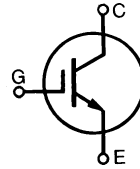


# Low $V_{CE(sat)}$ IGBT High speed IGBT

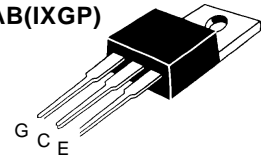
**IXGA/IXGP/IXGH10N60**  
**IXGA/IXGP/IXGH10N60A**

| $V_{CES}$ | $I_{C25}$ | $V_{CE(sat)}$ |
|-----------|-----------|---------------|
| 600 V     | 20 A      | 2.5 V         |
| 600 V     | 20 A      | 3.0 V         |

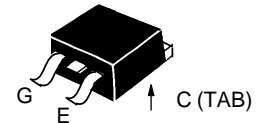


| Symbol  | Test Conditions   | Maximum Ratings                  |                  |
|---|---|----------------------------------|------------------|
| $V_{CES}$   | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$   | 600                              | V                |
| $V_{CGR}$   | $T_J = 25^\circ\text{C}$ 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                |
| $I_{C25}$   | $T_C = 25^\circ\text{C}$  | 20                               | A                |
| $I_{C90}$   | $T_C = 90^\circ\text{C}$  | 10                               | A                |
| $I_{CM}$  | $T_C = 25^\circ\text{C}$ , 1 ms   | 40                               | A                |
| <b>SSOA (RBSOA)</b>   | $V_{GE} = 15\text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 150\ \Omega$<br>Clamped inductive load, $L = 300\ \mu\text{H}$ | $I_{CM} = 20$<br>@ $0.8 V_{CES}$ | A                |
| $P_C$   | $T_C = 25^\circ\text{C}$  | 100                              | W                |
| $T_J$   |   | -55 ... +150                     | $^\circ\text{C}$ |
| $T_{JM}$  |   | 150                              | $^\circ\text{C}$ |
| $T_{stg}$   |   | -55 ... +150                     | $^\circ\text{C}$ |
| Maximum Lead and Tab temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |   | 300                              | $^\circ\text{C}$ |
| $M_d$   | Mounting torque, TO-247 AD  | 1.13/10                          | Nm/lb.in.        |
| <b>Weight</b>   | TO-263 AA   | 2                                | g                |
|   | TO-247 AD   | 6                                | g                |

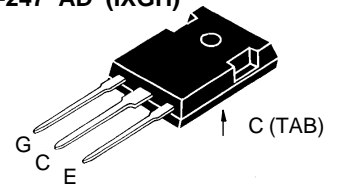
TO-220AB (IXGP)



TO-263 AA (IXGA)



TO-247 AD (IXGH)



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

### Features

- International standard packages JEDEC TO-263 AA surface mountable and JEDEC TO-247 AD
- 2nd generation HDMOS™ process Low  $V_{CE(sat)}$ 
  - for low on-state conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity

### Applications

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

### Advantages

- Space savings, TO-263 AA
- Facilitates automated assembly
- Reduces assembly time and cost
- Easy to mount with 1 screw, TO-247 (isolated mounting screw hole)
- High power density

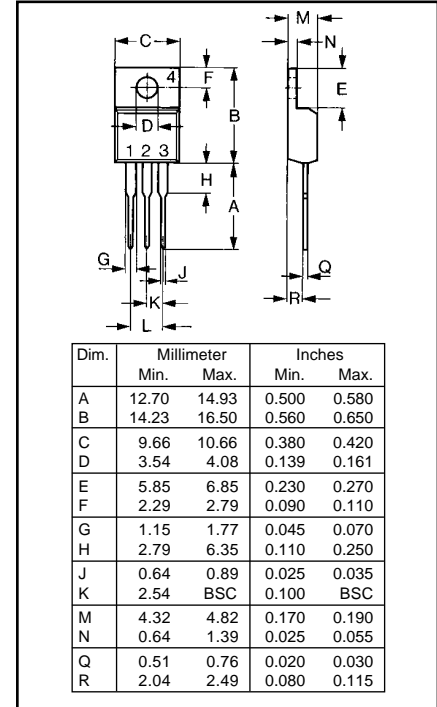
| Symbol        | Test Conditions                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                     |
|---------------|---|---|------|---------------------|
|               |   | min.  | typ. | max.                |
| $BV_{CES}$    | $I_C = 250\ \mu\text{A}$ , $V_{GE} = 0\text{ V}$      | 600   |      | V                   |
| $V_{GE(th)}$  | $I_C = 250\ \mu\text{A}$ , $V_{CE} = V_{GE}$          | 2.5   |      | 5 V                 |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$<br>$V_{GE} = 0\text{ V}$ | $T_J = 25^\circ\text{C}$  |      | 200 $\mu\text{A}$   |
|               |   | $T_J = 125^\circ\text{C}$   |      | 1 mA                |
| $I_{GES}$     | $V_{CE} = 0\text{ V}$ , $V_{GE} = \pm 20\text{ V}$    |   |      | $\pm 100\text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$              | 10N60   |      | 2.5 V               |
|               |   | 10N60A  |      | 3.0 V               |

Symbol Test Conditions Characteristic Values  
( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

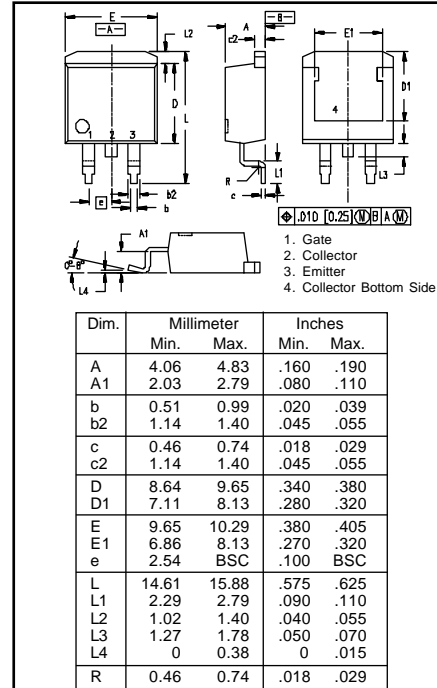
|              |  | min. | typ. | max. |     |
|--------------|--|------|------|------|-----|
| $g_{fs}$     | $I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$  | 4    | 8    |      | S   |
| $C_{ies}$    | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$  |      | 750  |      | pF  |
| $C_{oes}$    |  |      | 100  |      | pF  |
| $C_{res}$    |  |      | 30   |      | pF  |
| $Q_g$        | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$  |      | 50   | 70   | nC  |
| $Q_{ge}$     |  |      | 15   | 25   | nC  |
| $Q_{gc}$     |  |      | 25   | 45   | nC  |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 100\ \mu\text{H}$<br>$V_{CE} = 0.8 V_{CES}$ ,<br>$R_G = R_{off} = 150\ \Omega$<br>Remarks: Switching times<br>may increase for $V_{CE}$<br>(Clamp) $> 0.8 \cdot V_{CES}$ 10N60A<br>higher $T_J$ or increased $R_G$ 10N60A      |      | 100  |      | ns  |
| $t_{ri}$     |  |      | 200  |      | ns  |
| $E_{on}$     |  |      | 0.4  |      | mJ  |
| $t_{d(off)}$ |  |      | 600  |      | ns  |
| $t_{fi}$     |  |      | 300  |      | ns  |
| $E_{off}$    |  |      | 0.6  |      | mJ  |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ ,<br>$L = 100\ \mu\text{H}$<br>$V_{CE} = 0.8 V_{CES}$ ,<br>$R_G = R_{off} = 150\ \Omega$<br>Remarks: Switching times<br>may increase for $V_{CE}$<br>(Clamp) $> 0.8 \cdot V_{CES}$ , higher 10N60<br>$T_J$ or increased $R_G$ 10N60A |      | 100  |      | ns  |
| $t_{ri}$     |  |      | 200  |      | ns  |
| $E_{on}$     |  |      | 1    |      | mJ  |
| $t_{d(off)}$ |  |      | 900  | 1500 | ns  |
| $t_{fi}$     |  |      | 570  | 2000 | ns  |
| $E_{off}$    |  |      | 360  | 600  | ns  |
| $R_{thJC}$   |  |      |      | 1.25 | K/W |
| $R_{thCK}$   |  | 0.25 |      |      | K/W |

IXGA/P/IXGH 10N60 / 10N60A characteristic curves are located in the IXGH 10N60U1 and IXGH 10N60AU1 data sheet.

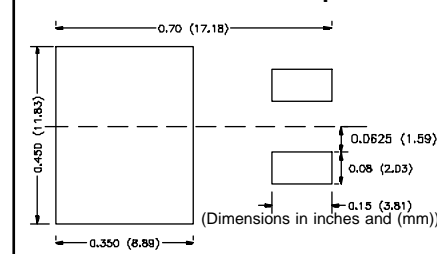
TO-220 AB Outline



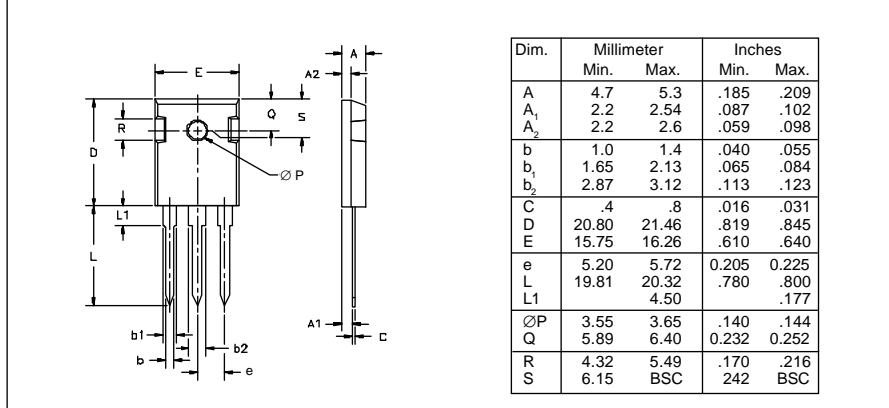
TO-263 AA Outline



Min. Recommended Footprint



TO-247 AD Outline



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