. 3 3

Description

The CAT3636 is a high efficiency fractional charge pump that can drive up to six LEDs programmable by a one wire digital interface. The inclusion of a 1.33x fractional charge pump mode increases devic4eo639.6 (efficien uTf0.s1/cey)23.036 ef06 ef061 8i.208 71s4e22F(s[da99))di.33x

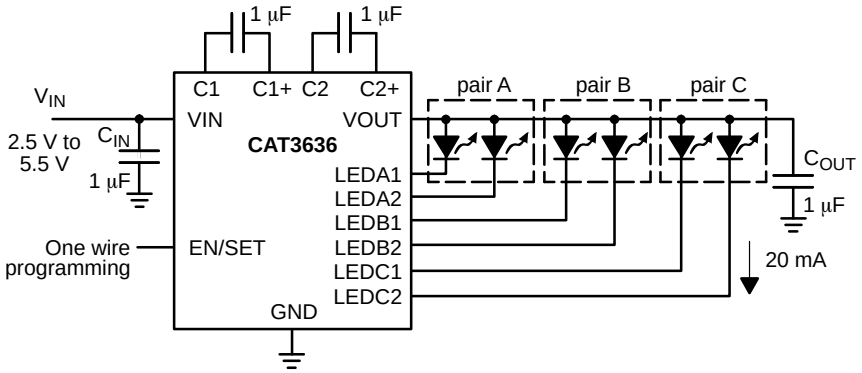


Figure 1. Typical Application Circuit

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Unit
VIN, LEDx, C1±, C2± voltage	6	V
VOUT Voltage	7	V
EN/SET Voltage	VIN + 0.7 V	V
Storage Temperature Range	65 to +160	°C
Junction Temperature Range (Note 3)	40 to +150	°C
Lead Temperature	300	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 2. RECOMMENDED OPERATING CONDITIONS

Parameter	Range	Unit
VIN	2.5 to 5.5	V
Ambient Temperature Range (Note 3)	40 to +85	°C
I_{LED} per LED pin	0 to 32	mA
Total Output Current	0 to 192	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

C

TYPICAL PERFORMANCE CHARACTERISTICS

(V_{IN} = 3.6 V, I_{OUT} = 120 mA (6 LEDs at 20 mA), C_{IN} = C_{OUT} = C1 = C2 = 1 μF, T_{AMB} = 25°C unless otherwise specified.)

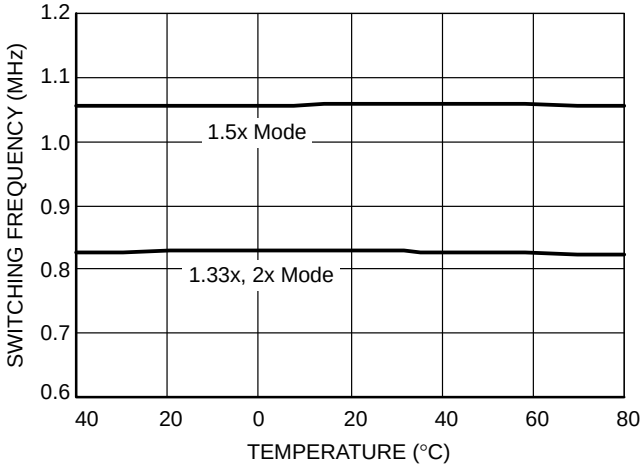


Figure 8. Switching Frequency vs. Temperature

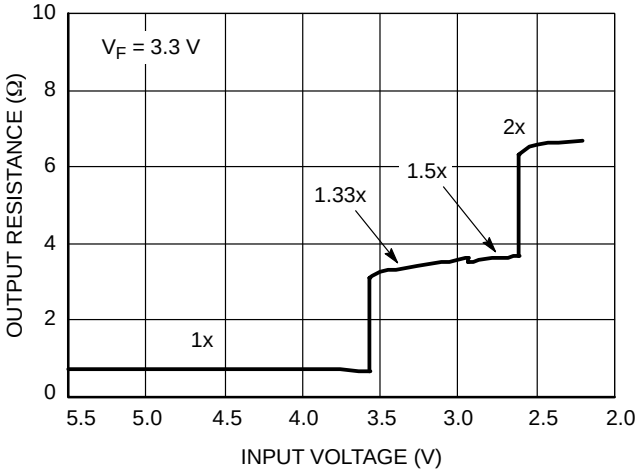


Figure 9. Output Resistance vs. Input Voltage

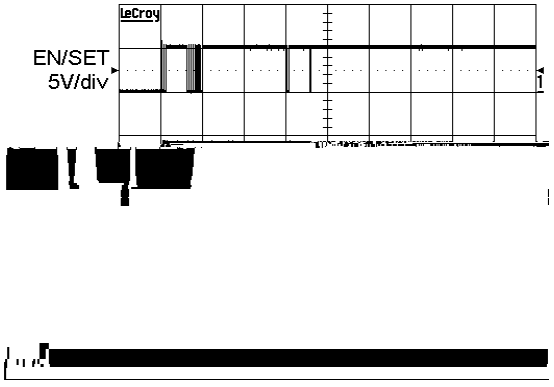


Figure 10. Power Up in 1x Mode

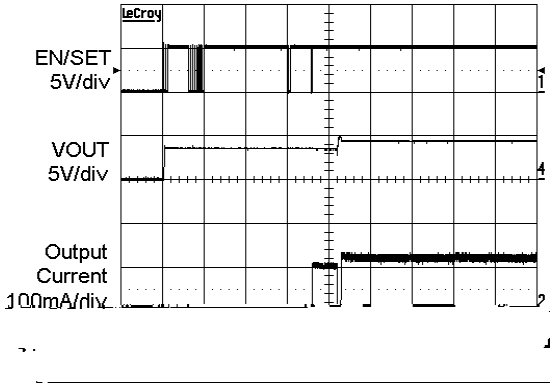


Figure 11. Power Up in 1.33x Mode

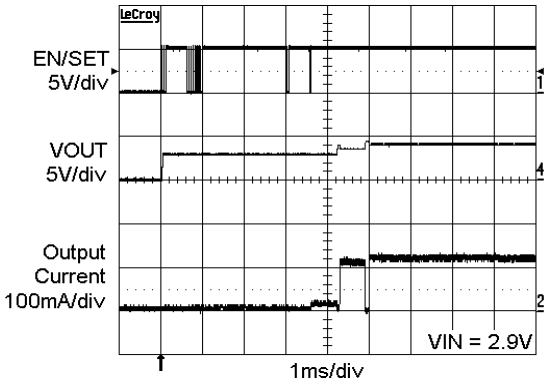


Figure 12. Power Up in 1.5x Mode

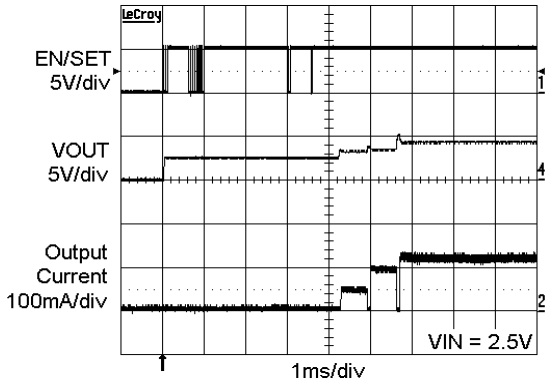


Figure 13. Power Up in 2x Mode

TYPICAL PERFORMANCE CHARACTERISTICS

(V_{IN} = 3.6 V, I_{OUT} = 120 mA (6 LEDs at 20 mA), C_{IN} = C_{OUT} = C1 = C2 = 1 μF, T_{AMB} = 25°C unless otherwise specified.)

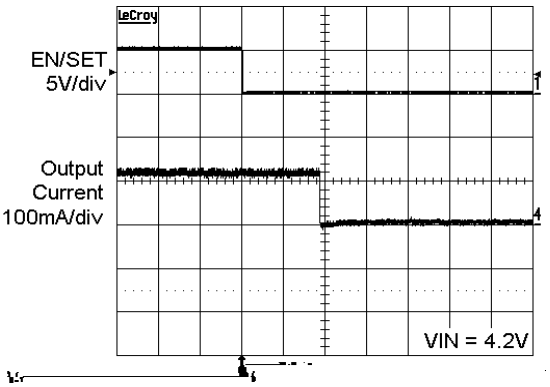


Figure 14. Power Down Delay (1x Mode)

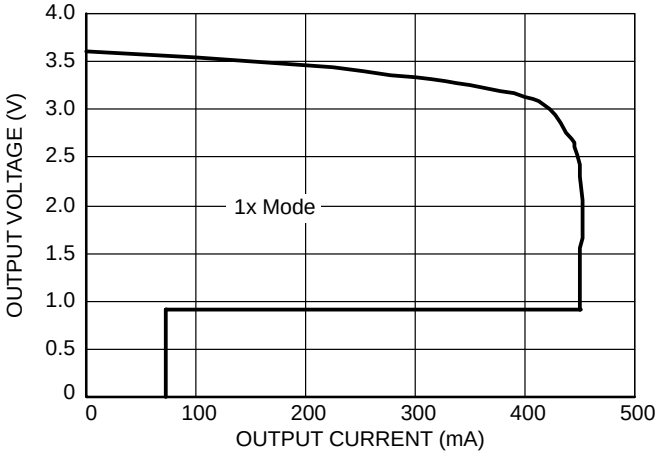


Figure 15. Foldback Current Limit

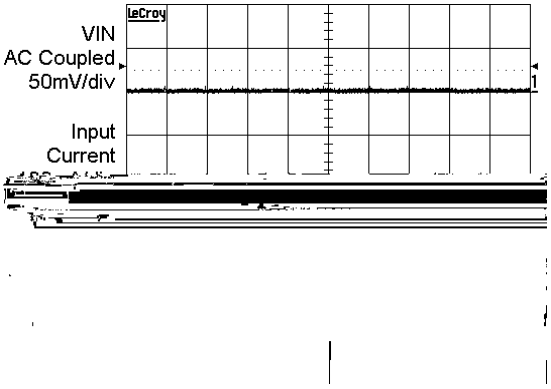


Figure 16. Operating Waveforms in 1x Mode

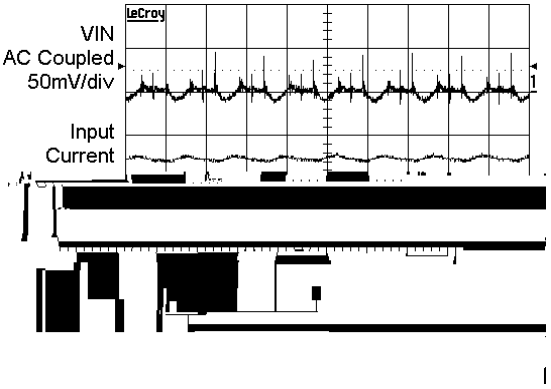


Figure 17. Switching Waveforms in 1.33x Mode

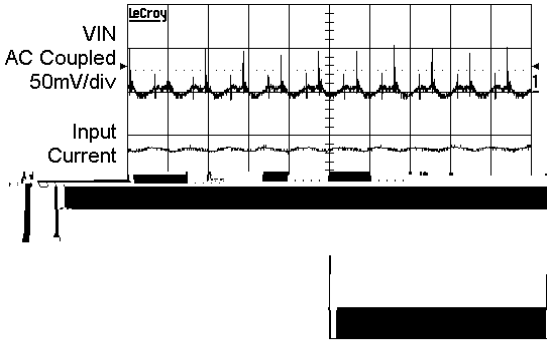


Figure 18. Switching Waveforms in 1.5x Mode

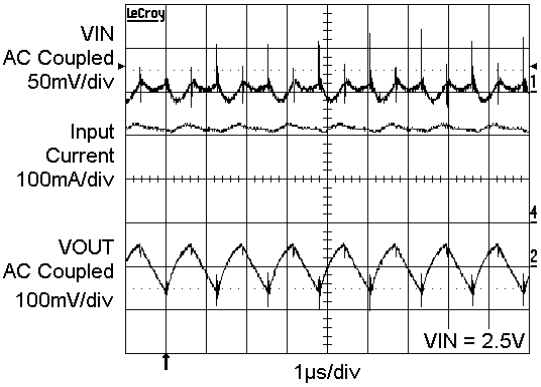


Figure 19. Switching Waveforms in 2x Mode

Table 5. PIN DESCRIPTION

Pin #	Name	Function
1	LEDC2	LEDC2 cathode terminal
2	LEDC1	LEDC1 cathode terminal
3	LEDB2	LEDB2 cathode terminal
4	LEDB1	LEDB1 cathode terminal
5	LEDA2	LEDA2 cathode terminal
6	LEDA1	LEDA1 cathode terminal
7	VOUT	Charge pump output, connect to LED anodes
8	VIN	Charge pump input, connect to battery or supply
9	C1+	Bucket capacitor 1, positive terminal
10	C1	Bucket capacitor 1, negative terminal
11	C2+	Bucket capacitor 2, positive terminal
12	C2	Bucket capacitor 2, negative terminal
13/14	NC	No connect
15	GND	Ground reference
16	EN/SET	Device enable (active high) and 1 wire control input
TAB	TAB	Connect to GND on the PCB

Pin Function

VIN is the supply pin for the charge pump. A small 1 μF ceramic bypass capacitor is required between the VIN pin and ground near the device. The operating input voltage range is from 2.5 V to 5.5 V. Whenever the input supply falls below the under−voltage threshold (2 V) all the LED channels will be automatically disabled and the device register are reset to default values.

EN/SET is the enable and one wire addressable control logic input for all LED channels. Guaranteed levels of logic high and logic low are set at 1.3 V and 0.4 V respectively. When EN/SET is initially taken high, the device becomes enabled and all LED currents remain at 0 mA. To place the device into zero current mode, the EN/SET pin must be held low for more than 1.5 ms.

VOUT is the charge pump output that is connected to the LED anodes. A small 1 μF ceramic bypass capacitor is required between the VOUT pin and ground near the device.

GND is the ground reference for the charge pump. The pin must be connected to the ground plane on the PCB.

C1+, C1− are connected to each side of the ceramic bucket capacitor C1.

C2+, C2− are connected to each side of the ceramic bucket capacitor C2.

LEDxx provide the internal regulated current for each of the LED cathodes. These pins enter high−impedance zero current state whenever the device is placed in shutdown mode.

TAB is the exposed pad underneath the package. For best thermal performance, the tab should be soldered to the PCB and connected to the ground plane.

Block Diagram

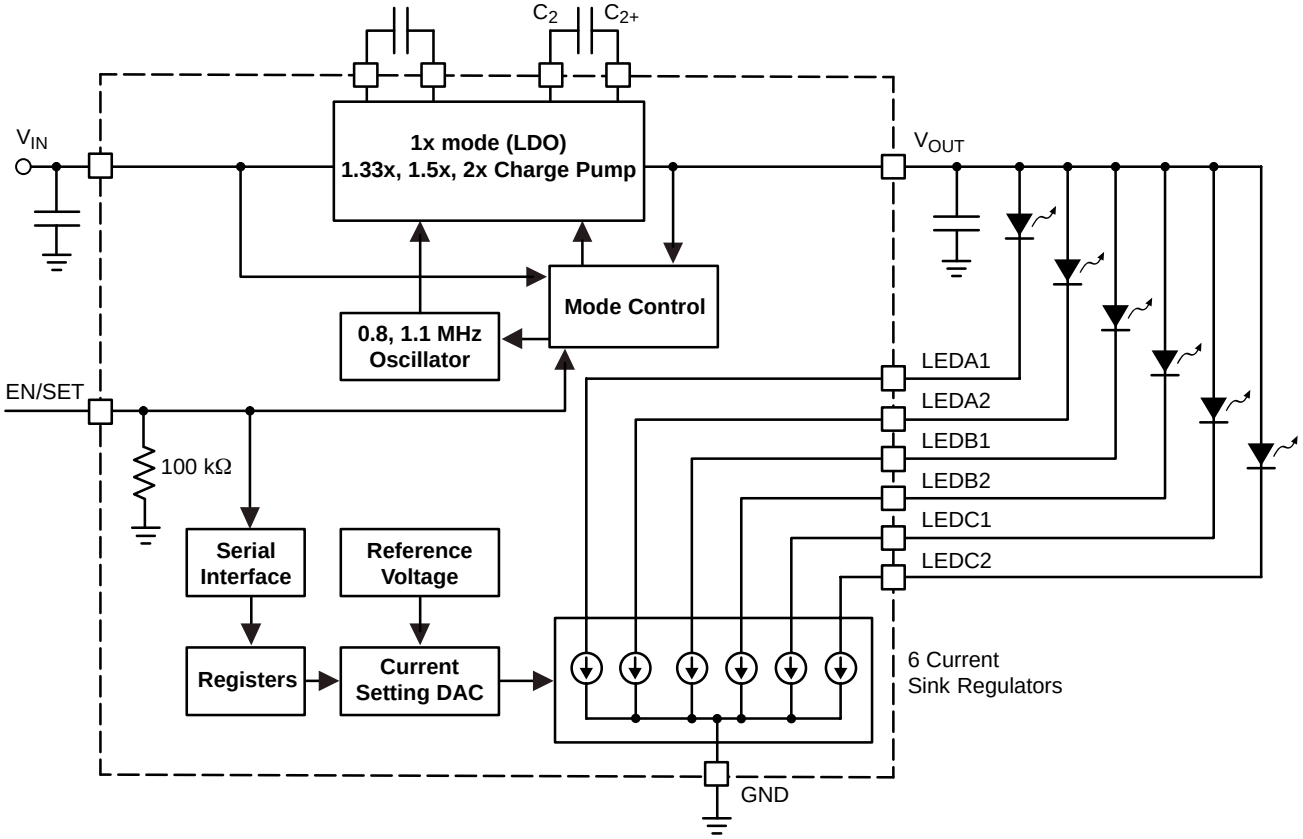


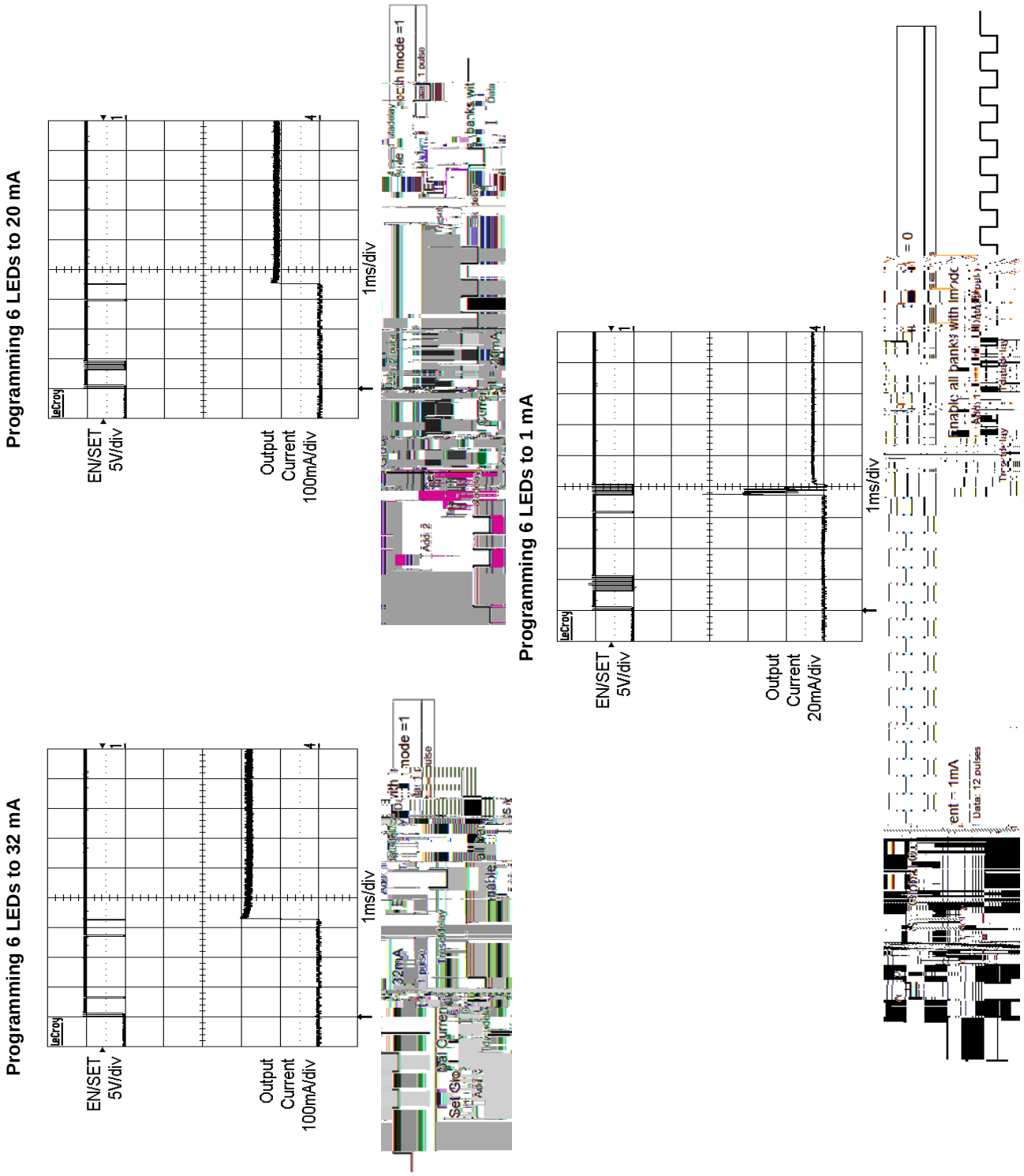
Figure 20. CAT3636 Functional Block Diagram

Register Configuration and Programming

Table 6. REGISTER ADDRESS AND DATA

Register	Address Pulses	Description	Bits	DATA Pattern			
				Bit 3	Bit 2	Bit 1	Bit 0
REG1	1	Bank Enable and IMODE	4	IMODE	ENA	ENB	ENC
REG2	2	Global Current Setting	4	See Table 8 for values			

Programming Examples



TQFN16, 3x3