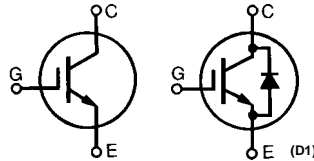


# HiPerFAST™ IGBT ISOPLUS247™ (Electrically Isolated Backside)

**IXGR 40N60B**  
**IXGR 40N60BD1**

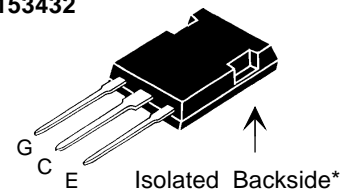
$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 70 \text{ A}$   
 $V_{CE(sat)} = 2.1 \text{ V}$   
 $t_{fi(typ)} = 180 \text{ ns}$



| Symbol  | Test Conditions   | Maximum Ratings                  |                  |
|---|---|----------------------------------|------------------|
| $V_{CES}$   | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$  | 600                              | V                |
| $V_{CGR}$   | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$  | 600                              | V                |
| $V_{GES}$   | Continuous  | $\pm 20$                         | V                |
| $V_{GEM}$   | Transient   | $\pm 30$                         | V                |
| $I_{C25}$   | $T_C = 25^\circ\text{C}$  | 70                               | A                |
| $I_{C90}$   | $T_C = 90^\circ\text{C}$  | 35                               | A                |
| $I_{CM}$  | $T_C = 25^\circ\text{C}, 1 \text{ ms}$  | 150                              | A                |
| <b>SSOA (RBSOA)</b>   | $V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10 \Omega$<br>Clamped inductive load, $L = 100 \mu\text{H}$ | $I_{CM} = 80$<br>@ $0.8 V_{CES}$ | A                |
| $P_C$   | $T_C = 25^\circ\text{C}$  | 200                              | W                |
| $T_J$   |   | -40 ... +150                     | $^\circ\text{C}$ |
| $T_{JM}$  |   | 150                              | $^\circ\text{C}$ |
| $T_{stg}$   |   | -40 ... +150                     | $^\circ\text{C}$ |
| 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

E153432



G = Gate, C = Collector  
E = Emitter

\* Patent pending

## Features

- DCB Isolated mounting tab
- Meets TO-247AD package Outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on - drive simplicity
- Low collector-to-drain capacitance (<35pF)

## Applications

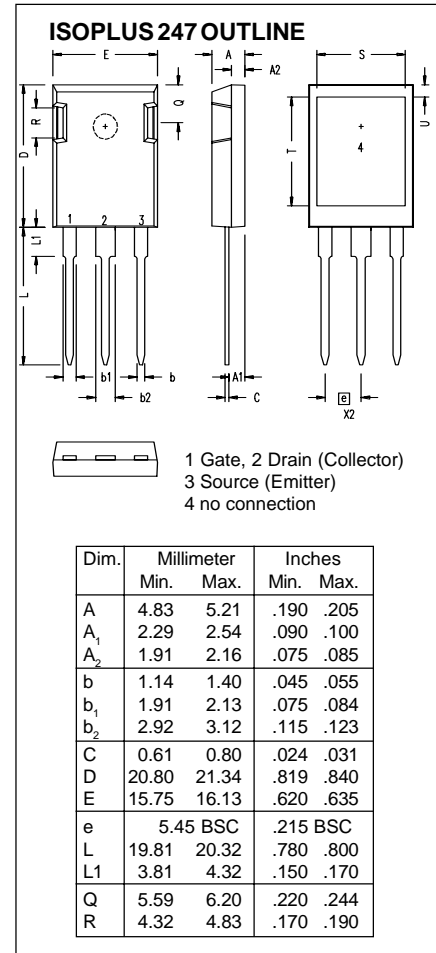
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

## Advantages

- Easy assembly
- High power density

| Symbol        | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                      |
|---------------|--|---|------|----------------------|
|               |  | Min.  | Typ. | Max.                 |
| $BV_{CES}$    | $I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$                  | 40N60B  | 600  | V                    |
|               | $I_C = 750 \mu\text{A}$  | 40N60BD1  | 600  |                      |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$                       | 40N60B  | 2.5  | 5.0 V                |
|               | $I_C = 500 \mu\text{A}$  | 40N60BD1  | 2.5  | 5.0 V                |
| $I_{CES}$     | $V_{CE} = 0.8 V_{CES}, T_J = 25^\circ\text{C}$                 | 40N60B  |      | 200 $\mu\text{A}$    |
|               | $V_{GE} = 0 \text{ V}; \text{note } 1, T_J = 25^\circ\text{C}$ | 40N60BD1  |      | 650 $\mu\text{A}$    |
|               | $T_J = 125^\circ\text{C}$                                      | 40N60B  |      | 1 mA                 |
|               | $T_J = 125^\circ\text{C}$                                      | 40N60BD1  |      | 3 mA                 |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$              |   |      | $\pm 100 \text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_T, V_{GE} = 15 \text{ V}$                             |   | 1.6  | 2.1 V                |

| Symbol       | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |    |
|--------------|--|---|------|------|----|
|              |  | min.  | typ. | max. |    |
| $g_{fs}$     | $I_C = I_T; V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$   | 30  | 42   | S    |    |
| $C_{ies}$    | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$  |   | 3300 | pF   |    |
| $C_{oes}$    |  | 40N60B  | 310  | pF   |    |
| $C_{res}$    |  | 40N60BD1  | 370  | pF   |    |
| $Q_g$        | $I_C = I_T, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$  |   | 116  | nC   |    |
| $Q_{ge}$     |  |   | 23   | nC   |    |
| $Q_{gc}$     |  |   | 55   | nC   |    |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_T, V_{GE} = 15\text{ V}$<br>$V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 4.7\ \Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$                     |   | 25   | ns   |    |
| $t_{ri}$     |  |   | 30   | ns   |    |
| $t_{d(off)}$ |  |   | 180  | 300  | ns |
| $t_{fi}$     |  |   | 180  | 270  | ns |
| $E_{off}$    |  |   | 2.7  | 4.0  | mJ |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_T, V_{GE} = 15\text{ V}$<br>$V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 4.7\ \Omega$ 40N60B<br>40N60BD1<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$ |   | 25   | ns   |    |
| $t_{ri}$     |  |   | 30   | ns   |    |
| $E_{on}$     |  |   | 0.4  | mJ   |    |
| $t_{d(off)}$ |  |   | 1.2  | mJ   |    |
| $t_{fi}$     |  |   | 300  | ns   |    |
| $E_{off}$    |  |   | 270  | ns   |    |
| $R_{thJC}$   |  |   | 0.6  | K/W  |    |
| $R_{thCK}$   |  | 0.15  |      | K/W  |    |



| Symbol     | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |   |
|------------|--|---|------|---|
|            |  | min.  | typ. | max.  |
| $V_F$      | $I_F = I_T, V_{GE} = 0\text{ V}$ ,<br>Note 1   |   |      | $T_J = 150^\circ\text{C}$<br>1.3 V<br>1.8 V |
| $I_{RM}$   | $I_F = I_T, V_{GE} = 0\text{ V}, V_R = 100\text{ V}, T_J = 100^\circ\text{C}, -di/dt = 100\text{ A}/\mu\text{s}$ |   | 7.5  | A   |
| $t_{rr}$   | $I_F = 1\text{ A}; -di/dt = 100\text{ A}/\mu\text{s}; V_R = 30\text{ V}$   |   | 35   | ns  |
| $R_{thJC}$ |  |   | 0.90 | K/W   |

Note: 1. Pulse test,  $t_p \leq 300\text{ ms}$ , duty cycle:  $d \leq 2\%$   
2.  $I_T = 40\text{ A}$

IXYS reserves the right to change limits, test conditions, and dimensions.