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SPECIFICATION
(TENTATIVE)

(600A/650V-IGBT Module)

Device Name : IGBT Module

Type Name : 6MBI600VW-065V

Spec. No. : MT5F25923

	DATE	NAME	APPROVAL	Fuji Electric Co., Ltd.		
DRAWN	9-Jul-12	S. Adachi	F. Nagaune	DWG No.	MT5F25923	1 / 12
CHECKED	9-Jul-12	T. Hitachi				
CHECKED						

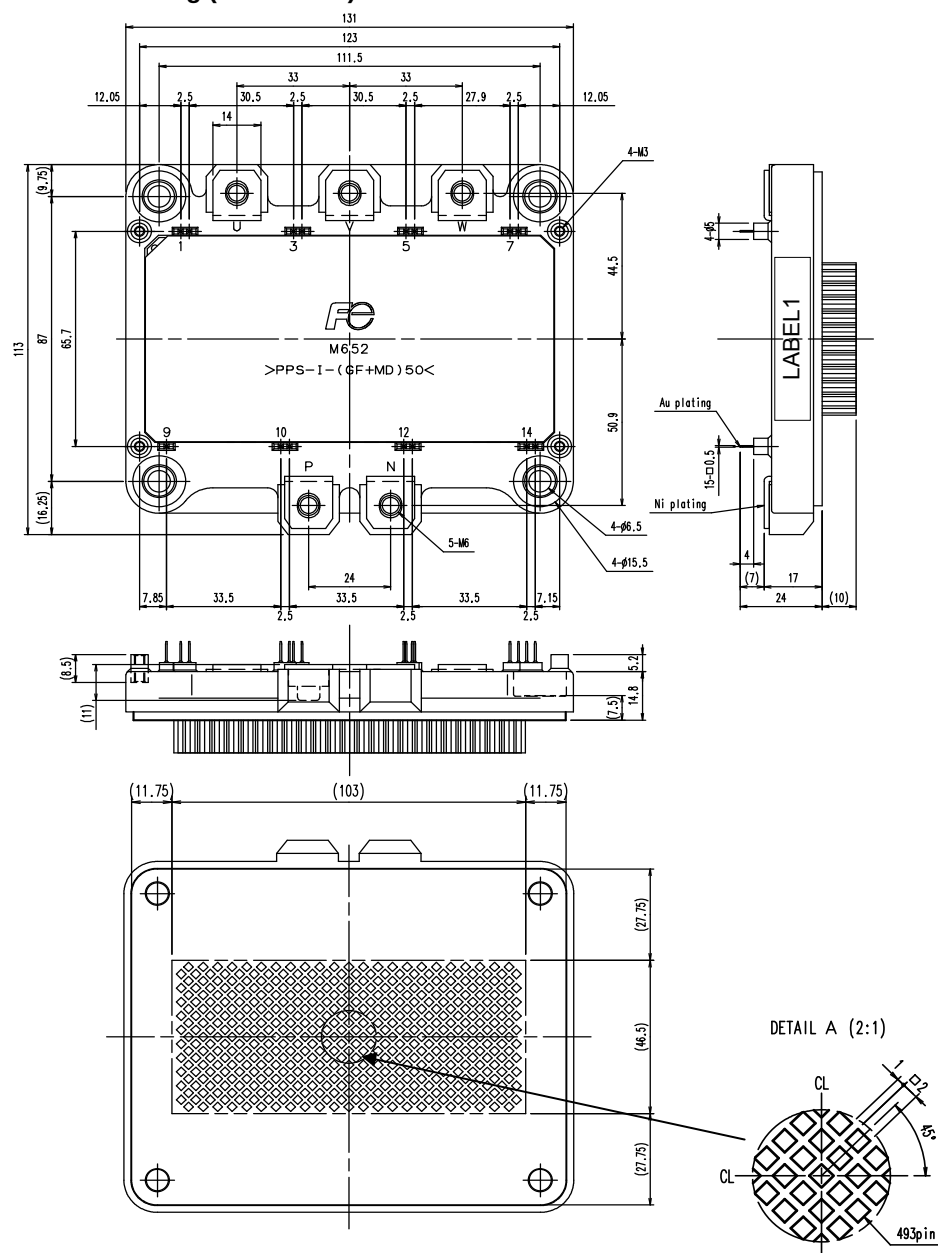
Revised Records

[illegible]

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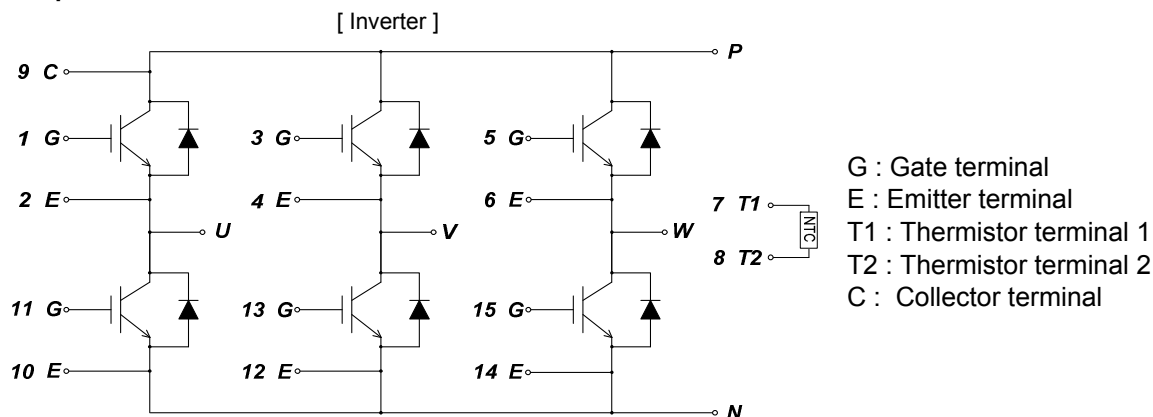
Type Name: 6MBI600VW-065V

1. Outline Drawing (Unit : mm)



Weight: 900 g(typ.)

2. Equivalent Circuit



3. Maximum Ratings (at Tc= 25°C unless otherwise specified)

Items		Symbols	Conditions		Maximum Ratings	Units
Inverter	Collector-Emitter voltage	Vces			650	V
	Gate-Emitter voltage	Vges			±20	V
	Collector current	Ic	Continuous	Tw=25°C	360	A
				Tw=65 °C	300	
		Ic pulse	1ms		600	
		-Ic			300	
		-Ic pulse	1ms		600	
	Collector power dissipation	Pc	1 device		710	W
Junction temperature		Tj			175	°C
Operating junction temperature (under switching conditions)		Tjop			150	
Case temperature		Tc			125	
Storage temperature		Tstg			-40 ~ +125	
Isolation voltage	between terminal and copper base (*1)	Viso	AC: 1min.		2500	VAC
	between thermistor and others (*2)					
Screw Torque	Mounting	-	M6		5.8	N m
	Main Terminals	-	M6		5.8	
	PCB mounting Terminals	-	M3		0.7	

(*1) All terminals should be connected together during the test.

(*2) Two thermistor terminals should be connected together,
other terminals should be connected together and shorted to base plate during the test.

4. Electrical characteristics (at Tj= 25°C unless otherwise specified)

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage Collector current	Ices	Vge=0V, Vce=650V		-	-	1.0	mA
	Gate-Emitter leakage current	Iges	Vce=0V, Vge=±20V		-	-	200	nA
	Gate-Emitter threshold voltage	Vge(th)	Vce=20V, Ic=600mA		5.8	6.4	6.9	V
	Collector-Emitter saturation voltage	Vce(sat) (chip)	Vge=15V, Ic=600A	Tj=25°C	-	1.95	2.30	V
				Tj=125°C	-	2.50	-	
				Tj=150°C	-	2.65	-	
	Input capacitance	Cies	Vce=10V, Vge=0V, f=1MHz		-	16	-	nF
	Turn-on time	ton	Vcc=300V, Ic=600A, Vge=+15/-8V, Rg=+5.6/-18Ω, Ls=20nH		-	500	-	nsec
		tr			-	340	-	
	Turn-off time	toff			-	1600	-	
tf		-			130	-		
Forward on voltage	Vf (chip)	Vge=0V, If=600A	Tj=25°C	-	1.78	2.33	V	
			Tj=125°C	-	1.66	-		
			Tj=150°C	-	1.67	-		
Reverse recovery time	trr	If=600A		-	150	-	nsec	
Thermistor	Resistance	R	T=25°C		4851	4950	5049	Ω
			T=100°C		-	493	-	
	B value	B	T=25/85°C		3376	3410	3444	K

5. Thermal resistance characteristics

Items	Symbols	Conditions		Characteristics			Units
				min.	typ.	max.	
Thermal resistance(1device)	Rth(j-w)	Inverter IGBT	Cooling fluid = 50 % water/	-	-	0.210	°C/W
		Inverter FWD	50 %ethlenglycol, 10 L / min	-	-	0.300	

6. Other characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Pressure drop in cooling circuit	ΔP	Cooling fluid = 50 % water/ 50 %ethlenglycol, 10 L / min	-	6	-	kPa
Maximum pressure in cooling circuit	P		-	-	200	kPa

7. Indication on module (モジュール表示)

Display on the module label

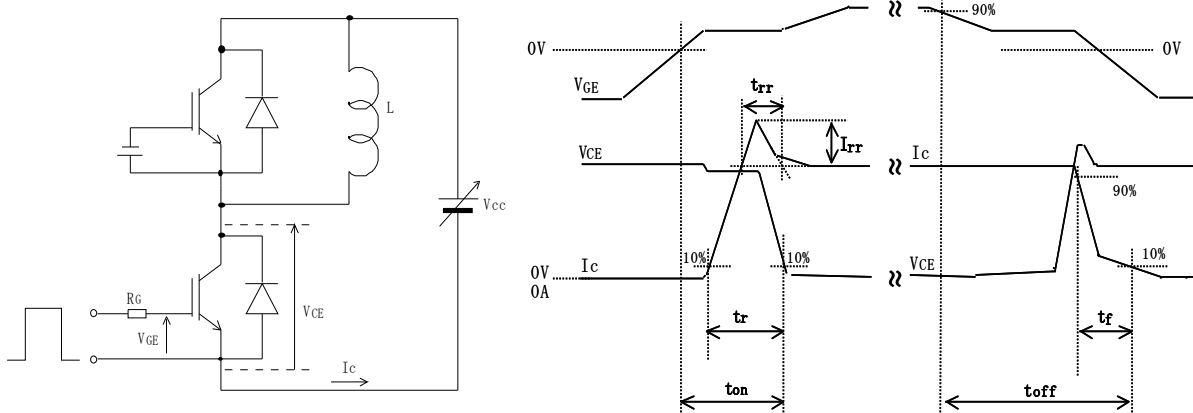
- Logo of production
- Type name : 6MBI600VW-065V
- IC, VCES rating 600A 650V
- Lot No. (5 digits)
- Place of manufacturing (code)
- Bar code

8. Applicable Category

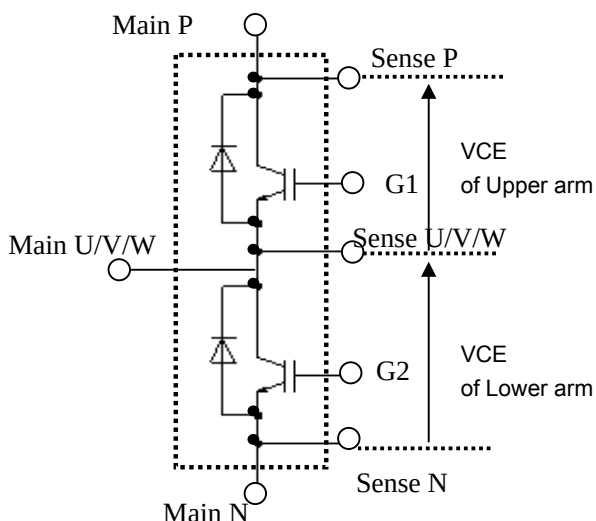
This specification is applied to IGBT Module named 6MBI600VW-065V .

本納入仕様書はIGBTモジュール 6MBI600VW-065Vに適用する。

9. Definitions of switching time (スイッチング時間の定義)



10. Definition of switching characteristics (スイッチング特性についての定義)



Switching characteristics of VCE also is defined between Sense P and Sense U/V/W for Upper arm and Sense U/V/W and Sense N for Lower arm .

Please use these terminals whenever measure spike voltage.

11. Storage and transportation notes (保管・運搬上の注意事項)

- The module should be stored at a standard temperature of 5 to 35°C and humidity of 45 to 75% .

Be careful to solderability of the terminals if the module has passed over one year from manufacturing date, under the above storage condition.

常温・常湿保存が望ましい。(5～35°C, 45～75%)

本保存条件下で、製造から1年以上経過した場合は端子半田付け性に十分注意すること。

- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
急激な温度変化のなきこと。(モジュール表面が結露しないこと)
- Avoid exposure to corrosive gases and dust.
腐食性ガスの発生場所、塵埃の多い場所は避けること。
- Avoid excessive external force on the module.
製品に荷重がかからないように十分注意すること。
- Store modules with unprocessed terminals.
モジュールの端子は未加工の状態で保管すること。
- Do not drop or otherwise shock the modules when transporting.
製品の運搬時に衝撃を与えたり、落下させたりしないこと。

12. Packing and labeling (梱包仕様)

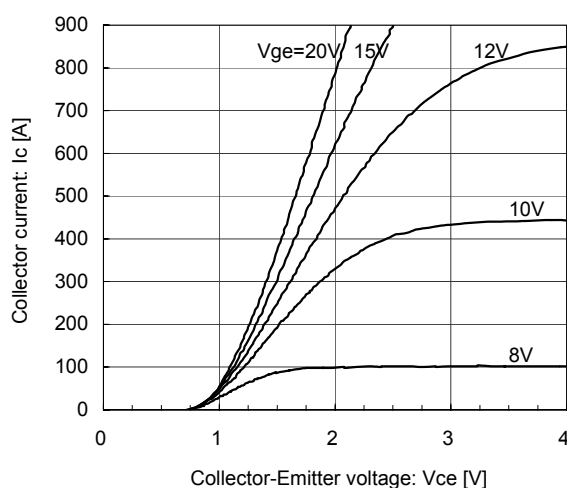
Display on the packing box

- Logo of production
- Type name
- Lot No
- Products quantity in a packing box

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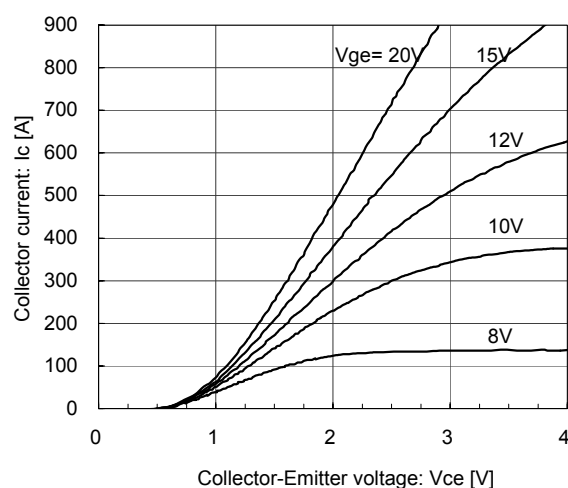
[INVERTER]

Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



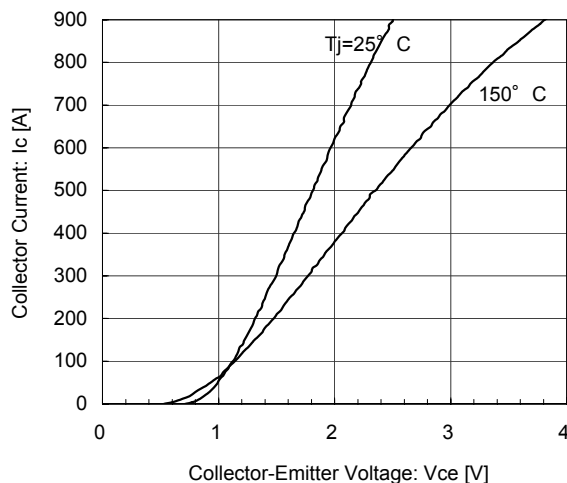
[INVERTER]

Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



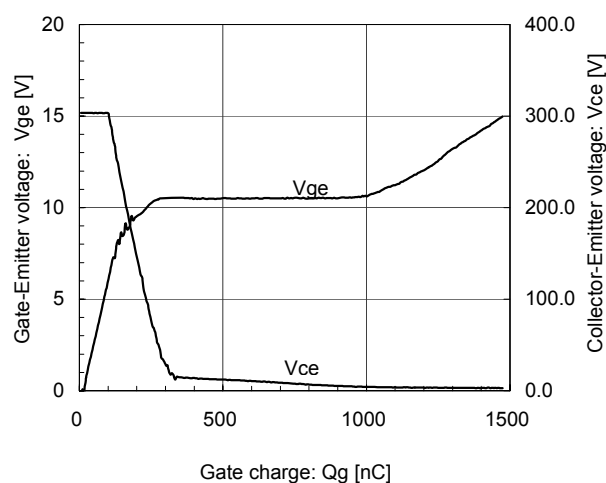
[INVERTER]

Collector current vs. Collector-Emitter voltage (typ.)
 $V_{ge} = 15\text{V}$ / chip



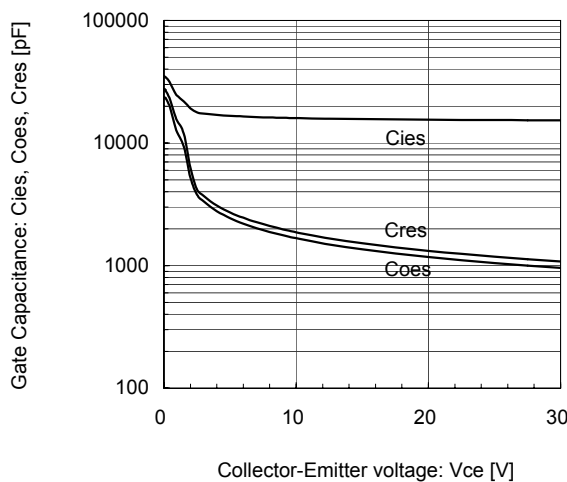
[INVERTER]

Dynamic Gate Charge (typ.)
 $V_{cc} = 300\text{V}$, $I_c = 600\text{A}$, $T_j = 25^\circ\text{C}$



[INVERTER]

Gate Capacitance vs. Collector-Emitter Voltage (typ.)
 $V_{ge} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$

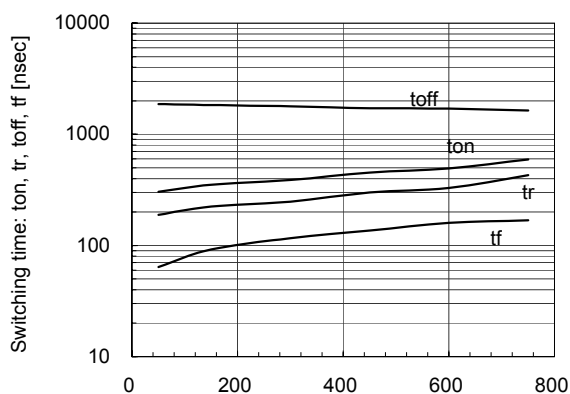


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[INVERTER]

Switching time vs. Collector current (typ.)

Vcc=300V, Vge=+15/-8V, Rg=+5.6/-18Ω, Tj=25°C

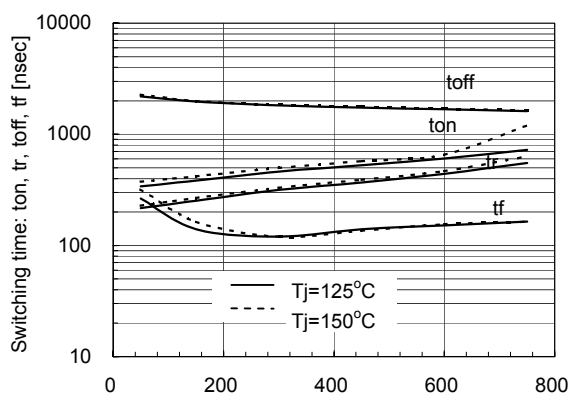


Collector current: Ic [A]

[INVERTER]

Switching time vs. Collector current (typ.)

Vcc=300V, Vge=+15V/-8V, Rg=+5.6/-18Ω, Tj=125°C, 150°C

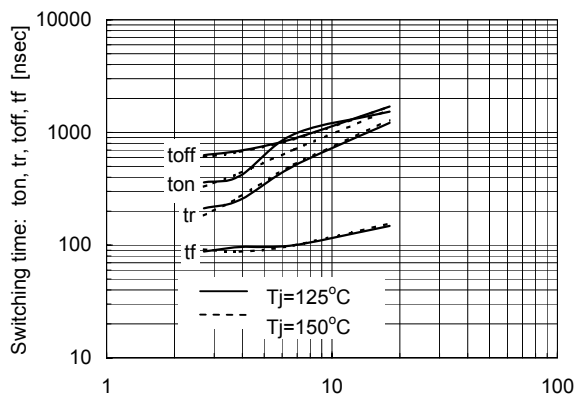


Collector current: Ic [A]

[INVERTER]

Switching time vs. Gate resistance (typ.)

Vcc=300V, Ic=600A, Vge=+15/-8V, Tj=125°C, 150°C

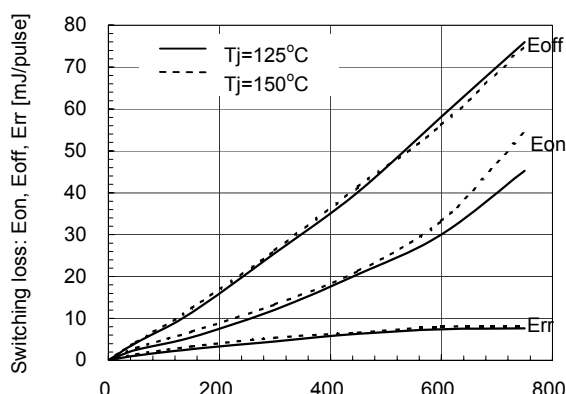


Gate resistance: Rg [Ω]

[INVERTER]

Switching loss vs. Collector current (typ.)

Vcc=300V, Vge=+15/-8V, Rg=+5.6/-18Ω, Tj=125°C, 150°C

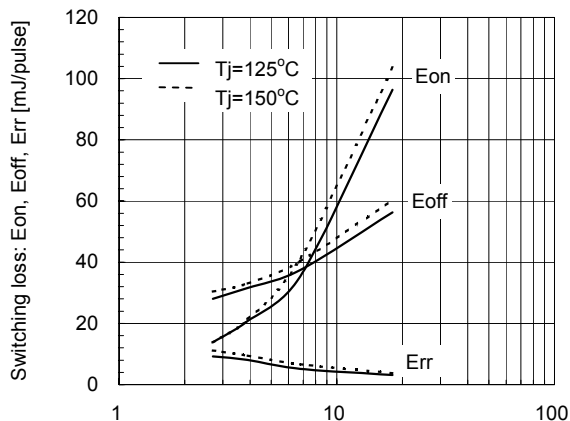


Collector current: Ic [A]

[INVERTER]

Switching loss vs. Gate resistance (typ.)

Vcc=300V, Ic=600A, Vge=+15/-8V, Tj=125°C, 150°C

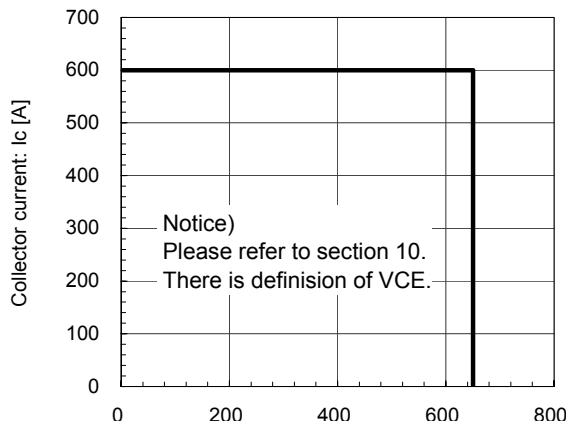


Gate resistance: Rg [Ω]

[INVERTER]

Reverse bias safe operating area (max.)

Vge=+15/-8V, Rg=+5.6/-18Ω, Tj=150°C

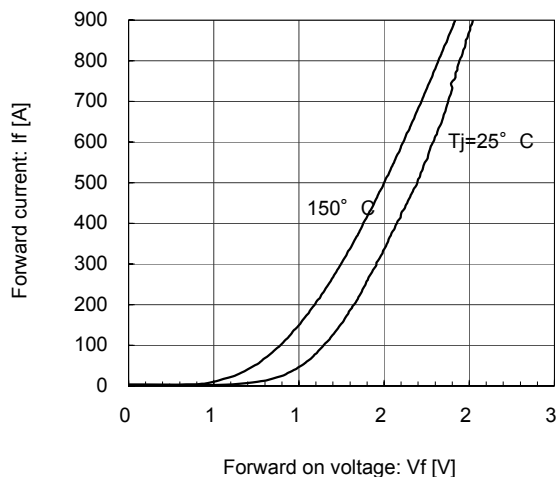


Collector-Emitter voltage: Vce [V]

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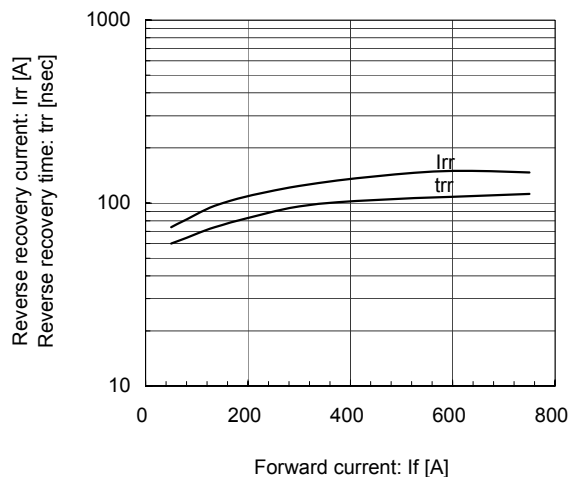
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



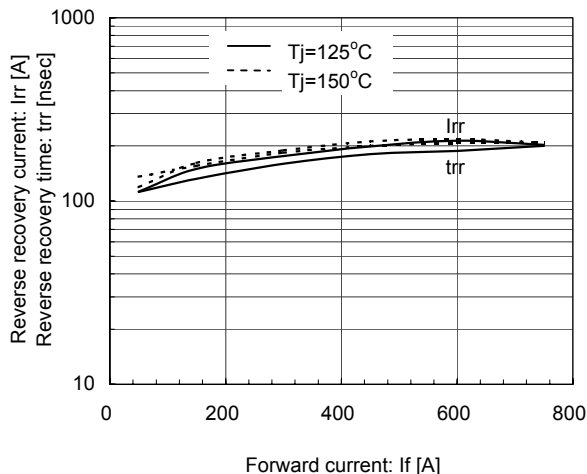
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{cc}=300V$, $V_{ge}=+15/-8V$, $R_g=+5.6/-18\Omega$, $T_j=25^\circ C$

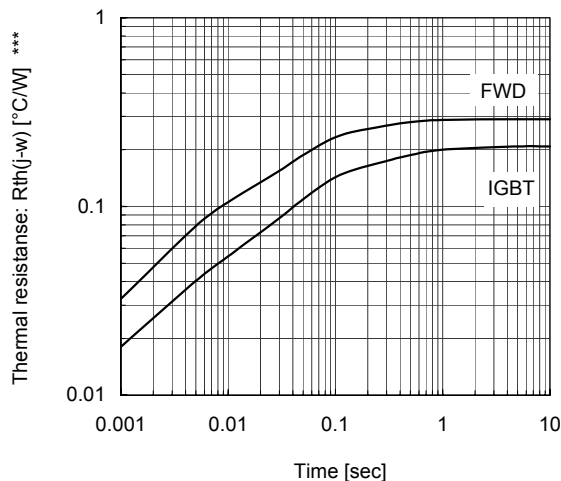


[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{cc}=300V$, $V_{ge}=+15/-8V$, $R_g=+5.6/-18\Omega$, $T_j=125^\circ C$, $150^\circ C$

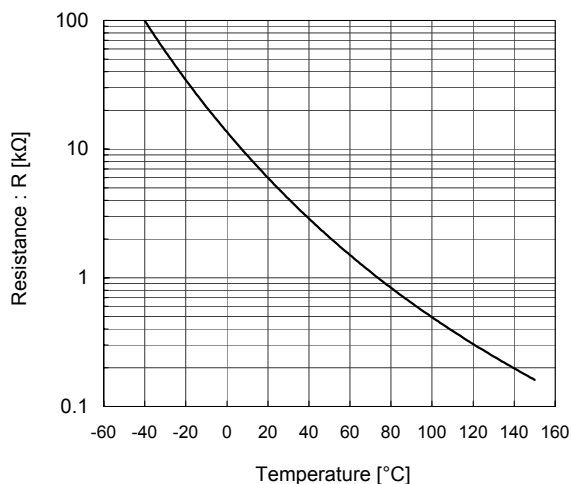


Transient Thermal Resistance (max.)



[THERMISTOR]

Temperature characteristic (typ.)



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Warnings

- This product shall be used within its maximum rating (voltage, current, and temperature). This product may be broken in case of using beyond the maximum ratings.
製品の最大定格（電圧、電流、温度等）の範囲内で御使用下さい。最大定格を超えて使用すると、素子が破壊する場合があります。
- Connect adequate fuse or protector of circuit between three-phase line and this product to prevent the equipment from causing secondary destruction, such as fire, its spreading, or explosion.
万一の不慮の事故で素子が破壊した場合を考慮し、商用電源と本製品の間に適切な容量のヒューズ又はブレーカーを必ず付けて火災、爆発、延焼等の2次破壊を防いでください。
- Use this product after realizing enough working on environment and considering of product's reliability life. This product may be broken before target life of the system in case of using beyond the product's reliability life.
製品の使用環境を十分に把握し、製品の信頼性寿命が満足できるか検討の上、本製品を適用して下さい。製品の信頼性寿命を超えて使用した場合、装置の目標寿命より前に素子が破壊する場合があります。
- If the product had been used in the environment with acid, organic matter, and corrosive gas (hydrogen sulfide, sulfurous acid gas), the product's performance and appearance can not be ensured easily.
酸・有機物・腐食性ガス（硫化水素、亜硫酸ガス等）を含む環境下で使用された場合、製品機能・外観等の保証はできません。
- Never add mechanical stress to deform the main or control terminal. The deformed terminal may cause poor contact problem.
主端子及び制御端子に応力を与えて変形させないで下さい。端子の変形により、接触不良などを引き起こす場合があります。
- It shall be confirmed that IGBT's operating locus of the turn-off voltage and current are within the RBSOA specification. This product may be broken if the locus is out of the RBSOA.
ターンオフ電圧・電流の動作軌跡がRBSOA仕様内にあることを確認して下さい。RBSOAの範囲を超えて使用すると素子が破壊する可能性があります。
- If excessive static electricity is applied to the control terminals, the devices may be broken. Implement some countermeasures against static electricity.
制御端子に過大な静電気が印加された場合、素子が破壊する場合があります。取り扱い時は静電気対策を実施して下さい。
- Never add the excessive mechanical stress to the main or control terminals when the product is applied to equipments. The module structure may be broken.
素子を装置に実装する際に、主端子や制御端子に過大な応力を与えないで下さい。端子構造が破壊する可能性があります。
- In case of higher turn-on dv/dt of IGBT, erroneous turn-on of opposite arm IGBT may occur. Use this product in the most suitable drive conditions, such as +VGE, -VGE, RG, CGE to prevent the malfunction.
ターンオン dv/dt が高いと対向アームのIGBTが誤点弧を起こす可能性があります。誤点弧を起こさない為の最適なドライブ条件(+VGE, -VGE, RG, CGE)でご使用下さい。
- This product may be broken by avalanche in case of VCE beyond maximum rating VCES is applied between C-E terminals. Use this product within its maximum voltage.
VCESを超えた電圧が印加された場合、アバランシェを起こして素子破壊する場合があります。VCEは必ず最大定格の範囲内でご使用下さい。
- Please prevent water leak.
水漏れ防止の処置をして下さい。

Cautions

- Fuji Electric is constantly making every endeavor to improve the product quality and reliability. However, semiconductor products may rarely happen to fail or malfunction. To prevent accidents causing injury or death, damage to property like by fire, and other social damage resulted from a failure or malfunction of the Fuji Electric semiconductor products, take some measures to keep safety such as redundant design, spread-fire-preventive design, and malfunction-protective design.
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