

Data Sheet

Customer:

Product: Automotive Grade Metal Film Precision MELF Resistor - CSRA Series

Size: 0102/0204/0207

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Automotive Grade Metal Film Precision MELF Resistor



■ Features

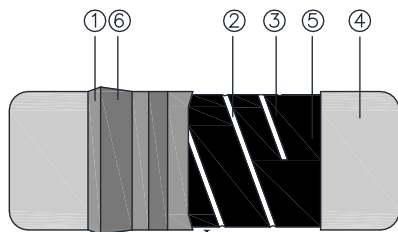
- AEC-Q200 Compliance
- Thin film technology
- Excellent overall stability
- Sn termination on Ni barrier layer
- Tight tolerance down to $\pm 0.1\%$
- Extremely low TCR down to $\pm 5 \text{ PPM}/^\circ\text{C}$
- High power rating up to 1 Watts
- SMD enabled structure
- Lead-free and RoHS compliant

■ Applications

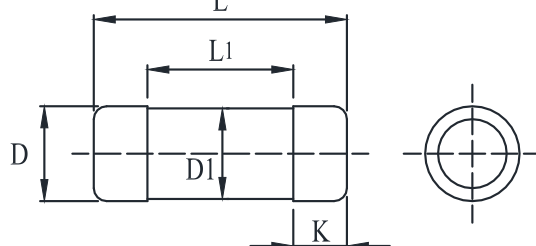
- Automotive
- Industrial
- Telecommunication
- Medical Equipment
- Measurement/Testing Equipment

TECHNICAL SPECIFICATIONS						
DESCRIPTION	CSRA0102		CSRA0204		CSRA0207	
Resistance range	1 Ω -1M Ω ; 0 Ω		0.1 Ω -3.4M Ω ; 0 Ω		0.1 Ω -3.4M Ω ; 0 Ω	
Resistance tolerance	$\pm 5\%$; $\pm 1\%$; $\pm 0.5\%$; $\pm 0.25\%$; $\pm 0.1\%$					
Temperature coefficient	$\pm 100 \text{ ppm}/^\circ\text{C}$; $\pm 50 \text{ ppm}/^\circ\text{C}$; $\pm 25 \text{ ppm}/^\circ\text{C}$; $\pm 15 \text{ ppm}/^\circ\text{C}$		$\pm 100 \text{ ppm}/^\circ\text{C}$; $\pm 50 \text{ ppm}/^\circ\text{C}$; $\pm 25 \text{ ppm}/^\circ\text{C}$; $\pm 15 \text{ ppm}/^\circ\text{C}$; $\pm 10 \text{ ppm}/^\circ\text{C}$; $\pm 5 \text{ ppm}/^\circ\text{C}$			
Operation mode	Standard	High power	Standard	High power	Standard	High power
Power rating P ₇₀	1/5W	0.3W	1/4W	2/5W	1/2W	1W
Operating voltage U _{max.}	200V	200V	200V	200V	300V	350V
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	$\leq 0.5\%$		$\leq 0.5\%$		$\leq 0.5\%$	

■ Construction & Dimension



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

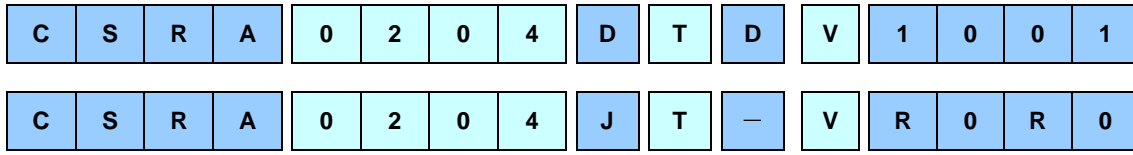


Type	L (mm)	L ₁ min. (mm)	ΦD (mm)	ΦD ₁ (mm)	K (mm)	Weight 1,000EA (g)
CSRA0102	2.20 \pm 0.10	1.1	1.10 \pm 0.10	D +0/-0.15	0.45 \pm 0.05	7.7
CSRA0204	3.50 \pm 0.2	1.7	1.40 \pm 0.15	D +0/-0.2	0.8 \pm 0.1	18.7
CSRA0207	5.90 \pm 0.2	2.9	2.20 \pm 0.20	D +0/-0.2	1.3 \pm 0.1	80.9

Part Numbering

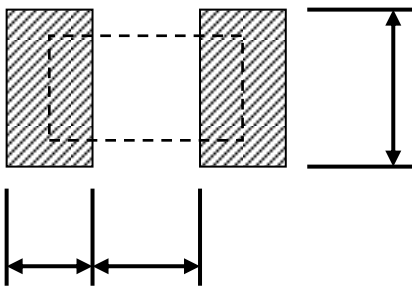
Part Number : CSRA0204DTDV1001

Part Number : CSRA0204JTVR0R0



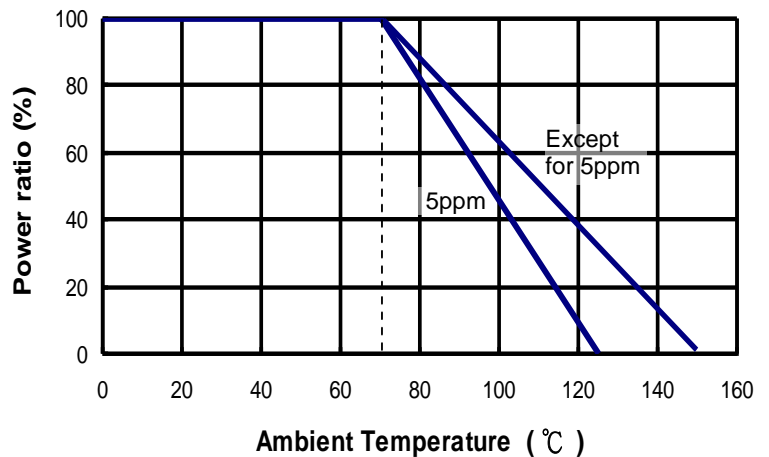
Product Type	Dimensions (LxΦD)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
CSRA	0102: 2.2x1.1 0204: 3.5x1.4 0207: 5.9x2.2	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1% J: ±5%	T: Taping Reel	S: ±5 B: ±10 N: ±15 C: ±25 D: ±50 E: ±100 -: Jumper	T: 1W U: 1/2W V: 1/4W G: 2/5W P: 1/5W L: 0.3W	0010: 1Ω 0100: 10Ω 2201: 2200Ω 1001: 1KΩ 1004: 1MΩ R050: 0.05Ω 22R1: 22.1Ω R0R0: 0Ω

Recommend Land Pattern

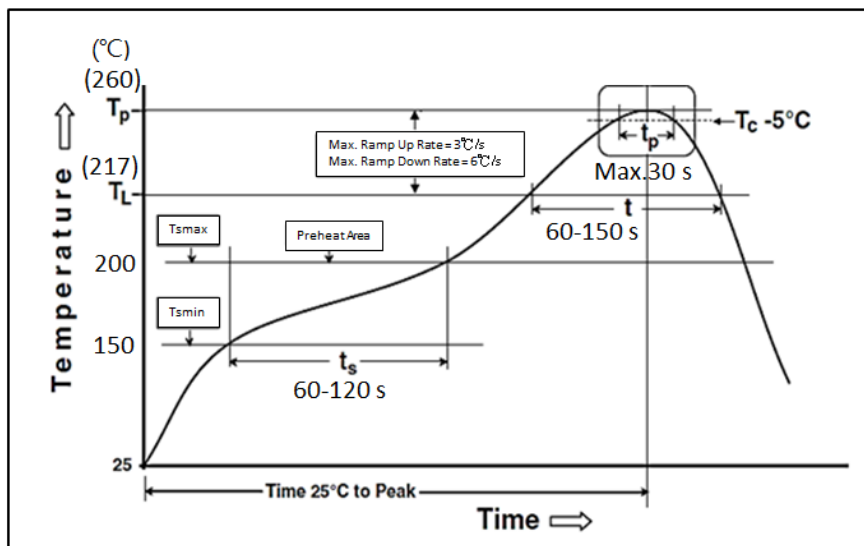


Type	A (mm)	B (mm)	C (mm)
CSRA0102	1.0	0.8	1.5
CSRA0204	1.6	1.2	1.6
CSRA0207	3.0	1.7	2.4

Derating Curve



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



Standard 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%	±0.25%	±0.5%	±1%	±5%				
0102	1/5W	-55 ~ +155°C	200V	400V	100Ω-56KΩ					-	±15		
					100Ω-82KΩ		49.9Ω- 200KΩ	49.9Ω- 390KΩ			-	±25	
							1Ω-1MΩ					±50	
							1Ω-1MΩ					±100	
0204	1/4W	-55 ~ +125°C	200V	400V	10Ω-332KΩ					-	±5		
					49.9Ω-20KΩ							-	±10
		-55 ~ +155°C	200V	400V	10Ω-300KΩ							-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ				±25	
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ				±50	
							0.1Ω-1MΩ					±100	
0207	1/2W	-55 ~ +125°C	300V	600V	10Ω-332KΩ					-	±5		
					49.9Ω-20KΩ							-	±10
		-55 ~ +155°C	300V	600V	10Ω-300KΩ							-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ				±25	
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ				±50	
							0.1Ω-1MΩ					±100	

High Power Rating 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%	±0.25%	±0.5%	±1%	±5%				
0102	0.3W	-55 ~ +155°C	200V	400V	100Ω-56KΩ					-	±15		
					100Ω-82KΩ		49.9Ω- 200KΩ	49.9Ω- 390KΩ			-	±25	
							1Ω-1MΩ					±50	
							1Ω-1MΩ					±100	
0204	2/5W	-55 ~ +125°C	200V	400V	10Ω-332KΩ					-	±5		
					49.9Ω-20KΩ							-	±10
		-55 ~ +155°C	200V	400V	10Ω-300KΩ							-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ				±25	
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ				±50	
							0.1Ω-1MΩ					±100	
0207	1W	-55 ~ +125°C	350V	700V	10Ω-332KΩ					-	±5		
					49.9Ω-20KΩ							-	±10
		-55 ~ +155°C	350V	700V	10Ω-300KΩ							-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ				±25	
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ				±50	
							0.1Ω-1MΩ					±100	

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.

■ Jumper Specifications

Type \ Item	Power Rating	Operating Temp.Range	Resistance	Rated Current
CSRA0102	1/5W 0.3W	-55 ~ +155°C	0Ω(<15mΩ)	2A
CSRA0204	1/4W 2/5W	-55 ~ +155°C		3A
CSRA0207	1/2W 1W	-55 ~ +155°C		5A

■ Environmental Characteristics

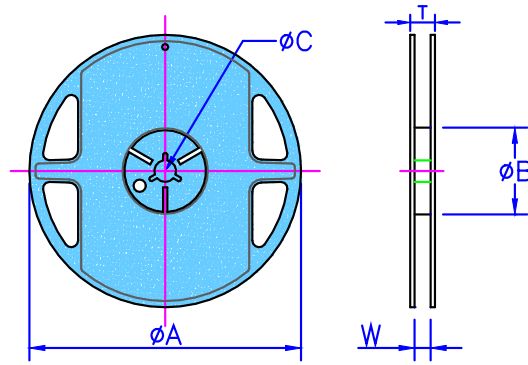
Item	Requirement		Test Method
	5% and Below	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec		JIS-C-5201-1 4.8 IEC-60115-1 4.8 At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature 5ppm: At 25°C/-10°C and 25°C/+85°C, 25°C is the reference temperature
Short Time Overload	10Ω-270KΩ: ±(0.1%+0.01Ω) <10Ω & >270KΩ: ±(0.15%+0.01Ω) 0102: ±(0.15%+0.01Ω) 5ppm: ±(0.05%+0.01Ω)	<15mΩ	JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G		JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute
Operational Life	10Ω-270KΩ: ±(0.25%+0.01Ω) <10Ω & >270KΩ: ±(0.5%+0.01Ω) 0102: ±(0.5%+0.01Ω)	<15mΩ	MIL-STD-202 Method 108 Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion. 5ppm: 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Biased Humidity	10Ω-270KΩ: ±(0.5%+0.01Ω) <10Ω & >270KΩ: ±(1%+0.01Ω) 0102: ±(2%+0.01Ω)	<15mΩ	MIL-STD-202 Method 103 1344 hrs 85°C/85%RH 10% of operating power. (≤ 100 V)
High Temperature Exposure	10Ω-270KΩ: ±(0.25%+0.01Ω) <10Ω & >270KΩ: ±(1%+0.01Ω) 0102: ±(1%+0.01Ω)	<15mΩ	MIL-STD-202 Method 108 at 125°C/+155°C for 1000 hrs
Board Flex	10Ω-270KΩ: ±(0.1%+0.01Ω) <10Ω & >270KΩ: ±(0.5%+0.01Ω) 0102: ±(0.5%+0.01Ω)	<15mΩ	AEC-Q200-005 Bending once for 60 seconds with 2mm
Solderability	95% min. coverage		JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002 245±5°C for 3 seconds
Resistance to Soldering Heat	10Ω-270KΩ: ±(0.1%+0.01Ω) <10Ω & >270KΩ: ±(0.25%+0.01Ω) 0102: ±(0.25%+0.01Ω) 5ppm: ±(0.05%+0.01Ω)	<15mΩ	MIL-STD-202 Method 210 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover		JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤ 10%		JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds

Item	Requirement		Test Method
	5% and Below	Jumper	
Temperature Cycling	10Ω-270KΩ: ±(0.25%+0.01Ω) <10Ω & >270KΩ: ±(0.5%+0.01Ω) 0102: ±(1%+0.01Ω)	<15mΩ	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.01Ω)	<15mΩ	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.01Ω)	<15mΩ	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	±(0.5%+0.01Ω)	<15mΩ	AEC-Q200-002 Human body, 0102/0204:2KV; 0207:4KV
Resistance to Solvents	No visible damage on appearance and marking.		MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken		AEC-Q200-006 Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching of the pinewood board		UL-94 V-0 or V-1 are acceptable. Electrical test not required.

RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

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

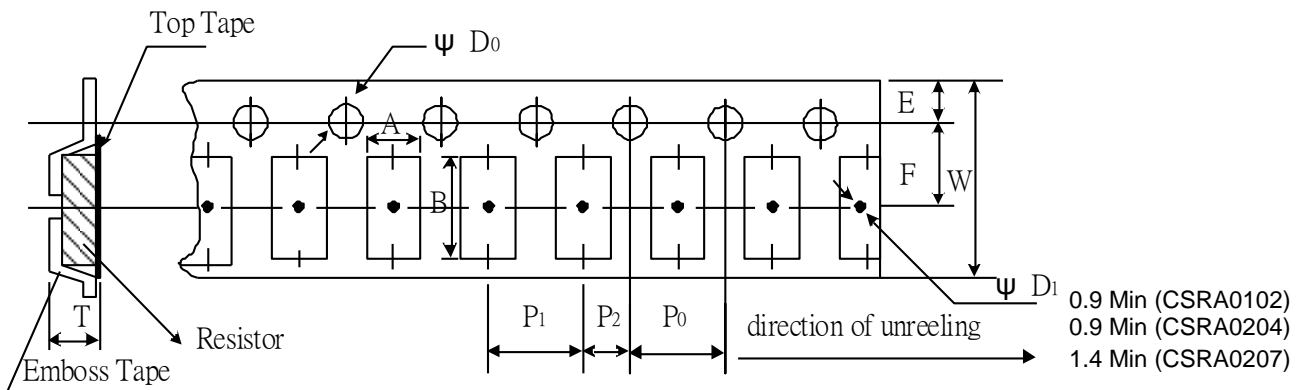
■ Packaging



Packaging Quantity & Reel Specifications

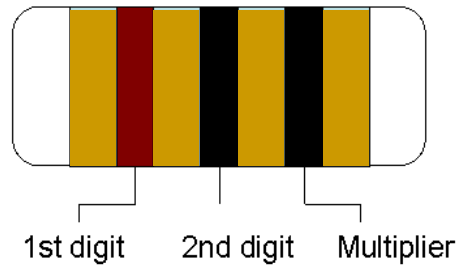
Type	Reel Diameter	ϕA (mm)	ϕB (mm)	ϕC (mm)	W (mm)	T (mm)	Emboss Plastic Tape (EA)
CSRA0102	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
CSRA0204	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
CSRA0207	7 inch	178.5±1.5	60.0+1.0	13.0±0.5	13.0±0.5	15.5±0.5	2,000

Emboss Plastic Tape Specifications

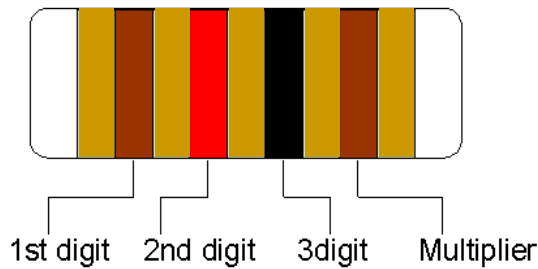


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ϕD_0 (mm)	T (mm)
CSRA0102	1.30±0.10	2.40±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.50±0.10
CSRA0204	1.55±0.10	3.65±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.80±0.10
CSRA0207	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

■ Marking & Resistance Tolerance



±5%	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
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±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%	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 ⁻²
Gold	-	10 ⁻¹
Black	0	10 ⁰
Brown	1	10 ¹
Red	2	10 ²
Orange	3	10 ³
Yellow	4	10 ⁴
Green	5	10 ⁵
Blue	6	10 ⁶
Violet	7	10 ⁷
Grey	8	10 ⁸
White	9	10 ⁹

※ Resistance more than two significant figures(<1R) or more than three significant figures(>1R) will not provide color code.

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Sep 24, 2020	-	- New product release
Version A1	Mar 10, 2021	-	- Modify Soldering Condition (IPC/JEDEC J-STD-020)