

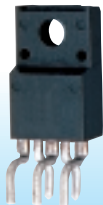
## High-Side Power Switch for Motor, Solenoid and Lamp Drivers

TPD1008SA is a monolithic power IC for high-side switches. The IC has a vertical MOSFET output which can be directly driven from a CMOS or TTL logic circuit (e.g., an MPU). The device offers intelligent self-protection and diagnostic functions.

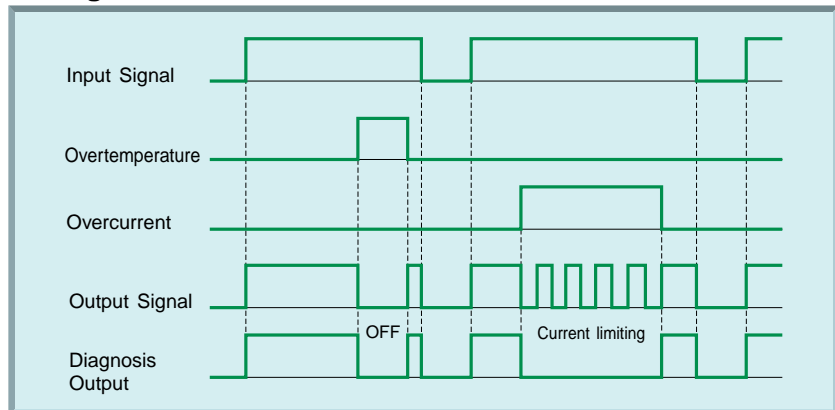
### Features

- A monolithic power IC with a new structure combining a control block (Bi-CMOS) and a vertical power MOSFET ( $\pi$ -MOS) on a single chip.
- One side of load can be grounded to a high-side switch.
- Can directly drive a power load from a microprocessor.
- Built-in protection against thermal shutdown and load short circuiting.
- Incorporates a diagnosis function that allows diagnosis output to be read externally at load short circuiting, opening or overtemperature.
- Up to  $-10$  V of counter electromotive force from an L load can be applied.
- Low ON-resistance:  
 $R_{DS(ON)} = 200$  m $\Omega$  (max)
- Low operating current:  
 $I_{DD} = 1$  mA (typ.)  
 (@  $V_{DD} = 12$  V,  $V_{IN} = 0$  V)
- 5-pin TO-220 new insulated package
- Three standard lead configurations

TO-220NIS 5PIN  
(LBS)



### Timing Chart



### Maximum Rating ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Supply Voltage	DC	$V_{DD}^{(1)}$	25
	Pulse	$V_{DD}^{(2)}$	60 ( $R_s = 1\Omega$ , $\tau = 250$ ms)
Input Voltage	DC	$V_{IN}^{(1)}$	$-0.5$ to 12
	Pulse	$V_{IN}^{(2)}$	$V_{DD}^{(1)} + 1.5$ ( $t = 100$ ms)
Diagnosis Output Voltage	$V_{DIAG}$	$-0.5$ to 25	V
Output Current	$I_O$	Internally limited	A
Input Current	$I_{IN}$	$\pm 10$	mA
Diagnosis Output Current	$I_{DIAG}$	5	mA
Power Dissipation	$T_c = 25^\circ\text{C}$	$P_D^{(1)}$	30
	$T_a = 25^\circ\text{C}$	$P_D^{(2)}$	2
Operating Temperature	$T_{opr}$	$-40$ to 110	$^\circ\text{C}$
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	$-55$ to 150	$^\circ\text{C}$
Lead Temperature / Time	$T_{SOL}$	275 (5 s), 260 (10 s)	$^\circ\text{C}$

### Electrical Characteristics ( $T_j = -40$ to $110^\circ\text{C}$ , $V_{DD} = 8$ to 18 V)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Operating Supply Voltage	$V_{DD(opr)}$	—	5	12	18	V
Supply Current	$I_{DD}$	$V_{DD} = 12$ V, $V_{IN} = 0$ V	—	1	5	mA
Input Voltage	$V_{IH}$	$V_{DD} = 12$ V, $I_O = 2$ A	3.5	—	—	V
	$V_{IL}$	$V_{DD} = 12$ V, $I_O = 1.2$ mA	—	—	1.5	V
Input Current	$I_{IN}^{(1)}$	$V_{DD} = 12$ V, $V_{IN} = 5$ V	—	50	200	$\mu\text{A}$
	$I_{IN}^{(2)}$	$V_{DD} = 12$ V, $V_{IN} = 0$ V	$-0.2$	—	0.2	$\mu\text{A}$
On-Voltage	$V_{DS(ON)}$	$V_{DD} = 12$ V, $I_O = 2$ A, $T_j = 25^\circ\text{C}$	—	—	0.4	V
On-Resistance	$R_{DS(ON)}$		—	—	0.2	$\Omega$
Output Leakage Current	$I_{OL}$	$V_{DD} = 18$ V, $V_{IN} = 0$ V	—	—	1.2	mA
Diagnosis Output Voltage	"L" Level $V_{DL}$	$V_{DD} = 12$ V, $I_{DL} = 2$ mA	—	—	0.4	V
Diagnosis Output Current	"H" Level $I_{DH}$	$V_{DD} = 18$ V, $V_{DH} = 18$ V	—	—	10	$\mu\text{A}$
Overcurrent Protection	$I_S^{(1)}$ (Note1)	$V_{DD} = 12$ V, $T_j = 25^\circ\text{C}$	4	6	8	A
	$I_S^{(2)}$ (Note2)		4	8	12	A
Thermal Shutdown	Temperature $T_S$	—	150	160	200	$^\circ\text{C}$
	Hysteresis $\Delta T_S$	—	—	10	—	$^\circ\text{C}$
Open Detection Resistance	$R_{Ops}$	$V_{DD} = 8$ V	1	20	100	k $\Omega$
Switching Time	$t_{ON}$	$V_{DD} = 12$ V, $R_L = 5$ $\Omega$ , $T_j = 25^\circ\text{C}$	10	100	—	$\mu\text{s}$
	$t_{OFF}$		10	30	—	$\mu\text{s}$

Note 1:  $I_S^{(1)}$  Overcurrent detection value when load is short circuited and  $V_{IN} = "L" \rightarrow "H"$

Note 2:  $I_S^{(2)}$  Overcurrent detection value when load current is increased while  $V_{IN} = "H"$