

SuperMOS – SOT-23 -20V V_{DSS} , 90m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The NCE2301-ES is P-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 NCE2301-ES is Pb-free.

2. Features

- -20V, $R_{DS(ON)}$ =90m Ω (TYP.) @ V_{GS} =-4.5V
- $R_{DS(ON)}$ =110m Ω (TYP.) @ V_{GS} =-2.5V
- Fast Switching
- 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 |
|-------------|---------|---------|--------------|-------------|-------------------|---------------------|-----------|
| NCE2301-ES | SOT-23 | A1Ts | Halogen free | Tape & Reel | 3,000 PCS | UL 94V-0 | 7inches |

Table-1 Ordering information

5. Pin Configuration and Functions

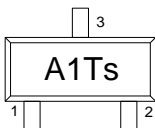
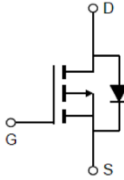
| Pin | Function | Outline | Circuit Diagram |
|-----|----------|---|---|
| 1 | Gate |  |  |
| 2 | Source | | |
| 3 | Drain | | |

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} | ± 8 | V |
| Continuous Drain Current | I_D | $T_A=25^\circ\text{C}$ | 2.3 |
| | | $T_A=75^\circ\text{C}$ | 1.7 |
| Maximum Power Dissipation | P_D | $T_A=25^\circ\text{C}$ | 1.4 |
| | | $T_A=75^\circ\text{C}$ | 0.84 |
| Pulsed Drain Current | I_{DM} | 9.2 | A |
| Operating Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

Thermal resistance ratings

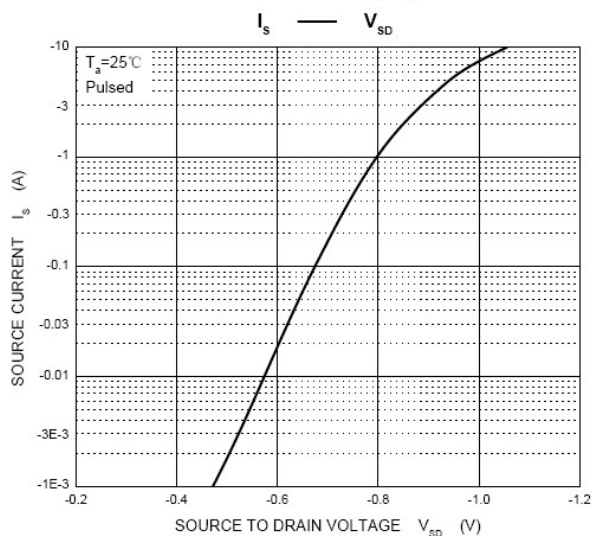
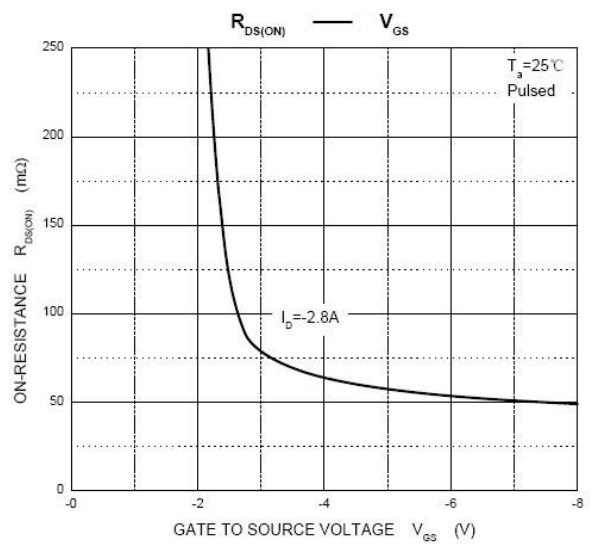
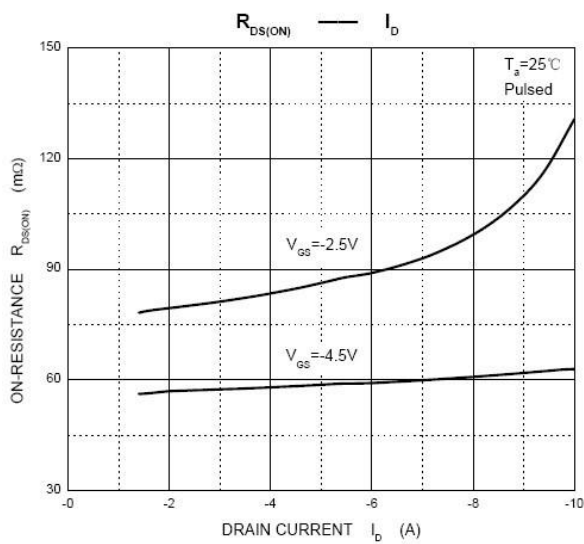
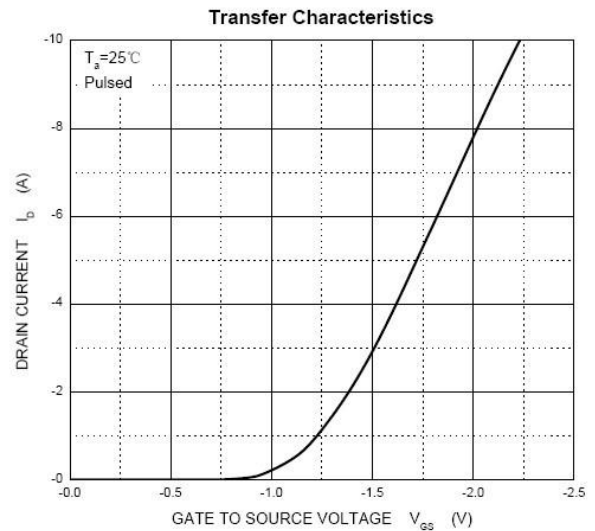
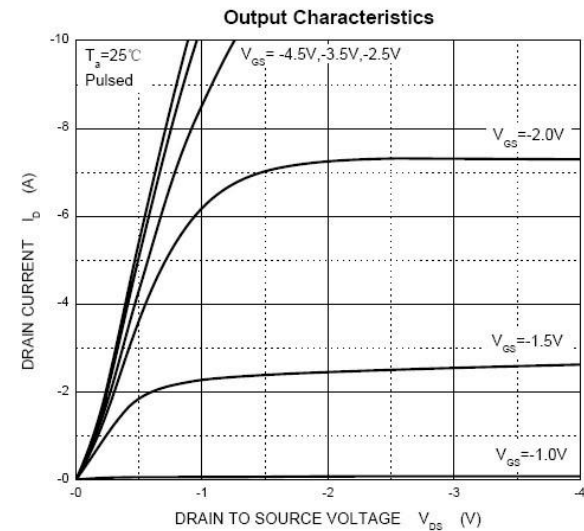
| Single Operation | | | |
|--|-----------------|---------|--------------------|
| Parameter | Symbol | Typical | Unit |
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 90 | $^\circ\text{C/W}$ |

Electrical Characteristics

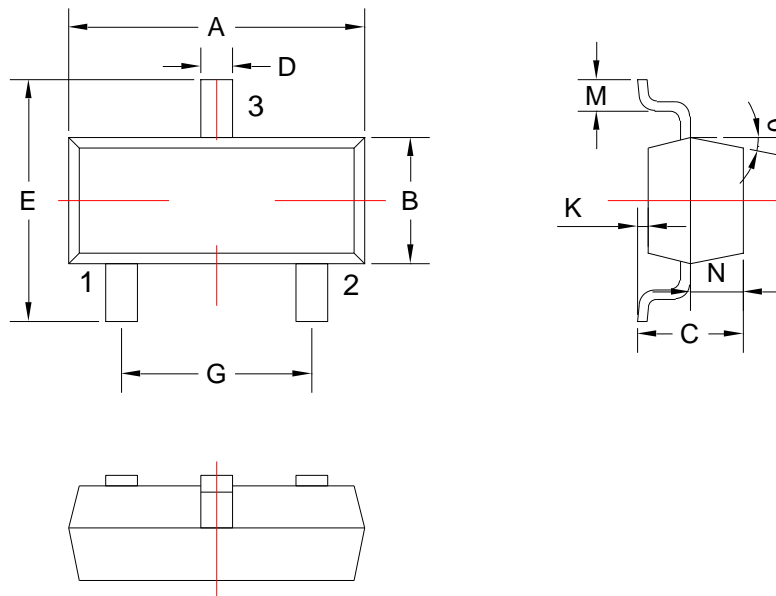
At TA = 25°C unless otherwise specified

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|--|--------------|--|------|------|-----------|------------|
| OFF CHARACTERISTICS | | | | | | |
| 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 | μA |
| Gate-to-source Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 8V$ | | | ± 100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -0.4 | -0.7 | -1.0 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-2.3A$ | | 90 | 112 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-2A$ | | 110 | 142 | |
| Forward trans conductance(a) | gfs | $V_{DS}=-5V, I_D=-2.3A$ | | 6.5 | | S |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=-10V,$ $f=1MHz$ | | | 405 | pF |
| Output Capacitance | C_{OSS} | | | | 75 | |
| Reverse Transfer Capacitance | C_{RSS} | | | | 55 | |
| Gate Resistance | R_g | $f=1MHz$ | | 6 | | Ω |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}=-2.5V, V_{DS}=-10V,$ $I_D=-2.3A$ | | 3.3 | 6 | nC |
| Gate-to-Source Charge | Q_{GS} | | | 0.7 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 1.3 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS}=-4.5V, V_{DS}=10V,$ $R_L=10\Omega, I_D=-1A,$ $R_G=1\Omega$ | | 11 | 20 | ns |
| Rise Time | t_r | | | 35 | 60 | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 30 | 50 | |
| Fall Time | t_f | | | 10 | 20 | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=-1.0A$ | | -0.8 | -1.5 | V |

7. Typical Characteristic



8. Dimension (SOT-23)



| COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER | | | | | |
|---|------|------|--------|------|------|
| SYMBOL | MIN | MAX | SYMBOL | MIN | MAX |
| A | 2.85 | 3.04 | G | 1.80 | 2.00 |
| B | 1.20 | 1.40 | K | 0 | 0.10 |
| C | 0.90 | 1.10 | M | 0.20 | - |
| D | 0.40 | 0.50 | N | 0.50 | 0.70 |
| E | 2.25 | 2.55 | θ | 5° | 9° |

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