LTP8800-1A
54V Input, High Current DC/DC Power µModule with PMBus Interface

DESCRIPTION

Demonstration circuit 3190A-A is a high current, high density, high efficiency open-frame µModule® regulator with 45V to 65V input range. The demo board has a LTP™8800-1A µModule regulator which provides microprocessor 0.75V voltage from 54V power distribution architecture with digital power system management. The maximum output current for the demo board is 150A. Please see LTP8800-1A data sheet for more detailed information.

DC3190A-A powers up to default settings and produces power based on configuration resistors without the need for any serial bus communication. This allows easy evaluation of the DC/DC converter. To fully explore the extensive power system management features of the part, download the GUI software LTpowerPlay® onto your PC and use ADI's I²C/SMBus/PMBus dongle DC1613A to connect to the board. LTpowerPlay allows the user to reconfigure the part on-the-fly and store the configuration in EEPROM, view telemetry of voltage, current, temperature and fault status.

GUI Download

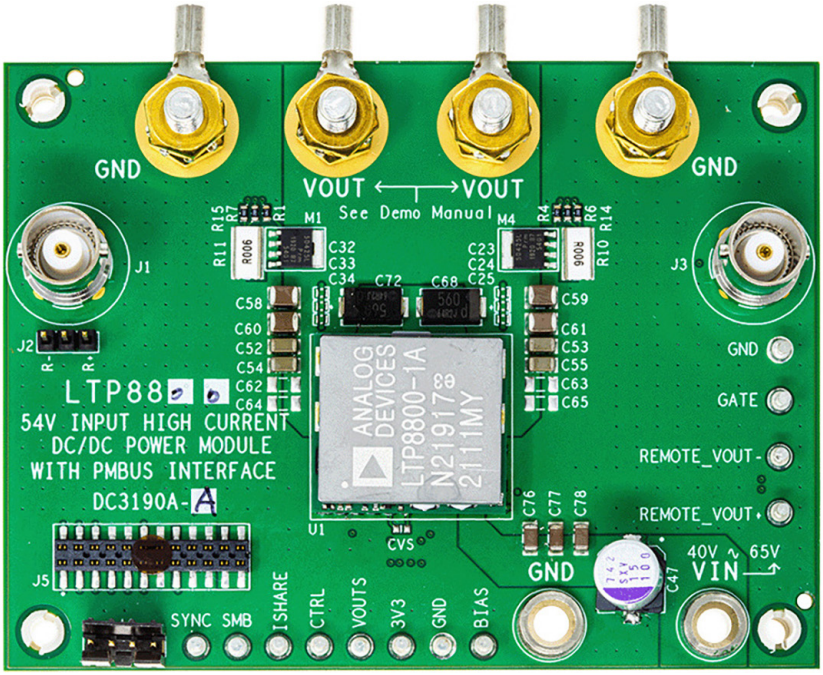
The software can be downloaded from: LTpowerPlay

For more details and instructions of LTpowerPlay, please refer to LTpowerPlay GUI for LTP8800-1A Quick Start Guide.

Design files for this circuit board are available.

BOARD PHOTO

Part marking is either ink mark or laser mark



PERFORMANCE SUMMARY

Specifications are at T_A = 25°C, Air cooling 400LFM

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range V_{IN}		45		65	V
Output Voltage		0.746	0.75	0.754	V
Default Switching Frequency		0.925	1.0	1.075	MHz
Maximum Output Current	Derating is Necessary for Certain V_{IN} and Thermal Conditions, I_{OUT} = 150A		150		A
Converter Efficiency	V_{IN} = 54V • f_{SW} = 1MHz, V_{OUT} = 0.75V, I_{OUT} = 150A		85.6		%

QUICK START PROCEDURE

Demonstration circuit 3190A-A is easy to set up to evaluate the performance of the LTP8800-1A. Refer to Figure 1 for the proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply to V_{IN} (45V to 65V) and GND.
2. With power off, connect the auxiliary power supply to BIAS (7V) and GND.
3. With power off, connect the auxiliary power supply to 3V3 (3.3V) and GND.
4. With power off, connect the load from V_{OUT} to GND.
5. Connect the DMMs to the input and outputs.
6. Turn on the auxiliary power supply and the input power supply and check for the proper output voltage. V_{OUT} should be 0.75V ±0.5%.
7. Once the input and output voltages are properly established, adjust the load current within the operating range of 0A to 150A. Observe the output voltage regulation, output voltage ripples, load transient response and other parameters.
8. Connect the dongle and control the output voltages from the GUI. See LTpowerPlay GUI for the LTP8800-1A Quick Start Guide for details.

   Note: When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe. See Figure 2 for the proper scope probe technique. Short, stiff leads need to be soldered to the (+) and (–) terminals of an output capacitor. The probe's ground ring needs to touch the (–) lead and the probe tip needs to touch the (+) lead.

QUICK START PROCEDURE

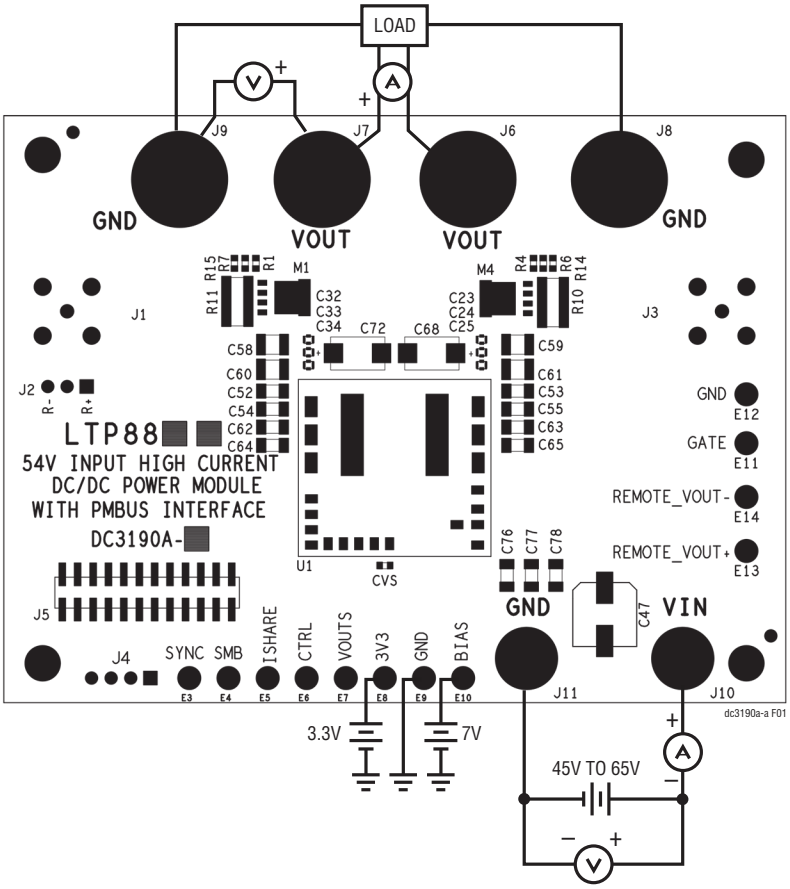


Figure 1. Proper Measurement Equipment Setup

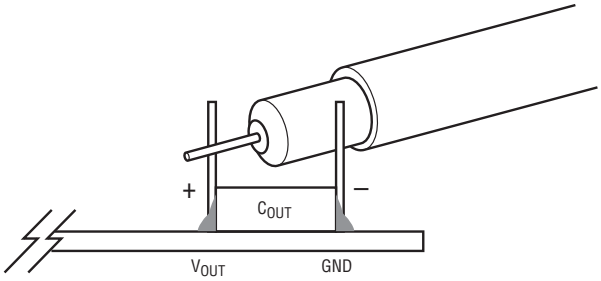


Figure 2. Measuring Output Voltage Ripple

CONNECT PC TO DC3190A-A

Use a PC to reconfigure the power management features of the LTP8800-1A such as: nominal V_{OUT}, margin set points, OV/UV limits, temperature fault limits, sequencing parameters, the fault log, fault responses, GPIOs and other functionalities. LTpowerPlay utilizes the DC1613A USB-to-SMBus controller to communicate with one of demo system, or a customer board. The software also provides an automatic update feature to keep the software current with the latest set of device drivers and documentation. The LTpowerPlay software can be downloaded from: LTpowerPlay.

To access technical support documents for Analog Devices Digital Power Products, visit the LTpowerPlay Help menu. Online help also available through the LTpowerPlay.

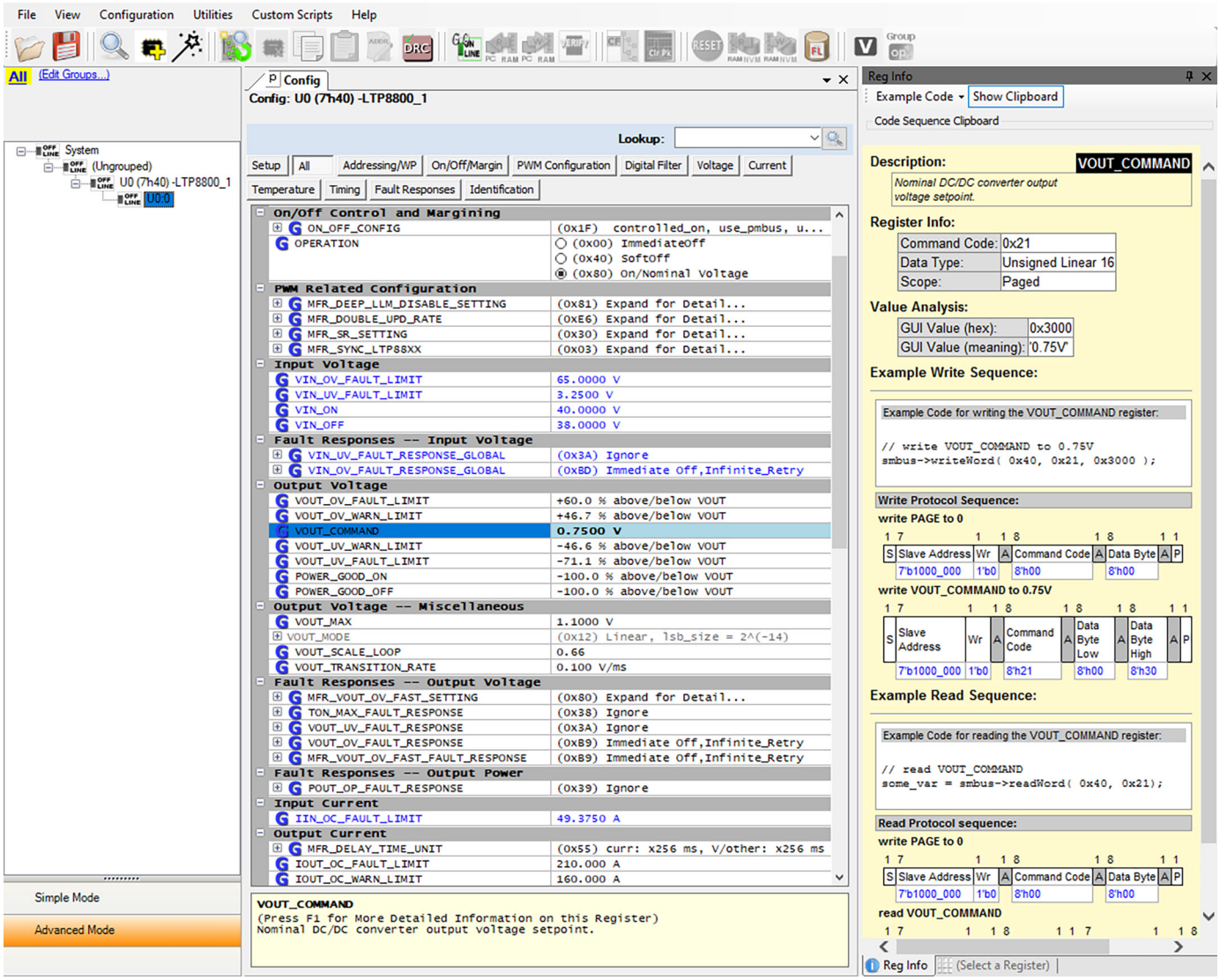


Figure 3. LTpowerPlay Main Interface

TYPICAL PERFORMANCE CHARACTERISTICS

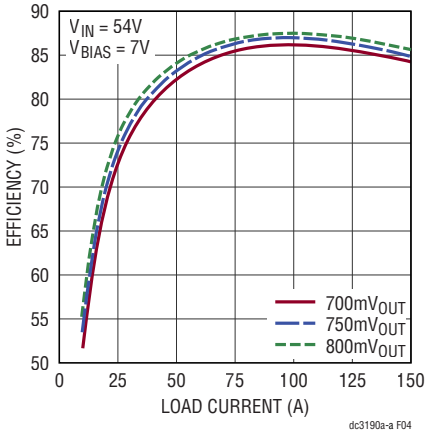


Figure 4. Measured LTP8800-1A Efficiency at V_{IN} = 54V, f_{SW} = 1MHz, Forced Air Cooled with 500LFM

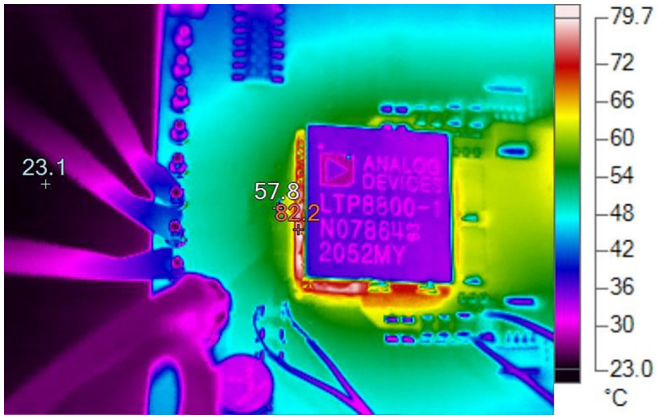


Figure 5. LTP8800-1A Thermal Performance at V_{IN} = 54V, I_{LOAD} = 150A, T_A = 25°C, 500LFM Forced Airflow

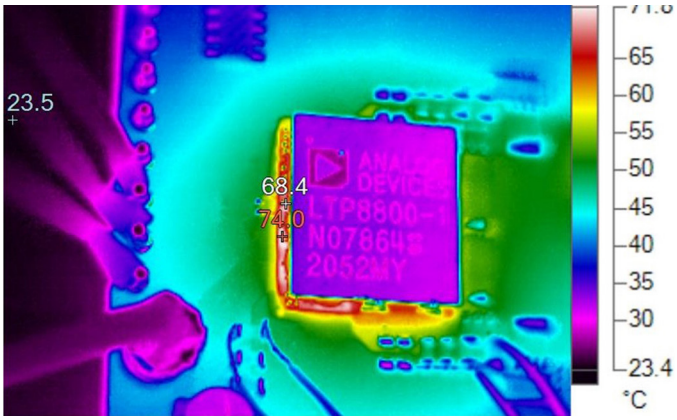


Figure 6. LTP8800-1A Thermal Performance at V_{IN} = 54V, I_{LOAD} = 150A, T_A = 25°C, 900LFM Forced Airflow

TYPICAL PERFORMANCE CHARACTERISTICS

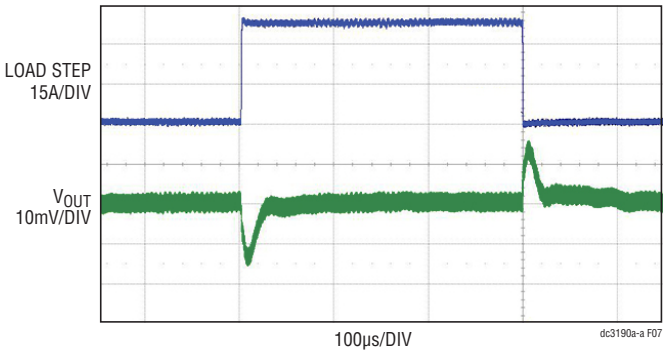


Figure 7. LTP8800-1A Load Transient Responses with Load Steps 0A to 37.5A to 0A at d_i/d_t = 37.5A/µs

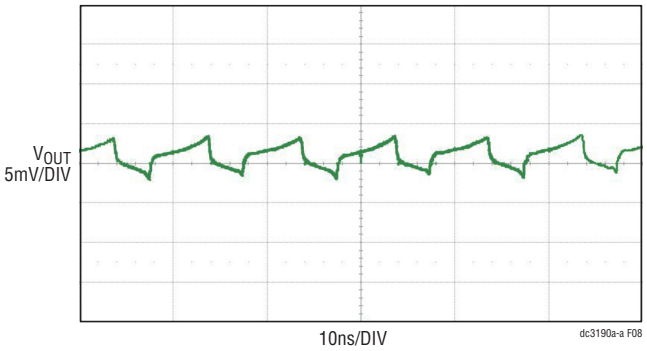


Figure 8. LTP8800-1A DC3190A-A Output Voltage Ripple Measured Through J3 (54V Input, I_{OUT} = 150A, 20MHz BW Limit)

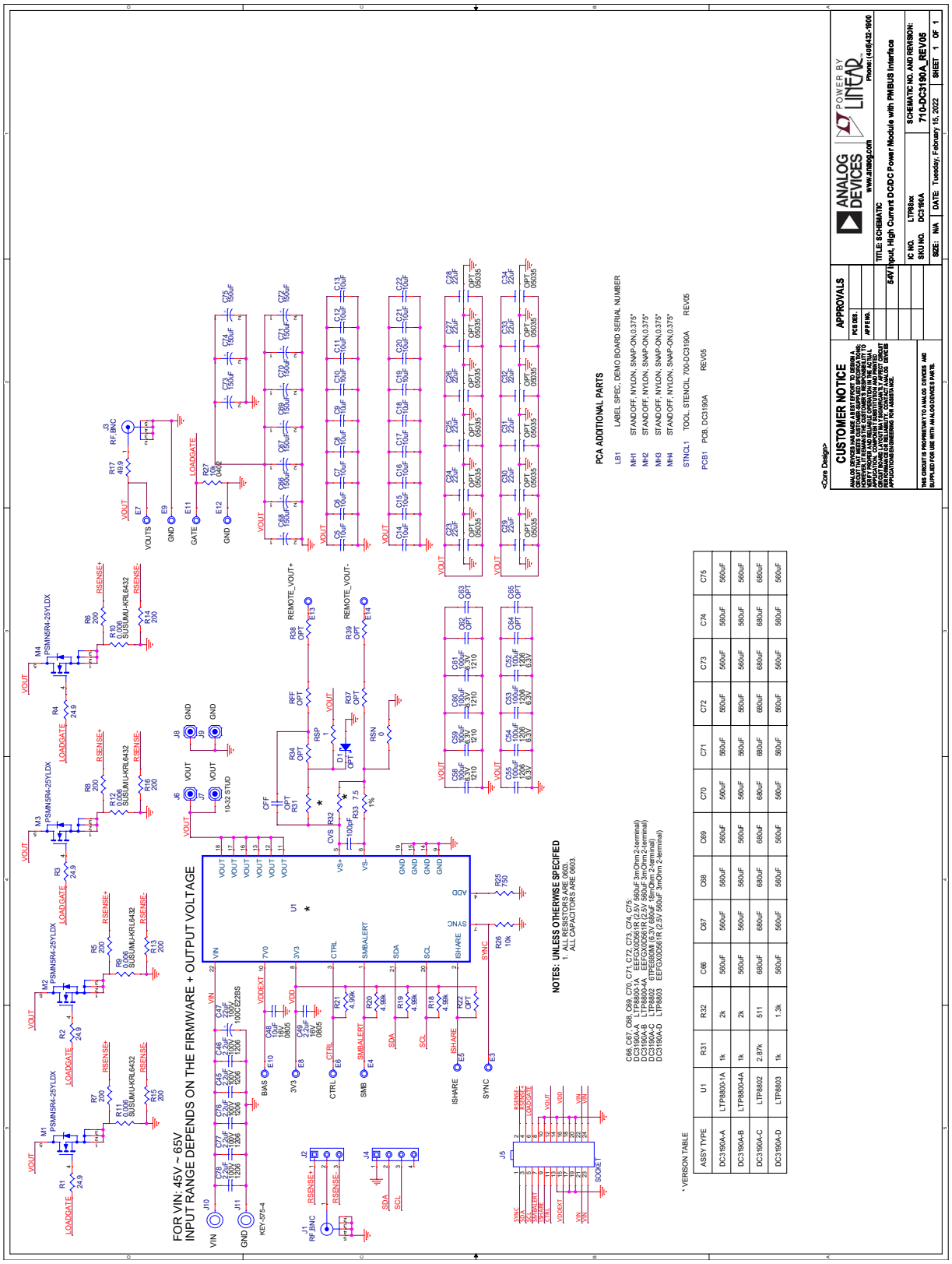
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	18	C5-C22	CAP., 10µF, X7S, 6.3V, 20%, 0603	TDK, C1608X7S0J106M080AC
2	5	C45, C46, C76-C78	CAP., 2.2µF, X7R, 100V, 10%, 1206	SAMSUNG, CL31B225KCHSNNE
3	1	C47	CAP., 22µF, ALUM, 100V, 20%, 8mm × 10.2mm, SMD, RADIAL, AEC-Q200, CE-BS	SUN ELECTRONIC INDUSTRIES CORP, 100CE22BS
4	1	C48	CAP., 10µF, X7S, 16V, 10%, 0805	MURATA, GRM21BC71C106KE11L
5	1	C49	CAP., 2.2µF, X7R, 16V, 10%, 0805	KEMET, C0805C225K4RACTU
6	4	C52-C55	CAP., 100µF, X5R, 6.3V, 20%, 1206	TDK, C3216X5R0J107M160AB
7	4	C58-C61	CAP., 100µF, X6S, 6.3V, 20%, 1210	SAMSUNG, CL32X107MQVNNNE
8	10	C66-C75	CAP., 560µF, ALUM POLY, SP-CAP, 2V, 20%, 7343	PANASONIC, EEFGX0D561R
9	1	CVS	CAP., 100pF, X7R, 16V, 10%, 0603	AVX, 0603YC101KAT2A
10	4	J6-J9	EVAL BOARD STUD HARDWARE SET, #10-32	ANALOG DEVICES, 720-0010
11	1	LB1	LABEL SPEC,DEMO BOARD SERIAL NUMBER	BRADY, THT-96-717-10
12	4	M1-M4	XSTR., MOSFET, N-CH, 25V, 70A, LFPAK55, POWER-SO8	NEXPERIA, PSMN5R4-25YLDX
13	4	R1-R4	RES., 24.9Ω, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF24R9V
14	8	R5-R8, R13-R16	RES., 200Ω, 1%, 1/10W, 0603	VISHAY, CRCW0603200RFKEA
15	4	R9-R12	RES., 0.006Ω, 1%, 3W, 2512, LONG-SIDE TERM., METAL, SENSE, AEC-Q200	SUSUMU, KRL6432E-M-R006-F-T1
16	1	R17	RES., 49.9Ω, 1%, 1/10W, 0603	PANASONIC, ERJ3EKF49R9V
17	4	R18-R21	RES., 4.99k, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF4991V
18	1	R25	RES., 750Ω, 1%, 1/10W, 0603, AEC-Q200	STACKPOLE ELECTRONICS,INC., RMCF0603FT750R
19	1	R26	RES., 10k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW060310K0FKEA
20	1	R27	RES., 10k, 1%, 1/16W, 0402, AEC-Q200	VISHAY, CRCW040210K0FKED
21	1	R31	RES., 1k, 0.1%, 1/10W, 0603, THIN-FILM	YAGEO, RT0603BRD071KL
22	1	R32	RES., 2k, 0.1%, 1/10W, 0603, METAL FILM, AEC-Q200	PANASONIC, ERA3AEB202V
23	1	R33	RES., 7.5Ω, 1%, 1/10W, 0603	YAGEO, RC0603FR-077R5L
24	1	RSN	RES., 0Ω, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3GEY0R00V
25	1	RSP	RES., 1Ω, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F1R00TRF
26	1	U1	IC, 165A DC/DC µModule REG., OPEN-FRAME, 22mm × 24mm, SMD	ANALOG DEVICES, LTP8800-1AIPV#PBF
Additional Demo Board Circuit Components				
1	0	C23-C34	CAP., 22µF, FEEDTHRU, 4V, 20%, 05035, SMD, 3-TERM., EMI FILTER, 2A	MURATA, NFMJMPC226R0G3D
2	0	C62-C65	CAP., OPTION,1206	
3	0	CFF	CAP., OPTION,0603	
4	0	D1	DIODE, OPTION, SOD-323	
5	1	PCB1	PCB, DC3190A	ADI APPROVED SUPPLIER, 600-DC3190A
6	0	R22, R34, R37-R39, RFF	RES., OPTION, 0603	

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Hardware: For Demo Board Only				
1	12	E3-E14	TEST POINT, TURRET, 0.064" MTG. HOLE, PCB 0.062 THK	MILL-MAX, 2308-2-00-80-00-00-07-0
2	2	J1, J3	CONN., RF, BNC, RCPT, JACK, 5-PIN, ST, THT, 50ΩS	AMPHENOL RF, 112404
3	1	J2	CONN., HDR, MALE, 1×3, 2.54mm, VERT, ST, THT	SAMTEC, TSW-103-07-L-S
4	1	J4	CONN., HDR, SHROUDED, MALE, 1×4, 2.54mm, VERT, ST, THT	AMPHENOL, 69167-104HLF
5	1	J5	CONN., SOCKET, FEMALE, 2×12, 2mm, SMD, BOTTOM ENTRY	SAMTEC, CLT-112-02-F-D-BE-A-K-TR
6	2	J10, J11	CONN., BANANA JACK, FEMALE, THT, NON-INSULATED, SWAGE, 0.218"	KEYSTONE, 575-4
7	4	MH1-MH4	STANDOFF, NYLON, SNAP-ON, 0.375"	KEYSTONE, 8832
8	1	STNCL1	TOOL, STENCIL, 700-DC3190A-A	ADI APPROVED SUPPLIER, 830-DC3190A-A

SCHEMATIC DIAGRAM



REVISION HISTORY

REV	DATE	DESCRIPTION	PAGE NUMBER
A	08/23	Release for product intro.	—

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.

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