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**BCT2562**  
**2 $\mu$ A I<sub>Q</sub>, 600mA Low Dropout Linear Regulators****GENERAL DESCRIPTION**

The BCT2562 series are ultra-low power, low-dropout CMOS linear voltage regulators. They are the perfect choice for low voltage, low power applications. Quiescent current of only 2 $\mu$ A makes these devices ideal for powering the battery-powered, always-on systems that require very little idle-state power dissipation to a longer service life. The BCT2562 series also offer ultra-low dropout voltage to prolong battery life in portable electronics. Systems requiring a quiet voltage sources.

Other features include a 10nA logic-controlled shutdown mode, current limit and thermal shutdown protection.

The BCT2562 is available in Green SOT23-3 SOT23-5 and UTDFN1x1-4L packages. It operates over an ambient temperature range of -40°C to +85°C.

**FEATURES**

- 2 $\mu$ A Ground Current at no Load
- 600mA Output Current
- $\pm 2\%$  Output Accuracy
- 10nA Logic-Controlled Shutdown
- Wide Operating Input Voltage Range: 1.6V to 5.5V
- Fixed Output Voltage 0.8V, 0.9V, 1.2V, 1.3V, 1.5V, 1.8V, 1.85V, 2.5V, 2.8V, 3.0V, 3.3V
- Thermal-Overload Protection
- Output Current Limit
- Available in Green SOT23-3 , SOT23-5, UTDFN1x1-4L Packages

**APPLICATIONS**

Portable/Battery-Powered Equipment  
Low Power Microcontrollers  
Wireless Communication Equipment  
Audio/Video Equipment  
Hand-Held Instruments

#### ORDERING INFORMATION

Order Number	V <sub>OUT</sub> (V)	Package Type	Temperature Range	Marking	QTY/Reel
BCT2562EUK08-TR	0.8	SOT23-5	-40°C to +85°C	n8XX	3000
BCT2562EUK09-TR	0.9	SOT23-5	-40°C to +85°C	n9XX	3000
BCT2562EUK12-TR	1.2	SOT23-5	-40°C to +85°C	n2XX	3000
BCT2562EUK13-TR	1.3	SOT23-5	-40°C to +85°C	n3XX	3000
BCT2562EUK15-TR	1.5	SOT23-5	-40°C to +85°C	n5XX	3000
BCT2562EUK18-TR	1.8	SOT23-5	-40°C to +85°C	n8XX	3000
BCT2562EUK185-TR	1.85	SOT23-5	-40°C to +85°C	nCXX	3000
BCT2562EUK25-TR	2.5	SOT23-5	-40°C to +85°C	n5XX	3000
BCT2562EUK28-TR	2.8	SOT23-5	-40°C to +85°C	n8XX	3000
BCT2562EUK30-TR	3.0	SOT23-5	-40°C to +85°C	n0XX	3000
BCT2562EUK33-TR	3.3	SOT23-5	-40°C to +85°C	n3XX	3000
BCT2562EUR08-TR	0.8	SOT23-3	-40°C to +85°C	n8XX	3000
BCT2562EUR09-TR	0.9	SOT23-3	-40°C to +85°C	n9XX	3000
BCT2562EUR12-TR	1.2	SOT23-3	-40°C to +85°C	n2XX	3000
BCT2562EUR13-TR	1.3	SOT23-3	-40°C to +85°C	n3XX	3000
BCT2562EUR15-TR	1.5	SOT23-3	-40°C to +85°C	n5XX	3000
BCT2562EUR18-TR	1.8	SOT23-3	-40°C to +85°C	n8XX	3000
BCT2562EUR185-TR	1.85	SOT23-3	-40°C to +85°C	nCXX	3000
BCT2562EUR25-TR	2.5	SOT23-3	-40°C to +85°C	n5XX	3000
BCT2562EUR28-TR	2.8	SOT23-3	-40°C to +85°C	n8XX	3000
BCT2562EUR30-TR	3.0	SOT23-3	-40°C to +85°C	n0XX	3000
BCT2562EUR33-TR	3.3	SOT23-3	-40°C to +85°C	n3XX	3000
BCT2562ELS08-TR	0.8	UTDFN1x1-4L	-40°C to +85°C	n8X	10000
BCT2562ELS09-TR	0.9	UTDFN1x1-4L	-40°C to +85°C	n9X	10000
BCT2562ELS12-TR	1.2	UTDFN1x1-4L	-40°C to +85°C	n2X	10000
BCT2562ELS13-TR	1.3	UTDFN1x1-4L	-40°C to +85°C	n3X	10000
BCT2562ELS15-TR	1.5	UTDFN1x1-4L	-40°C to +85°C	n5X	10000
BCT2562ELS18-TR	1.8	UTDFN1x1-4L	-40°C to +85°C	n8X	10000
BCT2562ELS185-TR	1.85	UTDFN1x1-4L	-40°C to +85°C	nCX	10000
BCT2562ELS25-TR	2.5	UTDFN1x1-4L	-40°C to +85°C	n5X	10000
BCT2562ELS28-TR	2.8	UTDFN1x1-4L	-40°C to +85°C	n8X	10000
BCT2562ELS30-TR	3.0	UTDFN1x1-4L	-40°C to +85°C	n0X	10000
BCT2562ELS33-TR	3.3	UTDFN1x1-4L	-40°C to +85°C	n3X	10000

#### Note:

"n" in Marking is product short code for BCT2562.

"XX" or "X" in Marking will be appeared as the batch code.



# BCT2562

## 2uA I<sub>Q</sub>, 600mA

### Low Dropout Linear Regulators

#### ABSOLUTE MAXIMUM RATINGS

VIN to GND.....	-0.3V to 6.5V
EN, OUT to GND.....	-0.3V to 6.0V
Output Short-Circuit Duration.....	Infinite
OUT,BP to GND.....	-0.3V to (VIN +0.3V)
Power Dissipation, P <sub>D</sub> @T <sub>A</sub> =25°C	
SOT23-3.....	0.42W
SOT23-5.....	0.48W
UTDFN1x1-4L.....	0.45W
Package Thermal Resistance	
SOT23-3.....	300°C/W
SOT23-5, θ <sub>JA</sub> .....	260°C/W
UTDFN1x1-4L.....	280°C/W
Operating Temperature Range.....	-40°C to +85°C
Storage Temperature Range.....	-65°C to 150°C
Lead Temperature (Soldering, 10 sec).....	260°C
ESD Susceptibility	
HBM.....	4000V
MM.....	200V

#### RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range.....	1.6V to 5.5V
Operating Temperature Range .....	-40°C to +85°C

#### OVERSTRESS CAUTION

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and 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 affect device reliability.

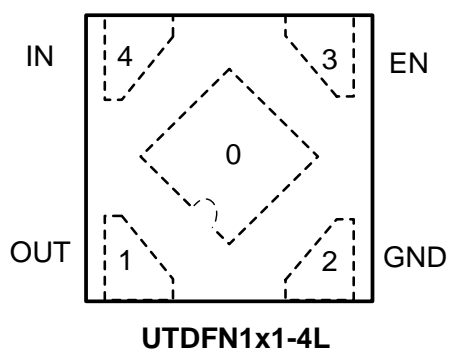
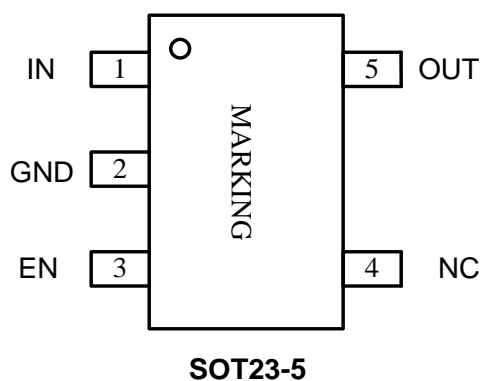
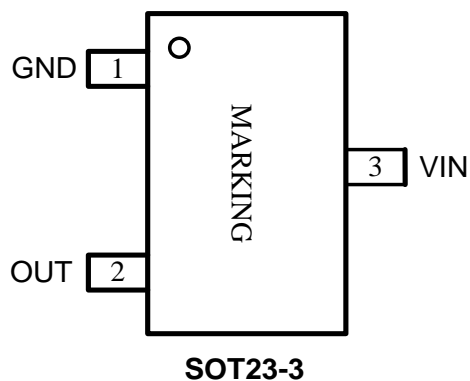
#### ESD SENSITIVITY CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

#### DISCLAIMER

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

### PIN CONFIGURATION (TOP VIEW)



### PIN DESCRIPTION

PIN			NAME	FUNCTION
SOT23-3	SOT23-5	UTDFN1x1-4L		
1	2	2	GND	Ground.
2	5	1	OUT	Regulator Output.
3	1	4	IN	Input of Supply Voltage.
-	3	3	EN	Enable Control Input. Active high.
-	4	-	NC	No Connection
-	-	0	Exposed Pad	Leave floating or tie to GND.

## ELECTRICAL CHARACTERISTICS

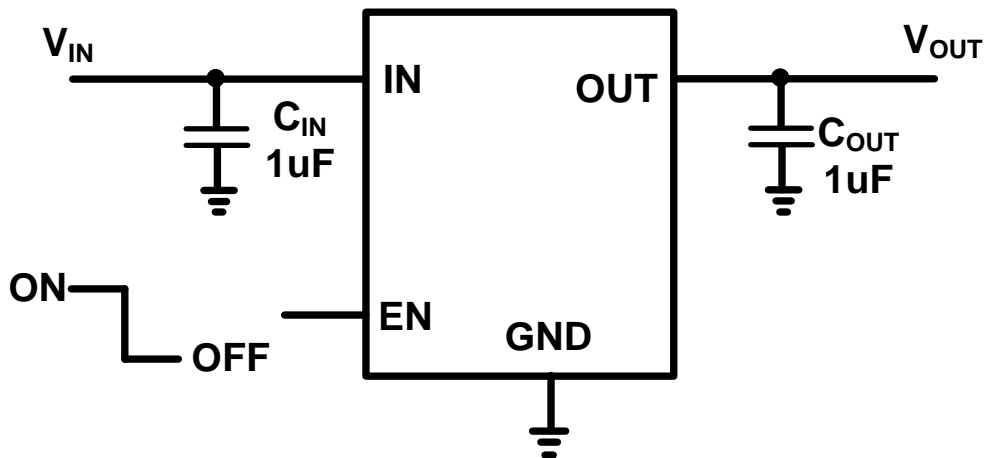
( $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or  $1.6V$ , Full =  $-40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise specified.)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage	$V_{IN}$		1.6		5.5	V
Output Voltage Accuracy <sup>(1)</sup>		$I_{OUT}=0.1mA$	-2.0		2.0	%
Maximum Output Current				600		mA
Current Limit	$I_{LIM}$		650	1000		mA
Ground Pin Current	$I_Q$	No load, $EN = V_{IN}$		2		$\mu A$
Dropout Voltage <sup>(2)</sup>	$V_{DROP}$	$I_{OUT}=600mA$	$V_{OUT} = 0.8V$	1360		mV
			$V_{OUT} = 1.2V$	840		
			$V_{OUT} = 1.5V$	620		
			$V_{OUT} = 1.8V$	500		
			$V_{OUT} = 2.5V$	400		
			$V_{OUT} = 2.8V$	360		
			$V_{OUT} = 3.0V$	320		
			$V_{OUT} = 3.3V$	300		
Line Regulation	$\Delta V_{LNR}$	$V_{IN}=1.6V$ or $(V_{OUT}+0.5V)$ to $5.5V$ , $I_{OUT}=30mA$		0.2		%
Load Regulation	$\Delta V_{LDR}$	$I_{OUT}=10mA$ to $600mA$ , $C_{OUT}=1\mu F$		0.4		%
Output Voltage Noise	$e_n$	$f=10Hz$ to $100kHz$ , $C_{OUT}=1\mu F$ , $I_{OUT}=100mA$		48		$\mu V_{RMS}$
Power Supply Rejection Ratio	PSRR	$I_{LOAD}=50mA$ , $C_{OUT}=1\mu F$ , $V_{IN}=2.2V$ , $V_{OUT}=1.2V$ , $f=1KHz$		70		dB
<b>SHUTDWON</b>						
EN Input Threshold	$V_{IH}$		1.5			V
	$V_{IL}$				0.4	
EN Input Bias Current	$I_{IN}$	$V_{IN}=5.0V$ , $EN=5.0V$		0.01	1	$\mu A$
Shutdown Supply Current	$I_{Q(SHDN)}$	$EN=0V$		0.01	1	$\mu A$
<b>THERMAL PROTECTION</b>						
Thermal Shutdown Temperature	$T_{SHDN}$			150		$^{\circ}C$
Thermal Shutdown Hysteresis	$\Delta T_{SHDN}$			15		$^{\circ}C$

NOTES:

- $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or  $1.6V$ , whichever is greater.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$ .

**TYPICAL APPLICATION CIRCUIT**



## Input and Output Capacitor Requirements

The external input and output capacitors of BCT2562 series must be properly selected for stability and performance. Use a 1μF or larger input capacitor and place it close to the IC's VIN and GND pins. Any output capacitor meeting the minimum 1mΩ ESR (Equivalent Series Resistance) and effective capacitance between 1μF and 22μF requirement may be used. Place the output capacitor close to the IC's VOUT and GND pins. Increasing capacitance and decreasing ESR can improve the circuit's PSRR and line transient response.

## Thermal Considerations

Thermal protection limits power dissipation in BCT2562. When the operation junction temperature exceeds 150°C, the OTP circuit starts the thermal shutdown function turn the pass element off. The pass element turns on again after the junction temperature cools by 15°C.

For continue operation, do not exceed absolute maximum operation junction temperature 150°C. The power dissipation definition in device is:

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_Q$$

The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surroundings airflow and temperature difference between junction to ambient. The maximum power dissipation can be calculated by following formula:

$$P_D(\text{MAX}) = (T_J(\text{MAX}) - T_A) / \theta_{JA}$$

Where  $T_J(\text{MAX})$  is the maximum operation junction temperature 150°C,  $T_A$  is the ambient temperature and the  $\theta_{JA}$  is the junction to ambient thermal resistance. For recommended operating conditions specification of BCT2562, where  $T_J(\text{MAX})$  is the maximum junction temperature of the die (150°C) and  $T_A$  is the maximum ambient temperature. The junction to ambient thermal resistance ( $\theta_{JA}$  is layout dependent) for SOT23-5 package is 260°C/W, on standard JEDEC 51-3 thermal test board. The maximum power dissipation at  $T_A = 25^\circ\text{C}$  can be calculated by following formula:

$$P_D(\text{MAX}) = (150^\circ\text{C} - 25^\circ\text{C}) / 260 = 0.48\text{W (SOT23-5)}$$

The maximum power dissipation depends on operating ambient temperature for fixed  $T_J(\text{MAX})$  and thermal resistance  $\theta_{JA}$ . It is also useful to calculate the junction of temperature of the BCT2562 under a set of specific conditions. In this example let the Input voltage  $V_{IN} = 3.3\text{V}$ , the output current  $I_O = 600\text{mA}$  and the case temperature  $T_A = 40^\circ\text{C}$  measured by a thermal couple during operation. The power dissipation for the  $V_O = 2.8\text{V}$  of the BCT2562 can be calculated as:

$$P_D = (3.3\text{V} - 2.8\text{V}) \times 600\text{mA} + 3.3\text{V} \times 2\mu\text{A} \approx 0.3\text{W}$$

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**Low Dropout Linear Regulators**

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And the junction temperature,  $T_J$ , can be calculated as follows:

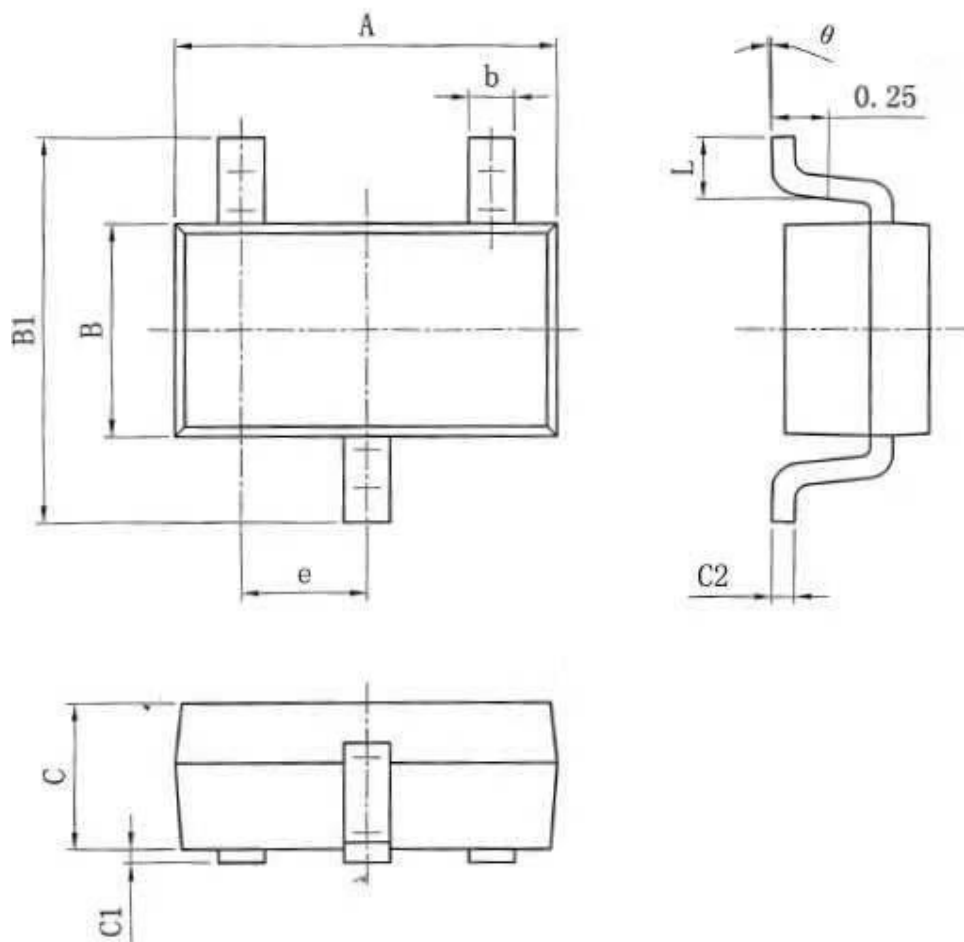
$$\begin{aligned} T_J &= T_A + P_D \times \theta_{JA} = 40^\circ\text{C} + 0.3\text{W} \times 260^\circ\text{C/W} \\ &= 40^\circ\text{C} + 78^\circ\text{C} = 118^\circ\text{C} < T_J(\text{MAX}) = 150^\circ\text{C} \end{aligned}$$

For this operating condition,  $T_J$  is lower than the absolute maximum operating junction temperature  $150^\circ\text{C}$ , so it is safe to use the BCT2562 in this configuration.



## Package Outline Dimensions

SOT23-3

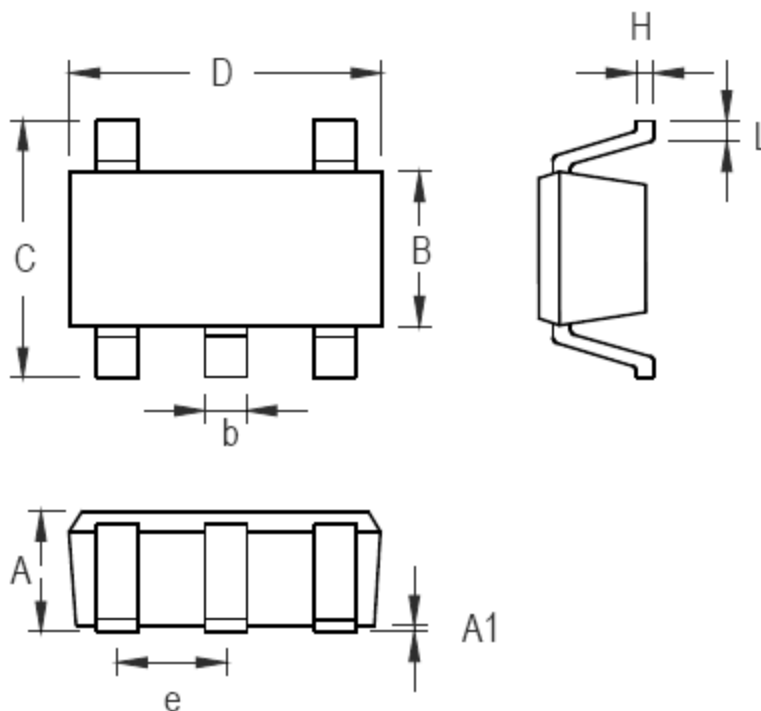


Symbol	Dimensions In Millimeters	
	Min	Max
A	2.82	3.02
e	0.95(BSC)	
b	0.28	0.45
B	1.50	1.70
B1	2.75	3.05
C	1.05	1.15
C1	0.03	0.15
C2	0.12	0.23
L	0.35	0.55
θ	0°	8°

### SOT23-3 Surface Mount Package

### Package Outline Dimensions

SOT23-5

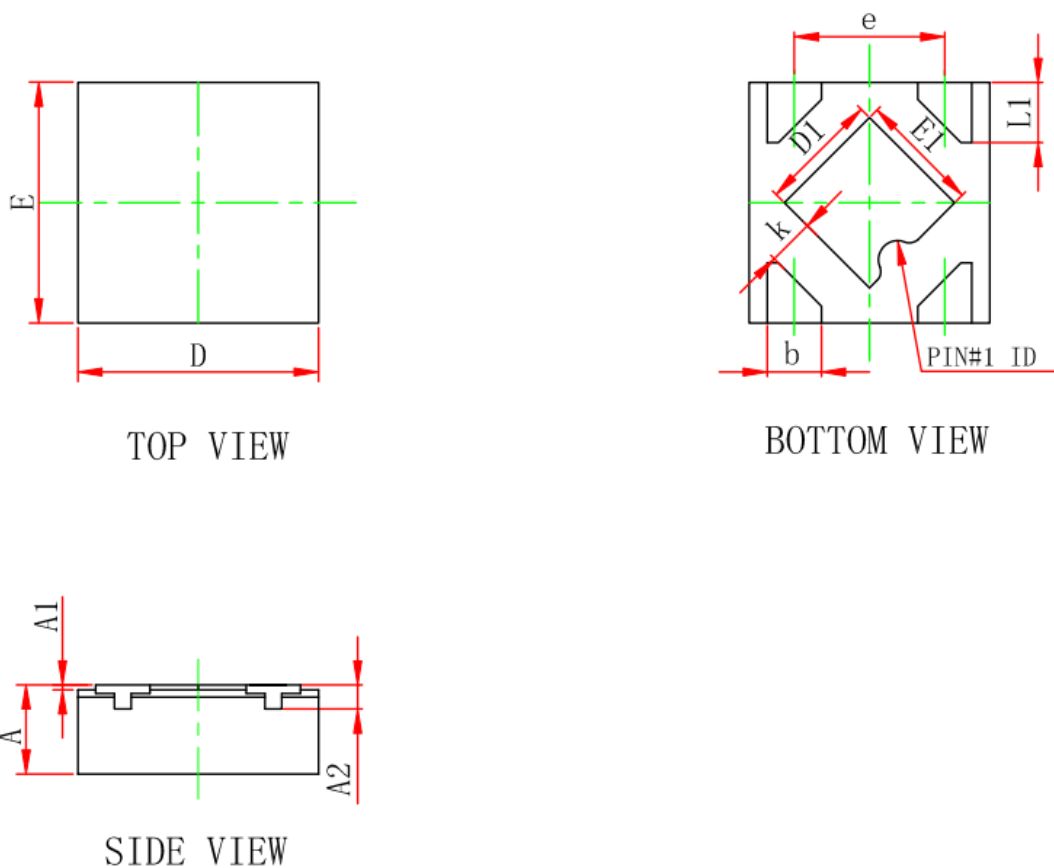


Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.15
A1	0.03	0.15
B	1.5	1.7
b	0.28	0.45
C	2.75	3.05
D	2.82	3.02
e	0.95(BSC)	
H	0.12	0.23
L	0.35	0.55

### SOT23-5 Surface Mount Package

### Package Outline Dimensions

UTDFN1x1-4L

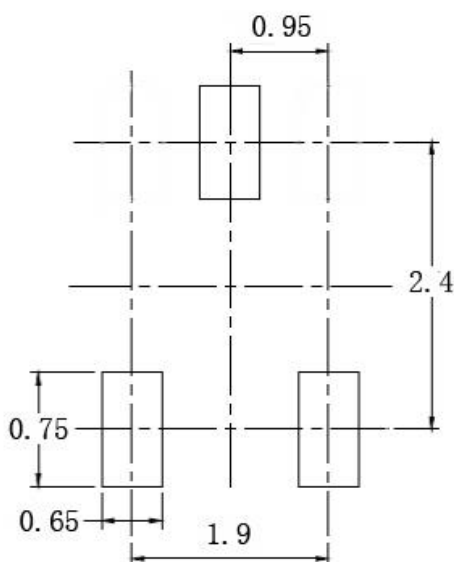


Symbol	Dimensions In Millimeters	
	Min	Max
A	0.335	0.405
A1	0.000	0.050
A2	0.100 REF	
D	0.950	1.050
D1	0.450	0.550
E	0.950	1.050
E1	0.450	0.550
K	0.195 REF	
b	0.175	0.275
e	0.575	0.675
L	0.200	0.300

UTDFN1x1-4L Surface Mount Package

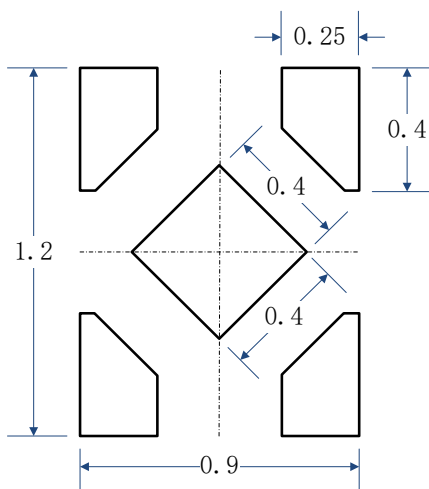
## LAND PATTERN DATA

SOT23-3

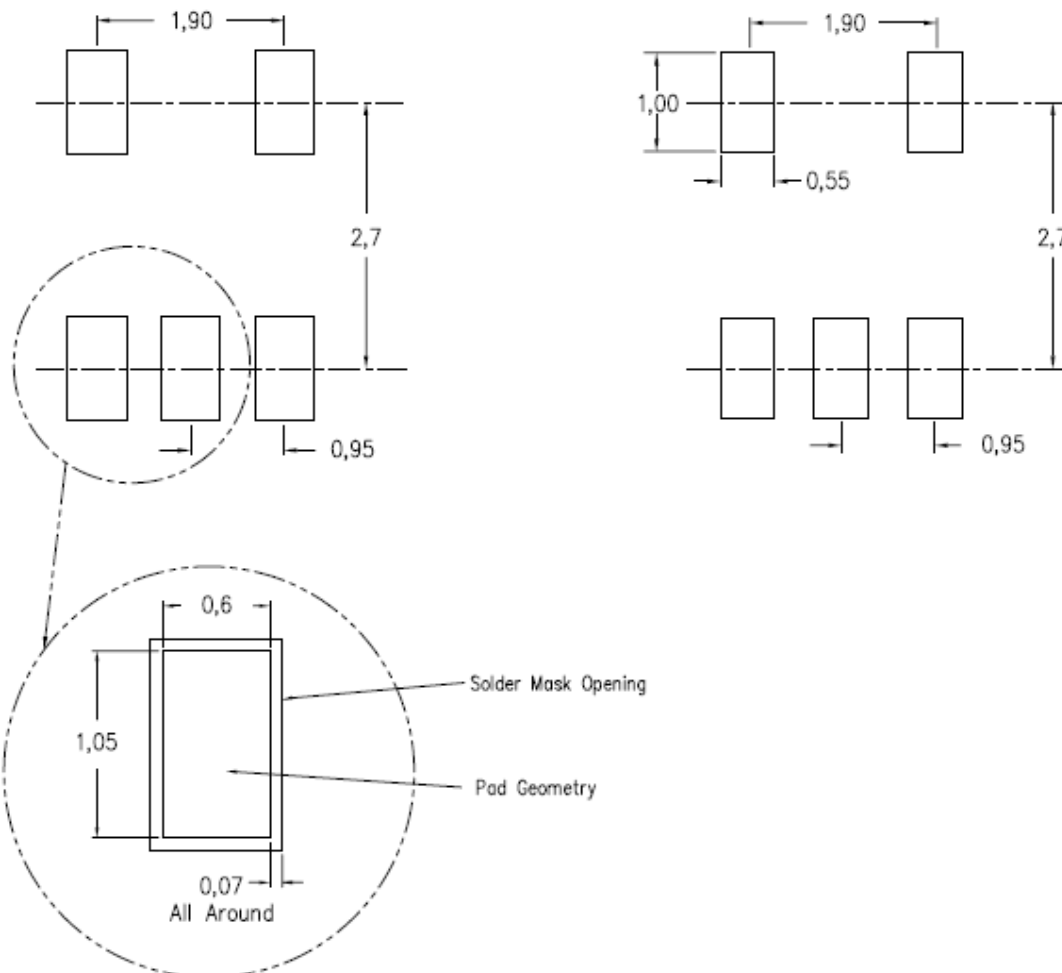


RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)

UTDFN1x1-4L



RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)



### RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)