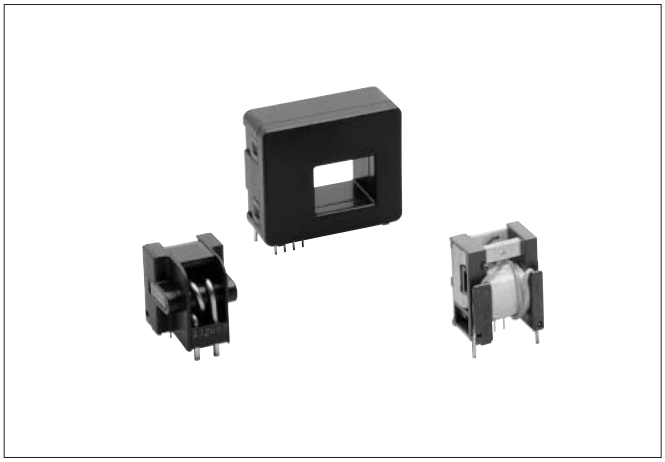
Magnetic Direct Current Sensor MDCS



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)				Double power supply operating type (Magnetic balance system)							
Model			LA12				JB15							
			20V21	30V21	40V21	50V21	05V41	10V41	15V41	20V41	25V41	30V41	40V41	50V41
Rated current	(A)	IcL1	±20	±30	±40	±50	±5	±10	±15	±20	±25	±30	±40	±50
Primary side windings	(Turn)	–	3	2	2	2	6	3	2	1	1	1	–	–
Scope of measurement	–	–	0 to 100% of rated current (IcL1)				0 to 250% of rated current (IcL1)						0 to 150% of rated current (IcL1)	
Power supply voltage	(V)	Vcc	+12±5%				+15±5%							
		Vee	–				–15±5%							
Consumption current	(mA) max.	–	40				50							
Output voltage	(V)	Vh	±2.000±0.060 (at IcL1, RL=10Ω)				±4.000±0.060 (at IcL1, RL=18kΩ)							
Remaining voltage	(V)	Voff	+2.500±0.060 (at 0A, RL=10kΩ)				±0.050 (at 0A, RL=18kΩ)							
Hysteresis	(mV) max.	Vhys	60				30						60	
Power supply voltage variation	(mV) max.	–	30 (Vcc=+12V±5%)				30 (Vcc=+15V±5%, Vee=–15V±5%)							
Vh temperature characteristics	(%/˚C)	–	±0.15				±0.04							
Voff temperature characteristics	(mV/˚C)	–	±4				±1.5							
Pulse response	(μs) max.	Tp	20 (di/dt=100AT/μs)				3 (di/dt=100AT/μs)							
Linearity	(%) max.	γ	±2				±0.5							
insulation withsand 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											

* Besides the standard windings, any other windings within the rated current are possible.
* The rated current unit A is designated as the primary side current (A) × number of turns (Turn).

● **THS56,56F,65,63F**

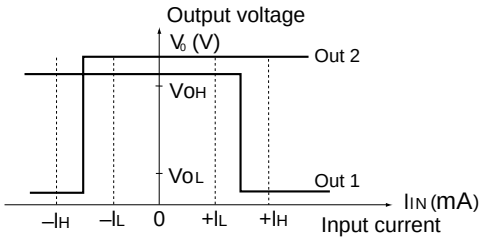
Electrical Characteristics (Ta=25°C, Vcc=+5V)

Item		Marking	Conditions	Rating			Comments
				min.	typ.	max.	
Sensitivity current (mA)	56,65	I_L	Ta=+5°C~+45°C	2			
		I_H				15	
	56F,63F	I_L		5			
		I_H				10	
Primary side input current (mA)	56,56F,63F,65	Iin		-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)		V_{OH}	RL=10kΩ	3.5			
		V_{OL}			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	Iin offset	Iin=0 B=1×10^{-3}T		3		
"Analog" out put — Loss (dB)	56,65		Iin=0~120mA 1kHz,60Ω	30	34	38	
	56F			30	33	36	
	63F			-2	0	2	
S/N (dB)	56,56F,65		Input level(Vin) –45~+20dBm	15			
	63F		Input level(Vin) –45~0dBm				

Maximum Rating

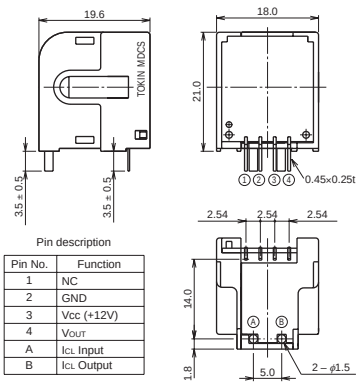
Item		Marking	Rating	Comments
Power supply voltage (V)		V_{CC}	7.0	
Primary side input current (A)	56,56F,63F,65	Iin	0.5	10sec. max.
Withstand voltage between primary and secondary (kVAC) min.			2.2	60sec. 50Hz RH=65±5%
Operating temperature range (°C)		Topt.	–10 ~ +70	
Storage temperature range (°C)		Tstg.	–20 ~ +80	

Input Current - Output Voltage Characteristics



Shape and Dimensions

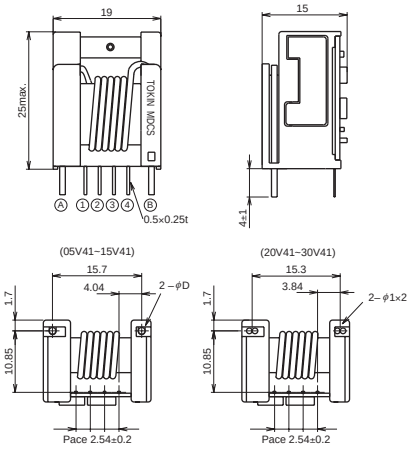
● **LA12-○○V21**



Pin description

Pin No.	Function
1	NC
2	GND
3	Vcc (+12V)
4	VOUT
A	ICL Input
B	ICL Output

● **JB15-05V41~30V41**



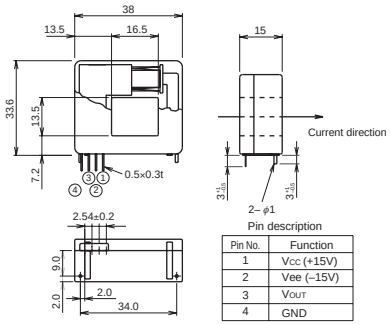
Pin description

Pin No.	Function
1	VOUT
2	Vcc (+15V)
3	GND
4	(–15V)
A	ICL Input
B	ICL Output

Model/Wire size

Model	φ D
05V41	φ 0.8
10~15V41	φ 1.0
20~30V41	φ 1.0×2

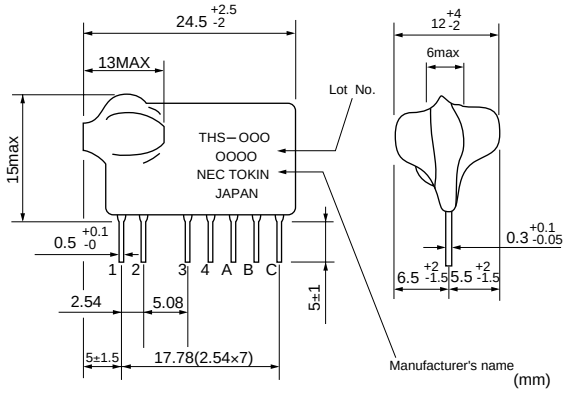
● **JB15-40V41/50V41**



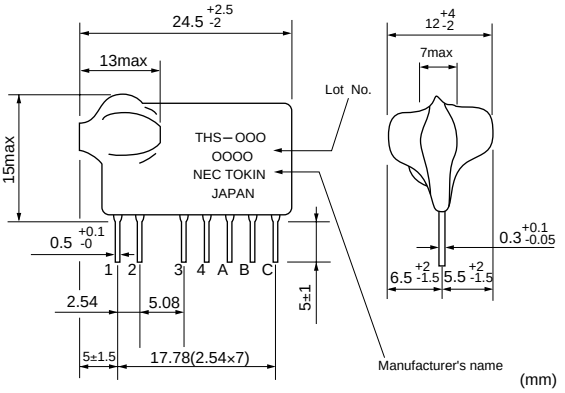
Pin description

Pin No.	Function
1	VCC (+15V)
2	Vee (–15V)
3	VOUT
4	GND

● **THS-56,56F,65**



● **THS-63F**



Pin number	LA12	JB15-05V41~30V41	JB15-40V41/50V41	THS56,56F,65,63F
1	NC	Vout (Output voltage pin)	Vcc (+15V)	(Coil input)
2	GND (Ground pin)	Vcc (+15V)	Vee (-15V)	(Coil input)
3	Vcc (+12V)	GND (Ground pin)	Vout (Output voltage pin)	GND (Ground pin)
4	Vout (Output voltage pin)	Vee (-15V)	GND (Ground pin)	"Analog" output
A	(Measured current ⊕pin)	(Measured current ⊕pin)	—	OUT2
B	(Measured current ⊖ pin)	(Measured current ⊖ pin)	—	OUT1
C	—	—	—	Vcc (+5V)

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.