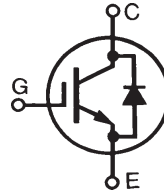


## PolarHV™ IGBT

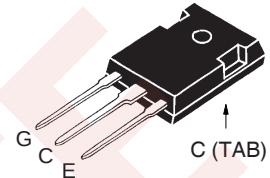
## IXGH28N60B3D1

$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 28A \\ V_{CE(sat)} &\leq 1.8V \end{aligned}$$



| 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 $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$                                    | 600             | V                |
| $V_{GES}$                     | Continuous                                                                                               | $\pm 20$        | V                |
| $V_{GEM}$                     | Transient                                                                                                | $\pm 30$        | V                |
| $I_{C25}$                     | $T_C = 25^\circ\text{C}$                                                                                 | 66              | A                |
| $I_{C110}$                    | $T_C = 110^\circ\text{C}$                                                                                | 28              | A                |
| $I_{F110}$                    | $T_C = 110^\circ\text{C}$                                                                                | 10              | A                |
| $I_{CM}$                      | $T_C = 25^\circ\text{C}$ , 1ms                                                                           | 150             | A                |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 10\Omega$<br>Clamped inductive load @ $\leq 600V$ | $I_{CM} = 60$   | A                |
| $P_C$                         | $T_C = 25^\circ\text{C}$                                                                                 | 190             | W                |
| $T_J$                         |                                                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$                      |                                                                                                          | 150             | $^\circ\text{C}$ |
| $T_{stg}$                     |                                                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_L$                         | 1.6mm (0.062 in.) from case for 10 seconds                                                               | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$                    | Plastic body for 10 seconds                                                                              | 260             | $^\circ\text{C}$ |
| $M_d$                         | Mounting torque (M3)                                                                                     | 1.13/10         | Nm/lb.in.        |
| <b>Weight</b>                 |                                                                                                          | 6               | g                |

## TO-247 (IXGH)



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

## Features

- Square RBSOA
- High current handling capability
- MOS Gate turn-on  
- drive simplicity

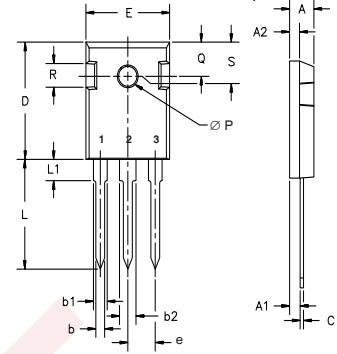
## Applications

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

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) | Characteristic Values |      |                            |
|---------------|---------------------------------------------------------------------------|-----------------------|------|----------------------------|
|               |                                                                           | Min.                  | Typ. | Max.                       |
| $BV_{CES}$    | $I_C = 250\mu\text{A}$ , $V_{GE} = 0V$                                    | 600                   |      | V                          |
| $V_{GE(th)}$  | $I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$                                | 3.0                   |      | 5.0 V                      |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ\text{C}$           |                       |      | 50 $\mu\text{A}$<br>1.0 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                        |                       |      | $\pm 100$ nA               |
| $V_{CE(sat)}$ | $I_C = 24A$ , $V_{GE} = 15V$ , Note 1                                     | 1.5                   | 1.8  | V                          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                                          | Characteristic Values |      |                         |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                      | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $I_C = I_{C110}, V_{CE} = 10\text{V}$ , Note 1                                                                                       | 18                    | 30   | S                       |
| $C_{ies}$    | $V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$                                                                     |                       | 2320 | pF                      |
| $C_{oes}$    |                                                                                                                                      |                       | 176  | pF                      |
| $C_{res}$    |                                                                                                                                      |                       | 24   | pF                      |
| $Q_g$        | $I_C = I_{C110}, V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$                                                                 |                       | 62   | nC                      |
| $Q_{ge}$     |                                                                                                                                      |                       | 11   | nC                      |
| $Q_{gc}$     |                                                                                                                                      |                       | 23   | nC                      |
| $t_{d(on)}$  | Inductive load, $T_J = 25^\circ\text{C}$<br>$I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 400\text{V}$ , $R_G = 10\Omega$  |                       | 19   | ns                      |
| $t_{ri}$     |                                                                                                                                      |                       | 24   | ns                      |
| $E_{on}$     |                                                                                                                                      |                       | 0.34 | mJ                      |
| $t_{d(off)}$ |                                                                                                                                      |                       | 125  | ns                      |
| $t_{fi}$     |                                                                                                                                      |                       | 100  | ns                      |
| $E_{off}$    |                                                                                                                                      |                       | 0.65 | mJ                      |
| $t_{d(on)}$  | Inductive load, $T_J = 125^\circ\text{C}$<br>$I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$<br>$V_{CE} = 400\text{V}$ , $R_G = 10\Omega$ |                       | 19   | ns                      |
| $t_{ri}$     |                                                                                                                                      |                       | 26   | ns                      |
| $E_{on}$     |                                                                                                                                      |                       | 0.6  | mJ                      |
| $t_{d(off)}$ |                                                                                                                                      |                       | 180  | ns                      |
| $t_{fi}$     |                                                                                                                                      |                       | 170  | ns                      |
| $E_{off}$    |                                                                                                                                      |                       | 1.0  | mJ                      |
| $R_{thJC}$   |                                                                                                                                      |                       |      | 0.66 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                      |                       | 0.21 | $^\circ\text{C/W}$      |

TO-247 (IXGH) Outline



Terminals: 1 - Gate  
3 - Source  
2 - Drain  
Tab - Drain

| 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  |
| L1             |            | 4.50  |        | .177  |
| ØP             | 3.55       | 3.65  | .140   | .144  |
| Q              | 5.89       | 6.40  | 0.232  | 0.252 |
| R              | 4.32       | 5.49  | .170   | .216  |
| S              | 6.15       | BSC   | .242   | BSC   |

## Reverse Diode (FRED)

| Symbol     | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                | Characteristic Values |           |                |
|------------|------------------------------------------------------------------------------------------------------------|-----------------------|-----------|----------------|
|            |                                                                                                            | Min.                  | Typ.      | Max.           |
| $V_F$      | $I_F = 24\text{A}$ , $V_{GE} = 0\text{V}$ , Note 1<br>$T_J = 150^\circ\text{C}$                            |                       |           | 2.5 V<br>1.7 V |
| $I_{RM}$   | $I_F = 24\text{A}$ , $V_{GE} = 0\text{V}$ , $-di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$    |                       | 5         | A              |
| $t_{rr}$   | $I_F = 1\text{A}$ , $-di_F/dt = 100\text{A}/\mu\text{s}$ , $V_R = 30\text{V}$<br>$T_J = 100^\circ\text{C}$ |                       | 25<br>100 | ns<br>ns       |
| $R_{thJC}$ |                                                                                                            |                       |           | 1.0 K/W        |

Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

## ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |              |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338 B2 |
| 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |              |
| 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |              |

**OBSOLETE**

OBSOLETE



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