

# 2MBI300XNA170-50

IGBT Modules

**Power Module (X series)**  
1700V / 300A / 2-in-1 package

■ **Features**

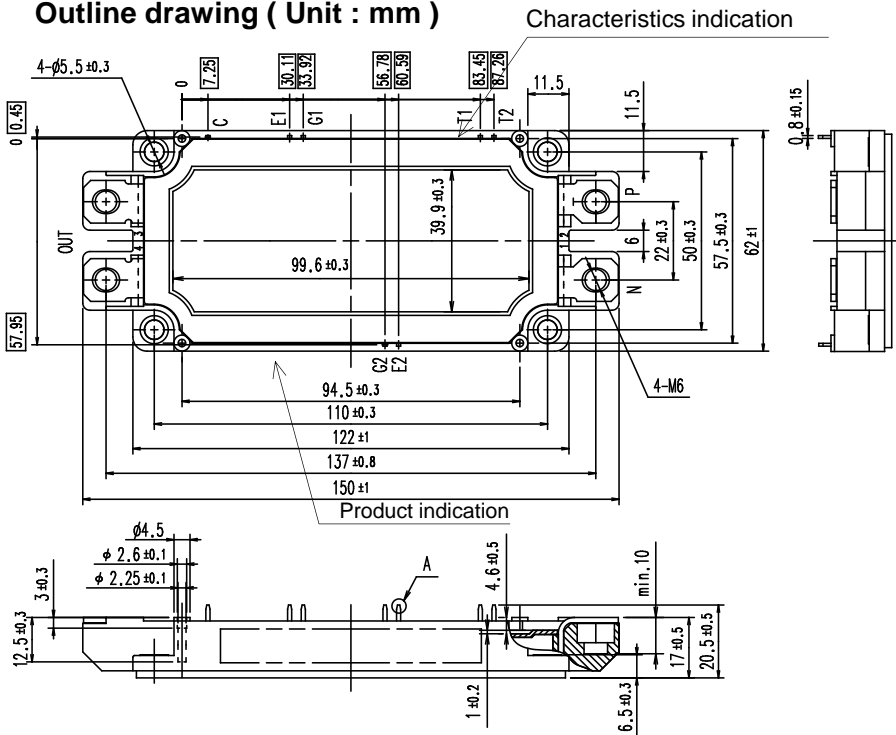
- Low  $V_{CE(sat)}$
- Low Inductance Module structure
- Solder pin terminals

■ **Applications**

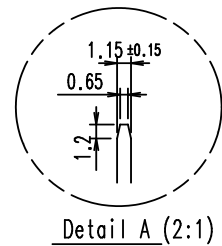
- Inverter for Motor Drives, AC and DC Servo Drives
- Uninterruptible Power Supply Systems, Wind Turbines, PV Power Conditioning Systems



■ **Outline drawing ( Unit : mm )**

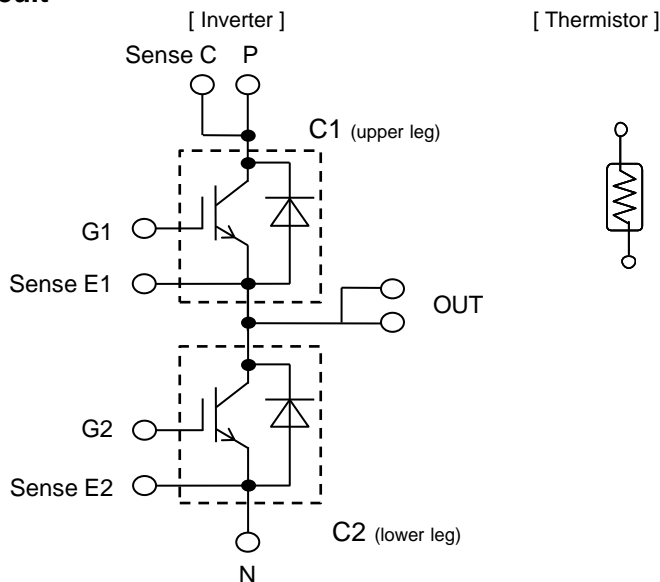


NOTE)   shows theoretical dimension and tolerance is  $\pm \phi 0.5$



Weight: 350 g(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
Collector-emitter voltage, gate-emitter short-circuited		$V_{CES}$		1700	V
Gate-emitter voltage, collector-emitter short-circuited		$V_{GES}$		$\pm 20$	V
Collector current		$I_C$	Continuous $T_c=100^\circ\text{C}$	300	A
Repetitive peak collector current		$I_{CRM}$	1ms	600	
Forward current		$I_F$		300	
Repetitive peak forward current		$I_{FRM}$	1ms	600	
Total power dissipation		$P_{tot}$	1 device	#REF!	W
Virtual junction temperature		$T_{vj}$		175	°C
Operating junction temperature (under switching conditions)		$T_{vjop}$		175	
Case temperature		$T_c$		125	
Storage temperature		$T_{stg}$		-40 ~ 125	
Isolation voltage	between terminal and copper base (*1)	$V_{isol}$	AC: 1min.	3400	Vrms
	between thermistor and others (*2)				
Mounting torque of screws to heatsink (*3)		$M_s$	M5	6.0	N·m
Mounting torque of screws to terminals (*3)		$M_t$	M6	6.0	

(\*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 torque of screws to heatsink 2.5 ~ 6.0 N·m (M5)  
 Recommendable Value: : Mounting torque of screws to terminals 3.5 ~ 6.0 N·m (M6)

# 2MBI300XNA170-50

■ 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	$I_{CES}$	$V_{GE} = 0\text{V}$ $V_{CE} = 1700\text{V}$	-	-	150	$\mu\text{A}$	
Gate leakage current, collector-emitter short-circuited	$I_{GES}$	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}$	-	-	300	nA	
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20\text{V}$ $I_C = 300\text{mA}$	6.0	6.5	7.0	V	
Collector-emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15\text{V}$ $I_C = 300\text{A}$	$T_{vj}=25^{\circ}\text{C}$	-	#N/A	#N/A	V
	$V_{CE(sat)}$ (chip)		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	#N/A	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
Internal gate resistance	$r_g$	-	-	3.33	-	$\Omega$	
Capacitance	$C_{ies}$	$V_{CE}=10\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$	-	#N/A	-	nF	
	$C_{oes}$		-	#N/A	-		
	$C_{res}$		-	#N/A	-		
Gate charge	$Q_G$	$V_{CC} = 900\text{V}, I_C = 300\text{A}$ $V_{GE} = -15 \rightarrow +15\text{V}$	-	#REF!	-	$\mu\text{C}$	
Forward voltage	$V_F$ (terminal)	$V_{GE} = 0\text{V}$ $I_F = 300\text{A}$	$T_{vj}=25^{\circ}\text{C}$	-	#N/A	#N/A	V
	$V_F$ (chip)		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	#N/A	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
Switching time (*1)	$t_{d(on)}$	$V_{CC} = 900\text{V}$ $I_C, I_F = 300\text{A}$ $V_{GE} = \pm 15\text{V}$ $R_G = \pm 0.68\Omega$ $L_S = 35\text{ nH}$	$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	$\mu\text{s}$
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
	$t_r$		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
	$t_{d(off)}$		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
	$t_f$		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
Reverse recovery time	$t_{rr}$	$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-		
		$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-		
		$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-		
		$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-		

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

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

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Switching loss (per pulse)	$E_{on}$	$V_{CC} = 900\text{V}$ $I_C, I_F = 300\text{A}$ $V_{GE} = \pm 15\text{V}$ $R_G = \pm 0.68\Omega$ $L_S = 35\text{ nH}$	$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	mJ
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
	$E_{off}$		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
	$E_{rr}$		$T_{vj}=25^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=125^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=150^{\circ}\text{C}$	-	#N/A	-	
			$T_{vj}=175^{\circ}\text{C}$	-	#N/A	-	
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

NOTICE:

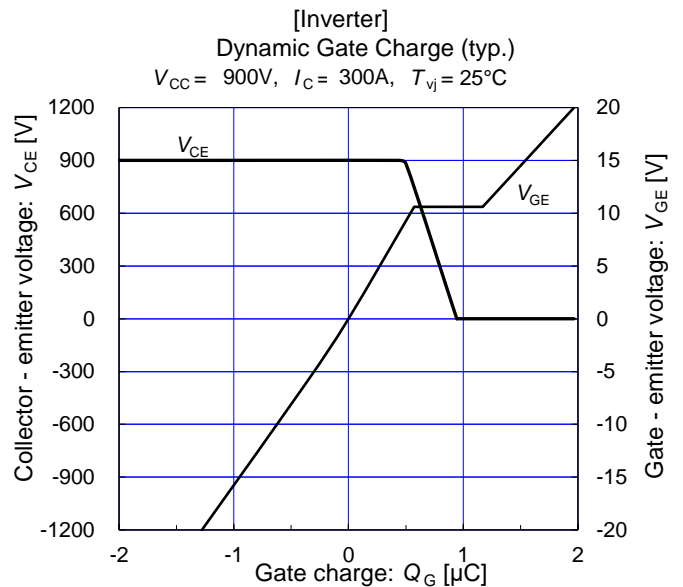
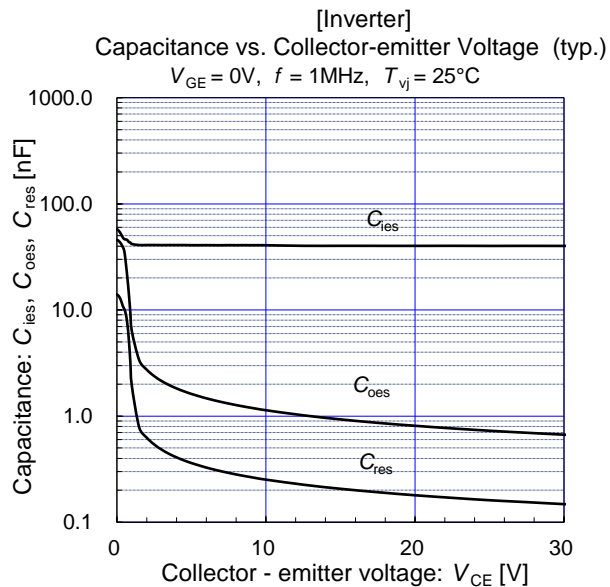
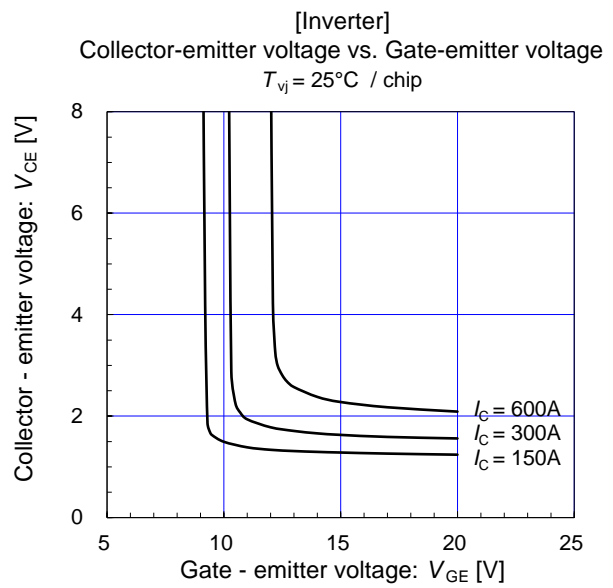
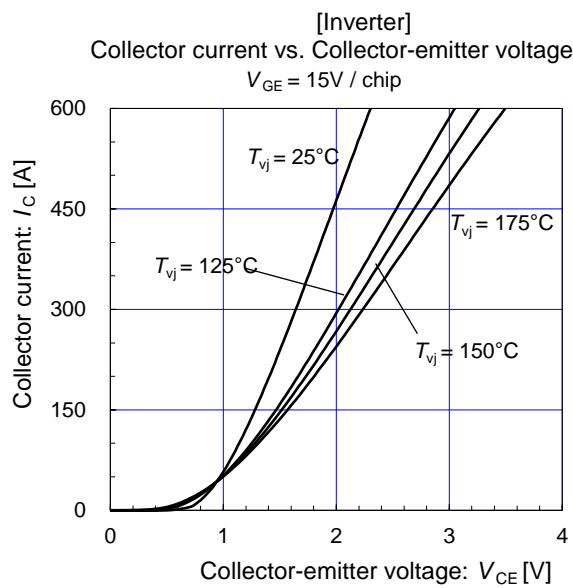
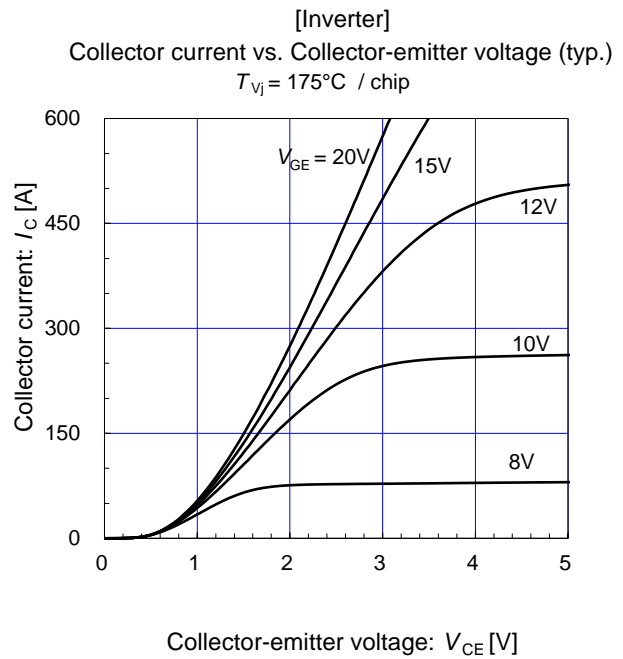
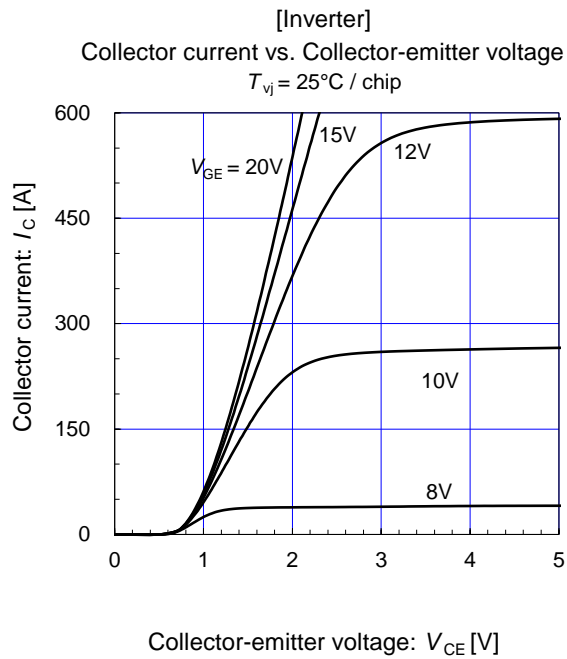
The external gate resistance ( $R_G$ ) shown above is one of our recommended value for the purpose of minimum switching loss. However the optimum  $R_G$  depends on circuit configuration and/or environment. We recommend that the  $R_G$  has to be carefully chosen based on consideration if IGBT module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

■ Thermal resistance characteristics

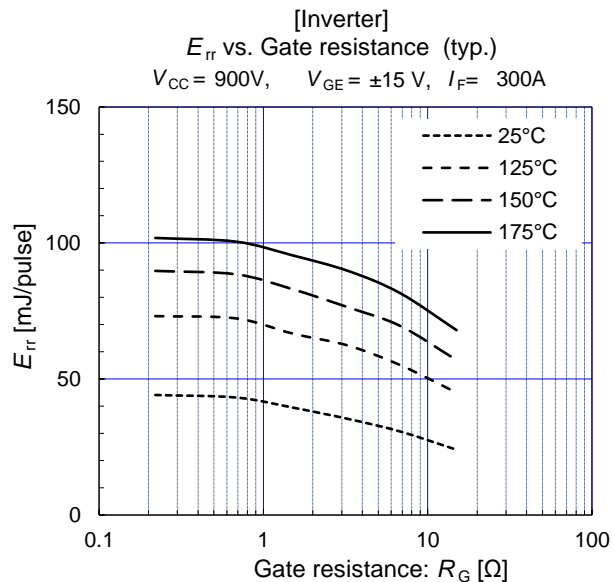
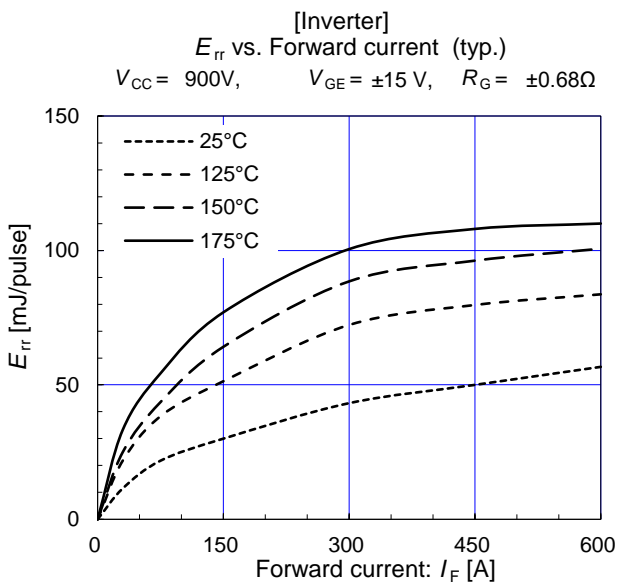
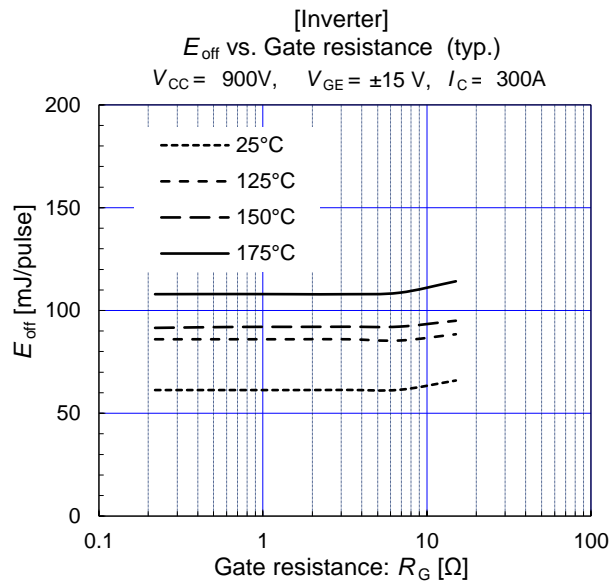
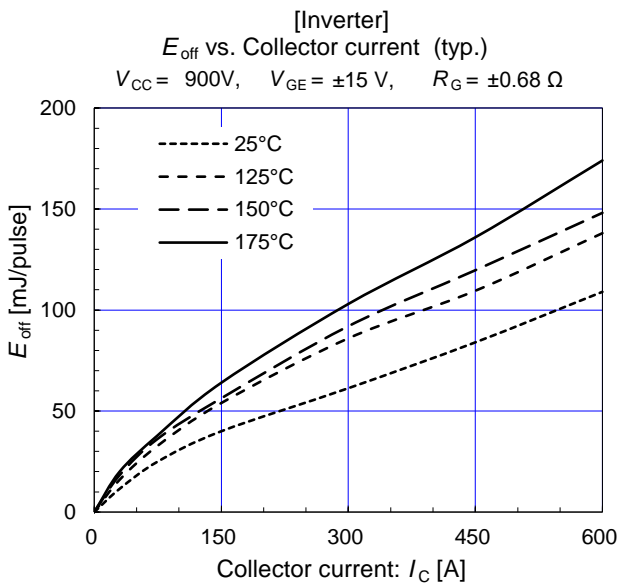
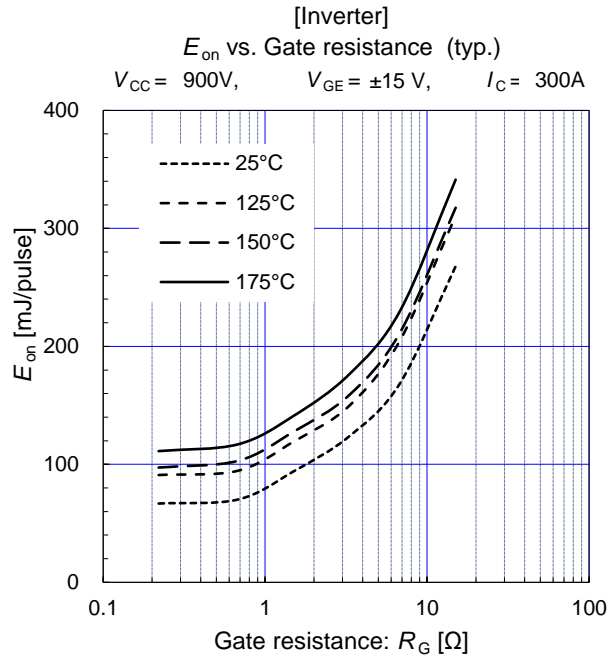
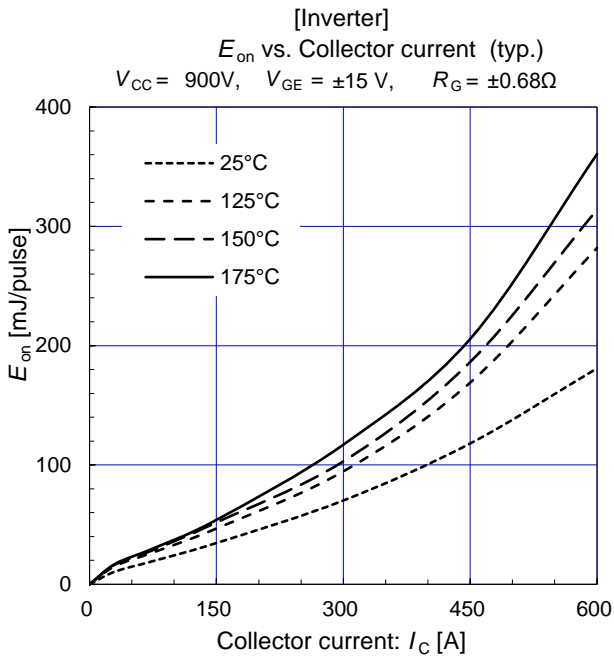
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance junction to case(1 device)	$R_{th(j-c)}$	Inverter IGBT	-	-	#REF!	K/W
		Inverter FWD	-	-	#REF!	
Thermal resistance case to heatsink(1 IGBT+1 FWD) (*1)	$R_{th(c-s)}$	with 1 W/(m·K) thermal greas	-	0.0167	-	

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

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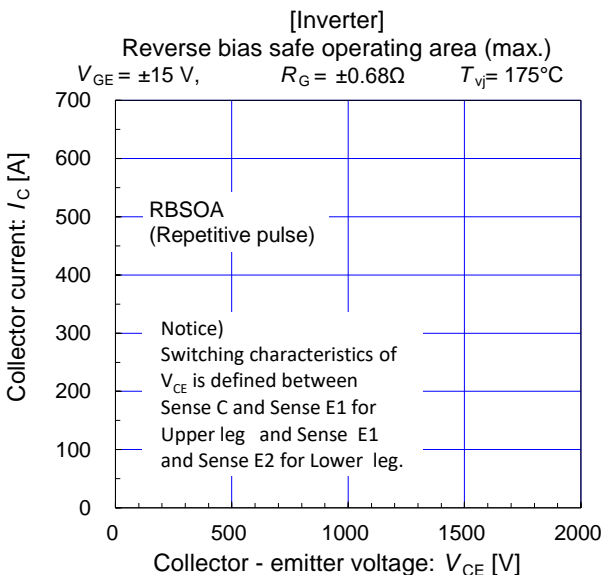
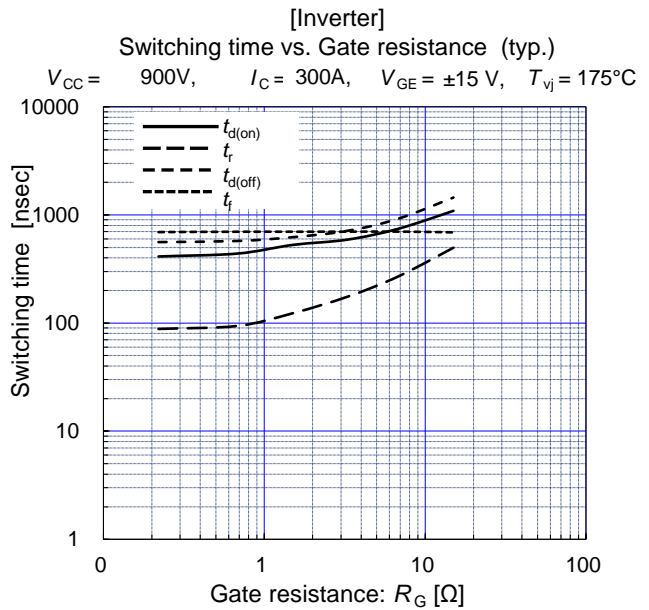
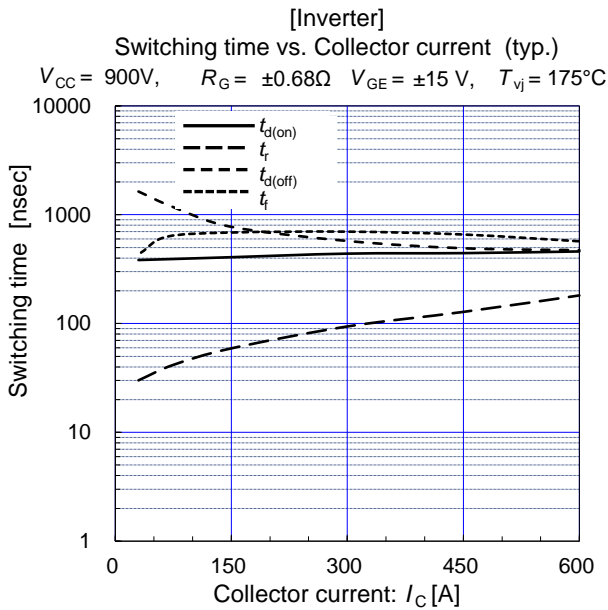
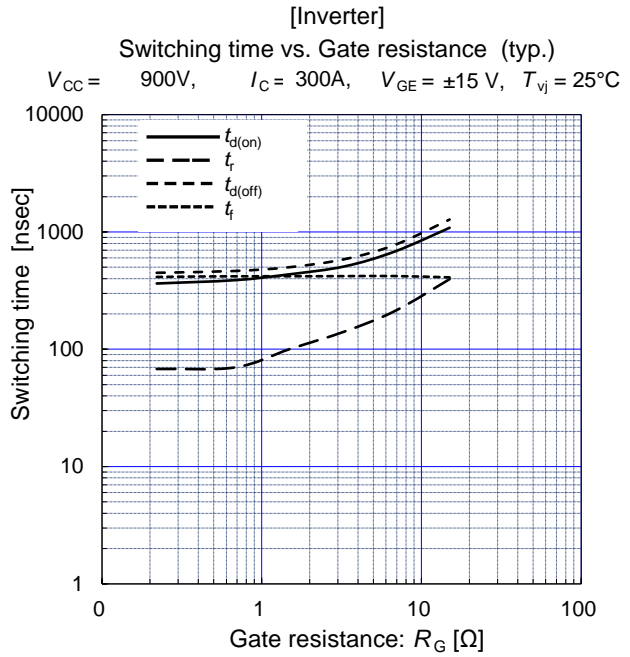
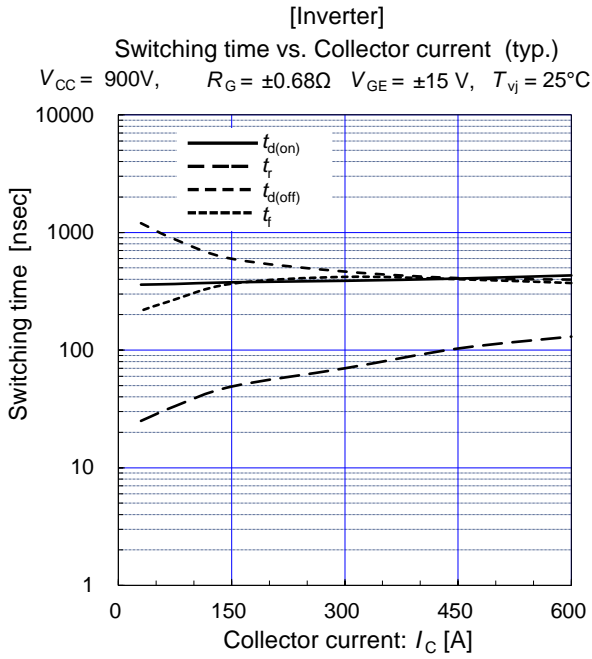


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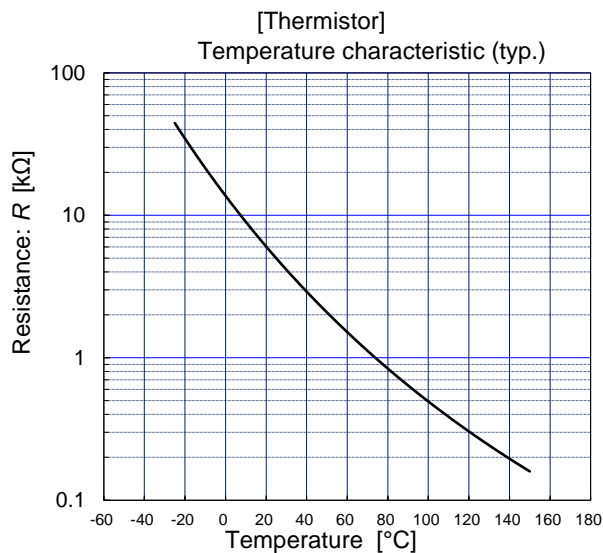
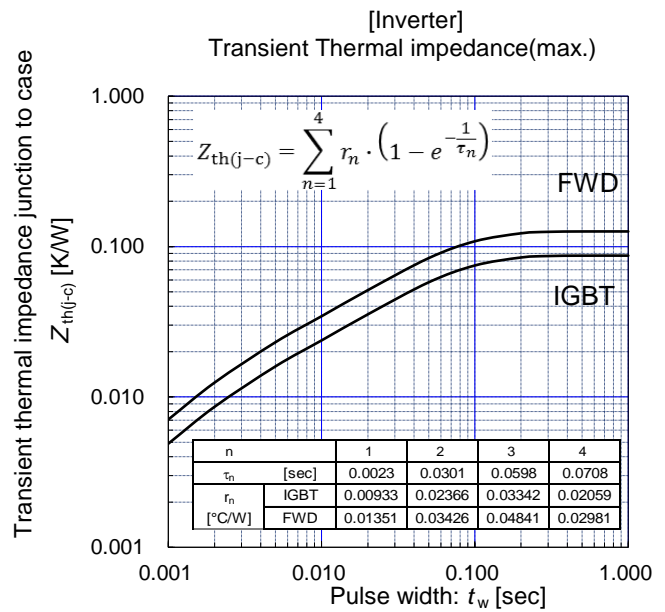
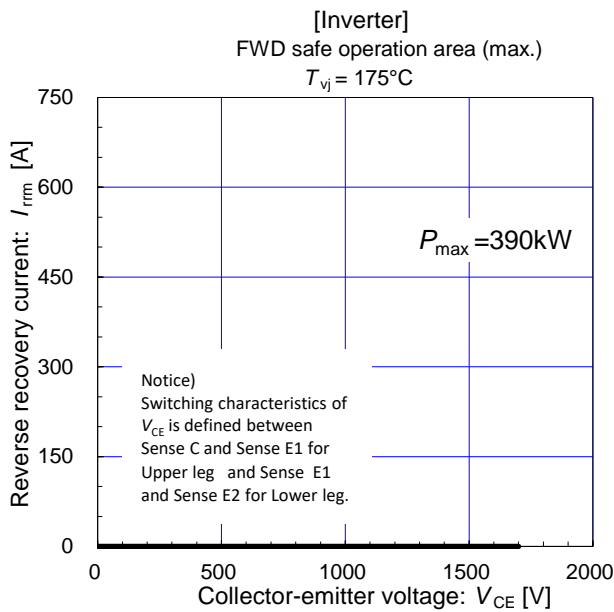
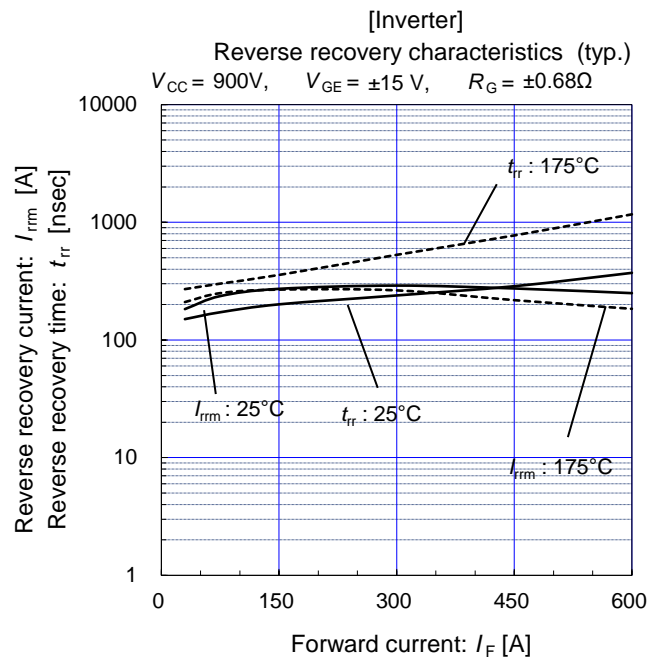
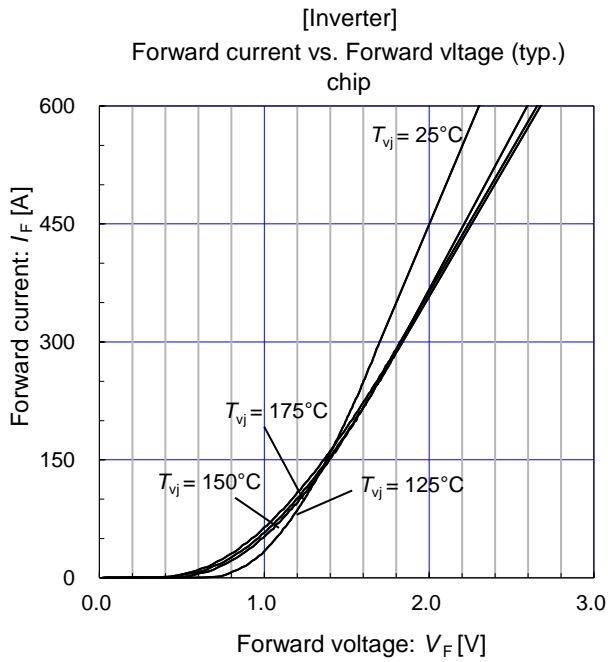


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## IGBT Modules

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