

# X2G100SD12P2

HIGH POWER SPT+ TYPE  
2-PACK IGBT MODULE



**1200V**  
**100A**

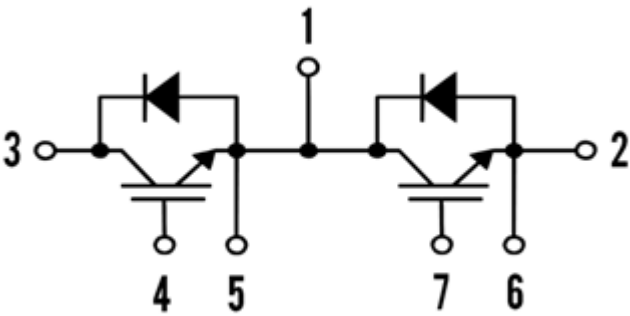
PACKAGE : M2

## FEATURES

- Soft Punch Through (SPT+) Technology
- Fast & soft inverse CAL diodes
- 10us short circuit capability
- Positive  $V_{CE(on)}$  temperature coefficient
- Industry standard package

## CIRCUIT DIAGRAM

**PRELIMINARY**



## 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             | -                                                 | 1200           | V                  |
| $I_C$        | DC-collector current                  | $T_C = 25^{\circ}\text{C}$                        | 150            | A                  |
|              |                                       | $T_C = 80^{\circ}\text{C}$                        | 100            | A                  |
| $I_{CRM}$    | Repetitive peak collector current     | $T_p=1\text{ms}$<br>$T_C = 80^{\circ}\text{C}$    | 200            | A                  |
| $V_{GES}$    | Gate-emitter peak voltage             | -                                                 | $\pm 20$       | V                  |
| $I_F$        | Diode continuous forward current      | $T_C = 80^{\circ}\text{C}$                        | 100            | A                  |
| $I_{FRM}$    | Diode repetitive peak forward current | -                                                 | 150            | A                  |
| $T_{vj,max}$ | Maximum junction temperature          | -                                                 | $-40 \sim 150$ | $^{\circ}\text{C}$ |
| $T_{vj,op}$  | Operating temperature range           | -                                                 | $-40 \sim 125$ | $^{\circ}\text{C}$ |
| $T_{stg}$    | Storage temperature range             | -                                                 | $-40 \sim 125$ | $^{\circ}\text{C}$ |
| $V_{ISOL}$   | Insulation test voltage               | 50/60Hz, $t=1\text{min}$<br>$I_{ISOL}=1\text{mA}$ | 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                |

Technical information and specification subject to change without notice.

**PRELIMINARY**

■ ELECTRICAL CHARACTERISTICS OF IGBT

T<sub>J</sub>=25℃ unless otherwise specified

| Symbol               | Parameter                           | Min  | Typ  | Max | Unit | Conditions                                                                                                                      |
|----------------------|-------------------------------------|------|------|-----|------|---------------------------------------------------------------------------------------------------------------------------------|
| V <sub>CE(Sat)</sub> | C-E saturation voltage              | -    | 1.8  | -   | V    | I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V, T <sub>vj</sub> = 25℃                                                             |
|                      |                                     | -    | 2.0  | -   | V    | I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V, T <sub>vj</sub> = 125℃                                                            |
| V <sub>GE(th)</sub>  | G-E threshold voltage               | 5.0  | 6.2  | 7.0 | V    | I <sub>C</sub> = 4mA , V <sub>CE</sub> = V <sub>GE</sub>                                                                        |
| I <sub>CES</sub>     | Zero gate voltage collector current | -    | 400  | -   | μA   | V <sub>GE</sub> = 0V , V <sub>CE</sub> = 1200V                                                                                  |
| I <sub>GES</sub>     | G-E leakage current                 | -200 | -    | 200 | nA   | V <sub>GE</sub> = ±20V                                                                                                          |
| R <sub>Gint</sub>    | Internal gate resistance            | -    | 2.0  | -   | Ω    | -                                                                                                                               |
| C <sub>ies</sub>     | Input capacitance                   | -    | 8.27 | -   | nF   | V <sub>GE</sub> = 0V,<br>f = 1MHz,<br>V <sub>CE</sub> = 25V,<br>T <sub>vj</sub> = 25℃                                           |
| C <sub>oes</sub>     | Output capacitance                  | -    | 0.83 | -   |      |                                                                                                                                 |
| C <sub>res</sub>     | Reverse transfer capacitance        | -    | 0.62 | -   |      |                                                                                                                                 |
| Q <sub>g</sub>       | Total gate charge                   | -    | 1050 | -   | nC   | V <sub>GE</sub> = ±15V                                                                                                          |
| t <sub>d(on)</sub>   | Turn-on delay time                  | -    | 135  | -   | ns   | V <sub>CE</sub> = 600V,<br>I <sub>C</sub> = 100A,<br>V <sub>GE</sub> = ±15V,<br>R <sub>G</sub> = 10Ω,<br>T <sub>vj</sub> = 125℃ |
| t <sub>r</sub>       | Turn-on rise time                   | -    | 60   | -   |      |                                                                                                                                 |
| t <sub>d(off)</sub>  | Turn-off delay time                 | -    | 490  | -   |      |                                                                                                                                 |
| t <sub>f</sub>       | Turn-off fall time                  | -    | 75   | -   |      |                                                                                                                                 |
| E <sub>ON</sub>      | Turn-on Energy loss                 | -    | 12.4 | -   | mJ   |                                                                                                                                 |
| E <sub>OFF</sub>     | Turn-off Energy loss                | -    | 10.8 | -   |      |                                                                                                                                 |

■ ELECTRICAL CHARACTERISTICS OF FRD

T<sub>J</sub>=25℃ unless otherwise specified

| Symbol          | Parameter                     | Min | Typ | Max | Unit | Conditions                                      |
|-----------------|-------------------------------|-----|-----|-----|------|-------------------------------------------------|
| V <sub>F</sub>  | Diode Forward Voltage Drop    | -   | 1.6 | -   | V    | T <sub>vj</sub> = 25℃                           |
|                 |                               | -   | 1.6 | -   |      | T <sub>vj</sub> = 125℃                          |
| I <sub>rr</sub> | Peak Reverse Recovery Current | -   | 51  | -   | A    | I <sub>F</sub> = 100A                           |
| Q <sub>rr</sub> | Diode Recovery Charge         | -   | 18  | -   | μC   | V <sub>CE</sub> = 600V<br>V <sub>GE</sub> = 15V |

■ THERMAL AND MECHANICAL CHARACTERISTICS

T<sub>J</sub>=25℃ unless otherwise specified

| Symbol   | Parameter                                   | Min | Typ  | Max | Unit | Condition |
|----------|---------------------------------------------|-----|------|-----|------|-----------|
| Rth(j-c) | Junction-to-Case (IGBT Part,Per 1/2 Module) | -   | 0.15 | -   | K/W  |           |
| Rth(j-c) | Junction-to-Case (FRD Part,Per 1/2 Module)  | -   | 0.54 | -   | K/W  |           |
| Rth(c-f) | Case-to-Heat Sink (With Thermal Compound)   | -   | 0.04 | -   | K/W  |           |
| Weight   | Module                                      |     | 220  |     | g    |           |

PRELIMINARY

■ PERFORMANCE CURVES (I)

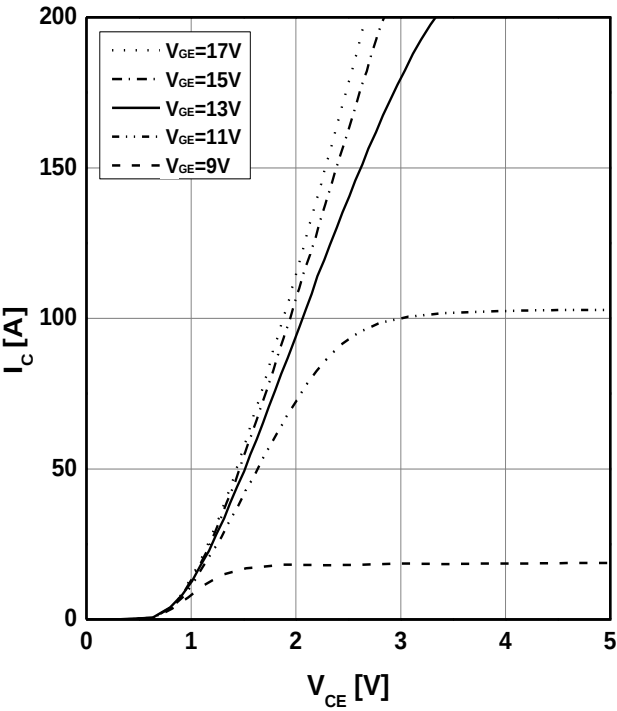


Fig1. Typical Output Characteristics

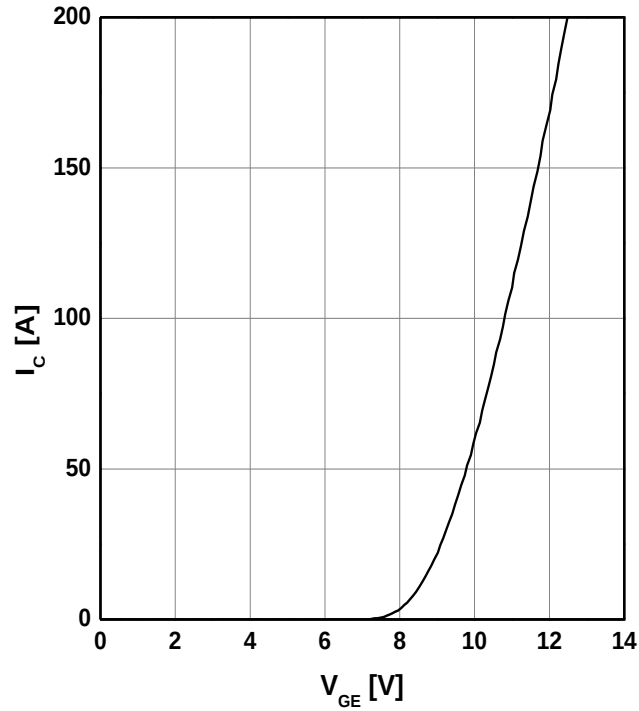


Fig2. Transfer Characteristics

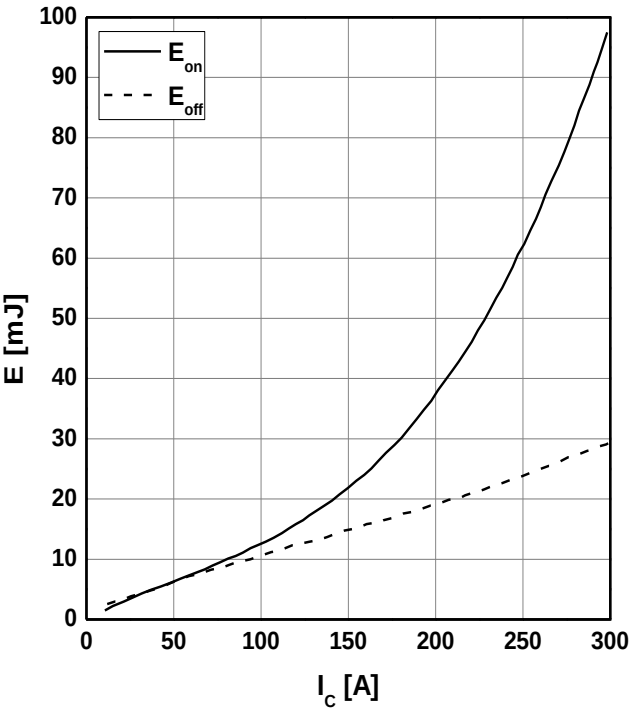


Fig3. Energy Loss vs.  $I_c$

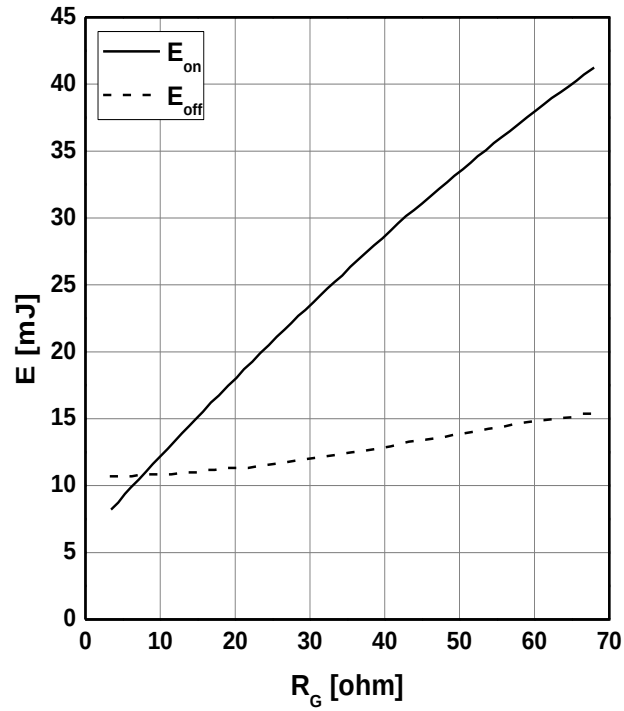


Fig4. Energy Loss vs.  $R_G$

■ PERFORMANCE CURVES (II)

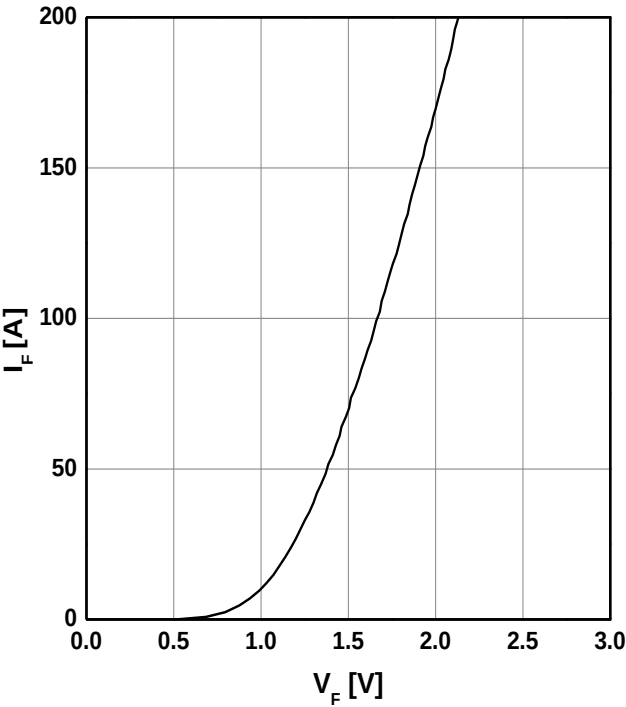


Fig5. DIODE Forward Characteristic

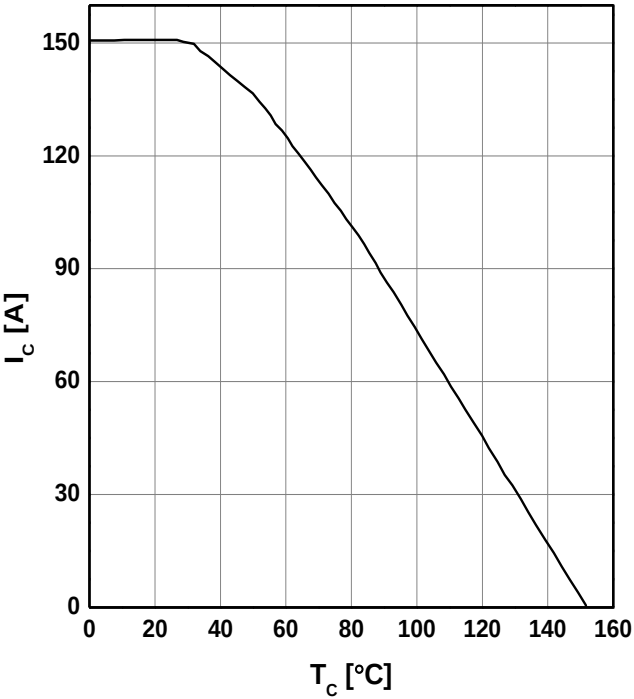


Fig6. Reverse Bios SOA ( $T_{vj} = 125^\circ\text{C}$ )

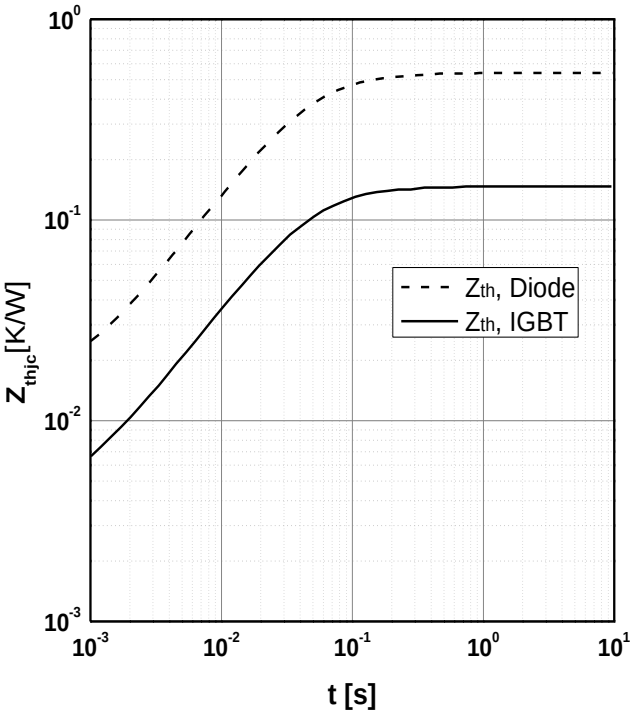


Fig7. Transient Thermal

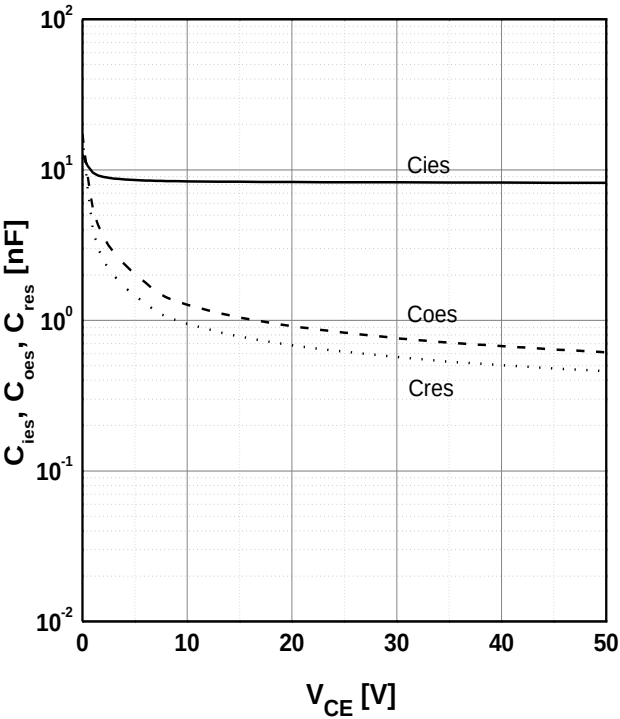


Fig8. Typ. Capacitance

PRELIMINARY

■ PACKAGE OUTLINES

