Messrs. Rockwell Automation

SPECIFICATION

Device Name : IGBT Module

Type Name : 7MBR15SA140E-01

Spec. No. : MS6M 0549

Date : Jun. - 02 - 2000

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Fuji Electric Co.,Ltd.
Matsumoto Factory

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

Fuji Electric Co.,Ltd.

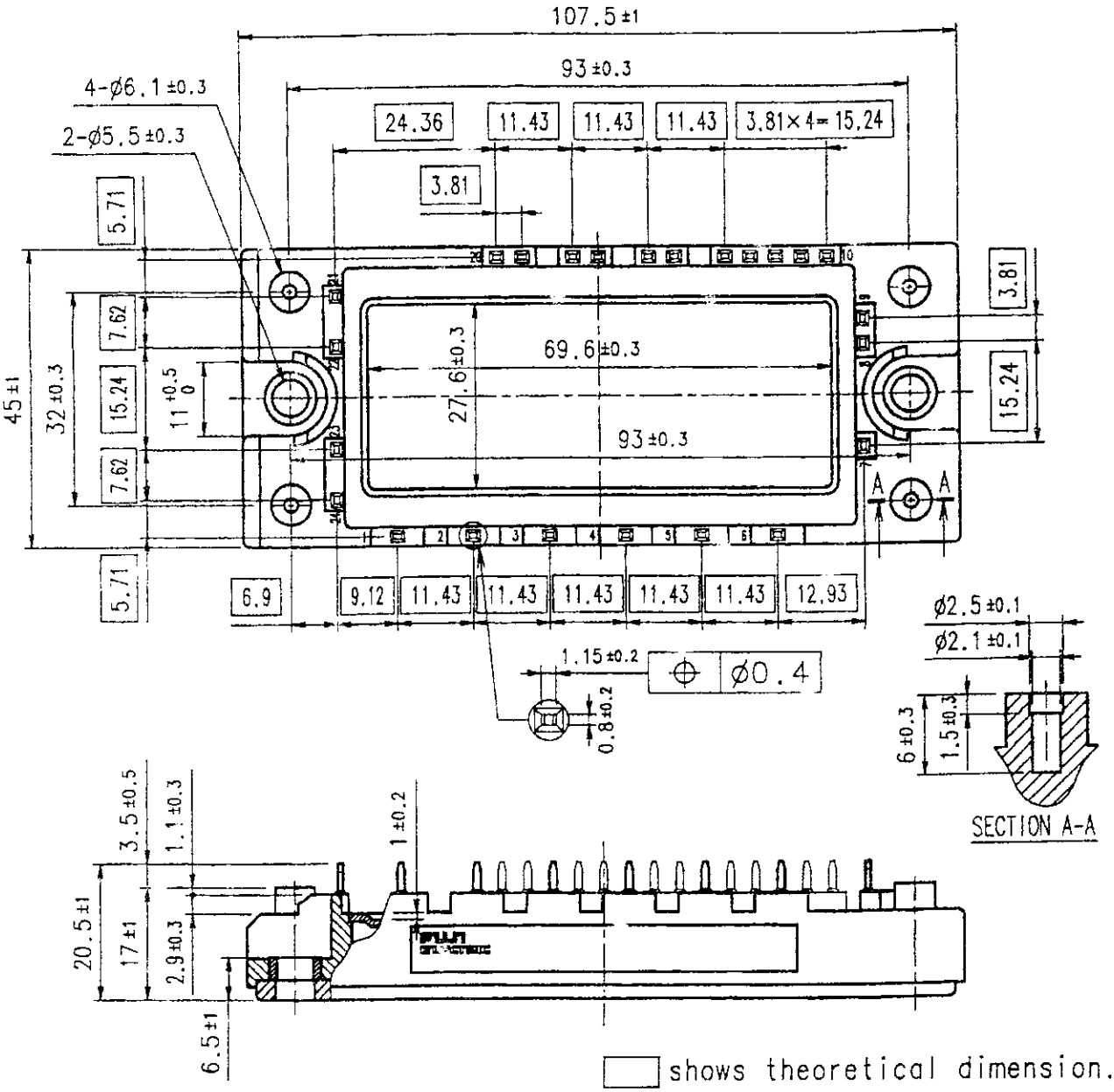
DWG.NO. MS6M 0549 1/10

Revised Records

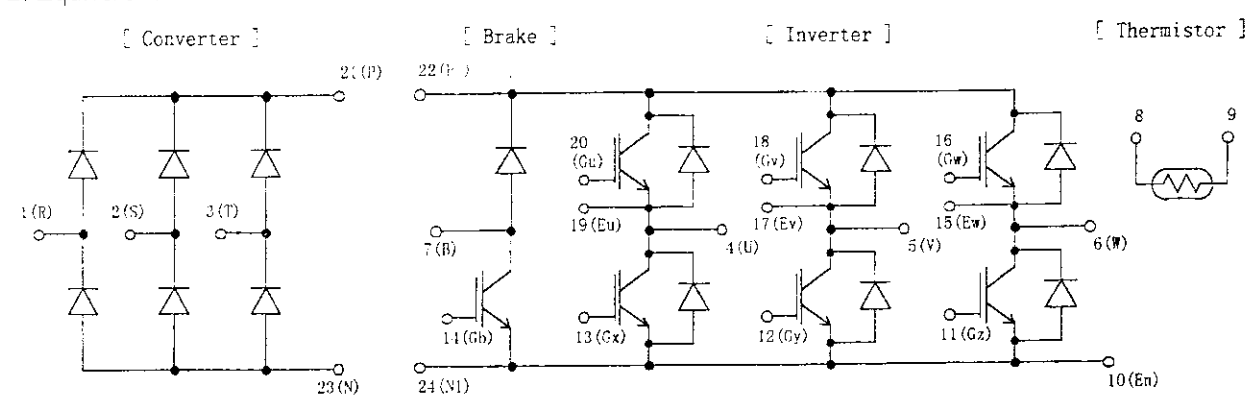
Date	Classi-fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Jun.-2-'00	enactment	——	————	Issued date	——	S.Mita	T.Miyasaka

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1. Outline Drawing (Unit : mm)



2. Equivalent circuit



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

Items		Symbols	Conditions		Maximum Ratings	Units
Inverter	Collector-Emitter voltage	VCES			1400	V
	Gate-Emitter voltage	VGES			+-20	V
	Collector current	Ic	Continuous	Tc=25C	25	A
				Tc=75C	15	
		Icp	1ms	Tc=25C	50	A
				Tc=75C	30	
		-Ic			15	A
	Collector Power Dissipation	Pc	1 device		110	W
Brake	Collector-Emitter voltage	VCES			1400	V
	Gate-Emitter voltage	VGES			+-20	V
	Collector current	Ic	Continuous	Tc=25C	25	A
				Tc=75C	15	
		Icp	1ms	Tc=25C	50	A
				Tc=75C	30	
	Collector Power Dissipation	Pc	1 device		110	W
	Repetitive peak reverse Voltage(Diode)	VRRM			1400	V
Converter	Repetitive peak reverse Voltage	VRRM			1600	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)

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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 1400 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 = 15 mA		5.5	7.2	8.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE 15 V, Ic = 15 A	chip		2.2		V
				terminal		2.25	2.7	
	Input capacitance	Cies	VGE 0 V, VCE 10 V f = 1 MHz			1800		pF
	Turn-on time	ton	Vcc= 800 V Ic = 15 A VGE +-15 V RG = 82 ohm			0.35	1.2	us
		tr				0.25	0.6	
		$tr_{(i)}$				0.1		
	Turn-off time	toff				0.45	1.0	
		tf				0.08	0.3	
	Forward on voltage	VF	IF = 15 A	chip		2.4		V
				terminal		2.45	3.3	
	Reverse recovery time	trr	IF = 15 A				350	ns
Brake	Zero gate voltage Collector current	ICES	VGE 0 V, VCE 1400 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 = 15 A	chip		2.2		V
				terminal		2.3	2.7	
	Turn-on time	ton	Vcc= 800 V Ic = 15 A VGE +-15 V RG = 82 ohm			0.35	1.2	us
		tr				0.25	0.6	
	Turn-off time	toff				0.45	1.0	
		tf				0.08	0.3	
	Reverse current	IRRM	VR = 1400 V				1.0	mA
Converter	Forward on voltage	VFM	IF = 15 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

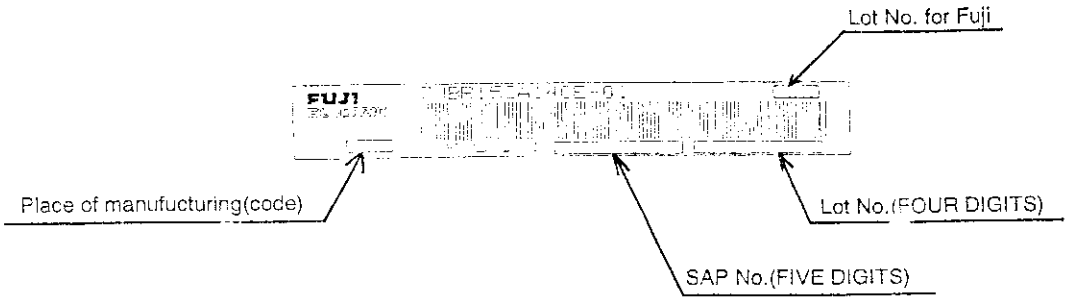
5. Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	typ.	Max.	Units
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			1.14	C/W
		Inverter FWD			1.85	
		Brake IGBT			1.14	
		Converter Diode			0.90	
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.

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6. Indication on module



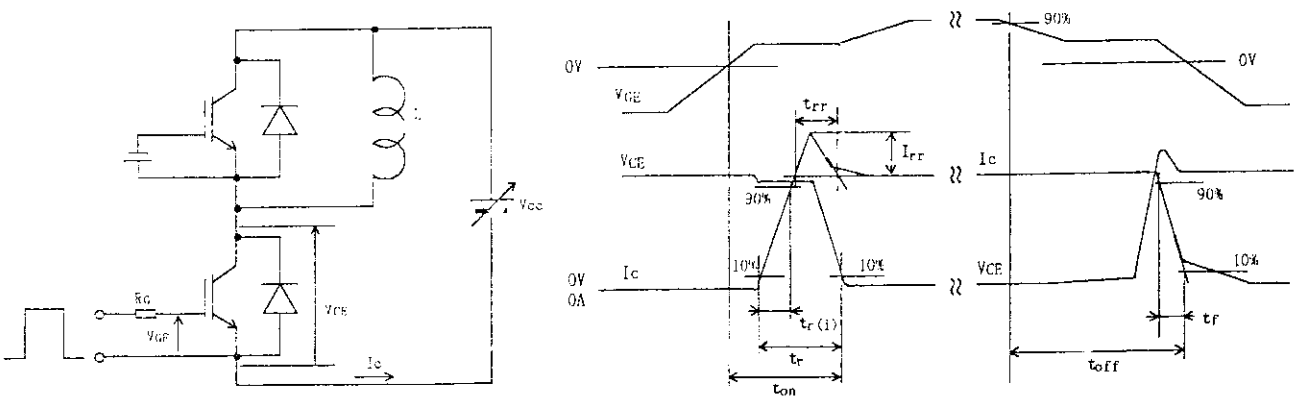
7. Applicable category

This specification is applied to Power Integrated Module named 7MBR15SA140E-01 .

8. 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℃ 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.

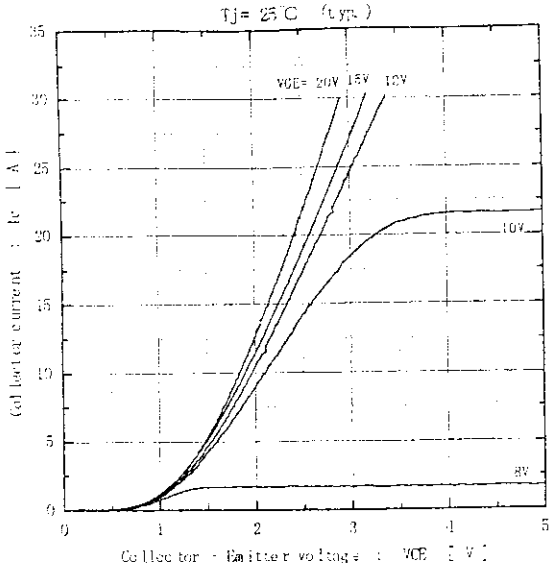
9. Definitions of switching time



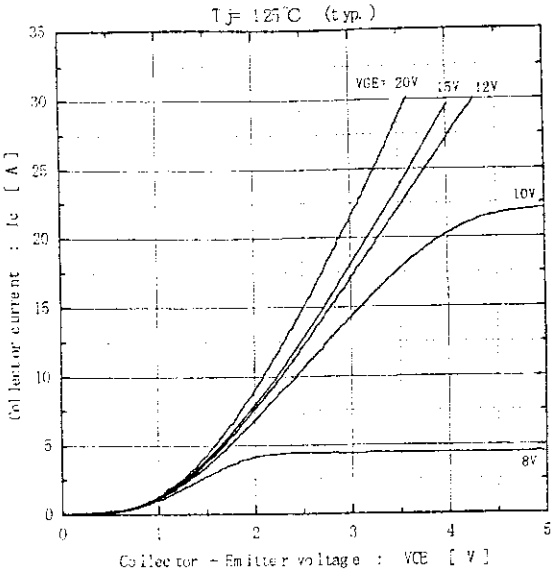
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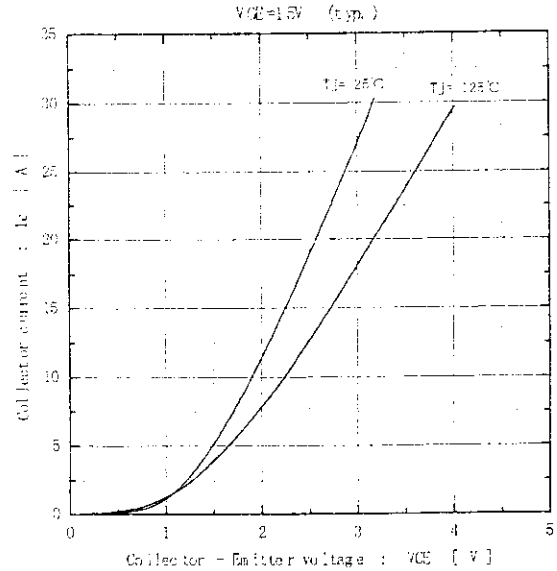
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Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



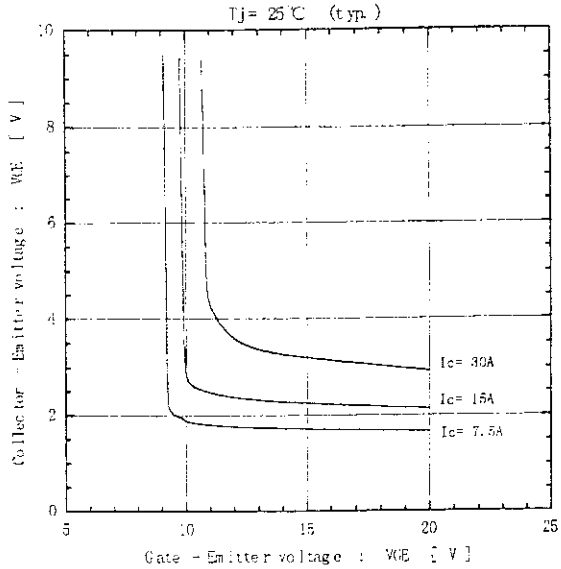
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



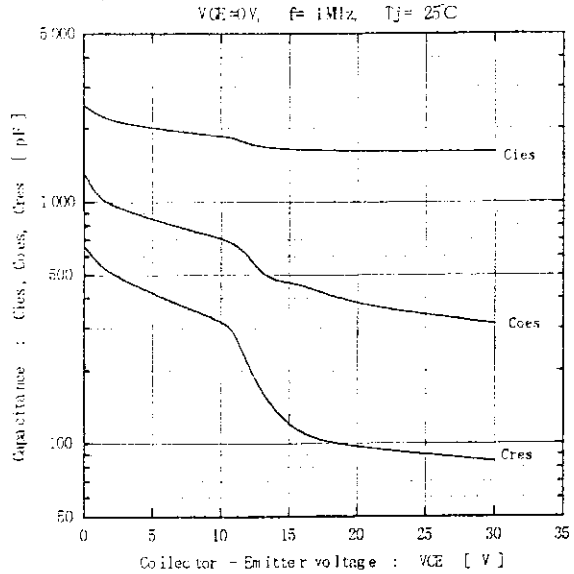
[Inverter]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



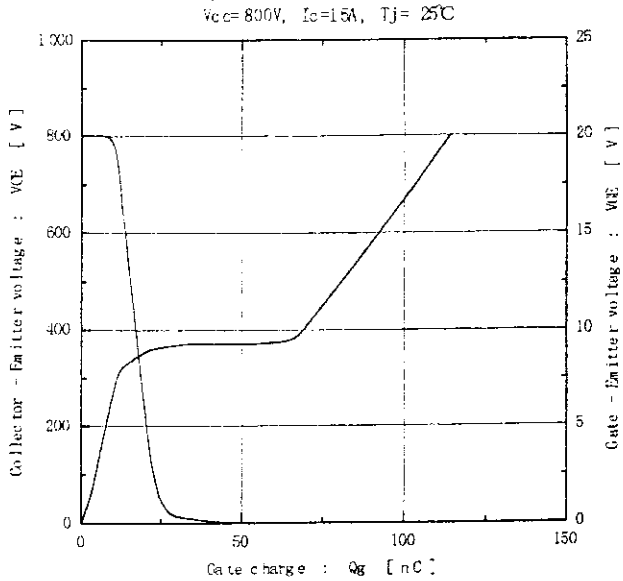
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25℃ (typ.)



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

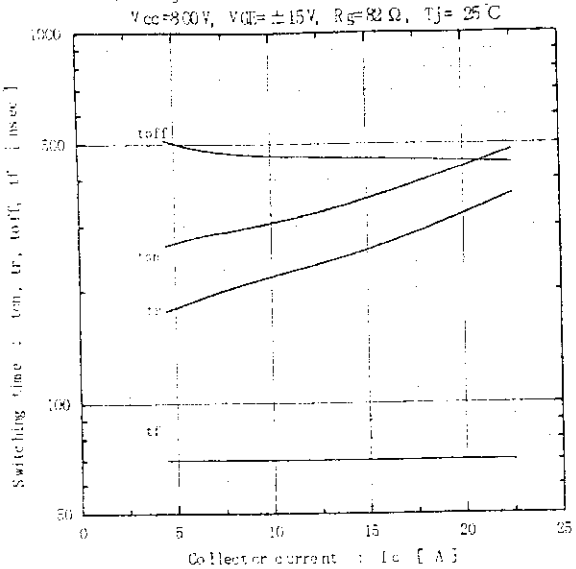


[Inverter]
Dynamic Gate charge (typ.)
Vcc= 300V, Ic=15A, Tj= 25℃

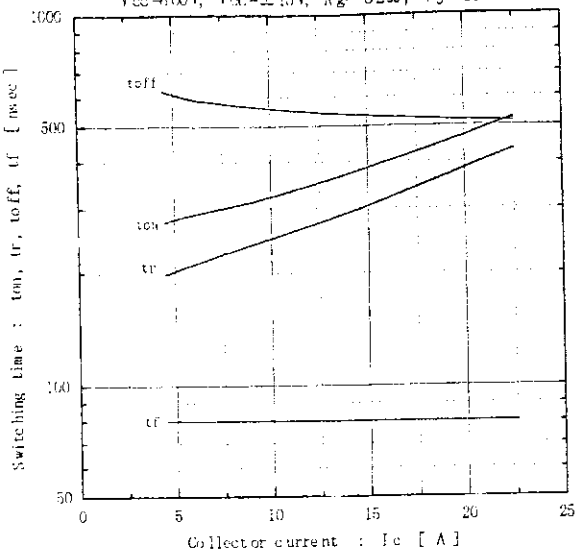


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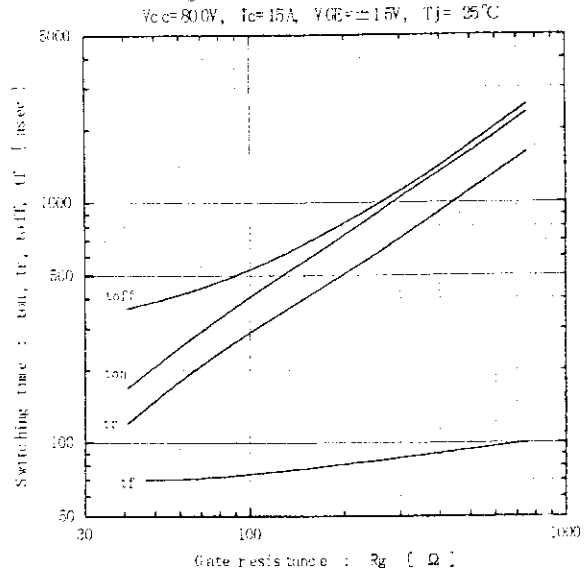
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=800V, VGE=±15V, Rg=82Ω, Tj= 25℃



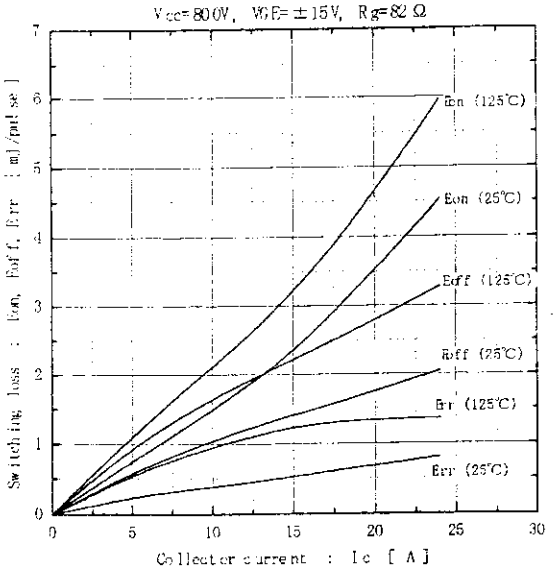
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=800V, VGE=±15V, Rg= 82Ω, Tj= 125℃



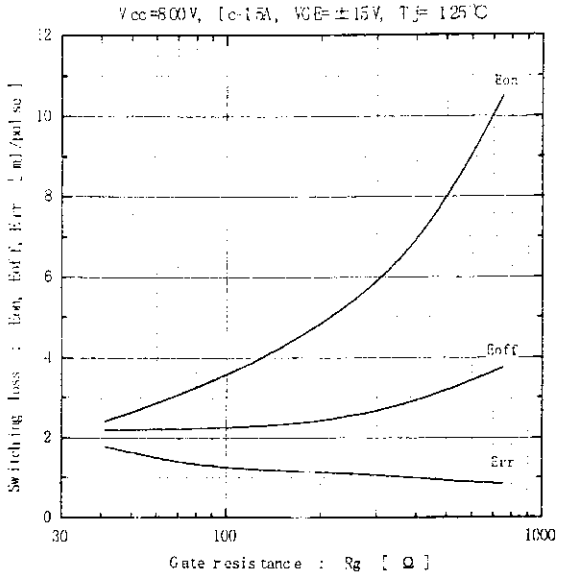
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=800V, Ic=15A, VGE=±15V, Tj= 25℃



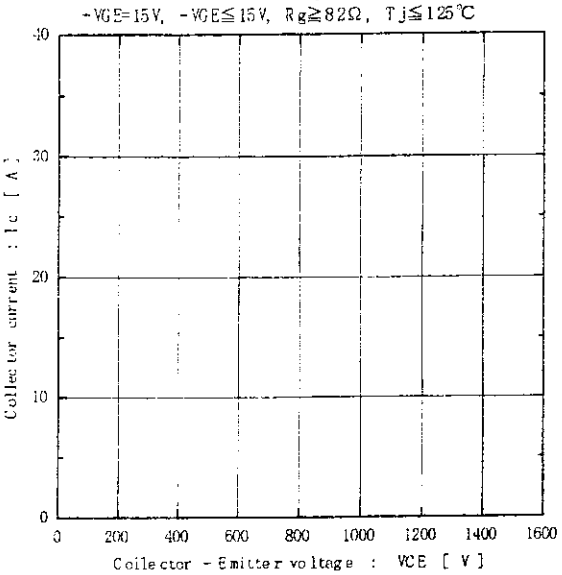
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=800V, VGE=±15V, Rg=82Ω



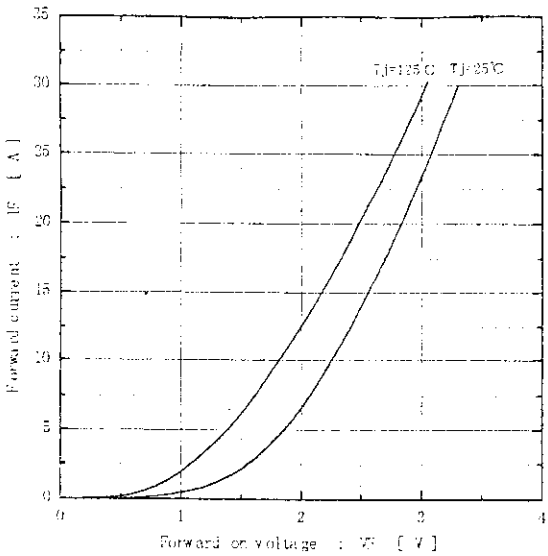
[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=800V, Ic=15A, VGE=±15V, Tj= 125℃



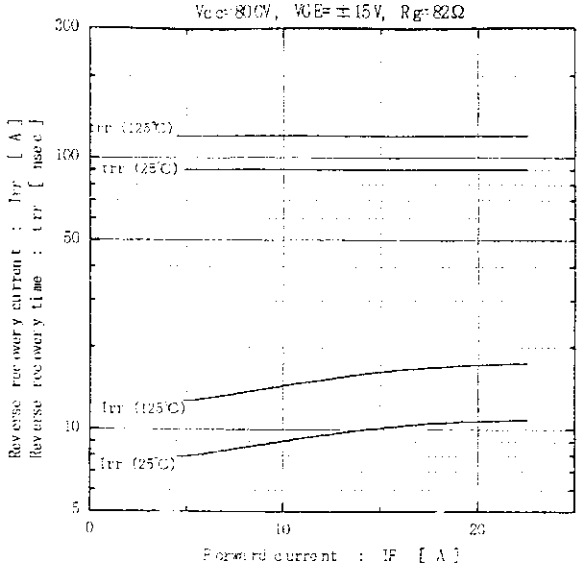
[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≦15V, Rg≧82Ω, Tj≦125℃



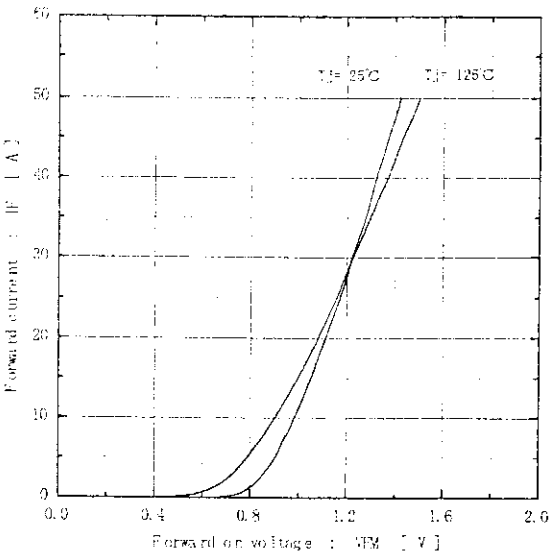
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Forward current vs. Forward on voltage (typ.)



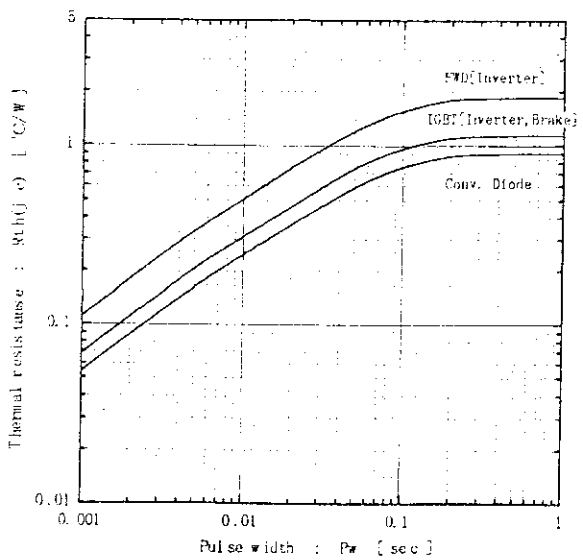
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Reverse recovery characteristics (typ.)
Vcc=800V, VGE=±15V, Rg=82Ω



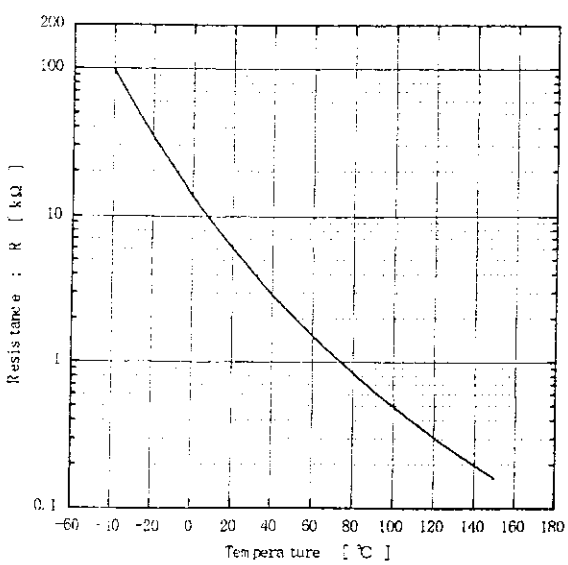
[Converter]
Forward current vs. Forward on voltage (typ.)



Transient thermal resistance



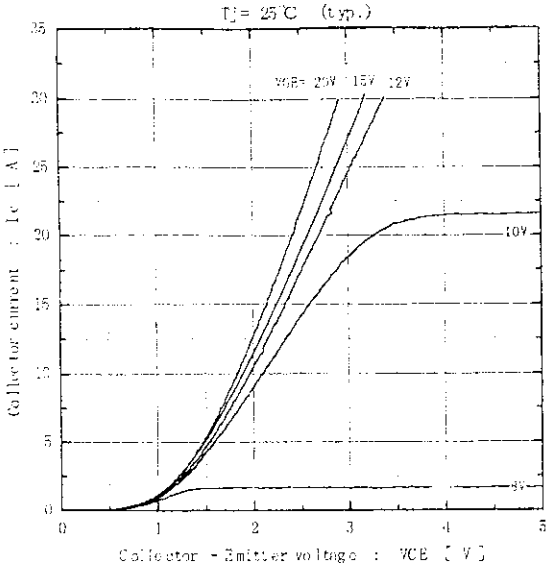
[Thermistor]
Temperature characteristic (typ.)



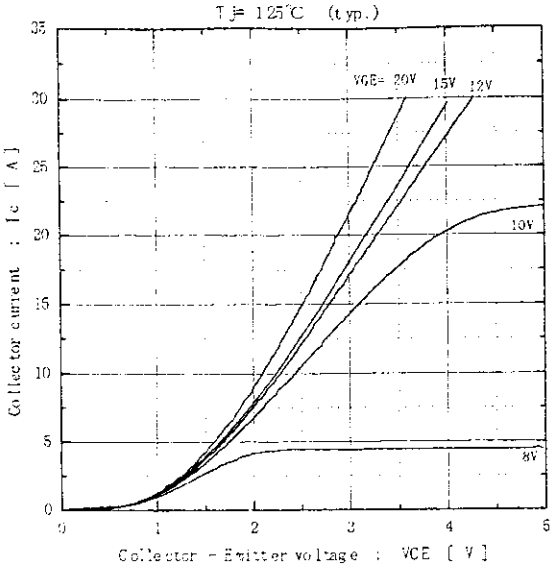
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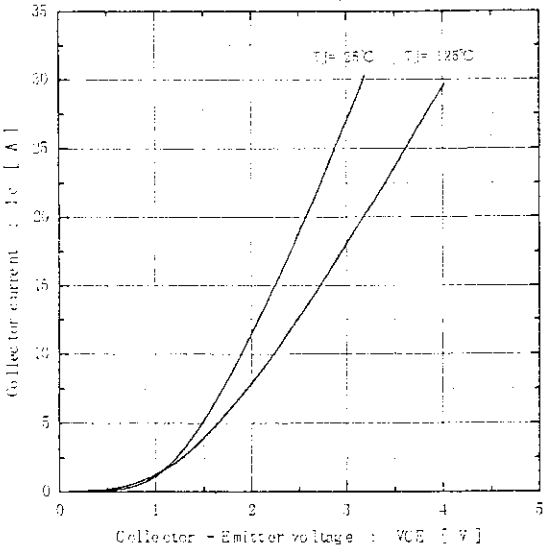
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 25℃ (typ.)



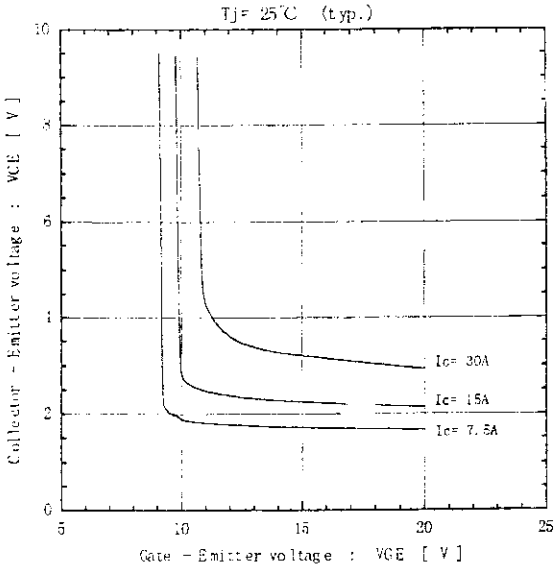
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 125℃ (typ.)



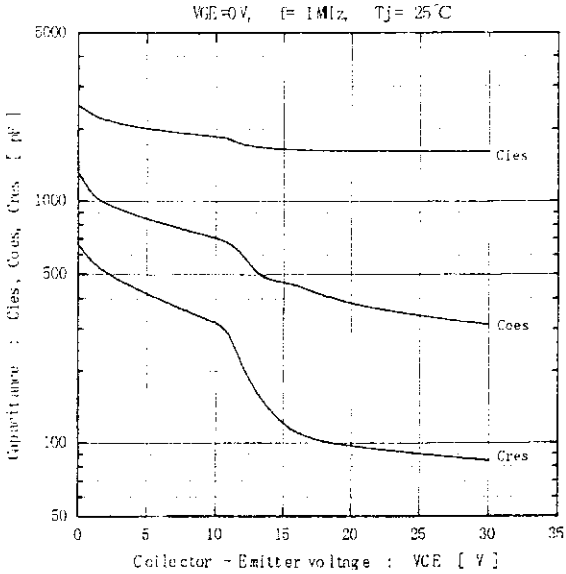
[Brake]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



[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=800V, Ic=15A, Tj= 25℃

