# CRYSTAL UNITS IN METAL HOLDER,

# BASED ON TYPE 807,

# FREQUENCY RANGE 4.0 - 140MHZ

## ESCC Detail Specification No. 3501/008

(Follow-up specification to ESA/SCC Detail Specification No. 3501/001)

**ISSUE 3**

**July 2008**

Document Custodian: European Space Agency - see https://escies.org

## LEGAL DISCLAIMER AND COPYRIGHT

## DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

| DCR No. | CHANGE DESCRIPTION |
|---|---|
| 401 | Specification upissued to incorporate technical and editorial changes per DCRs. |

## TABLE OF CONTENTS

Page

**TABLES**



**FIGURES**



**APPENDICES** (Applicable to specific Manufacturers only)

1.1 SCOPE

This specification details the values, physical and electrical characteristics, test and inspection data for Crystal Units in Metal Holder, based on Type 807, Frequency Range 4.0 - 140MHz.

It shall be read in conjunction with ESCC Generic Specification No. 3501, the requirements for which are supplemented herein.

This is a follow-up specification to ESCC Detail Specification No. 3501/001. ESCC 3501/001 should also be consulted by:-

(a) Users seeking information concerning the availability of variants additional to those listed in this specification.

(b) Manufacturers before requesting the introduction of a new variant in accordance with the requirements of Para. 1.2 of this specification.

1.2 COMPONENT TYPE VARIANTS

A list of the type variants of the crystal units specified herein, which are also covered by this specification, is given in "Table 1(a) - Type Variant Summary".

For each type variant, the full electrical and physical characteristics are given in individual Tables 1(a) - "Type Variant Detailed Information" at the end of this specification.

The contents of the individual Tables 1(a) shall be as shown in Table 1(c) and the characteristics therein listed shall relate to the design parameters of the individual crystal units, optimised for the intended application.

The specific characteristics shall be negotiated between the Manufacturer and the Orderer. The Manufacturer shall then apply to the ESCC Secretariat for a type variant number for each individual crystal unit concerned, by sending a finalised Table 1(a) which shall also be copied to the Qualifying Space Agency (QSA).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the crystal units specified herein, are as scheduled in Table 1(b).

1.4 PHYSICAL DIMENSIONS

The physical dimensions of the crystal units specified herein are shown in Figure 2.

1.5 FUNCTIONAL DIAGRAM

The functional diagram showing lead identification of the crystal units specified herein is shown in Figure 3.

## TABLE 1(a) - TYPE VARIANT SUMMARY

**N.B.** For additional information concerning Type Variants, see Para. 1.1.

| Variant | Resonance Frequency (MHz) | Load Capacitance ($C_L$ pF) | Reference Temp. ($T_o$ °C) | Operating Temp. Range ($T_{op}$ °C) | Lead Length (Dim. L mm) | |
|---|---|---|---|---|---|---|
| | | | | | Min. | Max. |
| 01 | 83.102493 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 02 | 85.412668 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 03 | 90.833333 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 04 | 90.857143 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 05 | 90.880952 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 06 | 50.0 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 07 | 85.412668 | ∞ | +65 | +59 to +71 | 12.7 | - |
| 08 | 93.988095 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 09 | 94.0 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 10 | 94.095238 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 11 | 94.107143 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 12 | 18.8875 | 32 | +25 | -20 to +70 | 12.7 | - |
| 13 | 16.0 | ∞ | +25 | -40 to +85 | 12.7 | - |
| 14 | 24.6862 | 30 | +25 | -20 to +70 | 12.7 | - |
| 15 | 110.045 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 16 | 110.765 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 17 | 27.5 | 30 | +25 | -20 to +50 | 12.7 | - |
| 18 | 92.852381 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 19 | 92.846032 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 20 | 88.134921 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 21 | 84.0 | ∞ | +70 | -20 to +80 | 12.7 | - |
| 22 | 15.0 | 25 | +25 | -55 to +105 | 12.7 | - |
| 23 | 40.0 | ∞ | +40 | 0 to +90 | 12.7 | - |
| 24 | 29.629 | ∞ | +40 | 0 to +90 | 12.7 | - |
| 25 | 32.0 | ∞ | +25 | -20 to +70 | 12.7 | - |
| 26 | 14.7456 | ∞ | +25 | -55 to +105 | 12.7 | - |
| 27 | 12.25 | 32 | +25 | -30 to +70 | 12.7 | - |
| 28 | 4.096 | 25 | +25 | -55 to +100 | 12.7 | - |
| 29 | 31.999305 | ∞ | +25 | -20 to +60 | 12.7 | - |
| 30 | 74.801912 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 31 | 78.217213 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 32 | 81.66667 | ∞ | +70 | -20 to + 70 | 12.7 | - |
| 33 | 81.00766 | ∞ | +70 | -20 to + 80 | 12.7 | - |
| 34 | 90.869921 | ∞ | +25 | -25 to +70 | 12.7 | - |
| 35 | 85.412668 | ∞ | +65 | +59 to +71 | 12.7 | - |
| 36 | 140.0 | ∞ | +25 | -20 to +70 | 12.7 | - |

**NOTES**: See Page 8.

**TABLE 1(a) - TYPE VARIANT SUMMARY (CONTINUED)**

| Variant | Resonance Frequency (MHz) | Load Capacitance ($C_L$ pF) | Reference Temp. ($T_o$ °C) | Operating Temp. Range ($T_{op}$ °C) | Intend. Applica-tion | Lead Length (Dim. L mm) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. |
| 37 | 81.544502 | ∞ | +67 | -20 to +80 | - | 12.7 | - |
| 38 | 81.632635 | ∞ | +65 | -20 to +80 | - | 12.7 | - |
| 39 | 20.0 | 32 | +25 | -30 to +70 | - | 12.7 | - |
| 40 | 83.133333 | ∞ | +65 | -20 to +80 | - | 12.7 | - |
| 41 | 16.0 | 30 | +25 | -22 to +90 | - | 12.7 | - |
| 42 | 20.0 | ∞ | +25 | -30 to +95 | - | 12.7 | - |
| 43 | 83.312841 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 44 | 83.316257 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 45 | 83.319672 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 46 | 83.362503 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 47 | 83.340164 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 48 | 83.346994 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 49 | 83.353825 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 50 | 83.360656 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 51 | 45.056 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 52 | 78.247951 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 53 | 78.213798 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 54 | 78.227459 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 55 | 78.220628 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 56 | 81.666667 | ∞ | +67 | -20 to +80 | - | 12.7 | - |
| 57 | 121.714286 | ∞ | +25 | -20 to +70 | - | 12.7 | - |
| 58 | 116.471429 | ∞ | +25 | -20 to +70 | - | 12.7 | - |
| 59 | 4.194304 | 22 | +60 | -20 to +70 | - | 12.7 | - |
| 60 | 16.0 | 30 | +25 | -30 to +70 | - | 12.7 | - |
| 61 | 10.0 | 30 | +30 | -30 to +70 | - | 12.7 | - |
| 62 | 25.0 | 30 | +25 | -30 to +80 | X0 | 12.7 | - |
| 63 | 90.0 | 12 | +25 | -20 to +85 | - | 12.7 | - |
| 64 | 83.366142 | ∞ | +67 | -20 to +80 | - | 12.7 | - |
| 65 | 70.975328 | ∞ | +25 | -25 to +70 | - | 12.7 | - |
| 66 | 79.93306 | ∞ | +65 | -20 to +80 | - | 12.7 | - |
| 67 | 79.941257 | ∞ | +65 | -20 to +80 | - | 12.7 | - |
| 68 | 9.2 | 30 | +30 | -30 to +70 | X0 | 12.7 | - |
| 69 | 24.0 | 30 | +27 | -55 to +100 | - | 12.7 | - |
| 70 | 76.8315 | ∞ | +25 | -25 to +80 | - | 12.7 | - |
| 71 | 20.0 | 30 | +25 | -30 to +80 | - | 12.7 | - |
| 72 | 20.0 | 30 | +25 | -55 to +105 | - | 12.7 | - |

**NOTES**: See Page 8.

**TABLE 1(a) - TYPE VARIANT SUMMARY (CONTINUED)**

| Variant | Resonance Frequency (MHz) | Load Capacitance ($C_L$ pF) | Reference Temp. ($T_o$ °C) | Operating Temp. Range ($T_{op}$ °C) | Intend. Applica-tion | Lead Length (Dim. L mm) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. |
| 73 | 40.960 | ∞ | +25 | −25 to +70 | - | 12.7 | - |
| 74 | 70.965082 | ∞ | +25 | −25 to +70 | - | 12.7 | - |
| 75 | 79.937158 | ∞ | +65 | −20 to +80 | - | 12.7 | - |
| 76 | 79.945355 | ∞ | +65 | −20 to +80 | - | 12.7 | - |
| 77 | 59.356136 | ∞ | +25 | −25 to +70 | - | 12.7 | - |
| 78 | 18.0 | 30 | +25 | −25 to +100 | - | 12.7 | - |
| 79 | 81.576923 | ∞ | +67 | −20 to +80 | OCXO | 12.7 | - |
| 80 | 86.024590 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 81 | 85.983607 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 82 | 79.949453 | ∞ | +65 | −20 to +80 | OCXO | 12.7 | - |
| 83 | 79.957650 | ∞ | +65 | −20 to +80 | OCXO | 12.7 | - |
| 84 | 70.970205 | ∞ | +25 | −25 to +70 | TCXO | 12.7 | - |
| 85 | 101.936620 | 12 | +25 | −20 to +80 | VCXO | 12.7 | - |
| 86 | 75.0 | 12 | +25 | −20 to +80 | VCXO | 12.7 | - |
| 87 | 80.0 | 12 | +25 | −20 to +80 | VCXO | 12.7 | - |
| 88 | 74.626318 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 89 | 64.791785 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 90 | 64.990091 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 91 | 64.995773 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 92 | 74.677455 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 93 | 66.638308 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 94 | 66.628692 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 95 | 60.091346 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 96 | 60.086538 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 97 | 37.083333 | ∞ | +25 | −20 to +80 | TCXO | 12.7 | - |
| 98 | 66.612423 | ∞ | +25 | −25 to +70 | TCXO | 12.7 | - |
| 99 | 79.924863 | ∞ | +65 | −20 to +80 | OCXO | 12.7 | - |

**NOTES**

1. Full electrical and physical characteristics are given in the individual Tables 1(a) at the end of this specification.

## TABLE 1(b) - MAXIMUM RATINGS

| No. | Characteristic | Symbol | Values | Unit | Remarks |
|---|---|---|---|---|---|
| 1 | Nominal Frequency Range | f | 4.0 to 140 | MHz | Note 1 |
| 2 | Drive Level Range | P | Note 1 | mW | |
| 3 | Operating Temperature Range | $T_{op}$ | - | °C | Note 2 |
| 4 | Storage Temperature Range | $T_{stg}$ | -65 to +125 | °C | Note 3 |
| 5 | Soldering Temperature | $T_{sol}$ | +260 | °C | Note 4 |

**NOTES**

1.

| Fundamental and Overtone Order | Approx. Frequency Range (MHz) | Drive Level Range (mW) |
|---|---|---|
| Fundamental | 4 - 35 | 0.05 to 0.2 |
| 3 | 30 - 100 | 0.05 to 0.25 |
| 5 | 80 - 140 | 0.05 to 0.25 |

2. See Table 1(a).
3. The duration at maximum storage temperature shall not exceed 16 hours.
4. Duration 10 seconds maximum at a distance of not less than 3.0mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.

## TABLE 1(c) - FORMAT FOR INDIVIDUAL TABLES 1(a)

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO.

| No. | Characteristic | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max | | |
| 1 | Resonance Frequency | $f_r$ or $f_L$ | | | MHz | Note 1 |
| 2 | Reference Temperature | $T_o$ | | | °C | Note 2 |
| 3 | Overtone Order | - | | | | |
| 4 | Load Capacitance | $C_L$ | | | pF | Note 3 |
| 5 | Rated Drive Level | $P_o$ | | | mW | Note 4 |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | | | $10^{-6}$ | At $T_o$ °C Note 5 |
| 7 | Resonance Resistance | $R_r$ or $R_L$ | | | Ω | At $T_o$ °C Note 6 |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | | | $10^{-9}$ | From frequency measured at $T_o$ °C Note 7 |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | | | % | From resistance measured at $T_o$ °C Note 7 |
| 10 | Operating Temperature Range | $T_{op}$ | | | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | | | $10^{-6}$ | From $P_{S1}$ = mW to $P_{S2}$ = mW Note 8 |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | | | % | From $P_{S1}$ = mW to $P_{S2}$ = mW Note 8 |
| 13 | Motional Inductance | $L_1$ | | | mH | Notes 9 and 10 |
| 14 | Motional Capacitance | $C_1$ | | | fF | Note 9 |
| 15 | Static Capacitance | $C_o$ | | | pF | Note 9 |
| 16 | Q Factor | Q | | | - | Notes 9 and 11 |
| 17 | Ratio of unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | | | | In the frequency range: f - kHz to f + kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | | | $10^{-6}$ | Note 13 |
| 19 | Terminal length | L | | | mm | Note 14 |
| 20 | Intended Application | | | | | Note 16 |

**NOTES**: See Pages 11 and 12.

**NOTES TO TABLE 1(c)**

1. (a) If $C_L$ is not specified, Symbol and measurement shall be $f_r$.

   (b) If $C_L$ is specified, Symbol and measurement shall be $f_L$.

2. Reference Temperature $T_o$

   (a) For a crystal unit functioning in a non-controlled temperature environment, the reference temperature is normally +25 ±2 °C.

   (b) For a crystal unit functioning in a controlled temperature environment, the reference temperature shall normally be the mid-point of the temperature range of the controlled environment.

3. Load Capacitance $C_L$

   (a) When a crystal unit must function at its series resonance frequency, $C_L$ shall be infinite.

   (b) When a crystal must function with a load capacitance, the $C_L$ value shall be specified. The standard values of load capacitance are as follows:

   - Fundamental Frequency Operation: 20pF, 30pF, 50pF and 100pF.
   - Overtone Operation: 8pF, 12pF, 15pF, 20pF and 30pF.

   **N.B**
   The tolerance on the load capacitance shall be that value which results in a frequency change not exceeding 10% of the frequency tolerance at $T_o$ or 1% of the nominal load capacitance, whichever is smaller.

4. Rated Drive Level $P_o$

   The rated drive level shall be selected from the standard drive levels specified below:

   - Preferred values: 2mW, 1mW, 0.5mW, 0.2mW, 0.1mW, 0.05mW, 0.02mW, 0.01mW, 0.001mW or 0.0001mW at ±20%.
   - Non-preferred values: 10mW, 5mW and 4mW all at ±20%.

5. Frequency Adjustment Tolerance

   (a) When a crystal must function at its series resonance frequency, the standard value of the adjustment tolerance shall be $\pm 10 \times 10^{-6}$.

   (b) When a crystal has to function with a load capacitance, the standard value of the adjustment tolerance shall also be $\pm 10 \times 10^{-6}$. However, if the load capacitance is adjustable, it is preferable to specify that the nominal frequency be obtained with a load capacitance value between the minimum and maximum value when the crystal is functioning in its fundamental mode.

6. Resonance Resistance

   (a) Generally, the maximum value only is specified.

   (b) $R_L$ may be calculated by $R_L = R_r \left( 1 + \frac{C_o}{C_L} \right)^2$

7. Frequency and Resistance Variation with Temperature

   These values shall be specified such that they are consistent with the operating temperature range.

8. Frequency and Resistance Variation with Drive Level

   These limits and the Drive Level range ($P_{S1}$ to $P_{S2}$) shall be specified for very special crystals only (i.e. crystals used in very high stability oscillators).

**NOTES TO TABLE 1(c) (Continued)**

9. Electrical Values

   The electrical values shall be specified only when required for the correct functioning of the equipment in which the crystal is used.

10. Motional Inductance $L_1$

    Because the inductance value may be restricted by other chosen parameters, the Manufacturer shall propose the value of $L_1$ in accordance with the Customer's requirements.

11. 'Q' Factor

    If 'R' and 'L' have been already specified, it will not be necessary to specify the minimum value of the 'Q' factor.

    The maximum value of the 'Q' factor is never specified.

12. Ratio of Unwanted Response Resistance to Resonance Resistance

    The standard minimum value is 2, but it is possible to obtain higher values.

    The frequency range within which the minimum value of the ratio is required shall also be specified.

13. Ageing

    Specify limits under appropriate column and ageing period under "Remarks".

14. Terminal Lengths

    To be specified if different from Figure 2 dimensions. If dimensions are as per Figure 2 then "Figure 2" to be entered in the Limits column.

15. Not applicable Items

    For all items where limits are not specified, "Not applicable" shall be entered in the Limits column.

16. Intended Application

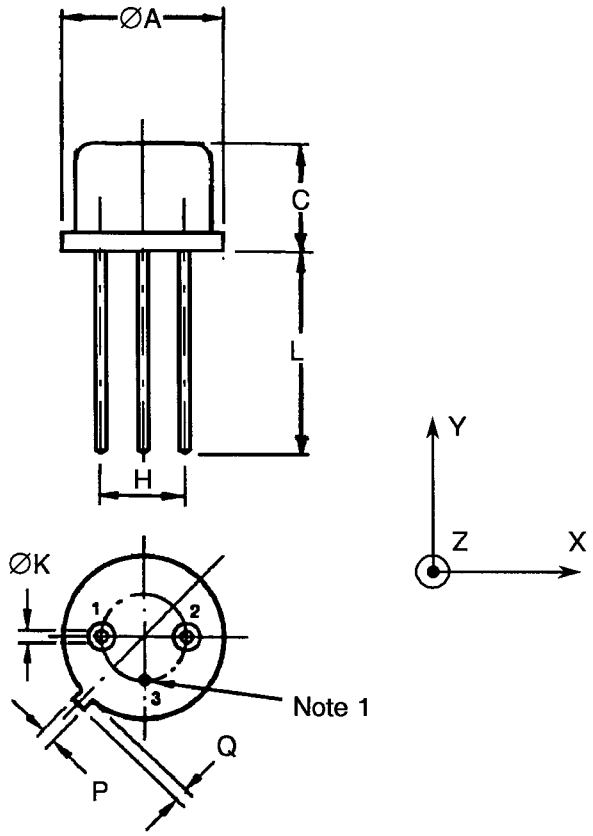
    For definitions of the selected symbol to be added, see ESCC Generic Specification No. 3501, Para. 3.

## FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

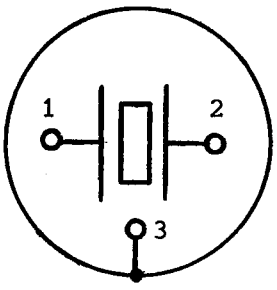
## FIGURE 2 - PHYSICAL DIMENSIONS

| Symbol | Millimetres | | Remarks |
|---|---|---|---|
| | Min. | Max. | |
| ØA | - | 10.70 | - |
| C | - | 6.80 | - |
| H | 4.83 | 5.33 | Pitch 5.08mm |
| ØK | 0.40 | 0.48 | - |
| L | 12.70 | - | - |
| P | - | 0.90 | Note 2 |
| Q | - | 0.95 | Note 2 |




**NOTES**
1. Lead No.3 is grounded to case.
2. The tag's position or presence is optional.

## FIGURE 3 - FUNCTIONAL DIAGRAM




(Bottom View)

## 2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:-

(a) ESCC Generic Specification No. 3501 for Quartz Crystal Units.

## 3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply. In addition, the following symbols are used:-

| | |
|---|---|
| Resonance Frequency | = $f_r$ |
| Load Resonance Frequency | = $f_L$ |
| Reference Temperature | = $T_o$ |
| Resonance Resistance | = $R_r$ |
| Load Resonance Resistance | = $R_L$ |
| Rated Drive Level | = $P_o$ |
| Static Capacitance | = $C_o$ |
| Load Capacitance | = $C_L$ |
| Motional Capacitance | = $C_1$ |
| Motional Inductance | = $L_1$ |
| Response Resistance | = $R_P$ |
| Response Impedance | = $\|Z_P\|$ |
| Insulation Resistance | = Ri |

## 4. REQUIREMENTS

### 4.1 GENERAL

The complete requirements for procurement of the crystal units specified herein shall be as stated in this specification and ESCC Generic Specification No. 3501 for Quartz Crystal Units. Deviations from the Generic Specification applicable to this specification only, are detailed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

### 4.2 DEVIATIONS FROM GENERIC SPECIFICATION

#### 4.2.1 Deviations from Special In-process Controls

None.

#### 4.2.2 Deviations from Final Production Tests (Chart II)

None.

#### 4.2.3 Deviations from Burn-in Tests (Chart III)

None.

#### 4.2.4 Deviations from Qualification Tests (Chart IV)

None.

#### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the crystal units specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the crystal units specified herein shall be 2.0 grammes.

4.3.3 Robustness of Terminations

The requirements for robustness of termination testing are specified in Section 9 of ESCC Generic Specification No. 3501.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the crystal units specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Case

4.4.1.1 Cap

Copper, nickel plated or nickel and gold plated.

4.4.1.2 Base

Kovar, nickel plated and gold plated.

4.4.2 Lead Material and Finish

The lead material shall be Type 'D' with Type '2' finish in accordance with the requirements of ESCC Basic Specification No. 23500.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

(a) The ESCC Component Number.

(b) Characteristics.

(c) Traceability Information.

4.5.2 The ESCC Component Number

Each component shall bear the SCC Component Number, which shall be constituted and marked as follows:-

350100801B

Detail Specification Number

Type variant, (see Table 1(a))

Testing level (B or C, as applicable)

4.5.3 Characteristics

The resonance frequency of the crystal units shall be clearly specified in MHz. Where necessary, it shall be specified to 6 decimal places.

4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESCC Basic Specification No. 21700.

4.5.5 Manufacturer's Name, Symbol or Code

The Manufacturer's marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Reference Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. The measurements shall be performed at the temperatures specified in the individual Tables 1(a), Item 2.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. These measurements shall only be performed if values are specified in Table 1(a) Items 8 and/or 9.

4.6.3 Circuits for Electrical Measurements (Figure 4)

Not applicable.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = T_o \pm 2$ °C. The parameter drift values (Delta) applicable to the scheduled parameters shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESCC Generic Specification No. 3501. The conditions for burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuits for Burn-in (Figure 5)

Not applicable.

## TABLE 2 - ELECTRICAL MEASUREMENTS AT REFERENCE TEMPERATURE

| No. | Characteristics | Symbol | ESCC 3501 Test Method | Limits | Unit |
|---|---|---|---|---|---|
| 1 | Resonance frequency at reference temperature and rated drive level<br>- with $C_O$<br>- with $C_L$ | <br><br>$f_r$ ($T_o$, $P_o$)<br>$f_L$ ($T_o$, $P_o$) | Para. 9.2.1.1 | Table 1(a), Item 1<br>± Item 6 | MHz |
| 2 | Resonance resistance at reference temperature and rated drive level<br>- with $C_O$<br>- with $C_L$ | <br><br>$R_r$ ($T_o$, $P_o$)<br>$R_L$ ($T_o$, $P_o$) | Para. 9.2.1.1 | Table 1(a), Item 7 | Ω |
| 3 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ ($T_o$, $\Delta P$) | Para. 9.2.1.1 | Table 1(a), Item 11 | $10^{-6}$ |
| 4 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ ($T_o$, $\Delta P$) | Para. 9.2.1.1 | Table 1(a), Item 12 | % |
| 5 | Motional Inductance | $L_1$ | Para. 9.2.1.3 | Table 1(a), Item 13 | mH |
| 6 | Static Capacitance | $C_o$ | Para. 9.2.1.4 | Table 1(a), Item 15 | pF |
| 7 | Unwanted response | $R_P/R$<br>or<br>$\|Z_P\|/R$ | Para. 9.2.1.5 | Table 1(a), Item 17 | - |
| 8 | Insulation Resistance | Ri | Para. 9.2.1.6 | 500 Min. | MΩ |

## TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

| No. | Characteristics | Symbol | ESCC 3501 Test Method | Limits | Unit |
|---|---|---|---|---|---|
| 9 | Frequency variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ ($\Delta T$, $P_o$) | Para. 9.2.1.2 | Table 1(a) Item 8 | $10^{-6}$ |
| 10 | Resistance variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ ($\Delta T$, $P_o$) | Para. 9.2.1.2 | Table 1(a) Item 9 | % |

## FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

Not applicable.

## TABLE 4 - PARAMETER DRIFT VALUES

| No. | Characteristics | Symbol | Spec. and/or Test Method | Test Conditions | Change Limits ($\Delta$) | Unit |
|---|---|---|---|---|---|---|
| 1 | Resonance frequency drift | $\frac{\Delta f}{f}$ | As per Table 2 | As per Table 2 | ± 2.0 | $10^{-6}$ |
| 2 | Resonance resistance drift | $\frac{\Delta R}{R}$ | As per Table 2 | As per Table 2 | ± 10 or (1) ± 1.0 | % Ω |

**NOTES**
1. Whichever is the highest value.

## TABLE 5 - CONDITIONS FOR BURN-IN AND LIFE TEST

| No. | Characteristics | Symbol | Condition | Unit |
|---|---|---|---|---|
| 1 | Ambient Temperature | $T_{amb}$ | +85 ±5 | °C |

## FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN AND LIFE TEST

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3501)

4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured and inspections to be performed on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = T_o \pm 2$ °C.

4.8.2 Measurements and Inspections at Intermediate Points and on Completion of Endurance Tests

The parameters to be measured and inspections to be performed at intermediate points and on completion of endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = T_o \pm 2$ °C.

4.8.3 Conditions for Operating Life Test (Part of Endurance Testing)

The requirements for the operating life test are specified in Section 9 of ESCC Generic Specification No. 3501. The test shall be performed as a high temperature storage test and the temperature to be applied shall be the maximum operating temperature specified in the individual Tables 1(a) given in this specification.

## TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

| NO. | ESCC GENERIC SPEC. NO. 3501 | | MEASUREMENTS AND INSPECTIONS | | SYMBOL | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | ENVIRONMENTAL AND ENDURANCE TESTS (1) | TEST METHOD AND CONDITIONS | IDENTIFICATION | CONDITIONS | | Min. | Max. | |
| 01 | Electrical Measurements at Reference Temperature | Para. 9.2.4 | Electrical Measurements | Table 2 | | Table 1(a) | | |
| 02 | Shock | Para. 9.3 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Table 2 Item 1 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Table 2 Item 2 | | |
| | | | **Final Measurements** | | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 | +10 | % |
| | | | | | $\Delta R$ | or (2) −1.0 | +1.0 | Ω |
| 03 | Vibration | Para. 9.4 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Table 2 Item 1 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Table 2 Item 2 | | |
| | | | **Final Measurements** | | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 | +10 | % |
| | | | | | $\Delta R$ | or (2) −1.0 | +1.0 | Ω |
| 04 | Seal Test | Para. 9.5 | Fine Leak<br>Gross Leak | Para. 9.5.1<br>Para. 9.5.2 | | Para. 9.5.1<br>Para. 9.5.2 | | |
| 05 | Permanence of Marking | Para. 9.8 | **Final Measurements** Visual Examination | No corrosion or obliteration of marking | - | - | - | - |
| 06 | External Visual Inspection | Para. 9.9 | **Final Measurements** Visual Inspection | ESCC No. 20500 | - | - | - | - |
| 07 | Solderability | Para. 9.13 | - | - | - | - | - | - |

**NOTES**

1. The tests in this table refer to either Chart IV or V, and shall be used as applicable.
2. Whichever is the highest value.

## TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (Cont.)

| NO. | ESCC GENERIC SPEC. NO. 3501 | | MEASUREMENTS AND INSPECTIONS | | SYMBOL | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | ENVIRONMENTAL AND ENDURANCE TESTS (1) | TEST METHOD AND CONDITIONS | IDENTIFICATION | CONDITIONS | | Min. | Max. | |
| 08 | Climatic Sequence<br>Dry Heat | Para. 9.14<br>Para. 9.14.1 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Table 2 Item 1 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Table 2 Item 2 | | |
| | | | **Final Measurements** | | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 or (2) | +10 | % |
| | | | | | ΔR | −1.0 | +1.0 | Ω |
| 09 | Cold | Para. 9.14.3 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Para. 9.14.1.3 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Final Measurements | | |
| | | | **Final Measurements** | | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 or (2) | +10 | % |
| | | | | | ΔR | −1.0 | +1.0 | Ω |
| 10 | Damp Heat (Acclerated) Remaining Cycles | Para. 9.14.4 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Para. 9.14.3.2 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Final Measurements | | |
| | | | **Final Measurements** | | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 or (2) | +10 | % |
| | | | | | ΔR | −1.0 | +1.0 | Ω |
| | | | Insulation Resistance | Table 2 Item 8 | Ri | 500 | - | MΩ |
| 11 | Rapid Change of Temperature | Para. 9.15 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Para. 9.14.4.2 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Final Measurements | | |
| | | | **Final Measurements** | After minimum Recovery of 2 hours | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ | −10 or (2) | +10 | % |
| | | | | | ΔR | −1.0 | +1.0 | Ω |
| 12 | Robustness of Terminations | Para. 9.16 | Tensile Strength | Gen. 3501 Para. 9.16.1 | | | | |
| | | | Visual Examination | No visible damage | | | | |
| | | | Bending | Gen. 3501 Para. 9.16.2 | | | | |
| | | | Visual Examination | No visible damage | | | | |

**NOTES**

1. The tests in this table refer to either Chart IV or V, and shall be used as applicable.
2. Whichever is the highest value.

## TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (Cont.)

| NO. | ESCC GENERIC SPEC. NO. 3501 | | MEASUREMENTS AND INSPECTIONS | | SYMBOL | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | ENVIRONMENTAL AND ENDURANCE TESTS (1) | TEST METHOD AND CONDITIONS | IDENTIFICATION | CONDITIONS | | Min. | Max. | |
| 13 | Life Test | Para. 9.17 | **Initial Measurements** | | | | | |
| | | | Resonance Frequency | Table 2 Item 1 | f | Table 2 Item 1 | | |
| | | | Resonance Resistance | Table 2 Item 2 | R | Table 2 Item 2 | | |
| | | | **Intermediate Measurements** | At 500 hours | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ or $\Delta R$ | −10 (2) −1.0 | +10 +1.0 | % Ω |
| | | | **Intermediate Measurements (Chart IV) and Final Measurements (Chart V)** | At 1000 hours | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −2.5 | +2.5 | $10^{-6}$ |
| | | | Resonance Resitance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ or $\Delta R$ | −10 (2) −1.0 | +10 +1.0 | % Ω |
| | | | **Final Measurements (Chart IV)** | At 2000 hours | | | | |
| | | | Resonance Frequency Drift | Table 2 Item 1 | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ |
| | | | Resonance Resistance Drift | Table 2 Item 2 | $\frac{\Delta R}{R}$ or $\Delta R$ | −10 (2) −1.0 | +10 +1.0 | % Ω |

**NOTES**

1. The tests in this table refer to either Chart IV or V, and shall be used as applicable.
2. Whichever is the highest value.

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 01

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.102493 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R<br>\|Zp\|/R | Not applicable | | | |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 02

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 84.412668 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R<br>\|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 03

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 90.833333 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 19 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.3 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 04

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 90.857143 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 19 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.3 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 05

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 90.880952 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 19 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.3 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 06

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 50.0 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 23 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 8.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 110 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 | +3.0 | $10^{-6}$ | After burn-in and per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 07

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 85.412668 | | MHz | Swept, AT cut |
| 2 | Reference Temperature | $T_o$ | +59 | +71 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -2.0 | +2.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | +59 | +71 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -1.0 | +1.0 | $10^{-6}$ | After burn-in and over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 08

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 93.988095 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 17 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or IZpI/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 09

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 94.0 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 17 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 10

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 94.095238 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 17 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R<br>or<br>\|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 11

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 94.107143 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 17 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.5 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 12

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 18.8875 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +25 | | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 32 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 21 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -7.0 | +7.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | - | 6.93 | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 60 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 3:1 | - | | In the frequency range: $f_L$ -200kHz to $f_L$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | After burn-in, per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 13

| No. | Characteristics | Symbol | Limits Min. | Limits Max. | Unit | Remarks |
|---|---|---|---|---|---|---|
| 1 | Resonance Frequency | $f_r$ | 16.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 18 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10<br>or<br>-1.5 | +10<br><br>+1.5 | %<br><br>Ω | From resistance measured at $T_o$ °C<br>If R<10Ω |
| 10 | Operating Temperature Range | $T_{op}$ | -40 | +85 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 7.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 60 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Impedance to Resonance Resistance | Rp/R<br><br>IZpI/R | 2:1 | - | | In the frequency range: $f_r$ -200kHz to $f_r$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 | +3.0 | $10^{-6}$ | After burn-in, per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 14

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 24.6862 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 10 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.7 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 40 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Impedance to Resonance Resistance | Rp/R<br><br>\|Zp\|/R | 4:1<br><br>5:1 | -<br><br>- | | In the frequency range: $f_L$ -50kHz to $f_L$ +50kHz<br><br>Overtones 3 and 5 |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -2.9 | +2.9 | $10^{-6}$ | After burn-in, over 4 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 15

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 110.045 | | MHz | Swept. |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | AT cut. |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 45 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 4.5 | 5.5 | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R<br>or<br>\|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -0.5<br>-1.0 | +0.5<br>+1.0 | $10^{-6}$ | First year after burn-in.<br>Over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 16

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 110.765 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | AT cut |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 45 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 4.5 | 5.5 | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -0.5<br>-1.0 | +0.5<br>+1.0 | $10^{-6}$ | First year after burn-in.<br>Over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 17

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 27.5 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 20 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +50 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or IZpI/R | 2:1 | - | | In the frequency range: $f_L$ -10% to $f_L$ +10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 18

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 98.852381 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -10% to $f_r$ +10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 19

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 92.846032 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -10% to $f_r$ +10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 20

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 88.134921 | | MHz | PQ swept |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R<br>or<br>\|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -8 000kHz to $f_r$ +8 000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 21

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 84.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +65 | +75 | °C | Turn-on Point |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -8 000kHz to $f_r$ +8 000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | After burn-in and over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 22

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 15.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 18 | 32 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 7 | Resonance Resistance | $R_r$ | - | 100 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -40 | +40 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -55 | +105 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_L$ -200kHz to $f_L$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -2.0 | +2.0 | $10^{-6}$ | After burn-in, per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 23

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 40.0 | | MHz | Swept |
| 2 | Reference Temperature | $T_o$ | +36 | +44 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | 10 | 25 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | 0 | +90 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | -1.0 | +1.0 | $10^{-6}$ | From $P_{S1}$ = 0.05mW to $P_{S2}$ = 0.2mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 5.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Resistance<br>Response Resistance | Rp/R<br><br><br>Rp<br>Rp | 4:1<br><br><br>2.5<br>25 | -<br><br><br>-<br>- | -<br><br><br>Ω<br>Ω | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz<br><br><br>Fundamental<br>Overtone 5 |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | After burn-in over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 24

| No. | Characteristics | Symbol | Limits Min. | Limits Max. | Unit | Remarks |
|---|---|---|---|---|---|---|
| 1 | Resonance Frequency | $f_r$ | 29.6296 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +36 | +44 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | 2.5 | 15 | Ω | Over $T_{op}$ °C and drive level |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -30 | +30 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10<br>or<br>-1.5 | +10<br><br>+1.5 | %<br><br>Ω | From resistance measured at $T_o$ °C<br>If R < 10Ω |
| 10 | Operating Temperature Range | $T_{op}$ | 0 | +90 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | -1.0 | +1.0 | $10^{-6}$ | From $P_{S1}$ = 0.025mW to $P_{S2}$ = 0.2mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.8 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 60 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Resistance | Rp/R<br><br>Rp | 4:1<br><br>30 | -<br><br>- | -<br><br>Ω | In the frequency range: $f_r$ -50kHz to $f_r$ +50kHz<br><br>Overtone 3 |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 | +3.0 | $10^{-6}$ | Per year after burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 25

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 32.0 | | MHz | Synthetic swept, Premium Q |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | Inflection temp. point |
| 3 | Overtone Order | - | 3 | | | A/T cut |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 30 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C One measurement each 2.5°C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -10% to $f_r$ +10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | After burn-in and per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 26

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 14.7456 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | A/T cut |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | 3.0 | 15 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -25 | +25 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -1.0 | +1.0 | Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -55 | +105 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -200kHz to $f_r$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -2.0 | +2.0 | $10^{-6}$ | Per year after burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 27

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 12.25 | | MHz | Parallel resonance |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | A/T cut |
| 4 | Load Capacitance | $C_L$ | 32 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.5 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 25 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -50 | +50 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -30 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | -25 | +25 | % | From $P_{S1}$ = 0.05mW to $P_{S2}$ = 0.2mW |
| 13 | Motional Inductance | $L_1$ | 27 | 33 | mH | |
| 14 | Motional Capacitance | $C_1$ | 5.04 | 6.16 | fF | |
| 15 | Static Capacitance | $C_o$ | - | 4.0 | pF | |
| 16 | Q Factor | Q | 30 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_L$ -500kHz to $f_L$ +500kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | After burn-in over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 28

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 4.096 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +22 | +28 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 25 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.2 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 75 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -50 | +50 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | -55 | +100 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 313 | 348 | mH | |
| 14 | Motional Capacitance | $C_1$ | 4.34 | 4.82 | fF | |
| 15 | Static Capacitance | $C_o$ | 1.5 | 2.0 | pF | |
| 16 | Q Factor | Q | 130 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 10:1 | - | | In the frequency range: $f_L$ -100kHz to $f_L$ +100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | 2 years at rated drive level |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 29

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 31.999305 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 | +10 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +60 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -200kHz to $f_r$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -1.0 | +1.0 | $10^{-6}$ | After burn-in per year. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 30

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 74.801912 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -7482kHz to $f_r$ + 7482kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 31

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 78.217213 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -7822kHz to $f_r$ +7822kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 32

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.66667 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +65 | +75 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -8166kHz to $f_r$ +8166kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 33

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.800766 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +65 | +75 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -8180kHz to $f_r$ +8180kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0<br>-5.0 | +3.0<br>+5.0 | $10^{-6}$ | After burn-in, first year.<br>Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 34

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 90.869921 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -9.0 | +9.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -9000kHz to $f_r$ + 9000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | After burn-in and 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 35

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 85.412668 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +59 | +71 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 45 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -2.0 | +2.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -59 | +71 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or \|Zp\|/R | 2:1 | - | | |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -1.0 | +1.0 | $10^{-6}$ | After burn-in and 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 36

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 140.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | 0 | 70 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | 0 | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R or IZpI/R | 2:1 | - | | In the frequency range: $f_r$ -200kHz to $f_r$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 | +3.0 | $10^{-6}$ | After burn-in, per year |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 37

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.544502 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +62 | +72 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20<br>or<br>-2.0 | +20<br><br>+2.0 | %<br><br>Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | 0 | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Impedance to Resonance Resistance | Rp/R<br><br>IZpI/R | 2:1 | - | | In the frequency range: $f_r$ -8100kHz to $f_r$ +8100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 | +3.0 | $10^{-6}$ | After burn-in, over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 38

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.632653 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 or -2.0 | +20 or +2.0 | % Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | 0 | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | Rp/R \|Zp\|/R | 2:1 | - | | In the frequency range: $f_r$ -8163kHz to $f_r$ +8163kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -3.0 -5.0 | +3.0 +5.0 | $10^{-6}$ | After burn-in, first year. Over 10 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 39

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 20 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 32 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 30 | Ω | Over $T_{op}$ |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -20 | +20 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -10 or -20 | +10 or +20 | % Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -30 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_L$ -200kHz to $f_L$ +200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -2.0 | +2.0 | $10^{-6}$ | Per year after Burn-in. |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 40

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.133333 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | -20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | -25 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ -500kHz to $f_r$ +500kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-6}$ | 13 years after Burn-in - Exterpolated |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 41

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 16.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 20 | Ω | Over $T_{op}$ |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -30 | +30 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | -22 | +90 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | Not applicable | | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | Not applicable | | | |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -30 | +30 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 42

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 20.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 30 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −100 | +100 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 or −2.0 | +20 or +2.0 | % Ω | From resistance measured at $T_o$ °C If R≤10Ω |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +95 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 100 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 200kHz to $f_r$ + 200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 43

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.312841 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8331kHz to $f_r$ + 8331kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 44

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.316257 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r$ − 8331kHz to $f_r$ + 8331kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 45

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.319672 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8331kHz to $f_r$ + 8331kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 46

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.326503 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8332kHz to $f_r$ + 8332kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 47

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.340164 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8334kHz to $f_r$ + 8334kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 48

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.346994 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8334kHz to $f_r$ + 8334kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 49

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.353825 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8335kHz to $f_r$ + 8335kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 50

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.360656 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8336kHz to $f_r$ + 8336kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 720 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 51

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 45.056 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 23 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 8.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 110 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 4500kHz to $f_r$ + 4500kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 52

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 78.247951 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7824kHz to $f_r$ + 7824kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 53

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 78.213798 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted:<br>Response Resistance to Resonance Resistance<br>or<br>Response Impedance to Resonance Resistance | $R_p/R$<br>or<br>$\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 7821$kHz to $f_r + 7821$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 54

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 78.227459 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 7822$kHz to $f_r + 7822$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 55

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 78.220628 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7822kHz to $f_r$ + 7822kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 56

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.666667 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +62 | +72 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 45 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 8.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 8166$kHz to $f_r + 8166$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 57

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 121.714286 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −8.0 | +8.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.5 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_r - 500$kHz to $f_r + 500$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ | Over 5 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 58

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 116.471429 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −8.0 | +8.0 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.5 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_r - 500$kHz to $f_r + 500$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ | Over 5 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 59

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 4.194304 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 22 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 75 | Ω | Over $T_{op}$ |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −15 | +15 | $10^{-6}$ | From frequency measured at +25 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 25 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 1 000 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_L$ − 420kHz to $f_L$ + 420kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 60

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 16.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 30 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 or 1.0 | +20 or 1.0 | % Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 65 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_L$ − 200kHz to $f_L$ + 200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 61

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 10.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +27 | +33 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 25 | 35 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 30 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | Not applicable | | | |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 62

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 25.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 10 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.7 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 40 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 4:1 | - | | In the frequency range: $f_L$ − 50kHz to $f_L$ + 50kHz |
| | | | 5:1 | - | | Overtones 3 and 5 |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ | 1 year after Burn-in at $T_o$ |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | X0 | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 63

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 90.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | 11.9 | 12.1 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 20 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | At $T_{op}$ = −20 to +70 °C |
| | | | −10 | +10 | | At $T_{op}$ = −20 to +85 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +85 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | - | - | mH | |
| 14 | Motional Capacitance | $C_1$ | 1.7 | - | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3.16:1 | - | | In the frequency range: $f_L$ − 100kHz to $f_L$ + 100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −6.0 | +6.0 | $10^{-6}$ | Over 20 years at rated drive level |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 64

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 83.366142 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +62 | +72 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 65

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 70.975328 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.2 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 80 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7100kHz to $f_r$ + 7100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 66

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.93306 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8000kHz to $f_r$ + 8000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 67

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.941257 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 8000kHz to $f_r$ + 8000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 68

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 9.2 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +27 | +33 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 25 | 35 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 30 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −15 | +15 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 or −2.0 | +20 or +2.0 | % Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | Not applicable | | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | Not applicable | | | |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −1.0 | +1.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | X0 | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 69

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 24.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +25 | +29 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 120 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −40 | +40 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | +20 or −2.0 | +20 or +2.0 | % Ω | From resistance measured at $T_o$ °C If R≤10Ω |
| 10 | Operating Temperature Range | $T_{op}$ | −55 | +100 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 60 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_L$ − 200kHz to $f_L$ + 200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 70

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 76.8315 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.2 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 50 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | +20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 3.5 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_r - 5000$kHz to $f_r + 5000$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-6}$ | Over 5 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 71

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 20.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +24 | +26 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −20 | +20 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 20 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −50 | +50 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −30 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 4.5 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_L$ − 200kHz to $f_L$ + 200kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 72

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 20.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 29.7 | 30.3 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.2 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −50 | +50 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 20 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −50 | +50 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −55 | +105 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 7:1 | - | | In the frequency range: $f_L - 500$kHz to $f_L + 500$kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −15 | +15 | $10^{-6}$ | After Burn-in over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 73

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 40.960 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | −0.5 | +0.5 | $10^{-6}$ | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | −20 | +20 | % | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 13 | Motional Inductance | $L_1$ | 5.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 4:1 | - | | In the frequency range: $f_r$ − 4000kHz to $f_r$ + 4000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 74

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 70.965082 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 4.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7000kHz to $f_r$ + 7000kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 75

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.937158 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7993kHz to $f_r$ + 7993kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 76

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.745355 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 7994kHz to $f_r$ + 7994kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after Burn-in + Ageing of 500 hours |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 77

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 59.356136 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | −0.5 | +0.5 | $10^{-6}$ | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | −20 | +20 | % | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 13 | Motional Inductance | $L_1$ | 3.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 4:1 | - | | In the frequency range: $f_r$ − 5800kHz to $f_r$ + 5800kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | 10 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 78

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 18.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | Fundamental | | | |
| 4 | Load Capacitance | $C_L$ | 30 | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 20 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −25 | +25 | $10^{-6}$ | From frequency measured at $T_o$ °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −55 | +100 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_L$ − 500kHz to $f_L$ + 500kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | Per year after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | - | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 79

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 81.576923 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +62 | +72 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 10 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | OCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 80

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 86.024590 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | Over 12 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 81

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 85.983607 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | Over 12 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 82

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.949453 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Over 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | OCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 83

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.957650 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Over 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | OCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 84

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 70.970205 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 4.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Over 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 85

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 101.936620 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 5 | | | |
| 4 | Load Capacitance | $C_L$ | 11.9 | 12.1 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | -5.0 | +5.0 | $10^{-4}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 70 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | -5.0<br>-10 | +5.0<br>+10 | $10^{-4}$ | From T - 20°C to +70°C<br>From T - 20°C to +80°C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | -20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-4}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | 0.37 | - | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 60 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2.5:1 | - | | In the frequency range: $f_L$ - 100kHz to $f_L$ + 100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | -6.0 | +6.0 | $10^{-4}$ | Over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | VCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 86

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 75.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | 11.9 | 12.1 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-4}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 25 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −5.0<br>−10 | +5.0<br>+10 | $10^{-4}$ | From T − 20°C to +70°C<br>From T − 20°C to +80°C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-4}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | 1.7 | - | fF | |
| 15 | Static Capacitance | $C_o$ | - | 6.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2.5:1 | - | | In the frequency range: $f_L$ − 100kHz to $f_L$ + 100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −6.0 | +6.0 | $10^{-4}$ | Over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | VCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 87

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_L$ | 80.0 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +23 | +27 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | 11.9 | 12.1 | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −2.0 | +2.0 | $10^{-4}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_L$ | - | 25 | Ω | Over $T_{op}$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | −5.0<br>−10 | +5.0<br>+10 | $10^{-4}$ | From T − 20°C to +70°C<br>From T − 20°C to +80°C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-4}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | Not applicable | | mH | |
| 14 | Motional Capacitance | $C_1$ | 1.7 | - | fF | |
| 15 | Static Capacitance | $C_o$ | - | 6.0 | pF | |
| 16 | Q Factor | Q | 50 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2.5:1 | - | | In the frequency range: $f_L$ − 100kHz to $f_L$ + 100kHz |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −6.0 | +6.0 | $10^{-4}$ | Over 5 years |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | VCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 88

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 74.626318 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 89

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 64.791785 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 90

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 64.990091 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | Over 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 91

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 64.995773 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 92

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 74.677455 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 93

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 66.638308 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 94

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 66.628692 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20 | +20 | % | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 95

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 60.091346 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −2.0 | +2.0 | Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | −0.5 | +0.5 | $10^{-6}$ | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | −20 | +20 | % | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 13 | Motional Inductance | $L_1$ | 3.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_r$ − 10% to $f_r$ + 10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 96

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 60.086538 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −2.0 | +2.0 | Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | −0.5 | +0.5 | $10^{-6}$ | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | −20 | +20 | % | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 13 | Motional Inductance | $L_1$ | 3.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 3:1 | - | | In the frequency range: $f_r$ − 10% to $f_r$ + 10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 97

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 37.083333 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −20 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +80 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −2.0 | +2.0 | Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | −0.5 | +0.5 | $10^{-6}$ | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | −20 | +20 | % | From $P_{S1}$ = 0.01mW to $P_{S2}$ = 0.1mW |
| 13 | Motional Inductance | $L_1$ | 3.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 7.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r$ − 10% to $f_r$ + 10% |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −5.0 | +5.0 | $10^{-6}$ | 12 years after Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 98

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 66.612423 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +20 | +30 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | 0<br>−9.0<br>−9.0 | +9.0<br>+9.0<br>0 | $10^{-6}$ | From T −25 to +10 °C<br>From T +10 to +50 °C<br>From T +50 to +70 °C |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20<br>or<br>−2.0 | +20<br><br>+2.0 | %<br><br>Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −25 | +70 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 6.5 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 90 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance or Response Impedance to Resonance Resistance | $R_p/R$ or $\lvert Z_p \rvert/R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | TCXO | | | |

## TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT NO. 99

| No. | Characteristics | Symbol | Limits | | Unit | Remarks |
|---|---|---|---|---|---|---|
| | | | Min. | Max. | | |
| 1 | Resonance Frequency | $f_r$ | 79.924863 | | MHz | |
| 2 | Reference Temperature | $T_o$ | +60 | +70 | °C | |
| 3 | Overtone Order | - | 3 | | | |
| 4 | Load Capacitance | $C_L$ | ∞ | | pF | |
| 5 | Rated Drive Level | $P_o$ | 0.1 | | mW | |
| 6 | Frequency Adjustment Tolerance | $\frac{\Delta f}{f}$ | −10 | +10 | $10^{-6}$ | At $T_o$ °C |
| 7 | Resonance Resistance | $R_r$ | - | 40 | Ω | At $T_o$ °C |
| 8 | Frequency Variation with Temperature over $T_{op}$ | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 9 | Resistance Variation with Temperature over $T_{op}$ | $\frac{\Delta R}{R}$ | −20<br>or<br>−2.0 | +20<br>+2.0 | %<br>Ω | From resistance measured at $T_o$ °C |
| 10 | Operating Temperature Range | $T_{op}$ | −20 | +80 | °C | |
| 11 | Frequency variation with Drive Level | $\frac{\Delta f}{f}$ | Not applicable | | $10^{-6}$ | |
| 12 | Resistance variation with Drive Level | $\frac{\Delta R}{R}$ | Not applicable | | % | |
| 13 | Motional Inductance | $L_1$ | 2.0 | - | mH | |
| 14 | Motional Capacitance | $C_1$ | Not applicable | | fF | |
| 15 | Static Capacitance | $C_o$ | - | 5.0 | pF | |
| 16 | Q Factor | Q | 70 000 | - | - | |
| 17 | Ratio of Unwanted: Response Resistance to Resonance Resistance<br>or<br>Response Impedance to Resonance Resistance | $R_p/R$<br>or<br>$\lvert Z_p \rvert /R$ | 2:1 | - | | In the frequency range: $f_r - 10\%$ to $f_r + 10\%$ |
| 18 | Ageing | $\frac{\Delta f}{f}$ | −3.0 | +3.0 | $10^{-6}$ | 12 years after 500 hours Burn-in |
| 19 | Terminal Length | L | Figure 2 | | mm | |
| 20 | Intended Application | | OCXO | | | |

**APPENDIX 'A'**



AGREED DEVIATIONS FOR C-MAC FREQUENCY PRODUCTS (F)

| ITEMS AFFECTED | DESCRIPTION OF DEVIATION |
|---|---|
| Para. 4.2.2 | Para. 9.3, Shock: Shall not be performed. |
| Para. 4.2.3 | Para. 9.11, Radiographic Inspection: Shall not be performed. |