TPD1009S

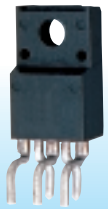
IPD

● *High-Side Power Switch for Motor, Solenoid and Lamp Drive Applications*

TPD1009S 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.

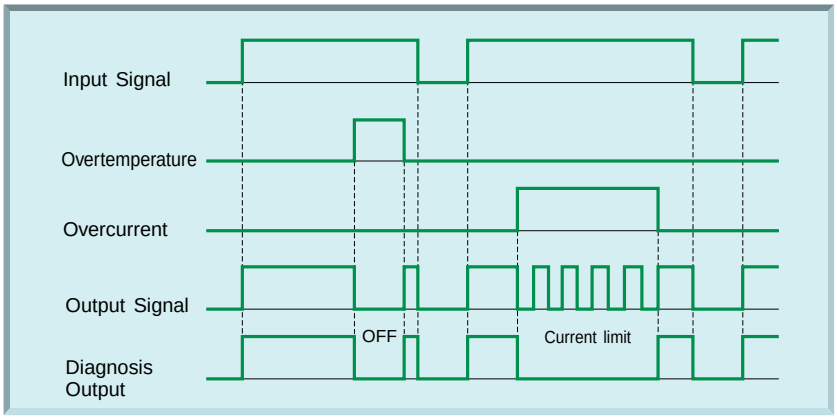
Features

- A monolithic power IC with a new structure combining a control block (Bi-CMOS) and a vertical power MOSFET (π-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 micriprocessor.
- 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 counterelectromotive force from an L load can be applied.
- Low ON-resistance: R_{ON} = 60 mΩ
- (max)
  Low operating current: I_{DD} = 1 mA
- (typ.) (@ V_{DD} = 12 V, V_{IN} = 0 V)
- 5-pin TO-220 insulated package
- Three standard lead configurations



TO-220NIS 5PIN
(LBS)

Timing Chart



Maximum Rating (T_a = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	60	V
Supply Voltage	DC	V_{DD} (1)	25	V
	Pulse	V_{DD} (2)	60 (Rs = 1Ω, τ = 250 ms)	
Input Voltage	DC	V_{IN} (1)	−0.5 to 12	V
	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}	±10	mA
Diagnosis Output Current		I_{DIAG}	5	mA
Power Dissipation	T_c = 25°C	P_D (1)	30	W
	T_a = 25°C	P_D (2)	2	
Operating Temperature		T_{opr}	−40 to 110	°C
Junction Temperature		T_j	150	°C
Storage Temperature		T_{stg}	−55 to 150	°C
Lead Temperature / Time		T_{SOL}	275 (5 s), 260 (10 s)	°C

Electrical Characteristics (T_j = –40 to 110°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 = 8 A	3.5	—	—	V
		V_{IL}	V_{DD} = 12 V, I_O = 1.2 mA	—	—	1.5	
Input Current		I_{IN} (1)	V_{DD} = 12 V, V_{IN} = 5 V	—	50	200	μA
		I_{IN} (2)	V_{DD} = 12 V, V_{IN} = 0 V	−0.2	—	0.2	
On-Voltage		$V_{DS(ON)}$	V_{DD} = 12 V, I_O = 8 A, T_j = 25°C	—	—	0.48	V
On-Resistance		$R_{DS(ON)}$		—	—	0.06	Ω
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	μA
Overcurrent Protection		I_S (1) (Note 1)	V_{DD} = 12 V, T_j = 25°C	8	12	—	A
		I_S (2) (Note 2)		15	24	—	
Thermal Shutdown	Temperature	T_S	—	150	160	200	°C
	Hysteresis	ΔT_S	—	—	10	—	
Open Detection Resistance		R_{ops}	V_{DD} = 8 V	1	50	100	kΩ
Switching Time		t_{ON}	V_{DD} = 12 V, R_L = 5 Ω, T_j = 25°C	10	200	—	μs
		t_{OFF}		10	30	—	

Note1 : I_S (1) Overcurrent detection value when load is short circuited and V_{IN} = "L" → "H"
Note2 : I_S (2) Overcurrent detection value when load current is increased while V_{IN} = "H"