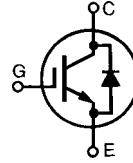


IGBT with Diode ISOPLUS 247™ (Electrically Isolated Backside)

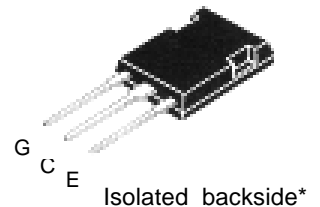
IXSR 40N60BD1 $V_{CES} = 600 \text{ V}$
 $I_{C25} = 70 \text{ A}$
 $V_{CE(sat)} = 2.2 \text{ V}$
 $t_{fi(typ)} = 120 \text{ ns}$

Short Circuit SOA Capability
Preliminary Data Sheet



| 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 | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ\text{C}$ | 70 | A |
| I_{C90} | $T_C = 90^\circ\text{C}$ | 40 | A |
| I_{CM} | $T_C = 25^\circ\text{C}, 1 \text{ ms}$ | 150 | A |
| SSOA (RBSOA) | $V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 22 \Omega$ Clamped inductive load, $L = 30 \mu\text{H}$ | $I_{CM} = 80$ @ $0.8 V_{CES}$ | A |
| t_{SC} (SCSOA) | $V_{GE} = 15 \text{ V}, V_{CE} = 360 \text{ V}, T_J = 125^\circ\text{C}$ $R_G = 22 \Omega$, non repetitive | 10 | μs |
| P_C | $T_C = 25^\circ\text{C}$ | 170 | W |
| T_J | | -55 ... +150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| V_{ISOL} | 50/60 Hz, RMS $t = 1 \text{ min leads-to housing}$ | 2500 | V~ |
| Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s | | 300 | $^\circ\text{C}$ |
| Weight | | 5 | g |

ISOPLUS247™
E 153432



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

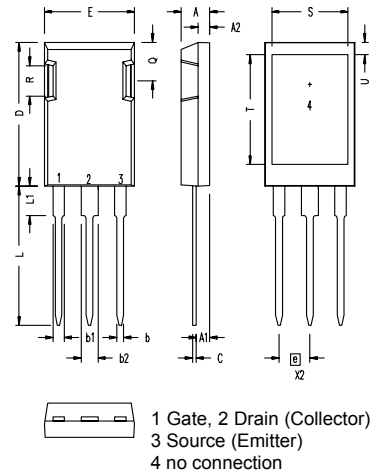
Advantages

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

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|---------------|--|---|------|--|
| | | min. | typ. | max. |
| BV_{CES} | $I_C = 1 \text{ mA}, V_{GE} = 0 \text{ V}$ | 600 | | V |
| $V_{GE(th)}$ | $I_C = 4 \text{ mA}, V_{CE} = V_{GE}$ | 4 | | 7 V |
| I_{CES} | $V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$ | | | $T_J = 25^\circ\text{C}$: 650 μA $T_J = 150^\circ\text{C}$: 5 mA |
| I_{GES} | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$ | | | $\pm 100 \text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_T, V_{GE} = 15 \text{ V}$ | | | 2.2 V |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | | |
|--------------|--|---|------|------|----|
| | | min. | typ. | max. | |
| g_{fs} | $I_C = I_T; V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$ | 16 | 23 | S | |
| C_{iss} | } $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 3700 | pF | |
| C_{oss} | | | 440 | pF | |
| C_{rss} | | | 60 | pF | |
| Q_g | } $I_C = I_T, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$ | | 190 | nC | |
| Q_{ge} | | | 45 | nC | |
| Q_{gc} | | | 88 | nC | |
| $t_{d(on)}$ | } Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}, L = 100\ \mu\text{H}$, $V_{CE} = 0.8 V_{CES}, R_G = 2.7\ \Omega$ Remarks: Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G | | 50 | ns | |
| t_{ri} | | | 50 | ns | |
| $t_{d(off)}$ | | | 110 | 200 | ns |
| t_{fi} | | | 120 | 200 | ns |
| E_{off} | | | 1.8 | 2.6 | mJ |
| $t_{d(on)}$ | } Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}, L = 100\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}, R_G = 2.7\ \Omega$ Remarks: Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G | | 50 | ns | |
| t_{ri} | | | 50 | ns | |
| E_{on} | | | 2.2 | mJ | |
| $t_{d(off)}$ | | | 190 | ns | |
| t_{fi} | | | 180 | ns | |
| E_{off} | | | 2.6 | mJ | |
| R_{thJC} | | | 0.73 | 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 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 |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|------------|---|---|------|----------|
| | | min. | typ. | max. |
| V_F | $I_F = I_T, V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 1.8 V |
| I_{RM} | } $I_F = I_T, V_{GE} = 0\text{ V}, -di_F/dt = 100\text{ A}/\mu\text{s}$ $V_R = 100\text{ V}$ $I_F = 1\text{ A}; -di/dt = 200\text{ A}/\mu\text{s}; V_R = 30\text{ V}$ | | 2 | 2.5 A |
| t_{rr} | | | 35 | ns |
| R_{thJC} | | | | 1.15 K/W |

Note: 1. $I_T = 40\text{ A}$

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