

LM3404 Driving a Seoul Semi Zpower P4 1A LED - RD-134

National Semiconductor
LM3404
Chris Richardson
April 2007



1.0 Design Specifications

Inputs	Output #1
VinMin=8.1V	Vout1=3.8V
VinMax=9.9V	Iout1=1A

2.0 Design Description

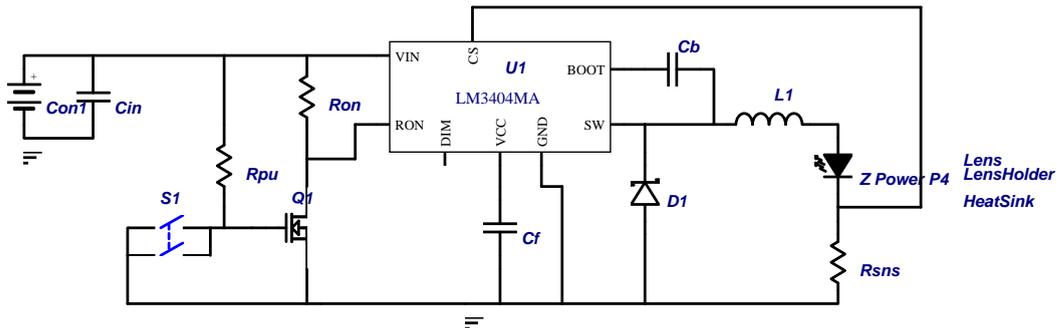
This demonstration circuit is designed to drive a single Seoul Semiconductor Z-Power P4 LED at a forward current of $1A \pm 10\%$ with a peak-to-peak ripple current of 200 mA or less. The expected forward voltage is 3.8V. The input is a 9V alkaline battery. Switching frequency is $700\text{ kHz} \pm 20\%$.

3.0 Features

- Integrated 1.0A NFET
- VIN Range $9V \pm 10\%$

- 1.2A Output Current Limit Over Temperature
- Input UVLO
- Cycle-by-Cycle Current Limit
- No Control Loop Compensation Required
- Separate PWM Dimming and Low Power Shutdown
- No Output Capacitor
- Thermal shutdown protection
- SO-8 Package

4.0 Schematic



schematic

FIGURE 1. Example Schematic Showing Connection for all Components.

5.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
Cb	Vishay-Vitramon	VJ0603Y103KXXA	Cap=1.0E-8 F
Cf	Vishay-Vitramon	VJ0603Y104KXXA	Cap=1.0E-7 F
Cin	TDK	C3216X7R1C106M	Cap=1.0E-5 F
Con1	Keystone	968K-ND	
D1	Central Semi	CMSH2-20M	Io=2 A
HeatSink	Aavid	374424b00035g	
L1	TDK	SLF7045T-M1R5-1PF	DCR=0.068 Ohm, L=1.5E-5 H
Lens	Khatod	KEPL 19806	
LensHolder	Khatod	KE 198	
Q1	Vishay	TN0201K	

Part	Manufacturer	Part#	Attributes
Ron	Vishay	CRCW06034222F	Resistance=42400 Ohm, Tolerance=1 %
Rpu	Vishay	CRCW06034993F	Resistance=499000 Ohm, Tolerance=1 %
Rsns	Panasonic	ERJ8BQFR20V	Resistance=0.2 Ohm, Tolerance=1 %
S1	ITT/Canon	KSC2-1-1-J-50SH-LFS	
U1	National Semiconductor	LM3404MA	
Z Power P4	Seoul Semiconductor	W42180-T	

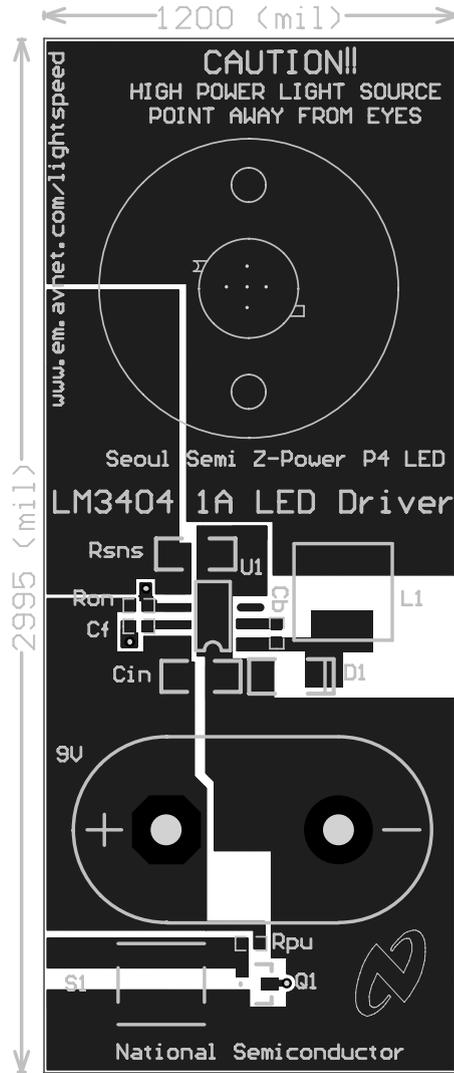
6.0 Other Operating Values

Operating Values

Description	Parameter	Value	Unit
Modulation Frequency	Frequency	700	KHz
Total Output Power	Pout	3.8	W
Peak-To-Peak Ripple Current	Iout p-p	200	mA

7.0 Layouts

LM3404 Seoul Top Layer and Overlay



layout6

FIGURE 2. LM3404 Seoul Top Layer and Overlay

LM3404 Seoul Bottom Layer

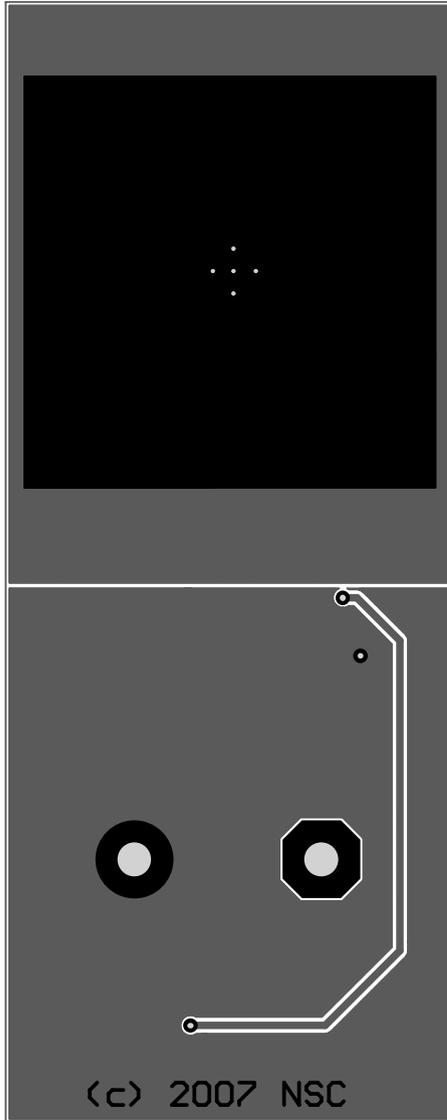
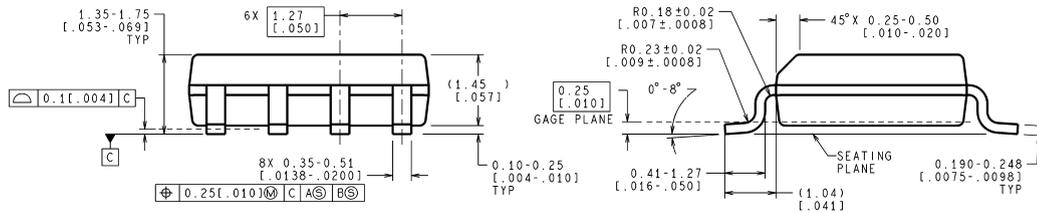
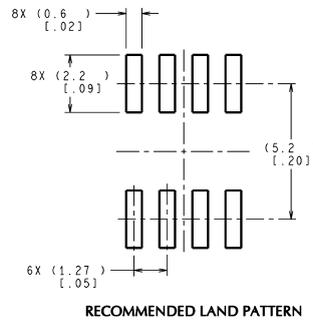
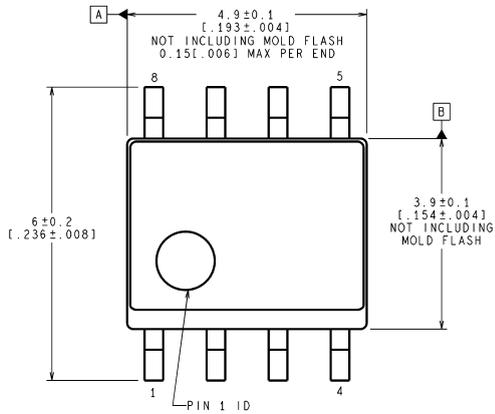


FIGURE 3. LM3404 Seoul Bottom Layer

8.0 Physical Dimensions inches (millimeters) unless otherwise noted



CONTROLLING DIMENSION IS MILLIMETER
VALUES IN [] ARE INCHES
DIMENSIONS IN () FOR REFERENCE ONLY

M08A (Rev L)

Notes

National Semiconductor's design tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Reference designs are created using National's published specifications as well as the published specifications of other device manufacturers. While National does update this information periodically, this information may not be current at the time the reference design is built. National and/or its licensors do not warrant the accuracy or completeness of the specifications or any information contained therein. National and/or its licensors do not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. National and/or its licensors do not warrant that the designs are production worthy. You should completely validate and test your design implementation to confirm the system functionality for your application.

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

For the most current product information visit us at www.national.com.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which,
 - are intended for surgical implant into the body, or
 - support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

BANNED SUBSTANCE COMPLIANCE

National Semiconductor certifies that the products and packing materials meet the provisions of the Customer Products Stewardship Specification (CSP-9-111C2) and the Banned Substances and Materials of Interest Specification (CSP-9-111S2) and contain no "Banned Substances" as defined in CSP-9-111S2.

Leadfree products are RoHS compliant.



National Semiconductor Americas Customer Support Center
 Email: new.feedback@nsc.com
 Tel: 1-800-272-9959

National Semiconductor Europe Customer Support Center
 Fax: +49 (0) 180-530-85-86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 69 9508 6208
 English Tel: +49 (0) 870 24 0 2171
 Français Tel: +33 (0) 1 41 91 8790

National Semiconductor Asia Pacific Customer Support Center
 Email: ap.support@nsc.com

National Semiconductor Japan Customer Support Center
 Fax: 81-3-5639-7507
 Email: jpn.feedback@nsc.com
 Tel: 81-3-5639-7560

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2012, Texas Instruments Incorporated