DC2820A-B

LTM8060F

Quad 40V_{IN}, 3A Silent Switcher µModule Regulator with Package-Level EMI Shield

General Description

The DC2820A-B evaluation board features the LTM®8060F, a quad output high-performance step-down Silent Switcher® power µModule® regulator in a thermally enhanced 16mm × 11.9mm × 2.9mm pre-soldered grid array (PSGA) package with a package-level electromagnetic interference (EMI) shield. The DC2820A-B has a wide operating input voltage range of 5.4V to 40V. The output rails are configured for 5V, 3.3V, 1.5V, and 1.2V. They are resistor programmable from 0.8V to 8V. Each output can provide up to 3A, and phases can also be paralleled together to satisfy higher rail current requirements.

The LTM8060F is a complete multi-output DC-to-DC point-of-load regulator in a compact form factor, requiring only a few input and output capacitors and resistors to set the output voltages and operating frequency. Output voltage tracking is made available by the TRSS pins for supply rail sequencing. External clock synchronization is available through the SYNC pins.

The CLKOUT pins provide for optional synchronization of additional phases. For reduced noise, spread spectrum operation is available through the SYNC pin programming. The LTM8060F data sheet must be read in conjunction with this user guide for working on or modifying the DC2820A-B.

Features and Benefits

- Optional Circuitry for Parallel Operation
- Input EMI Filter (VEMI)

DC2820A-B Evaluation Board Files

FILE	DESCRIPTION
DC2820A-B	Evaluation board design files.

***Ordering Information* appears at end of this user guide.**

Evaluation Board Photo

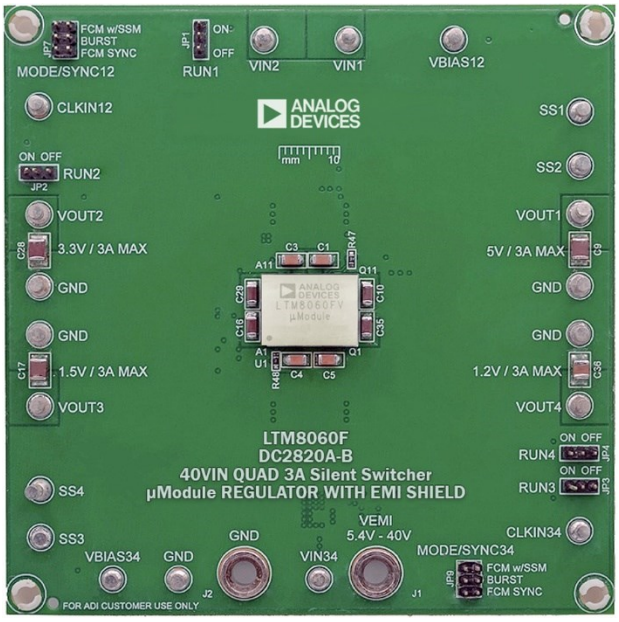


Figure 1. DC2820A-B Evaluation Board (Part Marking is either Ink Mark or Laser Mark)

One Analog Way, Wilmington, MA 01887-2356, U.S.A. | Tel: 781.329.4700

Performance Summary

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input voltage range		5.4		40	V
Output voltage V_{OUT}	V_{OUT1} V_{OUT2} V_{OUT3} V_{OUT4}		5 3.3 1.5 1.2		V V V V
Maximum continuous output current per phase	Derating is necessary for certain operating conditions. Refer to the LTM8060F datasheet for more details.		3		A
Default operating frequency	V_{OUT1}, V_{OUT2}, (R_T = 28kΩ) V_{OUT3}, V_{OUT4}, (R_T = 100kΩ)		1.2 400		MHz kHz
Efficiency	V_{IN} = 12V V_{OUT} = 5V/3A V_{OUT} = 3.3V/3A V_{OUT} = 1.5V/3A V_{OUT} = 1.2V/3A		See *Figure 3a* 93 91 84 82		 % % % %

Quick Start

Required Equipment

- Power Supply
- At least One Electronic Load
- At least Two Digital Multimeters (DMMs)

Procedure

The DC2820A-B evaluation board provides an easy way to evaluate the performance of the LTM8060F. See *Figure 2* for test setup connections and use the following procedure.

1. With power off, place the jumpers in the following positions.

JP1	JP2	JP3	JP4	JP7	JP9
RUN1	RUN2	RUN3	RUN4	MODE/SYNC12	MODE/SYNC34
ON	ON	ON	ON	Forced continuous mode (FCM), SYNC	FCM, SYNC

2. Before connecting the input supply, loads, and meters, preset the input voltage supply to be between 5.4V to 40V. Preset the load currents to 0A.

3. With power off, connect the loads, input voltage supply, and meters, as shown in *Figure 2*.

4. Turn on the input power supply. The output voltage meters for each phase should display the programmed output voltage ±2%.

5. Once the proper output voltages are established, adjust the load currents for each phase within the 0A to 3A range. Observe each output's load regulation, efficiency, and other performances. Output voltage ripples for each output should be measured across the furthest output capacitor with a BNC cable and oscilloscope.

6. To observe increased light load efficiency, place the MODE/SYNC pin jumpers (JP7, JP9) in the BURST position. For spread spectrum operation, place the jumpers in the FCM W/SSM position.

7. To synchronize VOUT1 and VOUT2 rails to an external clock, connect a clock to CLKIN12 (E19) with MODE/SYNC12 (JP7) set to FCM, SYNC and to synchronize VOUT3 and VOUT4 to an external clock connect a clock to CLKIN34 (E20) with MODE/SYNC34 (JP9) set to FCM, SYNC. Set the clock voltage to 50% duty cycle with clock low level below 0.8V and clock high level above 1.5V. Do not exceed 6V on these pins.

8. Optional: An input EMI filter is included on the evaluation board. To include this filter, connect the input supply positive terminal to VEMI. To exclude the input EMI filter, connect the input positive supply to VIN1, VIN2, or VIN34. VIN1 is the input for the VOUT1 rail, VIN2 is the input for the VOUT2 rail, and VIN34 is the input for the VOUT3 and VOUT4 rails.

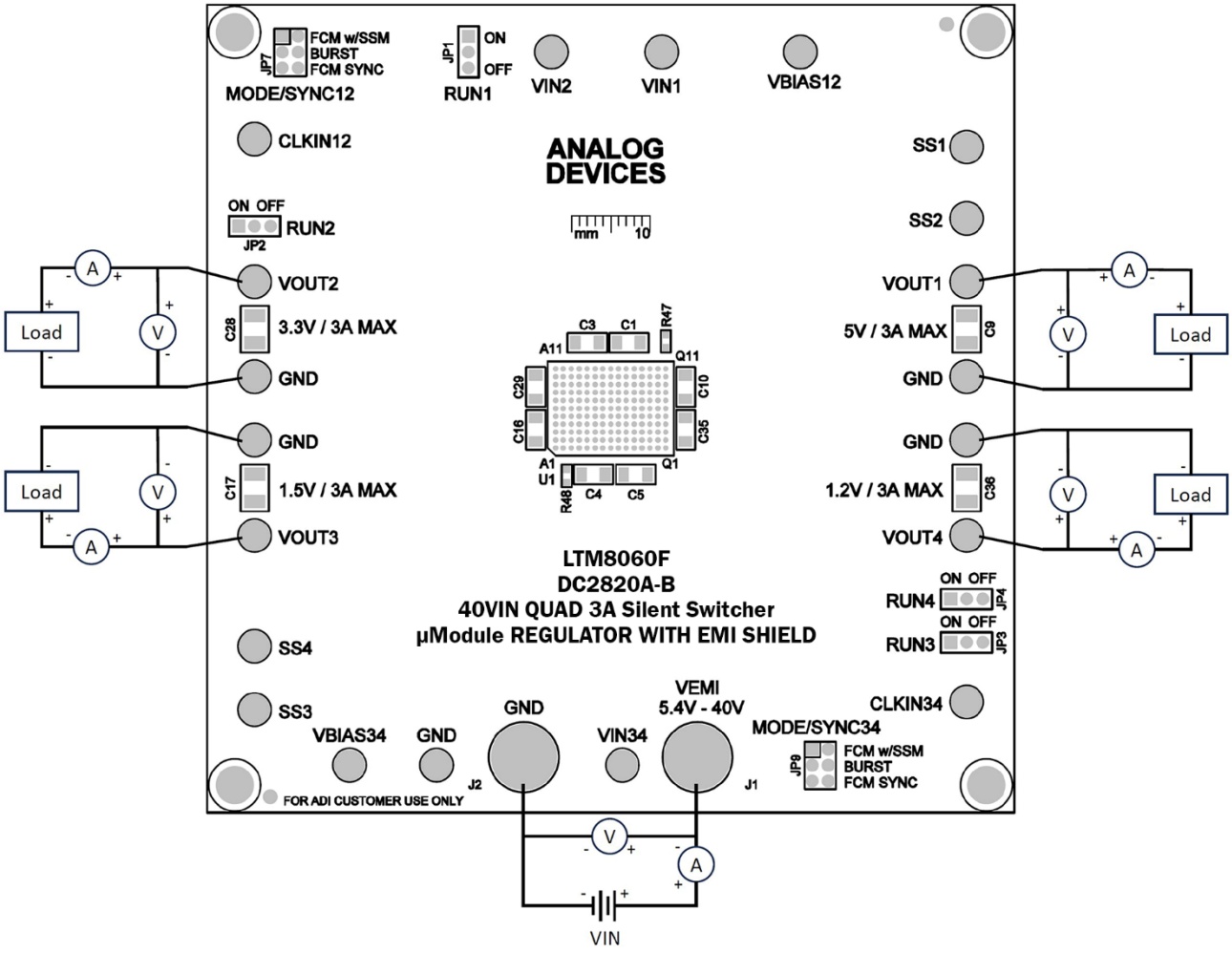
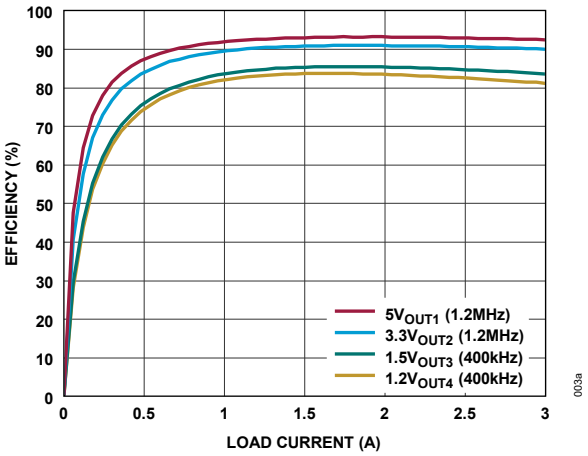
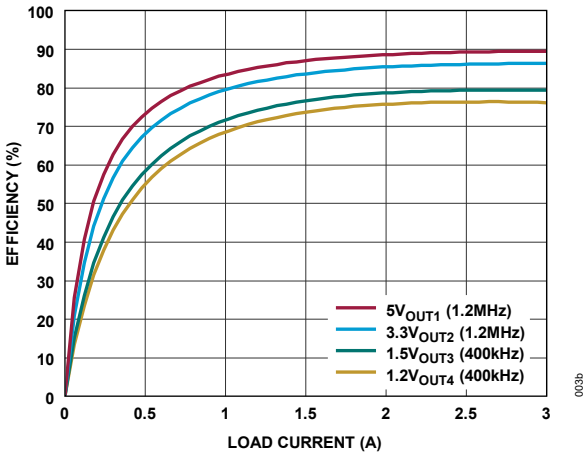


Figure 2. Test Setup of DC2820A-B

Typical Performance Characteristics

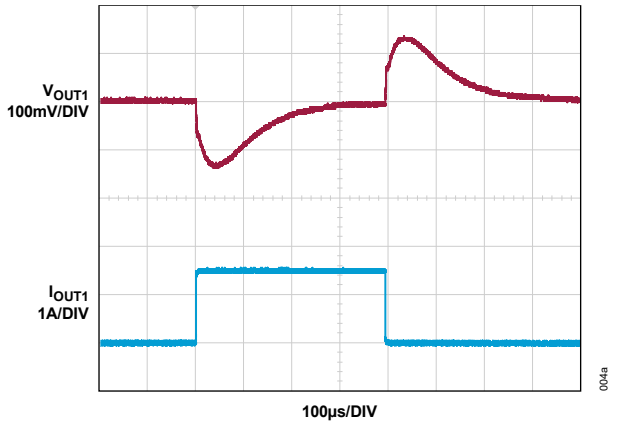


(a) $12V_{IN}$

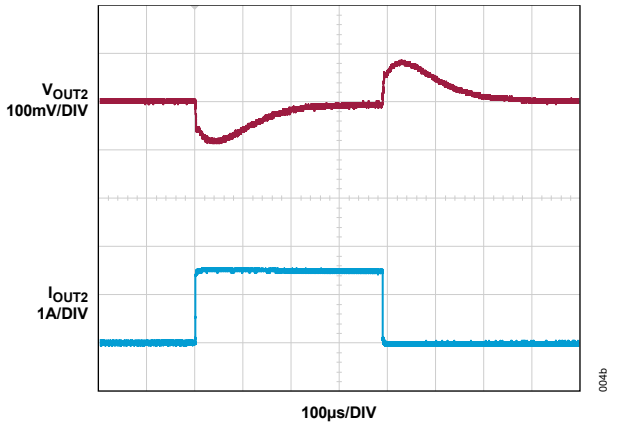


(b) $24V_{IN}$

Figure 3. Efficiency in Forced Continuous Mode (FCM)

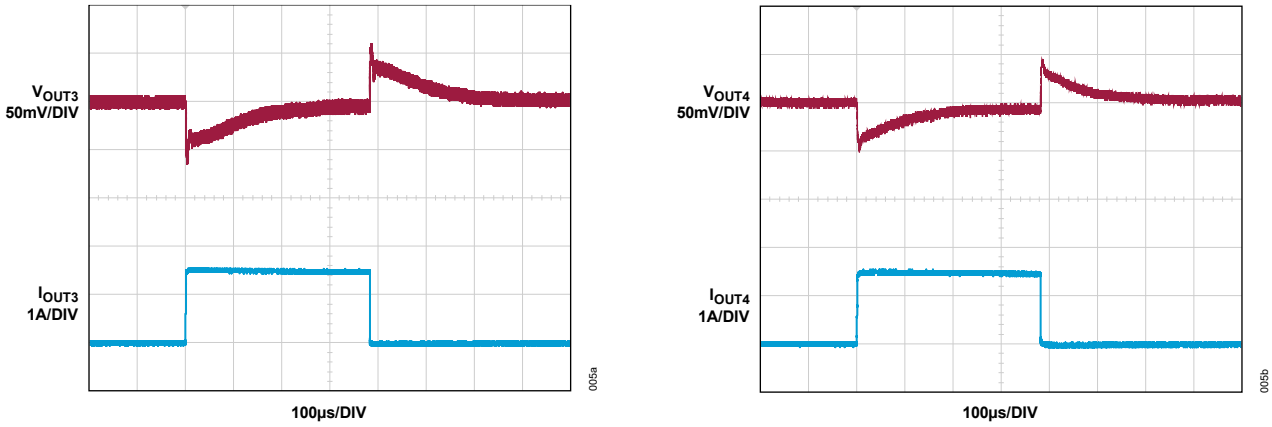


(a) V_{OUT1} = 5V



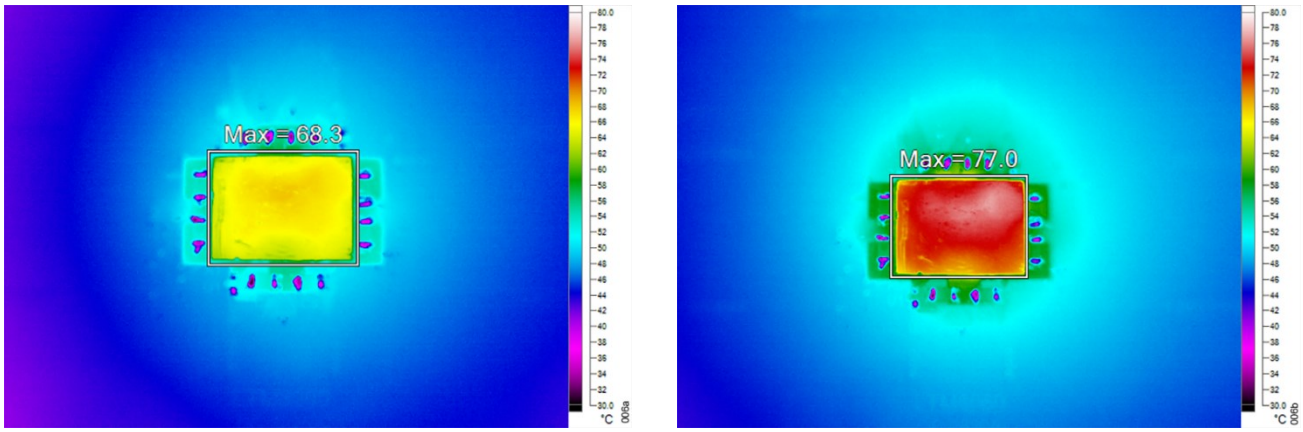
(b) V_{OUT2} = 3.3V

Figure 4. $12V_{IN}$ Measured Transient Responses at 1.5A to 3A Load Step



(a) V_{OUT3} = 1.5V *(b) V_{OUT4} = 1.2V*

Figure 5. 12V_{IN} Measured Load Transient Responses at 1.5A to 3A Load Step

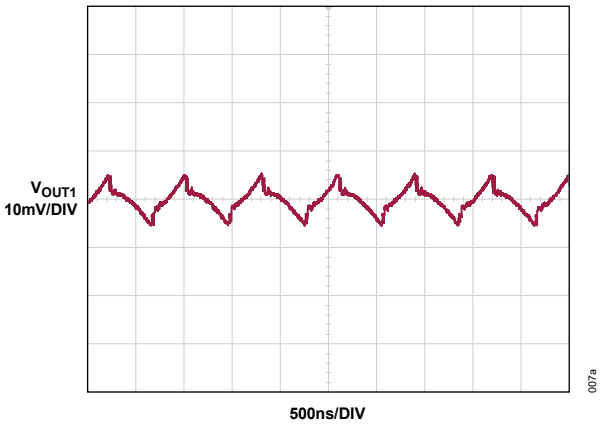


(a) V_{IN} = 12V *(b) V_{IN} = 24V*

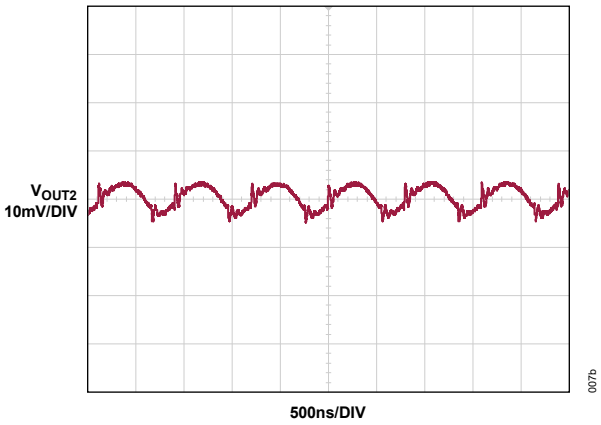
V_{IN} (V)	AIRFLOW	HEATSINK	AMBIENT (°C)
12	Natural convection	None	25

V_{IN} (V)	AIRFLOW	HEATSINK	AMBIENT (°C)
24	Natural convection	None	25

Figure 6. Measured Thermal Captures with 3A Load on each Output

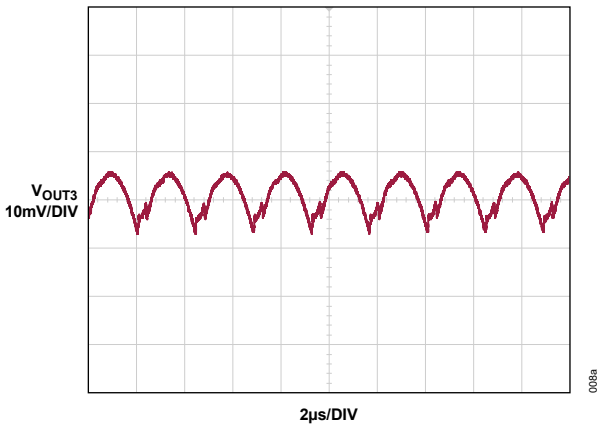


(a) V_{OUT1} = 5V

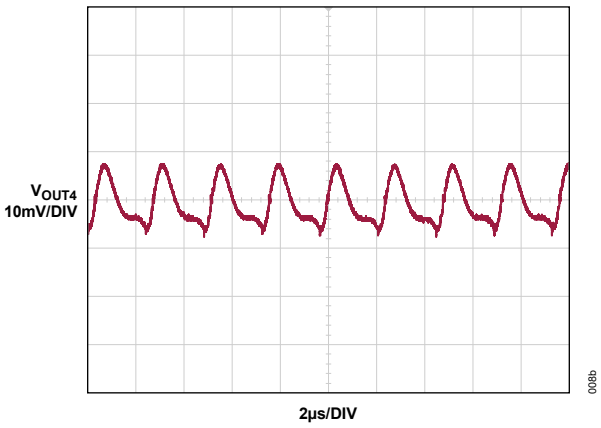


(b) V_{OUT2} = 3.3V

Figure 7. 12V_{IN} Measured Output Ripple at 3A Load



(a) V_{OUT3} = 1.5V



(b) V_{OUT4} = 1.2V

Figure 8. 12V_{IN} Measured Output Ripple at 3A Load

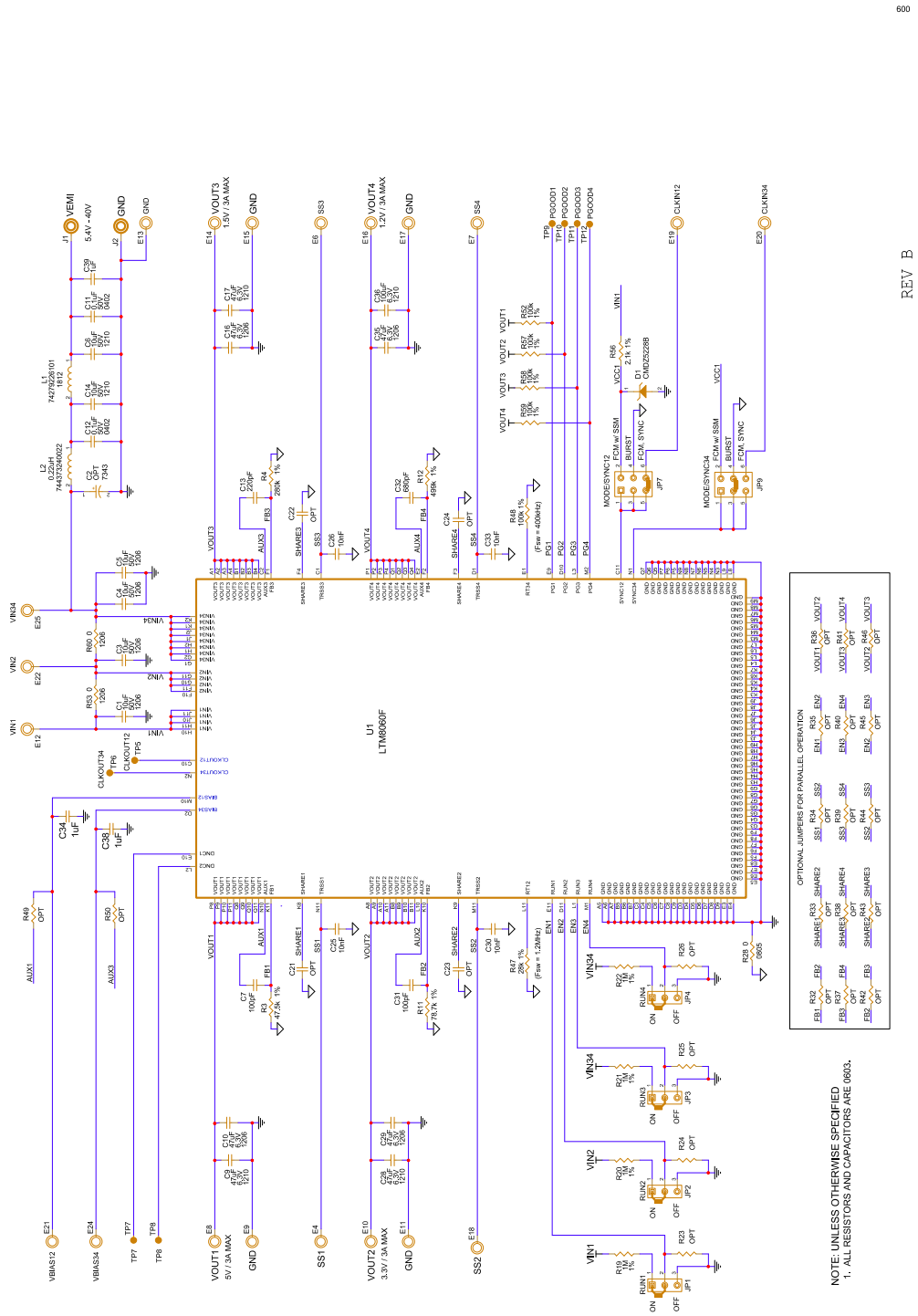
DC2820A-B Evaluation Board Bill of Materials

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	4	C1, C3-C5	CAP., 10µF, X5R, 50V, 10%, 1206	TDK, C3216X5R1H106K160AB
2	2	C6, C14	CAP., 10µF, X7R, 50V, 10%, 1210, NO SUBS. ALLOWED	MURATA, GRM32ER71H106KA12L
3	2	C7, C31	CAP., 100pF, X7R, 16V, 10%, 0603	WURTH ELEKTRONIK, 885012206028
4	3	C9, C17, C28	CAP., 47µF, X7R, 6.3V, 10%, 1210, AEC-Q200, NO SUBS ALLOWED	MURATA, GCM32ER70J476KE19L
5	4	C10, C16, C29, C35	CAP., 47µF, X5R, 6.3V, 20%, 1206	MURATA, GRM31CR60J476ME19L
6	2	C11, C12	CAP., 0.1µF, X7R, 50V, 10%, 0402, AEC-Q200, NO SUBS. ALLOWED	MURATA, GCM155R71H104KE02D
7	1	C13	CAP., 220pF, X7R, 25V, 10%, 0603	WÜRTH ELEKTRONIK, 885012206055
8	4	C25, C26, C30, C33	CAP., 0.01µF, X7R, 25V, 10%, 0603	MURATA, GCJ188R71E103KA01D
9	1	C32	CAP., 680pF, C0G, 25V, 5%, 0603	WÜRTH ELEKTRONIK, 885012006043
10	3	C34, C38, C39	CAP., 1µF, X5R, 50V, 10%, 0603, AEC-Q200	MURATA, GRT188R61H105KE13D
11	1	C36	CAP., 100µF, X5R, 6.3V, 20%, 1210, AEC-Q200	MURATA, GRT32ER60J107ME13L
12	1	D1	DIODE, ZENER, 3.9V, 250mW, SOD-323	CENTRAL SEMI., CMDZ5228B TR PBFREE
13	1	L1	IND., 100Ω AT 100MHz, FERRITE BEAD, 25%, 8A, 6mµ, 1812, AEC-Q200	WÜRTH ELEKTRONIK, 74279226101
14	1	L2	IND., 0.22µH, PWR, SHIELDED, 30%, 9.5A, 7.3mΩ, 4020	WÜRTH ELEKTRONIK, 744373240022
15	1	R3	RES., 47.5kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW060347K5FKEA
16	1	R4	RES., 280kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603280KFKEA

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
17	1	R11	RES., 78.7kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW060378K7FKEA
18	1	R12	RES., 499kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603499KFKEA
19	4	R19-R22	RES., 1MΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW06031M00FKEA
20	1	R28	RES., 0Ω, 1/8W, 0805, AEC-Q200	VISHAY, CRCW08050000Z0EA
21	1	R47	RES., 28kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW060328K0FKEA
22	5	R48, R52, R57-R59	RES., 100kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603100KFKEA
23	2	R53, R60	RES., 0Ω, 1/4W, 1206, AEC-Q200	VISHAY, CRCW12060000Z0EA
24	1	R56	RES., 2.1kΩ, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW06032K10FKEA
25	1	U1	IC, QUAD 40V_{IN}, 3A STEP-DOWN Silent Switcher µModule REGULATOR, WITH A PACKAGE-LEVEL EMI SHIELD, PSGA-165	ANALOG DEVICES, LTM8060FEV#PBF
Optional Circuit Components				
1	0	C2	CAP., OPTION, 7343	
2	0	C21-C24	CAP., OPTION, 0603	
3	0	R23-R26, R32-R35, R37-R40, R42-R45, R49, R50	RES., OPTION, 0603	
4	0	R36, R41, R46	RES., OPTION, 2512	
Hardware: For Demo Board Only				
1	20	E4, E6-E22, E24, E25	TEST POINT, TURRET, 0.094", MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	J1, J2	CONN, BANANA JACK, FEMALE, NON-INSULATED, THT, SWAGE, 0.218" LGTH	KEYSTONE, 575-4

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
3	4	JP1-JP4	CONN., HDR, MALE, 1×3, 2mm, VERT, STR, THT, NO SUBS. ALLOWED	WURTH ELEKTRONIK, 62000311121
4	2	JP7, JP9	CONN., HDR, MALE, 2×3, 2mm, VERT, STR, THT	WURTH ELEKTRONIK, 62000621121
5	4	MH1-MH4	STANDOFF, NYLON, SNAP-ON, 0.25 (6.4mm) LGTH	WURTH ELEKTRONIK, 702931000
6	6	XJP1-XJP4, XJP7, XJP9	CONN., SHUNT, FEMALE, 2-POS, 2mm	WURTH ELEKTRONIK, 60800213421

DC2820A-B Evaluation Board Schematic



Ordering Information

PART	TYPE
DC2820A-B	Evaluation board featuring the LTM®8060F, a quad output high performance step-down Silent Switcher® power µModule regulator with a package-level EMI shield.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/24	Initial release.	—

Notes

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Analog Devices Inc.:

DC2820A-B