



TND023F, TND023MP

Lamp-, solenoid-, and motor-driving Applications

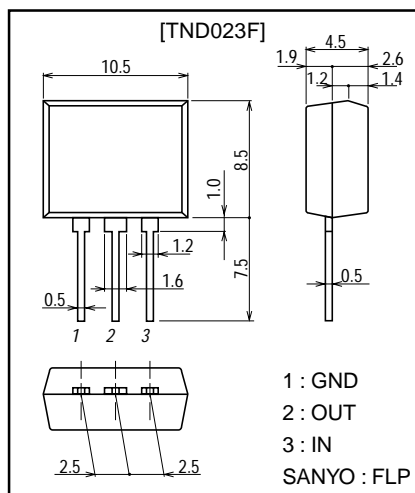
Features

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

Package Dimensions

Unit:mm

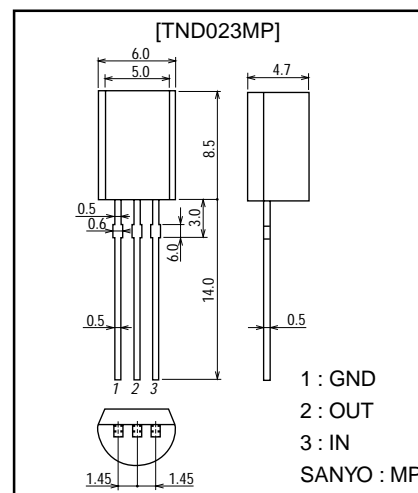
2154



Package Dimensions

Unit:mm

2145



Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	$V_{DS(DC)}$		60	V
Output Current (Average)	$I_O(DC)$	TND023F	2.5	A
	$I_O(DC)$	TND023MP	2.0	A
Input Voltage	V_{IN}		-0.3 to +10	V
Allowable Power Dissipation	P_D	TND023F	1.5	W
	P_D	TND023MP	1.0	W
Operating Temperature	T_{opr}		-40 to +150	°C
Junction Temperature	T_j		150	°C
Storage Temperature	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	$V_{DS\ clamp}$	$V_{IN}=0, I_O=1mA$	60			V
Output-OFF Current	$I_{DSS(1)}$	$V_{IN}=0, V_{DS}=50V$			100	μA
	$I_{DSS(2)}$	$V_{IN}=0, V_{DS}=12V$			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

Continued on next page.

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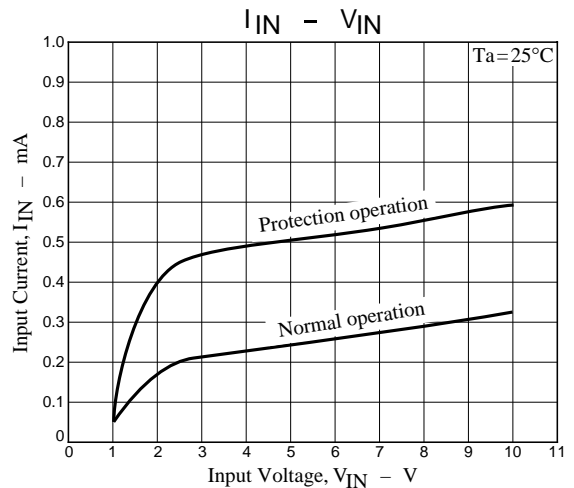
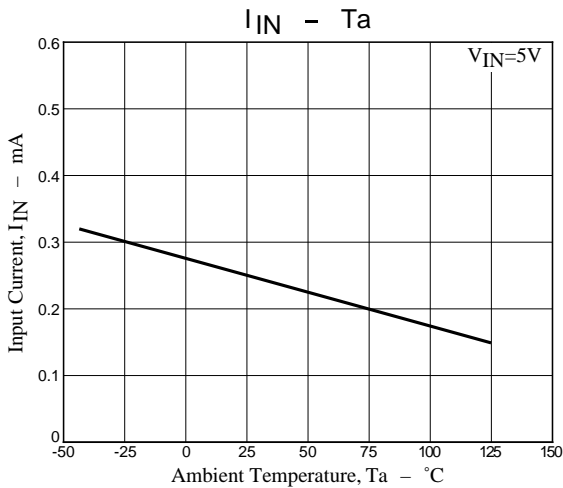
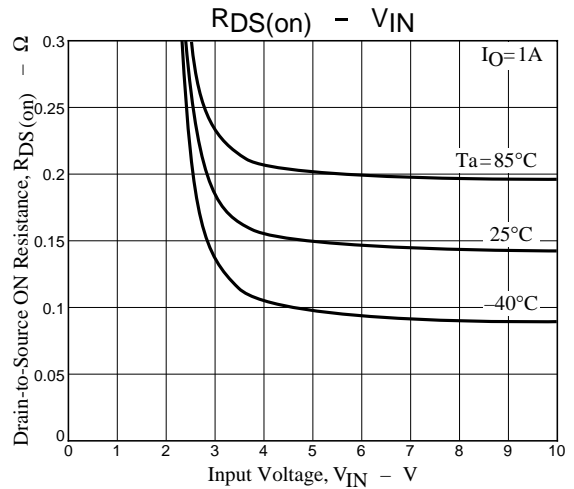
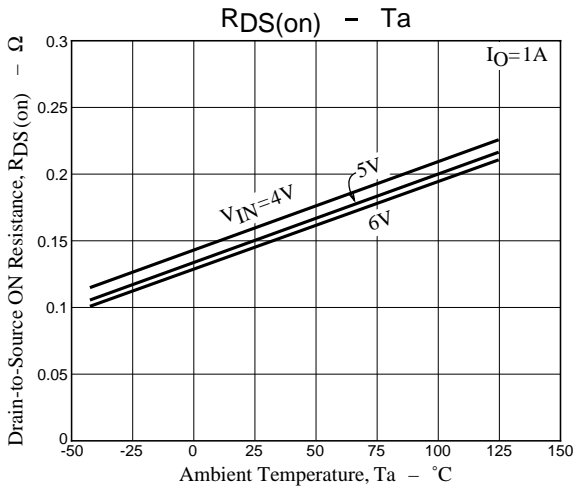
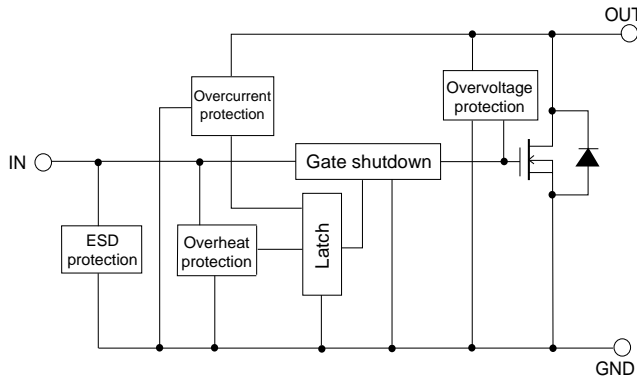
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output-ON Input current	I_{IN}	$V_{IN}=5V$		0.25	0.6	mA
Overheat Detecting Temperature	$T_J(sd)$	$V_{IN}=5V, I_O=1A$	155	165		$^{\circ}C$
Overcurrent Detecting Current	I_s	$V_{IN}=5V$	3.75	5	6.25	A
Input Clamp Voltage	$V_{IN\ clamp}$	$I_{IN}=5mA$	10			V

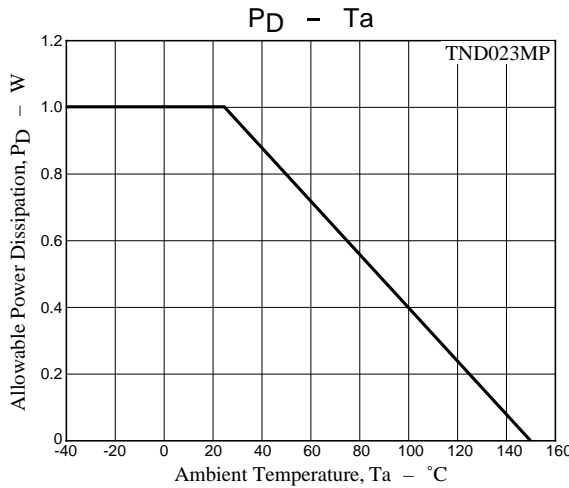
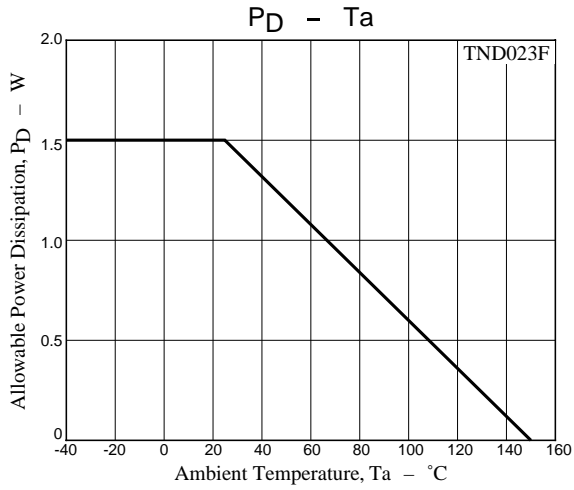
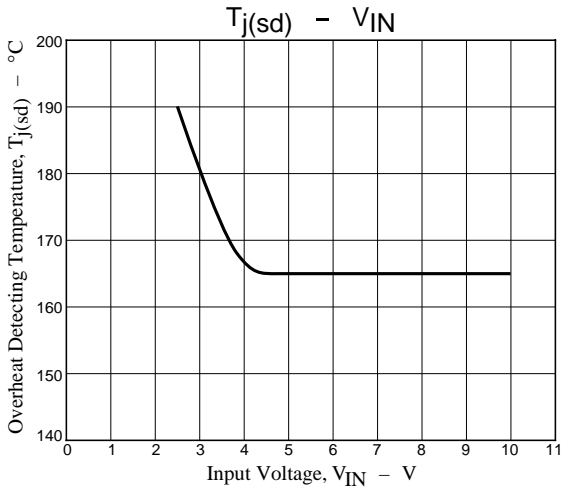
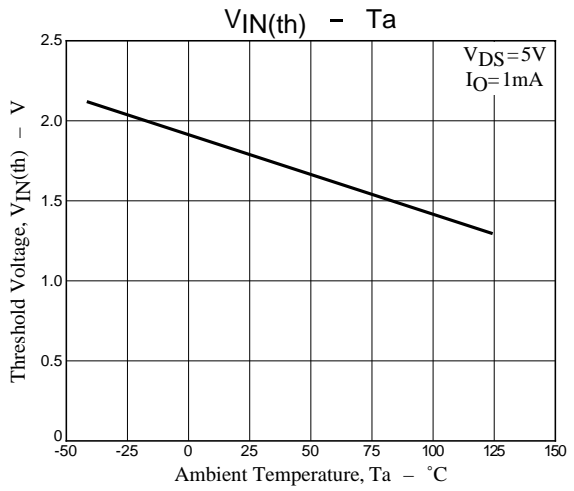
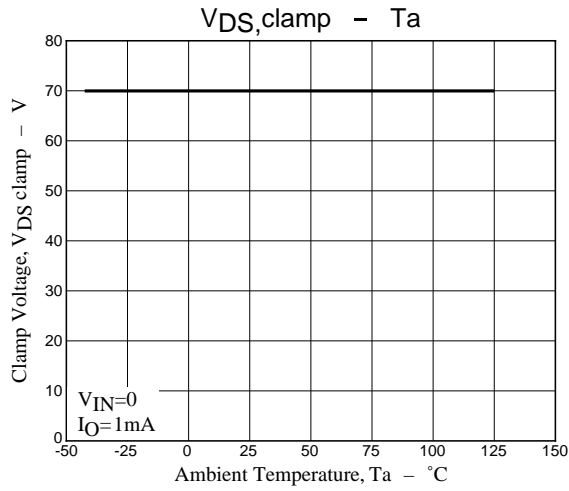
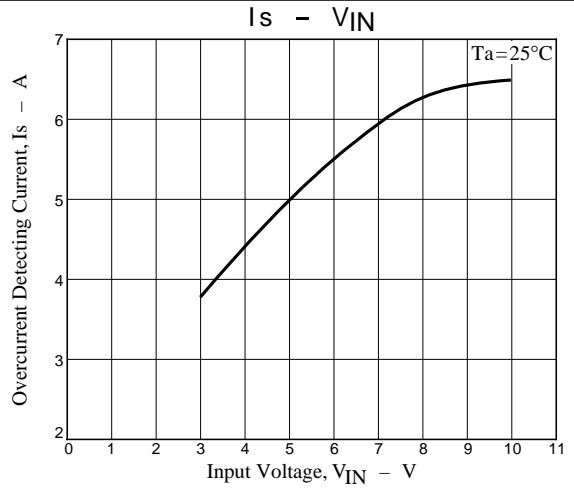
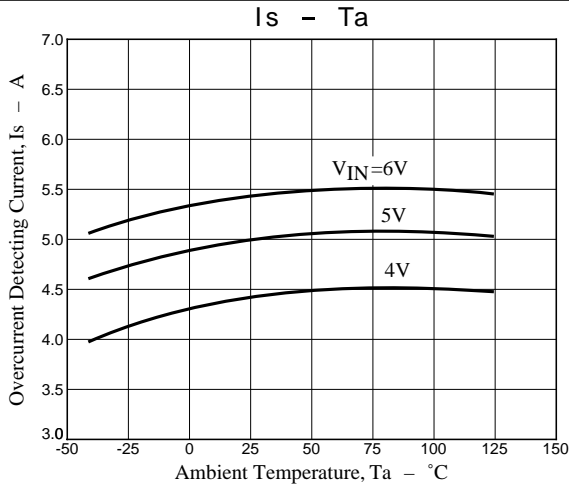
*Note:

- 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.

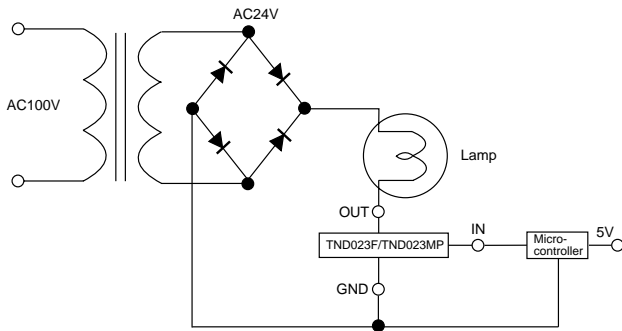
Block Diagram



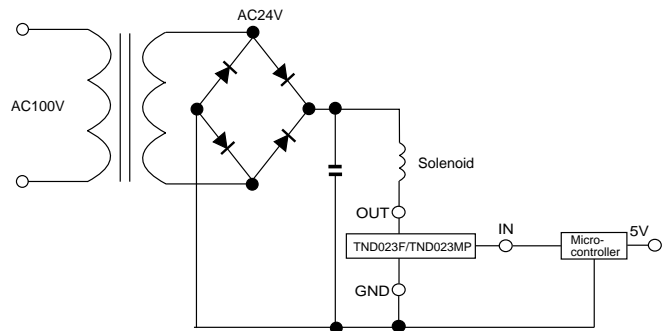
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Sample Application Circuit



**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.

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