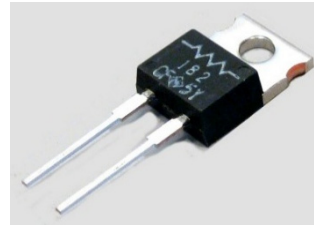


TO220 35W HIGH POWER RESISTORS

RNP-20S/RMP-20S

Features

- 35 W power rating, TO-220 package
- AEC-Q200 Grade, RoHS 2 compliant
- UL94 V-0 certified material
- 175°C maximum operating temperature
- Supports inductive and capacitive loads (DC 100 MHz)



RNP-20S



RMP-20S

Application

- Power Supply Units
- Inverter Circuit
- Automotive electrical equipment
- Electronic Load Device
- UPS
- Motor control inverter
- Testing/Measuring Equipment
- Filter
- Bleeder
- Snubber
- Damping Resistor

Ordering Information

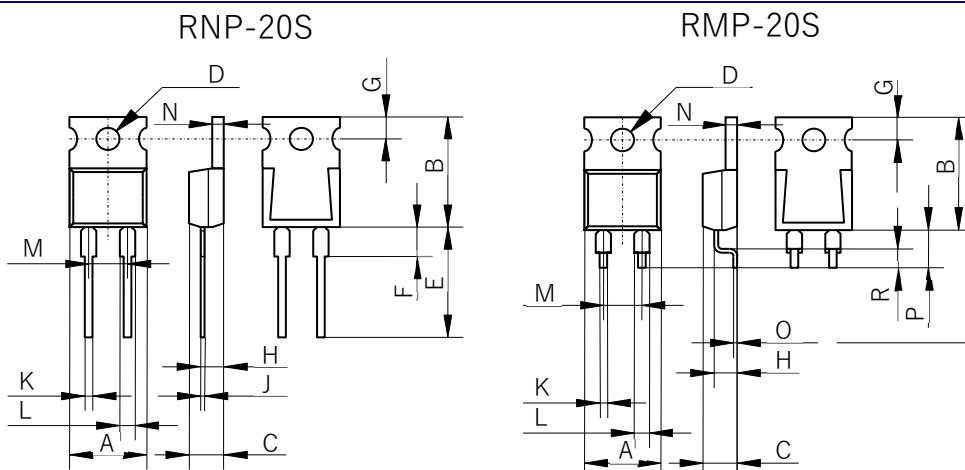
Model	TCR	Resistance	Tolerance	Packaging
RNP-20S	C/A/P/H	100 ohm	F	Z03

Model	TCR	Symbol	Value Range (Ω)	Tolerance (%)	Symbol	Packaging	Symbol
RNP-20S	50	C	10~51k	1	F	50pcs/ PVC Stick	Z03
RMP-20S	100	A	0.1~9.1	5	J		
	150	P	56k~1M				
	250	H	0.01~0.09				

Typical Resistance Values, Following modified E24, +E24.

1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.5	2.7	3.0	3.3
3.6	3.9	4.0	4.3	4.7	5.0	5.1	5.6	6.2	6.8	7.5	8.0	8.2	9.1

Dimensional Specifications (mm)



	mm
A	10.1+/-0.2
B	15.0+/-0.2
C	4.5+/-0.2
D	3.6+/-0.1
E	15.5+/-1.0
F	4.0+/-0.5
G	3.0+/-0.2
H	2.75+/-0.2
J	0.5+/-0.05
K	0.75+/-0.05
L	1.5+/-0.05
M	5.08+/-0.1
N	1.5+/-0.05
O	0.5+/-0.05
P	5.0+/-1.0
R	2.5+/-0.5

Specifications

Parameter	Values / Specifications	Test Conditions
Rated Power	35 W	-55°C to 25°C at flange
Rated Power	1.0 W	Free air
Max. Operating Volt.	Smaller value either 500V or $\sqrt{P \cdot R}$	Maximum input current: 20A
Operation Temperature Range	-55 °C~+175 °C	-

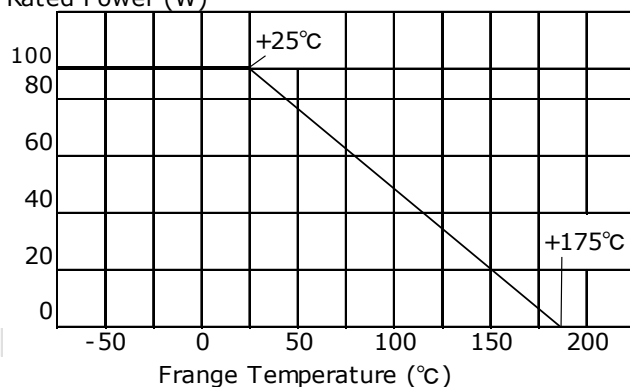
Note: In some of high ohmic and low ohmic cases, the rated power cannot be input due to the limitation of the maximum operation voltage or current value. Please use under 500V in the case over 7k Ohms. Please use below 20A in the case under 0.1 Ohms.

Reliability

Parameter	Values / Specifications	Test Conditions
Heat Resistance	3.3 °C/W	Between resistive material and flange *Typical value
Capacitance	1.44 pF	Between terminal and flange *Typical value
Inductance	8.38 nH	Between terminals *Typical value
Insulation Resistance	$\geq 1,000$ Mohm	Between terminal and flange
Insulation Voltage	$\geq 2,000$ VAC	Between terminal and flange, 1min.
Weight	2.1 g	-
High Temperature Exposure (Storage)	+/- (1.00 % + 0.05ohm)	AEC-Q200 No.3 +175 °C, 1,000 hours, 77pcs
Temperature Cycle	+/- (1.00 % + 0.05ohm)	AEC-Q200 No.4 -55 °C 30min. +125 °C 30min. 77pcs 1,000 cycles
Moisture Resistance	+/- (1.00 % + 0.05ohm)	AEC-Q200 No.6 +85 °C, 85 %RH, 1,000 hours, 0.1 W, 77pcs
High Temperature Operating Life	+/- (1.00 % + 0.05ohm)	AEC-Q200 No.8 TA=125 °C, 1,000 hours, Rated power, 77pcs
Terminal Strength	+/- (0.25 % + 0.05ohm)	AEC-Q200 No.11 30pcs
Vibration	+/- (1.00 % + 0.05ohm)	AEC-Q200 No.14 10~2,000 Hz, 30pcs
Solder ability	≥ 95 %	JIS C 60068-2-20 4.2.1 Pb-free solder, 245+/-5 °C 3 sec. 22pcs
Soldering Heat	+/- 0.1 %	JIS C 60068-2-20 5.2.1 Pb-free solder, 260+/-5 °C 10sec. 44pcs

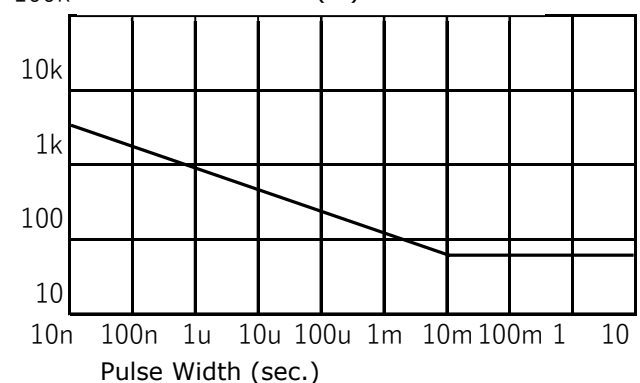
Derating

Rated Power (W)

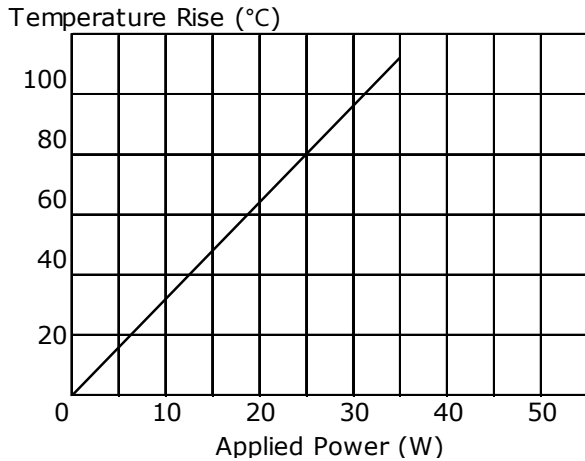


Pulse Energy Durability *note (6)

100k Pulse Peak Power (W)

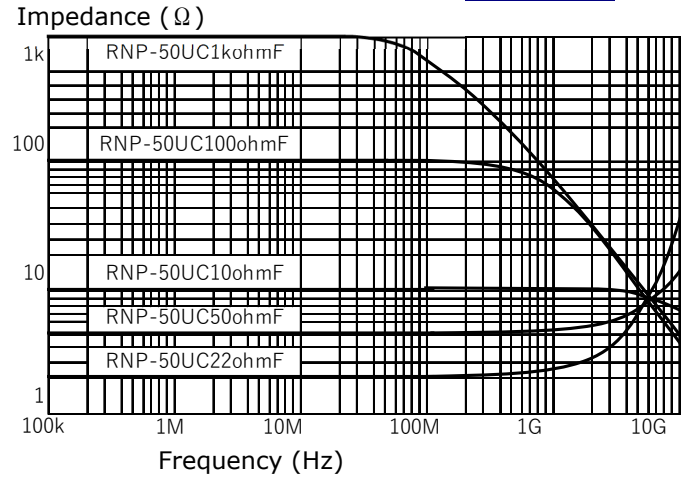


Temperature Rise



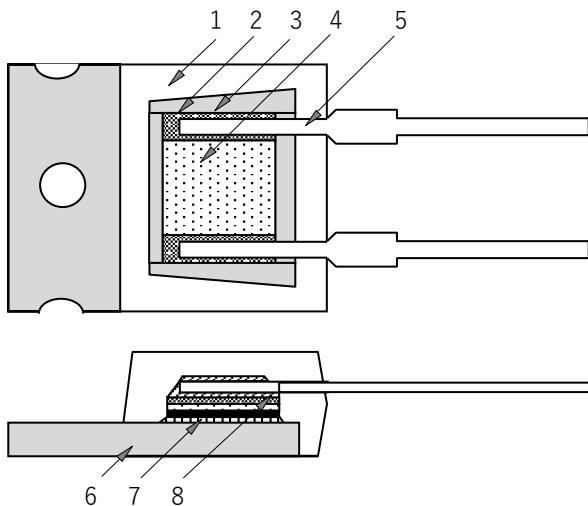
*Temperature rise of the resistor based on flange temperature

Frequency Characteristics



*RNP-50U shows the same results as RNP-20S/RPM20S

Structure and Material



No.	Part	Material
1	Exterior resin	Epoxy resin UL94V-0
2	Substrate	96% Almina
3	Electrode	Thin-film: Cu Thick-film: Ag-Pd
4-1	Resistive material	Thin-film: NiCr Thick-film: RuO
4-2	Glass	Only in thick-film
4-3	Internal protective layer	Epoxy resin
5	Terminal	Cu-Sn plating
6	Flange	Cu-Ni plating
7	Flange joint	Sn97% Solder -Ag-Cu
8	Terminal joint	Pb90% Solder -Sn-Ag

*Thin-film: 10-51kohm Thick-film: 0.01-1Mohm

*4: Layering in order as 4-1, 4-2, 4-3.

*Raw materials of RNP-20S and RMP-20S are same.

Note :

- (1) The resistance value and the tolerance are selectable not only from E24 as customization. Please contact to our factory for detail.
- (2) Flange is insulated from the internal resistive elements.
- (3) The resistance value of RNP-20S defined at 5.27mm +/-0.6 mm from external molding.
The resistance value of RMP-20S is defined at the terminal crank part.
- (4) TCR value of low resistance values are depend on the TCR of copper terminals. The TCR will shows the following values; 300ppm/0.02ohm、 200ppm/0.05ohm、 140ppm/0.1ohm、 80ppm/0.2ohm
- (5) Recommended screw torque is 0.5-0.6Nm.
- (6) Tentative continuous-pulse power allowance at duty 0.01.

Instruction for Use

- (1) If the resistor is not mounted on a heatsink, please operate it at 1W or less in ambient room temperature.
- (2) For effective heat conduction, please apply appropriate thermal interface materials such as grease or sheets.
- (3) This product is not designed for use in the special environments listed below.
 - Direct sunlight, outdoor exposure, or dusty environments
 - Areas with corrosive gases such as sea breeze, Cl₂, NO₂, NH₃, H₂S, or SO₂
 - Environments with strong electrostatic discharge or electromagnetic interference
 - Installation in close proximity to heat-generating components
 - Mounting methods where the product is isolated from the heat-dissipation system and encapsulated or coated with resin
 - Environments with continuous condensation
- (4) Please handle the product with care, as it may be damaged if subjected to impacts such as dropping.
- (5) This product is not designed for radiation-resistant operation or for use in vacuum environments.
- (6) Please verify the product's performance and reliability when it is mounted in the actual equipment. In particular, when transient loads such as pulses are applied, be sure to confirm performance and reliability.
- (7) Any failure caused by operating the product beyond the conditions stated in the datasheet is excluded from our warranty.