

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



■ Features

- Low $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit

■ Applications

- Inverter for Motoe Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

■ Maximum ratings and characteristics

● Absolute maximum ratings ($T_c=25^{\circ}\text{C}$ unless otherwise 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
		-I _C pulse	1ms	200	
Collector power dissipation	P _C	1 device	378	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	187	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}	T _J =150°C, 10ms	700	A
	I ² t (Non-Repetitive)	I ² t	half sine wave	2450	A ² s
Operating junction temperature		T _J		+150	°C
Storage temperature		T _{slg}		-40 to +125	°C
Isolation voltage	between terminal and copper base *2	V _{iso}	AC : 1 minute	AC 2500	V
	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 Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

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

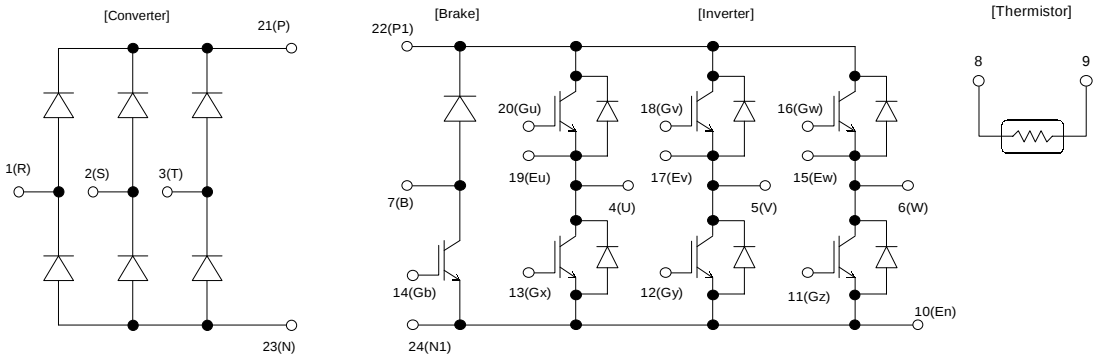
Item		Symbol	Condition		Characteristics			Unit
					Min.	Typ.	Max.	
Inverter	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V				200	nA
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, IC=100mA		6.2	6.7	7.7	V
	Collector-Emitter saturation voltage	VCE(sat) (terminal)	VGE=15V IC=100A	Tj=25°C		2.30	2.60	V
				Tj=125°C		2.50		
		VCE(sat) (chip)		Tj=25°C		1.85		
				Tj=125°C		2.00		
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			8.4		nF
	Turn-on time	ton	VCC=300V IC=100A VGE=±15V			0.51	1.20	μs
		tr				0.22	0.60	
		tr(i)				0.16		
	Turn-off time	toff	RG=33Ω			0.58	1.20	
		tr				0.07	0.45	
	Forward on voltage	VF (terminal)	VGE=0V IF=100A	Tj=25°C		2.10	2.40	V
				Tj=125°C		2.40		
		VF (chip)		Tj=25°C		1.60		
				Tj=125°C		1.65		
	Reverse recovery time	trr	IF=100A				0.35	μs
Brake	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V				1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V				200	nA
	Collector-Emitter saturation voltage	VCE(sat) (terminal)	IC=50A VGE=15V	Tj=25°C		2.10	2.40	V
				Tj=125°C		2.40		
		VCE(sat) (chip)		Tj=25°C		1.85		
				Tj=125°C		2.15		
	Turn-on time	ton	VCC=300V IC=50A VGE=±15V			0.42	1.20	μs
		tr				0.24	0.60	
	Turn-off time	toff	RG=68Ω			0.42	1.20	
		tr				0.03	0.45	
	Reverse current	IRRM	VR=600V				1.0	mA
Converter	Forward on voltage	VFM	IF=100A VGE=0V	terminal chip	1.20 1.10	1.50	V	
	Reverse current	IRRM	VR=800V					1.0
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

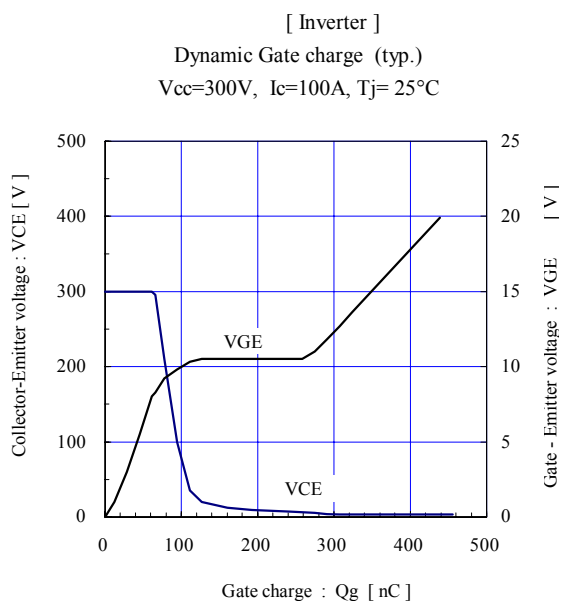
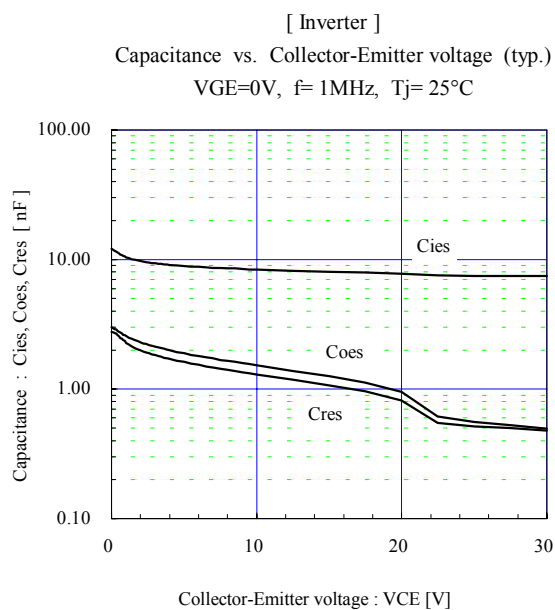
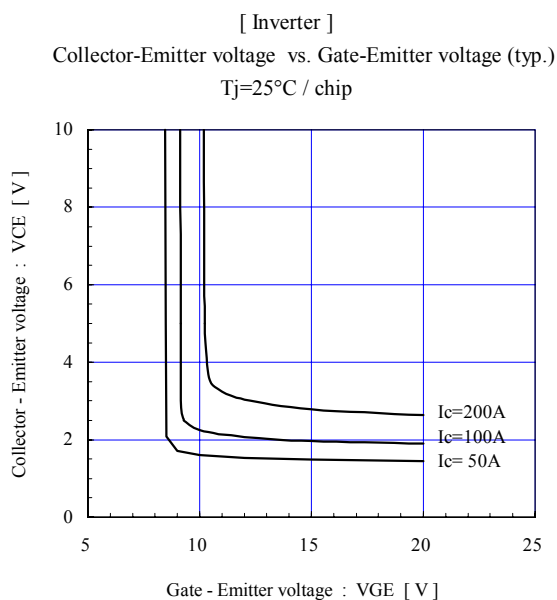
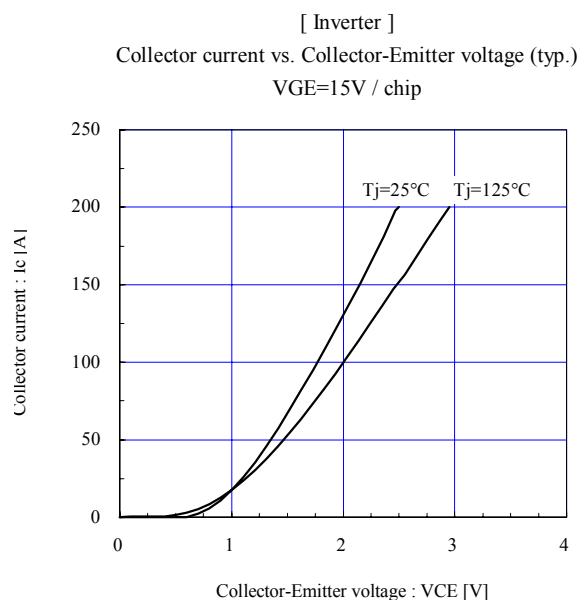
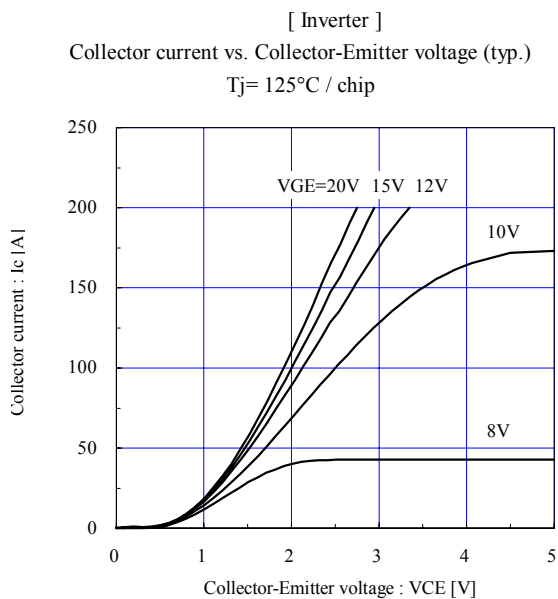
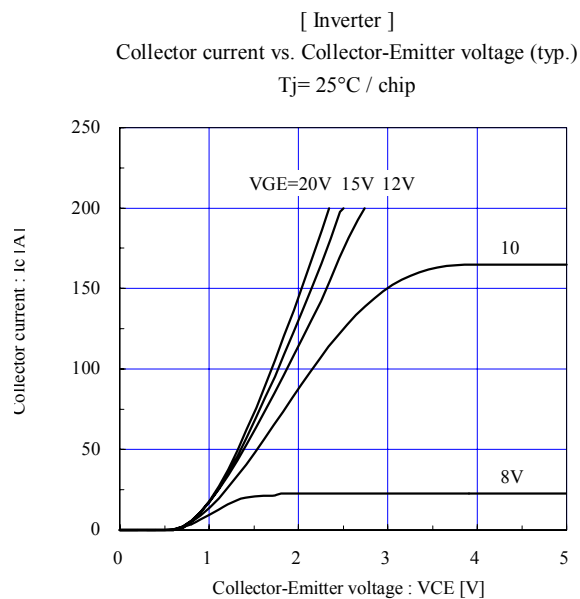
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance (1 device)	Rth(j-c)	Inverter IGBT			0.33	°C/W
		Inverter FWD			0.67	
		Brake IGBT			0.67	
		Converter Diode			0.47	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

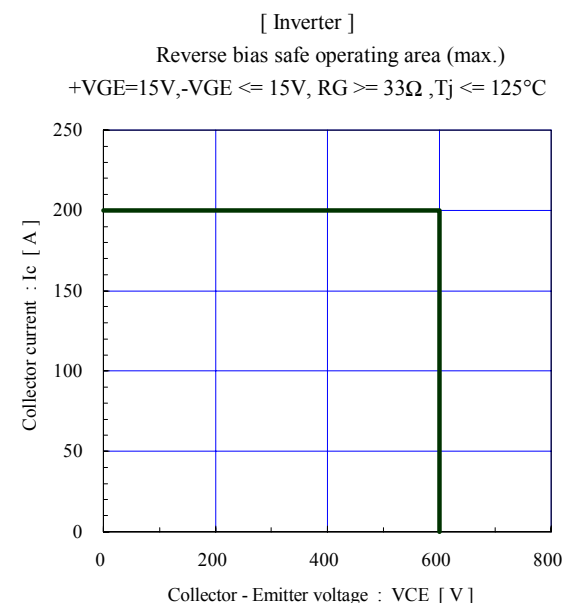
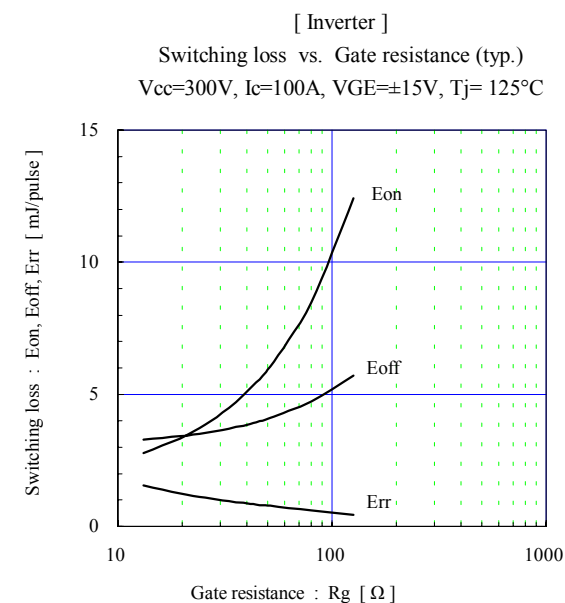
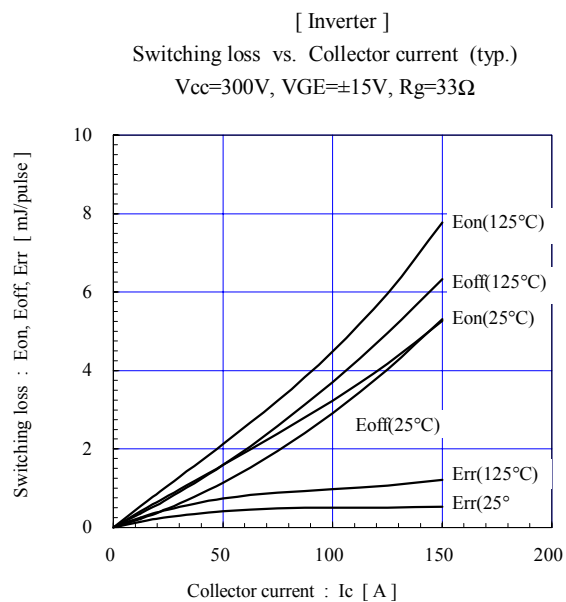
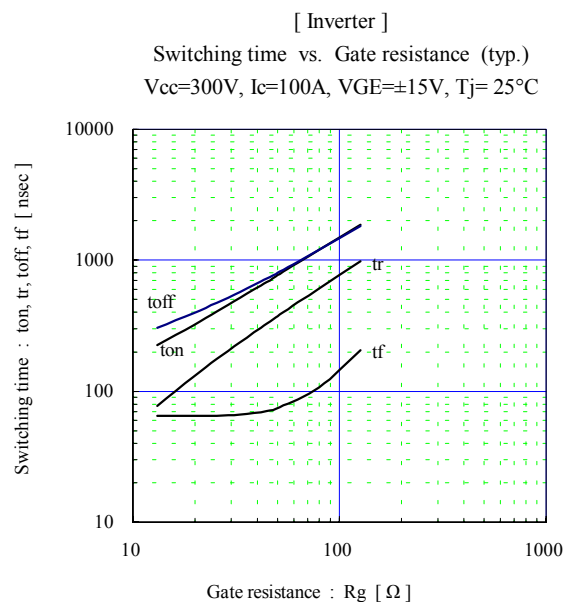
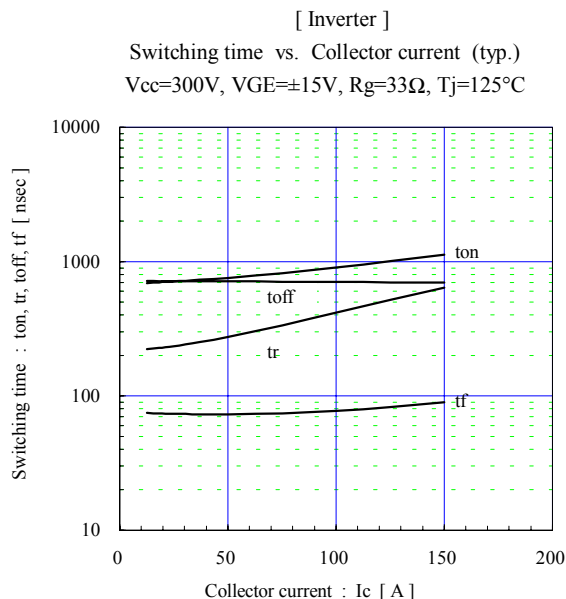
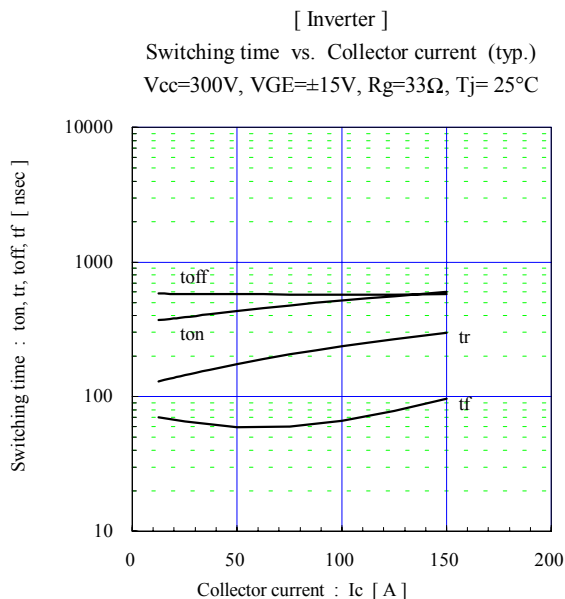
* This is the value which is defined mounting on the additional cooling fin with thermal compound

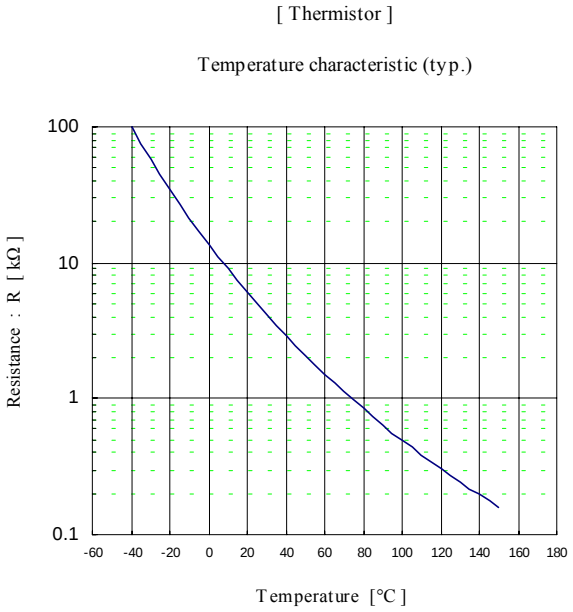
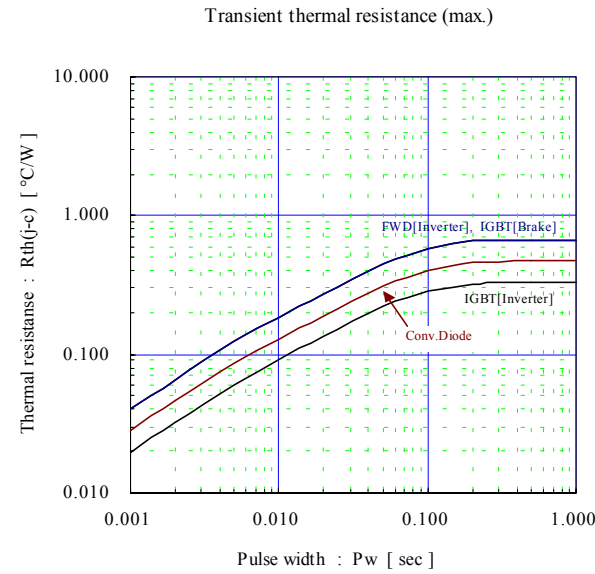
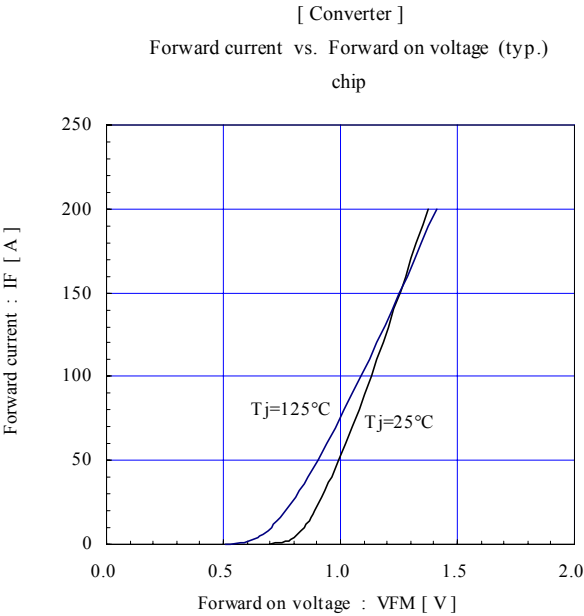
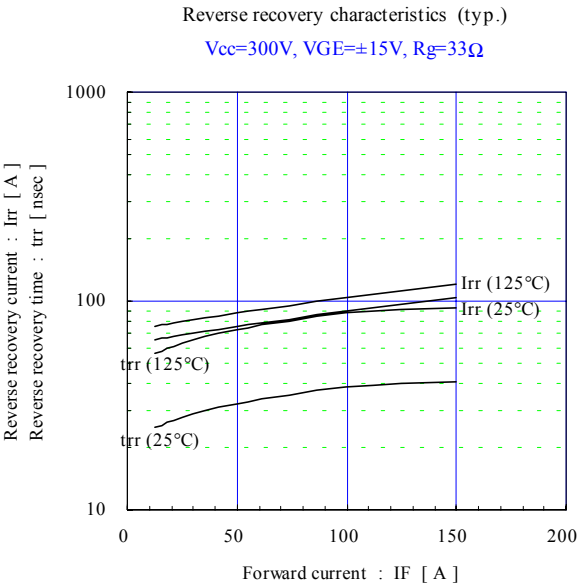
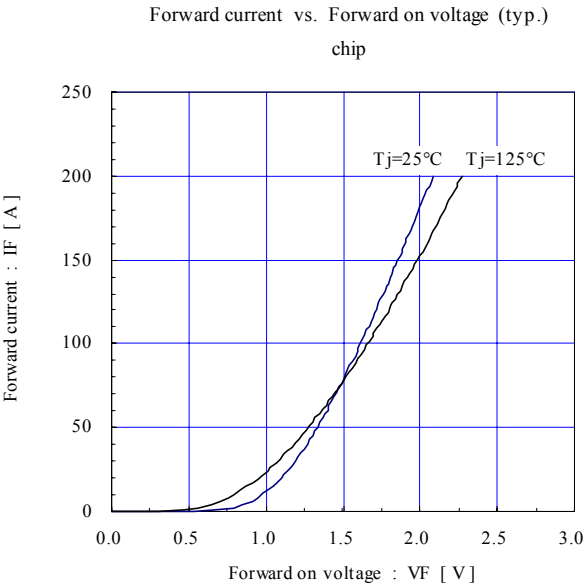
■ Equivalent Circuit Schematic



Characteristics (Representative)

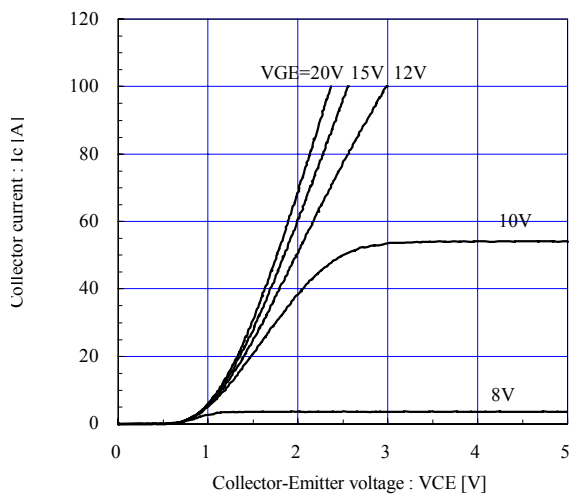






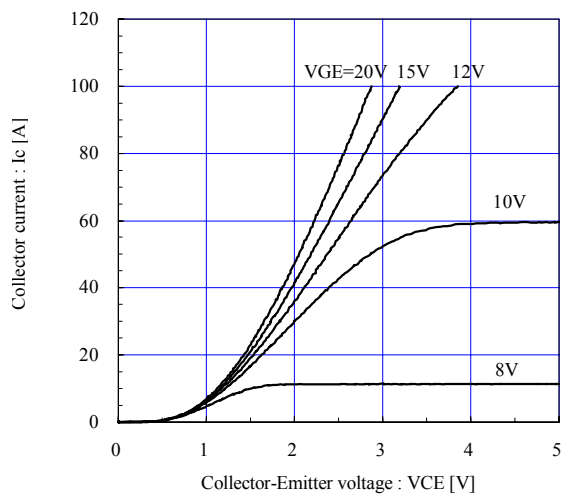
[Brake]

Collector current vs. Collector-Emittor voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

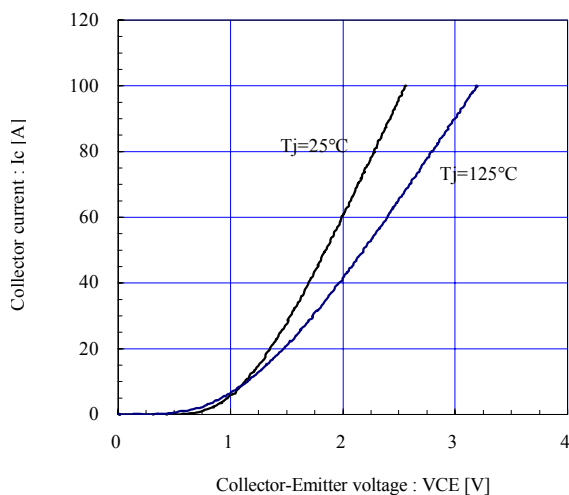
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Collector current vs. Collector-Emittor voltage (typ.)

 $T_j = 125^\circ\text{C}$ / chip

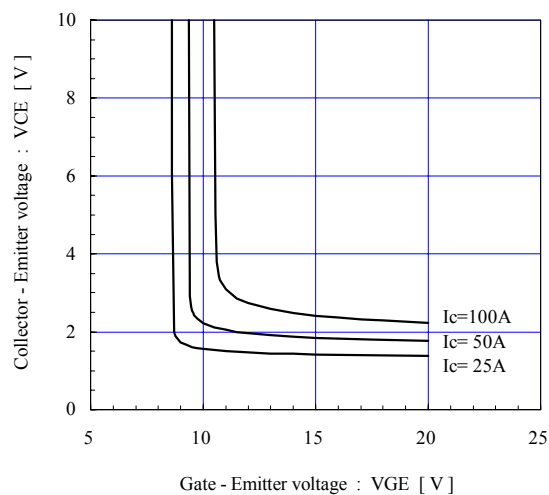
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Collector current vs. Collector-Emittor voltage (typ.)

 $V_{GE} = 15\text{V}$ / chip

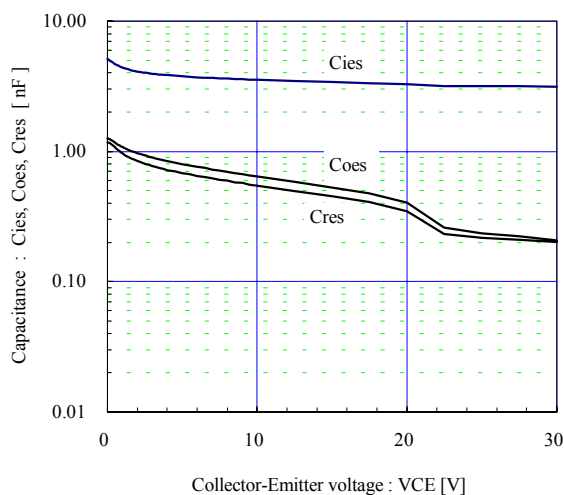
[Brake]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

[Brake]

Capacitance vs. Collector-Emittor voltage (typ.)

 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$ 

[Brake]

Dynamic Gate charge (typ.)

 $V_{cc} = 300\text{V}$, $I_c = 50\text{A}$, $T_j = 25^\circ\text{C}$ 