

SOT223 N-CHANNEL ENHANCEMENT  
MODE VERTICAL DMOS FET

ISSUE 3 - APRIL 1998

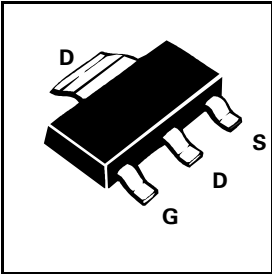
ZVN4206GV

FEATURES

- \* 60 Volt  $V_{DS}$
- \*  $R_{DS(on)} = 1\Omega$
- \* Repetitive avalanche rating
- \* No transient protection required
- \* Characterised for 5V logic drive

APPLICATIONS

- \* Automotive relay drivers
- \* Stepper motor driver



PARTMARKING DETAIL - ZVN4206V

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           | A           |
| Pulsed Drain Current                                     | $I_{DM}$      | 8           | A           |
| Gate-Source Voltage                                      | $V_{GS}$      | $\pm 20$    | V           |
| Power Dissipation at $T_{amb} = 25^{\circ}C$             | $P_{tot}$     | 2           | W           |
| Continuous Body Diode Current at $T_{amb} = 25^{\circ}C$ | $I_{SD}$      | 600         | mA          |
| Avalanche Current - Repetitive                           | $I_{AR}$      | 600         | mA          |
| Avalanche Energy - Repetitive                            | $E_{AR}$      | 15          | mJ          |
| Operating and Storage Temperature Range                  | $T_j:T_{stg}$ | -55 to +150 | $^{\circ}C$ |

# ZVN4206GV

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

| PARAMETER                                   | SYMBOL       | MIN. | 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<br>100 | $\mu\text{A}$<br>$\mu\text{A}$ | $V_{DS} = 60\text{V}$ , $V_{GS} = 0\text{V}$<br>$V_{DS} = 48\text{V}$ , $V_{GS} = 0\text{V}$ , $T = 125^{\circ}\text{C}$ (2) |
| On-State Drain Current (1)                  | $I_{D(on)}$  | 3    |           | A                              | $V_{DS} = 25\text{V}$ , $V_{GS} = 10\text{V}$                                                                                |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ |      | 1<br>1.5  | $\Omega$<br>$\Omega$           | $V_{GS} = 10\text{V}$ , $I_D = 1.5\text{A}$<br>$V_{GS} = 5\text{V}$ , $I_D = 0.5\text{A}$                                    |
| Forward Transconductance (1)(2)             | $g_{fs}$     | 300  |           | mS                             | $V_{DS} = 25\text{V}$ , $I_D = 1.5\text{A}$                                                                                  |
| Input Capacitance (2)                       | $C_{iss}$    |      | 100       | pF                             | $V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$                                                             |
| Common Source Output Capacitance (2)        | $C_{oss}$    |      | 60        | pF                             |                                                                                                                              |
| Reverse Transfer Capacitance (2)            | $C_{rss}$    |      | 20        | pF                             |                                                                                                                              |
| Turn-On Delay Time (2)(3)                   | $t_{d(on)}$  |      | 8         | ns                             | $V_{DD} \approx 25\text{V}$ , $I_D = 1.5\text{A}$ , $V_{GEN} = 10\text{V}$                                                   |
| Rise Time (2)(3)                            | $t_r$        |      | 12        | ns                             |                                                                                                                              |
| Turn-Off Delay Time (2)(3)                  | $t_{d(off)}$ |      | 12        | ns                             |                                                                                                                              |
| Fall Time (2)(3)                            | $t_f$        |      | 15        | ns                             |                                                                                                                              |

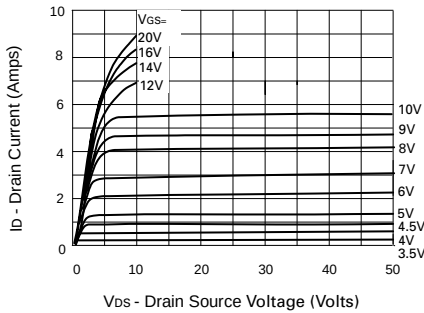
(1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

(2) Sample test.

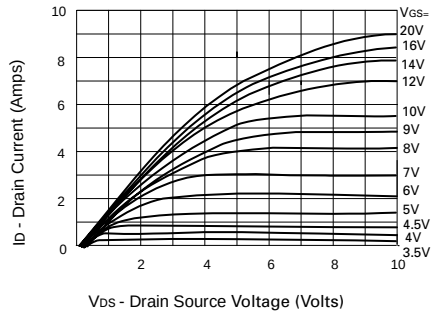
(3) Switching times measured with 50 $\Omega$  source impedance and <5ns rise time on a pulse generator

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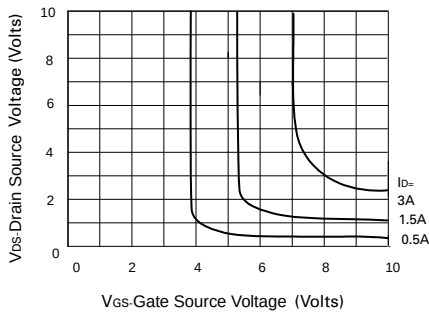
## TYPICAL CHARACTERISTICS



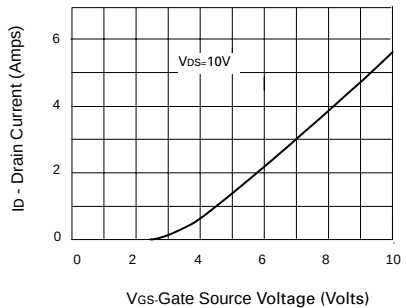
**Output Characteristics**



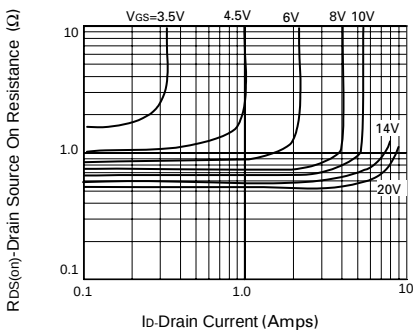
**Saturation Characteristics**



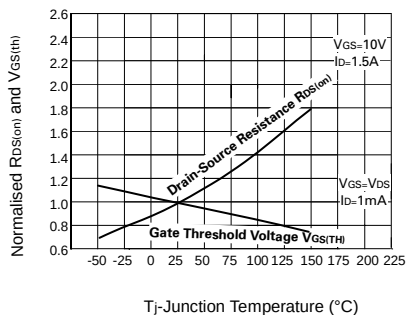
**Voltage Saturation Characteristics**



**Transfer Characteristics**



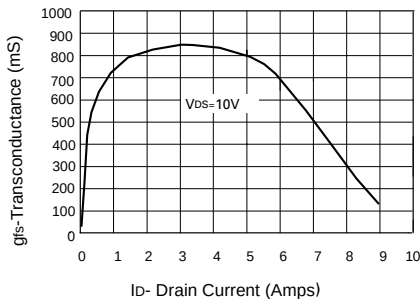
**On-resistance v drain current**



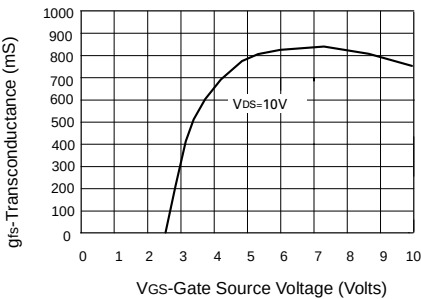
**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  v Temperature**

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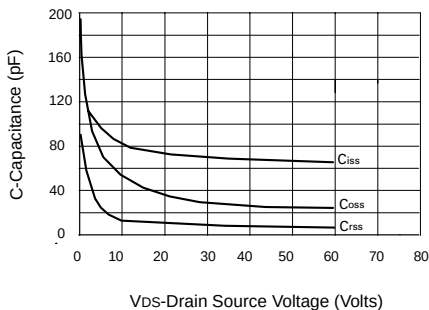
## TYPICAL CHARACTERISTICS



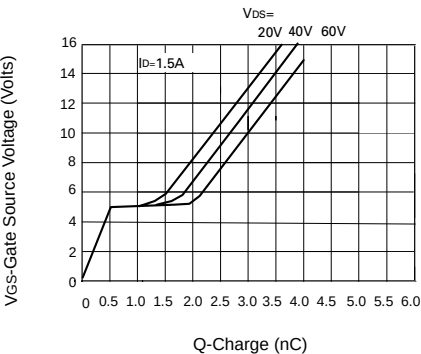
Transconductance v drain current



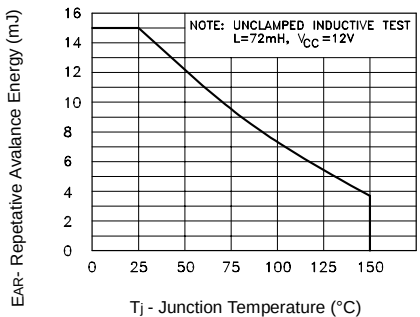
Transconductance v gate-source voltage



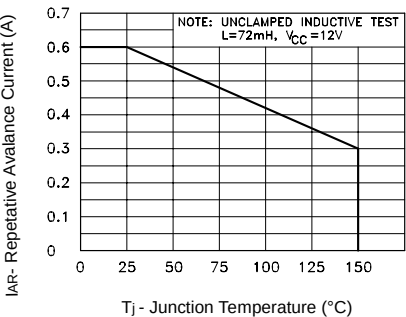
Capacitance v drain-source voltage



Gate charge v gate-source voltage



Maximum repetitive avalanche energy v Junction Temperature



Maximum repetitive avalanche current v Junction Temperature