SPECIFICATION

Device Name : IGBT Module

Type Name : 7MBR35SB120-01

Spec. No. : MS6M 0554

Date : Jun. - 02 - 2000

Fuji Electric Co.,Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED
DRAWN	Jun.-2-'00	T.Kobayashi	
CHECKED	June-2-00	S.Mata	

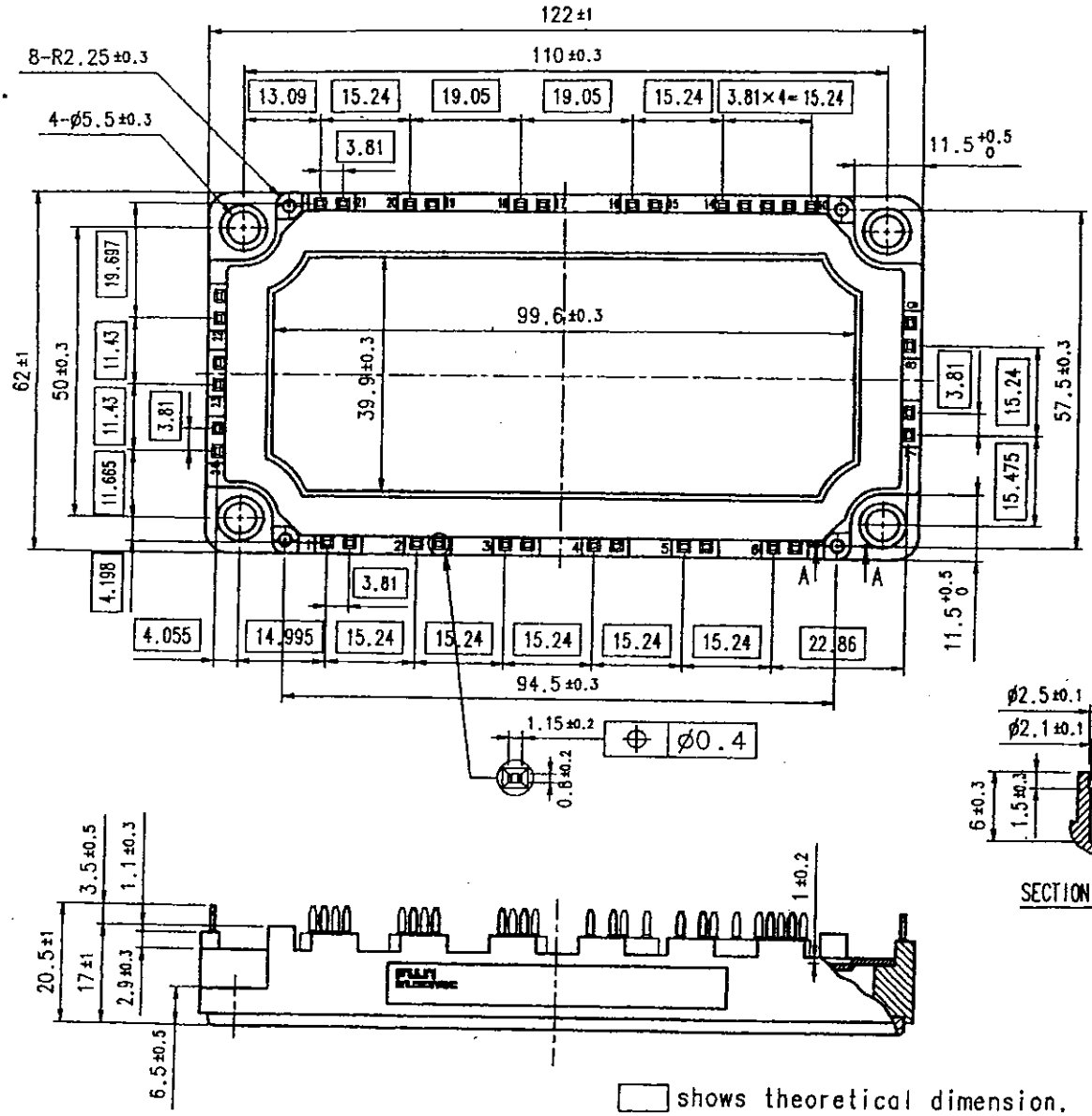
Fuji Electric Co.,Ltd.

DWG.NO. MS6M 0554 1/10

Revised Records

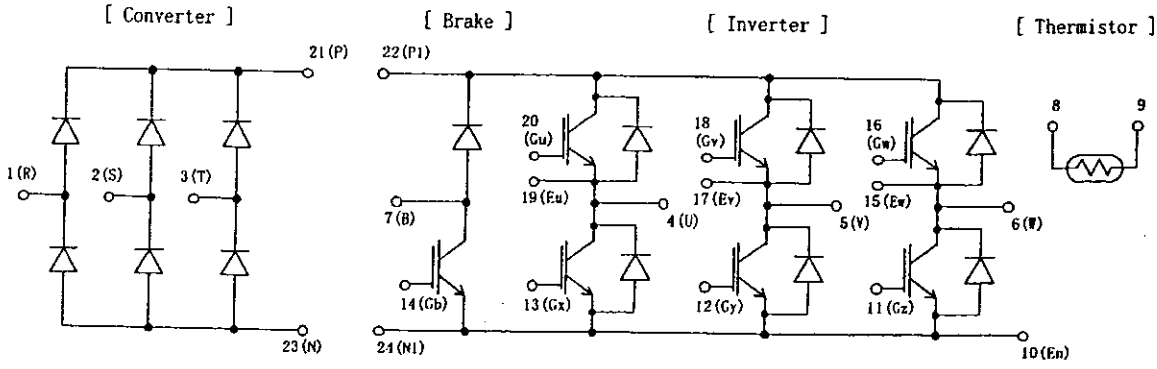
Date	Classi-fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jun.-2-'00	enactment	—	———	Issued date	—	S.Hatta	T.Miyasaka
Jun.-14-'00	Revision	a	Revised type miss (P5/10)		T.Kobayashi	S.Hatta	T.Miyasaka

1. Outline Drawing (Unit : mm)



shows theoretical dimension.

2. Equivalent circuit



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

	Items		Symbols	Conditions		Maximum Ratings	Units
Inverter	Collector-Emitter voltage		VCES			1200	V
	Gate-Emitter voltage		VGES			+-20	V
	Collector current		Ic	Continuous	Tc=25C	50	A
					Tc=80C	35	
			Icp	1ms	Tc=25C	100	A
					Tc=80C	70	
			-Ic			35	A
	Collector Power Dissipation		Pc	1 device		240	W
Brake	Collector-Emitter voltage		VCES			1200	V
	Gate-Emitter voltage		VGES			+-20	V
	Collector current		Ic	Continuous	Tc=25C	35	A
					Tc=80C	25	
			Icp	1ms	Tc=25C	70	A
					Tc=80C	50	
	Collector Power Dissipation		Pc	1 device		180	W
	Repetitive peak reverse Voltage(Diode)		VRRM			1200	V
Converter	Repetitive peak reverse Voltage		VRRM			1600	V
	Average Output Current		Io	50Hz/60Hz sine wave		35	A
	Surge Current (Non-Repetitive)		IFSM	Tj=150C,10ms half sine wave		360	A
	I^2t (Non-Repetitive)		I^2t			648	A^2s
Junction temperature			Tj			150	C
Storage temperature			Tstg			-40~ +125	C
Isolation voltage	between terminal and copper base(*1)		Viso	AC : 1min.		2500	V
	between thermistor and others (*2)					2500	V
Mounting Screw Torque (*3)						3.5	Nm

(*1) All terminals should be connected together when isolation test will be done.

(*2) Terminal 8 and 9 should be connected together. Terminal 1 to 7 and 10 to 24 should be connected together and shorted to copper base.

(*3) Recommendable Value : 2.5~3.5 Nm (M5)

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

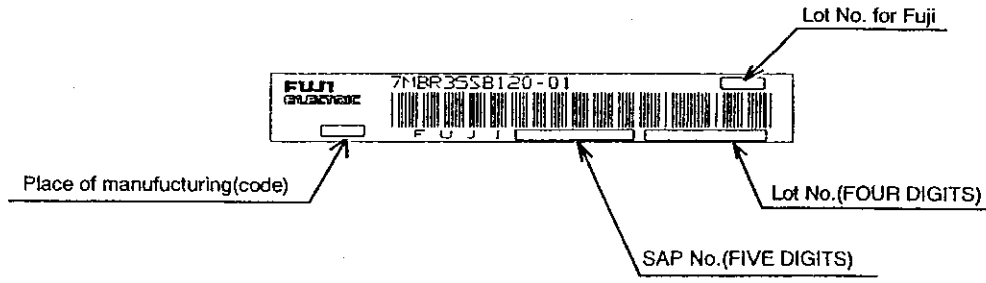
	Items	Symbols	Conditions		Characteristics min.	typ.	Max.	Units
Inverter	Zero gate voltage Collector current	ICES	VGE = 0 V, VCE = @1200 V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0 V, VGE = +-20 V				200	nA
	Gate-Emitter threshold voltage	VGE(th)	VCE = 20 V, Ic = 35 mA		5.5	7.2	8.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE = 15 V,	chip		2.1		V
			Ic = 35 A	terminal		2.25	2.7	
	Input capacitance	Cies	VGE = 0 V, VCE = 10 V f = 1 MHz			4200		pF
	Turn-on time	ton	Vcc= 600 V			0.35	1.2	us
		tr	Ic = 35 A			0.25	0.6	
		$tr_{(i)}$	VGE = +-15 V			0.1		
	Turn-off time	toff	RG = 33 ohm			0.45	1.0	
		tf				0.08	0.3	
	Forward on voltage	VF	IF = 35 A	chip		2.3		V
				terminal		2.45	3.3	
	Reverse recovery time	trr	IF = 35 A				350	ns
Brake	Zero gate voltage Collector current	ICES	VGE = 0 V, VCE = @1200 V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0 V, VGE = +-20 V				200	nA
	Collector-Emitter saturation voltage	VCE(sat)	VGE 15 V,	chip		2.1		V
			Ic = 25 A	terminal		2.25	2.7	
	Turn-on time	ton	Vcc= 600 V			0.35	1.2	us
		tr	Ic = 25 A			0.25	0.6	
	Turn-off time	toff	VGE = +-15 V			0.45	1.0	
		tf	RG = 51 ohm			0.08	0.3	
	Reverse current	IRRM	VR = @1200 V				1.0	mA
Converter	Forward on voltage	VFM	IF = 35 A	chip		1.1		V
				terminal		1.2	1.5	
	Reverse current	IRRM	VR = @1600 V				1.0	mA
Thermistor	Resistance	R	T = 25C			5000		ohm
			T =100C		465	495	520	
	B value	B	T = 25/50C		3305	3375	3450	K

5. Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	typ.	Max.	Units
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			0.52	C/W
		Inverter FWD			0.90	
		Brake IGBT			0.69	
		Converter Diode			0.75	
Contact Thermal resistance	Rth(c-f)	with Thermal Compound (*)		0.05		C/W

* This is the value which is defined mounting on the additional cooling fin with thermal compound.

6. Indication on module



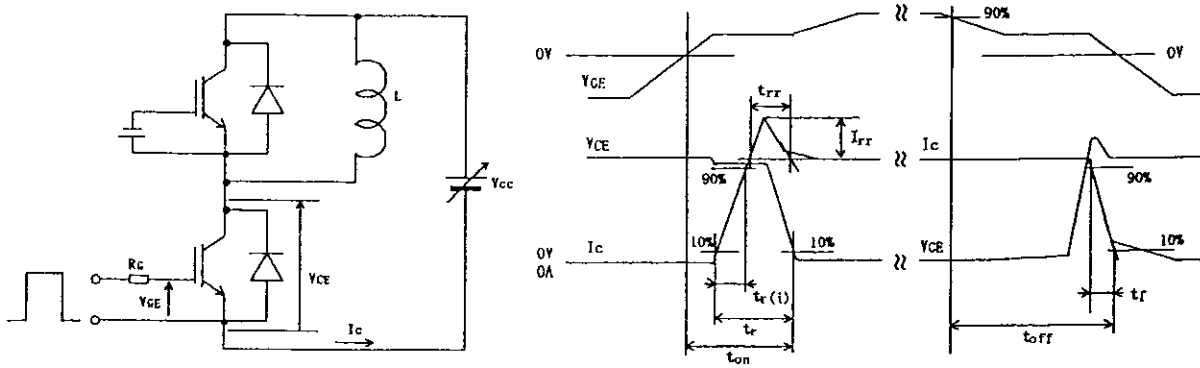
7. Applicable category

This specification is applied to Power Integrated Module named 7MBR35SB120-01 .

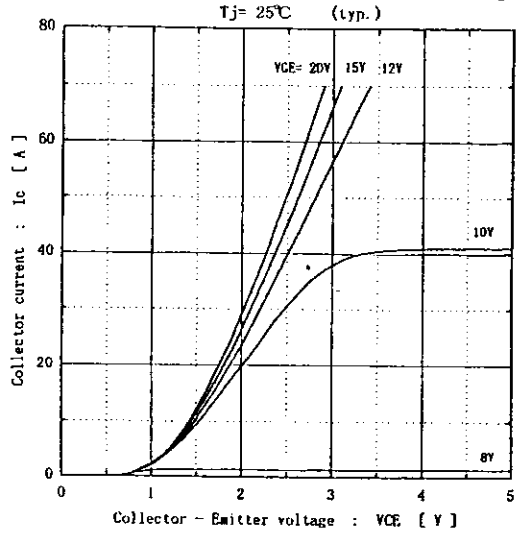
8. Storage and transportation notes

- The module should be stored at a standard temperature of 5 to 35℃ and humidity of 45 to 75% .
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
- Avoid exposure to corrosive gases and dust.
- Avoid excessive external force on the module.
- Store modules with unprocessed terminals.
- Do not drop or otherwise shock the modules when transporting.
- Please connect adequate fuse or protector of circuit between three-phase line and this product to prevent the equipment from causing secondary destruction.

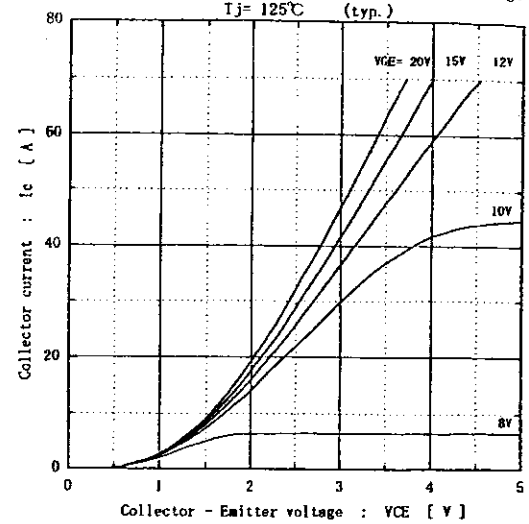
9. Definitions of switching time



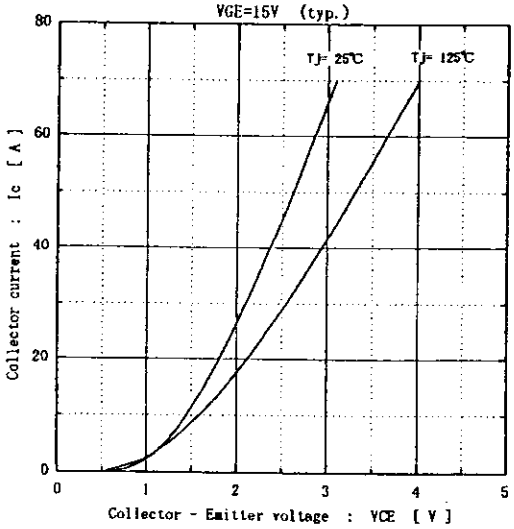
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



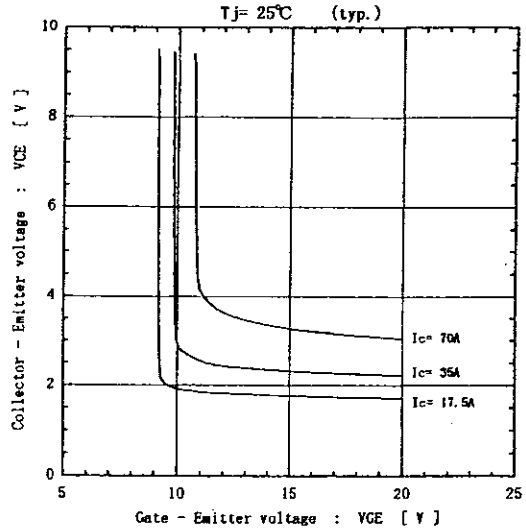
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



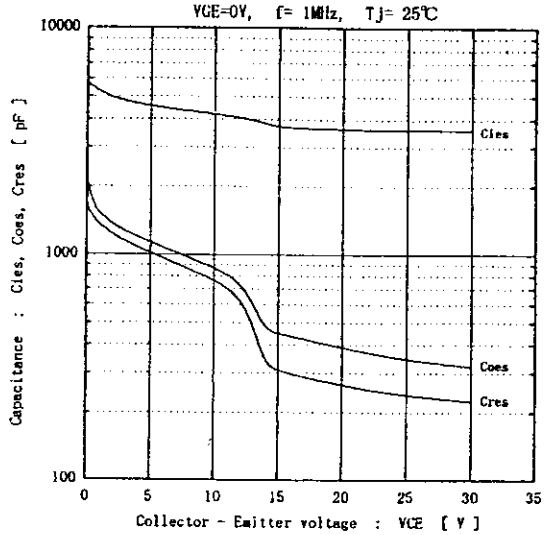
[Inverter]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



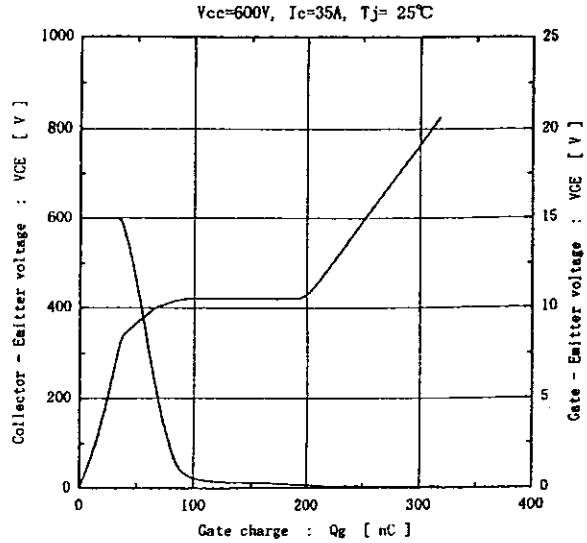
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



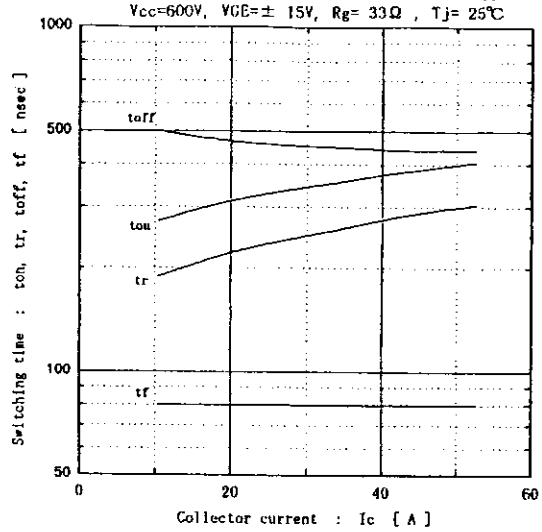
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



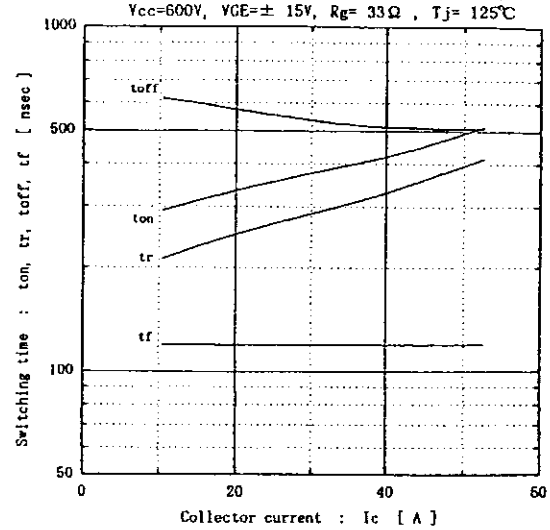
[Inverter]
Dynamic Gate charge (typ.)
Vcc=600V, Ic=35A, Tj= 25℃



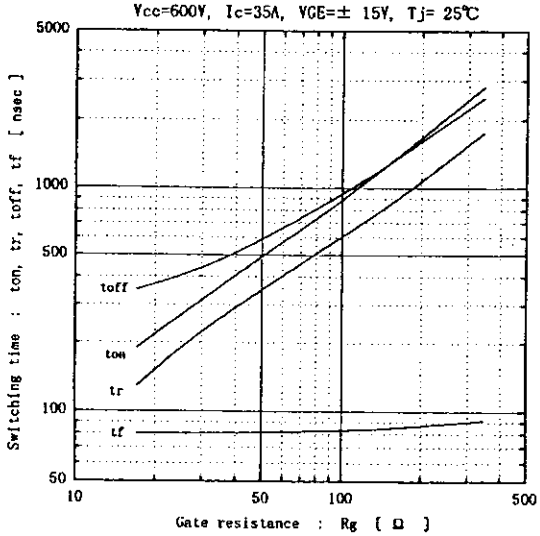
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg= 33Ω , Tj= 25℃



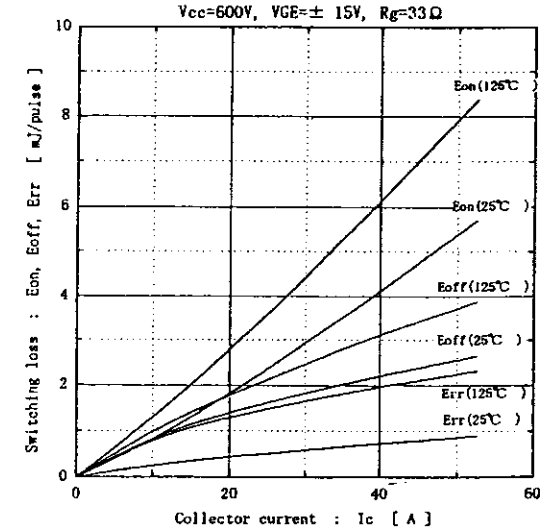
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg= 33Ω , Tj= 125℃



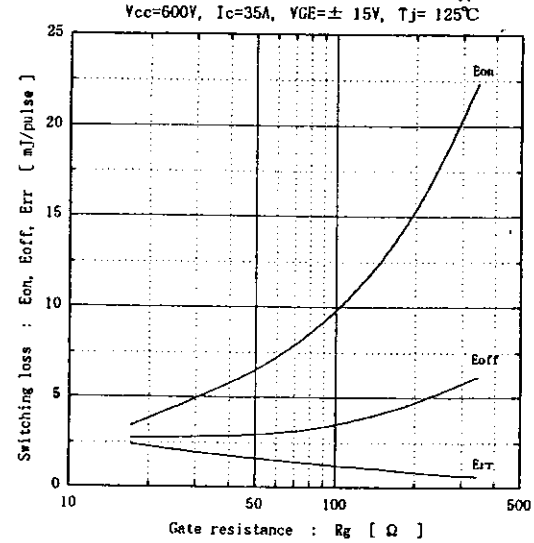
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=35A, VGE=± 15V, Tj= 25℃



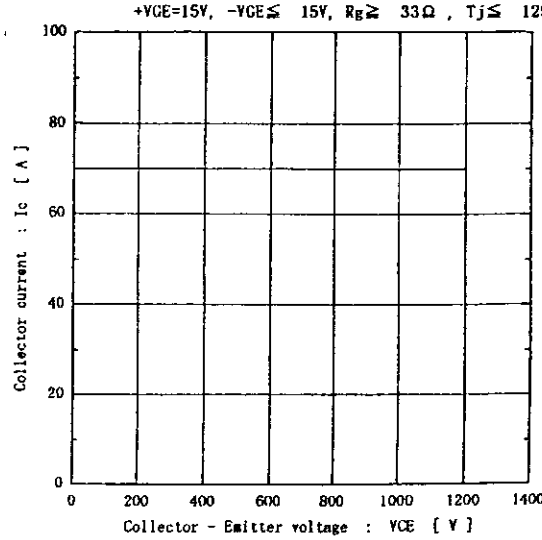
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=± 15V, Rg=33Ω



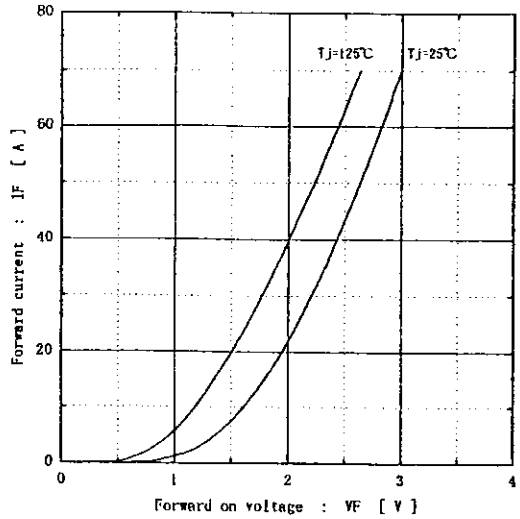
[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=35A, VGE=± 15V, Tj= 125℃



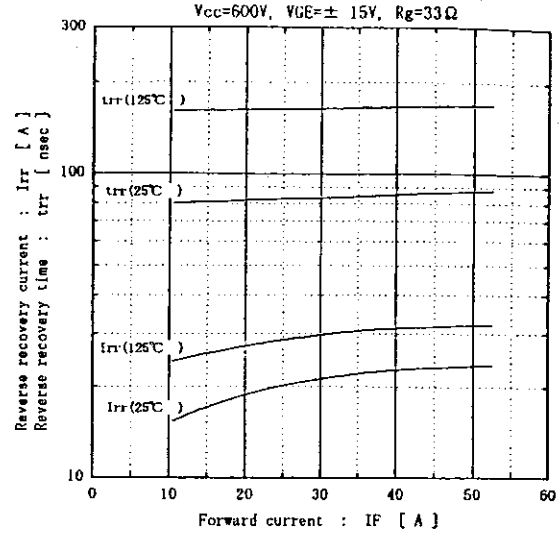
[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≦ 15V, Rg≧ 33Ω , Tj≦ 125℃



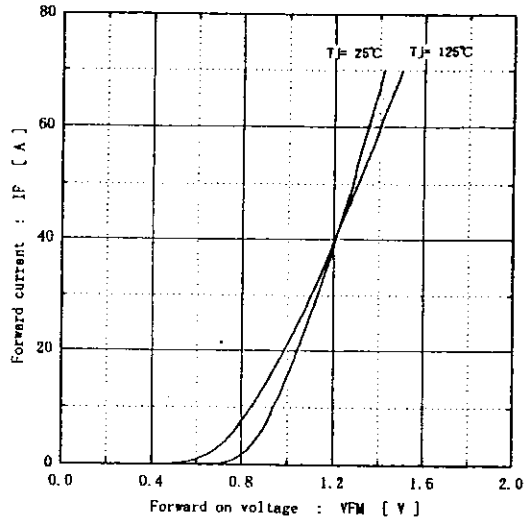
[Inverter]
Forward current vs. Forward on voltage (typ.)



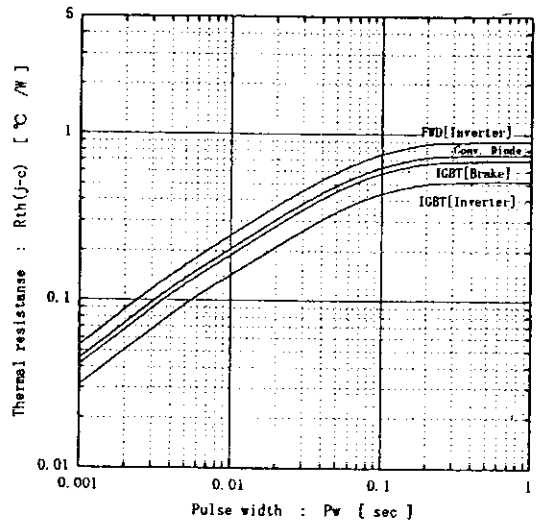
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=600V, VGE=± 15V, Rg=33Ω



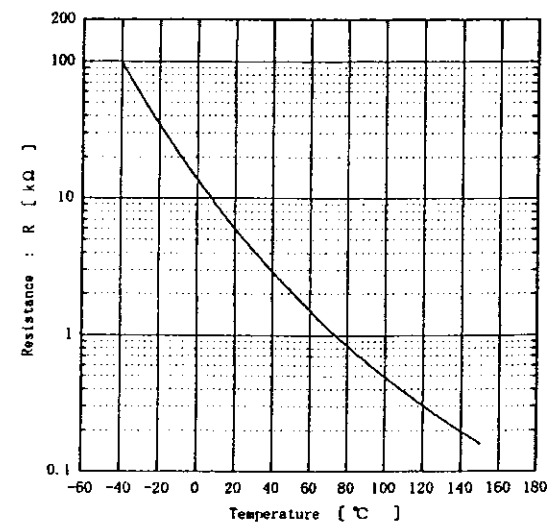
[Converter]
Forward current vs. Forward on voltage (typ.)



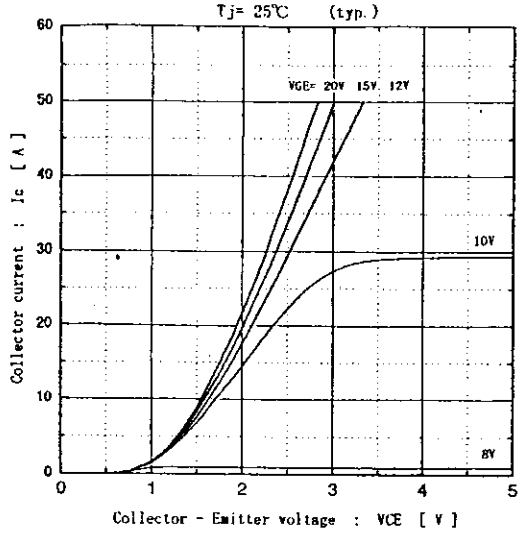
Transient thermal resistance



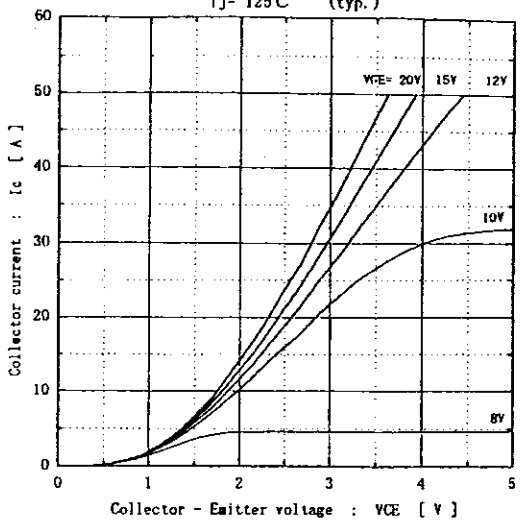
[Thermistor]
Temperature characteristic (typ.)



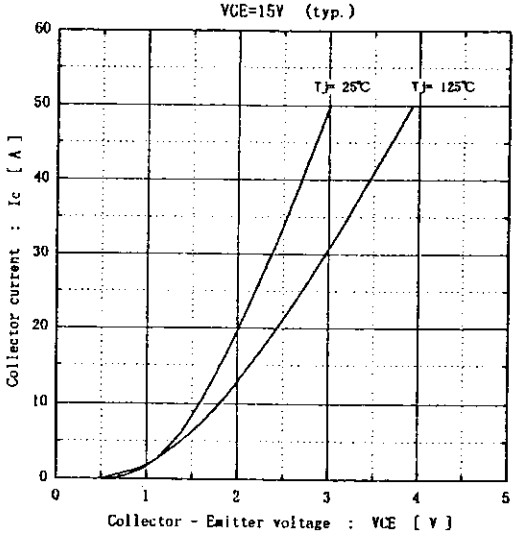
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



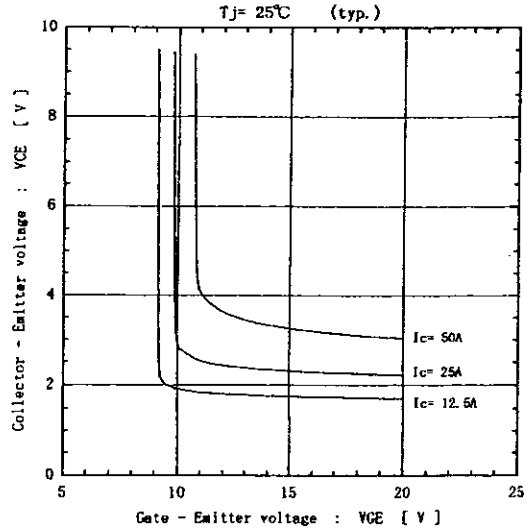
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



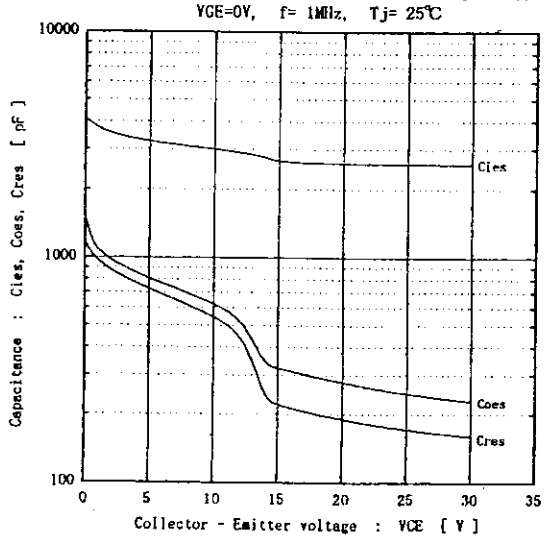
[Brake]
Collector current vs. Collector-Emitter voltage
VCE=15V (typ.)



[Brake]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



[Brake]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



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Dynamic Gate charge (typ.)
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