

FUJITSU GENERAL ELECTRONICS LIMITED

FGI-6I020E065D1

IGBT MODULE

650V/20A IPM

■ Features

- DC input, 3-phase AC output IGBT IPM
- Built-in various protection functions (Over current protection, Over heating protection, Under voltage protection)
- Short-circuit warranty type IGBT (5μs/125°C)
- Reliability improvement by epoxy resin encapsulation



■ Dimensions

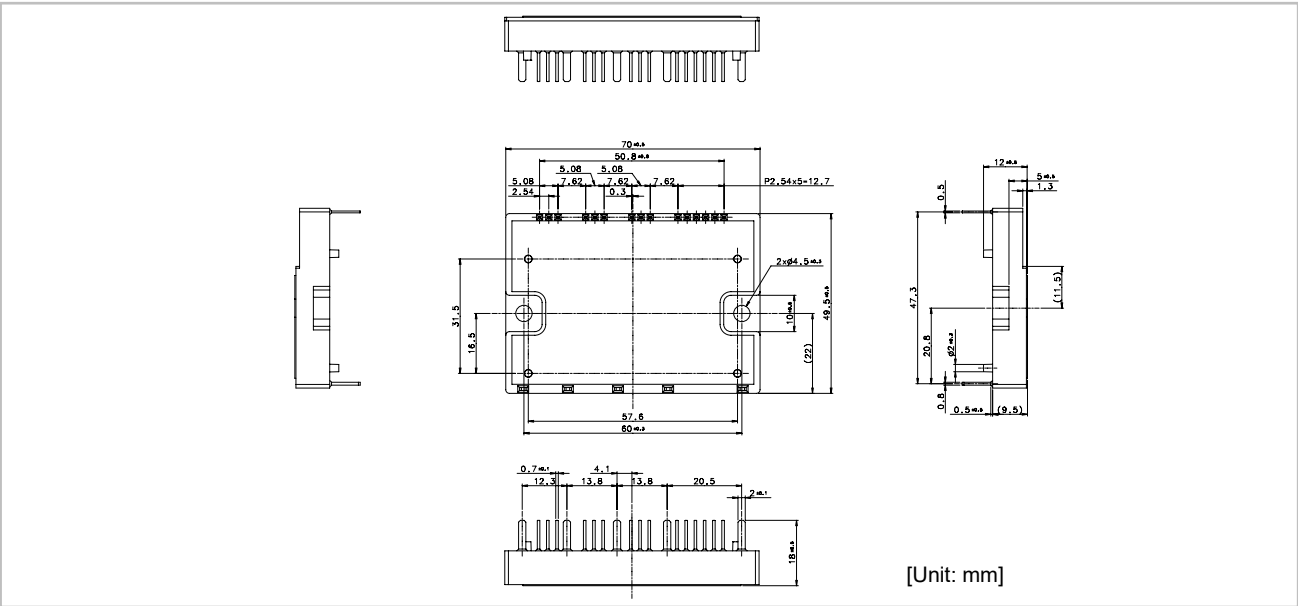


Fig.1. Dimensions

■ Pin Functions

Pin No.	Name	Function	Pin No.	Name	Function
1	GND U	Ground terminal (U)	9	Vcc W	Power supply (W)
2	Vin U	Driver input (U)	10	GND	Ground terminal (Under arm)
3	Vcc U	Power supply (U)	11	Vcc	Power supply for Under arm
4	GND V	Ground terminal (V)	12	Vin X	Driver input (X)
5	Vin V	Driver input (V)	13	Vin Y	Driver input (Y)
6	Vcc V	Power supply (V)	14	Vin Z	Driver input (Z)
7	GND W	Ground terminal (W)	15	ALM	Alarm output
8	Vin W	Driver input (W)			

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■ Block Diagram

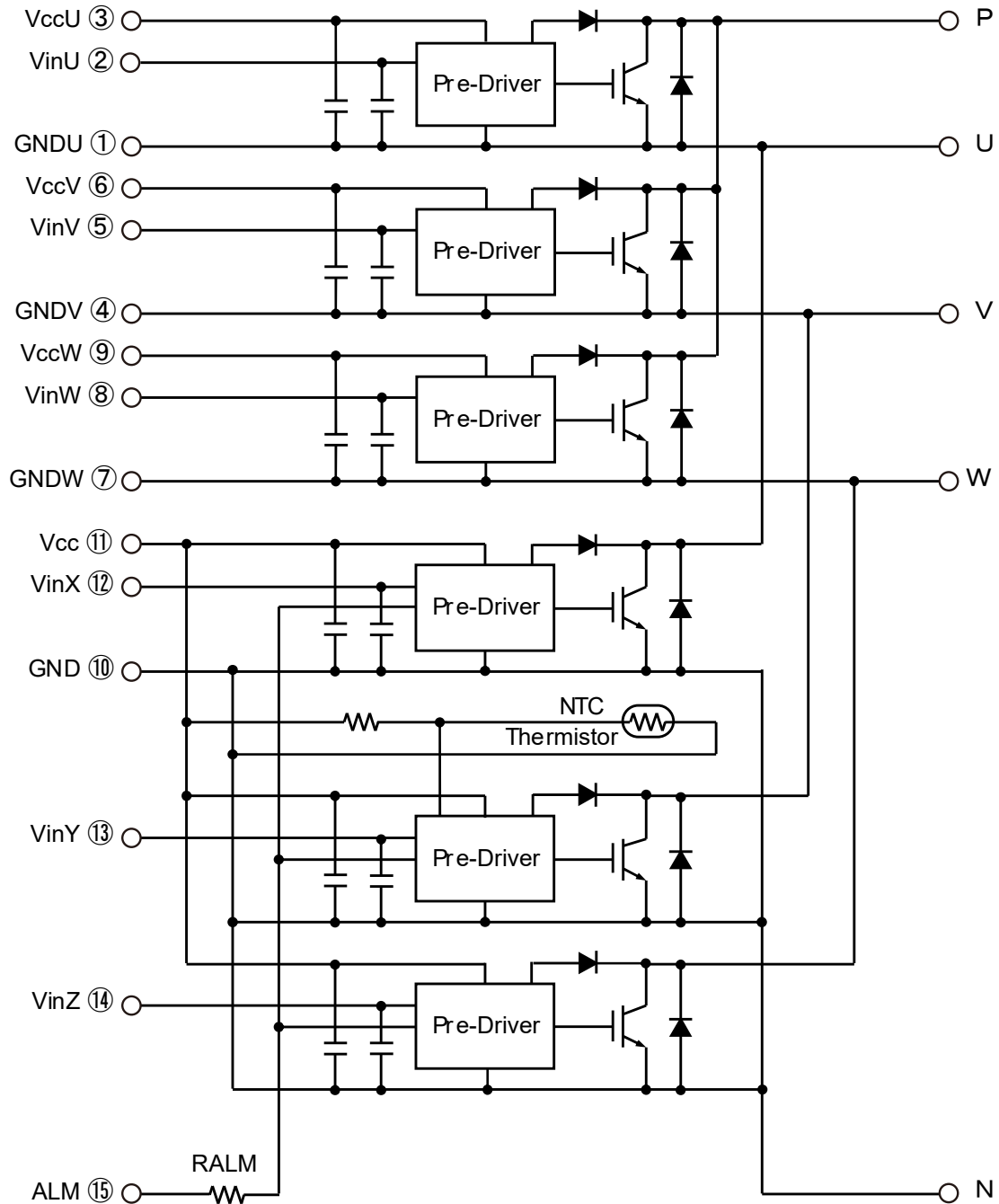


Fig.2. Block Diagram

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■ Absolute Maximum Ratings (Tc=25°C, Vcc=15V unless otherwise specified)

Items	Symbol	Min.	Max.	Units	
Collector-Emitter Voltage (*1)	V _{CEs}	0	650	V	
Short Circuit Voltage	V _{sc}	200	400	V	
Collector Current	DC	I _c	-	20	A
	1ms	I _{cp}	-	40	A
	Duty=100%(*2)	-I _c	-	20	A
Collector Power Dissipation	P _c	-	93	W	
Supply Voltage of Pre-Driver (*4)	V _{cc}	-0.3	20	V	
Input Signal Voltage (*5)	V _{in}	-0.3	V _{cc} +0.5	V	
Alarm Signal Voltage (*6)	V _{ALM}	-0.3	V _{cc}	V	
Alarm Signal Current (*7)	I _{ALM}	-	20	mA	
Junction Temperature	T _j	-	150	°C	
Operating Case Temperature	T _{opr}	-20	110	°C	
Storage Temperature	T _{stg}	-40	125	°C	
Solder Temperature (*8)	T _{sol}	-	260	°C	
Isolating Voltage (*9)	Viso	-	AC2500	Vrms	
Screw Torque	Mounting (M4)	-	-	1.7	N · m

Note*1: V_{CEs} shall be applied to the input voltage between terminal P-(U,V,W) and (U,V, W)-N.

Note*2: Duty=125°C/Rth(j-c)D / (If×Vf Max.)×100

Note*3: P_c=125°C/Rth(j-c)Q

Note*4: V_{cc} shall be applied to the input voltage between terminal No.3 and 1, 6 and 4, 9 and 7, 11 and 10.

Note*5: V_{in} shall be applied to the input voltage between terminal No.2 and 1, 5 and 4, 8 and 7, 12 - 14 and 10.

Note*6: V_{ALM} shall be applied to the voltage between terminal No.15 and 10.

Note*7: I_{ALM} shall be applied to the input current to terminal No.15.

Note*8: Immersion time 10 ± 1sec.1time.

Note*9: Terminal to base, 50/60Hz sine wave 1min. All terminals should be connected together during the test.

■ Electrical Characteristics (Tj=25°C Vcc=15V unless otherwise specified)

Items	Symbol	Conditions	Min.	Typ.	Max.	Units	
Collector Current at off signal	I _{CEs}	V _{CE} =650V	-	-	1.0	mA	
Collector-Emitter saturation	V _{CE(sat)}	I _c =20A	Terminal	-	-	2.25	V
			Chip	-	1.65	-	V
Forward voltage of FWD	V _F	I _F =20A	Terminal	-	-	2.05	V
			Chip	-	1.45	-	V
Switching time	t _{on}	V _{DC} =300V, T _j =125°C, I _c =20A	-	-	-	1.1	μs
	t _{off}		-	-	-	2.1	μs
	t _{tr}		V _{DC} =300V, I _F =20A	-	-	-	0.4
Supply current of P-side pre-driver (per one unit)	I _{ccp}	Switching Frequency=0-15kHz	-	-	-	13	mA
Supply current of N-side pre-driver	I _{ccn}	T _c =-20~110°C	-	-	-	38	mA
Input signal threshold voltage	V _{inth(on)}	V _{in} -GND	ON	1.2	1.5	1.6	V
	V _{inth(off)}		OFF	1.5	1.65	1.9	V
Over Current Protection Level	I _{OC}	T _j =125°C	30	-	-	A	
Over Current Protection Delay time	t _{OC}	T _j =125°C	-	1.5	-	μs	
Short Circuit Protection Delay time	t _{SC}	T _j =125°C	-	4	5	μs	
Over Heating Protection Temperature Level	T _{OH}	Module center	140	-	-	°C	
Over Heating Protection Hysteresis	T _H		-	20	-	°C	
Under Voltage Protection Level	V _{UV}		11.0	-	12.5	V	
Under Voltage Protection Hysteresis	V _H		0.2	0.5	-	V	
Alarm Signal Hold Time	t _{ALM(OC)}	ALM-GND T _c =-20~110°C	V _{cc} ≥10V	1.0	1.3	(1.6)	ms
	t _{ALM(UV)}			2.5	2.9	(3.2)	ms
	t _{ALM(ToH)}			5.0	5.6	(6.2)	ms
Resistance for current limit	R _{ALM}		1170	1300	1430	Ω	

Figures in () are reference values.

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■ Thermal Characteristics (Tc= 25°C)

Items		Symbol	Min.	Typ.	Max.	Units	
Junction to Case Thermal Resistance (*)	Inverter	IGBT	R _{th(j-c)Q}	-	-	1.35	°C/W
		FWD	R _{th(j-c)D}	-	-	1.74	°C/W
Case to Fin Thermal Resistance with Compound			R _{th(c-f)}	-	0.17	-	°C/W

Note *: For 1 device, the measurement point of the case is just under the chip.

■ Recommended Operating Conditions

Items	Symbol	Min.	Typ.	Max.	Units
DC Bus Voltage	V _{DC}	-	-	400	V
Power Supply Voltage of Pre-Driver	V _{CC}	13.5	15.0	16.5	V
Switching frequency of IPM	f _{sw}	-	-	20	kHz
Arm shoot through blocking time for IPM's Input signal	t _{dead}	1.0	-	-	μs
Screw Torque (M4)	-	1.3	-	1.7	N · m

■ Weight

Items	Symbol	Min.	Typ.	Max.	Units
Weight	Wt	-	80	-	g

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