LTP8802A-1B
54V Input, High Current DC/DC Power µModule with PMBus Interface

DESCRIPTION

Demonstration circuit 3190B-F is a high current, high density, high efficiency open-frame µModule® regulator with 45V to 65V input range. The DC3190B-F demo board has a LTP8802A-1B module regulator that provides the microprocessor a 3.3V voltage from 54V power distribution architecture with digital power system management (PSM). The maximum output current for the DC3190B-F demo board is 140A. See the LTP8802A-1B data sheet for more detailed information.

The DC3190B-F 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 DC3190B-F, download the graphical user interface (GUI) software LTpowerPlay® onto your PC and use Analog Devices 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.

LTpowerPlay GUI Download

The software can be downloaded at LTpowerPlay.

For more details and instructions of the LTpowerPlay, see the LTpowerPlay GUI for LTP8802A-1B Quick Start Guide.

Design files for this circuit board are available.

BOARD PHOTO

Part marking is either ink mark or laser mark

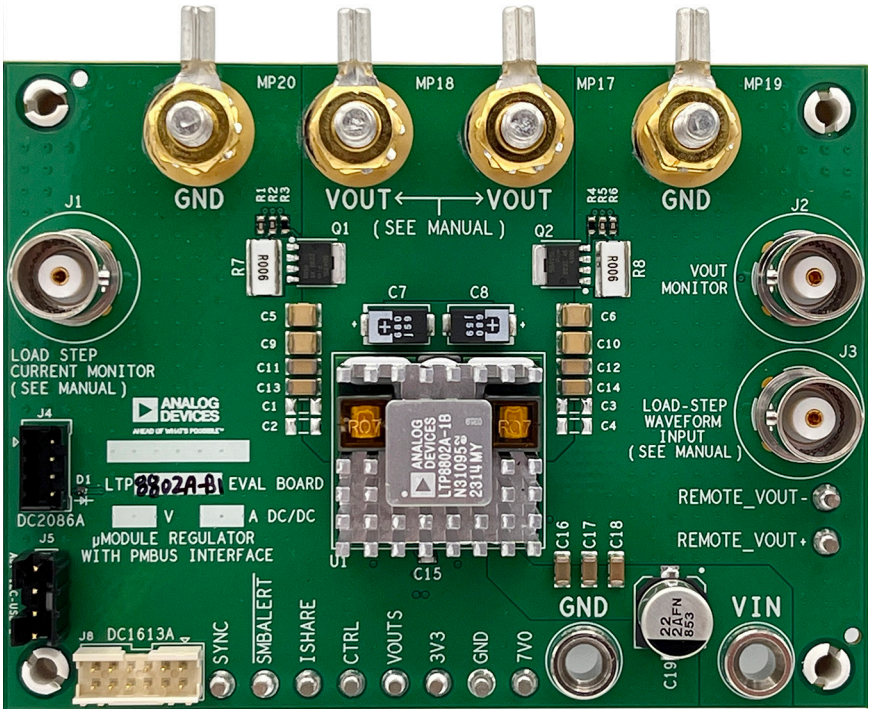


Figure 1. DC3190B-F Demo Board

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C, Air Cooling 900LFM

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range, V_{IN}		45		65	V
Output Voltage		3.29	3.30	3.31	V
Default Switching Frequency		776	800	824	kHz
Maximum Output Current	Derating is Necessary for Certain V_{IN} and Thermal Conditions		140		A
Converter Efficiency	V_{IN} = 54V, f_{SW} = 800kHz, V_{OUT} = 3.30V, I_{OUT} = 140A		93.0		%

QUICK START PROCEDURE

Demonstration circuit DC3190B-F is easy to set up to evaluate the performance of the LTP8802A-1B. See Figure 2 for the proper measurement equipment setup and use the following the procedure:

1. With the power off, connect the input power supply to VIN (45V to 65V) and GND.
2. With the power off, connect the auxiliary power supply to 7V0 (7V) and GND.
3. With the power off, connect the auxiliary power supply to 3V3 (3.3V) and GND.
4. With the power off, connect the load from VOUT to GND.
5. Connect the digital multi meters (DMMs) to the input and output.
6. Turn on the 3.3V and 7V auxiliary power supply before turning on the input power supply.
7. Turn on the input power supply and check for the proper output voltage. VOUT should be 3.30V ±0.5%.
8. Once the input and output voltages are properly established, adjust the load current within the operating range of 0A to 140A max. Observe the output voltage regulation, output voltage ripples, load transient response and other parameters.
9. Connect the dongle and control the output voltages from the GUI (optional).
10. Turn off the input power supply before turning off the auxiliary power supply.
11. Turn off the 3.3V and 7V auxiliary power supply.

NOTE: When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe. See Figure 3 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

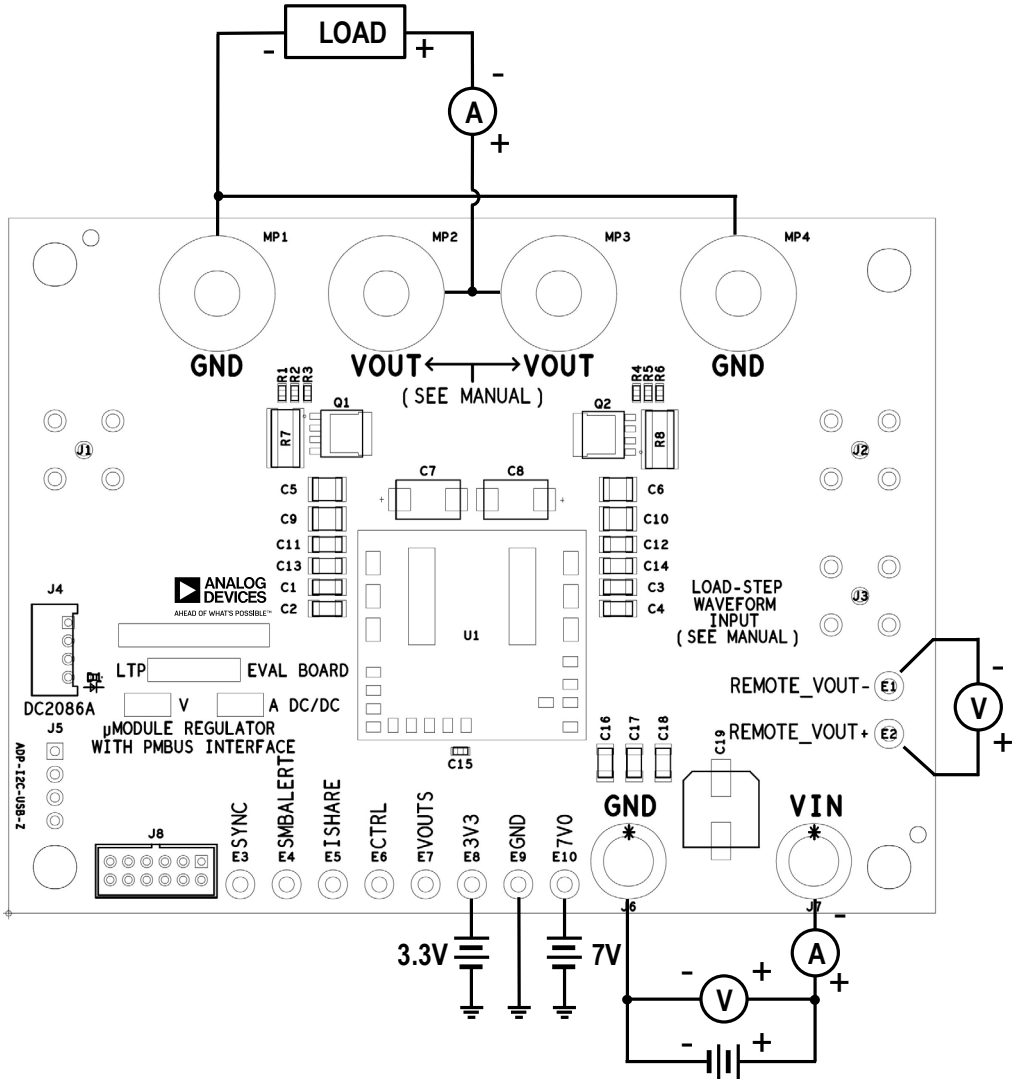


Figure 2. Proper Measurement Equipment Setup

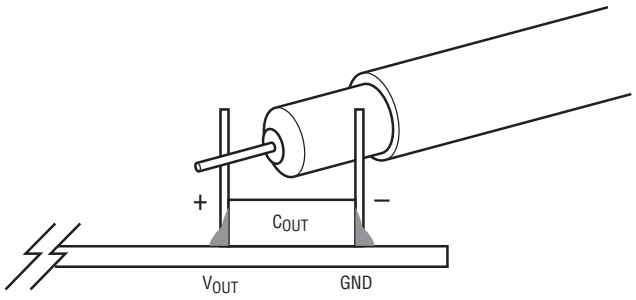


Figure 3. Measuring Output Ripple Voltage

CONNECT PC TO DC3190B-F

Use a PC to reconfigure the power management features of the LTP8802A-1B including, 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 the demo systems, or a customer board. The LTpowerPlay software also provides an automatic update feature to keep the LTpowerPlay software current with the latest set of device drivers and documentation. The LTpowerPlay software can be downloaded at LTpowerPlay.

To access technical support documents for Analog Devices digital power system management (PSM) products, visit the LTpowerPlay Help menu. Online help is also available through the LTpowerPlay interface.

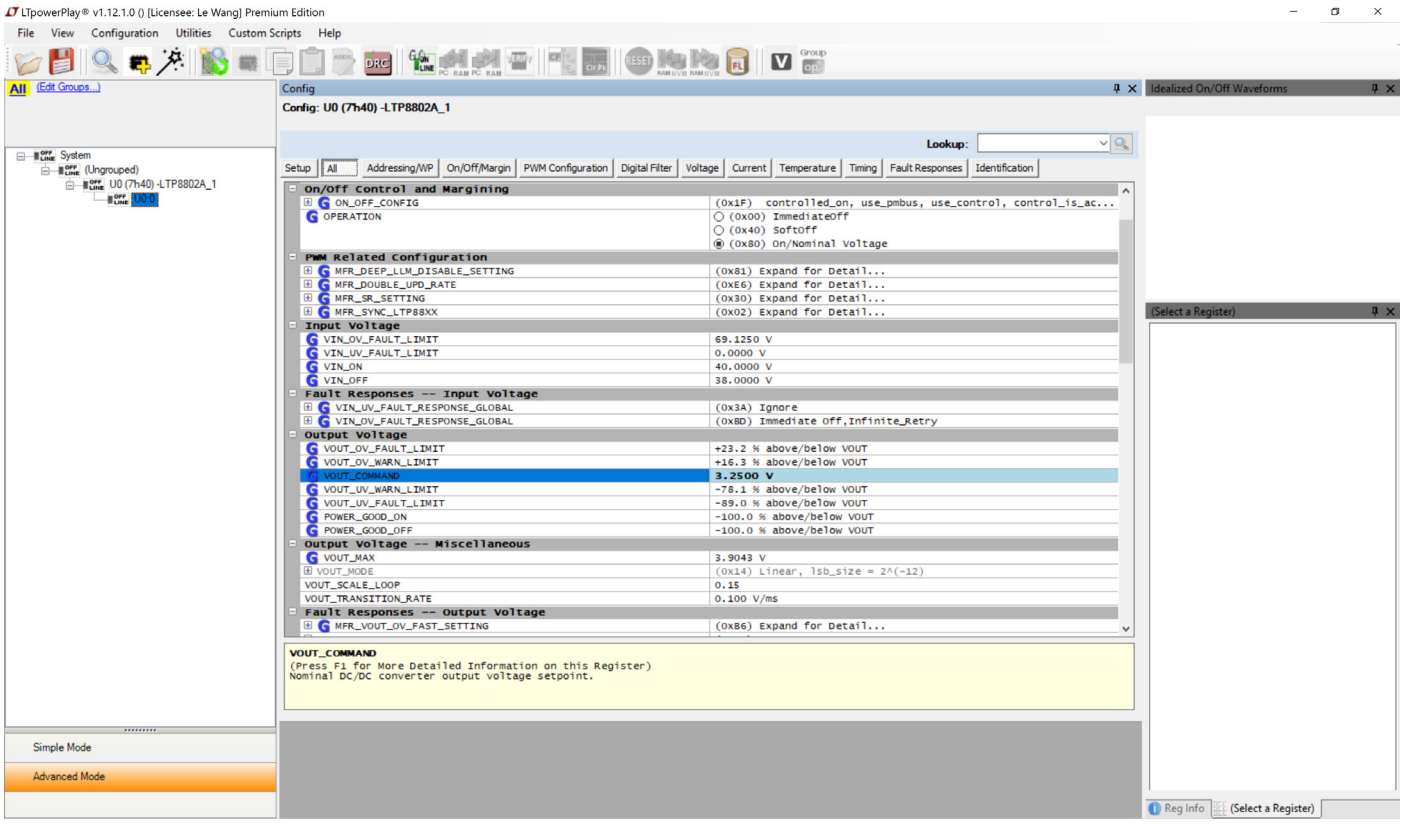


Figure 4. LTpowerPlay Main Interface

TYPICAL PERFORMANCE CHARACTERISTICS

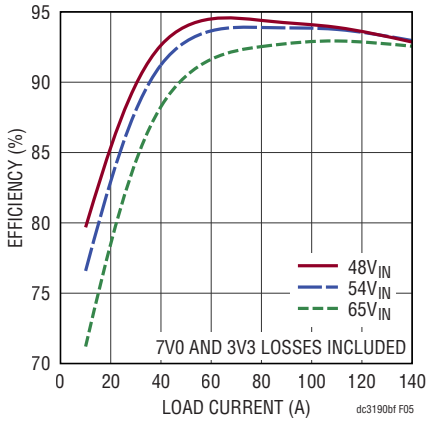
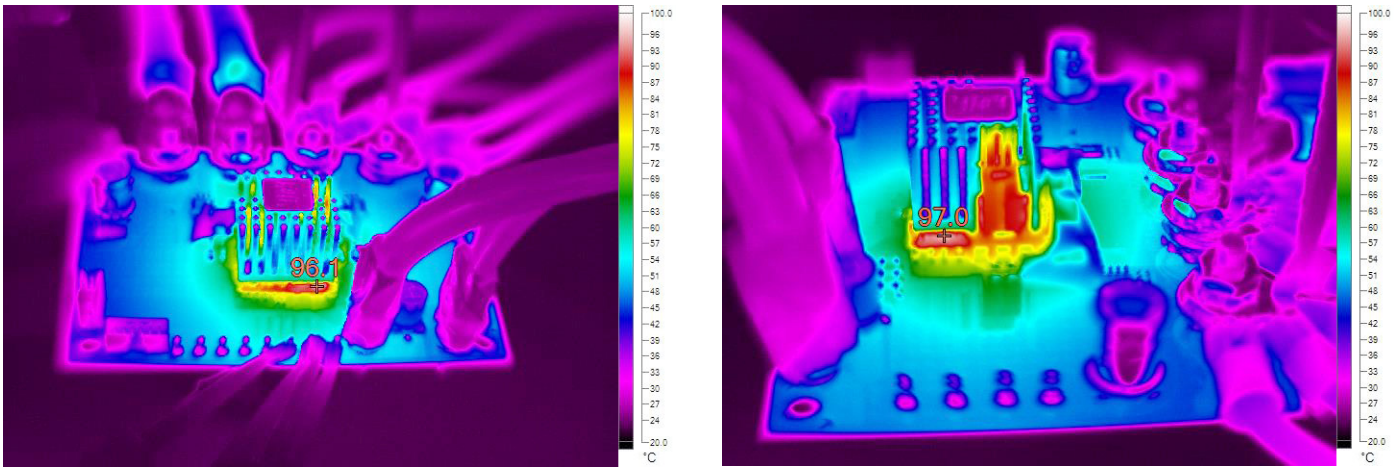
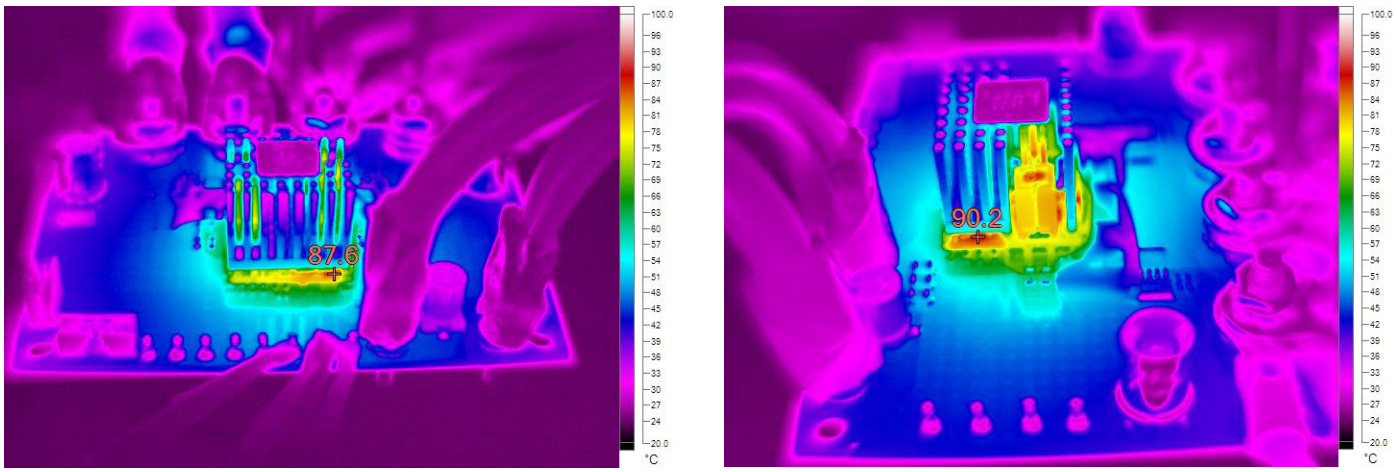


Figure 5. Measured LTP8802A-1B Efficiency at V_{IN} = 54V, V_{OUT} = 3.3V, f_{SW} = 800kHz, Forced Air Cooled with 900LFM



(a) Front View **(b) Side View**

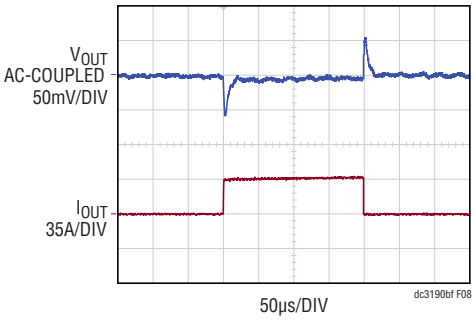
Figure 6. LTP8802A-1B Thermal Performance at V_{IN} = 54V, V_{OUT} = 3.3V, I_{LOAD} = 140A, T_A = 25°C, 500LFM Forced Airflow



(a) Front View **(b) Side View**

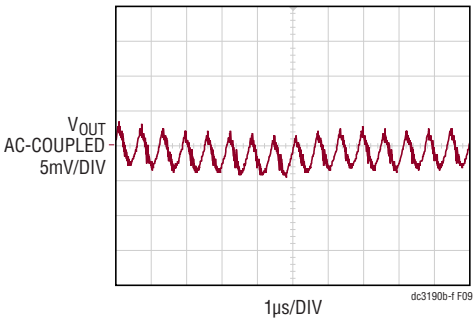
Figure 7. LTP8802A-1B Thermal Performance at V_{IN} = 54V, V_{OUT} = 3.3V, I_{LOAD} = 140A, T_A = 25°C, 900LFM Forced Airflow

TYPICAL PERFORMANCE CHARACTERISTICS



V_{IN} = 54V, V_{OUT} = 3.3V, f_{SW} = 800kHz
C_{OUT} = 680µF ×10 POSCAP + 100µF ×8 CERAMIC
REG FE01h = 20, REG FE02h = 120,
REG FE03h = 80, REG FE04h = 40

Figure 8. LTP8802A-1B Load Transient Responses with Load Steps 0A to 35A to 0A at dI/dt = 35A/µs



V_{IN} = 54V, V_{OUT} = 3.3V, I_{OUT} = 140A,
20MHz BW LIMIT

Figure 9. LTP8802A-1B Output Voltage Ripple Measured Through J2

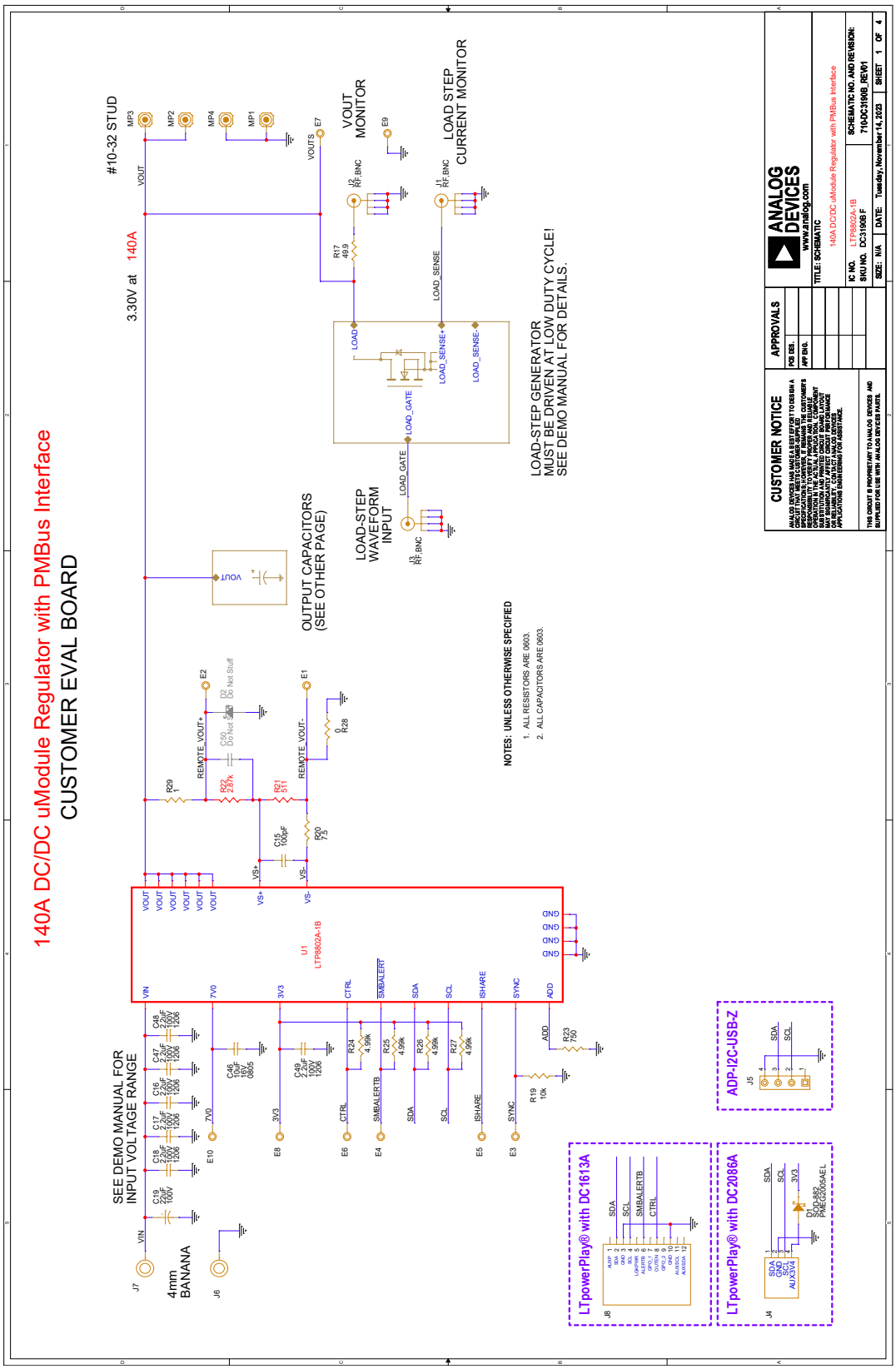
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	4	C5, C6, C9, C10	CAP., 100µF, X6S, 10V, 20%, 1210	TDK, C3225X6S1A107M250AC
2	10	C7, C8, C20-C23, C26, C27, C34, C37	CAP., 680µF, TANT POLY, POSCAP, 6.3V, 20%, 7343, D4	PANASONIC, 6TPE680MI
3	4	C11-C14	CAP CER 100µF 6.3V X5R 1206	MURATA, GRM31CR60J107MEA8L
4	1	C15	CAP., 100pF, X7R, 16V, 10%, 0603	AVX, 0603YC101KAT2A
5	6	C16-C18, C47-C49	CAP., 2.2µF, X7R, 100V, 10%, 1206	MURATA, GRM31CR72A225KA73L
6	1	C19	CAP., 22µF, ALUM, 100V, 20%, 8mm × 10.2mm, SMD, RADIAL, AEC-Q200, CE-FS	SUN ELECTRONIC INDUSTRIES CORP, 100CE22FS
7	18	C24, C25, C28-C33, C35, C36, C38-C45	CAP., 10µF, X7S, 6.3V, 20%, 0603	TDK, C1608X7S0J106M080AC
8	1	C46	CAP., 10µF, X7S, 16V, 10%, 0805	MURATA, GRM21BC71C106KE11L
9	1	D1	DIODE, SCHOTTKY, 20V, 0.5A, SOD-882, LEADLESS	NEXPERIA, PMEG2005AEL, 315
10	4	Q1-Q4	XSTR., MOSFET, N-CH, 25V, 70A, LFPAK55, Power-SO8	NEXPERIA, PSMN5R4-25YLDX
11	8	R1, R2, R5, R6, R9, R10, R13, R14	RES., 200Ω, 1%, 1/10W, 0603	VISHAY, CRCW0603200RFKEA
12	4	R3, R4, R11, R12	RES., 24.9Ω, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF24R9V
13	4	R7, R8, R15, R16	RES., 0.006Ω, 1%, 3W, 2512, LONG-SIDE TERM., METAL, SENSE, AEC-Q200	SUSUMU, KRL6432E-M-R006-F-T5
14	1	R17	RES., 49.9Ω, 1%, 1/10W, 0603	PANASONIC, ERJ3EKF49R9V
15	1	R18	RES., 10k, 1%, 1/16W, 0402, AEC-Q200	VISHAY, CRCW040210K0FKED
16	1	R19	RES., 10k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW060310K0FKEA
17	1	R20	RES., 7.5Ω, 1%, 1/10W, 0603	YAGEO, RC0603FR-077R5L
18	1	R21	RES., 511Ω, 0.1%, 1/10W, 0603, METAL FILM, AEC-Q200	PANASONIC, ERA3AEB5110V
19	1	R22	RES., 2.87k, 0.1%, 1/10W, 0603, METAL FILM, AEC-Q200	PANASONIC, ERA3AEB2871V
20	1	R23	RES., 750Ω, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF7500V
21	4	R24-R27	RES., 4.99k, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF4991V
22	1	R28	RES., 0Ω, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3GEY0R00V
23	1	R29	RES., 1Ω, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW06031R00FKEA
24	1	U1	140A DC/DC µModule REGULATOR WITH PMBus INTERFACE	ANALOG DEVICES, LTP8802A-1BIPV#PBF
Additional Demo Board Circuit Components				
1	0	C1-C4	CAP., OPTION, 1206	
2	0	C50	CAP., OPTION, 0603	
3	0	D2	DIODE, OPTION, SOD-323	

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
4	1	PCB1	PCB, DC3190B-F	ANALOG DEVICES APPROVED SUPPLIER, 600-DC3190B-F
Hardware: For Demo Board Only				
1	10	E1-E10	TEST POINT, TURRET, 0.064" MTG. HOLE, PCB 0.062" THK	MILL-MAX, 2308-2-00-80-00-00-07-0
2	3	J1-J3	CONN., RF, BNC, RCPT, JACK, 5-PIN, ST, THT, 50Ω	AMPHENOL RF, 112404
3	1	J4	CONN., HDR, SHROUDED, MALE, 1×4, 2mm, VERT, ST, THT	HIROSE ELECTRIC, DF3A-4P-2DSA
4	1	J5	CONN., HDR, SHROUDED, MALE, 1×4, 2.54mm, VERT, ST, THT	AMPHENOL, 69167-104HLF
5	2	J6, J7	CONN., BANANA JACK, FEMALE, THT, NON-INSULATED, SWAGE, 0.218"	KEYSTONE, 575-4
6	1	J8	CONN., HDR, SHROUDED, MALE, 2×6, 2mm, VERT, ST, THT	AMPHENOL, 98414-G06-12ULF
7	4	MH1-MH4	STANDOFF, NYLON, SNAP-ON, 0.375"	KEYSTONE, 8832
8	4	MP1-MP4	STUD, FASTENER, #10-32	PENNENGINEERING, KFH-032-10ET
9	4	MP5-MP8	WASHER, FLAT, STEEL, ZINC PLATE, OD: 0.436 [11.1]	KEYSTONE, 4703
10	8	MP9-MP16	NUT, HEX, #10-32, STEEL, ZINC PLATE	KEYSTONE, 4705
11	4	MP17-MP20	RING, LUG, #10, CRIMP, 16/14 AWG, NON-INSULATED, SOLDERLESS TERMINALS	KEYSTONE, 8205

SCHEMATIC DIAGRAM



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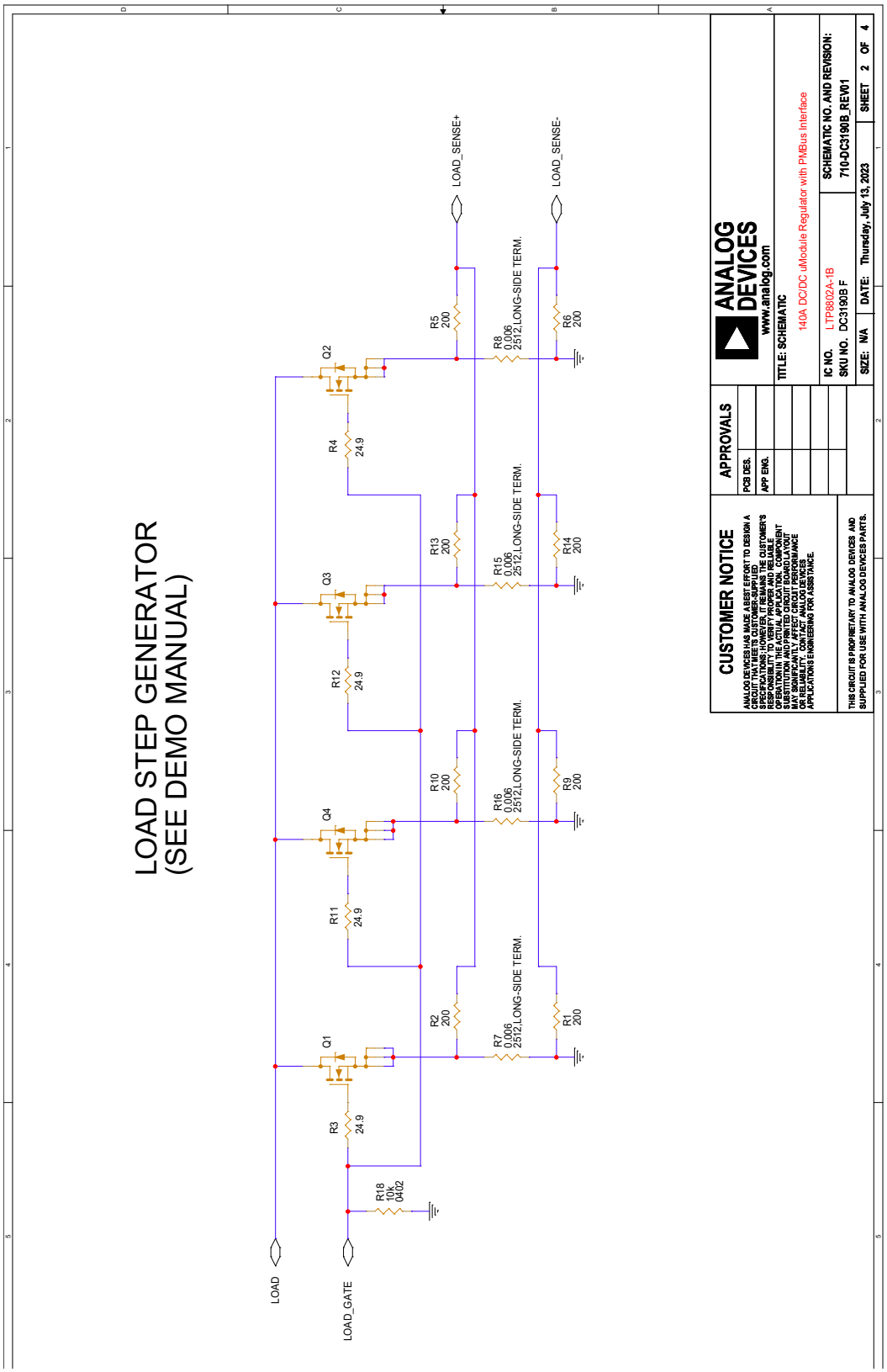

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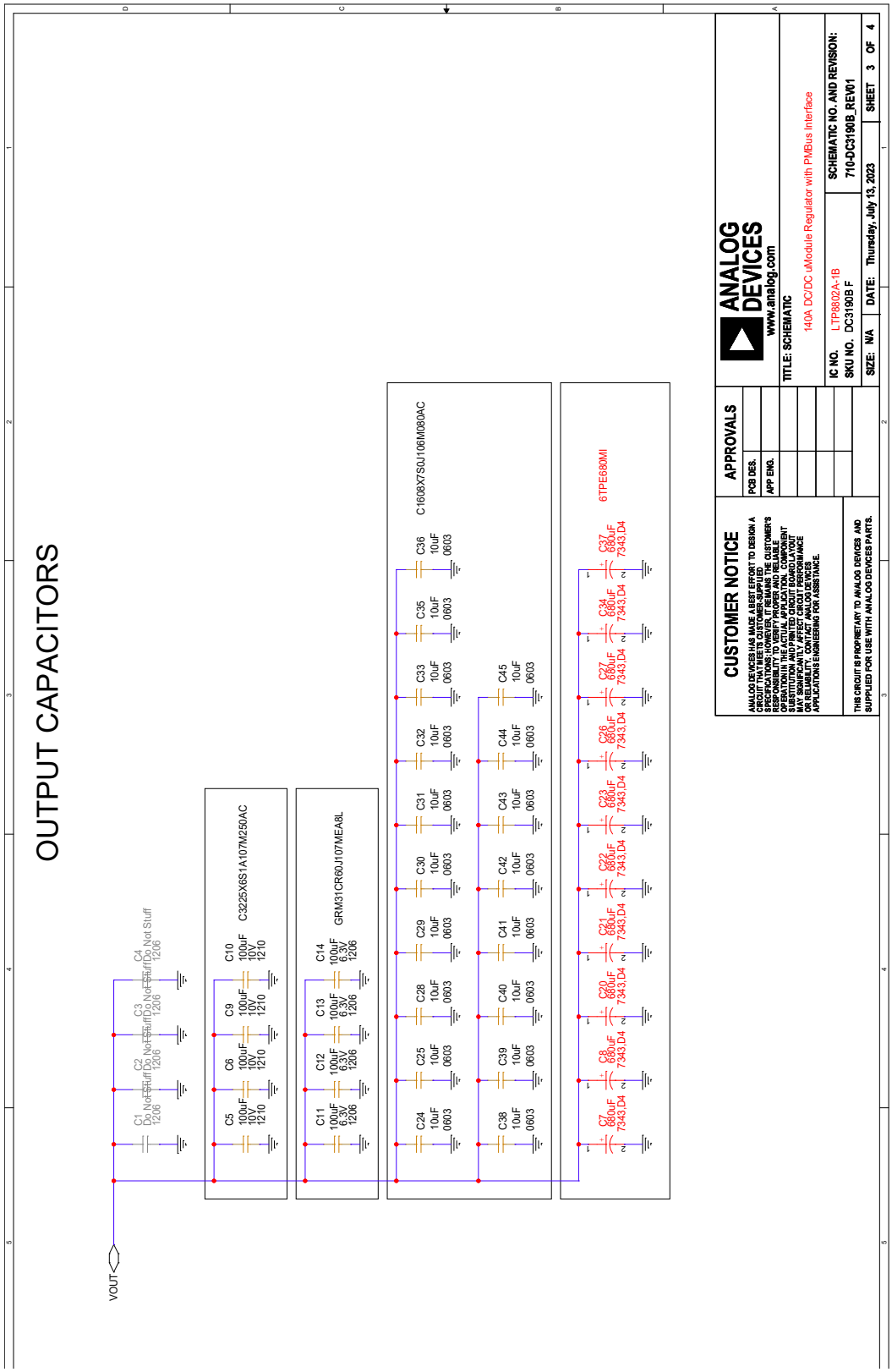
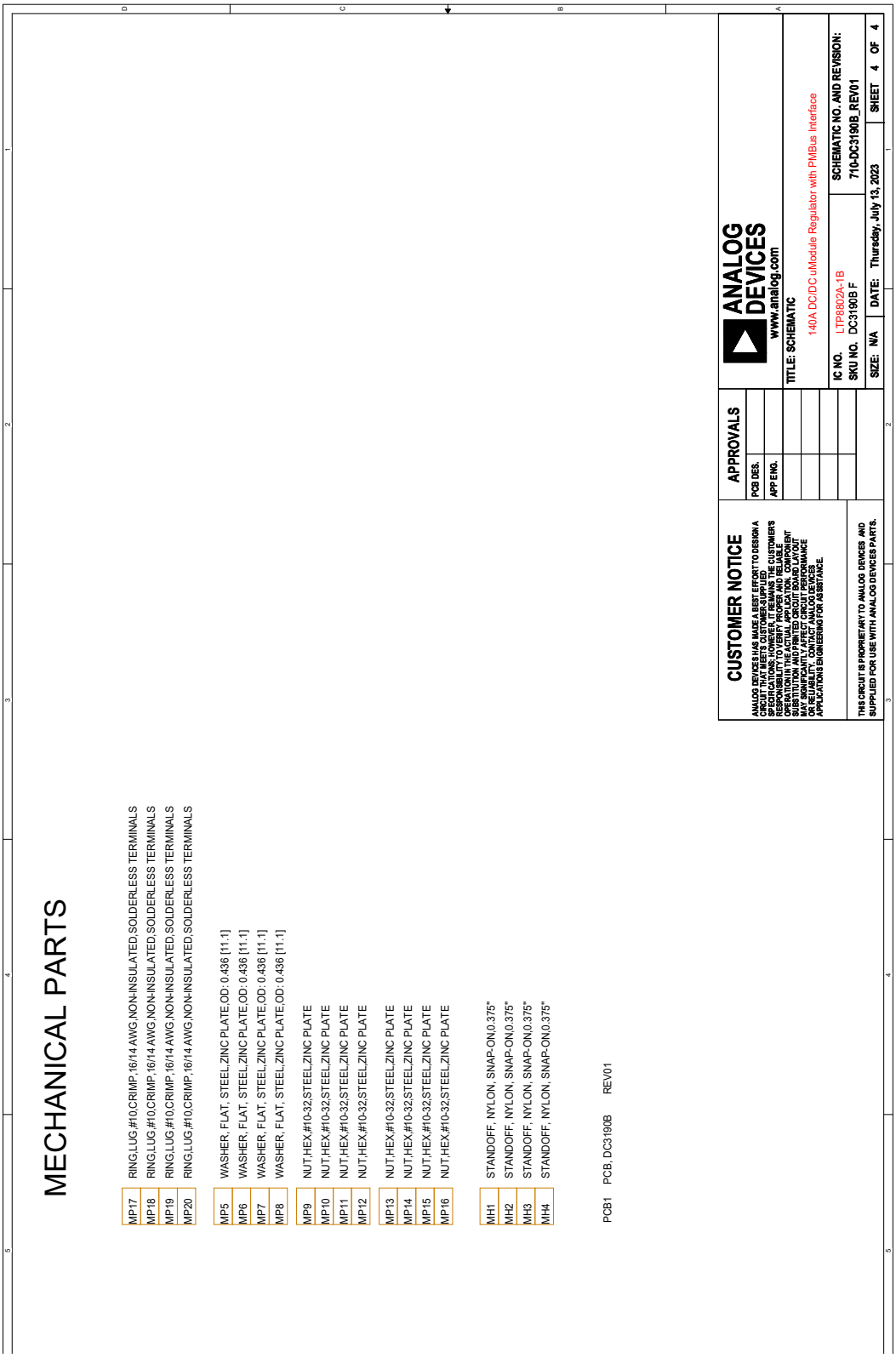


SCHEMATIC DIAGRAM



REVISION HISTORY

REV	DATE	DESCRIPTION	PAGE NUMBER
A	05/24	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.

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