ANALOG DEVICES

LTM8080EY

$40V_{IN}$, Dual 500mA or Single 1A Ultralow Noise, Ultrahigh PSRR µModule Regulator

DESCRIPTION

Demonstration circuit 3071A features the LTM®8080 µModule® regulator, a complete, low input noise, ultrahigh PSRR solution with an intermediate power bus and dual output 0.5A LDO regulators, in a thermally enhanced, compact 9mm × 6.25mm × 3.32mm BGA package. DC3071A has a wide operating input range of 4V to 40V. Each of the two outputs is an adjustable 3.3V/0.5A. The operating output range is a wide 0V to 8V. DC3071A also allows for the LDOs to be paralleled up to 1A rail load current.

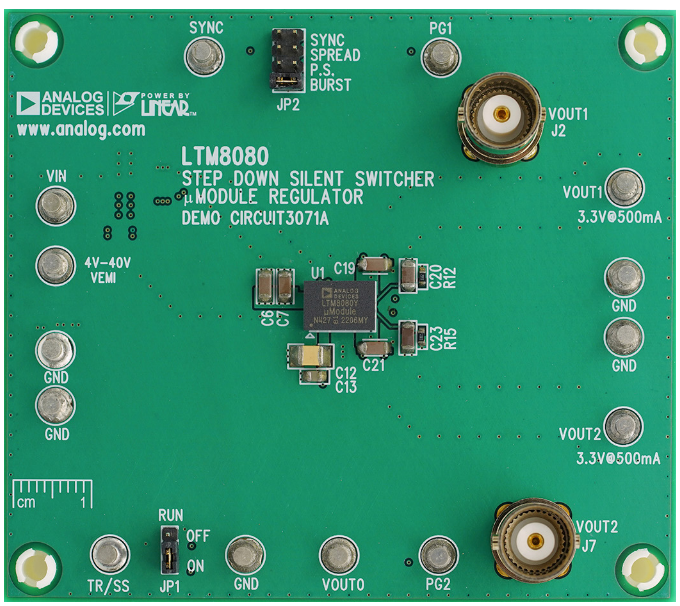
The LTM8080 includes voltage tracking functionality, external frequency synchronization, and low input noise compliance with CISPR22 Class B. The built-in voltage tracking function automatically sets V_{BUS} to either 2.5V nominal or 1V higher than V_{OUT1}, whichever is greater, to achieve the best noise performance and minimize power dissipation. External frequency synchronization is available through the SYNC pin. It also features the power good feedback function for an adjustable power good threshold.

The µModule regulator targets applications that require a complete switcher and LDO regulators solution with configurable output channels, power good protection features, and ultralow noise performance.

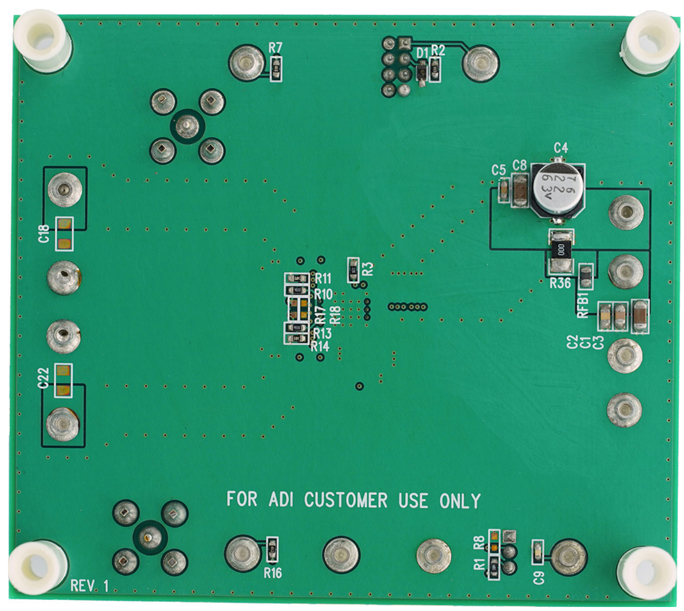
Design files for this circuit board are available.

BOARD PHOTO

Part marking is either ink mark or laser mark



(a) Front View



(b) Back View

PERFORMANCE SUMMARY Specifications are at $T_A = 25°C$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range	Continuous Operation, Free Air	4.0		40	V
V_{OUT1}	Output Voltage 1			3.3		V
V_{OUT2}	Output Voltage 2			3.3		V
I_{OUT1}	Output Current 1				0.5	A
I_{OUT2}	Output Current 2				0.5	A
P_{OUT}/P_{IN}	Efficiency (See Figure 3)	V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 0.5A			64.7	%

QUICK START PROCEDURE

Demonstration circuit 3071A is easy to set up to evaluate the performance of the LTM8080. See Figure 1 for the proper measurement equipment setup and follow the procedure below.

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

JUMPER	POSITION	FUNCTION
JP1	ON	RUN
JP2	BURST	SYNC

2. Before connecting the input supply, load, and meters, preset the input voltage supply to be between 4V to 40V. Then, preset the load currents to 0A.
3. With power off, connect the output loads between VOUT1 and GND, VOUT2 and GND, input voltage supply, respectively. (Initial load: no load). Refer to Figure 1.
4. Connect the DVMs to the input and outputs.
5. Turn on the input power supply and adjust the voltage to 12V.

   NOTE: Make sure that the input voltage does not exceed 40V.
6. Check for the proper output voltages from VOUT1 to GND and VOUT2 to GND. The output voltage meters for each phase should display the programmed output voltage within ±2%.
7. Once the proper output voltage is established, adjust the load current from 0A to 500mA, V_{OUT} should be within 3.234V to 3.366V.
8. Vary the input voltage from 4V to 40V, V_{OUT} should be within 3.234V to 3.366V.
9. After completing all tests, adjust the load to 0A and power of the input power supply.

OPTIONAL: An input EMI filter is included on the board. To include this filter, connect the input supply positive terminal to VEMI. Connect the input positive supply to VIN to exclude the input EMI filter.

QUICK START PROCEDURE

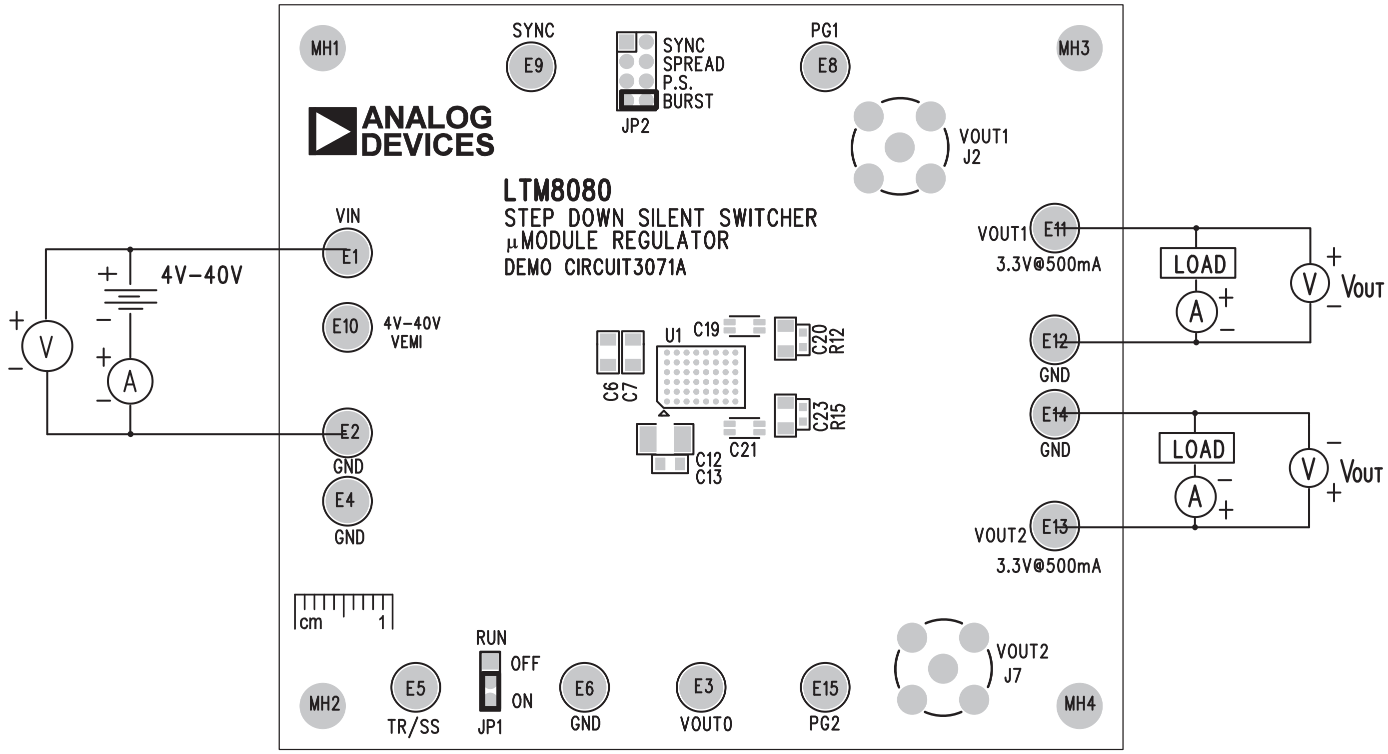


Figure 1. Test Setup Drawing for DC3071A

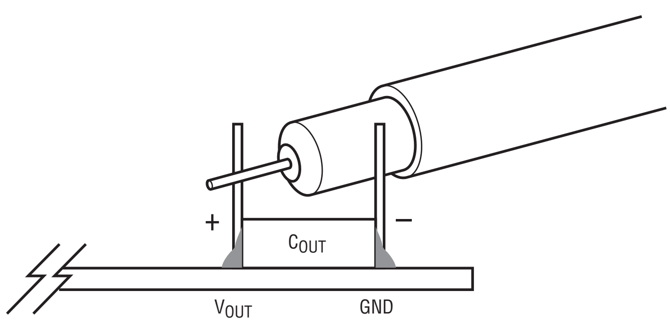


Figure 2. Proper Measurement Equipment Setup

TYPICAL TEST RESULTS

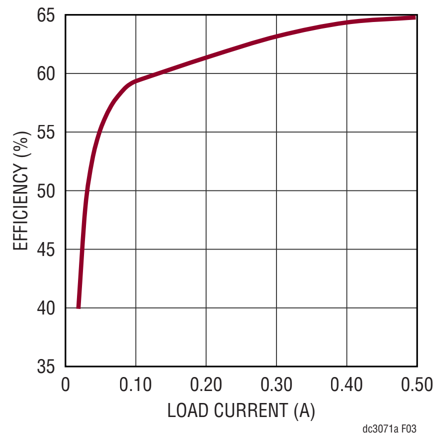
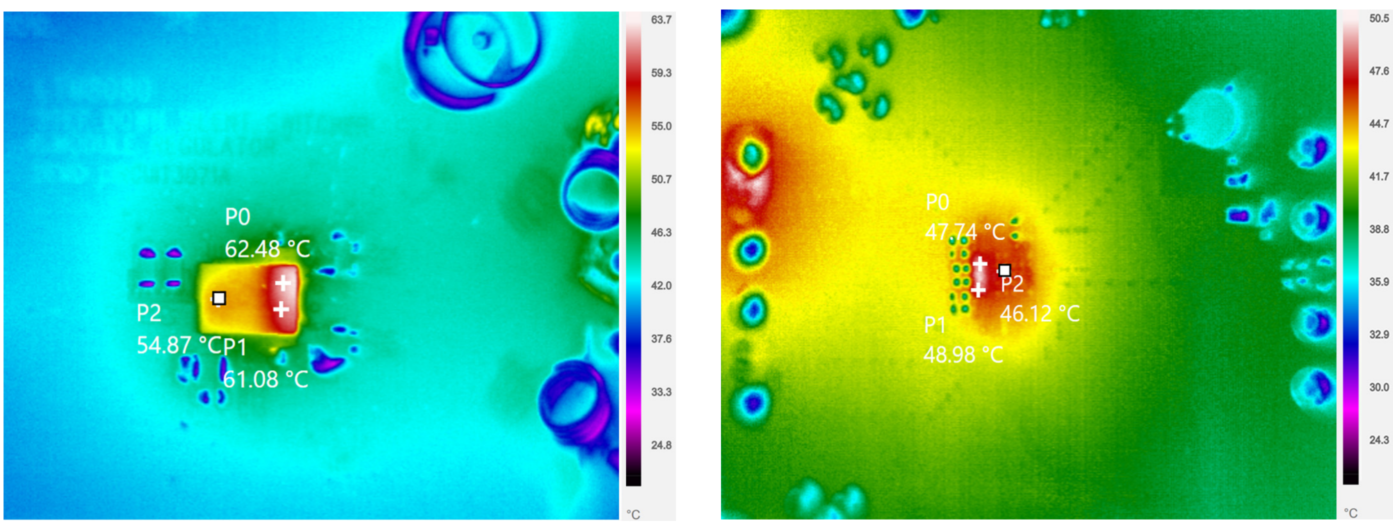


Figure 3. Measured Efficiency (V_{IN} = 12V, V_{OUT} = 3.3V, f_{SW} = 2.2MHz)

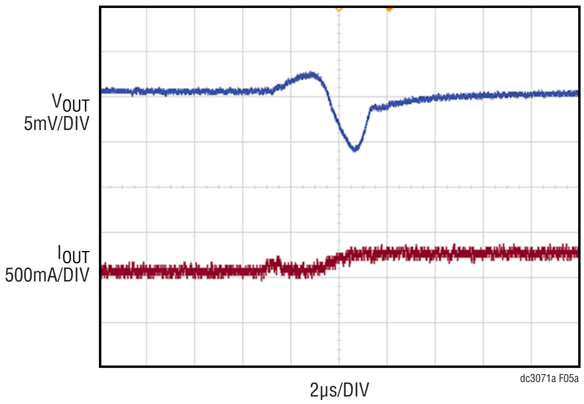


(a) Front **(b) Back**

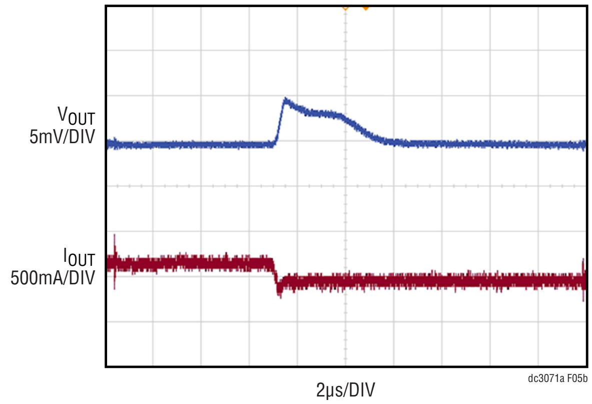
AIRFLOW	HEATSINK	AMBIENT (°C)
Natural Convection	None	25

Figure 4. Thermal at V_{IN} = 12V, V_{OUT1} = 3.3V at 500mA Load

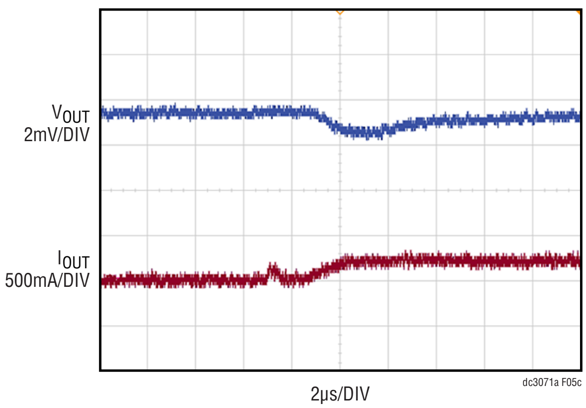
TYPICAL TEST RESULTS



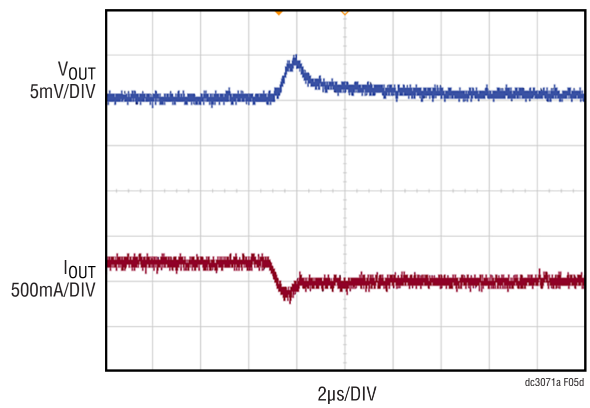
(a) 0mA to 250mA Load



(b) 250mA to 0mA Load



(c) 250mA to 500mA Load



(d) 500mA to 250mA Load

Figure 5. Measured Output Voltage vs Load Current (V_{IN} = 12V, V_{OUT} = 3.3V)

TYPICAL TEST RESULTS

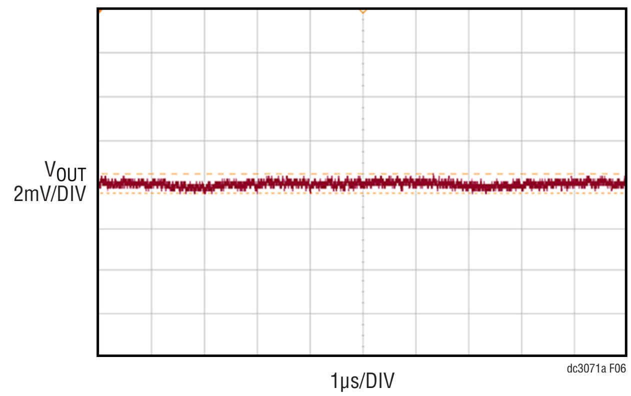
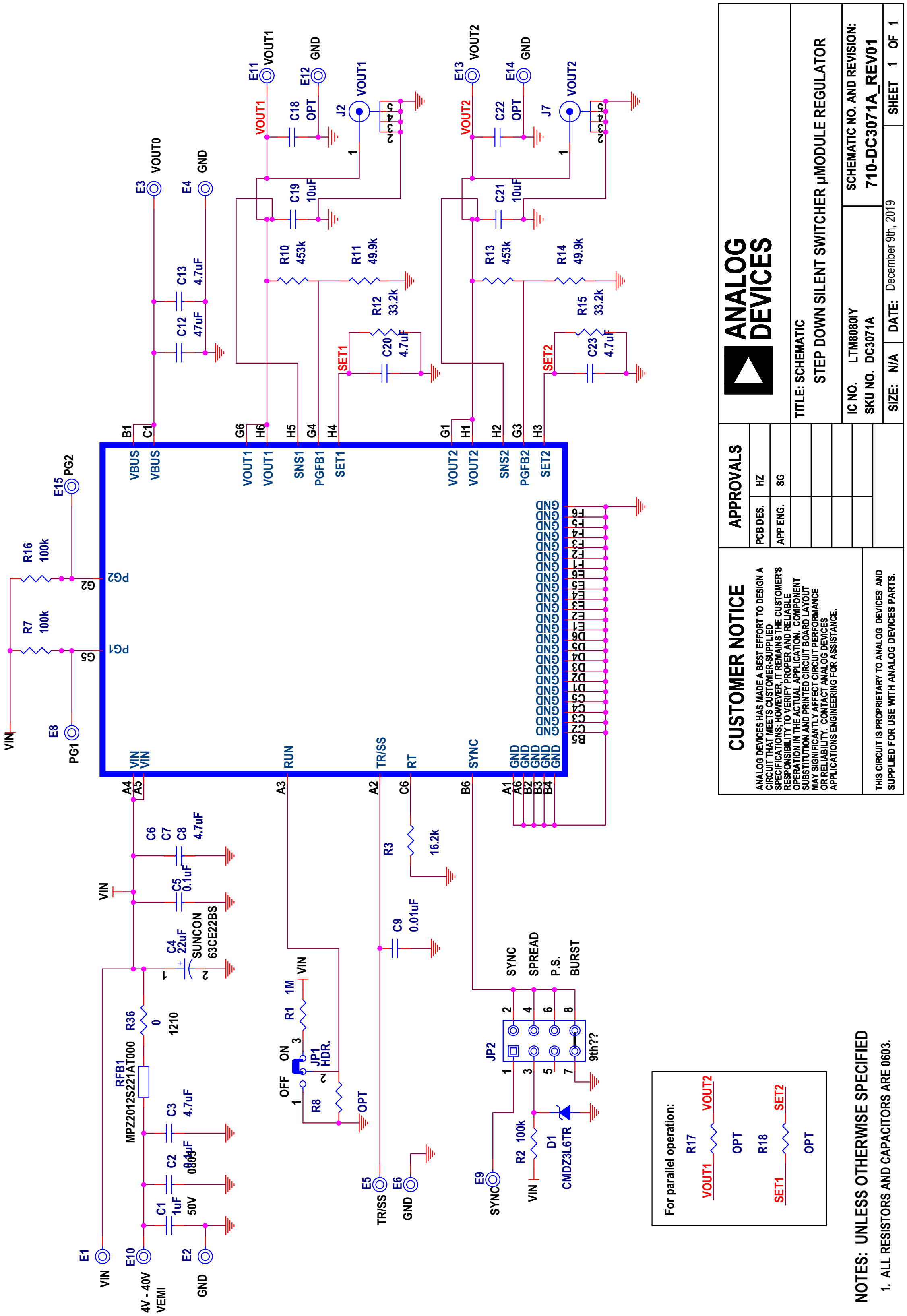


Figure 6. Measured Output Voltage Ripple (V_{IN} = 12V, V_{OUT} = 3.3V at 500mA Load)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	R1	RES., 1M, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F1004TRF
2	3	R2, R7, R16	RES., 100k, 1%, 1/10W, 0603	YAGEO, RC0603FR-07100KL
3	2	R11, R14	RES., 49.9k, 1%, 1/10W, 0603	NIC, NRC06F4992TRF
4	1	R3	RES., 16.2k, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF1622V
5	2	R12, R15	RES., 33.2k, 1%, 1/10W, 0603	PANASONIC, ERJ3EKF3322V
6	2	R10, R13	RES., 453k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603453KFKEA
7	1	R36	RES., 0Ω, 1/2W, 1210, AEC-Q200	VISHAY, CRCW12100000Z0EA
8	1	C5	CAP., 0.1µF, X7R, 16V, 10%, 0603	MURATA, GRM188R71C104KA01D
9	1	C9	CAP., 0.01µF, X7R, 16V, 10%, 0603	AVX, 0603YC103KAT2A
10	1	C23	CAP., 4.7µF, X7R, 25V, 5%, 1206	KEMET, C1206C475J3RACTU
11	1	C20	CAP., 4.7µF, X7R, 25V, 10%, 1206	AVX, 12063C475KAT2A
12	3	C6, C7, C8	CAP., 4.7µF, X7S, 50V, 10%, 1206, AEC-Q200	MURATA, GCM31CC71H475KA03K
13	2	C19, C21	CAP., 10µF, X7R, 16V, 10%, 1206, AEC-Q200	MURATA, GCM31CR71C106KA64L
14	1	C2	CAP., 0.1µF, X7R, 50V, 10%, 0805	AVX, 08055C104KAT2A
15	1	C1	CAP., 1µF, X7R, 50V, 10%, 0805	AVX, 08055C105KAT2A
16	1	C13	CAP., 4.7µF, X5R, 16V, 10%, 0805	AVX, 0805YD475KAT2A
17	1	C12	CAP., 47µF, X5R, 16V, 20%, 1210	AVX, 1210YD476MAT2A
18	1	C3	CAP., 4.7µF, X5R, 50V, 10%, 1206	TAIYO YUDEN, UMK316BJ475KL-T
19	1	C4	CAP., 22µF, ALUM. ELECT., 63V, 20%, 6.3mm × 7.7mm, CE-BS	SUN ELECTRONIC INDUSTRIES CORP, 63CE22BS
20	1	RFB1	IND., 220Ω AT 100MHz, FERRITE BEAD, 3A, 40mΩ, 0805, NO SUBS. ALLOWED	TDK, MPZ2012S221AT000
21	1	D1	DIODE, ZENER, 3.6V, 250mW, SOD323	CENTRAL SEMI., CMDZ3L6 TR PBFREE
22	1	U1	IC, STEP-DOWN CONTROLLER, BGA-48	ANALOG DEVICES, LTM8080EY#PBF
Additional Demo Board Circuit Components				
1	0	R8, R17, R18	RES., OPTION, 0603	
2	0	C18, C22	CAP., OPTION, 1206	
Hardware: For Demo Board Only				
1	1	JP1	CONN., HDR., MALE, 1×3, 2mm, VERT, STR, THT	SULLINS CONNECTOR SOLUTIONS, NRPN031PAEN-RC
2	1	JP2	CONN., HDR, MALE, 2×4, 2mm, VERT, STR, THT	SAMTEC, TMM-104-02-L-D
3	2	J2, J7	CONN., RF, BNC, RCPT, JACK, 5-PIN, ST, THT, 50Ω	AMPHENOL RF, 112404
4	2	XJP1, XJP2	CONN., SHUNT, FEMALE, 2-POS., 2mm	WURTH ELEKTRONIK, 60800213421
5	14	E1-E6, E8-E15	TEST POINT, TURRET, 0.094" MTG. HOLE, PCB 0.062" THK	MILL-MAX, 2501-2-00-80-00-00-07-0
6	1	PCB1	PCB, DC3071A	ADI APPROVED SUPPLIER, 600-DC3071A
7	4	MP5-MP8	STANDOFF, NYLON, SNAP-ON, 0.25" (6.4mm)	KEYSTONE, 8831 WURTH ELECTRONICS, 702931000
8	1	STNCL1	TOOL, STENCIL, DC3071A	ANALOG DEVICES, 830-DC3071A
9	1	LB1	LABEL SPEC, DEMO BOARD SERIAL NUMBER	BRADY, THT-96-717-10

SCHEMATIC DIAGRAM



REVISION HISTORY

REV	DATE	DESCRIPTION	PAGE NUMBER
0	11/22	Initial Release	—

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.