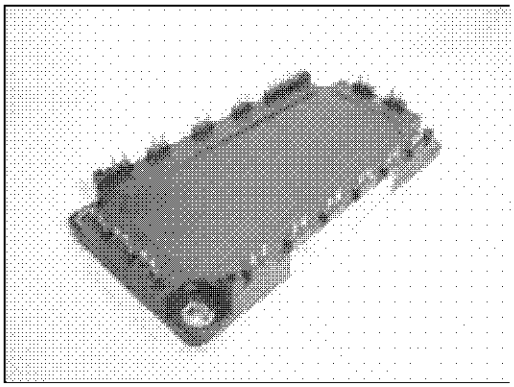
IGBT MODULE (S series)
600V / 100A / PIM



■ Features

- Low V_{CE}(sat)
- Compact package
- P.C. board mount
- Converter diode bridge, Dynamic brake circuit

■ Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

■ Maximum ratings and characteristics

● Absolute maximum ratings (Tc=25°C unless without specified)

Item		Symbol	Condition	Rating	Unit
Inverter	Collector-Emitter voltage	V_{CES}		600	V
	Gate-Emitter voltage	V_{GES}		±20	V
	Collector current	I_C	Continuous	100	A
		I_{CP}	1ms	200	A
		$-I_C$		100	A
	Collector power dissipation	P_C	1 device	400	W
Brake	Collector-Emitter voltage	V_{CES}		600	V
	Gate-Emitter voltage	V_{GES}		±20	V
	Collector current	I_C	Continuous	50	A
		I_{CP}	1ms	100	A
	Collector power dissipation	P_C	1 device	200	W
	Repetitive peak reverse voltage	V_{RRM}		600	V
Converter	Repetitive peak reverse voltage	V_{RRM}		800	V
	Average output current	I_O	50Hz/60Hz sine wave	100	A
	Surge current (Non-Repetitive)	I_{FSM}	Tj=150°C, 10ms	700	A
	I^2t (Non-Repetitive)	I^2t	half sine wave	2450	A^2s
Operating junction temperature		T_j		+150	°C
Storage temperature		T_{stg}		-40 to +125	°C
Isolation between terminal and copper base *2		V_{iso}	AC : 1 minute	AC 2500	V
voltage between thermistor and others *3				AC 2500	V
Mounting screw torque				3.5 *1	N·m

*1 Recommendable value : 2.5 to 3.5 N·m (M5)

*2 All terminals should be connected together when isolation test will be done.

*3 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.

● **Electrical characteristics (Tj=25°C unless otherwise specified)**

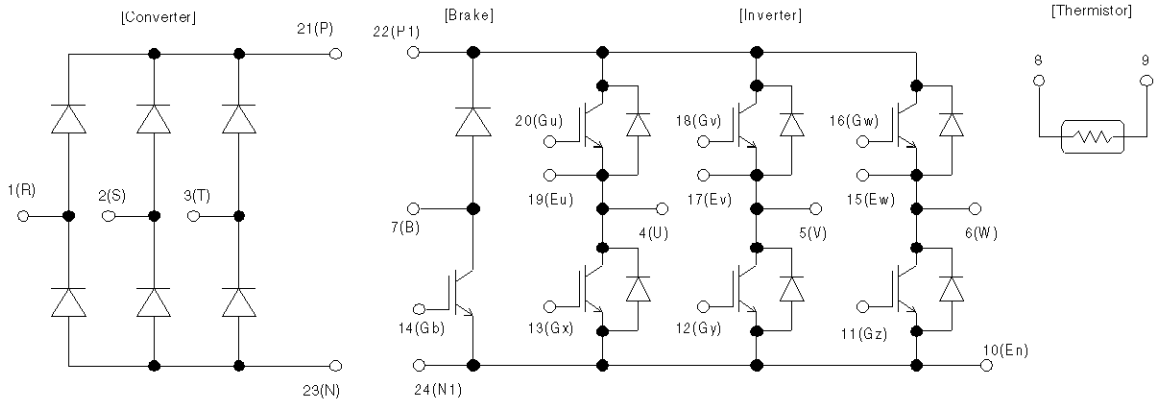
Item		Symbol	Condition		Characteristics			Unit
					Min.	Typ.	Max.	
Inverter	Zero gate voltage collector current	I_{CES}	V_{CE}=600V, V_{GE}=0V				1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V				0.2	μA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE}=20V, I_C=100mA		5.5	7.8	8.5	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, Ic=100A	chip		1.8		V
				terminal		2.15	2.6	
	Input capacitance	Cies	V_{GE}=0V, V_{CE}=10V, f=1MHz			10000		pF
	Turn-on time	t_{on}	V_{CC}=300V			0.45	1.2	μs
		t_r	I_C=100A			0.25	0.6	
		$t_{r(i)}$	V_{GE}=±15V			0.08		
	Turn-off	t_{off}	R_G=24Ω			0.40	1.0	
		t_f				0.05	0.35	
	Forward on voltage	V_F	I_F=100A	chip		1.6		V
				terminal		1.95	2.7	
	Reverse recovery time of FRD	t_{rr}	I_F=100A				0.3	μs
Brake	Zero gate voltage collector current	I_{CES}	V_{CES}=600V, V_{GE}=0V				1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V				0.2	μA
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	I_C=50A, V_{GE}=15V	chip		1.8		V
				terminal		2.05	2.5	
	Turn-on time	t_{on}	V_{CC}=300V			0.45	1.2	μs
		t_r	I_C=50A			0.25	0.6	
	Turn-off time	t_{off}	V_{GE}=±15V			0.40	1.0	
		t_f	R_G=51Ω			0.05	0.35	
	Reverse current	I_{RRM}	V_R=600V				1.0	mA
Converter	Forward on voltage	V_{FM}	I_F=100A	chip		1.1		V
				terminal		1.2	1.5	
	Reverse current	I_{RRM}	V_R=800V				1.0	mA
Thermistor	Resistance	R	T=25°C			5000		Ω
			T=100°C		465	495	520	
	B value	B	T=25/50°C		3305	3375	3450	K

● **Thermal resistance Characteristics**

Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			0.31	°C/W
		Inverter FWD			0.70	
		Brake IGBT			0.63	
		Converter Diode			0.47	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

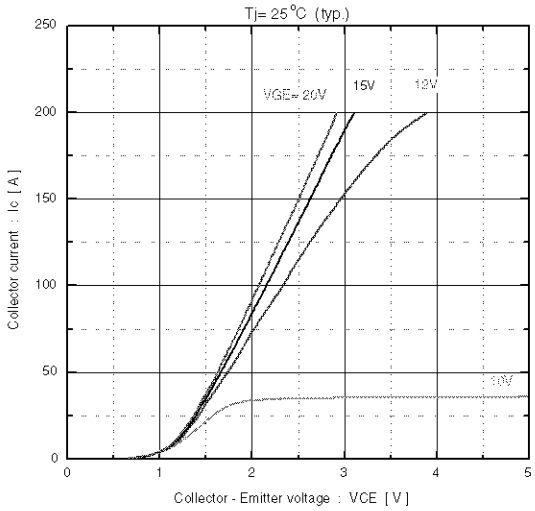
* This is the value which is defined mounting on the additional cooling fin with thermal compound

■ Equivalent Circuit Schematic

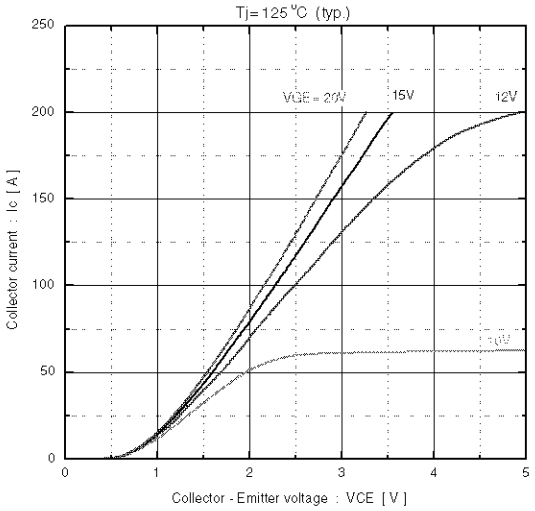


■ Characteristics (Representative)

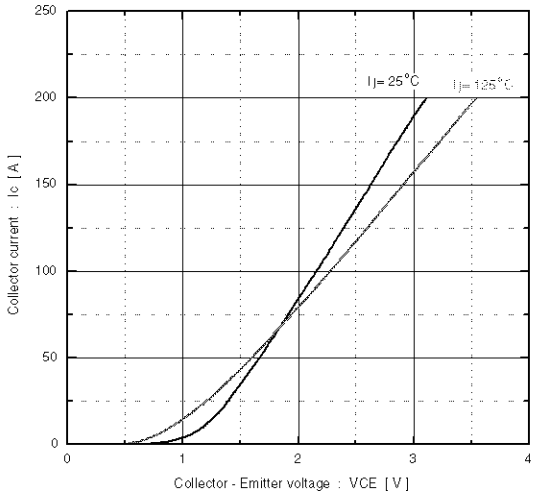
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 25 °C (typ.)



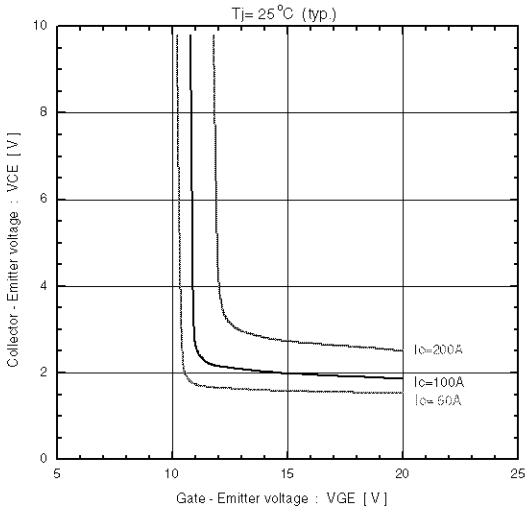
[Inverter]
Collector current vs. Collector-Emitter voltage
Tj= 125 °C (typ.)



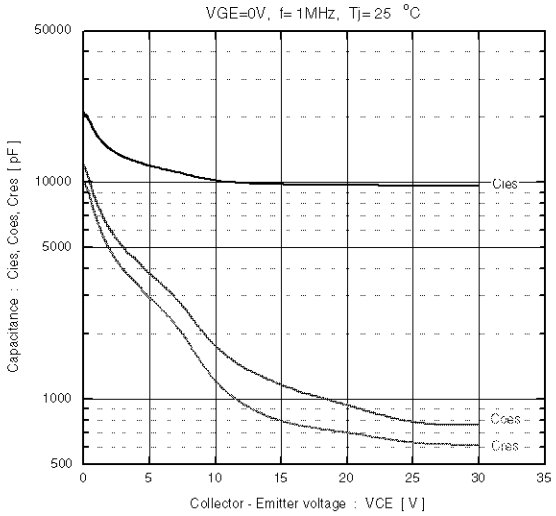
[Inverter]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



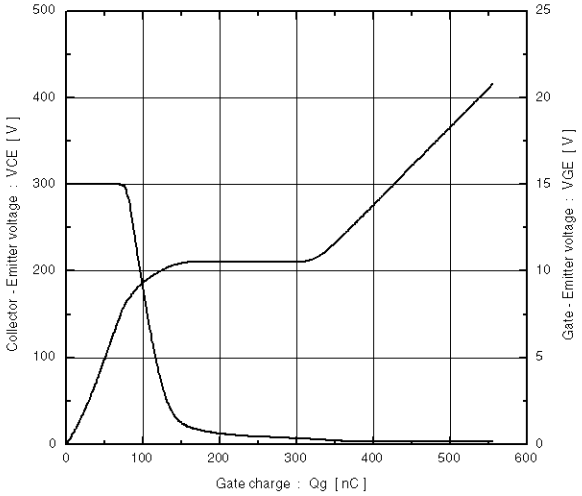
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25 °C (typ.)



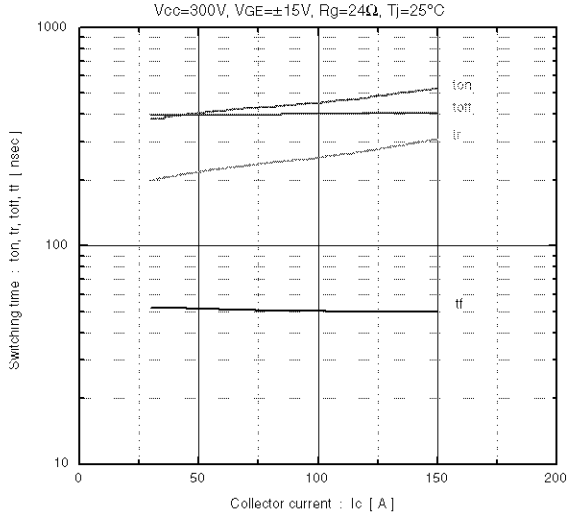
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25 °C



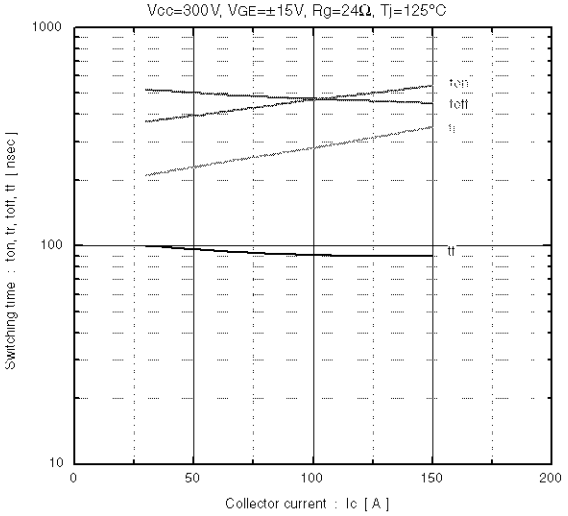
[Inverter]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=100A, Tj= 25 °C



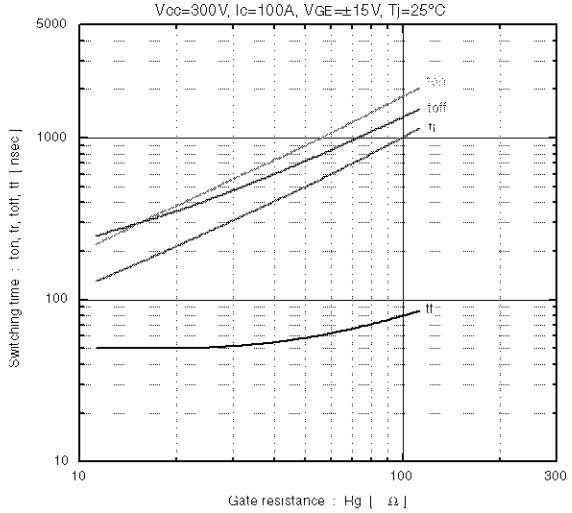
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=24Ω, Tj=25°C



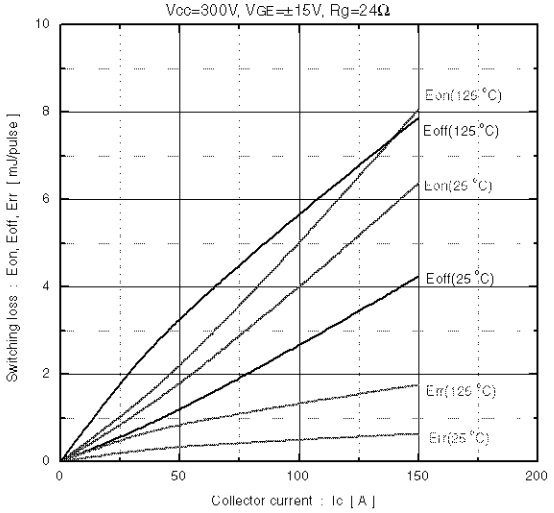
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=24Ω, Tj=125°C



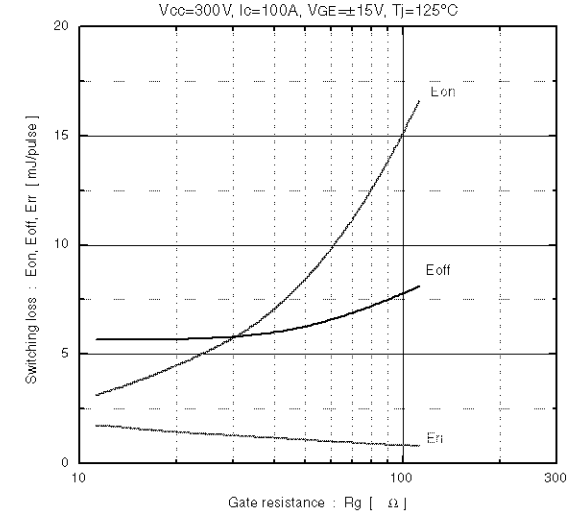
[Inverter]
Switching time vs. Gate resistance (typ.)
Vcc=300V, Ic=100A, VGE=±15V, Tj=25°C



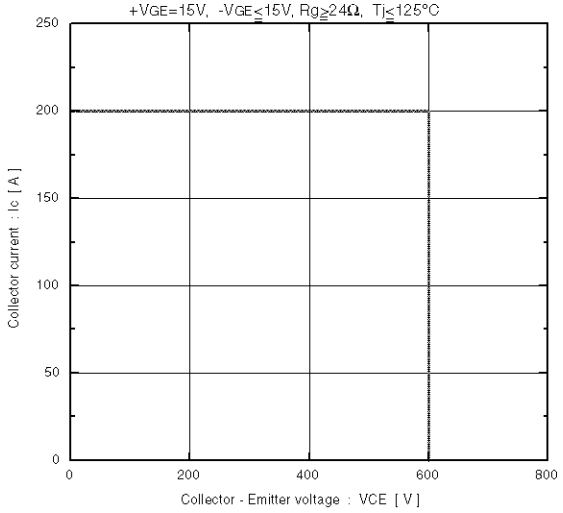
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=24Ω



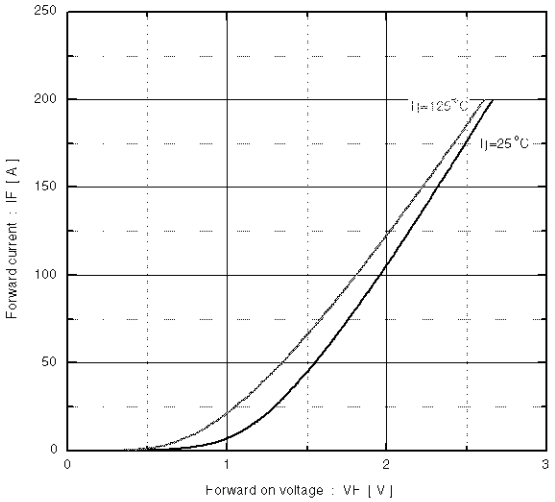
[Inverter]
Switching loss vs. Gate resistance (typ.)
Vcc=300V, Ic=100A, VGE=±15V, Tj=125°C



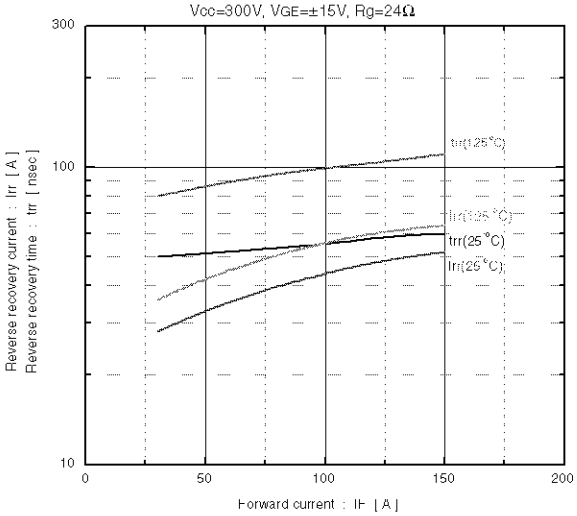
[Inverter]
Reverse bias safe operating area
+VGE=15V, -VGE≦15V, Rg≧24Ω, Tj≦125°C



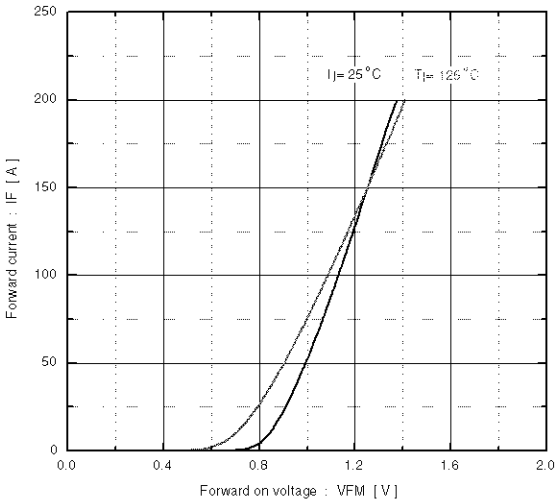
[Inverter]
Forward current vs. Forward on voltage (typ.)



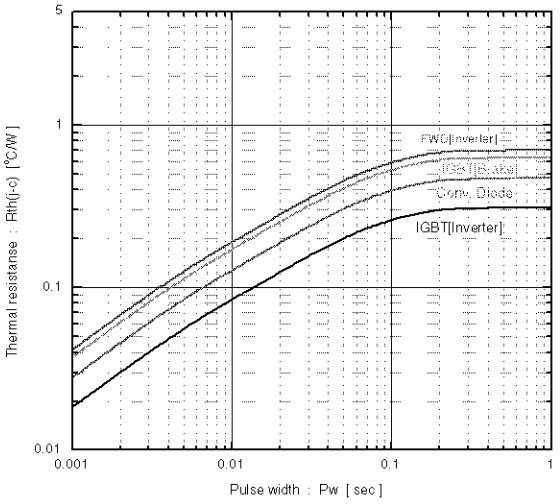
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=300V, VGE=±15V, Rg=24Ω



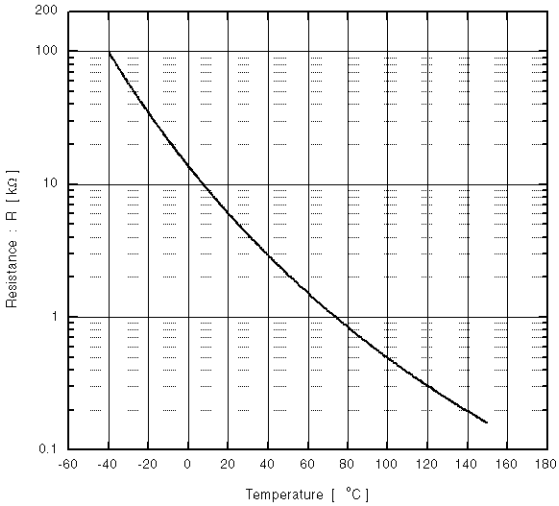
[Converter]
Forward current vs. Forward on voltage (typ.)



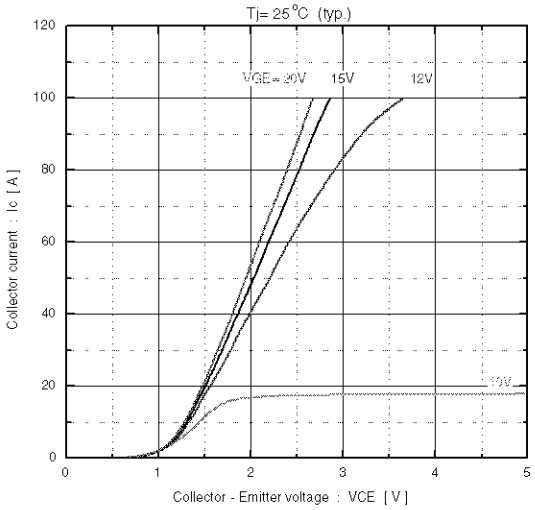
Transient thermal resistance



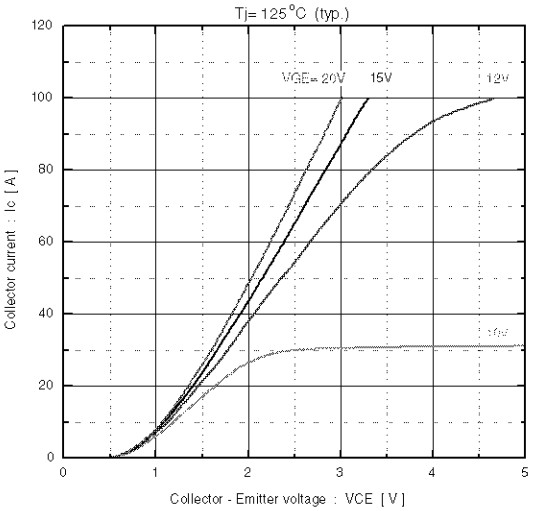
[Thermistor]
Temperature characteristic (typ.)



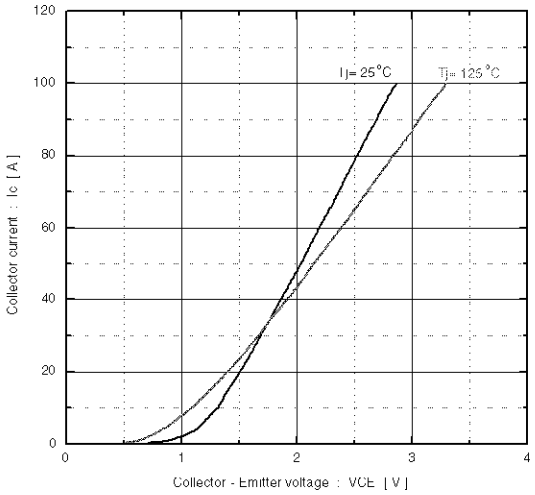
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 25°C (typ.)



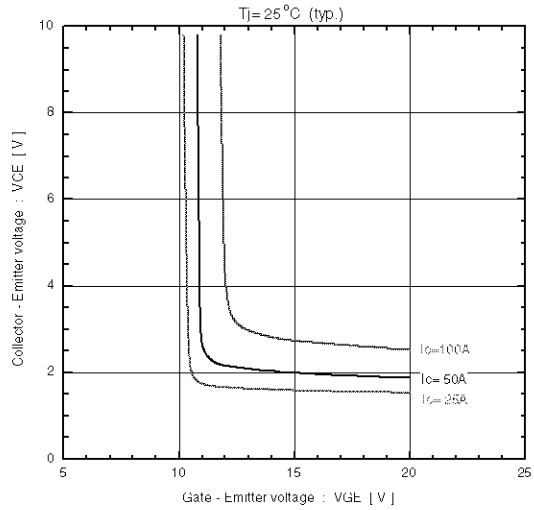
[Brake]
Collector current vs. Collector-Emitter voltage
Tj= 125°C (typ.)



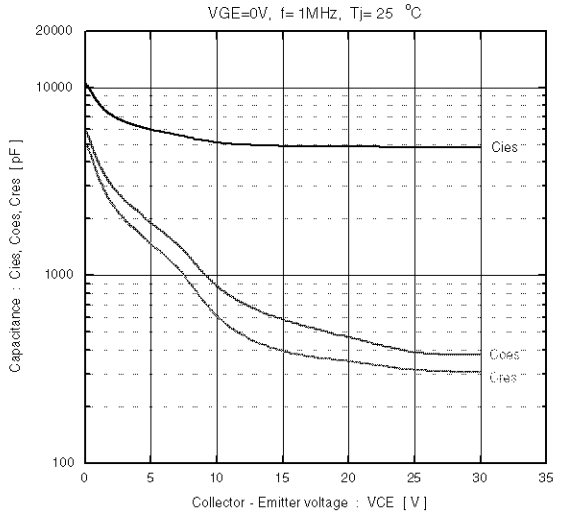
[Brake]
Collector current vs. Collector-Emitter voltage
VGE=15V (typ.)



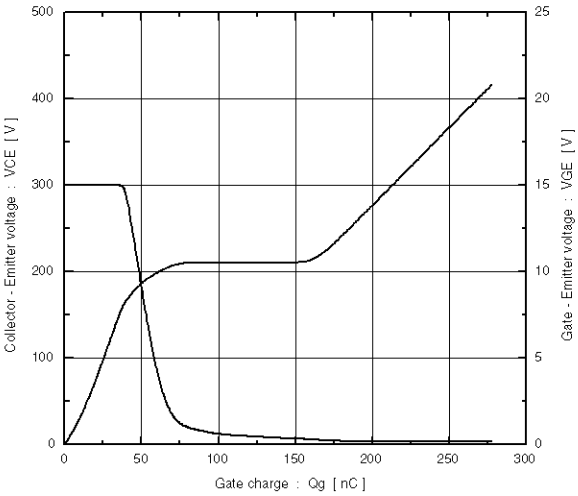
[Brake]
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25°C (typ.)



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



[Brake]
Dynamic Gate charge (typ.)
Vcc=300V, Ic=50A, Tj= 25 °C



■ Outline Drawings, mm

