



SANYO Semiconductors

DATA SHEET

TND023MP — Excellent Power Device Lamp-, solenoid-, and motor-driving Applications

Features

- N-channel MOSFET built in.
- Overheat protection.
- Overcurrent protection.
- Overvoltage protection.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V _{DS(DC)}		60	V
Output Current (Average)	I _{O(DC)}		2.0	A
Input Voltage	V _{IN}		-0.3 to +10	V
Allowable Power Dissipation	P _D		1.0	W
Operating Temperature	T _{opr}		-40 to +150	°C
Junction Temperature T _J	T _J		150	°C
Storage Temperature T _{stg}	T _{stg}		-55 to +150	°C

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Drain-to-Source Clamp Voltage	V _{DS clamp}	V _{IN} =0V, I _O =1mA	60			V
Output-OFF Current	I _{DSS(1)}	V _{IN} =0V, V _{DS} =50V			100	μA
	I _{DSS(2)}	V _{IN} =0V, V _{DS} =12V			10	μA
Input Threshold Voltage	V _{IN(th)}	V _{DS} =5V, I _O =1mA	1.0		2.5	V
Drain-to-Source ON Resistance	R _{DS(on)}	V _{IN} =5V, I _O =1A			0.2	Ω
Output-ON Input current	I _{IN}	V _{IN} =5V		0.25	0.6	mA

Continued on next page.

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Overheat Detecting Temperature	$T_{j(sd)}$	$V_{IN}=5V, I_O=1A$	155	165		$^{\circ}C$
Overcurrent Detecting Current	I_S	$V_{IN}=5V$	3.75	5	6.25	A
Input Clamp Voltage	$V_{IN\ clamp}$	$I_{IN}=5mA$	10			V

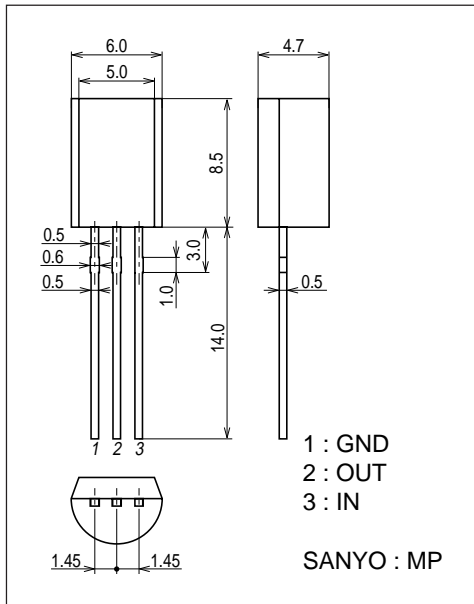
*Note:

1. Shutdown state will be kept after overheat and overcurrent protections operation and the system will be reset when the input voltage goes to or below the reset voltage (1.0V).
2. Overheat detecting temperature value is not a guarantee value but for reference only.

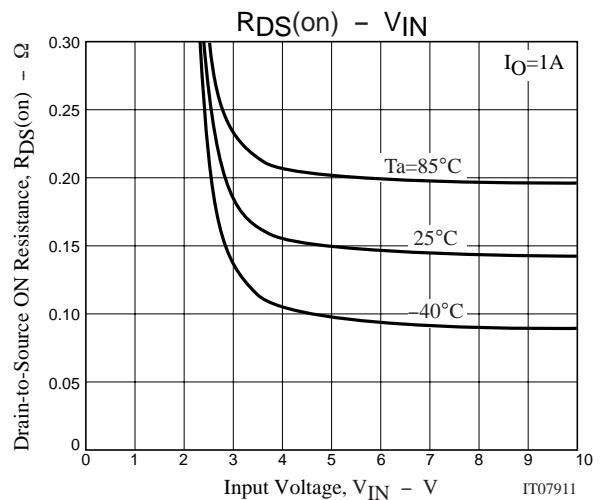
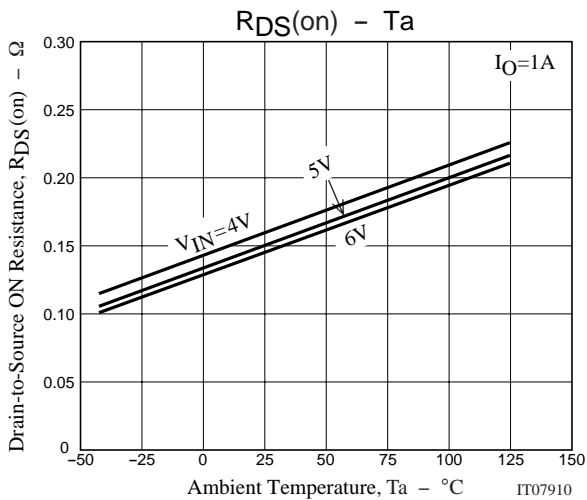
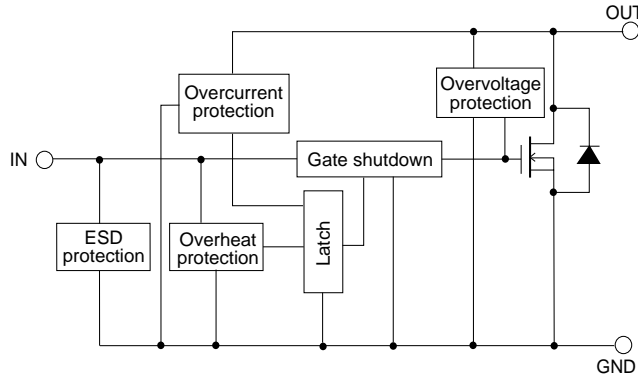
Package Dimensions

unit : mm (typ)

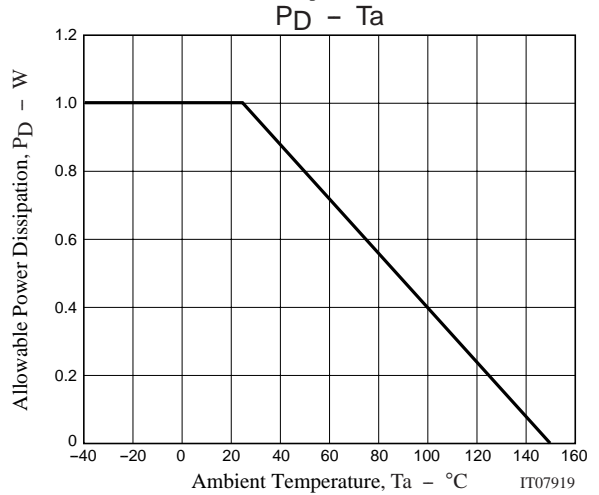
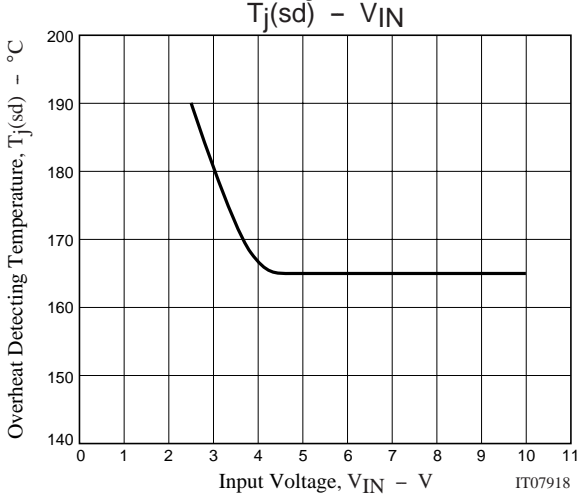
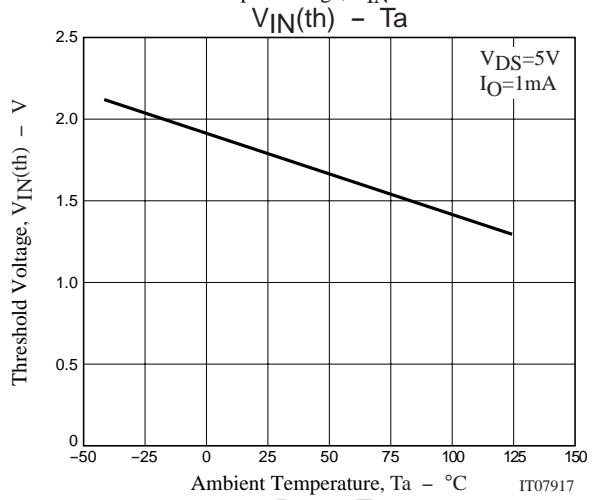
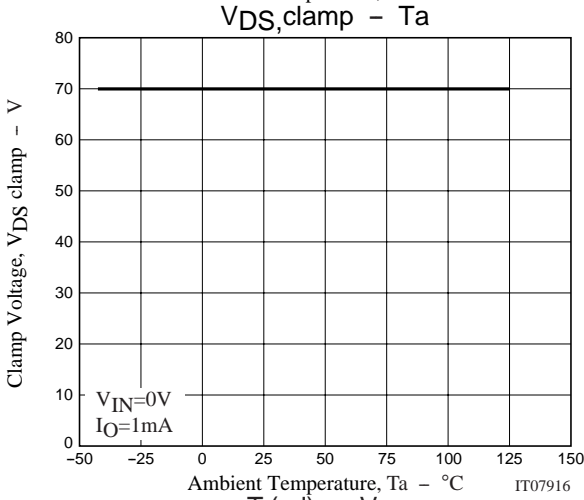
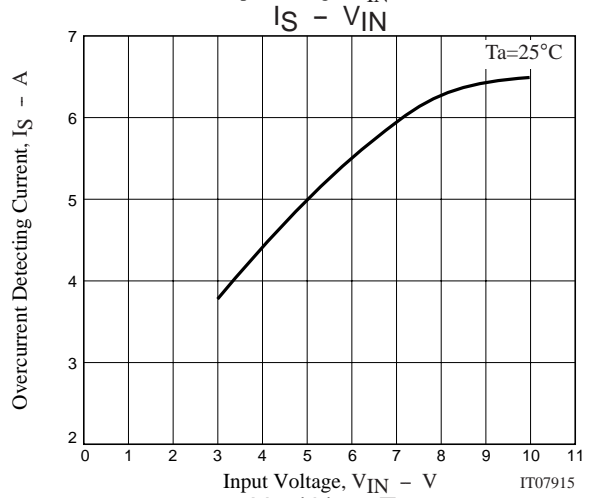
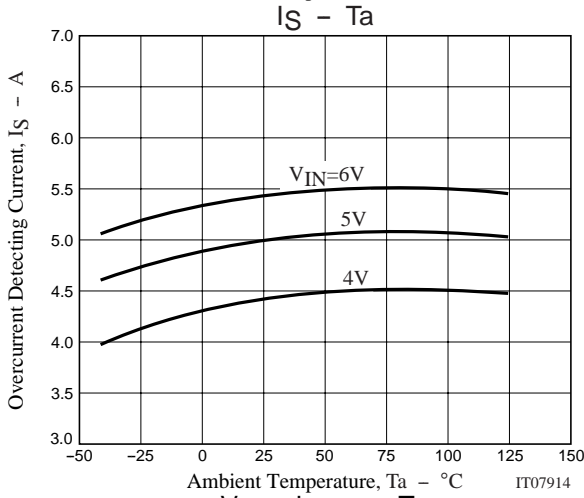
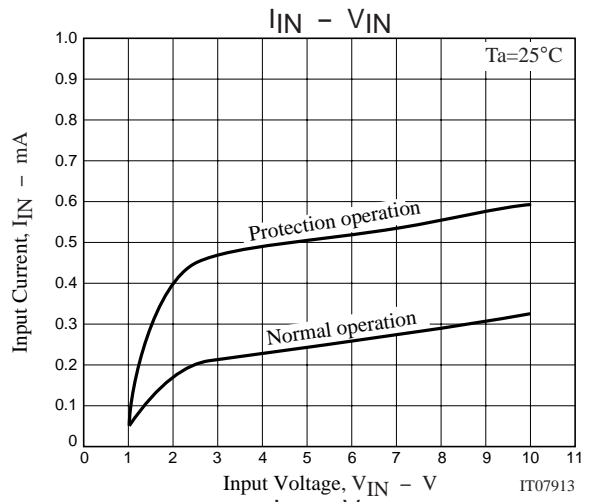
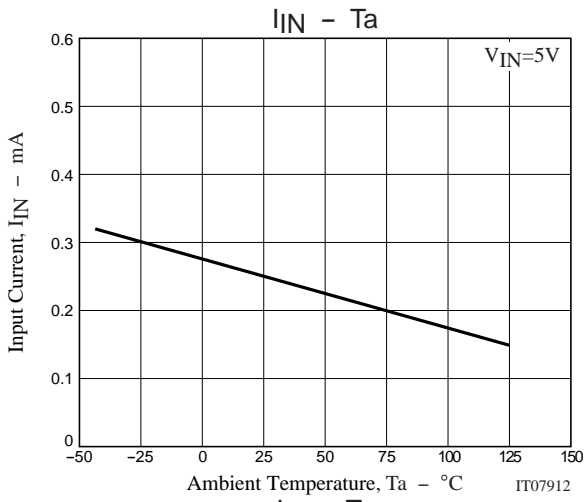
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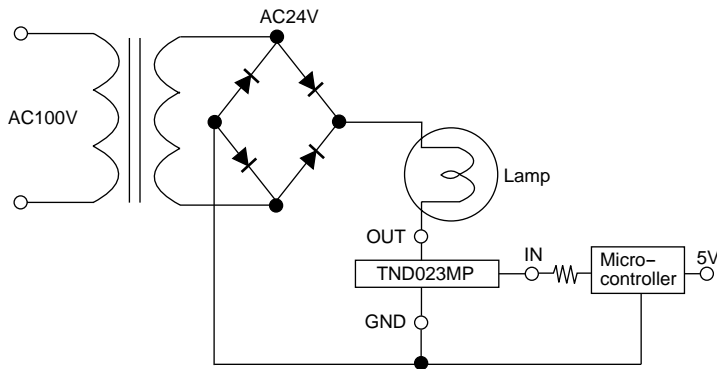
Block Diagram



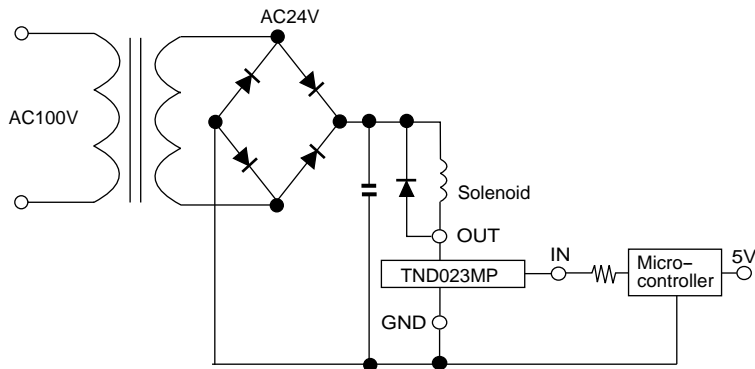
TND023MP



Sample Application Circuit



Another Sample Application Circuit (solenoid drive)



Operation Description

1. The output power MOSFET will be turned on when the input voltage exceeds the input threshold voltage (5V is recommended), and then the lamp will be turned on by the current flowing to the lamp. Conversely, the output power MOSFET will be turned off when the input voltage goes below the input threshold voltage, and then the lamp will be turned off.
2. The internal overcurrent protection function shuts down the output power MOSFET when output current of at least the overcurrent detecting current value flows at load short. Besides, if the device temperature exceeds the allowable power dissipation, overheat protection function protects the power switch from being broken down by shutting down the MOSFET when T_j comes to 165°C (typical).
3. Shutdown state will be kept after overheat and overcurrent protections operation and the system will be reset when the input voltage goes to or below the reset voltage (1.0V).
4. As an example of application circuit, DC voltage can also be controlled as a solenoid drive.

Addition

- The diode between OUT and GND in the block diagram is parasitic diode of the MOSFET.
- Not apply a voltage on IN terminal during the period when OUT voltage is lower than GND voltage when driving a solenoid or a motor.
- Be sure connect a diode between OUT terminal and GND terminal when you want to apply a voltage on IN terminal under the above-stated state (that is, OUT Voltage < GND Voltage).

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