

2MBI200XAA120-50

IGBT Modules

Power Module (X series)

1200V / 200A / 2-in-1 package

■ Features

LOW $V_{CE(sat)}$

High speed switching

Low Inductance Module structure

■ Applications

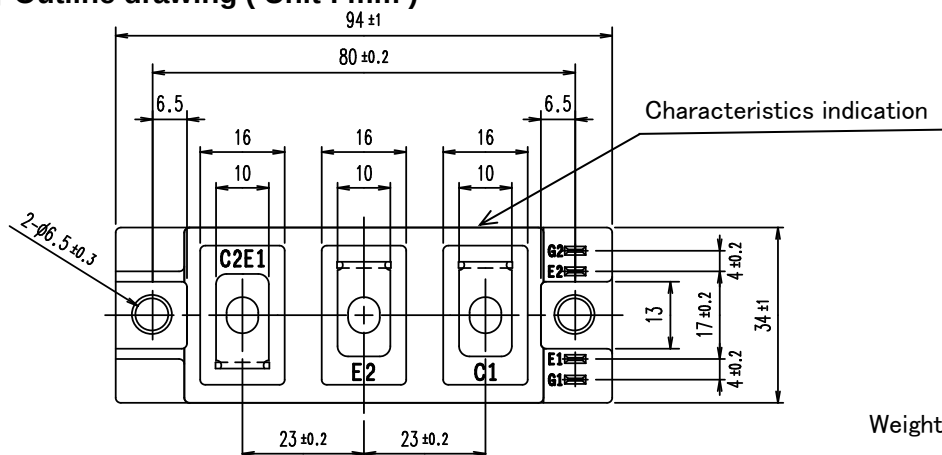
Inverter for Motor Drives, AC and DC Servo Drives

Uninterruptible Power Supply Systems,

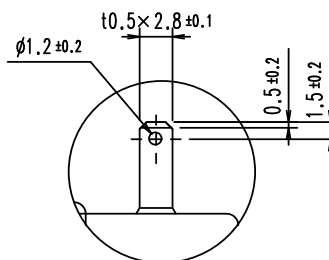
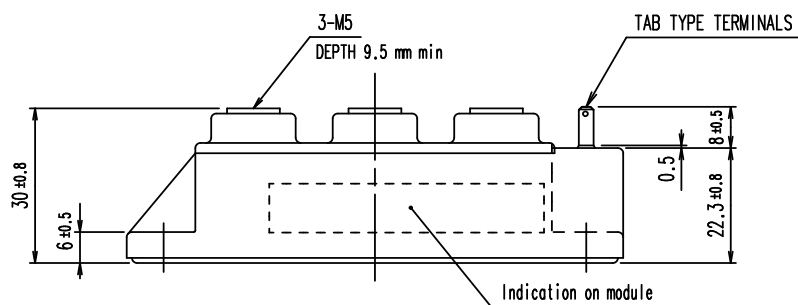
Industrial machines, such as Welding machines



■ Outline drawing (Unit : mm)

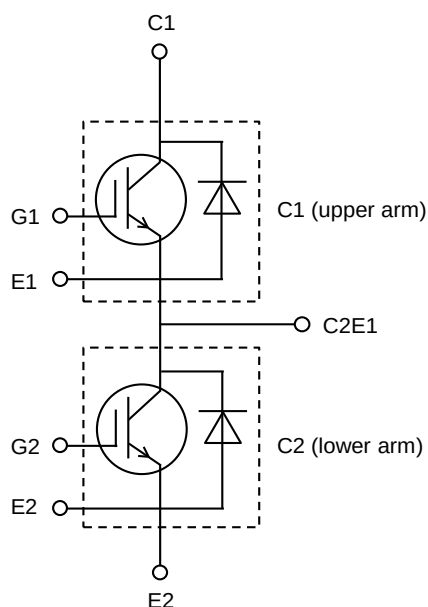


Weight: 180 g(typ.)



DETAIL TAB TYPE TERMINALS

■ 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, gate-emitter short-circuited	V_{CES}			1200	V
	Gate-emitter voltage, collector-emitter short-circuited	V_{GES}			± 20	V
	Collector current	I_C	Continuous	$T_c = 100^\circ\text{C}$	200	A
	Repetitive peak collector current	I_{CRM}	1ms		400	
	Forward current	I_F			200	
	Repetitive peak forward current	I_{FRM}	1ms		400	
	Total power dissipation	P_{tot}	1 device		830	W
	Virtual junction temperature	T_{vj}			175	$^\circ\text{C}$
	Operating virtual junction temperature	T_{vjop}			175	
Case temperature		T_c			125	
Storage temperature		T_{stg}			-40 ~ 125	
Isolation voltage	between terminals and copper base (*1)	V_{isol}	AC: 1min.		4000	Vrms
Mounting torque of screws to heatsink(*2)		M_s	M5		5.0	N·m
Mounting torque of screws to terminals(*3)		M_t	M5		5.0	

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

(*2) Recommendable Value: 3.0 ~ 5.0 N·m (M5 or M6)

(*3) Recommendable Value: 2.5 ~ 5.0 N·m (M5)

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Electrical characteristics (at Tvj= 25°C unless otherwise specified)

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Collector-emitter cut-off current,gate-emitter short-circuited	I_{CES}	$V_{GE} = 0V$ $V_{CE} = 1200V$		-	-	50	μA
	Gate leakage current,collector-emitter short-circuited	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$		-	-	100	nA
	Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 200mA$		6.0	6.5	7.0	V
	Collector-emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 200A$	$T_{vj}=25^{\circ}C$	-	1.70	2.15	V
		$V_{CE(sat)}$ (chip)		$T_{vj}=25^{\circ}C$	-	1.45	1.90	
				$T_{vj}=125^{\circ}C$	-	1.85	-	
				$T_{vj}=150^{\circ}C$	-	1.90	-	
				$T_{vj}=175^{\circ}C$	-	1.95	-	
	Internal gate resistance	r_g	-		-	5.00	-	Ω
	Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$		-	21	-	nF
	Output capacitance	C_{oes}			-	0.7	-	
	Reverse transfer capacitance	C_{res}			-	0.19	-	
	Gate charge	Q_G	$V_{CC} = 600V, I_C = 200A$ $V_{GE} = -15 \rightarrow +15V$		-	1.4	-	μC
	Forward voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 200A$	$T_{vj}=25^{\circ}C$	-	1.85	2.30	V
		V_F (chip)		$T_{vj}= 25^{\circ}C$	-	1.60	2.05	
				$T_{vj}=125^{\circ}C$	-	1.65	-	
				$T_{vj}=150^{\circ}C$	-	1.60	-	
				$T_{vj}=175^{\circ}C$	-	1.60	-	
	Turn-on delay time(*1)	$t_{d(on)}$	$V_{CC} = 600V$ $I_C, I_F = 200A$ $V_{GE} = +15/ -15V$ $R_G = 2.7 \Omega$ $L_S = 30 nH$	$T_{vj}= 25^{\circ}C$	-	0.39	-	μs
	Rise time(*1)	t_r		$T_{vj}=125^{\circ}C$	-	0.43	-	
				$T_{vj}=150^{\circ}C$	-	0.44	-	
				$T_{vj}=175^{\circ}C$	-	0.45	-	
				$T_{vj}= 25^{\circ}C$	-	0.07	-	
	Turn-off delay time(*1)	$t_{d(off)}$		$T_{vj}=125^{\circ}C$	-	0.08	-	
				$T_{vj}=150^{\circ}C$	-	0.08	-	
				$T_{vj}=175^{\circ}C$	-	0.09	-	
$T_{vj}= 25^{\circ}C$				-	0.38	-		
Fall time(*1)	t_f	$T_{vj}=125^{\circ}C$		-	0.42	-		
		$T_{vj}=150^{\circ}C$		-	0.43	-		
		$T_{vj}=175^{\circ}C$		-	0.44	-		
		$T_{vj}= 25^{\circ}C$		-	0.10	-		
Reverse recovery time	t_{rr}	$T_{vj}=125^{\circ}C$		-	0.13	-		
		$T_{vj}=150^{\circ}C$		-	0.14	-		
		$T_{vj}=175^{\circ}C$		-	0.14	-		
		$T_{vj}= 25^{\circ}C$		-	0.17	-		
		$T_{vj}=125^{\circ}C$		-	0.30	-		
$T_{vj}=150^{\circ}C$	-	0.32		-				
$T_{vj}=175^{\circ}C$	-	0.36		-				

(*1) Turn-on time (ton) = td(on) + tr , Turn-off time (toff) = td(off) + tf

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

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Turn-on energy	E_{on}	$V_{\text{CC}} = 600\text{V}$ $I_{\text{C}}, I_{\text{F}} = 200\text{A}$ $V_{\text{GE}} = +15/ -15\text{V}$ $R_{\text{G}} = 2.7 \, \Omega$ $L_{\text{S}} = 30 \, \text{nH}$	$T_{\text{vj}} = 25^{\circ}\text{C}$	-	15.1	-	mJ
				$T_{\text{vj}} = 125^{\circ}\text{C}$	-	24.5	-	
				$T_{\text{vj}} = 150^{\circ}\text{C}$	-	26.9	-	
				$T_{\text{vj}} = 175^{\circ}\text{C}$	-	29.2	-	
	Turn-off energy	E_{off}		$T_{\text{vj}} = 25^{\circ}\text{C}$	-	16.6	-	
				$T_{\text{vj}} = 125^{\circ}\text{C}$	-	20.0	-	
				$T_{\text{vj}} = 150^{\circ}\text{C}$	-	20.9	-	
				$T_{\text{vj}} = 175^{\circ}\text{C}$	-	21.7	-	
	Reverse recovery energy	E_{rr}		$T_{\text{vj}} = 25^{\circ}\text{C}$	-	7.2	-	
				$T_{\text{vj}} = 125^{\circ}\text{C}$	-	13.1	-	
				$T_{\text{vj}} = 150^{\circ}\text{C}$	-	14.6	-	
				$T_{\text{vj}} = 175^{\circ}\text{C}$	-	16.0	-	

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.

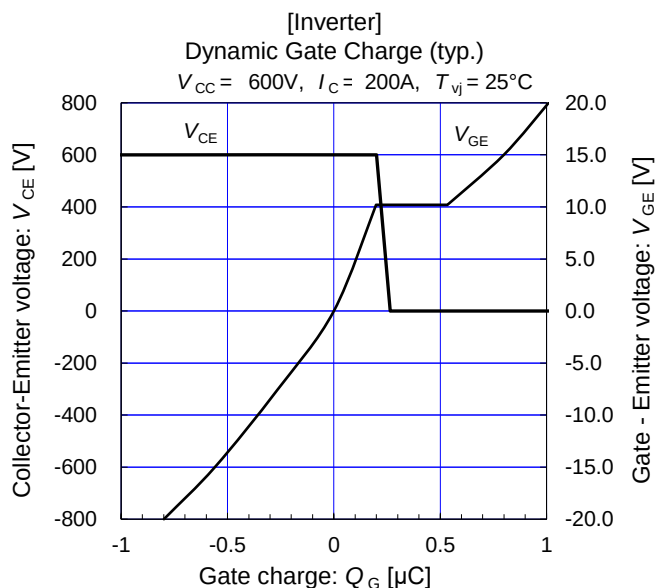
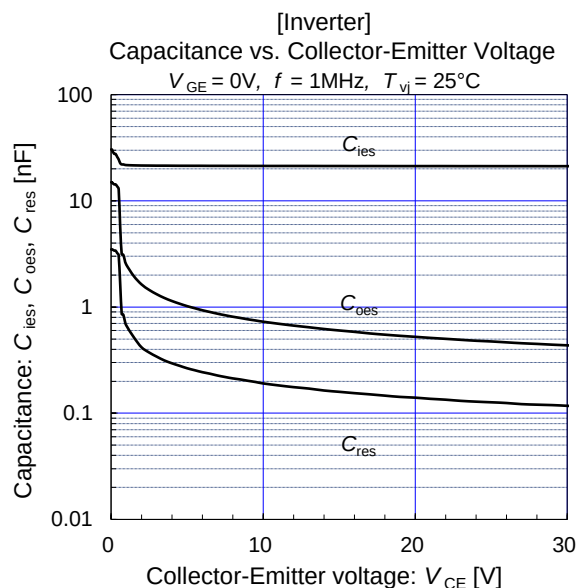
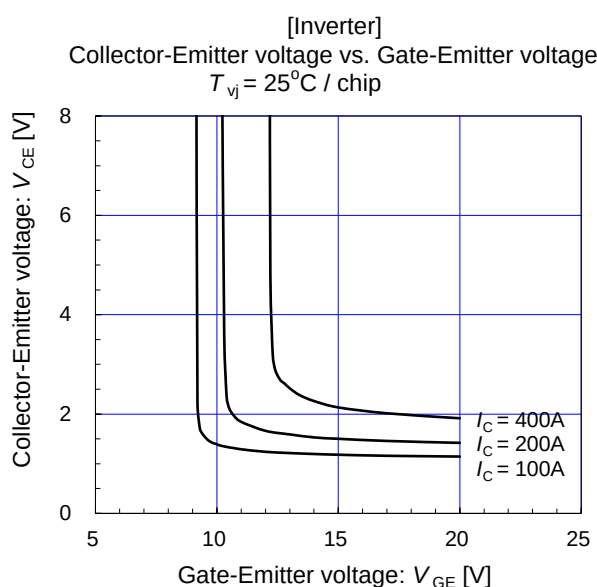
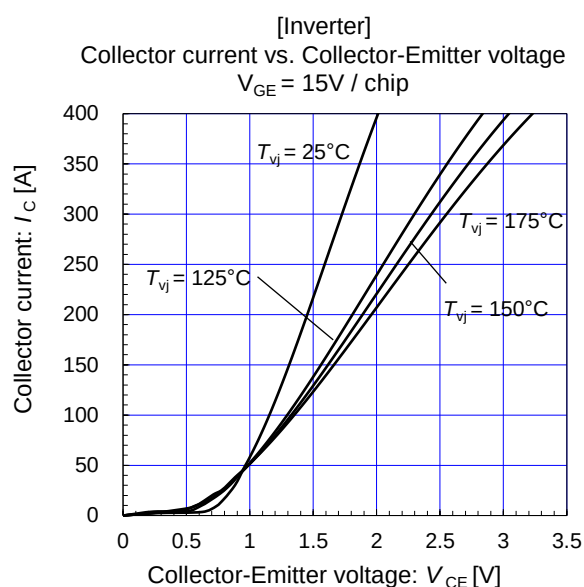
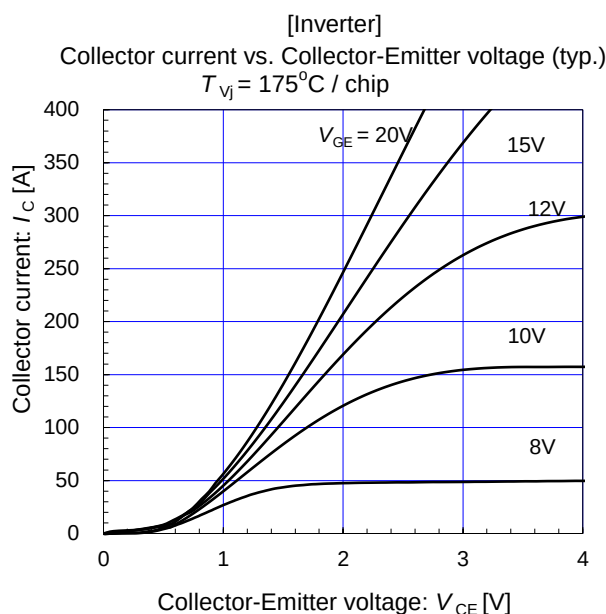
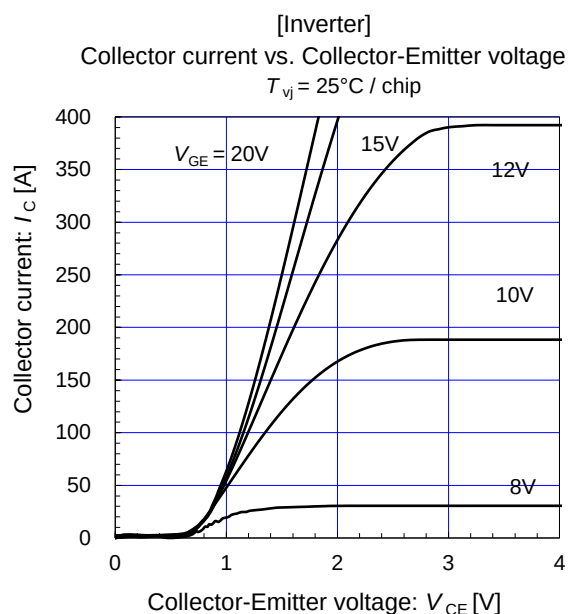
Thermal resistance characteristics

	Symbols	Conditions	Characteristics			ns
			min.	typ.	max.	
Thermal resistance junction to case (1device)	$R_{th(j-c)}$	IGBT	-	-	0.180	K/W
		FWD	-	-	0.271	
Thermal resistance case to heatsink (1IGBT + 1FWD) (*1)	$R_{th(c-s)}$	with 1 W/(m·K) thermal grease	-	0.050	-	

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

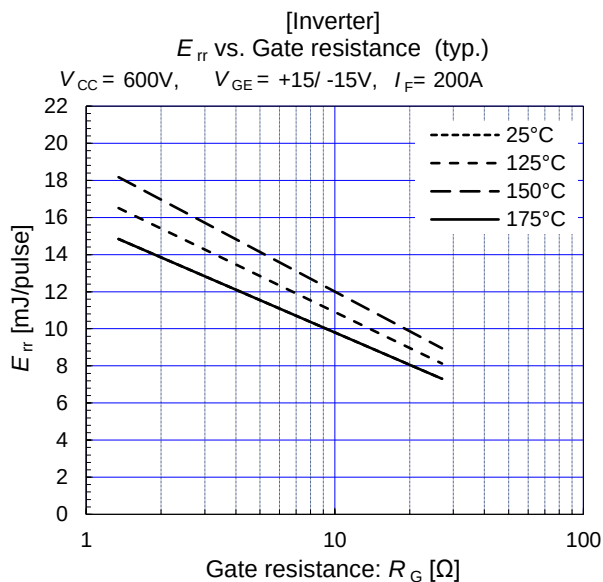
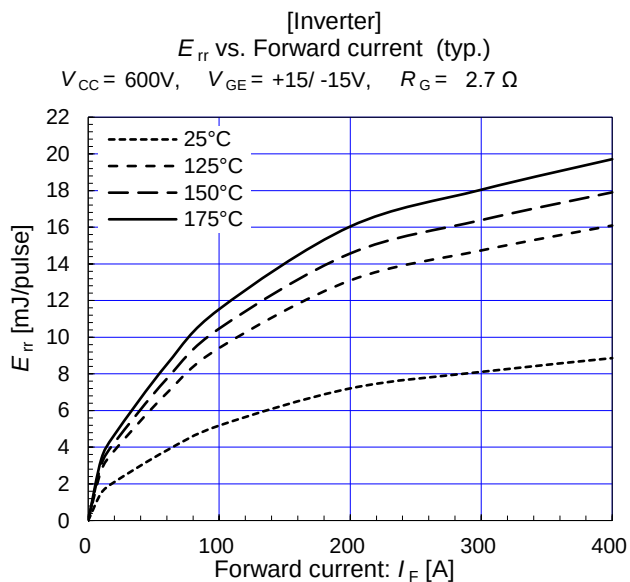
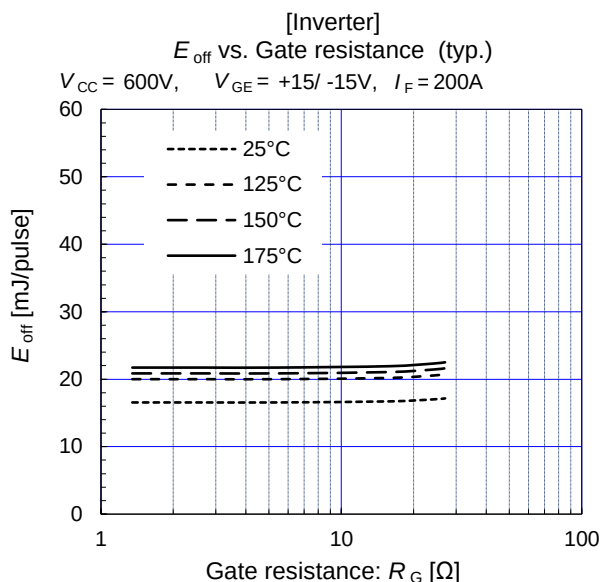
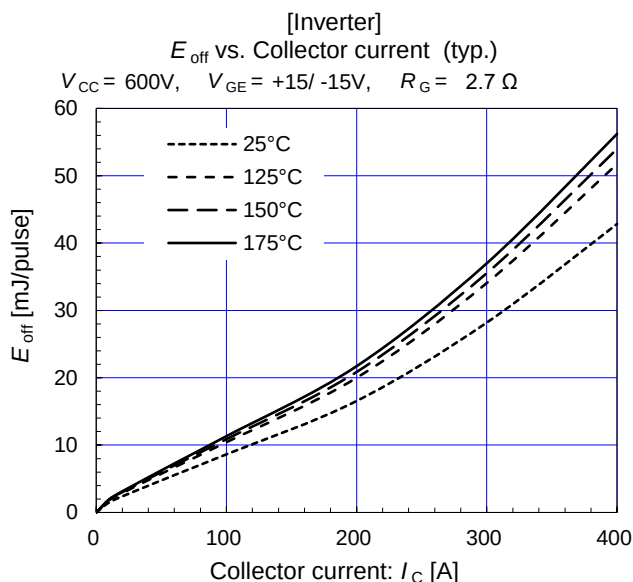
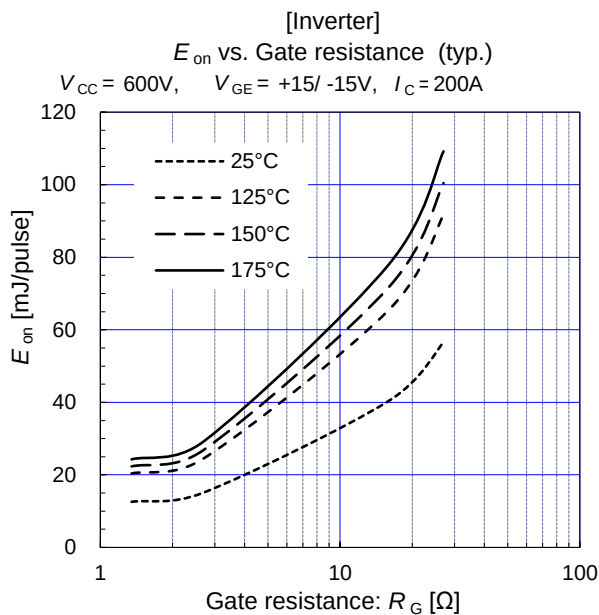
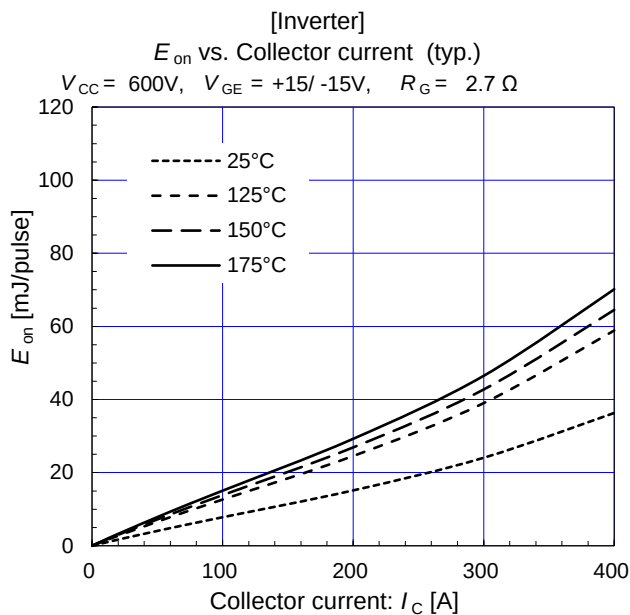
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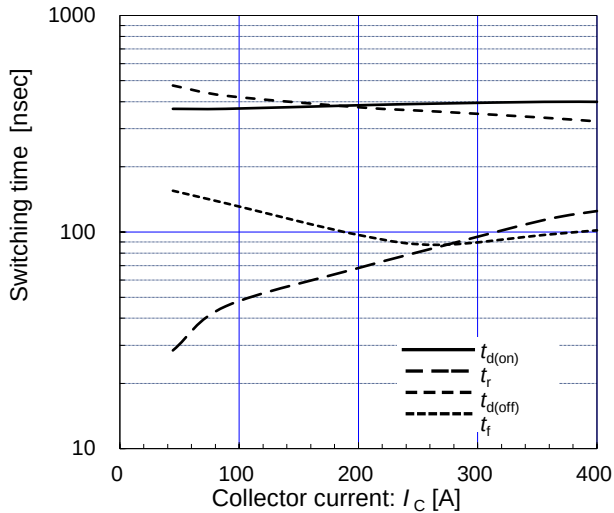


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[Inverter]

Switching time vs. Collector current (typ.)

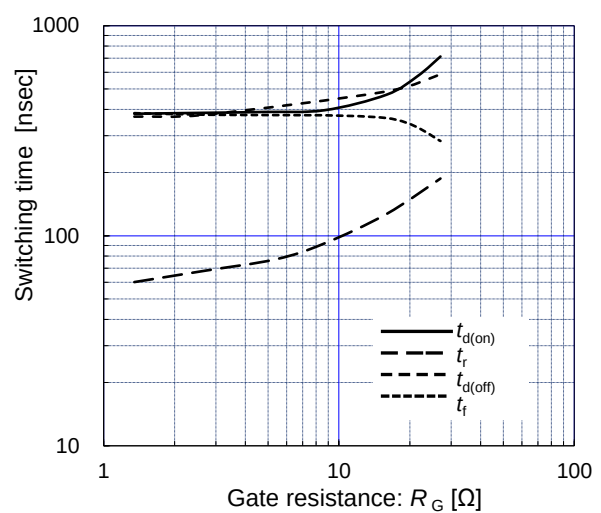
$V_{CC} = 600V$, $R_G = 2.7 \Omega$, $V_{GE} = +15/-15V$, $T_{vj} = 25^\circ C$



[Inverter]

Switching time vs. Gate resistance (typ.)

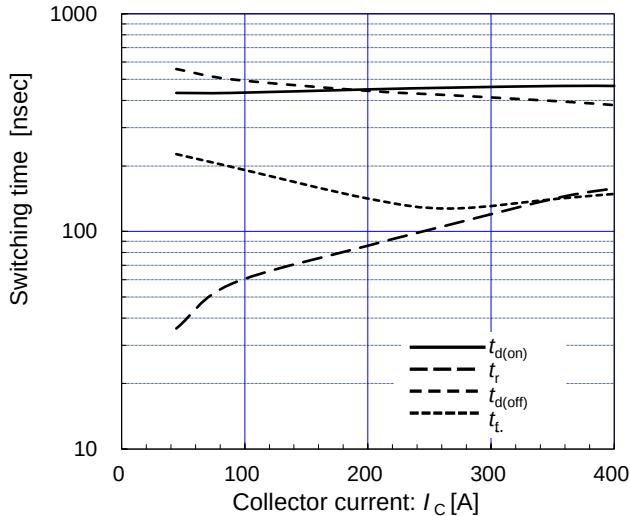
$V_{CC} = 600V$, $I_C = 200A$, $V_{GE} = +15/-15V$, $T_{vj} = 25^\circ C$



[Inverter]

Switching time vs. Collector current (typ.)

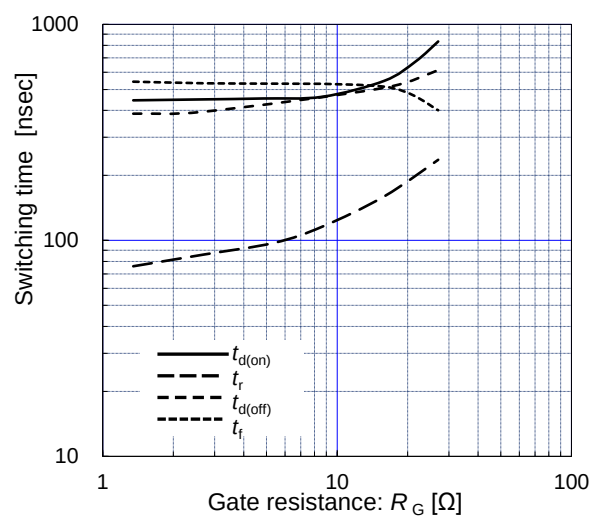
$V_{CC} = 600V$, $R_G = 2.7 \Omega$, $V_{GE} = +15/-15V$, $T_{vj} = 175^\circ C$



[Inverter]

Switching time vs. Gate resistance (typ.)

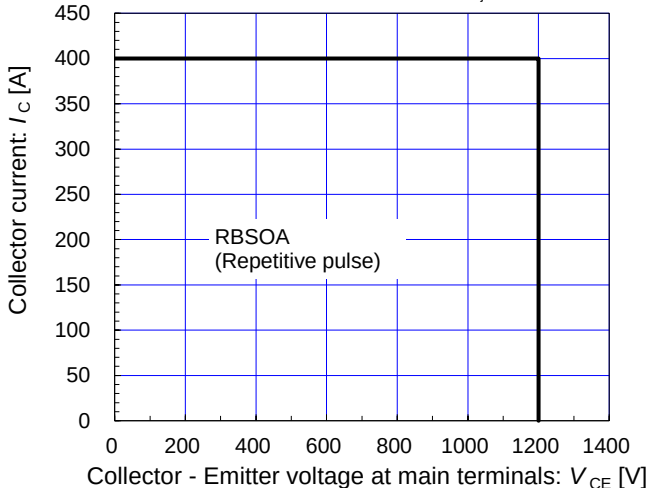
$V_{CC} = 600V$, $I_C = 200A$, $V_{GE} = +15/-15V$, $T_{vj} = 175^\circ C$



[Inverter]

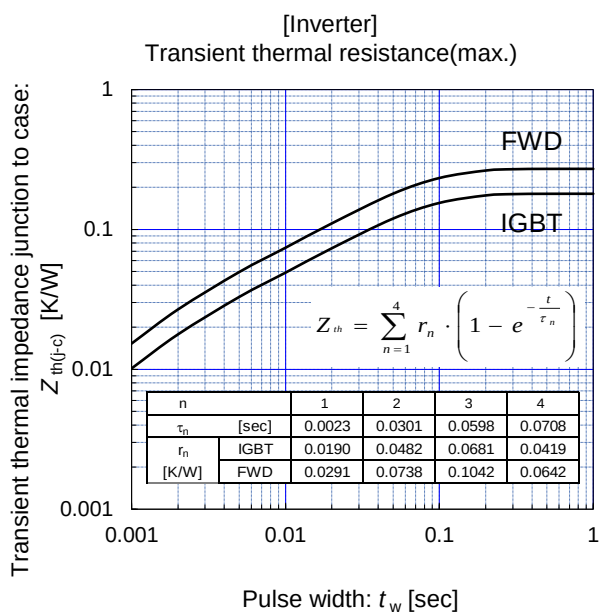
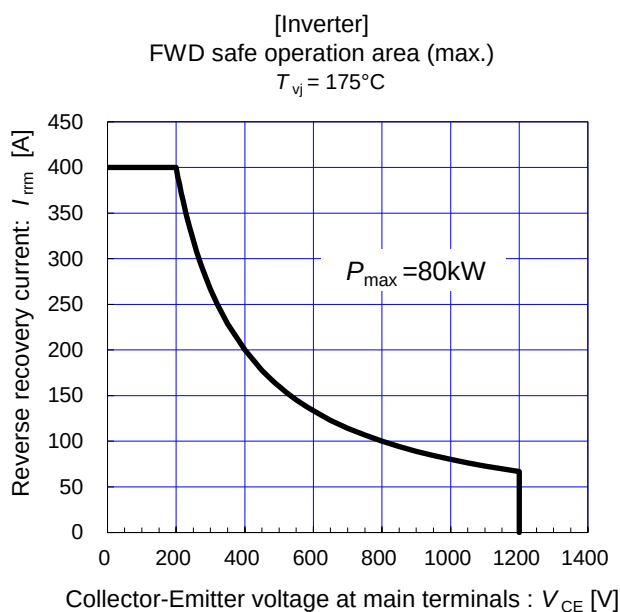
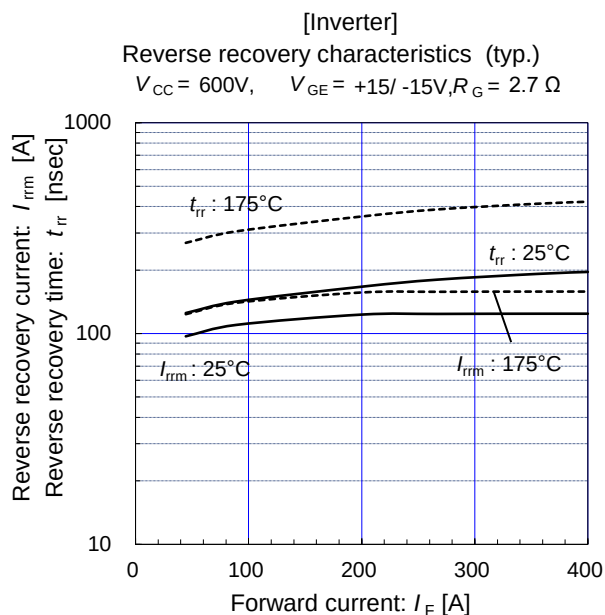
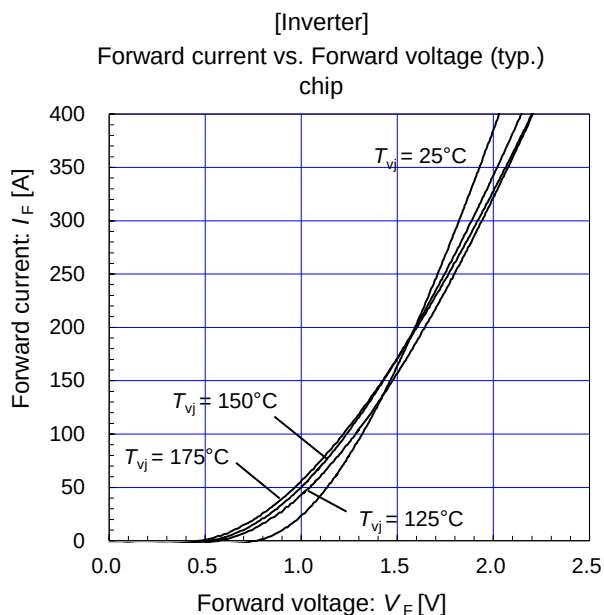
Reverse bias safe operating area (max.)

$V_{GE} = +15/-15V$, $R_G = 2.7 \Omega$, $T_{vj} = 175^\circ C$



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