Innovative Service Around the Globe YAGEO

DATA SHEET

ARRAY CHIP RESISTORS

ARC241/242

ARV241/242

5%; 1%

sizes 4 × 0603

Phycomp

Product Specification – Jul 25, 2003 V.2

Array chip resistors sizes 4 × 0603

ARC241/242, ARV241/242 5%; 1%

FEATURES

- 4 × 0603 sized resistors in one 1206-sized package
- Reduced reel exchange time
- Low assembly costs
- Reduced PCB area
- Reduced size of final equipment
- Higher component and equipment reliability.

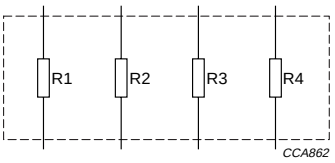
APPLICATIONS

- Camcorders
- Hand held measuring equipment
- Car telephones
- Computers
- Portable radio, CD and cassette players.

DESCRIPTION

The resistors are constructed on a high grade ceramic body (aluminium oxide). Internal metal electrodes are added at each end and connected by a resistive paste which is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance, by laser cutting of this resistive layer.

The resistive layer is covered with a protective coating and printed with the resistance value. Finally, external end terminations are added. For ease of soldering the outer layer of these end terminations is a lead-tin alloy.



R1 = R2 = R3 = R4.
For dimensions see Fig.3 and Table 3.

Fig.1 Equivalent circuit diagram.

QUICK REFERENCE DATA

DESCRIPTION	VALUE			
	ARC241	ARV241	ARC242	ARV242
Resistance range	10 Ω to 1 MΩ			
Resistance tolerance and E-series	±5%; E24 series	±5%; E24 series	±1%; E24/E96 series	
Temperature coefficient	$\leq \pm 200 \times 10^{-6}$/K	$\leq \pm 100 \times 10^{-6}$/K	$\leq \pm 200 \times 10^{-6}$/K	
Absolute maximum dissipation per resistive element at T_{amb} = 70 °C	0.063 W			
Maximum permissible voltage	50 V (DC or RMS)			
Climatic category (IEC 60068)	55/155/56			
Basic specification	IEC 60115-8			

R-Array overview

TYPE	TERMINATION TECHNOLOGY	SIZE	TOLERANCE (%)
ARC241	concave	4 × 0603	5
ARC242	concave	4 × 0603	1
ARV241	convex	4 × 0603	5
ARV242	convex	4 × 0603	1

ORDERING INFORMATION

Table 1 Ordering code indicating resistor type

TYPE	RESISTANCE VALUE	TOL. (%)	ORDERING CODE 2350 0.. …..
			PAPER TAPE ON REEL
			5 000 units
ARC241	10 Ω to 1 MΩ	5	34 10…
ARC242		1	24 1….
ARV241		5	35 10…
ARV242		1	25 1….
Jumper 0 Ω			
ARC241; note 1	–	–	34 91001
ARV241; note 1			35 91001

Note

1. The jumper has a maximum resistance R_{max} = 50 mΩ and a rated current I_R = 1 A.

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2350 0
- The subsequent three or four digits indicate the resistor termination style, tolerance and packing; see Table 1.
- The remaining digits indicate the resistance value:
  - The first 2 digits for 5% or 3 digits for 1% tolerance products indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with Table 2.

Table 2 Last digit of 12NC

RESISTANCE DECADE	LAST DIGIT
1 to 9.1 Ω	8
10 to 91 Ω	9
100 to 910 Ω	1
1 to 9.1 kΩ	2
10 to 91 kΩ	3
100 to 910 kΩ	4
1 MΩ	5
10 MΩ	6

ORDERING EXAMPLE

The ordering code of an ARV242 convex type array chip resistor, value 56 Ω, supplied on paper tape of 5000 units per reel is:
2350 025 15623.

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 or E96 series for resistors with a tolerance of ±5% or ±1%. The values of the E24/E96 series are in accordance with *"IEC publication 60063".*

Limiting values

TYPE	LIMITING VOLTAGE(1) (V)	LIMITING POWER (W)
ARC241	50	0.063
ARC242		
ARV241		
ARV242		

Note

1. This is the maximum voltage that may be continuously applied to the resistor element, see *"IEC publication 60115-8"*.

DERATING

The power that the resistor can dissipate depends on the operating ambient temperature; see Fig.2.

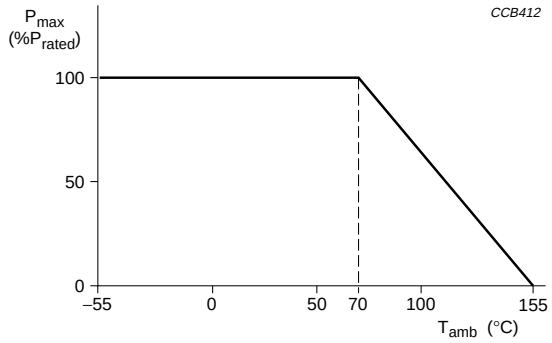


Fig.2 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb}).

MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
ARC241	1.1
ARC242	1.1
ARV241	0.9186
ARV242	0.9186

Marking

All resistors within the E24 series are marked with a 3-digit code and a 4-digit code for resistors of the E96 series, on the protective coat to designate the nominal resistance value.

3-DIGIT MARKING

For values of 10 Ω or greater the first 2 digits apply to the resistance value and the third indicates the number of zeros to follow.

Example

MARKING	RESISTANCE
120	12 Ω
124	120 kΩ
0	jumper

4-DIGIT MARKING

For values up to 97.6 Ω the R is used as a decimal point. For values of 1 K or greater the first 3 digits apply to the resistance value and the fourth indicates the number of zeros to follow.

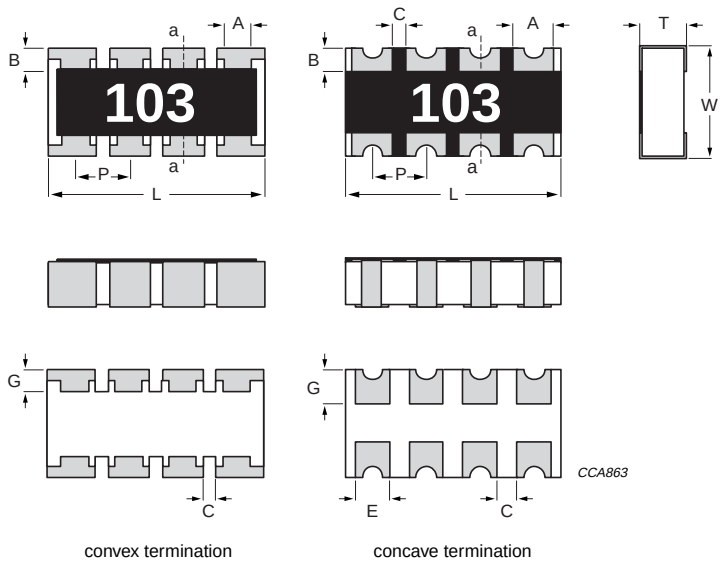
Example

MARKING	RESISTANCE
12R0	12 Ω
1203	120 kΩ

PACKAGE MARKING

The packing is also marked and includes resistance value, tolerance, catalogue number, quantity, production period, batch number and source code.

Outlines



Dimensions in mm.
For dimensions see Table 3.

Fig.3 Outlines.

Table 3 Physical dimensions; see Fig.3

SYMBOL	ARC241/242		ARV241		ARV242		UNIT
	VALUE	TOL.	VALUE	TOL.	VALUE	TOL.	
L	3.20	±0.20	3.20	±0.15	3.20	±0.15	mm
W	1.60	±0.15	1.60	±0.15	1.60	±0.15	mm
T	0.60	±0.10	0.60	±0.10	0.60	±0.10	mm
A	0.60	±0.15	0.40	±0.15	0.60	±0.05	mm
B	0.30	±0.15	0.30	±0.15	0.30	±0.15	mm
P	0.80	±0.05	0.80	±0.15	0.80	±0.15	mm
E	0.40	±0.15	–	–	–	–	mm
G	0.20	±0.15	0.30	±0.15	0.30	±0.15	mm
C	0.20	min.	0.10	min.	0.40	±0.15	mm

TEST AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of *"IEC publication 60115-8",* category **LCT/UCT/56** (rated temperature range: **L**ower **C**ategory **T**emperature, **U**pper **C**ategory **T**emperature; damp heat, long term, **56** days). The testing also covers the requirements specified by EIA and EIAJ.

The tests are carried out in accordance with IEC publication 60068*, "Recommended basic climatic and mechanical robustness testing procedure for electronic components"* and under standard atmospheric conditions according to *"IEC 60068-1"*, subclause 5.3.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 25% to 75%

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

In Table 4 the tests and requirements are listed with reference to the relevant clauses of *"IEC publications 60115-8 and 60068"*; a short description of the test procedure is also given. In some instances deviations from the IEC recommendations were necessary for our method of specifying.

All soldering tests are performed with mildly activated flux.

Table 4 Test procedures and requirements

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS			
				ARC241	ARV241	ARC242	ARV242
Tests in accordance with the schedule of IEC publication 60115-8							
4.4.1		visual examination		no holes; clean surface; no visible damage			
4.4.2		dimensions (outline; see Fig.3)	gauge (mm)	see Table 3 .			–
4.5		resistance	applied voltage (+0/–10%): 10 Ω ≤ R < 100 Ω: 0.3 V 100 Ω ≤ R < 1 kΩ: 1 V 1 kΩ ≤ R < 10 kΩ: 3 V 10 kΩ ≤ R < 100 kΩ: 10 V 100 kΩ ≥ R < 1 MΩ: 25 V R ≥ 1 MΩ: 50 V	$R - R_{nom}$: max. ±5%		$R - R_{nom}$: max. ±1%	$R - R_{nom}$: max. ±1%
4.18	20 (Tb)	resistance to soldering heat	unmounted chips: 10 ±1 s; 260 ±5 °C	no visible damage			
				ΔR/R max.: ±(1% + 0.05 Ω)			ΔR/R max.: ±(1% +0.05 Ω)
4.29	45 (Xa)	component solvent resistance	isopropyl alcohol or H_2O followed by brushing in accordance with *"MIL 202 F"*	no visible damage			
4.17	20 (Ta)	solderability	unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±2 °C	good tinning (≥95% covered); no visible damage			
4.7		voltage proof on insulation	maximum voltage (RMS) during 1 minute, metal block method	no breakdown or flashover			

Table 4 Test procedures and requirements

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS			
				ARC241	ARV241	ARC242	ARV242
4.13		short time overload	room temperature; $P = 6.25 \times P_n$; 5 s ($V \leq 2 \times V_{max}$)	$\Delta R/R$ max.: $\pm(2\% + 0.05\ \Omega)$			$\Delta R/R$ max.: $\pm(2\% + 0.05\ \Omega)$
4.33		bending	resistors mounted on a 90 mm glass epoxy resin PCB (FR4); bending: 5 mm	no visible damage			
				$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$		$\Delta R/R$ max.: $\pm(0.5\% + 0.05\ \Omega)$	$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$
4.19	14 (Na)	rapid change of temperature	30 minutes at LCT and 30 minutes at UCT; 5 cycles	no visible damage			
				$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$			$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$
4.24.2	3 (Ca)	damp heat (steady state)	56 days; 40 ±2 °C; 93 +2/–3% RH; loaded with 0.01 P_n	$\Delta R/R$ max.: $\pm(2\% + 0.05\ \Omega)$		$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$	$\Delta R/R$ max.: $\pm(2\% + 0.05\ \Omega)$
4.25.1		endurance	1000 +48/–0 hours; 70 ±2 °C; loaded with P_n or V_{max}; 1.5 hours on and 0.5 hours off	$\Delta R/R$ max.: $\pm(2\% + 0.1\ \Omega)$		$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$	$\Delta R/R$ max.: $\pm(2\% + 0.1\ \Omega)$
4.23.2	27 (Ba)	endurance at upper category temperature	1000 +48/–0 hours; no load	$\Delta R/R$ max.: $\pm(2\% + 0.1\ \Omega)$		$\Delta R/R$ max.: $\pm(1\% + 0.05\ \Omega)$	$\Delta R/R$ max.: $\pm(2\% + 0.1\ \Omega)$
4.8.4.2		temperature coefficient	at 20/LCT/20 °C and 20/UCT/20 °C:	$\leq \pm 200 \times 10^{-6}/K$		$\leq \pm 100 \times 10^{-6}/K$	$\leq \pm 200 \times 10^{-6}/K$
Other tests in accordance with IEC 60115 clauses and IEC 60068 test method							
4.17	20 (Ta)	solderability (after ageing)	8 hours steam or 16 hours at 155 °C; unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±2 °C	good tinning (≥95% covered); no damage			
4.6.1.1		insulation resistance	Voltage (DC) after 1 minute, metal block method: 10 V	R_{ins} min.: 10^3 MΩ			
4.12		noise	IEC publication 60195 (measured with Quantech-equipment)				
			$R \leq 100\ \Omega$	max. 0.316 μV/V (–10 dB)			
			$100\ \Omega < R \leq 1\ k\Omega$	max. 1 μV/V (0 dB)			
			$1\ k\Omega < R \leq 10\ k\Omega$	max. 3 μV/V (9.54 dB)			
			$10\ k\Omega < R \leq 100\ k\Omega$	max. 6 μV/V (15.56 dB)			
			$100\ k\Omega < R \leq 1\ M\Omega$	max. 10 μV/V (20 dB)			

Table 4 Test procedures and requirements

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS			
				ARC241	ARV241	ARC242	ARV242
Other applicable tests							
(JIS) C 5202 7.9		endurance (under damp and load)	1000 +48/–0 hours; 40 ±2 °C; 93 +2/–3% RH; loaded with P_n or V_{max}; 1.5 hours on and 0.5 hours off	ΔR/R max.: ±(3% + 0.1 Ω)			ΔR/R max.: ±(2% + 0.1 Ω)
EIA 575 3.13		leaching	unmounted chips; 60 ±1 s; 260 ±5 °C	good tinning; no leaching			
EIA/IS 703 4.5		load humidity	1000 +48/–0 hours; 85 ±2 °C; 85 ±5% RH; loaded with 0.01 P_n or V_{max}	ΔR/R max.: ±(2% + 0.1 Ω)			

REVISION HISTORY

Revision	Date	Change Notification	Description
Rev.2	2003 Jul 25	-	- Updated company logo - Marking code and test condition revised