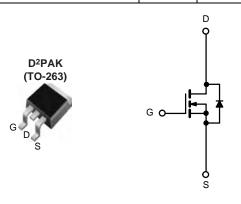


RF1S45N02LSM-VB Datasheet N-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY | | | | | | |
|---------------------|----------------------------------|------------------------------------|----------------------|--|--|--|
| V _{DS} (V) | $R_{DS(on)}(\Omega)$ | I _D (A) ^{a, e} | Q _g (Typ) | | | |
| 30 | 0.012 at V _{GS} = 10 V | 50 | 25 nC | | | |
| 30 | 0.018 at V _{GS} = 4.5 V | 45 | 23110 | | | |



FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU



APPLICATIONS

- OR-ing
- Server
- DC/DC

N-Channel MOSFET

| Parameter | | Symbol | Limit | Unit | |
|---|-----------------------------------|-----------------|----------------------|------|--|
| Drain-Source Voltage | | V _{DS} | 30 | V | |
| Gate-Source Voltage | | V _{GS} | ± 20 | | |
| | T _C = 25 °C | | 50 | A | |
| Continuous Drain Current (T _{.I} = 175 °C) | T _C = 70 °C | | 46 | | |
| Continuous Diam Current (1) = 173 C) | T _A = 25 °C | I _D | 27 ^{b, c} | | |
| | T _A = 70 °C | | 21 ^{b, c} | | |
| Pulsed Drain Current | | I _{DM} | 210 | | |
| Avalanche Current Pulse L = 0.1 ml | | I _{AS} | 39 | | |
| Single Pulse Avalanche Energy | L = U.1 IIII | E _{AS} | 94.8 | mJ | |
| Continuous Source-Drain Diode Current | T _C = 25 °C | L | 50 ^{a, e} | ^ | |
| Continuous Source-Drain Diode Current | T _A = 25 °C | l _S | 3.13 ^{b, c} | A | |
| | T _C = 25 °C | | 120 ^a | w | |
| Mayimum Dayyan Dinain ation | T _C = 70 °C | ь | 85 | | |
| Maximum Power Dissipation | T _A = 25 °C | P _D | 3.75 ^{b, c} | | |
| | T _A = 70 °C | | 2.63 ^{b, c} | | |
| Operating Junction and Storage Temperature Ra | T _J , T _{stg} | - 55 to 175 | °C | | |

| THERMAL RESISTANCE RATINGS | | | | | | |
|---|--------------|-------------------|------|------|------|--|
| Parameter | | Symbol | Тур. | Max. | Unit | |
| Maximum Junction-to-Ambient ^{b, d} | t ≤ 10 sec | R _{thJA} | 32 | 40 | °C/W | |
| Maximum Junction-to-Case | Steady State | R _{thJC} | 0.5 | 0.6 | | |

Notes:

- a. Based on T_C = 25 °C.
 b. Surface mounted on 1" x 1" FR4 board.

- b. Surface in the first policy.

 c. t = 10 sec.

 d. Maximum under steady state conditions is 90 °C/W.

 e. Calculated based on maximum junction temperature. Package limitation current is 90 A.



| Parameter | Symbol | Test Conditions | Min. | Тур. | Max. | Unit | |
|---|-------------------------|--|------|-------|-------|----------|--|
| Static | | | | | l | | |
| Drain-Source Breakdown Voltage | V _{DS} | $V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$ | 30 | | | V | |
| V _{DS} Temperature Coefficient | $\Delta V_{DS}/T_{J}$ | J 250 \ | | 35 | | > / / 0/ | |
| V _{GS(th)} Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | $I_{D} = 250 \mu\text{A}$ | | - 7.5 | | mV/°C | |
| Gate-Source Threshold Voltage | V _{GS(th)} | $V_{DS} = V_{GS}, I_D = 250 \mu A$ | 1.0 | | 3.0 | V | |
| Gate-Source Leakage | I _{GSS} | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$ | | | ± 100 | nA | |
| Zana Oata Valtana Basis Oursest | | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$ | | | 1 | ^ | |
| Zero Gate Voltage Drain Current | IDSS | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$ | | | 10 | μΑ | |
| On-State Drain Current ^a | I _{D(on)} | $V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$ | 90 | | | Α | |
| | | $V_{GS} = 10 \text{ V}, I_D = 28.8 \text{ A}$ | | 0.012 | | Ω | |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | $V_{GS} = 4.5 \text{ V}, I_D = 37 \text{ A}$ | | 0.018 | | | |
| Forward Transconductance ^a | 9 _{fs} | V _{DS} = 15 V, I _D = 28.8 A | | 160 | | S | |
| Dynamic ^b | <u>'</u> | | | • | ' | | |
| Input Capacitance | C _{iss} | | | 1201 | | pF | |
| Output Capacitance | C _{oss} | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | | 255 | | | |
| Reverse Transfer Capacitance | C _{rss} | | | 170 | | | |
| Total Cata Charge | Q_g | $V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 28.8 \text{ A}$ | | 35 | | nC | |
| Total Gate Charge | | | | 25 | | | |
| Gate-Source Charge | Q _{gs} | $V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 28.8 \text{ A}$ | | 15 | | | |
| Gate-Drain Charge | Q_{gd} | | | 20 | | | |
| Gate Resistance | R _g | f = 1 MHz | | 1.4 | 2.1 | Ω | |
| Turn-On Delay Time | t _{d(on)} | | | 18 | 27 | ns | |
| Rise Time | t _r | V_{DD} = 15 V, R_L = 0.625 Ω | | 11 | 17 | | |
| Turn-Off Delay Time | t _{d(off)} | $I_D\cong 24$ A, $V_{GEN}=10$ V, $R_g=1$ Ω | | 70 | 105 | | |
| Fall Time | t _f | | | 10 | 15 | | |
| Turn-On Delay Time | t _{d(on)} | | | 55 | 83 | | |
| Rise Time | t _r | V_{DD} = 15 V, R_L = 0.67 Ω | | 180 | 270 | | |
| Turn-Off Delay Time | t _{d(off)} | $I_D \cong 22.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$ | | 55 | 83 | | |
| Fall Time | t _f | | | 12 | 18 | | |
| Drain-Source Body Diode Characteristic | cs | | | | | | |
| Continuous Source-Drain Diode Current | I _S | T _C = 25 °C | | | 120 | Α | |
| Pulse Diode Forward Current ^a | I _{SM} | | | | 120 | | |
| Body Diode Voltage | V _{SD} | I _S = 22 A | | 0.8 | 1.2 | V | |
| Body Diode Reverse Recovery Time | t _{rr} | | | 52 | 78 | ns | |
| Body Diode Reverse Recovery Charge | Q _{rr} | I _F = 20 A, di/dt = 100 A/µs, T _J = 25 °C | | 70.2 | 105 | nC | |
| Reverse Recovery Fall Time | t _a | 1 _F - 20 A, αι/αι = 100 A/μ5, 1 _J = 25 °C | | 27 | | 200 | |
| Reverse Recovery Rise Time | t _b | t _b | | 25 | | ns | |

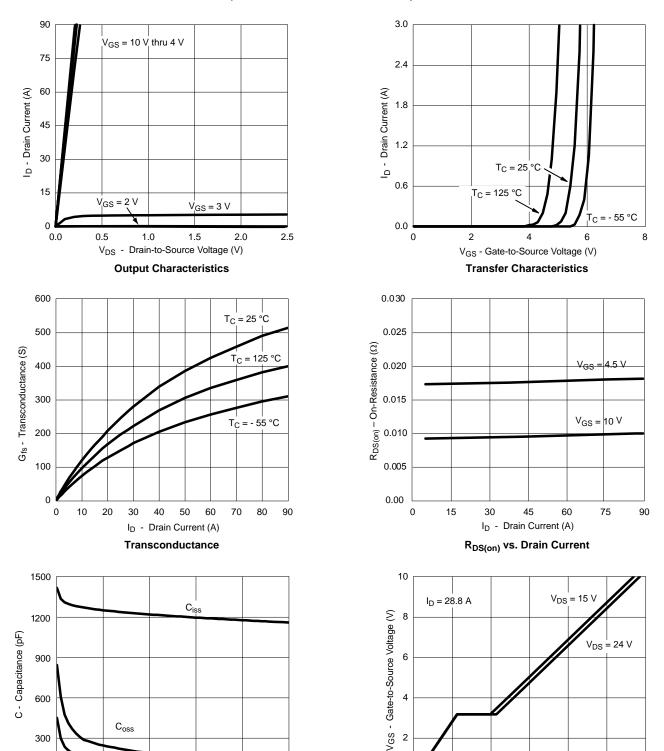
Notes:

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

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 (25 °C, unless otherwise noted)



2

30

60

90

Q_g - Total Gate Charge (nC)

Gate Charge

120

150

180

服务热线:400-655-8788

 C_{rss}

6

300

0

 C_{oss}

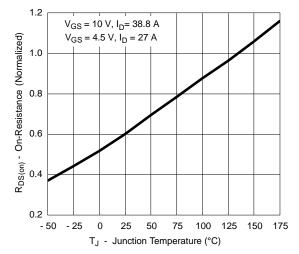
18

V_{DS} - Drain-to-Source Voltage (V) Capacitance

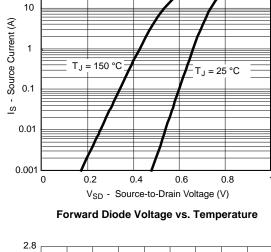
30

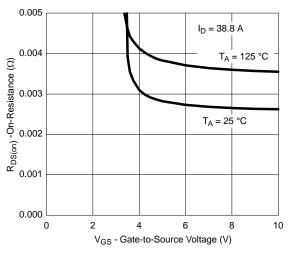


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

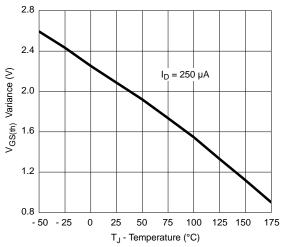


On-Resistance vs. Junction Temperature

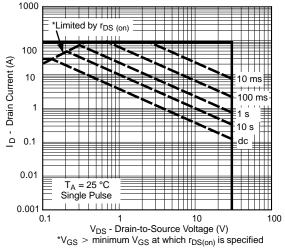




 $\rm R_{\rm DS(on)}$ vs. $\rm V_{\rm GS}$ vs. Temperature



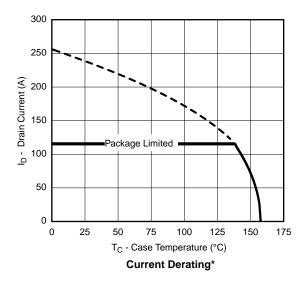
Threshold Voltage



Safe Operating Area, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





*The power dissipation P_D is based on $T_{J(max)}$ = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

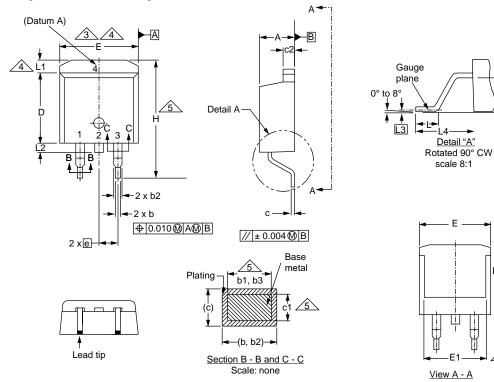


Normalized Thermal Transient Impedance, Junction-to-Case



Seating plane

TO-263AB (HIGH VOLTAGE)



| | MILLIMETERS | | INC | HES |
|------|-------------|------|-------|-------|
| DIM. | MIN. | MAX. | MIN. | MAX. |
| Α | 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 |
| С | 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 |

| | MILLIMETERS | | INC | HES |
|------|-------------|-------|-----------|-------|
| DIM. | MIN. | MAX. | MIN. | MAX. |
| D1 | 6.86 | - | 0.270 | - |
| Е | 9.65 | 10.67 | 0.380 | 0.420 |
| E1 | 6.22 | - | 0.245 | - |
| е | 2.54 BSC | | 0.100 BSC | |
| Н | 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 |
| | | | | |

ECN: S-82110-Rev. A, 15-Sep-08

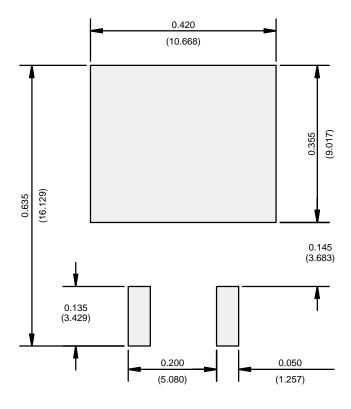
DWG: 5970

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.



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)



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