

**SuperMOS – SOT-23 20V  $BV_{DSS}$ , 36m $\Omega$   $R_{DS(on)}$ , 3.5A  $I_D$ , N-channel MOSFET**

**1. Description**

The CJ2302-ES is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product CJ2302-ES is Pb-free.

**2. Features**

- 20V,  $R_{DS(ON)}$ =36m $\Omega$ (Typ),  $V_{GS}$ =4.5V  
 $R_{DS(ON)}$ =47m $\Omega$ (Typ),  $V_{GS}$ =2.5V
- Use trench MOSFET technology
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

**3. Applications**

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**4. Ordering Information**

| Part Number | Package | Marking | Material     | Packing     | Quantity per reel | Flammability Rating | Reel Size |
|-------------|---------|---------|--------------|-------------|-------------------|---------------------|-----------|
| CJ2302-ES   | SOT-23  | 2302    | Halogen free | Tape & Reel | 3,000 PCS         | UL 94V-0            | 7 inches  |

Table-1 Ordering information

## 5. Pin Configuration and Functions

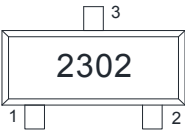
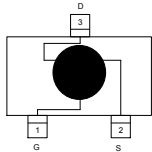
| Pin | Function | Outline   | Circuit Diagram   |
|-----|----------|---|---|
| 1   | Gate     |  |  |
| 2   | Source   |   |   |
| 3   | Drain    |   |   |

Table-2 Pin configuration

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

| Parameter                         | Symbol     | Limit      | Unit |
|-----------------------------------|------------|------------|------|
| Drain-Source Voltage              | $BV_{DSS}$ | 20         | V    |
| Gate-Source Voltage               | $V_{GS}$   | $\pm 10$   | V    |
| Continuous Drain Current          | $I_D$      | 3.5        | A    |
| Maximum Power Dissipation         | $P_D$      | 0.4        | W    |
| Pulsed Drain Current <sup>a</sup> | $I_{DM}$   | 14         | A    |
| Operating Junction Temperature    | $T_J$      | 150        | °C   |
| Lead Temperature                  | $T_L$      | 260        | °C   |
| Storage Temperature Range         | $T_{stg}$  | -55 to 150 | °C   |

### Thermal resistance ratings

| Single Operation                       |               |                 |         |         |      |
|--|---------------|-----------------|---------|---------|------|
| Parameter                              |               | Symbol          | Typical | Maximum | Unit |
| Junction-to-Ambient Thermal Resistance | $t \leq 10$ s | $R_{\theta JA}$ |         | 312.5   | °C/W |

Note:

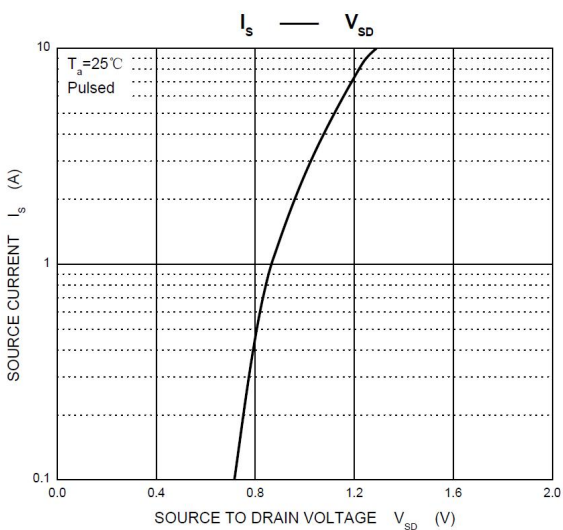
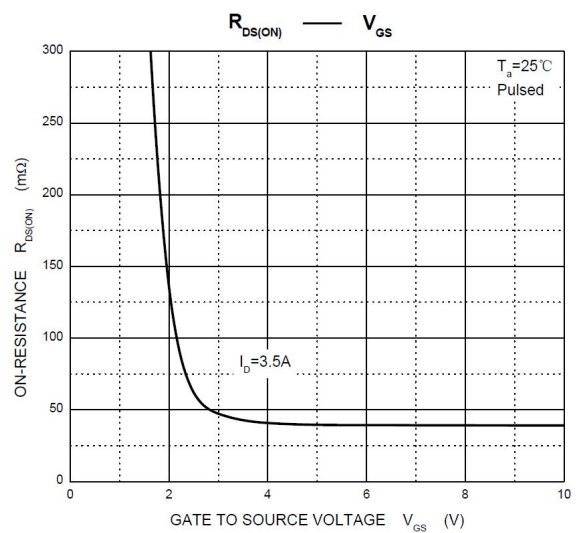
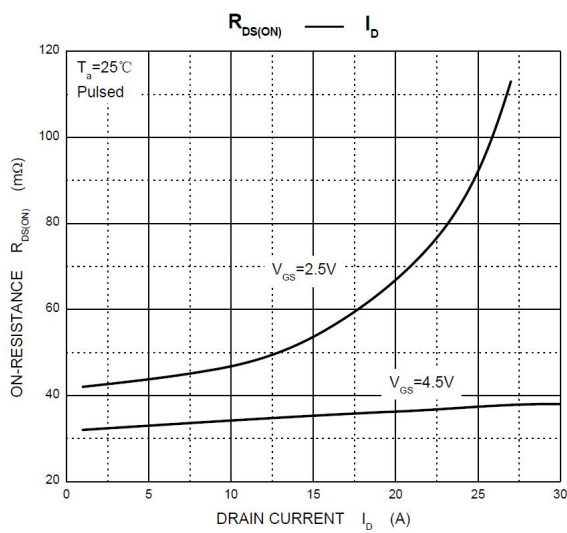
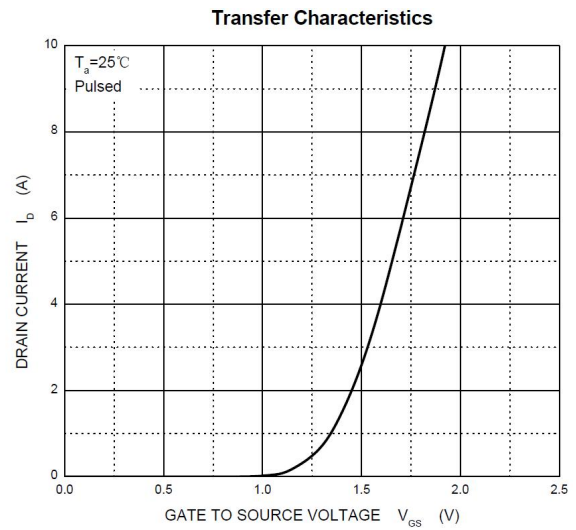
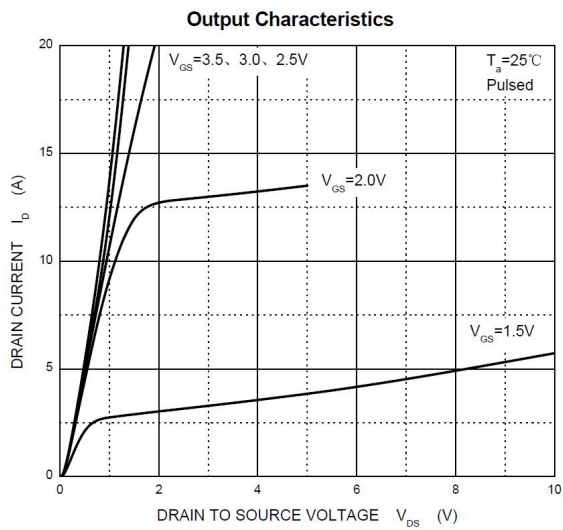
a: Repetitive rating, pulse width limited by junction temperature,  $t_p=10\mu s$ , Duty Cycle=1%

## Electrical Characteristics

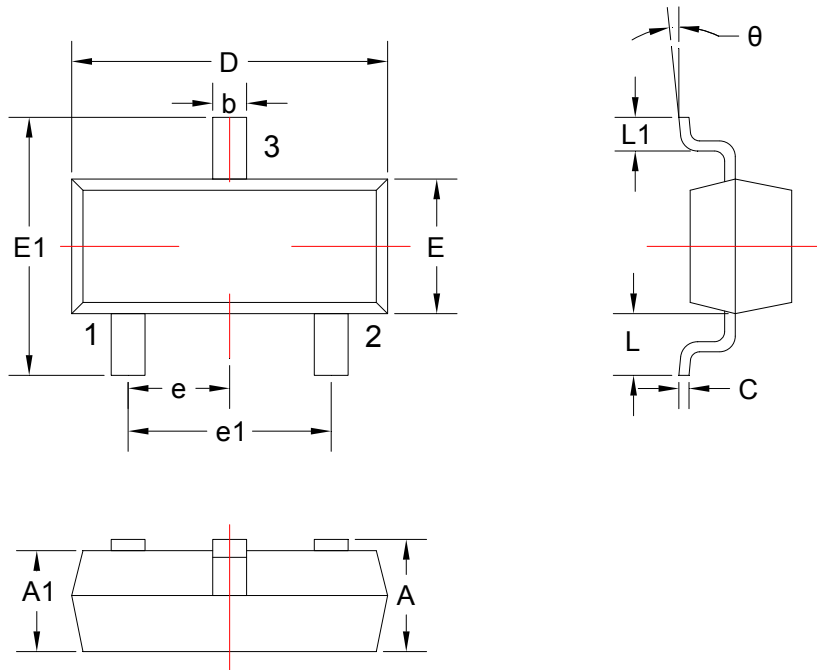
At TA = 25°C unless otherwise specified

| Parameter  | Symbol       | Test Conditions                                      | Min. | Typ. | Max.      | Unit       |
|--|--------------|--|------|------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                       |              |  |      |      |           |            |
| Drain-to-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                            | 20   |      |           | V          |
| Zero Gate Voltage Drain Current                  | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                              |      |      | 1         | $\mu A$    |
| Gate-to-source Leakage Current                   | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 10V$                          |      |      | $\pm 100$ | nA         |
| <b>ON CHARACTERISTICS</b>                        |              |  |      |      |           |            |
| Gate Threshold Voltage                           | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                        | 0.45 | 0.7  | 1.1       | V          |
| Drain-to-source On-resistance                    | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=3.5A$                              |      | 36.0 | 55.0      | m $\Omega$ |
|  |              | $V_{GS}=2.5V, I_D=2.0A$                              |      | 47.0 | 85.0      |            |
| Forward Trans conductance                        | $g_{FS}$     | $V_{DS}=5.0V, I_D=3.5A$                              |      | 7.8  |           | S          |
| <b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b> |              |  |      |      |           |            |
| Input Capacitance                                | $C_{ISS}$    | $V_{GS}=0V, f=1MHz, V_{DS}=10V$                      |      | 311  |           | pF         |
| Output Capacitance                               | $C_{OSS}$    |  |      | 125  |           |            |
| Reverse Transfer Capacitance                     | $C_{RSS}$    |  |      | 88   |           |            |
| Total Gate Charge                                | $Q_{G(TOT)}$ | $V_{GS}=4.5V, V_{DS}=10V, I_D=3.5A$                  |      | 4.1  | 10.5      | nC         |
| Gate-to-Source Charge                            | $Q_{GS}$     |  |      | 0.68 |           |            |
| Gate-to-Drain Charge                             | $Q_{GD}$     |  |      | 1.55 |           |            |
| <b>SWITCHING CHARACTERISTICS</b>                 |              |  |      |      |           |            |
| Turn-On Delay Time                               | $t_{d(ON)}$  | $V_{GS}=4.5V, V_{DS}=10V, R_L=55\Omega, R_G=6\Omega$ |      | 7.2  | 15        | ns         |
| Rise Time  | $t_r$        |  |      | 58.0 | 80        |            |
| Turn-Off Delay Time                              | $t_{d(OFF)}$ |  |      | 15.8 | 62        |            |
| Fall Time  | $t_f$        |  |      | 10.6 | 25        |            |
| <b>BODY DIODE CHARACTERISTICS</b>                |              |  |      |      |           |            |
| Forward Voltage                                  | $V_{SD}$     | $V_{GS}=0V, I_S=1.0A$                                |      | 0.75 | 1.25      | V          |

## 7. Typical Characteristic



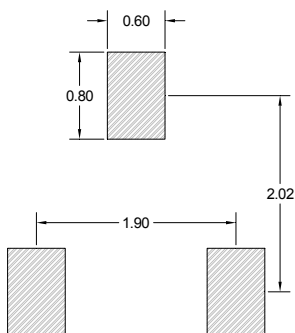
8. Dimension (SOT-23)



Unit: mm

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

Table-5 Product dimensions in millimeter



Note:

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

Unit: mm

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