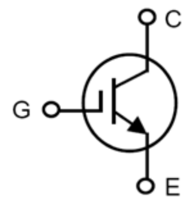
# IXYS

Advance Technical Information

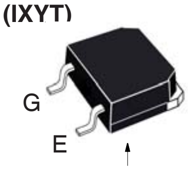
## High Voltage XPT™ IGBT

## IXYT30N450HV
## IXYH30N450HV

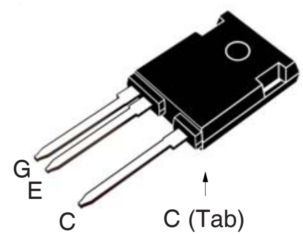
$V_{CES}$ = 4500V
$I_{C110}$ = 30A
$V_{CE(sat)}$ ≤ 3.9V




TO-268HV (IXYT)




TO-247HV (IXYH)




G = Gate    C = Collector
E = Emitter    Tab = Collector

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{CES}$ | $T_C$ = 25°C to 150°C | 4500 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C, $R_{GE}$ = 1MΩ | 4500 | V |
| $V_{GES}$ | Continuous | ± 20 | V |
| $V_{GEM}$ | Transient | ± 30 | V |
| $I_{C25}$ | $T_C$ = 25°C | 60 | A |
| $I_{C110}$ | $T_C$ = 110°C | 30 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1ms | 200 | A |
| SSOA (RBSOA) | $V_{GE}$ = 15V, $T_{VJ}$ = 125°C, $R_G$ = 10Ω<br>Clamped Inductive Load | $I_{CM}$ = 90<br>3600 | A<br>V |
| $P_C$ | $T_C$ = 25°C | 430 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering | 300 | °C |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s | 260 | °C |
| $M_d$ | Mounting Torque (TO-247HV) | 1.13/10 | Nm/lb.in |
| Weight | TO-268HV<br>TO-247HV | 4.0<br>6.0 | 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 | 4500 | | | V |
| $V_{GE(th)}$ | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 3.0 | | 5.0 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | | 25 | μA |
| | $T_J$ = 125°C | | | 1 | mA |
| $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ± 20V | | | ±200 | nA |
| $V_{CE(sat)}$ | $I_C$ = 30A, $V_{GE}$ = 15V, Note 1 | | 3.2 | 3.9 | V |
| | $T_J$ = 125°C | | 4.5 | | V |

### Features

- High Voltage Packages
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

### Advantages

- Low Gate Drive Requirement
- High Power Density

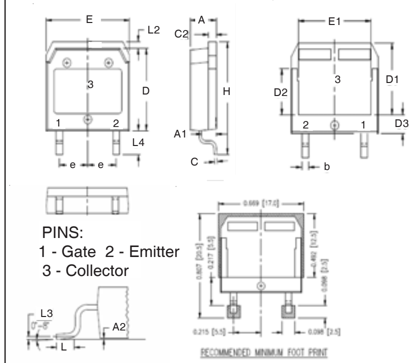
### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

| Symbol | Test Conditions ($T_J$ = 25°C Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. |
|---|---|---|---|---|
| $g_{fS}$ | $I_C$ = 30A, $V_{CE}$ = 10V, Note 1 | 11 | 18 | S |
| $C_{ies}$ | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz | | 1840 | pF |
| $C_{oes}$ | | | 83 | pF |
| $C_{res}$ | | | 35 | pF |
| $Q_g$ | $I_C$ = 30A, $V_{GE}$ = 15V, $V_{CE}$ = 1000V | | 88 | nC |
| $Q_{ge}$ | | | 11 | nC |
| $Q_{gc}$ | | | 40 | nC |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 25°C** | | 38 | ns |
| $t_r$ | $I_C$ = 30A, $V_{GE}$ = 15V | | 318 | ns |
| $t_{d(off)}$ | $V_{CE}$ = 960V, $R_G$ = 10Ω | | 168 | ns |
| $t_f$ | | | 1220 | ns |
| $t_{d(on)}$ | **Resistive Switching Times, $T_J$ = 125°C** | | 42 | ns |
| $t_r$ | $I_C$ = 30A, $V_{GE}$ = 15V | | 590 | ns |
| $t_{d(off)}$ | $V_{CE}$ = 960V, $R_G$ = 10Ω | | 180 | ns |
| $t_f$ | | | 1365 | ns |
| $R_{thJC}$ | | | | 0.29 °C/W |
| $R_{thCS}$ | TO-247HV | | 0.21 | °C/W |

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

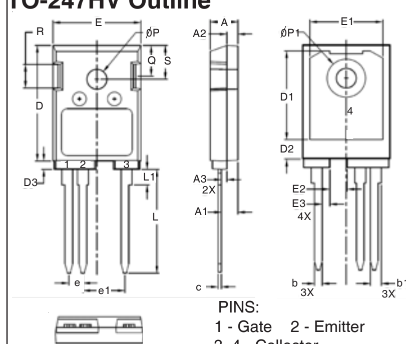
**TO-268HV Outline**



PINS:
1 - Gate 2 - Emitter
3 - Collector

| SYM | INCHES MIN | INCHES MAX | MILLIMETER MIN | MILLIMETER 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 |
| C | .016 | .026 | 0.40 | 0.65 |
| C2 | .057 | .063 | 1.45 | 1.60 |
| D | .543 | .551 | 13.80 | 14.00 |
| D1 | .465 | .476 | 11.80 | 12.10 |
| D2 | .295 | .307 | 7.50 | 7.80 |
| D3 | .114 | .126 | 2.90 | 3.20 |
| 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 | .067 | .079 | 1.70 | 2.00 |
| L2 | .039 | .045 | 1.00 | 1.15 |
| L3 | .010 BSC | | 0.25 BSC | |
| L4 | .150 | .161 | 3.80 | 4.10 |

**TO-247HV Outline**



PINS:
1 - Gate 2 - Emitter
3, 4 - Collector

| SYM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | .193 | .201 | 4.90 | 5.10 |
| A1 | .114 | .122 | 2.90 | 3.10 |
| A2 | .075 | .083 | 1.90 | 2.10 |
| A3 | .035 | .043 | 0.90 | 1.10 |
| b | .053 | .059 | 1.35 | 1.50 |
| b1 | .075 | .083 | 1.90 | 2.10 |
| c | .022 | .030 | 0.55 | 0.75 |
| D | .819 | .843 | 20.80 | 21.40 |
| D1 | .638 | .646 | 16.20 | 16.40 |
| D2 | .134 | .146 | 3.40 | 3.70 |
| D3 | .055 | .063 | 1.40 | 1.60 |
| E | .622 | .638 | 15.80 | 16.20 |
| E1 | .520 | .528 | 13.20 | 13.40 |
| E2 | .118 | .126 | 3.00 | 3.20 |
| E3 | .051 | .059 | 1.30 | 1.50 |
| e | .100 BSC | | 2.54 BSC | |
| e1 | .300 BSC | | 7.62 BSC | |
| L | .732 | .748 | 18.60 | 19.00 |
| L1 | .106 | .118 | 2.70 | 3.00 |
| øP | .138 | .142 | 3.50 | 3.60 |
| øP1 | .272 | .280 | 6.90 | 7.10 |
| Q | .216 | .224 | 5.50 | 5.70 |
| R | .165 | .169 | 4.20 | 4.30 |
| S | .240 | .248 | 6.10 | 6.30 |

**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.

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

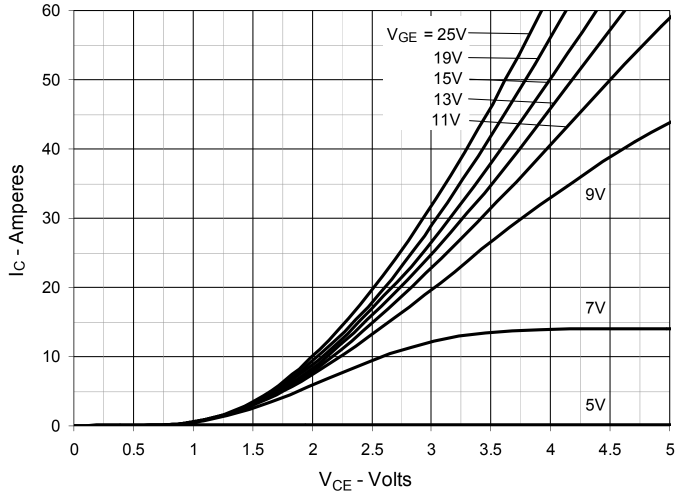



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

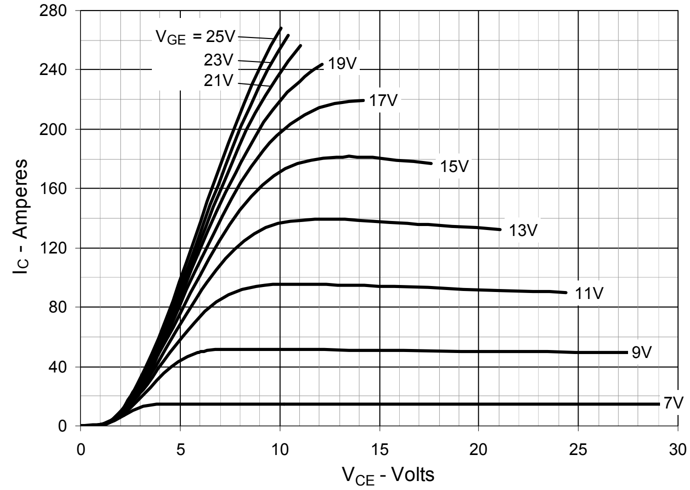



**Fig. 3. Output Characteristics @ $T_J$ = 125ºC**

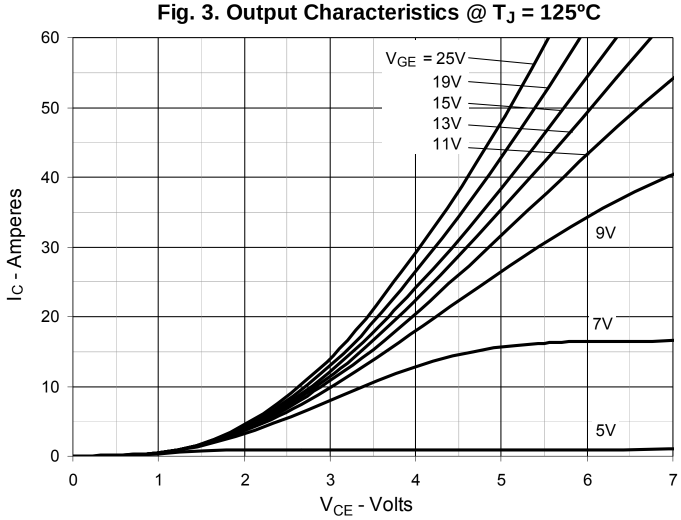



**Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature**

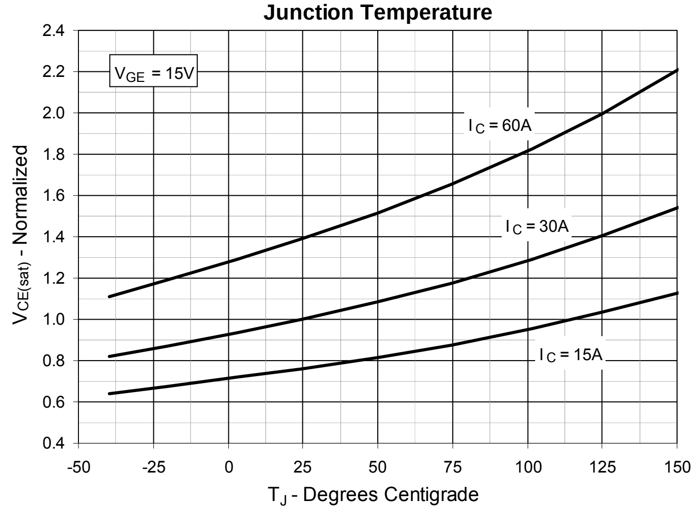



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

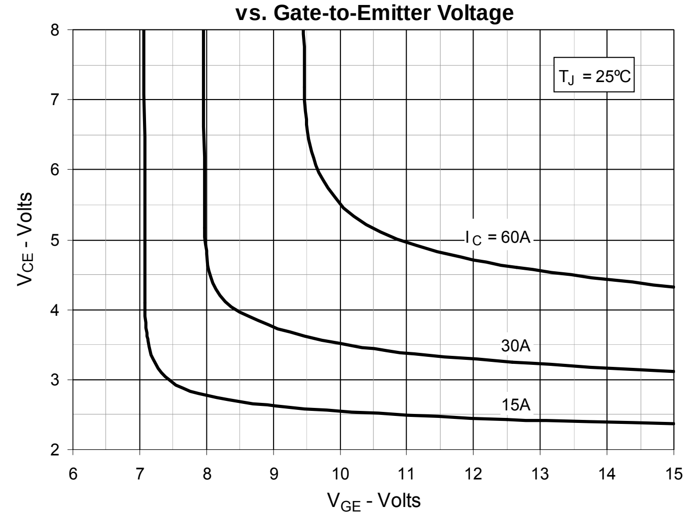



**Fig. 6. Input Admittance**

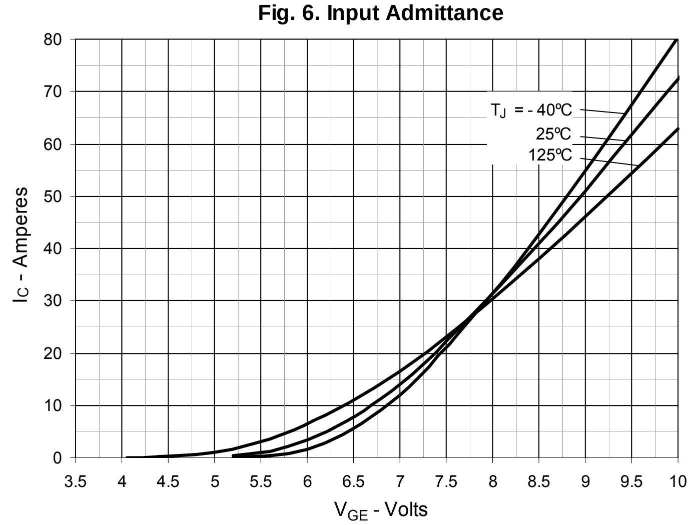


**Fig. 7. Transconductance**

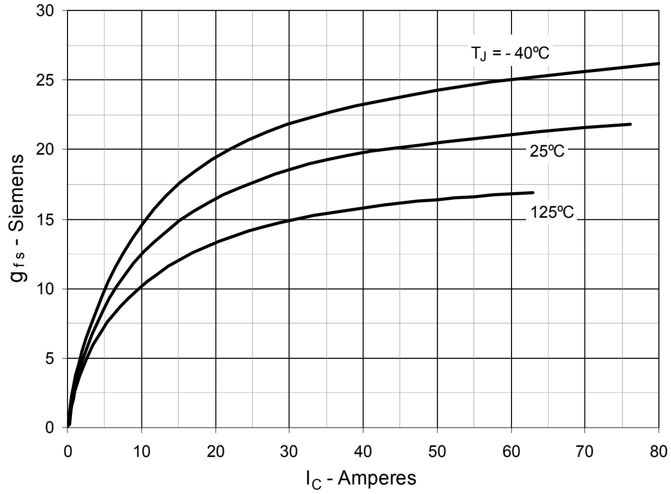



**Fig. 8. Gate Charge**

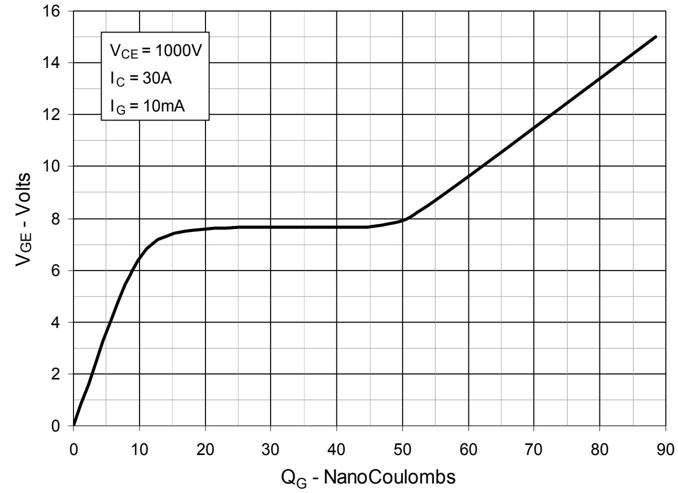



**Fig. 9. Capacitance**

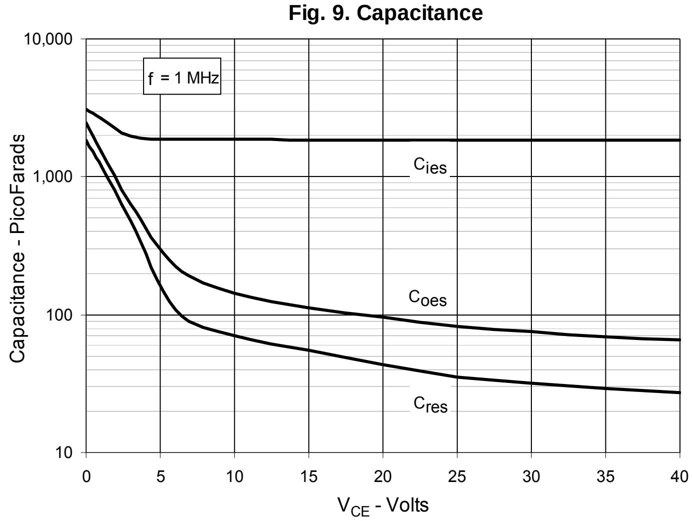



**Fig. 10. Reverse-Bias Safe Operating Area**

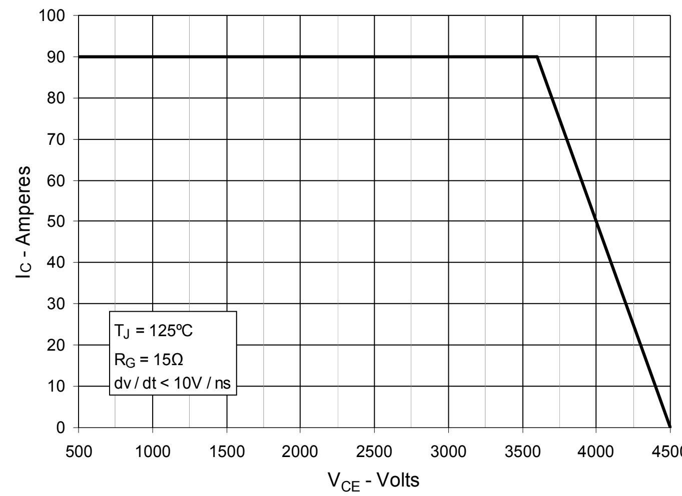
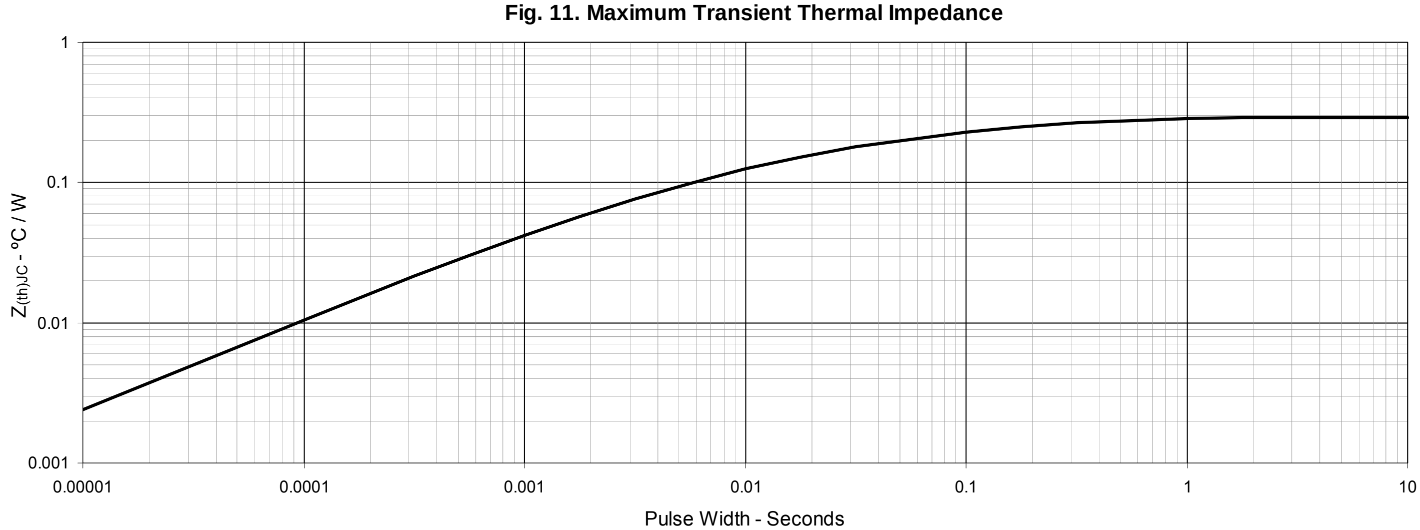



**Fig. 11. Maximum Transient Thermal Impedance**




IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.