

DATA SHEET

Anti-Sulfurated Thick Film Array Chip Resistors
(Flat Type, Reversed)

AF102M / AF104M

1%, 5%

RoHS Compliant & Halogen Free



YAGEO

Product specification – December 30, 2020 V.0



SCOPE

This specification describes AF102M and AF104M series flat type reversed chip resistor arrays with lead-free terminations made by thick film process.

APPLICATIONS

- DDR SDRAM
- Computer applications: laptop computer, desktop computer
- Consumer electronic equipment: PDAs, PNDs
- Mobile phone, telecom...

FEATURES

- RoHS compliant
- Halogen Free Epoxy
- Non-forbidden materials used in products/production
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- Moisture sensitivity level: MSL 1

ORDERING INFORMATION - GLOBAL PART NUMBER

Part number is identified by the series name, size, tolerance, packaging type, temperature coefficient of resistance, taping reel, resistance value.

AF 10 X X X X X XX XXX L
 (1) (2) (3) (4) (5) (6) (7) (8) (9)

(1) SIZE CODE

10 = 0201

(2) NUMBER OF RESISTORS

2 = 2 resistors

4 = 4 resistors

(3) TERMINATION TYPE

M = Reversed type

(4) TOLERANCE

F = $\pm 1\%$

J = $\pm 5\%$

(5) PACKAGING STYLE

R = Paper taping reel

(6) TEMPERATURE COEFFICIENT OF RESISTANCE

– = Based on spec

(7) TAPING REEL

07 = 7 inch dia. Reel

(8) RESISTANCE VALUE

10 Ω to 1M Ω

(9) DEFAULT CODE

Letter L is system default code for order only

ORDERING EXAMPLE

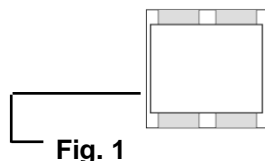
The ordering code of a AF102M convex flat type reversed chip resistor array, value 36 Ω with $\pm 5\%$ tolerance, supplied in 7-inch tape reel is: AF102MJR-0736RL

NOTE

1. All our R-Chip products meet RoHS compliant and Halogen Free. "LFP" of the internal 2D reel label mentions "Lead Free Process".
2. On customized label, "LFP" or specific symbol can be printed.

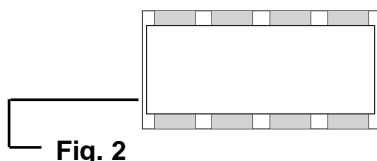
MARKING

AF102M



No marking

AF104M



No 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 glass layer 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. See fig.3

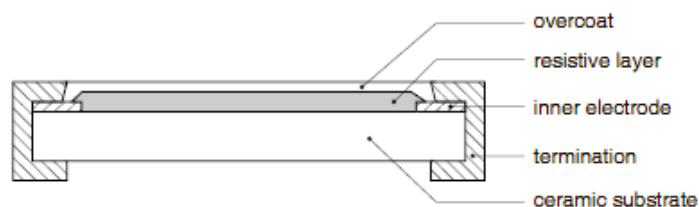


Fig. 3 Chip Resistor Outlines

DIMENSIONS

Table 1

TYPE	AF102M	AF104M
L (mm)	0.80±0.05	1.40±0.05
H (mm)	0.20±0.10	0.20±0.10
P (mm)	0.50±0.05	0.40±0.05
B (mm)	0.20±0.10	0.20±0.10
W ₁ (mm)	0.60±0.05	0.60±0.05
W ₂ (mm)	0.20±0.10	0.20±0.10
T (mm)	0.23±0.10	0.23±0.10

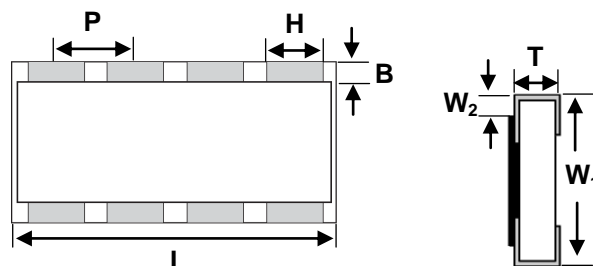


Fig. 4 Chip Resistors Dimension

SCHEMATIC

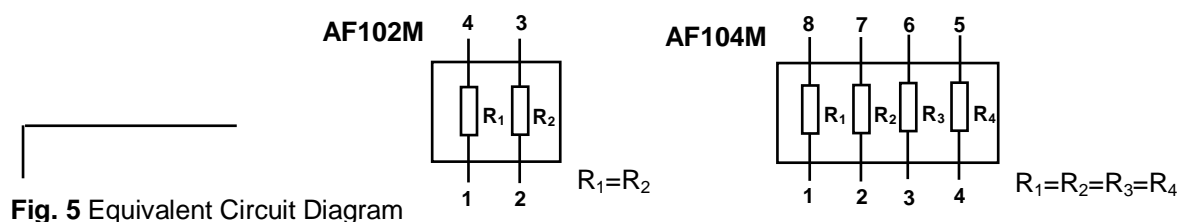


Fig. 5 Equivalent Circuit Diagram

ELECTRICAL CHARACTERISTICS

Table 2

CHARACTERISTICS	AF102M 1/32 W	AF104M 1/32 W
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C
Maximum Working Voltage	15V	12.5V
Maximum Overload Voltage	30V	25V
Dielectric Withstanding Voltage	30V	25V
Number of Resistors	2	4
Resistance Range	1%, 5%(E24) 10Ω to 1MΩ	1%, 5%(E24) 10Ω to 1MΩ
Temperature Coefficient	±200 ppm/°C	±200 ppm/°C

PACKING STYLE AND PACKAGING QUANTITY

Table 3

PRODUCT TYPE	PACKING STYLE	REEL DIMENSION	QUANTITY PER REEL
AF102M / AF104M	Paper Taping Reel (R)	7" (178 mm)	10,000 Units

NOTE: For paper tape and reel specification/dimensions, please see the special datasheet "Packing" document.

FUNCTIONAL DESCRIPTION

RATED POWER AT 70°C

AF102M is 1/32W

AF104M is 1/32W

RATED VOLTAGE

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

$$U = \sqrt{P * R}$$

Where

U=Continuous rated DC

or AC (rms) working voltage (v)

P=Rated power

R=Resistance value (Ω)

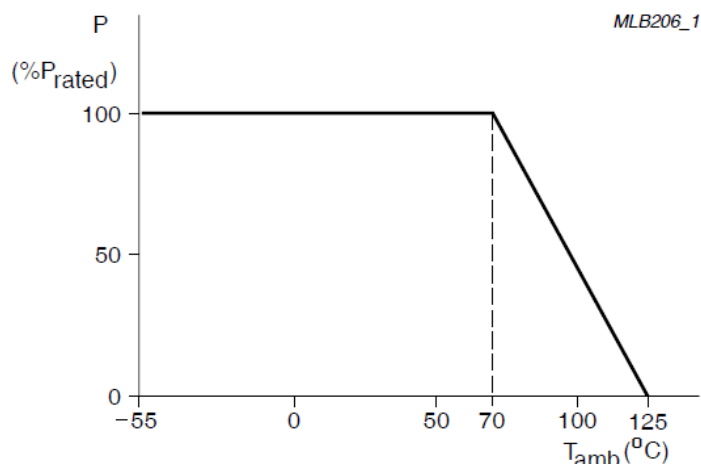
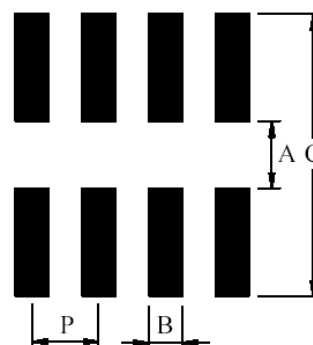


Fig. 6 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

RECOMMENDED FOOTPRINT DIMENSIONS

Table 4

Size Footprint	Dimensions Code		unit :mm	
	A	B	C	P
AF102M	0.3±0.1	0.3±0.05	0.9±0.2	0.5±0.05
AF104M	0.3±0.1	0.2±0.05	0.9±0.2	0.4±0.05



TESTS AND REQUIREMENTS

TEST	TEST METHOD	PROCEDURE	REQUIREMENT
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A 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%+0.05Ω) <100mΩ for Jumper
High Temperature Exposure/ Endurance at upper category temperature	MIL-STD-202G-method 108A 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	±(1%+0.05Ω) <50mΩ for Jumper
Moisture Resistance	MIL-STD-202G-method 106F 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%+0.05Ω) <100mΩ for Jumper
Thermal Shock	MIL-STD-202G-method 107G	-55/+125 °C Note: Number of cycles required is 300. Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	±(1%+0.05Ω) <50mΩ for Jumper
Short time overload	MIL-R-55342D-para 4.7.5 IEC60115-1 4.13	2.5 times of rated voltage or maximum overload voltage, the less of the above, for 5 sec at room temperature	±(2%+0.05Ω) <50mΩ 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%+0.05Ω) <50mΩ for Jumper No visible damage
Solderability - Wetting	IPC/JEDECJ-STD-002 B test B IEC 60068-2-58	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	IPC/JEDECJ-STD-002 B test D IEC 60068-2-58	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202G-method 210F IEC 60068-2-58	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%+0.05Ω) <50mΩ for Jumper No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENT
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)
FOS	ASTM-B-809-95* * Modified	Sulfur 750 hours, 105°C, unpowered	±(4%+0.05Ω)

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION
Version 0	2020/12/29	- First issue of this specification

" Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products are unchanged. Any product change will be announced by PCN."