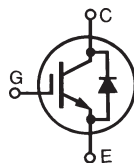


# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

## IXBT22N300HV IXBH22N300HV



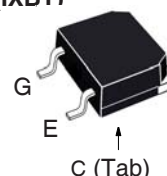
$$V_{CES} = 3000V$$

$$I_{C110} = 22A$$

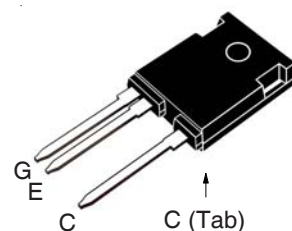
$$V_{CE(sat)} \leq 2.7V$$

| Symbol                                       | Test Conditions  | Maximum Ratings                       |            |
|--|--|---------------------------------------|------------|
| $V_{CES}$                                    | $T_J = 25^\circ C$ to $150^\circ C$  | 3000                                  | V          |
| $V_{CGR}$                                    | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$                                      | 3000                                  | V          |
| $V_{GES}$                                    | Continuous   | $\pm 20$                              | V          |
| $V_{GEM}$                                    | Transient  | $\pm 30$                              | V          |
| $I_{C25}$                                    | $T_C = 25^\circ C$   | 60                                    | A          |
| $I_{C110}$                                   | $T_C = 110^\circ C$  | 22                                    | A          |
| $I_{CM}$                                     | $T_C = 25^\circ C$ , 1ms   | 190                                   | A          |
| <b>SSOA</b><br><b>(RBSOA)</b>                | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 15\Omega$<br>Clamped Inductive Load           | $I_{CM} = 180$<br>$V_{CES} \leq 1500$ | A<br>V     |
| <b><math>T_{SC}</math></b><br><b>(SCSOA)</b> | $V_{GE} = 15V$ , $T_J = 125^\circ C$ ,<br>$R_G = 52\Omega$ , $V_{CE} = 1500V$ , Non-Repetitive | 10                                    | $\mu s$    |
| $P_C$  | $T_C = 25^\circ C$   | 290                                   | W          |
| $T_J$  |  | -55 ... +150                          | $^\circ C$ |
| $T_{JM}$                                     |  | 150                                   | $^\circ C$ |
| $T_{stg}$                                    |  | -55 ... +150                          | $^\circ C$ |
| $T_L$  | Maximum Lead Temperature for Soldering   | 300                                   | $^\circ C$ |
| $T_{SOLD}$                                   | Plastic Body for 10s   | 260                                   | $^\circ C$ |
| $M_d$  | Mounting Torque (TO-247HV)   | 1.13/10                               | Nm/lb.in   |
| <b>Weight</b>                                | TO-268HV   | 4                                     | g          |
|  | TO-247HV   | 6                                     | g          |

TO-268HV (IXBT)



TO-247HV (IXBH)



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

### 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<br>( $T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values |      |                      |
|---------------|---|-----------------------|------|----------------------|
|               |   | Min.                  | Typ. | Max.                 |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{GE} = 0V$                                    | 3000                  |      | V                    |
| $V_{GE(th)}$  | $I_C = 250\mu A$ , $V_{CE} = V_{GE}$                                | 3.0                   |      | 5.0 V                |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$           |                       |      | 25 $\mu A$<br>1.5 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                  |                       |      | $\pm 100$ nA         |
| $V_{CE(sat)}$ | $I_C = 22A$ , $V_{GE} = 15V$ , Note 1<br>$T_J = 125^\circ C$        |                       | 2.2  | 2.7 V                |
|               |   |                       | 2.7  | V                    |

| Symbol Test Conditions                                |  | Characteristic Values   |      |                    |
|---|--|---|------|--------------------|
| $(T_J = 25^\circ\text{C Unless Otherwise Specified})$ |  | Min.  | Typ. | Max.               |
| $g_{fs}$  | $I_C = 22\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$   | 13  | 22   | S                  |
| $C_{ies}$   | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$   |   | 2200 | pF                 |
| $C_{oes}$   |  |   | 85   | pF                 |
| $C_{res}$   |  |   | 30   | pF                 |
| $Q_{g(on)}$   | $I_C = 22\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1500\text{V}$   |   | 110  | nC                 |
| $Q_{ge}$  |  |   | 13   | nC                 |
| $Q_{gc}$  |  |   | 45   | nC                 |
| $t_{d(on)}$   | <b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 22\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 15\Omega$ |   | 46   | ns                 |
| $t_r$   |  |   | 360  | ns                 |
| $t_{d(off)}$  |  |   | 205  | ns                 |
| $t_f$   |  |   | 1820 | ns                 |
| $t_{d(on)}$   |  | <b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 22\text{A}, V_{GE} = 15\text{V}$<br>$V_{CE} = 960\text{V}, R_G = 15\Omega$ |      | 43                 |
| $t_r$   |  |   | 700  | ns                 |
| $t_{d(off)}$  |  |   | 220  | ns                 |
| $t_f$   |  |   | 1650 | ns                 |
| $R_{thJC}$  |  |   |      | 0.43               |
| $R_{thCS}$  | TO-247HV   | 0.21  |      | $^\circ\text{C/W}$ |

### Reverse Diode

| Symbol Test Conditions                                |   | Characteristic Values |      |               |
|---|---|-----------------------|------|---------------|
| $(T_J = 25^\circ\text{C Unless Otherwise Specified})$ |   | Min.                  | Typ. | Max           |
| $V_F$   | $I_F = 22\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$   |                       |      | 2.7 V         |
| $t_{rr}$  | $I_F = 11\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GE} = 0\text{V}$ |                       | 1.4  | $\mu\text{s}$ |
| $I_{RM}$  |   |                       | 30   | A             |
| $Q_{RM}$  |   |                       | 21   | $\mu\text{C}$ |

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

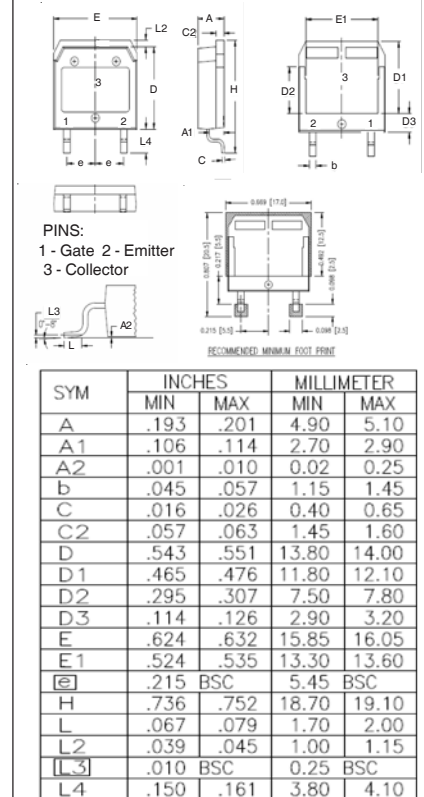
### ADVANCE TECHNICAL INFORMATION

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.

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 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
|  | 4,860,072 | 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    |             |

### TO-268HV Outline



### TO-247HV Outline

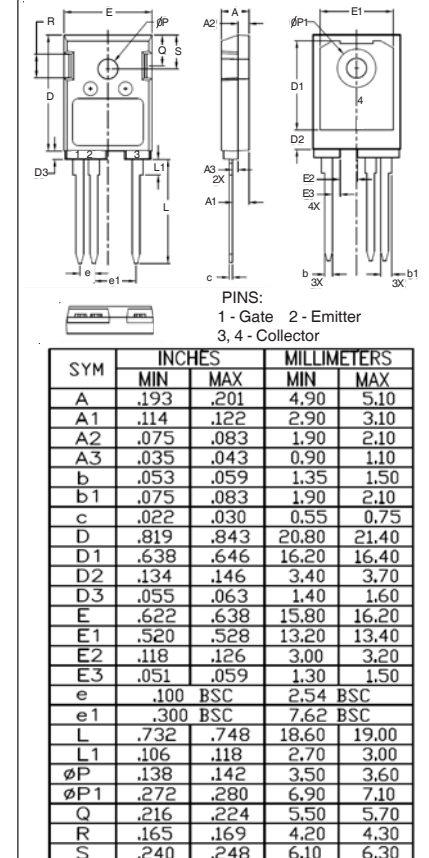


Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$

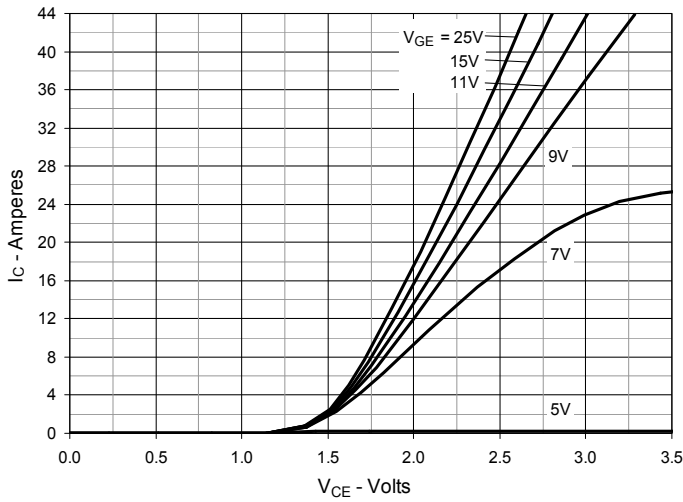


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

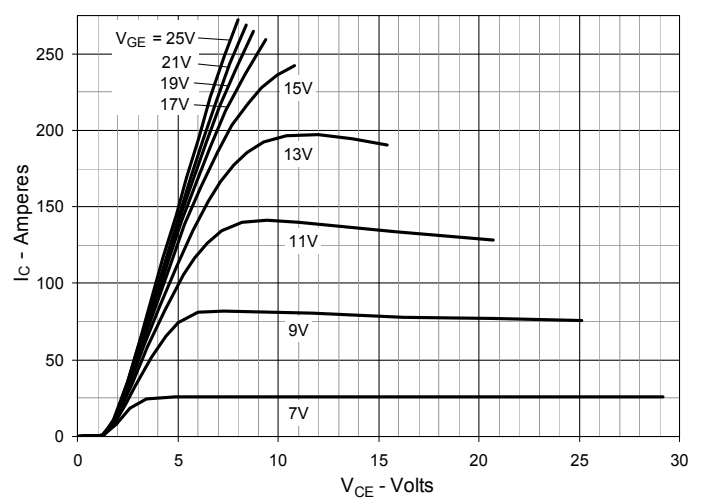


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

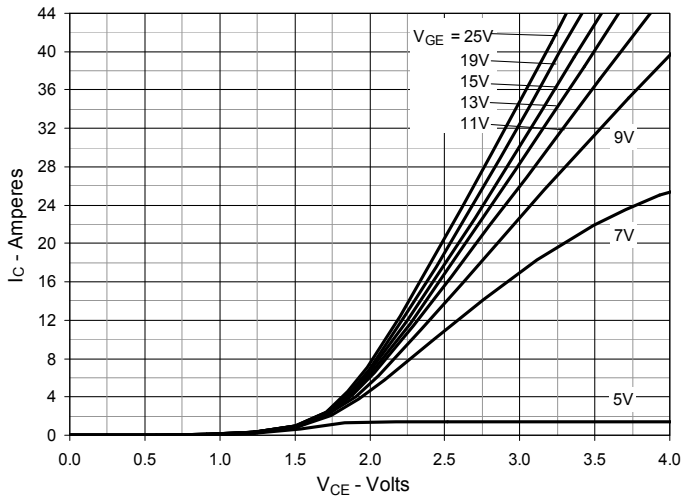


Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature

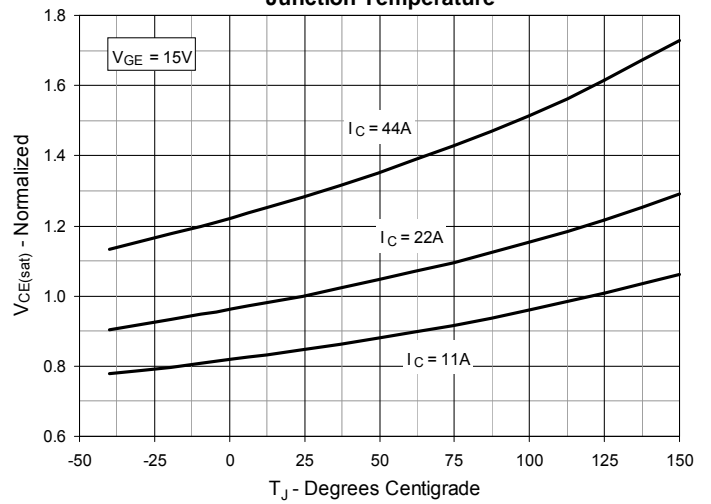


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

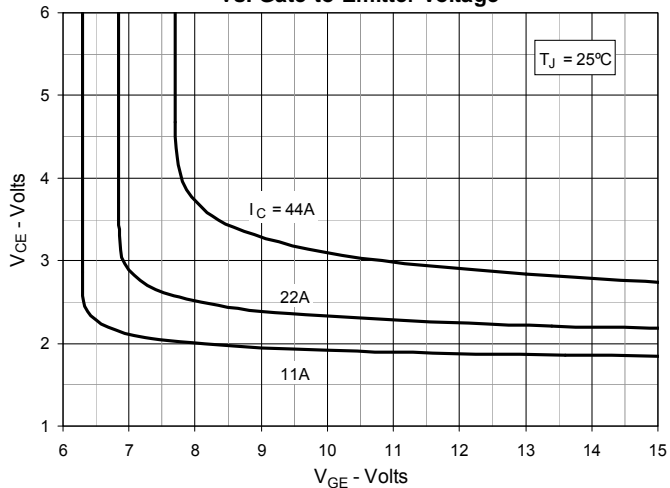


Fig. 6. Input Admittance

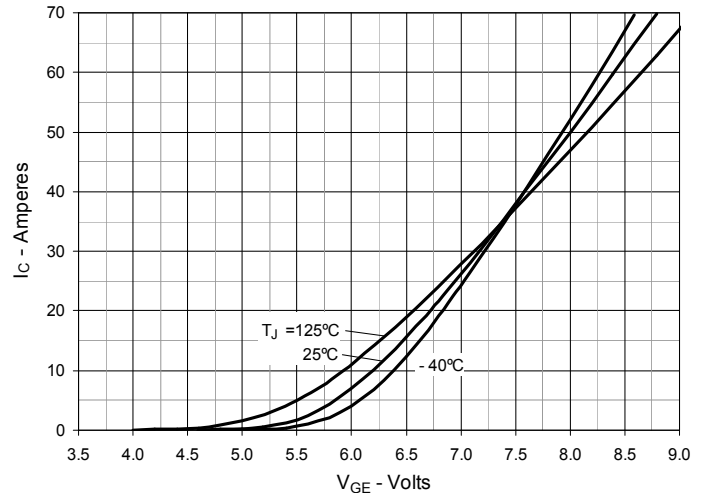


Fig. 7. Transconductance

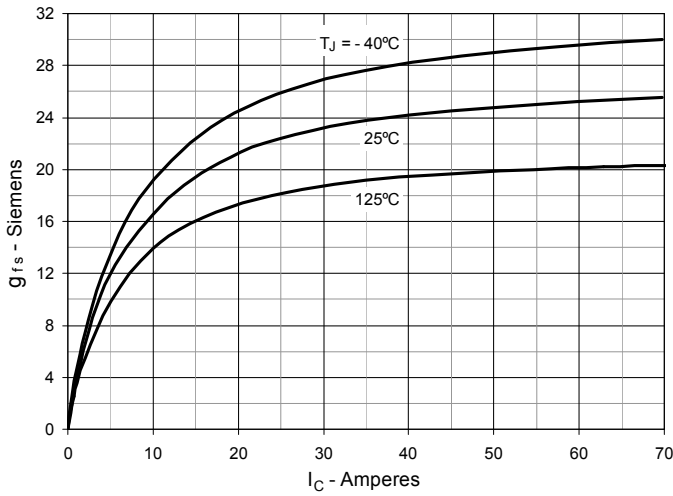


Fig. 8. Gate Charge

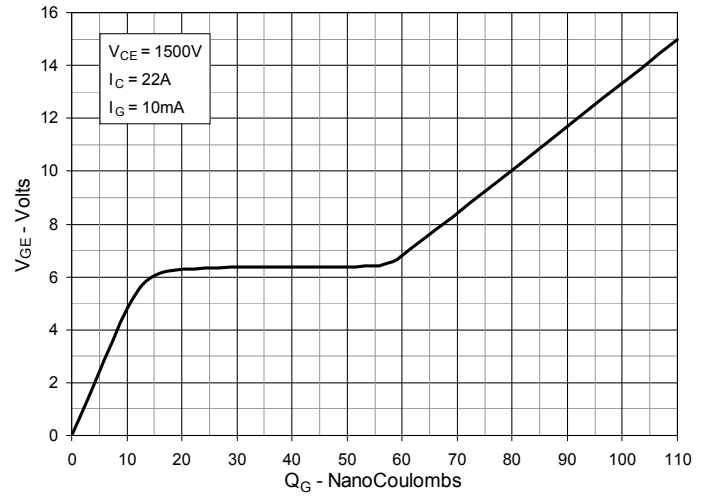


Fig. 9. Forward Voltage Drop of Intrinsic Diode

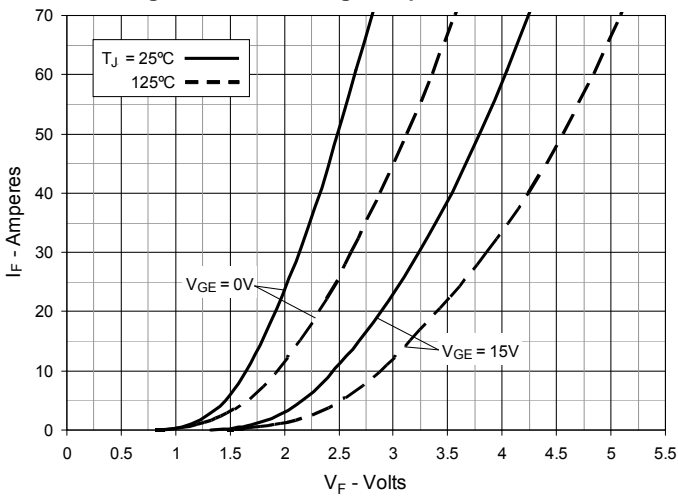


Fig. 10. Capacitance

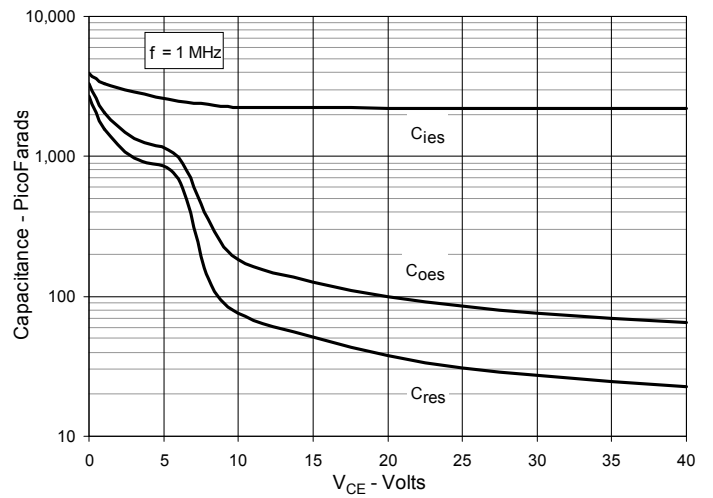


Fig. 11. Reverse-Bias Safe Operating Area

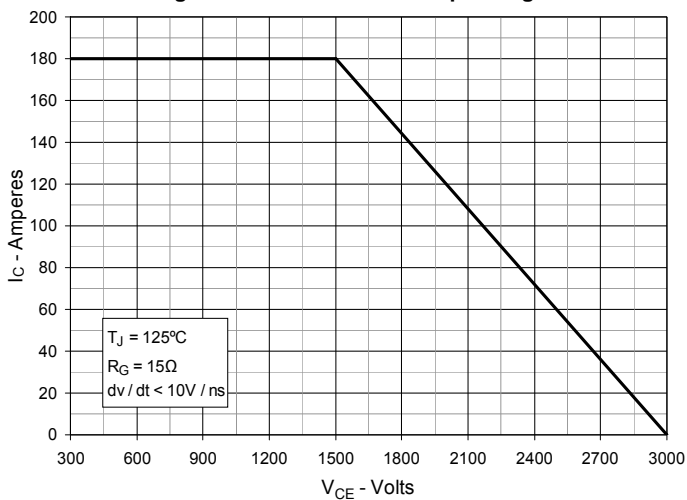


Fig. 12. Maximum Transient Thermal Impedance

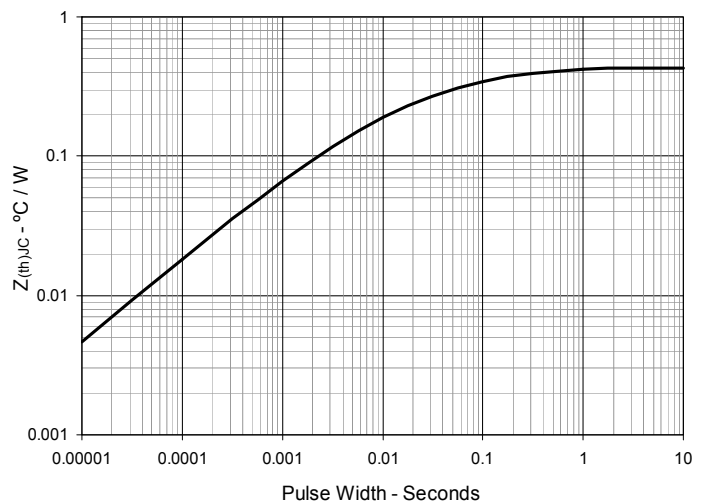


Fig. 13. Forward-Bias Safe Operating Area @  $T_C = 25^\circ\text{C}$

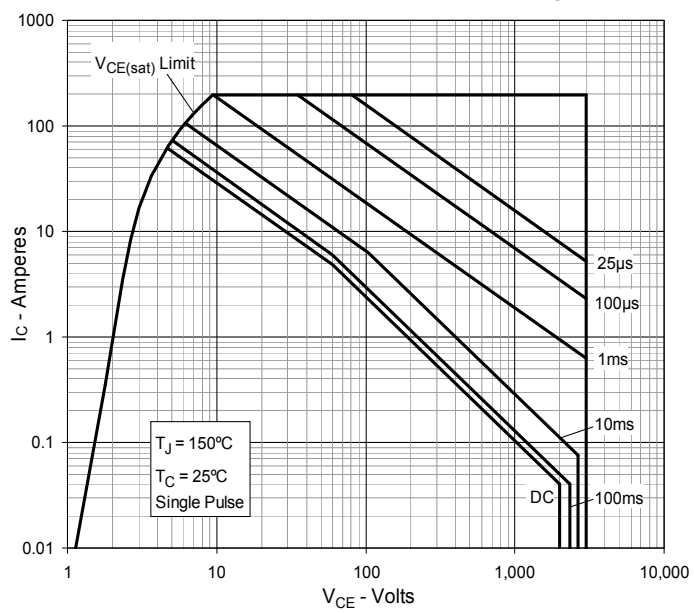
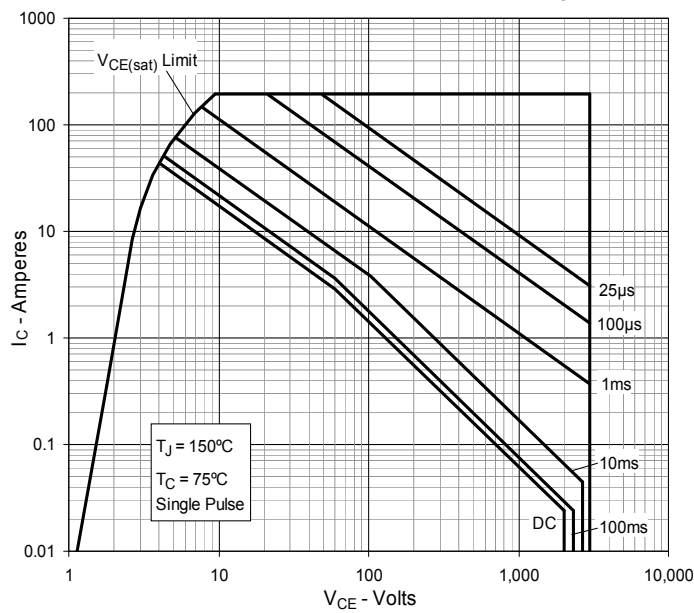


Fig. 14. Forward-Bias Safe Operating Area @  $T_C = 75^\circ\text{C}$





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