

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 | $^\circ\text{C}$ | |

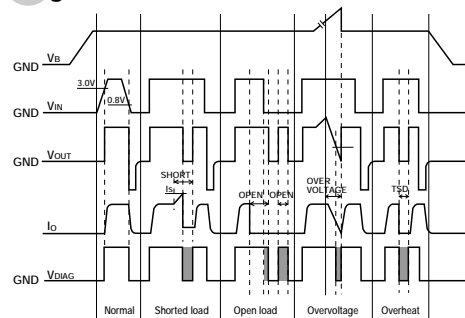
Electrical Characteristics

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

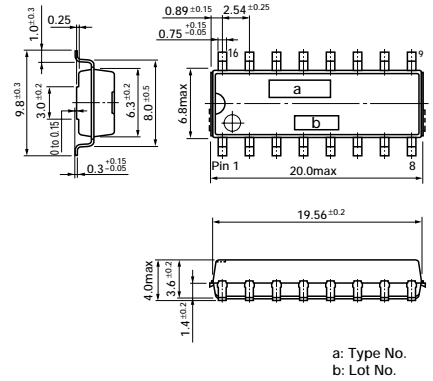
| Parameter | Symbol | Ratings | | | Unit | Conditions |
|---|---------------|----------|-----|-----|------------------|---|
| | | min | typ | max | | |
| Operating power supply voltage | V_{Bopr} | 6.0 | | 16 | V | |
| Quiescent circuit current | I_q | | 5 | 12 | mA | Lo output |
| Threshold input voltage | 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 | | | $^\circ\text{C}$ | $V_{Bopr} \geq 6\text{V}$ |
| 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).

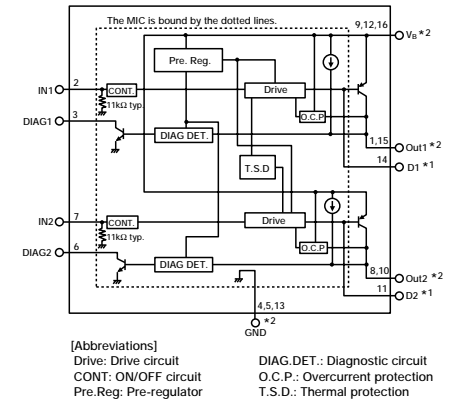
Diagnostic Function



External Dimensions (unit: mm) SMD-16A

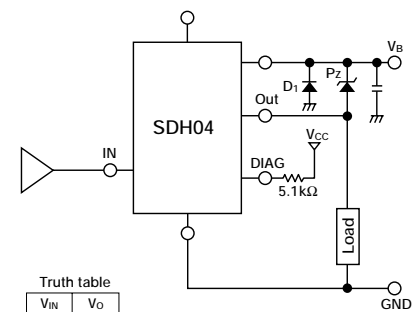


Equivalent Circuit Diagram



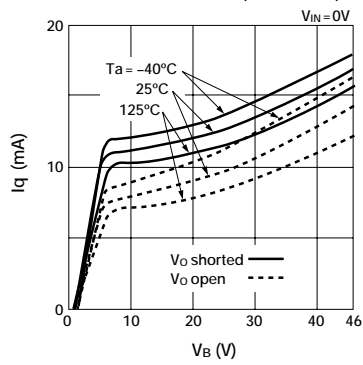
- *1. The base terminal (D terminal) is connected to the output transistor base. It is also connected to the control monolithic IC. Do not, therefore, apply an external voltage in operation.
- *2. SDH04 have two or three terminals of the same function (V_B , Out1, Out2, GND). The terminals of the same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

Standard Circuit Diagram

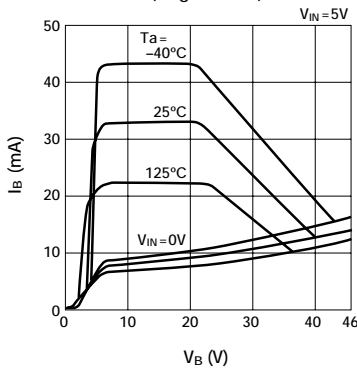


Note 1: A pull-down resistor (11 k Ω typ.) is connected to the IN terminal. V_{out} turns "L" when a high impedance is connected to the IN terminal in series.

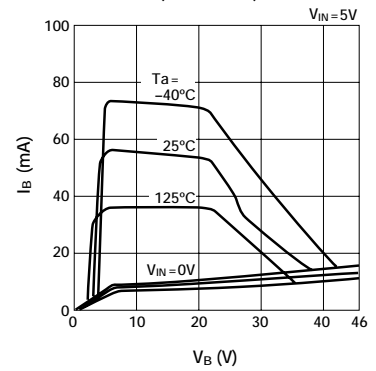
■ Quiescent Circuit Current (dual circuit)



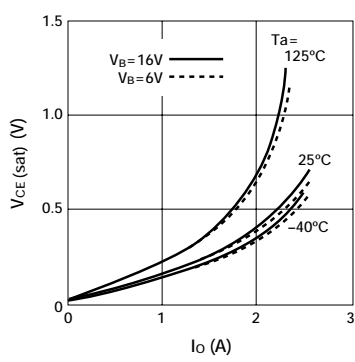
■ Circuit Current (single circuit)



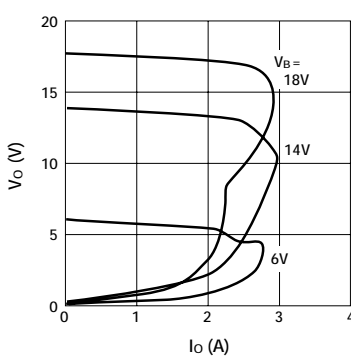
■ Circuit Current (dual circuit)



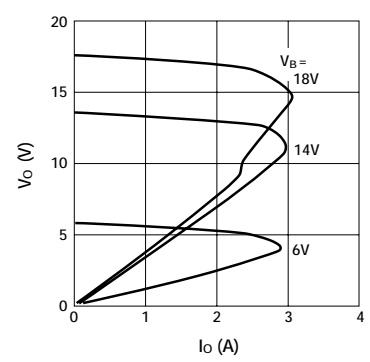
■ Saturation Voltage of Output Transistor



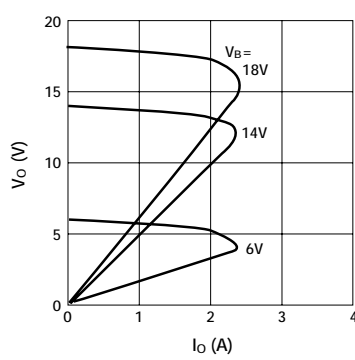
■ Overcurrent Protection Characteristics ($T_a = -40^\circ\text{C}$)



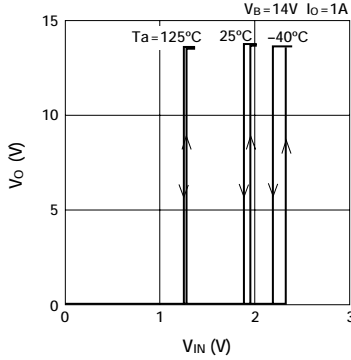
■ Overcurrent Protection Characteristics ($T_a = 25^\circ\text{C}$)



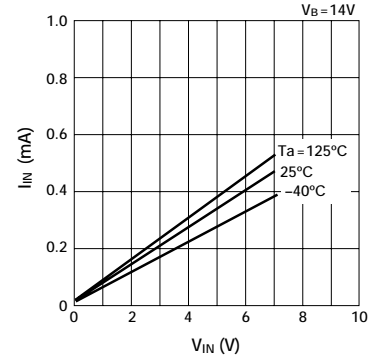
■ Overcurrent Protection Characteristics ($T_a = 125^\circ\text{C}$)



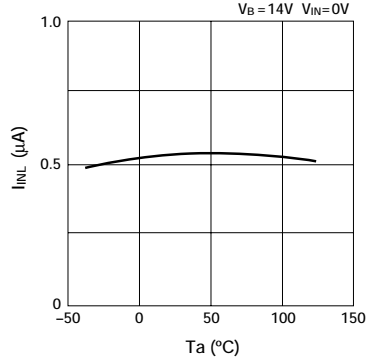
■ Threshold Characteristics of Input Voltage



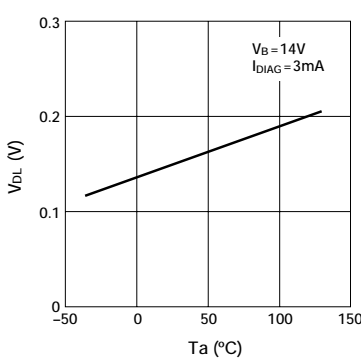
■ Input Terminal Source Current



■ Input Terminal Sink Current



■ Saturation Voltage of DIAG Output



■ Thermal Protection Characteristics

