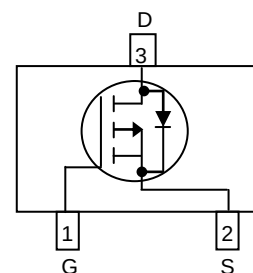


**WPM3401**
**Single P-Channel, -30V, -4.6A, Power MOSFET**
[www.sh-willsemi.com](http://www.sh-willsemi.com)

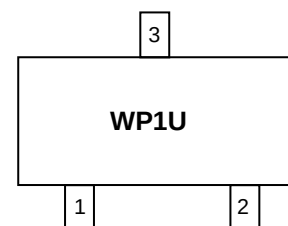
| $V_{DS}$ (V) | Max $R_{DS(on)}$ (m $\Omega$ ) |
|--------------|--------------------------------|
| -30          | 53@ $V_{GS}=-10V$              |
|              | 56@ $V_{GS}=-4.5V$             |


**SOT-23-3L**
**Descriptions**

The WPM3401 is the P-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, notebook computer power management and other battery powered circuits where high-side switching.


**Pin configuration (Top view)**
**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Small package SOT-23-3L



WP1= Specific Device Code

U = Date Code

**Applications**

- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch

**Marking**
**Order information**

| Device       | Package   | Shipping       |
|--------------|-----------|----------------|
| WPM3401-3/TR | SOT-23-3L | 3000/Reel&Tape |

## Absolute Maximum ratings

| Parameter                              |                      | Symbol           | 10 s       | Steady State | Unit |
|----------------------------------------|----------------------|------------------|------------|--------------|------|
| Drain-Source Voltage                   |                      | V <sub>DS</sub>  | -30        |              | V    |
| Gate-Source Voltage                    |                      | V <sub>GS</sub>  | ± 12       |              |      |
| Continuous Drain Current <sup>a</sup>  | T <sub>A</sub> =25°C | I <sub>D</sub>   | -5.5       | -4.6         | A    |
|                                        | T <sub>A</sub> =70°C |                  | -4.4       | -3.6         |      |
| Maximum Power Dissipation <sup>a</sup> | T <sub>A</sub> =25°C | P <sub>D</sub>   | 1.7        | 1.3          | W    |
|                                        | T <sub>A</sub> =70°C |                  | 1.1        | 0.8          |      |
| Continuous Drain Current <sup>b</sup>  | T <sub>A</sub> =25°C | I <sub>D</sub>   | -5.0       | -4.2         | A    |
|                                        | T <sub>A</sub> =70°C |                  | -4.0       | -3.4         |      |
| Maximum Power Dissipation <sup>b</sup> | T <sub>A</sub> =25°C | P <sub>D</sub>   | 1.4        | 1.0          | W    |
|                                        | T <sub>A</sub> =70°C |                  | 0.9        | 0.6          |      |
| Pulsed Drain Current <sup>c</sup>      |                      | I <sub>DM</sub>  | -20        |              | A    |
| Operating Junction Temperature         |                      | T <sub>J</sub>   | 150        |              | °C   |
| Lead Temperature                       |                      | T <sub>L</sub>   | 260        |              | °C   |
| Storage Temperature Range              |                      | T <sub>stg</sub> | -55 to 150 |              | °C   |

## Thermal resistance ratings

| Parameter                                           |                       | Symbol          | Typical | Maximum | Unit                 |
|-----------------------------------------------------|-----------------------|-----------------|---------|---------|----------------------|
| Junction-to-Ambient Thermal Resistance <sup>a</sup> | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 70      | 90      | $^{\circ}\text{C/W}$ |
|                                                     | Steady State          |                 | 95      | 125     |                      |
| Junction-to-Ambient Thermal Resistance <sup>b</sup> | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 85      | 105     |                      |
|                                                     | Steady State          |                 | 120     | 150     |                      |
| Junction-to-Case Thermal Resistance                 |                       | $R_{\theta JC}$ | 40      | 60      |                      |

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

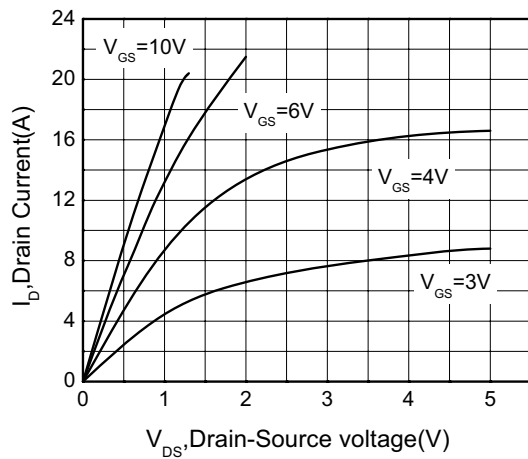
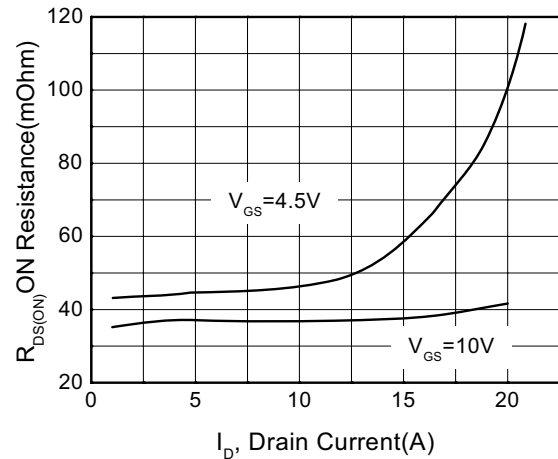
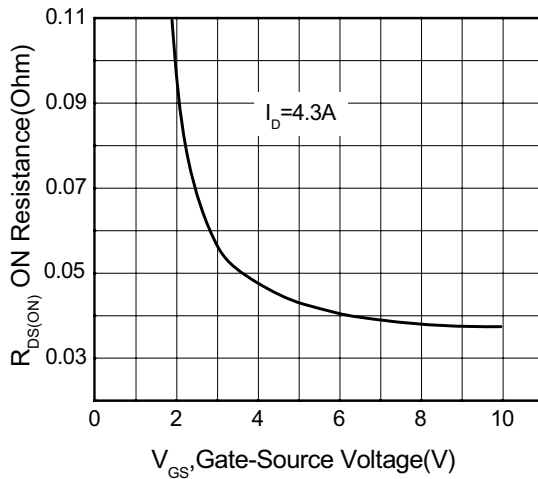
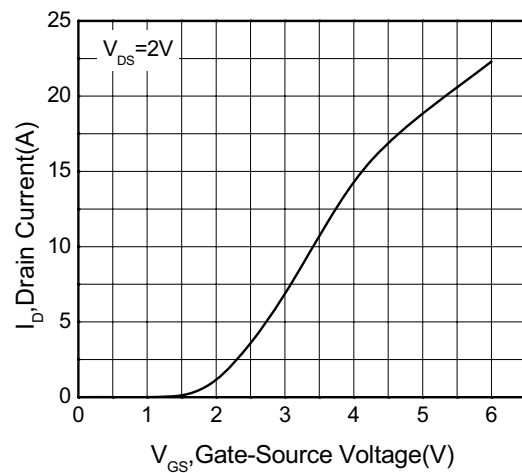
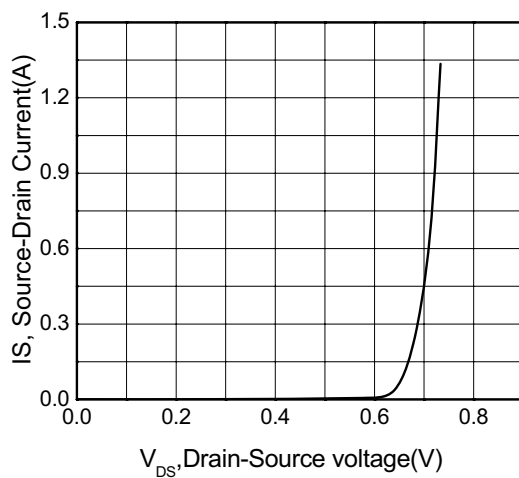
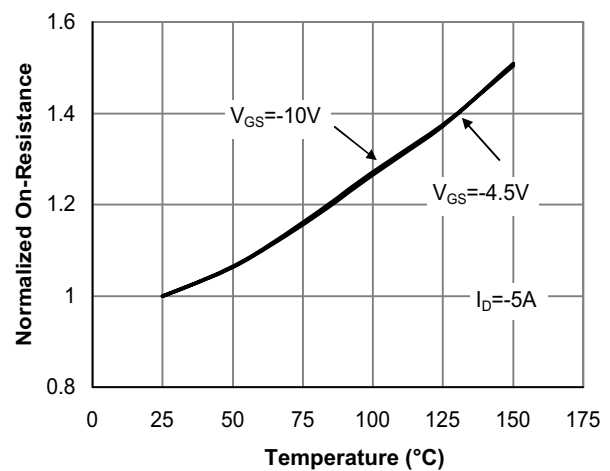
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

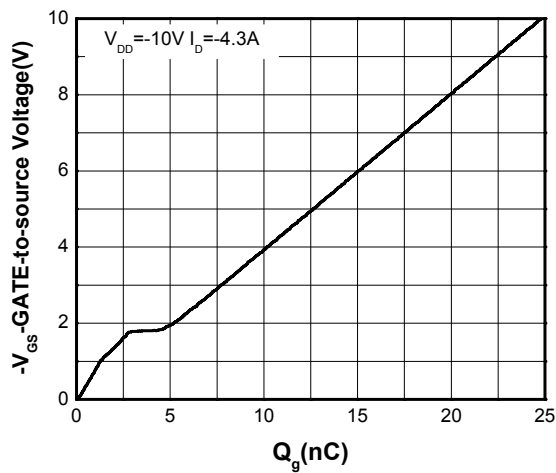
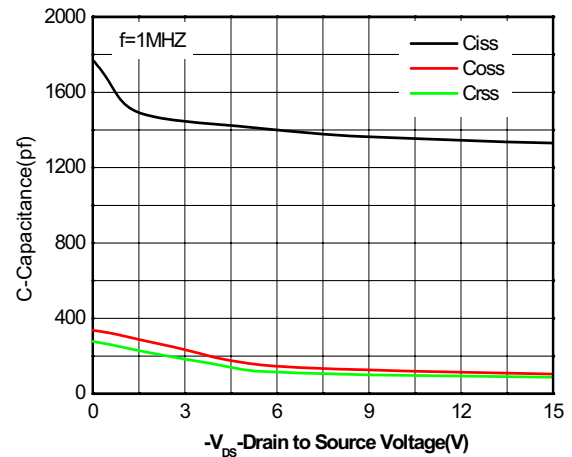
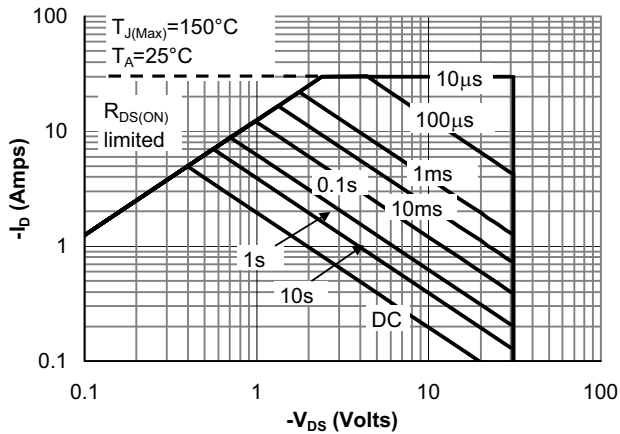
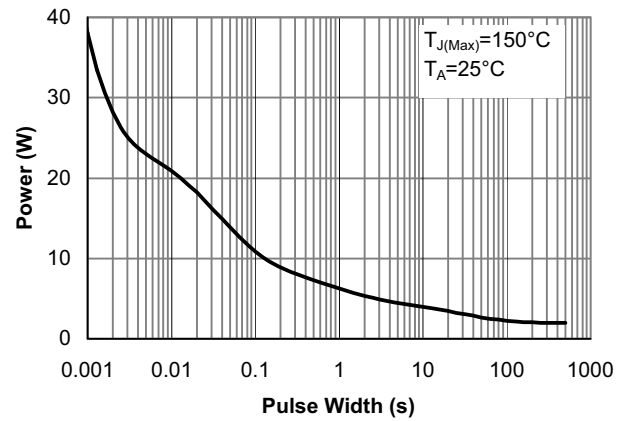
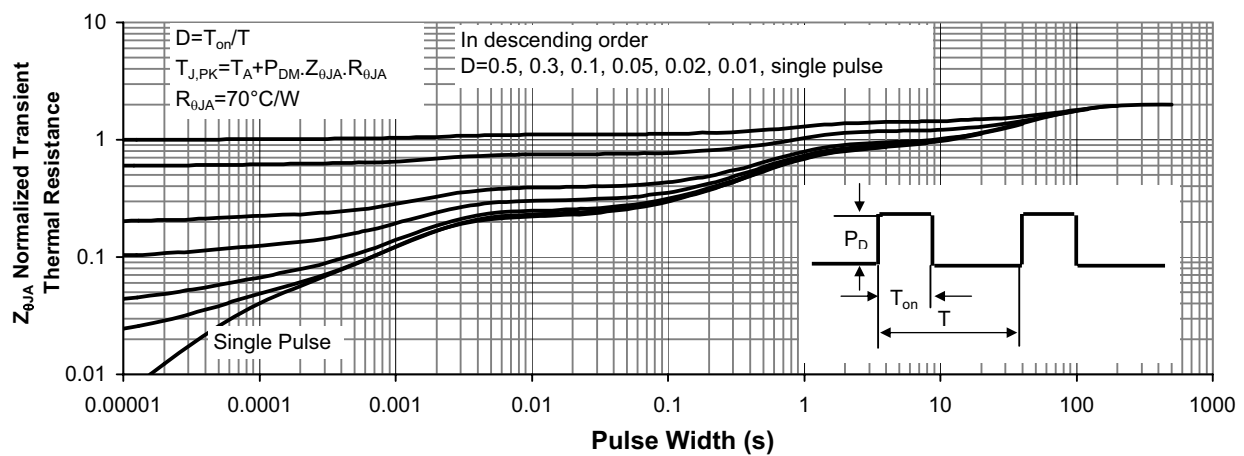
c Pulse width<380 $\mu\text{s}$ , Duty Cycle<2%

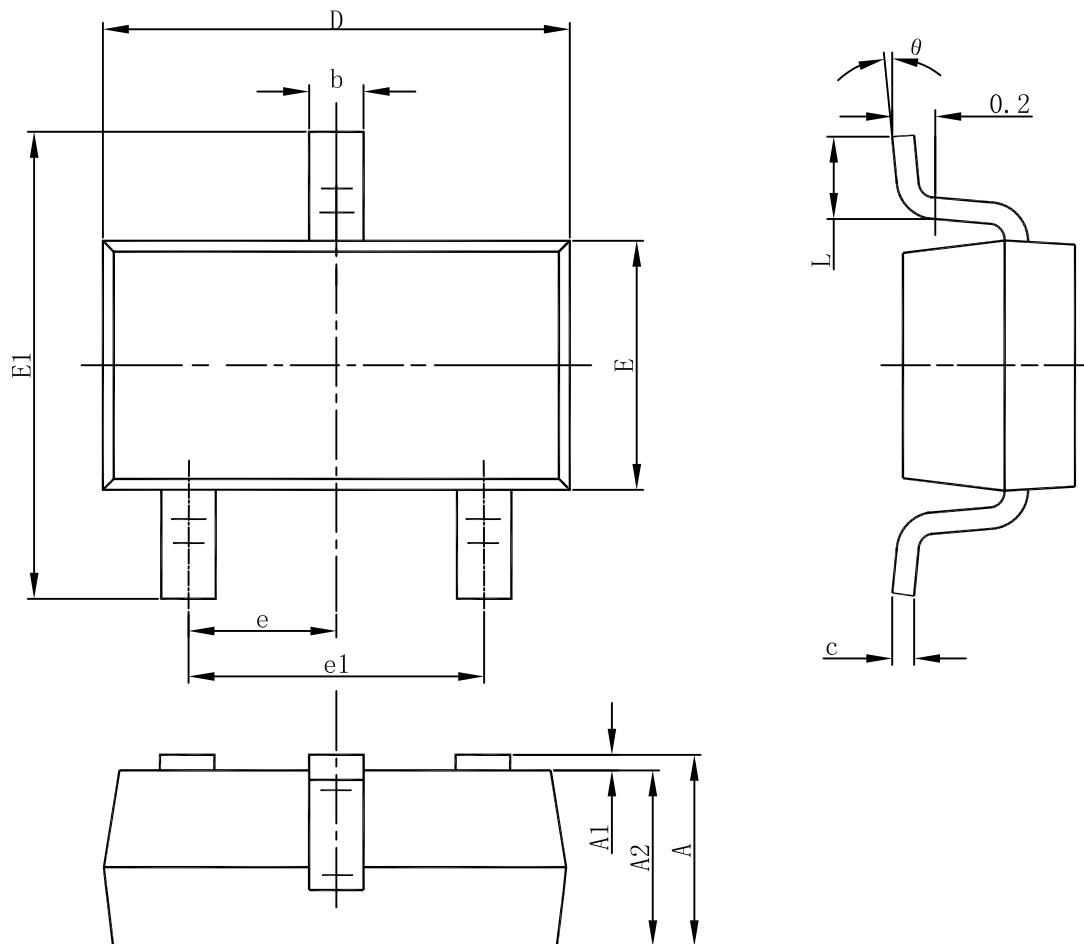
d Maximum junction temperature  $T_J=150^{\circ}\text{C}$ .

**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

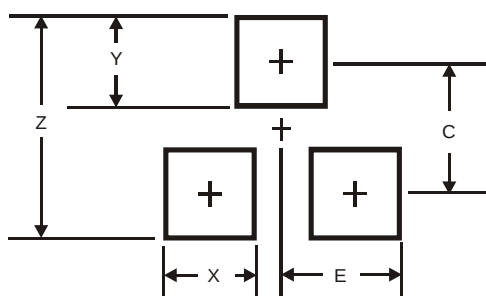
| Parameter                                      | Symbol              | Test Conditions                                                                                                    | Min  | Typ   | Max  | Unit |
|------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------|------|-------|------|------|
| OFF CHARACTERISTICS                            |                     |                                                                                                                    |      |       |      |      |
| Drain-to-Source Breakdown Voltage              | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250uA                                                                     | -30  |       |      | V    |
| Zero Gate Voltage Drain Current                | I <sub>DSS</sub>    | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V                                                                       |      |       | -1   | uA   |
|                                                |                     | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V,T <sub>J</sub> =85 °C                                                 |      |       | -5   |      |
| Gate-to-source Leakage Current                 | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12V                                                                      |      |       | ±100 | nA   |
| ON CHARACTERISTICS                             |                     |                                                                                                                    |      |       |      |      |
| Gate Threshold Voltage                         | V <sub>GS(TH)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250uA                                                        | -0.5 | -1.0  | -1.5 | V    |
| On State Drain Current (Pulse) <sup>b, c</sup> | I <sub>D(on)</sub>  | V <sub>DS</sub> =-5 V, V <sub>GS</sub> = -4.5V                                                                     | -10  |       |      | A    |
| Drain-to-source On-resistance <sup>b, c</sup>  | R <sub>DS(on)</sub> | V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.3A                                                                     |      | 38    | 53   | mΩ   |
|                                                |                     | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.5A                                                                    |      | 43    | 56   |      |
| BODY DIODE CHARACTERISTICS                     |                     |                                                                                                                    |      |       |      |      |
| Forward Voltage                                | V <sub>SD</sub>     | V <sub>GS</sub> = 0 V, I <sub>S</sub> = -1.0A                                                                      |      | -0.75 | -1.5 | V    |
| Forward Transconductance                       | G <sub>FS</sub>     | V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.3A                                                                     |      | 13    |      | s    |
| CAPACITANCES, CHARGES                          |                     |                                                                                                                    |      |       |      |      |
| Input Capacitance                              | C <sub>ISS</sub>    | V <sub>GS</sub> = 0 V,<br>f = 1.0 MHz,                                                                             |      | 1250  |      | pF   |
| Output Capacitance                             | C <sub>OSS</sub>    |                                                                                                                    |      | 106   |      |      |
| Reverse Transfer Capacitance                   | C <sub>RSS</sub>    | V <sub>DS</sub> = -15V                                                                                             |      | 90    |      |      |
| Total Gate Charge                              | Q <sub>G(TOT)</sub> | V <sub>GS</sub> = -10 V,<br>V <sub>DD</sub> = -10 V,<br>I <sub>D</sub> = -4.3A                                     |      | 24.8  |      | nC   |
| Threshold Gate Charge                          | Q <sub>G(TH)</sub>  |                                                                                                                    |      | 1.3   |      |      |
| Gate-to-Source Charge                          | Q <sub>GS</sub>     |                                                                                                                    |      | 2.2   |      |      |
| Gate-to-Drain Charge                           | Q <sub>GD</sub>     |                                                                                                                    |      | 1.8   |      |      |
| SWITCHING CHARACTERISTICS                      |                     |                                                                                                                    |      |       |      |      |
| Turn-On Delay Time                             | td(ON)              | V <sub>GEN</sub> = -10 V,V <sub>DD</sub> = -15 V,<br>I <sub>D</sub> =-1.0A,R <sub>G</sub> =6Ω, R <sub>L</sub> =15Ω |      | 10    |      | ns   |
| Rise Time                                      | tr                  |                                                                                                                    |      | 18    |      |      |
| Turn-Off Delay Time                            | td(OFF)             |                                                                                                                    |      | 60    |      |      |
| Fall Time                                      | tf                  |                                                                                                                    |      | 9     |      |      |

**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Drain Current VS Drain-Source voltage**

**Drain Current vs ON Resistance**

**Gate-Source Voltage vs ON Resistance**

**Drain Current VS Gate-Source Voltage**

**Drain Current VS Source-Drain Current**

**On-Resistance vs. Junction**


**Gate Charge Characteristics**

**Capacitance Characteristics**

**Maximum Forward Biased Safe Operating Area (Note E)**

**Single Pulse Power Rating Junction-to-Ambient (Note E)**

**Normalized Maximum Transient Thermal Impedance**

**Package outline dimensions**
**SOT-23-3L**


| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

**Suggested Land Pattern**
**SOT-23-3L**


| Dimensions | Value (mm) |
|------------|------------|
| <b>Z</b>   | 2.9        |
| <b>X</b>   | 0.8        |
| <b>Y</b>   | 0.9        |
| <b>C</b>   | 2.0        |
| <b>E</b>   | 1.35       |