

General Description

The VS3008 is a 1.2MHz PWM boost switching regulator designed for constant-current white LED driver applications.

The VS3008 can drive a string of 2 to 3 white LEDs from a 2.7V supply in series, ensuring uniform brightness and eliminating several ballast resistors. The VS3008 implements a constant frequency 1.2MHz PWM control scheme. The high frequency PWM operation also saves board space by reducing external component sizes. To improve efficiency, the feedback voltage is set to 95 mV, which reduces the power dissipation in the current setting resistor.

The VS3008 is equipped with OVP protection ability, the SW pin monitors the output voltage and will turn off the device if an over-voltage condition is present to prevent damage from an open circuit condition.

The VS3008 is available in SOT-23-5 package.

Features

- Inherently Uniform LED Current
- High Efficiency up to 84%
- Drives 2 to 3 LEDs from a 2.7V Supply
- 1.2MHz PWM Operation Frequency
- Requires Only 0.22 μ F Output Capacitor
- Shutdown Current: $< 1\text{mA}$
- Built-in Output Over-Voltage Protection
- Under Voltage Lock Out (UVLO)

Applications

- Cellular Phones
- Digital Cameras
- LCD modules
- GPS Receivers
- PDAs, Handheld Computers

Pin Configuration

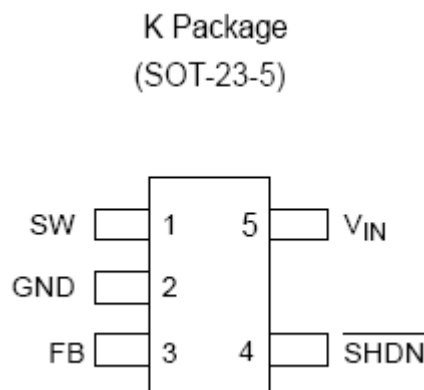


Figure 1. Pin Configuration of VS3008 (Top View)

Pin Description

Pin Number	Pin Name	Function
1	SW	Switch Pin. Connect external inductor
2	GND	Ground
3	FB	Voltage Feedback. Reference voltage is 95mV.
4	SHDN	Shutdown Pin. Connect to 1.5V or higher to enable device; Connect to 0.4V or less to disable device.
5	V _{IN}	Input Supply Pin. Must be locally bypassed.

Functional Block Diagram

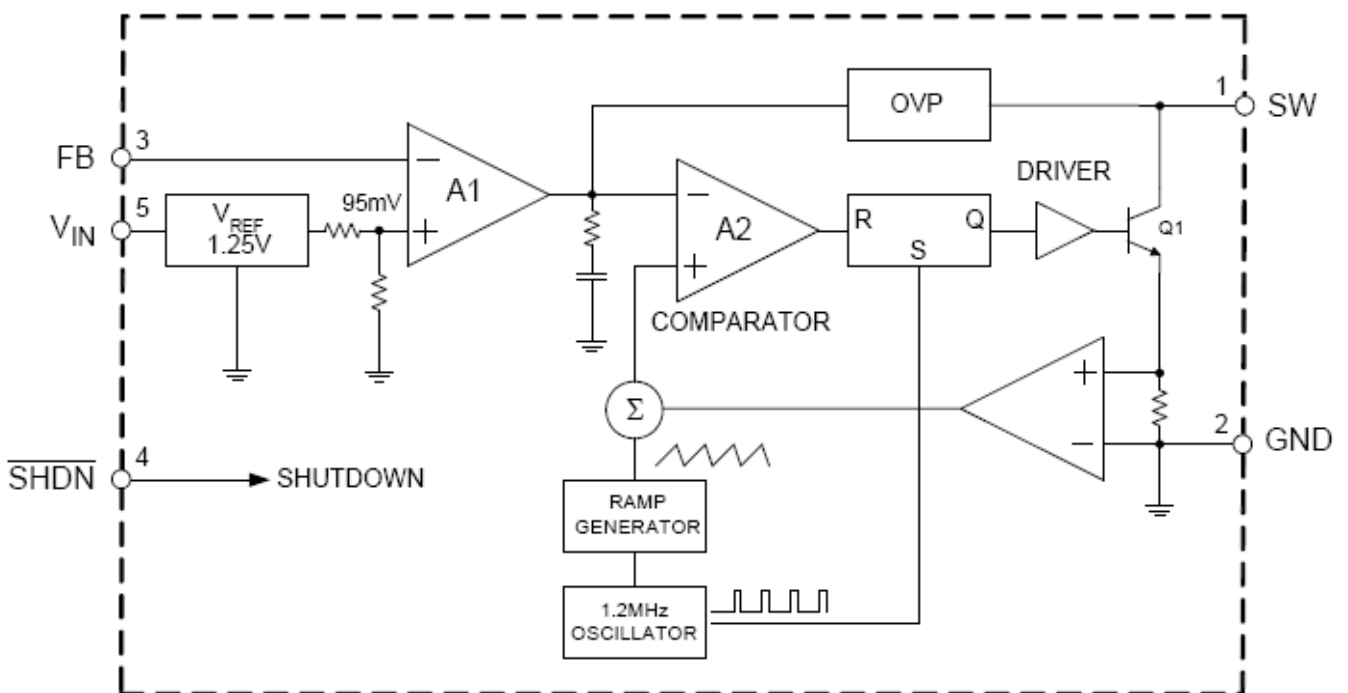
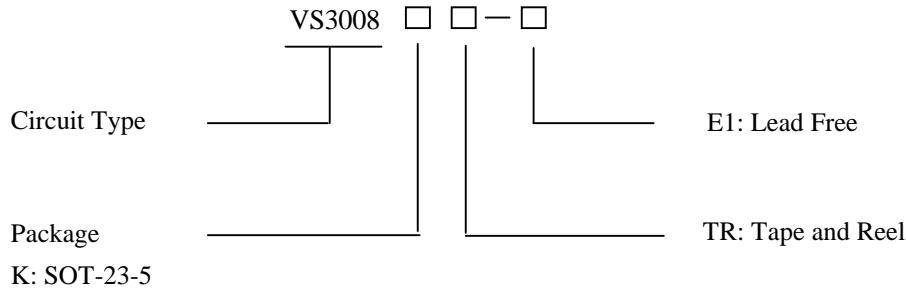


Figure 2. Functional Block Diagram of VS3008

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-23-5	-40 to 85°C	VS3008KTR-E1	E1B	Tape & Reel

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V _{IN}	15	V
SW Voltage	V _{SW}	36	V
FB Voltage	V _{FB}	10	V
SHDN Voltage		15	V
Thermal Resistance (Junction to Atmosphere, no Heat sink)	R _{θJA}	265	°C/W
Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-60-150	°C
Lead Temperature (Soldering, 10sec)	T _{LEAD}	260	°C
ESD (Machine Model)		250	V
ESD (Human Body Model)		2000	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V _{IN}	2.5	12	V
Operating Temperature	T _{OP}	-40	85	°C

Electrical Characteristics

(V_{IN}=3V, V_{SHDN}=3V, T_A=25°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Type	Max	Unit
Feedback Voltage	V _{FB}	I _{SW} =100mA, Duty Cycle=66%	86	95	104	mV
FB Pin Bias Current	I _{FB}			45	100	nA
Supply Current	I _{CC}			1.9	2.5	mA
Supply Current	I _Q	V _{SHDN} =0V		0.1	1.0	μA
Switching Frequency	f		0.8	1.2	1.6	MHz
Maximum Duty Cycle	D _{MAX}		85	90		%
Switch Current Limit	I _{LIM}	D=15%		320		mA
Switch V _{CESAT}	V _{CESAT}	I _{SW} =250mA		350		mV
Switch Leakage Current		V _{SW} =5V		0.01	5	μA
SHDN Voltage	V _{TH}	High	1.5			V
	V _{TL}	Low			0.4	
SHDN Pin Bias Current				50		uA
OVP Voltage	V _{OVP}			29		V

Typical Performance Characteristics

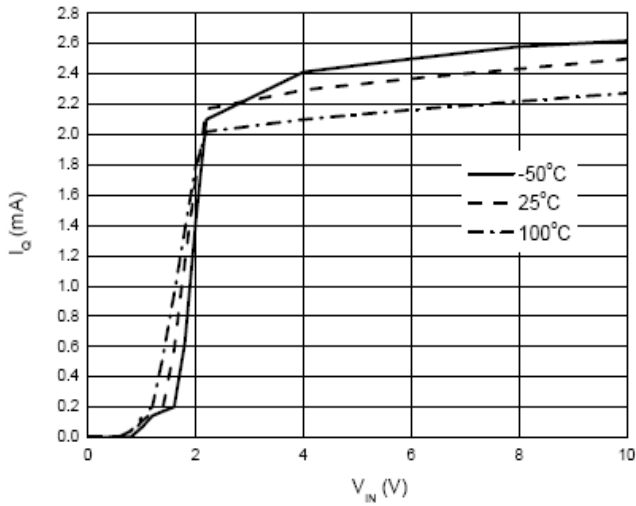


Figure 3. Quiescent Current vs. V_{IN}

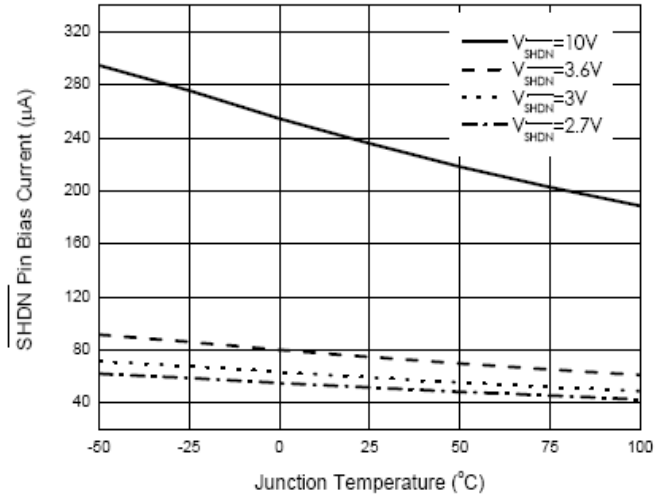


Figure 4. SHDN Pin Bias Current vs. Junction Temperature

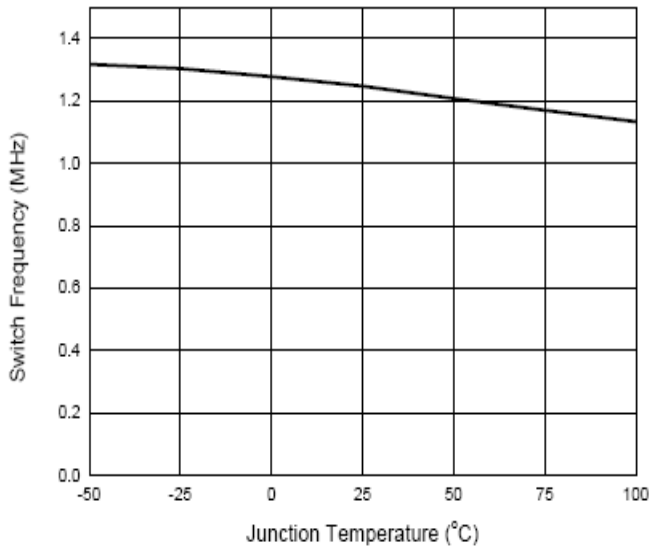


Figure 5. Switch Frequency vs. Junction Temperature

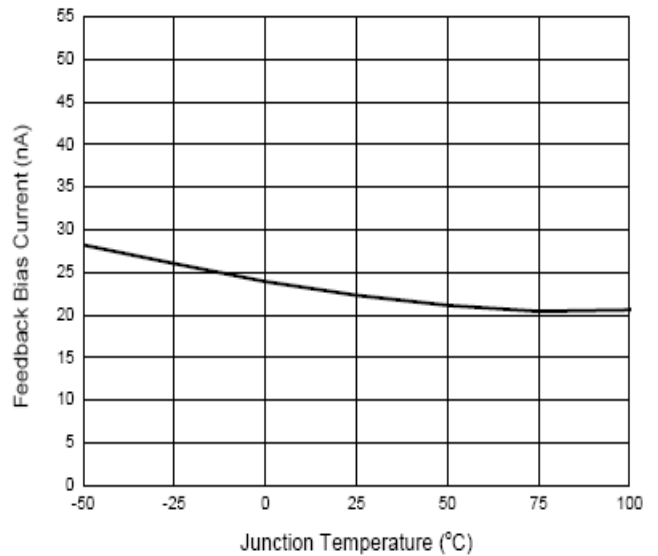


Figure 6. Feedback Bias Current vs. Junction Temperature

Typical Performance Characteristics (Continued)

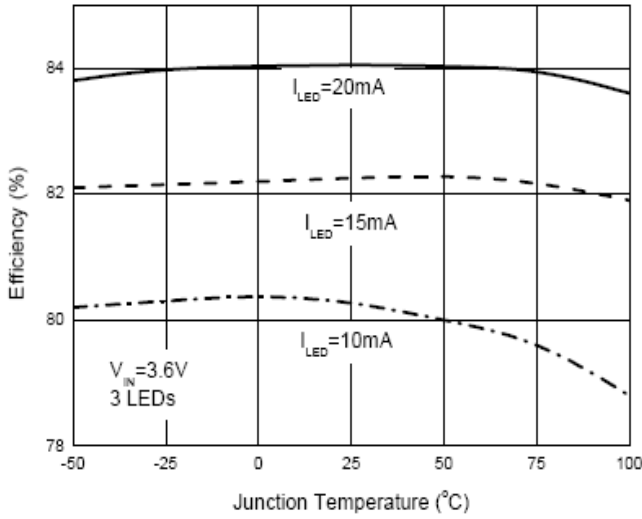


Figure 7. Efficiency vs. Junction Temperature

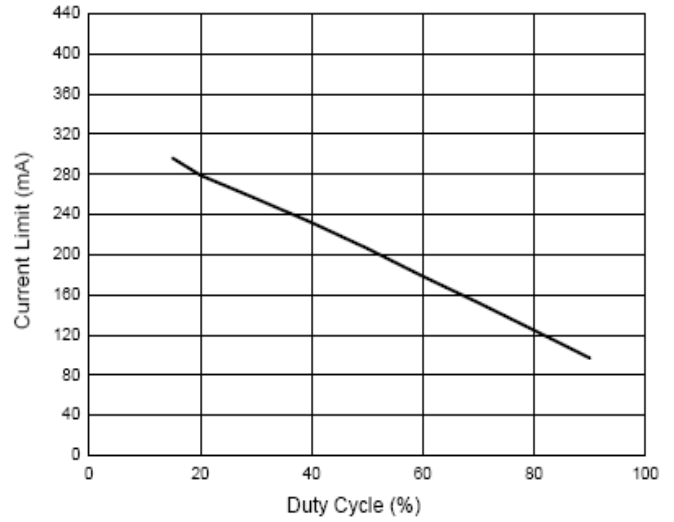


Figure 8. Switch Current vs. Duty Cycle

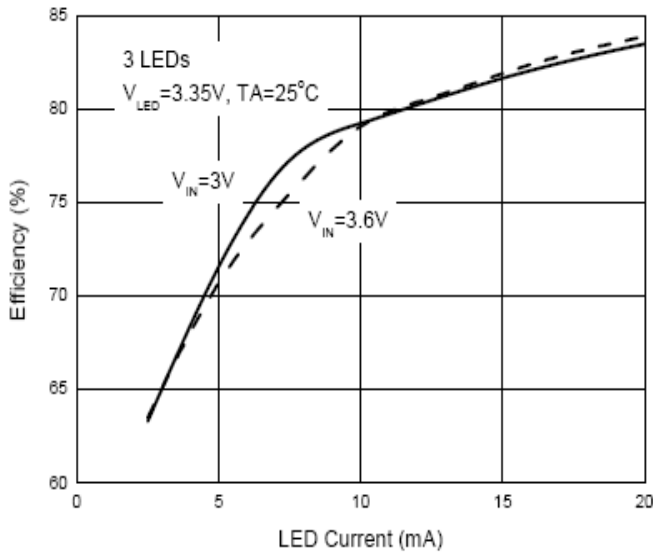


Figure 9. Efficiency vs. LED Current

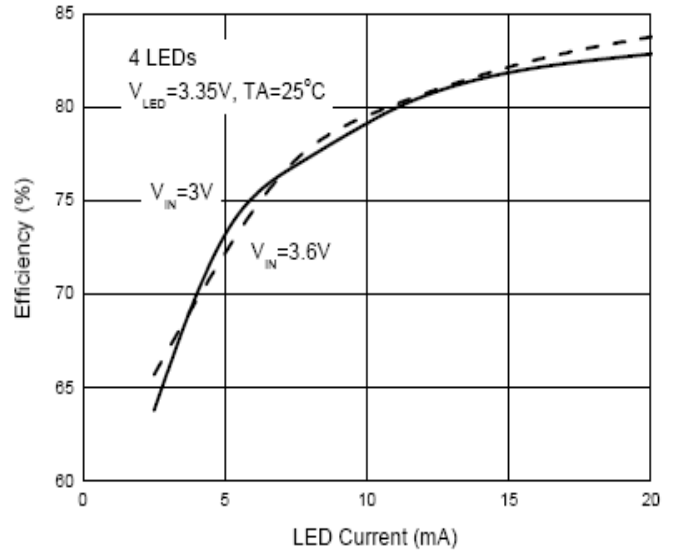


Figure 10. Efficiency vs. LED Current

Typical Application

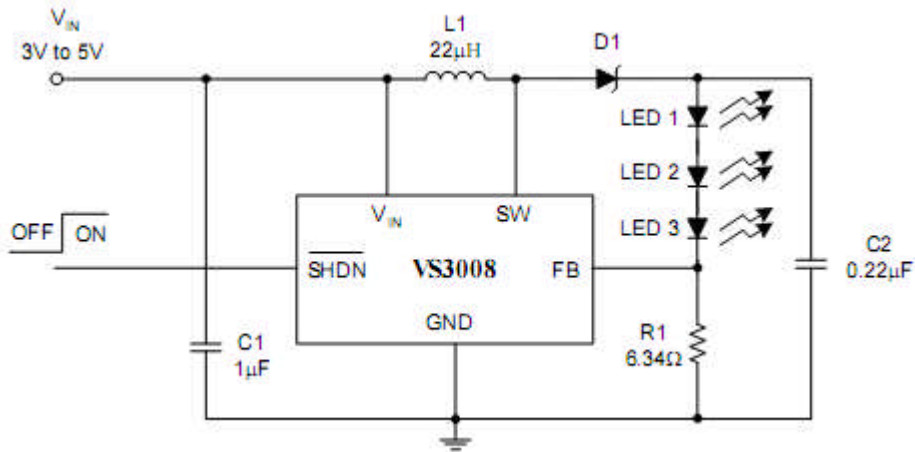


Figure 10. Three White LED Drivers

Mechanical Dimensions

SOT-23-6

Unit: mm(inch)

