

**WHITE LED DRIVER****AP3008****General Description**

The AP3008 is a 1.2MHz PWM boost switching regulator designed for constant-current white LED driver applications.

The AP3008 can drive a string of up to 4 white LEDs from a 3.2V supply or 6 white LEDs from a 5V supply in series, ensuring uniform brightness and eliminating several ballast resistors. The AP3008 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 AP3008 is equipped with OVP protection ability, the SW pin monitors the output voltage and will turn off the device if an overvoltage condition is present to prevent damage from an open circuit condition.

The AP3008 is available in SOT-23-5 package.

**Features**

- Inherently Uniform LED Current
- High Efficiency up to 84%
- Drives up to 4 LEDs from a 3.2V Supply or 6 LEDs from a 5V Supply
- 1.2MHz PWM Operation Frequency
- Requires Only 0.22 $\mu$ F Output Capacitor
- Shutdown Current: < 1 $\mu$ A
- Built-in Output Overvoltage Protection
- Under Voltage Lock Out (UVLO)

**Applications**

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

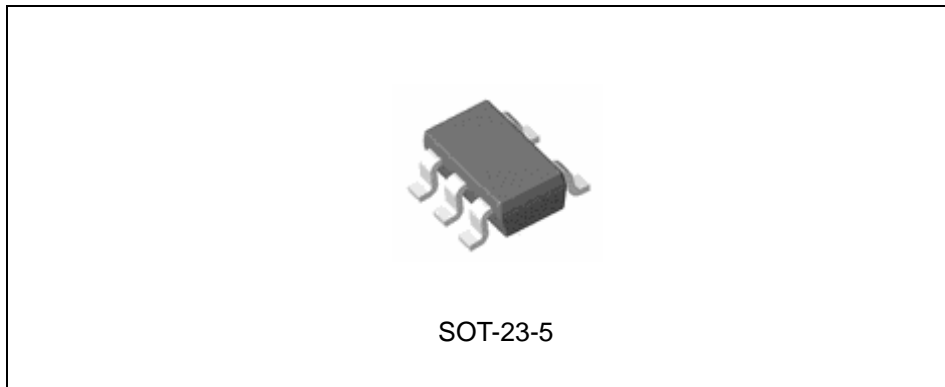


Figure 1. Package Type of AP3008

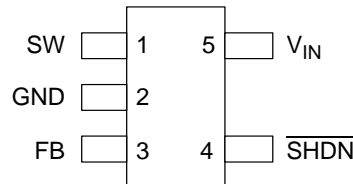
**WHITE LED DRIVER****AP3008****Pin Configuration**K Package  
(SOT-23-5)

Figure 2. Pin Configuration of AP3008 (Top View)

**Pin Description**

Pin Number	Pin Name	Function
1	SW	Switch Pin. Connect inductor/diode here. The output voltage can range up to 29V but not extend this limit. If the voltage on this pin is higher than the overvoltage protection threshold (OVP), the device comes back to shutdown mode. To restart the chip, one must then send a low to high sequence on shutdown pin or switch off the $V_{IN}$ supply.
2	GND	Ground Pin.
3	FB	Voltage Feedback. Reference voltage is 95mV.
4	$\overline{\text{SHDN}}$	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.



**WHITE LED DRIVER**

**AP3008**

**Functional Block Diagram**

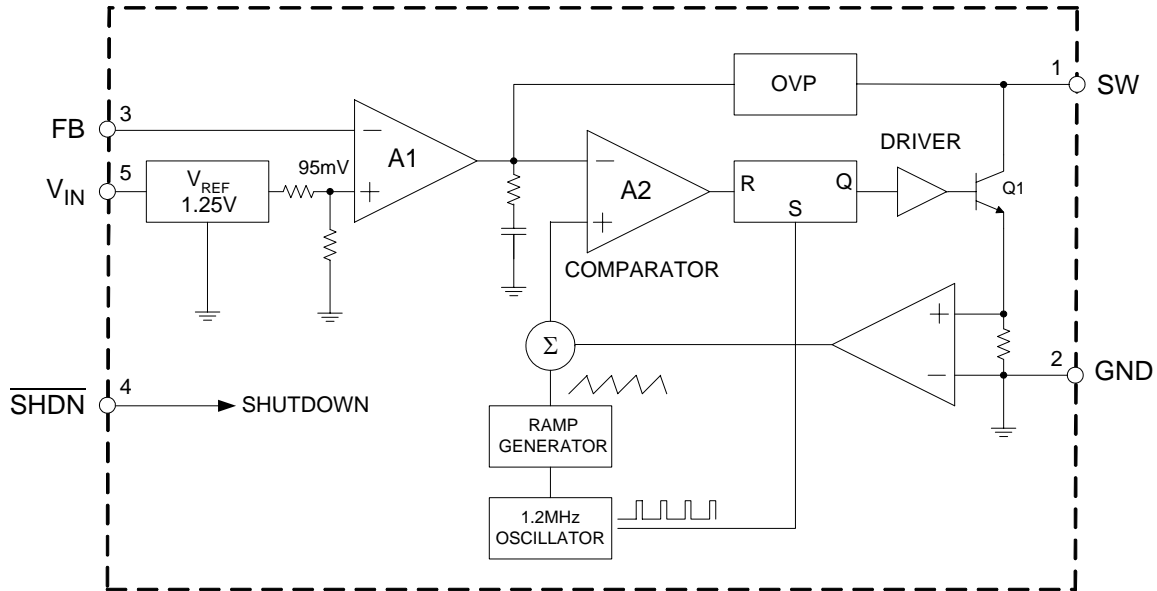
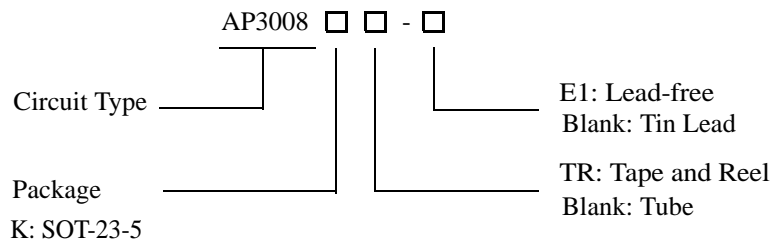


Figure 3. Functional Block Diagram of AP3008

**Ordering Information**



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
SOT-23-5	-40 to 85°C	AP3008KTR	AP3008KTR-E1	K1B	E1B	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**WHITE LED DRIVER****AP3008****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Input Voltage	$V_{IN}$	15	V
SW Voltage		36	V
FB Voltage		10	V
$\overline{SHDN}$ Voltage		15	V
Maximum Junction Temperature		125	°C
Storage Temperature Range	$T_{STG}$	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	300	°C
ESD (Machine Model)		250	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
Operating Temperature Range	$T_{OP}$	-40	85	°C
Operating Voltage Range		2.5	12	V

**WHITE LED DRIVER****AP3008****Electrical Characteristics** $(V_{IN}=3V, V_{\overline{SHDN}}=3V, T_A=25^{\circ}C, \text{ unless otherwise specified.})$ 

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Feedback Voltage	$V_{FB}$	$I_{SW}=100mA, \text{ Duty Cycle}=66\%$	86	95	104	mV
FB Pin Bias Current				45	100	nA
Supply Current				1.9	2.5	mA
		$V_{\overline{SHDN}}=0V$		0.1	1.0	$\mu A$
Switch Frequency			0.8	1.2	1.6	MHz
Maximum Duty Cycle			85	90		%
Switch Current Limit				320		mA
Switch $V_{CESAT}$		$I_{SW}=250mA$		350		mV
Switch Leakage Current		$V_{SW}=5V$		0.01	5	$\mu A$
$\overline{SHDN}$ Voltage		High	1.5			V
		Low			0.4	
$\overline{SHDN}$ Pin Bias Current				50		$\mu A$
OVP Voltage				29		V



**WHITE LED DRIVER**

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**Typical Performance Characteristics**

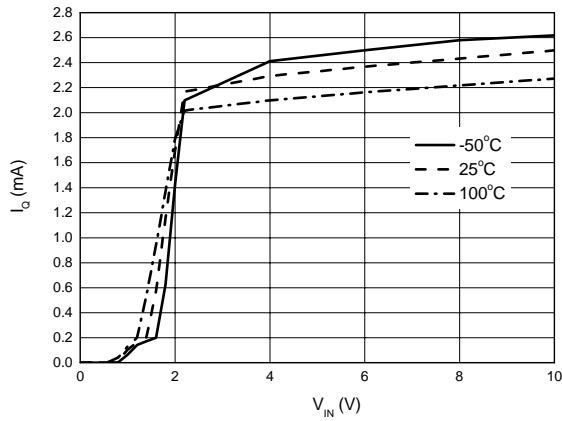


Figure 4. Quiescent Current vs.  $V_{IN}$

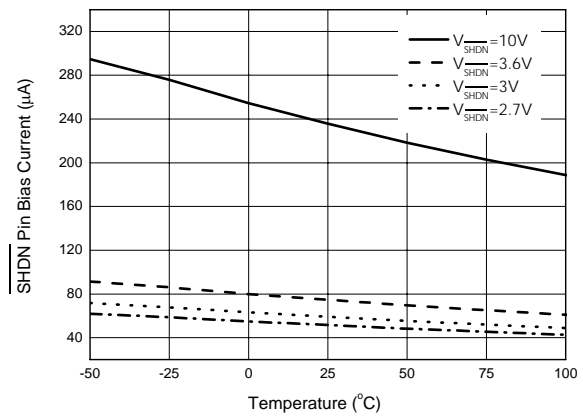


Figure 5. SHDN Pin Bias Current vs. Temperature

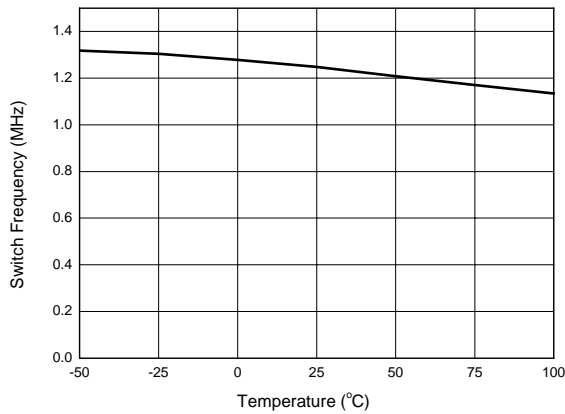


Figure 6. Switch Frequency vs. Temperature

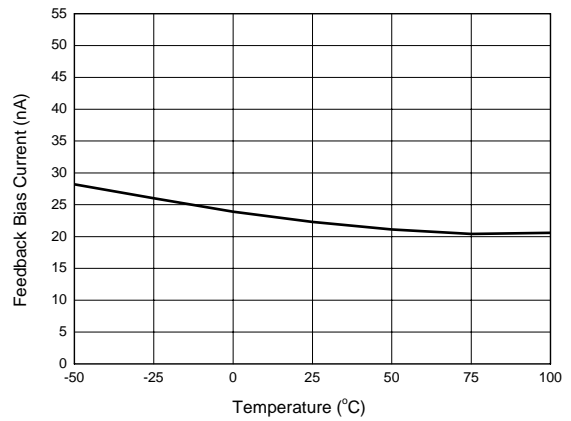


Figure 7. Feedback Bias Current vs. Temperature



**WHITE LED DRIVER**

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**Typical Performance Characteristics (Continued)**

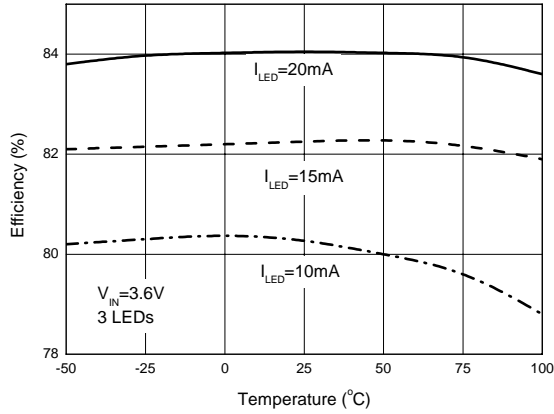


Figure 8. Efficiency vs. Temperature

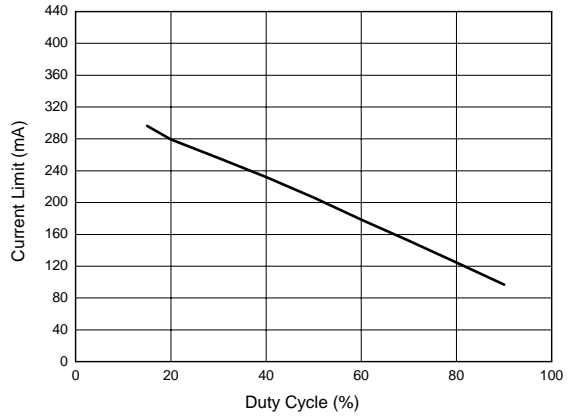


Figure 9. Switch Current vs. Duty Cycle

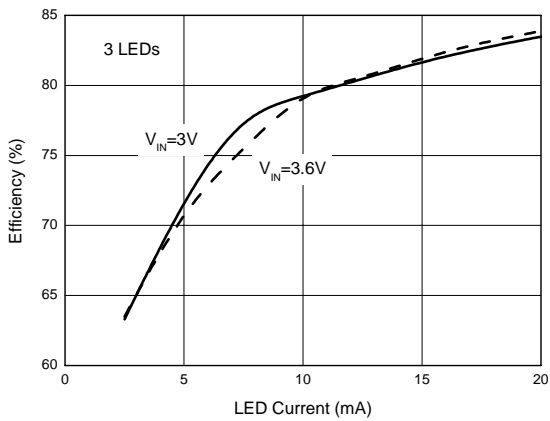


Figure 10. Efficiency vs. LED Current

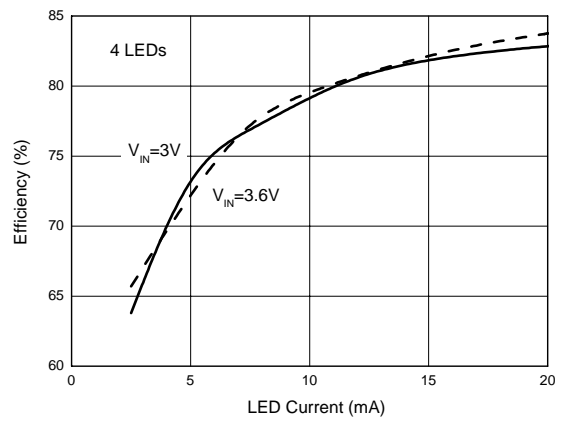


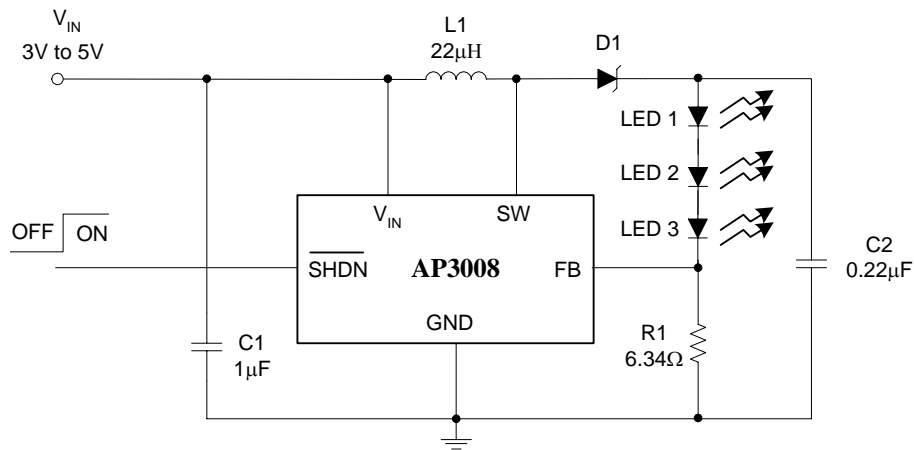
Figure 11. Efficiency vs. LED Current



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**Typical Application**



C1, C2: X5R or X7R Dielectric  
L1: SUMIDA CDRH5D28R-220NC or Equivalent

Figure 12. Three White LEDs Driver





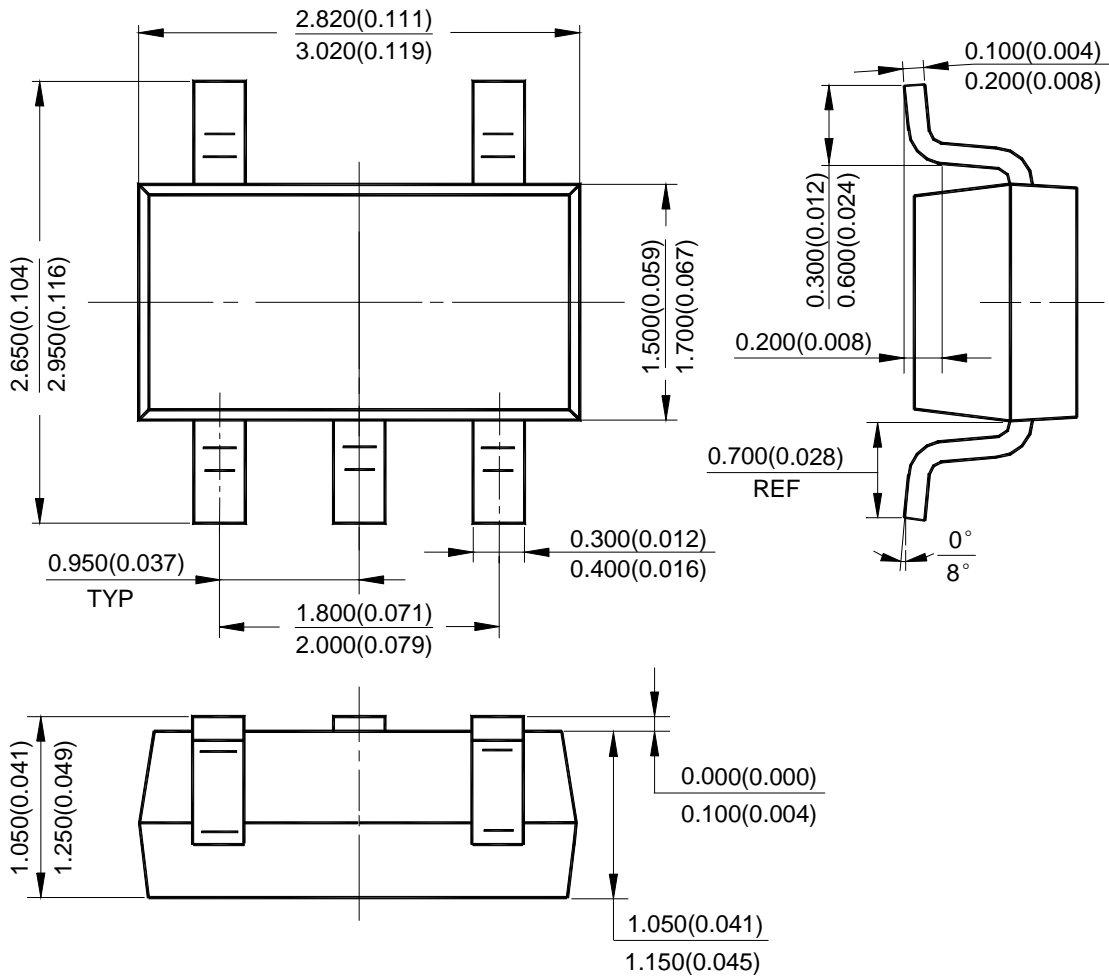
**WHITE LED DRIVER**

**AP3008**

**Mechanical Dimensions**

**SOT-23-5**

**Unit: mm(inch)**





BCD Semiconductor Manufacturing Limited

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