

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

**Product Summary**

$V_{(BR)DSS}$	Max $R_{DS(on)}$	Max $I_D$ @ $T_A = 25^\circ C$
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**

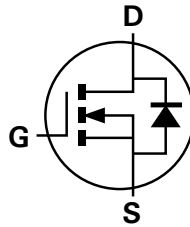
- DC – DC convertors
- Solenoids / relay drivers for automotive

**Mechanical Data**

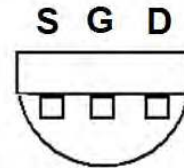
- Case: E-Line (TO-92 Compatible)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.159 grams (approximate)



E-Line



Equivalent Circuit



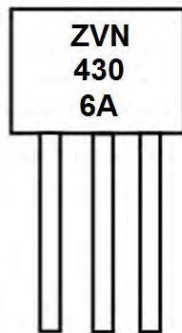
Pin Out - Bottom View

**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

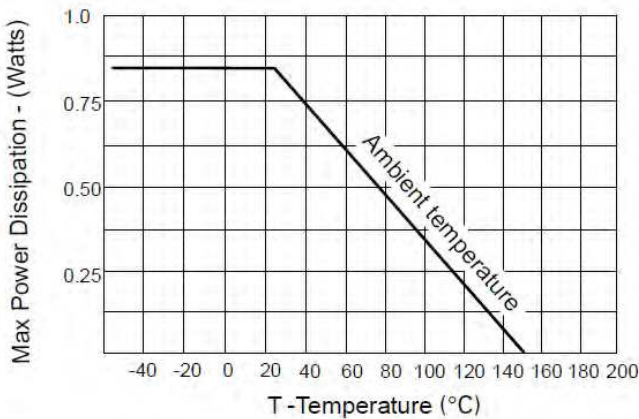
**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

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

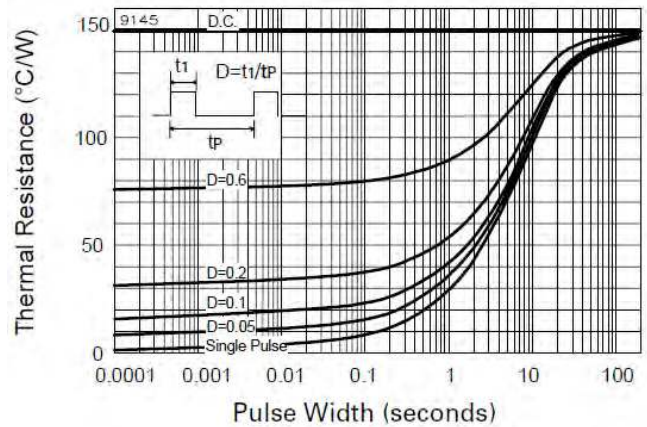
**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

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



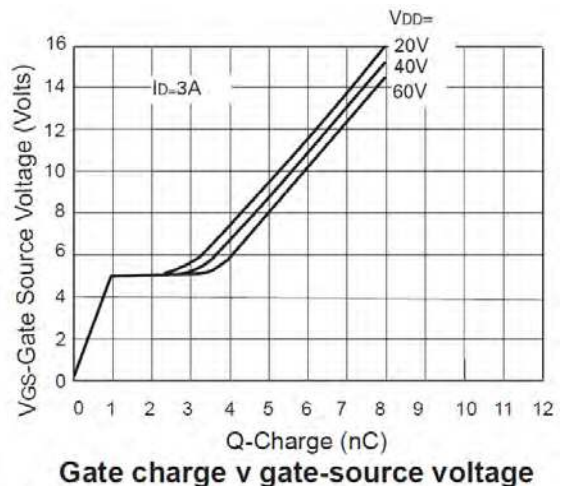
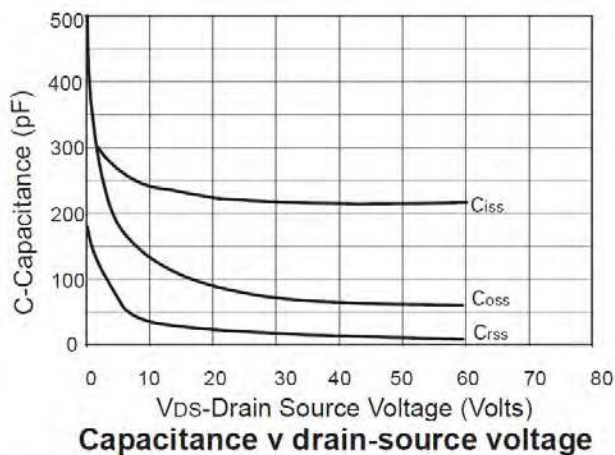
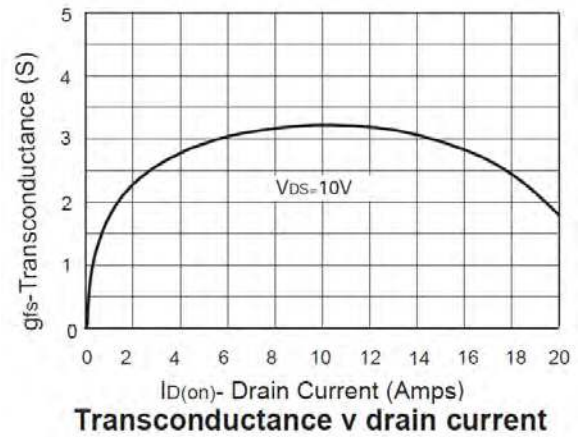
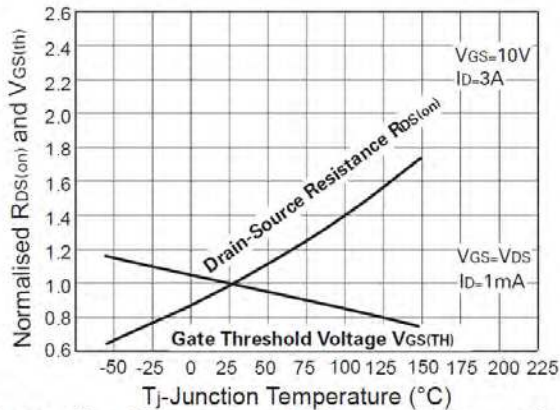
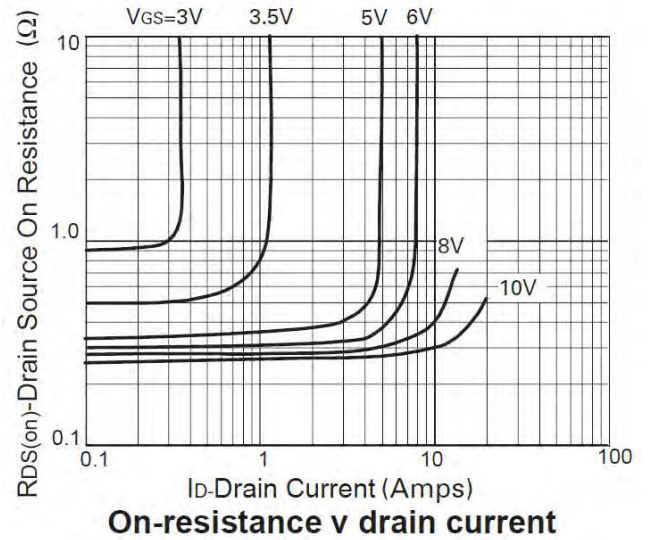
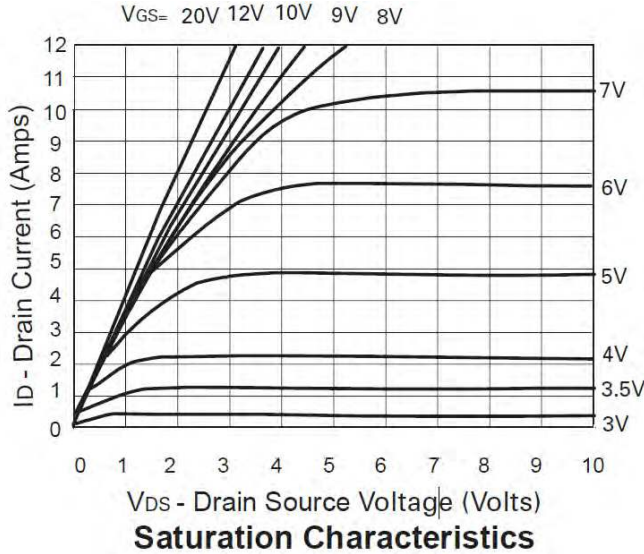
Maximum transient thermal impedance

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

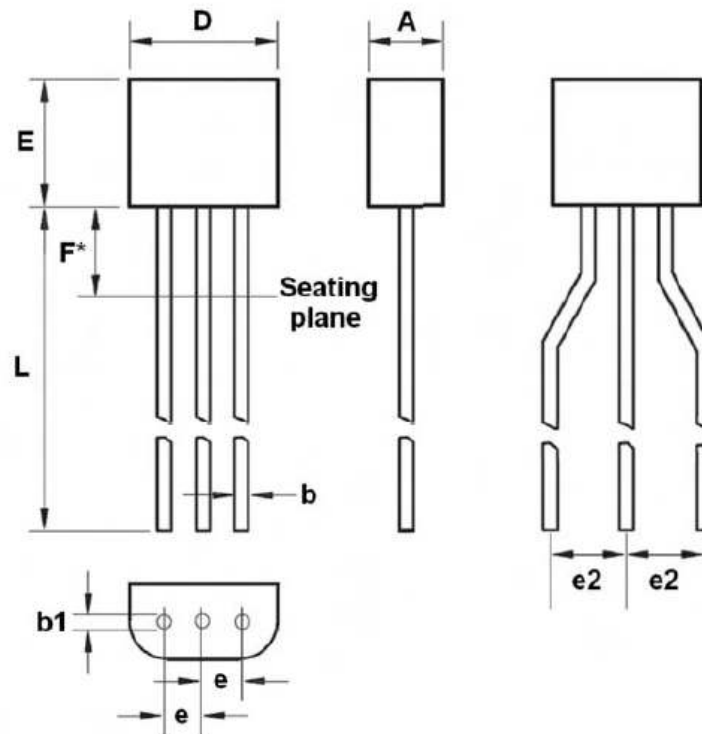
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	1 20	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V 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 0.32	0.33 0.45	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A 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, 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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