



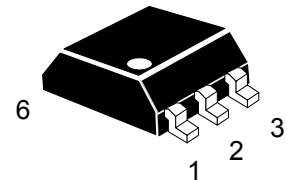
# Constant-Current DC/DC LED Driver LT1932

## DESCRIPTION

The LT1932 is a fixed frequency step-up DC/DC converter designed to operate as a constant-current source. Because it directly regulates output current, the LT1932 is ideal for driving light emitting diodes (LEDs) whose light intensity is proportional to the current passing through them, not the voltage across their terminals.

With an input voltage range of 1V to 10V, the device works from a variety of input sources. The LT1932 accurately regulates LED current even when the input voltage is higher than the LED voltage, greatly simplifying battery-powered designs. A single external resistor sets LED current between 5mA and 40mA, which can then be easily adjusted using either a DC voltage or a pulse width modulated (PWM) signal. When the LT1932 is placed in shutdown, the LEDs are disconnected from the output, ensuring a quiescent current of under 1 $\mu$ A for the entire circuit. The device's 1.2MHz switching frequency permits the use of tiny, low profile chip inductors and capacitors to minimize footprint and cost in space-conscious portable applications.

### SOT - 23-6L



LT1932 Plastic  
IZ1932 Chip

$T_A = -40 \dots +85 \text{ }^\circ\text{C}$

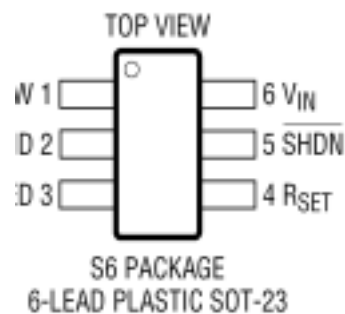
$T_{JMAX} = 125 \text{ }^\circ\text{C}, \theta_{JA} = 250 \text{ }^\circ\text{C/W}$

## FEATURES

- **Up to 80% Efficiency**
- **Inherently Matched LED Current**
- **Adjustable Control of LED Current**
- Drives Five White LEDs from 2V
- Drives Six White LEDs from 2.7V
- Drives Eight White LEDs from 3V
- Disconnects LEDs In Shutdown
- 1.2MHz Fixed Frequency Switching
- Uses Tiny Ceramic Capacitors
- Uses Tiny 1mm-Tall Inductors
- Regulates Current Even When  $V_{IN} > V_{OUT}$
- Operates with  $V_{IN}$  as Low as 1V
- Low Profile (1mm) Thin SOT Package

## APPLICATIONS

- Cellular Telephones
- Handheld Computers
- Digital Cameras
- Portable MP3 Players
- Pagers





# Constant-Current DC/DC LED Driver LT1932

## Absolute Maximum Ratings

(Note 1)

$V_{IN}$ Voltage	10V
SHDN Voltage	10V
SW Voltage	36V
LED Voltage	36V
$R_{SET}$ Voltage	1V
Junction Temperature	125 °C
Operating Temperature Range	-10°C to 85°C
Storage Temperature Range:	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	300°C

## Electrical Characteristics

The • denotes specifications that apply over the full operating temperature range otherwise specifications are at  $T_A = 25^\circ\text{C}$ .  
 $V_{IN} = 1.2\text{V}$ ,  $V_{SHDN} = 1.2\text{V}$ , unless otherwise noted.

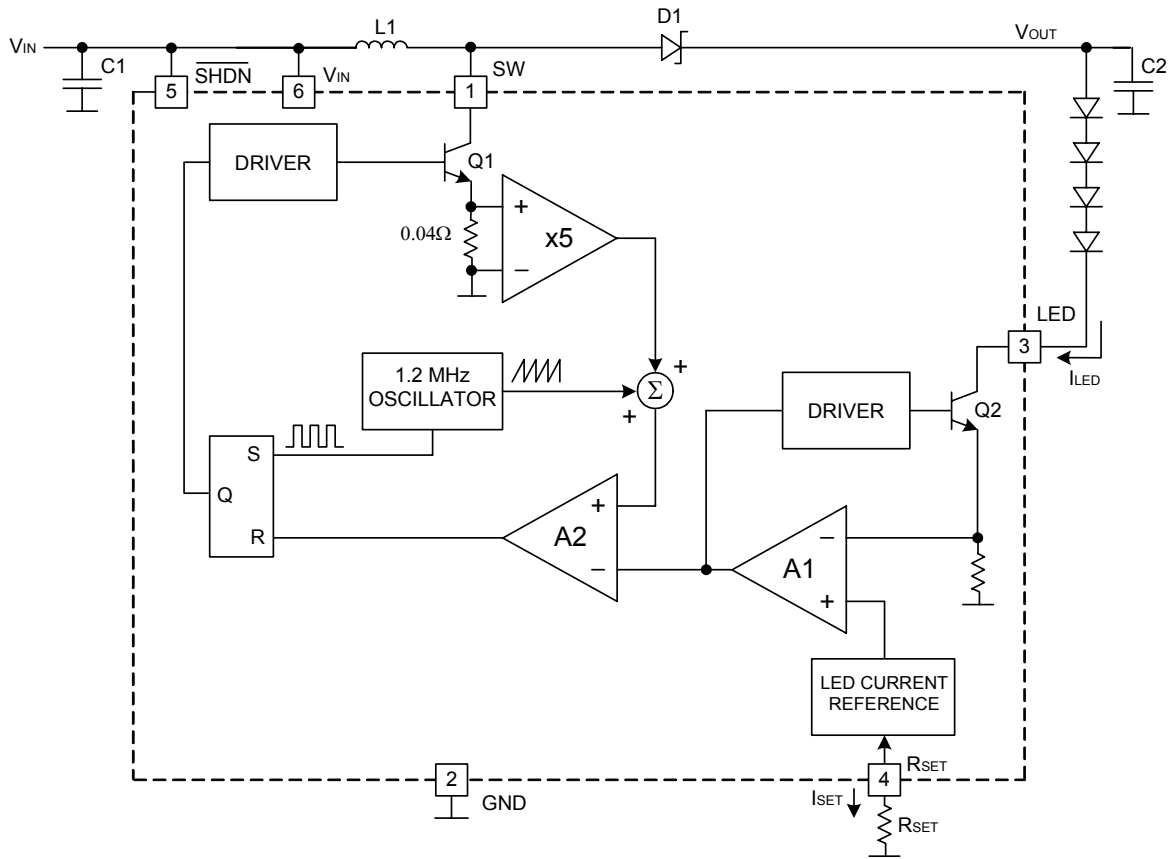
Parameter	Conditions	Min	Typ	Max	Unit
Minimum Input Voltage				1	V
Quiescent Current	$V_{RSET} = 0.2\text{V}$ $V_{SHDN} = 0\text{V}$		1.2 0.1	1.6 1.0	mA $\mu\text{A}$
$R_{SET}$ Pin Voltage	$R_{SET} = 1.50\text{k}$		100		mV
LED Pin Voltage	$R_{SET} = 1.50\text{k}$ , $V_{IN} < V_{OUT}$ (Figure 1)		120	180	mV
LED Pin Current	$R_{SET} = 562\Omega$ , $V_{IN} = 1.5\text{V}$ $R_{SET} = 750\Omega$ , $V_{IN} = 1.2\text{V}$ $R_{SET} = 1.50\text{k}$ , $V_{IN} = 1.2\text{V}$ $R_{SET} = 4.53\text{k}$ , $V_{IN} = 1.2\text{V}$	33 25 12.5	38 30 15 5	45 36 17.5	mA mA mA mA
LED Pin Current Temperature Coefficient	$I_{LED} = 15\text{mA}$		-0.02		mA / °C
Switching Frequency	$V_{IN} = 1\text{V}$	0.8	1.2	1.6	MHz
Maximum Switch Duty Cycle	•	90	95		%
Switch Current Limit		400	550	780	mA
Switch $V_{CESAT}$	$I_{SW} = 300\text{mA}$		150	200	mV
SHDN Pin Current	$V_{SHDN} = 0\text{V}$ $V_{SHDN} = 2\text{V}$		0 15	0.1 30	$\mu\text{A}$ $\mu\text{A}$
Start-Up Threshold (SHDN Pin)		0.85			V
Shutdown Threshold (SHDN Pin)				0.25	V
Switch Leakage Current	Switch Off, $V_{SW} = 5\text{V}$		0.01	5	$\mu\text{A}$

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.



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## BLOCK DIAGRAM

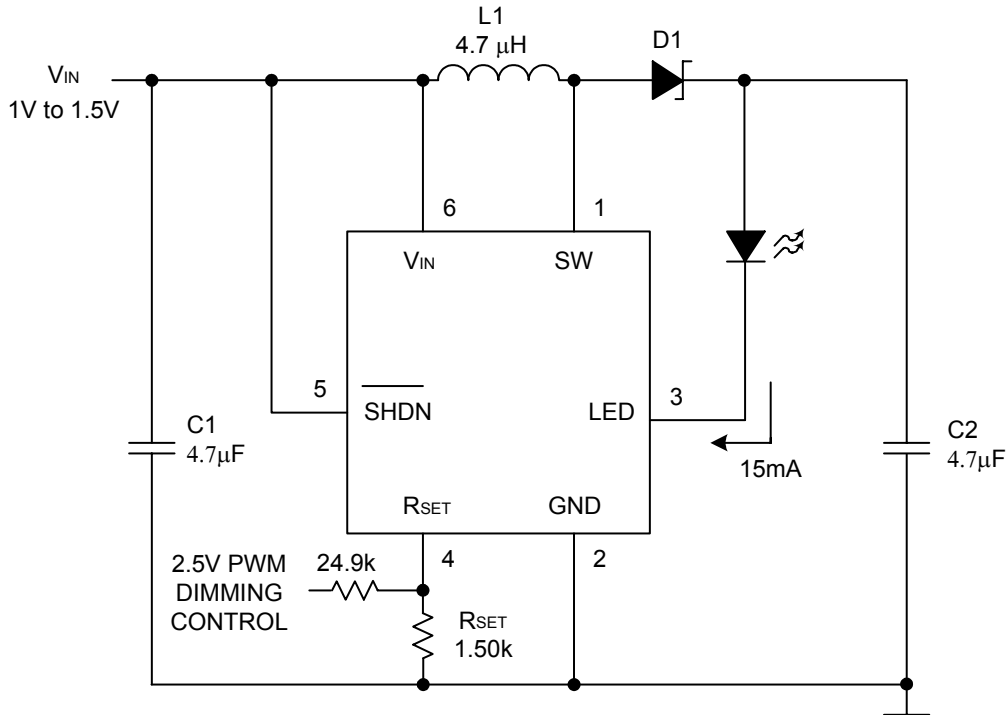




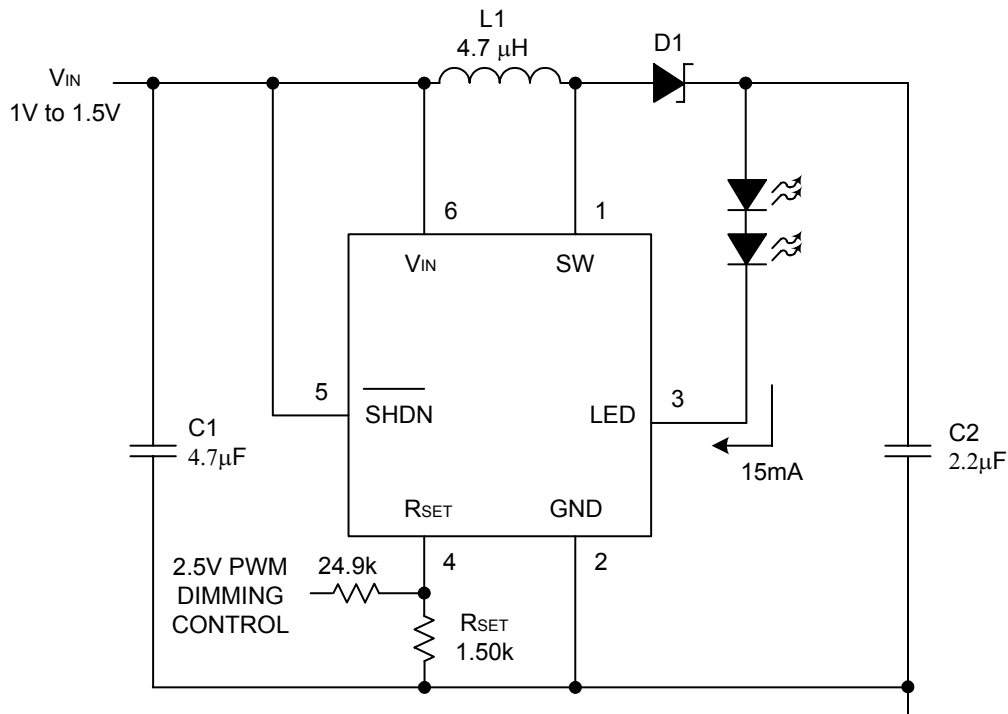
# Constant-Current DC/DC LED Driver LT1932

## TYPICAL APPLICATIONS

### Single Cell Driver for One White LED



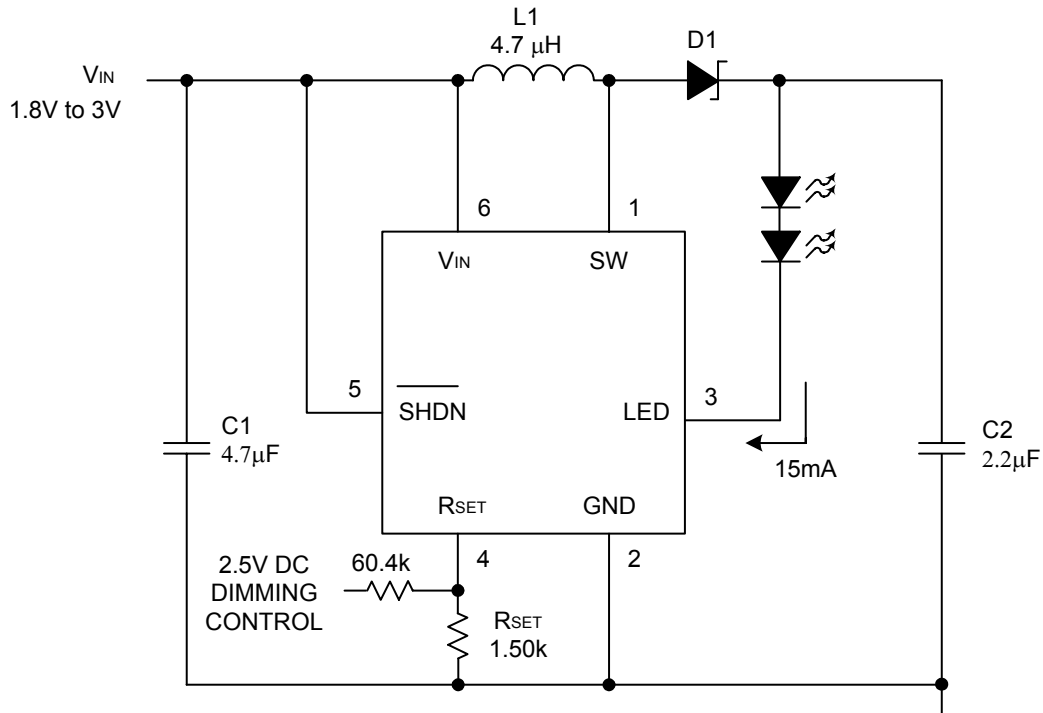
### Single Cell Driver for Two White LEDs



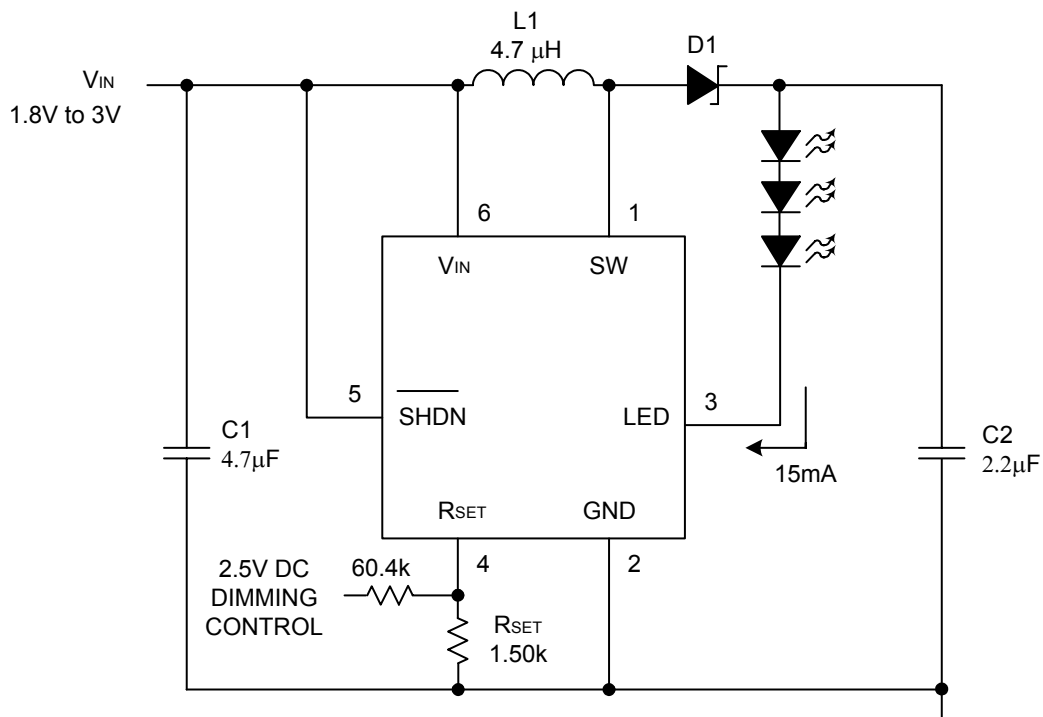


# Constant-Current DC/DC LED Driver LT1932

## 2 - Cell Driver for Two White LEDs



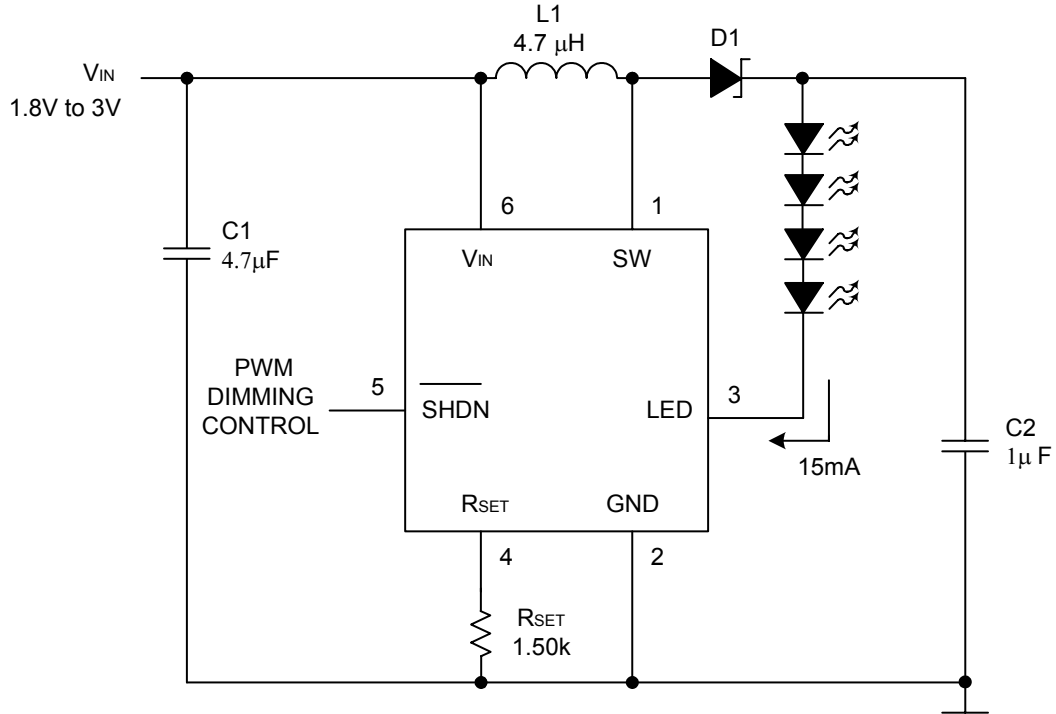
## 2 - Cell Driver for Three White LEDs



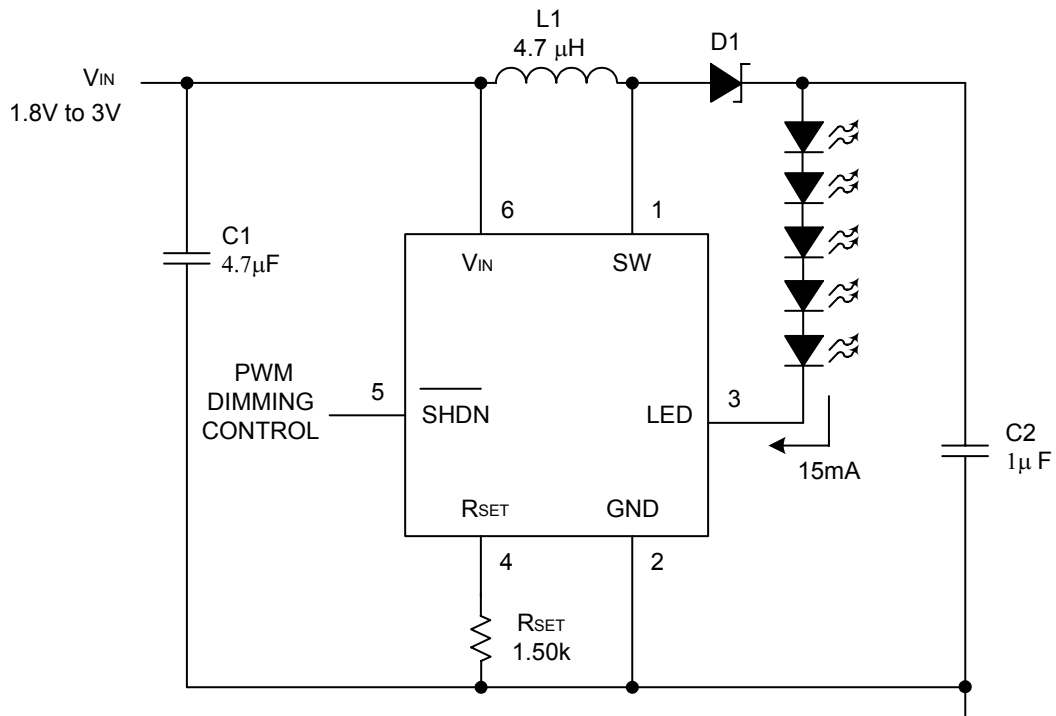


# Constant-Current DC/DC LED Driver LT1932

## 2 - Cell Driver for Four White LEDs



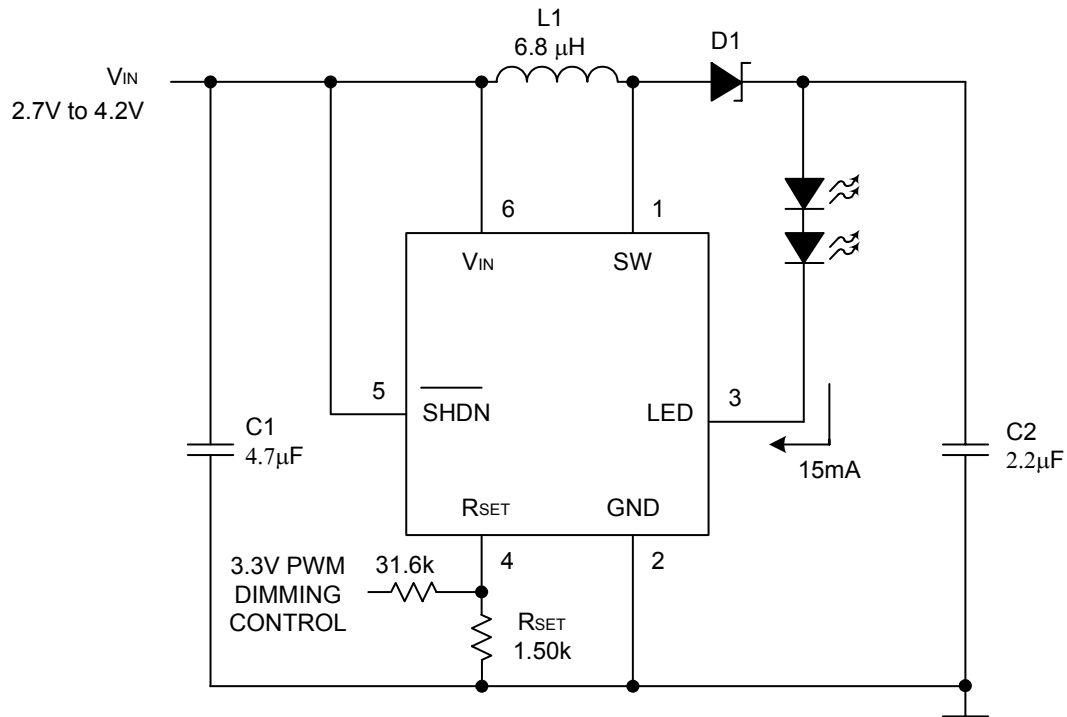
## 2 - Cell Driver for Five White LEDs



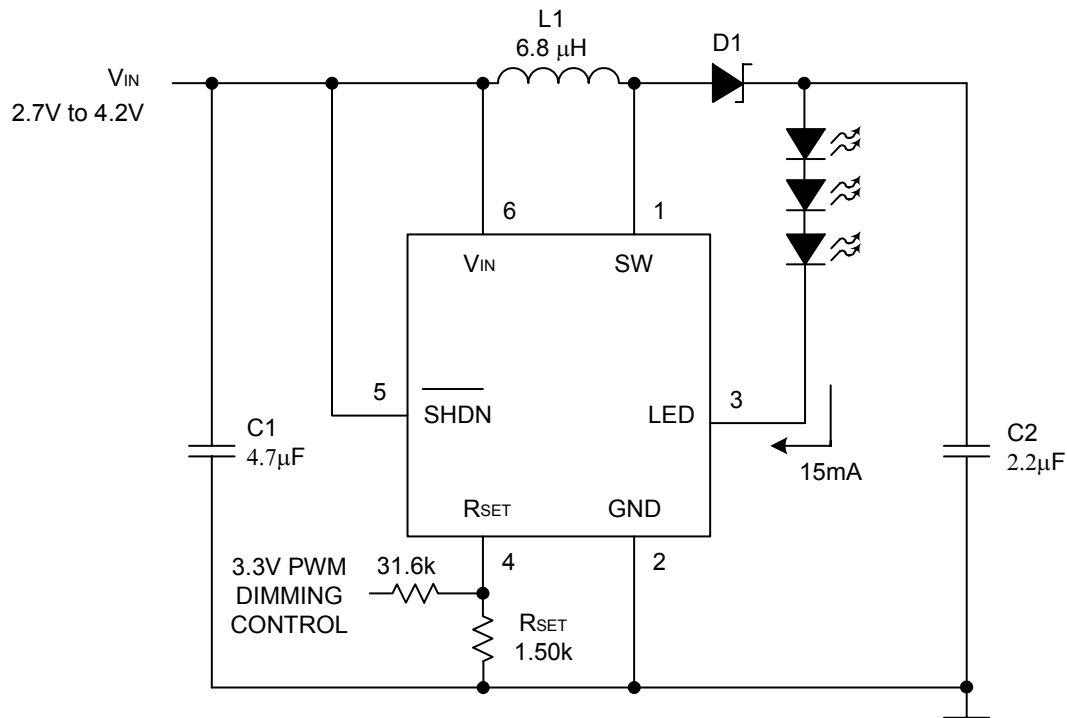


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## Li - Ion Driver for Two White LEDs



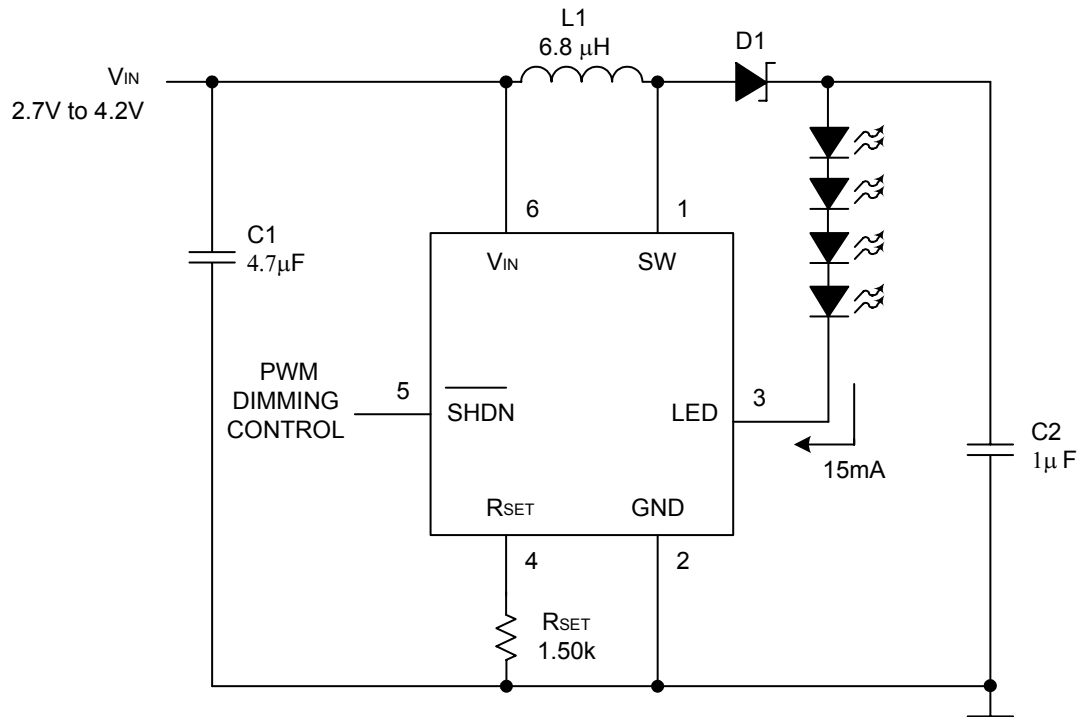
## Li - Ion Driver for Three White LEDs



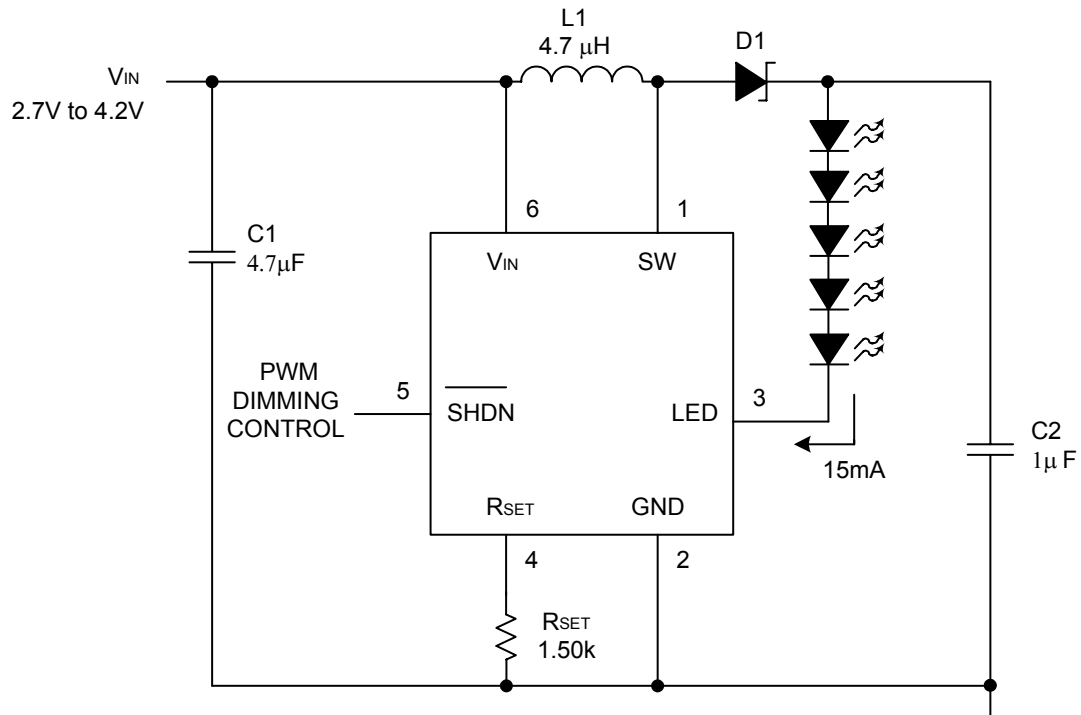


# Constant-Current DC/DC LED Driver LT1932

## Li - Ion Driver for Four White LEDs



## Li - Ion Driver for Five White LEDs

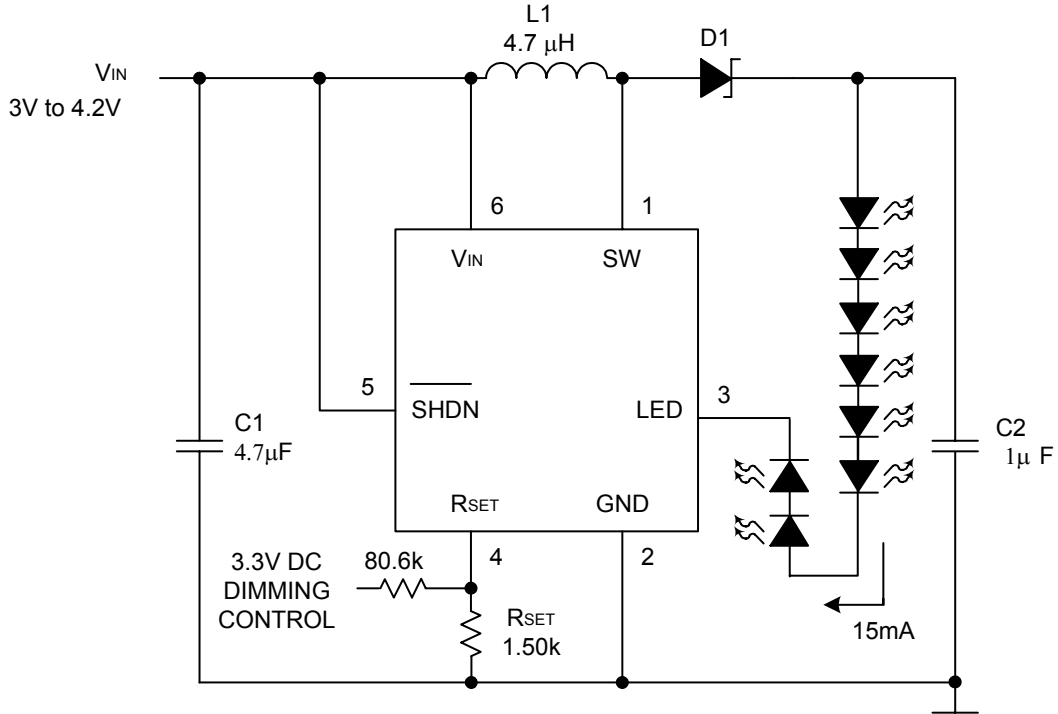




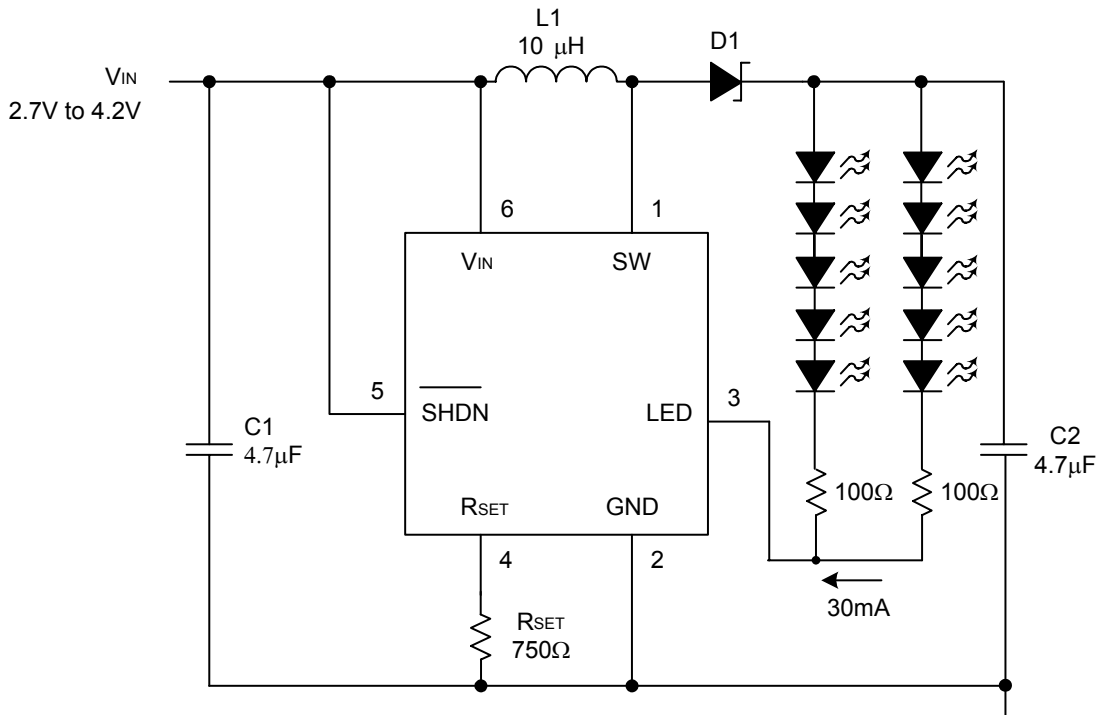


# Constant-Current DC/DC LED Driver LT1932

## Li - Ion Driver for Eight White LEDs



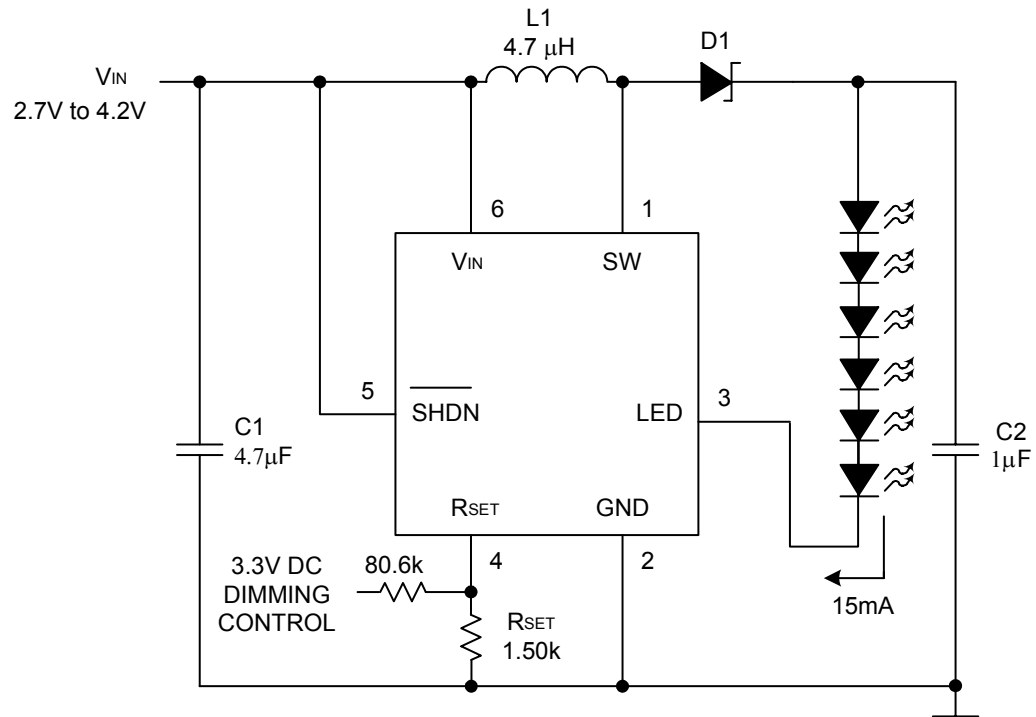
## Li - Ion Driver for Ten White LEDs

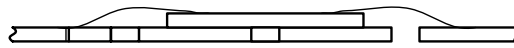
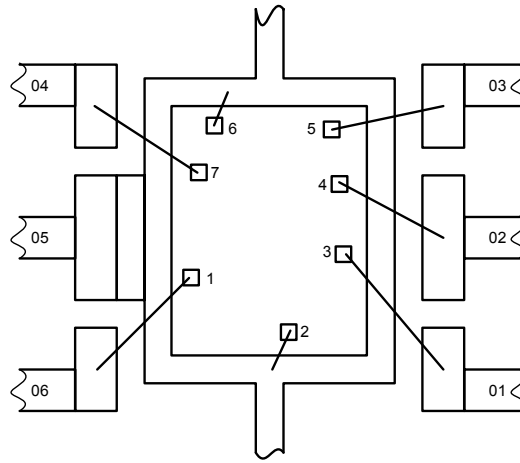




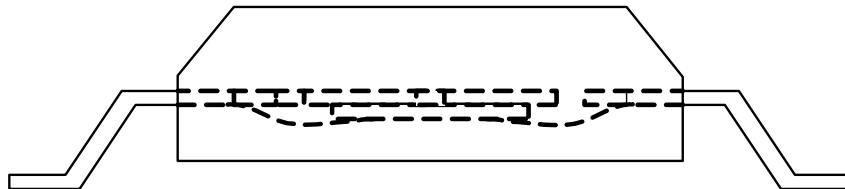
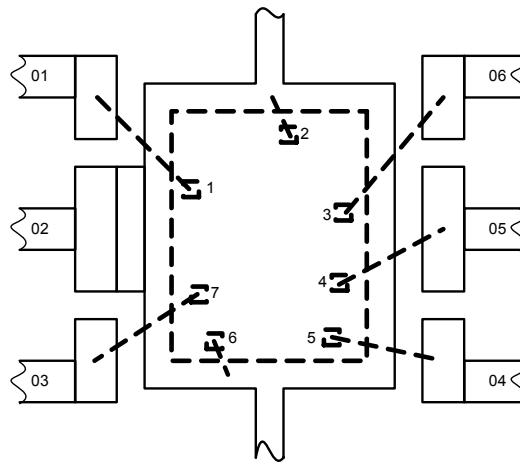
# Constant-Current DC/DC LED Driver LT1932

## Li - Ion Driver for Six White LEDs



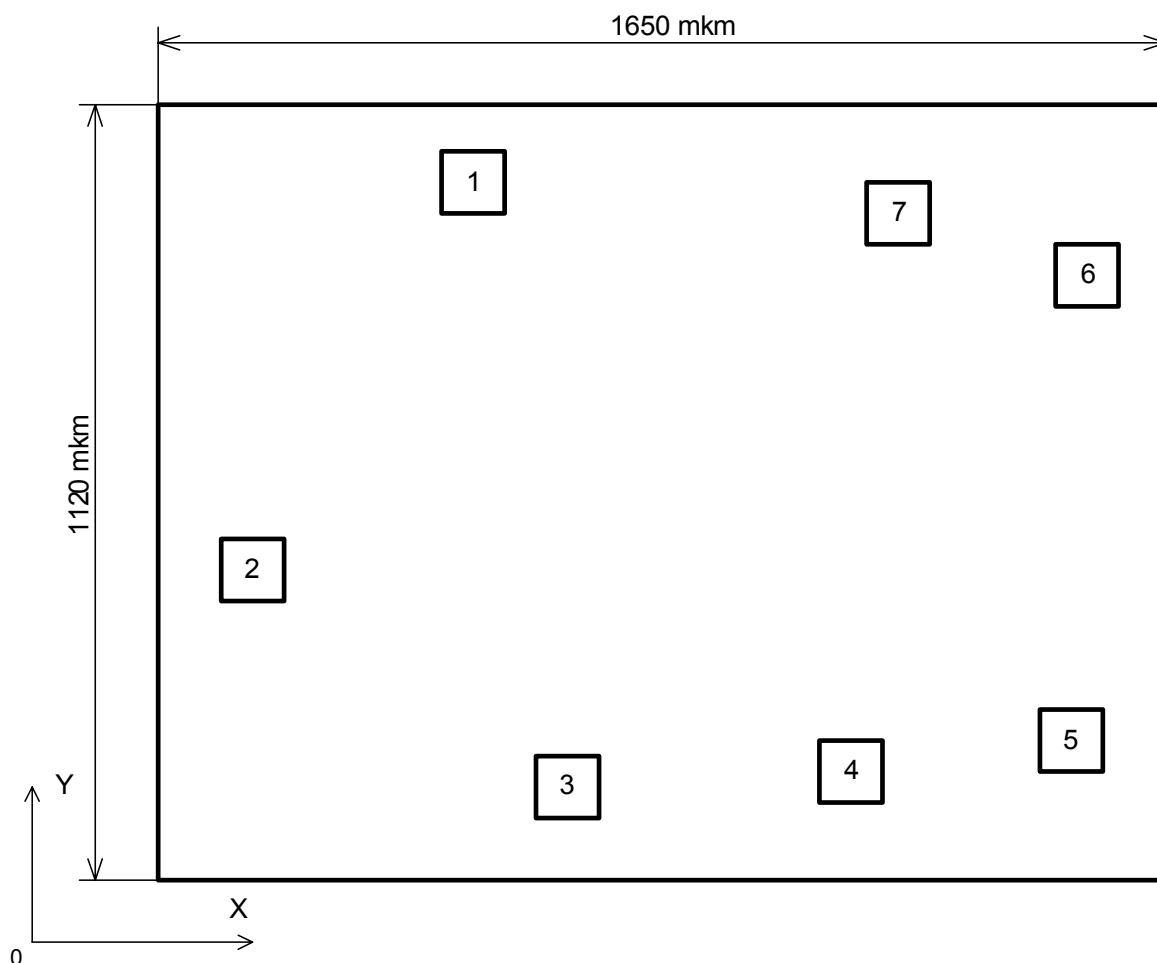


a)



B)

**Bonding diagram of LT1932**



### Pads location of LT1932

Die size  $X_r = 1120$  mkm,  $Y_r = 1650$  mkm (pad size  $100 \times 100$  mkm<sup>2</sup> measured by layer "passivation")

#### Coordinates of pad

No of pad (by layer "passivation")	X mkm (left bottom)	Y mkm (left bottom)
1	467	905
2	110	407
3	432	123
4	1104	130
5	1454	163
6	1454	772
7	1151	897