

7MBR20VKA060-50

IGBT Modules

Power Module (V series)
600V / 20A / PIM

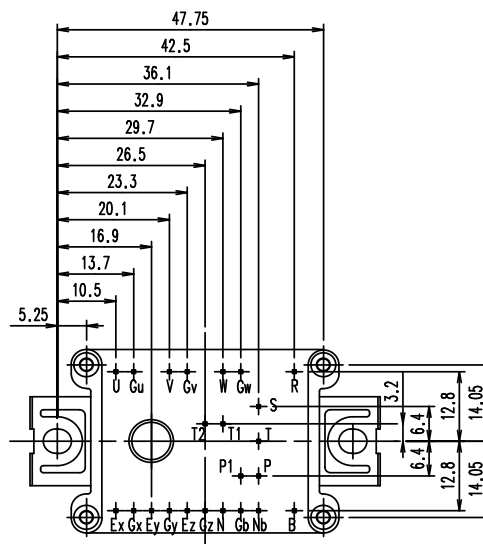
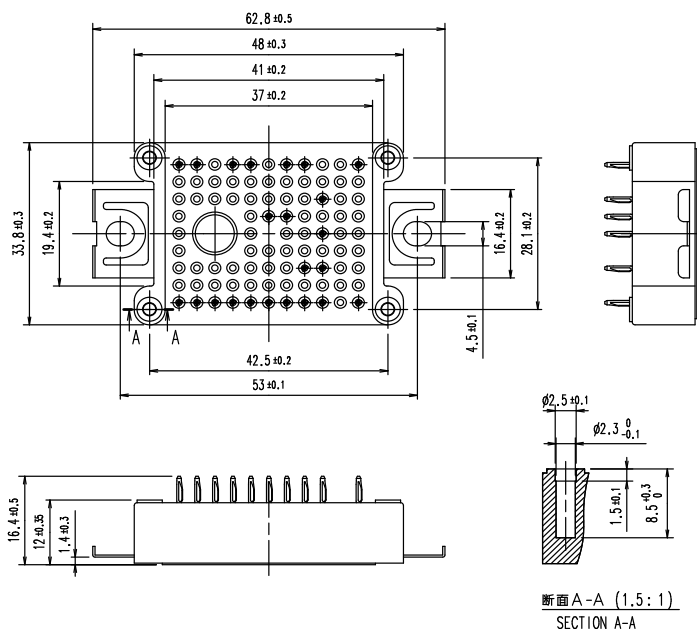
■ **Features**

- 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

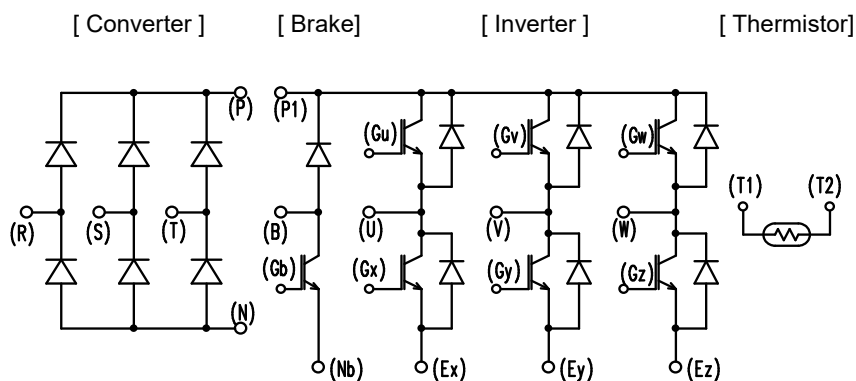
■ **Outline drawing (Unit : mm)**



ALL DIMENSION IN THE LEFT FIGURE ARE REFERENCE
 PIN POSITION TO DESIGNED CENTER OF MODULE $\phi \pm 0.7$
 PIN-BRID SPACING 3.2mm

Weight: 25g (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	$T_C=100^{\circ}\text{C}$	20	A
		I_{CP}	1ms	$T_C=80^{\circ}\text{C}$	40	
		$-I_C$			20	
$-I_C$ pulse	1ms			40		
Collector power dissipation	P_C	1 device		100	W	
Brake	Collector-Emitter voltage	V_{CES}			600	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_C	Continuous	$T_C=80^{\circ}\text{C}$	20	A
			1ms	$T_C=80^{\circ}\text{C}$	40	
	Collector power dissipation	P_C	1 device		100	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		20	A
	Surge current (Non-Repetitive)	I_{FSM}	10ms, $T_j=150^{\circ}\text{C}$		360	A
	I^2t (Non-Repetitive)	I^2t	half sine wave		660	A^2s
Junction temperature		T_j	Inverter, Brake		175	°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~+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	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 20mA$	6.2	6.7	7.2	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 20A$	$T_j = 25^\circ\text{C}$	-	1.95	2.35	V
				$T_j = 125^\circ\text{C}$	-	2.30	-	
				$T_j = 150^\circ\text{C}$	-	2.40	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_C = 20A$	$T_j = 25^\circ\text{C}$	-	1.70	2.10	
				$T_j = 125^\circ\text{C}$	-	2.05	-	
				$T_j = 150^\circ\text{C}$	-	2.15	-	
	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}	$V_{CC} = 300V$ $I_C = 20A$	t_r	-	0.08	1.20	μs
				$t_{r(l)}$	-	0.06	0.60	
				t_{off}	-	0.02	-	
Turn-off time	t_{off}	$R_G = 18 \Omega$	t_f	-	0.14	1.20		
			t_f	-	0.02	0.45		
Forward on voltage	V_F (terminal)	$I_F = 20A$	$T_j = 25^\circ\text{C}$	-	2.00	2.40	V	
			$T_j = 125^\circ\text{C}$	-	1.95	-		
			$T_j = 150^\circ\text{C}$	-	1.95	-		
	V_F (chip)	$I_F = 20A$	$T_j = 25^\circ\text{C}$	-	1.75	2.15		
			$T_j = 125^\circ\text{C}$	-	1.70	-		
			$T_j = 150^\circ\text{C}$	-	1.70	-		
Reverse recovery time	t_{rr}	$I_F = 20A$	-	-	0.35	μs		
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)	$V_{GE} = 15V$ $I_C = 20A$	$T_j = 25^\circ\text{C}$	-	1.95	2.35	V
				$T_j = 125^\circ\text{C}$	-	2.30	-	
				$T_j = 150^\circ\text{C}$	-	2.40	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_C = 20A$	$T_j = 25^\circ\text{C}$	-	1.70	2.10	
				$T_j = 125^\circ\text{C}$	-	2.05	-	
				$T_j = 150^\circ\text{C}$	-	2.15	-	
	Internal gate resistance	$R_{g(int)}$	-	-	0	-	Ω	
	Turn-on time	t_{on}	$V_{CE} = 300V$ $I_C = 20A$	t_r	-	0.08	1.20	μs
				t_{off}	-	0.06	0.60	
	Turn-off time	t_{off}	$V_{GE} = +15/-15V$ $R_G = 18 \Omega$	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}	$I_F = 20A$	terminal	-	1.30	1.75	V	
			chip	-	1.05	-		
Reverse current	I_{RRM}	$V_R = 800V$	-	-	1.0	mA		
Thermistor	Resistance	R	$T = 25^\circ\text{C}$	-	5000	-	Ω	
			$T = 100^\circ\text{C}$	465	495	520		
B value	B	$T = 25/50^\circ\text{C}$	3305	3375	3450	K		

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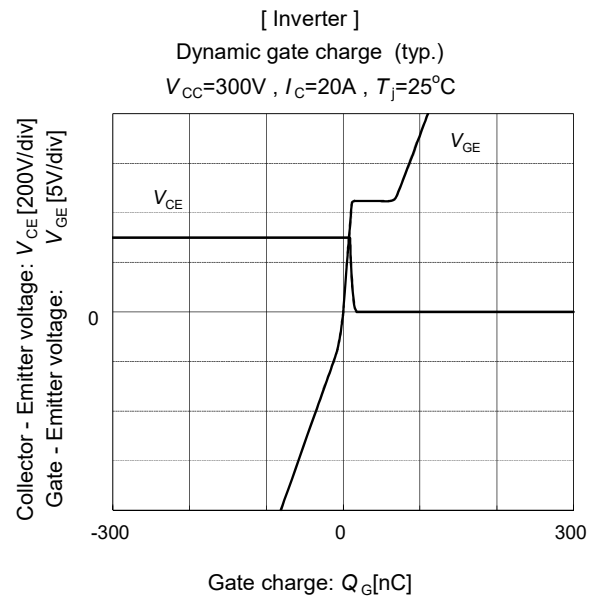
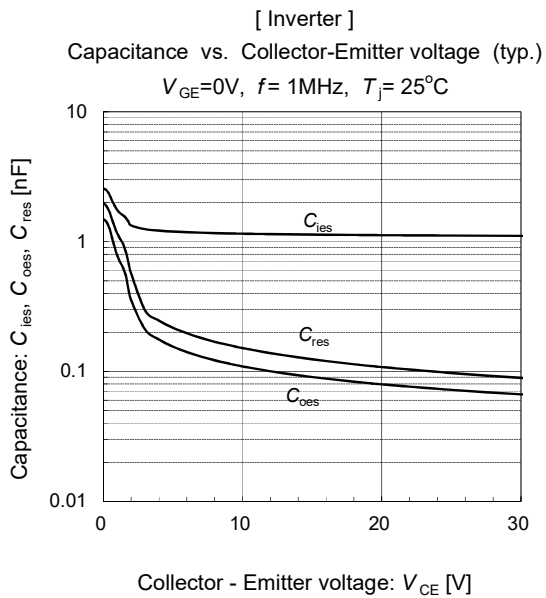
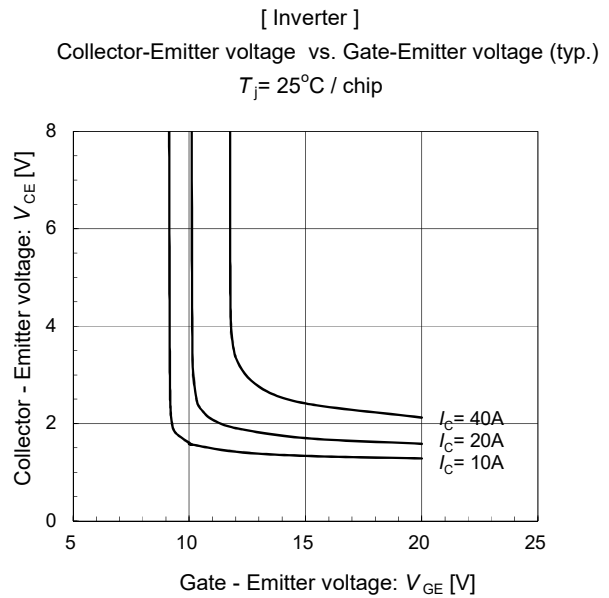
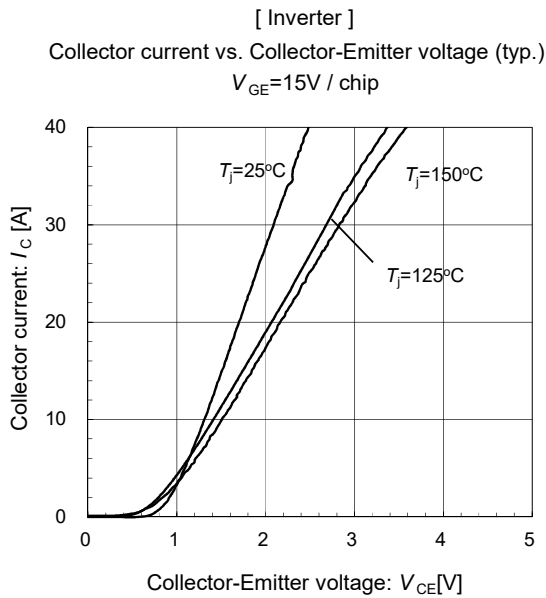
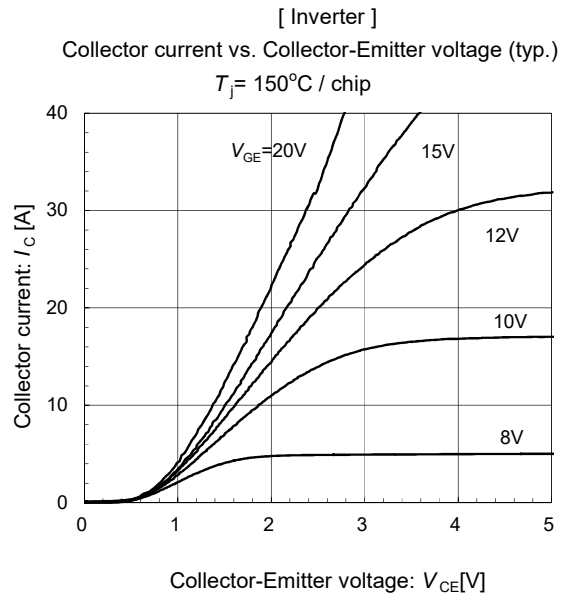
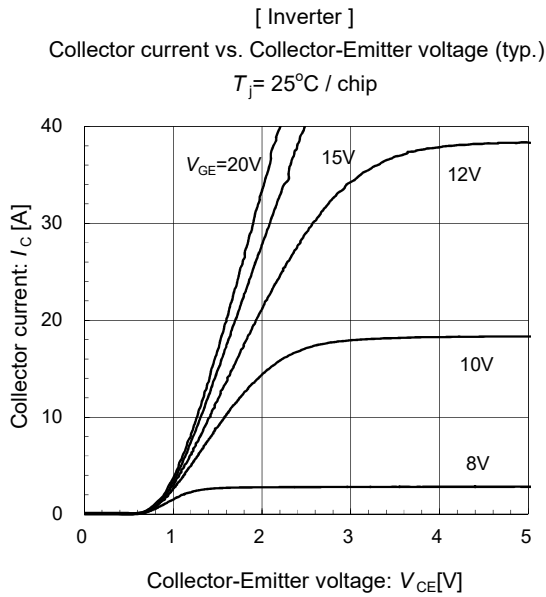
■ Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	1.56	°C/W
		Inverter FWD	-	-	1.97	
		Brake IGBT	-	-	1.56	
		Converter Diode	-	-	1.35	
Contact thermal resistance(*4) (1device)	$R_{th(c-f)}$	Inverter IGBT	-	0.75	-	
		Inverter FWD	-	0.88	-	
		Brake IGBT	-	0.79	-	
		Converter Diode	-	0.77	-	

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

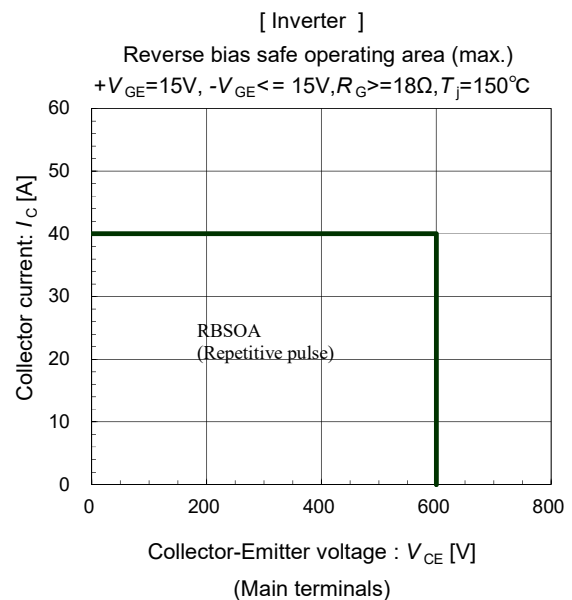
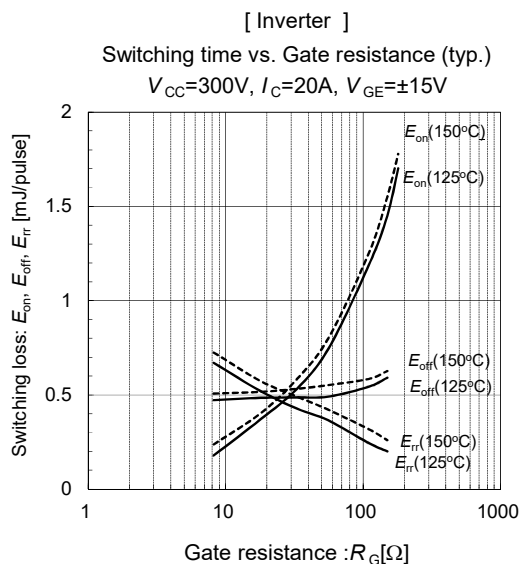
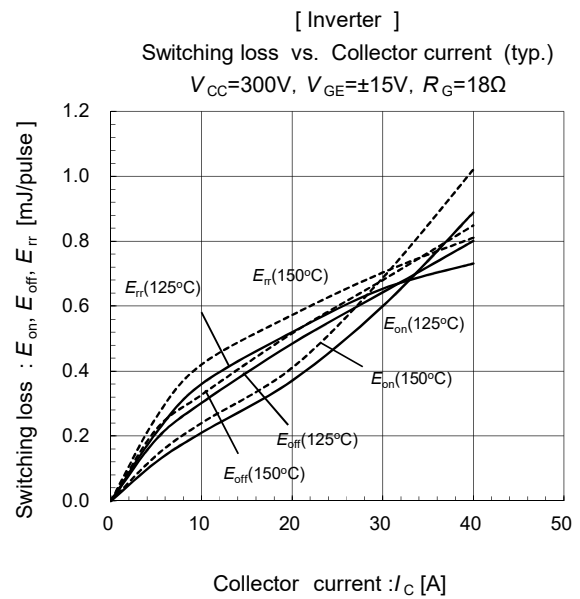
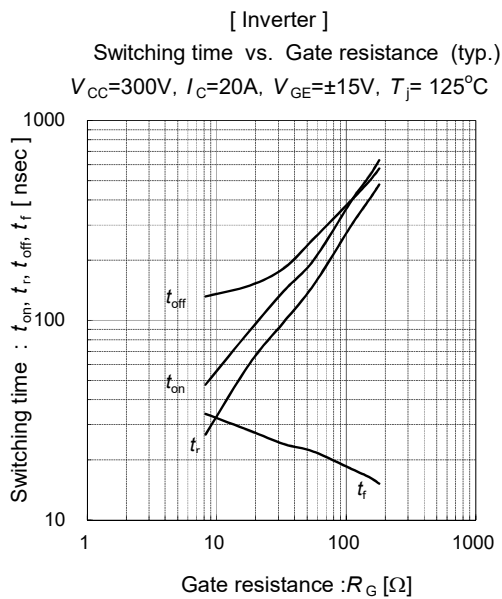
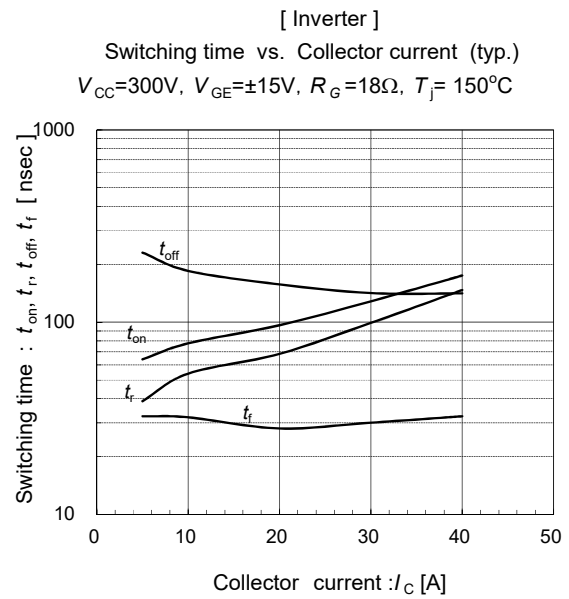
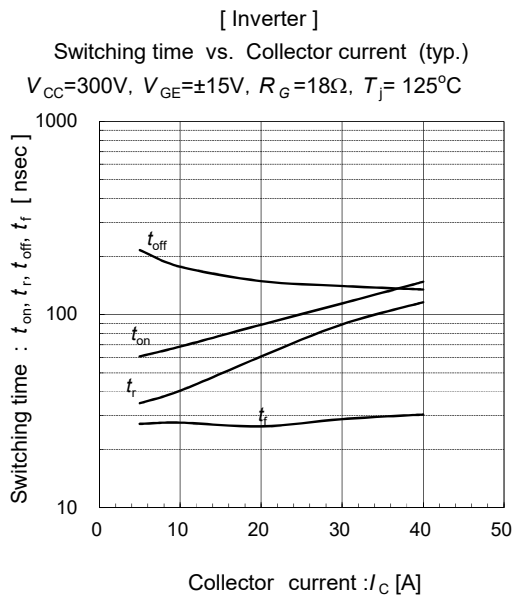
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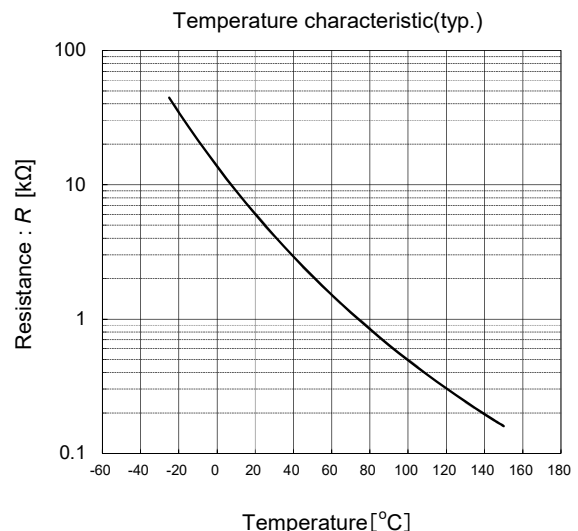
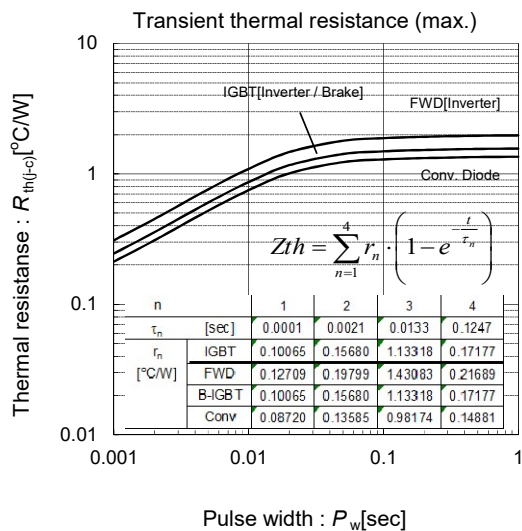
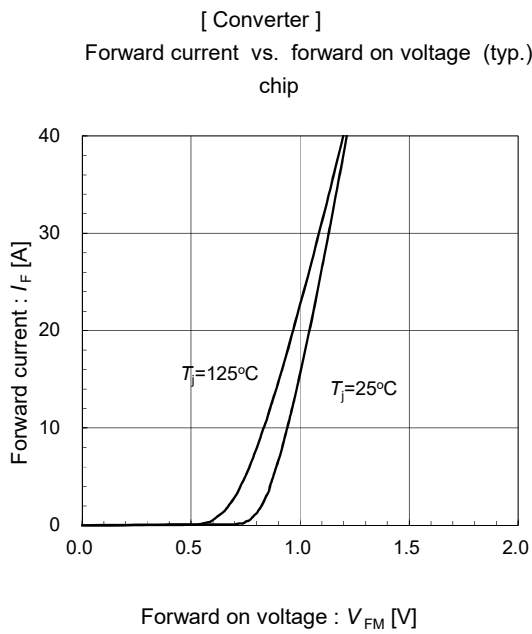
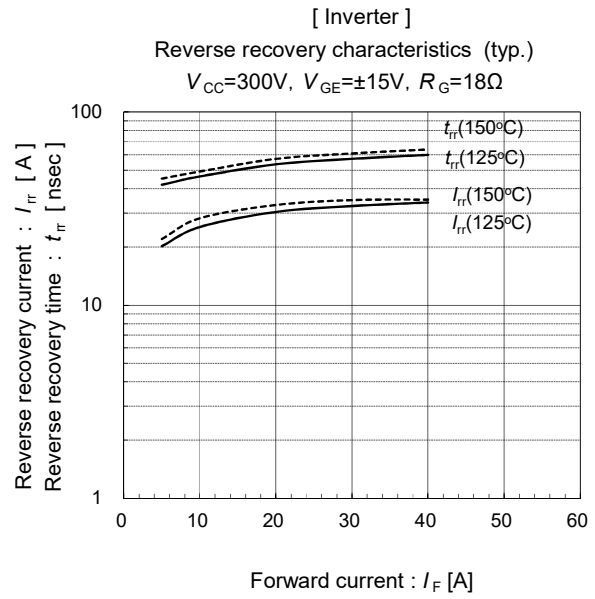
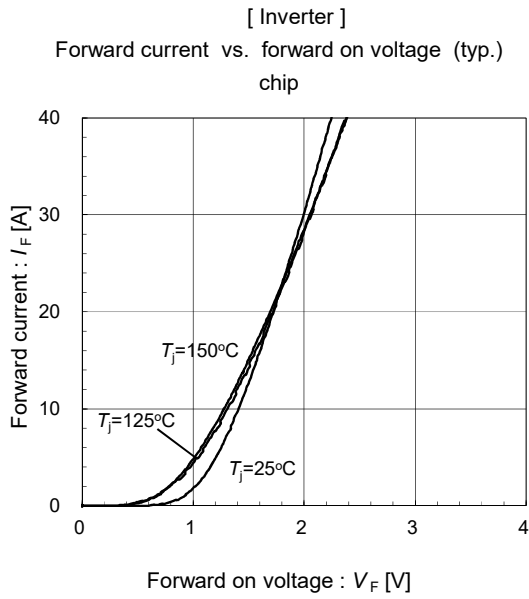
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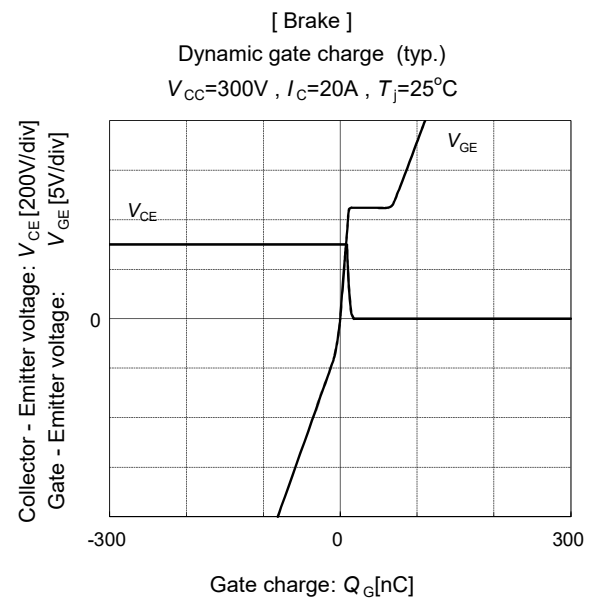
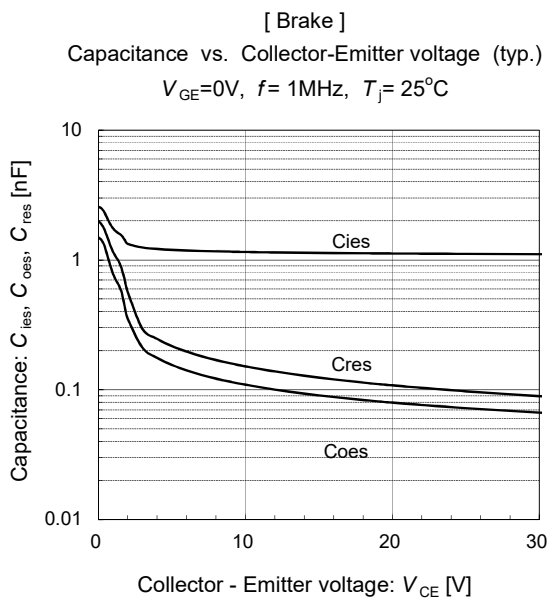
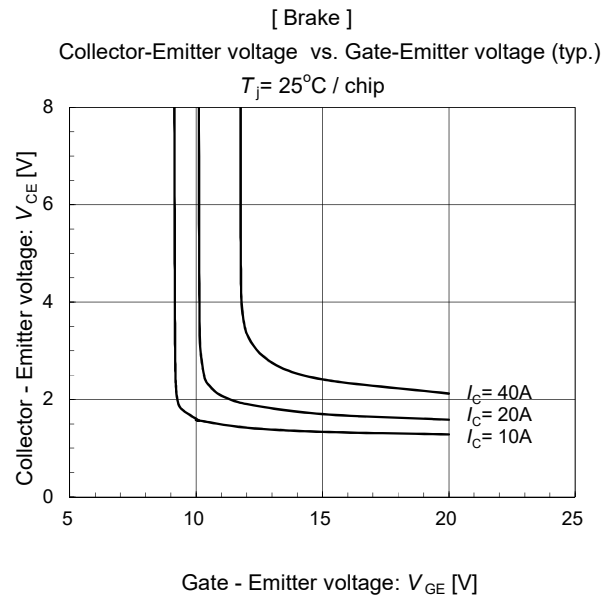
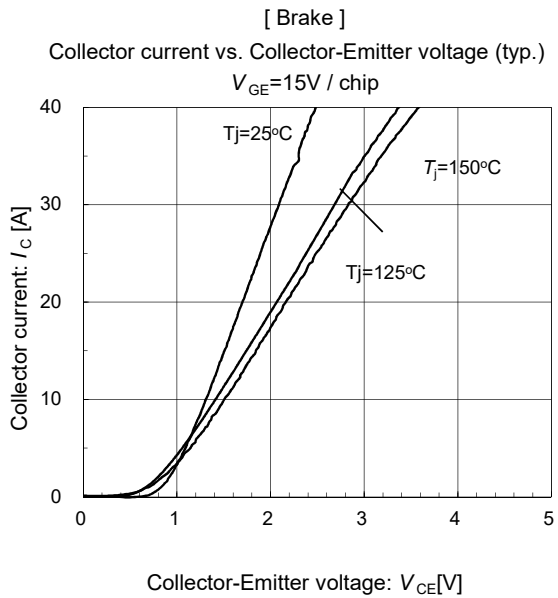
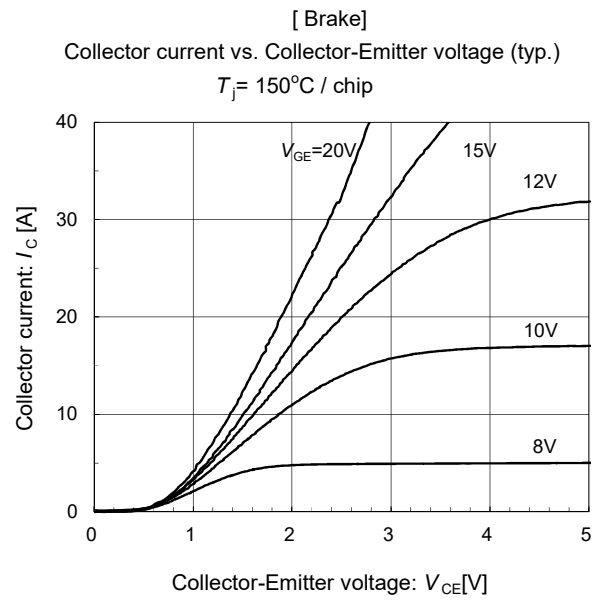
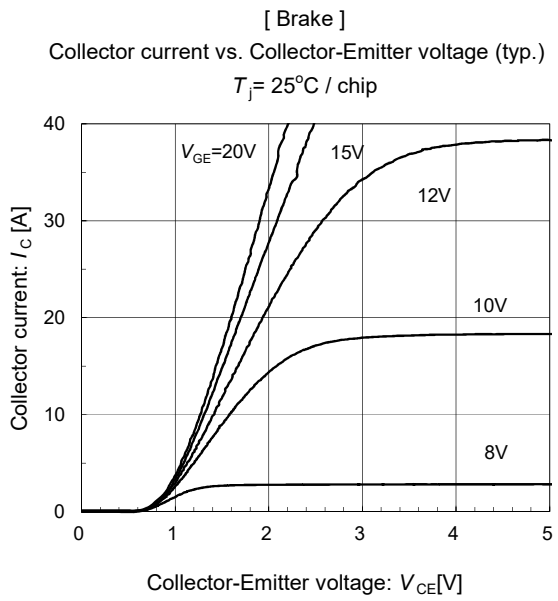
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