

### DESCRIPTION

Demonstration circuit 1422 features the LT6605-XX series of a dual, matched, fully differential 2<sup>nd</sup> order low-pass filter and amplifier. A DC1422 is available in three assemblies (refer to Table 1). The typical -3dB frequency (f<sub>3dB</sub>) of an LT6605-7, an LTC6605-10 and an LTC6605-14 is 7MHz, 10MHz and 14MHz respectively. However each LTC6605-XX the f<sub>3dB</sub> frequency can be set with one external resistor per channel in a small range listed on Table 2 (refer to Figure 3 and Table 2 of an LTC6605-XX data sheet).

The LTC6605-XX Internal laser-trimmed resistors and capacitors implement a very well matched (in gain and phase) 2<sup>nd</sup> order lowpass filter response. The LT6605-XX combines a two fully differential matched amplifiers and 2<sup>nd</sup> order lowpass filters for driving the differential inputs of a dual Analog to Digital Converter (ADC) and band-limiting the base-band signal of a digital communications receiver.

A DC1422 is configured as an AC coupled unity gain filter/amplifier using the lowest f<sub>3dB</sub> frequency in the range of Table 2 (6.5MHz, 9.7MHz and 12.4MHz for a -7, a -10 and a -14 respectively). Surface mount pads for 0603 passive components provide options to configure a DC1422 for gains greater than one and as 2<sup>nd</sup> order low-pass filter circuits as shown in an LTC6605-XX data sheet.

Connection to a differential input and output of a DC1422 is through SMA connectors. An on-board jumper with shunts configures the LTC6605-XX for full power, low power or shut-down operation.

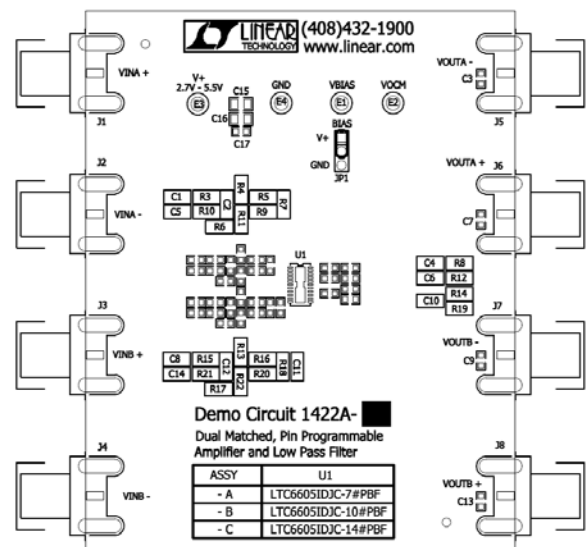
**Table 1. The DC1422 Assemblies**

| ASSEMBLY  | Filter IC  |
|-----------|------------|
| DC1422A-A | LTC6605-7  |
| DC1422A-B | LTC6605-10 |
| DC1422A-C | LTC6605-14 |

**Table 2. Resistor Set f<sub>3dB</sub> Range**


| Filter IC  | f <sub>3dB</sub> Range |
|------------|------------------------|
| LTC6605-7  | 6.5MHz – 10MHz         |
| LTC6605-10 | 9.7MHz – 14MHz         |
| LTC6605-14 | 12.4MHz – 20MHz        |

**Figure 1. The DC1422 Top Silk Screen**



**Design files for this circuit board are available.**

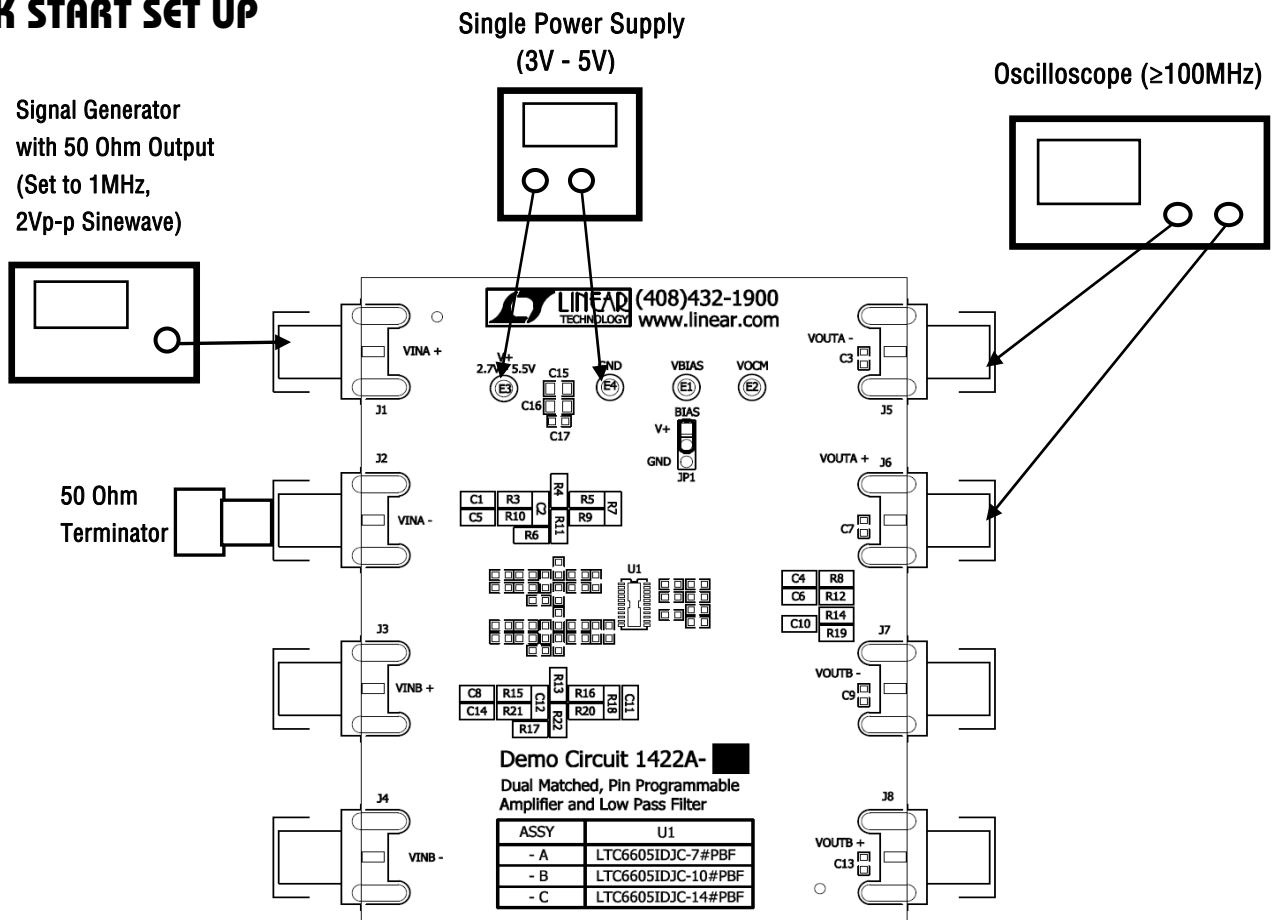
**Call the LTC factory.**

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# DEMO CIRCUIT 1422 QUICK START GUIDE, LTC6605-XX

## 7MHz, 10MHz and 14MHz, Dual, Matched, Filter/Amplifier

### QUICK START SET UP



**Figure 2. Single Supply Test Set Up Connections**  
(set the JP1 shunt to V+)

### Quick Test Procedure

A DC1422 has two pairs of differential inputs, VINA+/VINA- and VINB+/VINB- and two pairs of differential outputs VOUTA+ /VOUTA- and VOUTB+/VOUTB-.

#### 1. Testing the VINA to VOUTA Signal Path.

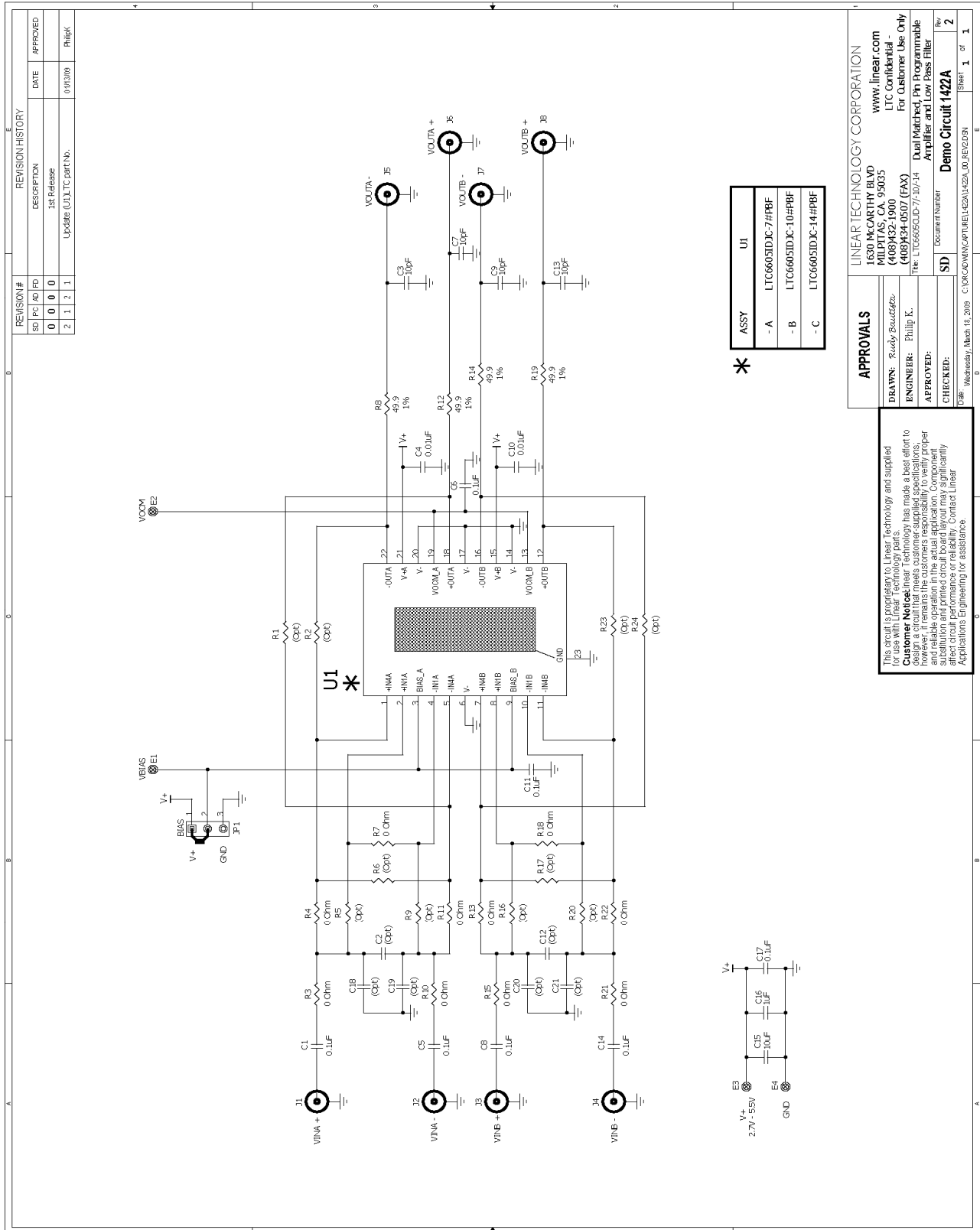
Connect a DC1422 board as shown in Figure 2 (connect signal generator to VINA+ and terminate VINA- with a 50 ohm terminator). Set the generator for a 1MHz, 2Vp-p, and sine-wave. The oscilloscope channels connected to VOUTA- and VOUTA+ show a 1MHz, 1Vp-p, sinewave (see Note 1).

#### 2. Testing the VINB to VOUTB Signal Path.

Connect signal generator to VINB+ and terminate VINB- with a 50 ohm terminator. Set the generator for a 1MHz, 2Vp-p, and sine-wave. Connect oscilloscope channel 1 to VOUTB- and channel 2 to VOUTB+. The oscilloscope channels connected to VOUTB- and VOUTB+ show a 1MHz, 1Vp-p, sinewave.

**Note:** For unity gain testing the DC1422 inputs must be ideally driven by a zero ohm source (the outputs of a high speed differential amplifier). However, if the 50 ohm impedance of the generator's output and terminator is in series with the input resistors then the gain is less than one and the filter's Q value is affected (refer to the filter equations of Figure 3 in the LTC6605-7 data sheet).

# DEMO CIRCUIT 1422 QUICK START GUIDE, LTC6605-XX 7MHz, 10MHz and 14MHz, Dual, Matched, Filter/Amplifier



| ASSY | U1                |
|------|-------------------|
| - A  | LTC6605DJC-7#PBF  |
| - B  | LTC6605DJC-10#PBF |
| - C  | LTC6605DJC-14#PBF |

\* \* \*

| REVISION HISTORY |          |
|------------------|----------|
| SD               | FC AD FD |
| 0                | 0 0      |
| 2                | 1 2 1    |

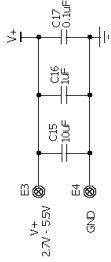
  

| DESCRIPTION             | DATE     | APPROVED  |
|-------------------------|----------|-----------|
| 1st Release             |          |           |
| Update (U) LTC part no. | 01/12/09 | Philip K. |

| APPROVALS                      |                               |
|--------------------------------|-------------------------------|
| DRAWN: Rudy Szwarczak          | www.linear.com                |
| ENGINEER: Philip K.            | MILPITAS, CA, 95035           |
| APPROVED:                      | LTC Confidential -            |
| CHECKED:                       | For Customer Use Only         |
| Doc# : Webassy, March 18, 2009 | The: LTC6605DJC-7/10/14       |
|                                | Dual Matched, Pn Programmable |
|                                | Amplifier and Low Pass Filter |
|                                | Document Number               |
|                                | SD                            |
|                                | Rev                           |
|                                | 2                             |
|                                | 1 of 1                        |

This circuit is proprietary to Linear Technology and supplied as a design aid only. Linear Technology has made a best effort to design a circuit that meets customer-supplied specifications, however, it remains the customer's responsibility to verify proper operation and performance of the circuit. Component substitution and limited circuit board layout may significantly affect circuit performance or reliability. Contact Linear Applications Engineering for assistance.



# DEMO CIRCUIT 1422 QUICK START GUIDE, LTC6605-XX

## 7MHz, 10MHz and 14MHz, Dual, Matched, Filter/Amplifier

### DC1422 Parts List

| Qty | Reference                                    | Part Description                        | Manufacturer / Part #            |
|-----|--|---|----------------------------------|
| 7   | C1,C5,C6,C8,C11,C14,C17                      | Cap., X7R 0.1uF 25V 10% 0603            | AVX 06033C104KAT2A               |
| 0   | C2,C12,C18,C19,C20,C21 (Opt)                 | Cap., 0603                              |                                  |
| 4   | C3,C7,C9,C13                                 | Cap., NPO 10pF 25V 10% 0603             | AVX 06033A100KAT2A               |
| 2   | C10,C4                                       | Cap., X7R 0.01uF 25V 10% 0603           | AVX 06033C103KAT2A               |
| 1   | C15  | Cap., X5R 10uF 10V 20% 0805             | TDK C2012X5R1A106M               |
| 1   | C16  | Cap., X7R 1uF 16V 10% 0805              | TDK C2012X7R1C105K               |
| 4   | E1,E2,E3,E4                                  | Turret, Testpoint 0.063"                | Mill Max 2308-2-00-80-00-00-07-0 |
| 1   | JP1  | Headers, 3 Pins 2mm Ctrs.               | CommConn Con Inc. 2802S-03G2     |
| 8   | J1,J2,J3,J4,J5,J6,J7,J8                      | Conn., SMA 50-Ohm                       | E.F. JOHNSON 142-0701-851        |
| 0   | R1,R2,R5,R6,R9,R16,R17, (Opt)<br>R20,R23,R24 | Res., 0603                              |                                  |
| 10  | R3,R4,R7,R10,R11,R13,R15,<br>R18,R21,R22     | Res/Jumper, Chip 0 Ohm 1/16W 1 AMP 0603 | Vishay CRCW06030000Z0EA          |
| 4   | R8,R12,R14,R19                               | Res., Chip 49.9 0.06W 1% 0603           | Vishay CRCW060349R9FKEA          |
| 1   | XJP1   | Shunt, 2mm Ctrs.                        | Samtec 2SN-BK-G                  |
| 1   |  | FAB, 1422A_Rev1                         | Demo Circuit 1422A               |
|     | VERSION A-A:                                 |   |                                  |
| 1   | U1   | I.C.                                    | Linear Tech. LTC6605IDJC-7#PBF   |
|     | VERSION A-B:                                 |   |                                  |
| 1   | U1   | I.C.                                    | Linear Tech. LTC6605IDJC-10#PBF  |
|     | VERSION A-C:                                 |   |                                  |
| 1   | U1   | I.C.                                    | Linear Tech. LTC6605IDJC-14#PBF  |