



## N-Channel Plastic-Encapsulate MOSFET

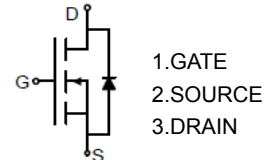
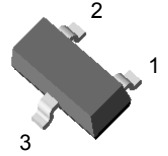
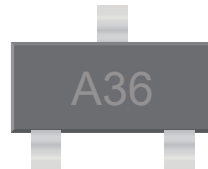
### PRIMARY CHARACTERISTICS

| BV <sub>DSS</sub> | R <sub>DS(on)</sub> MAX     | I <sub>D</sub> |
|-------------------|-----------------------------|----------------|
| 60V               | 105mΩ@V <sub>GS</sub> =10V  | 3A             |
|                   | 125mΩ@V <sub>GS</sub> =4.5V |                |

### SCHEMATIC DIAGRAM

#### SOT-23 PACKAGE

**MARKING: S10 or A36**



### FEATURES

- High power and current handing capability.
- Lead free product is acquired.
- Surface mount package.

### MECHANICAL DATA

- Case : Molded plastic,SOT-23
- Polarity : Shown above
- Terminals :Plated terminals, solderable per MIL-STD-750,Method 2026
- Epoxy : UL94-V0 rated flame retardant

### Maximum Ratings (T<sub>a</sub>=25 °C unless otherwise noted)

| Symbol           | Parameter                                                 | Value      | Unit  |
|------------------|-----------------------------------------------------------|------------|-------|
| V <sub>DS</sub>  | Drain-source voltage                                      | 60         | V     |
| V <sub>GS</sub>  | Gate-source voltage                                       | ±20        | V     |
| I <sub>D</sub>   | Continuous drain current                                  | 3          | A     |
| I <sub>DM</sub>  | Pulsed Drain Current <sup>1)</sup>                        | 10         |       |
| P <sub>D</sub>   | Power dissipation                                         | 0.35       | W     |
| T <sub>J</sub>   | Operating Junction                                        | 150        | °C    |
| T <sub>stg</sub> | Storage temperature                                       | -55 to 150 | °C    |
| R <sub>θJA</sub> | Thermal Resistance from Junction to Ambient <sup>2)</sup> | 357        | °C /W |



## N-Channel Plastic-Encapsulate MOSFET

Electrical Characteristics ( $T_a=25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| Symbol                  | Parameter                                      | Test conditions                                                                               | Min | Typ  | Max  | Unit |
|-------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------|-----|------|------|------|
| Static                  |                                                |                                                                                               |     |      |      |      |
| V <sub>(BR)DSS</sub>    | Drain- source breakdown voltage                | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250uA                                                 | 60  |      |      | V    |
| V <sub>GS(th)</sub>     | Gate threshold voltage <sup>3)</sup>           | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250uA                                    | 0.5 |      | 2    |      |
| I <sub>DSS</sub>        | Zero gate voltage drain current                | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0 V                                                  |     |      | 1    | μA   |
| I <sub>GSS</sub>        | Gate-body leakage current                      | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0 V                                                 |     |      | ±100 | nA   |
| R <sub>DS(on)</sub>     | Drain-Source on-state resistance <sup>3)</sup> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A                                                    |     |      | 105  | mΩ   |
|                         |                                                | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A                                                   |     |      | 125  |      |
| g <sub>fs</sub>         | Forward Transconductance <sup>3)</sup>         | V <sub>DS</sub> = 15V, I <sub>D</sub> = 2A                                                    | 1.4 |      |      | S    |
| V <sub>SD</sub>         | Diode forward voltage <sup>3)</sup>            | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 3A                                                    |     |      | 1.2  | V    |
| Dynamic <sup>4)</sup>   |                                                |                                                                                               |     |      |      |      |
| C <sub>iss</sub>        | Input capacitance                              | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 30V,<br>f = 1 MHz                                    |     | 247  |      | pF   |
| C <sub>oss</sub>        | Output capacitance                             |                                                                                               |     | 34   |      |      |
| C <sub>rss</sub>        | Reverse transfer capacitance                   |                                                                                               |     | 19.5 |      |      |
| Switching <sup>4)</sup> |                                                |                                                                                               |     |      |      |      |
| Q <sub>g</sub>          | Total gate charge                              | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A                            |     | 6    |      | nC   |
| Q <sub>gs</sub>         | Gate-source charge                             |                                                                                               |     | 1    |      |      |
| Q <sub>gd</sub>         | Gate-drain charge                              |                                                                                               |     | 1.3  |      |      |
| t <sub>d(on)</sub>      | Turn-on delay time                             | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 30V,<br>I <sub>D</sub> = 1.5A, R <sub>GEN</sub> = 1Ω |     | 6    |      | ns   |
| t <sub>r</sub>          | Rise time                                      |                                                                                               |     | 15   |      |      |
| t <sub>d(off)</sub>     | Turn-off delay time                            |                                                                                               |     | 15   |      |      |
| t <sub>f</sub>          | Fall time                                      |                                                                                               |     | 10   |      |      |

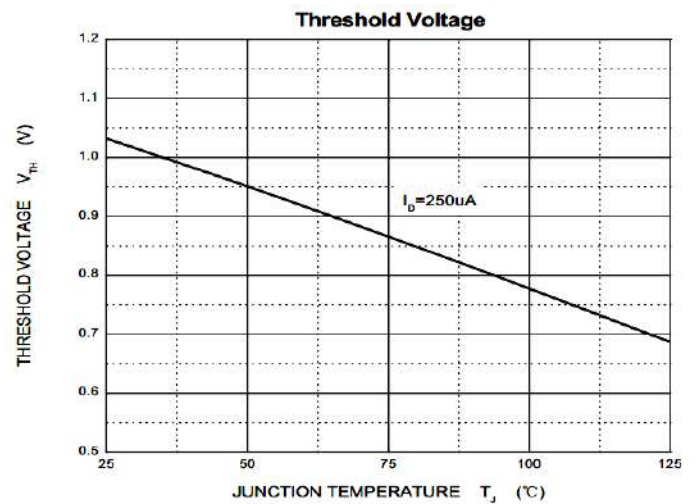
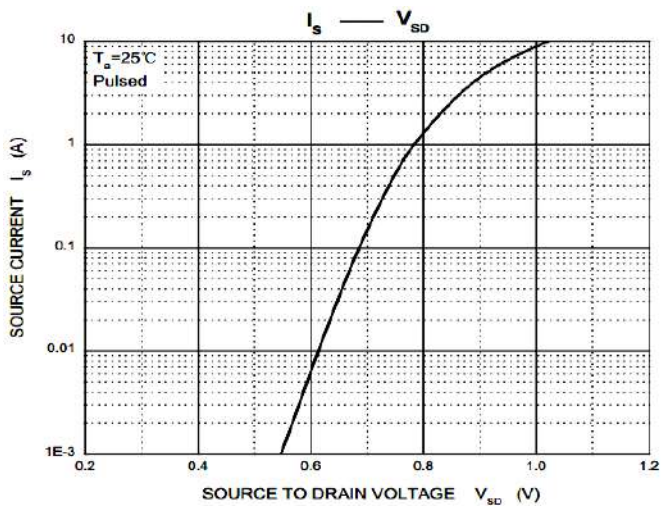
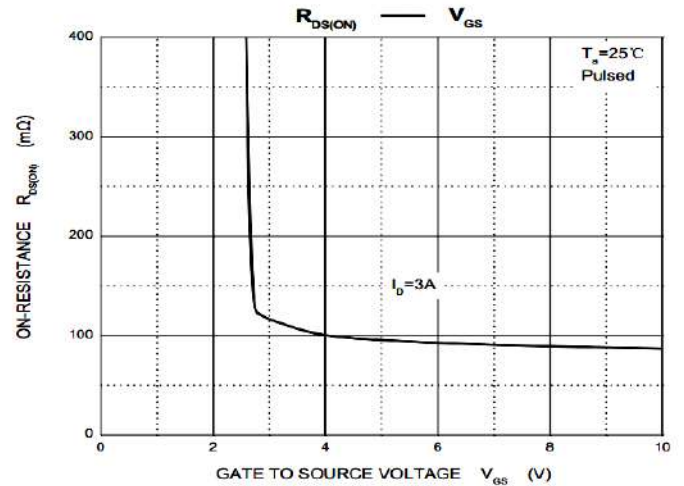
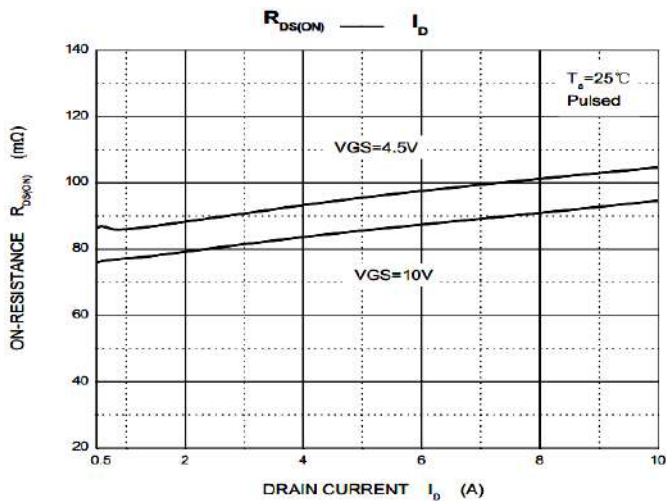
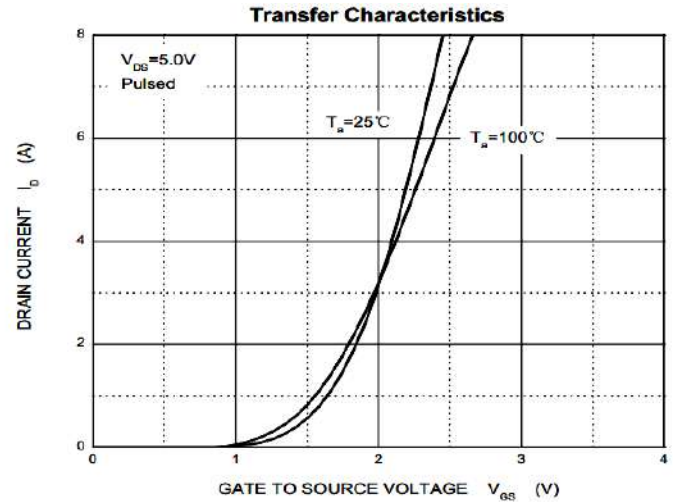
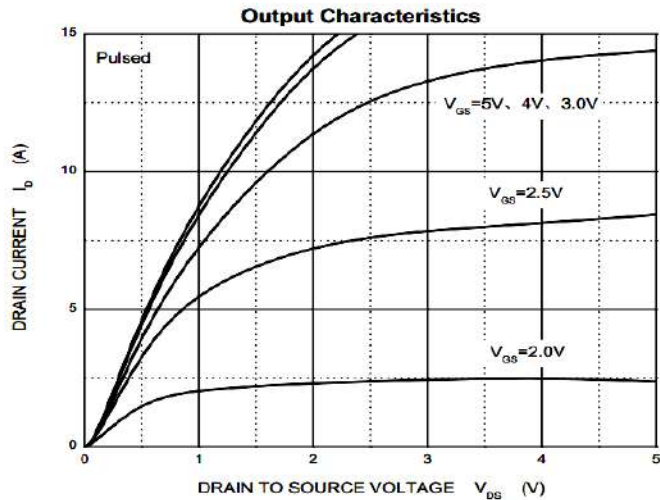
Notes:

1. Repetitive rating : Pulse width limited by junction temperature.
2. Surface mounted on FR4 board ,  $t \leq 10\text{s}$ .
3. Pulse Test : Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .
4. Guaranteed by design, not subject to producing.



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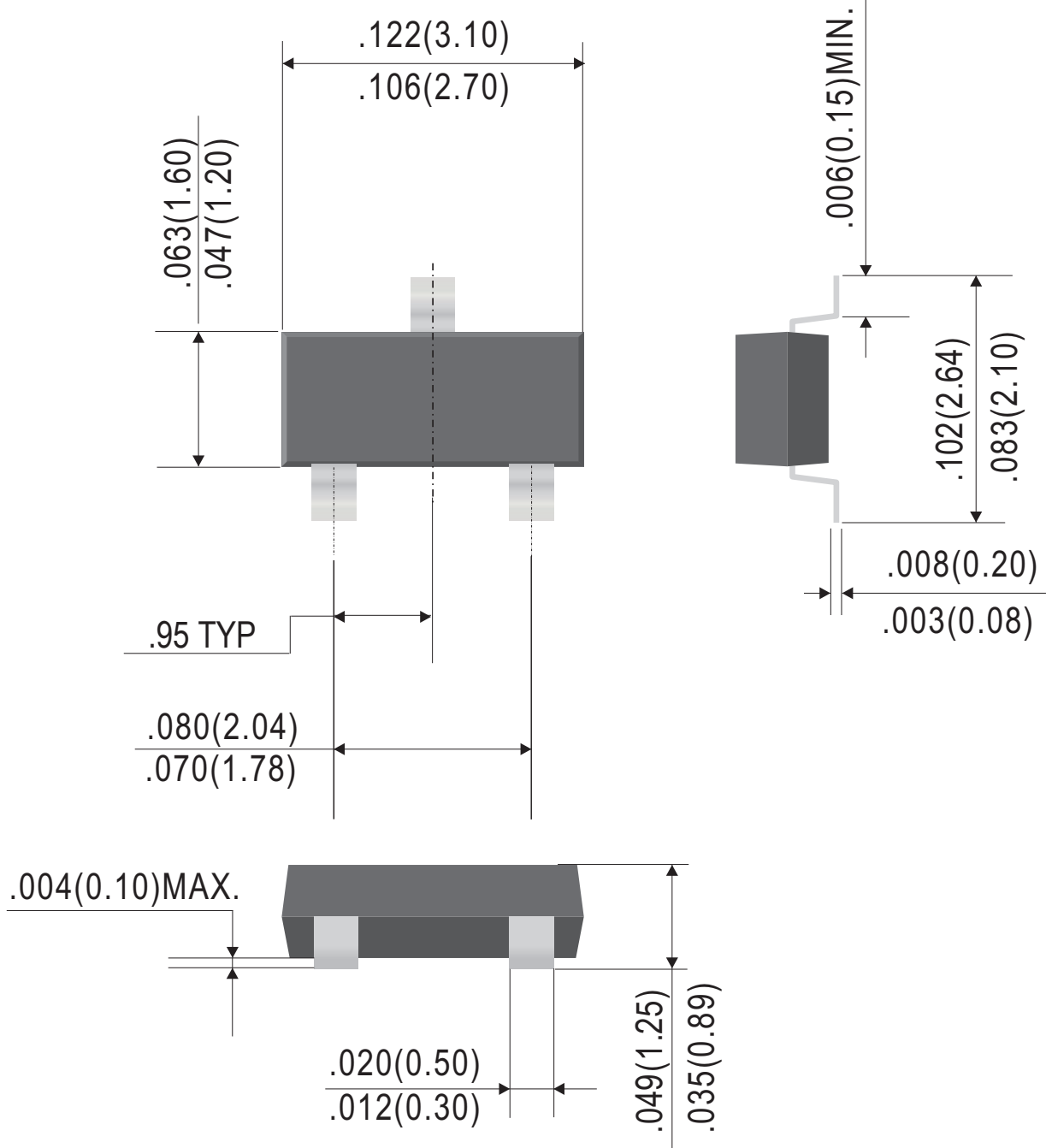
### Typical Characteristics





## Outline Drawing

## SOT-23



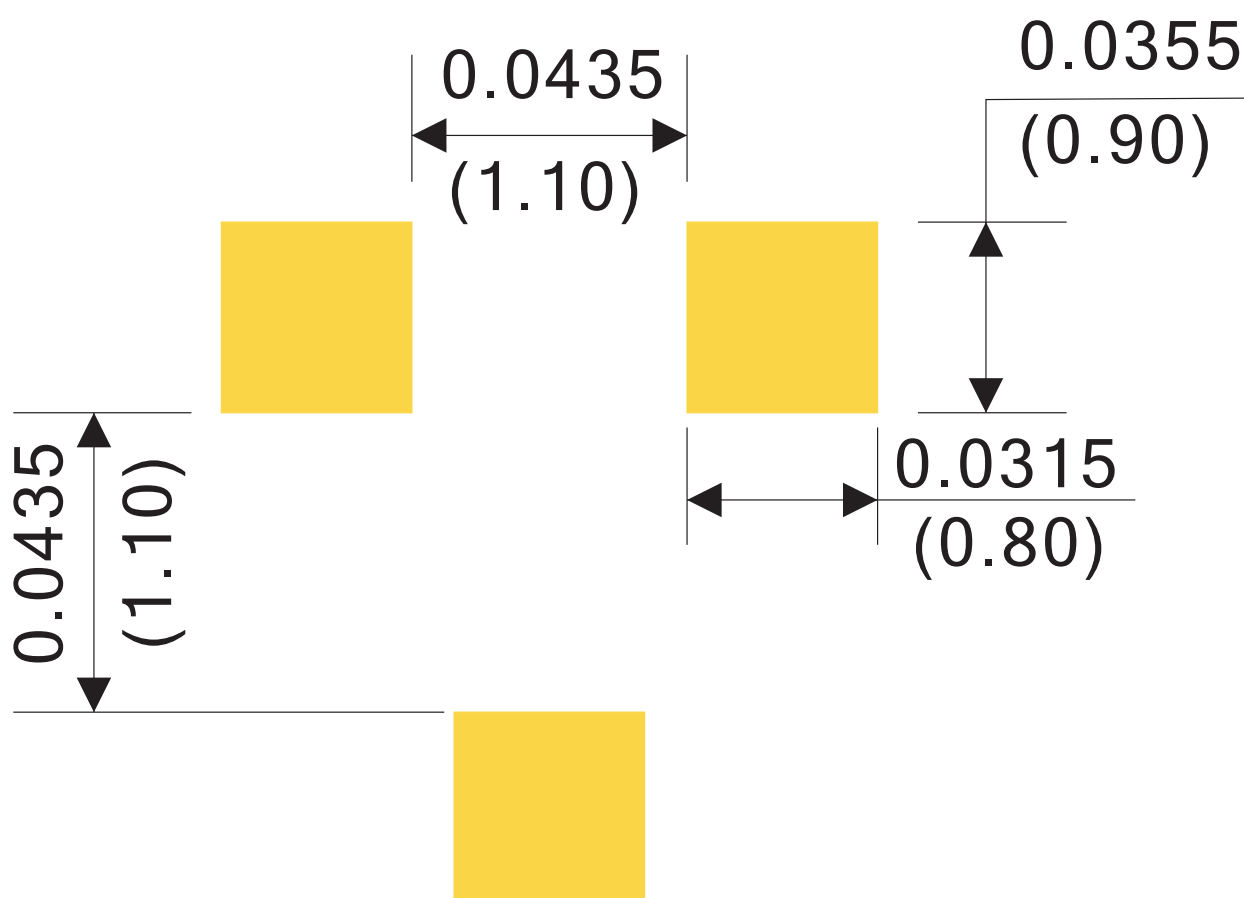
Dimensions in inches and (millimeters)

Rev.E



Suggested Soldering Pad Layout

SOT-23



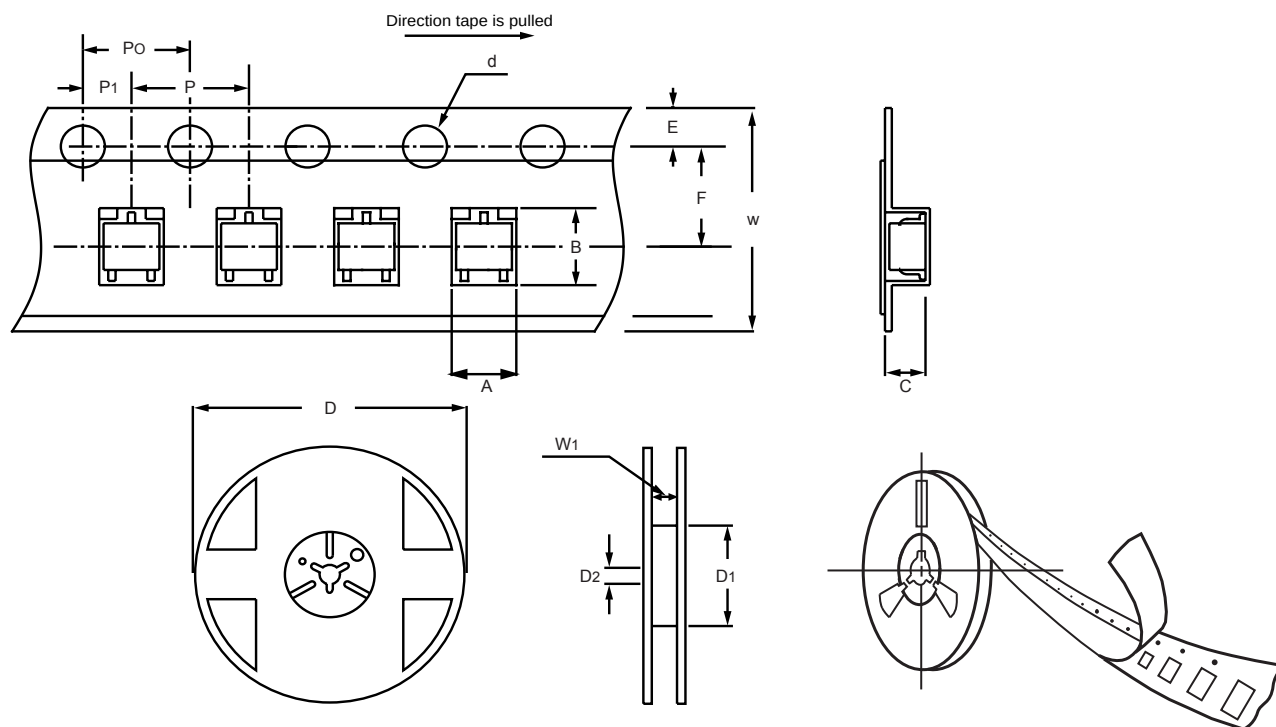
Dimensions in inches and (millimeters)

Rev.A



## N-Channel Plastic-Encapsulate MOSFET

### Reel Taping Sepecification - Surface Mount Device/SOT-23



| ITEM                   | SYMBOL | SPECIFICATIONS (mm) | SPECIFICATIONS (inch) |
|------------------------|--------|---------------------|-----------------------|
| Carrier width          | A      | 3.1±0.1             | 0.122±0.004           |
| Carrier length         | B      | 2.85±0.1            | 0.112±0.004           |
| Carrier depth          | C      | 1.40±0.1            | 0.055±0.004           |
| Sprocket hole          | d      | 1.5 + 0.1/-0        | 0.059 + 0.004/-0      |
| Reel outside diameter  | D      | 180 + 0/-3          | 7.083 + 0/-0.118      |
| Reel inner diameter    | D1     | 60 + 1/-0           | 2.361 + 0.039/-0      |
| Feed hole diameter     | D2     | 13±0.2              | 0.512±0.008           |
| Sprocket hole position | E      | 1.75±0.1            | 0.069±0.004           |
| Punch hole position    | F      | 3.5±0.05            | 0.138±0.002           |
| Punch hole pitch       | P      | 4.0±0.1             | 0.157±0.004           |
| Sprocket hole pitch    | P0     | 4.0±0.1             | 0.157±0.004           |
| Embossment center      | P1     | 2.0±0.05            | 0.079±0.002           |
| Tape width             | W      | 8.0±0.2             | 0.315±0.008           |
| Reel width             | W1     | 9.0±0.3             | 0.354±0.012           |

NOTE: 1.Devices are packed in accordance with EIAJ stand ETX-7001 and specifications listed above.

2.Available on 7 inch ( 3,000 c.t. ) or 13 inch ( 10,000 c.t. ) diameter reels.



## N-Channel Plastic-Encapsulate MOSFET

### Ordering Information:

| Device PN                                                    | Packing                |
|--------------------------------------------------------------|------------------------|
| SE2310 -T <sup>(1)</sup> H <sup>(2)</sup> -WS <sup>(3)</sup> | Tape&Reel: 3 Kpcs/Reel |

Note: (1) Packing code, Tape & Reel Packing

(2) Halogen free product for packing code suffix "H"

(3) WS : Willas brand abbreviation, Label Type does not display

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