

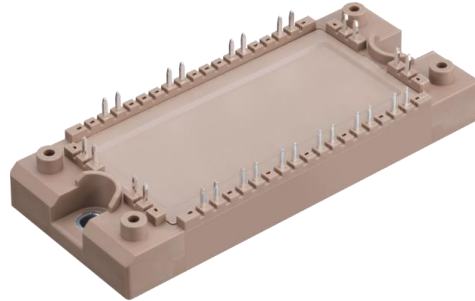
# 6MBI100XAE120-50

IGBT Modules

**Power Module (X series)**  
**1200V / 100A / 6-in-1 package**

■ **Features**

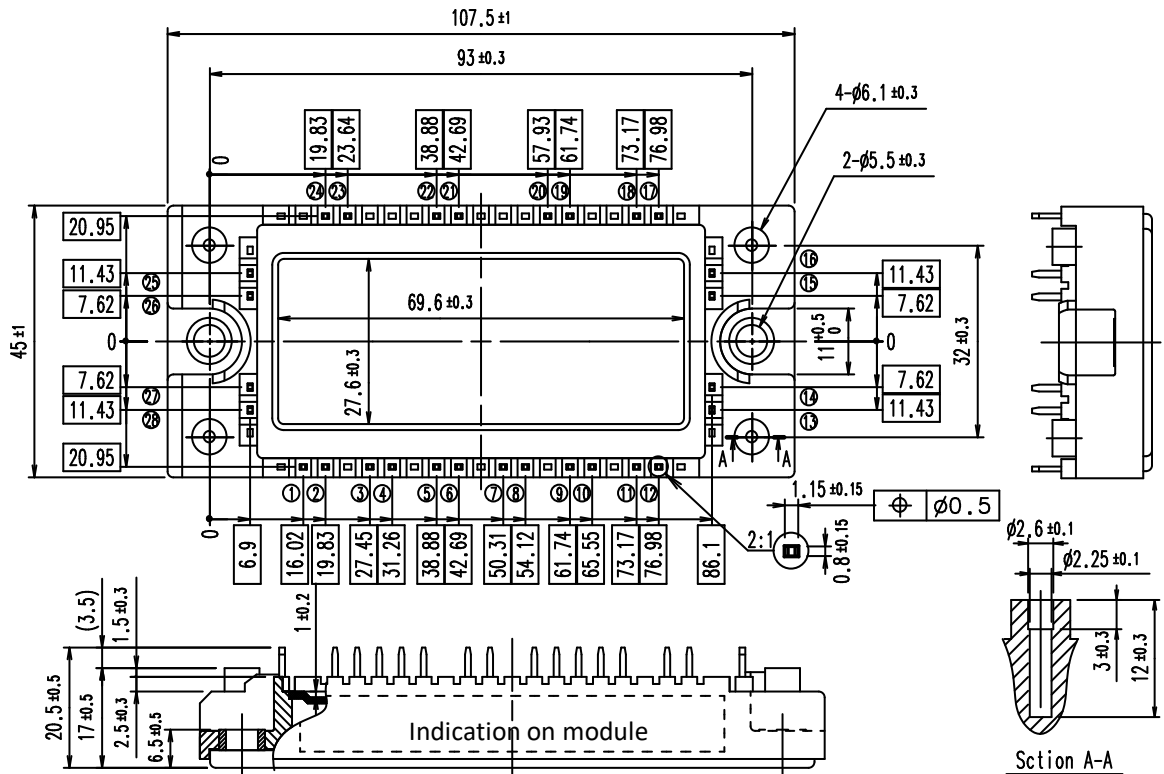
- Low  $V_{CE(sat)}$
- Compact Package
- P.C.Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit
- RoHS compliant Product



■ **Applications**

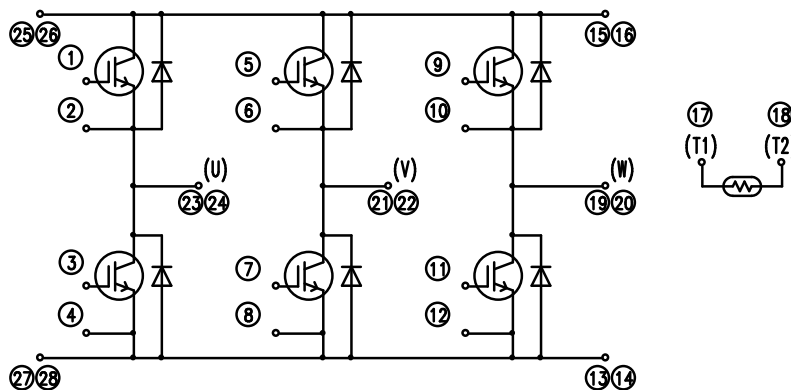
- Inverter for Motor Drives,
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

■ **Outline drawing ( Unit : mm )**



■ **Equivalent Circuit**

Weight: 200 g(typ.)



# 6MBI100XAE120-50

**IGBT Modules**
**■ Absolute Maximum Ratings (at  $T_C = 25^\circ\text{C}$  unless otherwise specified)**

Items		Symbols	Conditions	Maximum Ratings	Units
Collector-Emitter voltage, Gate-Emitter short-circuited		$V_{CES}$		1200	V
Gate-Emitter voltage, Collector-Emitter short-circuited		$V_{GES}$		$\pm 20$	V
Collector current		$I_C$	Continuous   $T_C = 100^\circ\text{C}$	100	A
Repetitive peak collector current		$I_{CRM}$	1ms	200	
Forward current		$I_F$	Continuous	100	
Repetitive peak forward current		$I_{FRM}$	1ms	200	
Total power dissipation		$P_{tot}$	1 device	685	W
Virtual junction temperature		$T_{vj}$		175	°C
Operating virtual junction temperature		$T_{vjop}$		175	
Case temperature		$T_C$		125	
Storage temperature		$T_{stg}$		-40 ~ 125	
Isolation voltage	between terminal and copper base (*1)	$V_{isol}$	AC: 1min.	2500	Vrms
	between thermistor and others (*2)				
Mounting torque of screws to heatsink (*3)		$M_s$	M5	6.0	N·m

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

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

(\*3) Recommendable value : Mounting 2.5 ~ 6.0 N·m (M5)

# 6MBI100XAE120-50

**IGBT Modules**
**■ Electrical characteristics (at  $T_{vj}=25^{\circ}\text{C}$  unless otherwise specified)**

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Collector-Emitter cut-off current, Gate-Emitter short-circuited	$I_{CES}$	$V_{GE} = 0V$ $V_{CE} = 1200V$	-	-	50	$\mu\text{A}$	
Gate leakage current, Collector-Emitter short-circuited	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	100	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 100\text{mA}$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 100A$	$T_{vj}=25^{\circ}\text{C}$	-	1.85	2.35	V
			$T_{vj}=25^{\circ}\text{C}$	-	1.45	1.90	
	$T_{vj}=125^{\circ}\text{C}$		-	1.80	-		
	$T_{vj}=150^{\circ}\text{C}$		-	1.85	-		
	$T_{vj}=175^{\circ}\text{C}$		-	1.90	-		
Internal Gate resistance	$r_g$	-	-	5.60	-	$\Omega$	
			-	11.6	-	nF	
Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1\text{MHz}$	-	0.4	-		
Output capacitance	$C_{oes}$		-	0.10	-		
Reverse transfer capacitance	$C_{res}$		-	-	-		
Gate charge	$Q_G$		$V_{CC} = 600V, I_C = 100A$ $V_{GE} = -15 \rightarrow +15V$	-	740.0	-	nC
Forward voltage	$V_F$ (terminal)	$V_{GE} = 0V$ $I_F = 100A$	$T_{vj}=25^{\circ}\text{C}$	-	2.20	2.70	V
			$T_{vj}=25^{\circ}\text{C}$	-	1.80	2.25	
	$T_{vj}=125^{\circ}\text{C}$		-	1.85	-		
	$T_{vj}=150^{\circ}\text{C}$		-	1.80	-		
	$T_{vj}=175^{\circ}\text{C}$		-	1.75	-		
Turn-on delay time (*1)	$t_{d(on)}$	$V_{CC} = 600V$ $I_C, I_F = 100A$ $V_{GE} = \pm 15V$ $R_G = 5.1\Omega$ $L_S = 30\text{nH}$	$T_{vj}=25^{\circ}\text{C}$	-	0.21	-	$\mu\text{s}$
			$T_{vj}=125^{\circ}\text{C}$	-	0.25	-	
			$T_{vj}=150^{\circ}\text{C}$	-	0.25	-	
			$T_{vj}=175^{\circ}\text{C}$	-	0.26	-	
Rise time (*1)	$t_r$		$T_{vj}=25^{\circ}\text{C}$	-	0.05	-	
			$T_{vj}=125^{\circ}\text{C}$	-	0.06	-	
			$T_{vj}=150^{\circ}\text{C}$	-	0.06	-	
			$T_{vj}=175^{\circ}\text{C}$	-	0.06	-	
Turn-off delay time (*1)	$t_{d(off)}$		$T_{vj}=25^{\circ}\text{C}$	-	0.29	-	
			$T_{vj}=125^{\circ}\text{C}$	-	0.32	-	
			$T_{vj}=150^{\circ}\text{C}$	-	0.33	-	
			$T_{vj}=175^{\circ}\text{C}$	-	0.34	-	
Fall time (*1)	$t_f$	$T_{vj}=25^{\circ}\text{C}$	-	0.10	-		
		$T_{vj}=125^{\circ}\text{C}$	-	0.16	-		
		$T_{vj}=150^{\circ}\text{C}$	-	0.18	-		
		$T_{vj}=175^{\circ}\text{C}$	-	0.20	-		
Reverse recovery time	$t_{rr}$	$T_{vj}=25^{\circ}\text{C}$	-	0.11	-		
		$T_{vj}=125^{\circ}\text{C}$	-	0.18	-		
		$T_{vj}=150^{\circ}\text{C}$	-	0.22	-		
		$T_{vj}=175^{\circ}\text{C}$	-	0.25	-		

(\*1) Turn-on time ( $t_{on} = t_{d(on)} + t_r$ ), Turn-off time ( $t_{off} = t_{d(off)} + t_f$ )

# 6MBI100XAE120-50

IGBT Modules

■ Electrical characteristics (at  $T_{vj}= 25^{\circ}\text{C}$  unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Turn-on energy	$V_{CC} = 600\text{V}$ $I_C, I_F = 100\text{A}$ $V_{GE} = \pm 15\text{V}$ $R_G = 5.1\ \Omega$ $L_S = 30\ \text{nH}$	$T_{vj}=25^{\circ}\text{C}$	-	7.45	-	mJ	
			$T_{vj}=125^{\circ}\text{C}$	-	10.51	-		
			$T_{vj}=150^{\circ}\text{C}$	-	11.50	-		
			$T_{vj}=175^{\circ}\text{C}$	-	12.79	-		
	Turn-off energy		$E_{off}$	$T_{vj}=25^{\circ}\text{C}$	-	7.07		-
				$T_{vj}=125^{\circ}\text{C}$	-	8.82		-
				$T_{vj}=150^{\circ}\text{C}$	-	9.55		-
	Reverse recovery energy		$E_{rr}$	$T_{vj}=175^{\circ}\text{C}$	-	9.93		-
				$T_{vj}=25^{\circ}\text{C}$	-	3.00		-
$T_{vj}=125^{\circ}\text{C}$		-		4.88	-			
Thermistor	Resistance	$T = 25^{\circ}\text{C}$	-	5000	-	$\Omega$		
		$T = 100^{\circ}\text{C}$	465	495	520			
	B value	$B$	$T = 25 / 50^{\circ}\text{C}$	3305	3375	3450	K	

NOTICE:

The external gate resistance ( $R_G$ ) shown above is one of our recommended value for the purpose of minimum switching loss. However the optimum  $R_G$  depends on circuit configuration and/or environment. We recommend that the  $R_G$  has to be carefully chosen based on consideration if IGBT module matches design criteria, for example, switching loss, EMC/EMI, spike voltage, surge current and no unexpected oscillation and so on.

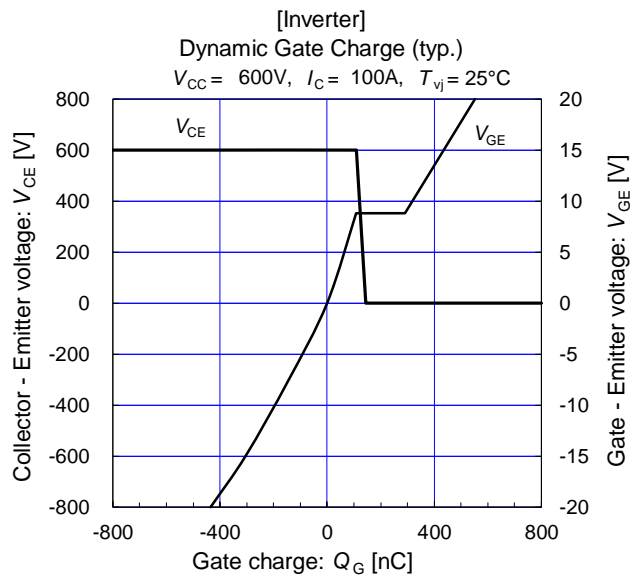
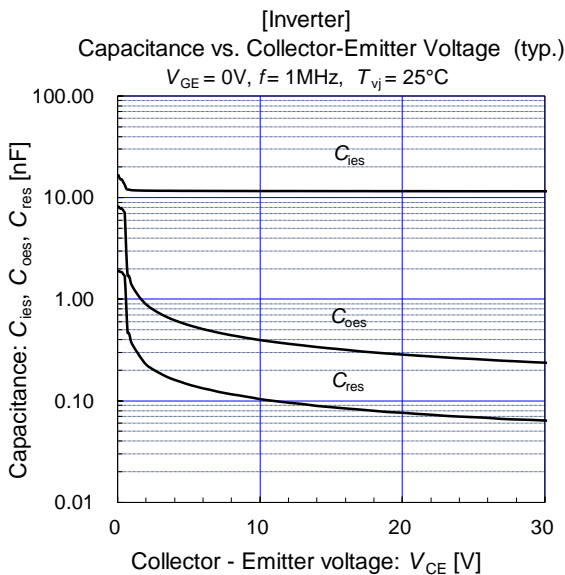
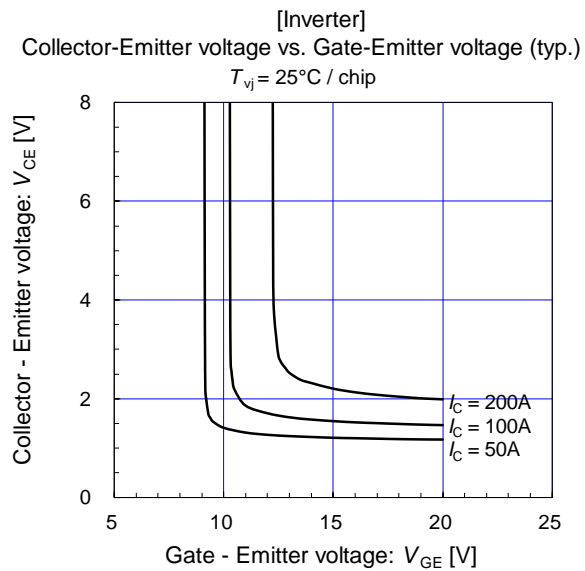
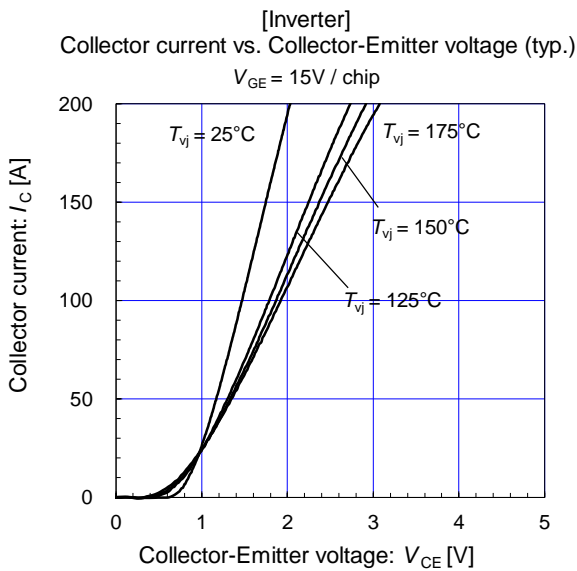
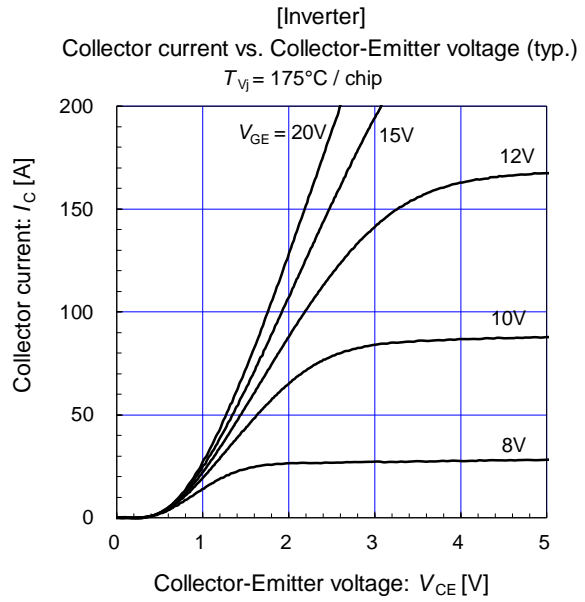
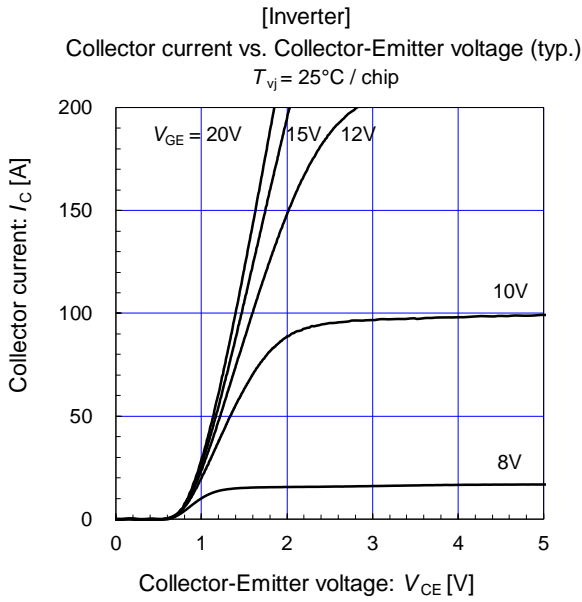
■ Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance junction to case (1 device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.22	K / W
		Inverter FWD	-	-	0.31	
Thermal resistance case to heatsink (1 IGBT + 1 FWD) (*1)	$R_{th(c-s)}$	with 1 W / (m·K) thermal grease	-	0.05	-	

(\*1) This is the value which is defined mounting on the additional heatsink with thermal grease.

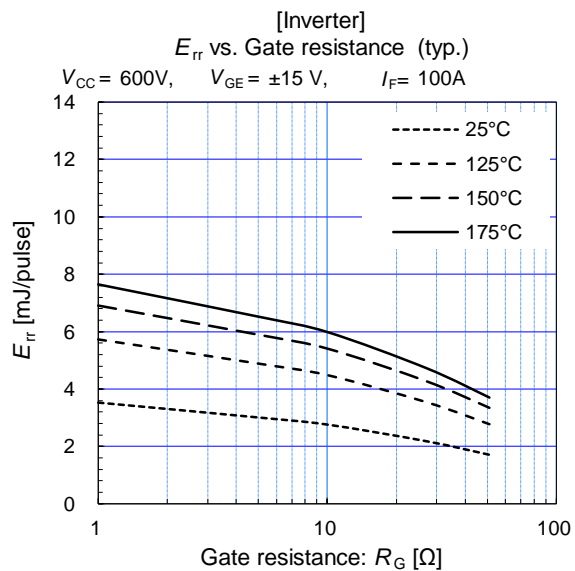
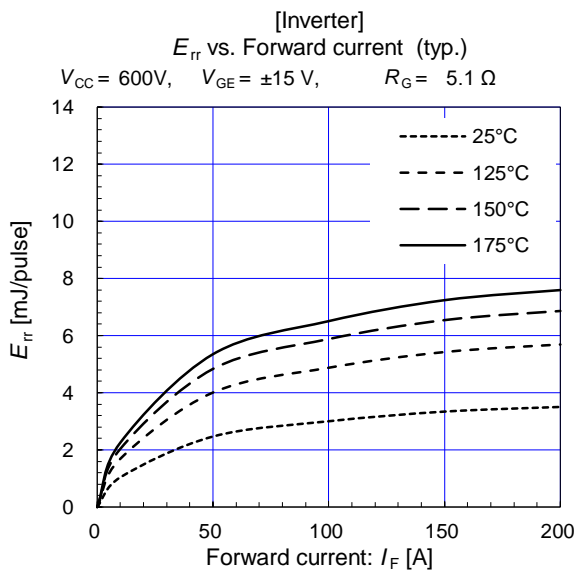
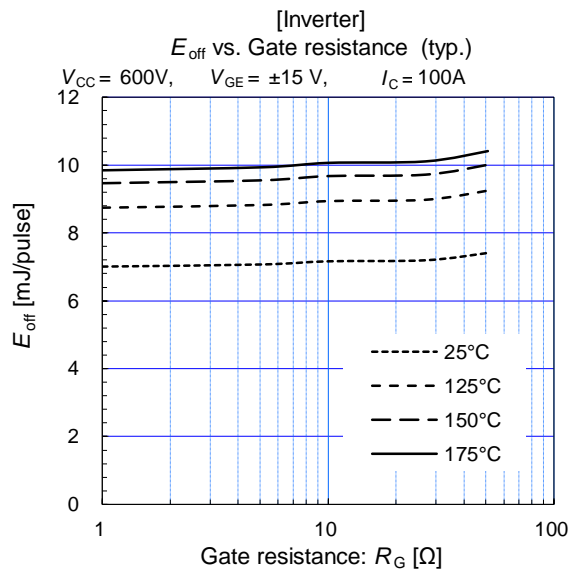
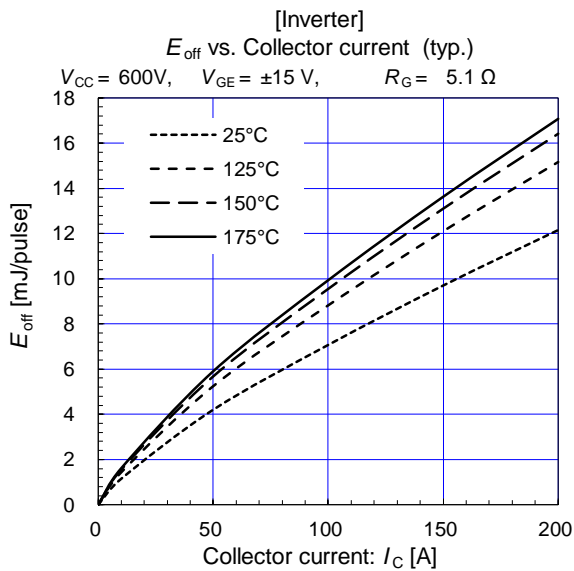
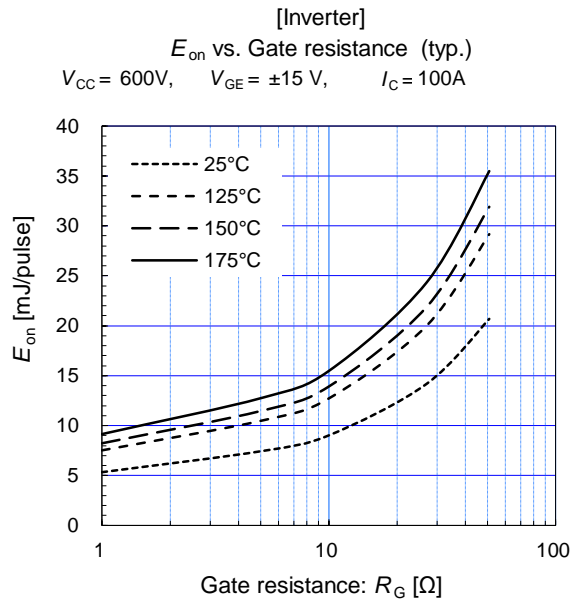
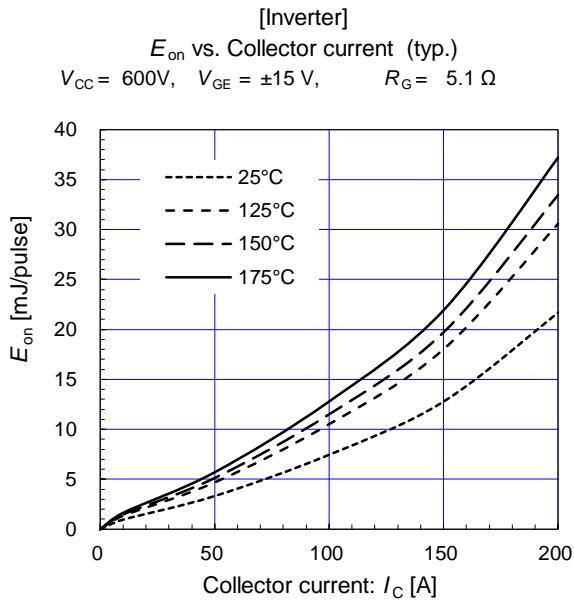
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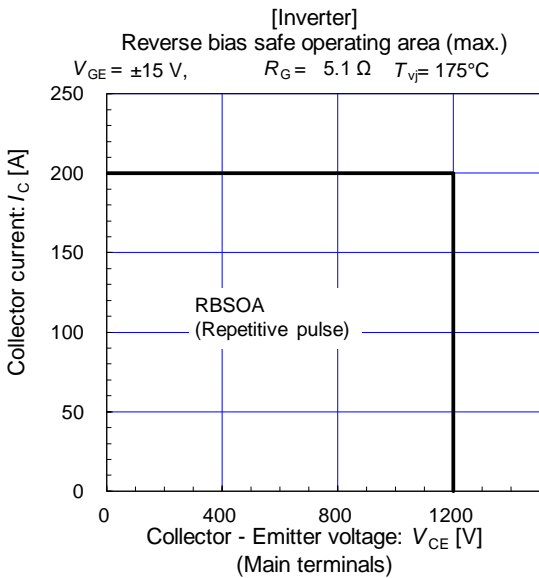
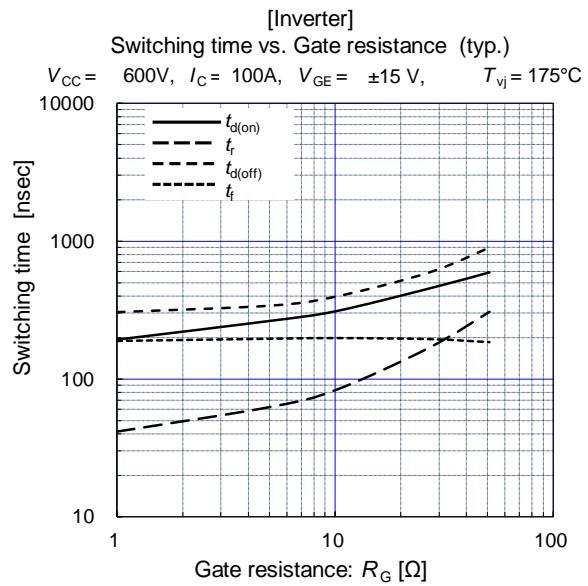
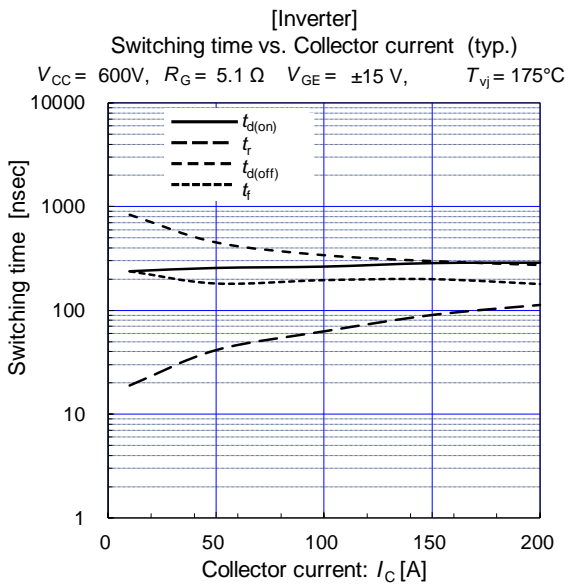
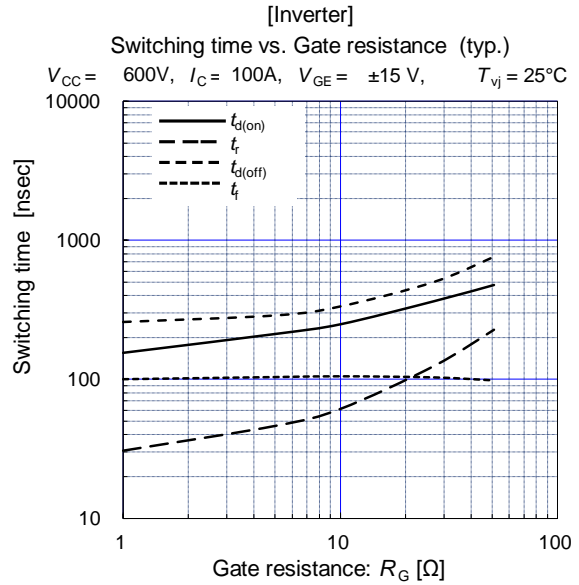
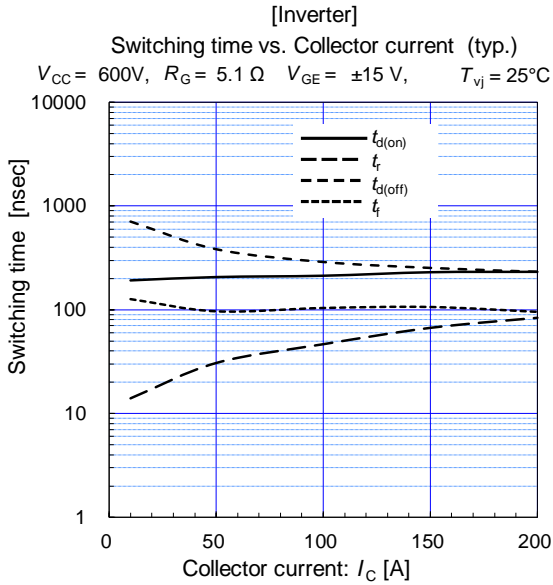
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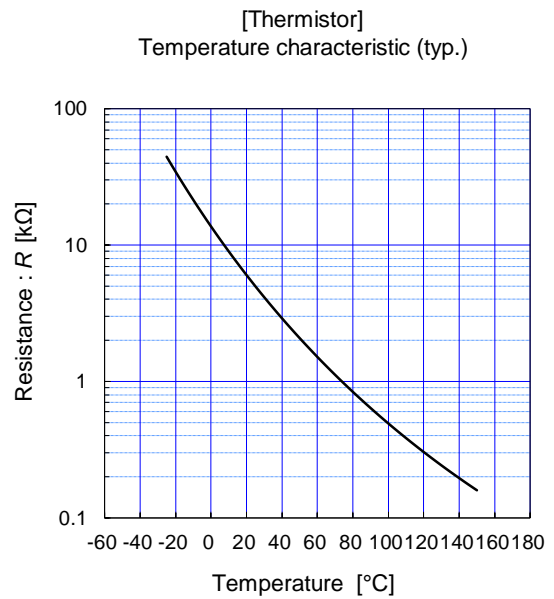
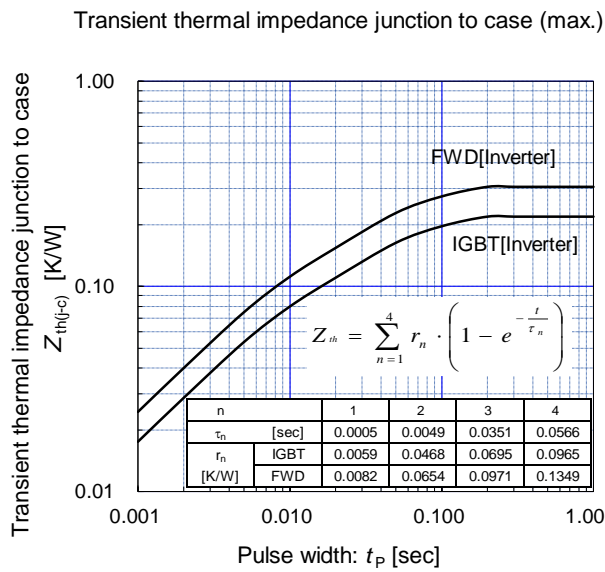
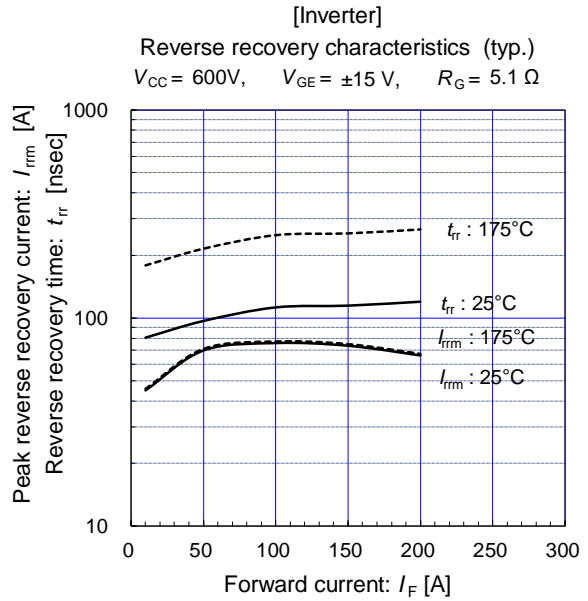
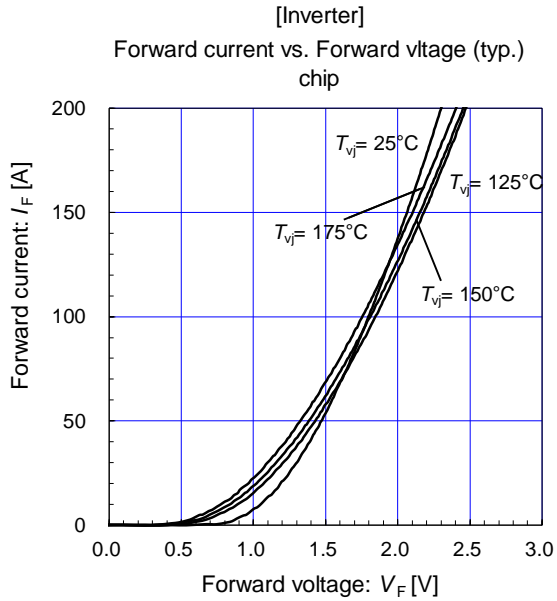
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