



PRODUCT DATA SHEET



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Datasheet



Resources



Samples

Please note: Please check the JINGAO Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.jg-semi.cn. Please email any questions regarding the system integration to JINGAO_questions@jgsemi.com.

General Description

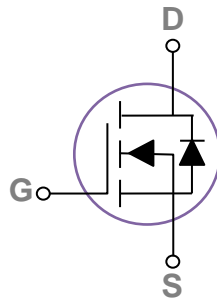
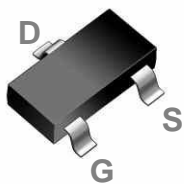
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

| | | |
|-------|-------|----|
| BVDSS | RDSON | ID |
| 20V | 23mΩ | 4A |

Features

- 20V, 4A, $R_{DS(ON)} = 23m\Omega @ V_{GS} = 4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

SOT-23 Pin Configuration



Applications

- Notebook
- Load Switch
- Hand-Held Instruments

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ\text{C}$) | 4 | A |
| | Drain Current – Continuous ($T_c=100^\circ\text{C}$) | 3.2 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 20 | A |
| P_D | Power Dissipation ($T_c=25^\circ\text{C}$) | 1.56 | W |
| | Power Dissipation – Derate above 25°C | 0.012 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 125 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 80 | $^\circ\text{C/W}$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|---|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 20 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.02 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =20V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =16V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±12V, V _{DS} =0V | --- | --- | ±100 | nA |

On Characteristics

| | | | | | | |
|----------------------|---|--|-----|-----|-----|-------|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =4.5V, I _D =4A | --- | 23 | 40 | mΩ |
| | | V _{GS} =2.5V, I _D =3A | --- | 30 | 55 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 0.4 | 0.6 | 1 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 2 | --- | mV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _S =2A | --- | 4.4 | --- | S |

Dynamic and switching Characteristics

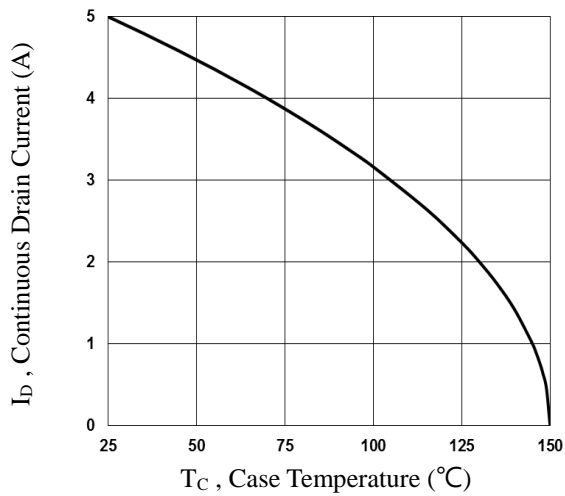
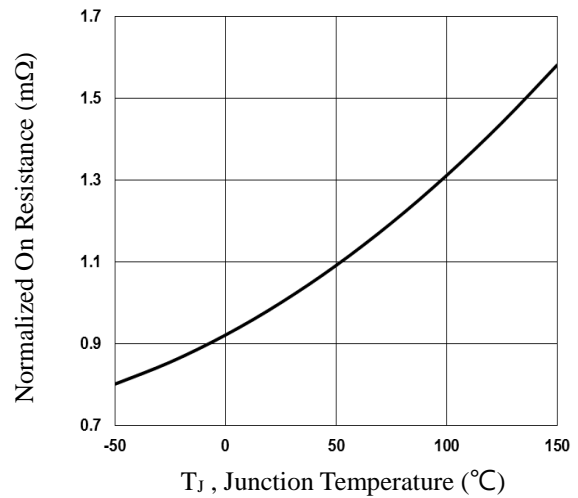
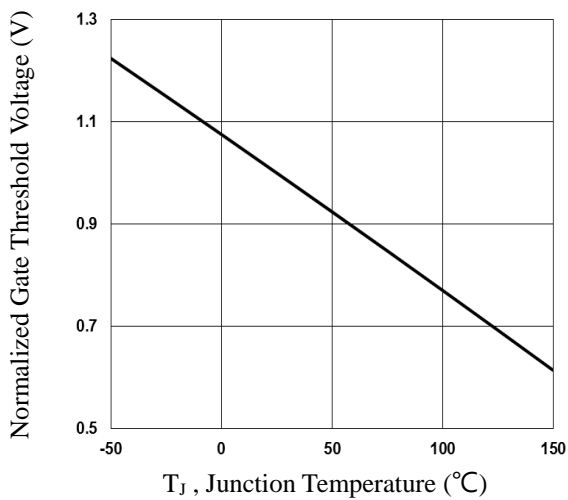
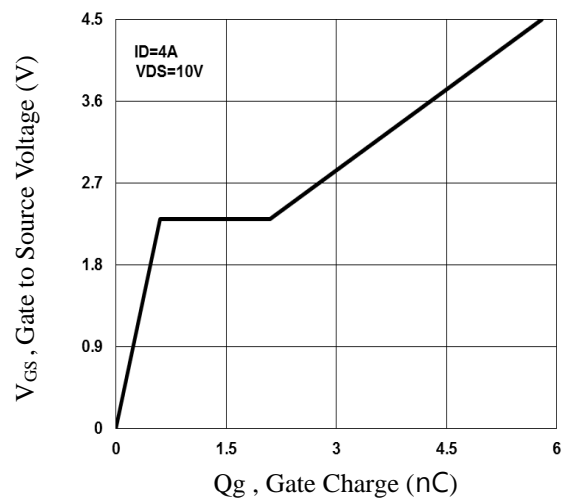
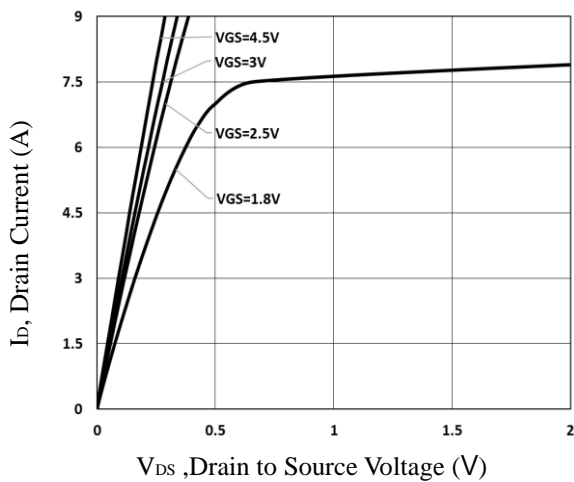
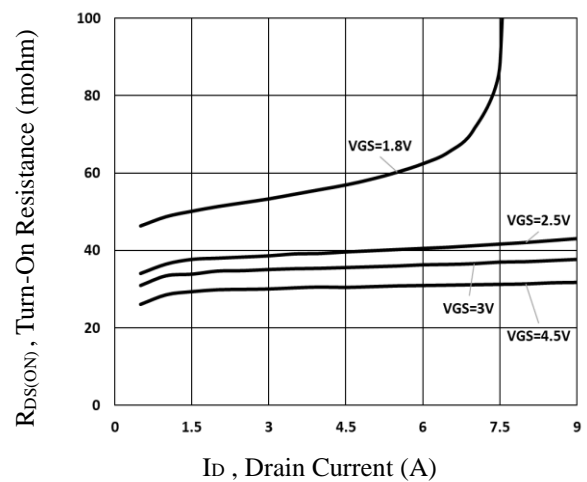
| | | | | | | |
|---------------------|------------------------------------|--|-----|------|--|----|
| Q _g | Total Gate Charge ^{2,3} | V _{DS} =10V, V _{GS} =4.5V, I _D =4A | --- | 5.8 | | nC |
| Q _{gs} | Gate-Source Charge ^{2,3} | | --- | 0.6 | | |
| Q _{gd} | Gate-Drain Charge ^{2,3} | | --- | 1.5 | | |
| T _{d(on)} | Turn-On Delay Time ^{2,3} | V _{DD} =10V, V _{GS} =4.5V, R _G =25Ω I _D =1A | --- | 2.9 | | nS |
| T _r | Rise Time ^{2,3} | | --- | 8.4 | | |
| T _{d(off)} | Turn-Off Delay Time ^{2,3} | | --- | 19.2 | | |
| T _f | Fall Time ^{2,3} | | --- | 5.6 | | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, F=1MHz | --- | 315 | | pF |
| C _{oss} | Output Capacitance | | --- | 50 | | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 40 | | |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 4 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 8 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.


Fig.1 Continuous Drain Current vs. T_c

Fig.2 Normalized $R_{DS(on)}$ vs. T_j

Fig.3 Normalized V_{th} vs. T_j

Fig.4 Gate Charge Waveform

Fig.5 Typical Output Characteristics

Fig.6 Turn-On Resistance vs. I_D

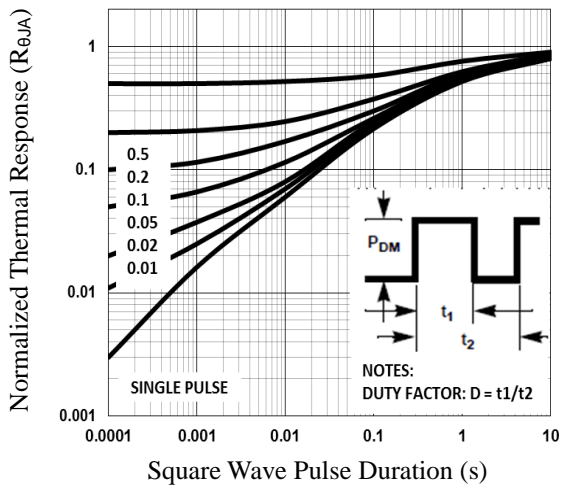


Fig.7 Normalized Transient Impedance

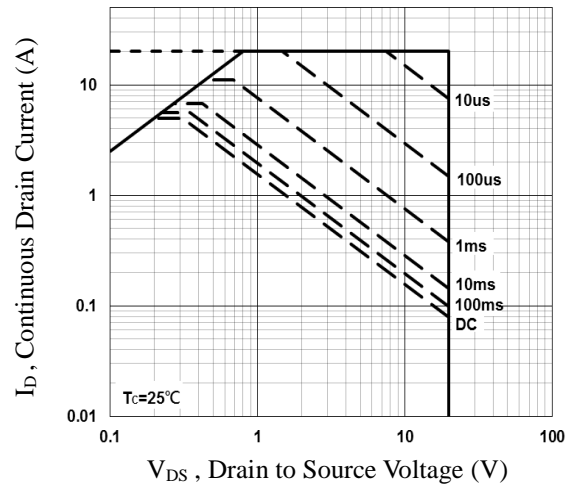


Fig.8 Maximum Safe Operation Area

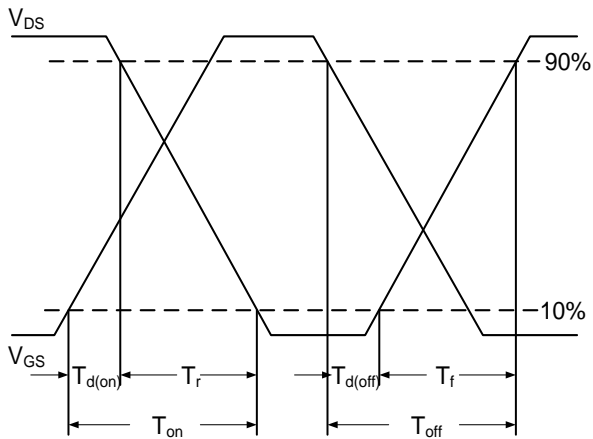


Fig.9 Switching Time Waveform

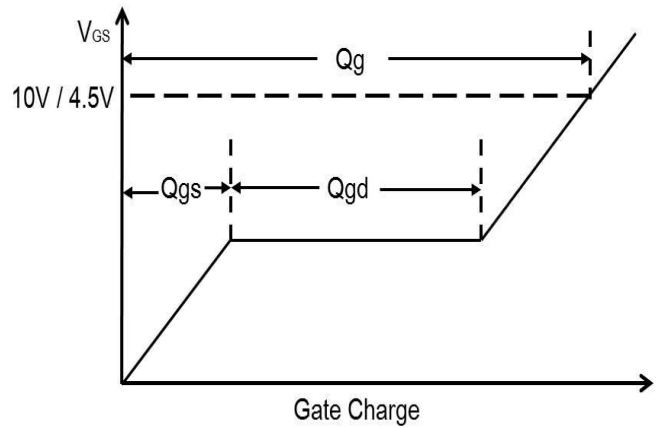
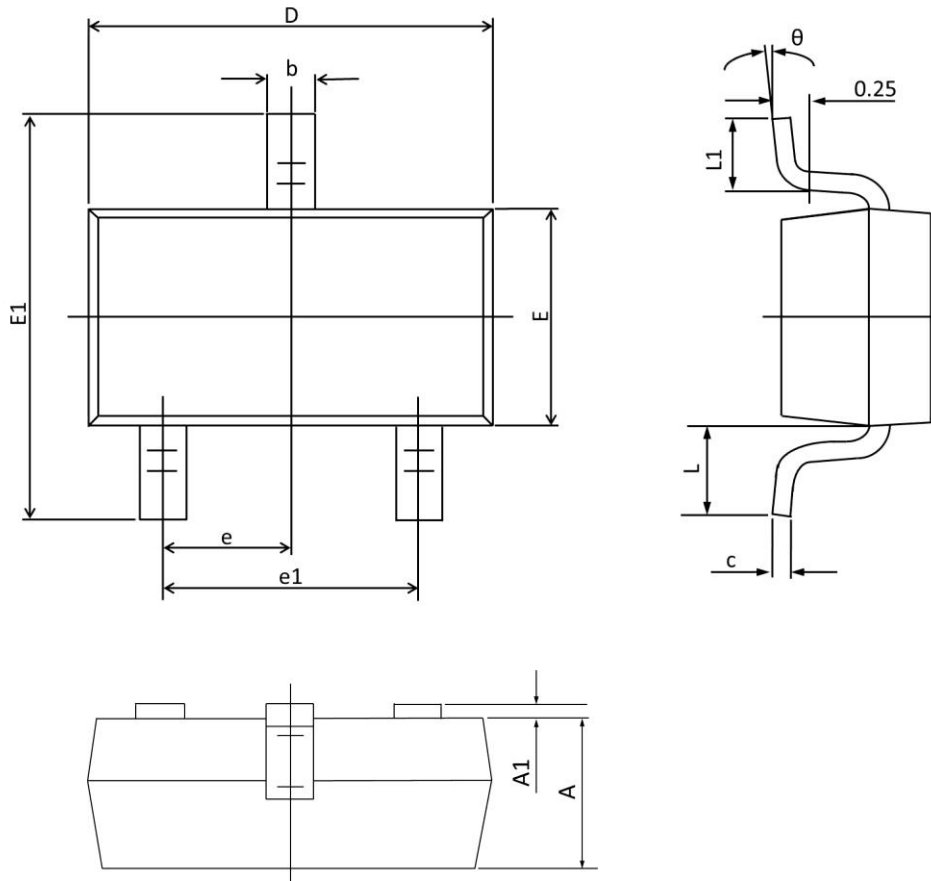


Fig.10 Gate Charge Waveform

SOT-23 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.000 | 0.035 | 0.039 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.090 | 0.110 | 0.003 | 0.004 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP. | | 0.037 TYP. | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF. | | 0.022 REF. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 1° | 7° | 1° | 7° |

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