

IRFL024TRPBF-VB Datasheet

N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) |
|--------------|---------------------------|-----------|
| 60 | 0.028 at $V_{GS} = 10$ V | 7.0 |
| | 0.033 at $V_{GS} = 4.5$ V | 5.6 |

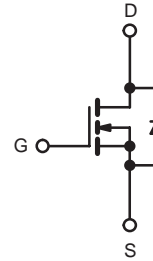
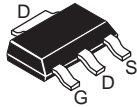
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFETs
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

SOT-223



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

| Parameter | Symbol | 10 s | Steady State | Unit |
|---|----------------|-------------|--------------|------|
| Drain-Source Voltage | V_{DS} | 60 | | V |
| Gate-Source Voltage | V_{GS} | ± 20 | | |
| Continuous Drain Current ($T_J = 175$ °C) ^a | I_D | 7.0 | 6.0 | A |
| | | 6.1 | 5.0 | |
| Pulsed Drain Current | I_{DM} | 40 | | |
| Avalanche Current | I_{AS} | 15 | | |
| Single Pulse Avalanche Energy | E_{AS} | 11 | | mJ |
| Maximum Power Dissipation ^a | P_D | 3.3 | 1.7 | W |
| | | 2.3 | 1.2 | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to 175 | | °C |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Typical | Maximum | Unit |
|--|------------|---------|---------|------|
| Maximum Junction-to-Ambient ^a | R_{thJA} | 36 | 45 | °C/W |
| | | 75 | 90 | |
| Maximum Junction-to-Foot (Drain) | R_{thJF} | 17 | 20 | |

Notes:

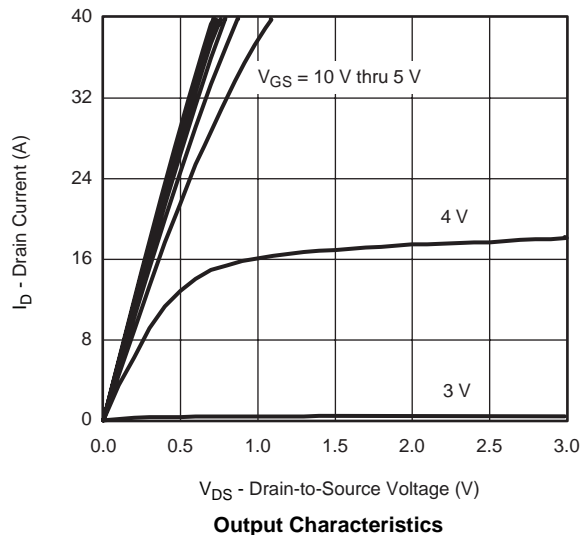
a. Surface Mounted on 1" x 1" FR4 board.

| 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} | $V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$ | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$ | 1 | | 3 | V |
| 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} | $V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$ | | | 1 | μA |
| | | $V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$ | | | 20 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$ | 40 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$ | | 0.028 | | Ω |
| | | $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$ | | 0.032 | | |
| | | $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$ | | 0.040 | | |
| | | $V_{GS} = 4.5\text{ V}$, $I_D = 5.1\text{ A}$ | | 0.033 | | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}$, $I_D = 6.0\text{ A}$ | | 25 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 1.7\text{ A}$, $V_{GS} = 0\text{ V}$ | | 0.8 | 1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$ | | 18 | 27 | nC |
| Gate-Source Charge | Q_{gs} | | | 3.4 | | |
| Gate-Drain Charge | Q_{gd} | | | 5.3 | | |
| Gate Resistance | R_g | $V_{GS} = 0.1\text{ V}$, $f = 5\text{ MHz}$ | 0.5 | 1.4 | 2.4 | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 30\text{ V}$, $R_L = 30\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 6\text{ }\Omega$ | | 10 | 20 | ns |
| Rise Time | t_r | | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 25 | 50 | |
| Fall Time | t_f | | | 12 | 24 | |
| Source-Drain Reverse Recovery Time | t_{rr} | $I_F = 1.7\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ | | 50 | 80 | |

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.

TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$, unless otherwise noted

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



On-Resistance vs. Drain Current



Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

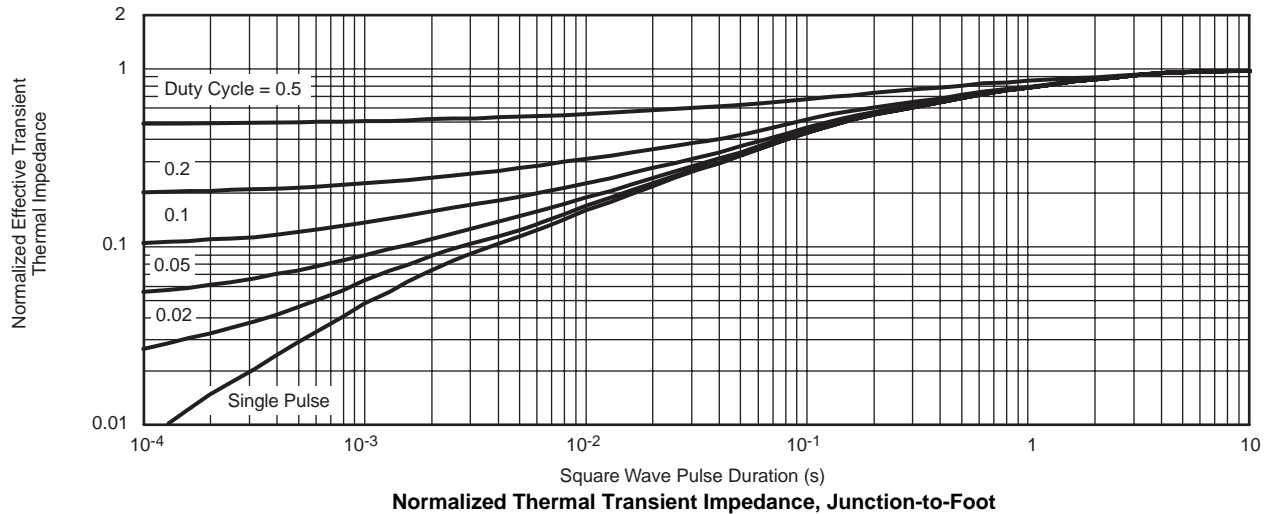
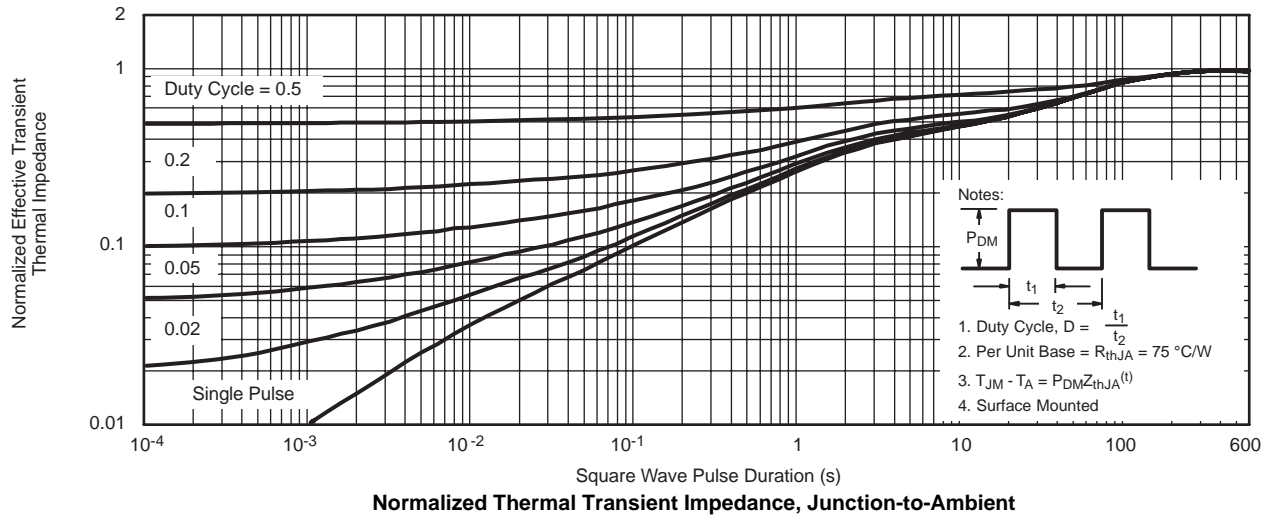
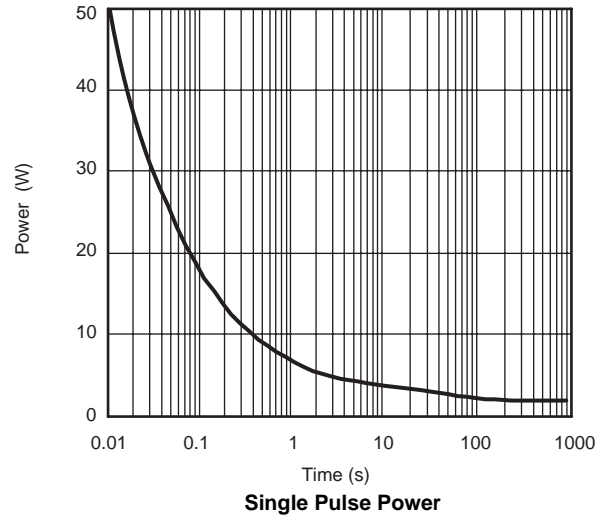
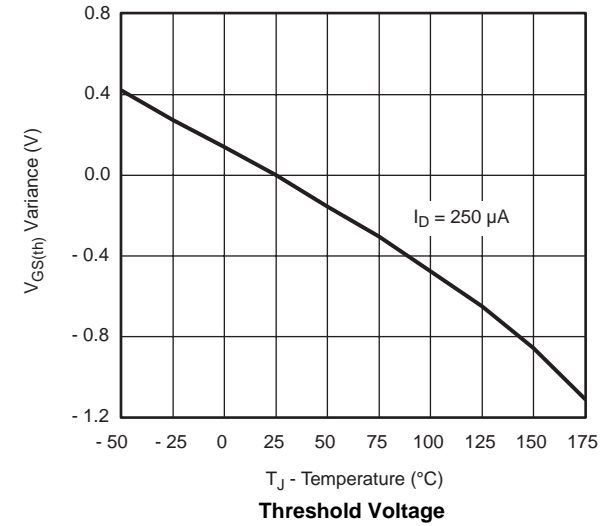


Source-Drain Diode Forward Voltage

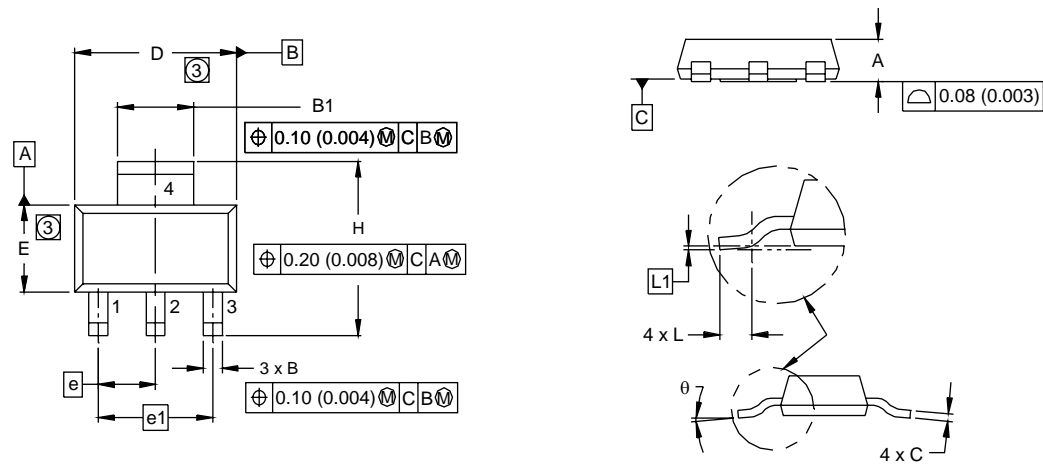


On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



SOT-223 (HIGH VOLTAGE)



| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|------|------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 1.55 | 1.80 | 0.061 | 0.071 |
| B | 0.65 | 0.85 | 0.026 | 0.033 |
| B1 | 2.95 | 3.15 | 0.116 | 0.124 |
| C | 0.25 | 0.35 | 0.010 | 0.014 |
| D | 6.30 | 6.70 | 0.248 | 0.264 |
| E | 3.30 | 3.70 | 0.130 | 0.146 |
| e | 2.30 BSC | | 0.0905 BSC | |
| e1 | 4.60 BSC | | 0.181 BSC | |
| H | 6.71 | 7.29 | 0.264 | 0.287 |
| L | 0.91 | - | 0.036 | - |
| L1 | 0.061 BSC | | 0.0024 BSC | |
| θ | - | 10° | - | 10° |

ECN: S-82109-Rev. A, 15-Sep-08
DWG: 5969

- Notes**
1. Dimensioning and tolerancing per ASME Y14.5M-1994.
 2. Dimensions are shown in millimeters (inches).
 3. Dimension do not include mold flash.
 4. Outline conforms to JEDEC outline TO-261AA.

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