

DATA SHEET

CHIP RESISTORS RF ATTENUATORS

ATV321 (Pb Free)
SIZE 0404



Product specification – Oct 12, 2004 V.0



SCOPE

This specification describes ATV321 series chip attenuators with lead-free terminations made by thick film process.

ORDERING INFORMATION

Part number is identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

YAGEO ORDERING CODE

CTC CODE

ATV321 X X X XX XXXX L
 (1) (2) (3) (4) (5) (6)

(1) TOLERANCE

- B = ±0.2 dB
- C = ±0.3 dB
- D = ±0.5 dB
- F = ±1 dB
- G = ±2 dB

(2) PACKAGING TYPE

R = Paper/PE taping reel

(3) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Not applicable

(4) TAPING REEL

- 07 = 7 inch dia. Reel
- 7H = Half quality packing on 7" reel
(non preferend)

(5) ATTENUATION VALUE

1 dB to 20 dB shown in the table of "Attenuation value, tolerance v.s. 12 NC code".

(6) RESISTOR TERMINATIONS

L = Lead free terminations (pure Tin)

Attenuation value, tolerance v.s. 12 NC code

| Attenuation value (dB) | Standard | | Optional | |
|------------------------|----------|------------------|----------|------------------|
| | Tol.(dB) | 12 NC | Tol.(dB) | 12 NC |
| 1 | ±0.3 | 2350 703 11012 L | ±0.2 | 2350 703 11011 L |
| 2 | ±0.3 | 2350 703 11022 L | ±0.2 | 2350 703 11021 L |
| 3 | ±0.3 | 2350 703 11032 L | ±0.2 | 2350 703 11031 L |
| 4 | ±0.3 | 2350 703 11042 L | ±0.2 | 2350 703 11041 L |
| 5 | ±0.3 | 2350 703 11052 L | ±0.2 | 2350 703 11051 L |
| 6 | ±0.5 | 2350 703 11063 L | ±0.3 | 2350 703 11062 L |
| 7 | ±0.5 | 2350 703 11073 L | ±0.3 | 2350 703 11072 L |
| 8 | ±0.5 | 2350 703 11083 L | ±0.3 | 2350 703 11082 L |
| 9 | ±0.5 | 2350 703 11093 L | ±0.3 | 2350 703 11092 L |
| 10 | ±0.5 | 2350 703 11103 L | ±0.3 | 2350 703 11102 L |
| 15 | ±1.0 | 2350 703 11154 L | ±0.5 | 2350 703 11153 L |
| 20 | ±2.0 | 2350 703 11205 L | ±1.0 | 2350 703 11204 L |

ORDERING EXAMPLE

The ordering code of an ATV321 attenuator with 2±0.3 dB attenuation, supplied in 7-inch tape reel is: **ATV321CR-072dB L**.

NOTE

1. The "L" at the end of the code is only for ordering. On the reel label, the standard CTC will be mentioned an additional stamp "LFP"= lead free production.
2. Products with lead in terminations fulfil the same requirements as mentioned in this datasheet.
3. Products with lead in terminations will be phased out in the coming months (before July 1st, 2006)

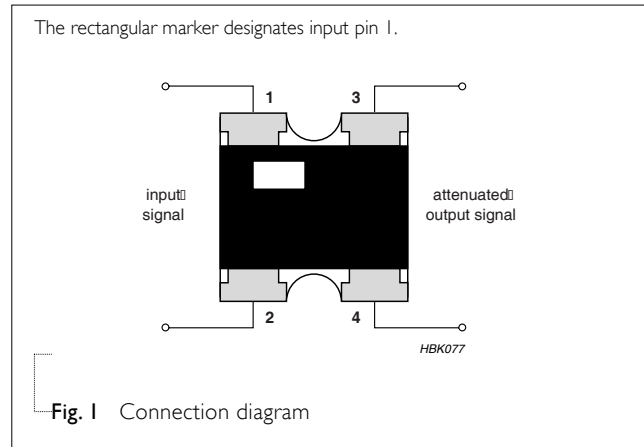
MARKING

No marking.

CONSTRUCTION

The attenuators are constructed on a high-grade ceramic body (aluminium oxide). The internal circuit is applied to the top surface of the substrate, and its design determines the required attenuation value. The attenuation layer is covered with a protective coating and a marking dot indicates input pin 1 as shown in the connection diagram of Fig. 1.

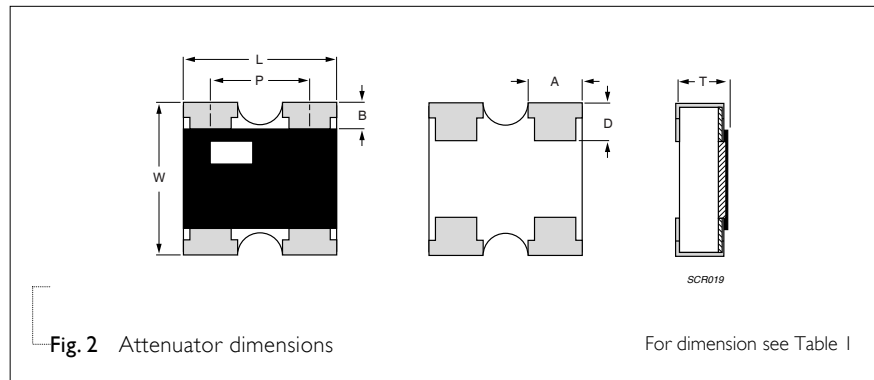
Finally, the four external end terminations are added. To guarantee optimum solderability the outer layer of the terminations are lead free (pure Tin).



DIMENSIONS

Table I

| TYPE | ATV321 |
|--------|------------|
| L (mm) | 1.0 ±0.10 |
| W (mm) | 1.0 ±0.10 |
| T (mm) | 0.35 ±0.05 |
| A (mm) | 0.33 ±0.10 |
| B (mm) | 0.15 ±0.10 |
| P (mm) | 0.65 ±0.10 |
| D (mm) | 0.25 ±0.10 |



ELECTRICAL CHARACTERISTICS

Table 2

| CHARACTERISTICS | ATV321 / 40 mW | |
|-----------------------------|------------------|-----------------------------|
| Attenuation Range | 1 dB to 20 dB | |
| Attenuation tolerance | 1 dB to 5 dB | ±0.3 dB (optional: ±0.2 dB) |
| | 6 dB and 10 dB | ±0.5 dB (optional: ±0.3 dB) |
| | 15 dB | ±1.0 dB (optional: ±0.5 dB) |
| | 20 dB | ±2.0 dB (optional: ±1.0 dB) |
| Characteristic impedance | 50 Ω | |
| Frequency Range | 1 dB to 10 dB | DC to 2.5 GHz |
| | 15 dB and 20 dB | DC to 2.0 GHz |
| VSWR | 1.3 max. | |
| Maximum permissible voltage | 50 V (DC or RMS) | |
| Power rating | 40 mW | |

FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please see the special data sheet “Chip resistors mounting”.

ENVIRONMENTAL DATA

For material declaration information (IMDS-data) of the products, please see the separated info “Environmental data”.

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

| PRODUCT TYPE | PACKING STYLE | REEL DIMENSION | QUANTITY PER REEL |
|--------------|----------------------------|---------------------------|-----------------------------|
| ATV321 | Paper / PE Taping Reel (R) | 7" (178 mm) | 10,000 units |
| | | 7" (half quality packing) | 5,000 units / not preferred |

NOTE

1. For Paper/PE tape and reel specification/dimensions, please see the special data sheet “Packing” document.

FUNCTIONAL DESCRIPTION

POWER RATING

ATV321 rated power at 70°C is 40 mW

RATED VOLTAGES

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

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

Where

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

P=Rated power (W)

R=Resistance value (Ω)

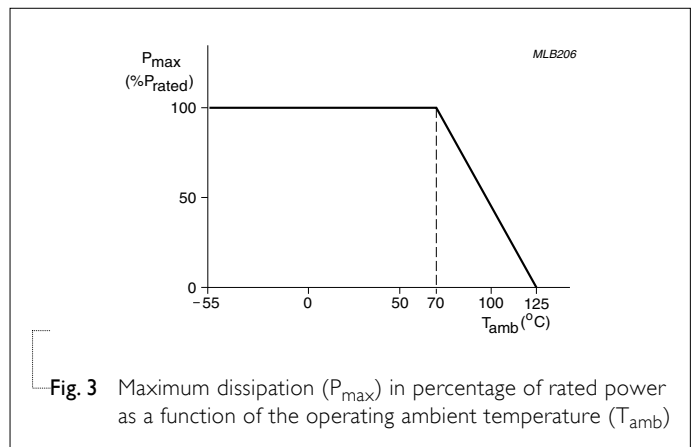


Fig. 3 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

| TEST | TEST METHOD | PROCEDURE | REQUIREMENTS |
|------------------------------|---|---|---|
| Thermal Shock | MIL-STD-202F-method 107G; IEC 60115-1 4.19 | At -65 (+0/-10) °C for 2 minutes and at +125 (+10/-0) °C for 2 minutes; 25 cycles | Max.: ±0.3 dB No visible damage |
| Short Time Overload | MIL-R-55342D-Para 4.7.5; IEC 60115-1 4.13 | 2.5 × RCWV applied for 5 seconds at room temperature | Max.: ±0.3 dB No visible damage |
| Insulation Resistance | MIL-STD-202F-method 302; IEC 60115-1 4.6.1.1 | RCOV for 1 minute <u>Type</u> ATV321 <u>Voltage (DC)</u> 50 V | ≥10 GΩ |
| Resistance to Soldering Heat | MIL-STD-202F-method 210C; IEC 60115-1 4.18 | Unmounted chips; 260 ±5 °C for 10 ±1 seconds | Max.: ±0.1 dB No visible damage |
| Life | MIL-STD-202F-method 108A; IEC 60115-1 4.25.1 | At 70±2 °C for 1,000 hours; RCWV applied for 1.5 hours on and 0.5 hour off | Max.: ±0.3 dB |
| Solderability | MIL-STD-202F-method 208A; IEC 60115-1 4.17 | Solder bath at 245±3 °C Dipping time: 2±0.5 seconds | Well tinned (≥95% covered) No visible damage |
| Bending Strength | JIS C 5202.6.14; IEC 60115-1 4.15 | Resistors mounted on a 90 mm glass epoxy resin PCB (FR4) Bending: 5 mm | Max.: ±0.3 dB No visible damage |
| Humidity (steady state) | JIS C 5202 7.5; IEC 60115-8 4.24.8 | 1,000 hours; 40±2 °C; 93(+2/-3)% RH RCWV applied for 1.5 hours on and 0.5 hour off | Max.: ±0.3 dB |
| Leaching | EIA/IS 4.13B; IEC 60115-8 4.18 | Solder bath at 260±5 °C Dipping time: 30±1 seconds | No visible damage |
| Moisture Resistance Heat | MIL-STD-202F-method 106F; IEC 60115-1 4.24.2 | 42 cycles; total 1,000 hours Shown as Fig. 4 | Max.: ±0.3 dB No visible damage |

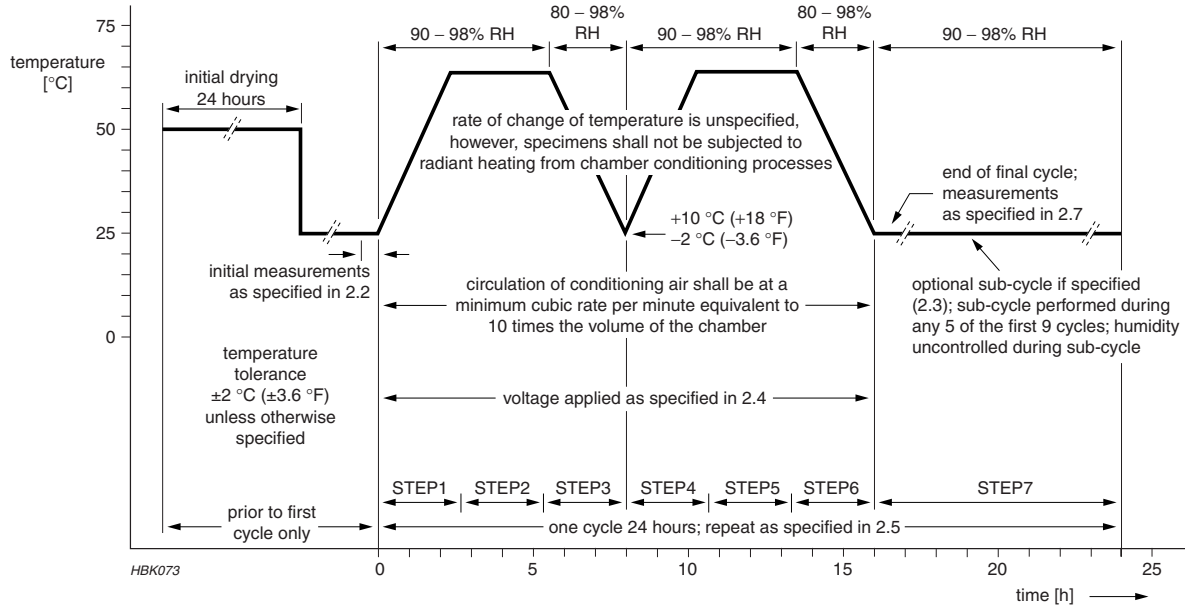


Fig. 4 Moisture resistance test requirements

REVISION HISTORYREVISION DATE CHANGE NOTIFICATION DESCRIPTION

| | | | |
|-----------|--------------|---|---|
| Version 0 | Oct 12, 2004 | - | - First issue of this specification for ATV321 series with lead-free terminations |
|-----------|--------------|---|---|
