LTC6419 Dual Differential Amplifier/ADC Driver

DESCRIPTION

Demonstration circuit 2473A features the LTC®6419 Dual Differential Amplifier/ADC Driver. It incorporates a variety of passive components to support configurations for varied applications. These fully-differential amplifiers accept single-ended or differential input with almost no difference in distortion performance.

The LTC6419 is a high speed dual differential amplifier with superior distortion and low noise, suitable for demanding communications transceivers, cellular base-stations and other high speed signal chain applications.

ADDITIONAL INFORMATION

The DC2473A demo board is ready for use as-is and is designed for ease of use and with minimum modification. The demo board has features that can be accessed by adding, removing or changing components on the board to configure for single-ended and/or differential inputs and outputs.

By default, the board is configured to have dual single-ended inputs with transformers, J4 ($IN1^-$) and J6 ($IN2^-$) and dual single-ended outputs with transformers, J1 ($OUT1^-$) and J7 ($OUT2^-$). Each of these ports is matched to 50Ω impedance to facilitate direct connections to test equipment.

Driving the Inputs DC-Coupled

It is possible to configure the DC2473A inputs differentially with DC coupling. Transformers and components at locations T1, T3, C2, C6, C13 and C17 connections should be replaced with 0Ω resistors. The inputs are now DC-coupled and can be driven single-ended or differentially (resistor values may be changed to balance the source impedances).

Changing the Output Common-Voltage

The turrets marked VOCM1 and VOCM2 (E2 and E4) control the output (and input, if AC-coupled) common mode voltage of the DC2473A. This function can be used to level-shift the DC output voltage for optimum system performance. If used for this purpose, output capacitors C3, C7, C14 and C18 can be replaced by 0Ω resistors to allow the DC bias to reach the outputs.

By default, VOCMA and VOCMB are self-biased and float to a typical 1.25V on each of the common-mode pins (with V^+ = 5V). The VOCMA and VOCMB voltage of the two amplifiers can be set independently with external DC supply voltage source, or on board voltage dividers R18/R19 and R37/R38.

Enable (Shutdown)

Jumpers JP1 and JP2 control the enable functions of amplifiers A and B. When set to the EN position, the part will be on and draw normal operating current. In the DIS position, the part will be in shutdown and draw a very small amount of leakage current.

Ground and V_{CC} Connections

DC2473A GND turret is not only connected to V^- of the LTC6419, it also serves as the demo board's ground. For best result, a low impedance return path to the power supply from GND is recommended. Short, low impedance wires to the V^+ and GND connectors of DC2473A will yield the best performance from the LTC6419.

Schematic Notes

For a 50Ω external load, transformer T2 or T4 and the series 100Ω resistors (R7, R9 or R26, R28) present each amplifier with a 400Ω load impedance. These resistors produce a 6dB voltage drop when driving loads.

Because the unmodified amplifier has 0dB voltage gain, and each transformer adds approximately 1dB insertion loss, the total unmodified demo board will measure approximately 8dB insertion loss from the input port (J4 or J6) to the output port (J1 or J7).

Design files for this circuit board are available at http://www.linear.com/demo/DC2473A

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QUICK START PROCEDURE

Table 1 shows the function of each SMA connector on the board. Refer to Figure 1 for the connection diagram and follow the procedure below:

1. Connect the power supply as shown. The power labels of V^+ and GND directly correspond to the power supply. Typical current consumption of LTC6419 is about 104mA for both amplifiers. Jumpers JP1 and JP2 enable or shut down the amplifier A and amplifier B, respectively.
2. Apply input signal or network analyzer to J4 ($IN1^-$) or J6 ($IN2^-$). DC2473A's input is impedance matched to 50Ω.
3. Observe the output via J1 ($OUT1^-$) or J7 ($OUT2^-$). The output is impedance matched to 50Ω, suitable for the input of a network or spectrum analyzer.

Table 1 shows the function of each input and output on the board.

Table 1. DC2473A Board I/O Descriptions

CONNECTOR	FUNCTION
J2 ($IN1^+$)/J4 ($IN1^-$) J6 ($IN2^-$)/J8 ($IN2^+$)	Can be configured to either single-ended or differential input.
J1 ($OUT1^-$)/J3 ($OUT1^+$) J5 ($OUT2^+$)/J7($OUT2^-$)	Can be configured to either single-ended or differential output. With proper impedance matching, the device can be used to drive a network analyzer, spectrum analyzer or an ADC.
E1 (VCM1), E3 (VCM2)	The input common mode voltage. Leave open if unused.
E2 (VOCM1), E4 (VOCM2)	Output common mode adjust. By default, these pins are self-biasing within U1A and U1B. Leave open if unused.
E5 (V^+)	Positive Supply voltage source
E8 (GND)	Supply Ground

QUICK START PROCEDURE

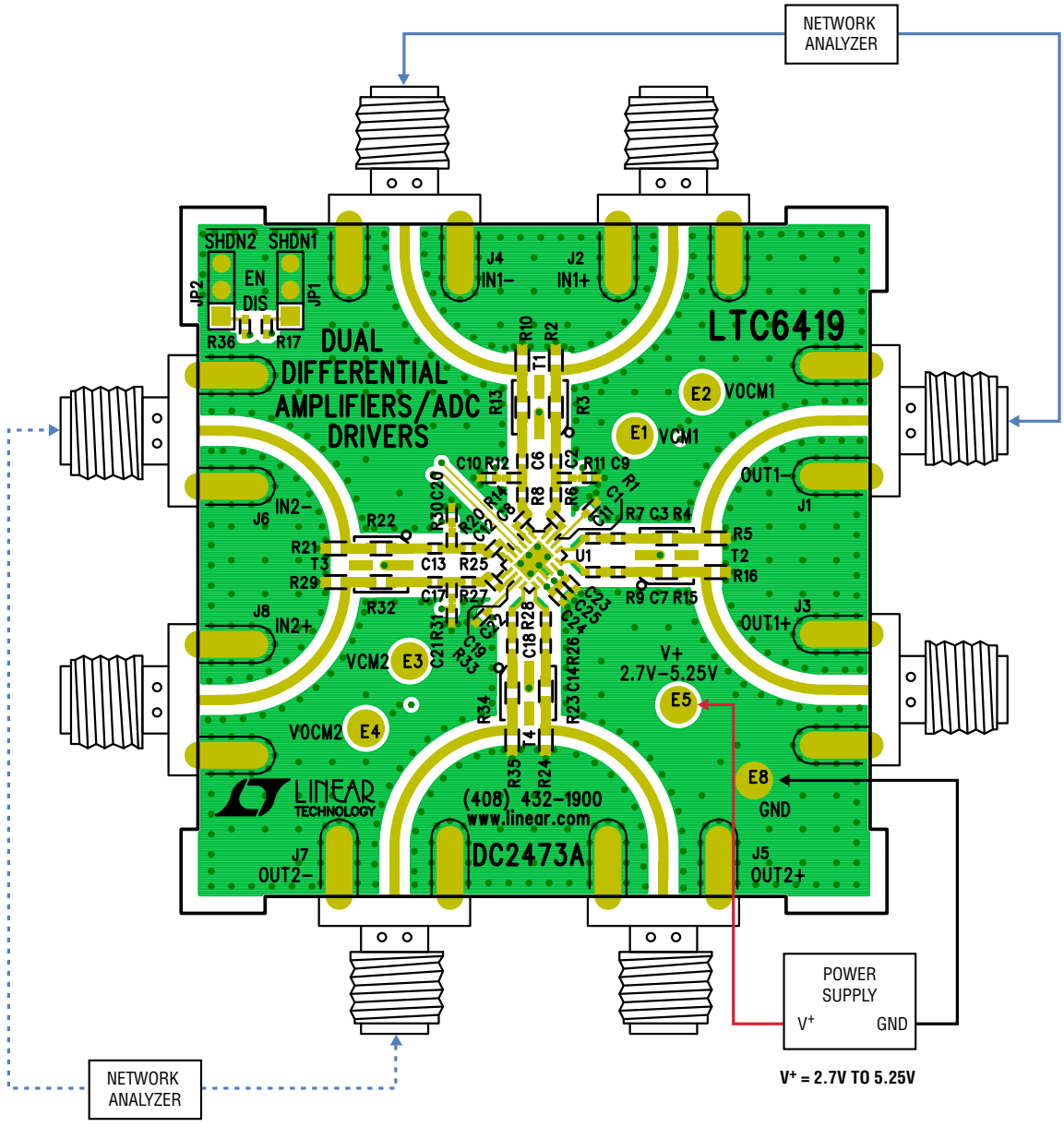
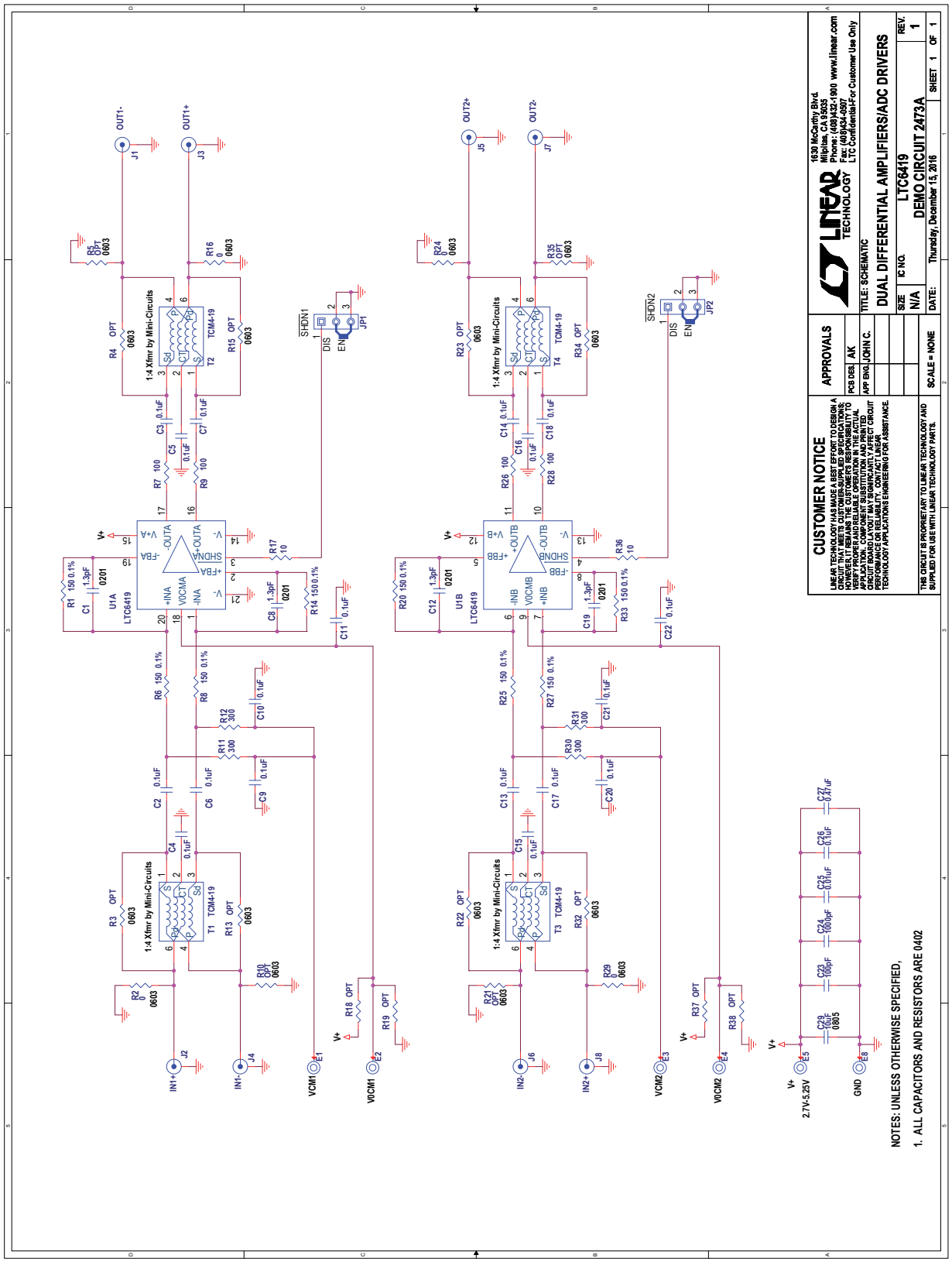


Figure 1. Proper Equipment Setup for Frequency Response Measurement

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	4	C1, C8, C12, C19	CAP., C0G,1.3pF, 25V, ±0.1pF, 0201	MURATA, GJM0335C1E1R3BB01
2	19	C2, C3, C4, C5, C6, C7, C9, C10, C11, C13, C14, C15, C16, C17, C18, C20, C21, C22, C26	CAP., X7R, 0.1µF, 16V, 10%, 0402	AVX, 0402YC104KA
3	1	C23	CAP., C0G, 100pF, 25V, 5%, 0402	MURATA, GRM1555C1E101JA01
4	1	C24	CAP., X7R, 1000pF, 50V, 10%, 0402	MURATA,GRM15AR71H102KA86
5	1	C25	CAP., X7R, 0.01µF, 25V, 10%, 0402	MURATA, GRM155R71E103KA01
6	1	C27	CAP., X5R, 0.47µF, 25V, 10%, 0402	MURATA, GRM155R61E474KE01
7	1	C29	CAP., X5R, 10µF, 25V, 10%, 0805	MURATA, KRM21ER61E106KFA1
8	6	E1, E2, E3, E4, E5, E8	TESTPOINT, TURRET, 0.063	MILL-MAX, 2308-2-00-80-00-00-07-0
9	2	JP1, JP2	CONN., HEADER, 1 × 3, 2mm	SULLINS, NRPN031PAEN-RC
10	2	XJP1, XJP2	SHUNT, 2mm	SAMTEC, 2SN-BK-G
11	8	J1-J8	CONN., SMA, 50Ω, EDGE-LANCH	E. F. JOHNSON, 142-0701-851
12	8	R1, R6, R8, R14, R20, R25, R27, R33	RES., CHIP, 150Ω 1/16W, 0.1%, 0402	YAGEO, RT0402BRE07150RL
13	0	R3, R4, R5, R10, R13, R15, R21, R22, R23, R32, R34, R35	RES., 0603, OPT	
14	4	R2, R16, R24, R29	RES., 0Ω, 0603	VISHAY, CRCW06030000Z0ED
15	4	R7, R9, R26, R28	RES., 100Ω, 1/16W, 1%, 0402	VISHAY, CRCW0402100RFKEA
16	4	R11, R12, R30, R31	RES., 300Ω, 1/16W, 1%, 0402	VISHAY, CRCW0402300RFKEA
17	2	R17, R36	RES., 10Ω, 1/16W, 1%, 0402	VISHAY, CRCW040210R0FKEA
18	0	R18, R19, R37, R38	RES., 0402, OPT	
19	4	T1, T2, T3, T4	RF TRANS., 50Ω, 10MHz – 1900MHz, TCM4-19	MINI CIRCUITS, TCM4-19+
20	1	U1	IC., DUAL ADC DRIVER, 20-PIN LGA, 4 × 3	LINEAR TECH., LTC6419IV#PDF

SCHEMATIC DIAGRAM



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