LTC2236, LTC2237, LTC2238, LTC2239, LTC2225, LTC2226, LTC2227, LTC2228, LTC2229, LTC2245, LTC2246, LTC2247, LTC2248, LTC2249 LTC2250, LTC2251, LTC2252, LTC2253, LTC2254, or LTC2255

DESCRIPTION

Demonstration circuit 782 supports a family of 10/12/14 BIT 10 TO 125 MSPS ADCs. Each assembly features one of the following devices: LTC2236, LTC2237, LTC2238, LTC2239, LTC2225, LTC2226, LTC2227, LTC2228, LTC2229, LTC2245, LTC2246, LTC2247, LTC2248, LTC2249, LTC2250, LTC2251 LTC2253, LTC2254, or LTC2255 high speed, high dynamic range ADCs.

Several versions of the 782A demo board supporting the 10 BIT, 12 BIT and 14 BIT series of A/D converters across the 10 to 125 MSPS speed/power range are listed in Table 1.

Depending on the required resolution, sample rate and input frequency, the DC782 is supplied with the appropriate A/D and with an optimized input circuit The circuitry on the analog inputs is optimized for analog input frequencies below 70 MHz or between 70 MHz to 170 MHz (Please read **ANALOG INPUT NETWORK** SECTION). For Higher operating frequencies, contact the factory for support.

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

Table 1. DC782A Variants

DC782 VARIANTS	ADC PART NUMBER	RESOLUTION*	MAXIMUM SAMPLE RATE	INPUT FREQUENCY
782A-A	LTC2249	14-Bit	80Msps	1MHz < A_{IN} < 70MHz
782A-B	LTC2248	14-Bit	65Msps	1MHz < A_{IN} < 70MHz
782A-C	LTC2247	14-Bit	40Msps	1MHz < A_{IN} < 70MHz
782A-D	LTC2246	14-Bit	25Msps	1MHz < A_{IN} < 70MHz
782A-E	LTC2245	14-Bit	10Msps	1MHz < A_{IN} < 70MHz
782A-F	LTC2229	12-Bit	80Msps	1MHz < A_{IN} < 70MHz
782A-G	LTC2228	12-Bit	65Msps	1MHz < A_{IN} < 70MHz
782A-H	LTC2227	12-Bit	40Msps	1MHz < A_{IN} < 70MHz
782A-J	LTC2226	12-Bit	25Msps	1MHz < A_{IN} < 70MHz
782A-K	LTC2225	12-Bit	10Msps	1MHz < A_{IN} < 70MHz
782A-L	LTC2239	10-Bit	80Msps	1MHz < A_{IN} < 70MHz
782A-M	LTC2238	10-Bit	65Msps	1MHz < A_{IN} < 70MHz
782A-N	LTC2237	10-Bit	40Msps	1MHz < A_{IN} < 70MHz
782A-P	LTC2236	10-Bit	25Msps	1MHz < A_{IN} < 70MHz
782A-Q	LTC2249	14-Bit	80Msps	70MHz <A_{IN} < 170MHz
782A-R	LTC2248	14-Bit	65Msps	70MHz <A_{IN} < 170MHz
782A-S	LTC2255	14-Bit	125 Msps	10MHz <A_{IN} < 170MHz
782A-T	LTC2254	14-Bit	105 Msps	10MHz <A_{IN} < 170MHz
782A-U	LTC2253	12-Bit	125 Msps	10MHz <A_{IN} < 170MHz
782A-V	LTC2252	12-Bit	105 Msps	10MHz <A_{IN} < 170MHz
782A-W	LTC2251	10-Bit	125 Msps	10MHz <A_{IN} < 170MHz
782A-X	LTC2250	10-Bit	105 Msps	10MHz <A_{IN} < 170MHz

Table 2. Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Supply Voltage	Depending on sampling rate and the A/D converter provided, this supply must provide up to 150mA.	Optimized for 3.0V [2.7V ⇔3.6V min/max]
Analog input range	Depending on Sense Pin Voltage	$1V_{PP}$ to $2V_{PP}$
Logic Input Voltages	Minimum Logic High	2.4V
	Maximum Logic Low	0.8V
Logic Output Voltage (ALVCH16373 output buffer, V_{cc} = 2.5V)	Minimum Logic High @ -1.6mA	2.3V (33ΩSeries terminations)
	Maximum Logic Low @ 1.6mA	0.7V (33ΩSeries terminations)
Sampling Frequency (Convert Clock Frequency)	See Table 1	
Convert Clock Level	50 Ω Source Impedance, AC coupled or ground referenced (Convert Clock input is capacitor coupled on board and terminated with 50Ω.)	$2V_{P-P}$ ⇔$2.5V_{P-P}$ Sine Wave or Square wave
Resolution	See Table 1	
Input frequency range	See Table 1	
SFDR	See Applicable Data Sheet	
SNR	See Applicable Data Sheet	

QUICK START PROCEDURE

Demonstration circuit 782 is easy to set up to evaluate the performance of any of the LTC223X, LTC222X or LTC224X family of A/D converters – LTC2236, LTC2237, LTC2238, LTC2239, LTC2225, LTC2226, LTC2227, LTC2228, LTC2229, LTC2245, LTC2246, LTC2247, LTC2248, LTC2249, LTC2250, LTC2251 LTC2253, LTC2254, or LTC2255. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

SETUP

If a DC718 QuickDATS Data Acquisition and Test System was supplied with the DC782 demonstration circuit, follow the DC718 Quick Start Guide to install the required software and for connecting the DC718 to the DC782 and to a PC running Windows98, 2000 or XP.

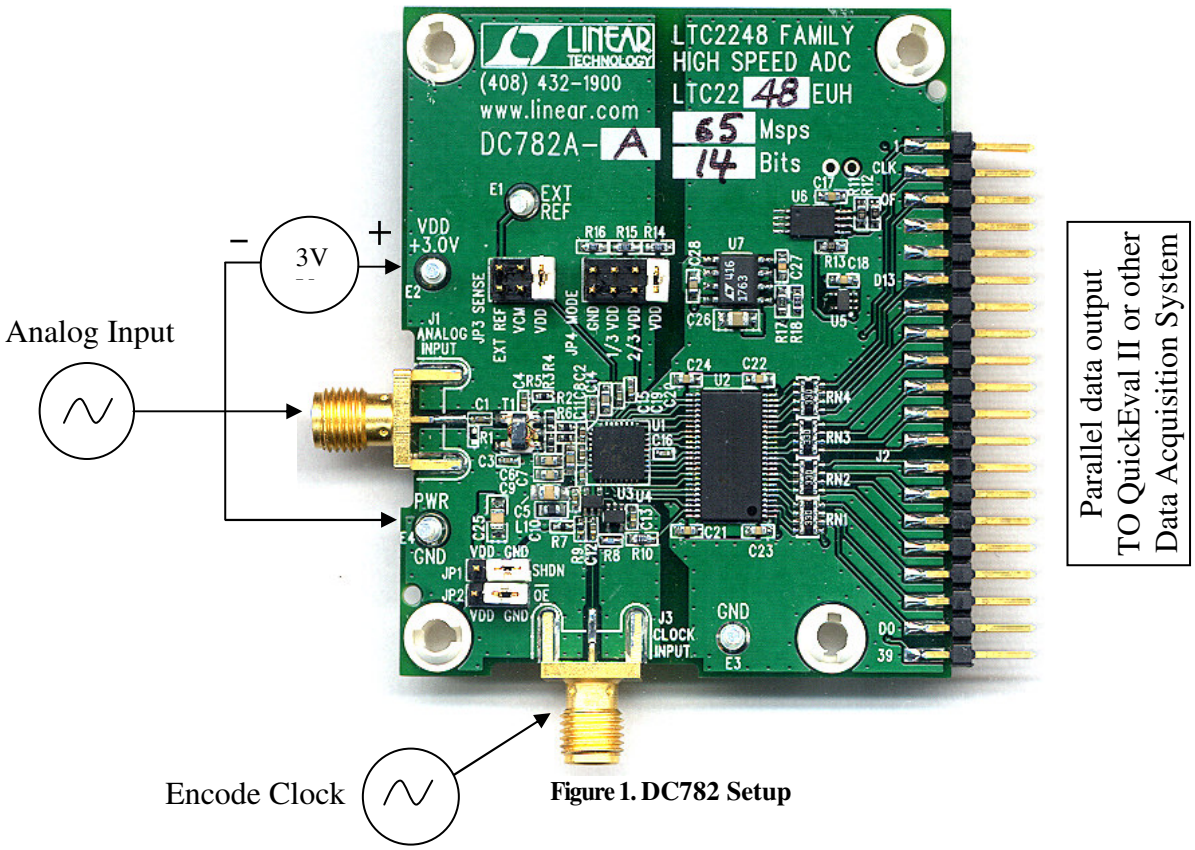


Figure 1. DC782 Setup

DC782 DEMONSTRATION CIRCUIT BOARD JUMPERS

The DC782 demonstration circuit board should have the following jumper settings:

JP1: SHDN: Ground, enables ADC core.

JP2: $\overline{OE}$: Ground, enables digital outputs.

JP3: SENSE: Select VDD for the $2V_{PP}$ input range
SENSE: Select VCM for the $1V_{PP}$ input range.

JP4: MODE: Select VDD (For 2's complement output format for PScope compatibility) and disables Clock Duty Cycle Stabilizer.

APPLYING POWER AND SIGNALS TO THE DC782 DEMONSTRATION CIRCUIT BOARD:

If a DC718 is used to acquire data from the DC782, the DC718 must FIRST be connected to a powered USB port or provided an external 6-9V BEFORE applying +3V across the pins marked "+3.0V" and "PWR GND" on the DC782. The DC782 demonstration circuit requires up to 150 mA depending on the sampling rate and the A/D converter supplied.

The DC718 data collection board is powered by the USB cable and does not require an external power supply unless it must be connected to the PC through an un-powered hub in which case it must be supplied an external 6-9V on turrets G7(+) and G1(-) or the adjacent 2.1mm power jack.

ENCODE CLOCK

NOTE: THIS IS NOT A LOGIC LEVEL INPUT. Apply an encode clock to the SMA connector on the DC782 demonstration circuit board marked "CLOCK INPUT". Refer to Table 2 for recommended level, impedance and coupling. This input is connected to ground through a 50Ω resistor. For the very best noise performance, the CLOCK INPUT must be driven with a very low jitter source. When using a sinusoidal generator, the amplitude should be as large as possible, up to $3V_{P-P}$. Using band pass filters on the clock and the analog input will improve the noise performance by reducing the wideband noise power of the signals. Data sheet FFT plots are taken with 10 pole LC filters made by TTE (Los Angeles, CA) to suppress signal generator harmonics, non-harmonically related spurs and broad band noise. Low phase noise Agilent 8664B generators are used with TTE band pass filters for both the Clock input and the Analog input.

[The Encode Clock can be driven with a 2.5V CMOS Logic Level square wave if C12 is replaced with a jumper. Note that the cable carrying the clock signal must be terminated to maintain the signal integrity of the Encode Clock Source. Therefore the signal source must be able to drive the 0 to 2.5V square wave signal into 50Ω load.]

Apply the analog input signal of interest to the SMA connector on the DC782 demonstration circuit board marked "ANALOG INPUT". This input is capacitive coupled to the primary of transformer T1. The conversion clock output is available on pin 3 of J2 and the data samples are available on Pins 11-37 for 14 BITS or (15-37 for 12 BITS) or (17-37 for 10 BITS) of J2. Data can be collected via a logic analyzer, cabled to a development system through a SHORT 2 to 4 inch long 40 pin ribbon cable or collected by the DC718 QuickEval-II Data Acquisition Board using the *PScope System Software* provided or down loaded from the Linear Technology website at http://www.linear.com/software/. If a DC718 was provided, follow the DC718 Quick Start Guide and the instructions below.

To start the data collection software if "*PScope.exe*", is installed (by default) in \Program Files\LTC\PScope\, double click the PScope Icon or bring up the run window under the start menu and browse to the PScope directory and select PScope.

Configure PScope for the appropriate variant of the DC782 demonstration circuit by selecting the correct A/D Converter as installed on the DC782. Under the "Configure" menu, go to "Device." Under the "Device" pull down menu, select device, either LTC2236, LTC2237, LTC2238, LTC2239, LTC2225, LTC2226, LTC2227, LTC2228, LTC2229, LTC2245, LTC2246, LTC2247, LTC2248, LTC2249, LTC2250, LTC2251 LTC2253, LTC2254, or LTC2255. If only a 14 BIT demonstration circuit was provided, 12 and 10 BIT performance can be simulated by selecting the appropriate LTC222X or LTC223X part in the Device List and PScope will automatically blank the last two or four LSBs when using a DC782 supplied with a 14 BIT part.

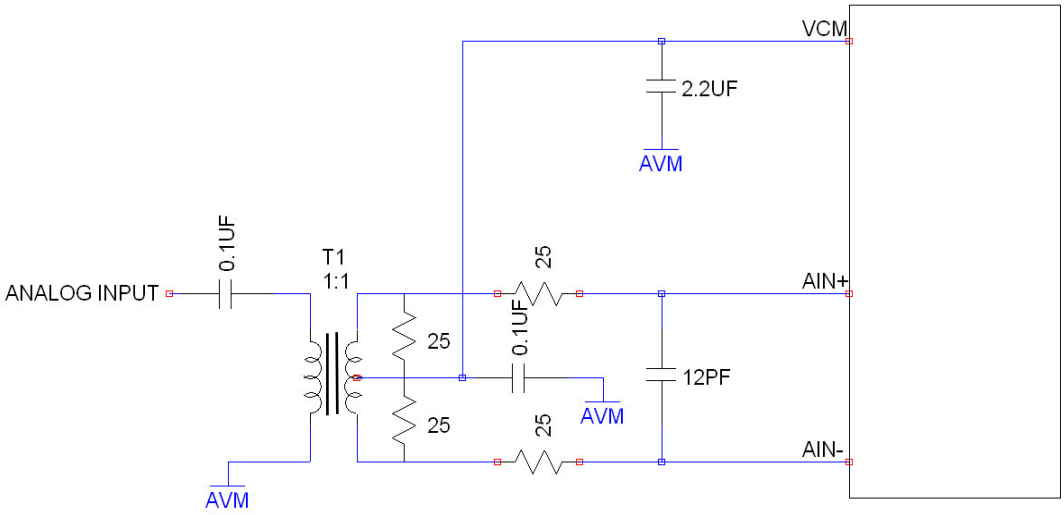
If everything is hooked up properly, powered and a suitable convert clock is present, clicking the "Collect" button should result in time and frequency plots displayed in the PScope window. Additional information and help for *PScope* is available in the DC718 Quick Start Guide and in the online help available within the *PScope* program itself.

ANALOG INPUT NETWORK

For optimal distortion and noise performance the RC network on the analog inputs are optimized for different analog input frequencies on the different versions of the DC782. For input frequencies below about 70 MHz, the circuit in Fig. 2 is recommended (this is installed on DC782 versions A,B,C,D,E,F,G,H, J,K,L,M,N,P). For input frequencies above 70 MHz and below 170 MHz, the circuit in Fig. 3 is recommended (this is installed on ver-

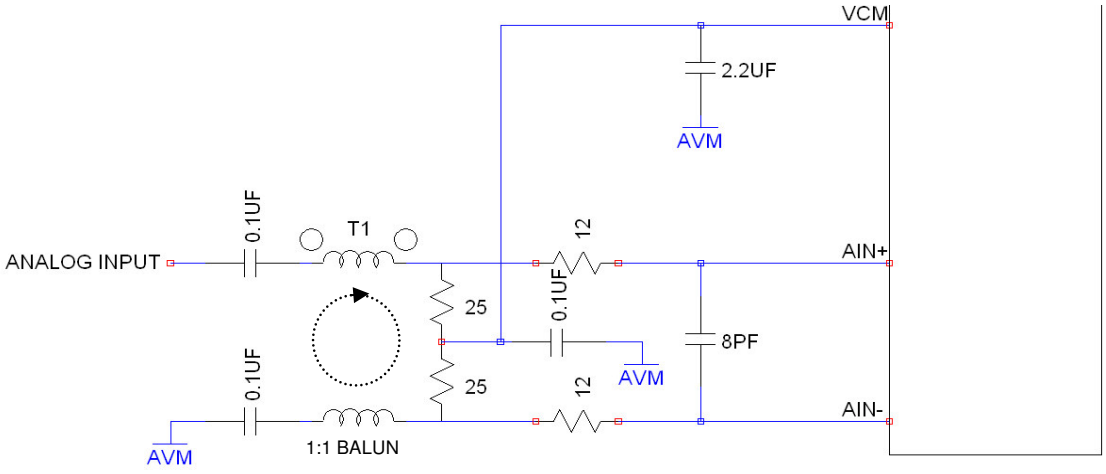
sions Q, R, S, T, U, V, W, X). (This circuit will work below 70MHz, down to below10MHz, but with degraded common mode rejection due to the frequency response of the balun.)

For input frequencies between 170 MHz and 300 MHz, the circuit in Fig. 4 is recommended. For input frequencies greater than 300 MHz contact the factory for support.



T1 = MA/COM ETC1-1T
RESISTORS AND CAPACITORS ARE 0402 PACKAGE SIZE

Figure 2. Analog Front End Circuit For 1MHz < A_{IN} < 70MHz



T1 = MA/COM ETC1-1-13
RESISTORS AND CAPACITORS ARE 0402 PACKAGE SIZE

Figure 3. Analog Front End Circuit For 70MHz < A_{IN} < 170MHz

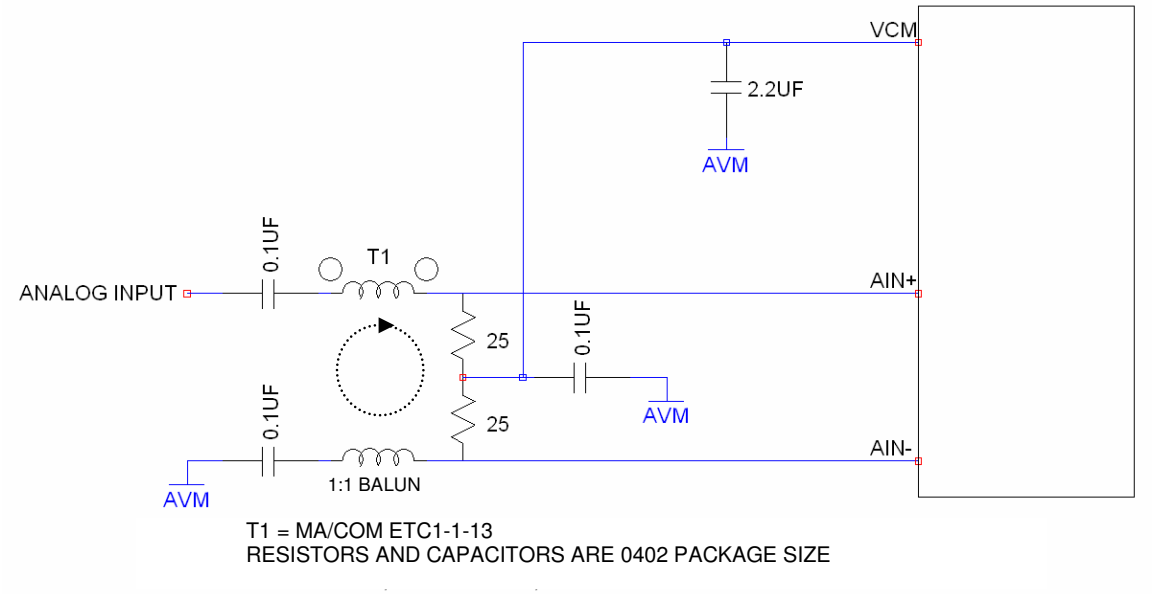


Figure 4. Analog Front End Circuit For 170MHz < A_{IN} < 300MHz