



**CAPACITORS, VARIABLE, CONCENTRIC
TRIMMER, AIR DIELECTRIC, 0.6 TO 3.5pF, BODY
DIAMETER 4.6mm**

ESCC Detail Specification No. 3010/012

| | |
|---------|-----------|
| Issue 3 | July 2018 |
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DOCUMENTATION CHANGE NOTICE

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| DCR No. | CHANGE DESCRIPTION |
|---------|---|
| 1165 | Specification updated to incorporate changes per DCR. |

TABLE OF CONTENTS

| | | |
|---------|---|----|
| 1 | GENERAL | 5 |
| 1.1 | SCOPE | 5 |
| 1.2 | APPLICABLE DOCUMENTS | 5 |
| 1.3 | TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS | 5 |
| 1.4 | THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS | 5 |
| 1.4.1 | The ESCC Component Number | 5 |
| 1.4.2 | Component Type Variants | 5 |
| 1.5 | MAXIMUM RATINGS | 6 |
| 1.6 | PHYSICAL DIMENSIONS | 7 |
| 1.6.1 | Component Type Variant 01 (Lug Panel Mount) | 7 |
| 1.6.2 | Component Type Variant 02 (Turret Panel Mount) | 8 |
| 1.6.3 | Component Type Variant 03 (PCB Mount) | 9 |
| 1.6.4 | Component Type Variant 04 (Vertical Mount) | 10 |
| 1.6.5 | Component Type Variant 05 (Stripline Mount) | 11 |
| 1.7 | FUNCTIONAL DIAGRAM | 11 |
| 1.8 | MATERIALS AND FINISHES | 11 |
| 1.8.1 | Case | 11 |
| 1.8.2 | Terminals | 11 |
| 2 | REQUIREMENTS | 12 |
| 2.1 | GENERAL | 12 |
| 2.1.1 | Deviations from the Generic Specification | 12 |
| 2.1.1.1 | Deviations from Screening Tests – Chart F3 | 12 |
| 2.1.1.2 | Deviations from Qualification and Periodic Tests – Chart F4 | 12 |
| 2.2 | MARKING | 12 |
| 2.3 | ROBUSTNESS OF TERMINATIONS | 12 |
| 2.4 | RESISTANCE TO SOLDERING HEAT | 12 |
| 2.5 | ELECTRICAL AND MECHANICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES | 13 |
| 2.5.1 | Room Temperature Electrical and Mechanical Measurements | 13 |
| 2.5.2 | High and Low Temperatures Electrical Measurements | 13 |
| 2.6 | INTERMEDIATE AND END-POINT ELECTRICAL AND MECHANICAL MEASUREMENTS | 14 |
| 2.7 | OPERATING LIFE CONDITIONS | 17 |
| | APPENDIX 'A' | 18 |

1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

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

- (a) ESCC Generic Specification No. [3010](#).

1.3 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.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 301001201

- Detail Specification Reference: 3010012
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

The Component Type Variants applicable to this specification are as follows:

| Type Variant | Minimum and Maximum Specified Capacitance (pF) | | Case Description (Note 1) | Weight Max (g) |
|--------------|--|-----|---------------------------|----------------|
| | Cm | CM | | |
| 01 | 0.6 | 3.5 | Lug Panel Mount | 0.8 |
| 02 | 0.6 | 3.5 | Turret Panel Mount | 0.8 |
| 03 | 0.6 | 3.5 | PCB Mount | 0.8 |
| 04 | 0.6 | 3.5 | Vertical Mount | 0.8 |
| 05 | 0.6 | 3.5 | Stripline Mount | 0.8 |

NOTES:

1. See Para. 1.6 for Physical Dimensions.

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics | Symbols | Maximum Ratings | Units | Remarks |
|--------------------------------------|-----------|-----------------|-------|------------|
| Rated Voltage | U_R | 250 | V | |
| Operating Temperature Range | T_{op} | -55 to +125 | °C | T_{amb} |
| Storage Temperature Range | T_{stg} | -55 to +125 | °C | |
| Soldering Temperature | T_{sol} | +260 | °C | Note 1 |
| Panel Mounting Nut Tightening Torque | - | 10 | N.cm | Notes 2, 3 |
| Sealing Cap Tightening Torque | - | 3 | N.cm | Note 3 |

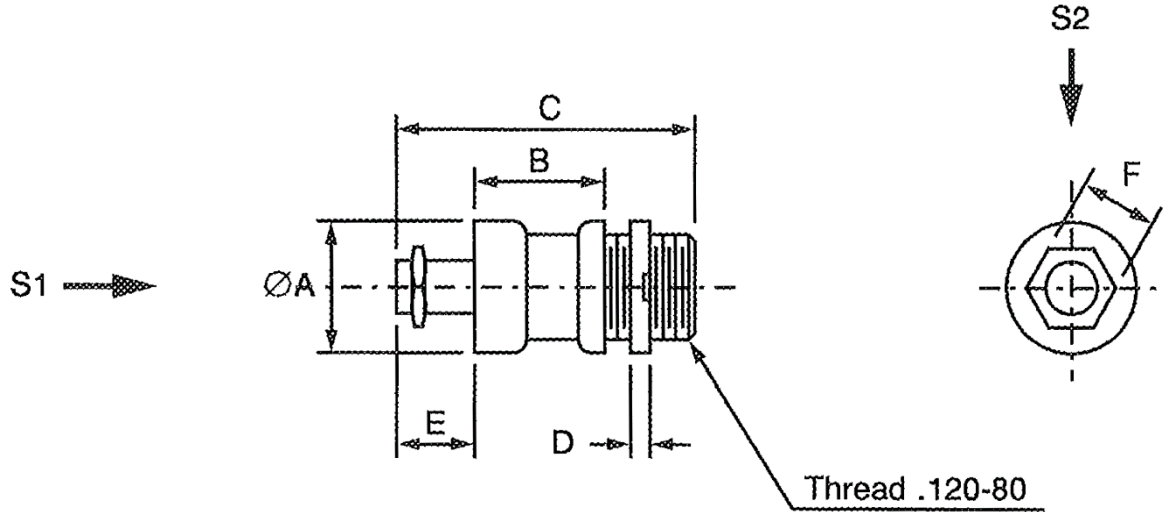
NOTES:

1. Duration 5 seconds maximum.
2. Only applicable to Variants 01 and 02.
3. Handling precautions are as follows:
 - An appropriate turning tool must be used.
 - The rotor shall not be disconnected from the stator.
 - When cleaning with solvent, the sealing cap must be correctly fitted and tightened to the rated torque.
 - The sealing cap, which is supplied with all units, must be removed from all flight units prior to flight.

1.6 PHYSICAL DIMENSIONS

Note: The sealing cap is intentionally omitted from the case drawings.

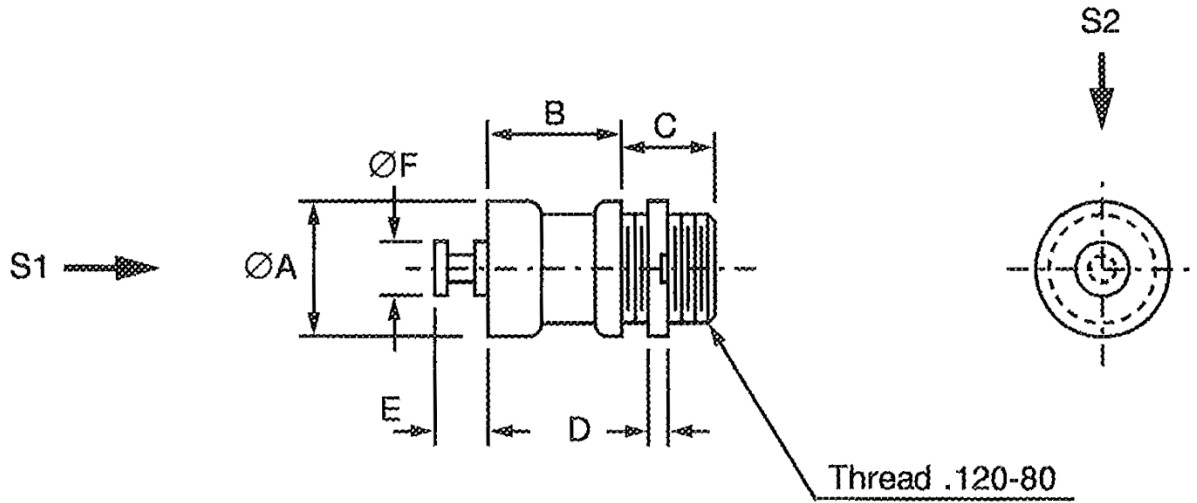
1.6.1 Component Type Variant 01 (Lug Panel Mount)



S1, S2 – Vibration and Shock axes

| Symbols | Dimensions (mm) | |
|---------|-----------------|------|
| | Min | Max |
| ØA | - | 4.6 |
| B | 6.5 | 6.9 |
| C | 14.7 | 15.2 |
| D | 1.4 | 1.6 |
| E | 3.1 | 3.3 |
| F | - | 3.2 |

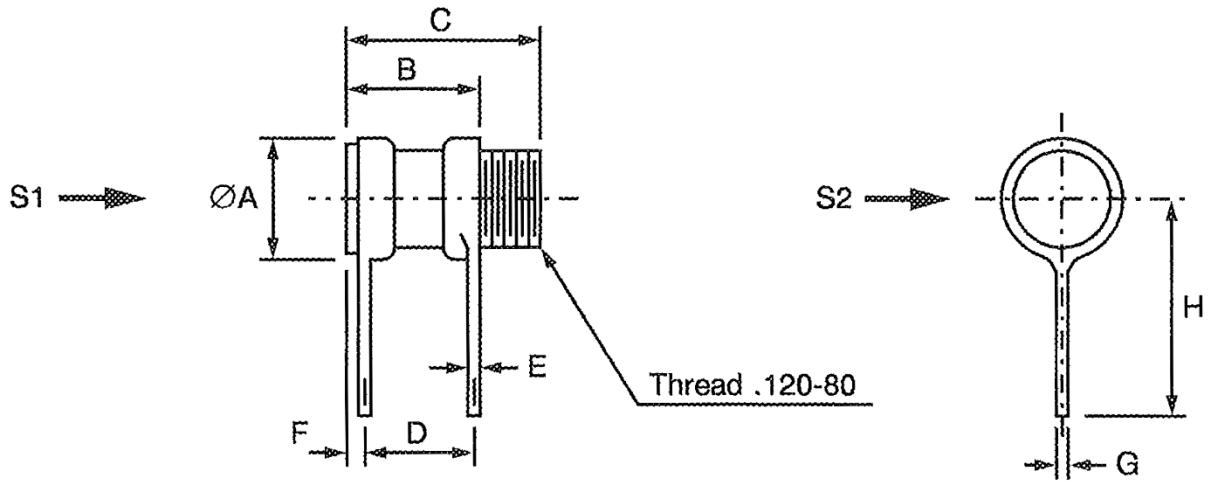
1.6.2 Component Type Variant 02 (Turret Panel Mount)



S1, S2 – Vibration and Shock axes

| Symbols | Dimensions (mm) | |
|---------|-----------------|-----|
| | Min | Max |
| ØA | - | 4.6 |
| B | 6.5 | 6.9 |
| C | 5 | 5.1 |
| D | 1.4 | 1.6 |
| E | 1.8 | 2.2 |
| ØF | 1.1 | 1.3 |

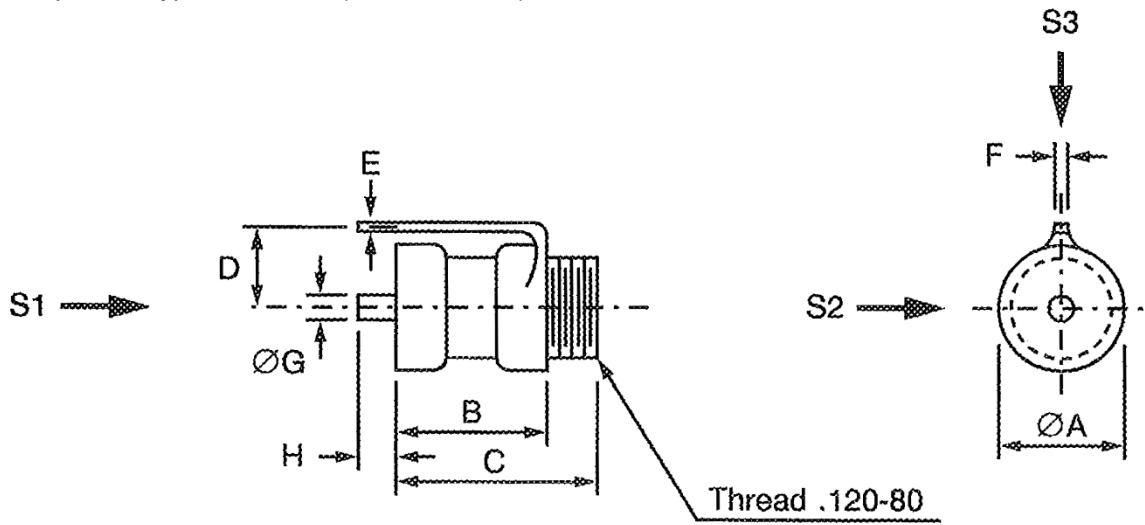
1.6.3 Component Type Variant 03 (PCB Mount)



S1, S2 – Vibration and Shock axes

| Symbols | Dimensions (mm) | |
|-----------------|-----------------|------|
| | Min | Max |
| $\varnothing A$ | - | 4.6 |
| B | 6.8 | 7.2 |
| C | 11.7 | 12.1 |
| D | 6.3 | 6.7 |
| E | 0.2 | 0.3 |
| F | - | 0.5 |
| G | 0.75 | 0.85 |
| H | 9.4 | - |

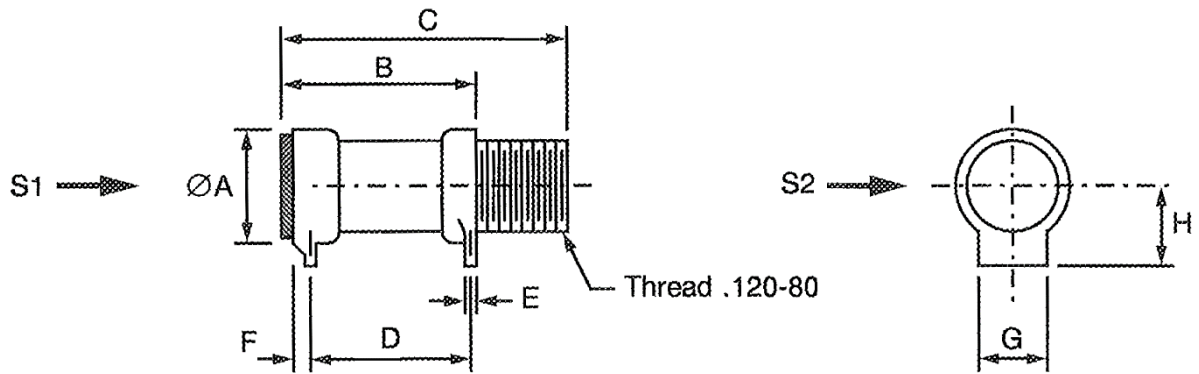
1.6.4 Component Type Variant 04 (Vertical Mount)



S1, S2, S3 – Vibration and Shock axes

| Symbols | Dimensions (mm) | |
|---------|-----------------|------|
| | Min | Max |
| ØA | - | 4.6 |
| B | 6.8 | 7.2 |
| C | 11.6 | 12 |
| D | 3 | 3.4 |
| E | 0.2 | 0.3 |
| F | 0.45 | 0.55 |
| ØG | 0.78 | 0.82 |
| H | - | 2.8 |

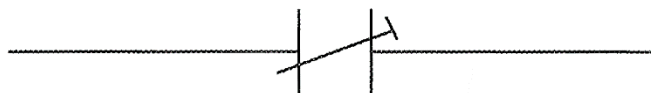
1.6.5 Component Type Variant 05 (Stripline Mount)



S1, S2 – Vibration and Shock axes

| Symbols | Dimensions (mm) | |
|---------|-----------------|------|
| | Min | Max |
| ØA | - | 4.6 |
| B | 6.8 | 7.2 |
| C | 11.7 | 12.1 |
| D | 6.5 | 6.9 |
| E | 0.35 | 0.45 |
| F | - | 0.5 |
| G | 3.7 | 3.9 |
| H | 2.1 | 2.3 |

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

1.8.1 Case

The body of the components shall be ceramic.

1.8.2 Terminals

Terminals shall be either gold plated or tinned.

2 REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

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

2.1.1 Deviations from the Generic Specification

2.1.1.1 *Deviations from Screening Tests – Chart F3*

(a) Burn-in: Not applicable.

2.1.1.2 *Deviations from Qualification and Periodic Tests – Chart F4*

(a) Mechanical Endurance: The 50 cycles shall be divided into 10 groups of 5 cycles. Upon completion of each group of 5 cycles, 1 minute of standing by shall be observed.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. [21700](#) and as follows.

The information to be marked on the component or its primary package shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number.
- (c) Traceability information.

2.3 ROBUSTNESS OF TERMINATIONS

Component Type Variants 03 and 04 shall be subjected to Robustness of Terminations as specified in the ESCC Generic Specification.

Not applicable to Component Type Variants 01, 02, 05.

2.4 RESISTANCE TO SOLDERING HEAT

The test conditions for Resistance to Soldering Heat are as follows:

- Immersion depth: To within 1mm from the body.
- Immersion time: 3.5 ±0.5 seconds.

2.5 ELECTRICAL AND MECHANICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical and mechanical measurements shall be performed at room, high and low temperatures.

2.5.1 Room Temperature Electrical and Mechanical Measurements

The measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}C$.

| Characteristics | Symbols | Test Method and Conditions | Limits | | Units |
|-----------------------|-----------------|--|-----------------|-----|-------|
| | | | Min | Max | |
| Minimum Capacitance | Cm | ESCC No. 3010 Frequency: 1 \pm 0.1MHz | - | 0.6 | pF |
| Maximum Capacitance | CM | ESCC No. 3010 Frequency: 1 \pm 0.1MHz | 3.5 | - | pF |
| Change in Capacitance | - | ESCC No. 3010 Frequency: 1 \pm 0.1MHz | Note 1 | | - |
| Insulation Resistance | R _i | ESCC No. 3010 Test voltage = 500 \pm 25V | 10 ⁶ | - | MΩ |
| Voltage Proof | VP | ESCC No. 3010 | 500 | - | V |
| Quality Factor | Q | ESCC No. 3010 Frequency: 100 \pm 5MHz Note 2 | 10000 | - | - |
| Operating Torque | T _{qo} | ESCC No. 3010 C minimum to maximum | 0.2 | 2 | N.cm |

NOTES:

1. The rate of change in capacitance as a function of the change in adjustment shall not change sign over the entire range of adjustment.
2. For Screening Tests, Quality Factor shall be performed on a randomly selected sample of 3 components with no failures allowed.

2.5.2 High and Low Temperatures Electrical Measurements

| Characteristics | Symbols | Test Method and Conditions (Note 1) | Limits | | Units |
|-------------------------|----------------|--|-----------------|-----|----------------------|
| | | | Min | Max | |
| Insulation Resistance | R _i | ESCC No. 3010 Test voltage = 500 \pm 25V $T_{amb} = +125 (+0 -3)^{\circ}C$ | 10 ⁵ | - | MΩ |
| Temperature Coefficient | TC | ESCC No. 3010 Note 2 | | | 10 ⁻⁶ /°C |
| | | Between -55°C and +22°C | -50 | +50 | |
| | | Between +22°C and +125°C | -50 | +50 | |

NOTES:

1. Measurements shall be performed on a sample of 5 components from each manufacturing lot with 0 failures allowed. In the event of any failure a 100% inspection may be performed.
2. Rotor set at approximately 75% of the maximum specified capacitance value.

2.6 INTERMEDIATE AND END-POINT ELECTRICAL AND MECHANICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}\text{C}$.

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Para. 2.5.1, Room Temperature Electrical and Mechanical Measurements.

| Test Reference per ESCC No. 3010 | Characteristics | Symbols | Limits | | Units |
|--|----------------------|--|---------------|---------------|------------------------|
| | | | Min | Max | |
| Rapid Change of Temperature Initial Measurements | Capacitance | CM & Cm | Note 1 | | pF |
| | Final Measurements | CM & Cm | Note 1 | | pF |
| | Capacitance Drift | ΔCM & ΔCm | -0.05 -0.5 | +0.05 +0.5 | pF or % (Note 2) |
| Vibration Initial Measurements | Capacitance (Note 3) | C | Record Values | | pF |
| | Final Measurements | C | Record Values | | pF |
| | Capacitance Drift | ΔC | -0.05 -1 | +0.05 +1 | pF or % (Note 2) |
| Shock Initial Measurements | Capacitance (Note 3) | C | Record Values | | pF |
| | Final Measurements | C | Record Values | | pF |
| | Capacitance Drift | ΔC | -0.05 -1 | +0.05 +1 | pF or % (Note 2) |
| Resistance to Soldering Heat Initial Measurements | Capacitance (Note 3) | C | Record Values | | pF |
| | Final Measurements | C | Record Values | | pF |
| | Capacitance Drift | ΔC | -0.05 -1 | +0.05 +1 | pF or % (Note 2) |
| | Voltage Proof | VP | Note 1 | - | V |
| | Quality Factor | Q | Note 1 | - | - |

| Test Reference per ESCC No. 3010 | Characteristics | Symbols | Limits | | Units |
|--|-----------------------|--------------------------------|---------------|-------------|------------------------|
| | | | Min | Max | |
| Climatic Sequence Initial Measurements Final Measurements | Capacitance (Note 3) | C | Record Values | | pF |
| | Capacitance (Note 3) | C | Record Values | | pF |
| | Capacitance Drift | ΔC | -0.05 -1 | +0.05 +1 | pF or % (Note 2) |
| | Quality Factor | Q | Note 1 | - | - |
| | Insulation Resistance | R_i | 10^5 | - | M Ω |
| | Voltage Proof | VP | Note 1 | - | V |
| | Operating Torque | T_{qo} | Note 1 | | N.cm |
| Damp Heat, Steady State (Note 4) Initial Measurements Final Measurements | Capacitance | C_M & C_m | Note 1 | | pF |
| | Capacitance | C_M & C_m | Note 1 | | pF |
| | Capacitance Drift | ΔC_M & ΔC_m | -0.05 -2 | +0.05 +2 | pF or % (Note 2) |
| | Quality Factor | Q | Note 1 | - | - |
| | Insulation Resistance | $R_i C_M$ & $R_i C_m$ | 10^5 | - | M Ω |
| | Voltage Proof | VP | Note 1 | - | V |
| | Operating Torque | T_{qo} | Note 1 | | N.cm |
| Operating Life Initial Measurements Intermediate Measurements (500 hours) (Note 5) (500 and 1000 hours) (Note 6) | Capacitance | C_M | Note 1 | - | pF |
| | Capacitance | C_M | Note 1 | - | pF |
| | Capacitance Drift | ΔC_M | -0.05 -2 | +0.05 +2 | pF or % (Note 2) |
| | Insulation Resistance | $R_i C_M$ | Note 1 | - | M Ω |
| | Voltage Proof | VP | Note 1 | - | V |
| | Quality Factor | Q | Note 1 | - | - |
| | Operating Torque | T_{qo} | Note 1 | | N.cm |

| Test Reference per ESCC No. 3010 | Characteristics | Symbols | Limits | | Units |
|---|---|-------------------|--------------------------------------|-------------|------------------------|
| | | | Min | Max | |
| Operating Life Final Measurements (1000 or 2000 hours) (Note 7) | Capacitance | CM | Note 1 | - | pF |
| | Capacitance Drift | Δ CM | -0.05 -2 | +0.05 +2 | pF or % (Note 2) |
| | Insulation Resistance | R _i CM | Note 1 | - | M Ω |
| | Voltage Proof | VP | Note 1 | - | V |
| | Quality Factor | Q | Note 1 | - | - |
| | Operating Torque | T _{qo} | Note 1 | | N.cm |
| Axial Thrust (Note 8) | | | | | |
| Initial Measurements | Capacitance (Note 3) | C | Record Values | | pF |
| Measurements during Test | Capacitance (Note 3) | C | Record Values | | pF |
| | Capacitance Drift | Δ C | -0.05 -1 | +0.05 +1 | pF or % (Note 2) |
| Mechanical Endurance | | | | | |
| Measurements after Mechanical Endurance Cycling | Voltage Proof | VP | Note 1 | - | V |
| | Change in Capacitance versus Rotation | - | Deviation \pm 10% max. (Note 9) | | - |
| Final Measurements | Operating Torque | T _{qo} | 0.1 | 2.75 | N.cm |
| | Insulation Resistance (between rotor screw and mounting base) | R _i | Note 1 | - | M Ω |
| | Quality Factor | Q | Note 1 | - | - |
| Electrical and Mechanical Measurements | | | | | |
| | Minimum Capacitance | C _m | - | Note 1 | pF |
| | Maximum Capacitance | CM | Note 1 | - | pF |
| | Change in Capacitance | - | Note 1 | | - |
| | Insulation Resistance | R _i | Note 1 | - | M Ω |
| | Voltage Proof | VP | Note 1 | - | V |
| | Quality Factor | Q | Note 1 | - | - |
| | Operating Torque | T _{qo} | Note 1 | | N.cm |
| Temperature Coefficient (Note 3) | | TC | | | 10 ⁻⁶ /°C |
| | Between -55°C and +22°C | | Note 10 | | |
| | Between +22°C and +125°C | | Note 10 | | |
| End-Stop Torque (Note 11) | | | | | |
| Final Measurements | Minimum Capacitance | C _m | - | Note 1 | pF |
| | Maximum Capacitance | CM | Note 1 | - | pF |

NOTES:

1. As specified in Para. 2.5.1.
2. Whichever is greater.

3. Measurements shall be made with the rotor set at approximately 75% of the maximum specified capacitance value.
4. Half the sample shall be measured with U_R applied and the remaining components shall be measured with no U_R applied.
5. 500 hours is applicable to Periodic Testing for extension of qualification.
6. 500 and 1000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.
7. 1000 hours is applicable to Periodic Testing for extension of qualification. 2000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.
8. Thrust: 4N
9. No reversals in direction.
10. As specified in Para. 2.5.2.
11. Torque: 3N.cm

2.7

OPERATING LIFE CONDITIONS

| Characteristics | Symbols | Conditions | Units |
|---------------------|-----------|--------------|-------|
| Ambient Temperature | T_{amb} | +125 (+0 -3) | °C |
| Applied Voltage | V_A | 375 | V |

APPENDIX 'A'
AGREED DEVIATIONS FOR EXXELIA TEMEX (F)

| Item Affected | Description of Deviations |
|---|---|
| <p>Para. 2.1.1.1, Deviations from Screening Tests – Chart F3</p> | <ul style="list-style-type: none"> • Quality Factor per Electrical and Mechanical Measurements in ESCC Generic Specification No. 3010 and Para. 2.5.1 herein: Quality Factor measurements shall be performed at frequencies comprised between 100 and 400 MHz. The value of the Quality Factor shall be determined at 100MHz by using the following formula: $Q_{fo} = Q_m \times (f_m/f_o)^{3/2}$ Where Q_m is the Quality Factor read at frequency f_m (f_m is that frequency where the quarter-wave line, including the capacitance being measured, is resonating) and $f_o = 100\text{MHz}$. The record sheet shall indicate the Quality Factor at 100MHz, as specified in Para. 2.5.1, as well as the frequency f_m at which the Quality Factor was read. |
| <p>Para. 2.1.1.2, Deviations from Qualification and Periodic Tests – Chart F4</p> | <ul style="list-style-type: none"> • Quality Factor per Electrical and Mechanical Measurements in ESCC Generic Specification No. 3010 and Para. 2.5.1 herein: Quality Factor measurements shall be performed at frequencies comprised between 100 and 400 MHz. The value of the Quality Factor shall be determined at 100MHz by using the following formula: $Q_{fo} = Q_m \times (f_m/f_o)^{3/2}$ Where Q_m is the Quality Factor read at frequency f_m (f_m is that frequency where the quarter-wave line, including the capacitance being measured, is resonating) and $f_o = 100\text{MHz}$. The record sheet shall indicate the Quality Factor at 100MHz, as specified in Para. 2.5.1, as well as the frequency f_m at which the Quality Factor was read. • Electrical Subgroup (Subgroup 3), Electrical and Mechanical Measurements: Quality Factor measurements shall be performed prior to Solderability. |