

LTC6604-2.5, LTC6604-5, LTC6604-10 and LTC6604-15  
 Dual, Matched, Fully-Differential, Lowpass Filter

## DESCRIPTION

Demonstration circuit 1418 features the LT6604-XX series of a dual, matched, fully differential 4<sup>th</sup> order lowpass filter approximating a Chebyshev frequency response. The cutoff frequencies ( $F_c$ ) of LT6604-XX are: 2.5MHz, 5MHz, 10MHz and 15MHz. (see Table 1). The LT6604-XX combines a lowpass filter with two fully differential matched amplifiers for driving the differential inputs of a dual analog to Digital Converter (ADC) and band-limiting the baseband signal of digital communications receiver. Each LT6604-XX filter IC requires only two external input resistors to set the filter's differential gain. A DC1418 board contains an LT6604-XX configured with input resistors as two unity gain differential amplifiers/lowpass filters.

Gains greater than one require changing the input resistors to a lower value (refer to an LTC6604-XX data sheet and the DC1418 schematic).

Connection to the differential input and output of a DC1418 is through SMA connectors. On-board jumpers configure the DC1418 for dual or single supply operation and internal or external output common (VOCM) mode biasing. The differential input of a DC1418 is AC coupled and can be configured for DC coupling by replacing shorting the input capacitors with zero ohms surface-mount resistor jumpers. In addition, the DC1418 has surface-mount pads to add input passive components for input signal filtering and DC biasing.

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

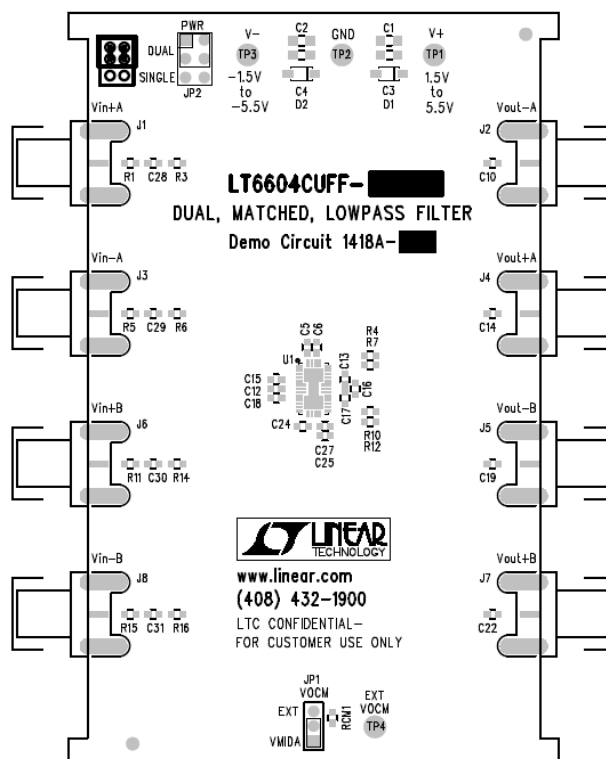
**Call the LTC factory.**

LT, LTC and LT are registered trademarks of Linear Technology Corporation.

Table 1. The DC1418 Assemblies

ASSEMBLY	
DC1418A-A	LTC6604-2.5, $F_c = 2.5\text{MHz}$
DC1418A-B	LTC6604-5, $F_c = 5\text{MHz}$
DC1418A-C	LTC6604-10, $F_c = 10\text{MHz}$
DC1418A-D	LTC6604-15, $F_c = 15\text{MHz}$

Figure 1. The DC1418 Top Silk Screen



**QUICK TEST SET UP**



**Figure 2. Dual Supply Test Set Up Connections**  
(set the JP1 shunt to VMIDA and the JP2 shunt to DUAL).

**Quick Test Procedure**

A DC1418 has two pairs of differential inputs, Vin+A/Vin-A and Vin+B/Vin-B and two pairs of differential outputs Vout-A /Vout+A and Vout-B/Vout-B.

**1. Testing the VinA to VoutA Signal Path.**

Connect a DC1418 board as shown in Figure 2 (connect signal generator to Vin+A and terminate Vin-A with a 50 ohm terminator). Set the generator for a 1MHz, 2Vp-p, and sinewave. The oscilloscope channels connected to Vout-A and Vout+A show a 1MHz, 1Vp-p, sinewave (see Note 1).

**2. Testing the VinB to VoutB Signal Path.**

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

**Note 1:** For unity gain testing the DC1418 inputs must be ideally driven by a zero ohm source (the outputs of a high speed differential amplifier). However with the 50 ohm impedance of the generator’s output and terminator is in series with the input resistors and the input to output gain is less than one.

**Note 2:** For single supply testing set the JP2 shunt to SINGLE.



CONTRACT NO.		APPROVALS	DATE
DRAWN		CHECKED	3/21/08
APPROVED		DESIGNED	
ENGINEER - PHELP K		DESIGNER	
SIZE		DWG NO	DC1418A - A/B/C/D
SCALE		FILE NAME	SHEET 1 OF 1

10001M, Corby Blvd  
 Milpitas, CA 94528  
 408.253.1600  
**LINEAR TECHNOLOGY**  
 LT6604CUFF-2.5/10/15  
 DUAL, MATCHED, LOWPASS FILTER

EXT	VCOM	TP4	RCM1	1K
V+	TP1	1.5V to 5.5V	GND	TP2
V-	TP3	-1.5V to -5.5V	GND	TP4
V+	TP5	1.5V to 5.5V	GND	TP6
V-	TP7	-1.5V to -5.5V	GND	TP8
V+	TP9	1.5V to 5.5V	GND	TP10
V-	TP11	-1.5V to -5.5V	GND	TP12
V+	TP13	1.5V to 5.5V	GND	TP14
V-	TP15	-1.5V to -5.5V	GND	TP16
V+	TP17	1.5V to 5.5V	GND	TP18
V-	TP19	-1.5V to -5.5V	GND	TP20
V+	TP21	1.5V to 5.5V	GND	TP22
V-	TP23	-1.5V to -5.5V	GND	TP24
V+	TP25	1.5V to 5.5V	GND	TP26
V-	TP27	-1.5V to -5.5V	GND	TP28
V+	TP29	1.5V to 5.5V	GND	TP30
V-	TP31	-1.5V to -5.5V	GND	TP32
V+	TP33	1.5V to 5.5V	GND	TP34
V-	TP35	-1.5V to -5.5V	GND	TP36
V+	TP37	1.5V to 5.5V	GND	TP38
V-	TP39	-1.5V to -5.5V	GND	TP40
V+	TP41	1.5V to 5.5V	GND	TP42
V-	TP43	-1.5V to -5.5V	GND	TP44
V+	TP45	1.5V to 5.5V	GND	TP46
V-	TP47	-1.5V to -5.5V	GND	TP48
V+	TP49	1.5V to 5.5V	GND	TP50
V-	TP51	-1.5V to -5.5V	GND	TP52
V+	TP53	1.5V to 5.5V	GND	TP54
V-	TP55	-1.5V to -5.5V	GND	TP56
V+	TP57	1.5V to 5.5V	GND	TP58
V-	TP59	-1.5V to -5.5V	GND	TP60
V+	TP61	1.5V to 5.5V	GND	TP62
V-	TP63	-1.5V to -5.5V	GND	TP64
V+	TP65	1.5V to 5.5V	GND	TP66
V-	TP67	-1.5V to -5.5V	GND	TP68
V+	TP69	1.5V to 5.5V	GND	TP70
V-	TP71	-1.5V to -5.5V	GND	TP72
V+	TP73	1.5V to 5.5V	GND	TP74
V-	TP75	-1.5V to -5.5V	GND	TP76
V+	TP77	1.5V to 5.5V	GND	TP78
V-	TP79	-1.5V to -5.5V	GND	TP80
V+	TP81	1.5V to 5.5V	GND	TP82
V-	TP83	-1.5V to -5.5V	GND	TP84
V+	TP85	1.5V to 5.5V	GND	TP86
V-	TP87	-1.5V to -5.5V	GND	TP88
V+	TP89	1.5V to 5.5V	GND	TP90
V-	TP91	-1.5V to -5.5V	GND	TP92
V+	TP93	1.5V to 5.5V	GND	TP94
V-	TP95	-1.5V to -5.5V	GND	TP96
V+	TP97	1.5V to 5.5V	GND	TP98
V-	TP99	-1.5V to -5.5V	GND	TP100

**DC1418A General Parts List**

Item	Qty	Reference	Part Description	Manufacturer / Part #
1	4	C1,C2,C3,C4	CAP., X5R 4.7µF 16V 0805	KEMET, C0805C475M4PAC
2	15	C5,C6,C12,C13,C15,C16, C17,C18,C24,C25,C27-C31	CAP., X7R 0.1µF 16V 0603	AVX, 0603YC104KAT
3	0	C7,C8,C11,C21,C23,C26(OPT)	CAP., 0603	
4	4	C10,C14,C19,C22	CAP., COG 10pF 25V 0603	AVX, 06033A100KAT
5	2	D1,D2	DIODE, schottky power rectifier SOD-123	ON-SEMI, MBR0520LT1G
6	1	JP1	HEADER, 3Pin 1 Row .079CC	SAMTEC, TMM-103-02-L-S
7	1	JP2	HEADER, .1 DOUBLE ROW, 2X3 PIN	SAMTEC, TSW-103-07-L-D
8	1	JP1	SHUNT, .079" Center	SAMTEC, 2SN-BK-G
9	1	JP2	SHUNT, .1" Center	SAMTEC, MNT-102-BK-G
10	8	J1-J8	CONN. SMA 50-OHM EDGE-LAUNCH	Amphenol Connex, 132357
11	4	TP1-TP4	TESTPOINT, TURRET, 065"	MILL-MAX 2308-2-00-80-00-00-07-0
12	1	RCM1	RES., CHIP, 1KΩ, 1%, 0603	VISHAY, CRCW06031K00FKEA
13	4	R1,R5,R11,R15	RES., CHIP, 0Ω, 0603	VISHAY, CRCW06030000Z0EA
14	4	R4,R7,R10,R12	RES., CHIP, 49.9Ω, 1%, 0603	VISHAY, CRCW060349R9FKEA

**DC1418A-A**

Item	Qty	Reference	Part Description	Manufacturer / Part #
1	1	DC1418A	DC1418A GENERAL BOM	
2	4	R3,R6,R14,R16	RES., CER. 1540Ω 1% 0603	VISHAY, CRCW06031K54FKEA
3	1	U1	IC, LT6604CUFF-2.5#PBF QFN	LINEAR TECH. LT6604CUFF-2.5#PBF
4	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1418A-A

**DC1418A-B**

Item	Qty	Reference	Part Description	Manufacturer / Part #
1	1	DC1418A	DC1418A GENERAL BOM	
2	4	R3,R6,R14,R16	RES., CER. 750Ω 1% 0603	VISHAY, CRCW0603750RFKEA
3	1	U1	I.C., LT6604CUFF-5#PBF, QFN	LINEAR TECH. LT6604CUFF-5#PBF
4	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1418A-B

**DC1418A-C**

Item	Qty	Reference	Part Description	Manufacturer / Part #
1	1	DC1418A	DC1418A GENERAL BOM	
2	4	R3,R6,R14,R16	RES., CER. 357Ω 1% 0603	VISHAY, CRCW0603357RFKEA
3	1	U1	I.C., LT6604CUFF-10#PBF, QFN	LINEAR TECH. LT6604CUFF-10#PBF
4	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1418A-C

**DC1418A-D**

Item	Qty	Reference	Part Description	Manufacturer / Part #
1	1	DC1418A	DC1418A GENERAL BOM	
2	4	R3,R6,R14,R16	RES., CER. 487Ω 1% 0603	VISHAY, CRCW0603487RFKEA
3	1	U1	I.C., LT6604CUFF-15#PBF, QFN	LINEAR TECH. LT6604CUFF-15#PBF
4	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1418A-D