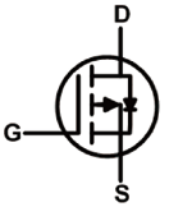
## Description

The SQ2301ES is the high cell density trenched P-ch MOSFETs, which provides excellent RDSON and efficiency for most of the small power switching and load switch applications.

## Applications

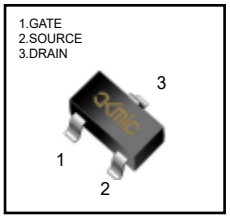
- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology



Equivalent Circuit

## General Features

- $V_{DSS}$=-20V $I_D$ =-2.5A
- $R_{DS(ON)}$ < 98mΩ @ $V_{GS}$=±12V



SOT23

## Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | -20 | V |
| $V_{GS}$ | Continuous Gate-Source Voltage | ±12 | V |
| $I_D$@TA=25℃ | Continuous Drain Current, $V_{GS}$@ -4.5V[1] | -2.5 | A |
| $I_D$@TA=70℃ | Continuous Drain Current, $V_{GS}$@ -4.5V[1] | -1.4 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | -8 | A |
| $P_D$@TA=25℃ | Power Dissipation[3] | 0.8 | W |
| $T_J$,$T_{STG}$ | Operation Junction and Storage Temperature Range | -55 to 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient[1] | 156 | ℃/W |
| $R_{\theta JC}$ | Thermal ResistanceJunction-Case[1] | --- | ℃/W |

## Ordering information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| SQ2301ES | SOT23 | A1SHB<br>S1 | 3000 |

## Electrical Characteristics ($T_A$=25℃, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=-250μA | -20 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-20V,$V_{GS}$= 0V | --- | --- | -1.0 | μA |
| $I_{GSS}$ | Gate -Source leakage current | $V_{GS}$=±12V, $V_{DS}$=0V | --- | --- | ±100 | nA |
| ON CHARACTERISTICS | | | | | | |
| $V_{GS(th)}$ | Gate-threshold voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.4 | -0.7 | -1.0 | V |
| $R_{DS(on)}$ | Drain-Source On-Resistance(note2) | $V_{GS}$=-4.5V, $I_D$=-2A | --- | 98 | 120 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$=-1A | --- | 129 | 180 | |
| Dynamic characteristics | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V,$V_{GS}$=0V,f=1MHz | --- | 185 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 35 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 25 | --- | |
| $Q_g$ | TotalGateCharge | $V_{DS}$=-10V,$I_D$=-2A, $V_{GS}$=-4.5V | --- | 2.2 | --- | nC |
| $Q_{gs}$ | Gate-SourceCharge | | --- | 0.5 | --- | |
| $Q_{gd}$ | Gate-Drain( “Miller” )Charge | | --- | 0.5 | --- | |
| SWITCHING CHARACTERISTICS | | | | | | |
| $T_{d(on)}$ | Turn-on delay time | $V_{DD}$=-10V,$R_L$=5Ω, $R_{GEN}$=3Ω,$V_{GS}$=-4.5V, | --- | 10 | --- | ns |
| $T_r$ | Rise time | | --- | 30 | --- | |
| $T_{d(off)}$ | Turn-off delay time | | --- | 63 | --- | |
| $T_f$ | Fall time | | --- | 50 | --- | |
| DRAIN-SOURCEDIODECHARACTERISTICSANDMAXIMUMRATINGS | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | --- | --- | -2 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | --- | --- | -8 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V,$I_S$=-2A | --- | --- | -1.2 | V |

Notes:

1.Repetitive Rating: Pulse Width Limitedby Maximum Junction Temperature

2.Pulse Test: Pulse Width≤300μs,Duty Cycle≤2%

## Typical Characteristics

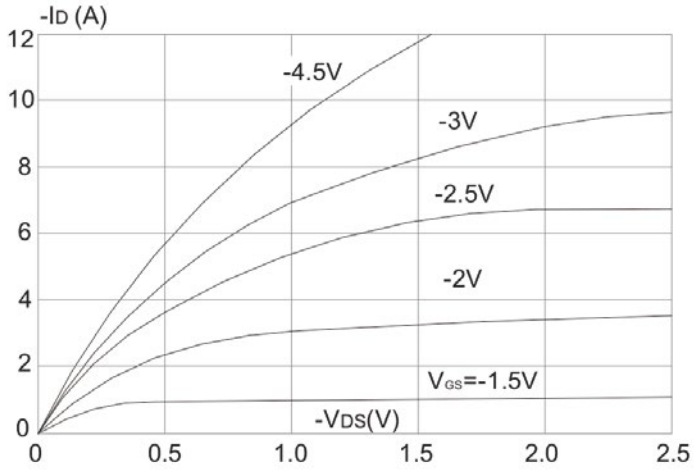



Figure1: Output Characteristics

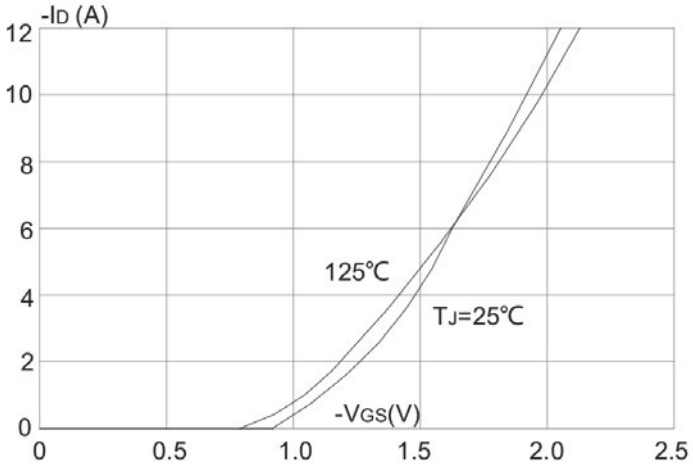



Figure 2: Typical Transfer Characteristics

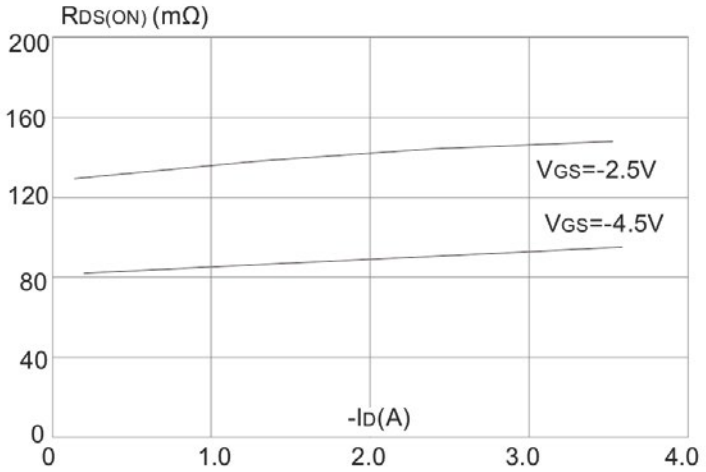



Figure 3:On-resistance vs. Drain Current

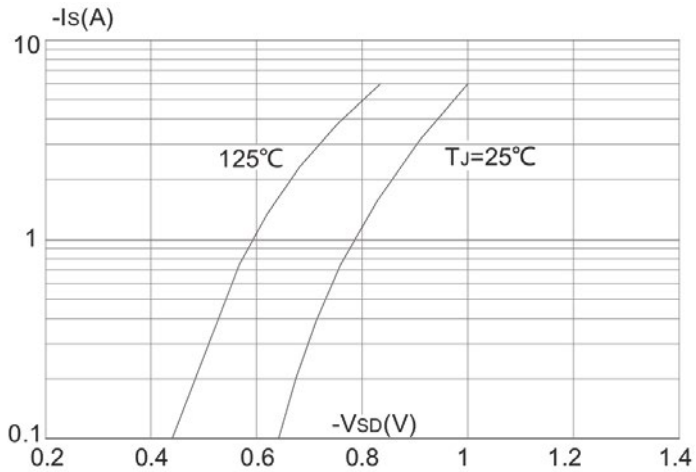



Figure 4: Body Diode Characteristics

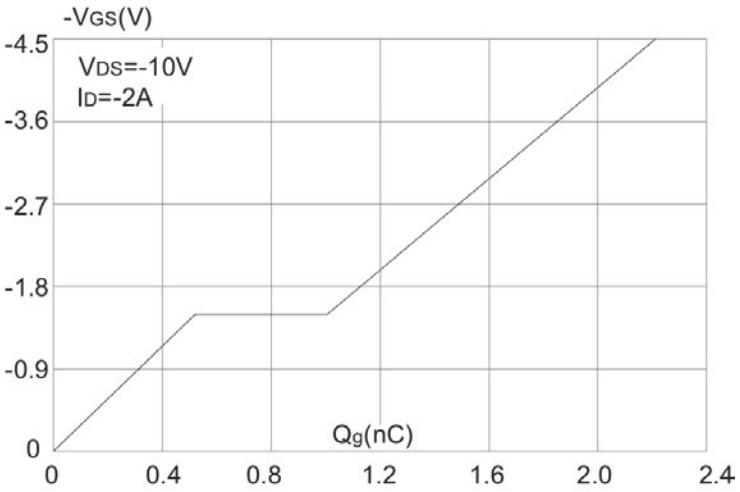



Figure 5: Gate Charge Characteristics

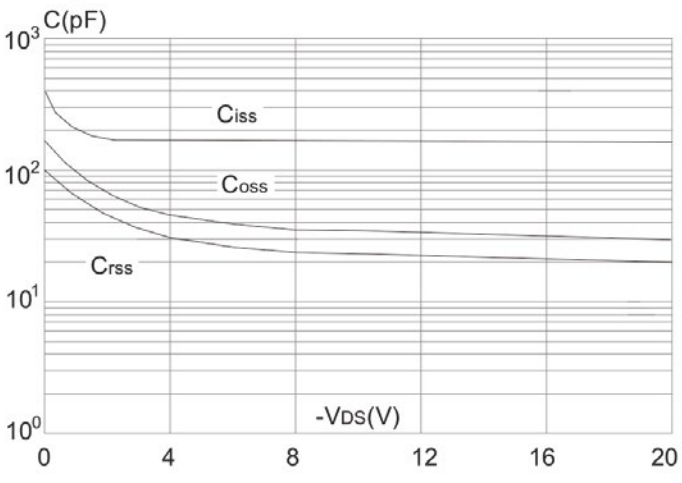



Figure 6: Capacitance Characteristics

## Typical Characteristics

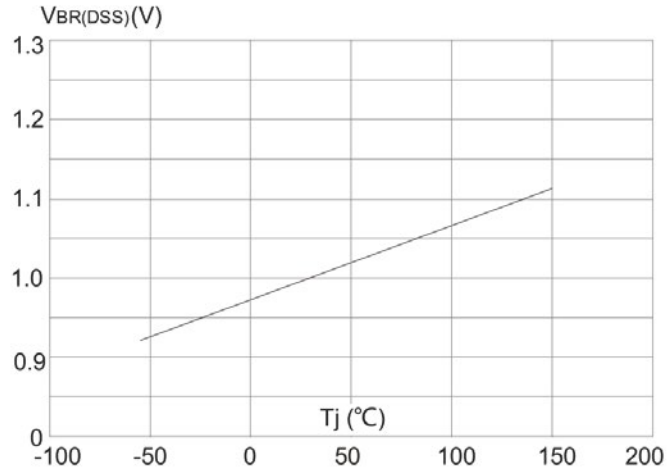



Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

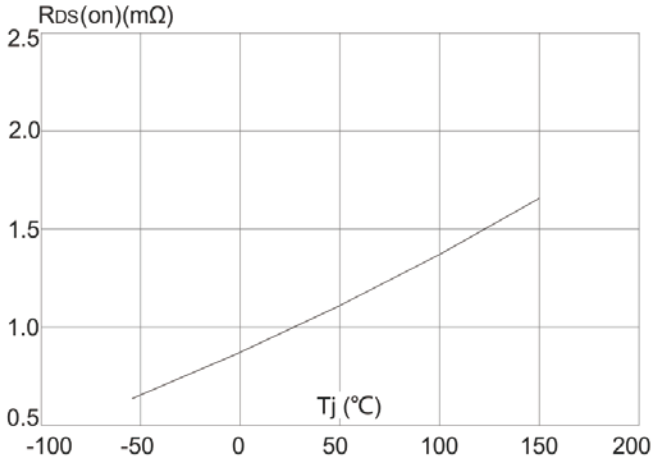



Figure 8: Normalized on Resistance vs. Junction Temperature

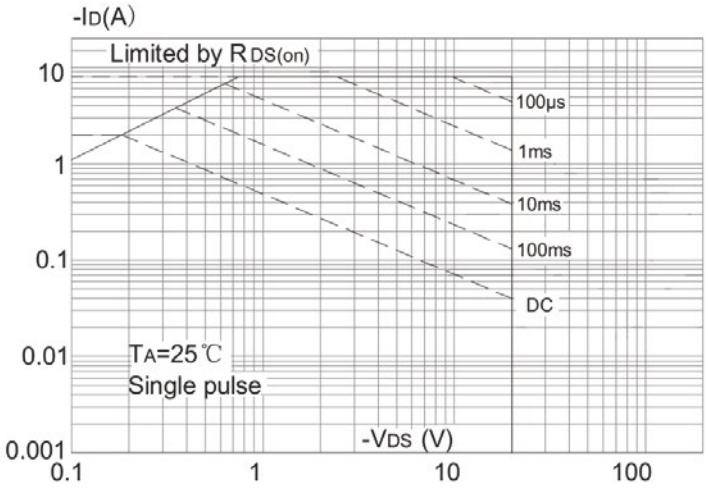



Figure 9: Maximum Safe Operating Area

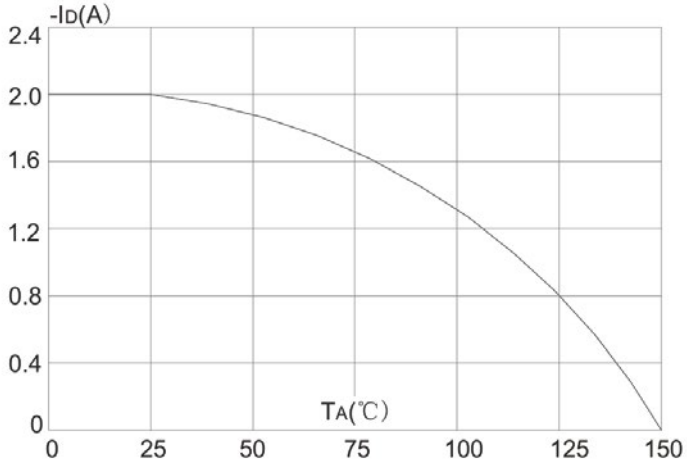



Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

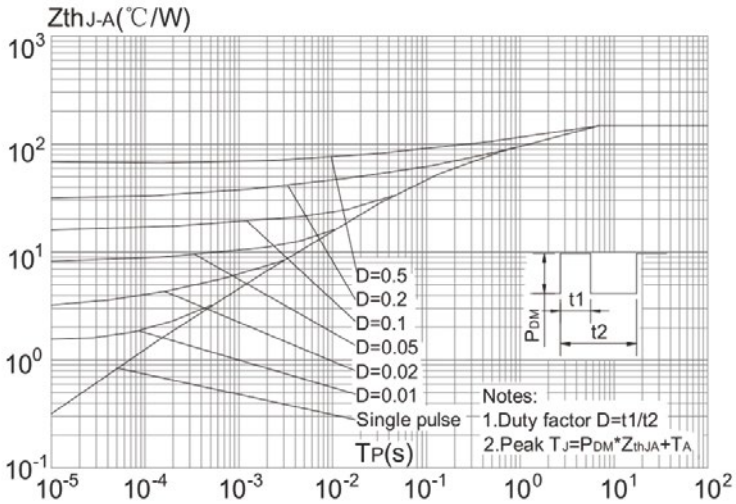
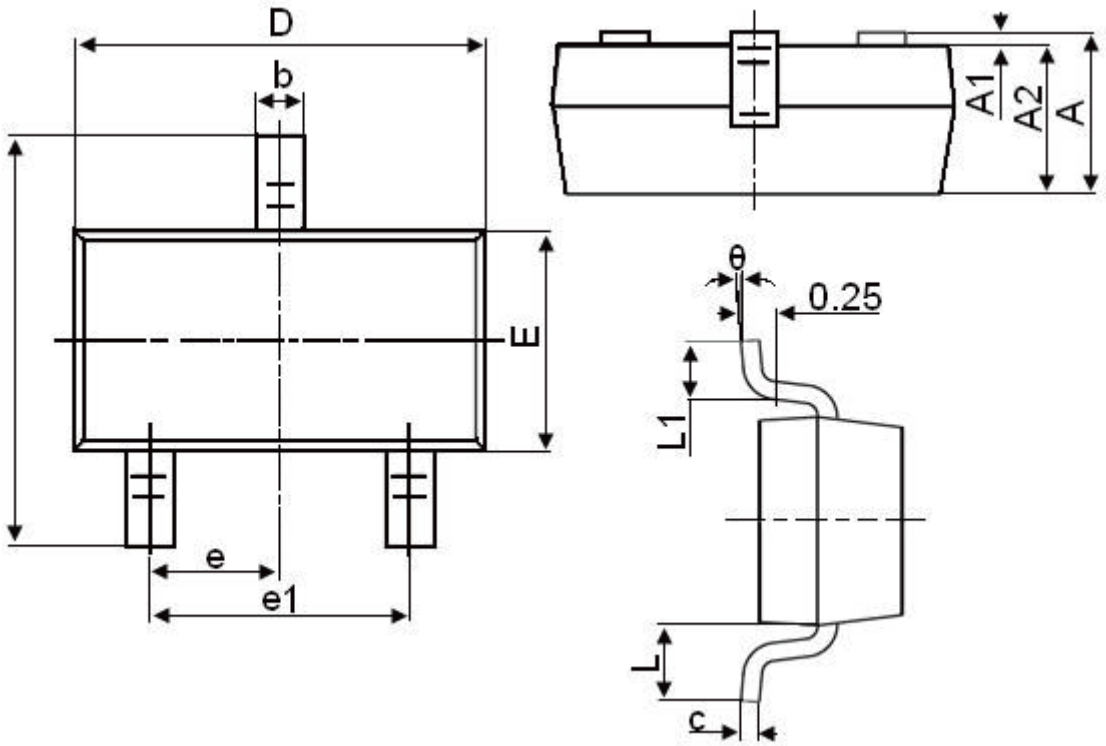



Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## SOT23 Package Outline Dimensions




| Symbol | Dimensions in Millimeters | |
|---|---|---|
| | mm | |
| | Min | Max |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |