

30V N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

| BV _{DSS} | Max R _{DS(on)} MAX | Max I _D MAX T _A = 25°C |
|-------------------|-------------------------------|---|
| 30V | 65mΩ @ V _{GS} = 10V | 3.2A |
| | 95mΩ @ V _{GS} = 4.5V | 2.6A |

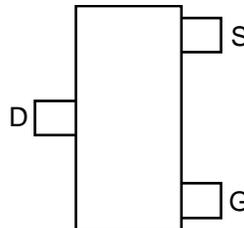
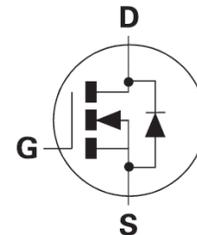
Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC - DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control



Top View


 Top View
Pin Out


Equivalent Circuit

Features and Benefits

- Low on-resistance
- Fast switching speed
- Low gate charge
- Low threshold
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

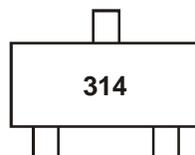
Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish —Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)

Ordering Information (Note 5)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| ZXMN3A14FQTA | 314 | 7 | 8 | 3,000 Units |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information


314 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

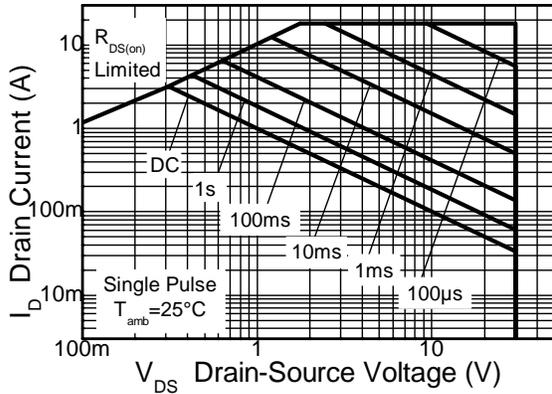
| Characteristic | | | Symbol | Value | Units | |
|---|-----------------------|-----------------------|------------------|----------|-------|---|
| Drain-Source Voltage | | | V _{DSS} | 30 | V | |
| Gate-Source Voltage | | | V _{GS} | ±20 | V | |
| Continuous Drain Current | V _{GS} = 10V | T _A = 70°C | I _D | (Note 7) | 3.9 | A |
| | | | | (Note 7) | 3.2 | |
| | | | | (Note 6) | 3.2 | |
| Pulsed Drain Current (Note 8) | | | I _{DM} | 18 | A | |
| Continuous Source Current (Body Diode) (Note 7) | | | I _S | 2.3 | A | |
| Pulsed Source Current (Body Diode) (Note 8) | | | I _{SM} | 18 | A | |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

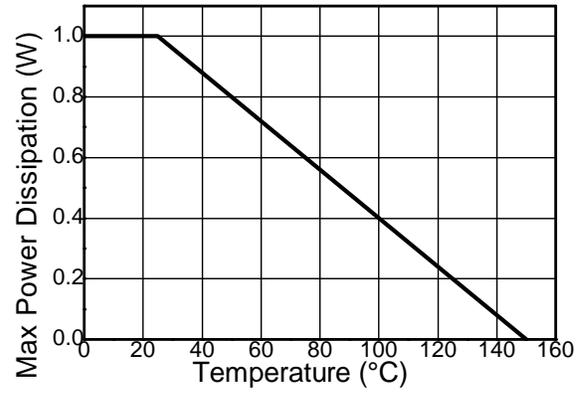
| Characteristic | | Symbol | Value | Unit |
|--|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 6) | | P _D | 1 | W |
| Linear Derating Factor | | | 8 | mW/°C |
| Power Dissipation (Note 7) | | P _D | 1.5 | W |
| Linear Derating Factor | | | 12 | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 6) | | R _{θJA} | 125 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 7) | | R _{θJA} | 83 | °C/W |
| Thermal Resistance, Junction to Leads (Note 9) | | R _{θJL} | 70.44 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
6. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
 7. For a device surface mounted on FR4 PCB measured at t ≤ 5 secs.
 8. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300µs - pulse current limited by maximum junction temperature.
 9. Thermal resistance from junction to solder-point (at the end of the drain lead).

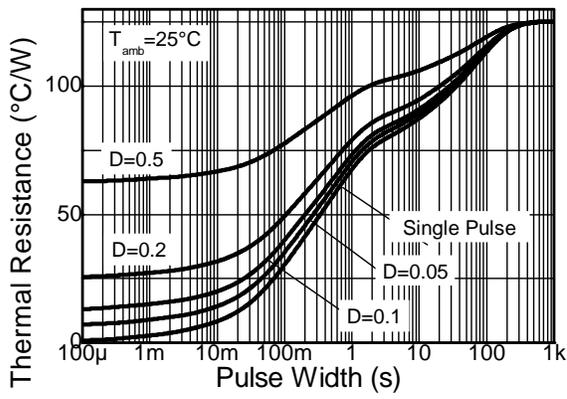
Thermal Characteristics



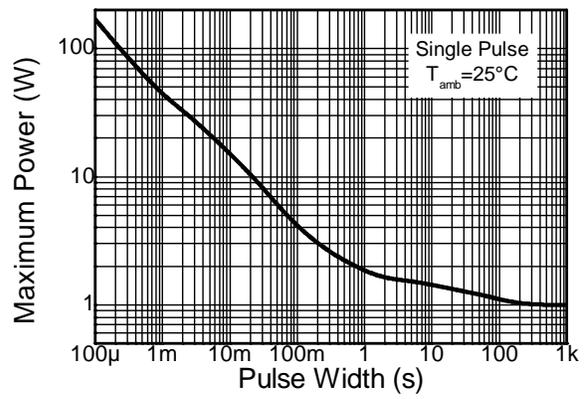
Safe Operating Area



Derating Curve



Transient Thermal Impedance



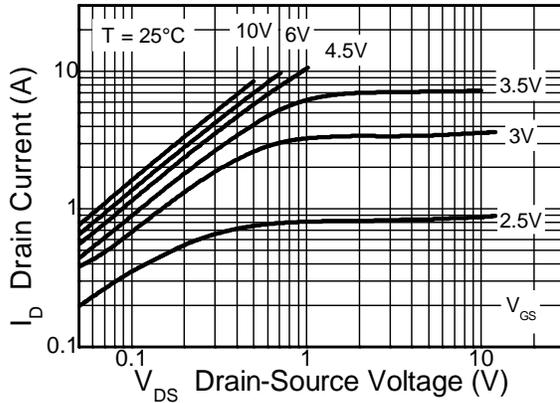
Pulse Power Dissipation

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

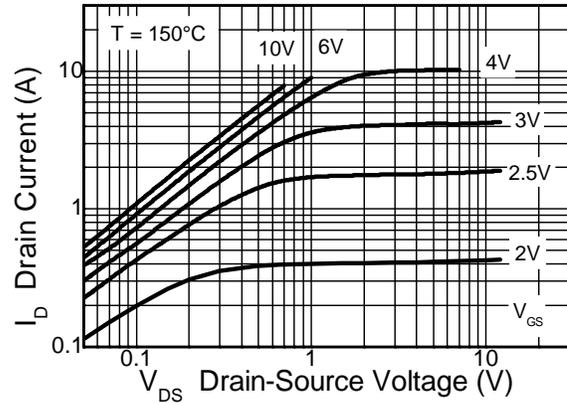
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|------|-----------|---------------|--|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 30 | — | — | V | $I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 30\text{V}$, $V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 12\text{V}$, $V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | — | 2.2 | V | $I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$ |
| Static Drain-Source On-Resistance (Note 10) | $R_{DS(on)}$ | — | 48 | 65 | m Ω | $V_{GS} = 10\text{V}$, $I_D = 3.2\text{A}$ |
| | | | 69 | 95 | | $V_{GS} = 4.5\text{V}$, $I_D = 2.6\text{A}$ |
| Forward Transconductance (Notes 10 and 12) | g_{fs} | — | 7.1 | — | S | $V_{DS} = 15\text{V}$, $I_D = 3.2\text{A}$ |
| Diode Forward Voltage (Note 10) | V_{SD} | — | 0.85 | 0.95 | V | $T_J = 25^\circ\text{C}$, $I_S = 2.5\text{A}$, $V_{GS} = 0\text{V}$ |
| Reverse Recovery Time (Note 12) | t_{rr} | — | 13 | — | ns | $T_J = 25^\circ\text{C}$, $I_F = 1.6\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge (Note 12) | Q_{rr} | — | 7 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 12) | | | | | | |
| Input Capacitance | C_{iss} | — | 448 | — | pF | $V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 82 | — | | |
| Reverse Transfer Capacitance | C_{rss} | — | 49 | — | | |
| Turn-On Delay Time (Note 11) | $t_{D(on)}$ | — | 2.4 | — | ns | $V_{DD} = 15\text{V}$, $I_D = 1\text{A}$, $R_G \cong 6.0\Omega$, $V_{GS} = 10\text{V}$ |
| Turn-On Rise Time (Note 11) | t_r | — | 2.5 | — | | |
| Turn-Off Delay Time (Note 11) | $t_{D(off)}$ | — | 13.1 | — | | |
| Turn-Off Fall Time (Note 11) | t_f | — | 5.3 | — | | |
| Total Gate Charge (Note 11) | Q_g | — | 8.6 | — | nC | $V_{DS} = 15\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 3.2\text{A}$ |
| Gate-Source Charge (Note 11) | Q_{gs} | — | 1.4 | — | | |
| Gate-Drain Charge (Note 11) | Q_{gd} | — | 1.8 | — | | |

Notes: 10. Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.
 11. Switching characteristics are independent of operating junction temperature.
 12. For design aid only, not subject to production testing.

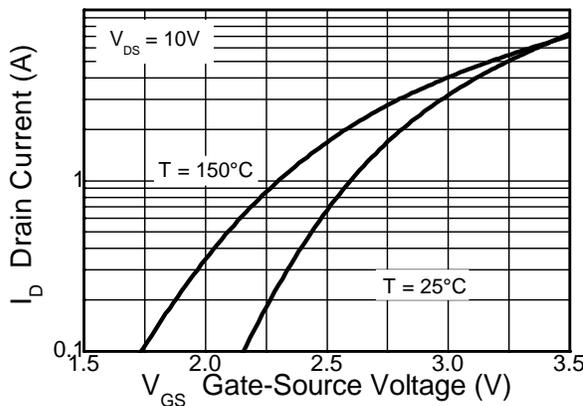
Typical Characteristics



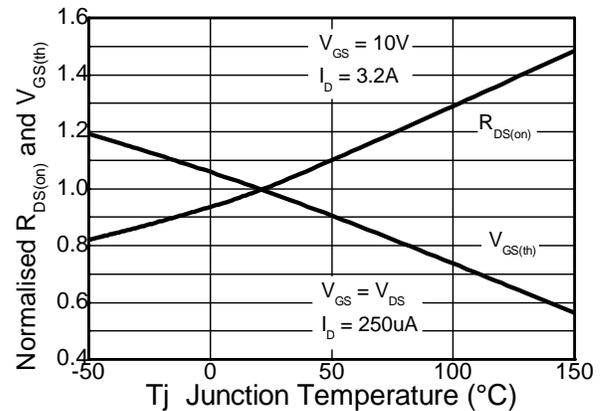
Output Characteristics



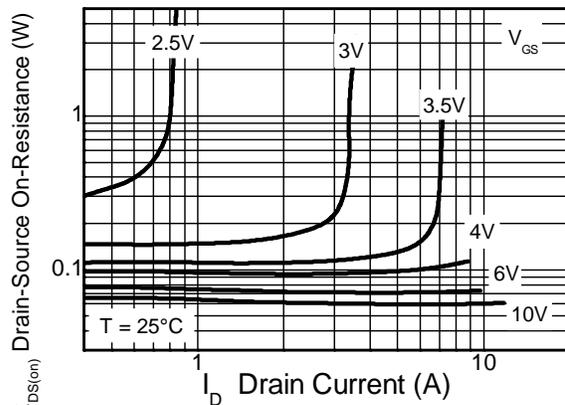
Output Characteristics



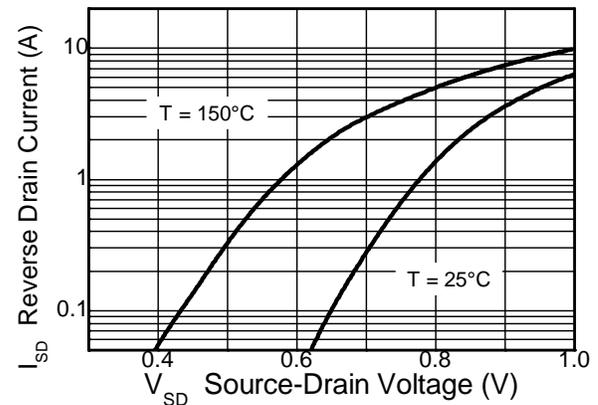
Typical Transfer Characteristics



Normalised Curves v Temperature

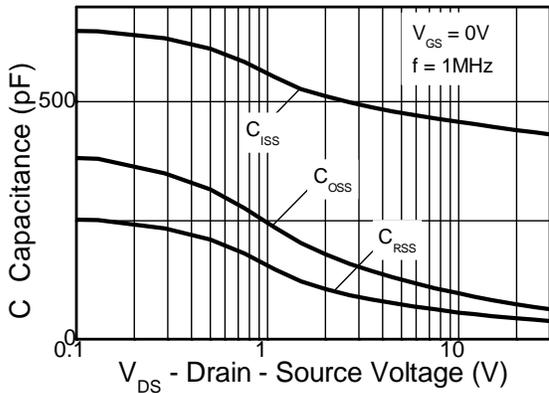


On-Resistance v Drain Current

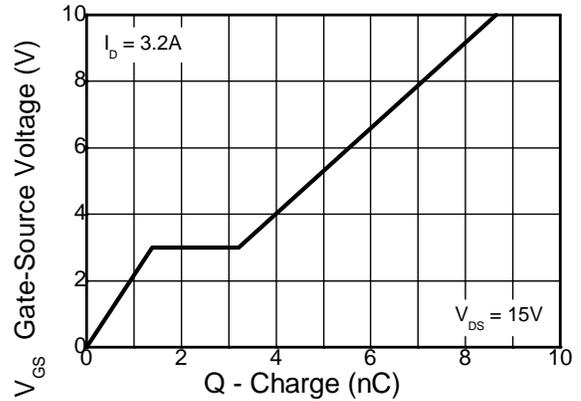


Source-Drain Diode Forward Voltage

Typical Characteristics (continued)

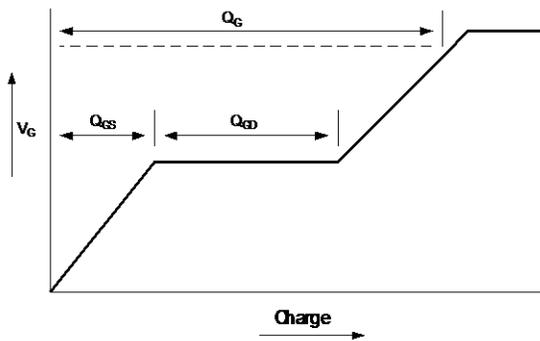


Capacitance v Drain-Source Voltage

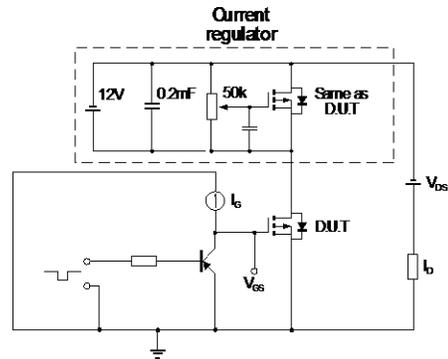


Gate-Source Voltage v Gate Charge

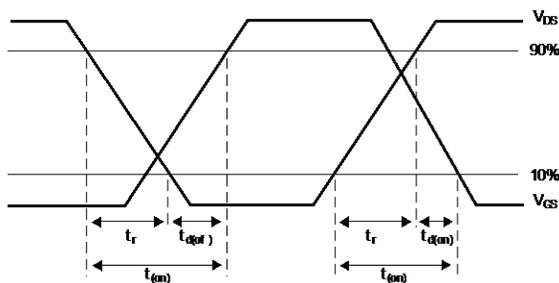
Test Circuits



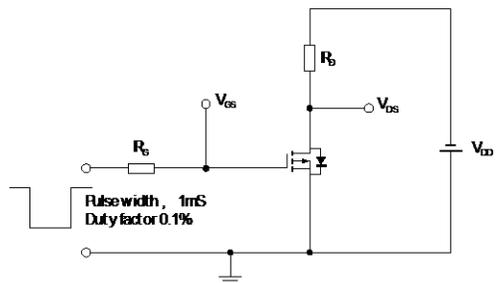
Basic gate charge waveform



Gate charge test circuit



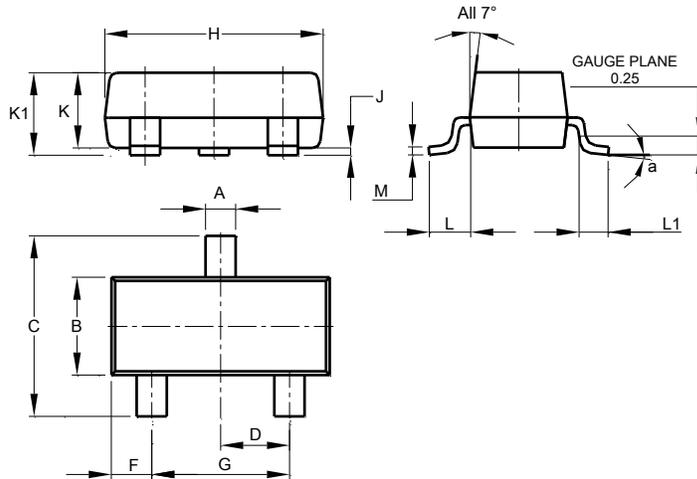
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

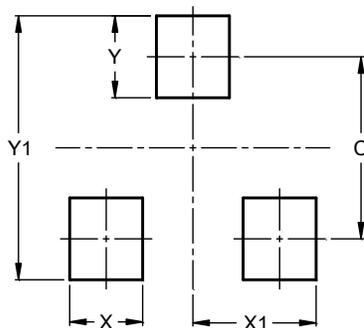
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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