

FEATURES

- NON-FLAMMABLE RESIN INSULATION
- HIGH STABILITY AND RELIABILITY
- LOW NOISE
- LOW COST ALTERNATIVE TO CARBON COMPOSITION AND WIREWOUND APPLICATIONS
- NEW REDUCED SIZES
- EIA COLOR CODING AND ALPHA-NUMERICAL CODING AVAILABLE DEPENDING ON SIZE



RoHS
Compliant
includes all homogeneous materials

*See Part Number System for Details

STANDARD TYPES, RATINGS AND AVAILABILITY

Type	NMO100	NMO200	NMO300	NMO500	NMO700
Power Rating at 70°C	1 Watt	2 Watts	3 Watts	5 Watts	7 Watts
Max. Working Voltage at 70°C**	350V	350V	500V	750V	850V
Max. Overload Voltage at 70°C	600V	600V	800V	1000V	1500V
Max. Pulse Voltage at 70°C	750V	750V	1500V	2000V	2000V
Resistance Range	±5% (J) Tol.	0.22Ω ~ 100KΩ	0.22Ω ~ 100KΩ	0.5Ω ~ 100KΩ	5.1Ω ~ 200KΩ
	±2% (G) Tol.	10Ω ~ 100KΩ	10Ω ~ 100KΩ	10Ω ~ 100KΩ	10Ω ~ 100KΩ
Resistance Value Availability	E-24	E-24	E-24	E-24	E-24
Axial Taping Availability	Yes	Yes	No	No	No

REDUCED SIZE, RATING AND AVAILABILITY

Type	NMO100S	NMO200S	NMO300S	NMO500S	NMO700S
Power Rating at 70°C	1 Watt	2 Watts	3 Watts	5 Watts	7 Watts
Max. Working Voltage at 70°C**	350V	350V	350V	500V	750V
Max. Overload Voltage at 70°C	600V	600V	600V	800V	1000V
Max. Pulse Voltage at 70°C	750V	750V	750V	750V	1200V
Resistance Range	±5% (J) Tol.	0.22Ω ~ 50KΩ	0.22Ω ~ 50KΩ	0.5Ω ~ 100KΩ	10Ω ~ 200KΩ
	±2% (G) Tol.	10Ω ~ 50KΩ	10Ω ~ 50KΩ	10Ω ~ 100KΩ	10Ω ~ 200KΩ
Resistance Value Availability	E-24	E-24	E-24	E-24	E-24
Axial Taping Availability	Yes	Yes	No	No	No

* Special Order ** Maximum allowable continuous voltage (Vdc or rms) for all resistors is the lower of the two values: "MAXIMUM WORKING VOLTAGE" as specified, or $\sqrt{\text{Power rating (WATTS} \times \text{Resistance (OHMS))}}$

CHARACTERISTICS

Requirements	Performance	Test Method & Conditions	
		JIS C5202	MIL-R-22684B
Operating Temperature Range	-55 ~ +200°C (Derated above 70°C as per derating curve below)		
Withstanding Voltage (Lead to Body)	See Maximum Working Voltage		
Temperature Coefficient	±200ppm/°C	5.2, t-to=80°C	4.6.11
Short Time Overload	$\Delta R < \pm(0.5\% + 0.05\Omega)$	5.5, Cond. A	4.6.5
Temperature Cycling	$\Delta R < \pm(0.5\% + 0.05\Omega)$	7.4, -55/+85°C	4.6.3
Soldering Effect	$\Delta R < \pm(0.5\% + 0.05\Omega)$	6.4, +350°C for 3 sec.	4.6.9
Vibration	$\Delta R < \pm(0.5\% + 0.05\Omega)$	6.3, Cond. A	4.6.14
Moisture Resistance	$\Delta R < \pm 5\%$	7.9, +40°C 90~95%RH 100hrs	4.6.10
Load Life	$\Delta R < \pm 5\%$	7.10, +70°C 1000hrs.	4.6.12

TYPICAL PERFORMANCE

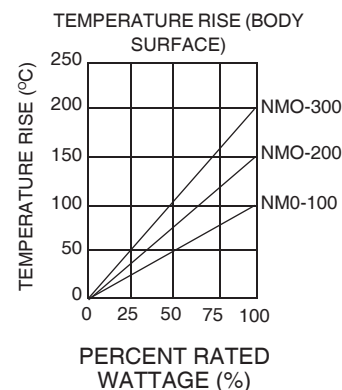
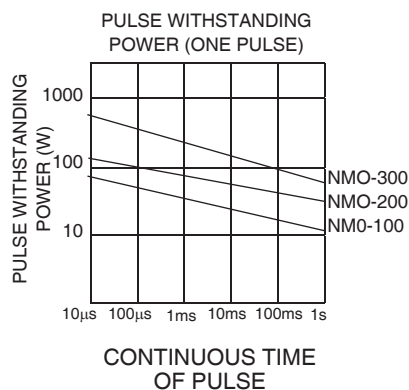
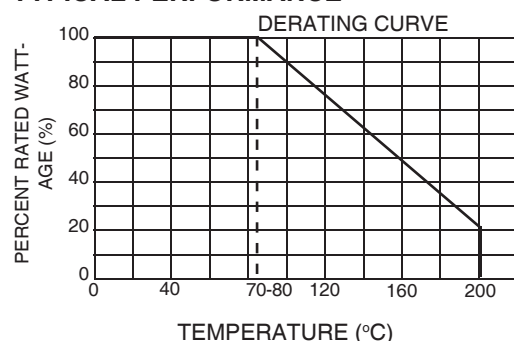


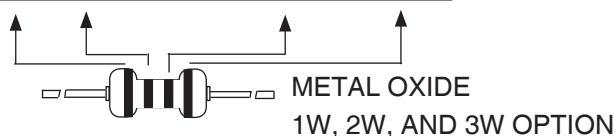
Figure 1: Schematic diagram of the experimental setup. The top part shows a cross-section of a cylindrical sample with diameter D and a central hole of diameter d . The bottom part shows a side view of the sample mounted on a lead material. The sample has a length L and is surrounded by lead material of thickness H on both sides. The lead material is labeled "Lead Material: 10% Pb, 90% Sb".

Type	Dimensions (mm)			
	D $\phi \pm 0.6$	L ± 1.0	H ± 3.0	d $\phi \pm 0.05$
NMO100	4.5	11	30	0.80
NMO200	5.5	15	30	0.80
NMO300	8.5	24	38	0.80
NMO500	8.5	41	38	0.80
NMO700	8.5	53	38	0.80

Type	Dimensions (mm)			
	D $\phi \pm 0.6$	L ± 1.0	H ± 3.0	d $\phi \pm 0.05$
NMO100S	3.5	9.0	30	0.65
NMO200S	4.5	11	30	0.80
NMO300S	5.5	15	30	0.80
NMO500S	8.5	24	38	0.80
NMO700S	8.5	41	38	0.80

Color	Significant Figure			Multiplier	Tolerance
	1st	2nd	3rd		
Black	0	0	0	1	-
Brown	1	1	1	10	F (±1%)
Red	2	2	2	100	G (±2%)
Orange	3	3	3	1,000	-
Yellow	4	4	4	10,000	-
Green	5	5	5	100,00	D ±0.5%)
Blue	6	6	6	1,000,000	C (±0.25%)
Violet	7	7	7	10,000,000	B (±0.1%)
Grey	8	8	8	-	-
White	9	9	9	-	-
Gold	-	-	-	0.1	J (±5%)
Silver	-	-	-	0.01	K (±10%)

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



NMO 5W
1KΩ

NMO 100 S J 103 TR F

RoHS compliant parts

TR = Tape and Reel
B = Bulk

Resistance Code: First 2 digits are significant,
3rd digit is multiplier, "R" indicates decimal on
values below 10 OHMS

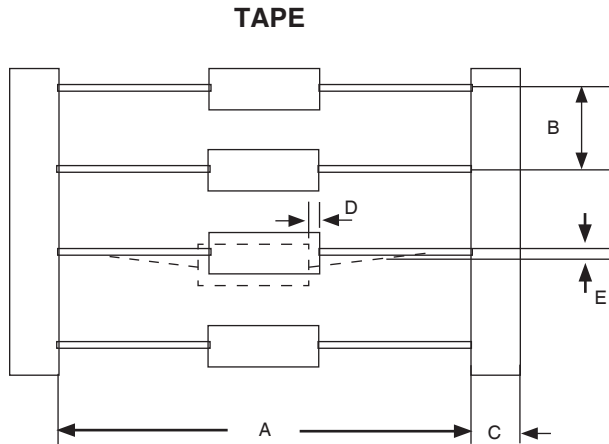
Tolerance Code:
G = $\pm 2\%$ (Opt.)
J = $\pm 5\%$ STD.

S = Reduced Size

Power Rating (Wattage Code)
100 = 1WATT 500 = 5WATTS
200 = 2WATTS 700 = 7 WATTS
300 = 3WATTS

Series

Resistor Taping Specifications & Mechanical Characteristics

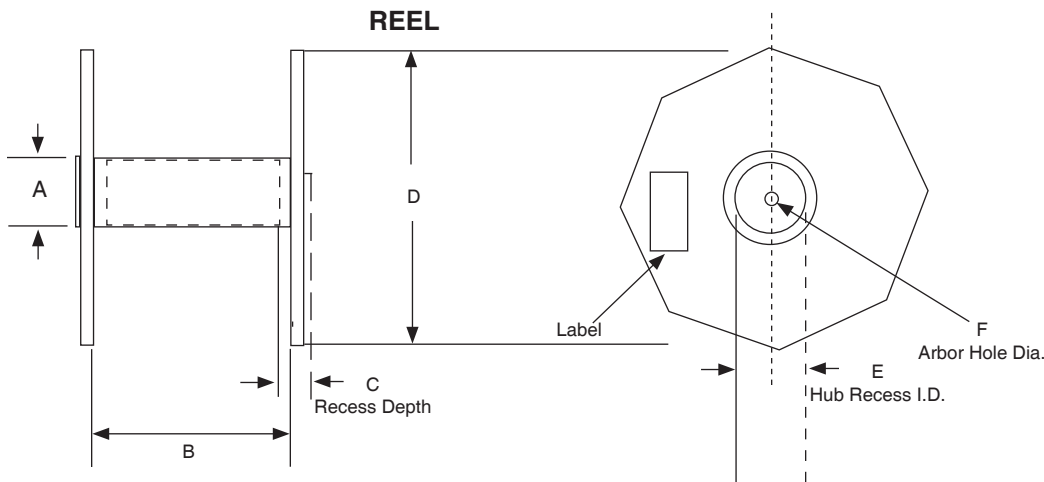


TAPE DIMENSIONS (mm)

Power Rating (Wattage)	A	B	C	D max.	E max.
1/8W	52 ± 1.0	5 ± 0.5	6 ± 0.3	0.6	1.2
1/4W	52 ± 1.0	5 ± 0.5	6 ± 0.3	0.6	1.2
1/2W	52 ± 1.0	5 ± 0.5	6 ± 0.3	0.6	1.2
1W	52.4 ± 1.5	5 ± 0.6	6 ± 0.3	0.6	1.2
	63.5 ± 1.5				
2W	52.4 ± 1.5	5 ± 0.6	6 ± 0.3	0.6	1.2
	63.5 ± 1.5	10 ± 1.0			
3W	52.4 ± 1.5	5 ± 0.6	6 ± 0.3	0.6	1.2
	63.5 ± 1.5	10 ± 1.0			

REEL DIMENSIONS (mm)

Power Rating	A max.	B	C ref.	D max.	E max.	F ± 1.0
1/8W ~ 2W	60	40 ~ 100	16	312	53	15
3W		70 ± 10				14.5



MECHANICAL CHARACTERISTICS

LEAD PULL TEST

The lead wire shall withstand steady pull of the following weight axially to the lead wire for the minimum period of 10 seconds without any breakage or damage:

Nom. Lead Diameter	0.4φmm	0.5φmm	0.6φmm	0.7φmm	0.8φmm & over
Steady Weight	1.0Kgs.	1.0Kgs.	1.5Kgs	2.0Kgs.	2.5Kgs.

LEAD BEND TEST

The lead wire shall withstand minimum 4 bends of 90° rotation without any breakage or damage, when the resistor is placed in a vertical position and is applied with a weight of 0.5Kgs for 0.4 - 0.5mm or 1.1Kgs for 0.6mm and over lead wire.

SOLDERABILITY

The lead wire is immersed into 10% methanol or isopropyl alcohol of rosin by weight for a period of 2 ± 0.5 seconds. Then, it shall be dipped into molten solder melted at 230 ± 5°C for a period of 5 ± 1 seconds approximately 1.5mm from the body of the resistor. A new adhering coating of solder shall cover minimum 95% of the surface being dipped into solder.

RESISTANCE TO CLEANING SOLVENTS

Color coating or marking shall remain legible after cleaning by solvents such as isopropyl alcohol, trichloroethylene, freon® TF/TAX, xylene etc., in form of liquid or gas.

