TAMURA CURRENT SENSORS

Fluxgate system ／ Voltage-output type

F01P***S05 SERIES

rev A / May 2013

ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Unit	Value	Comment
Supply voltage	Vcc	V	7	
Primary conductor temperature	—	℃	110	
Non repetitive primary current pulse(20μS), in powered or unpowered state.	Îp	A	20 × If	
ESD(HBM: Human Body Model)	—	kV	4	C=100pF, R=1.5kΩ

ISOLATION CHARACTERISTICS

Parameters	Symbol	Unit	Value	Comment
Insulation voltage	Vd	—	AC4200V, for 1minute(Sensing current 0.5mA)	Primary ⇔ Secondary
Insulation Resistance	R_{is}	—	≧ 500MΩ(at DC500V)	Primary ⇔ Secondary
Clearance distance	dCi	—	7.7mm(TYP)	Primary ⇔ Secondary
Creepage distance	dCp	—	7.7mm(TYP)	Primary ⇔ Secondary
Case material	—	—	UL94 V-0	
Comparative Tracking Index: (CTI)	CTI	V	600	
Application example	—	—	300V, CAT Ⅲ, PD2	Reinforced isolation,non uniform field according to EN50178, EN61010
	—	—	600V, CAT Ⅲ, PD2	Simple isolation,non uniform field according to EN50178, EN61010

ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Parameters	Symbol	Unit	Value			Comment
			MIN	TYP	MAX	
Ambient operating temperature	Ta	℃	−40		+105	
Ambient storage temperature	T_s	℃	−40		+105	
Mass	m	g		12		

SPECIFICATIONS

Ta=+25℃, RL=10kΩ, Vcc=+5V

Parameters		Symbol	Unit	Value MIN	Value TYP	Value MAX	Comment
Rated Current	F01P006S05	If	A		6		
	F01P015S05				15		
	F01P025S05				25		
	F01P050S05				50		
Maximum current(at Vcc=+5V, Ta=+105℃)	F01P006S05	Ipmax	A	−20		20	
	F01P015S05			−51		51	
	F01P025S05			−85		85	
	F01P050S05			−150		150	
Supply Voltage		Vcc	V	4.75	5.00	5.25	
Number of primary turns		Np	T		1, 2, 3		
Number of secondary turns	F01P006S05	Ns	T		1816		
	F01P015S05				1737		
	F01P025S05				1764		
	F01P050S05				1600		
Consumption current (at If)	F01P006S05	Icc	mA		25		Icc=15+Ip(mA)／Ns
	F01P015S05				30		
	F01P025S05				35		
	F01P050S05				55		
Output voltage		Vo	V	0.375		4.625	
Output voltage(at Ip=0A)		Vo	V		2.5		
Electrical offset voltage	F01P006S05	Voe	mV	−10.40		10.40	
	F01P015S05			−7.10		7.10	
	F01P025S05			−6.25		6.25	
	F01P050S05			−5.80		5.80	
Electrical offset current reffered to primary	F01P006S05	Ioe	A	−0.10		0.10	
	F01P015S05			−0.17		0.17	
	F01P025S05			−0.25		0.25	
	F01P050S05			−0.46		0.46	
Temperature coefficient of Output voltage(at Ip=0A)	F01P006S05	TCVo	ppm/K		±10.0	±80.0	ppm/K of 2.5V
	F01P015S05				±7.5	±70.0	(−40℃～+105℃)
	F01P025S05				±6.5	±60.0	
	F01P050S05				±6.0	±60.0	
Sensitivity(Theoretical value)	F01P006S05	Gth	mV/A		104.2		625mV/If
	F01P015S05				41.67		
	F01P025S05				25		
	F01P050S05				12.5		
Sensitivity error		ε_G	%	−0.7		0.7	
Temperature coefficient of Sensitivity(at Ta=−40℃～+105℃)		TCG	ppm/K			±40	
Output Linearity		ε_L	%	−0.1		0.1	
Magnetic offset current reffered to primary(at 10×If)		I_{OM}	A	−0.1		0.1	
Output current noise reffered to primary(at 100Hz～100kHz)	F01P006S05	Ino	$\mu A/(Hz)^{1/2}$		36		RL=1kΩ
	F01P015S05				90		
	F01P025S05				150		
	F01P050S05				300		

Offset voltage value is after removal of core hysteresis.

SPECIFICATIONS

Ta=+25℃, RL=10kΩ, Vcc=+5V

Parameters		Symbol	Unit	Value MIN	Value TYP	Value MAX	Comment
Peak to peak output ripple at oscillator freqency(f typ=450kHz)	F01P006S05	—	mV		40	160	RL=1kΩ
	F01P015S05				15	60	
	F01P025S05				10	40	
	F01P050S05				5	20	
Reaction time(at 10% of If)	F01P006S05	tra	μs			0.3	RL=1kΩ, di/dt=18A/μs
	F01P015S05					0.3	RL=1kΩ, di/dt=44A/μs
	F01P025S05					0.3	RL=1kΩ, di/dt=68A/μs
	F01P050S05					0.3	RL=1kΩ, di/dt=100A/μs
Response time 1 (at 90% of If)	F01P006S05	tr	μs			0.3	RL=1kΩ, di/dt=18A/μs
	F01P015S05					0.3	RL=1kΩ, di/dt=44A/μs
	F01P025S05					0.3	RL=1kΩ, di/dt=68A/μs
	F01P050S05					0.3	RL=1kΩ, di/dt=100A/μs
Response time 2 (at 10% of If to 90% of Vo)		tr	μs			0.6	RL=1kΩ, di/dt=If/μs
Frequency bandwidth(±1dB)		BW	kHz	200			RL=1kΩ
Frequency bandwidth(±3dB)		BW	kHz	300			RL=1kΩ
Output Voltage Accuracy(Overall)	F01P006S05	X_G	%			2.5	$X_G=(100\times Voe/625)+\varepsilon_G+\varepsilon_L$
	F01P015S05					1.9	
	F01P025S05					1.8	
	F01P050S05					1.7	

STANDARDS

EN50178, EN61010-1, EN60950-1, UL508(file №E243511)

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

Characteristic curve(TYP)

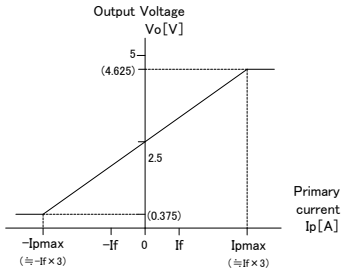


Figure 1:Linearity curve

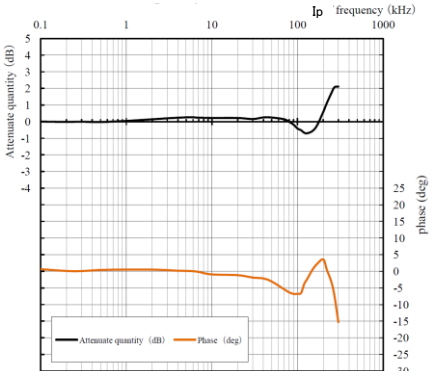


Figure 2:Frequency response curve

ex)F01P025S05

Measurement condition Ta=+25℃, RL=1kΩ, Ip=3A, Vcc=+5V

SUPPORT DOCUMENTATION

Maximum continuous DC primary current

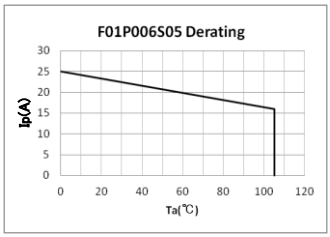


Figure 3 : Ip vs Ta for F01P006S05

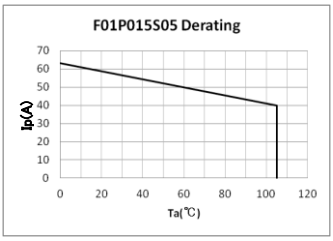


Figure 4 : Ip vs Ta for F01P015S05

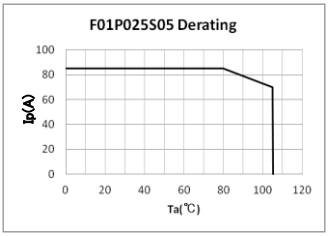


Figure 5 : Ip vs Ta for F01P025S05

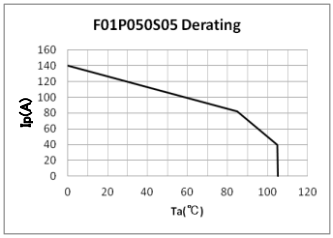


Figure 6 : Ip vs Ta for F01P050S05

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

①Ip ＜ Ipmax
②Junction temperature Tj ＜ 125℃
③Primary conductor temperature ＜ 110℃
④Resistor power dissipation ＜ 0.5 x rated power

Frequency derating

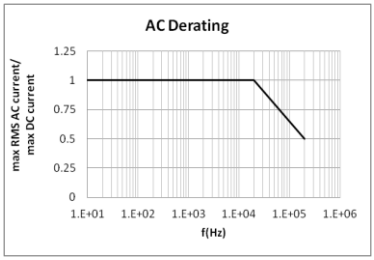
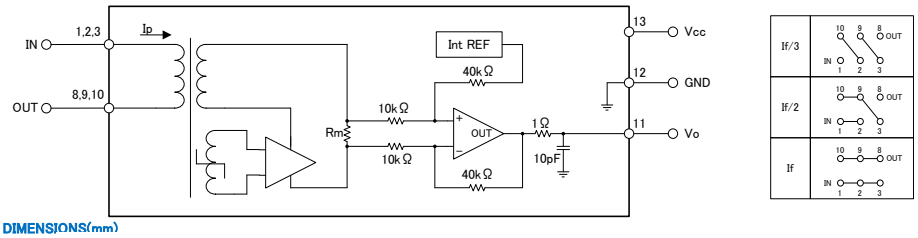
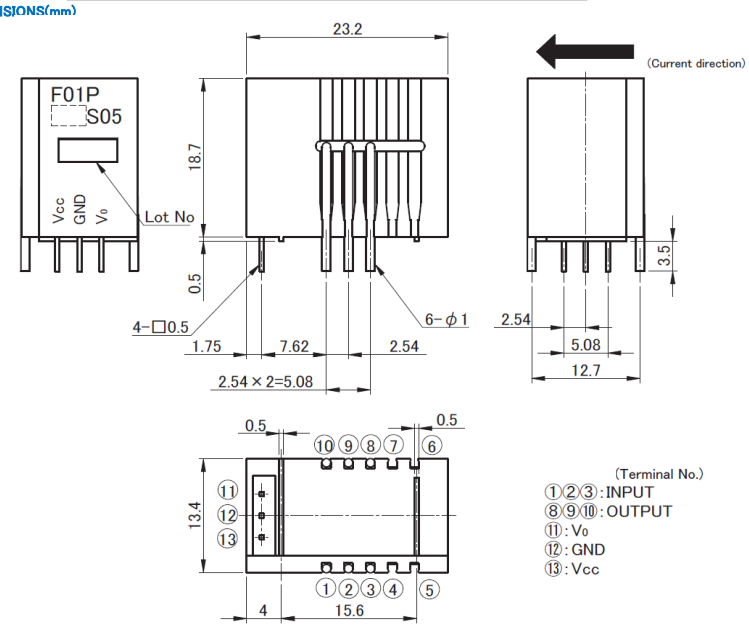


Figure 7 : Maximum RMS AC primary current/maximum DC primary current vs frequency

CONNECTION



DIMENSIONS(mm)



(Terminal No.)
①②③:INPUT
⑧⑨⑩:OUTPUT
⑪:Vo
⑫:GND
⑬:Vcc

※
(Unless otherwise specified tolerances shall be ±0.5)

RECOMMENDED HOLE DIAMETER(mm)