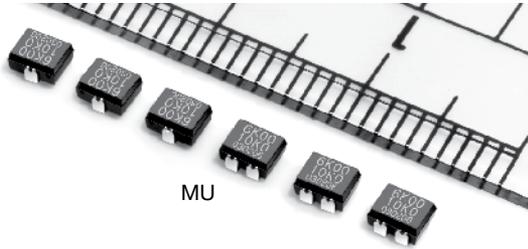


Ultra Precision SMT Resistor 1-2-3 Network  
(Molded, J-Lead Terminal)



MU

COMPOSITION OF TYPE NUMBER

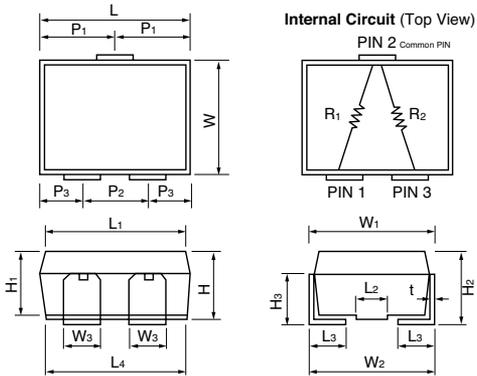
Example:

**MU 1K000/ 10K00 B Q L**

① ② ③ ④ ⑤ ⑥

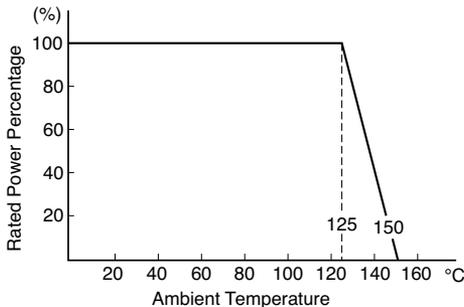
- ① Type
- ② Nominal Resistance Values (R1)
- ③ Nominal Resistance Values (R2)
- ④ Tolerance (Absolute)
- ⑤ Tolerance (Matching)
- ⑥ Tape & Reel Package Being Required

CONFIGURATION (DIMENSIONS IN mm)



L	W	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>
3.2 ±0.2	2.5 ±0.2	1.5 ±0.2	1.4 ±0.2	1.6 ±0.2	1.1 ±0.2	1.6 ±0.1	1.4 ±0.1	0.9 ±0.1
W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	t	
2.7 ±0.2	2.7 ±0.2	0.8 ±0.1	3.0 ±0.2	0.7 ±0.2	0.8 ±0.1	3.0 ±0.2	0.1 ±0.05	

POWER DERATING CURVE



RESISTANCE RANGE, TOLERANCE, RATED POWER

Type	Resistance Range Element**	Resistance Tolerance*		Rated Power/Element (W) at 125°C
		Absolute*	Matching*	
MU	10Ω ≤ R < 100Ω	±0.1% (B) ±0.5% (D)	±0.05% (A) ±0.1% (B) ±0.5% (D)	0.05
	100Ω ≤ R < 1kΩ	±0.05% (A) ±0.1% (B) ±0.5% (D)	±0.02% (Q) ±0.05% (A) ±0.1% (B) ±0.5% (D)	
	1kΩ ≤ R ≤ 20kΩ	±0.02% (Q) ±0.05% (A) ±0.1% (B) ±0.5% (D)	±0.01% (T) ±0.02% (Q) ±0.05% (A) ±0.1% (B) ±0.5% (D)	

\* Symbols in parentheses are for type number composition.

\*\* Please contact us for the availability.

ABSOLUTE TCR

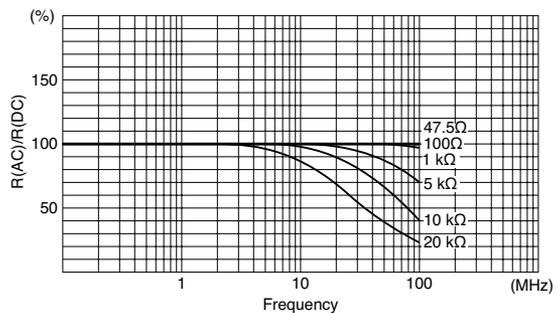
Resistance Range (Ω)	Absolute TCR (ppm/°C) -55°C to +125°C
10Ω ≤ R < 30Ω	±15
30Ω ≤ R < 100Ω	±10
100Ω ≤ R ≤ 20kΩ	±5

TCR TRACKING

Resistance Ratio	TCR Tracking (ppm/°C) -55°C to +125°C
Ratio = 1	±1
1 < Ratio ≤ 10	±2
10 < Ratio ≤ 100	±3
100 < Ratio	±5

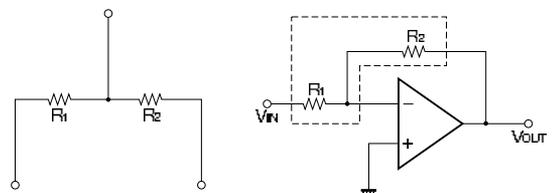
Applicable > 50 Ω

FREQUENCY CHARACTERISTICS



EXAMPLE OF APPLICATIONS

An Application of Type MU (input/feedback resistors for amplifiers)  
Because the input and the feedback resistors are incorporated into one single element, amplification is not affected by temperature change.



PERFORMANCE					
Parameters	Test Condition	ALPHA Specification		ALPHA Typical Test Data	
		Δ R	Δ Ratio	Δ R	Δ Ratio
Maximum Rated Operating Temperature Working Temperature Range		125°C -65°C to +150°C			
Thermal Shock Overload	-65°C/30 min. ↔ +150°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.05% ±0.05%	±0.02% ±0.02%	±0.01% ±0.01%	±0.005% ±0.005%
Low Temperature Storage and Operation Substrate Bending Test	-65°C, No Load, 24 hrs. → Rated Voltage, 45 min. 3 mm Bend 60 sec.	±0.05% ±0.05%	±0.02% ±0.02%	±0.01% ±0.01%	±0.005% ±0.005%
Dielectric Withstanding Voltage Insulation Resistance Resistance to Soldering Heat Moisture Resistance	Atom. Pres.: AC 200V, 1 min. DC 100V, 1 min. 260°C, 10 sec. +65°C to -10°C, 90% to 98% RH, Rated Power, 10 cycles (240 hrs.)	±0.01% ±0.05%	±0.01% ±0.02%	±0.005% ±0.03%	±0.0025% ±0.01%
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% ±0.01%	±0.01% ±0.01%	±0.005% ±0.005%
Life	125°C, Rated Power, 1.5 hrs. – ON, 0.5 hrs. – OFF, 2,000 hrs.	±0.05%	±0.02%	±0.03%	±0.015%
Storage Life	15°C to 35°C, 15% RH to 75% RH, No Load, 10,000 hrs.	±0.005%	±0.0025%	±0.0025%	±0.0015%
High Temperature Exposure	150°C, No Load, 2,000 hrs.	±0.05%	±0.02%	±0.02%	±0.01%

**TAPE AND REEL PACKAGE (BASED ON EIA-481-1) (DIMENSIONS IN mm)**

Tape Dimensions										Reel Dimensions (Reel capacity: 800 pieces/reel)							
Type	A	B	C	D	E	F	G	H	J	A	N	B	C	D	W <sub>1</sub>	W <sub>2</sub>	r
MU	3.6 ±0.2	3.1 ±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	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

**PRECAUTION IN USING FACE-BONDED CHIP RESISTOR (DIMENSIONS IN mm)**

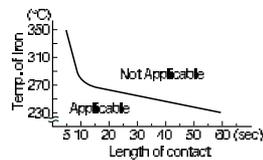
**1. Storage**

Storage condition 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.

**2. Caution in Soldering**

**① 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.



**② Solder Reflow in Furnace**

- Recommended
  - Peak Temperature: 250°C +0°C/-5°C
  - Holding time: 10 sec. max.
  - To cool gradually at room temperature

**③ Dipping in Solder (Wave or Still)**

- Recommended
  - Temp. of Solder: 240°C to 250°C
  - Length of Dipping: 3 to 4 seconds
  - To cool gradually at room temperature

**④ Other**

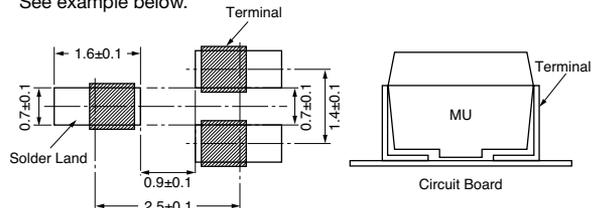
Corrosion-free flux, such as rosin, is recommended. Do not apply pressure to the molded housing immediately after soldering.

**3. Cleaning**

Use volatile cleaner such as methylalcohol or propylalcohol.

**4. 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.



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.



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