

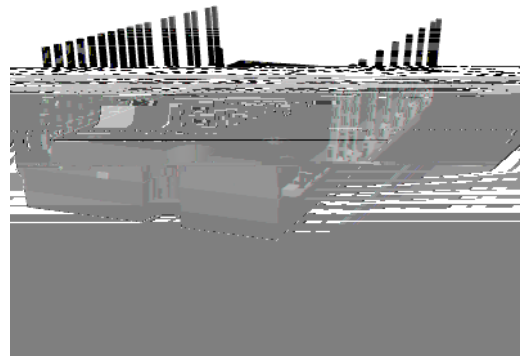
Motion SPM[®] 45 Series

FND42060F2

General Description

FND42060F2 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,

drive the module's robust short-circuit-rated



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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

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INTERNAL EQUIVALENT CIRCUIT AND INPUT/OUTPUT PINS

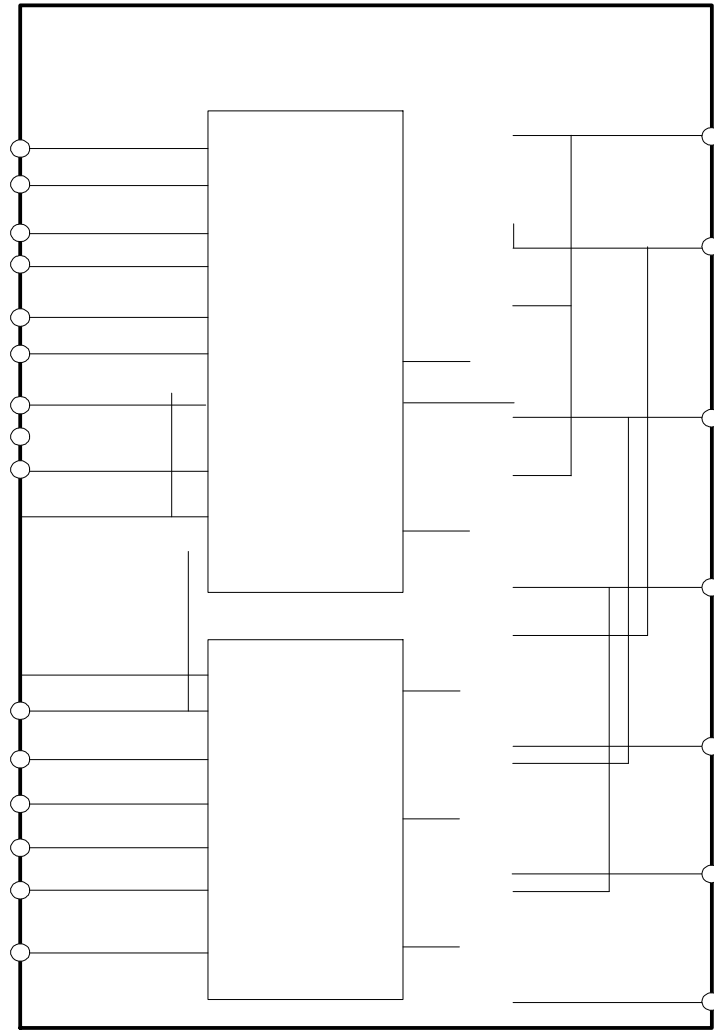


Figure 3. Internal Block Diagram

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

Symbol	Parameter	Conditions	Rating	Unit
INVERTER PART				
V _{PN}	Supply Voltage	Applied between P N _U , N _V , N _W	450	V
V _{PN(Surge)}	Supply Voltage (Surge)	Applied between P N _U , N _V , N _W	500	V
V _{CES}	Collector Emitter Voltage		600	V
±I _C	Each IGBT Collector Current	T _C = 25°C, T _J ≤ 150°C	20	A
±I _{CP}	Each IGBT Collector Current (Peak)	T _C = 25°C, T _J ≤ 150°C, Under 1 ms Pulse Width	40	A
P _C	Collector Dissipation	T _C = 25°C per Chip	50	W
T _J	Operating Junction Temperature	(Note 2)	40 ~ 150	°C

CONTROL PART

V _{CC}	Control Supply VTINGS
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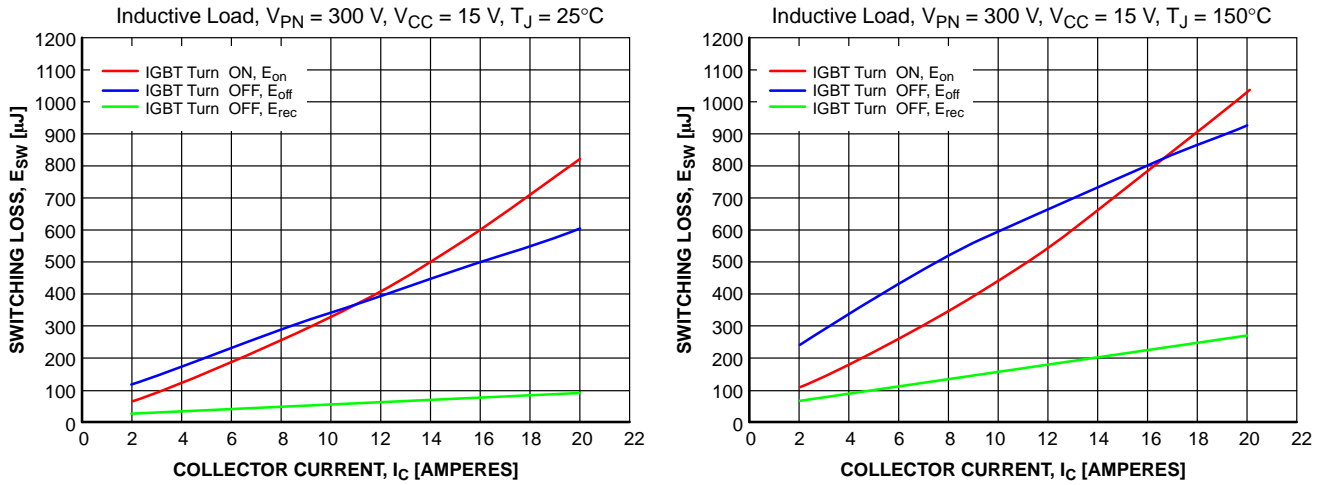


Figure 5. Switching Loss Characteristics (Typical)

CONTROL PART

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{QCH}	Quiescent V_{CC} Supply Current	$V_{CC(H)} = 15\text{ V}$, $I_{N(UH,VH,WH)} = 0\text{ V}$	$V_{DD(H)}$ COM		0.10	mA
I_{QCL}		$V_{CC(L)} = 15\text{ V}$, $I_{N(UL,VL,WL)} = 0\text{ V}$	$V_{CC(L)}$ COM		2.65	mA
I_{PCH}	Operating V_{CC} Supply Current	$V_{CC(L)} = 15\text{ V}$, $f_{PWM} = 20\text{ kHz}$, duty = 50%, Applied to one PWM Signal Input for High Side	$V_{CC(H)}$ COM		0.15	mA
I_{PCL}		$V_{CC(L)} = 15\text{ V}$, $f_{PWM} = 20\text{ kHz}$, duty = 50%, Applied to one PWM Signal Input for Low Side	$V_{CC(L)}$ COM		4.00	mA
I_{QBS}	Quiescent V_{BS} Supply Current	$V_{BS} = 15\text{ V}$, $I_{N(UH,VH,WH)} = 0\text{ V}$	$V_{B(U)}$ $V_{S(U)}$, $V_{B(V)}$ $V_{S(V)}$, $V_{B(W)}$ $V_{S(W)}$		0.30	mA
I_{PBS}	Operating V_{BS} Supply Current	$V_{DD} = V_{BS} = 15\text{ V}$, $f_{PWM} = 20\text{ kHz}$, duty = 50%, Applied to one PWM Signal Input for High Side	$V_{B(U)}$ $V_{S(U)}$, $V_{B(V)}$ $V_{S(V)}$, $V_{B(W)}$ $V_{S(W)}$		2.00	mA
V_{FOH}	Fault Output Voltage	$V_{SC} = 0\text{ V}$, V_{FO} Circuit: 10 k Ω to 5 V Pull up		4.5		V
V_{FOL}		$V_{SC} = 1\text{ V}$, V_{FO} Circuit: 10 k Ω to 5 V Pull up			0.5	V
$V_{SC(ref)}$	Short Circuit Trip Level	$V_{CC} = 15\text{ V}$ (Note 5)	0.45	0.50	0.55	V

UV

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{PN}	Supply Voltage	Applied between P N_U , N_V , N_W		300	400	V
V_{CC}	Control Supply Voltage	Applied between $V_{CC(H)}$ COM, $V_{CC(L)}$ COM	13.5	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_{CC}/dt , dV_{BS}/dt	Control Supply Variation		1		1	V/ μ s
t_{dead}	Blanking Time for Preventing Arm Short	For Each Input Signal	1.5			μ s
f_{PWM}	PWM Input Signal	$40^\circ\text{C} < T_J < 150^\circ\text{C}$			20	kHz
V_{SEN}	Voltage for Current Sensing	Applied between N_U , N_V , N_W COM (Including Surge Voltage)	4		4	V
$PW_{IN(ON)}$	Minimum Input Pulse Width	(Note 7)	0.7			μ s
$PW_{IN(OFF)}$			0.7			

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

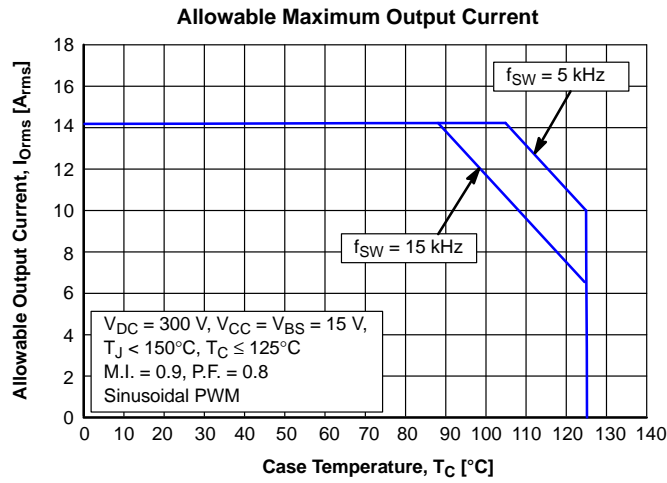


Figure 8. Allowable Maximum Output Current

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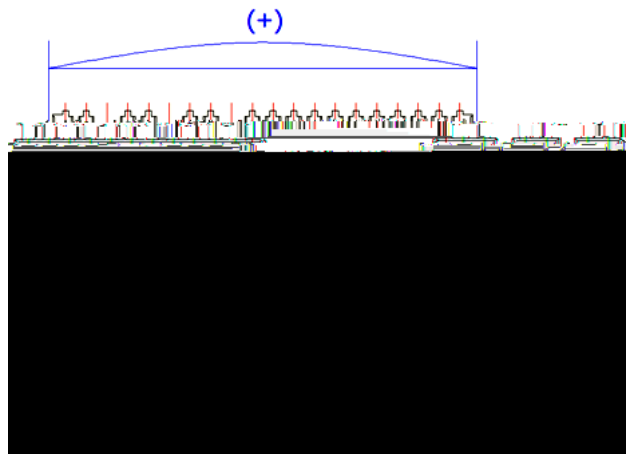
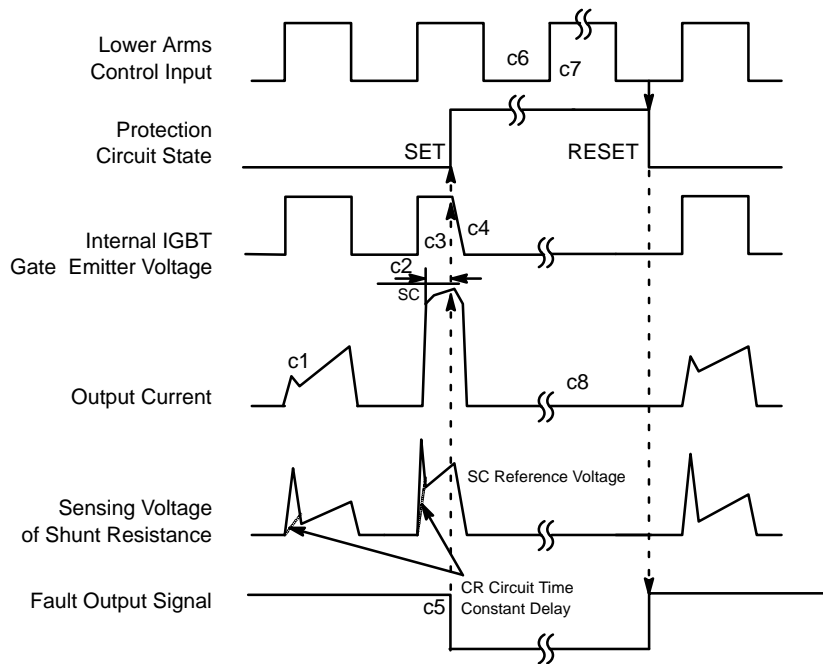


Figure 9. Flatness Measurement Position

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(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.

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

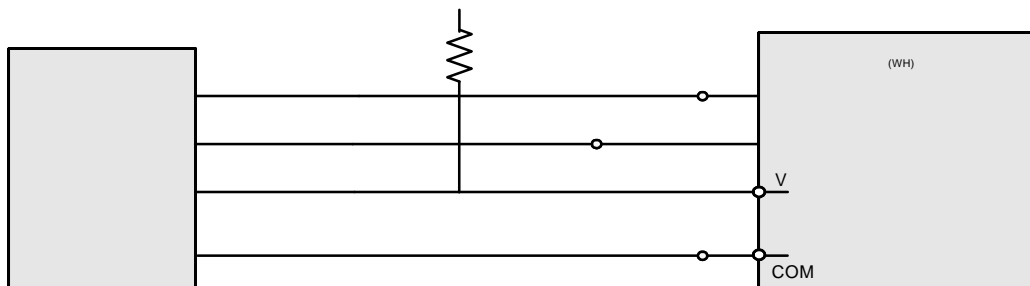


Figure 15. Recommended MCU I/O Interface Circuit

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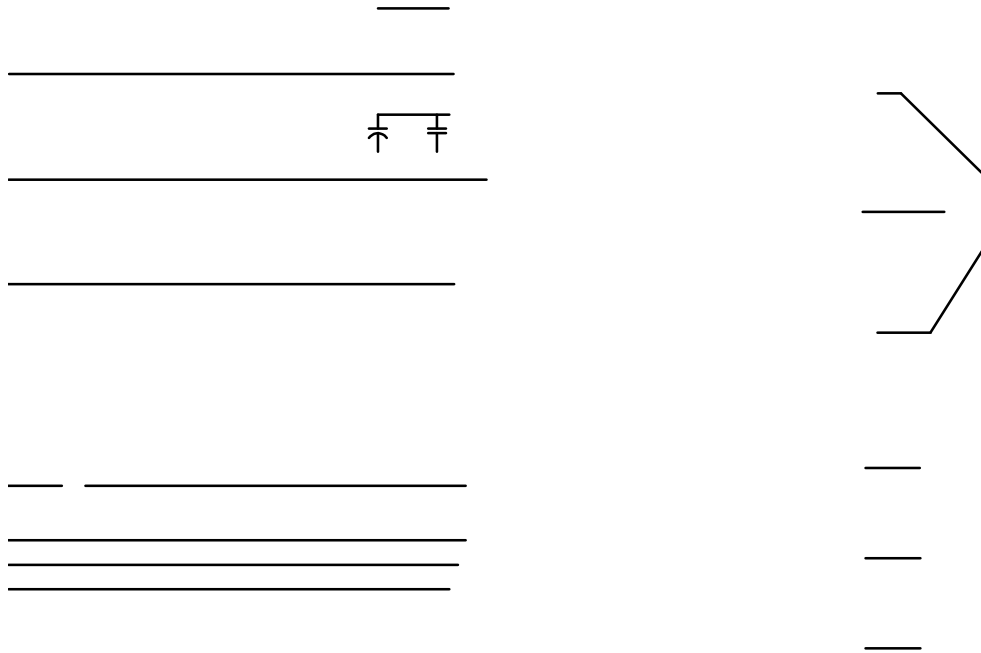


Figure 16. Typical Application Circuit

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