

# 7MBR50VKD060-50

IGBT Modules

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

■ **Features**

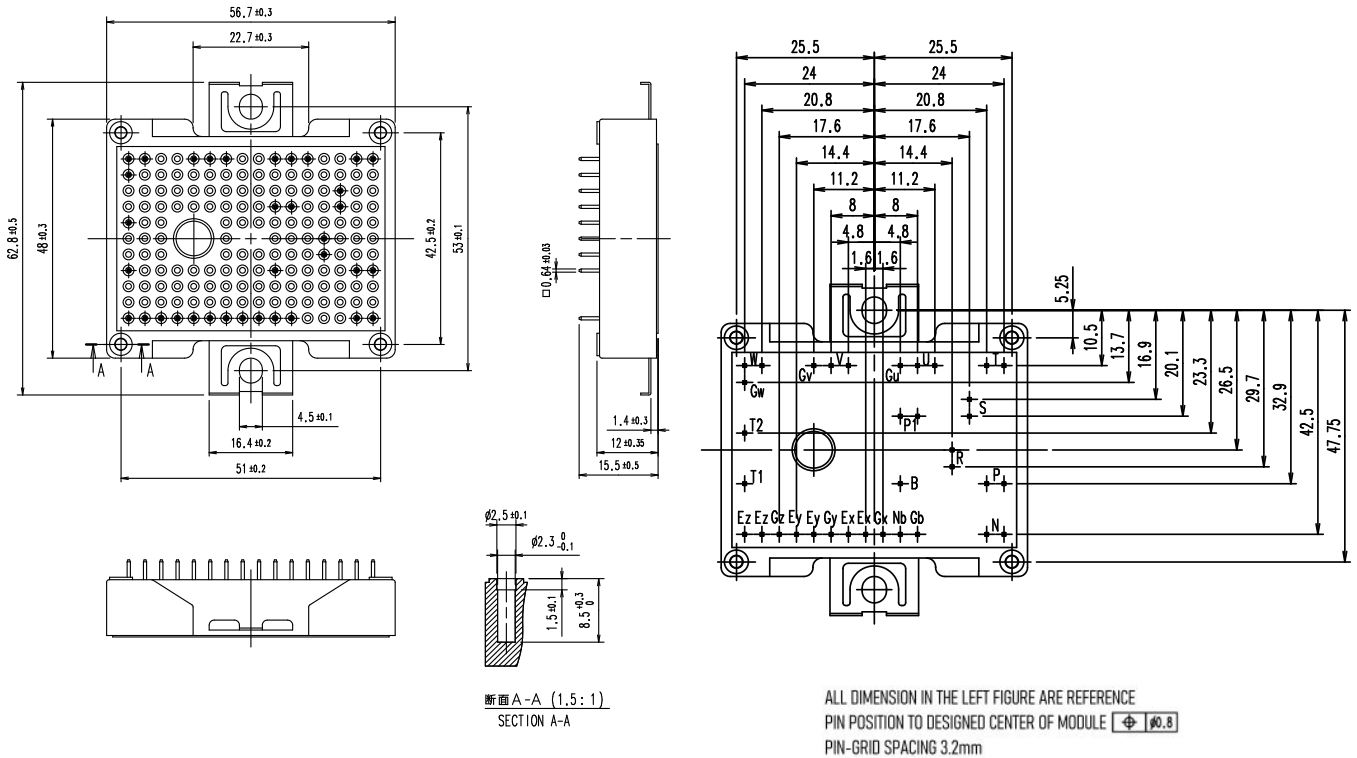
- LOW  $V_{CE(sat)}$
- Compact Package
- P.C.Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit
- RoHS compliant product

■ **Applications**

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

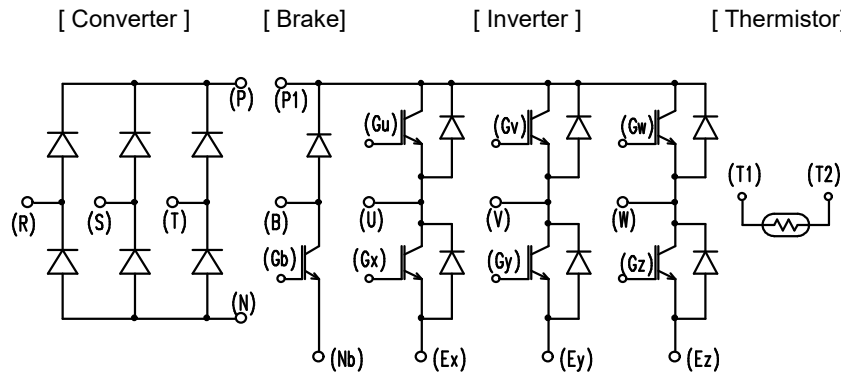


■ **Outline drawing ( Unit : mm )**



Weight: 45g (typ.)

■ **Equivalent Circuit**



# 7MBR50VKD060-50

**IGBT Modules**
**■ 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	$V_{GES}$			$\pm 20$	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	$V_{GES}$			$\pm 20$	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	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		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	$\text{A}^2\text{s}$
Junction temperature		$T_j$	Inverter, Brake		175	$^{\circ}\text{C}$
			Converter		150	
Operating junction temperature (under switching conditions)		$T_{jop}$	Inverter, Brake		150	
			Converter			
Case temperature		$T_C$			125	
Storage temperature		$T_{stg}$			-40~+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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**IGBT Modules**
**■ 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	$I_{CES}$	$V_{GE} = 0V$ $V_{CE} = 600V$	-	-	1.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V$ $V_{GE} = \pm 20V$	-	-	200	nA	
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 50mA$	6.2	6.7	7.2	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$	-	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)	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$	-	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	-	$\Omega$	
	Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	3.0	-	nF	
	Turn-on time	$t_{on}$	$V_{CC} = 300V$ $I_C = 50A$	$t_r$	-	0.08	1.20	$\mu s$
				$t_{r(l)}$	-	0.06	0.60	
				$t_{off}$	-	0.02	-	
	Turn-off time	$t_{off}$	$R_G = 8.2 \Omega$	$t_f$	-	0.14	1.20	
$t_f$				-	0.02	0.45		
Forward on voltage	$V_F$ (terminal)	$I_F = 50A$	$T_j = 25^\circ\text{C}$	-	1.90	2.30	V	
			$T_j = 125^\circ\text{C}$	-	1.85	-		
			$T_j = 150^\circ\text{C}$	-	1.80	-		
	$V_F$ (chip)	$I_F = 50A$	$T_j = 25^\circ\text{C}$	-	1.65	2.05		
			$T_j = 125^\circ\text{C}$	-	1.60	-		
			$T_j = 150^\circ\text{C}$	-	1.55	-		
Reverse recovery time	$t_{rr}$	$I_F = 50A$	-	-	0.35	$\mu s$		
Brake	Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V$ $V_{CE} = 600V$	-	-	1.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V$ $V_{GE} = \pm 20V$	-	-	200	nA	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$	-	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)	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$	-	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	-	$\Omega$	
	Turn-on time	$t_{on}$	$V_{CE} = 300V$ $I_C = 50A$	$t_r$	-	0.08	1.20	$\mu s$
				$t_{off}$	-	0.06	0.60	
	Turn-off time	$t_{off}$	$V_{GE} = +15/-15V$ $R_G = 8.2 \Omega$	$t_f$	-	0.14	1.20	
				$t_f$	-	0.02	0.45	
	Reverse current	$I_{RRM}$	$V_R = 600V$	-	-	1.00	mA	
	Forward on voltage	$V_{FM}$	$I_F = 50A$	terminal	-	1.25	1.70	V
chip				-	1.00	-		
Reverse current	$I_{RRM}$	$V_R = 800V$	-	-	1.00	mA		
Thermistor	Resistance	$R$	$T = 25^\circ\text{C}$	-	5000	-	$\Omega$	
			$T = 100^\circ\text{C}$	465	495	520		
B value	$B$	$T = 25/50^\circ\text{C}$	3305	3375	3450	K		

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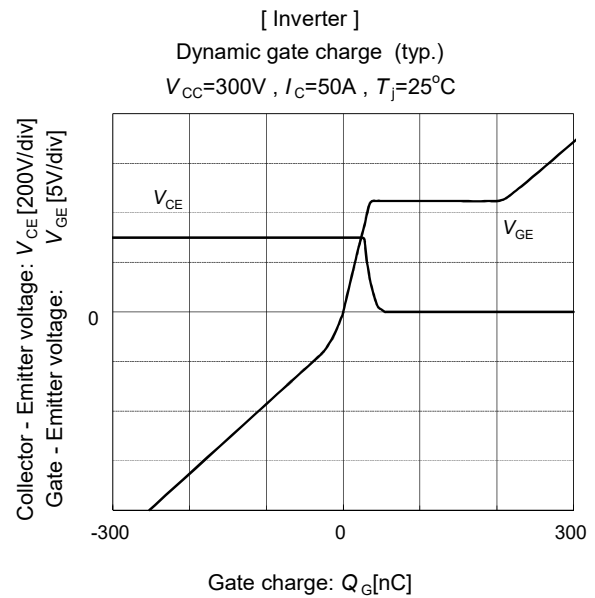
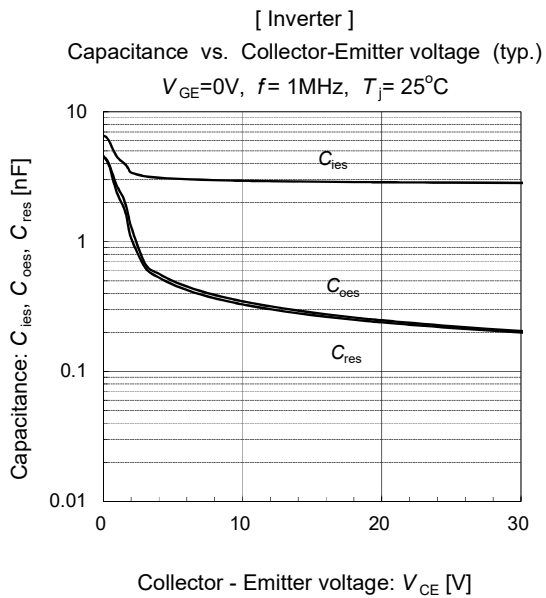
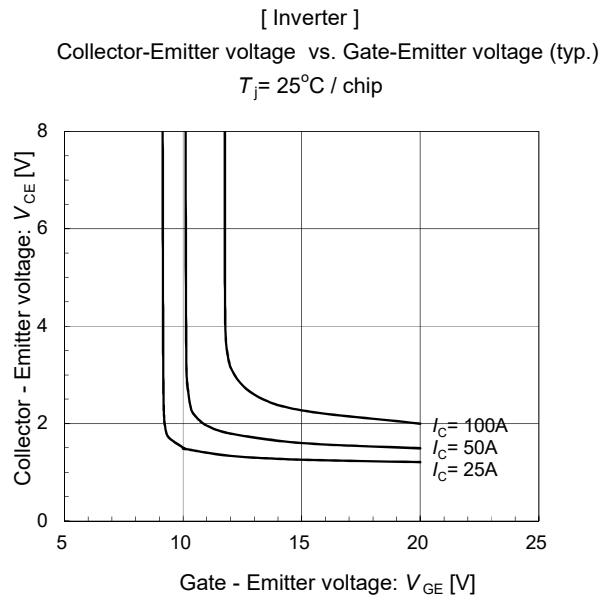
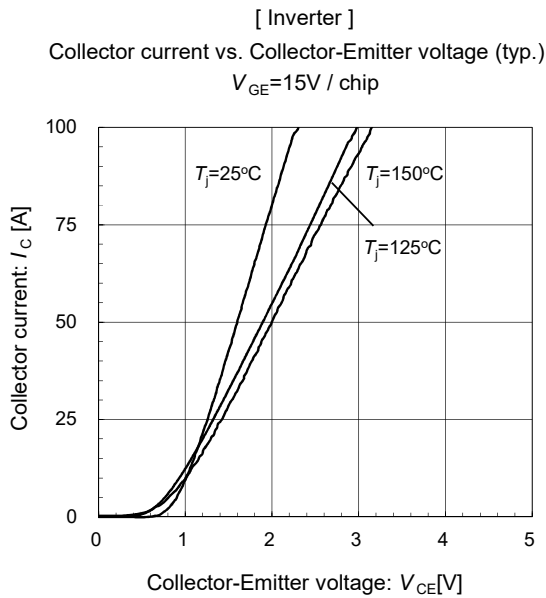
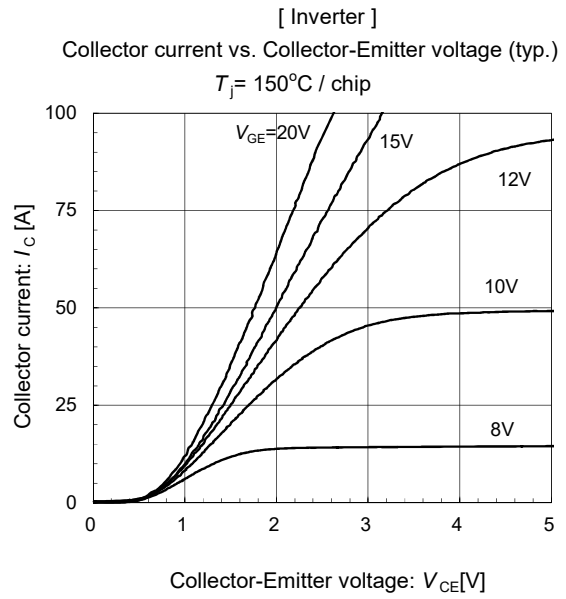
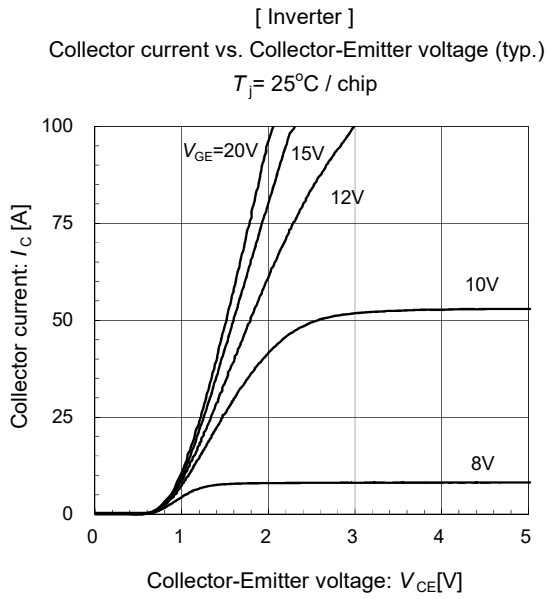
**IGBT Modules**
**■ Thermal resistance characteristics**

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.

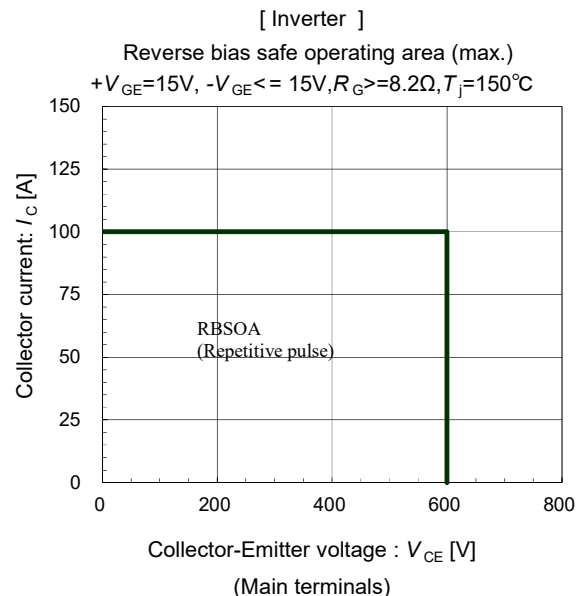
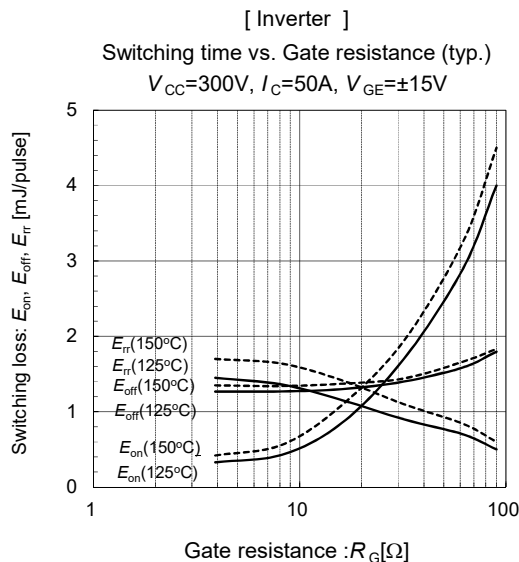
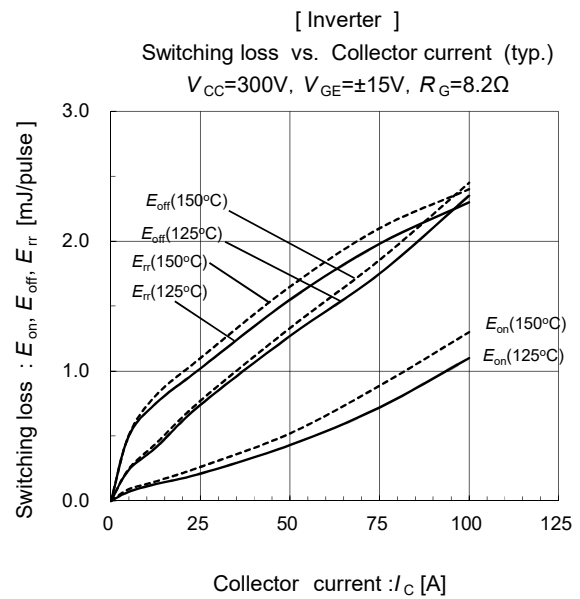
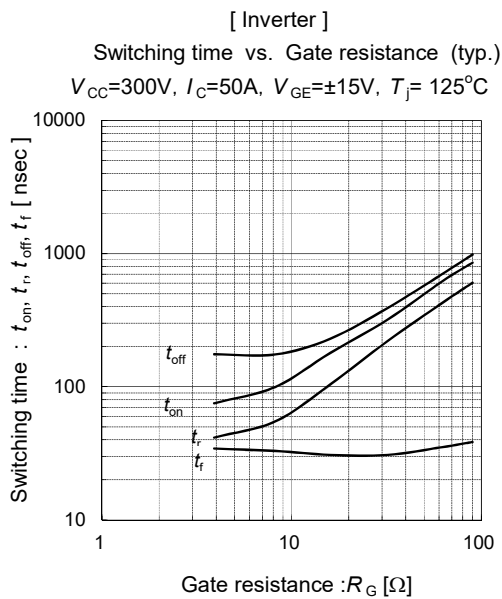
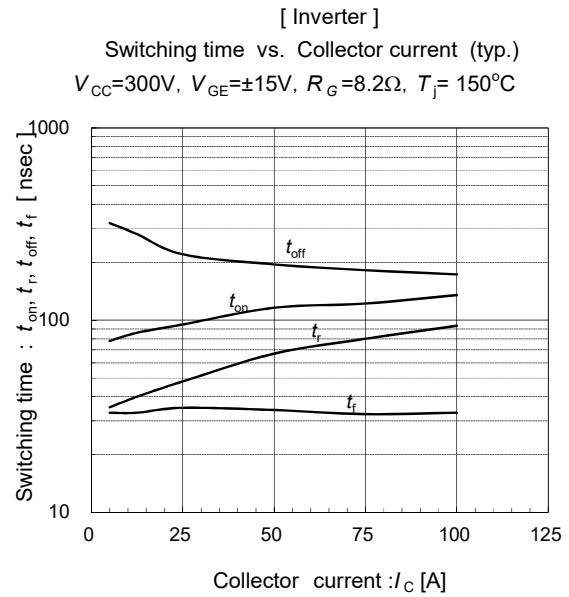
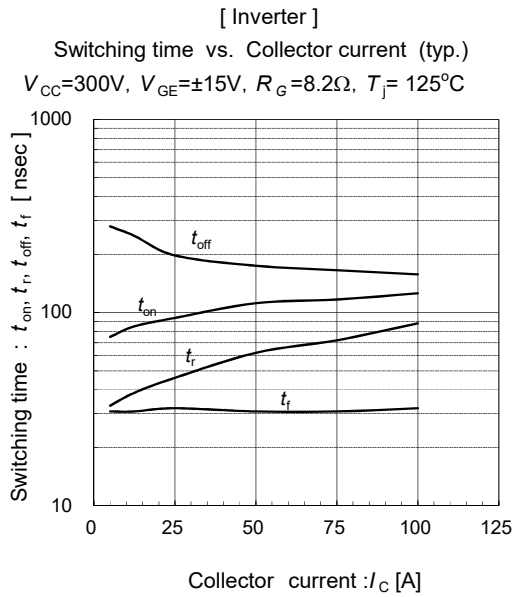
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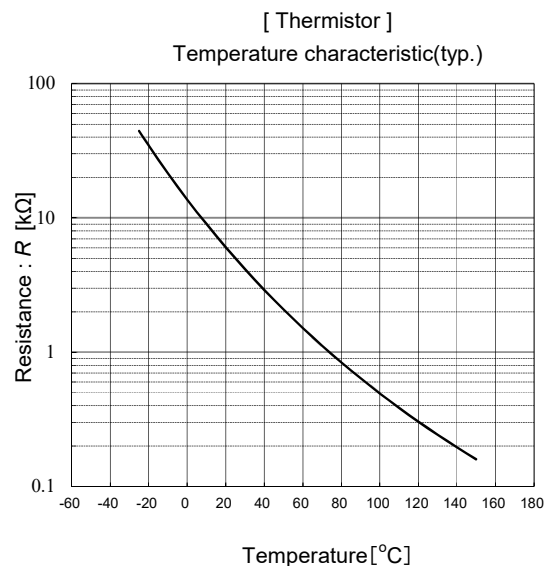
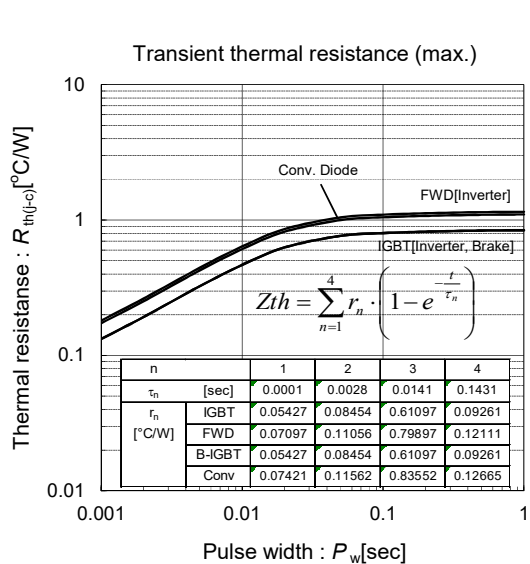
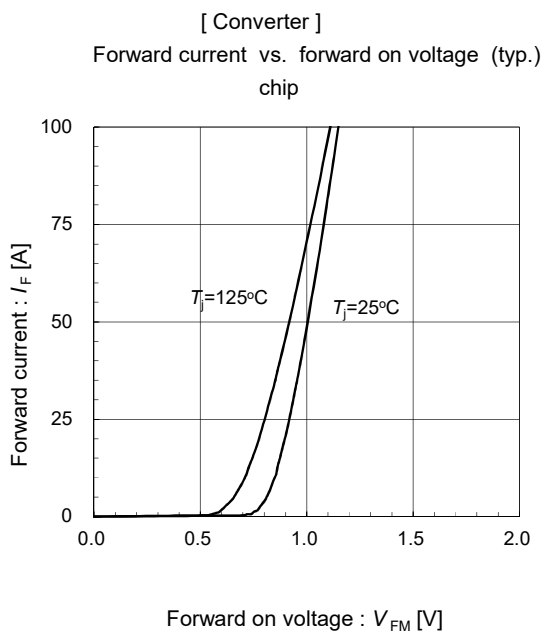
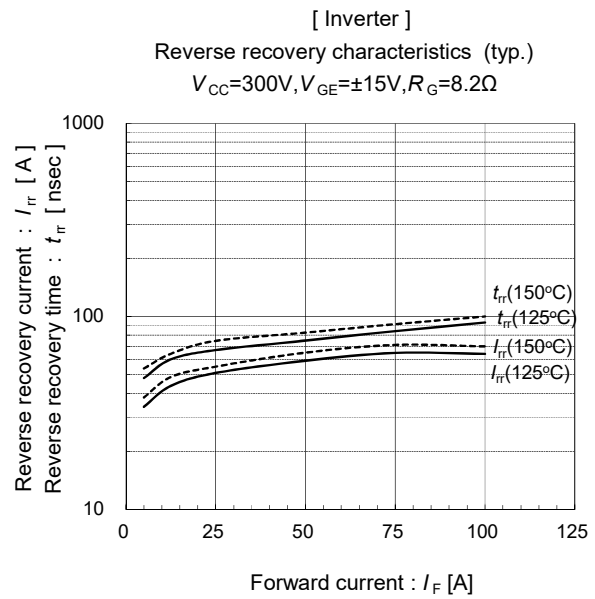
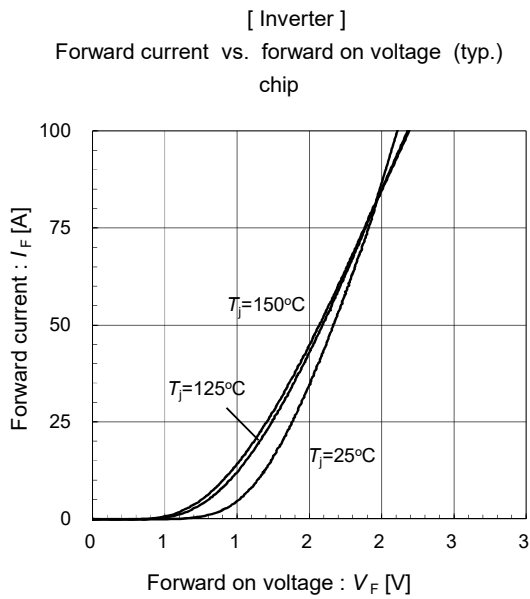
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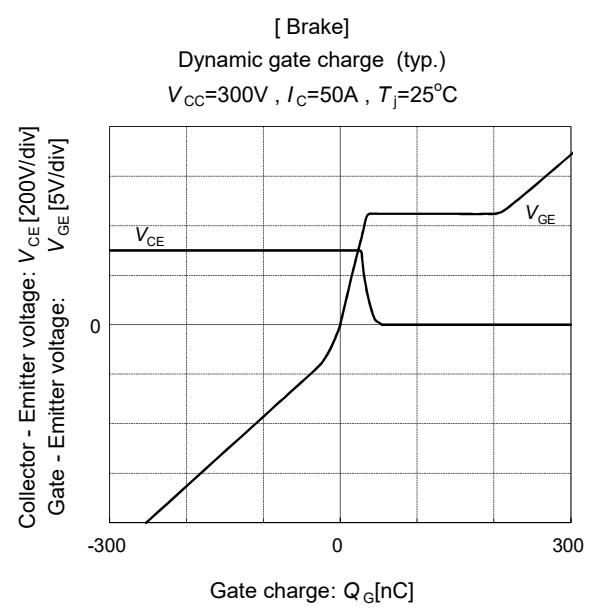
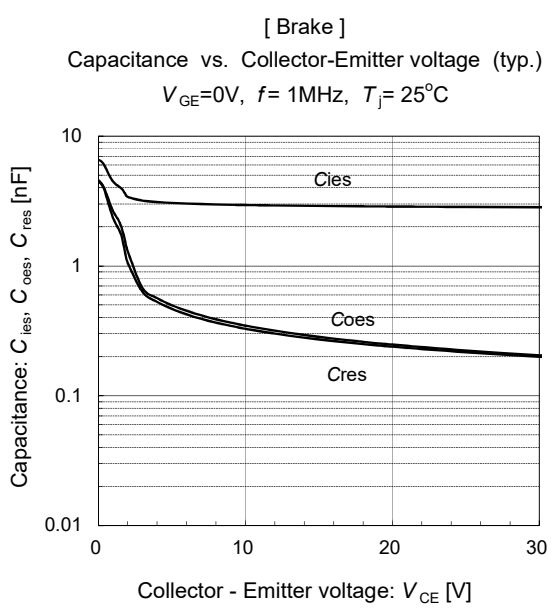
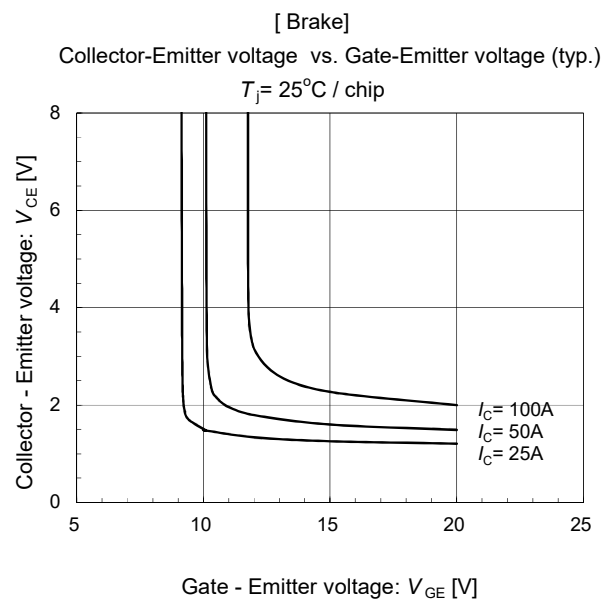
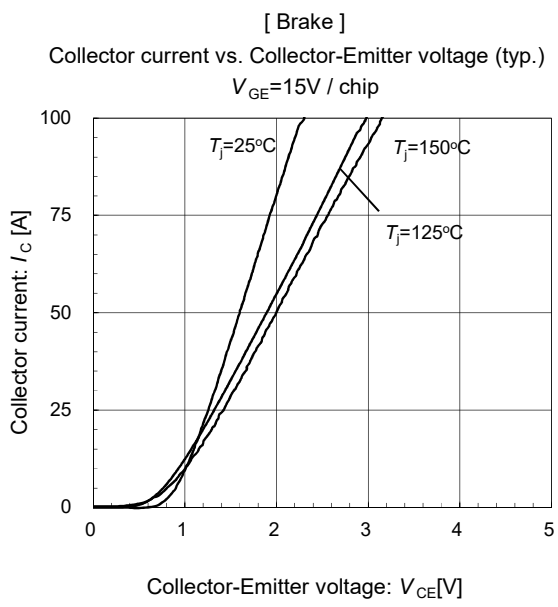
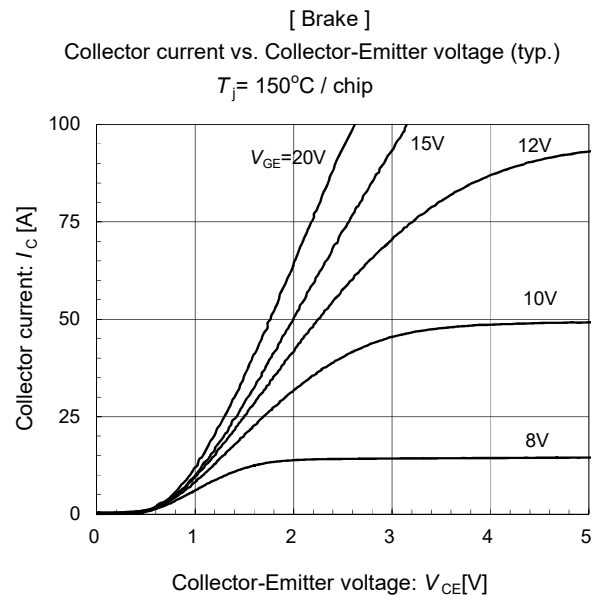
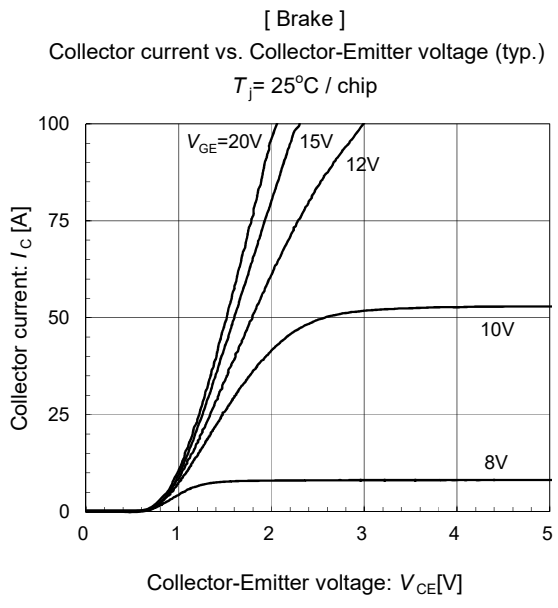
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