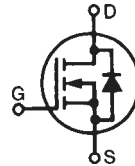


Polar™ HiPerFET™
Power MOSFETs

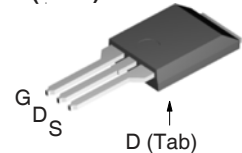
IXFH12N100P
IXFV12N100P
IXFV12N100PS

$V_{DSS} = 1000V$
 $I_{D25} = 12A$
 $R_{DS(on)} \leq 1.05\Omega$
 $t_{rr} \leq 300ns$

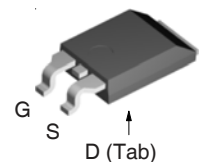
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Rectifier



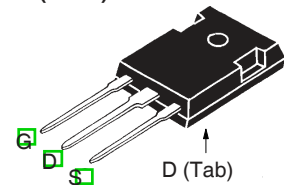
PLUS220 (IXFV)



PLUS220SMD (IXFV_S)



TO-247 (IXFH)



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

| Symbol | Test Conditions | Maximum Ratings | |
|---------------|--|------------------|------------|
| V_{DSS} | $T_J = 25^\circ C$ to $150^\circ C$ | 1000 | V |
| V_{DGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$ | 1000 | V |
| V_{GSS} | Continuous | ± 30 | V |
| V_{GSM} | Transient | ± 40 | V |
| I_{D25} | $T_C = 25^\circ C$ | 12 | A |
| I_{DM} | $T_C = 25^\circ C$, Pulse Width Limited by T_{JM} | 24 | A |
| I_{AR} | $T_C = 25^\circ C$ | 6 | A |
| E_{AS} | $T_C = 25^\circ C$ | 750 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$ | 15 | V/ns |
| P_D | $T_C = 25^\circ C$ | 463 | 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-247) | 1.13/10 | Nm/lb.in. |
| F_C | Mounting Force (PLUS220) | 11..65/2.5..14.6 | N/lb. |
| Weight | TO-247 | 6 | g |
| | PLUS220 types | 4 | g |

Features

- Low $R_{DS(on)}$ and Q_G
- Avalanche Rated
- Low Package Inductance
- Fast Intrinsic Rectifier

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

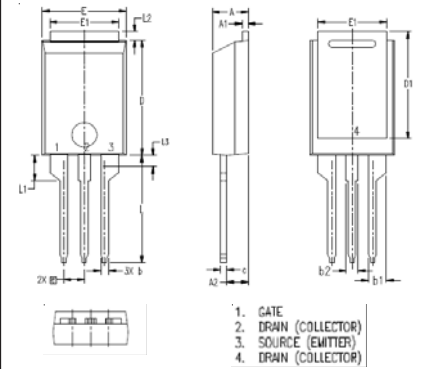
| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0V$, $I_D = 1mA$ | 1000 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 1mA$ | 3.5 | | 6.5 V |
| I_{GSS} | $V_{GS} = \pm 30V$, $V_{DS} = 0V$ | | | ± 100 nA |
| I_{DSS} | $V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ C$ | | | 20 μA 1.0 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | | | 1.05 Ω |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|--|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 20\text{V}, I_D = 0.5 \cdot I_{D25}$, Note 1 | 4.8 | 8.8 | S |
| R_{Gi} | Gate Input Resistance | | 1.9 | Ω |
| C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$ | | 4080 | pF |
| C_{oss} | | | 246 | pF |
| C_{rss} | | | 40 | pF |
| $t_{d(on)}$ | Resistive Switching Times $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 2\Omega$ (External) | | 30 | ns |
| t_r | | | 25 | ns |
| $t_{d(off)}$ | | | 60 | ns |
| t_f | | | 36 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ | | 80 | nC |
| Q_{gs} | | | 24 | nC |
| Q_{gd} | | | 35 | nC |
| R_{thJC} | (TO-247&PLUS220) | | | 0.27 $^\circ\text{C/W}$ |
| R_{thCS} | | | 0.25 | $^\circ\text{C/W}$ |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|----------|--|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| I_s | $V_{GS} = 0\text{V}$ | | | 12 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 48 A |
| V_{SD} | $I_F = I_s, V_{GS} = 0\text{V}$, Note 1 | | | 1.5 V |
| t_{rr} | $I_F = 6\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GS} = 0\text{V}$ | | | 300 ns |
| Q_{RM} | | | 0.8 | μC |
| I_{RM} | | | 7.9 | A |

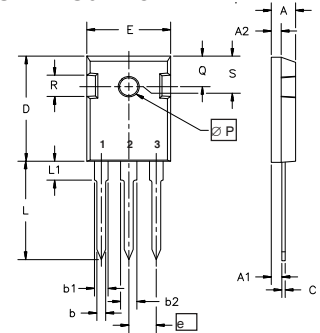
Note 1: Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.

PLUS220 Outline



| SYM | INCHES | | MILLIMETER | |
|-----|-------------------|------|------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .028 | .035 | 0.70 | 0.90 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| b | .035 | .047 | 0.90 | 1.20 |
| b1 | .080 | .095 | 2.03 | 2.41 |
| b2 | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D1 | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .331 | .346 | 8.40 | 8.80 |
| e | .100 BSC 2.54 BSC | | | |
| L | .512 | .551 | 13.00 | 14.00 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| L2 | .035 | .051 | 0.90 | 1.30 |
| L3 | .047 | .059 | 1.20 | 1.50 |

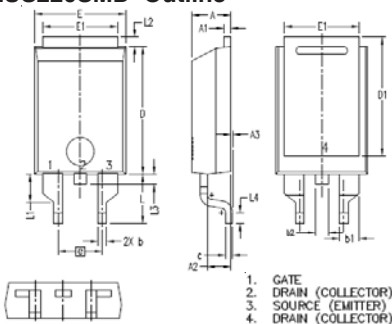
TO-247 Outline



Terminals: 1 - Gate 2 - Drain
3 - Source

| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.7 | 5.3 | .185 | .209 |
| A ₁ | 2.2 | 2.54 | .087 | .102 |
| A ₂ | 2.2 | 2.6 | .059 | .108 |
| b | 1.0 | 1.4 | .040 | .055 |
| b ₁ | 1.65 | 2.13 | .065 | .084 |
| b ₂ | 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 |
| ∅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 |

PLUS220SMD Outline



| SYM | INCHES | | MILLIMETER | |
|-----|-------------------|------|------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .169 | .185 | 4.30 | 4.70 |
| A1 | .028 | .035 | 0.70 | 0.90 |
| A2 | .098 | .118 | 2.50 | 3.00 |
| A3 | .000 | .010 | 0.00 | 0.25 |
| b | .035 | .047 | 0.90 | 1.20 |
| b1 | .080 | .095 | 2.03 | 2.41 |
| b2 | .054 | .064 | 1.37 | 1.63 |
| c | .028 | .035 | 0.70 | 0.90 |
| D | .551 | .591 | 14.00 | 15.00 |
| D1 | .512 | .539 | 13.00 | 13.70 |
| E | .394 | .433 | 10.00 | 11.00 |
| E1 | .331 | .346 | 8.40 | 8.80 |
| e | .200 BSC 5.08 BSC | | | |
| L | .209 | .228 | 5.30 | 5.80 |
| L1 | .118 | .138 | 3.00 | 3.50 |
| L2 | .035 | .051 | 0.90 | 1.30 |
| L3 | .047 | .059 | 1.20 | 1.50 |
| L4 | .039 | .059 | 1.00 | 1.50 |

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 | 7,157,338 B2 |
| | 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 @ $T_J = 25^\circ\text{C}$

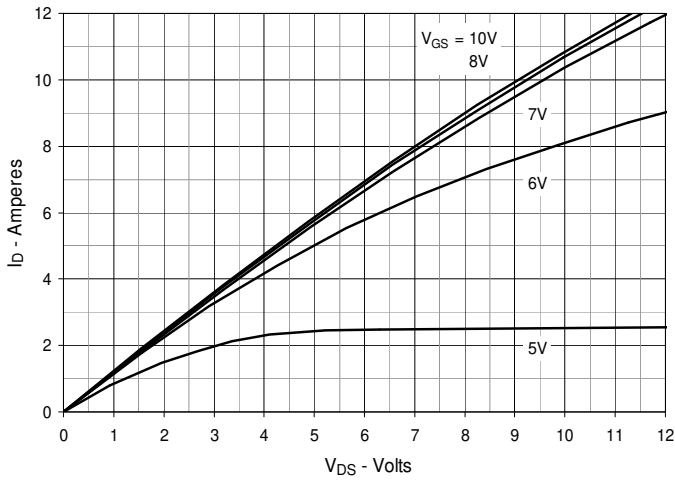


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

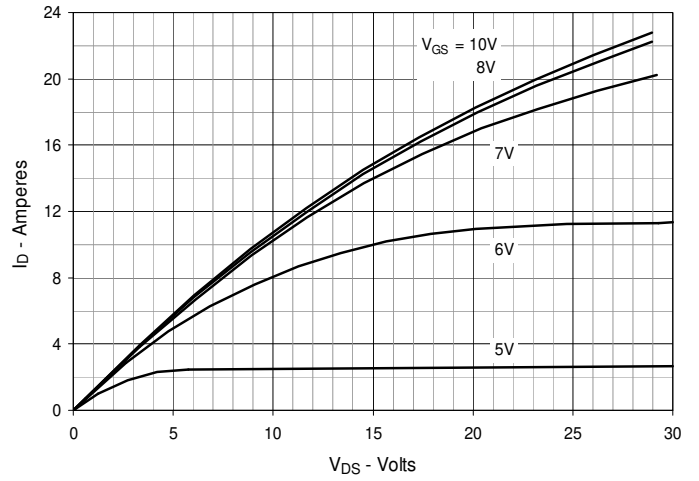


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

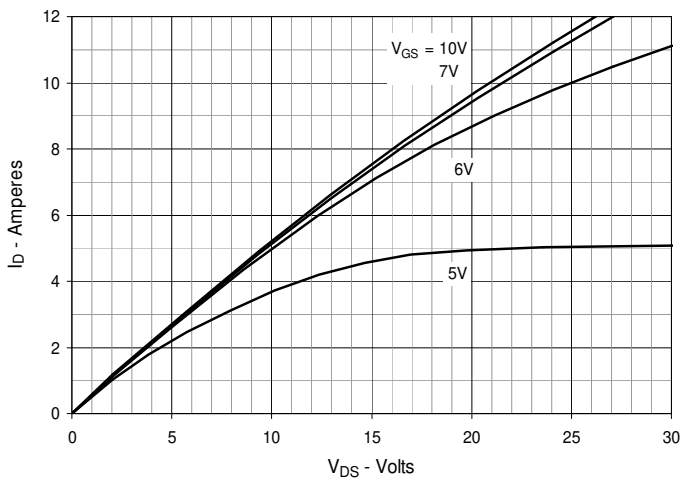


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 6\text{A}$ Value vs. Junction Temperature

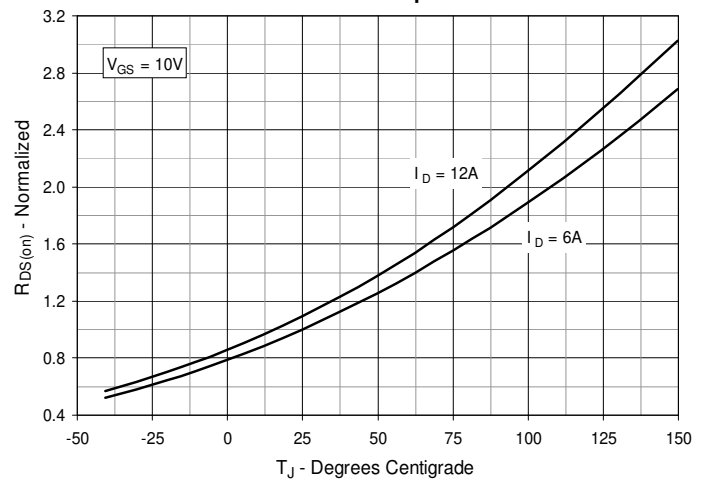


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 6\text{A}$ Value vs. Drain Current

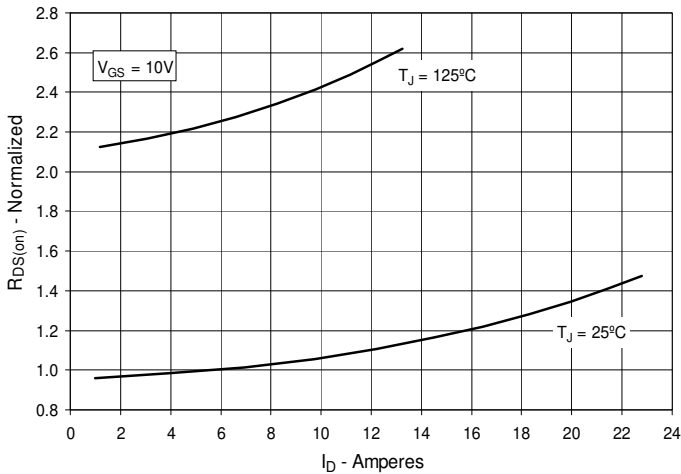


Fig. 6. Maximum Drain Current vs. Case Temperature

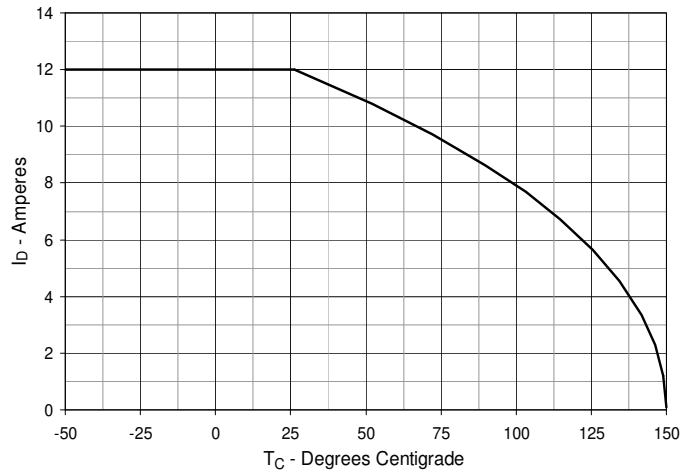


Fig. 7. Input Admittance

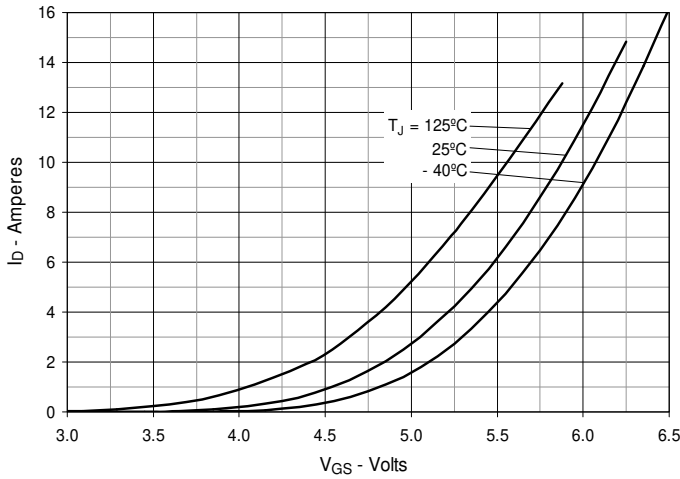


Fig. 8. Transconductance

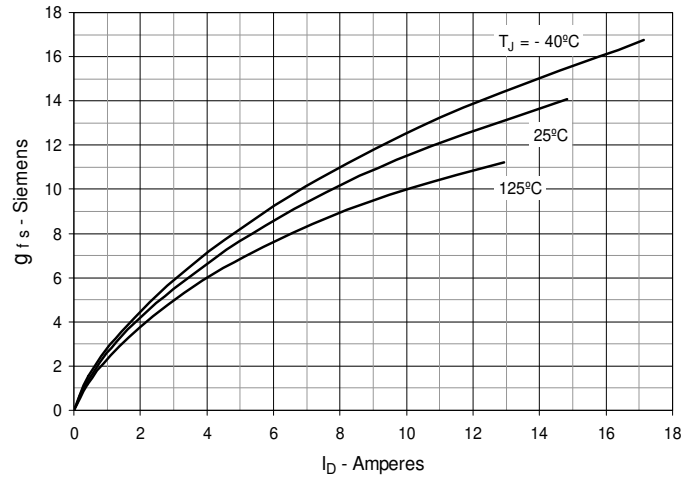


Fig. 9. Forward Voltage Drop of Intrinsic Diode

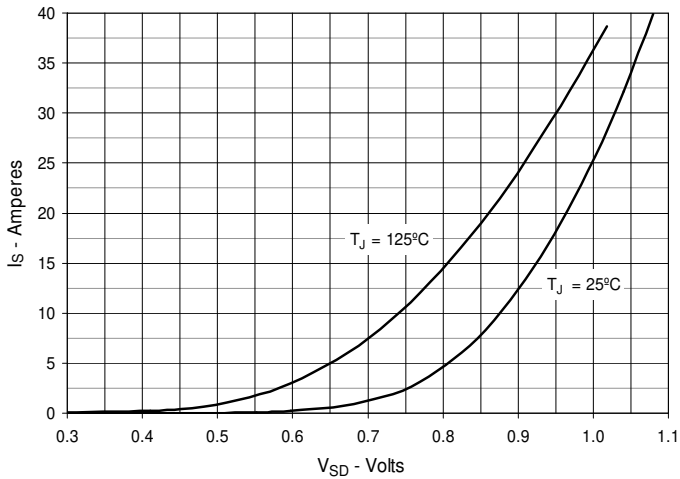


Fig. 10. Gate Charge

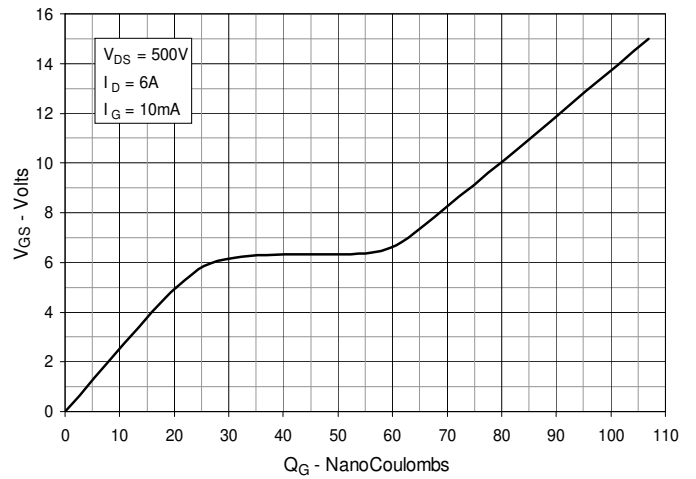


Fig. 11. Capacitance

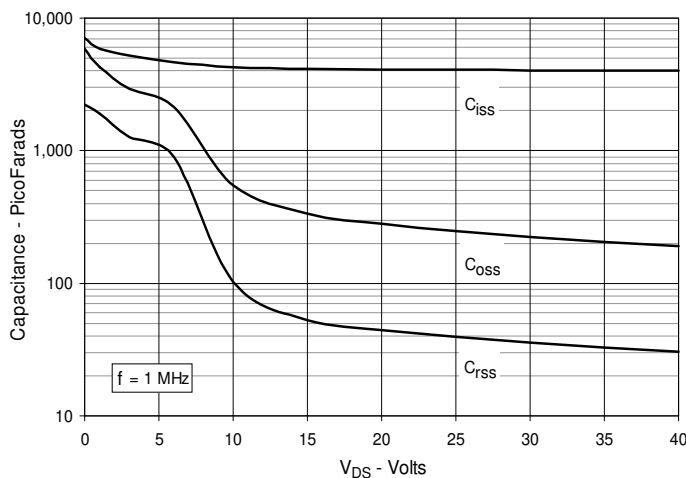
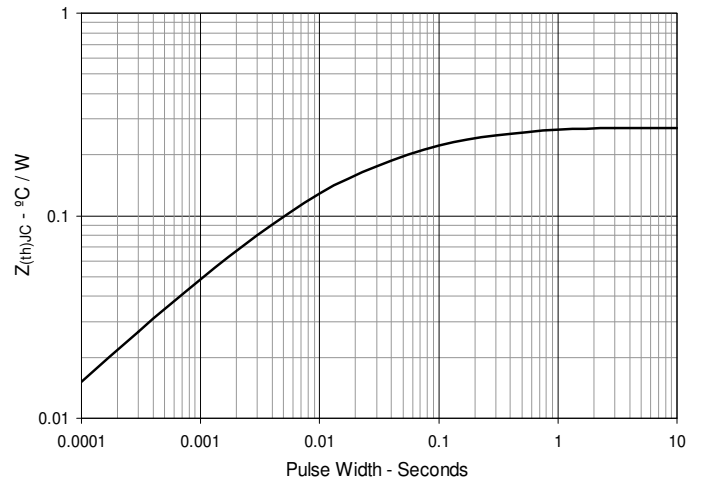


Fig. 12. Maximum Transient Thermal Impedance





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