

**30V N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

| BV <sub>DSS</sub> | Max R <sub>DS(on)</sub>       | Max I <sub>D</sub><br>T <sub>A</sub> = 25°C<br>(Note 4) |
|-------------------|-------------------------------|---|
| 30V               | 65mΩ @ V <sub>GS</sub> = 10V  | 3.2A  |
|                   | 95mΩ @ V <sub>GS</sub> = 4.5V | 2.6A  |

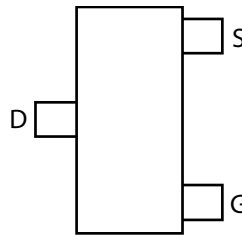
**Description and Applications**

This MOSFET utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed, making it ideal for high-efficiency power management applications.

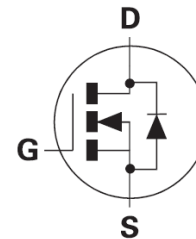
- DC - DC converters
- Power management functions
- Disconnect switches
- Motor control



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 (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

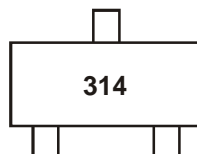
- Case: SOT23
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

**Ordering Information** (Note 3)

| Product     | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| ZXMN3A14FTA | 314     | 7                  | 8               | 3000 Units        |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  3. For more packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



314 = Product Type Marking Code

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

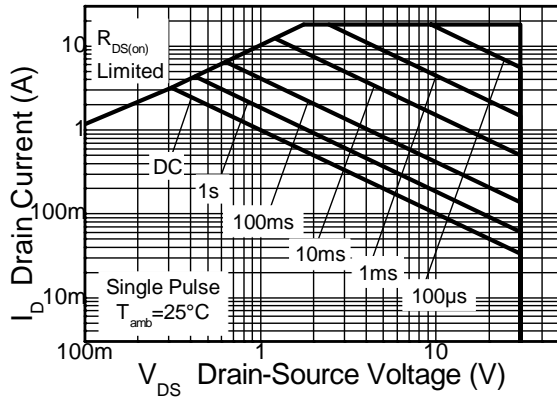
| Characteristic                                  |                       |                                   | Symbol    | Value    | Units |
|---|-----------------------|-----------------------------------|-----------|----------|-------|
| Drain-Source Voltage                            |                       |                                   | $V_{DSS}$ | 30       | V     |
| Gate-Source Voltage                             |                       |                                   | $V_{GS}$  | $\pm 20$ | V     |
| Continuous Drain Current                        | $V_{GS} = 10\text{V}$ | $T_A = 70^\circ\text{C}$ (Note 5) | $I_D$     | 3.9      | A     |
|   |                       | (Note 5)                          |           | 3.2      |       |
|   |                       | (Note 4)                          |           | 3.2      |       |
| Pulsed Drain Current (Note 6)                   |                       |                                   | $I_{DM}$  | 18       | A     |
| Continuous Source Current (Body Diode) (Note 5) |                       |                                   | $I_S$     | 2.3      | A     |
| Pulsed Source Current (Body Diode) (Note 6)     |                       |                                   | $I_{SM}$  | 18       | A     |

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

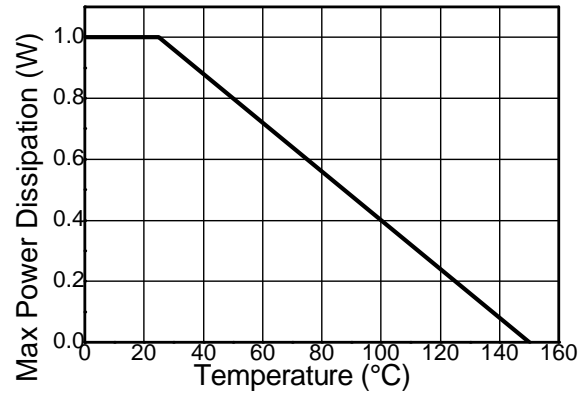
| Characteristic                                   |  | Symbol          | Value       | Unit                      |
|--|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 4)                       |  | $P_D$           | 1           | W                         |
| Linear Derating Factor                           |  |                 | 8           | mW/ $^\circ\text{C}$      |
| Power Dissipation (Note 5)                       |  | $P_D$           | 1.5         | W                         |
| Linear Derating Factor                           |  |                 | 12          | mW/ $^\circ\text{C}$      |
| Thermal Resistance, Junction to Ambient (Note 4) |  | $R_{\theta JA}$ | 125         | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient (Note 5) |  | $R_{\theta JA}$ | 83          | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note 7)   |  | $R_{\theta JL}$ | 70.44       | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range          |  | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$          |

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

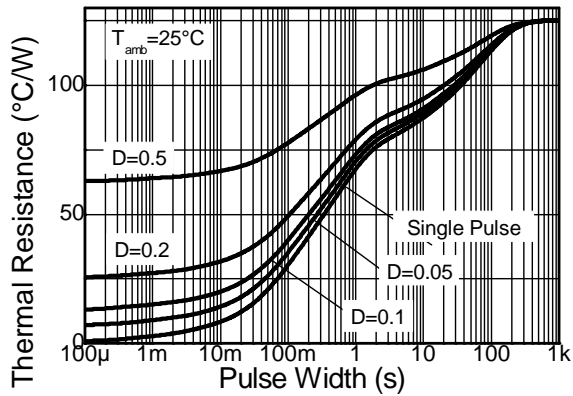
**Thermal Characteristics**



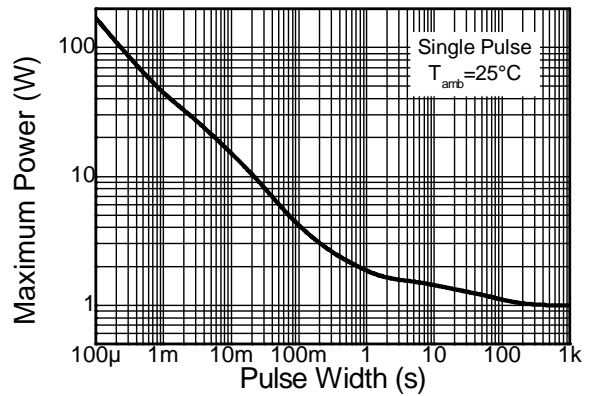
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



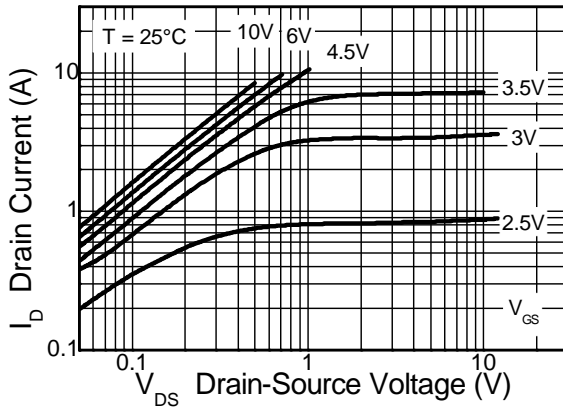
**Pulse Power Dissipation**

**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

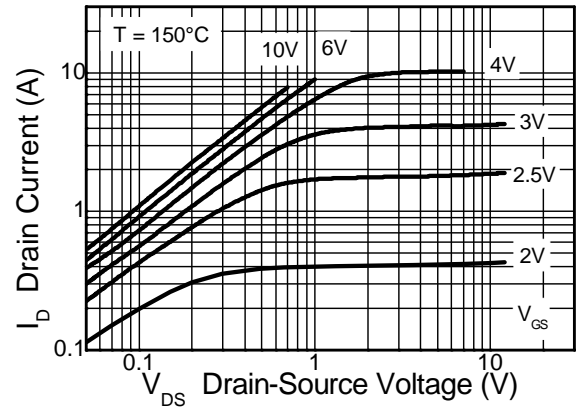
| Characteristic                             | Symbol              | Min | Typ  | Max  | Unit | Test Condition  |
|--|---------------------|-----|------|------|------|---|
| <b>OFF CHARACTERISTICS</b>                 |                     |     |      |      |      |   |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 30  | —    | —    | V    | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V  |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —    | 1    | μA   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS</b>                  |                     |     |      |      |      |   |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1.0 | —    | 2.2  | V    | I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>                                   |
| Static Drain-Source On-Resistance (Note 8) | R <sub>DS(on)</sub> | —   | 48   | 65   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.2A  |
|  |                     |     | 69   | 95   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.6A   |
| Forward Transconductance (Notes 8 and 10)  | g <sub>fs</sub>     | —   | 7.1  | —    | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 3.2A  |
| Diode Forward Voltage (Note 8)             | V <sub>SD</sub>     | —   | 0.85 | 0.95 | V    | T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.5A, V <sub>GS</sub> = 0V                          |
| Reverse Recovery Time (Note 10)            | t <sub>rr</sub>     | —   | 13   | —    | ns   | T <sub>J</sub> = 25°C, I <sub>F</sub> = 1.6A,   |
| Reverse Recovery Charge (Note 10)          | Q <sub>rr</sub>     | —   | 7    | —    | nC   | di/dt = 100A/μs   |
| <b>DYNAMIC CHARACTERISTICS (Note 10)</b>   |                     |     |      |      |      |   |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 448  | —    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                   |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 82   | —    |      |   |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 49   | —    |      |   |
| Turn-On Delay Time (Note 9)                | t <sub>D(on)</sub>  | —   | 2.4  | —    | ns   | V <sub>DD</sub> = 15V, I <sub>D</sub> = 1A,<br>R <sub>G</sub> ≅ 6.0Ω, V <sub>GS</sub> = 10V |
| Turn-On Rise Time (Note 9)                 | t <sub>r</sub>      | —   | 2.5  | —    |      |   |
| Turn-Off Delay Time (Note 9)               | t <sub>D(off)</sub> | —   | 13.1 | —    |      |   |
| Turn-Off Fall Time (Note 9)                | t <sub>f</sub>      | —   | 5.3  | —    | nC   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 3.2A                      |
| Total Gate Charge (Note 9)                 | Q <sub>g</sub>      | —   | 8.6  | —    |      |   |
| Gate-Source Charge (Note 9)                | Q <sub>gs</sub>     | —   | 1.4  | —    |      |   |
| Gate-Drain Charge (Note 9)                 | Q <sub>gd</sub>     | —   | 1.8  | —    |      |   |

- Notes:
8. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
  9. Switching characteristics are independent of operating junction temperature.
  10. For design aid only, not subject to production testing.

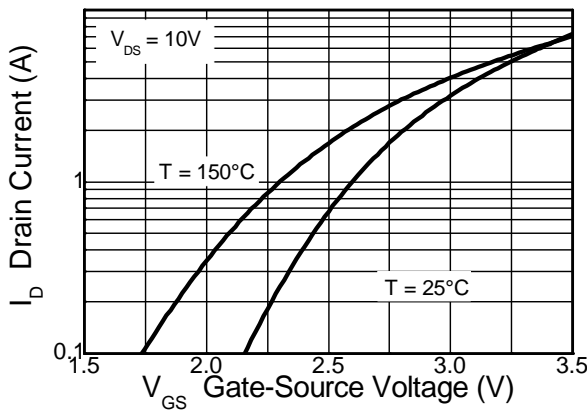
**Typical Characteristics**



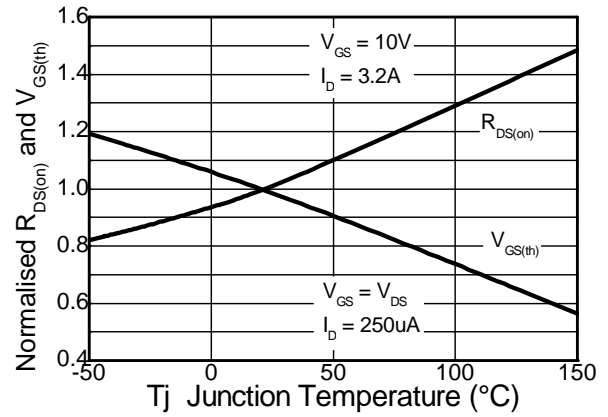
**Output Characteristics**



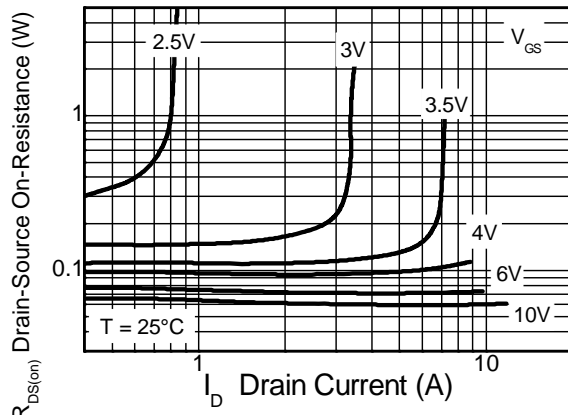
**Output Characteristics**



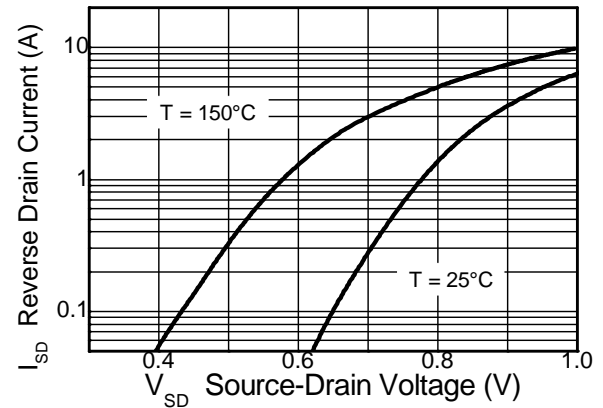
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

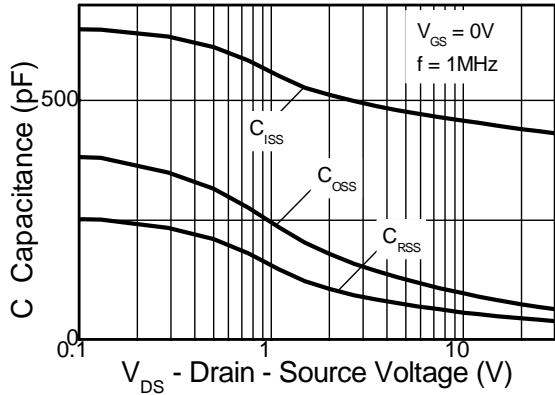


**On-Resistance v Drain Current**

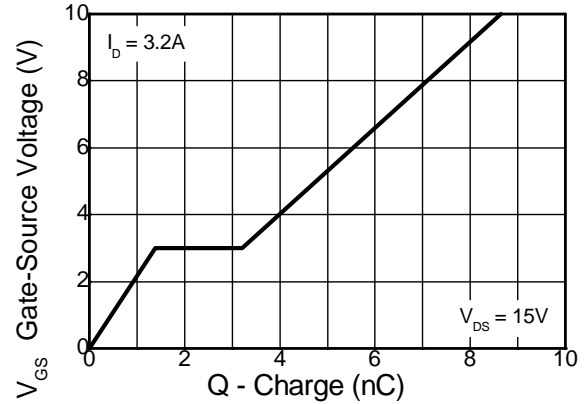


**Source-Drain Diode Forward Voltage**

**Typical Characteristics - continued**

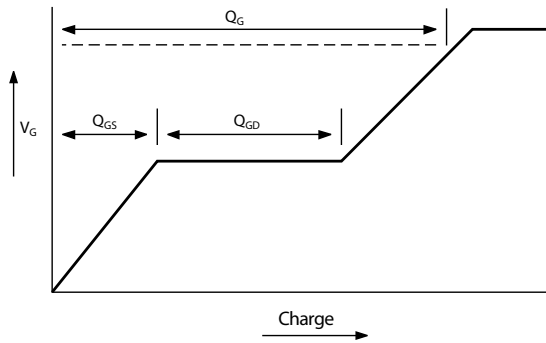


**Capacitance v Drain-Source Voltage**

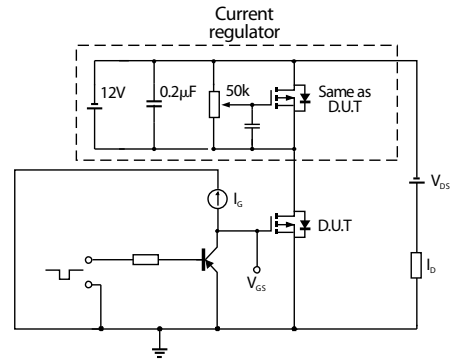


**Gate-Source Voltage v Gate Charge**

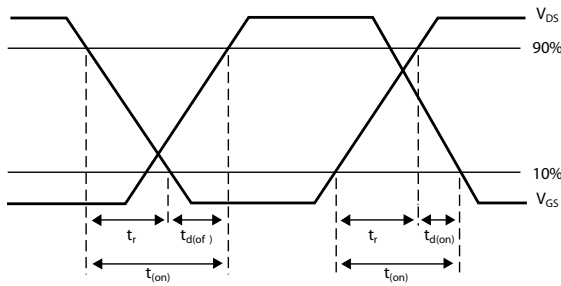
**Test Circuits**



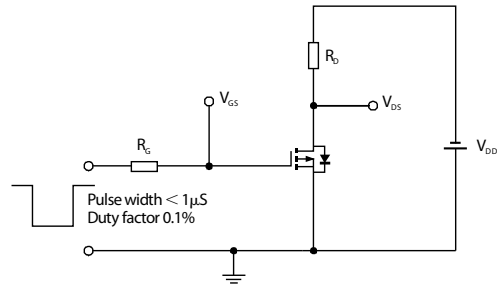
**Basic gate charge waveform**



**Gate charge test circuit**

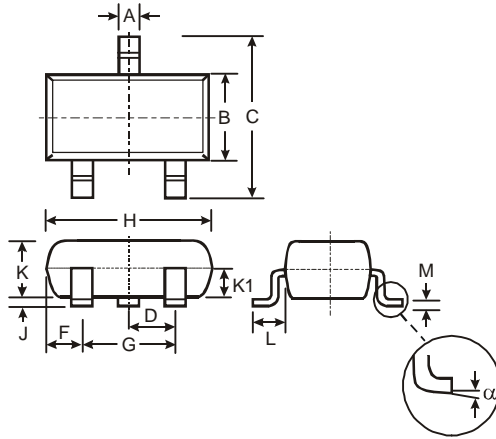


**Switching time waveforms**



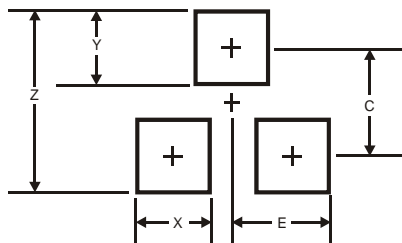
**Switching time test circuit**

**Package Outline Dimensions**



| 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                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| α                    | 0°    | 8°   | -     |
| All Dimensions in mm |       |      |       |

**Suggested Pad Layout**



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

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