

PolarHT™ Power MOSFET

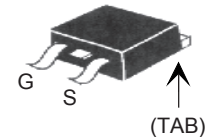
IXTA 75N10P
IXTP 75N10P
IXTQ 75N10P

$V_{DSS} = 100 \text{ V}$
 $I_{D25} = 75 \text{ A}$
 $R_{DS(on)} \leq 25 \text{ m}\Omega$

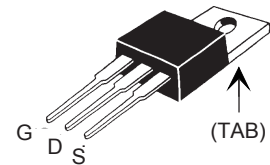
N-Channel Enhancement Mode
Avalanche Rated



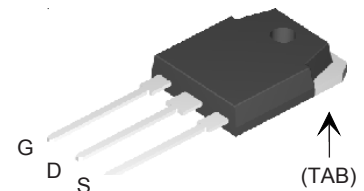
TO-263 (IXTA)



TO-220 (IXTP)



TO-3P (IXTQ)



G = Gate D = Drain
S = Source TAB = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|------------|--|-----------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}$ | 100 | V |
| V_{DGR} | $T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$ | 100 | V |
| V_{GS} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 75 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 200 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 50 | A |
| E_{AR} | $T_C = 25^\circ\text{C}$ | 30 | mJ |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.0 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 10 \Omega$ | 10 | V/ns |
| P_D | $T_C = 25^\circ\text{C}$ | 360 | W |
| T_J | | -55 ... +175 | $^\circ\text{C}$ |
| T_{JM} | | 175 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +175 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.062 in.) from case for 10 s | 300 | $^\circ\text{C}$ |
| T_{SOLD} | Plastic body for 10 s | 260 | $^\circ\text{C}$ |
| M_d | Mounting torque (TO-3P / TO-220) | 1.13/10 | Nm/lb.in. |
| Weight | TO-3P | 5.5 | g |
| | TO-220 | 4 | g |
| | TO-263 | 3 | g |

Features

- † International standard packages
- † Unclamped Inductive Switching (UIS) rated
- † Low package inductance
- easy to drive and to protect

Advantages

- † Easy to mount
- † Space savings
- † High power density

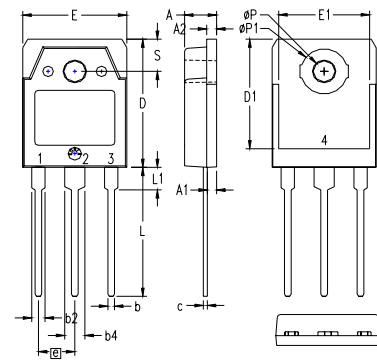
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| BV_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 100 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$ | 3.0 | | 5.5 V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 100 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$ | | | 25 μA |
| | | | | 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \mu\text{s}$, duty cycle $d \leq 2\%$ | 21 | | 25 $\text{m}\Omega$ |

Symbol Test Conditions Characteristic Values
 ($T_J = 25^{\circ}C$, unless otherwise specified)

| | | Min. | Typ. | Max. | |
|--------------|--|------|--------------|------|---------------|
| g_{fs} | $V_{DS} = 10V; I_D = 0.5 I_{D25}$, pulse test | 20 | 28 | | S |
| C_{iss} | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$ | | 2250 | | pF |
| C_{oss} | | | 890 | | pF |
| C_{rss} | | | 275 | | pF |
| $t_{d(on)}$ | $V_{GS} = 10V, V_{DS} = 0.5 V_{DSS}; I_D = 0.5 I_{D25}$ $R_G = 10\Omega$ (External) | | 27 | | ns |
| t_r | | | 53 | | ns |
| $t_{d(off)}$ | | | 66 | | ns |
| t_f | | | 45 | | ns |
| $Q_{g(on)}$ | $V_{GS} = 10V, V_{DS} = 0.5 V_{DSS}; I_D = 0.5 I_{D25}$ | | 74 | | nC |
| Q_{gs} | | | 18 | | nC |
| Q_{gd} | | | 40 | | nC |
| R_{thJC} | (TO-3P) (TO-220) | | | 0.42 | $^{\circ}C/W$ |
| R_{thCK} | | | 0.21 0.25 | | $^{\circ}C/W$ |

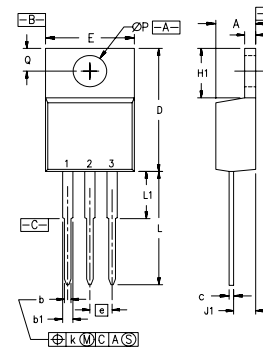
Source-Drain Diode Characteristic Values
 ($T_J = 25^{\circ}C$, unless otherwise specified)

| Symbol | Test Conditions | Min. | Typ. | Max. | |
|----------|---|------|------|------|---------|
| I_s | $V_{GS} = 0V$ | | | 75 | A |
| I_{SM} | Repetitive | | | 200 | A |
| V_{SD} | $I_F = I_S, V_{GS} = 0V$, Pulse test, $t \leq 300\mu s$, duty cycle $d \leq 2\%$ | | | 1.5 | V |
| t_{rr} | $I_F = 25A$ $-di/dt = 100A/\mu s$ | | 120 | | ns |
| Q_{RM} | $V_R = 50V$ | | 2.0 | | μC |

TO-3P (IXTQ) Outline


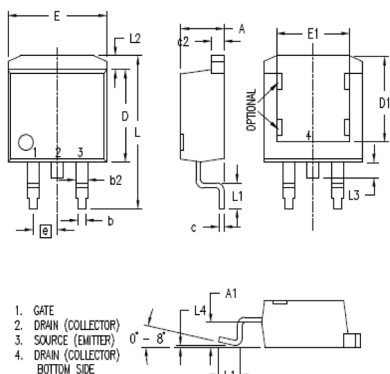
- 1 - GATE
 2 - DRAIN (COLLECTOR)
 3 - SOURCE (EMITTER)
 4 - DRAIN (COLLECTOR)

| 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 |
| ØP | .126 | .134 | 3.20 | 3.40 |
| ØP1 | .272 | .280 | 6.90 | 7.10 |
| S | .193 | .201 | 4.90 | 5.10 |

TO-220 (IXTP) Outline


- Pins: 1 - Gate 2 - Drain
 3 - Source 4 - Drain

| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .170 | .190 | 4.32 | 4.83 |
| b | .025 | .040 | 0.64 | 1.02 |
| b1 | .045 | .065 | 1.15 | 1.65 |
| c | .014 | .022 | 0.35 | 0.56 |
| D | .580 | .630 | 14.73 | 16.00 |
| E | .390 | .420 | 9.91 | 10.66 |
| e | .100 BSC | | 2.54 BSC | |
| F | .045 | .055 | 1.14 | 1.40 |
| H1 | .230 | .270 | 5.85 | 6.85 |
| J1 | .090 | .110 | 2.29 | 2.79 |
| k | 0 | .015 | 0 | 0.38 |
| L | .500 | .550 | 12.70 | 13.97 |
| L1 | .110 | .230 | 2.79 | 5.84 |
| ØP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

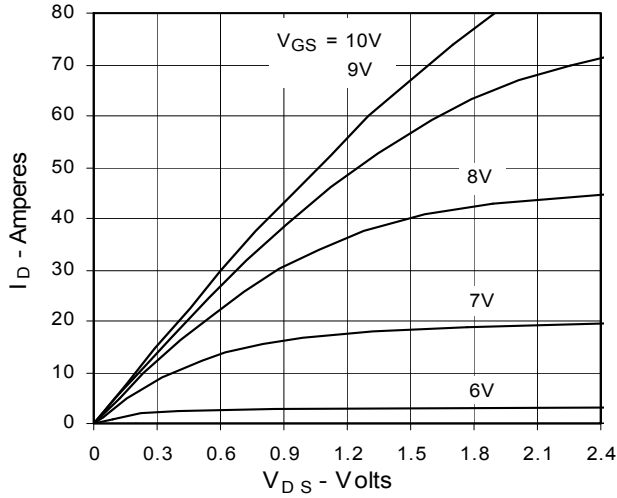
TO-263 (IXTA) Outline


| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .160 | .190 | 4.06 | 4.83 |
| A1 | .080 | .110 | 2.03 | 2.79 |
| b | .020 | .039 | 0.51 | 0.99 |
| b2 | .045 | .055 | 1.14 | 1.40 |
| c | .016 | .029 | 0.40 | 0.74 |
| c2 | .045 | .055 | 1.14 | 1.40 |
| D | .340 | .380 | 8.64 | 9.65 |
| D1 | .315 | .350 | 8.00 | 8.89 |
| E | .380 | .410 | 9.65 | 10.41 |
| E1 | .245 | .320 | 6.22 | 8.13 |
| e | .100 BSC | | 2.54 BSC | |
| L | .575 | .625 | 14.61 | 15.88 |
| L1 | .090 | .110 | 2.29 | 2.79 |
| L2 | .040 | .055 | 1.02 | 1.40 |
| L3 | .050 | .070 | 1.27 | 1.78 |
| L4 | 0 | .005 | 0 | 0.13 |

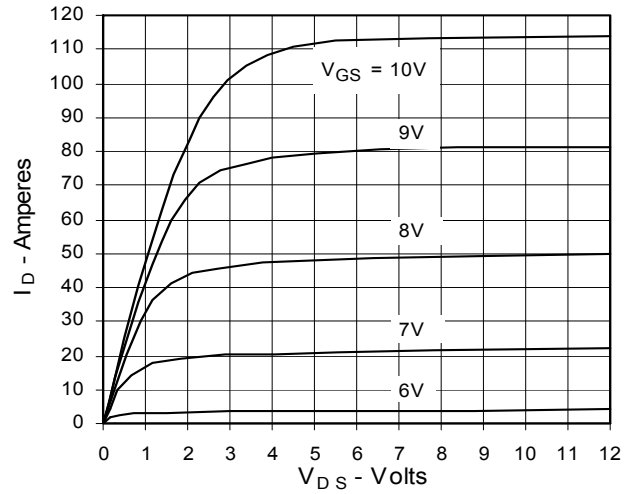
IXYS reserves the right to change limits, test conditions, and dimensions.

| | | | | | | | | |
|--|-----------|-----------|-----------|-----------|--------------|--------------|-------------|--------------|
| IXYS MOSFETs and IGBTs are covered by | 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 |
| one or more of the following U.S. patents: | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343 | 6,710,405B2 | 6,759,692 |
| | 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 |

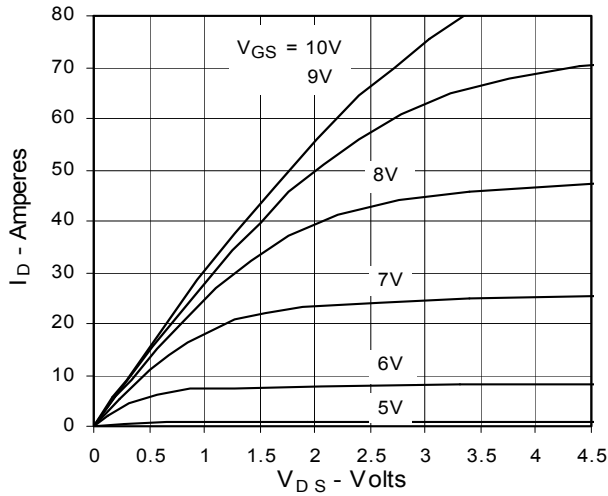
**Fig. 1. Output Characteristics
@ 25°C**



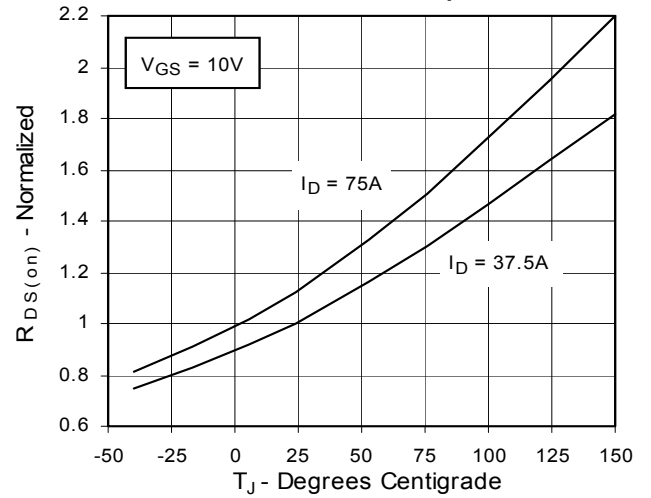
**Fig. 2. Extended Output Characteristics
@ 25°C**



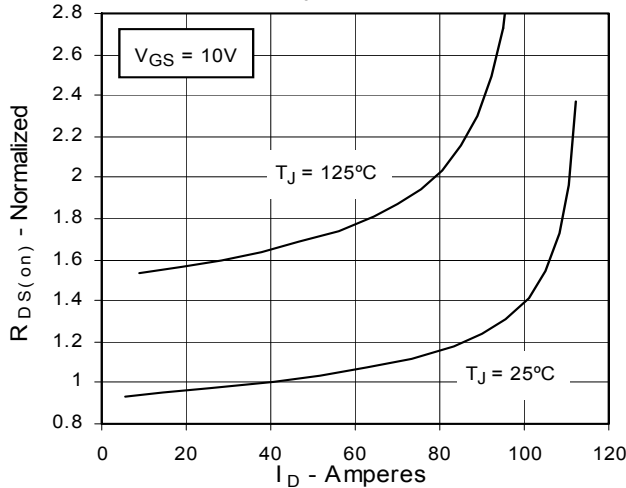
**Fig. 3. Output Characteristics
@ 125°C**



**Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25}
Value vs. Junction Temperature**



**Fig. 5. $R_{DS(on)}$ Normalized to
0.5 I_{D25} Value vs. I_D**



**Fig. 6. Drain Current vs. Case
Temperature**

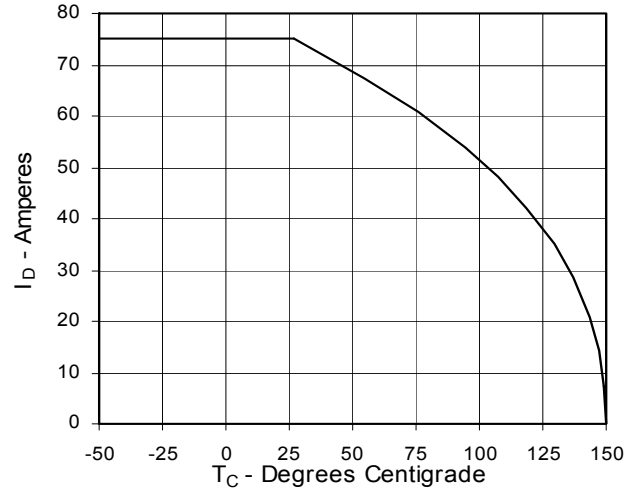


Fig. 7. Input Admittance

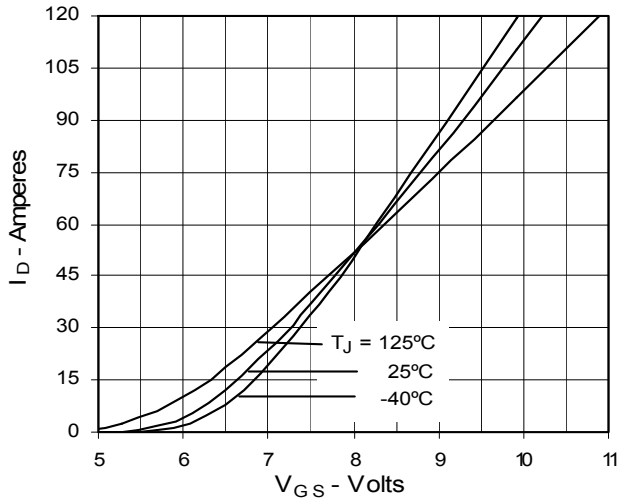


Fig. 8. Transconductance

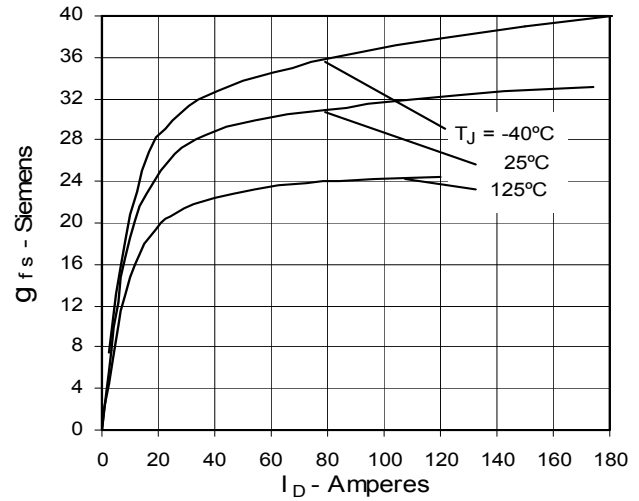


Fig. 9. Source Current vs. Source-To-Drain Voltage

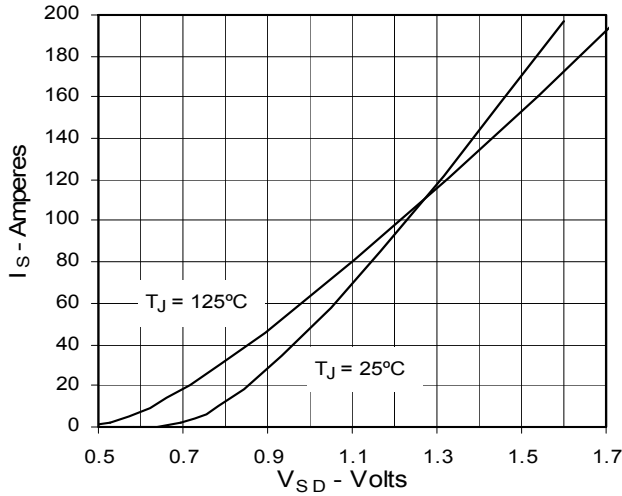


Fig. 10. Gate Charge

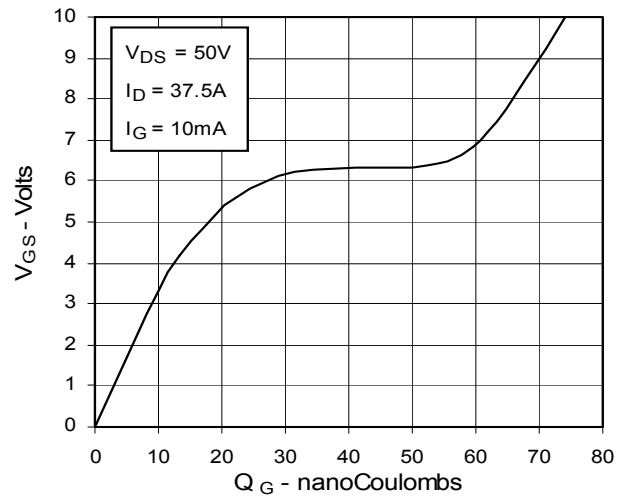


Fig. 11. Capacitance

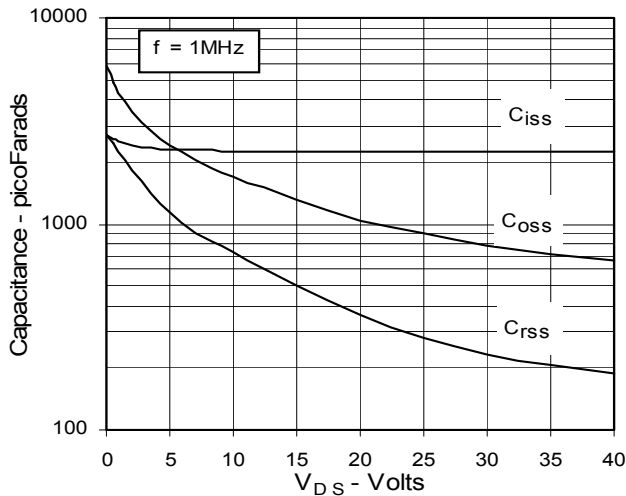


Fig. 12. Forward-Bias Safe Operating Area

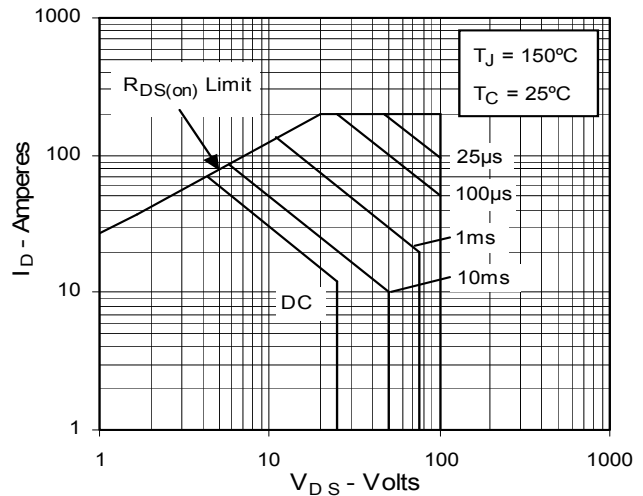
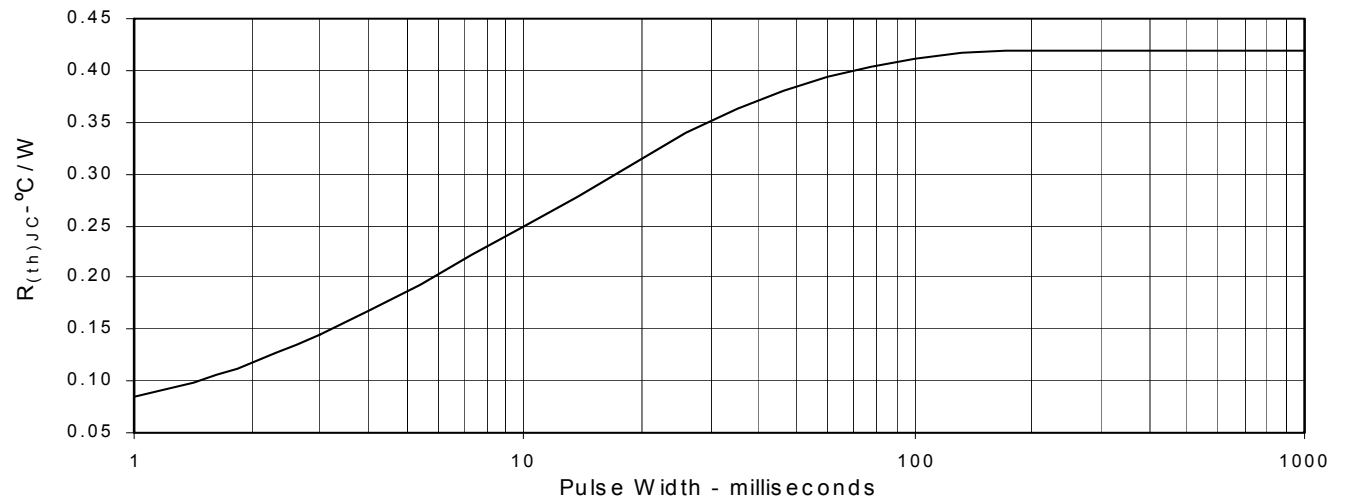


Fig. 13. Maximum Transient Thermal Resistance





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