

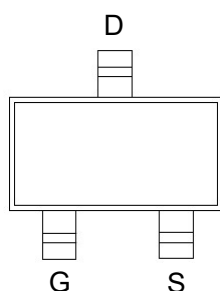
## -60V/-0.33A P-Channel MOSFET

### Features

- Advanced trench cell design
- High speed switch
- Low Gate Charge

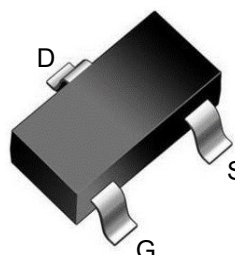
### Application

- Portable appliances
- Video monitor

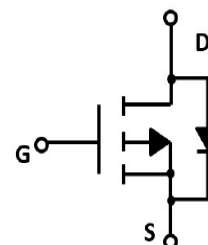


### Product Summary

| $V_{DS}$ | $R_{DS(ON)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|----------|--------------------------|-------------------|
| -60V     | 2Ω@-10V                  | -0.33A            |
|          | 3Ω@-4.5V                 |                   |



SOT-23 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)

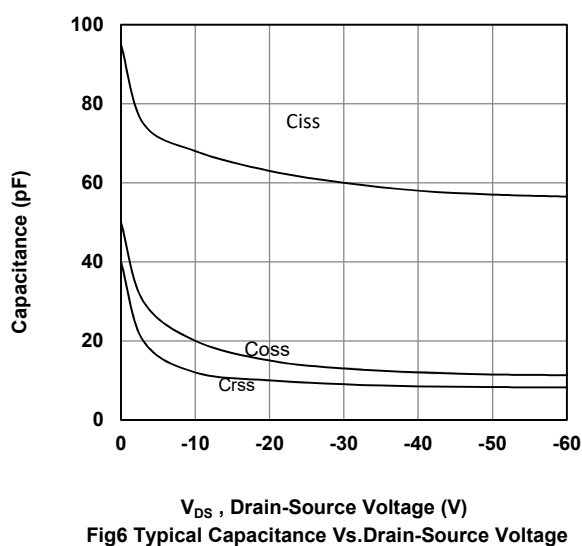
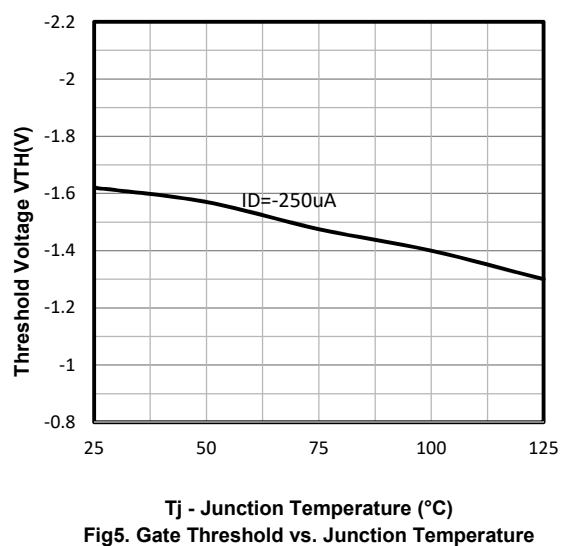
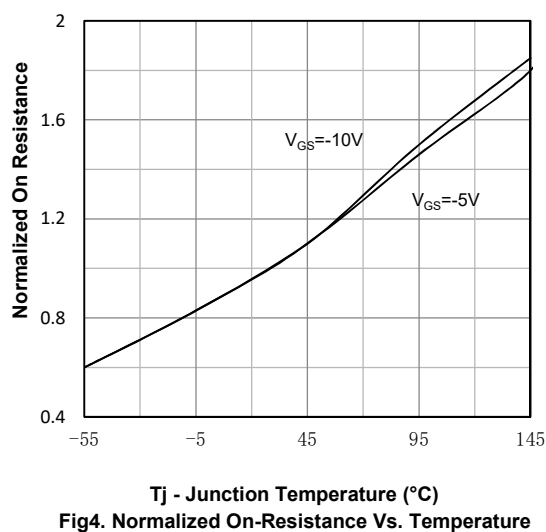
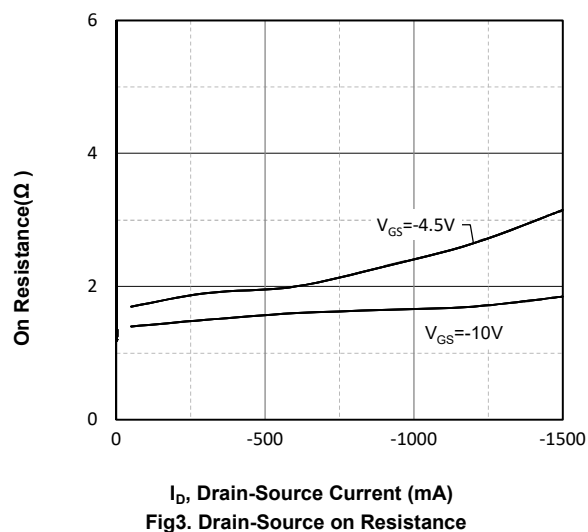
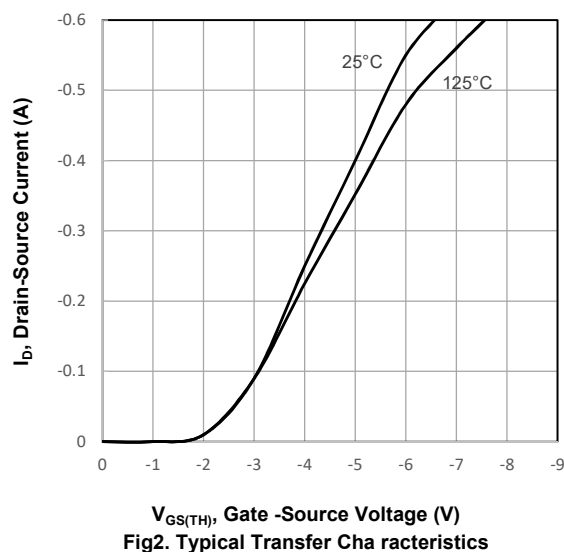
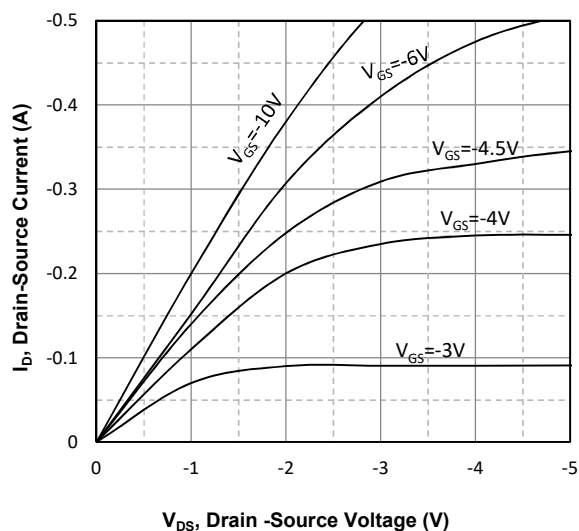
|           |                                  |                        |            |    |
|-----------|----------------------------------|------------------------|------------|----|
| $V_{DS}$  | Drain-Source Breakdown Voltage   |                        | -60        | V  |
| $V_{GS}$  | Gate-Source Voltage              |                        | ±20        | V  |
| $T_J$     | Maximum Junction Temperature     |                        | 150        | °C |
| $T_{STG}$ | Storage Temperature Range        |                        | -50 to 150 | °C |
| $I_S$     | Diode Continuous Forward Current | $T_C=25^\circ\text{C}$ | -0.33      | A  |

### Mounted on Large Heat Sink

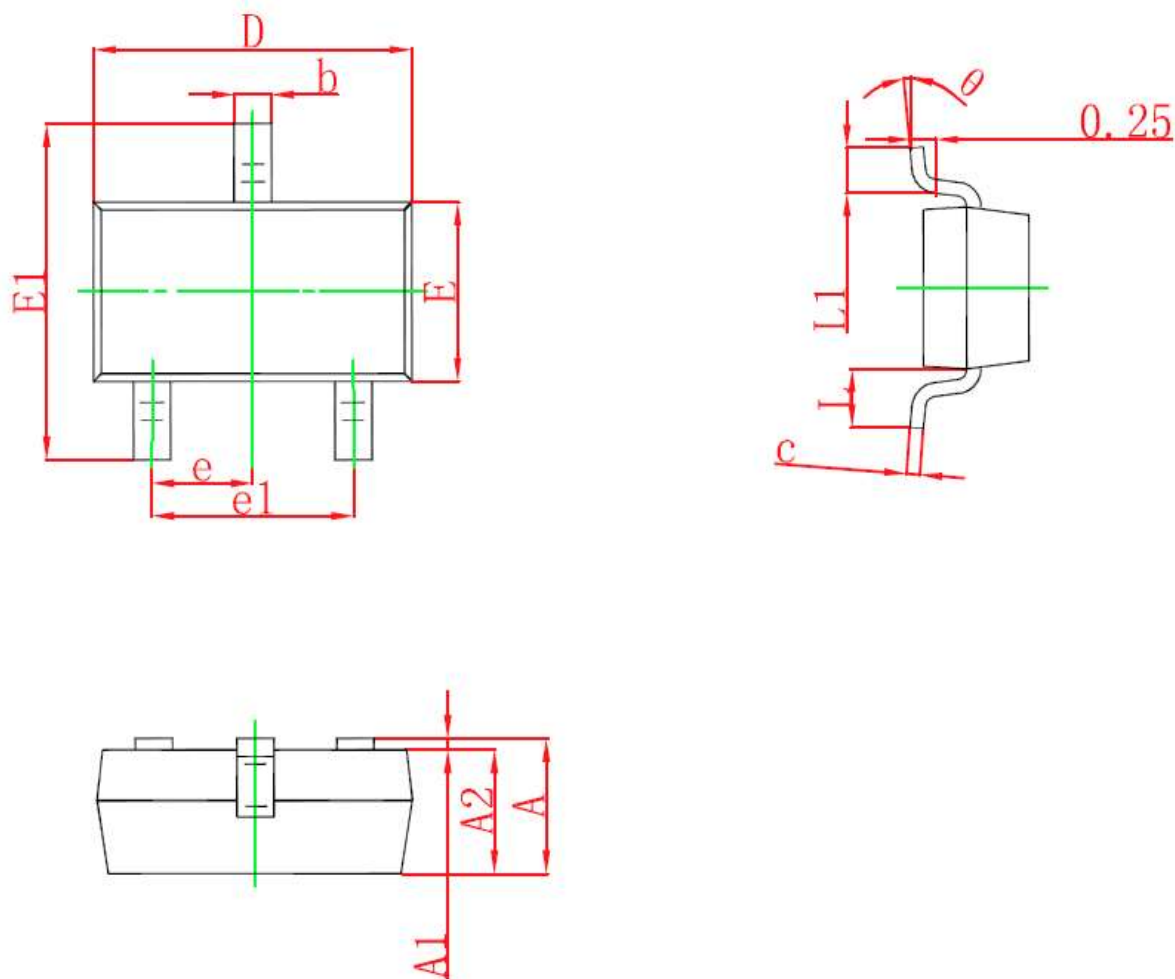
|                 |                                        |                        |       |      |
|-----------------|----------------------------------------|------------------------|-------|------|
| $I_{DM}$        | Pulse Drain Current Tested             | $T_C=25^\circ\text{C}$ | -1.2  | A    |
| $I_D$           | Continuous Drain Current               | $T_C=25^\circ\text{C}$ | -0.33 | A    |
| $P_D$           | Maximum Power Dissipation              | $T_C=25^\circ\text{C}$ | 0.35  | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction-to-Ambient |                        | 350   | °C/W |

| Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)             |                                  |                                                                                                |      |      |      |      |
|--------------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------|------|------|------|------|
| Symbol                                                                               | Parameter                        | Condition                                                                                      | Min  | Typ  | Max  | Unit |
| Static Electrical Characteristics @ T <sub>J</sub> = 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   | μA   |
| I <sub>GSS</sub>                                                                     | Gate-Body Leakage Current        | V <sub>GS</sub> =±20V, 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                                      | -1.0 | -1.5 | -2.0 | V    |
| R <sub>DS(on)</sub>                                                                  | Drain-Source On-State Resistance | V <sub>GS</sub> =-10V, I <sub>D</sub> =-0.33A                                                  | --   | 1.4  | 2.0  | Ω    |
|                                                                                      |                                  | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.27A                                                 | --   | 2.0  | 3.0  | Ω    |
| Dynamic Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated) |                                  |                                                                                                |      |      |      |      |
| C <sub>ISS</sub>                                                                     | Input Capacitance                | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1MHz                                             | --   | 60   | --   | pF   |
| C <sub>OSS</sub>                                                                     | Output Capacitance               |                                                                                                | --   | 19   | --   | pF   |
| C <sub>RSS</sub>                                                                     | Reverse Transfer Capacitance     |                                                                                                | --   | 8    | --   | pF   |
| Switching Characteristics                                                            |                                  |                                                                                                |      |      |      |      |
| Q <sub>g</sub>                                                                       | Total Gate Charge                | V <sub>DD</sub> =-30V, I <sub>D</sub> =-0.15A,<br>V <sub>GS</sub> =-4.5V                       | --   | 1.77 | --   | nC   |
| Q <sub>gs</sub>                                                                      | Gate Source Charge               |                                                                                                | --   | 0.57 | --   | 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> =-0.15A,<br>V <sub>GS</sub> =-4.5V, R <sub>G</sub> =2.5Ω | --   | 2.5  | --   | nS   |
| t <sub>r</sub>                                                                       | Turn-on Rise Time                |                                                                                                | --   | 1    | --   | nS   |
| t <sub>d(off)</sub>                                                                  | Turn-Off Delay Time              |                                                                                                | --   | 16   | --   | nS   |
| t <sub>f</sub>                                                                       | Turn-Off Fall Time               |                                                                                                | --   | 8    | --   | nS   |
| Source- Drain Diode Characteristics                                                  |                                  |                                                                                                |      |      |      |      |
| V <sub>SD</sub>                                                                      | Forward on voltage               | T <sub>J</sub> =25°C, I <sub>S</sub> =-0.24A,                                                  | --   | –    | -1.5 | 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°    |