

12MBI50VX-120-50

IGBT Modules

IGBT MODULE (V series)

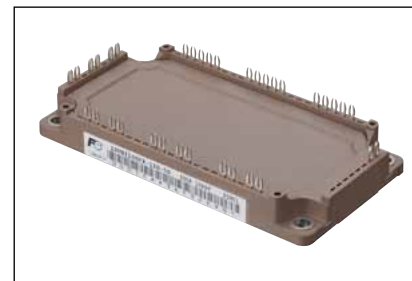
1200V / 50A / IGBT, RB-IGBT 12 in one package

■ 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	IGBT	I _C	Continuous	T _c =80°C	50	A	
			I _{CP}	1ms	T _c =80°C	100		
		FWD	-I _C					50
			-I _{C pulse}	1ms				100
	Collector power dissipation		P _C	1 device		230	W	
T3, T4	Collector-Emitter voltage		V _{CES}			600	V	
	Repetitive peak reverse voltage		V _{R_{RM}}			600	V	
	Gate-Emitter voltage		V _{GES}			±20	V	
	Collector current		I _C	Continuous	T _c =80°C	50	A	
			I _{CP}	1ms	T _c =80°C	100		
	Collector power dissipation		P _C	1 device		235	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) between thermistor and others (*2)		V _{iso}	AC : 1min.		2500	VAC	
	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)

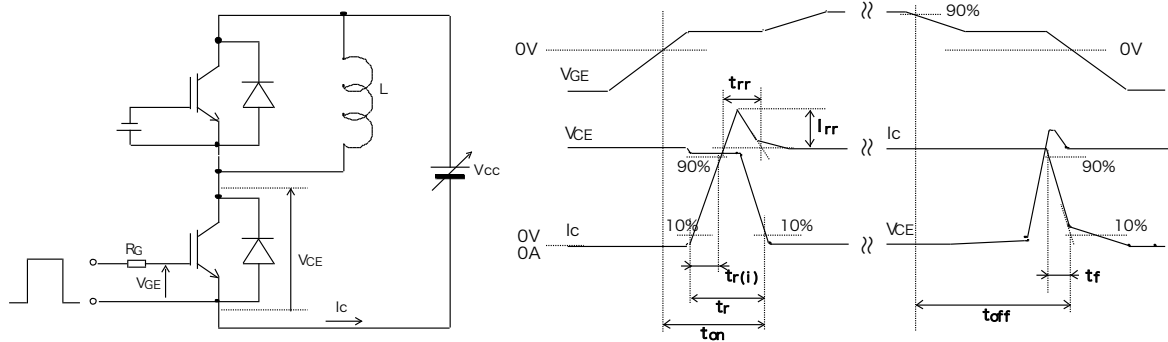
Items		Symbols	Conditions	Characteristics			Units	
				min.	typ.	max.		
T1, T2	Zero gate voltage collector current	ICES	VGE = 0V, VCE = 1200V		-	-	1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0V, VGE = ±20V		-	-	200	nA
	Gate-Emitter threshold voltage	VGE (th)	VCE = 20V, IC = 50mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	VCE (sat) (chip)	VGE = 15V IC = 50A	TJ= 25°C	-	1.85	2.30	V
				TJ=125°C	-	2.20	-	
		VCE (sat) (P-U, V, W / U, V, W-N terminal)	VGE = 15V IC = 50A	TJ= 25°C	-	2.30	2.75	
				TJ=125°C	-	2.65	-	
	Internal gate resistance	Rg(int)	-		-	4.0	-	Ω
	Input capacitance	Cies	VCE = 10V, VGE =0V, f = 1MHz		-	4.2	-	nF
	Turn-on time	t _{on}	SW mode : A VCC = 300V IC = 50A		-	0.20	1.20	μs
		t _r			-	0.08	0.60	
		t _{r (i)}			-	0.03	-	
	Turn-off time	t _{off}	VGE = ±15V RG = 8.2Ω		-	0.29	1.00	
		t _f			-	0.04	0.30	
	Forward on voltage	VF (chip)	IF = 50A	TJ= 25°C	-	1.70	2.15	V
				TJ=125°C	-	1.85	-	
		VF (P-U, V, W / U, V, W-N terminal)	IF = 50A	TJ= 25°C	-	2.15	2.60	
				TJ=125°C	-	2.30	-	
	Reverse recovery time	t _{rr}	SW mode : B VCC = 300V IF = 50A VGE = ±15V RG = 6.8Ω		-	-	0.35	μs
T3, T4	Zero gate voltage collector current	ICES	VGE = 0V, VCE = 600V		-	-	1.0	mA
	Gate-Emitter leakage current	IGES	VCE = 0V, VGE = ±20V		-	-	200	nA
	Gate-Emitter threshold voltage	VGE (th)	VCE = 20V, IC = 50mA		5.5	6.5	7.5	V
	Collector-Emitter saturation voltage	VCE (sat) (chip)	VGE = 15V IC = 50A	TJ= 25°C	-	2.45	2.80	V
				TJ=125°C	-	2.60	-	
		VCE (sat) (M-U, V, W terminal)	VGE = 15V IC = 50A	TJ= 25°C	-	3.25	3.70	
				TJ=125°C	-	3.05	-	
	Internal gate resistance	Rg(int)	-		-	18.0	-	Ω
	Input capacitance	Cies	VCE = 10V, VGE = 0V, f = 1MHz		-	3.3	-	nF
	Turn-on time	t _{on}	SW mode : B VCC = 300V IC = 100A		-	0.28	1.20	μs
		t _r			-	0.12	0.60	
		t _{r (i)}			-	0.05	-	
	Turn-off time	t _{off}	VGE = ±15V RG = 6.8Ω		-	0.18	1.00	
		t _f			-	0.02	0.30	
	Reverse recovery time	t _{rr}	SW mode : A VCC = 300V IC = 50A VGE = ±15V RG = 8.2Ω		-	-	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

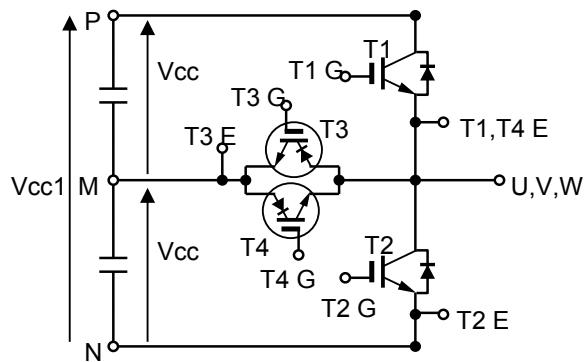
Items	Symbols	Conditions		Characteristics			Units
				min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	T1, T2 IGBT		-	-	0.54	°C/W
		T1, T2 FWD		-	-	0.73	
		T3, T4 RB-IGBT		-	-	0.53	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	T1, T2	with Thermal Compound	-	0.05	-	
		T3, T4					

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



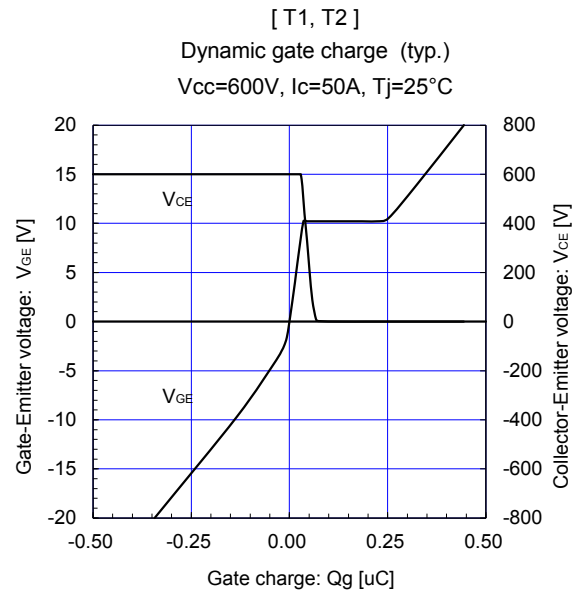
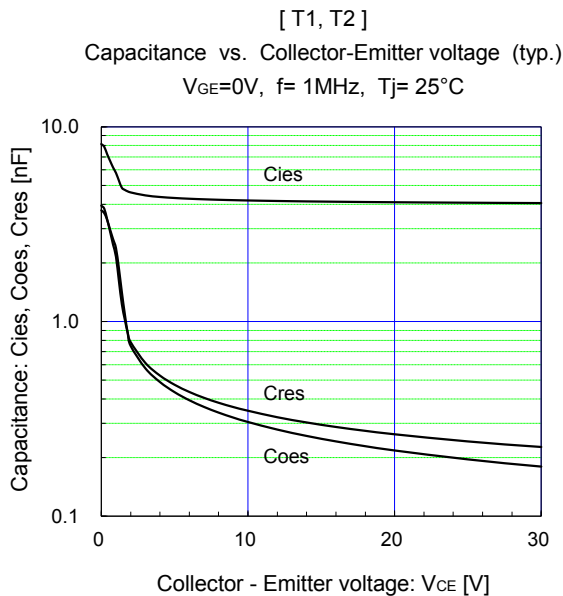
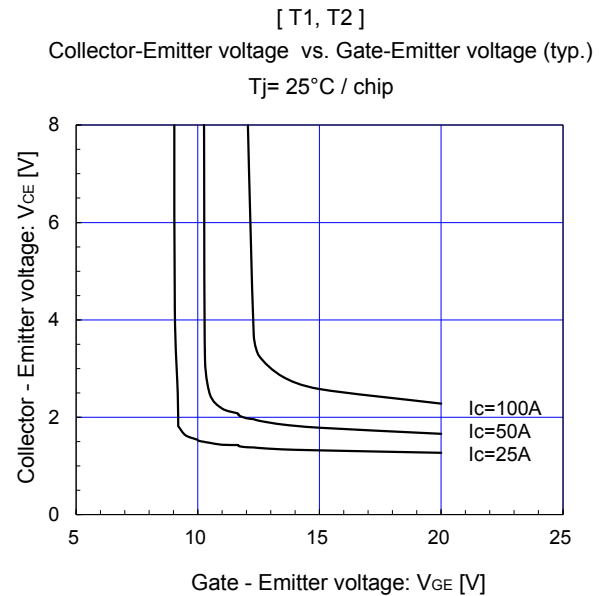
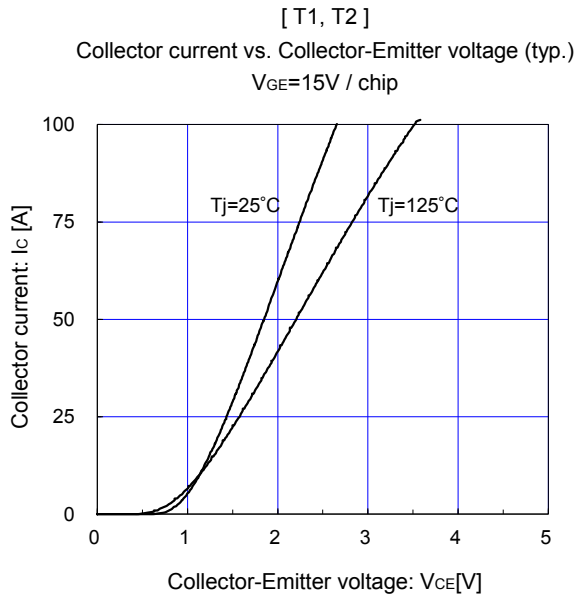
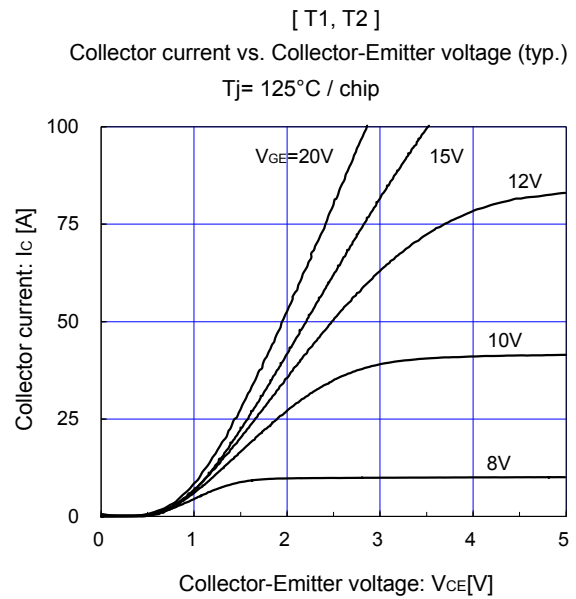
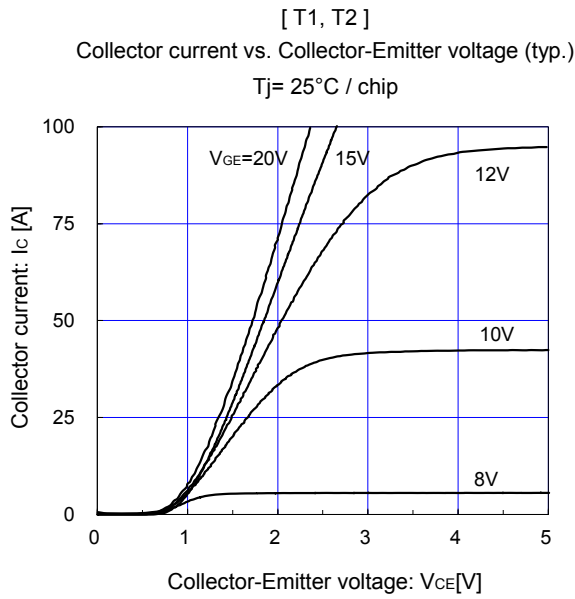
Definitions of switching mode

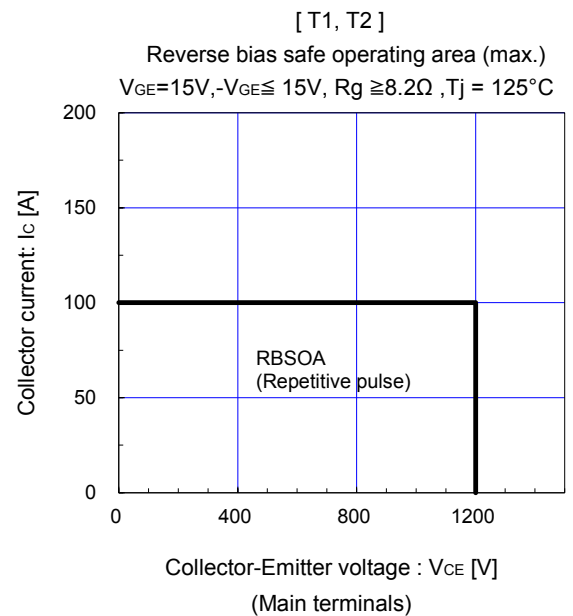
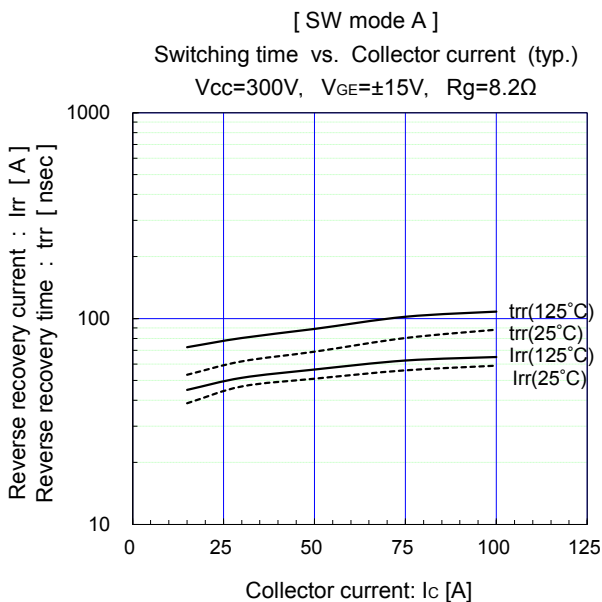
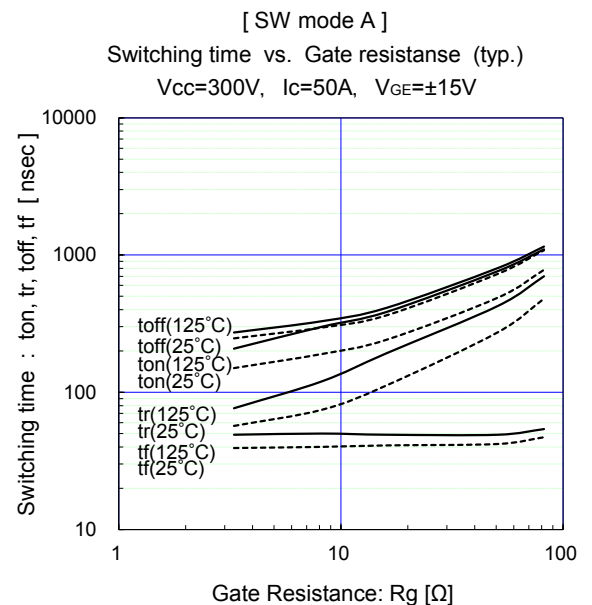
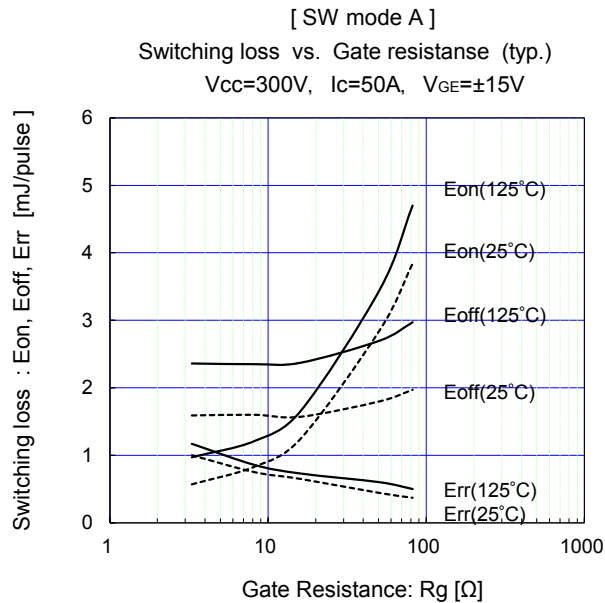
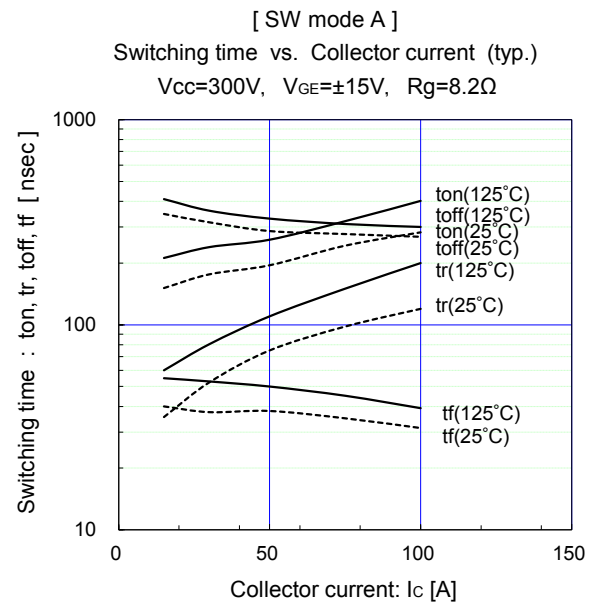
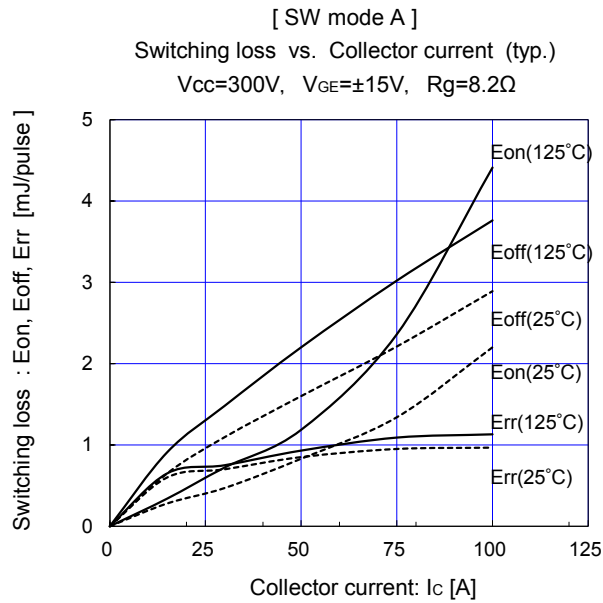


		State of switching device			
SW mode	Load L	T1	T2	T3	T4
A	M-U	SW	OFF	OFF	ON
	M-U	OFF	SW	ON	OFF
B	P-U	OFF	OFF	SW	ON
	U-N	OFF	OFF	ON	SW

SW: Connect to drive circuit and input gate signal.
ON: Bias voltate of gate +15V.
OFF: Reverse bias voltage of gate -15V.
V_{cc}=V_{cc1}/2

Characteristics (Representative)

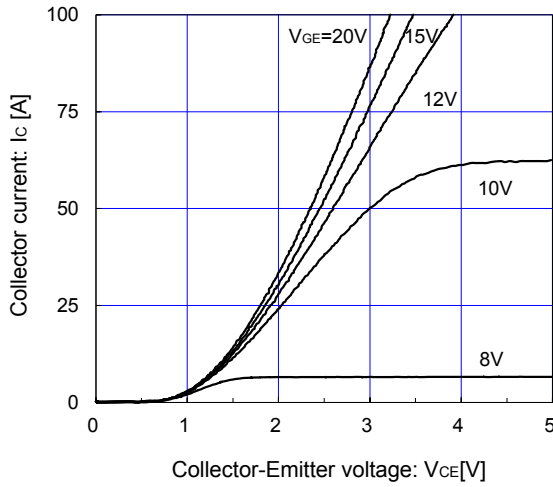




[T3, T4 (RB-IGBT)]

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

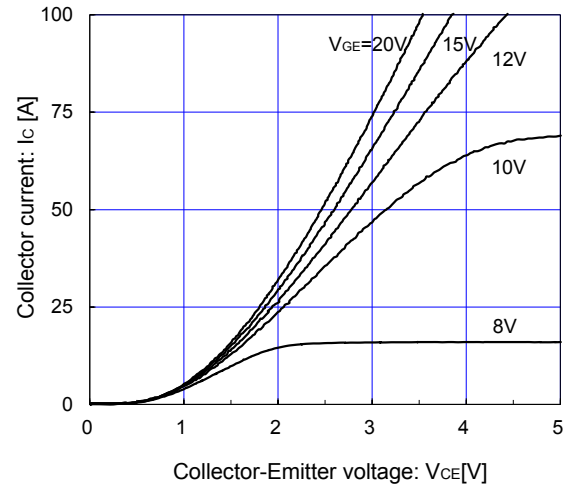
T_j = 25°C / chip



[T3, T4 (RB-IGBT)]

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

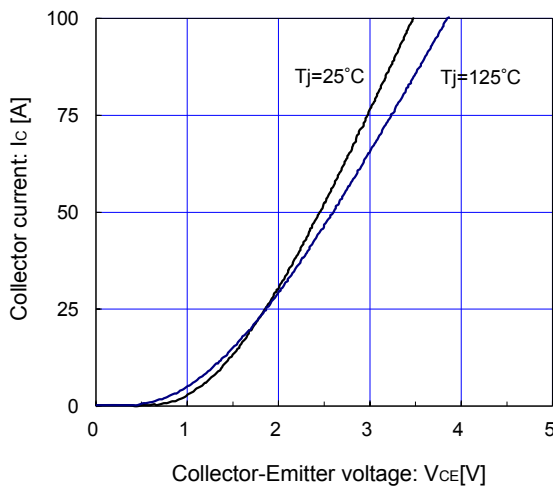
T_j = 125°C / chip



[T3, T4 (RB-IGBT)]

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

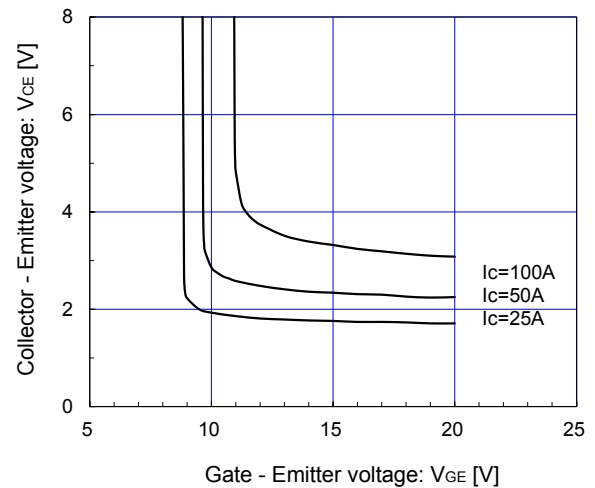
V_{GE} = 15V / chip



[T3, T4 (RB-IGBT)]

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

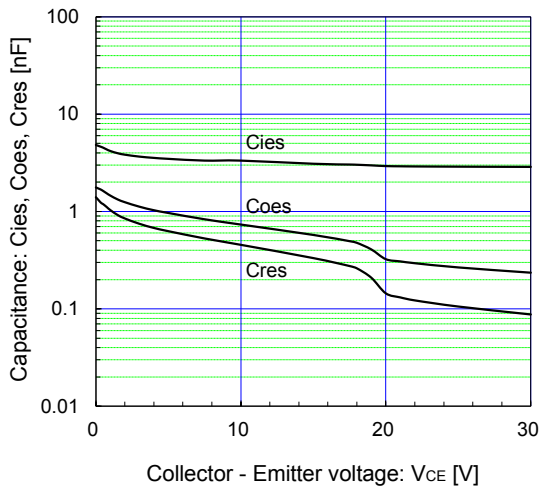
T_j = 25°C / chip



[T3, T4 (RB-IGBT)]

Capacitance vs. Collector-Emittor voltage (typ.)

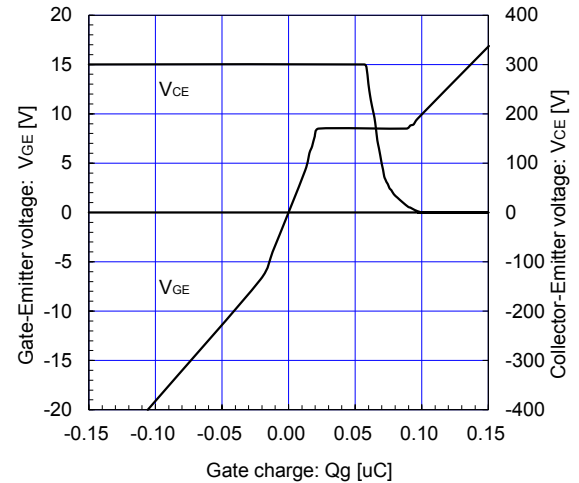
V_{GE} = 0V, f = 1MHz, T_j = 25°C

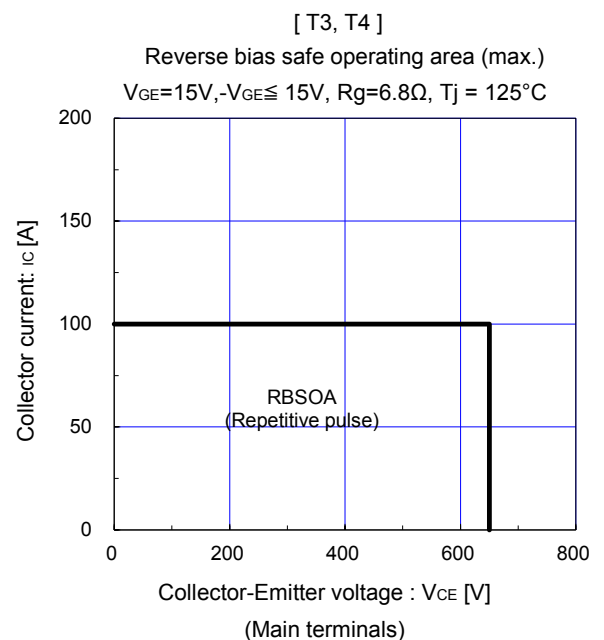
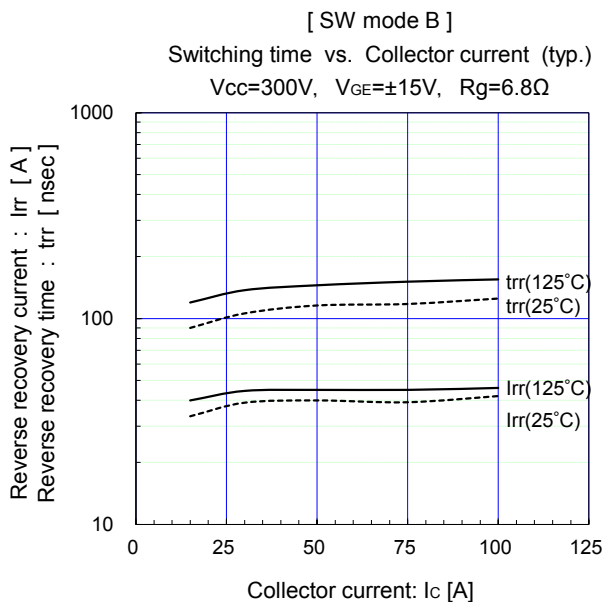
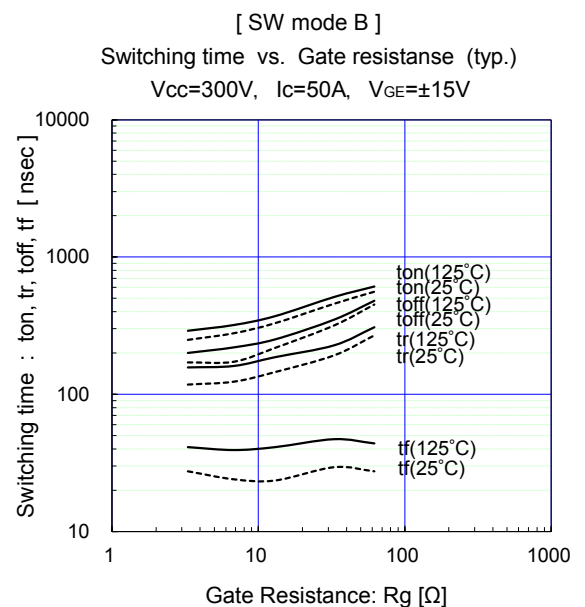
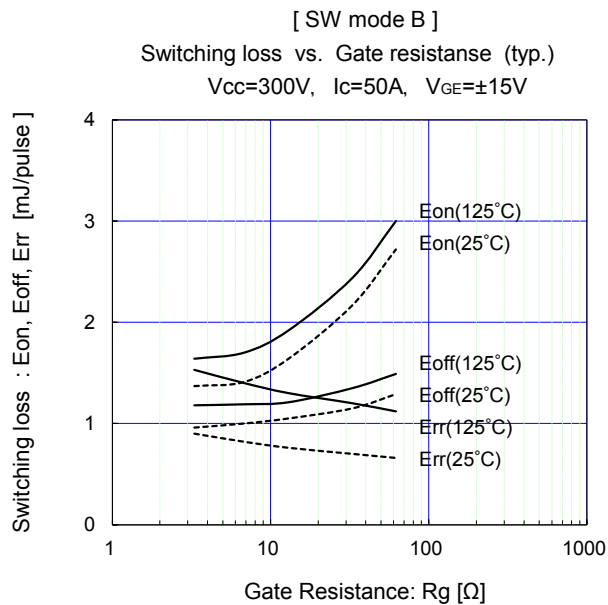
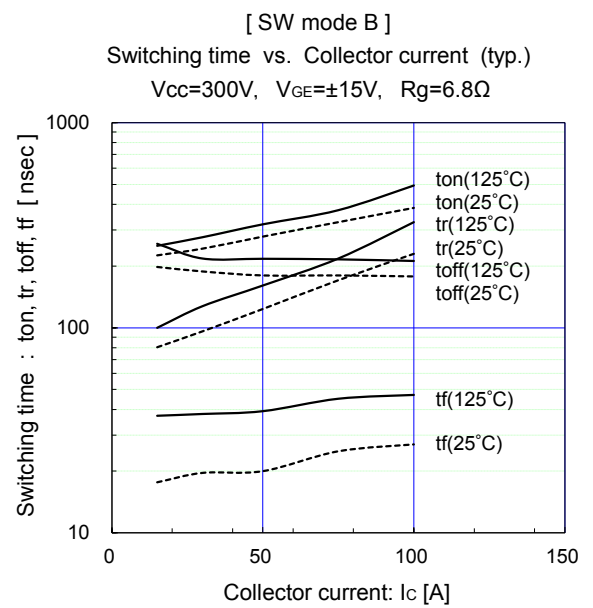
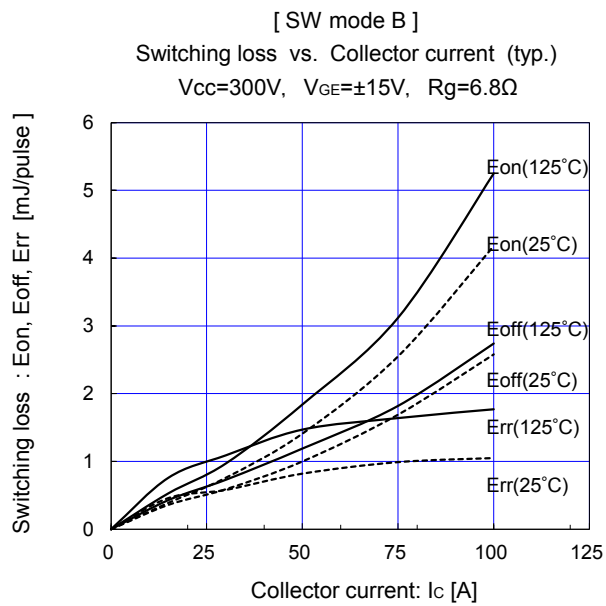


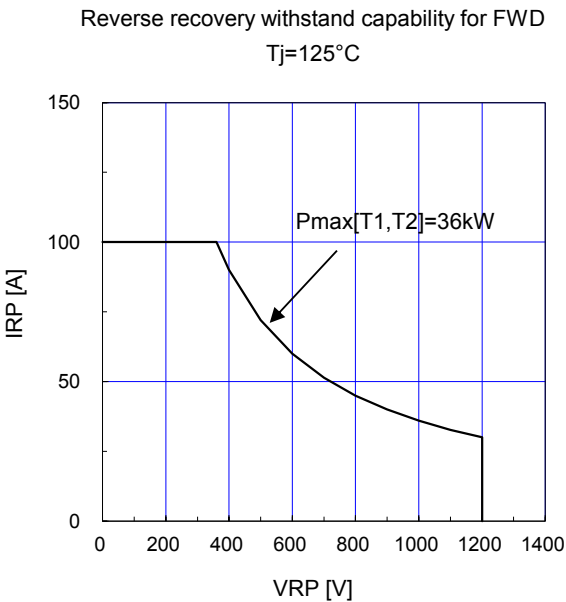
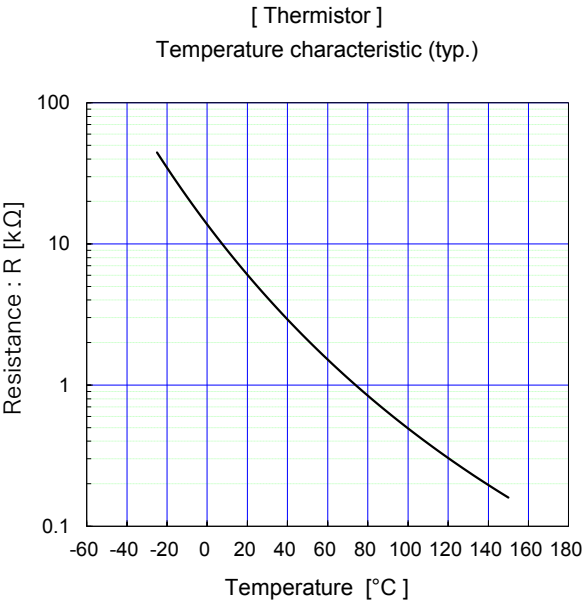
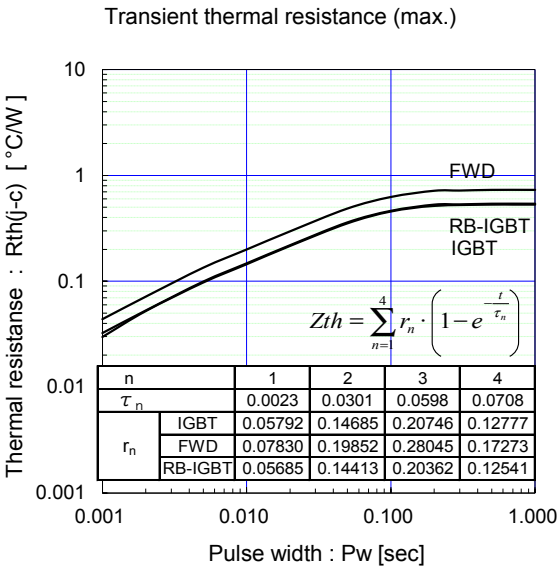
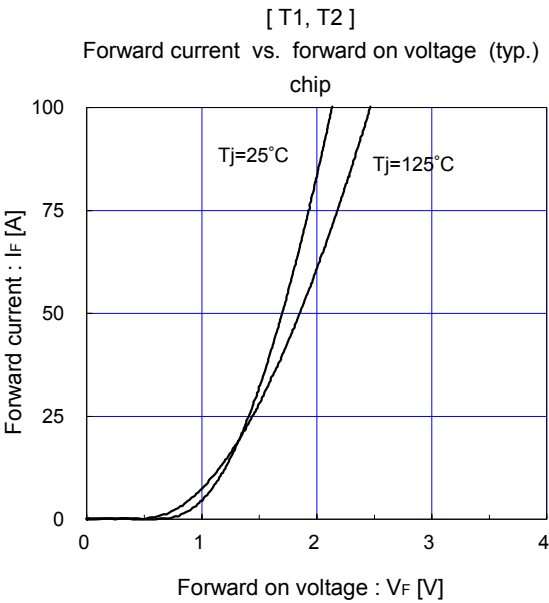
[T3, T4 (RB-IGBT)]

Dynamic gate charge (typ.)

V_{CC} = 300V, Ic = 50A, T_j = 25°C

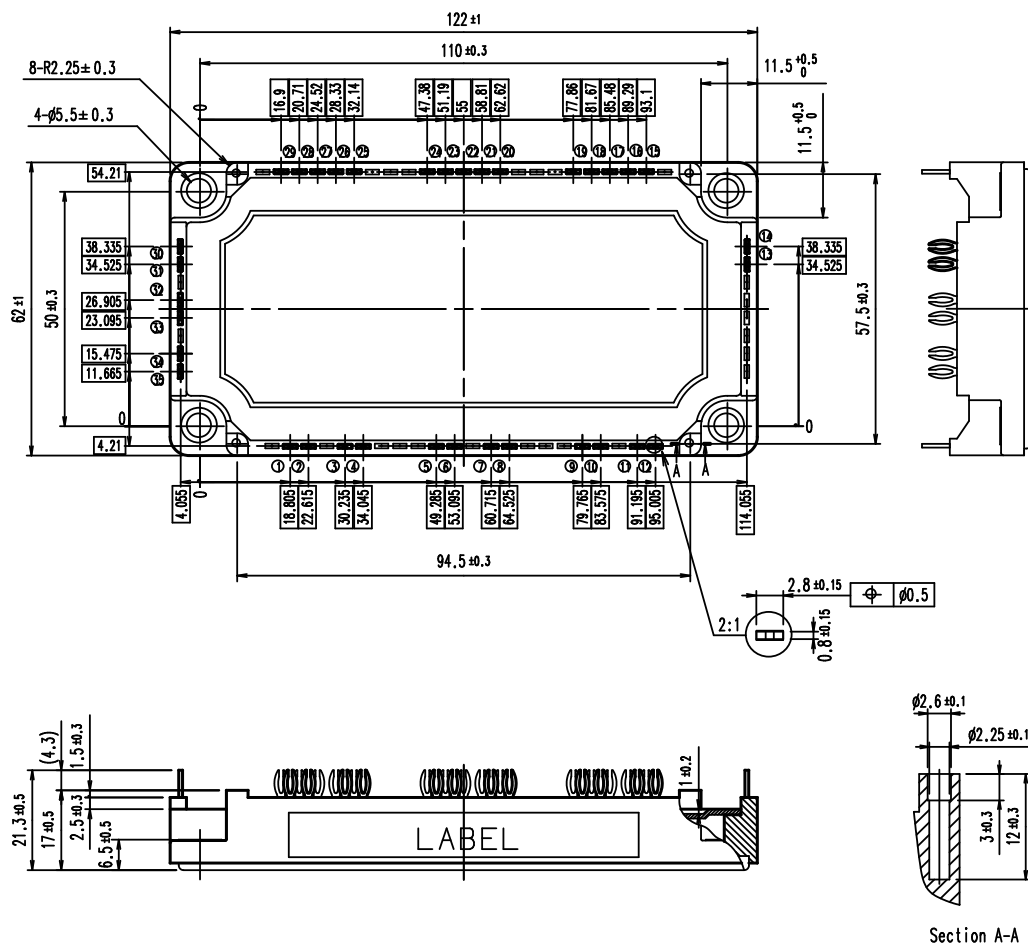






Outline Drawings, mm

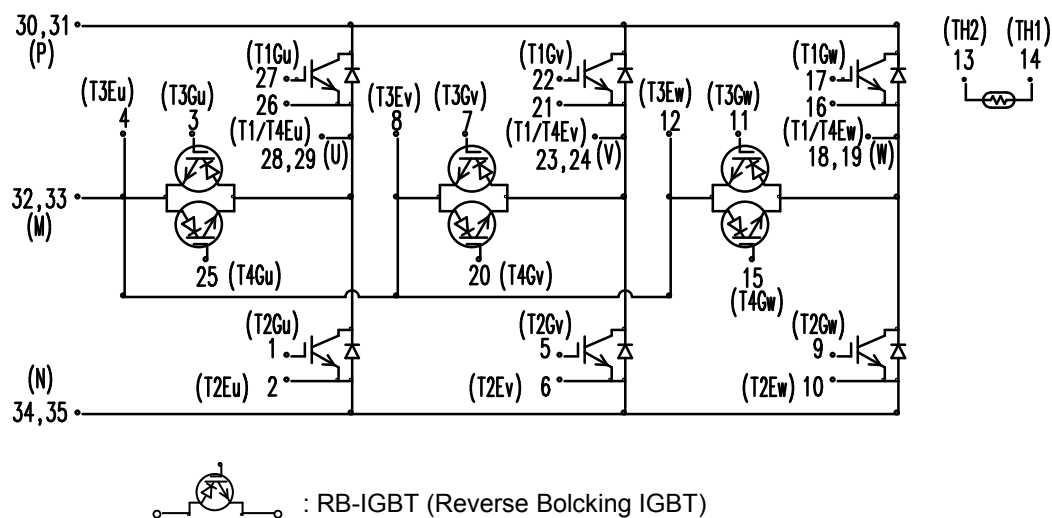
□ shows theoretical dimension.
() shows reference dimension.



Section A-A

Weight: 302g (typ.)

Equivalent Circuit Schematic



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IGBT Modules

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