# DESCRIPTION

Demonstration circuits 566A-A, -B and -C, feature the easy to use, rail-to-rail input and output LTC6910 series of Low Noise Programmable Gain Amplifier (PGA) parts. The inverting gain is set by changing the positions of three onboard jumpers: G0, G1 and G2 to set the 3-bit programming code. Demo Circuit 566A-A is for the LTC6910–1 with gains of 0, 1, 2, 5, 10, 20, 50, 100 V/V. Demo Circuit 566A-B is for the LTC6910–2 with gains of 1, 2, 4, 8, 16, 32, and 64 V/V. Demo Circuits 566A-C is for the LTC6910–3 with gains of 1, 2, 3, 4, 5, 6 and 7 V/V.

All three-demo boards have input jumpers to select between AC or DC coupling of the input, and a jumper to select operation with a single or dual supply. Typical applications include data acquisition systems, dynamic gain changing, automatic ranging circuits and automatic gain control. The LTC6910 family can operate from single or split supplies from 2.7V to 10.5V total between V+ and V-.

**Design files for this circuit board are available. Call the LTC factory.**

**Table 1. Performance Summary ($T_A$ = 25°C)**

| PARAMETER | CONDITION | VALUE |
|---|---|---|
| Supply Voltage Range | V+ to V– | 2.7V to 10.5V |
| Gain Accuracy | Gain Dependent (see Data Sheet) | Typical ±0.05dB at Gain = 1<br>and ±0.4 dB at Gain = 100 |
| Slew Rate | Vs = ±2.5V, $V_{OUT}$ = ±1.4V | 12V/µs |
| | Vs = ±5V, $V_{OUT}$ = ±1.4V | 16V/µs |

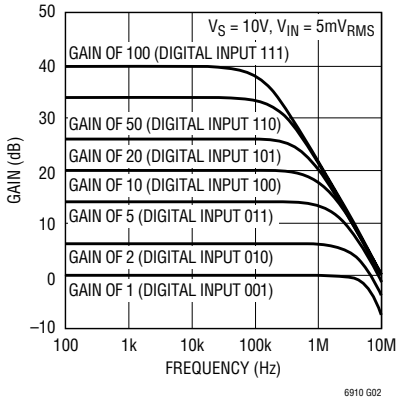



**Figure 1. LTC6910-1 Frequency Response**

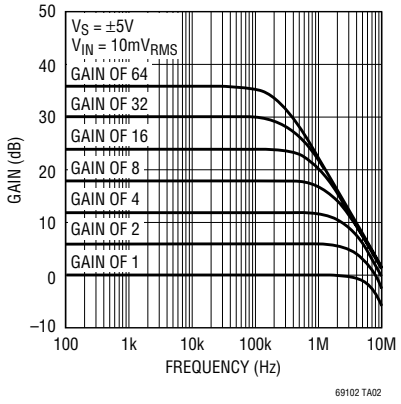



**Figure 2. LTC6910-2 Frequency Response**

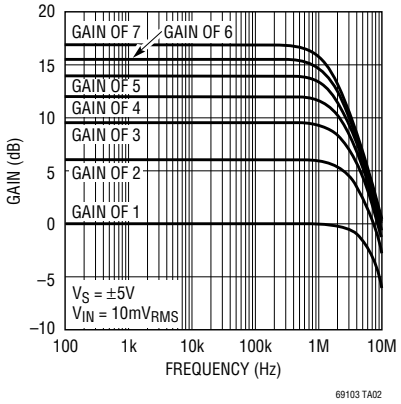



**Figure 3. LTC6910-3 Frequency Response**

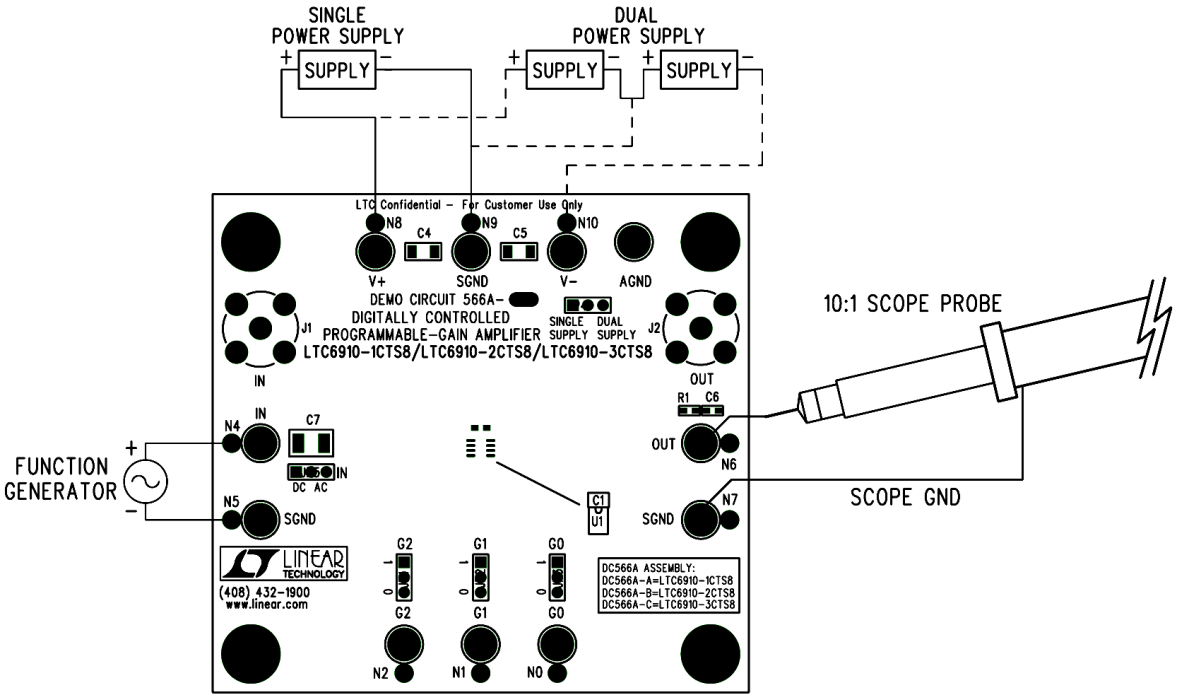



**Figure 4. Proper Measurement Equipment Setup**

## QUICK START PROCEDURE

The 566 family of Demonstration boards allow for easy evaluation of the performance of the LTC6910 series of PGAs. Refer to Figure 4 for proper measurement equipment setup and follow the procedure given below:

1. Place jumpers in the following positions:

   **Supply Jumper:**

   **SINGLE** for Single Supply

   **DUAL** for Dual Supply

   **Input Jumper (IN):**

   **DC** for DC Coupling

   **AC** for AC Coupling

   $f_{-3dB} = 1/(2\pi C_7 R_{INPUT})$

   $C_7$ = 10µF, $R_{INPUT}$ is the nominal input impedance and depends on the gain setting, see Table 2, 3, or 4.

   The jumper settings given in this procedure set the gain to a value of –1 (the LTC6910-X is an inverting amplifier), for other gain values refer to Gain Table 2, 3 or 4 which matches the Demo Circuit, 566-A, -B, or -C. To set the gain to a value of –1 set:

   **G0:** Set to **Logic 1**

   **G1:** Set to **Logic 0**

   **G2:** Set to **Logic 0**

2. With the power off, connect the input power supply to V+, V- and AGND as required.

   **NOTE:** Make sure that the input voltage does not exceed 11V total between V+ and V–.

3. Set a function generator to output a 1kHz $1V_{P-P}$ signal.

4. Set the input jumper to give the desired input coupling, AC or DC.

5. Turn on the power supply and connect the signal generator to the IN BNC, or turrets as shown in Figure 4.
6. Monitor the output (BNC or test point) with an oscilloscope to observe a 1kHz $1V_{P-P}$ signal.
7. Using Tables 2, 3 or 4 set the gain as desired and set the input to within the nominal linear input range. Example: For a dual 5V supply operation and a gain equal to five, the input to an LTC6910-1 should be set equal to or less than $2V_{P-P}$ (see Table 2).

**Table 2. DC566A–A Gain Settings And Properties LTC6910-1**

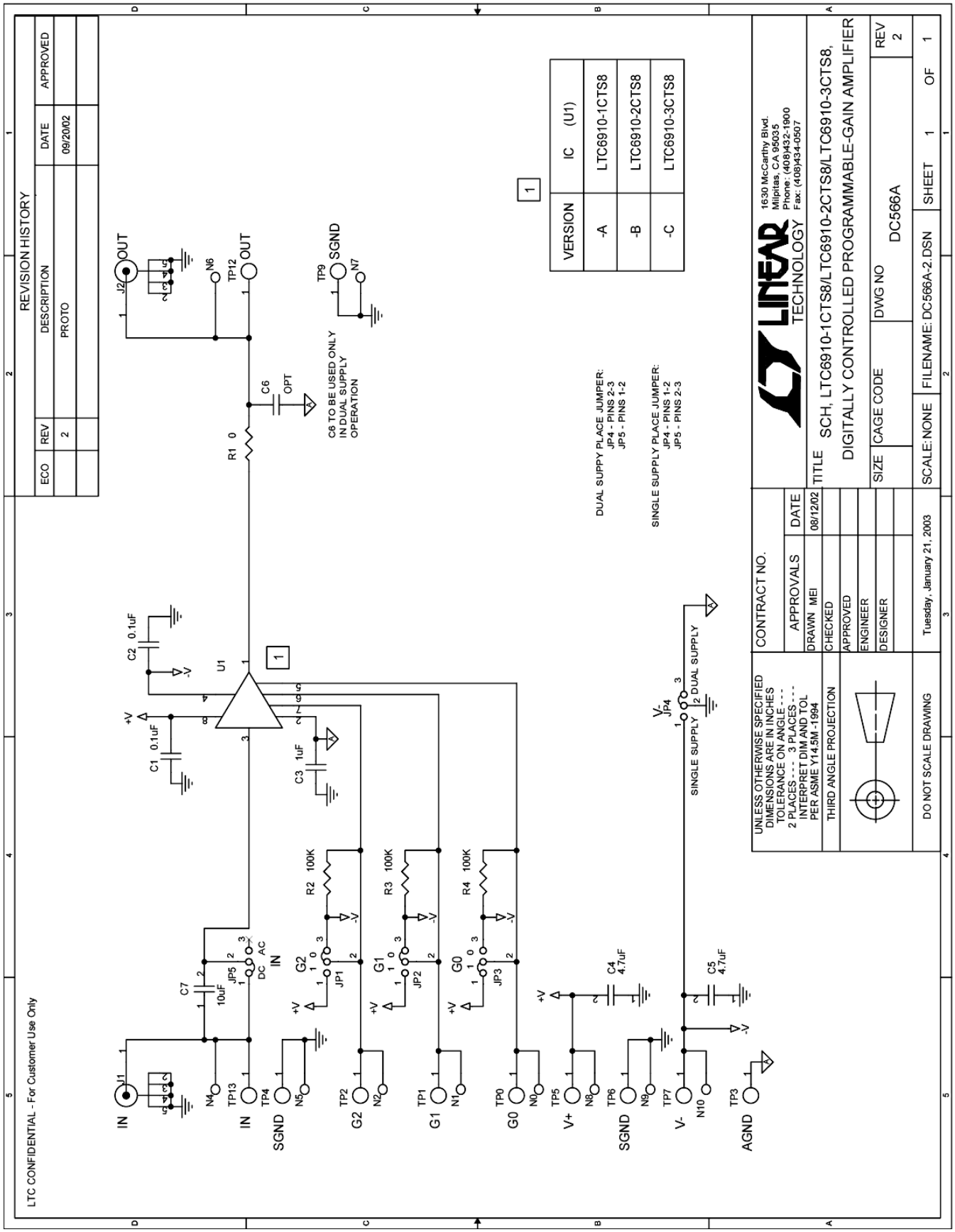
| G2 | G1 | G0 | NOMINAL VOLTAGE GAIN | | NOMINAL LINEAR INPUT RANGE ($V_{P-P}$) | | | NOMINAL INPUT IMPEDANCE (KΩ) |
|---|---|---|---|---|---|---|---|---|
| | | | VOLTS/VOLT | (dB) | DUAL 5V SUPPLY | SINGLE 5V SUPPLY | SINGLE 3V SUPPLY | |
| 1 | 0 | 0 | 0 | -120 | 10 | 5 | 3 | OPEN |
| 0 | 0 | 1 | -1 | 0 | 10 | 5 | 3 | 10 |
| 0 | 1 | 0 | -2 | 6 | 5 | 2.5 | 1.5 | 5 |
| 0 | 1 | 1 | -5 | 14 | 2 | 1 | 0.6 | 2 |
| 1 | 0 | 0 | –10 | 20 | 1 | 0.5 | 0.3 | 1 |
| 1 | 0 | 1 | -20 | 26 | 0.5 | 0.25 | 0.15 | 1 |
| 1 | 1 | 0 | -50 | 34 | 0.2 | 0.1 | 0.06 | 1 |
| 1 | 1 | 1 | -100 | 40 | 0.1 | 0.05 | 0.3 | 1 |

**Table 3. DC566A–B Gain Settings And Properties LTC6910-2**

| G2 | G1 | G0 | NOMINAL VOLTAGE GAIN | | NOMINAL LINEAR INPUT RANGE ($V_{P-P}$) | | | NOMINAL INPUT IMPEDANCE (K•) |
|---|---|---|---|---|---|---|---|---|
| | | | VOLTS/VOLT | (dB) | DUAL 5V SUPPLY | SINGLE 5V SUPPLY | SINGLE 3V SUPPLY | |
| 1 | 0 | 0 | 0 | -120 | 10 | 5 | 3 | OPEN |
| 0 | 0 | 1 | -1 | 0 | 10 | 5 | 3 | 10 |
| 0 | 1 | 0 | -2 | 6 | 5 | 2.5 | 1.5 | 5 |
| 0 | 1 | 1 | -4 | 12 | 2.5 | 1.25 | 0.75 | 2.5 |
| 1 | 0 | 0 | -8 | 18.06 | 125 | 0.625 | 0.375 | 1.25 |
| 1 | 0 | 1 | -16 | 24.08 | 0.625 | 0.313 | 0.188 | 1.25 |
| 1 | 1 | 0 | -32 | 30.1 | 0.313 | 0.156 | 0.094 | 1.25 |
| 1 | 1 | 1 | -64 | 36.12 | 0.156 | 0.078 | 0.047 | 1.25 |

**Table 4. DC566A–C Gain Settings And Properties LTC6910-3**

| G2 | G1 | G0 | NOMINAL VOLTAGE GAIN | | NOMINAL LINEAR INPUT RANGE ($V_{P-P}$) | | | NOMINAL INPUT IMPEDANCE (K•) |
|---|---|---|---|---|---|---|---|---|
| | | | VOLTS/VOLT | (dB) | DUAL 5V SUPPLY | SINGLE 5V SUPPLY | SINGLE 3V SUPPLY | |
| 1 | 0 | 0 | 0 | -120 | 10 | 5 | 3 | OPEN |
| 0 | 0 | 1 | -1 | 0 | 10 | 5 | 3 | 10 |
| 0 | 1 | 0 | -2 | 6 | 5 | 2.5 | 1.5 | 5 |
| 0 | 1 | 1 | -3 | 9.5 | 3.33 | 1.67 | 1 | 3.3 |
| 1 | 0 | 0 | -4 | 12 | 2.5 | 1.25 | 0.75 | 2.5 |
| 1 | 0 | 1 | -5 | 14 | 2 | 1 | 0.6 | 2 |
| 1 | 1 | 0 | -6 | 15.6 | 1.67 | 0.83 | 0.5 | 1.7 |
| 1 | 1 | 1 | -7 | 16.9 | 1.43 | 0.71 | 0.43 | 1.4 |


REVISION HISTORY
ECO
REV
DESCRIPTION
DATE
APPROVED
2
PROTO
09/20/02
LTC CONFIDENTIAL - For Customer Use Only
VERSION
IC (U1)
-A
LTC6910-1CTS8
-B
LTC6910-2CTS8
-C
LTC6910-3CTS8
DUAL SUPPY PLACE JUMPER:
JP4 - PINS 2-3
JP5 - PINS 1-2
SINGLE SUPPLY PLACE JUMPER:
JP4 - PINS 1-2
JP5 - PINS 2-3
C6 TO BE USED ONLY IN DUAL SUPPLY OPERATION
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON ANGLE - - -
2 PLACES - - - 3 PLACES - - -
INTERPRET DIM AND TOL
PER ASME Y14.5M -1994
THIRD ANGLE PROJECTION
CONTRACT NO.
APPROVALS
DATE
DRAWN MEI
08/12/02
CHECKED
APPROVED
ENGINEER
DESIGNER
TITLE
SCH, LTC6910-1CTS8/LTC6910-2CTS8/LTC6910-3CTS8,
DIGITALLY CONTROLLED PROGRAMMABLE-GAIN AMPLIFIER
SIZE
CAGE CODE
DWG NO
DC566A
REV
2
DO NOT SCALE DRAWING
Tuesday, January 21, 2003
SCALE: NONE
FILENAME: DC566A-2.DSN
SHEET 1 OF 1

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