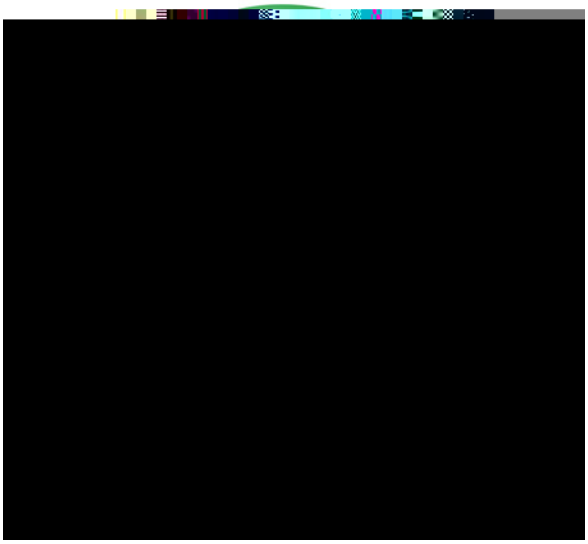
Is Now Part of



To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

April 2017

FNF51060TD1

Motion SPM® 55 Series

Features

- UL Certified No. E209204 (UL1557)
- 600 V - 10 A 3-Phase IGBT Inverter Including Control IC for Gate Drive and Protections
- Low-Loss, Short-Circuit Rated IGBTs
- Built-In Bootstrap Diodes in HVIC
- Separate Open-Emitter Pins from Low-Side IGBTs for Three-Phase Current Sensing
- Active-HIGH interface, works with 3.3 / 5 V Logic, Schmitt-trigger Input
- HVIC for Gate Driving, Under-Voltage and Short-Circuit Current Protection
- Fault Output for Under-Voltage and Short-Circuit Current Protection

Integrated Power Functions

- 600 V - 10 A IGBT inverter for three phase DC / AC power conversion (Please refer to Figure 3)

Integrated Drive, Protection and System Control Functions

- For inverter high-side IGBTs: gate drive circuit, high-voltage isolated high-speed level shifting
  control circuit Under-Voltage Lock-Out (UVLO) protection
- For inverter low-side IGBTs: gate drive circuit, Short-Circuit Protection (SCP)
  control supply circuit Under-Voltage Lock-Out (UVLO) protection
- Fault signaling: corresponding to UVLO (low-side supply) and SC faults
- Input interface: High-active interface, works with 3.3 / 5 V logic, Schmitt trigger input
- Built in Bootstrap circuitry in HVIC

Pin Configuration

Figure 2. Top View

Pin Descriptions

Pin Number	Pin Name	Pin Description
1	P	Positive DC-Link Input
2	U, V_S(U)	Output for U Phase
3	V, V_S(V)	Output for V Phase
4	W, V_S(W)	Output for W Phase
5	N_U	Negative DC-Link Input for U Phase
6	N_V	Negative DC-Link Input for V Phase
7	N_W	

Mechanical Characteristics and Ratings

Parameter	Conditions		Min.	Typ.	Max.	Unit
Device Flatness	See Figure 8		-50	-	100	m
Mounting Torque	Mounting Screw: - M3	Recommended 0.7 N • m	0.6	0.7	0.8	N • m
	Note Figure 9	Recommended 7.1 kg • cm	5.9	6.9	7.9	kg • cm
Weight			-	6.0	-	g

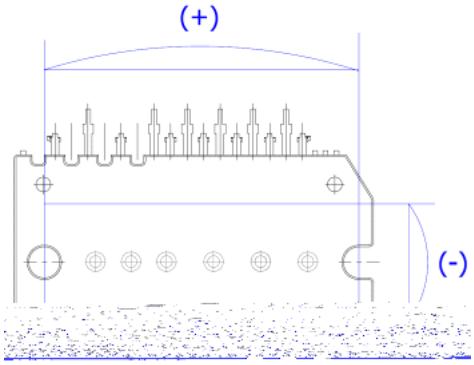


Figure 8. Flatness Measurement Position

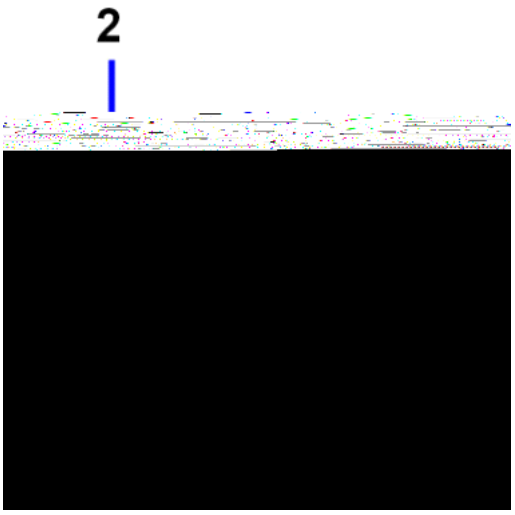


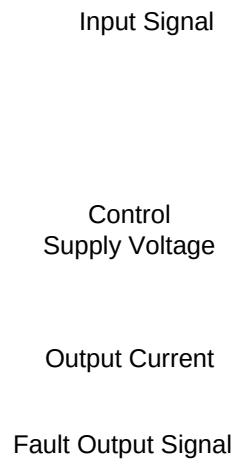
Figure 9. Mounting Screws Torque Order

Note:

12. Do not make over torque when mounting screws. Much mounting torque may cause package cracks, as well as bolts and Al heat-sink destruction.

13. Avoid one side tightening stress. Figure 10 shows the recommended torque order for mounting screws. Uneven mounting can cause the ceramic substrate of the Motion SPM 55 product to be damaged. The Pre-screwing torque is set to 20 ~ 30 % of maximum torque rating.

Time Charts of Protective Function



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

a2 : Normal operation: IGBT ON and carrying current.

a3 : Under voltage detection (UV_{DDD}).

a4 : IGBT OFF in spite of control input condition.

a5 : Fault output operation starts.

a6 : Under voltage reset (UV_{DDR}).

a7 : Normal operation: IGBT ON and carrying current.

Figure 10. Under-Voltage Protection (Low-Side)

b1 : Control supply voltage rises: After the voltage reaches UV_{BSR}, the circuits start to operate when next input is applied.

b2 : Normal operation: IGBT ON and carrying current.

b3 : Under voltage detection (UV_{BSD}).

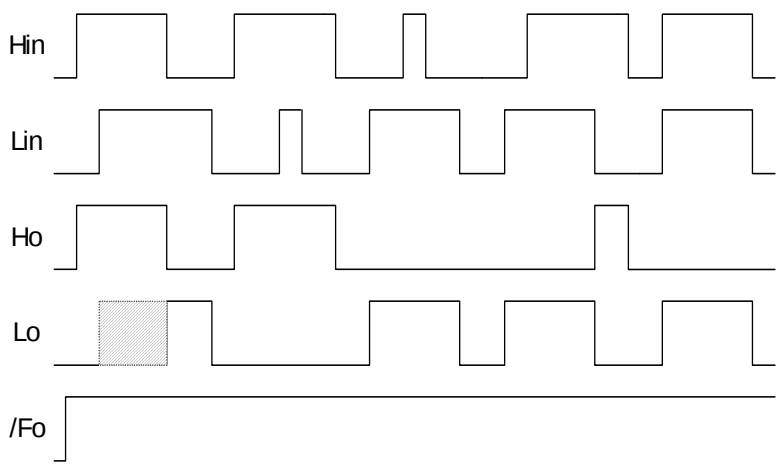
b4 : IGBT OFF in spite of control input condition, but there is no fault output signal.

b5 : Under voltage reset (UV_{BSR})

b6 : Normal operation: IGBT ON and carrying current

Figure 11. Under-Voltage Protection (High-Side)

(with the external shunt resistance and CR connection)



d1 : High Side First - Input - First - Output Mode

d2 : Low Side Noise Mode : No Lo

d3 : High Side Noise Mode : No Ho

d4 : Low Side First - Input - First - Output Mode

d5 : In - Phase Mode : No Ho

Figure 12. Inter-Lock Function

HIN : High-side Input Signal

LIN : Low-side Input Signal

HO : High-Side Output Signal

LO : Low-Side Output Signal

CSC : Short-circuit Current Detection Input

VF : Fault Out Function

Figure 13. Fault-Out Function By Over Current Protection

Note:

1) To avoid malfunction, the wiring of each input should be as short as possible. (less than 2 ~ 3 cm)

2) By virtue of integrating an application specific type of HVIC inside the SPM® 55 product, direct coupling to MCU terminals without any opto-coupler or transformer isolation is possible.

3) V_F is open-drain type. This signal line should be pulled up to the positive side of the MCU or control power supply with a resistor that makes I

Detailed Package Outline Drawings (FNF51060TD1, Short Lead)