

## LTM4677EY and LTM4650 Step-Down $\mu$ Module Regulator with PMBus Power System Management LTM4677 + LTM4650, 86A

### DESCRIPTION

Demonstration circuit 2481A-A is a high efficiency, high density,  $\mu$ Module<sup>®</sup> regulator with 4.5V to 16V input range. The output voltage is adjustable from 0.5V to 1.8V, and it can supply 86A maximum load current. The demo board has 1x LTM<sup>®</sup>4677 and 1x LTM4650  $\mu$ Module regulators. The LTM4677 is a dual 18A or single 36A step-down regulator with PMBus power system management, and the LTM4650 is a dual 25A or single 50A step-down regulator. Please see LTM4677 and LTM4650 data sheets for more detailed information.

DC2481A-A powers up to default settings and produce 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<sup>®</sup> onto your PC and use

LTC's I<sup>2</sup>C/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:

<http://www.linear.com/ltpowerplay>

For more details and instructions of LTpowerPlay, please refer to LTpowerPlay Software GUI.

**Design files for this circuit board are available at**  
<http://www.linear.com/demo/DC2481A-A>

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### BOARD PHOTO

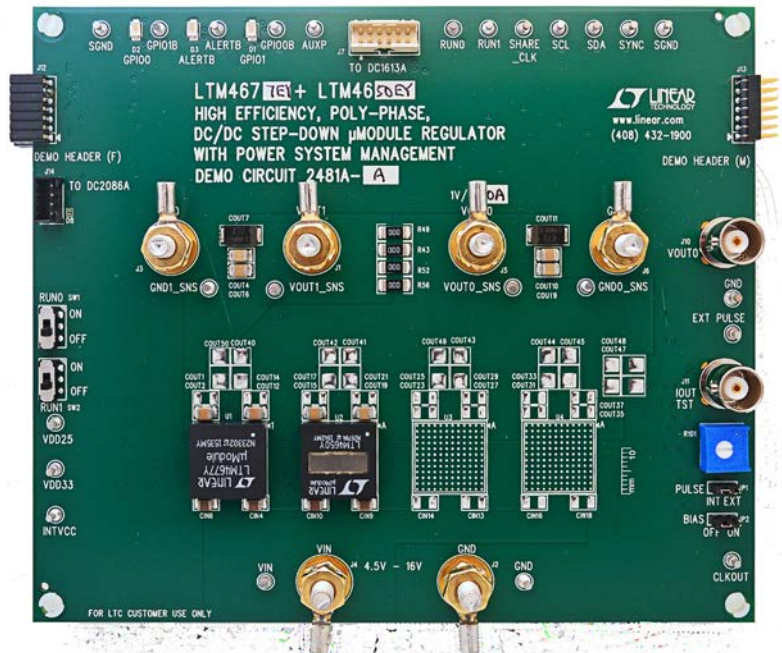


Figure 1. LTM4677 + LTM4650; 86A DC2481A-A Demo Circuit

# DEMO MANUAL DC2481A-A

## PERFORMANCE SUMMARY Specifications are at $T_A = 25^\circ\text{C}$

| PARAMETER                          | CONDITIONS  | VALUE                    |
|------------------------------------|---|--------------------------|
| Input Voltage Range                |   | 4.5V to 16V              |
| Output Voltage, $V_{OUT0}$         | $V_{IN} = 4.5\text{V to }16\text{V}$ , $I_{OUT0} = 0\text{A to }86\text{A}$   | 0.5 to 1.8V, Default: 1V |
| Maximum Output Current, $I_{OUT0}$ | $V_{IN} = 4.5\text{V to }16\text{V}$ , $V_{OUT} = 0.5\text{V to }1.8\text{V}$ | 86A                      |
| Typical Efficiency                 | $V_{IN} = 12\text{V}$ , $V_{OUT} = 1.0\text{V}$ , $I_{OUT} = 86\text{A}$      | 84.1%                    |
| Default Switching Frequency        |   | 425kHz                   |

## QUICK START PROCEDURE

| MAXIMUM OUTPUT CURRENT | NUMBER OF OUTPUT VOLTAGES | NUMBER OF LTM4677 $\mu$ MODULE REGULATORS ON THE BOARD | DEMO BOARD NUMBER |
|------------------------|---------------------------|--|-------------------|
| Dual 18A               | 2                         | 1 $\times$ LTM4677                                     | DC2066A           |
| 72A                    | 1                         | 2 $\times$ LTM4677                                     | DC2143A-A         |
| 108A                   | 1                         | 3 $\times$ LTM4677                                     | DC2143A-B         |
| 144A                   | 1                         | 4 $\times$ LTM4677                                     | DC2143A-C         |
| 86A                    | 1                         | 1 $\times$ LTM4677 (+1 $\times$ LTM4650)               | DC2481A-A         |
| 186A                   | 1                         | 1 $\times$ LTM4677 (+3 $\times$ LTM4650)               | DC2481A-B         |

Demonstration circuit 2481A-A is easy to set up to evaluate the performance of the LTM4677EY. Refer to Figure 2 for the proper measurement equipment setup and follow the procedure below.

1. With power off, connect the input power supply to  $V_{IN}$  (4.5V to 16V) and GND (input return).
2. Connect the 1.0V output load between  $V_{OUT0}$  and GND (Initial load: no load).
3. Connect the DVMs to the input and outputs. Set default switch position: SW1: ON; SW2: ON.
4. Turn on the input power supply and check for the proper output voltages.  $V_{OUT0}$  should be  $1.0\text{V} \pm 1\%$ .
5. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage and other parameters.
6. Connect the dongle and control the output voltages from the GUI. See "LTpowerPlay Software GUI" for details.

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.

### Connecting a PC to DC2481A-A

You can use a PC to reconfigure the power management features of the LTM4677 such as: nominal  $V_{OUT}$ , margin set points, OV/UV limits, temperature fault limits, sequencing parameters, the fault log, fault responses, GPIOs and other functionality. The DC1613A dongle may be plugged when  $V_{IN}$  is present.

## QUICK START PROCEDURE

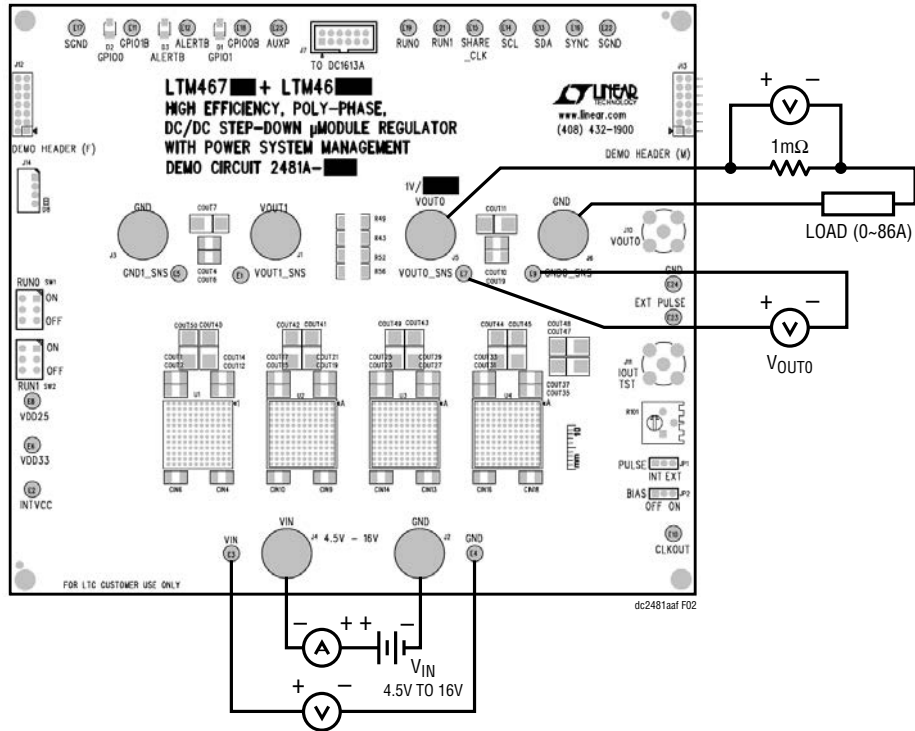


Figure 2. Proper Measurement Equipment Setup

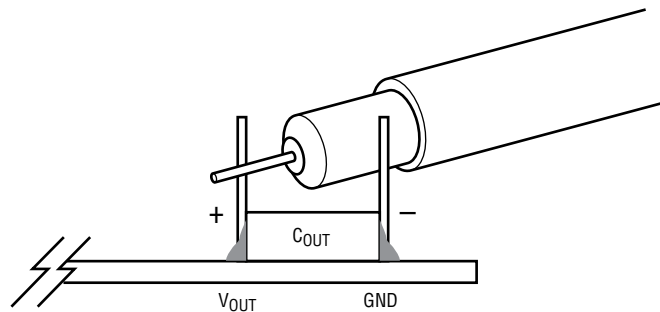


Figure 3. Measuring Output Voltage Ripple

## QUICK START PROCEDURE

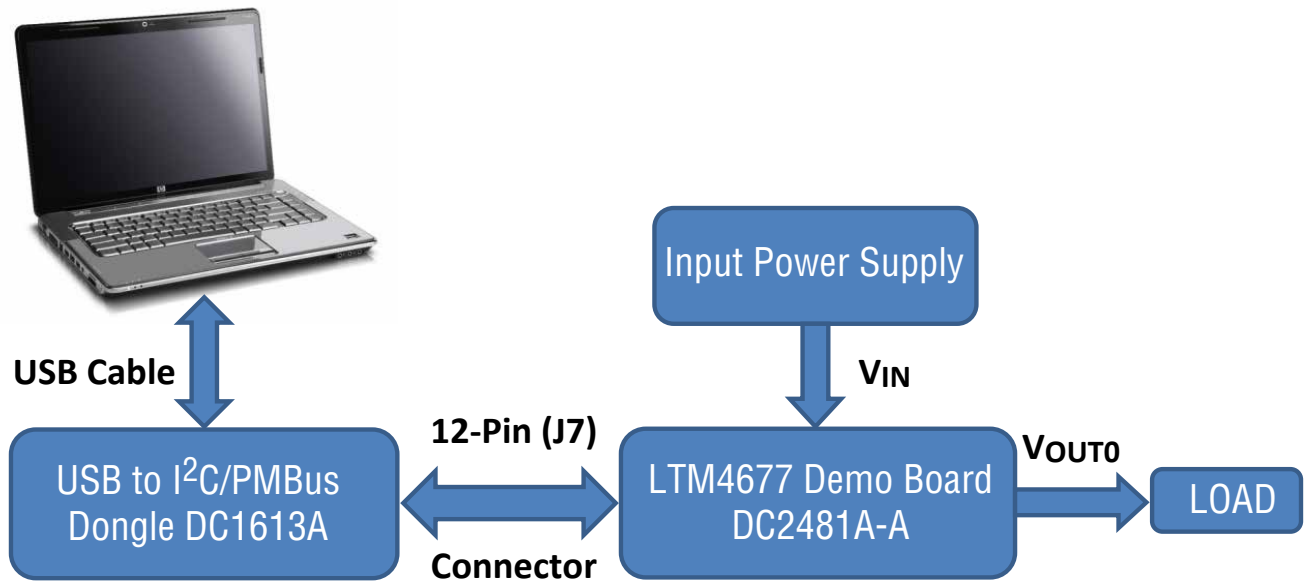


Figure 4. Demo Setup with PC

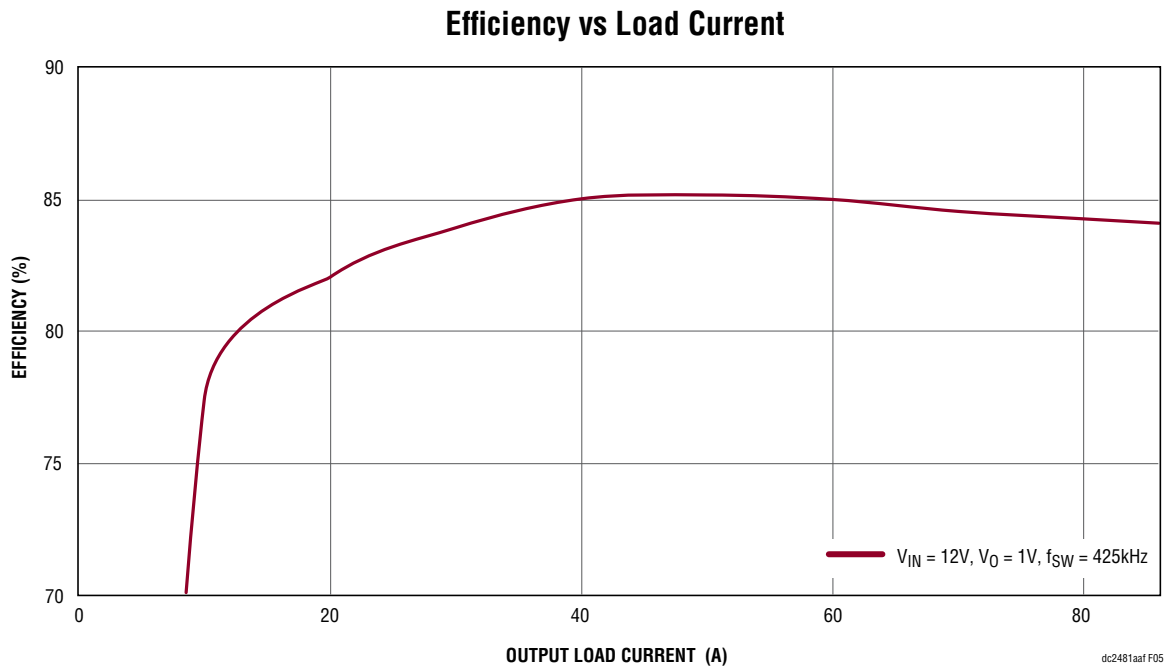


Figure 5. Efficiency vs Load Current at  $V_{IN} = 12V$ ,  $V_O = 1V$  and  $f_{SW} = 425kHz$

## QUICK START PROCEDURE

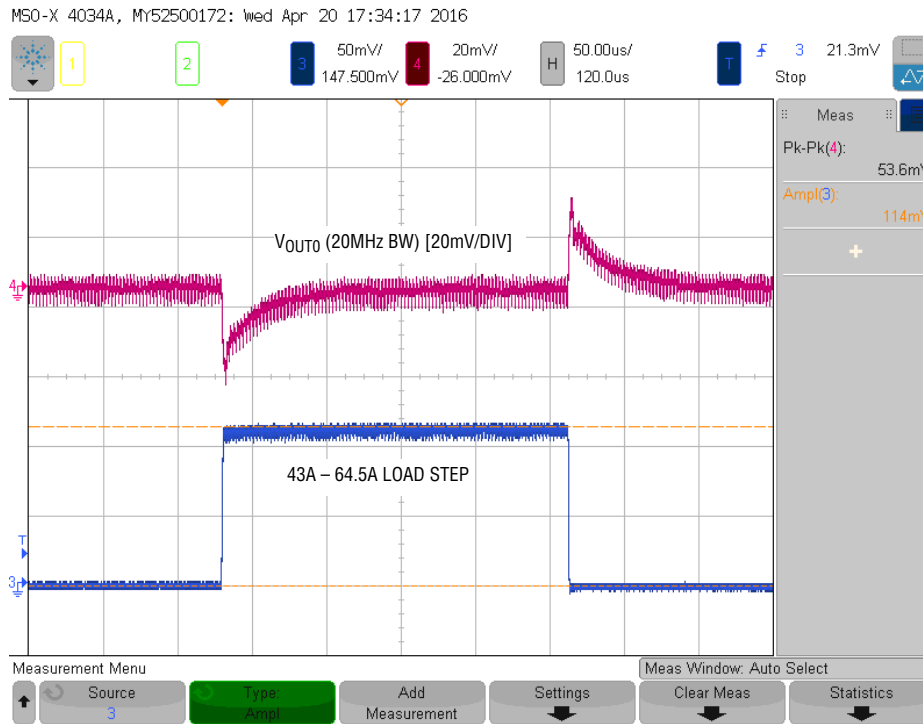


Figure 6. Output Voltage  $V_{OUTO}$  vs Load Current at  $V_{IN} = 12V$ ,  $V_{OUTO} = 1V$  ( $V_{OUTO}$  Range = 0)

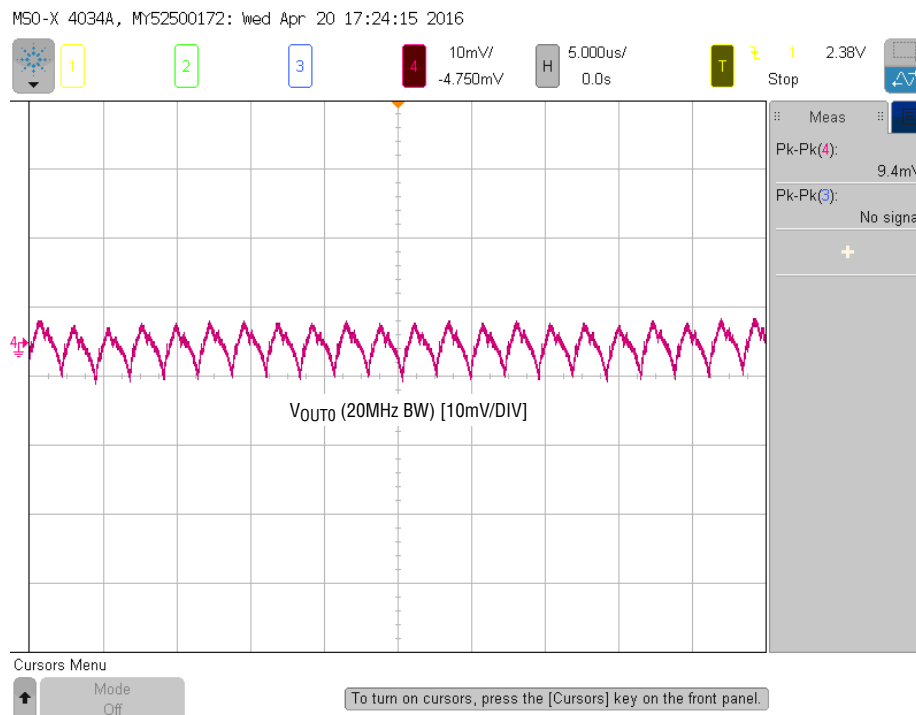


Figure 7. Output Voltage Ripple at  $V_{IN} = 12V$ ,  $V_{OUTO} = 1V$ ,  $I_{OUTO} = 86A$

## QUICK START PROCEDURE

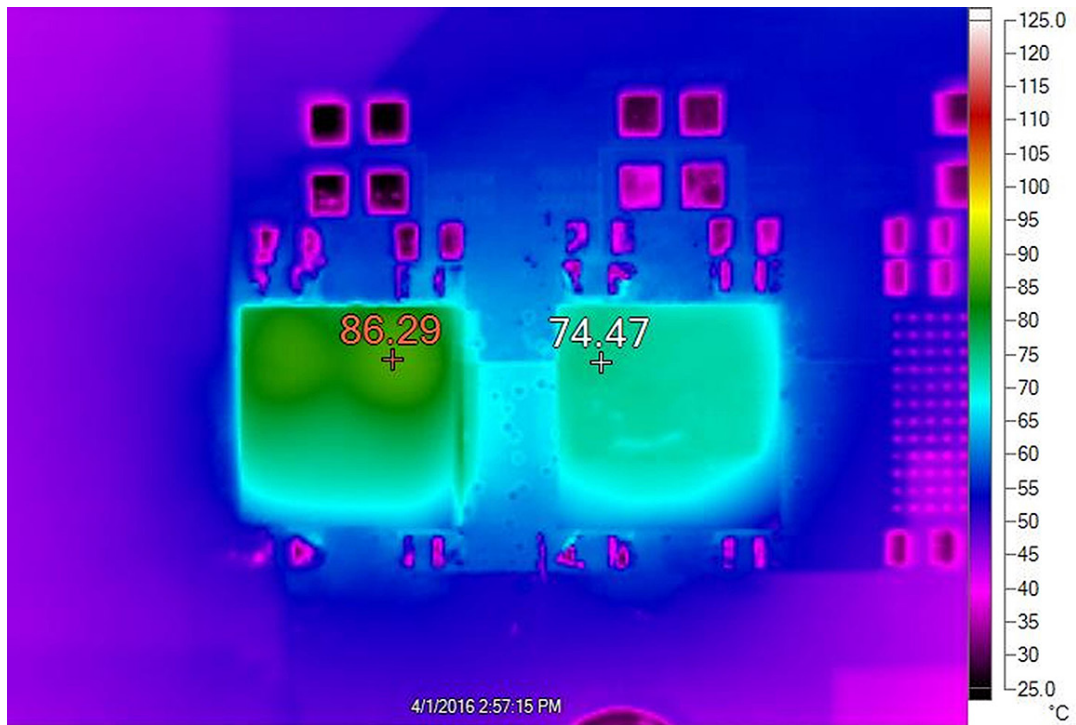


Figure 8. Thermal Performance at  $V_{IN} = 12V$ ,  $V_{OUT0} = 1V$ ,  $I_{OUT0} = 86A$ ,  $T_A = 23.8^\circ C$ , Air Flow 300LFM

### DC Load Current Sharing

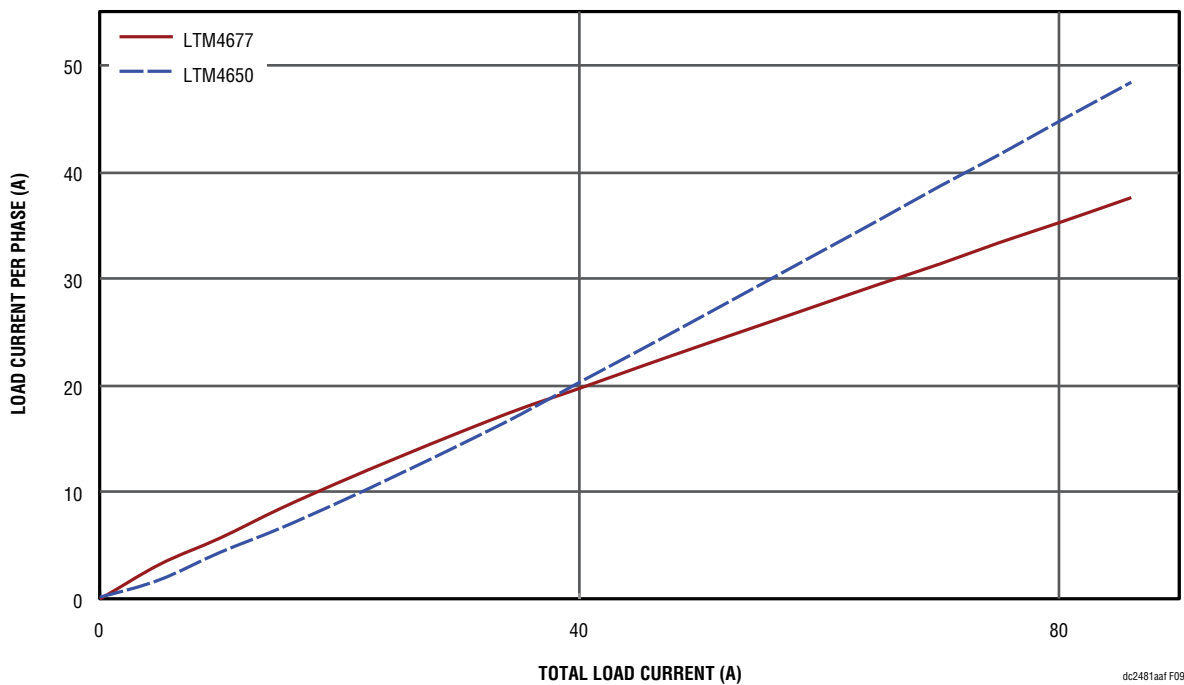


Figure 9. Current Sharing Performance at  $V_{IN} = 12V$ ,  $V_{OUT0} = 1V$

dc2481aaf

# LTPOWERPLAY SOFTWARE GUI

LTpowerPlay is a powerful Windows based development environment that supports Linear Technology power system management ICs, including the LTM4677, LTC®3880, LTC3883, LTC2974 and LTC2978. The software supports a variety of different tasks. You can use LTpowerPlay to evaluate Linear Technology ICs by connecting to a demo board system. LTpowerPlay can also be used in an offline mode (with no hardware present) in order to build a multichip configuration file that can be saved and reloaded at a later time. LTpowerPlay provides unprecedented diagnostic and debug features. It becomes a valuable diagnostic tool during board bring-up to program or tweak the power management scheme in a system, or to diagnose power

issues when bringing up rails. LTpowerPlay utilizes the DC1613A USB-to-SMBus controller to communicate with one of many potential targets, including the LTM4677, the LTC3880 and the LTC3883's 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:

<http://linear.com/ltpowerplay>

To access technical support documents for LTC Digital Power Products visit Help. View online help on the LTpowerPlay menu.

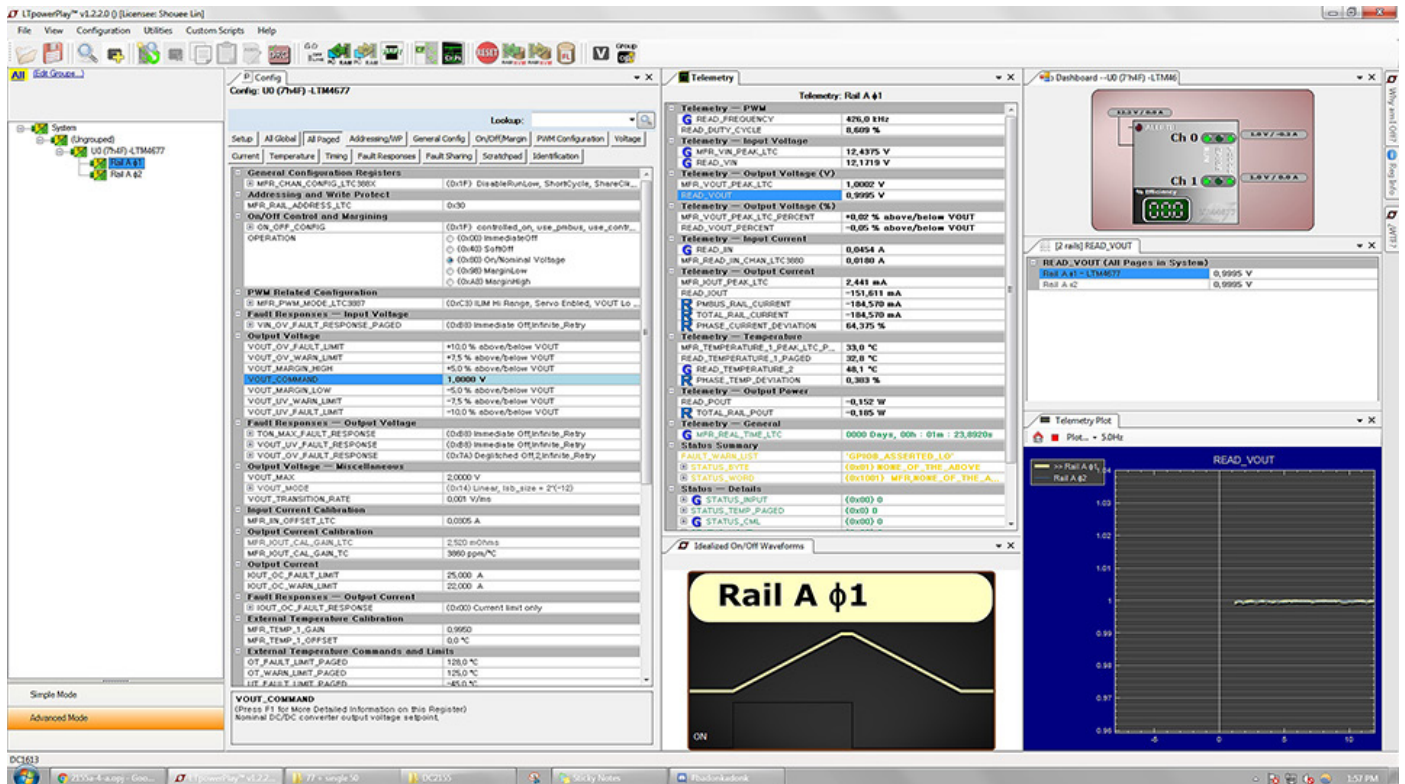


Figure 10. LTpowerPlay Main Interface

# DEMO MANUAL DC2481A-A

## LTPowerPLAY QUICK START PROCEDURE

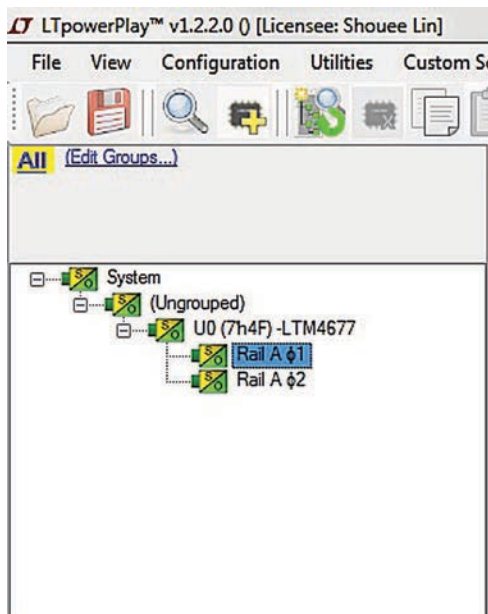
The following procedure describes how to use LTpowerPlay to monitor and change the settings of LTM4677.

1. Download and install the LTPowerPlay GUI:

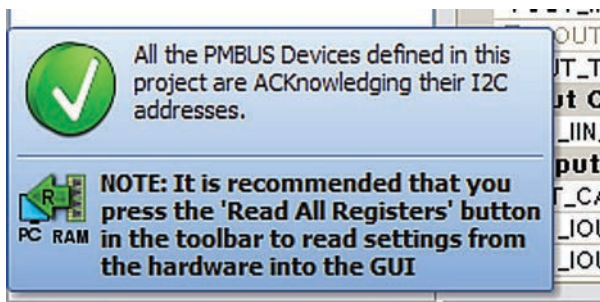
<http://linear.com/ltpowerplay>

2. Launch the LTPowerPlay GUI.

a. The GUI should automatically identify the DC2481A-B. The system tree on the left hand side should look like this:



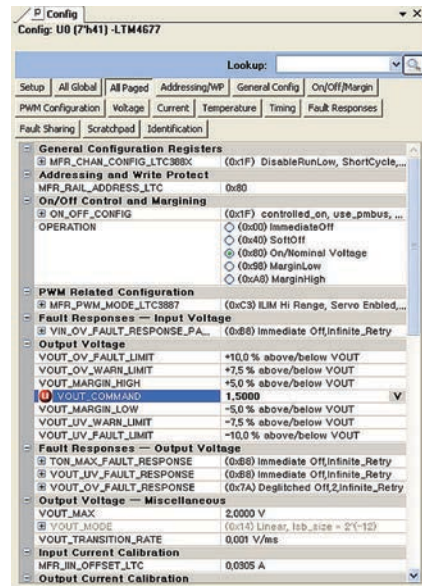
b. A green message box shows for a few seconds in the lower left hand corner, confirming that LTM4677 is communicating:



c. In the Toolbar, click the “R” (RAM to PC) icon to read the RAM from the TM4677. This reads the configuration from the RAM of LTM4677 and loads it into the GUI.



d. If you want to change the output voltage to a different value, like 1.5V. In the Config tab, type in 1.5 in the VOUT\_COMMAND box, like this:



Then, click the “W” (PC to RAM) icon to write these register values to the LTM4677. After finishing this step, you will see the output voltage will change to 1.5V.



If the write is successful, you will see the following message:



e. You can save the changes into the NVM. In the tool bar, click “RAM to NVM” button, as following



f. Save the demo board configuration to a (\*.proj) file. Click the Save icon and save the file. Name it whatever you want.



## PARTS LIST

| ITEM                               | QTY | REFERENCE   | PART DESCRIPTION                   | MANUFACTURER/PART NUMBER                           |
|------------------------------------|-----|---|------------------------------------|--|
| <b>Required Circuit Components</b> |     |   |                                    |  |
| 1                                  | 10  | CIN1, CIN2, CIN4-CIN11  | CAP, X5R, 10µF, 35V, 10%, 1210     | MURATA, GRM32ER6YA106KA12L                         |
| 2                                  | 1   | CIN3  | CAP, 150µF, 35V, Aluminum Electr., | SUN ELECT., 35CE150AX                              |
| 3                                  | 12  | COUT2-COUT4, COUT6, COUT9, COUT10, COUT12, COUT13, COUT15, COUT16, COUT19, COUT20                           | CAP, X5R, 100µF, 6.3V, 20% 1210    | MURATA, GRM32ER60J107M20L                          |
| 4                                  | 6   | COUT5, COUT7, COUT8, COUT11, COUT18, COUT22   | CAP, 470µF, 2.5V, SPCAP, D3L       | PANASONIC, EEF-LX0E471E4                           |
| 5                                  | 1   | C5  | CAP, CER 4700PF 16V X7R 0603       | MURATA, GRM188R71C472KA01D                         |
| 6                                  | 4   | C7,C8,C33.C34   | CAP, X7R, 0.01µF, 16V, 10%,0603    | MURATA, GRM188R71C103KA01D                         |
| 7                                  | 3   | C11,C18,C22   | CAP, X5R, 2.2µF, 16V, 10%, 0603    | MURATA, GRM188R61C225KE15D                         |
| 8                                  | 3   | C12,C19,C23   | CAP, X7R, 1µF, 16V, 10%, 0603      | MURATA, GRM188R71C105KA12D                         |
| 9                                  | 2   | C31,C28   | CAP, X7R, 1µF 25V,10%, 1206        | MURATA, GRM31MR71E105KA01L                         |
| 10                                 | 1   | C25   | CAP, X7R, 0.22µF, 25V,10%, 0805    | MURATA, GRM21BR71E224KA01L                         |
| 11                                 | 1   | C26   | CAP, X7R, 0.1µF, 25V,10%, 1206     | MURATA, GRM319R71E104KA01J                         |
| 12                                 | 1   | C29   | CAP, X5R, 1µF, 25V, 10%, 0805      | MURATA, GRM216R61E105KA12D                         |
| 13                                 | 1   | C27   | CAP, X7R, 150pF, 25V, 10%, 0603    | Wurth Elektronik, 885012206054                     |
| 14                                 | 1   | C30   | CAP, X5R, 4.7µF, 10V, 10%, 0603    | MURATA, GRM188R61A475KE15D                         |
| 15                                 | 2   | D1,D2   | LED, GREEN CLEAR 1208 SMD          | ROHM, SML-010FTT86                                 |
| 16                                 | 1   | D3  | LED, RED CLEAR 1208 SMD            | ROHM, SML-010VTT86                                 |
| 17                                 | 3   | Q1,Q3,Q4  | MOSFET N-CH 60V 115MA SOT-23       | FAIRCHILD, 2N7002K                                 |
| 18                                 | 1   | Q2  | MOSFET P-CH 20V 0.58A SOT-23       | VISHAY, Si2365EDS-T1-GE3 (ALTERNATE TP0101K-T1-E3) |
| 19                                 | 2   | Q5,Q6   | MOSFET SPEED SRS 30V 30A LFPK      | RENESAS, RJK0305DPB-02#J0                          |
| 20                                 | 1   | Q19   | P-Channel 30-V Mosfet              | DIODES INC., DMP3130L-7                            |
| 21                                 | 1   | R25   | RES., CHIP,18.0K, 1%, 0603         | VISHAY, CRCW060322K6FKEA                           |
| 22                                 | 22  | R4, R8, R23, R31, R32, R34, R37,R41, R42, R44, R46, R47, R50, R51, R55, R61, R64, R66, R75, R80, R114, R116 | RES., CHIP, 0, 1%, 0603            | VISHAY, CRCW06030000Z0EA                           |
| 23                                 | 4   | R43, R49, R52, R56  | RES., CHIP, 0, 1%, 2010            | VISHAY, CRCW20100000Z0EA                           |
| 24                                 | 11  | R10, R11, R12, R13, R16, R17, R21, R58, R77, R94, R118  | RES., CHIP, 10k, 1%, 0603          | VISHAY, CRCW060310K0FKEA                           |
| 25                                 | 1   | R9  | RES., CHIP, 7.15k, 1%, 0603        | VISHAY, CRCW06037K15FKEA                           |
| 26                                 | 4   | R22, R26, R70, R73  | RES., CHIP, 10, 1%, 0603           | VISHAY, CRCW060310R0FKEA                           |
| 27                                 | 1   | R102  | RES., CHIP, 732, 1%, 0603          | VISHAY, CRCW0603732RFKEA                           |
| 28                                 | 1   | R98   | RES., CHIP, 511, 1%, 0603          | VISHAY, CRCW0603511RFKEA                           |
| 29                                 | 3   | R33, R60, R65   | RES., CHIP, 121k, 1%, 0603         | VISHAY, CRCW0603121KFKEA                           |
| 30                                 | 3   | R40, R63, R68   | RES., CHIP, 80.6k, 1%, 0603        | VISHAY, CRCW060380K6FKEA                           |
| 31                                 | 1   | R35   | RES., CHIP, 60.4k, 1%, 0603        | VISHAY, CRCW060360K4FKEA                           |
| 32                                 | 1   | R36   | RES., CHIP, 8.25k, 1%, 0603        | VISHAY, CRCW06038K25FKEA                           |
| 33                                 | 1   | R19   | RES., CHIP, 6.04k, 1%, 0603        | VISHAY, CRCW06032K94FKEA                           |
| 34                                 | 3   | R45, R84, R85   | RES., CHIP, 200, 1%, 0603          | VISHAY, CRCW0603200RFKEA                           |
|                                    | 1   | R54,  | RES., CHIP, 2k, 1%, 0603           | VISHAY, CRCW06032K00FKEA                           |

# DEMO MANUAL DC2481A-A

## PARTS LIST

| ITEM | QTY | REFERENCE      | PART DESCRIPTION                | MANUFACTURER/PART NUMBER       |
|------|-----|----------------|---------------------------------|--------------------------------|
| 35   | 3   | R89, R92, R117 | RES., CHIP, 20k, 1%, 0603       | VISHAY, CRCW060320K0FKEA       |
| 36   | 2   | R76, R115      | RES., CHIP, 4.99k, 1%, 0603     | VISHAY, CRCW06034K99FKEA       |
| 37   | 1   | R86            | RES., CHIP, 127, 1%, 0603       | VISHAY, CRCW0603127RFKEA       |
| 38   | 1   | R87            | RES., CHIP, 2, 1%, 0603         | VISHAY, CRCW06032R00FKEA       |
| 39   | 1   | R88            | RES., CHIP, 1M, 1%, 0603        | VISHAY, CRCW06031M00FKEA       |
| 40   | 1   | R90            | RES., CHIP, 154k, 1%, 0603      | VISHAY, CRCW0603154KFKEA       |
| 41   | 1   | R91            | RES., CHIP, 3.3, 1%, 0603       | VISHAY, CRCW06033R30FKEA       |
| 42   | 1   | R93            | RES., CHIP, 681k, 1%, 0603      | VISHAY, CRCW0603681KFKEA       |
| 43   | 1   | R95            | RES., CHIP, 82.5, 1%, 0603      | VISHAY, CRCW060382R5FKEA       |
| 44   | 1   | R112           | RES., CHIP, 15.8k, 1%, 0603     | VISHAY, CRCW060315K8FKEA       |
| 45   | 2   | R99, R100      | RES., CHIP, 0.01, 1%, 2010      | VISHAY, WSL2010R0100FEA        |
| 46   | 1   | R101           | TRIMMING POTENTIOMETER, 5k      | BOURNS, 3386P-1-502LF          |
| 47   | 1   | R103           | RES., CHIP, 100k, 1%, 0603      | VISHAY, CRCW0603100KFKEA       |
| 48   | 1   | U1             | IC., LTM4677EY                  | LINEAR TECH., LTM4677EY#PBF    |
| 49   | 1   | U2             | IC., LTM4650EY                  | LINEAR TECH., LTM4650EY#PBF    |
| 50   | 1   | U5             | IC., LT1801CMS8, MSOP           | LINEAR TECH., LT1801CMS8#PBF   |
| 51   | 1   | U6             | IC., EEPROM 2KBIT 400KHZ 8TSSOP | MICROCHIP, 24LC025-I/ST        |
| 52   | 1   | U7             | IC., LTC6992-1, S6-TSOT23       | LINEAR TECH., LTC6992CS6-1#PBF |
| 53   | 1   | U8             | IC., LT1803IS5, S5-TSOT23       | LINEAR TECH., LT1803IS5#PBF    |
| 54   | 1   | U9             | IC., LT1129CS8-5, S8            | LINEAR TECH., LT1129CS8-5#PBF  |

### Additional Demo Board Circuit Components

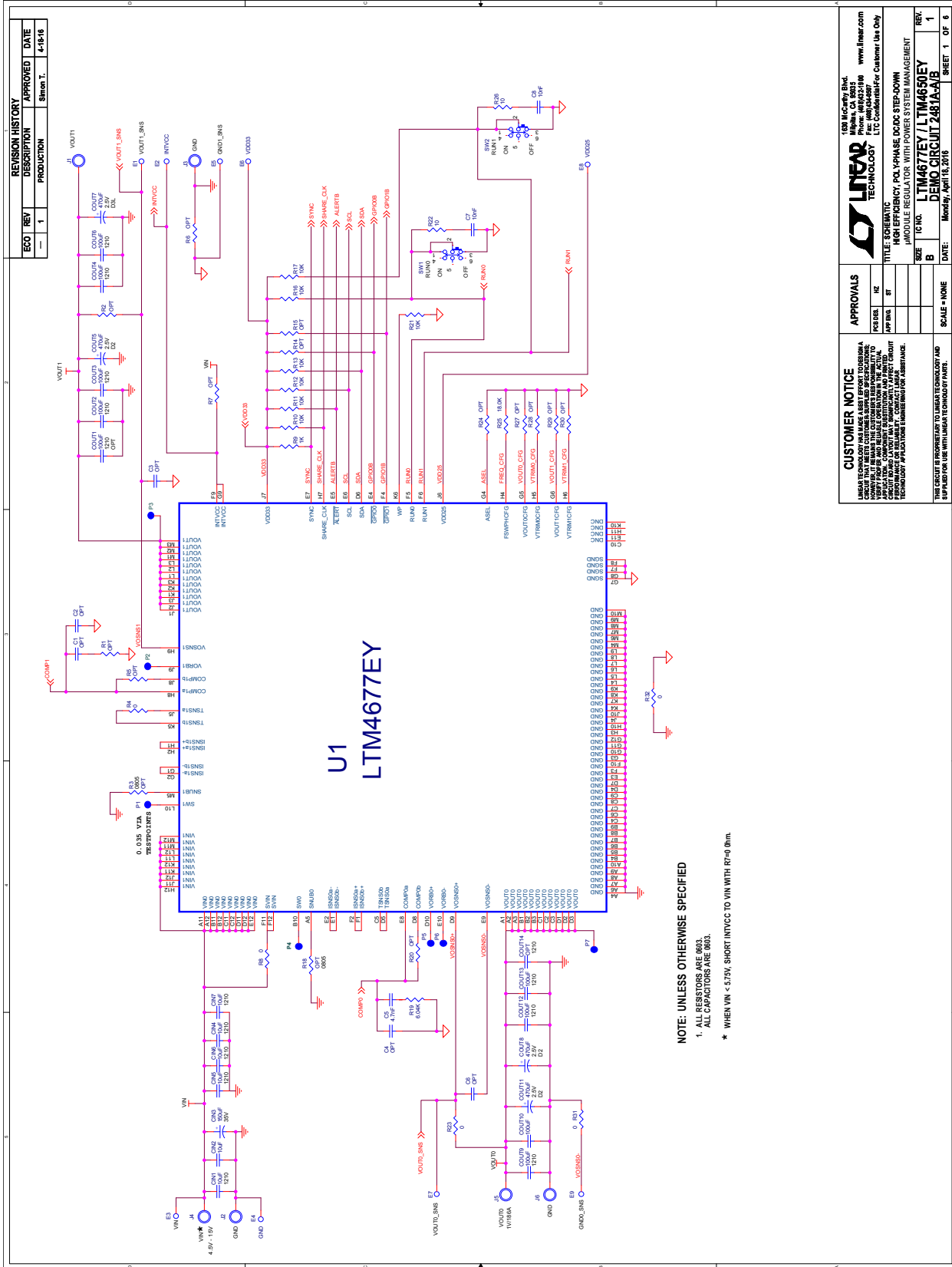
|   |   |   |                |  |
|---|---|---|----------------|--|
| 1 | 0 | CIN12-CIN19   | CAP, OPTIONAL  |  |
| 2 | 0 | C1, C2, C3, C4, C6, C13, COUT14, COUT17, COUT21, COUT23-COUT50  | CAP, OPTIONAL  |  |
| 3 | 0 | C9, C10, C16, C17, C20, C21   | CAP, OPTIONAL  |  |
| 4 | 0 | D10   | DIODE, OPT     |  |
| 5 | 0 | R1-R3, R5-R7, R14, R15, R18, R20, R24, R27-R30, R38, R39, R41, R48, R59, R62, R67, R69, R71, R72, R78, R79, R96, R97, R104-R109 |                |  |
| 6 | 0 | R39, R62, R67, R69  | RES., OPTIONAL |  |
| 7 | 0 | U3, U4  | IC., OPTIONAL  |  |

## PARTS LIST

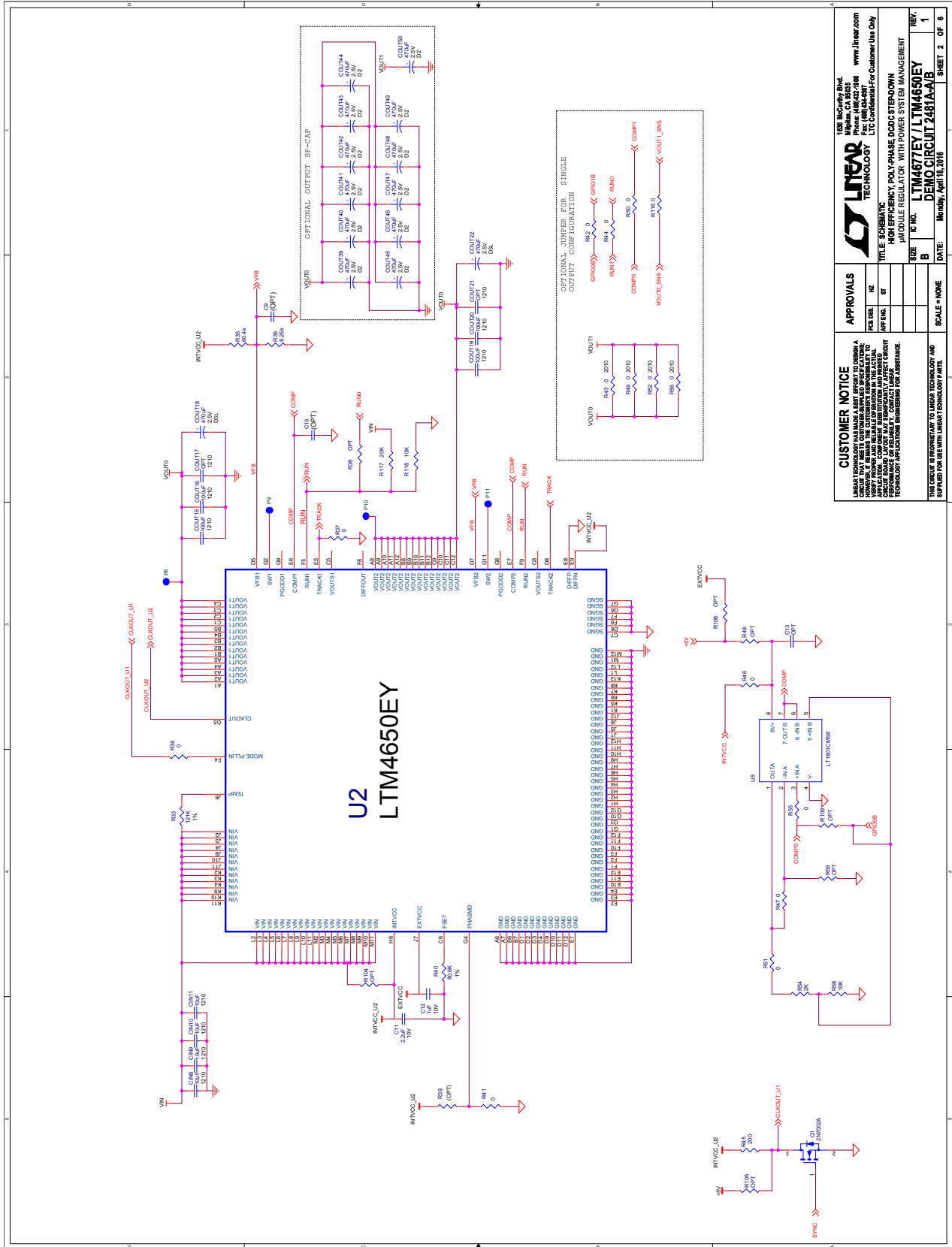
| ITEM                                 | QTY | REFERENCE                   | PART DESCRIPTION                    | MANUFACTURER/PART NUMBER          |
|--------------------------------------|-----|-----------------------------|-------------------------------------|-----------------------------------|
| <b>Hardware: For Demo Board Only</b> |     |                             |                                     |                                   |
| 1                                    | 24  | E1-E24                      | TESTPOINT, TURRET, .062"            | MILL-MAX, 2308-2-00-80-00-00-07-0 |
| 2                                    | 2   | JP1, JP2                    | HEADER, 3 PIN 0.079 SINGLE ROW      | Wurth Elektronik, 62000311121     |
| 3                                    | 2   | XJP1, XJP2                  | SHUNT, .079" CENTER                 | Wurth Elektronik, 60800213421     |
| 4                                    | 2   | J1, J3                      | JACK, BANANA                        | KEYSTONE, 575-4                   |
| 5                                    | 4   | J2, J4, J5, J6              | STUD, TESTPIN                       | PEM, KFH-032-10                   |
| 6                                    | 8   | J1, J2, J3, J4, J5, J6 (x2) | NUT, BRASS 10-32                    | ANY, 10-32M/S BR PL               |
| 7                                    | 4   | J1, J2, J3, J4, J5, J6      | RING, LUG #10                       | KEYSTONE, 8205                    |
| 8                                    | 4   | J1, J2, J3, J4, J5, J6      | WASHER, TIN PLATED BRASS            | ANY #10, #10EXT BZ TN             |
| 9                                    | 2   | SW1, SW2                    | CONN, SUB MINIATURE SLIDE SWITCHES  | C&K., JS202011CQN                 |
| 10                                   | 1   | J7                          | CONN HEADER 12POS 2MM STR DL PCB    | FCI, 98414-G06-12ULF              |
| 11                                   | 2   | J10, J11                    | CONN, BNC, 5PINS                    | CONNEX, 112404                    |
| 12                                   | 1   | J14                         | HEADER, 4 PINS, SHROUDED            | HIROSE, DF3A-4P-2DSA              |
| 13                                   | 1   | J12                         | CONN RECEIPT 2MM DUAL R/A 14POS (F) | SULLINS, NPPN072FJFN-RC           |
| 14                                   | 1   | J13                         | HEADER 14POS 2MM R/A GOLD (M)       | MOLEX, 87760-1416                 |
| 15                                   | 4   | (STAND-OFF)                 | STAND-OFF, NYLON 0.50" tall         | WURTH ELEKTRONIK, 702935000       |
| 16                                   | 1   |                             | FAB, PRINTED CIRCUIT BOARD          | DEMO CIRCUIT 2481A Rev 1          |
| 17                                   | 2   |                             | STENCIL (TOP & BOTTOM)              | STENCIL DC2481A                   |

# DEMO MANUAL DC2481A-A

## SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM



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**APPROVALS**

|          |      |
|----------|------|
| DESIGNER | DATE |
| APP'D BY | DATE |
| REV. 1   | 1    |

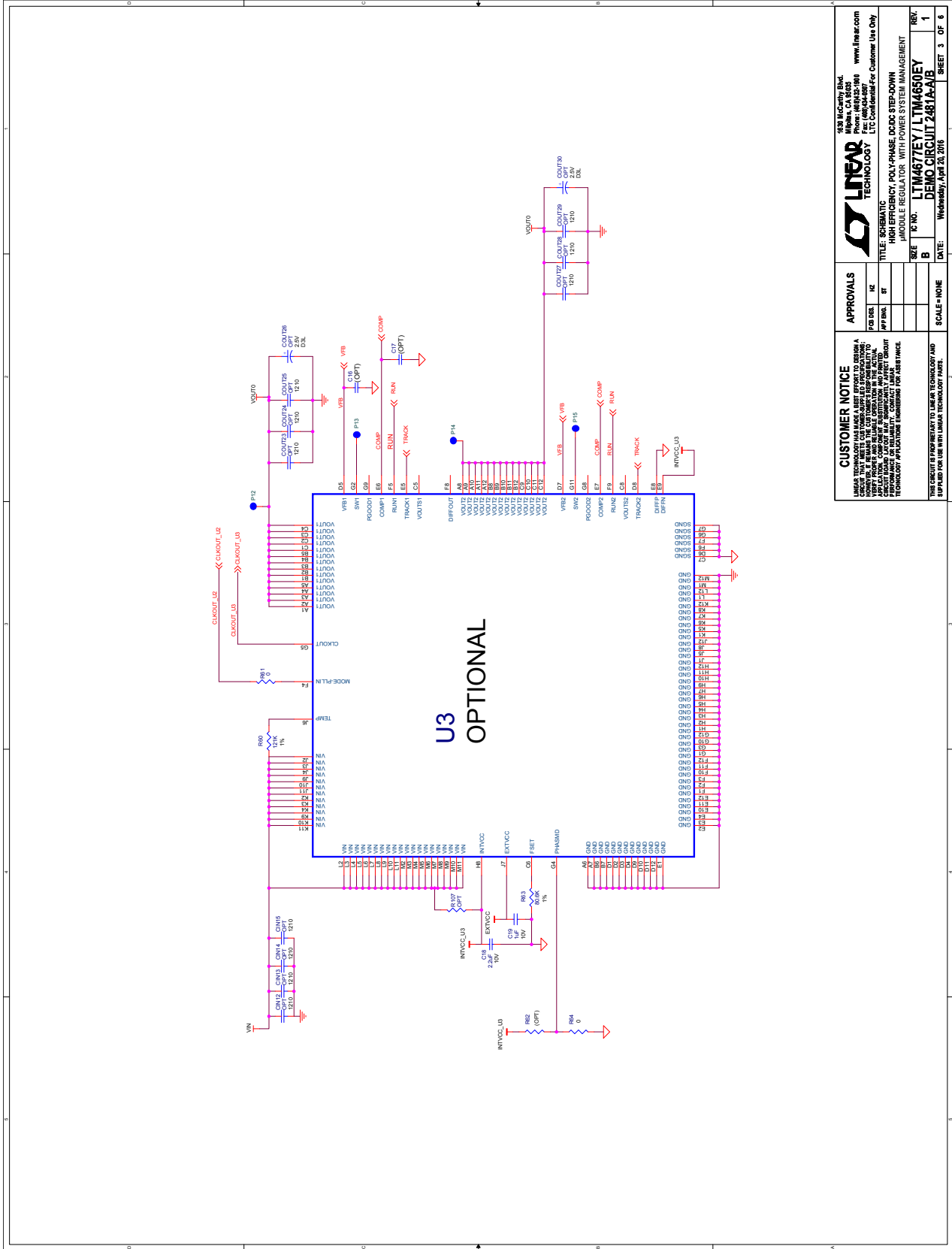
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**TITLE SCHEMATIC**  
 HIGH EFFICIENCY, POLY-PHASE, DDC03 STEP-DOWN  
 MICRO-REGULATOR WITH POWER SYSTEM MANAGEMENT

**REV. 1**  
**DATE:** Monday, April 18, 2016  
**SHEET 2** OF 6

# DEMO MANUAL DC2481A-A

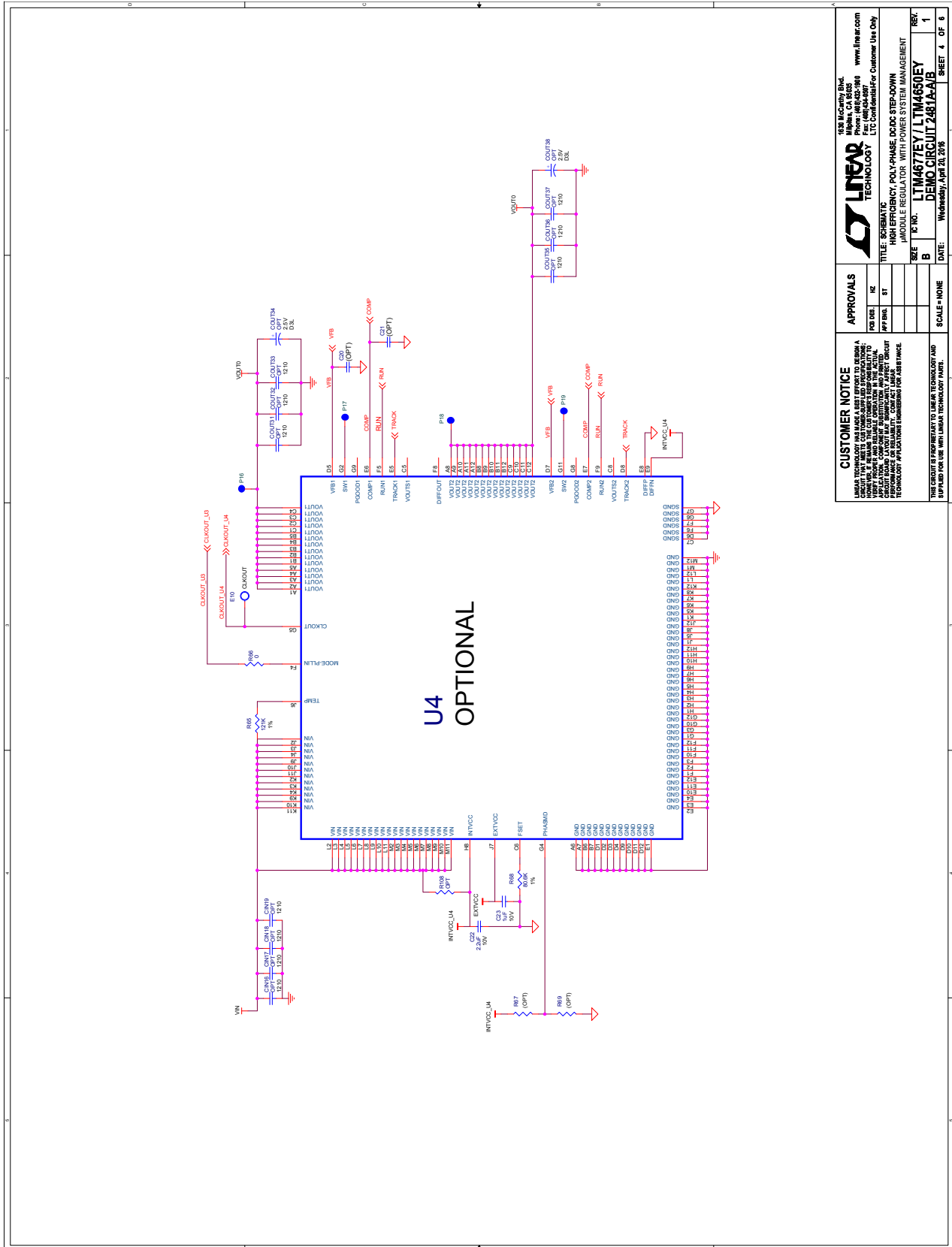
## SCHEMATIC DIAGRAM



|   |                                     |   |                                     |
|---|-------------------------------------|---|-------------------------------------|
| <b>CUSTOMER NOTICE</b><br>LINAAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A DEMO BOARD. IT REMAINS THE USER'S RESPONSIBILITY TO VERIFY THE BOARD'S OPERATION AND TO OBTAIN NECESSARY APPROVALS FROM THE CUSTOMER'S QUALIFICATION AND DESIGN DEPARTMENTS. CONTACT LINAAR TECHNOLOGY FOR ASSISTANCE. |                                     | <b>APPROVALS</b><br>PCB DES. KZ<br>APP'G. BT  |                                     |
| <b>LINEAR TECHNOLOGY</b><br>1430 McCarty Blvd<br>Milpitas, CA 95035<br>Phone: 408.953.9800<br>www.linear.com<br>LIT Confidential For Customer Use Only  |                                     | <b>TITLE: SCHEMATIC</b><br>HIGH EFFICIENCY, POLY-PHASE, DCM2 STEP-DOWN<br>MODULE REGULATOR WITH POWER SYSTEM MANAGEMENT |                                     |
| SHEET 3 OF 6  | DATE: Wednesday, April 20, 2016     | REVISION 1  | REVISION 1                          |
| SCALE = NONE  | LTM4650EY<br>DEMO CIRCUIT 2481A-A/B | LTM4650EY<br>DEMO CIRCUIT 2481A-A/B   | LTM4650EY<br>DEMO CIRCUIT 2481A-A/B |



## SCHEMATIC DIAGRAM



**CUSTOMER NOTICE**  
 LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A SCHEMATIC FOR THE DEMO CIRCUIT. HOWEVER, IT IS THE CUSTOMER'S RESPONSIBILITY TO VERIFY THE SCHEMATIC IS CORRECT FOR THEIR APPLICATION. CUSTOMERS SHOULD CONSULT WITH LINEAR TECHNOLOGY FOR ASSISTANCE IN VERIFYING THE SCHEMATIC'S PERFORMANCE IN THEIR APPLICATION. CONTACT LINEAR TECHNOLOGY APPLICATION ENGINEERING FOR ASSISTANCE.

**APPROVALS**

|           |    |
|-----------|----|
| DESIGNER: | KZ |
| APP'G:    | ST |

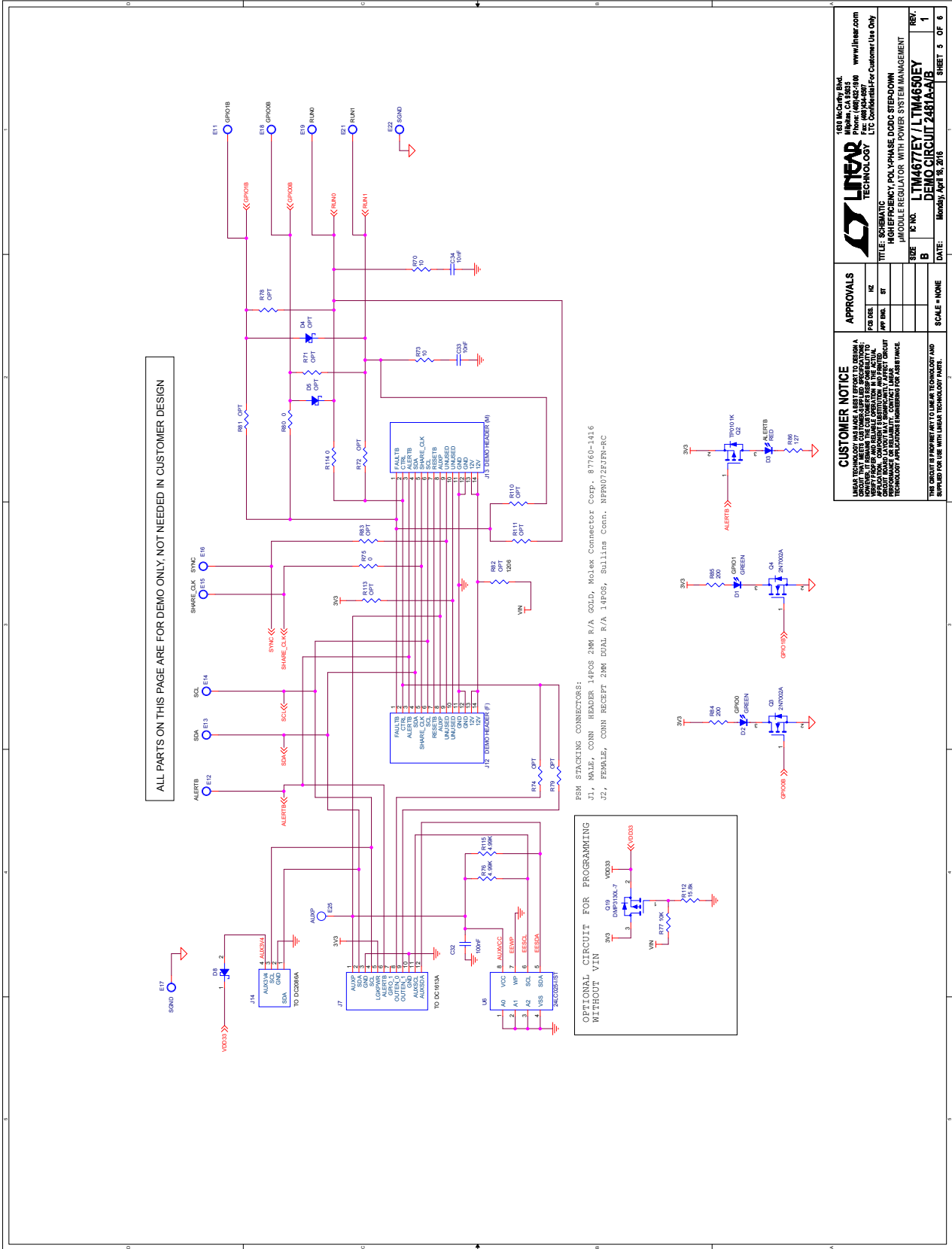
**SCALE - NONE**

|       |                           |
|-------|---------------------------|
| REV.  | 1                         |
| DATE: | WEDNESDAY, APRIL 20, 2016 |
| SHEET | 4 OF 6                    |

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 LTM4677EY / LTM4650EY  
 HIGH EFFICIENCY, POLY-PHASE, DC/DC STEP-DOWN  
 DEMO CIRCUIT 2481A-A/B

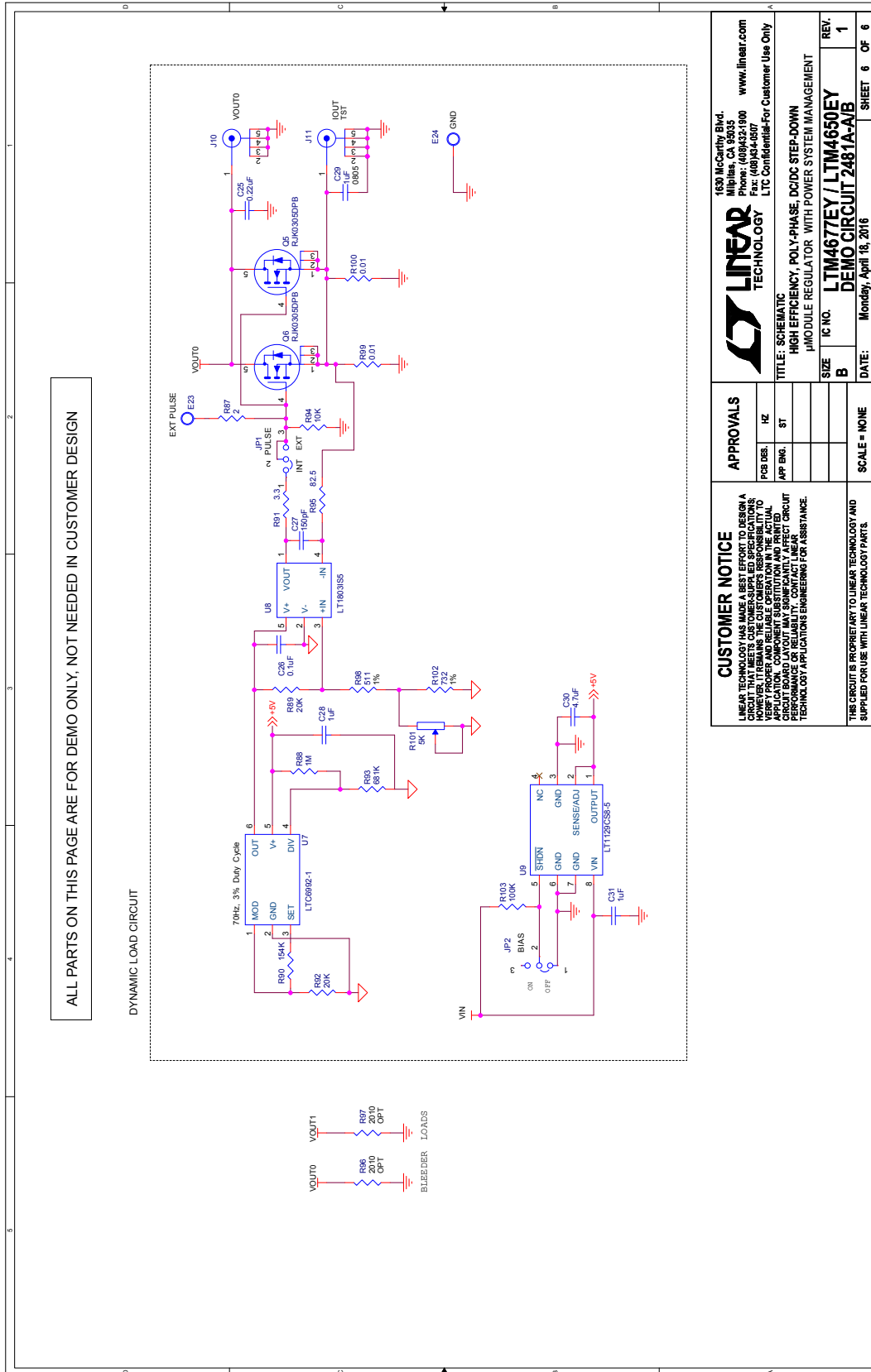
# DEMO MANUAL DC2481A-A

## SCHEMATIC DIAGRAM





## SCHEMATIC DIAGRAM



# DEMO MANUAL DC2481A-A

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