

# 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





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

**I2NC CODE**

TYPE/ 2×0402	2350	XXX XXXXX L				PAPER / PE TAPE ON REEL (units) <sup>(2)</sup>	
	(1)	(2)	(3)	(4)	10,000	50,000	
ARV321	2350	±5%	1 to 1 MΩ		013 11xxx	013 12xxx	
ARV322	2350	±1%	10 to 1 MΩ		013 2xxxx	013 3xxxx	
Jumper	2350	-	0 Ω		013 91001	-	

Last digit of I2NC Resistance decade <sup>(3)</sup>	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

- (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**

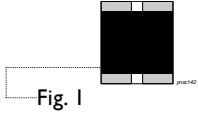
The ordering code of a ARV321 resistor, value 1,000Ω with ±5% tolerance, supplied in tape of 10,000 units per reel is: 235001311102(L) or YC122-JR-071KL.

**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)

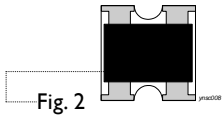
**MARKING**

**YC102**



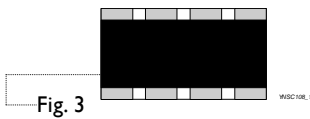
No marking

**YC122**



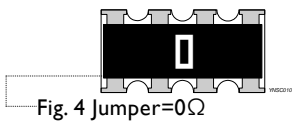
No marking

**YC104**



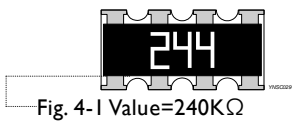
No marking

**YC124 / 162 / 164 / 324**



I-Digit marking

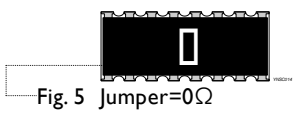
Fig. 4 Jumper=0Ω



E-24 series: 3 digits, 5%  
First two digits for significant figure and 3rd digit for number of zeros

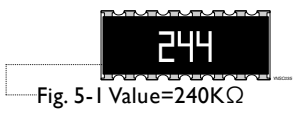
Fig. 4-I Value=240KΩ

**YC248**



I-Digit marking

Fig. 5 Jumper=0Ω



E-24 series: 3 digits, 5%  
First two digits for significant figure and 3rd digit for number of zeros

Fig. 5-I Value=240KΩ

**YC158T/358L/358T**

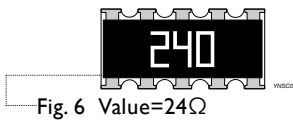


Fig. 6 Value=24Ω

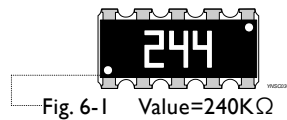
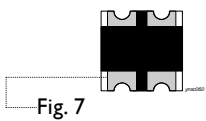


Fig. 6-I Value=240KΩ

E-24 series: 3 digits  
First two digits for significant figure and 3rd digit for number of zeros

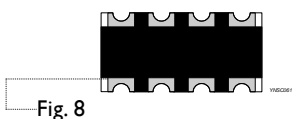
**TC122**



No marking

Fig. 7

**TC124**



No marking

Fig. 8

TCI64



I-Digit marking

Fig. 9 Jumper=0Ω



E-24 series: 3 digits, 5%  
First two digits for significant figure and 3rd digit for number of zeros

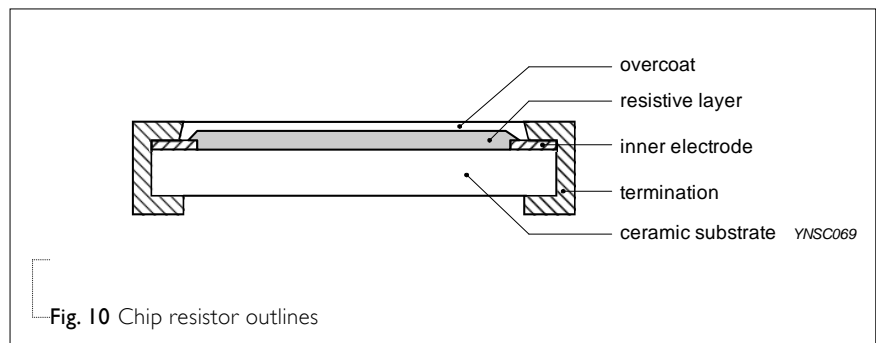
Fig. 9-1 Value=240KΩ

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

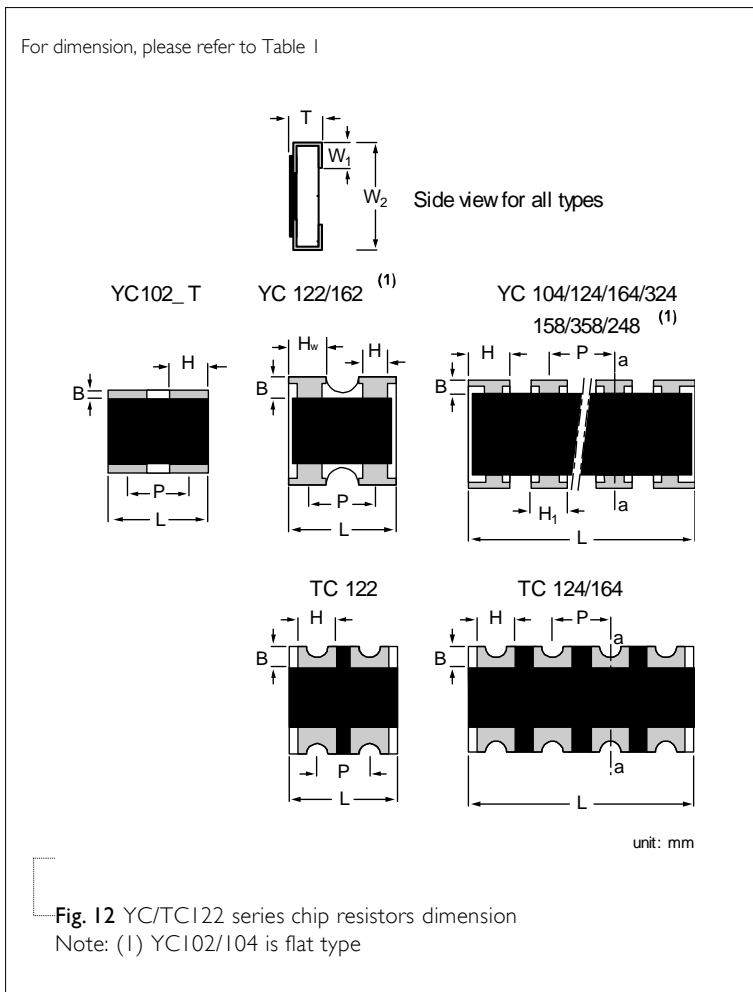
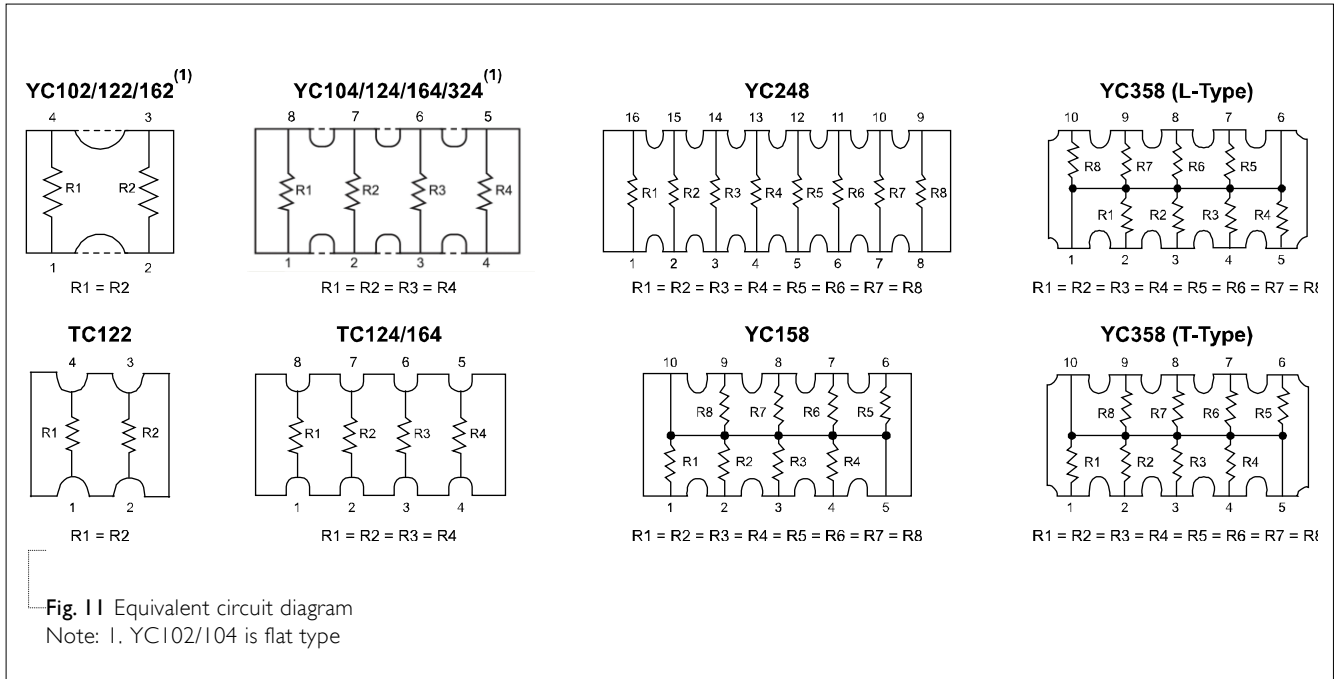
**CONSTRUCTION**

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.9.

**OUTLINES**



**SCHEMATIC**



**DIMENSIONS**

Table I

TYPE	H / H <sub>I</sub> / H <sub>W</sub>	B	P	L	T	W1	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 ± 0.05	0.40 ± 0.10	1.40 ± 0.10	0.35 ± 0.10	0.15 ± 0.10	0.60 ± 0.10
YC122	H: 0.21+0.10 / -0.05 H <sub>W</sub> : 0.35 ± 0.10	0.20 ± 0.10	0.67 ± 0.05	1.00 ± 0.10	0.30 ± 0.10	0.25 ± 0.10	1.00 ± 0.10
YC124	H: 0.40 ± 0.15 H <sub>I</sub> : 0.30 ± 0.05	0.20 ± 0.15	0.50 ± 0.05	2.00 ± 0.10	0.45 ± 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 ± 0.10	0.80 ± 0.05	1.60 ± 0.10	0.40 ± 0.10	0.30 ± 0.10	1.60 ± 0.10
YC164	H: 0.65 ± 0.05 H <sub>I</sub> : 0.50 ± 0.15	0.30 ± 0.15	0.80 ± 0.05	3.20 ± 0.15	0.60 ± 0.10	0.30 ± 0.15	1.60 ± 0.15
YC248	H: 0.45 ± 0.05 H <sub>I</sub> : 0.30 ± 0.05	0.30 ± 0.15	0.50 ± 0.05	4.00 ± 0.20	0.45 ± 0.10	0.40 ± 0.15	1.60 ± 0.15
YC324	H: 1.10 ± 0.15 H <sub>I</sub> : 0.90 ± 0.15	0.50 ± 0.20	1.27 ± 0.05	5.08 ± 0.20	0.60 ± 0.10	0.50 ± 0.15	3.20 ± 0.20
TC122	H: 0.30 ± 0.05	0.25 ± 0.15	0.50 ± 0.05	1.00 ± 0.10	0.30 ± 0.10	0.25 ± 0.15	1.00 ± 0.10
TC124	H: 0.30 ± 0.10	0.20 ± 0.10	0.50 ± 0.05	2.00 ± 0.10	0.40 ± 0.10	0.25 ± 0.10	1.00 ± 0.10
TC164	H: 0.50 ± 0.15	0.30 ± 0.15	0.80 ± 0.05	3.20 ± 0.15	0.60 ± 0.10	0.30 ± 0.15	1.60 ± 0.15
YC158T	H: 0.45 ± 0.05 H <sub>I</sub> : 0.32 ± 0.05	0.30 ± 0.15	0.64 ± 0.05	3.20 ± 0.20	0.60 ± 0.10	0.35 ± 0.15	1.60 ± 0.15
YC358L	H: 1.10 ± 0.15	0.50 ± 0.15	1.27 ± 0.05	6.40 ± 0.20	0.60 ± 0.10	0.50 ± 0.15	3.20 ± 0.20
YC358T	H <sub>I</sub> : 0.90 ± 0.15						

**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 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	±200 ppm/°C	Rated current 0.5 Max. current 1.0
YC104	1/32W	-55°C to +125°C	12.5V	25V	25V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω		Rated current 0.5 Max. current 1.0
YC122	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 1Ω ≤ R ≤ 1MΩ E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	1Ω ≤ R ≤ 10Ω ±250 ppm/°C 10Ω ≤ R ≤ 1MΩ ±200 ppm/°C	Rated current 0.5 Max. current 1.0
YC124	1/16W	-55°C to +155°C	25V	50V	100V	E24 ±5% 1Ω ≤ R ≤ 1MΩ E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω		Rated current 1.0 Max. current 2.0
YC162	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 1Ω ≤ R ≤ 1MΩ E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	±200 ppm/°C	Rated current 1.0 Max. current 2.0
YC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 1Ω ≤ R ≤ 1MΩ E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω		Rated current 1.0 Max. current 2.0
YC248	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	±200 ppm/°C	Rated current 2.0 Max. current 10.0
YC324	1/8W	-55°C to +155°C	200V	500V	500V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ		---
TC122	1/16W	-55°C to +125°C	50V	100V	100V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	±200 ppm/°C	Rated current 1.0 Max. current 1.5
TC124	1/16W	-55°C to +125°C	50V	100V	100V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω		Rated current 1.0 Max. current 1.5
TC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper < 0.05Ω	±200 ppm/°C	Rated current 1.0 Max. current 2.0
YC158T	1/16W	-55°C to +155°C	25V	50V	50V	E24 ±5% 10Ω ≤ R ≤ 100KΩ		---
YC358L YC358T	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 10Ω ≤ R ≤ 330KΩ	---	---

**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**

I. For tape and reel specification/dimensions, please refer to data sheet “Chip resistors packing”.



**FUNCTIONAL DESCRIPTION**

**OPERATING TEMPERATURE RANGE**

YC102/104, TC122/124 Range:

-55°C to +125°C (Fig.13)

YC122/124/162/164/248/324/158T/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

**RATED VOLTAGE**

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

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

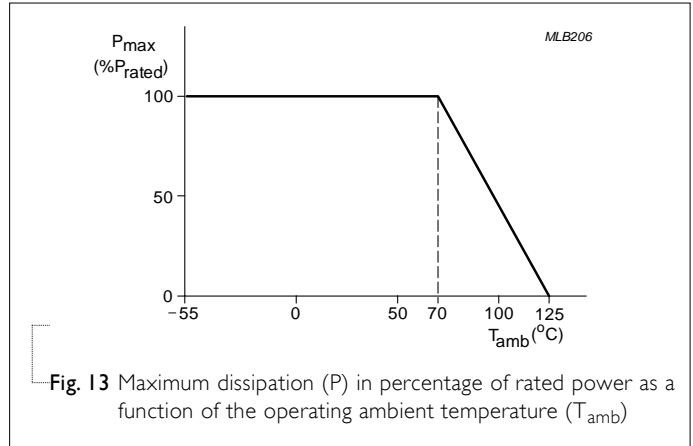
or max. working voltage whichever is less

Where

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

P=Rated power (W)

R=Resistance value ( $\Omega$ )



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

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202-method 108	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-202-method 108	1,000 hours at maximum operating	±(1%+0.05 Ω)
	IEC 60115-1 4.25.3	temperature depending on specification, unpowered	<50 mΩ for Jumper
	JIS C 5202-7.11	No direct impingement of forced air to the parts Tolerances: 125±3 °C	
Moisture Resistance	MIL-STD-202-method 106	Each temperature / humidity cycle is defined at	±(2%+0.05 Ω)
	IEC 60115-1 4.24.2	8 hours (method 106F), 3 cycles / 24 hours for 10d with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered	<100 mΩ for Jumper
		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	±(1%+0.05 Ω)
		Note: Number of cycles required is 300. Devices mounted	<50 mΩ for Jumper
		Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	
Short Time Overload	MIL-R-55342-para 4.7.5	2.5 times RCWV or maximum overload	±(2%+0.05 Ω)
	IEC60115-1 4.13	voltage 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, only 1 board bending required	±(1%+0.05 Ω)
		3 mm bending	<50 mΩ for Jumper
		Bending time: 60±5 seconds Ohmic value checked during bending	No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	J-STD-002 test	Electrical Test not required	Well tinned ( $\geq 95\%$ covered) No visible damage
		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	
- Leaching	J-STD-002 test	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202-method 210	Condition B, no pre-heat of samples Leadfree solder, 260 °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
Biased Humidity	AEC-Q200 Test 7	1,000 hours; 85 °C / 85% RH 10% of operating power Measurement at 24± 4 hours after test conclusion.	± (5.0%+0.05 Ω)
	MIL-STD-202-Method 103		

**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 24ohm
Version 6	Jun. 1, 2017	-	- Update ordering information for networks YC158T/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 1	Feb. 04, 2015	-	- Update YC102 to flat type
Version 0	Nov. 14, 2014	-	- First issue of this specification

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