

## Features

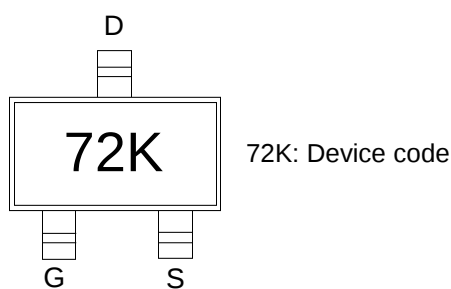
- High density cell design for Low  $R_{DS(on)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- ESD protected

## Application

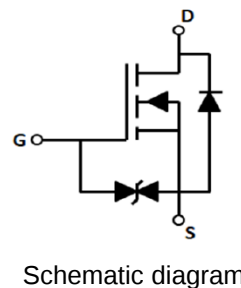
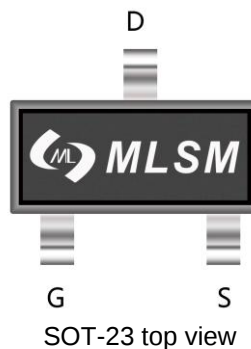
- Load Switch for Portable Devices
- DC/DC Converter

## Product Summary

| $V_{DS}$ | $R_{DS(ON)}$ TYP | $I_D$ |
|----------|------------------|-------|
| 60V      | 1.6Ω@10V         | 0.3A  |
|          | 2.1Ω@4.5V        |       |



Marking and pin assignment



Halogen-Free

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

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

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

|                  |                                  |         |            |    |
|------------------|----------------------------------|---------|------------|----|
| V <sub>DS</sub>  | Drain-Source Breakdown Voltage   |         | 60         | V  |
| V <sub>GS</sub>  | Gate-Source Voltage              |         | ±20        | V  |
| T <sub>J</sub>   | Maximum Junction Temperature     |         | 150        | °C |
| T <sub>STG</sub> | Storage Temperature Range        |         | -50 to 155 | °C |
| I <sub>S</sub>   | Diode Continuous Forward Current | Tc=25°C | 0.3        | A  |

## Mounted on Large Heat Sink

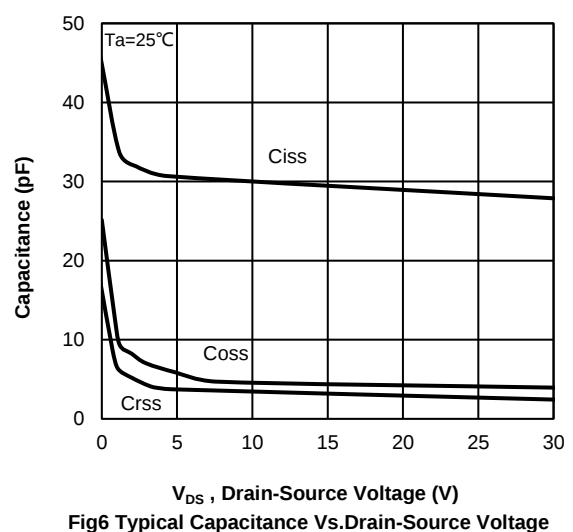
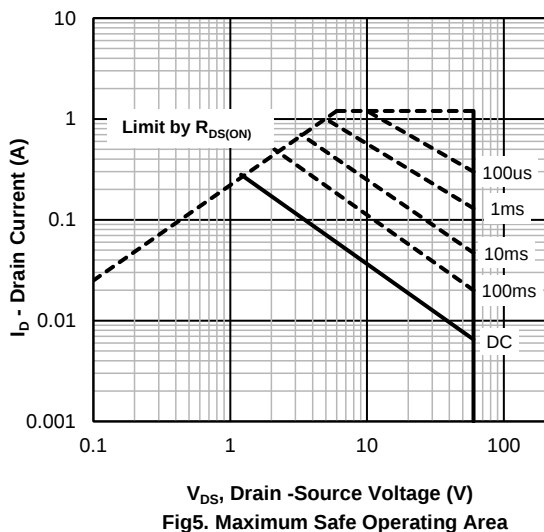
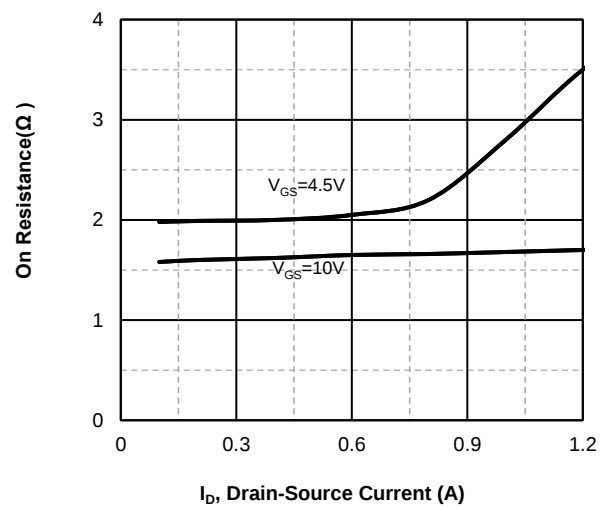
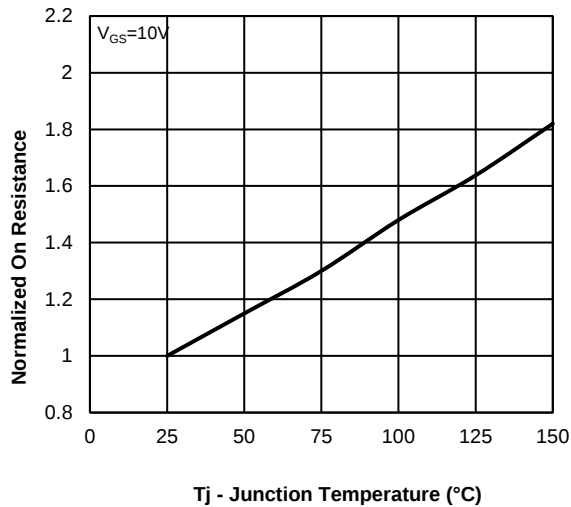
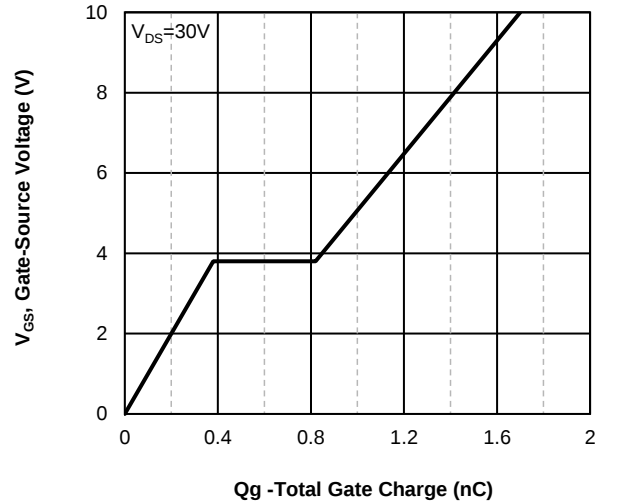
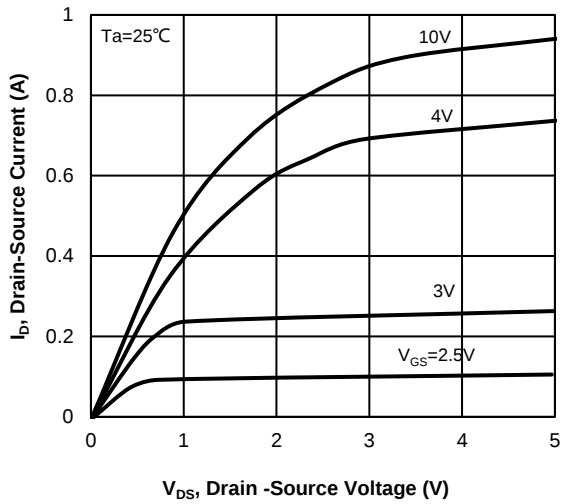
|                 |                                        |                   |      |      |
|-----------------|----------------------------------------|-------------------|------|------|
| $I_{DM}$        | Pulse Drain Current Tested             | $T_C=25^{\circ}C$ | 1.2  | A    |
| $I_D$           | Continuous Drain Current               | $T_C=25^{\circ}C$ | 0.3  | A    |
| $P_D$           | Maximum Power Dissipation              | $T_C=25^{\circ}C$ | 0.35 | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction-to-Ambient |                   | 357  | °C/W |

## Ordering Information (Example)

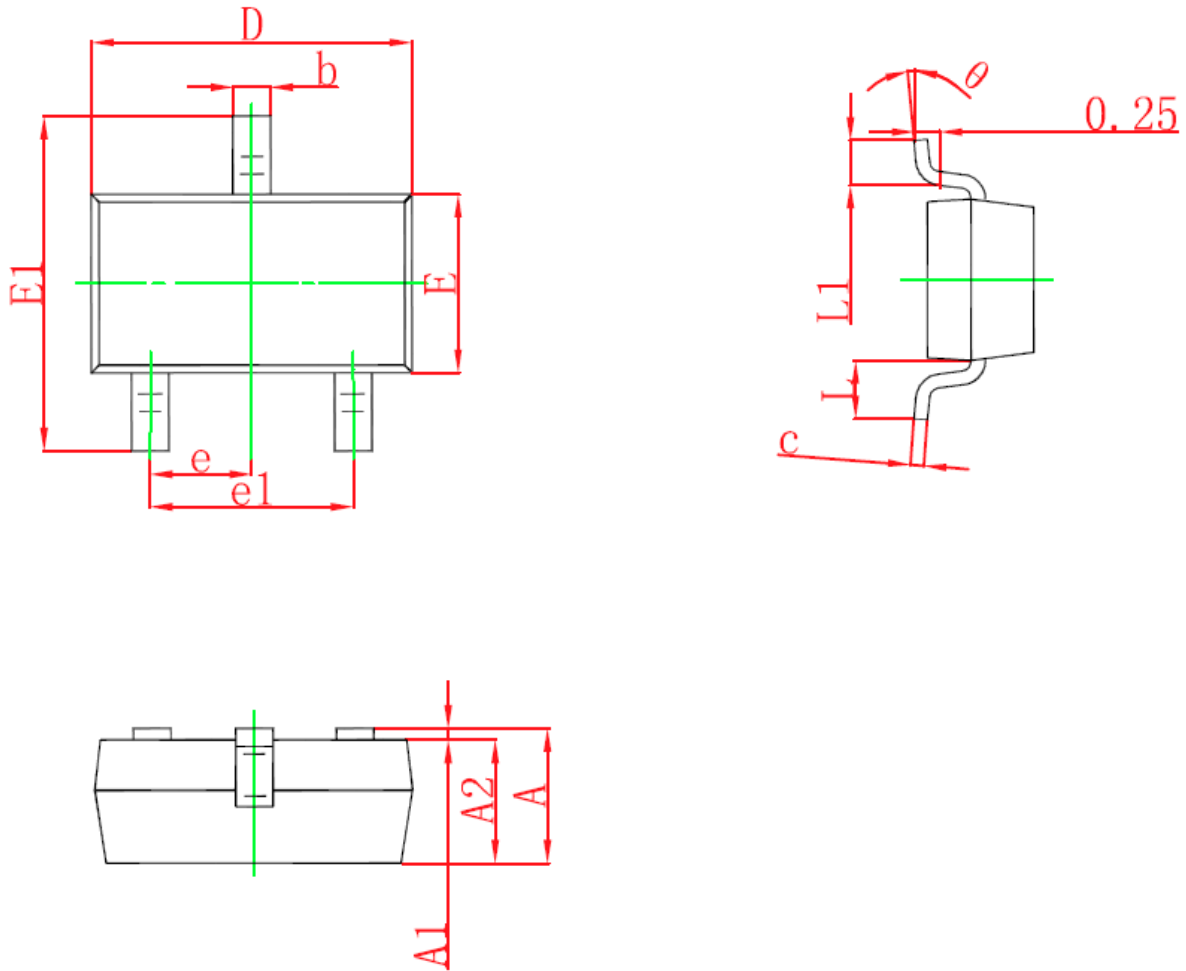
| Type    | Package | Marking | Minimum Package(pcs) | Inner Box Quantity(pcs) | Outer Carton Quantity(pcs) | Delivery Mode |
|---------|---------|---------|----------------------|-------------------------|----------------------------|---------------|
| 2N7002K | SOT-23  | 72K     | 3,000                | 45,000                  | 180,000                    | 7"reel        |

| Electrical Characteristics (TJ=25°C unless otherwise noted)              |                                  |                                                                                       |     |      |     |      |
|--------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|-----|------|-----|------|
| Symbol                                                                   | Parameter                        | Condition                                                                             | Min | Typ  | Max | Unit |
| Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)  |                                  |                                                                                       |     |      |     |      |
| BV <sub>(BR)DSS</sub>                                                    | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                            | 60  | --   | --  | V    |
| I <sub>DSS</sub>                                                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                             | --  | --   | 1.0 | μA   |
| I <sub>GSS</sub>                                                         | Gate-Body Leakage Current        | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                            | --  | --   | ±10 | μA   |
| V <sub>GS(th)</sub>                                                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                              | 0.8 | --   | 3.0 | V    |
| R <sub>DS(on)</sub>                                                      | Drain-Source On-State Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =0.3A                                            | --  | 1.6  | 2.5 | Ω    |
|                                                                          |                                  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.2A                                           | --  | 2.1  | 3.0 | Ω    |
| Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated) |                                  |                                                                                       |     |      |     |      |
| C <sub>ISS</sub>                                                         | Input Capacitance                | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz                                     | --  | 21   | --  | pF   |
| C <sub>OSS</sub>                                                         | Output Capacitance               |                                                                                       | --  | 9    | --  | pF   |
| C <sub>RSS</sub>                                                         | Reverse Transfer Capacitance     |                                                                                       | --  | 4    | --  | pF   |
| Switching Characteristics                                                |                                  |                                                                                       |     |      |     |      |
| Q <sub>g</sub>                                                           | Total Gate Charge                | V <sub>DS</sub> =30V, I <sub>D</sub> =0.3A, V <sub>GS</sub> =10V                      | --  | 1.22 | 2.4 | nC   |
| Q <sub>gs</sub>                                                          | Gate-Source Charge               |                                                                                       | --  | 0.5  | --  | nC   |
| Q <sub>gd</sub>                                                          | Gate-Drain Charge                |                                                                                       | --  | 0.18 | --  | nC   |
| t <sub>d(on)</sub>                                                       | Turn-on Delay Time               | V <sub>DD</sub> =30V, I <sub>D</sub> =0.3A, V <sub>GS</sub> =10V, R <sub>G</sub> =50Ω | --  | 7    | --  | nS   |
| t <sub>r</sub>                                                           | Turn-on Rise Time                |                                                                                       | --  | 19   | --  | nS   |
| t <sub>d(off)</sub>                                                      | Turn-Off Delay Time              |                                                                                       | --  | 20   | --  | nS   |
| t <sub>f</sub>                                                           | Turn-off fall Time               |                                                                                       | --  | 84   | --  | nS   |
| Source- Drain Diode Characteristics                                      |                                  |                                                                                       |     |      |     |      |
| V <sub>SD</sub>                                                          | Forward on voltage               | Tj=25°C, Is=0.3A                                                                      | --  | --   | 1.2 | V    |

## Typical Operating Characteristics



SOT-23 Package information



| Symbol | Dimensions in Millimeters(mm) |       | Dimensions In Inches |       |
|--------|-------------------------------|-------|----------------------|-------|
|        | Min                           | Max   | Min                  | Max   |
| A      | 0.900                         | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                         | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                         | 1.050 | 0.035                | 0.041 |
| b      | 0.300                         | 0.500 | 0.012                | 0.020 |
| c      | 0.080                         | 0.150 | 0.003                | 0.006 |
| D      | 2.800                         | 3.000 | 0.110                | 0.118 |
| E1     | 2.250                         | 2.550 | 0.088                | 0.100 |
| E      | 1.200                         | 1.400 | 0.047                | 0.055 |
| e      | 0.950TYP                      |       | 0.037TYP             |       |
| e1     | 1.800                         | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                     |       | 0.022 REF            |       |
| L1     | 0.300                         | 0.500 | 0.012                | 0.020 |
| θ      | 0°                            | 8°    | 0°                   | 8°    |