



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## Current Sensor : F03P\*\*\*S05L



### Features:

- Backward compatible to F02PS\*\*\*05 series
- Anti-Surge current (4kAT, 8/20uS, single)
- Mounting area reduced ; pin compatible. Longitudinal dimension reduced
- Super precision & High Stability (low temperature, drift)
- Unipolar power voltage ; +5V
- Multi-range models

### Comparison of the main features of F\*\*\*\*\*S05L series

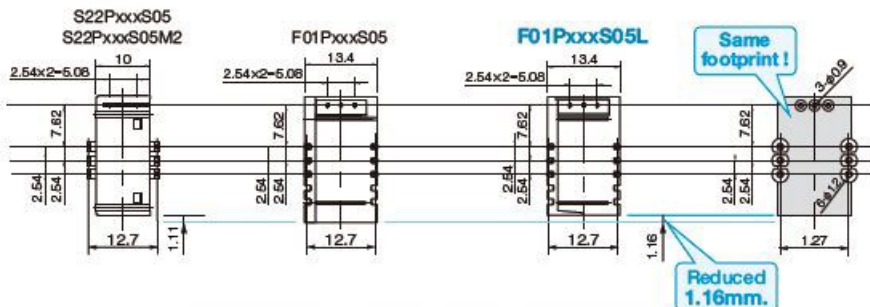
Series	Features
F01P***S05L	No reference access
F02P***S05L	No reference access. Ref In/Out
F03P***S05L	No reference access. Ref In/Out. Higher creep age and clearance distance.

\*\*\* = Rated Current Symbol

### Specification

	F03P***S05L
Maximum Peak Current	4kAT (2kAx2. Number of primary turns is two turns)
Rated Current If (***= rated current symbol)	6A(006) / 15A(015) / 25A(025) 50A(050)
Maximum Current	$\pm 20A(I_f=6A)$ / $\pm 51A(I_f=15A)$ / $\pm 85A(I_f=25A)$ / $\pm 150A(I_f=50A)$
Existence of reference access	Yes
Number of primary busbar	4 pcs
Clearance distance ; Primary ↔ Secondary	8.2 mm
Standards	UL508 (file#E243511) , EN501758, EN61010-1 , EN60950-1
Ambient Operating Temperature	-40°C ~ +105°C

### Mounting Area



The F02P/F03PxxxS05L series also similarly reduces the mounting area.

The mounting area has been reduced more than the F03P series. However, F03P\*\*\*S05L series are 100% compatible with original footprint mounting.

## Current Sensor : F03P\*\*\*S05L

### Absolute Maximum Rating

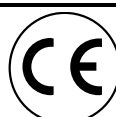
	Symbol	Unit	Value	Notes
Supply Voltage	Vcc	V	7	
Primary Conductor Temperature	-	°C	110	
ESD (HBM: Human Body Model)	-	kV	4	C=100pF , R=1.5kΩ
Maximum Peak Current	-	kAT	4	Current Waveform : <ul style="list-style-type: none"> <li>• Front time 8μs</li> <li>• Time to half value 20μs</li> <li>• Single</li> </ul>

### Isolation Characteristics

	Symbol	Unit	Value	Notes
Insulation Voltage	Vd	-	AC4300V for 1 min. (Sensing Current 0.5mA)	Primary↔Secondary
Insulation Resistance	Ris	-	≥500mΩ (@DC500V)	Primary↔Secondary
Clearance distance	dCi	-	8.2mm (TYP)	Primary↔Secondary
Creep age distance	dCp	-	8.2mm (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 EN61010
	-	-	600V , CAT III , PD2	Simple isolation Non uniform field according to EN50178
	-	-	1000V , CAT III , PD2	Simple isolation Non uniform field according to EN50178 ,

### Environmental and Mechanical Characteristics

	Symbol	Unit	Value		
			min	typ	max
Ambient Operating Temperature	Ta	°C	- 40		+ 105
Ambient Storage Temperature	Ts	°C	- 40		+105
Mass	-	g		12	





## Current Sensor : F03P\*\*\*S05L

### Specification

(\*1) = Offset voltage value is after removal of core hysteresis

		Symbol	Unit	Value			Notes
				min	typ	max	
Rated Current	F03P006S05L	If	A		6		
	F03P015S05L				15		
	F03P025S05L				25		
	F03P050S05L				50		
Maximum Current (@ Vcc : +5V , Ta : +105°C)	F03P006S05L	Ipmax	A	- 20		20	
	F03P015S05L			- 51		51	
	F03P025S05L			- 85		85	
	F03P050S05L			- 150		150	
Supply Voltage		Vcc	V	4.75	5.00	5.25	
Number of primary turns		Np	T	1,2,3,4			
Number of secondary turns	F03P006S05L	Ns	T		1816		
	F03P015S05L				1737		
	F03P025S05L				1764		
	F03P050S05L				1600		
Consumption current (at If)	F03P006S05L	Icc	mA		25		Icc=15+Ip(mA) / Ns
	F03P015S05L				30		
	F03P025S05L				35		
	F03P050S05L				55		
Internal Reference Voltage (@Ip=0A)		Vref1	V	2.495	2.500	2.505	Ref OUT mode
External Reference Voltage		Vref2	V	0		4	Ref IN mode
Output Voltage		Vo	V	0.375		4.625	
Output Voltage (Ip=0A)		Vo	V		Vref1, Vref 2		
Electrical Offset Voltage (*1)	F03P006S05L	Voe	mV	- 5.300		5.300	
	F03P015S05L			- 2.210		2.210	
	F03P025S05L			- 1.35		1.35	
	F03P050S05L			- 0.725		0.725	
Electrical Offset Current referred to primary	F03P006S05L	loe	mA	- 51		51	
	F03P015S05L			- 53		53	
	F03P025S05L			- 54		54	
	F03P050S05L			- 58		58	

## Current Sensor : F03P\*\*\*S05L

### Specification

		Symbol	Unit	Value			Notes
				min	typ	max	
Temperature coefficient of Internal reference voltage		TCVref1	ppm/K		±5.0	±50	
Temperature coefficient of Output voltage (@ Ip=0A)	F03P006S05L	TCVo	ppm/K		±6.0	±14	ppm/K of 2.5V (-40°C~+105°C)
	F03P015S05L				±2.3	±6	
	F03P025S05L				±1.4	±4	
	F03P050S05L				±0.7	±3	
Sensitivity (Theoretical value)	F03P006S05L	Gth	mV/A		104.2		625mV/If
	F03P015S05L				41.67		
	F03P025S05L				25		
	F03P050S05L				12.5		
Sensitivity Error		ε <sub>G</sub>	%	- 0.7		0.7	
Temperature coefficient of Sensitivity (@Ta=-40°C~+105°C)		TCG	ppm/K			±40	
Output Linearity		ε <sub>L</sub>	%	- 0.1		0.1	
Magnetic offset current referred to primary (@ 10xf)		Iom	A	- 0.1		0.1	
Output current noise referred to primary (@ 100Hz~100kHz)		I <sub>no</sub>	μA/(Hz) <sup>1/2</sup>		20		RL=1kΩ
Peak to peak output ripple at oscillator frequency (If typ=450kHz)	F03P006S05L	-	mV		40	160	RL=1kΩ
	F03P015S05L				15	60	
	F03P025S05L				10	40	
	F03P050S05L				5	20	
Reaction time (@ 10% of If)	F03P006S05L	tra	μs			0.3	RL=1kΩ, di/dt=18A/μs
	F03P015S05L					0.3	RL=1kΩ, di/dt=44A/μs
	F03P025S05L					0.3	RL=1kΩ, di/dt=68A/μs
	F03P050S05L					0.3	RL=1kΩ, di/dt=100/μs
Response time (@90% of If)	F03P006S05L	tr	μs			0.3	RL=1kΩ, di/dt=18A/μs
	F03P015S05L					0.3	RL=1kΩ, di/dt=44A/μs
	F03P025S05L					0.3	RL=1kΩ, di/dt=68A/μs
	F03P050S05L					0.3	RL=1kΩ, di/dt=100/μs

# Current Sensor : F03P\*\*\*S05L

## Specification

	Symbol	Unit	Value			Notes
			min	typ	max	
Response time 2 (@ 10% of $I_f$ to 90% of $V_o$ )	$t_r$	$\mu s$			0.6	$R_L=1k\Omega$
Frequency bandwidth ( $\pm 1dB$ )	BW	kHz	200			$R_L=1k\Omega$
Frequency bandwidth ( $\pm 3dB$ )	BW	kHz	300			$R_L=1k\Omega$
Output Voltage Accuracy (Overall)	F03P006S05L	$X_G$	%		1.7	$X_G=(100 \times V_{oe}/625)+\epsilon_G+\epsilon_L$
	F03P015S05L				1.2	
	F03P025S05L				1.0	
	F03P050S05L				0.9	

## Standards

EN 50178 ; EN 61010-1 ; EN 60950-1 ; UL 508 (file no. E243511)

## Characteristic Curve (TYP)

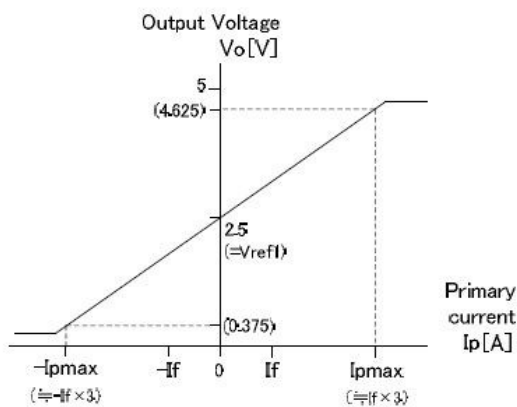


Figure 1: Linearity curve (Internal reference voltage)

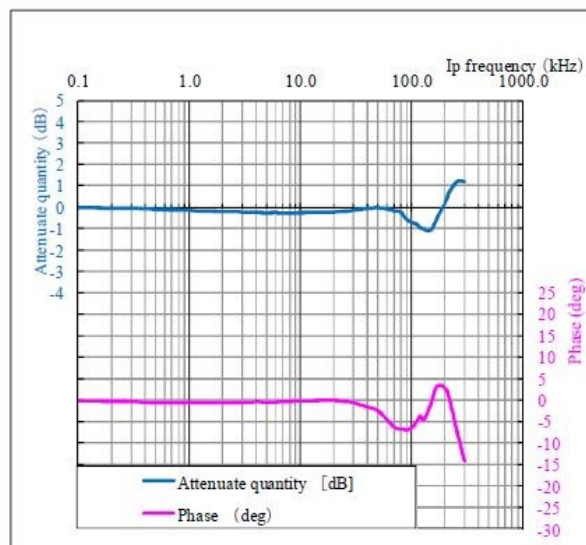


Figure 2: Frequency response curve

ex) F03P025S05L

Measurement condition  $T_a=+25^\circ C$ ,  $R_L=1k\Omega$ ,  $I_p=3A$ ,  $V_{cc}=+5V$

# Current Sensor : F03P\*\*\*S05L

## Maximum Continuous DC primary current

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

1.  $I_p < I_{pmax}$
2. Junction temperature  $T_j < 125^\circ\text{C}$
3. Primary conductor temperature  $< 110^\circ\text{C}$
4. Resistor power dissipation  $< 0.5 \times \text{rated power}$

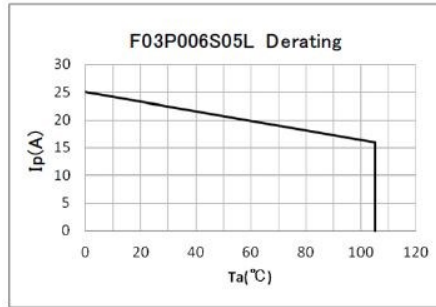


Figure 3:  $I_p$  vs  $T_a$  for F03P006S05L

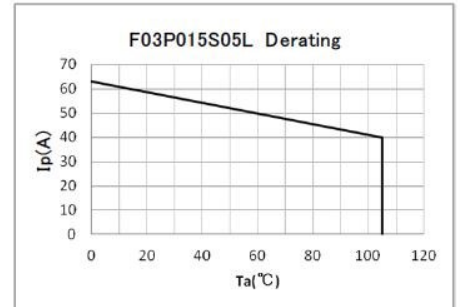


Figure 4:  $I_p$  vs  $T_a$  for F03P015S05L

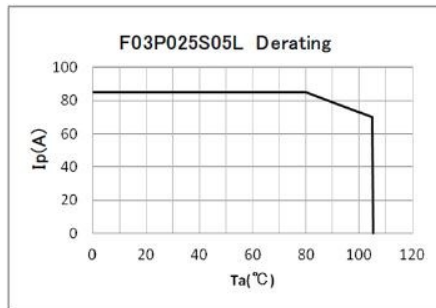


Figure 5:  $I_p$  vs  $T_a$  for F03P025S05L

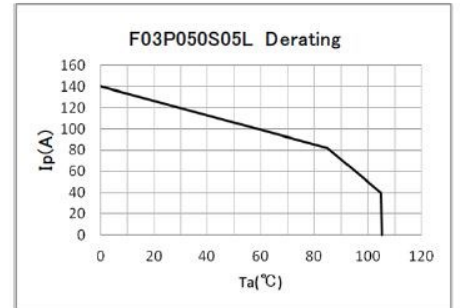


Figure 6:  $I_p$  vs  $T_a$  for F03P050S05L

## Frequency Derating

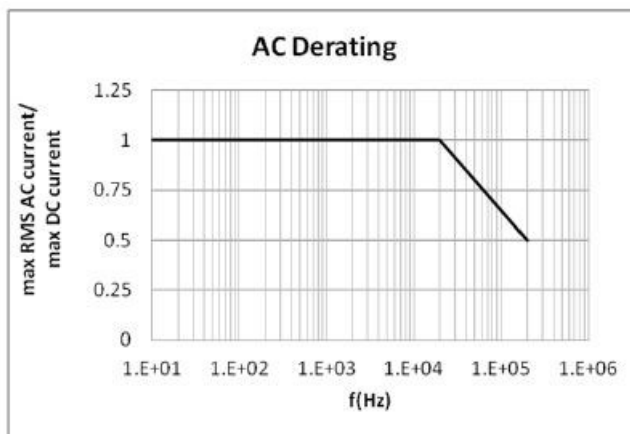


Figure 7 : Maximum RMS AC primary current / maximum DC primary current vs frequency

# Current Sensor : F03P\*\*\*S05L

## Reference voltage

Ref pin has two modes Ref IN and Ref OUT.

<Ref OUT mode>

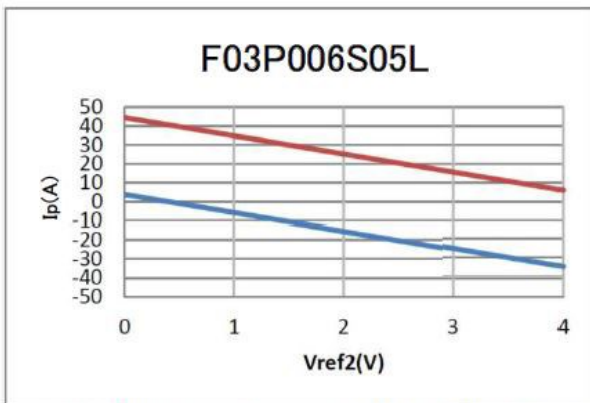
The 2.5V internal precision reference is used by the transducer as the reference point for bipolar measurement.

<Ref IN mode>

An external reference voltage is connected to the Ref pin; this voltage is specified in the range 0 to 4V. Its voltage is used as the reference voltage at the time of measurement.

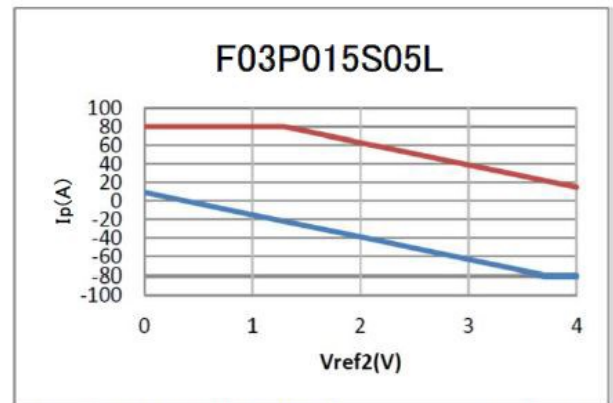
- Typical Source Current (Vref 2- 2.5) / 680  
The maximum value will be 2.2mA typ when Vref2=4V
- Typical Sink Current (Vref 2 - 2.5) / 680  
The maximum value will be 3.68mA typ. When Vref2=0V

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



Upper limit:  $I_p = -9.6 \times V_{ref2} + 44.4$  (Vref2=0...4V)

Lower limit:  $I_p = -9.6 \times V_{ref2} + 3.6$  (Vref2=0...4V)

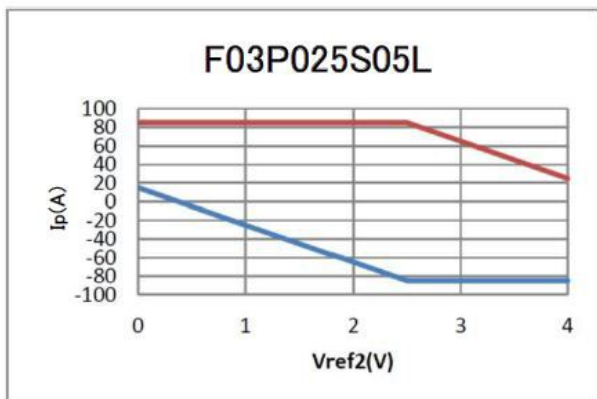


Upper limit:  $I_p = 80$  (Vref2=0...1.29V)

$I_p = -24 \times V_{ref2} + 111$  (Vref2=1.29...4V)

Lower limit:  $I_p = -24 \times V_{ref2} + 9$  (Vref2=0...3.7V)

$I_p = -80$  (Vref2=3.7...4V)

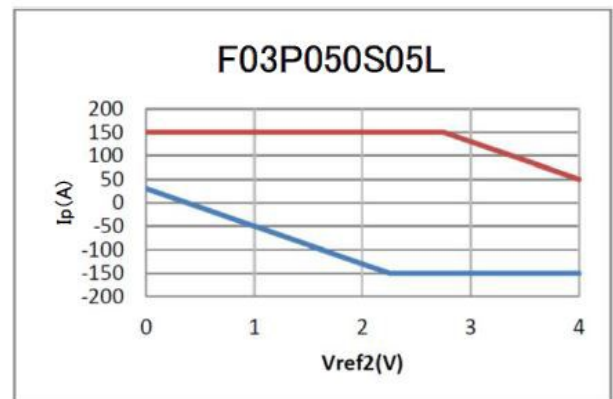


Upper limit:  $I_p = 85$  (Vref2=0...2.5V)

$I_p = -40 \times V_{ref2} + 185$  (Vref2=2.5...4V)

Lower limit:  $I_p = -40 \times V_{ref2} + 15$  (Vref2=0...2.5V)

$I_p = -85$  (Vref2=2.5...4V)



Upper limit:  $I_p = 150$  (Vref2=0...2.75V)

$I_p = -80 \times V_{ref2} + 370$  (Vref2=2.75...4V)

Lower limit:  $I_p = -80 \times V_{ref2} + 30$  (Vref2=0...2.25V)

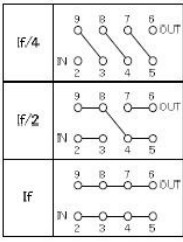
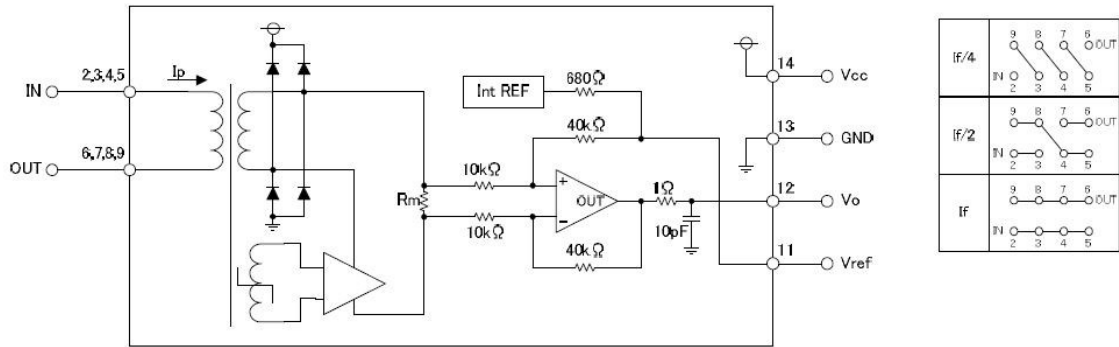
$I_p = -150$  (Vref2=2.25...4V)

If do not prefer to use the Ref pin, please disconnect.

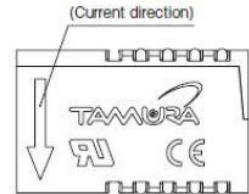
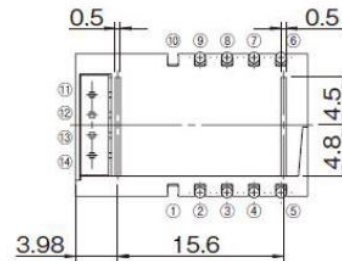
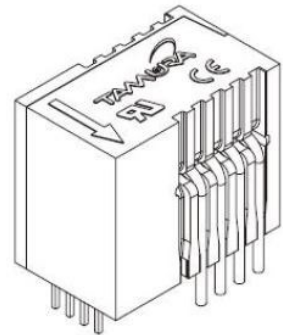
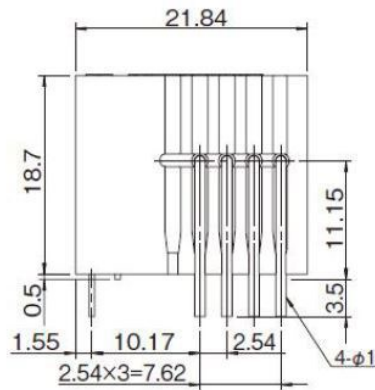
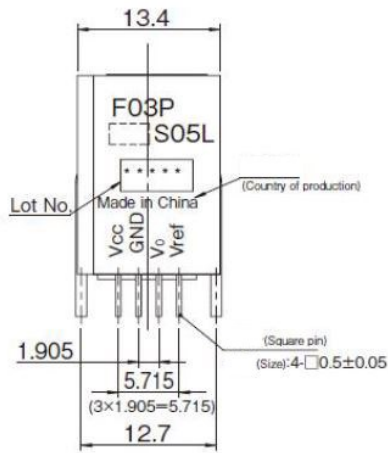


# Current Sensor : F03P\*\*\*S05L

## Connection



## Dimensions (mm)



Terminal number	
① -	⑧ Output
② Input	⑨ Output
③ Input	⑩ -
④ Input	⑪ Vref
⑤ Input	⑫ Vo
⑥ Output	⑬ GND
⑦ Output	⑭ Vcc

### Note

1. Unless otherwise specified, tolerances shall be  $\pm 0.25$ mm
2. Unit is [mm]

## Recommended Hole Diameter (mm)

