Product Specification Sheet Model: MS3709

Slim Plug-In Pulse Shaper (Pulse Isolator) with Isolated Single/Dual Output

DESCRIPTION

The MS3709 is a slim, plug-in pulse shaper (pulse isolator) that accepts pulse train signals from sensors or other devices, shapes these pulses or converts signal levels, and provides isolated single or dual output.

ORDERING CODE

MS3709 - □ - □ □ □

Model

Power Supply
A: 100 to 240V AC (50 to 60Hz)
D: 24V DC **P**: 100 to 240V DC

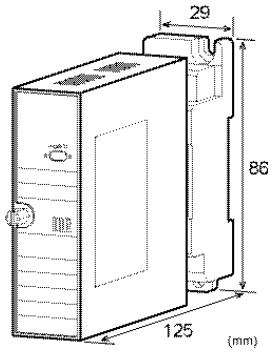
Input
O: Dry contact or open collector
(Pull-up: Approx. 13V, 3.3kΩ)
A: AC voltage pulse
(Threshold voltage: Approx. 0.06Vp-p)
D: DC voltage pulse
(Threshold voltage: Approx. 2V)
I : 4 to 20mA DC pulse
(Threshold current: Approx. 8mA)
Y: Other input signal and/or threshold voltage

Output 1
1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

Output 2
No code: None
The codes are the same as for Output 1.

Note: When a combination of TTL levels or voltage pulses is selected for Outputs 1 and 2, the voltage levels for both outputs should be the same.

Options
No code: None
/A: Sensor power supply: 24V DC (±10%), 2-wire type
/B: Sensor power supply: 12V DC (±10%), 2-wire type
/C: Sensor power supply: 24V DC (±10%), 3-wire type
/D: Sensor power supply: 12V DC (±10%), 3-wire type
/T: Pulse Hold Function provided.
/X: Others (Special order)
* For non-standard options, ask MTT for availability.



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3709-A-D11

Other Ordering Examples:
For an input code of "Y": MS3709-A-Y11 (Input DC voltage pulse: 0 to 12V / SH = 8.5V, SL = 2.5V)
For an input code of "Y": MS3709-A-Y11 (Input AC pulse: 200Vp-p / S= 2Vp-p)
For an option code of "T": MS3709-A-D11/AT (Pulse hold time: 200ms)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
Note 1: Specify a pulse width between 200μs and 500ms.
Note 2: When a DC current pulse is selected for input, the range should be specified between 0-100μA and 0-100mA.
Note 3: If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 24V DC: 24V DC±10% 100 to 240V DC: 85 to 264V DC
Power Sensitivity	Better than ±0.1% of span for each power supply range.
Power Line Fuse	160mA fuse is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	2.1W max	7.2W max
Dual Output	5.5VA max	2.2W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With power:	1MΩ min. (Standard, 5V input)
	Without power:	10kΩ min.
Current Input (DC)	250Ω (Standard for 4 to 20mA)	

Note: When a 2-wire type sensor power supply is specified, a shunt resistor of 100Ω is used.

Allowable Input Voltage	
DC Voltage Input Model	30V DC max., continuous.
DC Current Input Model	40mA DC max., continuous.
AC Voltage Input Model	200Vp-p AC max., continuous (up to ±100V with reference to 0V).
Input Pulse Width	10μs min. (for both ON and OFF)
Sensor Power Supply	30mA max. (2-wire or 3-wire type)

Ranges Available

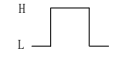
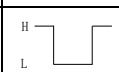
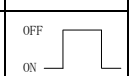
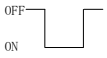
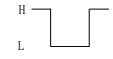
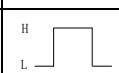
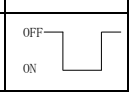
	AC Voltage Pulse	DC Voltage Pulse
Input Range	-300 to 300V	0 to 300V
Input Voltage Span	0.1 to 600Vp-p	1 to 300V
Input Bias	N/A	0 to +300%
Threshold Voltage	50mVp-p min.	Hi-Lo voltage: 0.2V min.

Input Spec. Ex.: For 10 to 15V DC voltage pulse input, the input span is 5V and the bias +200%.

●OUTPUT SECTION

Maximum Output Load	
TTL Level	(Maximum output 10mA @ 3.5V)
Voltage Pulse 10V	(Maximum output 7mA @ ±10%)
Voltage Pulse 12V	(Maximum output 7mA @ ±10%)
Maximum Rating	Open collector (Maximum rating: 30V, 100mA)
Maximum Output Frequency without Pulse Hold Function	Voltage Pulse Output: 50kHz Open Collector Output: 20kHz (For both of the above, the conditions are as follows: input pulse duty ratio 50% and standard threshold voltage.)
Maximum Output Frequency with Pulse Hold Function	When a pulse hold time is specified, the maximum possible output frequency is determined by: Hz = 1 / (T × 1.2 + 10μs*) * 10μs: Output pulse Lo level for TTL and voltage pulse outputs or output pulse ON for open collector output. (Example) When a pulse hold time of 200ms is set, the maximum output frequency is: 1 / (0.2×1.2+0.00001) = 4.166Hz
Duty Ratio	50% typical (Input pulse duty ratio 50%, standard threshold voltage) DC voltage pulse: 0-5V/1kHz input AC voltage pulse: 5Vp-p/1kHz input Open collector: 1kHz input
Polarity Reversing Function	See the Output Logic Table below.

●OUTPUT LOGIC

Input Signal	Input Waveform	Polarity Reversing Switch	Voltage Pulse Output	Open Collector Output
Voltage Pulse		NORMAL		
		REVERSE		
Open Collector		NORMAL		
		REVERSE		

●PERFORMANCE

Output Pulse Hold Time Accuracy	Better than ±20% of a user-specified value.
Isolation	4-way isolation between input, output [Output 1/Output 2], power, and ground.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output [Output 1/Output 2], power, and ground.
Dielectric Strength	Input / Output [Output 1/Output 2] / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA) Output 1 / Output 2: 500V AC for 1 minute (Cutoff current: 0.5mA)
Surge Withstand Capability	Tested as per ANSI/IEEE C37.90.1-1989.
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-out preventions screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIALS

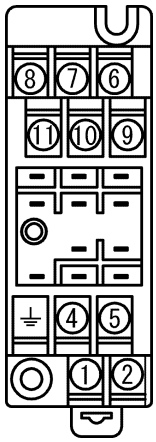
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)
Anti-Humidity Coating	HumiSeal® 1A27NS (Polyurethane)

* HumiSeal® is a registered trademark of Chase Corporation.

●STANDARDS CONFORMITY

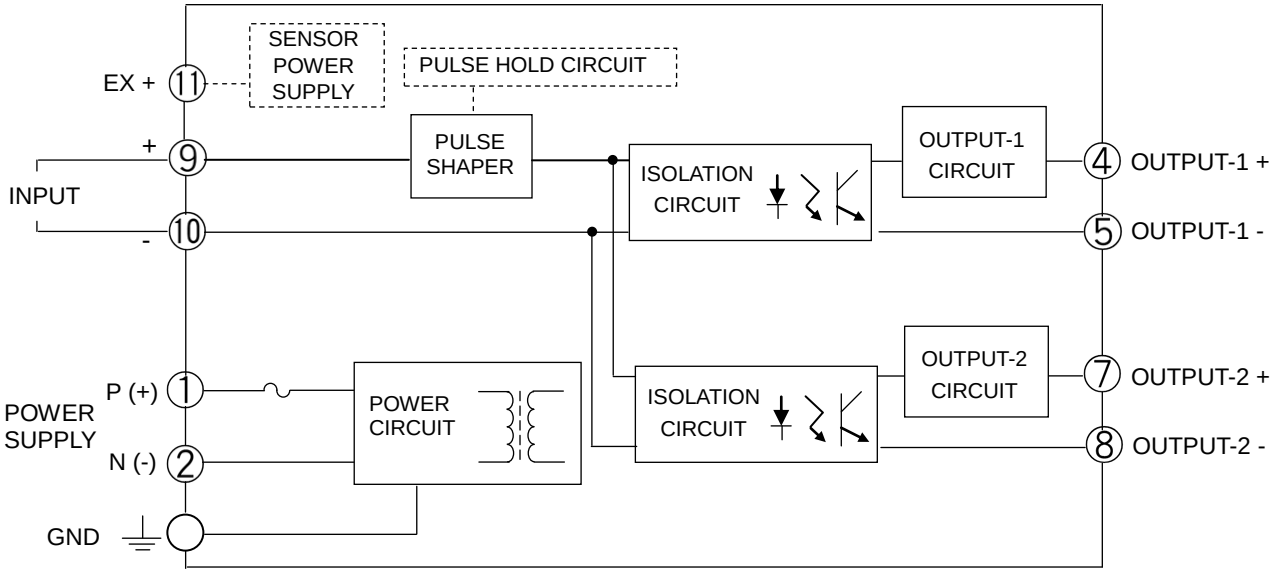
CE Directive Conformity	EMC Directive (2014/30/EU) EN61326-1: 2013 Low Voltage Directive (2014/35/EU) IEC61010-1/EN61010-1: 2010 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENT

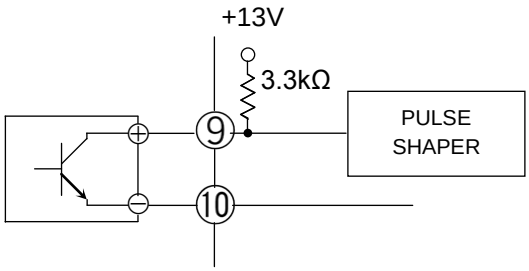


①	P (+)	POWER
②	N (-)	
⏚	GND	
④	+ OUTPUT 1	
⑤	- OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	- OUTPUT 2	
⑨	+ INPUT	
⑩	- INPUT	
⑪	EX	

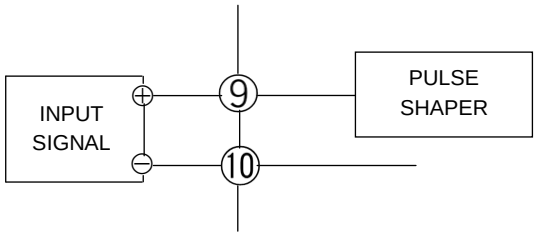
BLOCK DIAGRAM



For dry contact or open collector input:



For voltage pulse input:



When a 2-wire sensor is used:
Note: The connections may vary depending on the type of the sensor used.