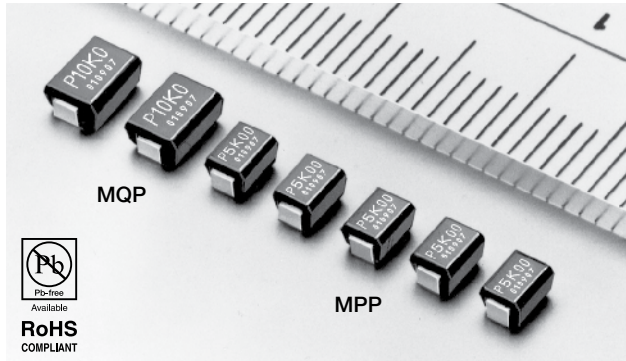


## Z-Foil Ultra High-Precision SMT Resistor (Molded, J-Lead Terminal)

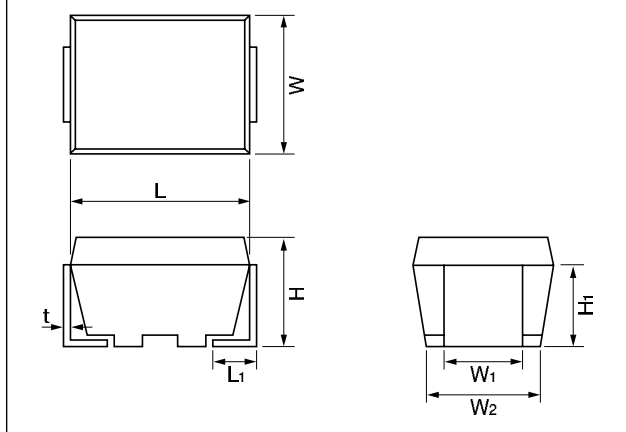


FEATURES	
•	Temperature coefficient of resistance (TCR): 0.05 ppm/°C typical (0°C to +60°C) by New Generation Z-Foil Technology
•	0.2 ppm/°C typical (-55°C to +125°C, +25°C ref.)
•	Resistance tolerance: to ±0.01%
•	Power coefficient “ΔR due to self heating”: 5 ppm at rated power (typical)
•	Power rating: to 200 mW (MPP) and 250 mW (MQP) at +70°C
•	Load life stability: to ±0.005% at 70°C, 2000h at rated power (typical)
•	Not restricted to standard values, we can supply specific “as required” values at no extra cost or delivery (e.g., 1K2345 vs. 1K)

COMPOSITION OF TYPE NUMBER	
Example:	
<b>MPP</b>	<b>10K005* T L</b>
	<ul style="list-style-type: none"> <li>— Resistance Value</li> <li>— Resistance Tolerance</li> <li>— Type</li> <li>— Tape &amp; Reel Package Required</li> </ul>
Resistance value, in ohm, is expressed by a series of six characters, five of which represent significant digits. R or K is a dual-purpose letter that designates both the value range (R for ohmic; K for kilo-ohm) and the location of the decimal point.	
* Imprinting indicates up to 3 significant digits but ordered resistance value is traceable by date code	

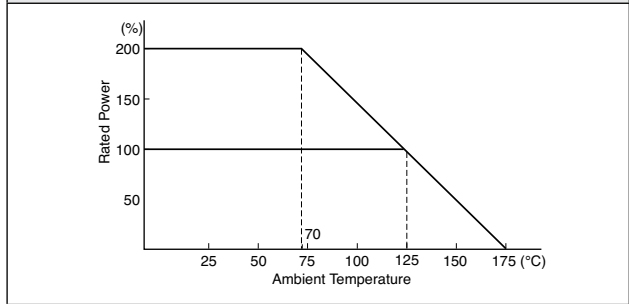
TCR, RESISTANCE RANGE, TOLERANCE, RATED POWER				
Type	TCR (ppm/°C) -55°C to +125°C	Resistance Range (Ω)	Resistance Tolerance (%)	Rated Power (W) at 125°C
MPP	±0.2±3.8	30 to <50	±0.1(B)	0.1
	±0.2±2.8	50 to <100	±0.1(B)	
	±0.2±1.8	100 to <1k	±0.1(B) ±0.05(A) ±0.02(Q)	
		1k to <20k	±0.1(B) ±0.05(A) ±0.02(Q) ±0.01(T)	
MQP	±0.2±3.8	30 to <50	±0.1(B)	0.125
	±0.2±2.8	50 to <100	±0.1(B)	
	±0.2±1.8	100 to <1k	±0.1(B) ±0.05(A) ±0.02(Q)	
		1k to <40k	±0.1(B) ±0.05(A) ±0.02(Q) ±0.01(T)	

### CONFIGURATION (DIMENSIONS IN mm)

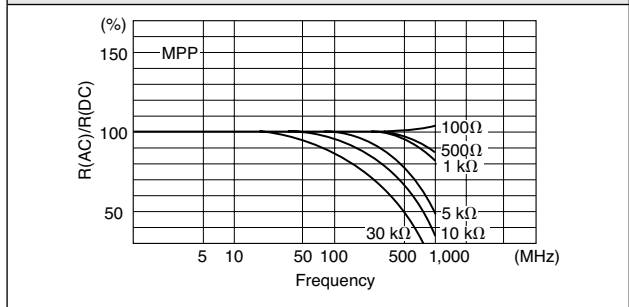


Type	MPP	MQP
L	3.2±0.2	4.5±0.2
W	2.5±0.2	3.2±0.2
H	2.0±0.2	
L1	0.6±0.2	0.8±0.2
W1	1.4±0.3	
W2	2.3±0.2	3.0±0.2
H1	1.5±0.3	
t	0.15±0.05	

### POWER DERATING CURVE



### FREQUENCY CHARACTERISTICS



PERFORMANCE				
Parameters	Test Condition	Specification		Typical MPP/MQP
		MP/MQ	MPP/MQP	
Maximum Rated Operating Temperature Working Temperature Range Maximum Working Voltage Maximum Working Current		125°C -65°C to +175°C MP = 50V, MQ = 100V 350 mA		
Thermal Shock Overload	-65°C/30 min. ↔ +150°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.05%	±0.01%	±0.005%
Low Temperature Storage and Life Outstanding PC Board Bending	-65°C, No Load, 24 hrs. → Rated Voltage, 45 min. 3 mm Bend, 60 sec.	±0.05%	±0.01%	±0.005%
Dielectric Withstanding Voltage Insulation Resistance Resistance to Soldering Heat Moisture Resistance	AC 200V, 1 min. DC 100V, 1 min. 260°C, 10 sec. +65°C to -10°C, 90% RH to 98% RH, Rated Voltage, 10 cycles (240 hrs.)	±0.01%	±0.01%	±0.005%
Shock Vibration, High Frequency	100G, 6 ms, Sawtooth Wave, X, Y, Z, each 10 shocks 20G, 10 Hz to 2,000 Hz to 10 Hz, 20 min., X, Y, Z, each 2.5 hrs.	±0.02%	±0.02%	±0.01%
Storage Life	15°C to 35°C, 15% RH to 75% RH, No Load, 10,000 hrs.	±0.005%	±0.005%	±0.0025%
High Temperature Exposure	175°C, No Load, 2,000 hrs.	±0.05%	±0.05%	±0.03%
Life	70°C, Rated Power, 1.5 hr. – on, 0.5 hr. – off, 2,000 hrs. 70°C, Rated Power x 2, 1.5 hr. – on, 0.5 hr. – off, 2,000 hrs.	—	±0.01%	±0.005%
		—	±0.03%	±0.01%

TAPE AND REEL PACKAGE (BASED ON EIA-481-1) (DIMENSIONS IN mm)																	
Tape Dimensions										Reel Dimensions							
Type	A	B	C	D	E	F	G	H	J	A	N	B	C	D	W1	W2	r
MPP	2.8 ±0.2	3.9 ±0.2	12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia. 1.5 ±0.1-0	Dia. 178 ±2	Dia. 60 min.	Dia. 13 ±0.5	Dia. 21 ±0.8	2 ±0.5	12.4 +2.0-0	18.4 max.	1.0 ±0.5
MQP	3.6 ±0.2	5.2 ±0.2	12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	8.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia. 1.5 ±0.1-0	Reel Capacity		MPP: 1,200 pieces/reel		MQP: 800 pieces/reel			

### PRECAUTION IN USING FACE-BONDED CHIP RESISTORS

- Storage**  
Storage conditions or environment may adversely affect solderability of the exterior terminals. Do not store in high temperature and humidity. The recommended storage environment is lower than 40°C, has less than 70% RH humidity and is free from harmful gases such as sulphur and chlorine.
- Caution in Soldering**
  - Hand Soldering**—Hand soldering is applicable as shown at right.  
Recommended
    - Temp. of iron tip: 240°C to 270°C
    - Power of iron: 20W or less
    - Diameter of tip: dia. 3 mm max.
  - Solder Reflow in Furnace**  
Recommended
    - Peak temperature: 250±0/-5°C
    - Holding time: 10 sec. max.
    - To cool gradually at room temperature
  - Dipping in Solder (Wave or Still)**  
Recommended
    - Temp. of solder: 260°C max
    - Length of dipping: 10 seconds
    - To cool gradually at room temperature
  - Other**  
Corrosion-free flux, such as rosin, is recommended. Do not apply pressure to the molded housing immediately after soldering.
- Cleaning**  
Use volatile cleaner such as methylalcohol or propyl alcohol.
- Circuit Board Design**  
The dimensions of solder land must be determined in conformity with the size of resistors and with the soldering method. They are also subject to the mounting machine and the material of the substrate. See example below.

Type	A	B	C	D
MPP	1.6 to 2.0	0.5 to 1.5	2.2 to 2.6	1.8
MQP				2.5

When parts are mounted on a board in high density, solder can possibly attach to the resistors in an excessive amount to affect performance or reliability of the resistors. To prevent this effect, the use of solder resist is recommended to isolate solder lands.