Three Channel, Ultra Low-Dropout, Constant-Current White LED Bias

Features
- **Ultra Low 150mV Dropout at 20mA**
- **0.6% High Accuracy Current Matching**
- **20mA Full Scale Current**
- **32 Level Linear Current Brightness Control**
- **PWM Brightness Control**
- **2.5V to 5.5V Supply Voltage Range**
- **SOT-23-6 and TSOT-23-6 Package**

Applications
- **Mobile Phones**
- **White LED backlighting**

General Description
The G5920 is a high performance ultra low- dropout constant current bias supply for white LEDs. It can be used as an alternative to the simple ballast resistors in conventional parallel white LEDs applications. Each white LED bias current is matching to 0.6%.

For dimming control, an enable input pin is controlled by processor GPIO output pulses for 32 level linear current. Using a low frequency PWM waveform to this enable input pin also controls the average LED current which is proportional to the PWM duty.

The G5920 is suitable for single cell Li-ion battery power device that using low forward voltage white LEDs. The white LEDs can be powered directly from battery without extra external components. This takes an advantage of highest efficiency and creates no EMI problem.

Ordering Information

ORDER NUMBER	ORDER NUMBER (Pb free)	MARKING	TEMP. RANGE	PACKAGE
G5920TB1U	G5920TB1Uf	5920x	-40°C to 85°C	SOT-23-6
---	G5920TP1U	5920x	-40°C to 85°C	TSOT-23-6

Note:TB : SOT23-6   TP : TSOT23-6
   1: Bonding Code (only SOT-23-6 and TSOT-23-6)
   U: Tape & Reel

Pin Configuration

G5920

LED2 `1`	`6` LED1
GND `2`	`5` VCC
LED3 `3`	`4` EN

SOT-23-6/TSOT-23-6
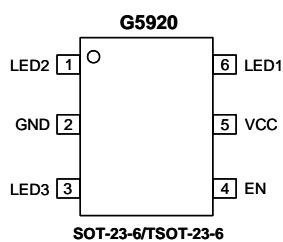
Typical Application Circuit

Linear Current Dimming

G5920
EN, LED1, LED2, LED3, GND, VCC, 0.1µF, V$_{BAT}$

PWM Dimming

G5920
EN, LED1, LED2, LED3, GND, VCC, 0.1µF, V$_{BAT}$
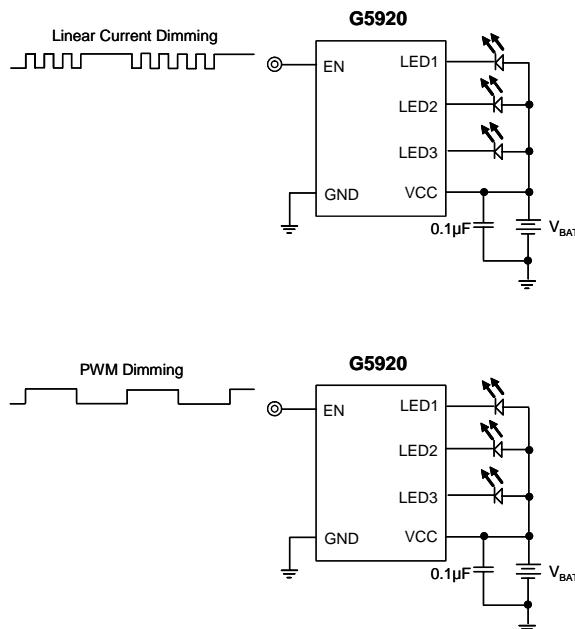
Absolute Maximum Ratings

VCC to GND. . . . . -0.3V to +7.0V
EN, LED1, LED2, LED3 to GND .. . -0.3V to VCC+0.3V
Operating Temperature Range. . . . .-40°C to 85°C

Junction Temperature. .125°C
Storage Temperature. . . . . -65°C to 150°C
Reflow Temperature (soldering, 10sec) . . . . 260°C

Stress beyond those listed under "Absolute Maximum Rating" may cause permanent damage to the device.

Electrical Characteristics

$V_{CC} = V_{EN} = 3.6V$, $T_A = 25°C$

| PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{CC}	2.5	---	5.5	V
Quiescent Current	I_Q	---	180	230	µA
Shutdown Current	$I_{Q(OFF)}$, $V_{EN} = 0V$	-1	---	+1	µA
Input Voltage UVLO Threshold	V_{UVLO}	---	2	---	V
Output Current	Max I_{LED}	18	20	22	mA
Output Current Line Regulation	$V_{LED} = 0.5V~2V$	-0.5	---	+0.5	%/V
Current Matching	$V_{LED} = 0.5V$	-4	±0.6	+4	%
LED Pin Voltage Dropout	$V_{LED(DROP)}$, 90% Max I_{LED}	---	---	0.15	V
EN Pin Input Voltage High	V_{IH}	2	---	---	V
EN Pin Input Voltage Low	V_{IL}	---	---	0.8	V
EN Pin Input Current	I_{EN}	-1	---	+1	µA
EN Pin Off Timeout	T_{OFF}	40	80	200	µS
EN Pin End of Pulse Timeout	T_{EOP}	40	80	200	µS
EN Pin Pulse High Time	T_{HIGH}	5	---	30	µS
EN Pin Pulse Low Time	T_{LOW}	5	---	30	µS

Typical Performance Characteristics

V_{CC} =V_{EN} =3.6V, V_{LED}=0.5V, T=25°C, unless otherwise noted.

PWM Diming Waveform
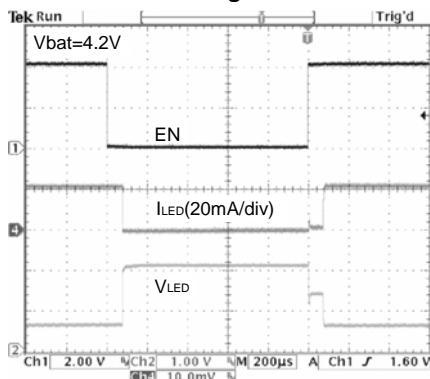

**Linear Dimming Waveform I**
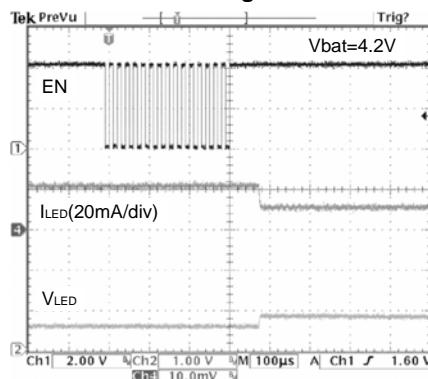
**Linear Dimming Waveform II**
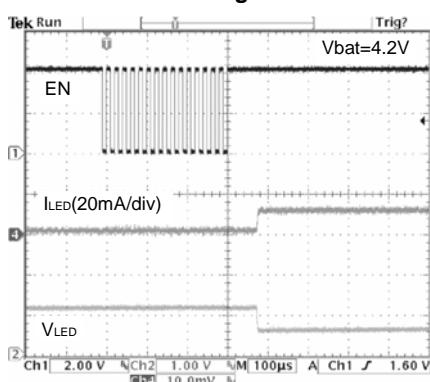
Input Voltage UVLO
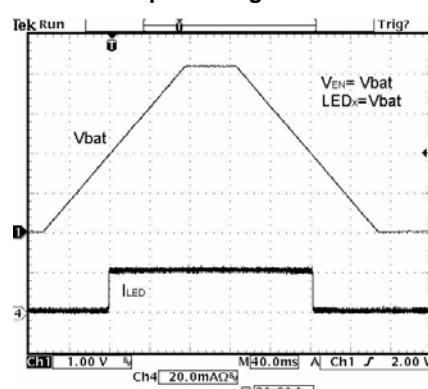
Quiescent Current vs. Temperature
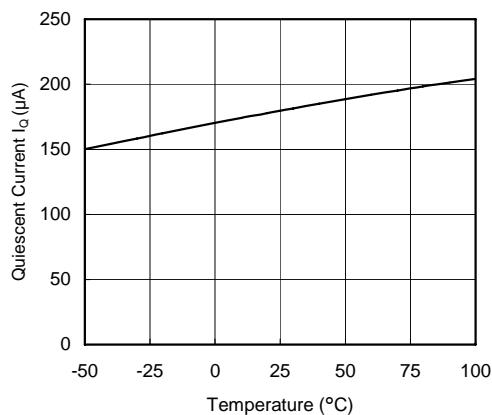
Quiescent Current vs. V_{CC}
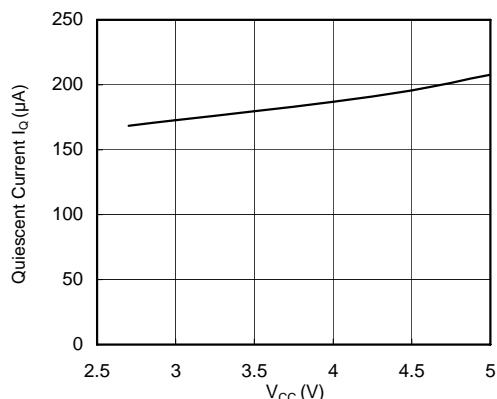
Typical Performance Characteristics (continued)

I_LED vs. Temperature

I_LED vs. V_CC

I_LED vs. Code

I_LED vs.

Current Match vs. Temperature

Current Match vs. V_cc
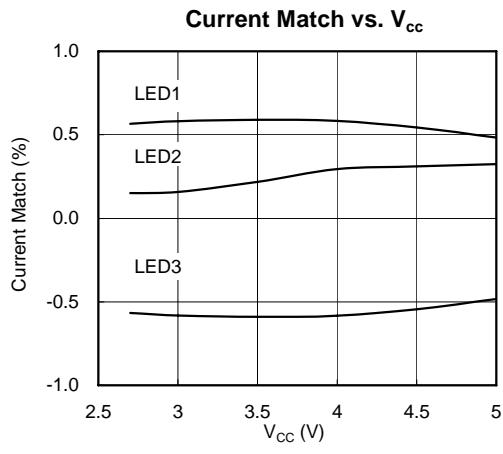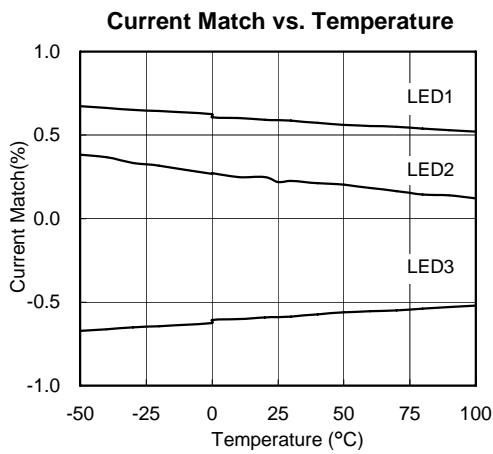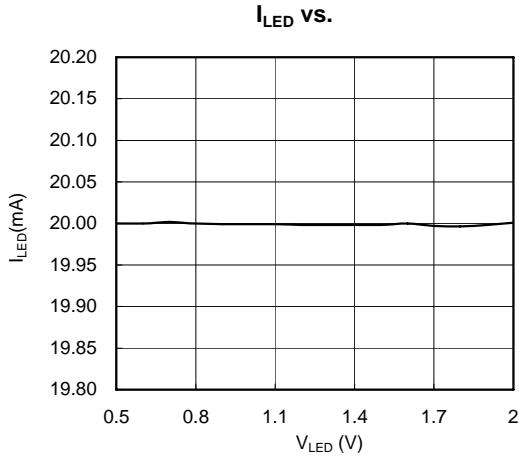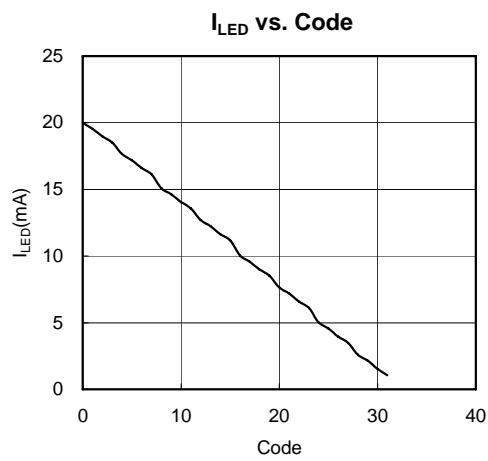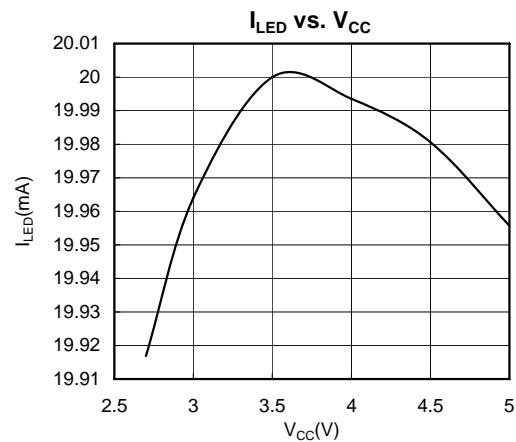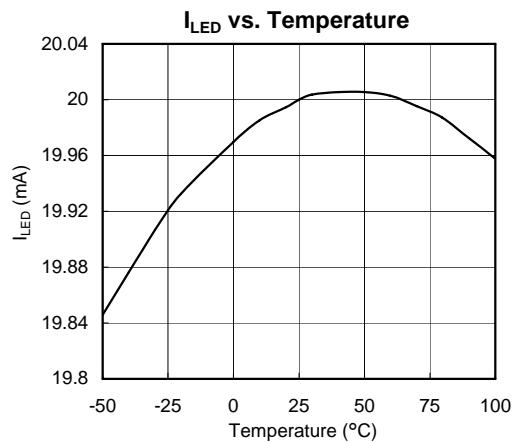
Typical Performance Characteristics (continued)

Current Match vs. Code
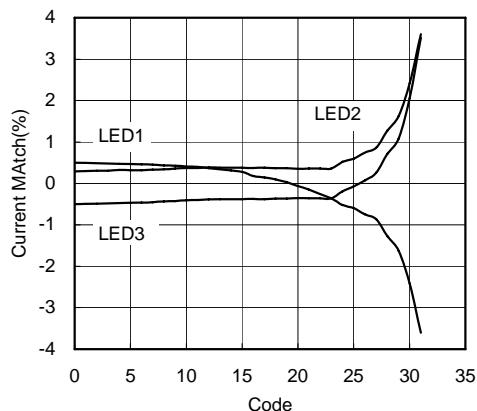
Current Match vs. V_LED
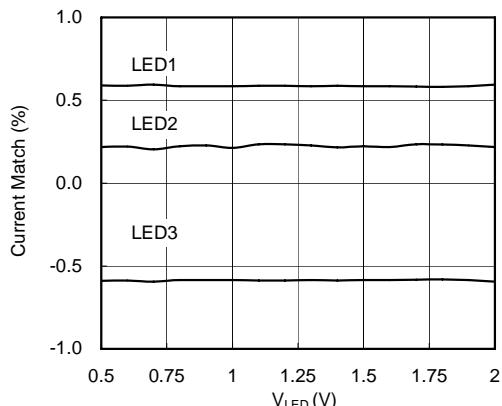
I_LED vs. Vbat
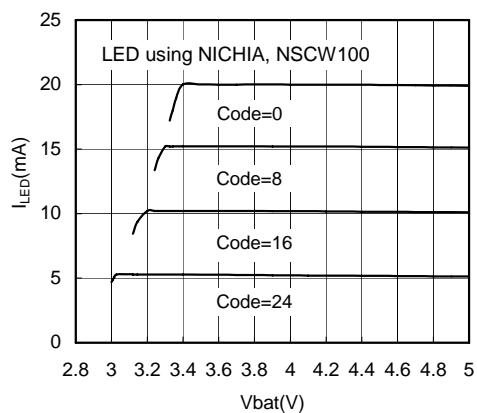
Recommended Minimum Footprint

SOT-23-6/TSOT-23-6

4.2mm

1.2mm

3mm

0.5mm
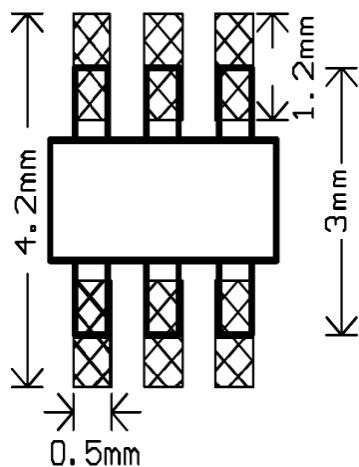
Pin Descriptions

PIN SOT-23-6/TSOT-23-6	NAME	FUNCTION
1	LED2	LED2 bias current input.
2	GND	Ground.
3	LED3	LED3 bias current input.
4	EN	Enable Dimming control.
5	VCC	Power supply.
6	LED1	LED1 bias current input.

Block Diagram
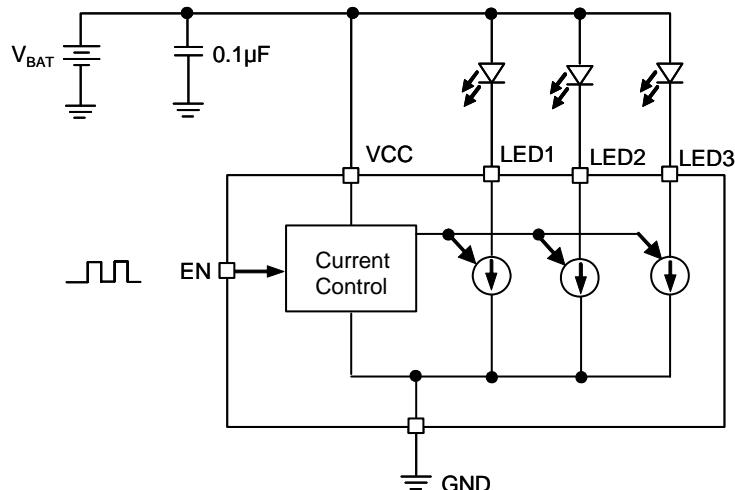
Function Description

G5920 LED pins act as well matched current source driving LED diode to ground. An EN pin is used to turn on and turn off G5920.

When applying a lower frequency (less than 2kHz) PWM waveform to EN pin, the average LED current will be duty*20mA(typical). Refer to Fig.1
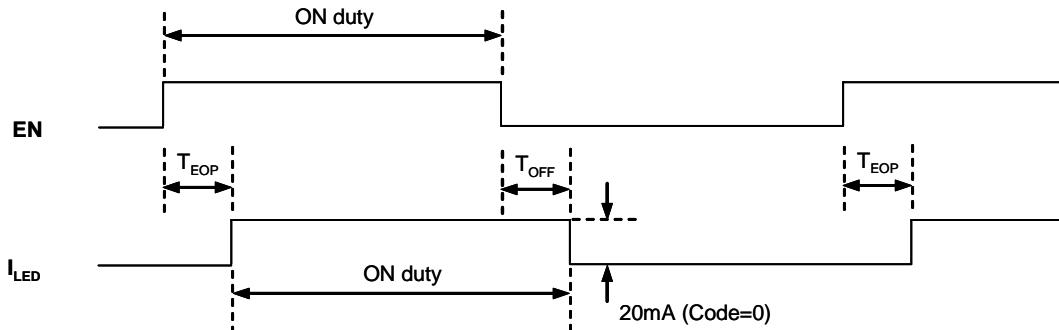
Fig.1 Turn ON to PWM dimming

If the application is not suitable to apply such a low frequency PWM dimming waveform, this EN pin can be negatively pulsed to set continuous LED current. When no negative pulse is input to EN pin (Code=0), the internal register will latched to set the maximum LED current, typically 20mA. Whenever input N negative pulses to the EN pin, it will get a LED current corresponding to Code N. In this manner, LED current will changed from previous value to new value after the last pulse for typical 80µs (T_{EOP}). Please refer to Fig.2
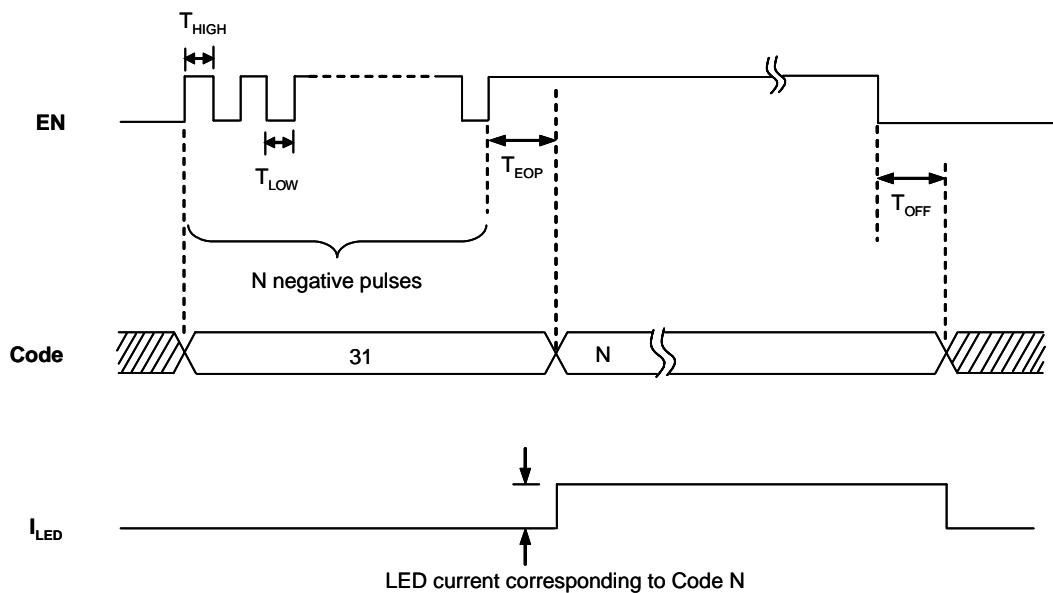
Fig.2 Turn ON and config Code N

Package Information
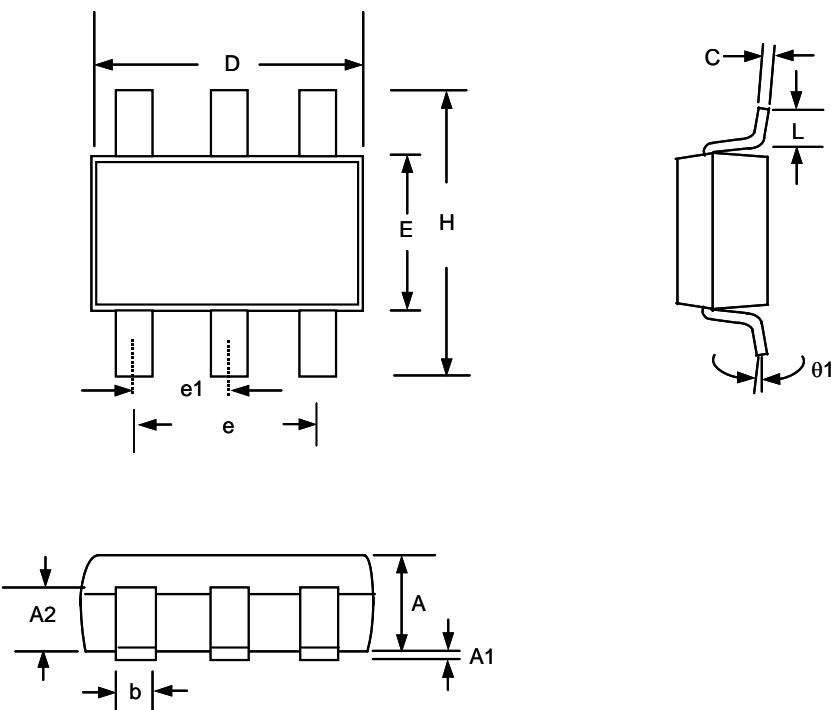
SOT-23-6 (TB) Package

Note:

1. Package body sizes exclude mold flash protrusions or gate burrs
2. Tolerance ±0.1000 mm (4mil) unless otherwise specified
3. Coplanarity: 0.1000mm
4. Dimension L is measured in gage plane

SYMBOL	DIMENSION IN MM			DIMENSION 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	0.028	0.031	0.035
b	0.35	0.40	0.50	0.014	0.016	0.020
C	0.10	0.15	0.25	0.004	0.006	0.010
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.40	1.60	1.80	0.055	0.063	0.071
e	-----	1.90(TYP)	-----	-----	0.075(TYP)	-----
e1	-----	0.95	-----	-----	0.037	-----
H	2.60	2.80	3.00	0.102	0.110	0.118
L	0.37	------	-----	0.015	-----	-----
$\theta 1$	1°	5°	9°	1°	5°	9°
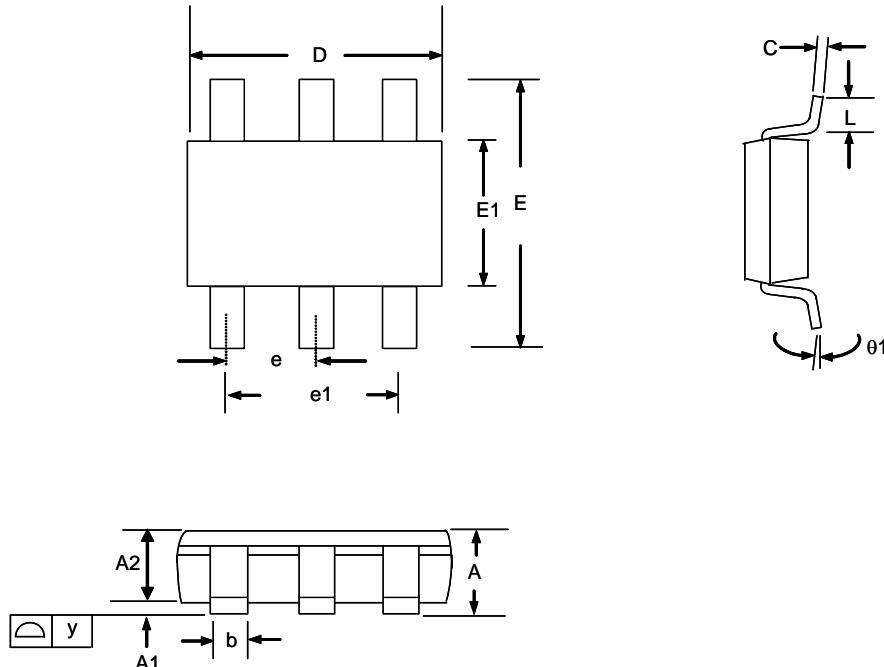
TSOT-23-6 (TP) Package

Note:

1. Dimension D does not include mold flash, protrusions or tate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.1mm PER end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15mm PER side.

2. The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the 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.

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.75	-----	0.90	0.030	-----	0.035
A1	0.00	-----	0.10	0.000	-----	0.004
A2	0.70	0.75	0.80	0.028	0.030	0.031
b	0.35	-----	0.51	0.014	-----	0.020
C	0.10	-----	0.25	0.004	-----	0.010
D	2.80	2.90	3.00	0.110	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
e	0.95 BSC			0.0374 BSC		
e1	1.90 BSC			0.0748 BSC		
L	0.37	-----	-----	0.015	-----	-----
y	-----	-----	0.10		-----	0.004
$\theta 1$	0°	-----	8°	0°	-----	8°

Taping Specification

Feed Direction
SOT/TSOT Package Orientation
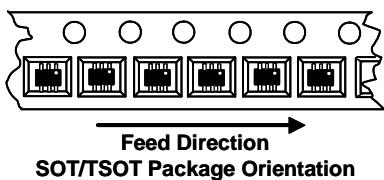
PACKAGE	Q′TY/REEL
SOT-23-6	3,000 ea
TSOT-23-6	3,000 ea

射 频 和 天 线 设 计 培 训 课 程 推 荐

易迪拓培训(www.edatop.com)由数名来自于研发第一线的资深工程师发起成立，致力并专注于微波、射频、天线设计研发人才的培养；我们于 2006 年整合合并微波 EDA 网(www.mweda.com)，现已发展成为国内最大的微波射频和天线设计人才培养基地，成功推出多套微波射频以及天线设计经典培训课程和 ADS、HFSS 等专业软件使用培训课程，广受客户好评；并先后与人民邮电出版社、电子工业出版社合作出版了多本专业图书，帮助数万名工程师提升了专业技术能力。客户遍布中兴通讯、研通高频、埃威航电、国人通信等多家国内知名公司，以及台湾工业技术研究院、永业科技、全一电子等多家台湾地区企业。

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课程网址： http://www.edatop.com/peixun/ads/13.html
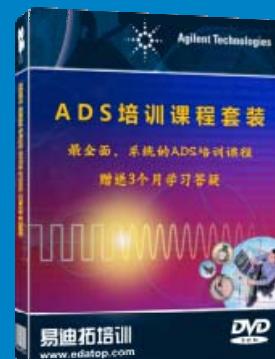
HFSS 学习培训课程套装

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详情浏览：http://www.edatop.com/peixun/antenna/116.html

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