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LT8610AB
42V, 3.5A Micropower Synchronous Step-Down Regulator

DESCRIPTION

Demonstration circuit 2012A is a 42V, 3.5A micropower synchronous step-down regulator featuring the LT®8610AB. The LT8610AB is a compact, high efficiency, high speed synchronous monolithic step-down switching regulator that consumes only 2.5µA of quiescent current when output is regulated at 5V. The efficiency of the circuit is greater than 90% at light load up to 1.5A. This is a 10% improvement over competing parts. Top and bottom power switches, compensation components and other necessary circuits are inside of the LT8610AB 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 synchronous 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.

Figure 2 shows the thermal performance of the circuit. When running at input voltage greater than 30V, 3.5A output current and 2MHz switching frequency, the temperature rise will be significant. Either reducing the input voltage, the output current or the switching frequency will bring the temperature down to acceptable level without external cooling.

The demo board has an EMI filter installed. The board and the IC are designed to minimize conducted and radiated EMI. The conducted EMI performance of the board is shown on Figure 3. The limit in Figure 3 is EN55022 class B, average. It shows the circuit passes the test with a wide margin.

The LT8610AB 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 DC2012A.

Design files for this circuit board are available at http://www.linear.com/demo/DC2012A

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}*	Input Supply Range		5.5		42	V
V_{OUT}	Output Voltage		4.8	5	5.2	V
I_{OUT}	Maximum Output Current		3.5			A
f_{SW}	Switching Frequency		1.85	2	2.15	MHz
EFE	Efficiency at DC	I_{OUT} = 1A		91		%

* Refer to Figure 2 to determine the maximum input voltage. If IC temperature exceeds target, reduce input voltage, output current or switching frequency.

QUICK START PROCEDURE

DC2012A is easy to set up to evaluate the performance of the LT8610AB. 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 V_{OUT} and GND.
3. Check JP1 setting
4. Turn on the power at the input.
5. Carefully evaluate other design parameters as needed.

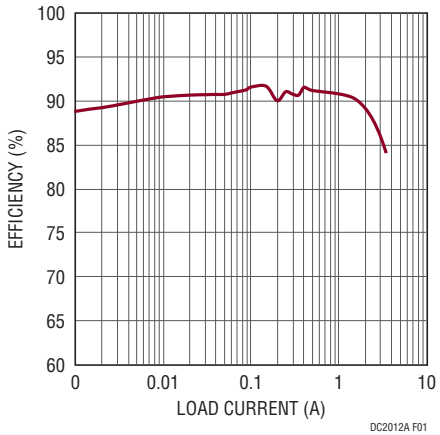


Figure 1. LT8610AB 12V_{IN} to 5V_{OUT} Efficiency at 2MHz Switching Frequency

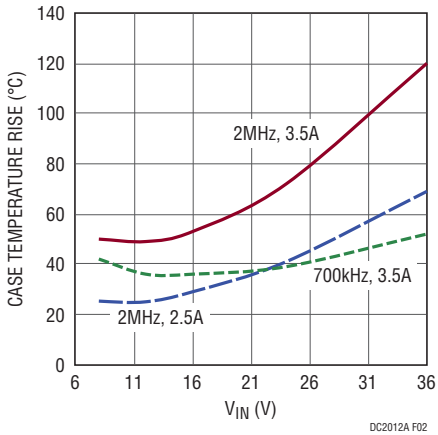


Figure 2. LT8610AB Case Temperature Rise. V_{OUT} = 5V, T_A = 25°C

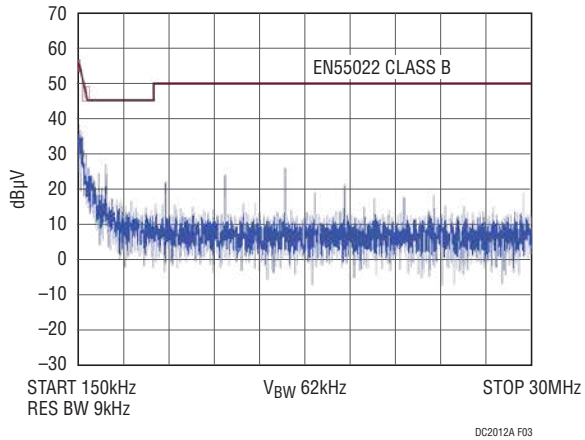


Figure 3. LT8610AB Demo Circuit Conducted EMI Performance

QUICK START PROCEDURE

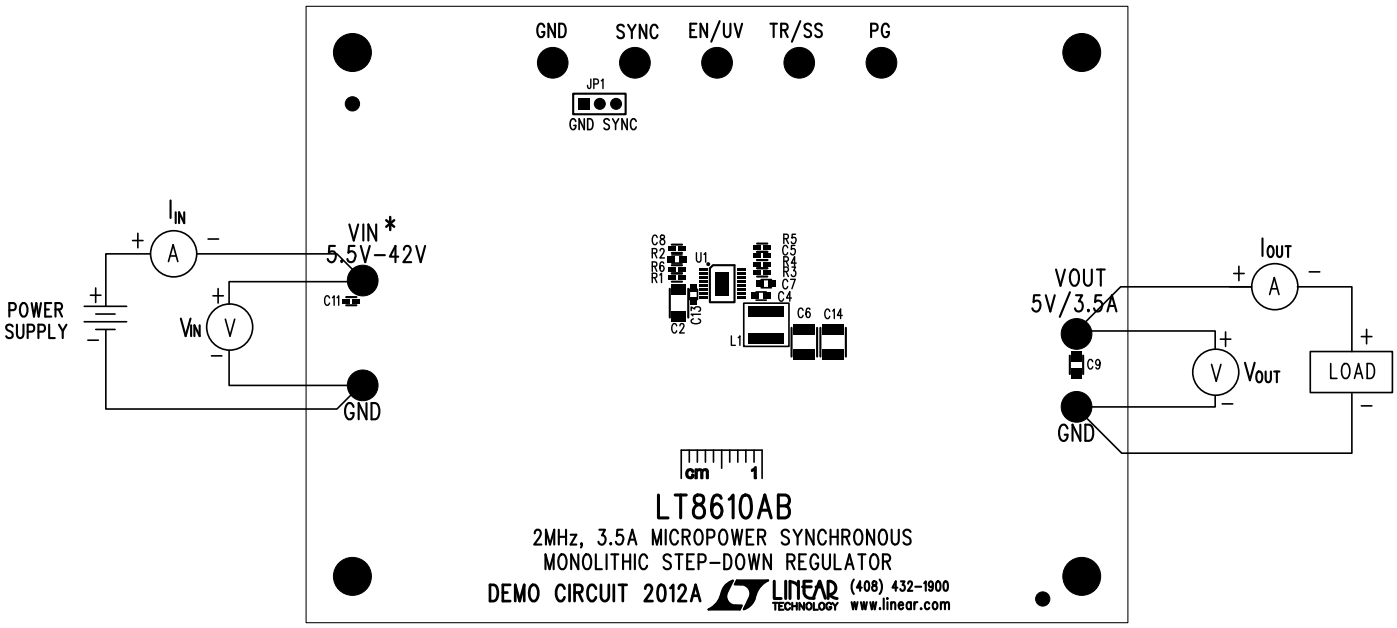


Figure 4. Proper Measurement Equipment Setup

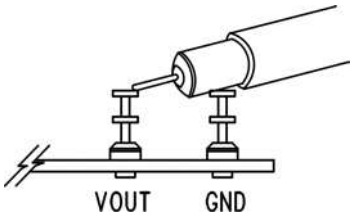
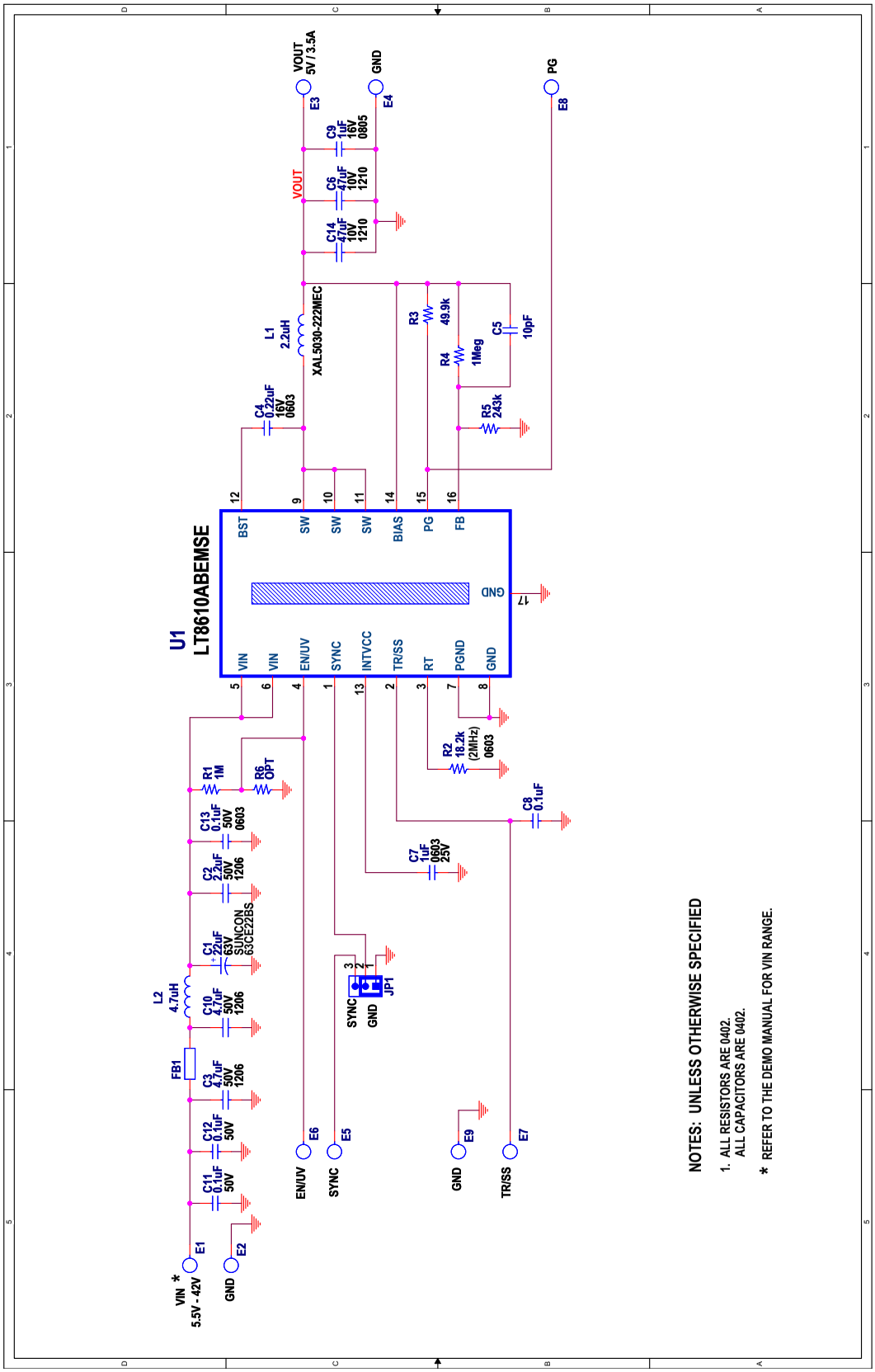


Figure 5. Measure Output Ripple

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP., X7R, 2.2µF, 50V, 10%, 1206	MURATA, GCJ31CR71H225KA12L
2	1	C4	CAP., X7R, 0.22µF, 16V, 10%, 0603	AVX, 0603YC224KAT2A
3	1	C5	CAP., C0G, 10pF, 25V, 10%, 0402	AVX, 04023A100KAT2A
4	2	C6, C14	CAP., X7R, 47µF, 10V, 10%, 1210	MURATA, GRM32ER71A476KE15L
5	1	C7	CAP., X7R, 1.0µF, 25V, 10%, 0603	MURATA, GRM188R71E105KA12D
6	1	C8	CAP., X7R, 0.1µF, 16V, 10%, 0402	MURATA, GRM155R71C104KA88D
7	1	L1	IND., 2.2µH	COILCRAFT, XAL5030-222MEC
8	1	R2	RES., CHIP, 18.2k, 1/10W, 1% 0603	VISHAY, CRCW060318K2FKEA
9	1	R3	RES., CHIP, 49.9k, 1/16W, 1% 0402	VISHAY, CRCW040249K9FKED
10	2	R1, R4	RES., CHIP, 1M, 1/16W, 1% 0402	VISHAY, CRCW04021M00FKED
11	1	R5	RES., CHIP, 243k, 1/16W, 1% 0402	VISHAY, CRCW0402243KFKED
12	1	U1	IC, LT8610ABEMSE#PBF MSE16	LINEAR TECH, LT8610ABEMSE#PBF
Additional Demo Board Circuit Components				
1	1	C1	CAP., ALUM, 22µF, 63V	SUN ELECT, 63CE22BS
2	2	C3, C10	CAP., X7R, 4.7µF, 50V, 10%, 1206	MURATA, GRM31CR71H475KA12L
3	1	C9	CAP., X7R, 1.0µF, 16V, 10%, 0805	AVX, 0805YC105KAT2A
4	1	C11, C12	CAP., X7R, 0.1µF, 50V, 10%, 0402	TDK, C1005X7R1H104K
5	2	C13	CAP., X7R, 0.1µF, 50V, 10%, 0603	MURATA, GCJ188R71H104KA12D
6	1	FB1	FERRITE BEAD 0805	TDK, MPZ2012S101AT
7	1	L2	IND., 4.7µH	VISHAY, IHLP2020BZ-ER4R7M01
8	0	R6	RES., OPT, 0402	OPT
Hardware: For Demo Board Only				
1	9	E1-E9	TESTPOINT, TURRET, .094"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	JP1	HEADER 1X3 079	SAMTEC, TMM-103-02-L-S
3	1	XJP1	SHUNT, .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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