

DESCRIPTION

LC1465 series are a group of positive voltage output, low power consumption, low dropout voltage regulators. It can provide foldback short-circuit protection and output current limit function.

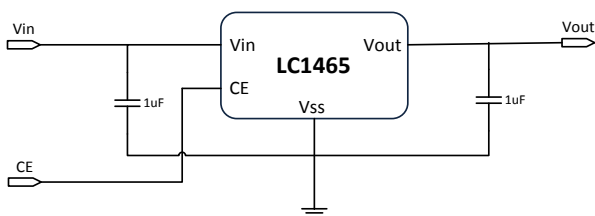
LC1465 can provide output value in the range of 1.0V~4.5V every 0.1V step. It also can be customized on command. LC1465 can also work under a wide input voltage ranging from 2V to 7V.

LC1465 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

LC1465 has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

LC1465 is available in TSOT-23, SOT-23-3, SOT-23-5 and SOT89-3 packages which are lead free.

TYPICAL APPLICATION



NOTE: Input capacitor ($C_{in}=1\mu F$) and Output capacitor ($C_{out}=1\mu F$) are recommended in all application circuit.

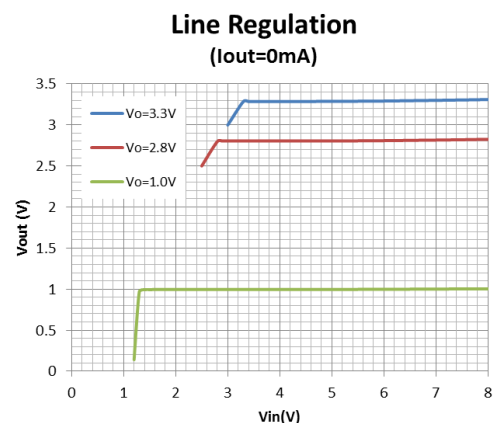
FEATURES

- Input voltage range: 2 – 7V
- Output voltage range: 1.0V~4.5V (customized on command every 0.1V step)
- Low power consumption: 35 μ A (Typ.)
- Low output noise (47 μ V_{RMS})
- Shutdown mode: 0.1 μ A
- Low dropout voltage:
 - 300mV@300mA ($V_{out}=3.3V$)
 - 500mV@500mA ($V_{out}=3.3V$)
- High ripple rejection:70dB@1KHz (Typ.)
- Low temperature coefficient: ± 100 ppm/ $^{\circ}C$
- Excellent line regulation: 0.05%/V
- Build-in chip enable circuit
- Highly accurate: $\pm 2\%$
- Output current limit
 - 800mA@ $V_{out}=3.3V$
- Fold-back short circuit current
 - 250mA@ $V_{out}=3.3V$

APPLICATIONS

- Power source for cellular phones and various kind of PCSs
- Battery Powered equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Voltage Reference
- Regulation after Switching Power

ELECTRICAL CHARACTERISTICS



ORDERING INFORMATION

LC1465 [1](#) [2](#) [3](#) [4](#)

| Code | Description |
|-------------------|---|
| 1 | Temperature&Rohs: C: -40~85°C ,Pb Free Rohs Std. |
| 2 | Package type: B3A: TSOT-23 B3: SOT-23-3 B5A: SOT-23-5(A) C3B: SOT-89-3(B) |
| 3 | Packing type: TR: Tape&Reel (Standard) |
| 4 | Output voltage: e.g. 15=1.5V 18=1.8V 44=4.4V |

MARKING DESCRIPTON

F/AD: Product Code

X: Output Voltage Code (for SOT23-3, SOT23-5)

| Vout | Code | Vout | Code | Vout | Code |
|------|-----------|------|-----------|------|-----------|
| 1.0V | 0 | 2.3V | $\bar{3}$ | 3.6V | $\bar{6}$ |
| 1.1V | 1 | 2.4V | $\bar{4}$ | 3.7V | $\bar{7}$ |
| 1.2V | 2 | 2.5V | $\bar{5}$ | 3.8V | $\bar{8}$ |
| 1.3V | 3 | 2.6V | $\bar{6}$ | 3.9V | $\bar{9}$ |
| 1.4V | 4 | 2.7V | $\bar{7}$ | 4.0V | $\bar{0}$ |
| 1.5V | 5 | 2.8V | $\bar{8}$ | 4.1V | $\bar{1}$ |
| 1.6V | 6 | 2.9V | $\bar{9}$ | 4.2V | $\bar{2}$ |
| 1.7V | 7 | 3.0V | $\bar{0}$ | 4.3V | $\bar{3}$ |
| 1.8V | 8 | 3.1V | $\bar{1}$ | 4.4V | $\bar{4}$ |
| 1.9V | 9 | 3.2V | $\bar{2}$ | 4.5V | $\bar{5}$ |
| 2.0V | $\bar{0}$ | 3.3V | $\bar{3}$ | | |
| 2.1V | $\bar{1}$ | 3.4V | $\bar{4}$ | | |
| 2.2V | $\bar{2}$ | 3.5V | $\bar{5}$ | | |

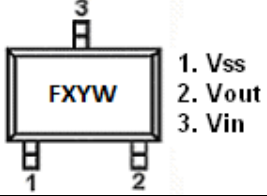
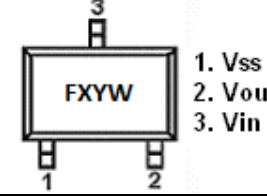
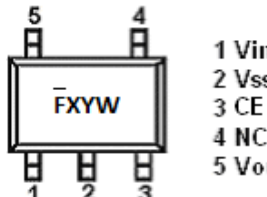
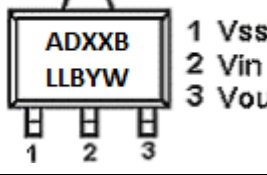
XX: Output Voltage (for SOT89-3).

"18" stands for 1.8V, "28" stands for 2.8V, and "28" stands for 2.85V.

Y: The Year of manufacturing, "1" stands for year 2011, "2" stands for year 2012, and "8" stands for year 2018.

W: The week of manufacturing. "A" stands for week 1, "Z" stands for week 26, "A" stands for week 27, "Z" stands for week 52.

PIN CONFIGURATION

| | |
|------------------------|---|
| Product Classification | LC1465CB3ATR□□ |
| F: Product Code | TSOT-23 |
| X: Output Voltage |  |
| YW: Date Code | |
| Product Classification | LC1465CB3TR□□ |
| F: Product Code | SOT-23-3 |
| X: Output Voltage |  |
| YW: Date Code | |
| Product Classification | LC1465CB5ATR□□ |
| F: Product Code | SOT-23-5 (A) |
| X: Output Voltage |  |
| YW: Date Code | |
| Product Classification | LC1465CC3BTR□□ |
| AD: Product Code | SOT-89-3 |
| XX: Output Voltage |  |
| B: Package | |
| LL: Lot No. | |
| B: Fab Code | |
| YW: Date Code | |
| Vss | Ground Pin |
| Vin | Supply Voltage Input |
| Vout | Output Voltage |
| CE | Chip Enable |
| NC | No Connection |

ABSOLUTE MAXIMUM RATING

| Parameter | | Value |
|------------------------------------|----------|--------------|
| Max Input Voltage | | 8V |
| Operating Junction Temperature(Tj) | | 125°C |
| Output Current | | 500mA |
| Ambient Temperature(Ta) | | -40°C –85°C |
| Power Dissipation | TSOT-23 | 250mW |
| | SOT-23-3 | 250mW |
| | SOT-23-5 | 250mW |
| | SOT-89-3 | 500mW |
| Storage Temperature(Ts) | | -40°C -150°C |
| Lead Temperature & Time | | 260°C,10S |

Note:

Exceed these limits to damage to the device.

Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

| Item | Min | Recommended | Max. | Unit |
|----------------------|-----|-------------|------|------|
| Input Voltage Range | 2 | | 7 | V |
| Ambient Temperature* | -40 | | 85 | °C |

*The operation ambient temperature range is verified on several test samples. Not a test condition for volume production whose test is only performed under 25°C.

ELECTRICAL CHARACTERISTICS

(Test Conditions: Cin=1uF,Cout=1uF,TA=25°C, unless otherwise specified.)

LC1465, For Arbitrary Output Voltage

| Symbol | Parameter | | Conditions | Min | Typ | Max | Units |
|--|---------------------------|-----------|-----------------------------------|---------------|------|---------------|-------|
| Vin | Input Voltage | | | 2 | | 7 | V |
| Vout | Output Voltage | Vout>1.5V | Vin=Set Vout+1V 1mA≤Iout≤30mA | Vout x0.98 | Vout | Vout X1.02 | V |
| | | Vout≤1.5V | | Vout -0.03 | | Vout +0.03 | |
| Iout (Max.) | Maximun Output Current | | Vin-Vout=1V | 500 | | | mA |
| Vdrop ¹ | Dropout Voltage,Vout≥2.8V | | Iout=100mA | | 100 | 150 | mV |
| | | | Iout=300mA | | 300 | 400 | mV |
| | | | Iout=500mA | | 500 | 800 | mV |
| $\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$ | Line Regulation | | Iout=40mA 2.8V≤Vin≤6V | | 0.05 | 0.2 | %/V |
| $\Delta V_{out} / \Delta I_{out}$ | Load Regulation | | Vin=Set Vout+1V 1mA≤Iout≤500mA | | 70 | 100 | mV |
| Iss | Supply Current | | Vin=Set Vout+1V | | 35 | 80 | uA |
| Istandby | Supply Current (Srandby) | | Vin=Set Vout+1V Vce=Vss | | 0.1 | 1.0 | uA |

LC1465

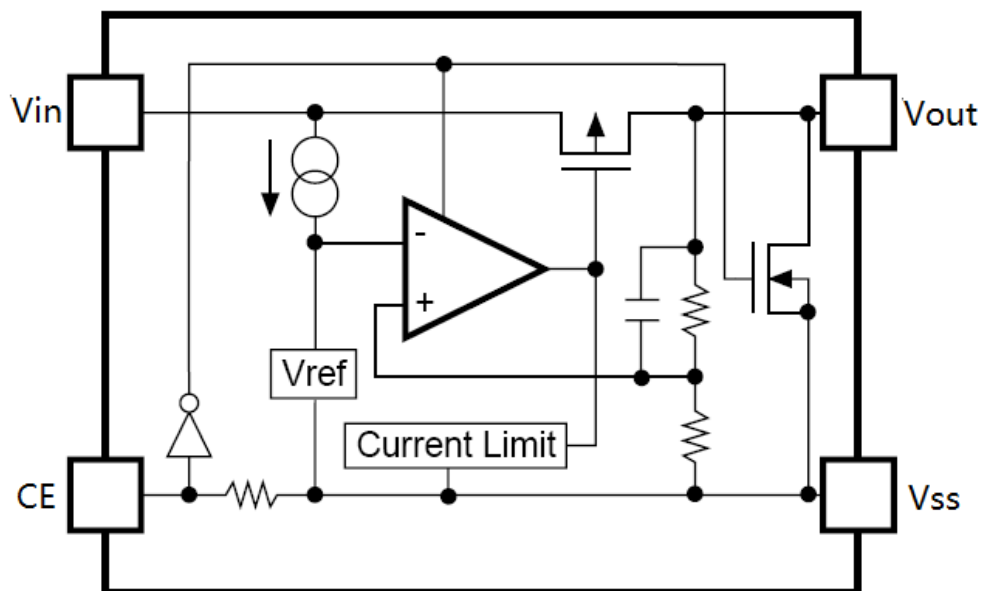
| $\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$ | Output Voltage Temperature Coefficient | $I_{out}=30mA$ | | ± 100 | | ppm/°C |
|---|--|---|-----|-----------|------|--------|
| PSRR | Ripple Rejection | F=1KHz, Ripple=0.5Vp-p Vin=Set Vout+1V | | 70 | | dB |
| Ilim | Current Limit | | | 800 | | mA |
| Rcepd | CE pin pull down resistor | CE=Vin=5V | | 5 | | Mohm |
| Vceh | CE Input Voltage "H" | | 1.5 | | Vin | V |
| Vcel | CE Input Voltage "L" | | 0 | | 0.25 | V |
| en | Output Noise | BW=10Hz~100kHz | | 47 | | uVrms |

NOTE:

$V_{drop} = V_{in1} - (V_{out2} * 0.98)$ V_{out2} is the output voltage when $V_{in} = V_{out1} + 1.0V$ and $I_{out} = 500mA$.

V_{in1} is the input voltage at which the output voltage becomes 98% of V_{out1} after gradually decreasing the input voltage.

BLOCK DIAGRAM



EXPLANATION

LC1465 series is a group of positive voltage output, low noise, low power consumption, low dropout voltage regulator.

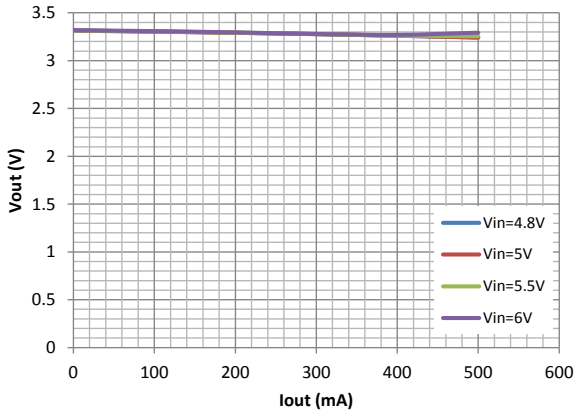
LC1465 can provide output value in the range of 1.0V~4.5V every 0.1V step. It also can be customized on command.

LC1465 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

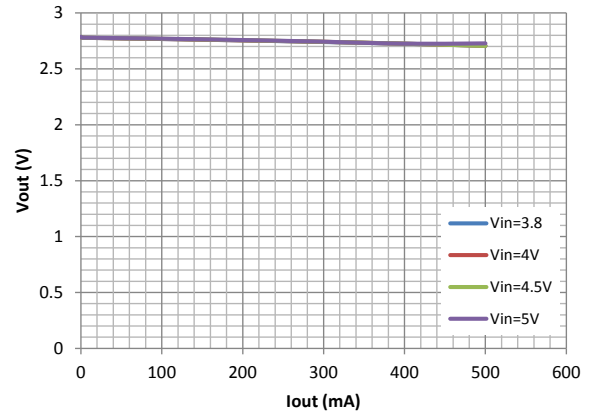
LC1465 has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

TYPICAL PERFORMANCE CHARACTERISTICS ($T=25^{\circ}\text{C}$)

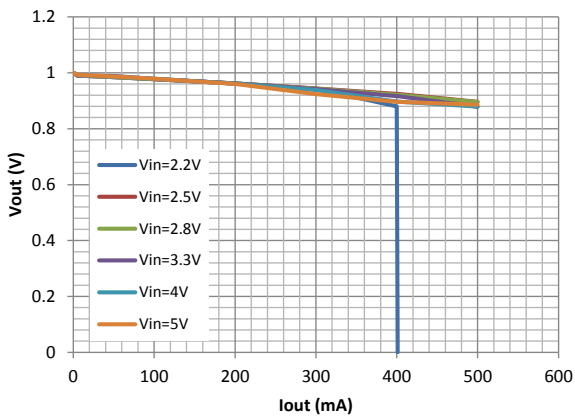
Load Regulation
($V_{out}=3.3\text{V}$)



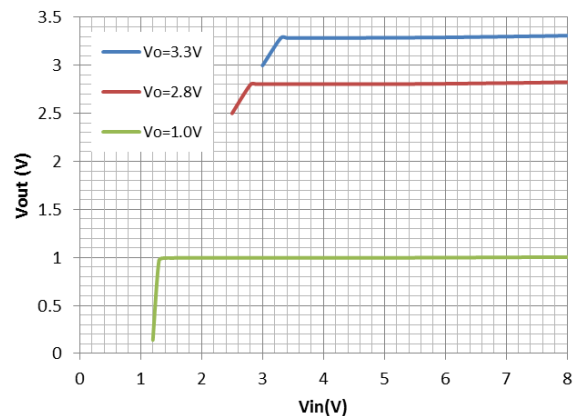
Load Regulation
($V_{out}=2.8\text{V}$)



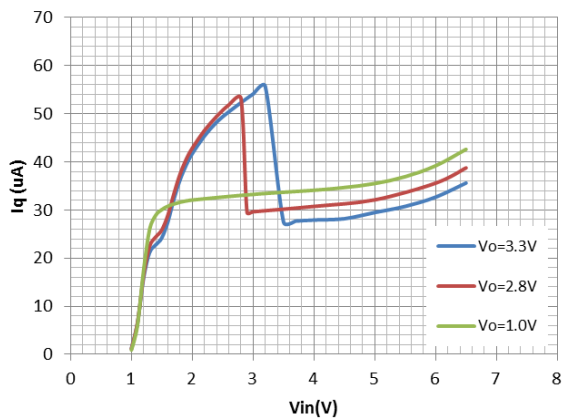
Load Regulation
($V_{out}=1.0\text{V}$)



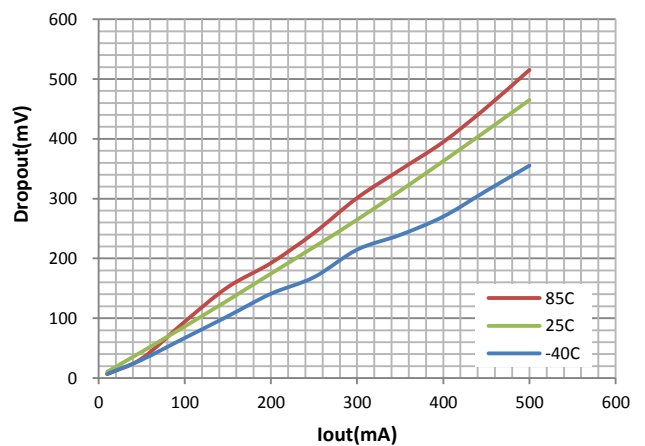
Line Regulation
($I_{out}=0\text{mA}$)



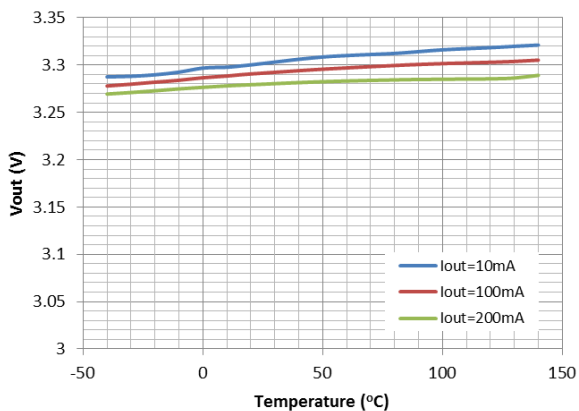
Quiescent Current
($I_{out}=0\text{mA}$ and $CE=\text{high}$)



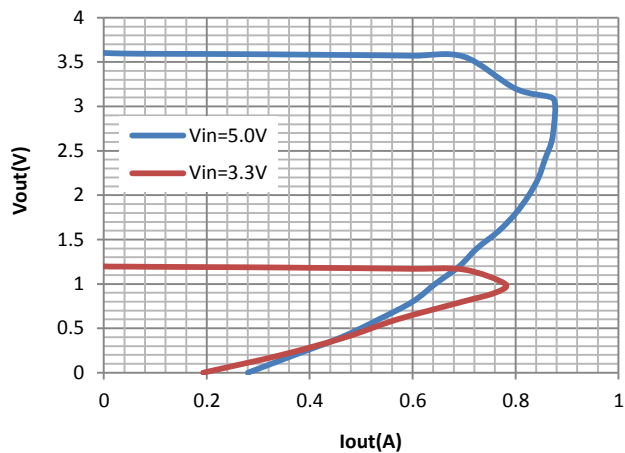
Dropout Voltage
($V_{out}=3.3\text{V}$)



Vout Temperature Coefficient (Vout=3.3V)

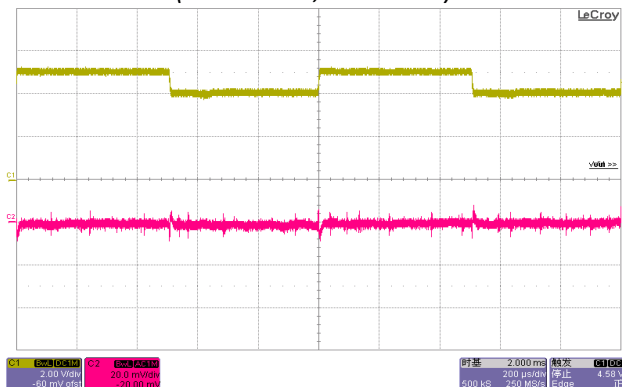


Current Limit



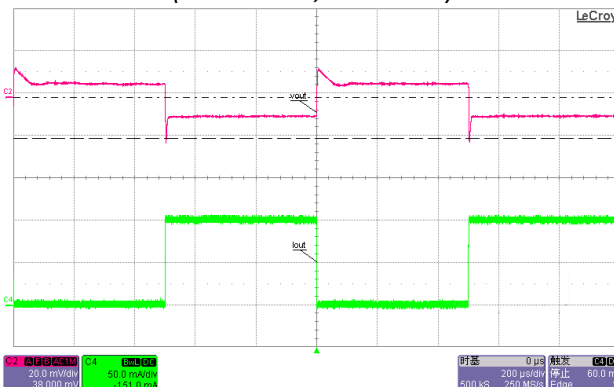
Line Transient Response

Vout=3.3V, Iout=20mA
(brown: Vin; Red: Vout)

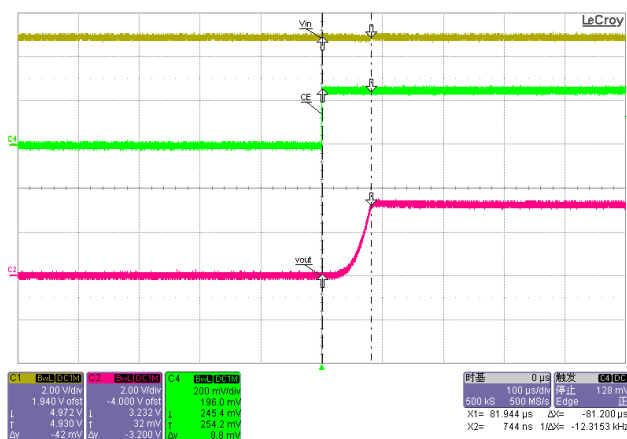


Load Transient Response

Vin=5V, Vout=3.3V, Iout=1-100mA
(Green: Iout; Red: Vout)



CE Chip Enable Response



PACKAGE OUTLINE

| Package | TSOT-23 | Devices per reel | 3000Pcs | Unit | mm |
|---|---------|------------------|---------|------|----|
| Package dimension: | | | | | |
| <p>Technical drawing of the TSOT-23 package. It includes three views: a top view, a side view, and a cross-sectional view. Dimensions are provided in millimeters with tolerances. Key dimensions include: total length 2.400 ± 0.05, distance from top edge to lead start 0.550 ± 0.05, lead length 0.400 ± 0.03, lead thickness 0.080 ± 0.02, lead width $0.100^{+0.05}_{-0.01}$, and lead angle 0.2 MIN. Lead radii are specified as $4 \times R0.1 \text{ MAX}$. Other dimensions include 1.300 ± 0.05, 1.900 ± 0.05, 2.900 ± 0.05, and $1.000^{0}_{-0.05}$.</p> | | | | | |

| Package | SOT-23-3 | Devices per reel | 3000Pcs | Unit | mm |
|--|----------|------------------|---------|------|----|
| Package Dimension: | | | | | |
| <p>Technical drawing of the SOT-23-3 package. It includes three views: a top view, a side view, and a cross-sectional view. Dimensions are provided in millimeters with tolerances. Key dimensions include: total length 2.9 ± 0.2, lead length 0.4 ± 0.1, lead thickness 0.2 MIN, lead width $0.16^{+0.1}_{-0.06}$, and lead angle 0.2 MIN. Lead radii are specified as 1.4 MAX. Other dimensions include $1.1^{+0.2}_{-0.1}$, 0.8, $0 \text{ to } 0.1$, 1.6 ± 0.2, 2.8 ± 0.3, and 1.9 ± 0.2.</p> | | | | | |

| Package | SOT-23-5 | Devices per reel | 3000Pcs | Unit | mm |
|---|----------|------------------|---------|------|----|
| <p>Package Dimension:</p> <p>Top view dimensions: Total width 2.9 ± 0.2, lead spacing 1.9 ± 0.2 (split into two 0.95 segments), lead width 0.4 ± 0.1, body width 1.6 (tolerance $+0.2, -0.1$), total height 2.8 ± 0.3, lead height 1.1 (tolerance $+0.2, -0.1$), lead thickness 0.8 ± 0.1, lead tip width 0.15 (tolerance $+0.1, -0.05$), lead tip thickness 0.2 MIN.</p> <p>Side view dimensions: Lead height 1.1 (tolerance $+0.2, -0.1$), lead thickness 0.8 ± 0.1, lead tip width 0.15 (tolerance $+0.1, -0.05$), lead tip thickness 0.2 MIN.</p> <p>Perspective view shows 5 leads labeled 1 through 5.</p> | | | | | |

| Package | SOT-89-3 | Devices per reel | 1000Pcs | Unit | mm |
|---|----------|------------------|---------|------|----|
| <p>Package dimension:</p> <p>Top view dimensions: Total width 4.5 ± 0.1, lead spacing 1.6 ± 0.2, lead width 0.4, body width 2.5 ± 0.1, total height 4.25 MAX., lead height 0.8 MIN., hole diameter $\varnothing 1.0$.</p> <p>Side view dimensions: Lead height 1.5 ± 0.1, lead thickness 0.4 ± 0.1, lead tip width 0.4 ± 0.1.</p> <p>Perspective view dimensions: Lead spacing 1.5 ± 0.1, lead width 0.47 ± 0.1, lead height 0.42 ± 0.2.</p> | | | | | |

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