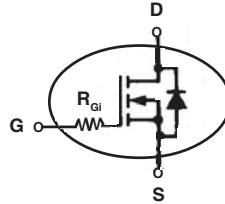


**LinearL2™**  
**Power MOSFET**  
**w/ Extended FBSOA**

**IXTH30N50L2**  
**IXTQ30N50L2**  
**IXTT30N50L2**

**V<sub>DSS</sub> = 500V**  
**I<sub>D25</sub> = 30A**  
**R<sub>DS(on)</sub> ≤ 215mΩ**

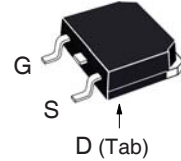
N-Channel Enhancement Mode



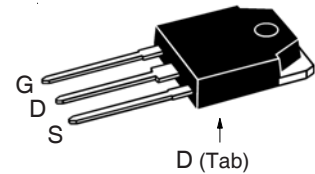
| Symbol            | Test Conditions   | Maximum Ratings |          |
|-------------------|---|-----------------|----------|
| V <sub>DSS</sub>  | T <sub>J</sub> = 25°C to 150°C                                | 500             | V        |
| V <sub>DGR</sub>  | T <sub>J</sub> = 25°C to 150°C, R <sub>GS</sub> = 1MΩ         | 500             | V        |
| V <sub>GSS</sub>  | Continuous  | ± 20            | V        |
| V <sub>GSM</sub>  | Transient   | ± 30            | V        |
| I <sub>D25</sub>  | T <sub>C</sub> = 25°C   | 30              | A        |
| I <sub>DM</sub>   | T <sub>C</sub> = 25°C, Pulse Width Limited by T <sub>JM</sub> | 60              | A        |
| I <sub>A</sub>    | T <sub>C</sub> = 25°C   | 30              | A        |
| E <sub>AS</sub>   | T <sub>C</sub> = 25°C   | 1.5             | J        |
| P <sub>D</sub>    | T <sub>C</sub> = 25°C   | 400             | W        |
| T <sub>J</sub>    |   | -55 ... +150    | °C       |
| T <sub>JM</sub>   |   | 150             | °C       |
| T <sub>stg</sub>  |   | -55 ... +150    | °C       |
| T <sub>L</sub>    | Maximum Lead Temperature for Soldering                        | 300             | °C       |
| T <sub>SOLD</sub> | Plastic Body for 10s  | 260             | °C       |
| M <sub>d</sub>    | Mounting Torque (TO-247&TO-3P)                                | 1.13 / 10       | Nm/lb.in |
| Weight            | TO-268  | 4.0             | g        |
|                   | TO-3P   | 5.5             | g        |
|                   | TO-247  | 6.0             | g        |

| Symbol              | Test Conditions<br>(T <sub>J</sub> = 25°C Unless Otherwise Specified)               | Characteristic Values |      |                 |
|---------------------|---|-----------------------|------|-----------------|
|                     |   | Min.                  | Typ. | Max.            |
| BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA  | 500                   |      | V               |
| V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                          | 2.5                   |      | 4.5 V           |
| I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |                       |      | ±100 nA         |
| I <sub>DSS</sub>    | V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0V<br>T <sub>J</sub> = 125°C |                       |      | 50 μA<br>300 μA |
| R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1             |                       |      | 215 mΩ          |

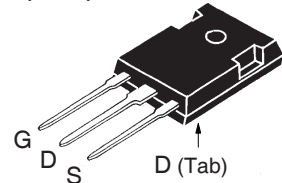
TO-268 (IXTT)



TO-3P (IXTQ)



TO-247 (IXTH)



G = Gate      D = Drain  
 S = Source    Tab = Drain

**Features**

- Designed for Linear Operation
- International Standard Packages
- Avalanche Rated
- Guaranteed FBSOA at 75°C

**Advantages**

- Easy to Mount
- Space Savings
- High Power Density

**Applications**

- Solid State Circuit Breakers
- Soft Start Controls
- Linear Amplifiers
- Programmable Loads
- Current Regulators

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)  | Characteristic Values |      |      |                    |
|--------------|--|-----------------------|------|------|--------------------|
|              |  | Min.                  | Typ. | Max. |                    |
| $g_{fs}$     | $V_{DS} = 10\text{V}, I_D = 0.5 \cdot I_{D25}$ , Note 1  | 9                     | 12   | 15   | S                  |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   |                       | 8100 |      | pF                 |
| $C_{oss}$    |  |                       | 530  |      | pF                 |
| $C_{rss}$    |  |                       | 115  |      | pF                 |
| $R_{Gi}$     | Integrated Gate Input Resistor   |                       | 3.5  |      | $\Omega$           |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 0\Omega$ (External) |                       | 35   |      | ns                 |
| $t_r$        |  |                       | 117  |      | ns                 |
| $t_{d(off)}$ |  |                       | 94   |      | ns                 |
| $t_f$        |  |                       | 40   |      | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$   |                       | 240  |      | nC                 |
| $Q_{gs}$     |  |                       | 58   |      | nC                 |
| $Q_{gd}$     |  |                       | 135  |      | nC                 |
| $R_{thJC}$   |  |                       |      | 0.31 | $^\circ\text{C/W}$ |
| $R_{thCS}$   | (TO-247&TO-3P)   | 0.25                  |      |      | $^\circ\text{C/W}$ |

### Safe Operating Area Specification

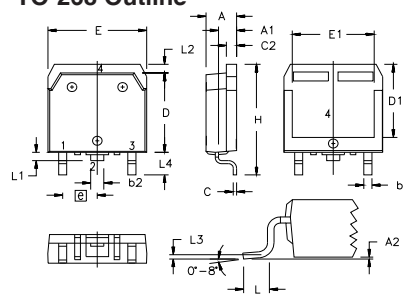
| Symbol | Test Conditions  | Characteristic Values |      |      |
|--------|--|-----------------------|------|------|
|        |  | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 400\text{V}, I_D = 0.5\text{A}, T_C = 75^\circ\text{C}, T_p = 2\text{s}$ | 200                   |      | W    |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)          | Characteristic Values |      |      |    |
|----------|--|-----------------------|------|------|----|
|          |  | Min.                  | Typ. | Max. |    |
| $I_s$    | $V_{GS} = 0\text{V}$   |                       |      | 30   | A  |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$  |                       |      | 120  | A  |
| $V_{SD}$ | $I_F = I_s, V_{GS} = 0\text{V}$ , Note 1   |                       |      | 1.5  | V  |
| $t_{rr}$ | $I_F = I_s, -di/dt = 100\text{A}/\mu\text{s}, V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       | 500  |      | ns |

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

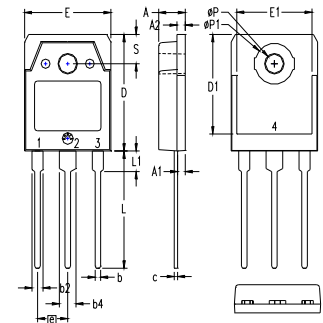
#### TO-268 Outline



Terminals: 1 - Gate, 2,4 - Drain, 3 - Source

| 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  |

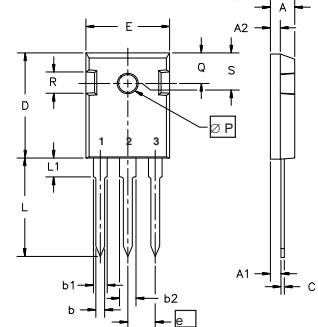
### TO-3P Outline



- 1 - GATE
- 2 - DRAIN
- 3 - SOURCE
- 4 - DRAIN

| SYM       | INCHES   |      | MILLIMETERS |       |
|-----------|----------|------|-------------|-------|
|           | MIN      | MAX  | MIN         | MAX   |
| A         | .185     | .193 | 4.70        | 4.90  |
| A1        | .051     | .059 | 1.30        | 1.50  |
| A2        | .057     | .065 | 1.45        | 1.65  |
| b         | .035     | .045 | 0.90        | 1.15  |
| b2        | .075     | .087 | 1.90        | 2.20  |
| b4        | .114     | .126 | 2.90        | 3.20  |
| c         | .022     | .031 | 0.55        | 0.80  |
| D         | .780     | .799 | 19.80       | 20.30 |
| D1        | .665     | .677 | 16.90       | 17.20 |
| E         | .610     | .622 | 15.50       | 15.80 |
| E1        | .531     | .539 | 13.50       | 13.70 |
| e         | .215 BSC |      | 5.45 BSC    |       |
| L         | .779     | .795 | 19.80       | 20.20 |
| L1        | .134     | .142 | 3.40        | 3.60  |
| $\phi P$  | .126     | .134 | 3.20        | 3.40  |
| $\phi P1$ | .272     | .280 | 6.90        | 7.10  |
| S         | .193     | .201 | 4.90        | 5.10  |

### TO-247 Outline



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

| 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  |
| $\phi P$       | 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 |       |

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    |             |

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

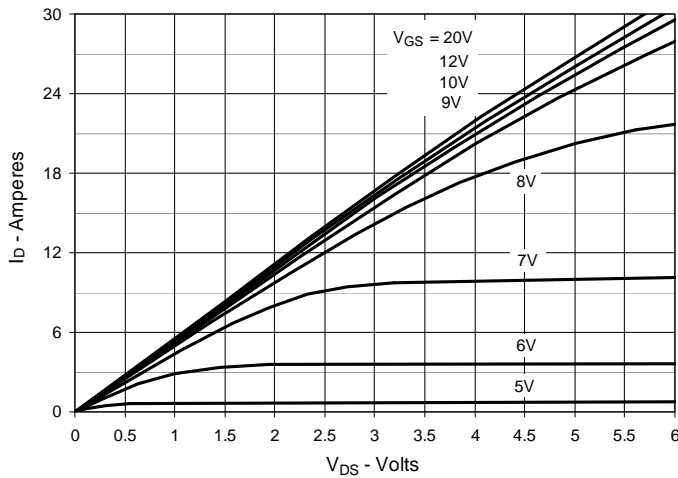


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

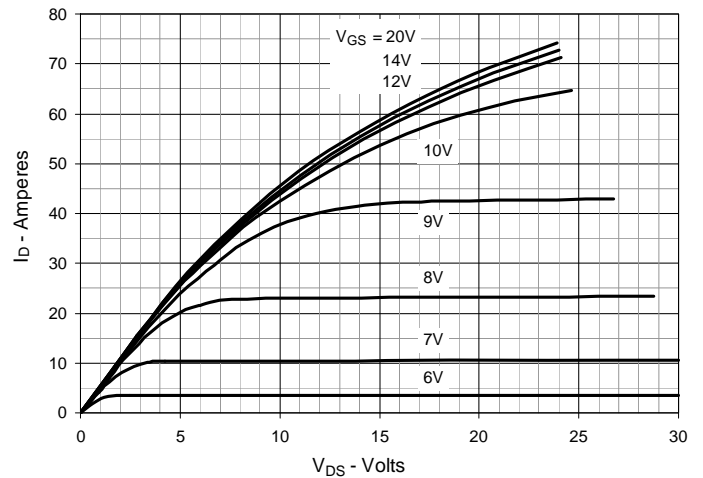


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

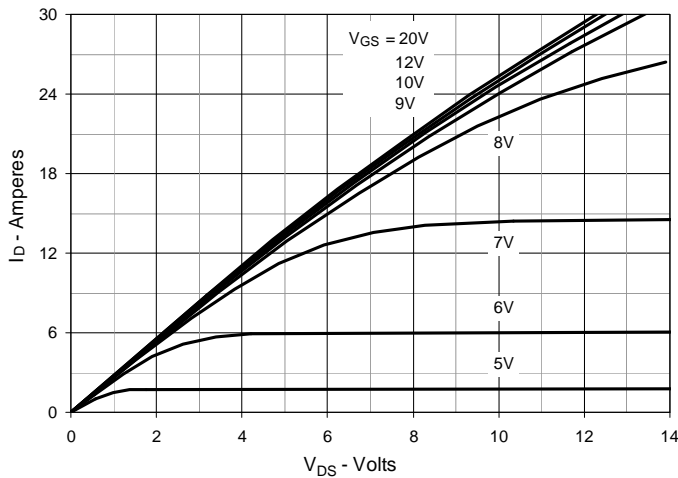


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 15\text{A}$  Value vs. Junction Temperature

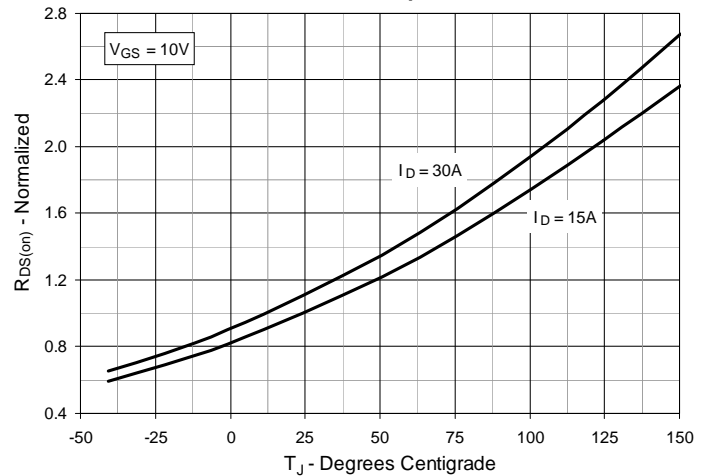


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 15\text{A}$  Value vs. Drain Current

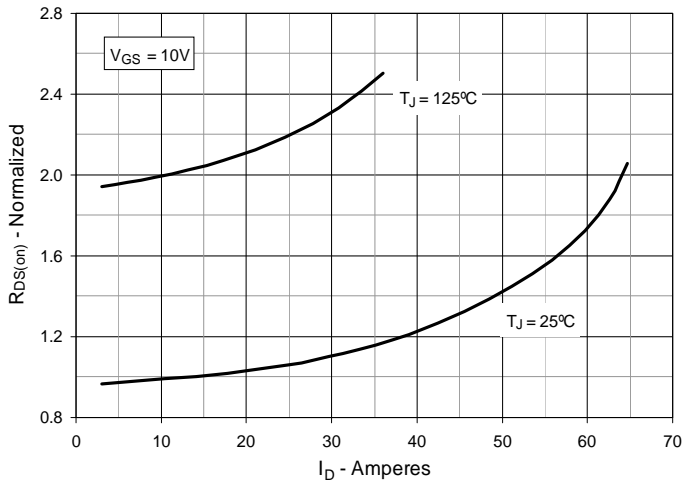


Fig. 6. Maximum Drain Current vs. Case Temperature

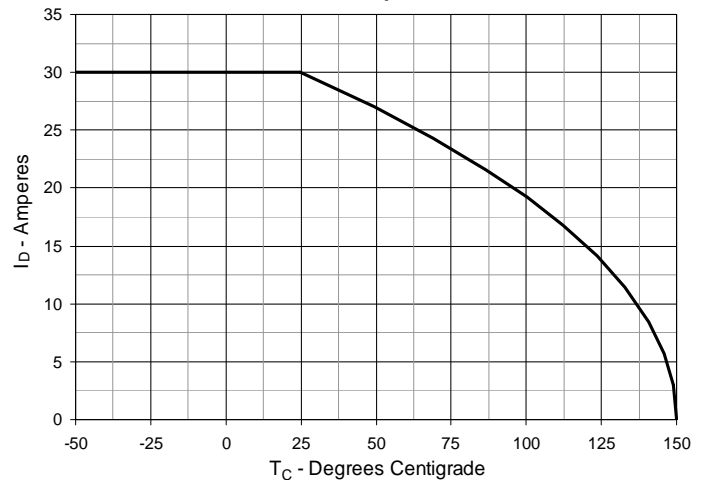


Fig. 7. Input Admittance

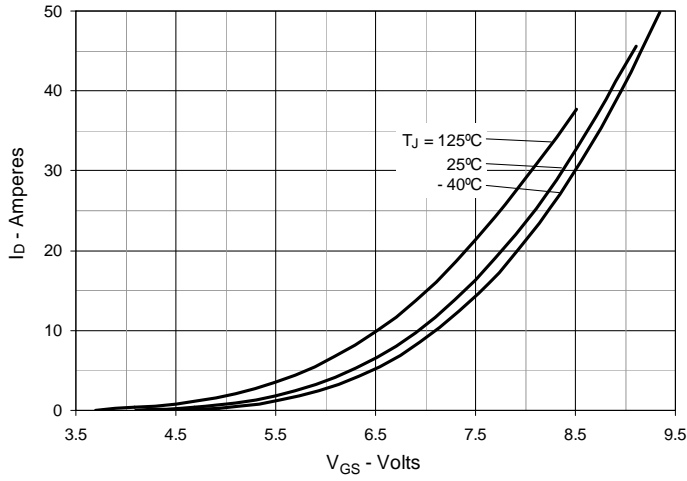


Fig. 8. Transconductance

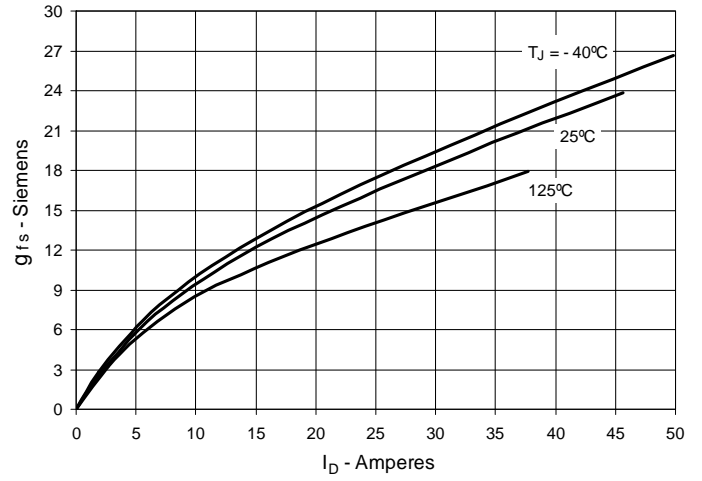


Fig. 9. Forward Voltage Drop of Intrinsic Diode

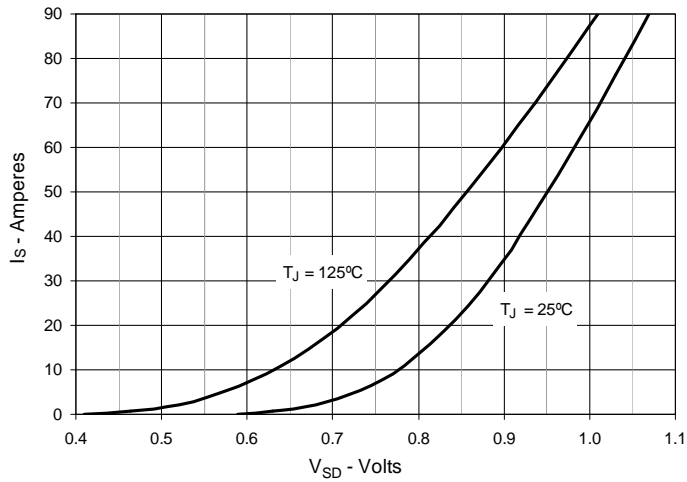


Fig. 10. Gate Charge

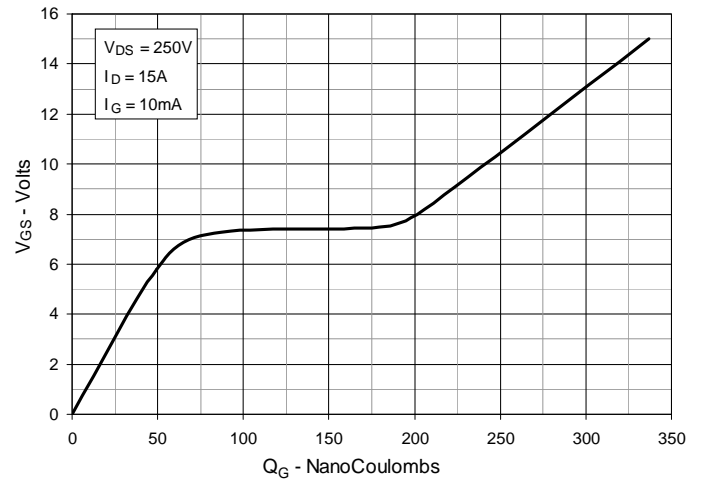


Fig. 11. Capacitance

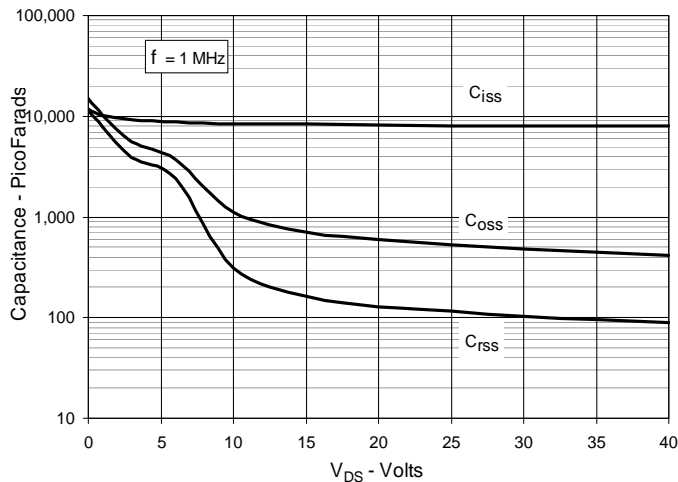


Fig. 12. Maximum Transient Thermal Impedance

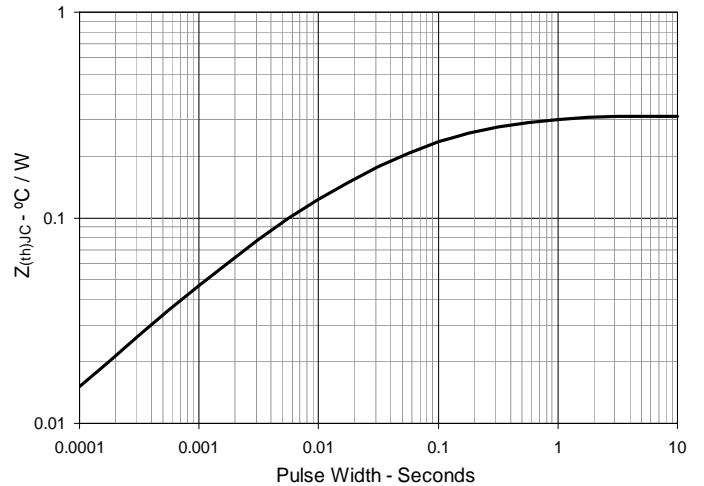


Fig. 13. Forward-Bias Safe Operating Area  
@  $T_C = 25^\circ\text{C}$

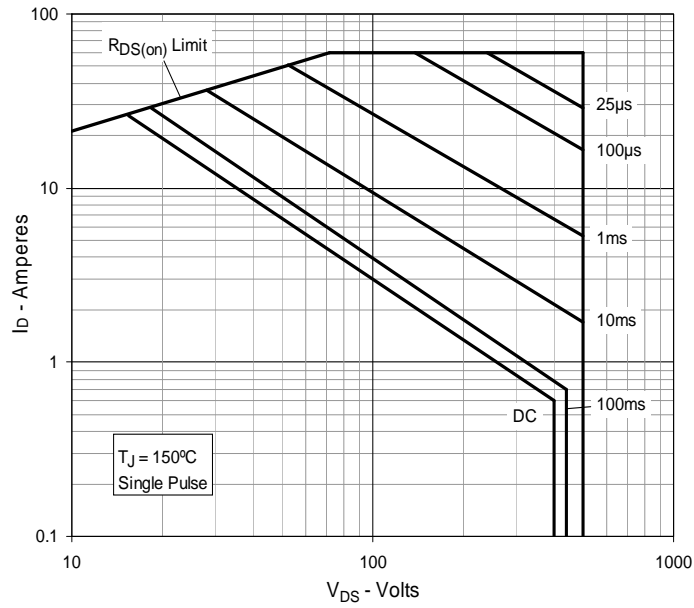
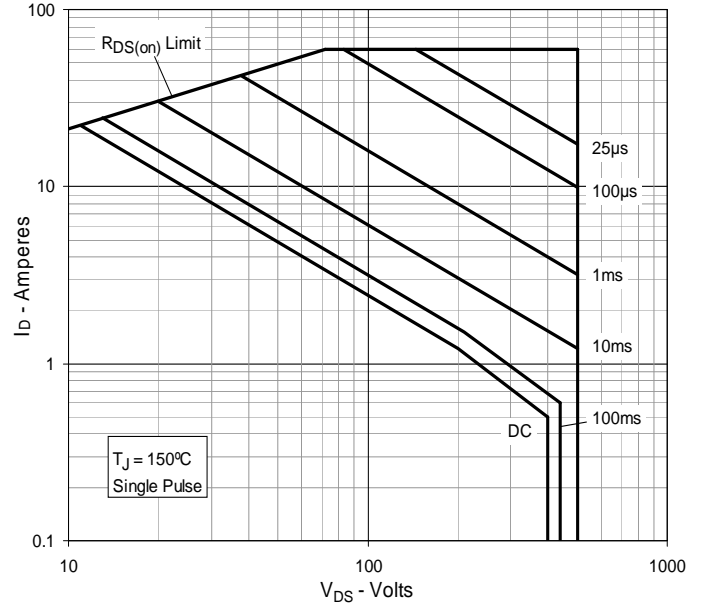


Fig. 14. Forward-Bias Safe Operating Area  
@  $T_C = 75^\circ\text{C}$





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