CAPACITORS, FIXED, GLASS DIELECTRIC,

BASED ON TYPES CYR51, CYR52 AND CYR53

ESCC Detail Specification No. 3004/003

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SCC

space components
coordination group

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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 1 and incorporates all modifications defined in Revision 'A' to Issue 1 and the changes agreed in the following DCR's:-		
		Cover page		None
		DCN		None
		Para. 2	: Reference to ESA/SCC 23500 deleted	23785
		Para. 3	: Second sentence added	23785
		Table 1(a)	: Column for 'Max Weight' added to table and columns numbered	23785
			: Symbol 'U_R' added to rated voltage column heading	23785
			: '$\pm$' moved from tolerance values to column heading	23785
		Table 1(b)	: Column heading 'Limit Ratings' amended to 'Maximum Ratings'	23785
			: No. 4, remarks moved to Note 1	23785
		Figure 2	: Imperial dimensions deleted from table	23785
		Para. 4.2.4	: Title amended and deviation added	23785
		Para. 4.2.5	: Deviation added	23785
		Para. 4.3.2	: Max Weight figures deleted	23785
		Para. 4.3.3	: Test conditions & method deleted	23785
		Para. 4.5.1	: Wording amended	23785
		Para. 4.5.4	: Paragraph standardised	23785
		Para. 4.7	: Title amended	23785
		Table 2	: Columns standardised	23785
			: No. 1, Limits entry amended to 'Note 1'	23785
			: No. 2, Note reference added	23785
			: No. 4, Symbol corrected to 'VP', Limit entry amended to '2.0U_R' and Note reference added	23785
			: Notes 1 and 3 added and existing Note 1 renumbered as '2'	23785
		Table 3	: Columns standardised	23785
		Figure 4	: Title amended	23785
		Table 4	: Entries for 'Spec. and/or Test Method' and 'Test Condition' amended to 'As per Table 2'	23785
		Table 5	: Note Deleted	23785
		Para. 4.8	: Title amended	23785
		Para. 4.8.1	: First sentence amended	23785
		Para. 4.8.2	: First sentence amended	23785
		Para. 4.8.3	: First sentence amended	23785
		Table 6	: Format amended and corrected	23785

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TABLES

FIGURES

APPENDICES (Applicable to specific Manufacturers only)
None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Capacitors, Fixed, Glass Dielectric, based on Types CYR51, CYR52 and CYR53. It shall be read in conjunction with ESA/SCC Generic Specification No. 3004, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic type capacitors specified herein, which are also covered by this specification, are given in Table 1(a).

1.3 MAXIMUM RATINGS

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

1.4 PARAMETER DERATING INFORMATION (FIGURE 1)

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the capacitors specified herein, are shown in Figure 2.

1.6 FUNCTIONAL DIAGRAM

The functional diagram for the capacitors specified herein is shown in Figure 3.

2. APPLICABLE DOCUMENTS

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

(a) ESA/SCC Generic Specification No. 3004 for Capacitors, Fixed, Glass Dielectric.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

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

V_T = Test Voltage.

TABLE 1(a) - TYPE VARIANTS

(1) Variant	(2) Based on Type	(3) Capacitance Range (pF)	(4) Tolerance		(5) Rated Voltage U_R (V)	(6) Max. Weight (g)	(7) Figure
			(±%)	(±pF)			
01	CYR51	1.0 to 12	-	0.25	300	0.5	2(a)
01	CYR51	13 to 24	2.0, 5.0	0.25	300	0.5	2(a)
01	CYR51	27 to 560	1.0, 2.0, 5.0	-	300	0.5	2(a)
02	CYR52	620 to 1000	1.0, 2.0, 5.0	-	300	0.6	2(b)
03	CYR53	1100 to 2400	1.0, 2.0, 5.0	-	300	0.9	2(c)

TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Ratings	Unit	Remarks
1	Rated Voltage	U_R	See Table 1(a)	V	
2	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
3	Storage Temperature Range	T_{stg}	−55 to +125	°C	
4	Soldering Temperature	T_{sol}	+350	°C	Note 1

NOTES

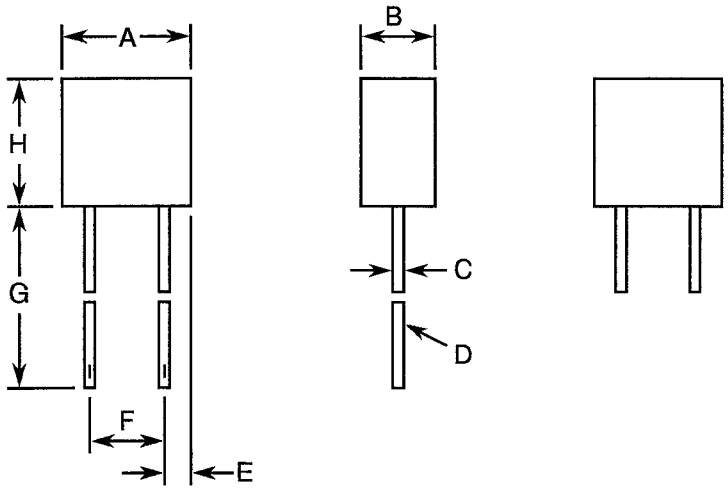
1. Duration 5.0 seconds maximum at a distance of not less than 3.0mm from the device body.

FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a)



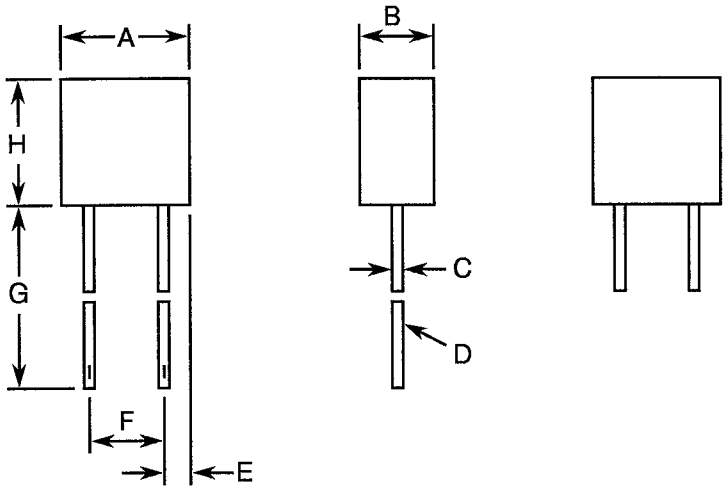
Symbol	Millimetres	
	Min.	Max.
A	7.493	7.747
B	2.794	3.048
C	0.457	0.559
D	Note 1	
E	0.762	1.778
F	4.572	5.588
G	31.75	-
H	4.826	5.334

NOTES

1. Terminals on centreline within 0.51mm.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(b)



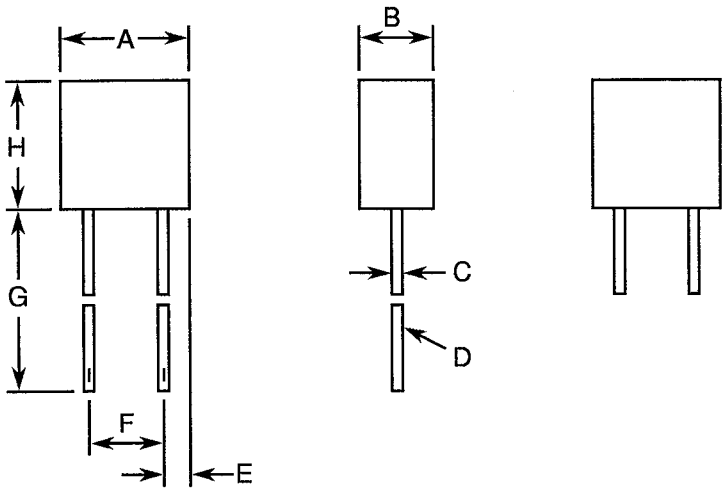
Symbol	Millimetres	
	Min.	Max.
A	7.493	7.747
B	2.794	3.048
C	0.457	0.559
D	Note 1	
E	0.762	1.778
F	4.572	5.588
G	31.75	-
H	7.366	7.874

NOTES

1. Terminals on centreline within 0.51mm.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(c)

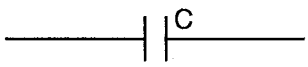


Symbol	Millimetres	
	Min.	Max.
A	12.573	12.827
B	2.794	3.048
C	0.457	0.559
D	Note 1	
E	0.762	1.778
F	9.652	10.668
G	31.75	-
H	7.366	7.874

NOTES

1. Terminals on centreline within 0.51mm.

FIGURE 3 - FUNCTIONAL DIAGRAM



4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the capacitors specified herein are stated in this specification and ESA/SCC Generic Specification No. 3004 for Capacitors, Fixed, Glass Dielectric. Deviations from the Generic Specification, applicable to this specification only, are listed 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 ESA/SCC 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 and Electrical Measurements (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.12, Terminal Strength: Applied Force : 10N.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.12, Terminal Strength: Applied Force : 10N.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the capacitors specified herein shall be verified in accordance with the requirements set out in Para. 9.5 of ESA/SCC Generic Specification No. 3004 and they shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the capacitors specified herein, shall be as specified in Table 1(b).

4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Para. 9.12 of ESA/SCC Generic Specification No. 3004.

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 capacitors 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

The case shall be Epoxy.

4.4.2 Lead Material and Finish

The lead material shall be Type 'C' with Type '2' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

4.5 MARKING

4.5.1 General

The marking of components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking as 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:-

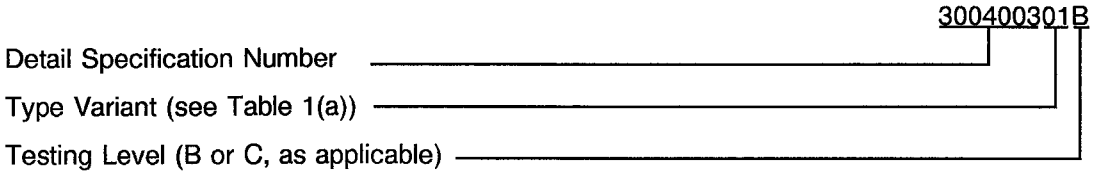
(a) The SCC Component Number.

(b) Electrical Characteristics and Ratings.

(c) Traceability Information.

4.5.2 The SCC Component Number

The SCC Component Number shall be constituted and marked as follows:-



4.5.3 Electrical Characteristics and Ratings

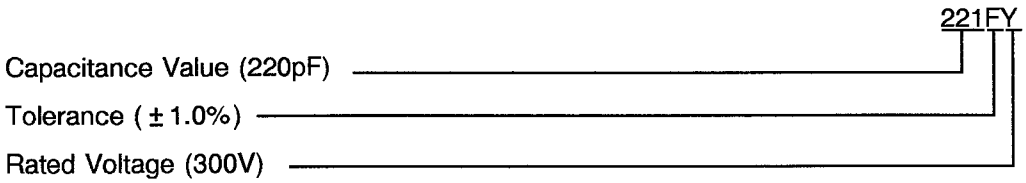
The electrical characteristics and ratings to be marked in the following order of precedence are:-

(a) Capacitance Value.

(b) Tolerance.

(c) Rated Voltage.

The information shall be constituted and marked as follows:-



4.5.3.1 Capacitance Values

Capacitance values shall be expressed by means of the following codes. The unit quantity for marking shall be picofarads.

Capacitance Value	Code
X.X	XCX
XX	XX0
$XX10^1$	XX1
$XX10^2$	XX2

4.5.3.2 Tolerances

The tolerances on capacitance values shall be indicated by the code letters specified hereafter.

Tolerance (±)	Code Letter
1.0%	F
2.0%	G
5.0%	J
0.25pF	C

4.5.3.3 Rated Voltage

The rated voltage shall be indicated by the code letters specified hereafter.

Rated Voltage (U_R) (V)	Code Letter
300	Y

4.5.4 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

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. The AQL shall be 2.5% for each capacitance value. Each capacitance value shall be considered as constituting a complete lot. For qualification or lot acceptance testing, the sample size shall be as specified in ESA/SCC Generic Specification No. 3004.

4.6.3 Circuits for Electrical Measurements

A circuit for use in performing the electrical measurements listed in Table 2 of this specification is shown in Figure 4.

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 $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled 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 ESA/SCC Generic Specification No. 3004. The conditions for burn-in shall be as specified in Table 5 of this specification.

On completion of burn-in, a recovery period of 24 ± 2 hours is necessary before performance of the end-measurements.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESA/SCC 3004 Test Method	Limits		Unit	Remarks
				Min.	Max.		
1	Capacitance	C	Para. 9.3.1.1	Note 1		pF	
2	Tangent of Loss Angle	Tgδ	Para. 9.3.1.2	-	10	10^{-4}	Note 2
3	Insulation Resistance	Ri	Para. 9.3.1.3	50	-	GΩ	
4	Voltage Proof	VP	Para. 9.3.1.4	$2.0U_R$	-	V	Note 3

NOTES

1. See Columns 3 and 4 of Table 1(a).
2. Or 20.10^{-4} for values ≤ 110pF.
3. See Column 5 of Table 1(a) for U_R.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

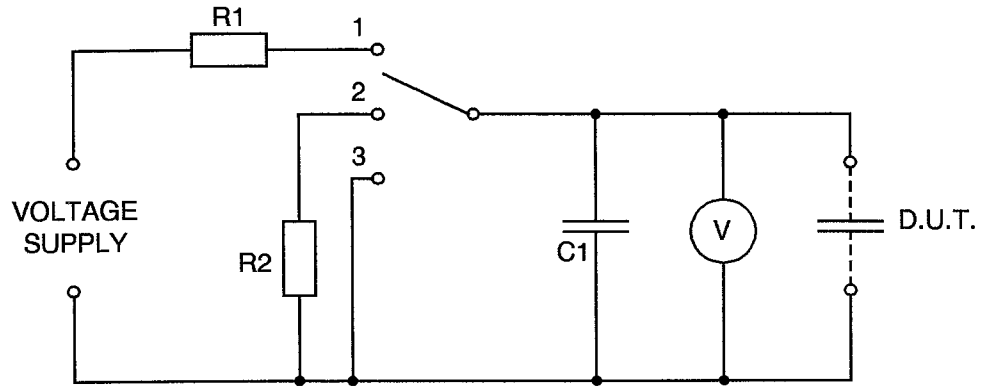
No.	Characteristics	Symbol	ESA/SCC 3004 Test Method	Test Conditions (Note 1)	Limits		Unit
					Min.	Max.	
3	Insulation Resistance (Between Terminals)	Ri	Para. 9.3.1.3	+125 ± 3 °C	10	-	GΩ

NOTES

1. These measurements shall be performed on a sample basis AQL = 2.5, Inspection Level II.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

FIGURE 4(a) - TEST CIRCUIT FOR VOLTAGE PROOF



NOTES

1. The resistance of the Voltmeter shall be not less than 20000 Ω/V. The capacitance of C shall be at least 10 times that of D.U.T.
2. The resistances of R1 and R2 shall be such that the initial charging and discharging current does not exceed 0.05A at the highest test voltage.

TABLE 4 - PARAMETER DRIFT VALUES

No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits (Δ)	Unit
1	Capacitance Change	$\frac{\Delta C}{C}$	As per Table 2	As per Table 2	±0.5 or (1) ±0.5	% pF

NOTES

1. Whichever is greater, referred to the initial value.

TABLE 5 - CONDITIONS FOR BURN-IN AND OPERATING LIFE TESTS

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+125	°C
2	Test Voltage	V_T	$1.5U_R$	V

FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN AND OPERATING LIFE TESTS

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 3004)

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 $T_{amb} = +22 \pm 3$ °C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

The parameters to be measured and inspections to be performed at intermediate points during endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.4 Conditions for Operating Life Tests (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 3004. The conditions for operating life testing shall be as specified in Table 5 of this specification.

4.8.5 Electrical Circuit for Operating Life Tests (Figure 5)

Not applicable.

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

NO.	ESA/SCC GENERIC SPEC.NO. 3004		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Moisture Resistance	Para. 9.8 During first 10 cycles loading voltage of 90 to 100V to be applied	**During Test** **Final Measurements** Insulation Resistance Visual Examination Capacitance Tangent of Loss Angle Voltage Proof	Once a day Shorts After a recovery period of 1 to 4 hours Table 2 Item 3 Between 4 and 24 hours later Corrosion or mechanical damage Table 2 Item 1 Table 2 Item 2 Table 2 Item 4	- Ri - C $T_g\delta$ VP	- 50 - Table 2 Item 1 - $2.0U_R$	- - - - 10 (2) -	- GΩ - pF 10^{-4} V
02	Shock	Para. 9.9	**During Shock** Intermittent Contact Visual Examination	 Open or Shorts Arcing or Damage	 - -	 - -	 - -	 - -
03	Vibration	Para. 9.10	**During Last Cycle** Intermittent Contact	 Open or Shorts	 -	 -	 -	 -
04	Solderability	Para. 9.11	Visual Examination	MIL-STD-202, Method 208, Solid Wire Termination Criteria	-	-	-	-
05	Terminal Strength	Para. 9.12 and Para's 4.2.4 and 4.2.5 of this spec.	Visual Examination	Loose/ruptured terminals or damage to terminals or seal	-	-	-	-
06	Barometric Pressure	Para. 9.13 During test $1.5U_R$ for between 1 and 5 seconds	Visual Examination	Arcing, breakdown or damage	-	-	-	-
07	Temperature Coefficient	Para. 9.14.1	Temperature Coefficient	Para. 9.14.1 of ESA/SCC 3004	TC	115	165	ppm
08	Capacitance Drift	Para. 9.14.2	Capacitance Change	Para. 9.14.2 of ESA/SCC 3004	$\frac{\Delta C}{C}$	-	+0.1	% or (3) pF
09	Resistance to Soldering Heat	Para. 9.15	**Initial Measurements** Capacitance **Final Measurements** Capacitance Change Tangent of Loss Angle Insulation Resistance	 Table 2 Item 1 After a recovery period of 10 ± 1 minutes Table 2 Item 1 Table 2 Item 2 Table 2 Item 3	 C $\frac{\Delta C}{C}$ $T_g\delta$ Ri	 Table 2 Item 1 −0.5 - 50	 +0.5 10 (2) -	 pF % or (3) pF 10^{-4} GΩ
10	Operating Life	Para. 9.16	**Initial Measurements** Capacitance **Intermediate Measurements** Capacitance Change Tangent of Loss Angle Insulation Resistance **Final Measurements** Capacitance Change Tangent of Loss Angle Insulation Resistance	 Table 2 Item 1 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3	 C $\frac{\Delta C}{C}$ $T_g\delta$ Ri $\frac{\Delta C}{C}$ $T_g\delta$ Ri	 Table 2 Item 1 −0.5 - 50 (4) −0.5 - 50 (4)	 Table 2 Item 1 +0.5 20 (4) - +0.5 20 (4) -	 pF % or (3) pF 10^{-4} GΩ % or (3) pF 10^{-4} GΩ

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. Or 20.10^{-4} for values ≤ 110pF.
3. Whichever is greater, referred to the initial value.
4. For information only.