

2MBI225XNB120-50

IGBT Modules

Power Module (X series)
1200V / 225A / 2-in-1 package

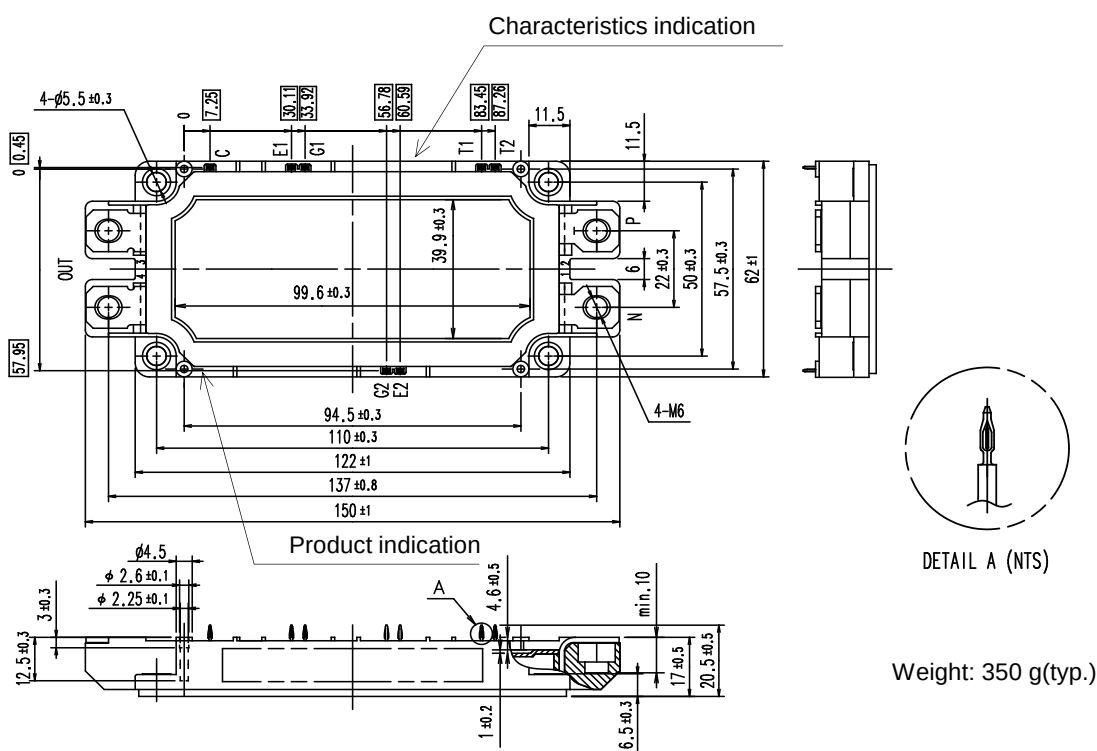
■ Features

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

■ Applications

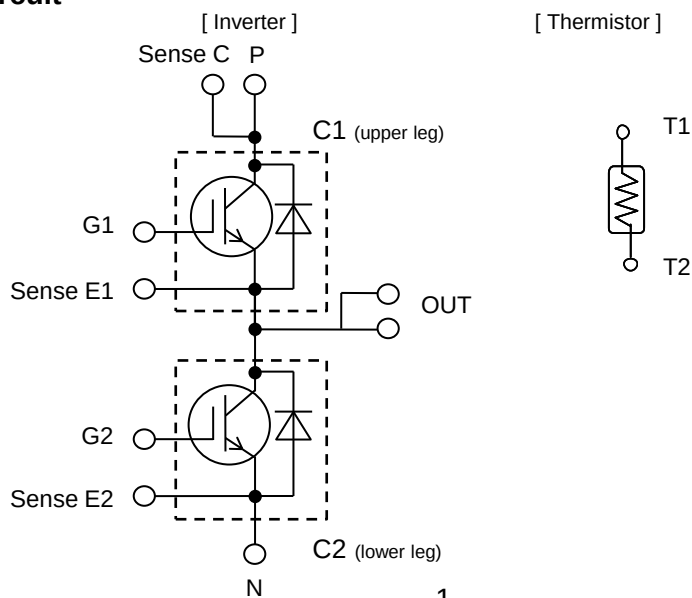
- Inverter for Motor Drives, AC and DC Servo Drives
- Uninterruptible Power Supply Systems, Wind Turbines, PV Power Conditioning Systems

■ Outline drawing (Unit : mm)



NOTE) shows theoretical dimension and tolerance is ± 0.5

■ 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	$T_c = 100^\circ\text{C}$	225	A
	Repetitive peak collector current	I_{CRM}	1ms		450	
	Forward current	I_F			225	
	Repetitive peak forward current	I_{FRM}	1ms		450	
	Total power dissipation	P_{tot}	1 device		1030	W
	Virtual junction temperature	T_{vj}			175	$^\circ\text{C}$
	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.		2500	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)

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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	Collector-emitter cut-off current, gate-emitter short-circuited	I_{CES}	$V_{GE} = 0V$ $V_{CE} = 1200V$		-	-	150	μA
	Gate leakage current, collector-emitter short-circuited	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$		-	-	300	nA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V$ $I_C = 225mA$		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 225A$	$T_{vj}=25^{\circ}C$	-	1.75	2.20	V
		$V_{CE(sat)}$ (chip)		$T_{vj}=25^{\circ}C$	-	1.45	1.90	
				$T_{vj}=125^{\circ}C$	-	1.80	-	
				$T_{vj}=150^{\circ}C$	-	1.90	-	
				$T_{vj}=175^{\circ}C$	-	1.95	-	
	Internal gate resistance	r_g	-		-	5.00	-	Ω
	Capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$		-	24	-	nF
		C_{oes}			-	0.8	-	
		C_{res}			-	0.21	-	
	Gate charge	Q_G	$V_{CC} = 600V, I_C = 225A$ $V_{GE} = -15 \rightarrow +15V$		-	1.6	-	μC
	Forward voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 225A$	$T_{vj}=25^{\circ}C$	-	1.90	2.35	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	-	
	Switching time (*1)	$t_{d(on)}$	$V_{CC} = 600V$ $I_C, I_F = 225A$ $V_{GE} = +15/-15 V$ $R_G = \pm 0.82\Omega$ $L_S = 35 nH$	$T_{vj}= 25^{\circ}C$	-	0.23	-	μs
				$T_{vj}=125^{\circ}C$	-	0.27	-	
$T_{vj}=150^{\circ}C$				-	0.27	-		
$T_{vj}=175^{\circ}C$				-	0.28	-		
t_r		$T_{vj}= 25^{\circ}C$		-	0.07	-		
		$T_{vj}=125^{\circ}C$		-	0.08	-		
		$T_{vj}=150^{\circ}C$		-	0.08	-		
		$T_{vj}=175^{\circ}C$		-	0.08	-		
$t_{d(off)}$		$T_{vj}= 25^{\circ}C$		-	0.33	-		
		$T_{vj}=125^{\circ}C$		-	0.35	-		
		$T_{vj}=150^{\circ}C$		-	0.35	-		
		$T_{vj}=175^{\circ}C$		-	0.36	-		
t_f		$T_{vj}= 25^{\circ}C$		-	0.05	-		
		$T_{vj}=125^{\circ}C$		-	0.06	-		
		$T_{vj}=150^{\circ}C$		-	0.07	-		
		$T_{vj}=175^{\circ}C$		-	0.08	-		
Reverse recovery time	t_{rr}	$T_{vj}= 25^{\circ}C$		-	0.14	-		
		$T_{vj}=125^{\circ}C$		-	0.27	-		
		$T_{vj}=150^{\circ}C$		-	0.35	-		
		$T_{vj}=175^{\circ}C$		-	0.40	-		

(*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	Switching loss (per pulse)	E_{on}	$V_{CC} = 600V$	$T_{vj}=25^{\circ}C$	-	21.5	-	mJ
			$I_C, I_F = 225A$	$T_{vj}=125^{\circ}C$	-	31.4	-	
			$V_{GE} = +15/-15 V$	$T_{vj}=150^{\circ}C$	-	35.1	-	
			$R_G = \pm 0.82\Omega$	$T_{vj}=175^{\circ}C$	-	38.6	-	
		E_{off}	$L_S = 35 nH$	$T_{vj}=25^{\circ}C$	-	14.3	-	
				$T_{vj}=125^{\circ}C$	-	17.9	-	
				$T_{vj}=150^{\circ}C$	-	18.8	-	
				$T_{vj}=175^{\circ}C$	-	20.6	-	
		E_{rr}		$T_{vj}=25^{\circ}C$	-	9.1	-	
				$T_{vj}=125^{\circ}C$	-	14.0	-	
				$T_{vj}=150^{\circ}C$	-	15.7	-	
				$T_{vj}=175^{\circ}C$	-	18.7	-	
Thermistor	Resistance	R	$T = 25^{\circ}C$	-	5000	-	Ω	
			$T = 100^{\circ}C$	465	495	520		
	B value	B	$T = 25/ 50^{\circ}C$	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.

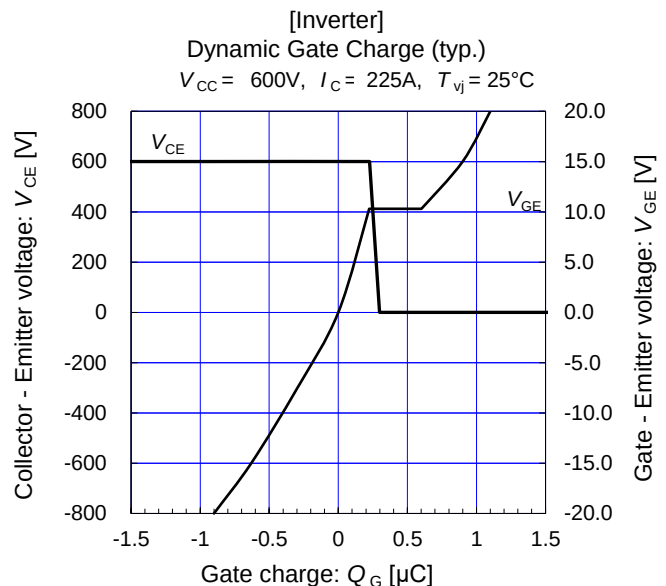
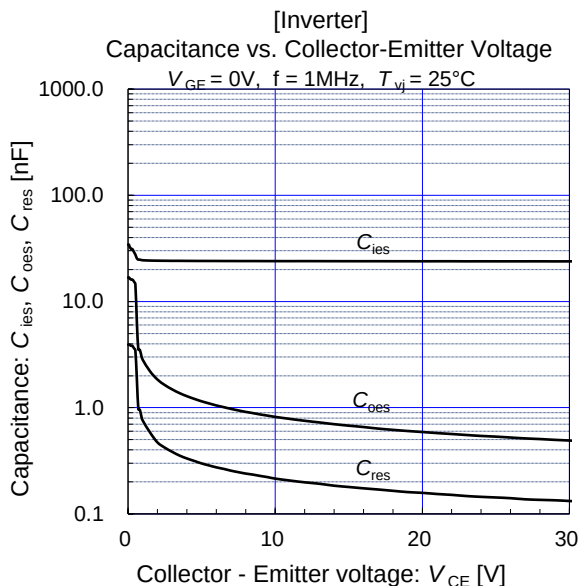
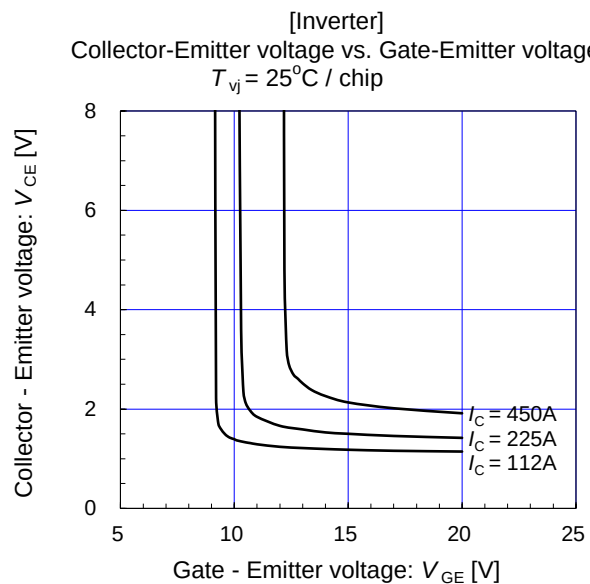
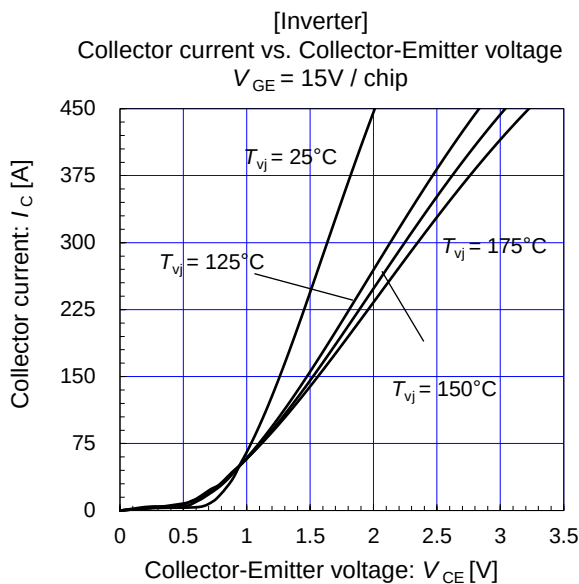
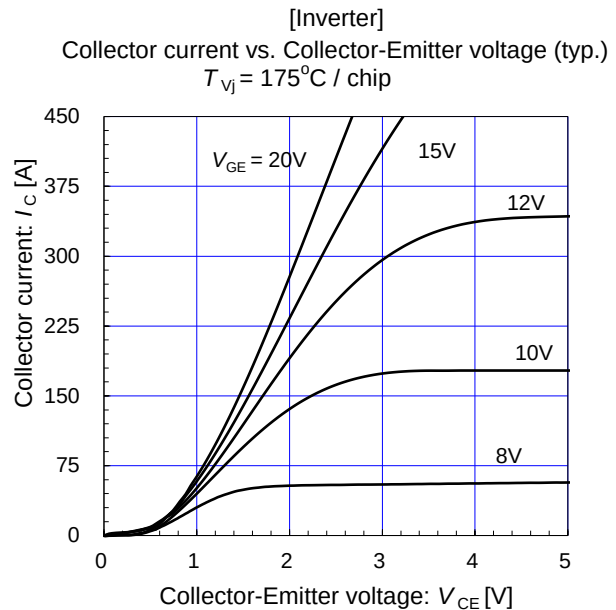
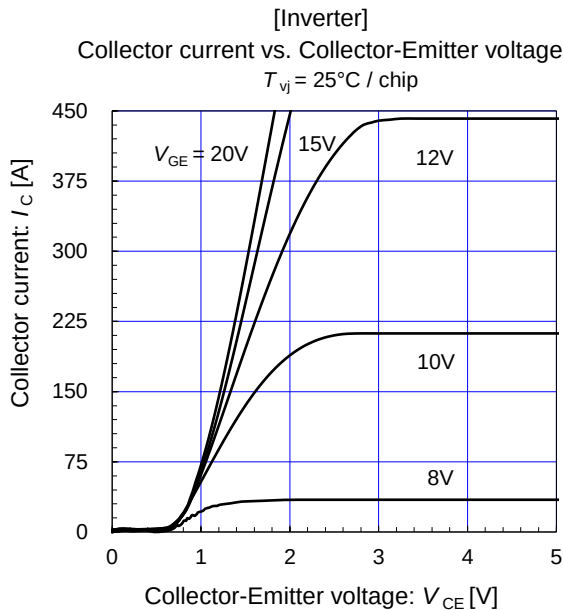
■ Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance junction to case(1 device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.145	K/W
		Inverter FWD	-	-	0.190	
Thermal resistance case to heatsink(1 IGBT+1 FWD) (*1)	$R_{th(c-s)}$	with 1 W/(m·K) thermal grease	-	0.0167	-	

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

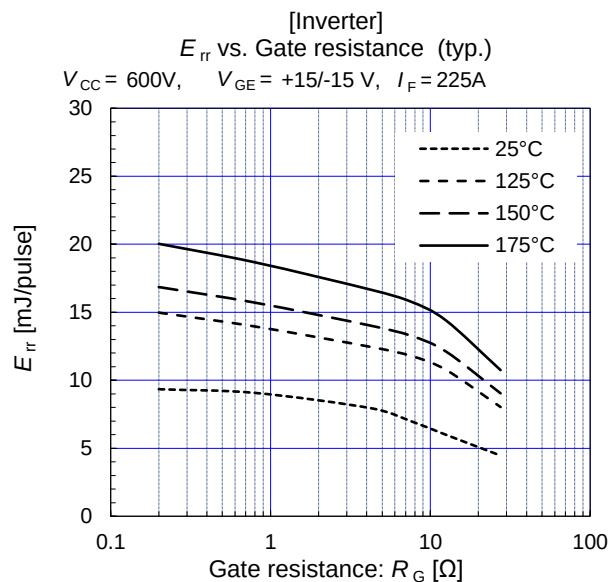
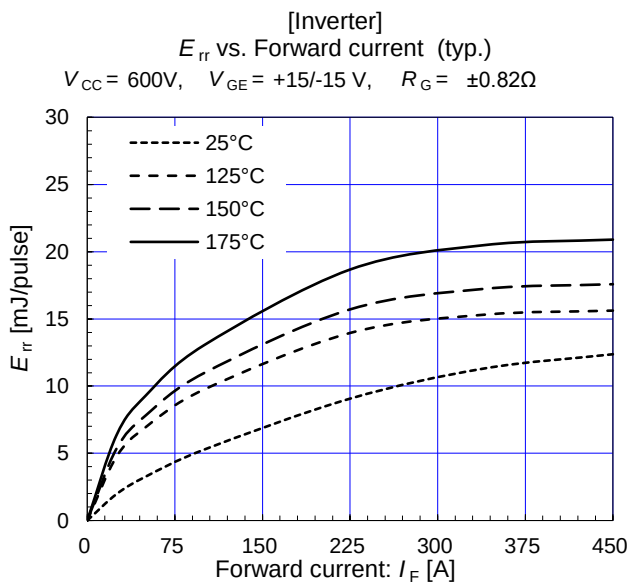
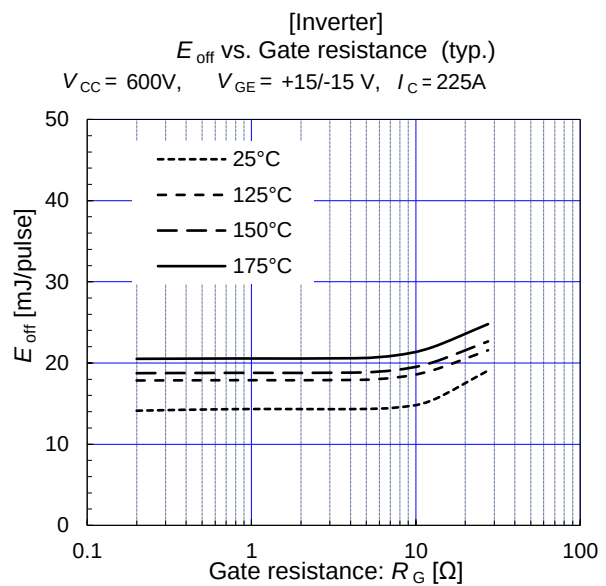
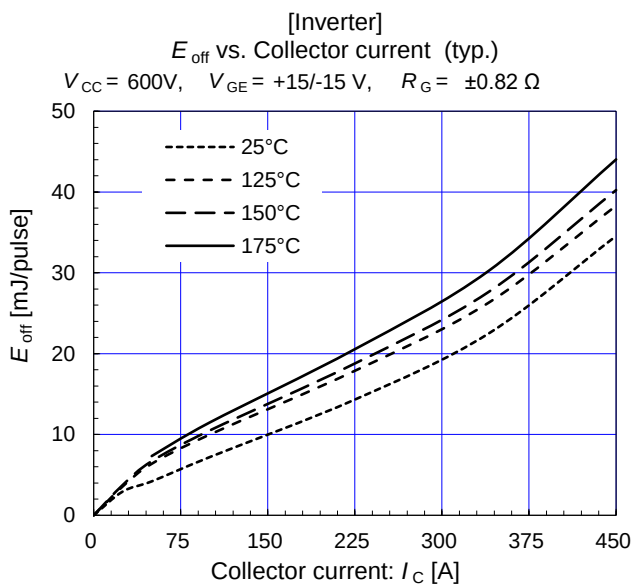
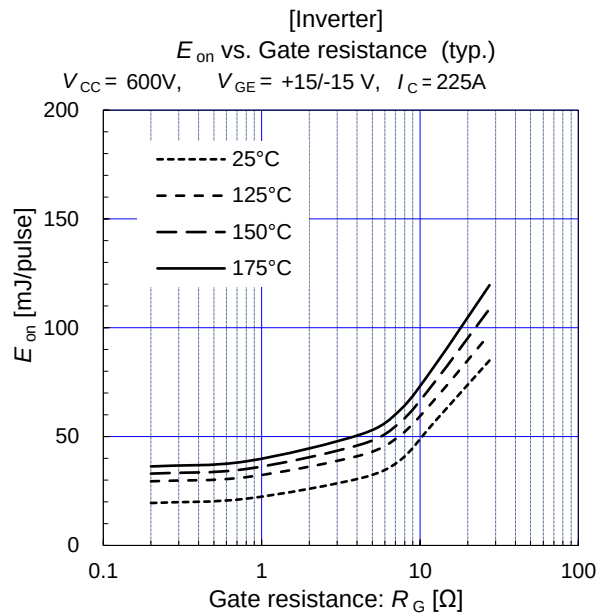
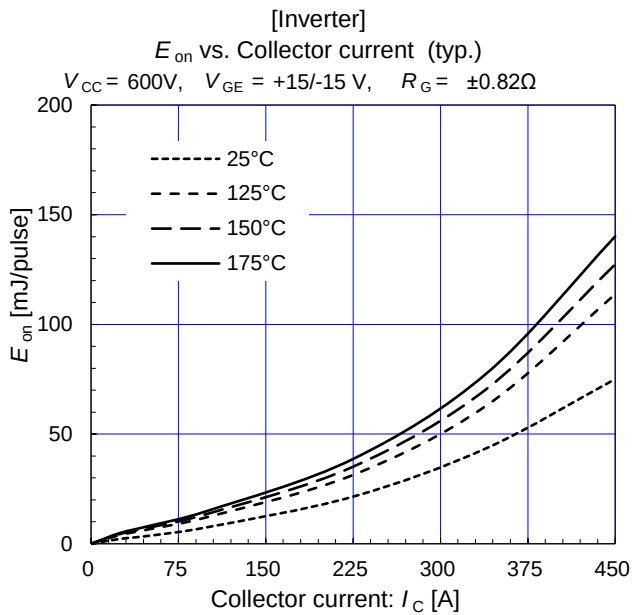
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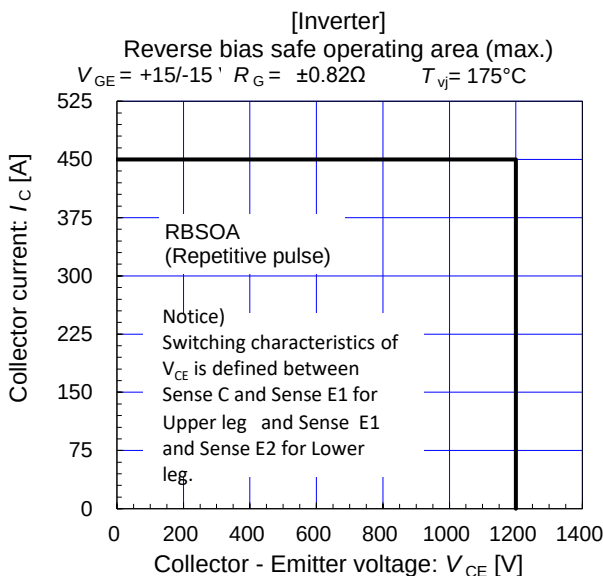
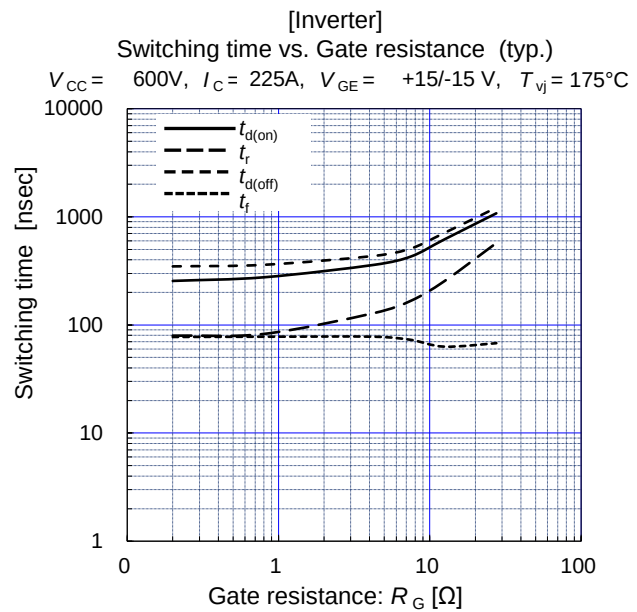
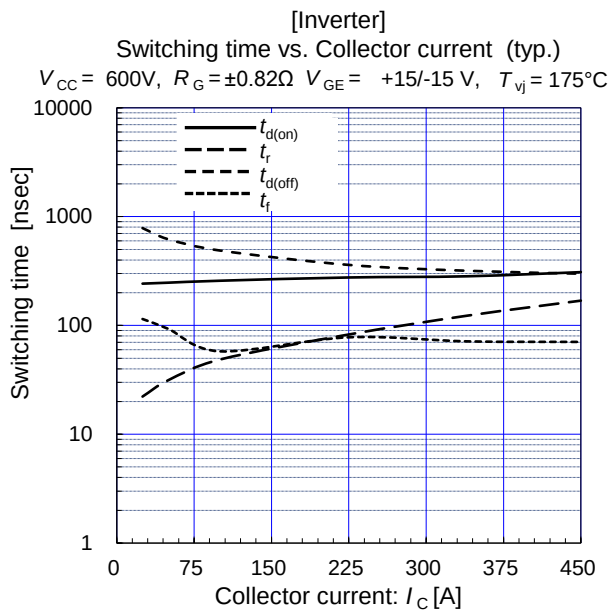
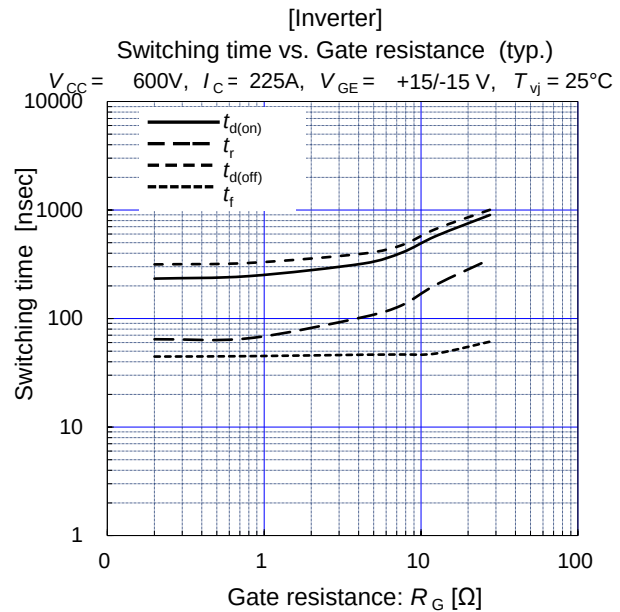
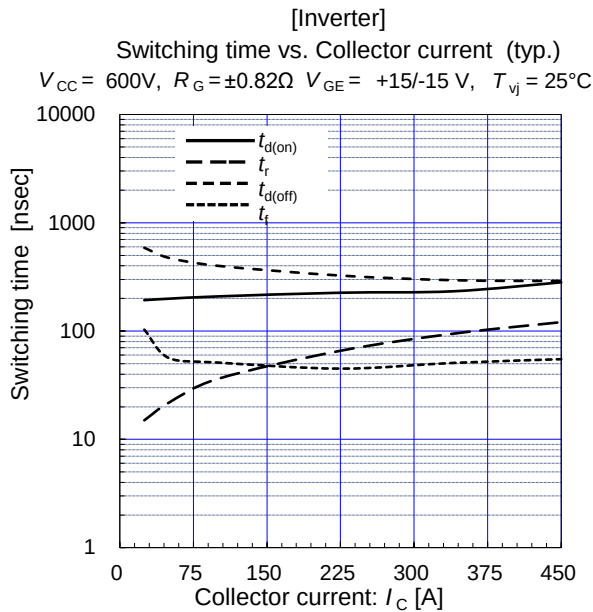
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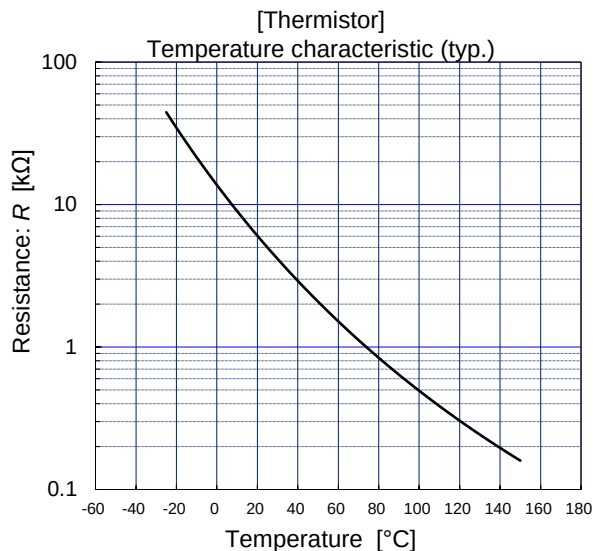
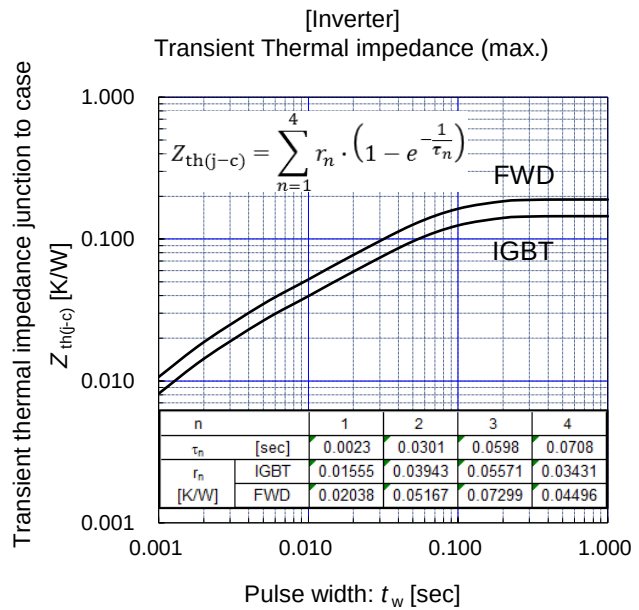
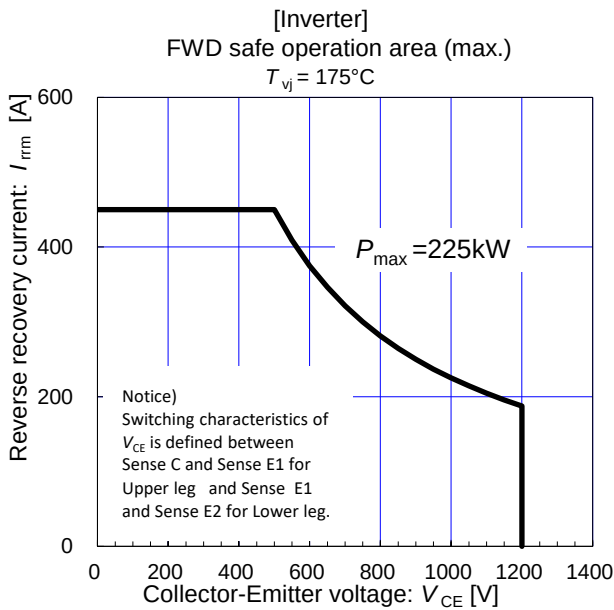
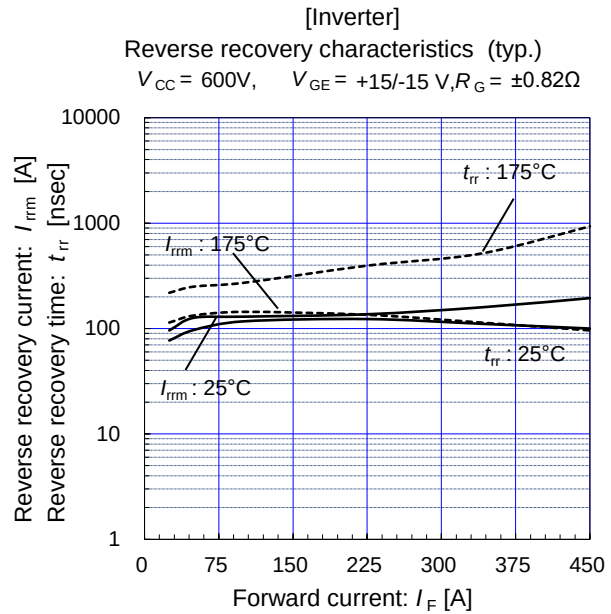
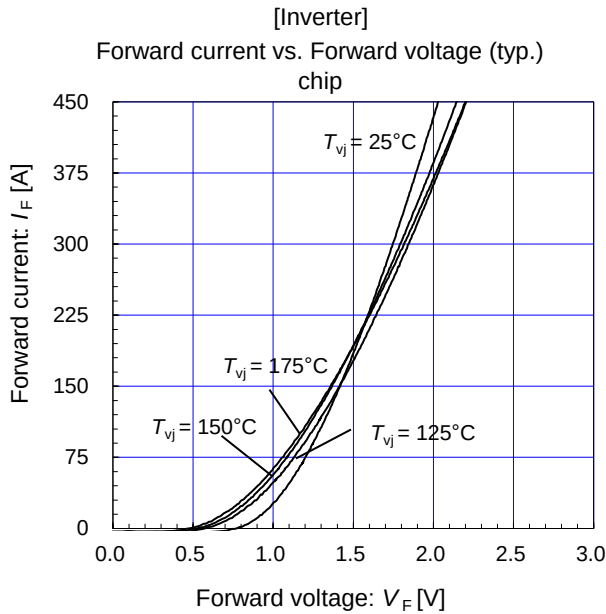
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