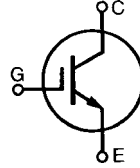


# IGBT

**IXGH 20N120**  
**IXGT 20N120**

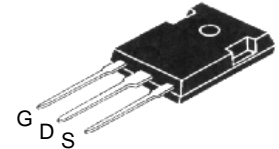
$V_{CES} = 1200 \text{ V}$   
 $I_{C25} = 40 \text{ A}$   
 $V_{CE(sat)} = 2.5 \text{ V}$   
 $t_{fi(typ)} = 380 \text{ ns}$

## Preliminary Data Sheet

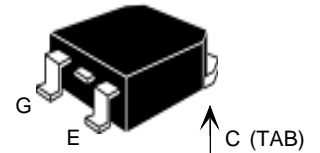


| Symbol  | Test Conditions  | Maximum Ratings                  |                  |
|---|--|----------------------------------|------------------|
| $V_{CES}$   | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$   | 1200                             | V                |
| $V_{CGR}$   | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$                     | 1200                             | V                |
| $V_{GES}$   | Continuous   | $\pm 20$                         | V                |
| $V_{GEM}$   | Transient  | $\pm 30$                         | V                |
| $I_{C25}$   | $T_C = 25^\circ\text{C}$   | 40                               | A                |
| $I_{C90}$   | $T_C = 90^\circ\text{C}$   | 20                               | A                |
| $I_{CM}$  | $T_C = 25^\circ\text{C}, 1 \text{ ms}$   | 80                               | A                |
| <b>SSOA</b><br><b>(RBSOA)</b>   | $V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 47 \Omega$<br>Clamped inductive load | $I_{CM} = 40$<br>@ $0.8 V_{CES}$ | A                |
| $P_C$   | $T_C = 25^\circ\text{C}$   | 150                              | 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                              | $^\circ\text{C}$ |
| Maximum tab temperature for soldering   |  | 260                              | $^\circ\text{C}$ |
| $M_d$   | Mounting torque (TO-247)   | 1.13/10                          | Nm/lb.in.        |
| <b>Weight</b>   | TO-247   | 6                                | g                |
|   | TO-268   | 5                                | g                |

### TO-247 (IXGH)



### TO-268 (IXGT)



### Features

- International standard packages  
JEDEC TO-247 and TO-268
- High current handling capability
- MOS Gate turn-on  
- drive simplicity

### Applications

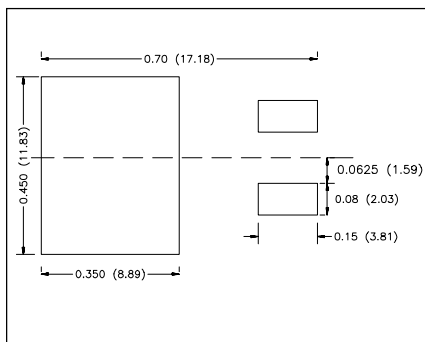
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies
- Capacitor discharge

### Advantages

- Easy to mount with one screw
- Reduces assembly time and cost
- High power density

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) | Characteristic Values     |      |                      |
|---------------|---|---------------------------|------|----------------------|
|               |   | Min.                      | Typ. | Max.                 |
| $BV_{CES}$    | $I_C = 1 \text{ mA}, V_{GE} = 0 \text{ V}$                                  | 1200                      |      | V                    |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$                                    | 2.5                       |      | V                    |
| $I_{CES}$     | $V_{CE} = V_{CES}$<br>$V_{GE} = 0 \text{ V}$                                | $T_J = 25^\circ\text{C}$  |      | 250 $\mu\text{A}$    |
|               |   | $T_J = 125^\circ\text{C}$ |      | 1 mA                 |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$                           |                           |      | $\pm 100 \text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_{C90}, V_{GE} = 15 \text{ V}$                                      |                           | 2.0  | 2.5 V                |

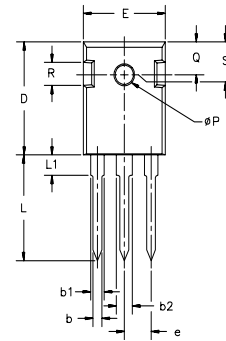
| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)   | Characteristic Values |      |      |    |
|--------------|---|-----------------------|------|------|----|
|              |   | Min.                  | Typ. | Max. |    |
| $g_{fs}$     | $I_C = I_{C90}; V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$  | 12                    | 16   | S    |    |
| $C_{ies}$    | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$   |                       | 1750 | pF   |    |
| $C_{oes}$    |   |                       | 90   | pF   |    |
| $C_{res}$    |   |                       | 31   | pF   |    |
| $I_{C(ON)}$  | $V_{GE} = 10\text{ V}, V_{CE} = 10\text{ V}$  |                       | 90   | A    |    |
| $Q_g$        | $I_C = I_{C90}; V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$   |                       | 63   | nC   |    |
| $Q_{ge}$     |   |                       | 13   | nC   |    |
| $Q_{gc}$     |   |                       | 26   | nC   |    |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C90}; V_{GE} = 15\text{ V}$<br>$V_{CE} = 800\text{ V}, R_G = R_{off} = 47\ \Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$  |                       | 28   | ns   |    |
| $t_{ri}$     |   |                       | 20   | ns   |    |
| $t_{d(off)}$ |   |                       | 400  | 800  | ns |
| $t_{fi}$     |   |                       | 380  | 700  | ns |
| $E_{off}$    |   |                       | 6.5  | 10.5 | 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>$V_{CE} = 800\text{ V}, R_G = R_{off} = 47\ \Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$ |                       | 30   | ns   |    |
| $t_{ri}$     |   |                       | 27   | ns   |    |
| $E_{on}$     |   |                       | 0.90 | mJ   |    |
| $t_{d(off)}$ |   |                       | 700  | ns   |    |
| $t_{fi}$     |   |                       | 550  | ns   |    |
| $E_{off}$    |   | 9.5                   | mJ   |      |    |
| $R_{thJC}$   |   |                       | 0.83 | K/W  |    |
| $R_{thCK}$   | TO-247  |                       | 0.25 | K/W  |    |



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

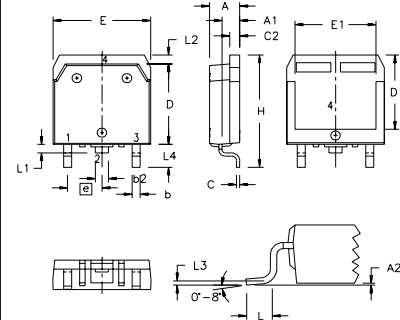
## TO-247

### TO-247 Outline



| Dim.           | Millimeter |       | Inches |       |
|----------------|------------|-------|--------|-------|
|                | Min.       | Max.  | Min.   | Max.  |
| A              | 4.7        | 5.3   | .185   | .209  |
| A <sub>1</sub> | 2.2        | 2.54  | .087   | .102  |
| A <sub>2</sub> | 2.2        | 2.6   | .059   | .098  |
| b              | 1.0        | 1.4   | .040   | .055  |
| b <sub>1</sub> | 1.65       | 2.13  | .065   | .084  |
| b <sub>2</sub> | 2.87       | 3.12  | .113   | .123  |
| C              | .4         | .8    | .016   | .031  |
| D              | 20.80      | 21.46 | .819   | .845  |
| E              | 15.75      | 16.26 | .610   | .640  |
| e              | 5.20       | 5.72  | 0.205  | 0.225 |
| L              | 19.81      | 20.32 | .780   | .800  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ∅P             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |

## TO-268 Outline



| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .193     | .201 | 4.90        | 5.10  |
| A1  | .106     | .114 | 2.70        | 2.90  |
| A2  | .001     | .010 | 0.02        | 0.25  |
| b   | .045     | .057 | 1.15        | 1.45  |
| b2  | .075     | .083 | 1.90        | 2.10  |
| C   | .016     | .026 | 0.40        | 0.65  |
| C2  | .057     | .063 | 1.45        | 1.60  |
| D   | .543     | .551 | 13.80       | 14.00 |
| D1  | .488     | .500 | 12.40       | 12.70 |
| E   | .624     | .632 | 15.85       | 16.05 |
| E1  | .524     | .535 | 13.30       | 13.60 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| H   | .736     | .752 | 18.70       | 19.10 |
| L   | .094     | .106 | 2.40        | 2.70  |
| L1  | .047     | .055 | 1.20        | 1.40  |
| L2  | .039     | .045 | 1.00        | 1.15  |
| L3  | .010 BSC |      | 0.25 BSC    |       |
| L4  | .150     | .161 | 3.80        | 4.10  |

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 |             |