

F2907ZS-VB Datasheet

N-Channel 80 V (D-S) MOSFET

PRODUCT SUMMARY

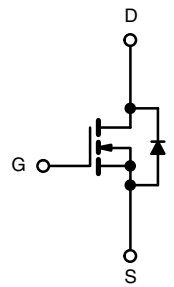
| V_{DS} (V) | $R_{DS(on)}$ (Ω) MAX. | I_D (A) | Q_g (TYP.) |
|--------------|--------------------------------|-----------|--------------|
| 80 | 0.0050 at $V_{GS} = 10$ V | 215 | 94 |
| | 0.0095 at $V_{GS} = 7.5$ V | 205 | |

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



N-Channel MOSFET

APPLICATIONS

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

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 | 215 | 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

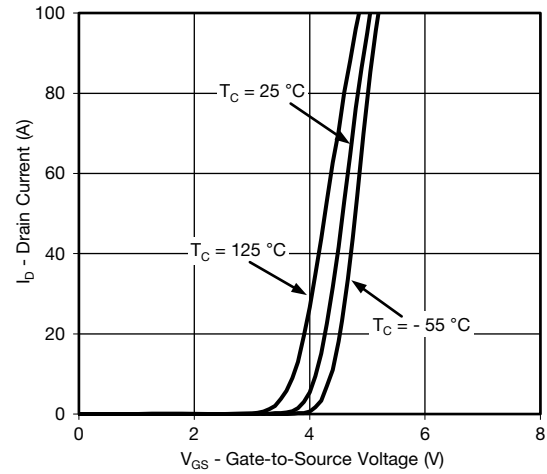
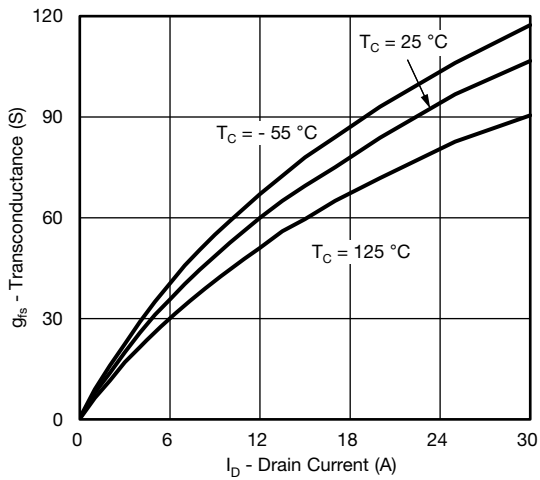
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.

| 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 | - | 0.0050 | - | Ω |
| | | V _{GS} = 7.5 V, I _D = 20 A | - | 0.0095 | - | |
| 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 |

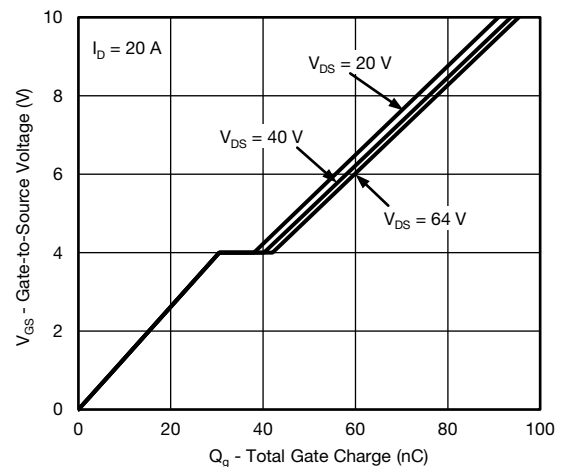
Notes

- 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.

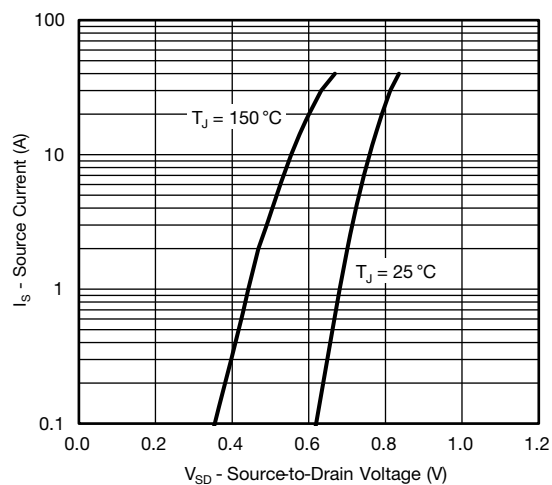
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

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

Current De-rating

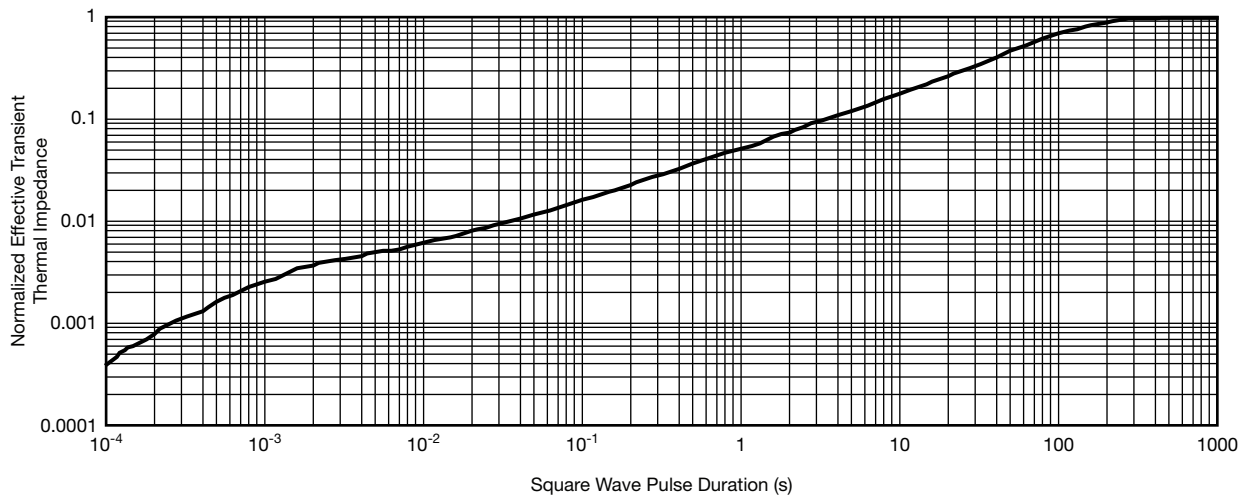
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Single Pulse Avalanche Current Capability vs. Time



Safe Operating Area



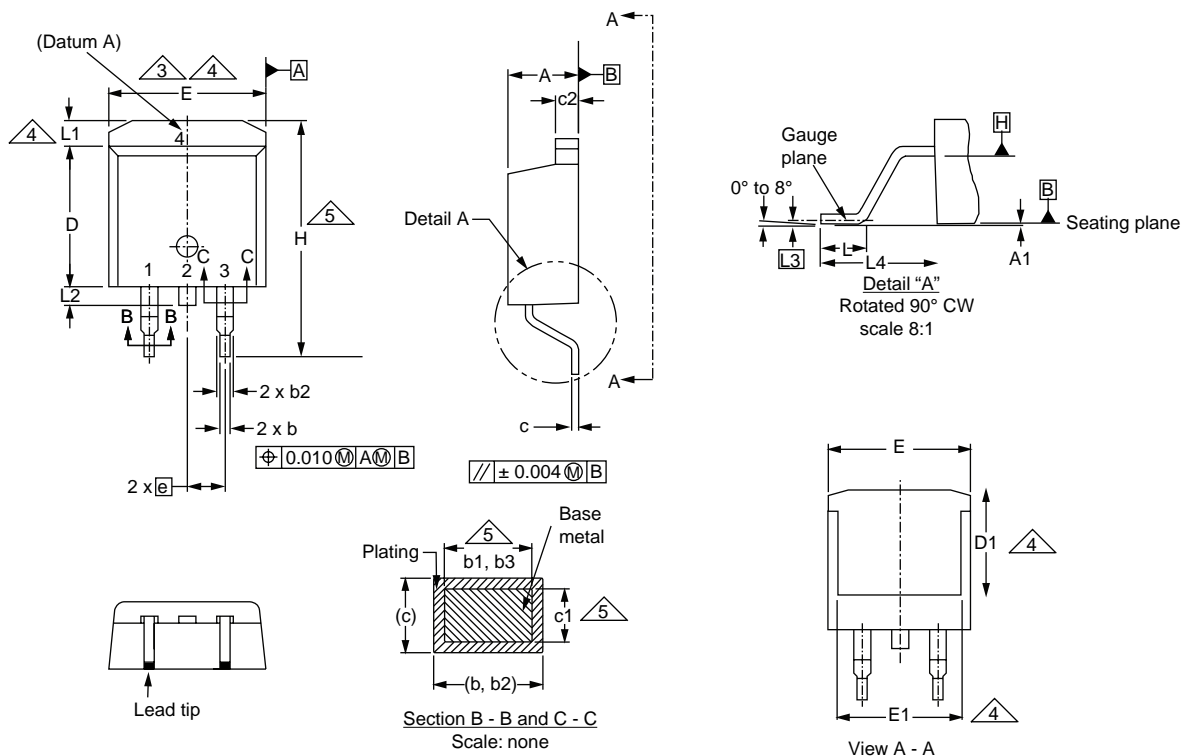
Normalized Thermal Transient Impedance, Junction-to-Ambient

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-263AB

| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|------|--------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 4.06 | 4.83 | 0.160 | 0.190 |
| A1 | 0.00 | 0.25 | 0.000 | 0.010 |
| b | 0.51 | 0.99 | 0.020 | 0.039 |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 |
| c | 0.38 | 0.74 | 0.015 | 0.029 |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 |
| D | 8.38 | 9.65 | 0.330 | 0.380 |

| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| D1 | 6.86 | - | 0.270 | - |
| E | 9.65 | 10.67 | 0.380 | 0.420 |
| E1 | 6.22 | - | 0.245 | - |
| e | 2.54 BSC | | 0.100 BSC | |
| H | 14.61 | 15.88 | 0.575 | 0.625 |
| L | 1.78 | 2.79 | 0.070 | 0.110 |
| L1 | - | 1.65 | - | 0.066 |
| L2 | - | 1.78 | - | 0.070 |
| L3 | 0.25 BSC | | 0.010 BSC | |
| L4 | 4.78 | 5.28 | 0.188 | 0.208 |

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 DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

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