

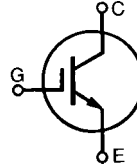
# HiPerFAST™ IGBT

**IXGA 7N60B\***

**IXGP 7N60B**

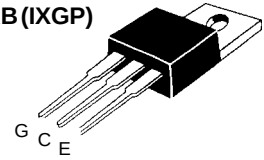
**\*Obsolete Part Number**

$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 14 \text{ A} \\ V_{CE(sat)} &= 2 \text{ V} \\ t_{fi} &= 150 \text{ ns} \end{aligned}$$

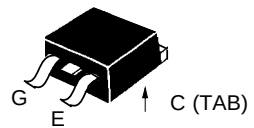


| Symbol                                                                          | Test Conditions                                                                                                       | Maximum Ratings                  |                  |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| $V_{CES}$                                                                       | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                        | 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                |
| $I_{C25}$                                                                       | $T_C = 25^\circ\text{C}$                                                                                              | 14                               | A                |
| $I_{C90}$                                                                       | $T_C = 90^\circ\text{C}$                                                                                              | 7                                | A                |
| $I_{CM}$                                                                        | $T_C = 25^\circ\text{C}, 1 \text{ ms}$                                                                                | 30                               | A                |
| <b>SSOA (RBSOA)</b>                                                             | $V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 22 \Omega$<br>Clamped inductive load, $L = 300 \mu\text{H}$ | $I_{CM} = 14$<br>@ $0.8 V_{CES}$ | A                |
| $P_C$                                                                           | $T_C = 25^\circ\text{C}$                                                                                              | 54                               | W                |
| $T_J$                                                                           |                                                                                                                       | -55 ... +150                     | $^\circ\text{C}$ |
| $T_{JM}$                                                                        |                                                                                                                       | 150                              | $^\circ\text{C}$ |
| $T_{stg}$                                                                       |                                                                                                                       | -55 ... +150                     | $^\circ\text{C}$ |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                                                                       | 300                              | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque, (TO-220)                                                                                             | M3 0.45/4<br>M3.5 0.55/5         | Nm/lb.in.        |
| <b>Weight</b>                                                                   | TO-220                                                                                                                | 4                                | g                |
|                                                                                 | TO-263                                                                                                                | 2                                | g                |

TO-220AB (IXGP)



TO-263 AA (IXGA)



G = Gate, C = Collector,  
E = Emitter, TAB = Collector

## Features

- International standard packages JEDEC TO-263 surface mountable and JEDEC TO-220 AB
- Medium frequency IGBT
- High current handling capability
- HiPerFAST™ HDMOS™ process
- MOS Gate turn-on - drive simplicity

## Applications

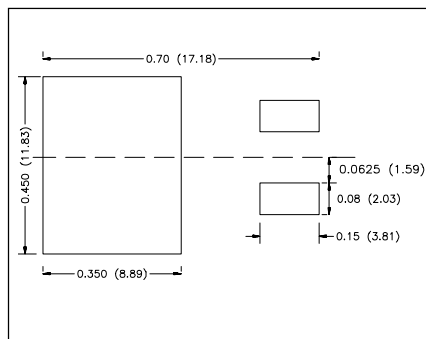
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

## Advantages

- High power density
- Suitable for surface mounting
- Very low switching losses for high frequency applications

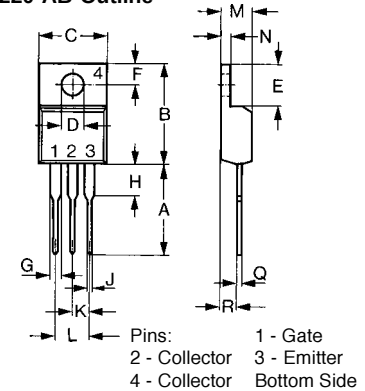
| Symbol        | Test Conditions                                                                                           | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                        |
|---------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|----------------------------------------|
|               |                                                                                                           | min.                                                                              | typ. | max.                                   |
| $BV_{CES}$    | $I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$                                                             | 600                                                                               |      | V                                      |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$                                                                  | 2.5                                                                               |      | V                                      |
| $I_{CES}$     | $V_{CE} = 0.8 V_{CES}$<br>$V_{GE} = 0 \text{ V}$<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ |                                                                                   |      | 100 $\mu\text{A}$<br>500 $\mu\text{A}$ |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$                                                         |                                                                                   |      | $\pm 100 \text{ nA}$                   |
| $V_{CE(sat)}$ | $I_C = I_{C90}, V_{GE} = 15 \text{ V}$                                                                    | 1.8                                                                               | 2.0  | 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>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$                                                                                                                                                                                                       | 3                                                                                 | 7    | S       |
| $C_{ies}$    | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                                                                                                                                                                                                  |                                                                                   | 500  | pF      |
| $C_{oes}$    |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 50   | pF      |
| $C_{res}$    |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 17   | pF      |
| $Q_g$        | $I_C = I_{C90}, V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$                                                                                                                                                                                                                                                       |                                                                                   | 25   | nC      |
| $Q_{ge}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 5    | nC      |
| $Q_{gc}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 10   | nC      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C90}, V_{GE} = 15\text{ V}$ , $L = 300\text{ }\mu\text{H}$ ,<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 22\text{ }\Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$  |                                                                                   | 9    | ns      |
| $t_{ri}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 10   | ns      |
| $E_{on}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 0.07 | mJ      |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 100  | ns      |
| $t_{fi}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 150  | ns      |
| $E_{off}$    |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 0.3  | mJ      |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_{C90}, V_{GE} = 15\text{ V}$ , $L = 300\text{ }\mu\text{H}$ ,<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 22\text{ }\Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$ |                                                                                   | 10   | ns      |
| $t_{ri}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 15   | ns      |
| $E_{on}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 0.15 | mJ      |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 200  | ns      |
| $t_{fi}$     |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 250  | ns      |
| $E_{off}$    |                                                                                                                                                                                                                                                                                                                      |                                                                                   | 0.6  | mJ      |
| $R_{thJC}$   |                                                                                                                                                                                                                                                                                                                      |                                                                                   |      | 2.3 K/W |
| $R_{thCK}$   | (TO-220)                                                                                                                                                                                                                                                                                                             |                                                                                   | 0.25 | K/W     |



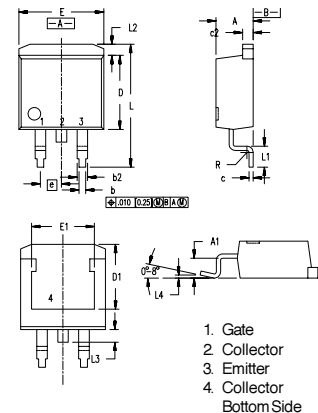
**Min. Recommended Footprint**  
(Dimensions in inches and mm)

### TO-220 AB Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 12.70      | 13.97 | 0.500  | 0.550 |
| B    | 14.73      | 16.00 | 0.580  | 0.630 |
| C    | 9.91       | 10.66 | 0.390  | 0.420 |
| D    | 3.54       | 4.08  | 0.139  | 0.161 |
| E    | 5.85       | 6.85  | 0.230  | 0.270 |
| F    | 2.54       | 3.18  | 0.100  | 0.125 |
| G    | 1.15       | 1.65  | 0.045  | 0.065 |
| H    | 2.79       | 5.84  | 0.110  | 0.230 |
| J    | 0.64       | 1.01  | 0.025  | 0.040 |
| K    | 2.54       | BSC   | 0.100  | BSC   |
| M    | 4.32       | 4.82  | 0.170  | 0.190 |
| N    | 1.14       | 1.39  | 0.045  | 0.055 |
| Q    | 0.35       | 0.56  | 0.014  | 0.022 |
| R    | 2.29       | 2.79  | 0.090  | 0.110 |

### TO-263 AA Outline



| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | Max. |
| A    | 4.06       | 4.83  | .160   | .190 |
| A1   | 2.03       | 2.79  | .080   | .110 |
| b    | 0.51       | 0.99  | .020   | .039 |
| b2   | 1.14       | 1.40  | .045   | .055 |
| c    | 0.46       | 0.74  | .018   | .029 |
| c2   | 1.14       | 1.40  | .045   | .055 |
| D    | 8.64       | 9.65  | .340   | .380 |
| D1   | 7.11       | 8.13  | .280   | .320 |
| E    | 9.65       | 10.29 | .380   | .405 |
| E1   | 6.86       | 8.13  | .270   | .320 |
| e    | 2.54       | BSC   | .100   | BSC  |
| L    | 14.61      | 15.88 | .575   | .625 |
| L1   | 2.29       | 2.79  | .090   | .110 |
| L2   | 1.02       | 1.40  | .040   | .055 |
| L3   | 1.27       | 1.78  | .050   | .070 |
| L4   | 0          | 0.38  | 0      | .015 |
| R    | 0.46       | 0.74  | .018   | .029 |

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

|                                                                                  |           |           |           |           |           |           |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 |
|                                                                                  | 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |             |



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