

6MBI180VB-120-55

IGBT Modules

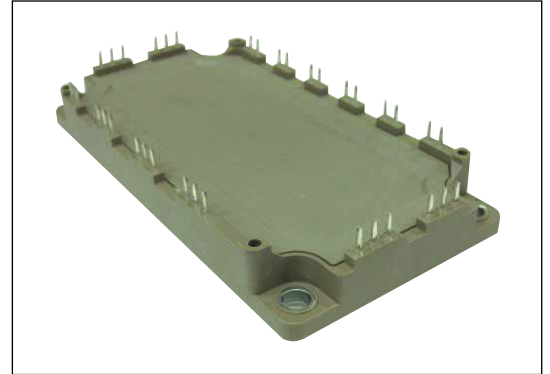
IGBT MODULE (V series) 1200V / 180A / 6 in one package

■ Features

- Compact Package
- P.C.Board Mount
- Low $V_{CE(sat)}$

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as welding machines



■ 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
		$I_{C(pulse)}$	1ms	$T_c=80^\circ\text{C}$	400	
		$-I_C$			150	
		$-I_{C(pulse)}$	1ms		400	
Collector power dissipation	P_C	1 device		1075	W	
Junction temperature	T_j			175	°C	
Operating junction temperature (under switching conditions)	T_{jop}			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 T_J = 25°C unless otherwise specified)

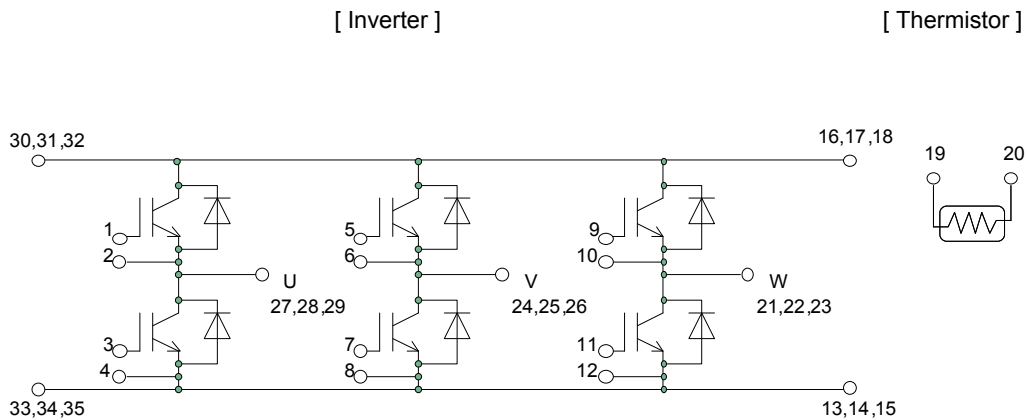
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I _{CEs}	V _{GE} = 0V, V _{CE} = 1200V	-	-	1.0	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	200	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 200mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 200A	T _J =25°C	-	2.70	3.15	V
			T _J =125°C	-	3.05	-	
			T _J =150°C	-	3.10	-	
	V _{CE(sat)} (chip)	V _{GE} = 15V I _c = 200A	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)}	-	-	3.8	-	Ω	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	16.5	-	nF	
Turn-on time	t _{on}	V _{CC} = 600V I _c = 200A V _{GE} = +15 / -15V R _G = 1.2Ω	-	0.39	1.20	μs	
	t _r		-	0.09	0.60		
	t _{r(i)}		-	0.03	-		
Turn-off time	t _{off}	R _G = 1.2Ω	-	0.53	1.00	μs	
	t _r		-	0.06	0.30		
Forward on voltage	V _F (terminal)	I _F = 200A	T _J =25°C	-	2.55	3.00	V
			T _J =125°C	-	2.70	-	
			T _J =150°C	-	2.65	-	
	V _F (chip)	I _F = 200A	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 = 200A	-	-	0.35	μs	
Thermistor	Resistance	R	T = 25°C	-	5000	-	Ω
		T = 100°C	465	495	520		
		B value	T = 25 / 50°C	3305	3375	3450	

● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	Inverter IGBT	-	-	0.14	°C/W
		Inverter FWD	-	-	0.25	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.05	-	

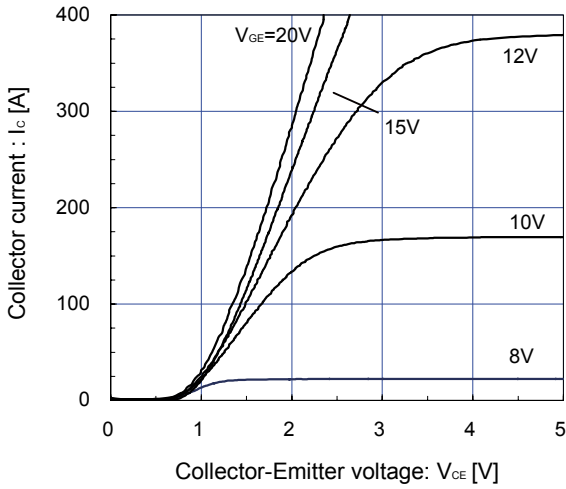
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

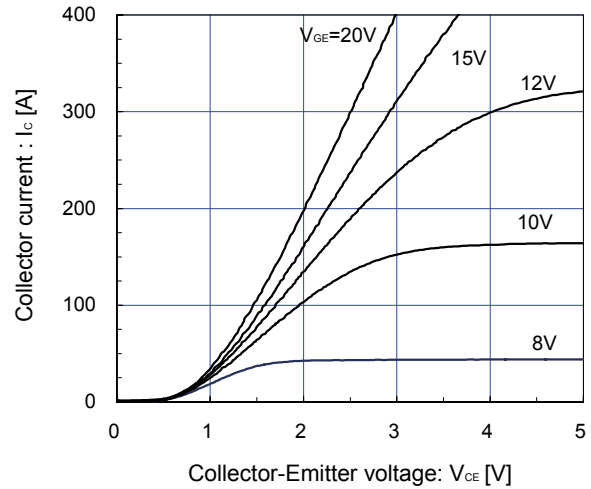


■ Characteristics (Representative)

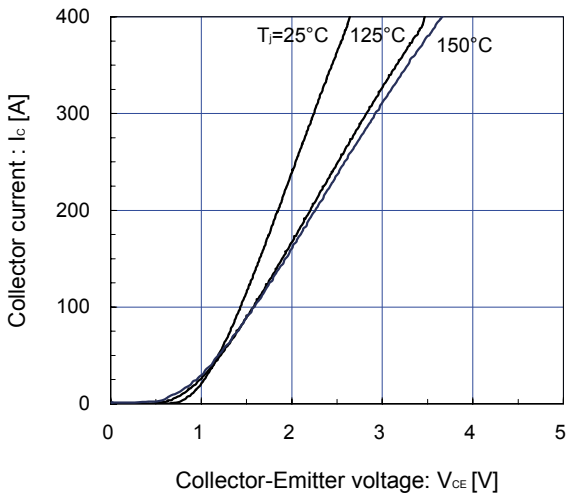
[Inverter]
Collector current vs. Collector-Emmitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



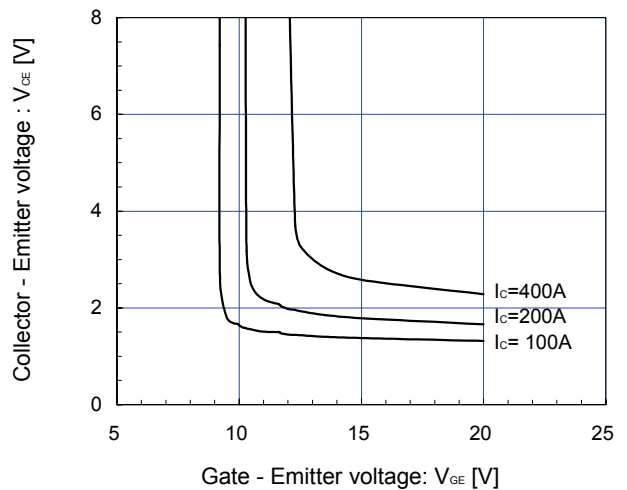
[Inverter]
Collector current vs. Collector-Emmitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



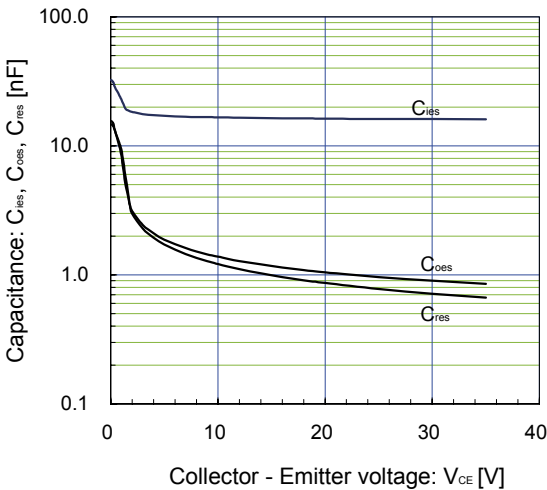
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Collector current vs. Collector-Emmitter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



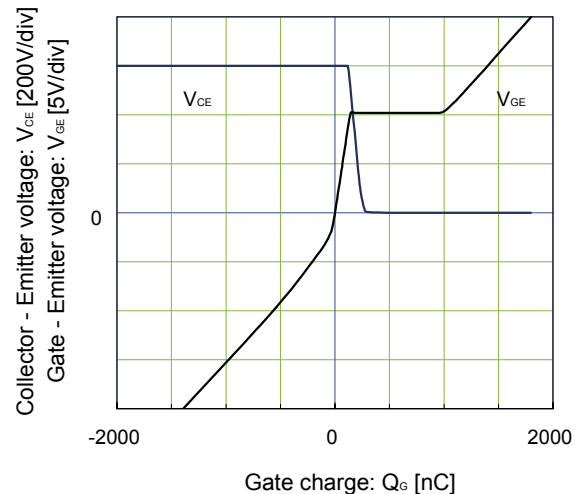
[Inverter]
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



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

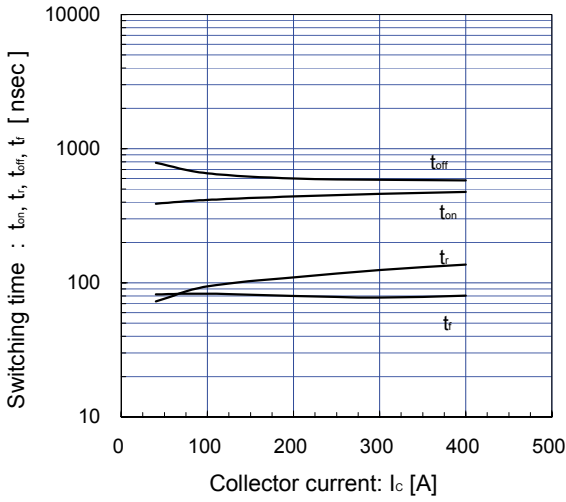


[Inverter]
Dynamic gate charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 200\text{A}$, $T_j = 25^\circ\text{C}$



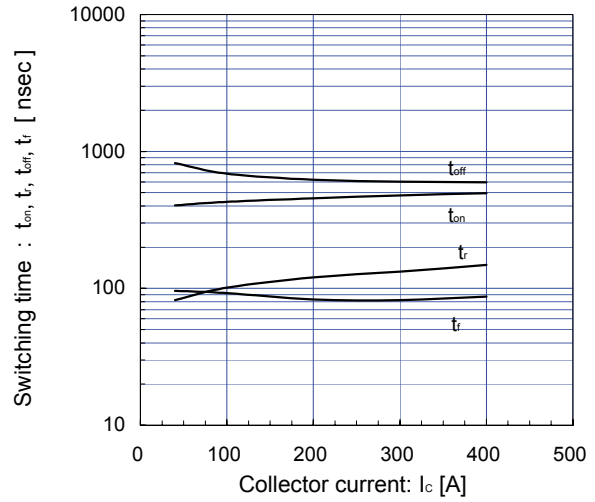
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega, T_J=125^\circ C$



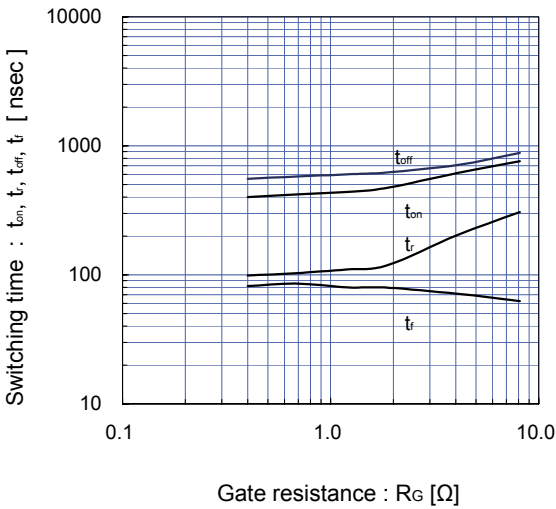
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega, T_J=150^\circ C$



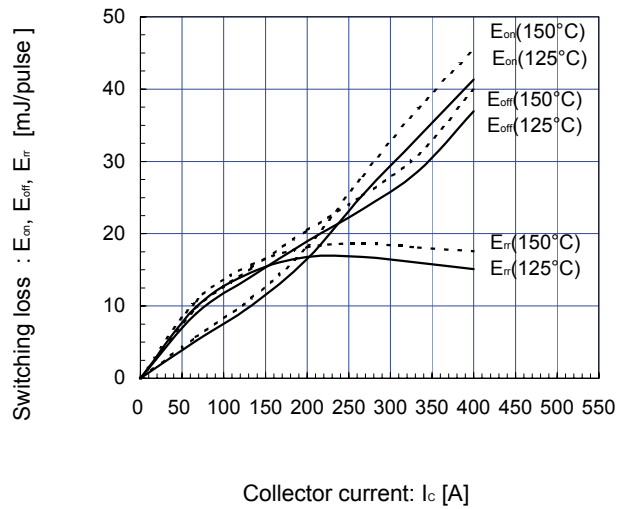
[Inverter]

Switching time vs. gate resistance (typ.)
 $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V, T_J=125^\circ C$



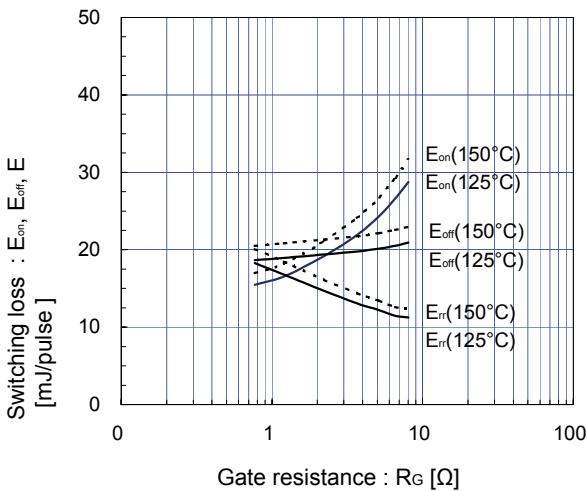
[Inverter]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega$



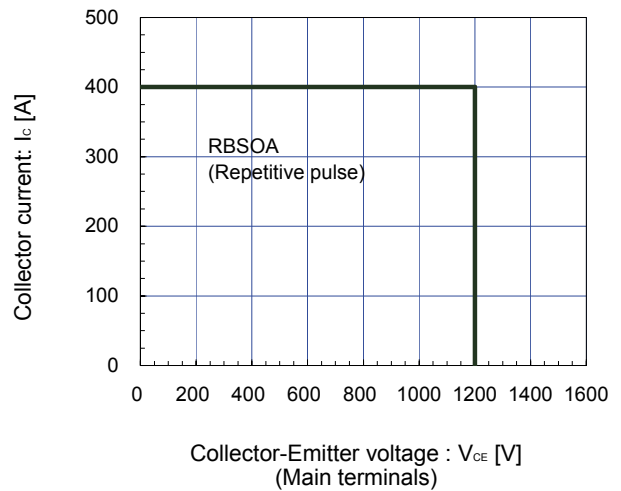
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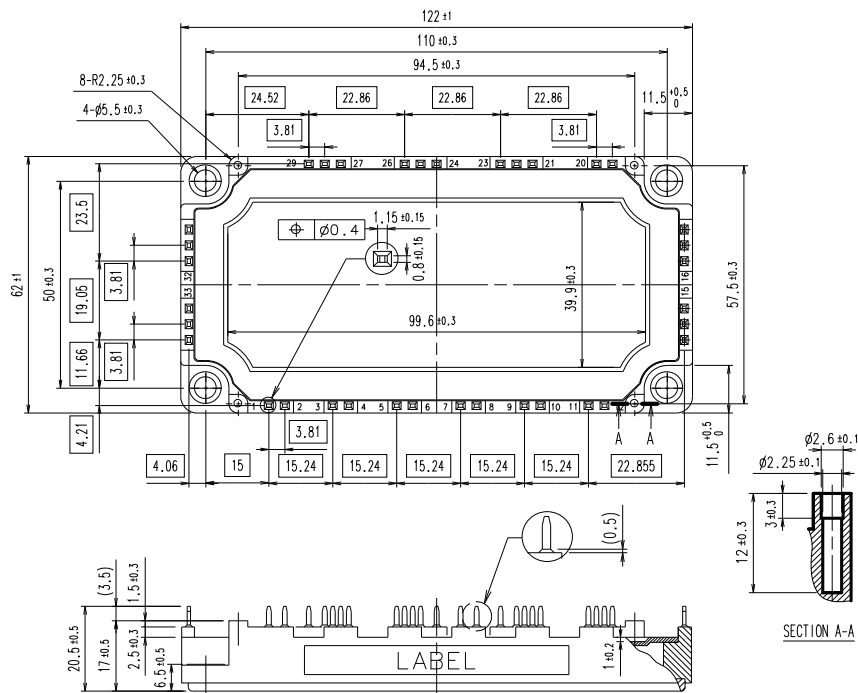
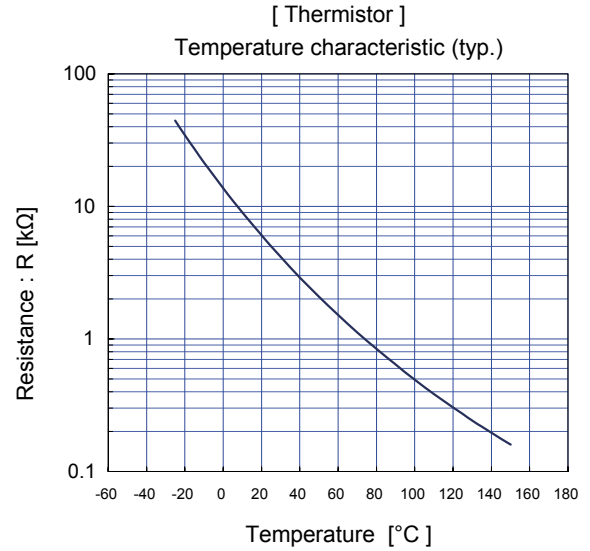
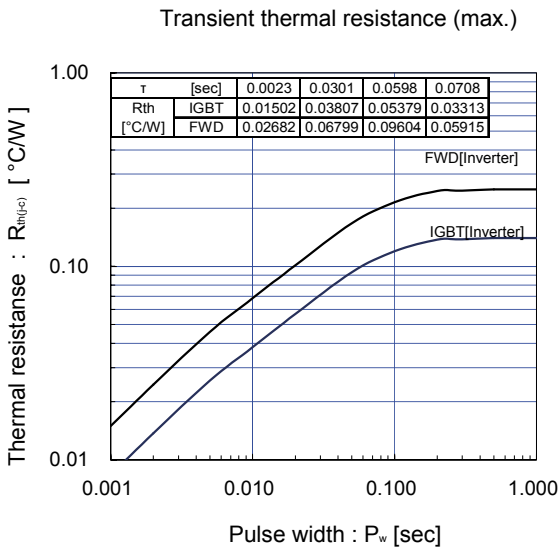
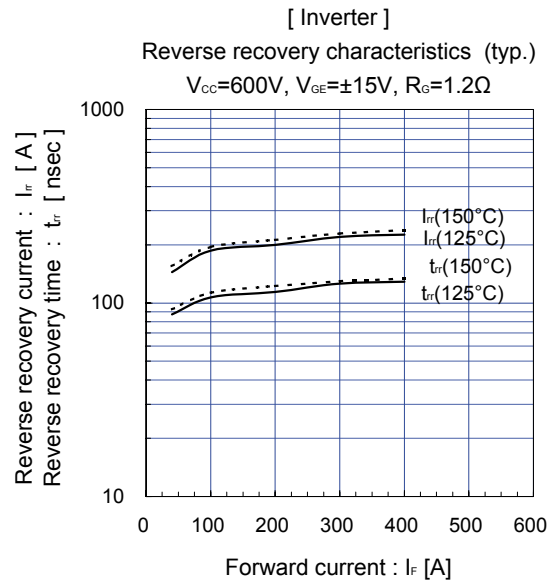
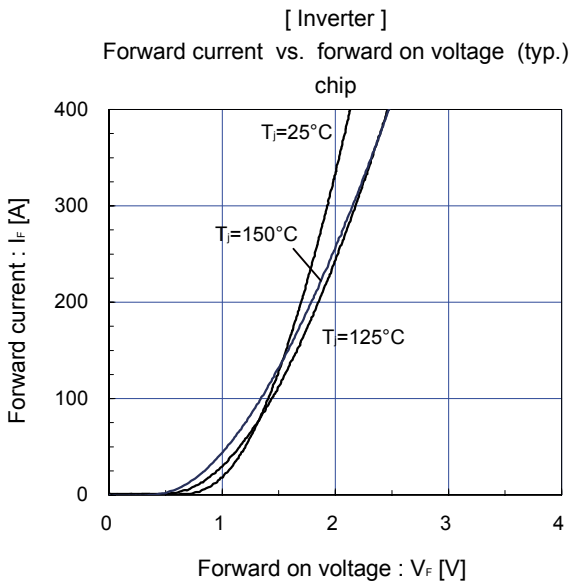
Switching loss vs. gate resistance (typ.)
 $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V$



[Inverter]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_G \ge 1.2\Omega, T_J \le 150^\circ C$





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