LT8361
Low I_Q Boost/SEPIC/ Inverting Regulator

DESCRIPTION

Demonstration circuit 2599A features the LT®8361 in a SEPIC configuration. It operates with a switching frequency of 400kHz and is designed to convert a 4.5V to 48V source to 24V, with up to 600mA output current (depending on input voltage). Refer to Figure 4 for load current versus input voltage.

The LT8361 can operate with inputs as high as 60V. However, in this demo circuit, the input is limited by the voltage rating of the input capacitors.

The demo board contains a selectable jumper, JP1, to aid in the selection of the desired Sync pin mode of operation. The default setting is Burst Mode® operation.

This layout is optimized for good EMI performance and small solution size. Input and output filters and an optimized power switching loop, comprised of C20 and C21 are necessary to pass CISPR 25 Class 5 emissions, and are added by default. These components can be excluded in applications not requiring noise immunity. Radiated emissions plots are included in this manual.

The data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this demo manual.

Design files for this circuit board are available at http://www.analog.com/DC2599A

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range		4.5		48	V
V_{OUT}	Output Voltage Range	V_{IN} = 12V, I_{LOAD} = 450mA	23.25	24	24.75	V
Ripple		V_{IN} = 12V, I_{LOAD} = 450mA		200		mV
Efficiency		V_{IN} = 12V, I_{LOAD} = 450mA		87		%
Switching Frequency				400		kHz

QUICK START PROCEDURE

Demo circuit 2599A is easy to set up to evaluate the performance of the LT8361. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} or V_{OUT} and GND terminals. See Figure 2 for proper scope probe technique.

1. With power off, connect the input power supply to V_{IN} and GND.
2. Turn on the power at the input.

   NOTE: Make sure that the input voltage does not exceed 48V.
3. Check for the proper output voltage.

   If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

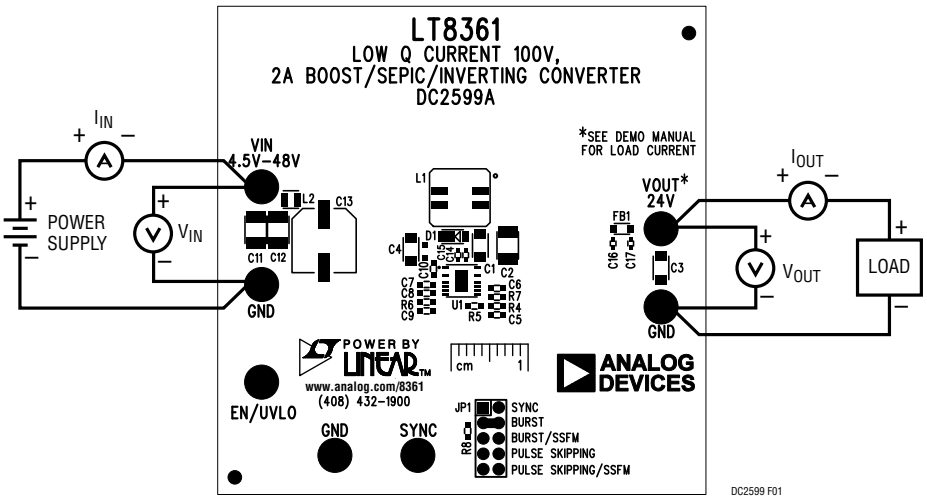


Figure 1. DC2599A Proper Equipment Setup

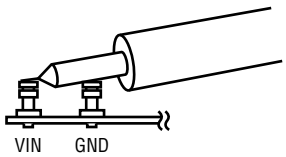


Figure 2. Measuring Input or Output Ripple

QUICK START PROCEDURE

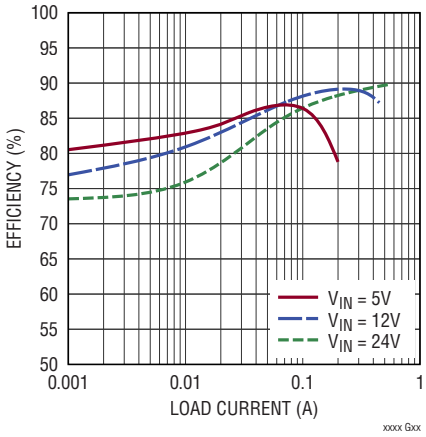


Figure 3. Efficiency vs Load Current

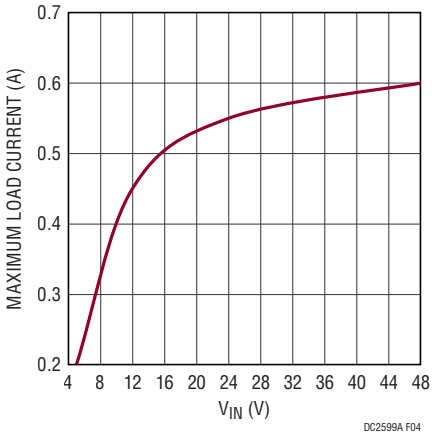


Figure 4. Maximum Load Current vs Input Voltage

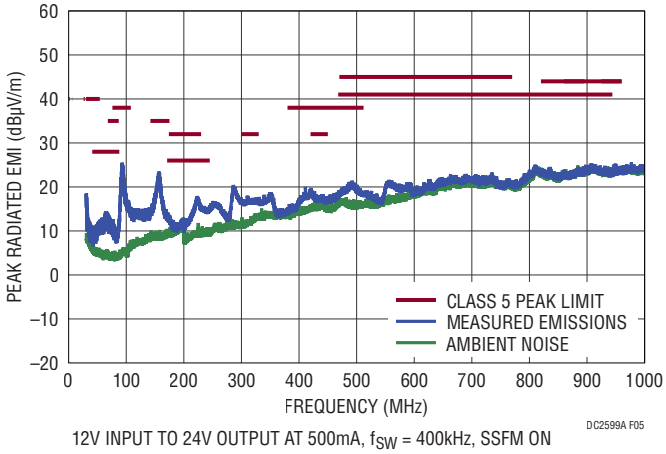


Figure 5. CISPR25 Radiated Emissions Test, Peak Detection

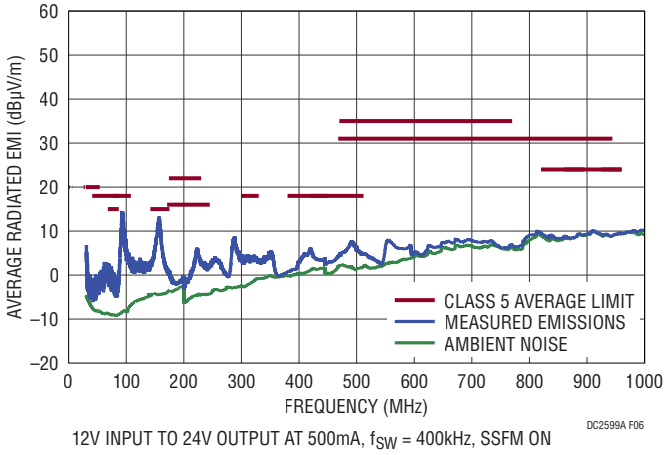
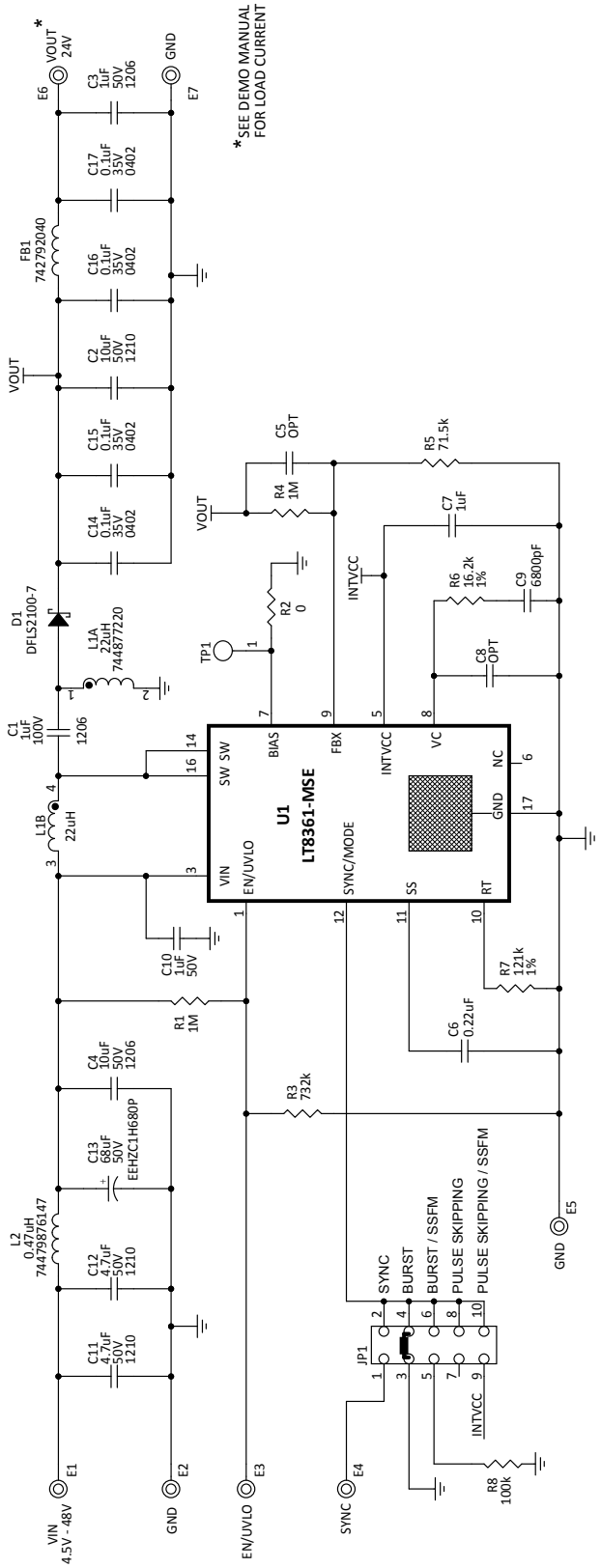


Figure 6. CISPR25 Radiated Emissions Test, Average Detection

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., 1µF, X7R, 100V, 10%, 1206	MURATA, GRM31CR72A105KA01L
2	1	C2	CAP., 10µF, X7R, 50V, 10%, 1210	MURATA, GRM32ER71H106KA12L
3	1	C3	CAP., 1µF, X7R, 50V, 10%, 1206	MURATA, GRM31MR71H105KA88L
4	1	C4	CAP., 10µF, X5R, 50V, 10%, 1206	MURATA, GRM31CR61H106KA12L
5	1	C6	CAP., 0.22µF, X7R, 25V, 10%, 0603	MURATA, GRM188R71E224KA88D
6	1	C7	CAP., 1µF, X5R, 25V, 10%, 0603	MURATA, GRM188R61E105KA12D
7	1	C9	CAP., 6800pF, X7R, 50V, 10%, 0603	MURATA, GRM188R71H682KA01D
8	1	C10	CAP., 1µF, X5R, 50V, 10%, 0603	MURATA, GRM188R61H105KAALD
9	2	C11, C12	CAP., 4.7µF, X7R, 50V, 10%, 1210	MURATA, GRM32ER71H475KA88L
10	1	C13	CAP ALUM POLY HYB 68µF 50V SMD	PANASONIC, EEH-ZC1H680P
11	4	C14, C15, C16, C17	CAP., 0.1µF, X5R, 35V, 10%, 0402	TAIYO YUDEN, GMK105BJ104KV-F
12	1	D1	DIODE, SCHOTTKY, 100V, 2A, PowerDI123	DIODES INC., DFLS2100-7
13	1	FB1	IND., 600Ω, FERRITE BEAD, 25%, 2A, 0805	WURTH ELEKTRONIK, 742792040
14	1	L1	IND., 22µH, PWR. CHOKE, SHIELDED COUPLED, 20%	WURTH ELEKTRONIK, 744877220
15	1	L2	IND., 0.47µH, PWR, 20%, 2.1A, 0.04Ω, 0806	WURTH ELEKTRONIK, 74479876147
16	2	R1,R4	RES., 1MΩ, 1%, 1/10W, 0603	VISHAY, CRCW06031M00FKEA
17	1	R2	RES., 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
18	1	R3	RES., 732kΩ,1%,1/10W,0603	PANASONIC, ERJ3EKF7323V
19	1	R5	RES., 71.5kΩ,1%,1/10W,0603	VISHAY, CRCW060371K5FKEA
20	1	R6	RES., 16.2kΩ,1%,1/10W,0603	VISHAY, CRCW060316K2FKEA
21	1	R7	RES., 121kΩ,1%,1/10W,0603	VISHAY, CRCW0603121KFKEA
22	1	R8	RES., 100kΩ,1%,1/10W,0603	VISHAY, CRCW0603100KFKEA
23	1	U1	IC, BOOST/SEPIC/INVERTG CONVERTER, MSOP-16	LINEAR TECH., LT8361EMSE#PBF
Additional Demo Board Circuit Components				
1	0	C5, C8	CAP., OPTION, 0603	
Hardware: For Demo Board Only				
1	7	E1, E2, E3, E4, E5, E6, E7	TEST POINT, TURRET, 0.094", MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	JP1	CONN., HDR, MALE, 2×5, 2mm, STR, THT	WURTH ELEKTRONIK, 62001021121
3	1	XJP1	CONN., SHUNT, FEMALE, 2 POS, 2mm	WURTH ELEKTRONIK, 60800213421

SCHEMATIC DIAGRAM



ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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