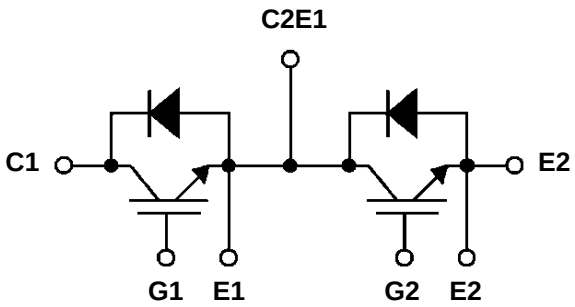
X2G400TD06P3

HIGH POWER Trench TYPE 2-PACK IGBT MODULE

600V
400A

PACKAGE : M3

CIRCUIT DIAGRAM



FEATURES

- IGBT3 Trench Technology
- 6us short circuit capability at T_{vj} = 150℃
- Positive $V_{CE(on)}$ temperature coefficient
- Industry standard package

APPLICATIONS

- High power inverter
- Switched mode power supplies (SMPS)
- UPS
- Electrical welding machine

ABSOLUTE MAXIMUM RATINGS

T_c=25℃, unless otherwise specified

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	-	600	V
I_C	DC-collector current	T_C = 25℃	500	A
		T_C = 70℃	400	A
I_{CRM}	Repetitive peak collector current	1ms	800	A
V_{GES}	Gate-emitter peak voltage	-	±20	V
I_F	Diode continuous forward current	-	400	A
I_{FRM}	Diode repetitive peak forward current	-	600	A
$T_{vj,max}$	Maximum junction temperature	-	-40 ~ 175	℃
$T_{vj,op}$	Operating temperature range	-	-40 ~ 150	℃
T_{stg}	Storage temperature range	-	-40 ~ 125	℃
V_{ISOL}	Insulation test voltage	50/60Hz, t=1min I_{ISOL}=1mA	2.5	kV
M_S	Mounting screw torque	M6	3.0 ~ 6.0	N.m
M_t	Mounting terminals screw torque	M6	2.5 ~ 5.0	N.m

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ELECTRICAL CHARACTERISTICS OF IGBT

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$V_{CE(Sat)}$	C-E saturation voltage	-	1.45	-	V	I_C = 400A, V_{GE} = 15V, T_{vj} = 25℃
		-	1.70	–	V	I_C = 400A, V_{GE} = 15V, T_{vj} = 150℃
$V_{GE(th)}$	G-E threshold voltage	5.0	5.8	6.5	V	I_C = 3200μA , V_{CE} = V_{GE}
I_{CES}	Zero gate voltage collector current	-	-	5	mA	V_{GE} = 0V , V_{CE} = 600V
I_{GES}	G-E leakage current	-	-	0.4	μA	V_{GE} = ±20V
R_{Gint}	Internal gate resistance	-	1.0	-	Ω	-
C_{ies}	Input capacitance	-	87.4	-	nF	V_{GE} = 0V, f = 1MHz, V_{CE} = 25V, T_{vj} = 25℃
C_{oes}	Output capacitance	-	1.77	-		
C_{res}	Reverse transfer capacitance	-	1.67	-		
Q_g	Total gate charge	-	4.3	-	μC	V_{GE} = ±15V
$t_{d(on)}$	Turn off delay time	-	130	-	ns	V_{CE} = 300V, I_C = 400A, V_{GE} = ±15V, R_G = 1.5Ω, T_{vj} = 150℃
t_r	Turn-on rise time	-	60	-		
$t_{d(off)}$	Turn-off delay time	-	530	-		
t_f	Turn-off fall time	-	70	-		
E_{ON}	Turn-on Energy loss	-	3.4	-	mJ	
E_{OFF}	Turn-off Energy loss	-	15.5	-		

ELECTRICAL CHARACTERISTICS OF FRD

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Conditions	
V_F	Diode Forward Voltage Drop	-	1.6	-	V	T_{vj}= 25℃	I_F=400A
		-	1.6	-		T_{vj}=150℃	
I_{rr}	Peak Reverse Recovery Current	-	350	-	A	I_F = 400A, V_{CE} = 300V V_{GE} = -15V, T_{vj}=150℃	
Q_{rr}	Diode Recovery Charge	-	32	-	μC		

THERMAL AND MECHANICAL CHARACTERISTICS

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Condition
Rth(j-c)	Junction-to-Case (IGBT Part,Per 1/2 Module)	-	0.12	-	K/W	
Rth(j-c)	Junction-to-Case (FRD Part,Per 1/2 Module)	-	0.22	-	K/W	
Rth(c-f)	Case-to-Heat Sink (With Thermal Compound)	-	0.03	-	K/W	
Weight	Module		320		g	

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PERFORMANCE CURVES (I)

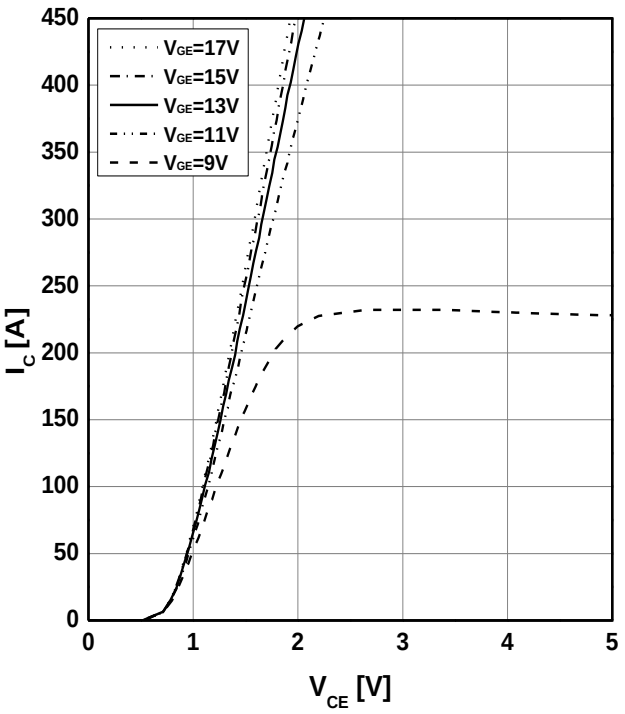

Fig1. Typical Output Characteristics

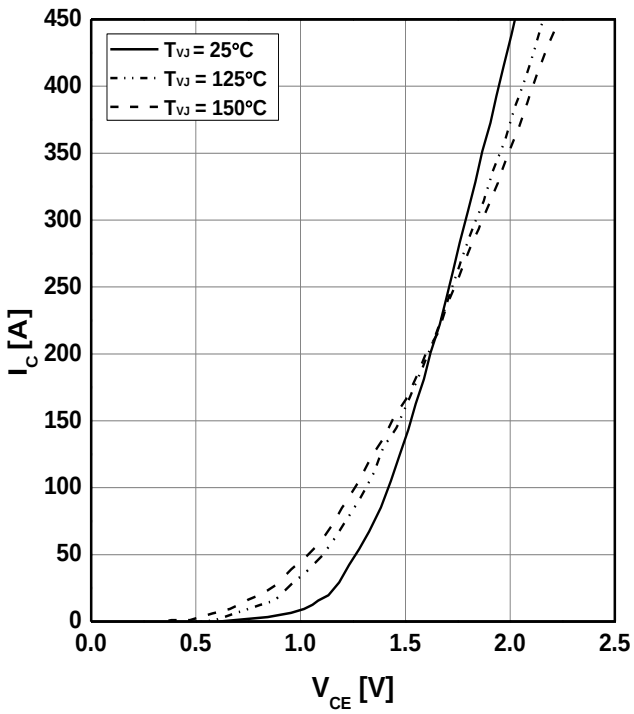

Fig2. Output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
V_{GE} =15V

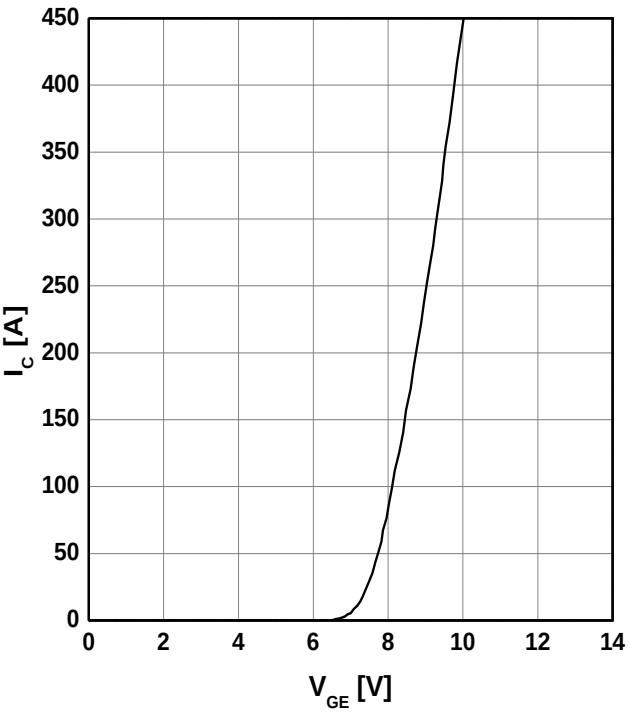

Fig3. Transfer Characteristics

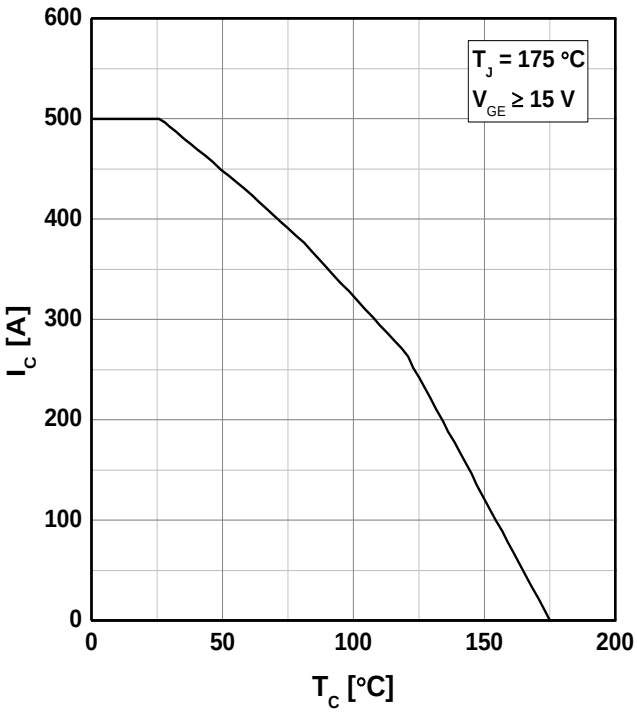

Fig4. Rated current vs. temperature $I_C = f(T_C)$

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PERFORMANCE CURVES (I)

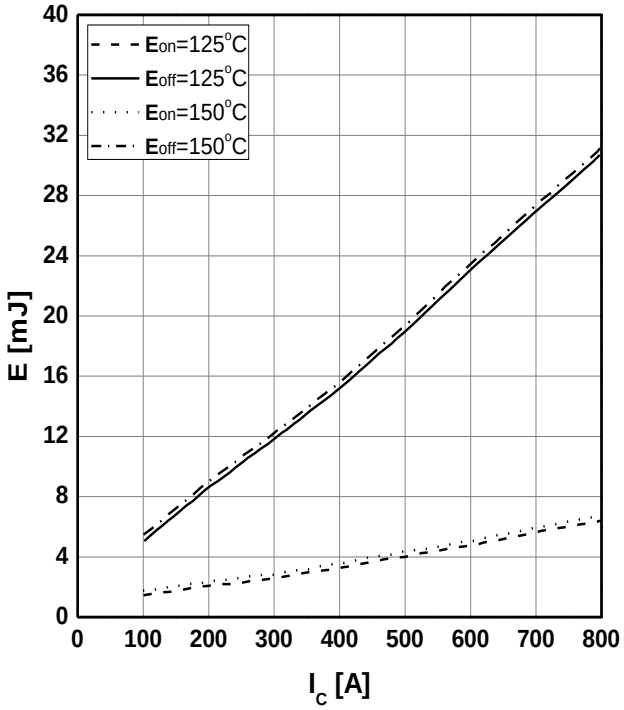

Fig5. Energy Loss vs. I_C

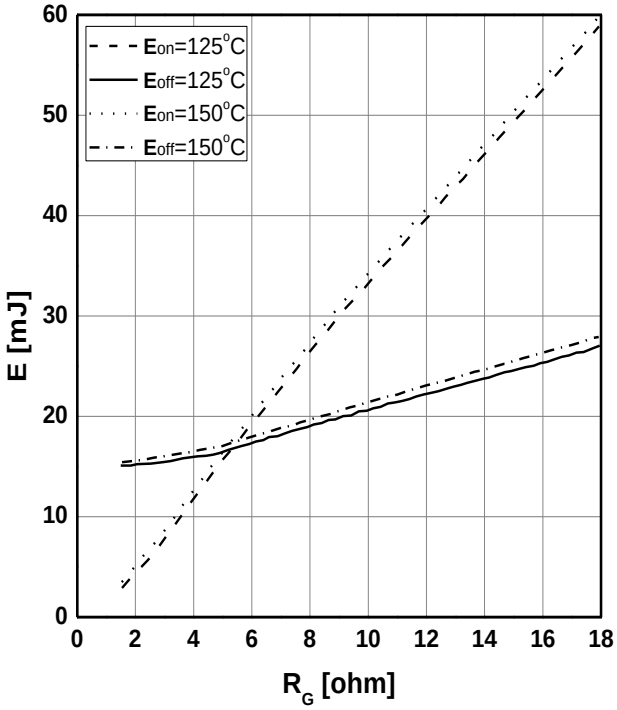

Fig6. Energy Loss vs. R_G

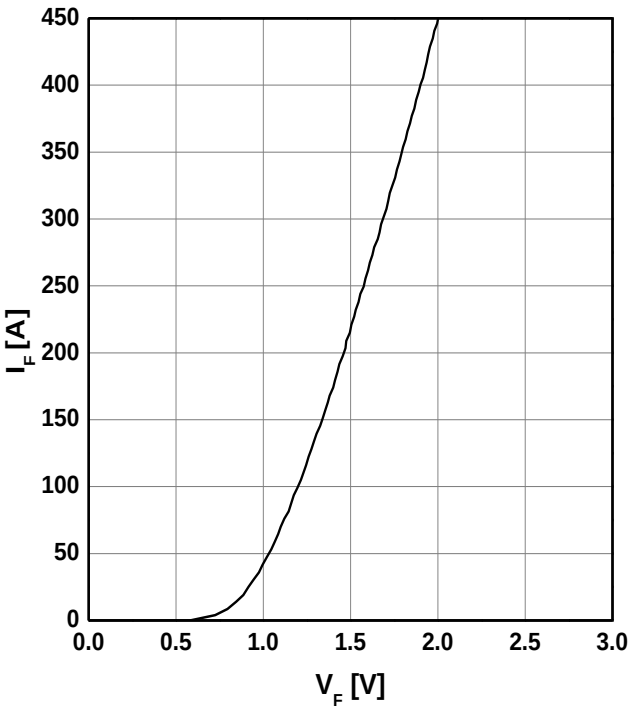

Fig7. DIODE Forward Characteristic

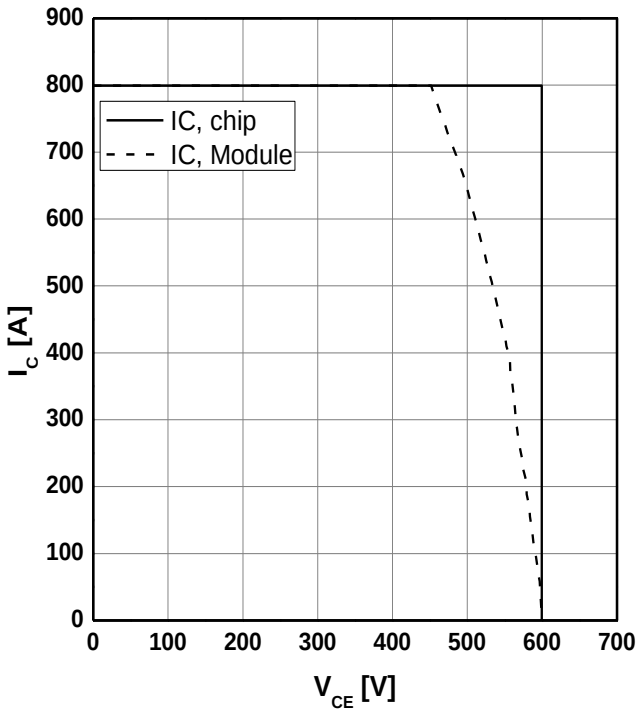

Fig8. Reverse Bios SOA (T_{vj} = 150℃)

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PERFORMANCE CURVES (II)

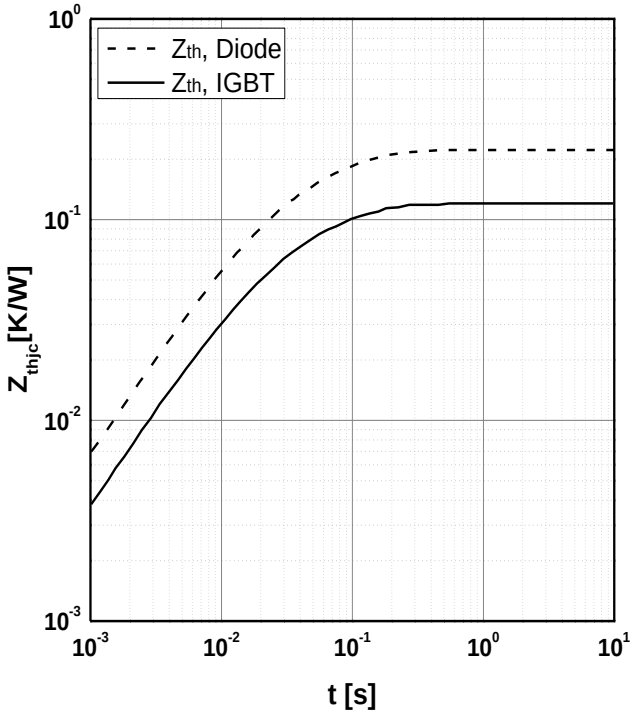


Fig9. Transient Thermal

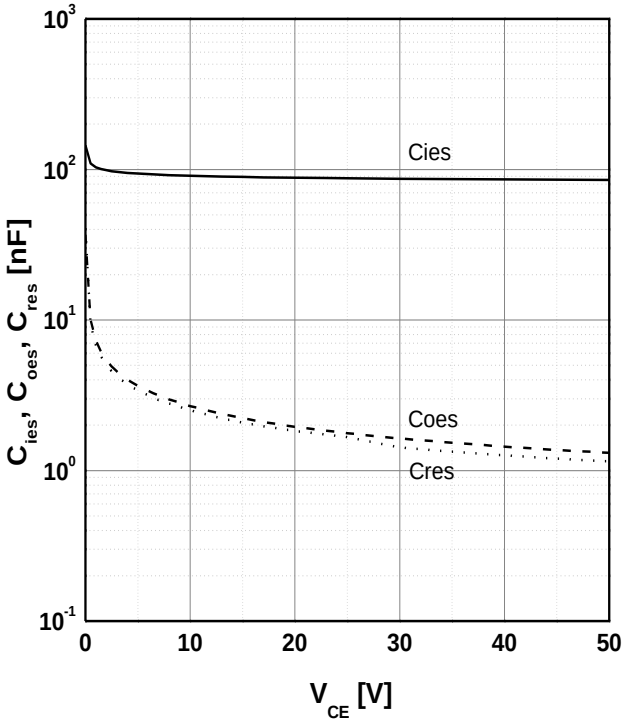
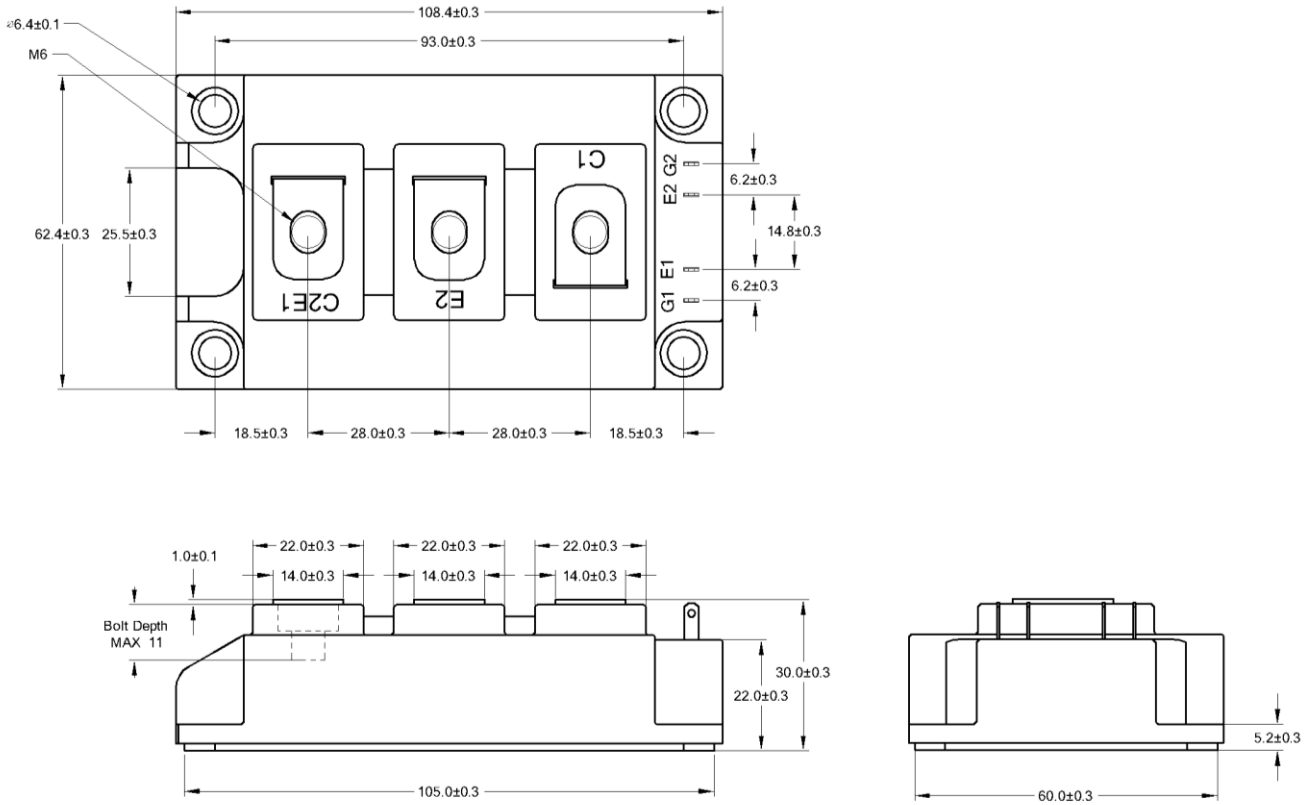


Fig10. Typ. Capacitance

PACKAGE OUTLINES



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