

High-side Power Switch ICs [With Diagnostic Function] SI-5151S

Features

- Built-in diagnostic function to detect short and open circuiting of loads and output status signals
- Low saturation PNP transistor use
- Allows direct driving using LS-TTL and C-MOS logic levels
- Built-in overcurrent and thermal protection circuits
- Built-in protection against reverse connection of power supply
- TO220 equivalent full-mold package not require insulation mica

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage	V_B	40	V	
Input terminal voltage	V_{IN}	-0.3 to V_B	V	
DIAG terminal voltage	V_{DIAG}	6	V	
Collector-emitter voltage	V_{CE}	40	V	
Output current	I_O	1.8	A	
	P_{D1}	18	W	With infinite heatsink ($T_c=25^\circ C$)
Power Dissipation	P_{D2}	1.5	W	Stand-alone without heatsink ($T_c=25^\circ C$)
Junction temperature	T_j	-40 to +125	°C	
Operating temperature	T_{OP}	-40 to +100	°C	
Storage temperature	T_{STG}	-40 to +125	°C	

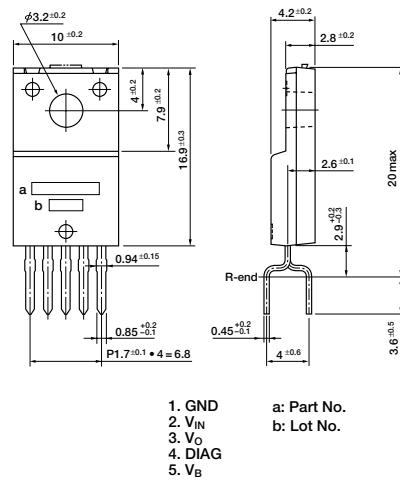
Electrical Characteristics

Parameter		Ratings			Unit	Conditions
	Symbol	min	typ	max		
Operating power supply voltage	V_{BOPR}	6.0		30	V	
Quiescent circuit current	I_Q		5	12	mA	$V_{BOPR}=14V, V_{IN}=0V$
Saturation voltage of output transistor	$V_{CE(\text{sat})}$			0.5	V	$I_O \leq 1.0A, V_{BOPR}=6 \text{ to } 16V$
				1.0	V	$I_O \leq 1.8A, V_{BOPR}=6 \text{ to } 16V$
Output leak current	$I_O, \text{ leak}$			2	mA	$V_{CEO}=16V$
Input voltage	Output ON	V_{IH}	2.0		V	$V_{BOPR}=6 \text{ to } 16V$
	Output OFF	V_{IL}	-0.3		V	$V_{BOPR}=6 \text{ to } 16V$
Input current	Output ON	I_{IH}		1	mA	$V_{IN}=5V$
	Output OFF	I_{IL}	-0.1		mA	$V_{IN}=0V$
Overcurrent protection starting current	I_S	1.9			A	$V_{BOPR}=14V, V_O=V_{BOPR}-1.5V$
Thermal protection starting temperature	T_{TSD}	125	145		°C	
Open load detection resistor	R_{OPEN}			30	kΩ	$V_{BOPR}=6 \text{ to } 16V$
Output transfer time	T_{ON}		8	30	μs	$V_{BOPR}=14V, I_O=1A$
	T_{OFF}		15	30	μs	$V_{BOPR}=14V, I_O=1A$
DIAG output voltage	V_{DH}	4.5		6	V	$V_{CC}=6V$
	V_{DL}			0.3	V	$V_{CC}=6V, I_{DD}=2mA$
DIAG output transfer time	T_{PLH}			30	μs	$V_{BOPR}=14V, I_O=1A$
	T_{PHL}			30	μs	$V_{BOPR}=14V, I_O=1A$
Minimum load inductance	L	1			mH	

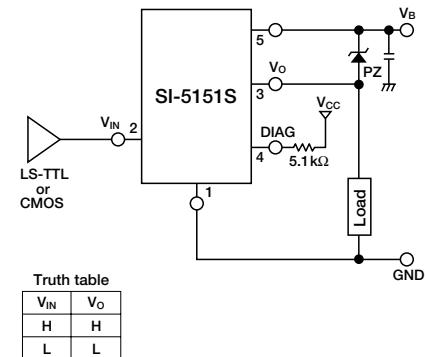
Note:

* The rule of protection against reverse connection of power supply is $V_B = -13V$, one minute (all terminals except, V_B and GND, are open).

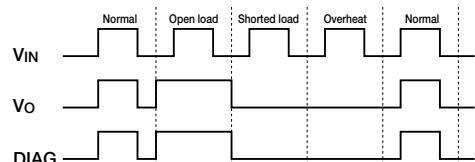
External Dimensions (unit: mm)



Standard Circuit Diagram



Diagnostic Function

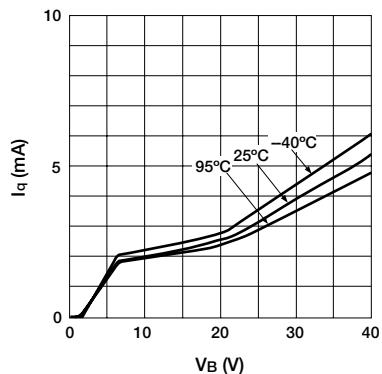


Mode	V_{IN}	V_O	DIAG
Normal	L	L	L
Open load	L	H	H
Shorted load	L	L	L
Overheat	L	L	L

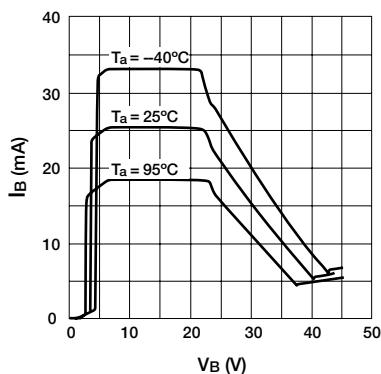
● DIAG output will be undetermined when a voltage exceeding 25V is applied to V_B terminal.

Electrical Characteristics

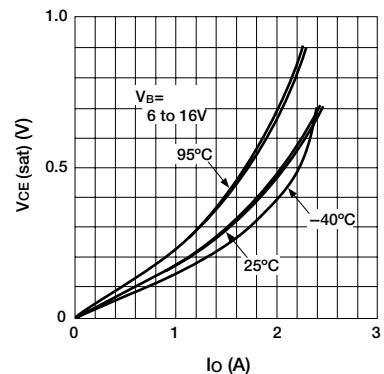
■ Quiescent Circuit Current



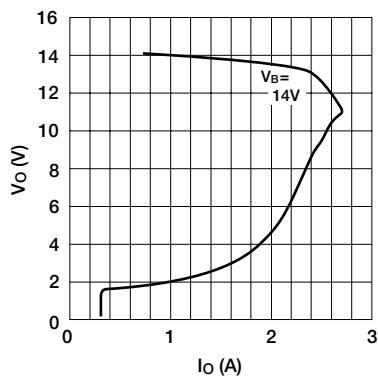
■ Circuit Current



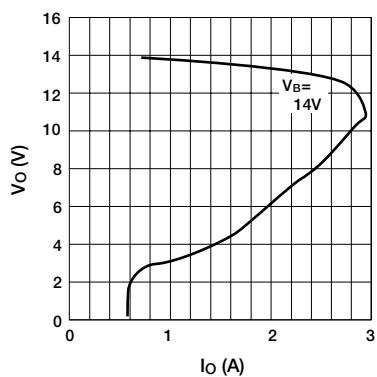
■ Saturation Voltage of Output Transistor



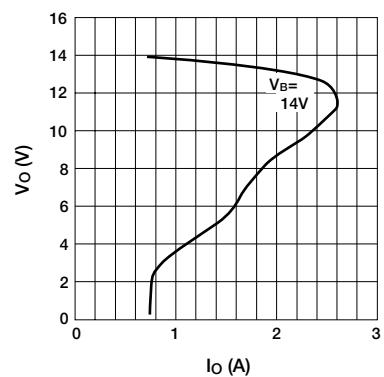
■ Overcurrent Protection Characteristics ($T_a = -40^\circ\text{C}$)



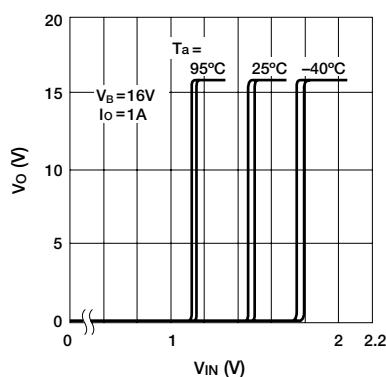
■ Overcurrent Protection Characteristics ($T_a = 25^\circ\text{C}$)



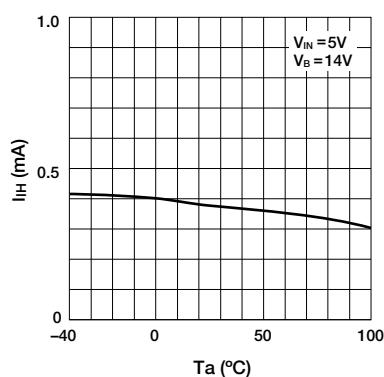
■ Overcurrent Protection Characteristics ($T_a = 100^\circ\text{C}$)



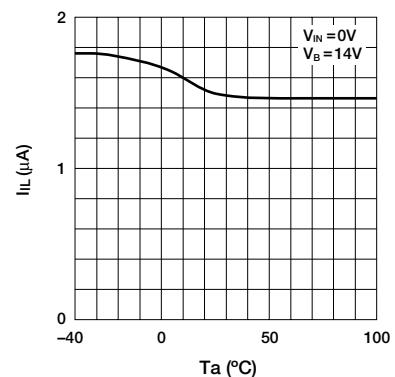
■ Threshold input voltage



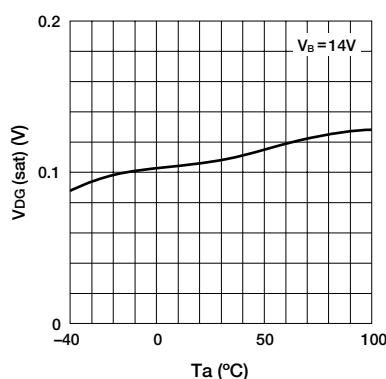
■ Input Current (Output ON)



■ Input Current (Output OFF)



■ Saturation Voltage of DIAG Output



■ Thermal Protection Characteristics

