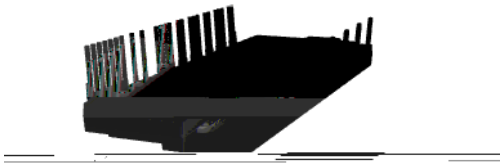


PIN DESCRIPTIONS

Pin Number	Pin Name	Pin Description
1	$P_)$	Positive DC−Link Input
2	W	Output for W−Phase
3	V	Output for V−Phase
4	U	Output for U−Phase
5	N_W	Negative DC−Link Input for W−Phase
6	N_V	Negative DC−Link Input for V−Phase
7	N_U	Negative DC−Link Input for U−Phase
8	R_{TH}	Series Resistor for Thermistor (Temperature Detection)
9	V_{TH}	Thermistor Bias Voltage
10	$V_{CC(L)}$	Low−Side Bias Voltage for IC and IGBTs Driving
11	$COM_{(L)}$	Low−Side Common Supply Ground
12	$IN_{(UL)}$	Signal Input for High−Side U−Phase
13	$IN_{(VL)}$	Signal Input for High−Side V−Phase
14	$IN_{(WL)}$	Signal Input for High−Side W−Phase
15	V_{FO}	Fault Output
16	C_{FOD}	Capacitor for Fault Output Duration Selection
17	C_{SC}	Capacitor (Low−Pass Filter) for Short−Circuit Current Detection Input
18	R_{SC}	Resistor for Short−Circuit Current Detection
19		

ABSOLUTE MAXIMUM RAwww.

ELECTRICAL CHARACTERISTICS (T_J = 25°C UNLESS OTHERWISE NOTED)

INVERTER PART

Symbol		Parameter	Conditions		Min.	Typ.	Max.	Unit
$V_{CE(SAT)}$		Collector – Emitter Saturation Voltage	V_{DD} = V_{BS} = 15 V, V_{IN} = 5 V	I_C = 50 A, T_J = 25°C	–	2.20	2.80	V
V_F		FWDi Forward Voltage	V_{IN} = 0 V	I_F = 50 A, T_J = 25°C	–	2.40	3.00	V
HS	t_{ON}	Switching Times	V_{PN} = 600 V, V_{CC} = 15 V, I_C = 50 A, T_J = 25°C V_{IN} = 0 V 5 V, Inductive Load See Figure 5 (Note 6)		0.90	1.40	2.00	μs
	t							

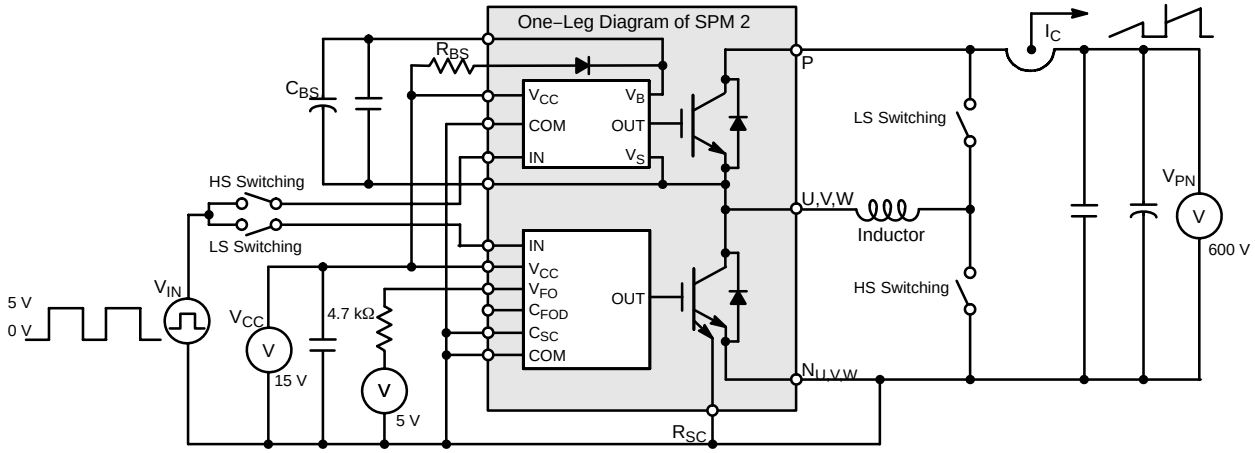


Figure 5. Example Circuit for Switching Test

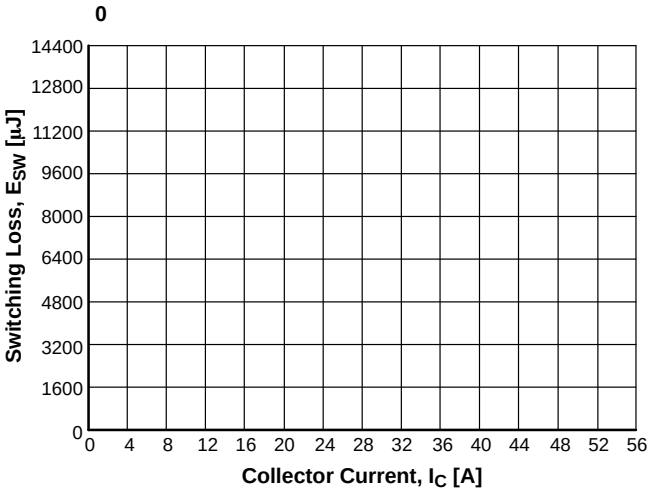


Figure 6. Switching Loss Characteristics (Typical)

BOOTSTRAP DIODE PART

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F = 1.0 A, T_J = 25°C	–	2.2	–	V
t_{rr}	Reverse−Recovery Time	I_F = 1.0 A, dI_F/dt = 50 A, T_J = 25°C	–	80	–	ns

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{PN}	Supply Voltage	Applied between P – N_U, N_V, N_W	300	600	800	V
V_{CC}	Control Supply Voltage	Applied between $V_{CC(UH,VH,WH)}$ − $COM_{(H)}$, $V_{CC(L)}$ − $COM_{(L)}$	14.0	15.0	16.5	V
V_{BS}	High−Side Bias Voltage	Applied between $V_{B(U)}$ − $V_{S(U)}$, $V_{B(V)}$ − $V_{S(V)}$, $V_{B(W)}$ − $V_{S(W)}$	13.0	15.0	18.5	V
dV_{DD}/dt, dV_{BS}/dt,	Control Supply Variation		−1	–	1	V/μs
t_{dead}	Blanking Time for Preventing Arm−Short	For Each Input Signal	2.0	–	–	μs
f_{PWM}	PWM Input Signal	−40°C ≤ T_C ≤ 125°C, −40°C ≤ T_J ≤ 150°C	–	–	20	kHz
V_{SEN}	Voltage for Current Sensing	Applied between N_U, N_V, N_W − $COM_{(H,L)}$ (Including Surge Voltage)	−5	–	5	V
$PW_{IN(ON)}$	Minimum Input Pulse Width	V_{CC} = V_{BS} = 15 V, I_C ≤ 75 A, Wiring Inductance between $N_{U,V,W}$ and DC Link N < 10 nH (Note 10)	2.5	–	–	μs
$PW_{IN(OFF)}$			2.5	–	–	
T_J	Junction Temperature		−40	–	150	°C

10. This product might not make response if input pulse width is less than the recommended value.

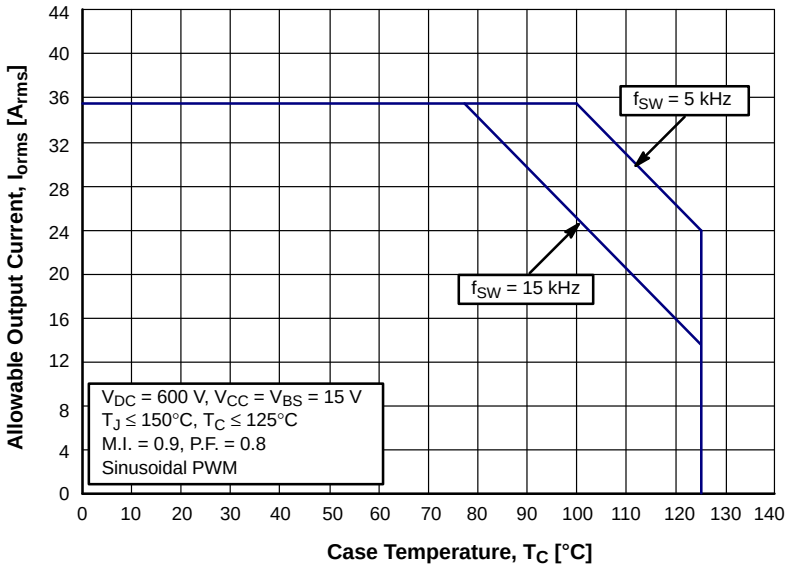


Figure 8. Allowable Maximum Output Current

NOTE:

11. This allowable output current value is the reference data for the safe operation of this product. This may be different from the actual application and operating condition.

MECHANICAL CHARACTERISTICS AND RATINGS						
	Min.	**Typ.**	**Max.**			
Device Flatness	See Figure 9		0	–	+200	μm
Mounting Torque	Mounting Screw: M4 See Figure 10	Recommended 1.0 N•m	0.9	1.0	1.5	N•m
		Recommended 10.1 kg•cm	9.1	10.1	15.1	kg•cm
Terminal Pulling Strength	Load 19.6 N		10	–	–	s
Terminal Bending Strength	Load 9.8 N, 90 degrees Bend		2	–	–	times
Weight			–	50	–	g

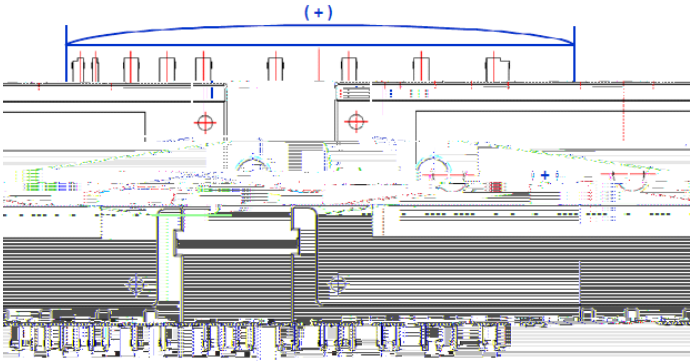


Figure 9. Flatness Measurement Position

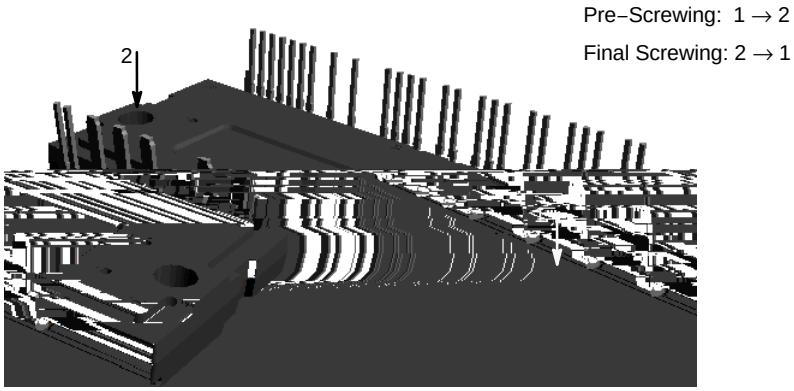
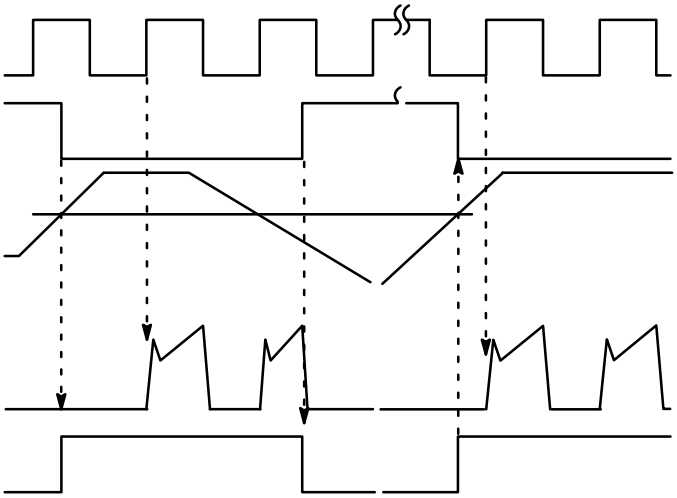


Figure 10. Mounting Screws Torque Order

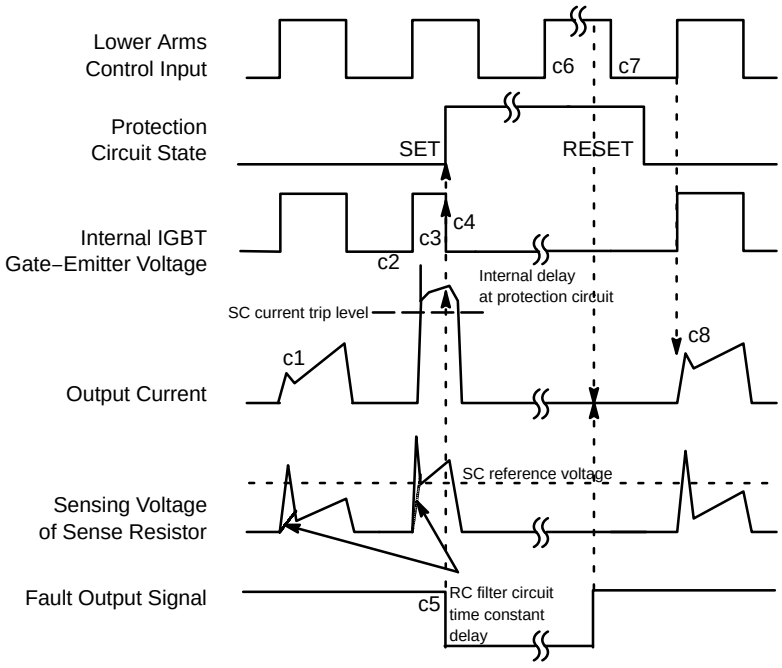
NOTES:

12. Do not make over torque when mounting screws. Much mounting torque may cause DBC cracks, as well as bolts and Al heat−sink destruction.
13. Avoid one−sided tightening stress. Figure 10 shows the recommended torque order for mounting screws. Uneven mounting can cause the DBC substrate of package to be damaged. The pre−screwing torque is set to 20 ~ 30% of maximum torque rating.



a1: Control supply voltage rises: After the voltage rises UV_{CCR}, the circuits start to operate when next input is applied.

Figure 11. Under−Voltage Protection (Low−Side)



c1: Normal operation: IGBT ON and carrying current.
c2: Short circuit current detection (SC trigger).
c3: All low−side IGBTs gate are hard interrupted.
c4: All low−side IGBTs turn OFF.
c5: Fault output operation starts with a fixed pulse width according to the condition of the external capacitor C_{FOD}.
c6: Input HIGH: IGBT ON state, but during the active period of fault output the IGBT doesn't turn ON.

Figure 13. Short−Circuit Current Protection (Low−Side Operation Only)

Figure 15. Ty

SPMCA−A34 / 34LD, PDD STD, DBC DIP TYPE
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