Efficiency

The efficiency is shown below:

Flyback Converter Only, VIN across C8

5.05Vout	12.00Vin		15.00Vin		24.0Vin		32.0Vin		48.0Vin		57.0Vin	
Iout	12Vlin	12VEff	15Vlin	15VEff	24lin	24VEff	32lin	32VEff	48lin	48VEff	57lin	57VEff
0.00	0.096	0.0%	0.087	0.0%	0.044	0.0%	0.038	0.0%	0.032	0.0%	0.030	0.0%
0.50	0.313	67.2%	0.259	65.0%	0.150	70.1%	0.117	67.4%	0.084	62.6%	0.075	59.1%
1.00	0.540	77.9%	0.439	76.7%	0.260	80.9%	0.199	79.3%	0.138	76.2%	0.119	74.5%
1.50	0.779	81.0%	0.624	80.9%	0.374	84.4%	0.283	83.6%	0.194	81.3%	0.166	80.1%
2.00	1.042	80.8%	0.822	81.9%	0.490	85.9%	0.369	85.5%	0.251	83.8%	0.214	82.8%

Flyback Converter Only, VIN at J4

5.05Vout	12.00Vin		15.00Vin		24.0Vin		32.0Vin		48.0Vin		57.0Vin	
Iout	12Vlin	12VEff	15Vlin	15VEff	24lin	24VEff	32lin	32VEff	48lin	48VEff	57lin	57VEff
0.00	0.071	0.0%	0.061	0.0%	0.045	0.0%	0.038	0.0%	0.033	0.0%	0.031	0.0%
0.50	0.313	67.2%	0.249	67.6%	0.157	67.0%	0.120	65.8%	0.086	61.2%	0.076	58.3%
1.00	0.573	73.4%	0.446	75.5%	0.273	77.1%	0.206	76.6%	0.141	74.6%	0.122	72.6%
1.50	0.857	73.7%	0.656	77.0%	0.393	80.3%	0.293	80.8%	0.198	79.7%	0.169	78.6%
2.00	1.173	71.8%	0.877	76.8%	0.517	81.4%	0.383	82.4%	0.256	82.2%	0.218	81.3%

Flyback Converter Only, VIN at J1

5.05Vout			48.0Vin	
Iout			48lin	48VEff
0.00			0.032	0.0%
0.50			0.087	60.5%
1.00			0.143	73.6%
1.50			0.201	78.5%
2.00			0.260	80.9%

Flyback Converter plus POL converters, VIN at J1

Vout	Iout	Vout	Iout	Vout	Iout	Vout	Iout	Vout	Iout	Pout		
5.05	1.00	3.31	0.399	3.00	0.200	2.50	0.050	1.20	1.00	8.29569	Watts	
								Vin	Iin	Pin		Eff
								48.02	0.230	11.0446	Watts	75.1%

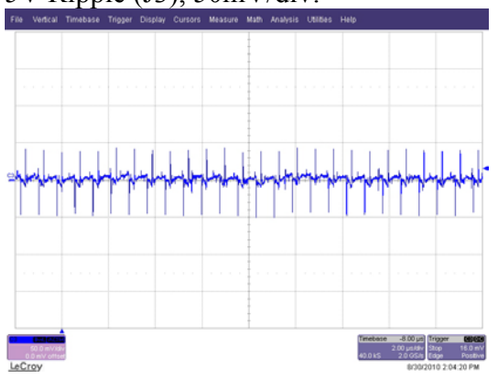
Flyback Converter plus POL converters, VIN at J4

Vout	Iout	Vout	Iout	Vout	Iout	Vout	Iout	Vout	Iout	Pout		
5.05	1.00	3.31	0.399	3.00	0.200	2.50	0.050	1.20	1.00	8.29569	Watts	
								Vin	Iin	Pin		Eff
								12.00	1.005	12.06	Watts	68.8%
								Vin	Iin	Pin		Eff
								24.00	0.453	10.872	Watts	76.3%
								Vin	Iin	Pin		Eff
								32.00	0.337	10.784	Watts	76.9%

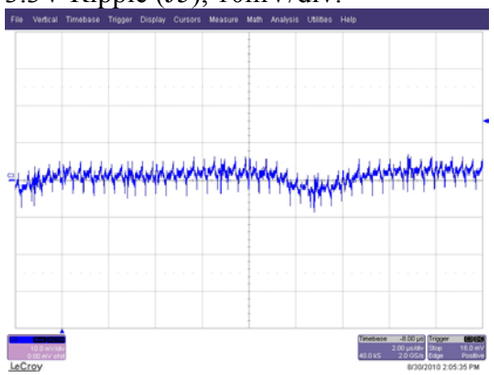
Ripple and Noise

Ripple measurements taken with a 48V input, maximum loads, and 20MHz BWL.

5V Ripple (J3), 50mV/div:

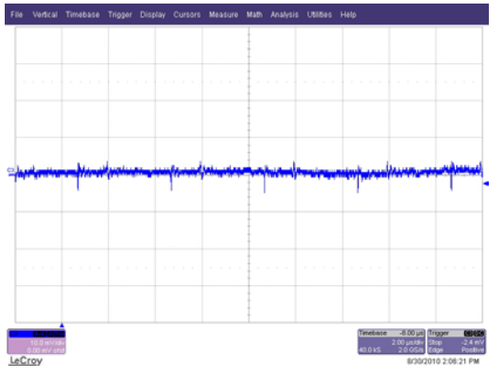


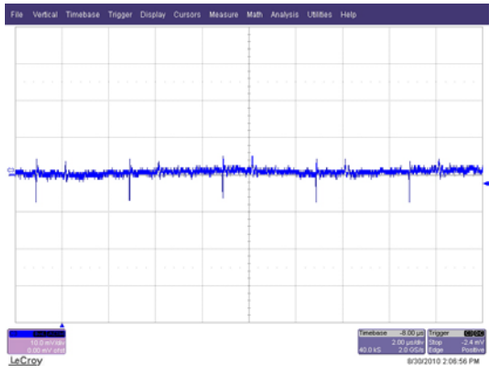
3.3V Ripple (J5), 10mV/div:



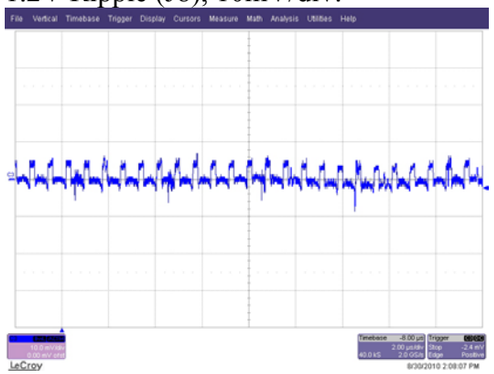
3.0V Ripple (J6), 10mV/div:

2.5V Ripple (J7), 10mV/div:



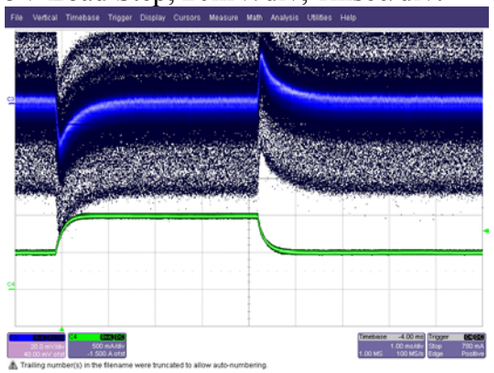


1.2V Ripple (J8), 10mV/div:



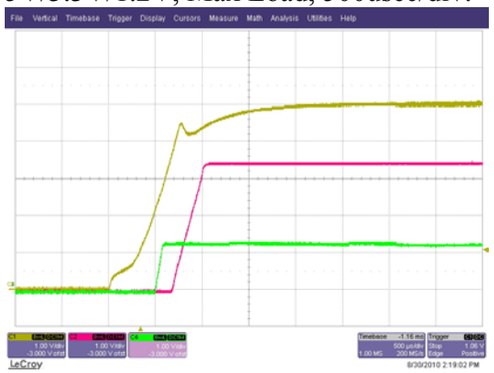
Dynamic Loading

5V Load Step, 20mV/div, 1msec/div:

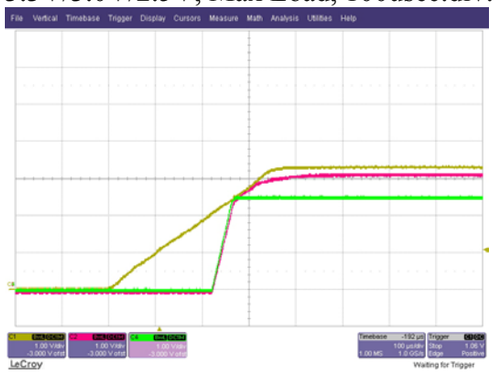


Turn On Response

5V/3.3V/1.2V, Max Load, 500usec/div:



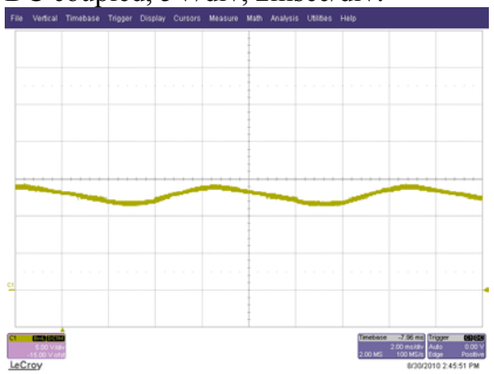
3.3V/3.0V/2.5V, Max Load, 100usec.div:



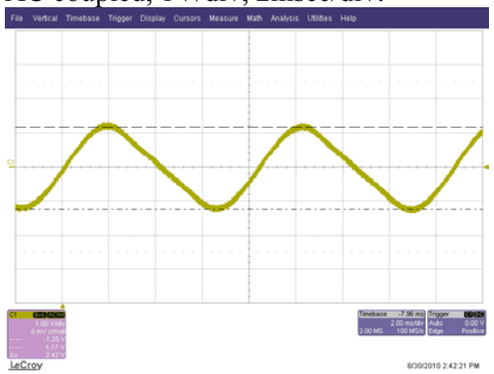
AC Input Ripple

12VAC input at J4, voltage across C27, maximum loads:

DC coupled, 5V/div, 2msec/div:

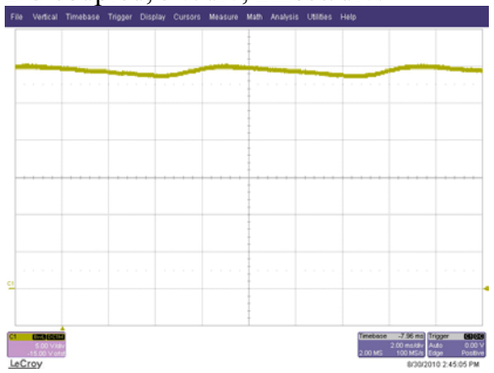


2.42V peak to peak ripple
AC coupled, 1V/div, 2msec/div:

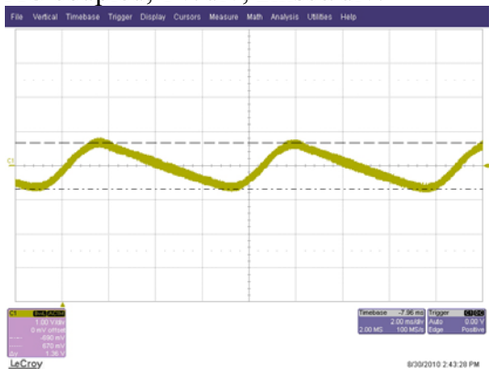


24VAC input at J4, voltage across C27, maximum loads:

DC coupled, 5V/div, 2msec/div:

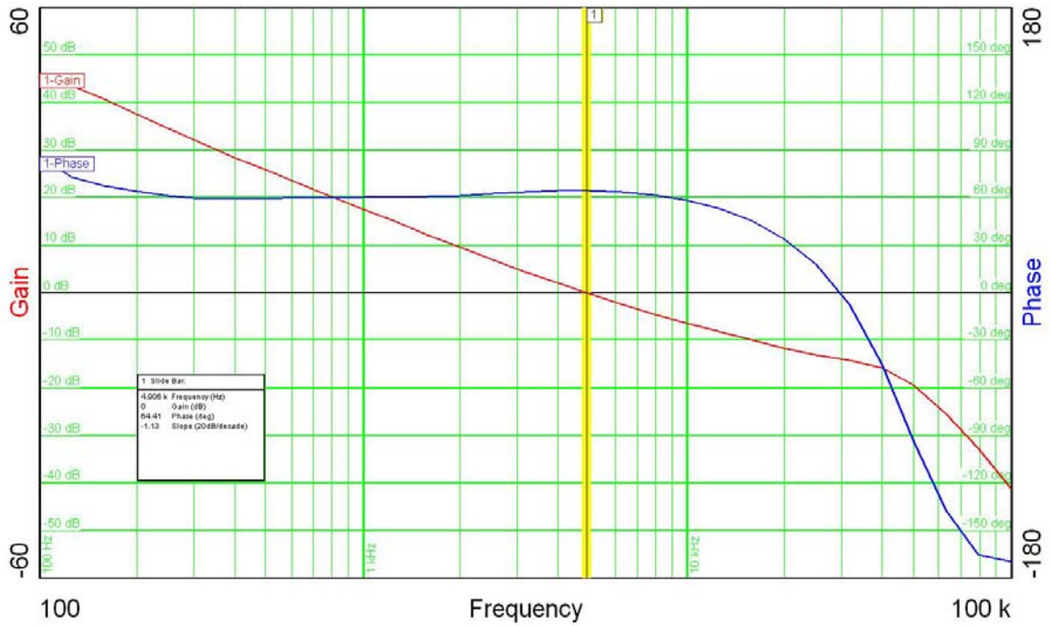


1.36V peak to peak ripple
AC coupled, 1V/div, 2msec/div:



Stability (Loop Gain)

The figure below is the loop gain of the converter with a 48V input and maximum loads. The Bandwidth is 4.9 KHz, the Phase Margin is 64 degrees, and the Gain Margin is 13 dB.



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**	
Audio	www.ti.com/audio	Communications and Telecom	www.ti.com/communications
Amplifiers	amplifier.ti.com	Computers and Peripherals	www.ti.com/computers
Data Converters	dataconverter.ti.com	Consumer Electronics	www.ti.com/consumer-apps
DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
DSP	dsp.ti.com	Industrial	www.ti.com/industrial
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Security	www.ti.com/security
Logic	logic.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Power Mgmt	power.ti.com	Transportation and Automotive	www.ti.com/automotive
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com	Wireless	www.ti.com/wireless-apps
RF/IF and ZigBee® Solutions	www.ti.com/lprf		
	TI E2E Community Home Page		e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265