Fluxgate system / Voltage-output type

F23PxxxS05R SERIES

ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Unit	Value	Comment
Supply voltage	Vcc	V	7	
Primary conductor temperature	—	℃	110	
ESD (HBM: Human Body Model)	—	kV	4	C=150pF, R=330 Ω

ISOLATION CHARACTERISTICS

Parameters	Symbol	Unit	Value	Comment
Insulation voltage	Vd	—	AC5000V, for 1minute (Sensing current 0.5mA)	Primary ⇔ Secondary
Insulation Resistance	R_{IS}	—	≧ 500M Ω (at DC500V)	Primary ⇔ Secondary
Clearance distance	d_{Cl}	—	11.0mm (MIN)	Primary ⇔ Secondary
Creepage distance	d_{Cp}	—	12.7mm (MIN)	Primary ⇔ Secondary
Case material	—	—	UL94 V-0	
Comparative Tracking Index ; (CTI)	CTI	V	600	
Application example	—	—	600V, CAT Ⅲ, PD2	Reinforced isolation,non uniform field according to EN62477-1 : 2012 and EN62477-1 : 2012/A11 2014, IEC61800-5-1
	—	—	1000V, CAT Ⅲ, PD2	Basic isolation,non uniform field according to EN62477-1 : 2012 and EN62477-1 : 2012/A11 2014, IEC61800-5-1

ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Parameters	Symbol	Unit	Value			Comment
			MIN	TYP	MAX	
Ambient operating temperature	T_A	℃	− 40		+ 85	
Ambient storage temperature	T_S	℃	− 40		+ 85	
Mass	m	g		13		

SPECIFICATIONS

Ta=+25℃,Np=1T,R_L=10kΩ,Vcc=+5V

Parameters		Symbol	Unit	Value			Comment
				MIN	TYP	MAX	
Primary nominal current	**F23P050S05R**	I_{PN}	A		50		
	F23P100S05R				100		
Primary current, measuring range (at Vcc=＋5V, Ta=＋85℃)	**F23P050S05R**	I_{PM}	A	－150		＋150	
	F23P100S05R			－200		＋200	
Supply Voltage		Vcc	V	4.75	5.00	5.25	
Number of primary turns		Np	T	1, 2, 3			
Number of secondary turns	**F23P050S05R**	Ns	T		1441		
	F23P100S05R				1127		
Consumption current (at If)	**F23P050S05R**	Icc	mA		55		Icc=20+I_{PN}／Ns
	F23P100S05R				110		
Reference voltage (output) (at IP=0A)		Vref1	V	2.495	2.500	2.505	Ref OUT mode
Reference voltage (input)		Vref2	V	0		4	Ref IN mode
Output voltage (at Ip=0A)		Vo	V		Vref1,Vref2		
Electrical offset voltage＊1	**F23P050S05R**	Voe	mV	－2.5		2.5	
	F23P100S05R						
Electrical offset current reffered to primary	**F23P050S05R**	Ioe	mA	－200		200	
	F23P100S05R			－400		400	
Temperature coefficient of Vref1		TCVref1	ppm/K		±5.0	±50	
Temperature coefficient of Output voltage (at Ip=0A)	**F23P050S05R**	TCVo	ppm/K		±3.0	±10	ppm/K of 2.5V (－40℃～＋85℃)
	F23P100S05R						
Theoretical sensitivity	**F23P050S05R**	Gth	mV/A		12.5		625mV (at I_{PN}) = | Vref - Vout | / I_{PN}
	F23P100S05R				6.25		
Sensitivity error		ε_G	%	－0.7		0.7	
Temperature coefficient of Sensitivity (at Ta=－40℃～＋85℃)		TCG	ppm/K			±40	
Linearity error (at IP)		ε_L	%	－0.1		0.1	
External recommended resistance of Vout		R_L	kΩ		10		
External recommended capacitance of Vout		C_L	pF			500	

＊1 Offset voltage value is after removal of core hysteresis.

SPECIFICATIONS

Ta=+25℃,Np=1T,R_L=10kΩ,Vcc=+5V

Parameters		Symbol	Unit	Value			Comment
				MIN	TYP	MAX	
Peak to peak output ripple at oscillator freqency (f typ =450kHz)	F23P050S05R	—	mV		5	20	R_L=1k Ω
	F23P100S05R						
Reaction time (at 10% of I_{PN})	F23P050S05R	t_{ra}	μs			0.5	R_L=1k Ω, di/dt=100A/μs
	F23P100S05R						
Response time (at 90% of I_{PN})	F23P050S05R	tr	μs			0.5	R_L=1k Ω, di/dt=100A/μs
	F23P100S05R						
Frequency bandwidth (± 3dB)		BW	kHz		100		R_L=1k Ω
Output Voltage Accuracy (Overall)	F23P050S05R	X_G	%			1.2	X_G= (100 × Voe/625) + ε_G + ε_L
	F23P100S05R						

STANDARDS

EN62477-1 : 2012 and EN62477-1 : 2012/A11 2014, EN(IEC)61800-5-1, UL508 (file No. E243511), CSA22.2 No.14-13

※ Please refer to the another sheet about conditions of UL Recognition.

Characteristic curve (TYP)

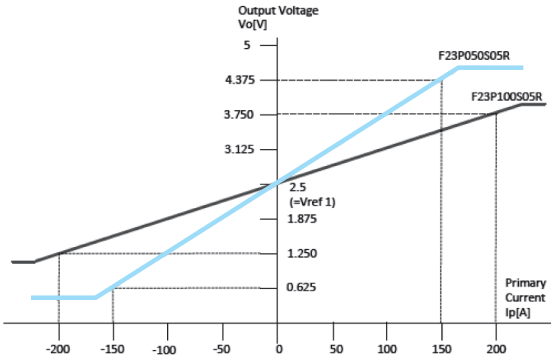


Figure 1 : Linearity curve (Internal reference voltage)
Measurement condition Ta=+25℃, R_L=10k Ω, Vcc=+5V

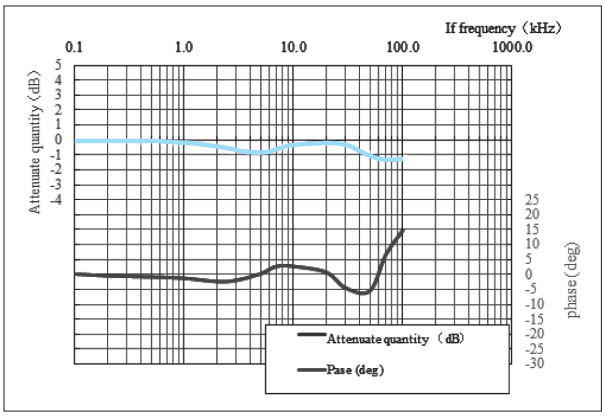


Figure 2 : Frequency response curve
ex) F23P100S05R
Measurement condition Ta=+25℃, R_L=1k Ω, Ip=3A × 3T, Vcc=+5V

SUPPORT DOCUMENTATION

Maximum continuous DC primary current

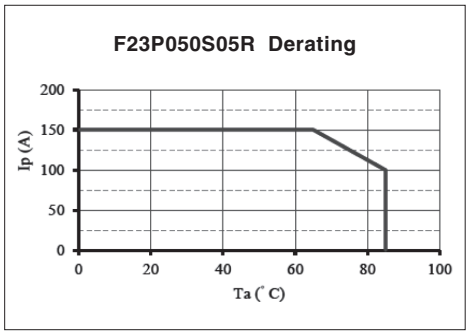


Figure 3 : Ip vs Ta for F23P050S05R

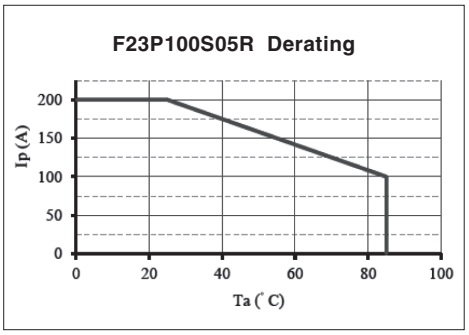


Figure 4 : Ip vs Ta for F23P100S05R
Measurement condition Vcc=+5V , R_L=10k Ω

According to which the following conditions are true the maximum continuous DC primary current plot shows the boundary of the area.

① Ip < Ipmax
② Junction temperature Tj < 125℃
③ Resistor power dissipation < 0.5 x rated power

Frequency derating

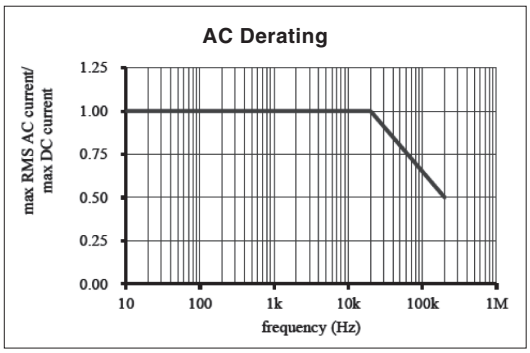


Figure 7 : Maximum RMS AC primary current/maximum DC primary current vs frequency

Reference voltage

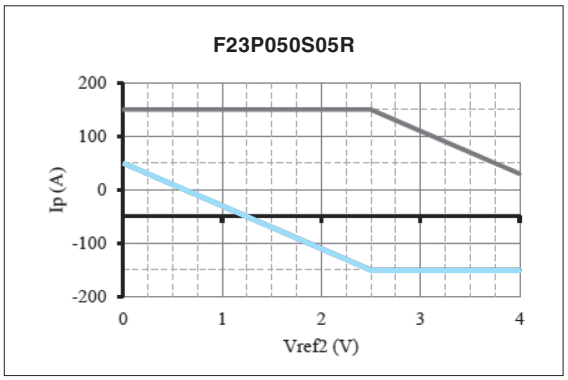
The Ref pin has two modes Ref IN and Ref OUT :

＜Ref OUT mode＞
The 2.5V internal precision reference is used by the transducer as the reference point for bipolar measurements;

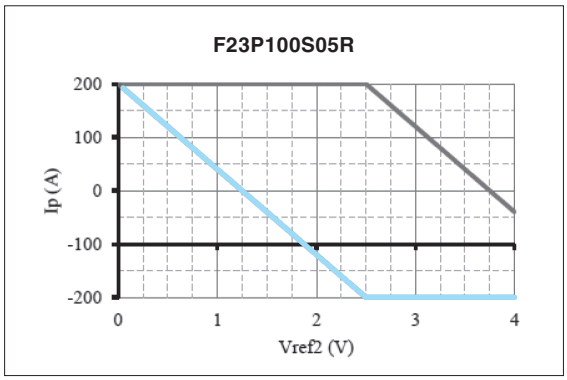
＜Ref IN mode＞
An external reference voltage is connected to the Ref pin; this voltage is specified in the range 0 to 4 V , its voltage is used as the reference voltage at the time of measurement.

-either to source a typical current of (Vref − 2.5) /680,the maximum value will be 2.2mA typ.when Vref2 = 4V.
-or to sink a typical current of (2.5 − Vref2) /680,the maximum value will be 3.68mA typ.when Vref2 = 0V.

The following graphs show how the measuring range of each transducer version depends on external reference voltage value Vref2.



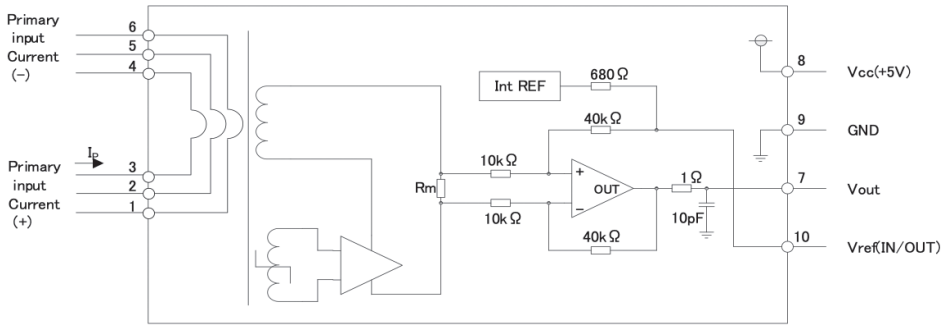
Upper limit : Ip = 150 (Vref2 = 0...2.5V)
Ip = − 80 × Vref2 + 350 (Vref2 = 2.5...4V)
Lower limit : Ip = − 80 × Vref2 + 50 (Vref2 = 0...2.5V)
Ip = − 150 (Vref2 = 2.5...4V)



Upper limit : Ip = 200 (Vref2 = 0...2.5V)
Ip = − 160 × Vref2 + 600 (Vref2 = 2.5...4V)
Lower limit : Ip = − 160 × Vref2 + 200 (Vref2 = 0...2.5V)
Ip = − 200 (Vref2 = 2.5...4V)

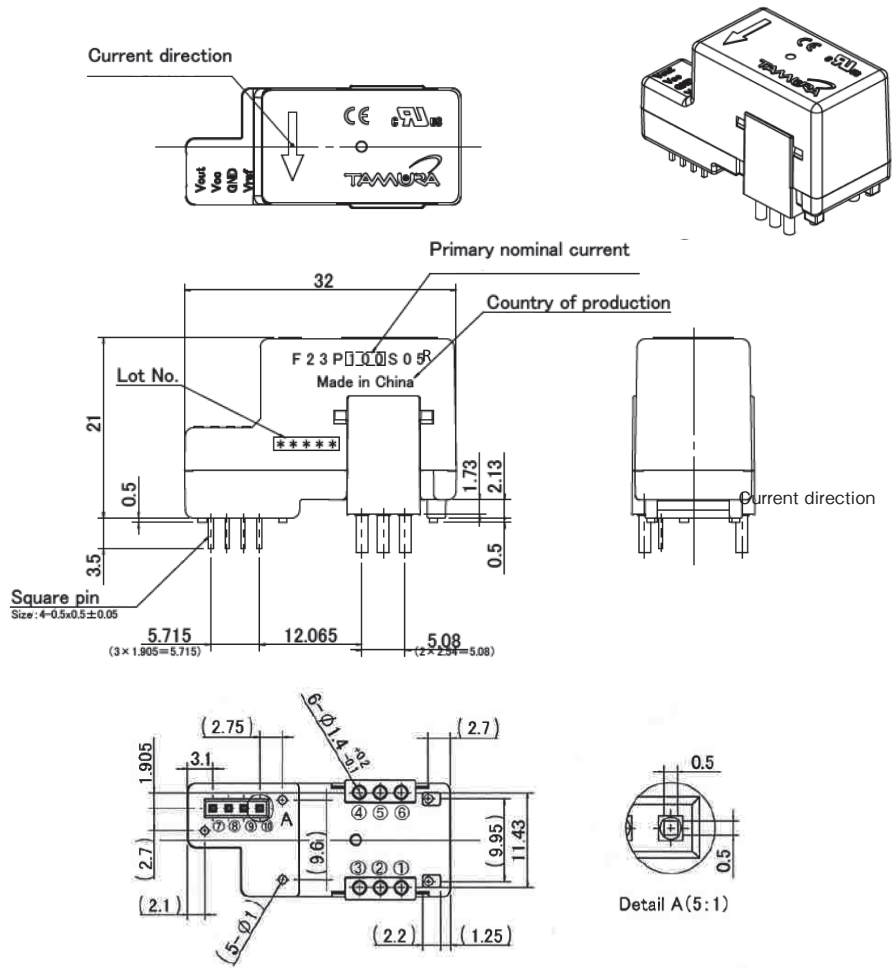
If you do not want to use the Ref pin, please unconnected.

CONNECTION



Primary winding Np	Primary current Ip [A]	wiring	Primary resistance Rp [mΩ]
3	Ip/3	Primary input current(+) 3 2 1 — 4 5 6 Primary input current(-)	1
2	Ip/2	Primary input current(+) 3 2 1 — 4 5 6 Primary input current(-)	0.45
1	Ip	Primary input current(+) 3 2 1 — 4 5 6 Primary input current(-)	0.1

DIMENSIONS (mm)



Terminal No.

① Primary input current 1 (+)
② Primary input current 2 (+)
③ Primary input current 3 (+)
④ Primary input current 3 (−)
⑤ Primary input current 2 (−)
⑥ Primary input current 1 (−)
⑦ Vout
⑧ Vcc (+5V)
⑨ GND
⑩ Vref (IN/OUT)

※ Tolerance: ± 0.2
Unit: mm

RECOMMENDED HOLE DIAMETER (mm)