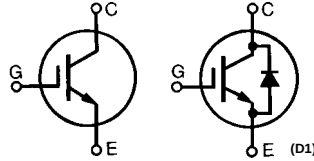


# HiPerFAST™ IGBT ISOPLUS247™ (Electrically Isolated Backside)

IXGR 40N60B  
IXGR 40N60BD1

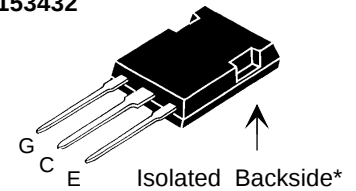
$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 70 \text{ A}$   
 $V_{CE(sat)} = 2.1 \text{ V}$   
 $t_{fi(typ)} = 180 \text{ ns}$



| 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

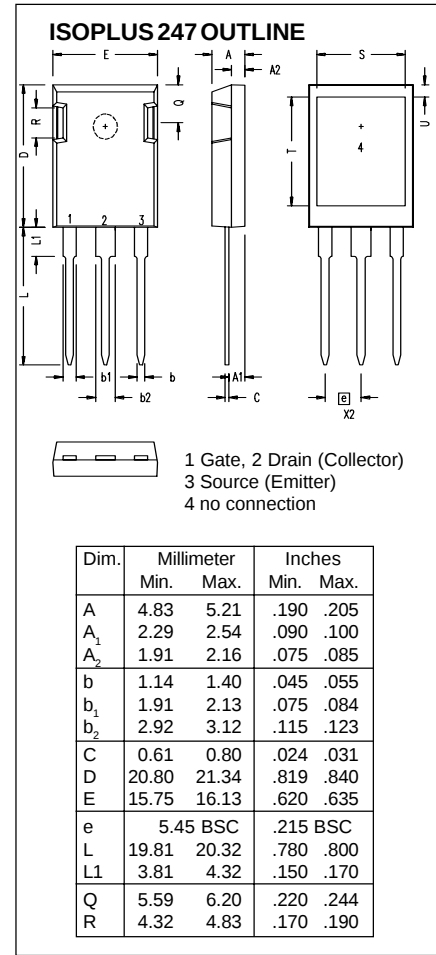
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

## Advantages

- Easy assembly
- High power density

| Symbol        | Test Conditions                                                                                                                                                           | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                                        |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------------------------------------|
|               |                                                                                                                                                                           | Min.                                                                              | Typ. | Max.                                                   |
| $BV_{CES}$    | $I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$<br>$I_C = 750 \mu\text{A}$                                                                                                  | 40N60B 600<br>40N60BD1 600                                                        |      | V                                                      |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$<br>$I_C = 500 \mu\text{A}$                                                                                                       | 40N60B 2.5<br>40N60BD1 2.5                                                        |      | 5.0 V<br>5.0 V                                         |
| $I_{CES}$     | $V_{CE} = 0.8 V_{CES}, T_J = 25^\circ\text{C}$<br>$V_{GE} = 0 \text{ V}; \text{note 1 } T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | 40N60B<br>40N60BD1<br>40N60B<br>40N60BD1                                          |      | 200 $\mu\text{A}$<br>650 $\mu\text{A}$<br>1 mA<br>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, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$                                                                                                                                                                                    | 30                                                                                | 42   | S      |
| $C_{ies}$    | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                                                                                                                                                                           | 40N60B<br>40N60BD1                                                                | 3300 | pF     |
| $C_{oes}$    |                                                                                                                                                                                                                                                                                               |                                                                                   | 310  | pF     |
| $C_{res}$    |                                                                                                                                                                                                                                                                                               |                                                                                   | 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>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 4.7\text{ }\Omega$<br>Remarks: Switching times may increase<br>for $V_{CE}(\text{Clamp}) > 0.8 V_{CES}$ , higher $T_J$ or<br>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>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 4.7\text{ }\Omega$<br>Remarks: Switching times may<br>increase for $V_{CE}(\text{Clamp}) > 0.8 V_{CES}$ ,<br>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     |
|              |                                                                                                                                                                                                                                                                                               |                                                                                   | 270  | ns     |
| $E_{off}$    |                                                                                                                                                                                                                                                                                               |                                                                                   | 4.0  | mJ     |
| $R_{thJC}$   |                                                                                                                                                                                                                                                                                               |                                                                                   | 0.6  | K/W    |
| $R_{thCK}$   |                                                                                                                                                                                                                                                                                               | 0.15                                                                              |      | K/W    |



| Reverse Diode (FRED) (IXGR40N60BD1) |                                                                                                                              | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|----------------|
| Symbol                              | Test Conditions                                                                                                              | min.                                                                              | typ. | max.           |
| $V_F$                               | $I_F = I_T$ , $V_{GE} = 0\text{ V}$ ,<br>Note 1                                                                              | $T_J = 150^\circ\text{C}$                                                         |      | 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.