LM2734X LUXEON LED driver

1.1 Specifications

Vin: Min 8V Max 19V
Vout: 3.7V
Iout: 735mA
Switching Frequency: 1600 kHz

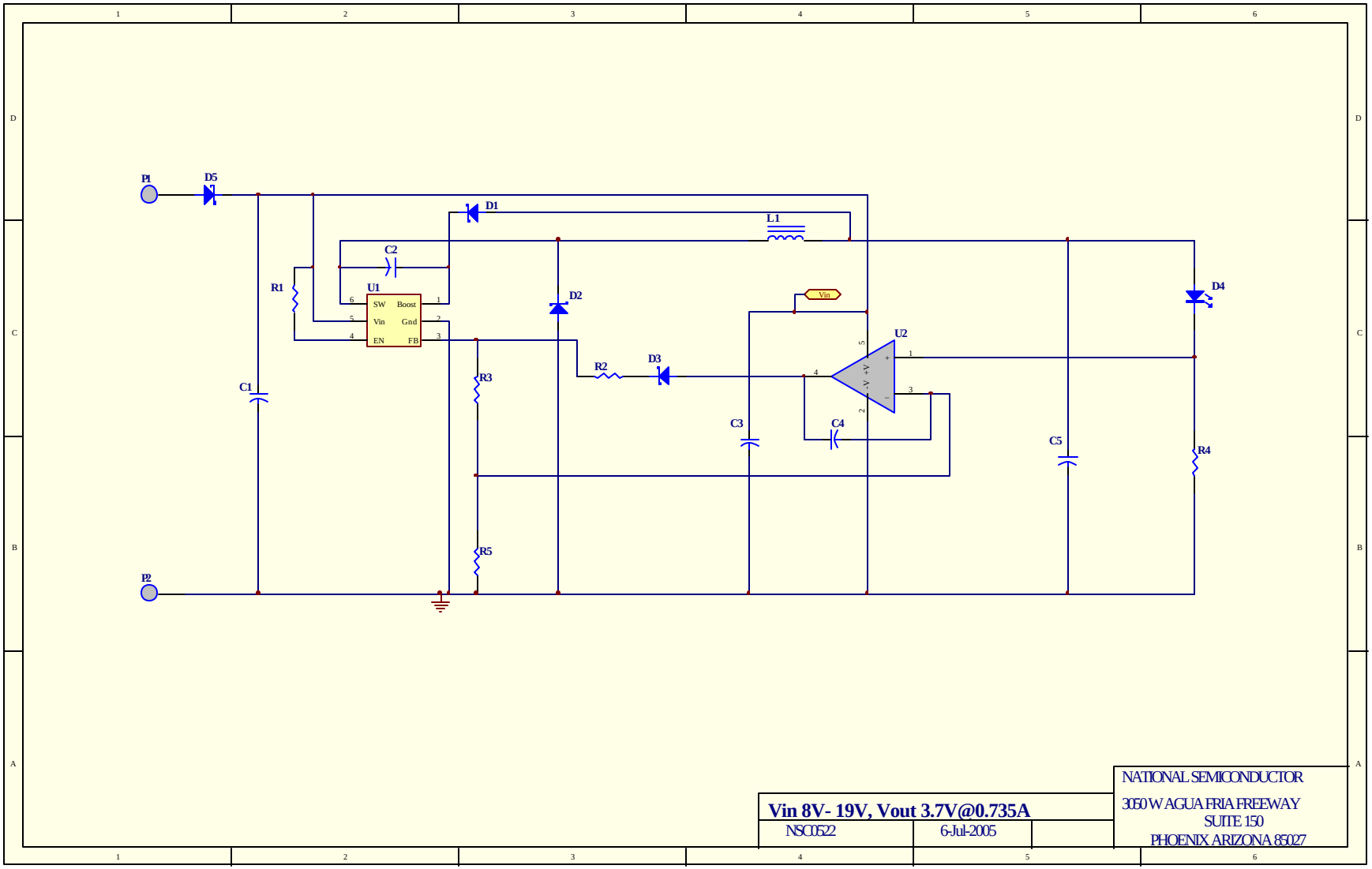
1.2 Theory of operation

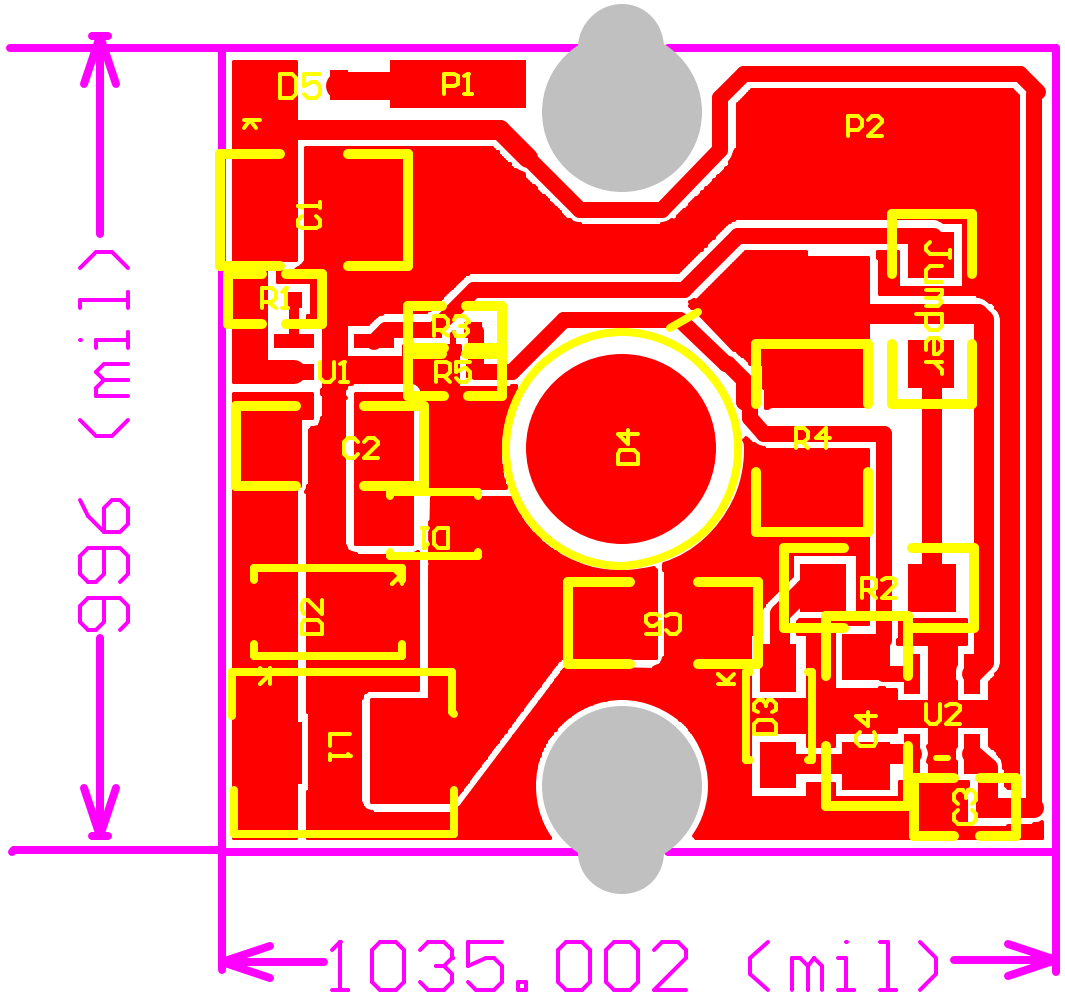
This design uses a buck topology. The integrated switch (part of LM2734x) is operating at 1.6MHz and steps down the output voltage to 3.7V (clamped by LUXEON LED). The load current in the LED is regulated by using an LM321. The load current is sensed across R5 (0.2 ohm resistor). R3/R7 sets the reference point for the output load current (set to 150mV). The output load can be changed by adjusting the voltage divider.

1.3 BOM

NSC0522 Vin 8V-19V, Vout 3.7V @ 1A

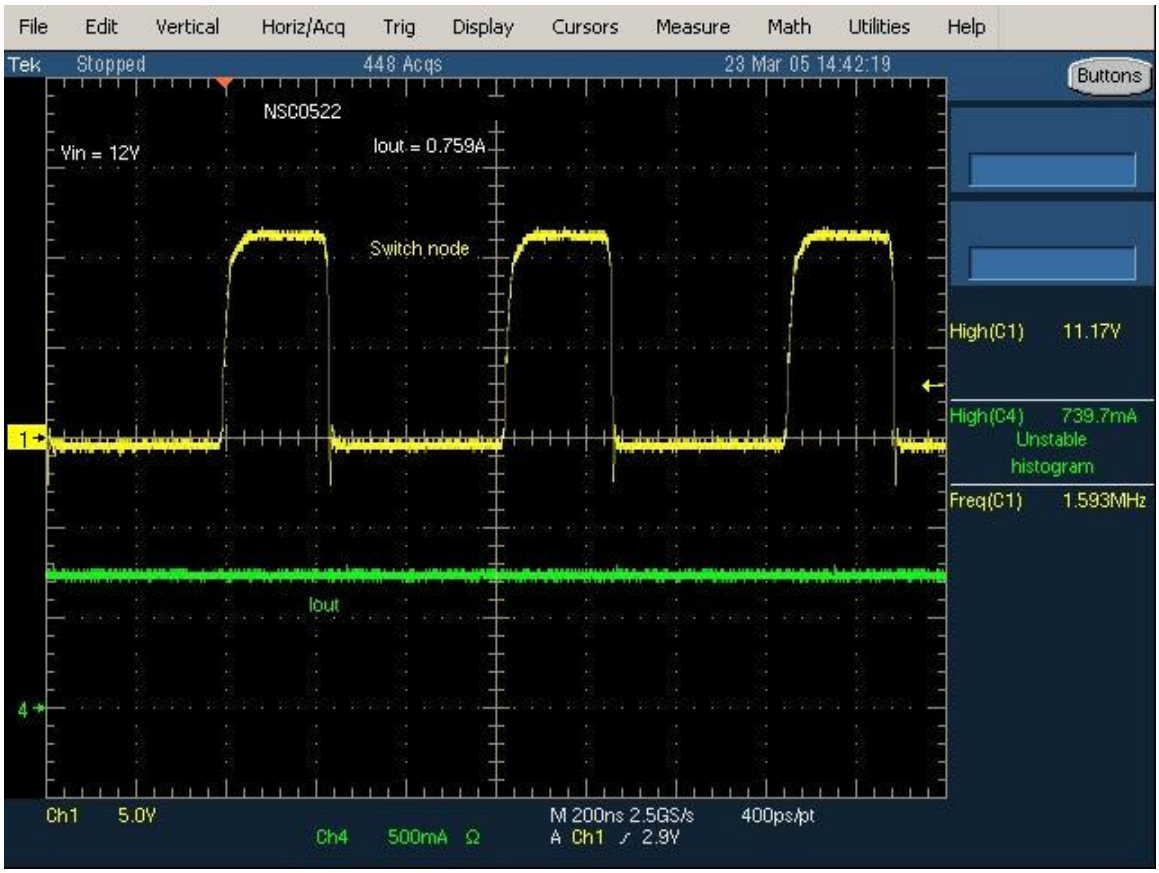
Designator	Part Type	Manfacturer Part No	Description
C1	10u	TDK C2012X5R0J106	Capacitor Ceramic X7R
C2	10n	TDK C3325X5R0J101	Capacitor Ceramic X7R
C3	100n	TDK C3325X5R0J102	Capacitor Ceramic X7R
C4	22n	TDK C3325X5R0J221	Capacitor Ceramic X7R
C5	10u	TDK C2012X5R0J106	Capacitor Ceramic X7R
D1	Diode	ON SEMI BAT54H	Schottky Diode
D2	Diode	ON SEMI BAT54H	Schottky Diode
D3	Diode	ON SEMI BAT54H	Schottky Diode
D4	LED	LXHL DW09	Luxeon emitter
D5	Diode	ON SEMI MBRS1100T3	Schottky Diode
L1	6.8u	DO1608C-682	Coilcraft Inductor
R1	10k	VISHAY CRCW08051002F	1% Thick Film
R2	10k	VISHAY CRCW08051002F	1% Thick Film
R3	43.2K	VISHAY CRCW08054322F	1% Thick Film
R4	0.2	VISHAY WSL0805-18 0.2	Vishay WSL0805-18 0.2
R5	10k	VISHAY CRCW08051002F	1% Thick Film
U1	LM2734-X	NSC LM2734X	1A Load Step Down Regulator
U2	LM321	NSC LM321	Low power single Op-Amp


P1
D5
D1
L1
C2
R1
U1
SW
Boost
Vin
Gnd
EN
FB
D2
Vin
U2
D4
R2
D3
C1
R3
C3
C4
C5
R4
R5
P2
Vin 8V- 19V, Vout 3.7V@0.735A
NSC0522
6-Jul-2005
NATIONAL SEMICONDUCTOR
3050 W AGUA FRIA FREEWAY
SUITE 150
PHOENIX ARIZONA 85027


D5
P1
P2
C1
R1
R3
R5
U1
C2
D4
R4
Jumper
C3
D2
C5
R2
D3
C4
U2
L1
996 (mil)
1035.002 (mil)

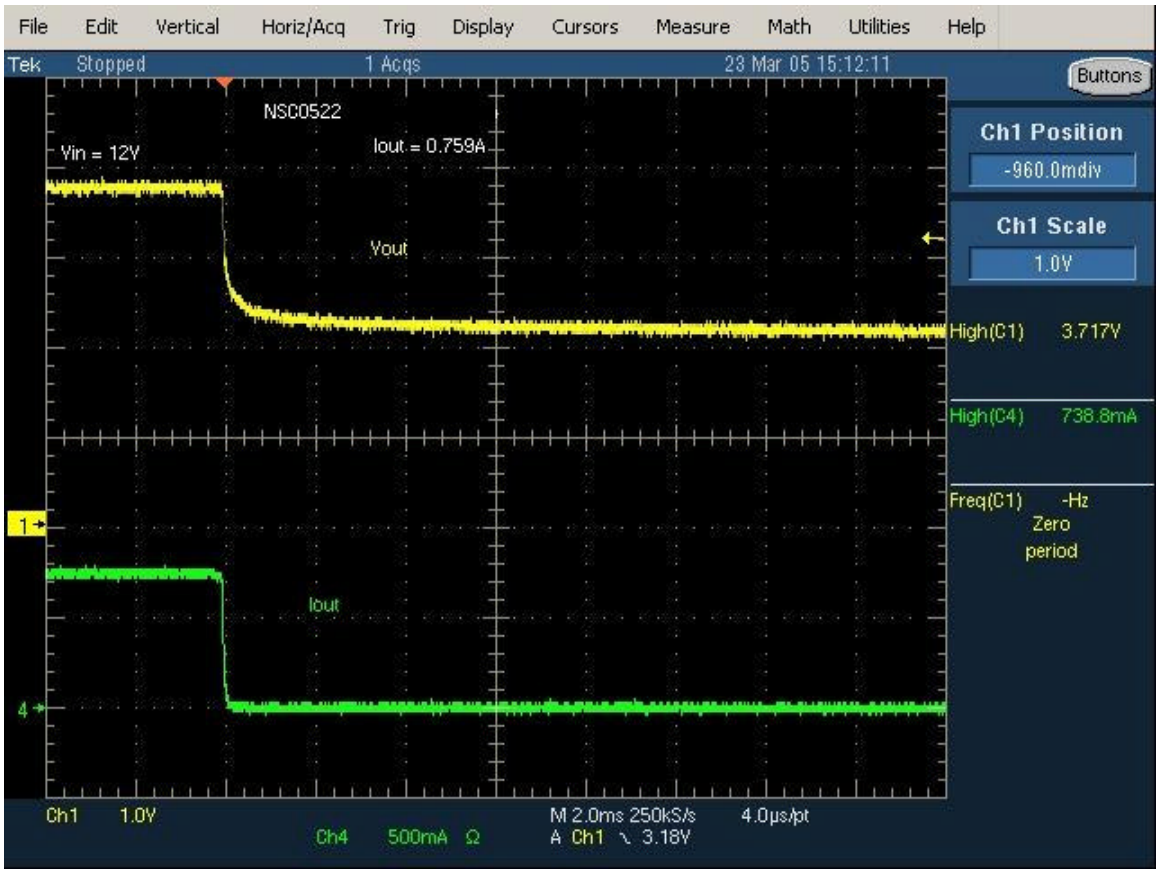
1.5 Circuit Waveforms

The switch node and the output current regulation at a 12V input.

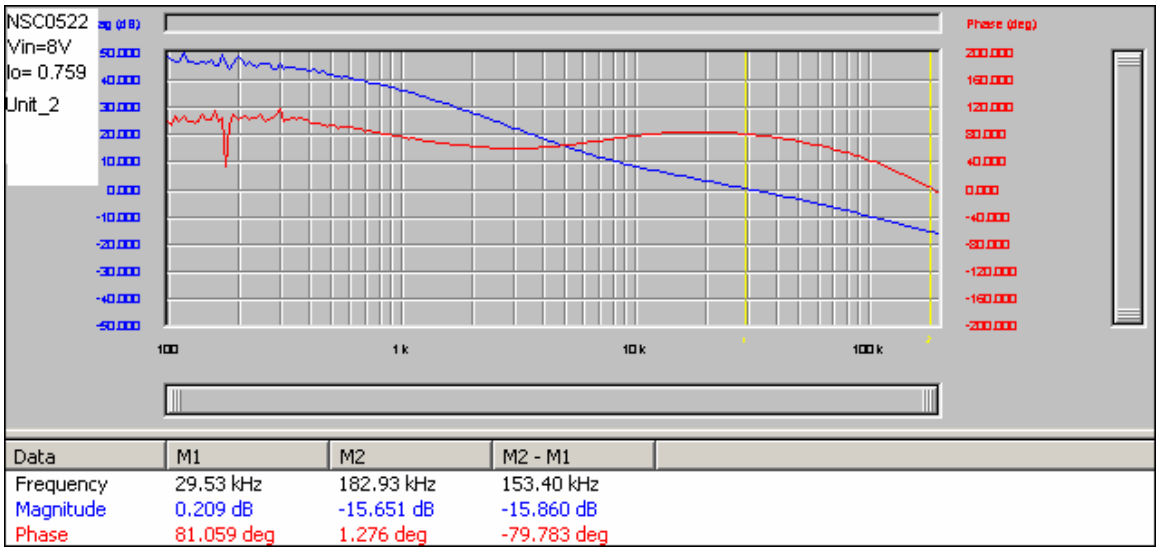


Turn-On Characteristics

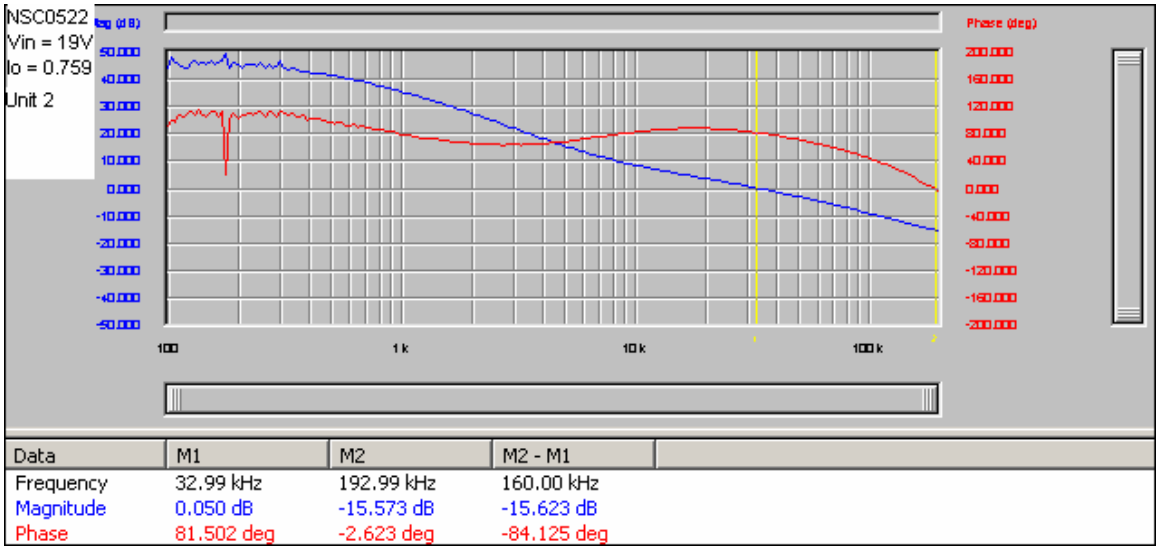
Turn-Off Characteristics



1.6 Bode Plots



Data	M1	M2	M2 - M1
Frequency	29.53 kHz	182.93 kHz	153.40 kHz
Magnitude	0.209 dB	-15.651 dB	-15.860 dB
Phase	81.059 deg	1.276 deg	-79.783 deg



Data	M1	M2	M2 - M1
Frequency	32.99 kHz	192.99 kHz	160.00 kHz
Magnitude	0.050 dB	-15.573 dB	-15.623 dB
Phase	81.502 deg	-2.623 deg	-84.125 deg