

7MBR150VR060-50

IGBT Modules

IGBT MODULE (V series)

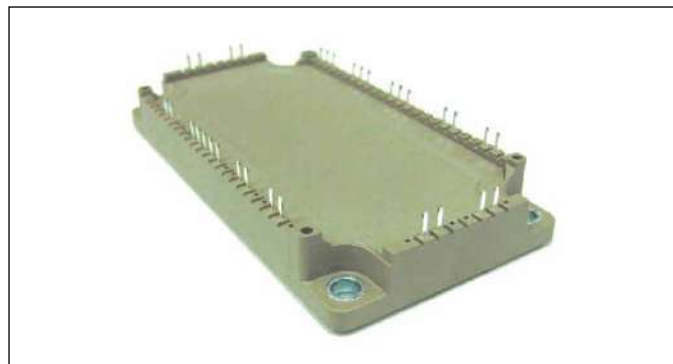
600V / 150A / PIM

■ 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}	600	V
	Gate-Emitter voltage	V_{GES}	± 20	V
	Collector current	I_c Continuous $T_c=80^\circ\text{C}$	150	A
		I_{cp} 1ms $T_c=80^\circ\text{C}$	300	
		$-I_c$	150	
		$-I_c$ pulse 1ms	300	
	Collector power dissipation	P_c 1 device	485	W
Brake	Collector-Emitter voltage	V_{CES}	600	V
	Gate-Emitter voltage	V_{GES}	± 20	V
	Collector current	I_c Continuous $T_c=80^\circ\text{C}$	75	A
		I_{cp} 1ms $T_c=80^\circ\text{C}$	150	
	Collector power dissipation	P_c 1 device	300	W
	Repetitive peak reverse voltage (Diode)	V_{RRM}	600	V
Converter	Repetitive peak reverse voltage	V_{RRM}	800	V
	Average output current	I_o 50Hz/60Hz, sine wave	150	A
	Surge current (Non-Repetitive)	I_{FSM} 10ms, $T_j=150^\circ\text{C}$	960	A
	I^2t (Non-Repetitive)	I^2t half sine wave	4608	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°C unless otherwise specified)

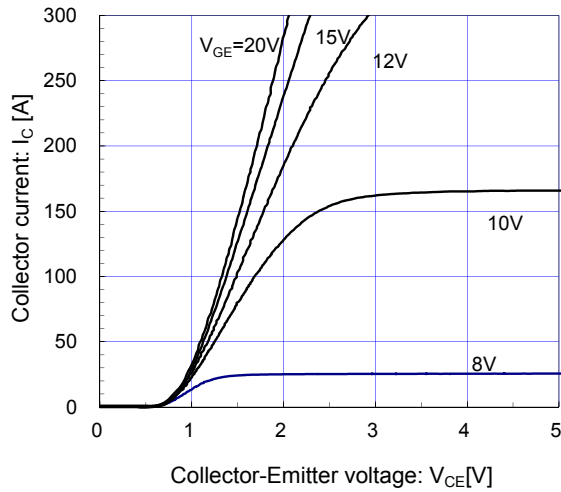
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 600V	-	-	1.0	mA
Gate-Emitter leakage current	I _{GES}	V _{GE} = 0V, V _{GE} = ±20V	-	-	200	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _C = 150mA	6.2	6.7	7.2	V
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _C = 150A	T _j = 25°C	2.25	2.70	V
			T _j = 125°C	2.55	-	
			T _j = 150°C	2.65	-	
	V _{CE(sat)} (chip)	V _{GE} = 15V I _C = 150A	T _j = 25°C	1.60	2.05	
			T _j = 125°C	1.90	-	
			T _j = 150°C	2.00	-	
Internal gate resistance	R _{g(int)}	-	-	6	-	Ω
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	9.7	-	nF
Turn-on time	t _{on}	V _{CC} = 300V I _C = 150A V _{GE} = +15 / -15V R _G = 9Ω	-	0.36	1.20	μs
	t _r		-	0.25	0.60	
	t _{r(i)}		-	0.07	-	
Turn-off time	t _{off}		-	0.52	1.20	
Forward on voltage	V _F (terminal)	I _F = 150A	T _j = 25°C	2.25	2.70	V
			T _j = 125°C	2.15	-	
			T _j = 150°C	2.10	-	
	V _F (chip)	I _F = 150A	T _j = 25°C	1.60	2.05	
			T _j = 125°C	1.50	-	
			T _j = 150°C	1.45	-	
Reverse recovery time	t _{rr}	I _F = 150A	-	-	0.35	μs
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} = +20 / -20V	-	-	200	nA
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _C = 75A	T _j = 25°C	1.95	2.40	V
			T _j = 125°C	2.25	-	
			T _j = 150°C	2.35	-	
	V _{CE(sat)} (chip)	V _{GE} = 15V I _C = 75A	T _j = 25°C	1.60	2.05	
			T _j = 125°C	1.90	-	
			T _j = 150°C	2.00	-	
Internal gate resistance	R _{g(int)}	-	-	0	-	Ω
Turn-on time	t _{on}	V _{CE} = 300V I _C = 75A V _{GE} = +15 / -15V R _G = 30Ω	-	0.36	1.20	μs
	t _r		-	0.25	0.60	
	t _{off}		-	0.52	1.20	
Turn-off time	t _f		-	0.03	0.45	
Reverse current	I _{RRM}	V _R = 600V	-	-	1.00	mA
Forward on voltage	V _{FM} (chip)	I _F = 150A	terminal	1.90	2.35	V
			chip	1.25	-	
Reverse current	I _{RRM}	V _R = 800V	-	-	1.0	mA
Resistance	R	T = 25°C	-	5000	-	Ω
		T = 100°C	465	495	520	
		T = 25 / 50°C	3305	3375	3450	
B value	B	T = 25 / 50°C	3305	3375	3450	K

● Thermal resistance characteristics

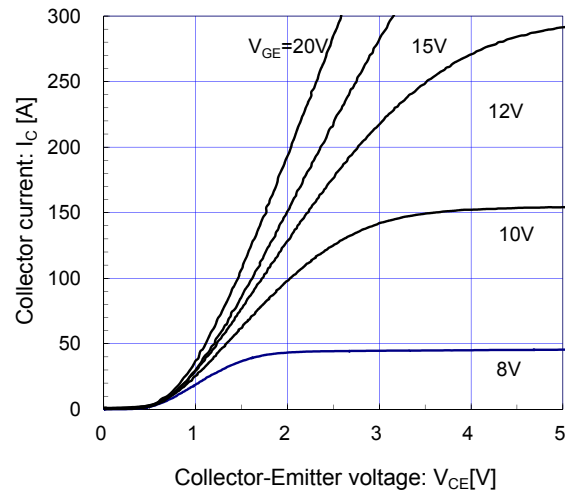
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	Inverter IGBT	-	-	0.31	°C/W
		Inverter FWD	-	-	0.60	
		Brake IGBT	-	-	0.50	
		Converter Diode	-	-	0.47	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.05	-	

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

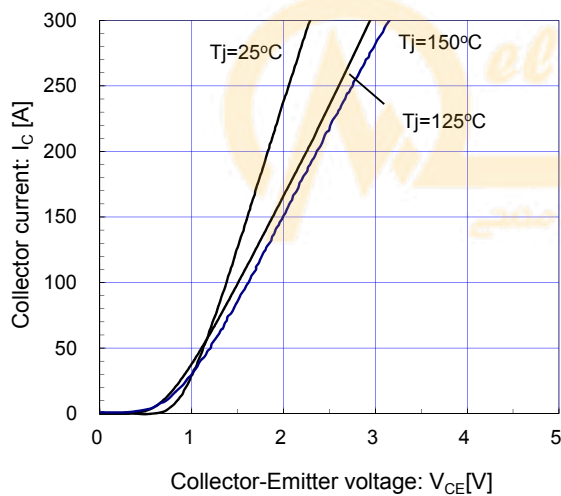
[Inverter]
Collector current vs. Collector-Emittter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



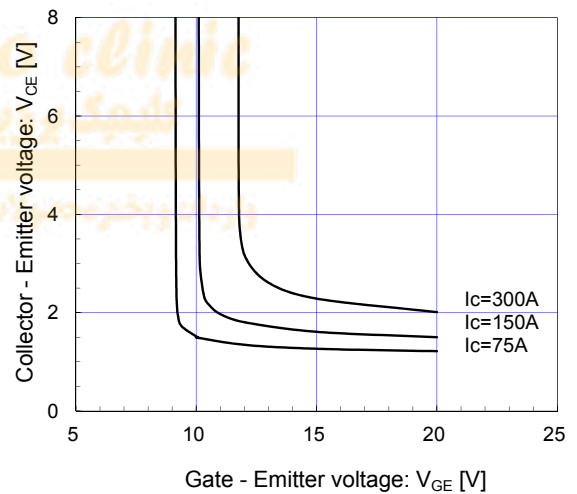
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Collector current vs. Collector-Emittter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



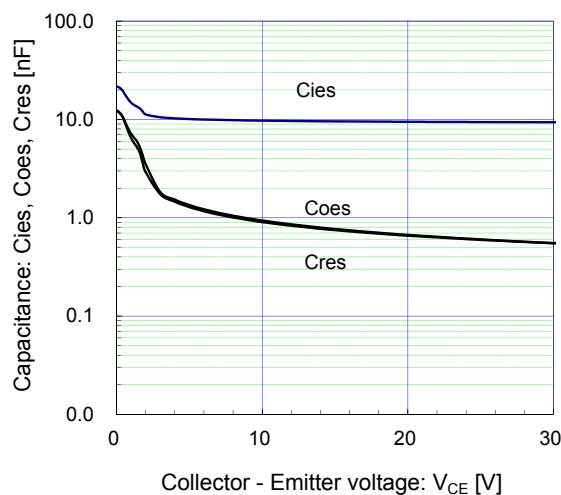
[Inverter]
Collector current vs. Collector-Emittter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



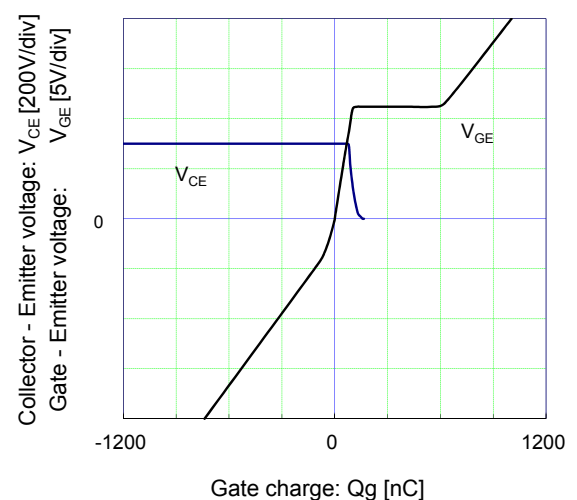
[Inverter]
Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



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

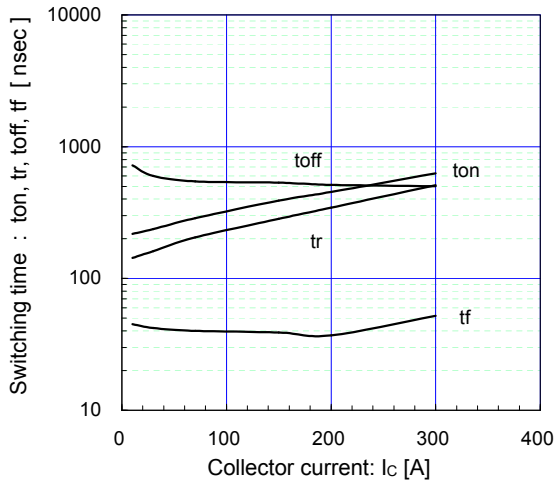


[Inverter]
Dynamic gate charge (typ.)
 $V_{CC} = 300\text{V}$, $I_c = 150\text{A}$, $T_j = 25^\circ\text{C}$



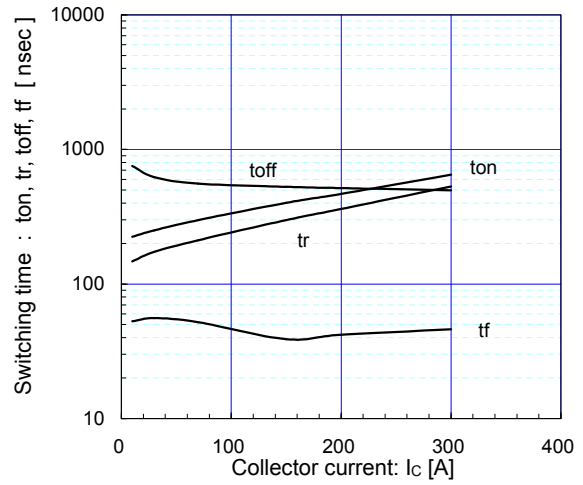
[Inverter]

Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_g=9Ω, T_j=125°C



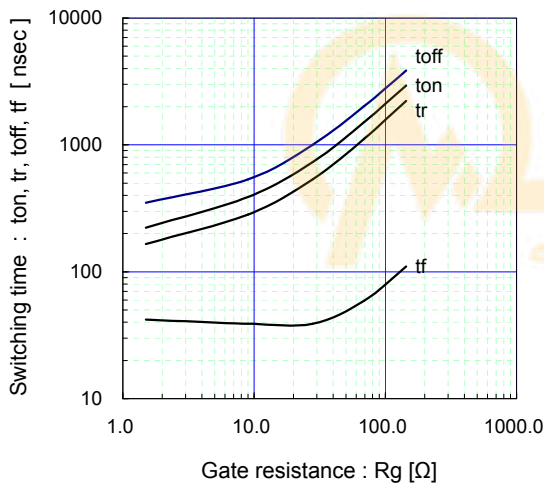
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Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_g=9Ω, T_j=150°C



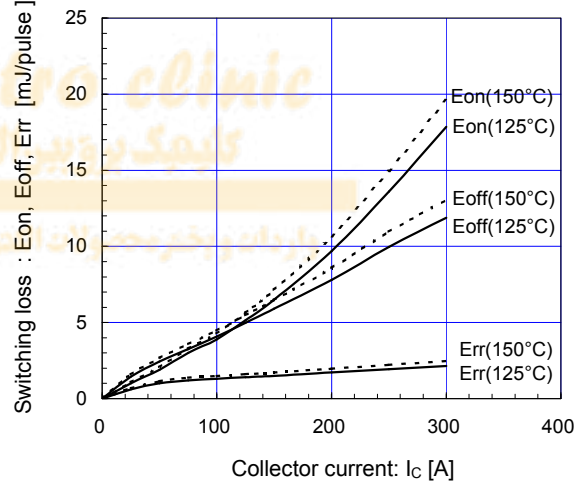
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Switching time vs. gate resistance (typ.)
V_{CC}=300V, Ic=150A, V_{GE}=±15V, T_j=125°C



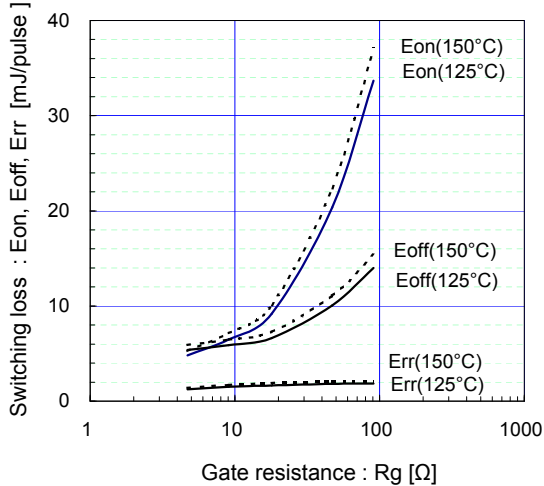
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Switching loss vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_g=9Ω



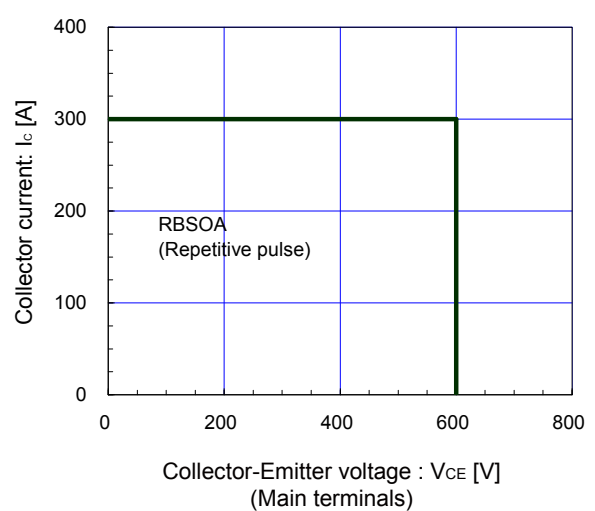
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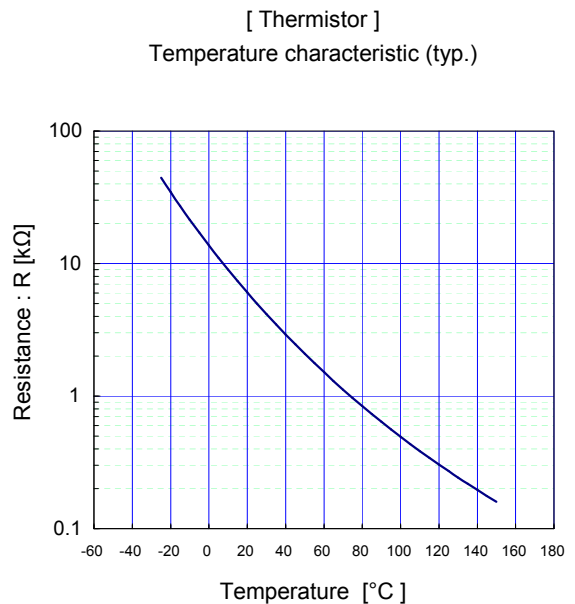
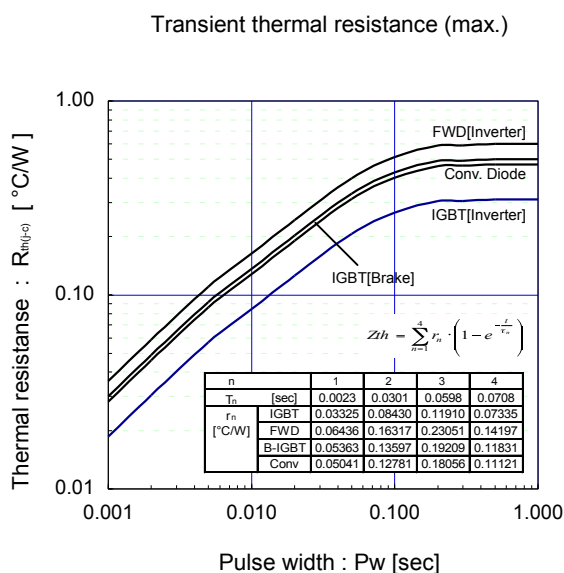
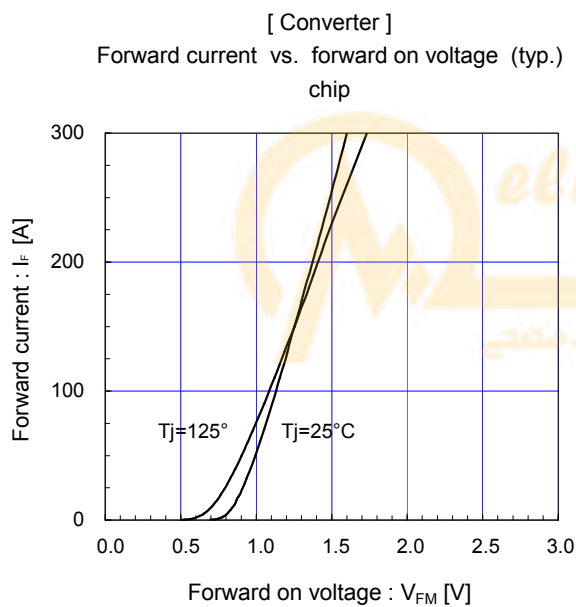
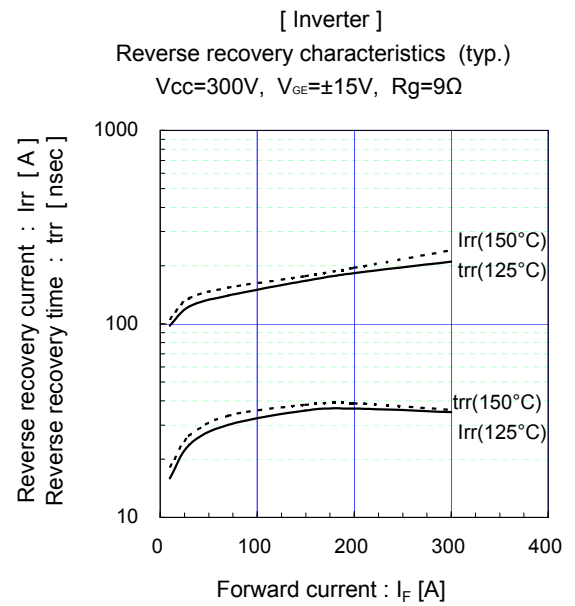
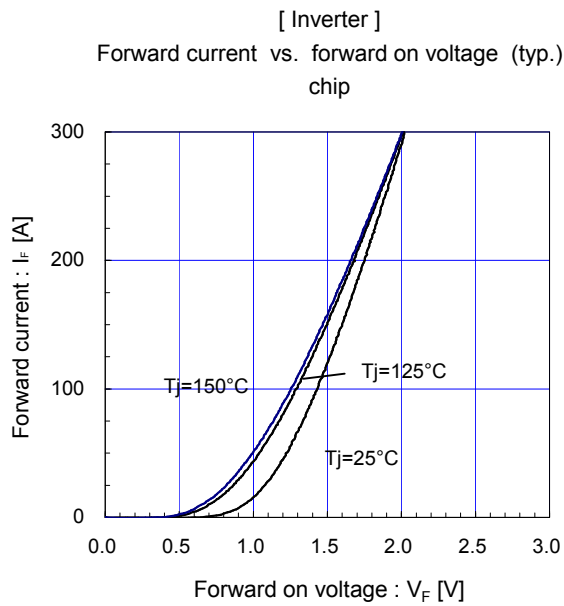
Switching loss vs. gate resistance (typ.)
V_{CC}=300V, Ic=150A, V_{GE}=±15V



[Inverter]

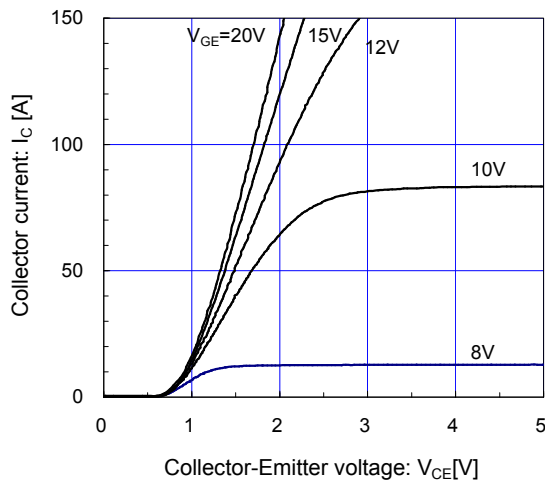
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE} ≤ 15V, R_g ≥ 9Ω, T_j = 150°C





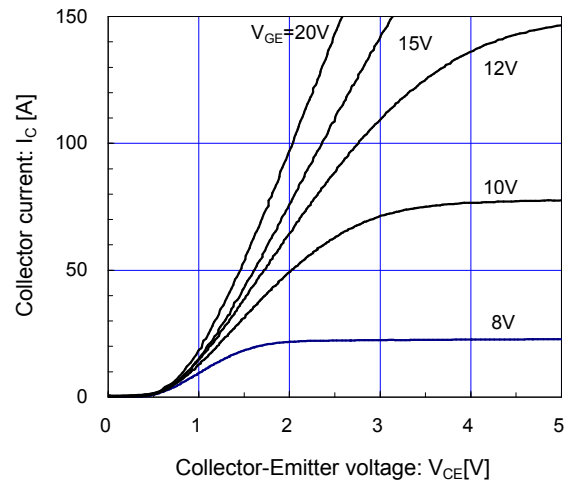
[Brake]

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

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

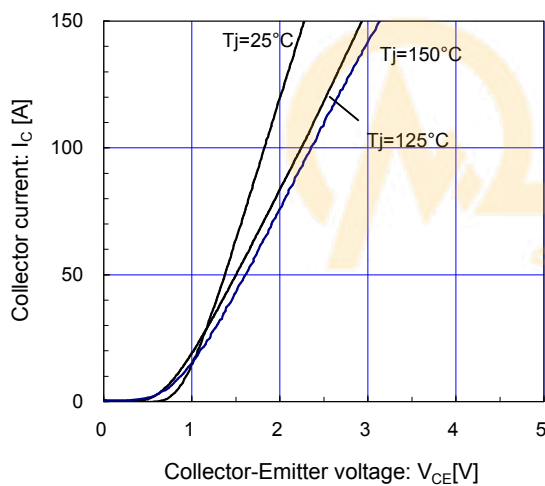
[Brake]

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

 $T_j = 150^\circ\text{C}$ / chip

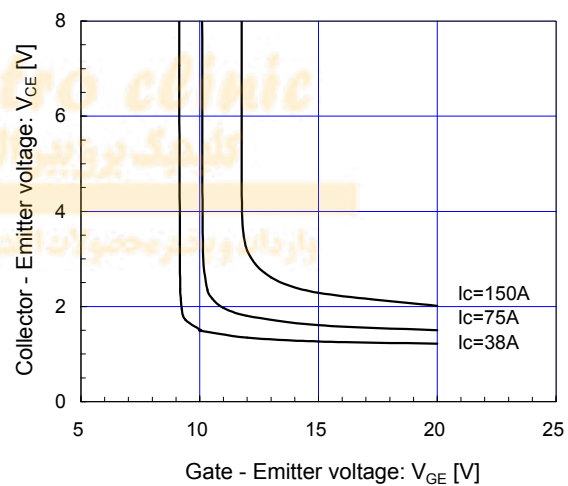
[Brake]

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

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

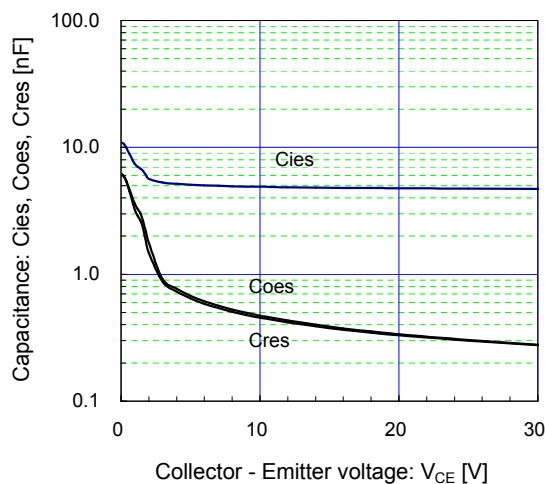
[Brake]

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

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

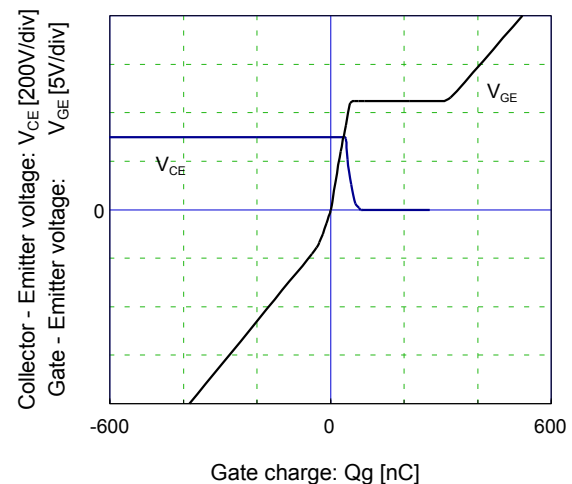
[Brake]

Capacitance vs. Collector-Emittor voltage (typ.)

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

[Brake]

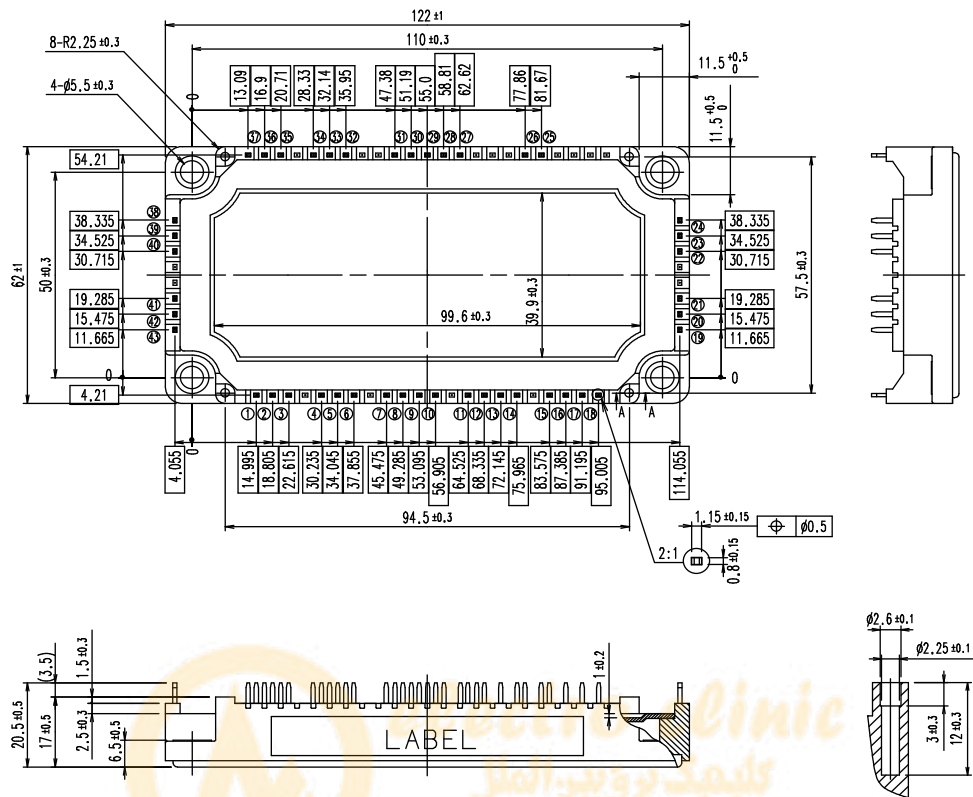
Dynamic gate charge (typ.)

 $V_{CC} = 300\text{V}$, $I_c = 75\text{A}$, $T_j = 25^\circ\text{C}$ 

Outline Drawings(Unit:mm)

□ shows theoretical dimension.

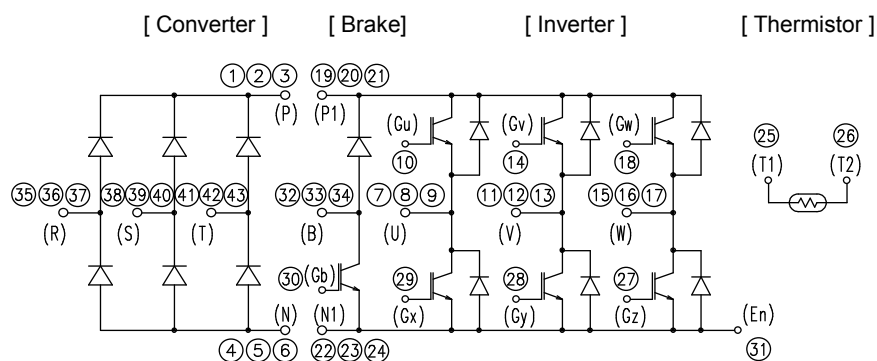
() shows reference dimension.



Section A-A

Weight: 310g(typ.)

Equivalent Circuit



WARNING

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The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sure to obtain the latest specifications.
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• Machine tools	• Audiovisual equipment	• Electrical home appliances	• Personal equipment
			• Industrial robots etc.
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• Traffic-signal control equipment	• Gas leakage detectors with an auto-shut-off feature
• Emergency equipment for responding to disasters and anti-burglary devices	• Safety devices
• Medical equipment	
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• Submarine repeater equipment		
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