

TOSHIBA Intelligent Power Device Silicon Monolithic Power MOS Integrated Circuit

TPD1024S

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

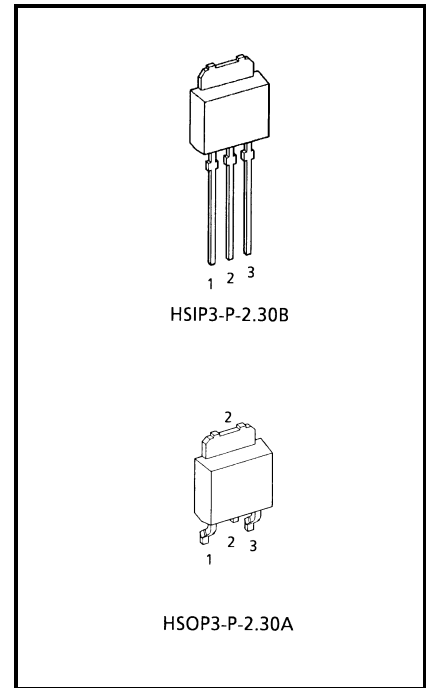
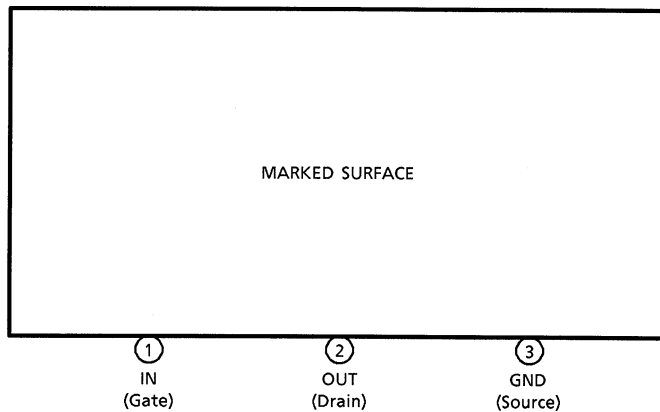
TPD1024S is a monolithic power IC for low-side switches. The IC has a vertical MOS FET output which can be directly driven from a CMOS or TTL logic circuit (e.g, an MPU).

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 (π -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



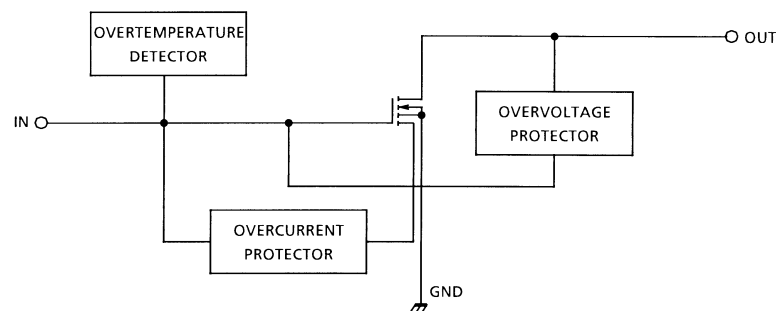
Weight

HSIP3-P-2.30B : 0.36 g (typ.)

HSOP3-P-2.30A : 0.28 g (typ.)

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

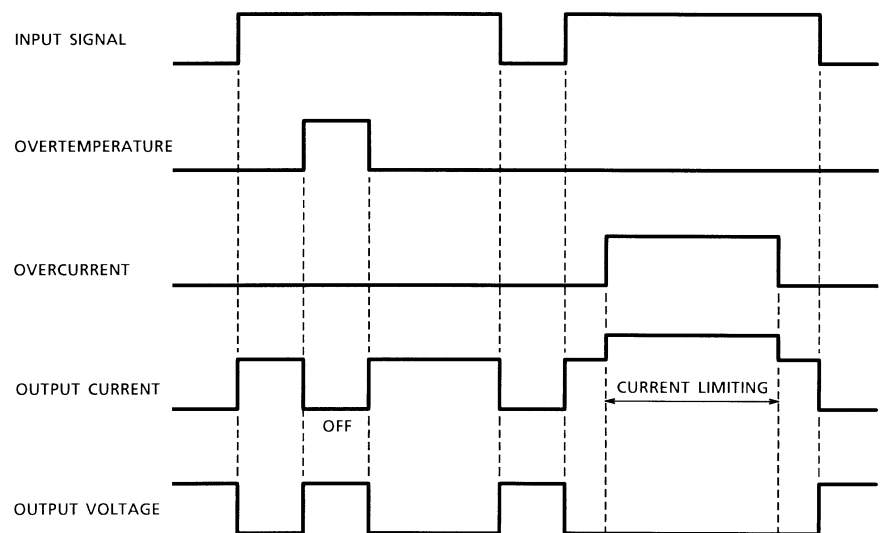
Block Diagram



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	P_D	1	W
		10	
Operating temperature	T_{opr}	-40 ~ 85	°C
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 ~ 150	°C

Recommendable Condition

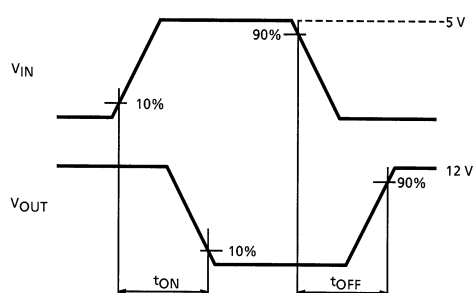
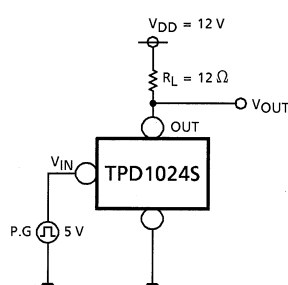
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Input voltage	V_{IN}	—	4.5	5	6	V

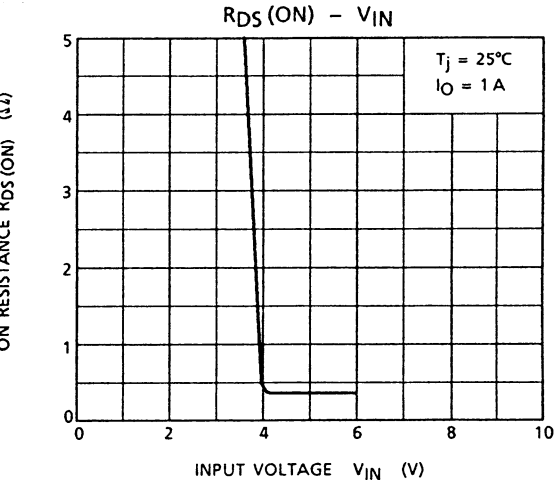
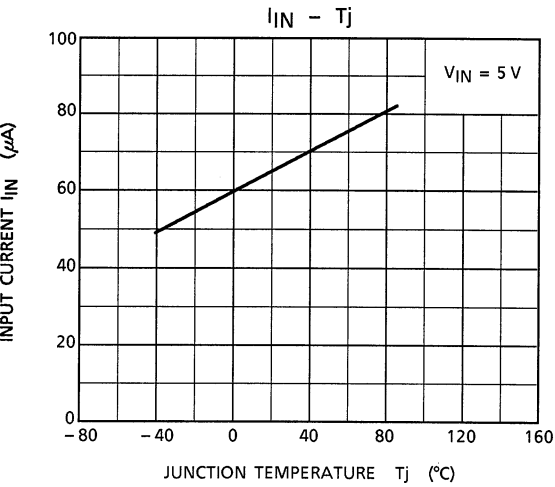
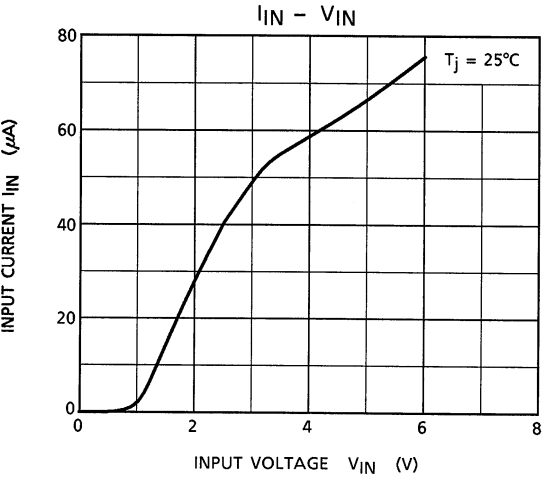
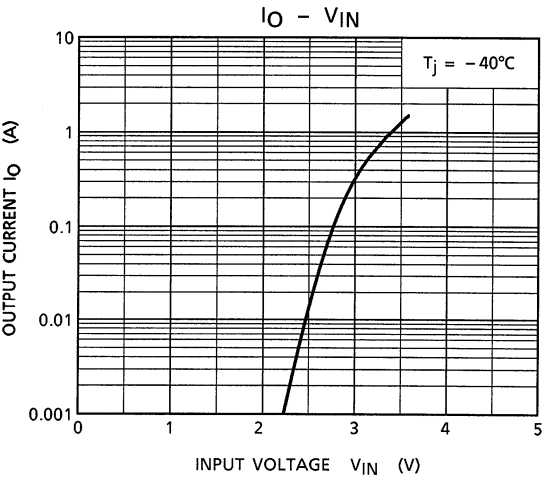
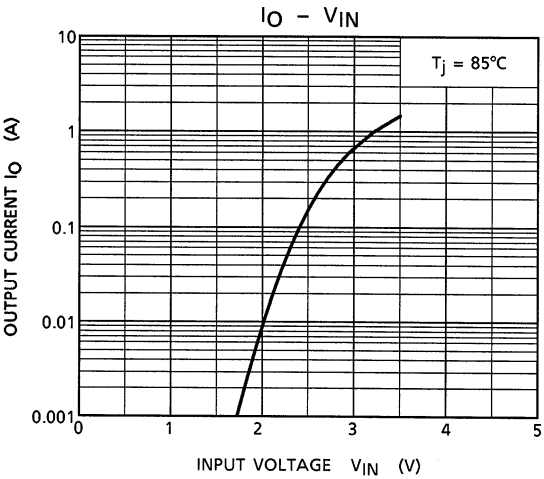
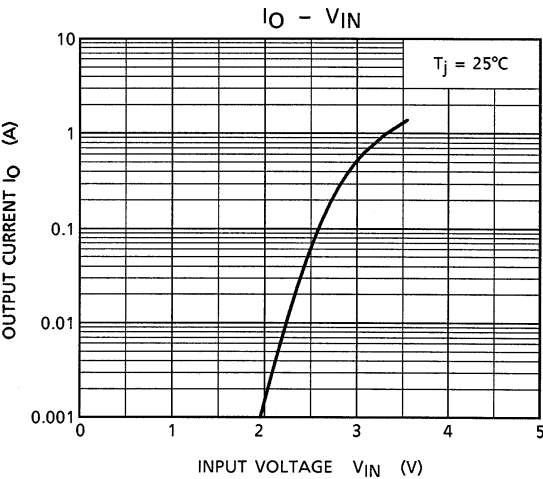
Electrical Characteristics (Tj = 25°C)

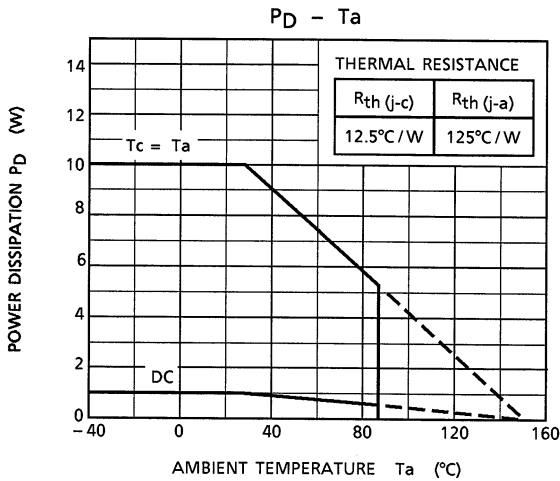
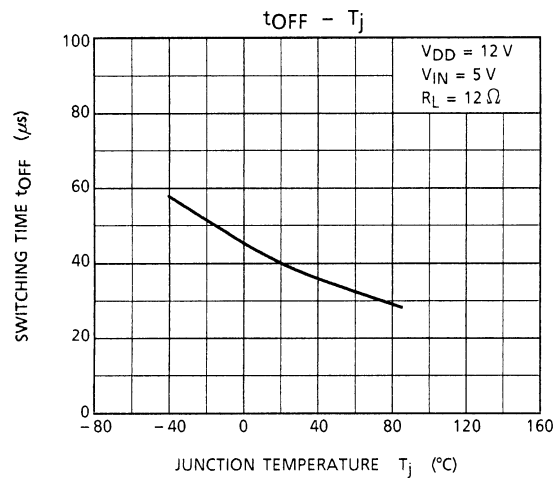
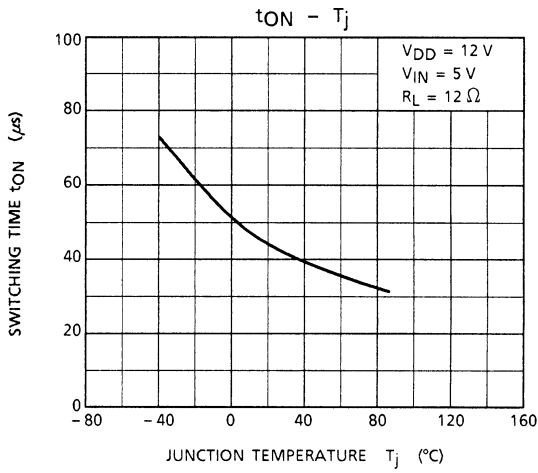
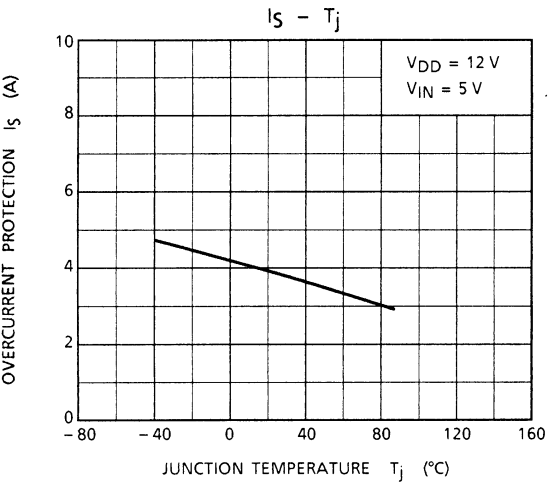
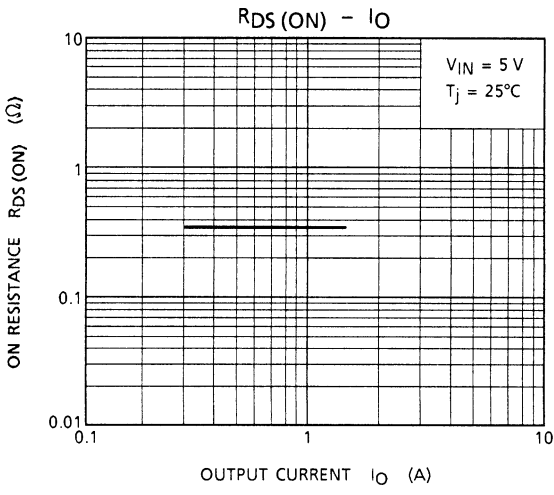
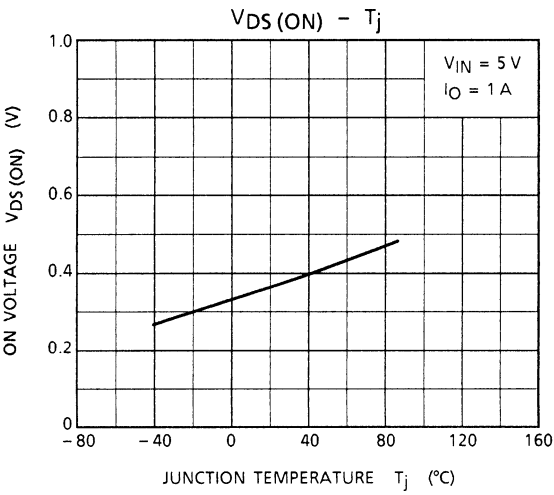
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	—	$V_{GS} = 0, I_D = 10 \text{ mA}$	40	—	—	V
Operating supply voltage	V_{DD} (OPR)	—	—	—	—	18	V
Current at output off	$I_{DSS} (1)$	—	$V_{GS} = 0, V_{DS} = 40 \text{ V}$	—	—	3	mA
	$I_{DSS} (2)$	—	$V_{GS} = 0, V_{DS} = 24 \text{ V}$	—	—	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	—	$L = 10 \text{ mH}$, Single pulse	30	—	—	mJ

Test Circuit 1

Switching Time



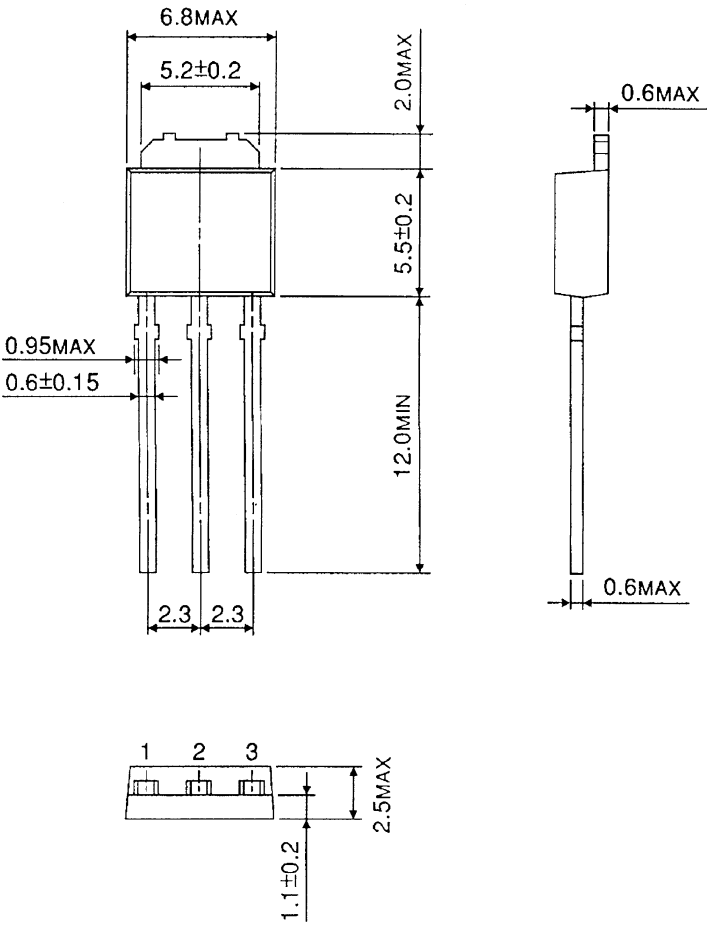




Package Dimenstions

HSIP3-P-2.30B

Unit : mm

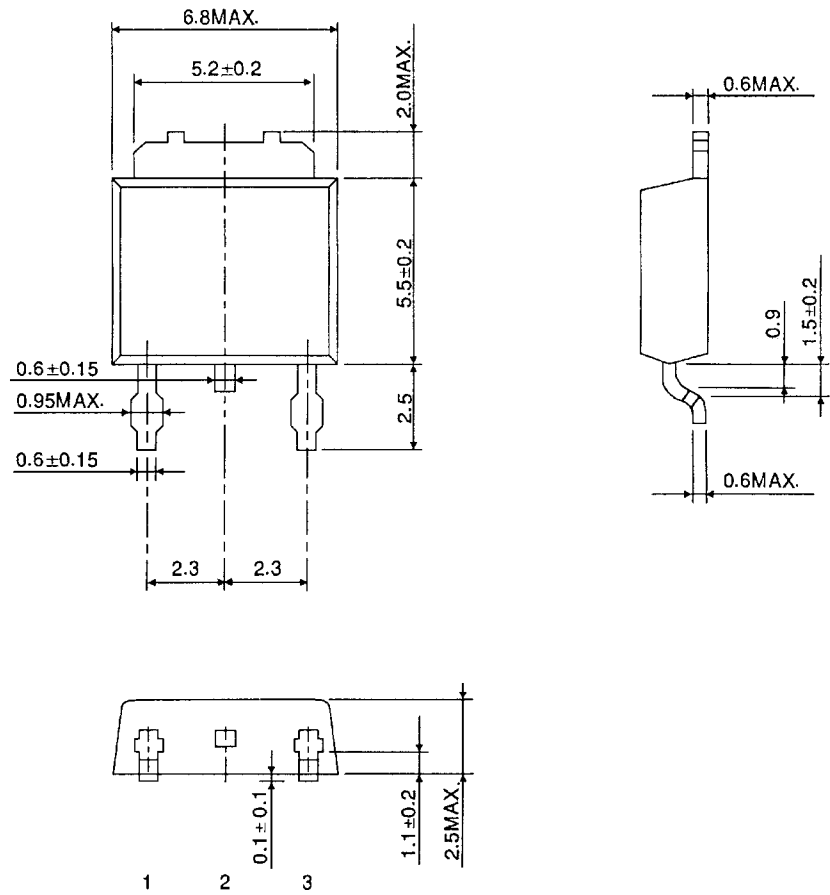


Weight: 0.36 g (typ.)

Package Dimenstions

HSOP3-P-2.30A

Unit : mm



Weight: 0.28 g (typ.)

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