

## Features

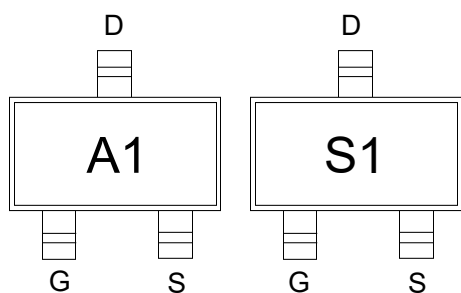
- Leading trench technology for low  $R_{DS(on)}$
- Low Gate Charge

## Product Summary

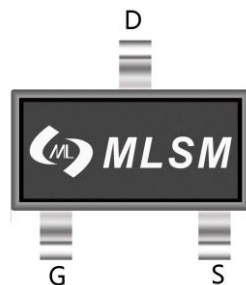
| $V_{DS}$ | $R_{DS(ON)}$ TYP | $I_D$ |
|----------|------------------|-------|
| -20V     | 125mΩ@4.5V       | -2.3A |
|          | 177mΩ@2.5V       |       |

## Application

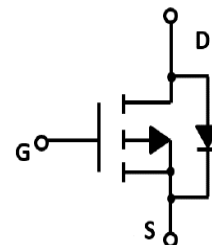
- Video monitor
- Power management



Marking and pin assignment



SOT-523 top view



Schematic diagram



Halogen-Free

## Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Unit |
|--------|-----------|--------|------|
|--------|-----------|--------|------|

### Common Ratings (TC=25°C Unless Otherwise Noted)

|           |                                  |                                |    |
|-----------|----------------------------------|--------------------------------|----|
| $V_{DS}$  | Drain-Source Breakdown Voltage   | -20                            | V  |
| $V_{GS}$  | Gate-Source Voltage              | ±10                            | V  |
| $T_J$     | Maximum Junction Temperature     | 150                            | °C |
| $T_{STG}$ | Storage Temperature Range        | -55 to 150                     | °C |
| $I_S$     | Diode Continuous Forward Current | $T_C=25^\circ\text{C}$<br>-2.3 | A  |

### Mounted on Large Heat Sink

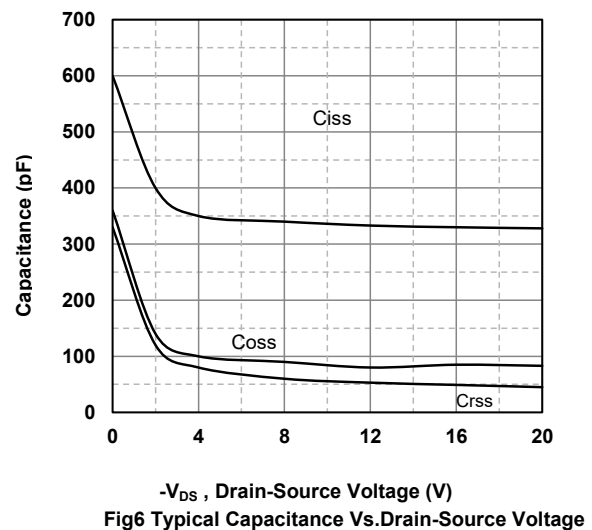
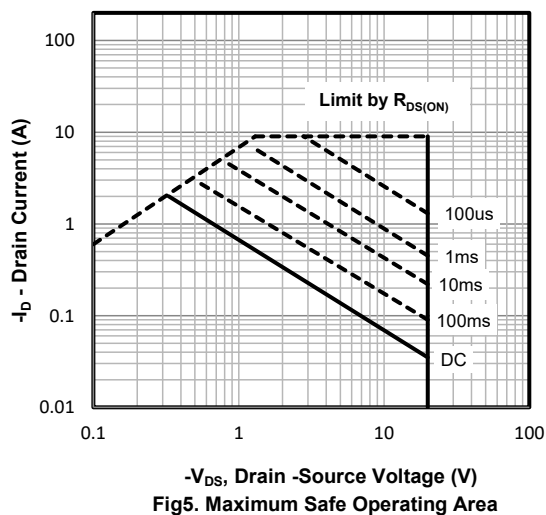
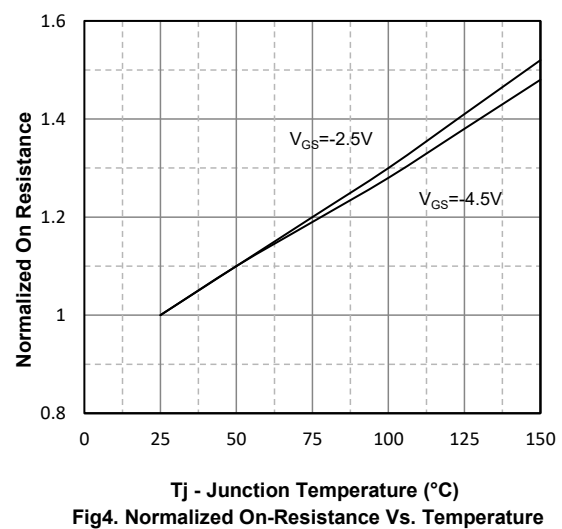
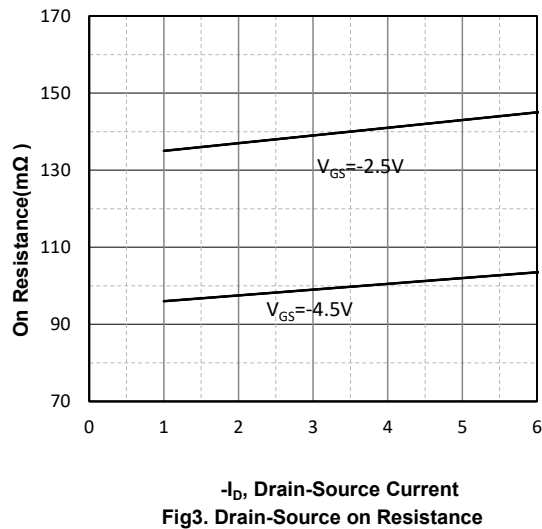
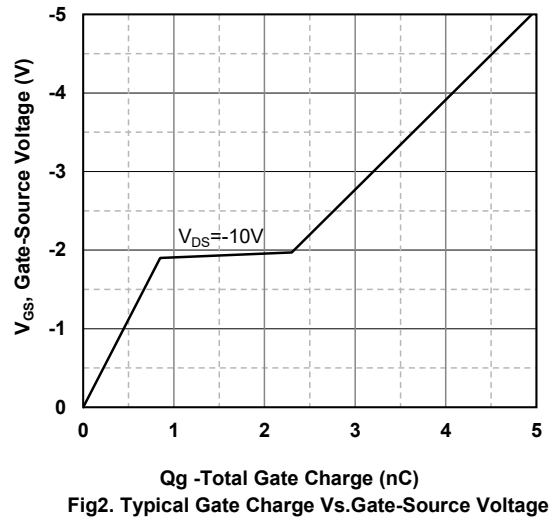
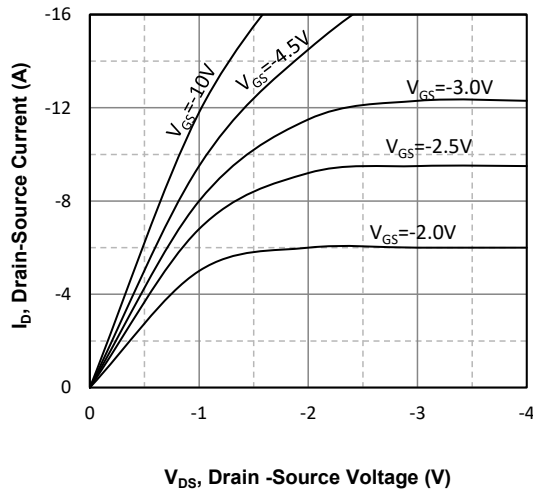
|                 |                                        |                                |      |
|-----------------|----------------------------------------|--------------------------------|------|
| $I_{DM}$        | Pulse Drain Current Tested             | $T_C=25^\circ\text{C}$<br>-6.0 | A    |
| $I_D$           | Continuous Drain Current               | $T_C=25^\circ\text{C}$<br>-2.3 | A    |
| $P_D$           | Maximum Power Dissipation              | $T_C=25^\circ\text{C}$<br>0.7  | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction-to-Ambient | 178                            | °C/W |

## Ordering Information (Example)

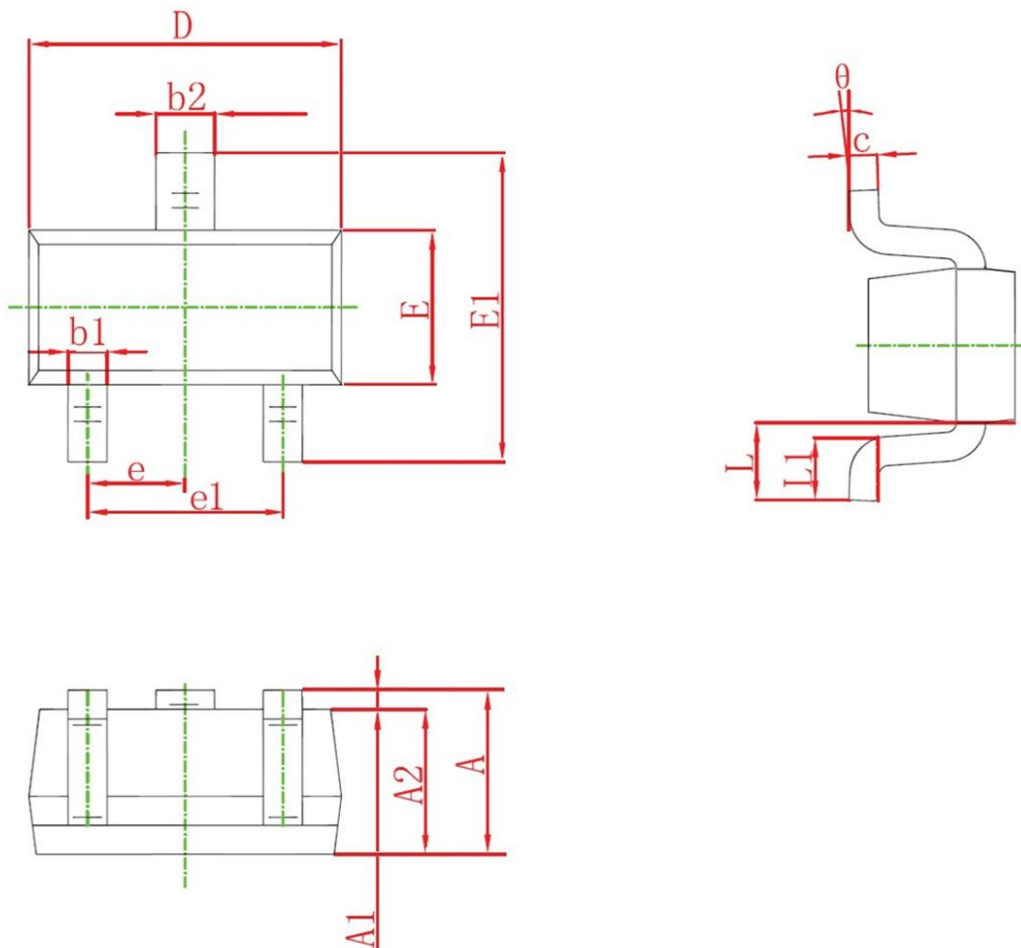
| Type      | Package | Marking | Minimum Package(pcs) | Inner Box Quantity(pcs) | Outer Carton Quantity(pcs) | Delivery Mode |
|-----------|---------|---------|----------------------|-------------------------|----------------------------|---------------|
| MLS2301DT | SOT-523 | A1/S1   | 3,000                | 45,000                  | 180,000                    | 7"reel        |

| Electrical Characteristics (TJ=25℃ unless otherwise noted)              |                                  |                                                                                          |      |       |      |      |
|-------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------|------|-------|------|------|
| Symbol                                                                  | Parameter                        | Condition                                                                                | Min  | Typ   | Max  | Unit |
| Static Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)  |                                  |                                                                                          |      |       |      |      |
| BV <sub>(BR)DSS</sub>                                                   | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                              | -20  | --    | --   | V    |
| I <sub>DSS</sub>                                                        | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V                                               | --   | --    | -1   | μA   |
| I <sub>GSS</sub>                                                        | Gate-Body Leakage Current        | V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V                                               | --   | --    | ±100 | nA   |
| V <sub>GS(th)</sub>                                                     | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                | -0.4 | -0.62 | -1.0 | V    |
| R <sub>DS(on)</sub>                                                     | Drain-Source On-State Resistance | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.0A                                            | --   | 125   | 160  | mΩ   |
|                                                                         |                                  | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.5A                                            | --   | 177   | 250  | mΩ   |
| Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated) |                                  |                                                                                          |      |       |      |      |
| C <sub>ISS</sub>                                                        | Input Capacitance                | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz                                       | --   | 327   | --   | pF   |
| C <sub>OSS</sub>                                                        | Output Capacitance               |                                                                                          | --   | 60    | --   | pF   |
| C <sub>RSS</sub>                                                        | Reverse Transfer Capacitance     |                                                                                          | --   | 55    | --   | pF   |
| Switching Characteristics                                               |                                  |                                                                                          |      |       |      |      |
| Q <sub>g</sub>                                                          | Total Gate Charge                | V <sub>DS</sub> =-10V, I <sub>D</sub> =-2A, V <sub>GS</sub> =-4.5V                       | --   | 4.4   | --   | nC   |
| Q <sub>gs</sub>                                                         | Gate Source Charge               |                                                                                          | --   | 0.8   | --   | nC   |
| Q <sub>gd</sub>                                                         | Gate Drain Charge                |                                                                                          | --   | 1.3   | --   | nC   |
| t <sub>d(on)</sub>                                                      | Turn-on Delay Time               | V <sub>DD</sub> =-10V, I <sub>D</sub> =-1A, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =2.8Ω | --   | 6     | --   | nS   |
| t <sub>r</sub>                                                          | Turn-on Rise Time                |                                                                                          | --   | 31    | --   | nS   |
| t <sub>d(off)</sub>                                                     | Turn-Off Delay Time              |                                                                                          | --   | 45    | --   | nS   |
| t <sub>f</sub>                                                          | Turn-Off Fall Time               |                                                                                          | --   | 40    | --   | nS   |
| Source- Drain Diode Characteristics                                     |                                  |                                                                                          |      |       |      |      |
| V <sub>SD</sub>                                                         | Forward on voltage               | Tj=25℃, Is=-2.5A,                                                                        | --   | --    | -1.2 | V    |

## Typical Operating Characteristics



**SOT-523 Package information**



| Symbol   | Dimensions in Millimeters(mm) |       | Dimensions in Inches |       |
|----------|-------------------------------|-------|----------------------|-------|
|          | Min                           | Max   | Min                  | Max   |
| A        | 0.700                         | 0.900 | 0.028                | 0.035 |
| A1       | 0.000                         | 0.100 | 0.000                | 0.004 |
| A2       | 0.700                         | 0.800 | 0.028                | 0.031 |
| b1       | 0.150                         | 0.250 | 0.006                | 0.010 |
| b2       | 0.250                         | 0.350 | 0.010                | 0.014 |
| c        | 0.100                         | 0.200 | 0.004                | 0.008 |
| D        | 1.500                         | 1.700 | 0.059                | 0.067 |
| E        | 0.700                         | 0.900 | 0.028                | 0.035 |
| E1       | 1.450                         | 1.750 | 0.057                | 0.069 |
| e        | 0.500TYP                      |       | 0.020TYP             |       |
| e1       | 0.900                         | 1.100 | 0.035                | 0.043 |
| L        | 0.400REF                      |       | 0.016REF             |       |
| L1       | 0.260                         | 0.460 | 0.010                | 0.018 |
| $\theta$ | 0°                            | 8°    | 0°                   | 8°    |