Issue No. :

Date of Issue : July 30.2014

Classification : ☐ New ☐ Changed

PRODUCT SPECIFICATION FOR APPROVAL

(Reference)

Product Description : Precision Thick Film Chip Resistors

Product Part Number : ERJ1GCFxxxxC

Country of Origin : JAPAN

Applications : Standard electronic equipment

*If you approve this specification, please fill in and sign the below and return 1 copy to us.

Approval No :

Approval Date :

Executed by :

(signature)

Title :

Dept. :

Circuit Components Business Division
Automotive & Industrial Systems Company
Panasonic Corporation

401 Sadamasa-cho,
Fukui City 910-8502 Japan

Phone : +81-776-56-8034

Prepared by : Engineering Section

Contact Person :

Signature

Name(Print)

Title :

Authorized by :

Signature

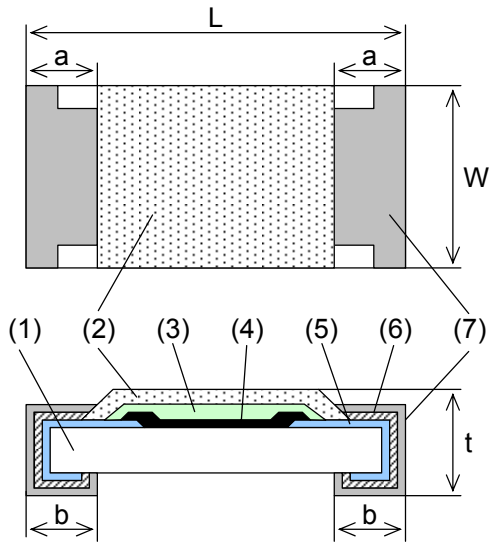
Name(Print)

Title : Manager of Engineering

Panasonic

Downloaded from Arrow.com.

1. Dimension

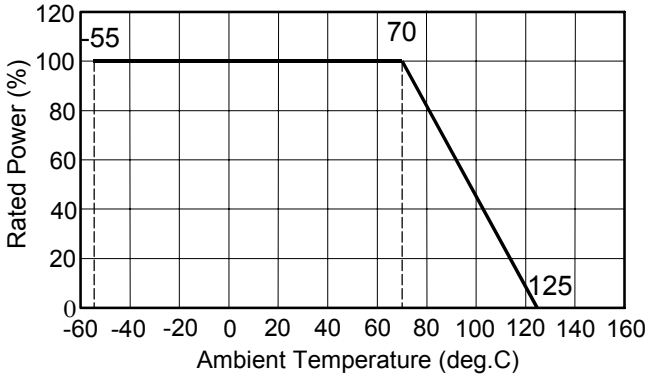


(1) Substrate : Alumina
(2) Protective Coating 1 : Resin
(3) Protective Coating 2 : PbO Glass
(4) Resistive Element : Metal glaze
(5) Inner Termination : Thick film material
(6) Middle Termination : Ni Plating
(7) Outer Termination : Sn Plating

Unit: (mm)

	L	W	a	b	t
Dimension	0.60+/-0.03	0.30+/-0.03	0.10+/-0.05	0.15+/-0.05	0.23+/-0.03

2. Power Derating Curve



Operating temperature range
: -55 to 125 deg.C

Figure 1

3. Ratings

3-1 Resistor

Item	Rated value (Explanation)
Power Rating	0.05W When used at ambient temperature above 70 deg.C, power rating shall be determined in accordance with Figure 1.

Downloaded from Arrow.com.

Item	Rated value (Explanation)
Rated voltage & Rated Continuous Working Voltage	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. Rated voltage = (Power rating x Resistance Value) $^{1/2}$ The maximum RCWV : 15V
Resistance Tolerance	Code: F — Tolerance: +/-1%
Resistance range	Resistance range: 1 ohm – 9.76 ohm — Series: E-24,E96

4. Explanation of Part Number

E	R	J	1	G	C	F	1	R	0	2	C
(1)			(2)			(3)	(4)				(5)

(1) Product Code : Thick Film Chip Resistor

(2) Size and Rated Power : 0.6 mm x 0.3 mm, 0.05 W

(3) Resistance Tolerance

Code	Resistance Tolerance
F	+/- 1%

(4) Resistance Value

" R " means decimal point, and the other three digits are significant figures of resistance value following in ohm.

(5) Packaging Configuration

Code	Packaging Configuration
C	Taping (15,000 pcs/reel)

Downloaded from Arrow.com.

5. Appearance & Construction

Item	Specification
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. Details of appearance criteria shall be as described in attached sheet.

Downloaded from Arrow.com.

As far as there shall not designation especially, the following tests and measurement shall be operated under the following conditions.

Normal temperature : 5 deg.C to 35 deg.C

Normal humidity : 45 % to 85 %

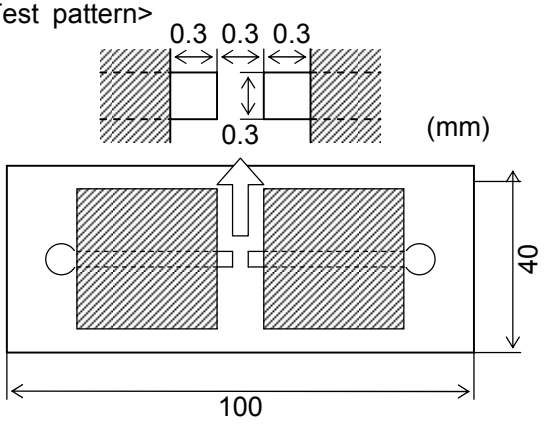
Normal atmospheric pressure : 86 kPa to 106 kPa

6. Performance Specification

Item	Specification	Test Method (JIS-C5201-1)
DC resistance	DC resistance value shall be within the specified tolerance.	At 20 deg.C, 65% relative humidity
Temperature coefficient of resistance (TCR)	1.0Ω≤R<10Ω (1.0 ohm to 9.76 ohm) : +600/-100 x 10^{-6}/K	Natural resistance change per temperature degree centigrade. TCR=$(R_2-R_1)x10^6/R_1(t_2-t_1)$ ($x10^{-6}$/K) R_1 : Resistance value at reference temperature (t_1) R_2 : Resistance value at test temperature (t_2) t_1 : 25 deg.C , t_2 : 125 deg.C
Short time overload	ΔR : +/-(2%+0.1ohm)	Resistors shall be applied 2.5 times the rated voltage for 5 seconds. However, the upper limit of the voltage in the test shall be 30V.
Intermittent overload	ΔR : +/-(5%+0.1ohm)	Resistors shall be subjected to 10000 cycles of 2.5 times the rated voltage applied for 1 second with pause of 25 seconds between tests. However, the upper limit of the voltage in the test shall be 30V.

Downloaded from Arrow.com.

7. Machinery characteristic

Item	Specification	Test Method (JIS-C5201-1)
Bending strength	No mechanical damage.	Substrate : Glass epoxy (t=1.0 mm) Span : 90mm Bending distance : 3mm (10 seconds) <Test pattern> 
	ΔR : +/-(1%+0.05ohm)	
Solderability	Termination should be covered uniformly with solder (Min. 95% coverage)	Resistors shall be dipped in the melted solder bath at 235 deg.C +/- 5 deg.C for 2 seconds +/- 0.5 second. Flux shall be removed from the surface of termination with clean organic solvent.
Resistance to soldering heat	ΔR : +/-(1%+0.05ohm)	Resistors shall be dipped in the melted solder bath at 270 deg.C +/- 3 deg.C for 10 seconds +/- 1 second.
Resistance to vibration (Low frequency)	ΔR : +/-(1%+0.05ohm)	Resistors shall be subjected to a single vibration having as double amplitude of 1.5 mm in 3 directions perpendicular one another for 2 hours each. (6 hours in total) The vibration frequency shall be varied uniformly from 10 Hz to 55 Hz, and return to 10 Hz traversing for 1 min.
Resistance to solvent	Without distinct deformation in appearance	Solvent solution : Isopropyl alcohol (1)Dipping 10 +/- 1 hours, dry in room condition for 30 +/- 10 minutes. (2)Ultrasonic wave washing : 5 +/- 1 min. ($0.3W/cm^2$,28kHz) Dry in room condition for 30 +/-10 minutes.
	ΔR : +/-(0.5%+0.05ohm)	

Downloaded from Arrow.com.

8. Environmental test

Item	Specification	Test Method (JIS-C5201-1)
Low temperature exposure	ΔR : +/-(1%+0.05ohm)	Resistors shall be exposed at -55 deg.C +/- 3 deg.C with no load for 1000 hours +48/-0 hours.
High temperature exposure	ΔR : +/-(1%+0.05ohm)	Resistors shall be exposed at 125 deg.C +/- 3 deg.C with no load for 1000 hours +48/-0 hours.
Temperature cycling	ΔR : +/-(1%+0.05ohm)	Resistors shall be tested for 5 cycles continuously in accordance with the following duty cycle.
Humidity (Steady state)	ΔR : +/-(1%+0.05ohm)	Resistors shall be exposed at 60 deg.C +/- 2 deg.C and 90% to 95% relative hummidity in a humidity test chamber for 1000 hours +48/-0 hours.
Load life	ΔR : +/-(3%+0.1ohm)	Resistors shall be operated at DC rated Voltage (1.5 hours "ON", 0.5 hours "OFF") for 1000 hours +48/-0 hours in a test chamber controlled at 70 deg.C +/-2 deg.C.
Load life in humidity	ΔR : +/-(3%+0.1 ohm)	Resistors shall be operated at DC rated Voltage (1.5 hours “ON”, 0.5 hours “OFF”) for 1000 hours +48/-0 hours in a test chamber controlled at 60 deg.C +/- 2 deg.C and at 90 % to 95% in relative hummidity.

Step	Temperature (deg.C)	Time (min.)
1	-55 +/-3	30
2	Room temperature	Max. 3
3	+125 +/-3	30
4	Room temperature	Max.3

9. Resistance value marking

No marking

Downloaded from Arrow.com.

10. Common precautions in handling resistors

⚠ Notice for use

(1) This specification shows the quality and performance of a unit component. 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 specification.

(3) In advance-notification to us is required in case you demand high reliability in the resistors because there is a possibility that a trouble or a failure in our resistor which is used in your transportation units (e.g. Trains, cars, ships, traffic signal equipment etc.), ocean floor-equipment, medical equipment, aerospace equipment, electrothermal goods, combustion and gas equipment, power station control equipment, information control equipment, rotating equipment, disaster and crime-preventive equipment, various safety devices, and the equivalent equipment may cause critical damage occurrence such as loss of life or property.
In addition, use fail-safe design as mentioned below for preventing extensive damage and for ensuring the safety:
*Ensure safety by the system in which the protective circuits and/or protective equipment are installed.
*Ensure safety by the system in which a single failure does not cause unsafety by installing such as redundant circuits.

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

(5) The product is designed to use in general standard applications of general electric equipment (AV products, household electric appliances, office equipment, information and equipment, etc.); hence, it do not take the use under the following special communication environments into consideration.
Accordingly, the use in the following special environments, and such environmental conditions may affect the performance of the product; 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, in outdoor or in 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 or strong electromagnetic waves or strong radial ray.
5) Where the product is close to a heating component, or where an inflammable such as a polyvinyl chloride wire is arranged close to the product.
6) Where the resistor is sealed or coated with resin etc.
7) Where solvent, water, or water-soluble detergent is used in cleaning free soldering and in flux cleaning after soldering. (Pay particular attention to water-soluble flux.)
8) Use in such a place where the product is wetted due to dew condensation.

(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

Downloaded from Arrow.com.

impair performance and/or reliability of resistor. Never exceed the rated power and rated voltage. Temperature of resistors may become high even with specified conditions. Please confirm safety of heat from resistors on print circuit board and components around them.
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.
Strong acid flux, water soluble-flux and flux including fluorine ion shall not be used.

(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 seconds or less up to 350 deg.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) Avoid immersion of chip resistor in solvent for long time. Use solvent after the effect of immersion is confirmed.

11. 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 deg.C to 35 deg.C and humidity range of 45 % relative hummidity to 70 % relative hummidity.

(4) Storage over a year after our delivery (This item also applies to the case where the storage method specified in item (1) to (3) has been followed.).

12. Laws and Regulations

(1) No ODCs or other ozone-depleting substances that are subject to regulation under the Montreal Protocol are used in our manufacturing processes, including in the manufacture of this product.

(2) This product complies with the RoHS Directive (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (DIRECTIVE 2011/65/EU)).

(3) All materials used in this product are existing chemical substances recognized under "lows on examination of chemical substances and regulations of manufacturing and others."

(4) Please contact us to obtain a notice as to whether this product has passed inspection under review criteria primarily based on Foreign Exchange and Foreign Trade Control Laws, and appended table in the Export Control Laws.

13. Production site

Country : Japan

Plant : Circuit Components Business Division, Panasonic Corporation

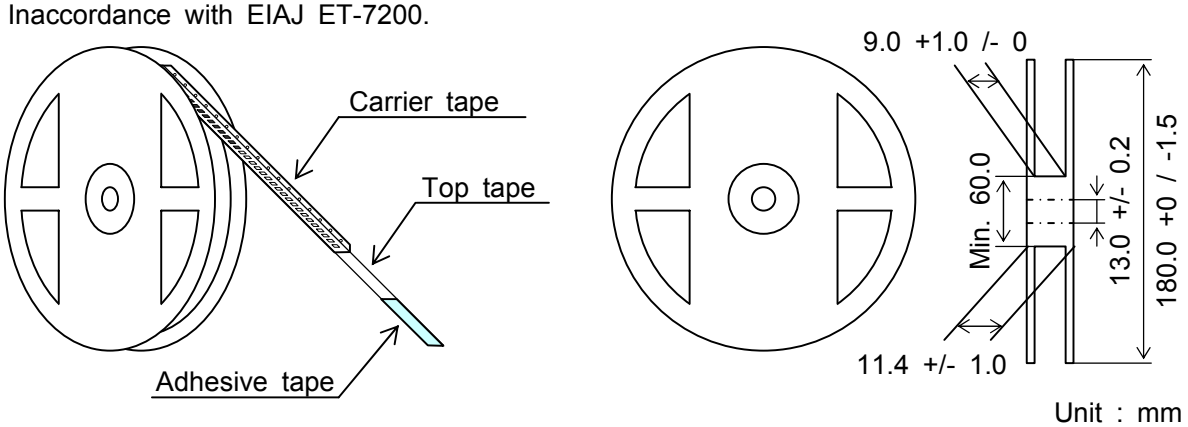
Downloaded from Arrow.com.

14. Taped and Reel Package

14-1 Physical Dimensions

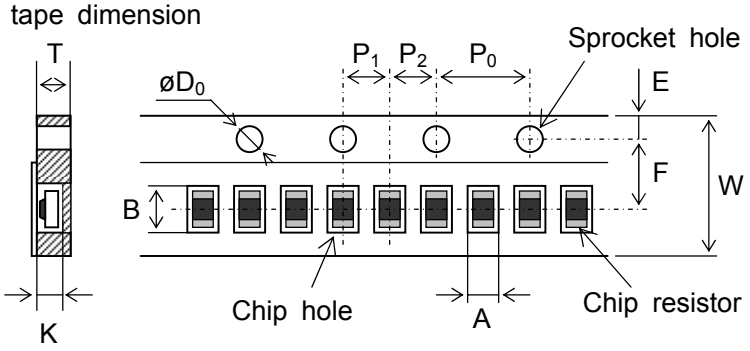
Structure and reel dimensions shall be as shown in the figure below.

Inaccordance with EIAJ ET-7200.



Unit : mm

14-2 Carrier tape dimension



	A	B	W	F	E
Dimension (mm)	0.38+/-0.05	0.68+/-0.05	8.00+/-0.20	3.50+/-0.05	1.75+/-0.10

	P_1	P_2	P_0	$øD_0$	T	K
Dimension (mm)	2.00+/-0.10	2.00+/-0.05	4.00+/-0.10	1.50+0.10/-0	0.42+/-0.05	0.29+/-0.05

14-3 Specifications

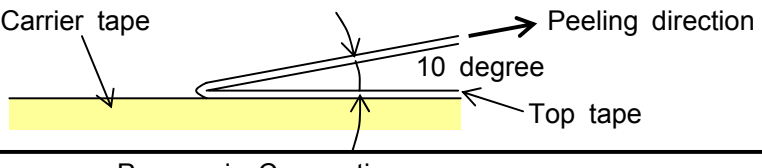
14-3-1 Taping

(1) 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.

(2) When the test shall be operated with the below conditions, peel strength should be 0.049 N to 0.686 N, should not have flash and tear after peeling.

(Test Method)



Downloaded from Arrow.com.

14-3-2 Quantity in Taping : 15,000 pcs./reel

14-3-3 Tape packaging

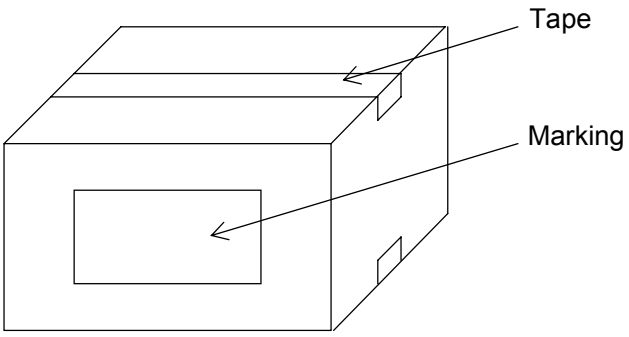
(1) Resistance side shall be facing upward.

(2) Chip resistor shall not be sticking to top tape.

(3) Chip resistor shall be easy to take out from carrier tape and chip hole or sprocket hole shall not have flash and break.

14-4 Outer Packaging

Quantity : 20 reels (Max. 300,000pcs.)



* 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.

14-5 Marking

At least, production country is displayed in English.

(1) Side of reel (Marking shall be on one side)

1)Part name, 2)Part number, 3)Quantity, 4)Lot number, 5)Maker name
6) Production country

(2)Packaging box

1)Customer name, 2)Part name, 3)Part number, 4)Customer part number, 5)Quantity
6)Maker name, 7)Production country

Downloaded from Arrow.com.