

Description

The PAM2800 is a high-power white LED driver with 350mA constant rated source current. It features high-efficiency and low quiescent current, making it ideal for battery-powered applications.

Features

- High Efficiency 92%
- Up to 350mA Constant Source Current
- Low Quiescent Current: Typ. 65µA
- 0.5µA Shutdown Current
- Short Circuit Protection
- Open Load LED Protection
- Thermal Protection
- Space Saving Package SOT25
- Pb-Free Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Pin Assignments

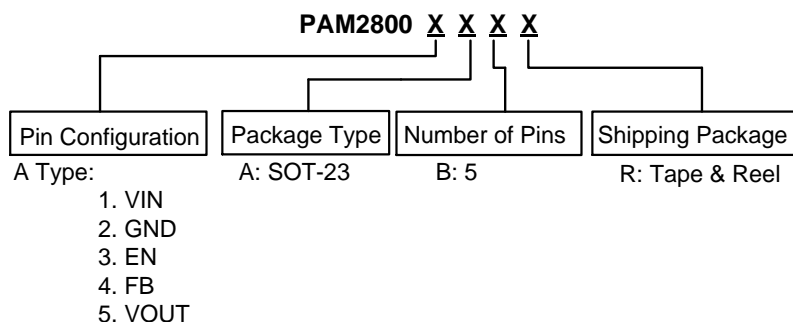
Top View
SOT23-5



Applications

- High Power White LED Driver

Ordering Information



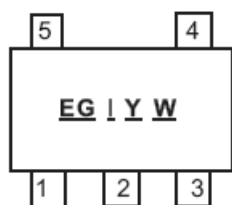
Part Number	Output Current	Marking	Package Type	Standard Package
PAM2800AABR	350mA	EGAYW	SOT25	3,000 Units/Tape & Reel

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Marking Information

Top View
SOT23-5



EG: Product Code of PAM2800
I: Current Code
Y: Year
W: Week

Typical Applications Circuit

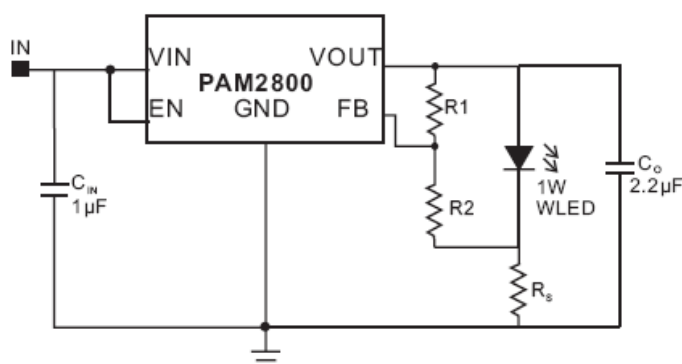
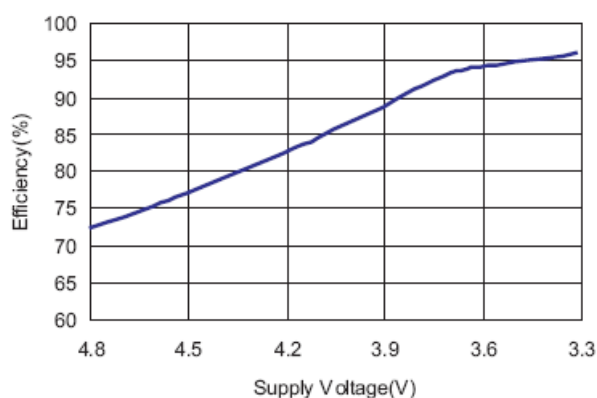


Figure 1



Pin Description

Pin Number	Pin Name	Function
1	VIN	Input
2	GND	Ground
3	EN	Chip Enable (Active High)
4	FB	Feedback
5	VOUT	Output

Absolute Maximum Ratings (@TA = +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 Voltage	6	V
Output Current	350	mA
Output Pin Voltage	GND -0.3 to VIN +0.3	V
Lead Soldering Temperature	300, (5sec)	°C
Storage Temperature	-65 to +150	°C

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

Parameter	Rating	Unit
Maximum Supply Voltage	5.5	V
Junction Temperature	-40 to +125	°C
Operation Temperature	-40 to +85	

Thermal Information

Parameter	Symbol	Package	Max	Unit
Thermal Resistance (Junction to Case)	θ_{JC}	SOT25	130	°C/W
Thermal Resistance (Junction to Ambient)	θ_{JA}	SOT25	250	
Internal Power Dissipation	P _D	SOT25	400	mW

Electrical Characteristics (@T_A = +25°C, V_{IN} = 3.7V, C_{IN} = 1μF, C_O = 2.2μF, unless otherwise specified.)

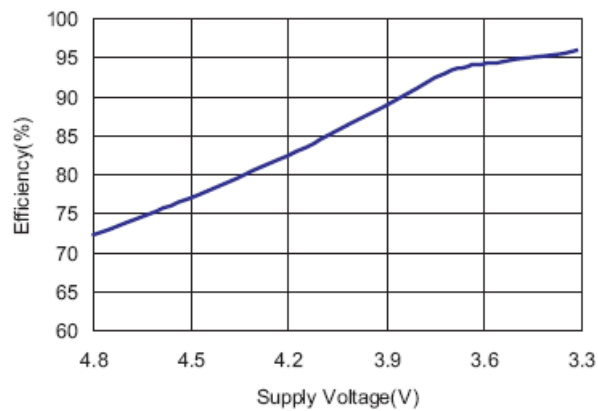
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage	V _{IN}	-	-	-	5.5	V
Feedback Voltage (Note 4)	V _{FB}	-	-	1.12	-	V
Output Current	I _O	-	300	-	-	mA
Quiescent Current	I _Q	No Load	-	65	90	μA
Efficiency	Eff	-	90	92	-	%
Overtemperature Shutdown	OTS	I _O = 1mA	-	150	-	°C
Overtemperature Hysteresis	OTH	I _O = 1mA	-	30	-	°C

Note: 4. Feedback voltage tolerance ±3%.

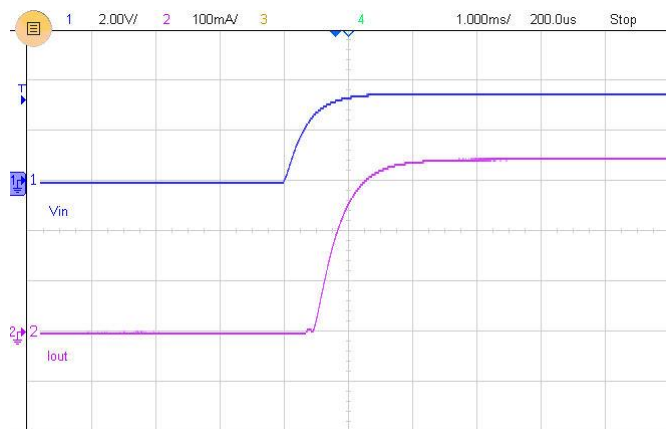
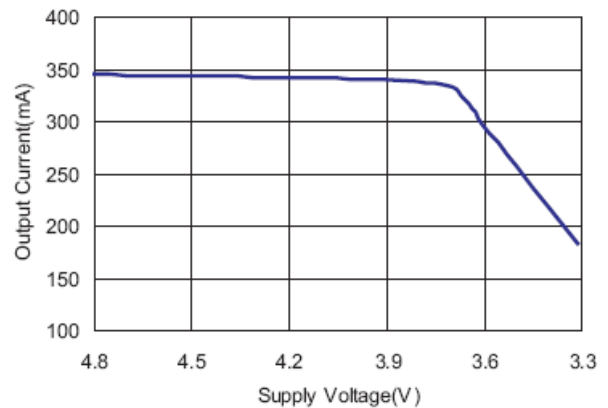
Typical Performance Characteristics

(@T_A = +25°C, C_{IN} = 1μF, C_O = 2.2μF, R₁ = 62kΩ, R₂ = 33kΩ, R_S = 0.22Ω, unless otherwise specified.)

Efficiency vs Supply Voltage



Output Current vs Supply Voltage



Startup time

Application Information

In the typical application (see Figure 1), the LED current will come to constant current level little by little after the device is powered. A 62K Ω resistor is recommended for R1, the value for R2 should be adjusted around 33K Ω due to LED forward voltage from lot-to-lot or brand-to-brand.

Power Dissipation and Thermal Consideration

Thermal protection limits power dissipation in the PAM2800. When the operation junction temperature exceeds +150°C, the OTP (Overtemperature Protection) starts the thermal shutdown and turns the pass transistor off. The pass transistor resumes operation after the junction temperature drops below +120°C.

For continuous operation, the junction temperature should be maintained below +125°C. The power dissipation is defined as:

$$P_D = (V_{IN} - V_{OUT}) * I_O + V_{IN} * I_{GND}$$

The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surrounding airflow and temperature difference between junction and ambient. The maximum power dissipation can be calculated by the following formula:

$$P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$$

Where $T_{J(MAX)}$ is the maximum operation junction temperature +125°C. T_A is the ambient temperature, and θ_{JA} is the thermal resistance from the junction to the ambient.

For example, as θ_{JA} is +250°C/W for SOT25, based on the standard JEDEC 51-3 for a single layer thermal test board, the maximum power dissipation for SOT25 package at $T_A = +25^\circ\text{C}$ can be calculated by following formula:

$$P_{D(MAX)} = (125^\circ\text{C} - 25^\circ\text{C}) / 250 = 0.4\text{W}$$

To calculate the junction temperature of the PAM2800 SOT25 package, if we use input voltage $V_{IN} = 4\text{V}$ at an output current $I_O = 300\text{mA}$ and the case temperature $T_A = 40^\circ\text{C}$ measured by the thermal couple while operating, the power dissipation is defined as:

$$P_D = (4\text{V} - 2.8\text{V}) * 300\text{mA} + 4\text{V} * 70\mu\text{A} \approx 360\text{mW}$$

Setting the I_{LED} Current

The LED current is set by the use of an external resistor, R_S . This resistor supplies the bias current of the PAM2800 together with current regulator to set the LED current.

$$I_{LED} \approx (V_{OUT} - (1 + R_1/R_2) * V_{FB}) / R_S$$

The external resistor, R_S is determined by this equation:

$$R_S \approx (V_{OUT} - (1 + R_1/R_2) * V_{FB}) / I_{LED}$$

For example: $V_{OUT} \approx 3.3\text{V}$ for 1 LED, $V_{FB} = 1.12$ (Typ. value from page 3), $R_2 = 33\text{k}\Omega$, $R_1 = 62\text{k}\Omega$, and $I_{LED} = 350\text{mA}$

$$R_S \approx (V_{OUT} - (1 + R_1/R_2) * V_{FB}) / I_{LED}$$

$$R_S \approx (3.3 - (1 + (62\text{k}/33\text{k})) * 1.12) / 0.35$$

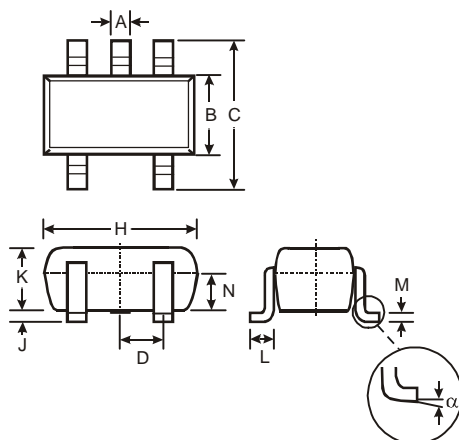
$$\approx 0.22\Omega$$

Notes: 1. V_{OUT} is approximately the LED forward voltage drop minus V_S which is insignificant.

2. If the V_{OUT} is lower than 3.3V, then the ratio of R1 and R2 needs to be adjusted to keep the $((1 + R_1/R_2) * V_{FB})$ term smaller than V_{OUT} .

Package Outline Dimensions (All dimensions in mm.)

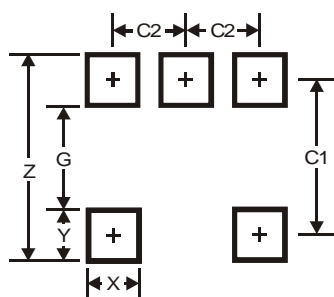
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



Dimensions	Value
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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