

**SuperMOS – SOT-23 -20V BV<sub>DSS</sub>, 580mΩ R<sub>DS(ON)</sub>, P-channel MOSFET**

**1. Description**

The YJL3139K-ES is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product YJL3139K-ES is Pb-free.

**2. Features**

- -20V, R<sub>DS(ON)</sub>=580mΩ(Typ), V<sub>GS</sub>=-4.5V
- R<sub>DS(ON)</sub>=855mΩ(Typ), V<sub>GS</sub>=-2.5V
- R<sub>DS(ON)</sub>=1350mΩ(Typ), V<sub>GS</sub>=-1.8V
- Use trench MOSFET technology
- High density cell design for low R<sub>DS(on)</sub>
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

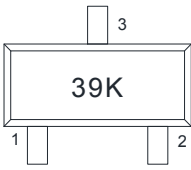
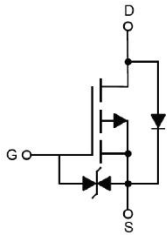
**3. Applications**

- 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 |
|-------------|---------|---------|--------------|-------------|-------------------|---------------------|-----------|
| YJL3139K-ES | SOT-23  | 39K     | Halogen free | Tape & Reel | 3,000 PCS         | UL 94V-0            | 7 inches  |

**5. Pin Configuration and Functions**

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

## 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            | $V_{GS}$   | $\pm 12$               | V                |
| Continuous Drain Current       | $I_D$      | $T_A=25^\circ\text{C}$ | -0.5             |
|                                |            | $T_A=75^\circ\text{C}$ | -0.4             |
| Maximum Power Dissipation      | $P_D$      | 0.35                   | W                |
| Pulsed Drain Current           | $I_{DM}$   | -2.6                   | A                |
| Operating Junction Temperature | $T_J$      | 150                    | $^\circ\text{C}$ |
| Lead Temperature               | $T_L$      | 260                    | $^\circ\text{C}$ |
| Storage Temperature Range      | $T_{stg}$  | -55 to 150             | $^\circ\text{C}$ |

### Thermal resistance ratings

| Single Operation                       |                     |                 |         |         |                    |
|--|---------------------|-----------------|---------|---------|--------------------|
| Parameter                              |                     | Symbol          | Typical | Maximum | Unit               |
| Junction-to-Ambient Thermal Resistance | $t \leq 10\text{s}$ | $R_{\theta JA}$ |         | 357     | $^\circ\text{C/W}$ |

## 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                   | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 10V$                                   |       |       | $\pm 10$ | $\mu A$    |
| <b>ON CHARACTERISTICS</b>                        |              |   |       |       |          |            |
| Gate Threshold Voltage                           | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$                                | -0.35 | -0.62 | -1.2     | V          |
| Drain-to-source On-resistance                    | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-0.5A$                                     |       | 580   | 850      | m $\Omega$ |
|  |              | $V_{GS}=-2.5V, I_D=-0.3A$                                     |       | 855   | 1200     |            |
|  |              | $V_{GS}=-1.8V, I_D=-0.2A$                                     |       | 1350  | 2000     |            |
| <b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b> |              |   |       |       |          |            |
| Input Capacitance                                | $C_{ISS}$    | $V_{GS}=0V, f=1MHz,$<br>$V_{DS}=-10V$                         |       | 71    |          | pF         |
| Output Capacitance                               | $C_{OSS}$    |   |       | 20    |          |            |
| Reverse Transfer Capacitance                     | $C_{RSS}$    |   |       | 15    |          |            |
| Total Gate Charge                                | $Q_{G(TOT)}$ | $V_{GS}=-4.5V, V_{DS}=-10V,$<br>$I_D=-0.5A$                   |       | 1.25  |          | nC         |
| Gate-to-Source Charge                            | $Q_{GS}$     |   |       | 0.38  |          |            |
| Gate-to-Drain Charge                             | $Q_{GD}$     |   |       | 0.28  |          |            |
| <b>SWITCHING CHARACTERISTICS</b>                 |              |   |       |       |          |            |
| Turn-On Delay Time                               | $t_{d(ON)}$  | $V_{GS}=-4.5V, V_{DS}=-10V,$<br>$R_L=2.5\Omega, R_G=-3\Omega$ |       | 4     |          | ns         |
| Rise Time  | $t_r$        |   |       | 19    |          |            |
| Turn-Off Delay Time                              | $t_{d(OFF)}$ |   |       | 16    |          |            |
| Fall Time  | $t_f$        |   |       | 25    |          |            |
| <b>BODY DIODE CHARACTERISTICS</b>                |              |   |       |       |          |            |
| Forward Voltage                                  | $V_{SD}$     | $V_{GS}=0V, I_S=-0.5A$  |       |       | -1.2     | V          |

## 7. Typical Characteristic

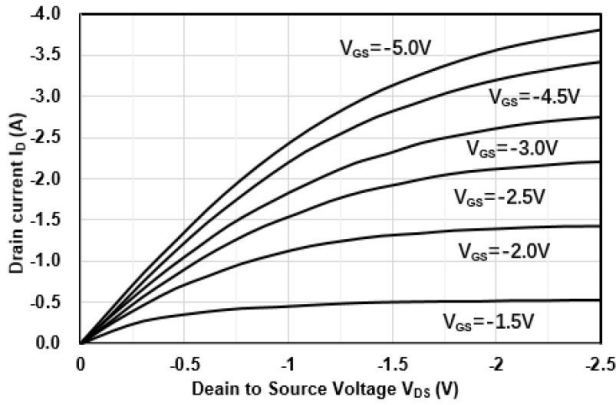


Figure1. Output Characteristics

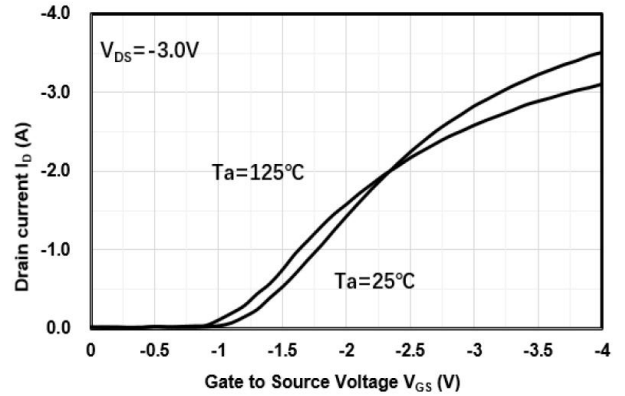


Figure2. Transfer Characteristics

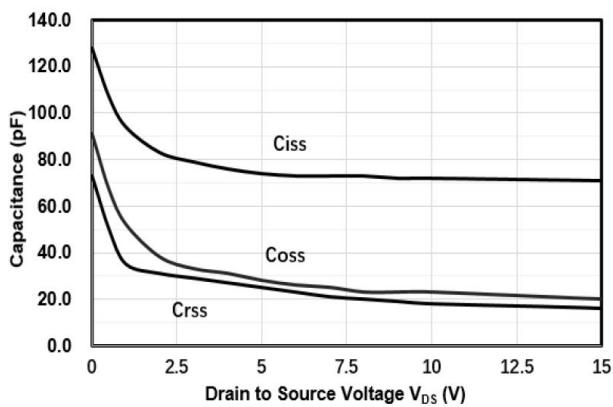


Figure3. Capacitance Characteristics

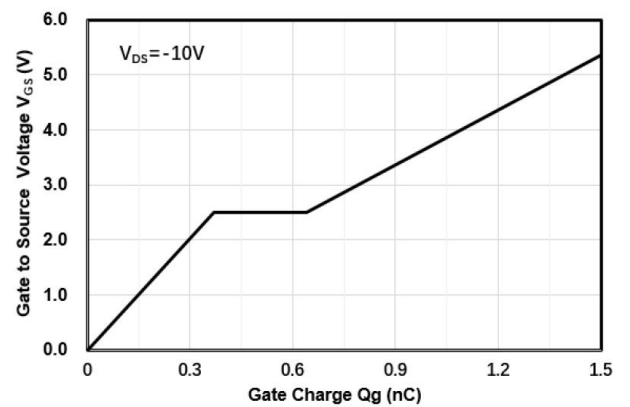


Figure4. Gate Charge

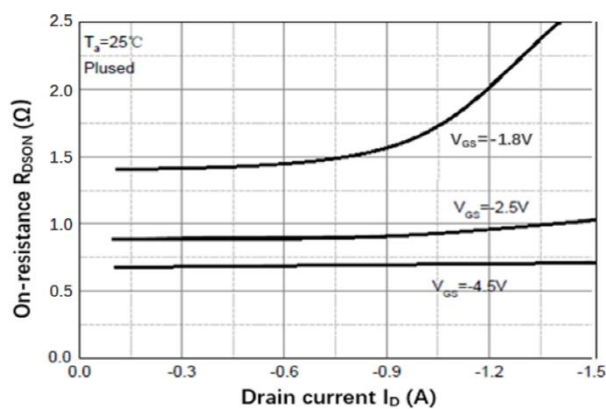


Figure5. Drain-Source on Resistance

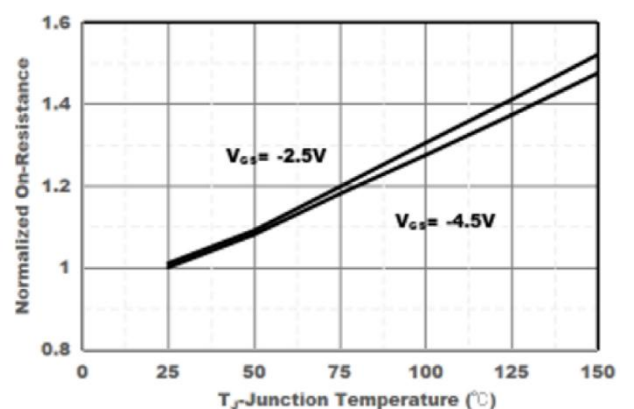


Figure6. Drain-Source on Resistance

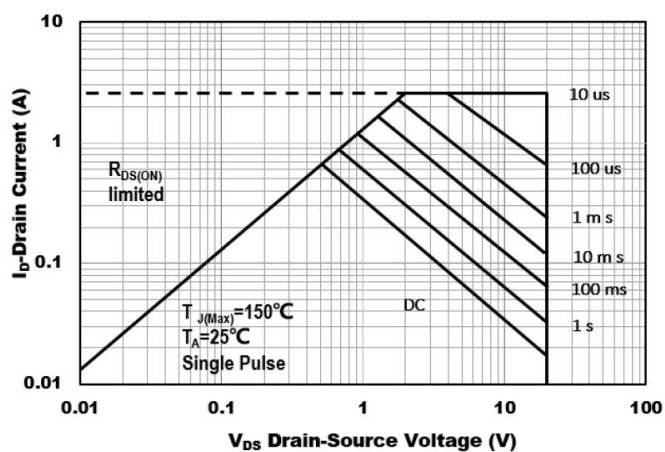
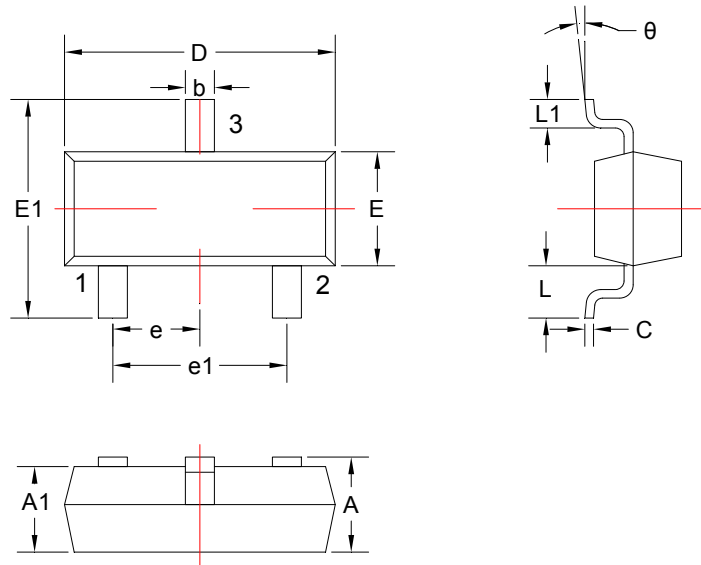


Figure7. Safe Operation Area

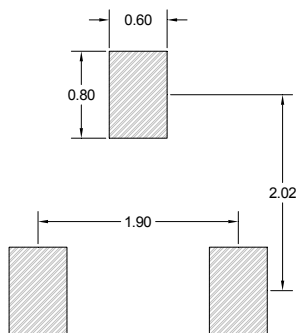
8. Dimension (SOT-23)



Units: 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      | 3.00  | L1     | 0.300      | 0.500 |
| E      | 1.200      | 1.400 | θ      | 0°         | 8°    |

Recommended Land Pattern



Note:

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

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