



### General Description

The EC49315 is a low noise 500mA fixed /adjustable output voltage, with high ripple rejection ratio and fast transient response. It includes a precise reference voltage, an error amplifier, driver transistors, a compensation network and a low ON-resistance power MOSFET. It also integrates many protection circuitries, such as current limiters and an over temperature protection module. The EC49315 works well with low ESR ceramic capacitors, suitable for battery-powered applications with stringent space requirements and demanding performance. It also offers low quiescent current.

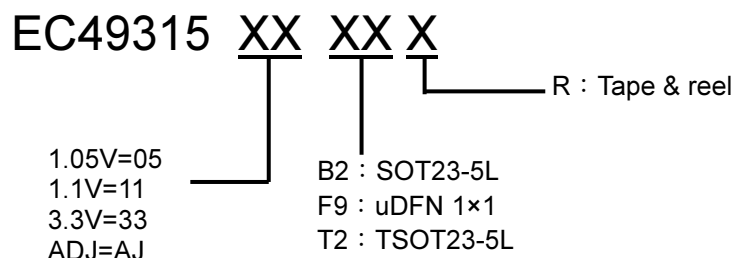
### Features

- ◆Wide 2.5V to 6V Operating Range
- ◆Current Limiting Protection
- ◆Thermal Shutdown Protection
- ◆Low Dropout : 225mV @ 300mA; VOUT = 3.3V
- ◆High Ripple Rejection 65dB@10Hz
- ◆Standby Current Less Than 0.1  $\mu$  A

### Applications

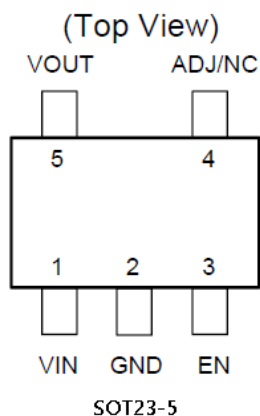
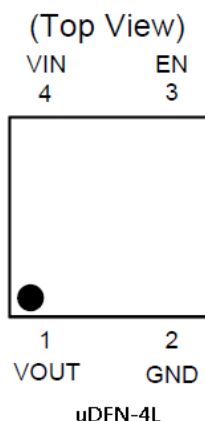
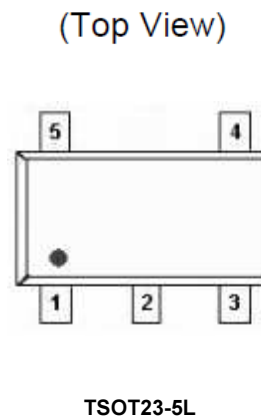
- ◆Battery-Powered Equipment
- ◆Portable Instruments
- ◆Digital Camera
- ◆WLAN Communication
- ◆Hand-Held Instruments

### Ordering/Marking Information



| Part No      | Package    | Marking  | Information                                                                                                                |
|--------------|------------|----------|----------------------------------------------------------------------------------------------------------------------------|
| EC49315XXB2R | SOT23-5L   | XXYW     | XX : Voltage Code<br>1.05V=05 ; 1.1V=11 ; 3.3V=33<br>Y : 2017=7 ; 2018=8 ; 2019=9<br>W : A~Z=1~26 weeks<br>a~z=27~52 weeks |
|              |            | XXYW     | XX : Voltage Code<br>1.05V=05 ; 1.1V=11 ; 3.3V=33<br>Y : 2017=H 、 2018=I...<br>W : A~Z=1~26 weeks<br>a~z=27~52 weeks       |
| EC49315XXF9R | Udfn1x1 4L | VV<br>YW | Y : 2017=H 、 2018=I...<br>W : A~Z=1~26 weeks<br>a~z=27~52 weeks                                                            |
| EC49315XXT2R | TSOT23-5L  |          |                                                                                                                            |

### Pin Configurations



### Pin Description

| Name | Description                                                                                                                                                      |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN   | Chip Enable (Active High). Note that this pin is high impedance. There should be a pull low 100kΩ resistor connected to GND when the control signal is floating. |
| GND  | Ground                                                                                                                                                           |
| VOUT | Output Voltage                                                                                                                                                   |
| VIN  | Input Voltage                                                                                                                                                    |
| ADJ  | Feedback pin voltage is set to be 0.8V, Output voltage can be programmed by a resistor divider.                                                                  |
| NC   | No Internal Connection (Floating or Connecting to GND).                                                                                                          |

### Typical Application Circuit

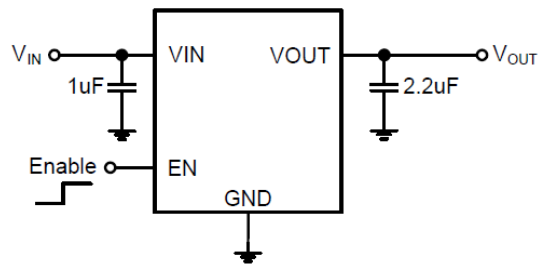
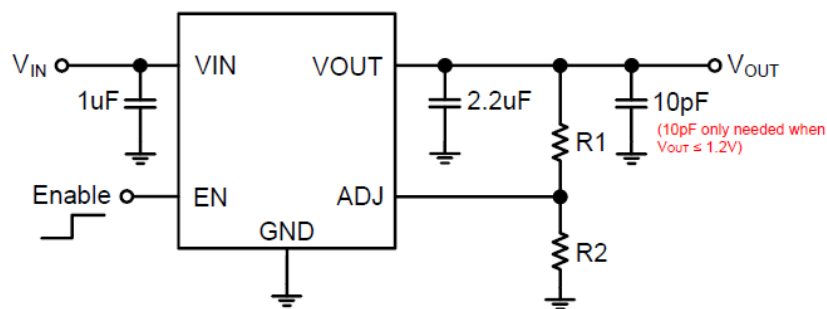


Figure1. Fixed Operation



$$V_{OUT} = V_{ADJ} \times \left(1 + \frac{R_1}{R_2}\right) \text{Volts}$$

Figure2. Adjustable Operation

### Absolute Maximum Ratings (Note 1)

- ◆ Supply Voltage VIN 8V
- ◆ Power Dissipation, PD @ TA=25°C
  - SOT23-5 400mW
  - uDFN-4L 400mW
- ◆ Thermal Resistance,  $\theta_{JA}$ 
  - SOT23-5 250°C/W
  - uDFN-4L 250°C/W
- ◆ Lead Temperature 260°C
- ◆ Storage Temperature -65°C to 150°C
- ◆ ESD Susceptibility
  - HBM (Human Body Mode) 2kV
  - MM (Machine Mode) 200V

**Recommended Operating Conditions**

|                                 |                |
|---------------------------------|----------------|
| ◆ Input Voltage $V_{IN}$        | 2.5V to 6V     |
| ◆ EN Input Voltage              | 0V to 6V       |
| ◆ Junction Temperature          | -40°C to 125°C |
| ◆ Ambient Operating Temperature | -40°C to 85°C  |

**Electrical Characteristics** (Unless otherwise specified.  $V_{IN}=5V$ ,  $T_A = 25^\circ C$ )

| Parameters                              |              | Symbol | Condition                          | Min   | Typ   | Max   | Units |
|-----------------------------------------|--------------|--------|------------------------------------|-------|-------|-------|-------|
| Operating Voltage Range                 |              | VIN    |                                    | 2.5   |       | 6.0   | V     |
| Shutdown Supply Current                 |              | ISBY   | VEN = GND, Shutdown                |       | 0.1   | 1     | μA    |
| Supply Current Limit                    |              | ILIMIT | RLOAD = 1Ω                         |       | 900   |       | mA    |
| Quiescent Current                       |              | IQ     | VADJ = 1V                          |       | 35    |       | μA    |
| Dropout Voltage                         |              | VDrop  | VOUT=3.3V IOUT = 300mA             |       | 225   |       | mV    |
|                                         |              |        | IOUT = 500mA                       |       | 370   |       | mV    |
| Line regulation                         |              | ΔVLINE | VIN = (VOUT +1V) to 6V, IOUT = 1mA |       | 0.075 |       | %/V   |
| Load Regulation                         |              | ΔVLOAD | (Vin=Vout+1V)1mA < IOUT < 500mA    |       | 10    |       | mV    |
| Fixed Output Voltage Accuracy           |              | ΔVOUT  | IOUT =1mA                          | -2    |       | +2    | %     |
| Feedback Voltage                        |              | VADJ   |                                    | 0.775 | 0.8   | 0.825 | V     |
| EN Threshold                            | Logic-Low V  | VIL    | VIN = 2.5V to 6V, Shutdown         |       |       | 0.5   | V     |
|                                         | Logic-High V | VIH    | VIN = 2.5V to 6V, Start-Up         | 1.5   |       |       |       |
| Power Supply Rejection Rate             | f = 10Hz     | PSRR   | COUT = 2.2 F, IOUT = 10mA          |       | 65    |       | dB    |
| Thermal Shutdown Temperature            |              | TSD    |                                    |       | 150   |       | °C    |
| Thermal Shutdown Temperature Hysteresis |              | ΔTSD   |                                    |       | 30    |       | °C    |

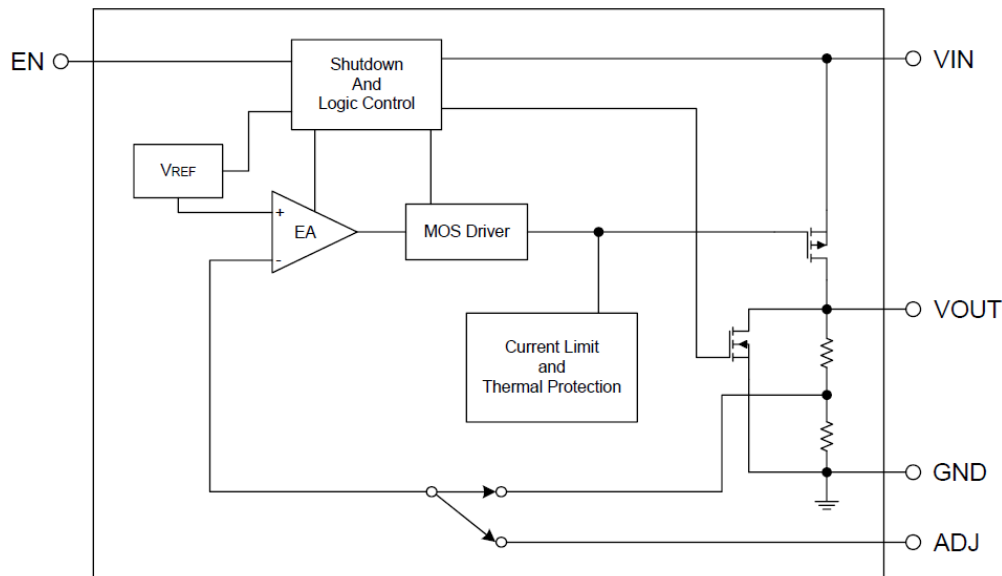
Note 1: Stresses listed as the above “Absolute Maximum Ratings” may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2:  $V_{IN(MIN)} = V_{OUT} + V_{DROP}$

Note 3: The dropout voltage is defined as (VIN-VOUT) when VOUT is 100mV below the target value of VOUT.

Note 4: The maximum output current is defined as (VIN-VOUT) x IOUT < Power dissipation value.

### Function Block Diagram



### Application Information

#### Input Capacitor

An input capacitance of 1 $\mu$ F is required between the device input pin and ground directly (the amount of the capacitance may be increased without limit). The input capacitor **MUST** be located less than 1cm from the device to assure input stability. A lower ESR capacitor allows the use of less capacitance, while higher ESR type (like aluminum electrolytic) requires more capacitance. Capacitor types (aluminum, ceramic and tantalum) can be mixed in parallel, but the total equivalent input capacitance/ESR must be defined as above for stable operation. There are no requirements for the ESR on the input capacitor, but tolerance and temperature coefficient must be considered when selecting the capacitor to ensure the capacitance is 1 $\mu$ F over the entire operating range.

#### Output Capacitor

The EC49315 is designed specifically to work with very small ceramic output capacitors. The minimum capacitance recommended (temperature characteristics of X7R, X5R, Z5U or Y5V) is within the 1 $\mu$ F to 10mf range with 5m $\Omega$  to 50m $\Omega$  ESR range ceramic capacitor between LDO output and GND for transient stability, but it may be increased without limit. Higher capacitance values help to improve transient response. The output capacitor's ESR is critical because it forms a zero to provide phase lead which is required for loop stability.

#### Enable Function

The EC49315 is shut down by pulling the EN pin low, and turned on by driving the input high. If the shutdown feature is not required, the EN pin should be tied to VIN to keep the regulator on at all times (the EN pin **MUST NOT** be left floating). To assure proper operation, the signal source used to drive the EN pin must be able to swing above and below the specified turn-on/off voltage thresholds listed in the "Electrical Characteristics" under VIH and VIL. The ON/OFF signal may come from either CMOS output, or an open-collector output with pull up resistor to the device input voltage or another logic supply. The high-level voltage may exceed the device input voltage, but must remain within the absolute maximum ratings for the EN pin.

#### Thermal Considerations

For continuous operation, do not exceed the maximum operation junction temperature 125 $^{\circ}$  C. The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surroundings airflow and temperature difference between junctions to ambient. The maximum power dissipation can be calculated by following formula:

$$P_{D(MAX)} = \frac{(T_{J(MAX)} - T_A)}{\theta_{JA}}$$

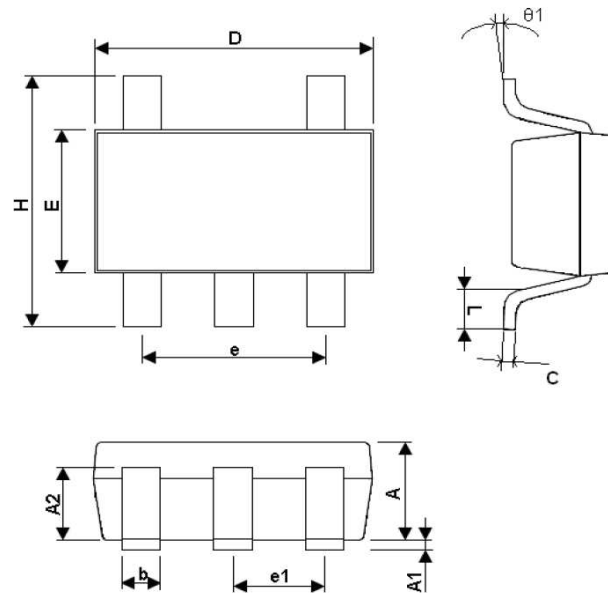
Where  $T_J(\text{MAX})$  is the maximum operation junction temperature  $125^\circ\text{C}$ ,  $T_A$  is the ambient temperature and  $\theta_{JA}$  is the junction to ambient thermal resistance. For recommended operating conditions specification of EC49315 where  $T_J(\text{MAX})$  is the maximum junction temperature of the die ( $125^\circ\text{C}$ ) and  $T_A$  is the maximum ambient temperature. The junction to ambient thermal resistance  $\theta_{JA}$  is layout dependent.

### Adjustable Operation

The adjustable version of the EC49315 has an output voltage ranging from 0.9V to 5V. The output voltage of the EC49315 adjustable regulator is programmed using an external resistor divider as shown in Figure2. R2 resistor must less than 100K $\Omega$  for good stability. To enable default output voltage (pre-set), connect ADJ pin to ground. There is no external component needed to decide voltage.

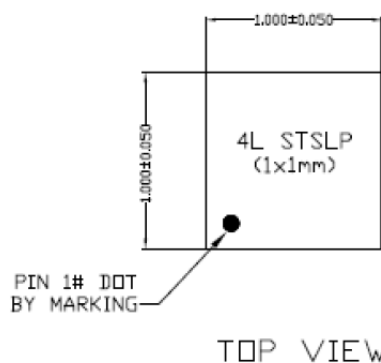
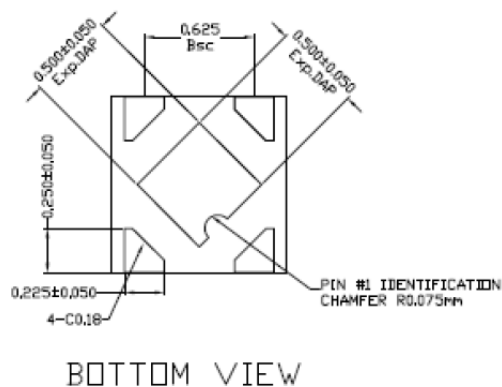
### Package Information

#### SOT23-5



| SYMBOLS    | DIMENSIONS IN MILLIMETERS |           |           | DIMENSIONS IN INCH |           |           |
|------------|---------------------------|-----------|-----------|--------------------|-----------|-----------|
|            | MIN                       | NOM       | MAX       | MIN                | NOM       | MAX       |
| A          | 1.00                      | 1.10      | 1.30      | 0.039              | 0.043     | 0.051     |
| A1         | 0.00                      | ---       | 0.10      | 0.000              | ---       | 0.004     |
| A2         | 0.70                      | 0.80      | 0.90      | 0.027              | 0.031     | 0.035     |
| b          | 0.35                      | 0.40      | 0.50      | 0.013              | 0.016     | 0.020     |
| C          | 0.10                      | 0.15      | 0.25      | 0.004              | 0.006     | 0.001     |
| D          | 2.70                      | 2.90      | 3.10      | 0.106              | 0.114     | 0.122     |
| E          | 1.50                      | 1.60      | 1.80      | 0.059              | 0.063     | 0.071     |
| e          | ---                       | 1.90(TYP) | ---       | ---                | 0.075     | ---       |
| H          | 2.60                      | 2.80      | 3.00      | 0.102              | 0.110     | 0.118     |
| L          | 0.370                     | ---       | ---       | 0.015              | ---       | ---       |
| $\theta_1$ | $1^\circ$                 | $5^\circ$ | $9^\circ$ | $1^\circ$          | $5^\circ$ | $9^\circ$ |
| e1         | ---                       | 0.95(TYP) | ---       | ---                | 0.037     | ---       |

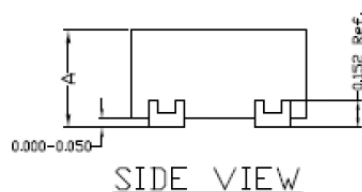
### uDFN(1x1) TypeA



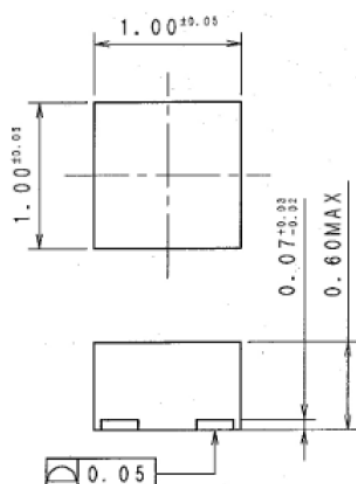
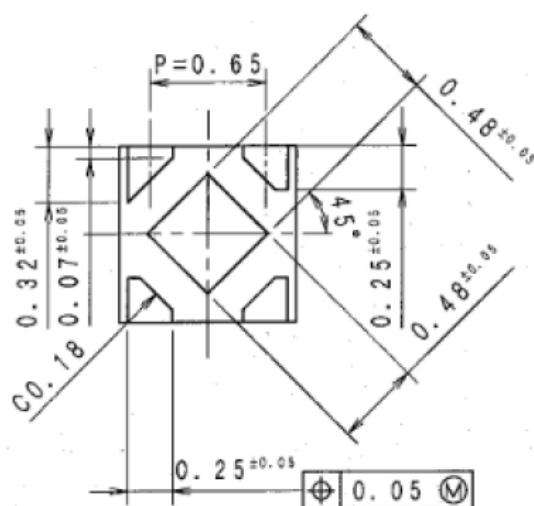
#### NOTE:

1). 'A' DIMENSION AS BELOW TABLE

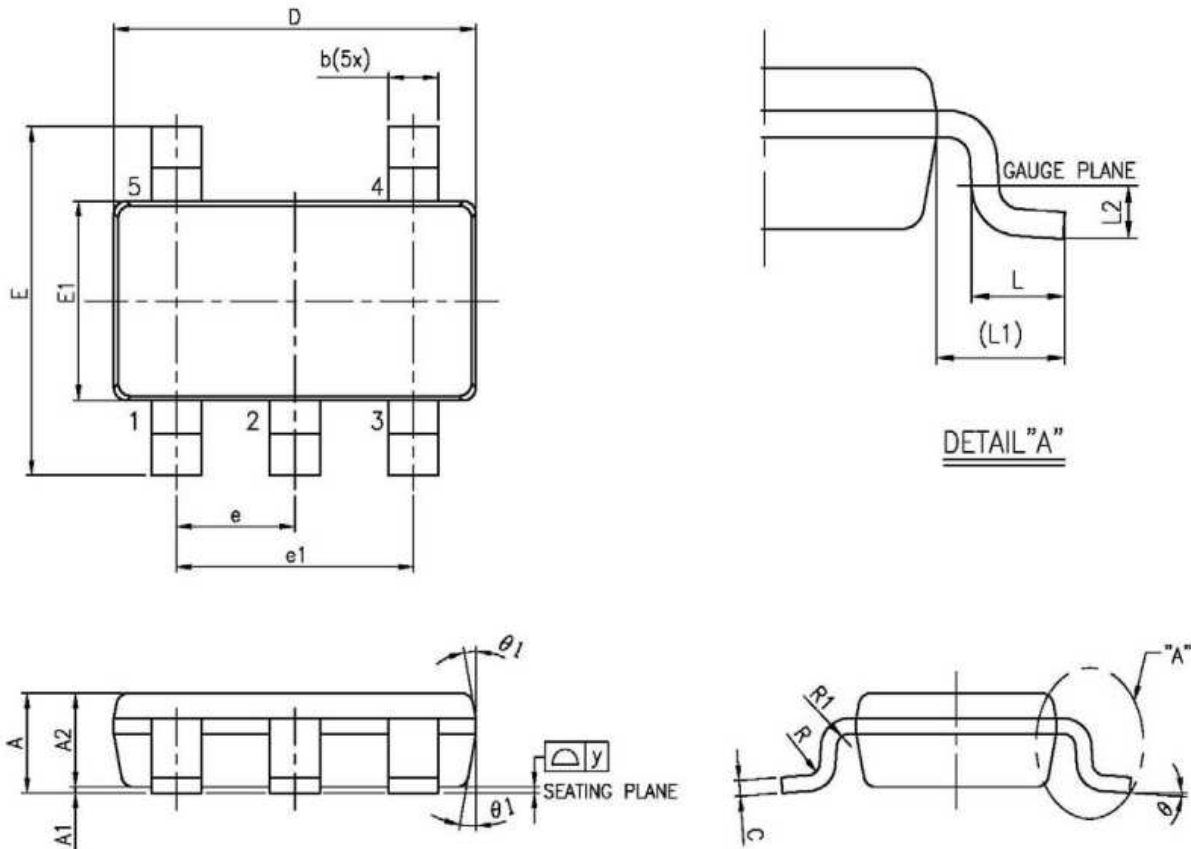
| A | STSLP |       |
|---|-------|-------|
|   | MAX.  | 0.600 |
|   | NOM.  | 0.550 |
|   | MIN.  | 0.500 |



### uDFN(1x1) TypeB



### TSOT23-5L



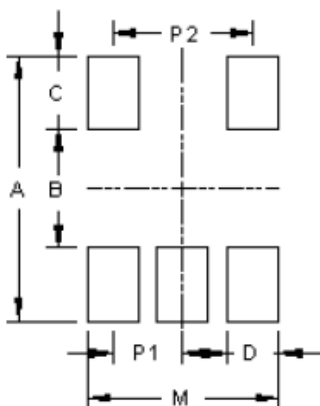
#### NOTE :

1. All dimensions are in millimeters.
2. Dimension D does not include mold flash, protrusion or gate burrs. Mold flash protrusions or gate burrs shall not exceed 0.15mm per end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15mm per side.
3. The package top may be smaller than the package bottom. Dimensions D and E1 are determined at outermost extremes of the plastic body exclusive of mold flash, Tie bar burrs, Gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.
4. Dimension "b" does not include dambar protrusion. Allowable dambar protrusion shall be 0.08mm total in excess of the "b" dimension at maximum material condition. The dambar cannot be located on the lower radius of the foot. Minimum space between protrusion and an adjacent lead shall not be less than 0.07mm

| SYMBOLS    | DIMENSIONS IN MILLIMETERS |          |       |
|------------|---------------------------|----------|-------|
|            | MIN                       | NOM      | MAX   |
| A          | 0.75                      | -----    | 0.90  |
| A1         | 0.00                      | -----    | 0.10  |
| A2         | 0.70                      | 0.75     | 0.80  |
| B          | 0.30                      | -----    | 0.50  |
| c          | 0.08                      | -----    | 0.20  |
| D          | 2.80                      | 2.90     | 3.00  |
| E          | 2.60                      | 2.80     | 3.00  |
| E1         | 1.50                      | 1.60     | 1.70  |
| e          |                           | 0.95 BSC |       |
| e1         |                           | 1.90 BSC |       |
| L          | 0.30                      | 0.45     | 0.60  |
| L1         |                           | 0.60 REF |       |
| L2         |                           | 0.25 BSC |       |
| R          | 0.10                      | -----    | ----- |
| R1         | 0.10                      | -----    | 0.25  |
| $\theta$   | 0°                        | 4°       | 8°    |
| $\theta 1$ | 4°                        | 10°      | 12°   |
| y          | -----                     | -----    | 0.10  |

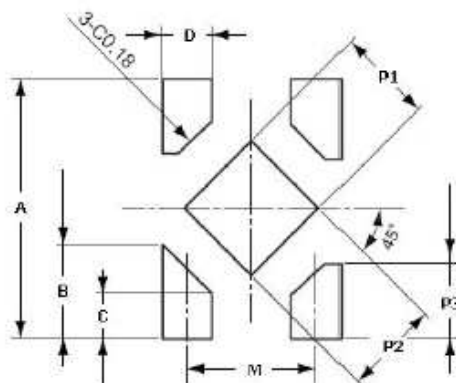
## Footprints

### SOT23-5



| Package     | Number of PIN | Footprint Dimension (mm) |      |      |      |      |      |      | Tolerance |
|-------------|---------------|--------------------------|------|------|------|------|------|------|-----------|
|             |               | P1                       | P2   | A    | B    | C    | D    | M    |           |
| (T)SOT-23-5 | 5             | 0.95                     | 1.90 | 3.60 | 1.60 | 1.00 | 0.70 | 2.60 | ±0.10     |

### uDFN(1x1)



| Package | Number of PIN | Footprint Dimension (mm) |      |     |     |      |      |      |      | Tolerance |
|---------|---------------|--------------------------|------|-----|-----|------|------|------|------|-----------|
|         |               | P1                       | P2   | P3  | A   | B    | C    | D    | M    |           |
| UDFN-4L | 4             | 0.48                     | 0.48 | 0.4 | 1.3 | 0.47 | 0.22 | 0.25 | 0.65 | ±0.10     |