MULTI DIMENSION
Sensing the Future

TMR-MAC005

Microampere Current Sensor

General Description

TMR-MAC005 is a microampere current sensor incorporating high sensitivity tunneling magnetoresistive (TMR) sensor and Integrated coil with anti-magnetic interference design.

TMR-MAC005 provides 10 mA measuring range, 150 nA and standard SOP8 package.

Features and Benefits

- Tunneling magnetoresistance technique
- Low current measurement
- 150 nA high resolution
- Excellent temperature stability
- Wide operating voltage range
- Compact size

Applications

- Weak current measurement
- Bioelectric current measurement
- Industrial sensor
- Instrument and equipment

SPECIFICATIONS

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	V_{CC}	7	V
Reverse supply voltage	V_{RCC}	7	V
External magnetic field	H	3000	Oe
ESD performance (HBM)	V_{ESD}	4000	V
Ambient operating temperature	T_A	~40~125	℃
Ambient storage temperature	T_S	~50~150	℃

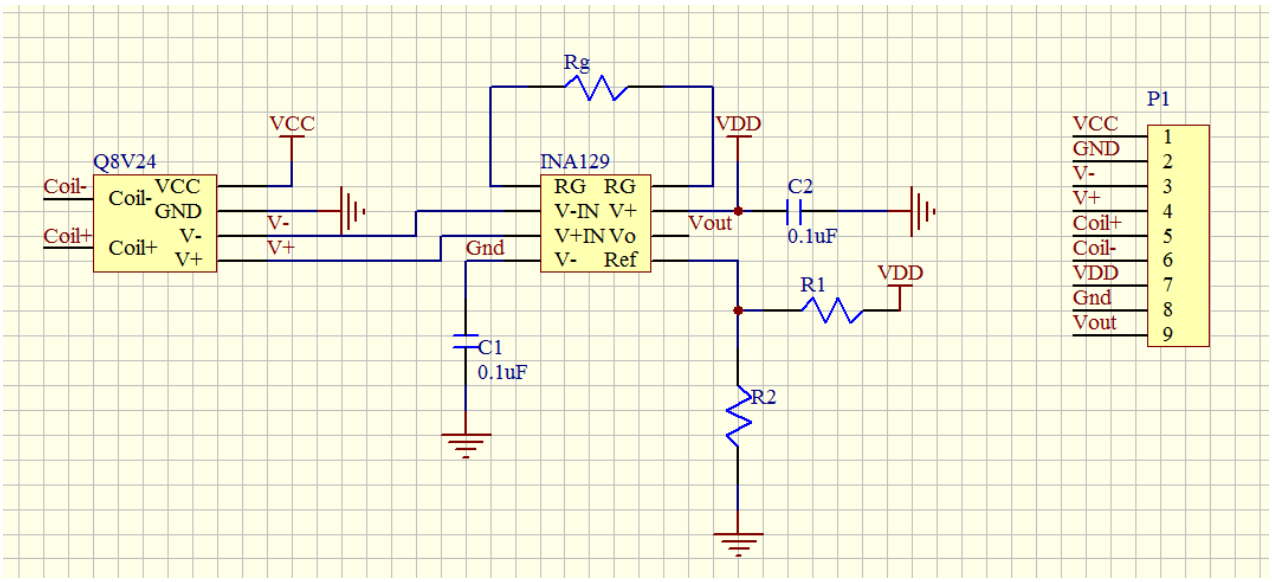
Electrical Parameters (at Vcc=5.0V, T_A=25°C, differential output)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	Operating		5	7	V
Supply current	I_{CC}	Output open		70(1)		μA
TMR resistance	R			70		kohm
Coil resistance	R_coil			85		ohm
Current measuring range	Range		-10		10	mA
Sensitivity	Sen	±10 mA		2.9		mV/V/mA
Electrical offset voltage	Voffset			-1		mV/V
Resolution	Res	±10 mA @ 1 Hz		150		nA
Linearity error	Non_line	±10 mA		0.5%		FS%
Temperature coefficient of sensitivity	TCS	within current measuring range		-300		PPM/℃
Output noise	Ni	1/f V noise @ 1 Hz		1.2		μV/rtHz
		thermal V noise		70		nV/rtHz
		1/f I noise @ 1 Hz		150		nA/rtHz
		thermal I noise		10		nA/rtHz

Note

1. Icc may vary at 5V Vcc due to the resistance difference, customizable according to requirements

TYPICAL BLOCK DIAGRAM



Note

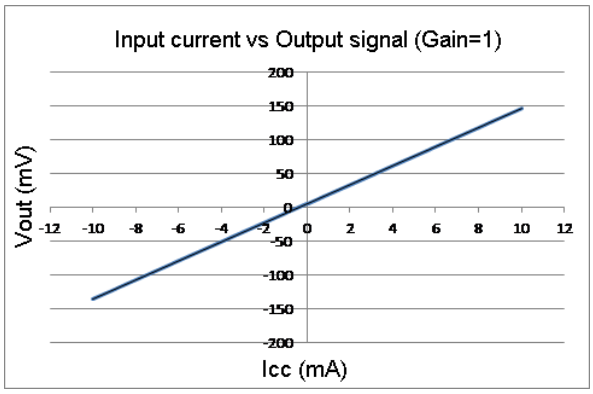
1.VCC could equal to VDD

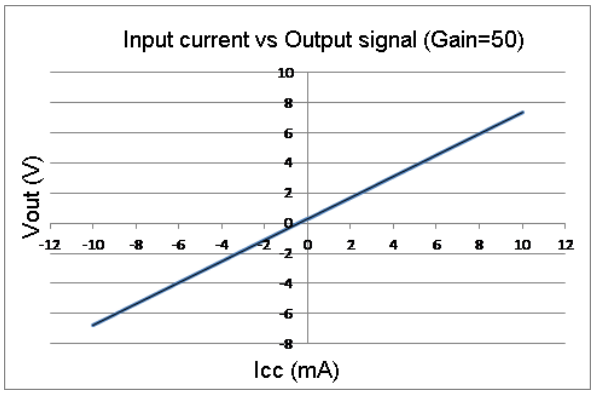
2.C1=0 (short circuit) when using single power supply

3.Tuning Voffset by changing the ratio of R1/R2

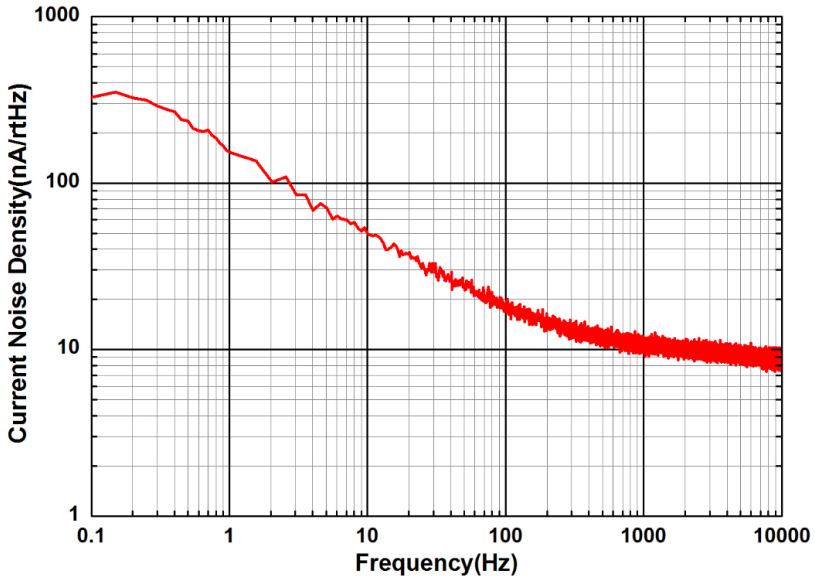
4.Choose proper gain by changing Rg

TYPICAL TRANSFER FUNCTION

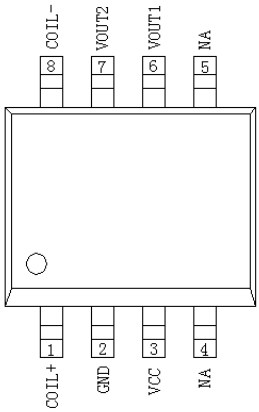




TYPICAL CURRENT NOISE DENSITY SPECTRUM

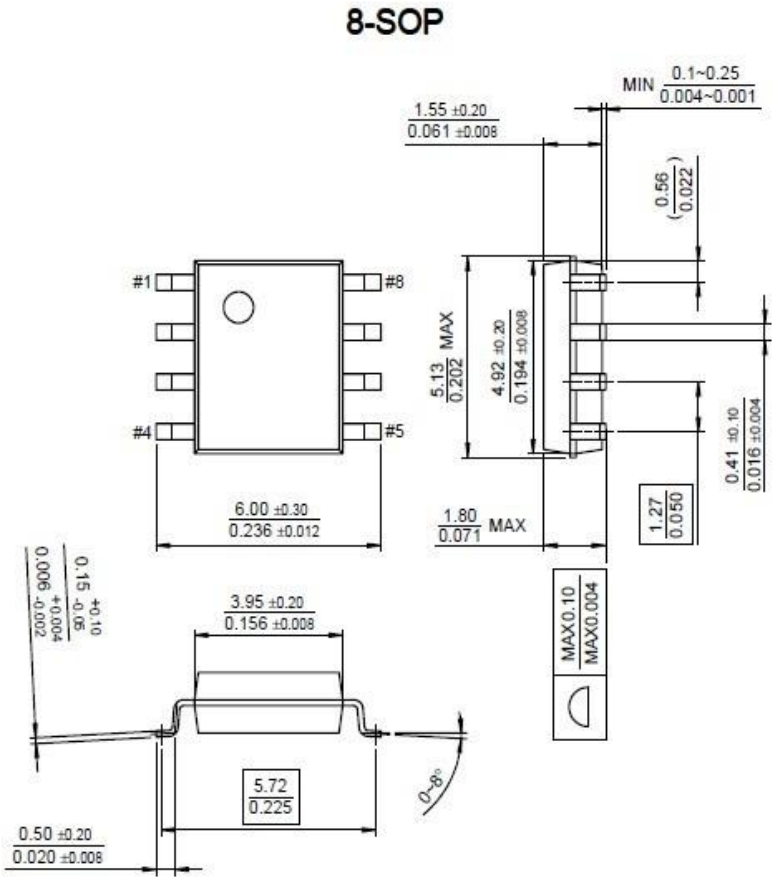


CONNECTION DIAGRAM



1	Coil+
2	GND
3	VCC
4	N/A
5	N/A
6	Vout1
7	Vout2
8	Coil-

DIMENSIONS (mm)



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