

## Magnetic Proportion System / Through Type

# L37S S05 SERIES



RoHS

### ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Unit	Value	Comment
Supply voltage	V <sub>cc</sub>	V	+ 7V	

### ISOLATION CHARACTERISTICS

Parameters	Symbol	Unit	Value	Comment
Insulation voltage	V <sub>d</sub>	—	AC3300V, for 1minute (Sensing current 0.5mA)	Primary ⇔ Secondary
Impulse withstand voltage	V <sub>w</sub>	kV	6.0	Primary ⇔ Secondary Input waveform : • Front time 1.2μs • Time to half value 50μs • single
Insulation resistance	R <sub>IS</sub>	—	≥ 1000M Ω (at DC500V)	Primary ⇔ Secondary
Clearance distance	d <sub>ci</sub>	—	6.5mm (MIN)	Primary ⇔ Secondary
Creepage distance	d <sub>cp</sub>	—	6.5mm (MIN)	Primary ⇔ Secondary
Case material	—	—	UL94 V-0	
Comparative tracking index; (CTI)	CTI	V	200 ( group IIIa )	
Application example	—	—	300V, CAT III, PD2	Reinforced isolation, non uniform field according to EN62477-1 : 2012 and EN62477-1 : 2012/ A11 2014, IEC/EN 61010-1
	—	—	600V, CAT III, PD2	Basic isolation, non uniform field according to EN62477-1 : 2012 and EN62477-1 : 2012/A11 2014, IEC/EN 61010-1

### ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Parameters	Symbol	Unit	Value			Comment
			MIN	TYP	MAX	
Ambient operating temperature	T <sub>A</sub>	°C	− 40		+ 85	
Ambient storage temperature	T <sub>S</sub>	°C	− 40		+ 85	
Mass	m	g		62		

## SPECIFICATIONS

Ta=+25°C, R<sub>L</sub>=10kΩ, V<sub>CC</sub>=±15V

Parameters		Symbol	Unit	Value			Comment
				MIN	TYP	MAX	
Primary nominal current	L37S050S05 *	I <sub>PN</sub>	A		50		
	L37S100S05 *				100		
	L37S200S05 *				200		
	L37S300S05 *				300		
	L37S400S05 *				400		
	L37S500S05 *				500		
	L37S600S05 *				600		
Primary current, measuring range	L37S050S05 *	I <sub>PM</sub>	A	150			
	L37S100S05 *			300			
	L37S200S05 *			600			
	L37S300S05 *			900			
	L37S400S05 *			900			
	L37S500S05 *			900			
	L37S600S05 *			900			
Supply voltage		V <sub>CC</sub>	V	4.75	5.00	5.25	
Consumption current		I <sub>CC</sub>	mA		15	20	
Reference voltage (output)		V <sub>REF1</sub>	V	2.475	2.495	2.515	at I <sub>P</sub> = 0A
Reference voltage (input) * 1		V <sub>REF2</sub>	V	1.500		2.800	
Reference internal output resistance		R <sub>REF</sub>	Ω		200		
Reference internal output capacitance		C <sub>REF</sub>	nF		47		
Output voltage		V <sub>O</sub>	V	V <sub>O</sub> + 0.625V ± 0.015V			at I <sub>P</sub>
Offset voltage * 2		V <sub>OF</sub>	V				at I <sub>P</sub> = 0A
Hysteresis error		V <sub>OH</sub>	mV			± 20	at 0A → I <sub>PN</sub> → 0A
Temperature coefficient of V <sub>REF1</sub>		T <sub>C</sub> V <sub>REF1</sub>	ppm/K				at I <sub>P</sub> = 0A
Temperature coefficient of V <sub>O</sub>		T <sub>C</sub> V <sub>O</sub>	%/K			± 0.1	Without T <sub>C</sub> V <sub>OF</sub>
Temperature coefficient of V <sub>OF</sub>	L37S050S05 *	T <sub>C</sub> V <sub>OF</sub>	mV/K			± 1.0	at I <sub>P</sub> = 0A
	L37S100S05 *					± 1.0	
	L37S200S05 *					± 1.0	
	L37S300S05 *					± 0.3	
	L37S400S05 *					± 0.3	
	L37S500S05 *					± 0.3	
	L37S600S05 *					± 0.3	
Linearity error 1		ε <sub>L1</sub>	%	− 0.5		+ 0.5	at I <sub>P</sub> = 0A ~ I <sub>PN</sub>
Linearity error 2		ε <sub>L2</sub>	%	− 1.0		+ 1.0	at I <sub>P</sub> = 0A ~ I <sub>PM</sub>
Response time (@90% of I <sub>f</sub> )		t <sub>r</sub>	μs			5	di/dt=100A/μs
Frequency bandwidth (at -3dB) * 4		BW	kHz	50			
Output voltage noise (DC ~ 10MHz)		V <sub>NO</sub>	mVpp			40	

\* 1 It is possible to change V<sub>OF</sub> with an external reference voltage (between 1.5V - 2.8V providing its ability to sink or source approximately 5 mA.).  
If the external reference voltage is not used, the V<sub>REF</sub> pin should be left unconnected.

\* 2 Offset voltage value is after removal of core hysteresis.

\* 3 Measurement condition : Primary conductor cross sectional area is as same as through hole, and penetration with 1 turn in through hole.

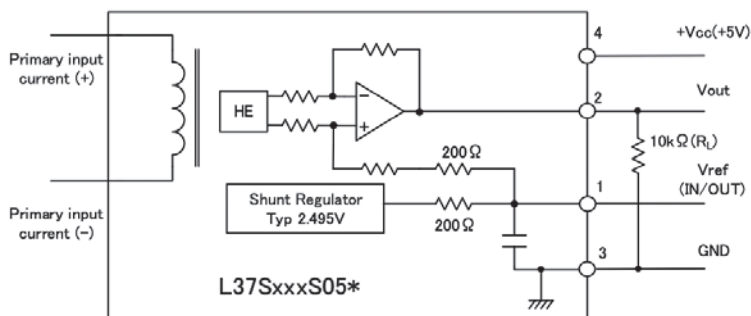
\* 4 Please derate input current to avoid excessive product heating. If you input current with high frequency band.

## STANDARDS

EN62477-1:2012 and EN62477-1:2012/A11:2014 , EN50178 , IEC/EN 61010-1 , IEC/EN 62109-1 , UL508 (file No E243511)

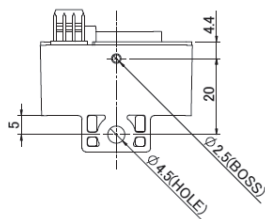
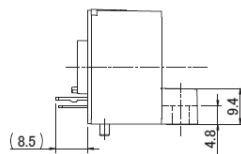
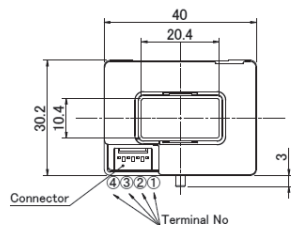
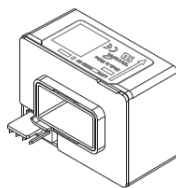
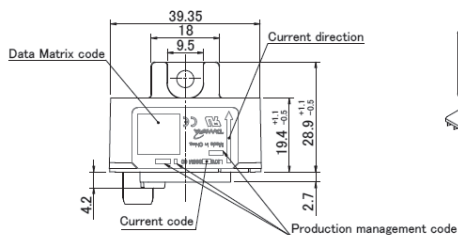
※ Please refer to the another sheet about conditions of UL Recognition.

## CONNECTION



## DIMENSIONS (mm)

L37SxxxD15M



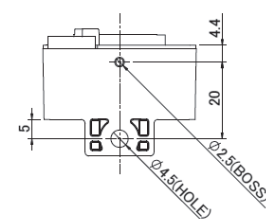
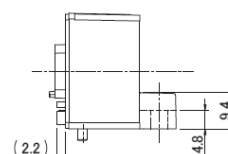
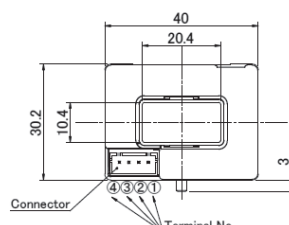
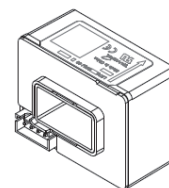
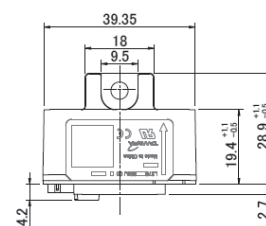
Terminal number

- 1 VREF
- 2 Vout
- 3 GND
- 4 +Vcc (+5V)

Note

Unless otherwise specified tolerances shall be  $\pm 0.5\text{mm}$ .

L37SxxxD15J



Note

It is different from how to put the pin numbering of connector manufacturer (JST). It changes to the expression of the Molex product.

## Order number and Connector number (terminal plating)

Types		Connector			
		Manufacturer	Part Number	Old Part Number	Plating of terminal
L37SxxxS05J	Standard	JST	B4B-XH-A-G	—	Au
L37SxxxS05M	Standard	Molex	22-04-1041	5045-04A	Sn
L37SxxxS05M-A	Build to Order		22-11-1041	5045-04AG	Au

As for the L37SxxxS05M series of a gold-plated connector, '—A' attaches to the end of the product name.

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  - *Use that involves exposure to direct sunlight, outdoor exposure, or dusty conditions.*
  - *Use in locations where corrosive gases such as sea winds, Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, or NO<sub>2</sub>, are present. (Some product improves durability)*
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# Application notes

## <General Considerations>

1. The sensor uses polar electronic components. When the polarity of the power supply is mistaken, the sensor is damaged.
2. Static electricity or excessive voltage can increase an offset voltage in the Hall element, and cause offset voltage to change. Please exercise care in handling and application.
3. In order to prevent the influence of noise, the use of twisted cable or shielded cable for the output line is recommended
4. If using this device within a magnetic field generated by other devices, the specified accuracy may not be obtainable.
5. Our products (several models are excluded ) are adjusted with the trimming method by the measurement condition (Load resistance, Power supply voltage) of specification sheets. Therefore, characteristics (Offset, Output, etc.) and its deviation may be changed in different circuit conditions from the measurement condition. All change characteristic items are not indicated on specification sheets.
6. The performance of current sensors with through-hole (aperture) is dependent on the position of the primary conductor. Tamura specifications are based on a primary conductor completely filling the through-hole (aperture) area.
7. The current sensor rated current in DC Amps.
8. Please use mating connector with equivalent terminal plating material to insure proper operation and avoid possibility of 'galvanic corrosion' .
9. Please do not store in high-temperature and high-humidity storage environment. Please use it after confirming soldering when it is kept for six months or more. (product soldered with substrate)
10. We recommend performing a zero offset adjustment by measuring the offset voltage at startup. In continuously operation for a few months, or at change of ambient temperature or humidity is large, we recommend regularly performing a zero offset adjustment at being idling (it is clear that the current is not apply) .
11. The current sensor doesn't have built-in protection circuit (devices and fuses, etc.). As a failure mode of the sensor, there is a short circuit and open state. In the case of a short-circuit state, the abnormal temperature rise of the internal parts is assumed, and there is a possibility to smoke and to ignite. If it is used in safety critical circuit blocks, please take appropriate measures by protection devices, protection circuits, etc. For closed loop -type sensors and flux gate (closed loop type) sensors, the consumption current of the secondary power supply varies in proportion to the measurement current.

## <Open loop>

1. High frequency primary current may result in excessive heating in iron magnetic core and cause damage to internal circuitry; for high frequency applications select current sensor with ferrite core material.
2. If the measured current exceeds the rated current, magnetic core saturation will occur and the output voltage signal will not be linearly proportional to the measured current.

## <Closed Loop>

1. For closed loop current sensors please insure the power supply voltage is balanced, symmetrical, and, applied simultaneously to avoid potential increase in DC offset error.
2. Maximum rated current measurement duration is timedependent. Maximum rated current applied in excess of the time limit can result in damage to internal electronic circuitry; please consult Tamura for assistance.
3. When using a measurement resistor to convert current output to voltage output select a resistor with stable temperature characteristic to insure accuracy of the output voltage.
4. Compensation current supplied to the secondary winding varies in proportion to the measured current based on the conversion ratio. (If/ $KN$ ;  $KN$  = secondary turns) Please insure the PSU has required current capacity to supply compensation current to the secondary winding.

## <Flux-Gate>

1. Compensation current supplied to the secondary winding varies in proportion to the measured current. Please insure the PSU has required current capacity to supply compensation current to the secondary winding.
2. There is 450kHz ripple voltage present on the output and reference output voltage signals . An external capacitor maybe added if necessary.

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