

# **DATA SHEET**

**ARRAY CHIP RESISTORS** 

YC/TC

5%, 1%

sizes

YC:102/104/122/124/162/164/248/324/158T/358L/358T

TC: 122/124/164

**RoHS** compliant



YAGEO Phícomp



#### SCOPE

This specification describes YC (convex, flat) and TC (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 equipments: PDAs, PNDs
- Mobile phone, telecom...

#### **FEATURES**

- · AEC-Q200 qualified
- More efficient in pick & place application
- · Low assembly costs
- 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 (PREFERSRED)**

#### 

#### (I) SIZE

YC:102/104/122/124/162/164/248/324/158T/358L/358T

TC: 122/124/164

#### (2) ARRAYS OR NETWORKS

Array YC102/104/122/124/162/164/248/324: -Network YC158T/YC358L/YC358T: NA

#### (3) TOLERANCE

#### (4) PACKAGING TYPE

R = Paper taping reel K = Embossed plastic tape reel

#### (5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Base on spec

#### (6) TAPING REEL

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

#### (7) RESISTANCE VALUE

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point. Detailed resistance rules show in table of "Resistance rule of global part number".

#### (8) DEFAULT CODE

Letter L is the system default code for ordering only. (Note)
Letter T is the only default code for YCI02.

#### **ORDERING EXAMPLE**

The ordering code of a YC122 convex chip resistor array, value 1,000  $\Omega$  with ±5% tolerance, supplied in 7-inch tape reel is: YC122-JR-071KL.

YCI58T network, value  $100,000\Omega$  with 5% tolerance, supplied in 7-inch tape reel is: YCI58T|R-07100KL

#### NOTE

- All our RSMD products meet RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- 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)

#### Resistance rule of global part number Resistance code rule Example 0R 0R = Jumper $IR = I \Omega$ XRXX $IR5 = 1.5 \Omega$ (1 to 9.76 $\Omega$ ) $9R76 = 9.76 \Omega$ XXRX $IOR = IO \Omega$ (10 to 97.6 $\Omega$ ) $97R6 = 97.6 \Omega$ XXXR $100R = 100 \Omega$ (100 to 976 $\Omega$ ) XKXX $IK = 1,000 \Omega$ (I to 9.76 K $\Omega$ ) $9K76 = 9760 \Omega$ ΧM $IM = 1,000,000 \Omega$ $(I M\Omega)$



102 to 358

#### **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. TC122 series is supplied and ordered by global part number only.

#### 12NC CODE

2350 <u>X</u> (I)			2) (3) (4)		
TYPE/ 2×0402	-	TOL. (%)	resistance range	PAPER / PE TAPE ON RE	EEL (units) (2) 50,000
ARV321	2350	±5%	Ι to Ι ΜΩ	013 11xxx	013 12xxx
ARV322	2350	±1%	10 to 1 $M\Omega$	013 2xxxx	013 3xxxx
Jumper	2350	-	0 Ω	013 91001	<u> </u>

- (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 (Note).

#### **ORDERING EXAMPLE**

The ordering code of a ARV321 resistor, value 1,000 $\Omega$  with ±5% tolerance, supplied in tape of 10,000 units per reel is: 235001311102(L) or YC122-JR-071KL.

Resistance decade (3)	Last digit
0.01 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
I to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
I to 9.76 KΩ	2
10 to 97.6 KΩ	3
100 to 976 KΩ	4
I to 9.76 MΩ	5
10 to 97.6 MΩ	6

Example:	0.02 Ω	=	0200 or 200
	0.3 Ω	=	3007 or 307
	ΙΩ	=	1008 or 108
	33 KΩ	=	3303 or 333
	10 ΜΩ	=	1006 or 106

#### NOTE

- I. 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)



12

SERIES

102 to 358

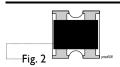
### <u>MARKING</u>

#### YCI02



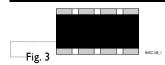
No marking

YC122



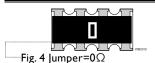
No marking

YCI04

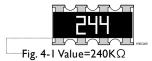


No marking

#### YC124 / 162 / 164 / 324



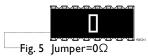
I-Digit marking



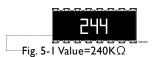
E-24 series: 3 digits, 5%

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

# YC248



I-Digit marking

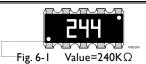


E-24 series: 3 digits, 5%

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

#### YC158T/358L/358T

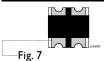




E-24 series: 3 digits

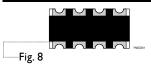
First two digits for significant figure and 3rd digit for number of zeros

#### TC122



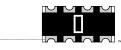
No marking

#### TCI24



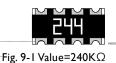
No marking

#### TC164



I-Digit marking

Fig. 9 Jumper= $\mathbf{0}\Omega$ 



E-24 series: 3 digits, 5%

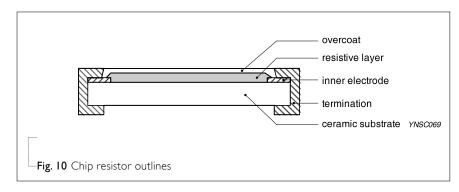
First two digits for significant figure and 3rd digit for number of zeros

For further marking information, please refer to data sheet "Chip resistors marking".

#### CONSTRUCTION

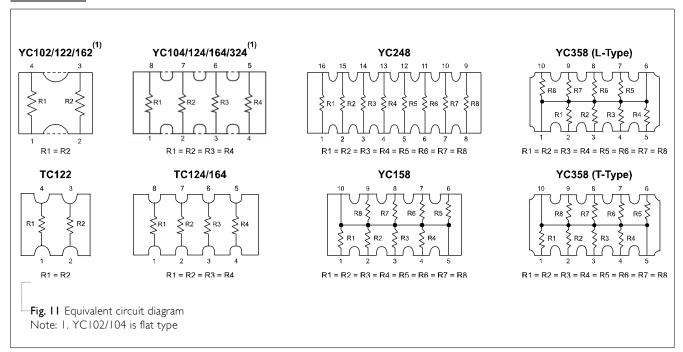
The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added on each end to make the contacts to the thick film resistive element. The composition of the resistive element is a noble metal imbedded into a glass and covered by a second glass to prevent environment 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 Nibarrier) are added as shown in Fig.9.

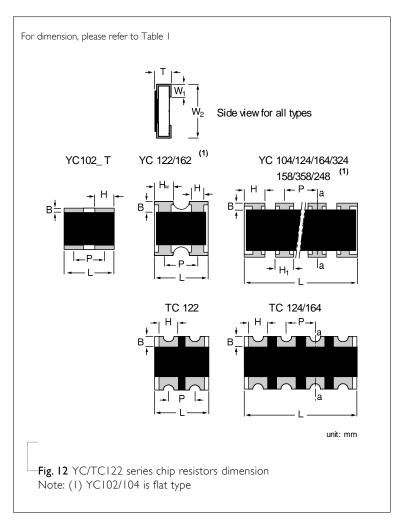
#### **OUTLINES**



6 12

#### SCHEMATIC





7/12

# Chip Resistor Surface Mount YC/TC SERIES 102 to 358

# **DIMENSIONS**

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TYPE	H / H <sub>I</sub> / H <sub>W</sub>	В	Р	L	Т	WI	W2
YC102	H: 0.25 ± 0.10	0.15 ±0.10	0.55 ±0.10	0.80 ±0.10	0.35 ±0.10	0.15 ±0.10	0.60 ±0.10
YC104	H: 0.20 ± 0.10	0.15 <b>±</b> 0.05	0.40 ±0.10	1.40 ±0.10	0.35 <b>±</b> 0.10	0.15 <b>±</b> 0.10	0.60 ±0.10
YC122	H: 0.21+0.10 / -0.05 H <sub>w</sub> : 0.35 ±0.10	0.20 <b>±</b> 0.10	0.67 <b>±</b> 0.05	1.00 ±0.10	0.30 ±0.10	0.25 <b>±</b> 0.10	1.00 ±0.10
YC124	H: $0.40 \pm 0.15$ H <sub>1</sub> : $0.30 \pm 0.05$	0.20 <b>±</b> 0.15	0.50 <b>±</b> 0.05	2.00 ±0.10	0.45 <b>±</b> 0.10	0.30 ±0.15	1.00 ±0.10
YC162	H : 0.30 ±0.10 H <sub>w</sub> : 0.65 ±0.15	0.30 <b>±</b> 0.10	0.80 <b>±</b> 0.05	1.60 <b>±</b> 0.10	0.40 <b>±</b> 0.10	0.30 <b>±</b> 0.10	1.60 <b>±</b> 0.10
YC164	H : 0.65 ±0.05 H <sub>I</sub> : 0.50 ±0.15	0.30 <b>±</b> 0.15	0.80 <b>±</b> 0.05	3.20 <b>±</b> 0.15	0.60 <b>±</b> 0.10	0.30 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC248	H : 0.45 ±0.05 H <sub>I</sub> : 0.30 ±0.05	0.30 ±0.15	0.50 <b>±</b> 0.05	4.00 <b>±</b> 0.20	0.45 <b>±</b> 0.10	0.40 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC324	H: 1.10 ±0.15 H <sub>1</sub> : 0.90 ±0.15	0.50 ±0.20	1.27 <b>±</b> 0.05	5.08 <b>±</b> 0.20	0.60 ±0.10	0.50 <b>±</b> 0.15	3.20 <b>±</b> 0.20
TC122	H: 0.30 ±0.05	0.25 <b>±</b> 0.15	0.50 <b>±</b> 0.05	1.00 ±0.10	0.30 ±0.10	0.25 <b>±</b> 0.15	1.00 ±0.10
TC124	H: 0.30 ±0.10	0.20 <b>±</b> 0.10	0.50 <b>±</b> 0.05	2.00 ±0.10	0.40 ±0.10	0.25 <b>±</b> 0.10	1.00 ±0.10
TC164	H: 0.50 ±0.15	0.30 <b>±</b> 0.15	0.80 <b>±</b> 0.05	3.20 <b>±</b> 0.15	0.60 ±0.10	0.30 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YCI58T	H: 0.45 <b>±</b> 0.05 H <sub>I</sub> : 0.32± 0.05	0.30 <b>±</b> 0.15	0.64 <b>±</b> 0.05	3.20 <b>±</b> 0.20	0.60 ±0.10	0.35 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC358L YC358T	H: 1.10±0.15 H <sub>I</sub> : 0.90±0.15	0.50 <b>±</b> 0.15	1.27 <b>±</b> 0.05	6.40 ±0.20	0.60 ±0.10	0.50 <b>±</b> 0.15	3.20 <b>±</b> 0.20



#### **ELECTRICAL CHARACTERISTICS**

Table 2			_					
TYPE	POWER P <sub>70</sub>	OPERATING TEMP. RANGE	MWV	RCOV	DWV	RESISTANCE RANGE & TOLERANCE	T. C. R.	Jumper criteria (unit: A)
YC102	1/32W	-55°C to +125°C	15V	30V	30V	E24 $\pm 5\%$ $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm 1\%$ $10\Omega \le R \le 1M\Omega$ Jumper $< 0.05\Omega$	1200 /95	Rated current 0.5 Max. current 1.0
YC104	1/32W	-55°C to +125°C	12.5V	25V	25V	$ \begin{array}{c cccc} & E24 \pm 5\% & I0\Omega \leq R \leq IM\Omega \\ & E24/E96 \pm I\% & I0\Omega \leq R \leq IM\Omega \\ & Jumper & < 0.05\Omega \end{array} $	±200 ppm/°C-	Rated current 0.5 Max. current 1.0
YC122	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5%   $\Omega \le R \le  M\Omega $ E24/E96 $\pm$ 1%   $\Omega \le R \le  M\Omega $ Jumper $<$ 0.05 $\Omega$		Rated current 0.5 Max. current 1.0
YCI24	1/16W	-55°C to +155°C	25V	50V	100V	E24 $\pm$ 5%   $\Omega \le R \le  M\Omega $ E24/E96 $\pm$ 1%   $\Omega \le R \le  M\Omega $ Jumper $<$ 0.05 $\Omega$	$ \Omega \le R \le  0\Omega ^{-1}$ $\pm 250 \text{ ppm/°C}$ $ 0\Omega \le R \le  M\Omega $ $\pm 200 \text{ ppm/°C}$	Max. current 2.0
YC162	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5%   $\Omega \le R \le  M\Omega $ E/24/E96 $\pm$ 1%   $\Omega \le R \le  M\Omega $ Jumper $<$ 0.05 $\Omega$	±200 ррпп С-	Rated current 1.0 Max. current 2.0
YC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5%   $\Omega \le R \le  M\Omega $ E24/E96 $\pm$ 1%   $\Omega \le R \le  M\Omega $ Jumper $<$ 0.05 $\Omega$		Rated current 1.0 Max. current 2.0
YC248	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$ Jumper $<$ 0.05 $\Omega$		Rated current 2.0 Max. current 10.0
YC324	1/8W	-55°C to +155°C	200V	500V	500V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$		
TC122	1/16W	-55°C to +125°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$ Jumper $< 0.05\Omega$	±200 ppm/°C -	Rated current 1.0 Max. current 1.5
TCI24	1/16W	-55°C to +125°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$ Jumper $<$ 0.05 $\Omega$	±200 ррпп С-	Rated current 1.0 Max. current 1.5
TC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$ Jumper $< 0.05\Omega$	-	Rated current 1.0 Max. current 2.0
YCI58T	1/16W	-55°C to +155°C	25V	50V	50V	E24 ±5%   10 <b>Ω</b> ≤ R ≤   100K <b>Ω</b>	-	
YC358L YC358T	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 10 <b>Ω</b> ≤ R ≤ 330K <b>Ω</b>	-	

#### FOOTPRINT AND SOLDERING PROFILES

For 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

PACKING STYLE	PACKING STYLE	YC102/ 104	YC/TC 122	YC/TC 124	YC162	YC/TC 164	YC248	YC324	YC158T	YC358L YC358T
Paper taping reel (R)	7" (178mm)	10,000	10,000	10,000	5,000	5,000	5,000		5,000	
	13" (254mm)	50,000	50,000	40,000		20,000			20,000	
Embossed taping reel ( K)	7" (178mm)						4,000	4,000		4,000

#### NOTE

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



#### **FUNCTIONAL DESCRIPTION**

#### **OPERATING TEMPERATURE RANGE**

YC102/104/122/162, TC122/124 Range:

-55°C to +125°C (Fig.13)

YC124/164/248/324/158T/358L/358T, TC164 Range:

-55°C to +155°C(Fig.14)

#### **POWER RATING**

Each type rated power at 70°C YC102/104 = 1/32 W YC122/124/162/164/248/158T/358L/358T = 1/16 W YC324 = 1/8 W

TC122/124/164 = 1/16 W



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

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

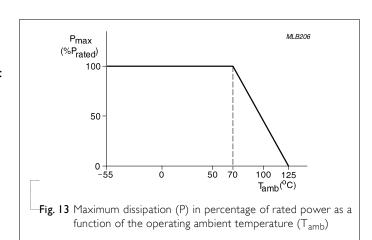
or max. working voltage whichever is less

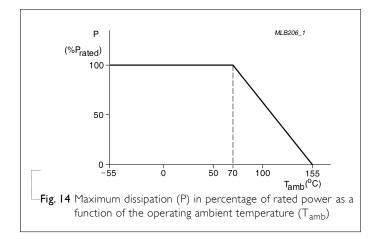
Where

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

P=Rated power (W)

R=Resistance value ( $\Omega$ )





12

# TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202-method 108 IEC 60115-1 4.25.1 JIS C 5202-7.10	151 051 6 (1)	$\pm$ (2%+0.05 Ω) <100 mΩ for Jumper
High Temperature Exposure/ Endurance at Upper Category Temperature	MIL-STD-202-method 108 IEC 60115-1 4.25.3 JIS C 5202-7.11	I,000 hours at maximum operating temperature depending on specification, unpowered  No direct impingement of forced air to the parts  Tolerances: I25±3 °C	$\pm (1\% + 0.05~\Omega)$ <50 m $\Omega$ for Jumper
Moisture Resistance	MIL-STD-202-method 106 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  Parts mounted on test-boards, without condensation on parts  Measurement at 24±2 hours after test conclusion	,
Thermal Shock	MIL-STD-202-method 107	-55/+125 °C  Note: Number of cycles required is 300.  Devices mounted  Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	$\pm$ (1%+0.05 Ω) <50 mΩ for Jumper
Short Time Overload	MIL-R-55342-para 4.7.5 IEC60115-1 4.13	2.5 times RCWV or maximum overload voltage whichever is less for 5 sec at room temperature	$\pm (2\% + 0.05 \ \Omega)$ <50 m $\Omega$ for Jumper No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described, only I board bending required 3 mm bending Bending time: 60±5 seconds Ohmic value checked during bending	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage



Chin	Resistor	Surface	Mount

YC/TC SERIES

102 to 358

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS		
Solderability	J-STD-002 test	Electrical Test not required	Well tinned (≥95% covered)		
- Wetting		Magnification 50X	No visible damage		
		SMD conditions:			
		I <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			
- Leaching	J-STD-002 test	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage		
- Resistance to	MIL-STD-202-method 210	Condition B, no pre-heat of samples	±(1%+0.05 Ω)		
Soldering Heat		Leadfree solder, 260 °C, 10 seconds	$<$ 50 m $\Omega$ for Jumper		
		immersion time	No visible damage		
		Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	Ü		
Biased Humidity	AEC-Q200 Test 7	1,000 hours; 85 °C / 85% RH	± (5.0%+0.05 Ω)		
	MIL-STD-202-Method 103	10% of operating power			
		Measurement at $24\pm 4$ hours after test conclusion.			

Chip Resistor Surface Mount YC/TC SERIES

102 to 358

# REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 9	Feb.19, 2019	-	- Update H dimension for YC124
Version 8	Dec. 24. 2018	-	- Update AEC-Q200 qualified
Version 7	Aug. 22, 2017	-	- Correct the typo for YC158T/358L/358T, Marking, "240" is 240hm
Version 6	Jun. 1, 2017	-	- Update ordering information for networks YCI58T/YC358L/YC358T
Version 5	Feb. 14, 2017	-	- Update YC158 and 358 part number to YC158T , YC358L and YC358T
Version 4	Dec. 22, 2016	-	- Delete YC102 default code L type
Version 3	Apr. 29, 2016	-	- Update YC series and TC164 dimension
Version 2	Dec. 11, 2015	-	- Update Operating Temperature
Version I	Feb. 04, 2015	-	- Update YC102 to flat type
Version 0	Nov. 14, 2014	-	- First issue of this specification

<sup>&</sup>quot;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."