LTC7812EUH
Wide V_{IN}, Step-Up + Step-Down DC/DC Converter

DESCRIPTION

Demonstration circuit DC2422A is a step-up + step-down DC/DC converter featuring the LTC®7812EUH, a high performance dual output (Boost + Buck) synchronous DC/DC switching regulator controller. This board has three different configurations:

- **DC2422A-A:** Regulated V_{OUT} to 12V
- **DC2422A-B:** Quasi regulated V_{OUT} between 10V and 16V
- **DC2422A-C:** Dual outputs: 12V (boost channel)
  5V (buck channel)

This circuit enables a drop-in layout where the total circuit area is only 1½" by 1". The LTC7812EUH is in a 32-lead exposed pad QFN package.

The main features of the board include rail tracking (buck channel only), an internal 5V linear regulator for bias, separate RUN pins for each output and a Mode selector that allows the converter to run in CCM, pulse skip or Burst Mode® operation. Synchronization to an external clock is also possible.

The LTC7812 buck input is supplied from the boost output for the DC2422A-A and DC2422A-B only. With this boost-then-buck topology, the buck output maintains regulation over the entire input range. The wide input voltage range of 4V to 36V is suitable for automotive or other battery fed applications where low quiescent current is important.

The DC2422A-B is designed such that V_{OUT} is partially regulated between 10V and 16V for higher efficiency (Figure 4a), reduced power loss, and switching noise. When V_{IN} is between 10V and 16V, it operates in pass-thru mode with the boost synchronous FET fully on and the buck in drop-out with >99% duty cycle. When V_{IN} is below 10V, the boost is activated and when V_{IN} is above 16V, the buck is activated as shown in Figure 4b.

The LT7812 data sheet gives a complete description of the part, operation and application information and must be read in conjunction with this quick start guide.

Design files for this circuit board are available at http://www.linear.com/demo/DC2422A

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PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	M_{IN}	TYP	MAX	UNITS
V_{IN}	Input Supply Range		4		36	V
V_{OUT1}	Output1 Voltage Range	DC2422A-A: V_{IN} = 4V* – 36V, I_{OUT1} = 0A to 8A†	11.7	12	12.3	V
		DC2422A-B: V_{IN} = 4V* – 36V, I_{OUT1} = 0A to 8A†	9.7		16.3	V
		DC2422A-C: V_{IN} = 4V* – 36V, I_{OUT1} = 0A to 8A†	4.9	5**	5.1	V
V_{BUS}	V_{BUS} Voltage Range (DC2422A-C only)		11.7	12	12.3	V
f_{SW}	Typical Free Running Switching Frequency			350		kHz
	Efficiency See Figures 3, 4, 5 and 6 for Efficiency Curves	DC2422A-A: V_{IN} = 8V, V_{OUT1} = 12V, I_{OUT1} = 8A V_{IN} = 12V, V_{OUT1} = 12V, I_{OUT1} = 8A V_{IN} = 36V, V_{OUT1} = 12V, I_{OUT1} = 8A		93 95.4 95		% % %
		DC2422A-B: V_{IN} = 8V, V_{OUT1} = 10V, I_{OUT1} = 8A V_{IN} = 12V, V_{OUT1} = 12V, I_{OUT1} = 8A V_{IN} = 36V, V_{OUT1} = 16V, I_{OUT1} = 6A		94.8 97.2 95.8		% % %
		DC2422A-C: V_{IN} = 8V, V_{BUS} = 12V, Ibus = 8A V_{IN} = 12V, V_{OUT1} = 5V, I_{OUT1} = 8A V_{IN} = 36V, V_{OUT1} = 5V, I_{OUT1} = 8A		95.8 94 91.9		% % %

†I_{OUT1} starts to derate when V_{IN} < 8V, *V_{IN} needs to be >4.5V to start up, **V_{OUT1} follows V_{IN} when V_{IN} < 5V.

QUICK START PROCEDURE

Demonstration circuit DC2422A is easy to set up to evaluate the performance of the LTC7812EUH. 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 or directly across relevant capacitor. See Figure 2 for proper scope probe technique.

1. Place jumpers in the following positions:

   JP1: ON

   JP2: ON

   JP3: Burst Mode BURST

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

3. Turn on the power at the input.

   NOTE: Make sure that the input voltage is higher than 8V and does not exceed 36V.

4. Check for the proper output voltages for different boards.

   DC2422A-A: V_{OUT1} = 11.7V to 12.3V,

   DC2422A-B: 9.7V < V_{OUT1} < 16.3V,

   DC2422A-C: V_{OUT1} = 4.9V to 5.1V; V_{BUS} = 11.7V to 12.3V.

   NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

5. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

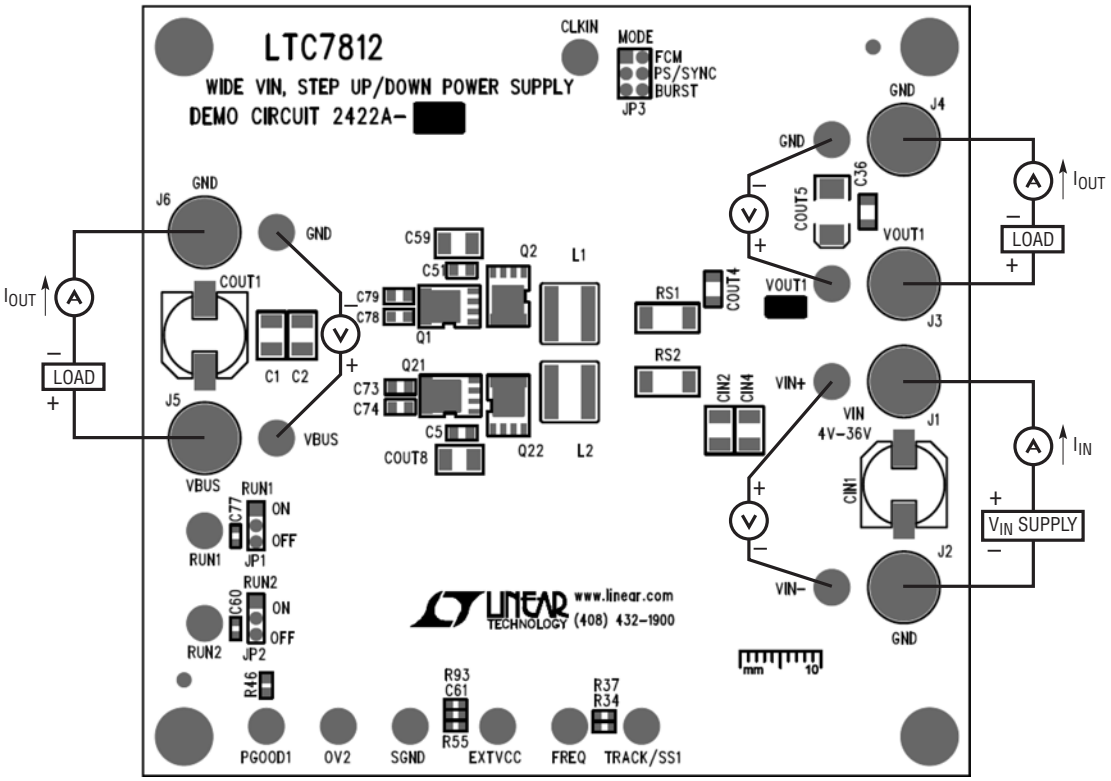

Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE

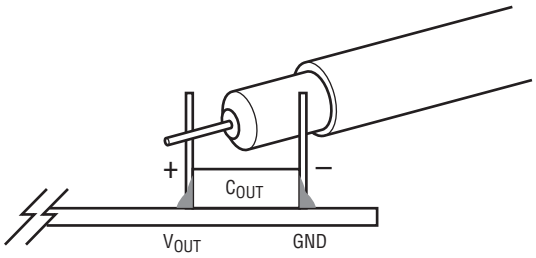

Figure 2. Measuring Input or Output Ripple Directly Across Ceramic Capacitor

FREQUENCY SYNCHRONIZATION AND MODE SELECTION

Demonstration circuit DC2422A's Mode selector allows the converter to run in forced continuous operation, pulse skip operation, Burst Mode operation or be synchronizing to an external clock by changing the position of JP3.

Table 1. Mode Selection and Synchronized Operation Options

CONFIGURATION	JP3
Forced Continuous Operation	FCM
Pulse Skip Operation	PS/Sync
Synchronized to Ext. Clock Applied to CLKIN Pin	PS/Sync
Burst Mode Operation	Burst

RAIL TRACKING

Demonstration circuit DC2422A is configured for an on-board soft-start circuit. The soft-start ramp rate can be adjusted by changing the value of C47. Demonstration circuit DC2422A can also be modified to track an external reference. Refer to Table 2 for tracking options and to the data sheet for more details.

Table 2. V_{OUT1} Tracking Options

CONFIGURATION	R34	R37	C47	TRK/SS1 CAP
Soft-Start without Tracking (Default)	OPEN	OPEN	0.1µF	OPEN
V_{OUT1} Tracking Scaled External Reference	Resistor Divider		OPEN	External Reference

OPTIONAL INDUCTOR DCR CURRENT SENSING

Demonstration circuit 2422A provides an optional circuit for Inductor DCR Current Sensing. Inductor DCR Current Sensing uses the DCR of the inductor to sense the inductor current instead of discrete sense resistors. The advantages of DCR sensing are lower cost, reduced board space and higher efficiency, but the disadvantage is a less accurate current limit. If DCR sensing is used, be sure to select an inductor current with a sufficiently high saturation current or use an iron powder type material.

Refer to Table 3 for Optional Inductor DCR Current Sensing setup and to the data sheet for more details.

OPTIONAL INDUCTOR DCR CURRENT SENSING

Table 3. Optional Inductor DCR Current Sensing

CONFIGURATION	CHANNEL1 / CHANNEL2	RS1 / RS2	R39 / R80	R40 / R81	C15 / C56	R51 / R89	R53 / R90	R62 / R91
Current Sense Resistor (Default)		Ref. Sch.	Ref. Sch.	Ref. Sch.	Ref. Sch.	OPEN	OPEN	OPEN
Inductor DCR Current Sensing		0Ω Copper	OPEN	OPEN	Calculated Value from Data Sheet			0Ω

Low Quiescent Current Applications and Measurement

The typical quiescent current (I_Q) of the LTC7812 controller is 28µA in sleep mode as specified in the LTC7812 data sheet. However, the input current of the DC2422A board can be higher than this value because of additional circuit outside of the IC. To reduce the total input current, large value FB divider resistors should be used. In addition, some of the optional pull-up resistors should be removed from the board. Refer to Table 4 for the low input quiescent current setup.

Table 4. Low Input Quiescent Current Configuration

Reference Designator	R46	R92
Function	PGOOD1	OV2
Stuffing Option	OPEN	OPEN

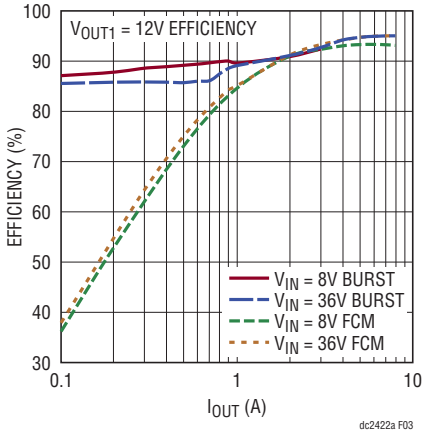

Figure 3. DC2422A-A V_{OUT1} Typical Efficiency vs Load Current

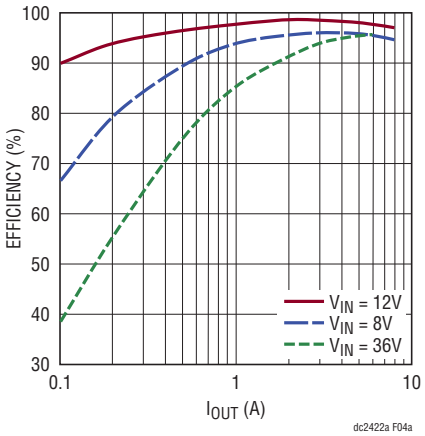

Figure 4a. DC2422A-B V_{OUT1} Typical FCM Efficiency vs Load Current

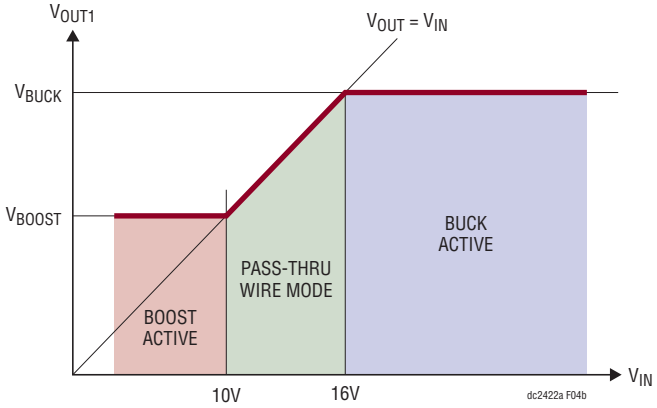

Figure 4b. DC2422A-B Partially Regulated V_{OUT}

OPTIONAL INDUCTOR DCR CURRENT SENSING

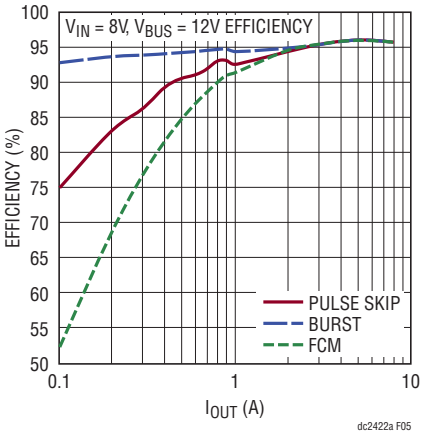

Figure 5. DC2422A-C V_{BUS} Typical Efficiency vs Load Current

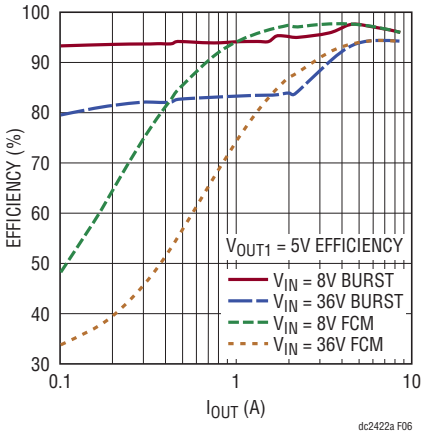

Figure 6. DC2422A-C V_{OUT1} Typical Efficiency vs Load Current

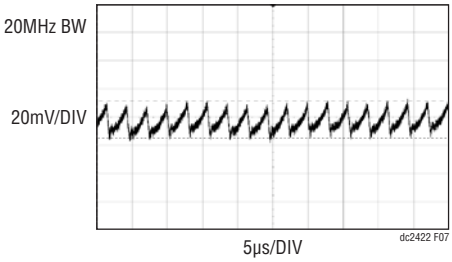

Figure 7. DC2422A-A V_{OUT1} Voltage Ripple at V_{IN} = 8V

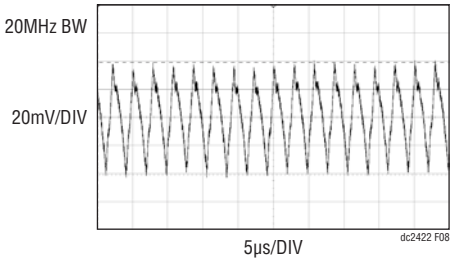

Figure 8. DC2422A-A V_{OUT1} Voltage Ripple at V_{IN} = 36V

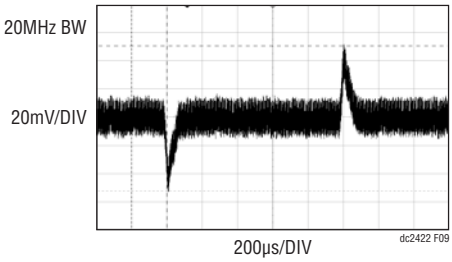

Figure 9. DC2422A-A V_{OUT1} 2A – 4A – 2A Load Transient at V_{IN} = 8V

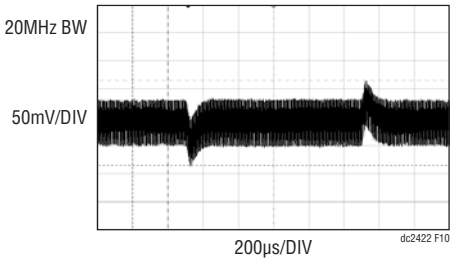

Figure 10. DC2422A-A V_{OUT1} 2A – 4A – 2A Load Transient at V_{IN} = 36V

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
DC2422A-A Required Circuit Components				
1	1	CIN1	CAP, 33µF, 63V, 20%, ELEC	SUN ELEC. 63HVH33M
2	1	COUT1	CAP, 100µF, 50V, 20%, ELEC	PANASONIC, EEHZA1H101P
3	6	CIN2, CIN3, CIN4, COUT6, COUT8, C59, C80	CAP, 10µF, X7R, 50V, 10%, 1210	AVX, 12105C106KAT2A
4	1	COUT4	CAP, 4.7µF, X7R, 16V, 20%, 1206	TDK, C3216X7R1C475M
5	2	COUT5, COUT11	CAP, 150µF, 16V, 20% 7343	PANASONIC, 16TQC150MYF
6	5	C4, C17, C21, C47, C52	CAP, 0.1µF, X7R, 25V, 10%, 0603	TDK, C1608X7R1E104K
7	2	C5, C51	CAP, 4.7µF, X5R, 50V, 10%, 0805	TDK, C2012X5R1H475K125AB
8	4	C15, C53, C56, C62	CAP, 1nF, X7R, 50V, 10%, 0603	AVX, 06035C102KAT2A
9	1	C43	CAP, 68pF, NPO, 50V, 10%, 0603	AVX, 06035A680KAT2A
10	1	C44	CAP, 2.2nF, X7R, 50V, 10%, 0603	AVX, 06035C222KAT2A
11	1	C54	CAP, 10nF, X7R, 50V, 10%, 0603	TDK, C1608X7R1H103K
12	1	C61	CAP, 1µF, X5R, 25V, 20%, 0603	TDK, C1608X5R1E105M
13	1	C64	CAP, 4.7µF X5R, 10V, 20%, 0603	AVX, 0603ZD475MAT2A
14	2	D1, D2	DIODE, SCHOTTKY, 40V, 3A, SOD323	CENTRAL SEMI, CMDSH-4E
15	0	D3	DIODE, SCHOTTKY, 40V, 3A, SMB	DIODES INC, B340B-13-F OPTION
16	0	L1	IND, 4.7µH	COILCRAFT, XAL7070-472
17	0	L2	IND, 1.0µH	COILCRAFT, XAL7070-102
18	2	Q1, Q2	XSTR, N-CHANNEL MOSFET	INFINEON, BSC093N04LS
19	2	Q21, Q22	XSTR, N-CHANNEL MOSFET	INFINEON, BSC027N04LS
20	1	RS1	RES., SENSE, 0.003Ω, 1/2W, 1%, 2010	VISHAY, WSL20103L000FEA
21	2	RS2, RS3	RES., SENSE, 0.004Ω, 1/2W, 1%, 2010	VISHAY, WSL20104L000FEA
22	1	R33	RES., 35.7k, 1/10W, 1%, 0603	VISHAY, CRCW060335K7FKEA
23	1	R35	RES., 15k, 1/10W, 5%, 0603	VISHAY, CRCW060315K0JNEA
24	1	R43	RES., 499k, 1/10W, 1%, 0603	VISHAY, CRCW0603499KFKEA
25	3	R46, R48, R92	RES., 100k, 1/10W, 5%, 0603	VISHAY, CRCW0603100KJNEA
26	1	R75	RES., 3.6k, 1/10W, 1%, 0603	VISHAY, CRCW06033K60FKEA
27	1	R78	RES., 549k, 1/10W, 1%, 0603	VISHAY, CRCW0603549KFKEA
28	1	R79	RES., 49.9k, 1/10W, 1%, 0603	VISHAY, CRCW060349K9FKEA
29	1	R81	RES., 100Ω, 1/10W, 5%, 0603	VISHAY, CRCW0603100RJNEA
30	1	R86	RES., 2.2Ω, 1/10W, 5%, 0603	VISHAY, CRCW06032R20JNEA
31	1	U1	IC, LOW I_Q, 38V BOOST + BUCK SYNCHRONOUS CONTROLLER	LINEAR TECH. LTC7812EUH#PBF

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Additional Demo Board Circuit Components				
1	0	C1, C2, C3, C6, CIN5, C68	CAP, OPTION, 1210	OPTION
2	0	COUT2	CAP, OPTION	OPTION
3	0	C36	CAP, OPTION, 1206	OPTION
4	0	C39, C40, C66, C67, C73, C74, C78, C79	CAP, OPTION, 0805	OPTION
5	0	C49, C55, C57, C60, C63, C65, C77	CAP, OPTION, 0603	OPTION
6	0	L3	IND, OPTION	COILCRAFT, OPTION
7	0	Q9, Q11, Q18, Q19	XSTR, N-CHANNEL MOSFET	OPTION
8	9	R34, R36, R39, R40, R70, R72, R80, R95, R96	RES., 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
9	0	R37, R51, R53, R55, R62, R85, R89, R90, R91, R93, R94	RES., OPTION, 0603	OPTION
10	0	R82	RES., OPTION, 1206	OPTION
11	0	R100	RES., OPTION , 0805	OPTION
12	0	R101	RES., OPTION, 1210	OPTION
13	1	R102	RES., 0Ω, 2010	VISHAY, CRCW20100000Z0EF
Hardware: For Demo Board Only				
1	15	E1-E15	TURRET	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	CONN., HEADER, 1X3, 2mm	WURTH ELEKTRONIK, 620 003 111 21
3	1	JP3	CONN., HEADER, 2X3, 2mm	WURTH ELEKTRONIK, 620 006 211 21
4	3	XJP1, XJP2, XJP3	SHUNT, 2mm	WURTH ELEKTRONIK, 608 002 134 21
5	6	J1, J2, J3, J4, J5, J6	JACK, BANANA	KEYSTONE, 575-4
6	4		STANDOFF, SNAP ON	KEYSTONE, 8833

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
DC2422A-B Required Circuit Components				
1	1	CIN1	CAP, 33µF, 63V, 20%, ELEC	SUN ELEC. 63HVH33M
2	1	COUT1	CAP, 100µF, 50V, 20%, ELEC	PANASONIC, EEHZA1H101P
3	6	CIN2, CIN3, CIN4, COUT6, COUT8, C59, C80	CAP, 10µF, X7R, 50V, 10%, 1210	AVX, 12105C106KAT2A
4	1	COUT4	CAP, 4.7µF, X7R, 16V, 20%, 1206	TDK, C3216X7R1C475M
5	2	COUT5, COUT11	CAP, 150µF, 16V, 20% 7343	PANASONIC, 16TQC150MYF
6	5	C4, C17, C21, C47, C52	CAP, 0.1µF, X7R, 25V, 10%, 0603	TDK, C1608X7R1E104K
7	2	C5, C51	CAP, 4.7µF, X5R, 50V, 10%, 0805	TDK, C2012X5R1H475K125AB
8	4	C15, C53, C56, C62	CAP, 1nF, X7R, 50V, 10%, 0603	AVX, 06035C102KAT2A
9	1	C43	CAP, 68pF, NPO, 50V, 10%, 0603	AVX, 06035A680KAT2A
10	1	C44	CAP, 2.2nF, X7R, 50V, 10%, 0603	AVX, 06035C222KAT2A
11	1	C54	CAP, 10nF, X7R, 50V, 10%, 0603	TDK, C1608X7R1H103K
12	1	C61	CAP, 1µF, X5R, 25V, 20%, 0603	TDK, C1608X5R1E105M
13	1	C64	CAP, 4.7µF X5R, 10V, 20%, 0603	AVX, 0603ZD475MAT2A
14	2	D1, D2	DIODE, SCHOTTKY, 40V, 3A, SOD323	CENTRAL SEMI, CMDSH-4E
15	0	D3	DIODE, SCHOTTKY, 40V, 3A, SMB	DIODES INC, B340B-13-F OPTION
16	0	L1	IND, 4.7µH	COILCRAFT, XAL7070-472
17	0	L2	IND, 1.0µH	COILCRAFT, XAL7070-102
18	2	Q1, Q2	XSTR, N-CHANNEL MOSFET	INFINEON, BSC093N04LS
19	2	Q21, Q22	XSTR, N-CHANNEL MOSFET	INFINEON, BSC027N04LS
20	1	RS1	RES., SENSE, 0.003Ω, 1/2W, 1%, 2010	VISHAY, WSL20103L000FEA
21	2	RS2, RS3	RES., SENSE, 0.004Ω, 1/2W, 1%, 2010	VISHAY, WSL20104L000FEA
22	1	R33	RES., 26.7k, 1/10W, 1%, 0603	VISHAY, CRCW060326K7FKEA
23	1	R35	RES., 15k, 1/10W, 5%, 0603	VISHAY, CRCW060315K0JNEA
24	1	R43	RES., 499k, 1/10W, 1%, 0603	VISHAY, CRCW0603499KFKEA
25	3	R46, R48, R92	RES., 100k, 1/10W, 5%, 0603	VISHAY, CRCW0603100KJNEA
26	1	R75	RES., 3.6k, 1/10W, 1%, 0603	VISHAY, CRCW06033K60FKEA
27	1	R78	RES., 365k, 1/10W, 1%, 0603	VISHAY, CRCW0603365KFKEA
28	1	R79	RES., 49.9k, 1/10W, 1%, 0603	VISHAY, CRCW060349K9FKEA
29	1	R81	RES., 100Ω, 1/10W, 5%, 0603	VISHAY, CRCW0603100RJNEA
30	1	R86	RES., 2.2Ω, 1/10W, 5%, 0603	VISHAY, CRCW06032R20JNEA
31	1	U1	IC, LOW I_Q, 38V BOOST + BUCK SYNCHRONOUS CONTROLLER	LINEAR TECH. LTC7812EUH#PBF

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3	0	C36	CAP, OPTION, 1206	OPTION
4	0	C39, C40, C66, C67, C73, C74, C78, C79	CAP, OPTION, 0805	OPTION
5	0	C49, C55, C57, C60, C63, C65, C77	CAP, OPTION, 0603	OPTION
6	0	L3	IND, OPTION	COILCRAFT, OPTION
7	0	Q9, Q11, Q18, Q19	XSTR, N-CHANNEL MOSFET	OPTION
8	9	R34, R36, R39, R40, R70, R72, R80, R95, R96	RES., 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
9	0	R37, R51, R53, R55, R62, R85, R89, R90, R91, R93, R94	RES., OPTION, 0603	OPTION
10	0	R82	RES., OPTION, 1206	OPTION
11	0	R100	RES., OPTION, 0805	OPTION
12	0	R101	RES., OPTION, 1210	OPTION
13	1	R102	RES., 0Ω, 2010	VISHAY, CRCW20100000Z0EF
Hardware: For Demo Board Only				
1	15	E1-E15	TURRET	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	CONN., HEADER, 1X3, 2mm	WURTH ELEKTRONIK, 620 003 111 21
3	1	JP3	CONN., HEADER, 2X3, 2mm	WURTH ELEKTRONIK, 620 006 211 21
4	3	XJP1, XJP2, XJP3	SHUNT, 2mm	WURTH ELEKTRONIK, 608 002 134 21
5	6	J1, J2, J3, J4, J5, J6	JACK, BANANA	KEYSTONE, 575-4
6	4		STANDOFF, SNAP ON	KEYSTONE, 8833

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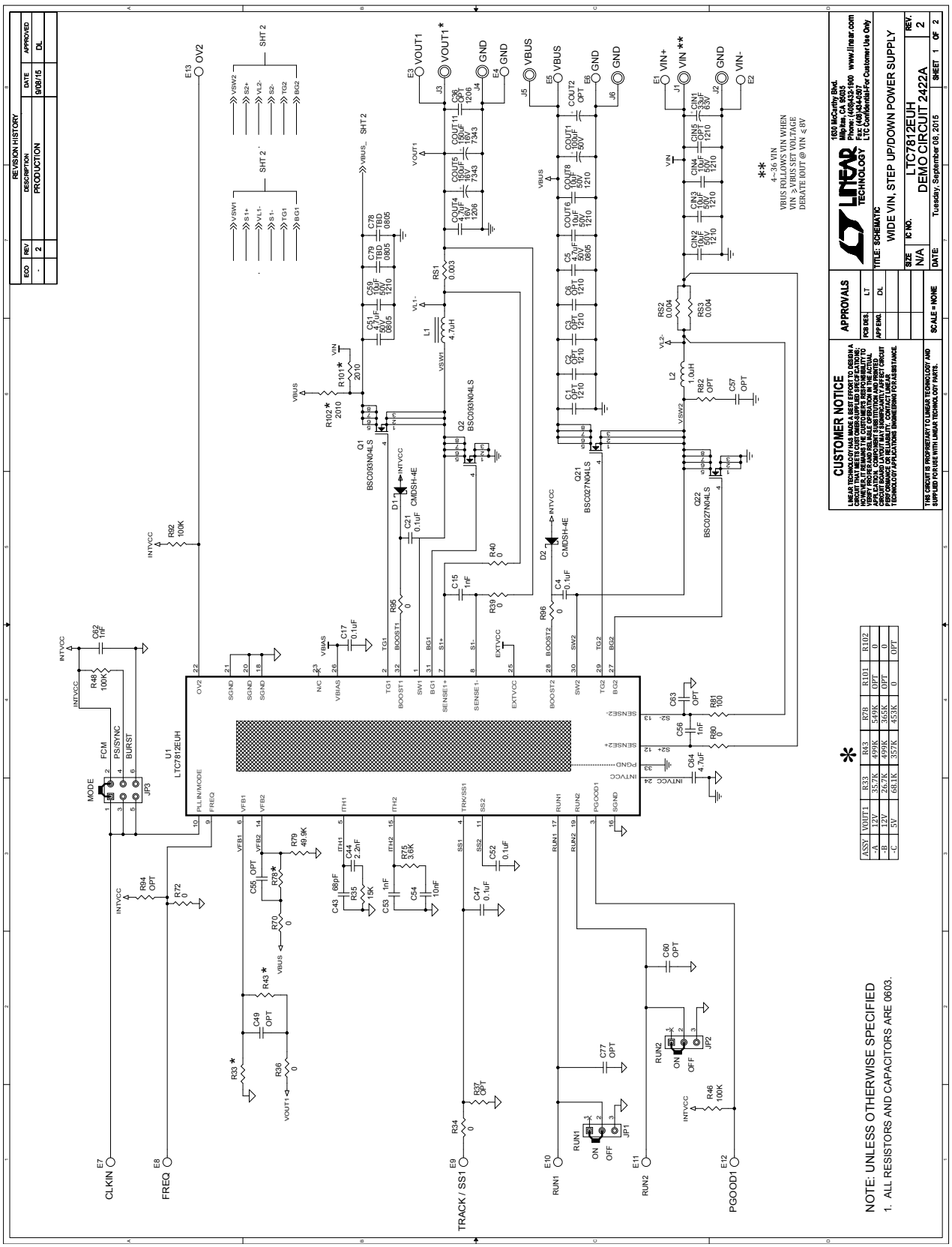
2	1	COUT1	CAP, 100µF, 50V, 20%, ELEC	PANASONIC, EEHZA1H101P
3	6	CIN2, CIN3, CIN4, COUT6, COUT8, C59, C80	CAP, 10µF, X7R, 50V, 10%, 1210	AVX, 12105C106KAT2A
4	1	COUT4	CAP, 4.7µF, X7R, 16V, 20%, 1206	TDK, C3216X7R1C475M
5	2	COUT5, COUT11	CAP, 150µF, 16V, 20% 7343	PANASONIC, 16TQC150MYF
6	5	C4, C17, C21, C47, C52	CAP, 0.1µF, X7R, 25V, 10%, 0603	TDK, C1608X7R1E104K
7	2	C5, C51	CAP, 4.7µF, X5R, 50V, 10%, 0805	TDK, C2012X5R1H475K125AB
8	4	C15, C53, C56, C62	CAP, 1nF, X7R, 50V, 10%, 0603	AVX, 06035C102KAT2A
9	1	C43	CAP, 68pF, NPO, 50V, 10%, 0603	AVX, 06035A680KAT2A
10	1	C44	CAP, 2.2nF, X7R, 50V, 10%, 0603	AVX, 06035C222KAT2A
11	1	C54	CAP, 10nF, X7R, 50V, 10%, 0603	TDK, C1608X7R1H103K
12	1	C61	CAP, 1µF, X5R, 25V, 20%, 0603	TDK, C1608X5R1E105M
13	1	C64	CAP, 4.7µF X5R, 10V, 20%, 0603	AVX, 0603ZD475MAT2A
14	2	D1, D2	DIODE, SCHOTTKY, 40V, 3A, SOD323	CENTRAL SEMI, CMDSH-4E
15	0	D3	DIODE, SCHOTTKY, 40V, 3A, SMB	DIODES INC, B340B-13-F OPTION
16	0	L1	IND, 4.7µH	COILCRAFT, XAL7070-472
17	0	L2	IND, 1.0µH	COILCRAFT, XAL7070-102
18	2	Q1, Q2	XSTR, N-CHANNEL MOSFET	INFINEON, BSC093N04LS
19	2	Q21, Q22	XSTR, N-CHANNEL MOSFET	INFINEON, BSC027N04LS
20	1	RS1	RES., SENSE, 0.003Ω, 1/2W, 1%, 2010	VISHAY, WSL20103L000FEA
21	2	RS2, RS3	RES., SENSE, 0.004Ω, 1/2W, 1%, 2010	VISHAY, WSL20104L000FEA
22	1	R33	RES., 68.1k, 1/10W, 1%, 0603	VISHAY, CRCW060368K1FKEA
23	1	R35	RES., 15k, 1/10W, 5%, 0603	VISHAY, CRCW060315K0JNEA
24	1	R43	RES., 357k, 1/10W, 1%, 0603	VISHAY, CRCW0603357KFKEA
25	3	R46, R48, R92	RES., 100k, 1/10W, 5%, 0603	VISHAY, CRCW0603100KJNEA
26	1	R75	RES., 3.6k, 1/10W, 1%, 0603	VISHAY, CRCW06033K60FKEA
27	1	R78	RES., 453k, 1/10W, 1%, 0603	VISHAY, CRCW0603453KFKEA
28	1	R79	RES., 49.9k, 1/10W, 1%, 0603	VISHAY, CRCW060349K9FKEA
29	1	R81	RES., 100Ω, 1/10W, 5%, 0603	VISHAY, CRCW0603100RJNEA
30	1	R86	RES., 2.2Ω, 1/10W, 5%, 0603	VISHAY, CRCW06032R20JNEA
31	1	U1	IC, LOW I_Q, 38V BOOST + BUCK SYNCHRONOUS CONTROLLER	LINEAR TECH. LTC7812EUH#PBF

PARTS LIST

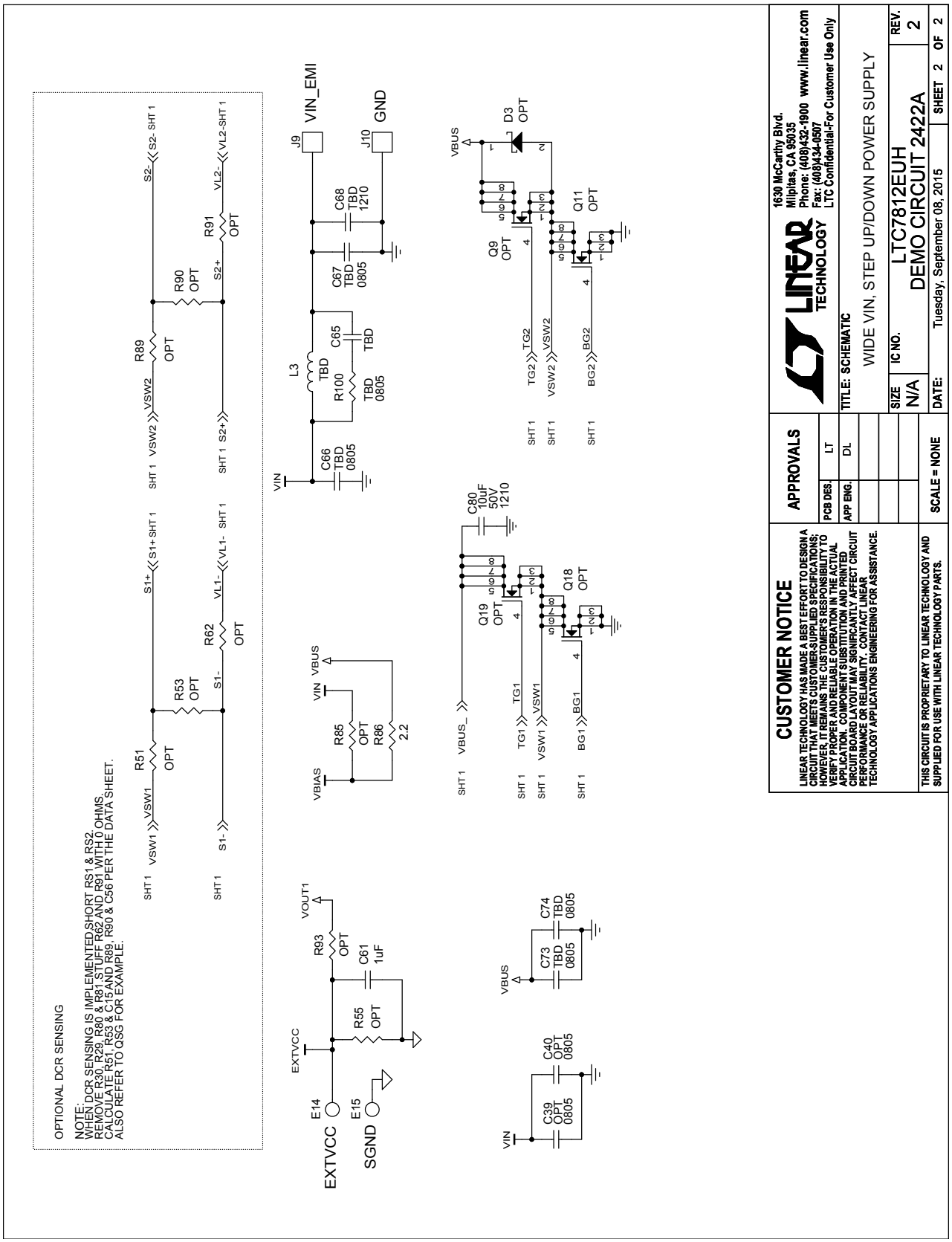
ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Additional Demo Board Circuit Components				
1	0	C1, C2, C3, C6, CIN5, C68	CAP, OPTION, 1210	OPTION
2	0	COUT2	CAP, OPTION	OPTION
3	0	C36	CAP, OPTION, 1206	OPTION
4	0	C39, C40, C66, C67, C73, C74, C78, C79	CAP, OPTION, 0805	OPTION
5	0	C49, C55, C57, C60, C63, C65, C77	CAP, OPTION, 0603	OPTION
6	0	L3	IND, OPTION	COILCRAFT, OPTION
7	0	Q9, Q11, Q18, Q19	XSTR, N-CHANNEL MOSFET	OPTION
8	9	R34, R36, R39, R40, R70, R72, R80, R95, R96	RES., 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
9	0	R37, R51, R53, R55, R62, R85, R89, R90, R91, R93, R94, R100	RES., OPTION, 0603	OPTION
10	0	R82	RES., OPTION, 1206	OPTION
11	1	R101	RES., 0Ω, 2010	VISHAY, CRCW20100000Z0EF
12	0	R102	RES., OPTION, 1210	OPTION
Hardware: For Demo Board Only				
1	15	E1-E15	TURRET	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	CONN., HEADER, 1X3, 2mm	WURTH ELEKTRONIK, 620 003 111 21
3	1	JP3	CONN., HEADER, 2X3, 2mm	WURTH ELEKTRONIK, 620 006 211 21
4	3	XJP1, XJP2, XJP3	SHUNT, 2mm	WURTH ELEKTRONIK, 608 002 134 21
5	6	J1, J2, J3, J4, J5, J6	JACK, BANANA	KEYSTONE, 575-4
6	4		STANDOFF, SNAP ON	KEYSTONE, 8833

SCHEMATIC DIAGRAM



ASSY	VOUT1	R33	R43	R78	R101	R102
-A	12V	35.7K	499K	549K	OPT	0
-B	12V	26.7K	499K	365K	OPT	0
-C	5V	68.1K	357K	453K	0	OPT

SCHEMATIC DIAGRAM



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