SamHop Microelectronics Corp.

# STC2200

Mar 15 2005 ver1.2

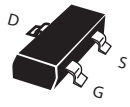
## N-Channel Enhancement Mode Field Effect Transistor

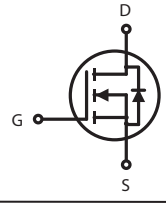
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Max |
| 20V | 2.3A | 85 @ $V_{GS}$ = 4.5V<br>110 @ $V_{GS}$ = 2.5V |

### FEATURES

- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- SOT-323 package.

SOT-323




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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±10 | V |
| Drain Current-Continuous[a] @ $T_c$=25°C | $I_D$ | 2.3 | A |
| -Pulsed[b] | $I_{DM}$ | 8 | A |
| Drain-Source Diode Forward Current[a] | $I_S$ | 1 | A |
| Maximum Power Dissipation[a] | $P_D$ | 1.0 | W |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to 150 | °C |

### THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient[a] | $R_{thJA}$ | 125 | °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 | $I_{GSS}$ | $V_{GS}$=± 10V, $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTICS [b]** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 0.5 | 0.8 | 1.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=2A | | 60 | 85 | m-ohm |
| | | $V_{GS}$=2.5V, $I_D$=1A | | 85 | 110 | 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, $I_D$=2.3A | | 7 | | S |
| **DYNAMIC CHARACTERISTICS [c]** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=10V, $V_{GS}$=0V<br>f=1.0MHz | | 210 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 75 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 46 | | pF |
| **SWITCHING CHARACTERISTICS [c]** | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$=10V,<br>$I_D$=1A,<br>$V_{GS}$=4.5V,<br>$R_{GEN}$=6 ohm | | 13.2 | | ns |
| Rise Time | $t_r$ | | | 9.1 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 27.3 | | ns |
| Fall Time | $t_f$ | | | 15.9 | | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V, $I_D$=2A,<br>$V_{GS}$=4.5V | | 4.2 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.88 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.53 | | nC |

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

| Parameter | Symbol | Condition | Min | Typ[c] | Max | Unit |
|---|---|---|---|---|---|---|
| DRAIN-SOURCE DIODE CHARACTERISTICS [b] | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V, Is =1A | | 0.83 | 1.2 | V |

Notes

a.Surface Mounted on FR4 Board, t≤10sec.
b.Pulse Test:Pulse Width≤300us, Duty Cycle≤ 2%.
c.Guaranteed by design, not subject to production testing.

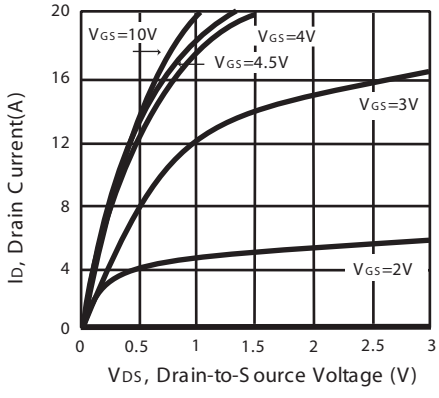



Figure 1. Output Characteristics

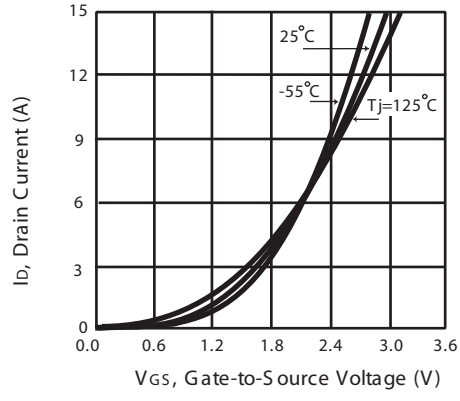



Figure 2. Transfer Characteristics

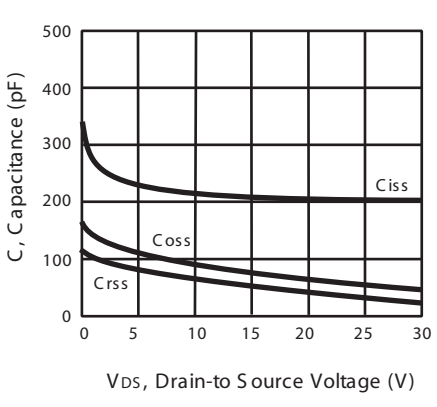



Figure 3. Capacitance

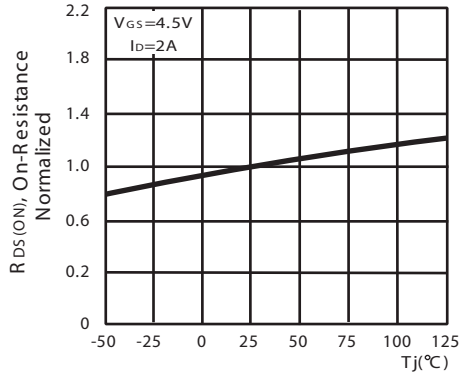
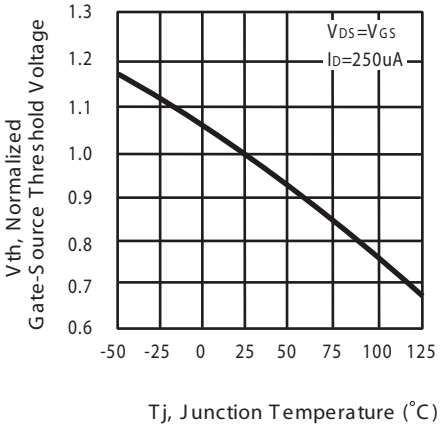



Figure 4. On-Resistance Variation with Temperature




with Temperature

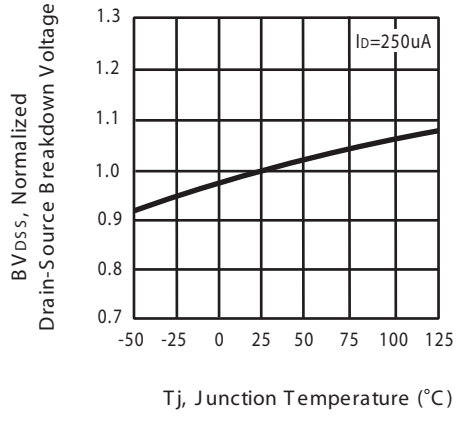



Figure 6. Breakdown Voltage Variation with Temperature

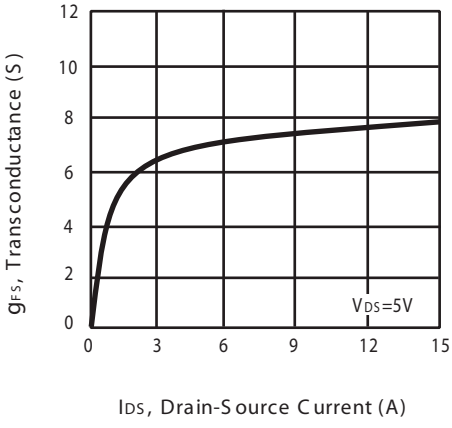



Figure 7. Transconductance Variation with Drain Current

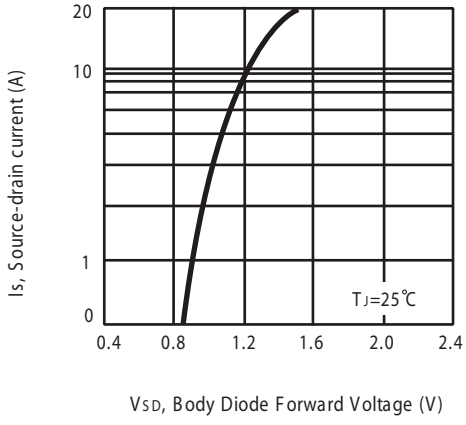



Figure 8. Body Diode Forward Voltage Variation with Source Current

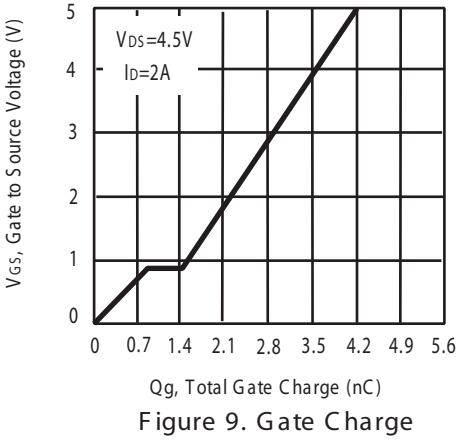



Figure 9. Gate Charge

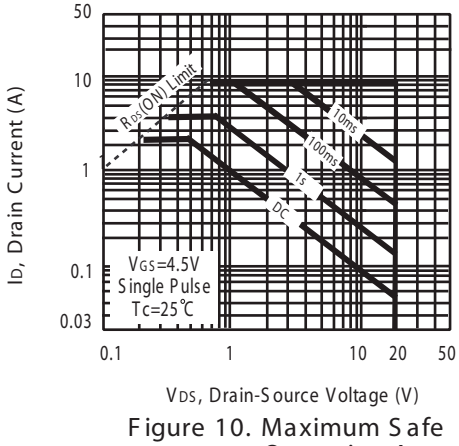



Figure 10. Maximum Safe Operating Area

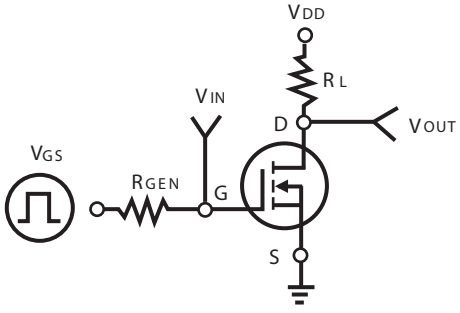



Figure 11. Switching Test Circuit

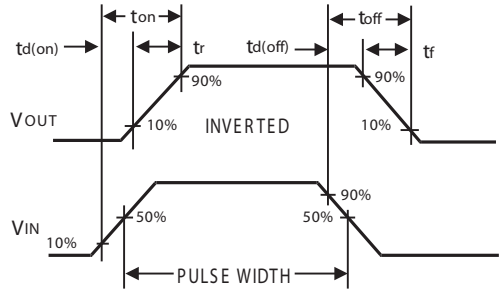
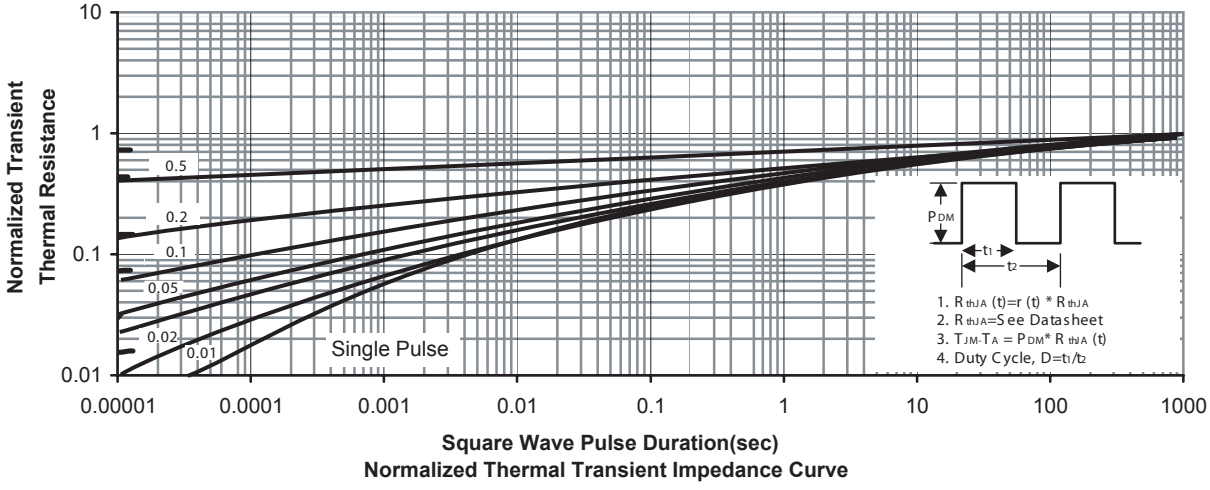



Figure 12. Switching Waveforms



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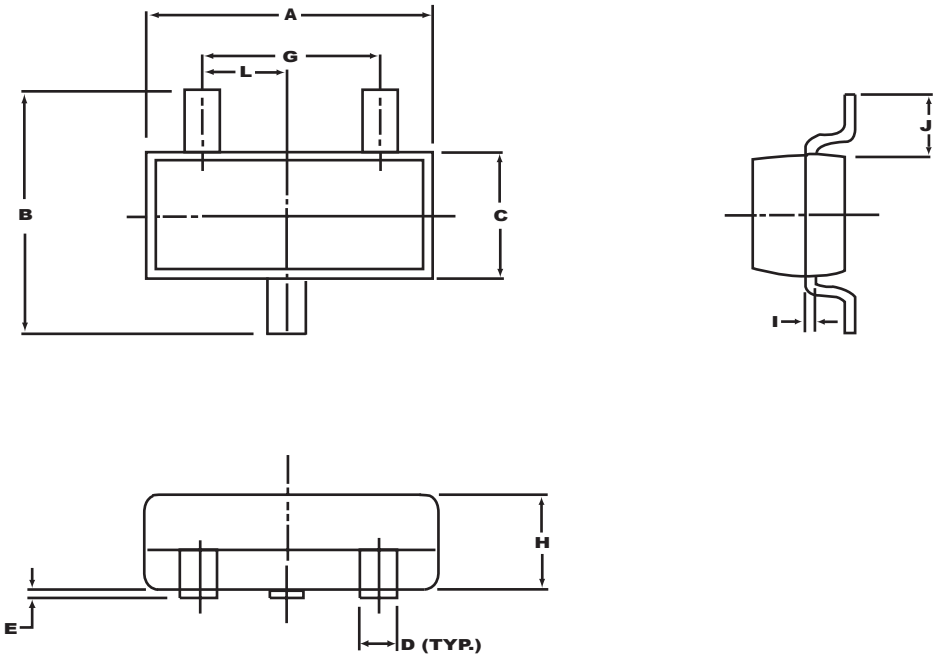
## PACKAGE OUTLINE DIMENSIONS

SOT-323




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 1.8 | 2.2 | 0.709 | 0.866 |
| B | 1.8 | 2.4 | 0.709 | 0.945 |
| C | 1.15 | 1.35 | 0.453 | 0.531 |
| D | 0.25 | 0.4 | 0.098 | 0.157 |
| E | 0 | 0.10 | 0 | 0.039 |
| F | ---- | ---- | ---- | ---- |
| G | 1.30 REF. | | 0.512 REF. | |
| H | 0.80 | 1.00 | 0.315 | 0.394 |
| I | 0.10 | 0.25 | 0.039 | 0.098 |
| J | ---- | --- | ---- | ---- |
| L | 0.65 | ---- | 0.256 | ---- |

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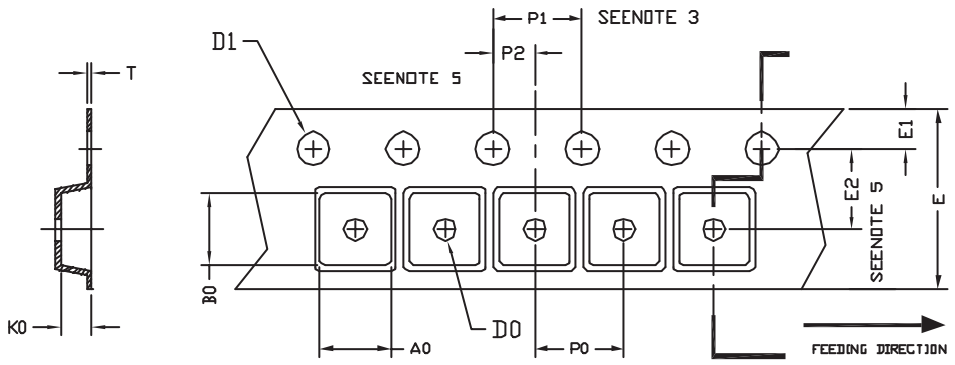
## SOT-323 Tape and Reel Data

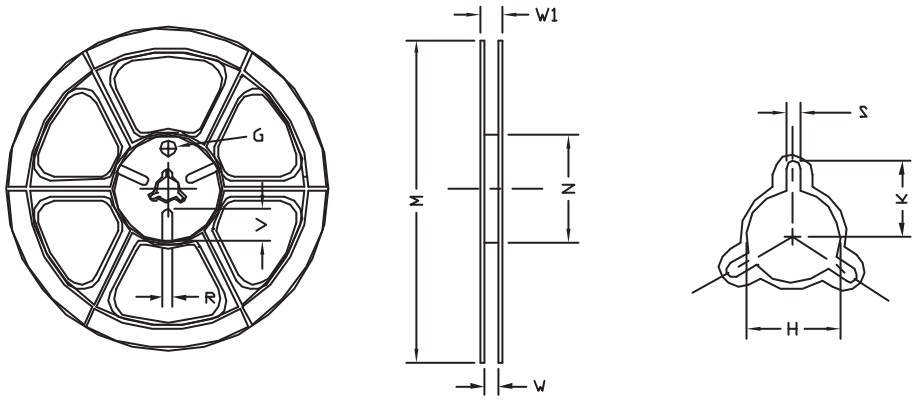
SOT-323 Carrier Tape




UNIT:㎜

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOT-323 | 2.40 ±0.10 | 2.40 ±0.10 | 1.19 ±0.10 | ∮ 1.00 +0.25 | ∮ 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 | 0.254 ±0.02 |

SOT-323 Reel




UNIT:㎜

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