Description

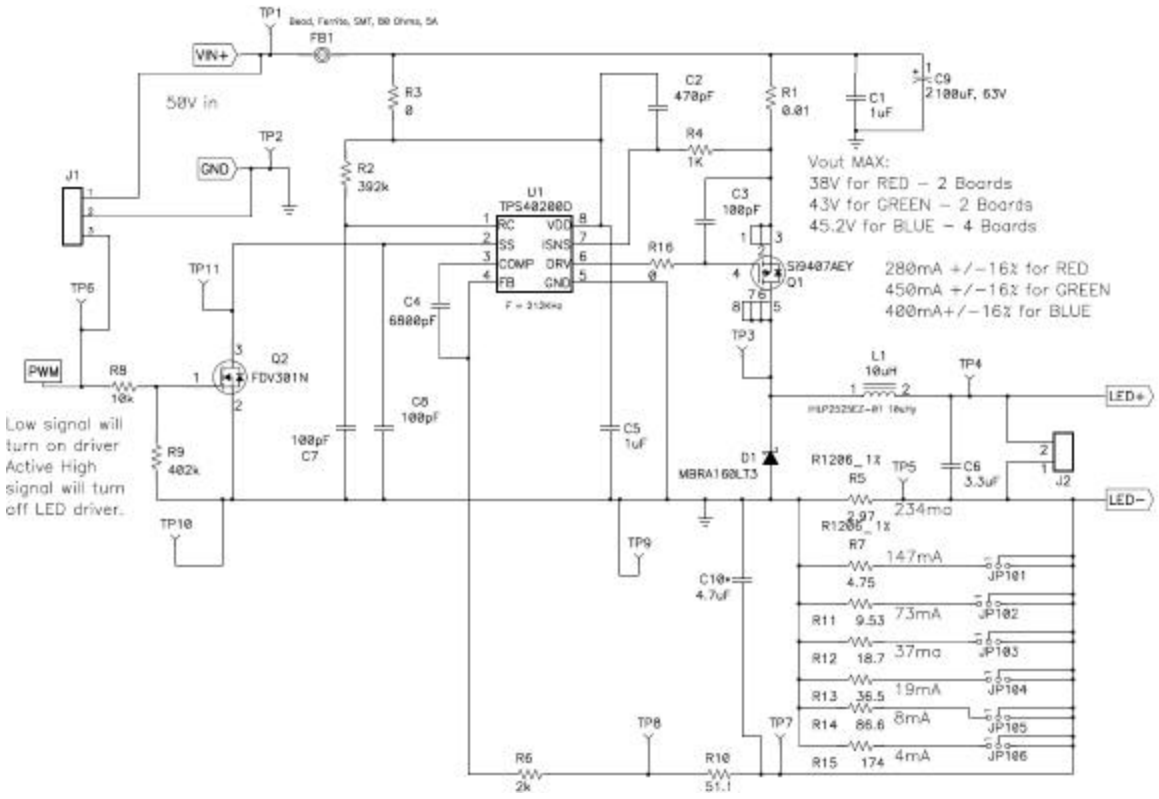
The TPS40200 controller can be used as a low cost LED driver. With an input voltage rating of 4.5 to 52 volts, it can power LED strings with regulated current and up to a 45V drop across the string. Current is sensed across a resistor between the cathode of the string and ground and is compared against a 696mV reference to provide regulated current. Because the driver is a buck and not a boost or flyback, an open string will not produce voltages above the input voltage and overvoltage protection is not needed.

The driver can operate in either the continuous or discontinuous mode. For output voltages above 35V the discontinuous mode is needed due to duty cycle limitation above 35V. The circuit shown has a Pulse Width Modulator (PWM) input for dimming purposes. Targeted current can be set with jumpers.

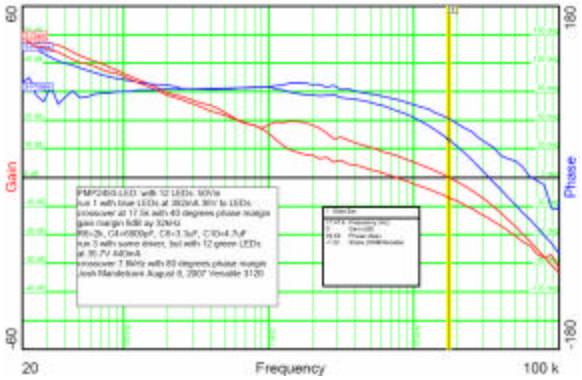
Specifications

Parameter	Test Conditions	Min	Typ	Max	Unit
Input Voltage		48	50	52	Volts
Output Voltage	Targeted LED current	20		45	Volts
Output Current		234		520	mAmp
Ripple current			120		mA p-p
Switching Frequency			210		kHz
Efficiency	Targeted LED current		>90		%
PWM response time			100usec		

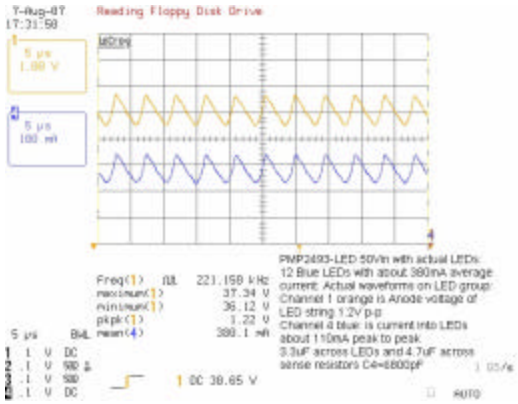
PMP 2493-LED Schematic



Control Loop



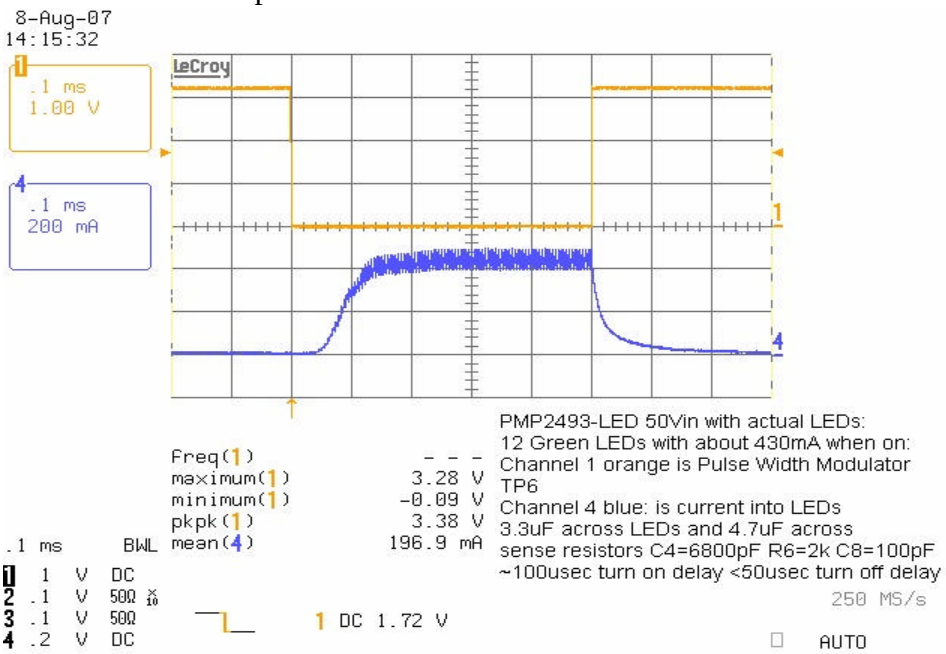
Ripple



Regulation / Efficiency

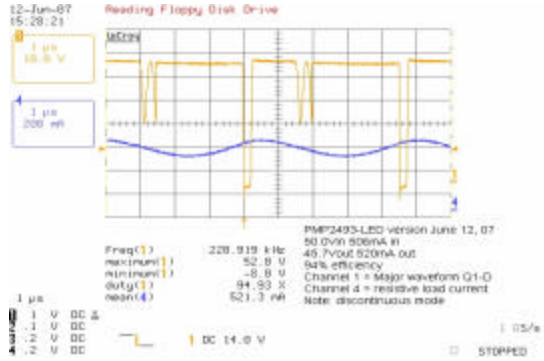
Vin Volts	Iin mA	Vout Volts	Iout mA	Efficiency %
50.0	506	45.7	520	93.9
50.0	452	40.0	521	92.2
50.0	407	35.3	520	90.2
50.0	294	45.9	301	94.0
50.0	260	39.9	301	92.4
50.0	203	29.72	301	88.1

PWM Response

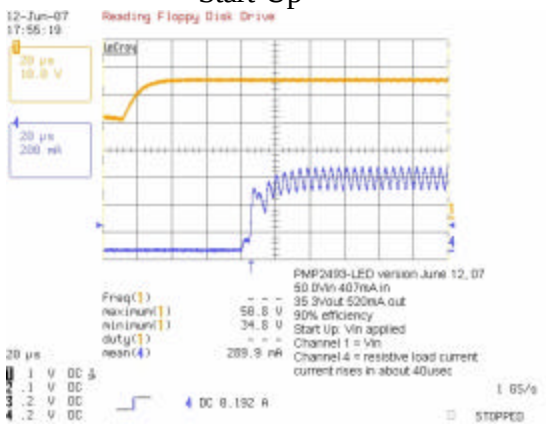


PMP2493-LED 50Vin with actual LEDs:
12 Green LEDs with about 430mA when on:
Channel 1 orange is Pulse Width Modulator TP6
Channel 4 blue: is current into LEDs
3.3uF across LEDs and 4.7uF across sense resistors C4=6800pF R6=2k C8=100pF
~100usec turn on delay <50usec turn off delay

Internal Waveform



Start Up



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		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Clocks and Timers	www.ti.com/clocks	Digital Control	www.ti.com/digitalcontrol
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated