

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/ μs
	$V_S = \pm 5\text{V}$, $V_{OUT} = \pm 1.4\text{V}$	16V/ μs

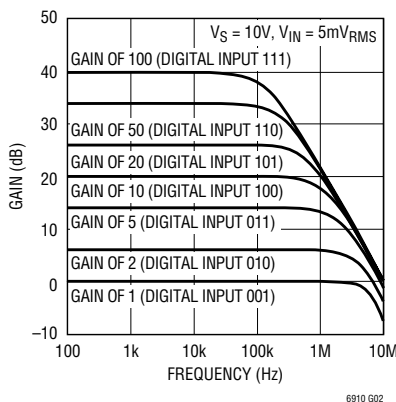


Figure 1. LTC6910-1 Frequency Response

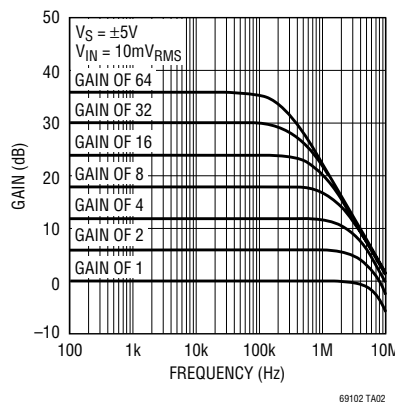


Figure 2. LTC6910-2 Frequency Response

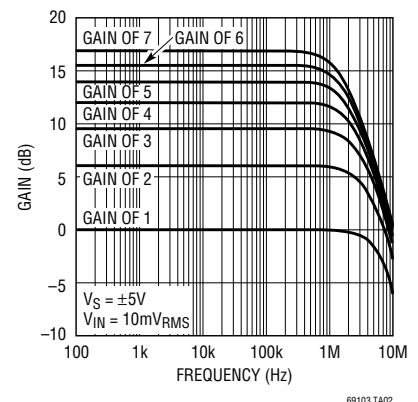


Figure 3. LTC6910-3 Frequency Response

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 566

DIGITALLY CONTROLLED PROGRAMMABLE GAIN AMPLIFIER

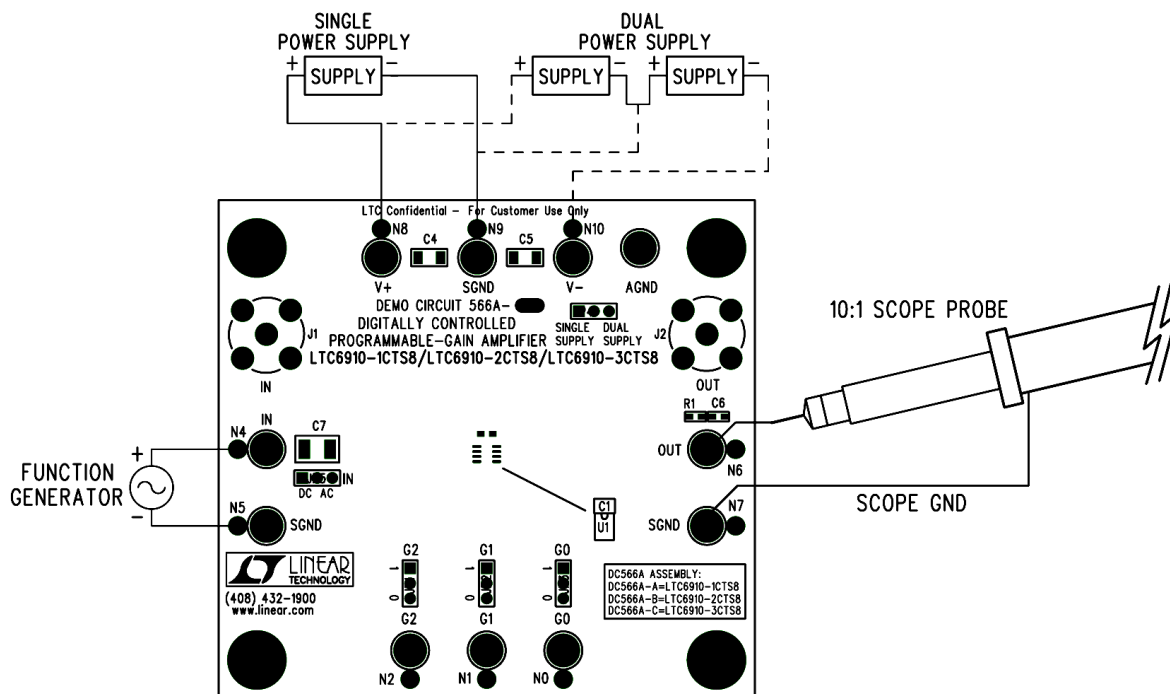


Figure 4. Proper Measurement Equipment Setup

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_{P-P} signal.
4. Set the input jumper to give the desired input coupling, AC or DC.

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 566

DIGITALLY CONTROLLED PROGRAMMABLE GAIN AMPLIFIER

- 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_{P-P} 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_{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 (K Ω)
			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

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 566

DIGITALLY CONTROLLED PROGRAMMABLE GAIN AMPLIFIER

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

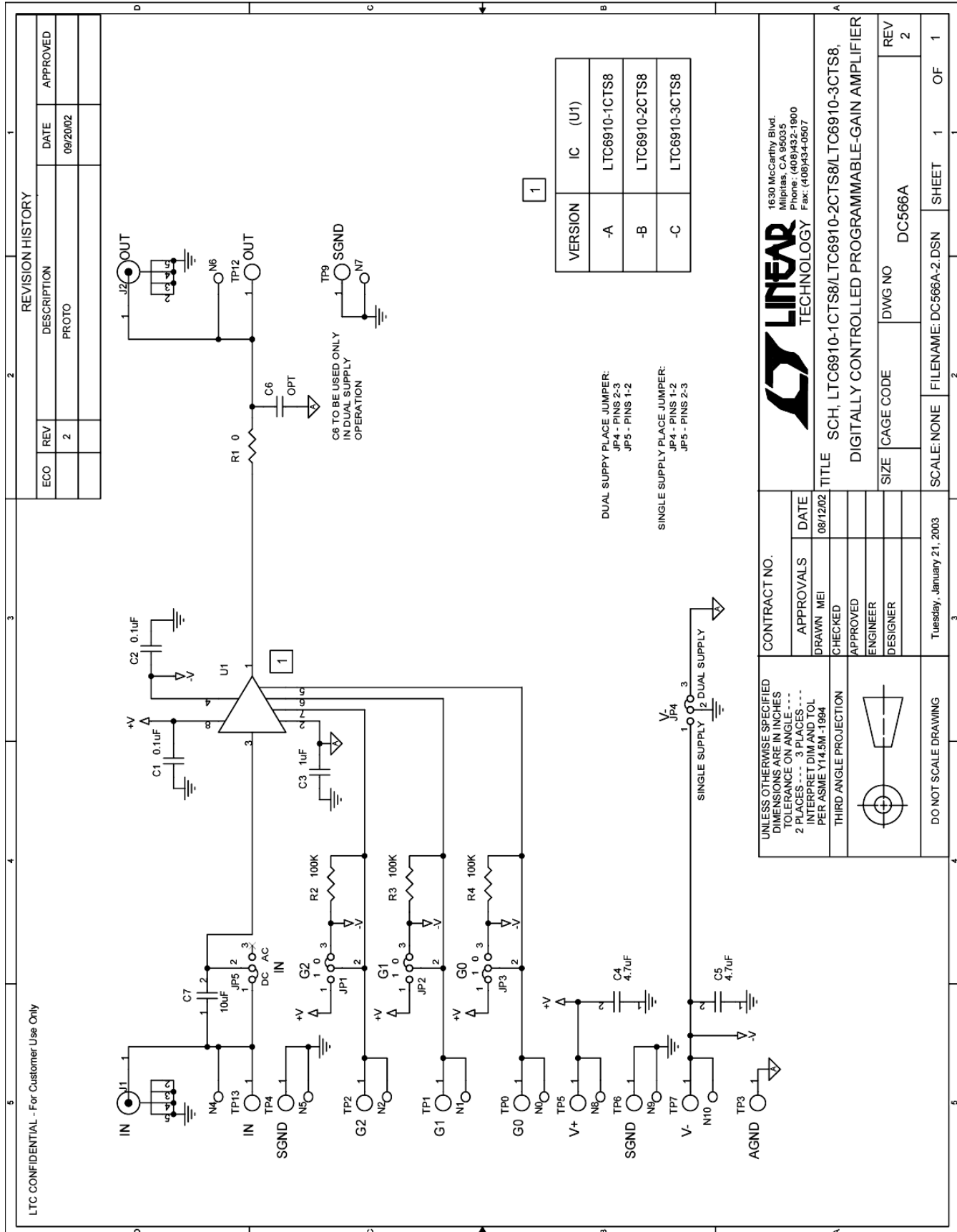
G2	G1	G0	NOMINAL VOLTAGE GAIN		NOMINAL LINEAR INPUT RANGE (V_{P-P})			NOMINAL INPUT IMPEDANCE (K Ω)
			VOLTS/VOLT	(dB)	DUAL 5V SUPPLY	SINGLE 5V SUPPLY	SINGLE 3V SUPPLY	
1	0	0	0	-120	10	5	3	OPEN
0	0	1	-1	0	10	5	3	10
0	1	0	-2	6	5	2.5	1.5	5
0	1	1	-4	12	2.5	1.25	0.75	2.5
1	0	0	-8	18.06	125	0.625	0.375	1.25
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 Ω)
			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

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 566

DIGITALLY CONTROLLED PROGRAMMABLE GAIN AMPLIFIER



<i>Item</i>	<i>Qty</i>	<i>Ref</i>	<i>Desc</i>	<i>Part Number</i>
1	3	C1,C2,C3	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 10V 20% 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, LTC6910-3CTS8	LINEAR TECH LTC6910-3CTS8
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