

IRFB3077PBF-VB Datasheet

N-Channel 80 V (D-S) MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) MAX. | I_D (A) | Q_g (TYP.) |
|--------------|--------------------------------|-----------|--------------|
| 80 | 0.0028 at $V_{GS} = 10$ V | 195 | 94 |
| | 0.0030 at $V_{GS} = 7.5$ V | 185 | |



FEATURES

- Trench power MOSFET
- Maximum 175 °C junction temperature
- Very low Q_{gd} reduces power loss from passing through $V_{plateau}$
- 100 % R_g and UIS tested



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Power supply
 - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management



N-Channel MOSFET

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

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--|----------------|------------------|------|
| Drain-Source Voltage | V_{DS} | 80 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current ($T_J = 150$ °C) | I_D | 195 | A |
| | | 120 ^d | |
| Pulsed Drain Current ($t = 100$ μ s) | I_{DM} | 600 | |
| Avalanche Current | I_{AS} | 70 | |
| Single Avalanche Energy ^a | E_{AS} | 245 | mJ |
| Maximum Power Dissipation ^a | P_D | 375 ^b | W |
| | | 125 ^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 °C, unless otherwise noted) | | | | | | |
|---|----------------------|--|------|--------|-------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = 250 μA | 80 | - | - | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 2 | - | 4 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | - | - | ± 250 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 80 V, V _{GS} = 0 V | - | - | 1 | μA |
| | | V _{DS} = 80 V, V _{GS} = 0 V, T _J = 125 °C | - | - | 150 | |
| | | V _{DS} = 80 V, V _{GS} = 0 V, T _J = 175 °C | - | - | 5 | mA |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ 10 V, V _{GS} = 10 V | 120 | - | - | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = 10 V, I _D = 30 A | - | 0.0028 | - | Ω |
| | | V _{GS} = 7.5 V, I _D = 20 A | - | 0.0030 | - | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 30 A | - | 82 | - | S |
| Dynamic ^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 40 V, f = 1 MHz | - | 7910 | - | pF |
| Output Capacitance | C _{oss} | | - | 3250 | - | |
| Reverse Transfer Capacitance | C _{rss} | | - | 348 | - | |
| Total Gate Charge ^c | Q _g | V _{DS} = 40 V, V _{GS} = 10 V, I _D = 20 A | - | 94 | 141 | nC |
| Gate-Source Charge ^c | Q _{gs} | | - | 31 | - | |
| Gate-Drain Charge ^c | Q _{gd} | | - | 10 | - | |
| Gate Resistance | R _g | f = 1 MHz | 0.28 | 1.4 | 2.8 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 40 V, R _L = 4 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω | - | 24 | 40 | ns |
| Rise Time ^c | t _r | | - | 24 | 40 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | - | 34 | 60 | |
| Fall Time ^c | t _f | | - | 14 | 28 | |
| Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C) | | | | | | |
| Pulsed Current (t = 100 μs) | I _{SM} | | - | - | 250 | A |
| Forward Voltage ^a | V _{SD} | I _F = 10 A, V _{GS} = 0 V | - | 0.8 | 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = 34 A, di/dt = 100 A/μs | - | 126 | 190 | ns |
| Peak Reverse Recovery Charge | I _{RM(REC)} | | - | 5 | 10 | A |
| Reverse Recovery Charge | Q _{rr} | | - | 0.315 | 0.475 | μC |

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.

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



Output Characteristics



Transfer Characteristics



Transconductance



On-Resistance vs. Drain Current



Capacitance

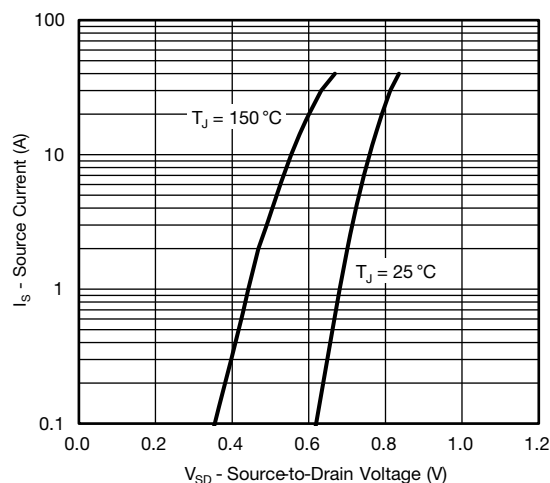


Gate Charge

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

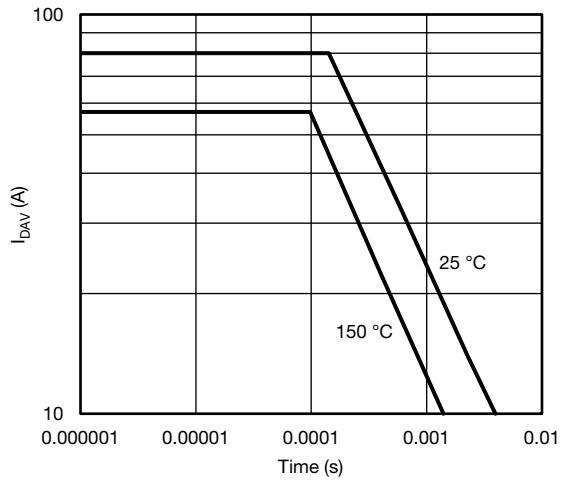


Drain Source Breakdown vs. Junction Temperature

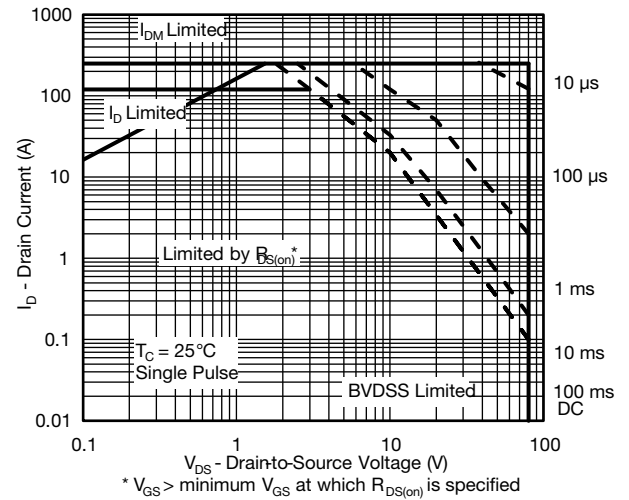


Current De-rating

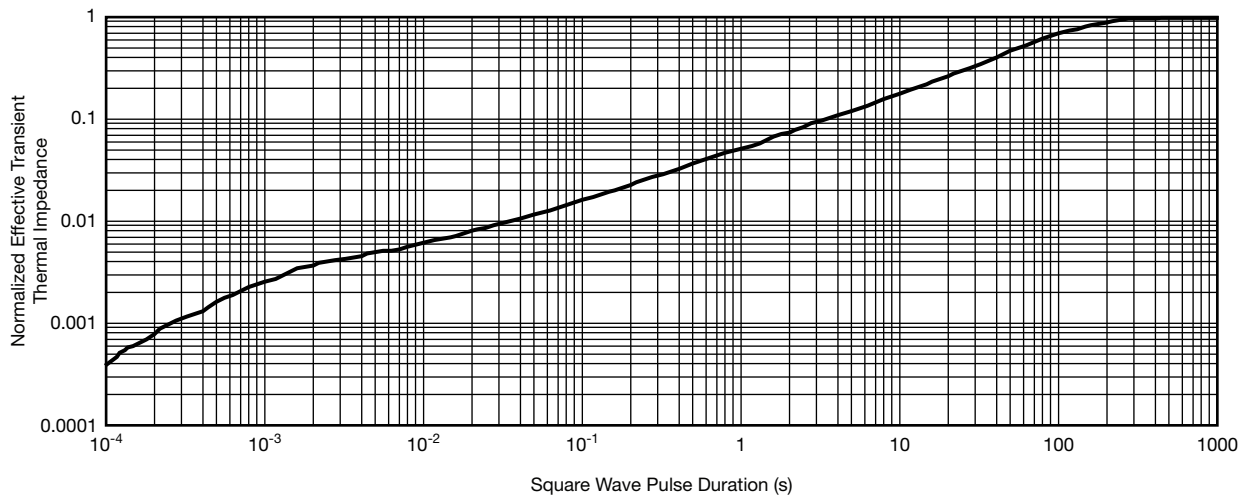
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Single Pulse Avalanche Current Capability vs. Time



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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


Normalized Thermal Transient Impedance, Junction-to-Case

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.

TO-220AB

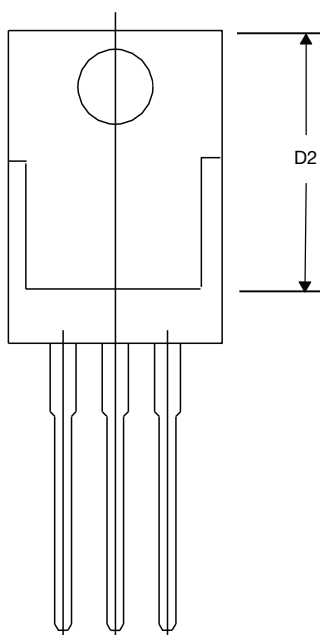


| DIM. | MILLIMETERS | | INCHES | |
|-----------------|-------------|-------|--------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 4.25 | 4.65 | 0.167 | 0.183 |
| b | 0.69 | 1.01 | 0.027 | 0.040 |
| b(1) | 1.20 | 1.73 | 0.047 | 0.068 |
| c | 0.36 | 0.61 | 0.014 | 0.024 |
| D | 14.85 | 15.49 | 0.585 | 0.610 |
| D2 | 12.19 | 12.70 | 0.480 | 0.500 |
| E | 10.04 | 10.51 | 0.395 | 0.414 |
| e | 2.41 | 2.67 | 0.095 | 0.105 |
| e(1) | 4.88 | 5.28 | 0.192 | 0.208 |
| F | 1.14 | 1.40 | 0.045 | 0.055 |
| H(1) | 6.09 | 6.48 | 0.240 | 0.255 |
| J(1) | 2.41 | 2.92 | 0.095 | 0.115 |
| L | 13.35 | 14.02 | 0.526 | 0.552 |
| L(1) | 3.32 | 3.82 | 0.131 | 0.150 |
| $\varnothing P$ | 3.54 | 3.94 | 0.139 | 0.155 |
| Q | 2.60 | 3.00 | 0.102 | 0.118 |

ECN: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note

* $M = 1.32 \text{ mm to } 1.62 \text{ mm}$ (dimension including protrusion)
Heatsink hole for HVM



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