Innovative Service Around the Globe YAGEO

# DATA SHEET

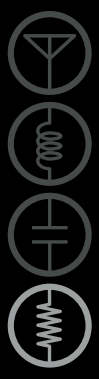
## ARRAY CHIP RESISTORS

YC/TC 164 (8Pin/4R)

5%, 1%

**sizes 4 × 0603**

**RoHS compliant**



YAGEO Phicomp

Product specification – Oct 27, 2008 V.3



## 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 & 12NC

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/TC | 164 | – | X (1) | X (2) | X (3) | XX (4) | XXXX (5) | L (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 |
|---|---|
| 0R | 0R = Jumper |
| XRXX (1 to 9.76 Ω) | 1R = 1 Ω<br>1R5 = 1.5 Ω<br>9R76 = 9.76 Ω |
| XXRX (10 to 97.6 Ω) | 10R = 10 Ω<br>97R6 = 97.6 Ω |
| XXXR (100 to 976 Ω) | 100R = 100 Ω |
| XKXX (1 to 9.76 KΩ) | 1K = 1,000 Ω<br>9K76 = 9760 Ω |
| XMXX (1 to 9.76 MΩ) | 1M = 1,000,000 Ω<br>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 / 12NC can be added (both are on customer request)

### PHYCOMP BRAND ordering codes

Both GLOBAL PART NUMBER (preferred) and 12NC (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.

### 12NC CODE

**2350 XXX XXXXX L**

(1) (2) (3) (4)

| TYPE/ 4×0603 | START IN (1) | TOL. (%) | RESISTANCE RANGE | PAPER / PE TAPE ON REEL (units) (2) | |
|---|---|---|---|---|---|
| | | | | 5,000 | 20,000 |
| ARV241 | 2350 | ±5% | 1 to 1 MΩ | 035 10xxx | 035 12xxx |
| ARV242 | 2350 | ±1% | 1 to 1 MΩ | 025 1xxxx | 025 3xxxx |
| ARC241 | 2350 | ±5% | 10 to 1 MΩ | 034 10xxx | 013 3xxxx |
| ARC242 | 2350 | ±1% | 10 to 1 MΩ | 024 1xxxx | 013 3xxxx |
| Jumper | 2350 | - | 0 Ω | ARV241/YC164 035 91001 | - |
| | | | | ARC241/TC164 034 91001 | - |

(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 12NC".

(4) "L" is optional symbol (Note).

Last digit of 12NC

| Resistance decade (3) | Last digit |
|---|---|
| 0.01 to 0.0976 Ω | 0 |
| 0.1 to 0.976 Ω | 7 |
| 1 to 9.76 Ω | 8 |
| 10 to 97.6 Ω | 9 |
| 100 to 976 Ω | 1 |
| 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 |

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

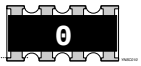
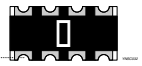
### ORDERING EXAMPLE

The ordering code of a ARV241 resistor, value 1,000 Ω with ±5% tolerance, supplied in tape of 10,000 units per reel is: 2350035101O2(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 / 12NC can be added (both are on customer request)

## MARKING

| YC164 | TC164 | |
|---|---|---|
|  Fig. 1 Jumper=0Ω |  Fig. 2 Jumper=0Ω | 1-Digit marking |
|  Fig. 3 Value = 240 KΩ |  Fig. 4 Value = 240 KΩ | E-24 series: 3 digits<br>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

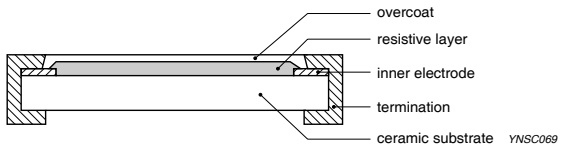



Fig. 5 Chip resistor outlines

## DIMENSIONS

Table 1

| TYPE | YC164 | TC164 |
|---|---|---|
| B (mm) | 0.30 ±0.15 | 0.30 ±0.15 |
| H (mm) | 0.65 ±0.05 | --- |
| $H_1$ (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 |
| $W_1$ (mm) | 0.30 ±0.15 | 0.30 ±0.15 |
| $W_2$ (mm) | 1.60 ±0.15 | 1.60 ±0.15 |

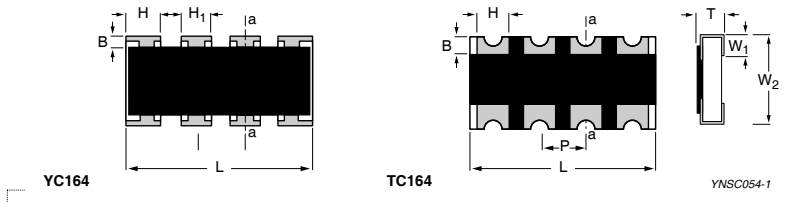



Fig. 6 YC/TC164 series chip resistors dimension

## SCHEMATIC

For dimension see Fig. 6 and Table 1

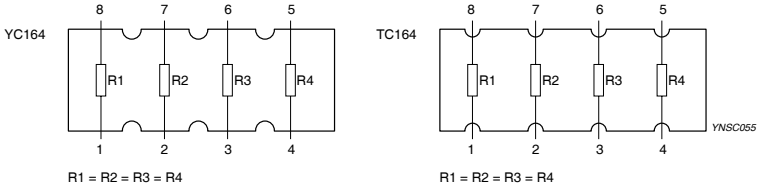



Fig. 7 Equivalent circuit diagram

## 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**

1. 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=Continuous rated DC or AC (rms) working voltage (V)

P=Rated power (W)

R=Resistance value (Ω)

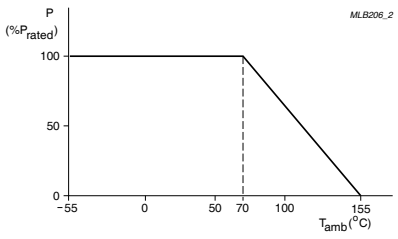



Fig. 8 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$)

## TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

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

| TEST | TEST METHOD | PROCEDURE | REQUIREMENTS |
|---|---|---|---|
| Solderability<br>- Wetting | IPC/JEDECJ-STD-002B test B<br>IEC 60068-2-58 | Electrical Test not required<br>Magnification 50X<br>SMD conditions:<br>1st step: method B, aging 4 hours at 155 °C dry heat<br>2nd 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 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 immersion time<br>Procedure 2 for SMD: devices fluxed and 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 | - | - Change to dual brand datasheet that describes YC/TC164 with RoHS compliant<br>- Description of "Halogen Free Epoxy" added<br>- Define global part number |
| Version 2 | Mar 01, 2005 | - | - Test method and procedure updated<br>- TC164, the concave chip resistor arrays combined |
| Version 1 | Apr. 22, 2004 | - | - 13" taping and Jumper added, delete G in ordering code, and test & requirement (Pb free) updated |
| Version 0 | Nov. 10, 2003 | - | - First issue of this specification |

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AC1206FR-0724R3L AC1206FR-0751RL CC0402BRNPO9BN2R2 RC0201JR-073K3L RC0402FR-07255RL
RC0402BR-071KL RC0603FR-07178KL RC0805FR-07150RP RC1206JR-0751RL AC0402FR-13100KL
AC1206JRNPO0BN221 RC0603JR-07 3RL AC1206KKX7RCBB102 CC0402JPNPO9BN150
CQ0201JRNPO8BN100 RL1210FR-070R01L CC0805KRX7R9BB561 AC0402FR-071RL
CQ0402FRNPO9BN100 RC0805FR-7W1KL