

Surface-mount Dual Circuit High-side Power Switch Array SDH04

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
- $T_j = 150^\circ\text{C}$ guaranteed
- Surface-mount full-mold package

Absolute Maximum Ratings

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

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage	V_B	-13 to +40	V	
Drive terminal applied voltage	V_D	-0.3 to V_B	V	
Input terminal voltage	V_{IN}	-0.3 to +7.0	V	
DIAG output applied voltage	V_{DIAG}	-0.3 to +7.0	V	
DIAG output source current	I_{DIAG}	3	mA	
Voltage across power supply and drive terminal	V_{B-D}	$V_B - 0.4$	V	
Output current	I_O	1.5	A	
Power dissipation	P_D	2.6	W	Without heatsink, all circuits operating
Junction temperature	T_J	-40 to +150	$^\circ\text{C}$	
Operating temperature	T_{OP}	-40 to +100	$^\circ\text{C}$	
Storage temperature	T_{stg}	-40 to +150	$^\circ\text{C}$	

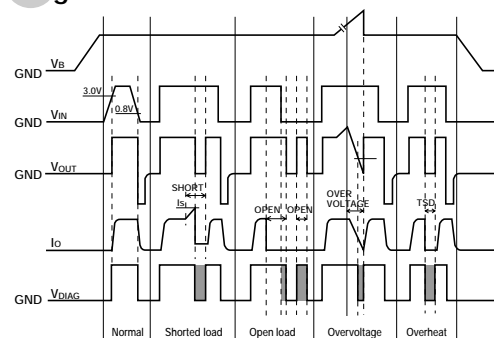
Electrical Characteristics

($V_{Bopr} = 14\text{V}$, $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min	typ	max		
Operating power supply voltage	V_{Bopr}	6.0		16	V	
Quiescent circuit current	I_q		5	12	mA	I_O output
Threshold input voltage	V_{Inth}	0.8		3.0	V	
Input current	Hi output	I_{IN}		1.0	mA	$V_{IN} = 5\text{V}$
	Lo output	I_{IN}	0	100	μA	$V_{IN} = 0\text{V}$
Saturation voltage of output transistor	$V_{CE(sat)}$			0.5	V	$I_O \leq 1.0\text{A}$, $V_{Bopr} = 6$ to 16V
Output terminal sink current	$I_{O(off)}$			2.0	mA	$V_O = 0\text{V}$, $V_{IN} = 0\text{V}$
Saturation voltage of DIAG output	V_{DL}			0.3	V	$I_{DIAG} = 3\text{mA}$
Leak current of DIAG output	I_{DGH}			100	μA	$V_{DIAG} = 5\text{V}$
Open load detection resistor	R_{open}	1		30	k Ω	
Overcurrent protection starting current	I_S	1.6			A	$V_O = V_{Bopr} - 1.9\text{V}$
Thermal protection starting temperature	T_{TSD}	150			$^\circ\text{C}$	$V_{Bopr} \approx 6\text{V}$
Output transfer time	T_{ON}		8	30	μs	$I_O = 1\text{A}$
	T_{OFF}		15	30	μs	$I_O = 1\text{A}$
DIAG output transfer time	T_{PLH}		10	30	μs	$I_O = 1\text{A}$
	T_{PHL}		15	30	μs	$I_O = 1\text{A}$

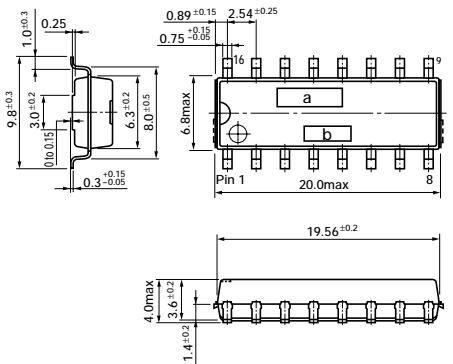
Note: * The rule of protection against reverse connection of power supply is $V_B = -13\text{V}$, one minute (all terminals except, V_B and GND, are open).

Diagnostic Function



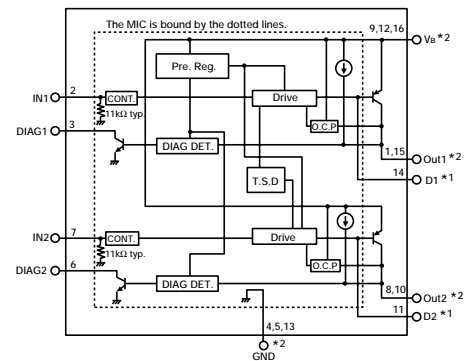
ERROR SIGNAL for CPU

External Dimensions (unit: mm) SMD-16A



a: Type No.
b: Lot No.

Equivalent Circuit Diagram

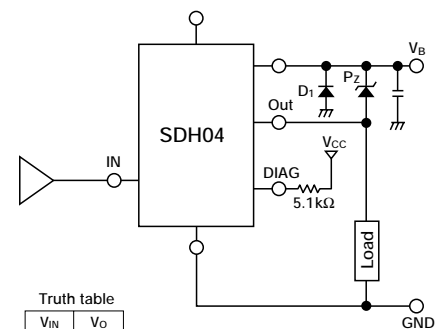


[Abbreviations]

Drive: Drive circuit
CONT: ON/OFF circuit
Pre.Reg: Pre-regulator
DIAG.DET.: Diagnostic circuit
O.C.P.: Overcurrent protection
T.S.D.: Thermal protection

- *1. The base terminal (D terminal) is connected to the output transistor base. It is also connected to the control monolithic IC. Do not, therefore, apply an external voltage in operation.
- *2. SDH04 have two or three terminals of the same function (V_B , Out1, Out2, GND). The terminals of the same function must be shorted at a pattern near the product.

Standard Circuit Diagram

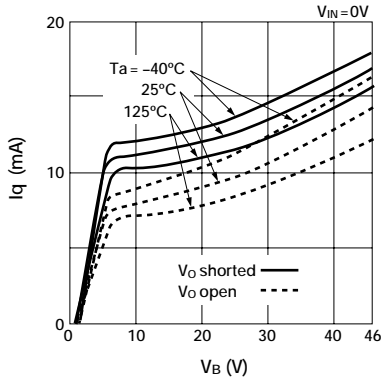


Truth table

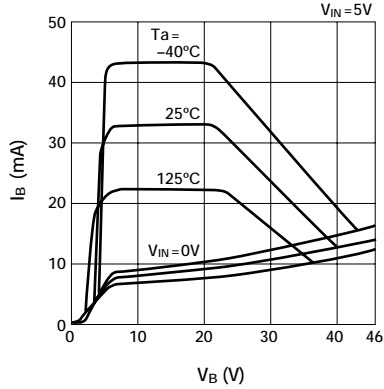
V_{IN}	V_O
H	H
L	L

Note 1: A pull-down resistor (11 k Ω typ.) is connected to the IN terminal. Your turns "L" when a high impedance is connected to the IN terminal in series.

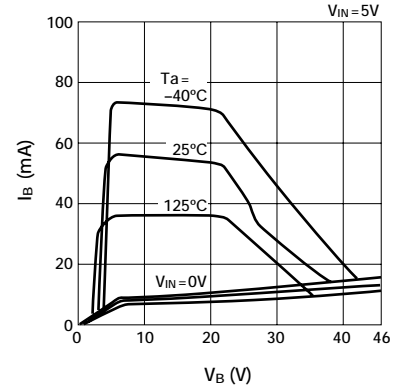
■ Quiescent Circuit Current (dual circuit)



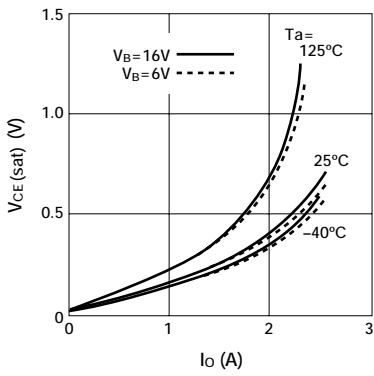
■ Circuit Current (single circuit)



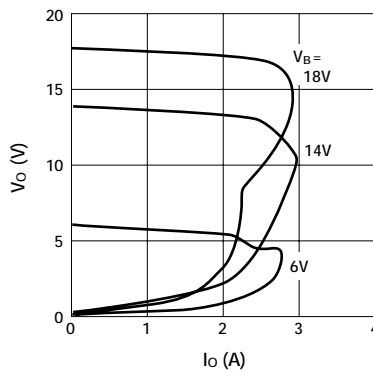
■ Circuit Current (dual circuit)



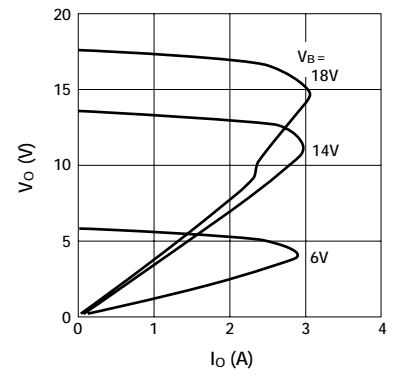
■ Saturation Voltage of Output Transistor



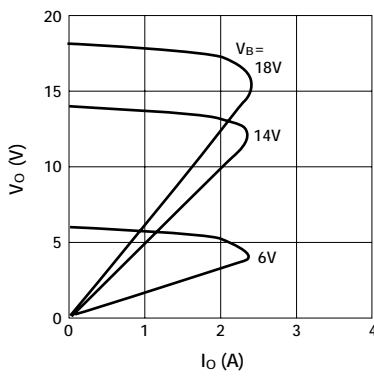
■ Overcurrent Protection Characteristics (Ta=-40°C)



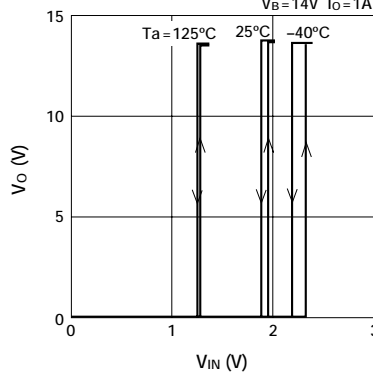
■ Overcurrent Protection Characteristics (Ta=25°C)



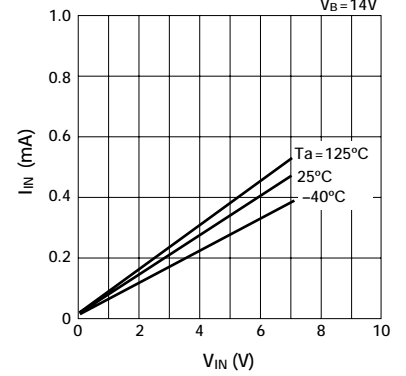
■ Overcurrent Protection Characteristics (Ta=125°C)



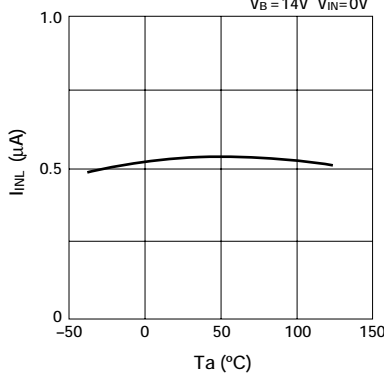
■ Threshold Characteristics of Input Voltage



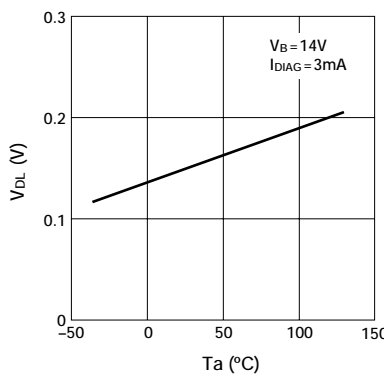
■ Input Terminal Source Current



■ Input Terminal Sink Current



■ Saturation Voltage of DIAG Output



■ Thermal Protection Characteristics

