

7MBR150VX120-50

IGBT Modules

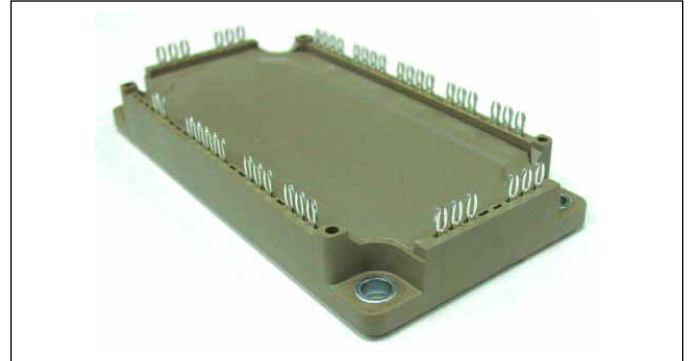
IGBT MODULE (V series) 1200V / 150A / PIM

■ Features

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

■ Applications

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



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_c	Continuous	$T_c=80^\circ\text{C}$	150	A
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	300	
		$-I_c$			150	
		$-I_c$ pulse	1ms		300	
Collector power dissipation	P_c	1 device		885	W	
Brake	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_c	Continuous	$T_c=80^\circ\text{C}$	100	A
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	200	
	Collector power dissipation	P_c	1 device		520	W
	Repetitive peak reverse voltage (Diode)	V_{RRM}			1200	V
Converter	Repetitive peak reverse voltage	V_{RRM}			1600	V
	Average output current	I_o	50Hz/60Hz, sine wave		150	A
	Surge current (Non-Repetitive)	I_{FSM}	10ms, $T_j=150^\circ\text{C}$		780	A
	I^2t (Non-Repetitive)	I^2t	half sine wave		3000	A^2s
Junction temperature	T_j	Inverter, Brake		175	$^\circ\text{C}$	
		Converter		150		
Operating junction temperature (under switching conditions)	T_{jop}	Inverter, Brake		150		
		Converter		150		
Case temperature	T_c			125		
Storage temperature	T_{stg}			-40~+125		
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*3)	-	M5		3.5	N m

Note *1: All terminals should be connected together during the test.

Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note *3: Recommendable value : 2.5-3.5 Nm (M5)

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

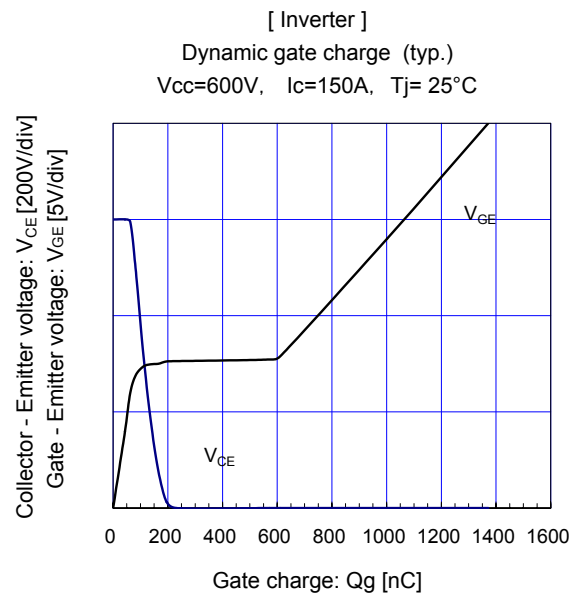
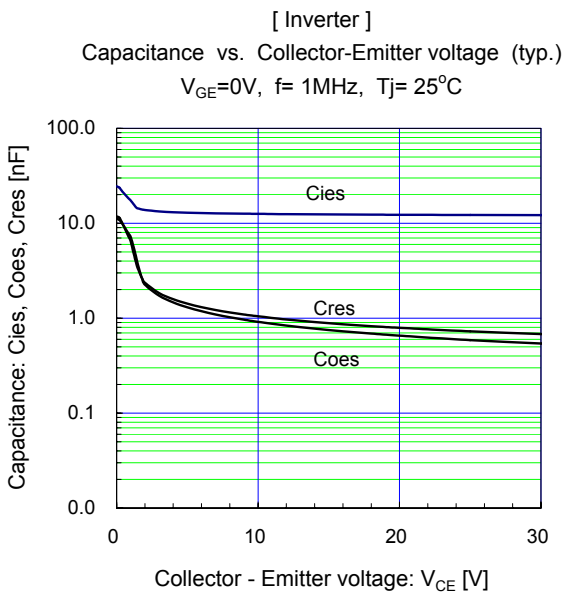
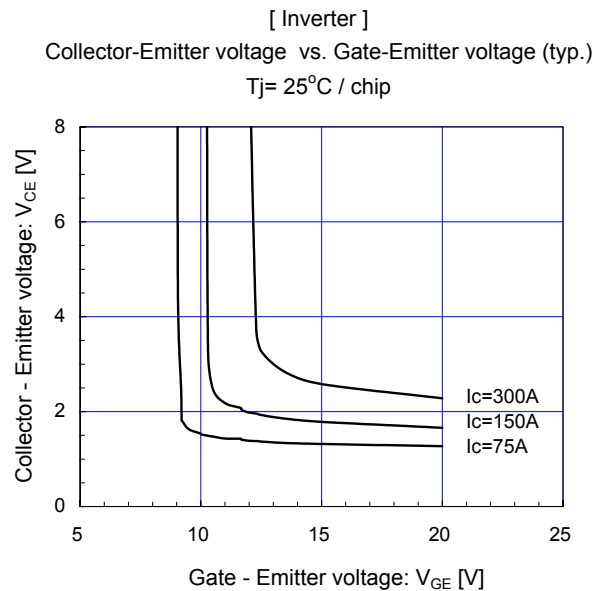
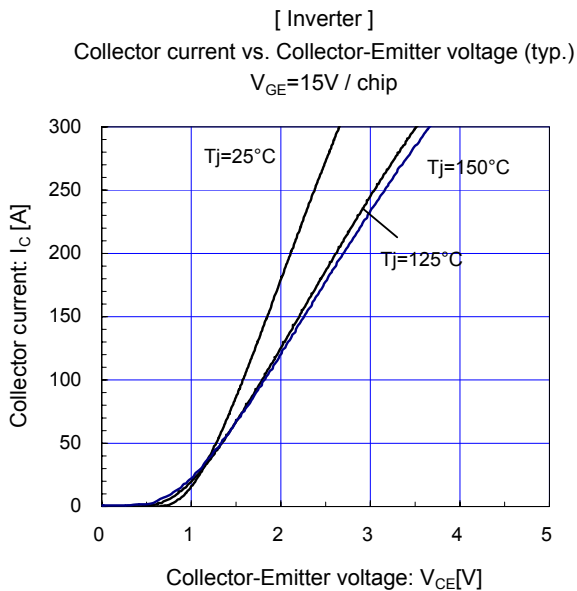
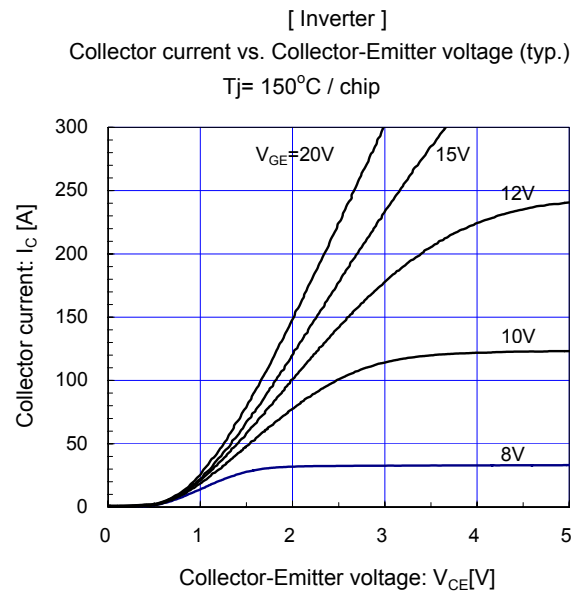
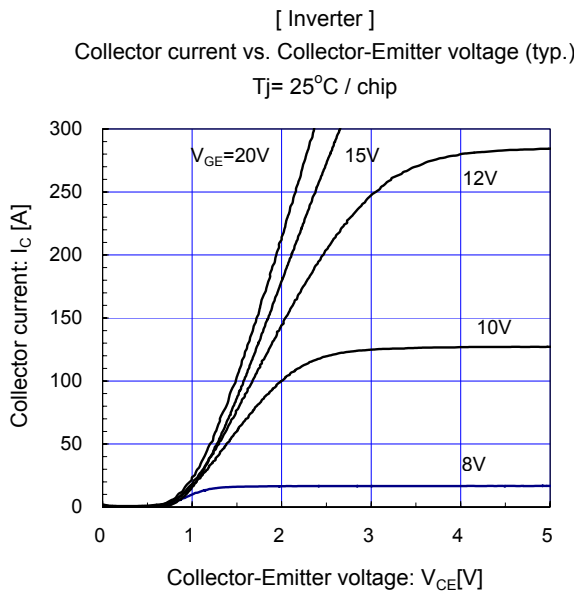
Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
	Gate-Emitter leakage current	I_{GES}	$V_{GE} = 0V, V_{CE} = \pm 20V$	-	-	200	nA	
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 150mA$	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 150A$	Tj=25°C	-	2.45	2.90	V
				Tj=125°C	-	2.80	-	
				Tj=150°C	-	2.85	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 150A$	Tj=25°C	-	1.85	2.30	
				Tj=125°C	-	2.20	-	
	Input capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	12.5	-	nF	
	Turn-on time	t_{on}	$V_{CC} = 600V$ $I_c = 150A$ $V_{GE} = +15 / -15V$ $R_G = 1.8\Omega$	-	0.39	1.20	μs	
		t_r		-	0.09	0.60		
		$t_r(i)$		-	0.03	-		
	Turn-off time	t_{off}	$R_G = 1.8\Omega$	-	0.53	1.00	μs	
		t_f		-	0.06	0.30		
	Forward on voltage	V_F (terminal)	$I_F = 150A$	Tj=25°C	-	2.50	2.95	V
Tj=125°C				-	2.80	-		
Tj=150°C				-	2.75	-		
V_F (chip)		$I_F = 150A$	Tj=25°C	-	1.90	2.35		
			Tj=125°C	-	2.20	-		
Reverse recovery time	t_{rr}	$I_F = 150A$	-	-	0.35	μs		
Brake	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V$ $V_{CE} = 1200V$	-	-	1.0	mA	
	Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0V$ $V_{GE} = +20 / -20V$	-	-	200	nA	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 100A$	Tj=25°C	-	2.15	2.60	V
				Tj=125°C	-	2.45	-	
				Tj=150°C	-	2.50	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 100A$	Tj=25°C	-	1.75	2.20	
				Tj=125°C	-	2.05	-	
	Turn-on time	t_{on}	$V_{CE} = 600V$ $I_c = 100A$ $V_{GE} = +15 / -15V$ $R_G = 1.6\Omega$	-	0.39	1.20	μs	
	t_r	-		0.09	0.60			
	t_{off}	-		0.53	1.00			
Turn-off time	t_{off}	$R_G = 1.6\Omega$	-	0.53	1.00	μs		
t_f	-		0.06	0.30				
Reverse current	I_{RRM}	$V_R = 1200V$	-	-	1.00	mA		
Converter	Forward on voltage	$I_F = 150A$	terminal	-	2.00	2.45	V	
			chip	-	1.40	-		
Reverse current	I_{RRM}	$V_R = 1600V$	-	-	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		

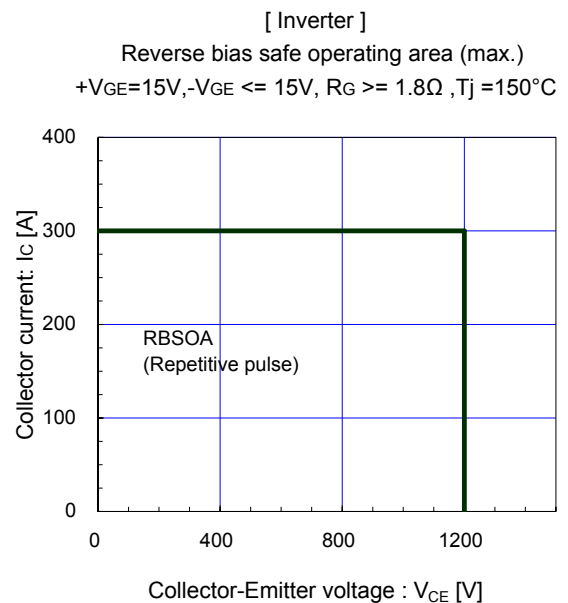
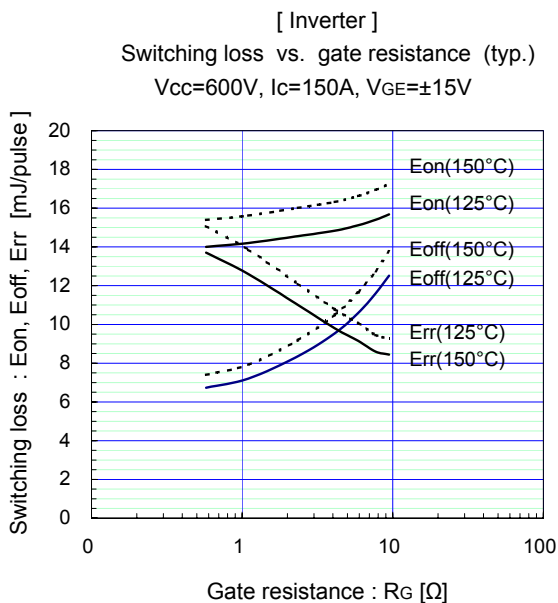
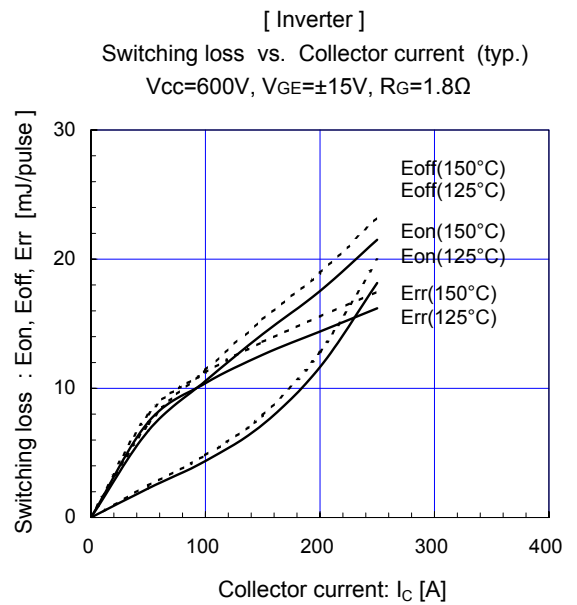
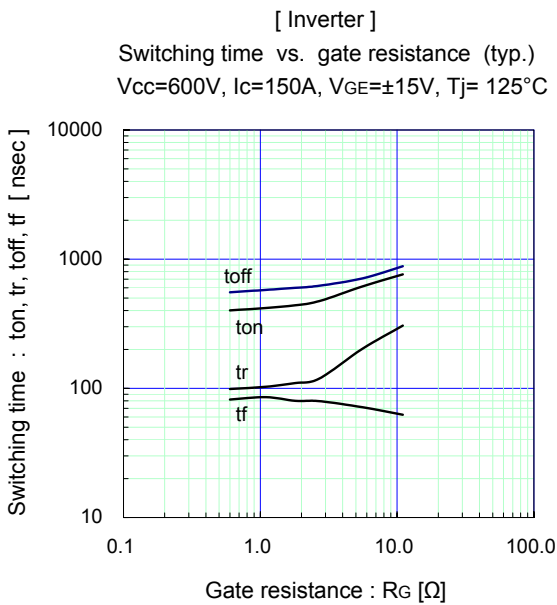
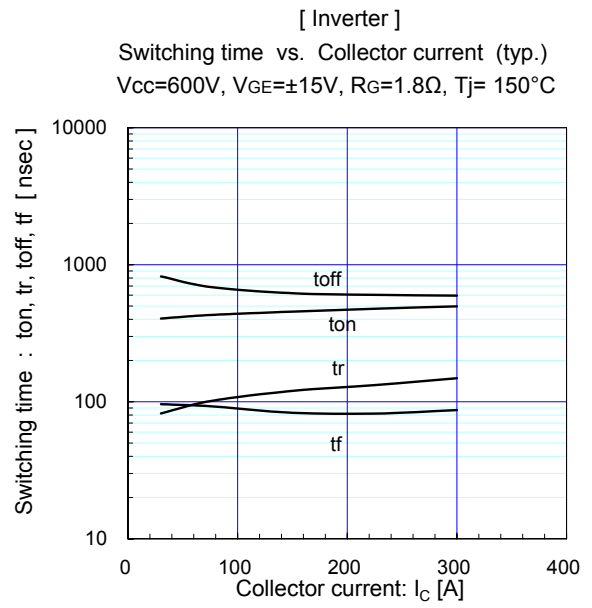
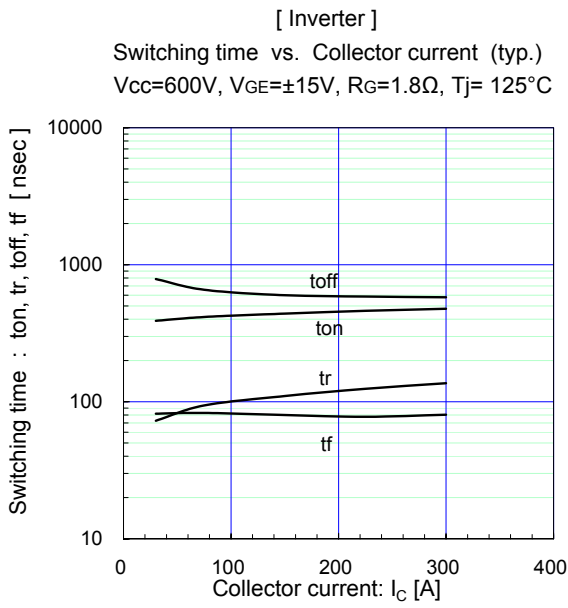
● Thermal resistance characteristics

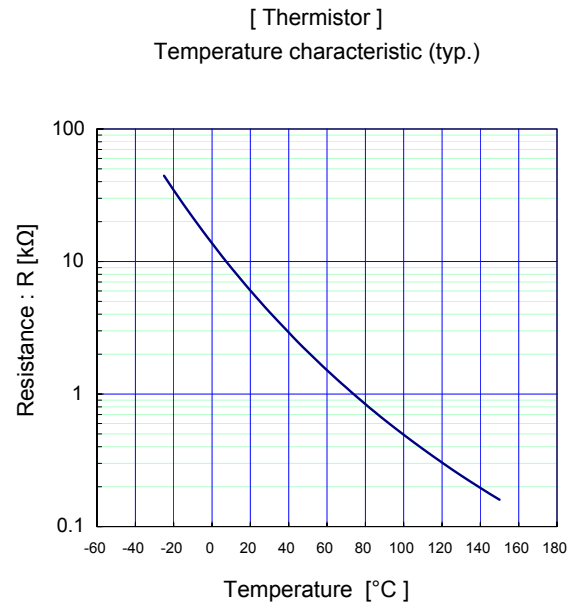
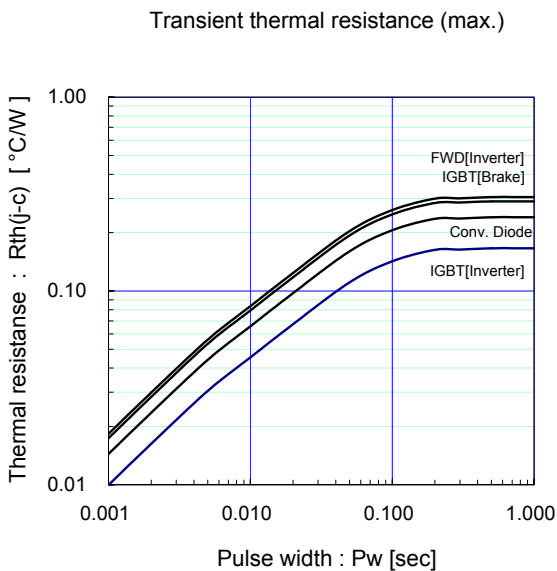
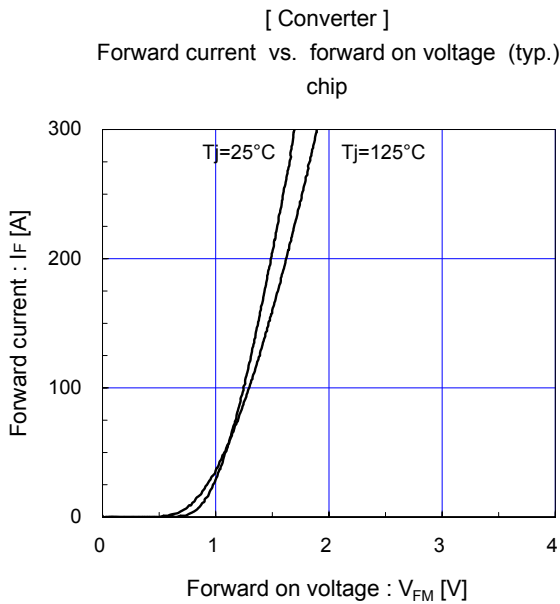
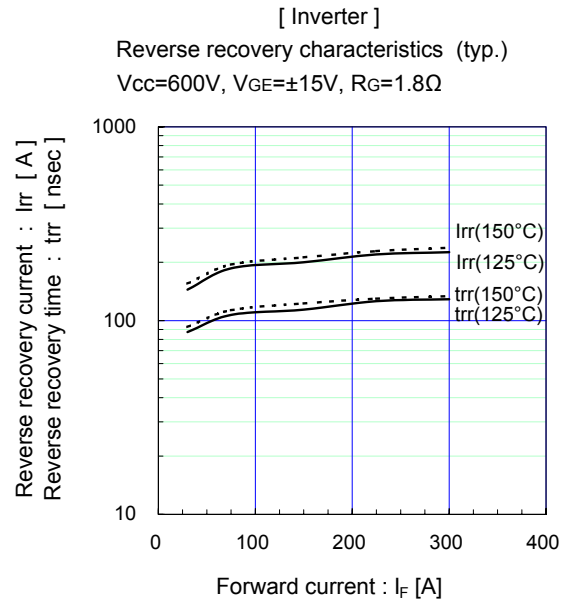
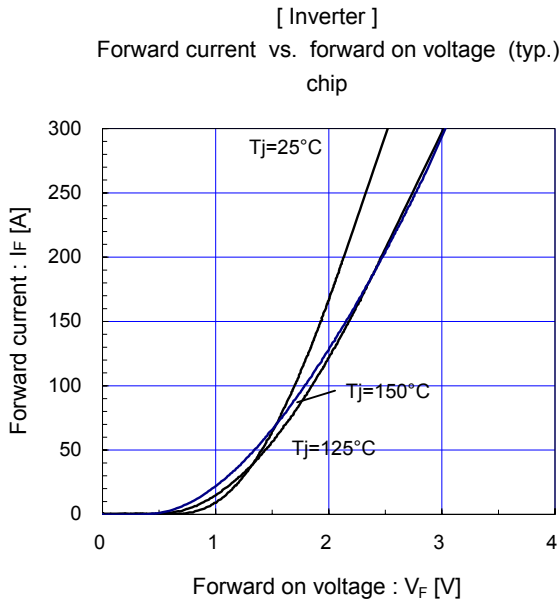
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.17	°C/W
		Inverter FWD	-	-	0.31	
		Brake IGBT	-	-	0.29	
		Converter Diode	-	-	0.24	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.05	-	

Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



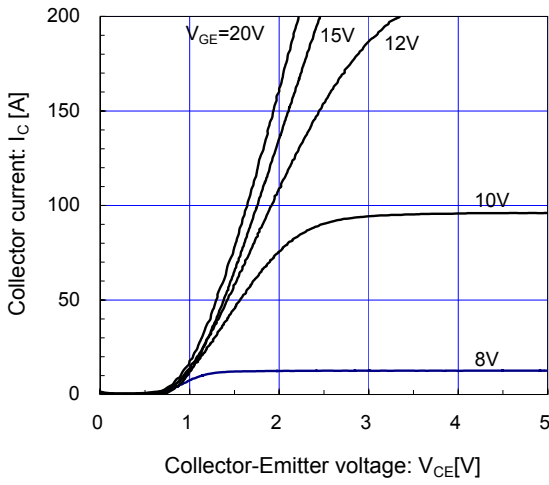




[Brake]

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

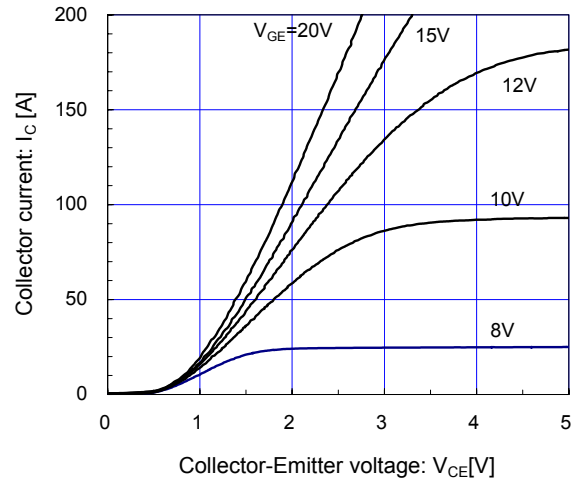
$T_j = 25^\circ\text{C}$ / chip



[Brake]

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

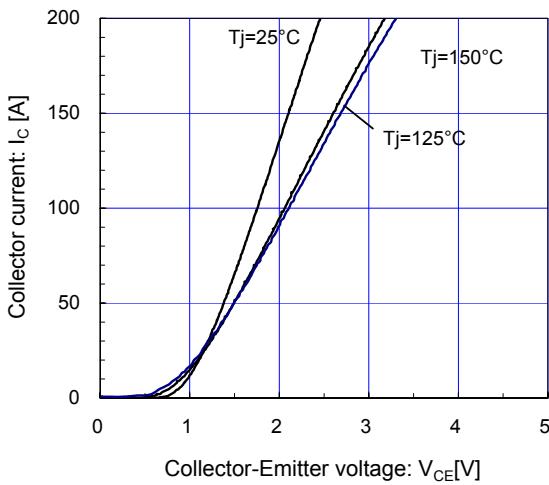
$T_j = 150^\circ\text{C}$ / chip



[Brake]

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

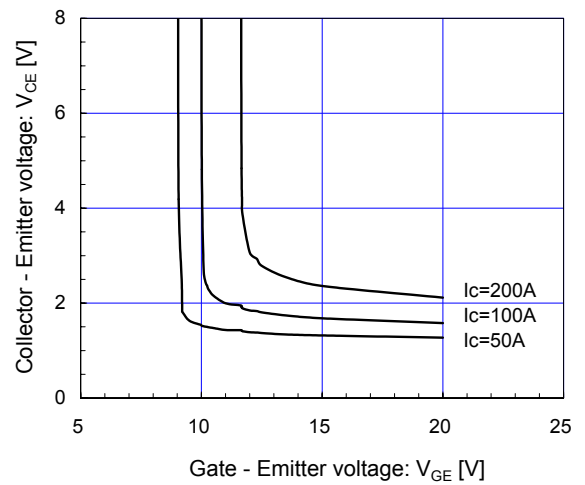
$V_{GE} = 15\text{V}$ / chip



[Brake]

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

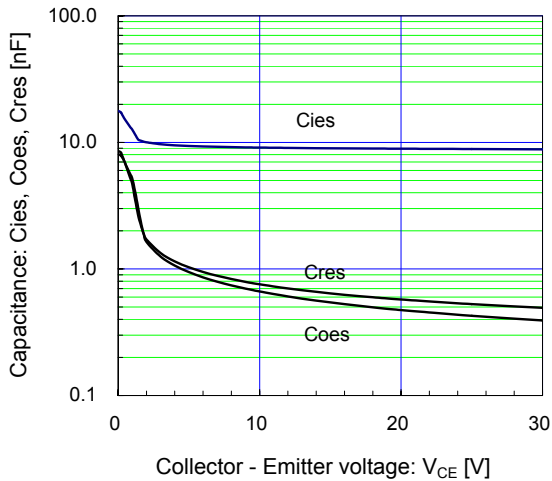
$T_j = 25^\circ\text{C}$ / chip



[Brake]

Capacitance vs. Collector-Emitter voltage (typ.)

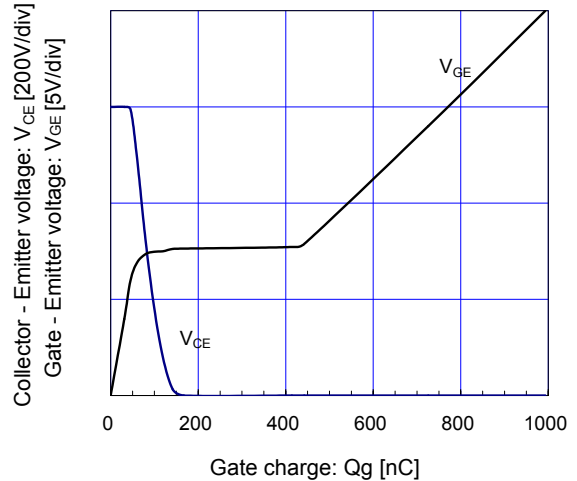
$V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



[Brake]

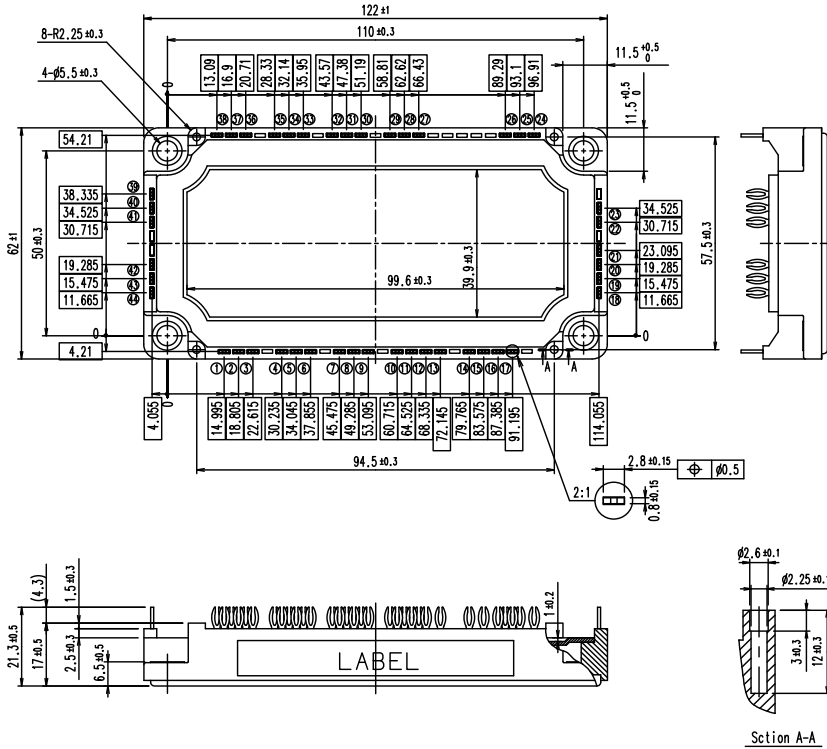
Dynamic gate charge (typ.)

$V_{CC} = 600\text{V}$, $I_c = 100\text{A}$, $T_j = 25^\circ\text{C}$



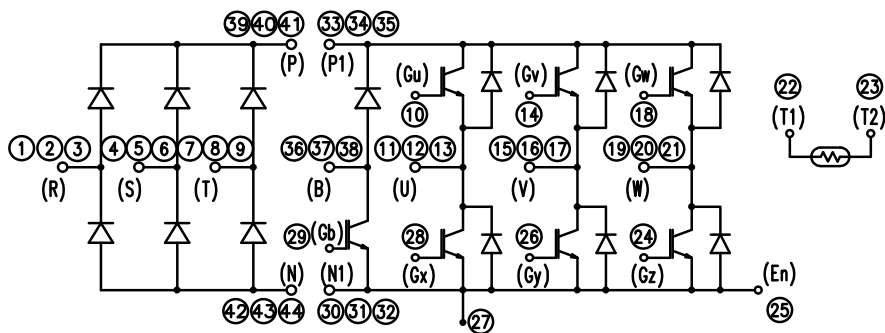
Outline Drawings, mm

□ shows theoretical dimension.
 () shows reference dimension.



Equivalent Circuit Schematic

[Converter] [Brake] [Inverter] [Thermistor]



WARNING

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