Ordering number : ENN7437A

SANYO Semiconductors
DATA SHEET

TND027SW
TND027TD

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.
- Incorporates two sets of circuit.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V_{DS}		60	V
Output Current	I_O(DC)		1.5	A
Input Voltage	V_{IN}		-0.3 to +10	V
Allowable Power Dissipation	P_D	TND027SW Mounted on a ceramic board (1200mm²×0.8mm)1unit	1.3	W
		TND027SW Mounted on a ceramic board (1200mm²×0.8mm)	1.7	W
		TND027TD Mounted on a ceramic board (1000mm²×0.8mm)1unit	0.8	W
		TND027TD Mounted on a ceramic board (1000mm²×0.8mm)	1.3	W
Operating Supply Voltage	V_{DS}(opr)		40	V
Operating Temperature	Topr		-40 to +85	°C
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		-55 to +150	°C

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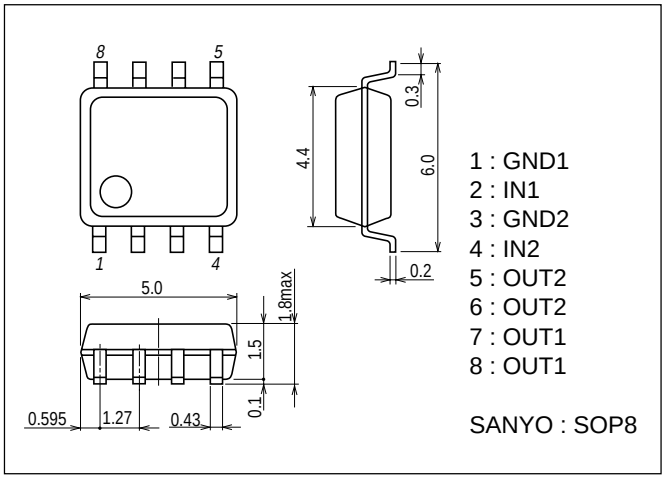
Electrical Characteristics at Ta=25°C

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			10	μA
	I_{DSS}(2)	V_{IN}=0, V_{DS}=12V			5	μA
Input Threshold Voltage	V_{IN}(th)	V_{DS}=5V, I_O=1mA	1.0	1.5	2.0	V
Protection Circuit Operating Input Voltage	V_{IN}(opr)		4		10	V
Drain-to-Source ON Resistance	R_{DS}(on)	V_{IN}=5V, I_O=1A		0.3	0.4	Ω
Input Current (Output On)	I_{IN}	V_{IN}=5V			0.6	mA
Over-Heat Detecting Temperature	Tj(sd)	V_{IN}=5V, I_O=1A	120	150	190	°C
Over-Current Detecting Current	Is	V_{IN}=5V	3.0	6.0	9.0	A
Over-Current Limit (Peak)	I_{LMT}	V_{IN}=5V	3.0	6.0	9.0	A
Input Clamp Voltage	V_{IN}, clamp	I_{IN}=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.

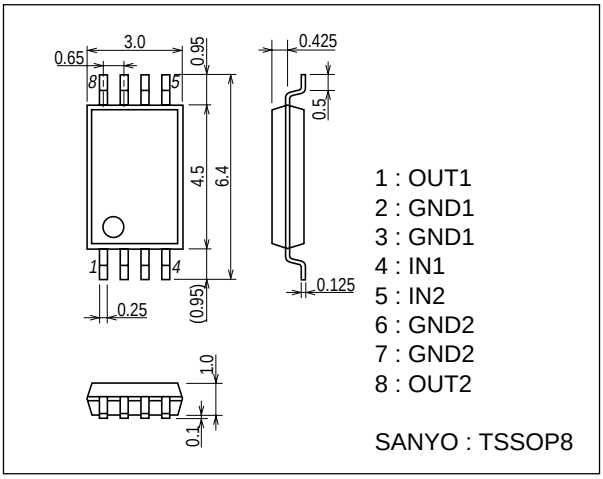
Package Dimensions

unit : mm
2181 [TND027SW]

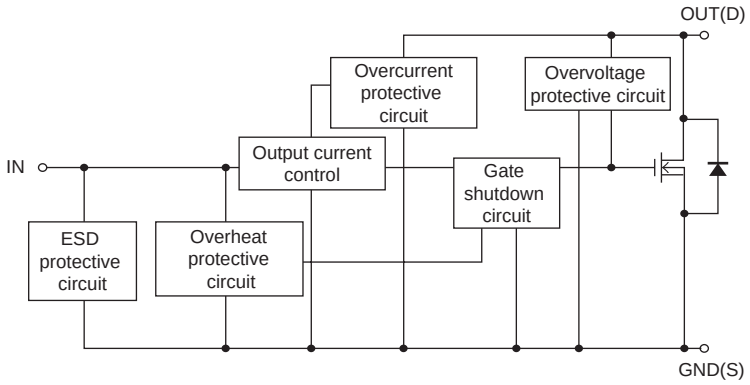


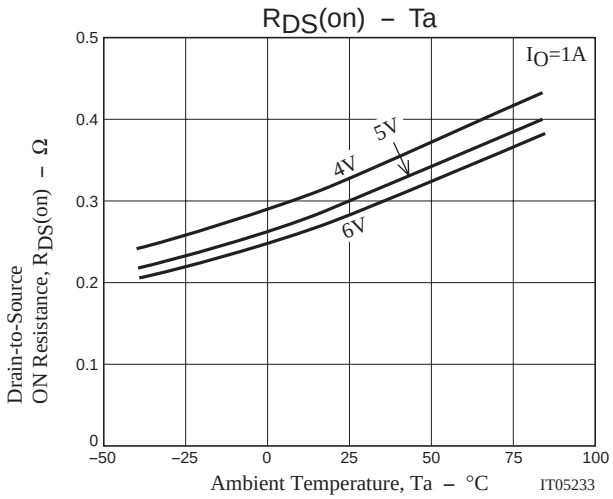
Package Dimensions

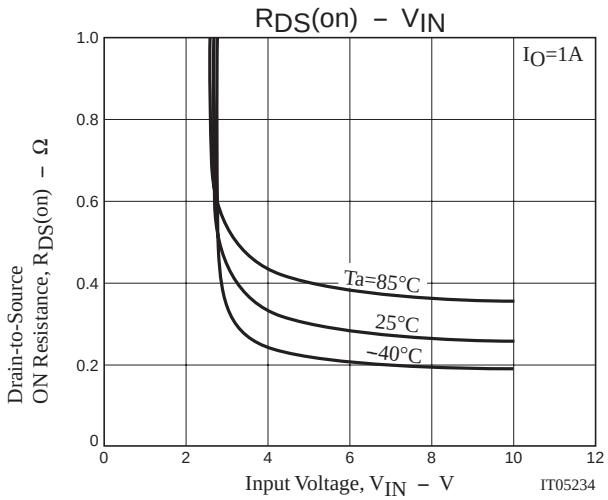
unit : mm
2219 [TND027TD]

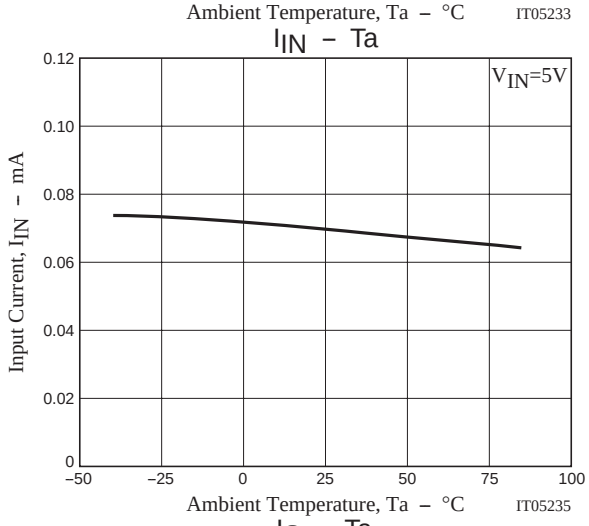


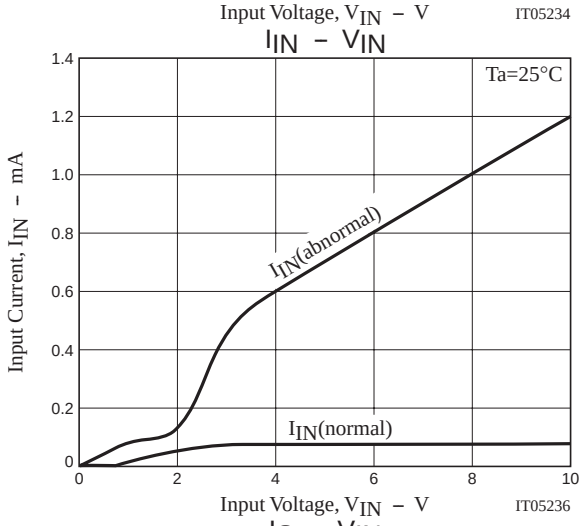
Block Diagram

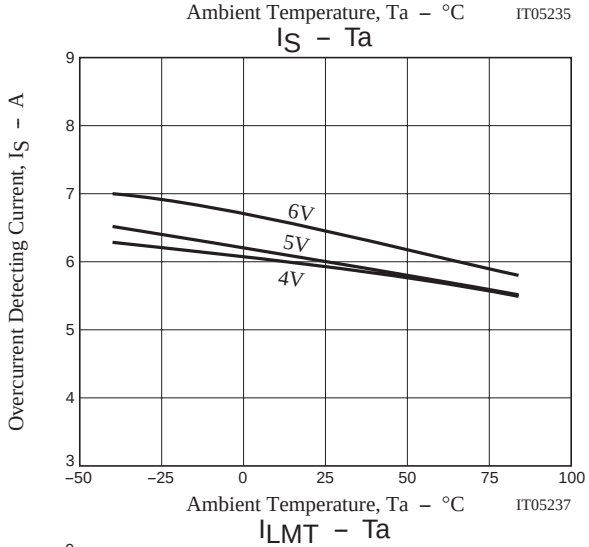


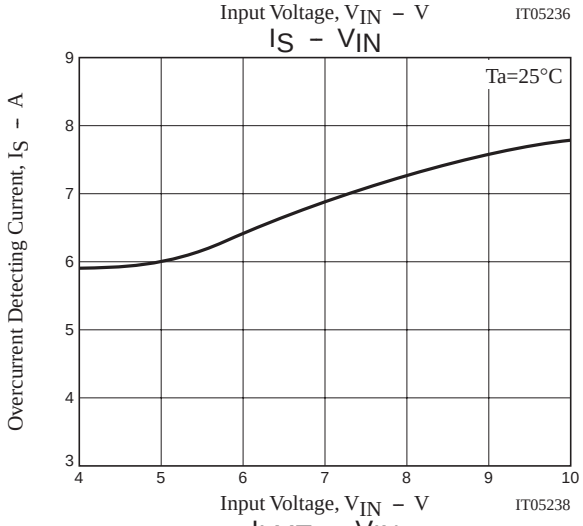

RDS(on) – Ta
IO=1A
5V
4V
6V
Drain-to-Source ON Resistance, RDS(on) – Ω
Ambient Temperature, Ta – °C
IT05233

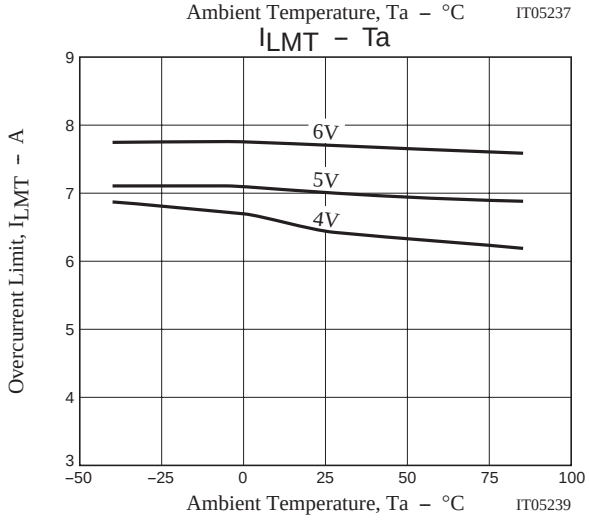

RDS(on) – VIN
IO=1A
Ta=85°C
25°C
–40°C
Drain-to-Source ON Resistance, RDS(on) – Ω
Input Voltage, VIN – V
IT05234

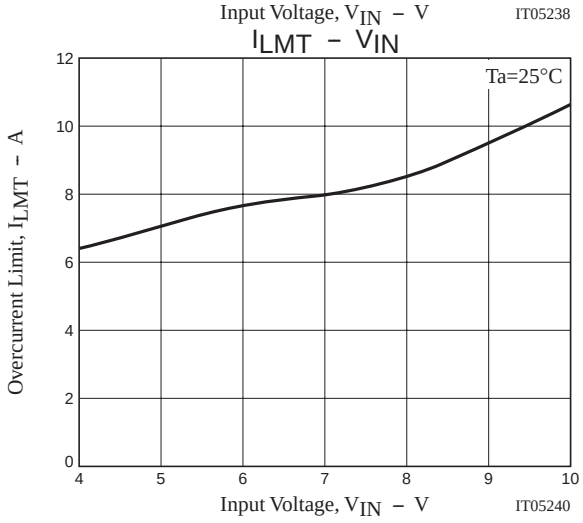

IIN – Ta
VIN=5V
Input Current, IIN – mA
Ambient Temperature, Ta – °C
IT05235

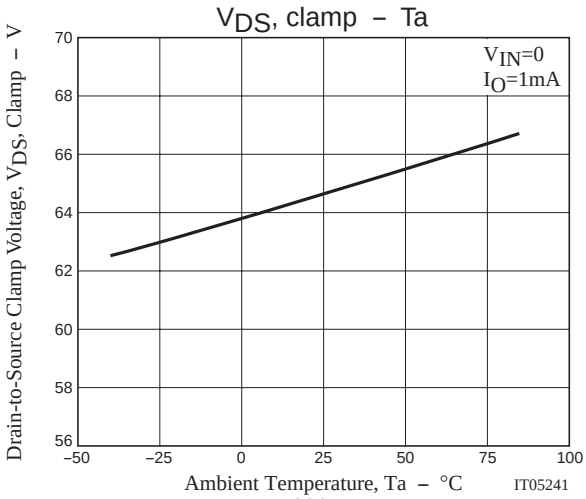

IIN – VIN
Ta=25°C
IIN(abnormal)
IIN(normal)
Input Current, IIN – mA
Input Voltage, VIN – V
IT05236

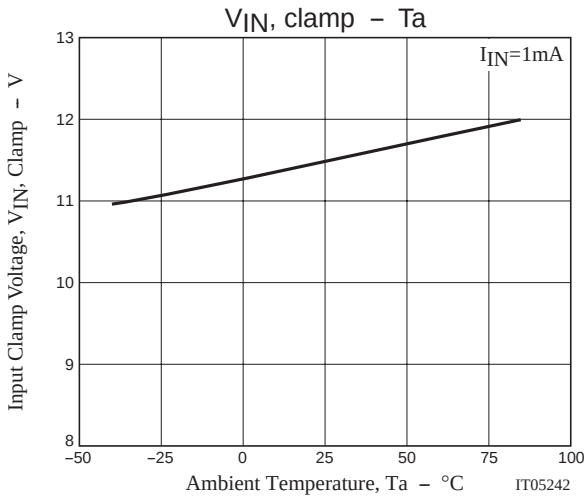

IS – Ta
6V
5V
4V
Overcurrent Detecting Current, IS – A
Ambient Temperature, Ta – °C
IT05237

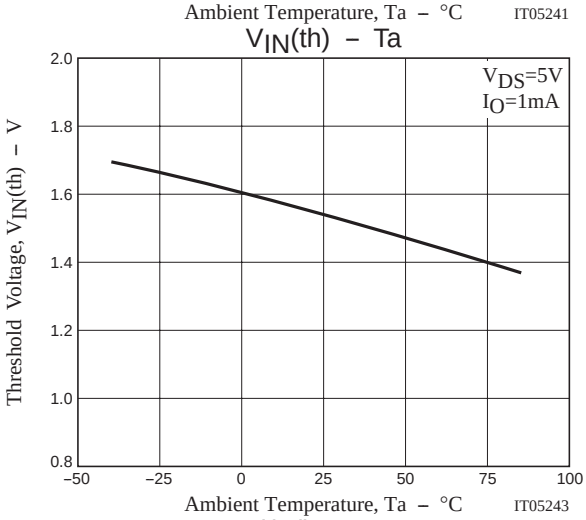

IS – VIN
Ta=25°C
Overcurrent Detecting Current, IS – A
Input Voltage, VIN – V
IT05238

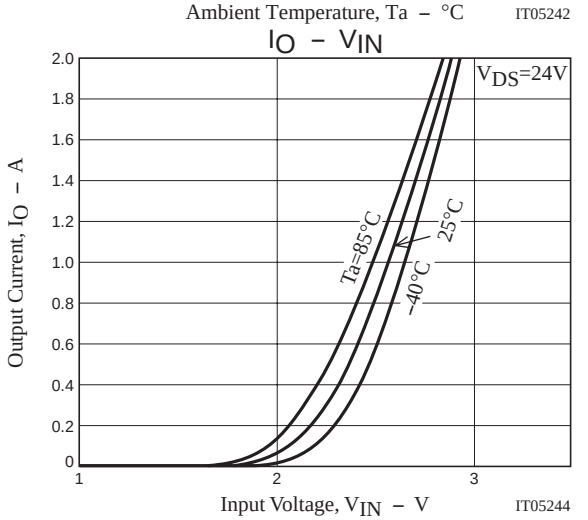

ILMT – Ta
6V
5V
4V
Overcurrent Limit, ILMT – A
Ambient Temperature, Ta – °C
IT05239

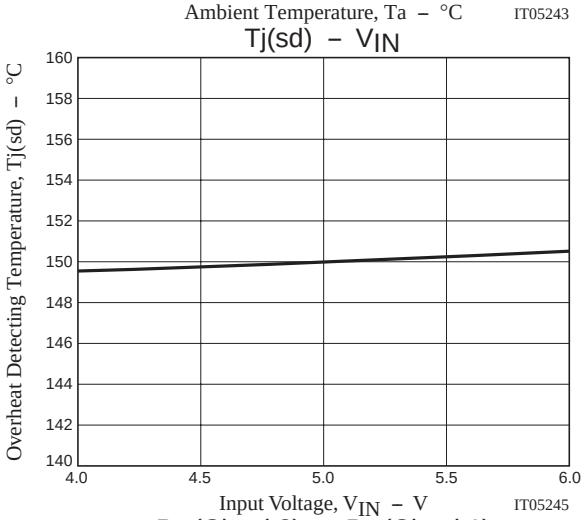

ILMT – VIN
Ta=25°C
Overcurrent Limit, ILMT – A
Input Voltage, VIN – V
IT05240

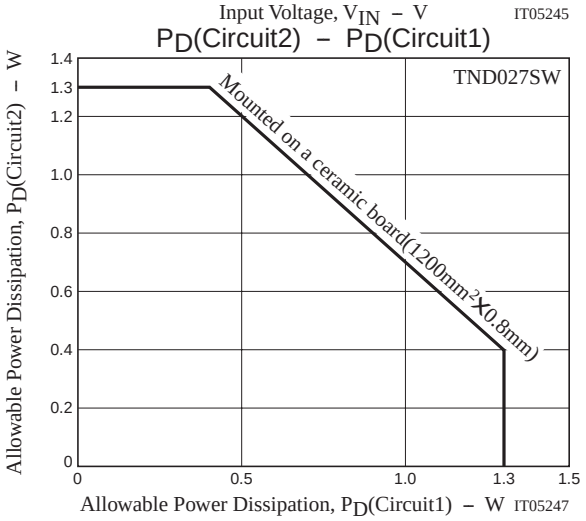

VDS, clamp – Ta
VIN=0
IO=1mA
Drain-to-Source Clamp Voltage, VDS, Clamp – V
70
68
66
64
62
60
58
56
–50
–25
0
25
50
75
100
Ambient Temperature, Ta – °C
IT05241

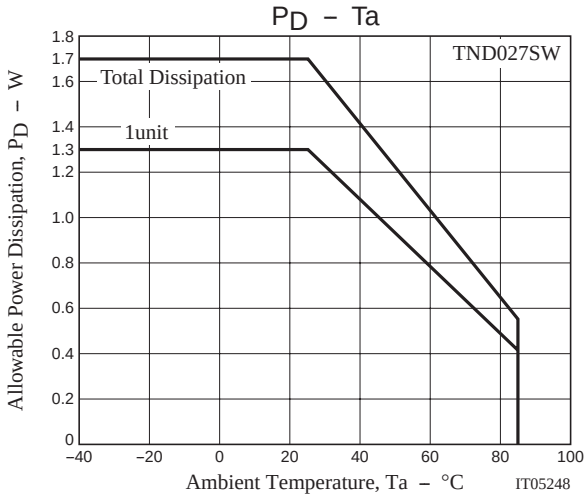

VIN, clamp – Ta
IIN=1mA
Input Clamp Voltage, VIN, Clamp – V
13
12
11
10
9
8
–50
–25
0
25
50
75
100
Ambient Temperature, Ta – °C
IT05242

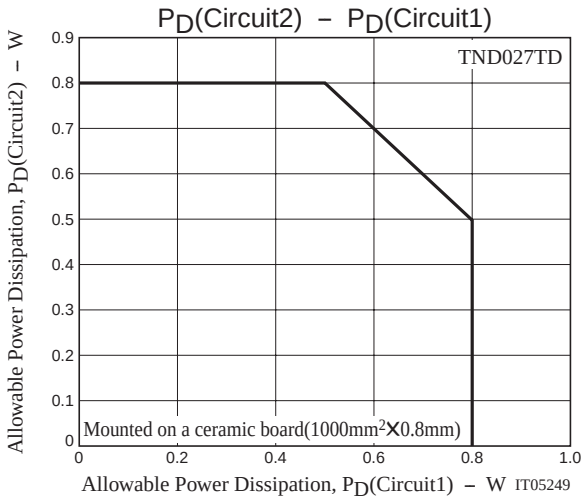

VIN(th) – Ta
VDS=5V
IO=1mA
Threshold Voltage, VIN(th) – V
2.0
1.8
1.6
1.4
1.2
1.0
0.8
–50
–25
0
25
50
75
100
Ambient Temperature, Ta – °C
IT05243

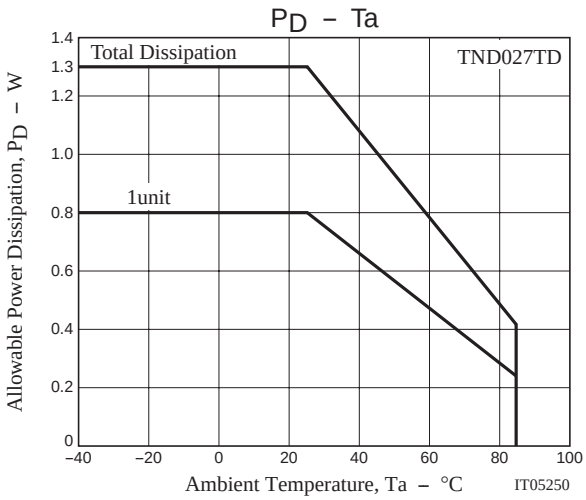

IO – VIN
VDS=24V
Ta=85°C
25°C
–40°C
Output Current, IO – A
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
1
2
3
Input Voltage, VIN – V
IT05244


Tj(sd) – VIN
Overheat Detecting Temperature, Tj(sd) – °C
160
158
156
154
152
150
148
146
144
142
140
4.0
4.5
5.0
5.5
6.0
Input Voltage, VIN – V
IT05245

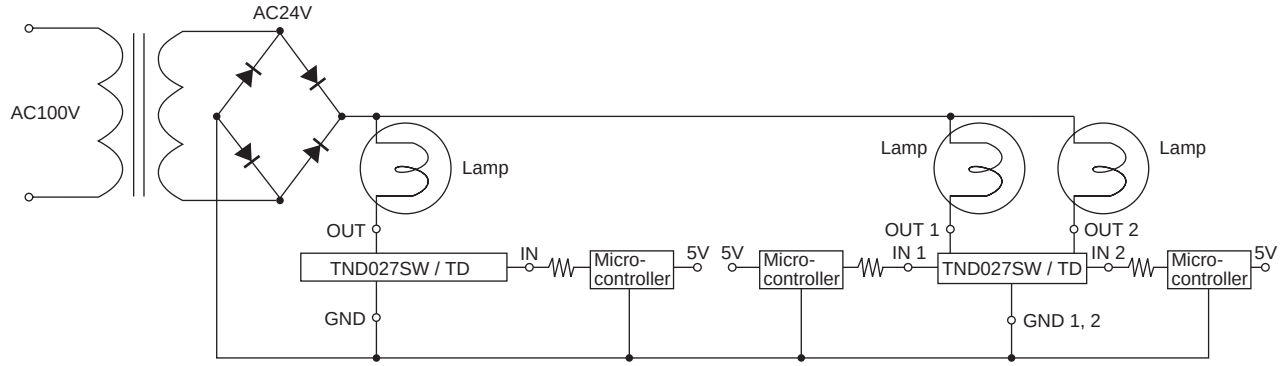

PD(Circuit2) – PD(Circuit1)
TND027SW
Mounted on a ceramic board(1200mm2×0.8mm)
Allowable Power Dissipation, PD(Circuit2) – W
1.4
1.3
1.2
1.0
0.8
0.6
0.4
0.2
0
0
0.5
1.0
1.3
1.5
Allowable Power Dissipation, PD(Circuit1) – W
IT05247


PD – Ta
TND027SW
Total Dissipation
1unit
Allowable Power Dissipation, PD – W
1.8
1.7
1.6
1.4
1.3
1.2
1.0
0.8
0.6
0.4
0.2
0
–40
–20
0
20
40
60
80
100
Ambient Temperature, Ta – °C
IT05248

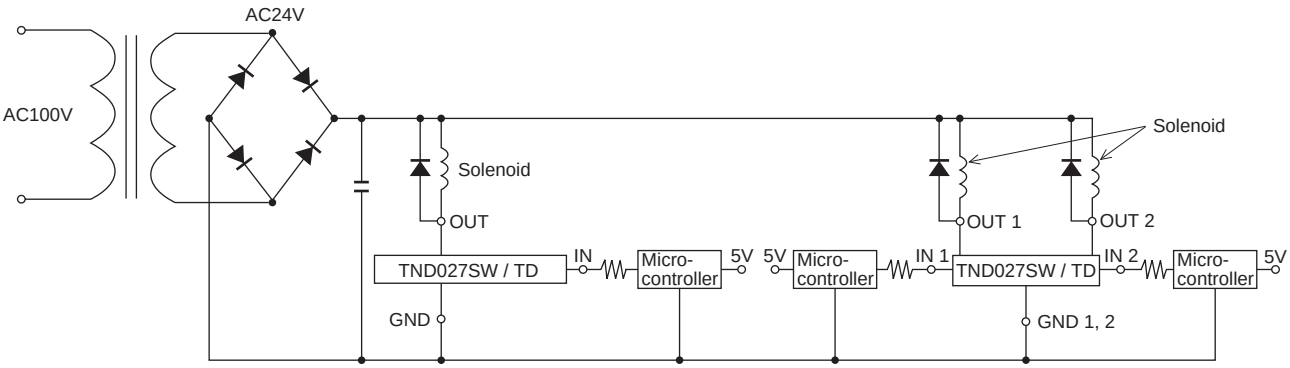




Sample Application Circuit



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 Tj comes to 150°C (typical).
- As an example of application circuit, DC voltage can also be controlled as a solenoid drive.