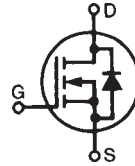


Trench Gate Power MOSFET

IXTQ 160N085T
IXTA 160N085T
IXTP 160N085T

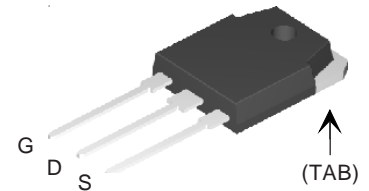
$V_{DSS} = 85 \text{ V}$
 $I_{D25} = 160 \text{ A}$
 $R_{DS(on)} = 6.0 \text{ m}\Omega$

N-Channel Enhancement Mode

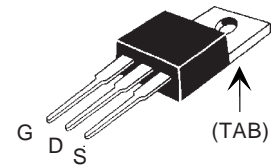


| Symbol | Test Conditions | Maximum Ratings | |
|------------|--|-----------------|--------------------------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 175°C | 85 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 175°C ; $R_{GS} = 1 \text{ M}\Omega$ | 85 | V |
| V_{GSM} | | ± 20 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 160 | A |
| I_{DRMS} | External lead current limit | 75 | A |
| I_{DM} | $T_C = 25^\circ\text{C}$, pulse width limited by T_{JM} | 350 | A |
| I_{AR} | $T_C = 25^\circ\text{C}$ | 75 | A |
| E_{AS} | $T_C = 25^\circ\text{C}$ | 1.0 | J |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 10 \Omega$ | 3 | 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 ... +150 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.062 in.) from case for 10 s Maximum tab temperature for soldering TO-263 package for 10s | 300 260 | $^\circ\text{C}$ $^\circ\text{C}$ |
| 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 |

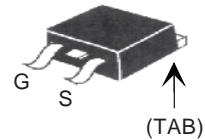
TO-3P (IXTQ)



TO-220 (IXTP)



TO-263 (IXTA)



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

Features

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

Advantages

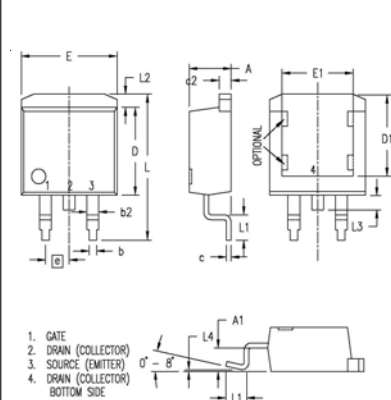
- Easy to mount
- Space savings
- High power density

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| V_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$ | 85 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 1 \text{ mA}$ | 2.0 | | 4.0 V |
| I_{GSS} | $V_{GS} = \pm 20 \text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 200 \text{ nA}$ |
| I_{DSS} | $V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$ | | | 25 μA |
| | | | | 250 μA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$, $I_D = 50 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$, duty cycle $d \leq 2 \%$ | 5.0 | 6.0 | $\text{m}\Omega$ |

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|---|---|------|----------|
| | | Min. | Typ. | Max. |
| g_{fs} | $V_{DS} = 10\text{ V}$; $I_D = 50\text{ A}$, pulse test | 64 | 85 | S |
| C_{iss} | $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | | 6400 | pF |
| C_{oss} | | | 927 | pF |
| C_{rss} | | | 92 | pF |
| $t_{d(on)}$ | $V_{GS} = 10\text{ V}$, $V_{DS} = 60\text{ V}$, $I_D = 35\text{ A}$ $R_G = 5\ \Omega$ (External) | | 37 | ns |
| t_r | | | 61 | ns |
| $t_{d(off)}$ | | | 65 | ns |
| t_f | | | 36 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{ V}$, $V_{DS} = 40\text{ V}$, $I_D = 80\text{ A}$ | | 164 | nC |
| Q_{gs} | | | 48 | nC |
| Q_{gd} | | | 45 | nC |
| R_{thJC} | | | | 0.42 K/W |
| R_{thCK} | (TO-3P) | 0.21 | | K/W |
| | (TO-220) | 0.25 | | K/W |

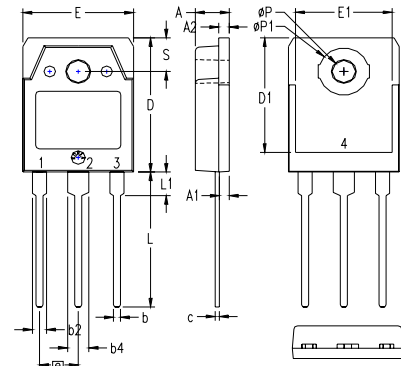
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|----------|--|---|------|---------------|
| | | Min. | Typ. | Max. |
| I_S | $V_{GS} = 0\text{ V}$ | | | 160 A |
| I_{SM} | Repetitive | | | 350 A |
| V_{SD} | $I_F = 50\text{ A}$, $V_{GS} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 1.2 V |
| t_{rr} | $I_F = 25\text{ A}$, $-di/dt = 100\text{ A}/\mu\text{s}$ | | 100 | ns |
| Q_{RM} | $V_R = 25\text{ V}$, $V_{GS} = 0\text{ V}$ | | 0.6 | μC |

TO-263 (IXTA) Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|--------|------|
| | Min. | Max. | Min. | Max. |
| A | 4.06 | 4.83 | .160 | .190 |
| A1 | 2.03 | 2.79 | .080 | .110 |
| b | 0.51 | 0.99 | .020 | .039 |
| b2 | 1.14 | 1.40 | .045 | .055 |
| c | 0.46 | 0.74 | .018 | .029 |
| c2 | 1.14 | 1.40 | .045 | .055 |
| D | 8.64 | 9.65 | .340 | .380 |
| D1 | 7.11 | 8.13 | .280 | .320 |
| E | 9.65 | 10.29 | .380 | .405 |
| E1 | 6.86 | 8.13 | .270 | .320 |
| e | 2.54 | BSC | .100 | BSC |
| L | 14.61 | 15.88 | .575 | .625 |
| L1 | 2.29 | 2.79 | .090 | .110 |
| L2 | 1.02 | 1.40 | .040 | .055 |
| L3 | 1.27 | 1.78 | .050 | .070 |
| L4 | 0 | 0.38 | 0 | .015 |
| R | 0.46 | 0.74 | .018 | .029 |

TO-3P (IXTQ) Outline

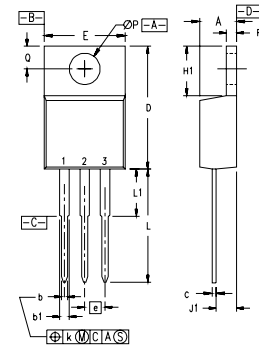


- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - DRAIN (COLLECTOR)

| 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 | .791 | 19.80 | 20.10 |
| 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 |
| ϕP | .126 | .134 | 3.20 | 3.40 |
| $\phi P1$ | .272 | .280 | 6.90 | 7.10 |
| S | .193 | .201 | 4.90 | 5.10 |

All metal area are tin plated.

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 |
| ϕP | .139 | .161 | 3.53 | 4.08 |
| Q | .100 | .125 | 2.54 | 3.18 |

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 |
| | 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 |
| | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505 | 6,710,463 | |

Fig. 1. Output Characteristics @ 25°C

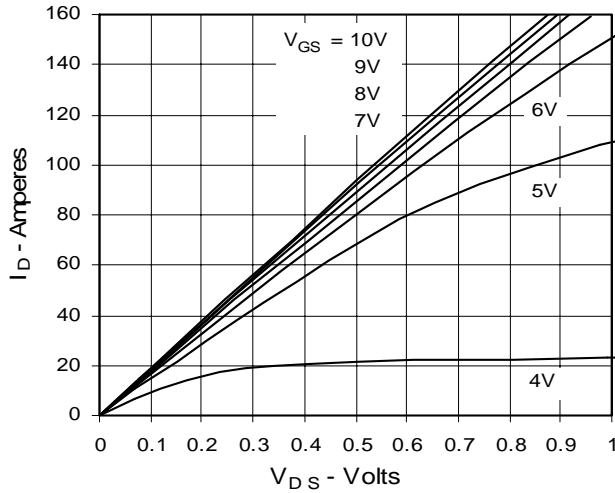


Fig. 2. Extended Output Characteristics @ 25°C

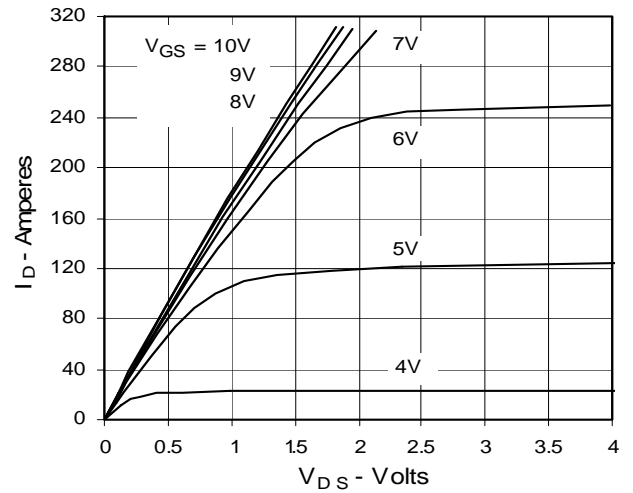


Fig. 3. Output Characteristics @ 150°C

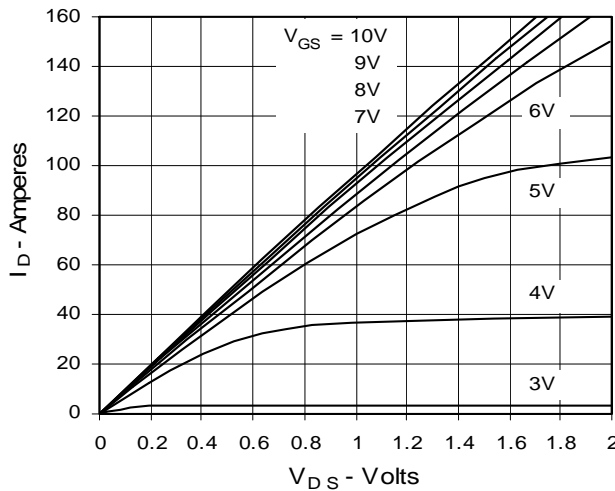


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 50A$ Value vs. Junction Temperature

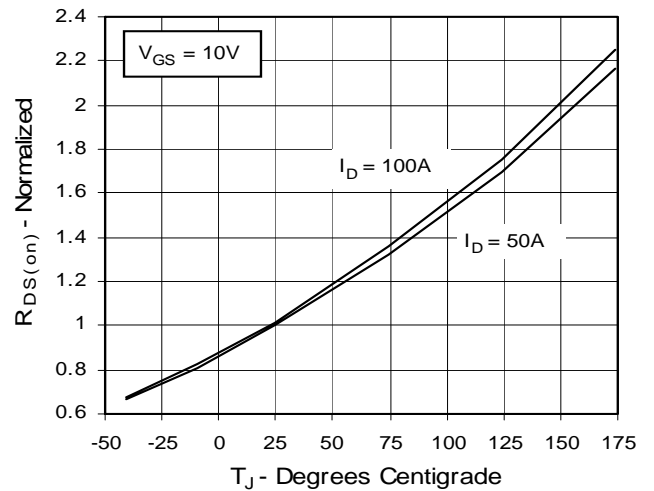


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 50A$ Value vs. Drain Current

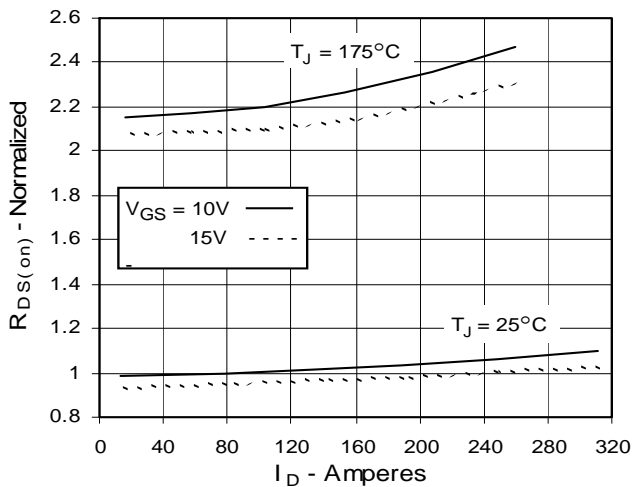


Fig. 6. Drain Current vs. Case Temperature

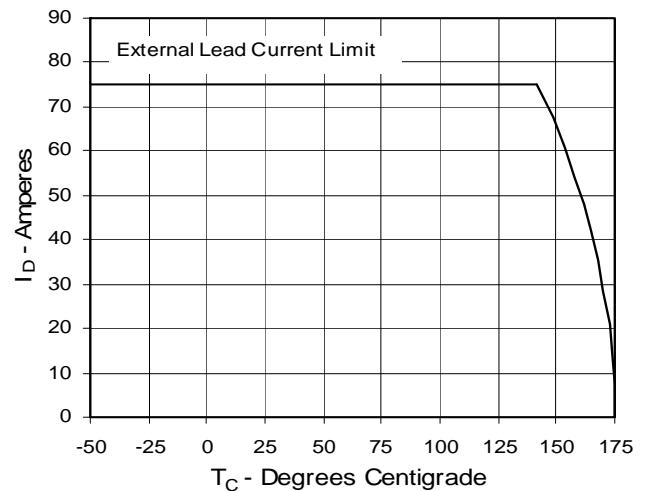


Fig. 7. Input Admittance

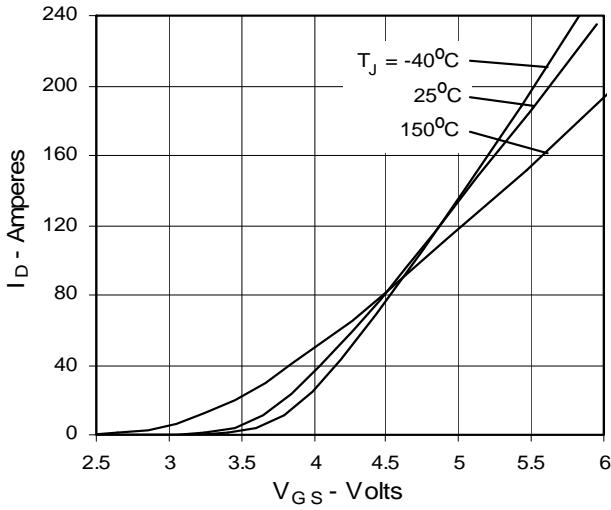


Fig. 8. Transconductance

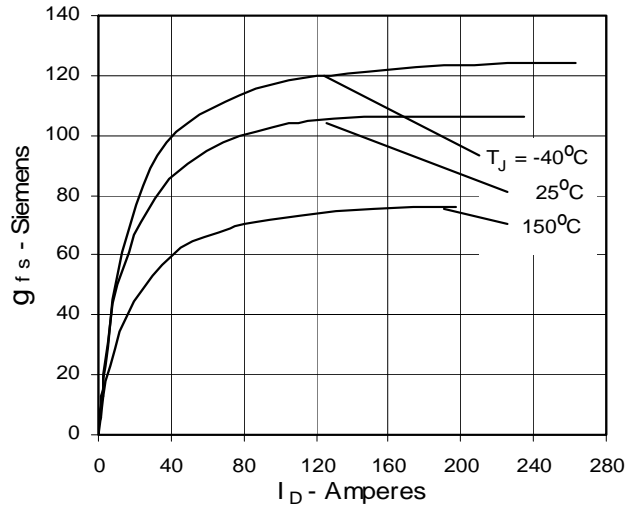


Fig. 9. Source Current vs. Source-To-Drain Voltage

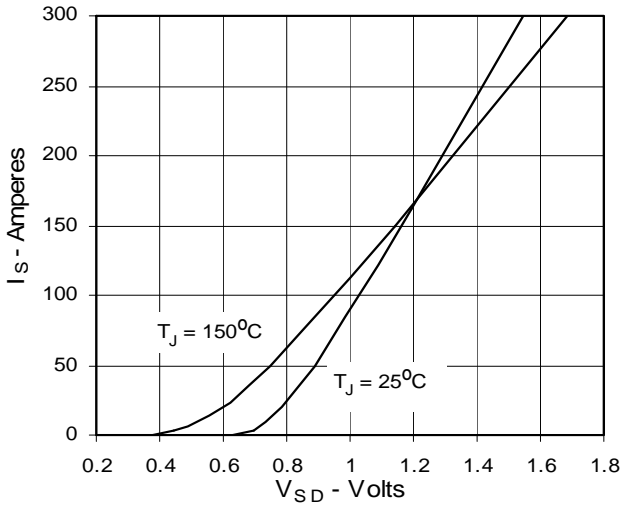


Fig. 10. Gate Charge

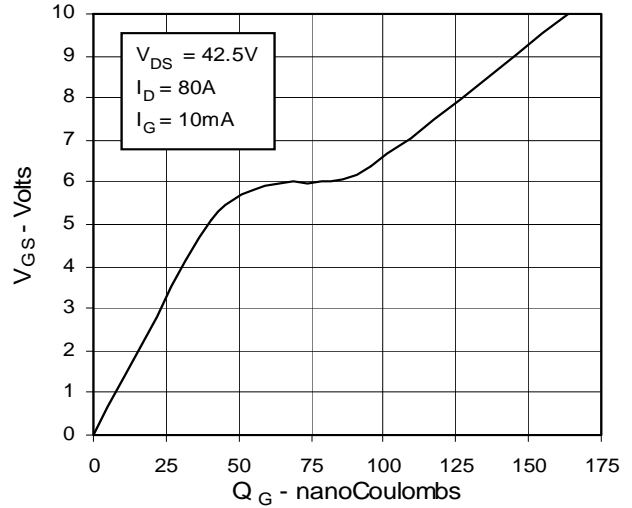


Fig. 11. Capacitance

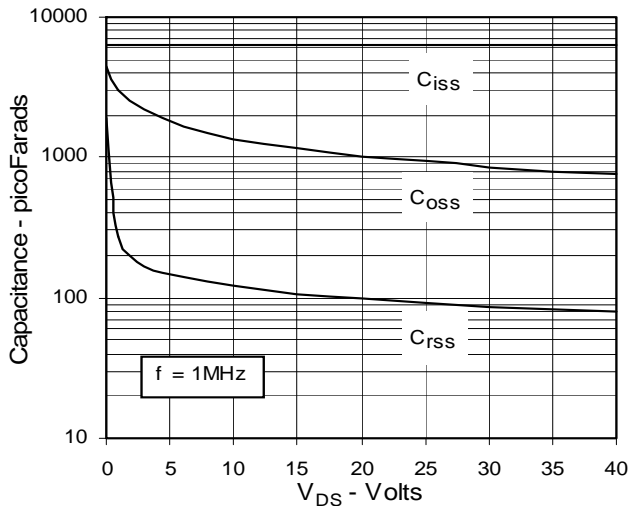


Fig. 12. Forward-Bias Safe Operating Area

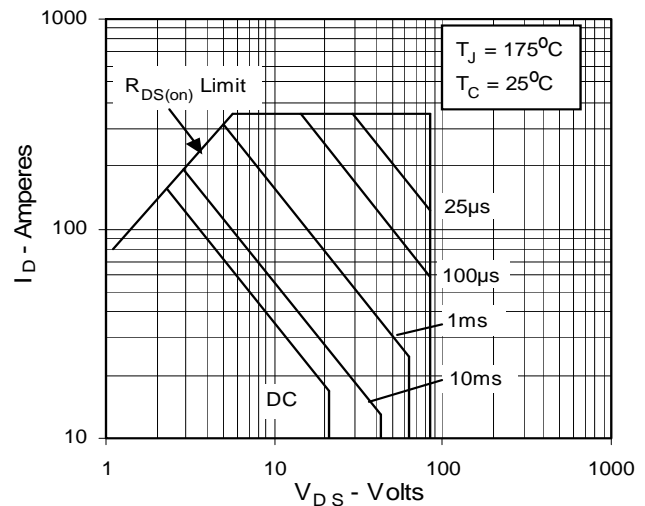


Fig. 13. Maximum Transient Thermal Resistance

