

General Description

The MP1523 is a 5 pin SOT23 step up converter designed for driving up to six (6) series white LEDs from a single cell Lithium Ion battery. The MP1523 uses a current limited, variable frequency architecture to regulate the LED current, which is measured through an external current sense resistor. It's low 0.4V feedback threshold reduces power loss and improves efficiency. To prevent damage due to an open circuit condition, the BIAS pin can measure the output voltage and turn off the converter if an overvoltage condition is present.

The MP1523 includes under-voltage lockout, current limiting and thermal overload protection preventing damage in the event of an output overload. The MP1523 is available in a small 5 lead SOT23 package.

Features

- On board power MOSFET
- Drives 6 White LEDs
- Up to 90% efficiency
- Over 80mA output current capacity
- Open Load Shut Down
- Low 0.4V Feedback Threshold
- UVLO, Thermal shutdown
- Soft Start
- Internal Current Limit
- Available in SOT23-5 Package
- **Evaluation Board Available**

Applications

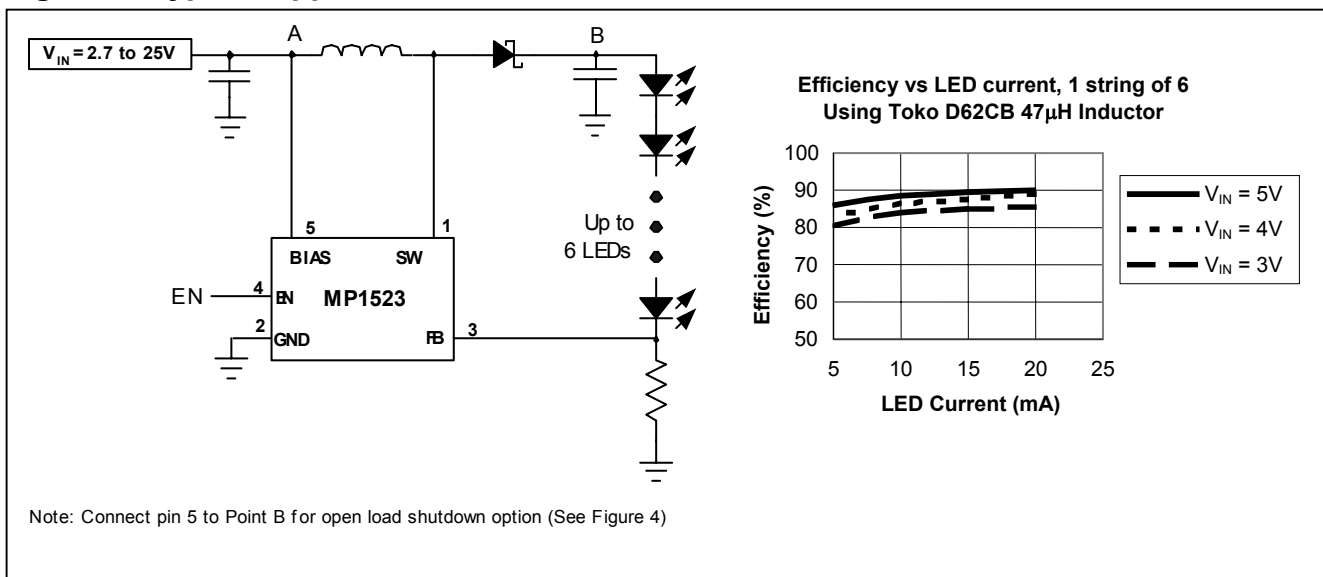
- Cell Phones
- Handheld Computers and PDAs
- Digital Still and Video Cameras
- Small LCD Displays

Ordering Information

Part Number*	Package	Temperature
MP1523DT	SOT23-5	-40° to +85°C
EV0035	Evaluation Board	

* For Tape & Reel use suffix - Z (e.g. MP1523DT-Z)

Figure 1: Typical Application Circuit



Absolute Maximum Ratings

BIAS	-0.3V to 28V
SW	-0.5V to 28V
All Other Pins	-0.3V to 6V
Storage Temperature	-55°C to 150°C

Recommended Operating Conditions

BIAS Supply Voltage	2.7V to 25V
Output Voltage	V_{IN} to 25V
Operating Temperature	-40°C to +85°C

Thermal Resistance

Thermal Resistance Θ_{JA} (SOT23-5)	150°C/W
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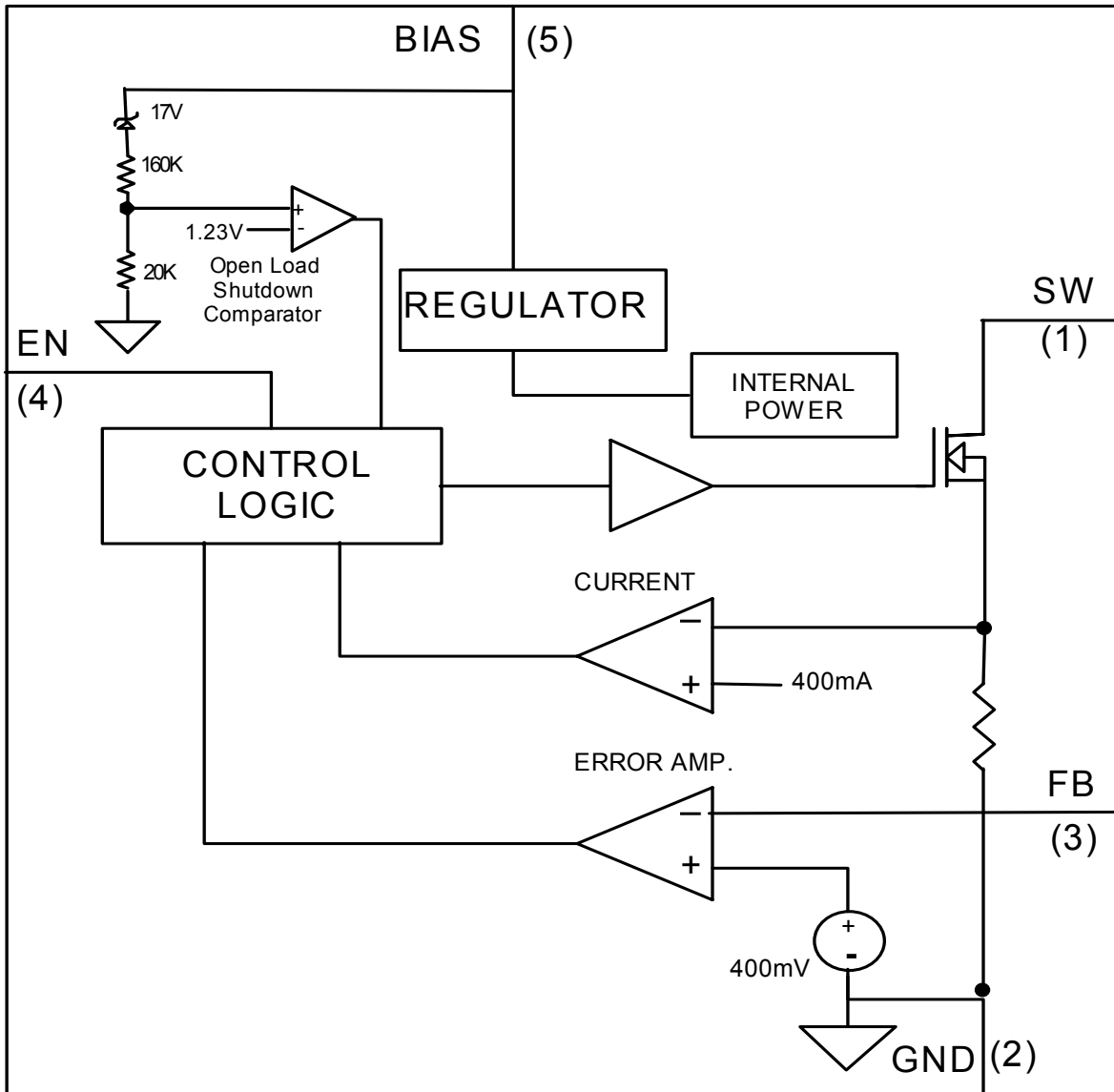
Electrical Characteristics ($V_{BIAS}=V_{EN}=5.0V$, $T_A = 25^\circ C$ unless specified otherwise)

Parameters	Symbol	Condition	Min	Typ	Max	Units
Supply Current (shutdown)	$I_{BIAS(OFF)}$	$V_{EN}=0V$		1	3	μA
Supply Current (quiescent)	$I_{BIAS(ON)}$	$V_{FB}=0.45V$		650	750	μA
Minimum Off Time, Normal Operation	T_{OFF}	$V_{FB}=0V$	300	550	700	ns
Minimum Off Time, Start-Up	T_{OFF}	$V_{FB}=0V$ (Note 1)		1.6		μS
Undervoltage Lockout						
BIAS Under Voltage Lockout	UVLO	V_{BIAS} Rising, 100mV Hysteresis	2.1	2.3	2.65	V
Open Lamp Shutdown Threshold		V_{BIAS} Rising		28		V
Enable						
EN Threshold		V_{EN} Rising	0.8	1.1	2.0	V
EN Hysteresis				60		mV
EN Input Bias Current		$V_{EN}=0V, 5V$			1	μA
Feedback Comparator						
FB Regulation Threshold		V_{FB} Falling	380	400	420	mV
FB Hysteresis (Note 2)				10		mV
FB Input Bias Current		$V_{FB}=0.2V$	-150	-80		nA
Output Switch						
SW On-Resistance (Note 2)	R_{ON}	$V_{BIAS} = 5.0V$		0.5	0.6	Ω
SW Current Limit			300	450		mA
SW Voltage	BV		25			V
Thermal Shutdown (Note 2)				160		$^\circ C$

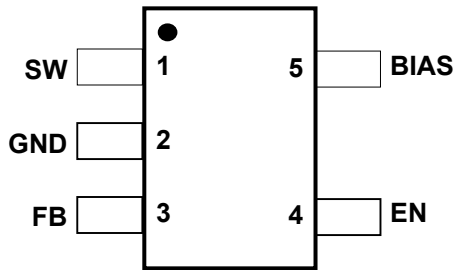
Notes:

1. First 64 pulses after EN switches high.
2. Guaranteed by design

Figure 2: Functional Block Diagram



Pin Description



SOT23-5
Top View
Marking: A3xx

Table 1: Pin Designator

Pin #	Pin Name	Pin Function
1	SW	Power Switch Output. SW is the drain of the internal MOSFET switch. Connect the power inductor and output rectifier to SW. SW can swing between GND and 25V.
2	GND	Ground
3	FB	Feedback Input. The MP1523 regulates the voltage across the current sense resistor between FB and GND. Connect a current sense resistor from the bottom of the LED string to GND. Connect the bottom of the LED string to FB. The regulation threshold is 0.4V.
4	EN	Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input source for automatic startup. If EN is driven over 10V, place a 100KΩ resistor in series with EN.
5	BIAS	Internal Power Input. BIAS powers the internal circuitry and measures the output voltage for open circuit protection. Connect BIAS to the output voltage at the top of the LED string to enable open load shutdown feature (see Figure 3). Connect BIAS to output of inductor to eliminate open load shutdown feature (see Figure 4).

Figure 3: One String of Six (6) LEDs without Open Load Shutdown Option

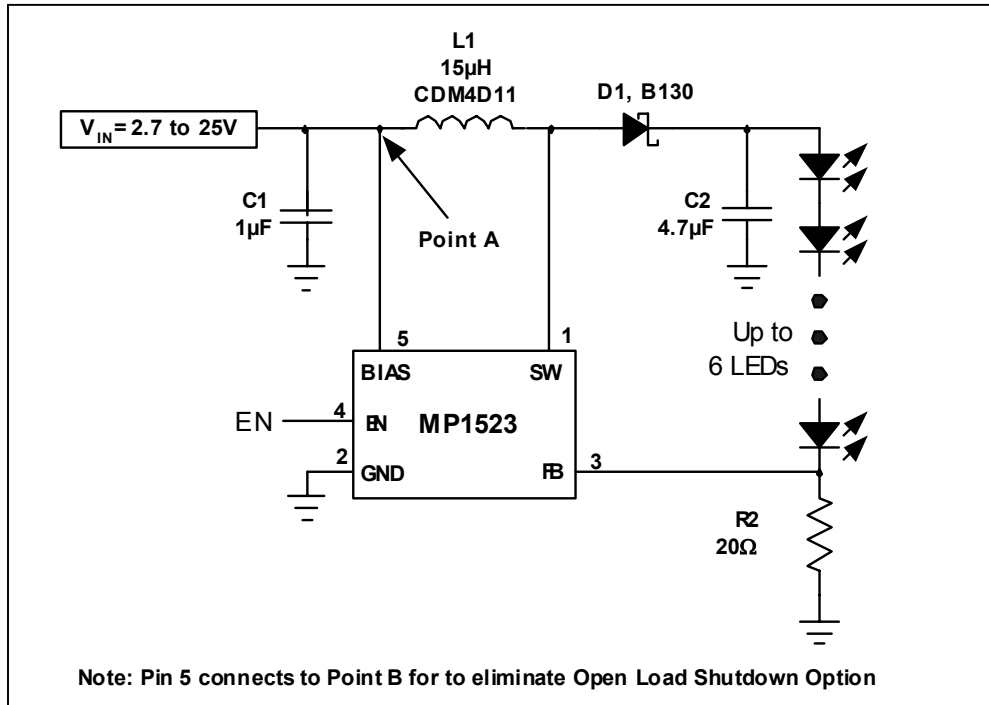


Figure 4: One String of Six (6) LEDs with Open Load Shutdown Option

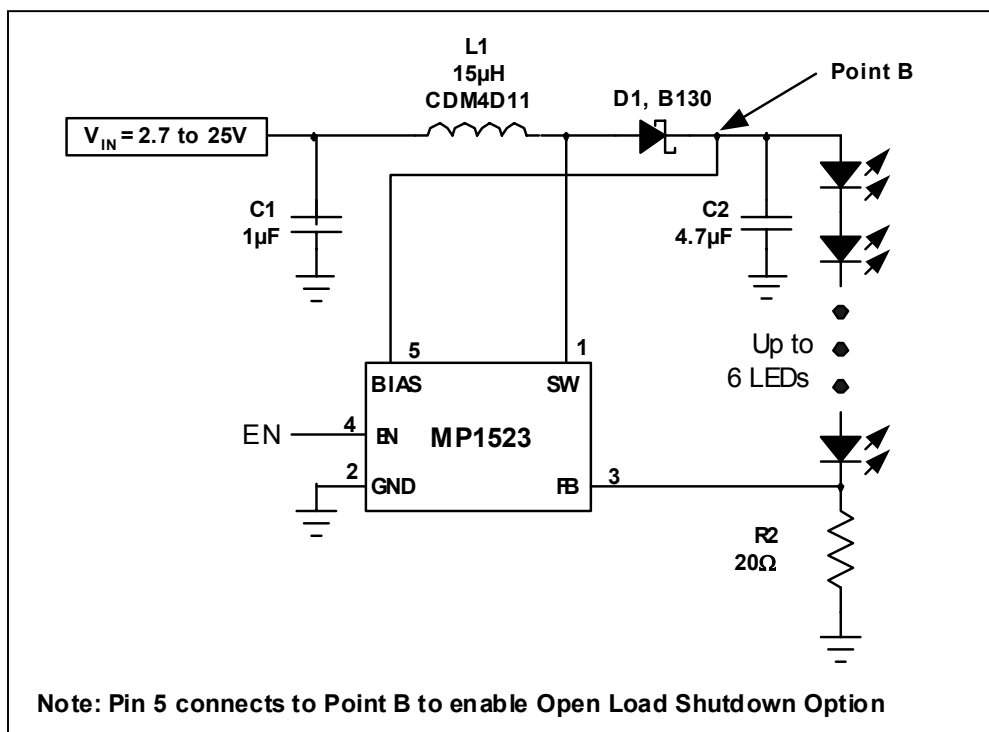


Figure 5: Efficiency vs V_{IN} of Figure 3 and 4

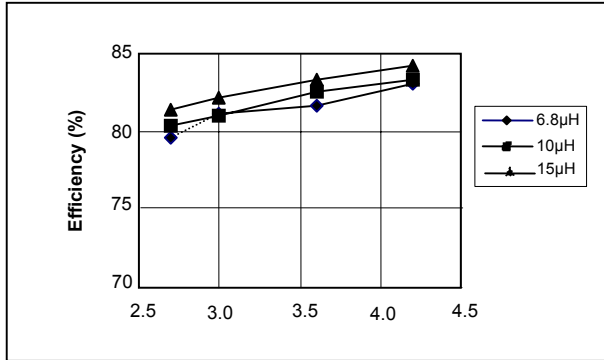
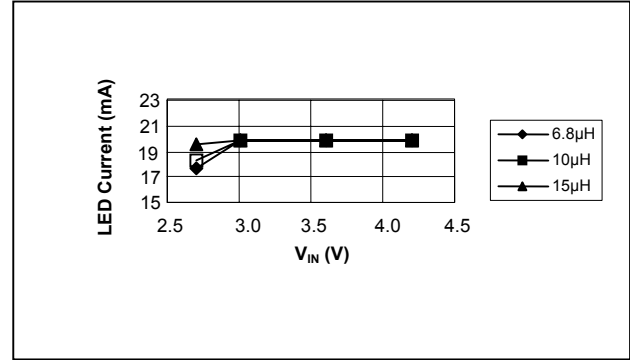
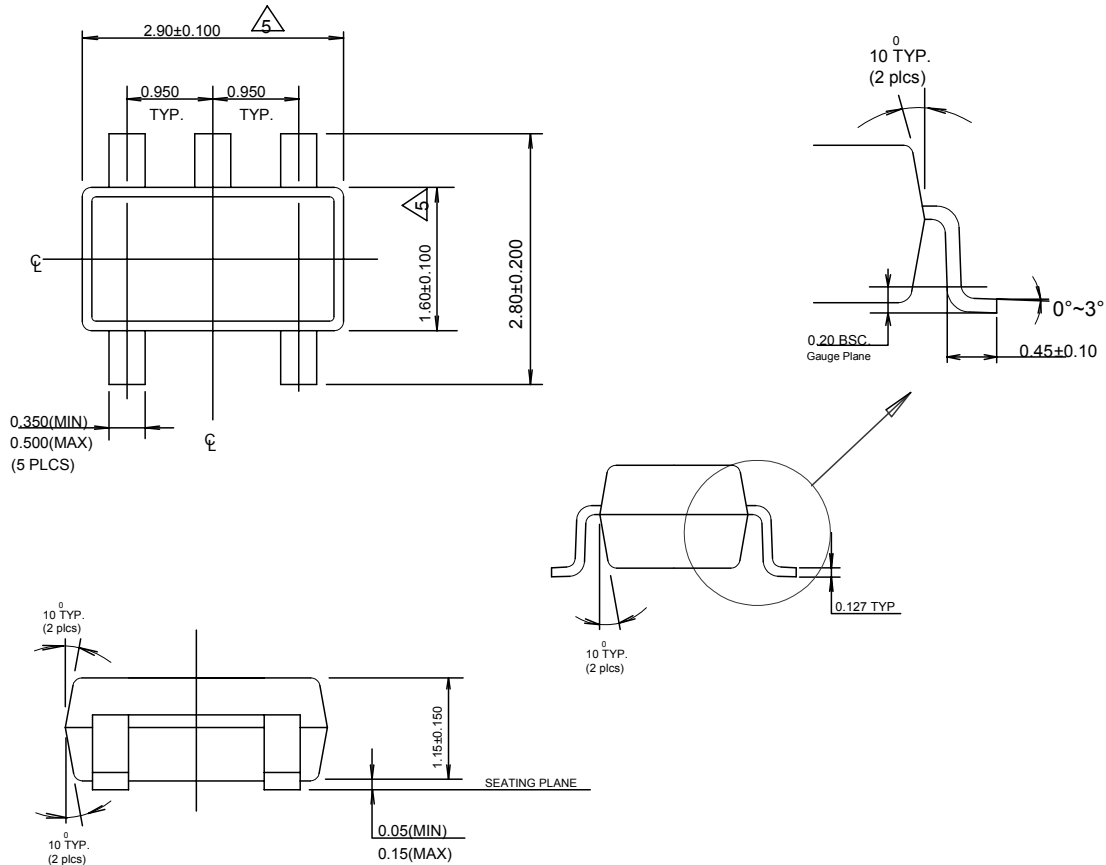


Figure 6: Line regulation of Figure 3 and 4



Package Information

SOT23-5



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