

RU140N10R-VB Datasheet N-Channel 100 V (D-S) MOSFET

| PRODUCT SUMMARY | |
|---|--------|
| V _{DS} (V) | 100 |
| R _{DS(on)} (Ω) at V _{GS} = 10 V | 0.005 |
| I _D (A) ^a | 120 |
| Configuration | Single |

FEATURES

- ThunderFET® power MOSFET
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see



RoHS
COMPLIANT



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | | |
|---|-------------------------|-----------------------------------|------------------|------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | | V _{DS} | 100 | V |
| Gate-Source Voltage | | V _{GS} | ± 20 | |
| Continuous Drain Current (T _J = 150 °C) | T _C = 25 °C | I _D | 120 ^d | A |
| | T _C = 70 °C | | 90 ^d | |
| Pulsed Drain Current (t = 100 μs) | | I _{DM} | 480 | |
| Avalanche Current | | I _{AS} | 73 | |
| Single Avalanche Energy ^a | L = 0.1 mH | E _{AS} | 266 | mJ |
| Maximum Power Dissipation ^a | T _C = 25 °C | P _D | 370 ^b | W |
| | T _C = 125 °C | | 120 ^b | |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | -55 to +175 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|--|--|-------------------|-------|------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Junction-to-Ambient (PCB Mount) ^c | | R _{thJA} | 40 | °C/W |
| Junction-to-Case (Drain) | | R _{thJC} | 0.4 | |

Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.

| 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} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 100 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 2.5 | - | 4 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | - | - | ± 250 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$ | - | - | 1 | μA |
| | | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | - | 150 | |
| | | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | - | - | 5 | mA |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$ | 120 | - | - | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | - | 0.005 | - | Ω |
| | | $V_{GS} = 7.5\text{ V}, I_D = 15\text{ A}$ | - | 0.006 | - | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$ | - | 82 | - | S |
| Dynamic ^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$ | - | 10000 | - | μF |
| Output Capacitance | C_{oss} | | - | 2025 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 165 | - | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | - | 76 | 120 | nC |
| Gate-Source Charge ^c | Q_{gs} | | - | 23 | - | |
| Gate-Drain Charge ^c | Q_{gd} | | - | 17 | - | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | 0.6 | 3.3 | 6.6 | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 50\text{ V}, R_L = 5\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$ | - | 15 | 30 | ns |
| Rise Time ^c | t_r | | - | 22 | 40 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | - | 55 | 100 | |
| Fall Time ^c | t_f | | - | 15 | 30 | |
| Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Pulsed Current | I_{SM} | | - | - | 480 | A |
| Forward Voltage ^a | V_{SD} | $I_F = 10\text{ A}, V_{GS} = 0\text{ V}$ | - | 0.8 | 1.5 | V |

Notes

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

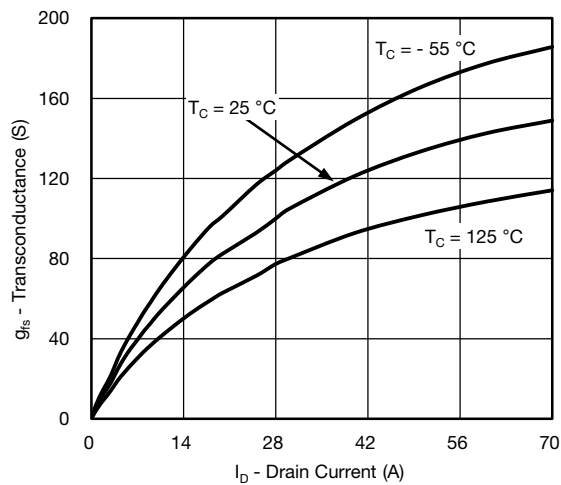
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



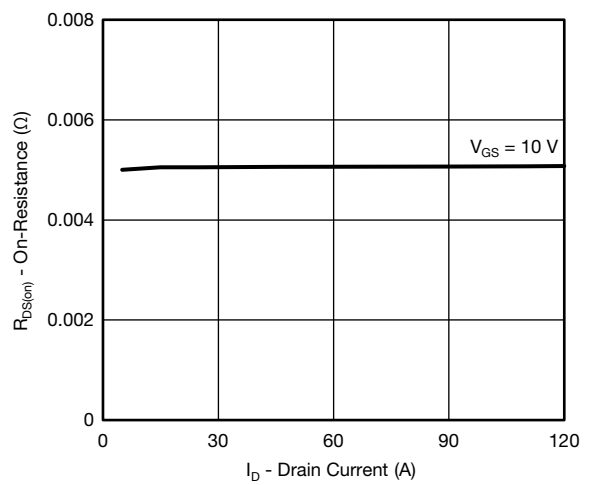
Output Characteristics



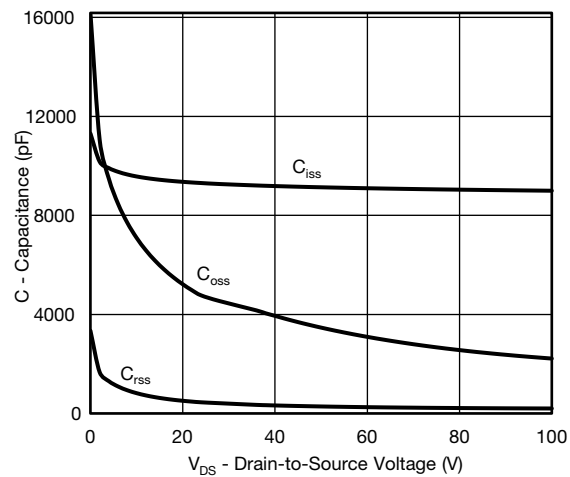
Transfer Characteristics



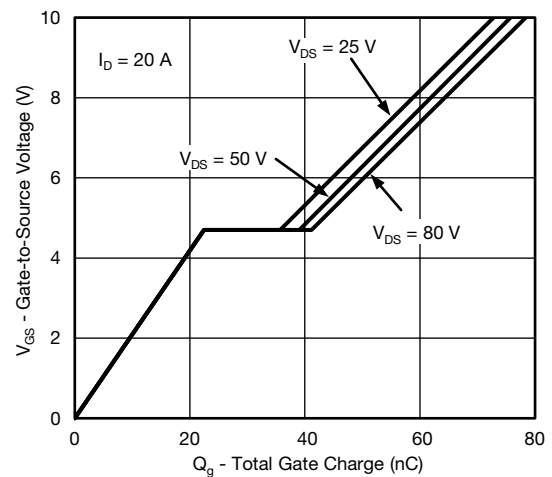
Transconductance



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



Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

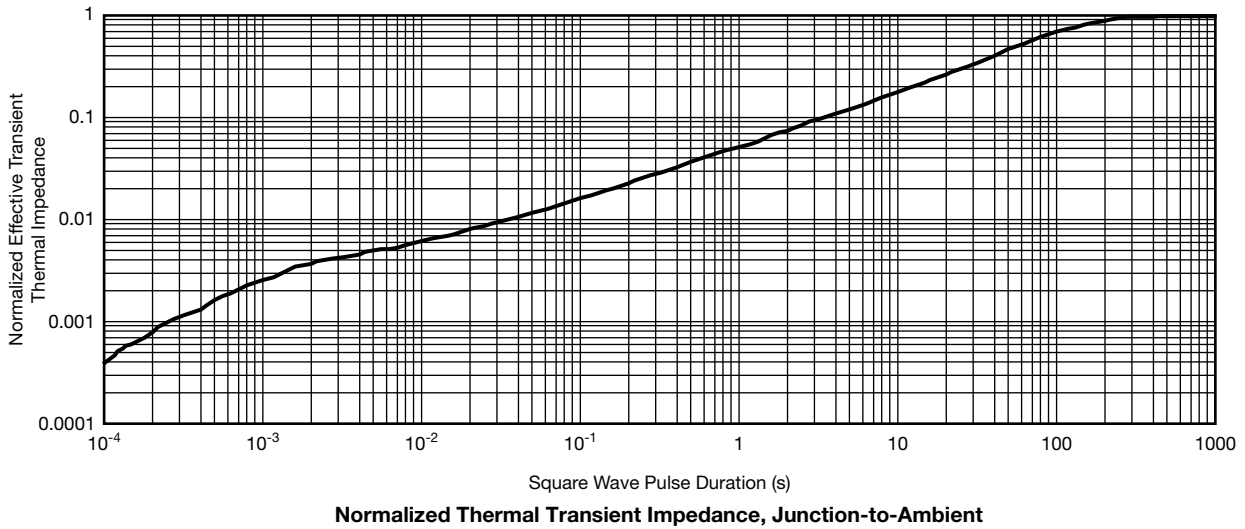


Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

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



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



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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