

Isolation amplifier (MSA203/MSA203A)

1. Features (for outside view, see Fig. 1)

- Power voltage: 15V
- Isolation between input, output and case
- Insulation resistance: $\geq 100\text{M}\Omega$ (500V DC)
- Range of operating temperature: -45 ~85
- Bandwidth: 10kHz
- Electric discharge multiple: 1~100 times
- Zero drift: <15mV



Size: 28×41×10mm³
Weight: 34g

Fig. 1 Outside view of MSA203, MSA203A

2. Scope of application

Isolation amplifier MSA203/MSA203A can realize effective isolation between signal ground wire and supply power ground wire, it is commonly used in the application where there is dynamic or static high common-mode voltage in the sensor interface or in input circuit of amplification circuit, it can also be used in the service environment with strong interference.

3. Description

MSA203/MSA203A isolation amplifier can substitute AD203 isolation amplifier. The isolation amplifier consists of input circuit, processing circuit, transformer isolation and oscillation circuit, output processing circuit and filter circuit; the input signal and output signal are completely galvanically isolated from each other.

This product is manufactured by the thick-film multilayer process and is metal gastight packaged. Both the design and manufacture of the product satisfy the requirements of detailed product specification.

4. Electrical performance (Table 1 and 2)

| Table 1 Rated conditions and recommended operating conditions | |
|---|---|
| Absolute rated value | max. Power voltage: +18V Storage temperature: -55~125 |
| Recommended operating conditions | Power voltage: +15 ± 0.5V Input signal: DC level 0~±10V AC peak-peak value: 0~20V Range of operating temperature (T _A): -45 ~+85 |

5. Circuit block diagram (Fig. 2)

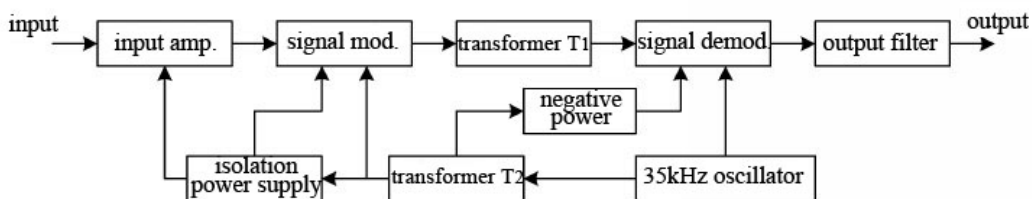


Fig. 2 Circuit block diagram

Table 2 Electric characteristics

| Parameter | Symbol | Conditions (unless otherwise specified) $V_+ = 15 \pm 0.5V, -45^\circ C \leq T_A \leq 85^\circ C$ | MSA203 | | MSA203A | |
|--|--|---|--|-----------------|---------|-----------------|
| | | | Enterprise military standard(Q/HW30787-2005) | | | |
| | | | min. | min. | min. | min. |
| output voltage (@amplification =1)/V | V_{out1} | input signal:(DC/AC) | | | | |
| | | $V_{in} = 1V \pm 10mV$ | 0.90 | 1.10 | 0.90 | 1.10 |
| | | $V_{in} = -1V \pm 10mV$ | -1.10 | -0.90 | -1.10 | -0.90 |
| | | DC level: $V_{in} = 5V \pm 15mV$ | 4.85 | 5.15 | 4.90 | 5.10 |
| | | $V_{in} = -5V \pm 15mV$ | -5.15 | -4.85 | -5.10 | -4.90 |
| | | $V_{in} = 10V \pm 20mV$ | 9.80 | 10.20 | 9.80 | 10.20 |
| | | $V_{in} = -10V \pm 20mV$ | -10.20 | -9.80 | -10.20 | -9.80 |
| | | AC range (peak-peak) $V_{in} = 2 \sim 20V$ | $V_{in} = 2V \pm 20mV$ | 1.8 | 2.2 | 1.8 |
| | $V_{in} = 20V \pm 20mV$ | 19.5 | 20.5 | 19.6 | 20.4 | |
| output voltage (@amplification =100)/V | V_{out2} | input signal:(DC/AC) | | | | |
| | | DC level $V_{in} = 0.1V \pm 2mV$ | 9.80 | 10.20 | 9.80 | 10.20 |
| | | $V_{in} = -0.1V \pm 2mV$ | -10.20 | -9.80 | -10.20 | -9.80 |
| | AC(peak-peak) $V_{in} = 0.2V \pm 2mV$ | 19.5 | 20.5 | 19.6 | 20.4 | |
| output voltage (output voltage peak-peak at -3dB)/V | WB | input signal: AC(peak-peak) $V_{in} = 20V, f = 10kHz$ | 13.0 | 15.0 | 13.0 | 15.0 |
| Nonlinearity/% | G | $T_A = 25^\circ C, V_{in} = \pm 5V$ | — | 0.025% (5mV) | — | 0.025% (5mV) |
| temp. drift/mV | ΔV_{out} | $V_{in} = \pm 5V, V_{in} = \pm 7.5V$ | — | 30 | — | 30 |
| zero drift voltage | P_D | input short-circuit, $T_A = 25 \pm 3^\circ C$; $T_A = 25^\circ C$ | — | 15.0 | — | 15.0 |
| insulation resistance/M Ω | R_I | apply 500V(MSA203), 1000V(MSA203A) DC voltage between input and output or between any pin (except pin 12) and housing | 100 | — | 100 | — |

6 Typical characteristic curve(Fig. 3)

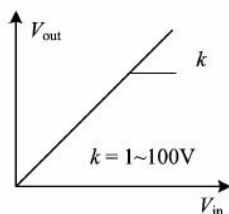


Fig. 3 Typical characteristic curve

7 MTBF curve(Fig. 4)

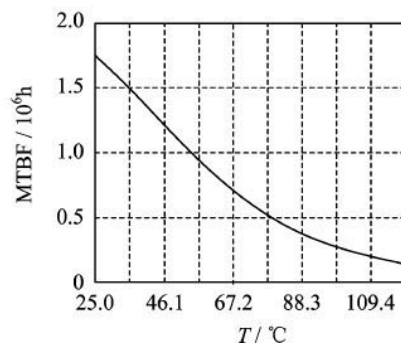


Fig. 4 MTBF vs temperature curve
(as per GJB/Z 299B-98, envisaged good ground condition)

8 Pin designation (Fig. 5, Table 3, Fig. 6, Table 4)

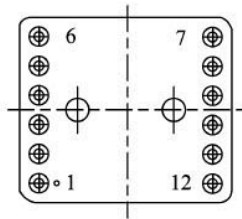


Fig. 5 Bottom view(MSA203)

Table 3 Pin designation

| pin | function | pin | function | pin | function |
|-----|--------------------------|-----|--------------------------|-----|----------|
| 1 | feedback | 5 | ground 1 | 9 | output |
| 2 | negative phase input | 6 | internal power supply(+) | 10 | control |
| 3 | positive phase input | 7 | vacant | 11 | ground |
| 4 | internal power supply(-) | 8 | positive power supply | 12 | vacant |

Table 4 Pin designation

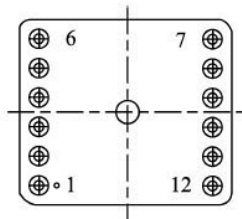
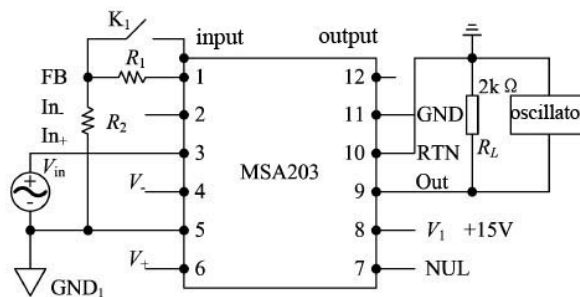


Fig. 6 Bottom view (MSA203A)

| pin | function | pin | function | pin | function |
|-----|--------------------------|-----|--------------------------|-----|----------|
| 1 | feedback | 5 | ground 1 | 9 | output |
| 2 | negative phase input | 6 | internal power supply(+) | 10 | control |
| 3 | positive phase input | 7 | vacant | 11 | ground |
| 4 | internal power supply(-) | 8 | positive power supply | 12 | housing |

9 Connection diagram for typical application(Fig. 7)



Note: $V_{out} = V_{in}(1 + R_1/R_2)$; in case K_1 is short circuit, $V_{out} = V_{in}$

Fig. 7 Connection diagram for typical application

10 Package specifications (Unit: mm)(Fig. 8, Fig. 9, Table 5)

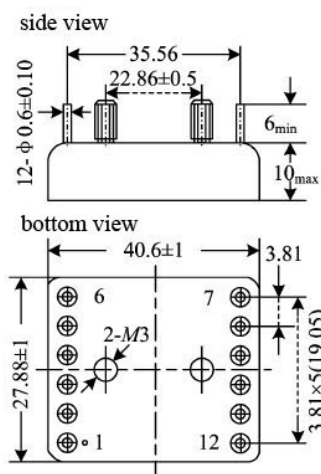


Fig. 8 external dimension diagram(MSA203)

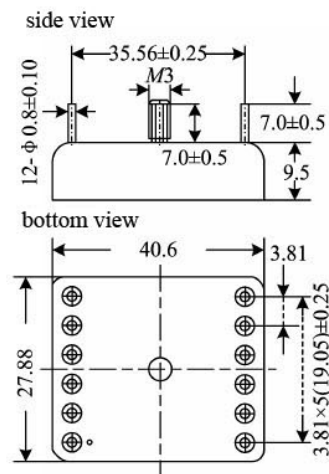


Fig. 9 external dimension diagram (MSA203A)

Table 5 Case materials

| Case model | Header | Header plating | Cover | Covering plating | Pin material | Pin plating | Sealing style | Notes |
|------------|-------------------------|----------------|--------------------------|-------------------------|--------------|-------------|------------------|-------|
| UPP4128-12 | Cold-rolled steel (10#) | Nickel coating | Iron/nickel alloy (4J42) | Hardened Nickel (HNI-1) | (4J50) | Au | Compression seal | |

Note: temperature of the solder pins within 10s shall not exceed 300 .

11 Part numbering key (Fig. 10)

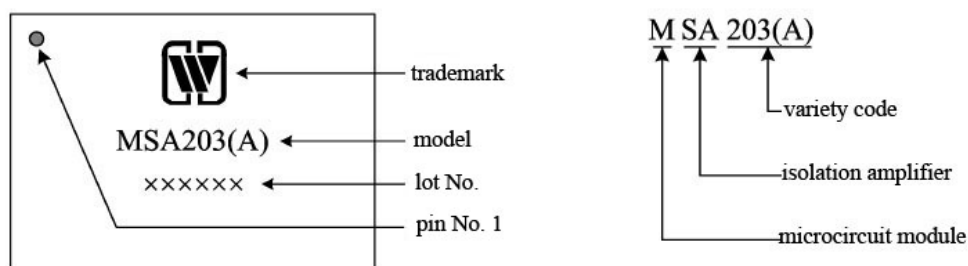


Fig. 10 Park numbering key

Application notes

- ★ Upon power-on, be sure to correctly connect the positive and negative pole of the power supply to ensure correct power supply for fear of burning.
- ★ When assembling, the product bottom shall fit to the circuit board closely and the nuts shall be tightened.
- ★ Do not bend the pinouts to prevent the insulator from breaking, which affects the sealing property.
- ★ When the user places an order for the product, detailed electric performance indexes shall refer to the relevant enterprise standard.