

# 3-circuit High-side Power Switch Array SLA2501M

## Features

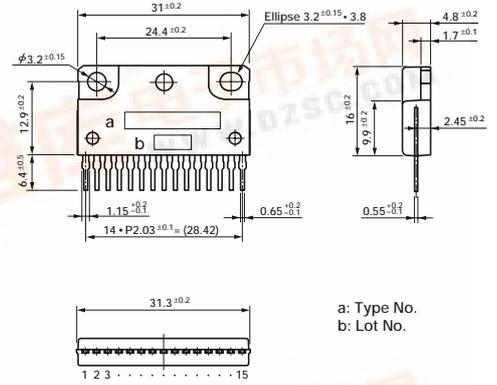
- Built-in diagnostic function to detect short and open circuiting of loads and output status signals
- Low saturation PNP transistor use ( $V_{CE(sat)} \leq 0.2V$ )
- Allows direct driving using LS-TTL and C-MOS logic levels
- Built-in Zener diode in transistor eliminates the need of (or simplifies)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

## Absolute Maximum Ratings

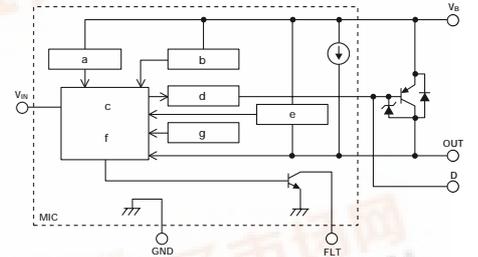
( $T_a = 25^\circ C$ )

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 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	$E_S/A$	$\pm 250$	V	$C = 200pF, R = 0\Omega$
Power Dissipation	$P_D$	4.8	W	Stand-alone without heatsink, all circuits operating
Junction temperature	$T_J$	-40 to +150	$^\circ C$	
Operating temperature	$T_{OP}$	-40 to +115	$^\circ C$	
Storage temperature	$T_{stg}$	-50 to +150	$^\circ C$	

## External Dimensions (unit: mm)



## Equivalent Circuit Diagram

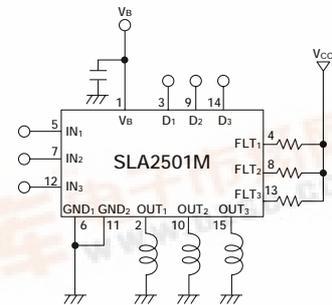


- a: Pre-regulator
- b: Overvoltage protection circuit
- c: Control circuit
- d: Driver circuit
- e: Overcurrent protection circuit
- f: Diagnostic circuit
- g: Thermal protection circuit

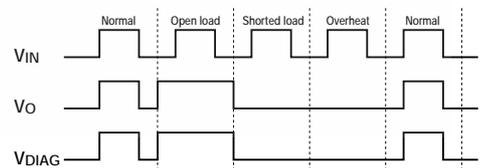
## Electrical Characteristics ( $V_{Bopr} = 14V, T_J = -40$ to $+150^\circ C$ unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions	
		min	typ	max			
Operating power supply voltage	$V_{Bopr}$	6.0		16	V		
Quiescent circuit current (per circuit)	$I_q$		0.8	1.6	mA	Lo output	
Circuit current (per circuit)	$I_B$		19.3		mA	$T_J = 25^\circ C$	
Threshold input voltage	$V_{INth}$	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		$\mu A$	$V_{IN} = 0V$	
Saturation voltage of output transistor	$V_{CE(sat)}$			0.2	V	$I_O \leq 1.2A, V_{Bopr} = 6$ to $16V$	
	$V_{CE(sat)}$		1.0		V	$I_O \leq 1.5A, V_{Bopr} = 6$ to $16V$	
Output terminal sink current	$I_{O(off)}$		2.5	5	mA	$T_J = 25^\circ C, V_{CEO} = 14V$	
Surge clamp voltage	$V_{B-O}$		29	34	39	V	$T_J = 25^\circ C, I_c = 10mA$
			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	$\mu A$	$V_{CC} = 7V$	
Open load detection resistor	$R_{open}$	5.5			k $\Omega$		
Overcurrent protection starting current	$I_S$	1.6			A	$V_O = V_{Bopr} - 1.5V$	
Thermal protection starting temperature	$T_{TSD}$				$^\circ C$	$V_{Bopr} \geq 6V$	
Output transfer time	$T_{ON}$			30	$\mu S$	$I_O = 1A$	
	$T_{OFF}$			100	$\mu S$	$I_O = 1A$	
DIAG output transfer time	$T_{PLH}$			30	$\mu S$	$I_O = 1A$	
	$T_{PHL}$			100	$\mu S$	$I_O = 1A$	
Minimum load inductance	$L_O$	1.0			mH		
Maximum ON duty	$D_{(OM)}$	0		60	%		

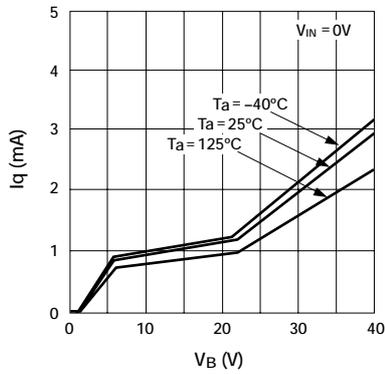
## Standard Circuit Diagram



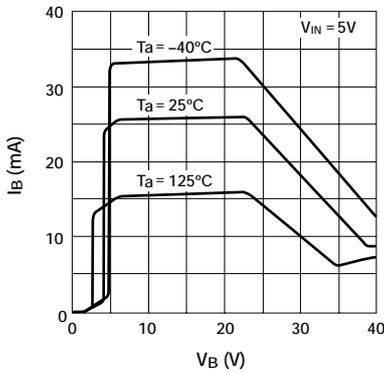
## Diagnostic Function



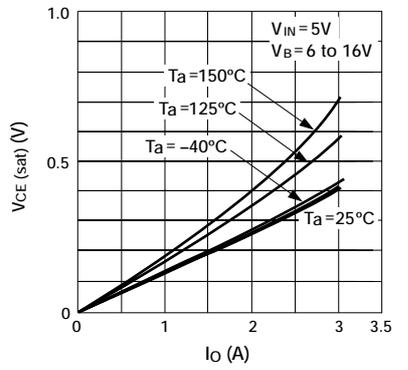
■ Quiescent Circuit Current (single circuit)



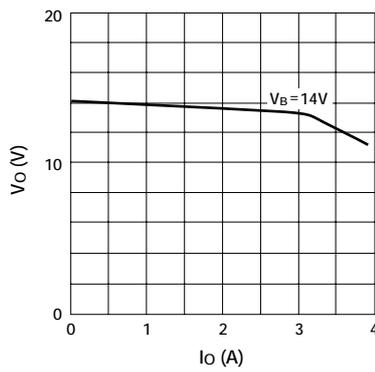
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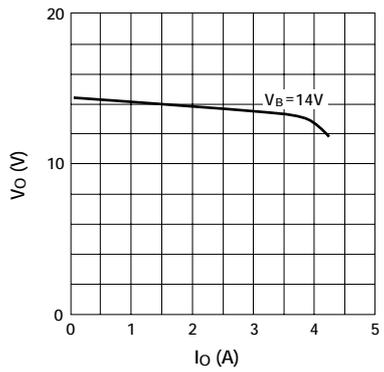
■ Saturation Voltage of Output Transistor



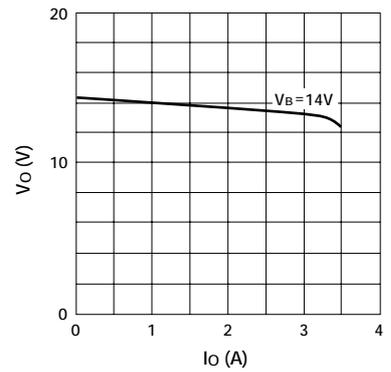
■ Overcurrent Protection Characteristics ( $T_a = -40^\circ C$ )



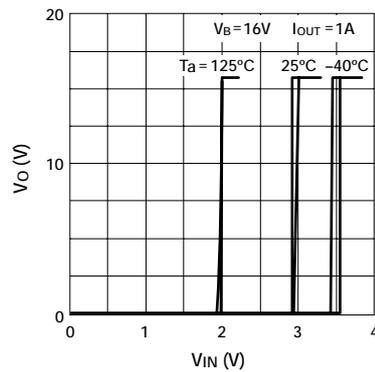
■ Overcurrent Protection Characteristics ( $T_a = 25^\circ C$ )



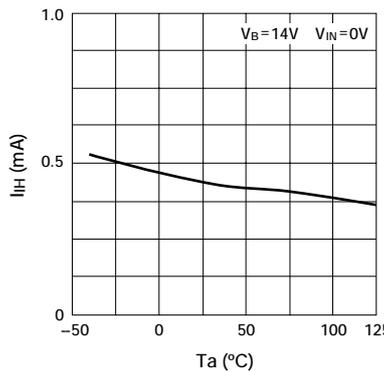
■ Overcurrent Protection Characteristics ( $T_a = 115^\circ C$ )



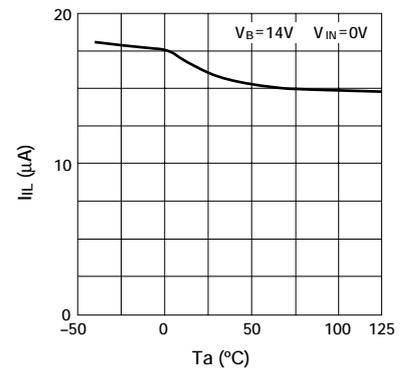
■ Threshold Input Voltage



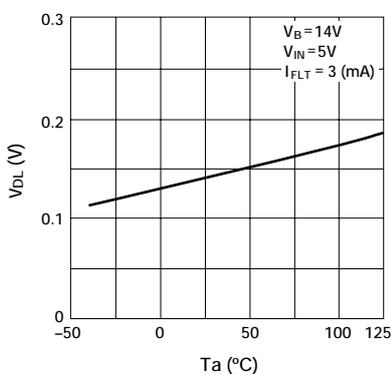
■ Input Current (Output ON)



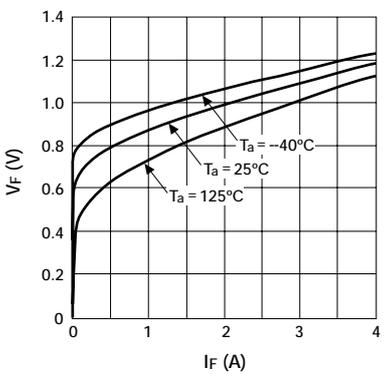
■ Input Current (Output OFF)



■ Saturation Voltage of DIAG Output



■ Output Reverse Current



■ Thermal Protection

