

## LT8364 Low $I_Q$ Boost/SEPIC/Inverting Regulator

### DESCRIPTION

Demo circuit 2716A features the [LT8364](#) in boost configuration. It is designed to convert a 4.5V to 20V source to 24V, with up to 1.6A, depending on input voltage, with a switching frequency of 2MHz. The LT8364 can operate with inputs as high as 60V, however, in this demo circuit, the input is limited by the level of the output voltage. Refer to Figure 4 for load current versus input voltage.

The demo board contains a selectable jumper, JP1, to aid in the selection of the desired Sync pin mode of operation. The default setting is Burst Mode<sup>®</sup> operation.

This layout is optimized for good EMI performance and solution size. Input and output filters and an optimized

hot loop, comprised of C11 and C12 are necessary to pass CISPR 25 Class 5 emissions, and are added by default. These components can be excluded in applications not requiring noise immunity. Radiated emissions plots are included in this manual.

The data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this demo manual.

**Design files for this circuit board are available at <http://www.linear.com/demo/DC2716A>**

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### PERFORMANCE SUMMARY

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

| SYMBOL     | PARAMETER            | CONDITIONS                                       | MIN   | TYP | MAX   | UNITS |
|------------|----------------------|--------------------------------------------------|-------|-----|-------|-------|
| $V_{IN}$   | Input Supply Range   |                                                  | 4.5   |     | 20    | V     |
| $V_{OUT}$  | Output Voltage Range | $V_{IN} = 12\text{V}$ , $I_{LOAD} = 1.2\text{A}$ | 23.25 | 24  | 24.75 | V     |
| RIPPLE     |                      | $V_{IN} = 12\text{V}$ , $I_{LOAD} = 1.2\text{A}$ |       | 50  |       | mV    |
| EFFICIENCY |                      | $V_{IN} = 12\text{V}$ , $I_{LOAD} = 1\text{A}$   |       | 93  |       | %     |
| $f_{SW}$   |                      |                                                  |       | 2   |       | MHz   |

## QUICK START PROCEDURE

Demo circuit 2716A is easy to set up to evaluate the performance of the LT8364. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the  $V_{IN}$  or  $V_{OUT}$  and GND terminals. See Figure 2 for proper scope probe technique.

1. With power off, connect the input power supply to  $V_{IN}$  and GND.

2. Turn on the power at the input.

Note. Make sure that the input voltage does not exceed 20V.

3. Check for the proper output voltage.

If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

NOTE:

4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

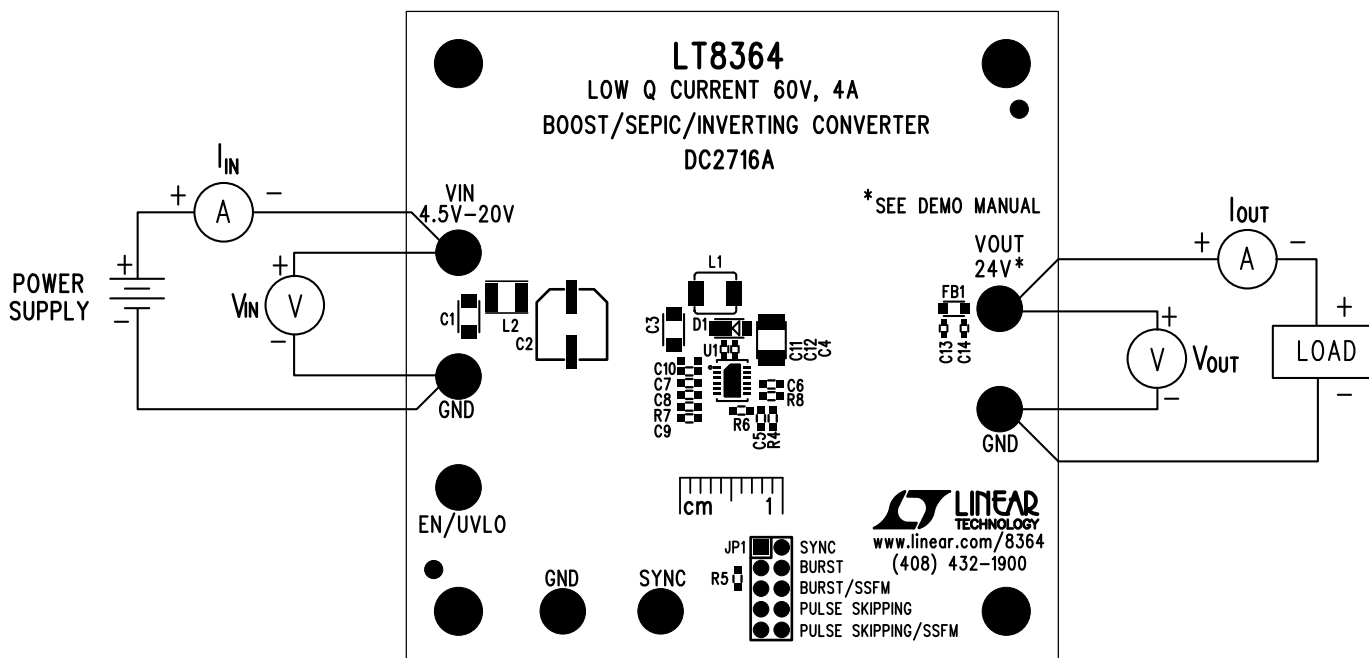


Figure 1. DC2716A Proper Equipment Setup

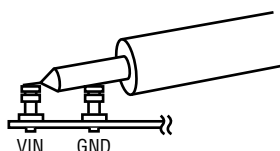


Figure 2. Measure Output Ripple

## QUICK START PROCEDURE

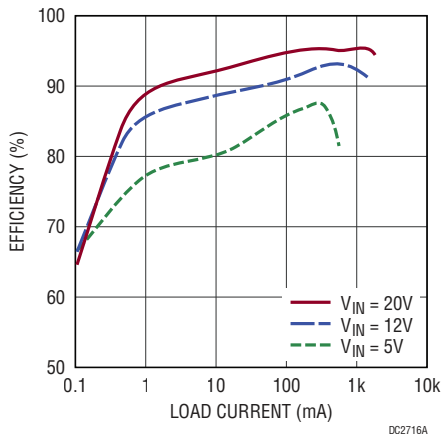


Figure 3. Efficiency Versus Load Current

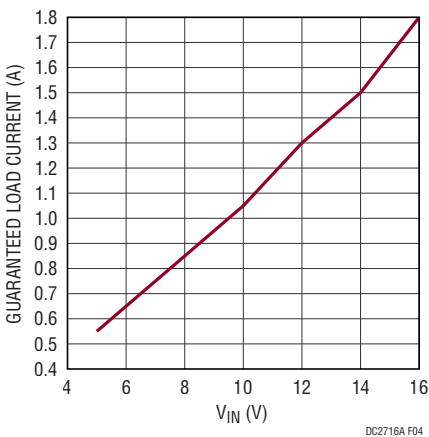


Figure 4. Guaranteed Load Current Versus Input Voltage

## TYPICAL PERFORMANCE CHARACTERISTICS

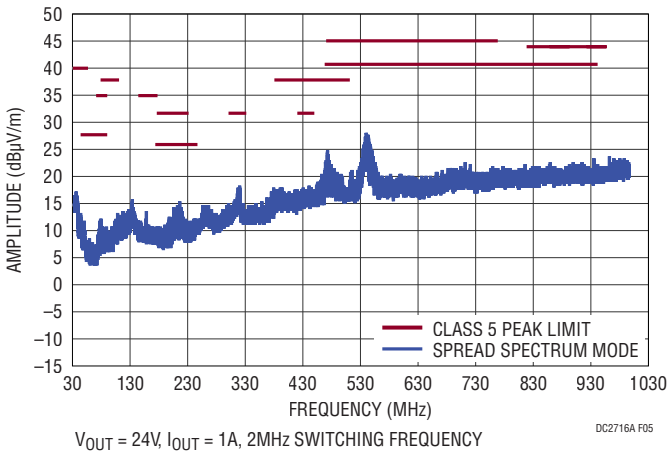


Figure 5. CISPR 25 Radiated Emission Test Peak Detection, Vertical Polarization)  $V_{IN} = 12V$

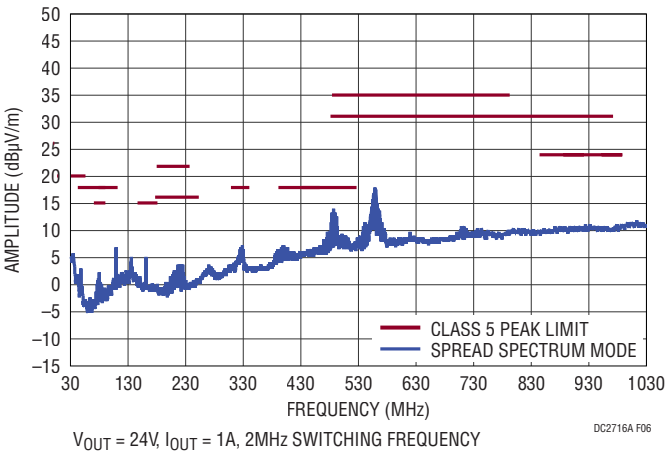


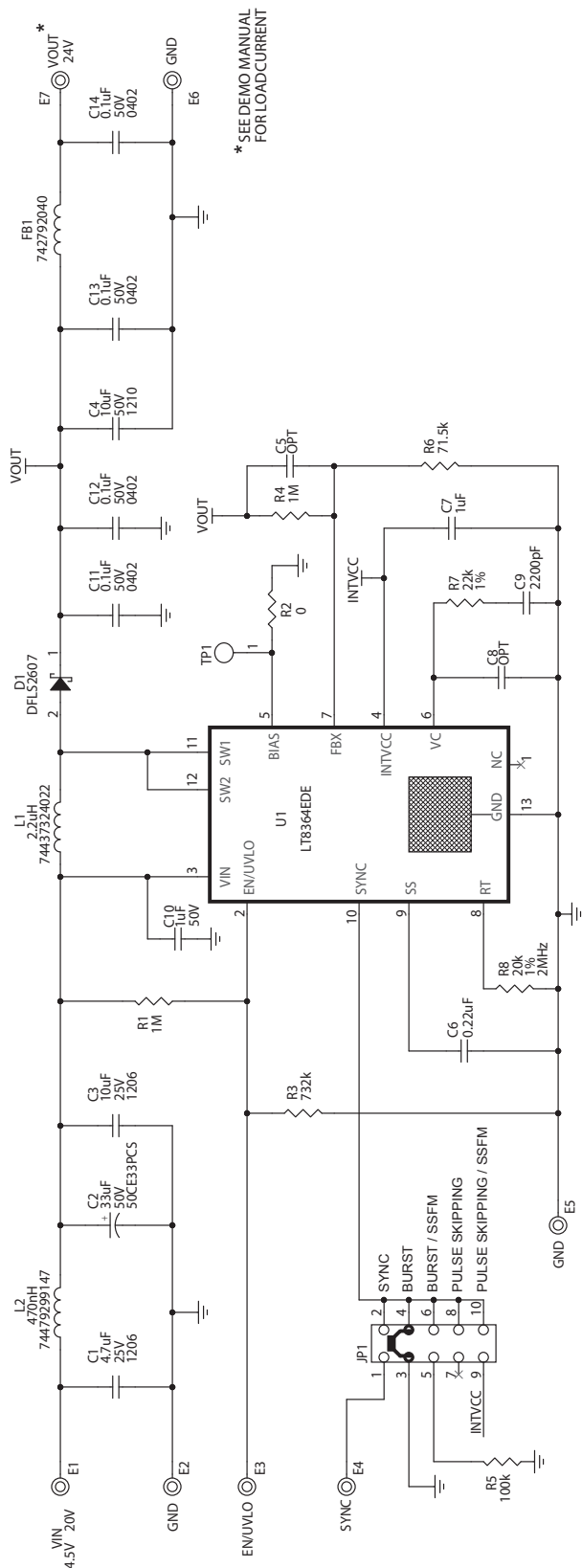
Figure 6. CISPR 25 Radiated Emission Test (Average Detection, Vertical Polarization)  $V_{IN} = 12V$

# DEMO MANUAL DC2716A

## PARTS LIST

| ITEM                                            | QTY | REFERENCE                  | PART DESCRIPTION                                 | MANUFACTURER/PART NUMBER                   |
|-------------------------------------------------|-----|----------------------------|--------------------------------------------------|--------------------------------------------|
| <b>Required Circuit Components</b>              |     |                            |                                                  |                                            |
| 1                                               | 1   | C1                         | CAP, 4.7 $\mu$ F, X7R, 25V, 10%, 1206            | MURATA, GRM31CR71E475KA88L                 |
| 2                                               | 1   | C2                         | CAP, 33 $\mu$ F, ALUM. ELECT., 50V, 20%          | SUN ELECTRONIC INDUSTRIES CORP., 50CE33PCS |
| 3                                               | 1   | C3                         | CAP, 10 $\mu$ F, X7R, 25V, 10%, 1206             | MURATA, GRM31CR71E106KA12L                 |
| 4                                               | 1   | C4                         | CAP, 10 $\mu$ F, X7S, 50V, 10%, 1210             | MURATA, GCM32EC71H106KA03L                 |
| 5                                               | 1   | C6                         | CAP, 0.22 $\mu$ F, X7R, 25V, 10%, 0603           | MURATA, GRM188R71E224KA88D                 |
| 6                                               | 1   | C7                         | CAP, 1 $\mu$ F, X5R, 25V, 10%, 0603              | MURATA, GRM188R61E105KA12D                 |
| 7                                               | 1   | C9                         | CAP, 2200pF, X7R, 25V, 10%, 0603                 | MURATA, GRM188R71E222KA01D                 |
| 8                                               | 1   | C10                        | CAP, 1 $\mu$ F, X5R, 50V, 10%, 0603              | MURATA, GRM188R61H105KAALD                 |
| 9                                               | 4   | C11, C12, C13, C14         | CAP, 0.1 $\mu$ F, X7R, 50V, 10%, 0402, AEC-Q200  | MURATA, GCM155R71H104KE02D                 |
| 10                                              | 1   | D1                         | DIODE, SCHOTTKY, 60V, 2.0A, POWERDI 123          | DIODES INC., DFLS260-7                     |
| 11                                              | 1   | FB1                        | IND., 600 $\Omega$ , FERRITE BEAD, 25%, 2A, 0805 | WURTH ELEKTRONIK, 742792040                |
| 12                                              | 1   | L1                         | IND., 2.2 $\mu$ H, 3.25A, 61m $\Omega$ , SMD     | WURTH ELECTRONICS INC., 74437324022        |
| 13                                              | 1   | L2                         | IND., 470nH, 3.6A, 31m $\Omega$ , SMD            | WURTH ELEKTRONIK, 74479299147              |
| 14                                              | 2   | R1, R4                     | RES., 1M $\Omega$ , 1%, 1/10W, 0603              | VISHAY, CRCW06031M00FKEA                   |
| 15                                              | 1   | R3                         | RES., 732k, 1%, 1/10W, 0603                      | VISHAY, CRCW0603732KFKEA                   |
| 16                                              | 1   | R5                         | RES., 100k, 1%, 1/10W, 0603                      | VISHAY, CRCW0603100KFKEA                   |
| 17                                              | 1   | R6                         | RES., 71.5k, 1%, 1/10W, 0603                     | VISHAY, CRCW060371K5FKEA                   |
| 18                                              | 1   | R7                         | RES., 22k, 1%, 1/10W, 0603                       | VISHAY, CRCW060322K0FKEA                   |
| 19                                              | 1   | R8                         | RES., 20k, 1%, 1/10W, 0603                       | VISHAY, CRCW060320K0FKEA                   |
| 20                                              | 1   | U1                         | IC, BOOST/SEPIC/INVERTING CONVERTER              | LINEAR TECH., LT8364EDE                    |
| <b>Additional Demo Board Circuit Components</b> |     |                            |                                                  |                                            |
| 1                                               | 1   | R2                         | RES., 0 $\Omega$ , 1/10W, 0603                   | VISHAY, CRCW06030000Z0EA                   |
| 2                                               | 1   | C5 (OPT)                   | CAP, OPT, 0603                                   |                                            |
| 3                                               | 0   | C8                         | CAP, OPTION, 0603                                |                                            |
| <b>Hardware: For Demo Board Only</b>            |     |                            |                                                  |                                            |
| 1                                               | 7   | E1, E2, E3, E4, E5, E6, E7 | TEST POINT, TURRET, 0.094", MTG. HOLE            | MILL-MAX, 2501-2-00-80-00-00-07-0          |
| 2                                               | 1   | JP1                        | CONN., HEADER, MALE, 2 $\times$ 5.2mm, ST, THT   | WURTH ELEKTRONIK, 62001021121              |
| 3                                               | 1   | XJP1                       | CONN., SHUNT, FEMALE, 2 POS, 2mm                 | WURTH ELEKTRONIK, 60800213421              |
| 4                                               | 4   | MP1, MP2, MP3, MP4         | STANDOFF, NYLON, 0.50"                           | KEYSTONE, 8833                             |

## SCHEMATIC DIAGRAM



\* SEE DEMO MANUAL  
FOR LOAD CURRENT

NOTES: UNLESS OTHERWISE SPECIFIED  
1. ALL RESISTORS ARE 0603.  
ALL CAPACITORS ARE 0603.

# DEMO MANUAL DC2716A

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