

TOSHIBA INTELLIGENT POWER DEVICE SILICON MONOLITHIC POWER MOS IC

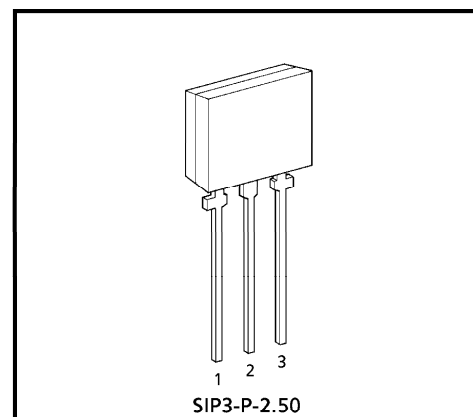
TPD1028AS

LOW-SIDE SWITCH FOR MOTOR, SOLENOID AND LAMP DRIVE

TPD1028AS is a monolithic power IC for low-side switch. The IC has a vertical MOSFET output which can be directly driven from a CMOS or TTL logic circuit (e.g., an MPU). The IC offers intelligent self-protection functions.

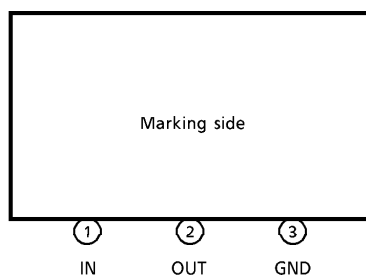
FEATURES

- A monolithic power IC with a new structure combining a control block and a vertical power MOSFET (π -MOS) on a single chip.
- Can directly drive a power load from a CMOS logic etc.
- Built-in protection circuits against overvoltage, overheat, and overcurrent.
- Low ON-resistance. $R_{DS(ON)} = 0.25 \Omega$ (Max.) (@ $V_{IN} = 5V$, $T_j = 25^\circ C$)
- Package TPS can be packed in tape.



Weight : 0.54 g (Typ.)

PIN ASSIGNMENT

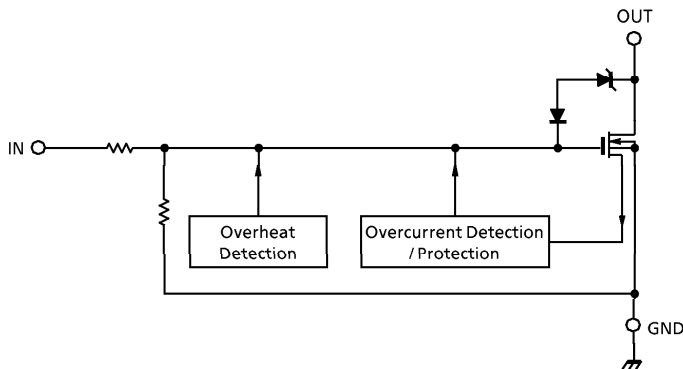


(Note) That because of its MOS structure, this product is sensitive to static electricity.

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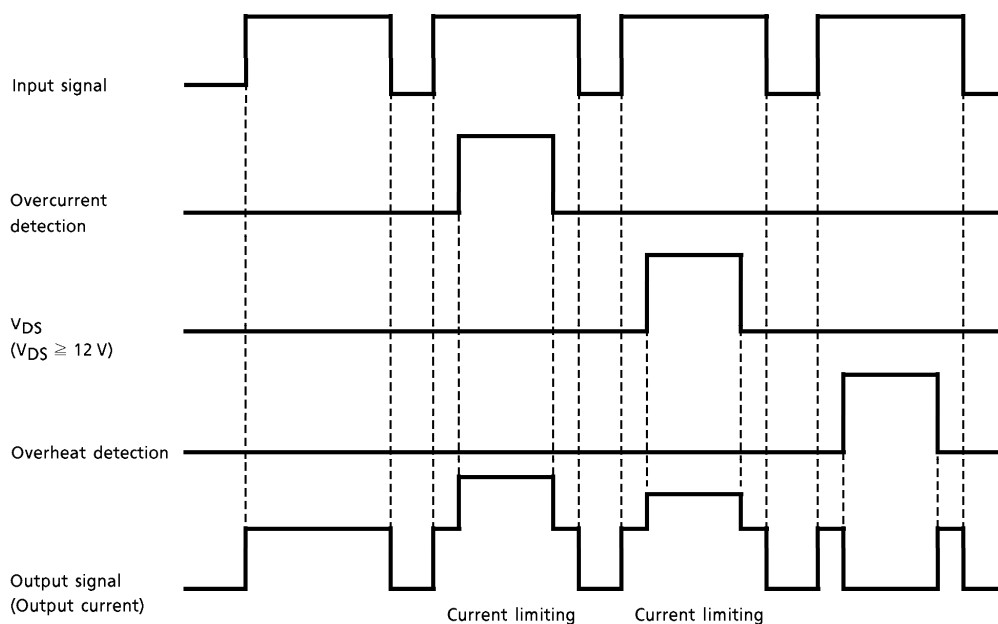
BLOCK DIAGRAM



PIN DESCRIPTION

PIN No.	SYMBOL	PIN DESCRIPTION
1	IN	Input pin. This pin is connected to a pull-down resistor internally, so that even when input wiring is open-circuited, output can never be turned on inadvertently.
2	OUT	Output pin. If an inrush current flows (e.g., from a lamp), the current is clamped at 10 A (typ.) by an overcurrent protective circuit. Also, a 150 μs (typ.) mask circuit is included internally, so that if $V_{DS} \geq 12$ V (typ.) after this mask time, the current is clamped at 3 A (Typ.).
3	GND	Ground pin.

TIMING CHART



TRUTH TABLE

IN	VOUT	MODE
L	H	Normal
H	L	
L	H	Overcurrent (during inrush)
H	L	
L	H	Overcurrent (shorted load)
H	L	
L	H	Overheat
H	H	

MAXIMUM RATING (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-source Voltage	V _{DS} (DC)	40	V
Output Current	I _D	1.5	A
Input Voltage	V _{IN}	-0.5~6	V
Power Dissipation	P _D	1.2	W
Energy Tolerance	ES / B	200	mJ
Operating Temperature	T _{opr}	-40~85	°C
Junction Temperature	T _j	150	°C

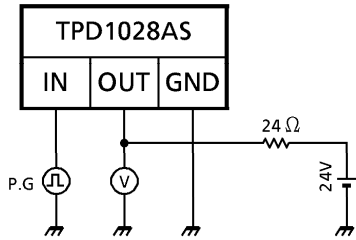
ELECTRICAL CHARACTERISTICS (Tj = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Drain-source Breakdown Voltage	V _{(BR) DSS}	—	V _{IN} = 0 V, I _D = 10 mA	40	—	—	V
Operating Supply Voltage	V _{DD}	—	—	—	—	38	V
High Level Input Voltage	V _{IH}	—	V _{DS} = 24 V, I _D = 1 A	4.5	5	5.5	V
Low Level Input Voltage	V _{IL}	—	V _{DS} = 24 V, I _D = 10 μA	—	—	0.8	V
Current at Output Off	I _{DSS} (1)	—	V _{IN} = 0 V, V _{DS} = 40 V	—	—	100	μA
	I _{DSS} (2)	—	V _{IN} = 0 V, V _{DS} = 24 V	—	—	10	
Input Current	I _{IN}	—	V _{IN} = 5 V, at normal operation	—	—	300	μA
ON-Resistance	R _{DS} (ON)	—	V _{IN} = 5 V, I _D = 1 A	—	—	0.25	Ω
Overheat Protection	T _S	—	V _{IN} = 5 V	—	160	—	°C
Overcurrent Protection	I _S (1)	—	V _{DS} = 24 V, V _{IN} = 5 V, during inrush	—	10	—	A
	I _S (2)	—	V _{DS} = 24 V, V _{IN} = 5 V, when shorted load	—	3	—	
Shorted Load Detection Voltage	V _{DS}	—	When shorted load	—	12	—	V
Switching Time	t _{ON}	1	V _{DS} = 24 V, V _{IN} = 5 V, R _L = 24 Ω	—	70	—	μs
	t _{OFF}			—	120	—	
Diode Forward Voltage Between Drain and Source	V _{DSF}	—	I _F = 1.5 A	—	0.9	1.8	V

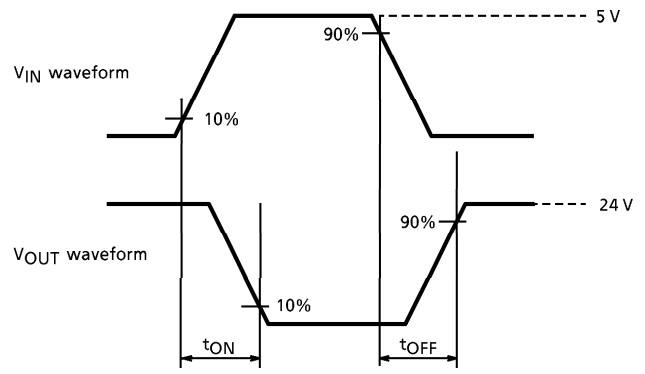
TEST CIRCUIT 1

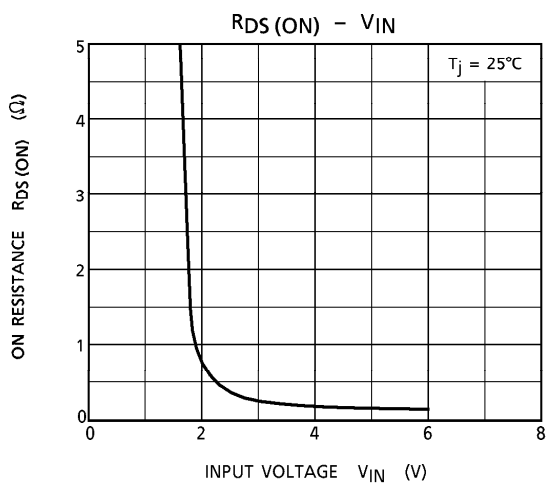
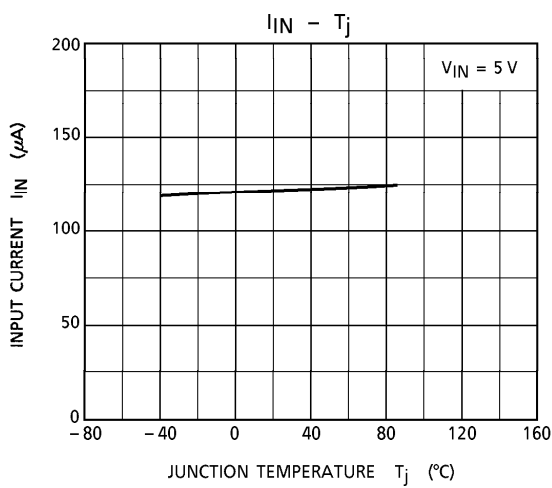
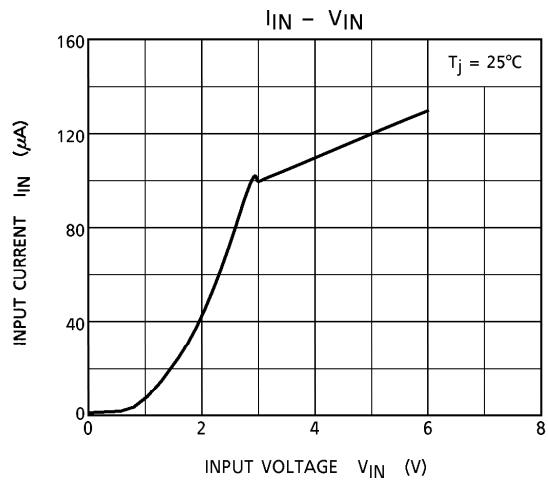
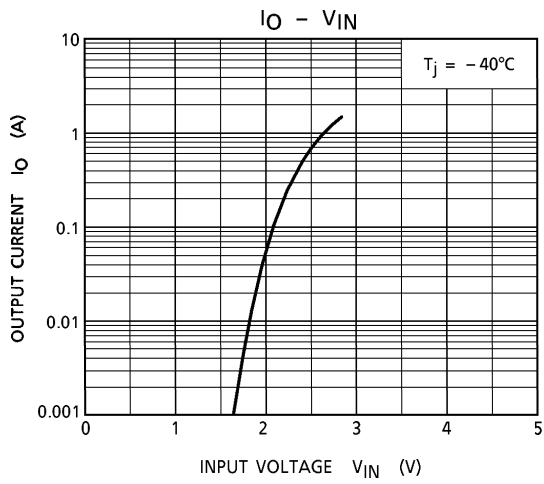
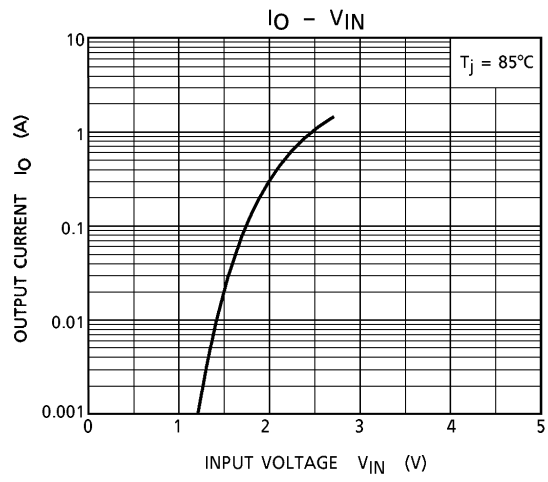
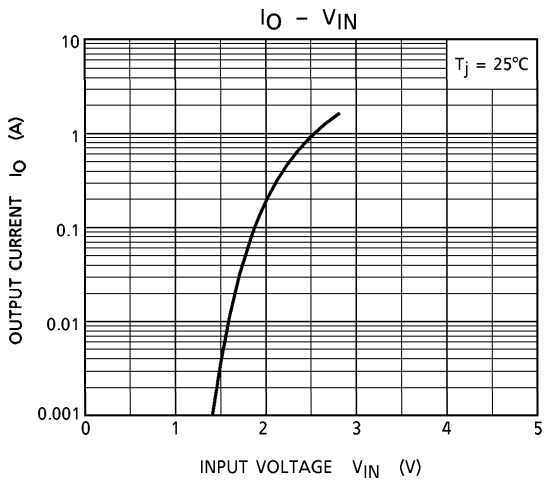
Switching time measuring circuit

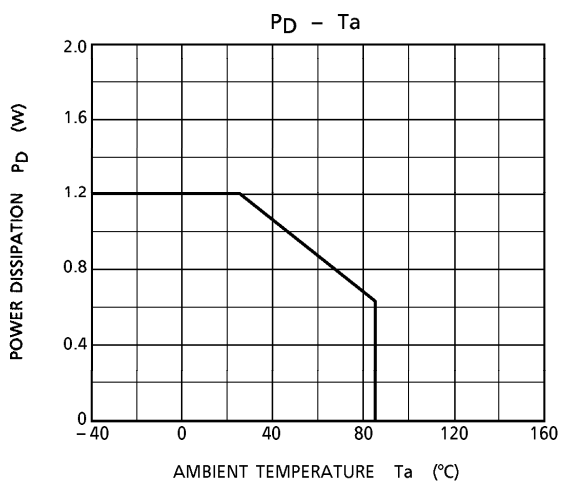
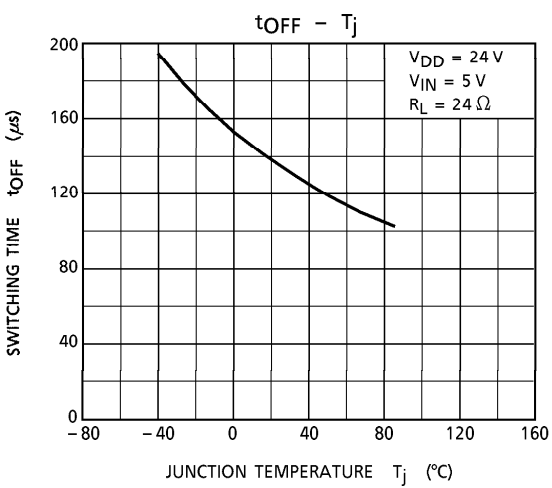
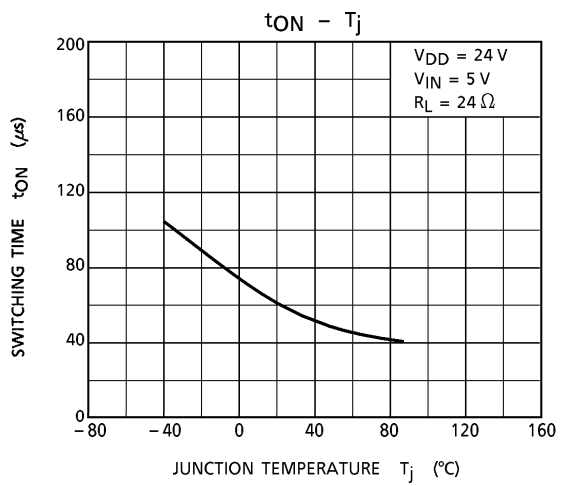
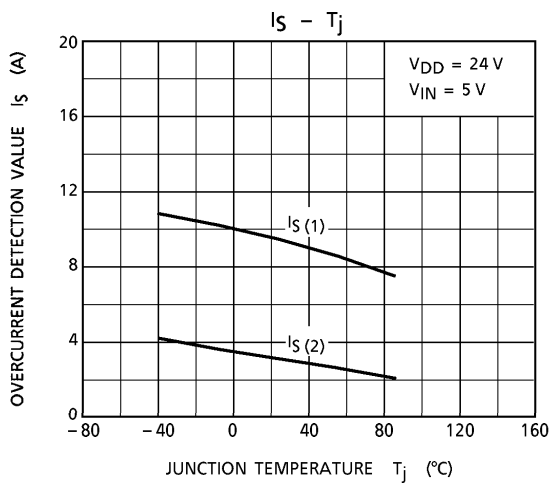
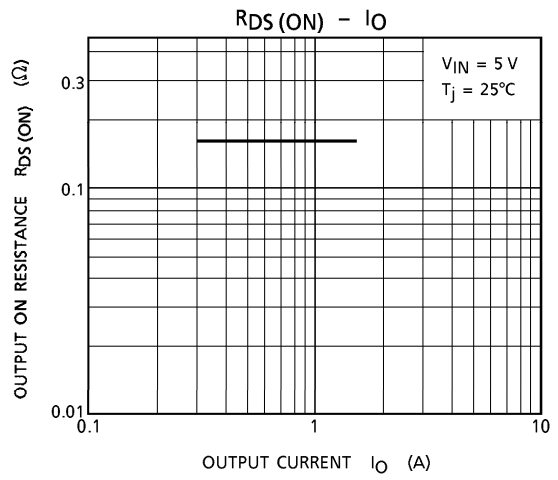
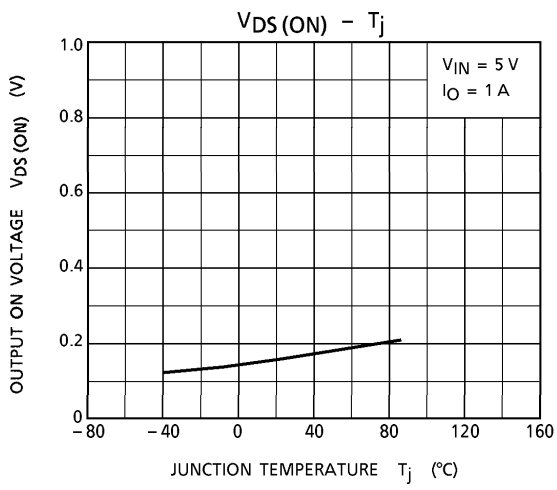
Test circuit



Measured waveforms

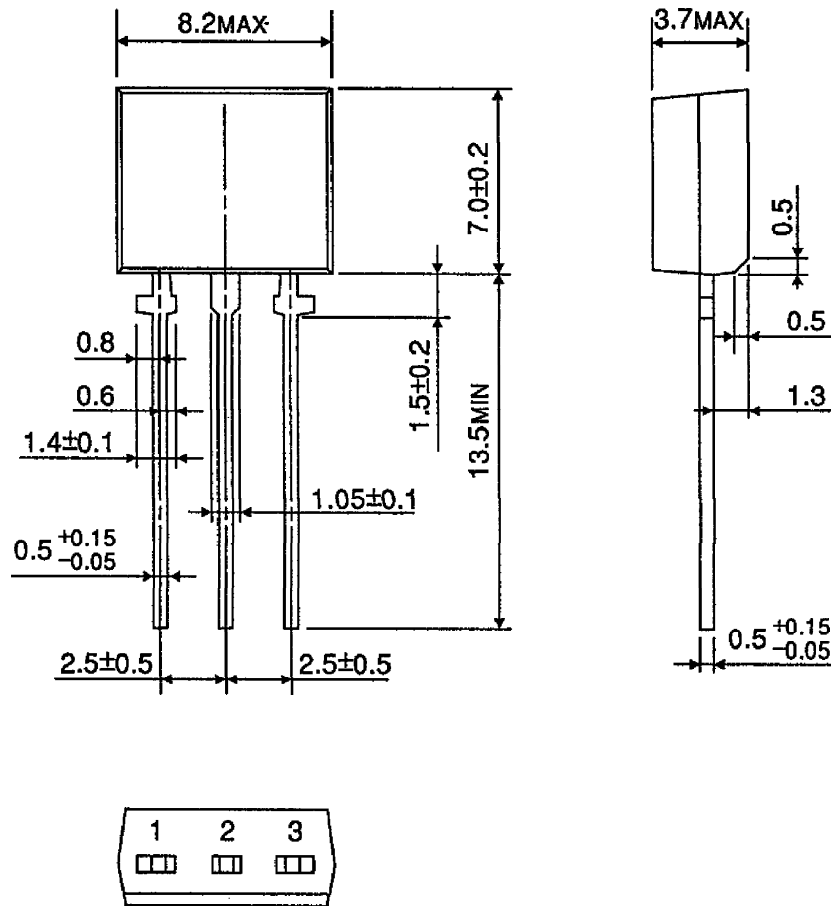






OUTLINE DRAWING
SIP3-P-2.50

Unit : mm



Weight : 0.54 g (Typ.)