

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 751

10/12-BIT 80, 105 AND 135 MSPS ADC

LTC2222, LTC2223, LTC2232, LTC2233, LTC2224 OR LTC2234

DESCRIPTION

Demonstration circuit 751 supports a family of 10/12-bit 80, 105 and 135 Msps ADCs. Each assembly features one of the following devices: LTC2222, LTC2223, LTC2232, LTC2233, LTC2224 or LTC2234 high speed, high dynamic range ADCs.

Several versions of the 751A demo board supporting the LTC2232/3/4 10-bit and LTC2222/3/4 12-bit series of A/D converters are listed in Table 1. Depending on the required resolution, sample rate and input frequency, the DC751 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 100 MHz or between 100 MHz to 250 MHz. For Higher operating frequencies, contact the factory for support.

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

LTC is a trademark of Linear Technology Corporation

Table 1. DC751A Variants

| DC751 VARIANTS | ADC PART NUMBER | RESOLUTION | MAXIMUM SAMPLE RATE | INPUT FREQUENCY |
|----------------|-----------------|------------|---------------------|-----------------------------------|
| 751A-A | LTC2222 | 12-Bit | 105 Msps | 1MHz < A _{IN} < 100MHz |
| 751A-B | LTC2223 | 12-Bit | 80Msps | 1MHz < A _{IN} < 100MHz |
| 751A-C | LTC2232 | 10-Bit | 105 Msps | 1MHz < A _{IN} < 100MHz |
| 751A-D | LTC2233 | 10-Bit | 80Msps | 1MHz < A _{IN} < 100MHz |
| 751A-E | LTC2222 | 12-Bit | 105 Msps | 100MHz < A _{IN} < 250MHz |
| 751A-F | LTC2223 | 12-Bit | 80Msps | 100MHz < A _{IN} < 250MHz |
| 751A-G | LTC2232 | 10-Bit | 105 Msps | 100MHz < A _{IN} < 250MHz |
| 751A-H | LTC2233 | 10-Bit | 80Msps | 100MHz < A _{IN} < 250MHz |
| 751A-I | LTC2224 | 12-Bit | 135Msps | 1MHz < A _{IN} < 100MHz |
| 751A-J | LTC2234 | 10-Bit | 135Msps | 1MHz < A _{IN} < 100MHz |
| 751A-K | LTC2224 | 12-Bit | 135Msps | 100MHz < A _{IN} < 250MHz |
| 751A-L | LTC2234 | 10-Bit | 135Msps | 100MHz < A _{IN} < 250MHz |

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 751

10/12-BIT 80, 105 AND 135 MSPS ADC

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 200mA. | Optimized for 3.3V [3.1V ↔ 3.5V 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 (33Ω Series terminations) |
| | Maximum Logic Low @ 1.6mA | 0.7V (33Ω Series terminations) |
| Sampling Frequency (Convert Clock Frequency) | See Table 1 | |
| Encode Input Level | 50 Ω Source Impedance. (Encode 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 751 is easy to set up to evaluate the performance of any of the LTC2222/3/4 or LTC2232/3/4 family of A/D converters - LTC2222,

LTC2223, LTC2232, LTC2233 LTC2224 OR LTC2234. 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 DC751 demonstration circuit, follow the DC718 Quick Start Guide to install the

required software and for connecting the DC718 to the DC751 and to a PC running Windows98, 2000 or XP.

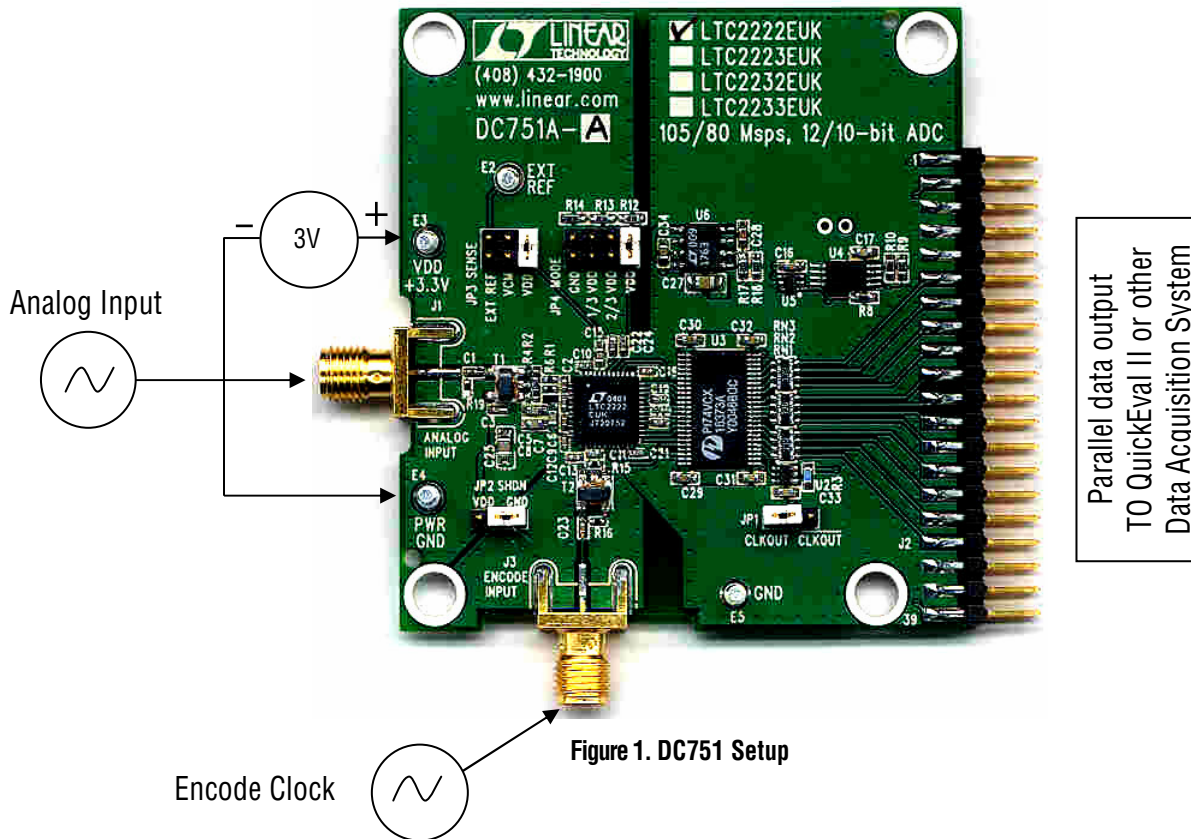


Figure 1. DC751 Setup

DC751 DEMONSTRATION CIRCUIT BOARD JUMPERS

The DC751 demonstration circuit board should have the following jumper settings:

JP1: CLK POL: Non-inverting (CLKOUT).

JP2: SHDN: Ground, enables ADC Core.

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 DC751 DEMONSTRATION CIRCUIT BOARD:

If a DC718 is used to acquire data from the DC751, the DC718 must FIRST be connected to a powered USB port or provided an external 6-9V BEFORE applying +3.3V across the pins marked "+3.3V" and "PWR GND" on the DC751. The DC751 demonstration circuit requires up to 200 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 DC751 demonstration circuit board marked "ENCODE INPUT". Refer to Table 2 for recommended level, impedance and coupling. For the very best noise performance (SNR and SFDR), the ENCODE 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 ENCODE INPUT 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 LTC2222 series of converters Encode Clock interface is very flexible and capable of accommodating both single ended and differential sources. See the LTC2222 data sheet for other Encode Clock drive options.]

Apply the analog input signal of interest to the SMA connector on the DC751 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 11-33 for 12-bits or (11-29 for 10-bits) which can be collected via a logic analyzer, cabled to a de-

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 DC751. For input frequencies below about 100 MHz, the circuit in Fig. 2 is recommended (this is installed on DC751 versions A,B,C,D,I,J). For input frequencies above 100 MHz

velopment 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 DC751 demonstration circuit by selecting the correct A/D Converter as installed on the DC751. Under the "Configure" menu, go to "Device." Under the "Device" pull down menu, select device, either LTC2222, LTC2223, LTC2232, LTC2233 LTC2224 or LTC2234. When evaluating 10-bit performance using a 12-bit part, select the 10-bit part and PScope will automatically blank the last two LSBs when using a DC751 supplied with a 12-bit ADC.

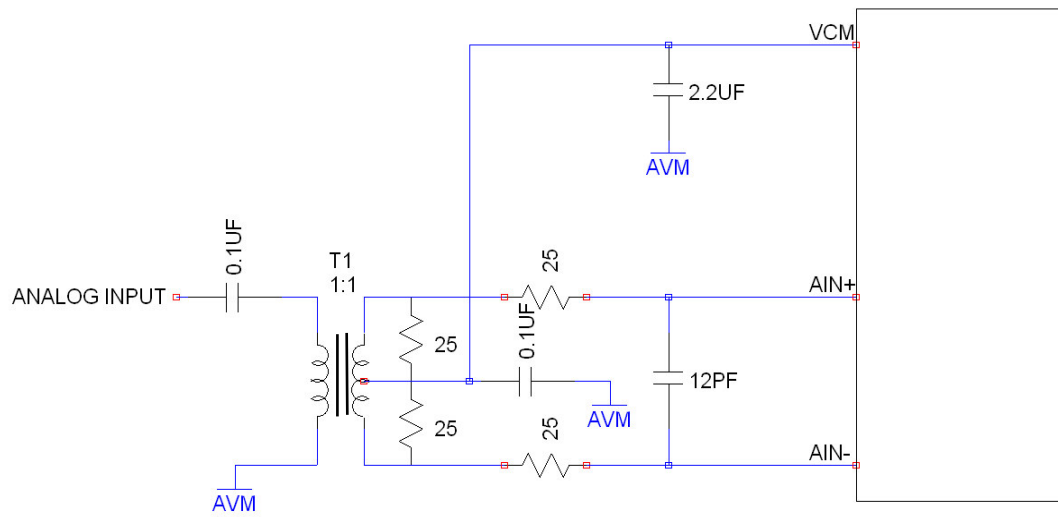
If everything is hooked up properly, powered and a suitable convert clock is present, clicking the "Collect" button should result in time and frequency plots displayed in the PScope window. Additional information and help for *PScope* is available in the DC718 Quick Start Guide and in the online help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

and below 250 MHz, the circuit in Fig. 3 is recommended (this is installed on versions E,F,G,H,K,L).

For input frequencies between 250 MHz and 500 MHz, the circuit in Fig. 4 is recommended. For input frequencies greater than 250 MHz contact the factory for support.

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 751

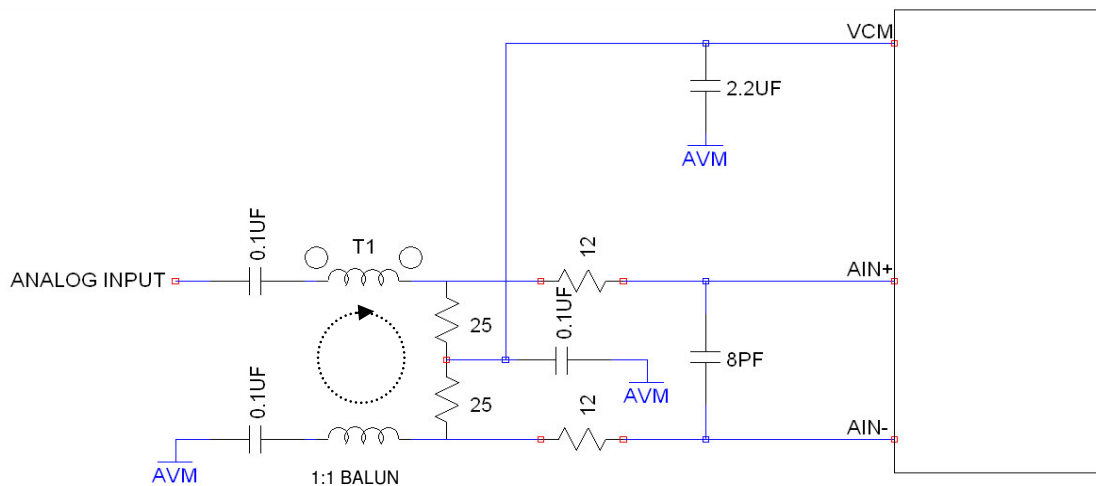
10/12-BIT 80, 105 AND 135 MSPS ADC



T1 = MA/COM ETC1-1T

RESISTORS AND CAPACITORS ARE 0402 PACKAGE SIZE

Figure 2. Analog Front End Circuit For $1\text{MHz} < A_{IN} < 100\text{MHz}$



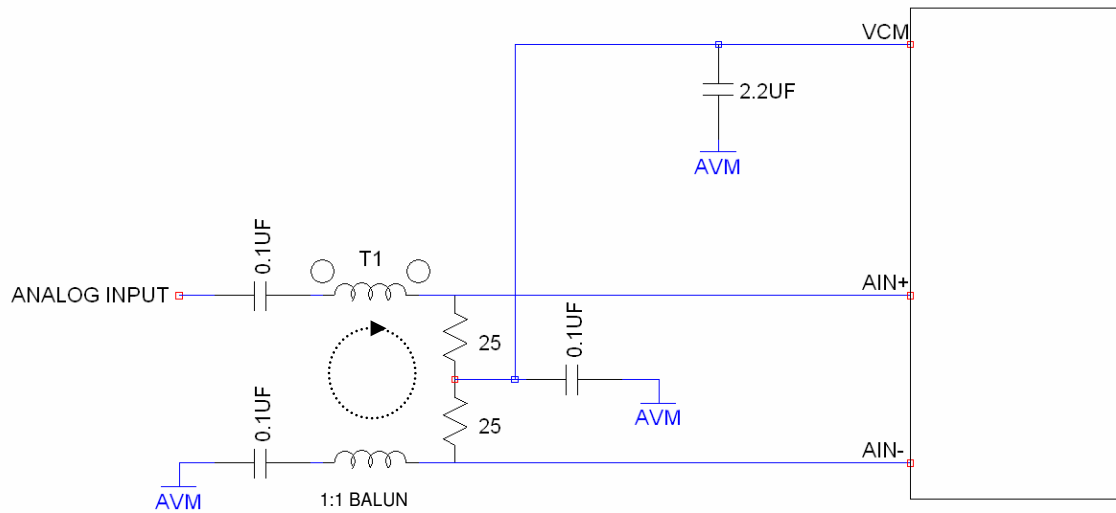
T1 = MA/COM ETC1-1-13

RESISTORS AND CAPACITORS ARE 0402 PACKAGE SIZE

Figure 3. Analog Front End Circuit For $100\text{MHz} < A_{IN} < 250\text{MHz}$

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 751

10/12-BIT 80, 105 AND 135 MSPS ADC



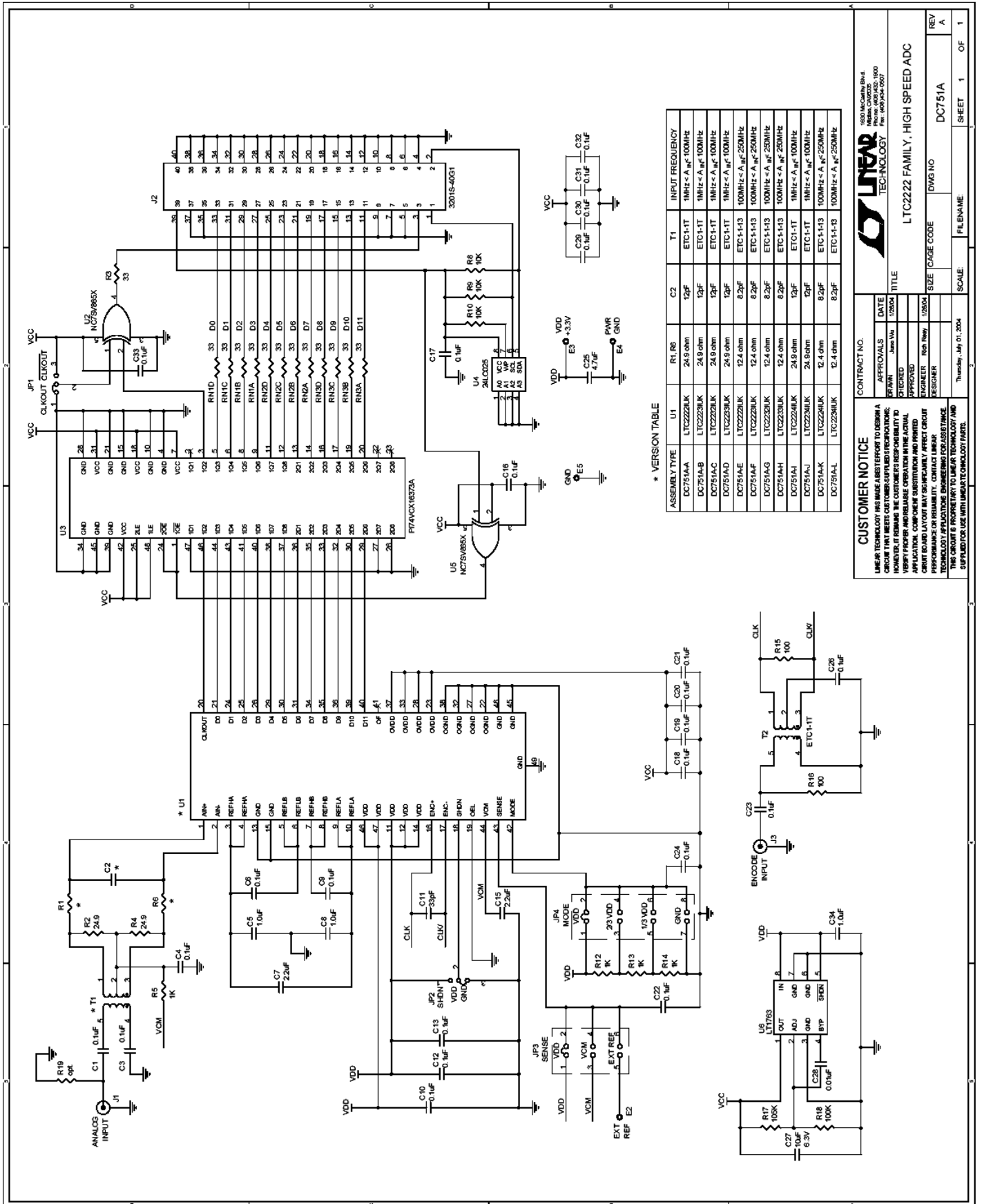
T1 = MA/COM ETC1-1-13

RESISTORS AND CAPACITORS ARE 0402 PACKAGE SIZE

Figure 4. Analog Front End Circuit For $250\text{MHz} < A_{IN} < 500\text{MHz}$

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 751

10/12-BIT 80, 105 AND 135 MSPS ADC



* VERSION TABLE

| ASSEMBLY TYPE | U1 | R1, R8 | C2 | T1 | INPUT FREQUENCY |
|---------------|-------------|----------|-------|-----------|-----------------------------------|
| DC751A-A | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1T | 1MHz < A _{IN} < 100MHz |
| DC751A-B | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1T | 1MHz < A _{IN} < 100MHz |
| DC751A-C | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1T | 1MHz < A _{IN} < 100MHz |
| DC751A-D | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-E | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-F | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-G | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-H | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-I | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1T | 1MHz < A _{IN} < 100MHz |
| DC751A-J | LT1C2228LJK | 24.9 ohm | 12pF | ETC1-1T | 1MHz < A _{IN} < 100MHz |
| DC751A-K | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |
| DC751A-L | LT1C2228LJK | 12.4 ohm | 6.2pF | ETC1-1-13 | 100MHz < A _{IN} < 250MHz |

CUSTOMER NOTICE

LINEAR TECHNOLOGY MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, REGARDING THE PERFORMANCE OF THE PRODUCT IN ANY APPLICATION. THE USER SHALL BE RESPONSIBLE FOR VERIFYING PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENTS OPERATING AT THE LIMITS OF PERFORMANCE OR RELIABILITY AFFECT CIRCUIT PERFORMANCE. LINEAR TECHNOLOGY ASSUMES NO LIABILITY FOR DAMAGE TO OR LOSS OF DATA FROM ANY SOFTWARE OR HARDWARE SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PRODUCTS.

| | |
|--------------|------|
| CONTRACT NO. | DATE |
| APPROVALS | DATE |
| DESIGNED BY | DATE |
| CHECKED BY | DATE |
| APPROVED BY | DATE |
| DESIGNED BY | DATE |
| ENGINEER | DATE |
| DESIGNER | DATE |

1000 McCallum Blvd
Melrose, CA 94565
Tel: 916/752-0000
Fax: 916/752-0007

LINEAR TECHNOLOGY

LT1C2222 FAMILY, HIGH SPEED ADC

REV A

DC751A

SHEET 1 OF 1