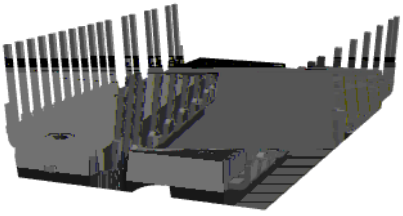
Motion SPM® 45 Series

FND43060T2

www.onsemi.com

General Description

FND43060T2 is an advanced Motion SPM 45 module providing a fully featured, high performance inverter output stage for AC Induction, BLDC, and PMSM motors. These modules integrate optimized gate drive of the built in IGBTs to minimize EMI and losses, while also providing multiple on module protection features including under voltage lockouts, over current shutdown, thermal monitoring, and fault reporting. The built in, high speed HVIC requires only a single supply voltage and translates the incoming logic level gate inputs to the high voltage, high current drive signals required to properly drive the module's robust short €



SPMAA−C26
CASE MODFC

Built In Bootstrap Diodes and Dedicated Vs Pins Simplify PCB Layout

- Built In NTC Thermistor for Temperature Monitoring
- Separate Open Emitter Pins from Low Side IGBTs for Three Phase Current Sensing
- Single Grounded Power Supply
- Isolation Rating: 4000 V_{rms}/min
- Remove Dummy Pin

Applications

- Motion Control Home Appliance/Industrial Motor

Related Resources

- AN 9084 Smart Power Module, Motion SPM® 45 H V3 Series User's Guide
- AN 9072 Smart Power Module, Motion SPM® in SPM45H Thermal Performance Information
- AN 9071 Smart Power Module Motion SPM® in SPM45H Mounting Guidance
- AN 9760 PCB Design Guidance for SPM®

Integrated Power Functions

- 600 V 30 A IGBT inverter for three phase DC/AC power conversion (Refer to Figure 3)

MARKING DIAGRAM

XXXXXXXXXXX
ZZZ ATYWW
NNNNNNN

XXXX	= Specific Device Code
ZZZ	= Lot ID
AT	= Assembly and Test Location
Y	= Year
WW	= Work Week
NNN	= Serial Number

PIN DESCRIPTIONS

Pin Number	Pin Name	Pin Description
1	V_{TH}	Thermistor Bias Voltage
2	R_{TH}	Series Resistor for the Use of Thermistor (Temperature Detection)
3	P	Positive DC−Link Input
4	U	Output for U−Phase
5	V	Output for V−Phase
6	W	Output for W−Phase
7	N_U	Negative DC−Link Input for U−Phase
8	N_V	Negative DC−Link Input for V−Phase
9	N_W	Negative DC−Link Input for W−Phase
10	C_{SC}	Capacitor (Low−Pass Filter) for Short−circuit Current Detection Input
11	V_{FO}	Fault Output
12	IN	

INTERNAL EQUIVALENT CIRCUIT AND INPUT/OUTPUT PINS

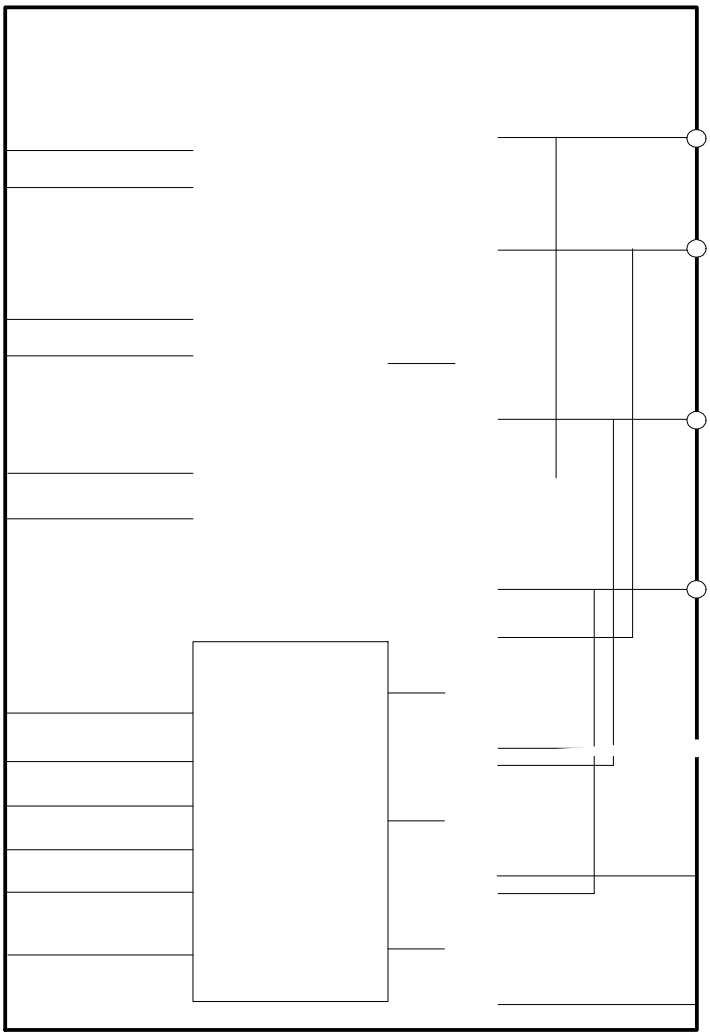


Figure 3. Internal Block Diagram

ABSOLUTE MAXIMUM RATINGS (T_J = 25°C unless otherwise specified)

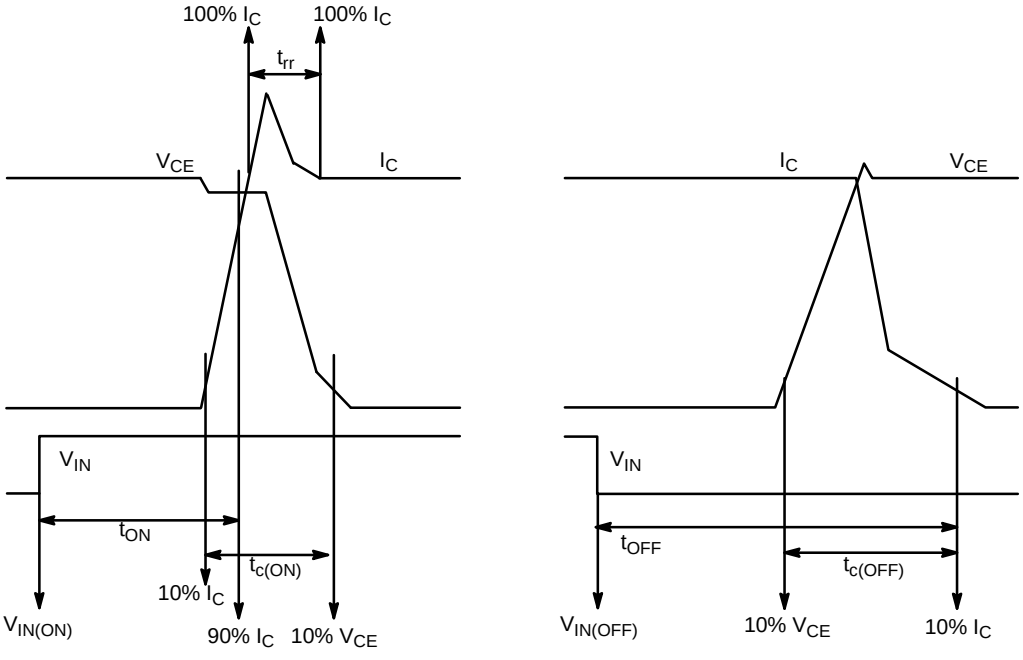
Symbol	Parameter	Conditions	Rating	Unit
INVERTER PART				
V_{PN}	Supply Voltage			

ELECTRICAL CHARACTERISTICS − INVERTER PART (T_J = 25°C unless otherwise specified)

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 = 30 A, T_J = 25°C	−	1.65	2.25	V
V_F		FWDi Forward Voltage	V_{IN} = 0 V	I_F = 30 A, T_J = 25°C	−	2.00	2.60	V
HS	t_{ON}	Switching Times	V_{PN} = 300 V, V_{DD} = V_{BS} = 15 V, I_C = 30 A, T_J = 25°C V_{IN} = 0 V ⇔ 5 V, Inductive Load (Note 4)		0.45	0.85	1.35	μs
	$t_{C(ON)}$				−	0.20	0.50	μs
	t_{OFF}				−	0.70	1.20	μs
	$t_{C(OFF)}$				−	0.15	0.45	μs
	t_{rr}				−	0.10	−	μs
LS	t_{ON}		V_{PN} = 300 V, V_{DD} = V_{BS} = 15 V, I_C = 30 A, T_J = 25°C V_{IN} = 0 V ⇔ 5 V, Inductive Load (Note 4)		0.5	0.90	1.40	μs
	$t_{C(ON)}$				−	0.30	0.60	μs
	t_{OFF}				−	0.80	1.30	μs
	$t_{C(OFF)}$				−	0.15	0.45	μs
	t_{rr}				−	0.15	−	μs
I_{CES}		Collector−Emitter Leakage Current	V_{CE} = V_{CES}		−	−	1	mA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. t_{ON} and t_{OFF} include the propagation delay of the internal drive IC. $t_{C(ON)}$ and $t_{C(OFF)}$ are the switching time of IGBT itself under the given gate driving condition internally. For the detailed information, please see Figure 4.



(a) turn − on **(b) turn − off**

Figure 4. Switching Time Definition

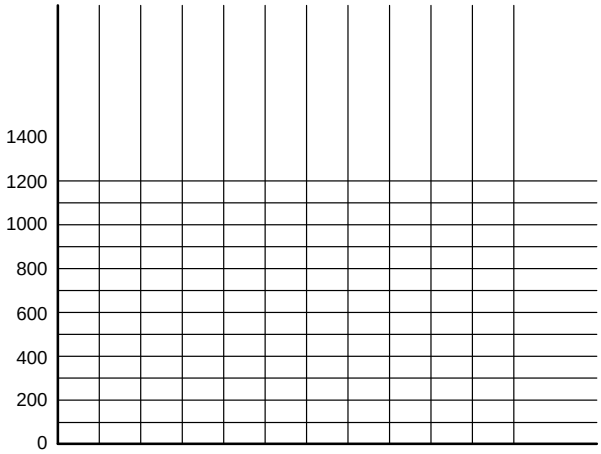


Figure 5. Switching Loss Characteristics (Typical)

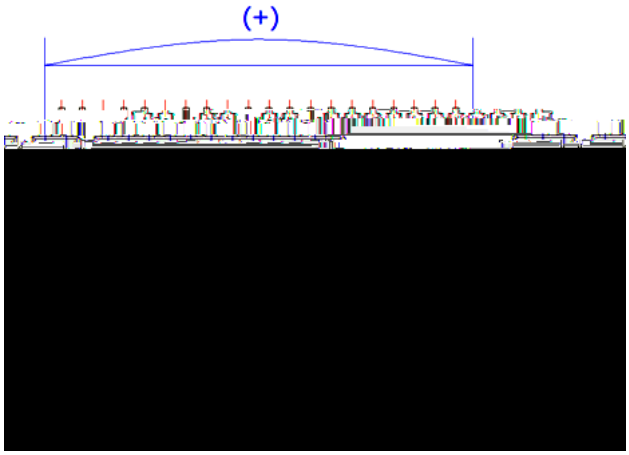
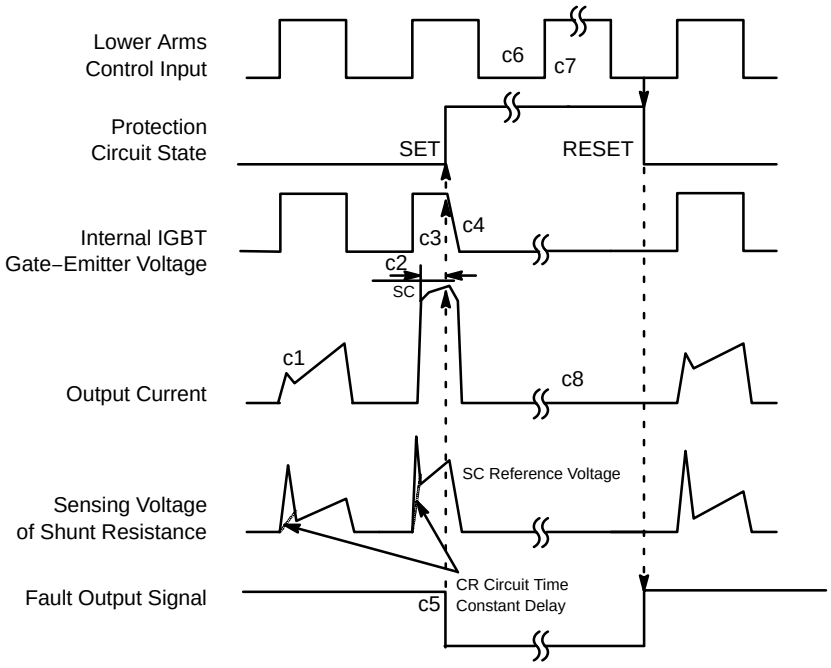


Figure 9. Flatness Measurement Position

Pre

Figure 10. Mounting Screws Torque Order



(with the external sense resistance and CR connection)

c1: Normal operation: IGBT ON and carrying current.

c2: Short−circuit current detection (SC trigger).

c3: Hard IGBT gate interrupt.

c4: IGBT turns OFF.

c5: Input “LOW”:IGBT OFF state.

c6: Input “HIGH”: IGBT ON state, but during the active period of fault output the IGBT doesn’t turn ON.

c7: IGBT OFF state.

c8: Normal operation: IGBT ON and carrying current.

Figure 14. Short−Circuit Protection (Low−Side Operation Only)

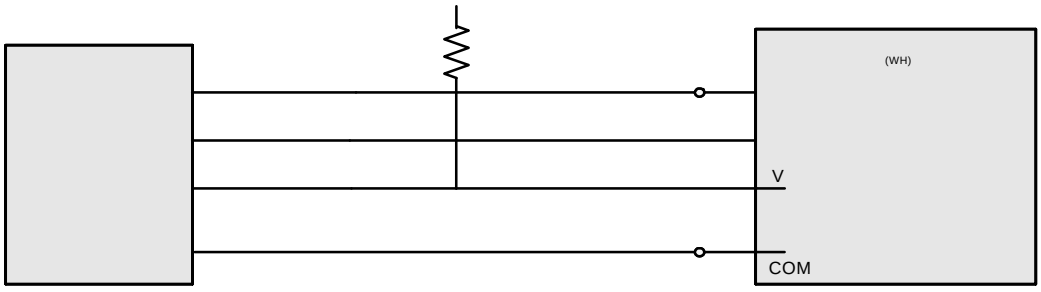


Figure 15. Recommended MCU I/O Interface Circuit

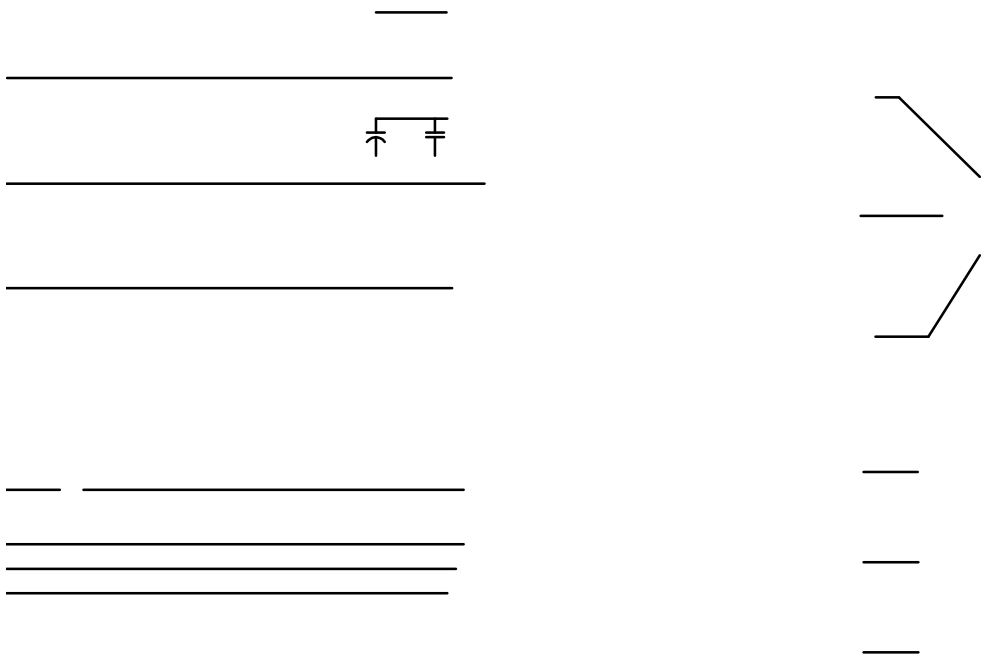


Figure 16. Typical Application Circuit