

7MBR75VB120-50

IGBT Modules

IGBT MODULE (V series)

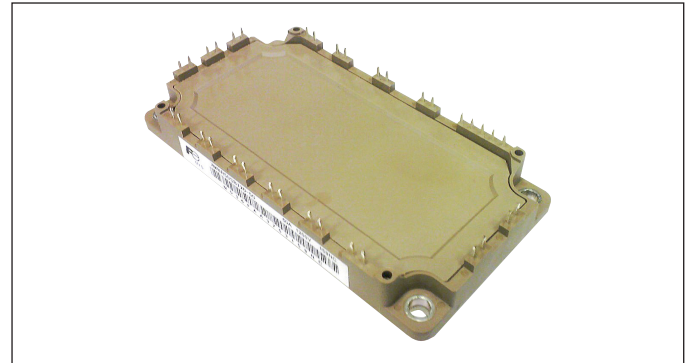
1200V / 75A / PIM

■ 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	$T_c=100^\circ\text{C}$	75	A	
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	150		
		$-I_c$			75		
$-I_{c\ pulse}$		1ms		150			
Collector power dissipation	P_c	1 device		385	W		
Brake	Collector-Emitter voltage	V_{CES}			1200	V	
	Gate-Emitter voltage	V_{GES}			± 20	V	
	Collector current	I_c	Continuous	$T_c=80^\circ\text{C}$	50	A	
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	100		
	Collector power dissipation	P_c	1 device		280	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		75	A	
	Surge current (Non-Repetitive)	I_{FSM}	10ms, $T_j=150^\circ\text{C}$		520	A	
	I^2t (Non-Repetitive)	I^2t	half sine wave		1352	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			
Maximum junction temperature	T_{jmax}			175			
Operating temperature (under switching conditions)	T_{jop}			150			
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 T_j= 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} = ±20V	-	-	200	nA	
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 75mA	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 75A	T _j =25°C	-	2.35	2.80	V
				T _j =125°C	-	2.70	-	
				T _j =150°C	-	2.75	-	
		V _{CE(sat)} (chip)	V _{GE} = 15V I _c = 75A	T _j =25°C	-	1.85	2.30	
				T _j =125°C	-	2.20	-	
	T _j =150°C	-	2.25	-				
	Internal gate resistance	R _{g(int)}	-	-	10	-	Ω	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	6.0	-	nF	
	Turn-on time	t _{on}	V _{CC} = 600V I _c = 75A V _{GE} = +15 / -15V R _G = 2.2Ω	-	0.39	1.20	μs	
		t _r		-	0.09	0.60		
		t _{r(i)}		-	0.03	-		
	Turn-off time	t _{off}	R _G = 2.2Ω	-	0.53	1.00	μs	
t _r		-		0.06	0.30			
Forward on voltage	V _F (terminal)	I _F = 75A	T _j =25°C	-	2.20	2.65	V	
			T _j =125°C	-	2.35	-		
			T _j =150°C	-	2.30	-		
	V _F (chip)	I _F = 75A	T _j =25°C	-	1.70	2.15		
			T _j =125°C	-	1.85	-		
T _j =150°C	-	1.80	-					
Reverse recovery time	t _{rr}	I _F = 75A	-	-	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 = 50A	T _j =25°C	-	2.20	2.65	V
				T _j =125°C	-	2.55	-	
				T _j =150°C	-	2.60	-	
		V _{CE(sat)} (chip)	V _{GE} = 15V I _c = 50A	T _j =25°C	-	1.85	2.30	
				T _j =125°C	-	2.20	-	
	T _j =150°C	-	2.25	-				
	Internal gate resistance	R _{g(int)}	-	-	4	-	Ω	
	Turn-on time	t _{on}	V _{CE} = 600V I _c = 50A	-	0.39	1.20	μs	
t _r		-		0.09	0.60			
Turn-off time	t _{off}	V _{GE} = +15 / -15V R _G = 15Ω	-	0.53	1.00	μs		
	t _r		-	0.06	0.30			
Reverse current	I _{RRM}	V _R = 1200V	-	-	1.00	mA		
Converter	Forward on voltage	I _F = 75A	terminal	-	1.90	2.35	V	
			chip	-	1.40	-		
Reverse current	I _{RRM}	V _R = 1600V	-	-	1.0	mA		
Thermistor	Resistance	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	-	-	0.39	°C/W
		Inverter FWD	-	-	0.55	
		Brake IGBT	-	-	0.54	
		Converter Diode	-	-	0.43	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.05	-	

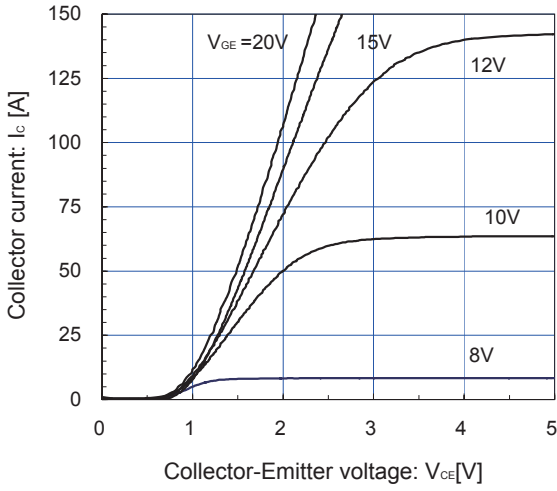
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

[Inverter]

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

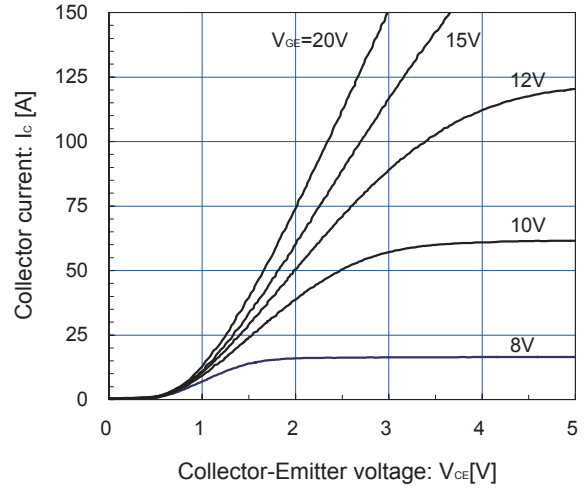
$T_j = 25^\circ\text{C}$ / chip



[Inverter]

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

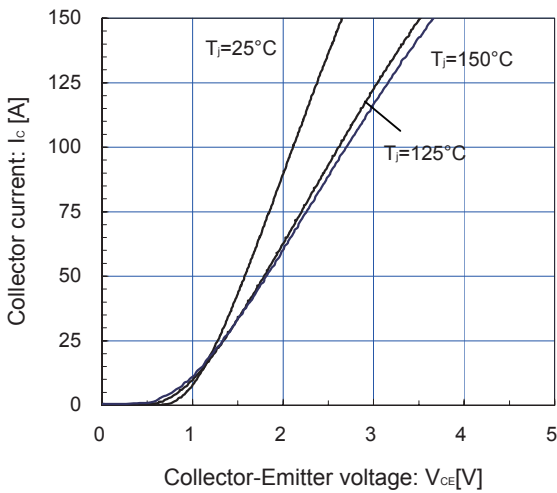
$T_j = 150^\circ\text{C}$ / chip



[Inverter]

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

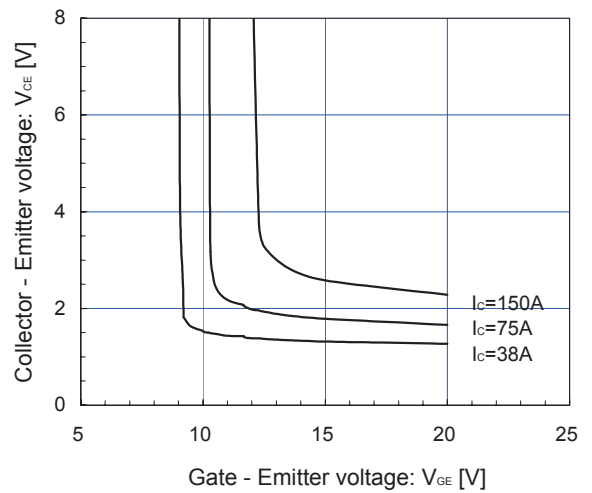
$V_{GE} = 15\text{V}$ / chip



[Inverter]

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

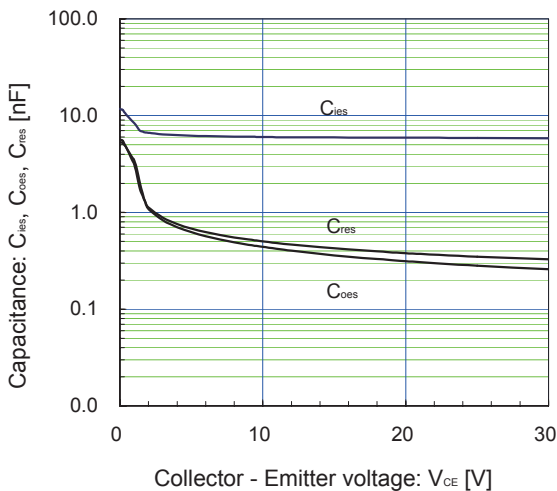
$T_j = 25^\circ\text{C}$ / chip



[Inverter]

Capacitance vs. Collector-Emmitter voltage (typ.)

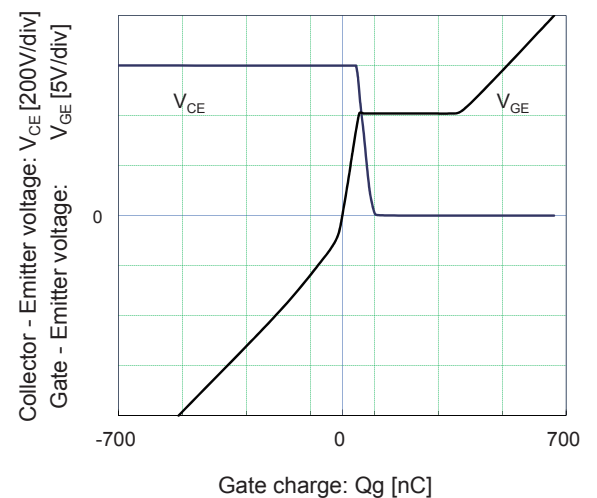
$V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



[Inverter]

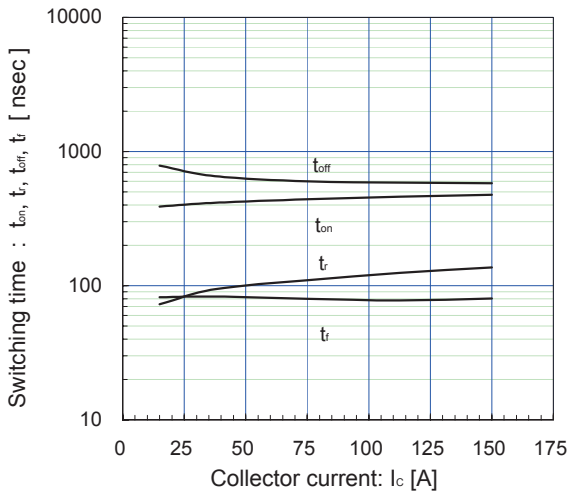
Dynamic gate charge (typ.)

$V_{CC} = 600\text{V}$, $I_c = 75\text{A}$, $T_j = 25^\circ\text{C}$



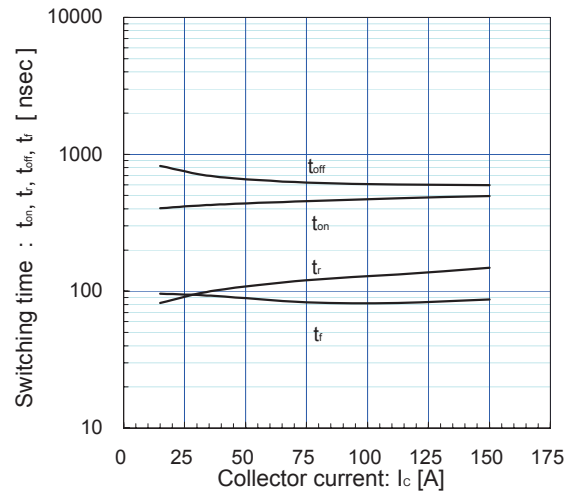
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=2.2\Omega, T_J=125^\circ C$



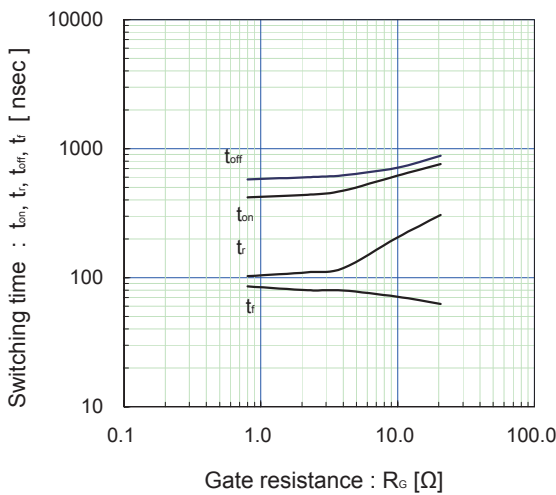
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=2.2\Omega, T_J=150^\circ C$



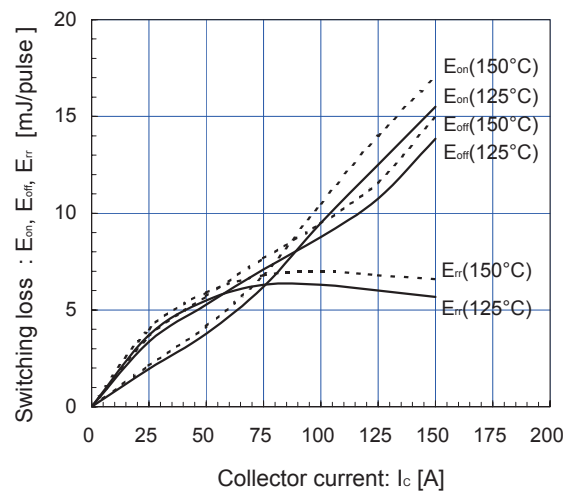
[Inverter]

Switching time vs. gate resistance (typ.)
 $V_{CC}=600V, I_C=75A, V_{GE}=\pm 15V, T_J=125^\circ C$



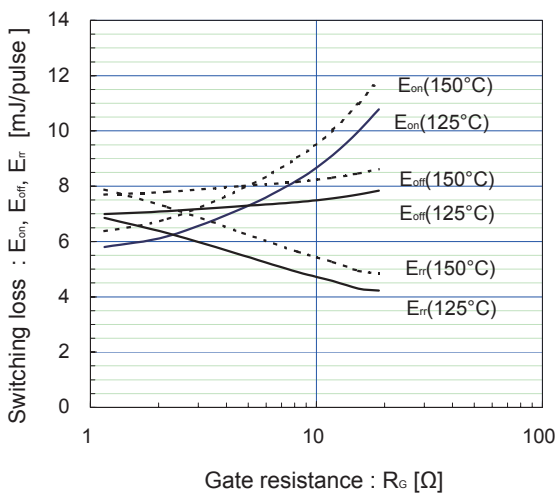
[Inverter]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=2.2\Omega$



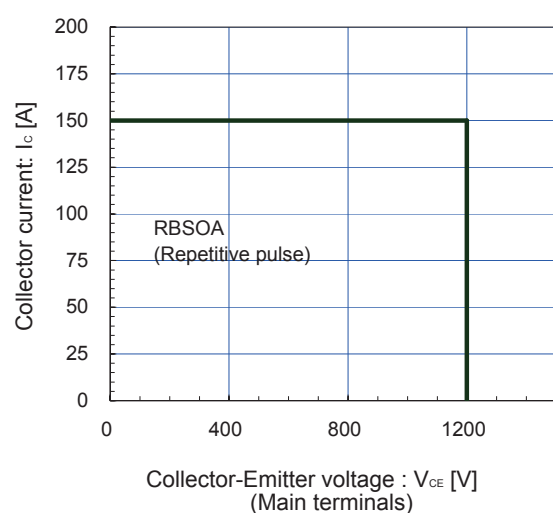
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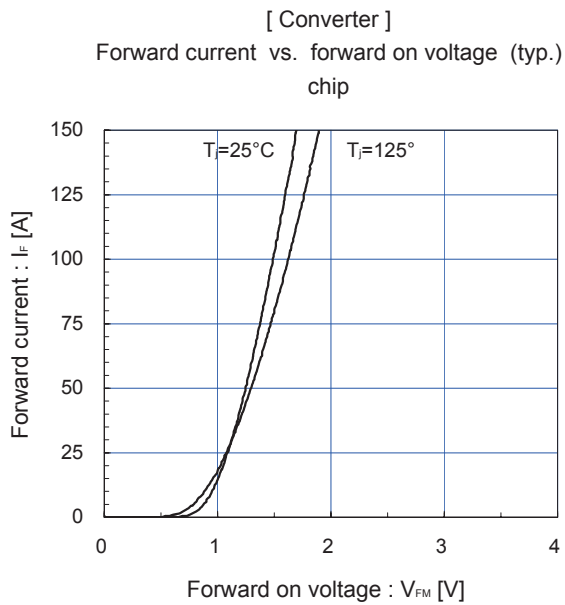
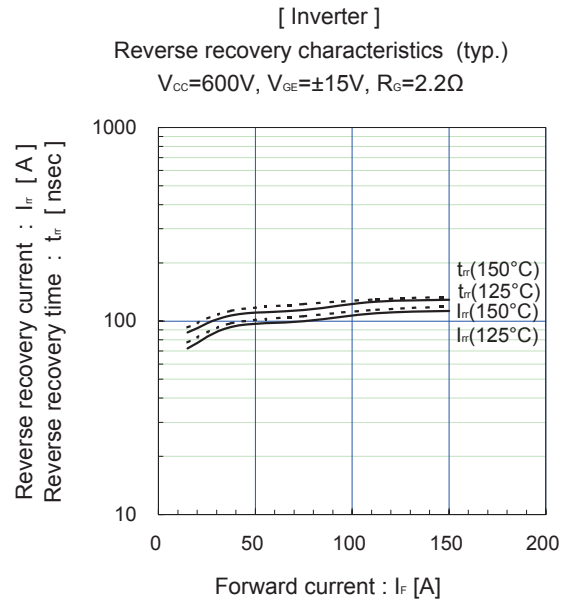
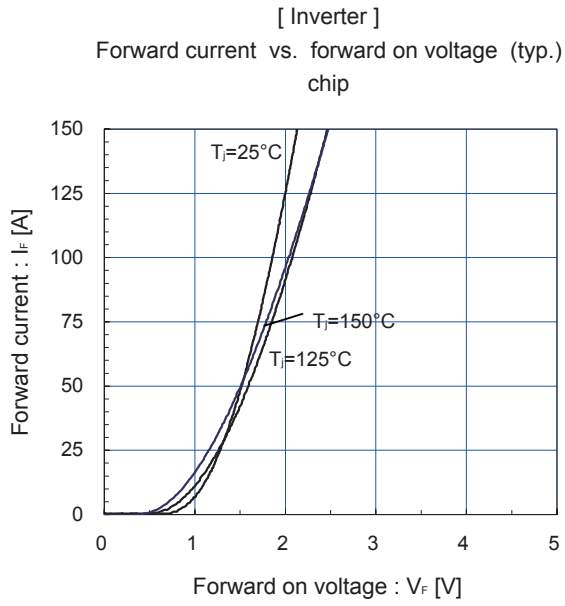
Switching Loss vs. gate resistance (typ.)
 $V_{CC}=600V, I_C=75A, V_{GE}=\pm 15V$



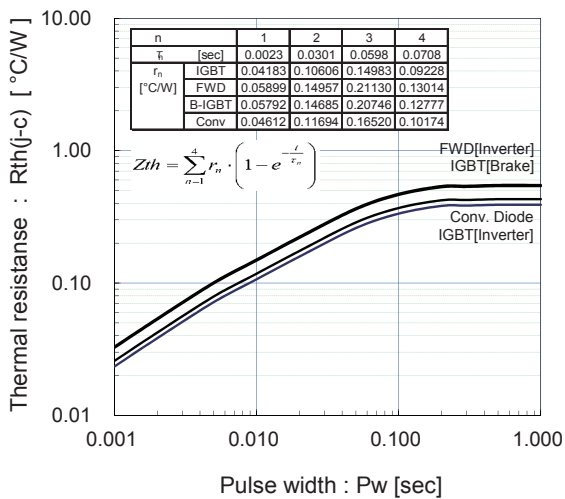
[Inverter]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_G \ge 2.2\Omega, T_J=150^\circ C$

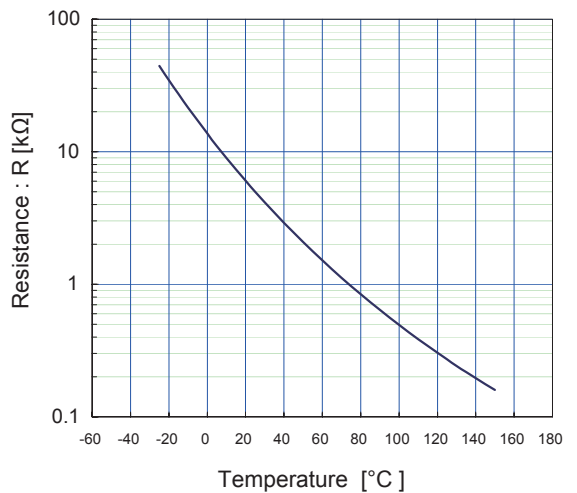




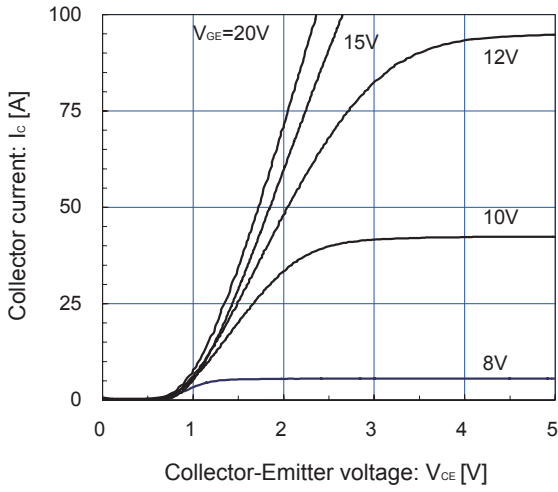
Transient thermal resistance (max.)



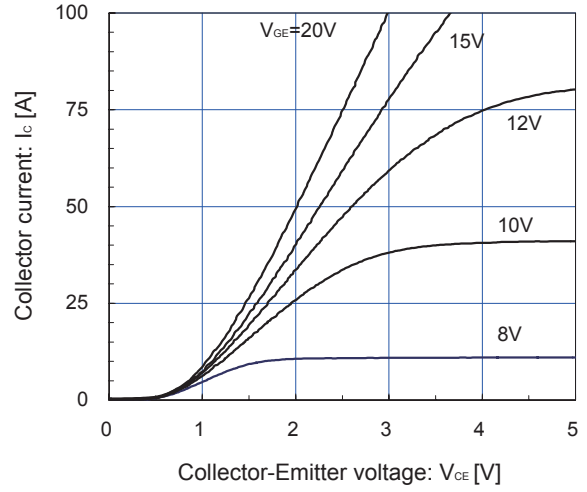
[Thermistor]
Temperature characteristic (typ.)



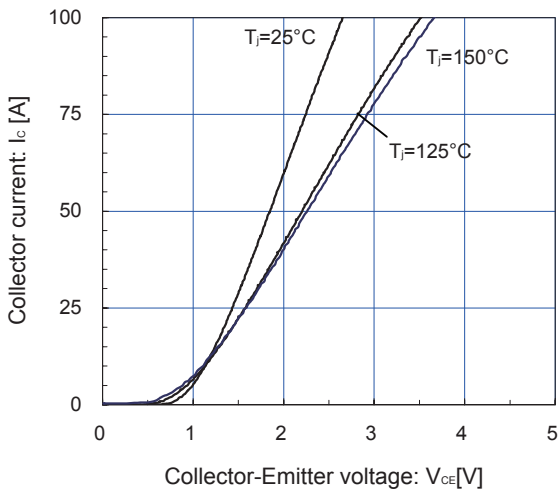
[Brake]
 Collector current vs. Collector-Emittor voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



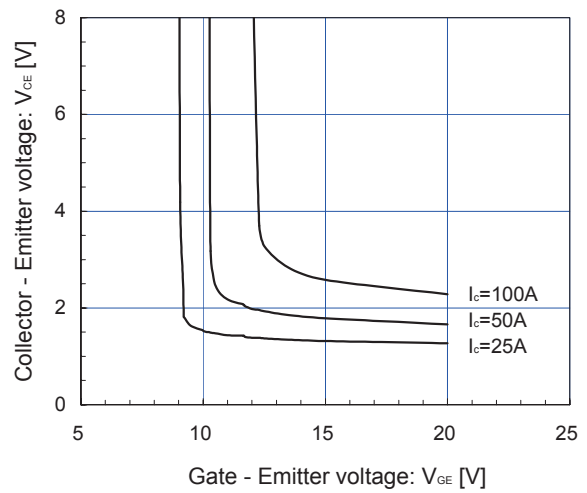
[Brake]
 Collector current vs. Collector-Emittor voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



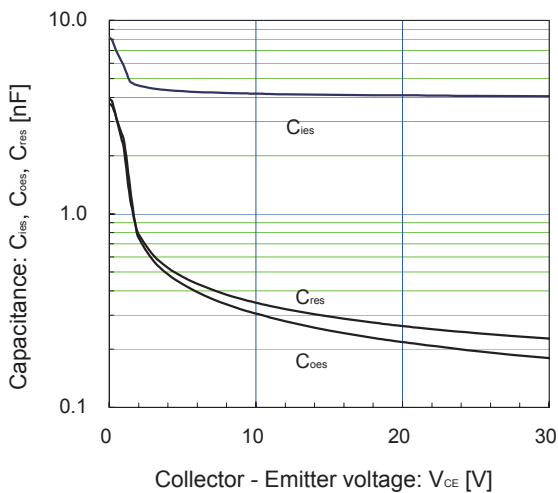
[Brake]
 Collector current vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



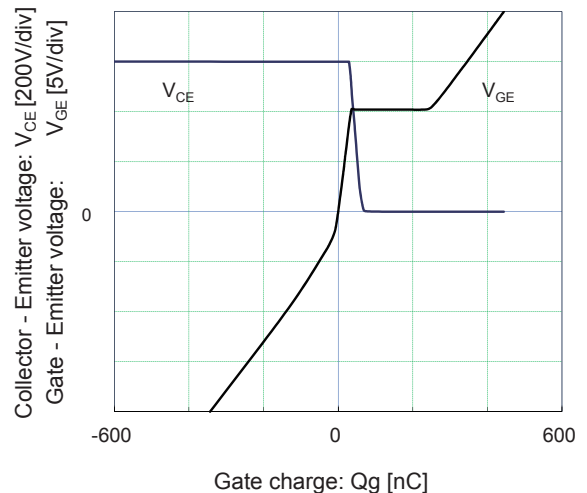
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 Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



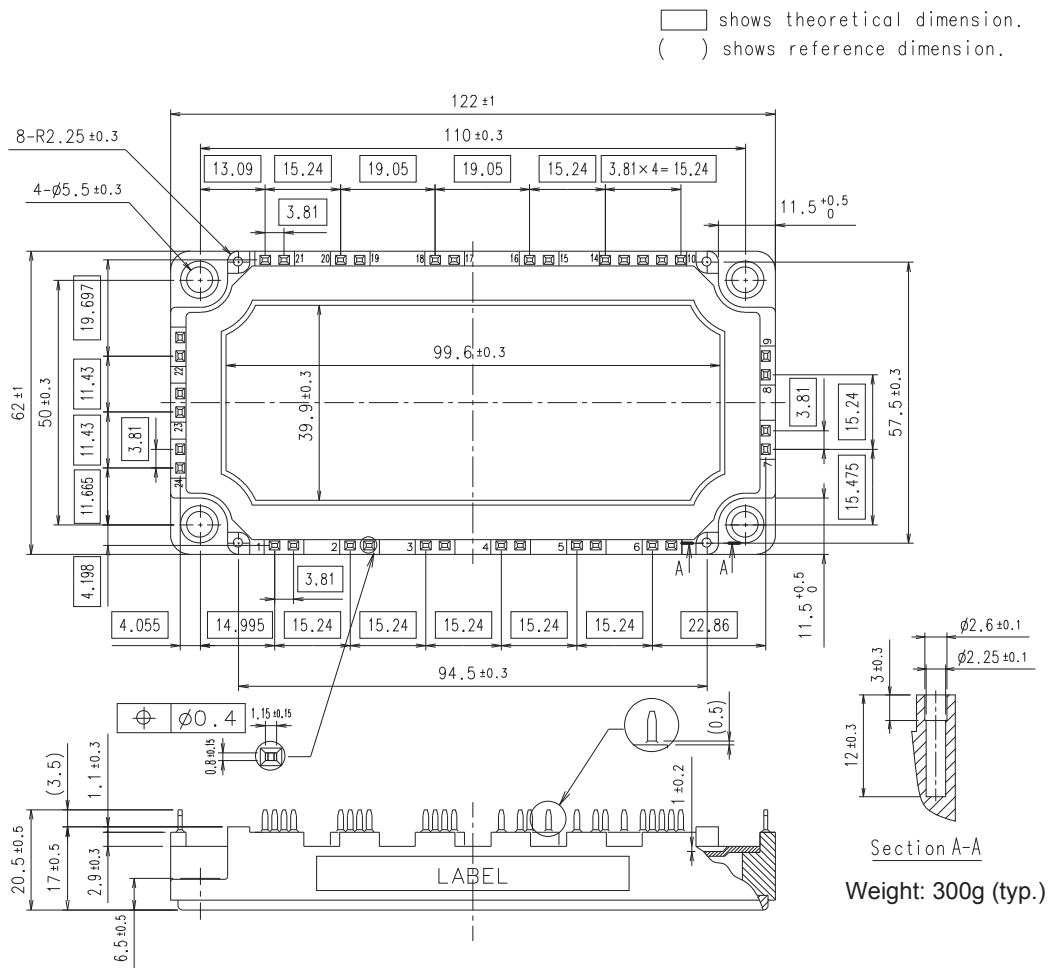
[Brake]
 Capacitance vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



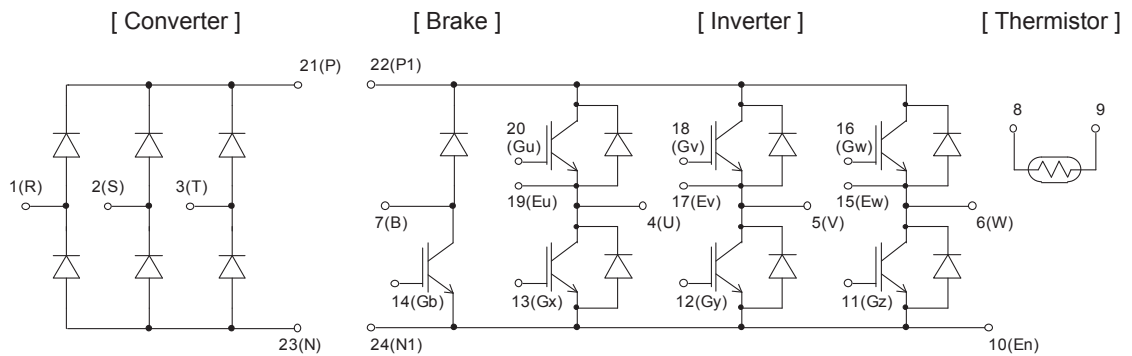
[Brake]
 Dynamic gate charge (typ.)
 $V_{CC} = 600\text{V}$, $I_c = 50\text{A}$, $T_j = 25^\circ\text{C}$



■ Outline Drawings (Unit: mm)



■ Equivalent Circuit



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IGBT Modules

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