

60V N-CHANNEL ENHANCEMENT MODE VERTICAL DMOS FET IN E-LINE

**Product Summary**

| $V_{(BR)DSS}$ | Max $R_{DS(on)}$               | Max $I_D$<br>@ $T_A = 25^\circ C$ |
|---------------|--------------------------------|-----------------------------------|
| 60V           | 330m $\Omega$ @ $V_{GS} = 10V$ | 1.4A                              |
|               | 450m $\Omega$ @ $V_{GS} = 5V$  | 1.2A                              |

**Features and Benefits**

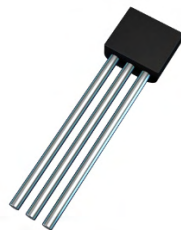
- Breakdown Voltage  $BV_{DSS} > 60V$
- $R_{DS(on)} \leq 0.33\Omega$  @  $V_{GS} = 10V$
- Maximum continuous drain current  $I_D = 1.1A$
- “Green” component, Lead Free Finish / RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

**Application**

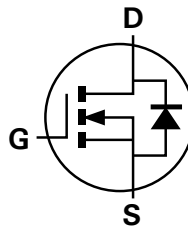
- DC – DC convertors
- Solenoids / relay drivers for automotive

**Mechanical Data**

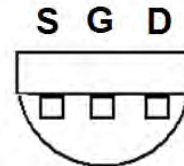
- Case: E-Line (TO-92 Compatible)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.159 grams (approximate)



E-Line



Equivalent Circuit



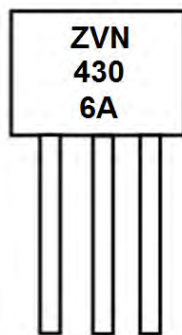
Pin Out - Bottom View

**Ordering Information** (Note 1)

| Part Number | Package | Marking  | Quantity            |
|-------------|---------|----------|---------------------|
| ZVN4306ASTZ | E-Line  | ZVN4306A | 2,000 per Ammo pack |
| ZVN4306A    | E-Line  | ZVN4306A | 4,000 loose per box |

Notes: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds. All applicable RoHS exemptions applied. Further information about Diodes Inc.’s “Green” Policy can be found on our website at <http://www.diodes.com>

**Marking Information**



ZVN4306A = Product Type Marking Code On Rounded Face

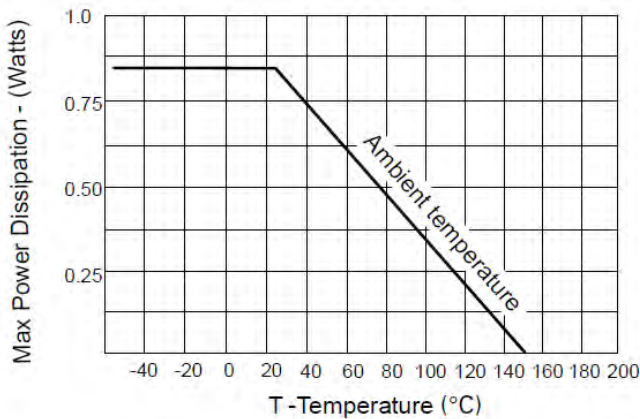
**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                     | Symbol    | Value    | Unit |
|------------------------------------|-----------|----------|------|
| Drain-Source Voltage               | $V_{DSS}$ | 60       | V    |
| Gate-Source Voltage                | $V_{GSS}$ | $\pm 20$ | V    |
| Continuous Drain Current           | $I_D$     | 1.1      | A    |
| Practical Continuous Drain Current | $I_{DP}$  | 1.3      | A    |
| Pulsed Drain Current               | $I_{DM}$  | 15       | A    |

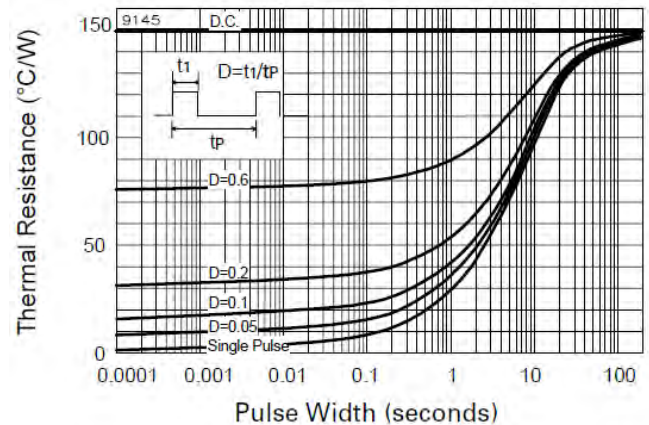
**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                   | Symbol          | Value       | Unit               |
|--------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation                                | $P_D$           | 850         | mW                 |
| Practical Power Dissipation (Note 2)             | $P_{DP}$        | 1.13        | W                  |
| Thermal Resistance, Junction to Ambient          | $R_{\theta JA}$ | 150         | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient (Note 2) | $R_{\theta JA}$ | 111         | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Leads (Note 3)   | $R_{\theta JL}$ | 50          | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

Notes: 2. For a device mounted on 25mm X 25mm X 1.6mm FR-4 PCB with high coverage of single sided 1oz copper, in still air condition.  
3. Thermal resistance from junction to solder-point



Derating curve



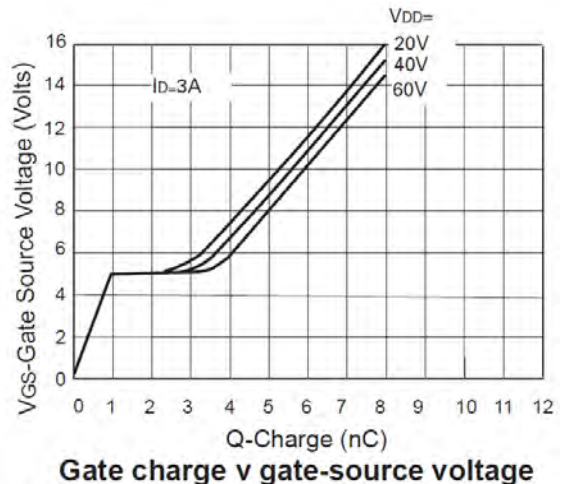
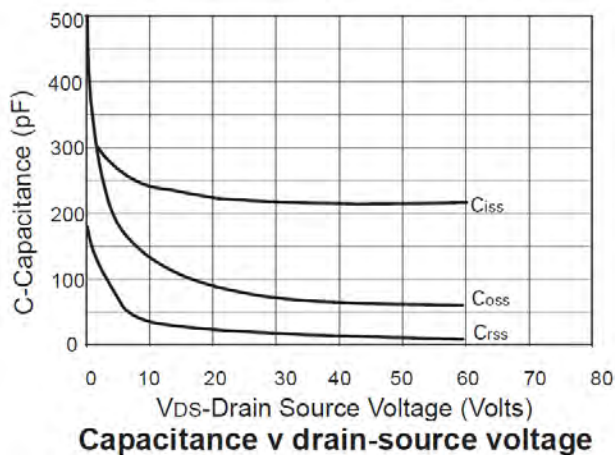
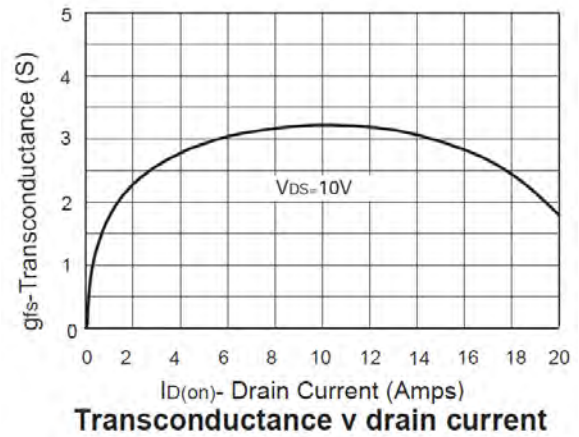
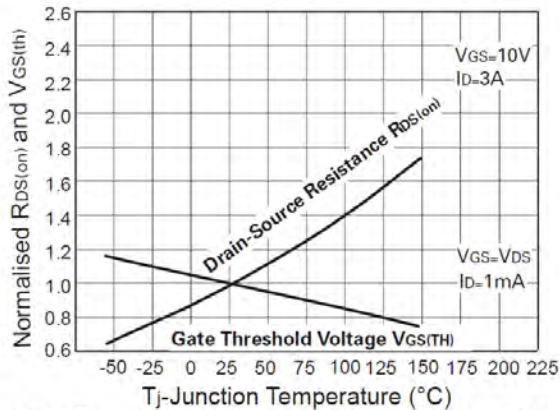
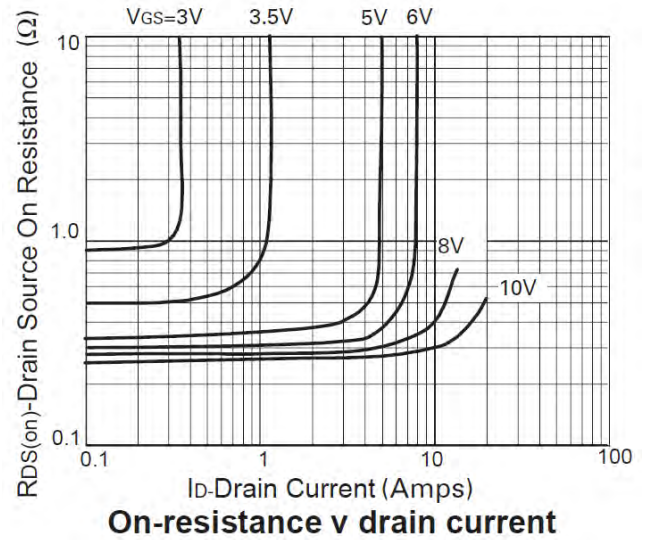
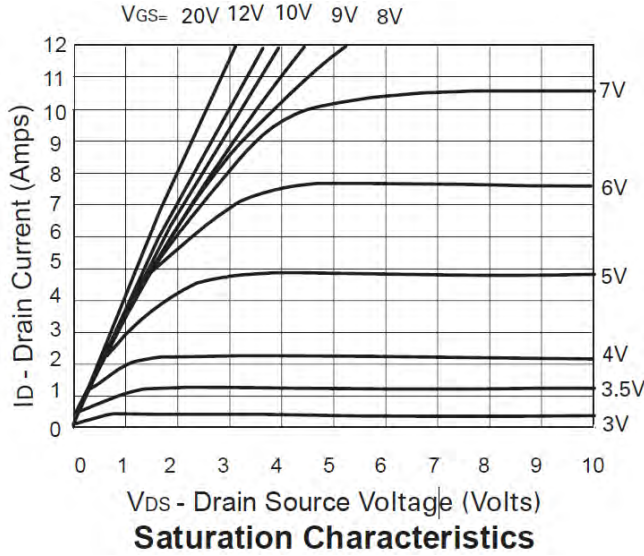
Maximum transient thermal impedance

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

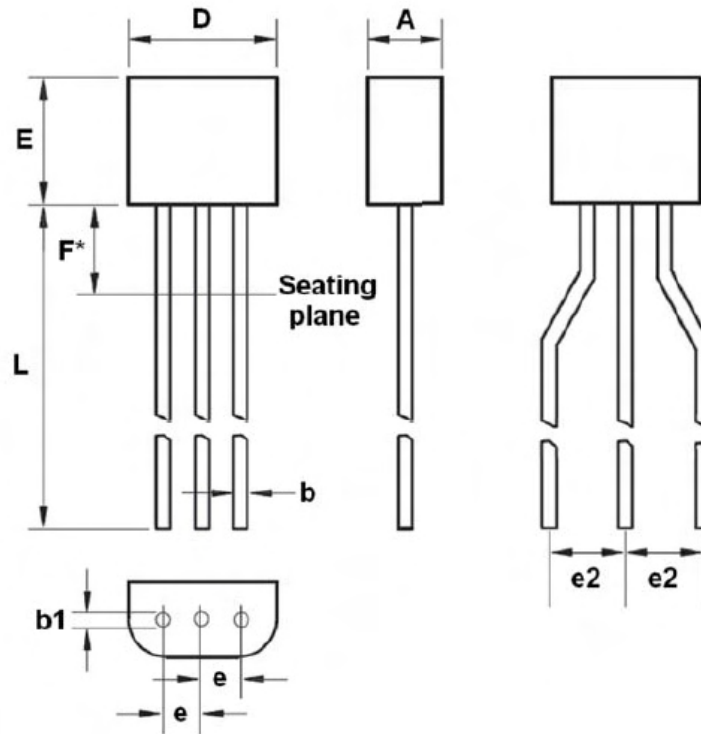
| Characteristic                                        | Symbol              | Min | Typ          | Max          | Unit | Test Condition                                                                                                     |
|-------------------------------------------------------|---------------------|-----|--------------|--------------|------|--------------------------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 4)</b>                   |                     |     |              |              |      |                                                                                                                    |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | 60  | -            | -            | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA                                                                         |
| Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C | I <sub>DSS</sub>    | -   | -            | 1<br>20      | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V, T <sub>A</sub> = 125°C |
| Gate-Source Leakage                                   | I <sub>GSS</sub>    | -   | -            | ±100         | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                                       |
| On-State Drain Current                                | I <sub>D(on)</sub>  | 12  | -            | -            | A    | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 10V                                                                       |
| <b>ON CHARACTERISTICS (Note 4)</b>                    |                     |     |              |              |      |                                                                                                                    |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | 1.3 | -            | 3            | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA                                                           |
| Static Drain-Source On-Resistance                     | R <sub>DS(on)</sub> | -   | 0.22<br>0.32 | 0.33<br>0.45 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A<br>V <sub>GS</sub> = 5V, I <sub>D</sub> = 1.5A                          |
| Forward Transconductance                              | g <sub>fs</sub>     | 700 | -            | -            | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 3A                                                                         |
| <b>DYNAMIC CHARACTERISTICS (Note 4)</b>               |                     |     |              |              |      |                                                                                                                    |
| Input Capacitance                                     | C <sub>iss</sub>    | -   | -            | 350          | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                                         |
| Output Capacitance                                    | C <sub>oss</sub>    | -   | -            | 140          | pF   |                                                                                                                    |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    | -   | -            | 30           | pF   |                                                                                                                    |
| Turn-On Delay Time (Note 5)                           | t <sub>d(on)</sub>  | -   | -            | 8            | ns   | V <sub>DD</sub> = 25V, I <sub>D</sub> = 3A, V <sub>GEM</sub> = 10V                                                 |
| Turn-On Rise Time (Note 5)                            | t <sub>r</sub>      | -   | -            | 25           | ns   |                                                                                                                    |
| Turn-Off Delay Time (Note 5)                          | t <sub>d(off)</sub> | -   | -            | 30           | ns   |                                                                                                                    |
| Turn-Off Fall Time (Note 5)                           | t <sub>f</sub>      | -   | -            | 16           | ns   |                                                                                                                    |

Notes: 4. Measured under pulsed conditions. Width = 300μs. Duty cycle ≤ 2%  
5. Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator

**Electrical Characteristics**



**Package Outline Dimensions**



| DIM | Millimeters |       | Inches    |        |
|-----|-------------|-------|-----------|--------|
|     | Min.        | Max.  | Min.      | Max.   |
| A   | 2.16        | 2.41  | 0.085     | 0.095  |
| b   | 0.41        | 0.495 | 0.016     | 0.0195 |
| b1  | 0.41        | 0.495 | 0.016     | 0.0195 |
| D   | 4.37        | 4.77  | 0.172     | 0.188  |
| E   | 3.61        | 4.01  | 0.142     | 0.158  |
| e*  | 1.27 NOM    |       | 0.050 NOM |        |
| e†  | 2.54 NOM    |       | 0.100 NOM |        |
| F‡  | —           | 2.50  | —         | 0.098  |
| L   | 13.00       | 13.97 | 0.512     | 0.550  |

**NOTES:**

- \* loose product only
- † taped product only
- ‡ leads uncontrolled above seating plane

Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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