

42V, 2.5A Micropower Synchronous Step-Down Regulator

DESCRIPTION

Demonstration circuit 1749A is a 42V, 2.5A micropower synchronous step-down regulator featuring the LT[®]8610. The LT8610 is a compact, high efficiency, high speed synchronous monolithic step-down switching regulator that consumes only 2.5 μ A of quiescent current when output is regulated at 3.3V. Top and bottom power switches, compensation components and other necessary circuits are inside of the LT8610 to minimize external components and simplify design.

The SYNC pin on the demo board is grounded by default for low ripple burst mode operation. To synchronize to an external clock, move JP1 to SYNC and apply the external clock to the SYNC turret. Once JP1 is on SYNC position, a DC voltage of higher than 2V or INTV_{CC} can be applied to the SYNC turret for pulse skipping operation. Figure 1 shows the efficiency of the circuit at 12V input.

The demo board has an EMI filter installed. The EMI performance of the board is shown on Figure 2. Figure 3 shows the EMI performance of the board with the switching frequency change to 1MHz. The limit in Figure 2 and Figure 3 is EN55022 Class B. Both figures show the circuit passes the test with a wide margin. To use the EMI filter, the input should be tied to VEMI, not VIN.

The LT8610 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1749A.

Design files for this circuit board are available at <http://www.linear.com/demo>

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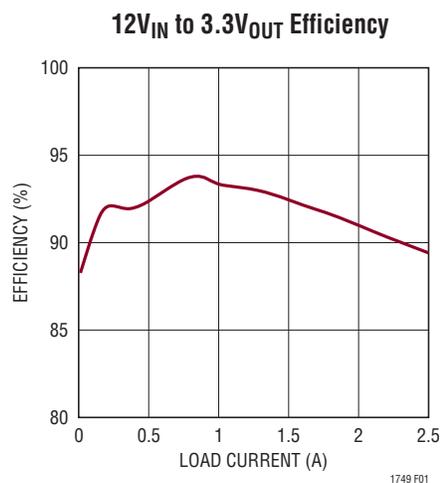


Figure 1. LT8610 Efficiency from 12V to 3.3V

DESCRIPTION

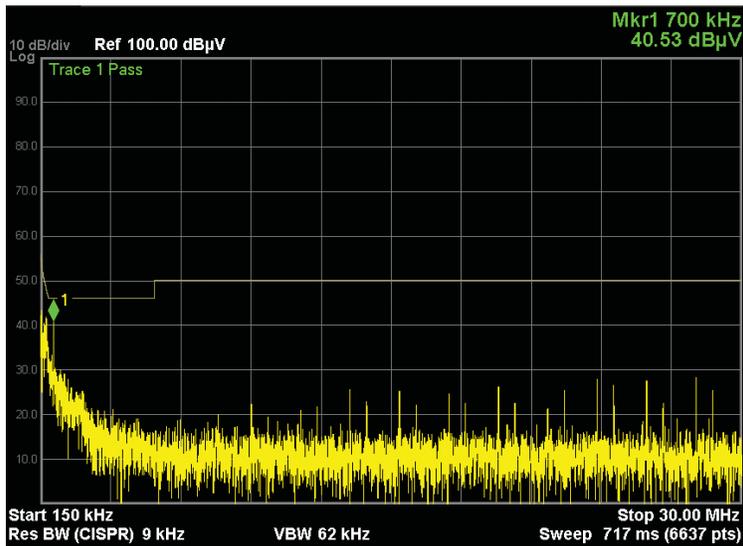


Figure 2. LT8610 Demo Circuit EMI Performance, Switching Frequency = 700kHz

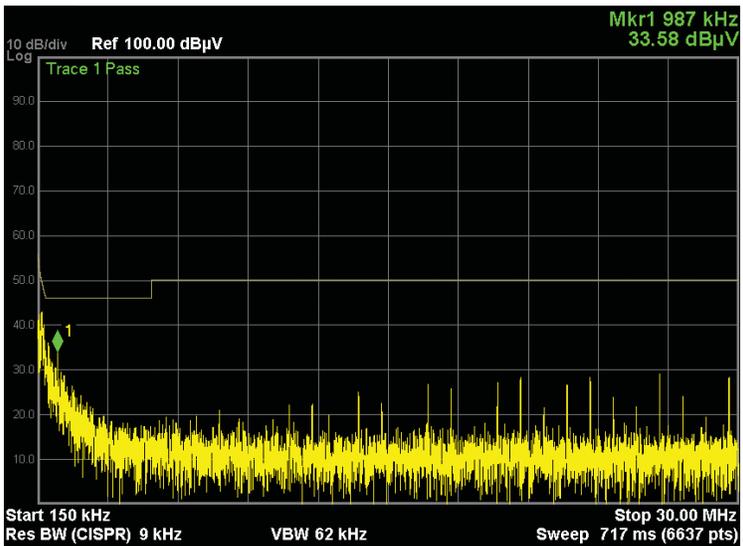


Figure 3. LT8610 Demo Circuit EMI Performance, Switching Frequency = 1MHz

PERFORMANCE SUMMARY (T_A = 25°C)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V _{IN}	Input Supply Range		3.8		42	V
V _{OUT}	Output Voltage		3.168	3.3	3.465	V
I _{OUT}	Maximum Output Current			2.5		A
F _{SW}	Switching Frequency		630	700	770	kHz
EFE	Efficiency at DC	I _{OUT} = 1A		93		%

dc1749af

QUICK START PROCEDURE

Demonstration circuit 1749A is easy to set up to evaluate the performance of the LT8610. Refer to Figure 4 and Figure 5 for proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply to V_{IN} and GND.
2. With power off, connect the load to V_{OUT} and GND.
3. Check JP1 setting
4. Turn on the power at the input.
5. Carefully evaluate other design parameters as needed.

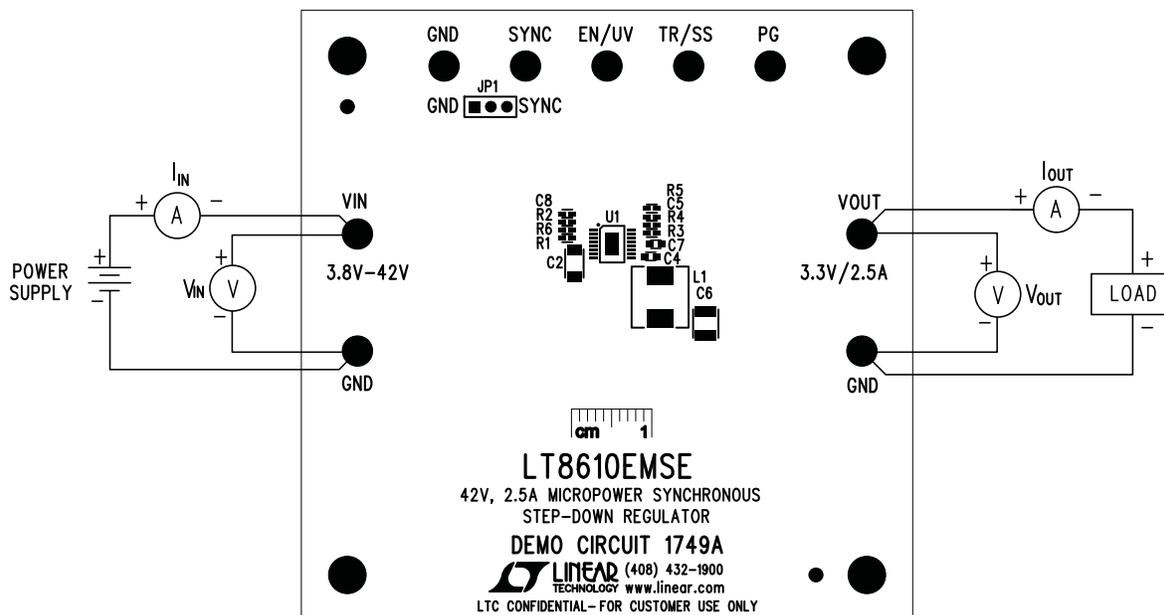


Figure 4. Proper Measurement Equipment Setup

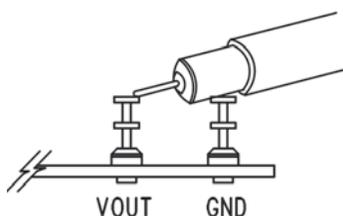


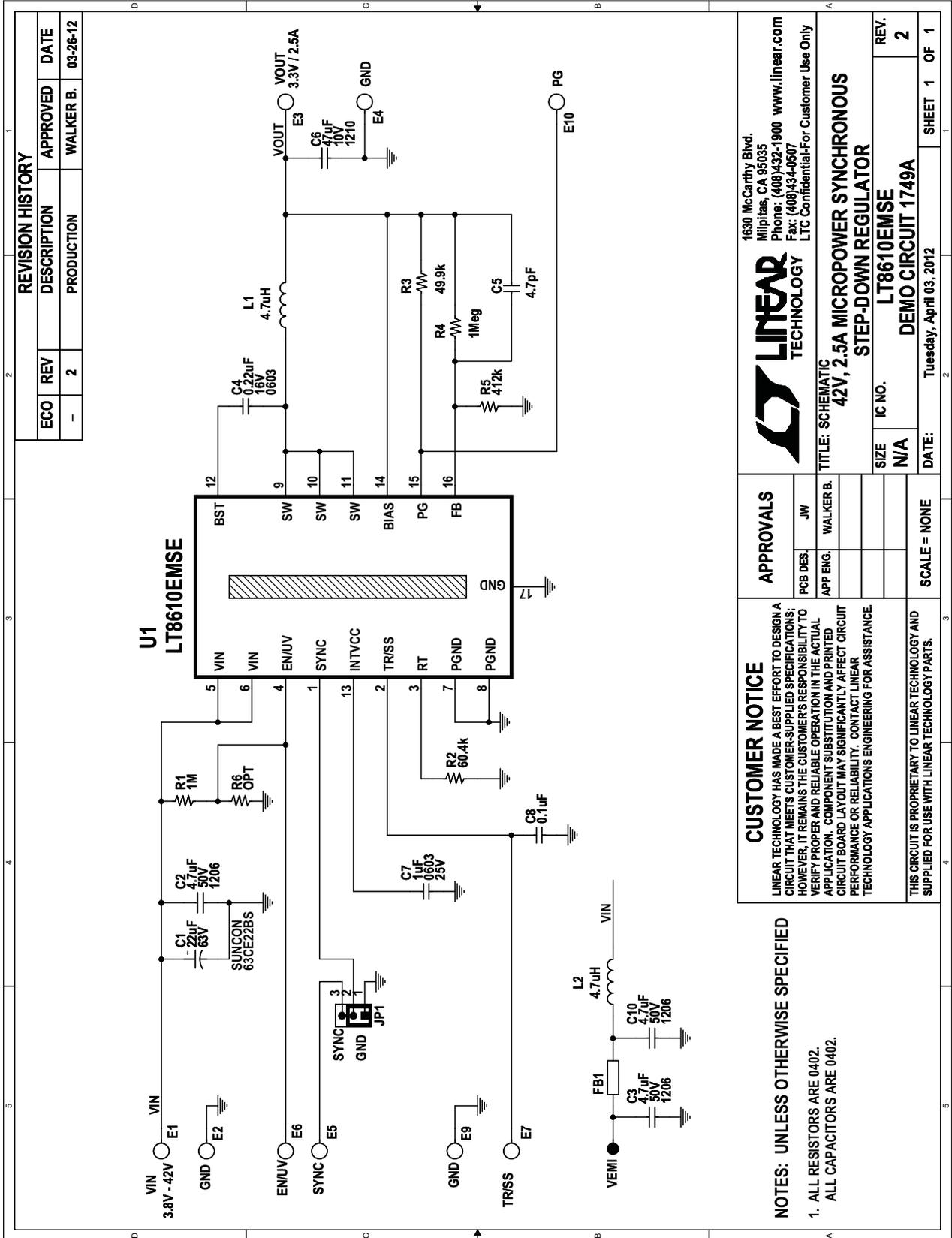
Figure 5. Measure Output Ripple

DEMO MANUAL DC1749A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP, CER 4.7 μ F 50V 1206	TAIYO YUDEN UMK316BJ475KL-T
2	1	C4	CAP, CER 0.22 μ F 16V 0603	TAIYO YUDEN EMK107BJ224KA-T
3	1	C5	CAP, CER 4.7pF 25V 0402	AVX, 04023A4R7CAT2A
4	1	C6	CAP, CER 47 μ F 10V 1210	MURATA GRM32ER71A476KE15L
5	1	C7	CAP, CER 1.0 μ F 25V 0603	MURATA GCM188R71E105KA64
6	1	C8	CAP, CER 0.1 μ F 16V 0402	AVX, 0402YC104KAT2A
7	1	L1	IND, 4.7 μ H	COILTRONICS HCM0703-4R7-R
8	1	R2	RES, 60.4k 1% 0402	VISHAY, CRCW040260K4FKED
9	1	R3	RES, 49.9k 1% 0402	VISHAY, CRCW040249K9FKED
10	2	R1, R4	RES, 1M 1% 0402	VISHAY, CRCW04021M00FKED
11	1	R5	RES, 412k 1% 0402	VISHAY, CRCW0402412KFKED
12	1	U1	IC, LT8610EMSE MSE16	LINEAR TECH.CORP. LT8610EMSE
Additional Demo Board Circuit Components				
1	1	C1	CAP, ALUM 22 μ F 63V	SUNCON 63CE22BS
2	1	C10	CAP, CER 4.7 μ F 50V 1206	TAIYO YUDEN UMK316BJ475KL-T
3	1	C3	CAP, CER 4.7 μ F 50V 1206	MURATA GRM31CR71H475KA12L
4	1	FB1	FERRITE BEAD 0805	TDK, MPZ2012S221A
5	1	L2	IND, 4.7 μ H	VISHAY, IHLP2020BZ-ER4R7M01
6	0	R6	RES, OPT 0402	OPT
Hardware/Components (For Demo Board Only)				
1	9	E1-E7, E9, E10	TESTPOINT TURRET 0.094"	MILL-MAX-2501-2
2	1	JP1	HEADER 1X3 0.079"	SAMTEC, TMM-103-02-L-S
3	1	XJP1	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
4	4	MH1-MH4	STAND-OFF, NYLON 0.50" TALL	KEYSTONE, 8833 (SNAP ON)

SCHEMATIC DIAGRAM



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LINEAR TECHNOLOGY

TITLE: SCHEMATIC
42V, 2.5A MICROPOWER SYNCHRONOUS
STEP-DOWN REGULATOR

SIZE IC NO. N/A
REV. 2

DATE: Tuesday, April 03, 2012

APPROVALS

PCB DES.	JW
APP ENG.	WALKER B.
SCALE = NONE	

CUSTOMER NOTICE

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NOTES: UNLESS OTHERWISE SPECIFIED

- ALL RESISTORS ARE 0402.
- ALL CAPACITORS ARE 0402.

DEMO MANUAL DC1749A

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