

LTC7852

High Efficiency 6-Phase Step-Down Converter

DESCRIPTION

Demonstration circuit 2631A features the **LTC7852** in two high output current, high efficiency step down converters each with its own assembly type. The converter for the –A assembly provides two 3-phase outputs of 1.0V / 100A & 1.5V/100A. The –B assembly provides a single 6-phase 1.0V/200A output. Block diagrams are shown in Figure 3. Both converters operate over a 7V to 14V input voltage range at a switching frequency of 400kHz.

The power stage for each phase consists of a 5mm × 5mm DrMOS and 11.3mm × 11.0mm 0.25μH ferrite inductor with a DCR of 0.32mΩ typical. The LTC7852 employs a peak current mode architecture which allows accurate DCR sensing and sharing with sub-mOhm DCR inductors. The LTC7852 provides a three-state compatible PWM output for each DrMOS.

Additional features of the DC2631A include:

- Differential sensing for the output voltages of V_{OUT1} and V_{OUT2}
- IMON pins to monitor the inductor current of each rail.

- Optional resistors and jumpers to change the phase arrangement for V_{OUT1} & V_{OUT2} :
 - V_{OUT1} : 4ph, V_{OUT2} : 2ph
 - V_{OUT1} : 5ph, V_{OUT2} : 1ph
 - Note, the default arrangement is:
 V_{OUT1} : 3ph, V_{OUT2} : 3ph
- Optional resistors and jumpers to parallel V_{OUT1} & V_{OUT2} .
- RUN, PGOOD, PLLIN and CLKOUT pins

The LTC7852 data sheet provides a complete description of the IC operation and application information. The data sheet must be read in conjunction with the quick start guide.

Design files for this circuit board are available at
<http://www.analog.com/DC2631A-A>

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PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$, for the -A Assembly

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		7V to 14V
V_{OUT1}	$V_{IN} = 7\text{V to } 14\text{V}$, $I_{OUT1} = 0\text{A to } 100\text{A}$	$1.0\text{V} \pm 1.5\%$
I_{OUT1}	$V_{IN} = 7\text{V to } 14\text{V}$, $V_{OUT1} = 1.0\text{V}$	100A
V_{OUT1} Typical Efficiency (See Figure 4)	$V_{IN} = 12\text{V}$, $I_{OUT1} = 100\text{A}$	90.3% typical
V_{OUT2}	$V_{IN} = 7\text{V to } 14\text{V}$, $I_{OUT2} = 0\text{A to } 100\text{A}$	$1.5\text{V} \pm 2\%$
I_{OUT2}	$V_{IN} = 7\text{V to } 14\text{V}$, $V_{OUT2} = 1.5\text{V}$	100A
V_{OUT2} Typical Efficiency (See Figure 5)	$V_{IN} = 12\text{V}$, $I_{OUT2} = 100\text{A}$	93.3% typical
Nominal Switching Frequency		400kHz

DEMO MANUAL

DC2631A-A/2631A-B

PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$, for the -B Assembly

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		7V to 14V
V_{OUT1}	$V_{IN} = 7\text{V to } 14\text{V}$, $I_{OUT1} = 0\text{A to } 200\text{A}$	$1.0\text{V} \pm 1.5\%$
I_{OUT1}	$V_{IN} = 7\text{V to } 14\text{V}$, $V_{OUT1} = 1.0\text{V}$	200A
V_{OUT1} Typical Efficiency (See Figure 6)	$V_{IN} = 12\text{V}$, $I_{OUT1} = 200\text{A}$	90.0% typical
Nominal Switching Frequency		400kHz

QUICK START PROCEDURE

The evaluation setup for demonstration circuit 2631A-A/-B is straight forward. Refer to the diagram shown in Figure 1.

Next, follow the procedure below:

- 1) With power off, connect the input supply, load and meters as shown in Figure 1. Preset the load to 0A and the V_{IN} supply to 0V.
- 2) Place the RUN1, RUN2 and 5V BIAS jumpers in the ON position.
- 3) Slowly increase the input voltage to 12.0V while monitoring V_{OUT1} and/or V_{OUT2} .
- 4) At an input voltage of 12.0V, check V_{OUT1} and/or V_{OUT2} . The output voltage(s) should be within the regulation limits shown in the Performance Summary table.
- 5) Apply full load to the output(s) and re-measure the output voltages. They should be within the regulation limits.
- 6) After the basic performance has been verified, the other aspects of performance can be measured and observed.

DYNAMIC LOAD CIRCUITS

The DC2631A-A/DC2631B-B provides a load step circuit for V_{OUT1} and V_{OUT2} . Each load step circuit consists of a load step MOSFET with a $2\text{m}\Omega$ sense resistor at its source. To use it, connect the output of a pulse generator between the PULSE GEN pin and the GND pin. Monitor the load step signal across the ISTEP+ and ISTEP- pins. Monitor the output voltage with the V_{OUT} BNC. See Figure 2 for the setup. For safe operation for a 0A to 200A load step, limit the duty cycle to 5% or less. The load step responses are shown in Figure 9 through 11.

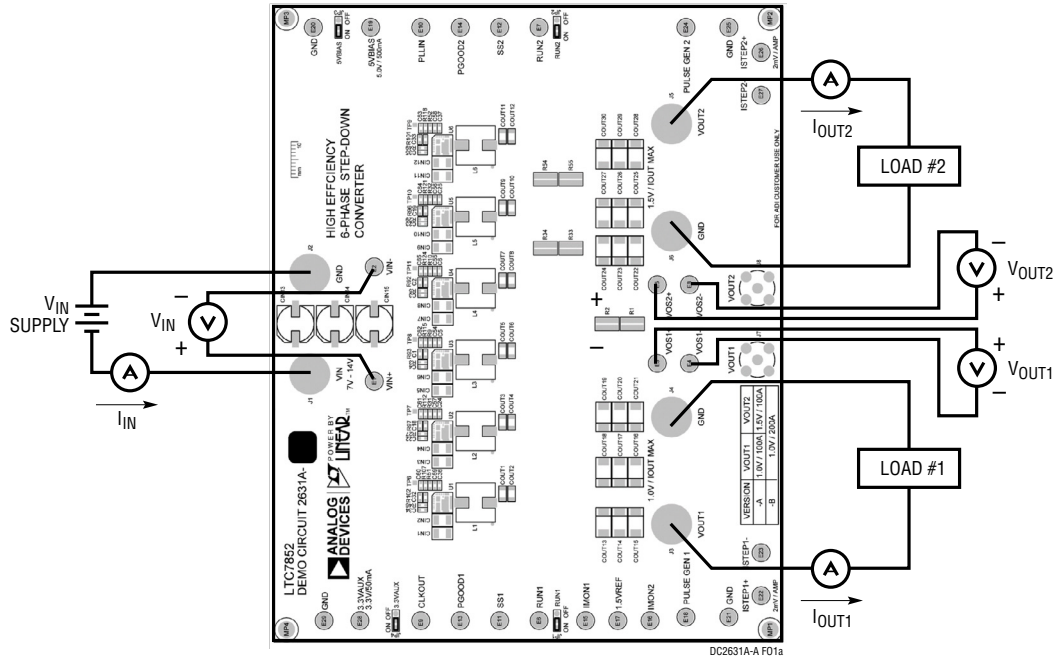
Note 1:

200 LFM airflow or more is recommended when full load is applied to both outputs of the -A assembly or when full load is applied to the output of the -B assembly. Thermal images are shown in Figure 7 and 8.

Note 2:

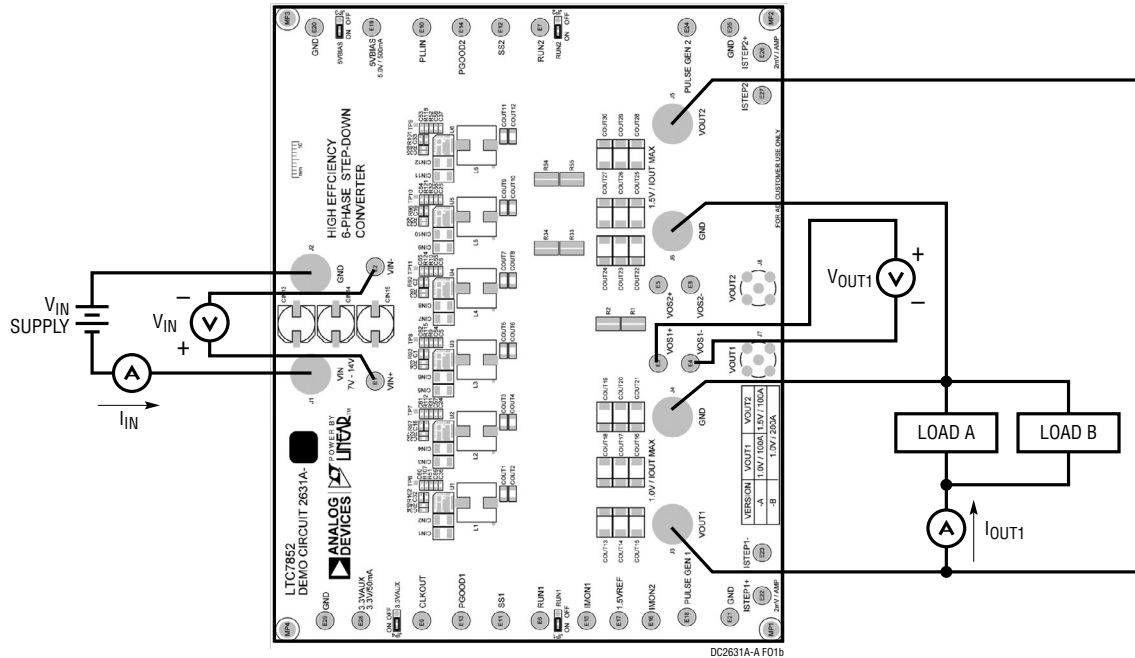
When powering the board, first connect the input supply to the DC2631A. Next, turn-on the input supply. Do not hot plug. This could cause large input voltage transients that may damage the converter.

QUICK START PROCEDURE



NOTE: FOR ACCURATE EFFICIENCY MEASUREMENTS, MONITOR V_{OUT1} ACROSS THE CERAMIC AT COUT1 AND V_{OUT2} ACROSS THE CERAMIC AT COUT7. THE V_{OS+} TURRETS MONITOR THE OUTPUT VOLTAGE AT THE BULK OUTPUT CAPACITORS

(a) DC2631A-A



(a) DC2631A-B

Figure 1. Proper Measurement Setup

QUICK START PROCEDURE

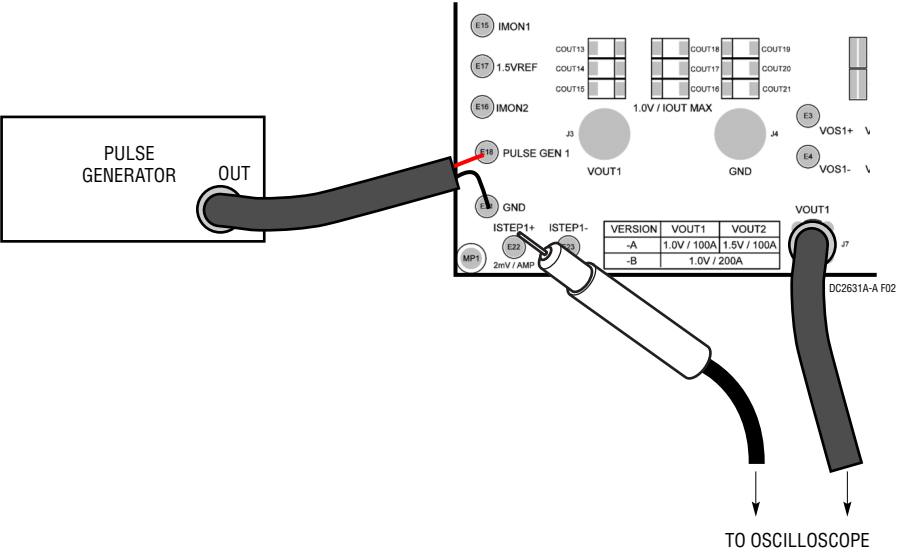


Figure 2. Setup of the Dynamic Load Circuits

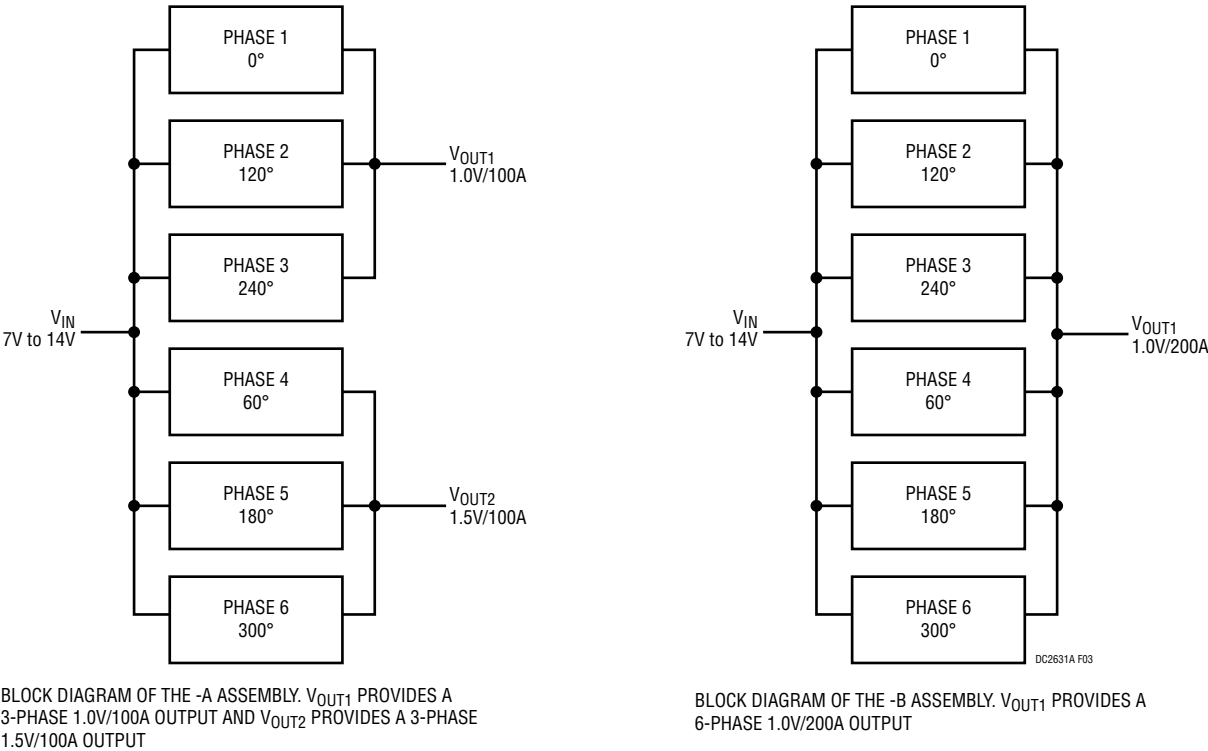


Figure 3. Block Diagram of the DC2631A-A/DC2631B-B

QUICK START PROCEDURE

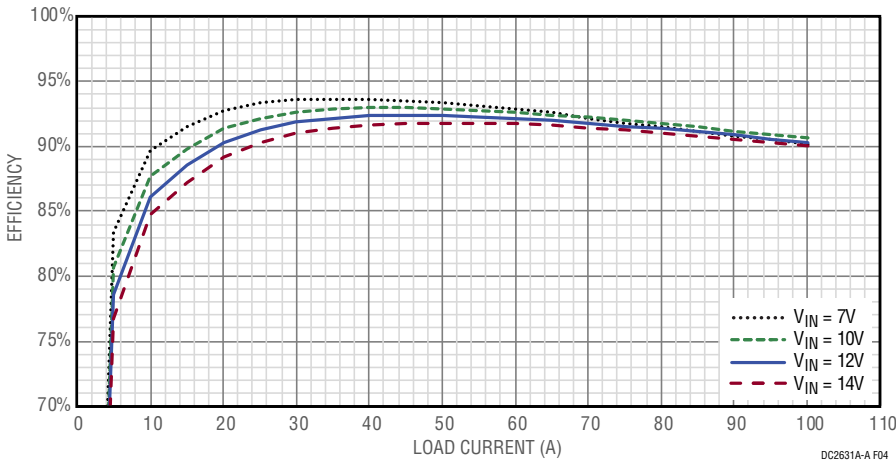


Figure 4. Efficiency of the 1.0V/100A Rail of the DC2631A-A

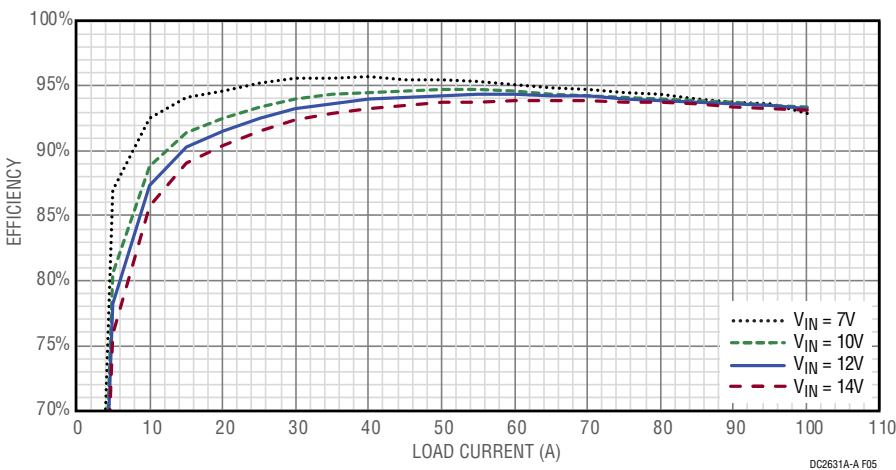


Figure 5. Efficiency of the 1.5V/100A Rail of the DC2631A-A

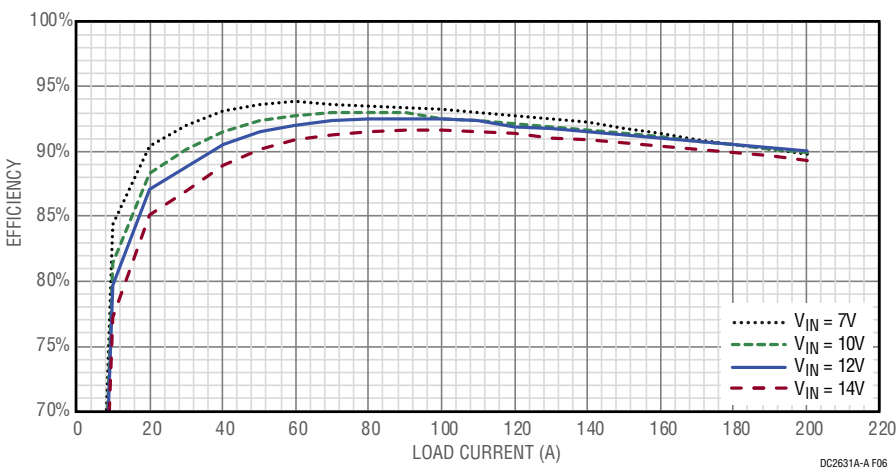


Figure 6. Efficiency of the 1.0V/200A Rail of the DC2631A-B

QUICK START PROCEDURE

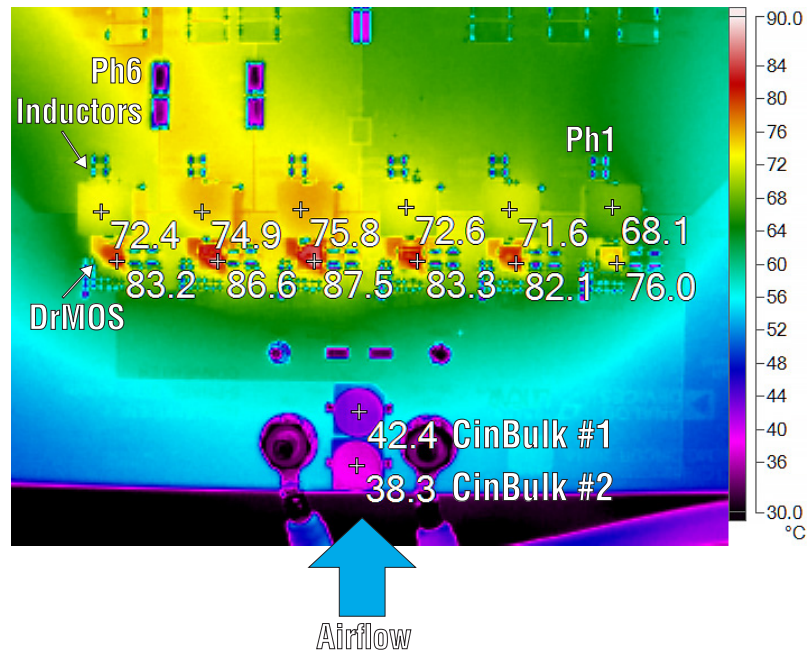


Figure 7. Thermal Image of the 1.0V/100A 3-Phase and 1.5V/100A 3-Phase Converter (DC2631A-A) at $V_{IN} = 12V$, Full Load on Both Outputs. Tambient = 24°C with 200 LFM Airflow. Hot Spot is DrMOS of Phase 4.
DrMOS = FDMF5820DC, L = Würth 744301025, $f_{SW} = 400kHz$.

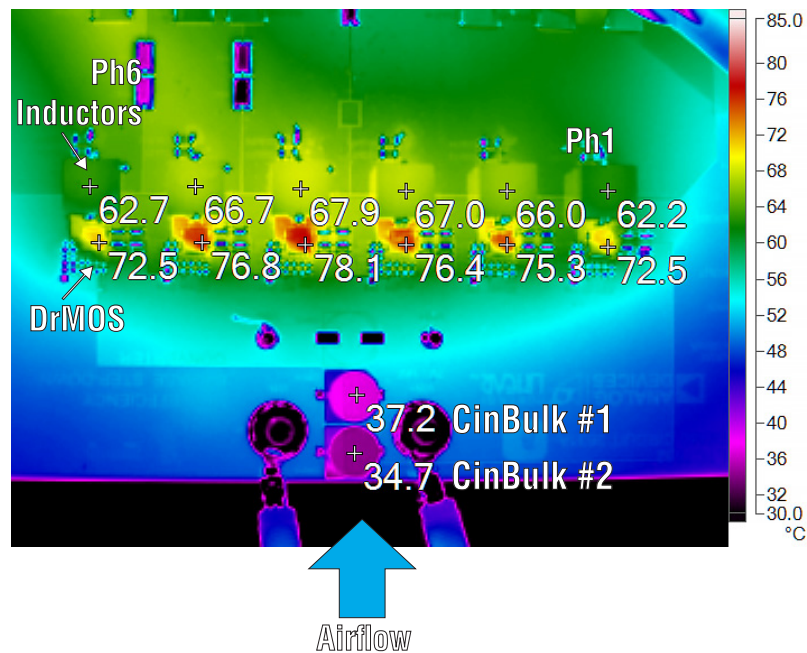
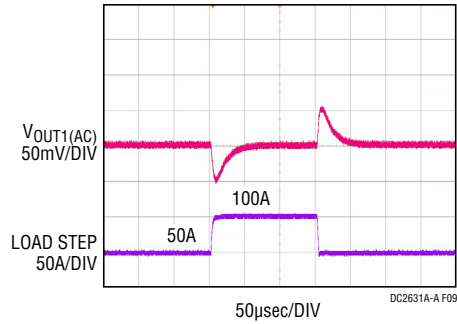
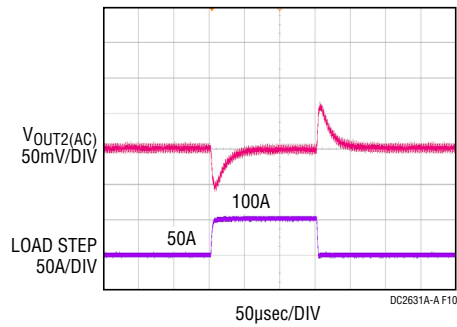


Figure 8. Thermal Image of the 1.0V/200A 6-Phase Converter (DC2631A-B) at $V_{IN} = 12V$, Full Load. Tambient = 24°C with 200 LFM Airflow. Hot Spot is DrMOS of Phase 4.
DrMOS = FDMF5820DC, L = Würth 744301025, $f_{SW} = 400kHz$.

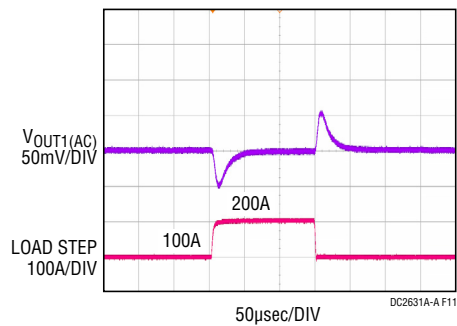
QUICK START PROCEDURE



**Figure 9. 50% to 100% Load Step Response of the 1.0V/100A 3-Phase Rail of the DC2631A A. $V_{IN} = 12V$.
 $C_{OUT} = 9x (330\mu F, 9m\Omega) \parallel 3x (220\mu F, X5R, 1210)$, $f_{SW} = 400kHz$**



**Figure 10. 50% to 100% Load Step Response of the 1.5V/100A 3-Phase Rail of the DC2631A A. $V_{IN} = 12V$.
 $C_{OUT} = 9x (330\mu F, 9m\Omega) \parallel 3x (220\mu F, X5R, 1210)$, $f_{SW} = 400kHz$**



**Figure 11. 50% to 100% Load Step Response of the 1.0V/200A 6-Phase Rail of the DC2631A B. $V_{IN} = 12V$.
 $C_{OUT} = 18x (330\mu F, 9m\Omega) \parallel 6x (220\mu F, X5R, 1210)$, $f_{SW} = 400kHz$**

DEMO MANUAL

DC2631A-A/2631A-B

PARTS LIST DEMO CIRCUIT 2631A-A

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Component DC2631A-A				
1	14	C1, C2, C5, C6, C18, C19, C24, C25, C28, C29, C32, C33, C36, C37	CAP., 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
2	18	C3, C4, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C20, C21, C22, C23, C34, C35	CAP., 0.22 μ F, X5R, 25V, 10%, 0603	AVX, 06033D224KAT2A MURATA, GRM188R61E224KA88D NIC, NMC0603X5R224K25TRPF TAIYO YUDEN, TMK107BJ224KA-T
3	2	C30, C31	CAP., 0.1 μ F, X7R, 16V, 10%, 0603	AVX, 0603YC104JAT4A
4	2	C46, C47	CAP., 1 μ F, X7R, 50V, 10%, 0805	AVX, 08055C105KAT2A TAIYO YUDEN, UMK212B7105KG-T TDK, C2012X7R1H105K125AB
5	2	C48, C50	RES., AEC-Q200, 100 Ω , 1%, 1/8W, 0805	VISHAY, CRCW0805100RFKEA
6	2	C49, C51	CAP., 47 μ F, X5R, 6.3V, 20%, 0805	TAIYO YUDEN, JMK212BBJ476MG-T TDK, C2012X5R0J476M125AC TAIYO YUDEN, JMK212BJ476MG-T
7	1	C7	CAP., 1 μ F, X5R, 25V, 20%, 0603	AVX, 06033D105MAT2A TAIYO YUDEN, TMK107BJ105MA-T TDK, C1608X5R1E105M080AC
8	12	CIN1, CIN2, CIN3, CIN4, CIN5, CIN6, CIN7, CIN8, CIN9, CIN10, CIN11, CIN12	CAP., 22 μ F, X5R, 25V, 10%, 1210	MURATA, GRM32ER61E226KE15L TAIYO YUDEN, TMK325BJ226KM-P AVX, 12103D226KAT2A TAIYO YUDEN, TMK325BJ226KM-T
9	2	CIN13, CIN14	CAP., 180 μ F, 30m Ω , ALUM. POLYMER, 16V, 20%, SMD"	PANASONIC, 16SVP180MX
10	1	CITH1	CAP., 3300pF, X7R, 50V, 10%, 0603	AVX, 06035C332KAT2A MURATA, GRM188R71H332KA01D NIC, NMC0603X7R332K50TRPF
11	1	CITH2	CAP., 2200pF, C0G, 50V, 5%, 0603	MURATA, GCM1885C1H222JA16D
12	2	CITHP1, CITHP2	CAP., 150pF, NP0, 50V, 5%, 0603	AVX, 06035A151JAT2A
13	6	COUT1, COUT3, COUT5, COUT7, COUT9, COUT11	CAP., 220 μ F, X5R, 4V, 20%, 1206, NO SUBS. ALLOWED	MURATA, GRM31CR60G227ME11L
14	18	COUT13, COUT14, COUT15, COUT16, COUT17, COUT18, COUT19, COUT20, COUT21, COUT22, COUT23, COUT24, COUT25, COUT26, COUT27, COUT28, COUT29, COUT30	CAP., 330 μ F, 9m Ω , ALUM. POLYMER, 2.5V, 20%, 7343, 6.3A"	PANASONIC, EEF5X0E331ER
15	6	L1, L2, L3, L4, L5, L6	INDUCTOR, 0.25 μ H, 0.32m Ω	WURTH ELEKTRONIK, 744301025
16	6	R19, R23, R38, R41, R66, R69	RES., 715 Ω , 1%, 1/10W, 0603	NIC, NRC06F7150TRF SAMSUNG, RC1608F7150CS YAGEO, RC0603FR-07715RL
17	6	R20, R21, R22, R24, R25, R26	RES SMD 2.32K Ω , 1%, 1/10W, 0603	VISHAY, CRCW06032K32FKEA
18	24	R3, R5, R7, R8, R11, R12, R14, R16, R17, R18, R27, R29, R39, R40, R46, R49, R67, R68, R105, R110, R113, R116, R119, R122	RES., AEC-Q200, 0 Ω , 1/10W, 0603	VISHAY, CRCW06030000Z0EA NIC, NRC06Z0TRF
19	4	R33, R34, R54, R55	RES., COPPER, 0m Ω , JUMPER, 2010	TEPRO OF FLORIDA, RN6083

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
20	4	R37, R50, R64, R76	RES., 10 Ω , 1%, 1/10W, 0603	VISHAY, CRCW060310R0FKEA NIC, NRC06F10R0TRF PANASONIC, ERJ3EKF10R0V Rohm, MCR03EZPFX10R0 YAGEO, RC0603FR-0710RL
21	7	R4, R6, R28, R30, R42, R47, R48	RES., AEC-Q200, 1 Ω , 5%, 1/10W, 0603	VISHAY, CRCW06031R00JNEA
22	1	R44	RES., 37.4k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060337K4FKEA
23	2	R72, R73	RES., AEC-Q200, 39.2k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060339K2FKEA
24	2	R78, R79	RES., AEC-Q200, 100k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA NIC, NRC06F1003TRF PANASONIC, ERJ3EKF1003V
25	17	R9, R10, R31, R32, R51, R52, R74, R75, R92, R93, R96, R97, R101, R102, RB1, RB2, RT1	RES., AEC-Q200, 10k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKEA KOA SPEER, RK73H1JTTD1002F PANASONIC, ERJ3EKF1002V
26	6	R94, R95, R99, R100, R103, R104	RES., 24.9k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060324K9FKEA PANASONIC, ERJ3EKF2492V
27	1	R1TH1	RES., 4.99k Ω , 1%, 1/10W, 0603	VISHAY, CRCW06034K99FKEA
28	1	R1TH2	RES., AEC-Q200, 7.5k Ω , 1%, 1/10W, 0603	VISHAY, CRCW06037K50FKEA
29	1	RT2	RES., 20k Ω , 1%, 1/10W, 0603	PANASONIC, ERJ3EKF2002V VISHAY, CRCW060320K0FKEA YAGEO, RC0603FR-0720KL
30	6	U1, U2, U3, U4, U5, U6	IC, SMAT POWER STAGE MODULE	FAIRCHILD, FDMF5820DC
31	1	U7	IC, DUALOUTPUT 6-PHASE CONTROLLER, GQFN-48 (5x6)	ANALOG DEVICES, LTC7852ERHE#TRPBF

Dynamic Load Circuits

1	2	Q1, Q2	XSTR., N-CH, TRENCH MOSFET, 30V, 80A, TO-263AB	FAIRCHILD SEMI, FDB8832
2	2	R85, R90	RES., AEC-Q200, 10k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKEA KOA SPEER, RK73H1JTTD1002F PANASONIC, ERJ3EKF1002V
3	2	R87, R91	RES., SENSE, 0.002 Ω , 1%, 1W, 2512	VISHAY, WSL25122L000FEA

Bias Supply for DrMOS and LTC7852

1	1	C41	CAP., 0.1 μ F, X7R, 16V, 10%, 0603	AVX, 0603YC104JAT4A
2	1	C40	CAP., 1 μ F, X7R, 50V, 10%, 0805	AVX, 08055C105KAT2A TAIYO YUDEN, UMK212B7105KG-T TDK, C2012X7R1H105K125AB
3	1	C42	CAP., 22 μ F, X5R, 6.3V, 20%, 0805	MURATA, GRM21BR60J226ME39L SAMSUNG, CL21A226MQNNNE TDK, C2012X5R0J226M125AC
4	1	C43	CAP., 10 μ F, X5R, 6.3V, 1 0%, 0805	AVX, 08056D106KAT2A KEMET, C0805C106K9PAC7800 KEMET, C0805C106K9PACTU
5	1	D1	DIODE, SCHOTTKY BARRIER RECTIFIER, 40V 500mA, SOD-323"	NXP, PMEG4005AEA,115
6	1	L7	IND, 15 μ H, HIGH CURRENT LOW PROFILE SMD	Eaton, MP14020V2-150-R
7	1	R89	RES., AEC-Q200, 0 Ω , 1/10W, 0603	VISHAY, CRCW06030000Z0EA NIC, NRC06Z0TRF

DEMO MANUAL

DC2631A-A/2631A-B

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
8	1	R84	RES., AEC-Q200, 0 Ω , 1/4W, 1206	VISHAY, CRCW12060000Z0EA PANASONIC, ERJ8GEY0R00V NIC, NRC12ZOTRF
9	1	R86	RES., 105k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603105KFKEA NIC, NRC06F1053TRF
10	1	R88	RES., 20k Ω , 1%, 1/10W, 0603	PANASONIC, ERJ3EKF2002V VISHAY, CRCW060320K0FKEA YAGEO, RC0603FR-0720KL
11	1	U8	IC, 1.1MHz/2.2MHz, 500mA STEP-DOWN REGULATOR	ANALOG DEVICES, LTC3502EDC#PBF

3.3V Auxiliary Supply

1	1	C68	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
2	1	C69	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
3	1	C66	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
4	1	C67	CAP, 220pF, X7R, 50V, 5%, 0603	AVX, 06035C221JAT2A
5	1	R125	RES., AEC-Q200, 1 Ω , 5%, 1/10W, 0603	VISHAY, CRCW06031R00JNEA
6	1	R127	RES., AEC-Q200, 100k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA NIC, NRC06F1003TRF PANASONIC, ERJ3EKF1003V
7	1	R129	RES., AEC-Q200, 0 Ω , 1/4W, 1206	VISHAY, CRCW12060000Z0EA PANASONIC, ERJ8GEY0R00V NIC, NRC12ZOTRF
8	1	R126	RES., AEC-Q200, 1M Ω , 1%, 1/10W, 0603	VISHAY, CRCW06031M00FKEA NIC, NRC06F1004TRF PANASONIC, ERJ3EKF1004V
9	1	R128	RES., AEC-Q200, 162k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603162KFKEA PANASONIC, ERJ3EKF1623V ROHM, MCR03EZPFX1623
10	1	U9	IC, LDO μ PWR LINEAR REG., MSOP-8	LINEAR TECH, LT3010EMS8E#PBF LINEAR TECH, LT3010EMS8E#TRPBF

Additional Components

1	0	C26, C27, C38, C39, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65	CAP, OPTION, 0603	
2	0	CIN15	CAP, OPTION, ALUM. ELECT., SMD	
3	0	CIN16, CIN17, CIN18, CIN19, CIN20, CIN21, CIN22, CIN23, CIN24, CIN25, CIN26, CIN27	CAP, OPTION, 1210	
4	0	COUT2, COUT4, COUT6, COUT8, COUT10, COUT12	CAP, OPTION, 1206	
5	0	COUT31, COUT32, COUT33, COUT34, COUT35, COUT36, COUT37, COUT38, COUT39, COUT40, COUT41, COUT42, COUT43, COUT44, COUT45, COUT46, COUT47, COUT48	CAP, OPTION, 7343	

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
6	0	R13, R15, R35, R36, R43, R45, R53, R56, R57, R58, R59, R60, R61, R62, R63, R65, R70, R71, R77, R80, R81, R82, R83, R106, R107, R108, R109, R111, R112, R114, R115, R117, R118, R120, R121, R123, R124	RES., OPTION, 0603	
7	0	R1,R2	RES., OPTION, 2010	
Hardware				
1	29	E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, E23, E24, E25, E26, E27, E28, E29	TEST POINT, TURRET, 0.094", MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	6	J1, J2, J3, J4, J5, J6	STUD, FASTENER, #10-32	PENNENGINEERING, KFH-032-10ET
3	2	J7, J8	CONN., RF, BNC, RCPT JACK, 5-PIN, STR, THT, 50Ω	AMPHENOL RF, 112404
4	6	JLRE1, JLRE2, JLRE3, JLRE4, JLRE5, JLRE6	"RING, LUG, CRIMP, #10, NON-INSULATED, SOLDERLESS TERMINALS	KEYSTONE, 8205
5	12	JNE1, JNE2, JNE3, JNE4, JNE5, JNE6, JNE7, JNE8, JNE9, JNE10, JNE11, JNE12	NUT,HEX, #10-32, BRASS	PENCOM, NU1132
6	4	JP1, JP2, JP3, JP4	"CONN.,HDR,MALE, 1x3, 2mm, THT, STR, NO SUBS. ALLOWED"	Wurth Elektronik, 62000311121
7	6	JWE1, JWE2, JWE3, JWE4, JWE5, JWE6	WASHER, #10, LOCK, EXT, TIN FINISH	PENCOM, WA4526
8	4	MP1,MP2,MP3,MP4	STANDOFF, NYLON, SNAP-ON, 0.625"	KEYSTONE, 8834
9	4	XJP1, XJP2, XJP3, XJP4	CONN., SHUNT, FEMALE, 2 POS, 2mm	Wurth Elektronik, 60800213421

DEMO MANUAL

DC2631A-A/2631A-B

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Component DC2631A-B				
1	14	C1, C2, C5, C6, C18, C19, C24, C25, C28, C29, C32, C33, C36, C37	CAP, 2.2μF, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
2	18	C3, C4, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C20, C21, C22, C23, C34, C35	CAP, 0.22μF, X5R, 25V, 10%, 0603	AVX, 06033D224KAT2A MURATA, GRM188R61E224KA88D NIC, NMC0603X5R224K25TRPF TAIYO YUDEN, TMK107BJ224KA-T
3	2	C30, C31	CAP, 0.1μF, X7R, 16V, 10%, 0603	AVX, 0603YC104JAT4A
4	2	C46, C47	CAP, 1μF, X7R, 50V, 10%, 0805	AVX, 08055C105KAT2A TAIYO YUDEN, UMK212B7105KG-T TDK, C2012X7R1H105K125AB
5	2	C48, C50	RES., AEC-Q200, 100Ω, 1%, 1/8W, 0805	VISHAY, CRCW0805100RFKEA
6	2	C49, C51	CAP, 47μF, X5R, 6.3V, 20%, 0805	TAIYO YUDEN, JMK212BBJ476MG-T TDK, C2012X5R0J476M125AC TAIYO YUDEN, JMK212BJ476MG-T
7	1	C7	CAP, 1μF, X5R, 25V, 20%, 0603	AVX, 06033D105MAT2A TAIYO YUDEN, TMK107BJ105MA-T TDK, C1608X5R1E105M080AC
8	12	CIN1, CIN2, CIN3, CIN4, CIN5, CIN6, CIN7, CIN8, CIN9, CIN10, CIN11, CIN12	CAP, 22μF, X5R, 25V, 10%, 1210	MURATA, GRM32ER61E226KE15L TAIYO YUDEN, TMK325BJ226KM-P AVX, 12103D226KAT2A TAIYO YUDEN, TMK325BJ226KM-T
9	2	CIN13, CIN14	CAP, 180μF, 30mΩ, ALUM. POLYMER, 16V, 20%, SMD	PANASONIC, 16SVP180MX
10	1	CITH1	CAP, 5600pF, COG, 50V, 5%, 0603	MURATA, GRM1885C1H562JA01D
11	2	CITHP1, CITHP2	CAP, 150pF, NP0, 50V, 5%, 0603	AVX, 06035A151JAT2A
12	6	COUT1, COUT3, COUT5, COUT7, COUT9, COUT11	CAP, 220μF, X5R, 4V, 20%, 1206, NO SUBS. ALLOWED	MURATA, GRM31CR60G227ME11L
13	18	COUT13, COUT14, COUT15, COUT16, COUT17, COUT18, COUT19, COUT20, COUT21, COUT22, COUT23, COUT24, COUT25, COUT26, COUT27, COUT28, COUT29, COUT30	CAP, 330μF, 9mΩ, ALUM. POLYMER, 2.5V, 20%, 7343, 6.3A	PANASONIC, EEFX0E331ER
14	6	L1, L2, L3, L4, L5, L6	INDUCTOR, 0.25μH, 0.32mΩ	WURTH ELEKTRONIK, 744301025
15	6	R19, R23, R38, R41, R66, R69	RES., 715Ω, 1%, 1/10W, 0603	NIC, NRC06F7150TRF SAMSUNG, RC1608F7150CS YAGEO, RC0603FR-07715RL
16	6	R20, R21, R22, R24, R25, R26	RES SMD, 2.32kΩ, 1%, 1/10W, 0603	VISHAY, CRCW06032K32FKEA
17	29	R3, R5, R7, R8, R11, R12, R14, R16, R17, R18, R27, R29, R39, R40, R46, R49, R67, R68, R77, R80, R81, R82, R83, R105, R110, R113, R116, R119, R122	RES., AEC-Q200, 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA NIC, NRC06ZOTRF
18	6	R1, R2, R33, R34, R54, R55	RES., COPPER, 0mΩ, JUMPER, 2010	TEPRO OF FLORIDA, RN6083

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
19	4	R37, R50, R64, R76	RES., 10 Ω , 1%, 1/10W, 0603	VISHAY NIC PANASONIC Rohm YAGEO
20	7	R4, R6, R28, R30, R42, R47, R48	RES., AEC-Q200, 1 Ω , 5%, 1/10W, 0603	VISHAY, CRCW06031R00JNEA
21	1	R44	RES., 37.4k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060337K4FKEA
22	2	R72, R73	RES., AEC-Q200, 39.2k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060339K2FKEA
23	2	R78, R79	RES., AEC-Q200, 100k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA NIC, NRC06F1003TRF PANASONIC, ERJ3EKF1003V
24	17	R9, R10, R31, R32, R51, R52, R74, R75, R92, R93, R96, R97, R101, R102, RB1, RT1	RES., AEC-Q200, 10k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKEA KOA SPEER, RK73H1JTTD1002F PANASONIC, ERJ3EKF1002V
25	6	R94, R95, R99, R100, R103, R104	RES., 24.9k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060324K9FKEA PANASONIC, ERJ3EKF2492V
26	1	R1TH1	RES., 2.49k Ω , 1%, 1/10W, 0603	NIC, NRC06F2491TRF VISHAY, CRCW06032K49FKEA YAGEO, RC0603FR-072K49L
27	6	U1, U2, U3, U4, U5, U6	IC, SMAT POWER STAGE MODULE	FAIRCHILD, FDMF5820DC
28	1	U7	IC,DUALOUTPUT 6-PHASE CONTROLLER, GQFN-48 (5x6)	ANALOG DEVICES, LTC7852ERHE#TRPBF

Dynamic Load Circuits

1	2	Q1, Q2	XSTR., N-CH, TRENCH MOSFET, 30V, 80A, TO-263AB	FAIRCHILD SEMI, FDB8832
2	2	R85, R90	RES., AEC-Q200, 10k Ω , 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKEA KOA SPEER, RK73H1JTTD1002F PANASONIC, ERJ3EKF1002V
3	2	R87, R91	RES., SENSE, 0.002 Ω , 1%, 1W, 2512	VISHAY, WSL25122L000FEA

Bias Supply for DrMOS and LTC7852

1	1	C41	CAP., 0.1 μ F, X7R, 16V, 10%, 0603	AVX, 0603YC104JAT4A
2	1	C40	CAP., 1 μ F, X7R, 50V, 10%, 0805	AVX, 08055C105KAT2A TAIYO YUDEN, UMK212B7105KG-T TDK, C2012X7R1H105K125AB
3	1	C42	CAP., 22 μ F, X5R, 6.3V, 20%, 0805	MURATA, GRM21BR60J226ME39L SAMSUNG, CL21A226MQQNNNE TDK, C2012X5R0J226M125AC
4	1	C43	CAP., 10 μ F, X5R, 6.3V, 10%, 0805	AVX, 08056D106KAT2A KEMET, C0805C106K9PAC7800 KEMET, C0805C106K9PACTU
5	1	D1	DIODE, SCHOTTKY BARRIER RECTIFIER, 40V 500mA, SOD-323	NXP, PMEG4005AEA,115
6	1	L7	IND, 15 μ H, HIGH CURRENT LOW PROFILE SMD	EATON, MP14020V2-150-R
7	1	R89	RES., AEC-Q200, 0 Ω , 1/10W, 0603	VISHAY, CRCW06030000Z0EA NIC, NRC06ZOTRF
8	1	R84	RES., AEC-Q200, 0 Ω , 1/4W, 1206	VISHAY, CRCW12060000Z0EA PANASONIC, ERJ8GEY0R00V NIC, NRC12ZOTRF

DEMO MANUAL

DC2631A-A/2631A-B

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
9	1	R86	RES., 105k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603105KFKEA NIC, NRC06F1053TRF
10	1	R88	RES., 20k Ω , 1%, 1/10W, 0603	PANASONIC, ERJ3EKF2002V VISHAY, CRCW060320K0FKEA YAGEO, RC0603FR-0720KL
11	1	U8	IC, 1.1MHz/2.2MHz, 500mA STEP-DOWN REGULATOR	

3.3V Auxiliary Supply

1	1	C68	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
2	1	C69	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
3	1	C66	CAP, 2.2 μ F, X5R, 16V, 10%, 0603	KEMET, C0603C225K4PAC7867 KEMET, C0603C225K4PACTU
4	1	C67	CAP, 220pF, X7R, 50V, 5%, 0603	AVX, 06035C221JAT2A
5	1	R125	RES., AEC-Q200, 1 Ω , 5%, 1/10W, 0603	VISHAY, CRCW06031R00JNEA
6	1	R127	RES., AEC-Q200, 100k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA NIC, NRC06F1003TRF
7	1	R129	RES., AEC-Q200, 0 Ω , 1/4W, 1206	VISHAY, CRCW12060000Z0EA PANASONIC, ERJ8GEY0R00V
8	1	R126	RES., AEC-Q200, 1M Ω , 1%, 1/10W, 0603	VISHAY, CRCW06031M00FKEA NIC, NRC06F1004TRF
9	1	R128	RES., AEC-Q200, 162k Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603162KFKEA PANASONIC, ERJ3EKF1623V ROHM, MCR03EZPFX1623
10	1	U9	IC, LDO μ PWR LINEAR REG., MSOP-8	LINEAR TECH, LT3010EMS8E#PBF LINEAR TECH, LT3010EMS8E#TRPBF

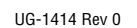
Additional Components

1	0	C26, C27, C38, C39, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C1H2	CAP, OPTION, 0603	
2	0	C1N15	CAP, OPTION, ALUM. ELECT., SMD	
3	0	C1N16, C1N17, C1N18, C1N19, C1N20, C1N21, C1N22, C1N23, C1N24, C1N25, C1N26, C1N27"	CAP, OPTION, 1210	
4	0	COUT2, COUT4, COUT6, COUT8, COUT10, COUT12	CAP, OPTION, 1206	
5	0	COUT31, COUT32, COUT33, COUT34, COUT35, COUT36, COUT37, COUT38, COUT39, COUT40, COUT41, COUT42, COUT43, COUT44, COUT45, COUT46, COUT47, COUT48	CAP, OPTION, 7343	
6	0	R13, R15, R35, R36, R43, R45, R53, R56, R57, R58, R59, R60, R61, R62, R63, R65, R70, R71, R106, R107, R108, R109, R111, R112, R114, R115, R117, R118, R120, R121, R123, R124, RB2, RT2, R1TH2	RES., OPTION, 0603	

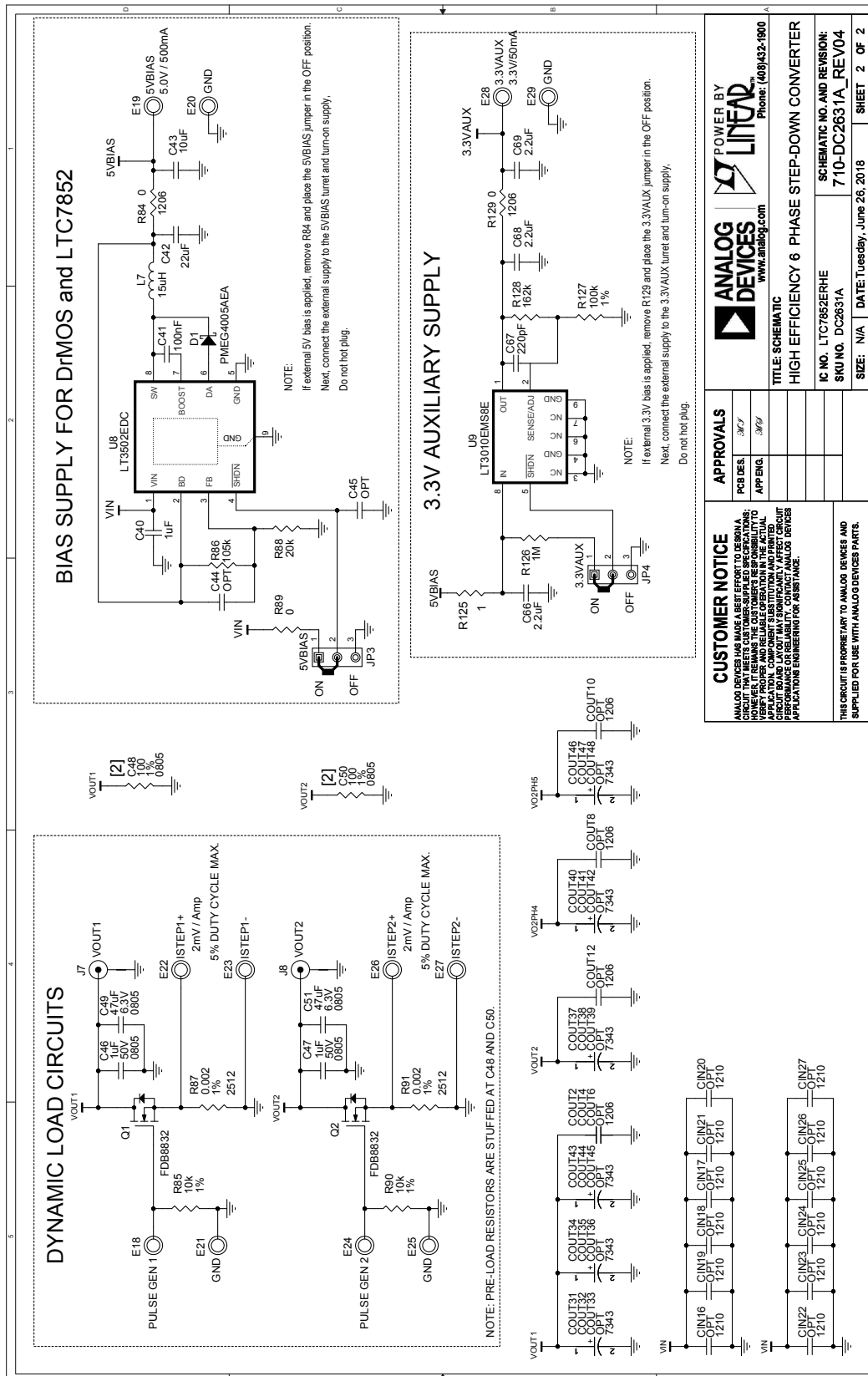
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Hardware				
1	29	E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, E23, E24, E25, E26, E27, E28, E29	TEST POINT, TURRET, 0.094", MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	6	J1, J2, J3, J4, J5, J6	STUD, FASTENER, #10-32	PENNENGINEERING, KFH-032-10ET
3	2	J7, J8	CONN., RF, BNC, RCPT JACK, 5-PIN, STR, THT, 50Ω	AMPHENOL RF, 112404
4	6	JLRE1, JLRE2, JLRE3, JLRE4, JLRE5, JLRE6	"RING, LUG, CRIMP, #10, NON-INSULATED, SOLDERLESS TERMINALS"	KEYSTONE, 8205
5	12	JNE1, JNE2, JNE3, JNE4, JNE5, JNE6, JNE7, JNE8, JNE9, JNE10, JNE11, JNE12	NUT, HEX, #10-32, BRASS	PENCOM, NU1132
6	4	JP1, JP2, JP3, JP4	"CONN., HDR, MALE, 1x3 ,2mm, THT, STR, NO SUBS. ALLOWED"	Wurth Elektronik, 62000311121
7	6	JWE1, JWE2, JWE3, JWE4, JWE5, JWE6	WASHER, #10, LOCK, EXT, TIN FINISH	PENCOM, WA4526
8	4	MP1, MP2, MP3, MP4	STANDOFF, NYLON, SNAP-ON, 0.625"	KEYSTONE, 8834
9	4	XJP1, XJP2, XJP3, XJP4	CONN., SHUNT, FEMALE, 2 POS, 2mm	Wurth Elektronik, 60800213421

SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM



DEMO MANUAL

DC2631A-A/2631A-B



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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