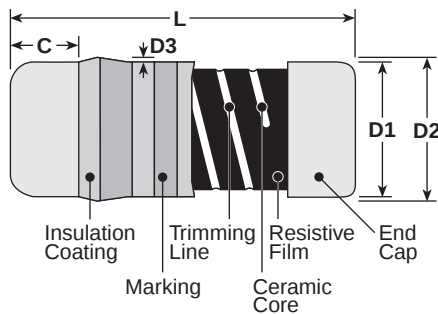




features

- Higher stability in short and long term tests
- Marking: Blue body color for "RN", green for "RM"
- Products with lead-free terminations meet EU RoHS and China RoHS requirements
- AEC-Q200 Qualified: RN412ES, RN413AS only

dimensions and construction



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

ordering information

New Part #	RN41	2ES	T	TE	1002	F	50*
Type	RN41	Size	Termination Material	Packaging	Nominal Resistance	Tolerance	T.C.R. (ppm/°C)
		2A: 0.125W 2D: 0.2W 2E: 0.25W 2ES: 0.4W 2H: 0.25W 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)	±5%: 2 significant figures + 1 multiplier. "R" indicates decimal on values <10Ω ±1%: 3 significant figures + 1 multiplier. "R" indicates decimal on values <100Ω	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1% J: ±5%	25 50 100 200

*T.C.R. noted for RN41 only

New Part #	RM41	2D	T	TE	1R0	J
Type	RM41	Size	Termination Material	Packaging	Nominal Resistance	Tolerance
		2D: 0.2W 2H: 0.5W	T: Sn	TE: 7" embossed plastic (2D - 2,000 pieces/reel) (2H - 1,500 pieces/reel)	±5%: 2 significant figures + 1 multiplier. "R" indicates decimal on values <10Ω	J: ±5%

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.

9/26/17

applications and ratings

Part Designation	Power Rating @ 70°C	Rated Ambient Temp.	Rated Terminal Part Temp.	T.C.R. (ppm/°C) Max.	Resistance Range					Absolute Max. Working Voltage	Absolute 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)**	—	90°C	±50	—	—	—	1Ω-100Ω	0.22Ω-0.91Ω	—	—
RN412E	1/4W (.25W)	70°C	—	±25	—	100Ω-100kΩ	100Ω-1MΩ	—	—	250V	500V
		70°C	—	±50	—	—	—	10Ω-1.0MΩ	—		
RN412H	1/2W (.5W)	70°C	—	±200	—	—	—	—	0.22Ω-100kΩ	250V	600V
RN413AS	1W*	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	—	—	—	—	—	—	—

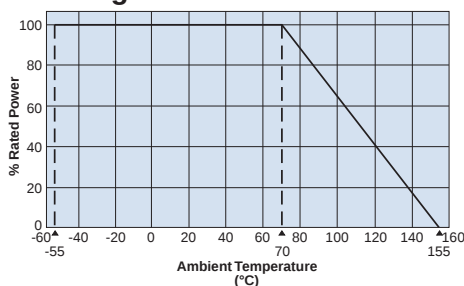
* A power rating shall be guaranteed with a method shown in the Performance Characteristics. Please contact factory prior to use.
Operating Temperature Range: -55°C to +155°C

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

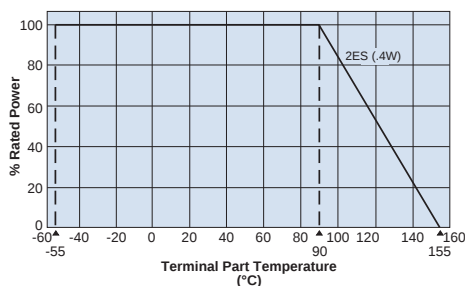
If any questions should arise whether to use the "Rated Ambient Temperature" or the "Rated Terminal Part Temperature," please give priority to the "Rated Terminal Part Temperature." Prior to use and for more details refer to "Introduction of the derating curves on the terminal part temperature" in the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

environmental applications

Derating Curve



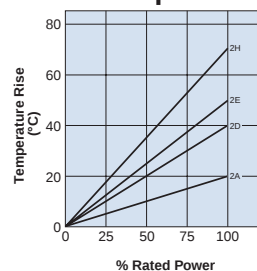
For resistors operated at an ambient temperature of 70°C or above, a power rating shall be derated in accordance with the above derating curve.



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.

Surface Temperature Rise



Performance Characteristics

Parameter	Requirement $\Delta R \pm (\% + 0.05\Omega)$		Test Method
	Limit	Typical	
Resistance	Within specified tolerance	—	25°C
T.C.R.	Within specified T.C.R.	—	+25°C/-55°C, +25°C/+125°C
Overload (Short time)	*2ES: Test Group D ±0.5%: All Others	±0.3%	Rated voltage x 2.5 for 5 seconds
Intermittent Overload	±1%: RN41 2A,2D,2H ±0.5%: RM41 2E *2ES: Does Not Apply	—	Rated voltage x 4 (2Ax3) or Max. intermittent overload voltage, whichever is lower, 10,000 cycles. Max. intermittent overload voltage: 2A: 200V, 2D: 300V, 2E: 500V, 2H: 600V
Resistance to Soldering Heat	±2%: 2H (10Ω>) ±1%: 2H (10Ω≤) ±0.5%: RN41 2A~2E *2ES: Test Group D	±1%: 2H (10Ω>) ±0.5%: 2H (10Ω≤) ±0.3%: RN 2A~2E	260°C ± 5°C, 10 seconds ± 1 second
Rapid Change of Temperature	±0.5%: RN41 2A~2E ±1%: RN41 2H ±1%: RM41 *2ES: Test Group D	±0.3%: RN41 2A~2E ±0.7%: RN41 2H ±0.75%: RM41	-55°C (30 minutes), +125°C (30 minutes), 5 cycles
Moisture Resistance	±1%: RN41 2D,2E ±3%: RN41 2A ±5%: RN41 2H ±5%: RM41 *2ES: Test Group C	±0.75%: RN41 2D,2E ±1.5%: RN41 2A ±3%: RN41 2H ±3%: RM41	40°C ± 2°C, 90 ~ 95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
Endurance at 70°C	±1%: RN41 2D,2E ±3%: RN41 2A ±5%: RN41 2H ±5%: RM41 *2ES: Test Group A	±0.5%: RN41 2D,2E ±1.5%: RN41 2A ±3%: RN41 2H ±3%: RM41	70°C ± 2°C, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle
High Temperature Exposure	±1%: RN41 *2ES: Test Group C	±0.75%: RN41	+125°C, 100 hours

*Stability Class

Stability Class	Resistance Range	Limit Resistance Changing Attests (Test Group)			
		A	B	C	D
0.25	10-332kΩ	±(0.25 + 0.05Ω)	±(0.50 + 0.05Ω)	±(0.25 + 0.05Ω)	±(0.05 + 0.05Ω)
0.5	1-<10Ω			±(0.50 + 0.05Ω)	±(0.10 + 0.05Ω)
1	0.22-<1Ω			±(1.00 + 0.05Ω)	±(0.25 + 0.05Ω)
2	>332kΩ-≤5.11MΩ	±(0.50 + 0.05Ω)	±(1.00 + 0.05Ω)	±(2.00 + 0.05Ω)	±(0.50 + 0.05Ω)