



SP1937

DC-DC Step-Up Converter for White LED

DESCRIPTION

The SP1937 is a step-up DC/DC converter for white LED driver with constant current. The device can driver one to four LEDs in series from a single cell Lithium Ion battery. Internal functions include current limiting; thermal shutdown and soft-start to prevent damage operate status. The SP1937 DC/DC converter operates at 1.2MHz and low output capacitor as small as 0.22uF; apply to Lithium-Ion powered systems. A low 95mV (Typ) reference voltage minimizes power loss in the current setting resistor for better efficiency.

APPLICATIONS

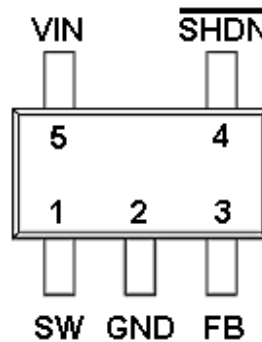
- Battery Power Equipment
- Notebook Computers
- PDA
- Cellular Phone
- Digital Cameras
- MP3 Players
- GPS Receivers

FEATURES

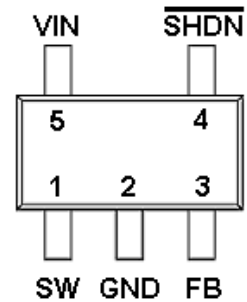
- ◆ Fast 1.2MHz Switching Frequency
- ◆ High Efficiency up to 85%
- ◆ Drives up to Four LEDs From 3.2V Supply
- ◆ Low Quiescent Current
- ◆ Disconnects LEDs in Shutdown Mode
- ◆ Internal Over Temperature and Current Limiting Shutdown Function
- ◆ 36V Rugged Bipolar Switch
- ◆ Small Package SOT-23-5L & SOT-353

PIN CONFIGURATION

SOT-23-5L

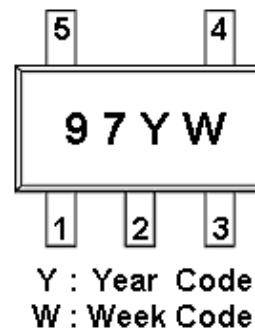


SOT-353 (SC-70-5L)

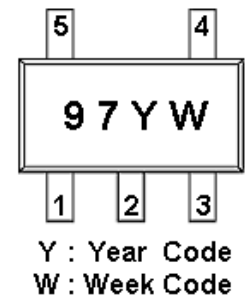


PART MARKING

SOT-23-5L



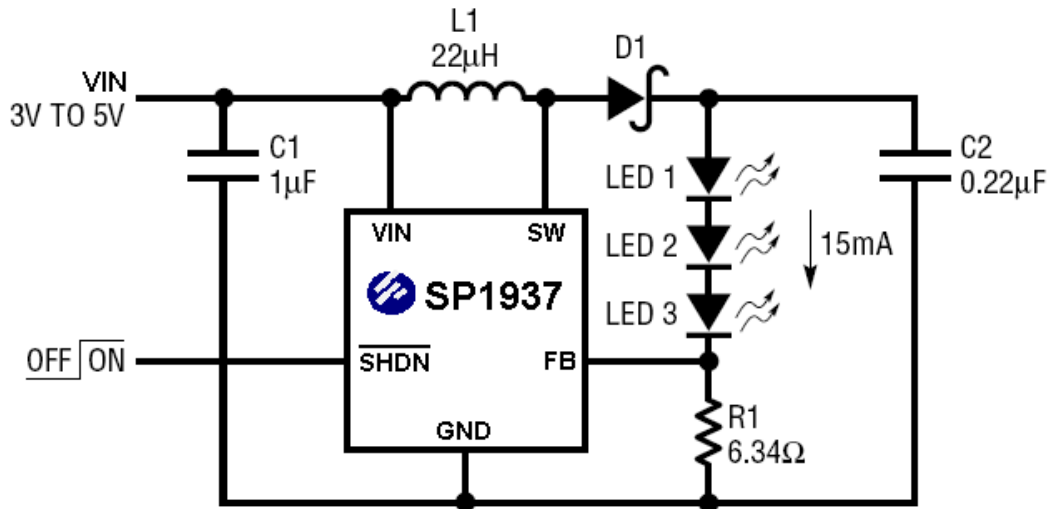
SOT-353 (SC-70-5L)





SP1937 DC-DC Step-Up Converter for White LED

TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION

SP1937S25RG / SP1937S25RGB

Pin	Symbol	Description
1	SW	Switch Pin.
2	GND	Ground Pin
3	FB	Feedback Pin.
4	SHDN	Shutdown Pin. Active-low enable
5	VIN	Supply Voltage Input

SP1937S35RG / SP1937S35RGB

Pin	Symbol	Description
1	SW	Switch Pin.
2	GND	Ground Pin
3	FB	Feedback Pin.
4	SHDN	Shutdown Pin. Active-low enable
5	VIN	Supply Voltage Input

ORDERING INFORMATION

Part Number	Package	Part Marking
SP1937S25RG	SOT-23-5L	97YW
SP1937S25RGB	SOT-23-5L	97YW
SP1937S35RG	SOT-353 (SC-70-5L)	97YW
SP1937S35RGB	SOT-353 (SC-70-5L)	97YW

※ Week Code : A ~ Z (1 ~ 26) ; a ~ z (27 ~ 52)

※ SP1937S25RG : Tape Reel ; Pb – Free

※ SP1937S25RGB : Tape Reel ; Pb – Free ; Halogen - Free

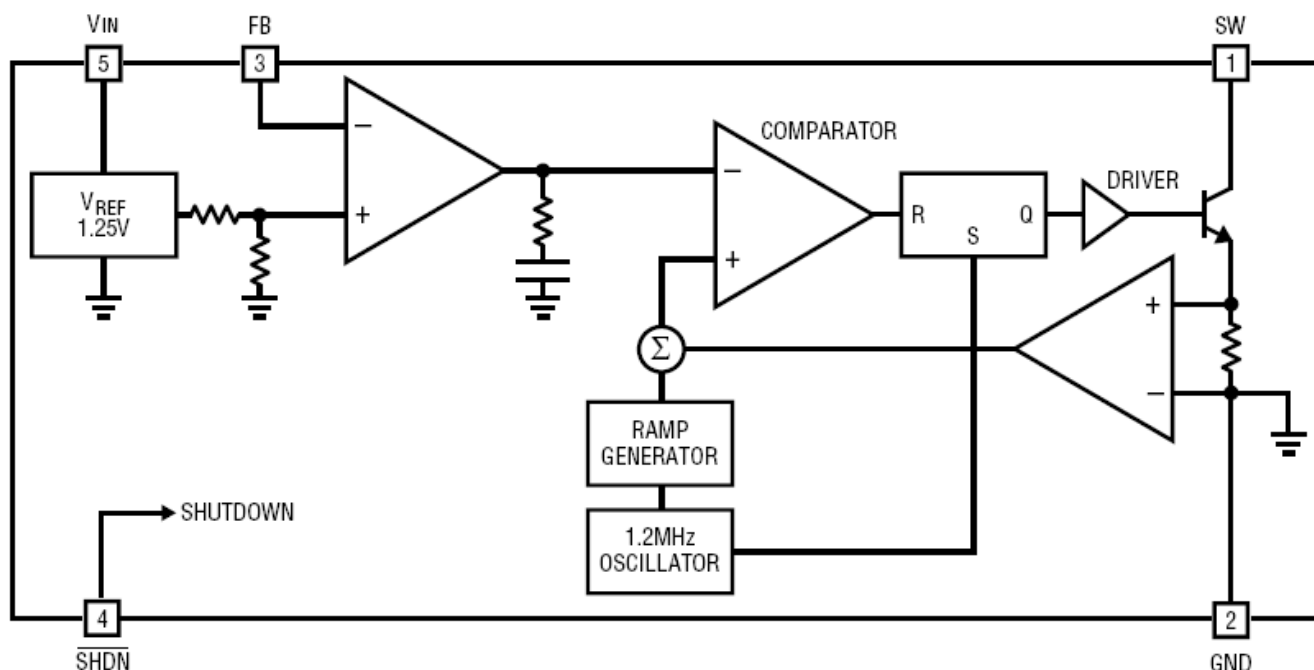
※ SP1937S35RG : Tape Reel ; Pb – Free

※ SP1937S35RGB : Tape Reel ; Pb – Free ; Halogen - Free



SP1937 DC-DC Step-Up Converter for White LED

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

(T_A=25°C Unless otherwise specified)

Parameter	Symbol	Value	Unit
DC Supply Voltage	V _{IN}	10	V
SW Voltage	V _{SW}	36	V
FB Voltage	V _{FB}	10	V
SHDN Voltage	V _{SHDN}	10	V
Operating Temperature	T _{OPR}	-40~85	°C
Maximum Junction Temperature	T _{J(Max)}	125	°C
Storage Temperature	T _S	-65~150	°C

The IC has a protection circuit against static electricity. Do not apply high static electricity or high voltage that exceeds the performance of the protection circuit to the IC.



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DC-DC Step-Up Converter for White LED

ELECTRICAL CHARACTERISTICS

($T_A=25^{\circ}\text{C}$, $V_{IN}=3\text{V}$, $V_{SHDN}=3\text{V}$, Unless otherwise specified)

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Voltage		2.5		9	V
Out Voltage				27	V
Feedback Voltage	$I_{sw}=100\text{mA}$, Duty Cycle = 66%	86		110	mV
FB Pin Bias Current				150	nA
Supply Current			2.8	3.5	mA
	$V_{SHDN} = 0\text{V}$		0.1	1.0	μA
Switching Frequency		0.8	1.2	1.6	MHz
Maximum Duty Cycle			85		%
Switch Current Limit			320		mA
Switch Leakage Current	$V_{sw} = 5\text{V}$		0.01	5	μA
Switch V_{cesat}	$I_{sw} = 200\text{mA}$		150		mV
SHDN Voltage High		1.5			V
SHDN Voltage Low				0.4	V
SHDN Pin Bias Current			90		μA

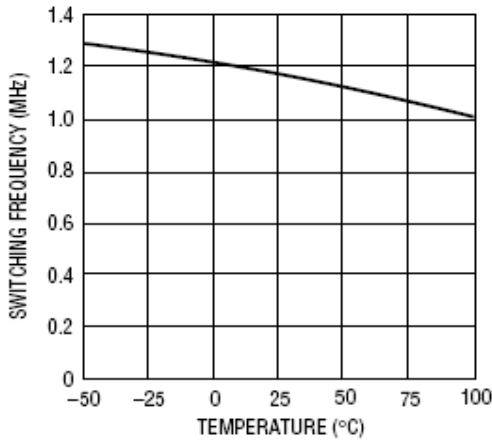


SP1937

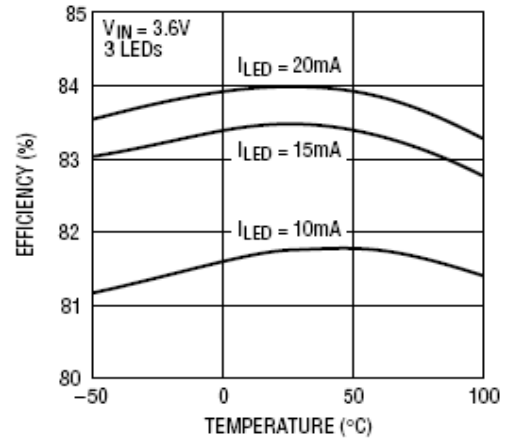
DC-DC Step-Up Converter for White LED

TYPICAL PERFORMANCE CHARACTERISTICS

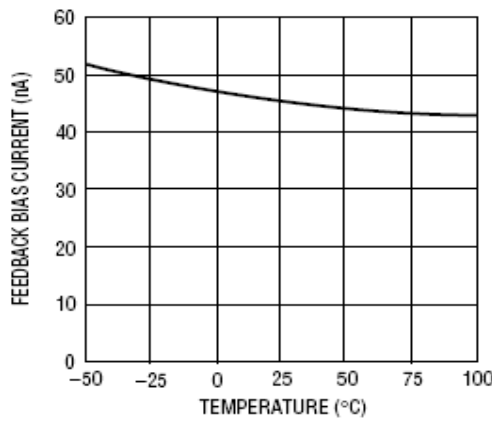
Switching Frequency



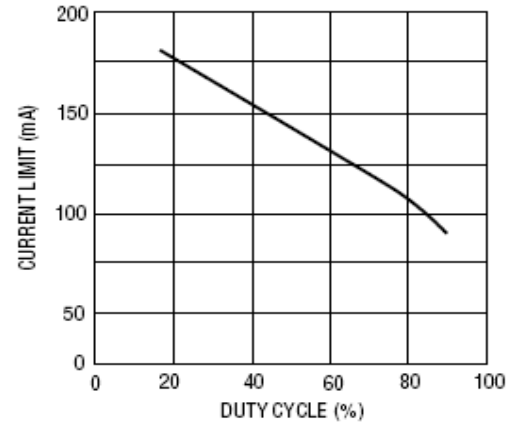
Efficiency vs Temperature



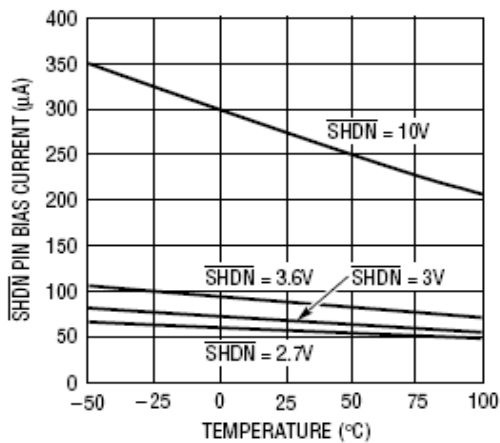
Feedback Bias Current



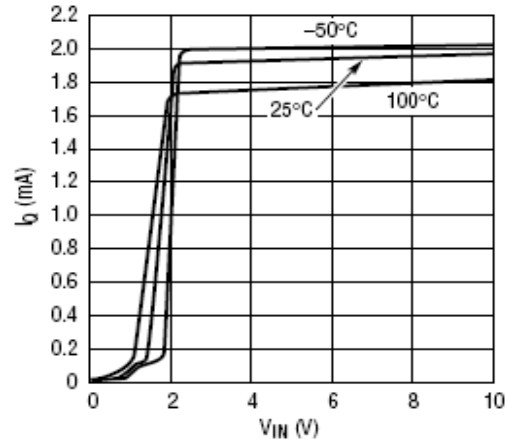
Current Limit vs Duty Cycle



SHDN Pin Bias Current



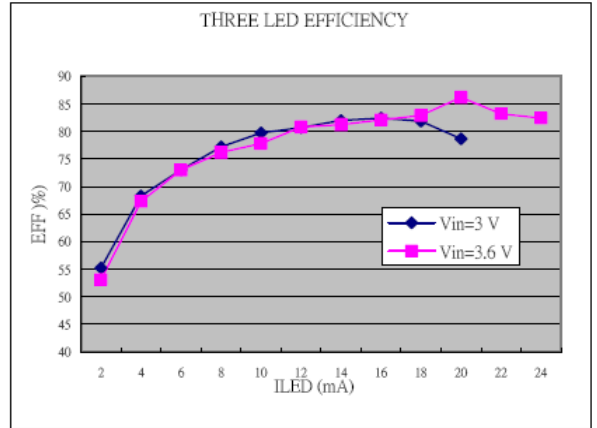
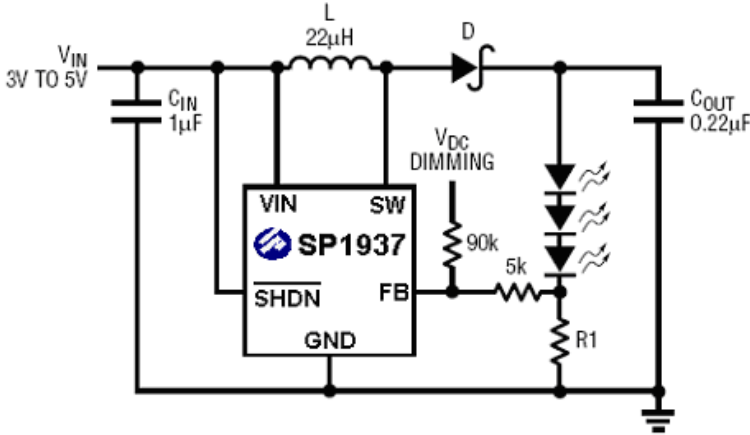
Quiescent Current



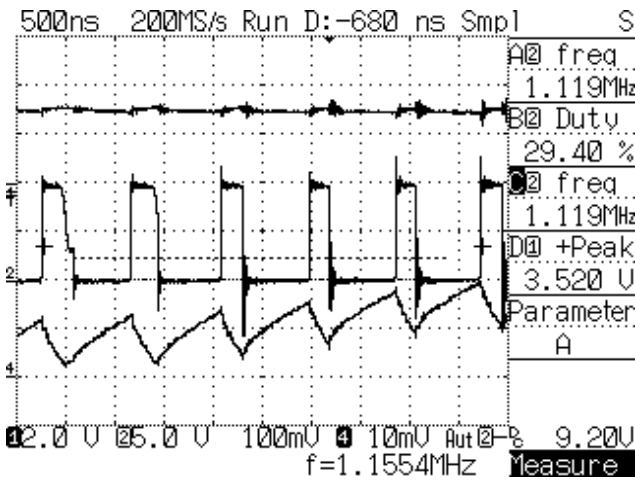


SP1937 DC-DC Step-Up Converter for White LED

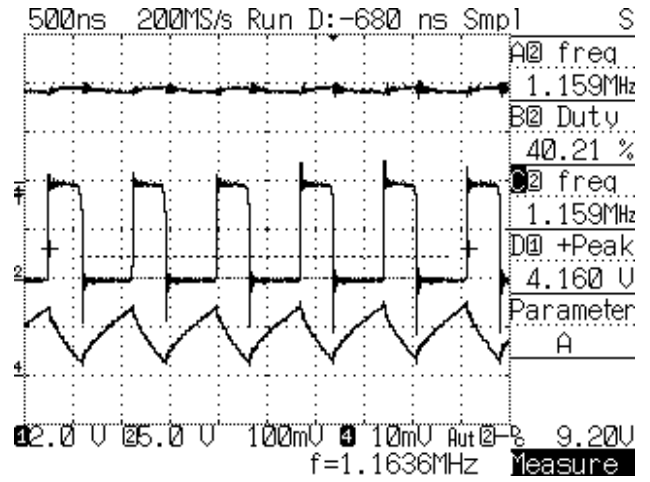
APPLICATION INFORMATION



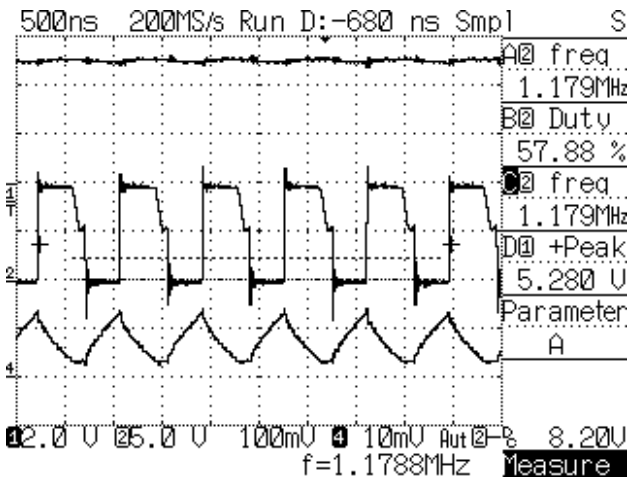
CH1: VCC / CH2: V_{sw} / CH3: Inductor current / R1= 6.8Ω



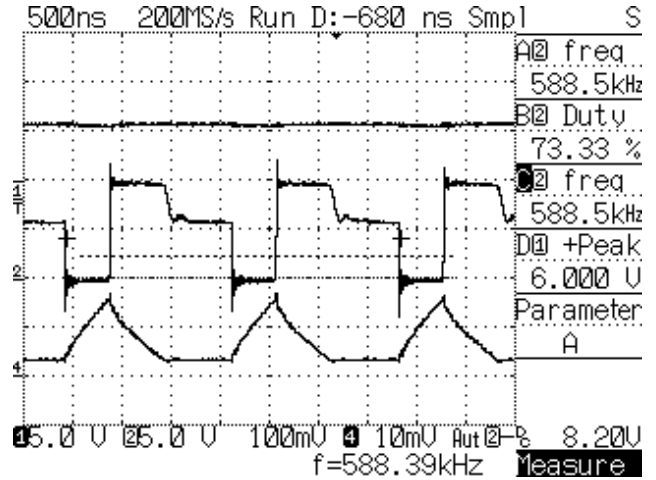
Vin=3V ; Vout=8.972V ; Iout=14.624mA



Vin=3.75V ; Vout=8.957V ; Iout=14.698mA



Vin=5V ; Vout=8.963V ; Iout=14.869mA



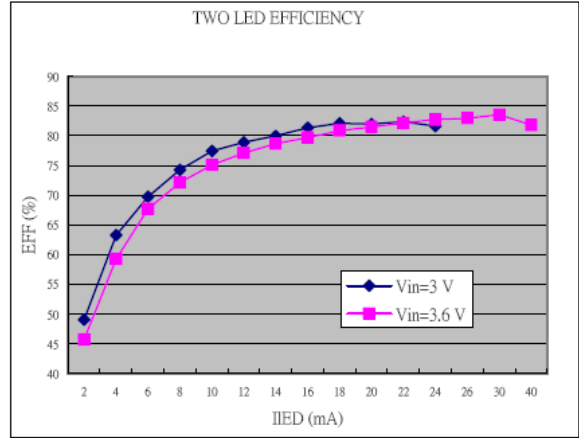
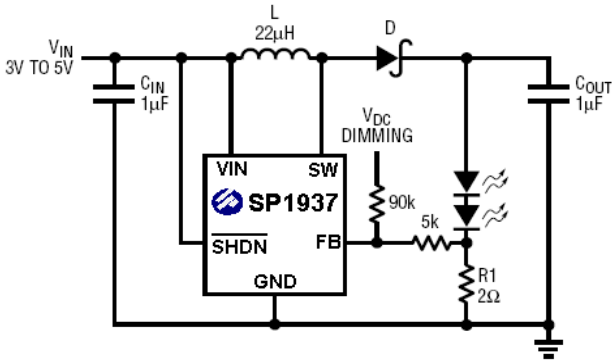
Vin=5.5V ; Vout=8.959V ; Iout=14.836mA



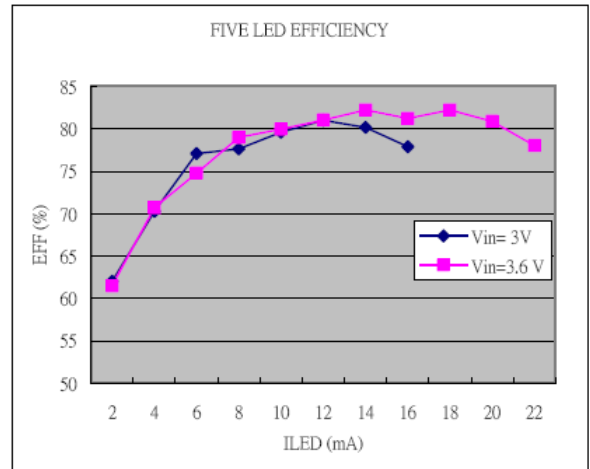
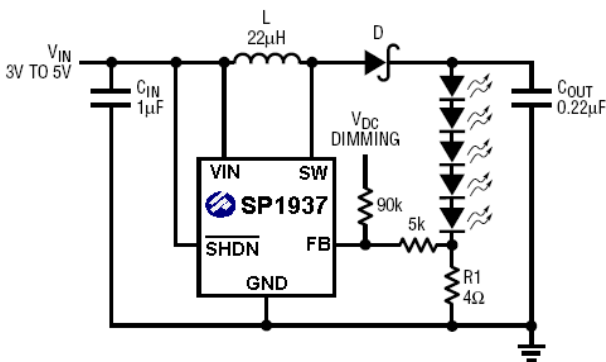
SP1937 DC-DC Step-Up Converter for White LED

APPLICATION CIRCUIT (For Portable System --- Series)

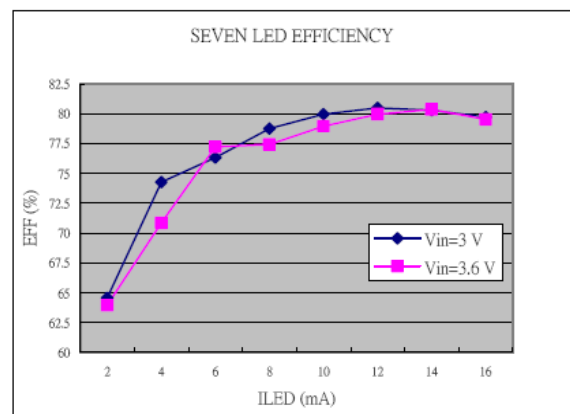
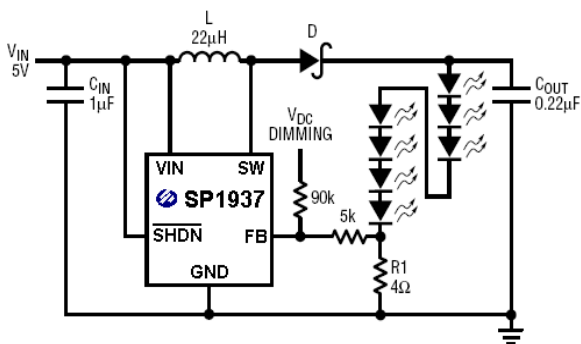
Li-Ion to Two White LEDs



Li-Ion to Five White LEDs



5V to Seven White LEDs



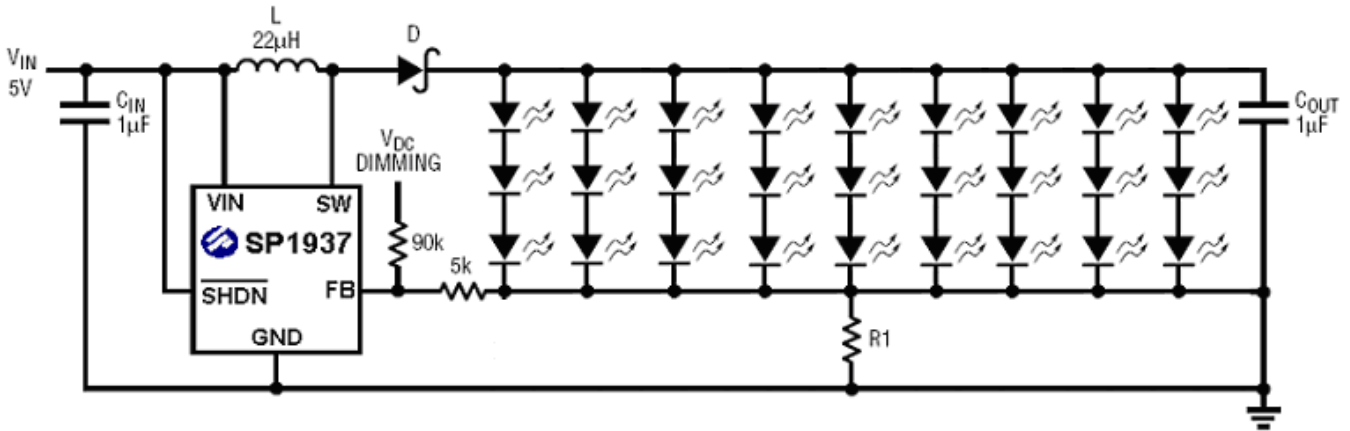


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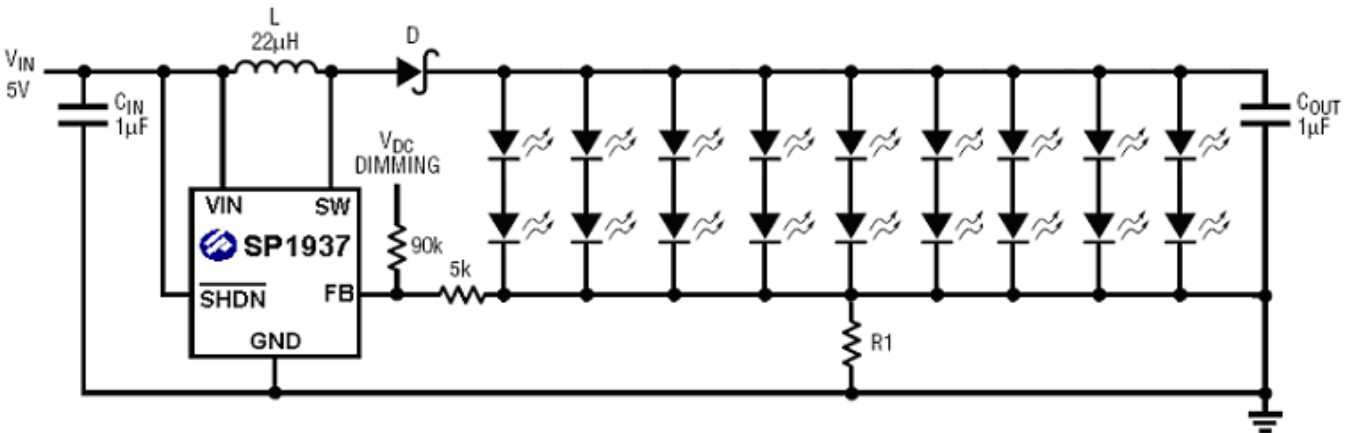
DC-DC Step-Up Converter for White LED

APPLICATION CIRCUIT (For LCD Panel --- Series & Parallel)

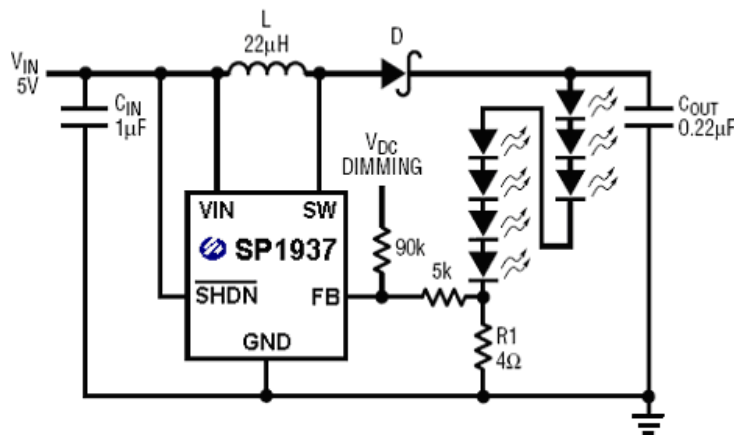
Three Series / Nine Parallel For 8" LCD Panel



Two Series / Nine Parallel For 7" LCD Panel



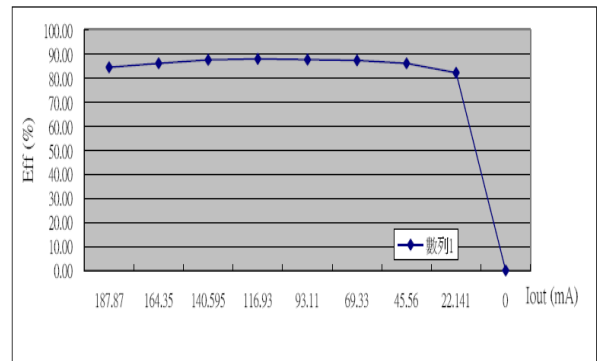
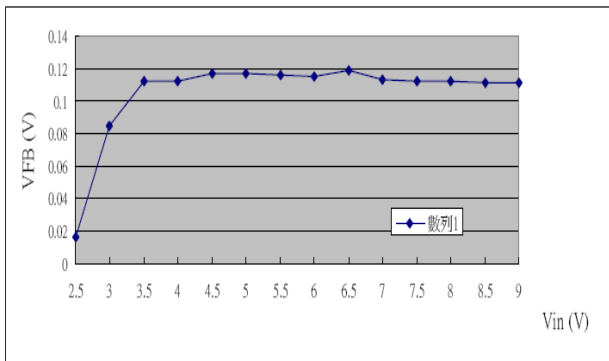
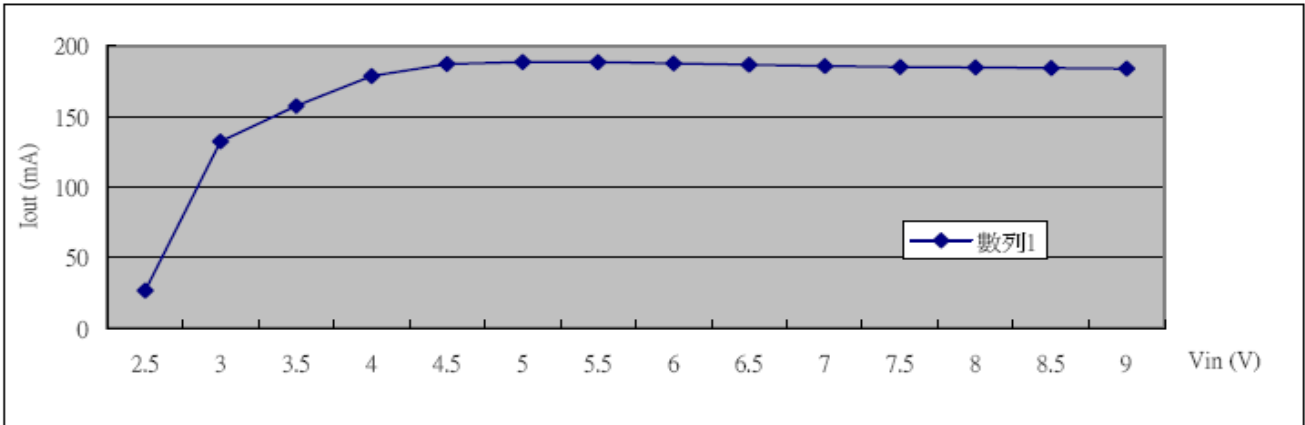
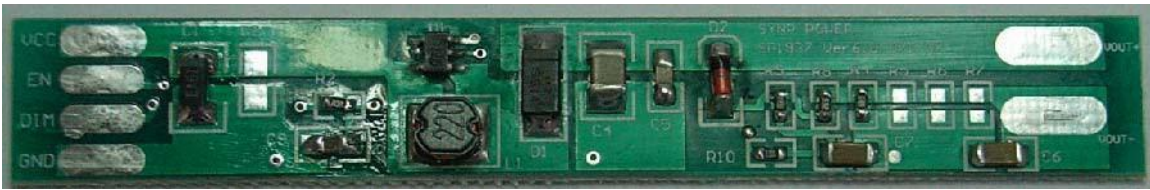
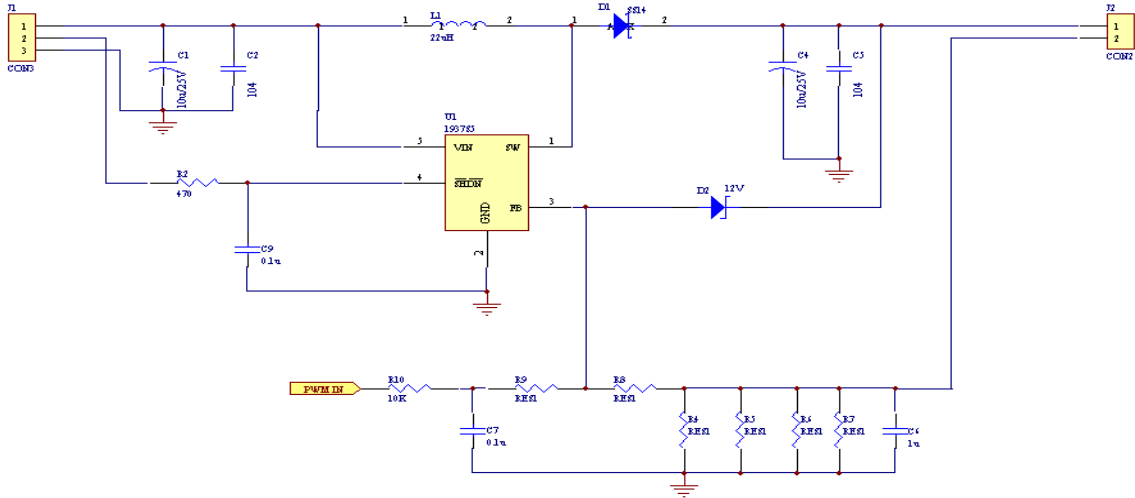
Seven Series For 3.5" LCD Panel





SP1937 DC-DC Step-Up Converter for White LED

TYPICAL PERFORMERCE CHARACTERISTICS(For LCD Panel)

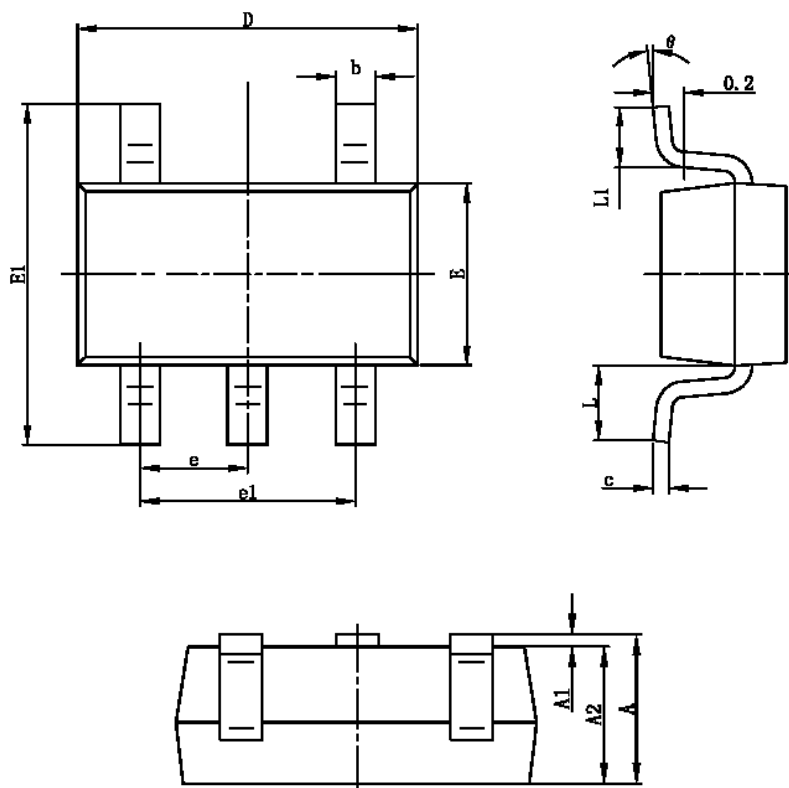




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DC-DC Step-Up Converter for White LED

SOT-23-5L PACKAGE OUTLINE



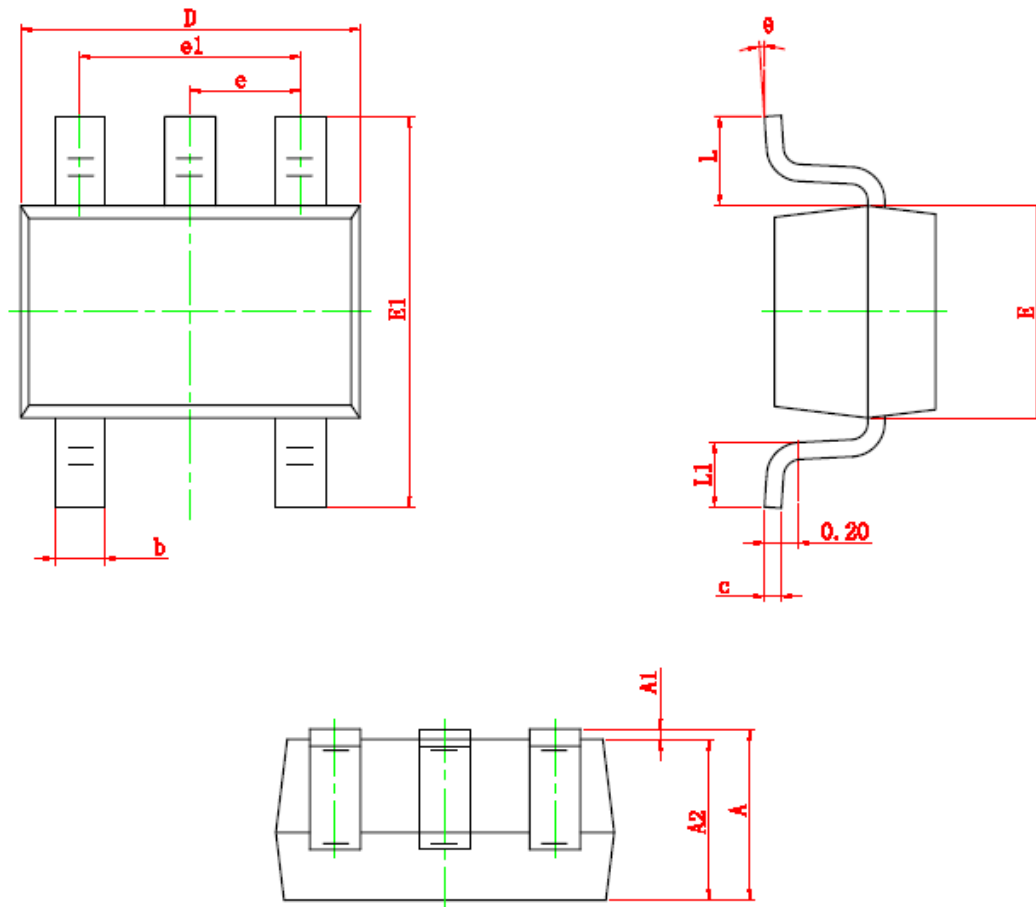
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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DC-DC Step-Up Converter for White LED

SOT-353 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
theta	0°	8°	0°	8°



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DC-DC Step-Up Converter for White LED

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