

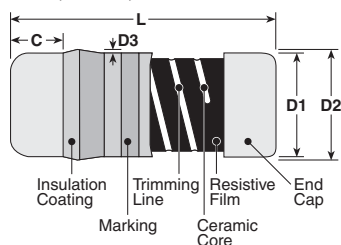


features

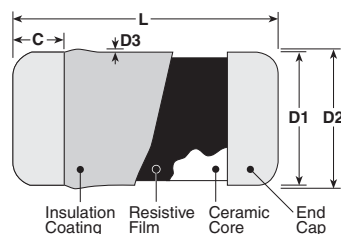
- Free direction for mounting due to cylindrical design
- High precision products (Resistance tolerance $\pm 0.1\%$ and T.C.R. $\pm 25 \times 10^{-6}/K$) available (RN41)
- The electrode strength is firm
- The noise characteristics is excellent
- Suitable for reflow, flow and iron solderings
- Products meet EU-RoHS requirements
- AEC-Q200 qualified (RN41 2ES/3AS, CC 12M/25)

dimensions and construction

RN41, RM41, RD41



CC



Type (Inch/DIN Size Code)	Dimensions inches (mm)				
	L	C	D1	D2 (max.)	D3 (max.)
2A (0805/0102)	.079 $\pm$.004 (2.0 $\pm$ 0.1)	.012 (0.3 min.)	.049 $\pm$.002 (1.25 $\pm$ 0.05)	.053 (1.35)	.003 (0.07)
2D (1206/0203)	.126 $\pm$.008 (3.2 $\pm$ 0.2)	.02 (0.5 min.)	.061 $\pm$.006 (1.55 $\pm$ 0.15)	.069 (1.75)	.004 (0.1)
2ES (1406/0204)	.138 $\pm$.008 (3.5 $\pm$ 0.2)	.02 ~ .035 (0.5 ~ 0.9)	.055 $\pm$.004 (1.4 $\pm$ 0.1)	.061 (1.55)	
CC12M (1406/0204)	.138 $\pm$.008 (3.5 $\pm$ 0.2)	.02 ~ .035 (0.5 ~ 0.9)	.055 $\pm$.004 (1.4 $\pm$ 0.1)	.061 (1.55)	.004 (0.1)
2E, 2H, 3AS (2309/0207)	.232 $\pm$.008 (5.9 $\pm$ 0.2)	.02 (0.5 min.)	.087 $\pm$.004 (2.2 $\pm$ 0.1)	.094 (2.4)	.006 (0.15)
CC25 (2309/0207)	.232 $\pm$.008 (5.9 $\pm$ 0.2)	.02 (0.5 min.)	.087 $\pm$.004 (2.2 $\pm$ 0.1)	.094 (2.4)	.006 (0.15)

ordering information

RN41	2ES	T	TE	1001	F	50*
Type	Size	Termination Material	Packaging	Nominal Resistance	Tolerance	T.C.R. (ppm/°C)
RN41 RM41 RD41	2A: 0.125W 2D: 0.2W 2ES: 0.25W, 0.4W 2E: 0.25W 2H: 0.5W 3AS: 1W	T: Sn	TE: 7" embossed plastic (2A, 2ES - 3,000 pieces/reel) (2D - 2,000 pieces/reel) (2E, 2H, 3AS - 1,500 pieces/reel)	$\pm 5\%$: 2 significant figures + 1 multiplier. "R" indicates decimal on values <10 Ω $\pm 1\%$: 3 significant figures + 1 multiplier. "R" indicates decimal on values <100 Ω	B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$	25: ± 25 50: ± 50 100: ± 100 200: ± 200 Nil: RM41 RD41

*T.C.R. noted for RN41 only

CC12M	T	TE
Type	Termination Material	Packaging
CC12M CC25	T: Sn	TE: 7" embossed plastic

For further information on packaging, please refer to Appendix A.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

10/26/18

applications and ratings

Part Designation	Power Rating @ 70°C	Rated Ambient Temp.	Rated Terminal Part Temp.	T.C.R. (ppm/°C) Max.	Resistance Range					Max. Working Voltage	Max. Overload Voltage
					E-24, E-96 (B±0.1%)	E-24, E-96 (C±0.25%)	E-24, E-96 (D±0.5%)	E-24, E-96 (F±1%)	E-24 (J±5%)		
RN412A	1/8W (.125W)	70°C	—	±100	—	—	—	100Ω-100kΩ	—	150V	200V
RN412D	1/5W (.2W)	70°C	—	±50	—	—	—	10Ω-604kΩ	—		300V
RN412ES	1/4W (.25W)	70°C	90°C	±25	43Ω-511kΩ	100Ω-100kΩ	100Ω-604kΩ	—	—	200V	400V
		70°C	90°C	±50	—	—	—	1Ω-5.11MΩ	0.22Ω-0.91Ω		
RN412ES	2/5W (.4W)*1*2	—	90°C	±50	—	—	—	1Ω-5.11MΩ	0.22Ω-0.91Ω	200V	400V
RN412H	1/2W (.5W)	70°C	—	±200	—	—	—	—	0.22Ω-100kΩ	250V	600V
RN413AS	1W*2	70°C	—	±50	—	—	—	1Ω-1MΩ	0.22Ω-0.91Ω	400V	600V
RM412D	1/5W (.2W)	70°C	—	±350	—	—	—	—	0.22Ω-8.2Ω (E-12)	—	—
RM412H	1/2W (.5W)	70°C	—	±350	—	—	—	—	—	—	—
RD412ES	1/4W (.25W)	70°C	—	—*3	—	—	—	2.2 - 1.0M	2.2 - 1.0M	200V	400V
RD412E	1/4W (.25W)	70°C	—	—*3	—	—	—	1.0 - 2.2M	1.0 - 2.2M	300V	600V

Part Designation	Current Rating	Rated Ambient Temp.	Maximum Resistance
CC12M	2A	+70°C	20 mΩ or less
CC25	5A		

*1 A power rating is guaranteed at the terminal part temperature

If any questions should arise whether to use the "Rated Ambient Temperature" or the "Rated Terminal Part Temperature," please give priority to the "Rated Terminal Part Temperature." Prior to use and for more details refer to "Introduction of the derating curves on the terminal part temperature" in the beginning of the catalog.

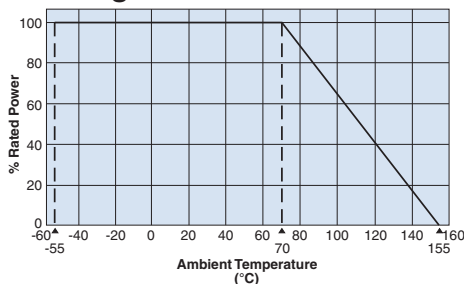
*2 A power rating shall be guaranteed with a method shown in the Performance Characteristics. Please contact factory prior to use.

*3 Please contact factory for T.C.R. of RD41

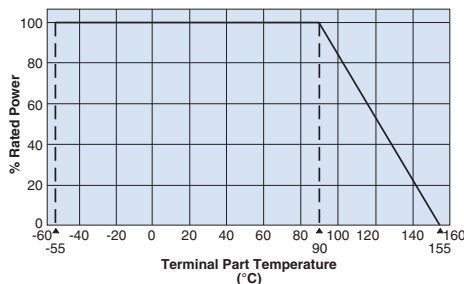
Operating Temperature Range: -55°C to +155°C

environmental applications

Derating Curve



For resistors operated at an ambient temperature of 70°C or above, a power rating shall be derated in accordance with the above derating curve.



For resistors operated at a terminal part temperature of described for each size or above, a power rating shall be derated in accordance with the derating curve.

Please refer to "Introduction of the derating curve based on the terminal part temperature" in the beginning of our catalog before use.

Performance Characteristics

Parameter	Type	Requirement $\Delta R \pm (\% + 0.05\Omega)$	Test Method
		Limit	Typical
Resistance	RN41 RM41 RD41	Within specified tolerance	—
T.C.R.	RN41 RM41 RD41	Within specified T.C.R.	—
Overload (Short time)	RN41 RM41 RD41	$\pm 0.5\%$ $\pm 0.5\%$ $\pm 1\%$	$\pm 0.3\%$ $\pm 0.3\%$ $\pm 0.5\%$
Intermittent Overload	RN41 ¹ RM41 RD41	$\pm 1\%$ $\pm 0.5\%: 2E$ $\pm 1\%$	— — —
Resistance to Soldering Heat	RN41 ² RD41	$\pm 2\%: 2H (10\Omega >)$ $\pm 1\%: 2H (10\Omega \leq)$ $\pm 0.5\%: 2A \sim 2E$ $\pm 1\%$	$\pm 1\%: 2H (10\Omega >)$ $\pm 0.5\%: 2H (10\Omega \leq)$ $\pm 0.3\%: 2A \sim 2E$ $\pm 0.5\%$
Rapid Change of Temperature	RN41 ² RM41 RD41	$\pm 0.5\%: 2A \sim 2E$ $\pm 1\%: 2H$ $\pm 1\%$	$\pm 0.3\%: 2A \sim 2E$ $\pm 0.7\%: 2H$ $\pm 0.75\%$
Moisture Resistance	RN41 ¹ RM41 RD41	$\pm 1\%: 2D, 2E$ $\pm 3\%: 2A; \pm 5\%: 2H$ $\pm 5\%$ $\pm 5\%$	$\pm 0.75\%: 2D, 2E$ $\pm 1.5\%: 2A; \pm 3\%: 2H$ $\pm 3\%$ $\pm 2.5\%$
Endurance at 70°C	RN41 ⁴ RM41 RD41	$\pm 1\%: 2D, 2E$ $\pm 3\%: 2A; \pm 5\%: 2H$ $\pm 5\%$ $\pm 2\%$	$\pm 0.5\%: 2D, 2E$ $\pm 1.5\%: 2A; \pm 3\%: 2H$ $\pm 3\%$ $\pm 1\%$
Low Temperature Exposure	RD41	$\pm 1\%$	$\pm 0.75\%$
High Temperature Exposure	RN41 ³ RD41	$\pm 1\%$ $\pm 2\%$	$\pm 0.75\%$ $\pm 1\%$

¹ 2ES: Does Not Apply ² 2ES: Test Group D ³ 2ES: Test Group A ⁴ 2ES: Test Group C

CC

Parameter	Requirement Δ Real R	Test Method
	Limit	Typical
Resistance	20m Ω Max. after the test	7.5m Ω Max. after the test
Resistance to Solder Heat		
Rapid Change of Temperature		
Moisture Resistance		
Endurance at 70°C		

*Stability Class

Stability Class	Resistance Range	Limit Resistance Changing Attests (Test Group)			
		A	B	C	D
0.25	10-332k Ω	$\pm(0.25 + 0.05\Omega)$	$\pm(0.50 + 0.05\Omega)$	$\pm(0.25 + 0.05\Omega)$	$\pm(0.05 + 0.05\Omega)$
0.5	1-<10 Ω			$\pm(0.50 + 0.05\Omega)$	$\pm(0.10 + 0.05\Omega)$
1	0.22-<1 Ω			$\pm(1.00 + 0.05\Omega)$	$\pm(0.25 + 0.05\Omega)$
2	>332k Ω -<5.11M Ω	$\pm(0.50 + 0.05\Omega)$	$\pm(1.00 + 0.05\Omega)$	$\pm(2.00 + 0.05\Omega)$	$\pm(0.50 + 0.05\Omega)$

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