Innovative Service Around the Globe YAGEO

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

Product Specification – February 21, 2019 V.9

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)

YC / TC	XXXX	X	X	X	X	XX	XXXX	L/T
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) 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

F = ±1%   J = ±5%   (for Jumper ordering, use code of J)

(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 YC102.

ORDERING EXAMPLE

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

YC158T network, value 100,000Ω with 5% tolerance, supplied in 7-inch tape reel is: YC158TJR-07100KL

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)

Resistance rule of global part number

Resistance code rule	Example
0R	0R = Jumper
XRXX (1 to 9.76 Ω)	1R = 1 Ω 1R5 = 1.5 Ω 9R76 = 9.76 Ω
XXRX (10 to 97.6 Ω)	10R = 10 Ω 97R6 = 97.6 Ω
XXXR (100 to 976 Ω)	100R = 100 Ω
XKXX (1 to 9.76 KΩ)	1K = 1,000 Ω 9K76 = 9760 Ω
XM (1 MΩ)	1M = 1,000,000 Ω

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

TYPE/ 2×0402	START IN (1)	TOL. (%)	RESISTANCE RANGE	PAPER / PE TAPE ON REEL (units) (2) 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	-

(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).

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.

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

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

YC102

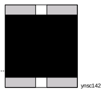

Fig. 1

No marking

YC122

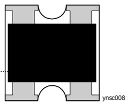

Fig. 2

No marking

YC104

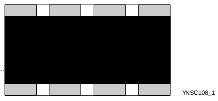

Fig. 3

No marking

YC124 / 162 / 164 / 324

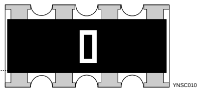

Fig. 4 Jumper=0Ω

1-Digit marking

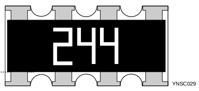

Fig. 4-1 Value=240KΩ

E-24 series: 3 digits, 5%

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

YC248

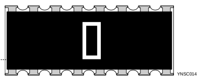

Fig. 5 Jumper=0Ω

1-Digit marking

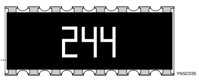

Fig. 5-1 Value=240KΩ

E-24 series: 3 digits, 5%

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

YC158T/358L/358T

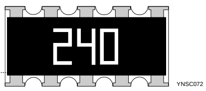

Fig. 6 Value=24Ω

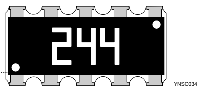

Fig. 6-1 Value=240KΩ

E-24 series: 3 digits

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

TC122

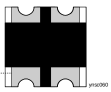

Fig. 7

No marking

TC124

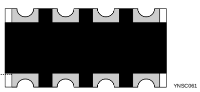

Fig. 8

No marking

TC164

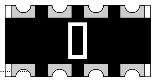

Fig. 9 Jumper=0Ω

1-Digit marking

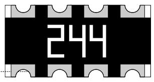

Fig. 9-1 Value=240KΩ

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 Ni-barrier) are added as shown in Fig.9.

OUTLINES

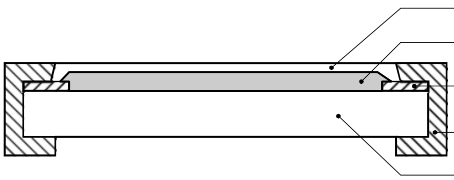

Fig. 10 Chip resistor outlines

SCHEMATIC

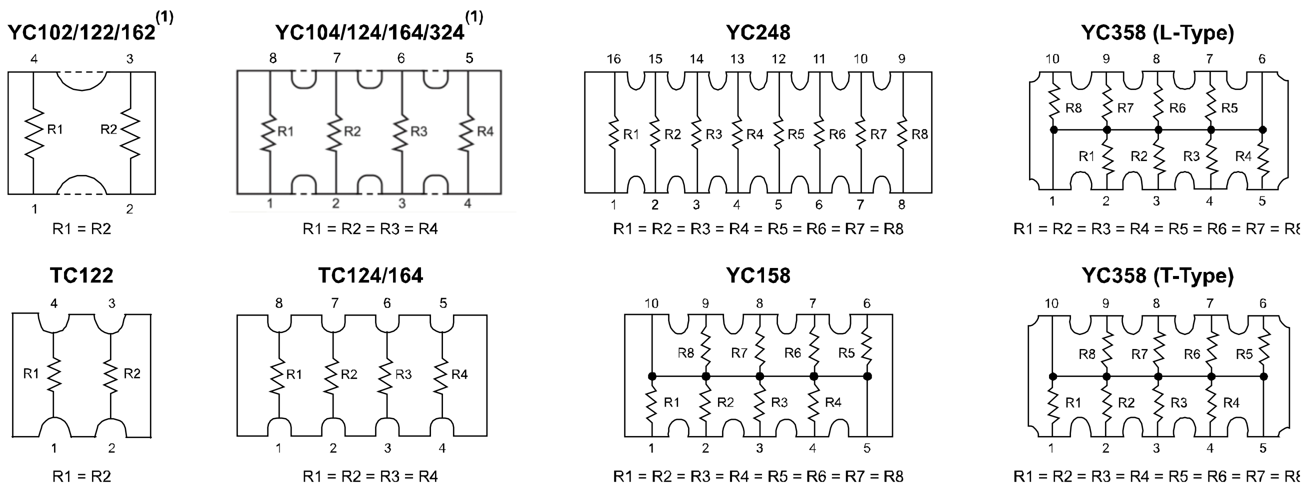

Fig. 11 Equivalent circuit diagram
Note: 1. YC102/104 is flat type

For dimension, please refer to Table 1

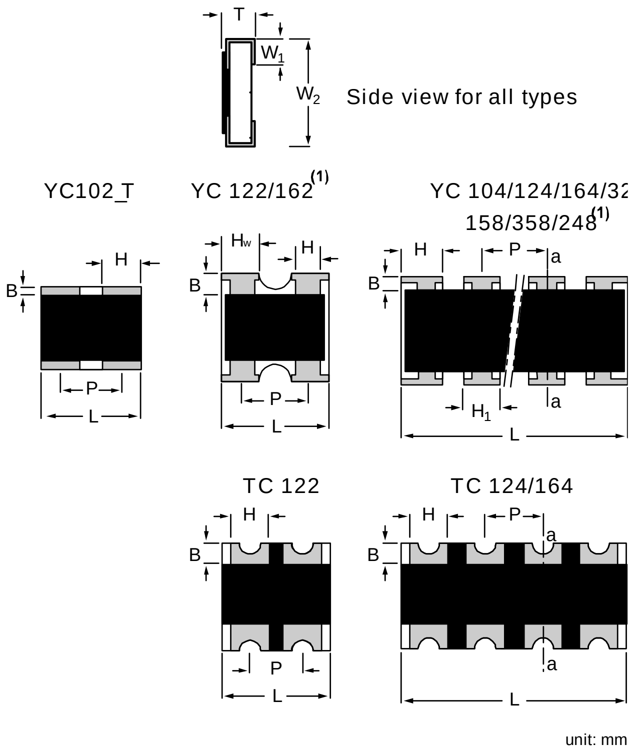

Fig. 12 YC/TC122 series chip resistors dimension
Note: (1) YC102/104 is flat type

DIMENSIONS

Table 1

TYPE	H / H_I / H_W	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_W : 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_I: 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_W : 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_I: 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_I: 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_I: 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_I: 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 **YC358T**	H : 1.10±0.15 H_I: 0.90±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

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	POWER P_{70}	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% E24/E96 ±1% Jumper	10Ω≤ R ≤ 1MΩ 10Ω≤ R ≤ 1MΩ < 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% E24/E96 ±1% Jumper	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 0.5 Max. current 1.0
YC122	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	1Ω ≤ R ≤ 1MΩ 1Ω ≤ R ≤ 1MΩ < 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% E24/E96 ±1% Jumper	1Ω ≤ R ≤ 1MΩ 1Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 1.0 Max. current 2.0
YC162	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% E/24/E96 ±1% Jumper	1Ω ≤ R ≤ 1MΩ 1Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 1.0 Max. current 2.0
YC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	1Ω ≤ R ≤ 1MΩ 1Ω ≤ R ≤ 1MΩ < 0.05Ω	±200 ppm/°C	Rated current 1.0 Max. current 2.0
YC248	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 2.0 Max. current 10.0
YC324	1/8W	-55°C to +155°C	200V	500V	500V	E24 ±5% E24/E96 ±1%	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ		--- ---
TC122	1/16W	-55°C to +125°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 1.0 Max. current 1.5
TC124	1/16W	-55°C to +125°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ < 0.05Ω		Rated current 1.0 Max. current 1.5
TC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% E24/E96 ±1% Jumper	10Ω ≤ R ≤ 1MΩ 10Ω ≤ R ≤ 1MΩ < 0.05Ω		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

1. 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℃ to +125℃ (Fig.13)

YC122/124/162/164/248/324/158T/358L/358T, TC164 Range:

-55℃ to +155℃(Fig.14)

POWER RATING

Each type rated power at 70℃

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 (Ω)

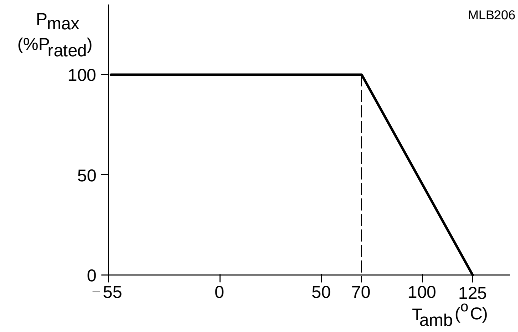

Fig. 13 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

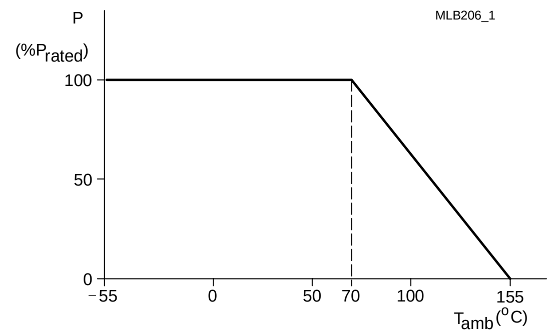

Fig. 14 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202-method 108 IEC 60115-1 4.25.1 JIS C 5202-7.10	1,000 hours at 70±5 °C applied RCWV 1.5 hours on, 0.5 hour off, still air required	±(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	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 125±3 °C	±(1%+0.05 Ω) <50 mΩ 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	±(2%+0.05 Ω) <100 mΩ for Jumper
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	±(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	±(2%+0.05 Ω) <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 3 mm bending Bending time: 60±5 seconds Ohmic value checked during bending	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	J-STD-002 test	Electrical Test not required Magnification 50X SMD conditions: 1st step: method B, aging 4 hours at 155 °C dry heat 2nd step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	Well tinned (≥95% covered) No visible damage
- 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 MIL-STD-202-Method 103	1,000 hours; 85 °C / 85% RH 10% of operating power Measurement at 24± 4 hours after test conclusion.	± (5.0%+0.05 Ω)

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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