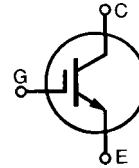


## High Voltage IGBT ISOPLUS 247™ (Electrically Isolated Backside)

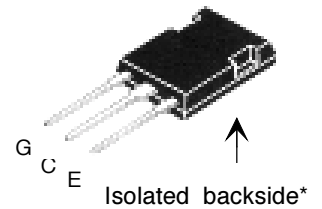
$$\begin{aligned} \text{IXSR } 45\text{N120B} \quad V_{\text{CES}} &= 1200 \text{ V} \\ I_{\text{C25}} &= 70 \text{ A} \\ V_{\text{CE(sat)}} &= 3.0 \text{ V} \end{aligned}$$

### Short Circuit SOA Capability



| Symbol                                                                          | Test Conditions                                                                                                             | Maximum Ratings                                |                  |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------|
| $V_{\text{CES}}$                                                                | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                              | 1200                                           | V                |
| $V_{\text{CGR}}$                                                                | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{\text{GE}} = 1 \text{ M}\Omega$                                           | 1200                                           | V                |
| $V_{\text{GES}}$                                                                | Continuous                                                                                                                  | $\pm 20$                                       | V                |
| $V_{\text{GEM}}$                                                                | Transient                                                                                                                   | $\pm 30$                                       | V                |
| $I_{\text{C25}}$                                                                | $T_C = 25^\circ\text{C}$                                                                                                    | 70                                             | A                |
| $I_{\text{C90}}$                                                                | $T_C = 90^\circ\text{C}$                                                                                                    | 45                                             | A                |
| $I_{\text{CM}}$                                                                 | $T_C = 25^\circ\text{C}, 1 \text{ ms}$                                                                                      | 180                                            | A                |
| <b>SSOA (RBSOA)</b>                                                             | $V_{\text{GE}} = 15 \text{ V}, T_{\text{VJ}} = 125^\circ\text{C}, R_G = 5 \Omega$                                           | $I_{\text{CM}} = 90$<br>@ $0.8 V_{\text{CES}}$ | A                |
| <b><math>t_{\text{SC}}</math> (SCSOA)</b>                                       | $V_{\text{GE}} = 15 \text{ V}, V_{\text{CE}} = 720 \text{ V}, T_J = 125^\circ\text{C}$<br>$R_G = 5 \Omega$ , non repetitive | 10                                             | $\mu\text{s}$    |
| $P_C$                                                                           | $T_C = 25^\circ\text{C}$                                                                                                    | 250                                            | W                |
| $T_J$                                                                           |                                                                                                                             | -55 ... +150                                   | $^\circ\text{C}$ |
| $T_{\text{JM}}$                                                                 |                                                                                                                             | 150                                            | $^\circ\text{C}$ |
| $T_{\text{stg}}$                                                                |                                                                                                                             | -55 ... +150                                   | $^\circ\text{C}$ |
| $V_{\text{ISOL}}$                                                               | 50/60 Hz, RMS $t = 1 \text{ min leads-to housing}$                                                                          | 2500                                           | V~               |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                                                                             | 300                                            | $^\circ\text{C}$ |
| <b>Weight</b>                                                                   |                                                                                                                             | 5                                              | g                |

ISOPLUS 247™  
E 153432



G = Gate      C = Collector  
E = Emitter

\* Patent pending

### Features

- DCB Isolated mounting backside
- Meets TO-247AD package outline
- High current handling capability
- MOS Gate turn-on  
- drive simplicity

### Applications

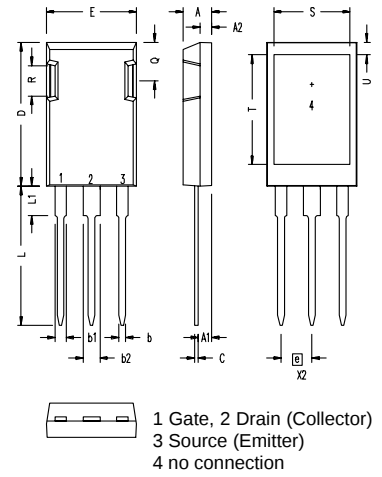
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- Welding

### Advantages

- Easy assembly
- High power density

| Symbol               | Test Conditions                                                                                | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                            |
|----------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|----------------------------|
|                      |                                                                                                | min.                                                                              | typ. | max.                       |
| $BV_{\text{CES}}$    | $I_C = 1 \text{ mA}, V_{\text{GE}} = 0 \text{ V}$                                              | 1200                                                                              |      | V                          |
| $V_{\text{GE(th)}}$  | $I_C = 250 \mu\text{A}, V_{\text{CE}} = V_{\text{GE}}$                                         | 3                                                                                 |      | 6 V                        |
| $I_{\text{CES}}$     | $V_{\text{CE}} = 0.8 V_{\text{CES}}, V_{\text{GE}} = 0 \text{ V}$<br>$T_J = 125^\circ\text{C}$ |                                                                                   |      | 50 $\mu\text{A}$<br>2.5 mA |
| $I_{\text{GES}}$     | $V_{\text{CE}} = 0 \text{ V}, V_{\text{GE}} = \pm 20 \text{ V}$                                |                                                                                   |      | $\pm 100 \text{ nA}$       |
| $V_{\text{CE(sat)}}$ | $I_C = I_{\text{C90}}, V_{\text{GE}} = 15 \text{ V}$<br>$T_J = 125^\circ\text{C}$              | 2.5<br>2.6                                                                        |      | 3.0 V<br>V                 |

| Symbol       | Test Conditions                                                                                                                                           | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------|
|              |                                                                                                                                                           | min.                                                                              | typ. | max.    |
| $g_{fs}$     | $I_C = I_{C90}; V_{CE} = 10\text{ V}$<br>Note 1                                                                                                           | 16                                                                                | 23   | S       |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                                                             |                                                                                   | 3300 | pF      |
| $C_{oss}$    |                                                                                                                                                           |                                                                                   | 240  | pF      |
| $C_{rss}$    |                                                                                                                                                           |                                                                                   | 65   | pF      |
| $Q_g$        | $I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$                                                                                               |                                                                                   | 120  | nC      |
| $Q_{ge}$     |                                                                                                                                                           |                                                                                   | 40   | nC      |
| $Q_{gc}$     |                                                                                                                                                           |                                                                                   | 45   | nC      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C90}, V_{GE} = 15\text{ V}$<br>$V_{CE} = 0.8 V_{CES}, R_G = 5\ \Omega$<br>Note 2  |                                                                                   | 36   | ns      |
| $t_{ri}$     |                                                                                                                                                           |                                                                                   | 27   | ns      |
| $t_{d(off)}$ |                                                                                                                                                           |                                                                                   | 360  | 500 ns  |
| $t_{fi}$     |                                                                                                                                                           |                                                                                   | 380  | 750 ns  |
| $E_{off}$    |                                                                                                                                                           |                                                                                   | 13   | 22 mJ   |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_{C90}, V_{GE} = 15\text{ V}$<br>$V_{CE} = 0.8 V_{CES}, R_G = 5\ \Omega$<br>Note 2 |                                                                                   | 38   | ns      |
| $t_{ri}$     |                                                                                                                                                           |                                                                                   | 29   | ns      |
| $E_{on}$     |                                                                                                                                                           |                                                                                   | 2.9  | mJ      |
| $t_{d(off)}$ |                                                                                                                                                           |                                                                                   | 440  | ns      |
| $t_{fi}$     |                                                                                                                                                           |                                                                                   | 700  | ns      |
| $E_{off}$    |                                                                                                                                                           |                                                                                   | 22   | mJ      |
| $R_{thJC}$   |                                                                                                                                                           |                                                                                   |      | 0.5 K/W |
| $R_{thCK}$   |                                                                                                                                                           | 0.15                                                                              |      | K/W     |

**ISOPLUS 247 OUTLINE**


| Dim.           | Millimeter |       | Inches   |      |
|----------------|------------|-------|----------|------|
|                | Min.       | Max.  | Min.     | Max. |
| A              | 4.83       | 5.21  | .190     | .205 |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100 |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085 |
| b              | 1.14       | 1.40  | .045     | .055 |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084 |
| b <sub>2</sub> | 2.92       | 3.12  | .115     | .123 |
| C              | 0.61       | 0.80  | .024     | .031 |
| D              | 20.80      | 21.34 | .819     | .840 |
| E              | 15.75      | 16.13 | .620     | .635 |
| e              | 5.45 BSC   |       | .215 BSC |      |
| L              | 19.81      | 20.32 | .780     | .800 |
| L1             | 3.81       | 4.32  | .150     | .170 |
| Q              | 5.59       | 6.20  | .220     | .244 |
| R              | 4.32       | 4.83  | .170     | .190 |

Notes: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$

2. Switching times may increase for  $V_{CE}$  (Clamp)  $> 0.8 V_{CES}$ , higher  $T_J$  or increased  $R_G$ .