High Voltage Full Bridge Drive ICs SMA2409M

Features

- One Package Full Bridge Driver Consisted of High Voltage IC and Power IGBT (4 pieces)
- High Voltage Driver which accepts direct connection to the input signal line

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Power supply voltage	V_M	500	V	Power GNG to HV
Input voltage	V_{IN}	15	V	
Operation voltage	Vcc	15	V	
Output voltage	Vo	500	V	
Output current (DC)	$I_{O(DC)}$	7	A	
Output current (pulses)	$I_{O(pulse)}$	15	A	Single pulse (PW=50μs max.)
Power dissipation	P_D	4	W	
		20		Tc=25°C
Thermal resistance	θj-a	31.2	°CW	
	θj-c	6.2		Tc=25°C
Operating temperature	Topr	–40 to +105	°C	
Storage temperature	Tstg	–40 to +150	°C	
Junction temperature	Tj	150	°C	
IGBT single pulse avalanche resistance	E_{AS}	5	mJ	V_{DD}=30V, L=1mH, Unclamped, Ic=3.2A
ESD protection	E_{SD}	±2	kV	Human body model (C=100pF, R=1.5kΩ)

Electrical Characteristics

(Ta=25°C)

Parameter		Symbol	Ratings min	Ratings typ	Ratings max	Unit	Conditions
IGBT output breakdown voltage		BV_{OUT}	570			V	Io=100μA, Tj=25°C
IGBT output leak current		$I_{OUT\ (off)}$			100	μA	Vo=500V
IGBT output ON voltage		$V_{OUT\ (on)}$		1.0	1.2	V	Io=0.4A, V_{IN} (or V_{GL})=10V
				1.3	1.8	V	Io=2.0A, V_{IN} (or V_{GL})=10V
Quiescent circuit current		Icc1			3.0	mA	Vcc=10V, V_M=V_{IN}=0V
		Icc2			4.0	mA	Vcc=10V, V_M=400V, V_{IN}=0V
Operating circuit current		Icc3			4.0	mA	Vcc=10V, V_M=400V, V_{IN1} (or V_{IN2})=10V
Input threshold voltage		V_{IH}	0.8•Vcc			V	Vcc=9 to 15V
		V_{IL}			0.2•Vcc	V	
Low-side IGBT gate drive voltage		V_{GL}	0.8•Vcc		16	V	Vcc=9 to 15V
Delay time*	High side	$t_{d\ (on)}$	0.6	0.7	0.8	μs	V_M=85V, Io=0.41A Vcc=10V V_{IN}=10V (Out Stage=ON) V_{IN}=0V (Out Stage=OFF)
		$t_{d\ (off)}$	1.8	2.2	2.6	μs	
	Low side	$t_{d\ (on)}$	0.8	0.9	1.0	μs	
		$t_{d\ (off)}$	1.3	1.6	1.9	μs	
		Δt_d			2.5	μs	Δt_d=H/S $t_{d\ (off)}$ - L/S $t_{d\ (on)}$ or L/S $t_{d\ (off)}$ - H/S $t_{d\ (on)}$
Operating voltage		Vcc	9		15	V	Ta=–40 to +105°C

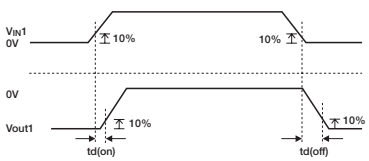
Recommended Operation Range

Parameter	Symbol	Ratings min	Ratings typ	Ratings max	Unit	Conditions
Dead time	t_d	5.0			μs	Ta=–40 to +105°C

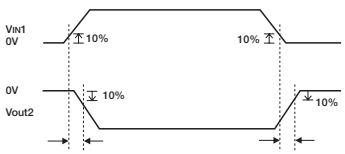
* About delay time

Signal input waveform vs output waveform

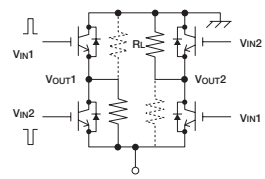
① Highside switch turn-on, turn-off



② Lowside switch turn-on, turn-off



Measurement Circuit



Conditions

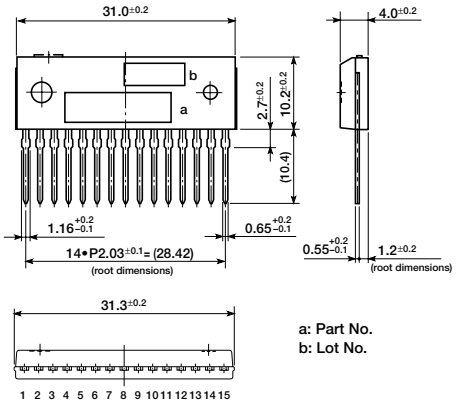
V_{CC}=10V, V_{IN}=10V (pulse)

V_M=85V

I_O=0.41A (R_L=206Ω)

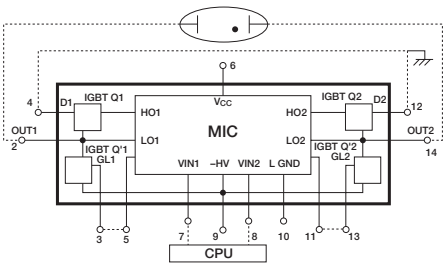
* When pulse signal is inputted to V_{IN1}, R_L on solid line is ON and dotted line R_L is off.
On the contrary, when pulse signal is inputted to V_{IN2}, R_L on dotted line is ON and dotted line R_L is off.

External Dimensions (unit: mm)



a: Part No.
b: Lot No.

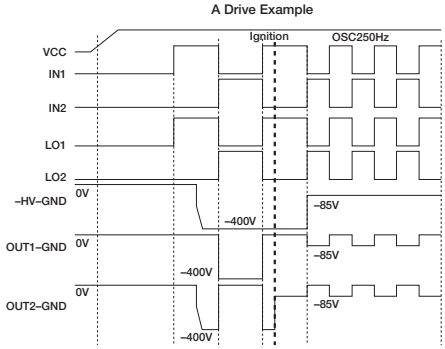
Block Diagram



* Dotted Line: Outside Connection

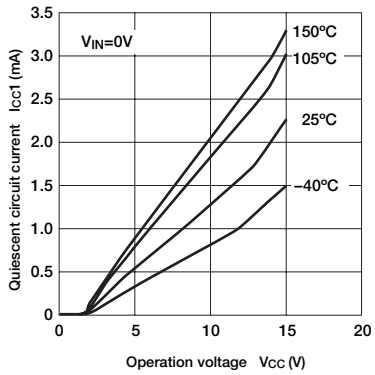
Timing Chart

A Drive Example

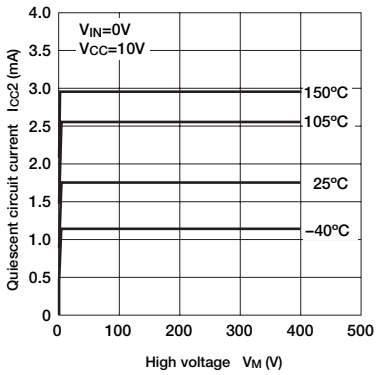


Electrical Characteristics

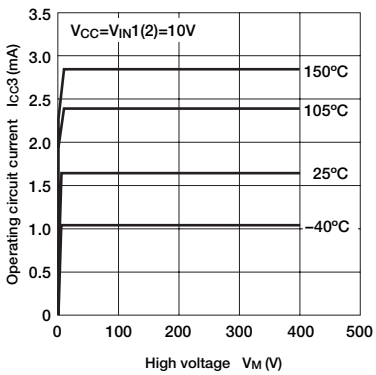
■ Quiescent circuit current



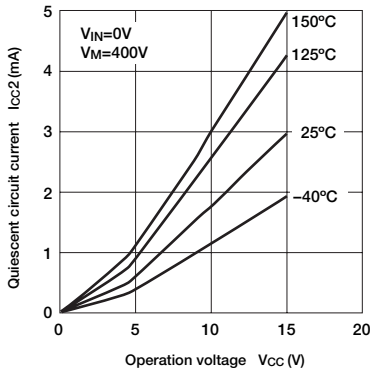
■ Quiescent circuit current supplied high voltage



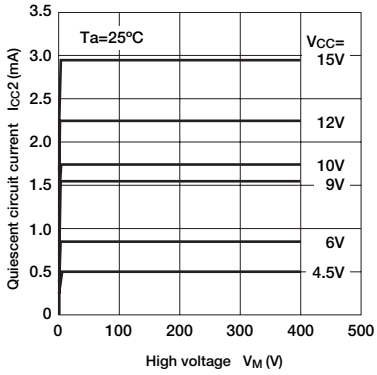
■ Operating circuit current



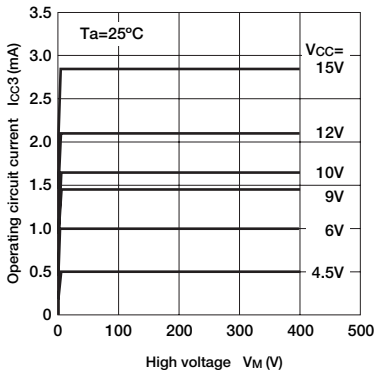
■ Quiescent circuit current supplied high voltage



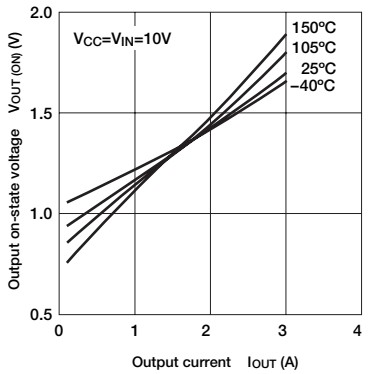
■ Quiescent circuit current supplied high voltage



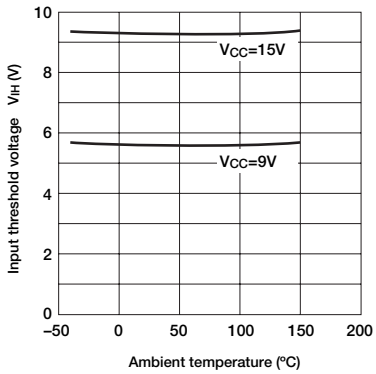
■ Operating circuit current



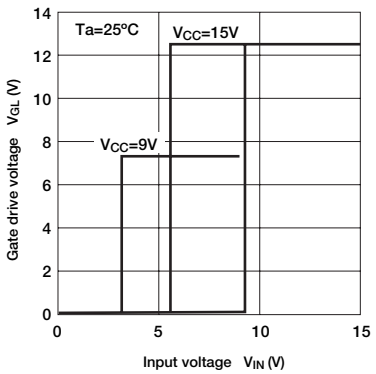
■ Output on-state voltage



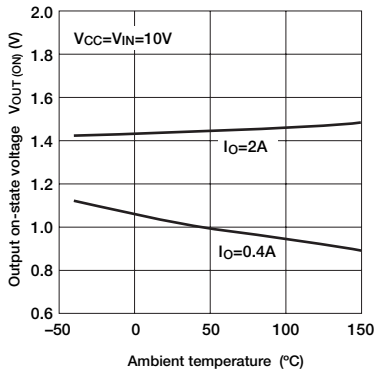
■ Input threshold voltage



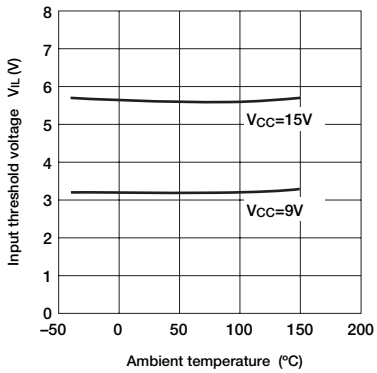
■ Gate drive voltage



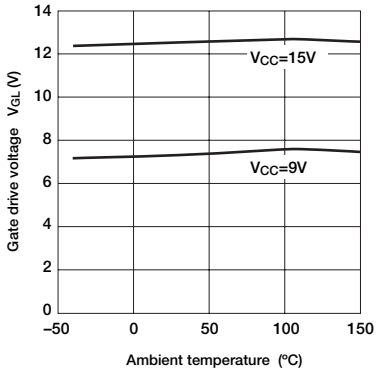
■ Output on-state voltage



■ Input threshold voltage

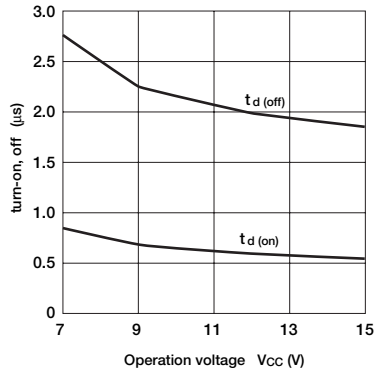


■ Gate drive voltage

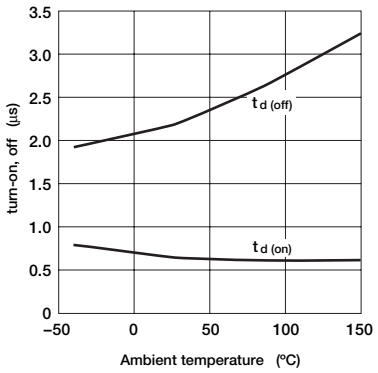


Electrical Characteristics

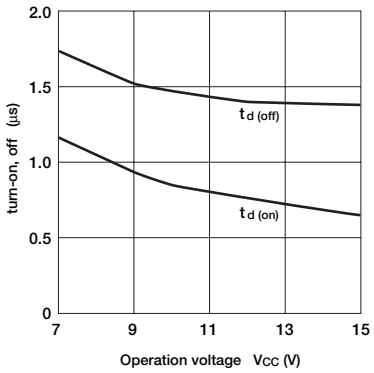
■ High side switch turn-on, off



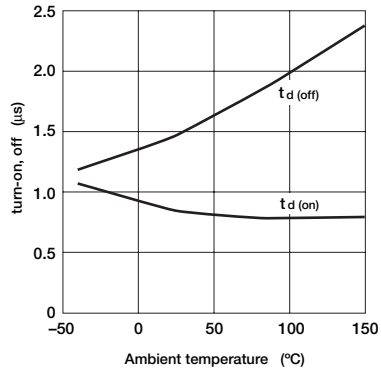
■ High side switch turn-on, off



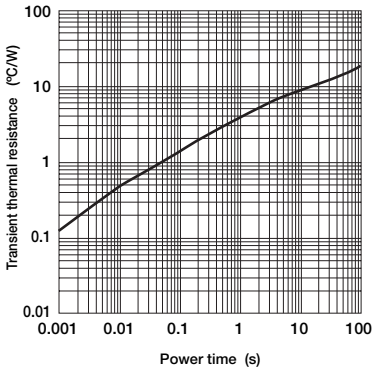
■ Low side switch turn-on, off



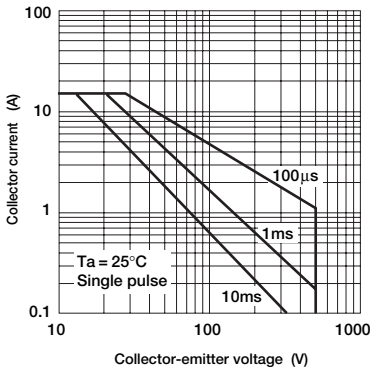
■ Low side switch turn-on, off



■ Transient thermal resistance characteristics



■ IGBT ASO characteristics



■ Power derating curve