2.3 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

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

2.3.1 ROOM TEMPERATURE ELECTRICAL MEASUREMENTS

The measurements shall be performed at T_{amb} = +22 ±3°C.

Characteristics	Symbols	Test Method and Conditions	Tolerance (± %)	Limits		Units
				Min	Max	
Capacitance (Note 1)	C_A	ESCC No. 3009				pF
			5	$0.95C_n$	$1.05C_n$	
			10	$0.9C_n$	$1.1C_n$	
			20	$0.8C_n$	$1.2C_n$	
Tangent of Loss Angle	tgδ	ESCC No. 3009	All	-	250×10^{-4}	-
Insulation Resistance	R_I	ESCC No. 3009	All			
		For $C_n \leq$ 10000pF		100	-	GΩ
		For $C_n >$ 10000pF		1000	-	GΩ.nF
Voltage Proof	VP	ESCC No. 3009	All	$2.5U_R$	-	V

NOTES:

1. Capacitance limits may be adjusted to take into account capacitance ageing, as specified in the Generic Specification.

2.3.2 HIGH AND LOW TEMPERATURES ELECTRICAL MEASUREMENTS

Characteristics	Symbols	Test Method and Conditions	Limits		Units
			Min	Max	
Insulation Resistance (Note 1)	**R_I**	**ESCC No. 3009 Tamb=+125 ±2°C For Cn ≤ 10000pF For Cn > 10000pF**	**10 100**	**- -**	**GΩ GΩ.nF**
Temperature Characteristic **(Note 2)**	TC	ESCC No. 3009 Tamb=-55 ±2°C, +20 ±2°C, +125 ±2°C Note **3** For V_T = no voltage applied: All variants: For $V_T = U_R$: Variants 01, 03, 05, 06, 08: Variants 07, 09, 10, 11:	 -20 -30 Note **4**	 +20 +20	%

NOTES:

1. **The measurement shall be performed during Chart F4 only and for Qualification and Periodic Testing only**.
2. The 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.
3. In the case of a 100% inspection, a 1% total percent defective is allowed.
4. X7R dielectric. Temperature Characteristic for $V_T = U_R$ is typically -60%. Temperature Characteristic measurements with rated voltage applied are not required.

2.4 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

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

Test Reference per ESCC No. 3009	Characteristics	Symbols	Limits		Units
			Min	Max	
Mounting					
Final Measurements	Capacitance	C_A	Record Values		
	Tangent of Loss Angle	tgδ	-	250×10^{-4}	-
	Insulation Resistance	R_I	Note 1		
Rapid Change of Temperature					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Final Measurements	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	-	500×10^{-4}	-
Steady State Humidity (85/85)					
Initial Measurements	Capacitance	C_A	Notes 1		
Final Measurements (1 000 hours)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-10	+10	%
	Tangent of Loss Angle	tgδ	-	500×10^{-4}	-
	Insulation Resistance (Note 3):				
	For $C_n \leq 10000$pF	R_I	3	-	GΩ
	For $C_n > 10000$pF	R_I	30	-	GΩ.nF
Operating Life					
Initial Measurements	Capacitance	C_A	Notes 1, 2		
Intermediate Measurements (1000 hours) (Note 4)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Insulation Resistance:				
	For $C_n \leq 10000$pF	R_I	10	-	GΩ
	For $C_n > 10000$pF	R_I	100	-	GΩ.nF
Final Measurements (1000 or 2000 hours) (Note 5)	Capacitance	C_A	Note 1		
	Change in Capacitance	$\Delta C_A/C_A$	-15	+15	%
	Tangent of Loss Angle	tgδ	-	500×10^{-4}	-
	Insulation Resistance:				
	For $C_n \leq 10000$pF	R_I	10	-	GΩ
	For $C_n > 10000$pF	R_I	100	-	GΩ.nF
	Voltage Proof	VP	$2.5U_R$	-	V
Temperature Characterisation	Insulation Resistance	R_I	Note 6		
	Temperature Characteristic	TC			
Robustness of Terminations	Capacitance	C_A	Note 1		

NOTES:

1. As specified in Room Temperature Electrical Measurements.
2. Capacitance values recorded during Mounting may be used as initial measurements.
3. Test conditions for Insulation Resistance shall be as specified in Steady State Humidity in the ESCC Generic Specification
4. Intermediate measurements are optional at the Manufacturer's discretion.
5. 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.
6. As specified in High and Low Temperatures Electrical Measurements.