SPECIFICATION

Device Name	:	IGBT Module
Type Name	:	7MBR20SA060D-01
Spec. No.	:	MS6M 0542
Date	:	Jun. - 02 - 2000

Fuji Electric Co., Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED
DRAWN	Jun. - 2 - '00	Y. Kobayashi	
CHECKED	June - 2 - 00	S. Kato	T. Miyata

Fuji Electric Co.,Ltd.

DWG.NO. MS6M 0542 1/10

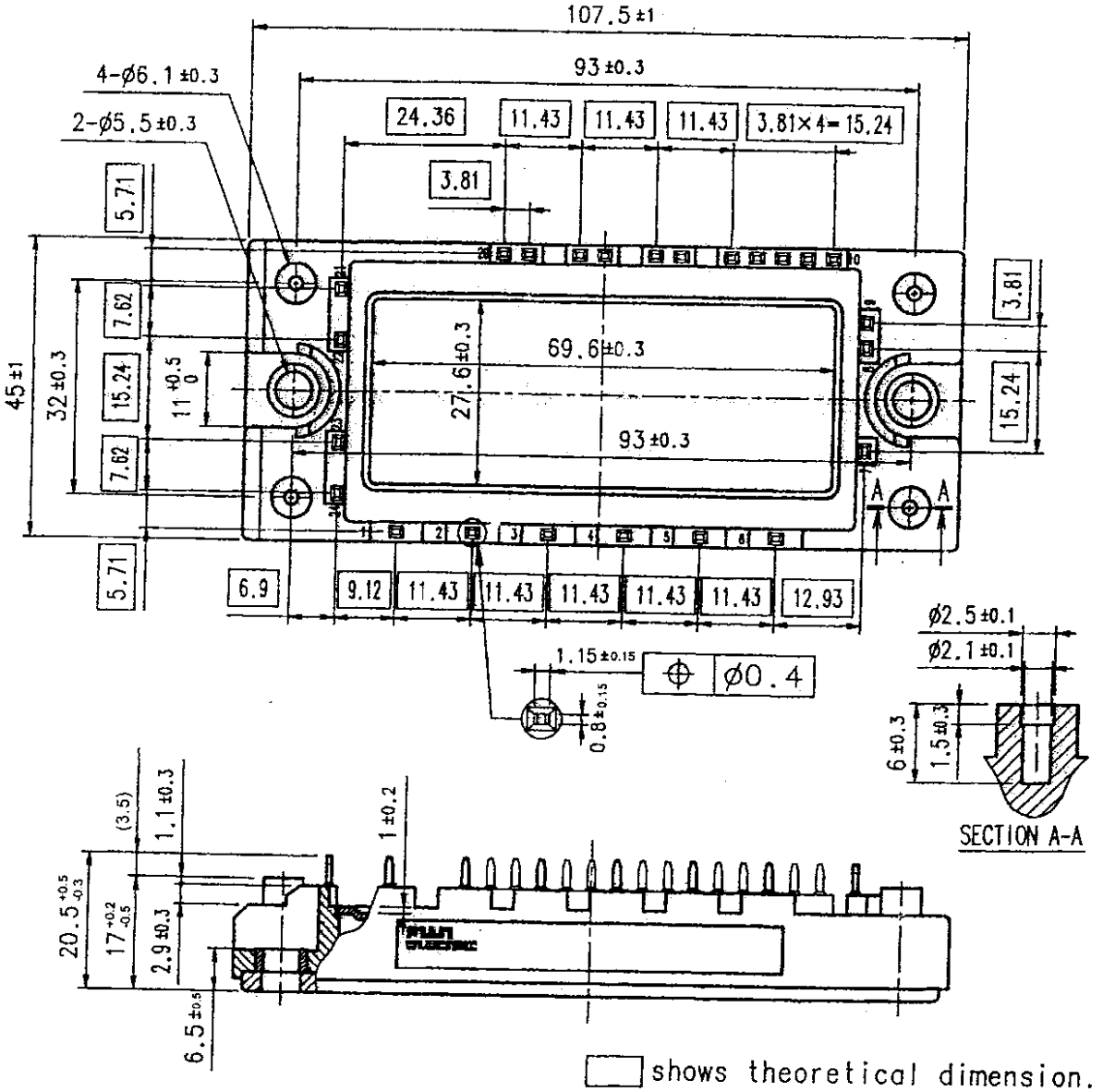
H04-004-05

Revised Records

Date	Classi-fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jun-2-'00	enactment	——	—— ——	Issued date	——	S.Mita	T.Miyata

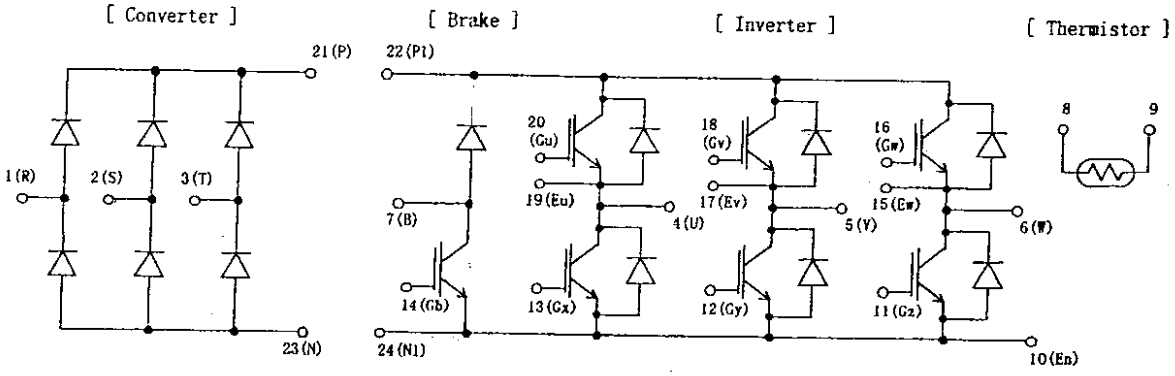
7MBR20SA060D-01

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		600	V
	Gate-Emitter voltage	VGES		+-20	V
	Collector current	Ic	Continuous	20	A
		Icp	1ms	40	A
		-Ic		20	A
	Collector Power Dissipation	Pc	1 device	80	W
Brake	Collector-Emitter voltage	VCES		600	V
	Gate-Emitter voltage	VGES		+-20	V
	Collector current	Ic	Continuous	20	A
		Icp	1ms	40	A
	Collector Power Dissipation	Pc	1 device	50	W
	Repetitive peak reverse Voltage(Diode)	VRRM		600	V
Converter	Repetitive peak reverse Voltage	VRRM		800	V
	Average Output Current	Io	50Hz/60Hz sine wave	25	A
	Surge Current (Non-Repetitive)	IFSM	Tj=150C,10ms half sine wave	260	A
	I^2t (Non-Repetitive)	I^2t		338	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)

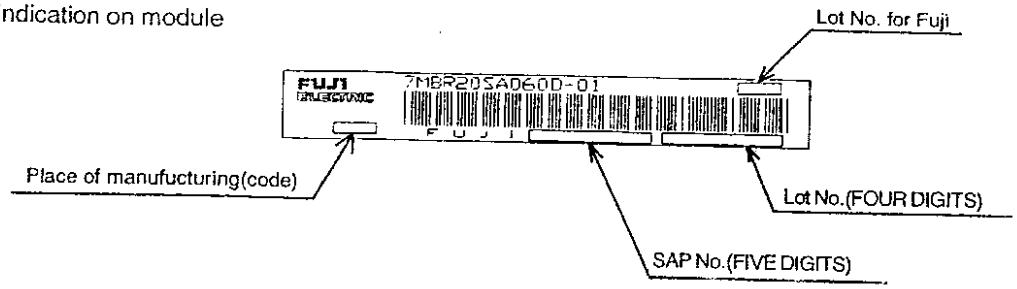
	Items	Symbols	Conditions	Characteristics min.	typ.	Max.	Units
Inverter	Zero gate voltage Collector current	ICES	VGE 0 V, VCE 600 V			1.0	mA
	Gate-Emitter leakage current	IGES	VCE 0 V, VGE +-20 V			200	nA
	Gate-Emitter threshold voltage	VGE(th)	VCE 20 V, Ic = 20 mA	5.5	7.8	8.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE 15 V, Ic = 20 A, chip		1.8		V
			VGE 15 V, Ic = 20 A, terminal		1.95	2.4	
	Input capacitance	Cies	VGE 0 V, VCE 10 V, f = 1 MHz		3000		pF
	Turn-on time	ton	Vcc= 300 V, Ic = 20 A, VGE +-15 V, RG = 120 ohm		0.45	1.2	us
		tr			0.25	0.6	
		$tr_{(i)}$			0.08		
	Turn-off time	toff			0.40	1.0	
		tf			0.05	0.35	
	Forward on voltage	VF	IF = 20 A, chip		1.8		V
			IF = 20 A, terminal		1.95	2.6	
	Reverse recovery time	trr	IF = 20 A			300	ns
Brake	Zero gate voltage Collector current	ICES	VGE 0 V, VCE 600 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, Ic = 20 A, chip		1.8		V
			VGE 15 V, Ic = 20 A, terminal		1.95	2.4	
	Turn-on time	ton	Vcc= 300 V, Ic = 20 A, VGE +-15 V, RG = 120 ohm		0.45	1.2	us
		tr			0.25	0.6	
	Turn-off time	toff			0.40	1.0	
		tf			0.05	0.35	
	Reverse current	IRRM	VR = 600 V			1.0	mA
Converter	Forward on voltage	VFM	IF = 20 A, chip		1.0		V
			IF = 20 A, terminal		1.1	1.5	
	Reverse current	IRRM	VR = 800 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			1.56	C/W
		Inverter FWD			3.00	
		Brake IGBT			2.50	
		Converter Diode			1.30	
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



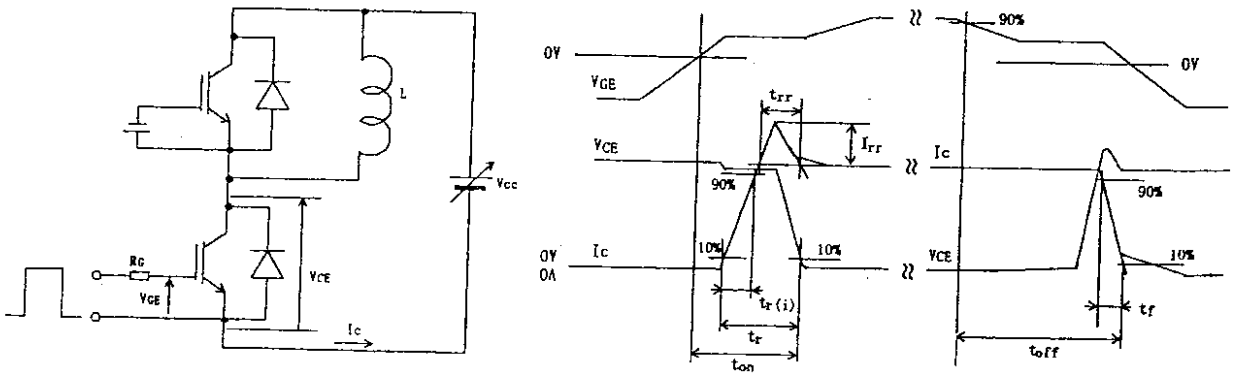
7. Applicable category

This specification is applied to Power Integrated Module named 7MBR20SA060D-01.

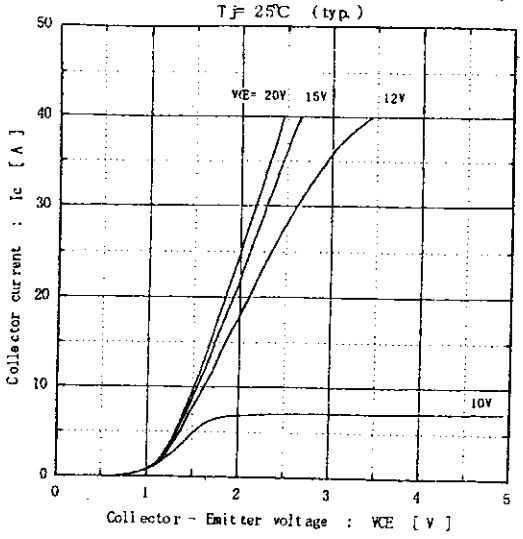
8. Storage and transportation notes

- The module should be stored at a standard temperature of 5 to 35°C 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.

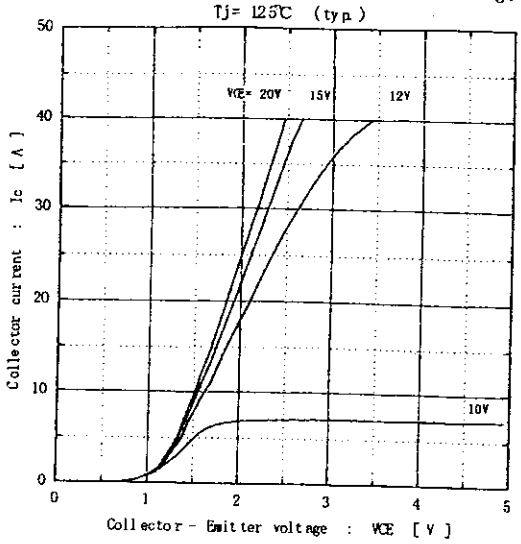
9. Definitions of switching time



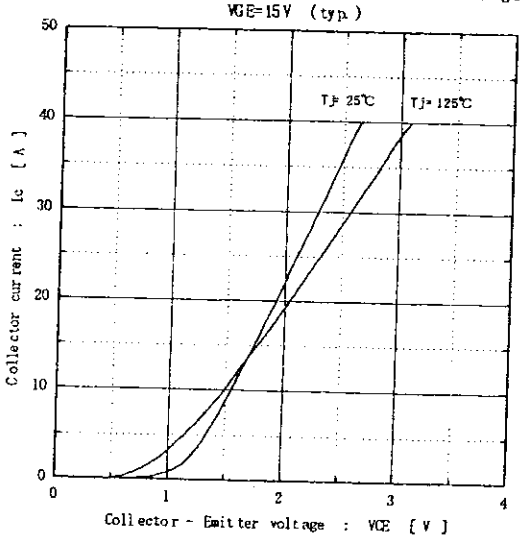
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



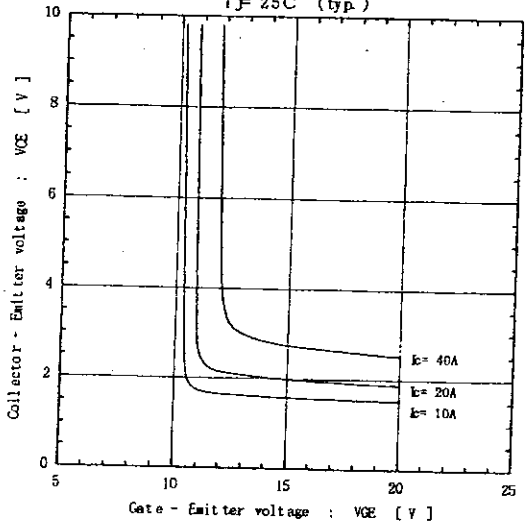
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



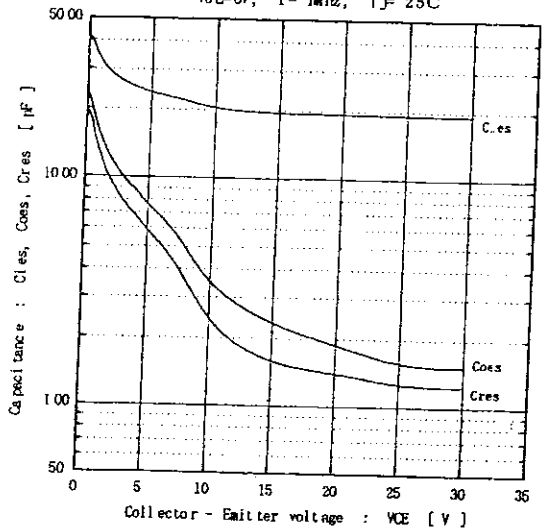
[Inverter]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



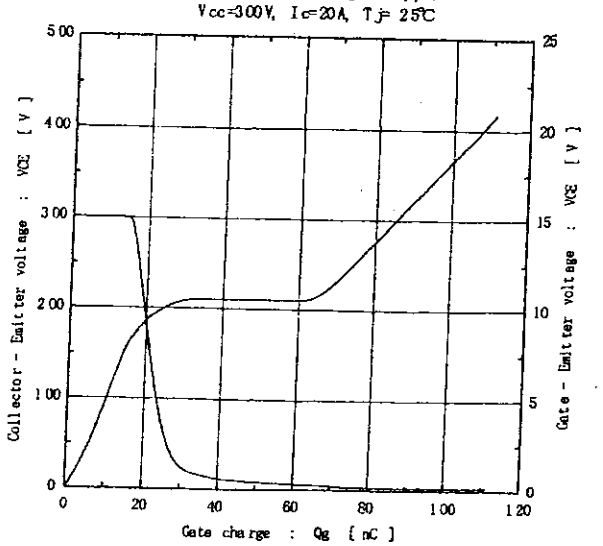
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



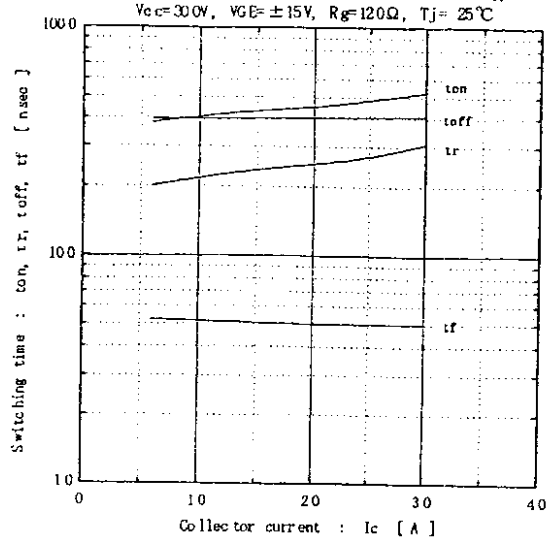
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25℃



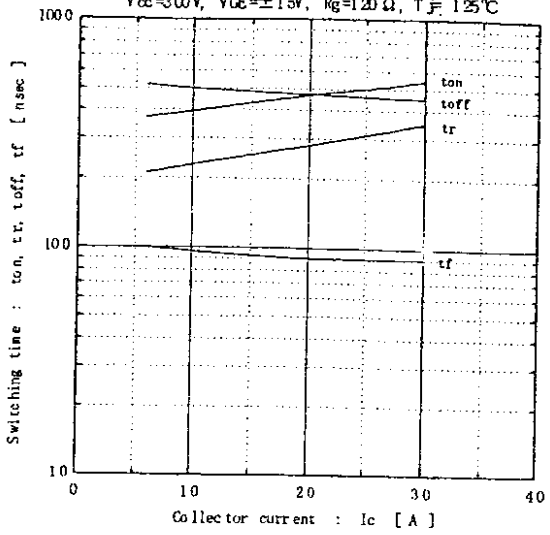
[Inverter]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=20A, Tj= 25℃



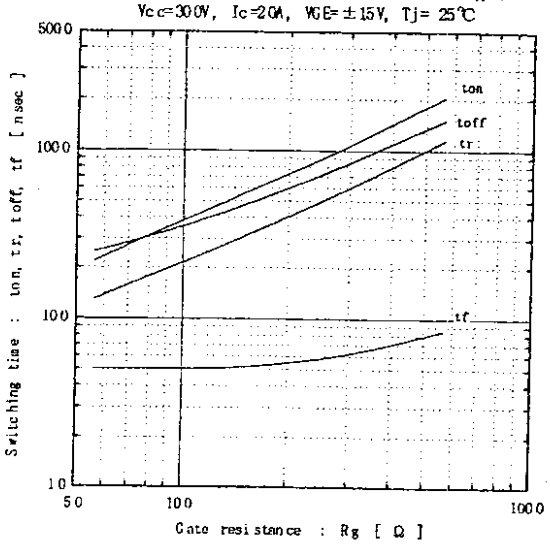
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω, Tj= 25℃



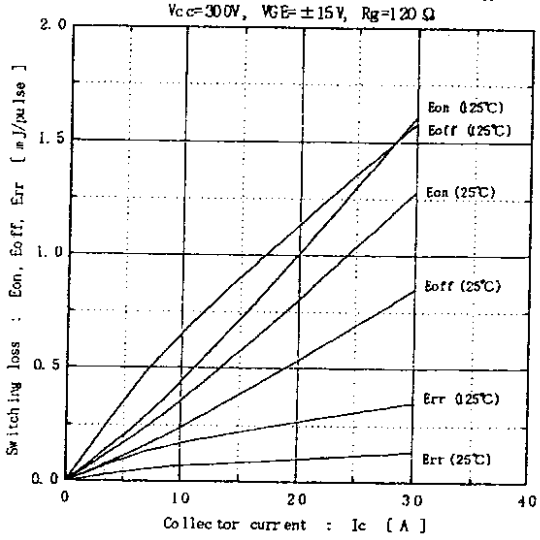
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω, Tj= 125℃



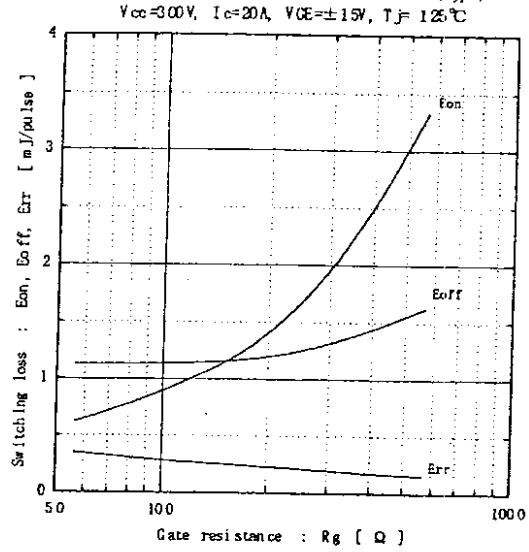
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=300V, Ic=20A, VGE=±15V, Tj= 25℃



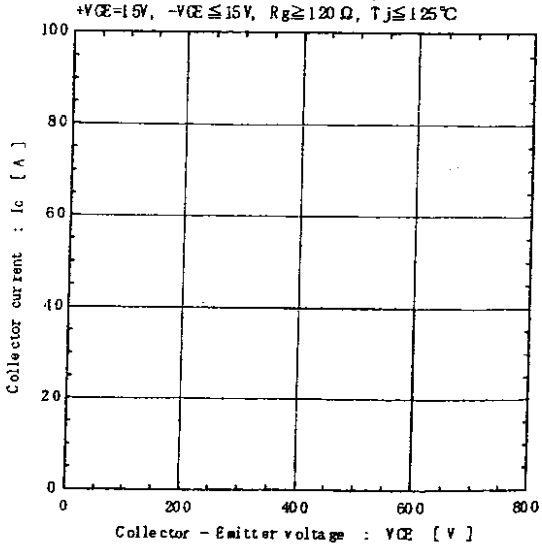
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=120Ω



[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=300V, Ic=20A, VGE=±15V, Tj= 125℃

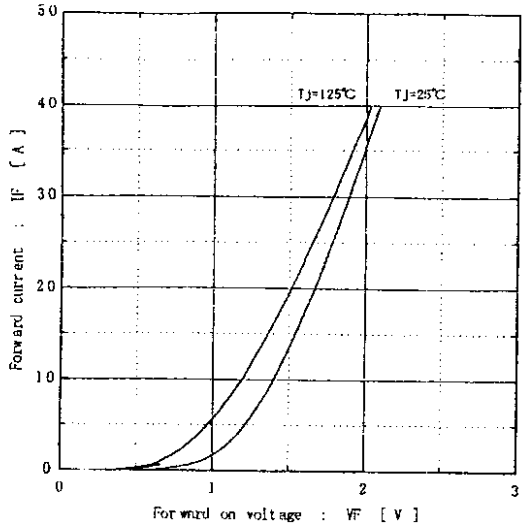


[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≦15V, Rg≧120Ω, Tj≦125℃



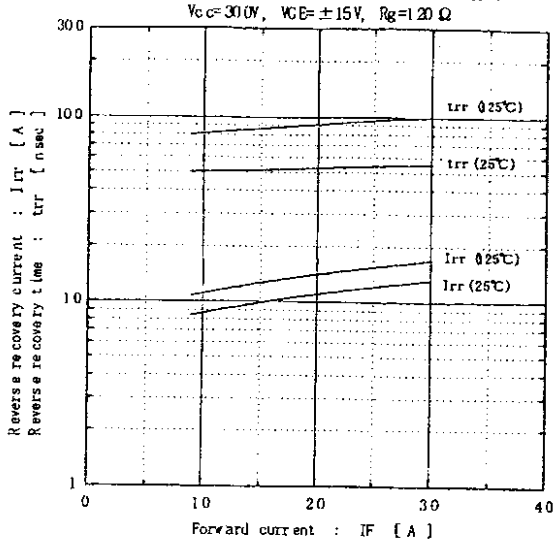
[Inverter]

Forward current vs. Forward on voltage (typ.)



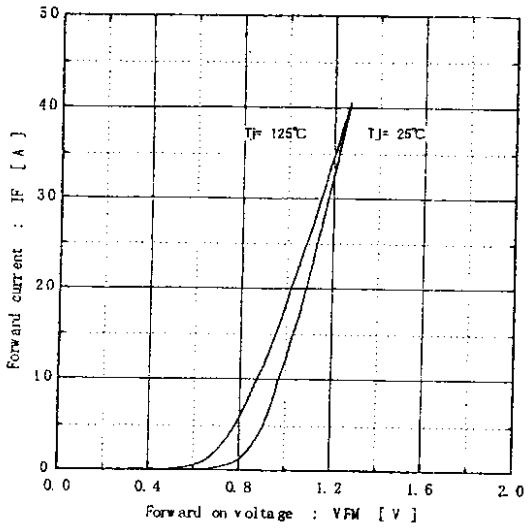
Reverse recovery characteristics (typ.)

Vcc=300V, VGE=±15V, Rg=120Ω

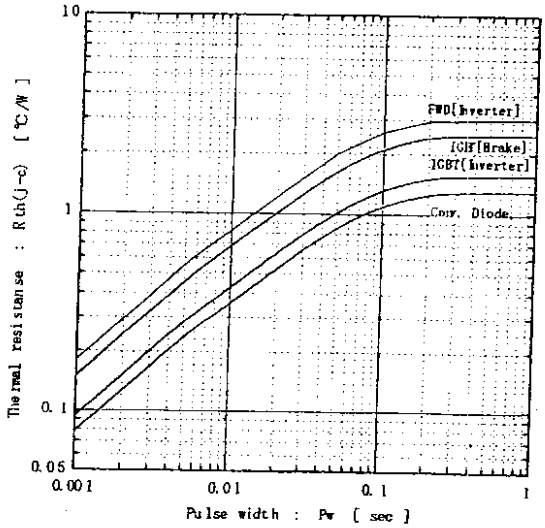


[Converter]

Forward current vs. Forward on voltage (typ.)

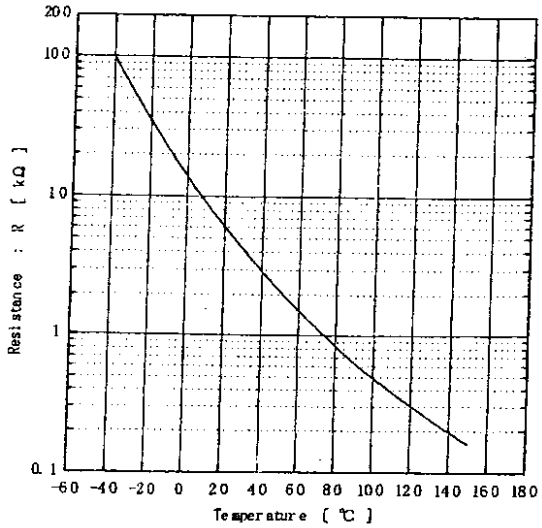


Transient thermal resistance

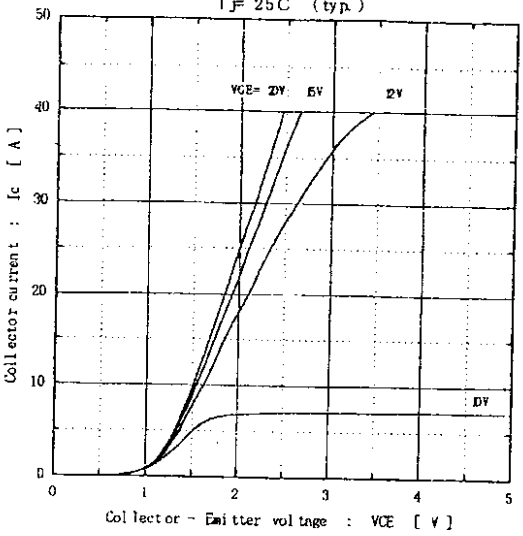


[Thermistor]

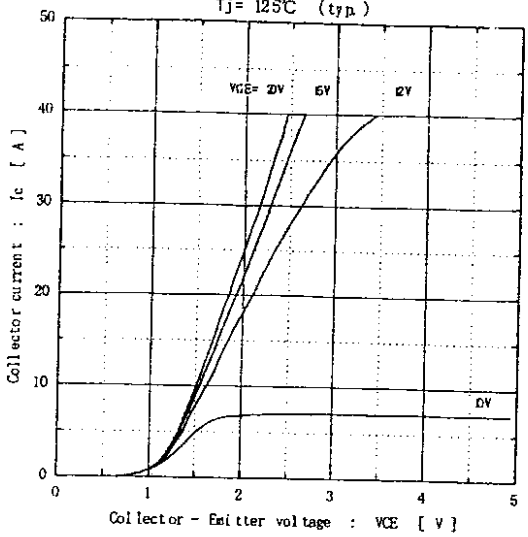
Temperature characteristic (typ.)



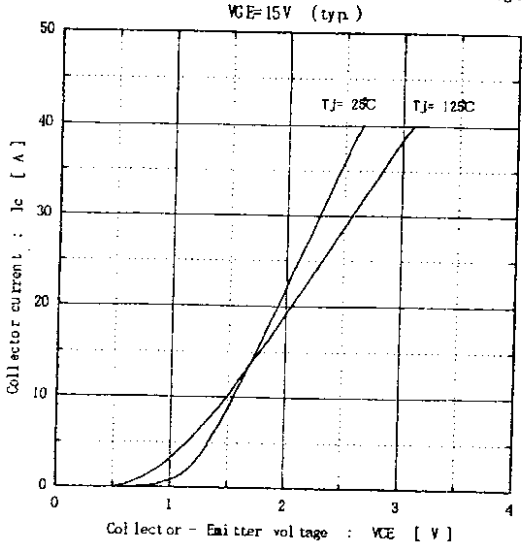
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



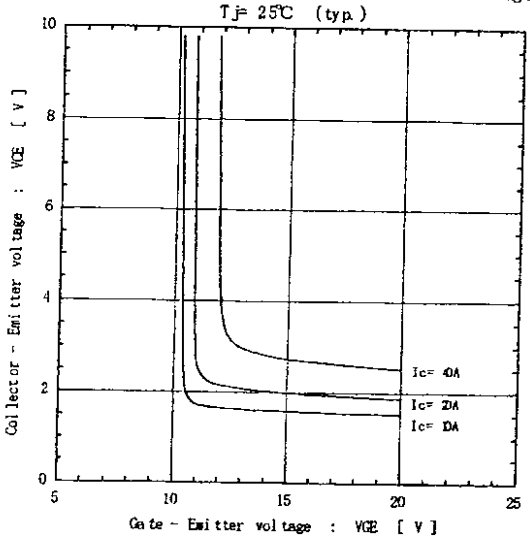
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



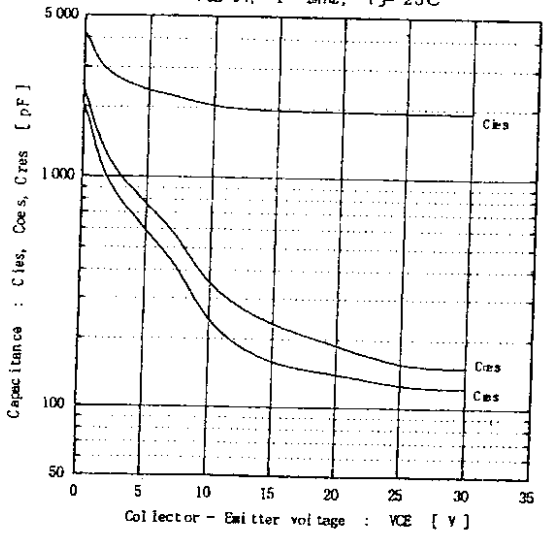
[Brake]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



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



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



[Brake]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=20A, Tj= 25℃