

## SMD – Resistor Networks

Product: Thick Film Array Chip Resistor-SMRA Series

Size: 0402x4 / 0603x4 / 0402x4(Concave) / 0603x4(Concave)  
0402x8



official distributor of



## SMD – Resistor Networks

### Thick Film Array Chip Resistor – SMRA Series

#### ► 1. Scope

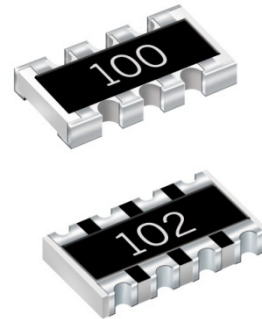
– This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

#### ► 2. Features

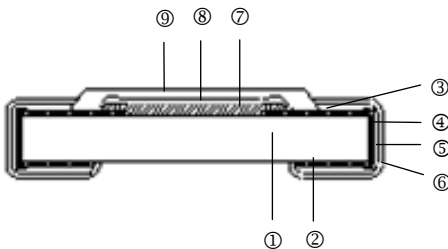
- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality
- Suitable for both IR reflow soldering and wave soldering

#### ► 3. Applications

- Entertainment
- Computer & Related Products
- Communication Equipment
- Power Equipment
- Measuring Instrument

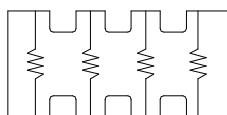


#### ► 4. Construction

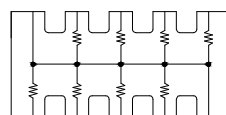


① Alumina Substrate	④ Edge Electrode (Ag)	⑦ Resistor Layer (RuO <sub>2</sub> /Ag)
② Bottom Electrode (Ag-Pd)	⑤ Barrier Layer (Ni)	⑧ Primary Overcoat (Glass)
③ Top Electrode (Ag)	⑥ External Electrode (Sn)	⑨ Secondary Overcoat (Epoxy)

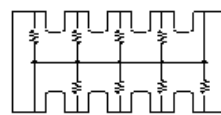
#### ► 5. Equivalent Circuit Diagram



SMRA-42 / 43



SMRA-82 (R-Type)

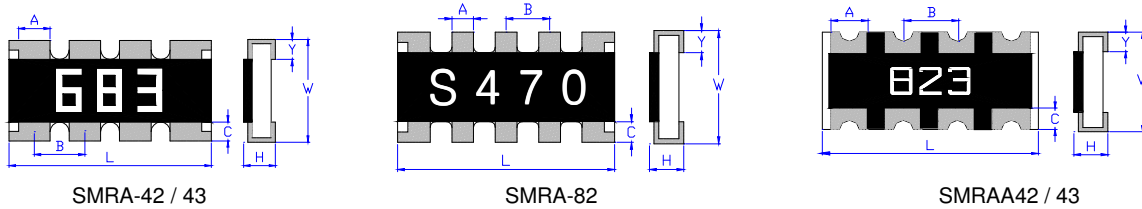


SMRA-82 (S-Type)



#### ► 6. Dimensions

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Unit: mm

Type	Number of Resistors	L	W	H	A	B	C	Y	Weight (g) (1000pcs)
SMRA-42	4	2.00±0.10	1.00±0.10	0.45±0.10	0.30±0.10	0.50±0.05	0.22±0.15	0.22±0.15	2.817
SMRA-43	4	3.20±0.15	1.60±0.15	0.55±0.10	0.50±0.15	0.80±0.05	0.30±0.15	0.30±0.15	8.288
SMRA-82	8	3.20±0.15	1.60±0.15	0.55±0.10	0.35±0.15	0.64±0.05	0.40±0.15	0.40±0.15	9.026
SMRAA42	4	2.00±0.10	1.00±0.10	0.40±0.10	0.30±0.10	0.50±0.05	0.20±0.10	0.25±0.10	3.003
SMRAA43	4	3.20±0.15	1.60±0.15	0.55±0.10	0.50±0.15	0.80±0.05	0.30±0.15	0.40±0.15	10.115

### 7. Part Numbering

SMRA-	42	F	L	6	---1K
Product Type	Dimensions (LxW)	Resistance Tolerance	Function Code	Packaging Code	Resistance
SMRA- (Convex) SMRAA (Concave)	42: 0402x4 43: 0603x4 82: 0402x8	F: ±1% J: ±5%	L: 4P2R/8P4R R: 10P8R (R-type) S: 10P8R (S-type)	6: 7" Reel 10Kpcs 7: 7" Reel 5Kpcs A: 10" Reel 10Kpcs B: 10" Reel 20Kpcs C: 13" Reel 40Kpcs D: 13" Reel 20Kpcs F: Bulk	---1K: 1KΩ --3K3: 3.3KΩ ---10K: 10KΩ  "-" to fill up 6 spaces

### 8. Standard Electrical Specifications

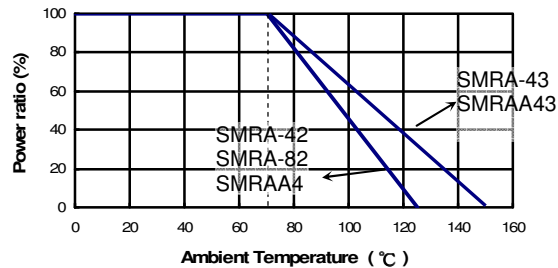
Type	Item	Power Rating / Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Number of Resistors	Resistance Range		TCR (PPM/°C)
							±1%	±5%	
SMRA-42 Jumper	1/16W 1A		-55 ~ +125°C	25V	50V	4	10Ω - 1MΩ		±200
							0Ω (<50mΩ)		
SMRA-43 Jumper	1/10W 1A		-55 ~ +155°C	50V	100V	4	10Ω - 1MΩ		±200
							0Ω (<50mΩ)		
SMRA-82 Jumper	1/16W 0.5A		-55 ~ +125°C	25V	50V	8	10Ω - 560KΩ		±200
							0Ω (<100mΩ)		
SMRAA42 Jumper	1/16W 1A		-55 ~ +125°C	25V	50V	4	10Ω - 1MΩ		±200
							0Ω (<50mΩ)		
SMRAA43 Jumper	1/16W 1A		-55 ~ +155°C	50V	100V	4	10Ω - 1MΩ		±200
							0Ω (<50mΩ)		

Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage Listed above, whichever is lower.

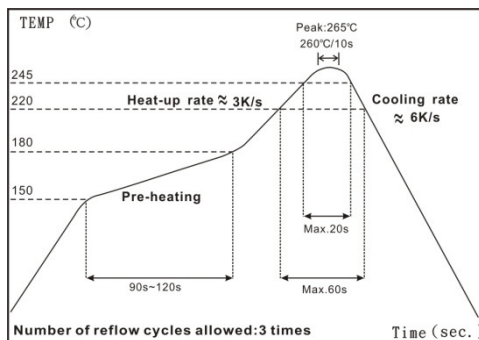
Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage Listed above, whichever is lower.

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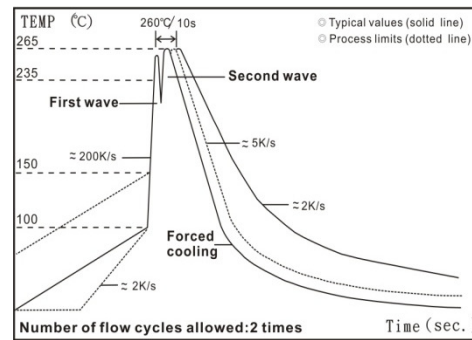
### 9. Derating Curve



### 10. Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

### 11. Environmental Characteristics

Item	Requirement			Test Method
	$\pm 1\%$	$\pm 5\%$	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			JIS C 5201-1 4.8 IEC 60115-1 4.8 -55°C~+125/+155°C, 25°C is the reference temperature
Short Time Overload	$\pm(1.0\%+0.05\Omega)$	$\pm(2.0\%+0.05\Omega)$	SMRA-82 <100m $\Omega$ Others <50m $\Omega$	JIS C 5201-1 4.13 IEC 60115-1 4.13 2.5 times RCWV or Max. overload voltage for 5 seconds
Insulation Resistance	$\geq 10G$			JIS C 5201-1 4.6 IEC 60115-1 4.6 Max. overload voltage for 1 minute
Endurance	$\pm(2.0\%+0.10\Omega)$	$\pm(3.0\%+0.10\Omega)$	SMRA-82 <100m $\Omega$ Others <50m $\Omega$	JIS C 5201-1 4.25 IEC 60115-1 4.25.1 70 $\pm$ 2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(2.0\%+0.10\Omega)$	$\pm(3.0\%+0.10\Omega)$	SMRA-82 <100m $\Omega$ Others <50m $\Omega$	JIS 5201-1 4.24 40 $\pm$ 2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	$\pm(1.0\%+0.05\Omega)$	$\pm(1.5\%+0.10\Omega)$	SMRA-82 <100m $\Omega$ Others <50m $\Omega$	JIS C 5201-1 4.23 IEC 60115-1 2.23.2 at +125/+155°C for 1000 hrs
Bending Strength	$\pm(1.0\%+0.05\Omega)$	$\pm(1.0\%+0.05\Omega)$	SMRA-82 <100m $\Omega$ Others <50m $\Omega$	JIS C 5201-1 4.33 IEC 60115-1 4.33 Bending once for 5 seconds with 3mm

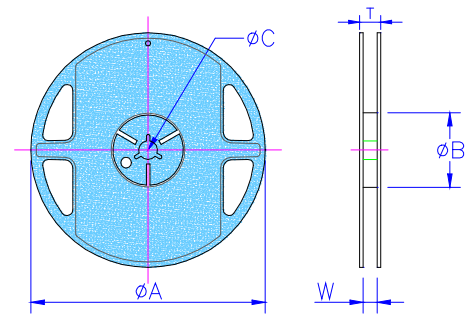
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Solderability	>95% coverage			<b>JIS C 5201-1 4.17</b> <b>IEC 60115-1 4.17</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	SMRA-82 <100mΩ Others <50mΩ	<b>JIS C 5201-1 4.18</b> <b>IEC 60115-1 4.18</b> 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover			<b>JIS C 5201-1 4.7</b> <b>IEC 60115-1 4.7</b> 1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%			<b>JIS C 5201-1 4.18</b> <b>IEC 60068-2-58 8.2.1</b> 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	SMRA-82 <100mΩ Others <50mΩ	<b>JIS C 5201-1 4.19</b> <b>IEC 60115-1 4.19</b> -55°C to +125/+155°C, 5 cycles

Storage Temperature: 25±3°C; Humidity < 80%RH

### ► 12. Packaging

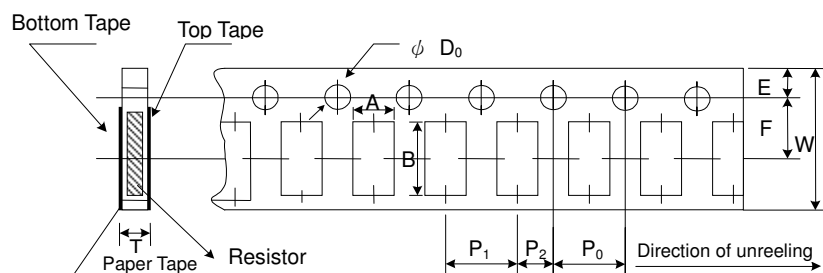
Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity	Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T
SMRA-42 SMRAA42	10K	8mm	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5
	20K		10 inch	254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
40K								
SMRA-43 SMRA-82 SMRAA43	5K	8mm	13 inch	330±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
	10K							
	20K							

Paper Tape Specifications



## SMD – Resistor Networks

Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
SMRA-42	1.20±0.1	2.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	2.0±0.05	1.5 <sup>+0.1</sup> <sub>-0</sub>	0.70±0.1
SMRA-43	1.95±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 <sup>+0.1</sup> <sub>-0</sub>	0.85±0.1
SMRA-82	1.95±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 <sup>+0.1</sup> <sub>-0</sub>	0.85±0.1
SMRAA42	1.20±0.1	2.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	2.0±0.05	1.5 <sup>+0.1</sup> <sub>-0</sub>	0.70±0.1
SMRAA43	1.95±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 <sup>+0.1</sup> <sub>-0</sub>	0.85±0.1

### ► 13. Marking

Jumper for all: Letter "0"

1% for SMRA-42/SMRA-43/SMRAA42/SMRAA43: 4 digits marking (non-including E24 series)

Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

5% for SMRA-42/SMRA-43/SMRAA42/SMRAA43: 3 digits marking in E24

 Example: 101=100Ω 102=1KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> code is multiplier)

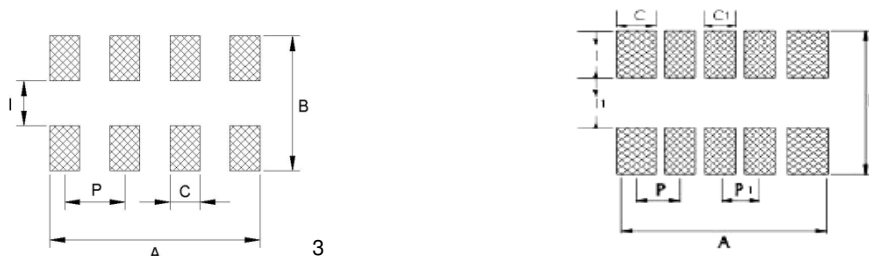
E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

5% for SMRA-82: 4 digits marking in E24

 Example: R470=47Ω R-type (1<sup>st</sup> is R-type or S-type, 2<sup>nd</sup> and 3<sup>rd</sup> are E24 code, 4<sup>th</sup> is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

### ► 14. Recommended Land Pattern



Unit: mm

Type	A	B	C	C1	I	I1	P	P1
SMRA-42	1.80	2.10	0.30	--	0.50	--	0.50	--
SMRA-43	2.85	3.10	0.45	--	0.80	--	0.80	--
SMRA-82	3.20	2.90	0.50	0.35	1.05	0.80	0.70	0.65
SMRAA42	1.80	2.10	0.30	--	0.50	--	0.50	--
SMRAA43	2.85	3.10	0.45	--	0.80	--	0.80	--