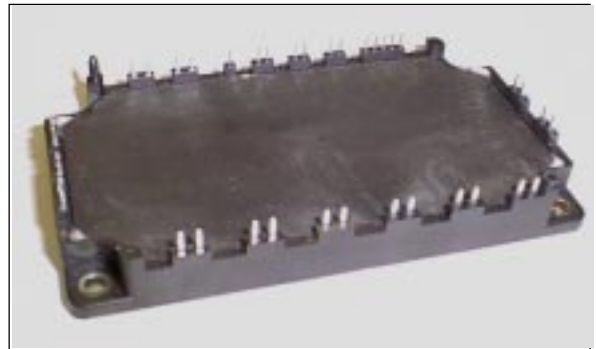


### PIM/Built-in converter with thyristor and brake (S series) 1200V / 35A / PIM



#### ■ Features

- Low  $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- 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 ( $T_c=25^\circ\text{C}$  unless without specified)

Item	Symbol	Condition	Rating	Unit		
Inverter	Collector-Emitter voltage	$V_{CES}$	1200	V		
	Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V		
	Collector current	$I_c$	Continuous	$T_c=25^\circ\text{C}$ 50	A	
				$T_c=80^\circ\text{C}$ 35		
		$I_{CP}$	1ms	$T_c=25^\circ\text{C}$	100	A
				$T_c=80^\circ\text{C}$	70	
	$-I_c$		35	A		
Collector power dissipation	$P_c$	1 device	240	W		
Brake	Collector-Emitter voltage	$V_{CES}$	1200	V		
	Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V		
	Collector current	$I_c$	Continuous	$T_c=25^\circ\text{C}$ 35	A	
				$T_c=80^\circ\text{C}$ 25		
		$I_{CP}$	1ms	$T_c=25^\circ\text{C}$	70	A
				$T_c=80^\circ\text{C}$	50	
Collector power dissipation	$P_c$	1 device	180	W		
Repetitive peak reverse voltage(Diode)	$V_{RRM}$		1200	V		
Thyristor	Repetitive peak off-state voltage	$V_{DRM}$	1600	V		
	Repetitive peak reverse voltage	$V_{RRM}$	1600	V		
	Average on-state current	$I_{T(AV)}$	50Hz/60Hz sine wave	35	A	
	Surge On-state current (Non-Repetitive)	$I_{TSM}$	$T_j=125^\circ\text{C}$ , 10ms half sine wave	390	A	
	Junction temperature	$T_{jw}$		125	$^\circ\text{C}$	
Converter	Repetitive peak reverse voltage	$V_{RRM}$	1600	V		
	Average output current	$I_o$	50Hz/60Hz sine wave	35	A	
	Surge current (Non-Repetitive)	$I_{FSM}$	$T_j=150^\circ\text{C}$ , 10ms	360	A	
	$I^2t$ (Non-Repetitive)	$I^2t$	half sine wave	648	$\text{A}^2\text{s}$	
Junction temperature (except Thyristor)	$T_j$		+150	$^\circ\text{C}$		
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$		
Isolation between terminal and copper base *2 voltage between thermistor and others *3	$V_{iso}$	AC : 1 minute	AC 2500	V		
			AC 2500	V		
Mounting screw torque			1.7 *1	N·m		

\*1 Recommendable value : 1.3 to 1.7 N·m (M4)

\*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 26 should be connected together and shorted to copper base.

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

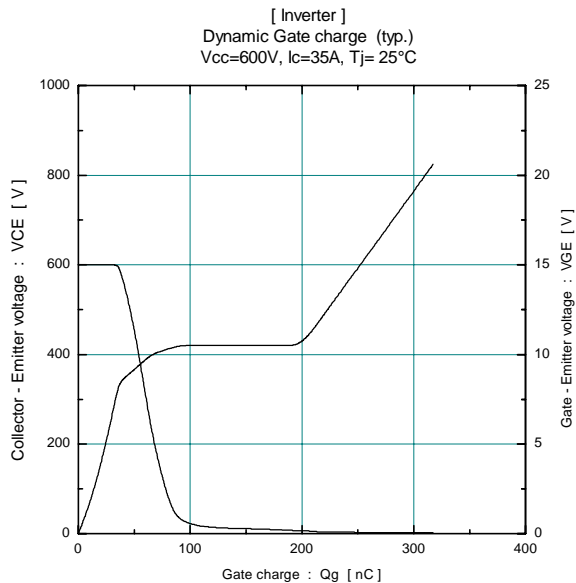
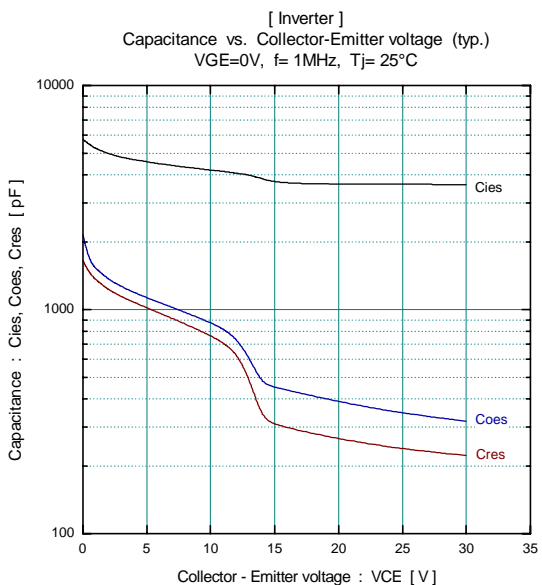
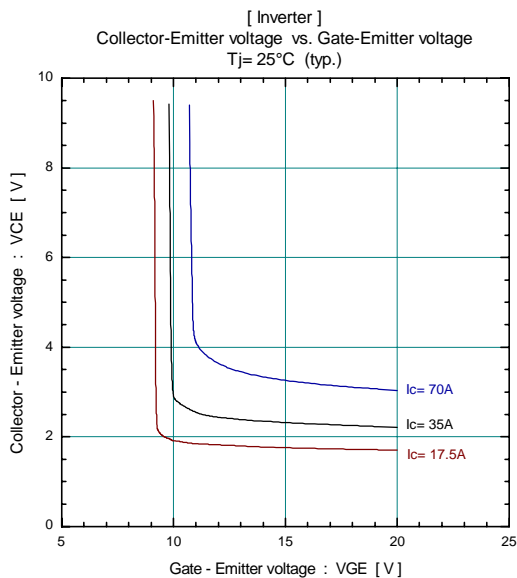
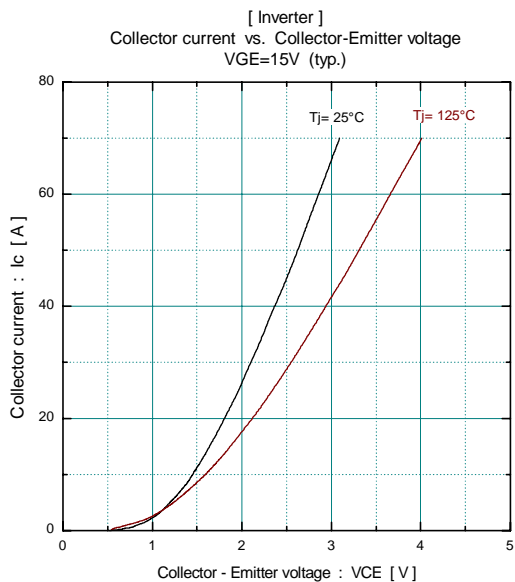
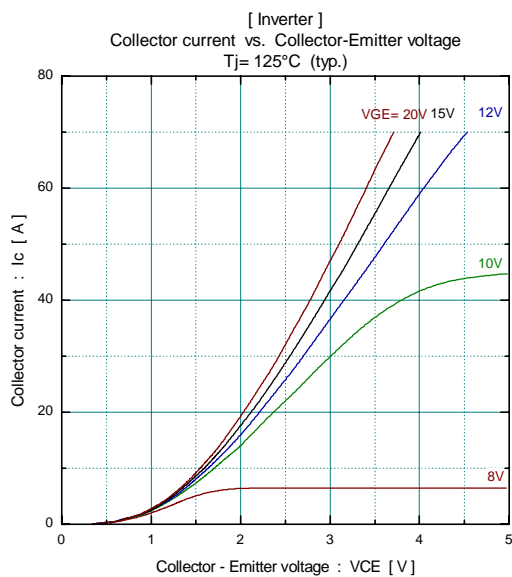
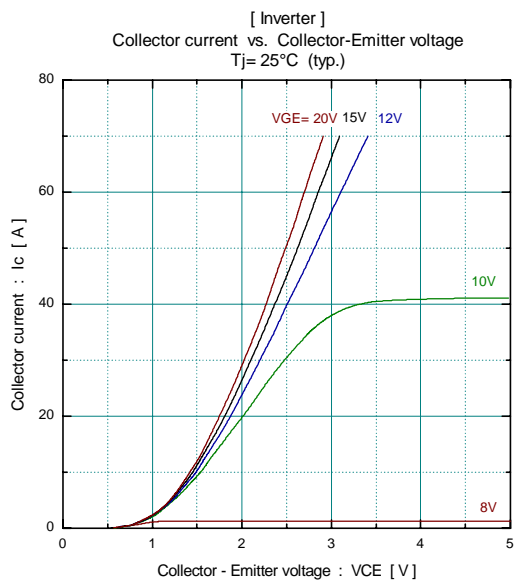
Item	Symbol	Condition	Characteristics			Unit		
			Min.	Typ.	Max.			
Inverter	Zero gate voltage collector current	ICES	VCE=1200V, VGE=0V		200	μA		
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V		200	nA		
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, Ic=35mA		5.5	7.2	8.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE=15V, Ic=35A	chip	2.1		V	
				terminal	2.25	2.7		
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz		4200		pF	
	Turn-on time	ton	VCC=600V		0.35	1.2	μs	
		tr	Ic=35A		0.25	0.6		
	Turn-off	toff	VGE=±15V		0.45	1.0		
		tf	RG=33Ω		0.08	0.3		
Forward on voltage	VF	IF=35A	chip	2.3		V		
			terminal	2.45	3.3			
Reverse recovery time of FRD	trr	IF=35A			350	ns		
Brake	Zero gate voltage collector current	ICES	VCEs=1200V, VGE=0V		200	μA		
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V		200	nA		
	Collector-Emitter saturation voltage	VCE(sat)	Ic=25A, VGE=15V	chip	2.1		V	
				terminal	2.25	2.7		
	Turn-on time	ton	VCC=600V		0.35	1.2	μs	
		tr	Ic=25A		0.25	0.6		
	Turn-off time	toff	VGE=±15V		0.45	1.0		
		tf	RG=51Ω		0.08	0.3		
	Reverse current	I <sub>RRM</sub>	VR=1200V			200	μA	
	off-state current	IDM	VDM=1600V			1.0	mA	
Thyristor	Reverse current	I <sub>RRM</sub>	VRM=1600V			1.0	mA	
	Gate trigger current	IGT	Vd=6V, It=1A			100	mA	
	Gate trigger voltage	VGT	Vd=6V, It=1A			2.5	V	
	On-state voltage	VTM	ITM=35A	chip	1.1	1.2	V	
				terminal	1.2			
Converter	Forward on voltage	VFM	IF=35A	chip	1.1	V		
				terminal	1.2		1.5	
Thyristor	Reverse current	I <sub>RRM</sub>	VR=1600V			200	μA	
	Resistance	R	T=25°C			5000	Ω	
			T=100°C		465	495		520
B value	B	T=25/50°C		3305	3375	3450	K	

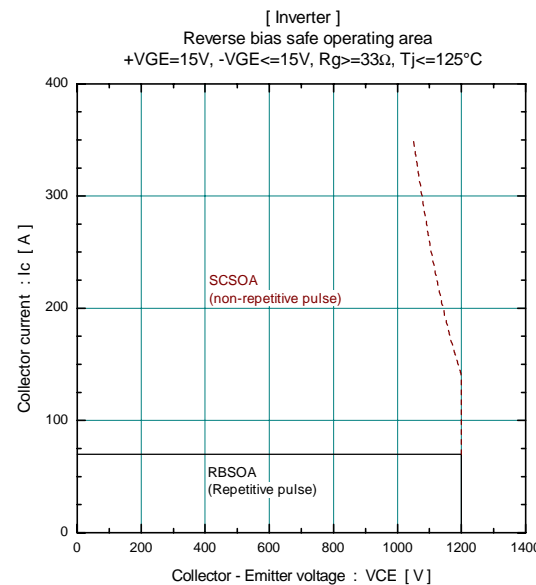
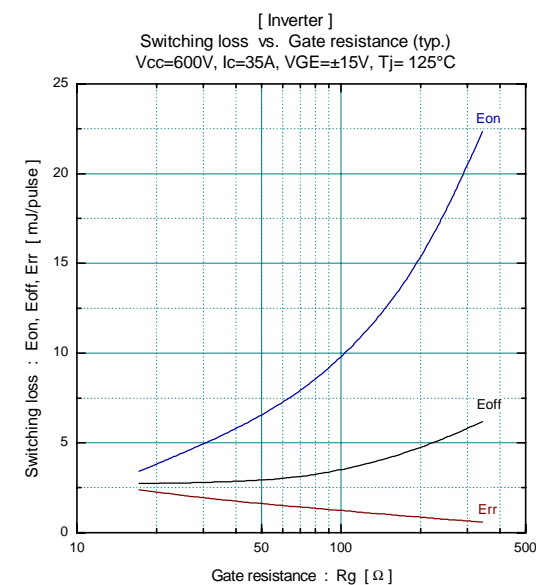
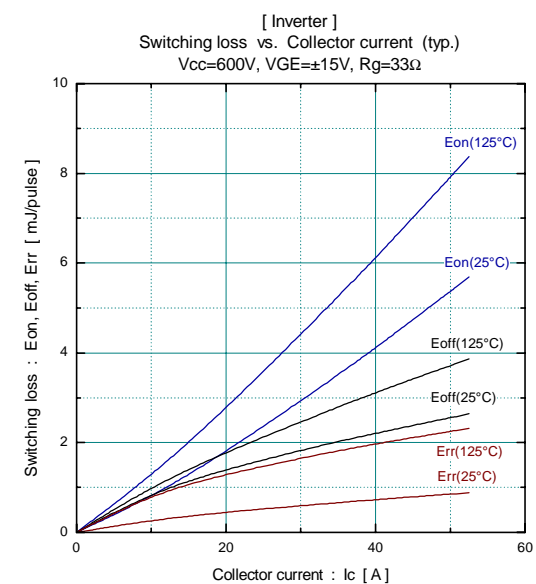
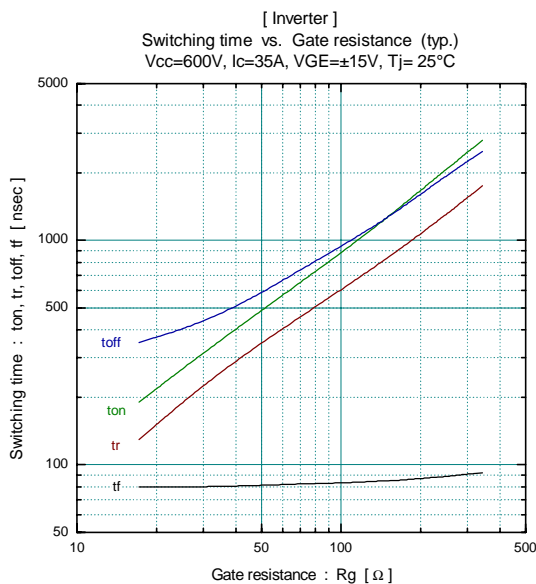
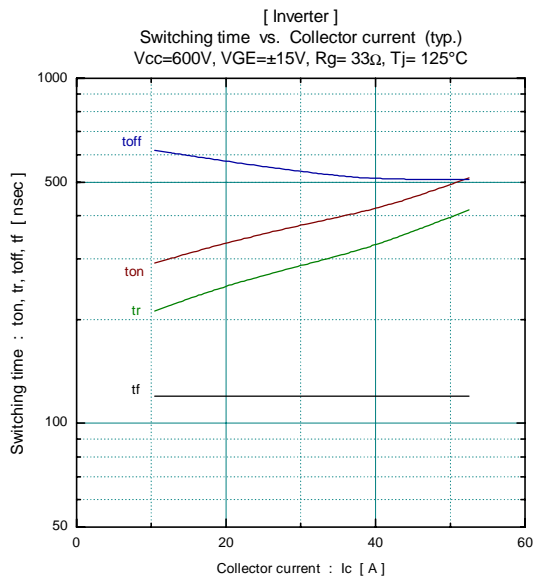
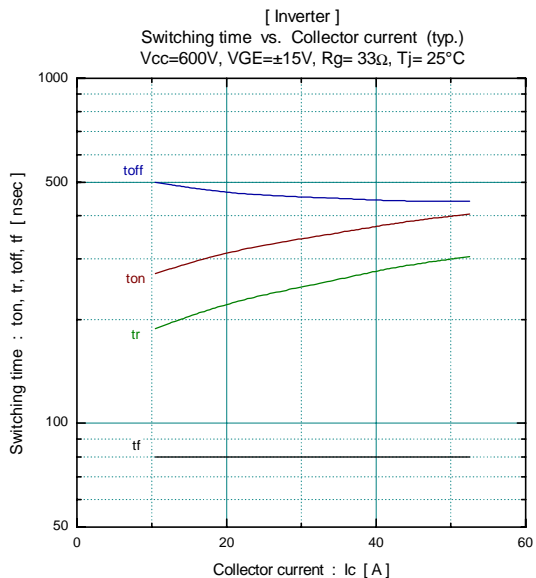
● Thermal resistance Characteristics

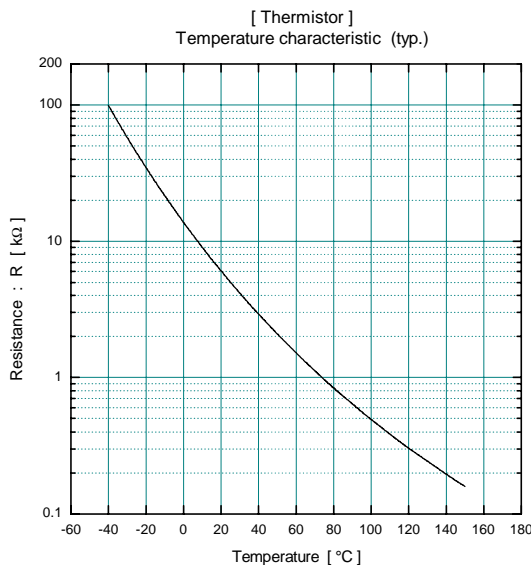
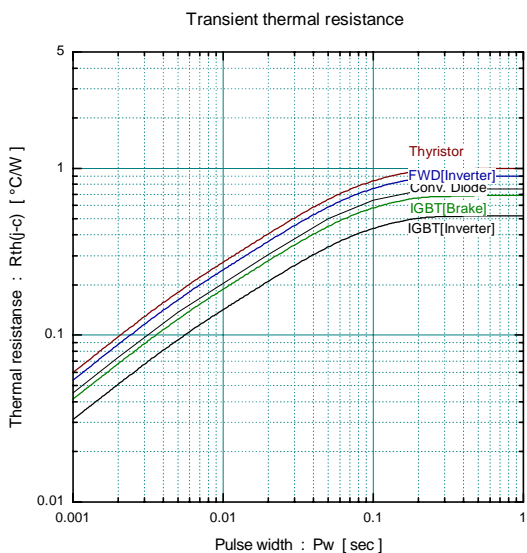
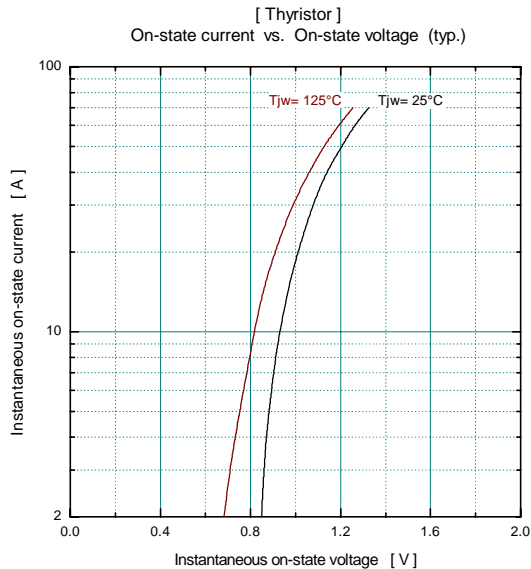
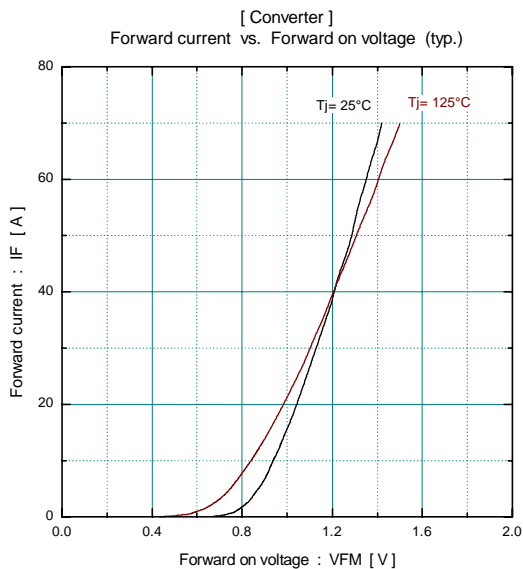
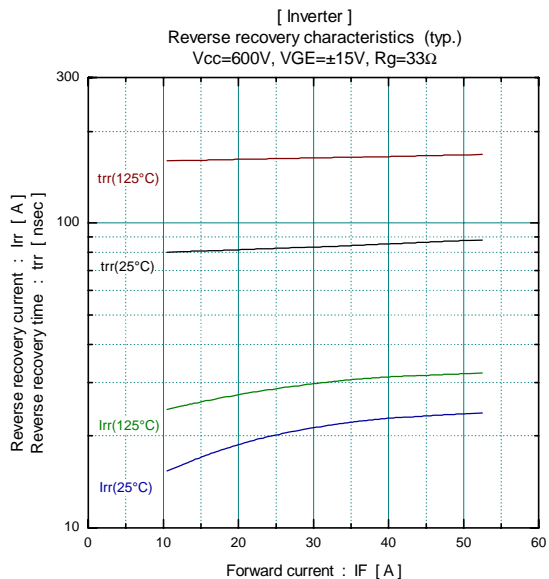
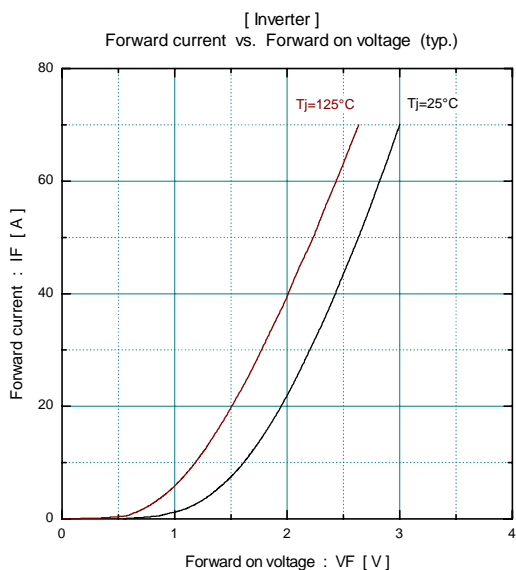
Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance ( 1 device )	Rth(j-c)	Inverter IGBT			0.52	°C/W
		Inverter FWD			0.90	
		Brake IGBT			0.69	
		Thyristor			1.00	
		Converter Diode			0.75	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

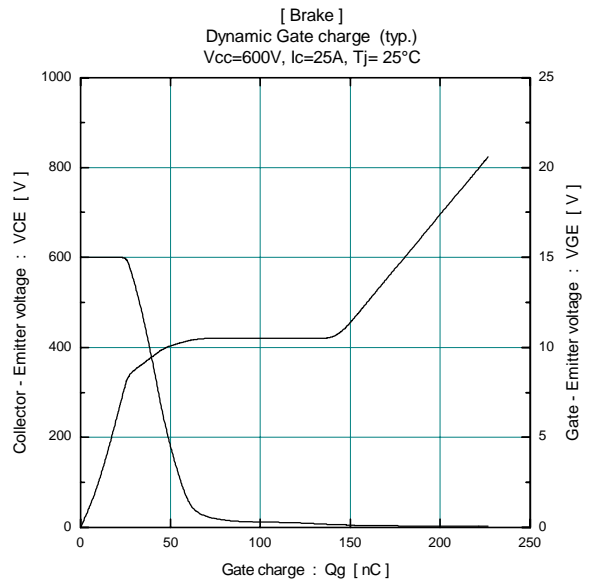
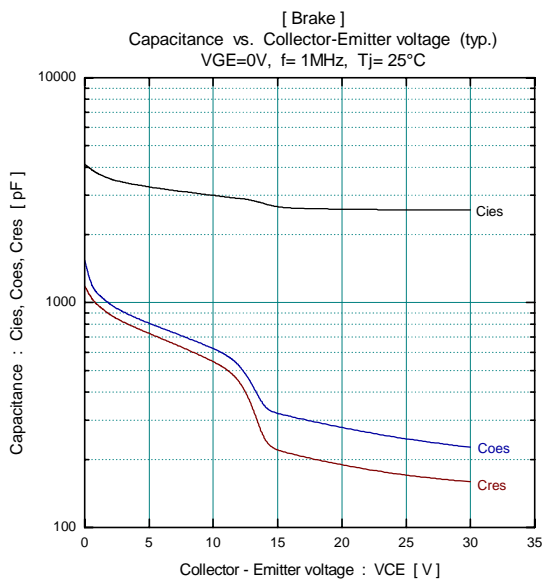
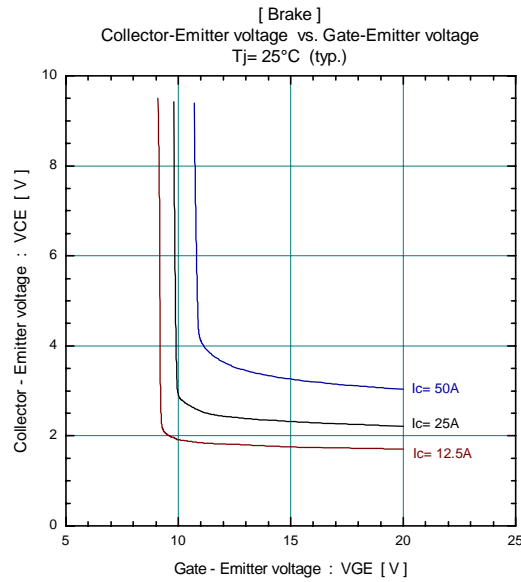
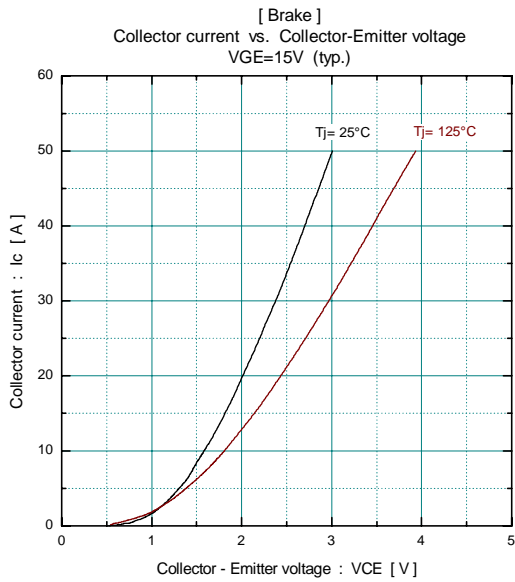
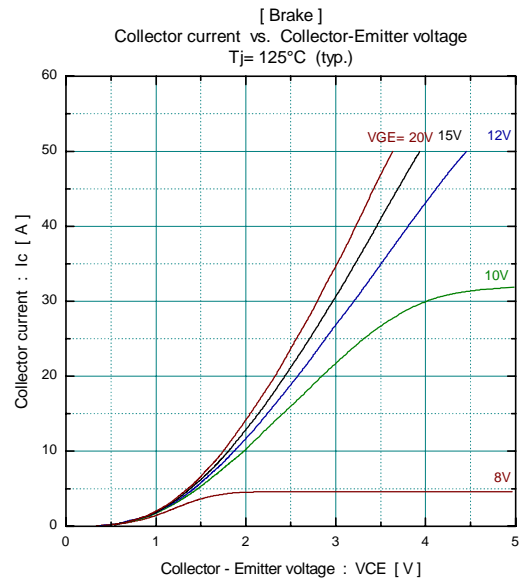
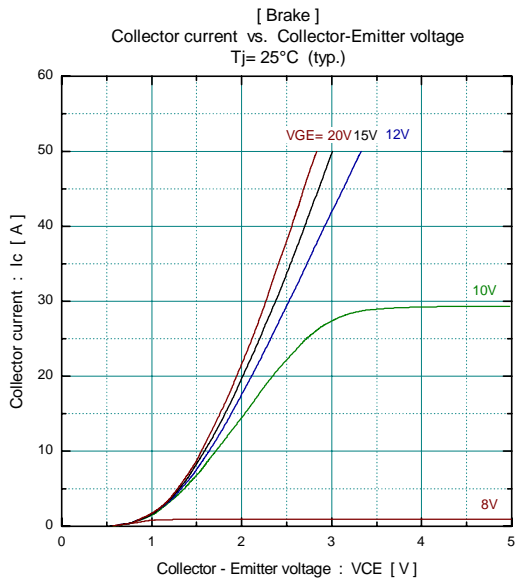
\* This is the value which is defined mounting on the additional cooling fin with thermal compound

■ Characteristics (Representative)

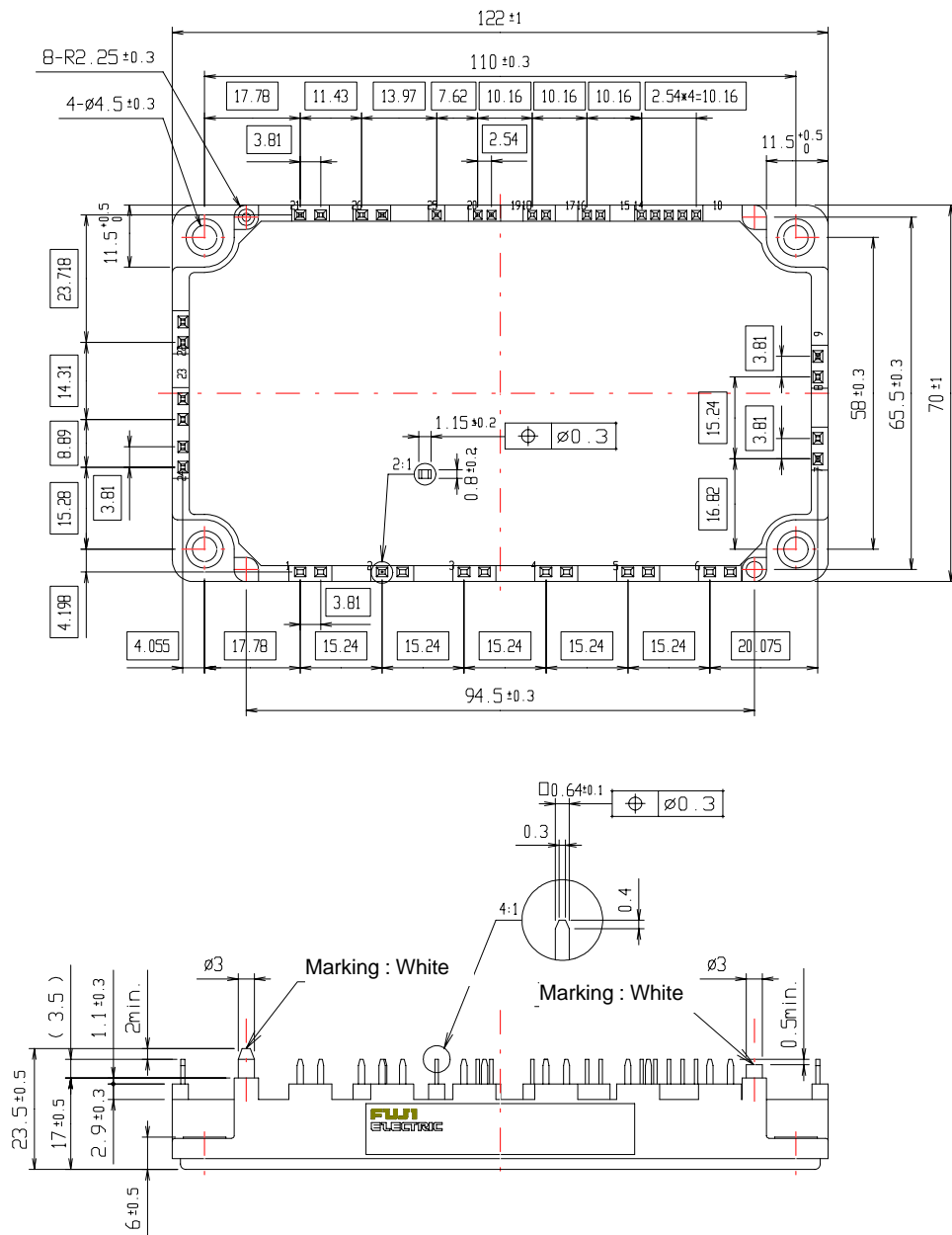








■ Outline Drawings, mm



■ Equivalent Circuit Schematic

