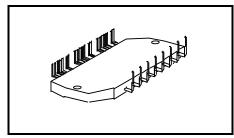
# MIG10J503

MIG10J503 is an intelligent power module for three-phase inverter system. The 4th generation low saturation voltage trench gate IGBT and FRD are connected to a three-phase full bridge type, and IC by the original high-voltage SOI(silicon-on-insulator) process drives these directly in response to a PWM signal. Moreover, since high-voltage level-shifter is built in high-voltage IC, while being able to perform a direct drive without the interface with which the upper arm IGBT is insulated, the drive power supply of an upper arm can be driven with a bootstrap system, and the simplification of a system is possible. Furthermore, each lower arm emitter terminal has been



Weight:TBD g (Typ.)

independent so that detection can perform current detection at the time of vector control by current detection resistance of a lower arm. The protection function builds in Under Voltage Protection, Short Circuit Protection, and Over Temperature Protection. Original high thermal conduction resin is adopted as a package, and low heat resistance is realized.

#### **Feature**

- The 4th generation trench gate thin wafer NPT IGBT is adopted.
- FRD is built in.
- The level shift circuit by high-voltage IC is built in.
- The simplification of a high side driver power supply is possible by the bootstrap system.
- Short Circuit Protection, Over Temperature Protection , and the Power Supply Under Voltage Protection function are built in.
- Short Circuit Protection and Over Temperature Protection state are outputted.
- The lower arm emitter terminal has been independent by each phase for the purpose of the current detection at the time of vector control.
- Low thermal resistance by adoption of original high thermal conduction resin.

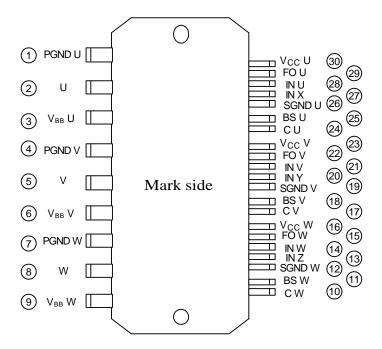
Since this product is MOS structure, it should be careful of static electricity in the case of handling.

This tentative specification is a development examination stage, and may change the contents without a preliminary announcement.

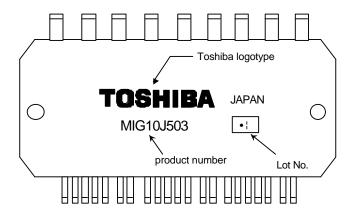
The information contained herein is subject to change without notice.

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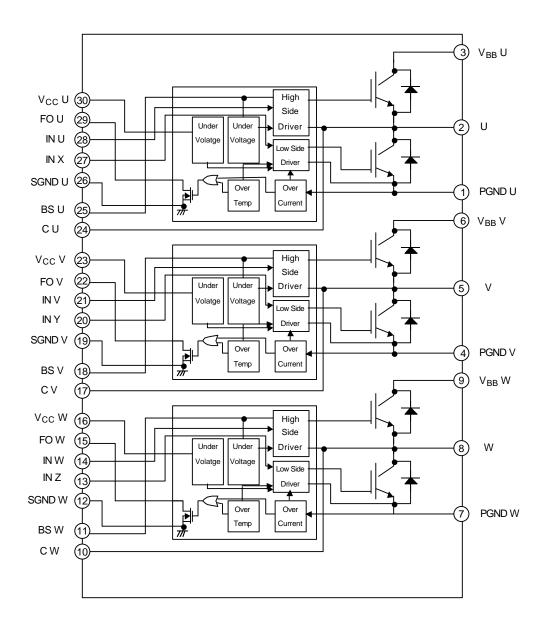
#### **Pin Assignment**



### Marking



#### **BLOCK DIAGRAM**



### **Pin Description**

resistor between this pin and SGND V pin)  V-Phase output pin  V-Phase output pin  V-Phase output pin  PGND W Phase Power Ground pin• i Connect a current detecting resistor between this pin and SGND W pin)  W-Phase output pin  V-BB W W-Phase output pin  V-BB W W-Phase bootstrap capacitor connecting pin(-)  SGND W W-Phase bootstrap capacitor connecting pin(-)  SGND W W-Phase Signal Ground pin  IN Z W-Phase low-side input pin(Negative logic)  W-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  SGND V W-Phase Signal Ground pin  V-C W W-Phase bootstrap capacitor connecting pin(-)  V-C W W-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  V-Phase bootstrap capacitor connecting pin(-)  SGND V V-Phase bootstrap capacitor connecting pin(-)  SGND V V-Phase Signal Ground pin  V-Phase Diagnosis output pin (Negative logic)  IN Y V-Phase low-side input pin (Negative logic)  V-Phase Diagnosis output pin (Negative logic)  V-Phase Dootstrap capacitor connecting pin (-)  SGND U U-Phase bootstrap capacitor connecting pin (-)  V-Phase Diagnosis output pin (Negative logic)	Pin No.	Symbol	Pin Description	
3 VBB U U-Phase high-voltage power supply pin 4 PGND V V-Phase Power Ground pin* i Connect a current detecting resistor between this pin and SGND V pin) 5 V V-Phase output pin 6 VBB V V-Phase high-voltage power supply pin 7 PGND W W-Phase Power Ground pin* i Connect a current detecting resistor between this pin and SGND W pin) 8 W W-Phase output pin 9 VBB W W-Phase bigh-voltage power supply pin 10 C W W-Phase bigh-voltage power supply pin 11 BS W W-Phase bootstrap capacitor connecting pin(-) 12 SGND W W-Phase Signal Ground pin 13 IN Z W-Phase Signal Ground pin 14 IN W W-Phase bigh-side input pin(Negative logic) 15 FO W W-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pir of other Phase.) 16 Vcc W W-Phase control power supply (+15V typ.) 17 C V V-Phase bootstrap capacitor connecting pin(-) 18 BS V V-Phase bootstrap capacitor connecting pin(-) 19 SGND V V-Phase Signal Ground pin 20 IN Y V-Phase Iow-side input pin (Negative logic) 21 IN V V-Phase Iow-side input pin (Negative logic) 22 FO V V-Phase low-side input pin (Negative logic) 23 Vcc V V-Phase Diagnosis output pin (Negative logic) 24 C U U-Phase Diagnosis output pin (Negative logic) 25 BS U U-Phase Diagnosis output pin (Negative logic) 26 SGND U U-Phase Signal Ground pin 27 IN X U-Phase low-side input pin (Negative logic) 28 IN U U-Phase Signal Ground pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic)	1	PGND U		
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11 BS W W-Phase bootstrap capacitor connecting pin(+)  12 SGND W W-Phase Signal Ground pin  13 IN Z W-Phase low -side input pin(Negative logic)  14 IN W W-Phase Diagnosis output pin(Negative logic)  15 FO W W-Phase Diagnosis output pin(Negative logic)  16 Vcc W W-Phase Control power supply (+15V typ.)  17 C V V-Phase bootstrap capacitor connecting pin(-)  18 BS V V-Phase bootstrap capacitor connecting pin(+)  19 SGND V V-Phase Signal Ground pin  20 IN Y V-Phase Iow -side input pin (Negative logic)  21 IN V V-Phase Diagnosis output pin (Negative logic)  22 FO V V-Phase Diagnosis output pin (Negative logic)  23 Vcc V V-Phase control power supply (+15V typ.)  24 C U U-Phase control power supply (+15V typ.)  25 BS U U-Phase bootstrap capacitor connecting pin (-)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase Diagnosis output pin (Negative logic)  28 IN U U-Phase Diagnosis output pin (Negative logic)  29 FO U U-Phase Diagnosis output pin (Negative logic)	9	V <sub>BB</sub> W	W-Phase high-voltage power supply pin	
12 SGND W W-Phase Signal Ground pin 13 IN Z W-Phase low-side input pin(Negative logic) 14 IN W W-Phase high-side input pin(Negative logic) 15 FO W W-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.) 16 V <sub>CC</sub> W W-Phase control power supply (+15V typ.) 17 C V V-Phase bootstrap capacitor connecting pin(-) 18 BS V V-Phase bootstrap capacitor connecting pin(+) 19 SGND V V-Phase Signal Ground pin 20 IN Y V-Phase low-side input pin (Negative logic) 21 IN V V-Phase high-side input pin (Negative logic) 22 FO V V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.) 23 V <sub>CC</sub> V V-Phase control power supply (+15V typ.) 24 C U U-Phase bootstrap capacitor connecting pin (-) 25 BS U U-Phase bootstrap capacitor connecting pin (-) 26 SGND U U-Phase Signal Ground pin 27 IN X U-Phase low-side input pin (Negative logic) 28 IN U U-Phase piagnosis output pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (Negative logic)	10	CW	W-Phase bootstrap capacitor connecting pin(-)	
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14 IN W W-Phase high-side input pin(Negative logic)  15 FO W W-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)  16 V <sub>CC</sub> W W-Phase control power supply (+15V typ.)  17 C V V-Phase bootstrap capacitor connecting pin(-)  18 BS V V-Phase bootstrap capacitor connecting pin(+)  19 SGND V V-Phase Signal Ground pin  20 IN Y V-Phase low-side input pin (Negative logic)  21 IN V V-Phase Diagnosis output pin (Negative logic)  22 FO V V-Phase Diagnosis output pin (open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)  23 V <sub>CC</sub> V V-Phase control power supply (+15V typ.)  24 C U U-Phase bootstrap capacitor connecting pin (-)  25 BS U U-Phase bootstrap capacitor connecting pin (-)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase Diagnosis output pin (Negative logic)  29 FO U U-Phase Diagnosis output pin (Negative logic)  U-Phase Diagnosis output pin (Negative logic)  U-Phase Diagnosis output pin (Negative logic)  U-Phase Diagnosis output pin (Open drain output. Wired oconnection can be performed with the Diagnosis output pin of other Phase.)	12	SGND W	W-Phase Signal Ground pin	
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connection can be performed with the Diagnosis output pir of other Phase.)  16	14	IN W	W-Phase high-side input pin(Negative logic)	
17 C V V-Phase bootstrap capacitor connecting pin(-)  18 BS V V-Phase bootstrap capacitor connecting pin(+)  19 SGND V V-Phase Signal Ground pin  20 IN Y V-Phase low-side input pin (Negative logic)  21 IN V V-Phase high-side input pin (Negative logic)  22 FO V V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  23 Vcc V V-Phase control power supply (+15V typ.)  24 C U U-Phase bootstrap capacitor connecting pin (-)  25 BS U U-Phase bootstrap capacitor connecting pin (+)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	15	FO W	W-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	
BS V V-Phase bootstrap capacitor connecting pin(+)  19 SGND V V-Phase Signal Ground pin  20 IN Y V-Phase low-side input pin (Negative logic)  21 IN V V-Phase high-side input pin (Negative logic)  22 FO V V-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)  23 Vcc V V-Phase control power supply (+15V typ.)  24 C U U-Phase bootstrap capacitor connecting pin (-)  25 BS U U-Phase bootstrap capacitor connecting pin (+)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)	16	V <sub>CC</sub> W	W-Phase control power supply (+15V typ.)	
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20 IN Y V-Phase low-side input pin (Negative logic)  21 IN V V-Phase high-side input pin (Negative logic)  22 FO V V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  23 Vcc V V-Phase control power supply (+15V typ.)  24 C U U-Phase bootstrap capacitor connecting pin (-)  25 BS U U-Phase bootstrap capacitor connecting pin (+)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	18	BS V	V-Phase bootstrap capacitor connecting pin(+)	
21 IN V V-Phase high-side input pin (Negative logic)  22 FO V V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  23 Vcc V V-Phase control power supply (+15V typ.)  24 C U U-Phase bootstrap capacitor connecting pin (-)  25 BS U U-Phase bootstrap capacitor connecting pin (+)  26 SGND U U-Phase Signal Ground pin  27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	19	SGND V	V-Phase Signal Ground pin	
FO V V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)  Vcc V V-Phase control power supply (+15V typ.)  C U U-Phase bootstrap capacitor connecting pin (-)  BS U U-Phase bootstrap capacitor connecting pin (+)  SGND U U-Phase Signal Ground pin  IN X U-Phase low-side input pin (Negative logic)  IN U U-Phase high-side input pin (Negative logic)  FO U U-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	20	INY	V-Phase low-side input pin (Negative logic)	
connection can be performed with the Diagnosis output pir of other Phase.)  23	21	IN V	V-Phase high-side input pin (Negative logic)	
24 C U U-Phase bootstrap capacitor connecting pin (-) 25 BS U U-Phase bootstrap capacitor connecting pin (+) 26 SGND U U-Phase Signal Ground pin 27 IN X U-Phase low-side input pin (Negative logic) 28 IN U U-Phase high-side input pin (Negative logic) 29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)	22	FO V	V-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	
25 BS U U-Phase bootstrap capacitor connecting pin (+) 26 SGND U U-Phase Signal Ground pin 27 IN X U-Phase low-side input pin (Negative logic) 28 IN U U-Phase high-side input pin (Negative logic) 29 FO U U-Phase Diagnosis output pin (open drain output. Wired o connection can be performed with the Diagnosis output pir of other Phase.)	23	V <sub>CC</sub> V	V-Phase control power supply (+15V typ.)	
26 SGND U U-Phase Signal Ground pin 27 IN X U-Phase low-side input pin (Negative logic) 28 IN U U-Phase high-side input pin (Negative logic) 29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)	24	CU	U-Phase bootstrap capacitor connecting pin (-)	
27 IN X U-Phase low-side input pin (Negative logic)  28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pir of other Phase.)	25	BS U	U-Phase bootstrap capacitor connecting pin (+)	
28 IN U U-Phase high-side input pin (Negative logic)  29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)	26	SGND U	U-Phase Signal Ground pin	
29 FO U U-Phase Diagnosis output pin(open drain output. Wired o connection can be performed with the Diagnosis output pin of other Phase.)	27	IN X	U-Phase low-side input pin (Negative logic)	
connection can be performed with the Diagnosis output pir of other Phase.)	28	IN U	U-Phase high-side input pin (Negative logic)	
30 Vcc II II-Phase control nower supply (±15\/ tvn.)	29	FO U	U-Phase Diagnosis output pin(open drain output. Wired or connection can be performed with the Diagnosis output pin of other Phase.)	
v cc o o-i mass control power supply (+15 v typ.)	30	V <sub>cc</sub> U	U-Phase control power supply (+15V typ.)	

#### **Truth Tble**

Protection Circuit Detection State			Input		,h,f,a,s State		Fault Output	
High Side Under Voltage	Low Side Under Voltage	Short Circuit	Over Temperature	IN(X)High Side Arm	IN(X)Low Side Arm	High Side Arm	Low Side Arm	FO(X)
Un-Detecting	Un-Detecting	Un-Detecting	Un-Detecting	Н	Н	OFF	OFF	OFF
Un-Detecting	Un-Detecting	Un-Detecting	Un-Detecting	Н	L	OFF	ON	OFF
Un-Detecting	Un-Detecting	Un-Detecting	Un-Detecting	L	Н	ON	OFF	OFF
Un-Detecting	Un-Detecting	Un-Detecting	Un-Detecting	_	L	OFF	OFF	OFF
Detecting	Un-Detecting	Un-Detecting	Un-Detecting	Н	Н	OFF	OFF	OFF
Detecting	Un-Detecting	Un-Detecting	Un-Detecting	Н	L	OFF	ON	OFF
Detecting	Un-Detecting	Un-Detecting	Un-Detecting	L	Н	OFF	OFF	OFF
Detecting	Un-Detecting	Un-Detecting	Un-Detecting	_	L	OFF	OFF	OFF
Un-Detecting	Detecting	Un-Detecting	Un-Detecting	Н	Н	OFF	OFF	OFF
Un-Detecting	Detecting	Un-Detecting	Un-Detecting	Н	L	OFF	OFF	OFF
Un-Detecting	Detecting	Un-Detecting	Un-Detecting	L	Н	OFF	OFF	OFF
Un-Detecting	Detecting	Un-Detecting	Un-Detecting	L	L	OFF	OFF	OFF
Detecting	Detecting	Un-Detecting	Un-Detecting	Н	Н	OFF	OFF	OFF
Detecting	Detecting	Un-Detecting	Un-Detecting	Н	L	OFF	OFF	OFF
Detecting	Detecting	Un-Detecting	Un-Detecting	L	Н	OFF	OFF	OFF
Detecting	Detecting	Un-Detecting	Un-Detecting	L	L	OFF	OFF	OFF
Un-Detecting	Un-Detecting	Detecting	Un-Detecting	Н	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Un-Detecting	Н	L	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Un-Detecting	L	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Un-Detecting	L	L	OFF	OFF	ON
Un-Detecting	Un-Detecting	Un-Detecting	Detecting	Н	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Un-Detecting	Detecting	Н	L	OFF	OFF	ON
Un-Detecting	Un-Detecting	Un-Detecting	Detecting	L	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Un-Detecting	Detecting	L	L	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Detecting	Н	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Detecting	Н	L	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Detecting	L	Н	OFF	OFF	ON
Un-Detecting	Un-Detecting	Detecting	Detecting	L	L	OFF	OFF	ON

- EThe above has indicated a part for single arm.
- EThere is no relevance of operation between arms.
- BWhen the input of a high side arm and a low side arm is simultaneously set to "L", IGBT of a high side arm and a low side arm turns off.
- IFO (X) terminal is turned on in the meantime at the same time, as for the output of Phase which detected the load short circuit state, it will maintain the OFF between 10ms, if a Short Current Protection detects a Short Current state. Although an incoming signal is reset by an upper arm and a lower arm being simultaneously set to "H" in the back in this state, OFF of an output and FO (X) are maintained between 10ms. Although FO (X) is turned off when FO (X) terminal for 10ms will not be in the simultaneous "H" state of an upper arm and a lower arm in during ON time, an output maintains OFF. This release is made by an upper arm and a lower arm being simultaneously set to "H." (Short Current Protection is a non-repetition. When FO (X) turns on, please turn off the input of all Phase.)
- Hf an Over Temperature Protection circuit detects an Over Temperature state, while the output of Phase which detected the Over Temperature Protection state is turned off, FO (X) terminal turns it on. This state will return operation, if temperature falls to Over Temperature Protection detection return temperature (Over Temperature Protection temperature Protection hysteresis).

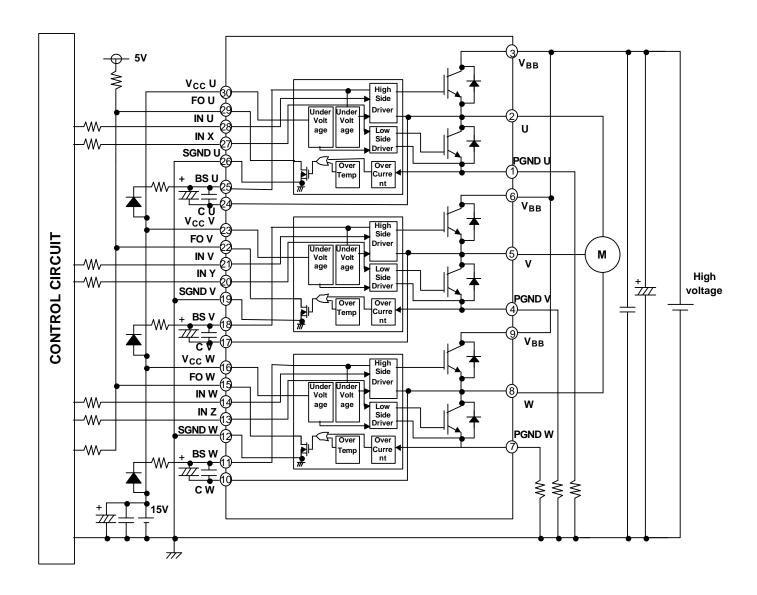
## Absolute Maximum Rating (Tj = 25°C)

Item	Symbol	Rating	Unit
	V <sub>BB</sub>	450	V
Power Supply Voltage	V <sub>BB</sub> (surge)	500	V
Fower Supply Voltage	V <sub>CC</sub>	20	V
	V <sub>BS</sub>	20	V
Collector-Emitter Voltage	VCES	600	,u
Each Collector Current (DC)	lc	•}10	А
Each Collector Current (PEAK)	lсР	•}20	,`
Input Voltage	V <sub>IN</sub>	20	V
Fault Output Supply Voltage	V <sub>FO</sub>	20	V
Fault Output Current	lFO	15	mA
PGND-SGND Voltage Difference	V <sub>PGND-SGND</sub>	•}5	,u
Output Voltage Rate of Change	dv/dt	20	k,u /fÊs
Collector Power Dissipation (Per 1 IGBT Chip)	Pc	43	W
Collector Power Dissipation (Per 1 FRD Chip)	Pc	25	W
Operating Temperature	T <sub>OPE</sub>	-20~100	℃
Junction Temperature	Tj	150	°C
Storage Temperature	T <sub>stg</sub>	-40~125	℃
Isolation Voltage• i 60Hz sinusoidal ,AO• j	V <sub>ISO</sub>	2500 (1min)	Vrms

# Electrical Characteristics (Tj = 25°C)

ltem	Symbol	Condition		Тур.	Max.	Unit	
	$V_{BB}$	_ 50		300	400		
Operating Power Supply Voltage	Vcc	_	13.5	15	17	V	
	V <sub>BS</sub>	_	13.5	15	17		
	lвв	$V_{BB} = 400 \text{ V } \text{mV}_{IN} = 5 \text{ V} \cdot \text{i,P arm} \cdot \text{j}$		_	1	mA	
	lcc	V <sub>CC</sub> = 15 V¤V <sub>IN</sub> = 5 V•i,P arm• j	_	0.8	,P.5	mA	
Current dissipation		V <sub>CC</sub> = 15 V¤V <sub>IN</sub> = 0 V•i,P arm• j	_	1.1	,P.5	mA	
	I <sub>BS</sub>	V <sub>CC</sub> = 15 V¤V <sub>IN</sub> = 5 V•i,P arm• j	_	330	600	fÊA	
		V <sub>CC</sub> = 15 V¤V <sub>IN</sub> = 0 V•i,P arm• j		470	1000	⊒A	
input Voltage	V <sub>IH</sub>	V <sub>IN</sub> = "H"	3.5	2.8	_	V	
input Voltage	VIL	V <sub>IN</sub> = "L"		2.3	1.5		
input Voltago hystorosis	$V_{INhys}$	V <sub>IN</sub> = "H"• " "L"	_	0.5	_	,u	
input Voltage hysteresis		V <sub>IN</sub> = "L"• ""H"		0.5	_		
Input Current	۱н	$V_{CC} = 15 V x V_{IN} = 5V$	50	100	200	μА	
Input Current	hι	$V_{CC} = 15 V x V_{IN} = 0 V$	75	150	300		
IGBT Saturation Voltage	V <sub>sat</sub> U	$V_{CC} = V_{BS} \cdot 15V$ , $I_C = 10$ A, Upper Arm		1.5	2.0	V	
IGBT Saturation voltage	$V_{sat}L$	$V_{CC} = 15V$ , $I_C = 10$ A, Lower Arm		1.5	2.0		
EDD Forward Voltage	V <sub>F</sub> U	I <sub>F</sub> = 10 A, Upper Arm	_	1.3	1.9	V	
FRD Forward Voltage	$V_{F}L$	I <sub>F</sub> = 10 A, Lower Arm		1.3	1.9	V	
Fault Output Voltage	V <sub>FO</sub>	$I_{FO} = 5 \text{ mA},$	_	0.8	1.2	V	
Short Current Protection Voltage	V <sub>R</sub>	Short Current Protection	0.45	0.5	0.55	V	
Short Current Protection delay time	V <sub>R,","</sub>	Short Current Protection	0.5	1	2	μs	
Over Temperature Protection	TSD	Over Temperature Protection	150	165	200	$^{\circ}$	
Over Temperature Protection hys.	ΔTSD	Over Temperature Protection return	_	20	_	$^{\circ}$	
Under Voltage Protection	V <sub>BS</sub> UVD	Upper Arm Under Voltage Protection	10.0	11.0	12.0		
Under Voltage Protection recovery	V <sub>BS</sub> UVR	Upper Arm Under Voltage Protection recovery	10.5	11.5	12.5	V	
Under Voltage Protection	VccUVD	Lower Arm Under Voltage Protection	10.5	11.5	12.5	V	
Under Voltage Protection recovery	VccUVR	Lower Arm Under Voltage Protection recovery	11.0	12.0	13.0		
IGBT turn-on propagation delay time	t <sub>dON</sub>	V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load	_	1.3	TBD		
IGBT rise time	t <sub>r</sub>	$V_{BB} = 300 \text{ V}, \text{ IC} = 10 \text{A}, \text{ Inductance Load}$	_	0.1	TBD		
IGBT turn-on time	t <sub>ON</sub>	V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load	_	1.4	TBD		
IGBT turn-off propagation delay time	t <sub>dOFF</sub>	$V_{BB} = 300 \text{ V}, \text{ IC} = 10 \text{A}, \text{ Inductance Load}$	_	1.2	TBD	μs -	
IGBT fall time	t <sub>f</sub>	V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load	_	0.1	TBD		
IGBT turn-off time	t <sub>OFF</sub>	V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load —		1.3	TBD		
GBT vertical arm turn-on, a turn-off ropagation delay time lag $ t_{OFF,k} - t_{ON,g} $ $V_{BB} = 300 \text{ V}$ , $ t_{OFB,k} $ include each Phase j		V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load • i include each Phase• i	_	0	300	ns	
IGBT vertical arm turn-on, a turn-off propagation delay time lag	t <sub>OFF,g</sub> - t <sub>ON,k</sub>	V <sub>BB</sub> = 300 V, IC = 10A, Inductance Load • i include each Phase• j		0	300	ns	
daed time	t <sub>daed</sub>	$V_{BB} = 300 \text{ V}, \text{ IC} = 10 \text{A}, \text{ Inductance Load}$	1	_	_	μs	
· · · ·	t <sub>rr</sub>	V <sub>BB</sub> = 300 V, I <sub>F</sub> = 10 A	-	100			

The example of an application circuit (in the case of not insulating with a control side)



### **Package Outline**

Unit• Imm

