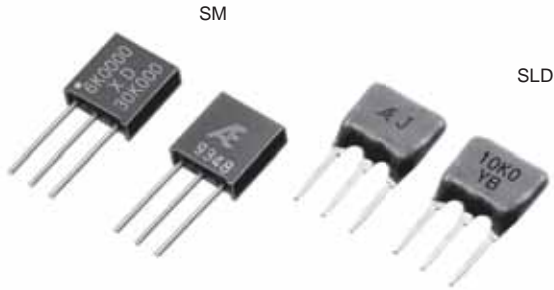


# Ultra-Precision Resistor 1-2-3 Network



DSCC Specification 87026

## Composition of Type Number

Example:  $R_1=R_2$

**SM 1X 10K00 BA**

① ②③ ④ ⑤ ⑥

Example:  $R_1 \neq R_2$

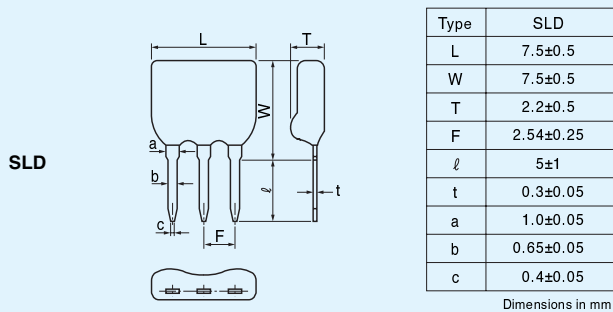
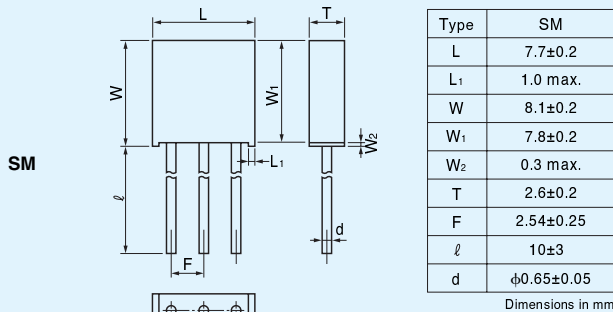
**SLD 2X 1K000 / 10K00 BQ**

① ②③ ④ ⑤ ⑥

- ① Type
- ② Number of Values
- ③ TCR Absolute
- ④ Nominal Resistance Values
- ⑤ Resistance Tolerance (Absolute)
- ⑥ Resistance Tolerance (Matching)

Resistance value, in ohm, is expressed by a series of five characters, four of which represent significant digits. The fifth 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 decimal point.

## Configuration



## TCR, Resistance Range, Tolerance, Rated Power

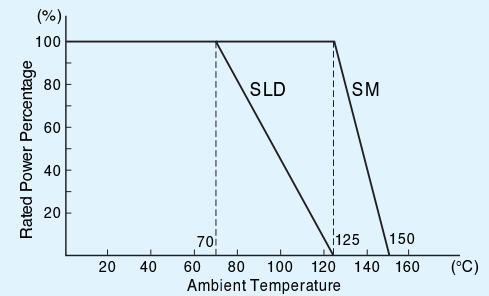
Type	TCR (ppm/°C) -55°C to +125°C*		Resistance Range Element (Ω)**	Resistance Tolerance (%)		Rated Power Package (W)
	Absolute	Tracking		Absolute	Matching	
SM	0±5 (X) 0±2.5 (Y)	See Table 1	50 to 30k	±0.02 (O) ±0.05 (A) ±0.1 (B)	±0.01 (T) ±0.02 (O) ±0.05 (A) ±0.1 (B)	0.3 at 125°C
SLD	0±5 (X) 0±2.5 (Y)	See Table 1	50 to 100	±0.1 (B) ±0.5 (D)	±0.05 (A) ±0.1 (B)	0.25 at 70°C
			100 to 30k	±0.05 (A) ±0.1 (B)	±0.02 (O) ±0.05 (A) ±0.1 (B)	

Symbols parenthesized are for type number composition.  
\* -25°C to +125°C for SLD type.  
\*\* Consult factory for resistance values composing network.

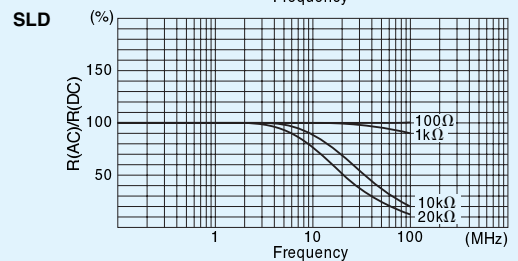
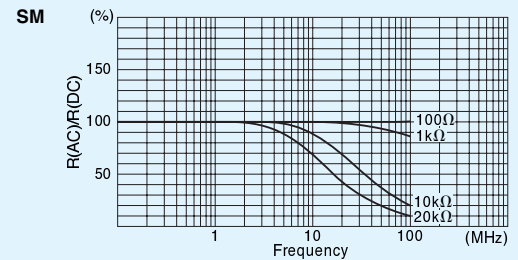
## Table 1. TCR Tracking is Subject to Resistance Ratio

Resistance Ratio	TCR Tracking (ppm/°C)
Resistance Ratio=1	±0.5
1 < Resistance Ratio ≤ 10	±1
10 < Resistance Ratio ≤ 100	±2
100 < Resistance Ratio	±3

## Power Derating Curve



## Frequency Characteristics



## Performance - SM

Parameters	Test Condition	ALPHA Specification		ALPHA Typical Test Data	
		$\Delta R$	$\Delta$ Ratio	$\Delta R$	$\Delta$ 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.	±0.02% ±0.02%	±0.01% ±0.01%	±0.005% ±0.0025%	±0.0025% ±0.001%
Solderability	245°C, 5 sec.	over 95% coverage		over 95% coverage	
Resistance to Solvents	① Isopropyl Alcohol + Mineral Spirits ② Water + Butyl Cellosolve + Monoethanolamine	no damage		no damage	
Low Temperature Storage and Operation Terminal Strength	-65°C, No Load, 24 hrs. → Rated Voltage, 45 min. 0.908kg (2 pounds), 10 sec.	±0.05% ±0.02%	±0.02% ±0.01%	±0.0025% ±0.0025%	±0.001% ±0.001%
Dielectric Withstanding Voltage Insulation Resistance Resistance to Soldering Heat Moisture Resistance	Atmospheric: AC 300V, 1 min. Barometric: 8mmHg, AC200V, 1 min. DC 500V, 2 min. 350°C, 3 sec. +65°C to -10°C, 90% RH to 98% RH, Rated Voltage, 10 cycles (240 hrs.)	±0.02% ±0.01%		±0.0025% ±0.001%	
		over 10,000M $\Omega$		over 10,000M $\Omega$	
Shock Vibration, High Frequency	100G, 6ms, Sawtooth Wave, X, Y, Z, each 10 shocks 20G, 10Hz to 2,000Hz to 10Hz, 20 min., X, Y, Z, each 2.5 hrs.	±0.02% ±0.05%	±0.01% ±0.02%	±0.0025% ±0.02%	±0.001% ±0.01%
		±0.01% ±0.02%	±0.005% ±0.01%	±0.0025% ±0.0025%	±0.001% ±0.001%
Life	125°C, Rated Power, 1.5 hrs. – ON, 0.5 hr. – OFF, 2,000 hrs.	±0.05%	±0.02%	±0.015%	±0.005%
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%	±0.015%	±0.005%
Current Noise Voltage Coefficient Thermal EMF		-32dB 0.0005%/V 1.0 $\mu$ V/°C		-42dB 0.00003%/V 0.1 $\mu$ V/°C	

## Performance - SLD

Parameters	Test Condition	ALPHA Specification		ALPHA Typical Test Data	
		$\Delta R$	$\Delta$ Ratio	$\Delta R$	$\Delta$ Ratio
Maximum Rated Operating Temperature Working Temperature Range		70°C -25°C to +125°C			
Thermal Cycling Overload	-25°C/30 min., Room Temperature/5 min., 125°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.05% ±0.05%	±0.01% ±0.01%	±0.01% ±0.0025%	±0.005% ±0.001%
Solderability Resistance to Solvents	235°C, 2 sec. Isopropyl Alcohol	over 75% coverage no damage		over 75% coverage no damage	
Low Temperature Operation Terminal Strength	-25°C, No Load, 2 hrs. 0.908kg (2 pounds), 10 sec.	±0.05% ±0.05%	±0.01% ±0.01%	±0.0025% ±0.0025%	±0.001% ±0.001%
Dielectric Withstanding Voltage Insulation Resistance Resistance to Soldering Heat Moisture Resistance	Atmospheric: AC 300V, 1 min. DC 100V, 1 min. 350°C, 3 sec. +65°C to -10°C, 90% RH to 98% RH, Rated Voltage, 10 cycles (240 hrs.)	±0.03% ±0.01%		±0.0025% ±0.001%	
		over 10,000M $\Omega$		over 10,000M $\Omega$	
Shock Vibration	50G, 11ms, Half-Sine Wave, X, Y, Z, each 3 shocks 20G, 10Hz to 55Hz to 10Hz, 1 min., X, Y, Z, each 2 hrs.	±0.03% ±0.03%	±0.01% ±0.01%	±0.005% ±0.005%	±0.001% ±0.001%
		±0.03% ±0.03%	±0.01% ±0.01%	±0.005% ±0.005%	±0.001% ±0.001%
Life (Rated Load)	70°C, Rated Power, 1.5 hrs. – ON, 0.5 hr. – OFF, 1,000 hrs.	±0.1%	±0.05%	±0.01%	±0.005%
Life (Moisture Load)	40°C, 90% RH to 95% RH, Rated Power, 1.5 hrs. – ON, 0.5 hr. – OFF, 1,000 hrs.	±0.05%	±0.01%	±0.01%	±0.005%
Storage Life	15°C to 35°C, 15% RH to 75% RH, No Load, 10,000 hrs.	±0.02%	±0.01%	±0.005%	±0.0025%
High Temperature Exposure	125°C, No Load, 1,000 hrs.	±0.05%	±0.01%	±0.01%	±0.005%

## Example of Application

An application of type SM/SLD (input/feedback resistors for amplifiers) Because the input and the feedback resistors are incorporated into one single element, amplification is not affected by temperature range.

