Isolation amplifier (MSA203/MSA203A)

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

- Power voltage: 15V
- Isolation between input, output and case
- Insulation resistance: ≥100MΩ (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)

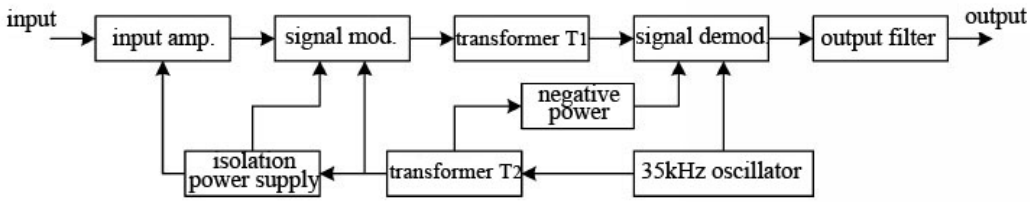


Fig. 2 Circuit block diagram

Table 2 Electric characteristics

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

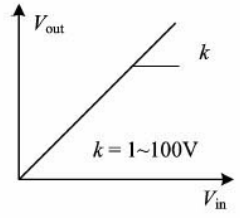


Fig. 3 Typical characteristic curve

7 MTBF curve(Fig. 4)

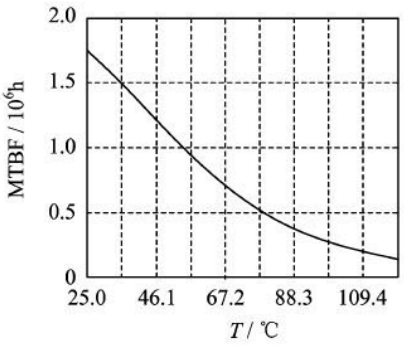


Fig. 4 MTBF vs temperature curve
(as per GJB/Z 299B-98, envisaged good ground condition)

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

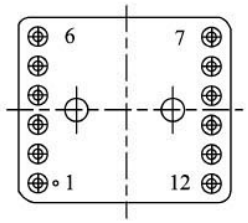


Fig. 5 Bottom view(MSA203)

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

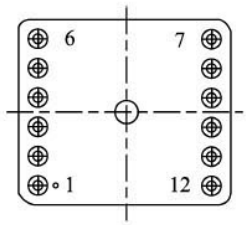
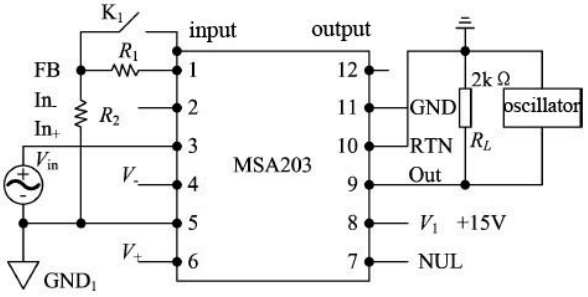


Fig. 6 Bottom view (MSA203A)

Table 4 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	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)

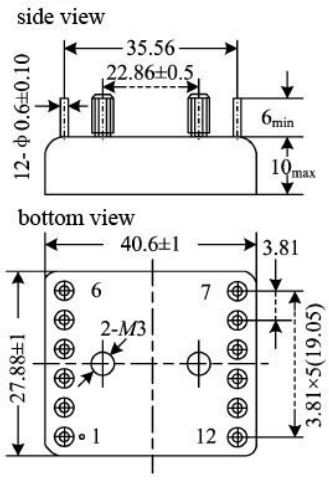


Fig. 8 external dimension diagram(MSA203)

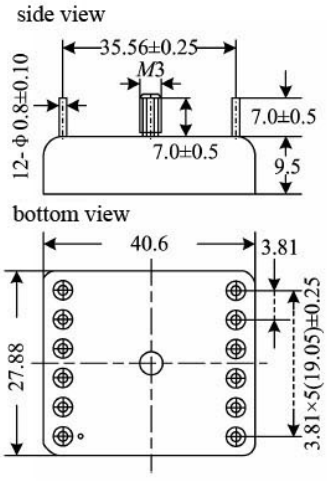


Fig. 9 external dimension diagram (MSA203A)

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)

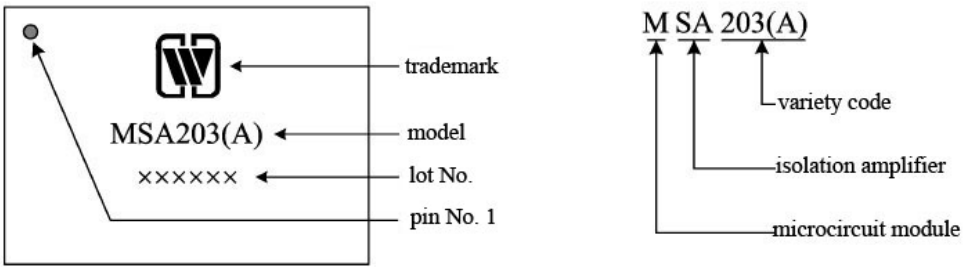


Fig. 10 Park numbering key

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.