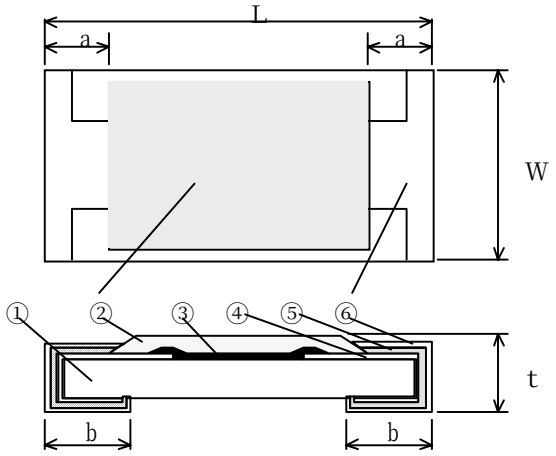
Subject Thin Film Chip Resistors PRODUCT SPECIFICATION FOR INFORMATION	Spec. No. 151-SRA-E202H4
Part No. E R A 6	9−1

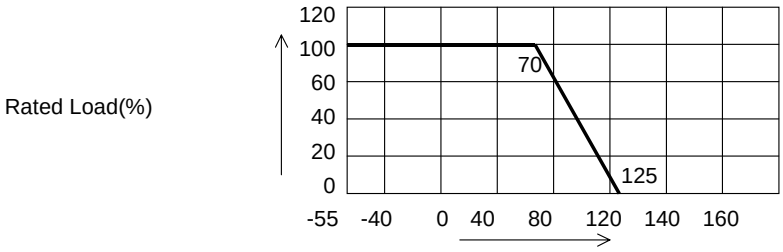
1. Dimension



① Substrate	Alumina
② Protective coating	Epoxy resin
③ Resistive element	NiCr alloy
④ Inner termination	special termination
⑤ Between termination	Ni plating
⑥ Outer termination	Sn plating

	L	W	a	b	t
mm	2.00±0.20	1.25±0.10	0.40±0.25	0.40±0.25	0.50±0.10
inch	.078±.008	.049±.004	.016±.010	.016±.010	.019±.004

2. Power deratimg Curve



Operating Temperature Range

-55~+125°C

Flg.1

3. Ratings

Item	Rated value	Explanation
Rated power	0.1 W (at 70 °C or lower)	When used at ambient temperture over 70°C, the load power should be reduced as shown in Fig.1
Rated voltage & Rated Continuous Working Voltage (RCWV)	The rated voltage of each resistance should be calculated from the equation below, and when the rated voltage exceeds the maximum RCWV, the maximum RCWV should be the rated voltage. $E = \sqrt{P \times R}$ Max.RCWV:100V *E* : rated voltage (V) *P* : rated power (W) *R* : nominal resistance value (Ω)	

Item	Rated value	Explanation
Max. overload Voltage	○Voltage should be 2.5×E. When the voltage exceeds the maximum overload voltage, the value shown below should be the maximum overload voltage. Max. overload voltage : 200V	
Tolerance for resistance	Code. D: ± 0.5%; Code. B: ± 0.1%	
Resistance range	Tolerance D: 10 Ω ~1M Ω, E-24; Tolerance B: 100 Ω ~100k Ω, E-24	E-96 series is special. When E-96 series overlap E-24 series, E-24 series should be the first priority

4. Explanation of Part Number

<E-24 series>

E	R	A	6	Y	E	D	1	0	2	V
Thin Film Chip Resistor			Type		TCR	Tolerance	Nominal Resistance			Packaging

Y	3 digit marking

Std. Taping (5000pcs/reel)	V

TCR		Resit. range
± 50x10^{-6}/°C	H	10Ω ~ 91Ω
± 25x10^{-6}/°C	E	100Ω ~ 100 kΩ
±100x10^{-6}/°C	K	110kΩ ~ 1MΩ

	Tol.
D	± .5%
B	± .1%

<E-96 series>

E	R	A	6	E	E	D	1	0	2	1	V
Thin Film Chip Resistor			Type		TCR	Tolerance	Nominal Resistance				Packaging

E	No marking

Std. Taping (5000pcs/reel)	V

TCR		Resit. range
± 50x10^{-6}/°C	H	10Ω ~ 97.6Ω
± 25x10^{-6}/°C	E	100Ω ~ 100 kΩ
±100x10^{-6}/°C	K	102kΩ ~ 1MΩ

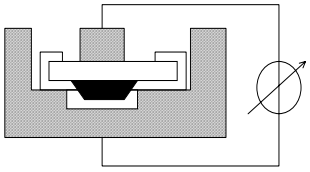
	Tol.
D	± .5%
B	± .1%

5. Appearance & Construction

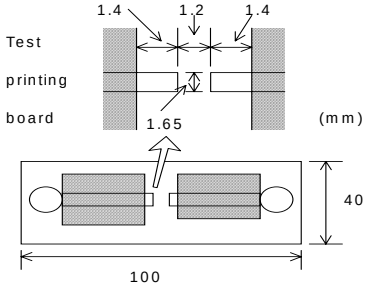
Item	Rated value	Explanation
Appearance & Construction	1. The resistive element should be covered with protective coating that don't fade easily. The surface of coating should avoid unevenness, flaw, pinhole and discoloration. 2. The electrode should be printed uniformly, as shown in the dimensions. The plating should not fade easily, and should avoid unevenness, flaw, pinhole, projection and discoloration. 3. The electrode should be connected electrically, mechanically to resistive element. 4. Dimensions of the substrate should be as in the list and it should not have chipping, flaw, flash and crack.	

As far as there shall not designation especially, the following test and measurement shall be operated under normal temperature (5~35°C), normal humidity(45~85%), normal atmospheric pressure(8.6×10^{4}~1.06×10^{5} Pa).

6. Performance Specification

Item	Specifications Chip Resistor	Explanation
DC Resistance	DC Resistance value shall be within the specified tolerance	At 20°C, 65%RH
Temperature Coefficient	Resit. range / TCR 10Ω ~97.6Ω : ± 50x10^{-6}/°C 100Ω ~100 kΩ : ±25x10^{-6}/°C 102kΩ ~ 1MΩ : ±100x10^{-6}/°C	Natural resistance change per Temperature degree centigrade. $\frac{R2-R1}{R1(t2-t1)}\times10^{-6}$ /°C R1 : Resistance value at reference temperature(t1) R2 : Resistance value at test temperature(t2) t2 – t1 = 100°C t1 = 25°C
Short-time overload	± (0.5 % + 0.1Ω)	Resistors shall be applied 2.5 times the rated voltage for 5 seconds. Max. overload voltage shall be 200V
Dielectric Withstanding	No evidence of flashover, mechanical damage, arcing or insulation break-down	A.C. 200 V shall be applied between sub-strate and electrodes for 60 s. Insulation Resistance Meter or AC power supply 
Insulation Resistance	Min.1,000MΩ	Resistors shall be facing down. After applying DC 200V to the resistor, insulation resistance shall be measured.

7. Mechanical characteristic

Item	Specifications Chip Resistor	Explanation
Bending Strength	Without distinct deformation in appearance	Substrate : Glass epoxy(t=1.6mm) Span : 90mm Bending distance:3mm (10 seconds) 
	± (0.5 % + 0.05Ω)	
Solderability	Termination should be covered uniformly with solder (min. 95% coverage)	Resistors shall be dipped in the melted solder bath at 235±5 °C for 2±0.5 sec. Flux shall be removed from the surface of termination with clean organic solvent.
Resistance to Soldering Heat	± (0.5 % + 0.05Ω)	Resistors shall be dipped in the melted solder bath at 270 ± 3 °C for 10 ± 1 °C sec.
Resistance to Solvent	Without distinct deformation in appearance	Solvent solution : Isopropyl alcohol Condition (1)Dipping 300 seconds (2)Ultrasonic wave eashing (20mW/cm^2,28kHz) : 60 seconds
	± (0.5 % + 0.05Ω)	
Resistance to Vibration (Low Frequency)	± (0.5 % + 0.05Ω)	Resistors shall be subjected to a single vibration having as double amplitude of 1.5 mm for 2 hours in each three mutually perpendicular directions for total 6 hours. The vibration frequency shall be varied uniformly 10 to 55 Hz, and return to 10 Hz traversing for 1min.

8. Environment Test

Item	Specifications Chip Resistor	Explanation
High Temperature Exposure	± (0.5 % + 0.05Ω)	Resistors shall be exposed at125±3°C for 1000^{+48}_{0} hours.
Humidity (Steady State)	± (0.5 % + 0.05Ω)	Resistors shall be exposed at 60±2°C and 90~95% relative humidity in a humidity test chamber for 1000^{+48}_{0} hours.
Temperature cycling	± (0.5 % + 0.05Ω)	-55 ± 3 °C 30minutes ↓↑ Normal Within 3minutes 5 cycles ↓↑ 125 ± 3 °C 30minutes
Load Life	± (1.0 % + 0.1Ω)	Resistors shall be exposed at 70±2°C and 1000^{+48}_{0} hours. During this time. The rated voltage shall be applied intermittently for 1.5 hours ON,0.5 hours OFF.
Load Life in Humidity	± (1.0 % + 0.1Ω)	Resistors shall be exposed to at 40±2°C and 90~95% relative humidity for 1000^{+48}_{0} hours. During this time the rated voltage shall be applied intermittently for 1.5 hours ON,0.5 hours OFF.

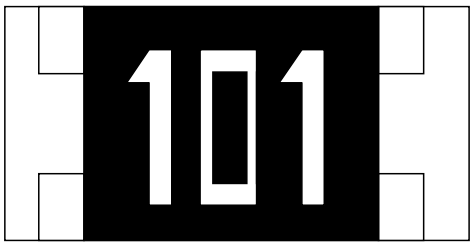
9. Other Characteristics

Item	Specifications	Test Methods
Surface Temperature	less than 20°C	Resistors shall be mounted on glass epoxy substrate(t=1.0mm). A power of 0.063W shall be applied. The temperature rise at the center of resistor is measured. However, applied voltage must not exceed Max. overload voltage.

10. Marking

Express resistance value on resin side with three digits.

(For example)



101→ 100Ω The first two digits are significant figures of resistance and the third one denotes number of zeros following.

★ E-96 series: No marking

11. Attention

⚠ Common precautions in handling resistors

(1) This catalog shows the quality and performance of a unit component.
For quality assurance, exchange the delivery specification with us. Before adoption, be sure to evaluate and verify the product mounting it in your product.

(2) We take no responsibility for troubles caused by the product usage that is not specified in this catalog. Be sure to exchange the delivery specification with us.

(3) In traffic transportation equipment (trains, cars, traffic signal equipment, etc.),medical equipment, aerospace equipment, electric heating appliances, combustion and gas equipment, rotating equipment, disaster and crime preventive equipment,etc. in cases where it is forecast that the failure of this product gives serious damage to the human. life and others, use fail-safe design and ensure safety by studying the following items to
・Ensure safety as the system by setting protective circuits and protective equipment.
・Ensure safety as the system by setting such redundant circuits as do not cause danger by a single failure.

(4) When a dogma shall be occurred about safety for this product, be sure to inform us rapidly, operate your technical examination.

(5) The products in this catalog are in tended for use is general standard applications for general electronic equipment (AV products, household electric appliances, office equipment, information and communication equipment, etc.); hence, they do not take the use under the following special environments into consideration.
Accordingly, the use in the following special environments, and such environmenta conditions may affect the performance of the products; prior to use, verify the performance, reliability, etc. thoroughly
① Use in liquids such as water, oil, chemical, and organic solvent
② Use under direct sunlight and in outdoor and dusty atmospheres
③ Use in places full of corrosive gases such as sea breeze, Cl_2,H_2S,NH_3,SO_2, AND NO_X.
④ Use in environment with large static electricity and strong electromagnetic waves.
⑤ Where the product is close to heating component, and where an inflammable such as a polyvinyl chloride wire is arranged close to the product.
⑥ Where the resistor is sealed and coated with resin, etc.
⑦ Where water or a water-soluble detergent is used in cleaning free soldering and in flux cleaning after soldering (Pay particular attention to soluble flux.)

(6) If transient load (heavy load in a short time) like pulse is expected to be applied,carry out evaluation and confirmation test with resistors actually mounted on your own board.
When the load of more than rated power is applied under the load condition at steady state, it may impair performance and/or reliability of resistor.
Never exceed the rated power.
When the product shall be used under special condition, be sure to ask us in advance.

(7) Halogen type (Chlorine type, Bromine type, etc.) or other high-activity flux is not recommended as the residue may affect performance or reliability of resistors.

(8) When soldering with soldering iron, never touch the body of the chip resistor with a tip of the soldering iron. When using a soldering iron with a tip at high temperature, solder for a time as short as possible (three second or less up to 350°C)

(9) Avoid physical shock to the resistor and nipping of the resistor with hard tool (a pair of pliers or tweezers) as it may damage protective film or the body of resistor and may affect resistor's performance.

(10) Keep the rated power and ambient temperature within the specified derating curve.
Avoid immersion of chip resistor in solvent for long time. Use solvent after the effect of immersion is confirmed.

12. Storage Method

If the product is stored in the following environments and conditions, the performance and solderability may be badly affected, avoid the storage in the following environments.

① Storage in places full of corrosive gases such as sea breeze, Cl_2, H_2S, NH_3, SO_2, AND NO_X

② Storage in places exposed to direct sunlight

③ Storage in places outside the temperature range of 5 to 35 deg. C and humidity range of 45 to 85%RH.

④ The period of guarantee for performance such as solderability is 1 year after our delivery; and this condition applies only to the case where the storage method specified in Item 3) has been followed.

13. Low, Regulation

① This product has not been manufactured with any ozone depleting chemical controlled under the Montreal Protocol.

② All the materials used in this part are registered material under the Law Concerning the Examination and Regulation of Manufactures, etc. of Chemical substances.

③ All the materials used in this part contain no brominated materials of PBBOs or PBBs as the flame-retardant.

④ If you need the notice by letter of “A preliminary judgement on the Laws of Japan foreign exchange and Foreign Trade control”, be sure to let us know.

14. Renewal for specification

When you confirm revision of this specification, the previous version shall lose its validity.

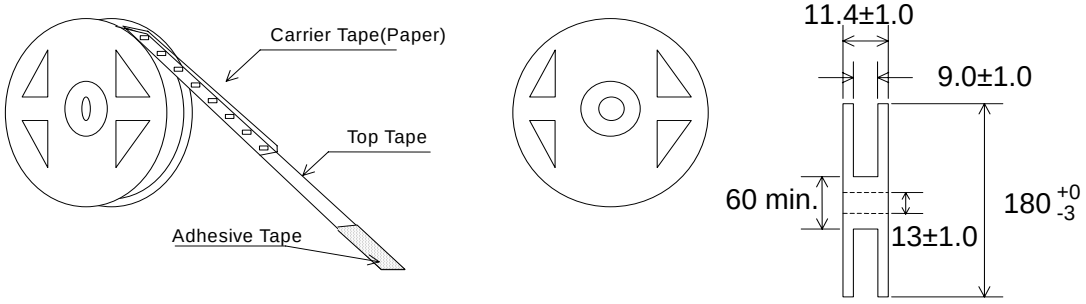
15. Manufacturing Locations

Country: Japan

Plant: Fukui Matsushita Electric Co.,Ltd

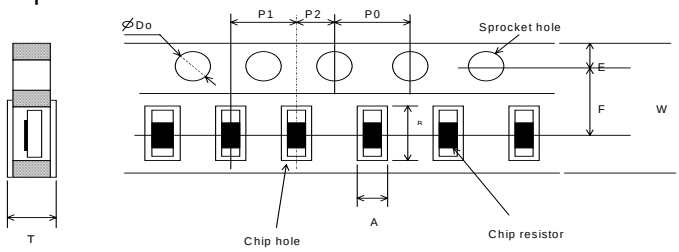
Subject Thin Film Chip Resistors PRODUCT SPECIFICATION FOR INFORMATION	Spec. No. 151-SRA-E202H4
Part No. E R A 6	9−8

1. Application Range
   This Specification covers taping spec. of ERA6 Type.
2. Physical Dimensions
   2-1 Structure and reel dimensions shall be as shown in the figure below.



Unit : mm

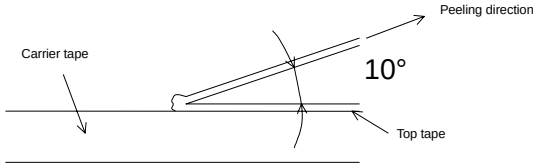
2-2 Carrier Tape Dimensions



	A	B	W	F	E
(mm)	1.65±0.15	2.50±0.20	8.00±0.20	3.50±0.05	1.75±0.10
(inch)	.065±.006	.098±.008	.315±.008	.138±.002	.069±.004

	P1	P2	P0	∅ D0	T
(mm)	4.00±0.10	2.00±0.05	4.00±0.10	$1.50 \pm^{0.10}_{0}$	0.84±0.05
(inchi)	.157±.004	.079±.002	.157±.004	$.059 \pm^{.004}_{0}$	.033±.002

3. Tapping specifications
   3-1 Taping
   ・When the test shall be operated with the below conditions, peel strength should be 0.049N~0.49N(5~50g), should not have flash and tear after peeling.
   <Test Methods>

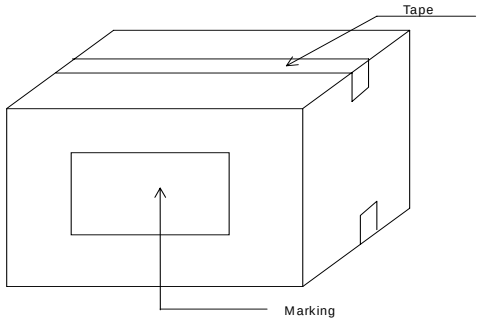


・Minimum Bending Radius
When Carrier tape shall be bent by Minimum Bending Radius (15mm), no defection of chip and no break of carrier tape. However minimum bending radius shall be tested for 1 time.
・Resistance to climate
When resistors shall be exposed at 60°C, 90~95%RH for 120 hours, no defection of chip and no break of carrier tape.
When the top tape shall be peeled tape should not have flash and tear

3-2 Quantity in Taping: 5000 pcs. /reel

3-3 Tape packaging
・Resistance side shall be facing upward.
・Chip resistors shall not be sticking to top tape and bottom tape
・Chip resistors shall be easy to take out from carrier tape and chip hole or sprocket hole shall not have flash and break.

4. Outer Packaging
Quantity: 20 reels (Max. 100,000pcs.)



・ When taping shall not reach Max. or quantity, the remaining empty space Shall be buried with buffer material.
・ When the quantity shall be few, alternative-packaging methods may be used. No problem must occur during the exportation of the product.

5. Marking
At last, production country is displayed in English.

Side of reel (Marking shall be on one side)
- Part name - Part number - Quantity - Lot Number - Maker name
- Production country
Packaging box
- Customer name - part name - Part number - Customer part number - Quantity
- Maker name - Production country