

7MBR50VKD060-50

IGBT Modules

Power Module (V series)
600V / 50A / PIM

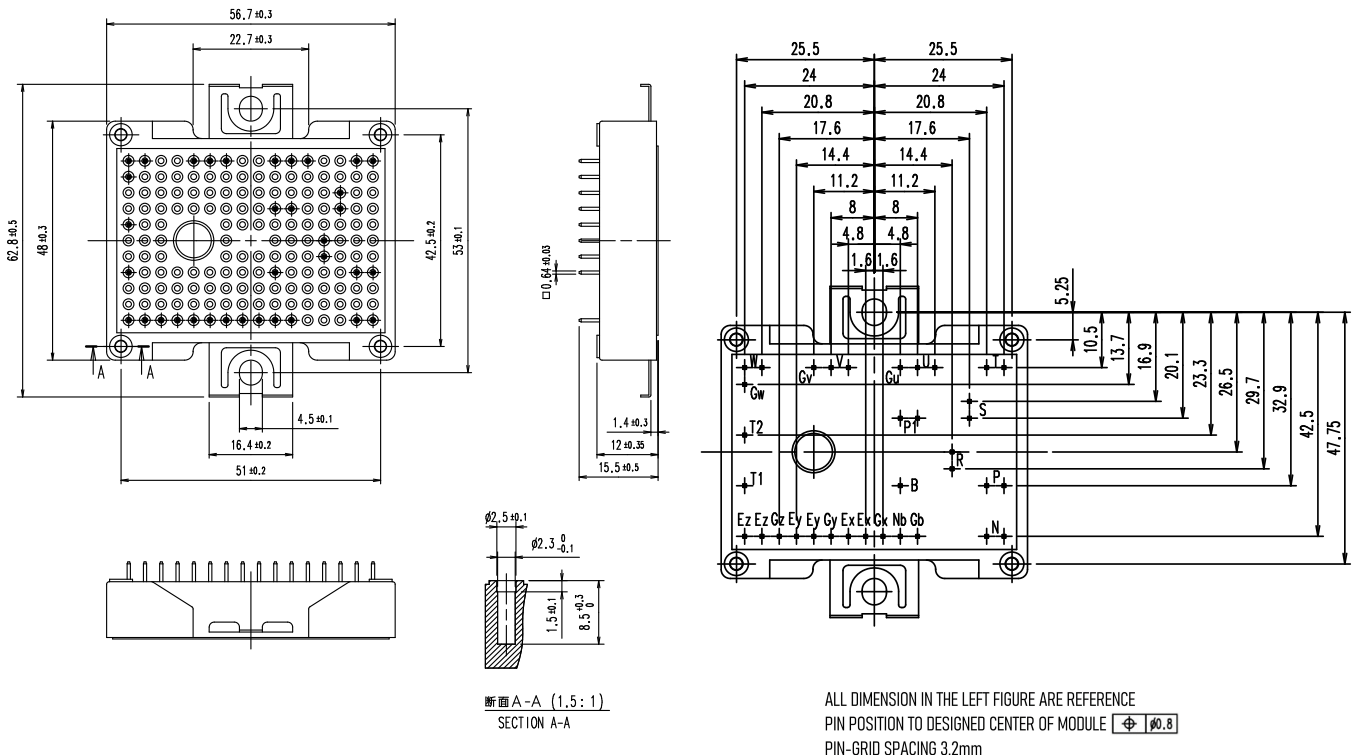
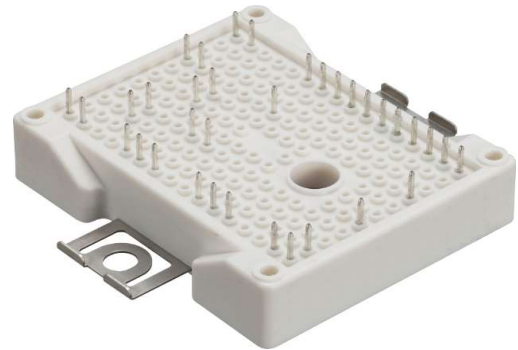
■ Features

- Low $V_{CE(sat)}$
- Compact Package
- P.C.Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit
- RoHS compliant product

■ Applications

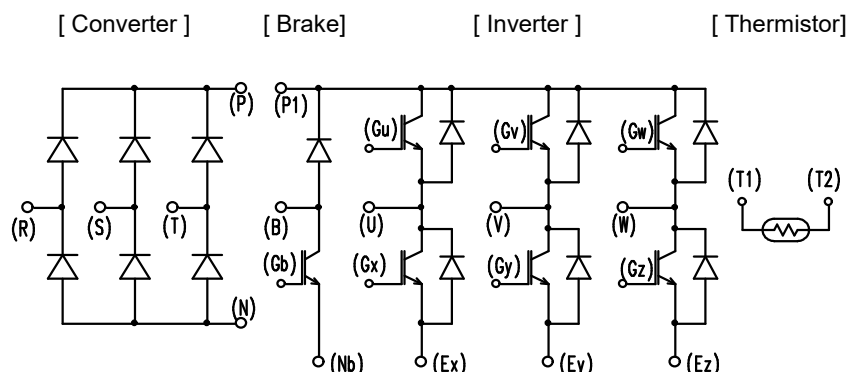
- Inverter for Motor Drives
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

■ Outline drawing (Unit : mm)



Weight: 45g (typ.)

■ Equivalent Circuit



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■ 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	$T_c = 100^\circ\text{C}$	50	A
		I_{CP}	1ms	$T_c = 80^\circ\text{C}$	100	
		$-I_C$			50	
		$-I_C$ pulse	1ms			100
	Collector power dissipation	P_C	1 device		180	W
Brake	Collector-Emitter voltage	V_{CES}			600	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_C	Continuous	$T_c = 80^\circ\text{C}$	50	A
			1ms	$T_c = 80^\circ\text{C}$	100	
	Collector power dissipation	P_C	1 device		180	
	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		50	A
	Surge current (Non-Repetitive)	I_{FSM}	10ms, $T_j = 150^\circ\text{C}$		580	A
	I^2t (Non-Repetitive)	I^2t	half sine wave		1670	A^2s
Junction temperature		T_j	Inverter, Brake		175	$^\circ\text{C}$
			Converter		150	
Operating junction temperature (under switching conditions)		T_{jop}	Inverter, Brake Converter		150	
Case temperature		T_C			125	
Storage temperature		T_{stg}			$-40 \sim +125$	
Isolation voltage	between terminal and copper base (*1) between temperature and others (*2)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*3)	-	M4		1.7	N m

(*1) All terminals should be connected together during the test.

(*2) Two thermister terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

(*3) Recommendable value : 1.3-1.7 Nm (M4)

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■ 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}	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	-	-	1.0	mA
	Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0\text{V}$ $V_{GE} = \pm 20\text{V}$	-	-	200	nA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20\text{V}$ $I_C = 50\text{mA}$	6.2	6.7	7.2	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.85	2.25	V
			$T_j = 125^\circ\text{C}$	-	2.15	-	
			$T_j = 150^\circ\text{C}$	-	2.25	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.60	2.00	
			$T_j = 125^\circ\text{C}$	-	1.90	-	
			$T_j = 150^\circ\text{C}$	-	2.00	-	
	Internal gate resistance	$R_{g(int)}$	-	-	0	-	Ω
	Input capacitance	C_{ies}	$V_{CE} = 10\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	3.0	-	nF
	Turn-on time	t_{on}	$V_{CC} = 300\text{V}$ $I_C = 50\text{A}$	-	0.08	1.20	μs
		t_r	$V_{GE} = \pm 15\text{V}$	-	0.06	0.60	
		$t_{r(l)}$	$R_G = 8.2\ \Omega$	-	0.02	-	
	Turn-off time	t_{off}		-	0.14	1.20	
		t_f		-	0.02	0.45	
	Forward on voltage	V_F (terminal)	$I_F = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.90	2.30	V
			$T_j = 125^\circ\text{C}$	-	1.85	-	
			$T_j = 150^\circ\text{C}$	-	1.80	-	
		V_F (chip)	$I_F = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.65	2.05	
			$T_j = 125^\circ\text{C}$	-	1.60	-	
			$T_j = 150^\circ\text{C}$	-	1.55	-	
	Reverse recovery time	t_{rr}	$I_F = 50\text{A}$	-	-	0.35	μs
Brake	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	-	-	1.0	mA
	Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0\text{V}$ $V_{GE} = \pm 20\text{V}$	-	-	200	nA
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.85	2.25	V
			$T_j = 125^\circ\text{C}$	-	2.15	-	
			$T_j = 150^\circ\text{C}$	-	2.25	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$ $T_j = 25^\circ\text{C}$	-	1.60	2.00	
			$T_j = 125^\circ\text{C}$	-	1.90	-	
			$T_j = 150^\circ\text{C}$	-	2.00	-	
	Internal gate resistance	$R_{g(int)}$	-	-	0	-	Ω
	Turn-on time	t_{on}	$V_{CE} = 300\text{V}$ $I_C = 50\text{A}$	-	0.08	1.20	μs
		t_r	$V_{GE} = +15/-15\text{V}$	-	0.06	0.60	
	Turn-off time	t_{off}	$R_G = 8.2\ \Omega$	-	0.14	1.20	
		t_f		-	0.02	0.45	
	Reverse current	I_{RRM}	$V_R = 600\text{V}$	-	-	1.00	mA
Converter	Forward on voltage	V_{FM}	$I_F = 50\text{A}$ terminal chip	-	1.25 1.00	1.70 -	V
	Reverse current	I_{RRM}	$V_R = 800\text{V}$	-	-	1.00	mA
Thermistor	Resistance	R	$T = 25^\circ\text{C}$ $T = 100^\circ\text{C}$	- 465	5000 495	- 520	Ω
	B value	B	$T = 25/50^\circ\text{C}$	3305	3375	3450	K

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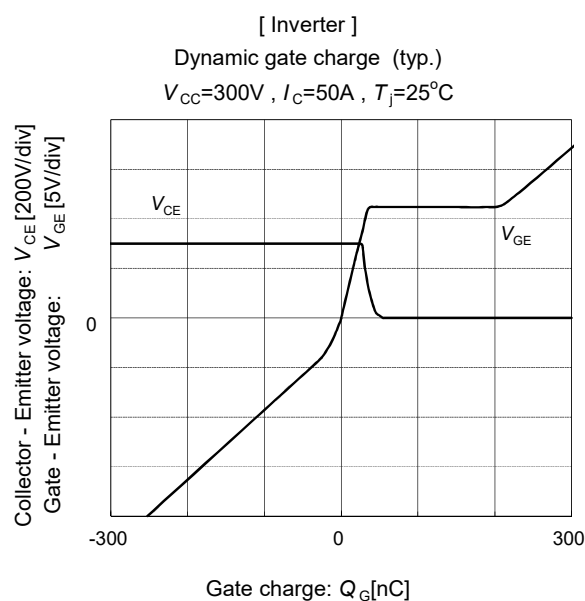
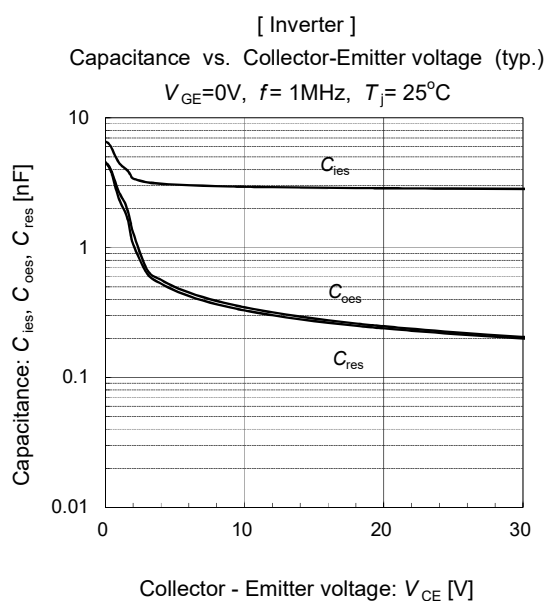
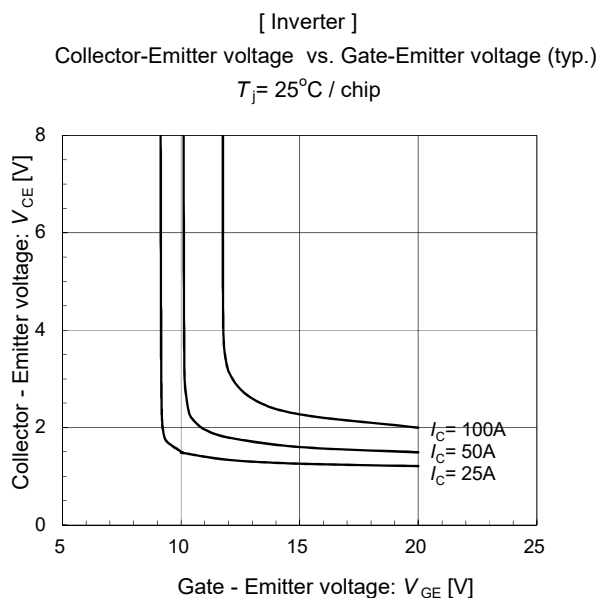
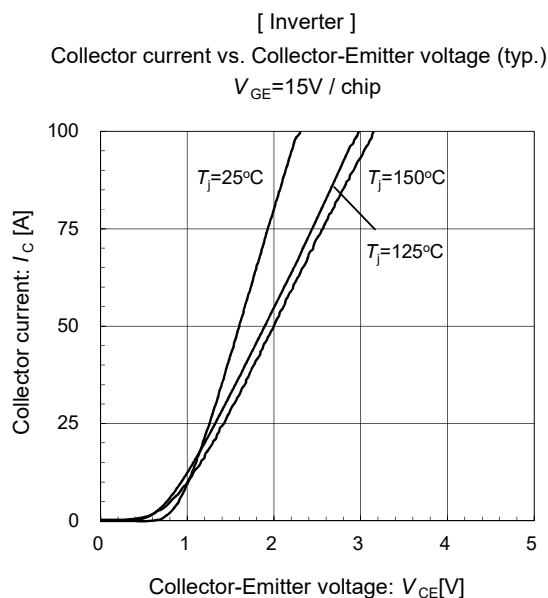
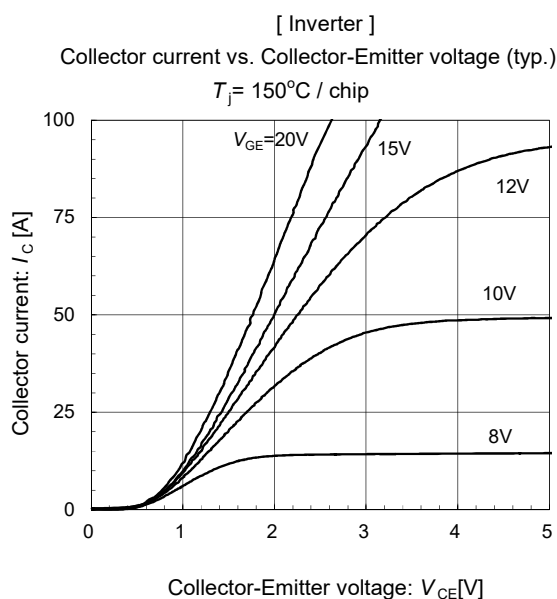
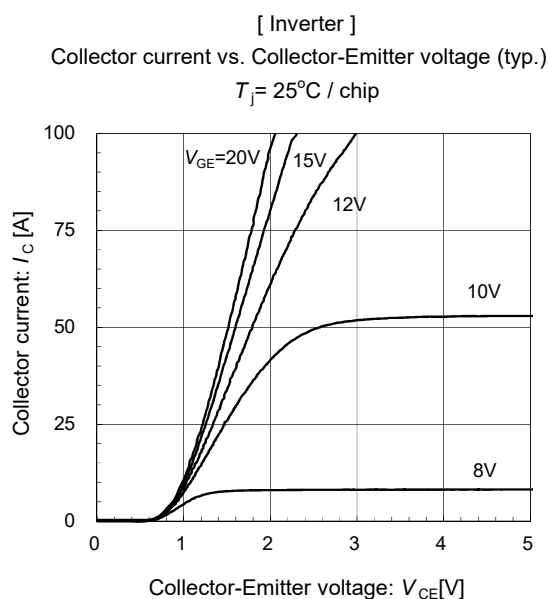
■ Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.84	°C/W
		Inverter FWD	-	-	1.1	
		Brake IGBT	-	-	0.84	
		Converter Diode	-	-	1.15	
Contact thermal resistance(*4) (1device)	$R_{th(c-f)}$	Inverter IGBT	-	0.53	-	
		Inverter FWD	-	0.59	-	
		Brake IGBT	-	0.59	-	
		Converter Diode	-	0.66	-	

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

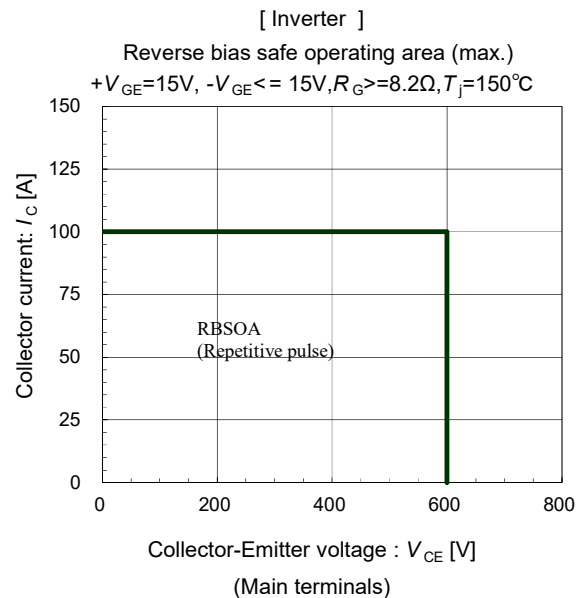
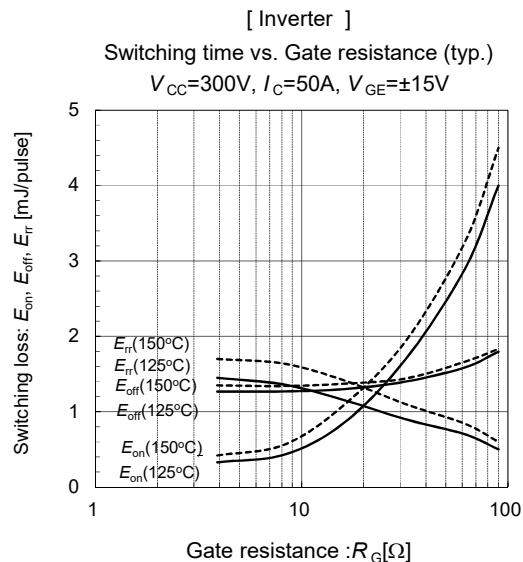
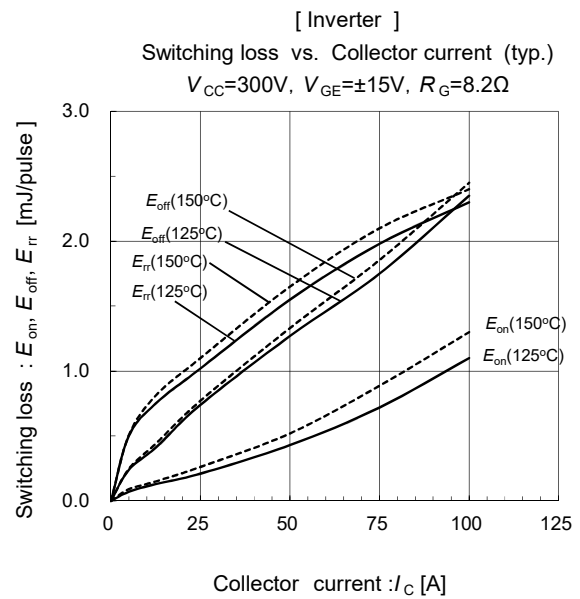
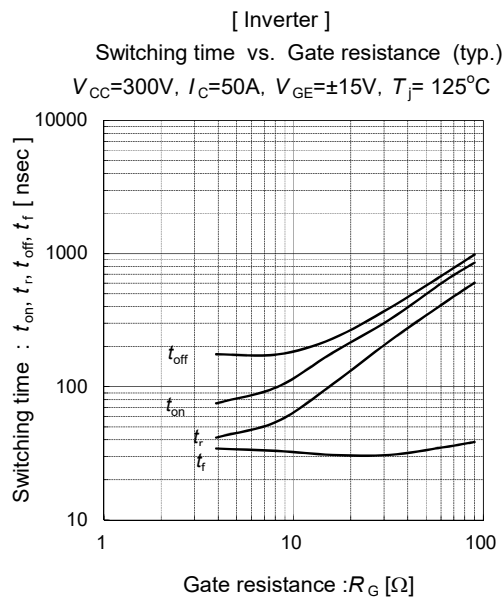
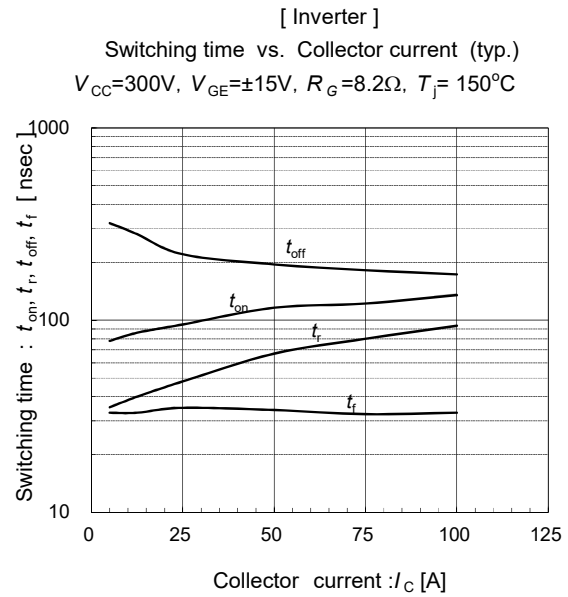
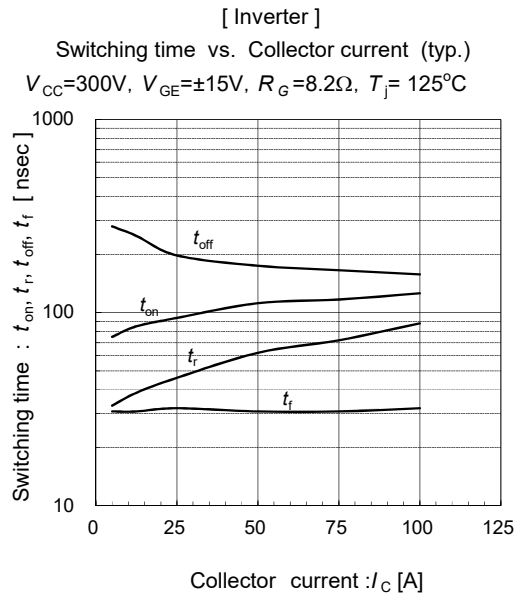
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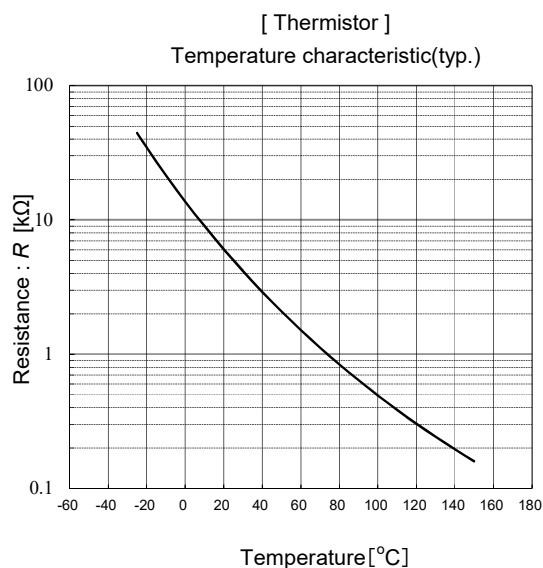
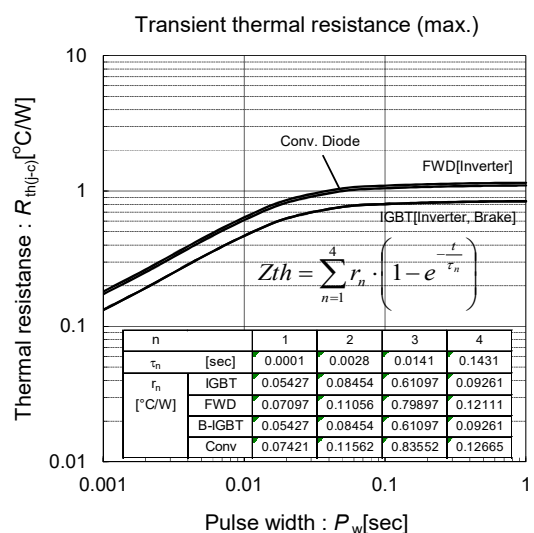
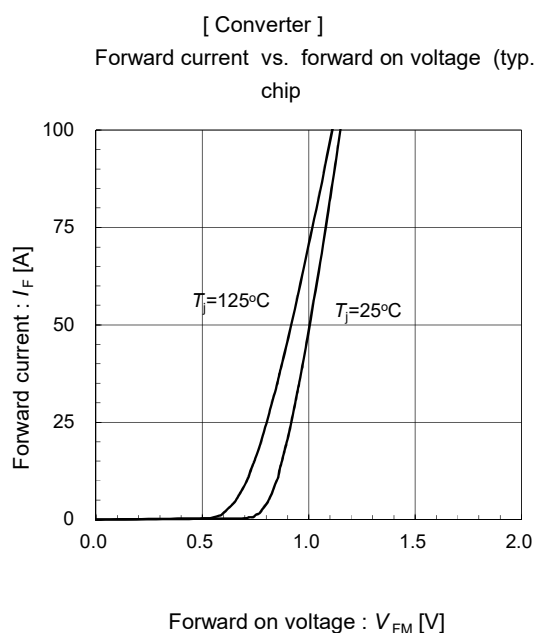
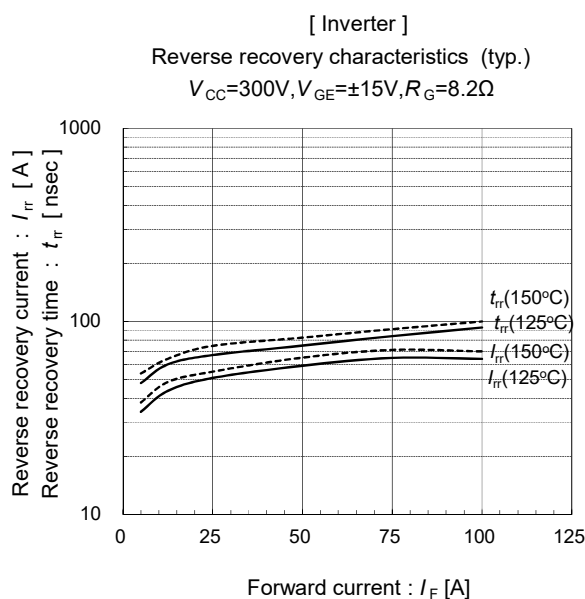
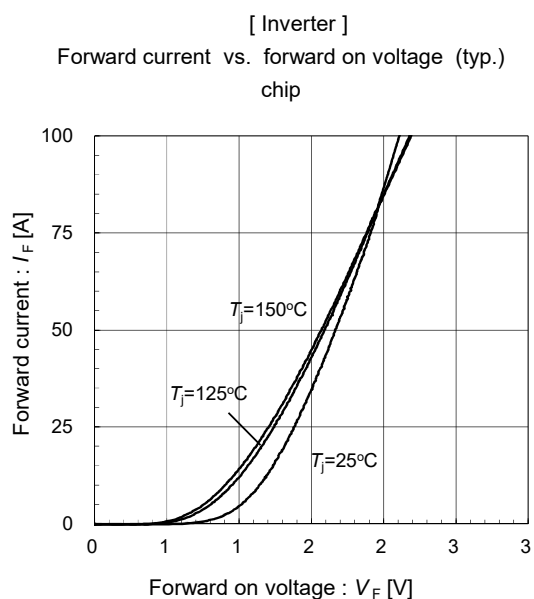
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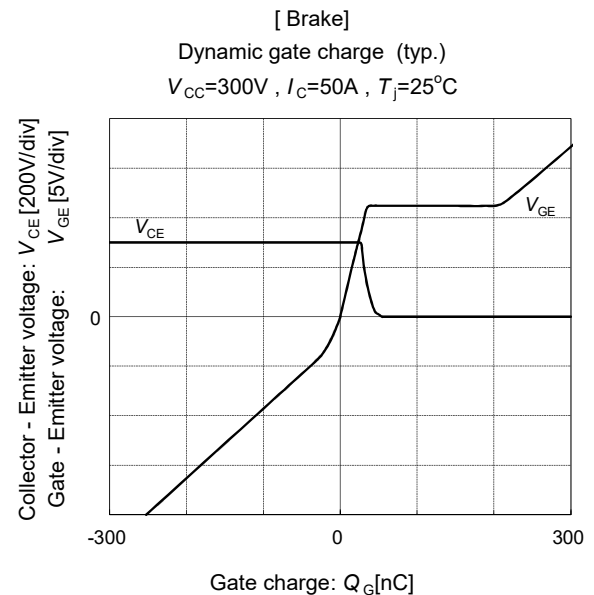
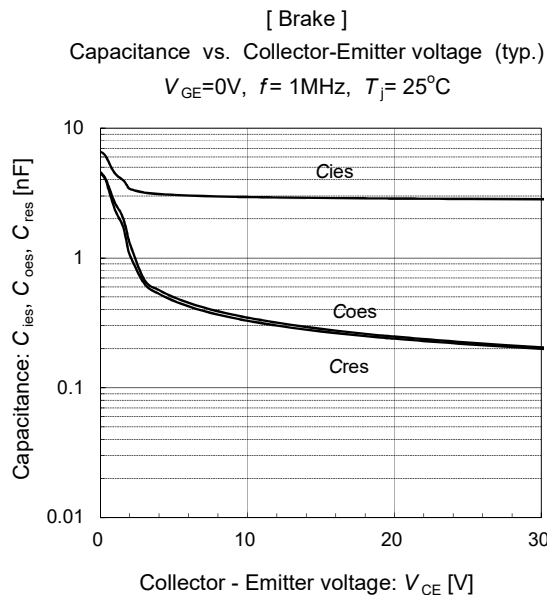
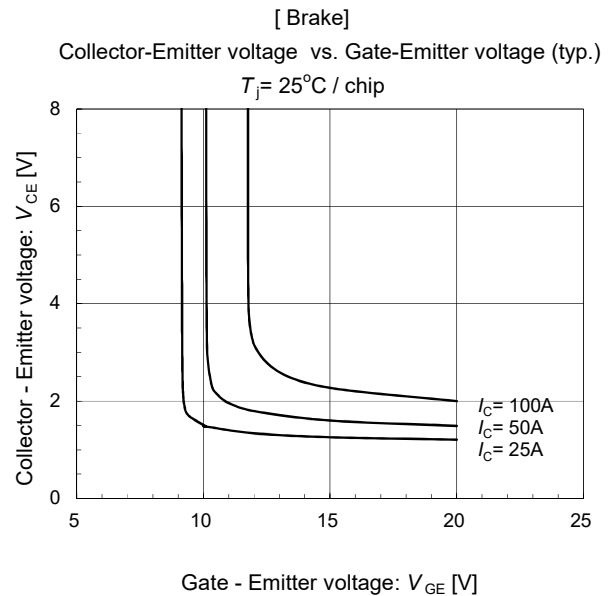
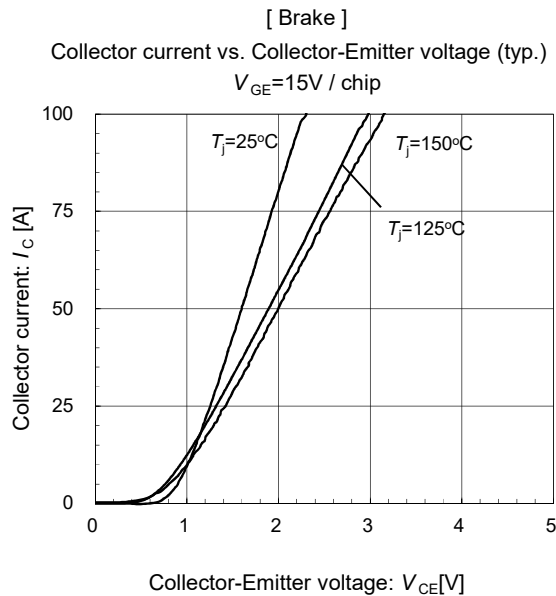
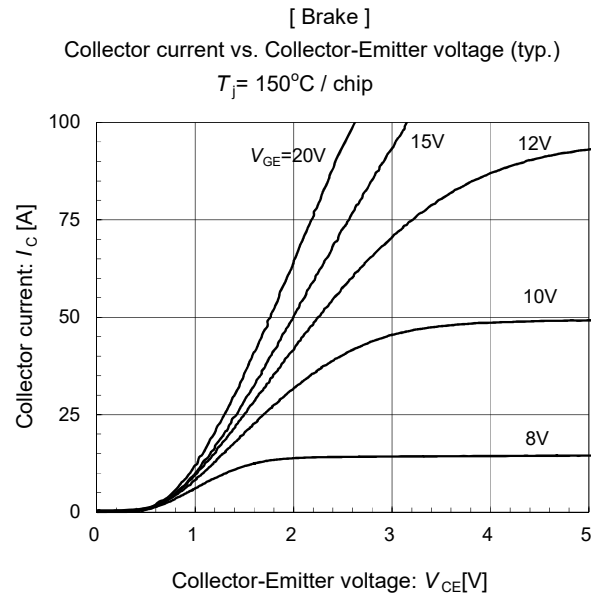
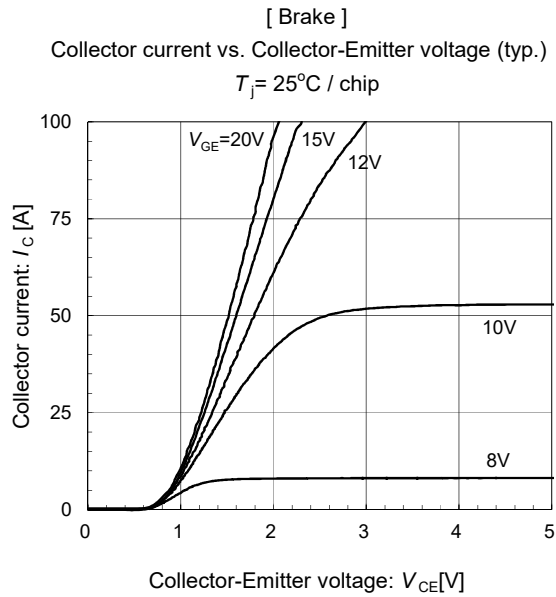
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