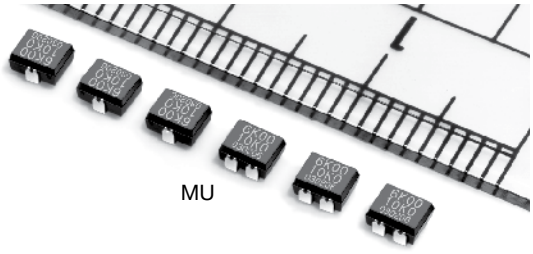
Alpha Electronics
A VPG Brand

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



Pb-free Available
RoHS COMPLIANT

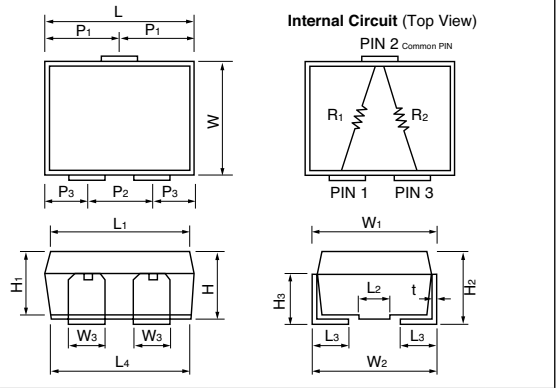
COMPOSITION OF TYPE NUMBER

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

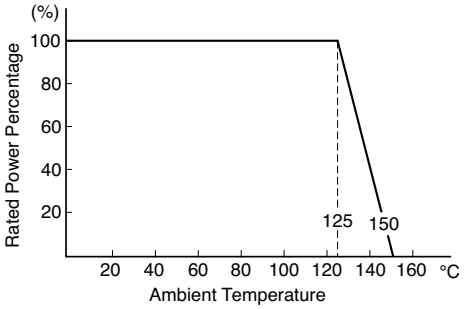
CONFIGURATION (DIMENSIONS IN mm)



L	W	H	H_1	H_2	H_3	P_1	P_2	P_3
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_1	W_2	W_3	L_1	L_2	L_3	L_4	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

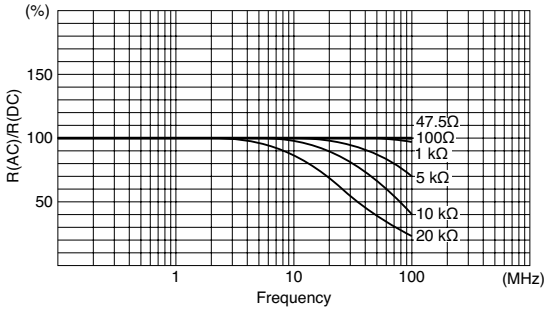
Resistance Range (Ω)	Absolute TCR (ppm/°C) –55C to +125°C
10Ω ≤R <30Ω	±15
30Ω ≤R <100Ω	±10
100Ω ≤R ≤20kΩ	±5

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

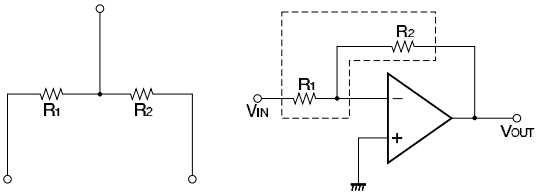
Applicable >50 Ω

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.

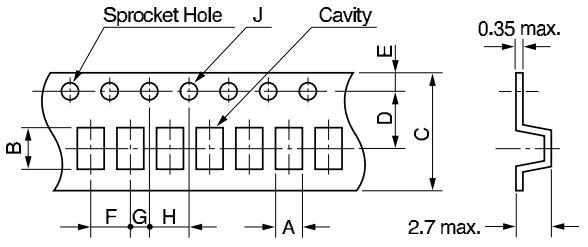


PERFORMANCE

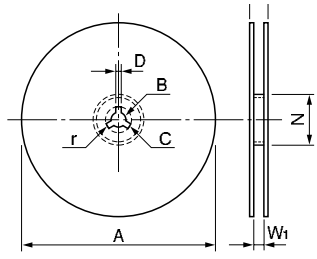
Parameters	Test Condition	ALPHA Specification		ALPHA Typical Test Data	
		Δ R	Δ Ratio	Δ R	Δ Ratio
Maximum Rated Operating Temperature Working Temperature Range		125°C –65°C to +150°C			
Thermal Shock Overload	–65°C/30 min. ↔ +150°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.05% ±0.05%	±0.02% ±0.02%	±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% over 10,000 MΩ ±0.05% ±0.05%	±0.01% ±0.02% ±0.02%	±0.005% over 10,000 MΩ ±0.01% ±0.03%	±0.0025% ±0.005% ±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_1	W_2	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.

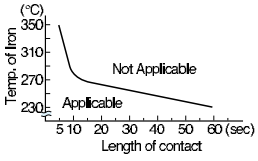
2. Caution in Soldering

❶ 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.



❷ Solder Reflow in Furnace

Recommended

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

❸ 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

❹ Other

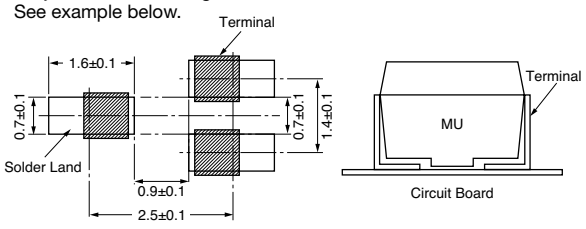
Corrosion-free flux, such as rosin, is recommended. Do not apply pressure to the molded housing immediately after soldering.

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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MU20K00/20K00BA MU100R0/100R0BA MU100R0/20K00BA MU10K00/10K00AT MU6K000/10K00BQ MU6K000/10K00DD MU6K000/12K00BB MU5K000/5K000BA MU5K000/5K500BQ MU5K500/10K00BA MU640R0/19K36DQ MU655R0/1K000DA MU4K700/4K700BA MU5K000/10K00BA MU5K000/10K00DQ MU5K000/15K00BB MU2K500/10K00BA MU400R0/400R0DA MU4K000/4K000BQ MU2K000/2K000BA MU2K000/2K000BB MU2K000/2K000BQ MU2K048/10K00DQ MU20R00/20K00BA MU2K000/10K00BA MU2K000/10K00BB MU2K000/20K00BA MU1K000/20K00BA MU1K000/2K000DA MU1K000/9K000BA MU1K000/9K000BQ MU200R0/500R0AQ MU1K000/1K000QQ MU1K000/1K000QT MU1K000/1K000BA MU1K000/1K000BQ MU1K000/1K000DD MU10K00/20K00BA MU15K00/10K00BB MU15K00/15K00BA MU10K00/10K00DQ MU10K00/10K00QT MU10K00/20K00AQ MU10K00/10K00BA MU10K00/10K00BQ MU10K00/10K00BT MU10K00/10K00DA