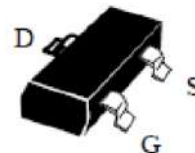


N-Channel High Density Trench MOSFET

Features:

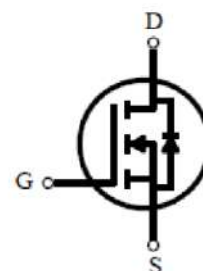
- Super high dense cell trench design for low $R_{DS(on)}$.
- Rugged and reliable.
- Surface Mount package.

SOT-23



PRODUCT SUMMARY

| V_{DSS} | I_D | $R_{DS(on)}$ (m-ohm) Max |
|-----------|-------|--------------------------|
| 20V | 3.0 | 65 @ $V_{GS} = 4.5V$ |
| | 2.0 | 90 @ $V_{GS} = 2.5V$ |



ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|----------------|----------------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Drain Current-Continuous ^a @ $T_A = 25\text{ }^\circ\text{C}$ -Pulse ^b | I_D | 3 | A |
| | I_{DM} | 9 | A |
| Drain-Source Diode Forward Current ^a | I_S | 1 | A |
| Maximum Power Dissipation ^a | P_D | $T_A = 25\text{ }^\circ\text{C}$ | 1.25 |
| | | $T_A = 75\text{ }^\circ\text{C}$ | 0.75 |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | - 55 to 150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| | | | |
|--|------------|-----|---------------------------|
| Thermal Resistance, Junction-to-Ambient ^a | R_{thJA} | 100 | $^\circ\text{C}/\text{W}$ |
|--|------------|-----|---------------------------|

Note

a. Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.

b. Pulse width limited by maximum junction temperature.

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 = 250μA | 20 | | | V | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 20V , V _{GS} = 0V | | | 1 | μA | |
| Gate-Body Leakage | I _{GSS} | V _{GS} = ±8V , V _{DS} = 0V | | | ±10 | μA | |
| ON CHARACTERISTICS^b | | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250μA | 0.5 | 0.7 | 1 | V | |
| Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} = 4.5V , I _D = 2.8A | | 50 | 65 | m-ohm | |
| | | V _{GS} = 2.5V , I _D = 2.0A | | 65 | 90 | | |
| Forward Transconductance | g _{fs} | V _{DS} = 5V , I _D = 4A | | 10.7 | | S | |
| DRAIN-SOURCE DIODE CHARACTERISTICS^b | | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} = 0V , I _S = 1.7A | | | 1.2 | V | |
| DYNAMIC CHARACTERISTICS^c | | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} = 6V , V _{GS} = 0V f = 1.0MHz | | 457 | | pF | |
| Output Capacitance | C _{OSS} | | | | 119 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | | 93 | | pF |
| SWITCHING CHARACTERISTICS^c | | | | | | | |
| Turn-On Delay Time | t _{D(ON)} | V _{DD} = 6V , I _D = 1A V _{GEN} = 4.5V | | 4 | 8 | ns | |
| Rise Time | t _r | | | | 14 | 26 | ns |
| Turn-Off Delay Time | t _{D(OFF)} | R _L = 6 ohm R _{GEN} = 6 ohm | | 21 | 39 | ns | |
| Fall Time | t _f | | | | 7.2 | | ns |
| Total Gate Charge | Q _g | V _{DS} = 6V I _D = 2.8A V _{GS} = 4.5V | | 13 | | nC | |
| Gate-Source Charge | Q _{gs} | | | | 4.1 | | nC |
| Gate-Drain Charge | Q _{gd} | | | | 2.9 | | nC |

Note

b. Pulse Test Pulse width ≤ 300us , Duty Cycle ≤ 2% .

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

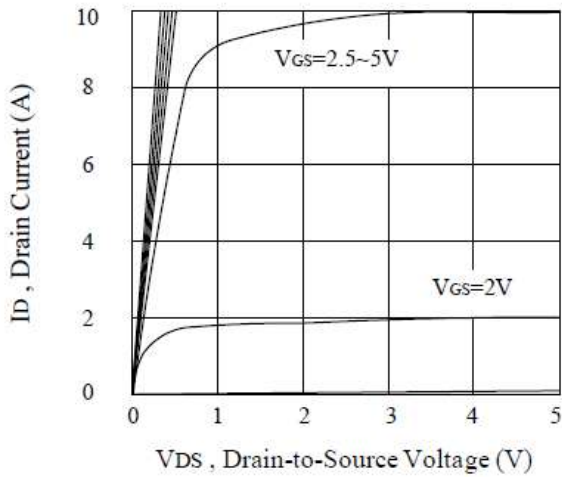


Figure 1. Output Characteristics

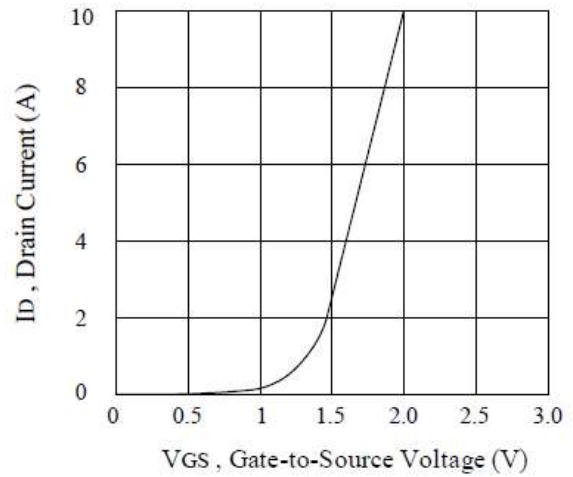


Figure 2. Transfer Characteristics

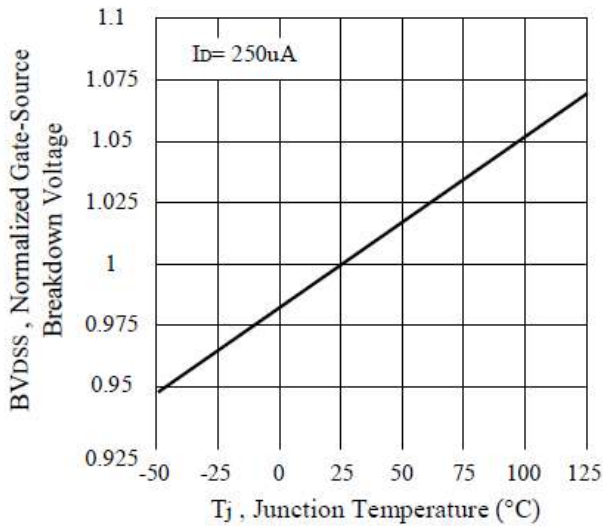


Figure 3. Breakdown Voltage Variation with Temperature

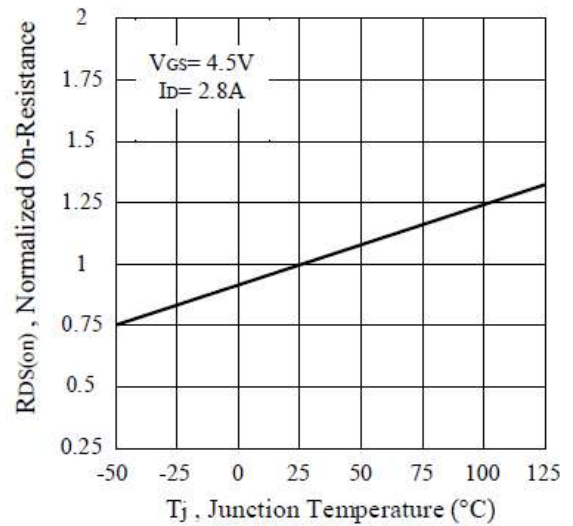


Figure 4. On-Resistance Variation with Temperature

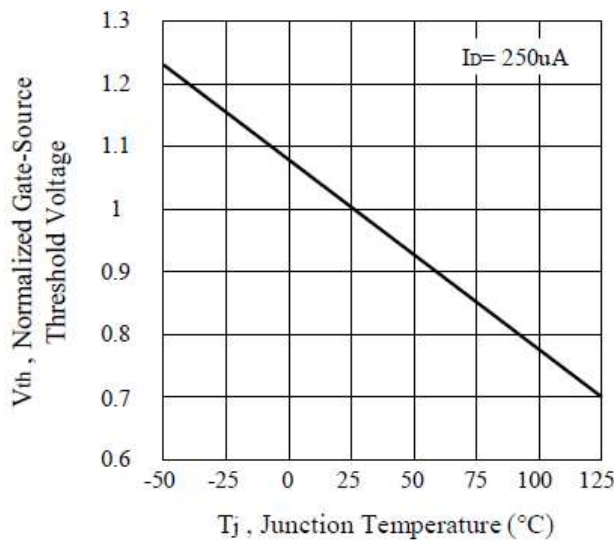


Figure 5. Gate Threshold Variation with Temperature

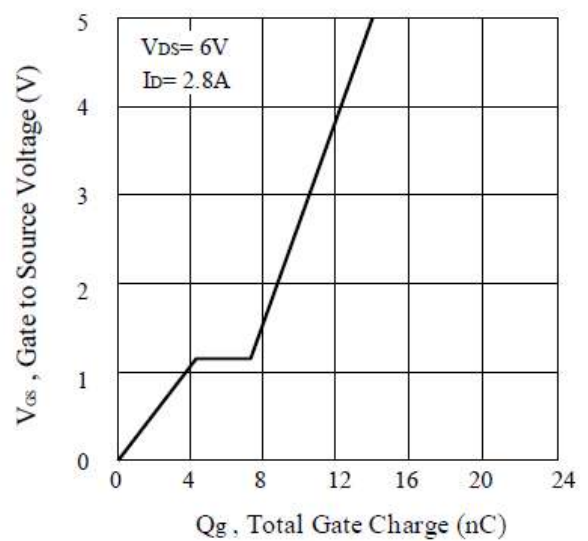


Figure 6. Gate Charge

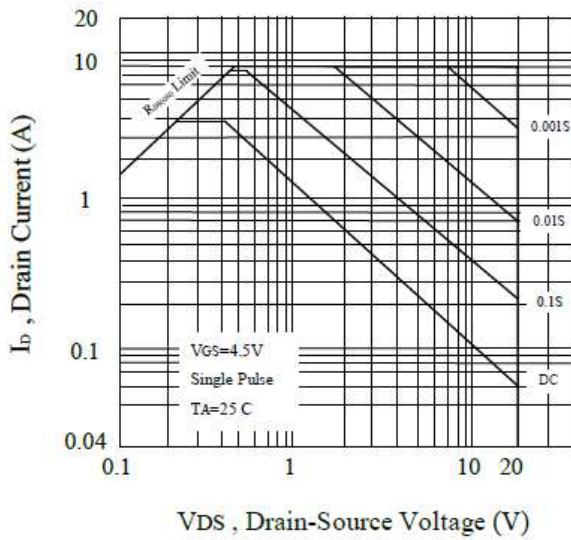


Figure 7. Maximum Safe Operating Area

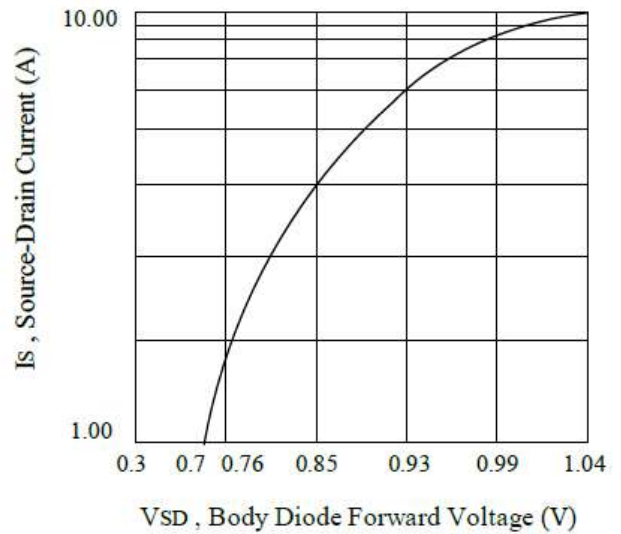


Figure 8. Body Diode Forward Voltage Variation with Source Current

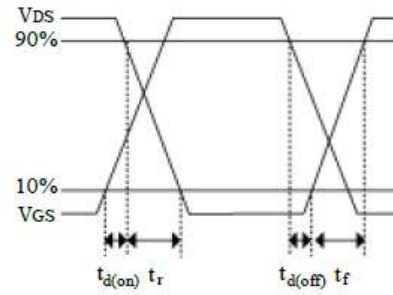
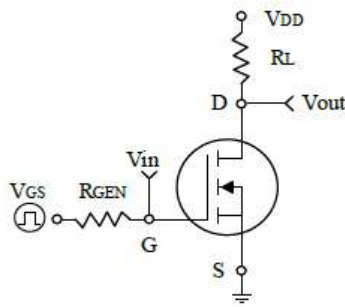


Figure 9. Switching Test Circuit and Switching Waveforms

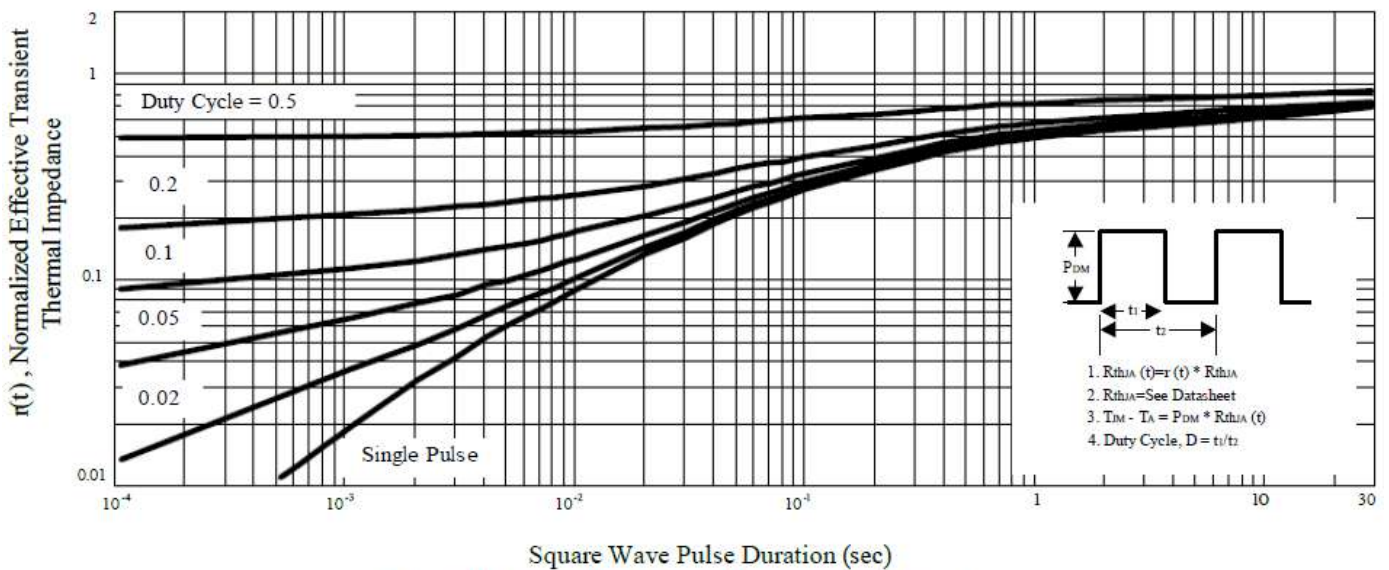
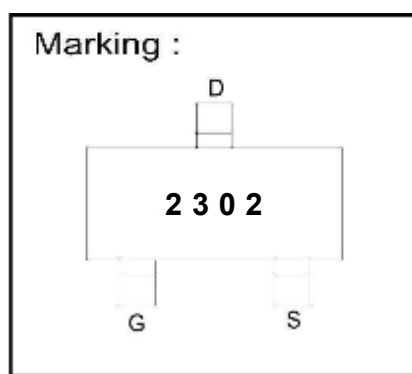
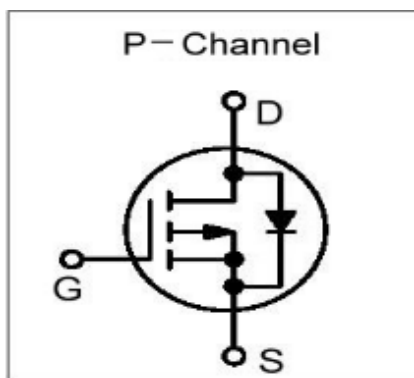
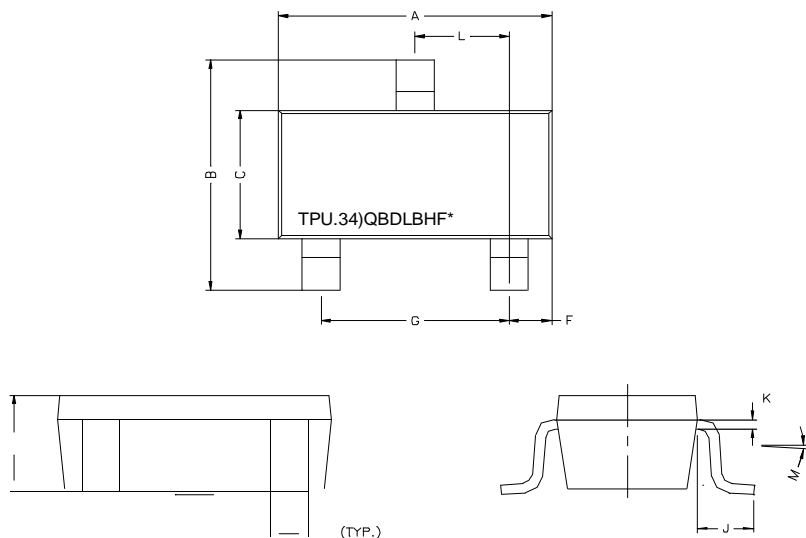


Figure 10. Normalized Thermal Transient Impedance Curve

Product Packaging Specification (K2302S SOT-23)

Package Dimensions



| REF. | Millimeter | | REF. | Millimeter | |
|------|------------|------|------|------------|------|
| | Min. | Max. | | Min. | Max. |
| A | 2.70 | 3.10 | G | 1.90 | REF. |
| B | 2.40 | 2.80 | H | 1.00 | 1.30 |
| C | 1.40 | 1.60 | K | 0.10 | 0.20 |
| D | 0.35 | 0.50 | J | 0.40 | - |
| E | 0 | 0.10 | L | 0.85 | 1.15 |
| F | 0.45 | 0.55 | M | 0 | 10 |