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SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

SI2302-MS

Product specification

Features

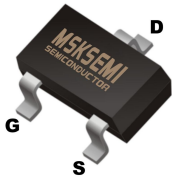
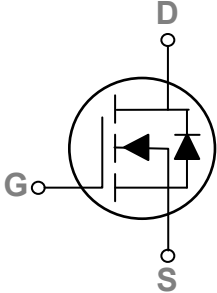

- 20V,2.8A,RDS(ON)=40mΩ@VGS=4.5V
- Improveddv/dtcapability
- Fastswitching
- GreenDeviceAvailable

Application

- *Notebook*
- *Load Switch*
- *Hand-Held Instruments*

| BVDSS | RDSON | ID |
|-------|-------|------|
| 20V | 40mΩ | 2.8A |

Reference News

| PACKAGE OUTLINE | Pin Configuration | Marking |
|--|--|--|
|  <p>SOT-23</p> |  |  |

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 20 | V |
| V _{GS} | Gate-Source Voltage | ±10 | V |
| I _D | Drain Current – Continuous (T _C =25°C) | 2.8 | A |
| | Drain Current – Continuous (T _C =100°C) | 2.8 | A |
| I _{DM} | Drain Current – Pulsed ¹ | 16 | A |
| P _D | Power Dissipation (T _C =25°C) | 1.56 | W |
| | Power Dissipation – Derate above 25°C | 0.012 | W/°C |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction to ambient | --- | 80 | °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 =250μA | 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 | μA |
| | | V _{DS} =16V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | μA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±10V, V _{DS} =0V | --- | --- | ±100 | nA |

On Characteristics

| | | | | | | |
|----------------------|---|--|-----|-----|-----|-------|
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} =4.5V, I _D =2A | --- | 40 | 60 | mΩ |
| | | V _{GS} =2.5V, I _D =1A | --- | 50 | 80 | |
| | | V _{GS} =1.8V, I _D =1A | --- | 80 | 130 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250μA | 0.4 | 0.5 | 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 =1A | --- | 3.6 | 7.2 | nC |
| Q _{gs} | Gate-Source Charge ^{2,3} | | --- | 0.38 | 0.76 | |
| Q _{gd} | Gate-Drain Charge ^{2,3} | | --- | 0.6 | 1.2 | |
| T _{d(on)} | Turn-On Delay Time ^{2,3} | V _{DD} =10V, V _{GS} =4.5V, R _G =25Ω I _D =1A | --- | 1.8 | 5 | nS |
| T _r | Rise Time ^{2,3} | | --- | 5.6 | 12 | |
| T _{d(off)} | Turn-Off Delay Time ^{2,3} | | --- | 11.3 | 24 | |
| T _f | Fall Time ^{2,3} | | --- | 3.2 | 7 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, F=1MHz | --- | 180 | 360 | pF |
| C _{oss} | Output Capacitance | | --- | 32 | 64 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 26 | 52 | |

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 | --- | --- | 3 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 6 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | 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.

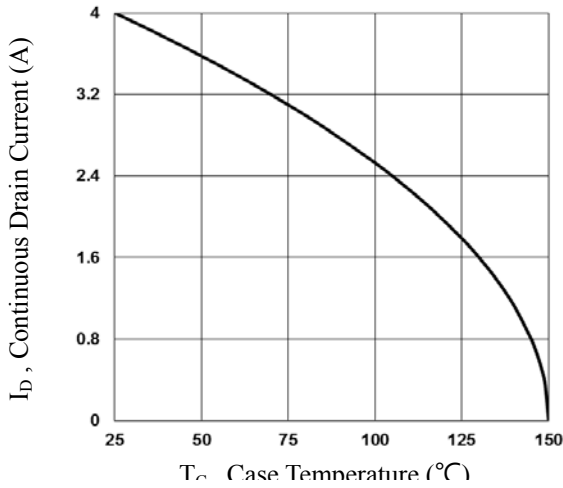


Fig.1 Continuous Drain Current vs. T_C

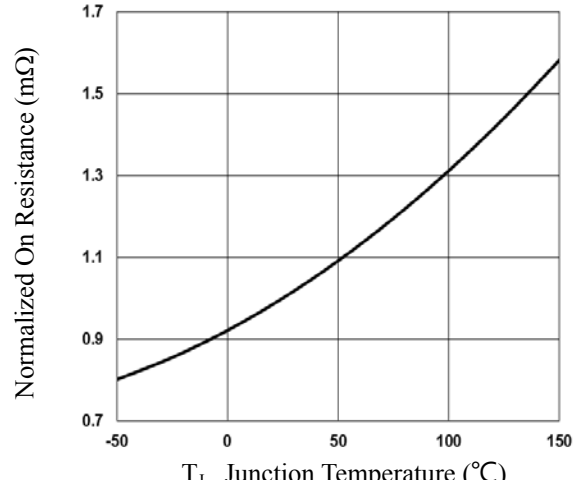


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

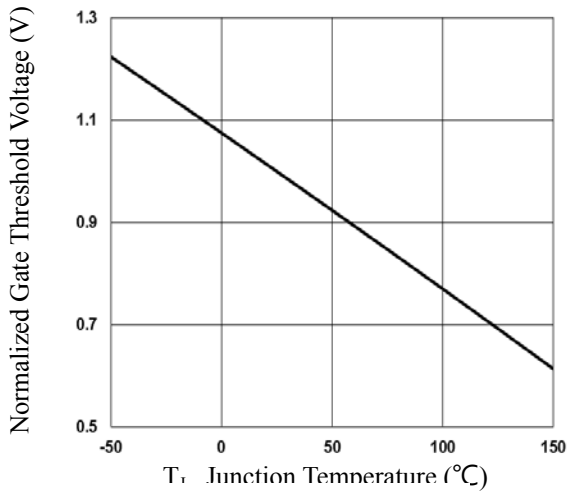


Fig.3 Normalized V_{th} vs. T_J

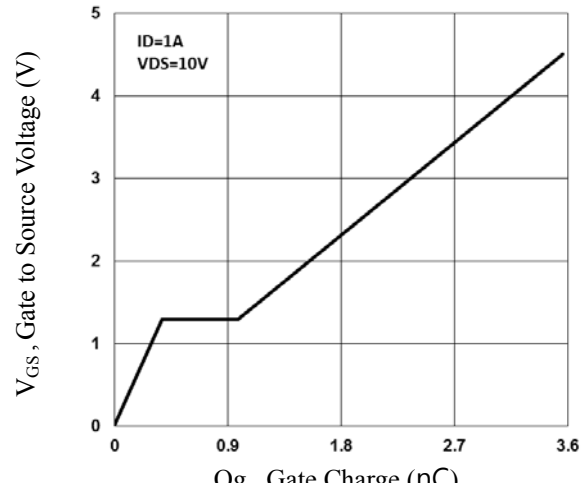


Fig.4 Gate Charge Waveform

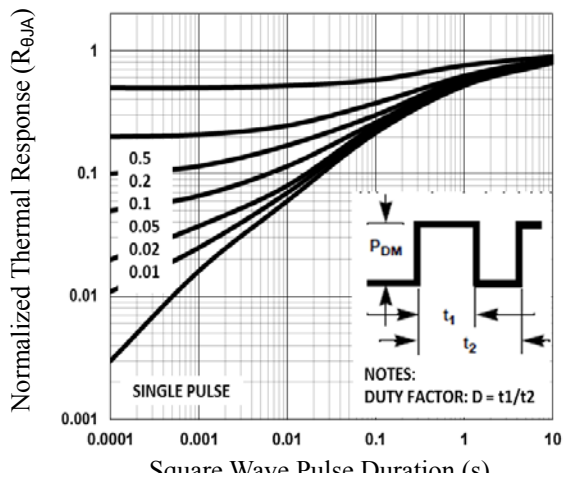


Fig.5 Normalized Transient Impedance

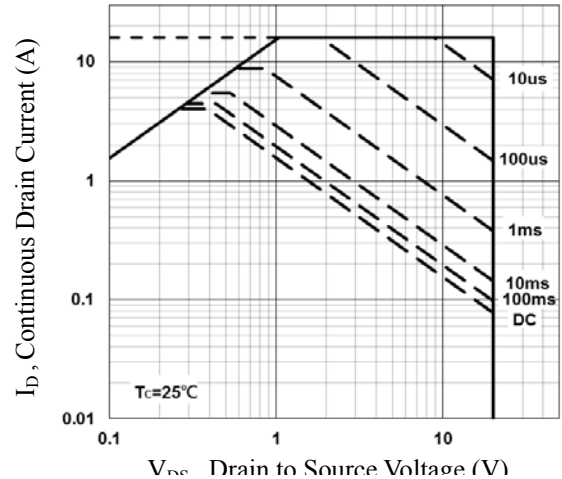


Fig.6 Maximum Safe Operation Area

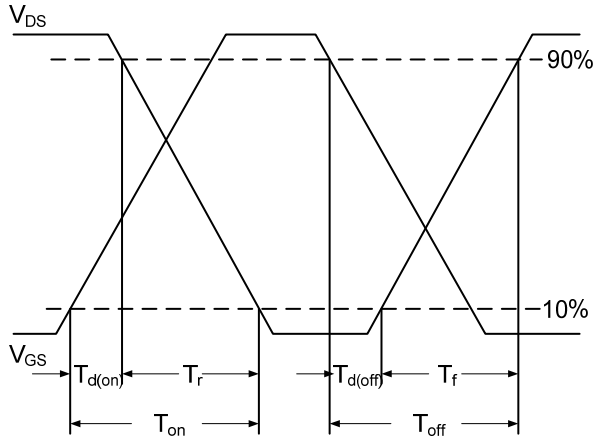


Fig.7 Switching Time Waveform

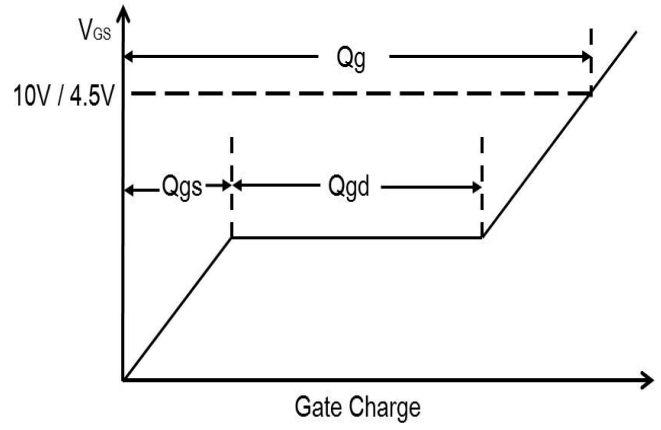
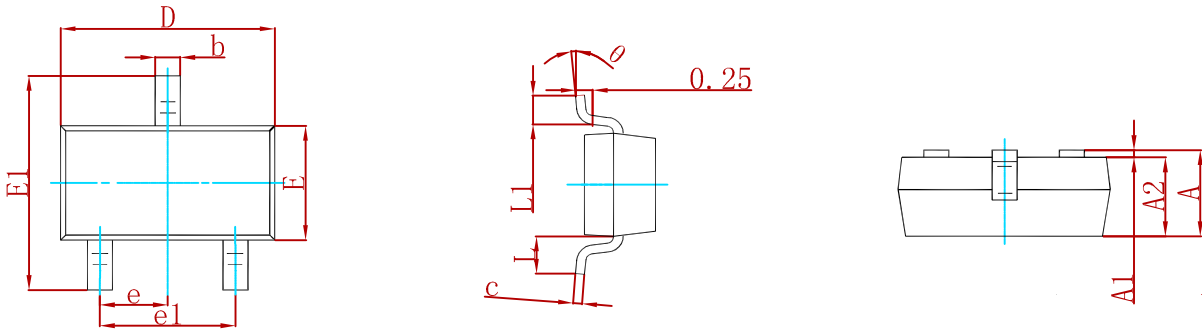


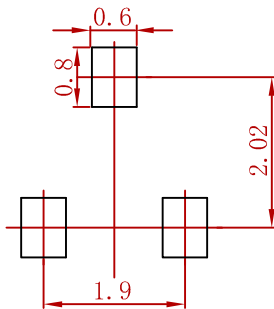
Fig.8 Gate Charge Waveform

PACKAGE MECHANICAL DATA



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| 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 | 0° | 8° | 0° | 8° |

Suggested Pad Layout



Note:
 1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.

REEL SPECIFICATION

| P/N | PKG | QTY |
|-----------|--------|------|
| SI2302-MS | SOT-23 | 3000 |

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