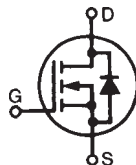


**X2-Class
Power MOSFET**
**IXTK120N65X2
IXTX120N65X2**

$$V_{DSS} = 650V$$

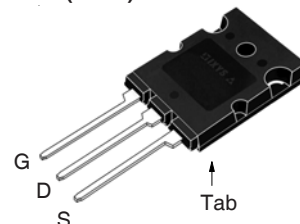
$$I_{D25} = 120A$$

$$R_{DS(on)} \leq 23m\Omega$$

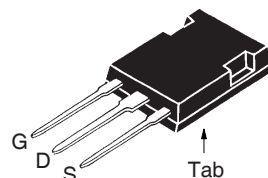
 N-Channel Enhancement Mode
Avalanche Rated


| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|------------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 650 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 650 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ C$ | 120 | A |
| I_{DM} | $T_C = 25^\circ C$, Pulse Width Limited by T_{JM} | 240 | A |
| I_A | $T_C = 25^\circ C$ | 15 | A |
| E_{AS} | $T_C = 25^\circ C$ | 3.5 | J |
| P_D | $T_C = 25^\circ C$ | 1250 | W |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 50 | V/ns |
| 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-264P) | 1.13/10 | Nm/lb.in |
| F_c | Mounting Force (PLUS247) | 20..120 /4.5..27 | N/lb |
| Weight | TO-264P | 10 | g |
| | PLUS247 | 6 | g |

TO-264P (IXTK)



PLUS247 (IXTX)


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

Features

- International Standard Packages
- Low 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 ($T_J = 25^\circ C$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|---------------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 1mA$ | 650 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 1mA$ | 3.0 | | 5.0 V |
| I_{GSS} | $V_{GS} = \pm 30V$, $V_{DS} = 0V$ | | | ± 200 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 25 μA 500 μA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | | | 23 $m\Omega$ |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|-------------------------------------|--|--|------|------------------------|
| | | Min. | Typ. | Max |
| g_{fs} | $V_{DS} = 10\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 66 | 110 | S |
| R_{Gi} | Gate Input Resistance | | 0.77 | Ω |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 13.6 | nF |
| C_{oss} | | | 9500 | pF |
| C_{rss} | | | 8.9 | pF |
| Effective Output Capacitance | | | | |
| $C_{o(er)}$ | Energy related | $V_{GS} = 0\text{V}$ $V_{DS} = 0.8 \cdot V_{DSS}$ | 425 | pF |
| $C_{o(tr)}$ | Time related | | 1960 | pF |
| Resistive Switching Times | | | | |
| $t_{d(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 1\Omega$ (External) | | 32 | ns |
| t_r | | | 24 | ns |
| $t_{d(off)}$ | | | 87 | ns |
| t_f | | | 10 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ | | 230 | nC |
| Q_{gs} | | | 74 | nC |
| Q_{gd} | | | 65 | nC |
| R_{thJC} | | | | 0.10°C/W |
| R_{thCS} | | 0.15 | | $^\circ\text{C/W}$ |

Source-Drain Diode

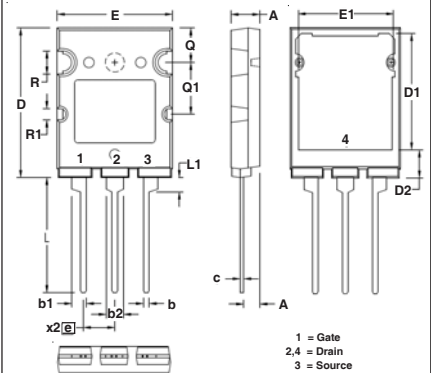
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|---|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{V}$ | | | 120 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 480 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.4 V |
| t_{rr} | $I_F = 60\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$ | | 505 | ns |
| Q_{RM} | | | 15 | μC |
| I_{RM} | | | 58 | A |

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

PRELIMINARY TECHNICAL INFORMATION

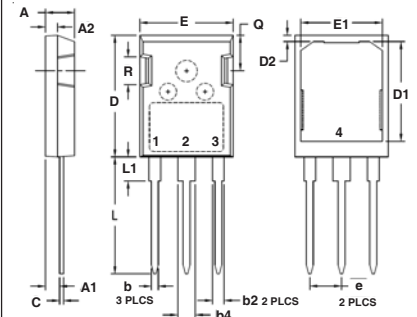
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test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

TO-264P Outline



| SYM | INCHES | | MILLIMETERS | |
|-----------|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.30 |
| A1 | .102 | .118 | 2.60 | 3.00 |
| b | .035 | .049 | 0.90 | 1.25 |
| b1 | .091 | .106 | 2.30 | 2.70 |
| b2 | .110 | .126 | 2.80 | 3.20 |
| c | .020 | .033 | 0.50 | 0.85 |
| D | 1.012 | 1.035 | 25.70 | 26.30 |
| D1 | .783 | .799 | 19.90 | 20.30 |
| D2 | .185 | .205 | 4.70 | 5.20 |
| E | .776 | .799 | 19.70 | 20.30 |
| E1 | .661 | .677 | 16.80 | 17.20 |
| e | .215 BSC | | 5.46 BSC | |
| L | .768 | .807 | 19.50 | 20.50 |
| L1 | .091 | .106 | 2.30 | 2.70 |
| Q | .228 | .244 | 5.80 | 6.20 |
| Q1 | .346 | .362 | 8.80 | 9.20 |
| ϕR | .150 | .165 | 3.80 | 4.20 |
| $\phi R1$ | .071 | .087 | 1.80 | 2.20 |

PLUS247™ Outline



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

| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .190 | .205 | 4.83 | 5.21 |
| A1 | .090 | .100 | 2.29 | 2.54 |
| A2 | .075 | .085 | 1.91 | 2.16 |
| b | .045 | .055 | 1.14 | 1.40 |
| b2 | .075 | .087 | 1.91 | 2.20 |
| b4 | .115 | .126 | 2.92 | 3.20 |
| C | .024 | .031 | 0.61 | 0.80 |
| D | .819 | .840 | 20.80 | 21.34 |
| D1 | .650 | .690 | 16.51 | 17.53 |
| D2 | .035 | .050 | 0.89 | 1.27 |
| E | .620 | .635 | 15.75 | 16.13 |
| E1 | .520 | .560 | 13.08 | 14.22 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .810 | 19.81 | 20.57 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |

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

IXYS MOSFETs and IGBTs are covered 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
by one or more of the following U.S. patents: 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 @ $T_J = 25^\circ\text{C}$

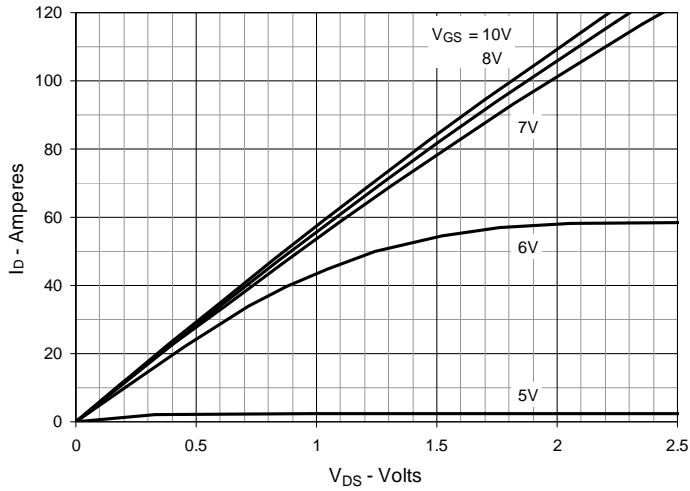


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

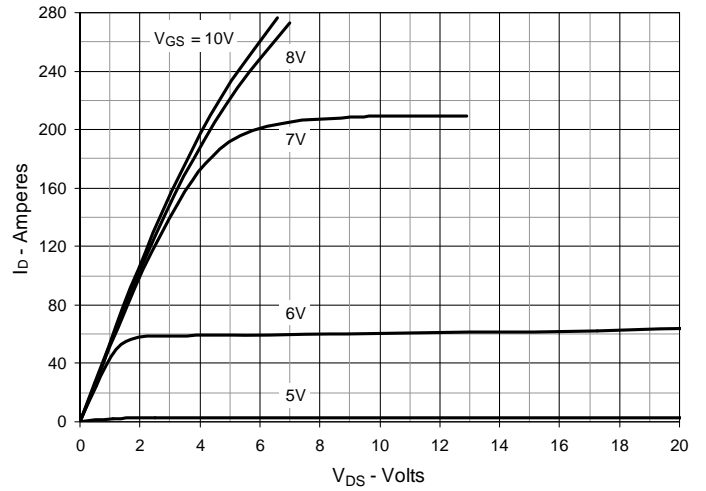


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

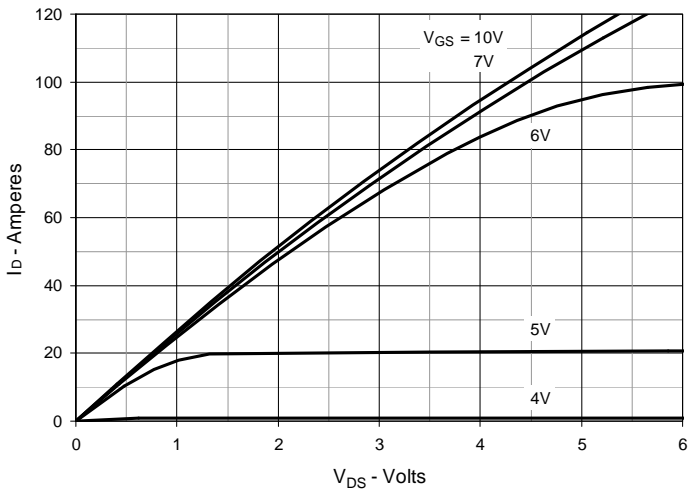


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 60\text{A}$ Value vs. Junction Temperature

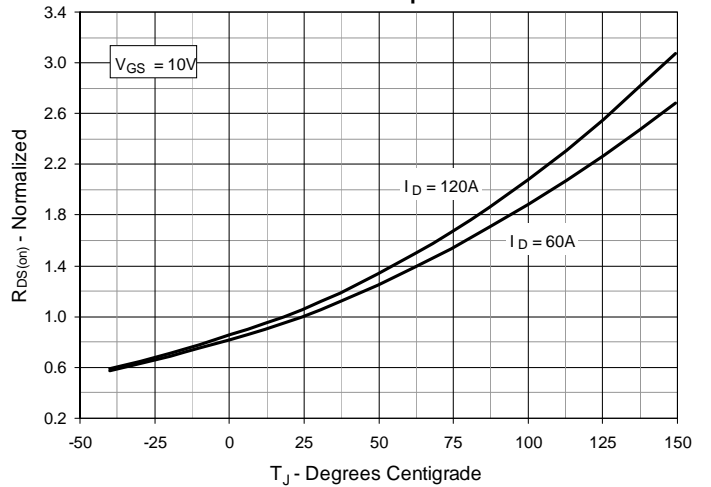


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 60\text{A}$ Value vs. Drain Current

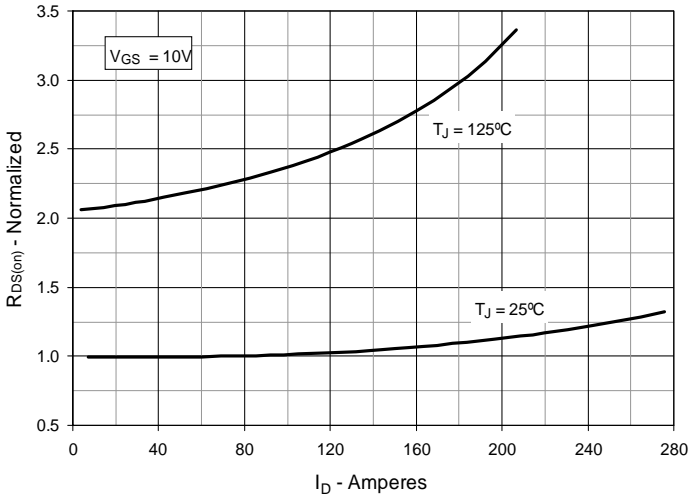


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

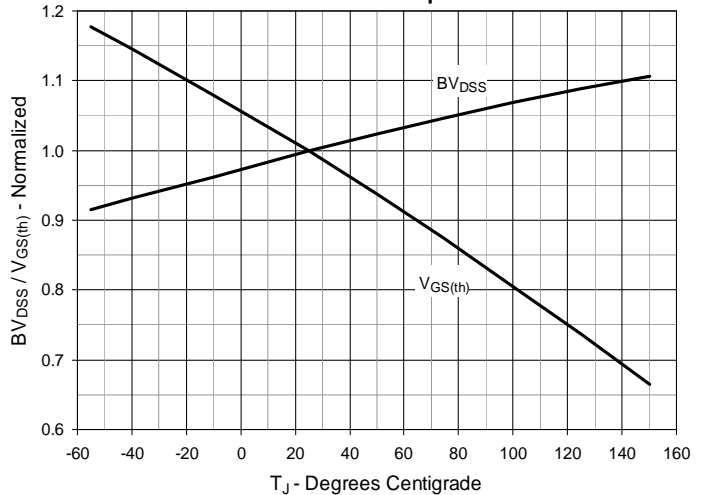


Fig. 7. Maximum Drain Current vs. Case Temperature

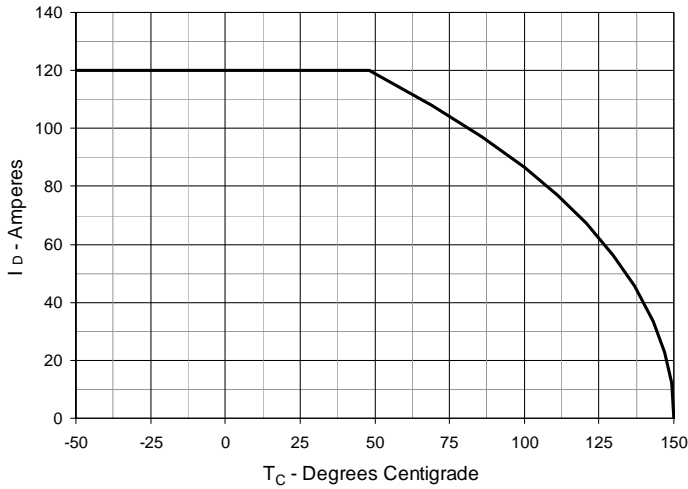


Fig. 8. Input Admittance

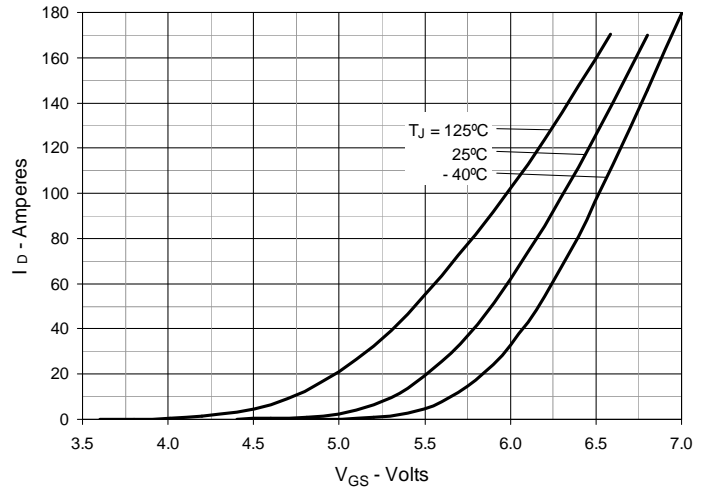


Fig. 9. Transconductance

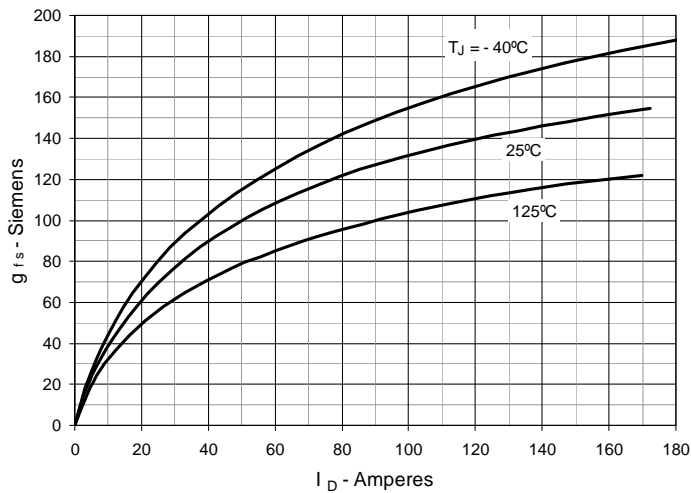


Fig. 10. Forward Voltage Drop of Intrinsic Diode

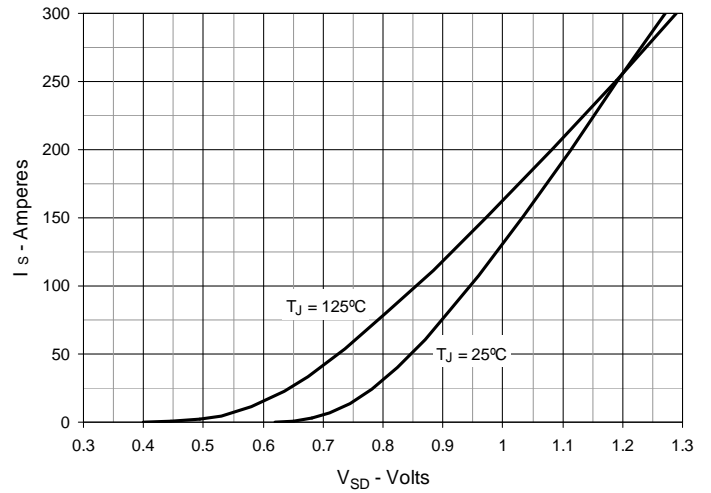


Fig. 11. Gate Charge

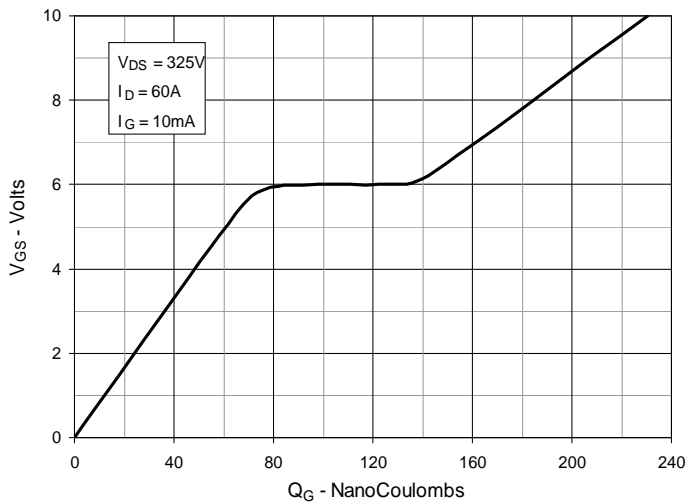


Fig. 12. Capacitance

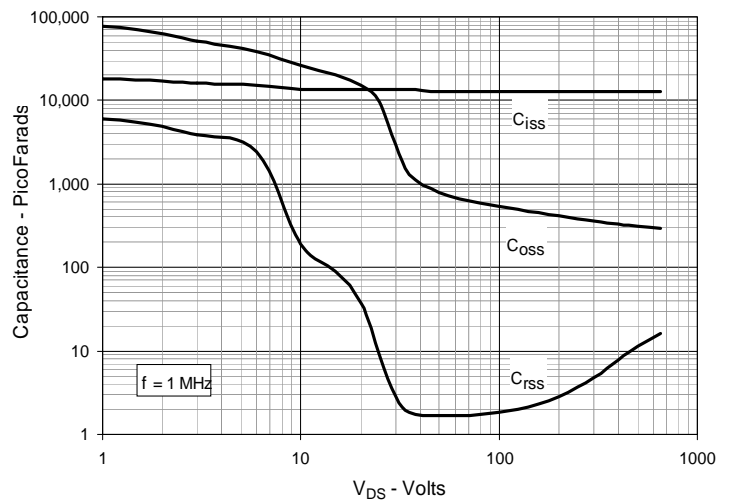


Fig. 13. Output Capacitance Stored Energy

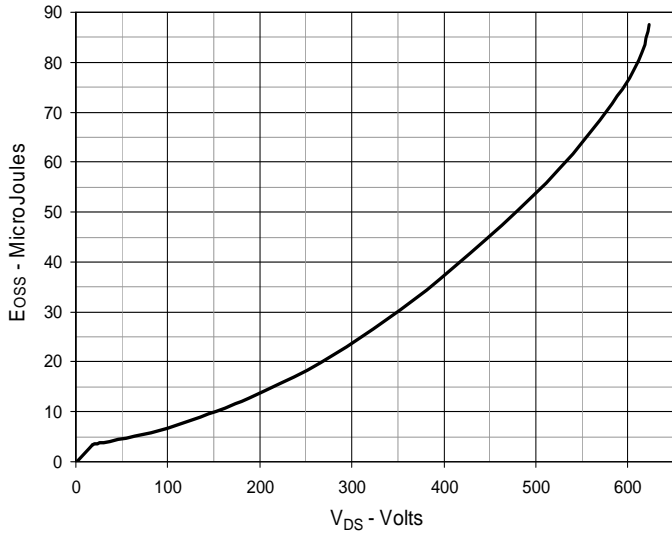


Fig. 14. Forward-Bias Safe Operating Area

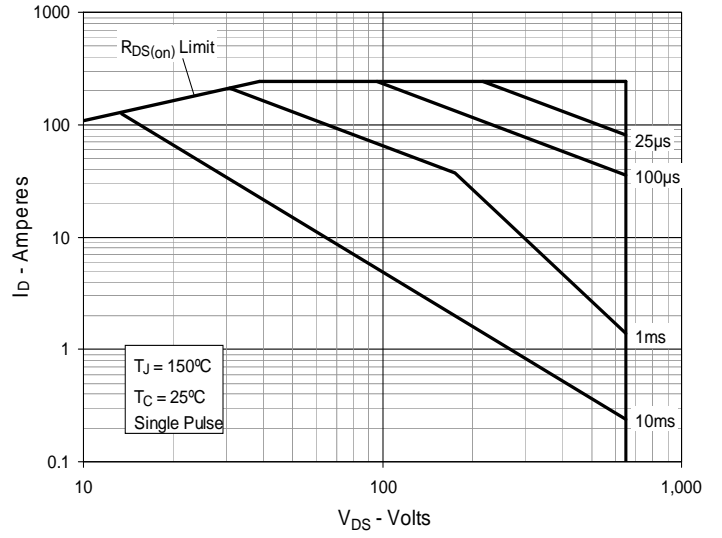


Fig. 15. Maximum Transient Thermal Impedance

