

N-Channel 200-V (D-S) MOSFET

PRODUCT SUMMARY

| | | |
|-------------------|---------------------------|-----------|
| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) |
| 200 | 0.122 at $V_{GS} = 10$ V | 25 |

FEATURES

- DT-Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R_g and UIS tested



RoHS*
COMPLIANT

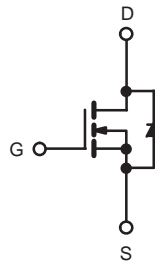
APPLICATIONS

- LCD/LED TV
- Consumer Appliances
- Lighting
- AC-DC Power Supply

D²PAK
(TO-263)



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--|----------------|----------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 200 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current | I_D | $T_C = 25$ °C | 25 ^a |
| | | $T_C = 100$ °C | 18 ^a |
| Pulsed Drain Current | I_{DM} | 100 | A |
| Single Pulse Avalanche Energy | E_{AS} | 365 | mJ |
| Avalanche Current | I_{AR} | 25 | A |
| Repetitive Avalanche Energy | E_{AR} | 14 | mJ |
| Maximum Power Dissipation | P_D | $T_C = 25$ °C | 3.1 ^c |
| | | $T_A = 25$ °C ^b | 130 |
| Peak Diode Recovery dV/dt | dV/dt | 5.0 | V/ns |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to + 175 | °C |
| Soldering Recommendations (Peak Temperature) | for 10 s | 300 | |

THERMAL RESISTANCE RATINGS

| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
|--|------------|------|------|------|
| Maximum Junction-to-Ambient (PCB Mounted, Steady-State) | R_{thJA} | - | 65 | °C/W |
| Maximum Junction-to-Case (Drain) | R_{thJC} | - | 4.98 | |

a. Package limited.

b. When Mounted on 1" square PCB (FR-4 material).

c. See SOA curve for voltage derating.

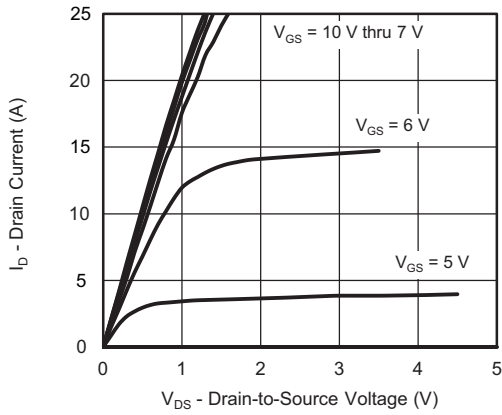
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|--|---------------|--|------|-------|---------------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 200 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 2 | - | 4 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 160\text{ V}, V_{GS} = 0\text{ V}$ | - | - | 1 | μA |
| | | $V_{DS} = 160\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | - | 100 | |
| | | $V_{DS} = 160\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | - | - | 2 | mA |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$ | 25 | - | - | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ | - | 0.122 | 0.145 | Ω |
| | | $V_{GS} = 7.5\text{ V}, I_D = 8\text{ A}$ | - | 0.135 | 0.158 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 20\text{ V}, I_D = 10\text{ A}$ | - | 15 | - | S |
| Dynamic ^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}, f = 1\text{ MHz}$ | - | 2450 | - | pF |
| Output Capacitance | C_{oss} | | 350 | | | |
| Reverse Transfer Capacitance | C_{rss} | | - | 90 | - | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 160\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ | - | 25 | 41 | nC |
| Gate-Source Charge ^c | Q_{gs} | | 4.5 | | | |
| Gate-Drain Charge ^c | Q_{gd} | | 13 | | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | - | 3.9 | - | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 160\text{ V}, R_L = 1.67\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$ | - | 15 | 26 | ns |
| Rise Time ^c | t_r | | 25 | 44 | | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | - | 27 | 54 | |
| Fall Time ^c | t_f | | - | 9 | 20 | |
| Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Pulsed Current ($t = 100\text{ }\mu\text{s}$) | I_{SM} | | - | - | 100 | A |
| Forward Voltage ^a | V_{SD} | $I_F = 20\text{ A}, V_{GS} = 0\text{ V}$ | - | 0.75 | 1.5 | V |
| Reverse Recovery Time | t_{rr} | $I_F = 20\text{ A}, d/dt = 100\text{ A}/\mu\text{s}$ | - | 88 | 176 | ns |
| Peak Reverse Recovery Charge | $I_{RM(REC)}$ | | - | 5 | 10 | A |
| Reverse Recovery Charge | Q_{rr} | | 0.22 | 0.44 | μC | |

Notes

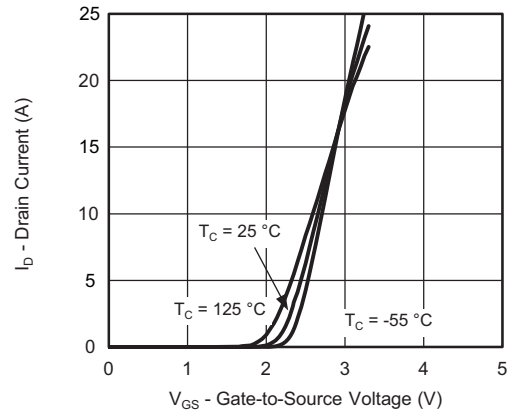
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

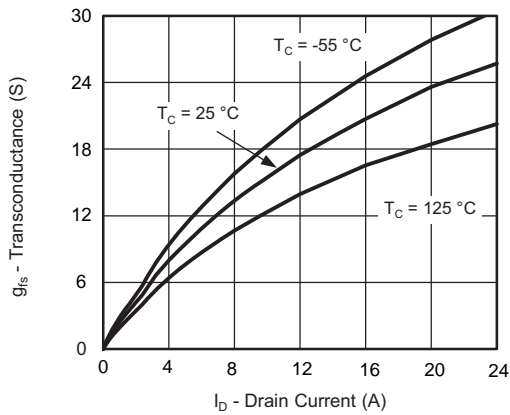
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



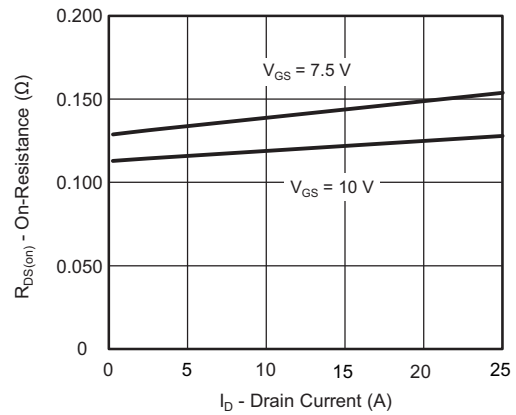
Output Characteristics



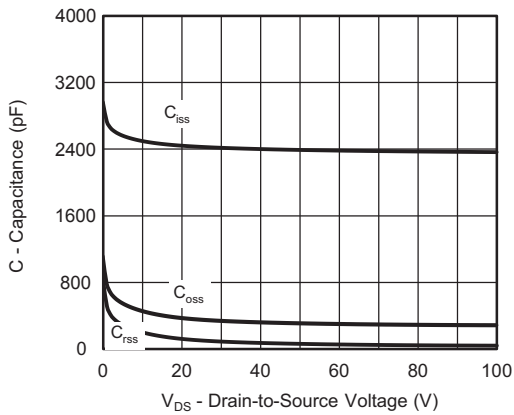
Transfer Characteristics



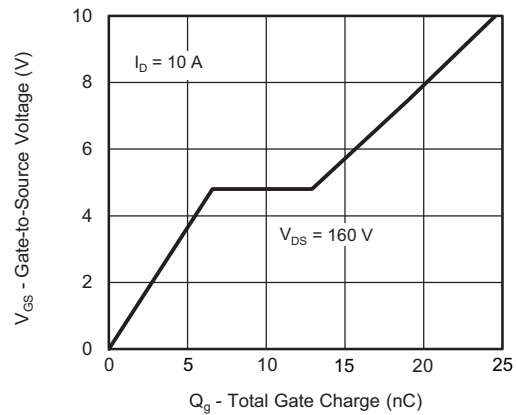
Transconductance



On-Resistance vs. Drain Current

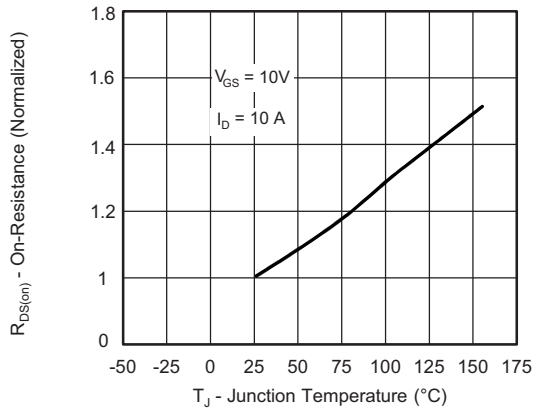


Capacitance

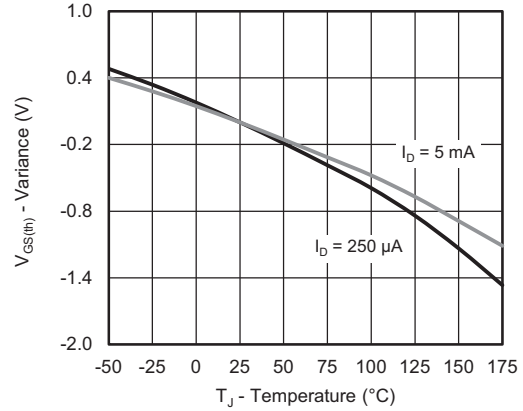


Gate Charge

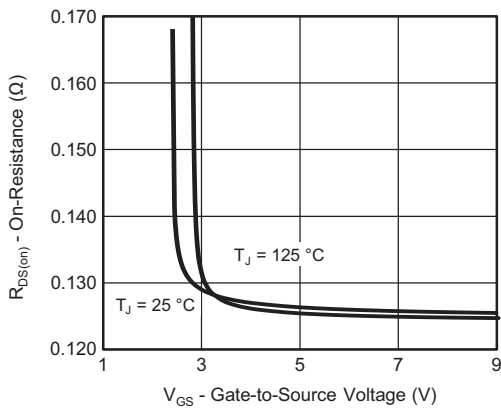
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



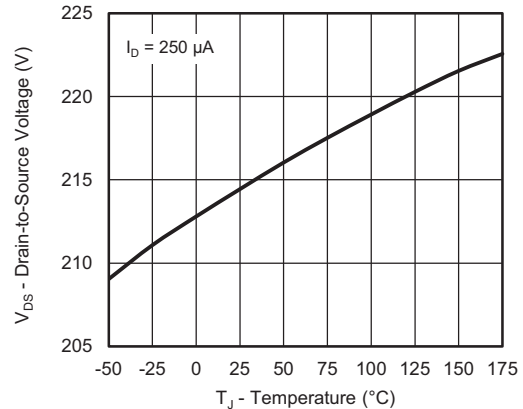
On-Resistance vs. Junction Temperature



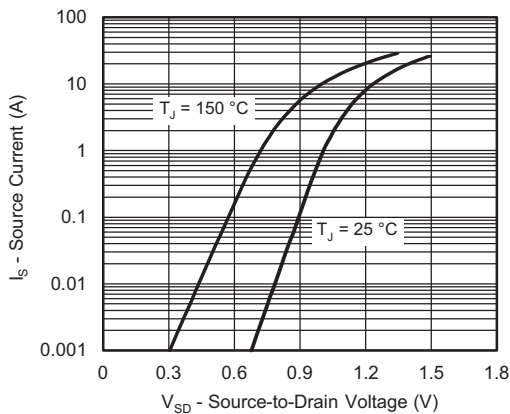
Threshold Voltage



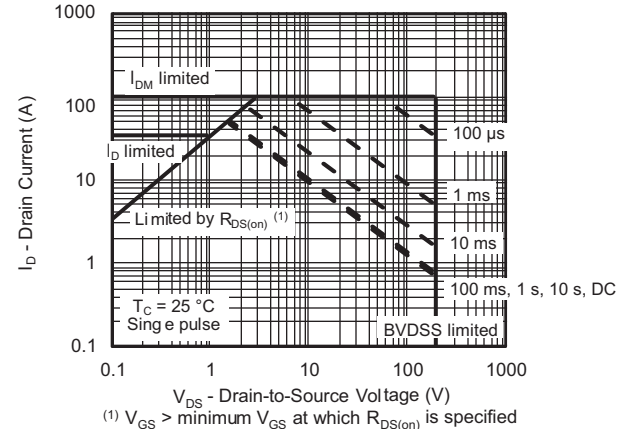
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



Source Drain Diode Forward Voltage



Safe Operating Area

(1) $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

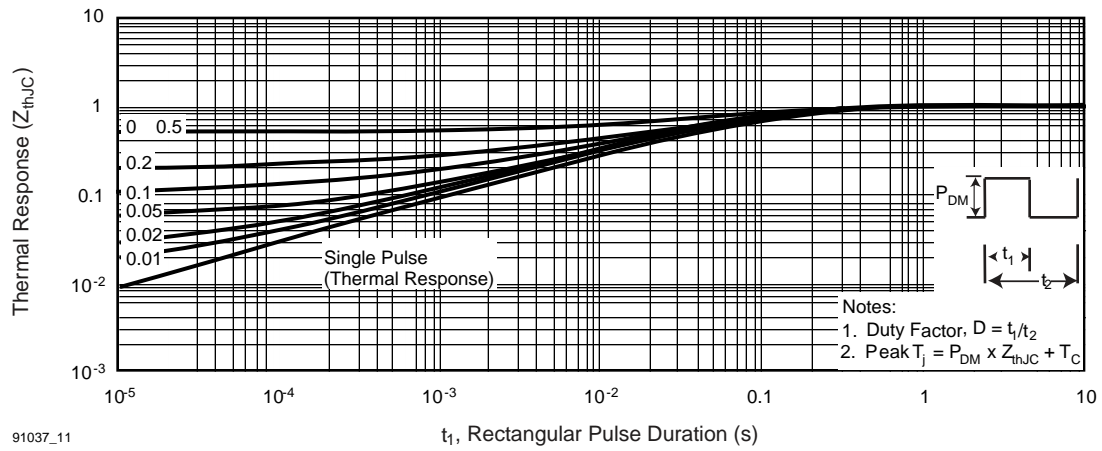


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

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