

12MBI100VX-120-50

IGBT Modules

IGBT MODULE (V series)

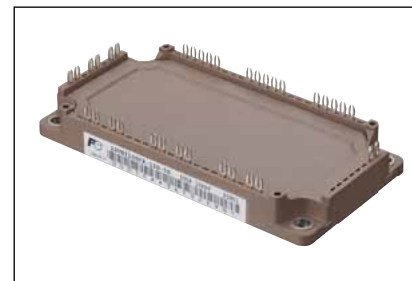
1200V / 100A / IGBT, RB-IGBT 12 in one package

■ Features

- Higher Efficiency
- Optimized A (T-type) -3 level circuit
- Low inductance module structure
- Featuring Reverse Blocking IGBT (RB-IGBT)

■ Applications

- Inverter for Motor Drive
- Uninterruptible Power Supply
- Power conditioner



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at Tc=25°C unless otherwise specified)

Items		Symbols	Conditions		Maximum ratings	Units
T1, T2	Collector-Emitter voltage	V _{CES}			1200	V
	Gate-Emitter voltage	V _{GES}			±20	V
	Collector current	I _C	Continuous	T _C =80°C	100	A
			1ms	T _C =80°C	200	
		-I _C			100	
			1ms		200	
	Collector power dissipation	P _C	1 device		430	W
T3, T4	Collector-Emitter voltage	V _{CES}			600	V
	Repetitive peak reverse voltage	V _{RRM}			600	V
	Gate-Emitter voltage	V _{GES}			±20	V
	Collector current	I _C	Continuous	T _C =80°C	100	A
		I _{CP}	1ms	T _C =80°C	200	
	Collector power dissipation	P _C	1 device		400	W
Junction temperature		T _J			150	°C
Case temperature		T _C			125	
Storage temperature		T _{stg}			-40 ~ +125	
Isolation voltage	between terminal and copper base (*1)	V _{iso}	AC : 1min.		2500	VAC
	between thermistor and others (*2)					
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)

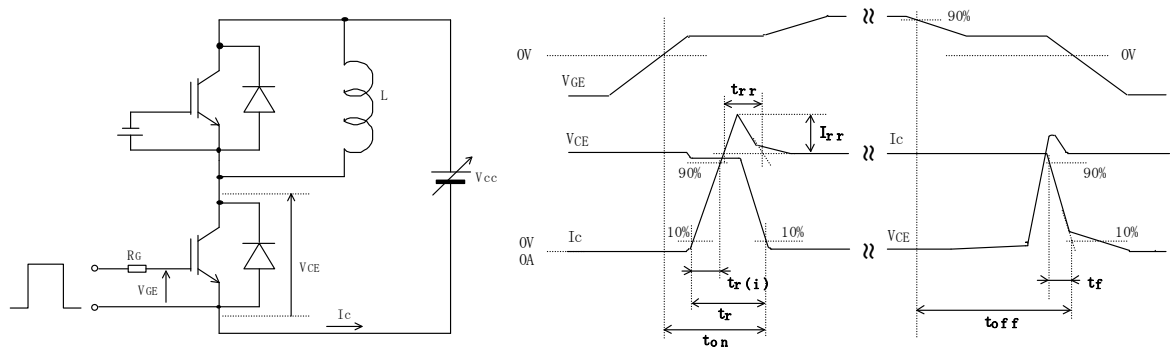
Items		Symbols	Conditions	Characteristics			Units		
				min.	typ.	max.			
T1, T2	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	1.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	200	nA	
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 100mA		6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 100A	T _J = 25°C	-	1.75	2.20	V	
				T _J =125°C	-	2.05	-		
		V _{CE (sat)} (P-U, V, W / U, V, W-N terminal)	V _{GE} = 15V I _C = 100A	T _J = 25°C	-	2.60	3.05		
				T _J =125°C	-	2.90	-		
	Internal gate resistance	R _{g(int)}	-			-	7.5	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} =0V, f = 1MHz			-	9.1	-	nF
	Turn-on time	t _{on}	SW mode : A V _{CC} = 600V I _C = 100A V _{GE} = ±15V R _G = 1.6Ω			-	0.39	1.20	μs
		t _r				-	0.09	0.60	
		t _{r (i)}				-	0.03	-	
	Turn-off time	t _{off}	V _{GE} = ±15V R _G = 1.6Ω			-	0.53	1.00	μs
		t _f				-	0.06	0.30	
	Forward on voltage	V _F (chip)	I _F = 100A	T _J = 25°C	-	1.70	2.15	V	
				T _J =125°C	-	1.85	-		
		V _F (P-U, V, W / U, V, W-N terminal)	I _F = 100A	T _J = 25°C	-	2.55	3.00		
T _J =125°C				-	2.70	-			
Reverse recovery time	t _{rr}	SW mode : A V _{CC} = 600V I _F = 100A V _{GE} = ±15V R _G = 1.6Ω		-	-	0.35	μs		
		SW mode : B V _{CC} = 300V I _F = 100A V _{GE} = ±15V R _G = 3.3Ω (T3,T4)		-	-	0.35			
Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 600V		-	-	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 = 100mA		5.5	6.5	7.5	V		
Collector-Emitter saturation voltage	V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 100A	T _J = 25°C	-	2.45	2.80	V		
			T _J =125°C	-	2.60	-			
	V _{CE (sat)} (M-U, V, W terminal)	V _{GE} = 15V I _C = 100A	T _J = 25°C	-	3.30	3.65			
			T _J =125°C	-	3.45	-			
Internal gate resistance	R _{g(int)}	-			-	8.8	-	Ω	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz			-	6.5	-	nF	
T3, T4	Turn-on time	t _{on}	SW mode : B V _{CC} = 300V I _C = 100A V _{GE} = ±15V R _G = 3.3Ω		-	0.24	1.20	μs	
		t _r			-	0.10	0.60		
		t _{r (i)}			-	0.04	-		
	Turn-off time	t _{off}	V _{GE} = ±15V R _G = 3.3Ω		-	0.20	1.00	μs	
		t _f			-	0.03	0.30		
	Reverse recovery time	t _{rr}	SW mode : C V _{CC} = 300V I _C = 100A V _{GE} = ±15V R _G = 1.6Ω (T1,T2)		-	-	0.35	μs	
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

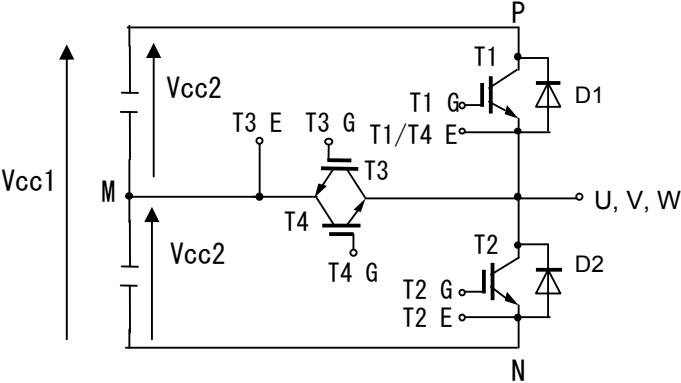
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	T ₁ , T ₂ IGBT	-	-	0.29	°C/W
		T ₁ , T ₂ FWD	-	-	0.44	
		T ₃ , T ₄ RB-IGBT	-	-	0.31	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	T ₁ , T ₂ T ₃ , T ₄	with Thermal Compound		0.05	-

Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound (thermal conductivity = 1W/m · K).

■ Definitions of switching time



Definitions of switching mode



		State of switching device			
SW mode	Load L	T1	T2	T3	T4
A	U-N	SW	OFF	OFF	OFF
	P-U	OFF	SW	OFF	OFF
B	P-U	OFF	OFF	SW	ON
	U-N	OFF	OFF	ON	SW
C	M-U	SW	OFF	OFF	ON
	M-U	OFF	SW	ON	OFF

SW: Connect to drive circuit and input gate signal.

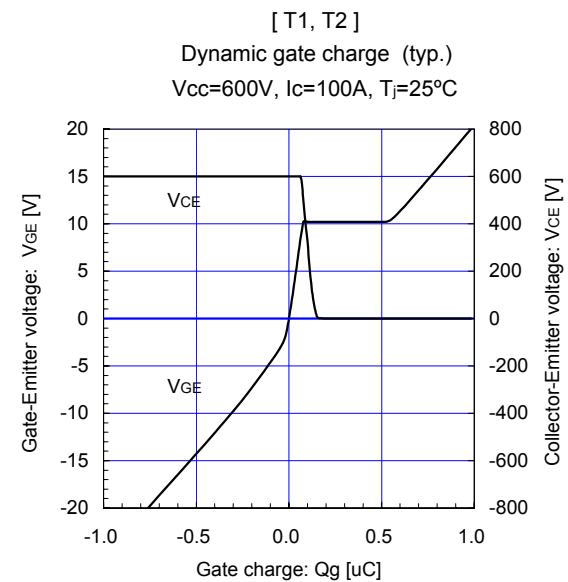
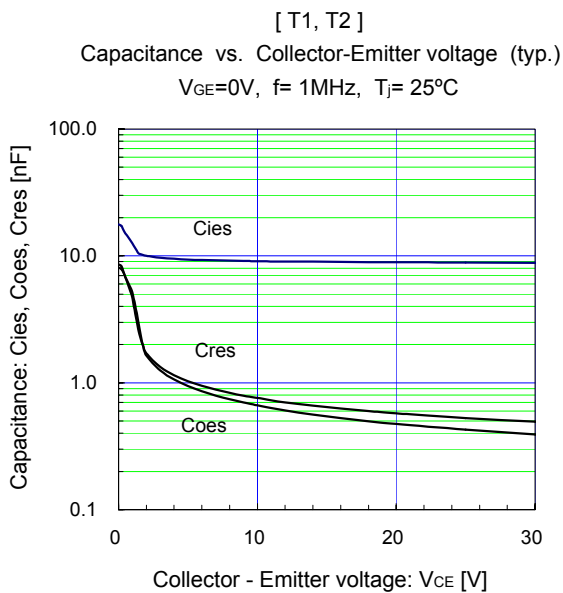
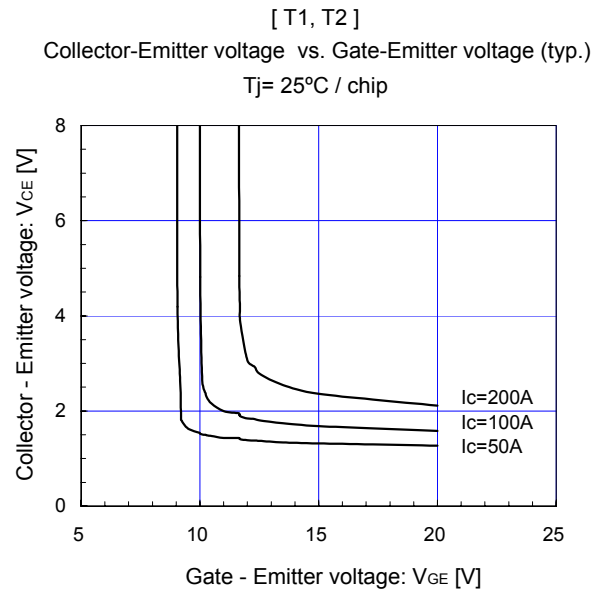
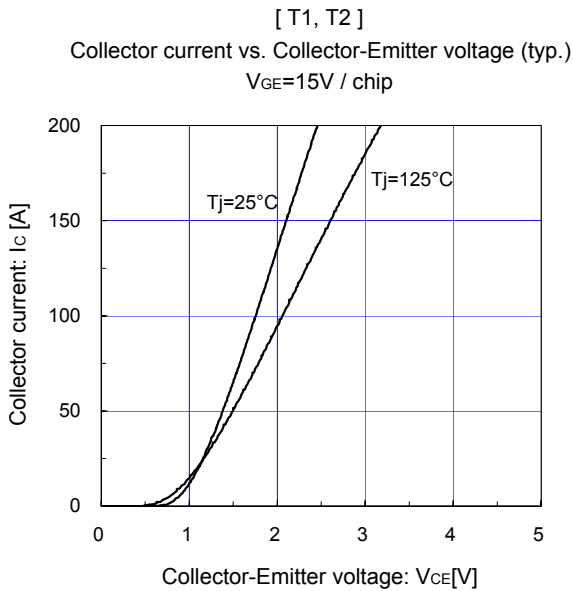
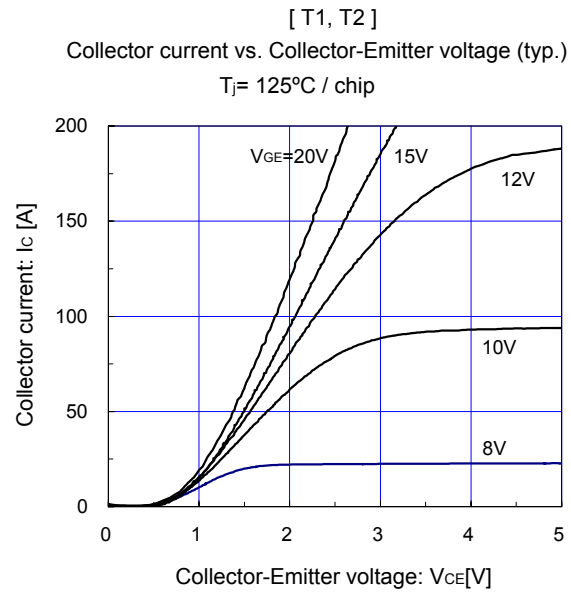
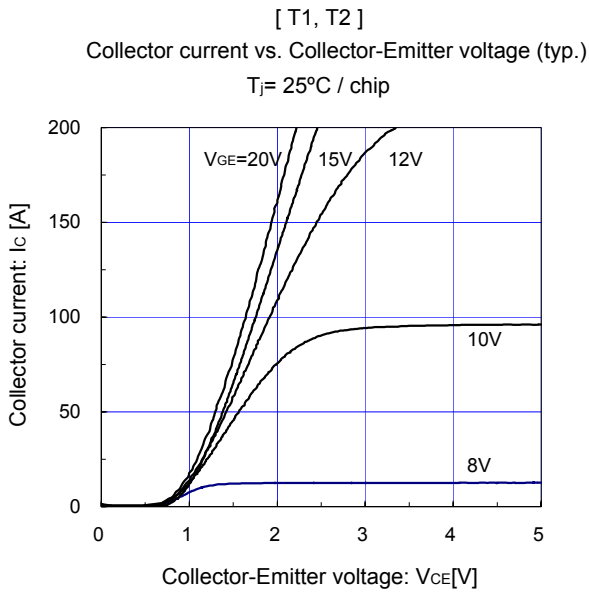
ON: Bias voltate of gate +15V.

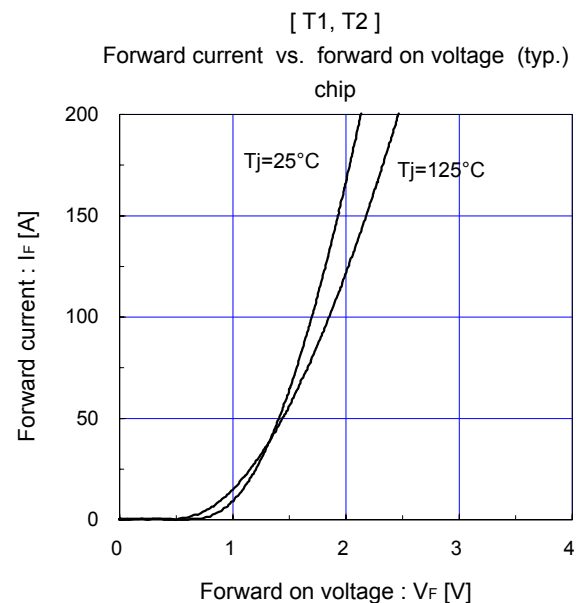
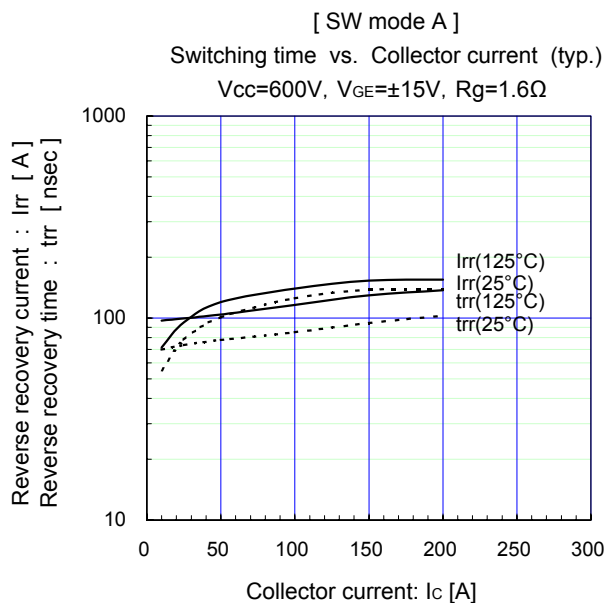
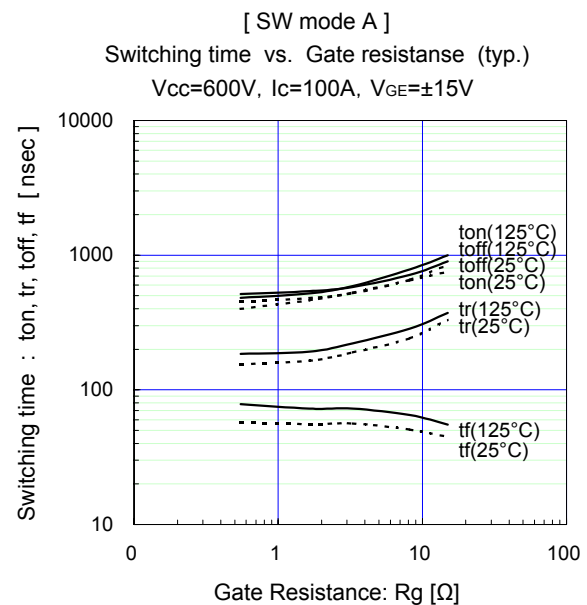
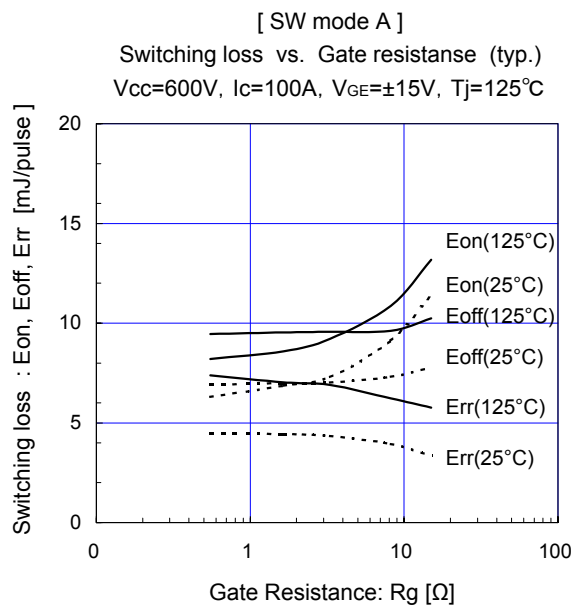
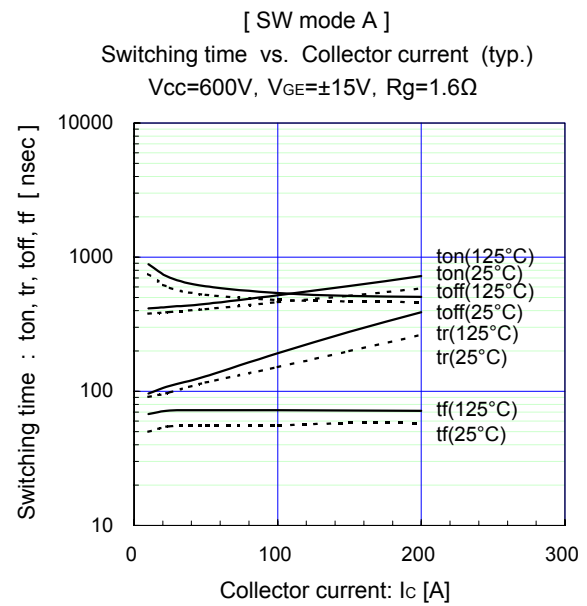
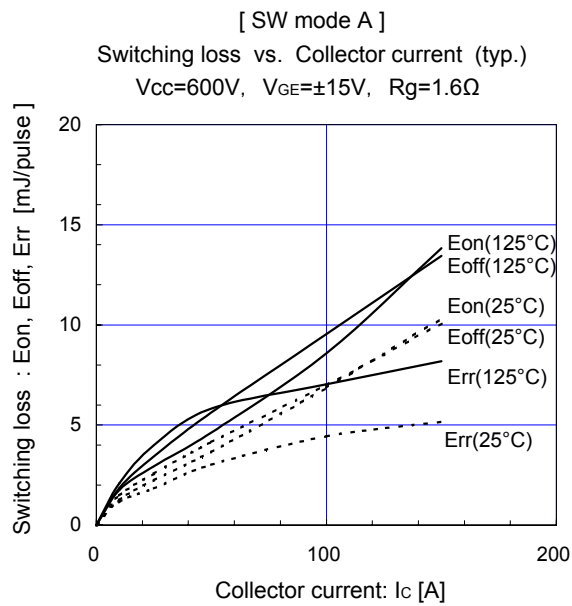
OFF: Reverse bias voltage of gate -15V.

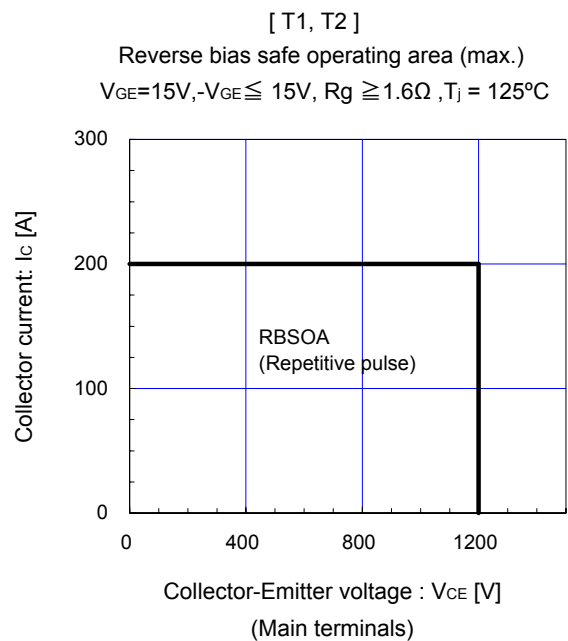
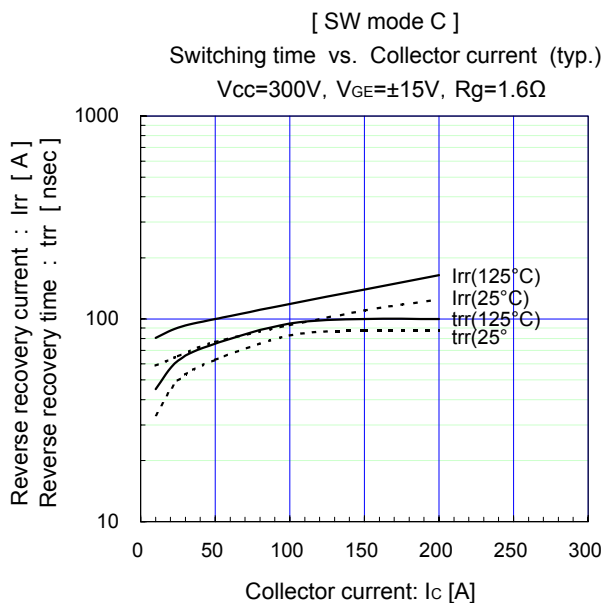
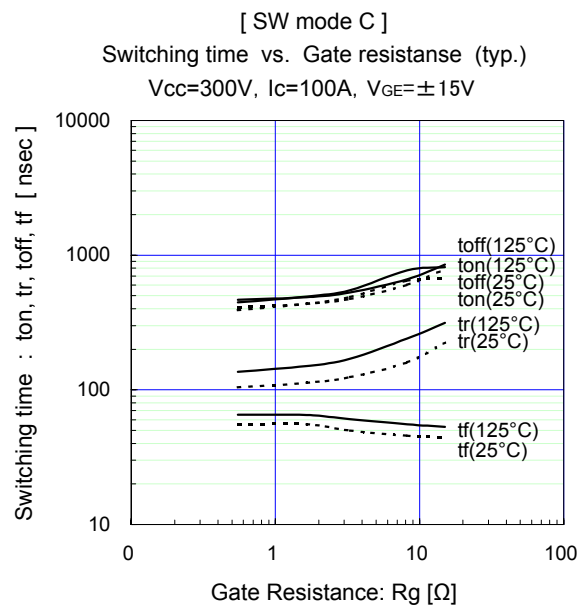
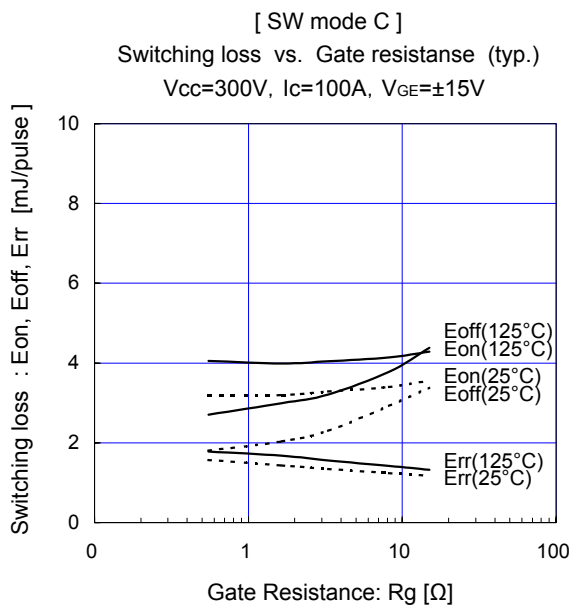
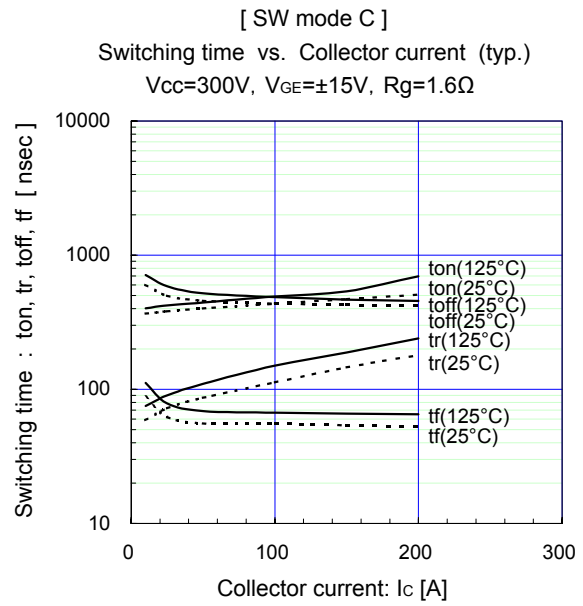
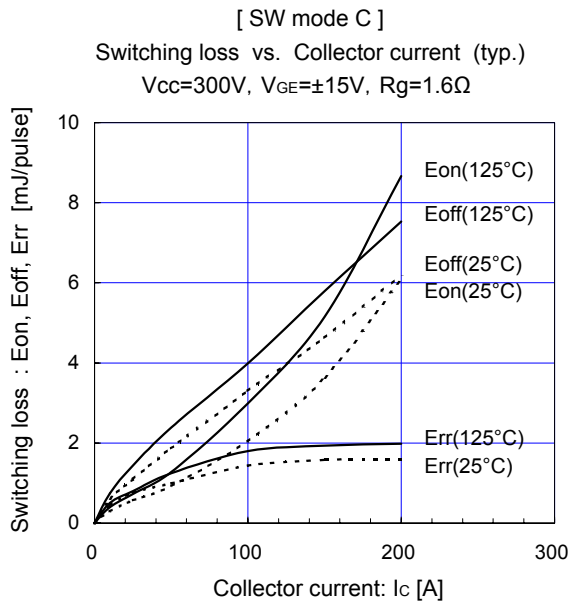
$V_{cc2}=V_{cc1}/2$

$$V_{cc} = \begin{cases} V_{cc1} \text{ (A mode)} \\ V_{cc2} \text{ (B mode)} \\ V_{cc2} \text{ (C mode)} \end{cases}$$

Characteristics (Representative)

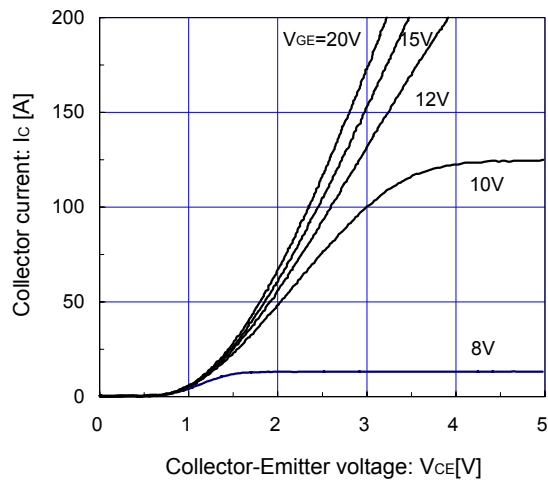






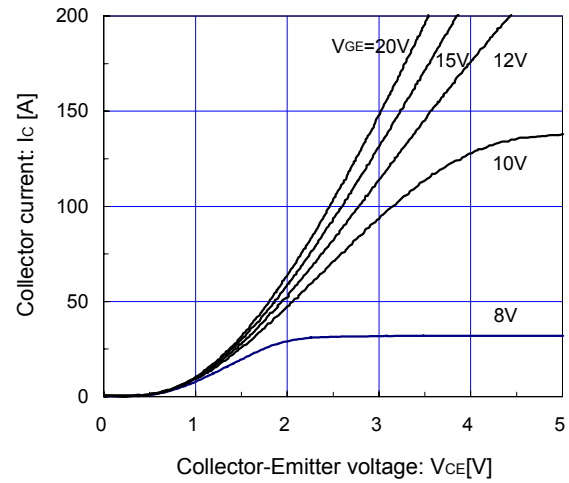
[T3, T4 (RB-IGBT)]

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

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

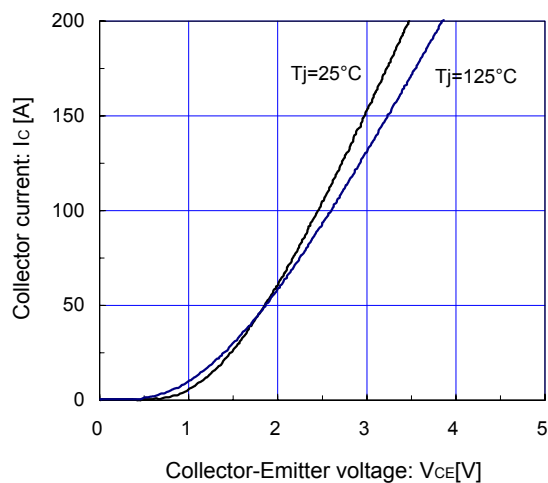
[T3, T4 (RB-IGBT)]

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

 $T_J = 125^\circ\text{C}$ / chip

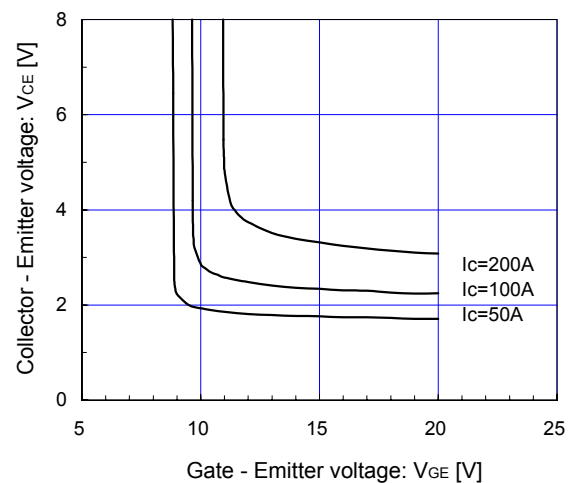
[T3, T4 (RB-IGBT)]

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

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

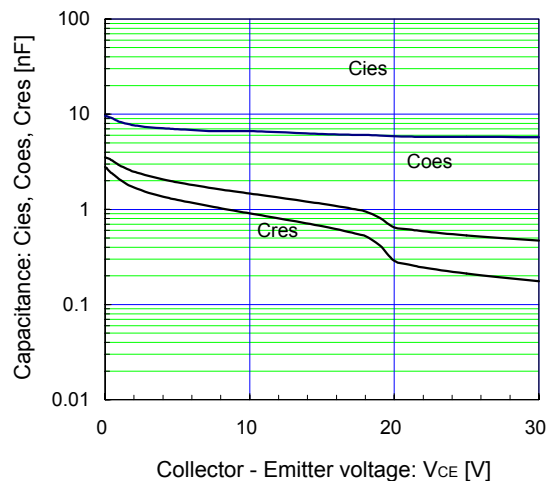
[T3, T4 (RB-IGBT)]

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

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

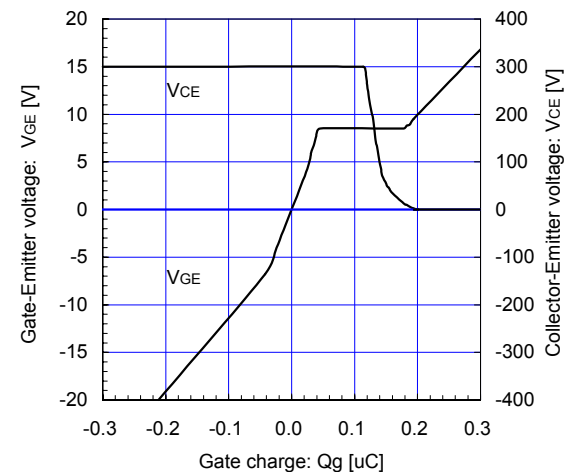
[T3, T4 (RB-IGBT)]

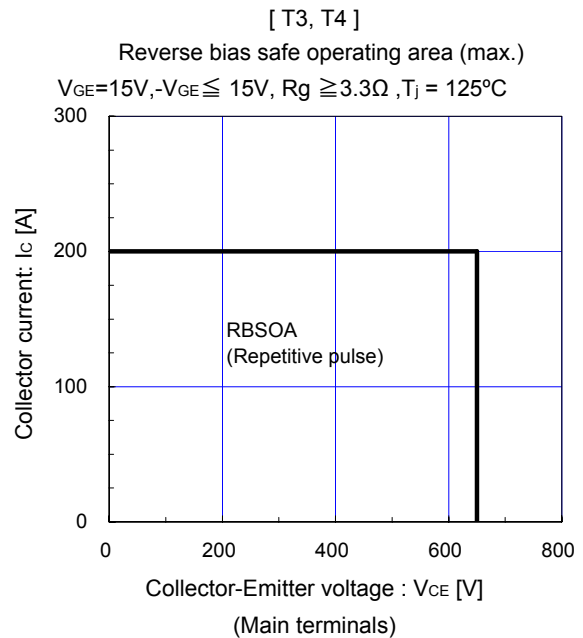
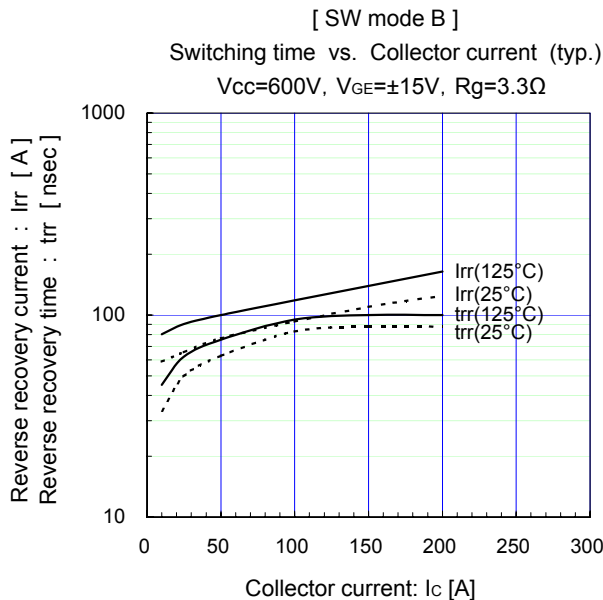
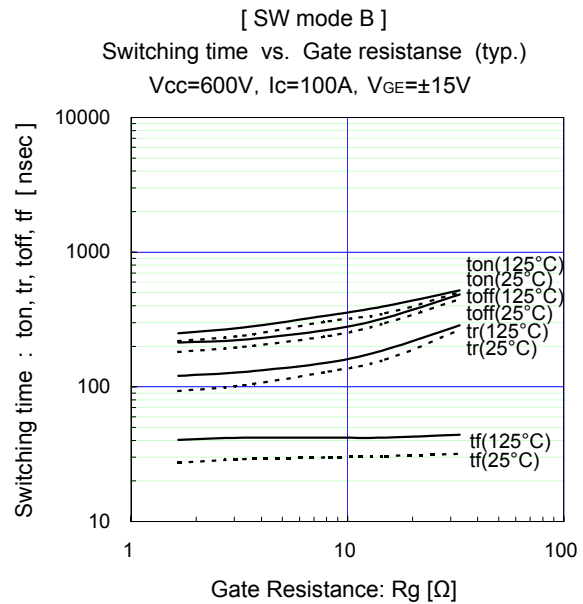
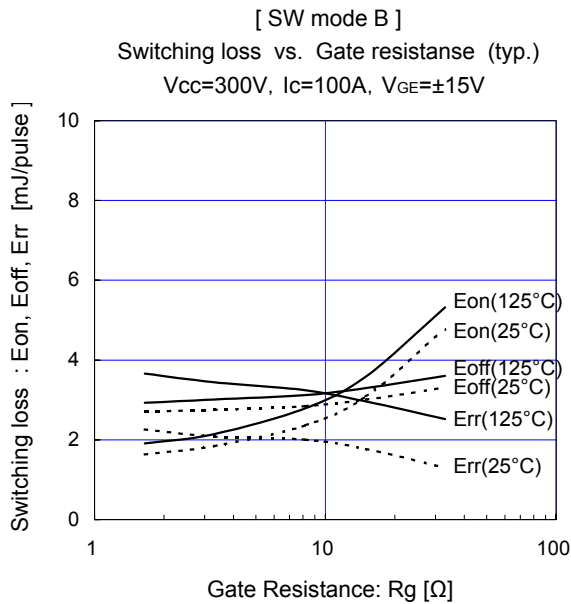
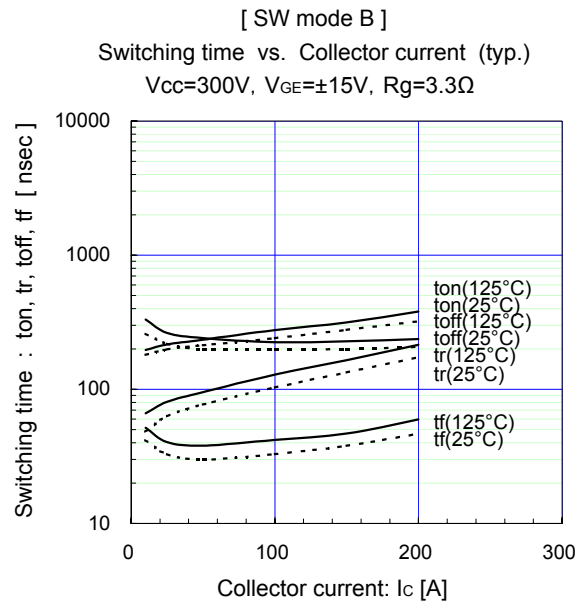
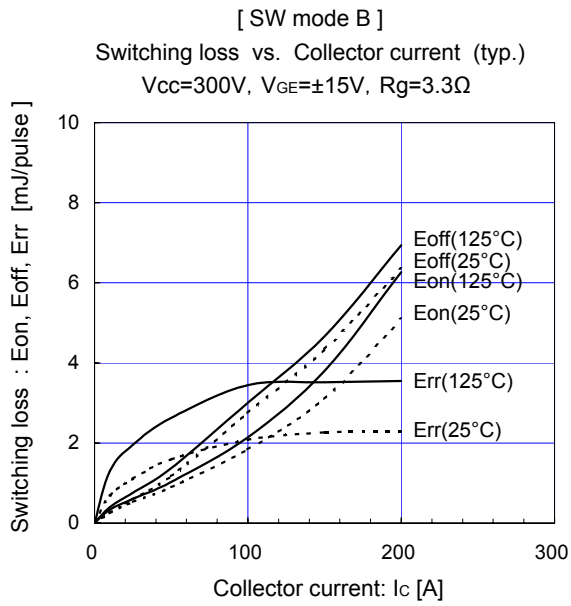
Capacitance vs. Collector-Emitter voltage (typ.)

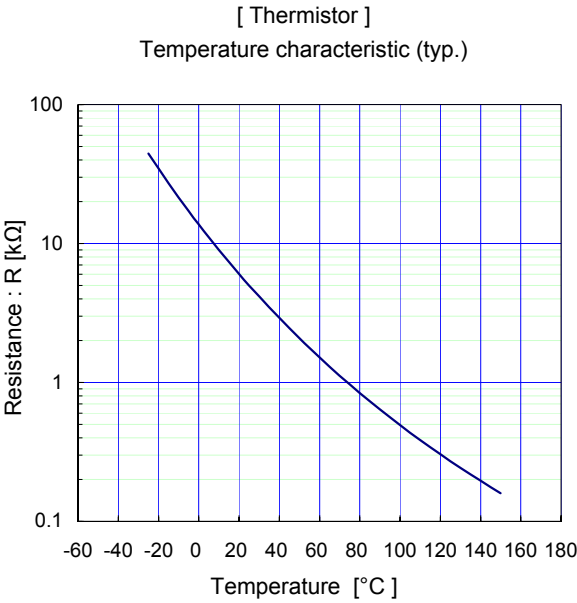
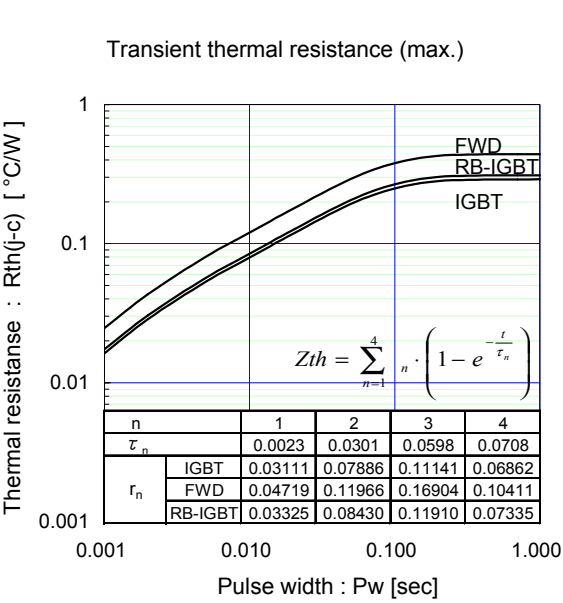
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$ 

[T3, T4 (RB-IGBT)]

Dynamic gate charge (typ.)

 $V_{CC} = 300\text{V}$, $I_C = 100\text{A}$, $T_J = 25^\circ\text{C}$ 





WARNING

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