

# 7MBR75VB120-50

IGBT Modules

## IGBT MODULE (V series)

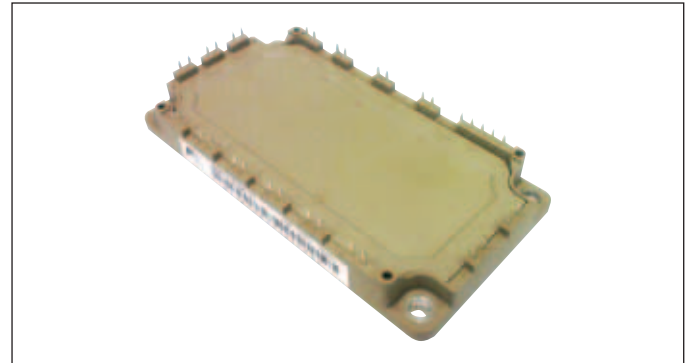
1200V / 75A / PIM

### ■ 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	$V_{GES}$		$\pm 20$	V	
	Collector current	$I_c$	Continuous	$T_c=80^\circ\text{C}$	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	$V_{GES}$		$\pm 20$	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	$\text{A}^2\text{s}$	
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  $T_j = 25^\circ\text{C}$  unless otherwise specified)

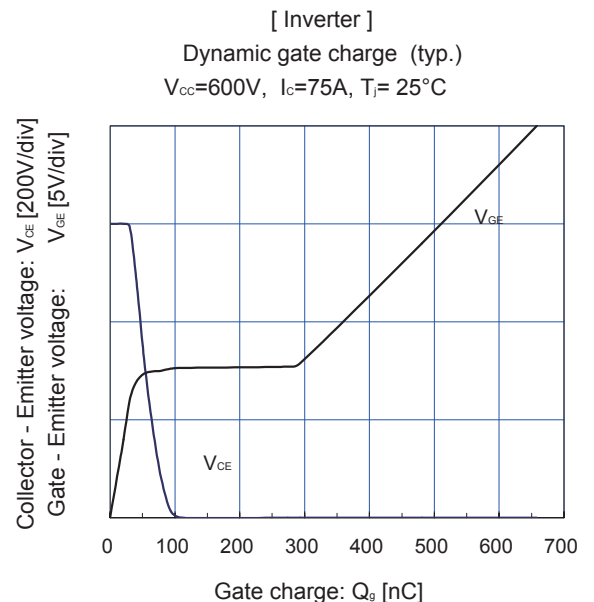
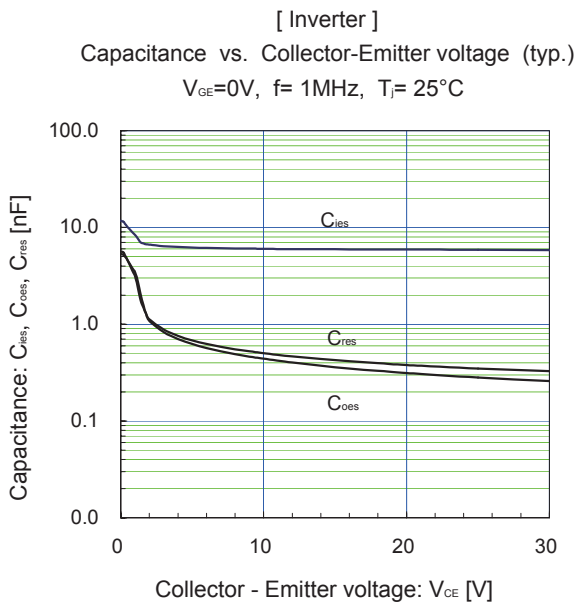
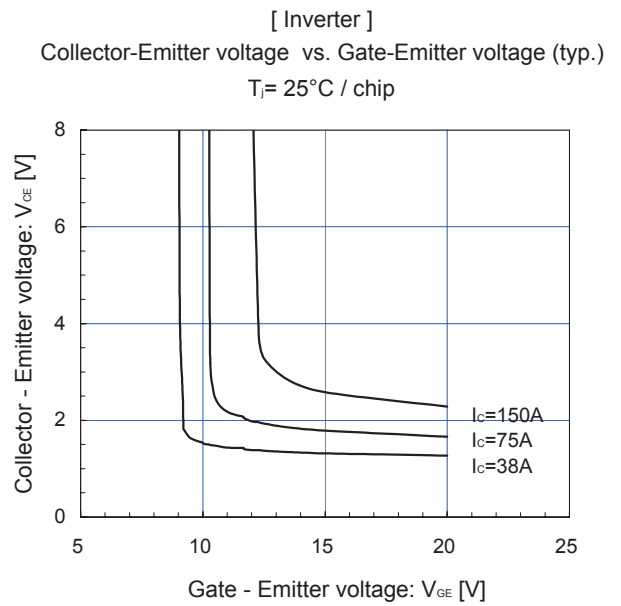
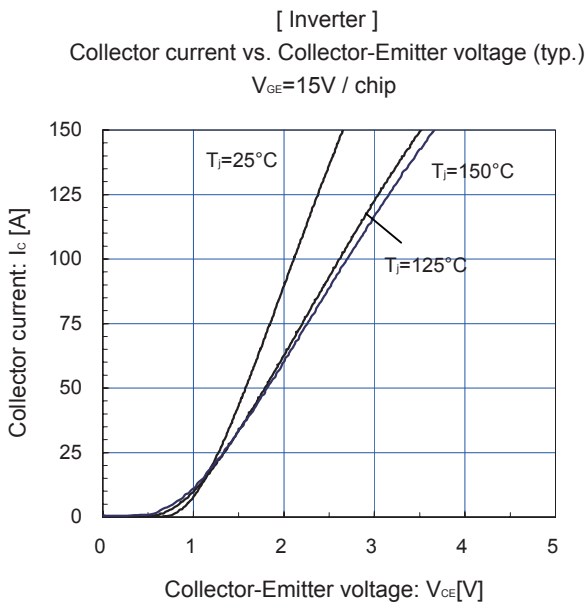
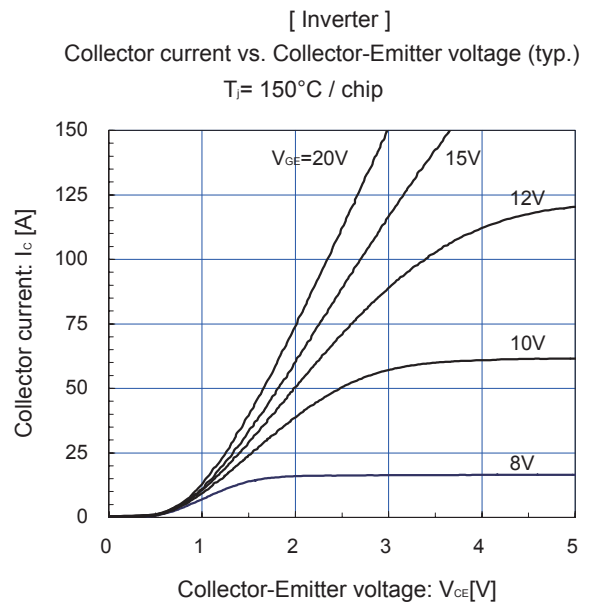
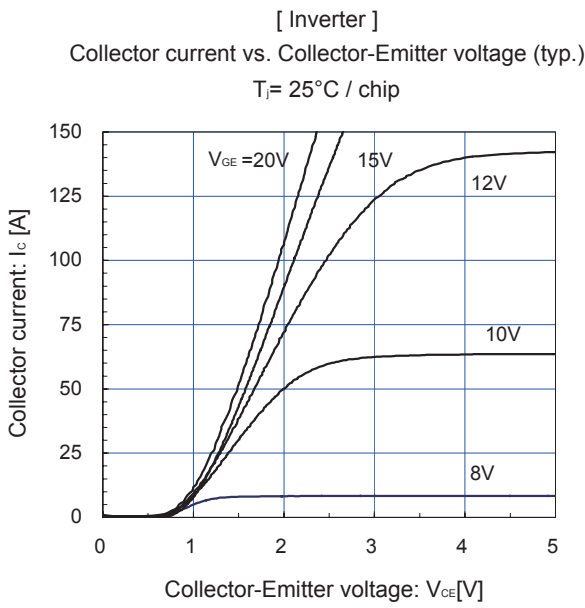
Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{GE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 75mA$	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 75A$	$T_j = 25^\circ\text{C}$	-	2.35	2.80	V
				$T_j = 125^\circ\text{C}$	-	2.70	-	
				$T_j = 150^\circ\text{C}$	-	2.75	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 75A$	$T_j = 25^\circ\text{C}$	-	1.85	2.30	
				$T_j = 125^\circ\text{C}$	-	2.20	-	
				$T_j = 150^\circ\text{C}$	-	2.25	-	
	Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	6.0	-	nF	
	Turn-on time	$t_{on}$	$V_{CC} = 600V$ $I_c = 75A$ $V_{GE} = +15 / -15V$ $R_G = 2.2\Omega$	-	0.39	1.20	$\mu s$	
		$t_r$		-	0.09	0.60		
		$t_{r(i)}$		-	0.03	-		
	Turn-off time	$t_{off}$	-	0.53	1.00			
$t_r$		-	0.06	0.30				
Forward on voltage	$V_F$ (terminal)	$I_F = 75A$	$T_j = 25^\circ\text{C}$	-	2.20	2.65	V	
			$T_j = 125^\circ\text{C}$	-	2.35	-		
			$T_j = 150^\circ\text{C}$	-	2.30	-		
	$V_F$ (chip)	$I_F = 75A$	$T_j = 25^\circ\text{C}$	-	1.70	2.15		
			$T_j = 125^\circ\text{C}$	-	1.85	-		
			$T_j = 150^\circ\text{C}$	-	1.80	-		
Reverse recovery time	$t_{rr}$	$I_F = 75A$	-	-	0.35	$\mu s$		
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)	$V_{GE} = 15V$ $I_c = 50A$	$T_j = 25^\circ\text{C}$	-	2.20	2.65	V
				$T_j = 125^\circ\text{C}$	-	2.55	-	
				$T_j = 150^\circ\text{C}$	-	2.60	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 50A$	$T_j = 25^\circ\text{C}$	-	1.85	2.30	
				$T_j = 125^\circ\text{C}$	-	2.20	-	
				$T_j = 150^\circ\text{C}$	-	2.25	-	
	Turn-on time	$t_{on}$	$V_{CE} = 600V$ $I_c = 50A$ $V_{GE} = +15 / -15V$ $R_G = 15\Omega$	-	0.39	1.20	$\mu s$	
		$t_r$		-	0.09	0.60		
Turn-off time	$t_{off}$	-	0.53	1.00				
	$t_r$	-	0.06	0.30				
Reverse current	$I_{RRM}$	$V_R = 1200V$	-	-	1.00	mA		
Converter	Forward on voltage	$V_{FM}$ (chip)	terminal	-	1.90	2.35	V	
			chip	-	1.40	-		
Reverse current	$I_{RRM}$	$V_R = 1600V$	-	-	1.0	mA		
Thermistor	Resistance	R	$T = 25^\circ\text{C}$	-	5000	-	$\Omega$	
			$T = 100^\circ\text{C}$	465	495	520		
B value	B	$T = 25 / 50^\circ\text{C}$	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	$^\circ\text{C/W}$
		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	-	

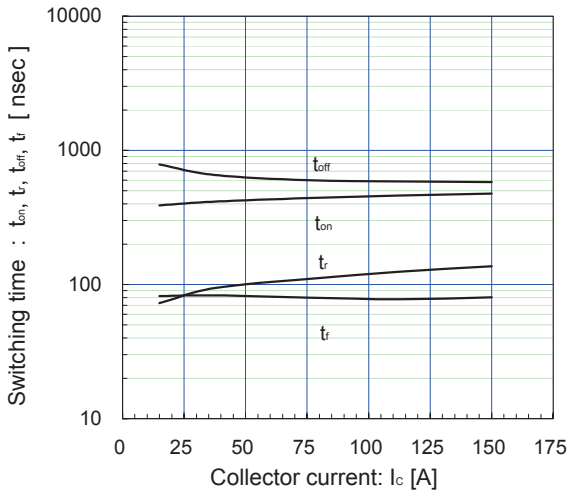
Note \*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



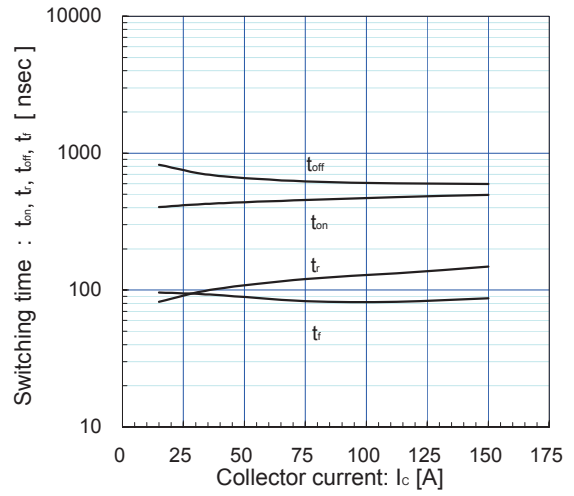
[ Inverter ]

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



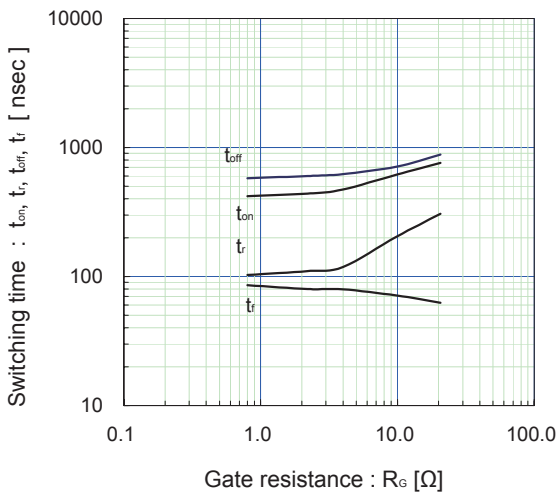
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Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=2.2\Omega, T_J=150^\circ C$



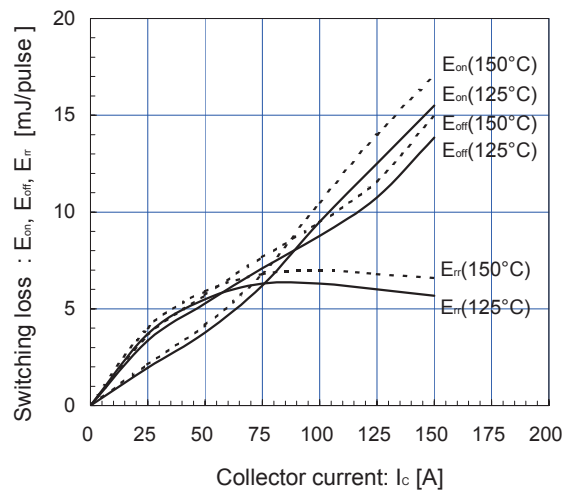
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Switching time vs. gate resistance (typ.)  
 $V_{CC}=600V, I_c=75A, V_{GE}=\pm 15V, T_J=125^\circ C$



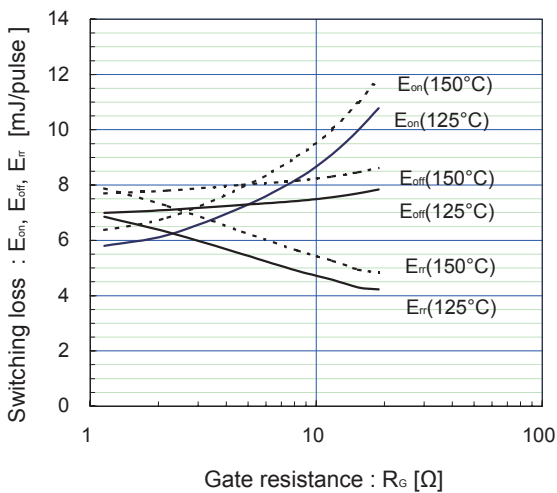
[ Inverter ]

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



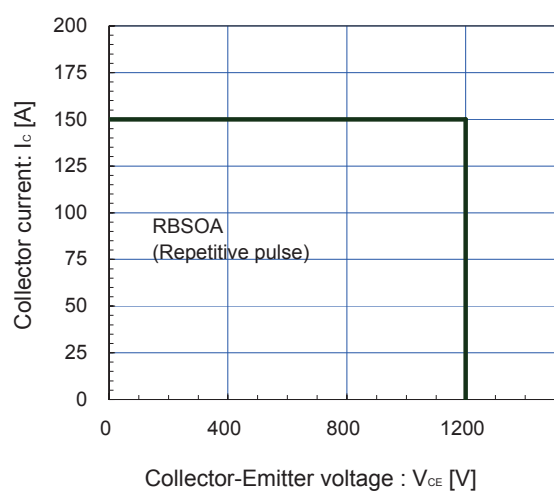
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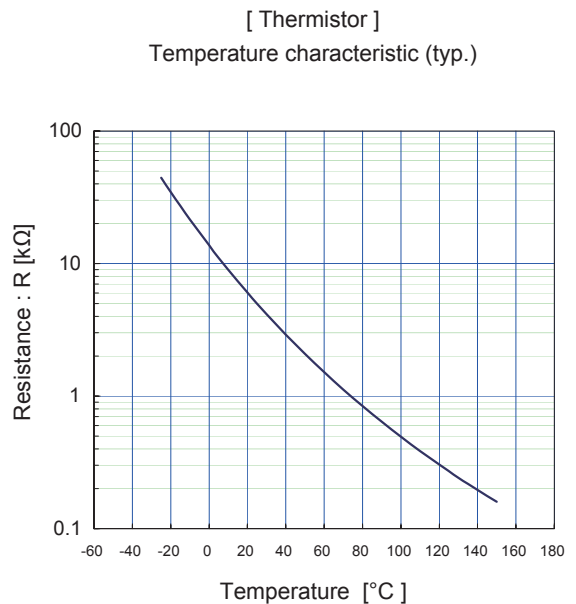
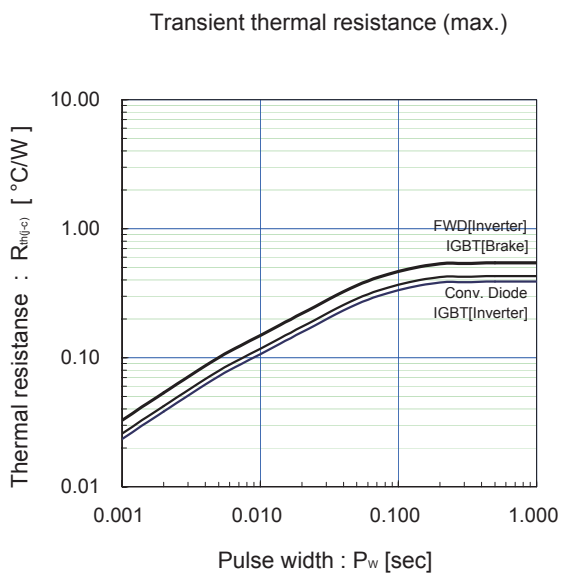
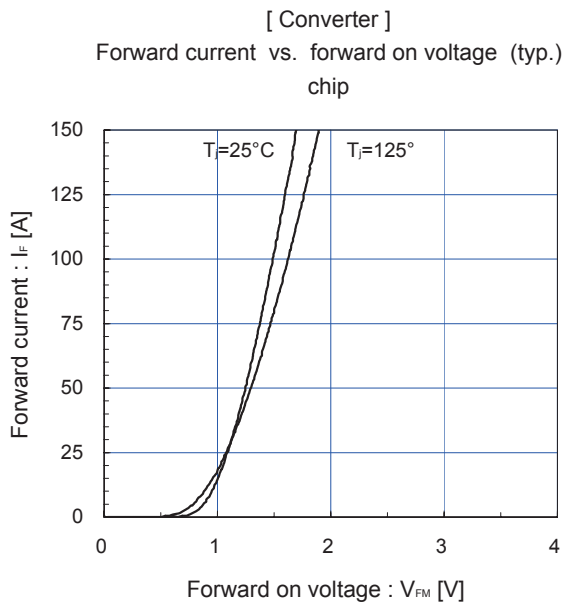
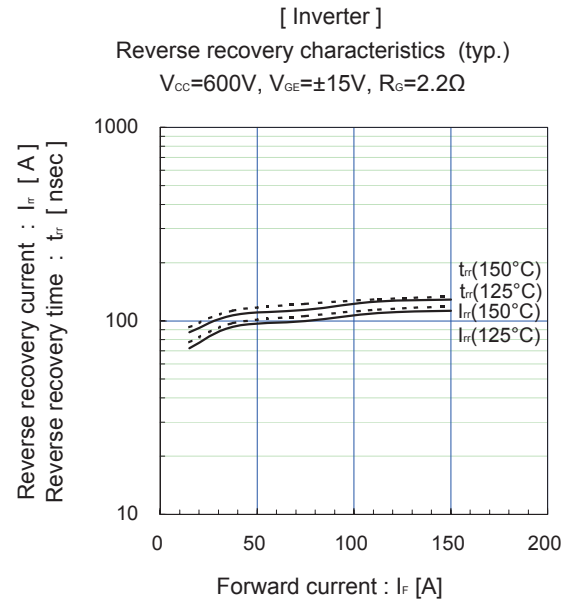
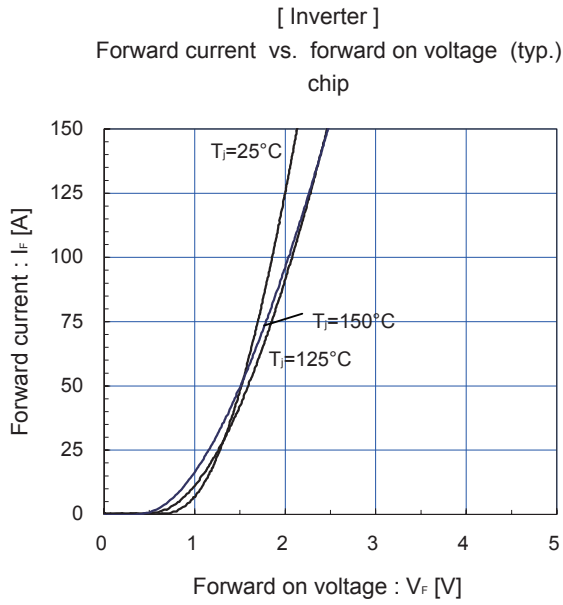
Switching Loss vs. gate resistance (typ.)  
 $V_{CC}=600V, I_c=75A, V_{GE}=\pm 15V$

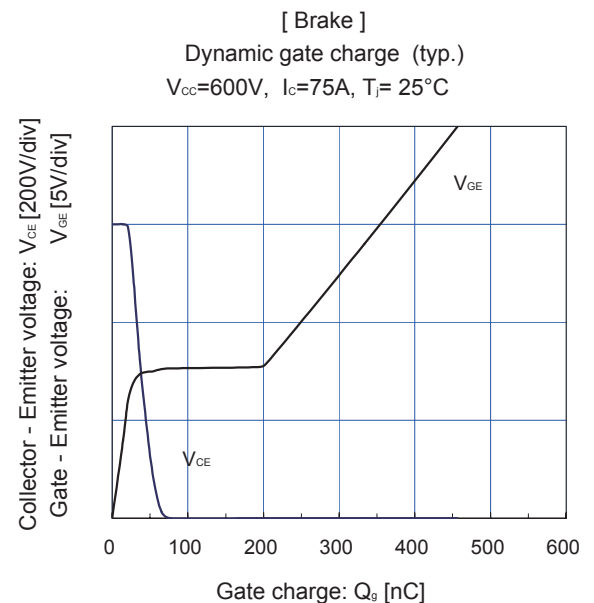
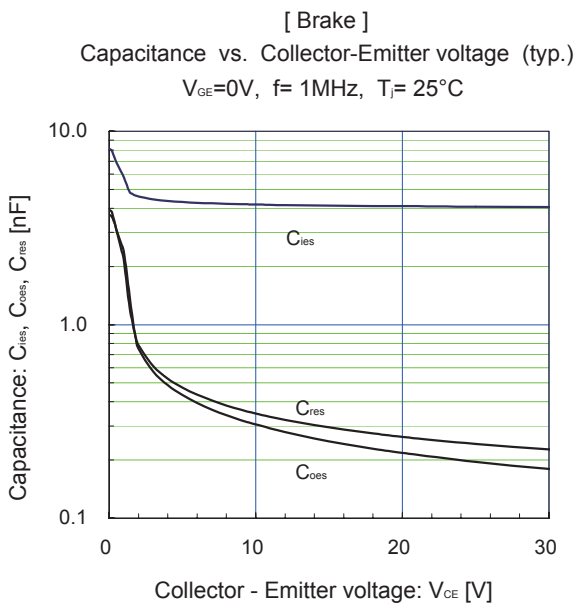
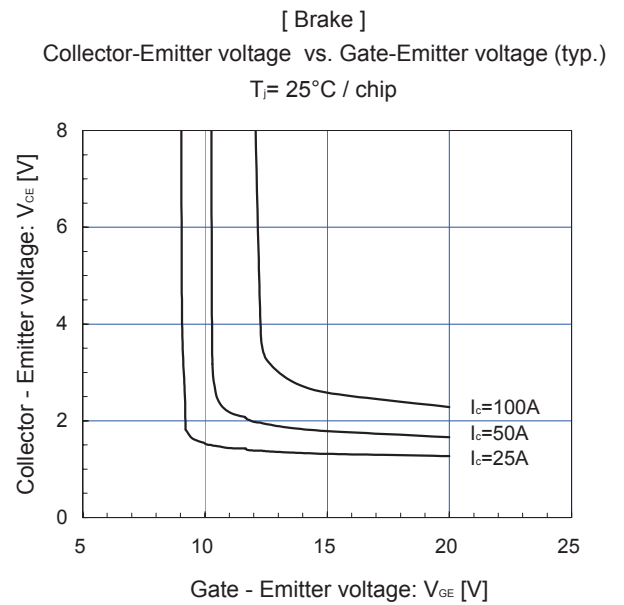
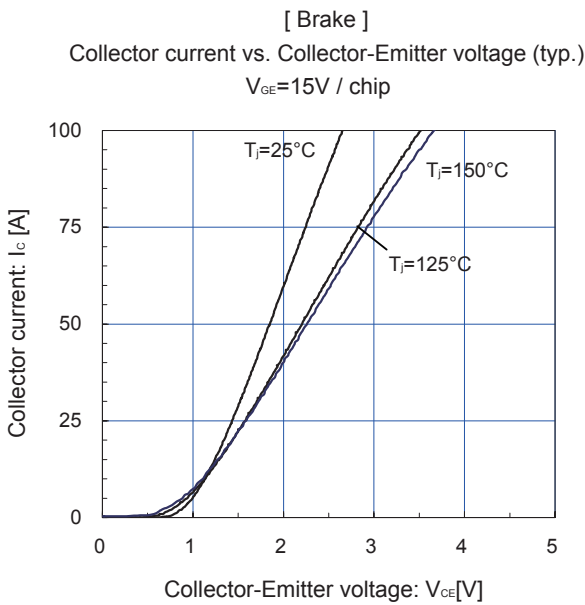
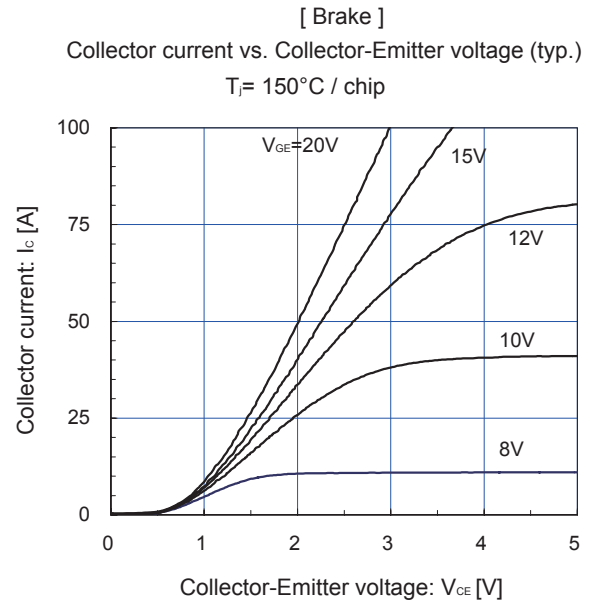
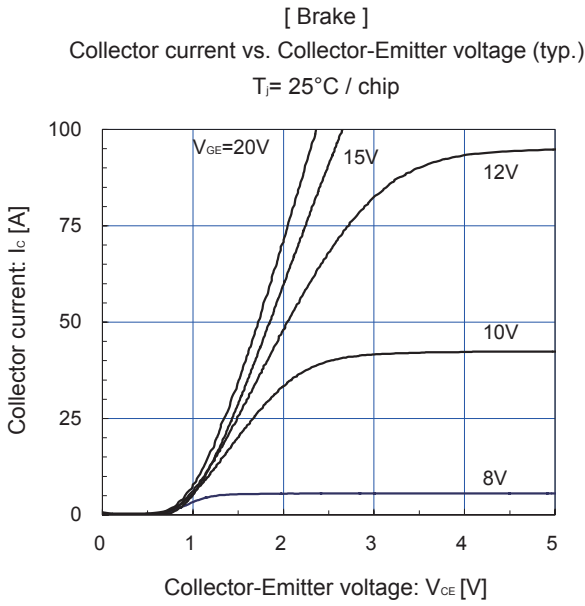


[ Inverter ]

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

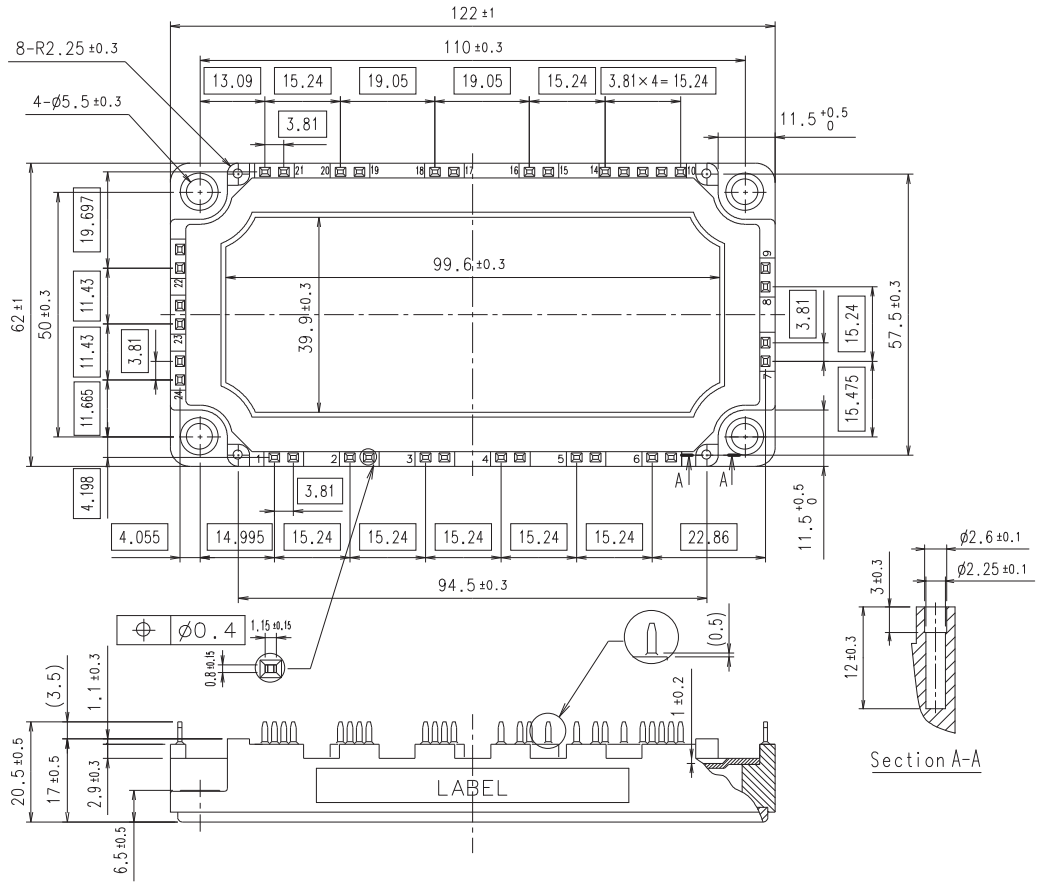




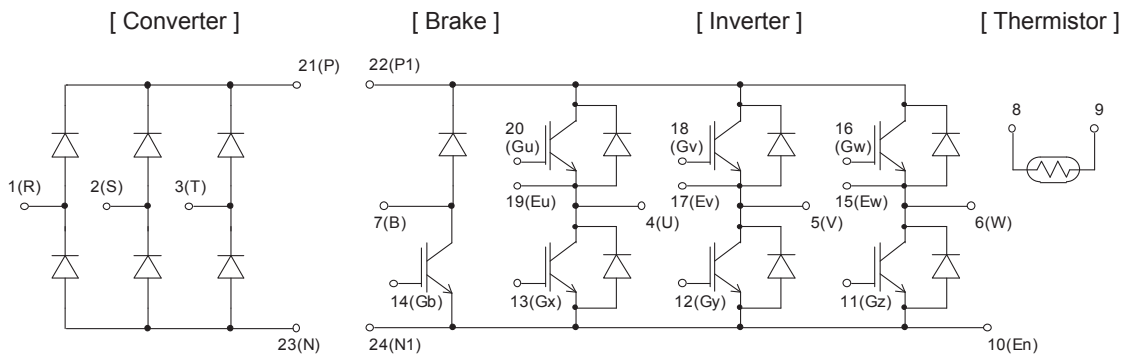


Outline Drawings, mm

□ shows theoretical dimension.  
 ( ) shows reference dimension.



Equivalent Circuit Schematic



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