

# Magnetic Direct Current Sensor MDCS®



## Outline

Magnetic direct current sensors (MDCS®) use a magnetic substance and hole device for magnetic detection of direct current. They detect all currents (DC, AC and pulse), and the output voltage varies in proportion to the strength of the current measured.

## Features

- Detection of both direct currents and alternating currents (including pulse currents)
- Fluctuations in output from changes in the power supply voltage and the ambient temperature are small.
- Excellent linearity of measured current and the converted power output
- The measured current and the secondary output side are insulated.

## Applications

- Inverter-based home appliances (Air-conditioners etc.)
- General-purpose inverters
- AC variable-speed drive and servo drive
- Industrial machines • UPS • DC motor control
- FAX and other multifunction telephone series (THS Series)

Item	Marking	Rated value and conditions (Ta=25°C)												
		Amplifier built-in type												
		Single power supply operating type (Magnetic proportion system)												
Model		LA12												
		10V21	12V21-2	15V21	20V21	24V21-2	25V21	30V21	32V21	36V21-2	40V21	48V21	50V21	60V21
Rated current (A)	IcL1	±10	±12	±15	±20	±24	±25	±30	±32	±36	±40	±48	±50	±60
Primary side windings *1 (Turn)	-	6	6	4	3	3	2	2	2	2	2	2	2	1
Scope of measurement	-	0 to 100% of rated current (IcL1)												
Power supply voltage (V)	Vcc	+12 ± 5%												
	Vee	-												
Consumption current (mA) max.	-	40												
Output voltage (V)	Vh	± 2.000 ± 0.060 (at IcL1, RL=10KΩ)												
Residual voltage (V)	Voff	± 2.500 ± 0.060 (at 0A, RL=10KΩ)												
Hysteresis (mV) max.	Vhys	60												
Power supply voltage variation (mV) max.	-	30 (Vcc=+12V ± 5%)												
Vh temperature characteristics (%/°C)	-	±0.15												
Voff temperature characteristics (mV/°C)	-	±4												
Pulse response (μs) max.	Tp	20 (di/dt=100AT/μs)												
Linearity (%)	g	-2 to 2												
Insulation withstand voltage	-	AC2000V/1min. (Between wire and terminals)												
Insulation resistance	-	500MΩ/DC500V (Between wire and terminals)												
Operating temperature range (°C)	Ta	-10 to +75												
Storage temperature range (°C)	Ts	-15 to +80												

\*1 Besides the standard windings, any other windings within the rated current are possible.  
 \*2 Sample delivery for this model may take extra time.



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● THS56,56F,65,63F

Electrical Characteristics (Ta=25°C, Vcc=+5V)

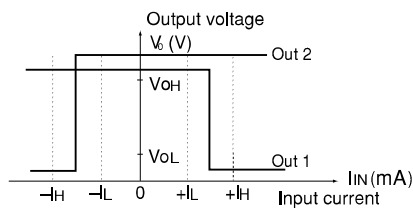
Item		Marking	Conditions	Rating			Comments
				min.	typ.	max.	
Sensitivity current (mA)	56,65	L	Ta=+5°C~+45°C	2		15	
		LH					
	56F,63F	L		5		10	
		LH					
Primary side input current (mA)	56,56F,63F,65	lin		-120		120	
Input direct current resistance (Ω)	56	Rin	Ta=-10°C~+70°C	2.5	3.5	4.5	
	56F,63F,65			2.5	3.9	5.0	
Input inductance (mH)	56	Lin	Ta=-10°C~+70°C	0.8	1.0	1.2	-10°C ~ +70°C
	56F,63F,65			0.8	1.1	1.4	
Output voltage (V)		VOH	RL=10kΩ				
		VOL			0.1	0.8	
Response (μS)		ton-off	RL=∞		60		
Power supply voltage (V)		Vcc		+4.5		+5.5	
Consumption current (mA)	56,56F,65	Icc			10		
	63F				12		
Effect of external magnetic field (mA)		56,56F,63F,65	lin offset	lin=0 B=1×10 <sup>-3</sup> T	3		
"Analog" out put	Loss (dB)	56,65	lin=0~120mA 1kHz,600Ω	30	34	38	
		56F		30	33	36	
		63F		-2	0	2	
	S/N (dB)	56,56F,65		15			
		63F					

Model change scheduled in 2010  
\*For all models of THS series

Maximum Rating

Item	Marking	Rating	Comments
Power supply voltage (V)	Vcc	7.0	
Primary side input current (A)	56,56F,63F,65	lin	10sec. max.
Withstand voltage between primary and secondary (kVAC) min.		2.2	60sec. 50Hz RH=65±5%
Operating temperature range (°C)	Topt.	-10 ~ +70	
Storage temperature range (°C)	Tstg.	-20 ~ +80	

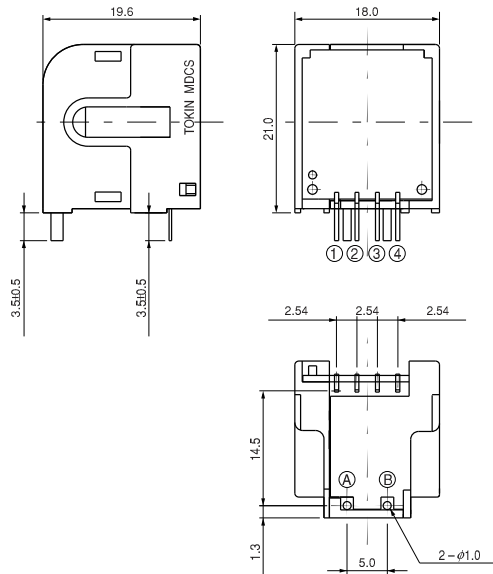
Input Current - Output Voltage Characteristics



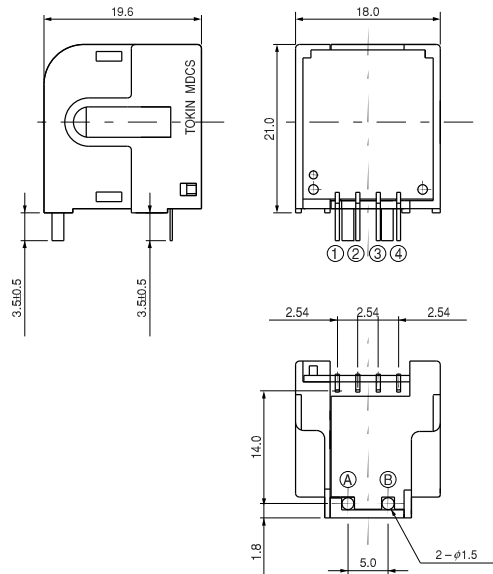
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Shape and Dimensions

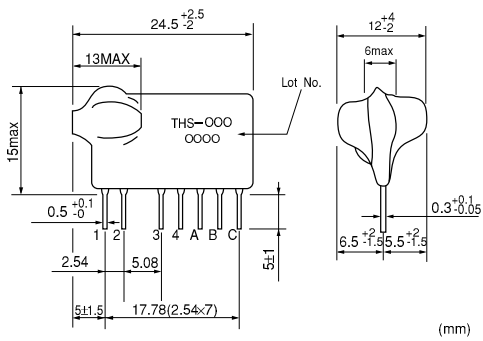
● LA12-10V21 to LA12-24V21



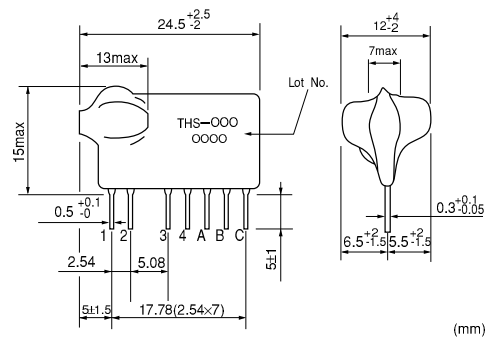
● LA12-25V21 to LA12-60V21



● THS-56,56F,65



● THS-63F



Pin number	LA12	THS56,56F,65,63F
1	NC GND	(Coil input)
2	(Ground pin)	(Coil input)
3	Vcc (+12V)	GND (Ground pin)
4	Vout (Output voltage pin)	"Analog" output
A	(Measured current ⊕ pin)	OUT2
B	(Measured current ⊖ pin)	OUT1
C	—	Vcc (+5V)

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**Before Using Magnetic Direct Current Sensor MDCS®**

- Strong physical shocks could damage cores. Be careful not to drop or apply other strong impact.
- These products are heat resistant up to 260°C for 10 seconds. Be careful not to exceed this amount when soldering. Use a low-corrosion type flux when soldering.
- Because the circuit uses ICs, application of strong static electricity could cause damage. Take static electricity precautions when handling.
- Because these products are magnetic current detectors, application of strong external magnetic fields could cause their characteristics to change. Limit ambient magnetic fields to 50e or less.



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