

SuperMOS – SOT23-6L -20V V_{DSS} , 82m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The WST2011-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 WST2011-ES is Pb-free.

2. Features

- -20V, $R_{DS(ON)}$ =82m Ω (TYP.) @ V_{GS} =-4.5V
- $R_{DS(ON)}$ =118m Ω (TYP.) @ V_{GS} =-2.5V
- $R_{DS(ON)}$ =180m Ω (TYP.) @ V_{GS} =-1.8V
- Fast Switching
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current


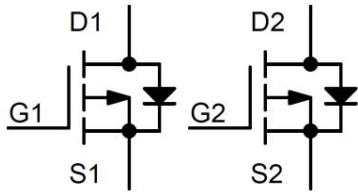
3. Applications

- 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 |
|-------------|----------|---------|--------------|-------------|-------------------|---------------------|-----------|
| WST2011-ES | SOT23-6L | .6312P | Halogen free | Tape & Reel | 3,000 PCS | UL 94V-0 | 7 inches |

5. Pin Configuration and Functions

| Pin | Function | Outline | Circuit Diagram |
|-----|----------|---|---|
| 1 | Gate1 |  |  |
| 5 | Source1 | | |
| 6 | Drain1 | | |
| 3 | Gate2 | | |
| 2 | Source2 | | |
| 4 | Drain2 | | |

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} | ±12 | V |
| Continuous Drain Current | I_D | $T_A=25^{\circ}C$ | -2 |
| | | $T_A=100^{\circ}C$ | -1.3 |
| Maximum Power Dissipation | P_D | 0.8 | W |
| Pulsed Drain Current | I_{DM} | -8 | A |
| Operating Junction Temperature | T_J | 150 | °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 ($t \leq 10s$) | $R_{\theta JA}$ | | 156 | °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} | $V_{DS}=0V, V_{GS}=\pm 12V$ | | | ± 100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -0.4 | -0.62 | -1.0 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-2A$ | | 82 | 95 | m Ω |
| | | $V_{GS}=-2.5A, I_D=-1.5A$ | | 118 | 138 | |
| | | $V_{GS}=-1.8V, I_D=-1A$ | | 180 | 210 | |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=-10V$ $f=1MHz$ | | 185 | | pF |
| Output Capacitance | C_{OSS} | | | 35 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 25 | | |
| Total Gate Charge | Q_G | $V_{GS}=-4.5V, V_{DS}=-10V$ $I_D=-2A$ | | 2.2 | | nC |
| Gate-to-Source Charge | Q_{GS} | | | 0.5 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 0.5 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS}=-4.5V, V_{DS}=-10V$ $R_L=5\Omega, R_G=3\Omega$ | | 10 | | ns |
| Rise Time | t_r | | | 30 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 62 | | |
| Fall Time | t_f | | | 50 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=-2A$ | | | -1.5 | V |

7. Typical Characteristics

Figure 1: Output Characteristics

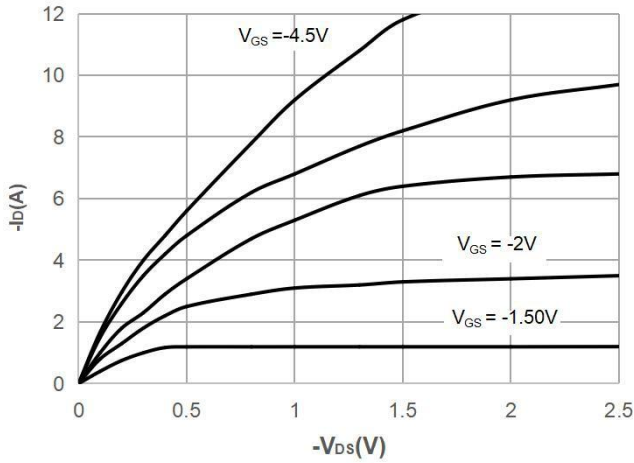


Figure 2: Typical Transfer Characteristics

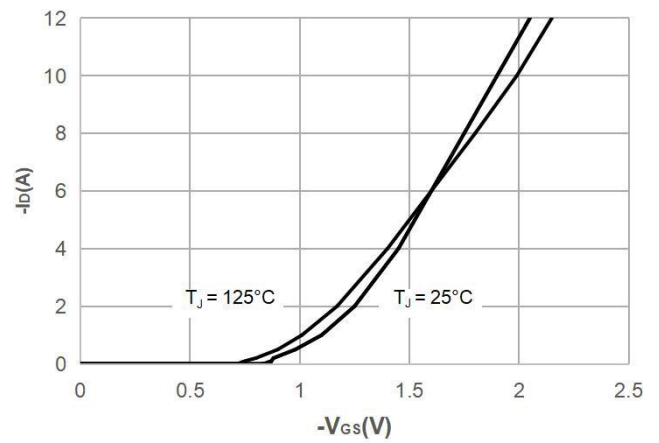


Figure 3: On-resistance vs. Drain Current

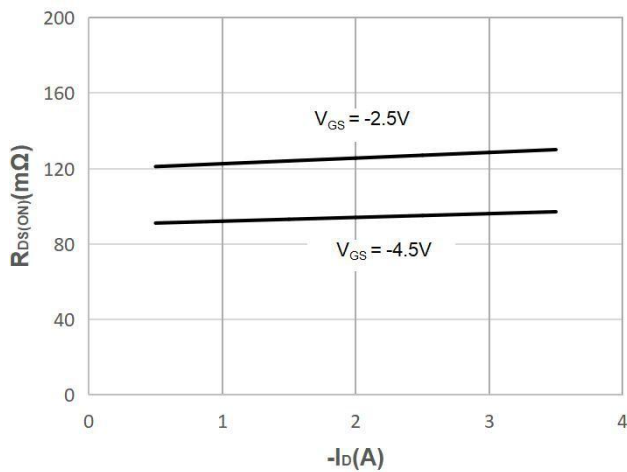


Figure 4: Body Diode Characteristics

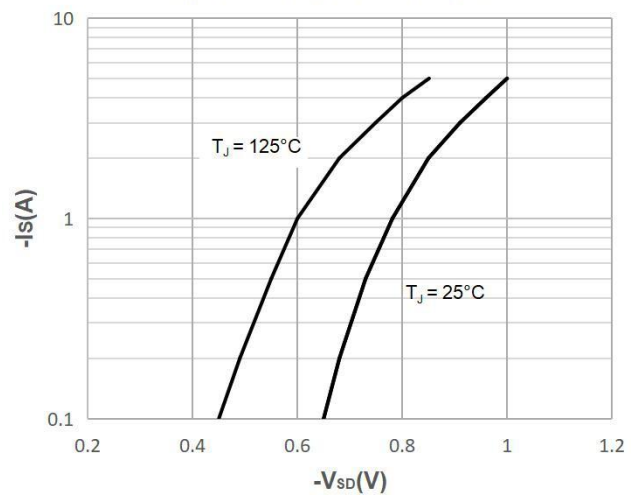


Figure 5: Gate Charge Characteristics

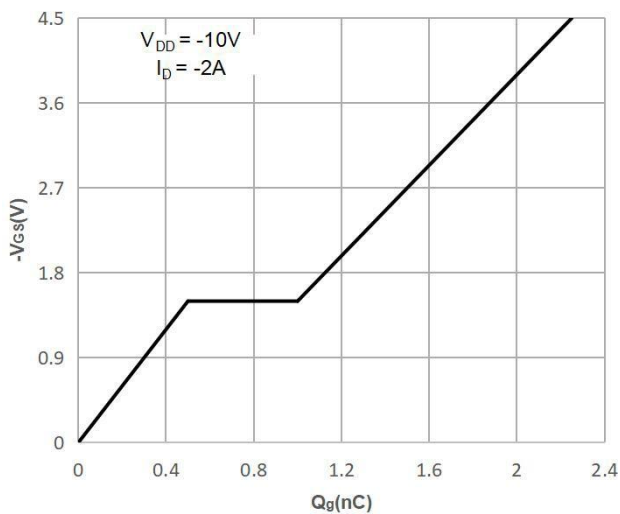


Figure 6: Capacitance Characteristics

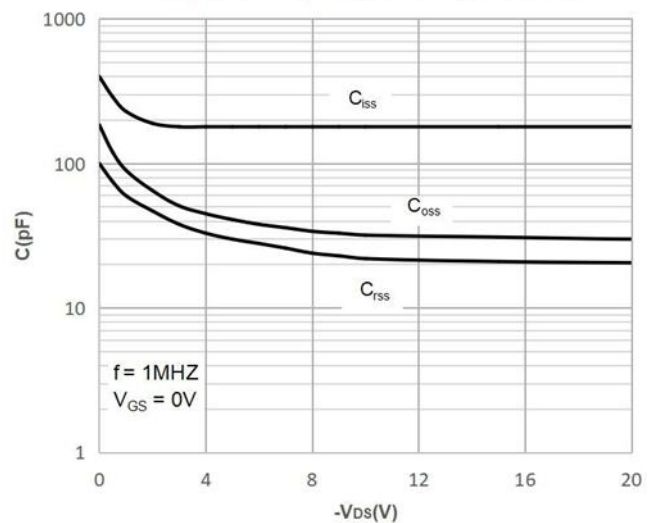


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

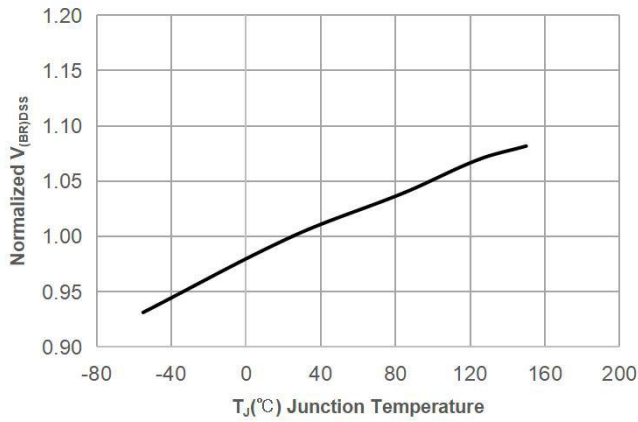


Figure 8: Normalized on Resistance vs. Junction Temperature

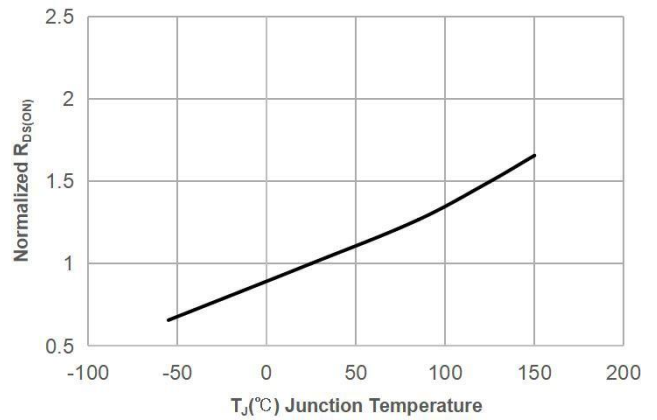


Figure 9: Maximum Safe Operating Area

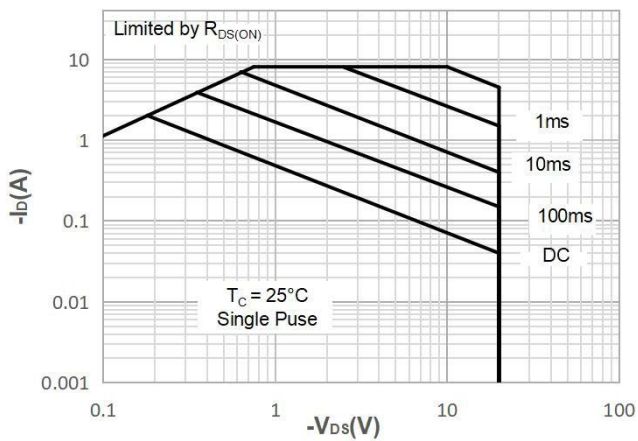


Figure 10: Maximum Continuous Driian Current vs. Case Temperature

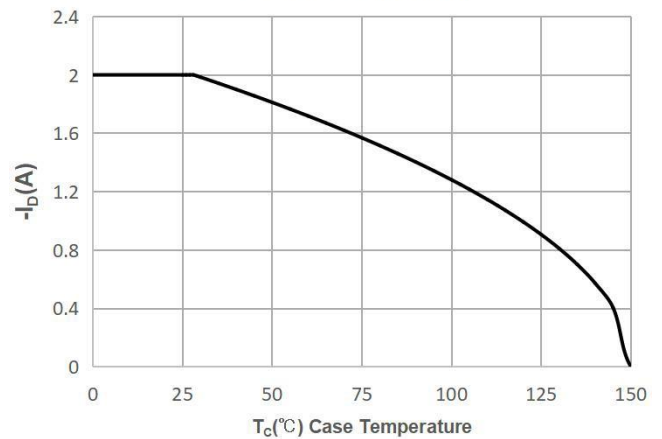


Figure 11: Normalized Maximum Transient Thermal Impedance

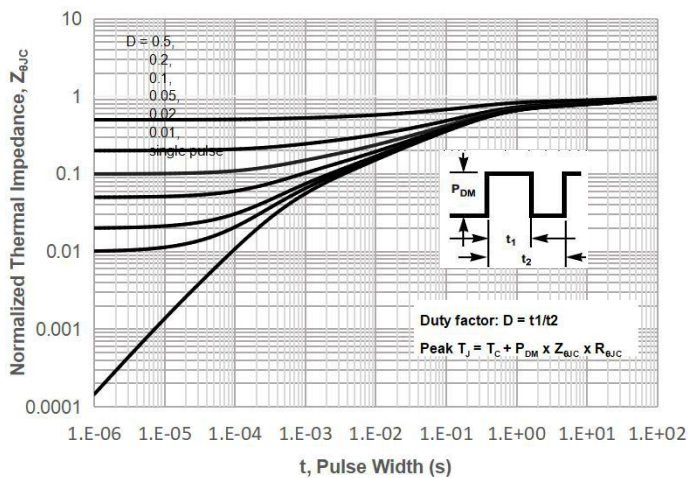
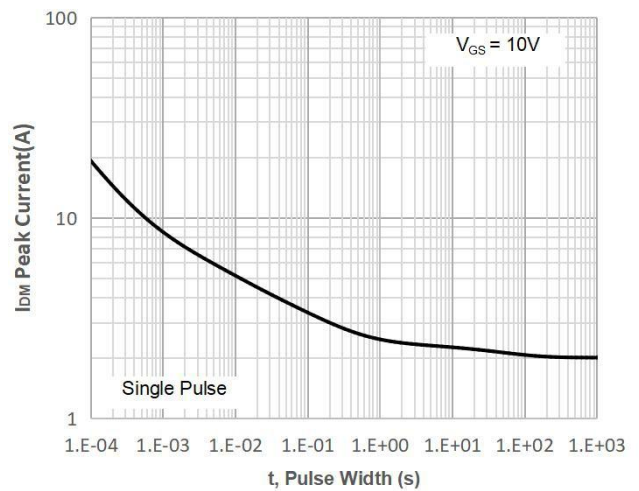
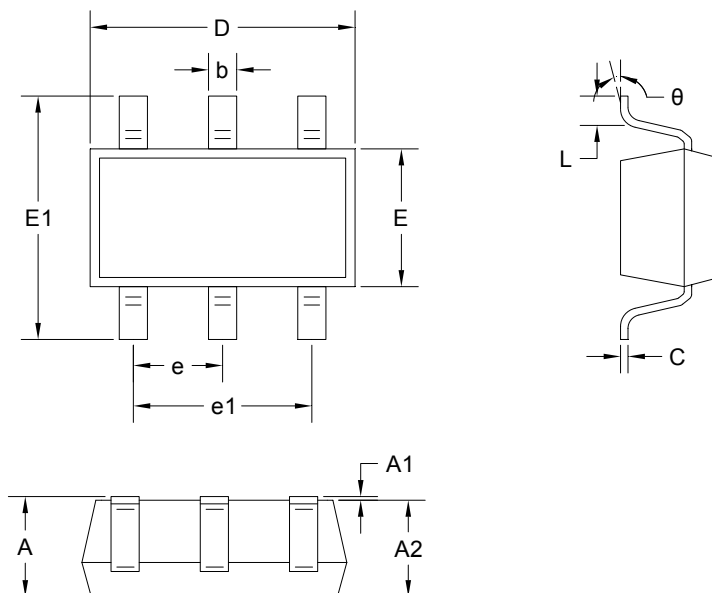


Figure 12: Peak Current Capacity



8. Dimension (SOT23-6L)



Unit: mm

| Symbol | | A | A1 | A2 | b | c | D |
|--------|-----|-------|-------|----------|-------|-------|----------|
| Spec | Min | 1.050 | 0.000 | 1.050 | 0.300 | 0.100 | 2.820 |
| | Max | 1.250 | 0.100 | 1.150 | 0.500 | 0.200 | 3.020 |
| Symbol | | E | E1 | e | e1 | L | θ |
| Spec | Min | 1.500 | 2.650 | 0.950BSC | 1.800 | 0.300 | 0° |
| | Max | 1.700 | 2.950 | | 2.000 | 0.600 | 8° |

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