

# 12MBI75VN-120-50

**IGBT Modules**

## IGBT MODULE (V series)

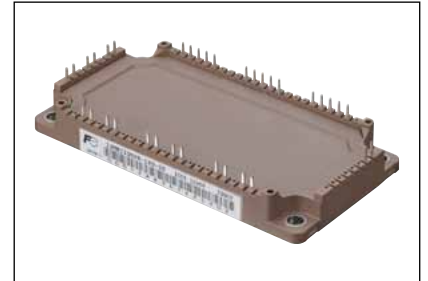
### 1200V / 75A / IGBT, RB-IGBT 12 in one package

#### ■ 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 <sub>GES</sub>			1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>			±20	V	
	Collector current	IGBT	I <sub>c</sub>	Continuous	T <sub>c</sub> =80°C	75	A
			I <sub>cp</sub>	1ms	T <sub>c</sub> =80°C	150	
		FWD	-I <sub>c</sub>			75	
			-I <sub>c pulse</sub>	1ms		150	
Collector power dissipation	P <sub>c</sub>	1 device		320	W		
T3, T4	Collector-Emitter voltage	V <sub>GES</sub>			600	V	
	Repetitive peak reverse voltage	V <sub>RRM</sub>			600	V	
	Gate-Emitter voltage	V <sub>GES</sub>			±20	V	
	Collector current	I <sub>c</sub>	Continuous	T <sub>c</sub> =80°C	75	A	
		I <sub>cp</sub>	1ms	T <sub>c</sub> =80°C	150		
Collector power dissipation	P <sub>c</sub>	1 device		305	W		
Junction temperature		T <sub>j</sub>			150	°C	
Case temperature		T <sub>c</sub>			125		
Storage temperature		T <sub>stg</sub>			-40 ~ +125		
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	V <sub>iso</sub>	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 Tj= 25°C unless otherwise specified)

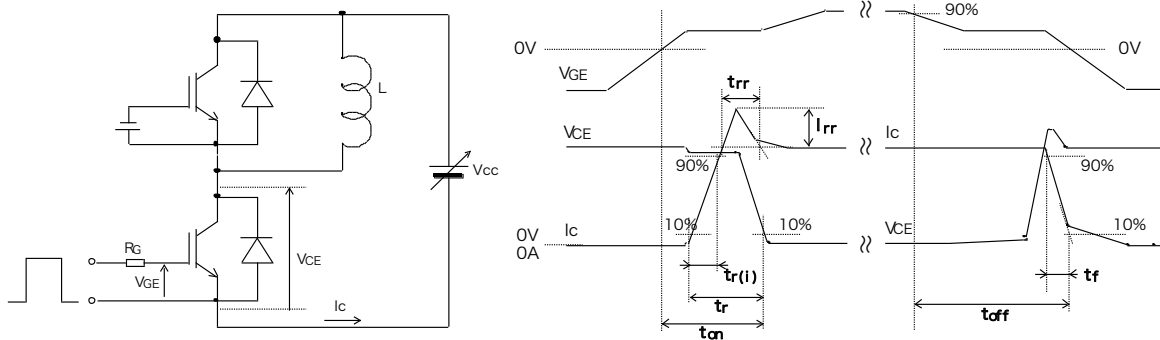
Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
T1, T2	Zero gate voltage collector current	ICES	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V	-	-	1.0	mA	
	Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	200	nA	
	Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 75mA	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (chip)	V <sub>GE</sub> = 15V I <sub>c</sub> = 75A	T <sub>j</sub> = 25°C	-	1.85	2.30	V
				T <sub>j</sub> = 125°C	-	2.20	-	
		V <sub>CE(sat)</sub> (P-U, V, W / U, V, W-N terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 75A	T <sub>j</sub> = 25°C	-	2.40	2.85	
				T <sub>j</sub> = 125°C	-	2.75	-	
	Internal gate resistance	R <sub>g(int)</sub>	-	-	10.0	-	Ω	
	Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	6.0	-	nF	
	Turn-on time	t <sub>on</sub>	SW mode : A V <sub>CC</sub> = 300V I <sub>c</sub> = 75A	-	0.38	1.20	μs	
		t <sub>r</sub>		-	0.10	0.60		
		t <sub>r(f)</sub>		-	0.05	-		
	Turn-off time	t <sub>off</sub>	V <sub>GE</sub> = ±15V R <sub>G</sub> = 2.2Ω	-	0.38	1.00	μs	
		t <sub>r</sub>	-	-	0.06	0.30		
Forward on voltage	V <sub>F</sub> (chip)	I <sub>F</sub> = 75A	T <sub>j</sub> = 25°C	-	1.70	2.15	V	
			T <sub>j</sub> = 125°C	-	1.85	-		
	V <sub>F</sub> (P-U, V, W / U, V, W-N terminal)	I <sub>F</sub> = 75A	T <sub>j</sub> = 25°C	-	2.25	2.70		
			T <sub>j</sub> = 125°C	-	2.40	-		
Reverse recovery time	t <sub>rr</sub>	SW mode : B V <sub>CC</sub> = 300V I <sub>F</sub> = 75A V <sub>GE</sub> = ±15V R <sub>G</sub> = 4.7Ω	-	-	0.35	μs		
T3, T4	Zero gate voltage collector current	ICES	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V	-	-	1.0	mA	
	Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	200	nA	
	Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 75mA	5.5	6.5	7.5	V	
	Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (chip)	V <sub>GE</sub> = 15V I <sub>c</sub> = 75A	T <sub>j</sub> = 25°C	-	2.45	2.80	V
				T <sub>j</sub> = 125°C	-	2.60	-	
		V <sub>CE(sat)</sub> (M-U, V, W terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 75A	T <sub>j</sub> = 25°C	-	3.00	3.35	
				T <sub>j</sub> = 125°C	-	3.15	-	
	Internal gate resistance	R <sub>g(int)</sub>	-	-	12.0	-	Ω	
	Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	5.0	-	nF	
	Turn-on time	t <sub>on</sub>	SW mode : B V <sub>CC</sub> = 300V I <sub>c</sub> = 75A	-	0.28	1.20	μs	
		t <sub>r</sub>		-	0.13	0.60		
		t <sub>r(f)</sub>		-	0.05	-		
	Turn-off time	t <sub>off</sub>	V <sub>GE</sub> = ±15V R <sub>G</sub> = 4.7Ω	-	0.20	1.00	μs	
		t <sub>r</sub>	-	-	0.03	0.30		
Reverse recovery time	t <sub>rr</sub>	SW mode : A V <sub>CC</sub> = 300V I <sub>c</sub> = 75A V <sub>GE</sub> = ±15V R <sub>G</sub> = 2.2Ω	-	-	0.35	μs		
Thermistor	Resistance	R	T = 25°C	-	5000	-	Ω	
	B value	B	T = 100°C	465	495	520	K	
			T = 25/50°C	3305	3375	3450	K	

● Thermal resistance characteristics

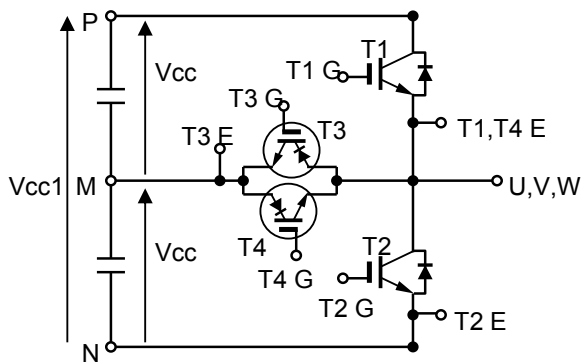
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Thermal resistance (1device)	R <sub>th(j-c)</sub>	T1, T2 IGBT	-	-	0.39	°C/W	
		T1, T2 FWD	-	-	0.55		
		T3, T4 RB-IGBT	-	-	0.41		
Contact thermal resistance (1device) (*4)	R <sub>th(c-f)</sub>	T1, T2 T3, T4	with Thermal Compound		-	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



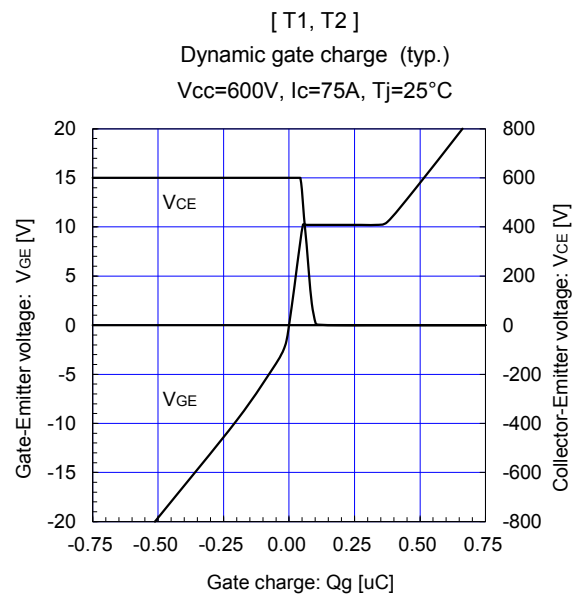
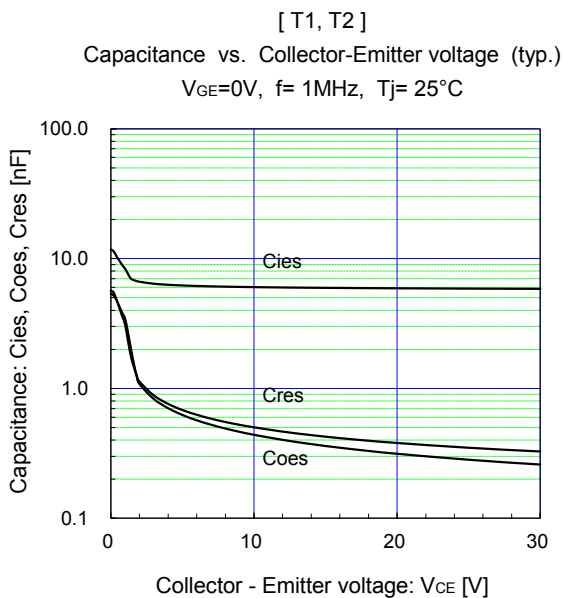
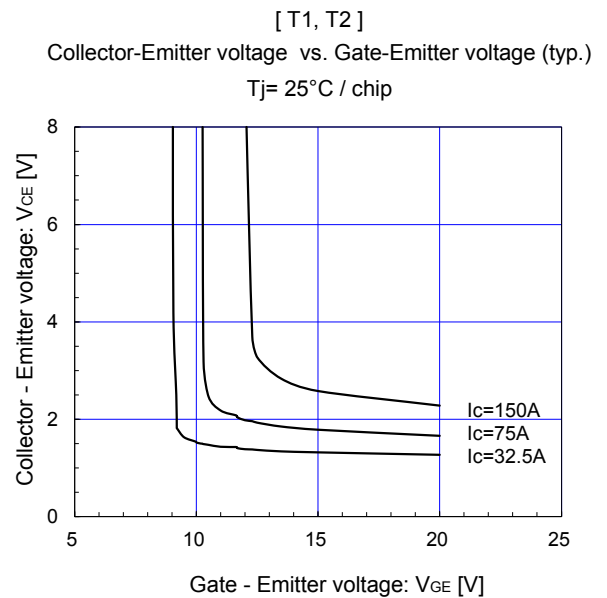
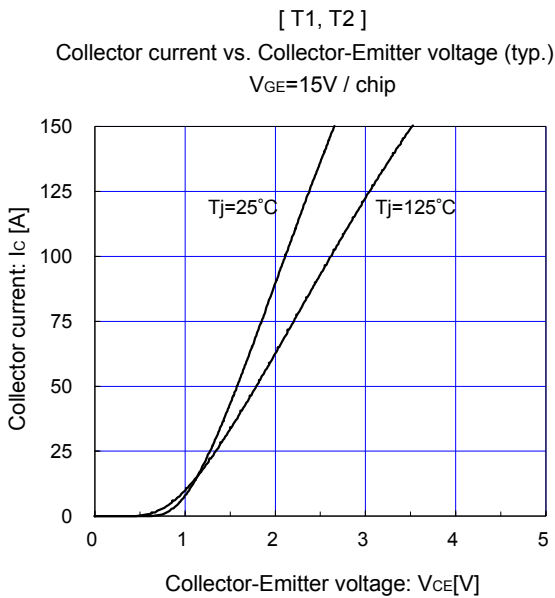
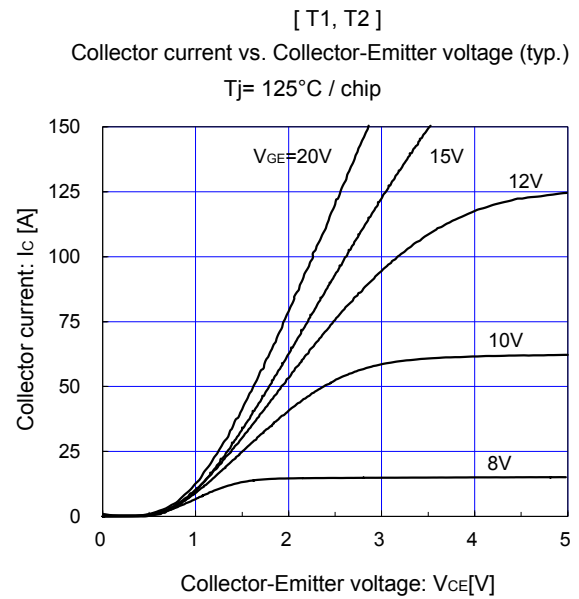
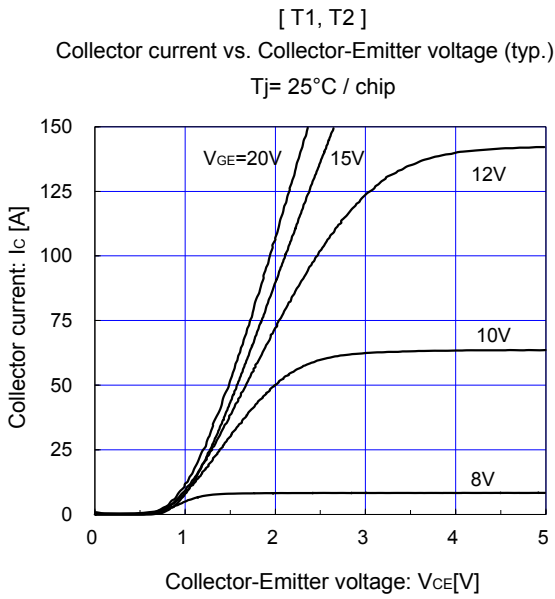
Definitions of switching mode

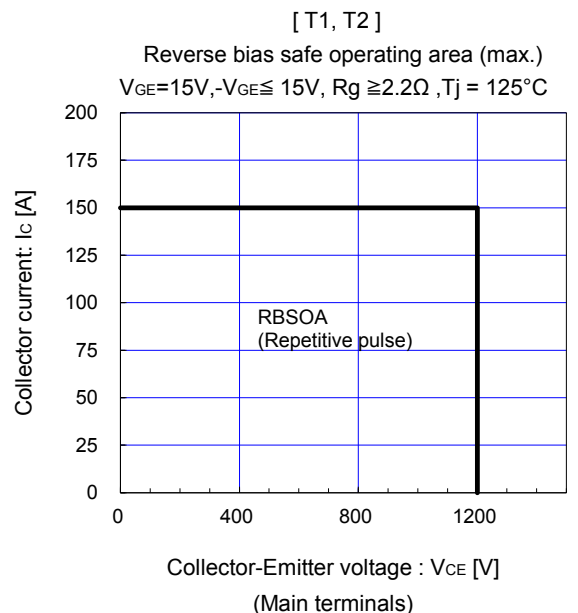
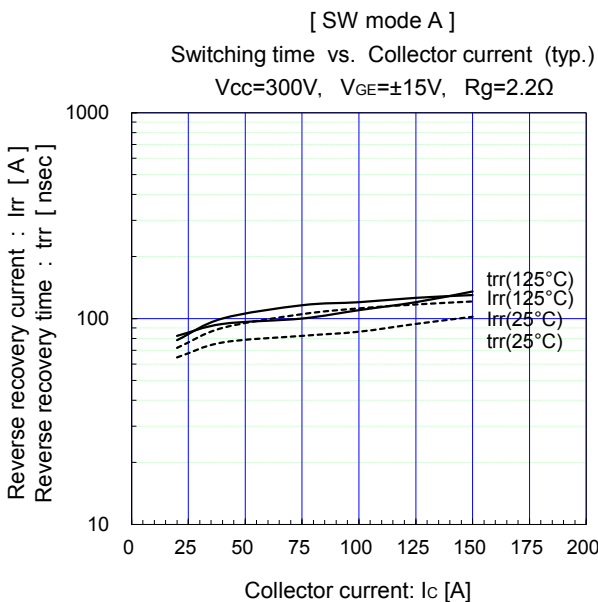
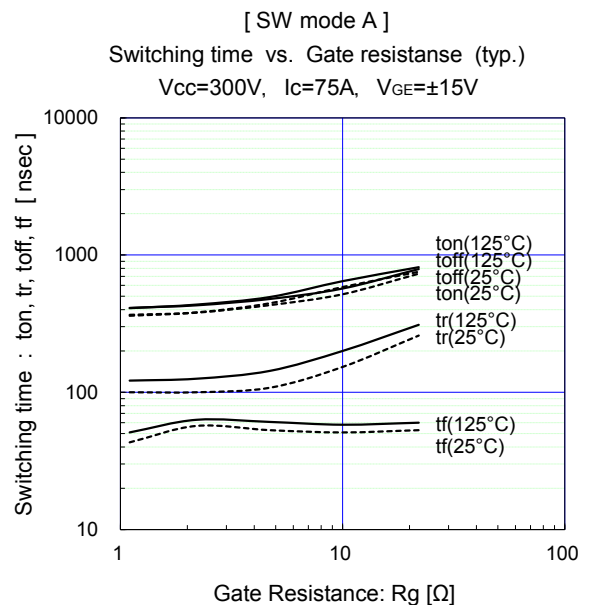
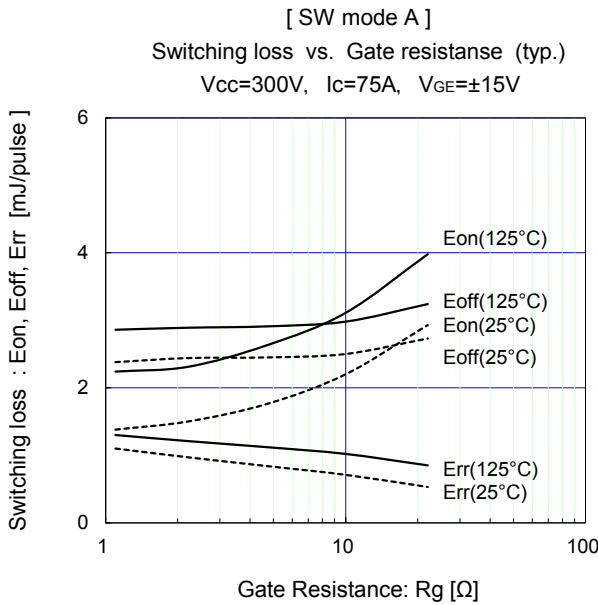
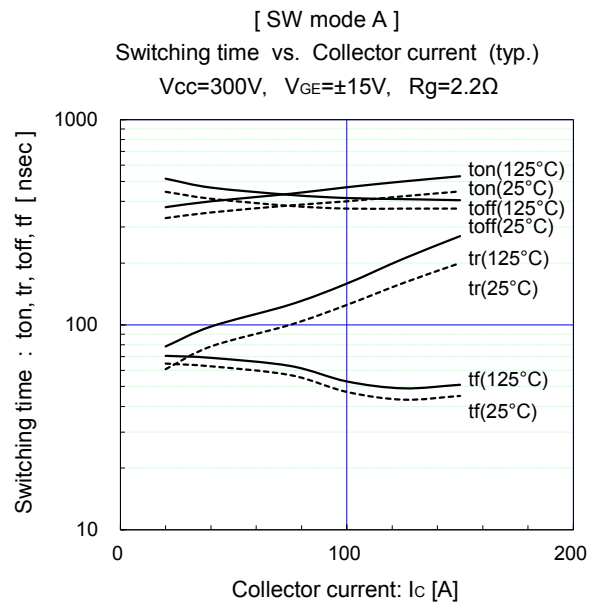
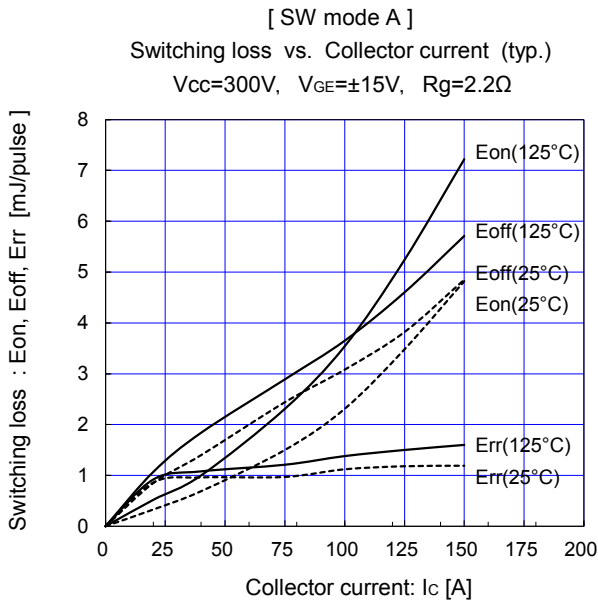


SW mode	Load L	State of switching device			
		T1	T2	T3	T4
A	M-U	SW	OFF	OFF	ON
	M-V	OFF	SW	ON	OFF
B	P-U	OFF	OFF	SW	ON
	U-N	OFF	OFF	ON	SW

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

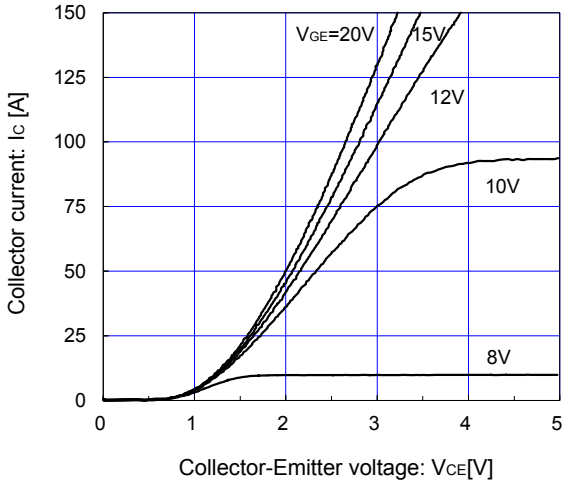
■ Characteristics (Representative)





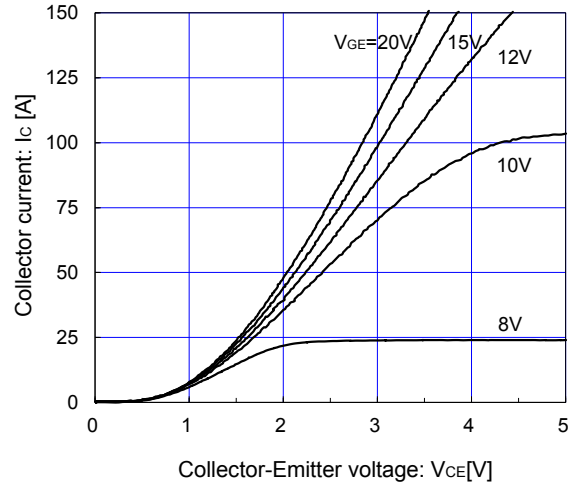
[ T3, T4 (RB-IGBT)]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 25°C / chip



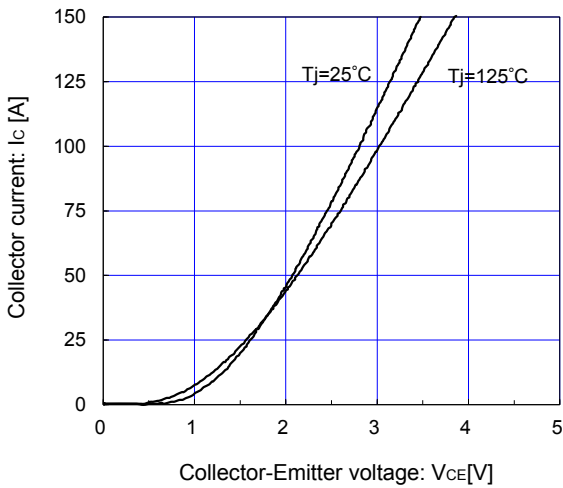
[ T3, T4 (RB-IGBT)]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 125°C / chip



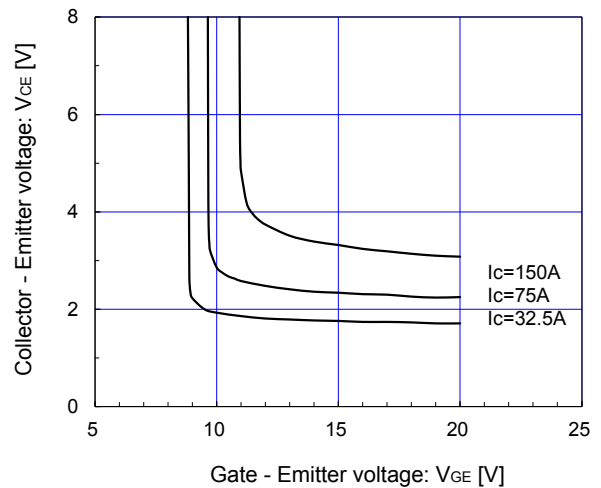
[ T3, T4 (RB-IGBT)]

Collector current vs. Collector-Emittor voltage (typ.)  
VGE=15V / chip



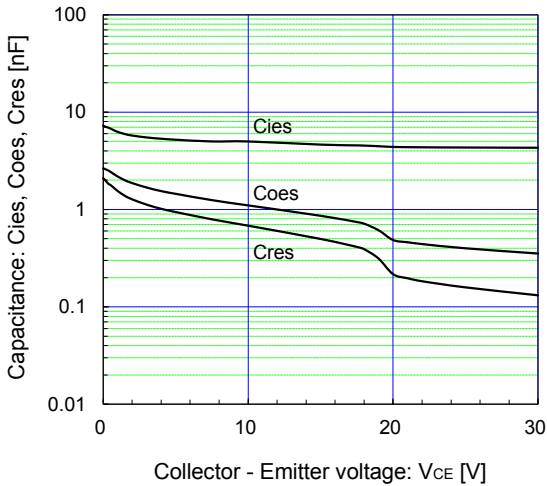
[ T3, T4 (RB-IGBT)]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
Tj= 25°C / chip



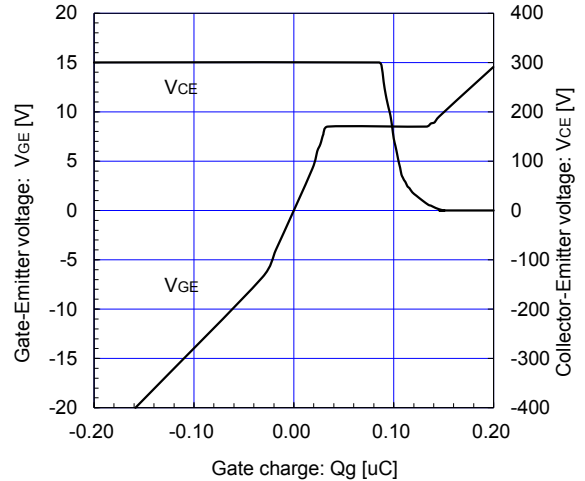
[ T3, T4 (RB-IGBT)]

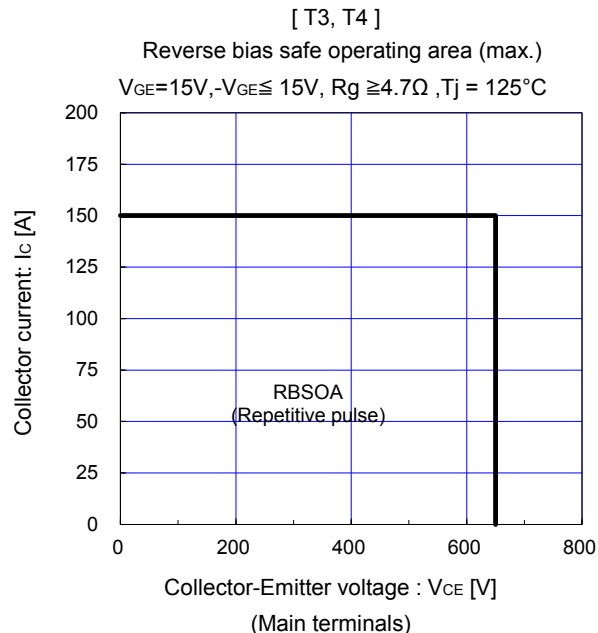
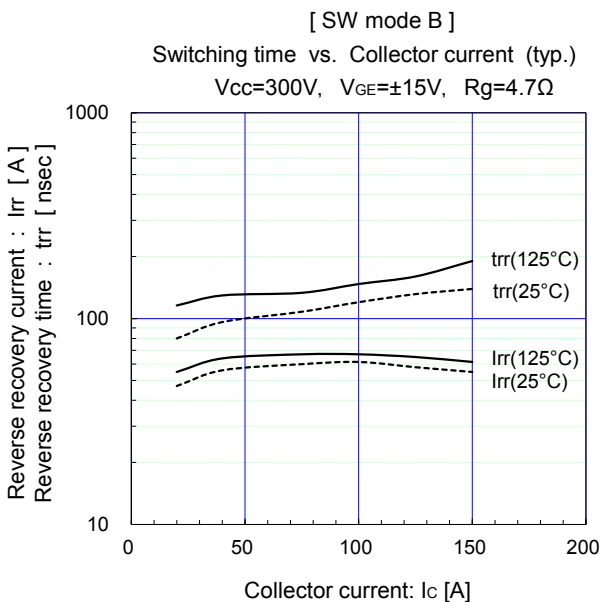
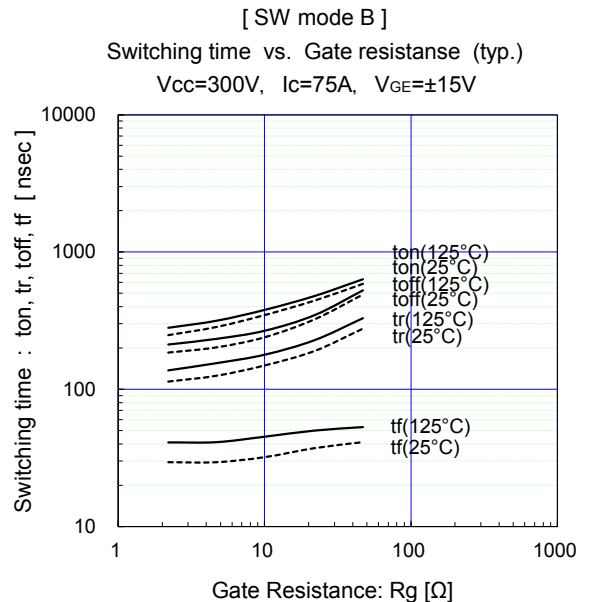
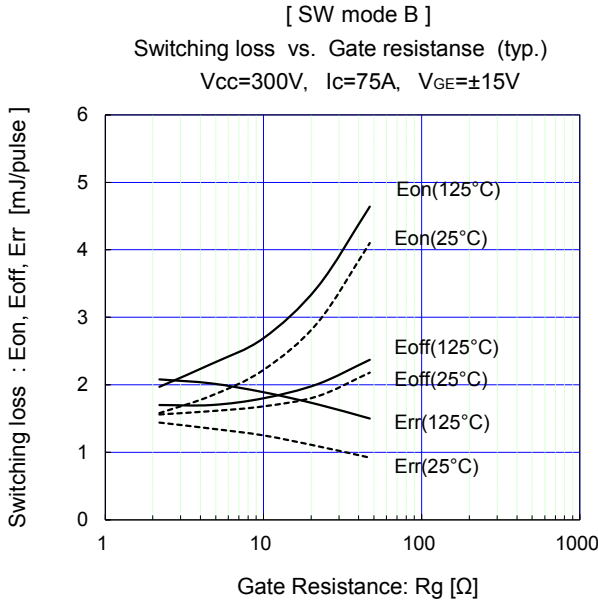
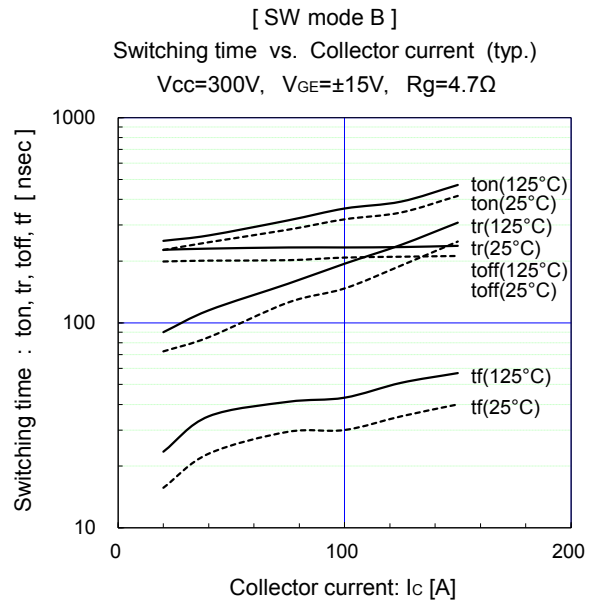
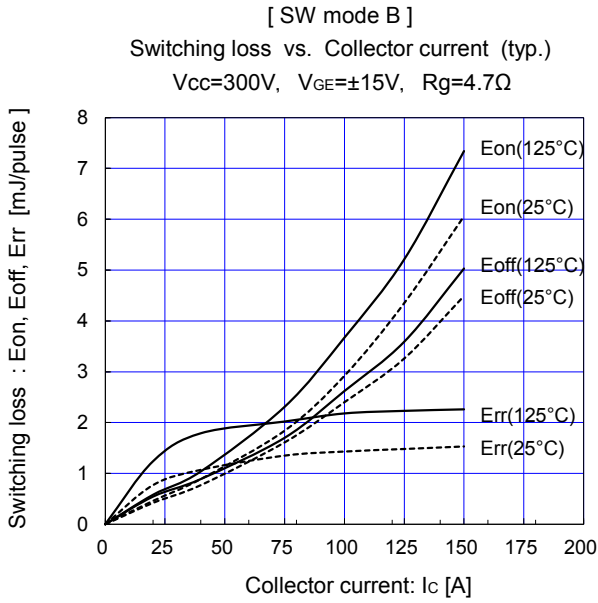
Capacitance vs. Collector-Emittor voltage (typ.)  
VGE=0V, f= 1MHz, Tj= 25°C

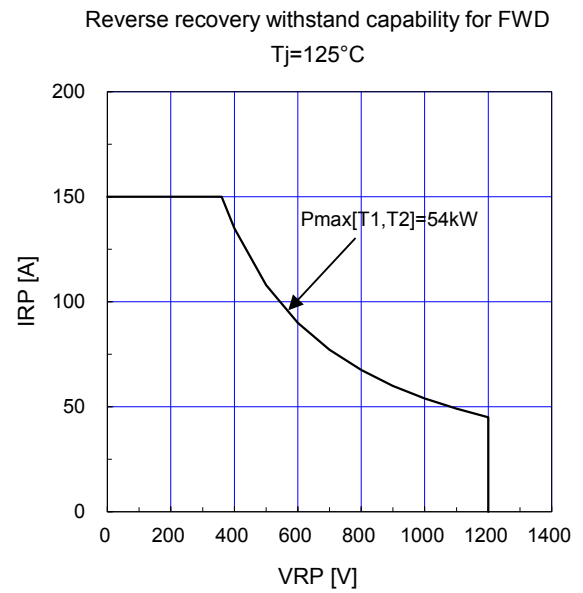
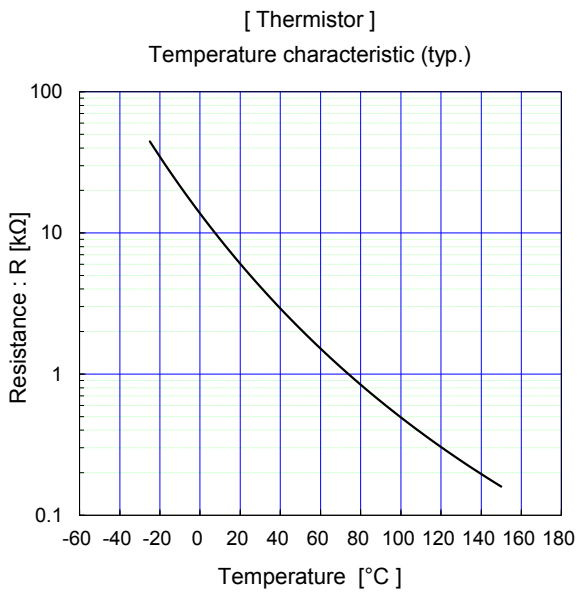
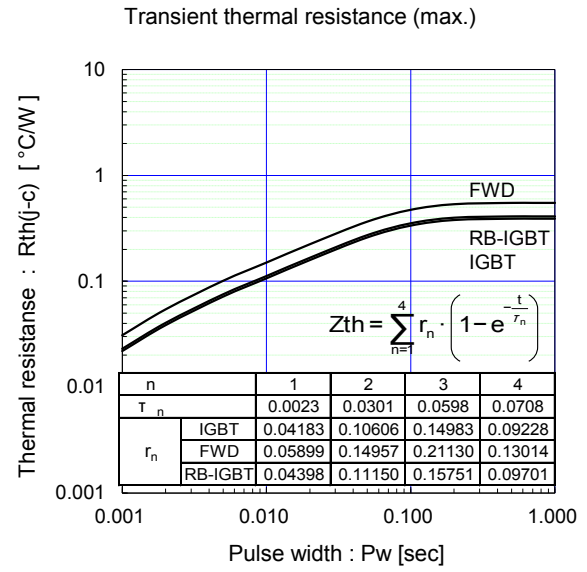
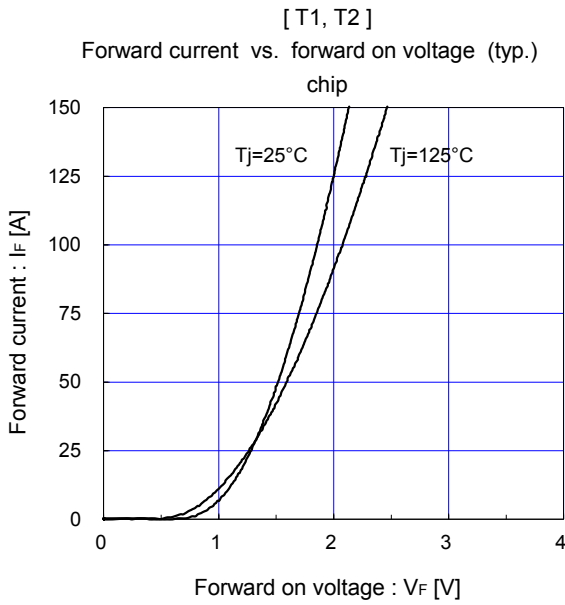


[ T3, T4 (RB-IGBT)]

Dynamic gate charge (typ.)  
Vcc=300V, Ic=75A, Tj=25°C











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