Innovative Service Around the Globe YAGEO

# DATA SHEET

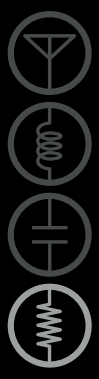
## ARRAY CHIP RESISTORS

YC/TC 124 (8Pin/4R)

5%, 1%

**sizes 4 × 0402**

**RoHS compliant**



YAGEO Phicomp

Product specification – Mar 09, 2011 V.3

## SCOPE

This specification describes YC124 (convex) and TC124 (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
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- Save 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 | 124 | – | 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

– = Based 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) DEFAULT CODE

Letter L is the system default code for ordering only. (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 YC124 convex chip resistor array, value 1,000 Ω with ±5% tolerance, supplied in 7-inch tape reel is: YC124-JR-071KL.

### 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.
TC124 series is supplied and ordered by global part number only.

### 12NC CODE

**2350** **XXX XXXXX L**
(1) (2) (3) (4)

| TYPE/ 4×0402 | START IN (1) | TOL. (%) | RESISTANCE RANGE | PAPER / PE TAPE ON REEL (units) (2) | |
|---|---|---|---|---|---|
| | | | | 10,000 | 40,000 |
| ARV341 | 2350 | ±5% | 1 to 1 MΩ | 033 11xxx | 033 13xxx |
| ARV342 | 2350 | ±1% | 1 to 1 MΩ | 023 2xxxx | 023 8xxxx |
| Jumper | 2350 | - | 0 Ω | 033 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 ARV341 resistor, value 1,000 Ω with ±5% tolerance, supplied in tape of 10,000 units per reel is: 23500311102 (L) or YC124-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

YC124

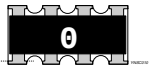



Fig. 1 Jumper = 0 Ω

1-Digit marking


Fig. 2 Value = 240 KΩ

E-24 series: 3 digits

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

TC124

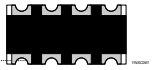


Fig. 3

No marking

For further marking information, please refer to 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, as shown in Fig 4.

## OUTLINES

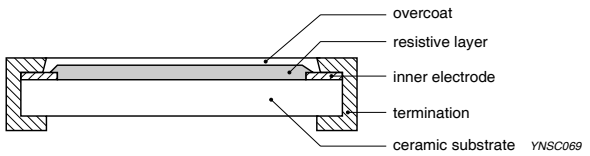



Fig. 4 Chip resistor outlines

## DIMENSIONS

Table 1

| TYPE | YC124 | TC124 |
|---|---|---|
| B (mm) | 0.20 ±0.15 | 0.20 ±0.10 |
| H (mm) | 0.45 ±0.05 | 0.30 ±0.10 |
| $H_1$ (mm) | 0.30 ±0.05 | --- |
| P (mm) | 0.50 ±0.05 | 0.50 ±0.05 |
| L (mm) | 2.00 ±0.10 | 2.00 ±0.10 |
| T (mm) | 0.45 ±0.10 | 0.40 ±0.10 |
| $W_1$ (mm) | 0.30 ±0.15 | 0.25 ±0.10 |
| $W_2$ (mm) | 1.00 ±0.10 | 1.00 ±0.10 |

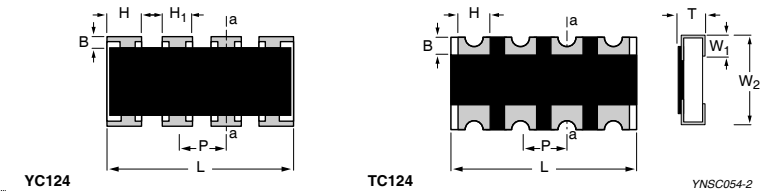



Fig. 5 YC/TC124 series chip resistors dimension

## SCHEMATIC

For dimension, please refer to Fig. 5 and Table 1

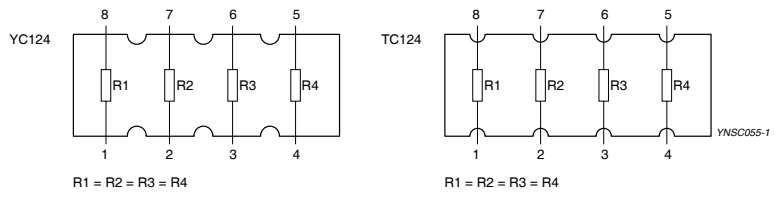



Fig. 6 Equivalent circuit diagram

## ELECTRICAL CHARACTERISTICS

Table 2

| CHARACTERISTICS | | YC124 | TC124 |
|---|---|---|---|
| Operating Temperature Range | | –55 °C to +155 °C | –55 °C to +125 °C |
| Rated Power | | 1/16 W | 1/16 W |
| Maximum Working Voltage | | 25 V | 50 V |
| Maximum Overload Voltage | | 50 V | 100 V |
| Dielectric Withstanding Voltage | | 100 V | 100 V |
| Resistance Range | 5% (E24)<br>1% (E24/E96) | 1 Ω to 1 MΩ | 10 Ω to 1 MΩ |
| | | | Zero Ohm Jumper < 0.05 Ω |
| Temperature Coefficient | 1 Ω ≤ R < 10 Ω | ±250 ppm/°C | ±200 ppm/°C |
| | 10 Ω ≤ R ≤ 1 MΩ | ±200 ppm/°C | |
| Jumper Criteria | Rated Current | 1.0 A | 1.0 A |
| | Maximum Current | 2.0 A | 1.5 A |

## FOOTPRINT AND SOLDERING PROFILES

Recommended footprint and soldering profiles, please refer to 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/TC124 | Paper Taping Reel (R) | 7" (178 mm) | 10,000 units |
| | | 10" (254 mm) | 20,000 units |
| | | 13" (330 mm) | 40,000 units |

**NOTE**

1. For paper tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".

## FUNCTIONAL DESCRIPTION

### OPERATING TEMPERATURE RANGE

- YC124: –55 °C to +155 °C
- TC124: –55 °C to +125 °C

### POWER RATING

YC/TC 124 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)

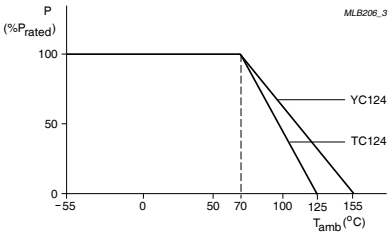



Fig. 7 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$)

## 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 | YC124: -55/+155 °C<br>TC124: -55/+125 °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 | Mar 09, 2011 | - | - YC124 resistance range extended |
| Version 2 | Oct 29, 2008 | - | - Change to dual brand datasheet that describes YC/TC124 with RoHS compliant<br>- Range extended to size TC124 (concave)<br>- Description of "Halogen Free Epoxy" added<br>- Define global part number |
| Version 1 | Feb 04, 2005 | - | - New datasheet for 4 × 0402 chip resistor arrays 1% and 5% with lead-free terminations<br>- Replace the 4 × 0402 part of pdf files: ARV341_5_PbFree_L_0.pdf and ARV342_1_PbFree_L_0.pdf<br>- Test method and procedure updated |
| Version 0 | Dec 05, 2003 | - | - |

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