

# TND027MP

## Excellent Power Device Lowside Power Switch Lamp / Solenoid / Motor Driving, Single MP



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### Features

- N-Channel MOSFET Built in
- Overheat Protection (Self Recovery Type)
- Overcurrent Protection (Self Recovery Type Current Limiting Function)
- Overvoltage Protection

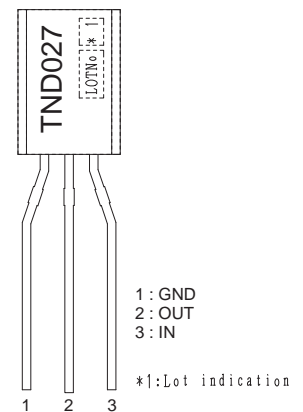
### SPECIFICATIONS

**ABSOLUTE MAXIMUM RATING** at Ta = 25°C (Note 1)

Parameter	Symbol	Value	Unit
Drain to Source Voltage	V <sub>DS</sub>	60	V
Output Current (DC)	I <sub>O</sub>	1.5	A
Input Voltage	V <sub>IN</sub>	-0.3 to +10	V
Power Dissipation	P <sub>D</sub>	1.0	W
Operating Supply Voltage	V <sub>DS(opr)</sub>	40	V
Operating Temperature	T <sub>opr</sub>	-40 to +85	°C
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

Note 1 : Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

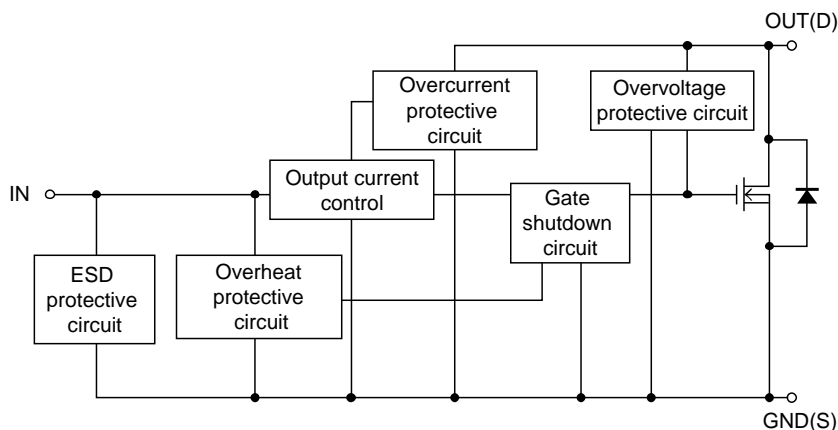
### MARKING



### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

### BLOCK DIAGRAM



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## ELECTRICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$ (Note 2, 3, 4)

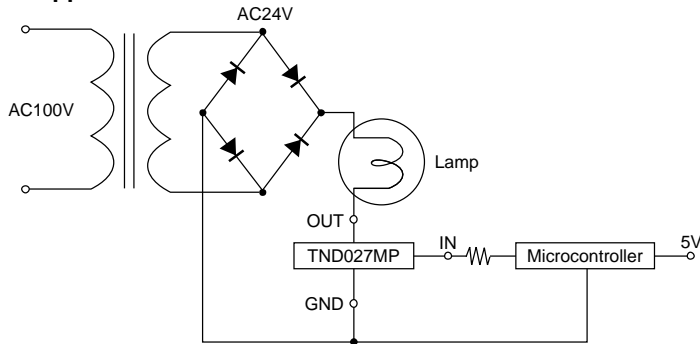
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Clamp Voltage	$V_{DS, \text{clamp}}$	$V_{IN}=0\text{V}, I_O=1\text{mA}$	60			V
Output-OFF Current	$I_{DSS(1)}$	$V_{IN}=0\text{V}, V_{DS}=50\text{V}$			10	$\mu\text{A}$
	$I_{DSS(2)}$	$V_{IN}=0\text{V}, V_{DS}=12\text{V}$			5	$\mu\text{A}$
Input Threshold Voltage	$V_{IN(\text{th})}$	$V_{DS}=5\text{V}, I_O=1\text{mA}$	1.0	1.5	2.0	V
Protection Circuit Operating Input Voltage	$V_{IN(\text{opr})}$		4		10	V
Drain to Source ON Resistance	$R_{DS(\text{on})}$	$V_{IN}=5\text{V}, I_O=1\text{A}$		0.3	0.4	$\Omega$
Input Current (Output On)	$I_{IN}$	$V_{IN}=5\text{V}$			0.6	mA
Over-Heat Detecting Temperature	$T_j(\text{sd})$	$V_{IN}=5\text{V}, I_O=1\text{A}$	120	150	190	$^\circ\text{C}$
Over-Curret Detecting Current	$I_s$	$V_{IN}=5\text{V}$	3.0	6.0	9.0	A
Over-Curret Limit (Peak)	$I_{LMT}$	$V_{IN}=5\text{V}$	3.0	6.0	9.0	A
Input Clamp Voltage	$V_{IN, \text{clamp}}$	$I_{IN}=1\text{mA}$	10			V

Note 2 :Overcurrent protection circuit limits the output current to the range of overcurrent limit value.

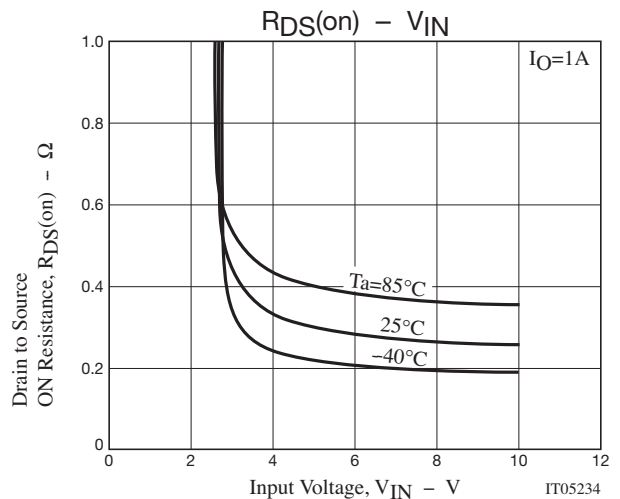
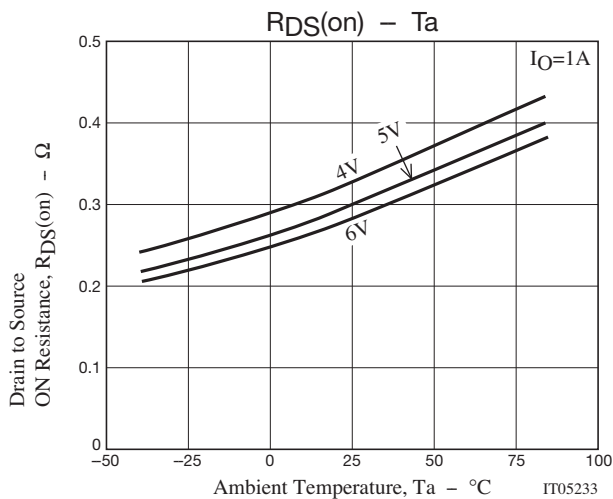
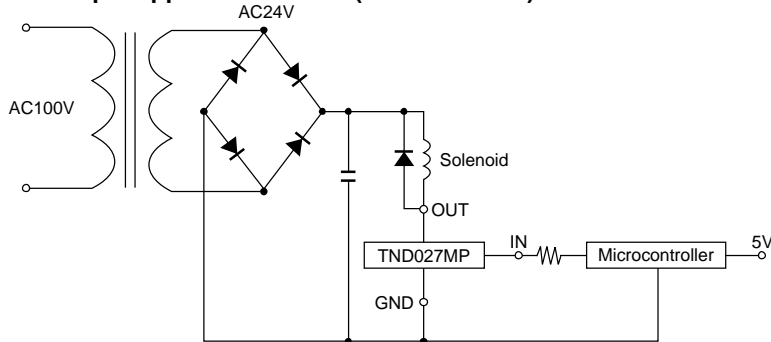
Note 3 :During overheating operation, output current is turned off.

Note 4 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

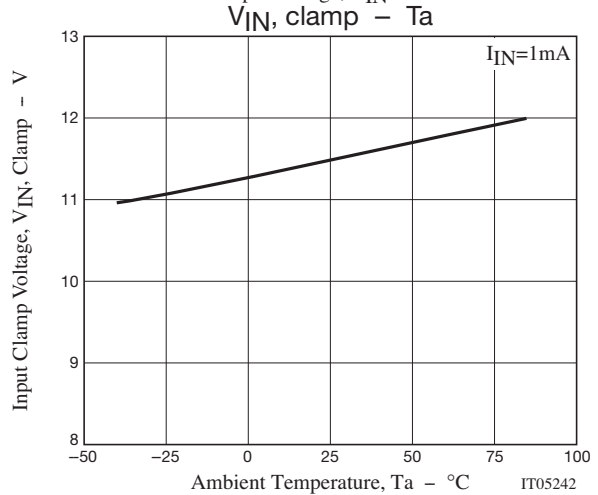
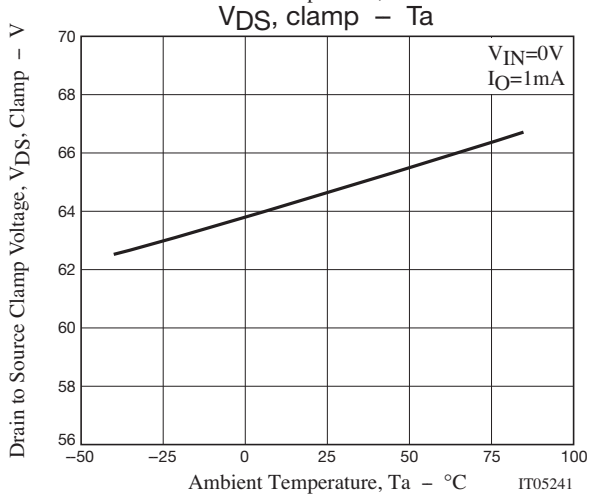
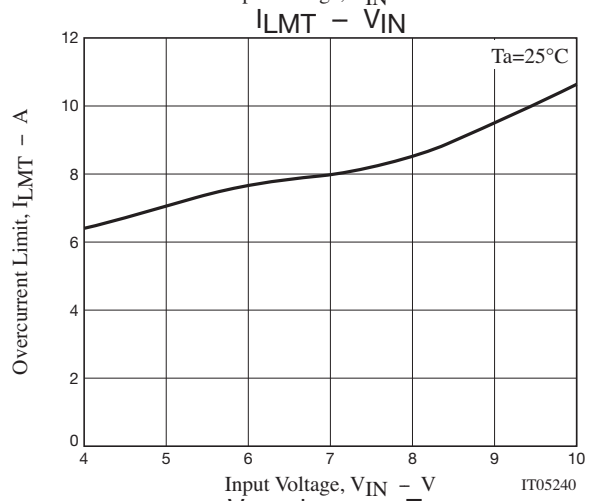
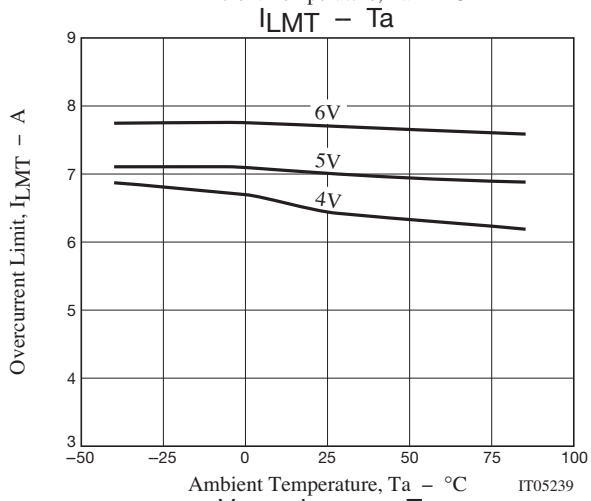
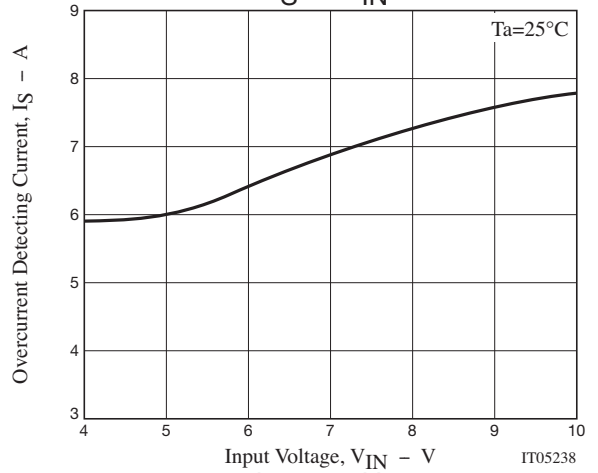
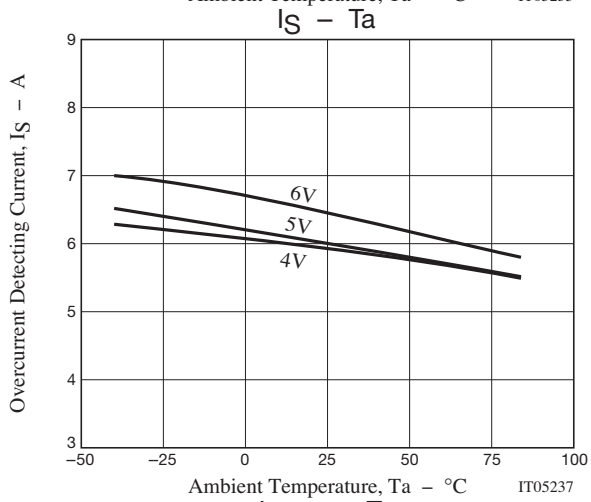
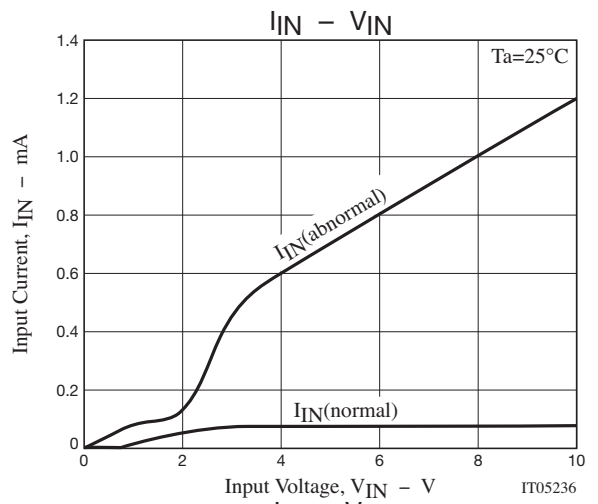
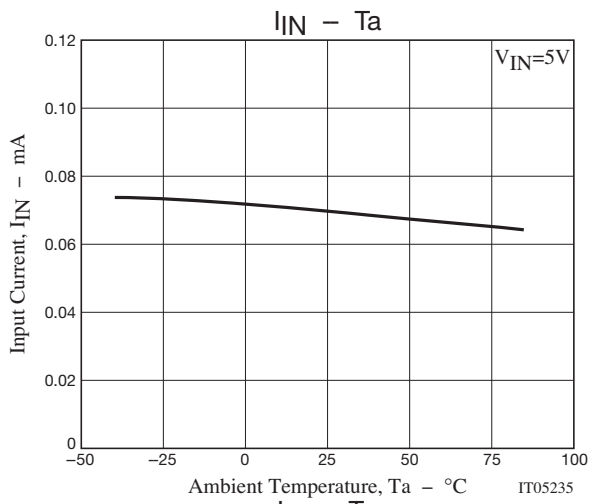
### Sample Application Circuit



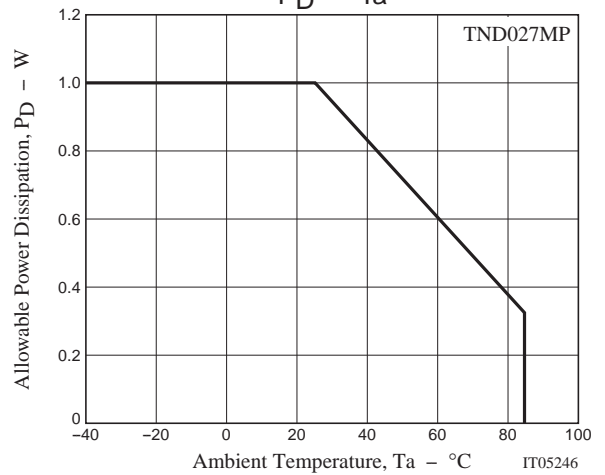
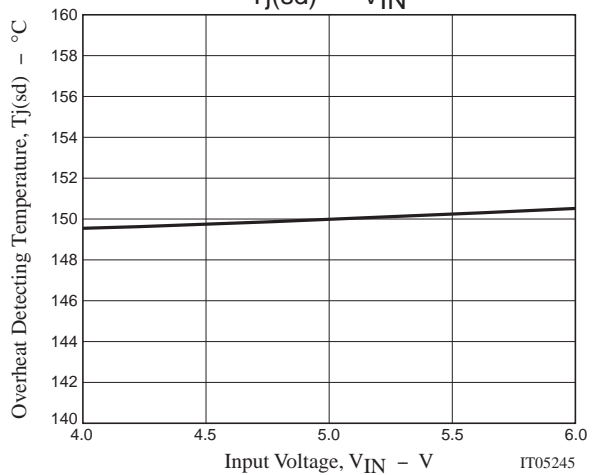
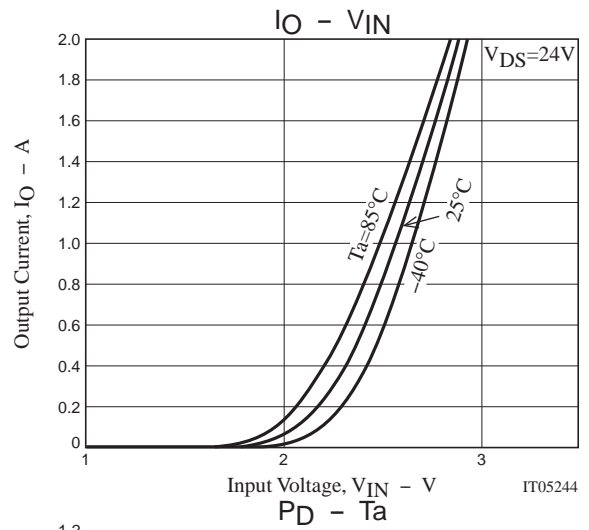
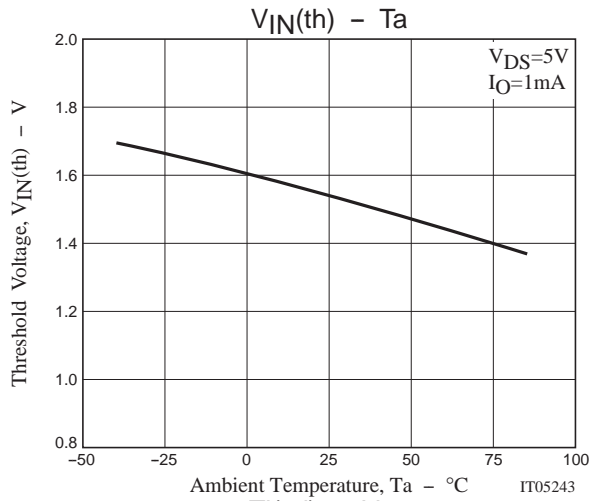
### Another Sample Application Circuit (Solenoid drive)



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## OPERATION DESCRIPTION

- The output power MOSFET will be turned on when the input voltage exceeds the input threshold voltage(4 to 6V 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 the lamp will be turned off.
- The inrush current that occurs during normal lamp operation is limited to a preset value by the built-in overcurrent protecting circuit, which makes the lamp life longer.
- The internal overcurrent protection function limits the current of 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 turning off the current of output power MOSFET when  $T_j$  comes to 150°C(typical).
- 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).

