

## Data Sheet

Customer:

Product: Metal Film Precision High Voltage MELF Resistor -  
CSRP Series

Size: 0204/0207

Issued Date: 10-Mar-21

Edition: REV.A2



VIKING TECH CORPORATION  
光頡科技股份有限公司  
No.70 Guangfu N. Rd., Hukou  
Township, Hsinchu County 303,  
Taiwan

TEL:886-3-5972931  
FAX:886-3-5972935•886-3-5973494  
E-mail:sales@viking.com.tw

VIKING TECH CORPORATION KAOHSIUNG BRANCH  
光頡科技股份有限公司高雄分公司  
No.248-3, Sin-Sheng Rd., Cian-Jhen Dist., Kaohsiung,  
806, Taiwan

TEL:886-7-8217999  
FAX:886-7-8228229  
E-mail:sales@viking.com.tw

VIKING ELECTRONICS (WUXI) CO., LTD.  
光頡電子(無錫)有限公司  
No.22 Xixia Road, Machinery & Industry Park,  
National Hi-Tech Industrial Development Zone  
of Wuxi, Wuxi, Jiangsu Province, China  
Zip Code:214028  
TEL:86-510-85203339  
FAX:86-510-85203667•86-510-85203977  
E-mail:china@viking.com.tw

Produced by (QC)	Checked (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
10-Mar-21	10-Mar-21	10-Mar-21		
<b>Susan Huang</b>	<b>J.C. Liu</b>	<b>J.C. Liu</b>		

**Metal Film Precision High Voltage MELF Resistor**

**■ Features**

- Thin film technology
- High voltage application
- Sn termination on Ni barrier layer
- Tight tolerance down to  $\pm 0.1\%$
- High power rating up to 1 Watts
- SMD enabled structure
- Lead-free and RoHS compliant

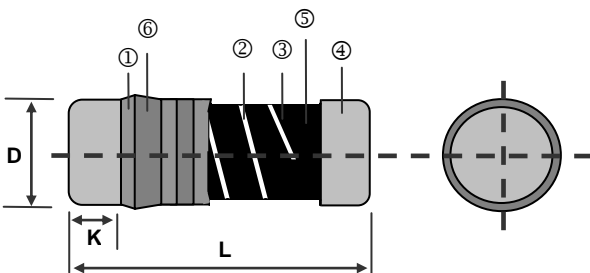


**■ Applications**

- Industrial
- Telecommunication
- Medical Equipment
- Measurement/Testing Equipment

TECHNICAL SPECIFICATIONS		
DESCRIPTION	CSRP0204	CSRP0207
Resistance range	340K $\Omega$ -3.4M $\Omega$	340K $\Omega$ -3.4M $\Omega$
Resistance tolerance	$\pm 1\%$ ; $\pm 0.5\%$ ; $\pm 0.25\%$ ; $\pm 0.1\%$	
Temperature coefficient	$\pm 50\text{ppm}/^\circ\text{C}$ ; $\pm 25\text{ppm}/^\circ\text{C}$	
Power rating P <sub>70</sub>	2/5W	1W
Operating voltage U <sub>max</sub>	500V	1000V
Operating temperature range	-55 $^\circ\text{C}$ ~155 $^\circ\text{C}$	
Max. resistance change at P70 for resistance range, $\Delta R/R$ max., after 1000 h	$\leq 0.5\%$	$\leq 0.5\%$

**■ Construction & Dimension**

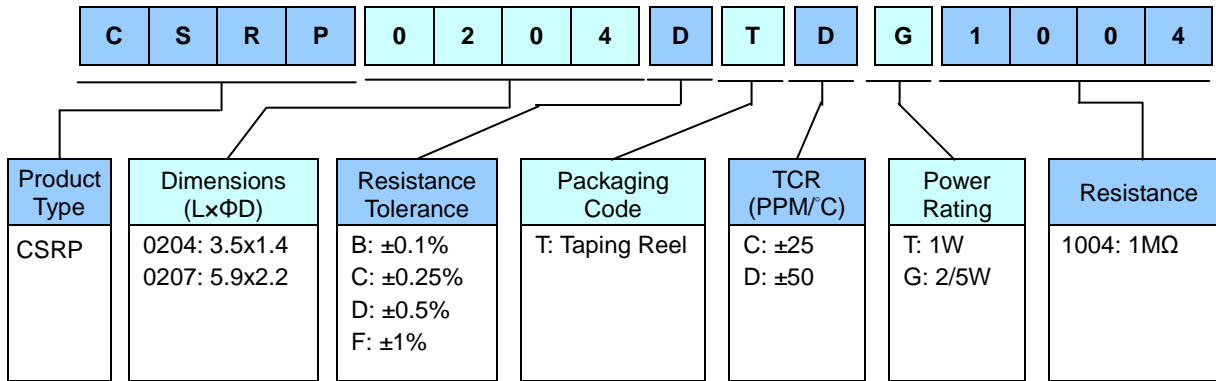


Type	L (mm)	$\Phi D$ (mm)	K (mm)	Weight 1,000EA (g)
CSRP0204	3.50 $\pm 0.2$	1.40 $\pm 0.15$	0.8 $\pm 0.1$	18.7
CSRP0207	5.90 $\pm 0.2$	2.20 $\pm 0.20$	1.3 $\pm 0.1$	80.9

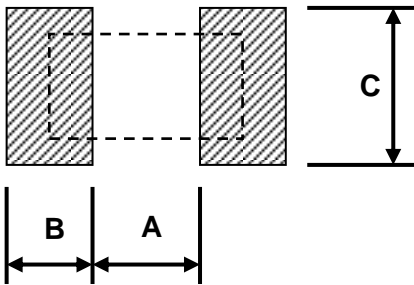
① Insulation Coating	④ Electrode Cap
② Trimming Line	⑤ Resistor Layer
③ Ceramic Rod	⑥ Marking

**Part Numbering**

Part Number : CSRP0204FTDG1004

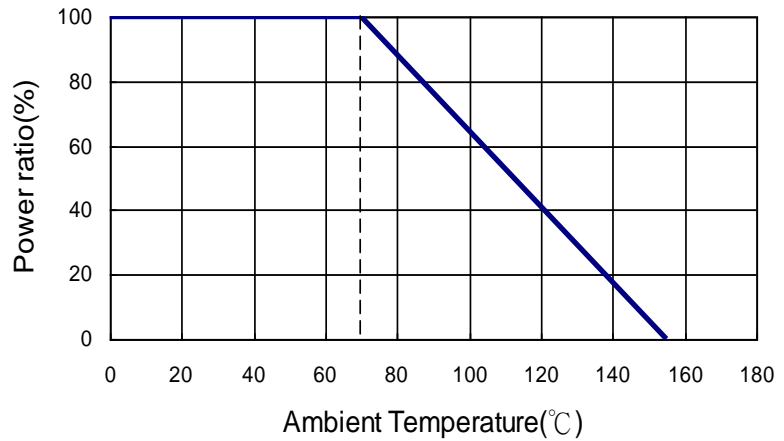


**Recommend Land Pattern**

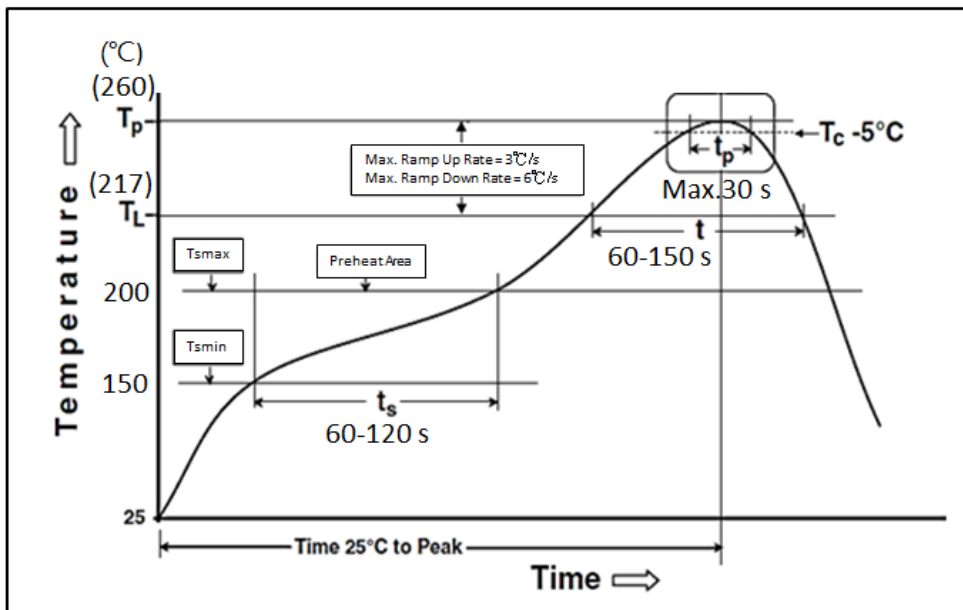


Type	A (mm)	B (mm)	C (mm)
CSRP0204	1.6	1.2	1.6
CSRP0207	3.0	1.7	2.4

**Derating Curve**



**Soldering Condition (IPC/JEDEC J-STD-020)**



**Electrical Specifications**

Item Type	Power Rating at 70 °C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/°C)
					±0.1% (E24,E96)	±0.25% (E24,E96)	±0.5% (E24,E96)	±1% (E24,E96)	
0204	2/5W	-55 ~ +155°C	500V	1000V	340KΩ-1MΩ		340KΩ-3.4MΩ		±25
					340KΩ-1MΩ		340KΩ-3.4MΩ		±50
0207	1W	-55 ~ +155°C	1000V	2000V	340KΩ-1MΩ		340KΩ-3.4MΩ		±25
					340KΩ-1MΩ		340KΩ-3.4MΩ		±50

Operating Voltage= $\sqrt{P \cdot R}$  or Max. Operating Voltage listed above, whichever is lower.  
 Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. Overload Voltage listed above, whichever is lower.  
 RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.  
 ■ Viking is capable of manufacturing the optional spec based on customer's requirement.

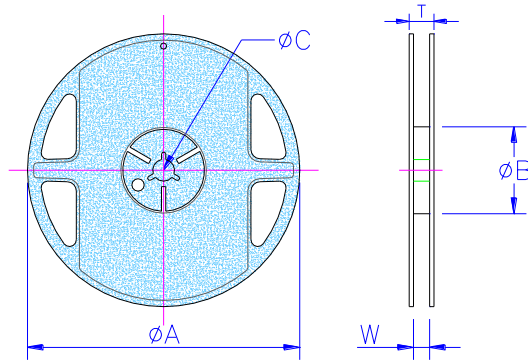
**Environmental Characteristics**

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec	<b>JIS-C-5201-1 4.8</b> <b>IEC-60115-1 4.8</b> At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(0.15%+0.05Ω)	<b>JIS-C-5201-1 4.13</b> <b>IEC-60115-1 4.13</b> RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G	<b>JIS-C-5201-1 4.6</b> <b>IEC-60115-1 4.6</b> Max. Overload Voltage for 1 minute
Endurance	±(1%+0.05Ω)	<b>JIS-C-5201-1 4.25</b> <b>IEC-60115-1 4.25.1</b> <b>MIL-STD-202 Method 108</b> 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Damp Heat with Load	±(1%+0.05Ω)	<b>JIS-C-5201-1 4.24</b> <b>IEC-60115-1 4.24</b> 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
High Temperature Exposure	±(1%+0.05Ω)	<b>MIL-STD-202 Method 108</b> at +155°C for 1000 hrs
Board Flex	±(0.5%+0.05Ω)	<b>AEC-Q200-005</b> Bending once for 60 seconds with 2mm
Solderability	95% min. coverage	<b>JIS-C-5201-1 4.17</b> <b>IEC-60115-1 4.17</b> <b>J-STD-002</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.25%+0.05Ω)	<b>MIL-STD-202 Method 210</b> 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	<b>JIS-C-5201-1 4.7</b> <b>IEC-60115-1 4.7</b> 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤ 10%	<b>JIS-C-5201-1 4.18</b> <b>IEC-60068-2-58 8.2.1</b> 260±5°C for 30 seconds
Temperature Cycling	±(0.5%+0.05Ω)	<b>JESD22 Method JA-104</b> -55°C to +125°C, 1000 cycles
Resistance to Solvents	No visible damage on appearance and marking.	<b>MIL-STD-202 Method 215</b> Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.

RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

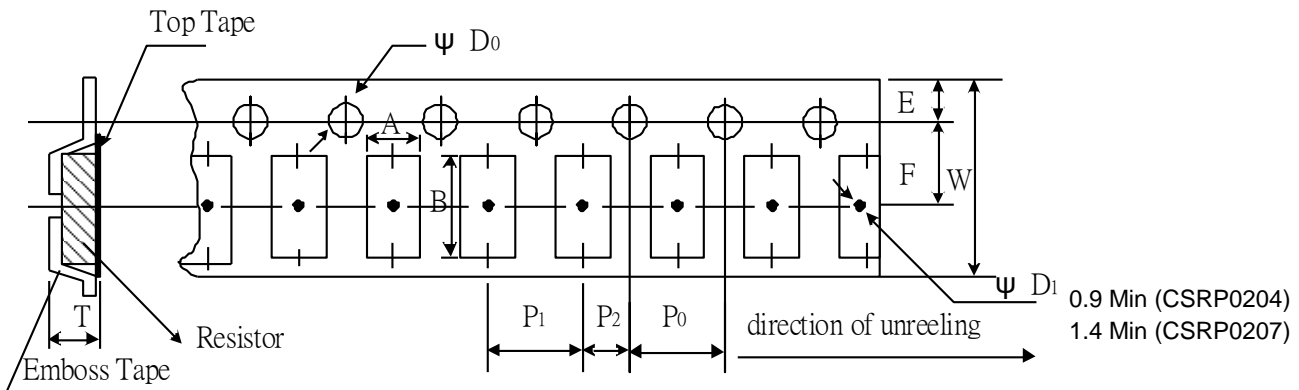
**■ Packaging**



Packaging Quantity & Reel Specifications

Type	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Emboss Plastic Tape (EA)
CSRP0204	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
CSRP0207	7 inch	178.5±1.5	60.0+1.0	13.0±0.5	13.0±0.5	15.5±0.5	2,000

Emboss Plastic Tape Specifications

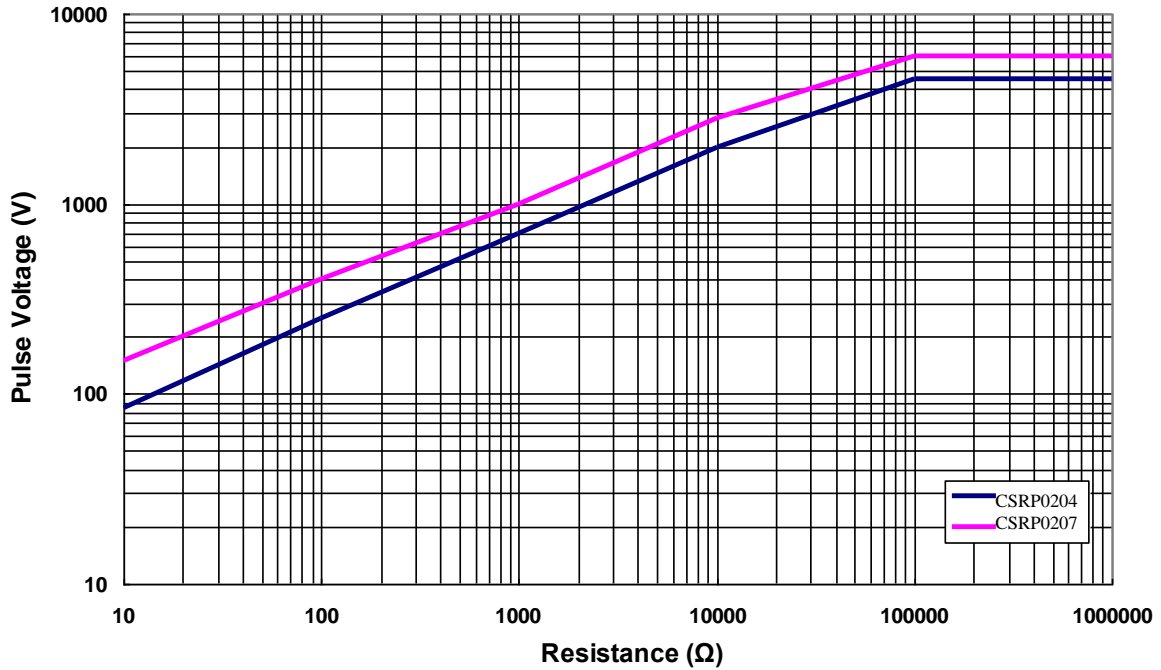


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P <sub>0</sub> (mm)	P <sub>1</sub> (mm)	P <sub>2</sub> (mm)	ΦD <sub>0</sub> (mm)	T (mm)
CSRP0204	1.55±0.10	3.65±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.80±0.10
CSRP0207	2.40±0.10	6.15±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	2.70±0.10

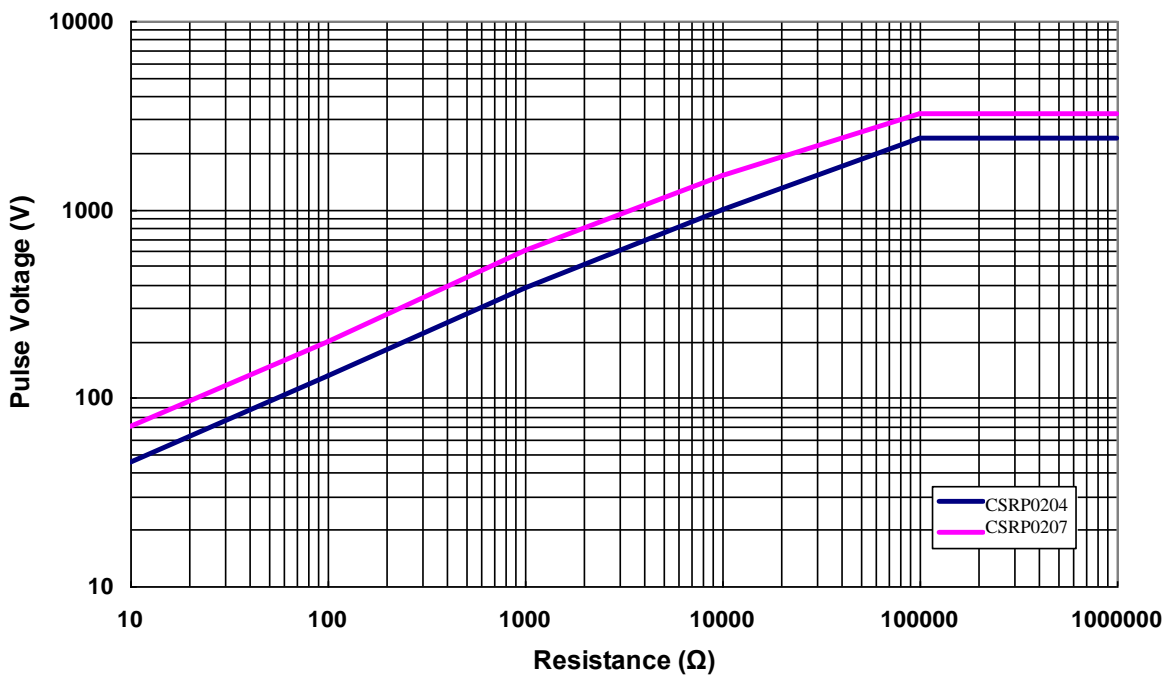
**■ Lightning Surge**

Resistors are tested in accordance with IEC 60115-1 using both 1.2/50 $\mu$ s and 10/700 $\mu$ s pulse shapes. The limit of acceptance is a shift in resistance of less than 0.5% from the initial value.

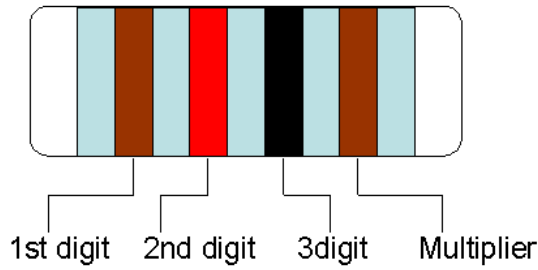
**1.2/50 $\mu$ s Lightning Surge**



**10/700 $\mu$ s Lightning Surge**



■ Marking & Resistance Tolerance



±1%	E-24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1
	E-96	1.00	1.02	1.05	1.07	1.10	1.13	1.15	1.18	1.21	1.24	1.27	1.30	1.33	1.37	1.40	1.43	1.47	1.50	1.54	1.58	1.62	1.65	1.69	1.74
		1.78	1.82	1.87	1.91	1.96	2.00	2.05	2.10	2.15	2.21	2.26	2.32	2.37	2.43	2.49	2.55	2.61	2.67	2.74	2.80	2.87	2.94	3.01	3.09
		3.16	3.24	3.32	3.40	3.48	3.57	3.65	3.74	3.83	3.92	4.02	4.12	4.22	4.32	4.42	4.53	4.64	4.75	4.87	4.99	5.11	5.23	5.36	5.49
5.62		5.76	5.90	6.04	6.19	6.34	6.49	6.65	6.81	6.98	7.15	7.32	7.50	7.68	7.87	8.06	8.25	8.45	8.66	8.87	9.09	9.31	9.53	9.76	
±0.5% ±0.25% ±0.1%	E-192	10.0	10.1	10.2	10.4	10.5	10.6	10.7	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	13.0	13.2
		13.3	13.5	13.7	13.8	14.0	14.2	14.3	14.5	14.7	14.9	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.5	16.7	16.9	17.2	17.4	17.6
		17.8	18.0	18.2	18.4	18.7	18.9	19.1	19.3	19.6	19.8	20.0	20.3	20.5	20.8	21.0	21.3	21.5	21.8	22.1	22.3	22.6	22.9	23.2	23.4
		23.7	24.0	24.3	24.6	24.9	25.2	25.5	25.8	26.1	26.4	26.7	27.1	27.4	27.7	28.0	28.4	28.7	29.1	29.4	29.8	30.1	30.5	30.9	31.2
		31.6	32.0	32.4	32.8	33.2	33.6	34.0	34.4	34.8	35.2	35.7	36.1	36.5	37.0	37.4	37.9	38.3	38.8	39.2	39.7	40.2	40.7	41.2	41.7
		42.2	42.7	43.2	43.7	44.2	44.8	45.3	45.9	46.4	47.0	47.5	48.1	48.7	49.3	49.9	50.5	51.1	51.7	52.3	53.0	53.6	54.2	54.9	55.6
		56.2	56.9	57.6	58.3	59.0	59.7	60.4	61.2	61.9	62.6	63.4	64.2	64.9	65.7	66.5	67.3	68.1	69.0	69.8	70.6	71.5	72.3	73.2	74.1
		75.0	75.9	76.8	77.7	78.7	79.6	80.6	81.6	82.5	83.5	84.5	85.6	86.6	87.6	88.7	89.8	90.9	92.0	93.1	94.2	95.3	96.5	97.6	98.8

Color	Digit	Multiplier
Silver	-	10 <sup>-2</sup>
Gold	-	10 <sup>-1</sup>
Black	0	10 <sup>0</sup>
Brown	1	10 <sup>1</sup>
Red	2	10 <sup>2</sup>
Orange	3	10 <sup>3</sup>
Yellow	4	10 <sup>4</sup>
Green	5	10 <sup>5</sup>
Blue	6	10 <sup>6</sup>
Violet	7	10 <sup>7</sup>
Grey	8	10 <sup>8</sup>
White	9	10 <sup>9</sup>

**REVISION HISTORY**

<b>REVISION</b>	<b>DATE</b>	<b>CHANGE NOTIFICATION</b>	<b>DESCRIPTION</b>
Version A	Oct 13, 2017	-	- Develop a new specification
Version A1	May 20, 2019	-	- Modify TCR Test description
Version A2	Mar 10, 2021	-	- Modify Soldering Condition (IPC/JEDEC J-STD-020)