

N-CHANNEL ENHANCEMENT MODE VERTICAL DMOS FET

ZVN4306AV

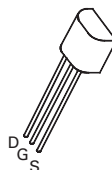
ISSUE 1 – FEBRUARY 95

FEATURES

- * 60 Volt V_{DS}
- * $R_{DS(on)} = 0.33\Omega$
- * Repetitive Avalanche Rating

APPLICATIONS

- * Solenoids / relay drivers for automotive
- * Stepper Motor Drivers
- * DC-DC convertors



E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---------------|-------------|-------------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Continuous Drain Current at $T_{amb}=25^{\circ}C$ | I_D | 1.1 | A |
| Practical Continuous Drain Current at $T_{amb}=25^{\circ}C$ | I_{DP} | 1.3 | A |
| Pulsed Drain Current | I_{DM} | 15 | A |
| Gate Source Voltage | V_{GS} | ± 20 | V |
| Power Dissipation at $T_{amb}=25^{\circ}C$ | P_{tot} | 850 | mW |
| Practical Power Dissipation at $T_{amb}=25^{\circ}C^*$ | P_{totp} | 1.13 | W |
| Avalanche Current-Repetitive | I_{AR} | 1 | A |
| Avalanche Energy-Repetitive | E_{AR} | 25 | mJ |
| Operating and Storage Temperature Range | $T_j:T_{stg}$ | -55 to +150 | $^{\circ}C$ |

*The power which can be dissipated assuming the device is mounted in a typical manner on a P.C.B. with copper equal to 1 inch square minimum

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ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

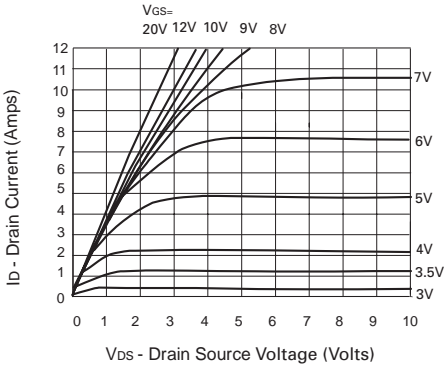
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS. |
|---|--------------|------|--------------|--------------|--------------------------------|--|
| Drain-Source Breakdown Voltage | BV_{DSS} | 60 | | | V | $I_D=1\text{mA}, V_{GS}=0\text{V}$ |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 1.3 | | 3 | V | $I_D=1\text{mA}, V_{DS}=V_{GS}$ |
| Gate-Body Leakage | I_{GSS} | | | 100 | nA | $V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | | | 10 100 | μA μA | $V_{DS}=60\text{V}, V_{GS}=0$ $V_{DS}=48\text{V}, V_{GS}=0\text{V}, T=125^{\circ}\text{C}(2)$ |
| On-State Drain Current(1) | $I_{D(on)}$ | 12 | | | A | $V_{DS}=10\text{V}, V_{GS}=10\text{V}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | 0.22 0.32 | 0.33 0.45 | Ω Ω | $V_{GS}=10\text{V}, I_D=3\text{A}$ $V_{GS}=5\text{V}, I_D=1.5\text{A}$ |
| Forward Transconductance (1)(2) | g_{fs} | 700 | | | mS | $V_{DS}=25\text{V}, I_D=3\text{A}$ |
| Input Capacitance (2) | C_{iss} | | | 350 | pF | $V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$ |
| Common Source Output Capacitance (2) | C_{oss} | | | 140 | pF | |
| Reverse Transfer Capacitance (2) | C_{rss} | | | 30 | pF | |
| Turn-On Delay Time (2)(3) | $t_{d(on)}$ | | | 8 | ns | $V_{DD}\approx 25\text{V}, V_{GEN}=10\text{V}, I_D=3\text{A}$ |
| Rise Time (2)(3) | t_r | | | 25 | ns | |
| Turn-Off Delay Time (2)(3) | $t_{d(off)}$ | | | 30 | ns | |
| Fall Time (2)(3) | t_f | | | 16 | ns | |

(1) Measured under pulsed conditions. Width=300 μs . Duty cycle $\leq 2\%$

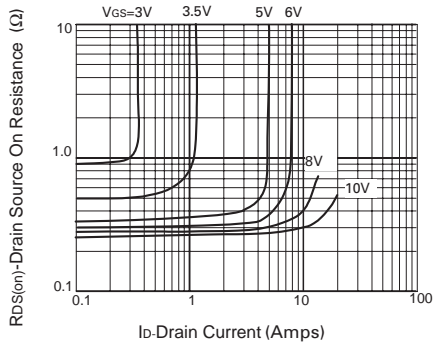
(2) Sample test.

(3) Switching times measured with 50 Ω source impedance and <5ns rise time on a pulse generator

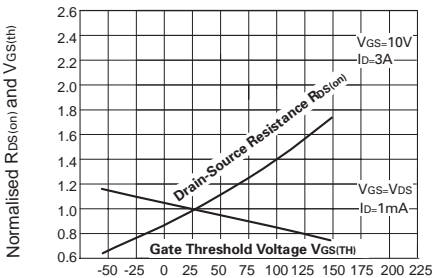
TYPICAL CHARACTERISTICS



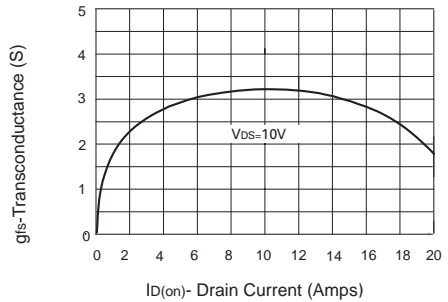
Saturation Characteristics



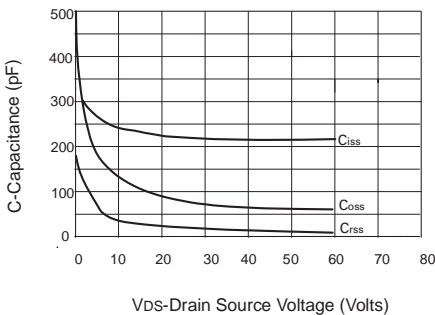
On-resistance v drain current



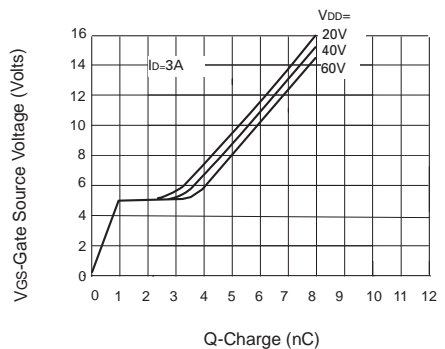
Normalised $R_{DS(on)}$ and $V_{GS(th)}$ v Temperature



Transconductance v drain current



Capacitance v drain-source voltage

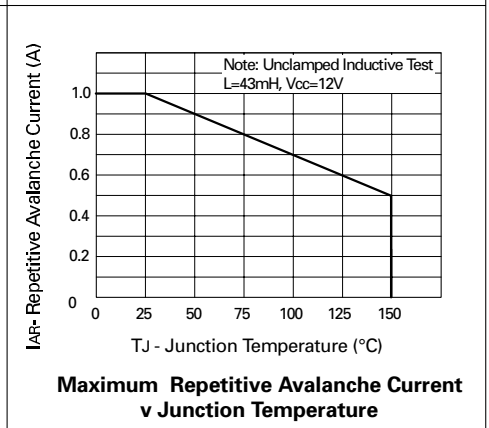
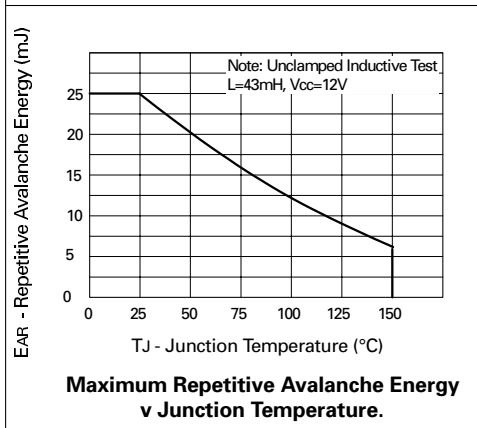
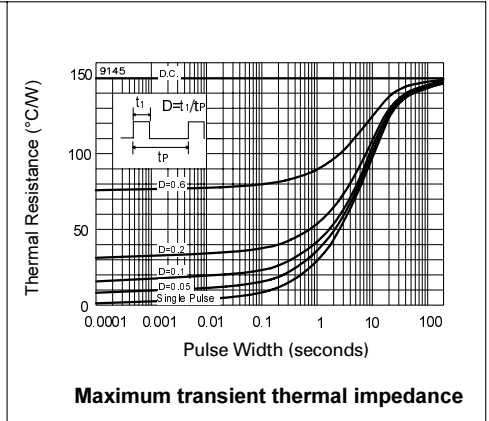
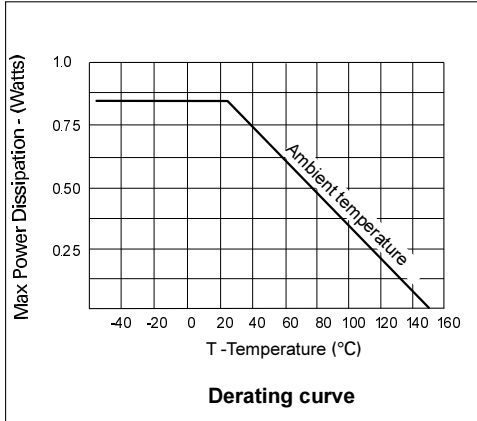


Gate charge v gate-source voltage

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THERMAL CHARACTERISTICS

| PARAMETER | SYMBOL | MAX. | UNIT |
|---|------------------|------|-----------------------------|
| Thermal Resistance: Junction to Ambient | $R_{th(j-amb)}$ | 150 | $^{\circ}\text{C}/\text{W}$ |
| Junction to Case | $R_{th(j-case)}$ | 50 | $^{\circ}\text{C}/\text{W}$ |



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