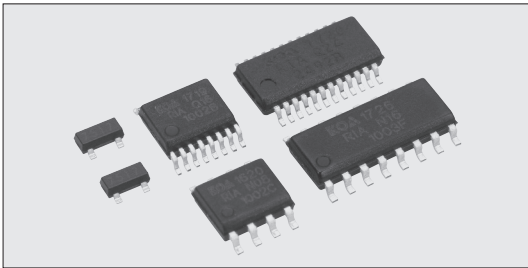
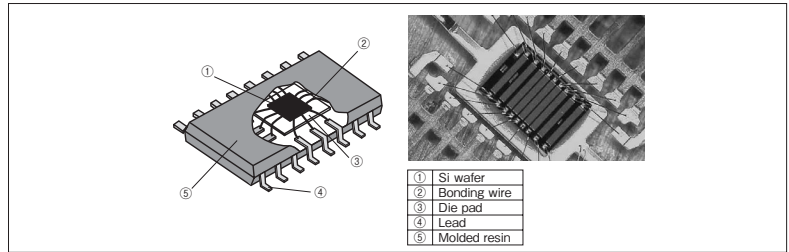


KPC | KOA's Integrated Passive Components



Coating color : Body color : Black

Construction



Features

- Thin film (metal film) Resistor array on silicon wafer.
- Excellent resistance matching, TCR tracking and stabilities.
- Custom circuits are available with flexible layout. (Different resistance combination possible)
- Higher integration saves board space and overall assembly costs.
- Excellent reliability with standard molded IC package.
- Suitable for reflow soldering.
- Products with lead free termination meet EU-RoHS requirements.

Applications

- Making peripheral resistors for analog operational amplifiers highly accurate 1 chip network.
- Automotives, Analog instrumentations, IC testers
- Computers, Data communications, Network systems
- Operational amplifiers, Terminations, Pull-up/Pull-down

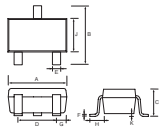
Reference Standards

IEC 60115-1 JIS C 5201-1 JIS C 5101-1

Dimensions

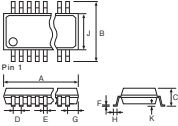
SOT type

SOT-23



QSOP, SOIC-N

QSOP, SOIC-N



Package Symbol	Package	Number of Pins	Dimensions (mm)										Taping & Q'ty/Reel TE	Weight (g) 1000pcs
			A±0.2	B±0.2	C±0.2	D±0.1	E±0.1	F±0.1	G±0.1	H±0.2	J±0.2	K±0.1		
S03	SOT-23	3	2.92	2.3	0.95	1.91	0.44	0.13	0.51	0.53	1.3	0.11	3,000	9
Q16	QSOP	16	4.90	5.99	1.60	0.635	0.25	0.20	0.20	0.66	3.81	0.18	2,500	76
Q20		20	8.66						1.47					125
Q24		24	8.66						0.84					129
N08	SOIC-N	8	4.83	1.27	0.41	0.20	0.52	0.66	3.81	0.18	2,500	73		
N14		14	8.66									150		
N16		16	9.91									153		

Type Designation

Resistor Networks : RIA, RBA, RBB, RLA

Example

RIA	Q20	T	TE	1002	B	E	B	T
Circuit Code	Package Symbol	Terminal Surface Material	Taping	Nominal Resistance	Absolute Resistance Tolerance	T.C.R. (×10⁻⁶/K)	Relative Resistance Tolerance	T.C.R. Tracking (×10⁻⁶/K)
RIA : Isolated resistor network RBA: Bussed resistor network RBB: High speed bussed network RLA: R/2R Ladder network	Package type symbol + Number of pins Q16, Q20, Q24: QSOP N08, N14, N16: SOIC Narrow	T: Sn	TE: Plastic embossed	4 digits 3 digits	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1% G: ±2% J: ±5%	T: ±10 E: ±25 C: ±50 H: ±100	A: 0.05% B: 0.1% C: 0.25% D: 0.5% F: 1% G: 2% Nil: Not specified	Y: 05 T: 10 E: 25 C: 50 Nil: Not specified

Specifications are limited by the circuit and resistance value. Please contact us separately.

Resistor Networks : RNX, RTX, RTY

Example

RNX	Q20	T	TE	5001
Circuit Code	Package Symbol	Terminal Surface Material	Taping	Custom Code
RNX: Custom Resistor Network RTX, RTY: SOT-23 Resistor network	Package type symbol + Number of pins	T: Sn	TE: Plastic embossed	

Resistor Networks : RDA, RDB

Example

RDA	Q20	T	TE	471J	511J	H
Circuit Code	Package Symbol	Terminal Surface Material	Taping	Nominal Resistance & Tolerance of R1	Nominal Resistance & Tolerance of R2	T.C.R. (×10⁻⁶/K)
RDA: Dual terminator network RDB: Differential terminator network	Same as above (Except Q24, N14, N08)	T: Sn	TE: Plastic embossed	3 digits G: ±2% J: ±5%	3 digits G: ±2% J: ±5%	E: ±25 C: ±50 H: ±100

Contact us when you have control request for environmental hazardous material other than the substance specified by EU-RoHS.

Ratings

Package	QSOP			SOIC			SOT-23
Package Symbol	Q16	Q20	Q24	N08	N14	N16	S03
Package Power Rating	0.8W	1.0W	1.0W	0.4W	0.6W	0.8W	0.2W
Resistance Range	10Ω~1kΩ	Power Rating 200mW/Resistor Element ^{※1}					
	1.1kΩ~	Power Rating 50mW/Resistor Element ^{※1}					
Max. Working Voltage	100V						
Rated Voltage	√Rated Power×Nominal Resistance Value, Rated Voltage should not exceed Max. Working Voltage.						
Rated Ambient Temp.	+70°C						
Operating Temp. Range	-55°C~+125°C ^{※2}						

Above ratings are based on the thermal resistances using a multi-layer circuit board (EIA/JESD51). For mounting on a mono-layer board, power derating shall be needed. Please inquire of us about conditions.

※1 Total power consumption of all elements should not exceed the package power rating.

※2 About operating temperature range -55°C~+155°C, We can provide as custom devices. Please inquire of us about it.

Standard Resistor Networks

Circuit Code	Circuit Schematics (Top View)	Number of Pins	T.C.R. (×10 ⁻⁶ /K)	Resistance Range (Ω) E24 and Absolute Tolerance		Circuit Code	Circuit Schematics (Top View)	Number of Pins	T.C.R. (×10 ⁻⁶ /K)	Resistance Range (Ω) (E24 and Resistance Tolerance)		
				F:±1%	G:±2%, J:±5%					G:±2%, J:±5%		
RBA		8, 14, 16, 20, 24	E:±25	100~100k	100~100k	RDA		16, 20	E:±25	R1=150~10k R1:R2=1:1~1:4		
				C:±50	51~100k						51~100k	C:±50
				H:±100	30~100k						10~100k	H:±100
RBB		8, 14, 16, 20, 24	E:±25	100~100k	100~100k	RDB		16, 20	E:±25	R1=150~10k R1:R2=1:1~1:4		
				C:±50	51~100k						51~100k	C:±50
				H:±100	30~100k						10~100k	H:±100
RTX		3 SOT-23 Only	E:±25	100~40k	100~40k	RLA		14, 16	H:±100	1k~30k		
				C:±50	51~40k						51~40k	
				H:±100								

Performance

Test Items	Performance Requirements ΔR± (%+0.05Ω)		Test Methods
	Limit	Typical	
Resistance	Within specified tolerance		25°C
T.C.R.	Within specified T.C.R.		+25°C/-55°C, +25°C/125°C
Resistance to soldering heat	0.1 ^{※3}	0.05	260°C±5°C, 10s±1s
Rapid change of temperature	0.5 ^{※3}	0.05	-55°C(30min.)/+125°C(30min.) , 100 cycles
Moisture resistance	0.5 ^{※3}	0.05	40°C±2°C, 90~95%RH, 1000h 1.5h ON/0.5h OFF cycle
Endurance at 70°C	0.25 ^{※3}	0.05	70°C±2°C, 1000h 1.5h ON/0.5h OFF cycle
High temperature exposure	0.25 ^{※3}	0.10	+125°C, 1000h

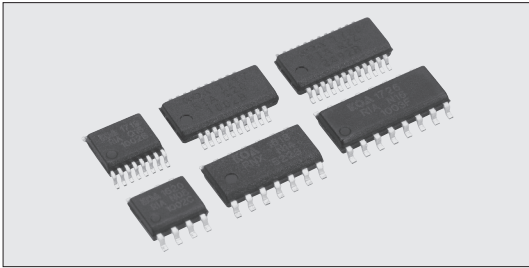
※3 Guaranteed value differs depending on resistance value.

Precautions for Use

- The resistor of this product is formed by narrow patterning a thin metal film. Thus, application of excessive voltage causes burn and destruction of the resistive film, abnormality in resistance or open resistance and loss of proper function. The properly and electrostatically measured taping materials are used for the components, but attention should be paid to the fact that there is some danger the parts may be destructed by static electricity(equivalent to 500V and more at 100pF, 1.5kΩ) to cause a change in resistance in the conditions of an excessive dryness when mounting on the boards. Similarly, care should be given not to apply the excessive static electricity at the time of mounting on the boards. When designing, consideration can be taken into withstanding ESD for customized KPC products. Please consult with us about the details.
- Hand soldering by iron soldering or repairment are not recommended because KPC is a multi-pin product.

KPC RIA ■ Isolated Resistor Networks

KPC RNX ■ Custom Resistor Networks



Body color : Black

■ Applications

- Automotives, medical instrument, industrial machines, Measurement equipment
- Computers and networks
- High precision OP amp circuit, High precision voltage divider

■ Features

- High precision resistor networks
- Combination of different resistance is available for custom circuit.
- Relative resistance tolerance 0.05%~
- TCR tracking $5 \times 10^{-6}/K \sim$

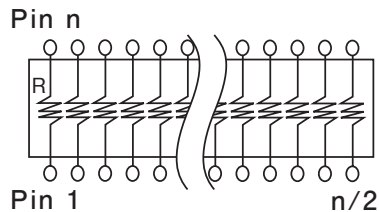
■ Ratings

Number of Pins	T.C.R. ($\times 10^{-6}/K$)	Resistance Range (Ω) and Absolute Tolerance					Relative resistance tol.	TCR Tracking ($\times 10^{-6}/K$)	
		B: $\pm 0.1\%$	C: $\pm 0.25\%$	D: $\pm 0.5\%$	F: $\pm 1\%$	G: $\pm 2\%$, J: $\pm 5\%$			
8, 14 16, 20 24	T: ± 10	510~100k	510~100k	510~100k	510~100k	510~100k	A: 0.05% B: 0.1% C: 0.25% D: 0.5% F: 1% G: 2%	Y: 5 T: 10 E: 25 C: 50	
	E: ± 25			100~510k	100~510k	100~510k			
	C: ± 50			51~510k	51~510k	51~510k			51~510k
	H: ± 100				30~510k	10~510k			10~510k

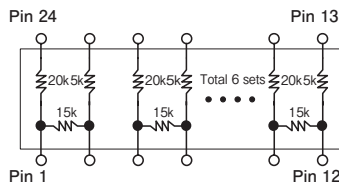
Rated power (70°C) : 10 Ω ~1k Ω 200mW/element 1.1k Ω ~50mW/element
 Please inquire of us about your custom devices and circuits. (Different resistance combination available)
 Depending on the circuit and package, much higher resistances are possible.
 For RIA20, 24 pin, highest resistance value/element is up to 100k Ω .

■ Circuit Construction (Top View)

● High Precision Resistor Networks

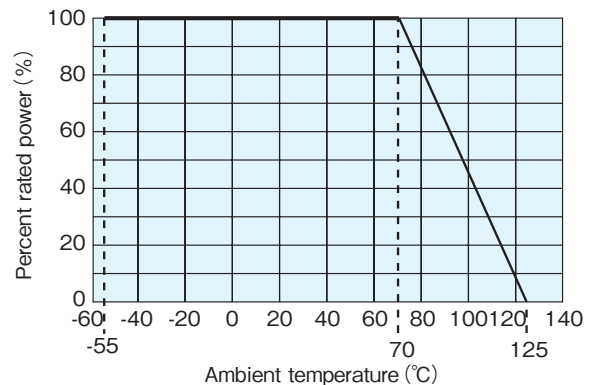


● Custom High Precision Resistor Networks



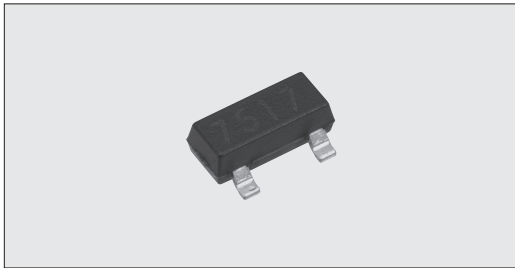
(Example of use)
 Resistance Value 5k Ω , 15k Ω , 20k Ω Total 18 elements
 Tol. abs. $\pm 0.1\%$ relative 0.1%
 T.C.R. abs. $\pm 10 \times 10^{-6}/K$ TCR Tracking $5 \times 10^{-6}/K$
 Please inquire of us about your custom devices and circuits.

■ Derating Curve



For resistors operated at an ambient temperature of 70°C or higher, the power shall be derated in accordance with the above derating curve.

KPC RTY Precision Voltage Divider



■ Features

- Expanded flexibility of component layout.
- Relative precision of pair resistors are guaranteed.
- Relative resistance tolerance 0.05%~
- TCR tracking $5 \times 10^{-6}/K \sim$

■ Application

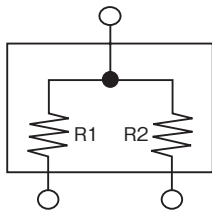
- Voltage dividing circuit
- Reference voltage circuit
- OP amplifier circuit
- Matching resistors

■ Ratings

T.C.R. ($\times 10^{-6}/K$)	Resistance Range (Ω) and Absolute Tolerance					Relative resistance tol.	TCR Tracking ($\times 10^{-6}/K$)
	B: $\pm 0.1\%$	C: $\pm 0.25\%$	D: $\pm 0.5\%$	F: $\pm 1\%$	G: $\pm 2\%$, J: $\pm 5\%$		
T: ± 10	1k~40k	1k~40k	1k~40k	1k~40k	1k~40k	A: 0.05% B: 0.1% C: 0.25% D: 0.5% F: 1% G: 2%	Y: 5 T: 10 E: 25 C: 50
E: ± 25	1k~150k	1k~150k	100~150k	100~150k	100~150k		
C: ± 50			51~200k	51~200k	51~200k		
H: ± 100			30~200k	30~200k	30~200k		

Max. total resistance in a package is up to 200k Ω

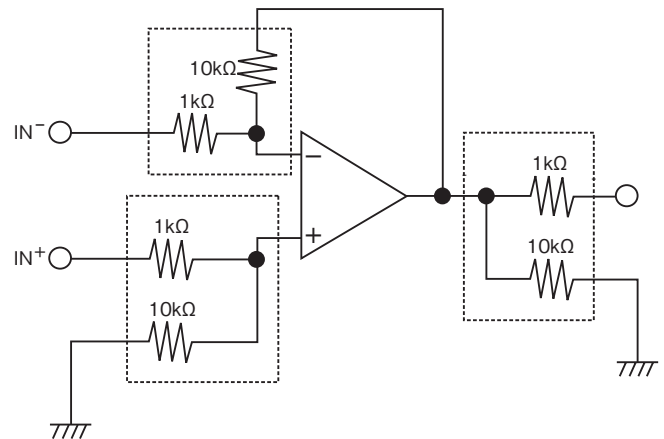
■ Schematic (Top View)



■ Package Ratings

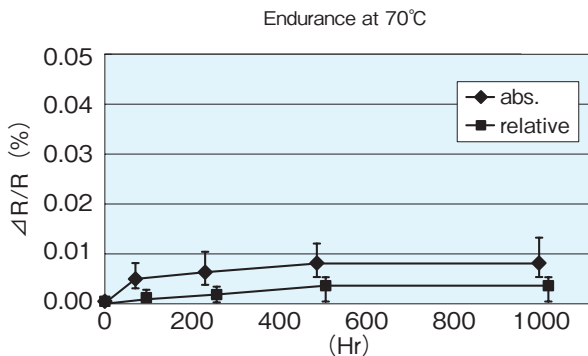
Package Symbol	Package	Number of pins	Package power rating (W)
S03	SOT-23	3	0.2

■ Example of Application



■ Typical Characteristics

Endurance at 70°C (Typical: 1k Ω , 8 resistors/package)



Merit of thin film resistor networks

Metal thin film resistors formed by sputtering method have very similar characteristic among pair resistors. When their characteristic of T.C.R., aging, etc. for relative precision is requested, it's very suitable to apply thin film resistor networks to utilize the characteristic as above.