

# 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).

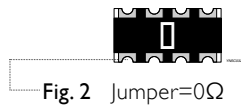
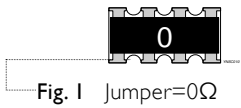
**NOTE**

- 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)

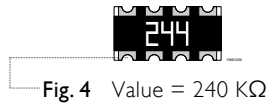
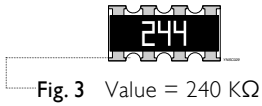
**MARKING**

YCI64

TCI64



I-Digit marking



E-24 series: 3 digits

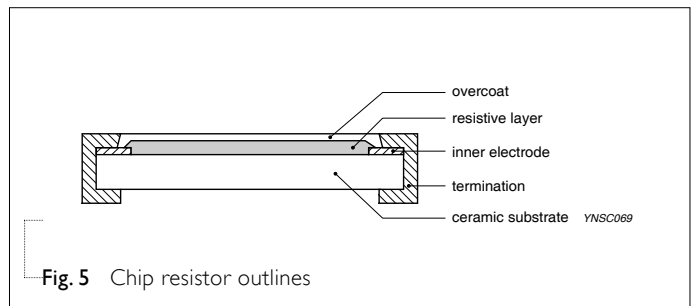
First two digits for significant figure and 3rd digit for number of zeros

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

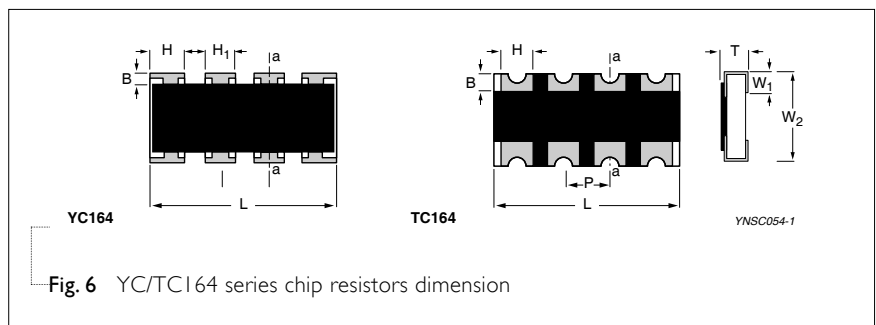
**OUTLINES**



**DIMENSIONS**

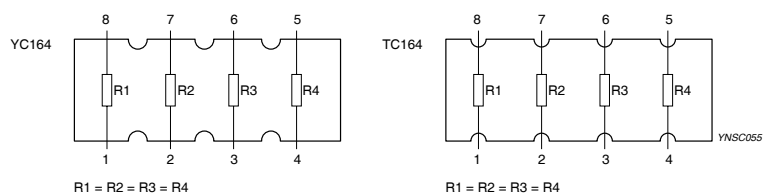
Table I

| TYPE                | YCI64      | TCI64      |
|---------------------|------------|------------|
| 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          | I/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<br>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 I/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

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

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

$$R = \text{Resistance value (Ω)}$$

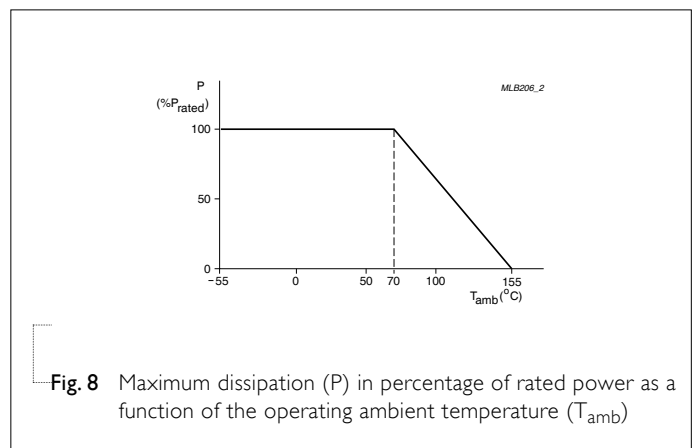


Fig. 8 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T<sub>amb</sub>)

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

| TEST  | TEST METHOD              | PROCEDURE   | REQUIREMENTS                           |
|---|--------------------------|---|--|
| Life/<br>Operational Life/<br>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<br>Temperature<br>Exposure/<br>Endurance at<br>upper category<br>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<br>Tolerances: 155±3 °C  |  |
| Moisture<br>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 &<br>7b, unpowered<br>Parts mounted on test-boards, without<br>condensation on parts<br>Measurement at 24±2 hours after<br>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<br>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<br>No visible damage |
| Board Flex/<br>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   |
|-----------------------------------|--|--|--|
| <b>Solderability</b><br>- Wetting | IPC/JEDECJ-STD-002B test B<br>IEC 60068-2-58 | Electrical Test not required<br>Magnification 50X<br>SMD conditions:<br>1 <sup>st</sup> step: method B, aging 4 hours at 155 °C<br>dry heat<br>2 <sup>nd</sup> step: leadfree solder bath at 245±3 °C<br>Dipping time: 3±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage        |
| - Leaching                        | IPC/JEDECJ-STD-002B test D<br>IEC 60068-2-58 | Leadfree solder, 260 °C, 30 seconds<br>immersion time  | No visible damage                                      |
| - Resistance to Soldering Heat    | MIL-STD-202G-method 210F<br>IEC 60068-2-58   | Condition B, no pre-heat of samples<br>Leadfree solder, 270 °C, 10 seconds<br>immersion time<br>Procedure 2 for SMD: devices fluxed and<br>cleaned with isopropanol  | ±(1%+0.05 Ω)<br><50 mΩ for Jumper<br>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.”*