# IXYS

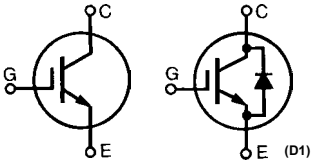
# HiPerFAST™ IGBT ISOPLUS247™

## (Electrically Isolated Backside)

**IXGR 40N60C**
**IXGR 40N60CD1**

$V_{CES}$ = 600 V
$I_{C25}$ = 75 A
$V_{CE(sat)}$ = 2.5 V
$t_{fi(typ)}$ = 75 ns

Preliminary Data Sheet




| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | 600 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C; $R_{GE}$ = 1 MΩ | 600 | V |
| $V_{GES}$ | Continuous | ±20 | V |
| $V_{GEM}$ | Transient | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 75 | A |
| $I_{C110}$ | $T_C$ = 110°C | 35 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1 ms | 150 | A |
| **SSOA (RBSOA)** | $V_{GE}$ = 15 V, $T_{VJ}$ = 125°C, $R_G$ = 10 Ω<br>Clamped inductive load | $I_{CM}$ = 80<br>@ 0.8 $V_{CES}$ | A |
| $P_C$ | $T_C$ = 25°C | 200 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s | | 300 | °C |
| $M_d$ | Mounting torque (M3) | 1.13/10Nm/lb.in. | |
| **Weight** | | 5 | g |

| Symbol | Test Conditions | | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) Min. | Typ. | Max. | |
|---|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250 µA, $V_{GE}$ = 0 V<br>$I_C$ = 750 µA | 40N60C<br>40N60CD1 | 600<br>600 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250 µA, $V_{CE}$ = $V_{GE}$<br>$I_C$ = 500 µA | 40N60C<br>40N60CD1 | 2.5<br>2.5 | | 5.0<br>5.0 | V<br>V |
| $I_{CES}$ | $V_{CE}$ = 0.8 • $V_{CES}$ $T_J$ = 25°C<br>$V_{GE}$ = 0 V; note 1 $T_J$ = 25°C<br>$T_J$ = 125°C<br>$T_J$ = 125°C | 40N60C<br>40N60CD1<br>40N60C<br>40N60CD1 | | | 200<br>650<br>1<br>3 | µA<br>µA<br>mA<br>mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = ±20 V | | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = $I_T$, $V_{GE}$ = 15 V | | | | 2.5 | V |

**ISOPLUS 247**

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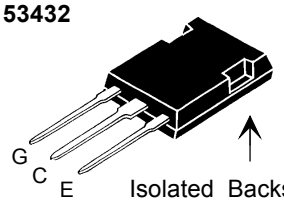



G = Gate, C = Collector
E = Emitter

* 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

### Applications

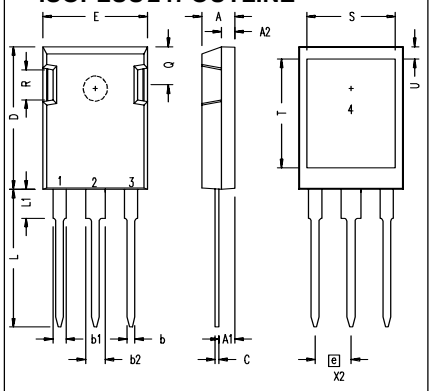
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

### Advantages

- Easy assembly
- High power density
- Very fast switching speeds for high frequency applications

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | min. | typ. | max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C = I_T$; $V_{CE}$ = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 % | 30 | 40 | | S |
| $C_{ies}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 3300 | | pF |
| $C_{oes}$ | | 40N60C | 310 | | pF |
| | | 40N60CD1 | 370 | | pF |
| $C_{res}$ | | | 65 | | pF |
| $Q_g$ | $I_C = I_T$, $V_{GE}$ = 15 V, $V_{CE}$ = 0.5 $V_{CES}$ | | 116 | | nC |
| $Q_{ge}$ | | | 23 | | nC |
| $Q_{gc}$ | | | 55 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** | | 25 | | ns |
| $t_{ri}$ | $I_C = I_T$, $V_{GE}$ = 15 V | | 30 | | ns |
| $t_{d(off)}$ | $V_{CE}$ = 0.8 • $V_{CES}$, $R_G = R_{off}$ = 4.7 Ω | | 100 | 150 | ns |
| $t_{fi}$ | Remarks: Switching times may increase for $V_{CE}$ (Clamp) > 0.8 • $V_{CES}$, higher $T_J$ or increased $R_G$ | | 75 | 150 | ns |
| $E_{off}$ | | | 0.85 | 1.70 | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** | | 25 | | ns |
| $t_{ri}$ | $I_C = I_T$, $V_{GE}$ = 15 V | | 35 | | ns |
| $E_{on}$ | | 40N60C | 0.4 | | mJ |
| $t_{d(off)}$ | $V_{CE}$ = 0.8 • $V_{CES}$, $R_G = R_{off}$ = 4.7 Ω | 40N60CD1 | 1.2 | | mJ |
| $t_{fi}$ | Remarks: Switching times may increase for $V_{CE}$ (Clamp) > 0.8 • $V_{CES}$, higher $T_J$ or increased $R_G$ | | 150 | | ns |
| | | | 105 | | ns |
| $E_{off}$ | | | 1.2 | | mJ |
| $R_{thJC}$ | | | | 0.6 | K/W |
| $R_{thCK}$ | | | 0.15 | | K/W |

**ISOPLUS 247 OUTLINE**




1 Gate, 2 Drain (Collector)
3 Source (Emitter)
4 no connection

| Dim. | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|---|---|---|---|---|
| A | 4.83 | 5.21 | .190 | .205 |
| $A_1$ | 2.29 | 2.54 | .090 | .100 |
| $A_2$ | 1.91 | 2.16 | .075 | .085 |
| b | 1.14 | 1.40 | .045 | .055 |
| $b_1$ | 1.91 | 2.13 | .075 | .084 |
| $b_2$ | 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 |

**Reverse Diode (FRED) (IXGR40N60CD1 only)** **Characteristic Values** ($T_J$ = 25°C, unless otherwise specified)

| Symbol | Test Conditions | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| $V_F$ | $I_F = I_T$, $V_{GE}$ = 0 V, Note 1 | $T_J$ = 150°C | | | 1.3 | V |
| | | $T_J$ = 25°C | | | 1.8 | V |
| $I_{RM}$ | $I_F = I_T$, $V_{GE}$ = 0 V, $V_R$ = 100 V, $-di_F/dt$ = 100 A/µs | $T_J$ = 100°C | | | 7.5 | A |
| $t_{rr}$ | $I_F$ = 1 A; -di/dt = 100 A/µs; $V_R$ = 30 V | | | 3.5 | | ns |
| $R_{thJC}$ | | | | | 0.90 | K/W |

Note: 1. Pulse test, $t_p$ ≤ 300 ms, duty cycle:d ≤ 2 %
2. $I_T$ = 40A