



STS 2302S

SamHop Microelectronics Corp.

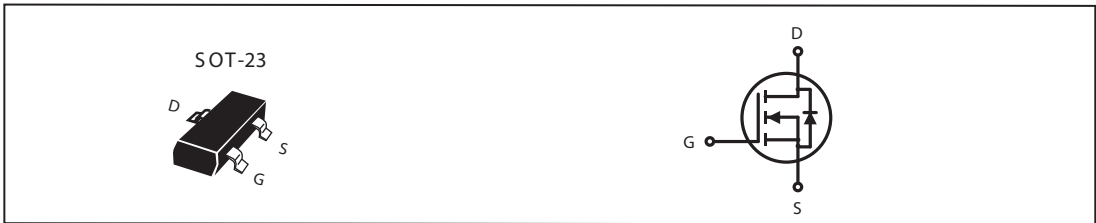
Sep. 3 2005

N-Channel Enhancement Mode Field Effect Transistor

| PRODUCT SUMMARY | | |
|------------------|----------------|--|
| V _{DSS} | I _D | R _{DS(ON)} (mΩ) Max |
| 20V | 4A | 47 @ V _{GS} = 4.5V 60 @ V _{GS} = 2.5V |

FEATURES

- Super high dense cell design for low R_{DS(ON)}.
- Rugged and reliable.
- SOT-23 package.



ABSOLUTE MAXIMUM RATING (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|-----------------------------------|------------|------|
| Drain-Source Voltage | V _{DS} | 20 | V |
| Gate-Source Voltage | V _{GS} | ± 12 | V |
| Drain Current-Continuous @ T _J =25°C -Pulsed ^b | I _D | 4 | A |
| | I _{DM} | 15 | A |
| Drain-Source Diode Forward Current | I _S | 1.25 | A |
| Maximum Power Dissipation ^a | P _D | 1.25 | W |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | -55 to 150 | °C |

THERMAL CHARACTERISTICS

| | | | |
|--|-------------------|-----|------|
| Thermal Resistance, Junction-to-Ambient ^a | R _{thJA} | 100 | °C/W |
|--|-------------------|-----|------|

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ ^c | Max | Unit |
|--|---------------------|---|-----|------------------|------|-------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} = 0V, I _D = 250uA | 20 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 16V, V _{GS} = 0V | | | 1 | uA |
| Gate-Body Leakage | I _{GSS} | V _{GS} = ± 12V, V _{DS} = 0V | | | ±100 | nA |
| ON CHARACTERISTICS^b | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250uA | 0.5 | 0.8 | 1.3 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} = 4.5V, I _D = 4A | | 40 | 47 | m-ohm |
| | | V _{GS} = 2.5V, I _D = 2A | | 55 | 60 | m-ohm |
| On-State Drain Current | I _{D(ON)} | V _{DS} = 5V, V _{GS} = 4.5V | 6 | | | A |
| Forward Transconductance | g _{FS} | V _{DS} = 5V, I _D = 3.8A | | 19 | | S |
| DYNAMIC CHARACTERISTICS^c | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} = 15V, V _{GS} = 0V f = 1.0MHz | | 495 | | pF |
| Output Capacitance | C _{OSS} | | | 88 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 65 | | pF |
| SWITCHING CHARACTERISTICS^c | | | | | | |
| Turn-On Delay Time | t _{D(ON)} | V _{DD} = 10V, I _D = 1A, V _{GS} = 4.5V, R _{GEN} = 6 ohm | | 12 | | ns |
| Rise Time | t _r | | | 13 | | ns |
| Turn-Off Delay Time | t _{D(OFF)} | | | 44 | | ns |
| Fall Time | t _f | | | 18 | | ns |
| Total Gate Charge | Q _g | V _{DS} = 10V, I _D = 4A, V _{GS} = 4.5V | | 6.8 | | nC |
| Gate-Source Charge | Q _{gs} | | | 1.5 | | nC |
| Gate-Drain Charge | Q _{gd} | | | 3 | | nC |

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ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|----------|----------------------------|-----|------|-----|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS^b | | | | | | |
| Diode Forward Voltage | V_{SD} | $V_{GS} = 0V, I_s = 1.25A$ | | 0.87 | 1.2 | V |

Notes

a. Surface mounted on FR-4 board, $t \leq 10$ sec

b. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

c. Guaranteed by design, not subject to production testing.

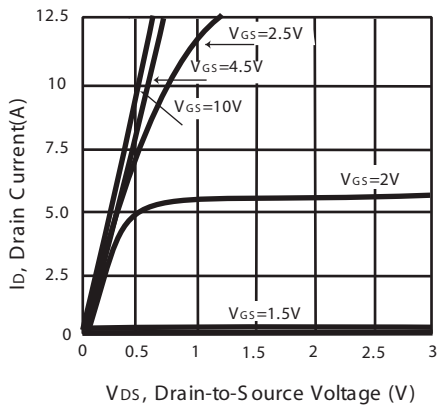


Figure 1. Output Characteristics

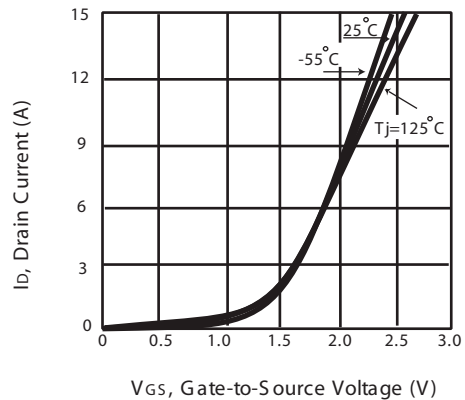


Figure 2. Transfer Characteristics

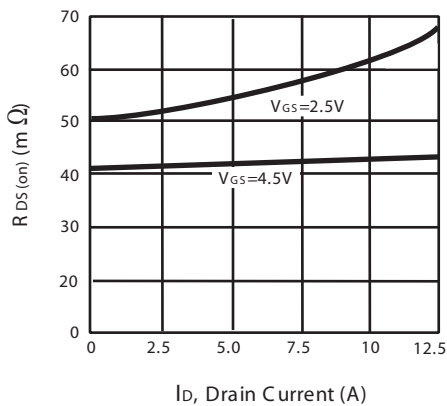


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

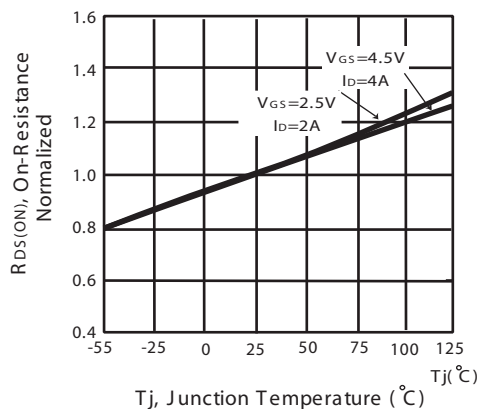


Figure 4. On-Resistance Variation with Drain Current and Temperature

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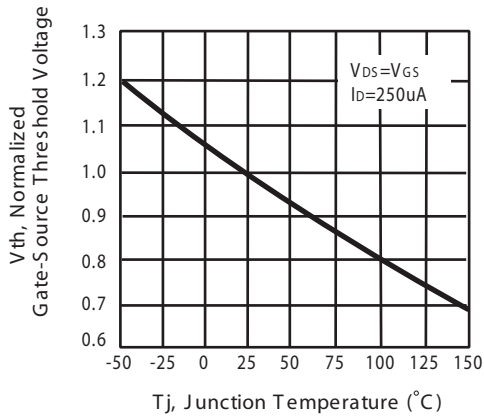


Figure 5. Gate Threshold Variation with Temperature

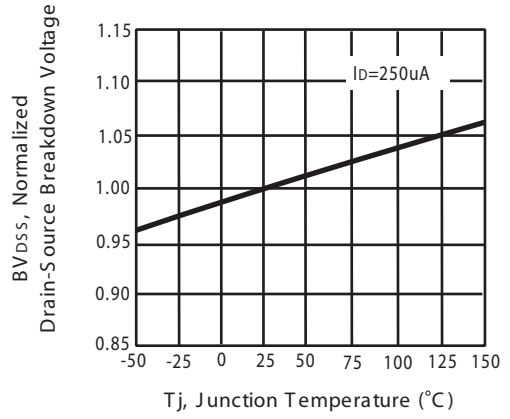


Figure 6. Breakdown Voltage Variation with Temperature

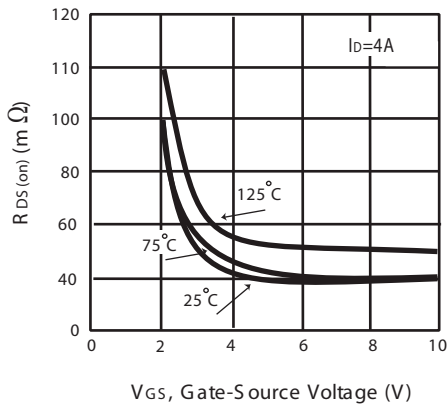


Figure 7. On-Resistance vs. Gate-Source Voltage

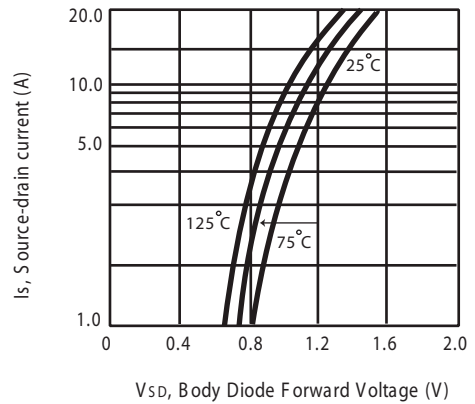


Figure 8. Body Diode Forward Voltage Variation with Source Current

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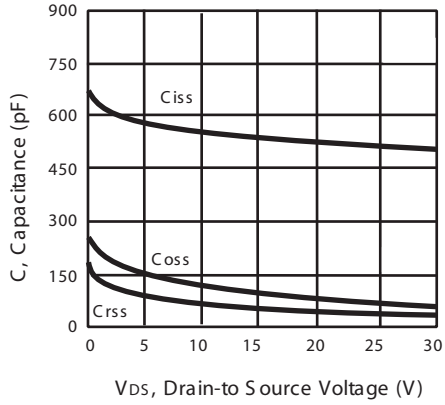


Figure 9. Capacitance

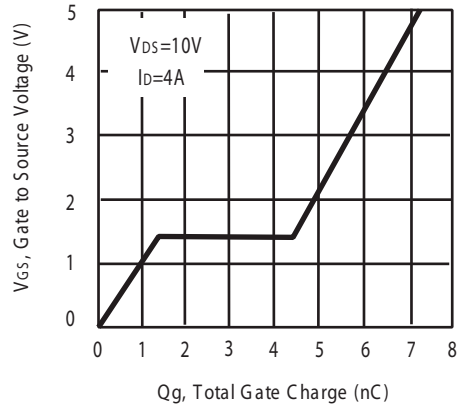


Figure 10. Gate Charge

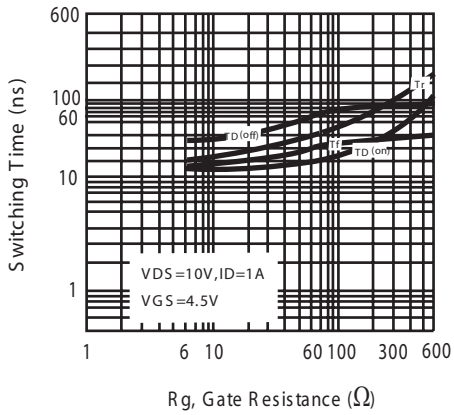


Figure 11. switching characteristics

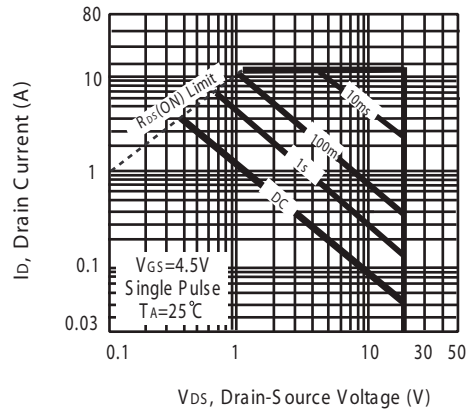


Figure 12. Maximum Safe Operating Area

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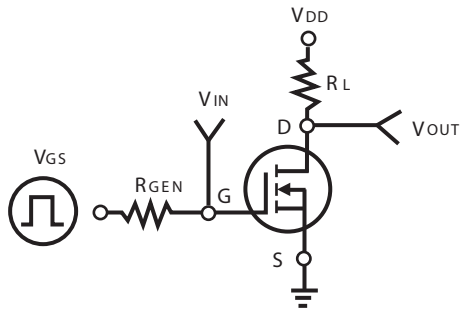


Figure 11. Switching Test Circuit

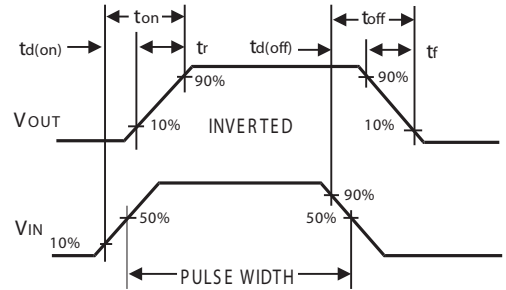
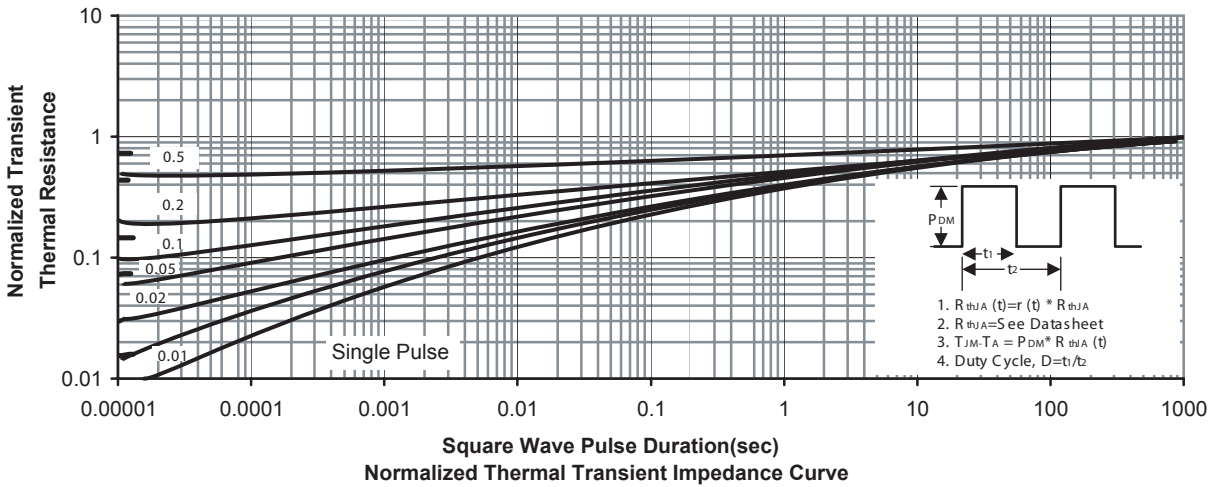


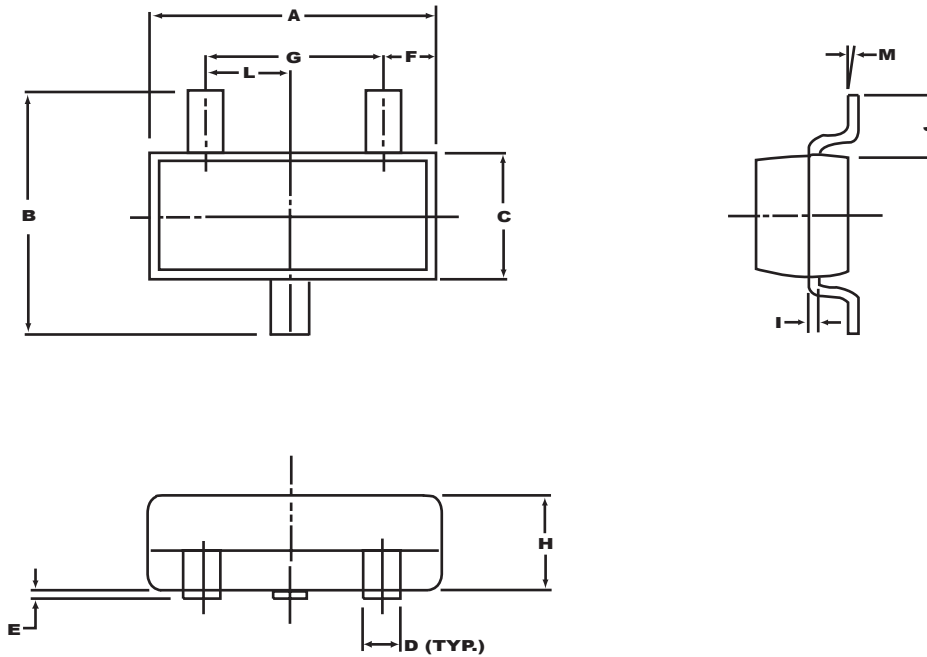
Figure 12. Switching Waveforms



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PACKAGE OUTLINE DIMENSIONS

SOT-23

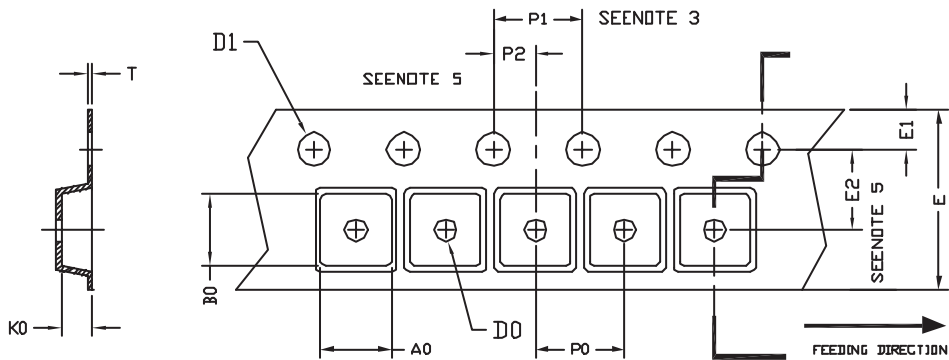


| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|------|------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.70 | 3.10 | 0.106 | 0.122 |
| B | 2.40 | 2.80 | 0.094 | 0.110 |
| C | 1.40 | 1.60 | 0.055 | 0.063 |
| D | 0.35 | 0.50 | 0.014 | 0.020 |
| E | 0 | 0.10 | 0 | 0.004 |
| F | 0.45 | 0.55 | 0.018 | 0.022 |
| G | 1.90 REF. | | 0.075 REF. | |
| H | 1.00 | 1.30 | 0.039 | 0.051 |
| I | 0.10 | 0.20 | 0.004 | 0.008 |
| J | 0.40 | - | 0.016 | - |
| L | 0.45 | 1.15 | 0.033 | 0.045 |
| M | 0° | 10° | 0° | 10° |

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SOT-23 Tape and Reel Data

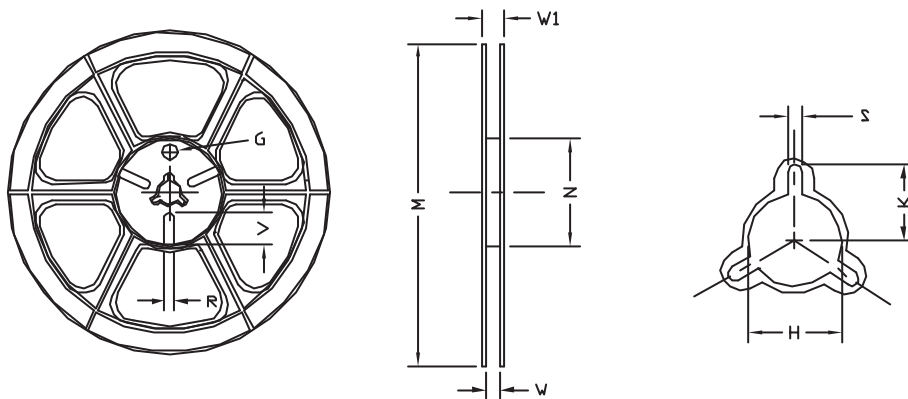
SOT-23 Carrier Tape



UNIT:mm

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|---------|--------------------|--------------------|--------------------|-------------------------------|-------------------------------|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| SOT-23 | 3.20 ± 0.10 | 3.00 ± 0.10 | 1.33 ± 0.10 | \varnothing 1.00 $+0.25$ | \varnothing 1.50 $+0.10$ | 8.00 $+0.30$ -0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 | 4.00 ± 0.10 | 4.00 ± 0.10 | 2.00 ± 0.05 | 0.20 ± 0.02 |

SOT-23 Reel



UNIT:mm

| TAPE SIZE | REEL SIZE | M | N | W | W1 | H | K | S | G | R | V |
|-----------|-------------------|------------------------------|-----------------------------|-------------------|--------------------|---------------------------------|------|-------------------|--------------------|------|-------|
| 8mm | \varnothing 178 | \varnothing 178 ± 1 | \varnothing 60 ± 1 | 9.00 ± 0.5 | 12.00 ± 0.5 | \varnothing 13.5 ± 0.5 | 10.5 | 2.00 ± 0.5 | \varnothing 10.0 | 5.00 | 18.00 |