

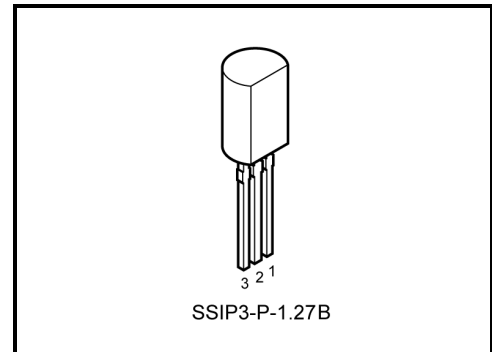
TPD1028BS

Low-Side Switch for Motors, Solenoids, and Lamp Drivers

TPD1028BS 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.

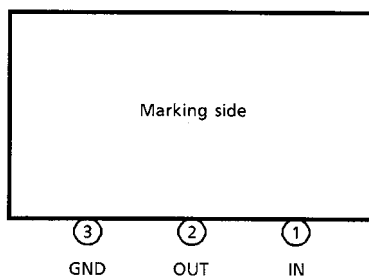
Features

- A monolithic power IC with a new structure combining a control block and a vertical power MOSFET (n -MOS) on a single chip.
- Can directly drive a power load from a CMOS or TTL logic.
- Built-in Protection circuits against overvoltage, load short circuiting, and thermal shutdown.
- Low on-resistance. $R_{DS(ON)} = 0.25$ (max) (@ $V_{IN} = 5$ V, $T_j = 25^\circ\text{C}$)
- Package TO-92(MOD) can be packed in tape.



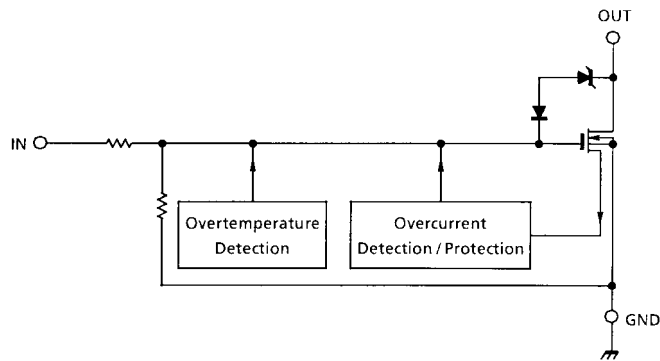
Weight: 0.36 g (typ.)

Pin Assignment



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

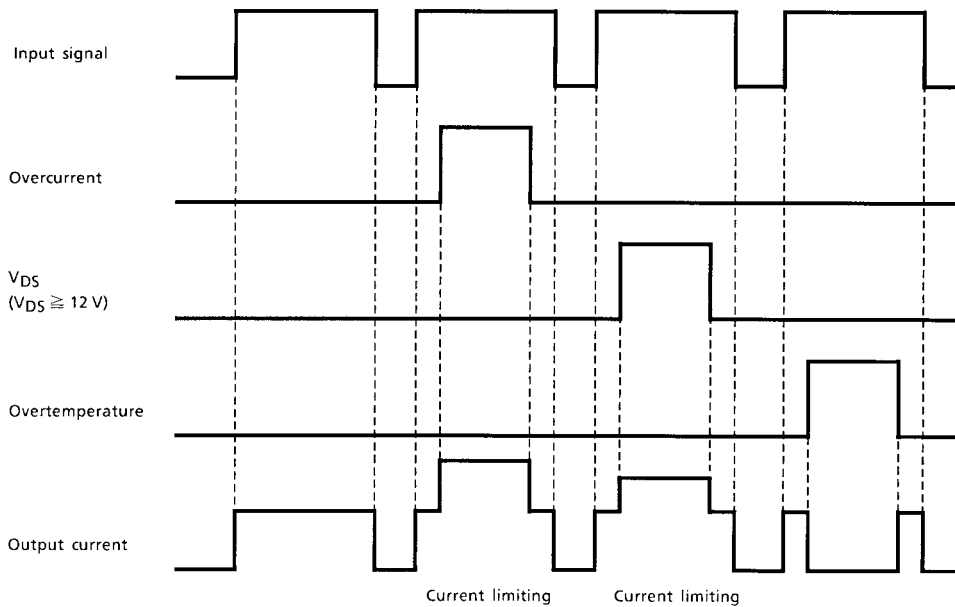
Block Diagram



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 μ s (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	State
L	H	Normal
H	L	
L	H	Overcurrent (during inrush)
H	L	
L	H	Overcurrent (shorted load)
H	L	
L	H	Overtemperature
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	0.9	W
Energy tolerance	E_S / B	200	mJ
Operating temperature	T_{opr}	- 40 ~ 85	°C
Junction temperature	T_j	150	°C

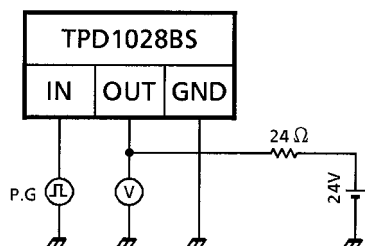
Electrical Characteristics (T_j = 25°C)

Characteristic	Symbol	Test Circuit	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(1)}	—	V _{DS} = 24 V, I _D = 1 A	4.5	5	5.5	V
	V _{IH(2)}	—	V _{DS} = 10 V, I _D = 0.75 A	3.9	5	5.7	
	V _{IH(3)}	—	V _{DS} = 38 V, I _D = 0.75 A	3.9	5	5.7	
Low level input voltage	V _{IL(1)}	—	V _{DS} = 24 V, I _D = 10 μA	—	—	0.8	V
	V _{IL(2)}	—	V _{DS} = 10 V, I _D = 10 μA	—	—	0.8	
	V _{IL(3)}	—	V _{DS} = 38 V, I _D = 10 μA	—	—	0.8	
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
Thermal shutdown temperature	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

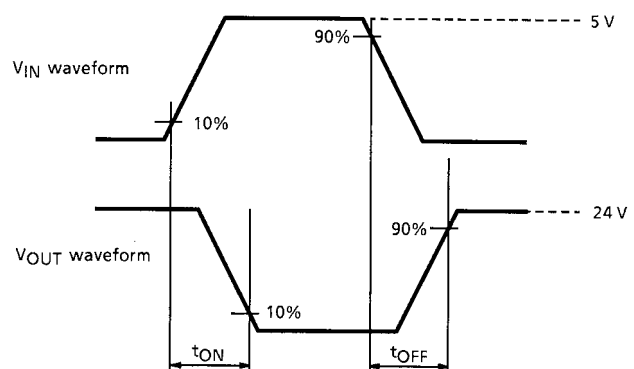
Test Circuit 1

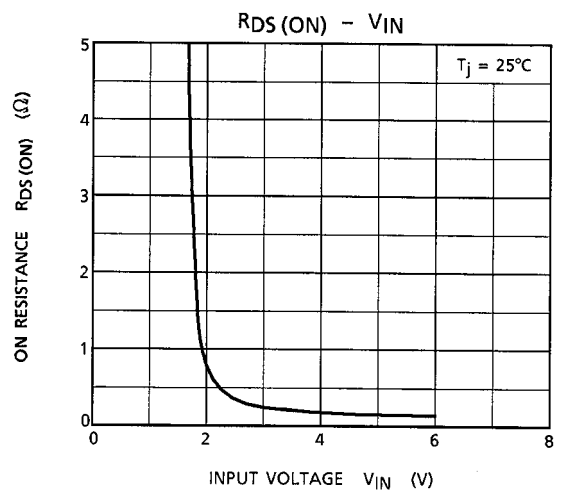
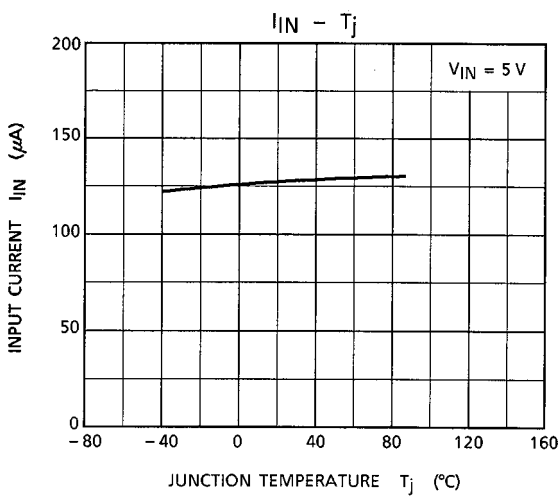
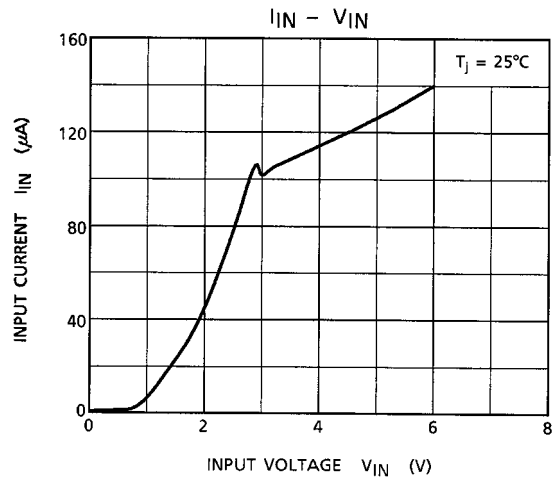
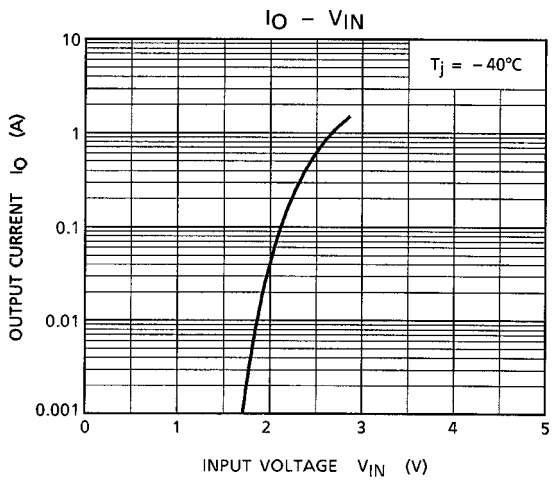
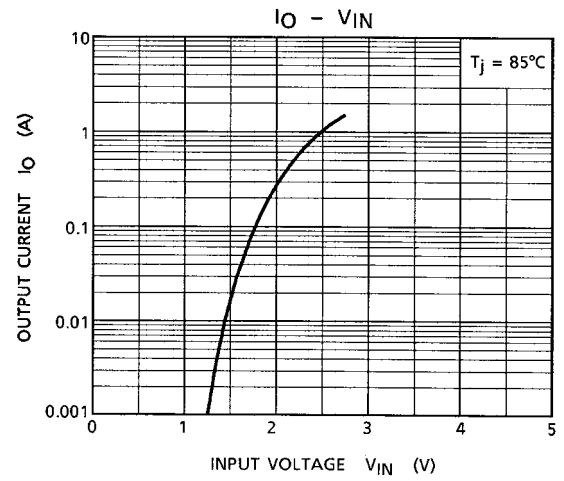
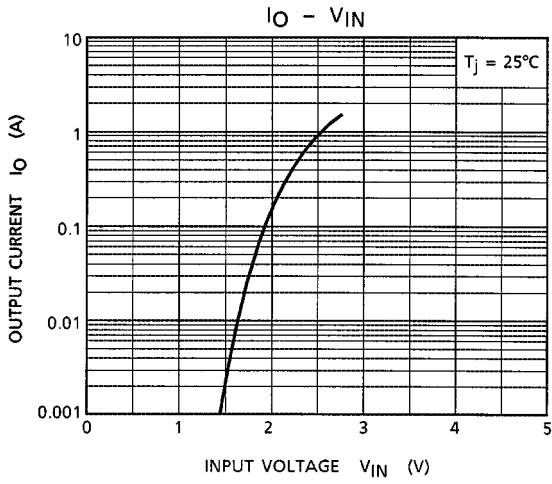
Switching time measuring circuit

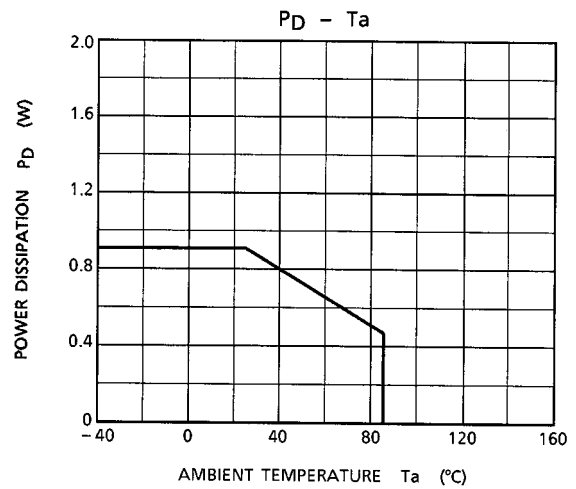
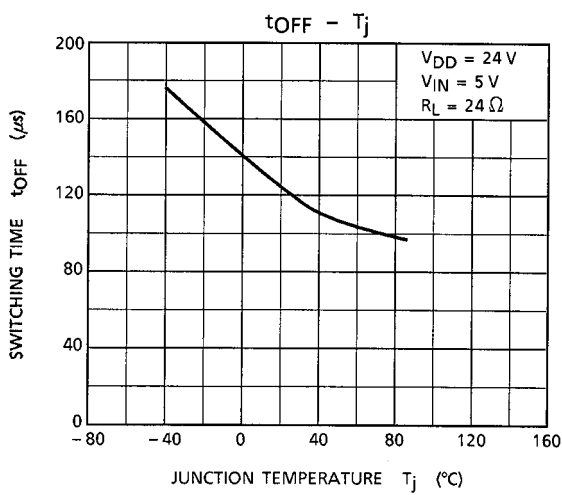
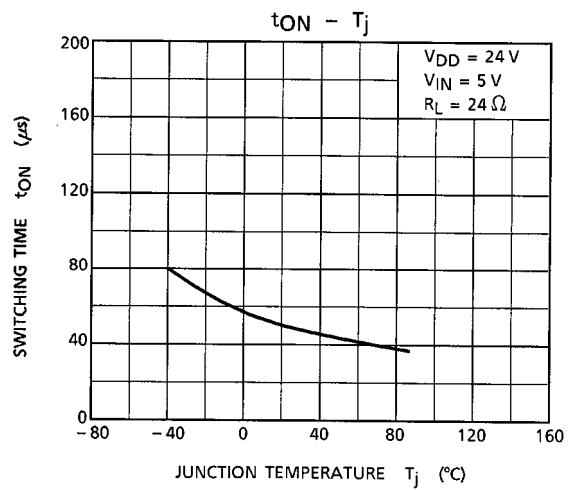
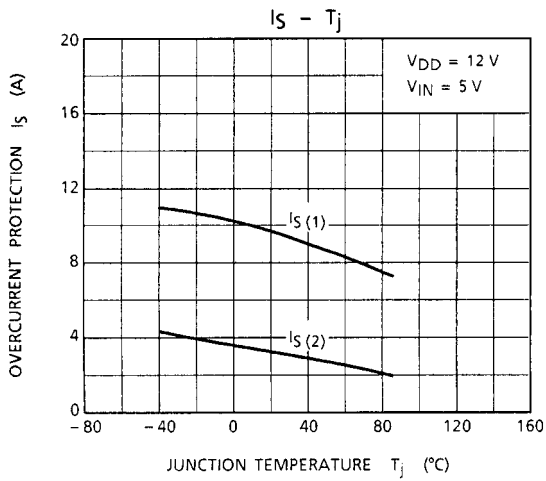
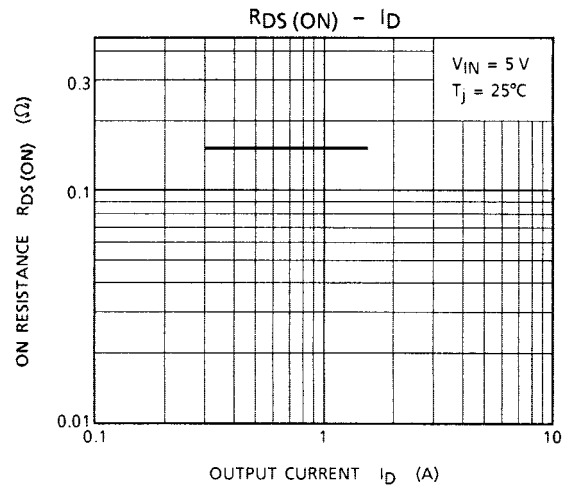
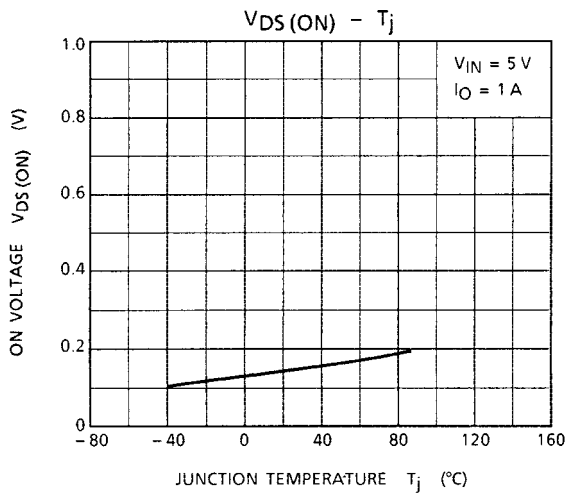
Test circuit



Measured waveforms



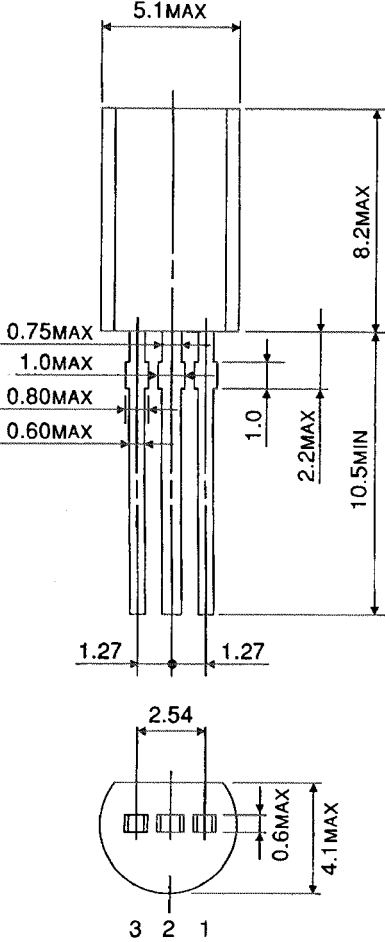




Package Dimensions

SSIP3-P-1.27B

Unit : mm



Weight: 0.36 g (typ.)

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