GOH1-xxB 系列电流传感器 Current Transducer

I_{PN} = 10 ... 50 A

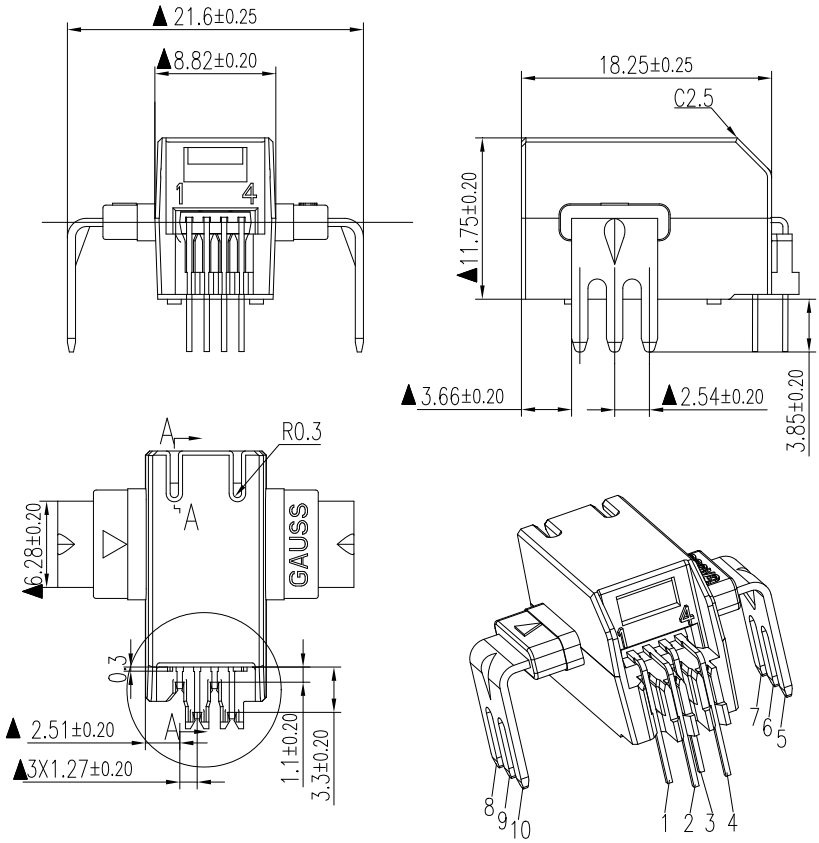
Ref：GOH1-10B, GOH1-16B, GOH1-20B, GOH1-32B, GOH1-40B, GOH1-50B

介绍 Introduction

GOH1-xxB 系列基于霍尔技术和开环原理设计。适用于直流、交流、脉冲及各种隔离条件下的不规则电流测量。

The GOH1-xxB series is based on Hall technology and open -loop design. It is suitable for DC, AC, pulsed and any kind of irregular current measurement under the isolated conditions.

尺寸 Dimensions (in mm)



Pin out	
Pin 1	V_{ref}
Pin 2	V_{out}
Pin 3	GND
Pin 4	+Uc

绝对最大额定值 Absolute maximum ratings

参数 Parameter	符号 Symbol	单位 Unit	值 Value
最大供电电压 Maximum supply voltage	U_C	V	6
反向电源电压 Reverse supply voltage	U_{RCC}	V	-0.1
原边铜排温度 Primary conductor temperature	T_S	℃	120
静电放电电压 Electrostatic discharge voltage	$U_{ESD\ HBM}$	KV	4

超过这些额定值可能会造成产品不可逆的损坏。较长时间接触绝对最大额定值可能会降低产品的可靠性。

Stresses above these ratings may cause permanent damage. Exposure to absolute maximum ratings for extended periods may degrade reliability.

环境特性 Environmental characteristics

参数 Parameter	符号 Symbol	单位 Unit	最小值 Min	典型值 Typical	最大值 Max
工作温度 Ambient operating temperature	T_A	℃	-40		105
储存温度 Ambient storage temperature	$T_{A\ st}$	℃	-40		125

额定参数 Ratings

参数 Parameter	符号 Symbol	单位 Unit	值 Value
原边电流 Primary current	I_P	A	According to series primary current
二次供电电压 Secondary supply voltage	U_C	V DC	5
输出电压 Output voltage	U_{out}	V	0.1 to 4.9

绝缘 Insulation

参数 Parameter	符号 Symbol	单位 Unit	值 Value	备注 Comment
耐压 RMS voltage for AC insulation test, 50Hz, 1 min	U_d	KV	4.3	
浪涌 Impulse withstand voltage 1.2/50 μs	U_{Ni}	KV	8	
电气间隙 Clearance	d_{Cl}	mm	8	When mounted on PCB with recommended layout
爬电距离 Creepage distance	d_{CP}	mm	> 8	Shortest path along device body
壳体材料 Case material	-	-	V0	According to UL 94
漏电起痕指数 Comparative tracking index	CTI	V	600	
应用实例 Application example	-	V	600	Reinforced insulation, CAT III, PD 2, non uniform field according to EN 50178, IEC 61010
应用实例 Application example	-	V	1000	Basic insulation, CAT III, PD 2, non uniform field according to EN 50178, IEC 61010
应用实例 Application example	-	V	1500	Basic insulation, CAT III, PD 2, according to IEC 62109-1 Altitude≤3000 m
应用实例 Application example	-	V	600	CAT III, PD 2, according to UL 508

GOH1-10B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-10		10	
测量电流范围 Primary current, measuring range	I_{PM}	A	-25		25	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_P=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-62.5		62.5	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		80		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 ··· I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 ··· I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-31.25		31.25	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		105		
		mV_{RMS}		15		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

GOH1-16B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-16		16	
测量电流范围 Primary current, measuring range	I_{PM}	A	-40		40	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_p=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-100		100	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		50		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 … I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 … I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-50		50	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		66		
		mV_{RMS}		8.9		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

GOH1-20B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-20		20	
测量电流范围 Primary current, measuring range	I_{PM}	A	-50		50	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_p=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-125		125	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		40		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 … I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 … I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-62.5		62.5	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		48		
		mV_{RMS}		6		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

GOH1-32B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-32		32	
测量电流范围 Primary current, measuring range	I_{PM}	A	-80		80	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_p=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-200		200	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		25		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 … I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 … I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-100		100	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		35		
		mV_{RMS}		4.4		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

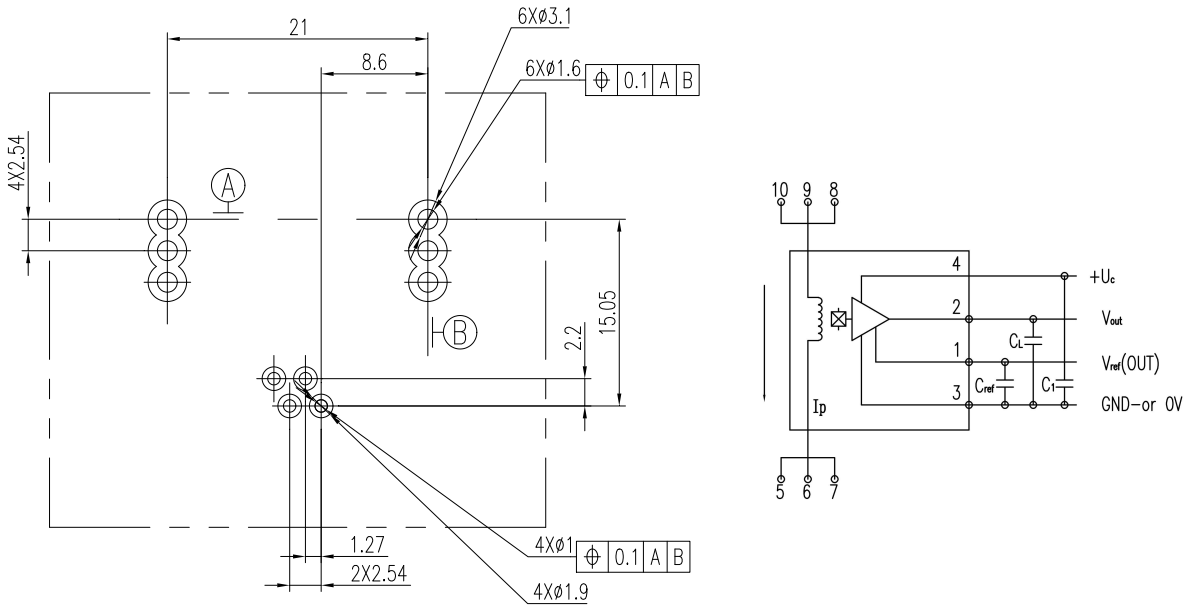
GOH1-40B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-40		40	
测量电流范围 Primary current, measuring range	I_{PM}	A	-100		100	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_p=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-250		250	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		20		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 … I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 … I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-125		125	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		29		
		mV_{RMS}		3.7		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

GOH1-50B

参数 Parameter	符号 Symbol	单位 Unit	规格 Specification			条件 Conditions
			最小值 Min	典型值 Typical	最大值 Max	
额定测量电流 Primary nominal RMS current	I_{PN}	A	-50		50	
测量电流范围 Primary current, measuring range	I_{PM}	A	-125		125	For U_C > 4.6V
初级匝数 Number of primary turns	N_P	-		1		
原边电阻 Resistance of primary jumper @ T_A =25℃	R_P	mΩ		0.21		
原边电阻 Resistance of primary jumper @ T_A =105℃	R_P	mΩ		0.29		
电源电压 Supply voltage	U_C	V	4.5	5	5.5	
电流消耗 Current consumption	I_C	mA		12	18	
基准电压 Reference voltage (output)	U_{ref}	V	2.49	2.5	2.51	内部基准 internal reference
输出电压范围 Output voltage range @ I_{PM}	U_{out} - U_{ref}	V	-2		2	
输出阻抗 V_{out} output resistance	R_{out}	Ω		10		
输出阻抗 V_{ref} output resistance	R_{ref}	Ω		5		
负载电容 Load capacitance	C_L	nF			6	
电零点输出误差 Electrical offset voltage referred to primary@ I_p=0	U_{OE}	mV	-5		5	25℃ ,U_{out} -U_{ref}
电零点偏置电流 Electrical offset current referred to primary	I_{OE}	mA	-312.5		312.5	
基准温度漂移 Temperature coefficient of U_{ref}	TCV_{ref}	ppm/K	-170		170	-40℃ ~105℃
零点温度漂移 Temperature coefficient of U_{OE}	U_{OE} - TRange	mV	-5		5	-40℃ ~105℃
增益温度漂移 Temperature coefficient of G	TCG	ppm/K	-170		170	-40℃ ~105℃
理论灵敏度 Theoretical sensitivity	G_{th}	mV/A		16		800mV@I_{PN}
增益误差 Sensitivity error	ε_G	%	-0.5		0.5	出厂调试 Factory adjustment
线性度误差 Linearity error 0 … I_{PN}	ε_L	% of I_{PN}	-0.5		0.5	
线性度误差 Linearity error 0 … I_{PM}	ε_L	% of I_{PM}	-0.5		0.5	
磁零点偏置电流 Magnetic offset current(@10*I_{PN}) referred to primary	I_{OM}	mA	-156.25		156.25	
磁零点输出误差 Magnetic offset voltage(@10*I_{PN}) referred to primary	U_{OM}	mV	-2.5		2.5	
输出噪声 Output RMS noise voltage DC.....20MHz	U_N	mV_{P-P}		25		
		mV_{RMS}		2.9		
反应时间 Reaction time @ 10% of I_{PN}	t_{ra}	us		1.4	2	@50A/us
响应时间 Step response time to 90% of I_{PN}	t_r	us		1.8	2.5	@50A/us
带宽 Frequency bandwidth (-3dB)	BW	kHz		240		
常温精度 Accuracy @I_{PN}	X_{TA}	% of I_{PN}	-1		1	
全温域精度 Accuracy @I_{PN} @ T_A	TA	% of I_{PN}	-2.5		2.5	

印制板封装 PCB footprint(in mm. 公差 General linear tolerance ±0.2mm)



备注 Remarks

√ 偏移量和灵敏度由此公式计算。The offset and sensitivity are relative to the following formula. $I_P = (U_{out} - U_{ref}) \times \frac{1}{G}$

√ 使用小电流测试避免母排、铁芯和 ASIC 发热。Small signal only to avoid excessive heating of the busbar , the magnetic core and the ASIC.

√ 母排温度不能超过 120℃。Busbar temperature must below 120℃.

√ 电流朝箭头方向时 $U_{out}>U_{ref}$。 $U_{out}>U_{ref}$ when I_P flows in the positive direction.

机械特性 Mechanical characteristics

√ 塑料外壳 Plastic case	PA6 PA66
√ 磁芯 Magnetic core	Ferrite
√ 质量 Mass	5g±5%
√ 引脚 Pins	CuSn6/Sn finishing
√ 母排 Bus bar	Cu

环境试验规范 Environmental test specifications

试验项 Name	标准 Standard	条件 Conditions
电气试验 Electrical tests		
噪声测量 Noise measurement	GAUSS-ELEC Procedure	Sweep from DC to 20 MHz
di/dt 延时 Delay time di/dt	GAUSS-ELEC Procedure	50A / µs, I pulse = $I_{P\ Max}$
绝缘耐压 Dielectric Withstand Voltage test	ISO 16750-2 §4.11 §4.12	4300 V AC / 1 min / 50 Hz
绝缘电阻 Insulation resistance	ISO 16750-2 (2010)	500 V DC, time = 60s R_{INS} ≥ 500 MΩ minimum
带宽 Frequency bandwidth (-3dB)	GAUSS-ELEC Procedure	240 KHz
大电流注入 BCI	ISO 11452-1 § -4 Level 2	FPSC I $\Delta V_{offset\ voltage}$ ≤100mV , U_C = 5 V
环境试验 Environmental tests		
高温高湿试验 High T °C, High Humidity, Electrical connection	IEC 60068-2-78 (2001)	1000 hours +85°C/85% RH U_C = 5 V DC, I_P = 0
温度冲击试验 Thermal Shock	ISO 16750-4 §5.3.2 (04.2010)	1000 cycles , 30 min @ -40°C , 30 min @ +125°C U_C not connected, I_P = 0
高温存储、低温存储 High T °C Storage 、Low T °C Storage	ISO 16750-4 §5.1.2.1 (04.2010)	Storage: 125°C for 1000 hours, -40°C for 1000 hours U_C not connected, I_P = 0 for both tests
正弦振动 Sine Vibration	DIN EN60068-2-6 2008	2 g , 1.5 h/axe , 10 Hz - 150 Hz
随机振动 Random Vibration	DIN EN60068-2-6 2008	1.6 g , 2.5 h/axe , 10 Hz - 150 Hz
反复开关机测试 Intermittent Operational Life	GAUSS-ELEC Procedure	T=25°C , ton/toff = 2 min/2 min U_C = 5 V DC, I_P = 0 Monitor VOUT after 5000 , 10000 ton/toff
电磁兼容性试验 EMC tests		
磁场抗扰度试验 Magnetic filed influence	IEC 61000-4-8:2009	Test Level: 5 100 A/m , DC and AC 50 Hz
静电放电抗扰度试验 ESD Test	IEC 61000-4-2:2009	150 pF / 330 Ω HBM: ±8 kV , U_C not connected