Inductorless 700mA Flash LED Driver

Features

- Input voltage range: 3V~4.3V
- High efficiency LED driver
- Flash-mode: drive up to 700mA
- Movie/torch-mode dimming via PWM control
- One resistor sets flash-mode LED current
- One resistor sets movie/torch-mode LED current
- LED short protection
- 0.1 μA shutdown current
- DFNWB2 2-8L Package
  - Only 0.75mm Height
  - RoHS Compliant
- -40 to +85 C° Temperature Range

Applications

- Digital Still Cameras
- Smart Phones and PDAs
  Mobile Phones

Description

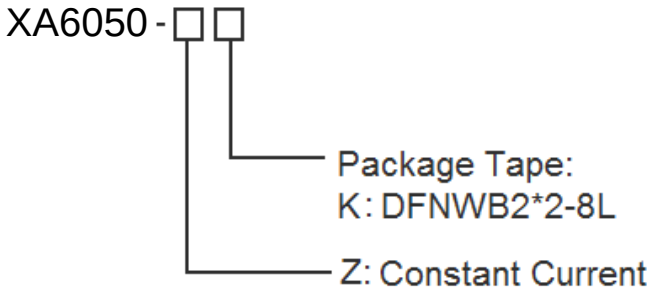
The XA6050 is the ideal power solution for flash LEDs used with cell phone camera modules or digital still cameras. It is a highly integrated linear flash LED driver, providing a very small total solution for portable photo flash with minimum external components. The XA6050 has a flash-mode and movie/torch-mode switching pin for maximum flexibility. The flash-mode and movie/torch-mode LED current is programmed by external resistors respectively, making the flash LED solution simple to control.

The LED output can drive flash LEDs up to 700mA continuous LED current.

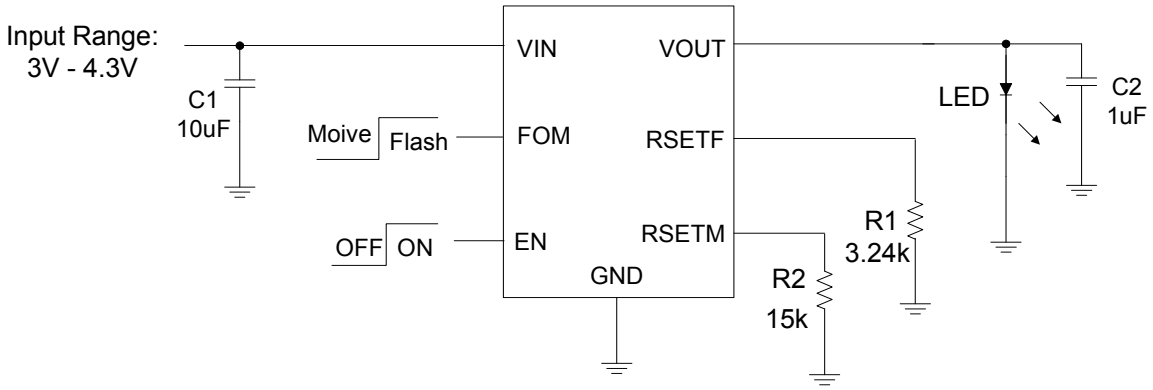
Various protection features are built into the XA6050, LED fault (short circuit) protection and thermal shutdown protection. The leakage current in shutdown mode is 0.1μA.

The XA6050 is available in a RoHS compliant DFNWB2 2-8L Package.

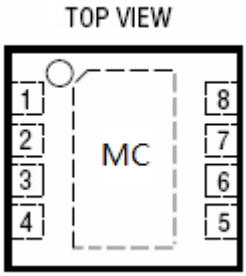
Ordering Information



Application Circuit



Pin Assignment



DFNWB2 2-8L

PIN NUMBER	PIN NAME	FUNCTION
1	RSETF	Flash-mode current setting pin
2, 5	VIN	Input supply pin for the IC
3	FOM	Flash (high) or Movie/torch (low) mode selection.
4	RSETM	Movie/torch current setting pin.
6	VOUT	Regulated output current, up to 700mA current
7	GND	Ground
8	EN	Chip high enable pin
	MC	Exposed metal pad. Connect to ground for electrical and thermal usage.

Absolute Maximum Ratings (Note 1)

- VIN,VOUT ..... –0.3V to 6V
- EN,FOM,RSETF,RSETM..... – 0.3V to VIN + 0.3V
- Maximum Junction Temperature 125
- Operating Ambient Temperature Range (Note 2)..... –40 to 85
- Storage Temperature Range ..... –65 to 125
- Lead Temperature (Soldering, 10 sec)..... 265

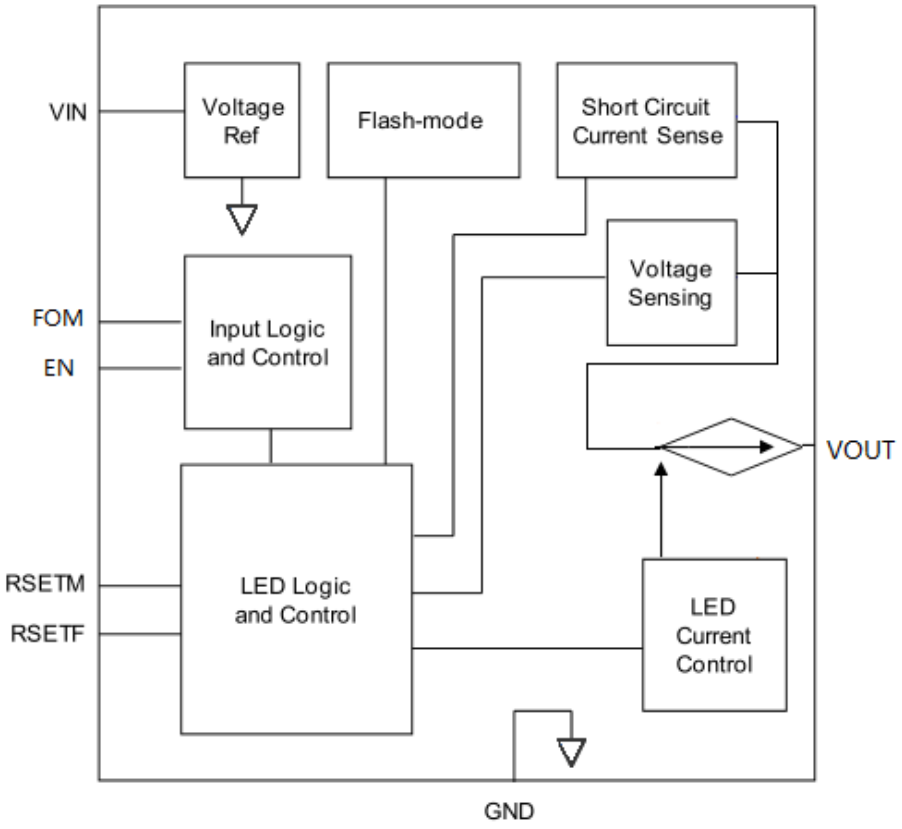
Note 1: Absolute Maximum Ratings are those values beyond which the life of the device may be impaired.

Note 2: The XA6050 is guaranteed to meet performance specifications from 0°C to 70°C. Specifications over the –40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.

Recommended Operating Voltage

- VIN,VOUT ..... 3V to 4.3V

Functional Block Diagram



Electrical Characteristics

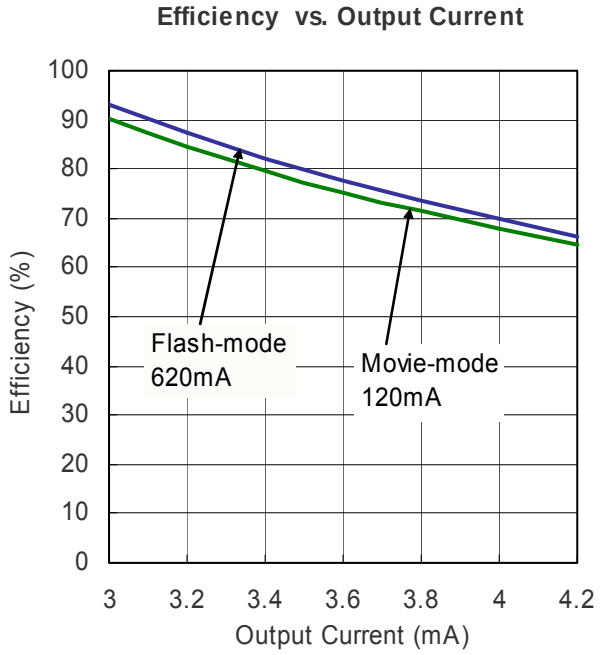
Operating Conditions: T_A=25 , C1=10uF, C2=1uF, R1=3.24k, R2=15k, VIN=3.6V, unless otherwise specified.

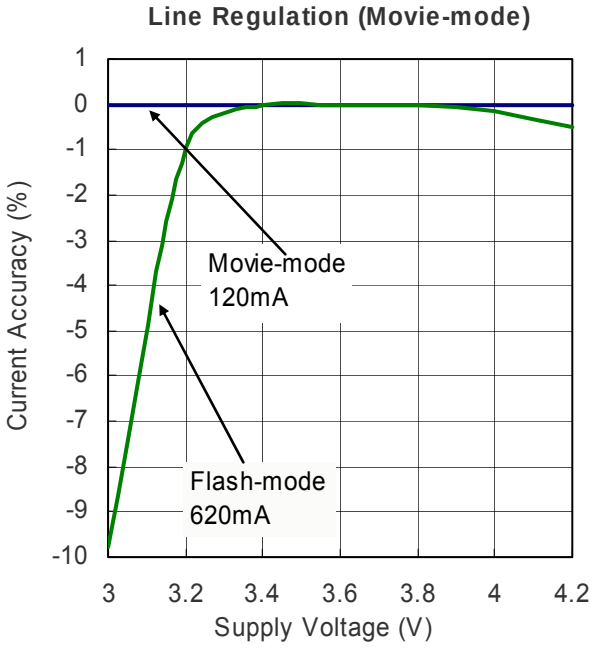
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
IC Supply						
V_{IN}	Input operating voltage range		3		4.3	V
UVLO	Input under voltage lockout	Rising edge		2.7		V
$UVLO_{HYST}$	UVLO hysteresis			0.1		V
I_Q	IC quiescent current			80		uA
I_{SHDN}	V_{IN} pin shutdown current	EN=FOM=GND		0.1		uA
Current Setting						
I_{OUT}	Total Output Current Movie/Torch Mode	EN=HIGH, FOM=GND, R_{SETM} =15kΩ.		120		mA
	Total Output Current, Flash Mode	EN=FOM=HIGH, R_{SETF} =3.24kΩ.		620		mA
Control						
V_{TH-L}	EN pin logic low threshold				0.5	V
V_{TH-H}	EN pin logic high threshold		2.5			V
T_{J-TH}	IC junction thermal shutdown threshold			150		C
	IC junction thermal shutdown hysteresis			20		C

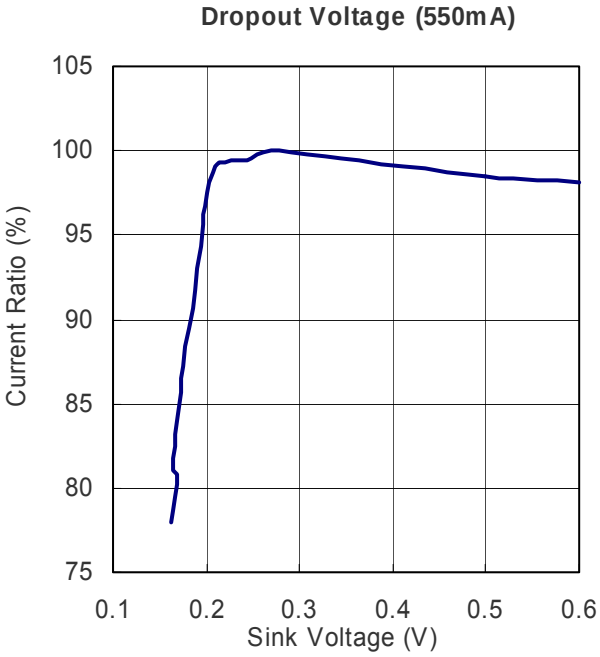
Note: 1. The XA6050 is guaranteed to meet performance specifications over the –40°C to +85°C operating temperature range by design, characterization and correlation with statistical process controls.

Typical Performance Characteristics

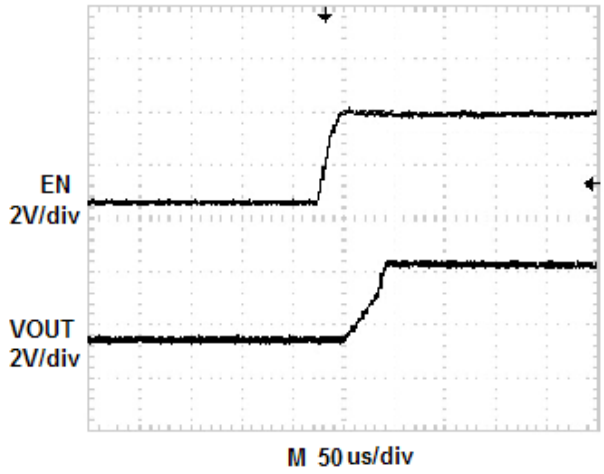
Operating Conditions: T_A=25 , C1=10uF, C2=1uF, VIN=3.6V, unless otherwise specified.



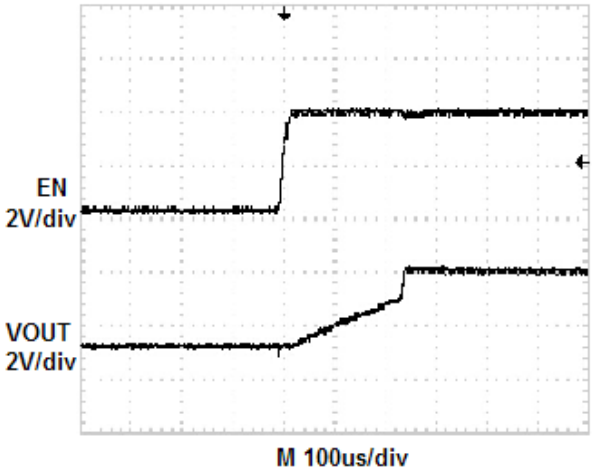




Flash Turn On (Vin=4V, 620mA)



Movie-Mode Turn On (Vin=4V, 120mA)



Application Information

The XA6050 is a highly integrated flash LED driver. A high current regulating device is integrated to drive up to 700mA flash LEDs.

The current regulation is accomplished by using a no-noise linear topology. The XA6050 eliminates the external components used for conventional charge pump and DC/DC boost circuits, while still maintaining high power efficiency. The use of unique control schemes maintains accurate current regulation in the current source while leaving the regulation voltage headroom at a minimum, increasing the usable battery voltage range. The current source can drive up to 700mA flash LED.

The control interface is designed for maximum design flexibility and compatibility with various types of system controls. When the EN and FOM are pulled high, the LED current will be ramped up to the flash mode current level which is programmed by RSETF resistor (R1). When EN is pulled high while the FOM is low, the LED current will be ramped up to the movie/torch-mode current level which is programmed by RSETM resistor (R2).

The driver IC and the flash LEDs will be shutdown when EN is at logic low.

Flash-Mode LED Current (Figure 1)

Flash-mode LED current can be programmed up to a maximum total current of 700mA. The flash-mode current is set by the RSETF resistor. For the desired flash-mode current, the resistor value can be calculated using the following equation: I_{Flash}= 2000/R1 (Table 1).

R1 (kΩ)	Current (mA)
6.6	300
5	400
4	500
3.4	600
2.9	700

Table 1, Current Setting Resistor

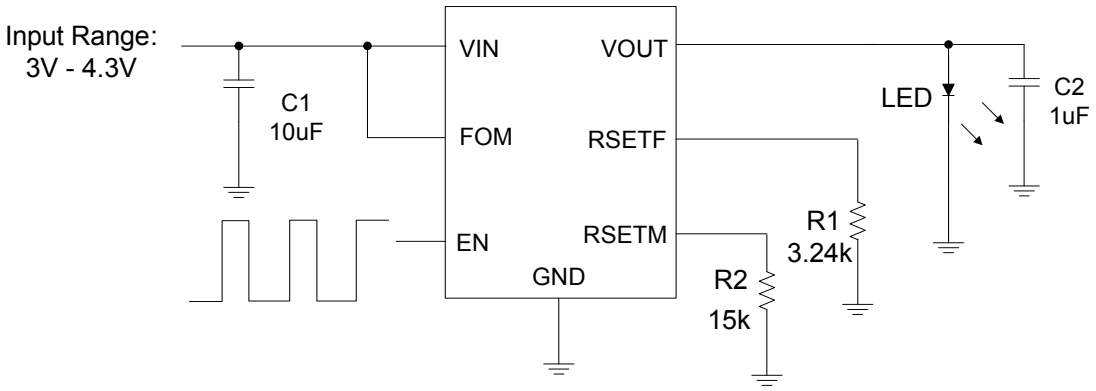


Figure 1: Flash Mode

✧ I_{Flash}= 2000/R1

Movie/Torch-Mode LED Current (Figure 2)

Movie/torch-mode LED current can be programmed up to a maximum total current of 200mA. The movie/torch mode current is set by the RSETM resistor. For the desired movie/torch-mode current, the resistor value can be calculated using the following equation: I_{Movie}= 1800/R2 (Table 2).

R2 (kΩ)	Current (mA)
34	50
18	100
12.5	150
9.8	200

Table 2, Current Setting Resistor

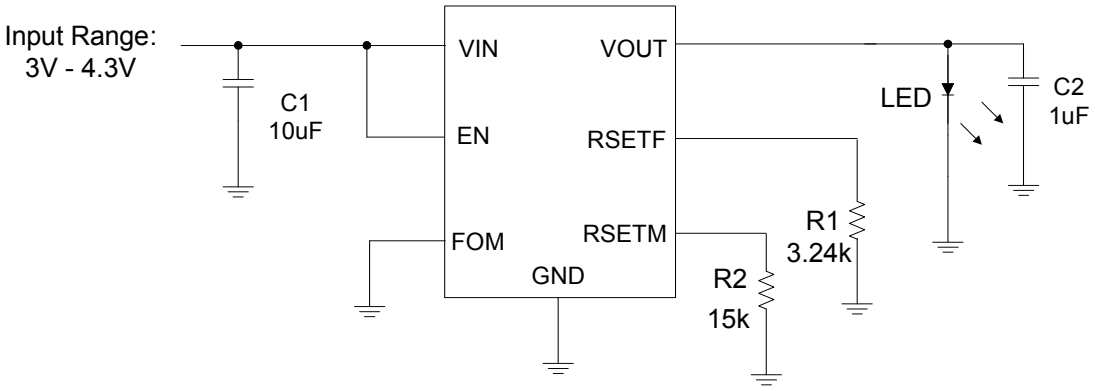
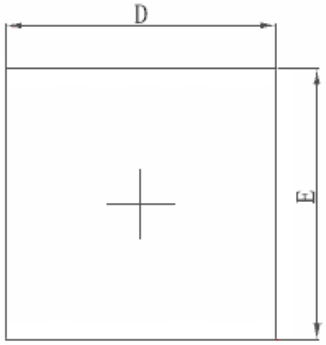


Figure 2: Movie/Torch Mode

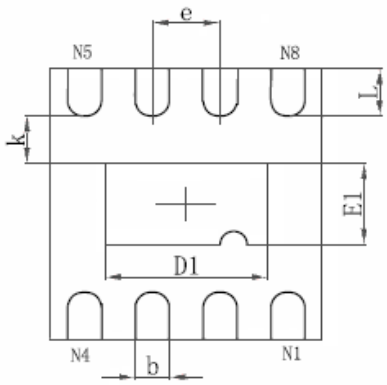
✧ I_{Movie}= 1800/R2

Packaging Information

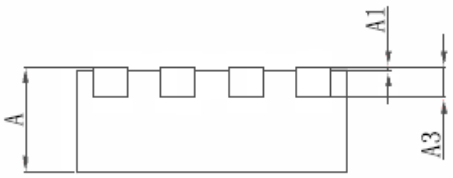
DFNWB2*2-8L Package Outline Dimension



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF		0.008REF	
D	1.900	2.100	0.075	0.083
E	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E1	0.500	0.700	0.020	0.028
k	0.200MIN		0.008MIN	
b	0.180	0.300	0.007	0.012
e	0.500TYP		0.020TYP	
L	0.250	0.450	0.010	0.018