Magnetic Proportion System / Through Type

L40S D15 SERIES

【STANDARDS】
·UL508
·CSA C22.2 No.14-18
·EN 62477-1
·EN 50178

RoHS

ABSOLUTE MAXIMUM RATINGS

Parameters	Symbol	Unit	Value	Comment
Supply voltage	Vcc	V	±18V	
Primary conductor temperature	—	℃	105	

ISOLATION CHARACTERISTICS

Parameters		Symbol	Unit	Value	Comment
Insulation voltage	**L40SxxxD15*** **	Vd	—	AC5400V, for 1minute (Sensing current 0.5mA)	Primary ⇔ Secondary
	L40SxxxD15C* **			AC7400V, for 1minute (Sensing current 0.5mA)	
Impulse withstand voltage	**L40SxxxD15*** **	Vw	kV	9.6	Primary ⇔ Secondary Input waveform : · Front time 1.2μs · Time to half value 50μs · single
	L40SxxxD15C* **			16.5	
Insulation resistance		R_{IS}	—	≧ 1000M Ω (at DC500V)	Primary ⇔ Secondary
Clearance distance	**L40SxxxD15*** **	d_{Cl}	—	11.0mm (MIN)	Primary ⇔ Secondary
	L40SxxxD15C* **			20.0mm (MIN)	
Creepage distance	**L40SxxxD15*** **	d_{Cp}	—	12.7mm (MIN)	Primary ⇔ Secondary
	L40SxxxD15C* **			30.5mm (MIN)	
Case material		—	—	UL94 V-0	
Comparative Tracking Index ; (CTI)	Case	CTI	V	600 (group Ⅰ)	
	Filler			600 (group Ⅰ)	

ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

Parameters	Symbol	Unit	Value			Comment
			MIN	TYP	MAX	
Ambient operating temperature * 1	T_A	℃	−40		+105	
Ambient storage temperature	T_S	℃	−40		+105	
Mass	m	g		280		

* 1 Temperature of the connector should not exceed +105℃ because the absolute maximum temperature of the connector is +105℃.

SPECIFICATIONS

Ta=+25℃, RL=10kΩ, Vcc=±15V

Parameters		Symbol	Unit	Value			Comment
				MIN	TYP	MAX	
Primary norminal current	**L40S200D15******	I_{PN}	A		200		
	L40S400D15****				400		
	L40S500D15****				500		
	L40S600D15****				600		
	L40S800D15****				800		
	L40S1T0D15****				1000		
	L40S1T2D15****				1200		
	L40S1T5D15****				1500		
Primary current, measuring range ＊1, 2	**L40S200D15******	I_{PM}	A	−600		600	
	L40S400D15****			−1200		1200	
	L40S500D15****			−1500		1500	
	L40S600D15****			−1800		1800	
	L40S800D15****			−2400		2400	
	L40S1T0D15****			−2800		2800	
	L40S1T2D15****			−2800		2800	
	L40S1T5D15****			−2800		2800	
Supply Voltage		Vcc	V	± 12 (± 5%)	± 15 (± 5%)		
Consumption current		Icc	mA		17	25	at I_P = 0A, Icc = 17 + Vout / RL
Rated output voltage		Vo	V	3.960	4.000	4.040	at I_{PN}
Offset voltage ＊3		Vof	V	−0.020	0.000	+0.020	at I_P = 0A
Hysteresis error		V_{OH}	mV	−10		10	at 0A → I_{PN} → 0A
Temperature coefficient of Vo		TcVo	%/℃	−0.05		0.05	Without TcVof
Temperature coefficient of Vof		TcVof	mV/℃	−1.0		1.0	at I_P = 0A
Linearity error (0A ～ I_{PN})		ε_L	%	−1		+1	
Response time (@90% of I_{PN}) ＊4		tr	μs			5	di/dt=100A/μs
Frequency bandwidth (-3dB) ＊5		BW	kHz	25			at very low current

＊1 If the product of 800A or less operate at Vcc = ± 12V power supplies, measuring range reduced to 2.5 x I_{PN}.
＊2 The value of measured current which indicates an output with a greater than ± 5% deviation from the theoretical output value.
＊3 Offset voltage value is after removal of core hysteresis.
＊4 Measurement condition : Primary conductor cross sectional area is as same as through hole, and penetration with 1turn in through hole.
＊5 High fundamental frequency primary current and/or harmonic current may result in excessive heating in magnetic core (Silicon steel).

STANDARDS

EN62477-1:2012, EN62477-1:2012/A1:2017 and EN62477-1:2012/A11:2014

Rated voltage	L40SxxxD15***	600V, CAT Ⅲ, PD2, Reinforced isolation, non uniform field
	L40SxxxD15C***	1000V, CAT Ⅲ, PD2, Reinforced isolation, non uniform field

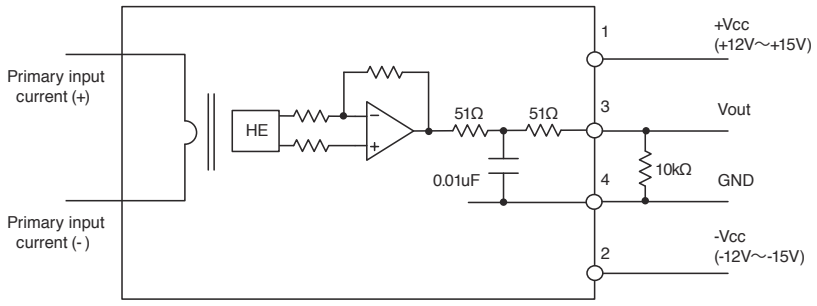
EN50178:1997

Rated voltage	L40SxxxD15C***	1500V, CAT Ⅲ, PD2, Reinforced isolation, non uniform field

UL508, CSA C22.2 No.14-18 (CSA FILE No. 218328)

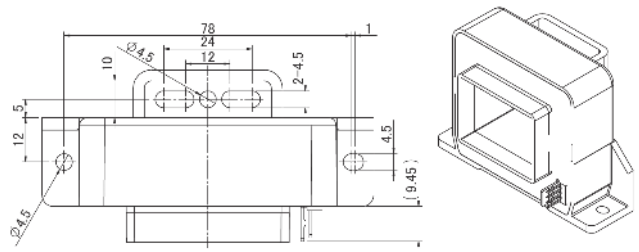
Rated voltage	L40SxxxD15***	600V, PD2
	L40SxxxD15C***	1500V, PD2

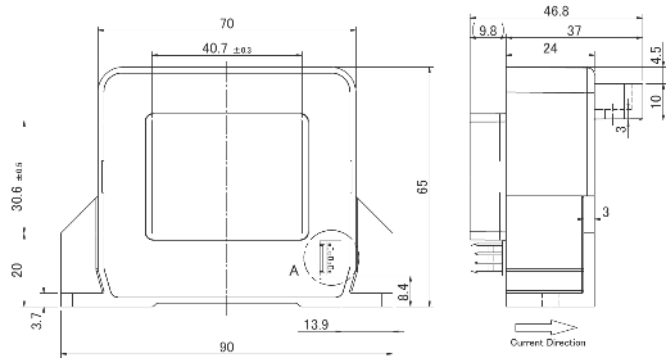
CONNECTION

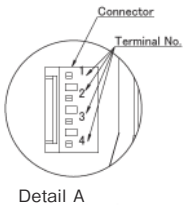


DIMENSIONS (mm)

L40SxxxD15M/M-A





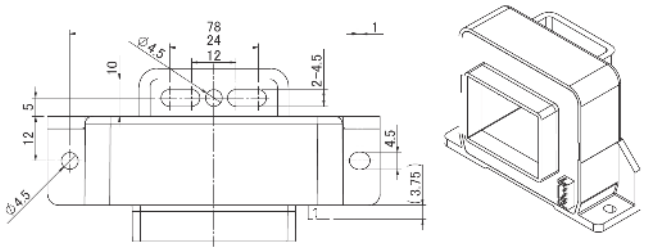


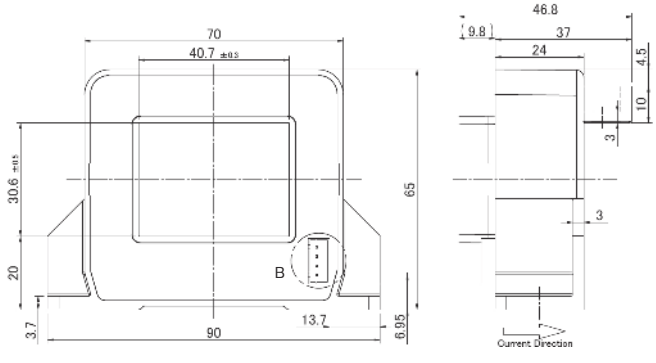
Detail A

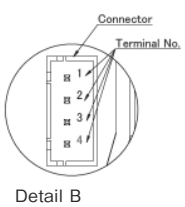
Terminal No.
① +Vcc (+15V)
② −Vcc (−15V)
③ Vout
④ GND

※ Tolerance: ± 1
Unit: mm

L40SxxxD15J







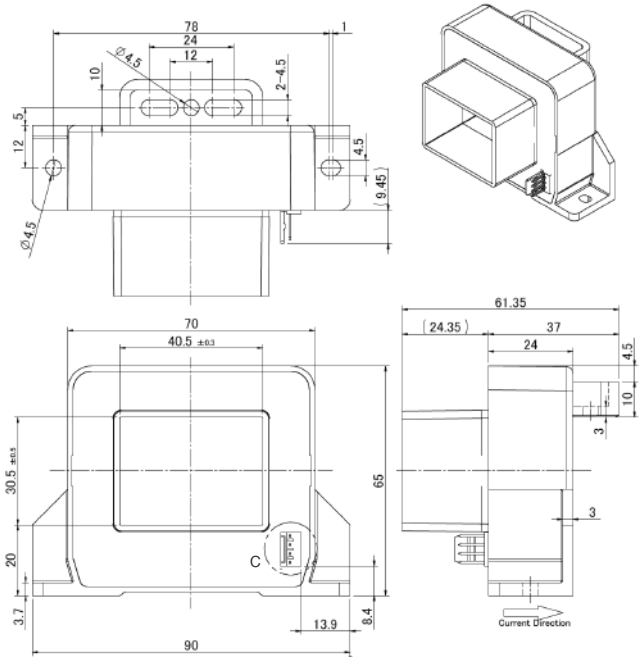
Detail B

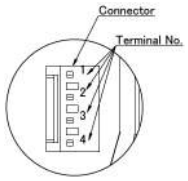
Terminal No.
① +Vcc (+15V)
② −Vcc (−15V)
③ Vout
④ GND

※ Tolerance: ± 1
Unit: mm

DIMENSIONS (mm)

L40SxxxD15CM/CM-A



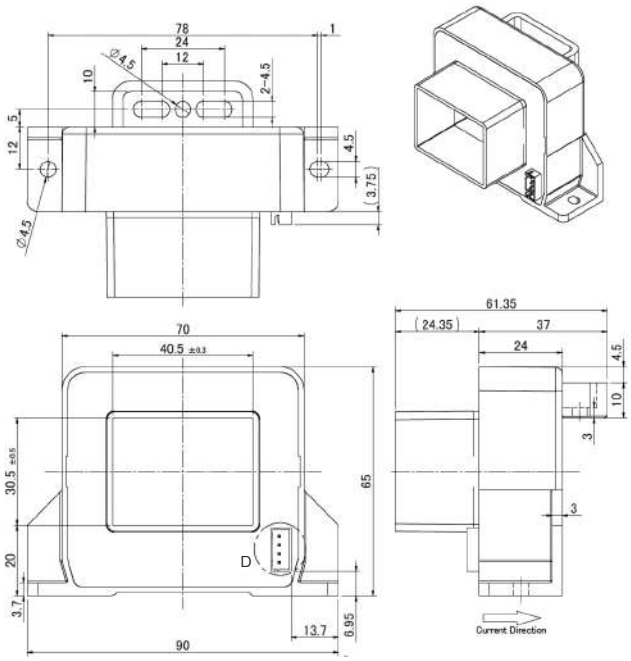


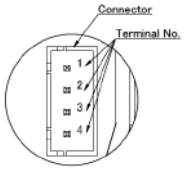
Detail C

Terminal No.
① +Vcc (+15V)
② −Vcc (−15V)
③ Vout
④ GND

※ Tolerance: ± 1
Unit: mm

L40SxxxD15CJ



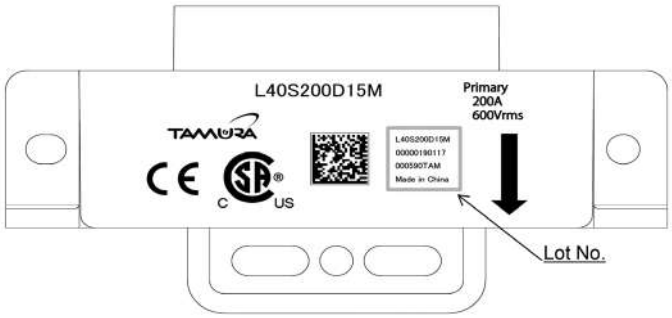


Detail D

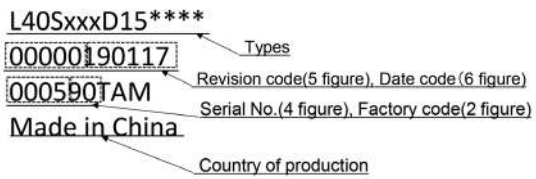
Terminal No.
① +Vcc (+15V)
② −Vcc (−15V)
③ Vout
④ GND

※ Tolerance: ± 1
Unit: mm

MARKING



Lot No.例 Example of Lot No.



Order number and Safety application / Connector number (terminal plating)

Types		Safety application		Connector			
		UL508-600V EN	UL508-1500V EN	Manufacturer	Part Number	Old Part Number	Plating of terminal
L40SxxxD15J	Standard	○		JST	B4B-XH-A-G	–	Au
L40SxxxD15CJ			○				
L40SxxxD15M	Standard	○		Molex	22-04-1041	5045-04A	Sn
L40SxxxD15CM			○				
L40SxxxD15M-A	Build to Order	○			22-11-1041	5045-04AG	Au
L40SxxxD15CM-A			○				

* As for the L40SxxxD15M series of a gold-plated connector, '-A' attaches to the end of the product name.

Important Notice

1. The content of this information is subject to change without prior notice for the purpose of improvements, etc. Ensure that you are in possession of the most up-to-date information when using this product.

2. This product is intended to be used in general electronics applications (electric home appliances, business equipment, information equipment, communication terminal equipment, measuring devices, industrial equipment, and so on). This product is neither intended nor warranted for use in following equipment or devices:

   Special application (such as for medical devices, transportation equipment, traffic signal control equipment, fire and crime prevention equipment, aeronautics and space devices, nuclear power control, fuel control, in-vehicle equipment, safety devices, and so on) in which extremely high quality and high reliability is required, or if the malfunction or failures of product could be cause loss of human life, bodily injury.

   Tamura Corporation shall not be held responsible for any damage incurred by customers or any third party when products are used in special application, unless specifically permitted in this document.

3. Tamura Corporation constantly strives to improve quality and reliability, but malfunction or failures are bound to occur with some probability in current sensor. To ensure that failures do not cause accidents resulting in injury or death, fire accidents, social damage, and so on, users are to thoroughly verify the safety of their designs in devices and/or systems.

4. The operation examples and circuit examples shown in this information are for reference purposes only, and Tamura Corporation disclaims all responsibility for any violations of industrial property rights, intellectual property rights and any other rights owned by Tamura Corporation or third parties that these may entail.

5. The circuit examples and part constants listed in these specifications are provided as reference for the verification of characteristics. The user is to perform design, verification, and judgment under his or her own responsibility, taking into account the various conditions.

6. The products are designed for use in environments where consumer electronics are commonly used. It is not designed for use in special environments such as listed below, and if such use is considered, the user is to perform thorough safety and reliability checks under his/her responsibility.

7. This product is not designed to resist radiation.
   - *Use in liquids such as water, oil, chemical solutions, or organic solvents, and use in locations where the product will be exposed to such liquids.*
   - *Use that involves exposure to direct sunlight, outdoor exposure, or dusty conditions.*
   - *Use in locations where corrosive gases such as sea winds, Cl2, H2S, NH3, SO2, or NO2, are present. (Some product improves durability)*
   - *Use in environments with strong static electricity or electromagnetic radiation.*
   - *Use that involves placing inflammable material next to the product.*
   - *Use of this product either sealed with a resin filling or coated with resin.*
   - *Use of water or a water soluble detergent for flux cleaning.*
   - *Use in locations where condensation is liable to occur.*

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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 abnor-mal 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.