CURRENT SENSOR

PRODUCT SERIES： SFG-X.XP/PF

PRODUCT PART NUMBER： SFG-0.6P/PF
SFG-1.0P/PF
SFG-3.0P/PF

Version： Ver 1.6

CONTENT

1. Description

Features
- Closed loop (compensated) current transducer
- Voltage output
- Insulation voltage for 5 kVAC
- Single supply voltage
- PCB mounting.

Advantages
- High accuracy
- High overload capability
- High insulation capability
- High separation ability
- Low temperature drift
- Degauss and test functions

Applications
- Residual current measurement
- Leakage current measurement in PV inverters
- First human contact protection of PV arrays
- Failure detection in power sources
- Leakage current detection in stacked DC sources
- Communication power.

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2024-10-18

2. Absolute parameter: SFG-X.XP/PF

Absolute maximum ratings

Parameter	Symbol	Unit	Value
Maximum Supply voltage	Vc_{max}	V	7
Maximum Primary conductor temperature	$T_{B\ max}$	℃	110
Maximum overload capability (100 μs, 500 A/μs)	$\hat{I}_{P\ max}$	A	3300
Maximum Voltage between test winding and secondary pins	$V_{d\ max}$	V	35
Maximum Current of test winding	$I_{T\ max}$	mA	300

Ratings

Parameter	Symbol	Unit	Value
Primary involved potential		V AC/DC	1000
Secondary supply voltage	U_C	V DC	5
Output voltage	V_{out}	V	0 to 5

Isolation parameters

Parameter	Symbol	Unit	Value	Remark
RMS voltage for AC	V_d	kV	4	test 50 Hz/1 min
Impulse withstand voltage	V_w	kV	10.1	1.2/50μs
Clearance distance (pri. –pri.)	d_{Cl}	mm	8	Shortest distance through air
Creepage distance (pri. – pri.)	d_{Cp}	mm	13	Shortest path along device body
Clearance distance (pri. –sec.)	d_{Cl}	mm	14.5	When mounted on PCB with recommended layout
Creepage distance (pri. –sec.)	d_{Cp}	mm	14.5	When mounted on PCB with recommended layout
Comparative tracking index	CTI	V	600	
Application example		V	600 CAT III, PD2	Reinforced insulation, non uniform field
Application example		V	1500 CAT III, PD2	Basic insulation, non uniform field

Environmental and mechanical characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Ambient operating temperature	T_A	℃	-40		105	
Ambient storage temperature	T_S	℃	-40		105	
Mass	m	g		300		
standard	EN 50178, IEC 61010, UL 508					

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3. Electrical data: SFG-0.6P/PF

At T_A = 25 ℃, V_C = 5 V.

Parameters	Symbol	Unit	Min	Typ	Max	Remark
Primary nominal residual rms current	I_{PN}	A		0.6		
Primary residual current, measuring range	I_{PM}	A	-0.85		0.85	
Supply voltage	V_C	V	4.75	5	5.25	
Current consumption	I_C	mA		17.5	21.6	I_P(mA) / Na N_a = 1000 turns - 40°C …105°C
Reference voltage @ I_P = 0	V_{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V_{REF}	V	2.3		4	Internal reference of V_{ref} input = 499 Ω
Electrical offset current referred to primary	I_{OE}	mA	-24	4.2	24	
Temperature coefficient of VOE @ I_P = 0	TCV_{OE}	ppm/K			±520	ppm/K of 2.5 V −40 … 105 °C
Theoretical sensitivity	Gth	V/A		2.476		
Sensitivity error	ε_G	%	-0.7	0.5	0.7	R_L > 500 kΩ
Temperature coefficient of G	TCG	ppm/K			±100	- 40°C …105°C
Linearity error	ε_L	%		0.4	1.3	
Number of turns (test winding)	N_T			20		R_L > 500 kΩ, di/dt > 5 A/µs
Reaction time @ 10 % of I_{PRN}	t_{ra}	µs		5		R_L > 500 kΩ, di/dt > 5 A/µs
Step response time to 90 % of I_{PN}	t_r	µs		40		R_L > 500 kΩ
Frequency bandwidth (−3dB)	BW	kHz		15		R_L > 500 kΩ
Noise(1 Hz ~ 10 kHz)	V_{no}	mV rms		10		
Accuracy@ I_{PN} @TA = 25℃	$X_{25℃}$	% of I_{PN}		±1.9		
Accuracy@ I_{PN} @TA = 105℃	$X_{105℃}$	% of I_{PN}		±3.2		

4.　　Electrical data: SFG-1.0P/PF

At T_A = 25 ℃, V_C = 5 V.

Parameters	Symbol	Unit	Min	Typ	Max	Remark
Primary nominal residual rms current	I_{PN}	A		1		
Primary residual current, measuring range	I_{PM}	A	-1.7		1.7	
Supply voltage	V_C	V	4.75	5	5.25	
Current consumption	I_C	mA		17.5	21.6	I_P(mA) / Na N_a = 1000 turns - 40°C …105°C
Reference voltage @ I_P = 0	V_{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V_{REF}	V	2.3		4	Internal reference of V_{ref} input = 499 Ω
Electrical offset current referred to primary	I_{OE}	mA	-24	7	24	
Temperature coefficient of VOE @ I_P = 0	TCV_{OE}	ppm/K		±50	±500	ppm/K of 2.5 V −40 … 105 °C
Theoretical sensitivity	Gth	V/A		1.2		
Sensitivity error	ε_G	%	-1.6	0.5	1.6	R_L > 500 kΩ
Temperature coefficient of G	TCG	ppm/K			±400	- 40°C …105°C
Linearity error	ε_L	%		0.5	1	
Number of turns (test winding)	N_T			20		R_L > 500 kΩ, di/dt > 5 A/μs
Reaction time @ 10 % of I_{PRN}	t_{ra}	μs		7		R_L > 500 kΩ, di/dt > 5 A/μs
Step response time to 90 % of I_{PN}	t_r	μs		50		R_L > 500 kΩ, di/dt > 5 A/μs
Frequency bandwidth (−3dB)	BW	kHz		15		R_L > 500 kΩ
Noise(1 Hz ~ 10 kHz)	V_{no}	mV rms		10		R_L > 500 kΩ
Accuracy@ I_{PN} @TA = 25℃	$X_{25℃}$	% of I_{PN}		±1.9		
Accuracy@ I_{PN} @TA = 105℃	$X_{105℃}$	% of I_{PN}		±3.2		

5. Electrical data: SFG-3.0P/PF

At T_A = 25 ℃, V_C = 5 V.

Parameters	Symbol	Unit	Min	Typ	Max	Remark
Primary nominal residual rms current	I_{PN}	A		3		
Primary residual current, measuring range	I_{PM}	A	-5		5	
Supply voltage	V_C	V	4.75	5	5.5	
Current consumption	I_C	mA		17.5	21.6	I_P(mA) / Na N_a = 1000 turns - 40°C …105°C
Reference voltage @ I_P = 0	V_{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V_{REF}	V	2.3		4	Internal reference of V_{ref} input = 499 Ω
Electrical offset current referred to primary	I_{OE}	mA	-24	7	24	
Temperature coefficient of VOE @ I_P = 0	TCV_{OE}	ppm/K			570	ppm/K of 2.5 V −40 … 105 °C
Theoretical sensitivity	Gth	V/A		0.4		
Sensitivity error	ε_G	%	-1.6	0.5	1.6	R_L > 500 kΩ
Temperature coefficient of G	TCG	ppm/K		±400		- 40°C …105°C
Linearity error	ε_L	%		0.5	1	
Number of turns (test winding)	N_T			20		R_L > 500 kΩ, di/dt > 5 A/µs
Reaction time @ 10 % of I_{PRN}	t_{ra}	µs		5		R_L > 500 kΩ, di/dt > 5 A/µs
Step response time to 90 % of I_{PN}	t_r	µs		40		R_L > 500 kΩ
Frequency bandwidth (−3dB)	BW	kHz		15		R_L > 500 kΩ
Noise(1 Hz ~ 10 kHz)	V_{no}	mV rms		10		
Accuracy@ I_{PN} @TA = 25℃	$X_{25℃}$	% of I_{PN}		±1.9		
Accuracy@ I_{PN} @TA = 105℃	$X_{105℃}$	% of I_{PN}		±3.2		

6. SFG- P/PF Application information

Connection


7. SFG- P/PF PCB footprint

Recommended drill diameters | TOP side view
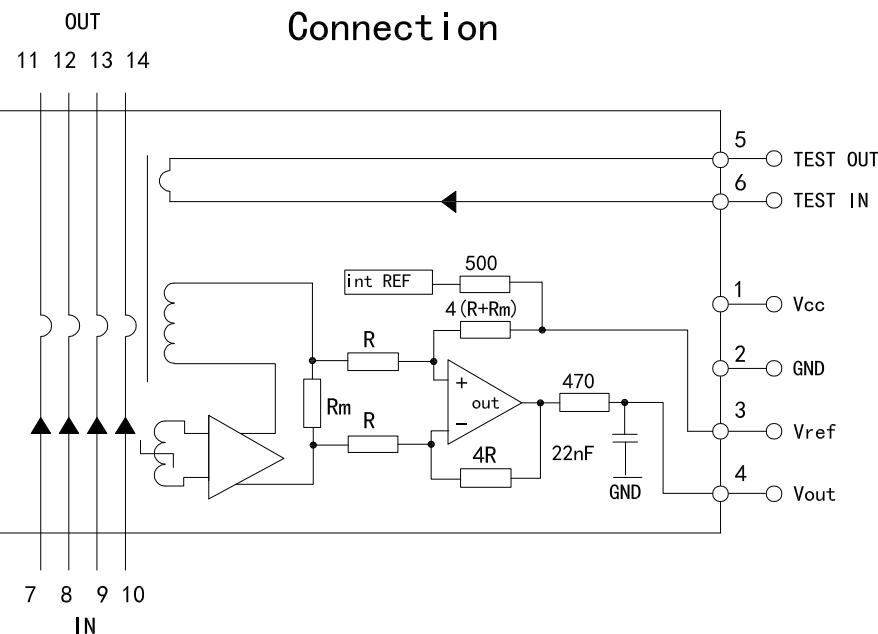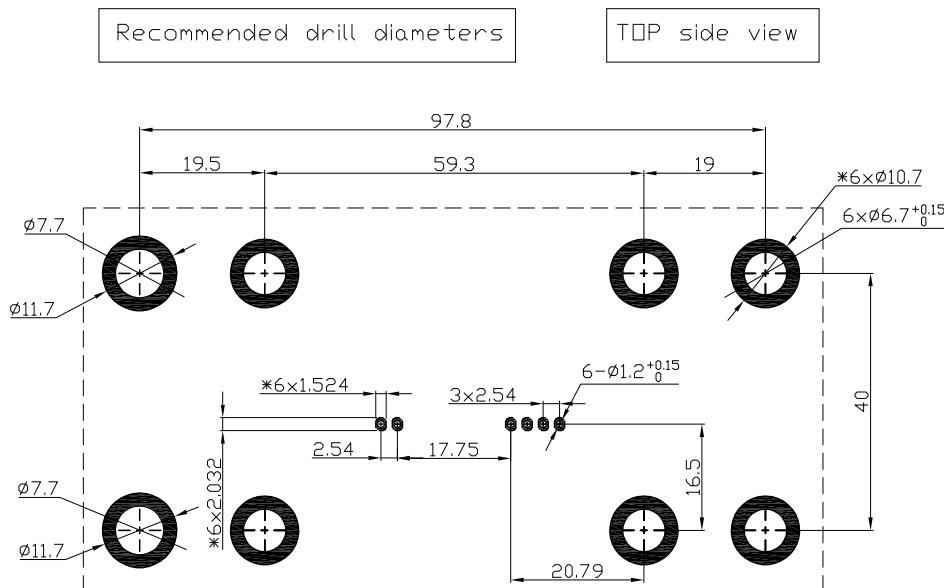
PCB holes diameter:
Secondary Pins:Ø1.2mm
Primary Pins:Ø6.7mm

✳=Pads design according to IPC 2221, IPC 2222

Assembly on PCB

- No Primary in shadow area
- Maximum PCB thickness 2.4 mm
- Wave-soldering：260°C @ 10 s
- Recommended PCB hole diameter 1.2 mm for secondary pin.

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8.   SFG- P/PF Dimensions

SFG-P/PF
X.X XXXXX
XXXXXXX
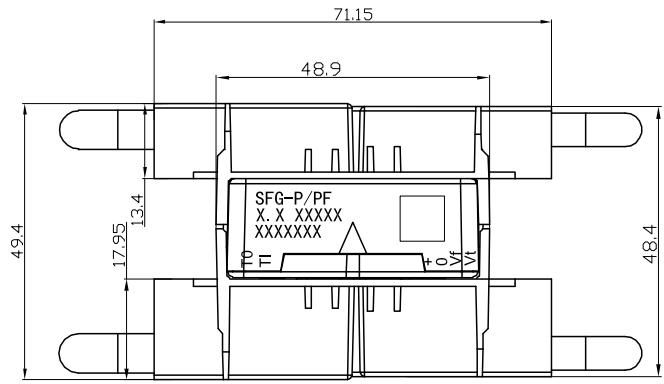
Terminals:

1	2	3
Vcc	GND	Vref
4	5	6
Vout	Test Out	Test In
7	8	9
Ip+	Ip+	Ip+
10	11	12
Ip+	Ip-	Ip-
13	14	
Ip-	Ip-	

Max=18.5

0.64*0.64
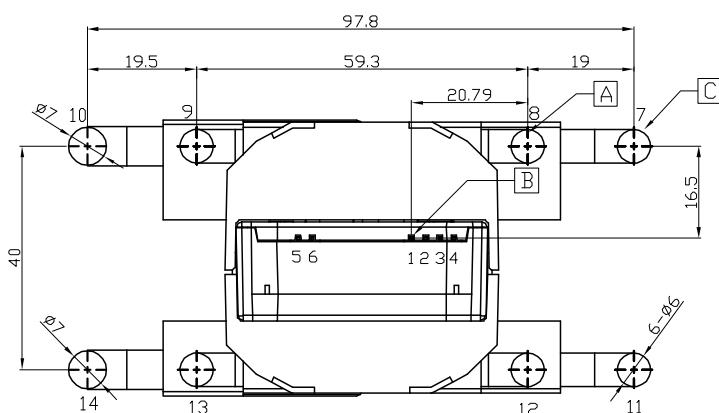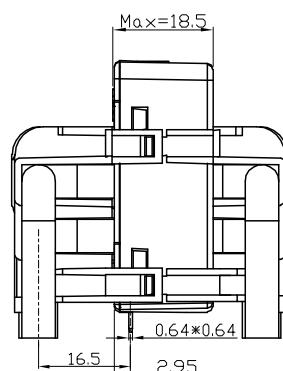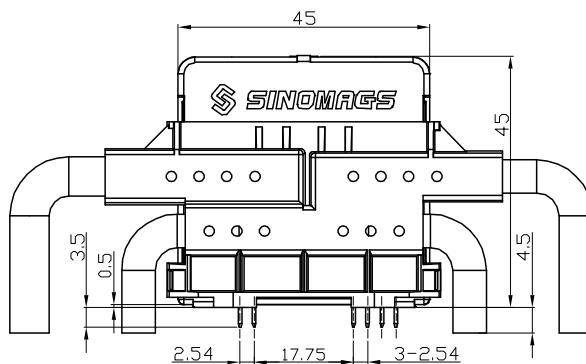
	d_{CI}	d_{Cp}
A-B	21mm	---
A-C	8mm	12mm
C-D	16.0mm	16.0mm

D is secondary inside
the transducer

On the customer's PCBA

	d_{CI}	d_{Cp}
A-B	14.5mm	14.5mm
A-C	8mm	8mm

Material : Fit UL94V-0 & RoHS
requirements ;
General tolerance : ±0.5
Unit :mm