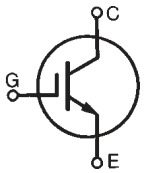
IXYS

Advance Technical Information

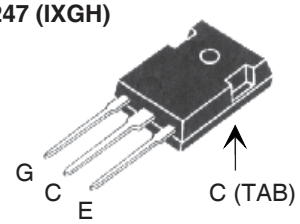
# High Voltage IGBT

# IXGH24N170
# IXGT24N170

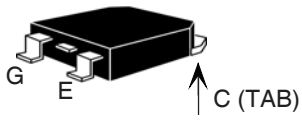
$V_{CES}$ = 1700V
$I_{C25}$ = 50A
$V_{CE(sat)}$ ≤ 3.3V
$t_{fi(typ)}$ = 250ns




**TO-247 (IXGH)**




**TO-268 (IXGT)**




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

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_C$ = 25°C to 150°C | 1700 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 1700 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 50 | A |
| $I_{C90}$ | $T_C$ = 90°C | 24 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 150 | A |
| SSOA (RBSOA) | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 5Ω<br>Clamped inductive load | $I_{CM}$ = 50<br>@ 0.8 • $V_{CES}$ | A |
| $t_{SC}$ (SCSOA) | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $V_{CE}$ = 1000V<br>$R_G$ = 5Ω, non repetitive | 10 | µs |
| $P_C$ | $T_C$ = 25°C | 250 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | 1.6mm (0.062 in.) from case for 10s | 300 | °C |
| $T_{SOLD}$ | Plastic body for 10 seconds | 260 | °C |
| $M_d$ | Mounting torque (TO-247) | 1.13/10 | Nm/lb.in. |
| Weight | TO-247<br>TO-268 | 6<br>4 | g<br>g |

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{CES}$ | $I_C$ = 250µA, $V_{GE}$ = 0V | 1700 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250µA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = 0.8 • $V_{CES}$<br>$V_{GE}$ = 0V $T_J$ = 125°C | | | 50<br>500 | µA<br>µA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = $I_{C90}$, $V_{GE}$ = 15V, Note 1<br>$T_J$ = 125°C | | 2.5<br>3.0 | 3.3 | V |

## Features

- International standard packages JEDEC TO-268 and JEDEC TO-247 AD
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Rugged NPT structure
- Molding epoxies meet UL 94 V-0 flammability classification

## Applications

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

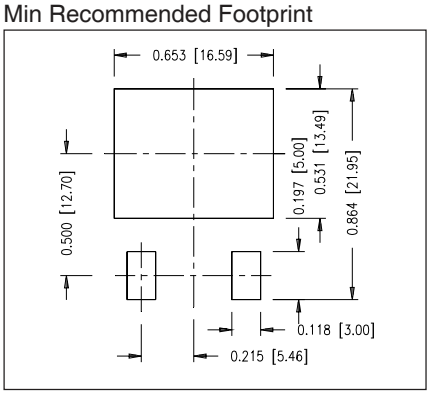
## Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $I_C = I_{C90}$, $V_{CE}$ = 10V, Note 1 | 18 | 25 | | S |
| $I_{C(ON)}$ | $V_{CE}$ = 10V, $V_{GE}$ = 10V | | 100 | | A |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 2400 | | pF |
| $C_{oes}$ | | | 120 | | pF |
| $C_{res}$ | | | 33 | | pF |
| $Q_g$ | $I_C = I_{C90}$, $V_{GE}$ = 15V, $V_{CE} = 0.5 \bullet V_{CES}$ | | 106 | | nC |
| $Q_{ge}$ | | | 18 | | nC |
| $Q_{gc}$ | | | 32 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** | | 42 | | ns |
| $t_{ri}$ | $I_C = I_{C25}$, $V_{GE}$ = 15V | | 39 | | ns |
| $t_{d(off)}$ | $V_{CE} = 0.8 \bullet V_{CES}$, $R_G = R_{off} = 5\Omega$ | | 200 | 400 | ns |
| $t_{fi}$ | Remarks: Switching times may increase for $V_{CE}$ (Clamp) > $0.8 \bullet V_{CES}$, | | 250 | 500 | ns |
| $E_{off}$ | higher $T_J$ or increased $R_G$ | | 8 | 12 | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** | | 50 | | ns |
| $t_{ri}$ | $I_C = I_{C25}$, $V_{GE}$ = 15V | | 55 | | ns |
| $E_{on}$ | $V_{CE} = 0.8 \bullet V_{CES}$, $R_G = R_{off} = 5\Omega$ | | 2.0 | | mJ |
| $t_{d(off)}$ | Remarks: Switching times may | | 200 | | ns |
| $t_{fi}$ | increase for $V_{CE}$ (Clamp) > $0.8 \bullet V_{CES}$, higher $T_J$ or increased $R_G$ | | 360 | | ns |
| $E_{off}$ | | | 12 | | mJ |
| $R_{thJC}$ | | | | 0.50 | °C/W |
| $R_{thCS}$ | (TO-247) | | 0.25 | | °C/W |

Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

Min Recommended Footprint




## 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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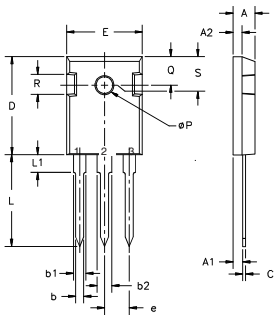
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

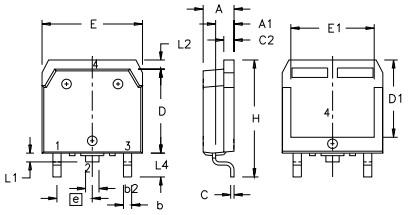
**TO-247 AD Outline**




Terminals: 1 - Gate 2 - Drain

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 4.7 | 5.3 | .185 | .209 |
| $A_1$ | 2.2 | 2.54 | .087 | .102 |
| $A_2$ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| $b_1$ | 1.65 | 2.13 | .065 | .084 |
| $b_2$ | 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 |

**TO-268 Outline**




Terminals: 1 - Gate 2 - Drain

| SYM | INCHES MIN | MAX | MILLIMETERS 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 |