

7MBR25VM120-50

IGBT Modules

IGBT MODULE (V series)

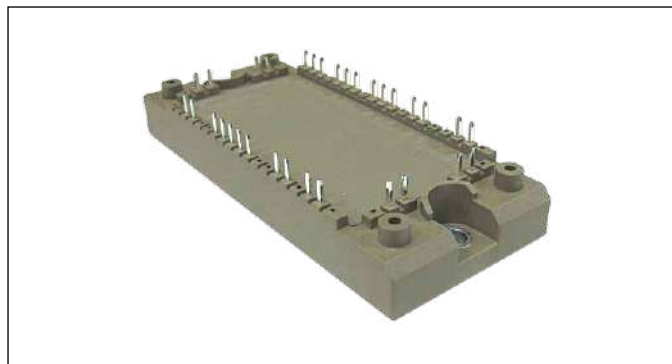
1200V / 25A / PIM

■ 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}	± 20	V
	Collector current	I_C Continuous $T_c=100^\circ\text{C}$	25	A
		I_{CP} 1ms $T_c=80^\circ\text{C}$	50	
		$-I_C$	25	
		$-I_C$ pulse 1ms	50	
	Collector power dissipation	P_C 1 device	170	W
Brake	Collector-Emitter voltage	V_{CES}	1200	V
	Gate-Emitter voltage	V_{GES}	± 20	V
	Collector current	I_C Continuous $T_c=80^\circ\text{C}$	25	A
		I_{CP} 1ms $T_c=80^\circ\text{C}$	50	
	Collector power dissipation	P_C 1 device	170	W
Converter	Repetitive peak reverse voltage (Diode)	V_{RRM}	1200	V
	Repetitive peak reverse voltage	V_{RRM}	1600	V
	Average output current	I_O 50Hz/60Hz, sine wave	25	A
	Surge current (Non-Repetitive)	I_{FSM} 10ms, $T_J=150^\circ\text{C}$	155	A
	I^2t (Non-Repetitive)	I^2t half sine wave	120	A^2s
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	
Storage temperature		T_{stg}	-40 to +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)

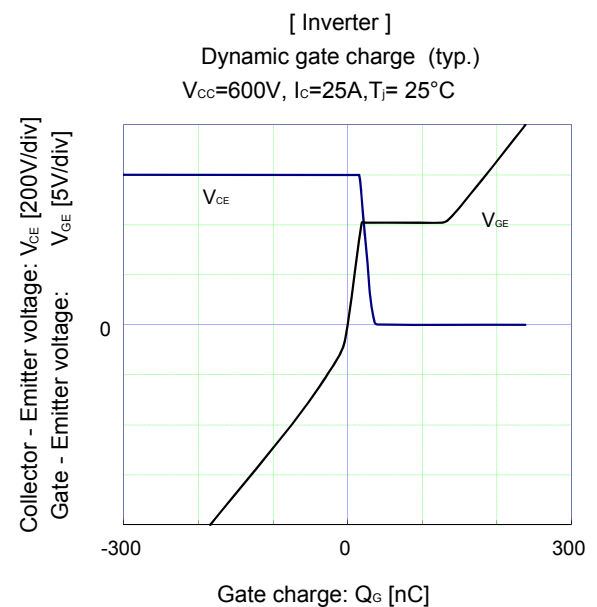
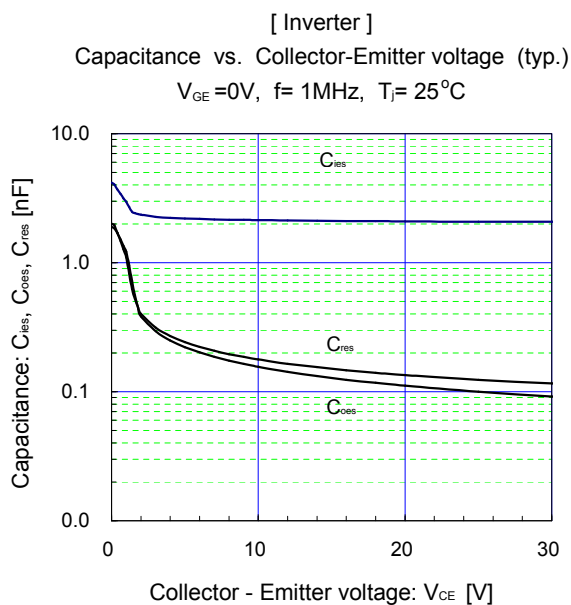
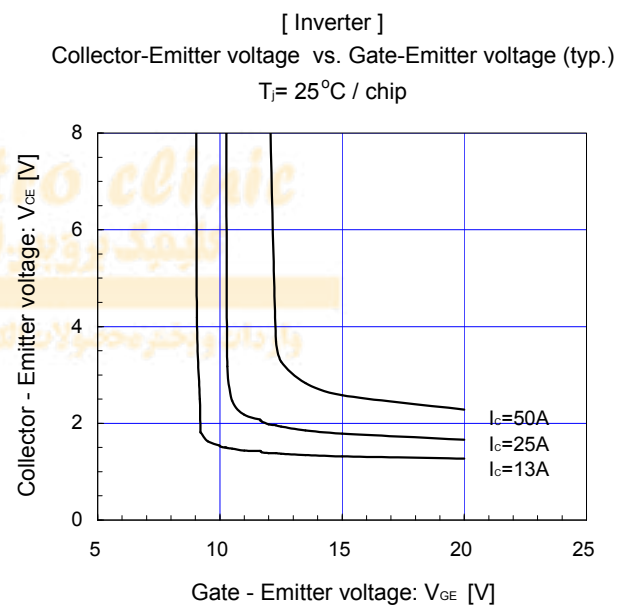
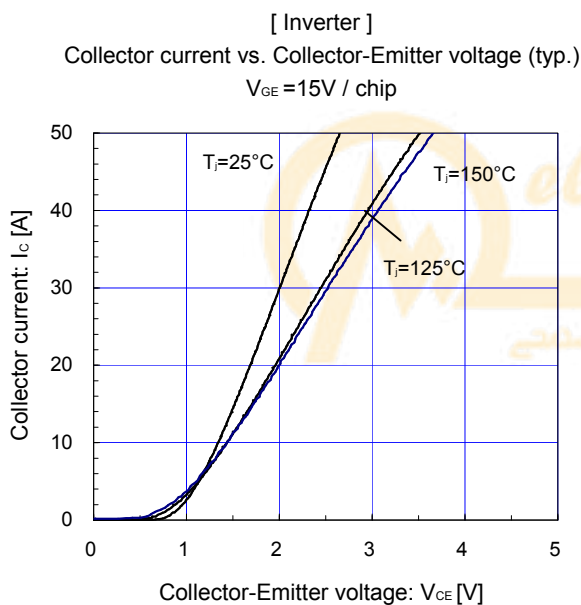
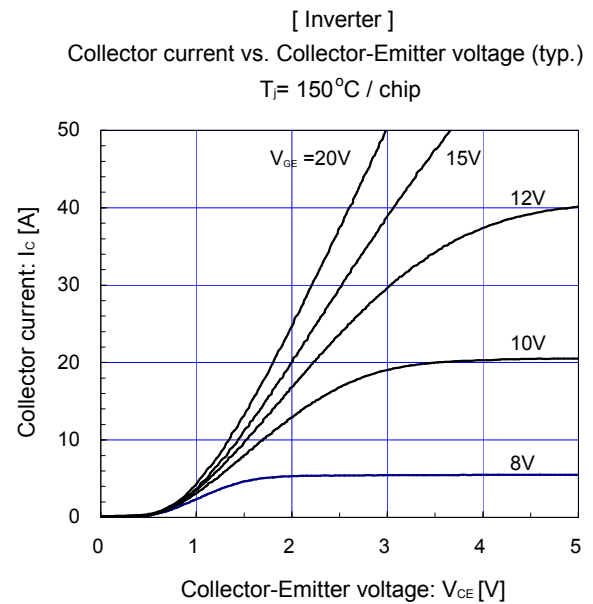
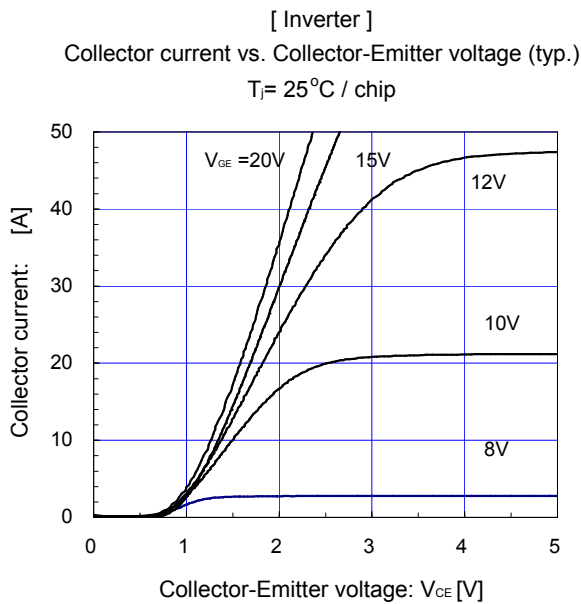
Items		Symbols	Conditions		Characteristics			Units	
					min.	typ.	max.		
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	1.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{GE} = 0V, V _{GE} = ±20V		-	-	200	nA	
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 25mA		6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 25A	T _J =25°C	-	2.10	2.55	V	
				T _J =125°C	-	2.45	-		
				T _J =150°C	-	2.50	-		
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 25A	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)}	-			-	0	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz			-	2.1	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V I _C = 25A V _{GE} = +15 / -15V R _G = 39Ω			-	0.39	1.20	μs
		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 = 25A	T _J =25°C	-	1.95	2.40	V		
			T _J =125°C	-	2.10	-			
			T _J =150°C	-	2.05	-			
	V _F (chip)	I _F = 25A	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 = 25A			-	-	0.35	μs	
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 = 25A	T _J =25°C	-	2.10	2.55	V	
				T _J =125°C	-	2.45	-		
				T _J =150°C	-	2.50	-		
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 25A	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)}	-			-	0	-	Ω
	Turn-on time	t _{on}	V _{CE} = 600V I _C = 25A			-	0.39	1.20	μs
		t _r				-	0.09	0.60	
	Turn-off time	t _{off}	V _{GE} = +15 / -15V R _G = 39Ω			-	0.53	1.00	μs
		t _r				-	0.06	0.30	
	Reverse current	I _{RRM}	V _R = 1200V		-	-	1.00	mA	
Converter	Forward on voltage	V _{FM} (chip)	I _F = 25A	terminal	-	1.65	2.10	V	
				chip	-	1.40	-		
	Reverse current	I _{RRM}	V _R = 1600V		-	-	1.0	mA	
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)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.89	$^\circ\text{C/W}$
		Inverter FWD	-	-	1.06	
		Brake IGBT	-	-	0.89	
		Converter Diode	-	-	0.97	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.05	-	

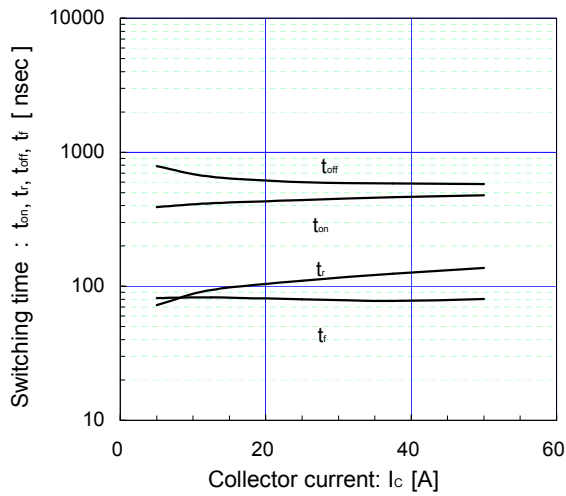
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



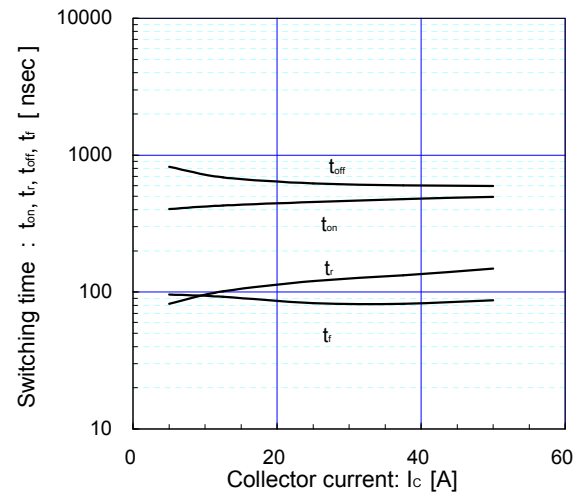
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=39\Omega$, $T_J=125^\circ C$ 

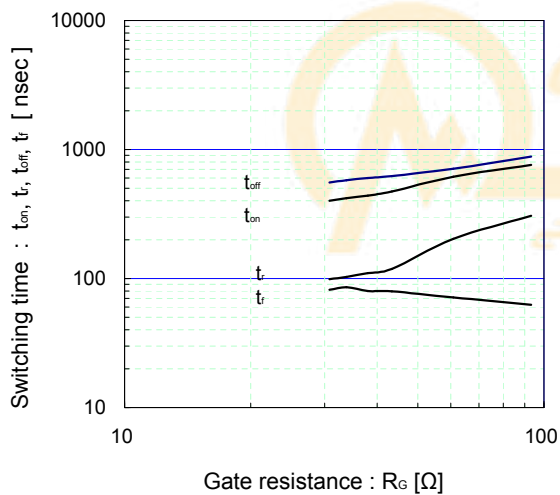
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=39\Omega$, $T_J=150^\circ C$ 

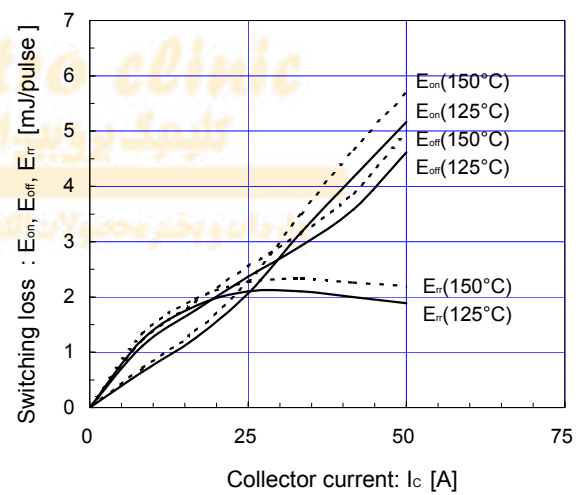
[Inverter]

Switching time vs. gate resistance (typ.)

 $V_{CC}=600V$, $I_C=25A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$ 

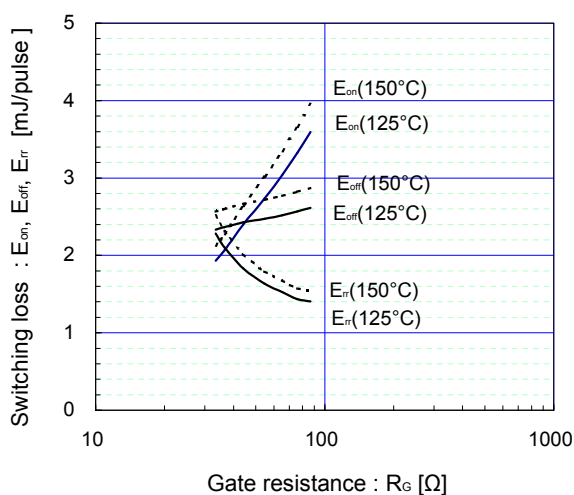
[Inverter] a

Switching loss vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=39\Omega$ 

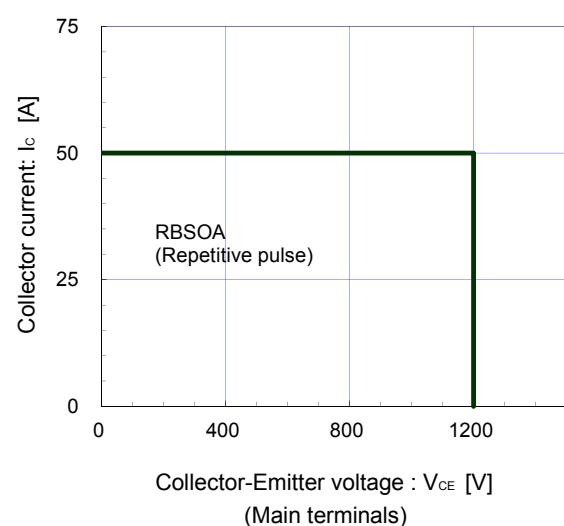
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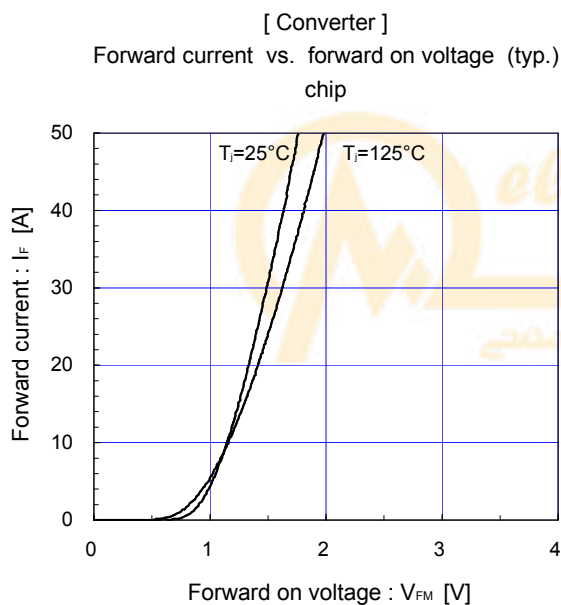
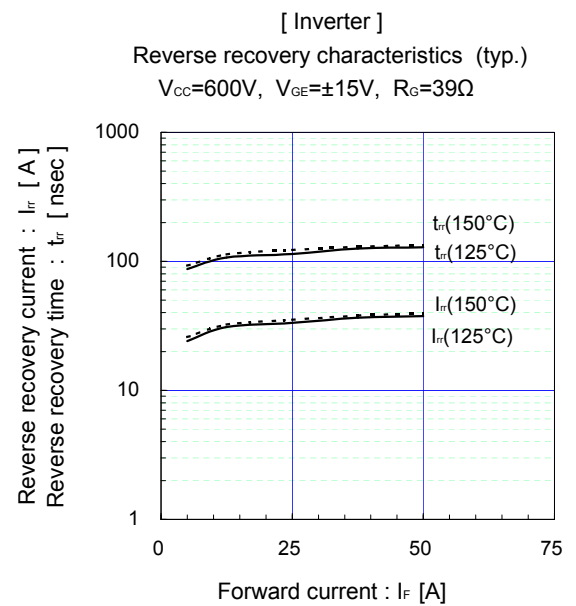
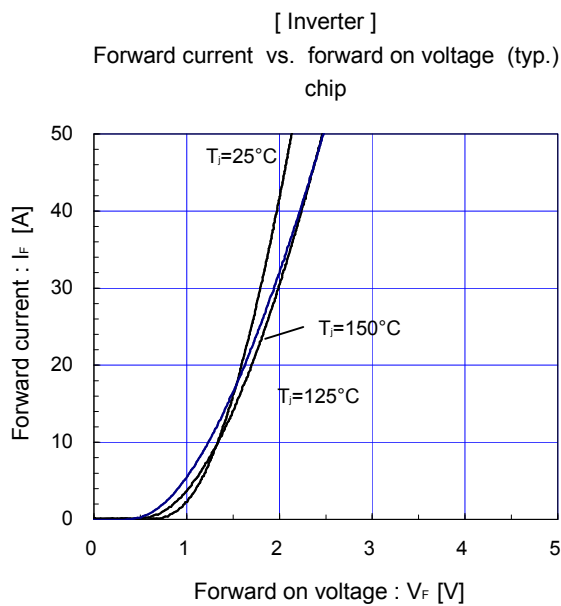
Switching loss vs. gate resistance (typ.)

 $V_{CC}=600V$, $I_C=25A$, $V_{GE}=\pm 15V$ 

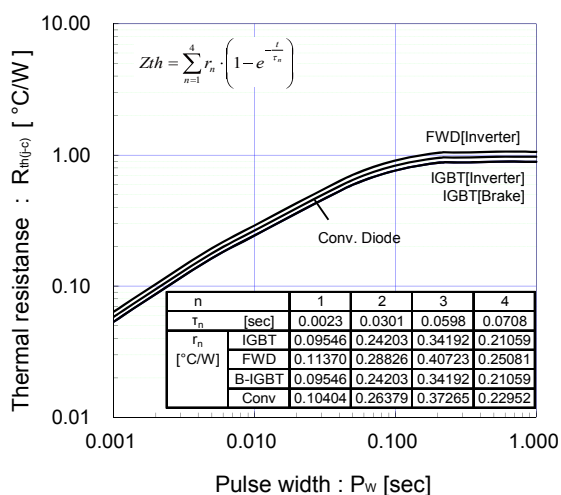
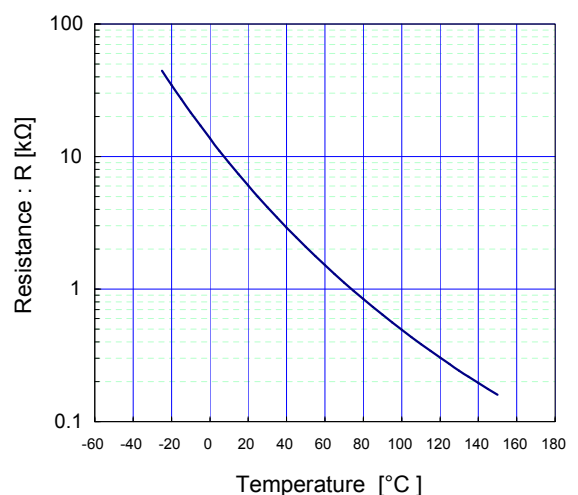
[Inverter]

Reverse bias safe operating area (max.)

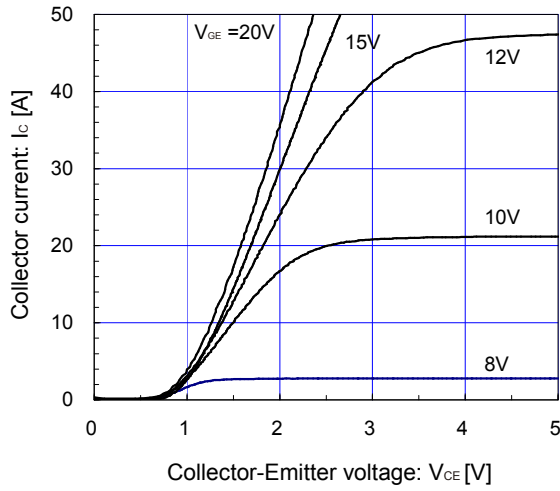
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_G \geq 39\Omega, T_J=150^\circ C$ 



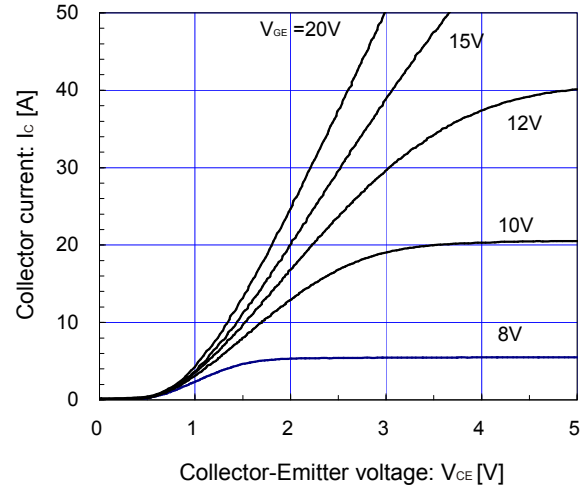
Transient thermal resistance (max.)

[Thermistor]
Temperature characteristic (typ.)

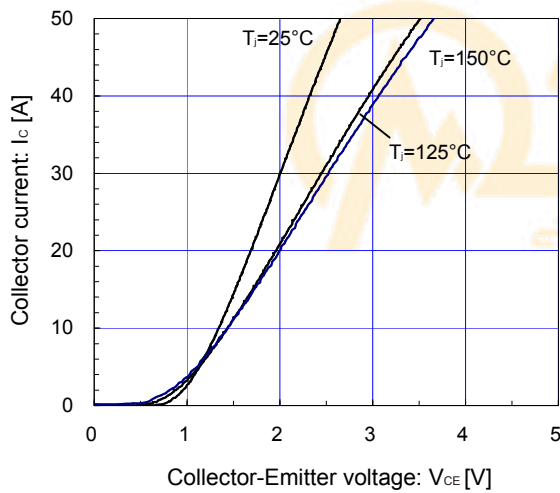
[Brake]
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



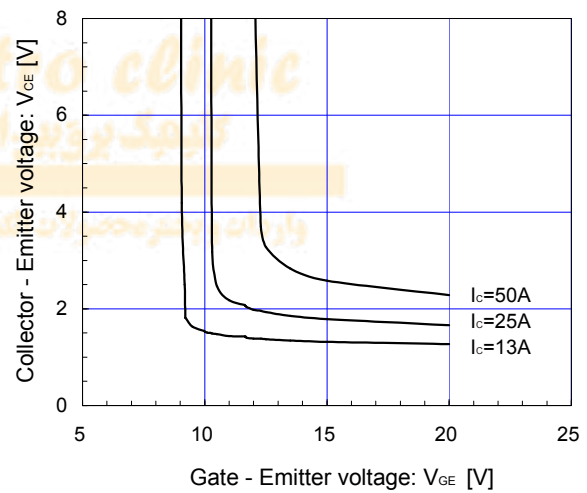
[Brake]
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



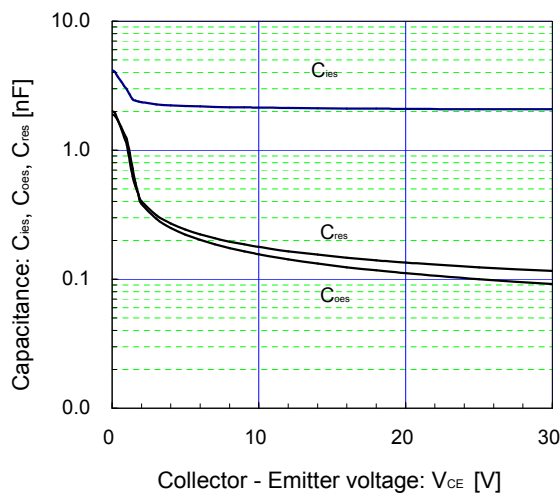
[Brake]
Collector current vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



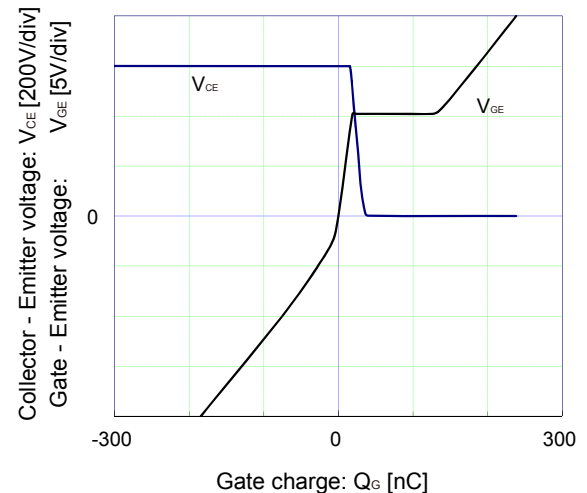
[Brake]
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



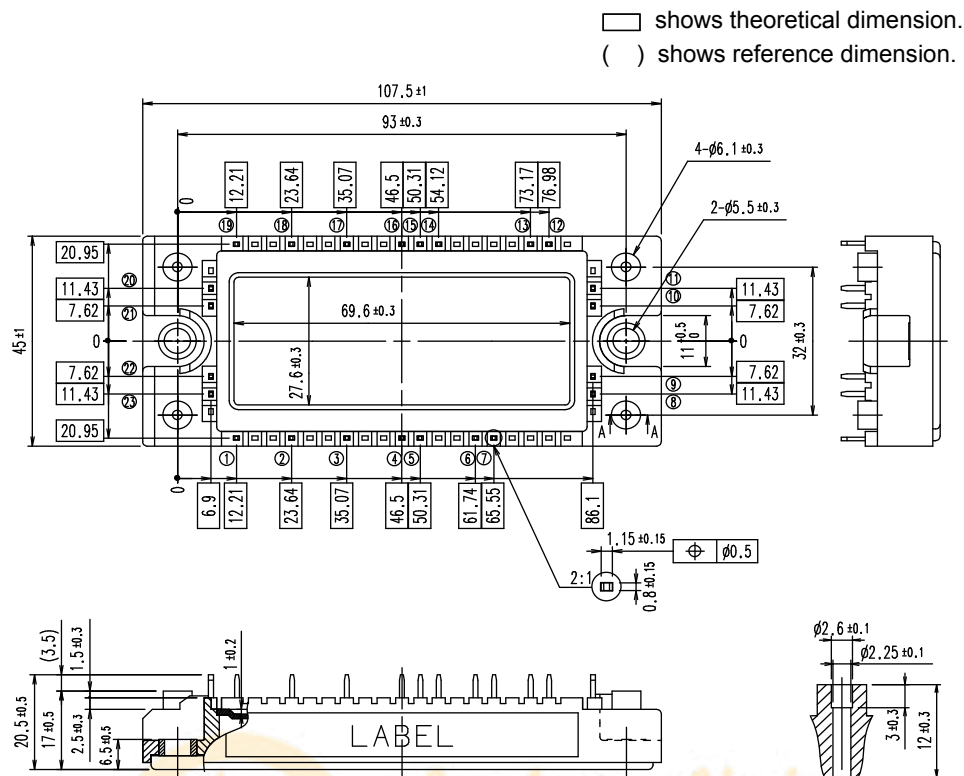
[Brake]
Capacitance vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



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



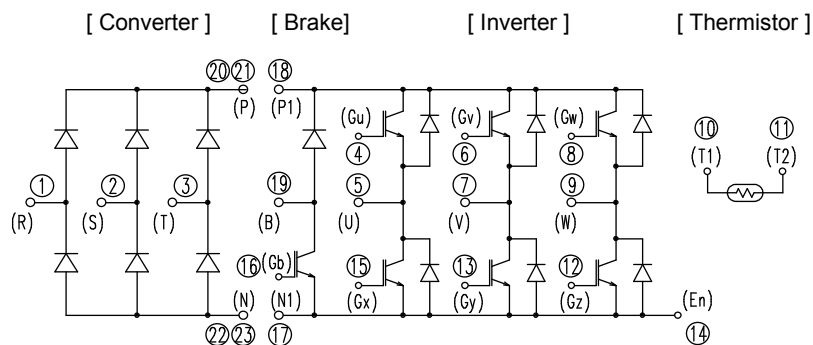
Outline Drawings (Unit : mm)



Section A-A

Weight: 200g(typ.)

Equivalent Circuit



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IGBT Modules

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