

# APPROVAL SHEET

**WA04P**

**$\pi$  type chip attenuator**

50 $\Omega$ , 0dB, 0.5dB to 20dB

Size 1.0 x 1.0 mm

## FEATURE

1. Unbalanced  $\pi$  type attenuator circuit in one chip (1.0mm x 1.0mm)
2. Mounting occupation area reduction
3. Mounting assembly cost saving

## APPLICATION

- Attenuation, level control, impedance matching of high frequency signals of communication equipment;
- Mobile phone (GSM, CDMA, PDC, etc,...)
- Telecom

## DESCRIPTION

The attenuator is constructed in a high grade ceramic body (aluminum oxide). 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 rectangular marker indicates input pin1 as shown in circuit configuration.

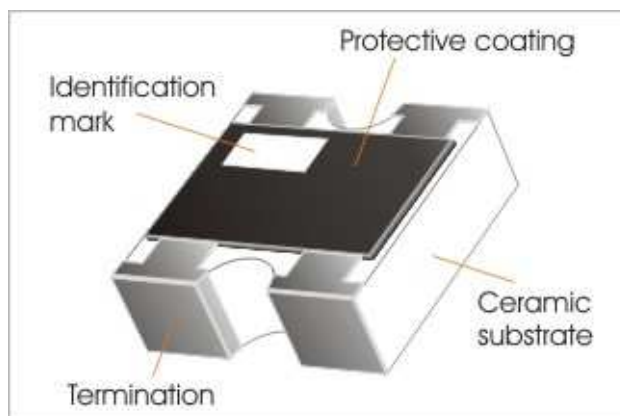
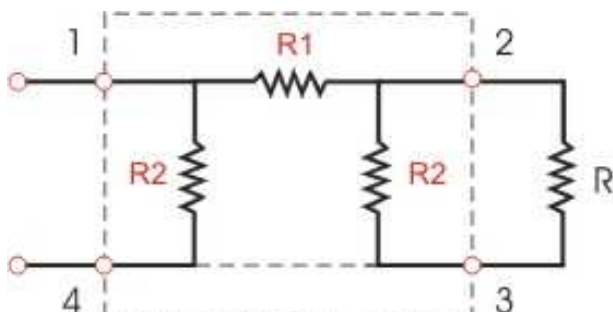


Fig 1. Outline of WA04P Chip attenuator

## CIRCUIT CONFIGURATION

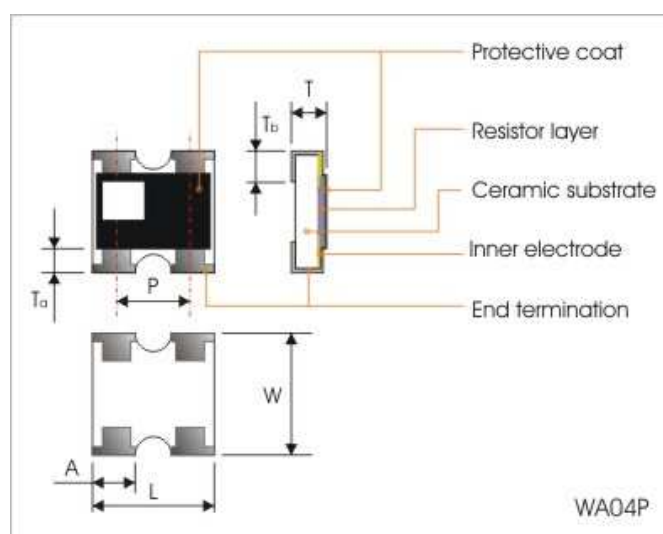


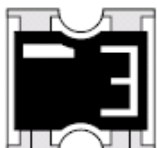
**QUICK REFERENCE DATA**

| Item                                  | General Specification |
|---------------------------------------|-----------------------|
| Series No.                            | WA04P(Convex type)    |
| Size                                  | 1.0 x 1.0 mm          |
| Attenuation Range                     | 0dB, 0.5 dB ~ 20dB    |
| Attenuation Tolerance                 |                       |
| 0dB                                   | -                     |
| 0.5 dB                                | ±0.1dB                |
| 1dB ~ 5dB                             | ±0.3dB                |
| 6dB ~ 10dB                            | ±0.4dB                |
| 11dB ~ 13dB                           | ±0.8dB                |
| 14dB                                  | ±1.0dB                |
| 15 ~ 16dB                             | ±1.5dB                |
| 17 ~ 19dB                             | ±2.0dB                |
| 20dB                                  | ±2.5dB                |
| Characteristic impedance              | 50Ω                   |
| Rated power at T <sub>amb</sub> =70°C | 0.1 W / package       |
| Limiting voltage (DC)                 | 50V                   |
| Frequency range (DC)                  | Max. 3GHz             |
| VSWR (Voltage Standing Wave Ratio)    | Max. 1.2              |
| Number of Resistors                   | 3 resistors           |
| Number of Terminals                   | 4 terminals           |
| category temperature range            | -40 ~ +125            |

**DIMENSIONS(mm)**

|           | <b>WA04P</b>    |
|-----------|-----------------|
| <b>L</b>  | 1.00 ± 0.10     |
| <b>W</b>  | 1.00 +0.10 / -0 |
| <b>T</b>  | 0.35 ± 0.10     |
| <b>P</b>  | 0.65 ± 0.10     |
| <b>A</b>  | 0.33 ± 0.10     |
| <b>Ta</b> | 0.15 ± 0.10     |
| <b>Tb</b> | 0.25 ± 0.10     |

**MARKING**



| code | 0 | X      | 1 | Y      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A      | B      | C      | D      | E      | F      | G      | H      | J      | K      | L      |
|------|---|--------|---|--------|---|---|---|---|---|---|---|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| dB   | 0 | 0<br>5 | 1 | 1<br>5 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1<br>0 | 1<br>1 | 1<br>2 | 1<br>3 | 1<br>4 | 1<br>5 | 1<br>6 | 1<br>7 | 1<br>8 | 1<br>9 | 2<br>0 |

## FUNCTIONAL DESCRIPTION

### Product characterization

Standard attenuation values include 0, 0.5dB to 20dB with a tolerance as defined in quick reference data.

## CATALOGUE NUMBERS AND PACKAGING

The attenuators have a catalogue number starting with .

| WA04                       | P                                    | 001                                                                                           | X               | B                                                                                                                                                                     | T                 | L                          |
|----------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------|
| Size code                  | Type code                            | Attenuation code                                                                              | Impedance       | Tolerance                                                                                                                                                             | Packaging code    | Termination code           |
| WA04 :<br>0402 per element | P : convex, $\pi$ type<br>attenuator | 000 = 0dB<br>001 = 1dB<br>005 = 5dB<br>010 = 10dB<br>020 = 20dB<br>R05 = 0.5dB<br>R15 = 1.5dB | X : 50 $\Omega$ | A : $\pm 0.1$ dB<br>B : $\pm 0.3$ dB<br>C : $\pm 0.4$ dB<br>D : $\pm 0.8$ dB<br>E : $\pm 1.0$ dB<br>F : $\pm 1.5$ dB<br>G : $\pm 2.0$ dB<br>H : $\pm 2.5$ dB<br>P : - | T : 7" reel taped | L = Sn base<br>(lead free) |

Packaging : 8mm width paper taping 10,000pcs per reel.

## SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

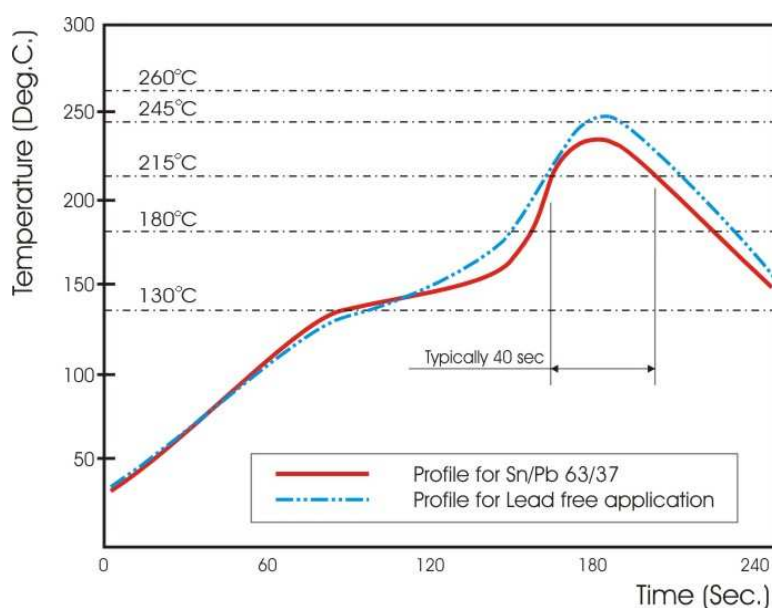
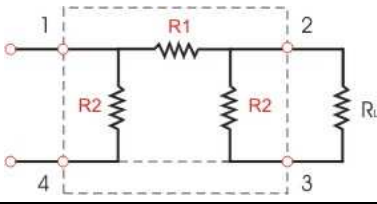
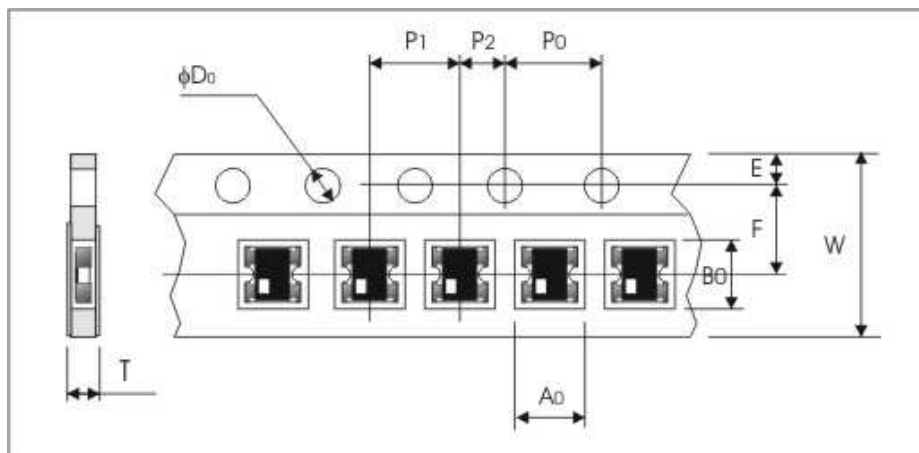


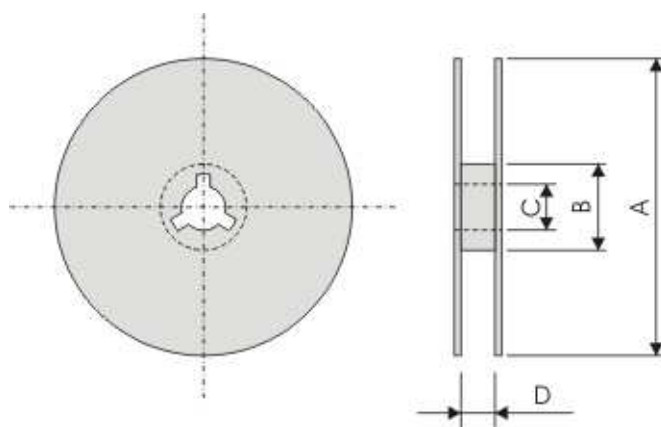
Fig 3. Infrared soldering profile

**TEST AND REQUIREMENTS (JIS C 5201-1 : 1998)**

| TEST                                                      | PROCEDURE                                                                                                                              | REQUIREMENT                                                                                                                            |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Characteristic Impedance                                  | Measuring circuit<br>                                 | 50Ω                                                                                                                                    |
| Insulation resistance<br><b>Clause 4.6</b>                | Apply the 50VDC for 1minute                                                                                                            | At least 100MΩ                                                                                                                         |
| Solderability<br><b>Clause 4.17</b>                       | Un-mounted chips completely immersed for 2±0.5 second in a SAC solder bath at 235°C±5°C                                                | good tinning (>95% covered)<br>no visible damage                                                                                       |
| Resistance to soldering heat(R.S.H)<br><b>Clause 4.18</b> | Un-mounted chips completely immersed for 10±1 second in a SAC solder bath at 260°C±5°C                                                 | no visible damage<br>Attenuation 0.5~ 2dB : within ±0.1dB<br>Attenuation 3~ 5dB : within ±0.2dB<br>Attenuation 6~ 20dB : within ±0.3dB |
| Temperature cycling<br><b>Clause 4.19</b>                 | 30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +125°C±3°C, 2~3 minutes at 20°C+5°C-1°C, total 5 continuous cycles | no visible damage<br>Attenuation 0.5~ 2dB : within ±0.1dB<br>Attenuation 3~ 5dB : within ±0.2dB<br>Attenuation 6~ 20dB : within ±0.3dB |
| Load life (endurance)<br><b>Clause 4.25</b>               | 1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 85±2°C, 1.5 hours on and 0.5 hours off                               | no visible damage<br>Attenuation 0.5~ 2dB : within ±0.1dB<br>Attenuation 3~ 5dB : within ±0.2dB<br>Attenuation 6~ 20dB : within ±0.3dB |
| Dielectric Withstand Voltage<br><b>Clause 4.7</b>         | Apply the maximum overload voltage (AC) for 1 minute                                                                                   | No breakdown or flashover                                                                                                              |

**PACKAGING****Paper Tape specifications** (unit :mm)

|      | A0        | B0        | W         | F                                   | E         |
|------|-----------|-----------|-----------|-------------------------------------|-----------|
| (mm) | 1.20±0.05 | 1.20±0.05 | 8.00±0.20 | 3.50±0.05                           | 1.75±0.10 |
|      | P1        | P2        | P0        | ØD0                                 | T         |
| (mm) | 2.00±0.10 | 2.00±0.05 | 4.00±0.10 | 1.50 <sup>+0.10</sup> <sub>-0</sub> | 0.45±0.10 |

**Reel dimensions**

| Symbol      | A          | B         | C        | D       |
|-------------|------------|-----------|----------|---------|
| (unit : mm) | Φ178.0±2.0 | Φ60.0±1.0 | 13.0±0.2 | 9.0±0.5 |