Automotive Grade Multifunctional high-precision isolation amplifier

General anti-interference Analog signal isolator：ISO EM210 Series

Product features:

● high bandwidth：20KHz (-3dB)，It is Pin-Pin compatible with the AD210 module

●Low cost,small-volume, DIP standard 38Pin Metal case with Shielded Packages

●Precision grade： 0.1 grade,0.2grade, nonlinear degree <0.2% in the full range

●Auxiliary power, signal input and output：3000VDC three isolation

● Auxiliary power supply: 5V,12V,15V,24VDC and other single power supply modes for optional

●Power distribution can be expanded in the input end and output end：±15V@±10mA

● variable gain input amplifier(G=1~100V/V)

● Small size：50.8 X 25.4 X 10.2 mm (Length X width X height)

● Automotive grade Operating environment wide temperature range: -40～+125 ℃

Typical application:

●isolate power distribution and signal acquisition and transmission for Passive transducers

●Pre-amplifier, bridge and other circuits are configured with power supply to facilitate signal collection

●PLC/FCS/DCS control system analog signal isolation, acquisition

● Isolated amplification conversion of high precision DC millivolt micro signal

● Analog Signal Ground Wire Interference And Its Suppression and loop isolation, acquisition

●Analog signal isolation amplification conversion and long - line transmission in industrial field

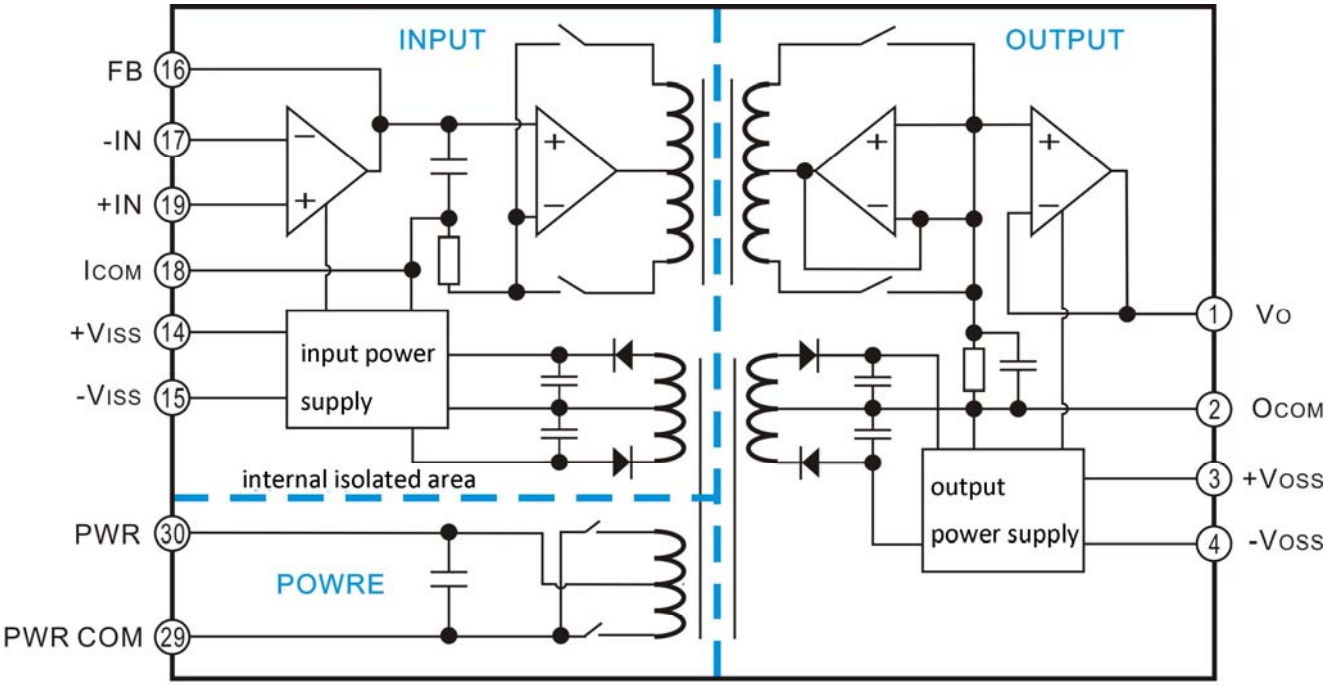
● Instruments and sensors, PLC analog transceiver

●Power monitoring, medical equipment high voltage isolation safety grid

● The input loop of multi-channel data acquisition is isolated and anti-interference

Features:

SunYuan The ISO EM210 series analog signal isolation amplifier is a hybrid integrated circuit with magneto-electric coupling. The product is packaged in a low cost, small size DIP standard 38Pin metal case, which effectively shields field EMC space interference and is Pin-Pin compatible with the AD210 module. Multiple groups of isolated DC/DC conversion circuit and magneto-electric coupling signal isolation circuit are integrated inside the module, so that external only need to select a DC 5V/12V/15V/24V single power supply to complete the analog signal input/output/auxiliary power three-terminal isolation amplification and conversion technology, and support single-ended and positive and negative two-way DC signal input and output. ISO EM210 have comprehensive function design, it uses a non-fixed gain modeThe input signal is amplified by the preamplifier (gain 1-100) at the input end and then entered the internal modulator for modulation. The non-fixed gain input amplifier is convenient for users to flexibly configure and use according to the field working condition. Users can realize variable gain application through peripheral feedback gain resistance, etc. The modulated signal is transmitted to the output side through transformer coupling. The output is amplified after demodulation circuit demodulation.The three-isolation design structure of the module enables the device to satisfy the complete isolation of signal input, signal output and auxiliary power supply. By interrupting the grounding loop and leakage path measures, and suppressing common mode voltage and noise, the measurement accuracy is prevented and the accuracy and integrity of the measurement signal are improved, which is very suitable for single channel or multi-channel signal isolation applications. ISO EM210 adopts the low cost scheme of magnetoelectric coupling, mainly used for EMC (electromagnetic interference) without special requirements, the internal DC-DC isolation power supply in addition to supply power to the internal amplifier circuit, also can provide a group of ±15V/±10mA stable voltage isolation power supply to the input and output terminals. Used for two-wire sensor distribution or input preamplification, signal bias, differential circuit, bridge circuit reference power supply. The product can meet the requirements of wet, vibration and wide temperature range -40～+125 ℃.



Picture1 ISOEM210 Schematic diagram

The maximum rating of product: （The life of the product will affect the long-term operation in the maximum rated environment，Once the maximum value is exceeded, irreparable damage occurs。）

Continuous Isolation Voltage （Maximum continuous isolation voltage between input and output）	3KVDC/rms
PWR (Maxi input range of auxiliary power supply voltage)	±25%Vdd
Junction Temperature （Maxi operating temperature range）	- 40℃ ～+ 125℃
Lead Temperature （maxi welding temperature of pin and duration<10S）	+300℃
Output Voltage Load Min （Minimum load when output voltage signal）	2KΩ

Product technical parameters:

Parameter name		Test condition	Mini	Typical value	Max	unit
Isolation voltage		AC,50Hz,1min		3000		VDC
Gain			1		100	V/V
Gain error				2		mV/V
Gain temperature drift				25		ppm/℃
Non-linearity				0.1	0.2	%FSR
Signal input		voltage	-10		10	V
Input offset voltage				2	5	mV
Input impedance				10^12		Ω
Distribution power output	voltage			±15		V
	current			±10		mA
	ripple			50		mV

	accuracy			2	5	%
Signal input		voltage	-10		10	V
Load capacity		Vout=±10V	1	2		kΩ
Frequency response		-3dB			20	KHz
CMRR					105	dB
Signal output ripple		Filterless		10	20	mVRMS
Signal voltage temperature drift				0.1	0.5	mV/℃
Auxiliary power supply	voltage	user-defined	5	12	24	VDC
	Power consumption	Full load		0.8	1	W
Operating ambient temperature			-40		125	℃
Storage temperature			-55		85	℃

Product model and selection definition:

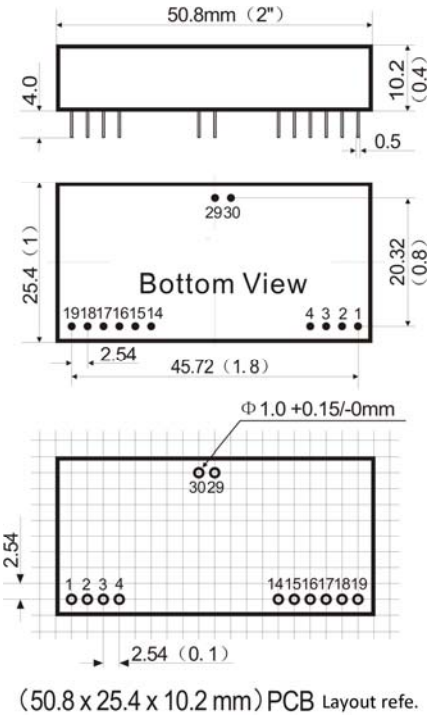
ISOEM210-P□

Power Supply
P1：24VDC
P2：12VDC
P3：5VDC
P4：15VDC
P8：customize

Model Selection for example：

For example 1： Auxiliary power supply：24VDC； Model number：ISOEM210 - P1
For example 2： Auxiliary power supply：15VDC； Model number：ISOEM210 - P4

Product shape and size picture of PCB layout for refe（Standard DIP38 pin）



（50.8 x 25.4 x 10.2 mm）PCB Layout refe.

Typical application diagram:

FIG. 2 shows the application of the most basic gain configuration. Set the gain of the input amplifier to G=1, that is, when the input signal is ±10V, the output is also ±10V. If the input signal is small and we need to amplify the input signal (G>1), we can configure the peripheral gain feedback resistor as shown in Figure 3 to amplify the input signal.In order to ensure the accuracy, it is best to choose a metal film resistance with a temperature coefficient of 25PPM. The value can be calculated according to the actual output voltage to amplify, according to the amplification factor to match the resistance, to meet the Vout calculation formula.

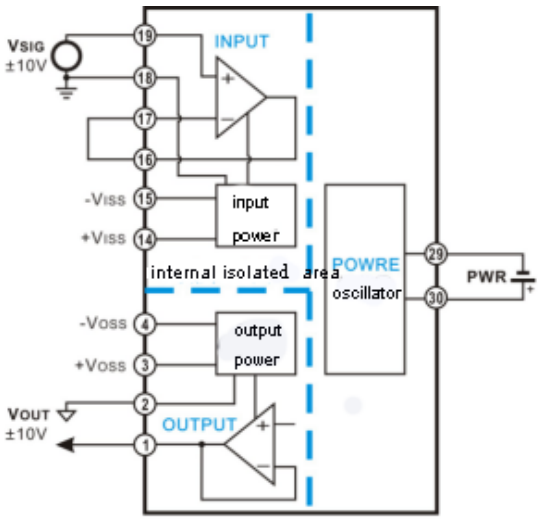


FIG. 2 Typical applications with a gain of 1 (G=1)

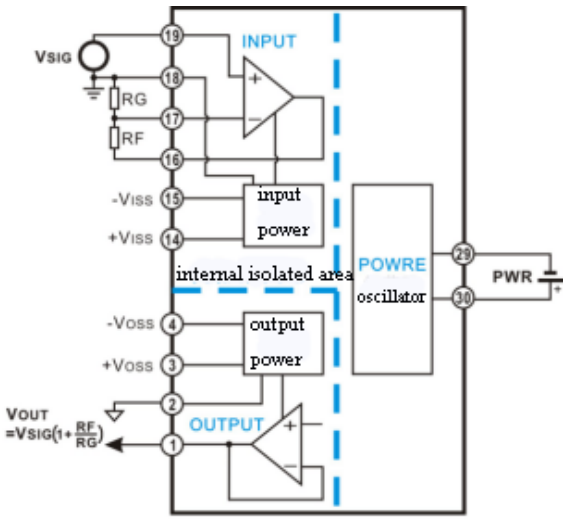


FIG. 3 Typical applications with gain greater than 1 (G > 1)

As shown in Figure 4, it is necessary to add a current sampling resistance at the input end to convert the current signal into a voltage signal input.In the figure, the gain of the input amplifier is configured as G=1, that is, the sampled voltage. After isolation of the module, the output voltage is basically consistent with the input voltage. If the sampled resistance is selected relatively small, the sampled voltage is obtained relatively small.When the sampled voltage needs to be amplified and then output, the peripheral gain feedback resistor can be configured as shown in Figure 3 for signal amplification. The value of the resistance can be calculated according to the actual voltage to be output, and the resistance can be matched according to the amplification ratio.In order to ensure accuracy, it is best to choose metal film resistance with temperature coefficient of 25PPM, which can meet the calculation formula of Vout。 FIG. 5 The input is connected to the inverting amplifier application, the input signal can be inverting amplifying output, gain can be set by adjusting RF and RS, if you choose the potentiometer adjustment, please choose the high-precision metal film multi-turn potentiometer.

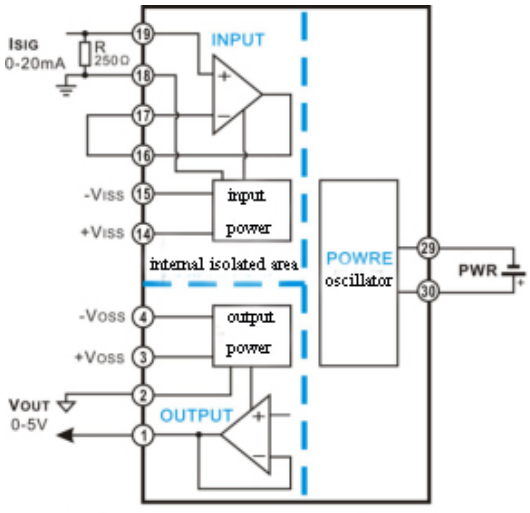


FIG. 4 Typical application of current input and voltage output

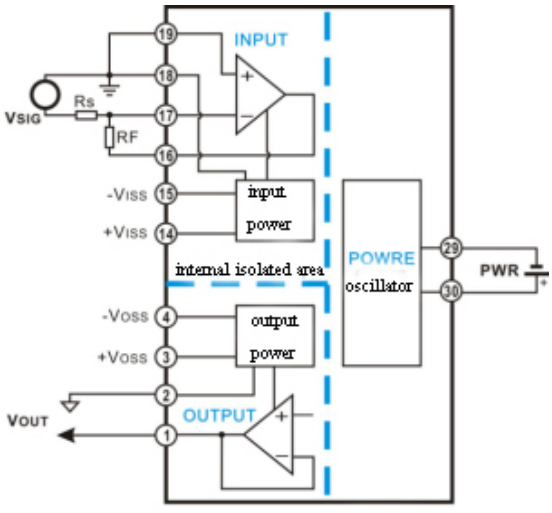
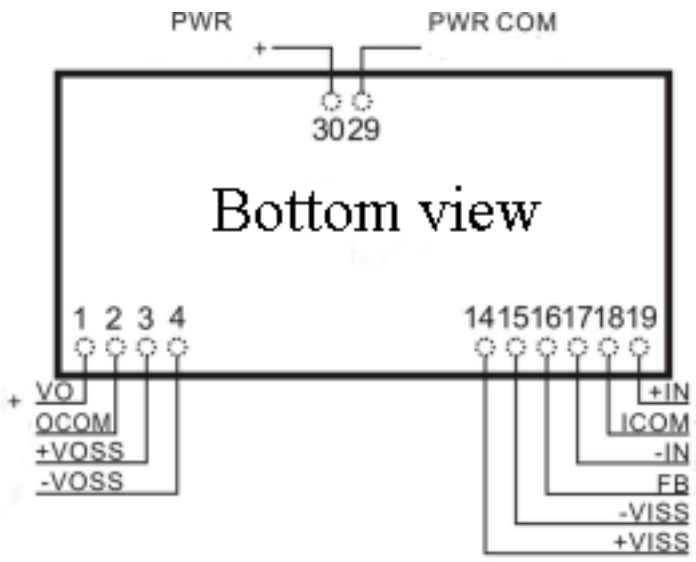


FIG 5 Typical application of signal reverse mode

Pin function description:

Pin	Pin function	
1	Output+	Signal output positive end
2	Ocom-	Signal output common ground terminal
3	+Voss	The output terminal isolates the positive output terminal of the distribution
4	-Voss	The output terminal isolates the negative output terminal of the distribution
14	+Viss	The input side isolates the positive output side of the distribution
15	-Viss	The input terminal isolates the negative output terminal of the distribution
16	FB	Signal feedback terminal
17	-IN	Input negative terminal
18	Icom-	Input common ground terminal
19	+IN	Positive input terminal
29	PWR COM	power input ground terminal
30	PWR	Power input positive end



车规级多功能高精度隔离放大器

通用型抗干扰模拟信号隔离器：ISO EM210 系列

产品特点

- 高带宽：20KHz (-3dB)，与 AD210 模块 Pin-Pin 兼容
- 低成本、小体积标准 DIP38 Pin 塑壳阻燃封装
- 精度等级：0.1 级、0.2 级、全量程内非线性度<0.2%
- 辅助电源、信号输入与输出之间：2500Vrms 三隔离
- 辅助电源：5V/12/15V/24V DC 等单电源供电方式可选
- 可在输入端、输出端功能拓展配电：±15V@±10mA
- 可变增益输入放大器(G=1~100V/V)
- PCB 板焊接安装：50.8 X 25.2 X 11.2 mm (长 X 宽 X 高)
- 车规级工作环境宽温度范围: -40～+125 ℃

典型应用

- 无源型传感器隔离配电及信号采集传输
- 前置放大、电桥等电路配置电源方便采集信号
- PLC/FCS/DCS 控制系统模拟信号隔离、采集
- 高精度直流毫伏级微小信号的隔离放大转换
- 模拟信号地线干扰抑制及回路隔离、采集
- 工业现场模拟信号隔离放大转换及长线传输
- 仪器仪表与传感器、PLC 模拟量收发
- 电力监控、医疗设备高压隔离安全栅
- 多通道数据采集器输入端各回路隔离抗干扰

产品特征

SunYuan ISO EM210 系列模拟信号隔离放大器是一种磁电耦合的混合集成电路，产品采用低成本小体积标准 DIP 38Pin 塑壳阻燃封装，与市面上常用的 AD 210 模块 Pin-Pin 兼容，相比 AD202/204 模块体积更小功能兼容。

ISO EM210 模块内部集成了多组隔离的 DC/DC 变换电路和磁电耦合信号隔离电路，现场工作时，只需要给模块提供一组直流 5V 或 12V/15V/24V 单电源供电，即可完成模拟信号输入/信号输出/辅助电源三端隔离放大及转换功能，并且支持用户单向及正负双向直流信号输入输出。

ISO EM210 功能设计全面，采用非固定增益技术，输入信号经过输入端的前置放大器（增益为 1-100）放大后进入内部调制器进行调制，非固定增益输入放大器方便用户根据现场工作状况灵活配置使用，用户可通过外设反馈增益电阻等实现增益可变应用，调制后的信号通过变压器耦合传输到输出边，经解调电路解调后放大输出。模块的三隔离设计结构使该器件可以满足信号输入、信号输出、辅助电源完全隔离，通过中断接地回路和泄漏路径措施来抑制共模电压和噪声，从而防止测量精度降低，提高测量信号精度和完整性，适合单路或多通道信号隔离应用。

ISO EM210 采用磁电偶合的低成本方案，主要用于对 EMC（电磁干扰）无特殊要求的场合，内部 DC-DC 隔离电源除了给内部放大电路供电外，还可以给输入和输出端各向外提供一组±15V/±10mA 的稳压隔离电源，用于二线制传感器配电或提供输入端前置放大、信号偏置、差分电路、电桥电路的基准电源，产品能满足潮湿、震动及宽温度范围 -40～+125 ℃的车规级现场工作环境要求。现场对 EMC（电磁干扰）要求较高的场合，请选用顺源科技公司 ISO EC 系列(电容隔离）或 ISO 系列(光电隔离）模拟信号隔离放大器产品。

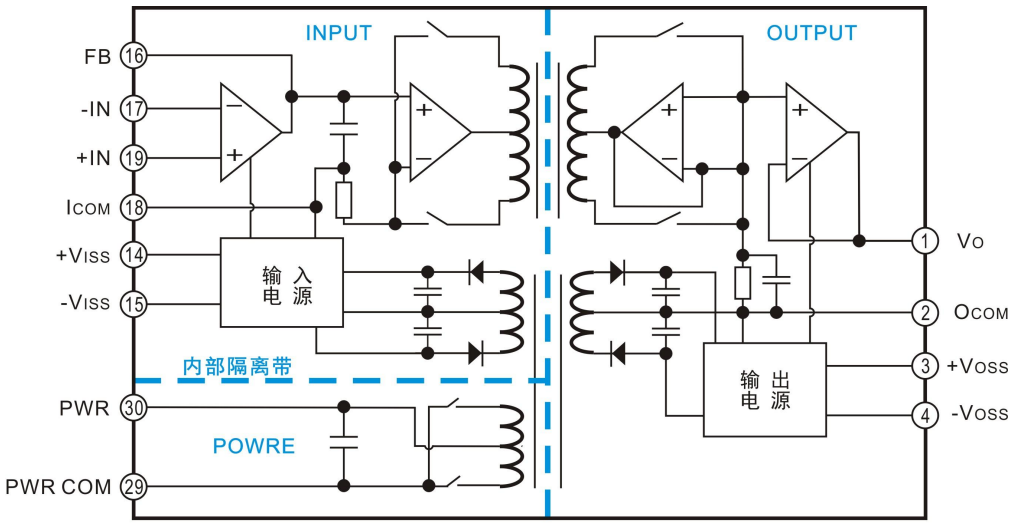


图1 ISOEM210原理框图

产品最大额定值 （长期在最大额定值环境下工作影响产品使用寿命，超过最大值会出现不可修复的损坏。）

Continuous Isolation Voltage （输入与输出端最高持续隔离电压）	2.5KVrms
PWR（辅助电源电压最大输入范围）	±25%Vdd
Junction Temperature （工作环境温度最大范围）	- 40℃ ～+ 125℃
Lead Temperature （引脚最高焊接温度及持续时间<10S）	+300℃
Output Voltage Load Min（输出电压信号时的最小负载）	2KΩ

产品技术参数

参数名称		测试条件	最小	典型值	最大	单位
隔离电压		AC,50Hz,1min		2500		Vrms
增益			1		100	V/V
增益误差				2		mV/V
增益温漂				25		ppm/℃
非线性度				0.1	0.2	%FSR
信号输入		电压	-10		10	V
输入失调电压				2	5	mV
输入阻抗				10^12		Ω
配电电源输出	电压			±15		V
	电流			±10		mA
	纹波			50		mV
	精度			2	5	%
信号输出		电压	-10		10	V
负载能力		Vout=±10V	1	2		kΩ
频率响应		-3dB			20	KHz
共模抑制比					105	dB
信号输出纹波		不滤波		10	20	mVRMS
信号电压温漂				0.1	0.5	mV/℃
辅助电源	电压	用户自定义	5	12	24	VDC
	功耗	满载		0.8	1	W
工作环境温度			-40		125	℃
贮存温度			-55		85	℃

产品型号及选型定义

ISOEM210-P□

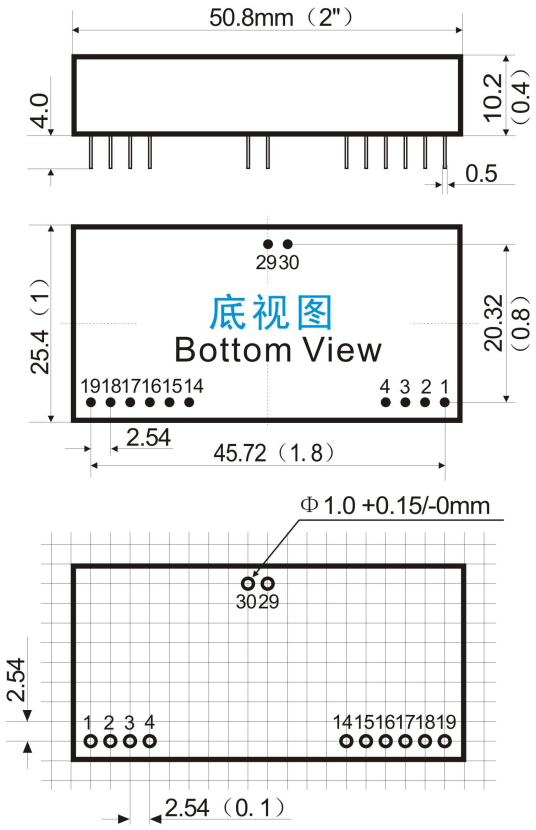
辅助电源
P1：24VDC
P2：12VDC
P3：5VDC
P4：15VDC
P8：用户自定义

产品选型举例：

例 1： 辅助电源：24VDC； 产品型号：ISOEM210 - P1

例 2： 辅助电源：15VDC； 产品型号：ISOEM210 - P4

产品外形及 PCB 布板参考尺寸图（标准 DIP38 脚）



（50.8 x 25.4 x 10.2 mm）PCB布板参考

典型应用图

图 2 所示为最基本的增益配置应用，将输入放大器增益设置为 G=1，即输入信号为±10V 时，输出也为±10V，不对输入信号做任何放大处理，基本满足 1:1 的比例完成信号隔离输出。对于输入信号较小，我们需要将输入信号进行放大处理时（G>1 时），可按图 3 配置外围增益反馈电阻进行输入信号的放大。为保证精度，电阻最好选用温度系数为 25PPM 的金属膜电阻，取值可按照实际要输出的电压来计算放大倍数，按放大倍数来匹配电阻，满足 Vout 计算公式即可。

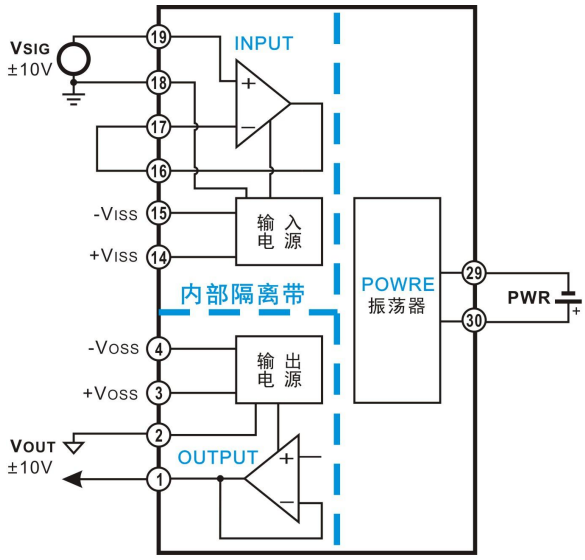


图2 增益为1的典型应用(G=1)

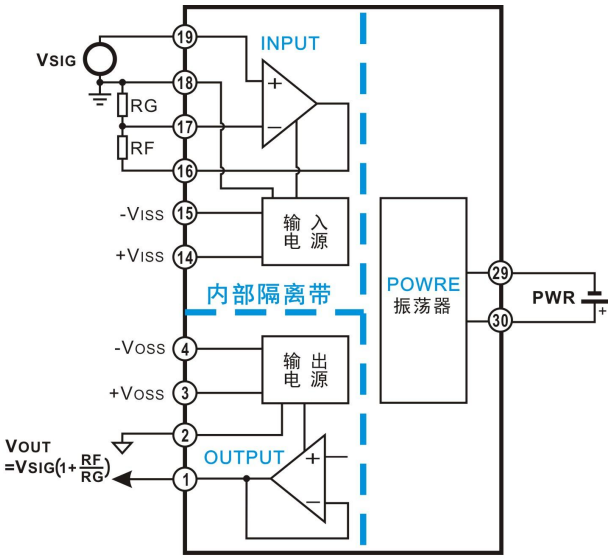


图3 增益大于1的典型应用(G>1)

图 4 所示为电流信号输入时需要在输入端加电流采样电阻，将电流信号转换为电压信号输入。图中输入放大器增益配置为 G=1，即采样的电压多少，经过模块隔离后输出电压与输入电压基本一致，如采样的电阻选的比较小，获得采样的电压比较小。需对采样的电压进行放大再输出时，可参照图 3 配置外围增益反馈电阻进行信号放大，电阻的取值可按照实际要输出的电压来计算放大倍数，按放大倍数来匹配电阻。为保证精度，电阻最好选用温度系数为 25PPM 的金属膜电阻，满足 Vout 计算公式即可。图 5 输入接成反相放大器应用，可对输入信号进行反相放大输出，增益可通过调整 RF 和 RS 设定，如果选择电位器调节，请选择高精度的金属膜多圈电位器。

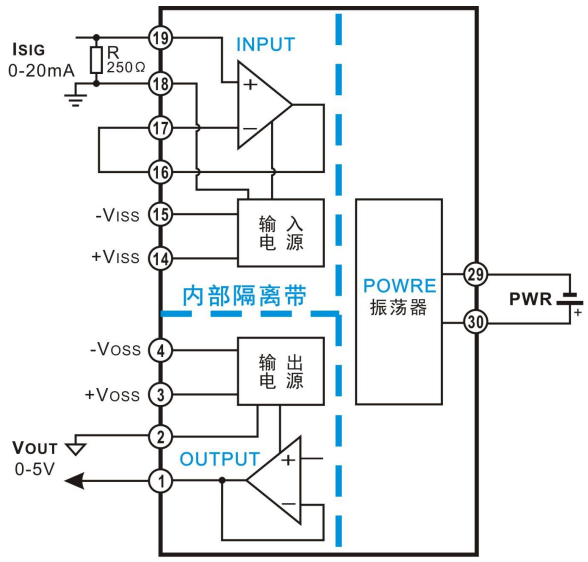


图4 电流输入电压输出典型应用

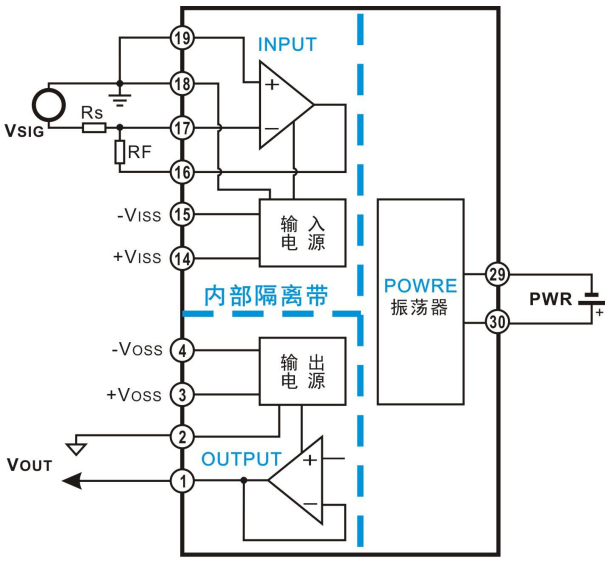


图5 信号反相模式典型应用

引脚功能描述

Pin	引脚功能	
1	Output+	信号输出正端
2	Ocom-	信号输出公共地端
3	+Voss	输出端隔离配电输出正端
4	-Voss	输出端隔离配电输出负端
14	+Viss	输入端隔离配电输出正端
15	-Viss	输入端隔离配电输出负端
16	FB	信号反馈端
17	-IN	输入负端
18	Icom-	输入公共地端
19	+IN	输入正端
29	PWR COM	电源输入地端
30	PWR	电源输入正端