## Description

The Si2302CDS-T1-E3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

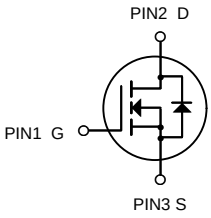



**SOT-23**

## General Features

$V_{DS}$ = 20V $I_D$ =2.3A

$R_{DS(ON)}$ < 60mΩ@ $V_{GS}$=4.5V




N-Channel MOSFET

## Application

Battery protection
Load switch
Uninterruptible power supply

### Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| Si2302CDS-T1-E3 | SOT-23 | HXY MOSFET | 3000 |

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

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Drain Current-Continuous | 2.3 | A |
| $I_{DM}$ | Drain Current-Pulsed (Note 1) | 16 | A |
| $P_D$ | Maximum Power Dissipation | 0.9 | W |
| $T_J$,$T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance,Junction-to-Ambient (Note 2) | 139 | ℃/W |

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 20 | 22 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±12V,$V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 0.5 | 0.75 | 1.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=2.5V, $I_D$=2.0A | - | 54 | 72 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=2.3A | - | 48 | 60 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=2.3A | - | 8 | - | S |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=10V,$V_{GS}$=0V, F=1.0MHz | - | 260 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 48 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 27 | - | PF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=10V, $R_L$=3.3Ω $V_{GS}$=4.5V,$R_{GEN}$=6Ω | - | 2.5 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 3.2 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 21 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 3 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V,$I_D$=2.3A, $V_{GS}$=4.5V | - | 2.9 | 5 | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 0.4 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 0.6 | - | nC |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=2.3A | - | 0.75 | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 3.3 | A |

## Notes:

**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.

**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.

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

**4.** Guaranteed by design, not subject to production

## Typical Electrical and Thermal Characteristics

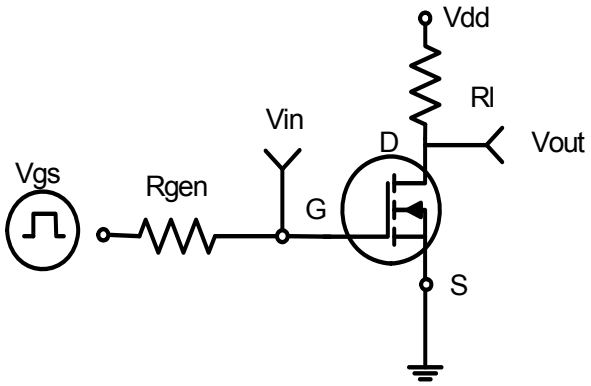



**Figure 1:Switching Test Circuit**

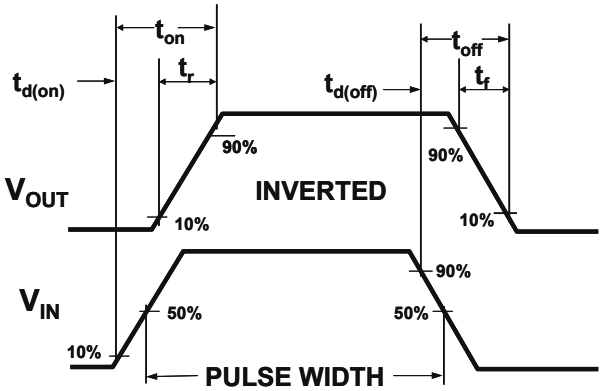



**Figure 2:Switching Waveforms**

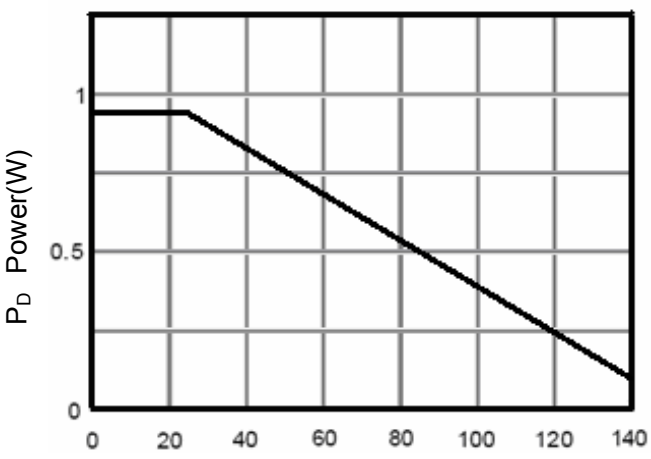



**Figure 3 Power Dissipation**

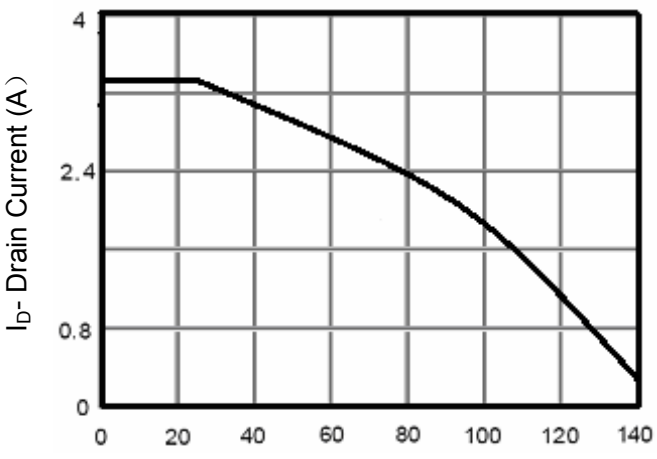



**Figure 4 Drain Current**

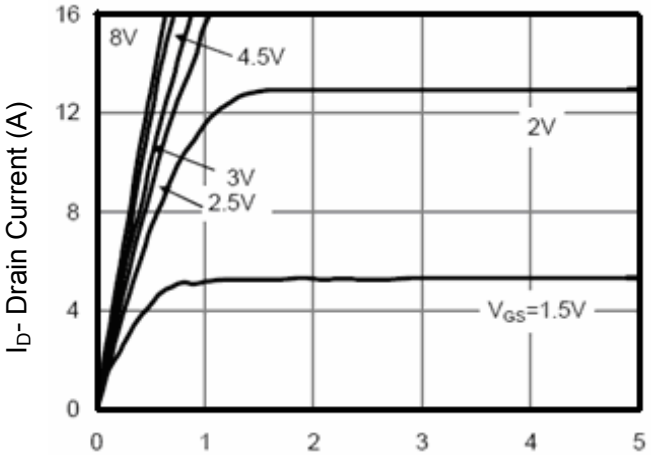



**Figure 5 Output Characteristics**

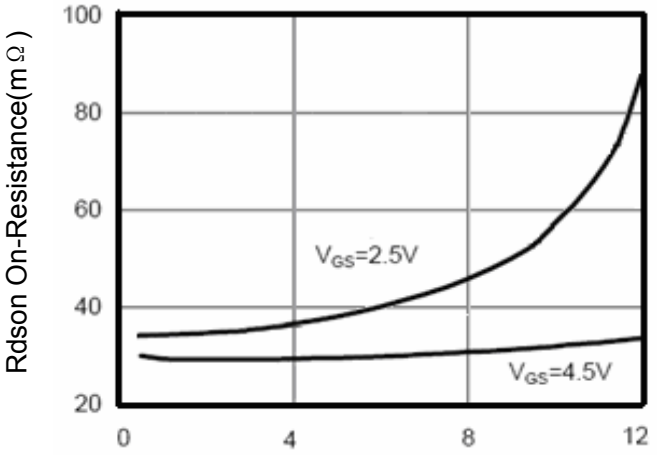
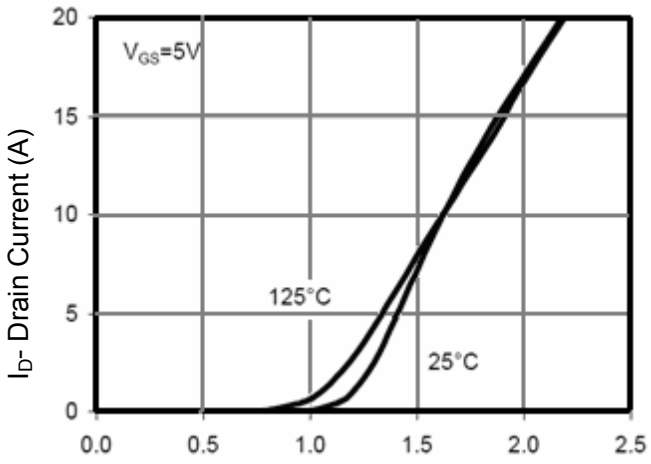
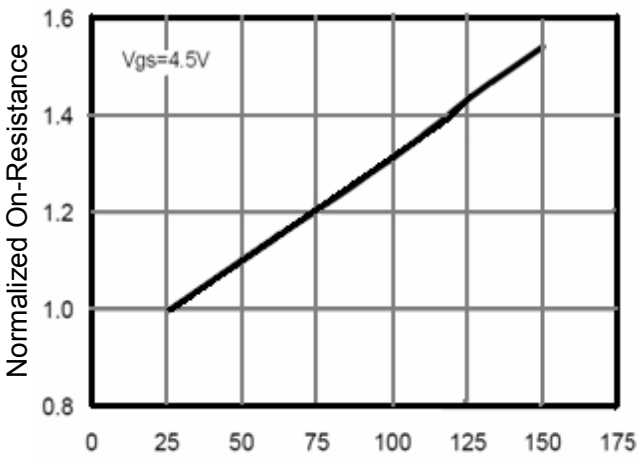



**Figure 6 Drain-Source On-Resistance**



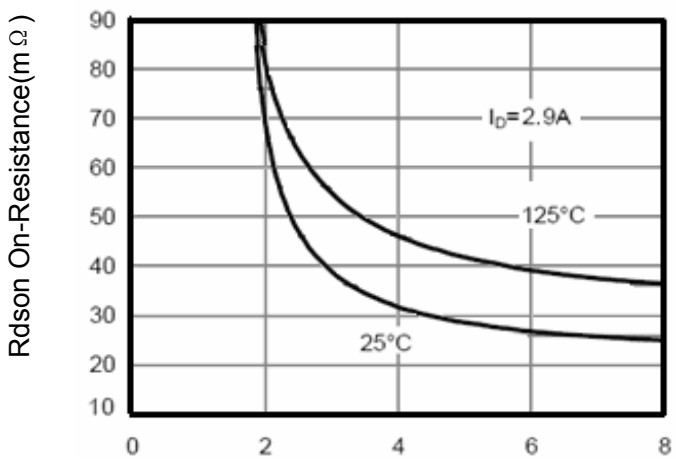

Vgs Gate-Source Voltage (V)

**Figure 7 Transfer Characteristics**



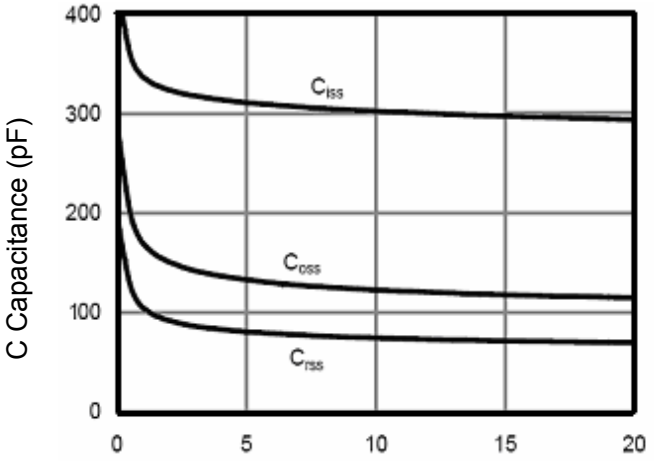

$T_J$-Junction Temperature(℃)

**Figure 8 Drain-Source On-Resistance**



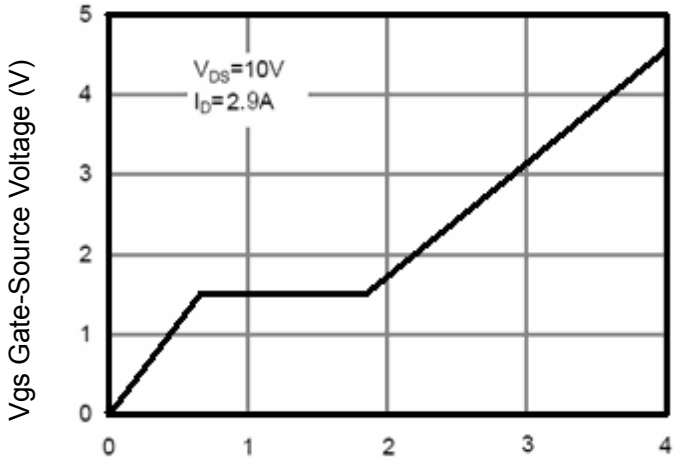

Vgs Gate-Source Voltage (V)

**Figure 9 Rdson vs Vgs**



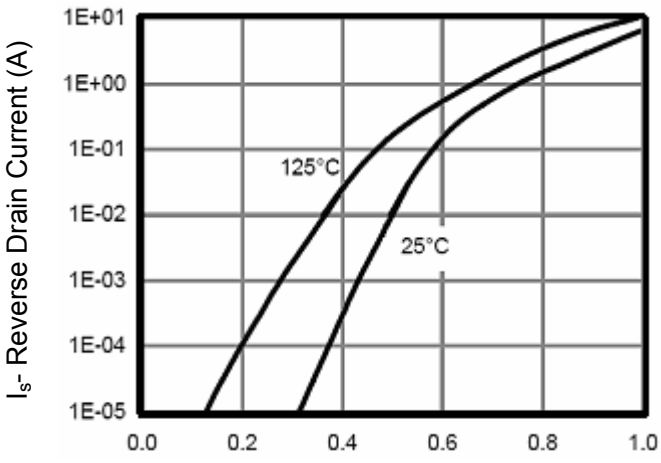

Vds Drain-Source Voltage (V)

**Figure 10 Capacitance vs Vds**




Qg Gate Charge (nC)

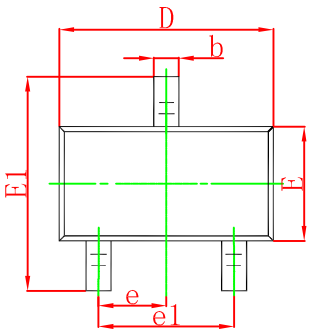
**Figure 11 Gate Charge**

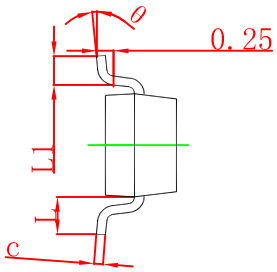


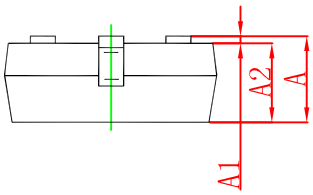

Vsd Source-Drain Voltage (V)

**Figure 12 Source- Drain Diode Forward**

## SOT-23 Package Outline Dimensions

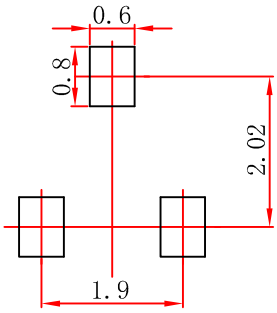



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006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

## SOT-23 Suggested Pad Layout




Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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