

2MBI100XAA120-50

IGBT Modules

Power Module (X series)
1200V / 100A / 2-in-1 package

■ Features

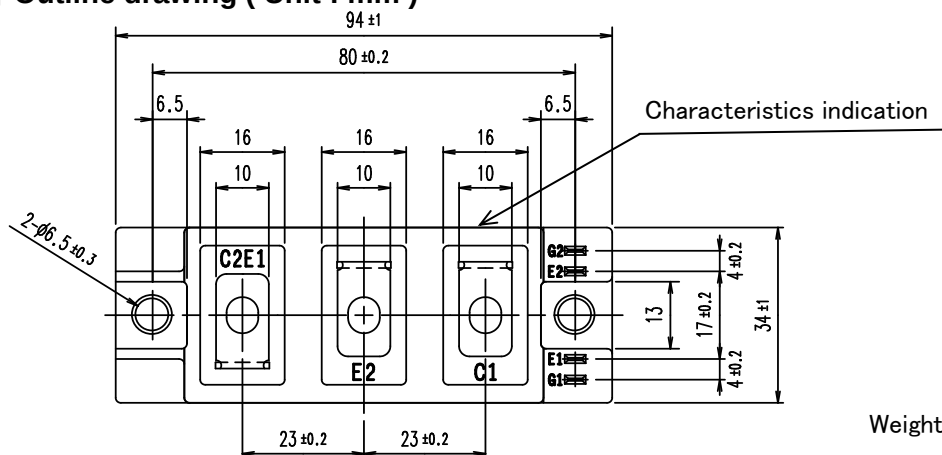
- LOW $V_{CE(sat)}$
- High speed switching
- Low Inductance Module structure

■ Applications

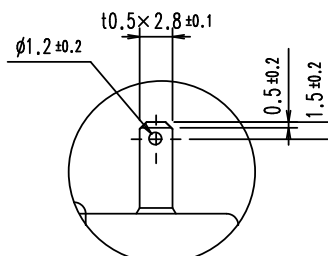
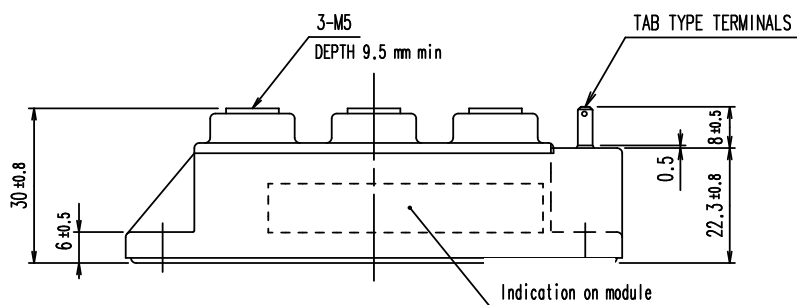
- Inverter for Motor Drives, AC and DC Servo Drives
- Uninterruptible Power Supply Systems,
- Industrial machines, such as Welding machines



■ Outline drawing (Unit : mm)

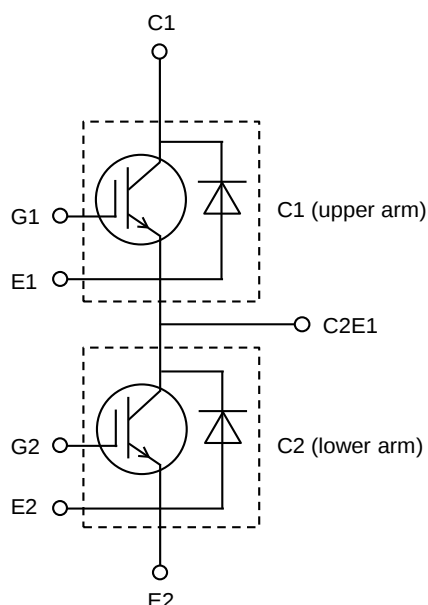


Weight: 180 g(typ.)



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	$T_c = 100^\circ\text{C}$	100	A
	Repetitive peak collector current	I_{CRM}	1ms		200	
	Forward current	I_F			100	
	Repetitive peak forward current	I_{FRM}	1ms		200	
	Total power dissipation	P_{tot}	1 device		530	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 T_{vj}= 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	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 100mA$		6.0	6.5	7.0	V	
	Collector-emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 100A$	$T_{vj}=25^{\circ}C$	-	1.60	2.05	V	
		$V_{CE(sat)}$ (chip)		$T_{vj}=25^{\circ}C$	-	1.40	1.85		
				$T_{vj}=125^{\circ}C$	-	1.70	-		
				$T_{vj}=150^{\circ}C$	-	1.80	-		
				$T_{vj}=175^{\circ}C$	-	1.85	-		
	Internal Gate resistance	r_g	-		-	9.00	-	Ω	
	Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$		-	12	-	nF	
	Output capacitance	C_{oes}			-	0.4	-		
	Reverse transfer capacitance	C_{res}			-	0.10	-		
	Gate charge	Q_G	$V_{CC} = 600V, I_C = 100A$ $V_{GE} = -15 \rightarrow +15V$		-	0.7	-	μC	
	Forward voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 100A$	$T_{vj}=25^{\circ}C$	-	1.80	2.25	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)	$t_{d(on)}$	$V_{CC} = 600V$ $I_C, I_F = 100A$ $V_{GE} = +15/-15V$ $R_G = 5.6 \Omega$ $L_S = 30 nH$	$T_{vj}= 25^{\circ}C$	-	0.34	-	μs	
	Rise time(*1)	t_r		$T_{vj}=125^{\circ}C$	-	0.38	-		
$T_{vj}=150^{\circ}C$				-	0.38	-			
$T_{vj}=175^{\circ}C$				-	0.39	-			
$T_{vj}= 25^{\circ}C$				-	0.07	-			
Turn-off delay time(*1)	$t_{d(off)}$	$T_{vj}=125^{\circ}C$		-	0.09	-			
		$T_{vj}=150^{\circ}C$		-	0.09	-			
		$T_{vj}=175^{\circ}C$		-	0.09	-			
		$T_{vj}= 25^{\circ}C$		-	0.31	-			
Fall time(*1)	t_f	$T_{vj}=125^{\circ}C$		-	0.36	-			
		$T_{vj}=150^{\circ}C$		-	0.37	-			
		$T_{vj}=175^{\circ}C$		-	0.51	-			
		$T_{vj}= 25^{\circ}C$		-	0.16	-			
Reverse recovery time	t_{rr}	$T_{vj}=125^{\circ}C$		-	0.25	-			
		$T_{vj}=150^{\circ}C$		-	0.27	-			
		$T_{vj}=175^{\circ}C$		-	0.26	-			
		$T_{vj}= 25^{\circ}C$		-	0.48	-			
				$T_{vj}=125^{\circ}C$	-	0.60	-		
				$T_{vj}=150^{\circ}C$	-	0.63	-		
				$T_{vj}=175^{\circ}C$	-	0.70	-		

(*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.	
Inverter	Turn-on energy	E_{on}	$V_{\text{CC}} = 600\text{V}$ $I_{\text{C}}, I_{\text{F}} = 100\text{A}$ $V_{\text{GE}} = +15/-15\text{V}$ $R_{\text{G}} = 5.6\ \Omega$ $L_{\text{S}} = 30\ \text{nH}$	$T_{\text{vj}}= 25^{\circ}\text{C}$	-	8.6	-	mJ
				$T_{\text{vj}}=125^{\circ}\text{C}$	-	12.7	-	
				$T_{\text{vj}}=150^{\circ}\text{C}$	-	13.7	-	
				$T_{\text{vj}}=175^{\circ}\text{C}$	-	15.3	-	
	Turn-off energy	E_{off}		$T_{\text{vj}}= 25^{\circ}\text{C}$	-	7.4	-	
				$T_{\text{vj}}=125^{\circ}\text{C}$	-	9.7	-	
				$T_{\text{vj}}=150^{\circ}\text{C}$	-	10.2	-	
				$T_{\text{vj}}=175^{\circ}\text{C}$	-	10.8	-	
	Reverse recovery energy	E_{rr}		$T_{\text{vj}}= 25^{\circ}\text{C}$	-	2.4	-	
				$T_{\text{vj}}=125^{\circ}\text{C}$	-	4.9	-	
				$T_{\text{vj}}=150^{\circ}\text{C}$	-	5.5	-	
				$T_{\text{vj}}=175^{\circ}\text{C}$	-	6.5	-	

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.

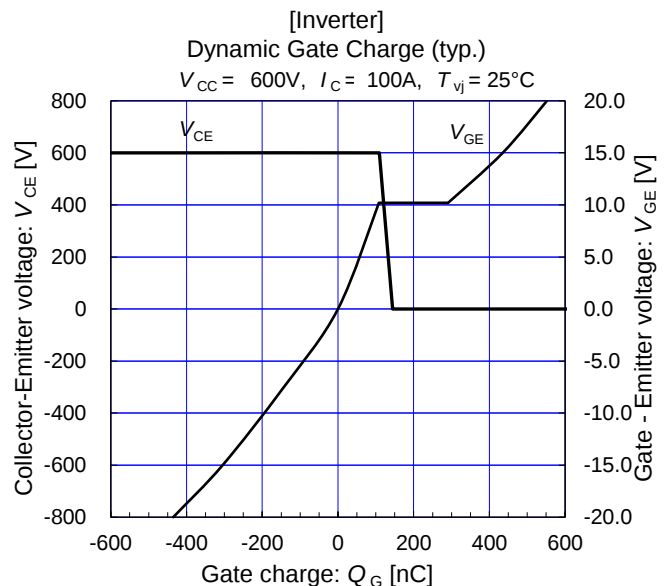
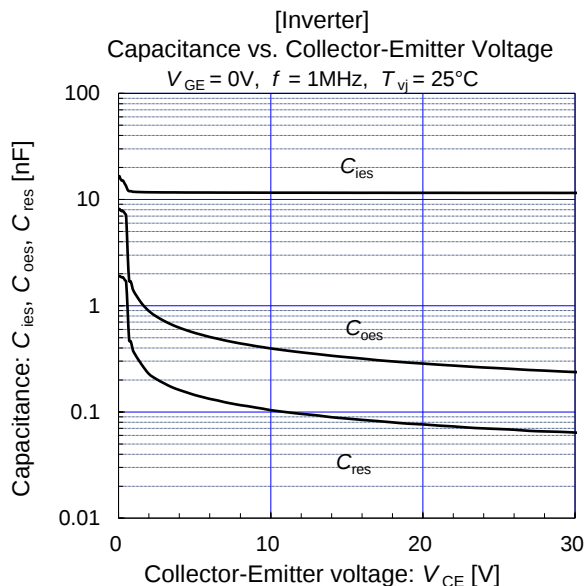
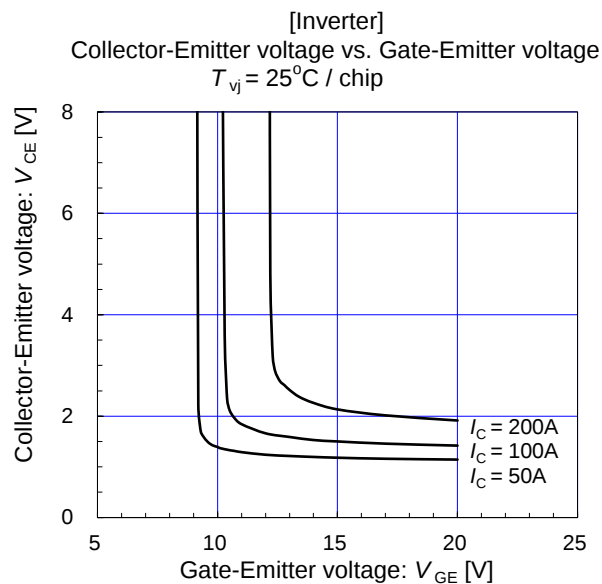
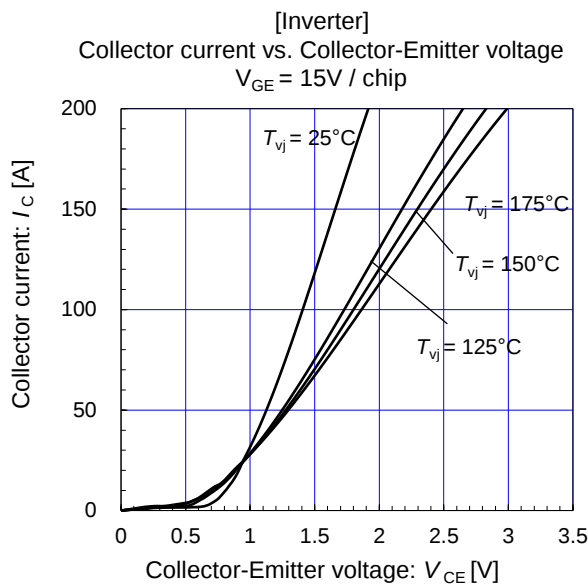
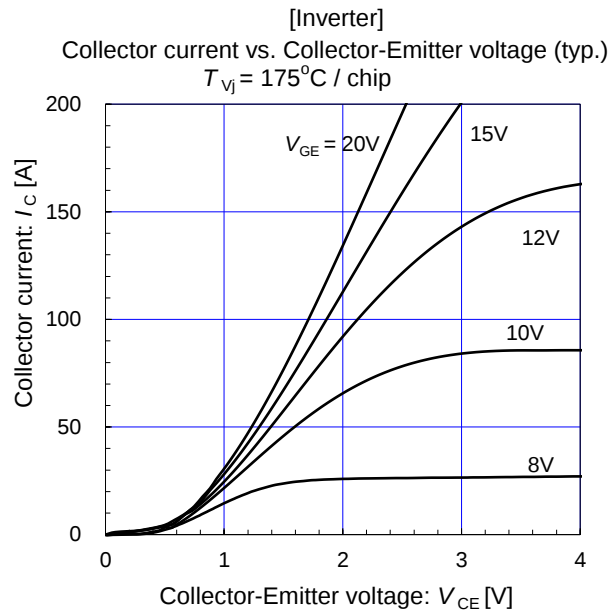
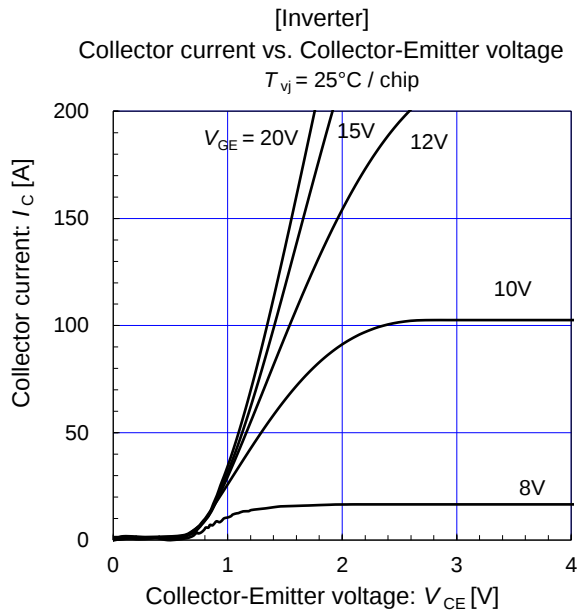
Thermal resistance characteristics

	Symbols	Conditions	Characteristics			ns
			min.	typ.	max.	
Thermal resistance junction to case (1device)	$R_{th(j-c)}$	IGBT	-	-	0.281	K/W
		FWD	-	-	0.550	
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.

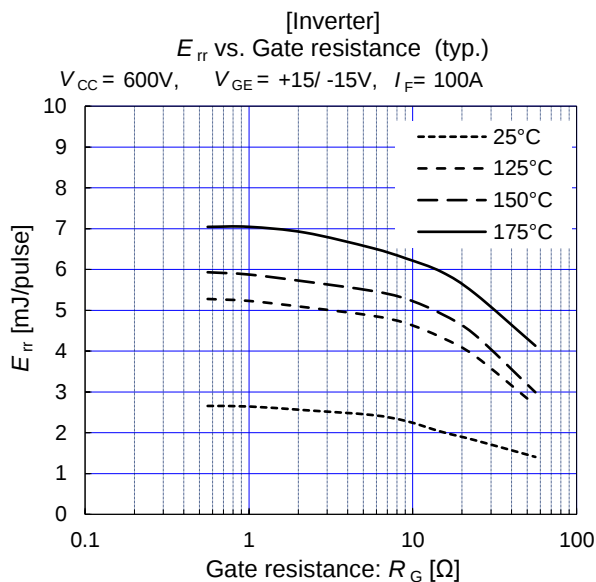
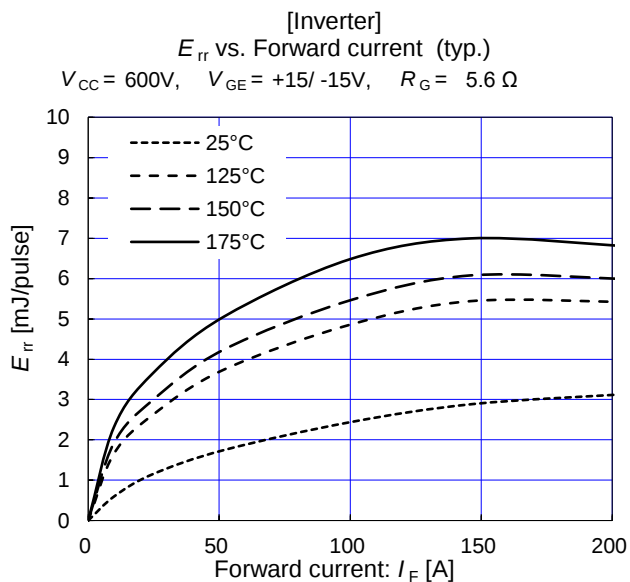
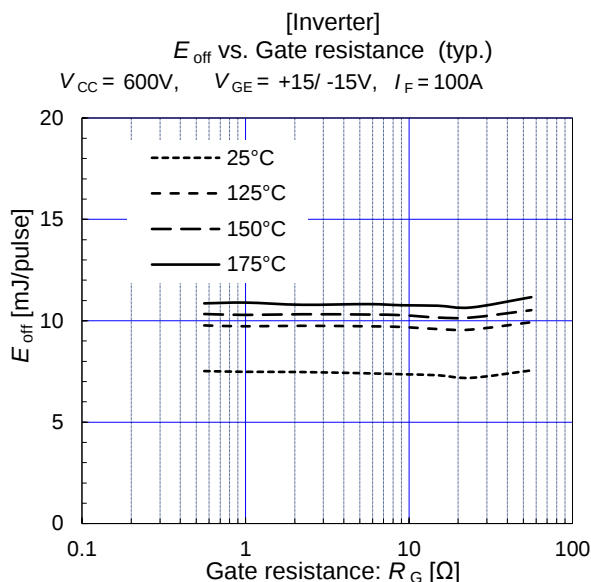
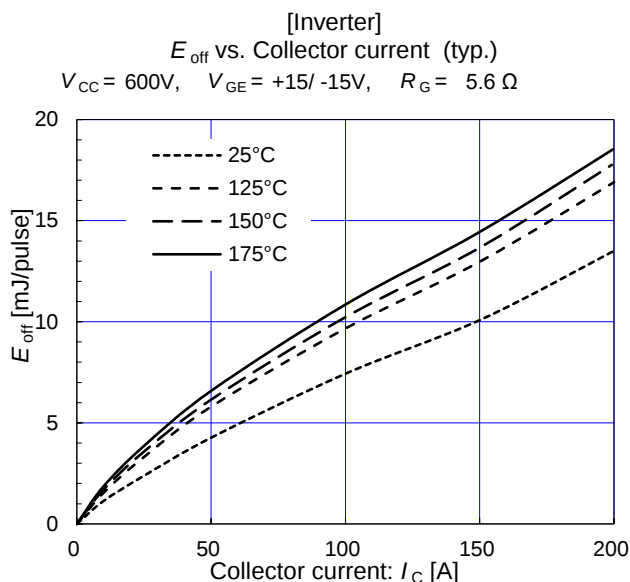
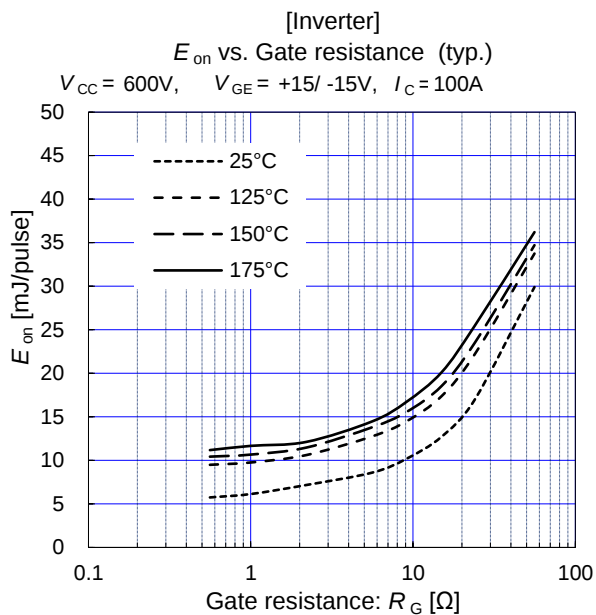
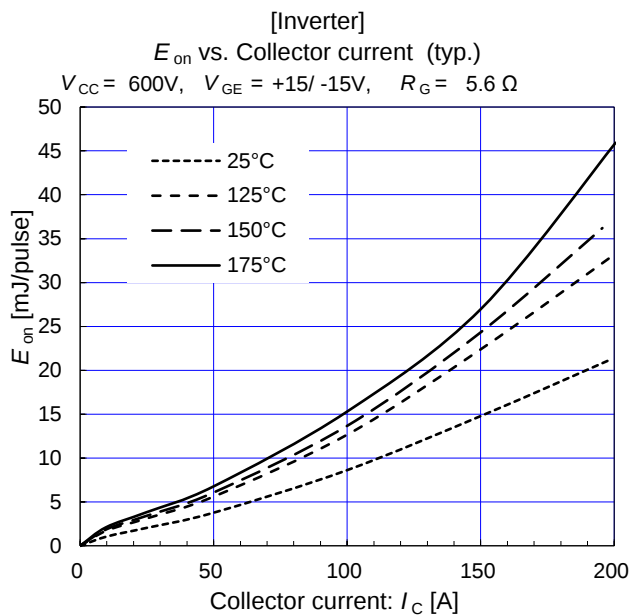
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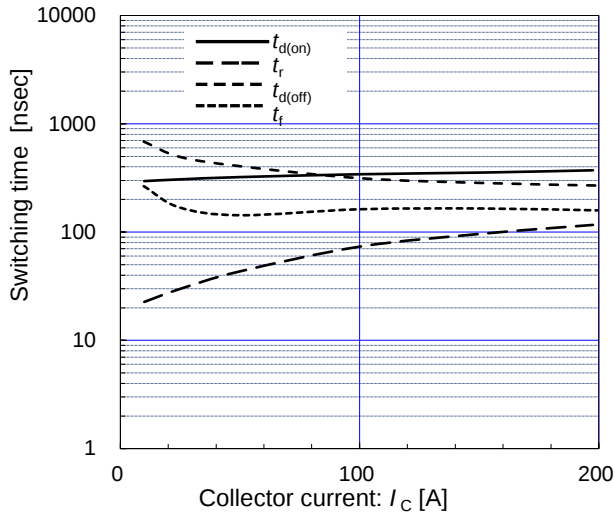
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[Inverter]

Switching time vs. Collector current (typ.)

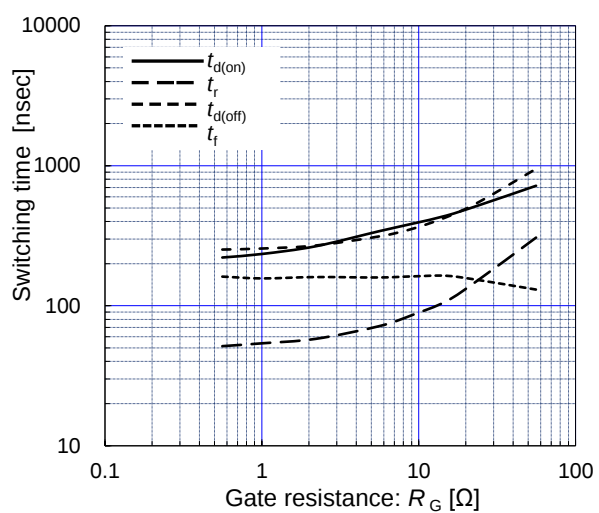
$V_{CC} = 600V$, $R_G = 5.6 \Omega$, $V_{GE} = +15/-15V$, $T_{vj} = 25^\circ C$



[Inverter]

Switching time vs. Gate resistance (typ.)

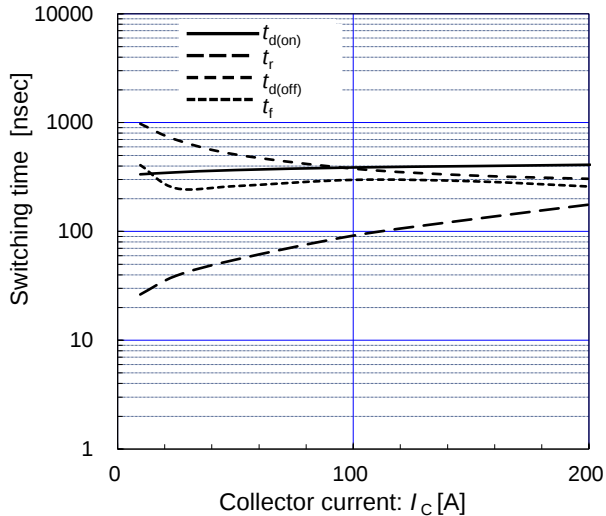
$V_{CC} = 600V$, $I_C = 100A$, $V_{GE} = +15/-15V$, $T_{vj} = 25^\circ C$



[Inverter]

Switching time vs. Collector current (typ.)

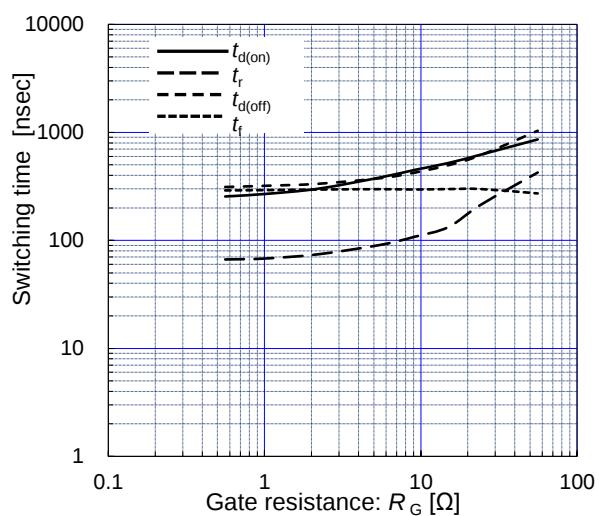
$V_{CC} = 600V$, $R_G = 5.6 \Omega$, $V_{GE} = +15/-15V$, $T_{vj} = 175^\circ C$



[Inverter]

Switching time vs. Gate resistance (typ.)

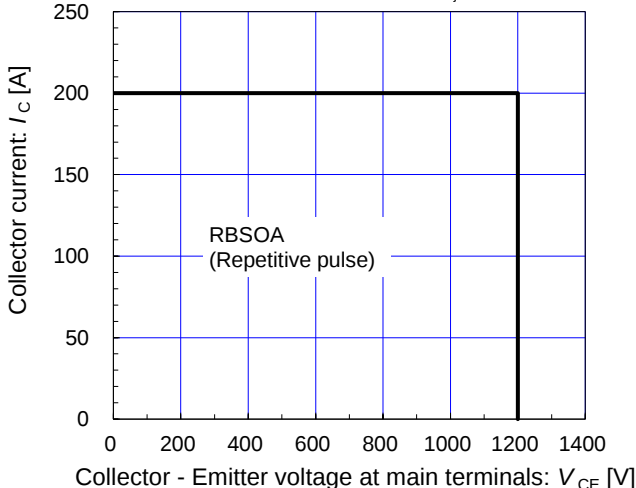
$V_{CC} = 600V$, $I_C = 100A$, $V_{GE} = +15/-15V$, $T_{vj} = 175^\circ C$



[Inverter]

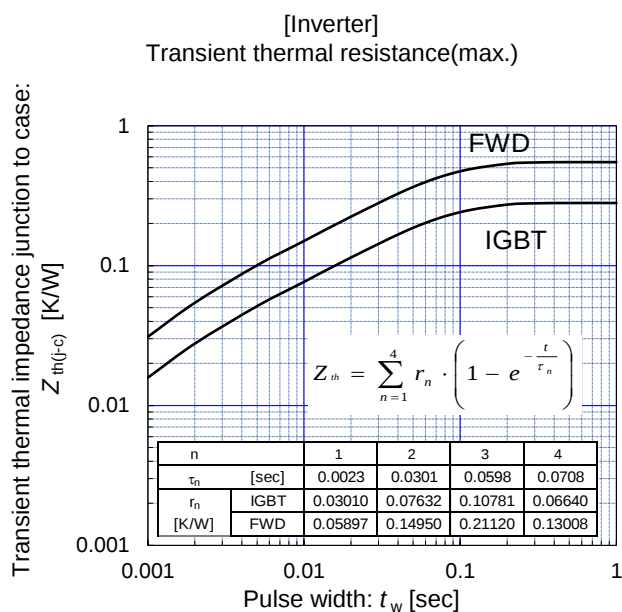
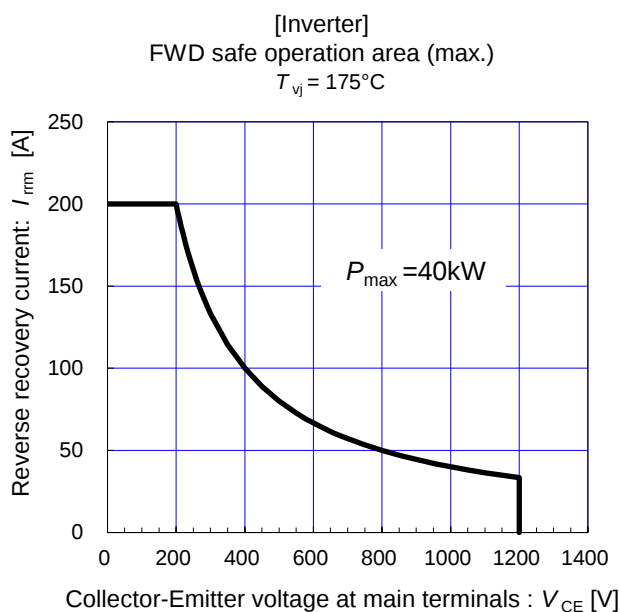
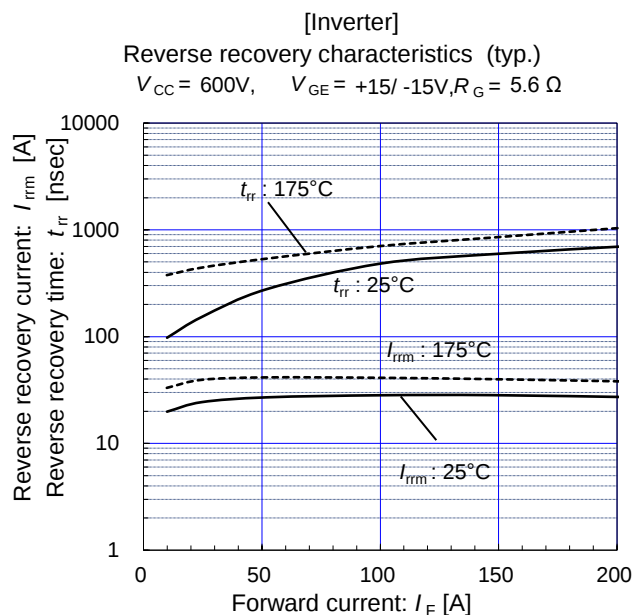
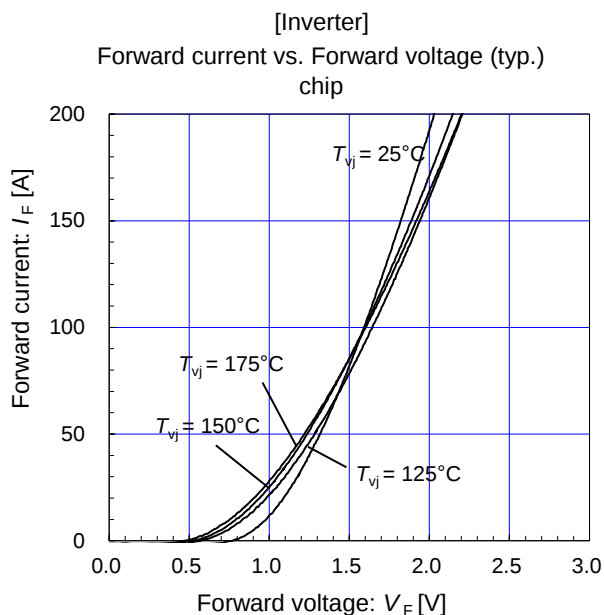
Reverse bias safe operating area (max.)

$V_{GE} = +15/-15V$, $R_G = 5.6 \Omega$, $T_{vj} = 175^\circ C$



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