

42V, 2.5A Micropower Synchronous Step-Down Regulator with Current Sense

DESCRIPTION

Demonstration circuit 1750A is a 42V, 2.5A micropower synchronous step-down regulator with current sense featuring the LT[®]8611. The LT8611 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 LT8611 to minimize external components and simplify design.

The demonstration circuit has output current limit set at 2.5A by default. The current limit can be moved to the input side for application where input supply current is limited, such as energy harvesting application. ICTRL and IMON on the board set and monitor the regulated current respectively. 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 running at 1MHz switching frequency. 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 LT8611 datasheet 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 1750A.

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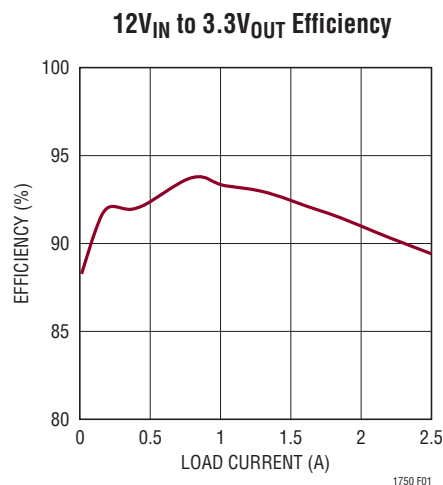


Figure 1. LT8611 Efficiency from 12V to 3.3V (R₅ = 0)

DESCRIPTION

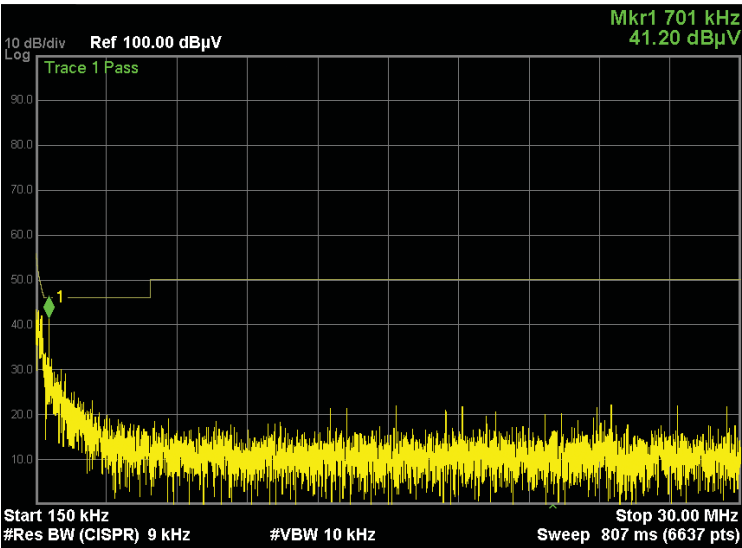


Figure 2. LT8611 Demo Circuit EMI Performance, Switching Frequency = 700kHz

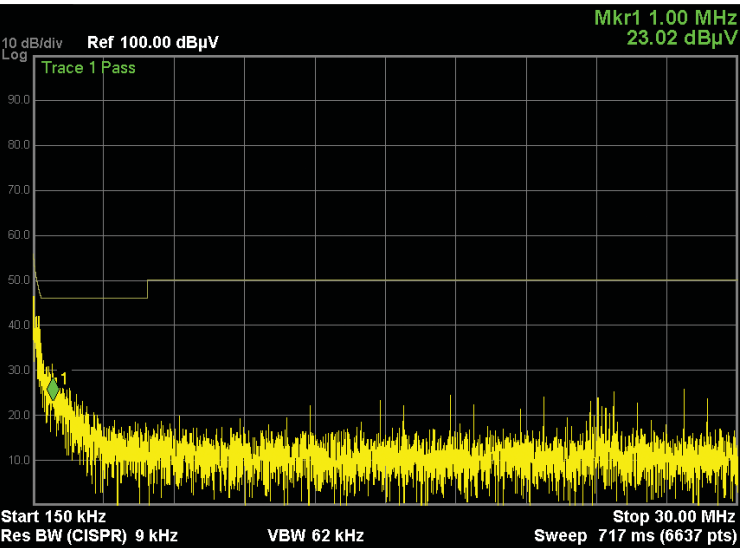


Figure 3. LT8611 Demo Circuit EMI Performance, Switching Frequency = 1MHz

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, R ₅ = 0		93		%

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QUICK START PROCEDURE

Demonstration circuit 1750A is easy to set up to evaluate the performance of the LT8611. 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 VIN and GND.
2. With power off, connect the load VOUT and GND.
3. Check JP1 setting
4. Turn on the power at the input.
5. Carefully evaluate other design parameters as needed.

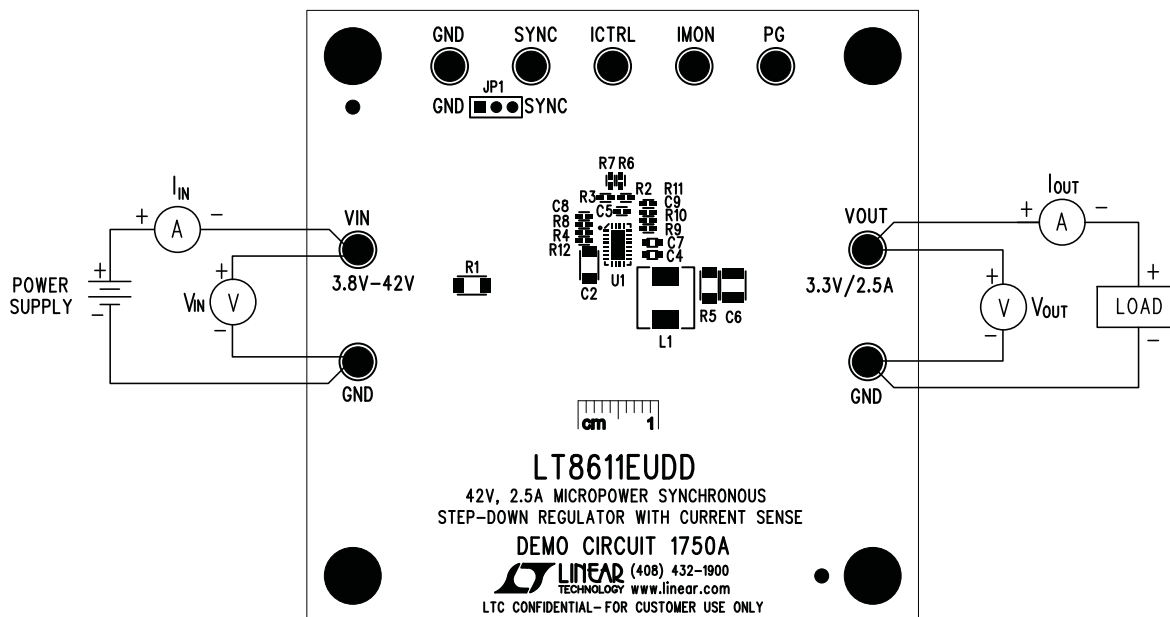


Figure 4. Proper Measurement Equipment Setup

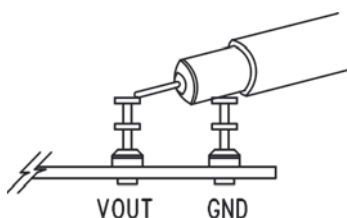


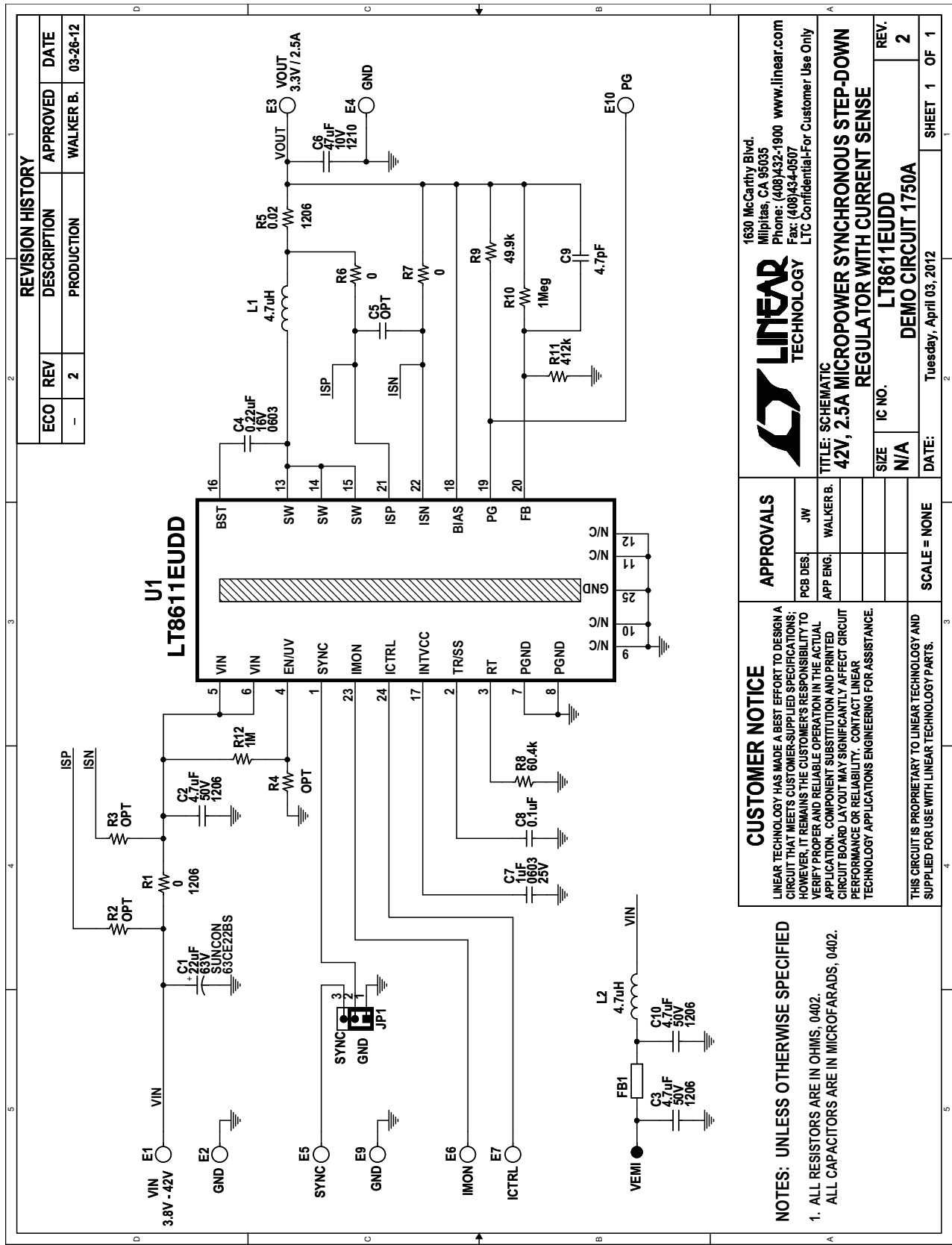
Figure 5. Measure Output Ripple

DEMO MANUAL DC1750A

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
2	1	C4	CAP, CER 0.22 μ F 16V 0603	TAIYO YUDEN EMK107BJ224KA-T
3	1	C6	CAP, CER 47 μ F 10V 1210	MURATA, GRM32ER71A476K
4	1	C7	CAP, CER 1.0 μ F 25V 0603	MURATA GRM188R71E105K
5	1	C8	CAP, CER 0.1 μ F 0402	AVX, 0402YD104KAT2A
6	1	C9	CAP, CER 4.7pF 25V 0402	AVX, 04023A4R7CAT
7	1	L1	IND, 4.7 μ H	COILTRONICS HCM0703-4R7-R
8	1	R5	RES, 0.02 Ω 1% 1206	VISHAY, WSL1206R0200FEA
9	1	R8	RES, 60.4k 1% 0402	VISHAY, CRCW040260K4FKED
10	1	R9	RES, 49.9k 1% 0402	VISHAY, CRCW040249K9FKED
11	2	R10, R12	RES, 1M 1% 0402	VISHAY, CRCW04021M00FKED
12	1	R11	RES, 412k 1% 0402	VISHAY, CRCW0402412KFKED
13	1	U1	IC, LT8611EUDD QFN24EUDD	LINEAR TECH.CORP. LT8611EUDD
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
3	1	C3	CAP, CER 4.7 μ F 50V 1206	MURATA, GRM31CR71H475K
4	0	C5	CAP, OPT 0402	OPT
5	1	FB1	FERRITE BEAD 0805	TDK, MPZ2012S221A
6	1	L2	IND, 4.7 μ H	VISHAY, IHLP2020BZ-ER4R7M01
7	1	R1	RES, 0 Ω 1206	AAC CJ18-000M
8	0	R2, R3, R4	RES, OPT 0402	OPT
9	2	R6, R7	RES, 0 Ω 0402	AAC, CJ05-000M
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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