

# X2G150ND06P2

# HIGH POWER NPT Low loss TYPE 2-PACK IGBT MODULE

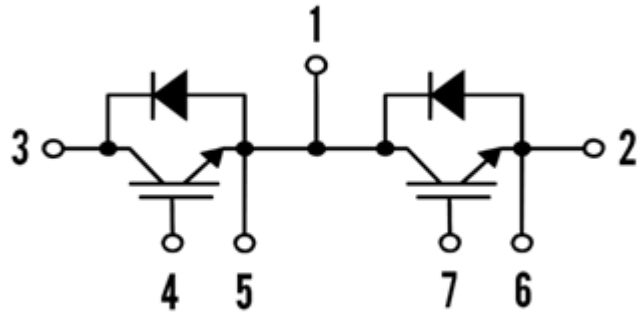


**600V**  
**150A**

PACKAGE : M2

**PRELIMINARY**

## ■ CIRCUIT DIAGRAM



## ■ FEATURES

- Non Punch Through (NPT) Technology
- Fast & soft inverse CAL diodes
- 10us short circuit capability
- 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

$T_c=25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CES}$	Collector-emitter voltage	-	600	V
$I_C$	DC-collector current	$T_C = 25^\circ\text{C}$	180	A
		$T_C = 60^\circ\text{C}$	150	A
$I_{CRM}$	Repetitive peak collector current	1ms	300	A
$V_{GES}$	Gate-emitter peak voltage	-	$\pm 20$	V
$I_F$	Diode continuous forward current	-	150	A
$I_{FRM}$	Diode repetitive peak forward current	-	300	A
$T_{vj,max}$	Maximum junction temperature	-	-40 ~ 150	$^\circ\text{C}$
$T_{vj,op}$	Operating temperature range	-	-40 ~ 125	$^\circ\text{C}$
$T_{stg}$	Storage temperature range	-	-40 ~ 125	$^\circ\text{C}$
$V_{ISOL}$	Insulation test voltage	50/60Hz, $t=1\text{min}$ $I_{ISOL}=1\text{mA}$	2.5	kV
$M_S$	Mounting screw torque	M6	3.0 ~ 6.0	N.m
$M_t$	Mounting terminals screw torque	M5	2.5 ~ 5.0	N.m

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**PRELIMINARY**

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## ELECTRICAL CHARACTERISTICS OF IGBT

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$V_{CE(Sat)}$	C-E saturation voltage	-	2.0	-	V	$I_C = 150\text{A}, V_{GE} = 15\text{V}, T_{vj} = 25^\circ\text{C}$
		-	2.2	-	V	$I_C = 150\text{A}, V_{GE} = 15\text{V}, T_{vj} = 125^\circ\text{C}$
$V_{GE(th)}$	G-E threshold voltage	4.5	5.5	6.5	V	$I_C = 1\text{mA}, V_{CE} = V_{GE}$
$I_{CES}$	Zero gate voltage collector current	-	-	500	$\mu\text{A}$	$V_{GE} = 0\text{V}, V_{CE} = 600\text{V}$
$I_{GES}$	G-E leakage current	-	-	0.4	$\mu\text{A}$	$V_{GE} = \pm 20\text{V}$
$R_{Gint}$	Internal gate resistance	-	5	-	$\Omega$	-
$C_{ies}$	Input capacitance	-	6.5	-	nF	$V_{GE} = 0\text{V},$ $f = 1\text{MHz},$ $V_{CE} = 25\text{V},$ $T_{vj} = 25^\circ\text{C}$
$C_{oes}$	Output capacitance	-	0.95	-		
$C_{res}$	Reverse transfer capacitance	-	0.6	-		
$Q_g$	Total gate charge	-	tbid	-	$\mu\text{C}$	$V_{GE} = \pm 15\text{V}$
$t_{d(on)}$	Turn-on delay time	-	125	-	ns	$V_{CE} = 300\text{V},$ $I_C = 150\text{A},$ $V_{GE} = \pm 15\text{V},$ $R_G = 1.5\Omega,$ $T_{vj} = 125^\circ\text{C}$
$t_r$	Turn-on rise time	-	30	-		
$t_{d(off)}$	Turn-off delay time	-	225	-		
$t_f$	Turn-off fall time	-	35	-		
$E_{ON}$	Turn-on Energy loss	-	2.3	-	mJ	
$E_{OFF}$	Turn-off Energy loss	-	4.6	-		

## ELECTRICAL CHARACTERISTICS OF FRD

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Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$V_F$	Diode Forward Voltage Drop	-	1.4	-	V	$T_{vj} = 25^\circ\text{C}$
		-	1.35	-		$T_{vj} = 125^\circ\text{C}$
$I_{rr}$	Peak Reverse Recovery Current	-	88	-	A	$I_F = 150\text{A},$ $V_{CE} = 300\text{V}$
$Q_{rr}$	Diode Recovery Charge	-	22	-	$\mu\text{C}$	$V_{GE} = -15\text{V}$ $T_{vj} = 125^\circ\text{C}$

## THERMAL AND MECHANICAL CHARACTERISTICS

$T_J=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Condition
$R_{th(j-c)}$	Junction-to-Case (IGBT Part, Per 1/2 Module)	-	0.21	-	K/W	
$R_{th(j-c)}$	Junction-to-Case (FRD Part, Per 1/2 Module)	-	0.54	-	K/W	
$R_{th(c-f)}$	Case-to-Heat Sink (With Thermal Compound)	-	0.04	-	K/W	
Weight	Module		220		g	

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PRELIMINARY

## PERFORMANCE CURVES (I)

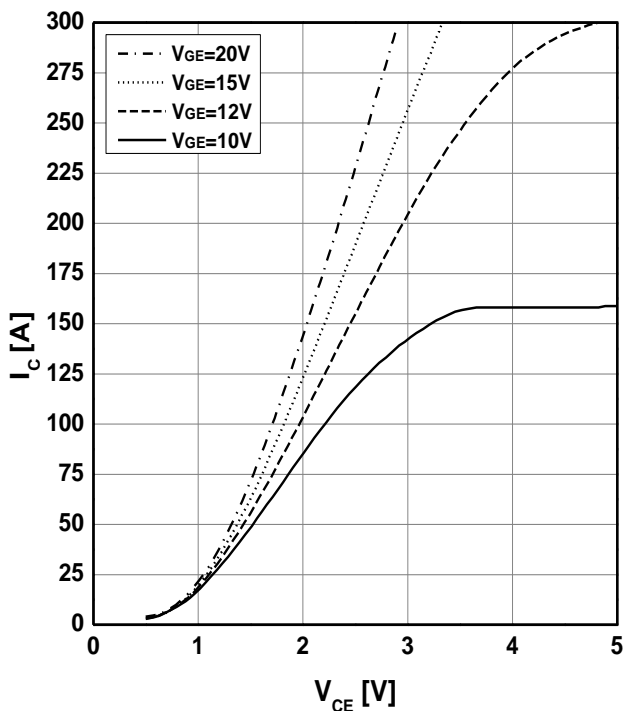


Fig1. Typical Output Characteristics

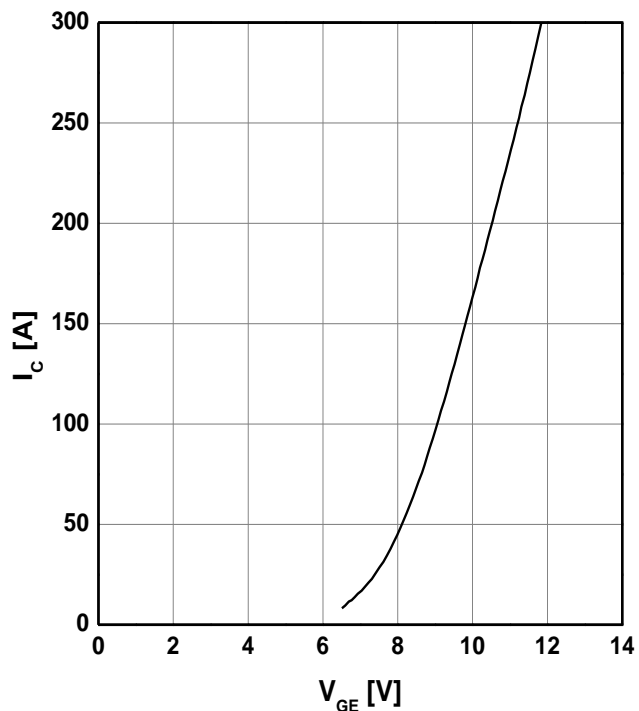


Fig2. Transfer Characteristics

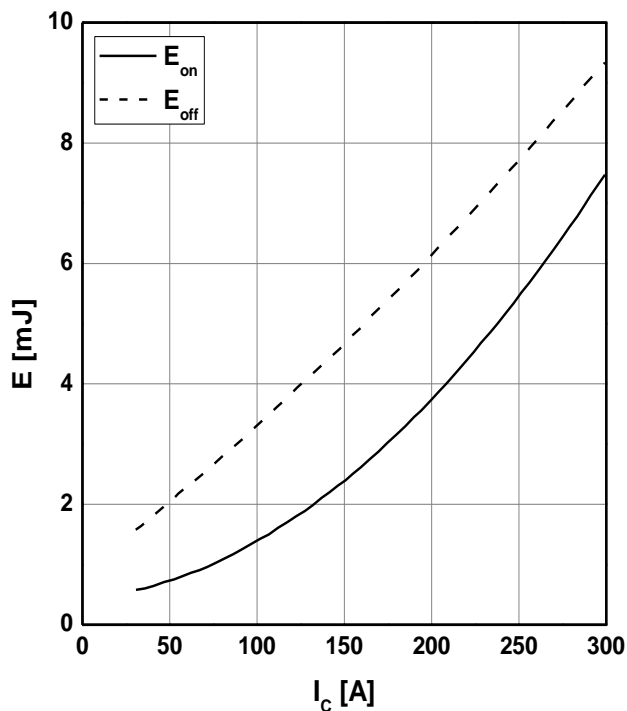


Fig3. Energy Loss vs. I<sub>c</sub>

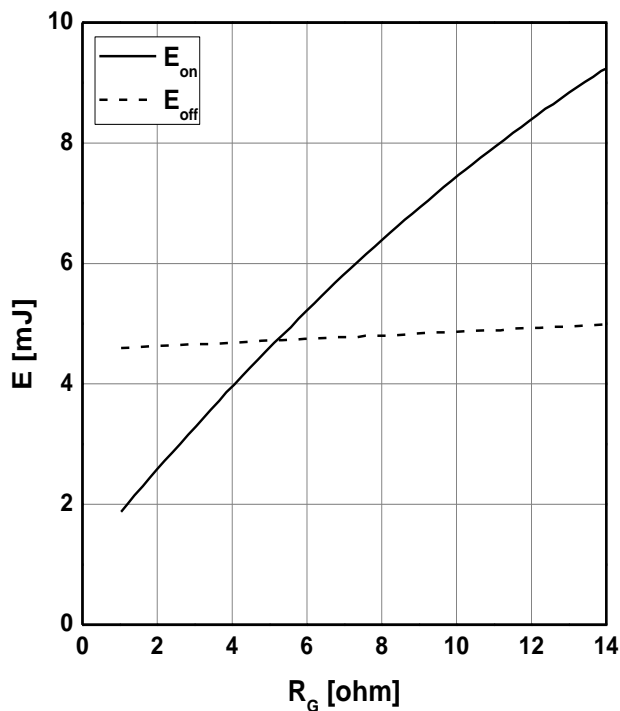


Fig4. Energy Loss vs. R<sub>G</sub>

PRELIMINARY

■ PERFORMANCE CURVES (II)

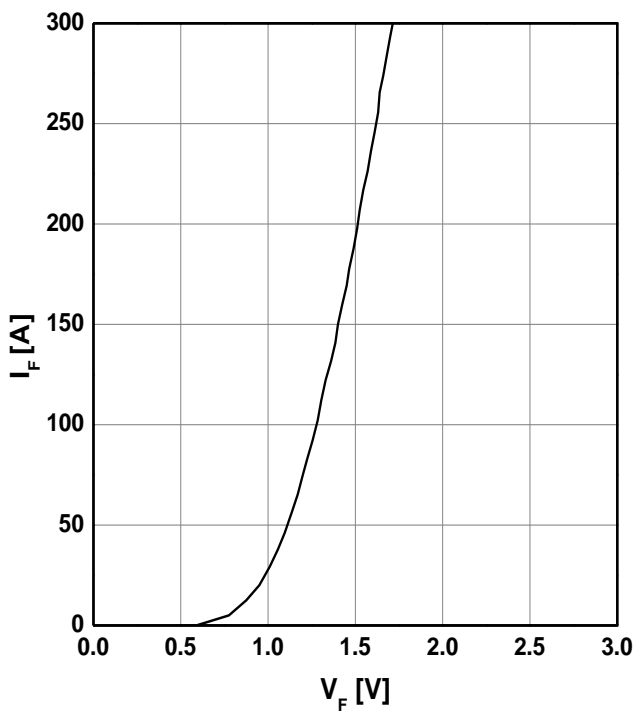


Fig5. DIODE Forward Characteristic

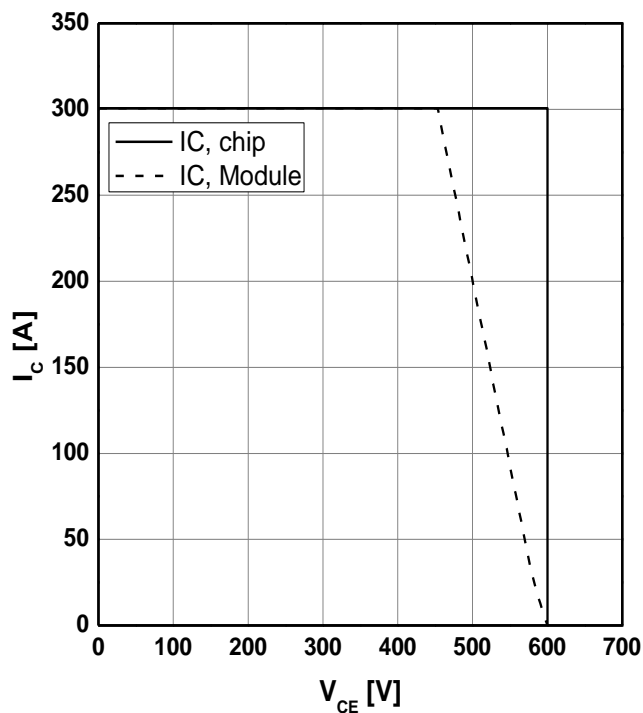


Fig6. Reverse Bias SOA ( $T_{vj} = 125^{\circ}\text{C}$ )

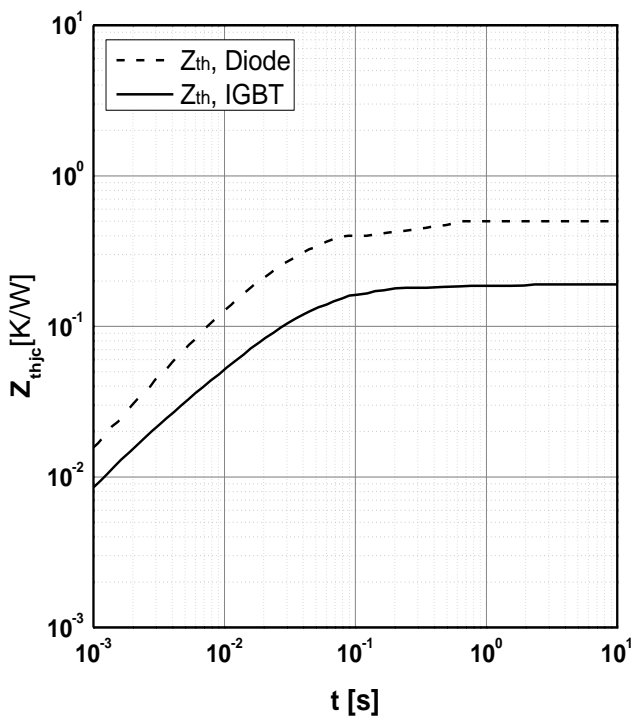


Fig7. Transient Thermal

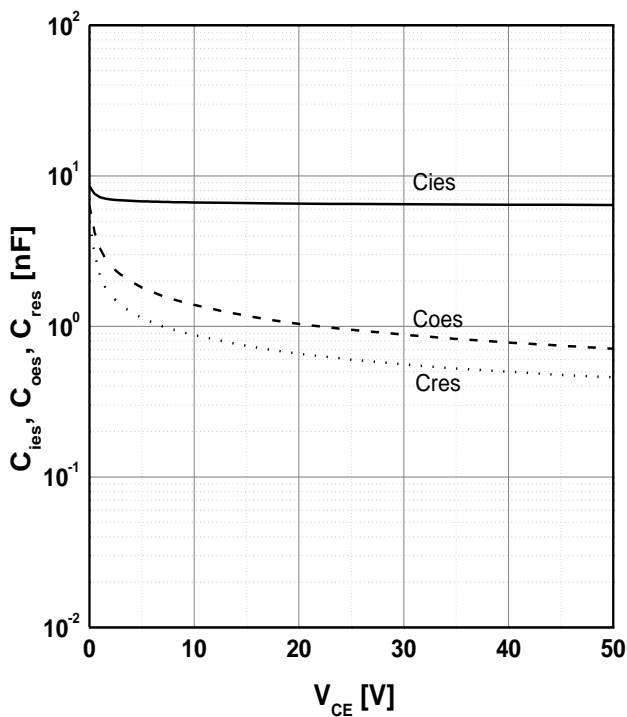


Fig8. Typ. Capacitance

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PRELIMINARY

## PACKAGE OUTLINES

