5W HIGH POWER HBLED DRIVER

Description

The PAM2808 is a 5W high power HBLED driver with 1.5A constant current. It features high efficiency and low quiescent current, making it ideal for battery powered applications.

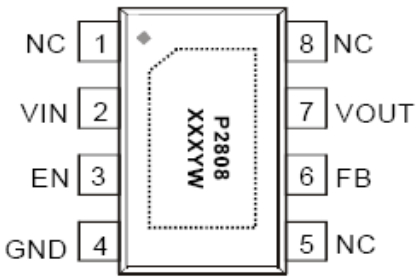
The PAM2808 features overcurrent protection and over temperature shutdown. The PAM2808 is stable with a ceramic output capacitor of 4.7µF or higher.

PAM2808 is available in SO-8EP (Type B) package.

Pin Assignments

Top View

SO-8EP (Type B)



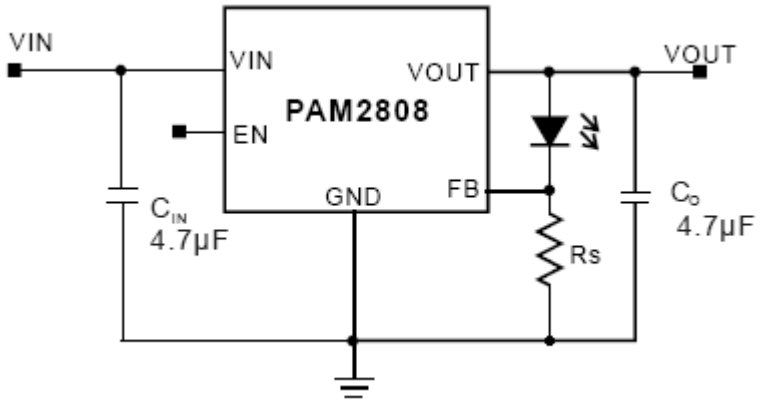
Features

- High Output Current Up to 1.5A
- Low Feedback Voltage: 0.1V
- Stable with a Ceramic Output Capacitor
- Low Quiescent Current
- Open Load LED Protection
- Over Temperature Shutdown
- Low Temperature Coefficient
- Standard SOP-8(EP) Packages
- Pb-Free Package

Applications

- High Bright LED Driver
- White LED Torch (Flashlight)

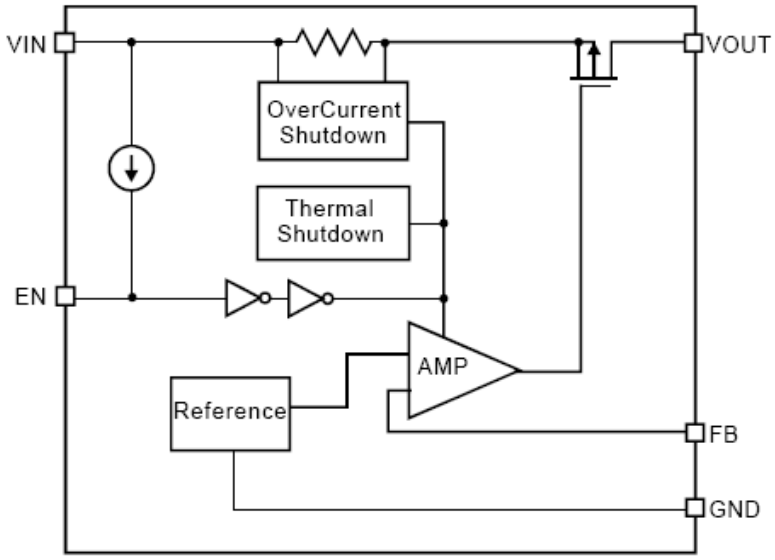
Typical Applications Circuit



Pin Description

Pin Number	Pin Name	Function
1	NC	Not Connected
2	VIN	Input Voltage
3	EN	Enabled
4	GND	Ground
5	NC	Not Connected
6	FB	Feedback
7	VOUT	Output Voltage
8	NC	Not Connected

Block Diagram



Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability. All voltages are with respect to ground.

Parameter	Rating	Unit
Input Pin Voltage	6.5	V
EN, FB VOUT Pin Voltage	-0.3 to V_{IN} +0.3	
Maximum Output Current	$P_D/(V_{IN} – V_O)$	—
Storage Temperature	-65 to +150	°C
Maximum Junction Temperature	+150	
Lead Soldering Temperature	+300	

Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

Parameter	Rating	Unit
Maximum Supply Voltage	6	V
Junction Temperature Range	-40 to +125	°C
Ambient Temperature Range	-40 to +85	

Thermal Information

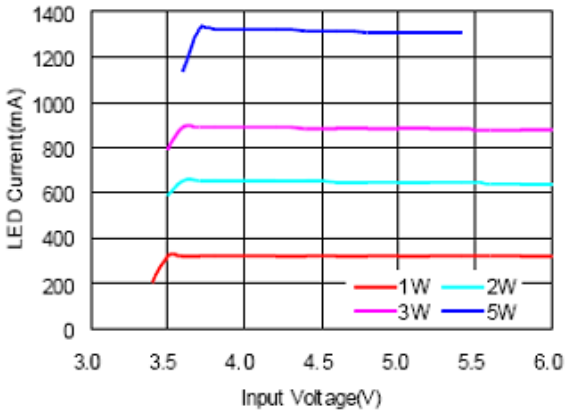
Parameter	Symbol	Package	Max	Unit
Thermal Resistance (Junction to Case)	θ_{JC}	SO-8EP (Type B)	11	°C/W
Thermal Resistance (Junction to Ambient)	θ_{JA}	SO-8EP (Type B)	90	

Electrical Characteristics (@T_A = +25°C, V_{IN} = 4.5V, C_{IN} = 4.7µF, C_O = 4.7µF, unless otherwise specified.)

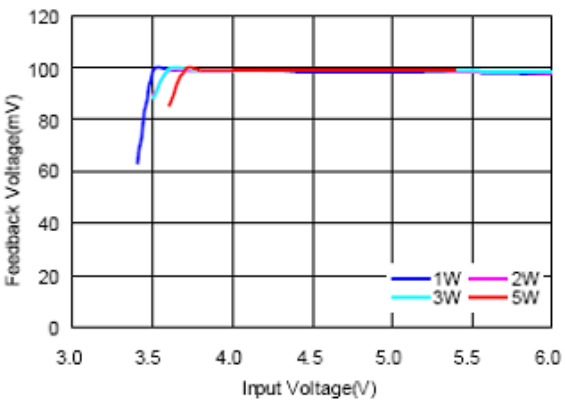
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage Range	V_{IN}	—	2.5	—	6.0	V
FB Reference Voltage	V_{REF}	—	—	0.1	—	V
Output Current	I_O	R_S = 0.3Ω	—	333	—	mA
		R_S = 0.14Ω	—	700	—	
		R_S = 0.1Ω	—	1000	—	
		R_S = 0.067Ω	—	1500	—	
Over Temperature Shutdown	OTS	—	—	+150	—	°C
Over Temperature Hysteresis	OTH	—	—	+40	—	°C
EN Input High Threshold	V_{EH}	V_{IN} = 2.5V to 5V	1.5	—	—	V
EN Input Low Threshold	V_{EL}	V_{IN} = 2.5V to 5V	—	—	0.3	V
Shutdown Current	I_{SD}	V_{EN} = 0V	—	—	1	µA

Typical Performance Characteristics (@T_A = +25°C, C_{IN} = 4.7µF, C_O = 4.7µF, unless otherwise specified.)

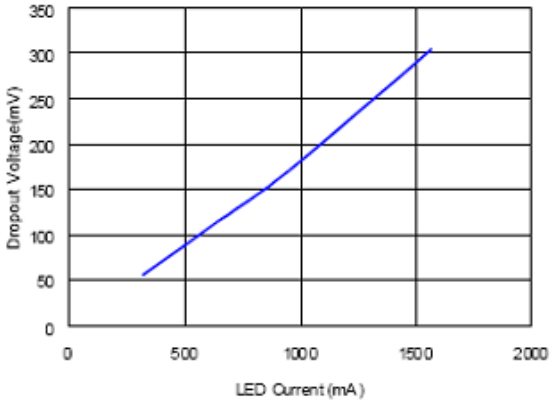
1. LED Current vs Input Voltage



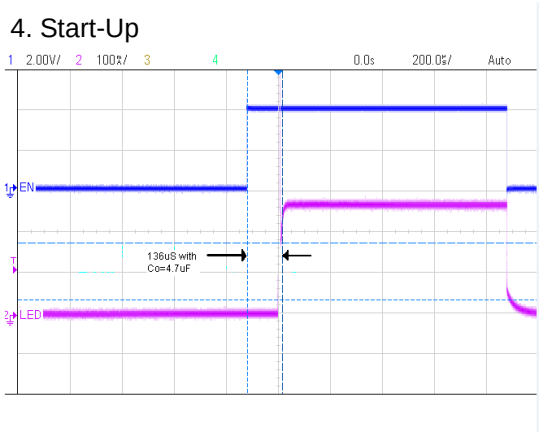
2. Feedback Voltage vs Input Voltage



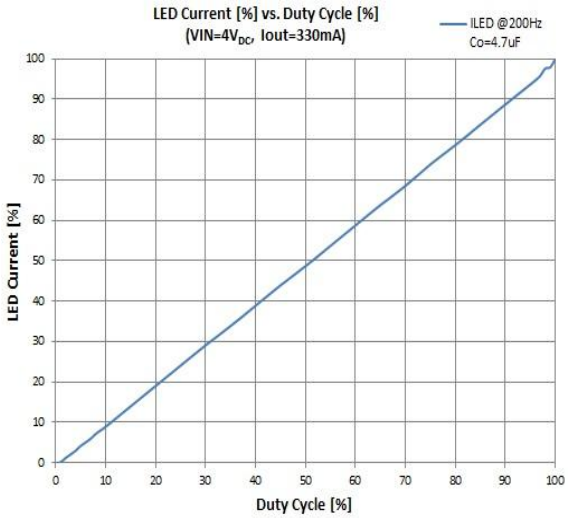
3. Dropout Voltage vs LED Current



4. Start-Up



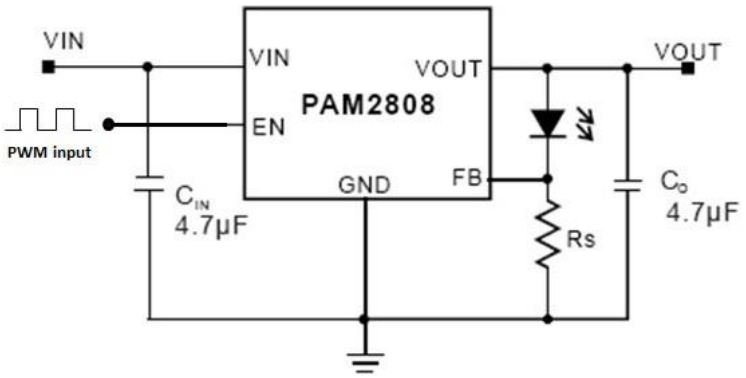
5. PWM Dimming: ILED vs. Duty Cycle



Application Information

PWM Dimming

The PAM2808 can be used to dim LED current dimming by driving the EN pin via PWM waveform. The V_{OUT} pin current is then effectively switched on and off causing the LED current to turn on and off. The recommended PWM frequency is 200Hz (see Figure 5 for details).



External Capacitor Requirements

A 4.7μF or larger ceramic input bypass capacitor, connected between V_{IN} and GND and located close to the PAM2808, is required for stability.
A 4.7μF minimum value capacitor from V_O to GND is also required. To improve transient response, noise rejection and ripple rejection, an additional 10μF or larger, low ESR capacitor is recommended at the output. A higher-value, low ESR output capacitor may be necessary if large, fast-rise-time load transients are anticipated and the device is located several inches from the power source, especially if the minimum input voltage of 2.5V is used.

Regulator Protection

The PAM2808 features internal current limiting, thermal protection and short circuit protection. During normal operation, the PAM2808 limits output current to about 2.5A. When current limiting engages, the output voltage scales back linearly until the over current condition ends. While current limiting is designed to prevent gross device failure, care should be taken not to exceed the power dissipation ratings of the package. If the temperature of the device exceeds +150°C, thermal-protection circuitry will shut down. Once the device has cooled down to approximately +40°C below the high temperature trip point, regulator operation resumes.

Thermal Information

The amount of heat generates is:

$$P_D = (V_{IN} - V_O)I_O$$

All integrated circuits have a maximum allowable junction temperature ($T_{J\ MAX}$) above which normal operation is not assured. A system designer must design the operating environment so that the operating junction temperature (T_J) does not exceed the maximum junction temperature ($T_{J\ MAX}$). The two main environmental variables that a designer can use to improve thermal performance are air flow and external heat sinks. The purpose of this information is to aid the designer in determining the proper operating environment for a linear regulator that is operating at a specific power level.

In general, the maximum expected power ($P_{D(MAX)}$) consumed by a linear regulator is computed as:

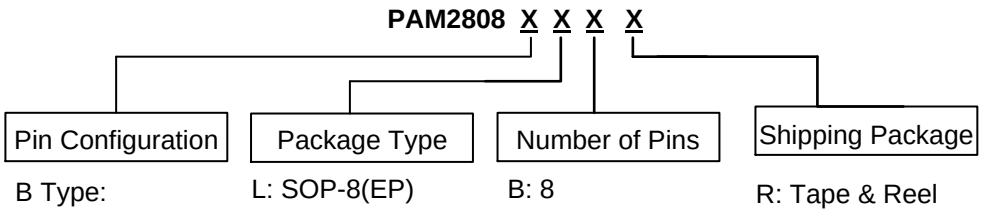
$$P_{DMAX} = (V_{I(AVG)} - V_{O(AVG)}) \times I_{O(AVG)} + V_{I(AVG)} \times I_{(Q)}$$

Where:

$V_{I(AVG)}$ is the average input voltage
$V_{O(AVG)}$ is the average output voltage
$I_{O(AVG)}$ is the average output current
$I_{(Q)}$ is the quiescent current

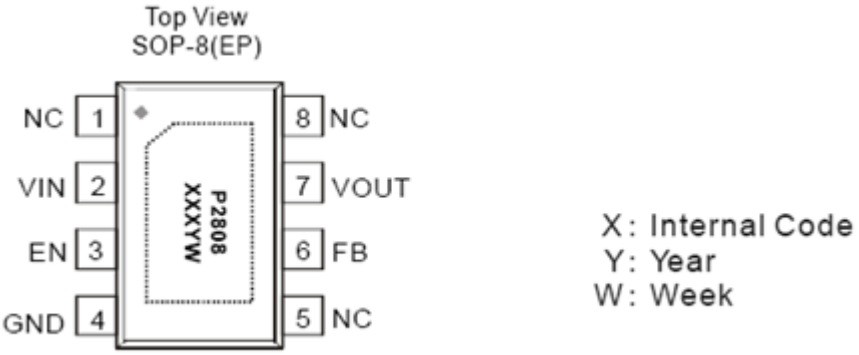
The quiescent current is insignificant compared to the average output current; therefore, the term $V_{I(AVG)} \times I_{(Q)}$ can be neglected. The operating junction temperature is computed by adding the ambient temperature (T_A) and the increase in temperature due to the regulator's power dissipation. The temperature rise is computed by multiplying the maximum expected power dissipation by the sum of the thermal resistances between the junction and the case ($R_{\theta JC}$), the case to heatsink ($R_{\theta JS}$), and the heatsink to ambient ($R_{\theta JA}$). Thermal resistances are measures of how effectively an object dissipates heat. Typically, the larger the device, the more surface area available for power dissipation so that the object's thermal resistance will be lower.

Ordering Information



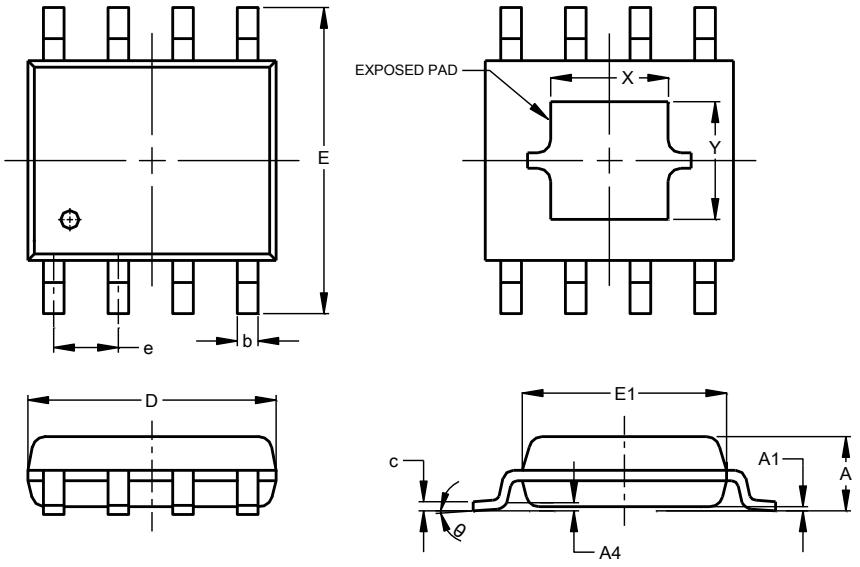
Part Number	Marking	Package Type	Standard Package
PAM2808BLBR	P2808 XXXYW	SO-8EP (Type B)	2,500 Units/Tape&Reel

Marking Information



Package Outline Dimensions (All dimensions in mm.)

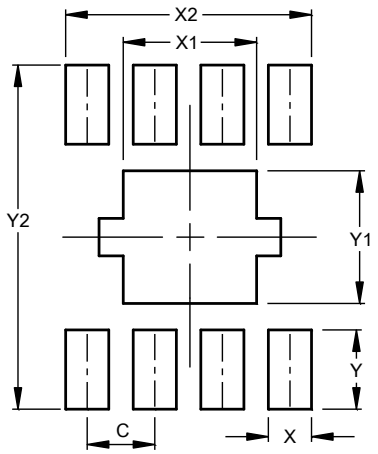
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SO-8EP (Type B)		
Dim	**Min**	**Max**
A	1.35	1.75
A1	0.00	0.15
A4	0.40	0.90
b	0.35	0.49
c	0.19	0.25
D	4.80	5.00
E	5.80	6.20
E1	3.80	4.00
e	1.27 TYP	
θ	0°	8°
Option 1	X	2.28
	Y	2.28
Option 2	X	2.41
	Y	3.30
All dimensions in mm		

Suggested Pad Layout (All dimensions in mm.)

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)	
C	-	1.270
X	-	0.820
X1	Option 1	2.480
X1	Option 2	2.610
X2	-	4.730
Y	-	1.500
Y1	Option 1	2.480
Y1	Option 2	3.500
Y2	-	6.500

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