

# DATA SHEET

## ARRAY CHIP RESISTORS

YC/TC 164 (8Pin/4R)

5%, 1%

sizes 4 × 0603

RoHS compliant



SCOPE

This specification describes YC164 (convex) and TC164 (concave) series chip resistor arrays with lead-free terminations made by thick film process.

APPLICATIONS

- Terminal for SDRAM and DDRAM
- Computer applications: laptop computer, desktop computer
- Consume electronic equipment: PDAs, PNDs
- Mobile phone, telecom...

FEATURES

- RoHS compliant
  - Products with lead free terminations meet RoHS requirements
  - Pb-glass contained in electrodes
  - Resistor element and glass are exempted by RoHS
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- None forbidden-materials used in products/production
- Halogen Free Epoxy

ORDERING INFORMATION - GLOBAL PART NUMBER & I2NC

Both part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

**YAGEO BRAND ordering code**

**GLOBAL PART NUMBER (PREFERRED)**

**YC** **164** - **X** **X** **X** **XX** **XXXX** **L**  
**TC** (1) (2) (3) (4) (5) (6)

**(1) TOLERANCE**

F = ±1%  
 J = ±5% (for Jumper ordering, use code of J)

**(2) PACKAGING TYPE**

R = Paper taping reel

**(3) TEMPERATURE COEFFICIENT OF RESISTANCE**

- = Base on spec

**(4) TAPING REEL**

07 = 7 inch dia. Reel  
 10 = 10 inch dia. Reel  
 13 = 13 inch dia. Reel

**(5) RESISTANCE VALUE**

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point, no need to mention the last zero after R/K/M, e.g.1K2, not 1K20.  
 Detailed resistance rules show in table of "Resistance rule of global part number".

**(6) OPTIONAL CODE**

L = optional symbol (Note)

**Resistance rule of global part number**

Resistance code rule	Example
OR	OR = Jumper
XRX	1R = 1 Ω
(1 to 9.76 Ω)	1R5 = 1.5 Ω
	9R76 = 9.76 Ω
XXRX	10R = 10 Ω
(10 to 97.6 Ω)	97R6 = 97.6 Ω
XXXXR	100R = 100 Ω
(100 to 976 Ω)	
XKXX	1K = 1,000 Ω
(1 to 9.76 KΩ)	9K76 = 9760 Ω
XMXX	1M = 1,000,000 Ω
(1 to 9.76 MΩ)	9M76= 9,760,000 Ω

**ORDERING EXAMPLE**

The ordering code of a YC164 convex chip resistor array, value 1,000 Ω with ±5% tolerance, supplied in 7-inch tape reel is: YC164-JR-071K(L).

**NOTE**

1. All our RSMD products meet RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

**PHYCOMP BRAND ordering codes**

Both GLOBAL PART NUMBER (preferred) and I2NC (traditional) codes are acceptable to order Phycomp brand products.

**GLOBAL PART NUMBER (PREFERRED)**

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2.

**I2NC CODE**

2350		XXX XXXXX L					Last digit of I2NC Resistance decade <sup>(3)</sup>		Last digit
(1)		(2)	(3)	(4)					
TYPE/ 4×0603	START IN <sup>(1)</sup>	TOL. (%)	RESISTANCE RANGE	PAPER / PE TAPE ON REEL (units) <sup>(2)</sup>					
				5,000	20,000				
ARV241	2350	±5%	1 to 1 MΩ	035 10xxx	035 12xxx	0.01 to 0.0976 Ω		0	
ARV242	2350	±1%	1 to 1 MΩ	025 1xxxx	025 3xxxx	0.1 to 0.976 Ω		7	
ARC241	2350	±5%	10 to 1 MΩ	034 10xxx	013 3xxxx	1 to 9.76 Ω		8	
ARC242	2350	±1%	10 to 1 MΩ	024 1xxxx	013 3xxxx	10 to 97.6 Ω		9	
Jumper	2350	-	0 Ω	ARV241/YC164	035 91001	100 to 976 Ω		1	
				ARC241/TC164	034 91001	1 to 9.76 KΩ		2	
						10 to 97.6 KΩ		3	
						100 to 976 KΩ		4	
						1 to 9.76 MΩ		5	
						10 to 97.6 MΩ		6	

- (1) The resistors have a 12-digit ordering code starting with 2350.
- (2) The subsequent 4 or 5 digits indicate the resistor tolerance and packaging.
- (3) The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in the table of "Last digit of I2NC".
- (4) "L" is optional symbol <sup>(Note)</sup>.

Example:

0.02 Ω	=	0200 or 200
0.3 Ω	=	3007 or 307
1 Ω	=	1008 or 108
33 KΩ	=	3303 or 333
10 MΩ	=	1006 or 106

**ORDERING EXAMPLE**

The ordering code of a ARV241 resistor, value 1,000 Ω with ±5% tolerance, supplied in tape of 10,000 units per reel is: 235003510102(L) or YC164-JR-071K(L).

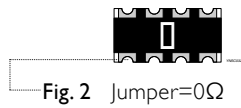
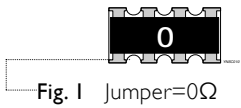
**NOTE**

- 1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- 2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

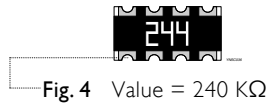
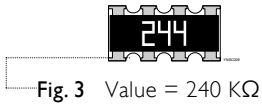
**MARKING**

YC164

TC164



I-Digit marking



E-24 series: 3 digits

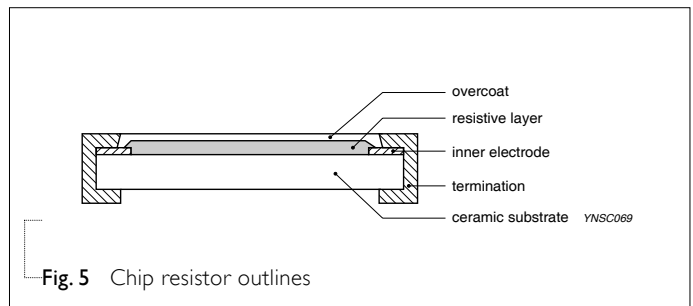
First two digits for significant figure and 3rd digit for number of zeros

For further marking information, please see special data sheet “Chip resistors marking”

**CONSTRUCTION**

The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added on each end to make the contacts to the thick film resistive element. The composition of the resistive element is a noble metal imbedded into a glass and covered by a second glass to prevent environment influences. The resistor is laser trimmed to the rated resistance value. The resistor is covered with a protective epoxy coat, finally the two external terminations (matte tin on Ni-barrier) are added. See fig.5

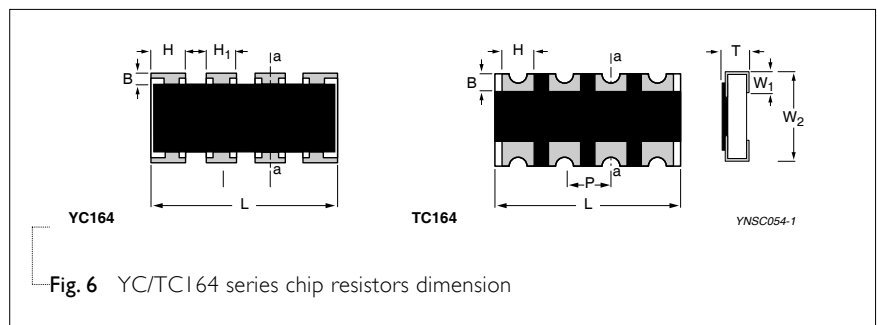
**OUTLINES**



**DIMENSIONS**

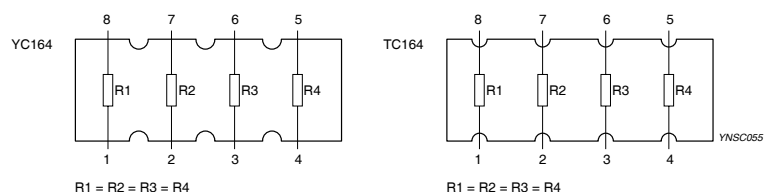
Table I

TYPE	YC164	TC164
B (mm)	0.30 ±0.15	0.30 ±0.15
H (mm)	0.65 ±0.05	---
H <sub>1</sub> (mm)	0.50 ±0.15	---
P (mm)	0.80 ±0.05	0.80 ±0.05
L (mm)	3.20 ±0.15	3.20 ±0.15
T (mm)	0.60 ±0.10	0.60 ±0.10
W <sub>1</sub> (mm)	0.30 ±0.15	0.30 ±0.15
W <sub>2</sub> (mm)	1.60 ±0.15	1.60 ±0.15



**SCHEMATIC**

For dimension see Fig. 6 and Table I



ELECTRICAL CHARACTERISTICS

Table 2

CHARACTERISTICS		YC/TC164	1/16 W
Operating Temperature Range		-55 °C to +155 °C	
Maximum Working Voltage		50 V	
Maximum Overload Voltage		100 V	
Dielectric Withstanding Voltage		100 V	
Resistance Range 5% (E24), 1% (E24/E96)	YC164	1 Ω to 1 MΩ	
	TC164	10 Ω to 1 MΩ	
	Zero Ohm Jumper < 0.05 Ω		
Temperature Coefficient		±200 ppm/°C	
Jumper Criteria	Rated Current	1.0 A	
	Maximum Current	2.0 A	

FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please see the special data sheet “Chip resistors mounting”.

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PRODUCT TYPE	PACKING STYLE	REEL DIMENSION	QUANTITY PER REEL
YC/TC164	Paper Taping Reel (R)	7" (178 mm)	5,000 units
		10" (254 mm)	10,000 units
		13" (330 mm)	20,000 units

**NOTE**

I. For paper tape and reel specification/dimensions, please see the special data sheet “Chip resistors packing”.

FUNCTIONAL DESCRIPTION

**POWER RATING**

YC/TC 164 rated power at 70 °C is 1/16 W

**RATED VOLTAGE**

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V = \sqrt{P \times R}$$

or max. working voltage whichever is less

Where

$$V = \text{Continuous rated DC or AC (rms) working voltage (V)}$$

$$P = \text{Rated power (W)}$$

$$R = \text{Resistance value (Ω)}$$

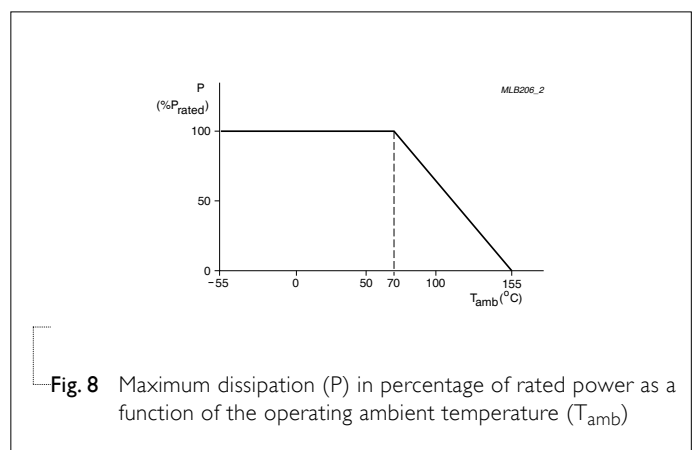


Fig. 8 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T<sub>amb</sub>)

**TESTS AND REQUIREMENTS**
**Table 4** Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A	1,000 hours at 70±5 °C applied RCWV	±(2%+0.05 Ω)
	IEC 60115-1 4.25.1	1.5 hours on, 0.5 hour off, still air required	<100 mΩ for Jumper
	JIS C 5202-7.10		
High Temperature Exposure/ Endurance at upper category temperature	MIL-STD-202G-method 108A	1,000 hours at maximum operating temperature	±(1%+0.05 Ω)
	IEC 60115-1 4.25.3	depending on specification, unpowered	<50 mΩ for Jumper
	JIS C 5202-7.11	No direct impingement of forced air to the parts Tolerances: 155±3 °C	
Moisture Resistance	MIL-STD-202G-method 106F	Each temperature / humidity cycle is defined at 8	±(2%+0.05 Ω)
	IEC 60115-1 4.24.2	hours (method 106F), 3 cycles / 24 hours for 10d	<100 mΩ for Jumper
		with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered Parts mounted on test-boards, without condensation on parts Measurement at 24±2 hours after test conclusion	
Thermal Shock	MIL-STD-202G-method 107G	-55/+155 °C	±(0.5%+0.05 Ω) for 10 KΩ to
		Note: Number of cycles required is 300. Devices	10 MΩ
		unmounted	±(1%+0.05 Ω) for others
		Maximum transfer time is 20 seconds. Dwell time	<50 mΩ for Jumper
		is 15 minutes. Air – Air	
Short time overload	MIL-R-55342D-para 4.7.5	2.5 times RCWV or maximum overload voltage	±(2%+0.05 Ω)
	IEC60115-1 4.13	whichever is less for 5 sec at room temperature	<50 mΩ for Jumper No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described,	±(1%+0.05 Ω)
		only 1 board bending required	<50 mΩ for Jumper
		3 mm bending	No visible damage
		Bending time: 60±5 seconds	
		Ohmic value checked during bending	

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	IPC/JEDECJ-STD-002B test B IEC 60068-2-58	Electrical Test not required Magnification 50X SMD conditions: 1 <sup>st</sup> step: method B, aging 4 hours at 155 °C dry heat 2 <sup>nd</sup> step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	Well tinned (≥95% covered) No visible damage
- Leaching	IPC/JEDECJ-STD-002B test D IEC 60068-2-58	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202G-method 210F IEC 60068-2-58	Condition B, no pre-heat of samples Leadfree solder, 270 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Oct 27, 2008	-	<ul style="list-style-type: none"> <li>- Change to dual brand datasheet that describes YC/TC164 with RoHS compliant</li> <li>- Description of "Halogen Free Epoxy" added</li> <li>- Define global part number</li> </ul>
Version 2	Mar 01, 2005	-	<ul style="list-style-type: none"> <li>- Test method and procedure updated</li> <li>- TC164, the concave chip resistor arrays combined</li> </ul>
Version 1	Apr. 22, 2004	-	<ul style="list-style-type: none"> <li>- 13" taping and Jumper added, delete G in ordering code, and test &amp; requirement (Pb free) updated</li> </ul>
Version 0	Nov. 10, 2003	-	<ul style="list-style-type: none"> <li>- First issue of this specification</li> </ul>

*“ Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products itself are unchanged. Any product change will be announced by PCN.”*