

## 20V N-Channel Mosfet

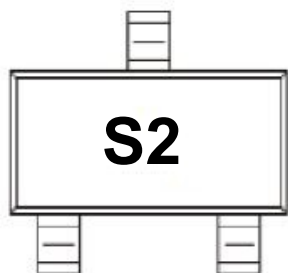
### FEATURES

- $R_{DS(ON)} \leq 80m\Omega$  ( 53m $\Omega$  Typ.)  
@ $V_{GS}=4.5V$
- $R_{DS(ON)} \leq 115m\Omega$  ( 72m $\Omega$  Typ.)  
@ $V_{GS}=2.5V$

### APPLICATIONS

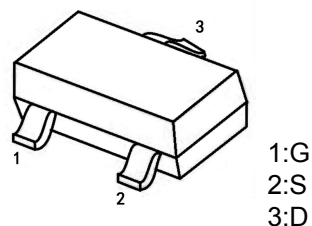
- Load Switch for Portable Devices
- DC/DC Converter

### MARKING

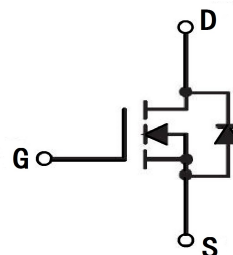


Other Marking: "A2SHB"

### SOT-23



### N-CHANNEL MOSFET



### Maximum ratings (Ta=25°C unless otherwise noted)

| Parameter                                                  | Symbol          | Value      | Unit          |
|------------------------------------------------------------|-----------------|------------|---------------|
| Drain-Source Voltage                                       | $V_{DS}$        | 20         | V             |
| Gate-Source Voltage                                        | $V_{GS}$        | $\pm 10$   |               |
| Continuous Drain Current                                   | $I_D$           | 2          | A             |
| Pulsed Drain Current                                       | $I_{DM}$        | 8          |               |
| Maximum Power Dissipation                                  | $P_D$           | 0.4        | W             |
| Thermal Resistance from Junction to Ambient( $t \leq 5s$ ) | $R_{\theta JA}$ | 312        | $^{\circ}C/W$ |
| Junction Temperature                                       | $T_J$           | 150        | $^{\circ}C$   |
| Storage Temperature                                        | $T_{stg}$       | -55 ~ +150 |               |

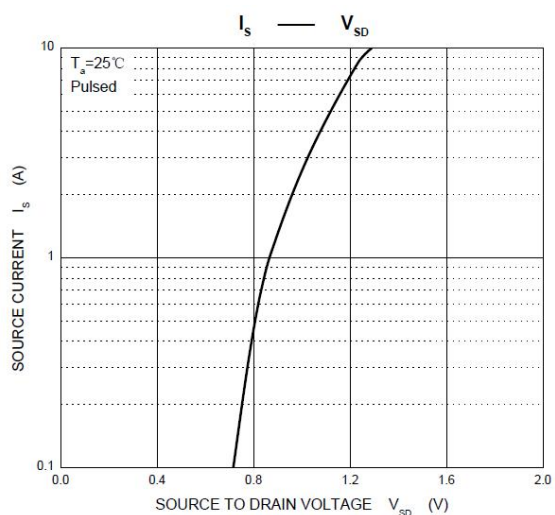
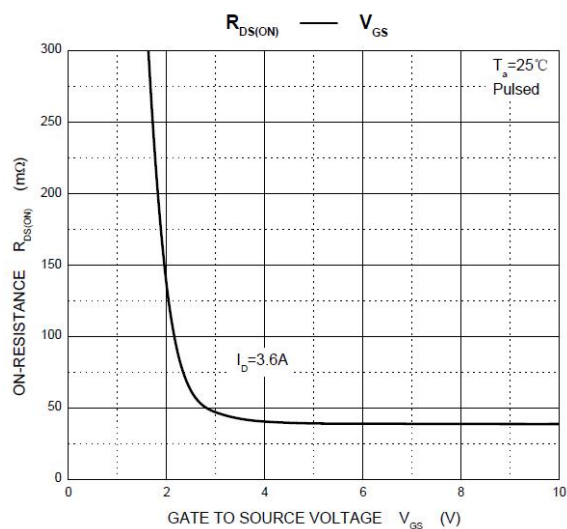
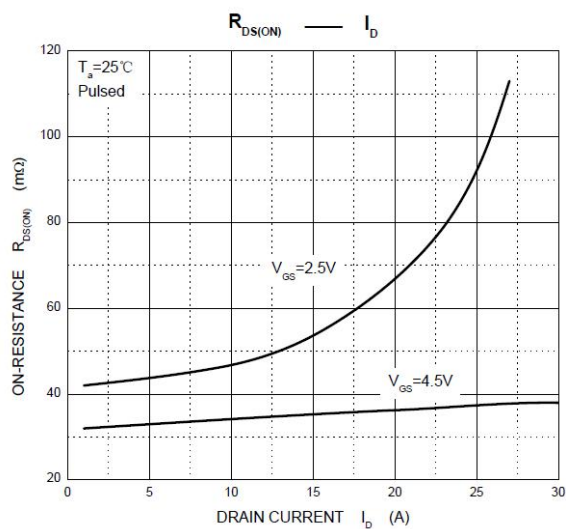
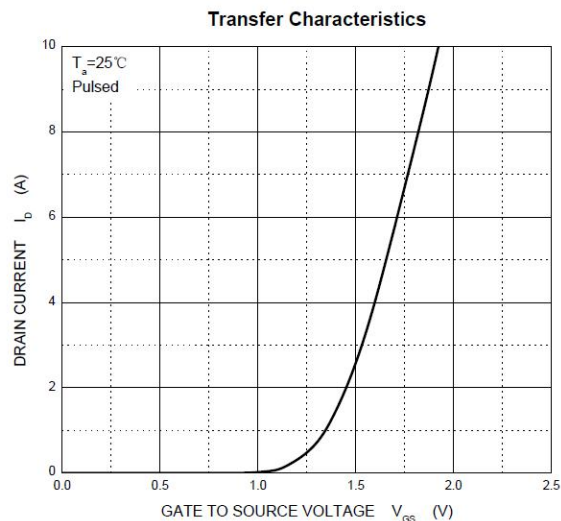
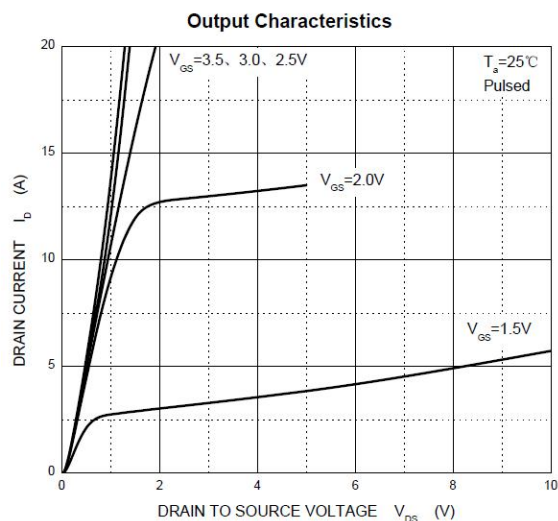
**MOSFET ELECTRICAL CHARACTERISTICS  $T_a=25\text{ }^{\circ}\text{C}$  unless otherwise specified**

| Symbol                                     | Parameter                                   | Test Condition                                                                                                     | Min. | Typ. | Max. | Unit |
|--------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Off Characteristics                        |                                             |                                                                                                                    |      |      |      |      |
| V <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   |
| On Characteristics                         |                                             |                                                                                                                    |      |      |      |      |
| V <sub>GS(th)</sub>                        | Gate threshold voltage                      | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                                          | 0.5  | 0.7  | 1.2  | V    |
| R <sub>DS(on)</sub>                        | Drain-source on-resistance <sup>note1</sup> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                                                          | -    | 53   | 80   | mΩ   |
|                                            |                                             | V <sub>GS</sub> =2.5V, I <sub>D</sub> =2A                                                                          | -    | 72   | 115  |      |
| Dynamic characteristics <sup>note2</sup>   |                                             |                                                                                                                    |      |      |      |      |
| C <sub>iss</sub>                           | Input Capacitance                           | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f =1MHz                                                                 | -    | 300  | -    | pF   |
| C <sub>oss</sub>                           | Output Capacitance                          |                                                                                                                    | -    | 120  | -    |      |
| C <sub>rss</sub>                           | Reverse Transfer Capacitance                |                                                                                                                    | -    | 80   | -    |      |
| Q <sub>g</sub>                             | Total gate charge                           | V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.6A                                                  | -    | 4    | 10   | nC   |
| Q <sub>gs</sub>                            | Gate-source charge                          |                                                                                                                    | -    | 0.65 | -    |      |
| Q <sub>gd</sub>                            | Gate-drain charge                           |                                                                                                                    | -    | 1.5  | -    |      |
| Switching Characteristics <sup>note2</sup> |                                             |                                                                                                                    |      |      |      |      |
| t <sub>d(on)</sub>                         | Turn-on delay time                          | V <sub>DD</sub> =10V,<br>R <sub>L</sub> =5.5Ω, I <sub>D</sub> =3.6A,<br>V <sub>GEN</sub> =4.5V, R <sub>g</sub> =6Ω | -    | 7    | 15   | nS   |
| t <sub>r</sub>                             | Rise time                                   |                                                                                                                    | -    | 55   | 80   |      |
| t <sub>d(off)</sub>                        | Turn-off delay time                         |                                                                                                                    | -    | 16   | 60   |      |
| t <sub>f</sub>                             | Fall tim                                    |                                                                                                                    | -    | 10   | 25   |      |
| Source-Drain Diode characteristics         |                                             |                                                                                                                    |      |      |      |      |
| V <sub>SD</sub>                            | Diode Forward voltage                       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                                                            | -    | 0.7  | 1.2  | V    |

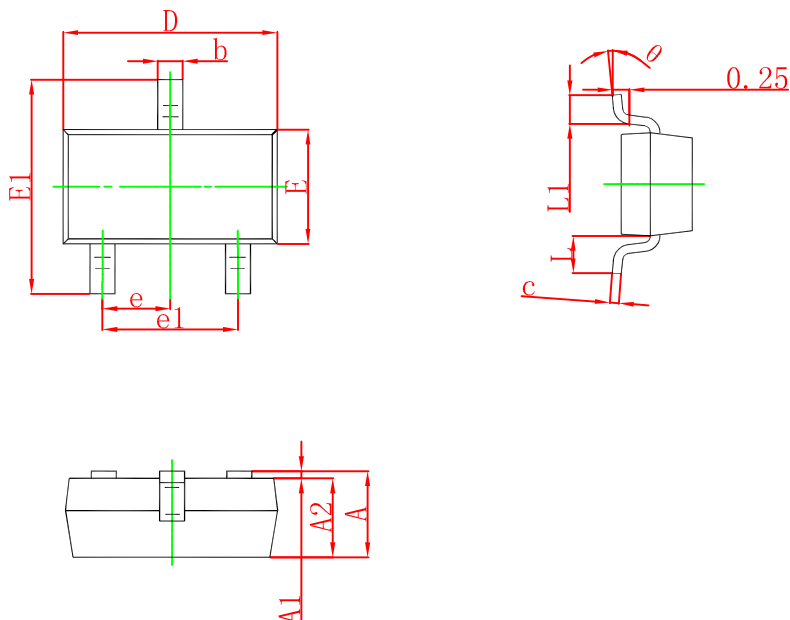
**Notes :**

1. Pulse Test : Pulse Width < 300 $\mu s$ , Duty Cycle  $\leq 2\%$ .
2. Guaranteed by design, not subject to production testing.

## TYPICAL PERFORMANCE CHARACTERISTICS



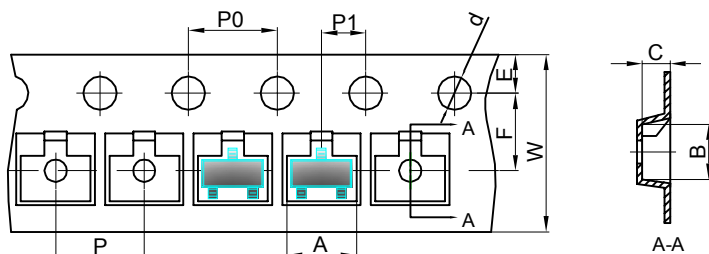
## SOT-23 PACKAGE OUTLINE DRAWING



| 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                     | 0.150 | 0.003                | 0.006 |
| 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 TYP                 |       | 0.037 TYP            |       |
| 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°    |

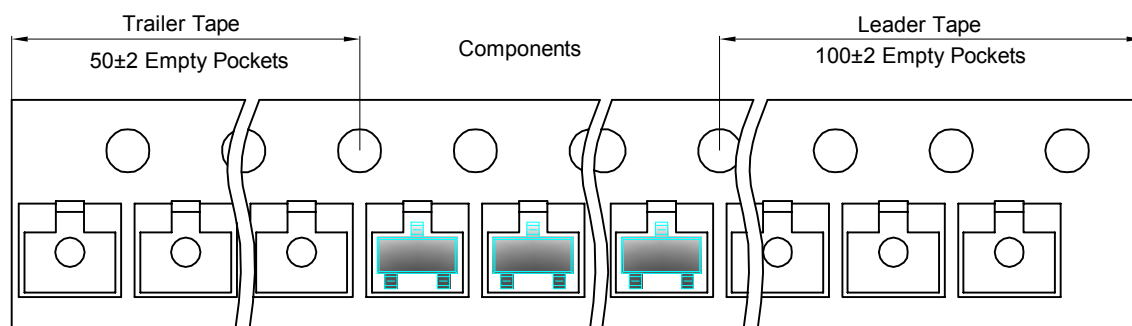
## SOT-23 Tape and reel

### SOT-23 Embossed Carrier Tape

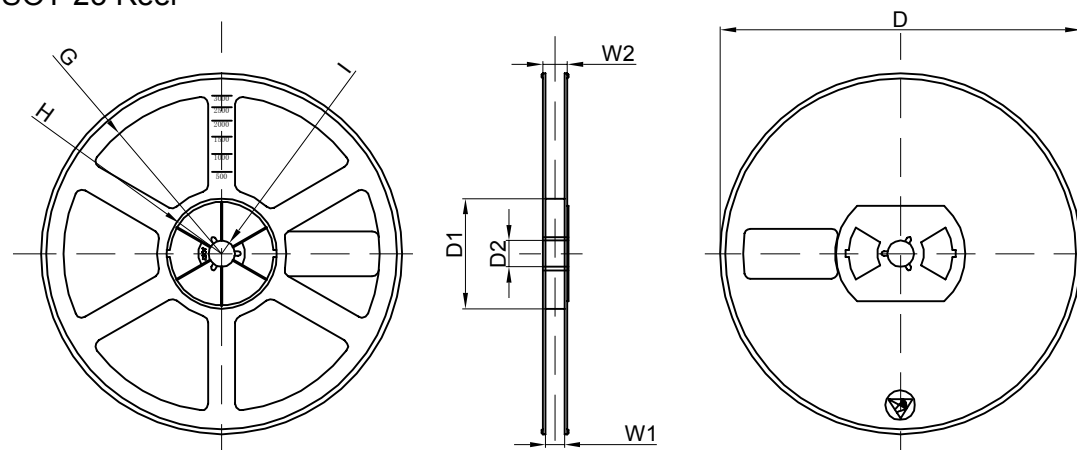


| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |      |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type                     | A    | B    | C    | d     | E    | F    | P0   | P    | P1   | W    |
| SOT-23                       | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

### SOT-23 Tape Leader and Trailer



### SOT-23 Reel



| Dimensions are in millimeter |         |       |       |        |        |       |      |       |
|------------------------------|---------|-------|-------|--------|--------|-------|------|-------|
| Reel Option                  | D       | D1    | D2    | G      | H      | I     | W1   | W2    |
| 7"Dia                        | Ø178.00 | 54.40 | 13.00 | R78.00 | R25.60 | R6.50 | 9.50 | 12.30 |

| REEL     | Reel Size | Box        | Box Size(mm) | Carton      | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch    | 30,000 pcs | 203×203×195  | 120,000 pcs | 438×438×220     |          |