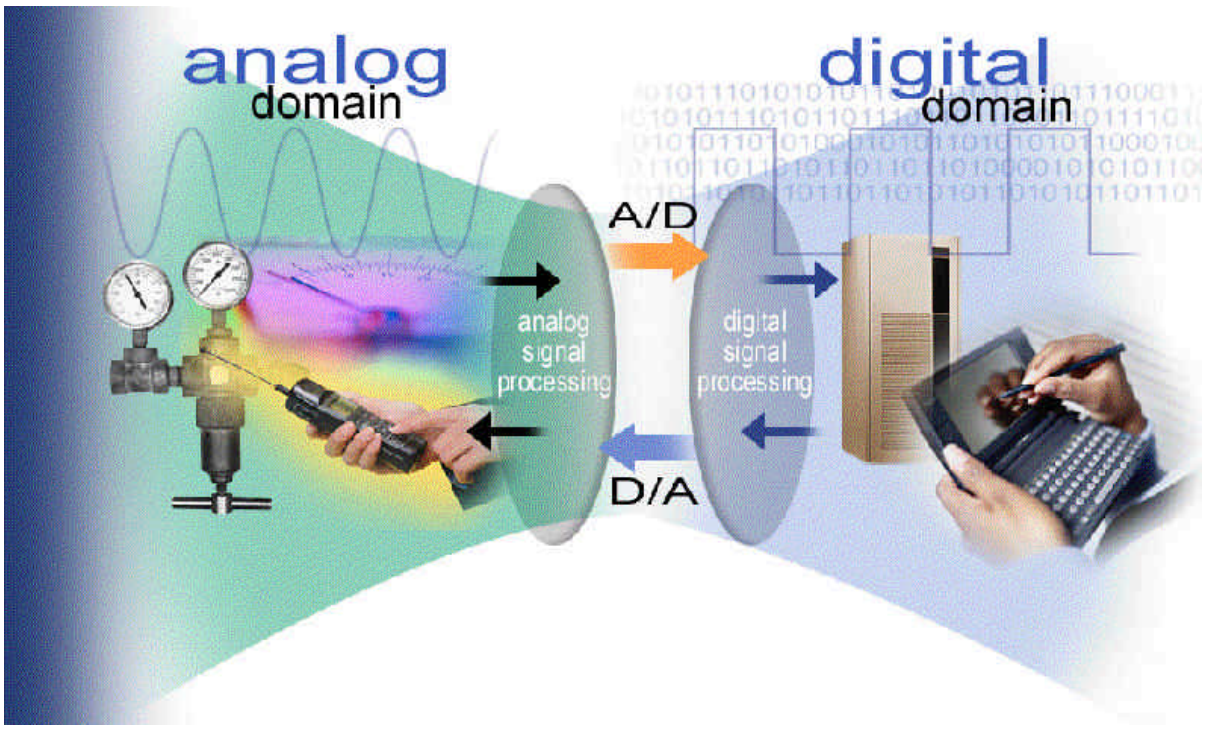
ADuC814 Evaluation Board Reference Guide



MicroConverter® ADuC814

QuickStart™ Development System

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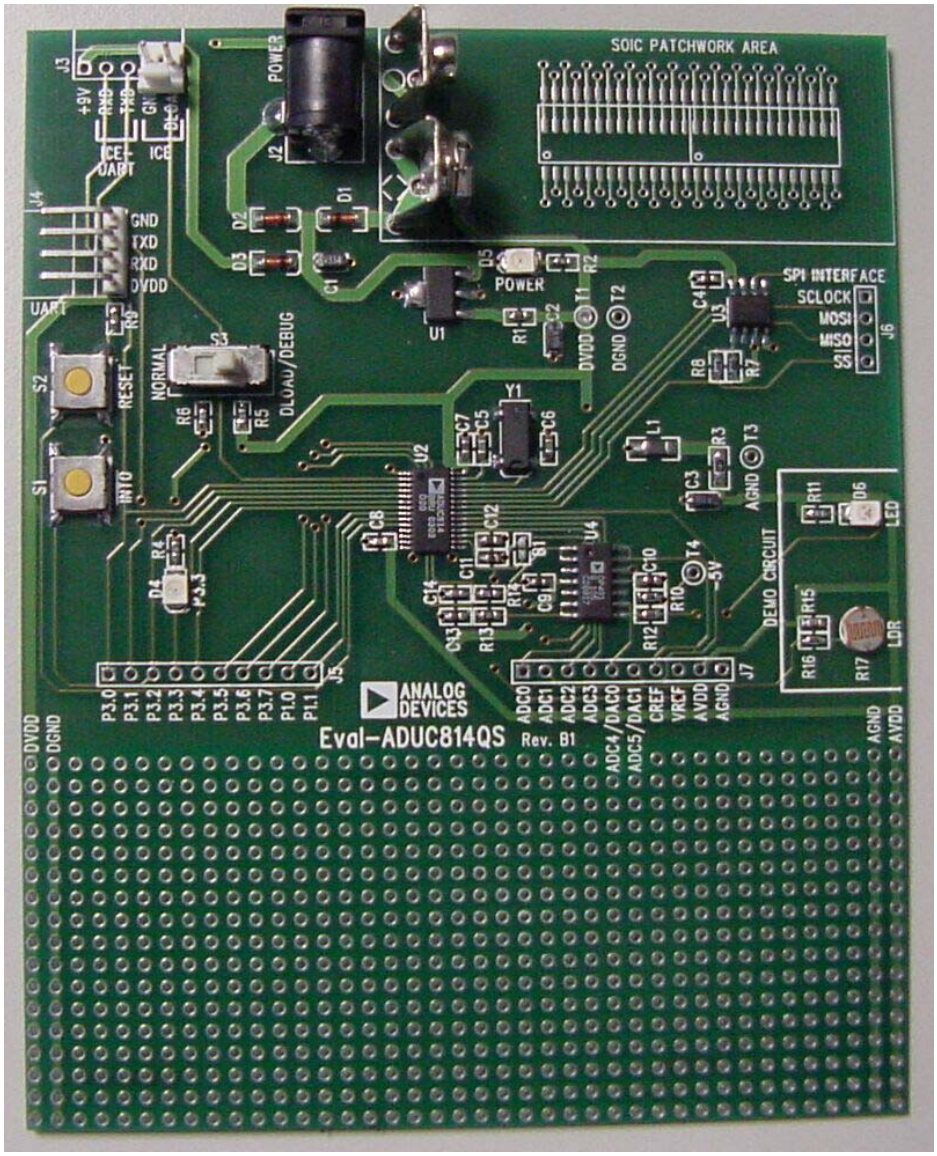

Figure 1: Reference Orientation of the ADuC814 Evaluation Board

1.0 EVALUATION BOARD OVERVIEW

The ADuC814 – 28TSSOP Evaluation board has the following features:

- 2 Layer PCB (5" X 4" Form Factor)
- 9V input power supply/9V battery connection, regulated to 5V on board
- 4 pin UART header to connect to the RS232 Interface Cable
- 5 pin ICE-UART header to connect to external emulator board.
- 64K bit (8k * 8 bit) SPI FRAM
- On board 32.768kHz Crystal
- Quad Op-amp
- Example LDR Sensor circuit on-board
- Reset/External Interrupt Buttons
- Power indicator/General Purpose LEDs
- Access to all ADC inputs from external header. DAC output channel buffered to external header. All device Ports are brought out to external header pins
- Surface Mount and Through-Hole General Purpose Prototype Area

NOTES :

1. All references in this document to physical orientation, placement of connectors and components are made with respect to a component side view of the board with the Battery Connector (J1) appearing in the top right hand corner of the board as shown in figure 1.

2. The board is laid out to minimize coupling between the analog and digital sections of the board. To this end, the ground plane is split with the analog section on the bottom right hand side and a digital plane on the rest of the board. The regulated 5V power supply is routed directly to the digital section and is filtered before being routed into the analog section of the board.

2.0 EVALUATION BOARD FEATURES

Power Supply:

The user should connect the 9V battery via J1(-) and J1(+). The 9V supply is regulated via a linear voltage regulator (U1). The 5V regulator output being used to drive the rest of the board directly.
Alternatively a 9V supply can be fed to the board via the 2.1mm input power socket (J2). The input connector is configured as 'CENTER NEGATIVE' i.e. GND on the center pin and +9V on the outer shield.
When on, the green LED (D5) indicates that a valid 5V supply is being driven from the regulator circuit.
All active components are decoupled with 0.1uF at device supply pins to ground.

RS232 Interface:
The ADuC814 (U2) TXD and RXD lines are connected to the RS232 Interface Cable via connector (J4). The Interface Cable generates the required level shifting to allow direct connection to a PC serial port. This interface will be the main channel of interactive comms on the board. Ensure that the cable supplied is connected to the board correctly i.e. DVDD is connected to DVDD and GND is connected to GND.

Emulation Interface:
Single pin non-intrusive emulation is possible using the ADuC814 by connecting an emulator to the DLOAD pin. J5 allows direct connection to the emulator board.

External Data Memory Interface:
The Evaluation board incorporates 8K x 8 SPI FRAM (U3). The 3 wire interface to this memory is SPI Mode 0 and Mode 3 compatible. The FRAM is active by default but may be disabled by removing the zero ohm resistor R8.

Analog I/O Connections:
Analog input signals can be applied to the ADuC814 via connector J7. ADC analog input channels 0 and 1 are buffered and filtered with a first order RC. The ADC4/DAC0 channel, has a buffer which is set up for DAC mode. If using this analog I/O as an input the buffer should be removed from the circuit. ADC3 and ADC5/DAC1 channels have direct connection from J7 to the ADuC814.

Crystal Circuit:
The board is fitted with a 32.768kHz crystal, from which the on-chip PLL circuit generates a 16.78 MHz clock.

On-Chip Band Gap Reference Buffer:
A buffered version of the on-chip voltage reference is provided on J7. This voltage is taken from the CREF pin. The internal reference can be bypassed by connecting Vref and Cref inputs together via solder bridge B1 and connecting the external reference to the Vref input. On the device, setting the ADCCON1.6 bit allows the internal reference to be bypassed.

Miscellaneous I/O:

RESET Input: The reset input is driven from the push button switch to allow the user manual access to the reset button.
Note: The ADuC814 reset pin is schmitt triggered internally.

$\overline{\text{INT0}}$ Input : The $\overline{\text{INT0}}$ push button switch is located down the left side of the board beside the Reset Input. It is driven directly to the $\overline{\text{INT0}}$ input on the ADuC814 (U2, Pin 5).

User LED: P3.3 on the ADuC814 drives the Display LED (D4). The CLR instruction turns the LED on and the SETB instruction turns the LED off.

Switch S3 DLOAD

Function: Allows the user to select between Serial Download/Debug mode or Normal mode.

Use : ***Move S3 to DLOAD/DEBUG position*** to enter serial download mode or debug mode on power-on or after a hardware reset (i.e. pressing reset button).
Move S3 to Normal position for normal device operation.

3.0 USING THE LDR CIRCUIT

As can be seen from examining the schematic an example LDR circuit is connected shown in Figure 2 below:

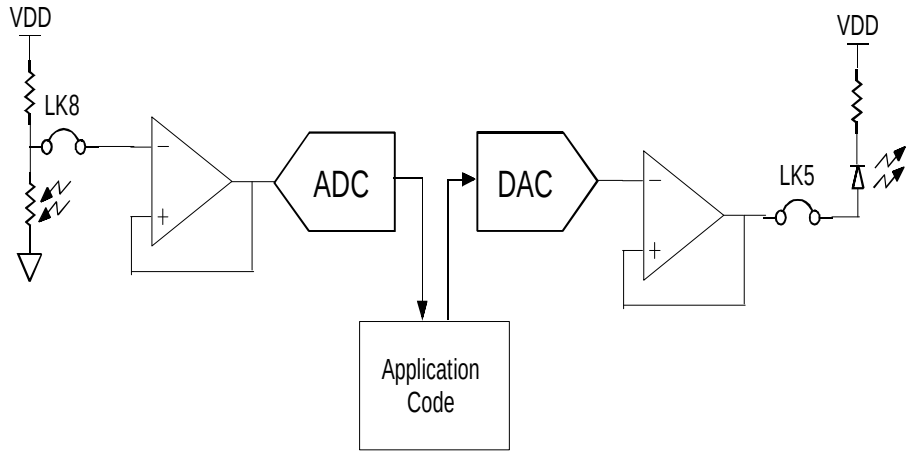

Figure 2: Circuit diagram of the LDR Circuit

Using the sample code in C:\ADuC\code\adc\adcldr.asm the variation in the resistance of the ldr can be seen by the reducing brightness of the output led as the amount of light is decreased.

4.0 EXTERNAL JUNCTIONS CONNECTORS

All Ports Pins, Timer I/O and Device Interface Signals are brought out to external connection points for easy connection via the prototype area or external instruments as detailed below.

J7 Analog I/O Connector

The analog I/O connector J7 carries all ADC inputs and DAC output channels as well as the external V_{REF} and C_{REF} inputs. The pinout and orientation of this connector is shown below.

Pin	Function
1	ADC0
2	ADC1
3	ADC2
4	ADC3
5	ADC4/DAC0
6	ADC5/DAC1
7	C_{REF}(Buffered)
8	V_{REF}
9	AV_{DD}
10	AGND

Table 1: Pin functions for Analog I/O connector J7

J5 (Port 3, Port 1.0 and Port 1.1)

This 10 way connector allows easy access to the general purpose port pins P3.0 – P3.7, P1.0 and P1.1 to and from the ADuC814. The exact pinout of this port is shown in the file 814sch.pdf.

Pin	Function
1	P3.0
2	P3.1
3	P3.2
4	P3.3
5	P3.4
6	P3.5
7	P3.6
8	P3.7
9	P1.0
10	P1.1

Table 1: Pin functions for Analog I/O connector J7

J5 (SPI/I2C Connector)

J5 is situated to the right side of the board and gives access to both the SPI interfaces. The orientation and pinout of the connector is given below.

Pin	Function
1	SCLOCK
2	MOSI
3	MISO
4	$\overline{SS}$

Table 2: Pin functions for SPI connector J7

2.0 ADuC814 Evaluation Board Parts List

Qty.	RefDes	Value	Part Description	Supplier	Cat No
1	U1	ZR78L05G	ZETEX 5V 200mA Regulator SOT-223	Farnell	572-329
1	U2	ADUC814ARU ADUC814BRU	MicroConverter	Analog Devices	
1	U3	FM25640-S	RAMTRON SPI FRAM	Future Electronics Ltd	
1	U4	OP491GS	Quad Single Supply Rail-to-Rail Op-amp	Analog Devices	
1	C1	0.33uF 35V	SMD Tantalum Cap, Taj-A Case	Farnell	498-919
2	C2 C3	10uF 10V	SMD Tantalum Cap, Taj-A Case	Farnell	197-130
9	C4 C7 C8 C9 C10 C11 C12 C13 C14	0.1uF	SMD Ceramic Cap, 0603 Case	Farnell	431-989
2	C5 C6 (Not populated)	18pF	SMD Ceramic Cap, 0603 Case	Farnell	
2	D1 D2 D3	PRLL4002 Diode	SMD Diode (SOD-87 case)	Farnell	316-2734
1	D4	Red LED	SMD LED	Farnell	515-607
1	D5	Green LED	SMD LED	Farnell	515-620
1	D6	Yellow LED	SMD LED	Farnell	515-619
1	J1	Battery Connector	Pair of 9V Snap on Battery Connectors	Farnell	723-988
1	J2	PCB Mounted Socket	PCB Mounted Socket (2.1mm Pin Diameter)	Farnell	224-959
1	J3	2 Pin/5 Pin 90^{o}	Single Row Header	Farnell	143-104
1	J4	4 Pin 90^{o}	Single Row Header	Farnell	672-130
1	J5, J7	10 Pin	Single Row Header	Farnell	511-766
1	J6	4 Pin	Single Row Header	Farnell	511-729
5	R1 R8 R10 R12 R16	0Ω 0.063W 1%	SMD Resistor, 0603 case	Farnell	772-227
3	R2 R4 R11	560Ω 0.063W 1%	SMD Resistor, 0603 case	Farnell	911-203
1	R3	1.5Ω 0.063W 1%	SMD Resistor, 0603 case	Farnell	321-7772
3	R5 R6 R9	1kΩ 0.063W 1%	SMD Resistor, 0603 case	Farnell	911-239
1	R7	4.7kΩ 0.063W 1%	SMD Resistor, 0603 case	Farnell	911-318
2	R13 R14	10Ω 0.063W 1%	SMD Resistor, 0603 case	Farnell	910-995
1	R15	20kΩ 0.063W 1%	SMD Resistor, 0603 case	Farnell	357-1555
1	R17	LDR	MPY54C569 Light Dependant Resistor	Farnell	179-611
1	L1	Ferrite Bead	1206 Case	Farnell	581-094

2	S1 S2	Push button Switch	SMD sealed 6mm Push Button Switch	Farnell	177-807
1	S3	Toggle Switch	Single Pole 2 Position Slide Switch	Farnell	733-647
3	T1 T2 T3 (Not populated)	Testpoint	Raised Loop Testpoint	Farnell	240-345
1	Y1	32.768 kHz XTAL	Seiko MC-306	Farnell	300-3127
1	PCB	Bare Board	Eval-ADuC814QS Rev. A Bare Board		
4	Each Corner	PCB Stand-off	Stick on mounting feet	Farnell	148-922