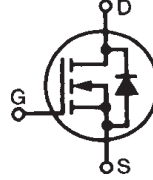


# LinearL2™ Power MOSFET w/ Extended FBSOA

## IXTH110N10L2 IXTT110N10L2

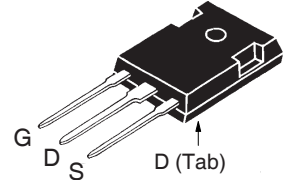
$$\begin{aligned} V_{DSS} &= 100V \\ I_{D25} &= 110A \\ R_{DS(on)} &\leq 18m\Omega \end{aligned}$$

N-Channel Enhancement Mode  
Guaranteed FBSOA  
Avalanche Rated

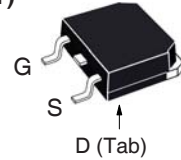


| Symbol     | Test Conditions                                                       | Maximum Ratings |                  |
|------------|-----------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                       | 100             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$ | 100             | V                |
| $V_{GSS}$  | Continuous                                                            | $\pm 20$        | V                |
| $V_{GSM}$  | Transient                                                             | $\pm 30$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                              | 110             | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$            | 300             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                              | 110             | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                              | 3               | J                |
| $P_D$      | $T_C = 25^\circ\text{C}$                                              | 600             | W                |
| $T_J$      |                                                                       | -55 to +150     | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                       | +150            | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                       | -55 to +150     | $^\circ\text{C}$ |
| $T_L$      | 1.6mm (0.063in) from Case for 10s                                     | 300             | $^\circ\text{C}$ |
| $T_{SOLD}$ | Plastic Body for 10s                                                  | 260             | $^\circ\text{C}$ |
| $M_d$      | Mounting Torque (TO-247)                                              | 1.13/10         | Nm/lb.in.        |
| Weight     | TO-247                                                                | 6.0             | g                |
|            | TO-268                                                                | 4.0             | g                |

TO-247 (IXTH)



TO-268 (IXTT)



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

### Features

- Designed for Linear Operation
- International Standard Packages
- Avalanche Rated
- Integrated Gate Resistor for Easy Paralleling
- Guaranteed FBSOA at  $75^\circ\text{C}$

### 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.             |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu\text{A}$                                      | 100                   |      | V                |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$                                  | 2.5                   |      | 4.5 V            |
| $I_{GSS}$    | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$                                          |                       |      | $\pm 100$ nA     |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$             |                       |      | 5 $\mu\text{A}$  |
|              |                                                                             |                       |      | 50 $\mu\text{A}$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                         |                       |      | 18 m $\Omega$    |

| Symbol       | Test Conditions                                                                                                                                      | Characteristic Values |      |                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|--------------------|
|              | ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                                                                             | Min.                  | Typ. | Max.               |
| $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                                                                                           | 45                    | 55   | 65                 |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                                     |                       | 10.5 | nF                 |
| $C_{oss}$    |                                                                                                                                                      |                       | 1585 | pF                 |
| $C_{rss}$    |                                                                                                                                                      |                       | 420  | pF                 |
| $R_{Gi}$     | Gate Input Resistance                                                                                                                                |                       | 1.8  | $\Omega$           |
| $t_{d(on)}$  | <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>$R_G = 2.2\Omega$ (External) |                       | 28   | ns                 |
| $t_r$        |                                                                                                                                                      |                       | 130  | ns                 |
| $t_{d(off)}$ |                                                                                                                                                      |                       | 99   | ns                 |
| $t_f$        |                                                                                                                                                      |                       | 24   | ns                 |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                                                                     |                       | 260  | nC                 |
| $Q_{gs}$     |                                                                                                                                                      |                       | 52   | nC                 |
| $Q_{gd}$     |                                                                                                                                                      |                       | 106  | nC                 |
| $R_{thJC}$   | TO-247                                                                                                                                               |                       | 0.21 | $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                                      |                       | 0.21 | $^\circ\text{C/W}$ |

### Safe Operating Area Specification

| Symbol | Test Conditions                                                                            | Characteristic Values |      |      |
|--------|--------------------------------------------------------------------------------------------|-----------------------|------|------|
|        |                                                                                            | Min.                  | Typ. | Max. |
| SOA    | $V_{DS} = 80\text{V}$ , $I_D = 3.6\text{A}$ , $T_C = 75^\circ\text{C}$ , $t_p = 5\text{s}$ | 360                   |      | W    |

### Source-Drain Diode

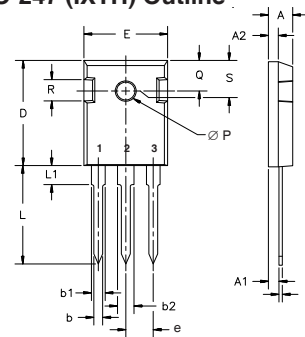
| Symbol   | Test Conditions                                                                                        | Characteristic Values |      |               |
|----------|--------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          | ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                               | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                   |                       |      | 110 A         |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                            |                       |      | 440 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                            |                       |      | 1.4 V         |
| $t_{rr}$ | $I_F = 55\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ ,<br>$V_R = 50\text{V}$ , $V_{GS} = 0\text{V}$ |                       | 230  | ns            |
| $I_{RM}$ |                                                                                                        |                       | 19.4 | A             |
| $Q_{RM}$ |                                                                                                        |                       | 2.2  | $\mu\text{C}$ |

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.

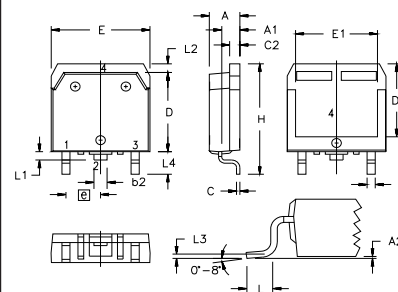
### TO-247 (IXTH) Outline



Terminals: 1 - Gate  
2 - Drain  
3 - Source  
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  |
| L <sub>1</sub> |            | 4.50  |        | .177  |
| ∅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   |

### TO-268 (IXTT) Outline



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

| SYM            | INCHES |      | MILLIMETERS |       |
|----------------|--------|------|-------------|-------|
|                | MIN    | MAX  | MIN         | MAX   |
| A              | .193   | .201 | 4.90        | 5.10  |
| A <sub>1</sub> | .106   | .114 | 2.70        | 2.90  |
| A <sub>2</sub> | .001   | .010 | 0.02        | 0.25  |
| b              | .045   | .057 | 1.15        | 1.45  |
| b <sub>2</sub> | .075   | .083 | 1.90        | 2.10  |
| C              | .016   | .026 | 0.40        | 0.65  |
| C <sub>2</sub> | .057   | .063 | 1.45        | 1.60  |
| D              | .543   | .551 | 13.80       | 14.00 |
| D <sub>1</sub> | .488   | .500 | 12.40       | 12.70 |
| E              | .624   | .632 | 15.85       | 16.05 |
| E <sub>1</sub> | .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  |
| L <sub>1</sub> | .047   | .055 | 1.20        | 1.40  |
| L <sub>2</sub> | .039   | .045 | 1.00        | 1.15  |
| L <sub>3</sub> | .010   | BSC  | 0.25        | BSC   |
| L <sub>4</sub> | .150   | .161 | 3.80        | 4.10  |

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 |
|                                                                                  | 4,850,072 | 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    |             |

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

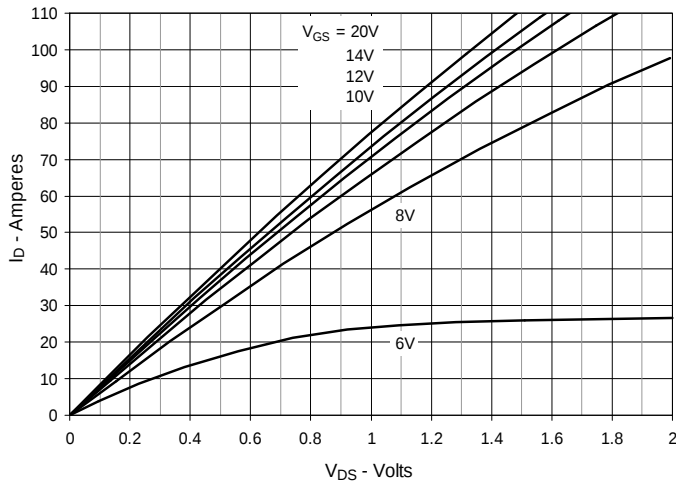


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

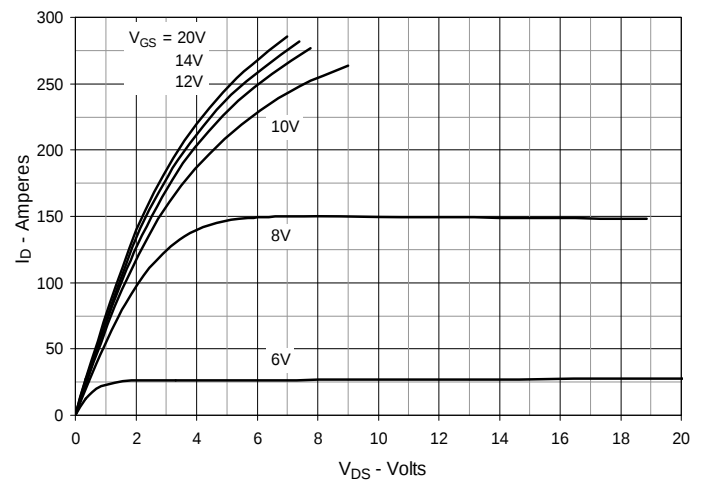


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

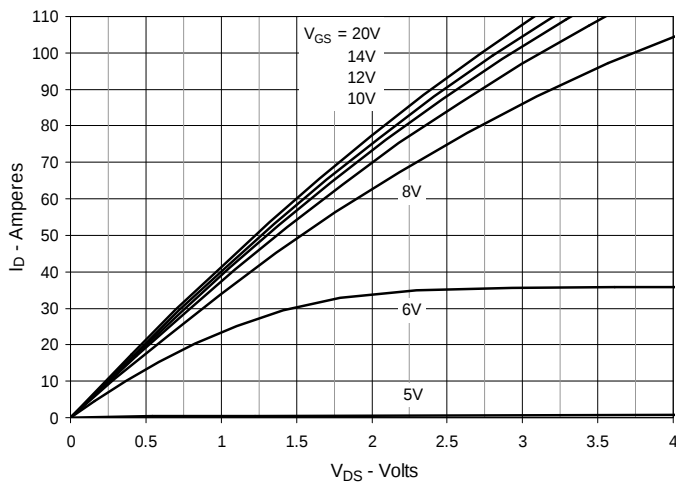


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 55\text{A}$  Value vs. Junction Temperature

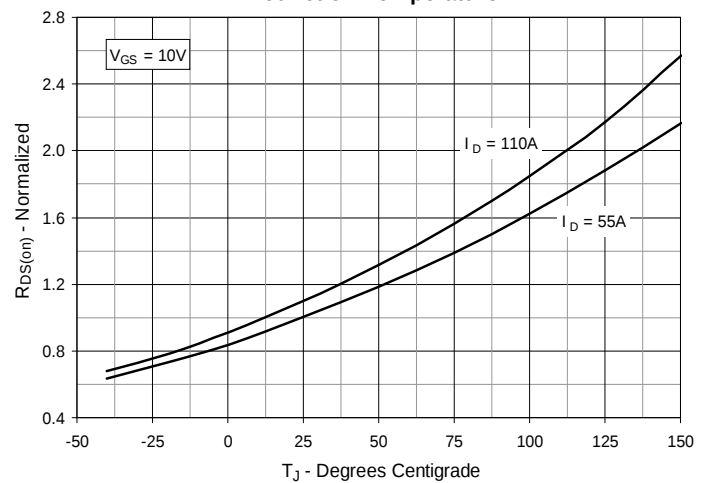


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 55\text{A}$  Value vs. Drain Current

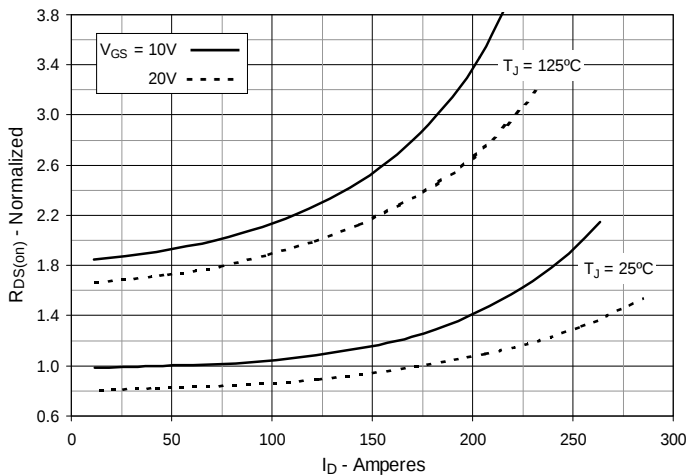
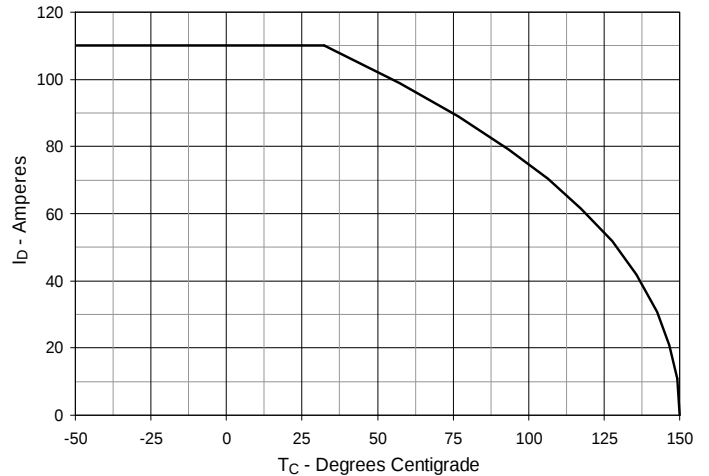
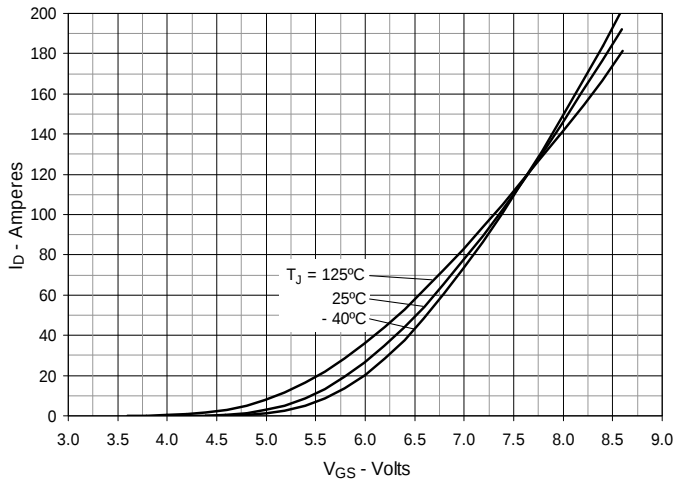


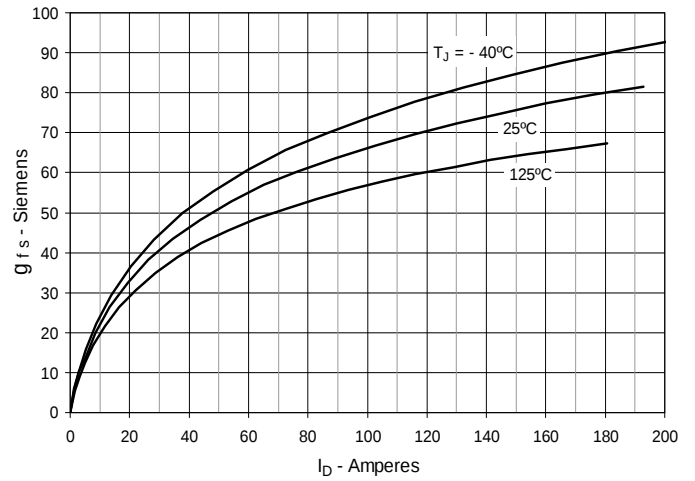
Fig. 6. Maximum Drain Current vs. Case Temperature



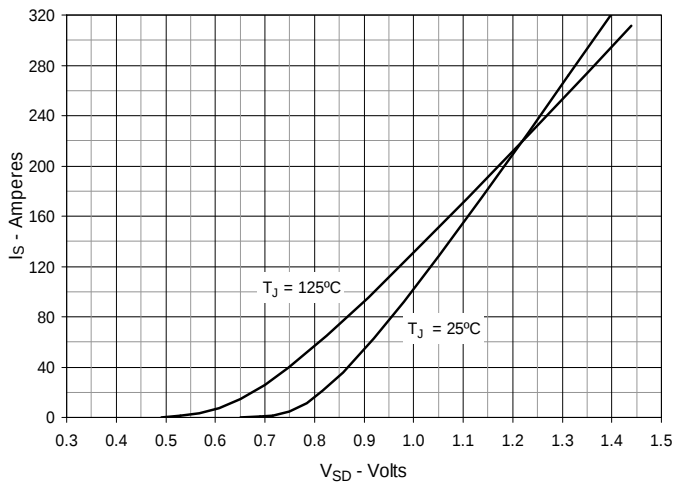
**Fig. 7. Input Admittance**



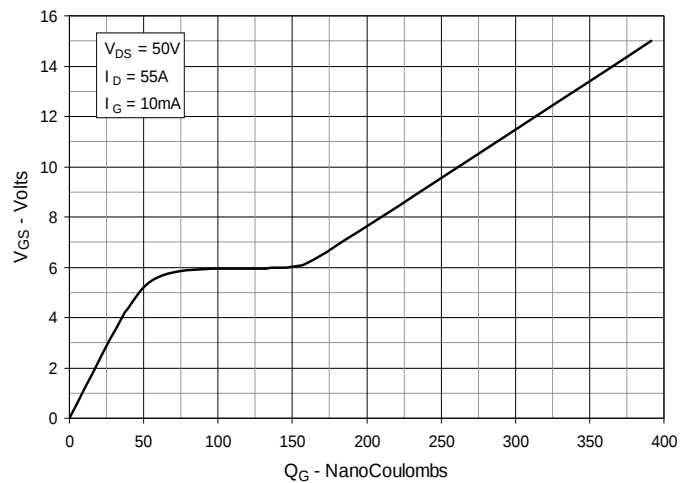
**Fig. 8. Transconductance**



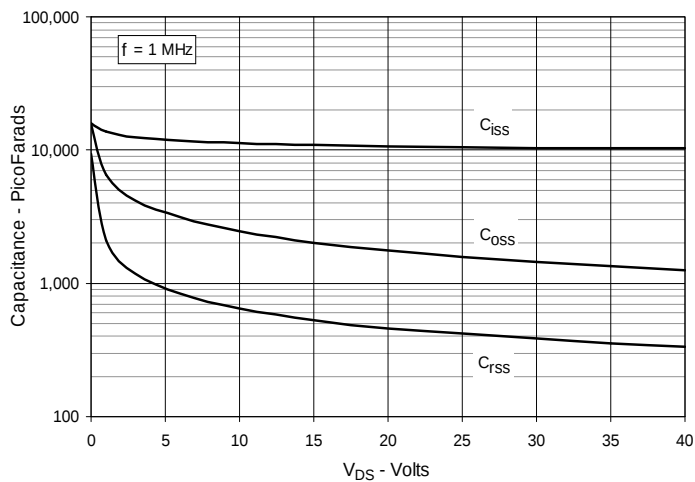
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



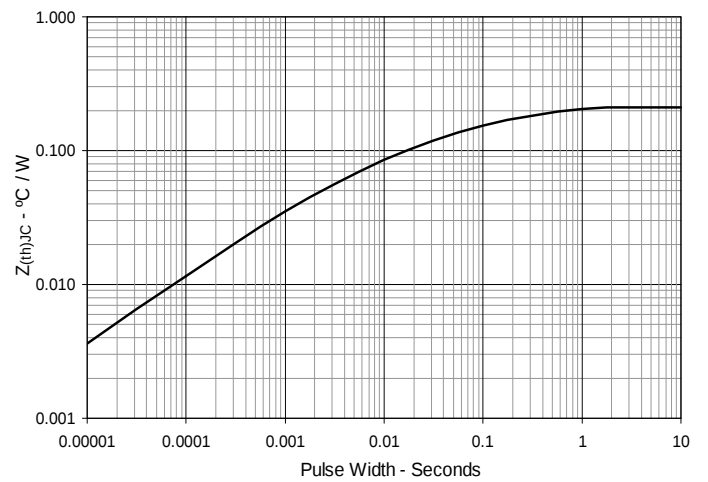
**Fig. 10. Gate Charge**



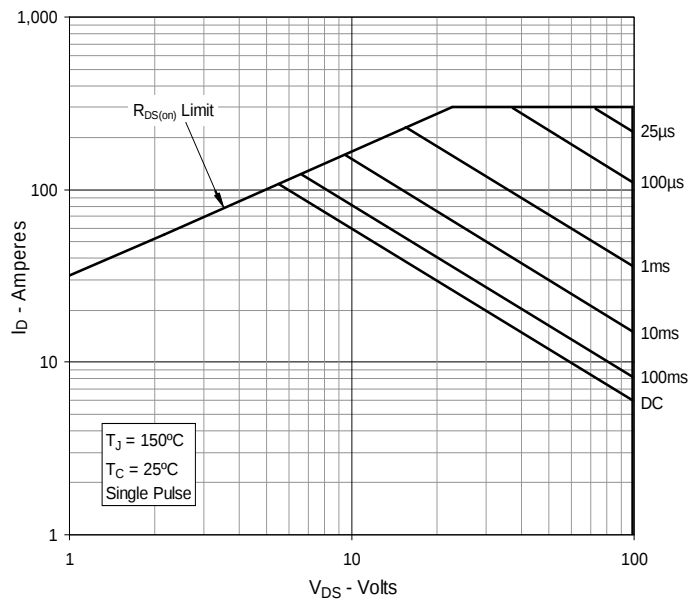
**Fig. 11. Capacitance**



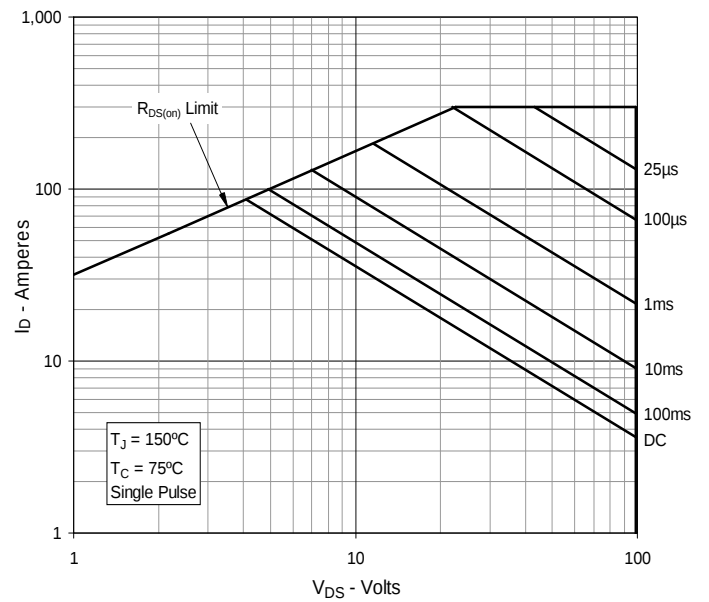
**Fig. 12. Maximum Transient Thermal Impedance**



**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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