

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| -30V          | 50mΩ@-10V       | -4.8A |
|               | 55mΩ@-4.5V      |       |
|               | 80mΩ@-2.5V      |       |

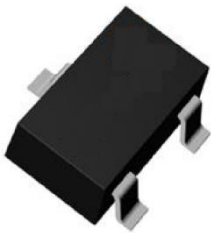
### Feature

- Advanced trench technology
- Excellent  $R_{DS(on)}$
- Low gate charge

### Application

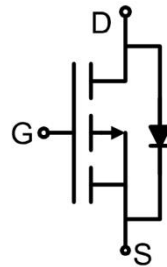
- Battery protection
- Load switch
- Uninterruptible power supply

### Package

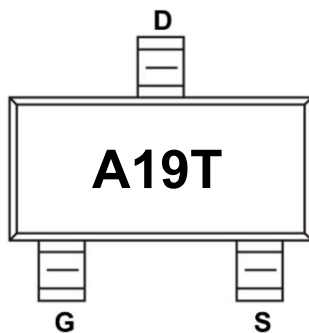


SOT-23

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>c</sub>=25°C unless otherwise noted)

| Parameter                                                                             | Symbol                 | Value      | Unit |
|---------------------------------------------------------------------------------------|------------------------|------------|------|
| Drain-Source Voltage                                                                  | V <sub>DS</sub>        | -30        | V    |
| Gate-Source Voltage                                                                   | V <sub>GS</sub>        | ±12        | V    |
| Continuous Drain Current <sup>1)</sup> (V <sub>GS</sub> =-10V)                        | I <sub>D</sub>         | -4.8       | A    |
| Continuous Drain Current <sup>1)</sup> (V <sub>GS</sub> =-10V, T <sub>c</sub> =100°C) | I <sub>D</sub> (100°C) | -3.3       | A    |
| Pulsed Drain Current <sup>1)</sup>                                                    | I <sub>DM</sub>        | -20.4      | A    |
| Power Dissipation <sup>3)</sup> (T <sub>A</sub> =25°C)                                | P <sub>D</sub>         | 2.15       | W    |
| Thermal Resistance from Junction to Ambient <sup>1)</sup>                             | R <sub>θJA</sub>       | 58         | °C/W |
| Operating Junction Temperature                                                        | T <sub>J</sub>         | -55 ~ +150 | °C   |
| Storage Temperature                                                                   | T <sub>STG</sub>       | -55 ~ +150 | °C   |

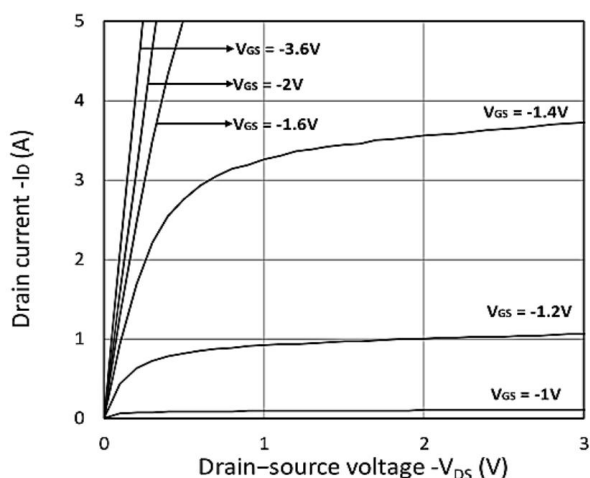
### Electrical characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

| Parameter                                | Symbol               | Test Condition                                                                            | Min. | Typ. | Max. | Unit |
|------------------------------------------|----------------------|-------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                   |                      |                                                                                           |      |      |      |      |
| Drain-source breakdown voltage           | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                               | -30  |      |      | V    |
| Zero gate voltage drain current          | I <sub>DSS</sub>     | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                                                |      |      | -1   | μA   |
| Gate-body leakage current                | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V                                                |      |      | ±100 | nA   |
| Gate threshold voltage                   | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                 | -0.5 | -1   | -1.5 | V    |
| Drain-source on-resistance <sup>2)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =-10V, I <sub>D</sub> =-5A                                                |      | 40   | 50   | mΩ   |
|                                          |                      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A                                               |      | 45   | 55   |      |
|                                          |                      | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1A                                               |      | 55   | 80   |      |
| Dynamic characteristics <sup>4)</sup>    |                      |                                                                                           |      |      |      |      |
| Input Capacitance                        | C <sub>iss</sub>     | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f =1MHz                                       |      | 745  |      | pF   |
| Output Capacitance                       | C <sub>oss</sub>     |                                                                                           |      | 70   |      |      |
| Reverse Transfer Capacitance             | C <sub>rss</sub>     |                                                                                           |      | 57   |      |      |
| Total Gate Charge                        | Q <sub>g</sub>       | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V<br>I <sub>D</sub> =-5.1A                     |      | 8    |      | nC   |
| Gate-Source Charge                       | Q <sub>gs</sub>      |                                                                                           |      | 1.8  |      |      |
| Gate-Drain Charge                        | Q <sub>gd</sub>      |                                                                                           |      | 2.7  |      |      |
| Turn-on delay time                       | t <sub>d(on)</sub>   | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V<br>I <sub>D</sub> =-1A, R <sub>G</sub> =2.5Ω |      | 7    |      | nS   |
| Turn-on rise time                        | t <sub>r</sub>       |                                                                                           |      | 3    |      |      |
| Turn-off delay time                      | t <sub>d(off)</sub>  |                                                                                           |      | 30   |      |      |
| Turn-off fall time                       | t <sub>f</sub>       |                                                                                           |      | 12   |      |      |
| Source-Drain Diode characteristics       |                      |                                                                                           |      |      |      |      |
| Diode Continuous Current                 | I <sub>S</sub>       |                                                                                           |      |      | -4.8 | A    |
| Diode Forward voltage                    | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =-4.8A                                                |      |      | -1.2 | V    |

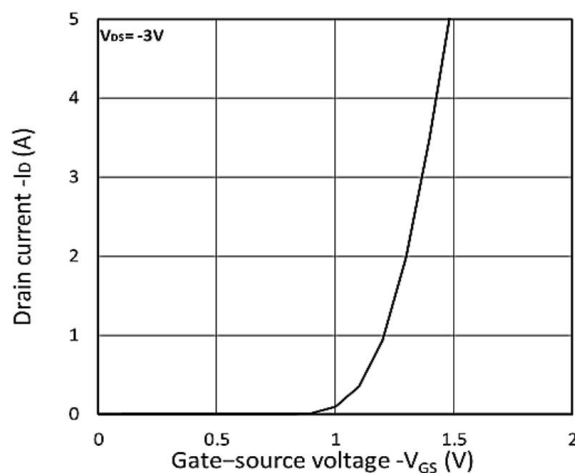
Notes:

- 1) The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2) The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
- 3) The power dissipation is limited by 150°C junction temperature.
- 4) Guaranteed by design, not subject to production testing.

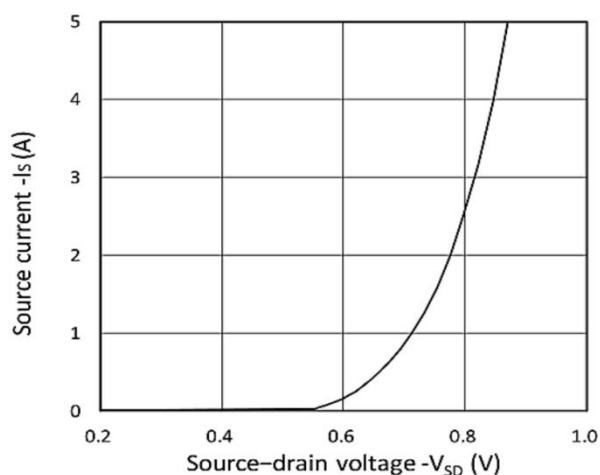
## Typical Characteristics



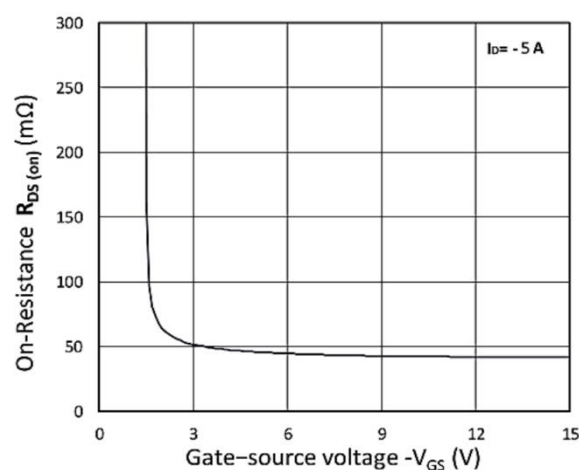
**Figure 1. Output Characteristics**



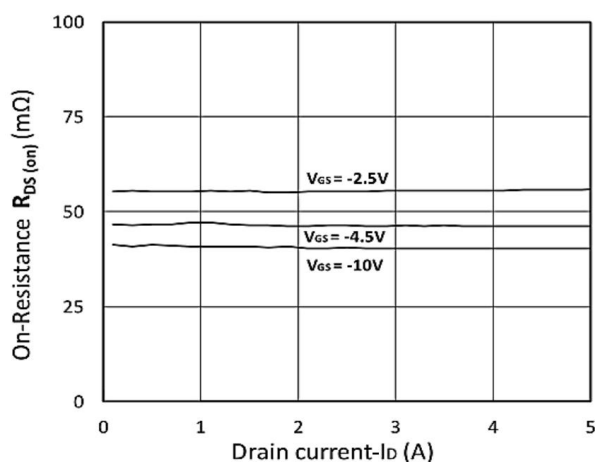
**Figure 2. Transfer Characteristics**



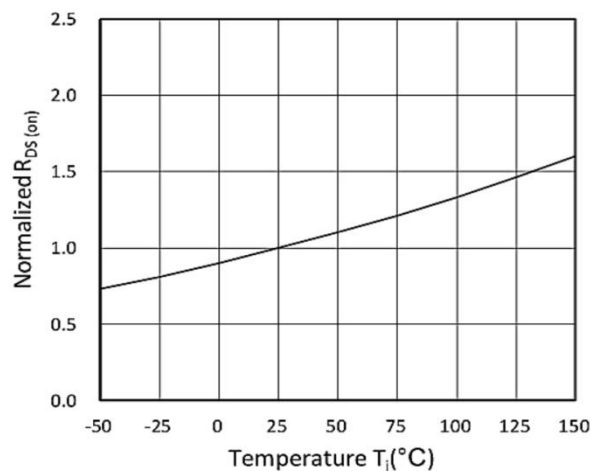
**Figure 3. Forward Characteristics of Reverse**



**Figure 4. R\_DS(ON) vs. V\_GS**



**Figure 5. R\_DS(ON) vs. I\_D**



**Figure 6. Normalized R\_DS(on) vs. Temperature**

## Typical Characteristics

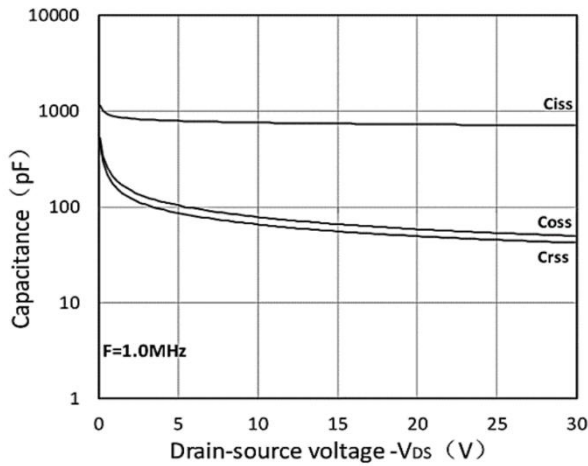


Figure 7. Capacitance Characteristics

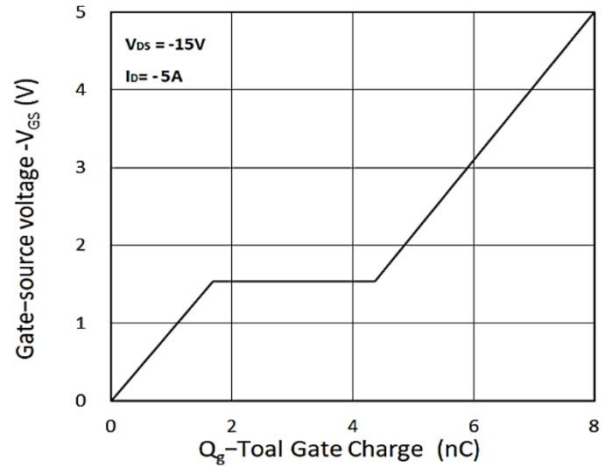


Figure 8. Gate Charge Characteristics

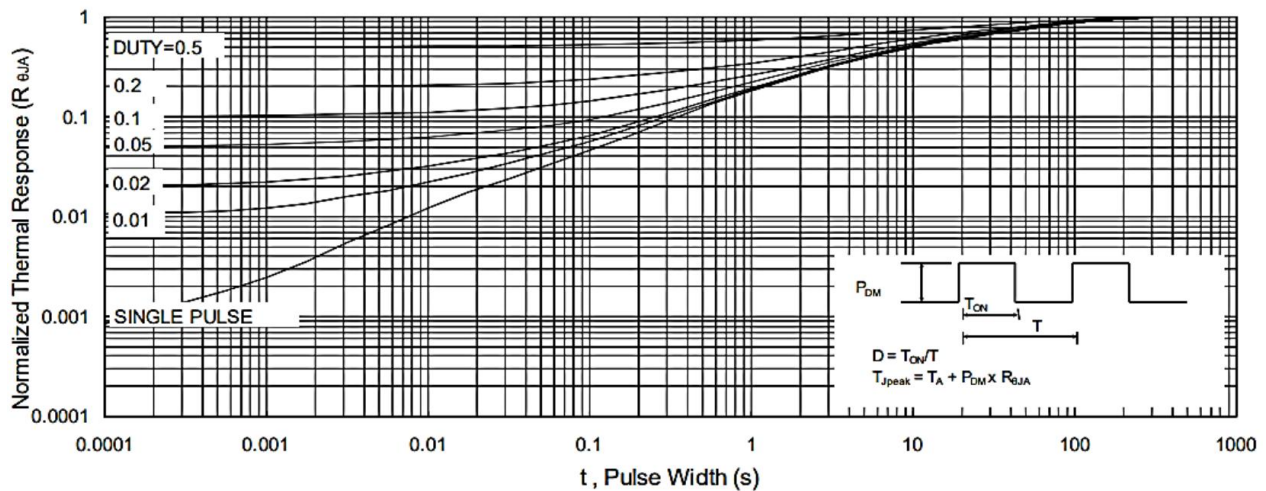


Figure 9 Normalized Maximum Transient Thermal Impedance

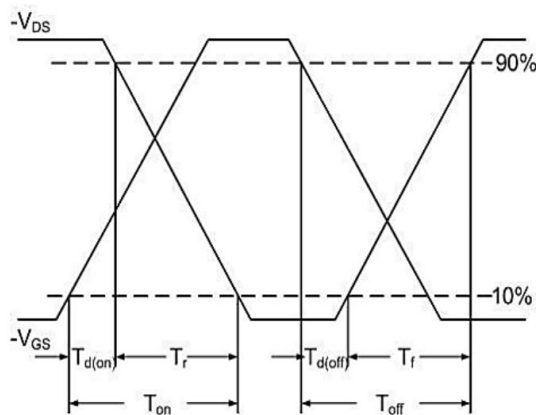


Figure.10 Switching Time Waveform

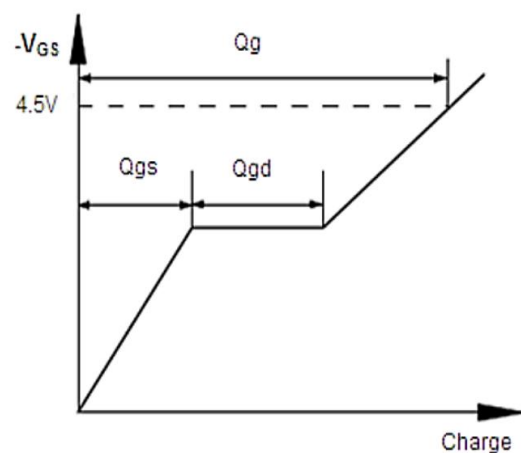
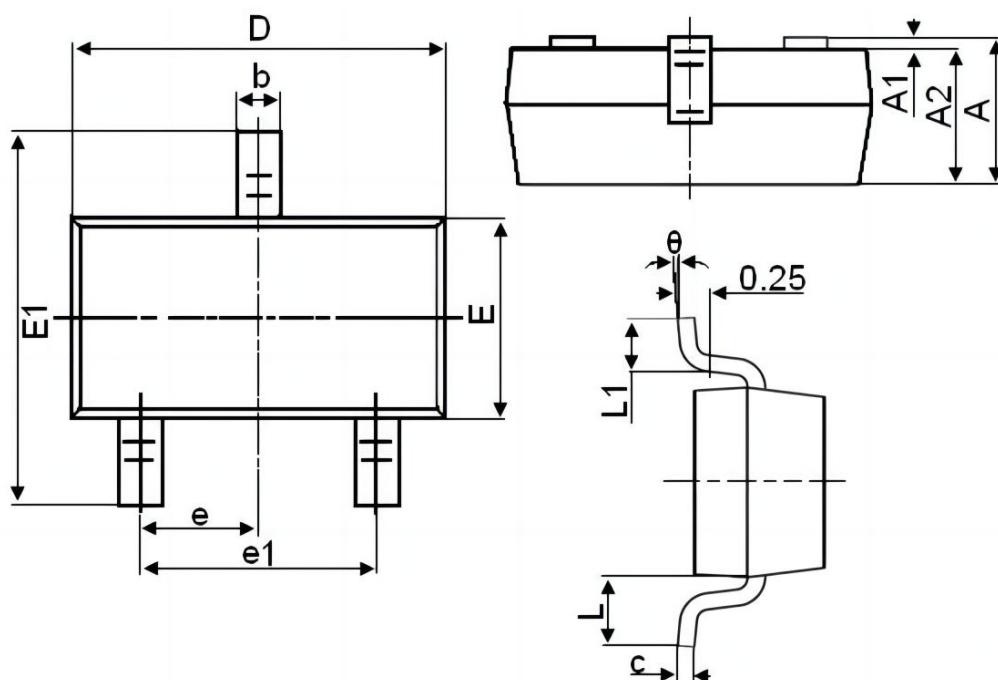


Figure.11 Gate Charge Waveform

### SOT-23 Package Information



| Symbol | Dimensions In Millimeters |       | 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                     | 0.200 | 0.003                | 0.008 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 REF.                |       | 0.037 REF.           |       |
| 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°    |