

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 566

## DIGITALLY CONTROLLED PROGRAMMABLE GAIN AMPLIFIER

LTC6910

### 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.

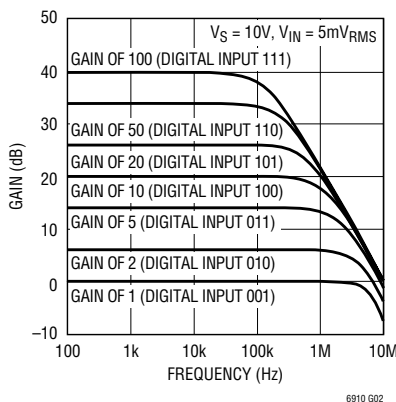
All three-demo boards have input jumpers to select between AC or DC coupling of the input, and a jumper to select operation with a single or dual supply. Typical applications include data acquisition systems, dynamic gain changing, automatic ranging circuits and automatic gain control. The LTC6910 family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

erate from single or split supplies from 2.7V to 10.5V total between  $V_+$  and  $V_-$ .

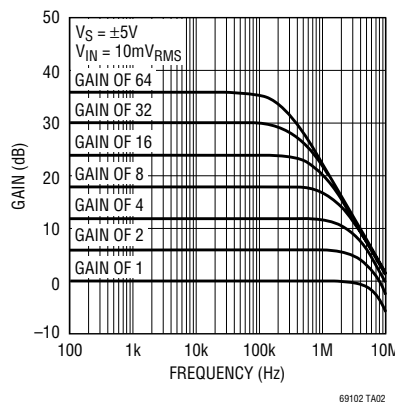
**Design files for this circuit board are available. Call the LTC factory.**

**Table 1. Performance Summary ( $T_A = 25^\circ\text{C}$ )**

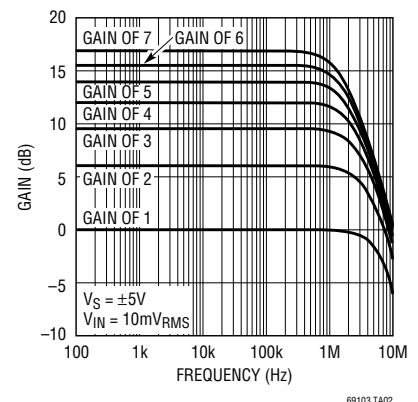
PARAMETER	CONDITION	VALUE
Supply Voltage Range	$V_+$ to $V_-$	2.7V to 10.5V
Gain Accuracy	Gain Dependent (see Data Sheet)	Typical $\pm 0.05\text{dB}$ at Gain = 1 and $\pm 0.4\text{ dB}$ at Gain = 100
Slew Rate	$V_S = \pm 2.5\text{V}$ , $V_{OUT} = \pm 1.4\text{V}$	12V/ $\mu\text{s}$
	$V_S = \pm 5\text{V}$ , $V_{OUT} = \pm 1.4\text{V}$	16V/ $\mu\text{s}$



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



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



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

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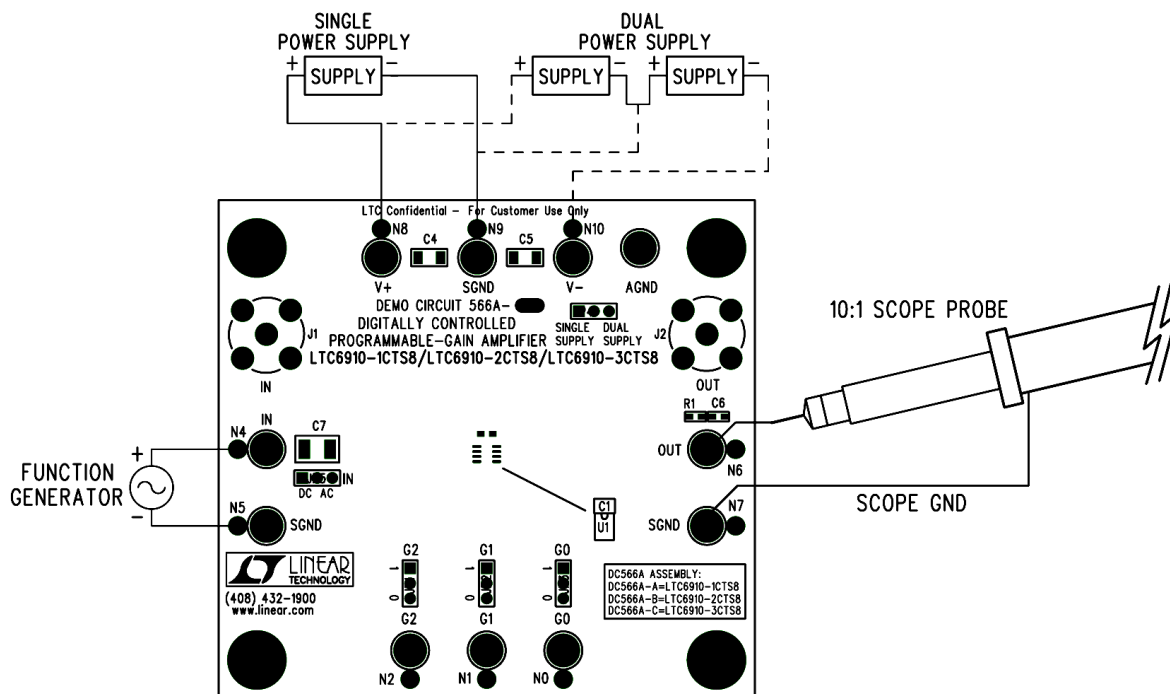


Figure 4. Proper Measurement Equipment Setup

## 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

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

$C_7 = 10\mu F$ ,  $R_{INPUT}$  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<sub>P-P</sub> signal.
4. Set the input jumper to give the desired input coupling, AC or DC.

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- Turn on the power supply and connect the signal generator to the IN BNC, or turrets as shown in Figure 4.
- Monitor the output (BNC or test point) with an oscilloscope to observe a 1kHz 1V<sub>P-P</sub> signal.
- 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<sub>P-P</sub> (see Table 2).

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

G2	G1	G0	NOMINAL VOLTAGE GAIN		NOMINAL LINEAR INPUT RANGE (V <sub>P-P</sub> )			NOMINAL INPUT IMPEDANCE (K $\Omega$ )
			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

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

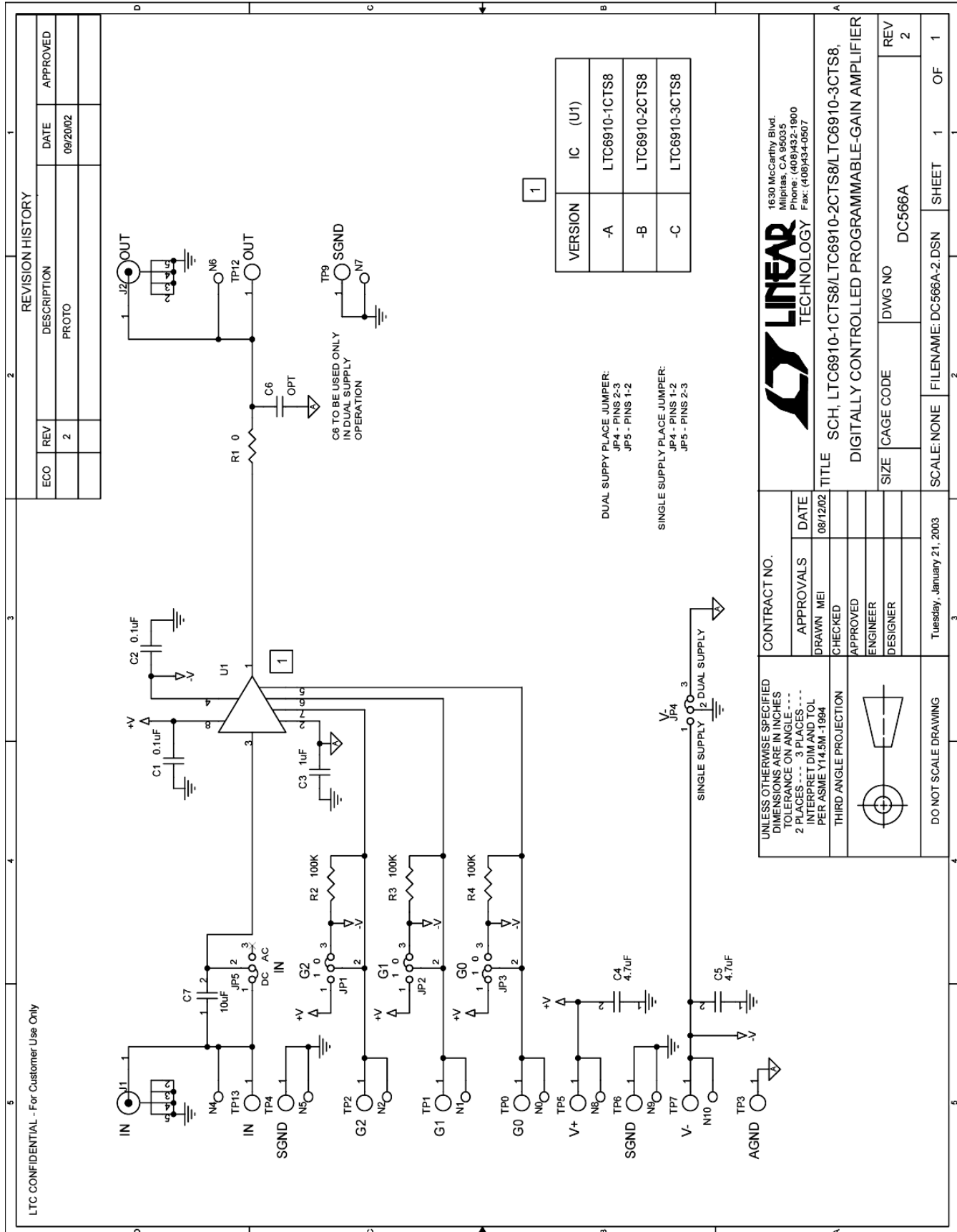
G2	G1	G0	NOMINAL VOLTAGE GAIN		NOMINAL LINEAR INPUT RANGE ( $V_{P-P}$ )			NOMINAL INPUT IMPEDANCE ( $K\Omega$ )
			VOLTS/VOLT	(dB)	DUAL 5V SUPPLY	SINGLE 5V SUPPLY	SINGLE 3V SUPPLY	
1	0	0	0	-120	10	5	3	OPEN
0	0	1	-1	0	10	5	3	10
0	1	0	-2	6	5	2.5	1.5	5
0	1	1	-4	12	2.5	1.25	0.75	2.5
1	0	0	-8	18.06	125	0.625	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 ( $K\Omega$ )
			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

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<i>Item</i>	<i>Qty</i>	<i>Ref</i>	<i>Desc</i>	<i>Part Number</i>
1	2	C1,C2	CAP, X7R 0.1uF 16V 10% 0603	AVX 0603YC104KAT
	1	C3	CAP, X5R 1uF 10V 10% 0603	AVX 0603ZD105KAT
2	2	C5,C4	CAP, X5R 4.7uF 16V 20% 1206	TAIYO YUDEN EMK316BJ475ML-T
3	0	C6	CAP, 0603 OPTION	OPTION
4	1	C7	CAP, X7R 10uF 20% 10V 1210	TAIYO YUDEN LMK325BJ106MN-T
5	5	JP1,JP2,JP3,JP4,JP5	HEADER, 3PIN, 2mm	COMM CON 2802S-03G2
6	2	J2,J1	CONN, BNC,5 PINS	CONNEX 112404
7	1	R1	RES, 0 OHM JUMPER 1/16W 0603	AAC CJ06-000
8	11	TP0-TP7,TP9,TP12,TP13	TURRET	MILL MAX2501-2
9	1	U1	IC, LTC6910-2CTS8	LINEAR TECH LTC6910-2CTS8
10	5	JP1,JP2,JP3,JP4,JP5	SHUNT, 2 PINS 2mm	COMM CON CCIJ2mm-138G
	3	R2,R3,R4	RES, 100K OHMS 5% 1/16W 0805	AAC CR10-104JM