

7MBR15VKA120-50

IGBT Modules

IGBT MODULE (V series)

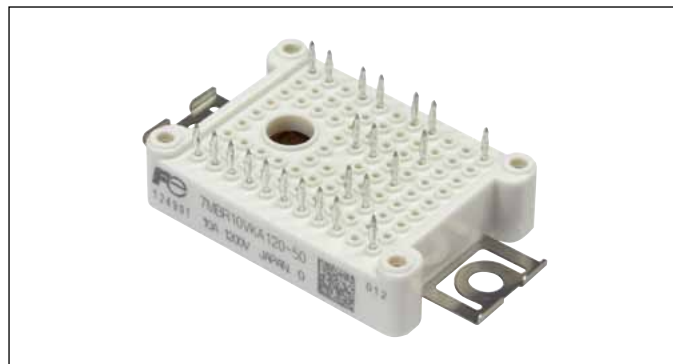
1200V / 15A / PIM

■ 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

● 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	$T_c=100^\circ\text{C}$	15	A
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	30	
		$-I_c$			15	
		$-I_{cp}$	1ms			30
	Collector power dissipation	P_c	1 device		135	W
Brake	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_c	Continuous	$T_c=80^\circ\text{C}$	15	A
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	30	
	Collector power dissipation	P_c	1 device		135	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		15	A
	Surge current (Non-Repetitive)	I_{FSM}	10ms, $T_j=150^\circ\text{C}$		245	A
	I^2t (Non-Repetitive)	I^2t	half sine wave		300	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	
	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)	-	M4		1.7	Nm

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 : 1.3-1.7 Nm (M4)

● Electrical characteristics (at T_j = 25°C unless otherwise specified)

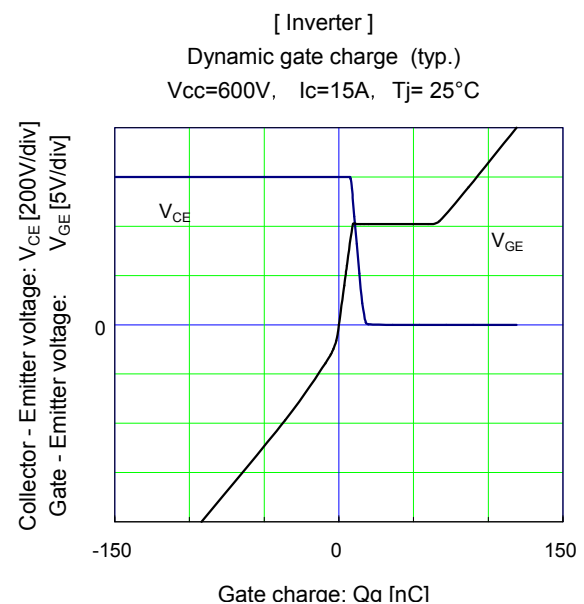
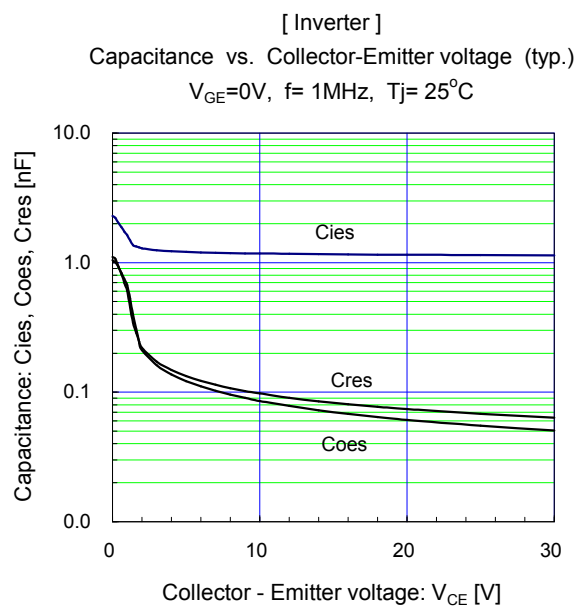
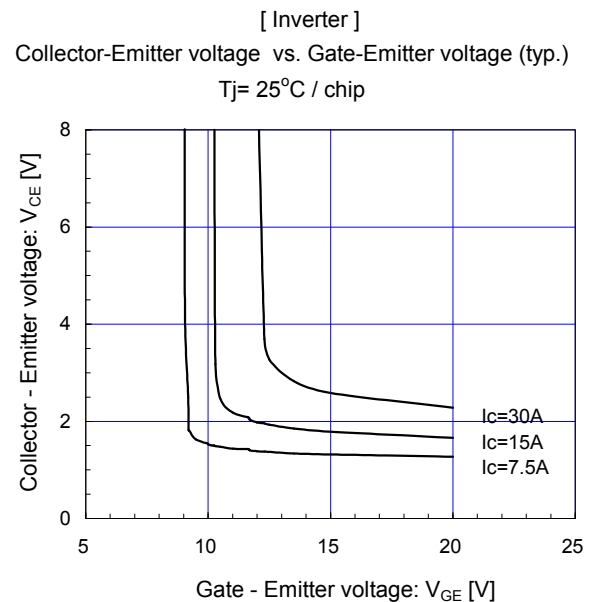
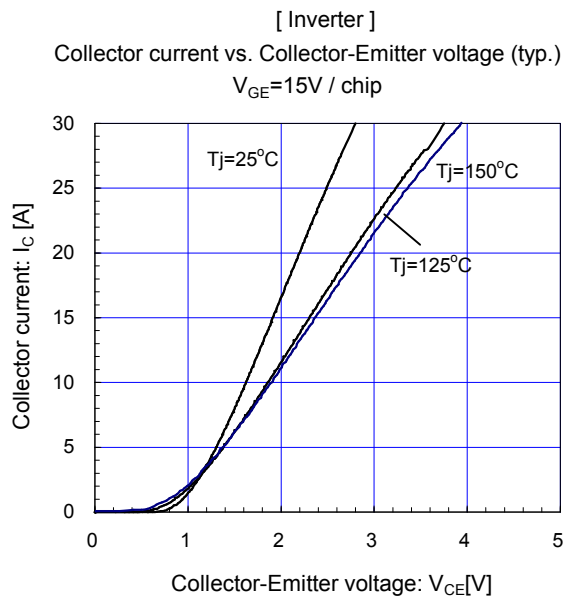
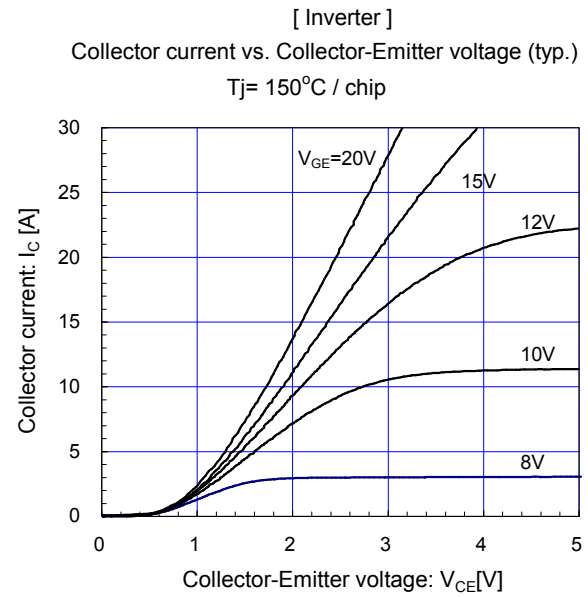
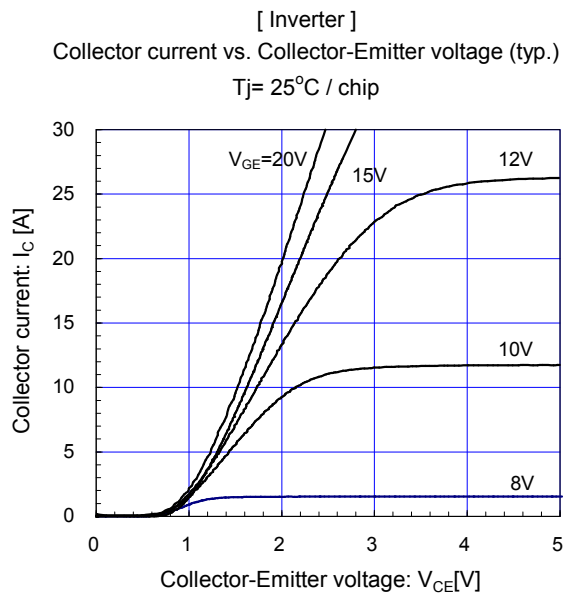
Items		Symbols	Conditions		Characteristics			Units	
					min.	typ.	max.		
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	1.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	200	nA	
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 15mA		6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 15A	T _J =25°C	-	2.10	2.55	V	
				T _J =125°C	-	2.50	-		
				T _J =150°C	-	2.55	-		
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 15A	T _J =25°C	-	1.90	2.30		
				T _J =125°C	-	2.30	-		
				T _J =150°C	-	2.35	-		
	Internal gate resistance	R _{g(int)}	-		-	0	-	Ω	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	1.2	-	nF	
	Turn-on time	t _{on}	V _{CC} = 600V I _C = 15A V _{GE} = +15 / -15V		-	0.18	1.20	μs	
		t _r			-	0.14	0.60		
		t _{r (i)}			-	0.02	-		
	Turn-off time	t _{off}	R _G = 39Ω		-	0.29	1.00		
		t _f			-	0.06	0.30		
	Forward on voltage	V _F (terminal)	I _F = 15A	T _J =25°C	-	2.05	2.65	V	
				T _J =125°C	-	2.30	-		
				T _J =150°C	-	2.30	-		
		V _F (chip)	I _F = 15A	T _J =25°C	-	1.85	2.45		
				T _J =125°C	-	2.10	-		
				T _J =150°C	-	2.10	-		
Reverse recovery time	t _{rr}	I _F = 15A		-	-	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 = 15A	T _J =25°C	-	2.10	2.55	V	
				T _J =125°C	-	2.50	-		
				T _J =150°C	-	2.55	-		
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 15A	T _J =25°C	-	1.90	2.30		
				T _J =125°C	-	2.30	-		
				T _J =150°C	-	2.35	-		
	Internal gate resistance	R _{g(int)}	-		-	0	-	Ω	
	Turn-on time	t _{on}	V _{CE} = 600V I _C = 15A		-	0.18	1.20	μs	
		t _r			-	0.14	0.60		
	Turn-off time	t _{off}	V _{GE} = +15 / -15V R _G = 39Ω		-	0.29	1.00		
		t _f			-	0.06	0.30		
	Reverse current	I _{RRM}	V _R = 1200V		-	-	1.00	mA	
Converter	Forward on voltage	V _{FM}	I _F = 15A	terminal	-	1.20	1.65	V	
				chip	-	1.00	-		
	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	-	-	1.15	°C/W
		Inverter FWD	-	-	2.16	
		Brake IGBT	-	-	1.15	
		Converter Diode	-	-	1.35	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.05	-	

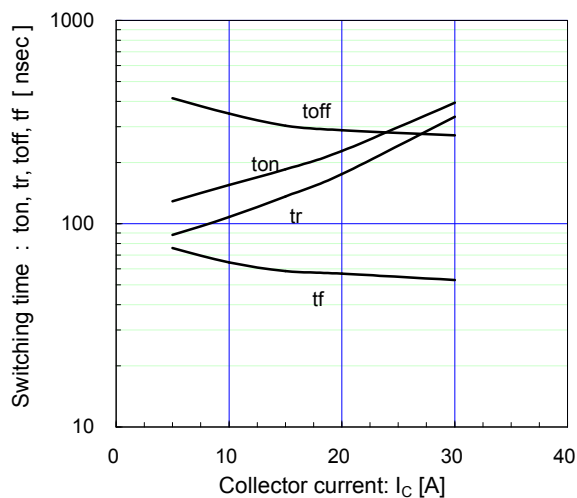
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



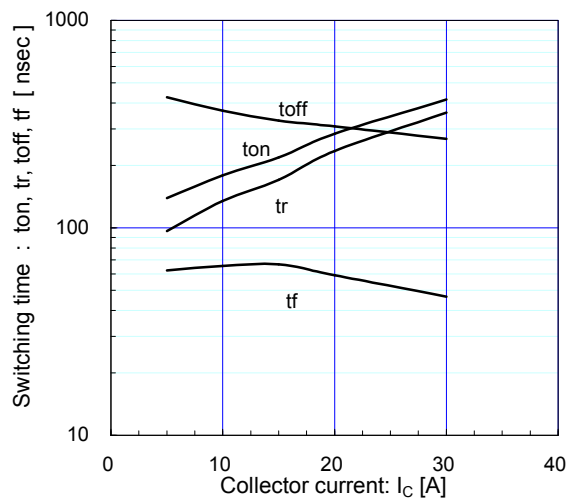
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=39\Omega$, $T_j=125^\circ C$



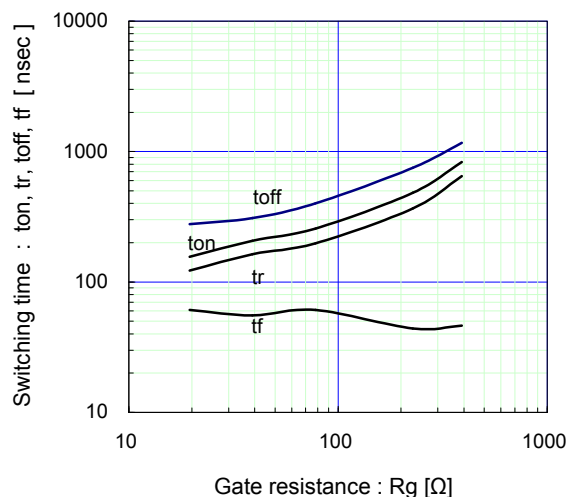
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=39\Omega$, $T_j=150^\circ C$



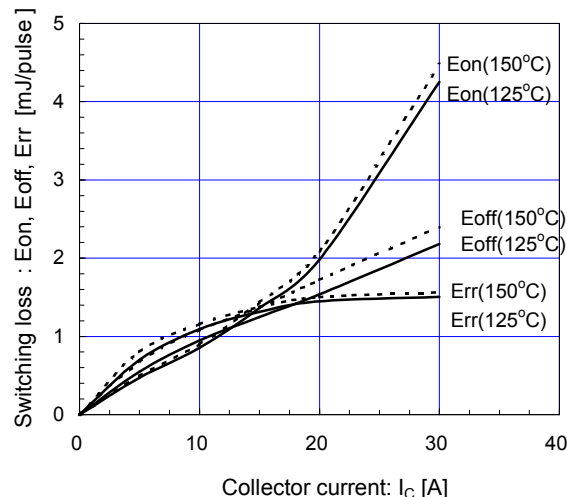
[Inverter]

Switching time vs. gate resistance (typ.)
 $V_{CC}=600V$, $I_C=15A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



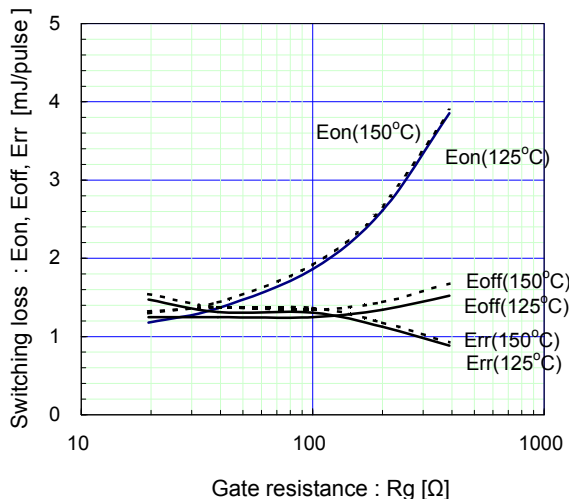
[Inverter]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=39\Omega$



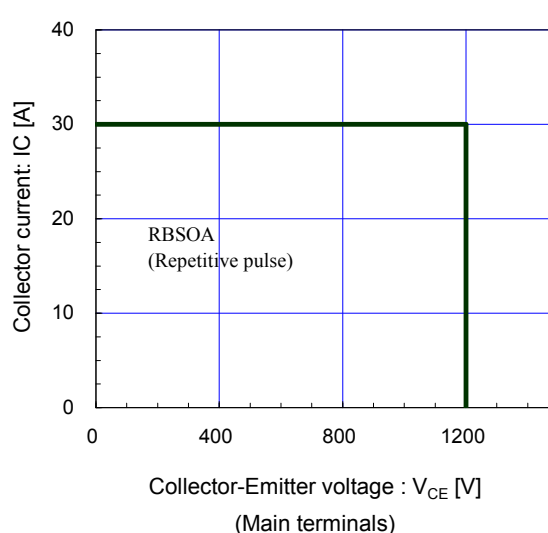
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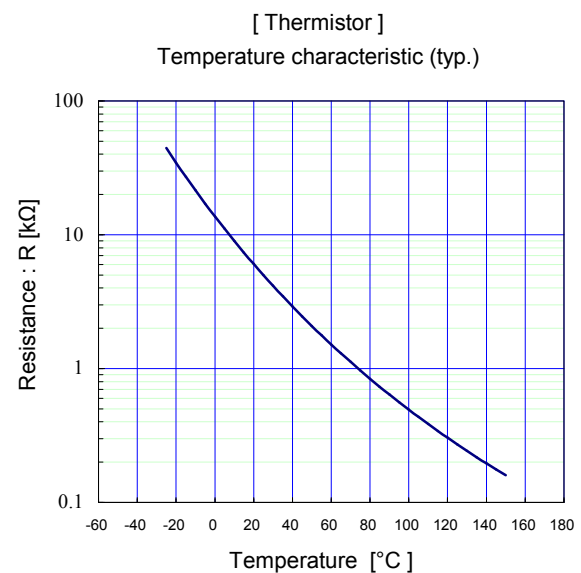
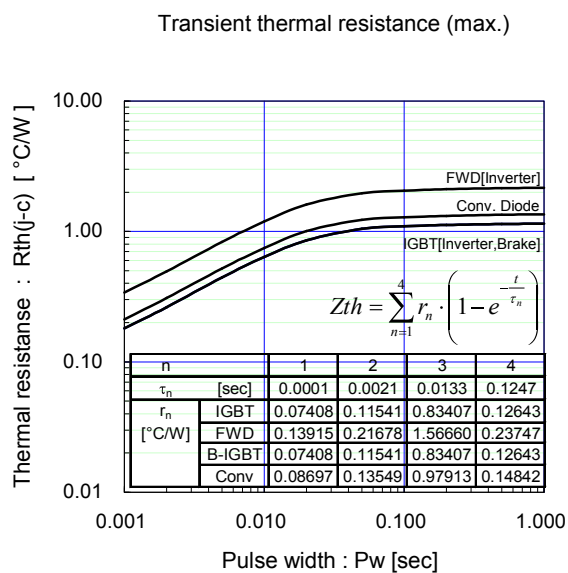
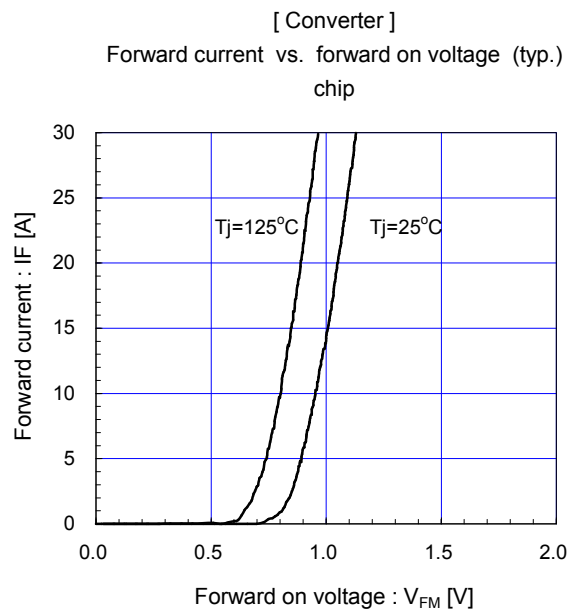
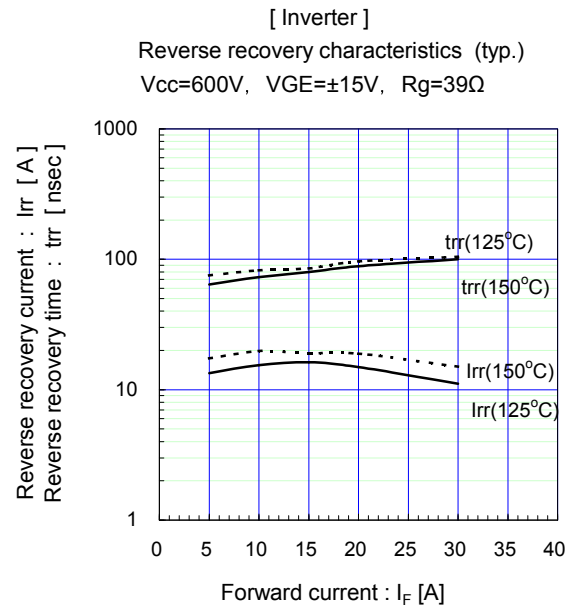
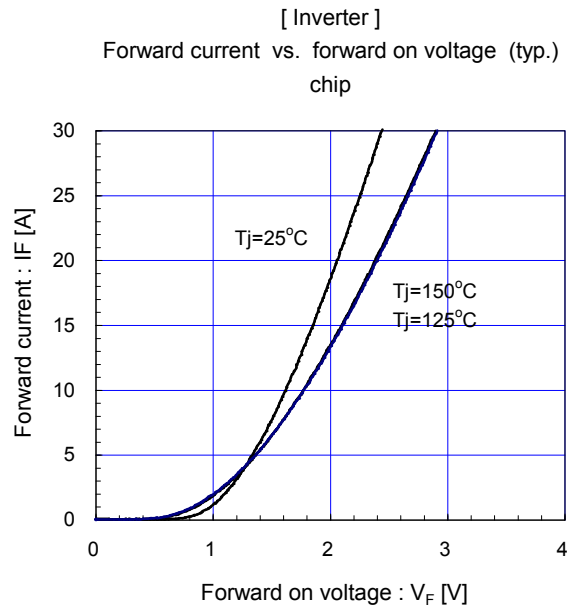
Switching loss vs. gate resistance (typ.)
 $V_{CC}=600V$, $I_C=15A$, $V_{GE}=\pm 15V$



[Inverter]

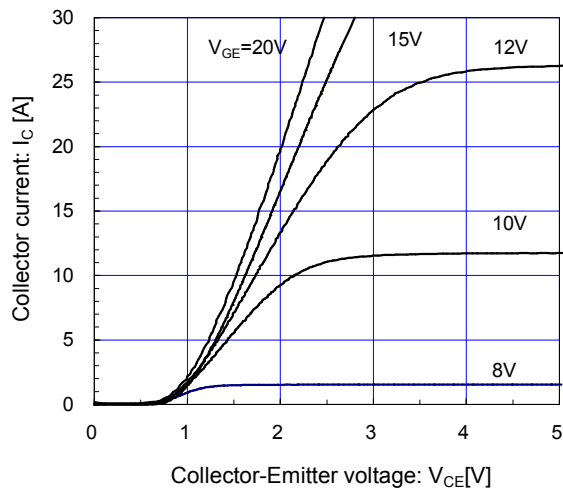
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_g \geq 39\Omega, T_j=150^\circ C$





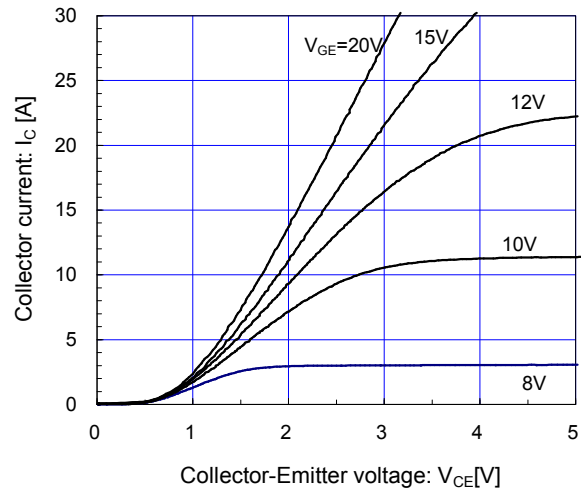
[Brake]

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

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

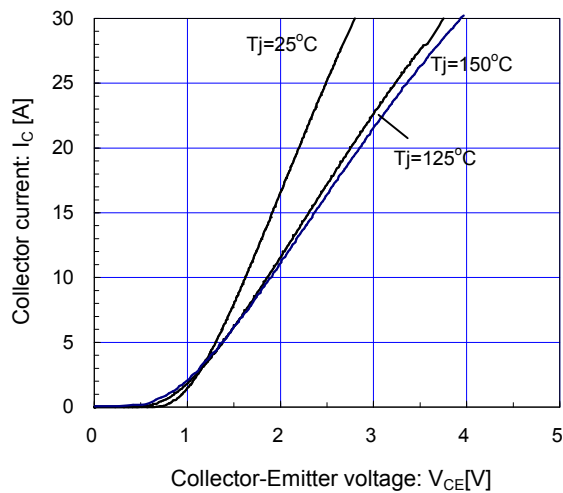
[Brake]

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

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

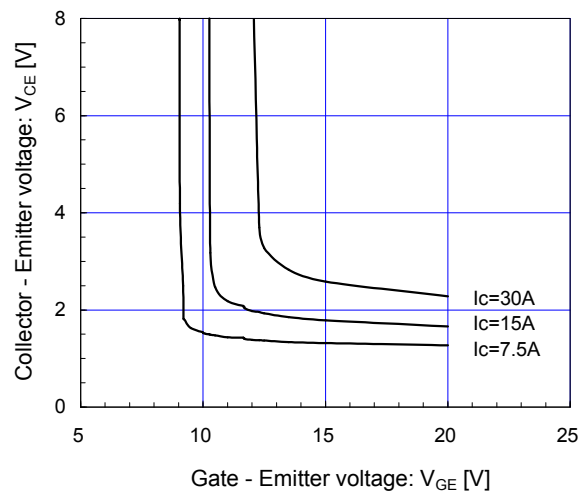
[Brake]

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

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

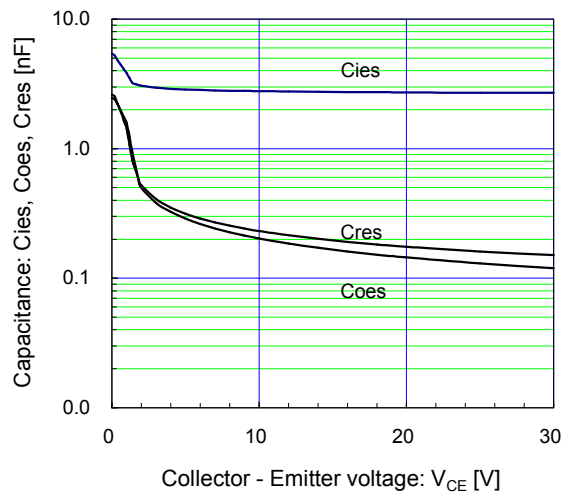
[Brake]

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

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

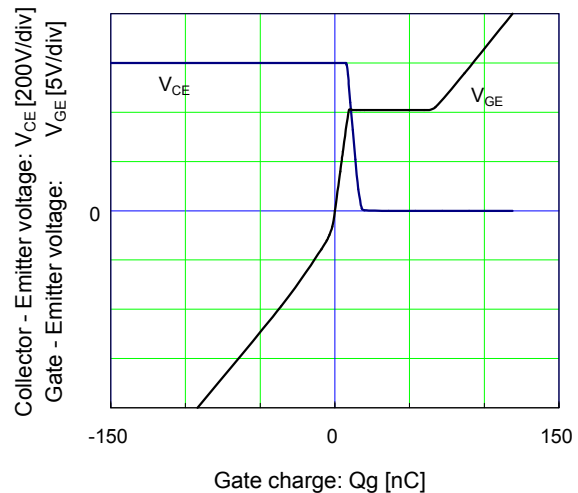
[Brake]

Capacitance vs. Collector-Emittor voltage (typ.)

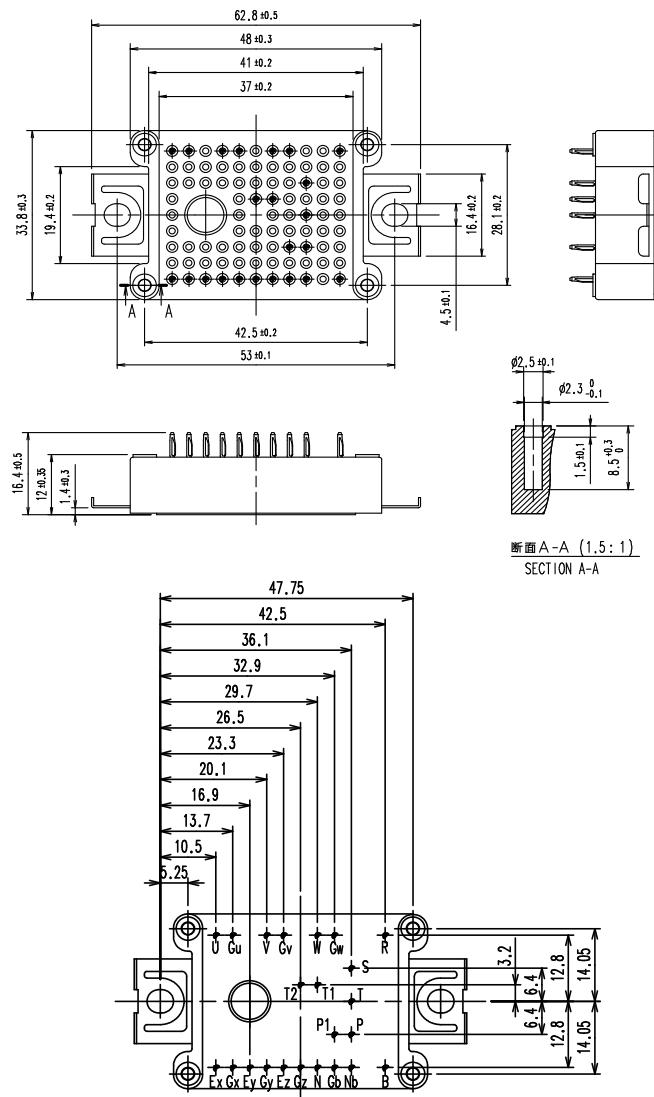
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$ 

[Brake]

Dynamic gate charge (typ.)

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

■ Outline drawing (Unit : mm)

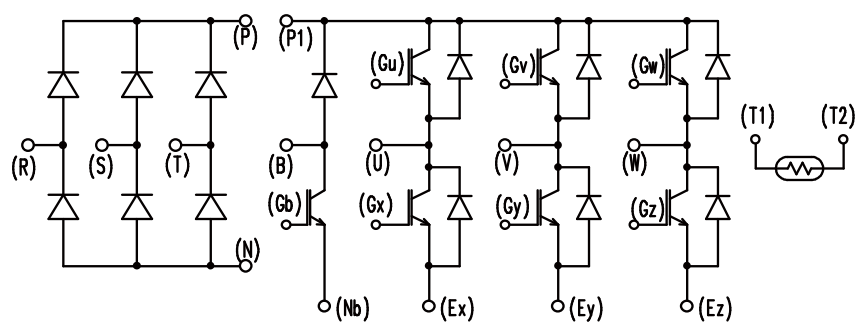


Weight: 25g(typ.)

PIN POSITIONS WITH TOLERANCE $\oplus \phi 0.4$

■ Equivalent circuit

[Converter] [Brake] [Inverter] [Thermistor]



WARNING

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			• 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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