2MBI800XNE120-50

IGBT Modules

Power Module (X series)
1200V / 800A / 2-in-1 package

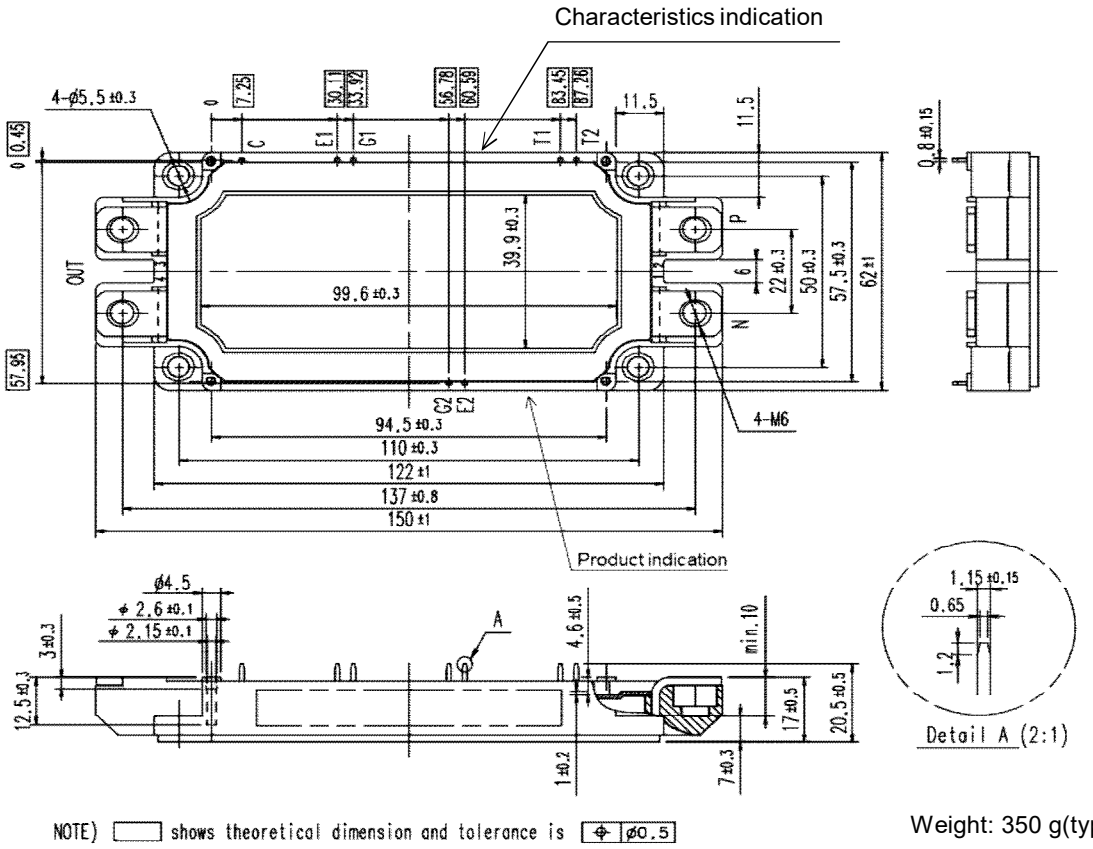
■ Features

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

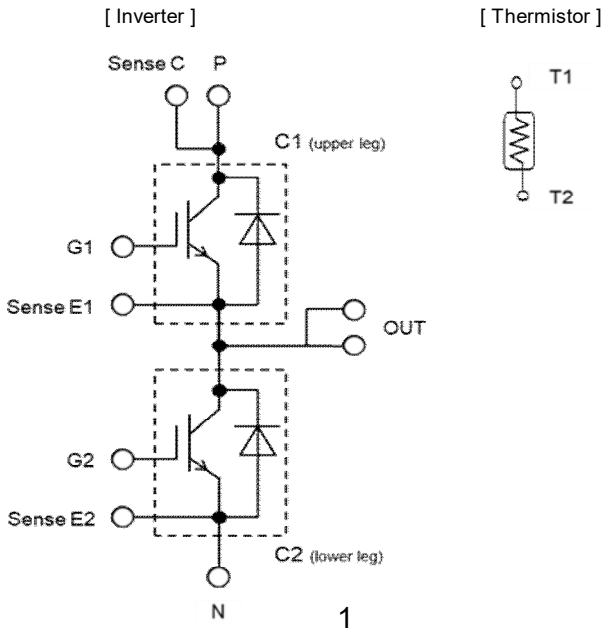
■ Outline drawing (Unit : mm)



NOTE) ☐ shows theoretical dimension and tolerance is ⌖ ø0.5

Weight: 350 g(typ.)

■ Equivalent circuit



FM5F9078b
2024/03

■ Absolute maximum ratings (at T_c= 25°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°C	800	A
	Repetitive peak collector current	I_{CRM}	1ms		1600	
	Forward current	I_F			800	
	Repetitive peak forward current	I_{FRM}	1ms		1600	
	Total power dissipation	P_{tot}	1 device		4050	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) Between thermistor and others (*2)	V_{isol}	AC: 1min.		4000	Vrms
Mounting torque of screws to heatsink		M_s	M5		2.5～6.0	N·m
Mounting torque of screws to terminals		M_t	M6		3.5～6.0	

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

(*2) Two thermistor terminals should be connected together, other terminals should be connected together

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■ Electrical characteristics (at T_{vj}= 25°C unless otherwise specified)

	Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	150	μA
	Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V		-	-	300	nA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE} = 20V, I_C = 800mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	V_{GE} = 15V, I_C= 800A	T_{vj}=25°C	-	2.45	2.90	V
		$V_{CE(sat)}$ (chip)		T_{vj}=25°C	-	1.45	1.90	
				T_{vj}=125°C	-	1.80	-	
				T_{vj}=150°C	-	1.90	-	
				T_{vj}=175°C	-	1.95	-	
	Internal gate resistance	r_g	-		-	1.17	-	Ω
	Capacitance	C_{ies}	V_{CE}=10V, V_{GE}=0V, f=1MHz		-	85	-	nF
		C_{oes}			-	2.9	-	
		C_{res}			-	0.76	-	
	Gate charge	Q_G	V_{CC} = 600V, I_C = 800A, V_{GE} = -15 → +15V		-	5.5	-	μC
	Forward voltage	V_F (terminal)	V_{GE} = 0V, I_F= 800A	T_{vj}=25°C	-	2.60	3.05	V
		V_F (chip)		T_{vj}= 25°C	-	1.60	2.05	
				T_{vj}=125°C	-	1.65	-	
				T_{vj}=150°C	-	1.60	-	
				T_{vj}=175°C	-	1.60	-	
	Switching time (*1)	$t_{d(on)}$	V_{CC} = 600V, I_C, I_F = 800A, V_{GE} = +15/-15 V, R_G = ±0.5Ω, L_S = 35 nH	T_{vj}= 25°C	-	0.47	-	μs
				T_{vj}=125°C	-	0.48	-	
				T_{vj}=150°C	-	0.49	-	
				T_{vj}=175°C	-	0.51	-	
		t_r		T_{vj}= 25°C	-	0.10	-	
				T_{vj}=125°C	-	0.11	-	
				T_{vj}=150°C	-	0.12	-	
				T_{vj}=175°C	-	0.12	-	
		$t_{d(off)}$		T_{vj}= 25°C	-	0.45	-	
				T_{vj}=125°C	-	0.49	-	
				T_{vj}=150°C	-	0.50	-	
				T_{vj}=175°C	-	0.52	-	
		t_f		T_{vj}= 25°C	-	0.08	-	
				T_{vj}=125°C	-	0.10	-	
				T_{vj}=150°C	-	0.10	-	
				T_{vj}=175°C	-	0.11	-	
	Reverse recovery time	t_{rr}		T_{vj}= 25°C	-	0.19	-	
				T_{vj}=125°C	-	0.29	-	
				T_{vj}=150°C	-	0.32	-	
				T_{vj}=175°C	-	0.37	-	

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

■ Electrical characteristics (at T_{vj}= 25°C unless otherwise specified)

Items		Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Switching loss (per pulse)	E_{on}	V_{CC} = 600V, I_C, I_F = 800A, V_{GE} = +15/-15 V, R_G = ±0.5Ω, L_S = 35 nH	T_{vj}=25°C	-	41.7	-	mJ
				T_{vj}=125°C	-	70.2	-	
				T_{vj}=150°C	-	81.1	-	
				T_{vj}=175°C	-	90.4	-	
		E_{off}		T_{vj}=25°C	-	77.6	-	
				T_{vj}=125°C	-	92.5	-	
				T_{vj}=150°C	-	94.9	-	
				T_{vj}=175°C	-	100.5	-	
		E_{rr}		T_{vj}=25°C	-	31.0	-	
				T_{vj}=125°C	-	52.9	-	
				T_{vj}=150°C	-	60.2	-	
				T_{vj}=175°C	-	67.8	-	
Thermistor	Resistance	R	T = 25°C		-	5000	-	Ω
			T = 100°C		465	495	520	
	B value	B	T = 25/ 50°C		3305	3375	3450	K

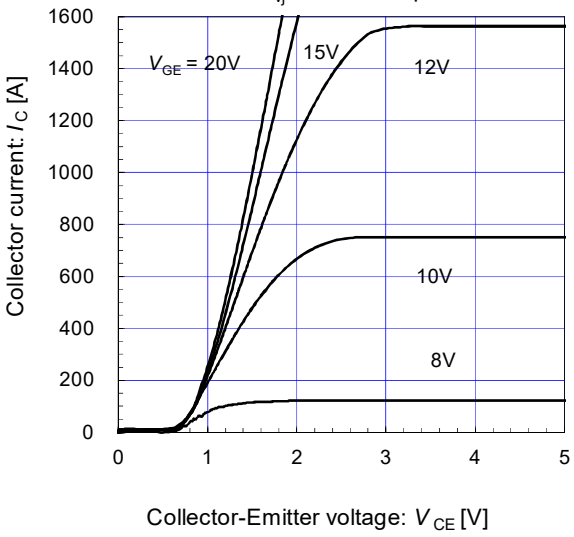
NOTICE:
The external gate resistance (R_G) shown above is one of our recommended value for the purpose of minimum switching loss. However the optimum R_G depends on circuit configuration and/or environment. We recommend that the R_G has to be carefully chosen based on consideration if IGBT module matches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

■Thermal resistance characteristics

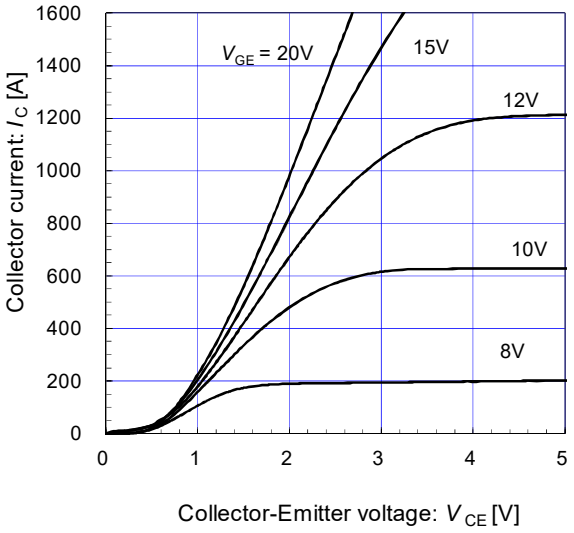
Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance junction to case(1 device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.037	K/W
		Inverter FWD	-	-	0.044	
Thermal resistance case to heatsink(1 IGBT+1 FWD)(*1)	$R_{th(c-s)}$	with 1 W/(m·°C) thermal grease	-	0.0167	-	

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

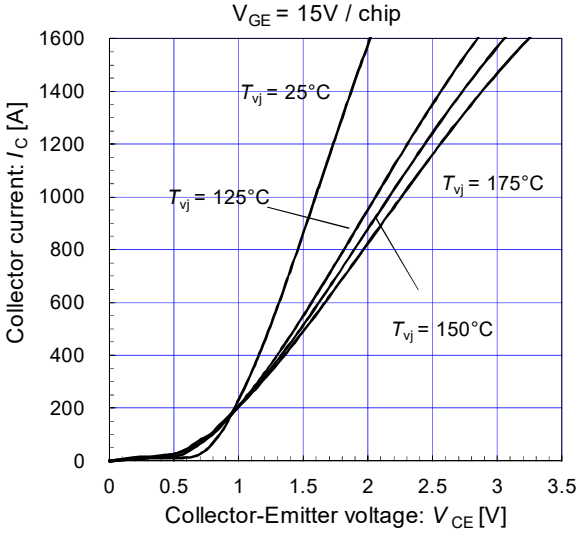
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_{vj} = 25°C / chip



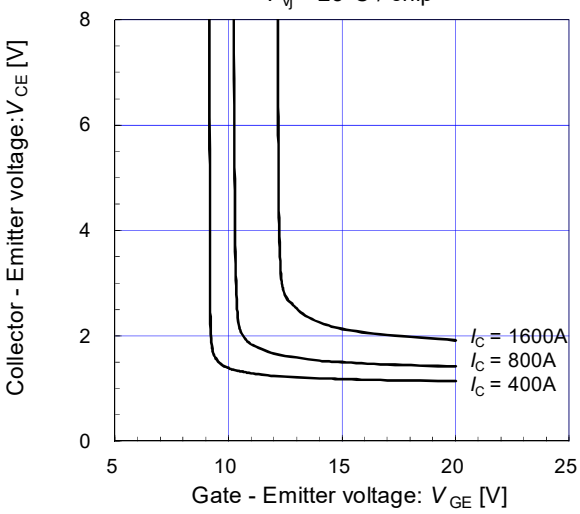
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_{Vj} = 175°C / chip



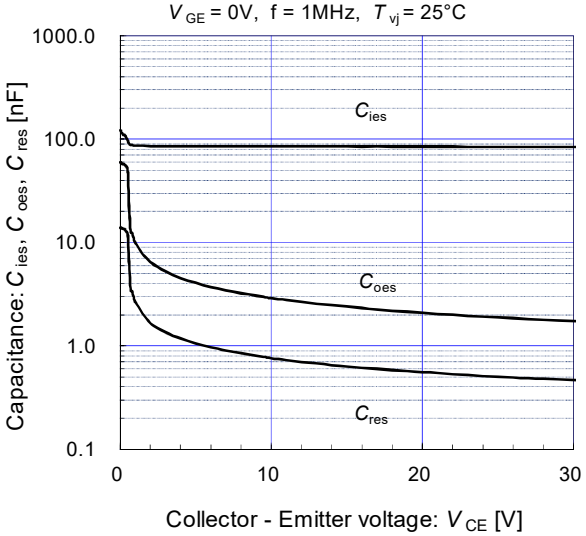
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE} = 15V / chip



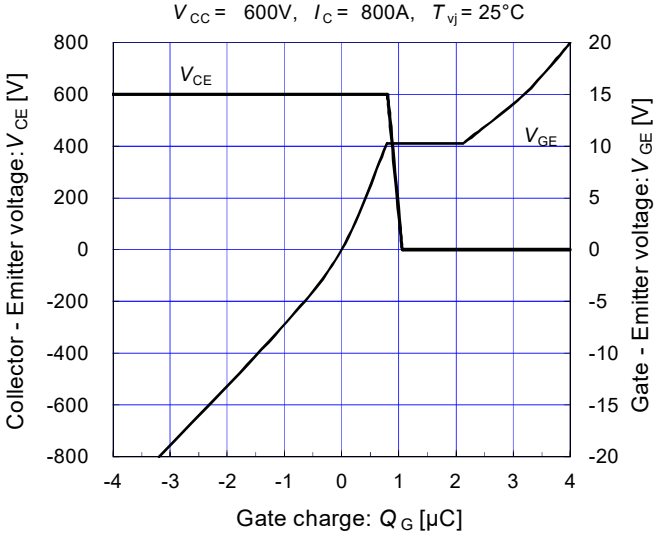
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_{vj} = 25°C / chip



[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE} = 0V, f = 1MHz, T_{vj} = 25°C



[Inverter]
Dynamic gate charge (typ.)
V_{CC} = 600V, I_C = 800A, T_{vj} = 25°C



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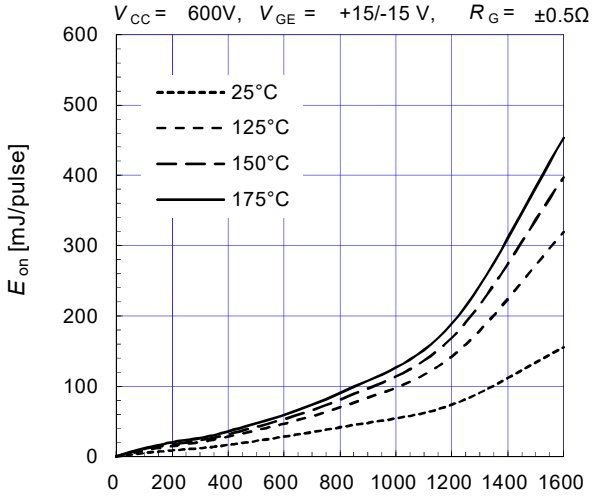
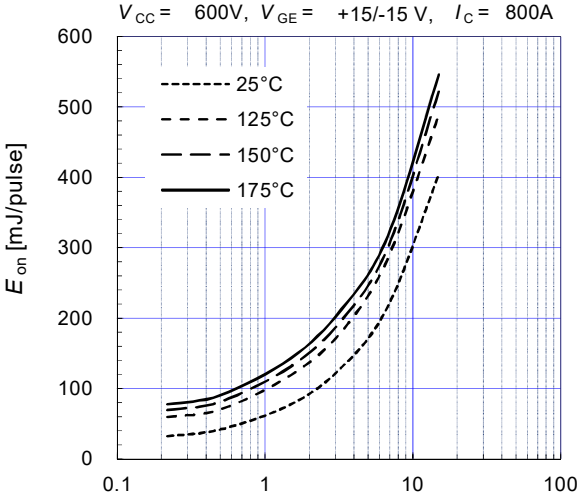
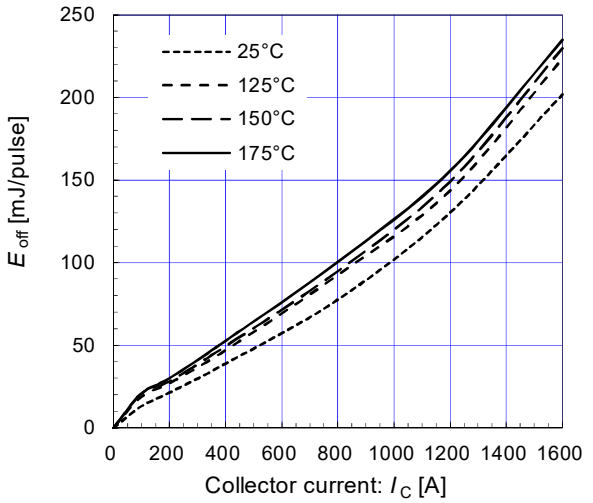
[Inverter]
E_{on} vs. Collector current (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, R_G = ±0.5Ω



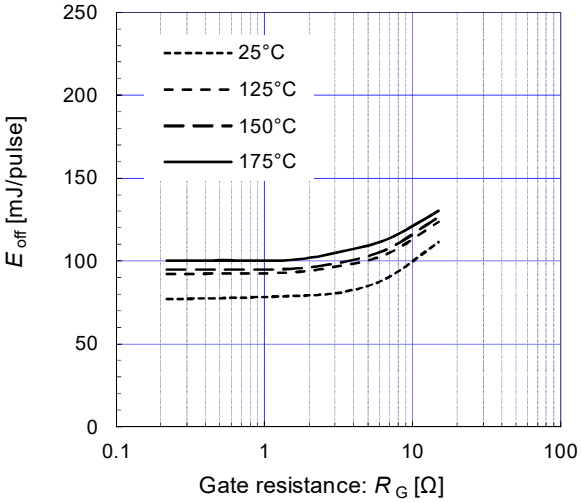
[Inverter]
E_{on} vs. Gate resistance (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, I_C = 800A



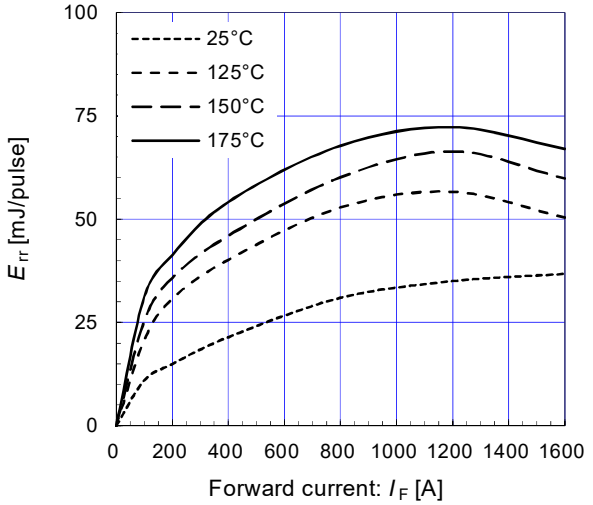
[Inverter]
E_{off} vs. Collector current (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, R_G = ±0.5Ω



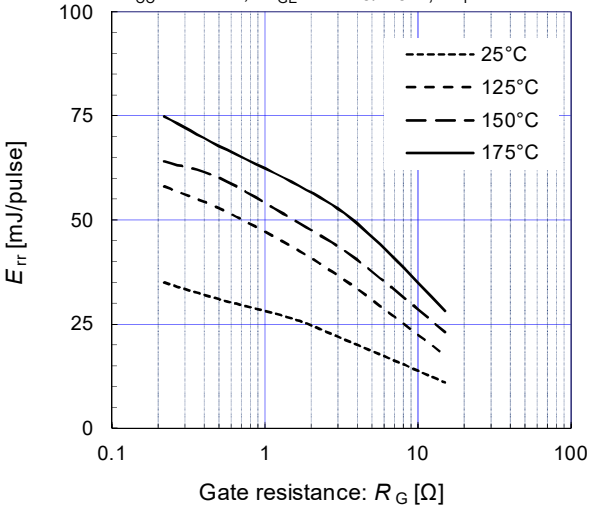
[Inverter]
E_{off} vs. Gate resistance (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, I_C = 800A



[Inverter]
E_{rr} vs. Forward current (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, R_G = ±0.5Ω



[Inverter]
E_{rr} vs. Gate resistance (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, I_F = 800A



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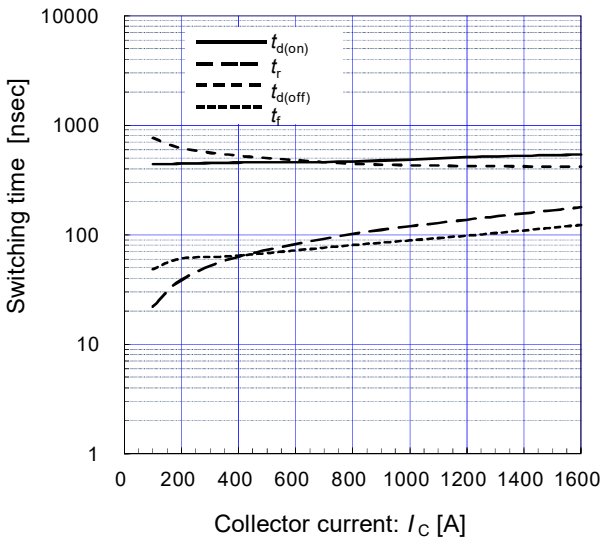
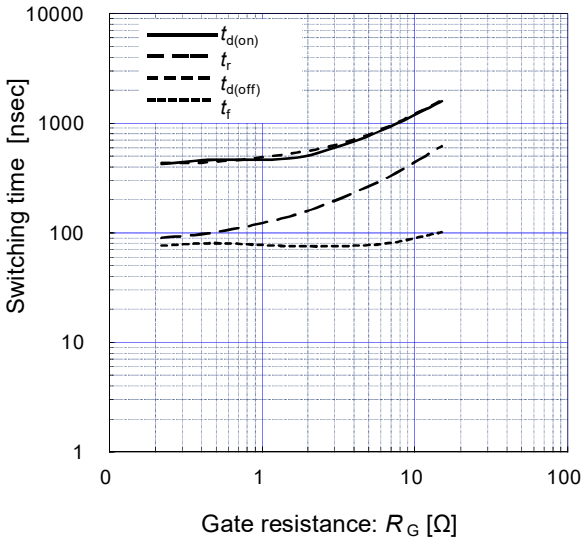
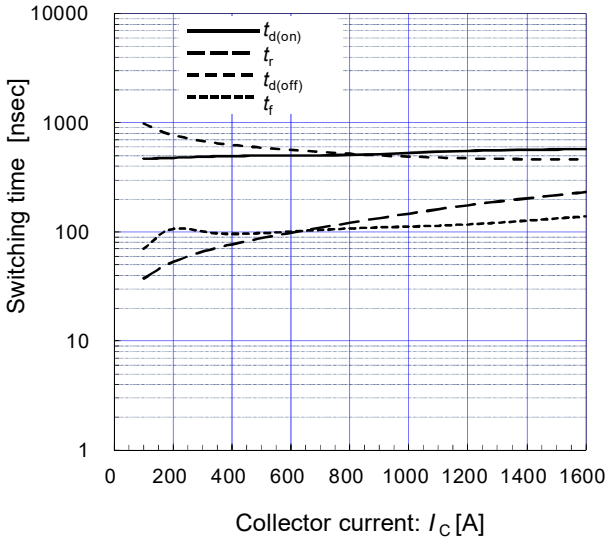
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC} = 600V, R_G = ±0.5Ω, V_{GE} = +15/-15 V, T_{vj} = 25°C



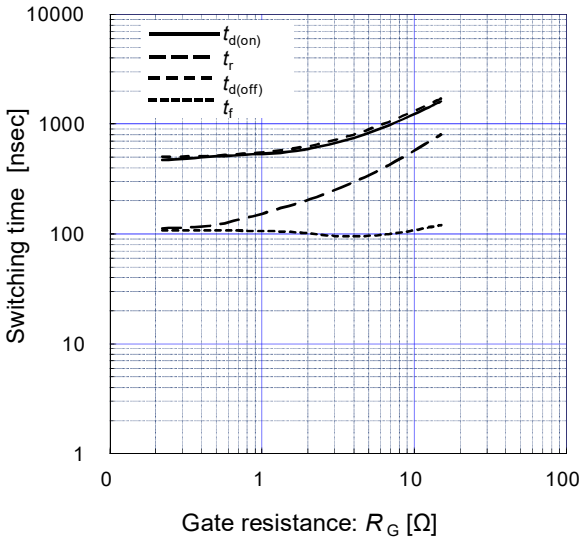
[Inverter]
Switching time vs. Gate resistance (typ.)
V_{CC} = 600V, I_C = 800A, V_{GE} = +15/-15 V, T_{vj} = 25°C



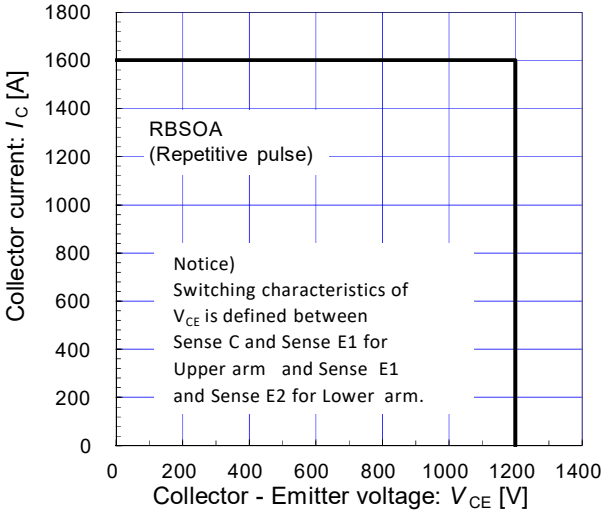
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC} = 600V, R_G = ±0.5Ω, V_{GE} = +15/-15 V, T_{vj} = 175°C



[Inverter]
Switching time vs. Gate resistance (typ.)
V_{CC} = 600V, I_C = 800A, V_{GE} = +15/-15 V, T_{vj} = 175°C



[Inverter]
Reverse bias safe operating area (max.)
V_{GE} = +15/-15 V, R_G = ±0.5Ω, T_{vj} = 175°C



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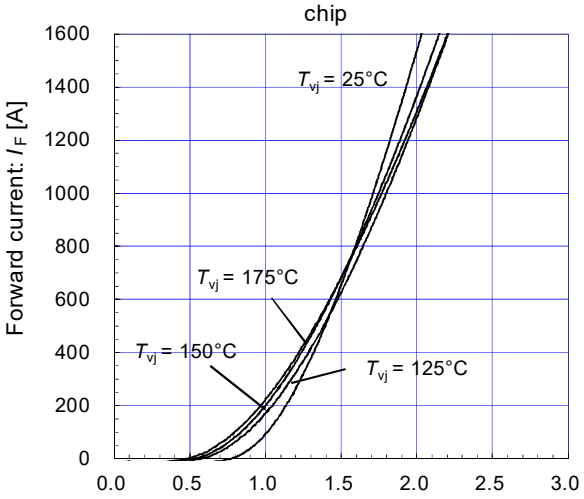
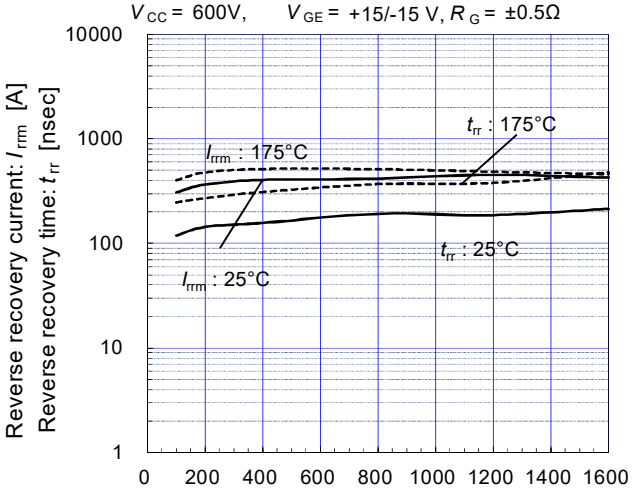
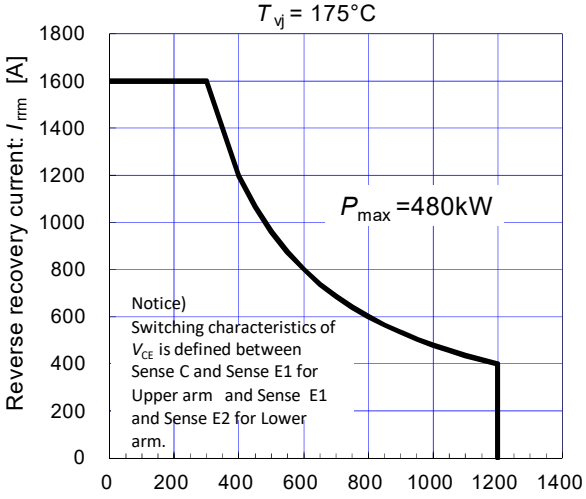
[Inverter]
Forward current vs. Forward voltage (typ.)
chip



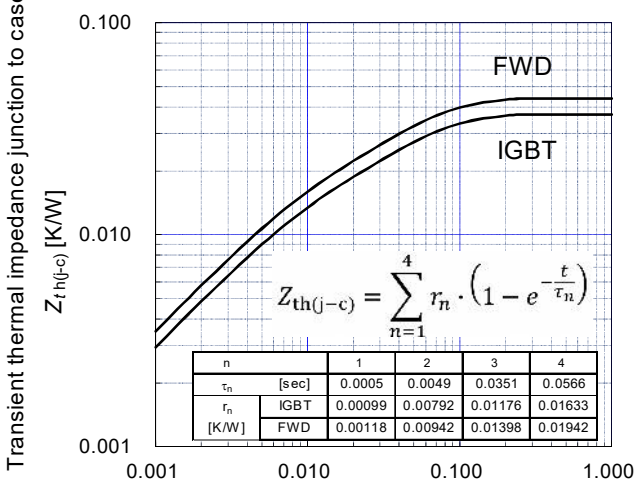
[Inverter]
Reverse recovery characteristics (typ.)
V_{CC} = 600V, V_{GE} = +15/-15 V, R_G = ±0.5Ω



[Inverter]
Reverse recovery characteristics (typ.)
T_{vj} = 175°C

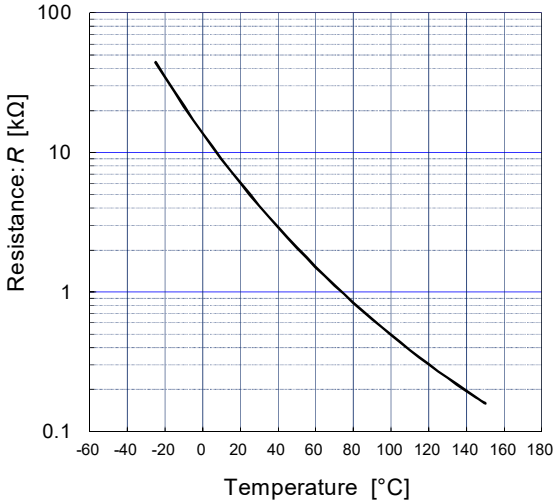


[Inverter]
Transient thermal resistance (max.)



n		1	2	3	4
τ_n	[sec]	0.0005	0.0049	0.0351	0.0566
r_n [K/W]	IGBT	0.00099	0.00792	0.01176	0.01633
	FWD	0.00118	0.00942	0.01398	0.01942

[Thermistor]
Temperature characteristic (typ.)



Warnings

1. This Catalog contains the product specifications, characteristics, data, materials, and structures as of 3/2024. The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sure to obtain the latest specifications.

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4. The products introduced in this Catalog are intended for use in the following electronic and electrical equipment which has normal reliability requirements.
・Computers ・OA equipment ・Communications equipment (terminal devices) ・Measurement equipment
・Machine tools ・Audiovisual equipment ・Electrical home appliances ・Personal equipment ・Industrial robots etc.

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・Traffic-signal control equipment ・Gas leakage detectors with an auto-shut-off feature
・Emergency equipment for responding to disasters and anti-burglary devices ・Safety devices ・Medical equipment

6. Do not use products in this Catalog for the equipment requiring strict reliability such as the following and equivalents to strategic equipment (without limitation).
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富士電機 Innovating Energy Technology

Technical Information

IGBT Modules

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- 关于本规格书中没有记载的产品信息，应用手册，技术信息等，请参考以下链接。
- 本データシートに記載されていない製品情報，アプリケーションマニュアル，デザインサポートは以下のURLをご参照下さい。

FUJI ELECTRIC Power Semiconductor WEB site

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5 Mounting Instructions	www.fujielectric.com/products/semiconductor/model/igbt/mounting/
6 IGBT Loss Simulation Software	www.fujielectric.com/products/semiconductor/model/igbt/simulation/
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2 产品信息	www.fujielectric.com/products/semiconductor/cn/model/
3 应用手册	www.fujielectric.com/products/semiconductor/cn/model/igbt/application/
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