



Pages 1 to 18

RESISTOR, FIXED, CHIP, THICK FILM

BASED ON TYPE CHP

ESCC Detail Specification No. 4001/026

Issue / 2 Draft A	<i>June</i> January 2007
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DOCUMENTATION CHANGE NOTICE(Refer to <https://escies.org> for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
	Specification updated to incorporate editorial changes per DCR.

see
Helgo
w/ No (339)

Variant	Style (Note 1)	Resistance Range R_n (Note 2)		Tolerance (\pm %) (Note 2)	Temperature Coefficient TC ($\pm 10^{-6}/^{\circ}\text{C}$) (Note 2)	Critical Resistance (k Ω)	Weight max (g)
		Min (Ω)	Max (M Ω)				
05	2512	1	10	1, 2, 5	100, 200	112	0.042

NOTES:

- See Figure 2
-

112.5

Resistance (Ω)	Value Series	Available Tolerance (\pm %)	Available Temperature Coefficient ($\pm 10^{-6}/^{\circ}\text{C}$)
$1 \leq R_n < 10$	Any value in the resistance range to 3 significant figures	2, 5	200
$10 \leq R_n < 1\text{M}$		1, 2, 5	100, 200
$R_n \geq 1\text{M}$		2, 5	200

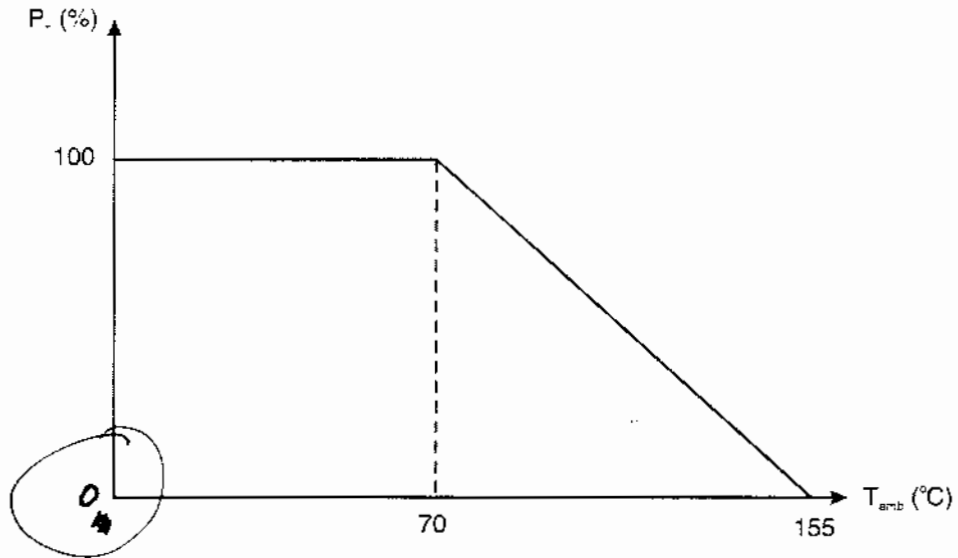
Table 1(b) - MAXIMUM RATINGS

No.	Characteristics	Variant	Style	Symbol	Maximum Rating	Unit	Remarks
1	Rated Dissipation	01 02 03 04 05	0603 0805 1216 1206 2010 2512	P_n	0.1 100 0.2 200 0.25 250 0.5 500 0.8 800	W mW	Note 1
2	Limiting Element Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	U_L	50 100 200 300 300	V	-
3	Rated Voltage	All	All	U_R	$\sqrt{P_n \times R_n}$	V	Note 2
4	Insulation Voltage	01 02 03 04 05	0603 0805 1206 2010 2512	U_I	100 200 300 300 300	V	-
5	Operating Temperature Range	All	All	T_{op}	-55 to +155	$^{\circ}\text{C}$	T_{amb}
6	Storage Temperature Range	All	All	T_{stg}	-55 to +155	$^{\circ}\text{C}$	-
7	Soldering Temperature	All	All	T_{sol}	+260	$^{\circ}\text{C}$	Note 3

NOTES:

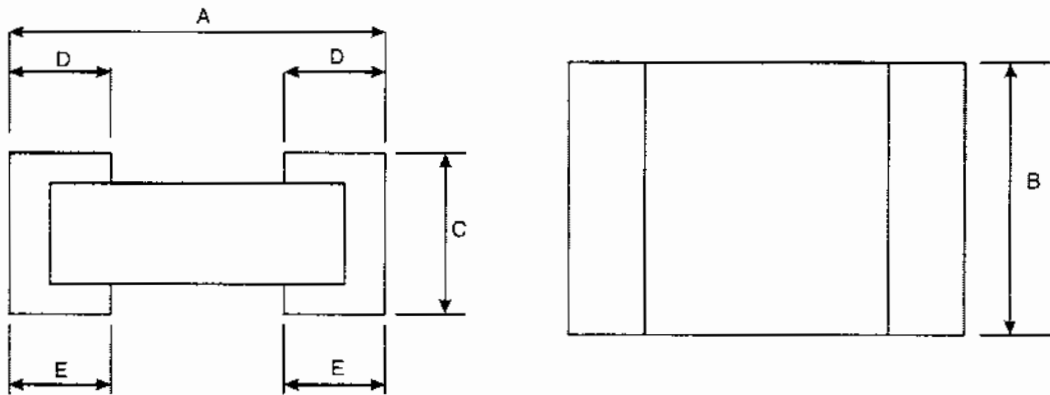
- At $T_{amb} \leq +70^{\circ}\text{C}$. For derating at $T_{amb} > +70^{\circ}\text{C}$, see Figure 1.
- Shall never exceed Limiting Element Voltage. R_n = rated resistance.
- Duration 10 seconds maximum.

FIGURE 1 - PARAMETER DERATING INFORMATION



Rated Dissipation versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Variant	Style	Dimensions (mm)							
		A		B		C		D, E	
		Min	Max	Min	Max	Min	Max	Min	Max
01	0603	1.36	1.68	0.72	0.98	0.38	0.53	0.25	0.51
02	0805	1.75	2.07	1.14	1.4	0.38	0.53	0.25	0.51
03	1206	2.89	3.21	1.47	1.73	0.38	0.53	0.25	0.51
04	2010	4.92	5.24	2.41	2.67	0.5	0.63	0.25	0.64
05	2512	6.19	6.51	2.93	3.32	0.5	0.63	0.25	0.64

4.5.3 ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

Example : 4001~~xxx~~01B

- Detail Specification Reference : 4001~~xxx~~
- Component Type Variant Number : 01 (as required)
- Testing Level (B or C, as applicable)

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.

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

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 distribution of the sample shall be as follows:

- 1/3 with lowest resistance value
- 1/3 with highest resistance value
- 1/3 with median resistance value or the critical resistance value if procured

of the procured range.

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 as specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb}=+22\pm 3^{\circ}\text{C}$. 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 values 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. 4001. The conditions for Burn-in shall be as specified in Table 5 of this specification.

After 168 (²⁴~~12~~-0) hours, the resistors shall be removed from the chamber and allowed to cool under normal atmospheric conditions for a minimum of 4 hours. They shall then be visually examined. There shall be no evidence of damage and marking shall still be legible.

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. 4001		Measurements and Inspections		Symbol	Limits		Unit	
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max		
01	Overload	Para. 9.1 and Paras 4.2.2 and 4.2.4 of this spec.	<u>Initial Measurements</u>	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage and marking legible	R _A	Record Values		Ω	
			Chart IV Resistance						
			<u>Final Measurements</u>	Table 2 item 1	R _A	Table 2 Item 1		Ω	
			Visual Examination						
		Chart II Resistance	Table 2 Item 1	ΔR _A /R _A	Note 4		%		
		Chart IV Resistance Change							
02	Seal Test (Hermetically Sealed only)	Para. 9.3	Not applicable	-	-	-	-	-	
03	Insulation Resistance (Insulated only)	Para. 9.6	<u>Final Measurements</u> Insulation Resistance	Para. 9.6.2 of ESCC 4001 (Note 2)	R _i	1000	-	MΩ	
04	Temperature Coefficient	Para. 9.7 Procedure I	Temperature Coefficient	Para. 9.5.1 of ESCC 4001	TC	-100 -200	+100 +200	10 ⁻⁶ /°C	
05	Voltage Proof	Para. 9.8.2	<u>During test</u>	1.4 x 100 ^{UT} for 60 ± 5 sec (Note 3)	-	-	-	-	
			Visual Examination	No breakdown or flashover	-	-	-	-	
06	Solderability	Para. 9.9 <i>Procedure I</i>	<u>Initial Measurements</u>	After Drying Table 2 item 1 24 ± 4hrs after soldering	R _A	Record Values		Ω	
			Resistance						
			<u>Final Measurements</u>	Table 2 Item 1	ΔR _A /R _A	Note 5		%	
Resistance Change									
07	Robustness of Terminations	Para. 9.10.2	-	After Mounting					
			Adhesion	<u>Initial Measurements</u>	Table 2 Item 1	R _A	Record Values		Ω
				Resistance					
				<u>Final Measurements</u>	Table 2 Item 1	ΔR _A /R _A	Note 5		%
		Resistance Change							
		Visual Examination	No damage, lifting, cracking or dry joints	-	-	-			
		Bend Strength of End Plate Facing	<u>Initial Measurements</u>	Table 2 Item 1	R _A	Record Values		Ω	
			Resistance						
<u>Final Measurements</u>	Table 2 Item 1		ΔR _A /R _A	Note 5		%			
Resistance Change									
Visual Examination	No damage, lifting, cracking or dry joints	-	-	-					

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
08	Resistance to Soldering Heat	Para. 9.11 Procedure I	<u>Initial Measurements</u> Resistance	After Drying Table 2 Item 1	R_A	Record Values		Ω
			<u>Final Measurements</u> Visual Examination	No evidence of damage and marking legible	-	-	-	
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 4	%	
09	Rapid Change of Temperature	Para. 9.12	<u>Initial Measurements</u> Resistance	Table 2 Item 1	R_A	Record Values		Ω
			<u>Final Measurements</u> Visual Examination	After a recovery period of 1-2 hrs No evidence of damage	-	-	-	
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 5	%	
10	Vibration	Para. 9.13 and Paras 4.2.4 and 4.2.5 of this spec.	Not applicable	-	-	-	-	-
11	Climatic Sequence	Para. 9.14 Procedure I	<u>Initial Measurements</u> Resistance	After Drying Table 2 Item 1	R_A	Record Values		Ω
			<u>Final Measurements</u> Visual Examination	Following completion of DC load test and after a recovery period of 1-2 hrs No evidence of damage and marking legible	-	-	-	
			Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	M Ω
Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6	%				
12	Operating Life	Para. 9.15 Chart IV	<u>Initial Measurements</u> Resistance	Table 2 Item 1	R_A	Record Values		Ω
			<u>Intermediate Measurements</u> (1000 hrs)	After a recovery period of 1-2 hrs	-	-	-	
			Visual Examination	No evidence of damage	-	-	-	
			Resistance Change	Table 2 Item 1	$\Delta R_A/R_A$	Note 6	%	
			<u>Final Measurements</u> (2000 hrs)	After a recovery period of 1-2 hrs	-	-	-	
			Visual Examination	No evidence of damage	-	-	-	
Resistance Change	Table 2, Item 1	$\Delta R_A/R_A$	Note 7	%				
Insulation Resistance	Para. 9.6 of ESCC 4001 (Note 2)	R_i	1000	-	M Ω			

No.	ESCC Generic Spec. No. 4001		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
		Para. 9.15 Chart V	<u>Initial Measurements</u> Resistance <u>Final Measurements</u> (1000 hrs) Visual Examination Resistance Change Insulation Resistance	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1 Para. 9.6 of ESCC 4001 (Note 2)	R_A - $\Delta R_A/R_A$ R_i	Record Values - Note 6 1000	Ω - % $M\Omega$	
13	High Temperature Storage	Para. 9.16	<u>Initial Measurements</u> Resistance <u>Intermediate</u> <u>Measurements</u> (1000 hrs) Visual Examination Resistance Change <u>Final Measurements</u> (2000 hrs) Visual Examination Resistance Change Insulation Resistance	Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1 After a recovery period of 1-2 hrs No evidence of damage Table 2 Item 1 Para. 9.6 of ESCC 4001 (Note 2)	R_A - $\Delta R_A/R_A$ - $\Delta R_A/R_A$ R_i	Record Values - Note 6 - Note 7 1000	Ω - % - % $M\Omega$	
14	Permanence of Marking	Para. 9.19	-	-	-	-	-	

NOTES:

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.

2. Test Voltage: $V_T = 100V$

3. For value of U_i see Table 1(b) Item 4.

4. $\Delta R_A/R_A$ limit: $\pm(0.5 + 0.05\Omega \times 100/R_n)\%$

5. $\Delta R_A/R_A$ limit: $\pm(0.25 + 0.05\Omega \times 100/R_n)\%$

6. $\Delta R_A/R_A$ limit: $\pm(1 + 0.05\Omega \times 100/R_n)\%$

7. $\Delta R_A/R_A$ limit: $\pm(1.5 + 0.05\Omega \times 100/R_n)\%$

$\leftarrow \pm(0.5 + 0.05\Omega \times 100/R_n)\%$
 $\leftarrow \pm(0.25 + 0.05\Omega \times 100/R_n)\%$
 $\leftarrow \pm(1 + 0.05\Omega \times 100/R_n)\%$
 $\leftarrow \pm(1.5 + 0.05\Omega \times 100/R_n)\%$

U_i