



Our Products

- 1.** CR Series Carbon Film Resistors
- 2.** MF Series Metal Film Resistors
- 3.** MO Series Flame-Proof Type Metal Oxide Film Resistors
- 4.** FCR Series Flame-Proof Type Carbon Film Resistors
- 5.** FMF Series Flame-Proof Type Metal Film Resistors
- 6.** FMR Series Ultra Miniature Style Metal Film Resistors
- 7.** FUSIBLE METAL FILM RESISTORS
- 8.** ZERO-OHM JUMPER WIRE
- 9-10.** KNP, KNS, KNSS, NKN, KNY Wirewound Resistors
- 11.** SQP Series Cement Wire Wound Resistors
- 12.** SQT Series Cement Wire Wound Resistors
- 13.** SQM Series Cement Wire Wound Resistors
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- 18.** SQV Series Cement Wire Wound Resistors
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- 21-23.** NON-FLAMMABLE FIXED WIRE-WOUND POWER RESISTORS
- 24-25.** ALUMINUM HOUSED, WIREWOUND RESISTORS
- 26-27.** PRECISION POWER RESISTORS DIMENSIONS - 5~50W, 100W, 250W.
- 28.** Thick Film Chip Resistors (RC Series)
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Low Value Chip Resistors (RL Series)
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Thick Film Chip Resistors Network (YC Series 10P/8R)
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CR Series Carbon Film Resistors

CARBON FILM RESISTORS

CR Series

1/6W; 1/8W, 1/4W, 1/2W, 1W, 2W, 3W,
1/4WS, 1/2WS, 1WS, 2WS, 3WS, 5WS
CR-12, CR-25, CR-50, CR-100, CR-200, CR-300



INTRODUCTION

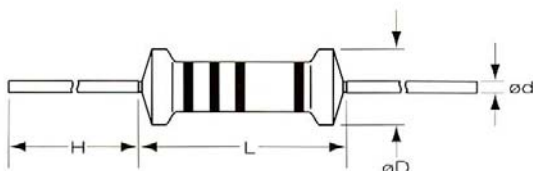
Featuring consistency and stably-controlled, these carbon film resistors with reasonable prices are widely & largely used in the electronic, electrical and information industries.

This resistor is a ceramic bar tightly coated with a carbon film which is composed of carbon separated from organic compound through the treatment of high-temperature vacuum. After the carbon-coated bar is connected with proper joint and engraved with grooves, its surface is finished with epoxy resin so that the bar is enclosed with a protective film.

FEATURES

- Industry's lower cost and deliver from stock.
- Exceptional long-term stability.
- Exceeds carbon comp MIL-R-11 performance.
- Standard tolerance: $\pm 2\%$, $\pm 5\%$
- Variety of packing-bulk, strip pack, 26mm and 52mm tape and reel, cut and formed or radial Pana.

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)	VALUE RANGE
	L	ØD	H	Ød		
CR-12	3.2 \pm 0.2	1.8 \pm 0.3	28 \pm 2	0.43 \pm 0.02	1/6W; 1/8W, 1/4WS	1 Ω ~10M
CR-25	6.0 \pm 0.2	2.3 \pm 0.3	28 \pm 2	0.5 \pm 0.02	1/4W, 1/2WS	1 Ω ~10M
CR-50	9.0 \pm 0.5	3.2 \pm 0.3	26 \pm 2	0.6 \pm 0.02	1/2W, 1WS	1 Ω ~10M
CR-100	11.0 \pm 0.5	4.5 \pm 0.5	35 \pm 2	0.7 \pm 0.02	1W, 2WS	1 Ω ~10M
CR-200	15.0 \pm 0.5	5.0 \pm 0.5	32 \pm 2	0.8 \pm 0.02	2W, 3WS	1 Ω ~10M
CR-300	17.0 \pm 0.5	6.0 \pm 0.5	32 \pm 2	0.8 \pm 0.02	3W, 5WS	1 Ω ~10M

ELECTRICAL CHARACTERISTICS:

Style	CR-12	CR-25	CR-50	CR-100	CR-200	CR-300
Power Rating 70°C	1/6; 1/8W, 1/4WS	1/4W, 1/2WS	1/2W, 1WS	1W, 2WS	2W, 3WS	3W, 5WS
Operating Temp. Range	-55°C ~ +155°C					
Max. Working Voltage	200V	250V	350V	500V	500V	600V
Max. Overload Voltage	400V	600V	700V	1000V	1000V	500V
Dielectric Withstanding Voltage (AC)	400V	500V	700V	1000V	1000V	1000V
Max. Intermittence Overload Voltage	500V	600V	700V	1000V	1000V	1000V
T.C.R. (PPM)	CR-12 / CR-25 / CR-50			CR-100 / CR-200 / CR-300		
	100K Ω down	100K Ω ~1M Ω	1M up	100K Ω down	100K Ω ~1M Ω	1M Ω up
	+350/-500	0 ~ -700	0 ~ -1500	+350 ~ -500	0 ~ -700	0 ~ -1500

FIG.1 DERATING CURVE

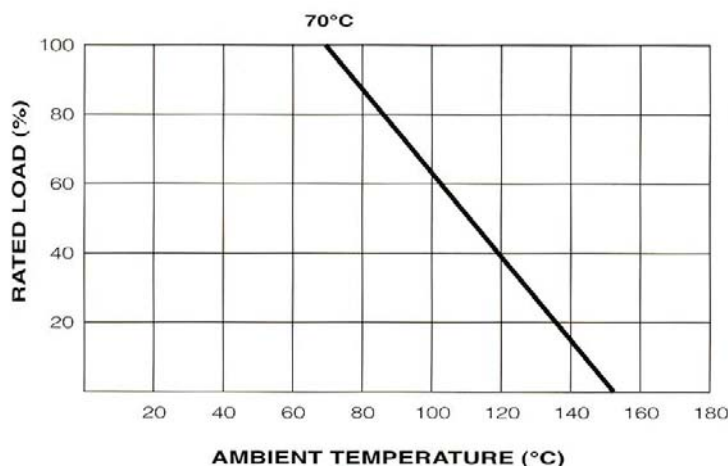
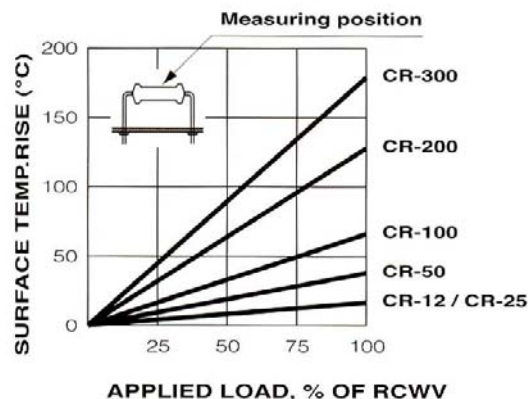


FIG.2 HOT-SPOT TEMPERATURE





MF Series Metal Film Resistors

METAL FILM RESISTORS

MF Series

1/6W; 1/8W, 1/4W, 1/2W, 1W, 2W,
1/4WS, 1/2WS, 1WS, 2WS, 3WS
MF-12, MF-25, MF-50, MF-100, MF-200

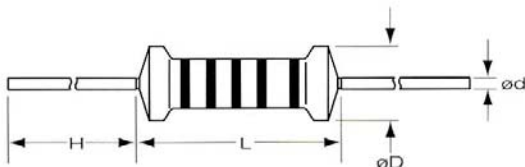
INTRODUCTION

The MF series Metal Film Resistors are manufactured using vacuum sputtering system to deposit multiple layers of mixed metals and passivative materials onto a carefully treated high grade ceramic substrate, the resistors are coated with layers of light-blue lacquer.

FEATURES

- MIL-R-1059F.
- MF-12, MF-25, MF-50, MF-100, MF-200 (RN-50, RN-55, RN-60, RN-65, RN-70)
- Resistance Tolerance :
±0.05%, ±0.1%, ±0.25%, ±0.5%, ±1%
- T.C.R. :
±15ppm, ±25ppm, ±50ppm, ±100ppm

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)	VALUE RANGE
	L	øD	H	ød		
MF-12	3.2±0.2	1.8±0.3	28±2	0.43±0.02	1/6W; 1/8W, 1/4WS	1Ω~10M
MF-25	6.0±0.2	2.3±0.3	28±2	0.5±0.02	1/4W, 1/2WS	1Ω~10M
MF-50	9.0±0.5	3.2±0.3	26±2	0.6±0.02	1/2W, 1WS	1Ω~10M
MF-100	11.0±0.5	4.5±0.5	35±2	0.7±0.02	1W, 2WS	1Ω~10M
MF-200	15.0±0.5	5.0±0.5	32±2	0.8±0.02	2W, 3WS	1Ω~10M
MF-300	17.0±0.5	6.0±0.5	32±2	0.8±0.02	3W, 5WS	1Ω~10M

ELECTRICAL CHARACTERISTICS:

Style	MF-12	MF-25	MF-50	MF-100	MF-200	—
Power Rating 70°C	1/6; 1/8W, 1/4WS	1/4W, 1/2WS	1/2W, 1WS	1W, 2WS	2W, 3WS	—
Operating Temp. Range	-55°C ~ +155°C					
Max. Working Voltage	200V	250V	350V	500V	500V	—
Max. Overload Voltage	400V	600V	700V	1000V	1000V	—
Dielectric Withstanding Voltage (AC)	300V	500V	700V	1000V	1000V	—
Max. Intermittence Overload Voltage	400V	600V	700V	1000V	1000V	—
Value Range ±0.25%, ±0.5%, ±1%	10Ω~1MΩ					
Value Range ±0.05%, ±0.1%	100Ω~100KΩ					
Temp. Coefficient (by Type)	±15ppm, ±25ppm, ±50ppm, ±100ppm					

FIG.1 DERATING CURVE

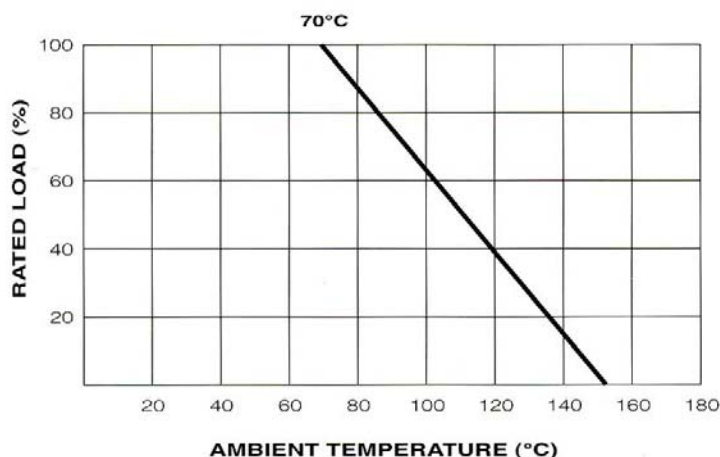
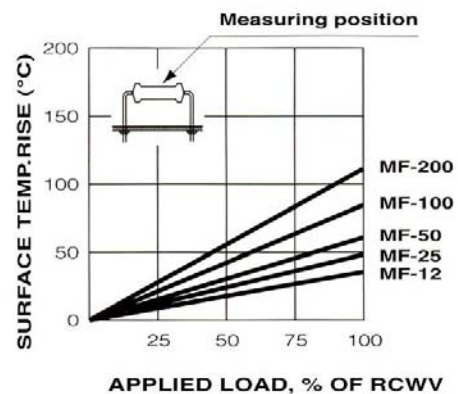


FIG.2 HOT-SPOT TEMPERATURE



MO Series Flame-Proof Type Metal Oxide Film Resistors

METAL OXIDE FILM RESISTORS



MO Series (Flame-Proof Type)

1/4W, 1/2W, 1W, 2W, 3W, 5W
1/2WS, 1WS, 2WS, 3WS, 5WS, 7WS
MO-25, MO-50, MO-100, MO-200, MO-300, MO-500

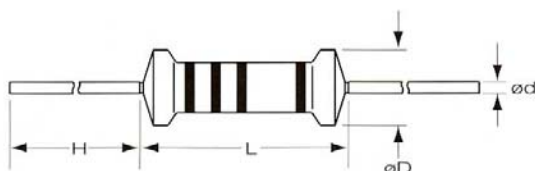
INTRODUCTION

These Metal Oxide Resistors offer excellent performance in applications where stability and uniformity of characteristics are desired. They provide lower cost alternatives to Charbon Composition Resistors and General Purpose Metal Films. Metal Oxide also can replace many low power General Purpose Wirewound applications, saving both money and time, with shorter delivery cycles.

FEATURES

- High power-to-size ratio for significant space savings.
- Excellent long-term stability.
- Complete flameproof construction.
- High surge/overload capability.
- Wide resistance range : $1\Omega \sim 180K\Omega$.
- Standard tolerance : $\pm 5\%$, $\pm 2\%$

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)	VALUE RANGE
	L	ϕD	H	ϕd		
MO-25	6.0 ± 0.2	2.3 ± 0.3	28 ± 2	0.5 ± 0.02	1/4W, 1/2WS	180K
MO-50	9.5 ± 0.5	3.2 ± 0.5	26 ± 2	0.6 ± 0.02	1/2W, 1WS	180K
MO-100	11.0 ± 0.5	4.5 ± 0.5	35 ± 2	0.7 ± 0.02	1W, 2WS	180K
MO-200	15.0 ± 0.5	5.0 ± 0.5	32 ± 2	0.8 ± 0.02	2W, 3WS	180K
MO-300	17.0 ± 0.5	6.0 ± 0.5	32 ± 2	0.8 ± 0.02	3W, 5WS	180K
MO-500	25.0 ± 1.0	8.0 ± 0.5	35 ± 3	0.8 ± 0.02	5W, 7WS	180K

ELECTRICAL CHARACTERISTICS:

Style	MO-25	MO-50	MO-100	MO-200	MO-300	MO-500
Power Rating 70°C	1/4WS, 1/2WS	1/2WS, 1WS	1WS, 2WS	2W, 3WS	3W, 5WS	5WS, 7WS
Operating Temp. Range	$-55^\circ\text{C} \sim +155^\circ\text{C}$					
Max. Working Voltage	250V	350V	350V	350V	500V	600V
Max. Overload Voltage	400V	700V	700V	700V	1000V	500V
Dielectric Withstanding Voltage (AC)	300V	350V	350V	500V	1000V	1000V
Max. Intermittence Overload Voltage	400V	700V	1000V	1000V	1000V	1000V
Value Range $\pm 1\%$, $\pm 2\%$, $\pm 5\%$	$1\Omega \sim 510K\Omega$					
Temp. Coefficient (by Type)	$\pm 350\text{ppm}/^\circ\text{C}$					

FIG.1 DERATING CURVE

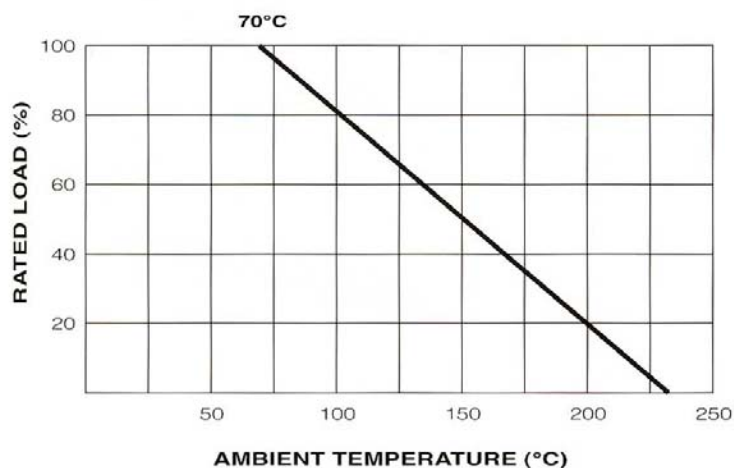
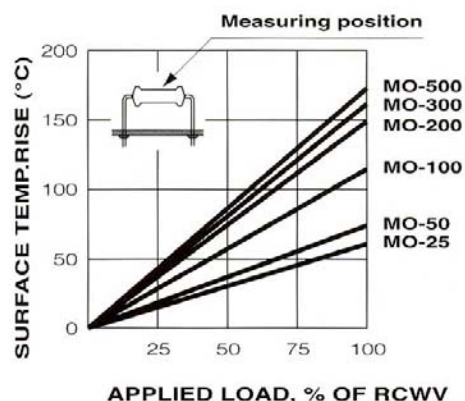


FIG.2 HOT-SPOT TEMPERATURE





FCR Series Flame-Proof Type Carbon Film Resistors

CARBON FILM RESISTORS

FLAME-PROOF TYPE FCR Series

1/4W, 1/2W, 1W, 2W, 3W
FCR-25, FCR-50, FCR-100,
FCR-200, FCR-300

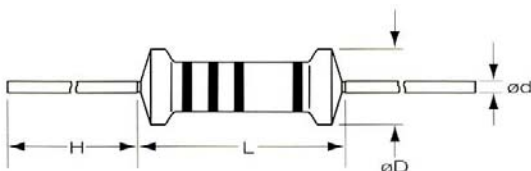
INTRODUCTION

The FCR series flame-proof Carbon Film Resistors are manufactured by Coating a homogeneous film of pure carbon on high grade ceramic rods, resistance less than 10 have an electroless deposited nickel film, and are coated with layers of gray color flame-proof lacquer. These resistors meet overload tests in accordance with UL specification #1412 without producing a fire hazard.

FEATURES

- lower cost and prompt deliver.
- High power-to size ratio for significant space savings.
- Complete flameproof construction-UL 1412.
- Excellent long-term stability.
- Wide resistance range : $1\Omega \sim 10M\Omega$
- Standard tolerance : $\pm 5\%$

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)
	L	ϕD	H	ϕd	
FCR-25	6.3 ± 0.5	2.3 ± 0.3	28.0 ± 2.0	0.6 ± 0.05	1/4W
FCR-50	9.0 ± 0.5	3.2 ± 0.5	26.0 ± 2.0	0.6 ± 0.05	1/2W
FCR-100	11.5 ± 1.0	3.2 ± 0.5	35.0 ± 2.0	0.8 ± 0.05	1W
FCR-200	15.5 ± 1.0	4.5 ± 0.5	32.0 ± 2.0	0.8 ± 0.05	2W
FCR-300	17.5 ± 1.0	6.5 ± 0.5	35.0 ± 2.0	0.8 ± 0.05	3W

ELECTRICAL CHARACTERISTICS:

Style	FCR-25	FCR-50	FCR-100	FCR-200	FCR-300	—
Power Rating 70°C	1/4W	1/2W	1W	2W	3W	—
Operating Temp. Range	-55°C ~ +155°C					
Max. Working Voltage	250V	350V	500V	500V	600V	—
Max. Overload Voltage	500V	700V	1000V	1000V	1000V	—
Dielectric Withstanding Voltage (AC)	500V	700V	1500V	1500V	1500V	—
Max. Intermittence Overload Voltage	750V	1000V	1500V	2000V	2000V	—
T.C.R. (PPM)	FCR-25 /CR-50			FCR-100 /FCR-200 /FCR-300		
	100K Ω down	100K Ω ~1M Ω	1M Ω up	100K Ω down	100K Ω ~1M Ω	1M Ω up
	+350/-500	+350/-700	+350/-1000	+350PPM	+350/-500	+350/-1000

FIG.1 DERATING CURVE

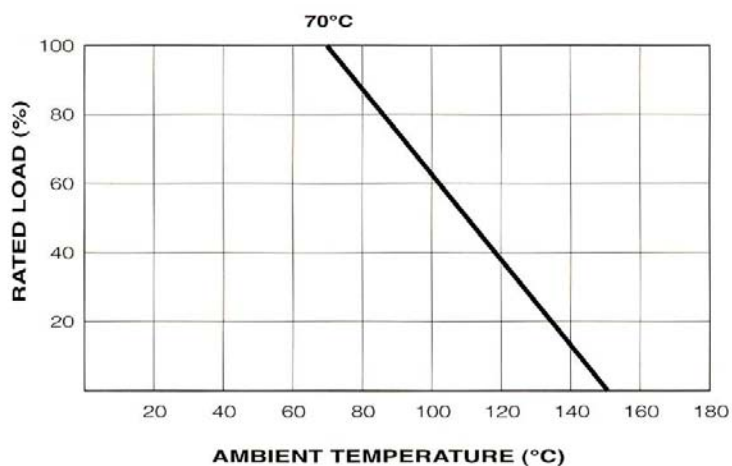
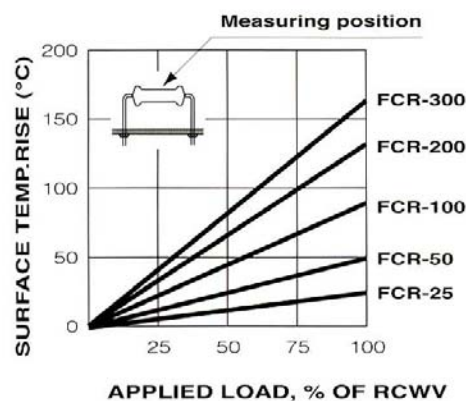


FIG.2 HOT-SPOT TEMPERATURE



FMF Series Flame-Proof Type Metal Film Resistors

METAL FILM RESISTORS

FLAME-PROOF TYPE FMF Series

1/4W, 1/2W, 1W, 2W
FMF-25, FMF-50, FMF-100, FMF-200



INTRODUCTION

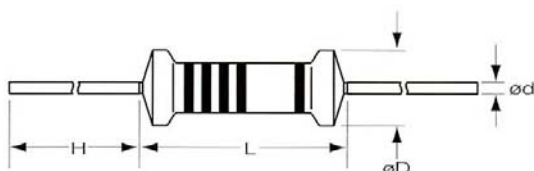
The FMF series flame-proof type Metal Film Resistors are manufactured by vacuum deposit metal film on high thermal conductivity ceramic rods, and are coated with layers of gray color flame-proof lacquer.

These FMF flame-proof metal film resistor is designed to replace the metal oxide resistors and low power wire wound resistors, where when flame-proof and small size is needed.

FEATURES

- Power Rating: 0.25W, 0.5W, 1W, 2W.
- Resistance Tolerance: $\pm 1\%$, $\pm 5\%$.
- T.C.R.: $\pm 50\text{ppm}/^\circ\text{C}$, $\pm 100\text{ppm}/^\circ\text{C}$.
- Complete flameproof construction-UL 1412.
- Value range: $1\Omega \sim 1\text{M}\Omega$

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)
	L	øD	H	ød	
FMF-25	6.0 \pm 0.2	2.3 \pm 0.3	28 \pm 2	0.6 \pm 0.05	1/4W
FMF-50	9.5 \pm 0.5	3.2 \pm 0.5	26 \pm 2	0.6 \pm 0.05	1/2W
FMF-100	11.0 \pm 1.0	4.5 \pm 0.5	35 \pm 2	0.8 \pm 0.05	1W
FMF-200	15.0 \pm 1.0	5.0 \pm 0.5	32 \pm 2	0.8 \pm 0.05	2W

ELECTRICAL CHARACTERISTICS:

Style	FMF-25	FMF-50	FMF-100	FMF-200	—	—
Power Rating 70°C	1/4W	1/2W	1W	2W	—	—
Operating Temp. Range	-55°C ~ +155°C					
Max. Working Voltage	250V	350V	500V	500V	—	—
Max. Overload Voltage	500V	700V	1000V	500V	—	—
Dielectric Withstanding Voltage (AC)	500V	700V	1000V	1000V	—	—
Max. Intermittence Overload Voltage	300V	500V	1000V	1000V	—	—
Value Range $\pm 1\%$, $\pm 5\%$	10 Ω ~ 1M Ω					
Temp. Coefficient (by Type)	$\pm 50\text{ppm}$, $\pm 100\text{ppm}$					

FIG.1 DERATING CURVE

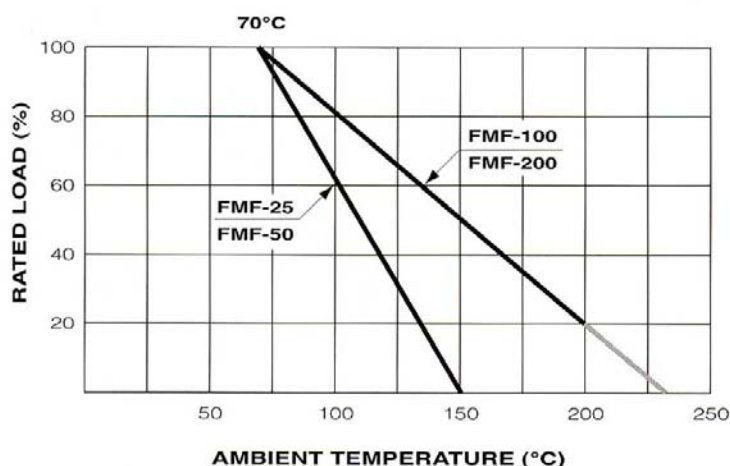
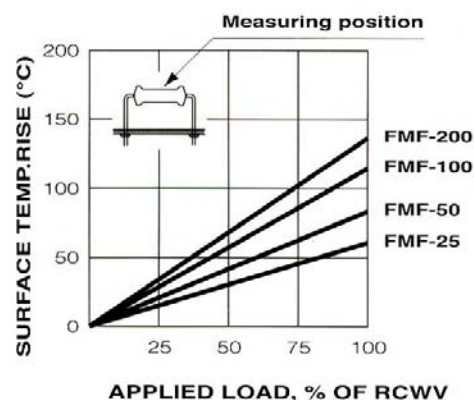


FIG.2 HOT-SPOT TEMPERATURE





FMR Series Ultra Miniature Style Metal Film Resistors

METAL FILM RESISTORS

FMR Series

0.4W, 0.5W, 0.6W, 1W, 1.8W, 3W
MFR-10, MFR20, MFR30,
MFR-01, MFR-02, MFR-03

INTRODUCTION

The FMF Series flame-proof type miniature Metal Film Resistors are manufactured by vacuum depos it metal film on high thermal conductivity and specific gravity Rosenthal ceramic or same grade Japanese rods. The both ends of ceramic are coated with precision mixed metals which help to prevent against noise, and to provide low TCR and low Tol precision resistors the can meet MIL and JIS requirement.

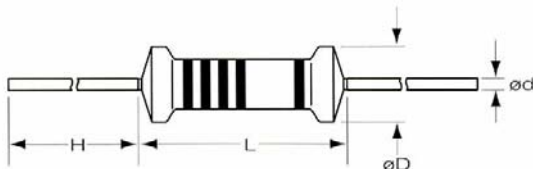
Utilizing a 95-98% of Al ceramic cores and combined a special cutting technology inside, this resulting superior resistors give excellent heat dissipation, stable performance and dignificantly up-grade the power rating.

This specially designed resistors are widely used by the industries of communication devices, meters, high-class, audio equipments and precision military defending facilities as well.

FEATURES

- Resistance Tolerance: $\pm 1\%$, $\pm 2\%$, $\pm 5\%$.
- Excellent long-term stability.
- High power-to-size ratio for significant space saving.
- Variety of packing: bulk, strip pack, 26mm and 52mm tape and reel, cut and formen.

DIMENSIONS:



STYLE	DIMENSION (mm)				POWER RATING (Watt)	VALUE RANGE
	L	øD	H	ød		
FMR-10	3.3 \pm 0.4	1.8 \pm 0.3	28 \pm 2	0.5 \pm 0.05	0.5W	10 Ω ~1M
FMR-20	6.3 \pm 0.5	2.3 \pm 0.3	28 \pm 2	0.6 \pm 0.05	0.4W	10 Ω ~1M
FMR-30	6.3 \pm 0.5	2.3 \pm 0.3	28 \pm 2	0.6 \pm 0.05	0.6W	10 Ω ~1M
FMR-01	6.3 \pm 0.5	2.3 \pm 0.3	28 \pm 2	0.6 \pm 0.05	1W	10 Ω ~1M
FMR-02	9.0 \pm 0.5	3.2 \pm 0.5	26 \pm 2	0.6 \pm 0.05	1.8W	10 Ω ~1M
FMR-03	15.5 \pm 1.0	5.0 \pm 0.5	32 \pm 2	0.6 \pm 0.05	3W	10 Ω ~1M

ELECTRICAL CHARACTERISTICS:

Style	FMR-10	FMR-20	FMR-30	FMR-01	FMR-02	FMR-03
Power Rating 70°C	0.5W	0.4W	0.6W	1W	1.8W	3W
Operating Temp. Range	-55°C ~ +155°C					
Max. Working Voltage	200V	250V	250V	250V	350V	500V
Max. Overload Voltage	400V	500V	500V	500V	700V	1000V
Dielectric Withstanding Voltage (AC)	300V	500V	500V	500V	700V	1000V
Max. Intermittence Overload Voltage	250V	300V	300V	300V	500V	1000V
Value Range $\pm 1\%$, $\pm 5\%$	10 Ω ~1K Ω					
Temp. Coefficient (by Type)	± 50 ppm, ± 100 ppm					

FIG.1 DERATING CURVE

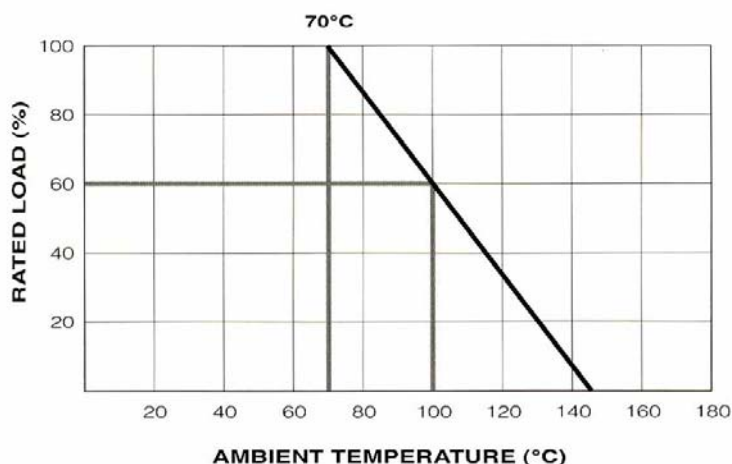
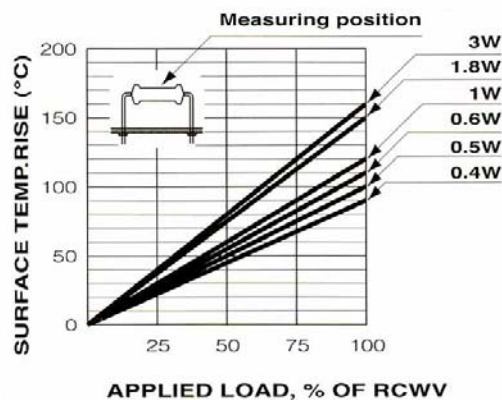


FIG.2 HOT-SPOT TEMPERATURE



FUSIBLE METAL FILM RESISTORS

FLAME-PROOF TYPE

FR SERIES



INTRODUCTION

These Fusible Resistors contain both functions as being resistor in normal condition and turned into fuse while abnormal current comes in. The FR series Fusible Metal Film Resistors are manufactured by high vacuum sputtering deposit metal film on high thermal conductivity and specific gravity ceramic rods, and are coated with multilayers of green color flameproof lacquer.

GENERAL SPECIFICATIONS:

STYLE	DIMENSION (mm)				POWER RATING	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	RESISTANCE RANGE	
	L	øD	H	ød				±2% (G)	±5% (J)
FR-25	6.0±0.2	2.3±0.3	28±2	0.5±0.05	1/4W	250	300	4.7Ω~1K	2.2Ω~1K
FR-50	9.0±0.5	3.2±0.3	26±2	0.6±0.05	1/2W	250	400	4.7Ω~1K	2.2Ω~1K
FR-100	11.0±0.5	4.5±0.5	35±2	0.8±0.05	1W	300	500	4.7Ω~1K	0.27Ω~1K
FR-200	15.0±0.5	5.0±0.5	32±2	0.8±0.05	2W	350	500	4.7Ω~1K	0.33Ω~1K
FR-300S	15.0±0.5	5.0±0.5	32±2	0.8±0.05	3WS	350	500	4.7Ω~1K	0.33Ω~1K
FR-300	17.0±0.5	6.0±0.5	32±2	0.8±0.05	3W	350	500	4.7Ω~1K	0.33Ω~1K

Other resistance value on request

CHARACTERISTICS:

Temperature Coefficient	±100 PPM Type 350 Max
Insulation Resistance	10,000 MΩ Min
Load Life (1,000 hours)	±5% + 0.05Ω Max
Short-time Overload	±2% + 0.05Ω Max
Temperature Cycling	±1% + 0.05Ω Max
Moisture Resistance	±5% + 0.05Ω Max
Shock and Vibration	±1% + 0.05Ω Max
Effect of Soldering	±1% + 0.05Ω Max

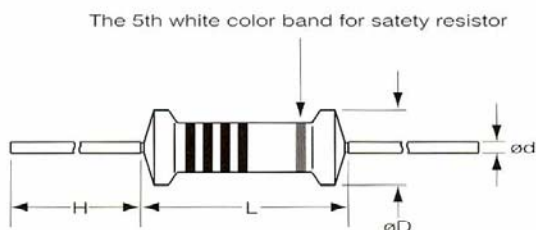
POWER:

POWER	Fusing Time Maximum
16 x Wattage	1 Min.
20	40 Sec.
24	30 Sec.
28	20 Sec.
32	15 Sec.

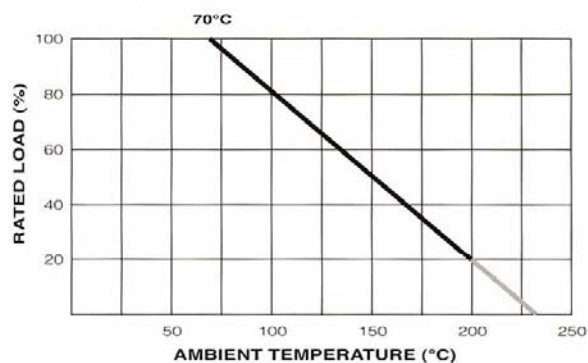
NOTE :

1. After voltaged the variable rate of resistance in excess (over) 100 times is open.
2. Operating Temper Range - 30°C~155°C

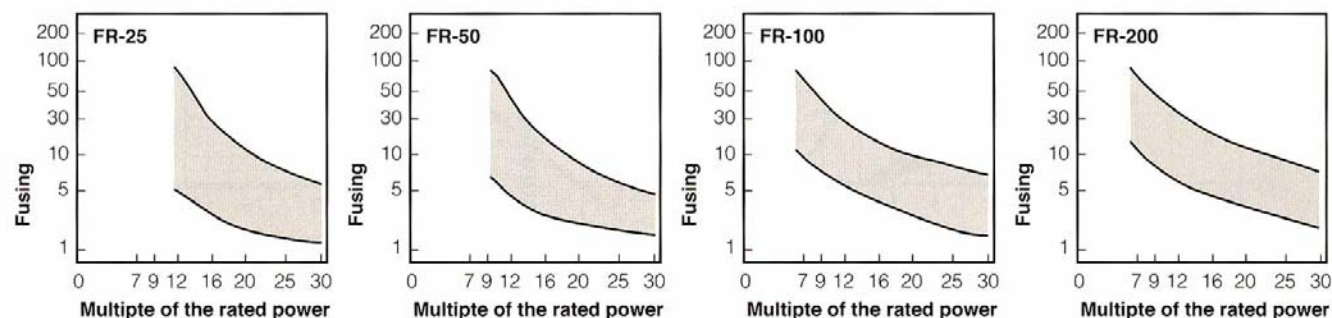
DIMENSIONS:



DERATING CURVE

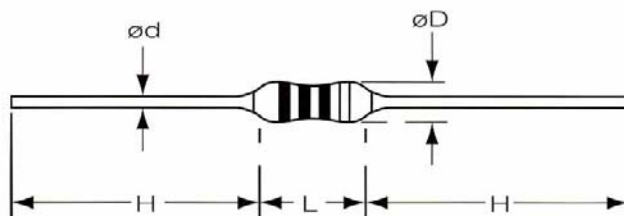


FUSING CHARACTERISTICS:





ZERO-OHM JUMPER WIRE



STYLE	DIMENSION (mm) in			
	L	ϕD	H	ϕd
1/8W	3.7 \pm 0.4	1.5 \pm 0.2	27MIN	0.5 \pm 0.02
1/4W	6.5 \pm 0.5	2.3 \pm 0.2	27MIN	0.6 \pm 0.02

DIMENSIONS (mm.)	In
E. 530.5.....	2.090 \pm .020
F. 6.6 \pm 0.5.....	2.600 \pm .020
P1.5.08 \pm 0.4.....	200 \pm .015
Pn.500 \pm 4.....	19.685 \pm .157
n:100 spacings	
L. 6.35 \pm 0.25.....	250 \pm .010

ELECTRICAL CHARACTERISTICS:

TEST	TEST METHOD	LIMITS
RESISTANCE	<0.005 ohm	
OPERATING TEMPERATURE	-55°C to +155°C	
MAX. CURRENT	5. amps	
MAX. WORKING VOLTAGE	300Vdc	
MAX. OVERLOAD VOLTAGE	600Vdc	
TEMPERATURE COEFFICIENT	(PPM/°C) 0 to - 100 PPM	
SHORT TIME OVERLOAD	Apply 2.5 times the voltage rating for 5 sec	NO VISIBLE DAMAGE
LOAD LIFE	1,000 hrs. at 70°C a direct voltage applied, cycles of 1.5 hrs. on and 0.5 hrs. off throughout test	$\Delta R = 0.5\%$
TEMPERATURE CYCLING	5 cycles of 30 min. duration at the extremes of temp range, maximum and minimum, measurement of ohmic value 4 hrs. after completion of test	$\Delta R = 0.5\%$
DIELECTRIC STRENGTH	Using a 90°V" shaped conductive block apply 100V minimum, Increasing 100V/sec. For 5 sec.	$\Delta R = 0.5\%$
HUMIDITY	HUMIDITY 350 hrs. at 40°C, 90 to 95% Rh	$\Delta R = 0.5\%$
SOLDERABILITY	Dipped in Sn / Pb (60/40) at 235°, 5scc. 1.5mm from the body	95% OF TESTED SURFACE COVERED
VIBRATION	By Mil STD. 202, 201A	
TERMINAL ROBUSTNESS	Traction, applied 2.5kg. for 10 sec. Bends, 2 bends 90° applying Load to terminals of 0.5kg. Twist, 2 successive turns 180°, 6mm From body	NO VISIBLE DAMAGE
RESISTANCE TO SOLVENTS	Trichlorethylene, TMC as the most aggressives for 60 sec. At Boiling point.	NO VISIBLE DAMAGE

APPLICATIONS

Molded jumper wires or crossovers, as they are sometimes called, are basically interconnection devices between points on a PC board.

Generally they are used for the following reasons:

- Inability to connect two points on a PC board due to other circuit paths which must be crossed over.
- An after-the-fact design change that requires new point connections.
- Circuit tuning by changing point connections.
- Optional feature applications.

KNP. KNS . KNSS . NKN Wirewound Resistors

WIREWOUND RESISTORS



KNP-Standard Type
KNS-Miniature Type
KNSS-Ultra Mini Type
NKN-Non-Inductive Type

1/2W, 1W, 2W, 3W, 4W, 5W, 7W

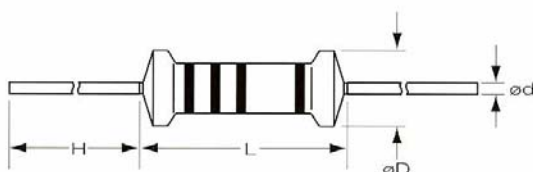
INTRODUCTION

Wire wound resistors are made by winding the resistance wire non-corrosive, heat-proof and humidity-proof material.

FEATURES

- Delivery from stock in bulk taped, and strip pack.
- Exceptional long-term stability.
- Standard tolerance: $\pm 5\%$.

DIMENSIONS:



STYLE		DIMENSION (mm)			
Normal	Miniature	L	øD	H	ød
KNP-1/2W	KNS-1W	9.0 \pm 1.0	3.5 \pm 0.5	26 \pm 2.0	0.6 \pm 1.0
	KNSS-1W	6.3 \pm 1.0	2.3 \pm 0.3	26 \pm 2.0	0.6 \pm 1.0
KNP-1W	KNS-2W	11.5 \pm 1.0	4.5 \pm 0.5	35 \pm 2.0	0.8 \pm 1.0
KNP-2W	KNS-3W	15.5 \pm 1.0	5.0 \pm 0.5	33 \pm 2.0	0.8 \pm 1.0
KNP-3W	KNS-4W	17.5 \pm 1.0	6.0 \pm 0.5	32 \pm 2.0	0.8 \pm 1.0
KNP-4W	KNS-5W	17.5 \pm 1.0	6.0 \pm 0.5	32 \pm 1.0	0.8 \pm 1.0
KNP-5W	KNS-7W	24.5 \pm 1.0	8.0 \pm 0.5	38 \pm 1.0	0.8 \pm 1.0

ELECTRICAL CHARACTERISTICS:

Style	Power Rating 70°C	KNP-1/2W	KNP-1W	KNP-2W	KNP-3W	KNP-4W	KNP-5W
		KNS/SS-1W	KNS-2W	KNS-3W	KNS-4W	KNS-5W	KNS-7W
Operating Temp. Range		-55°C ~ +155°C					
Dielectric Withstanding Voltage (AC)		300V	400V	400V	400V	400V	400V
Value Range $\pm 5\%$		0.1 Ω ~ 47 Ω	0.1 Ω ~ 100 Ω	0.1 Ω ~ 330 Ω	0.1 Ω ~ 560 Ω	0.1 Ω ~ 560 Ω	0.1 Ω ~ 1K Ω
Temp. Coefficient (by Type)		± 350 ppm					

- * a. Standard resistance is as the above list, below or over this resistance is on request.
 b. Value for NKN Non-Inductive type is up to 50 Ω only.

FIG.1 DERATING CURVE

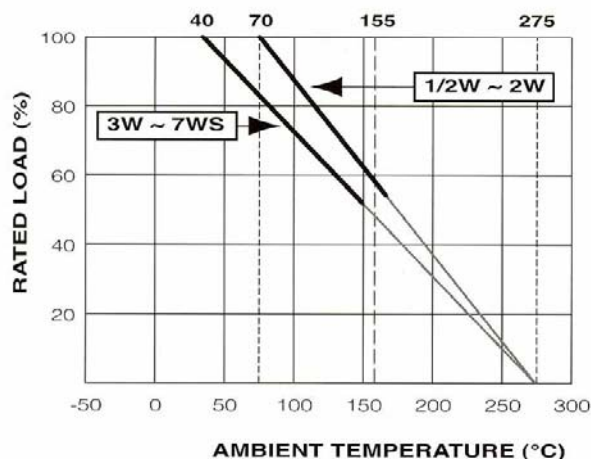
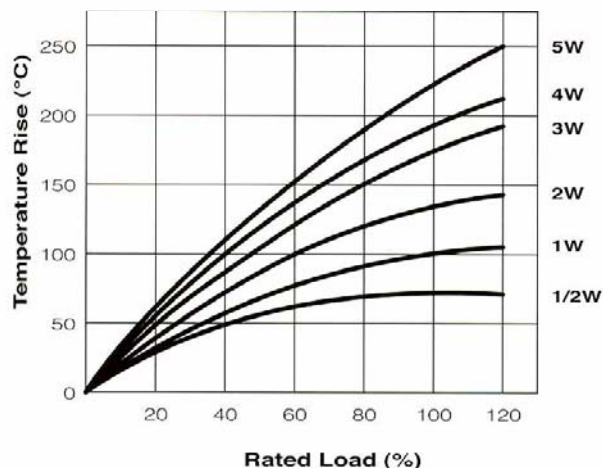


FIG.2 TEMPERATURE RISE





WIRE WOUND RESISTORS, FLAMEPROOF, RESIN PAINT, KN

INTRODUCTION

Wire wound resistors are made by winding the resistance wire on the alkaliless ceramic core, then coated with silicon resin or nonflame paint, capable of making low tolerance resistors.

HOW TO ORDER

KNP	3W	1Ω	J	Bulk
a	b	c	d	e

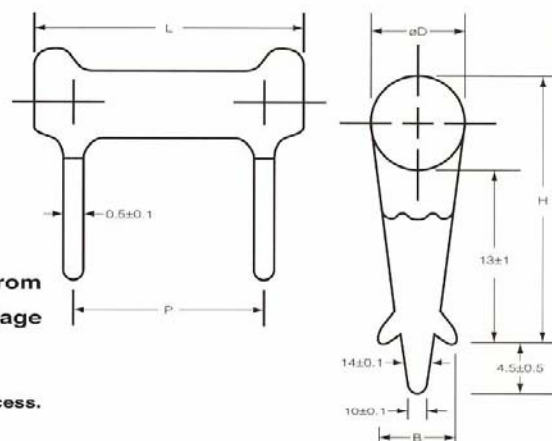
- a. common code for wire wound resin paint
b. rated power
c. resistance value
d. tolerance (J:5%)
e. package (Bulk, Tape in box & Tape & reel)

Rated Continuous Working Voltage (RCWV) shall be determined from RCWV: $\sqrt{\text{Rated Power} \times \text{Resistance Value}}$ or Max Working Voltage listed above, whichever less.

* Note: The resistance ranges listed above are the one wound by auto machines. Higher or lower values can be produced by hand-handling wirewound process.

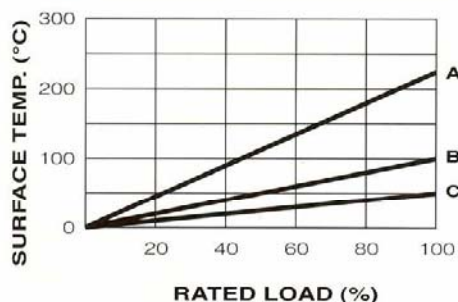
FEATURES

- Super heat dissipation; small linear temperature coefficient.
- Instant overload capability; low noise figure and without annual shift on resistance value.
- Flameproof, light weight, price is lower than enamel types which ones are produced in high temperature.

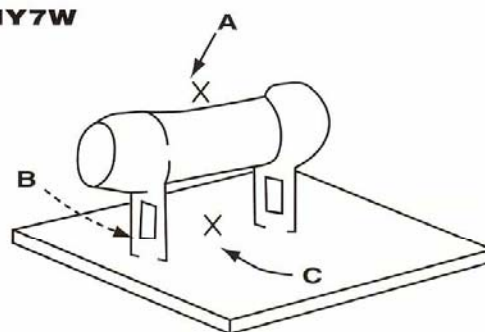


STYLE	DIMENSION (mm) in					Resistance Range	Dielectric Withstanding Voltage
KNY	øD	L	P	H	B		
5W	8.5±1	25.0±1.5	15.0±1.5	21.5±1	6.5±0.5	0.5Ω ~ 390Ω	500V
7W	8.5±1	32.0±1.5	22.0±1.5	21.5±1	6.5±0.5	0.5Ω ~ 1.5Ω	800V
10W	8.5±1	53.0±1.5	42.5±1.5	21.5±1	6.5±0.5	0.5Ω ~ 2.2Ω	1000V

RATED LOAD VS. SURFACE TEMP.



KNY7W

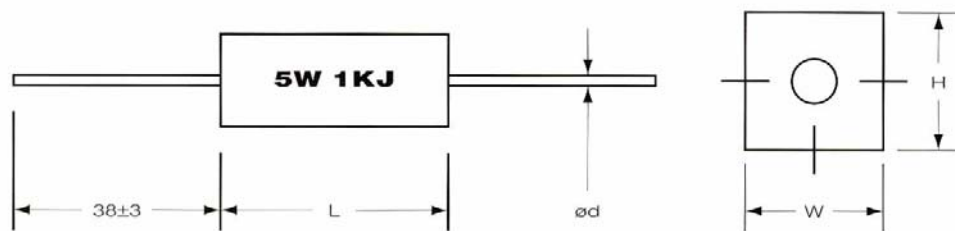


ELECTRICAL CHARACTERISTICS:

Test Items	Condition	Spec
Resistance Temp. Coeff.	-5°C~200°C	±300PPM/°C
Short Time Overload	10 times of rated wattage for 5 sec.	±2%
Rated Load	Rated wattage for 30 min.	±0.5%
Insulation Resistance	500V	±1,000MΩ
Load life	70°C on-off cycle 1000hrs.	±3%
Moisture-proof Load Life	40°C 95% RH on-off cycle 1000hrs.	±3%
Incombustibility	16 times of rated wattage for 5 min.	not flamed

* Total resistance : (ΔR% + 0.05Ω)

SQP-L Series Cement Wire Wound Resistors



DIMENSIONS:

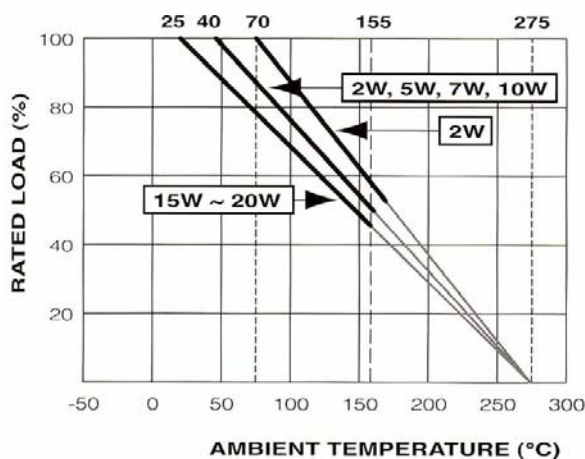
STYLE	DIMENSIONS (mm)						
	Normal	Mini.	Normal	Mini.	Normal	Mini.	ød
SQP-L	L		W		H		
1W	14.0±1.0	14.0±1.0	6.0±1.0	6.0±1.0	5.9±1.0	5.9±1.0	0.56±0.05
2W	18.0±1.0	-----	6.5±1.0	-----	6.5±1.0	-----	0.8±0.05
3W	22.0±1.5	20.0±1.5	8.0±1.0	6.5±1.0	8.0±1.0	6.5±1.0	0.8±0.05
5W	22.0±1.5	22.0±1.5	9.5±1.0	8.0±1.0	9.0±1.0	8.0±1.0	0.8±0.05
5WA	25.0±1.5	-----	6.5±1.0	-----	6.5±1.0	-----	0.8±0.05
7W	35.0±1.5	25.0±1.5	9.5±1.0	6.5±1.0	9.0±1.0	6.5±1.0	0.8±0.05
10W	48.0±1.5	35.0±1.5	9.5±1.0	9.5±1.0	9.0±1.0	9.0±1.0	0.8±0.05
15W	48.0±1.5	48.0±1.5	12.5±1.5	9.5±1.0	12.5±1.5	9.0±1.0	1.0±0.05
20W	60.0±1.5	60.0±1.5	14.0±1.5	12.5±1.5	14.0±1.5	12.5±1.5	1.0±0.05
25WA	60.0±1.5	60.0±1.5	14.0±1.5	12.5±1.5	14.0±1.5	12.5±1.5	1.0±0.05

ELECTRICAL CHARACTERISTICS:

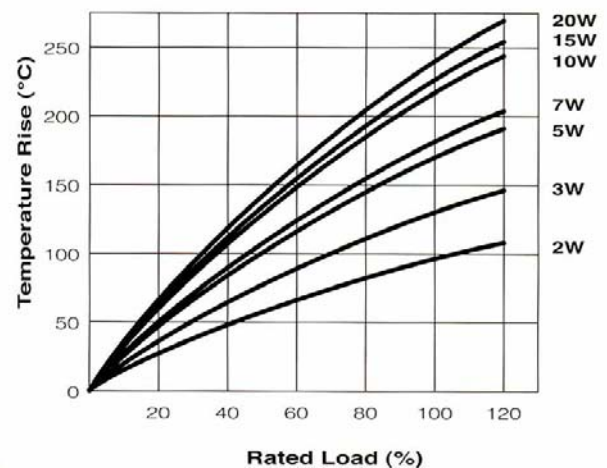
Style	Power Rating 70°C	SQP-L-2W	SQP-L-3W	SQP-L-5W	SQP-L-7W	SQP-L-10W	SQP-L-20W
		SQP-L-3WS	SQP-L-5WS	SQP-L-7WS	SQP-L-10WS	SQP-L-15WS	SQP-L-25WS
Operating Temp. Range		-55°C ~ +155°C					
Max. Working Voltage		250V	350V	350V	500V	500V	500V
Max. Overload Voltage		500V	700V	700V	1000V	1000V	1000V
Dielectric Withstanding Voltage (AC)		500V	700V	700V	1000V	1000V	1000V
Value Range ±5% (Ceramic core)		0.1Ω ~ 100Ω			0.5Ω ~ 220Ω	1Ω ~ 270Ω	
Value Range ±5% (Metal Oxide Film)		110Ω ~ 100K			240Ω ~ 10K	300Ω ~ 10K	
Temp. Coefficient		±300ppm/°C					

- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50Ω only.

DERATING CURVE

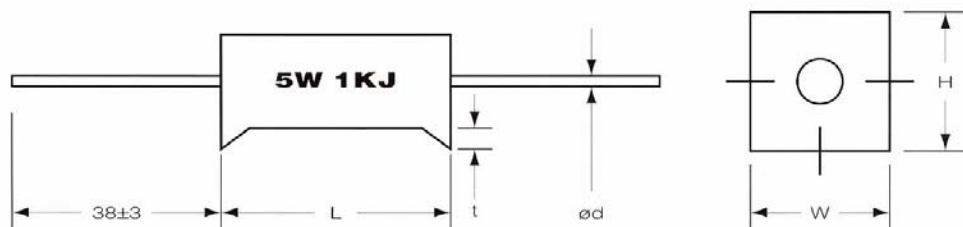


TEMPERATURE RISE





SQT Series Cement Wire Wound Resistors



DIMENSIONS:

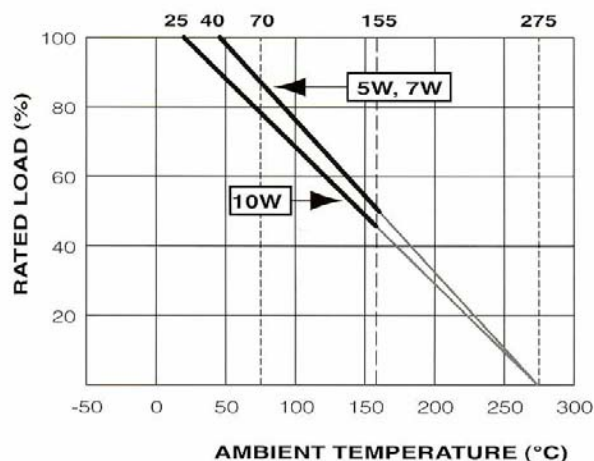
STYLE	DIMENSIONS (mm)				RESISTANCE RANGE (Ω)
SQT	W	H	L	t	
5W	10±1	9±1	22±1.5	1.5±0.5	0.1~50K
7W	10±1	9±1	35±1.5	3.0±0.5	0.1~50K
10W	10±1	9±1	48±1.5	3.0±0.5	0.1~50K

ELECTRICAL CHARACTERISTICS:

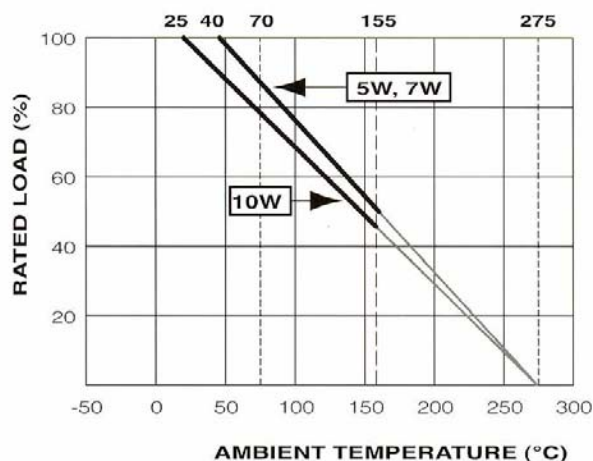
Style	Power Rating 70°C	SQT-5W	SQT-7W	SQT-10W
Operating Temp. Range		-55°C ~ +155°C		
Max. Working Voltage		350V	500V	500V
Max. Overload Voltage		700V	1000V	1000V
Dielectric Withstanding Voltage (AC)		700V	1000V	1000V
Value Range $\pm 5\%$ (Ceramic core)		0.1 Ω ~ 100 Ω	0.5 Ω ~ 220 Ω	1 Ω ~ 270 Ω
Value Range $\pm 5\%$ (Metal Oxide Film)		0 Ω ~ 100K	240 Ω ~ 10K	300 Ω ~ 10K
Temp. Coefficient		± 300 ppm/°C		

- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50 Ω only.

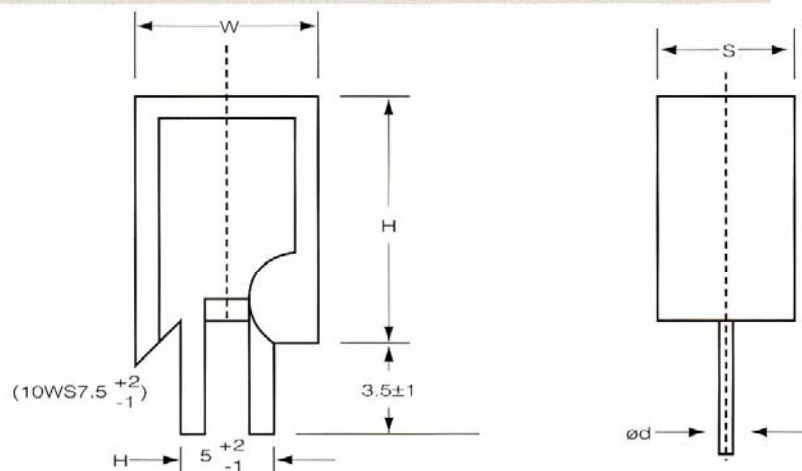
DERATING CURVE



TEMPERATURE RISE



SQM Series Cement Wire Wound Resistors



DIMENSIONS:

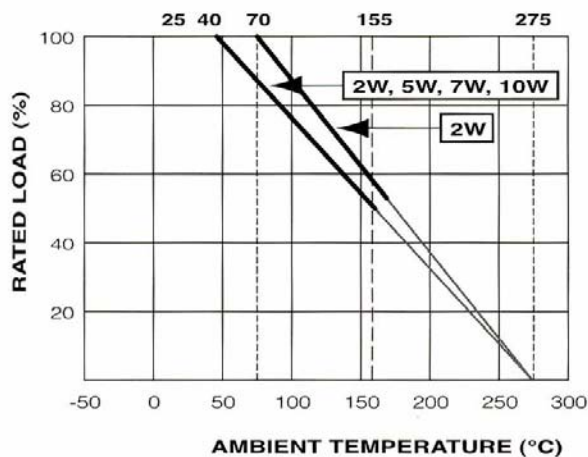
STYLE	DIMENSIONS (mm)						
SQP-L	Normal	Mini.	Normal	Mini.	Normal	Mini.	ød
	L		W		S		
2W	20.0±1.0	-----	11.0±1.0	-----	7.0±1.0	-----	0.8±0.05
3W	25.0±1.5	20.0±1.5	12.0±1.0	11.0±1.0	8.0±1.0	7.0±1.0	0.8±0.05
5W	25.0±1.5	25.0±1.5	13.0±1.0	12.0±1.0	9.0±1.0	8.0±1.0	0.8±0.05
7W	39.0±1.5	25.0±1.5	13.0±1.0	13.0±1.0	9.0±1.0	9.0±1.0	0.8±0.05
10W	51.0±1.5	35.0±1.5	13.0±1.0	16.0±1.0	10.0±1.0	12.0±1.0	0.8±0.05

ELECTRICAL CHARACTERISTICS:

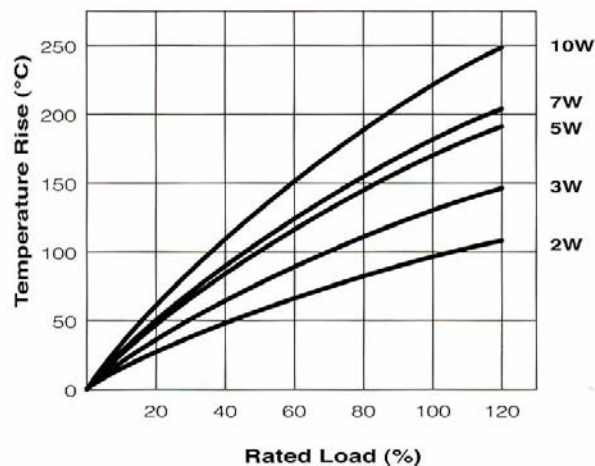
Style	Power Rating 70°C	SQM-2W	SQM-3W	SQM-5W	SQM-7W	SQM-10W
		SQM-3WS	SQM-5WS	SQM-7WS	SQM-10WS	—
Operating Temp. Range		-55°C ~ +155°C				
Max. Working Voltage		250V	350V	350V	500V	500V
Max. Overload Voltage		500V	700V	700V	1000V	1000V
Dielectric Withstanding Voltage (AC)		500V	700V	700V	1000V	1000V
Value Range ±5% (Ceramic core)		0.1Ω ~ 47Ω	0.1Ω ~ 100Ω	0.1 ~ 180Ω	0.1 ~ 470Ω	0.1 ~ 680Ω
Value Range ±5% (Metal Oxide Film)		48 ~ 100K	110Ω ~ 100K	180 ~ 100K	471 ~ 10K	681 ~ 10K
Temp. Coefficient		±300ppm/°C				

- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50Ω only.

DERATING CURVE



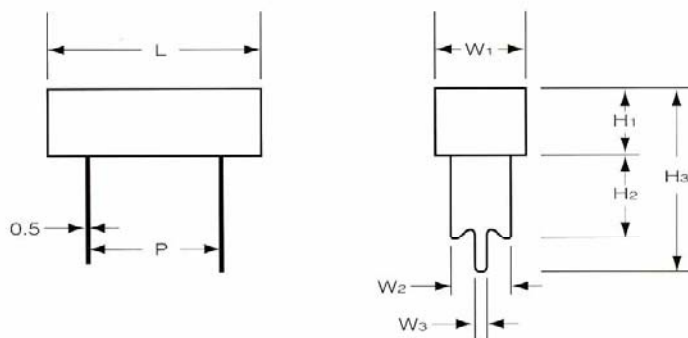
TEMPERATURE RISE





SQZ Series Cement Wire Wound Resistors

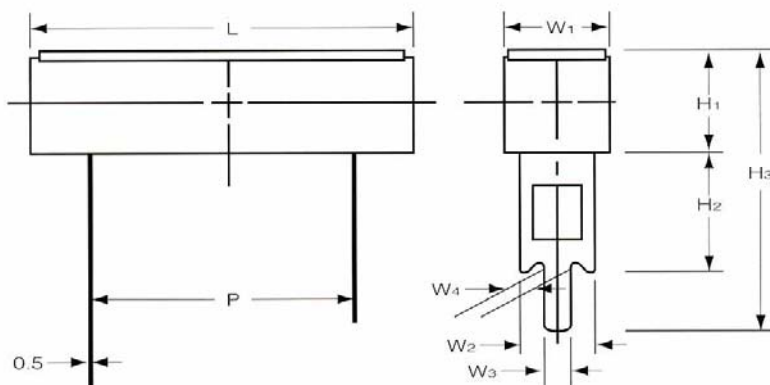
SQZ-YA



DIMENSIONS:

Watt	Watt Dimensions (mm)								Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	H ₁	H ₂	H ₃	
3	24.0±1.5	12.5±1.5	9.0±1.0	5.3±0.2	0.9±0.2	9.0±1.0	10.0±1.0	25.0±1.0	0.47-180
5	27.0±1.5	15.0±1.5	9.5±1.0	5.3±0.2	0.9±0.2	9.5±1.0	10.0±1.0	25.5±1.0	0.47-220
7	35.0±1.5	22.5±1.5	9.5±1.0	5.3±0.2	0.9±0.2	9.5±1.0	10.0±1.0	25.5±1.0	0.68-470
10	48.0±1.5	35.0±1.5	9.5±1.0	5.3±0.2	0.9±0.2	9.5±1.0	10.0±1.0	25.5±1.0	1.0-680

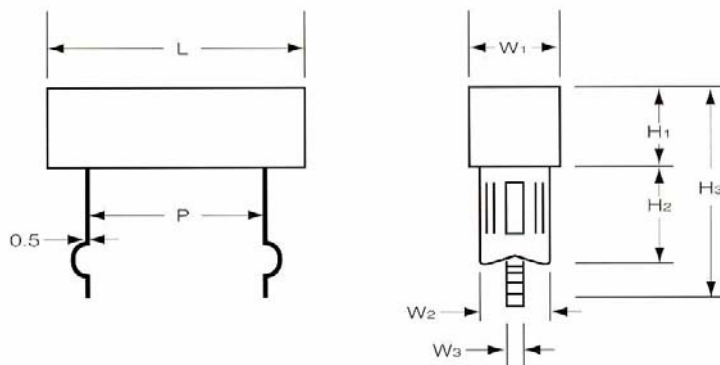
SQZ-YB



DIMENSIONS:

Watt	Watt Dimensions (mm)									Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	W ₄	H ₁	H ₂	H ₃	
15	48.5±1.5	32.5±1.5	12.5±1.0	10.0±0.2	2.7±0.2	3.0±0.2	12.5±1.0	15.0±1.0	36.5±1.0	1.0-820
20	63.5±1.5	44.0±1.5	12.5±1.0	10.0±0.2	2.7±0.2	3.0±0.2	12.5±1.0	15.5±1.0	36.5±1.0	1.0-1K

SQZ-YC



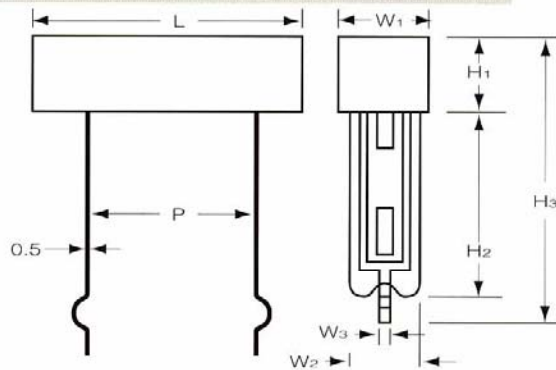
DIMENSIONS:

Watt	Watt Dimensions (mm)								Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	H ₁	H ₂	H ₃	
3	24.0±1.5	12.5±1.5	9.0±1.0	5.3±0.2	0.9±0.2	9.0±1.0	10.0±1.0	25.0±1.0	0.47-180
5	27.0±1.5	15.0±1.5	9.5±1.0	7.3±0.2	1.6±0.2	9.5±1.0	10.0±1.0	24.5±1.0	0.47-220
7	35.0±1.5	22.5±1.5	9.5±1.0	7.3±0.2	1.6±0.2	9.5±1.0	10.0±1.0	24.5±1.0	0.68-470
10	48.0±1.5	35.0±1.5	9.5±1.0	7.3±0.2	1.6±0.2	9.5±1.0	10.0±1.0	24.5±1.0	1.0-680

SQZ Series Cement Wire Wound Resistors



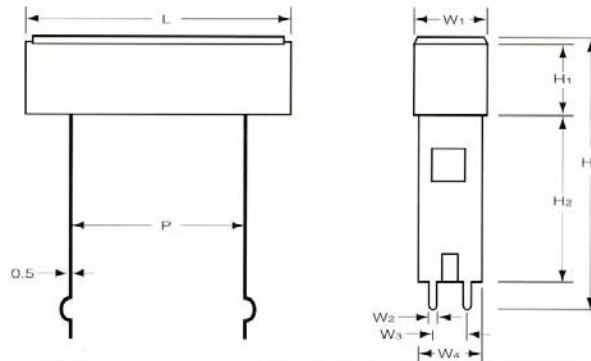
SQZ-YD



DIMENSIONS:

Watt	Watt Dimensions (mm)								Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	H ₁	H ₂	H ₃	
5	27.0±1.5	15.0±1.5	9.5±1.0	7.5±0.2	1.6±0.2	9.5±1.0	25.0±1.0	39.0±1.0	0.47-220
7	35.0±1.5	22.5±1.5	9.5±1.0	7.5±0.2	1.6±0.2	9.5±1.0	25.0±1.0	39.0±1.0	0.68-470
10	48.0±1.5	35.0±1.5	9.5±1.0	7.5±0.2	1.6±0.2	9.5±1.0	25.0±1.0	39.0±1.0	1.0-680
15	48.5±1.5	32.5±1.5	12.5±1.0	10.0±0.2	3.0±0.2	12.5±1.0	30.0±1.0	47.5±1.0	1.0-820
20	63.5±1.5	44.0±1.5	12.5±1.0	10.0±0.2	3.0±0.2	12.5±1.0	30.0±1.0	47.5±1.0	1.0-1K

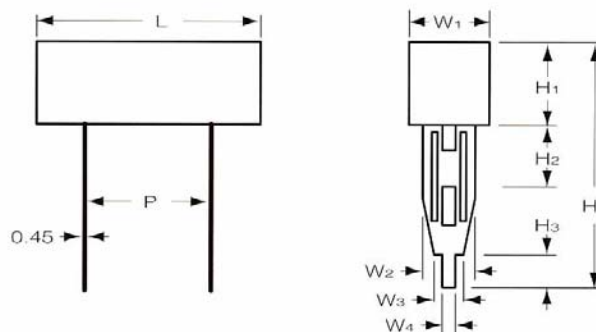
SQZ-YD-1



DIMENSIONS:

Watt	Watt Dimensions (mm)									Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	W ₄	H ₁	H ₂	H ₃	
5	27.0±1.5	15.0±1.5	9.5±1.0	1.4±0.2	3.5±0.2	7.3±0.2	9.5±1.0	25.0±1.0	39.0±1.0	0.47-220
7	35.0±1.5	22.5±1.5	9.5±1.0	1.4±0.2	3.5±0.2	7.3±0.2	9.5±1.0	25.0±1.0	39.0±1.0	0.68-470
10	48.0±1.5	35.0±1.5	9.5±1.0	1.4±0.2	3.5±0.2	7.3±0.2	9.5±1.0	25.0±1.0	39.0±1.0	1.0-820
15	48.5±1.5	32.5±1.5	12.5±1.0	2.0±0.2	5.0±0.2	10.0±0.2	12.5±1.0	30.0±1.0	47.5±1.0	1.0-820
20	63.5±1.5	44.0±1.5	12.5±1.0	2.0±0.2	5.0±0.2	10.0±0.2	12.5±1.0	30.0±1.0	47.5±1.0	1.0-1K

SQZ-YE



DIMENSIONS:

Watt	Watt Dimensions (mm)									Ohm (Ω)
	L	P	W ₁	W ₂	W ₃	W ₄	H ₁	H ₂	H ₃	
3	24.0±1.5	12.5±1.5	9.0±1.0	7.4±0.2	5.5±0.2	3.0±0.2	9.0±1.0	7.5±1.0	4.5±1.0	29.9±1.0
5	27.0±1.5	15.0±1.5	9.5±1.0	7.4±0.2	5.5±0.2	3.0±0.2	9.5±1.0	7.5±1.0	4.5±1.0	30.4±1.0
7	35.0±1.5	22.5±1.5	9.5±1.0	7.4±0.2	5.5±0.2	3.0±0.2	9.5±1.0	7.5±1.0	4.5±1.0	30.4±1.0
10	48.0±1.5	35.0±1.5	9.5±1.0	7.4±0.2	5.5±0.2	3.0±0.2	9.5±1.0	7.5±1.0	4.5±1.0	30.4±1.0



SQZ Series Cement Wire Wound Resistors

ELECTRICAL CHARACTERISTICS:

• SQZ-YE / SQZ-YA / SQZ-YC

<div>Power Rating 70°C</div> <div>Style</div>	SQZ-YE-3W/ SQZ-YA-3W/ SQZ-YC-3W	SQZ-YE-5W/ SQZ-YA-5W/ SQZ-YC-5W	SQZ-YE-7W/ SQZ-YA-7W/ SQZ-YC-7W	SQZ-YE-10W/ SQZ-YA-10W/ SQZ-YC-10W
Operating Temp. Range	-55°C ~ +155°C			
Max. Working Voltage	250V	350V	500V	500V
Max. Overload Voltage	500V	700V	1000V	1000V
Dielectric Withstanding Voltage (AC)	500V	700V	1000V	1000V
Value Range ±5% (Ceramic core)	0.1 ~ 100Ω		0.5 ~ 220Ω	
Value Range ±5% (Metal Oxide Film)	110Ω ~33K		240Ω ~10K	
Temp. Coefficient	±300ppm/°C			

• SQZ-YB / SQZ-YD

Style	Power Rating 70°C	SQZ-YB-15W/ SQZ-YD-1-15W SQZ-YB-20W/ SQZ-YD-1-20W	SQZ-YD-3W	SQZ-YD-5W	SQZ-YD-7W	SQZ-YD-10W	SQZ-YD-15W	SQZ-YD-20W
	Operating Temp. Range	-55°C ~ +155°C						
Max. Working Voltage	500V	250V	350V	500V	500V	500V	500V	
Max. Overload Voltage	1000V	500V	700V	1000V	1000V	1000V	1000V	
Dielectric Withstanding Voltage (AC)	1000V	500V	700V	1000V	1000V	1000V	1000V	
Value Range ±5% (Ceramic core)	1.0 ~ 270Ω	0.1 ~ 100Ω		0.5 ~ 220Ω		1.0 ~ 270Ω		
Value Range ±5% (Metal Oxide Film)	300Ω ~ 10K							
Temp. Coefficient	±300ppm/°C							

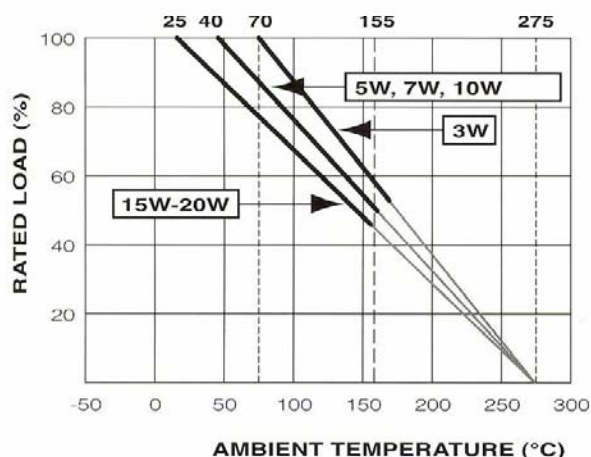
- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50Ω only.

ENVIRONMENTAL CHARACTERISTICS:

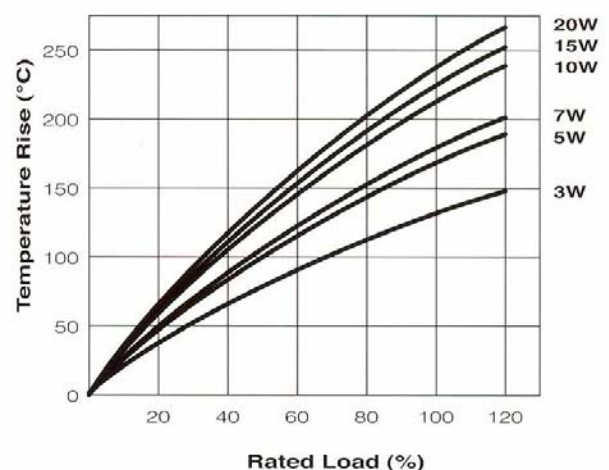
PERFORMANCE TEST	TEST METHOD	APPRAISE
Short Time Overload	JIS-C-5202 5.5: 2.5 times RCWV for 5 seconds	±(0.25%+0.05Ω)
Dielectric Withstanding V.	JIS-C-5202 5.7: in V-Block for 60 seconds	By Type
Temperature Coefficient	JIS-C-5202 5.2: -55°C ~ +155°C	Max. 300ppm/°C
Insulation Resistance	JIS-C-5202 5.6: in V-Block	≥ 1000 MΩ
Solderability	JIS-C-5202 6.5: 235°C for 5±0.5 seconds	95% min. coverage
Resistance to Solvent	JIS-C-5202 6.9: Trichroethane for 1 min. with ultrasonic	no deterioration
Terminal Strength	Direct load for 10 sec. In the direction of the terminal leads	≥ 2.5KG/24.5N
Pulse Overload	JIS-C-5202 5.8: 4 time RCWV 10000 cycles (1 sec.on, 25 sec.off)	±(2%+0.05Ω)
Toad Life in Humidity	JIS-C-5202 7.9: 40±2°C, 90 ~ 95% RH at RCWV for 1000hrs (1.5hrs. on, 0.5 hrs. off)	±(5%+0.05Ω)
Load Life	JIS-C-5202 7.10: 70°C at RCWV for 1000hrs (1.5hrs. on, 0.5hrs. off)	±(5%+0.05Ω)
Temperature Cycling	JIS-C-5202 7.4: 65°C ~ room temp. ~ 150°C ~ room temp for 5 cycle	±(2%+0.05Ω)
Soldering Heat	JIS-C-5202 6.4: 350±10°C for 3±0.5 seconds	±(1%+0.05Ω)

- * Rated continuous Working Voltage (RCWV) = $\sqrt{\text{power rating} \times \text{resistance value}}$

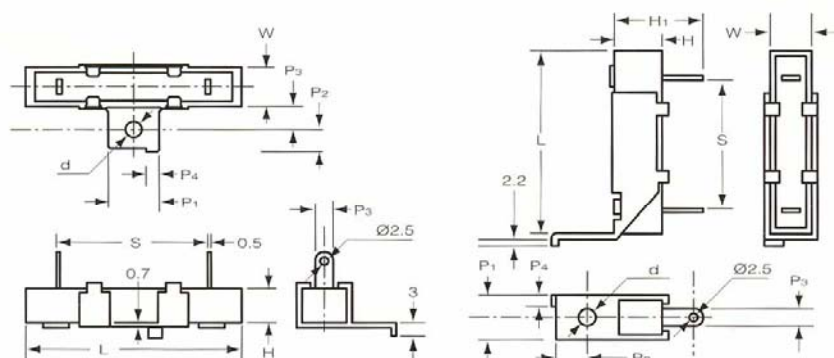
DERATING CURVE



TEMPERATURE RISE



SQH Series Cement Wire Wound Resistors



DIMENSIONS(mm):

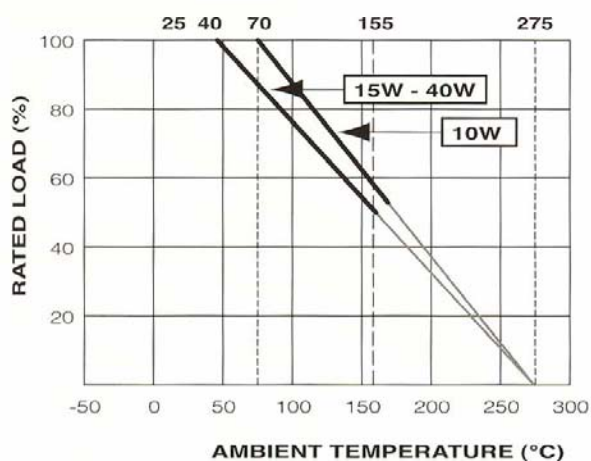
STYLE	DIMENSIONS (mm)									
	L	H	W	S	P ₀	P ₁	P ₂	P ₃	P ₄	d
SQH-10W	48.0±2.0	10.5±1.5	10.5±1.0	33.0±2.0	8.0	11.0	6.0	6.0	3.0	3.8
SQH-15W	48.0±2.0	12.5±1.5	12.0±1.0	33.0±2.0	8.0	11.0	6.0	6.0	3.0	3.8
SQH-20W	63.5±2.0	12.5±1.5	12.5±1.0	48.0±2.0	8.0	11.0	6.0	6.0	3.0	3.8
SQH-25W	63.5±2.0	12.5±1.5	12.5±1.0	46.0±2.0	10.0	11.0	6.0	6.0	3.0	3.8
SQH-30W	70.0±2.0	19.0±1.5	18.0±1.0	56.0±2.0	10.0	18.0	8.0	8.0	3.5	42.0
SQH-40W	90.0±2.0	19.0±1.5	18.0±1.0	70.0±2.0	10.0	18.0	8.0	8.0	3.5	3.5

ELECTRICAL CHARACTERISTICS:

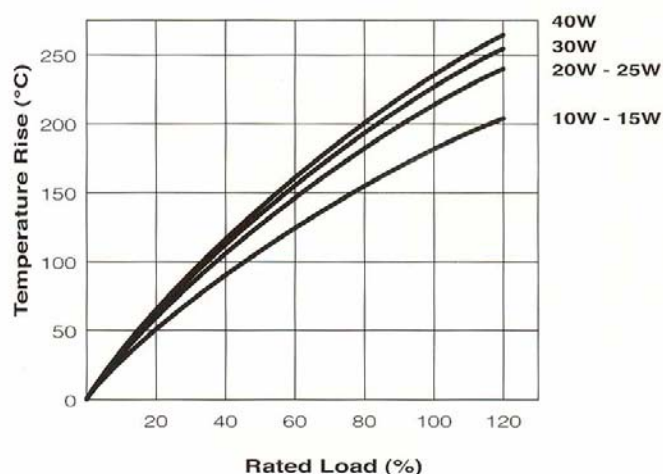
Style	Power Rating 70°C	SQH-10W	SQH-15W	SQH-20W	SQH-30W
		—	—	SQH-25W	SQH-40W
Operating Temp. Range	-55°C ~ +155°C				
Max. Working Voltage	350V	350V	500V	500V	
Max. Overload Voltage	500V	700V	1000V	1000V	
Dielectric Withstanding Voltage (AC)	1000V	1000V	1000V	1000V	
Value Range ±5% (Ceramic core)	0.39 ~ 300Ω			0.51 ~ 1K	
Value Range ±5% (Metal Oxide Film)	300Ω ~ 10K				
Temp. Coefficient	±300ppm/°C				

- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50Ω only.

DERATING CURVE

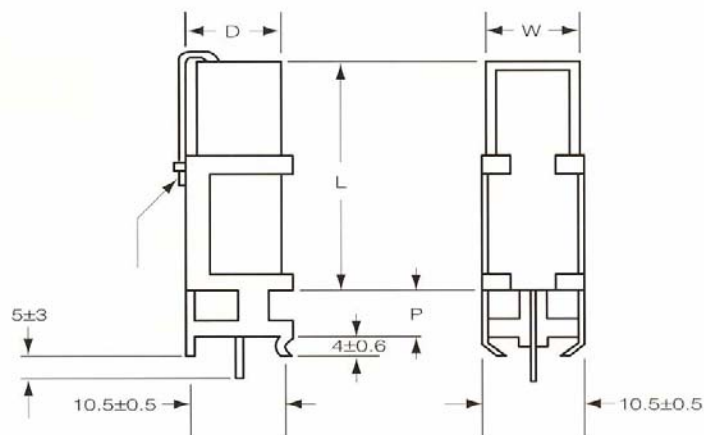


TEMPERATURE RISE





SQV Series Cement Wire Wound Resistors



DIMENSIONS (mm):

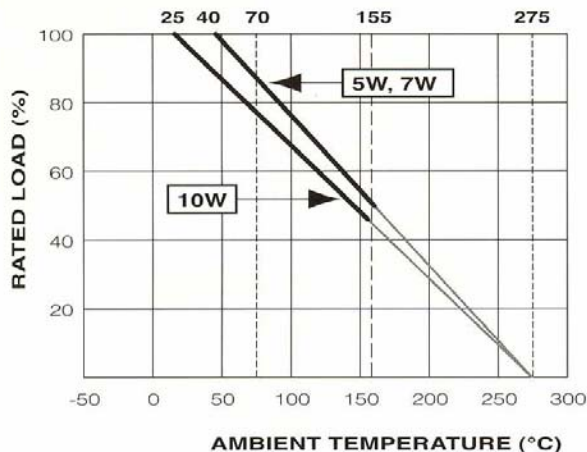
STYLE	DIMENSIONS (mm)				RESISTANCE	
SQV	W	D	L	P	Wirewound	RS
5W	10.0±2.0	9.0±1.0	22.0±1.0	5.0±2.0	0.1Ω ~ 200Ω	200Ω ~ 50Ω
7W	10.0±2.0	9.0±1.0	35.0±1.0	10.0±2.0	0.1Ω ~ 300Ω	300Ω ~ 50Ω
10W	10.0±2.0	9.0±1.0	48.0±1.0	10.0±2.0	0.1Ω ~ 500Ω	500Ω ~ 50Ω
15W	12.5±2.0	12.5±1.0	49.0±1.0	10.0±2.0	0.1Ω ~ 680Ω	680 ~ 50K
20W	13.0±2.0	13.0±1.0	60.0±1.0	10.0±2.0	0.1Ω ~ 820Ω	820 ~ 50K

ELECTRICAL CHARACTERISTICS:

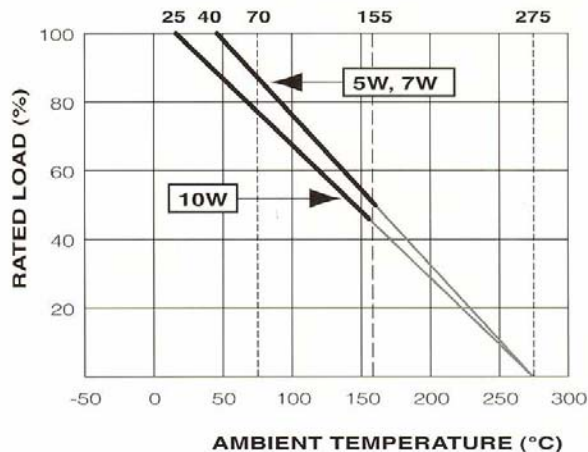
Style	Power Rating 70°C	SQV-5W	SQV-7W	SQV-10W
Operating Temp. Range		-55°C ~ +155°C		
Max. Working Voltage		350V	500V	500V
Max. Overload Voltage		700V	1000V	1000V
Dielectric Withstanding Voltage (AC)		700V	1000V	1000V
Temp. Coefficient		±300ppm/°C		

- * a. Standard resistance is as the above list, below or over this resistance is on request.
b. Value for NKN Non-Inductive type is up to 50Ω only.

DERATING CURVE



TEMPERATURE RISE



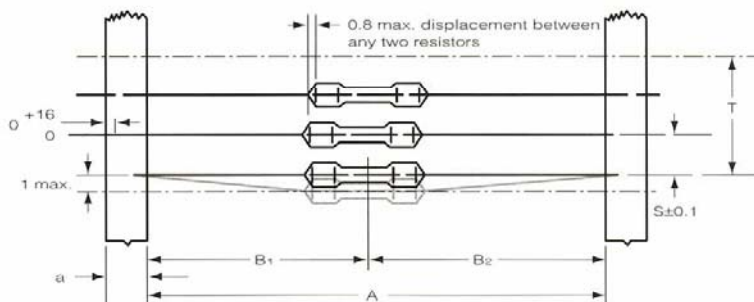
Packing methods and Cut & Forming



PACKING METHODS

Bandolier for Axial Leads

The resistors are supplied on bandolier ;
either 1000 resistors in ammopack or
5000 resistors on reel.



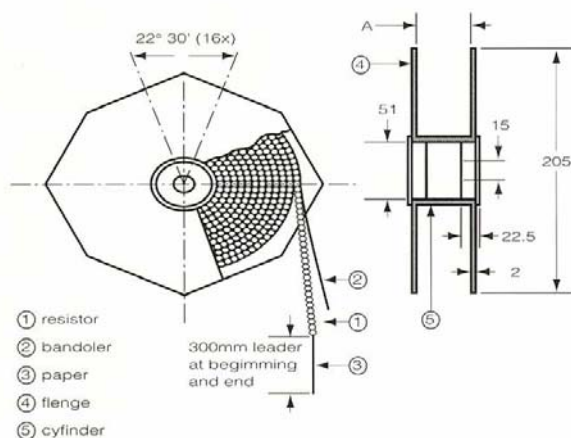
DIMENSIONS(mm):

STYLE		DIMENSIONS (mm)				
Normal	Miniature	a	A	B1 - B2	S (spacing)	T (max. deviation of spacing)
TYPE-12	TYPE25S	6.0±0.5	52.5±1.5	1.2	5.0	1 mm per 10 spacings 0.5 mm per 5 spacings
			26.0±1.5			
TYPE-25	TYPE50S	6.0±0.5	52.5±1.5	1.2	5.0	
			26.0±1.5	1.0		
TYPE-50	TYPE1W	6.0±0.5	52.5±1.5	1.2	5.0	
TYPE-100	TYPE2WS	6.0±0.5	73.0±1.5	1.5	5.0	
			52.5±1.5			
TYPE-200	—	6.0±0.5	73.0±1.5	1.5	10.0	
			52.5±1.5			

STYLE		TAPE ON REEL		TAPE ON BOX			
Normal	Miniature	ACROSS FLANGE (A)	QTY PER REEL	W (A)	H (B)	L (C)	QTY PER BOX
TYPE-12	TYPE25S	72.0	5,000	78.0	20.0	264.0	2,000 / 5,000
TYPE-25	TYPE50S	48.0 / 72.0	5,000	78.0	20.0	264.0	1,000 / 5,000
TYPE-50	TYPE1W	72.0	2,500	78.0	46.0	264.0	1,000
TYPE-100	TYPE2WS	95.0	2,000	103.0	70.0	265.0	1,000
TYPE-200	—	95.0	1,000	103.0	85.0	265.0	1,000

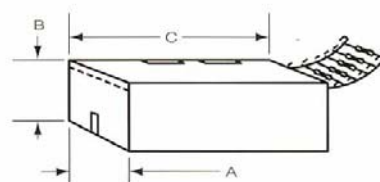
TAPE ON REEL PACKING

Bandoliers can be reeled; dimension A differ with type



TAPE ON BOX PACKING

Bandoliers may also be supplied in a cardboard box ("ammopack").



* "Ammopack" is an abbreviation of "ammunition packing"
The dimensions of A-B-C vary with type and quantity.

unit: mm/pcs

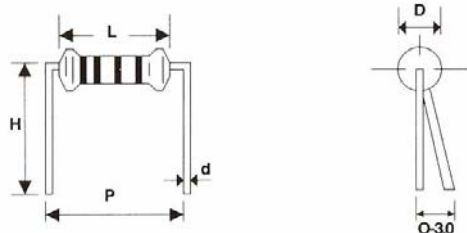


Packing methods and Cut & Forming

Forming:

M-Type

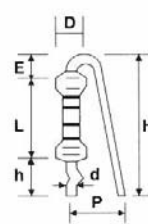
Rated Watts	Dimensions(mm)	
	$P \pm 0.5$	$H \pm 1$
1/6W, 1/4WS	6.0	6.0
1/4W, 1/2WS	10.0	10.0
1/2W, 1WS	12.5	10.0
1W, 2WS	15.0	12.5
2W, 3WS	20.0	15.0
5WS	30.0	14.5



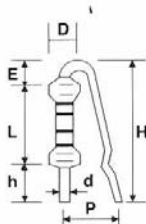
FK1-Type, FK2-Type and FKK-Type

Rated Watts	Dimensions(mm)			
	P	$h1 \pm 1$	H max	E max
1W, 2WS	5-7	10	25	3.5
2W, 3WS	5-7	10	30	3.5

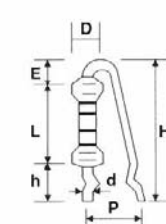
FK1-Type



FK2-Type

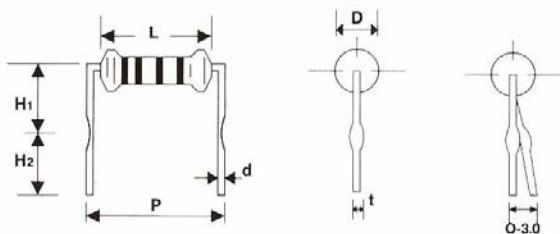


FKK-Type



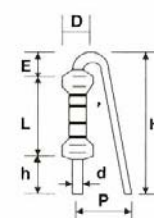
MB-Type

Rated Watts	Dimensions(mm)			
	$P \pm 0.5$	$H1 \pm 1$	$H2 \pm 1$	$t \pm 1$
1/2W, 1WS	12.5	6.0	5.0	1.0
1W, 2WS	15	6.0	5.0	1.3
2W, 3WS	20	7.0	5.0	1.3
3W, 5WS	30	13.0	5.0	1.3



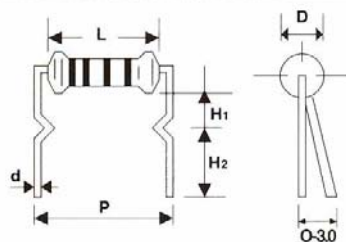
F-Type

Rated Watts	Dimensions(mm)			
	P	$h1 \pm 1$	H max	E max
1W, 2WS	5-7	5.0	25	3.5
2W, 3WS	5-7	5.0	30	3.5



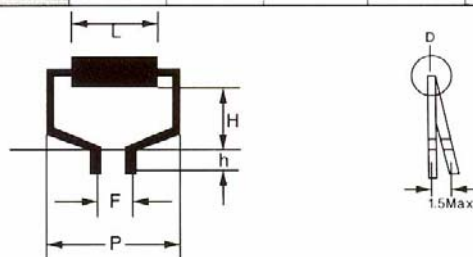
MK-Type

Rated Watts	Dimensions(mm)			
	$P \pm 0.5$	$H1 \pm 1$	$H2 \pm 1$	$t \pm 1$
1W, 2WS	15	6.0	5.0	1.3
2W, 3WS	20	7.0	5.0	1.3
3W, 5WS	30	13.0	5.0	1.3



ML-Type

Rated Watts	Dimensions(mm)				
	D	P	H	h	F
1/2W, 1WS	3.5 ± 1.00	14.0	7.0 ± 1.0	4.0 ± 0.5	7.5 ± 0.5
1W, 2WS	4.5 ± 1.00	17.0	8.0 ± 1.0	4.0 ± 0.5	7.5 ± 0.5
2W, 3WS	6.0 ± 1.00	21.0	9.0 ± 1.0	4.0 ± 0.5	7.5 ± 0.5



NON-FLAMMABLE FIXED WIRE-WOUND POWER RESISTOR

DQ SERIES

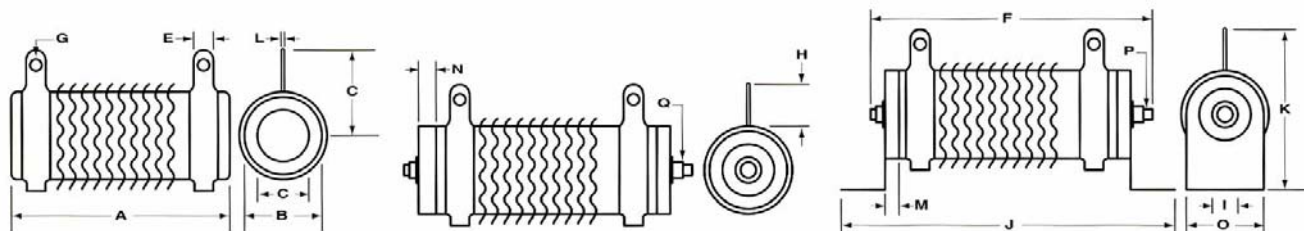


PERFORMANCE:

- RESISTING 400°C MAX CONTINUOUSLY
- TERMINAL STRENGTH: 20KG MIN
- RESISTANCE TOLERANCE: BELOW 5Ω ± 10%, 5Ω AND ABOVE ± 5%

- HEAT DISSIPATION IS ULTRALLY EXCELLENT
- SMALL SIZE VERSUS LARGE CURRENTS

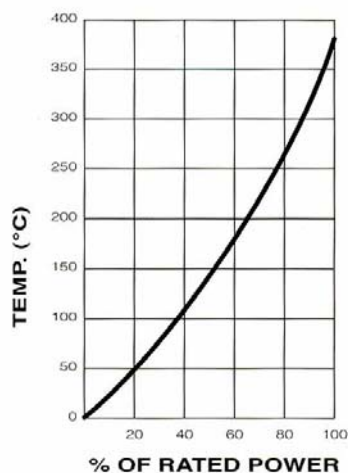
Special material coating (three types to choose from)
- Ceramic (1,200°C) - Silicone (350°C) - Enamel (500°C)



DIMENSIONS(mm):

RATED WATTS	DIMENSIONS(m/m)															
	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q
75W	110	25	16	30	8	150	5	18	6	166	58	1.2	6	27	M5X135	M5X135
90W	90	28	18	32	8	130	5	19	6	146	60	1.2	6	27	M5X115	M5X115
120W	110	28	18	32	8	150	5	19	6	166	60	1.2	6	27	M5X135	M5X135
150W	140	28	18	32	8	180	5	19	6	196	60	1.2	6	27	M5X165	M5X165
180W	160	28	18	32	8	200	5	19	6	216	60	1.2	6	27	M5X185	M5X185
225W	195	28	18	32	8	235	5	19	6	251	60	1.2	6	27	M5X230	M5X230
240W	185	35	24	36	10	225	5	19	8	245	76	1.6	6	34	M5X210	M5X210
300W	210	35	24	36	10	250	5	19	8	274	76	1.6	6	34	M5X245	M5X245
375W	210	40	25	38	12	250	5	20	8	274	78	1.6	6	34	M5X245	M5X245
450W	260	40	25	38	12	300	5	20	8	320	78	1.6	6	34	M5X295	M5X295
600W	330	40	25	38	12	370	5	20	8	395	78	1.6	6	34	M5X365	M5X365
750W	330	50	35	50	12	380	6	25	9	400	100	1.6	8	40	M5X365	M5X365
900W	400	50	35	50	12	450	6	25	9	470	100	1.6	8	40	M5X435	M5X435
1000W	460	50	35	50	12	510	6	25	9	530	100	1.6	8	40	M5X495	M5X495
1200W	460	60	40	55	15	515	6	30	10	535	110	1.6	10	50	M5X495	M5X495
1500W	540	60	40	55	15	595	6	30	10	615	110	1.6	10	50	M6X580	M5X580
2000W	650	65	42	62	15	702	6	30	10	722	115	1.6	10	50	M6X690	M5X690

SURFACE TEMP. VS POWER LOAD



QH200W	OS	A	N	10Ω	J
Type	With Fixed Stands Type			Resistance	Tolerance

A = Adjustable (Ω)
F = Fixed (Ω)

In case of Non-inductive type, use the N

Resistance Tolerance

D	± 0.5%
F	± 1.0%
G	± 2.0%
H	± 3.0%
J	± 5.0%
K	± 10.0%



NON-FLAMMABLE FIXED WIRE-WOUND POWER RESISTOR

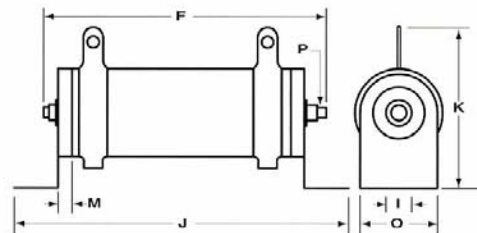
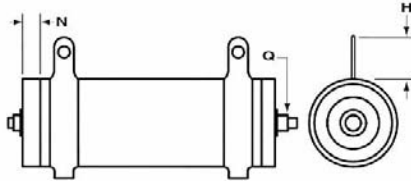
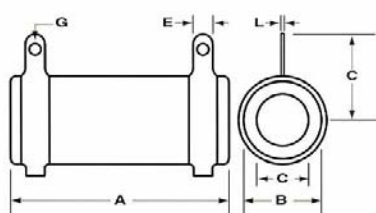
DR SERIES

FEATURES:

- STRONG TERMINALS (4.5-20KG/30SEC)
- RESISTANCE VALUE UNCHANGED AFTER LONGTERM USE
- MULTI-TERMINAL TYPES OR ADJUSTABLE TYPES AVAILABLE

PERFORMANCE:

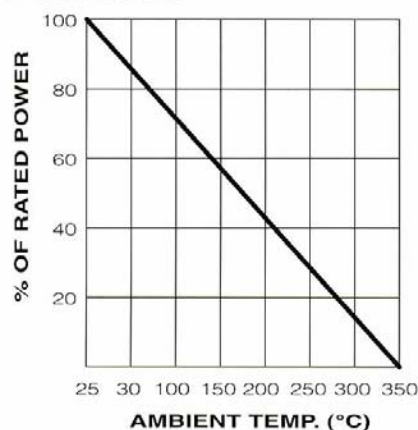
- RESISTANCE TEMP. COEFF $\pm 400, 260, 100\text{PPM}/^{\circ}\text{C}$
- SHORT TIME OVER $\pm (2\% \pm 0.05\Omega)$
- INSULATION RESISTANCE $500\text{V } 20\text{M}\Omega \text{ MIN}$
- VOLTAGE WITHSTANDING 1000V for 1 min



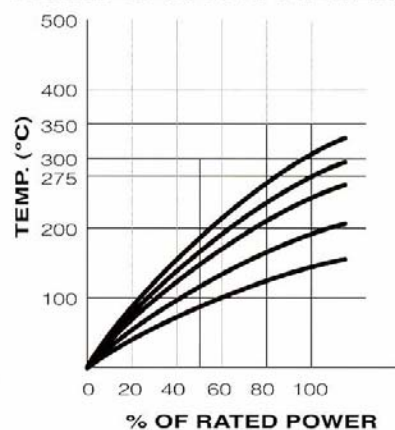
DIMENSIONS(mm):

RATED WATTS	DIMENSIONS(m/m)																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
10W	45	12	6	15	4	54	2	9	3	62	28	1.0		6	10		M3X68
20W	60	17	8	22	5	78	2	12	4	90	36	1.0		6	16	M3X68	M4X88
30W	80	17	8	22	5	100	2	12	4	112	36	1.0		6	16	M4X88	M4X108
40W	110	17	8	22	5	128	2	12	4	140	36	1.0		6	16	M4X118	M5X135
50W	110	25	16	30	8	150	5	18	6	166	58	1.2	6		27	M5X135	M5X135
60W	90	28	18	32	8	130	5	19	6	146	60	1.2	6		27	M4X115	M4X115
80W	110	28	18	32	8	150	5	19	6	166	58	1.2	6		27	M5X135	M5X135
100W	140	28	18	32	8	180	5	19	6	196	60	1.2	6		27	M5X165	M5X165
120W	160	28	18	32	8	200	5	19	6	216	60	1.2	6		27	M5X185	M5X185
150W	195	28	18	32	8	235	5	19	6	251	60	1.2	6		27	M5X230	M5X230
160W	185	35	24	36	10	225	5	19	8	245	76	1.6	6		34	M5X210	M5X210
200W	210	35	24	36	10	250	5	19	8	274	76	1.6	6		34	M5X245	M5X245
250W	210	40	25	38	12	250	5	20	8	274	78	1.6	6		34	M5X245	M5X245
300W	260	40	25	38	12	300	5	20	8	320	78	1.6	6		34	M5X295	M5X295
400W	330	40	35	38	12	370	5	20	8	395	78	1.6	6		34	M5X365	M5X365
500W	330	50	35	50	12	380	6	25	9	400	100	1.6	6		40	M5X365	M5X365
600W	400	50	35	50	12	450	6	25	9	470	100	1.6	8		40	M5X435	M5X435
700W	460	50	35	50	12	510	6	25	9	530	100	1.6	8		40	M5X495	M5X495
800W	460	60	40	55	15	515	6	30	10	535	110	1.6	108		50	M5X495	M5X495
1000W	540	60	40	55	15	595	6	30	10	615	110	1.6	10		50	M6X580	M5X580
1300W	650	65	42	62	15	702	6	30	10	722	115	1.6	10		50	M6X690	M5X690

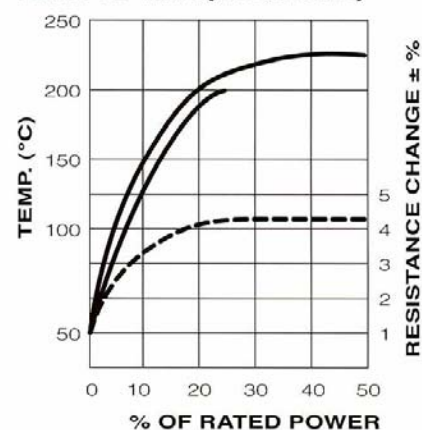
DERATING



SURFACE TEMP. VS POWER LOAD

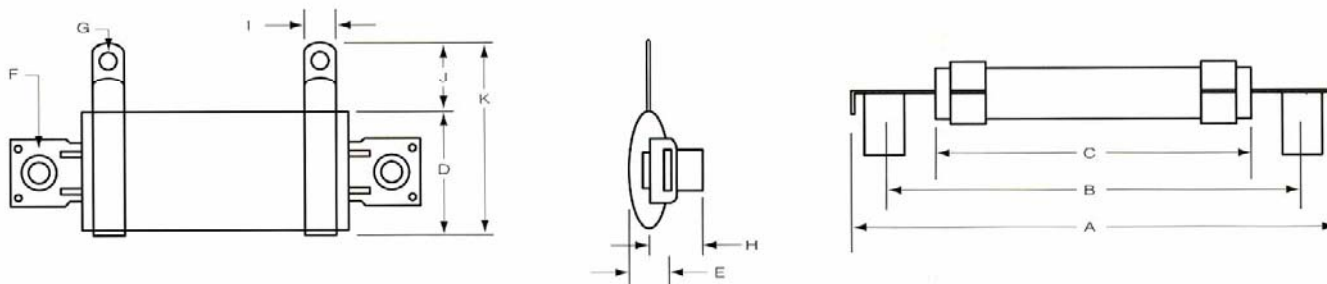


TEMP. VS TIME (100% LOAD)



NON-FLAMMABLE FIXED WIRE-WOUND POWER RESISTOR

ZR SERIES



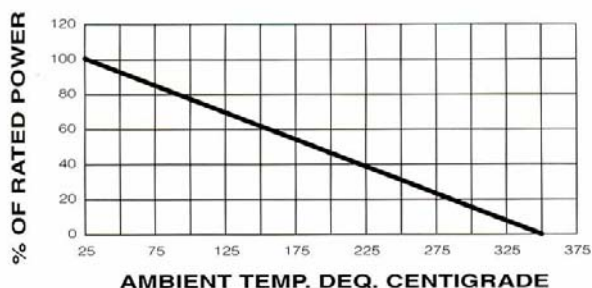
DIMENSIONS(mm):

RATED WATTS	DIMENSIONS(m/m)											
ZZR TYPE	A	B	C	D	E	F	G	H	I	J	K	ZQR TYPE
40W	83	70	50	28	11	5.2	4.1	13	6.5	12	42	60W
55W	123	110	90	28	11	5.2	4.1	13	6.5	12	42	82W
70W	153	140	120	28	11	5.2	4.1	13	6.5	12	42	105W
95W	183	170	150	28	11	5.2	4.1	13	6.5	12	42	140W
100W	193	180	160	28	11	5.2	4.1	13	6.5	12	42	150W
120W	218	205	185	28	11	5.2	4.1	13	6.5	12	42	180W
150W	218	205	185	35	11	5.2	5.2	13	9	13	46	225W
200W	243	230	210	35	11	5.2	5.2	13	9	13	46	300W
250W	287	274	254	35	11	5.2	5.2	13	9	13	48	375W
300W	333	320	300	35	11	5.2	5.2	13	9	13	48	450W

DERATING:

Industrial wirewound resistors have an operating temperature range of -55°C to +350°C

They must be derated at high ambient temperatures according to the curve at the right.



Dielectric Strength: 1000 vac minimum.

Short Time Overload: In intermittent duty the applied power can greatly exceed the wattage rating. However, since each pulse application is somewhat unique, the factory should be contacted for specific requirements.

MATERIAL SPECIFICATIONS:

Core: Steatite. Chemically inert-will withstands severe thermal shock and is impervious to moisture.

Element: Highest quality copper-nickel alloy or nickel-chrome alloy, depending on resistance value.

Coating: HL-special high temperature silicone, Cured at much lower temperatures than vitreous enamels.



ALUMINUM HOUSED. WIREWOUND RESISTORS

LARGE-CAPACITY TYPE RESISTORS

Aluminum Cased (Economy type)

FEATURES:

- Low price Small size.
- High power and Excellent load life stability.
- Excellent short time over load.
- Strongly resistant to moisture, solvent and insulation.
- Self-extinguish material is used in molding.
- both standard winding type and non-inductive winding type are available
- Terminal arrangements should be separately specified.
- High-surge-resistant items are also available.
- Items with the thermal switches are also available.

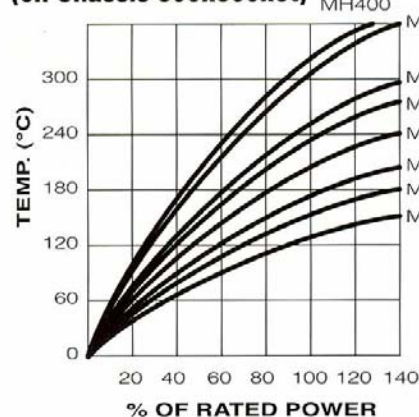
NOMINAL RESISTANCE VALUES

Type		Wattage Rating (w)	Resistance Range (Ω)	
			Standard Type	Non-inductive Type
MH(L) MV	60	60	0.001 Ω ~ 5K Ω	0.1 Ω ~ 2.5K Ω
MH(L) MV	80	80	0.001 Ω ~ 6K Ω	0.2 Ω ~ 3K Ω
MH(L) MV	100	100	0.001 Ω ~ 8K Ω	0.2 Ω ~ 4K Ω
MH(L) MV	120	120	0.001 Ω ~ 10K Ω	0.2 Ω ~ 5K Ω
MH(L) MV	150	150	0.001 Ω ~ 12K Ω	0.2 Ω ~ 6K Ω
MH(L) MV	200	200	0.001 Ω ~ 15K Ω	0.2 Ω ~ 7K Ω
MH(L) MV	300	300	0.001 Ω ~ 18K Ω	0.5 Ω ~ 8K Ω
MH(L) MV	400	400	0.001 Ω ~ 20K Ω	0.5 Ω ~ 10K Ω
MH(L) MV	500	500	0.001 Ω ~ 25K Ω	0.5 Ω ~ 12K Ω
MH(L) MV	1000	1000	0.05 Ω ~ 30K Ω	1 Ω ~ 15K Ω

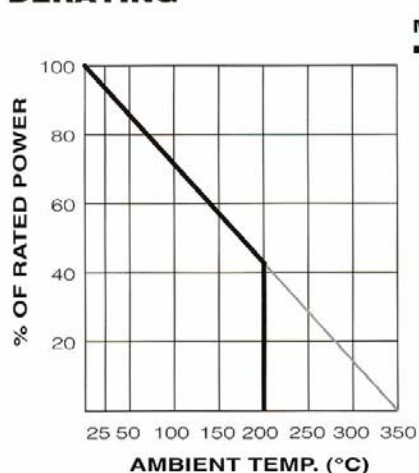
PERFORMANCE

Parameters	Test Conditions	Specifications
Short Time Over Load	5X wattage rating-5sec.	$\Delta R(2\%+0.05\Omega)$ MAX
Moisture Resistance	temp 40°C moisture 95% DC 100v500Hr	$\Delta R(3\%+0.05\Omega)$ MAX
Moisture LoadLife	temp 40°C moisture 95% 1/10 X wattage rating (1.5Hr ON-0.5Hr OFF) - Repeat 1000Hr	$\Delta R(3\%+0.05\Omega)$ MAX
Load Life	Load Rating (chassis is mounted) (1.5Hr ON-0.5Hr OFF) Repeat 1000Hr	$\Delta R(5\%+0.05\Omega)$ MAX
Vibration	10c/s~50c/s~10c/s (1min)-2Hr each of paralleled and right angle	$\Delta R(1\%+0.05\Omega)$ MAX
Heat Resistance	275°C 2Hr	$\Delta R(0.5\%+0.05\Omega)$ MAX
Dielectric Strength	AC1500V	$\Delta R(0.2\%+0.05\Omega)$ MAX
Insulation Resistance	Under the same test condition of Dielectric Strength, Load DC500V and measure the Insulation R.	100M Ω min
Temp. coefficient	260ppm/°C MAX	
Operating Temp.	-55°C ~ +250°C	

SURFACE TEMPERATURE VERSUS POWER LOAD (on Chassis 300x300x3t)



DERATING



MH100	N	80 Ω	J
Type	Resistance	Tolerance	
In case of Non-inductive type, use the N			

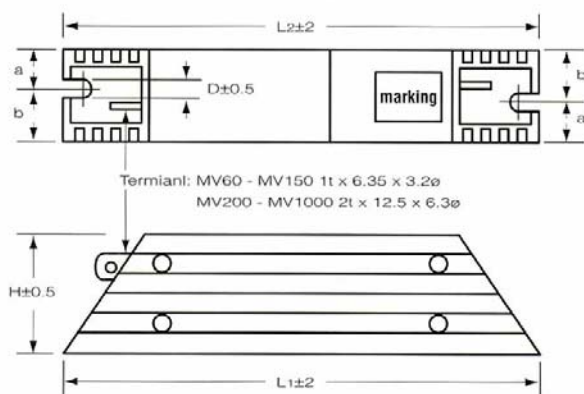
Resistance Tolerance

D	$\pm 0.5\%$
F	$\pm 1.0\%$
G	$\pm 2.0\%$
H	$\pm 3.0\%$
J	$\pm 5.0\%$
K	$\pm 10.0\%$

ALUMINUM HOUSED. WIREWOUND RESISTORS LARGE-CAPACITY TYPE RESISTORS



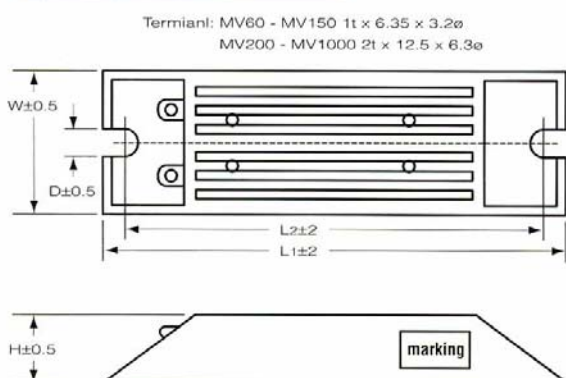
TYPE: MV



EXTERNAL DIMENSIONS

Type	Dimensions (mm)							MAX Weight (g)
	L1	L2	W	H	D	A±0.5	B±0.5	
MV60	115	100	20	40	5.3	8.0	12.0	110
MV80	140	125	20	40	5.3	8.0	12.0	160
MV100	165	150	20	40	5.3	8.0	12.0	200
MV120	190	175	20	40	5.3	8.0	12.0	240
MV150	215	200	20	40	5.3	8.0	12.0	290
MV200	165	150	30	60	5.3	13.0	17.0	460
MV300	215	200	30	60	5.3	13.0	17.0	750
MV400	265	250	30	60	5.3	13.0	17.0	930
MV500	335	320	30	60	5.3	13.0	17.0	1100
MV1000	400	385	50	100	5.3X2			2800

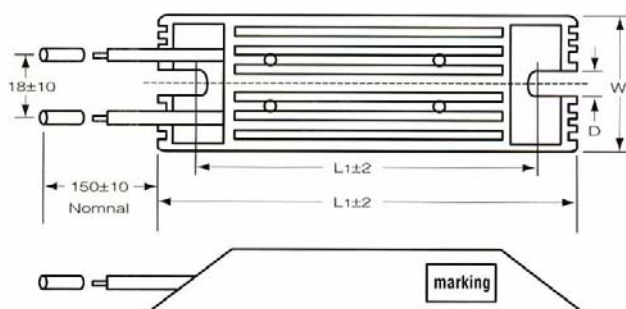
TYPE: MH



EXTERNAL DIMENSIONS

Type	Dimensions (mm)						MAX Weight (g)
	L1	L2	W	H	D		
MH60	115	100	40	20	5.3		110
MH80	140	125	40	20	5.3		160
MH100	165	150	40	20	5.3		200
MH120	190	175	40	20	5.3		240
MH150	215	200	40	20	5.3		290
MH200	165	150	60	30	5.3		460
MH300	215	200	60	30	5.3		750
MH400	265	250	60	30	5.3		930
MH500	335	320	60	30	5.3		1100
MH1000	400	385	100	50	5.3X2		2800

TYPE: MHL



LEAD WIRE CONDUCTOR CROSS-SECTION; WITHSTAND VOLTAGE

Conductor Cross-sectional areas	1.25mm ²	2mm ²	3.5mm ²
Withstand voltage			
2500V	○	-	-
3000V	○	○	○
3500V	-	○	○

- Dimensions are the same as MH type
- Lead's size to customers' request



PRECISION POWER RESISTORS DIMENSIONS - 5~50W. 100W. 250W PRECISION POWR RESISTORS

Aluminum Housed (Chassis Mount)

FEATURE:

- High power rating, small size and ultra precision.
- Standard winding & non-inductive winding types.
- High stability, strong construction.

GENERAL SPEC:

- Wattage Range: 6 styles to choose ranging from 5 to 250 watts.
- Resistance Tolerance: 10%, 5%, 3%, 2%, 1%, 0.5%
- Operating Temperature Range: -55% to +275
- Dielectric Strength: AH-5 AH-10 AH-25 1000V AH-50 1500V AH-100 AH-250 2500V
- Temperature Coefficient of Resistance: Standard T.C.: $\pm 30\text{PPM}/^{\circ}\text{C} = 10\Omega$ and up, $\pm 50\text{PPM}/^{\circ}\text{C} = 1$ to 9.99 Ω , $\pm 90\text{PPM}/^{\circ}\text{C} = \text{below } 1\Omega$

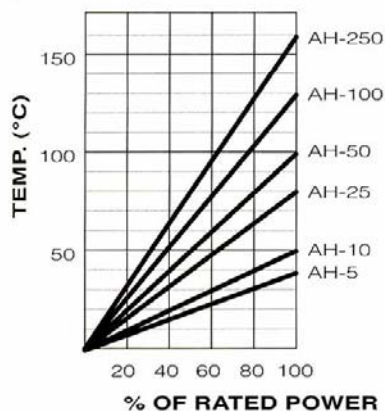
NOMINAL RESISTANCE VALUES

Type	MIL Style	Wattage Rating	Resistance Range (Ω)		MAX Working (V)		(g) MAX Weight	proper heat sink (aluminum chassis)
			AH Inductive	AHN Non-inductive	AH	AHN		
AH- 5	RE60	5	0.05 ~ 3k	0.1~1k	120	70	3	152X102X51X1t
AH- 10	RE65	10	0.02 ~ 6k	0.03~2.3k	245	180	7	152X102X51X1t
AH- 25	RE70	25	0.012~15k	0.02~5.5k	500	300	15	178X127X51X1t
AH- 50	RE75	50	0.01 ~40k	0.02~12k	1300	600	33	305X305X1.5t
AH-100	RE77	100	0.4 ~50k	0.12~25k	1900	1340	450	305X305X3t
AH-250	RE80	250	0.6 ~80k	0.15~40k	2500	1750	800	305X305X3t

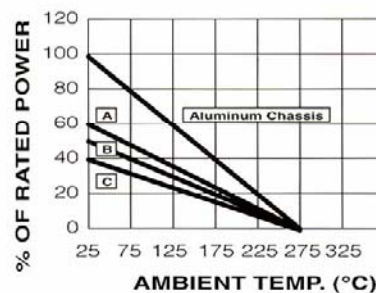
PERFORMANCE

Parameters	Test Conditions	Specifications
Short Time Over Load	5X wattage rating-5sec.	$\Delta R \pm(0.5\%+0.05\Omega)$ MAX
Moisture Resistance	Temp 40°C moisture 95% DC 100v500Hr	$\Delta R \pm(0.5\%+0.05\Omega)$ MAX
Moisture LoadLife	Temp 40°C moisture 95% 1/10 X wattage rating (1.5Hr ON-0.5Hr OFF) - Repeat 1000Hr	$\Delta R \pm(0.5\%+0.05\Omega)$ MAX
Load Life	Load Rating (chassis is mounted) (1.5Hr ON-0.5Hr OFF) Repeat 1000Hr	$\Delta R \pm(1.5\%+0.05\Omega)$ MAX
Vibration	10c/s~50c/s~10c/s (1min)-2Hr each of paralleled and right angle	$\Delta R \pm(0.2\%+0.05\Omega)$ MAX
Heat Resistance	275°C 2Hr	$\Delta R \pm(0.5\%+0.05\Omega)$ MAX
Dielectric Strength	AH- 5 AH- 10 AH- 25 1000V / AH-50 1500V AH-100 AH-250 2500V	$\Delta R \pm(0.2\%+0.05)$ MAX
Insulation Resistance	Under the same test condition of Dielectric Strength, Load DC500V and measure the Insulation R.	1000M Ω min
Terminal Strength	1. Pull Test (30 sec Min) AH-5 1kg, AH-10 2.3kg, AH-25, AH-50 4.5kg 2. Torque Test (5~15sec) AH-100 27kg-cm, AH-250 36kg-cm	$\Delta R \pm(0.2\%+0.05\Omega)$ MAX

SURFACE TEMPERATURE VERSUS POWER LOAD (on Chassis)



DERATING



Materials:

- Encapsulant: Silicone
- End caps: Stainless steel
- Core: Ceramic steatite or alumina
- Housing: Aluminum with hard anodic coating
- Element: Copper-nickel alloy, nickel-chrome alloy or manganese copper
- Standard Terminals: 5~50W Tinned terminals 100~250W Threaded terminals

HOW TO ORDER

AH50	20 Ω	J
Type	Resistance	Tolerance

Resistance Tolerance

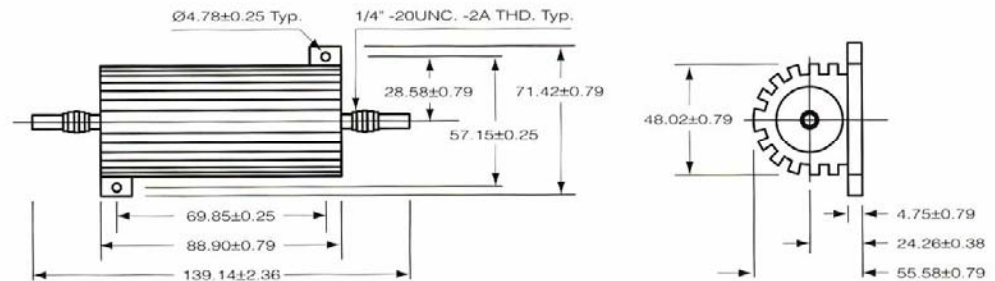
D	F	G	H	J	K
$\pm 0.5\%$	$\pm 1.0\%$	$\pm 2.0\%$	$\pm 3.0\%$	$\pm 5.0\%$	$\pm 10.0\%$

PRECISION POWER RESISTORS DIMENSIONS - 5~50W. 100W. 250W



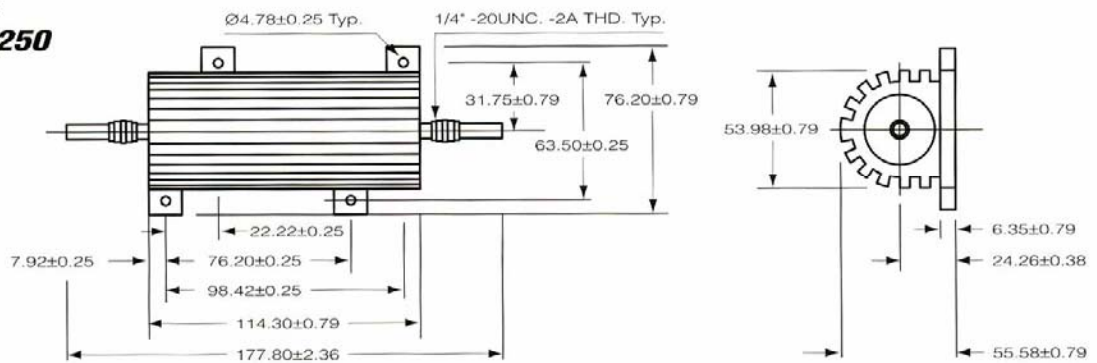
DIMENSIONS

AH-100 AHN-100



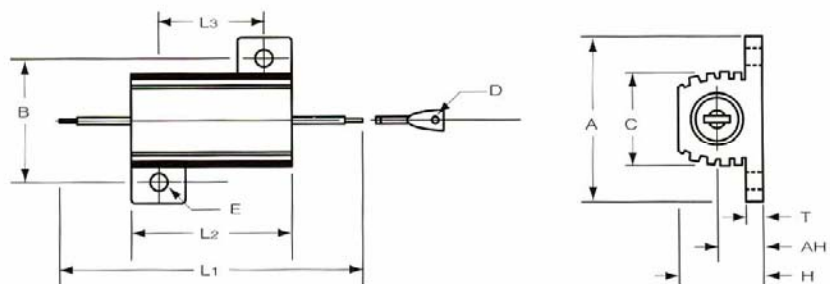
DIMENSIONS

AH-250 AHN-250



DIMENSIONS

AH-5 AHN-5
AH-10 AHN-10
AH-25 AHN-25
AH-50 AHN-50



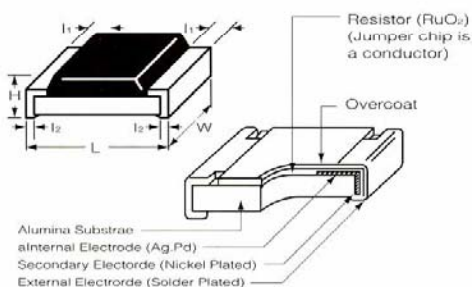
TYPE	Dimensions (mm)										
	L1	L2±1	L3±0.8	A±1	B±0.8	C±1	D±0.1	E±0.3	H±1	h±1	T±0.2
AH-5 / AHN-5	28.6	15.3	11.3	16.5	12.4	8.5	1.3	2.4	8.2	4	1.6
AH-10 / AHN-10	35	19	14.3	20.4	15.9	11	2.2	2.4	10	5	2
AH-25 / AHN-25	49	27	18.3	27.2	19.8	14	2.2	3.2	14	6.5	2
AH-50 / AHN-50	70	50	39.7	29.2	21.5	16	2.2	3.2	16	7	2



Thick Film Chip Resistors

RC Series

DIMENSIONS



FEATURES

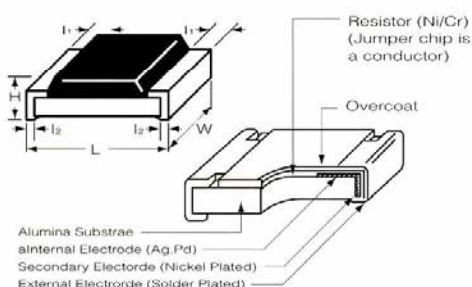
- Extremely thin and light
- Highly reliable multilayer electrode construction
- Compatible with all soldering process
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Zero Ohm Jumper is available
- Available in 8 mm Tape & Reel per EIA RS481

unit : mm

Style	K	W	H	l ₁	l ₂
RC0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
RC0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
RC0805	2.00±0.10	1.25±0.10	0.50±0.10	0.40±0.20	0.40±0.20
RC1206	3.10±0.10	1.60±0.10	0.55±0.10	0.50±0.25	0.50±0.25
RC1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20
RC2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20
RC2512	6.35±0.10	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20

RT Series

DIMENSIONS



FEATURES

- High stability
- Low TCR
- High accuracy (±0.1% , ±0.5%)

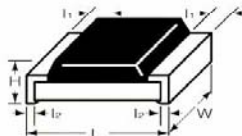
unit : mm

Style	K	W	H	l ₁	l ₂
RT0603	1.60±0.10	0.80±0.15 -0.05	0.45±0.10	0.30±0.20	0.30±0.20
RT0805	2.00±0.15	0.25±0.10 -0.05	0.50±0.10	0.40±0.20	0.40±0.20

Style	RC0402	RC0603	RC0805	RC1206	RC1210	RC2010	RC2512
Power Rating 70°C	1/16W	1/10W	1/6W	1/4W	1/3W	3/4W	1W
Operating Temp. Range	-55°C ~ +155°C (Derated to 0 Load at +125°C)						
Max. Working Voltage	25V	50V	150V	200V	200V	200V	200V
Max. Overload Voltage	50V	100V	300V	400V	400V	400V	400V
Dielectric Withstand Voltage	50V	100V	250V	500V	500V	500V	500V
Resistance Range	100Ω ~ 1MΩ 2Ω ~ 3.3MΩ			10Ω ~ 1MΩ 1Ω ~ 10MΩ			
±1%, E-96							
±5%, E-24							
Zero Ohm Jumper < 0.05Ω							
Temp. Coefficient	250ppm/°C			100ppm/°C			
	2Ω~10Ω: ±500ppm/°C			1Ω~10Ω: 250ppm/°C >1MΩ: 200ppm/°C			

RL Series

DIMENSIONS



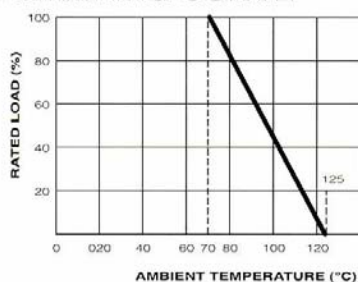
FEATURES

- Current sensing of Desktop & NoteBook PC
- Resistance values down to 0.010 ohms
- Highly reliable multilayer electrode construction
- Low Inductance
- High speed logic circuits

unit : mm

Style	K	W	H	l ₁	l ₂
RL0805	2.00±0.10	1.25±0.10	0.5±0.10	0.40±0.20	0.40±0.20
RL1206	3.10±0.10	0.60±0.10	0.55±0.10	0.50±0.25	0.50±0.25
RL1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20
RL2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.40±0.20
RL2512	6.35±0.10	3.20±0.15	0.55±0.10	0.60±0.25	0.40±0.20

DERATING CURVE

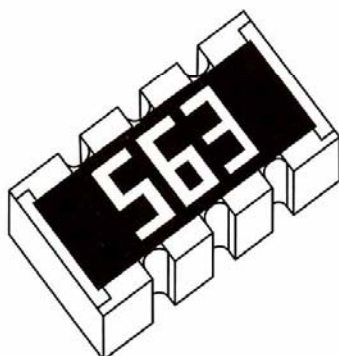


Style	RT0603	RT0805
Power Rating 70°C	1/16W	1/10W
Operating Temp. Range	-55°C to +125°C (Derated to 0 Load at +125°C)	
Max. Working Voltage	50V	100V
Max. Overload Voltage	100V	200V
Dielectric Withstand Voltage	100V	250V
Resistance Range	10Ω~91Ω : ±50ppm/°C	
E-24 only, E-96 on request	10Ω~91Ω : ±50ppm/°C	
±0.1% RT0603: 100Ω~33KΩ, 25ppm/°C only	100Ω~33Ω : ±25ppm/°C	100Ω~100Ω : ±25ppm/°C
±0.1% RT0805: 100Ω~100KΩ, 25ppm/°C only	36Ω~330Ω : ±100ppm/°C	110Ω~1MΩ : ±100ppm/°C
Temp. Coefficient	±25~100ppm/°C	
Resistance Tolerance	±0.1% , ±0.5%	

Thick Film Chip Resistors Network (YC Series / TC Series)



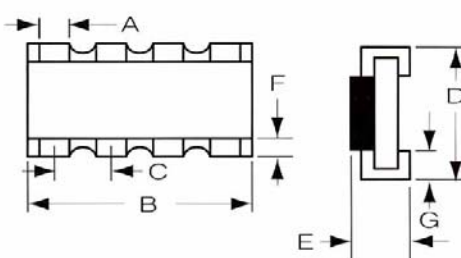
YC Series



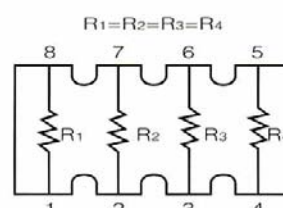
APPLICATIONS

- Telecommunication Equipment Lap-Top and Note-Book Computer

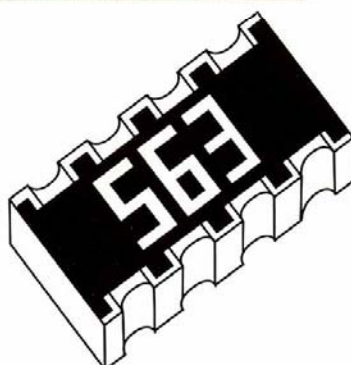
DIMENSIONS



SCHEMATICS



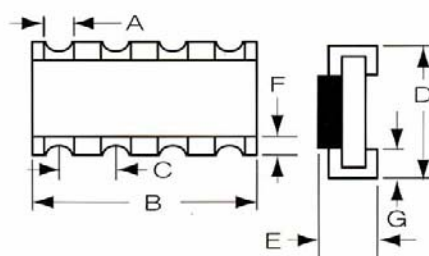
TC Series



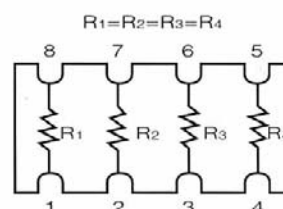
APPLICATIONS

- Telecommunication Equipment Lap-Top and Note-Book Computer

DIMENSIONS



SCHEMATICS



Style	Number of Resistors	A	B	C	D	E	F	G
YC16	4	0.5±0.15	3.20±0.2	0.80±0.05	1.6±0.2	0.0.1	0.3±0.15	0.3±0.15
TC16	4	0.5±0.15	3.20±0.2	0.80±0.05	1.6±0.2	0.0.1	0.3±0.15	0.3±0.15

ELECTRICAL CHARACTERISTICS:

Style	YC16	TC16
Power Rating 70°C	1/16W	
Operating Temp. Range	-55°C to +125°C (Derated to 0 Load at +125°C)	
Max. Working Voltage	50V	
Max. Overload Voltage	100V	
Dielectric Withstand Voltage	100V	
Number of Resistors	4	
Resistance Range	~10Ω ~ 1M Ω	
Temperature Coefficient	±200ppm/oC	
Resistance Tolerance (by Type)	±5%	



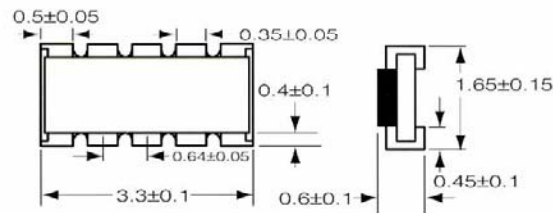
Thick Film Chip Resistors Network (YC Series 9P/8R & 10P/9R)

APPLICATIONS

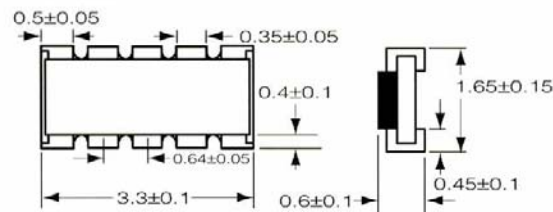
- Telecommunication Equipment Lap-Top and Note-Book Computer

DIMENSIONS

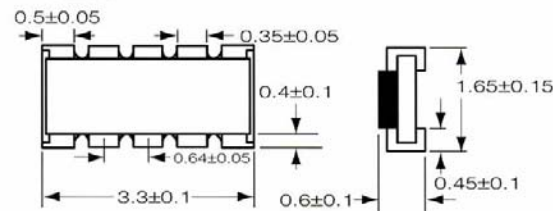
YC15



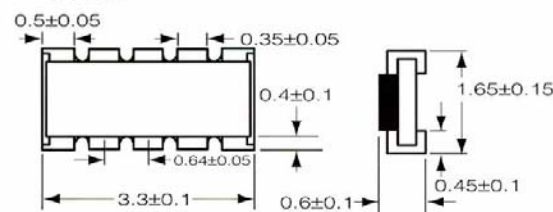
YC35



YC17

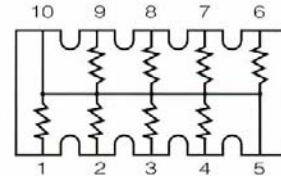


YC19

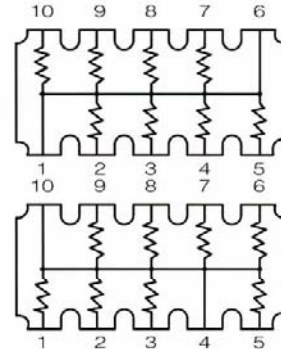


SCHEMATICS

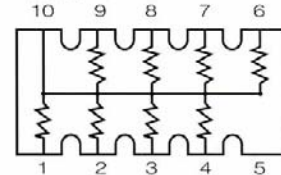
YC15



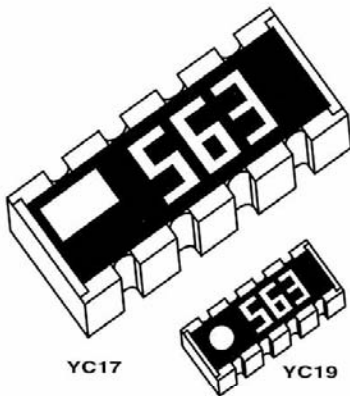
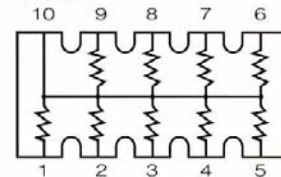
YC35



YC17



YC19



ELECTRICAL CHARACTERISTICS:

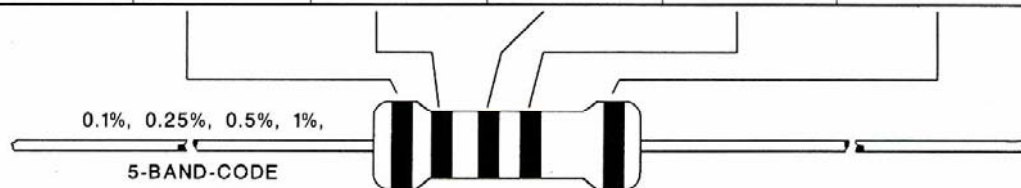
Style	YC15	YC35	YC17	YC19
Power Rating 70°C	1/132W	1/16W	1/32W	1/32W
Operating Temp. Range	-55°C to +125°C (Derated to 0 Load at +125°C)			
Max. Working Voltage	25V	50V	25V	25V
Max. Overload Voltage	50V	100V	50V	50V
Dielectric Withstand Voltage	50V	100V	50V	50V
Number of Resistors	8	8	8	9
Resistance Range	33Ω ~ 100Ω			
Temperature Coefficient	±200ppm/oC			
Resistance Tolerance (by Type)	±5%			

Color Indication Rating And Standard Values And Symbols



4-BAND-CODE
2%, 5%, 10%

COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	±1% (F)
RED	2	2	2	100Ω	±2% (G)
ORANGE	3	3	3	1KΩ	
YELLOW	4	4	4	10KΩ	
GREEN	5	5	5	100KΩ	±0.5% (D)
BLUE	6	6	6	1MΩ	±0.25% (C)
VIOLET	7	7	7	10MΩ	±0.10% (B)
GREY	8	8	8		±0.05%
WHITE	9	9	9		
GOLD				0.1	±5% (J)
SILVER				0.01	±10% (K)



STANDARD RESISTANCE VALUES FOR THE 10-TO-100 DECADE (also usable in decade multiples or sub-multiples)

RESISTANCE TOLERANCE (± %)																	
0.1%	0.25%	1%	2%	0.1%	0.25%	1%	2%	0.1%	0.25%	1%	2%	0.1%	0.25%	1%	2%	0.1%	2%
0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%	0.5%	10%
10.0	10.0	10	14.7	14.7	—	21.5	21.5	—	31.6	31.6	—	46.4	46.4	—	68.1	68.1	68
10.1	—	—	14.9	—	—	21.8	—	—	32.0	—	—	47.0	—	—	69.0	—	—
10.2	10.2	—	15.0	15.0	15	22.1	22.1	22	32.4	32.4	—	47.5	47.5	—	69.8	69.8	—
10.4	—	—	15.2	—	—	22.3	—	—	32.8	—	—	48.1	—	—	70.6	—	—
10.5	10.5	—	15.4	15.4	—	22.6	22.6	—	33.2	33.2	33	48.7	48.7	—	71.5	71.5	—
10.6	—	—	15.6	—	—	22.9	—	—	33.6	—	—	49.3	—	—	72.3	—	—
10.7	10.7	—	15.8	15.8	—	23.2	23.2	—	34.0	34.0	—	49.9	49.9	—	73.2	73.2	—
10.9	—	—	16.0	—	16	23.4	—	—	34.4	—	—	50.5	—	—	74.1	—	—
11.0	11.0	11	16.2	16.2	—	23.7	23.7	—	34.8	34.8	—	51.1	51.1	51	75.0	75.0	75
11.1	—	—	16.4	—	—	24.0	—	24	35.2	—	—	51.7	—	—	75.9	—	—
11.3	11.3	—	16.5	16.5	—	24.3	24.3	—	35.7	35.7	—	52.3	52.3	—	76.8	76.8	—
11.4	—	—	16.7	—	—	24.6	—	—	36.1	—	36	53.0	—	—	77.7	—	—
11.5	11.5	—	16.9	16.9	—	24.9	24.9	—	36.5	36.5	—	53.6	53.6	—	78.7	78.7	—
11.7	—	—	17.2	—	—	25.2	—	—	37.0	—	—	54.2	—	—	79.6	—	—
11.8	11.8	—	17.4	17.4	—	25.5	25.5	—	37.4	37.4	—	54.9	54.9	—	80.6	80.6	—
12.0	—	12	17.6	—	—	25.8	—	—	37.9	—	—	55.6	—	—	81.6	—	—
12.1	12.1	—	17.8	17.8	—	26.1	26.1	—	38.3	38.3	—	56.2	56.2	56	82.5	82.5	82
12.3	—	—	18.0	—	18	26.4	—	—	38.8	—	—	56.9	—	—	83.5	—	—
12.4	12.4	—	18.2	18.2	—	26.7	26.7	—	39.2	39.2	39	57.6	57.6	—	84.5	84.5	—
12.6	—	—	18.4	—	—	27.1	—	27	39.7	—	—	58.3	—	—	85.6	—	—
12.7	12.7	—	18.7	18.7	—	27.4	27.4	—	40.2	40.2	—	59.0	59.0	—	86.6	86.6	—
12.9	—	—	18.9	—	—	2.7	—	—	40.7	—	—	59.7	—	—	87.6	—	—
13.0	13.0	13	19.1	19.1	—	28.0	28.0	—	41.2	41.2	—	60.4	60.4	60.4	88.7	88.7	—
13.2	—	—	19.3	—	—	28.4	—	—	41.7	—	—	61.2	—	—	89.8	—	—
13.3	13.3	—	19.6	19.6	—	28.7	28.7	—	42.2	42.2	—	61.9	61.9	62	90.9	90.9	91
13.5	—	—	19.8	—	—	29.1	—	—	42.7	—	—	62.6	—	—	92.0	—	—
13.7	13.7	—	20.0	20.0	20	29.4	29.4	—	43.2	43.2	43	63.4	63.4	—	93.1	93.1	—
13.8	—	—	20.3	—	—	29.8	—	—	43.7	—	—	64.2	—	—	94.2	—	—
14.0	14.0	—	20.5	20.5	—	30.1	30.1	30	44.2	44.2	—	64.9	64.9	—	95.3	95.3	—
14.2	—	—	20.8	—	—	30.5	—	—	44.8	—	—	65.7	—	—	96.5	—	—
14.3	14.3	—	21.0	21.0	—	30.9	30.9	—	45.3	45.3	—	66.5	66.5	—	97.6	97.6	—
14.5	—	—	21.3	—	—	31.2	—	—	45.9	—	—	67.3	—	—	98.8	—	—
E-192	E-96	E-24	E-192	E-96	E-24	E-192	E-96	E-24	E-192	E-96	E-24	E-192	E-96	E-24	E-192	E-96	E-24