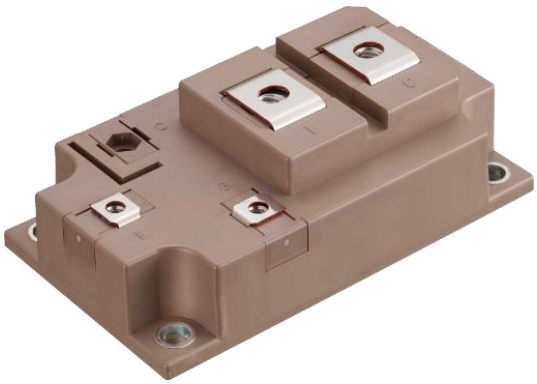
1MBI600V-170-50

IGBT Modules

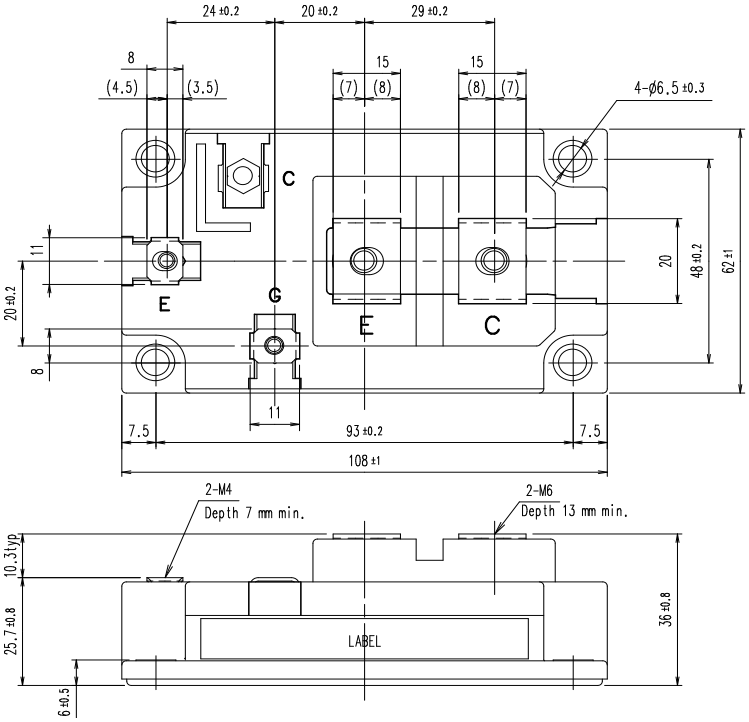
Power Module (V series)
1700V / 600A / 1-in-one package



■ Features
High speed switching
Voltage drive
Low Inductance module structure

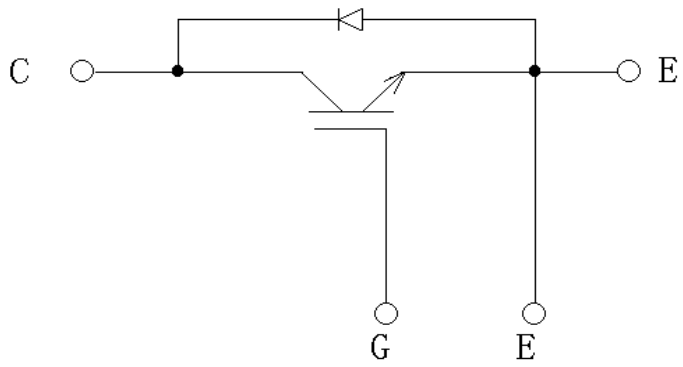
■ Applications
Inverter DB for Motor Drive
AC and DC Servo Drive Amplifier
Uninterruptible Power Supply
Industrial machines,such as Welding machines

■ Outline drawing (Unit : mm)



Weight: 380g (typ.)

■ Equivalent Circuit



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■ Absolute Maximum Ratings (at T_c= 25°C unless otherwise specified)

Items		Symbols	Conditions		Maximum Ratings	Units
Collector-Emitter voltage		V_{CES}			1700	V
Gate-Emitter voltage		V_{GES}			±20	V
Collector current		I_C	Continuous	T_c=100°C	600	A
				T_c=25°C	720	
		I_C pulse	1ms		1200	
		$-I_C$			600	
		$-I_C$ pulse	1ms		1200	
Collector power dissipation		P_C	1 device		3610	W
Junction temperature		T_j			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_c			125	
Storage temperature		T_{stg}			-40 ~ 125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC: 1min.		4000	VAC
Screw Torque	Mounting (*2)	M5 or M6			6.0	N m
	Terminals (*3)	M4			2.0	
		M6			5.0	

(*1) All terminals should be connected together during the test.
(*2) Recommendable Value : 3.0-6.0 Nm (M5 or M6)
(*3) Recommendable Value : 1.1-2.0 Nm (M4)
Recommendable Value : 2.5-5.0 Nm (M6)

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

Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Zero gate voltage Collector current	I_{CES}	V_{GE}=0V, V_{CE}=1700V		-	-	4.0	mA
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=±20V		-	-	1600	nA
Gate-Emitter threshold voltage	$V_{GE(th)}$	V_{CE}=20V,I_C=600mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	V_{GE}=15V, I_C=600A	T_j=25°C	-	2.20	2.65	V
			T_j=125°C	-	2.65	-	
			T_j=150°C	-	2.75	-	
	$V_{CE(sat)}$ (chip)	V_{GE}=15V, I_C=600A	T_j=25°C	-	2.00	2.45	
			T_j=125°C	-	2.45	-	
			T_j=150°C	-	2.55	-	
Internal gate resistance	$R_{G(int)}$	-		-	1.2	-	Ω
Input capacitance	C_{ies}	V_{CE}=10V, V_{GE}=0V, f=1MHz		-	66	-	nF
Turn-on time	t_{on}	V_{CC}=900V,I_C=600A, V_{GE}=±15V,R_G=1.2Ω, T_j=150°C,L_S=40nH		-	700	-	nsec
	t_r			-	300	-	
	$t_{r(i)}$			-	60	-	
Turn-off time	t_{off}			-	800	-	
	t_f			-	140	-	
Forward on voltage	V_F (terminal)	V_{GE}=0V, I_F=600A	T_j=25°C	-	1.95	2.40	V
			T_j=125°C	-	2.20		
			T_j=150°C	-	2.20	-	
	V_F (chip)	V_{GE}=0V, I_F=600A	T_j=25°C	-	1.80	2.25	
			T_j=125°C	-	2.05		
			T_j=150°C	-	2.05	-	
Reverse recovery time	t_{rr}	I_F=600A		-	220	-	nsec

■ Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.042	°C/W
		FWD	-	-	0.074	
Contact thermal resistance	$R_{th(c-f)}$	with Thermal Compound	-	0.0063	-	

(*1) This is the value which is defined mounting on the additional cooling fin with thermal compound.

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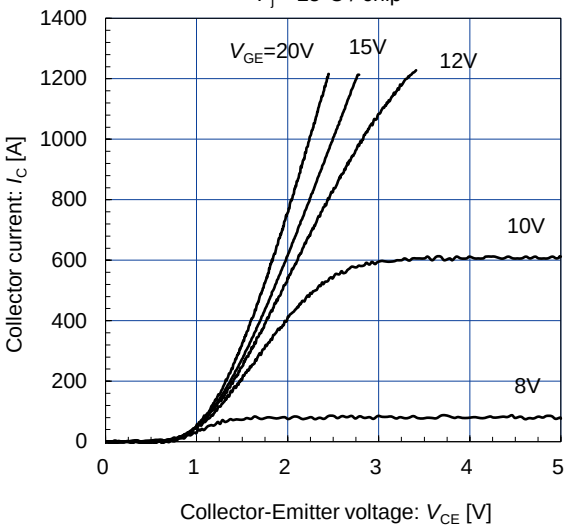
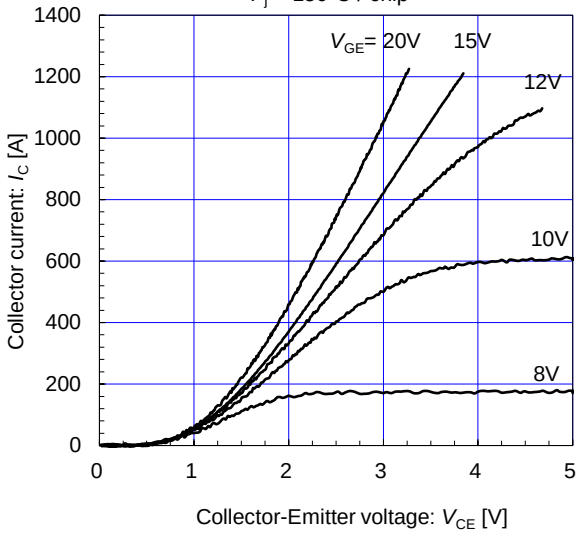
Collector current vs. Collector-Emitter voltage (typ.)

T_j = 25°C / chip



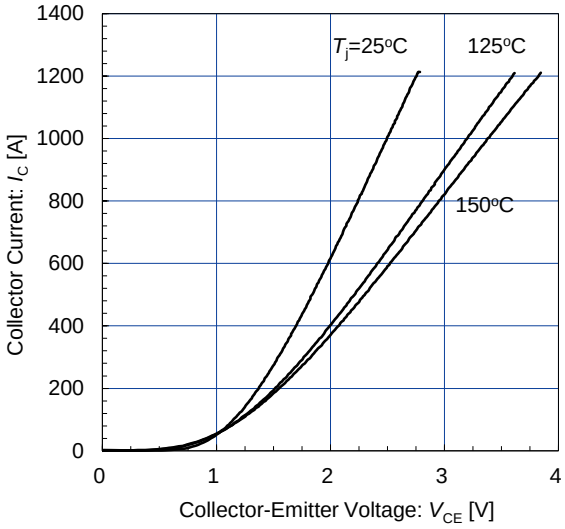
Collector current vs. Collector-Emitter voltage (typ.)

T_j = 150°C / chip



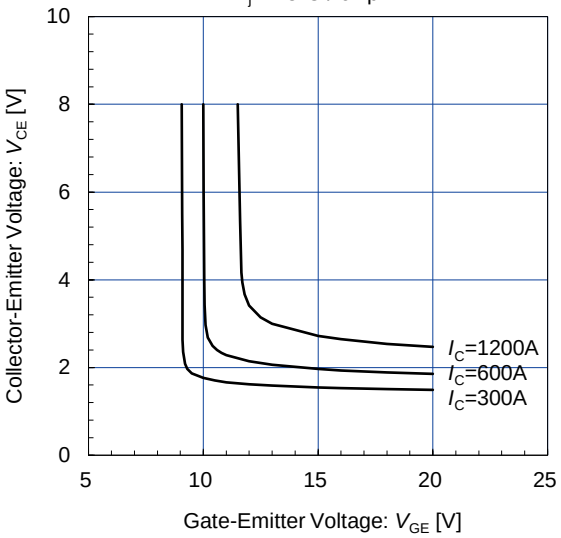
Collector current vs. Collector-Emitter voltage (typ.)

V_{GE}= 15V / chip



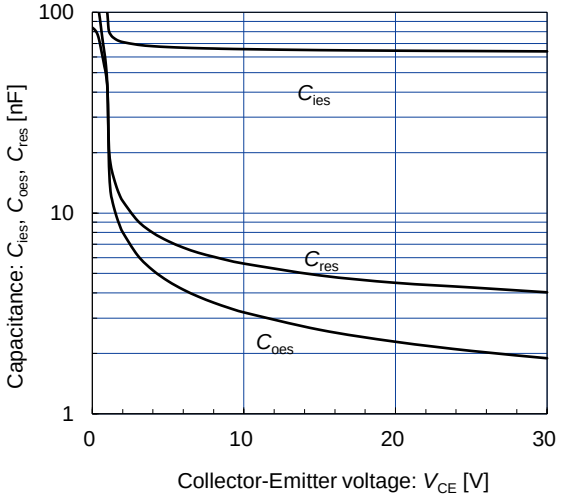
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

T_j = 25°C / chip



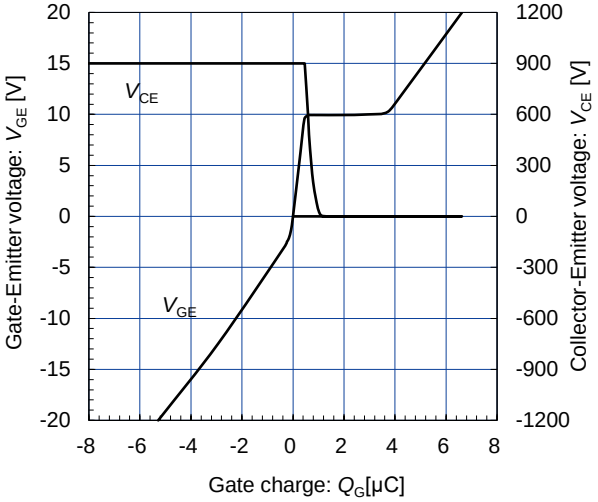
Capacitance vs. Collector-Emitter Voltage (typ.)

V_{GE}= 0V, f= 1MHz, T_j= 25°C



Dynamic Gate Charge (typ.)

V_{CC}=900V, I_C=600A, T_j=25°C



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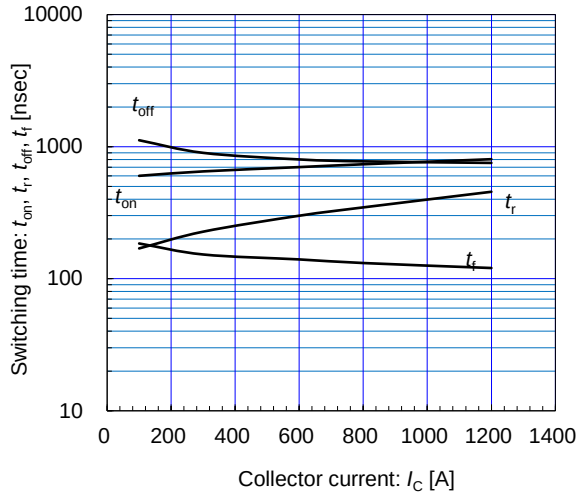
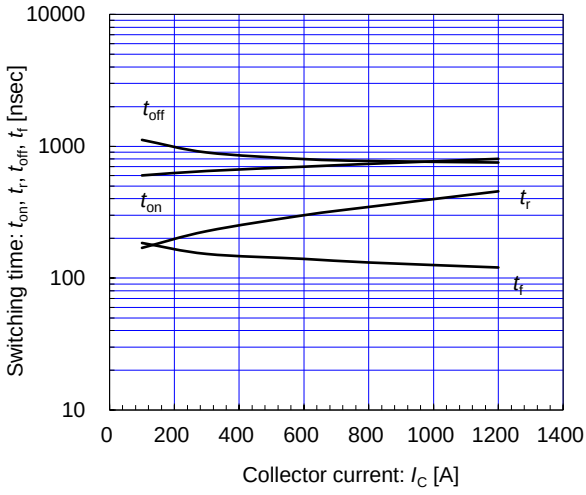
Switching time vs. Collector current (typ.)

V_{CC}=900V, V_{GE}=±15V, R_G=1.8Ω, T_j=125°C



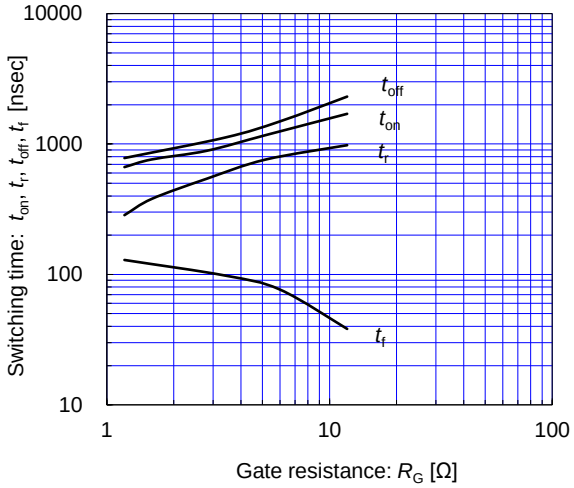
Switching time vs. Collector current (typ.)

V_{CC}=900V, V_{GE}=±15V, R_G=1.2Ω, T_j=150°C



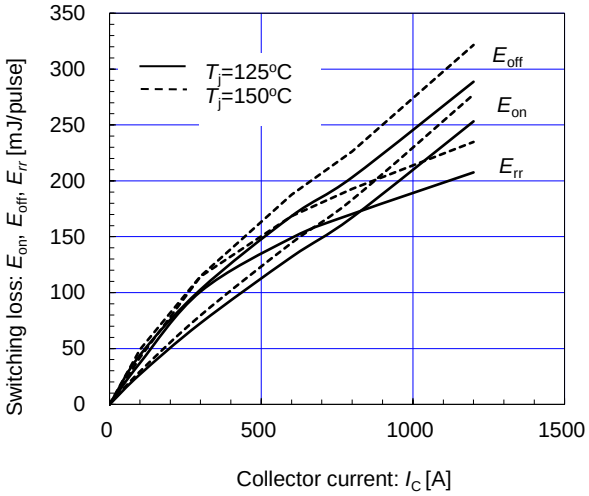
Switching time vs. Gate resistance (typ.)

V_{CC}=900V, I_C=600A, V_{GE}= ±15V, T_j=125°C



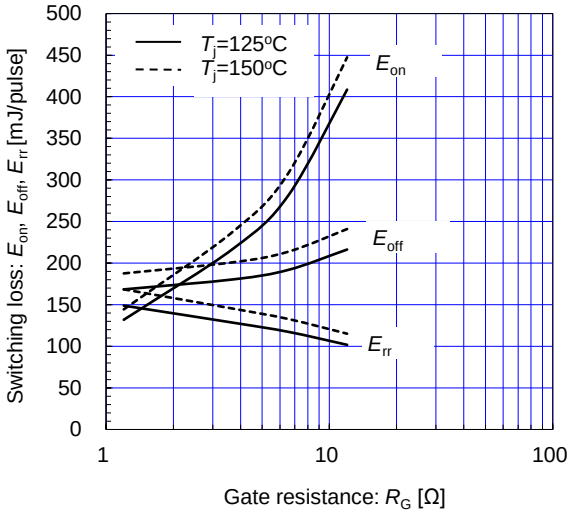
Switching loss vs. Collector current (typ.)

V_{CC}=900V, V_{GE}= ±15V, R_G= 1.2Ω, T_j=125,150°C



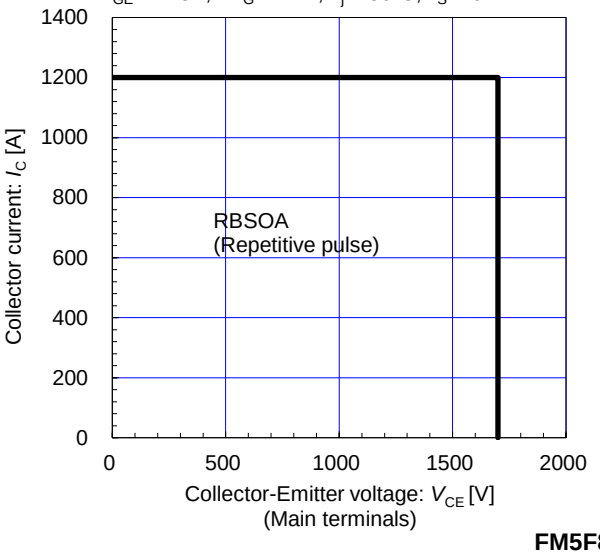
Switching loss vs. Gate resistance (typ.)

V_{CC}=900V, I_C=600A, V_{GE}=±15V, T_j=125,150°C



Reverse bias safe operating area (max.)

V_{GE}=±15V, R_G=1.2Ω, T_j=150°C, L_S=40nH



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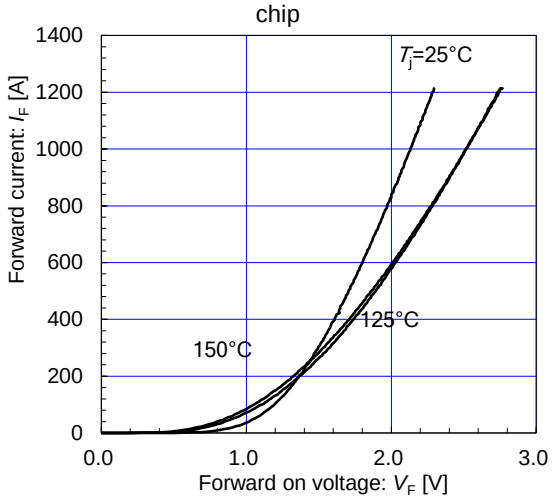
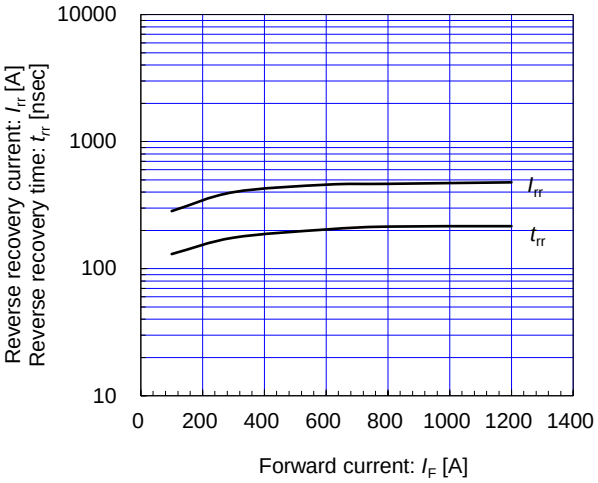
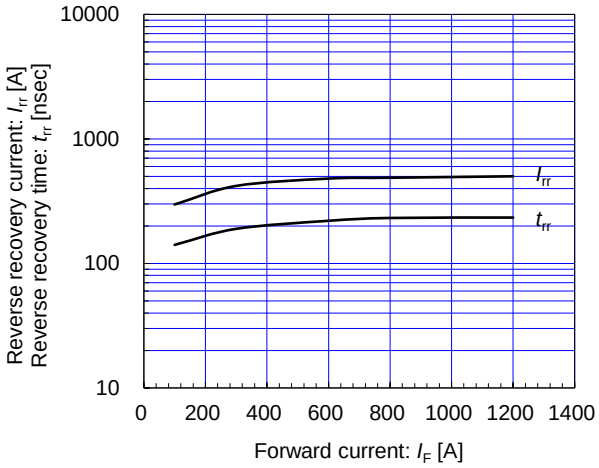
Forward Current vs.Forward Voltage(typ.)
chip



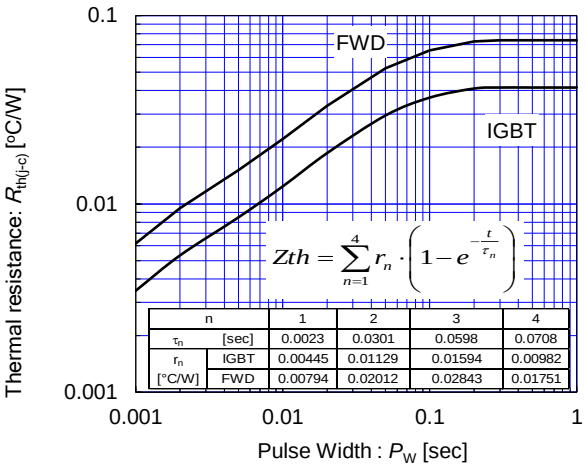
Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}= ±15V, R_G= 1.2Ω, T_j=125°C



Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}= ±15V, R_G= 1.2Ω, T_j=150°C

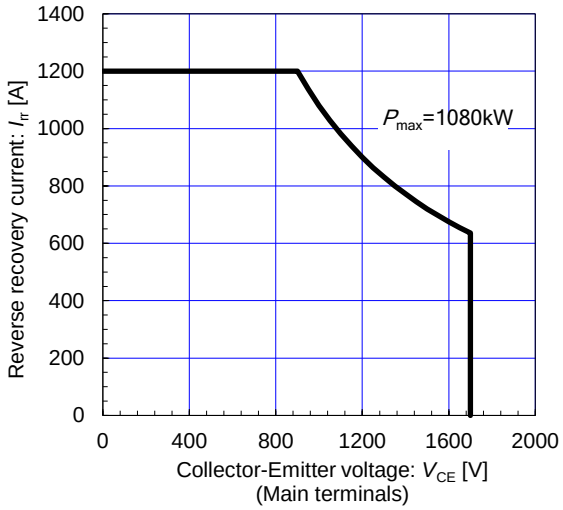


Transient Thermal Resistance(max.)



n		1	2	3	4
τ_n	[sec]	0.0023	0.0301	0.0598	0.0708
r_n	IGBT	0.00445	0.01129	0.01594	0.00982
[°C/W]	FWD	0.00794	0.02012	0.02843	0.01751

FWD safe operating area (max.)
T_j=150°C



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7.

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