3-circuit High-side Power Switch Array SLA2501M

Features

- Built-in diagnostic function to detect short and open circuiting of loads and output status signals
- Low saturation PNP transistor use ($V_{CE\ (sat)} \leqq 0.2V$)
- Allows direct driving using LS-TTL and C-MOS logic levels
- Built-in Zener diode in transistor eliminates the need of (or simplifies) external surge absorption circuit
- Built-in independent overcurrent and thermal protection circuit in each circuit
- Built-in protection against reverse connection of power supply
- Tj = 150ºC guaranteed

Absolute Maximum Ratings

(Ta=25ºC)

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 output terminal	V_{B-O}	V_B–34	V	
Voltage across power supply and drive terminal	V_{B-D}	–0.4	V	
Output current	I_O	1.5	A	
Output reverse current	I_O	–1.8	A	
Electrostatic resistance	$E_{S/A}$	±250	V	C=200pF, R=0Ω
Power Dissipation	P_D	4.8	W	Stand-alone without heatsink, all circuits operating
Junction temperature	Tj	–40 to +150	ºC	
Operating temperature	T_{OP}	–40 to +115	ºC	
Storage temperature	Tstg	–50 to +150	ºC	

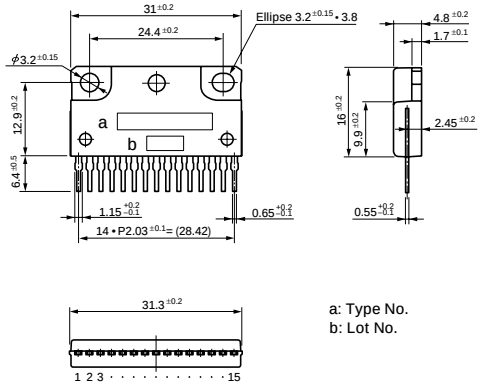
Electrical Characteristics

(V_{Bopr}=14V, Tj=–40 to +150ºC unless otherwise specified)

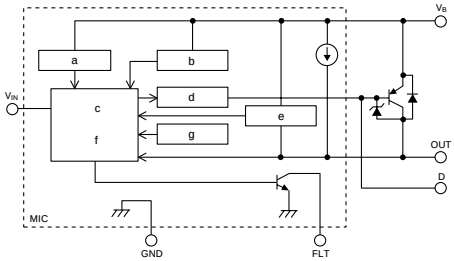
Parameter		Symbol	Ratings min	Ratings typ	Ratings max	Unit	Conditions
Operating power supply voltage		V_{Bopr}	6.0		16	V	
Quiescent circuit current (per circuit)		Iq		0.8	1.6	mA	Lo output
Circuit current (per circuit)		I_B		19.3		mA	Tj=25ºC
Threshold input voltage		V_{IN}th	0.8		3.0	V	
Input voltage	Hi output	V_{IN}	3.7			V	
	Lo output	V_{IN}			1.5	V	
Input current	Hi output	I_{IN}			–1.0	mA	V_{IN}=5V
	Lo output	I_{IN}	100			µA	V_{IN}=0V
Saturation voltage of output transistor		$V_{CE\ (sat)}$			0.2	V	$I_O \leqq 1.2A$, V_{Bopr}=6 to 16V
		$V_{CE\ (sat)}$		1.0		V	$I_O \leqq 1.5A$, V_{Bopr}=6 to 16V
Output terminal sink current		$I_{O\ (off)}$		2.5	5	mA	Tj=25ºC, V_{CEO}=14V
Surge clamp voltage		V_{B-O}	29	34	39	V	Tj=25ºC, I_C=10mA
			28	34	40	V	I_C=5mA
Saturation voltage of DIAG output		V_{DL}			0.4	V	I_{DGH}=–2mA, V_{Bopr}=6 to 16V
Leak current of DIAG output		I_{DGH}			–100	µA	V_{CC}=7V
Open load detection resistor		Ropen	5.5			kΩ	
Overcurrent protection starting current		I_S	1.6			A	V_O=V_{Bopr}–1.5V
Thermal protection starting temperature		T_{TSD}				ºC	$V_{Bopr} \geqq 6V$
Output transfer time		T_{ON}			30	µS	I_O=1A
		T_{OFF}			100	µS	I_O=1A
DIAG output transfer time		T_{PLH}			30	µS	I_O=1A
		T_{PHL}			100	µS	I_O=1A
Minimum load inductance		Lo	1.0			mH	
Maximum ON duty		$D_{(ON)}$	0		60	%	

Note:
* The Zener diode has an energy capability of 200 mJ (single pulse).
* A start failure may occur if a short OFF signal of 10 ms or below is input in the V_{IN} terminal.

External Dimensions (unit: mm)

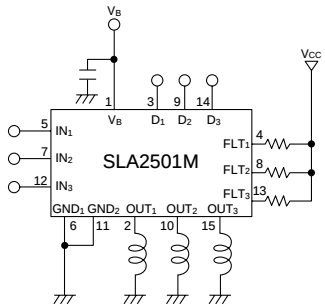


Equivalent Circuit Diagram

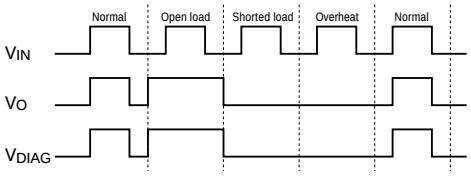


a: Pre-regulator
b: Overvoltage protection circuit
c: Control circuit
d: Driver circuit
e: Overcurrent protection circuit
f: Diagnostic circuit
g: Thermal protection circuit

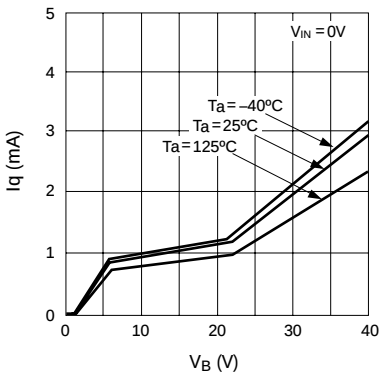
Standard Circuit Diagram



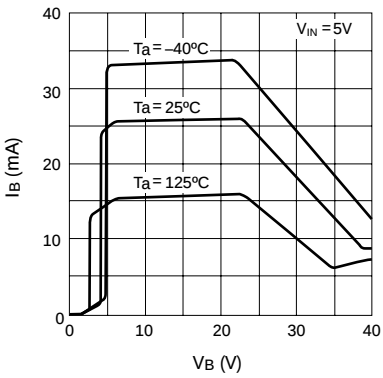
Diagnostic Function



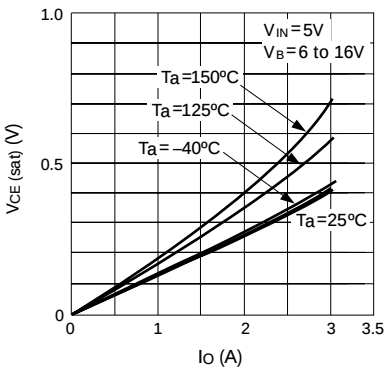
■ Quiescent Circuit Current (single circuit)



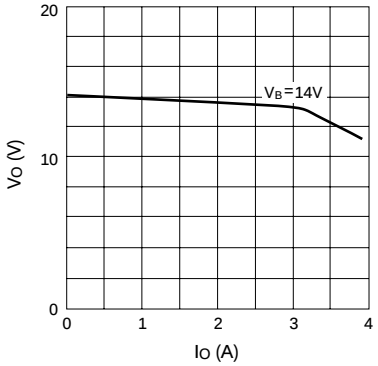
■ Circuit Current (single circuit)



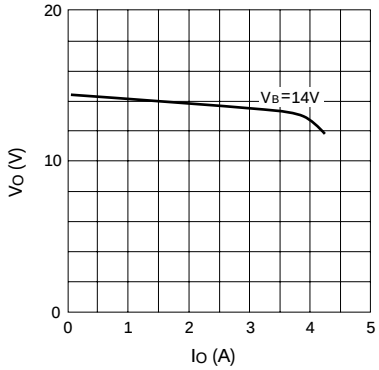
■ Saturation Voltage of Output Transistor



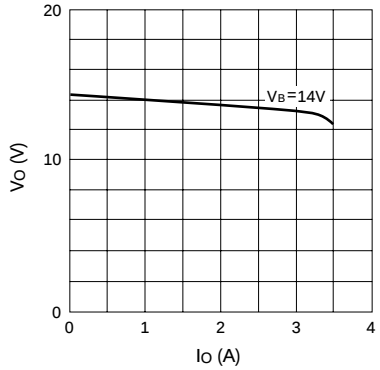
■ Overcurrent Protection Characteristics (Ta=–40ºC)



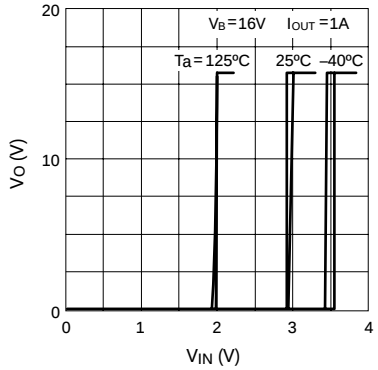
■ Overcurrent Protection Characteristics (Ta=25ºC)



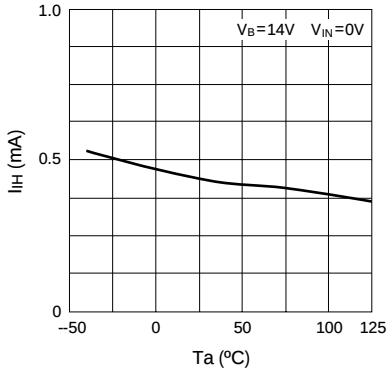
■ Overcurrent Protection Characteristics (Ta=115ºC)



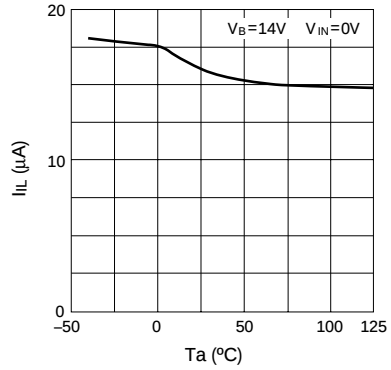
■ Threshold Input Voltage



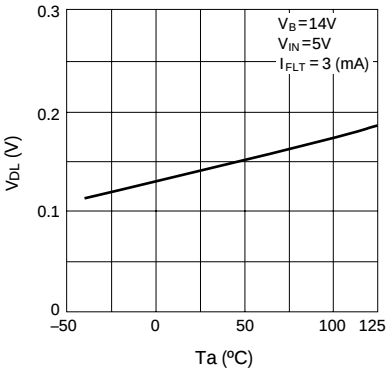
■ Input Current (Output ON)



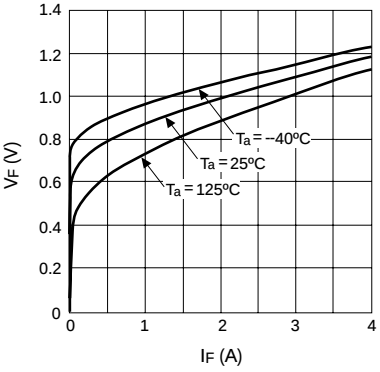
■ Input Current (Output OFF)



■ Saturation Voltage of DIAG Output



■ Output Reverse Current



■ Thermal Protection