

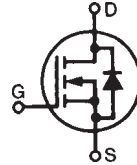
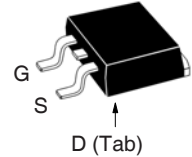
**X4-Class  
Power MOSFET™**
**IXTA130N15X4A**

$$V_{DSS} = 150V$$

$$I_{D25} = 130A$$

$$R_{DS(on)} \leq 8.0m\Omega$$

**AEC Q101 Qualified**

 N-Channel Enhancement Mode  
Avalanche Rated

**TO-263  
(IXTA)**

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

| Symbol     | Test Conditions  | Maximum Ratings    |            |
|------------|--|--------------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 150                | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 150                | V          |
| $V_{GSS}$  | Continuous   | $\pm 20$           | V          |
| $V_{GSM}$  | Transient  | $\pm 30$           | V          |
| $I_{D25}$  | $T_C = 25^\circ C$   | 130                | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 240                | A          |
| $I_A$      | $T_C = 25^\circ C$   | 65                 | A          |
| $E_{AS}$   | $T_C = 25^\circ C$   | 800                | mJ         |
| dv/dt      | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 10                 | V/ns       |
| $P_D$      | $T_C = 25^\circ C$   | 400                | 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                | $^\circ C$ |
| $T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s                                | 260                | $^\circ C$ |
| $F_C$      | Mounting Force   | 10..65 / 2.2..14.6 | N/lb       |
| Weight     | TO-263   | 2.5                | g          |

**Features**

- International Standard Package
- Low  $R_{DS(ON)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance

**Advantages**

- High Power Density
- Easy to Mount
- Space Savings

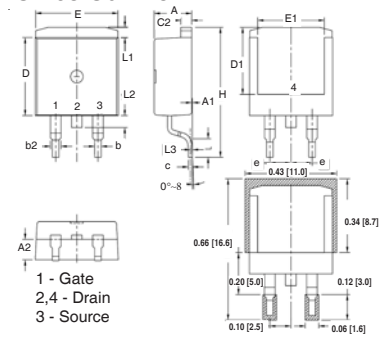
**Applications**

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---|-----------------------|------|--------------------------|
|              |   | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 250\mu A$                                      | 150                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                  | 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>$T_J = 125^\circ C$             |                       |      | 5 $\mu A$<br>200 $\mu A$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Notes 1&2                | 7.0                   | 8.0  | m $\Omega$               |

| Symbol                              | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)                                    | Characteristic Values                                |      |                         |
|-------------------------------------|--|--|------|-------------------------|
|                                     |  | Min.   | Typ. | Max                     |
| $g_{fs}$                            | $V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1  | 70   | 120  | S                       |
| $R_{Gi}$                            | Gate Input Resistance  |  | 3.4  | $\Omega$                |
| $C_{iss}$                           | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$   |  | 4770 | pF                      |
| $C_{oss}$                           |  |  | 710  | pF                      |
| $C_{rss}$                           |  |  | 3.5  | pF                      |
| <b>Effective Output Capacitance</b> |  |  |      |                         |
| $C_{o(er)}$                         | Energy related   | $V_{GS} = 0\text{V}$<br>$V_{DS} = 0.8 \cdot V_{DSS}$ | 560  | pF                      |
| $C_{o(tr)}$                         | Time related   |  | 1850 | pF                      |
| <b>Resistive Switching Times</b>    |  |  |      |                         |
| $t_{d(on)}$                         | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$<br>$R_G = 5\Omega$ (External) |  | 20   | ns                      |
| $t_r$                               |  |  | 27   | ns                      |
| $t_{d(off)}$                        |  |  | 100  | ns                      |
| $t_f$                               |  |  | 10   | ns                      |
| $Q_{g(on)}$                         | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$                               |  | 87   | nC                      |
| $Q_{gs}$                            |  |  | 24   | nC                      |
| $Q_{gd}$                            |  |  | 23   | nC                      |
| $R_{thJC}$                          |  |  |      | 0.31 $^\circ\text{C/W}$ |

### TO-263 Outline



| SYM | INCHES |      | MILLIMETER |       |
|-----|--------|------|------------|-------|
|     | MIN    | MAX  | MIN        | MAX   |
| A   | .170   | .185 | 4.30       | 4.70  |
| A1  | .000   | .008 | 0.00       | 0.20  |
| A2  | .091   | .098 | 2.30       | 2.50  |
| b   | .028   | .035 | 0.70       | 0.90  |
| b2  | .046   | .060 | 1.18       | 1.52  |
| C   | .018   | .024 | 0.45       | 0.60  |
| C2  | .049   | .060 | 1.25       | 1.52  |
| D   | .340   | .370 | 8.63       | 9.40  |
| D1  | .300   | .327 | 7.62       | 8.30  |
| E   | .380   | .410 | 9.65       | 10.41 |
| E1  | .270   | .330 | 6.86       | 8.38  |
| e   | .100   | BSC  | 2.54       | BSC   |
| H   | .580   | .620 | 14.73      | 15.75 |
| L   | .075   | .105 | 1.91       | 2.67  |
| L1  | .039   | .060 | 1.00       | 1.52  |
| L2  | —      | .070 | —          | 1.77  |
| L3  | .010   | BSC  | 0.254      | BSC   |

### Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)   | Characteristic Values |      |       |
|----------|---|-----------------------|------|-------|
|          |   | Min.                  | Typ. | Max   |
| $I_S$    | $V_{GS} = 0\text{V}$  |                       |      | 130 A |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$                                   |                       |      | 520 A |
| $V_{SD}$ | $I_F = 100\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1                           |                       |      | 1.4 V |
| $t_{rr}$ | $I_F = 65\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 75\text{V}$ |                       | 93   | ns    |
| $Q_{RM}$ |   |                       | 310  | nC    |
| $I_{RM}$ |   |                       | 6.7  | A     |

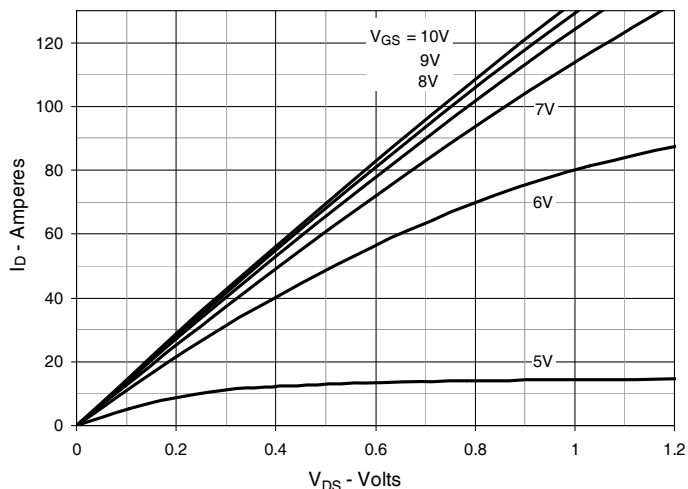
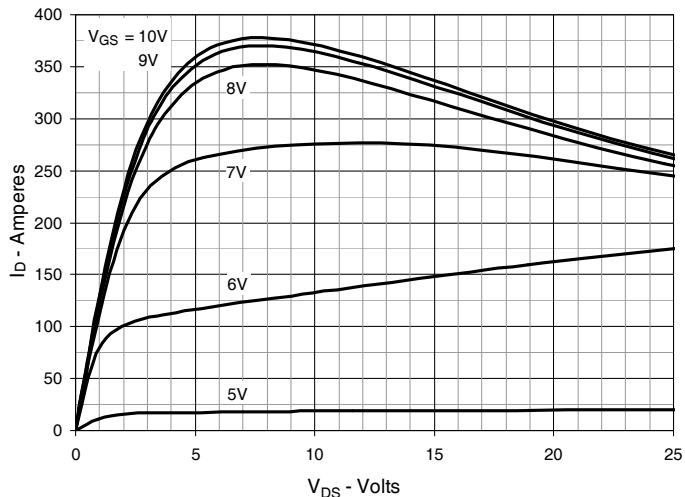
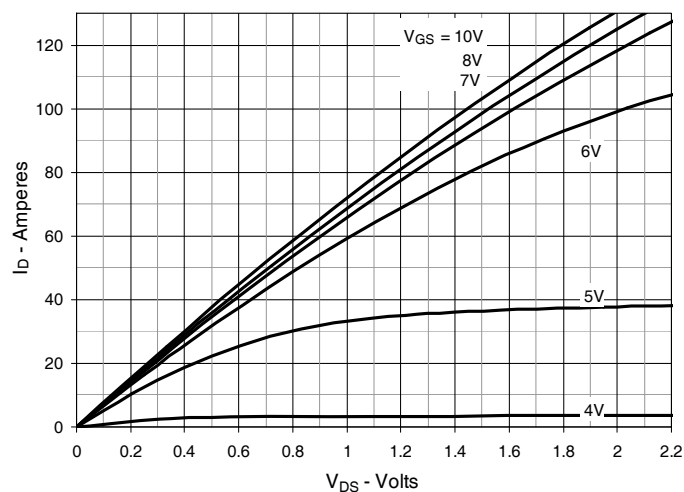
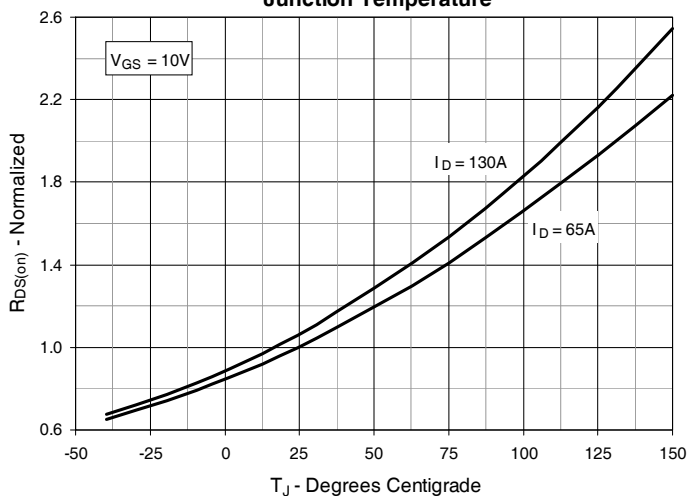
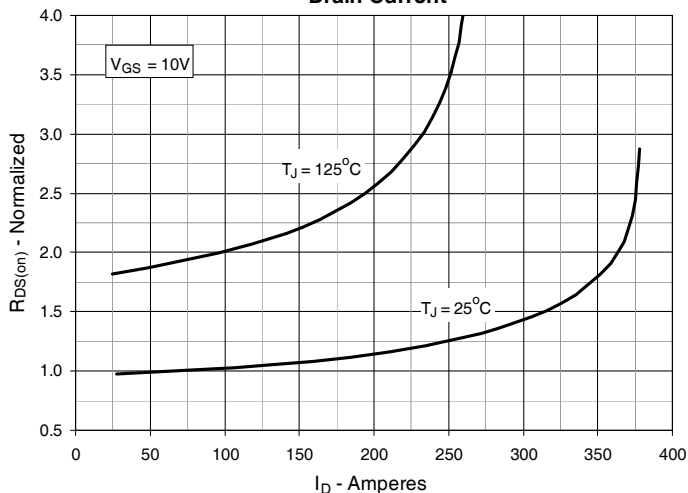
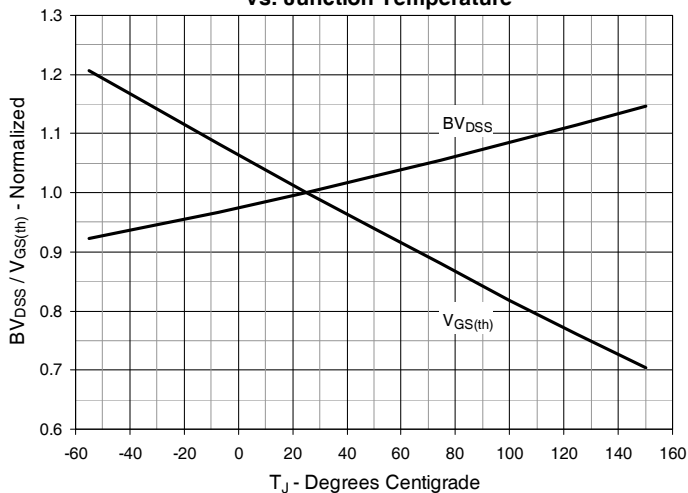
- Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .  
2. On through-hole packages,  $R_{DS(on)}$  Kelvin test contact location must be 5mm or less from the package body.

### ADVANCE TECHNICAL INFORMATION

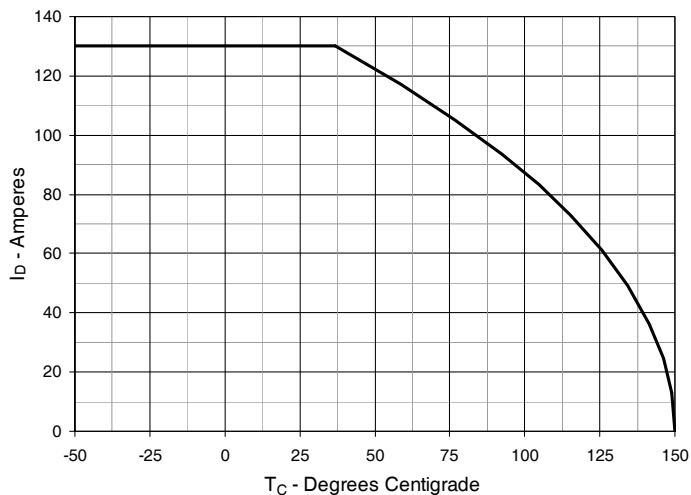
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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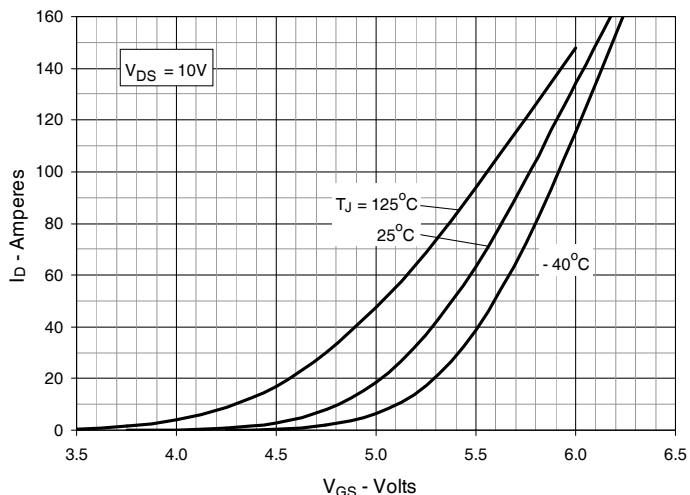
|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 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  $I_D = 65\text{A}$  Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 65\text{A}$  Value vs. Drain Current**

**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**


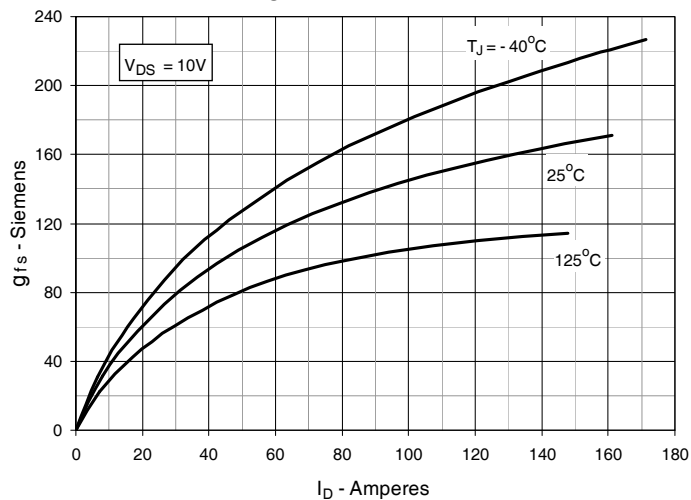
**Fig. 7. Maximum Drain Current vs. Case Temperature**



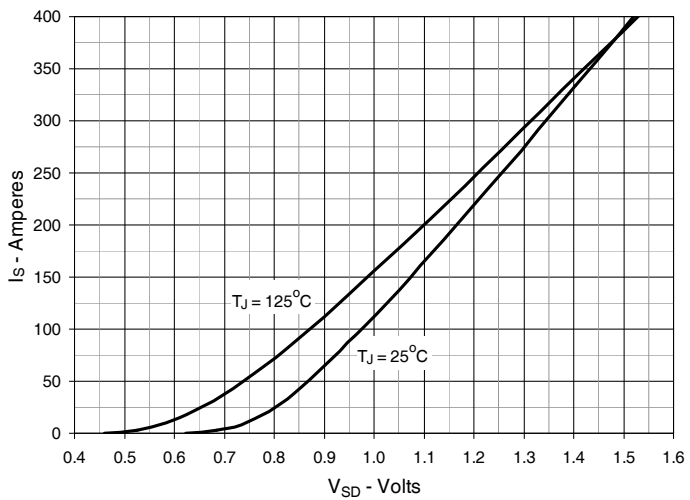
**Fig. 8. Input Admittance**



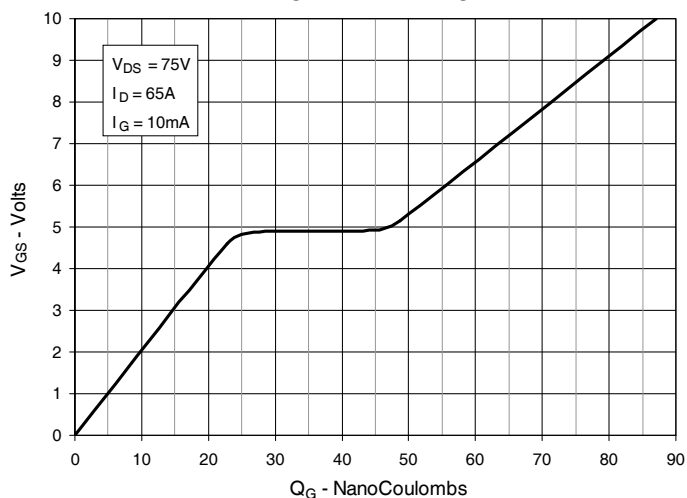
**Fig. 9. Transconductance**



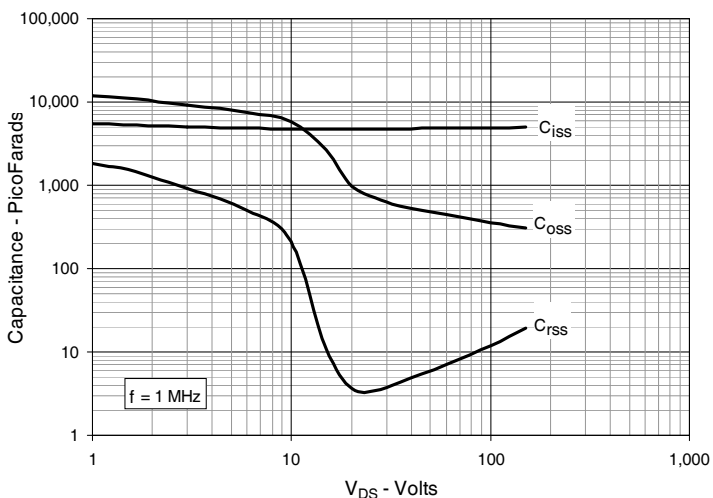
**Fig. 10. Forward Voltage Drop of Intrinsic Diode**



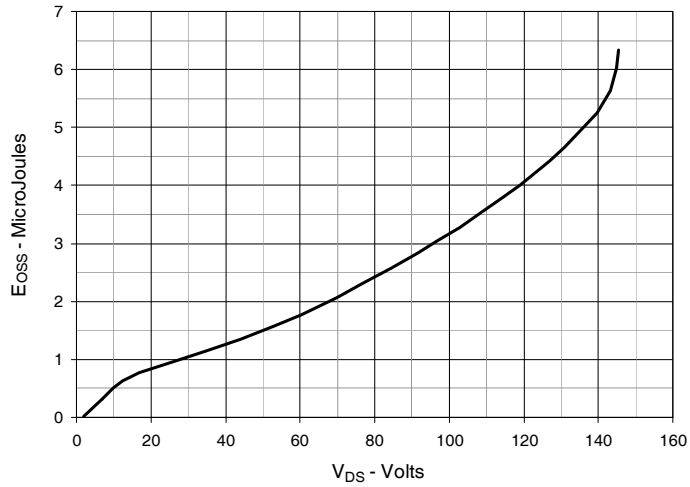
**Fig. 11. Gate Charge**



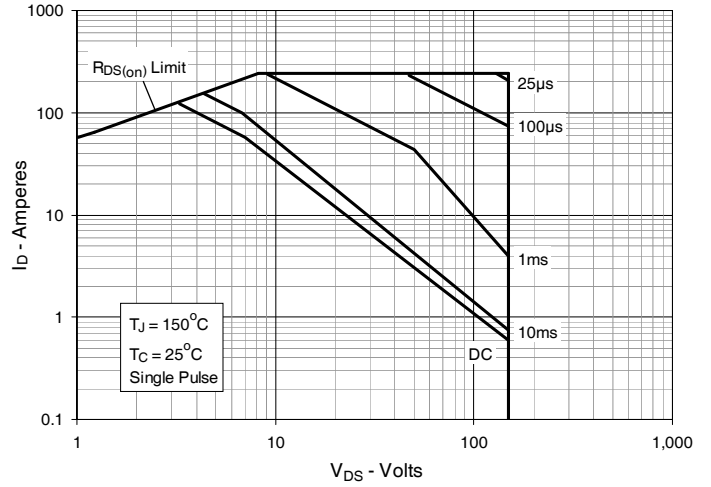
**Fig. 12. Capacitance**



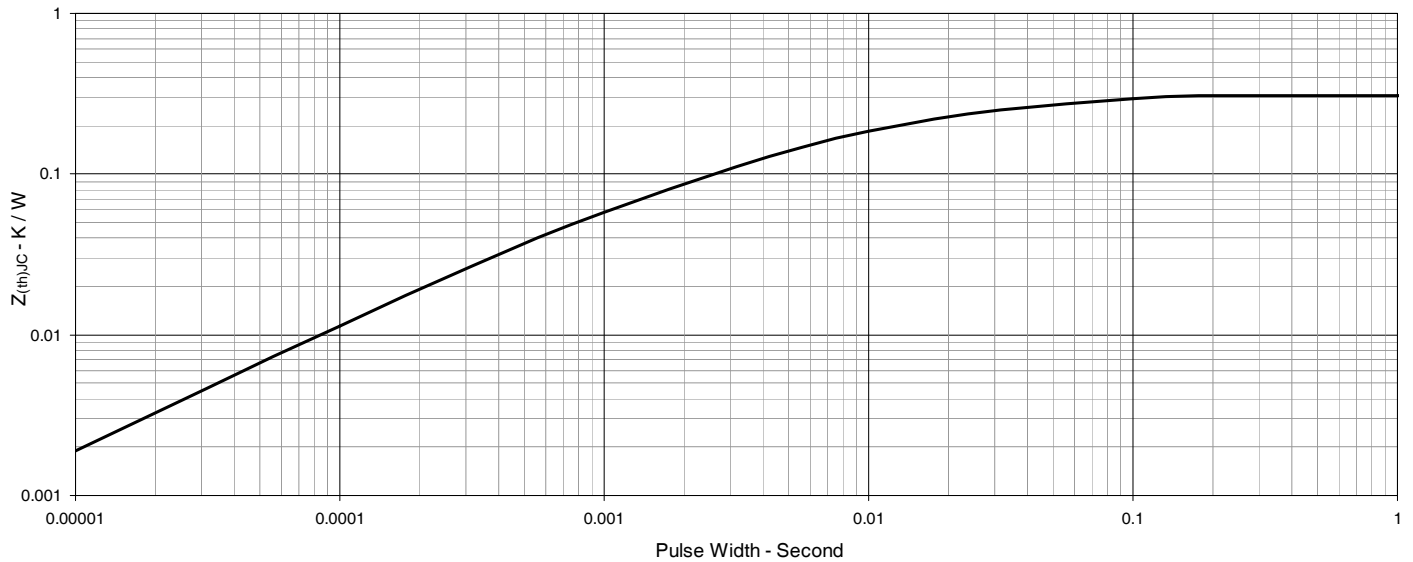
**Fig. 13. Output Capacitance Stored Energy**



**Fig. 14. Forward-Bias Safe Operating Area**



**Fig. 15. Maximum Transient Thermal Impedance**





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