



# TND027MP — ExPD(Excellent Power Device) Lowside Power Switch Lamp-, Solenoid-, and Motor-Driving Applications

## Features

- N-channel MOSFET built in.
- Overheat protection. (Self recovery type)
- Overcurrent protection. (Self recovery type current limiting function)
- Overvoltage protection.

## Specifications

### Absolute Maximum Ratings at Ta=25°C

| Parameter                   | Symbol                | Conditions | Ratings     | Unit |
|-----------------------------|-----------------------|------------|-------------|------|
| Drain-to-Source Voltage     | V <sub>DS</sub>       |            | 60          | V    |
| Output Current              | I <sub>O</sub> (DC)   |            | 1.5         | A    |
| Input Voltage               | V <sub>IN</sub>       |            | -0.3 to +10 | V    |
| Allowable Power Dissipation | P <sub>D</sub>        |            | 1.0         | W    |
| Operating Supply Voltage    | V <sub>DS</sub> (opr) |            | 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   |

### Electrical Characteristics at Ta=25°C

| Parameter                                  | Symbol                 | Conditions                               | Ratings |     |     | Unit |
|--|------------------------|--|---------|-----|-----|------|
|  |                        |  | min     | typ | max |      |
| Drain-to-Source Clamp Voltage              | V <sub>DS, clamp</sub> | V <sub>IN</sub> =0, I <sub>O</sub> =1mA  | 60      |     |     | V    |
| Output-OFF Current                         | I <sub>DSS</sub> (1)   | V <sub>IN</sub> =0, V <sub>DS</sub> =50V |         |     | 10  | μA   |
|  | I <sub>DSS</sub> (2)   | V <sub>IN</sub> =0, V <sub>DS</sub> =12V |         |     | 5   | μA   |
| Input Threshold Voltage                    | V <sub>IN</sub> (th)   | V <sub>DS</sub> =5V, I <sub>O</sub> =1mA | 1.0     | 1.5 | 2.0 | V    |
| Protection Circuit Operating Input Voltage | V <sub>IN</sub> (opr)  |  | 4       |     | 10  | V    |
| Drain-to-Source ON Resistance              | R <sub>DS(on)</sub>    | V <sub>IN</sub> =5V, I <sub>O</sub> =1A  |         | 0.3 | 0.4 | Ω    |
| Input Current (Output On)                  | I <sub>IN</sub>        | V <sub>IN</sub> =5V                      |         |     | 0.6 | mA   |
| Over-Heat Detecting Temperature            | T <sub>j</sub> (sd)    | V <sub>IN</sub> =5V, I <sub>O</sub> =1A  | 120     | 150 | 190 | °C   |
| Over-Current Detecting Current             | I <sub>s</sub>         | V <sub>IN</sub> =5V                      | 3.0     | 6.0 | 9.0 | A    |
| Over-Current Limit (Peak)                  | I <sub>LMT</sub>       | V <sub>IN</sub> =5V                      | 3.0     | 6.0 | 9.0 | A    |
| Input Clamp Voltage                        | V <sub>IN, clamp</sub> | I <sub>IN</sub> =1mA                     | 10      |     |     | V    |

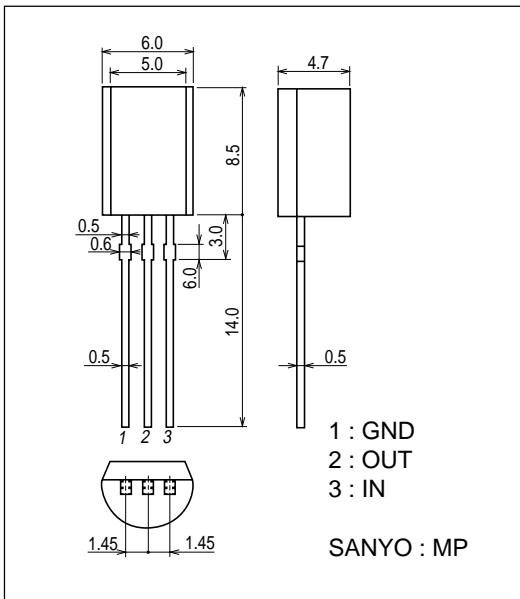
Notes : 1. Overcurrent protection circuit limits the output current to the range of overcurrent limit value.  
2. During overheat protecting operation, output current is turned off.

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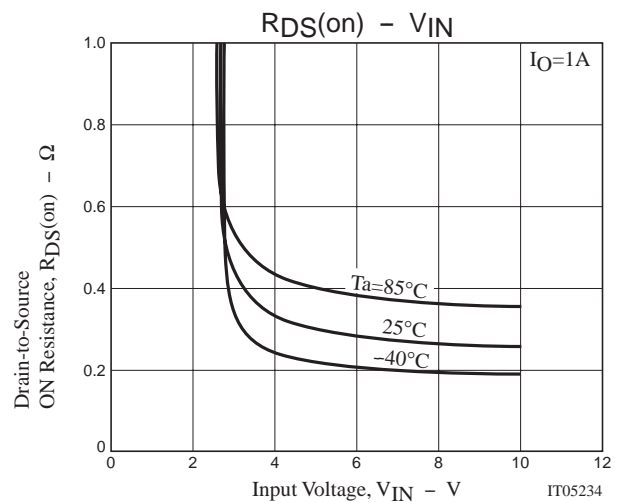
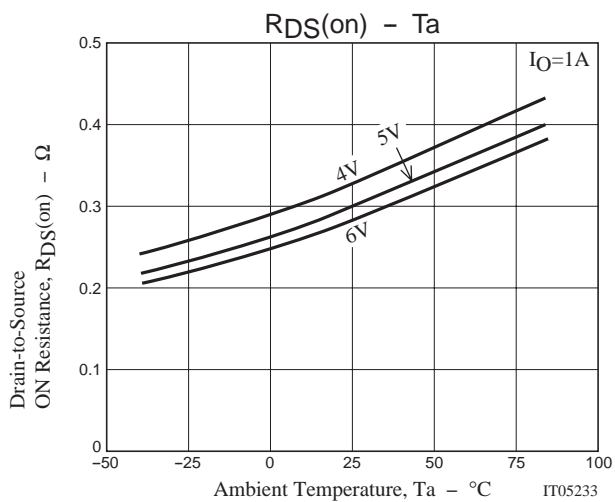
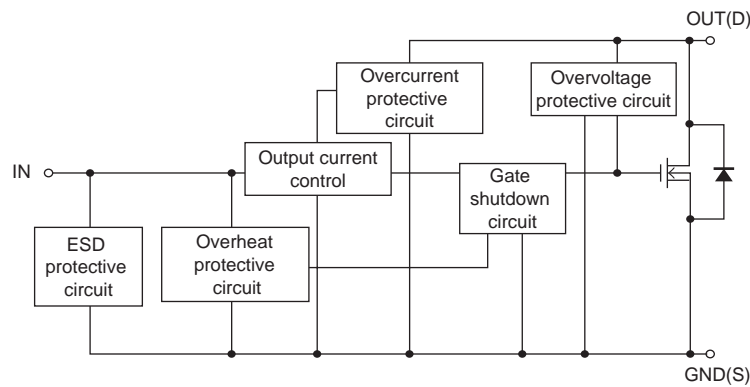
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## Package Dimensions

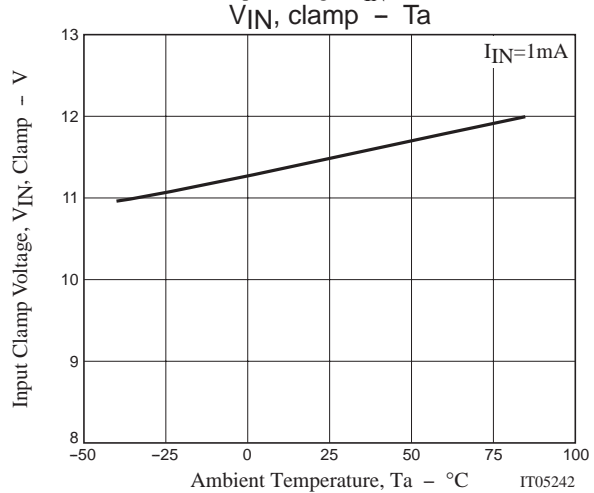
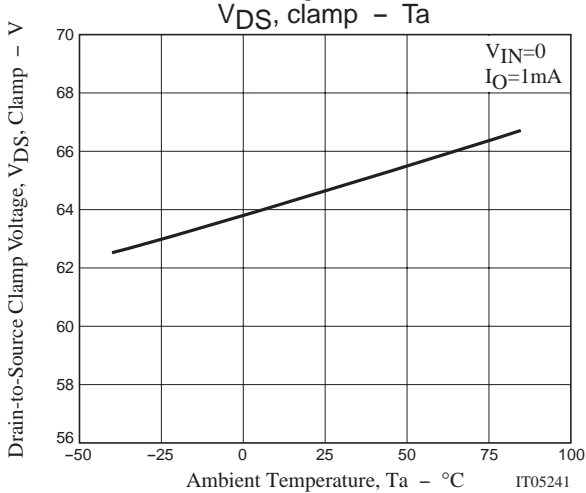
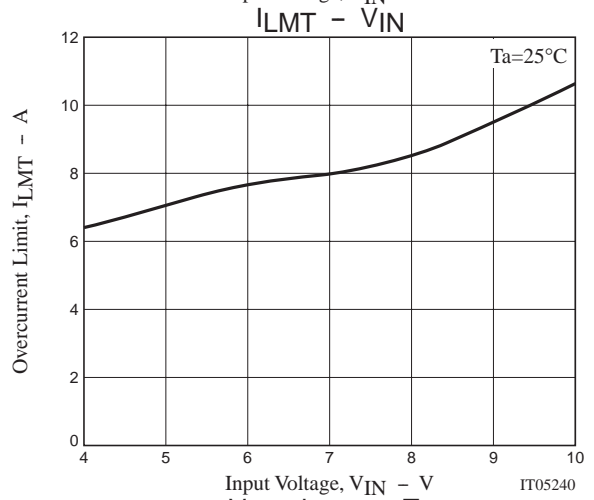
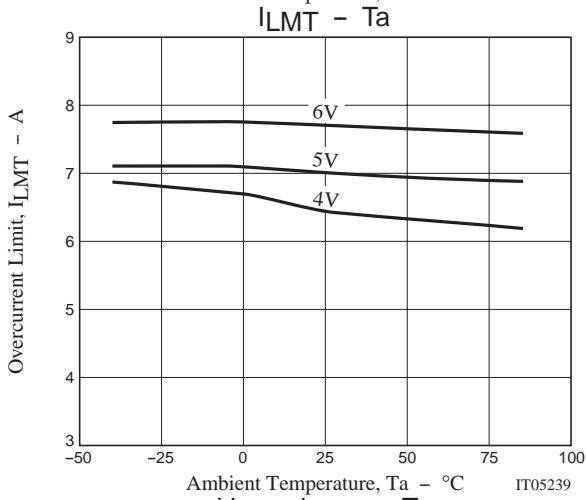
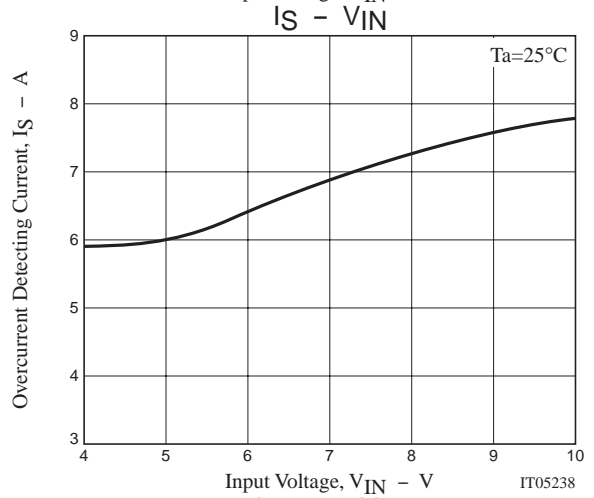
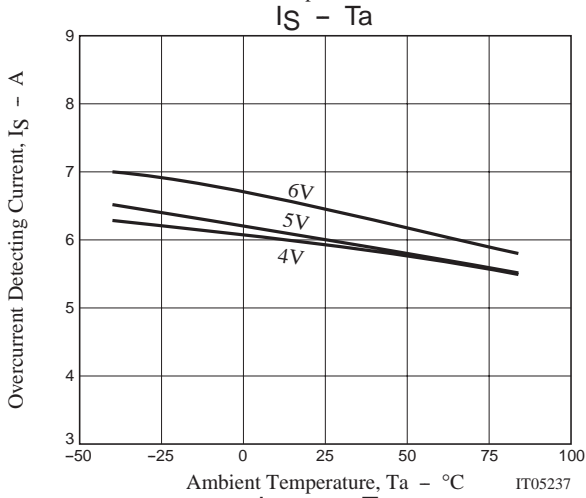
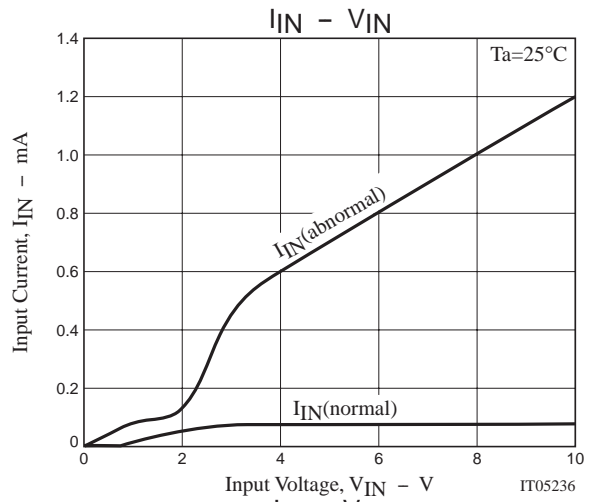
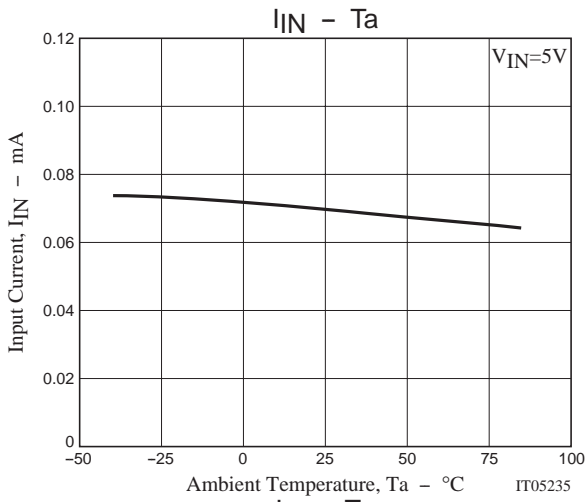
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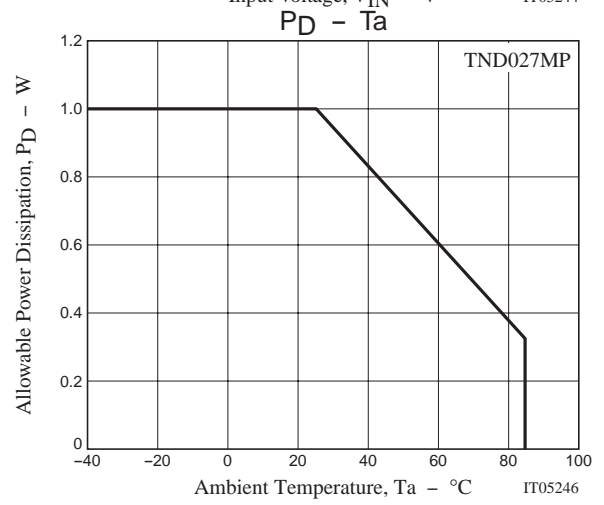
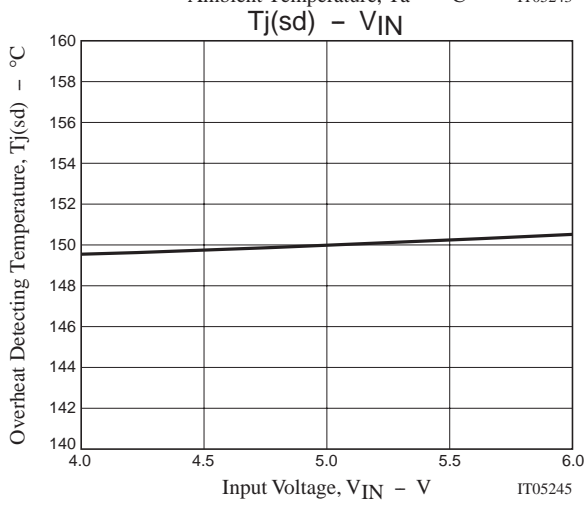
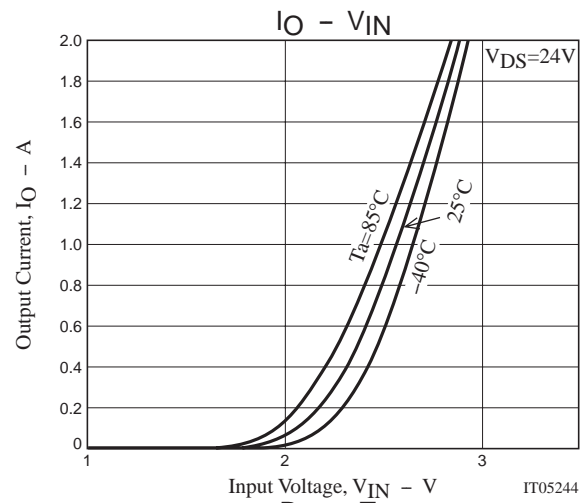
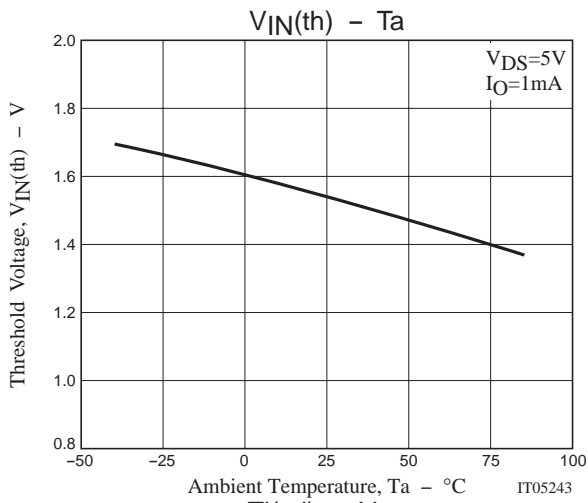
## Block Diagram



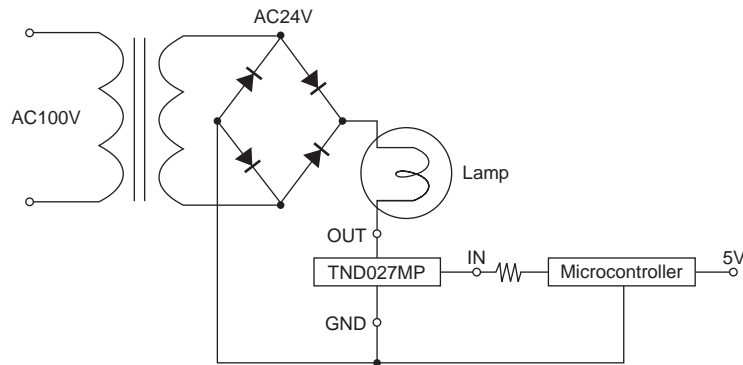
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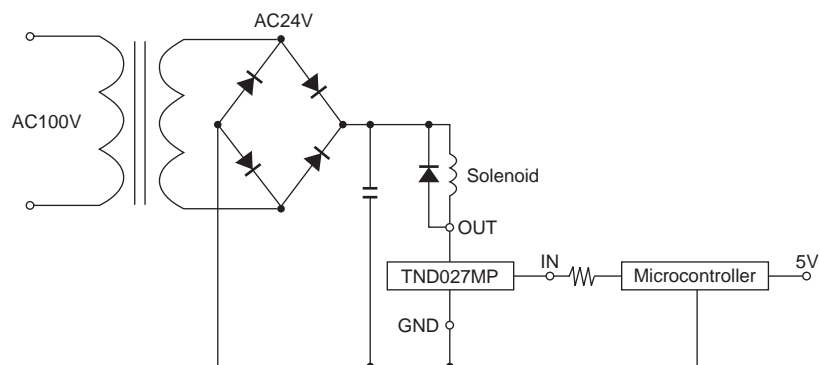
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## Sample Application Circuit



## Another Sample Application Circuit (Solenoid drive)



## 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.

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