

LTC6360

High Speed Op Amp with True Zero Output

DESCRIPTION

Demonstration circuit 1639 allows quick setup of the LTC6360 true zero op amp. The op amp is configured as a unity gain buffer, with landing pads provided to make other gains configurable. Ample bypass is provided for both the input supply and for the -0.6V on-chip charge pump. The recommended 10Ω 330pF output compensation is provided on board for unity-gain stability. If this

compensation is removed, gain bandwidth increases but the op amp is stable only in gains of four and higher.

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

LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

OPERATING PRINCIPLES

Most op amps which operate on single supplies have outputs that cannot get all the way to ground. The saturation of their output devices leave 10's of millivolts of output voltage error when the output tries to swing to

ground. The LTC6360 has an onboard charge pump that creates a -0.6V internal supply for the output stage, so it can swing all the way to ground and even a little below ground.

QUICK START PROCEDURE

Demonstration circuit 1639 is simple to use, with only one jumper provided to allow the shutdown option.

1. Set the power supply to 5V, then turn off the power supply. As shown in Figure 1, connect the +5V lead from the power supply to the V^+ terminal of the demo circuit, and connect the COM side of the supply to the GND terminal of the demo circuit.
2. Turn on the supply. Note that without input excitation the output is very near 0mV, much closer to ground than most op amps can achieve.
3. You are now free to connect a source to the input and exercise the LTC6360. The input range is 0V to about 4.25V. (Under high frequency large signal swing excitation, you may see some odd behavior as the negative charge pump voltage begins to safely collapse.)
4. If you want to set the LTC6360 for some other positive gain, turn off the supply and disconnect the board. Refer to the schematic in Figure 2. Install appropriate resistors at R7 and R6, and install appropriate impedances at C7 and R5 (shorts and/or blocking capacitance). The time domain and frequency responses can be adjusted using a small capacitance at C8.
5. For inverting gain, install J2 and appropriate passives in the path to the $-$ input. For inverting gains, the $+$ input must be biased up at some voltage. Installing R13 connects the $+$ input to the "EXT_VCM" turret which is biased nominally at 2V by R11 and R12, or the turret can be driven with an external supply.
6. **Shutdown:** The LTC6360 can be shut down by moving the shunt on JP1 from the "Enable" position to the "Disable" position. It can also be shut down and reactivated electrically via the $\overline{\text{SHDN}}$ turret, in which case the shunt on JP1 should be removed entirely.

QUICK START PROCEDURE

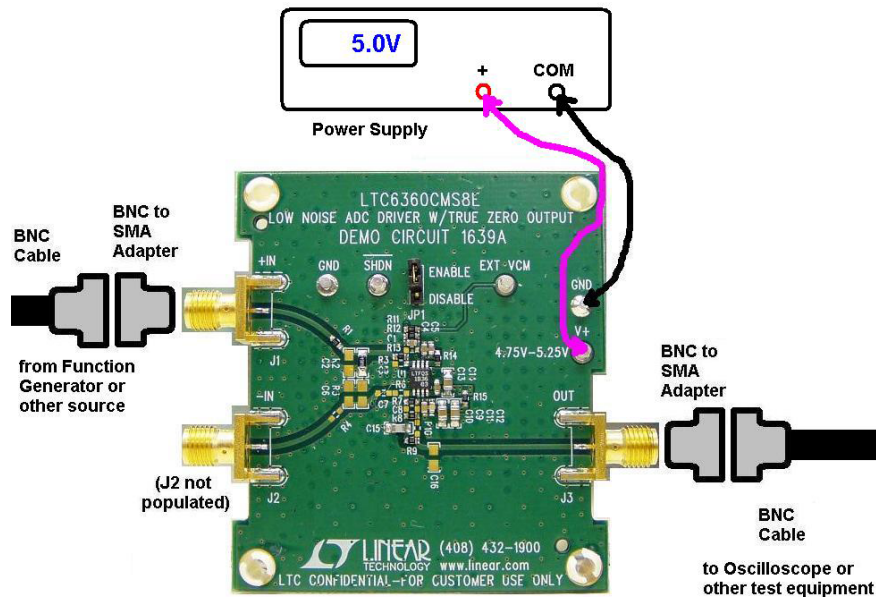


Figure 1. Proper Equipment Setup.

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C5	CAP., X7R, 1 μ F, 16V, 10% 0603	AVX, 0603YC105KAT2A
2	0	C2, C6	CAP., 0805	OPT
3	0	C3, C7	CAP., 0603	OPT
4	3	C4, C10, C13	CAP., X7R, 0.1 μ F, 25V, 10% 0603	AVX, 06033C104KAT2A
5	0	C8	CAP., 0603, NPO	OPT
6	1	C9	CAP., X7R, 0.01 μ F, 50V, 10% 0603	AVX, 06035C103KAT2A
7	3	C11, C12, C14	CAP., X5R, 10 μ F, 6.3V, 20% 0805	AVX, 08056D106MAT2A
8	1	C15	CAP., CERM 330pF, 50V, NPO, 0805	AVX, 08055A331JAT2A
9	0	C16	CAP., 0805, NPO	OPT
10	5	E1-E5	TESTPOINT, TURRET, .065" PBF	MILL-MAX, 2308-2-00-80-00-00-07-0
11	1	JP1	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S
12	1	XJP1	SHUNT, 2mm CENTER	SAMTEC, 2SN-BK-G
13	2	J1, J3	CONN, BNC, SMA 50 Ω EDGE-LANCH	E. F. JOHNSON, 142-0701-851
14	0	J2	CONN, BNC, SMA 50 Ω EDGE-LANCH	OPT
15	6	R1, R3, R7, R9, R14, R15	RES., CHIP, 0, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
16	1	R2	RES., CHIP, 49.9, 1/8W, 1% 0805	VISHAY, CRCW080549R9FKEA
17	0	R4, R6, R10, R13	RES., 0603	OPT
18	0	R5	RES., 0805	OPT
19	1	R8	RES., CHIP, 10, 1/10W, 1% 0603	VISHAY, CRCW060310R0FKEA
20	1	R11	RES., CHIP, 30.1k, 1/10W, 1% 0603	VISHAY, CRCW060330K1FKEA
21	1	R12	RES., CHIP, 20k, 1/10W, 1% 0603	VISHAY, CRCW060320K0FKEA
22	4	MH1-MH4 (STAND-OFF)	STAND-OFF, NYLON (SNAP ON), 0.50" TALL	KEYSTONE, 8833(SNAP ON)
23	1	U1	LOW NOISE ADC DRIVER W/TRUE ZERO OUTPUT	LINEAR TECH., LTC6360CMS8E#TRPBF
24	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT #1639A
25	1	STENCIL FOR TOP SIDE	STENCIL	STENCIL 1639A

dc1639f

SCHEMATIC DIAGRAM

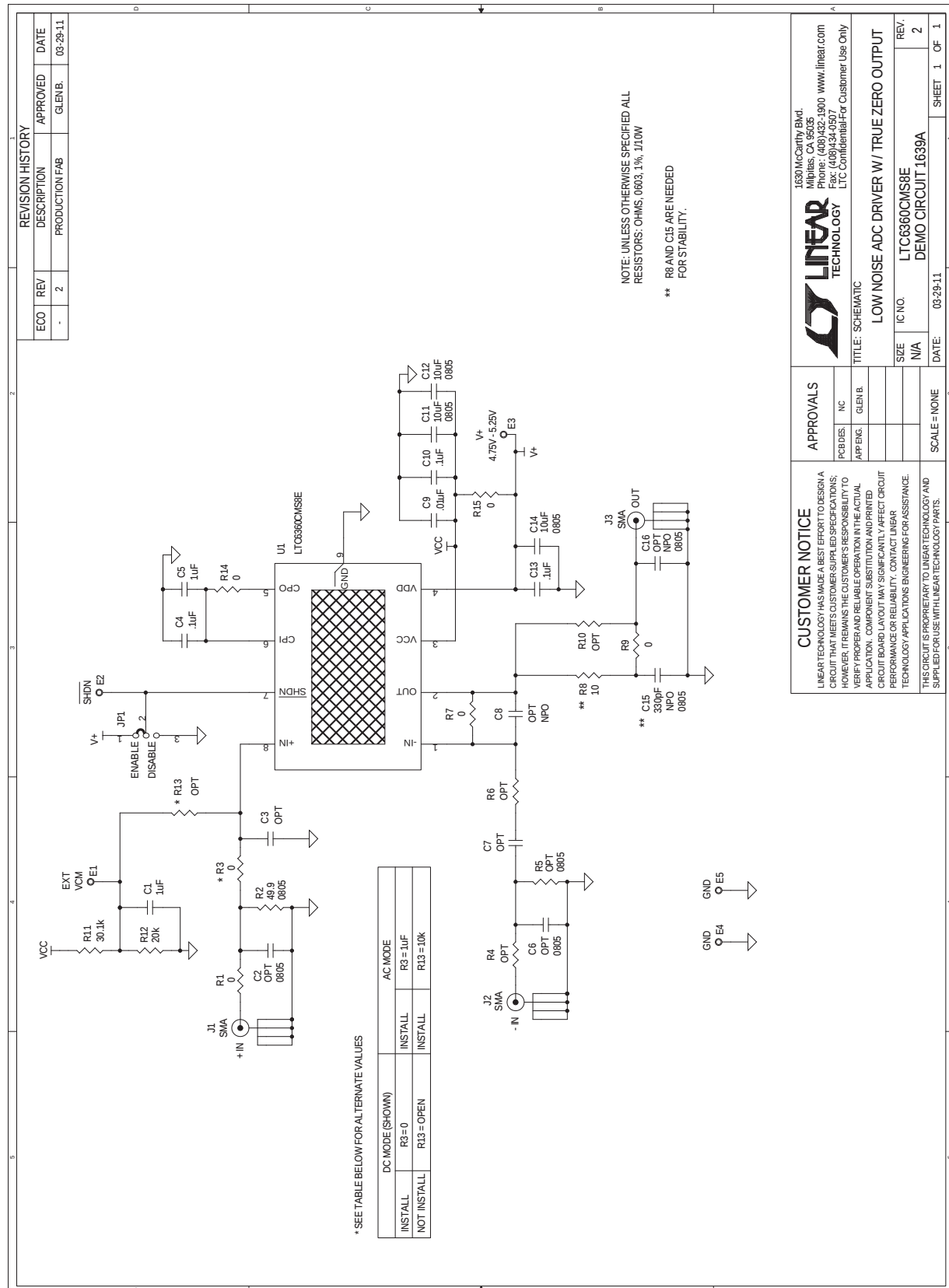


Figure 2

DEMO MANUAL DC1639

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

dc1639f