6-Channel Low Noise Charge Pump White LED Driver

Description

The CAT3606 controls up to four LEDs for the main display and two LEDs for the sub-display in cellular phones. The device is capable of operating in either 1x (LDO) mode or 1.5x charge pump mode. All LED pin currents are regulated and tightly matched to achieve uniformity of brightness across the LCD backlight. An external resistor (R_{SET}

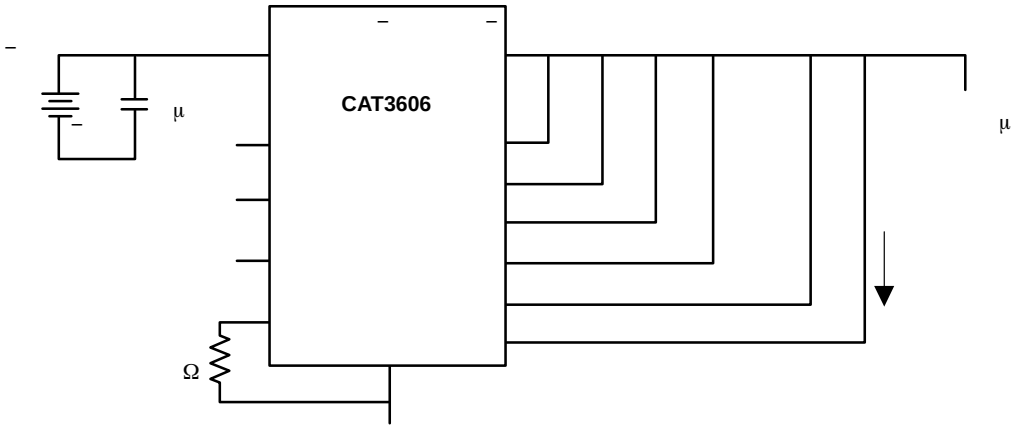


Figure 1. Typical Application Circuit

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Unit
	–	
	–	
	–	

TYPICAL CHARACTERISTICS

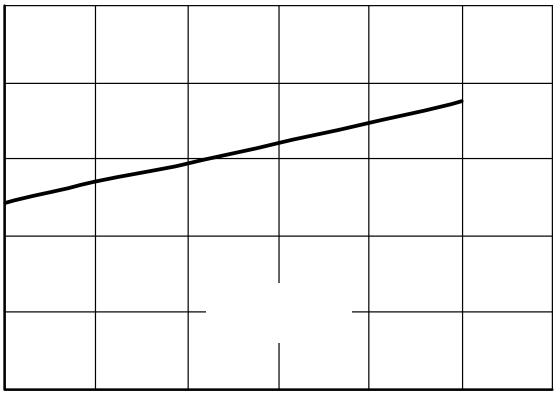


Figure 9. Ground Current vs. Input Voltage (1.5x Mode)

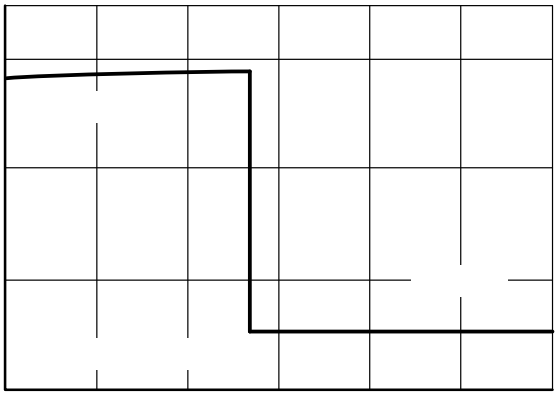


Figure 10. Supply Current vs. Input Voltage

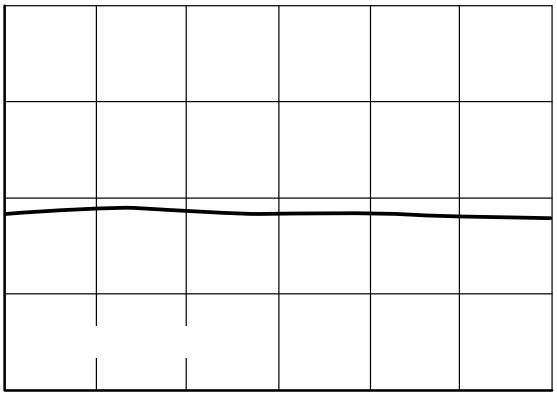


Figure 11. Oscillator Frequency vs. Input Voltage

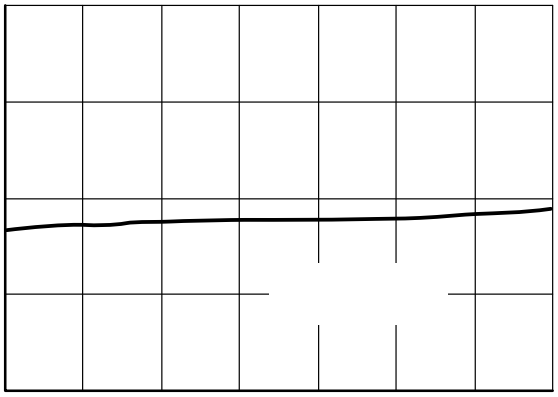


Figure 12. Oscillator Frequency vs. Temperature

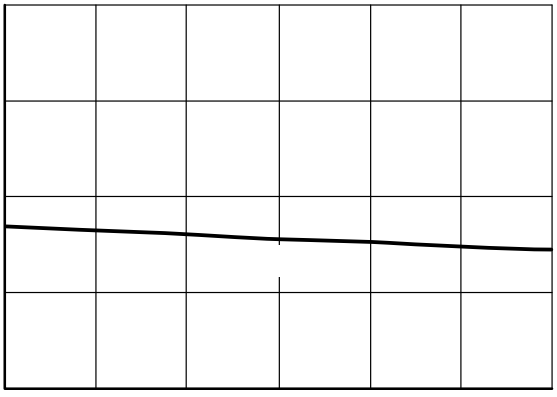


Figure 13. Output Resistance vs. Input Voltage (1x Mode)

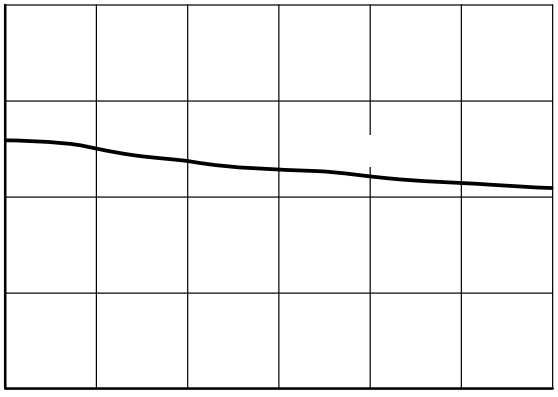


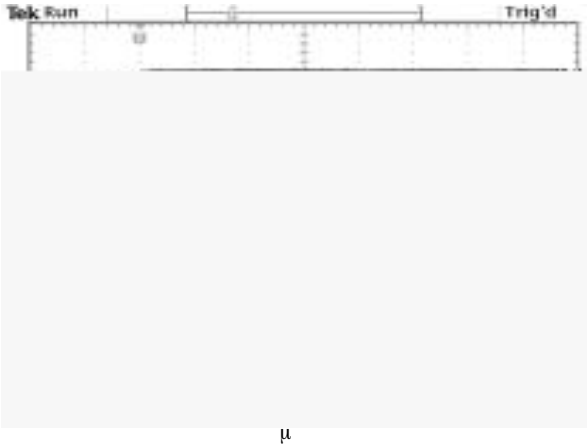
Figure 14. Output Resistance vs. Input Voltage (1.5x Mode)

TYPICAL CHARACTERISTICS

μ Ω °

Figure 15. Switching Waveforms in 1.5x Mode

Figure 16. Operating Waveforms in 1x Mode

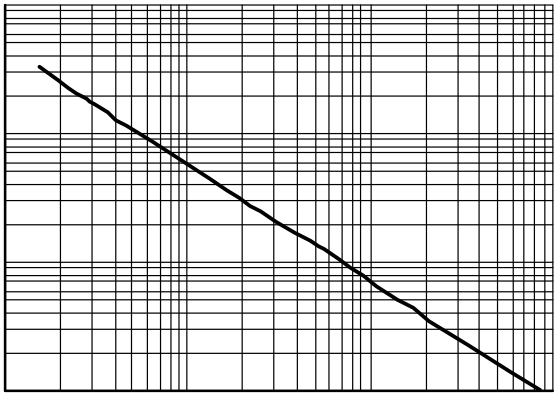


μ

Figure 17. Power Up 6 LEDs at 15 mA, VIN = 3 V (1.5x Mode)

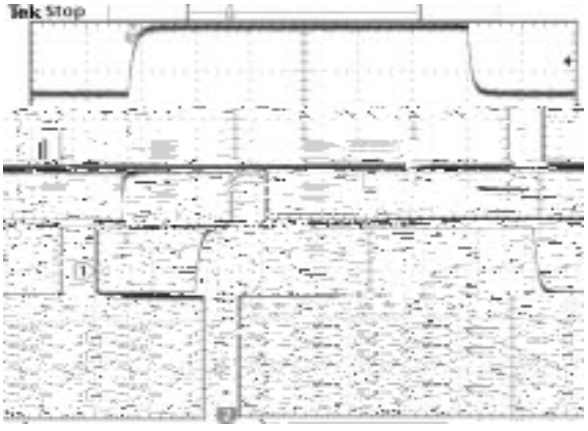
μ

Figure 18. Power Up 6 LEDs at 15 mA, VIN = 3.6 V (1x Mode)



Ω

Figure 19. LED Current vs. R_{SET}



μ

Figure 20. Line Transient Response in 1x Mode

TYPICAL CHARACTERISTICS

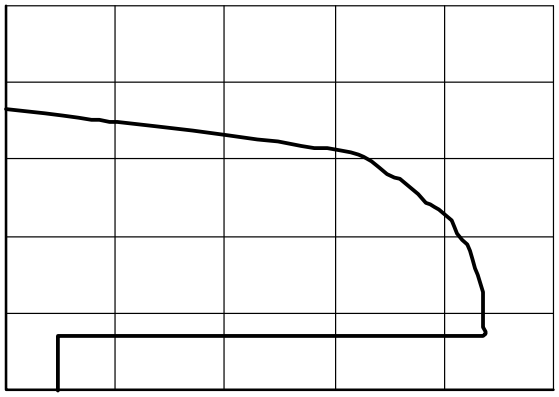


Figure 21. Foldback Current Limiting

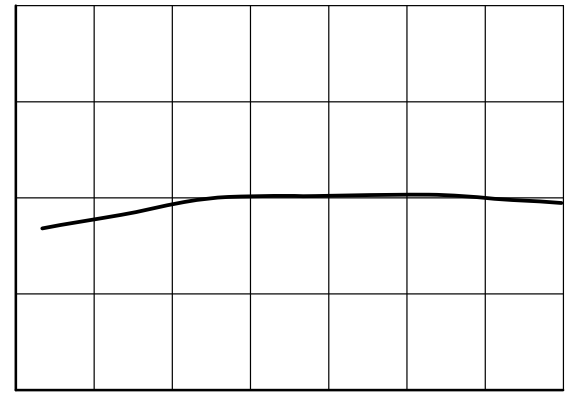


Figure 22. RSET Pin Voltage vs. Temperature

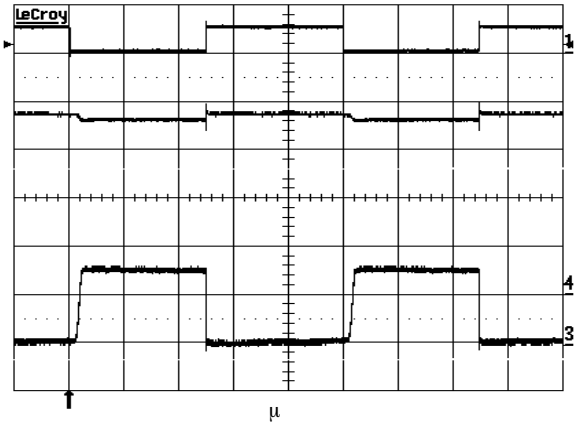


Figure 23. PWM Dimming at 1 kHz on $\overline{\text{ENM}}$ and $\overline{\text{ENS}}$

Recommended Layout

When the driver is in the 1.5x charge pump mode, the 1 MHz switching frequency operation requires to minimize trace length and impedance to ground on all 4 capacitors. A ground plane should cover the area on the bottom side of the PCB opposite to the IC and the bypass capacitors. Capacitors Cin and Cout require short connection to ground which can be done with multiple vias as shown on Figure 24. A square copper area matches the QFN16 exposed pad (GND) and must be connected to the ground plane underneath. The use of multiple via will improve the heat dissipation.

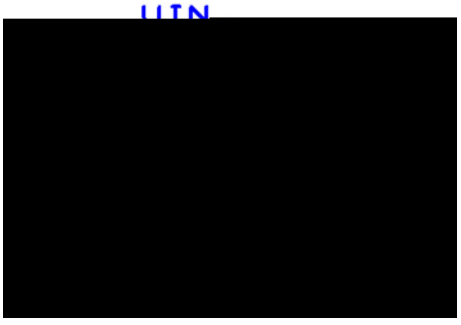
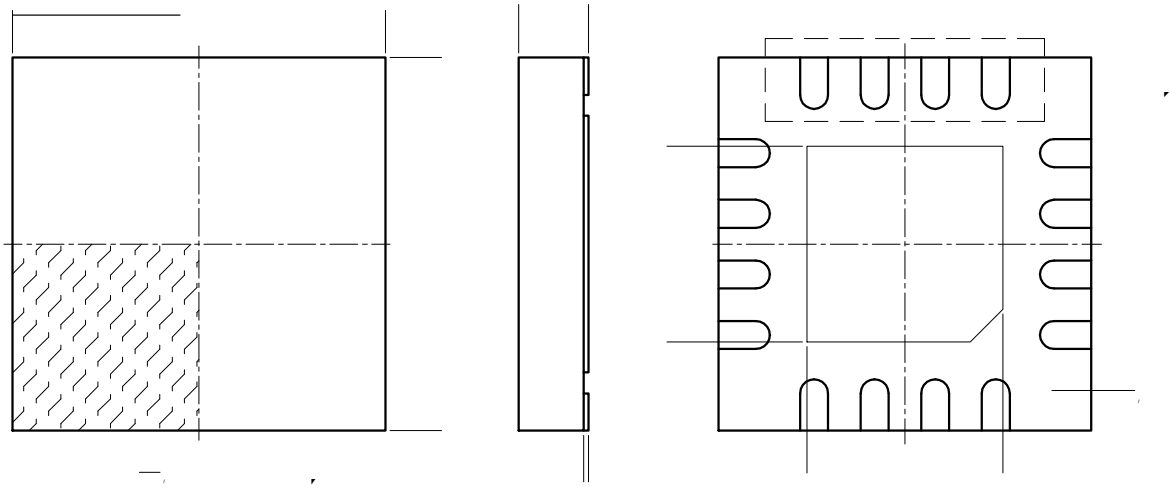


Figure 24. PCB Layout

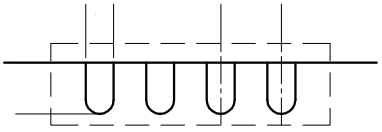
PACKAGE DIMENSIONS

TQFN16, 4x4

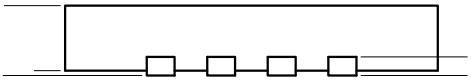


TOP VIEW **SIDE VIEW** **BOTTOM VIEW**

SYMBOL	MIN	NOM	MAX



DETAIL A

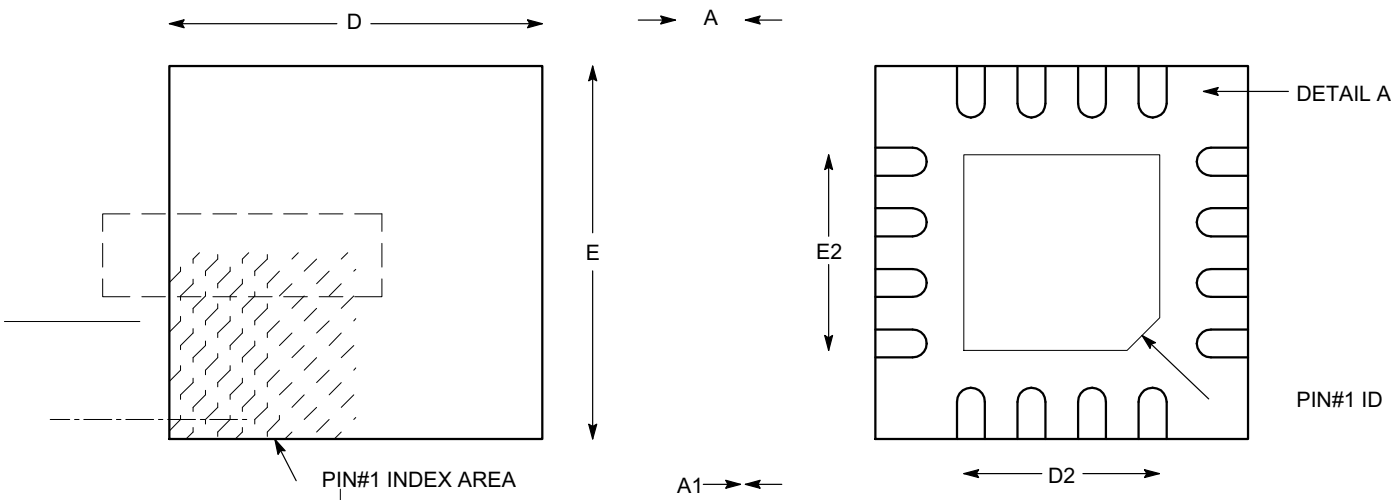


FRONT VIEW

Notes:

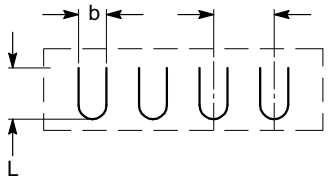
TQFN16, 4x4
CASE 510AE
ISSUE A

DATE 18 MAR 2009

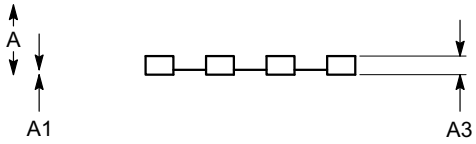


TOP VIEW **SIDE VIEW** **BOTTOM VIEW**

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.20 REF	
b	0.25	0.30	0.35
D	3.90	4.00	4.10
D2	2.00	−−−	2.25
E	3.90	4.00	4.10
E2	2.00	−−−	2.25
e		0.65 BSC	
L	0.45	−−−	0.65



DETAIL A



FRONT VIEW

Notes:
(1) A d . . a . . .
(2) C . . JEDEC MO-220.