

# TPD1024S

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

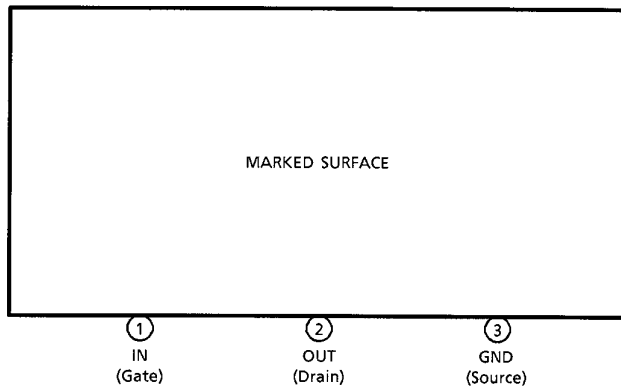
TPD1024S is a monolithic power IC for low-side switches. The IC has a vertical MOS FET output which can be directly driven from a CMOS or TTL logic circuit (e.g. an MPU).

The device offers intelligent self-protection function

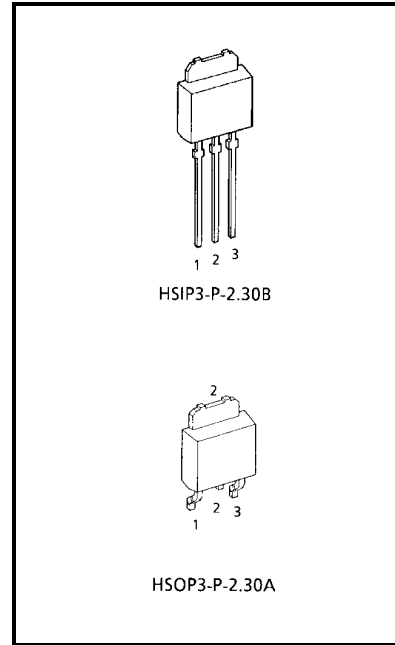
### Features

- A monolithic power IC with a new structure combining a control block and a vertical power MOS FET ( $\pi$ -MOS) on a single chip.
- Can directly drive a power load from a CMOS logic.
- Built-in protection against overvoltage, load short circuiting, and thermal shutdown.
- Low on resistance :  $R_{DS(ON)} = 0.5 \Omega(\text{max})$ , (@ $V_{IN} = 5 \text{ V}$ ,  $T_j = 25^\circ\text{C}$ )
- 3-pin power-molded package usable for surface mounting.

### Pin Assignment

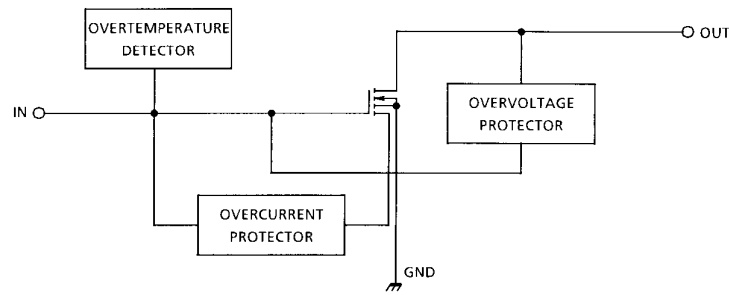


Note: That because of its MOS structure, this product is sensitive to static electricity.



Weight	
HSIP3-P-2.30B	: 0.36 g (typ.)
HSOP3-P-2.30A	: 0.28 g (typ.)

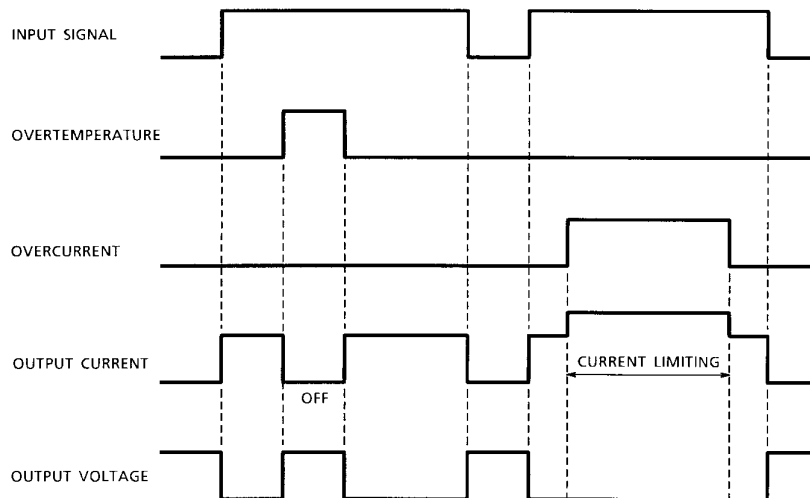
## Block Diagram



## Pin Description

Pin No.	Symbol	Function
1	IN	Input pin. Input is CMOS-compatible, with pull-down resistor connected. Even if the input is open, output will not accidentally turn on.
2	OUT	Output pin. When current in excess of the typical current (3.5 A (typ.)) flows to the output pin, the current limiter operates to protect the IC.
3	GND	Ground pin.

## Timing Chart



## Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		$V_{DS}$ (DC)	40	V
Output current		$I_D$	1.5	A
Input voltage		$V_{GS}$	-0.5 ~ 6	V
Power dissipation	Ta = 25°C	$P_D$	1	W
	Tc = 25°C		10	
Operating temperature		$T_{opr}$	-40 ~ 85	°C
Junction temperature		$T_j$	150	°C
Storage temperature		$T_{stg}$	-55 ~ 150	°C

## Recommendable Condition

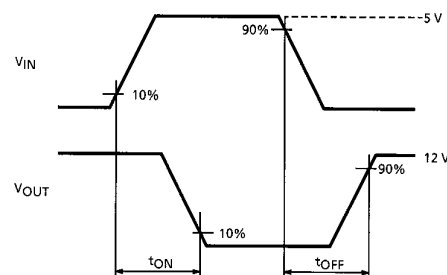
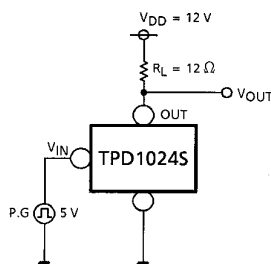
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Input voltage	$V_{IN}$	—	4.5	5	6	V

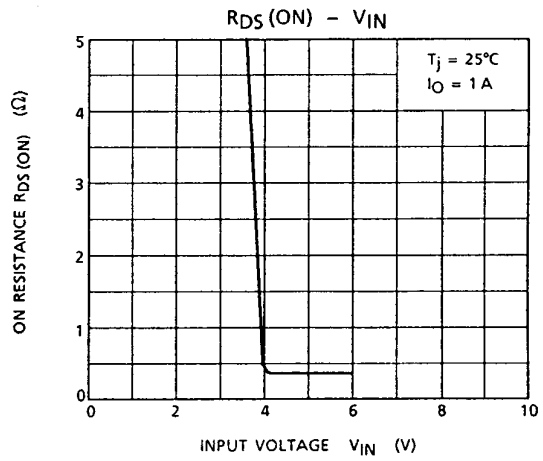
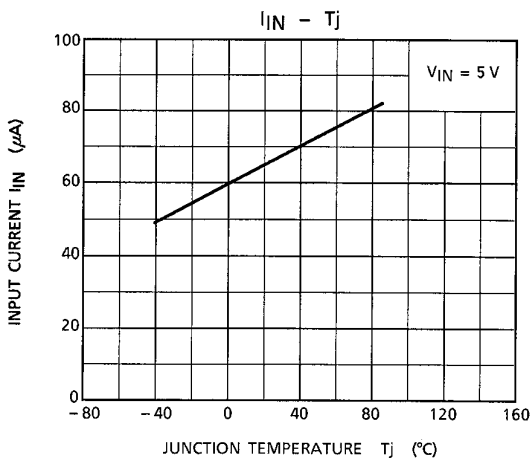
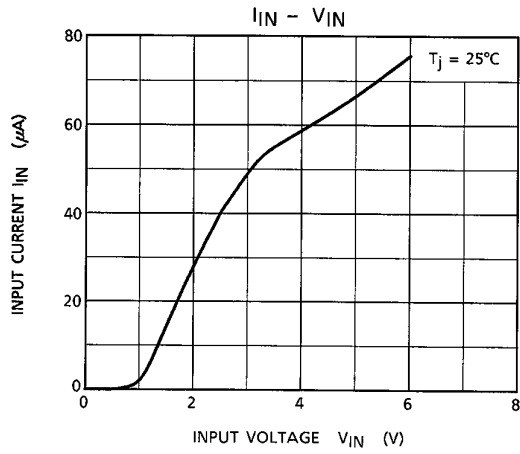
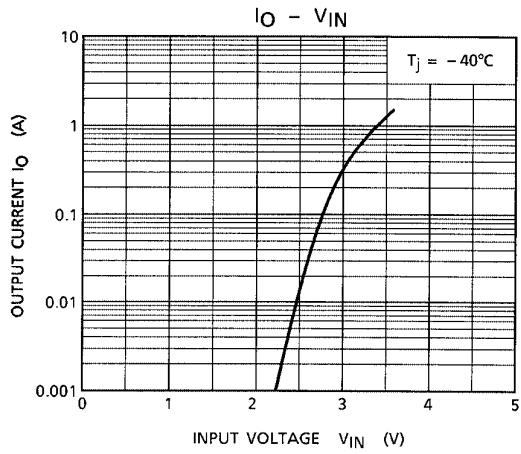
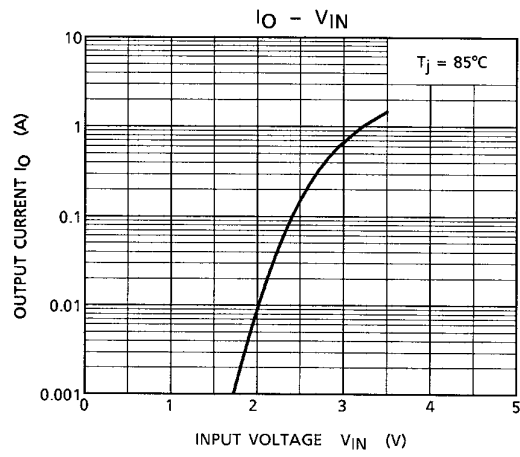
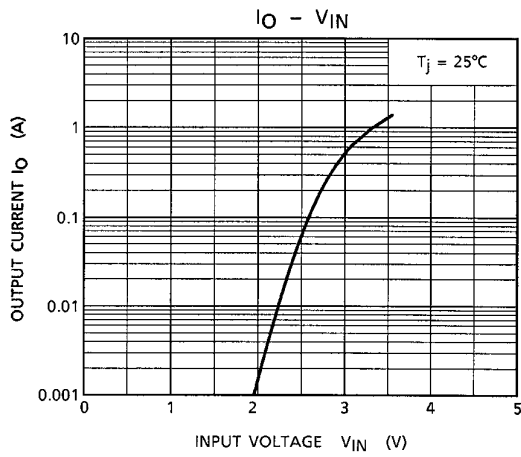
## Electrical Characteristics (Tj = 25°C)

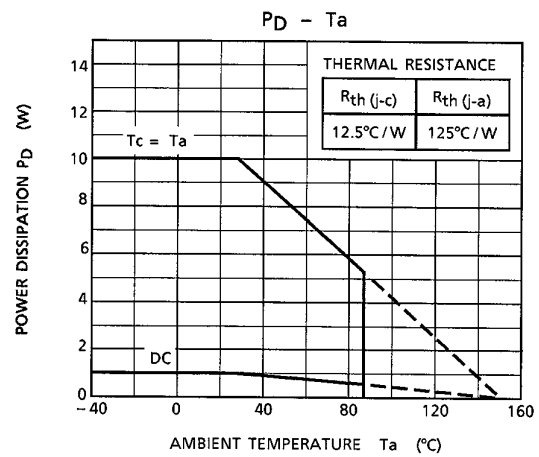
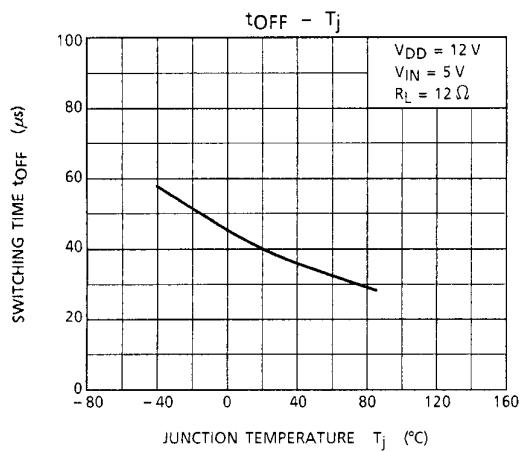
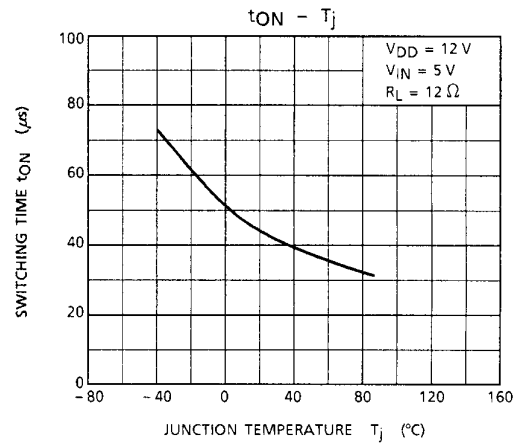
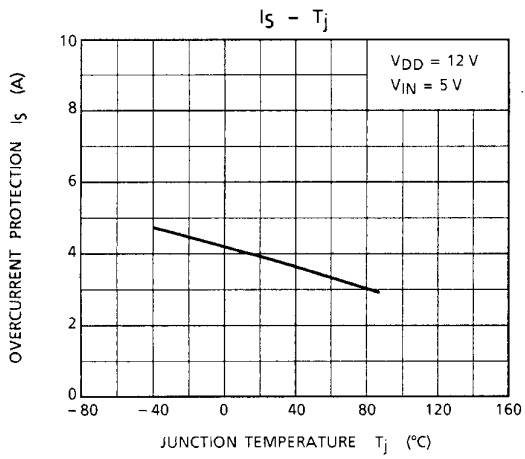
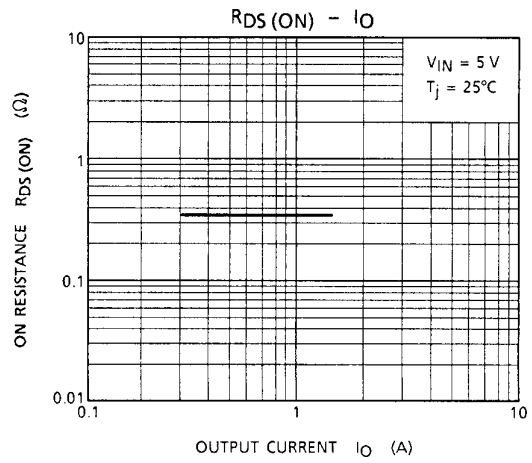
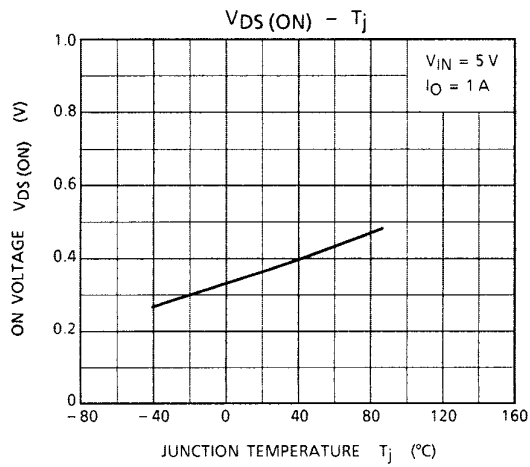
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	—	$V_{GS} = 0, I_D = 10 \text{ mA}$	40	—	—	V
Operating supply voltage	$V_{DD}$ (OPR)	—	—	—	—	18	V
Current at output off	$I_{DSS}$ (1)	—	$V_{GS} = 0, V_{DS} = 40 \text{ V}$	—	—	3	mA
	$I_{DSS}$ (2)	—	$V_{GS} = 0, V_{DS} = 24 \text{ V}$	—	—	100	μA
Input threshold voltage	$V_{th}$	—	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.5	V
Input current	$I_{GSS}$	—	$V_{GS} = 5 \text{ V}$ , at normal operation	—	—	300	μA
On resistance	$R_{DS(ON)}$	—	$V_{GS} = 5 \text{ V}, I_D = 1 \text{ A}$	—	—	0.5	Ω
Thermal shutdown temperature	$T_S$	—	—	—	160	—	°C
Overcurrent protection	$I_S$	—	$V_{DS} = 12 \text{ V}, V_{GS} = 5 \text{ V}$	—	3.5	—	A
Switching time	$t_{ON}$	1	$V_{DS} = 12 \text{ V}, V_{GS} = 5 \text{ V}$ , $R_L = 12 \text{ Ω}$	—	50	—	μs
	$t_{OFF}$			—	10	—	μs
Diode forward voltage Between drain and source	$V_{DSF}$	—	$I_F = 1.5 \text{ A}$	—	0.9	1.8	V
Avalanche energy	$E_A$	—	L = 10 mH, Single pulse	30	—	—	mJ

## Test Circuit 1

Switching Time



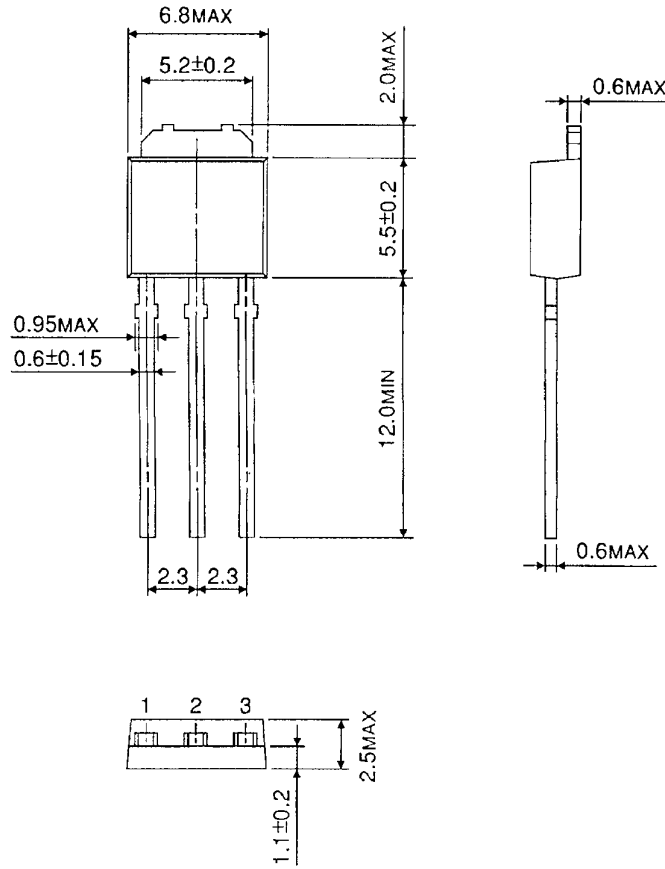




## Package Dimenstions

HSIP3-P-2.30B

Unit : mm

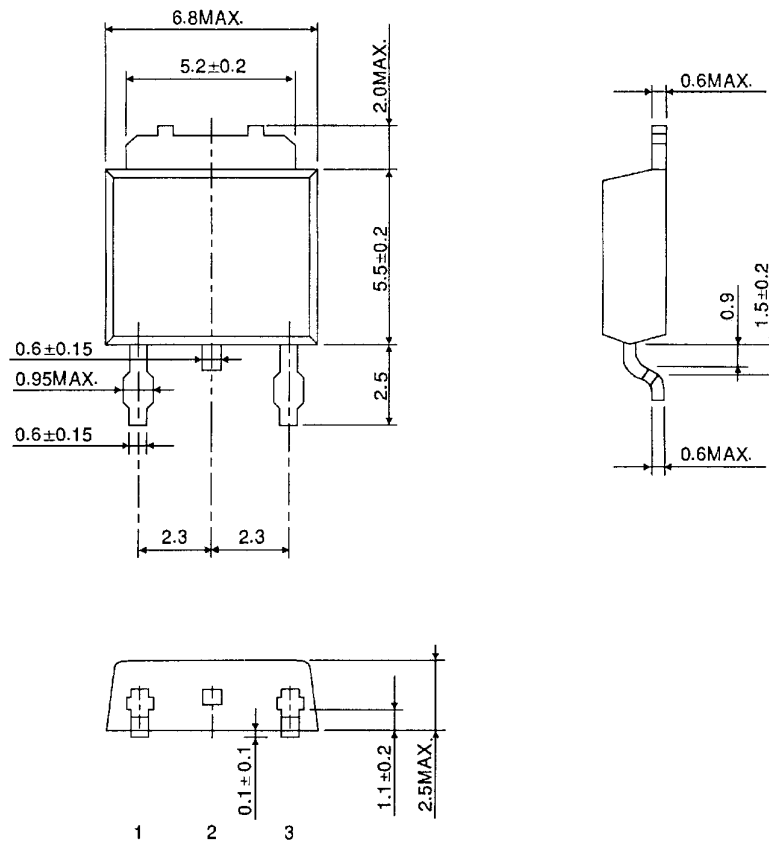


Weight: 0.36 g (typ.)

## Package Dimenstions

HSOP3-P-2.30A

Unit : mm



Weight: 0.28 g (typ.)

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