DAQ-2543
Analog Peripheral Board
Technical Manual

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DAQ-2543 Analog Peripheral Board Technical Manual. No part of this work may be reproduced in any manner without written permission of BiPOM Electronics.

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WARRANTY:

BiPOM Electronics warrants DAQ-2543 for a period of 1 year. If the board becomes defective during this period, BiPOM Electronics will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to DAQ-2543. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM's liability is limited to the purchase price of this product.

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1. Overview

DAQ-2543 is a family of high-perfomance multifunction boards which offers the two most desired measurement and control functions: 12-bit Analog-To-Digital Conversion and 12-bit Digital-To-Analog conversion. When combined with a low-cost microcontroller board, the DAQ-2543 family of boards are very cost-effective solutions for industrial measurement and monitoring applications.

DAQ-2543 has a TLC2543, 11-channel, 12-bit Analog-To-Digital Converter from Texas Instruments.

DAQ-2543-DA is the same as DAQ-2543 with the addition of an LTC1663, 10-bit Digital-To-Analog Converter from Linear Technology. The boards directly interface via expansion connector to Single Board Computer (SBC) systems from Bipom Electronics such as PRO-MAX/51, MINI-MAX/51-C and MINI-MAX/908-C.

2. Specifications

DAQ-2543 board has the following configuration:

- TLC-2543, 12-bit ADC, 11 channels, 0 to 4.096 Volt input range, 10 microsecond conversion time
- Voltage reference, 4.096V
- Expansion connector
- Analog input/output connector
- Analog input/output terminal blocks
- Resettable fuse

DAQ-2543-DA board is the same as DAQ-2543 with the addition of:

- LTC1663, 10-bit DAC, 1 channel

Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).

Mounting holes of 0.138 inches (3.5 millimeters) on four corners.

0° - 70° C operating, -40° - +85° C storage temperature range.

3. Functional Blocks

Figure 1 shows the block diagram of the DAQ-2543 board:

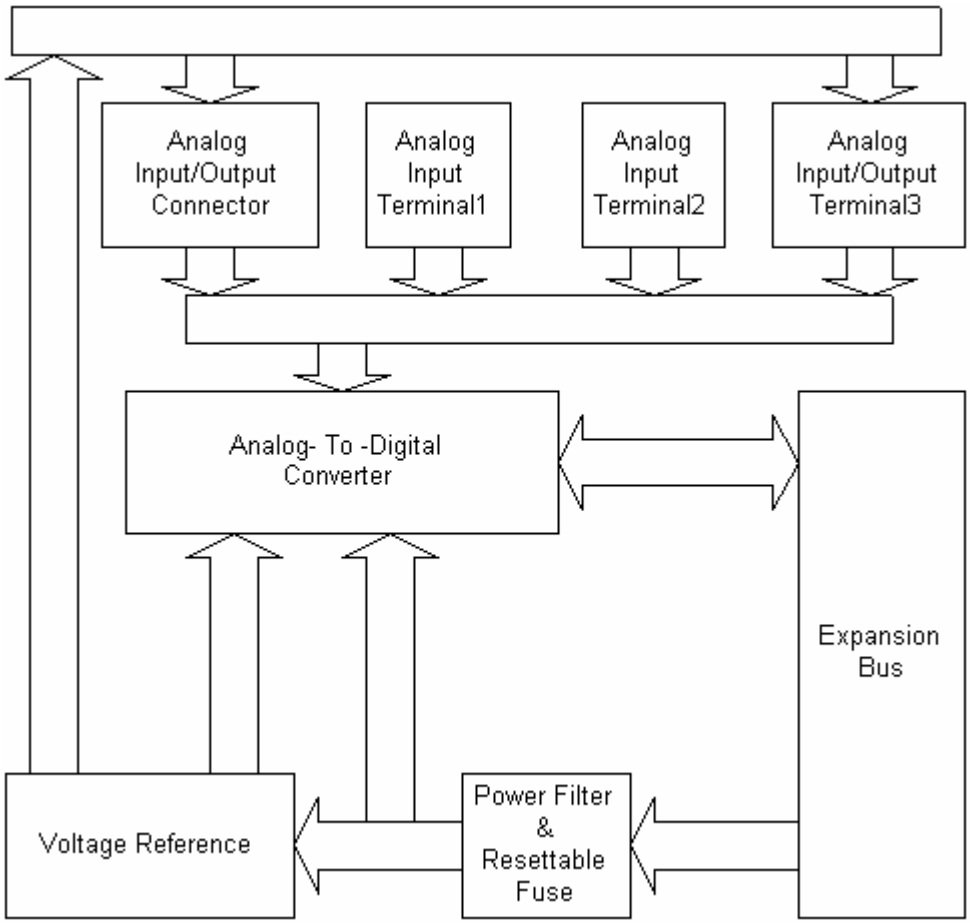


Figure 1

Figure 2 shows the block diagram of the DAQ-2543-DA board.

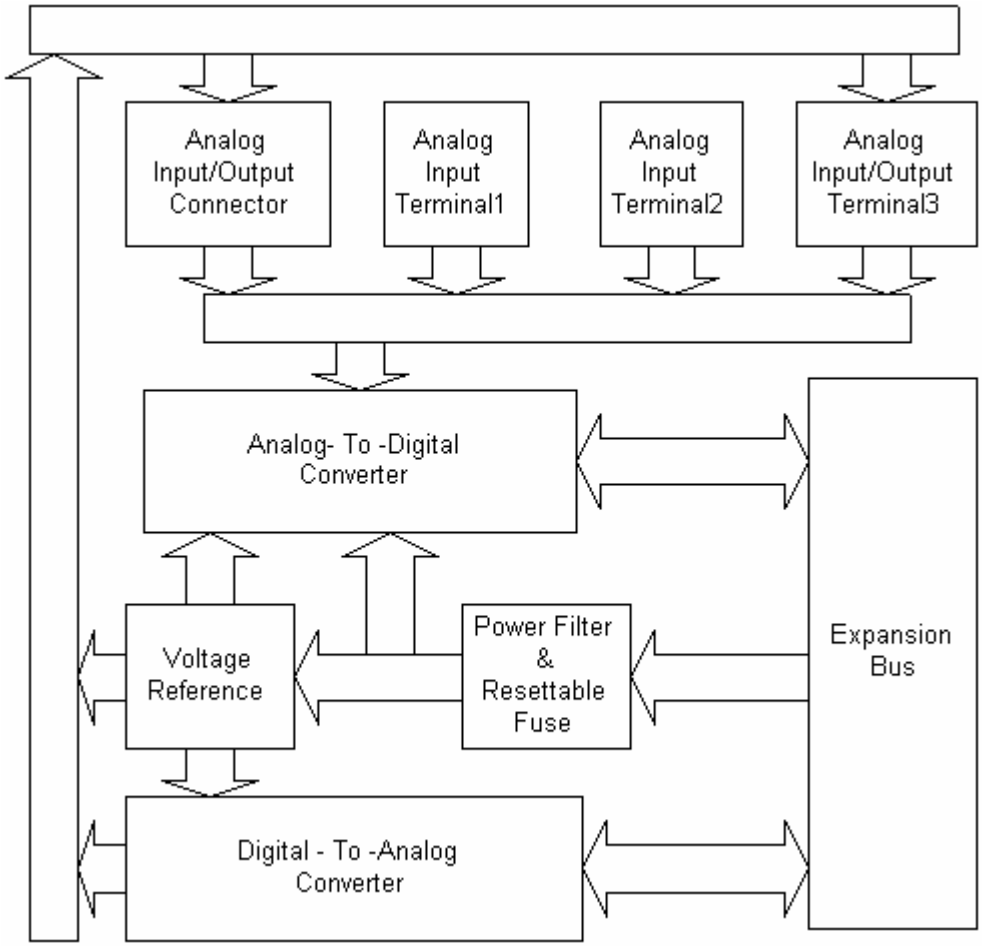


Figure 2

Analog-To-Digital Converter

The TLC-2543 (IC3) is a 12-bit data acquisition system (DAS) that requires only a single +5V supply and an external 4.096V reference for operation.TLC2543 has 11 single-ended, analog input channels that have 0 to 4.096 Volt range. All channels are available through X1, X2 and X3 terminal blocks. 8 of the channels are also available on the J2 connector. The TLC-2543 has a 3-wire, SPI-compatible serial interface that allows communication with microcontroller boards. Maximum conversion time is 10 microseconds. Input channels can withstand voltages between 0 to 5 Volts although the measurement range is 0 to 4.096 Volts.

Digital-To-Analog Converter

The LTC1663 (IC4) is a single 10-bit voltage-output Digital/Analog Converter (DAC). LTC1663 uses a 2-wire, I2C compatible serial interface. The reference for the DAC is derived from the power supply inputs and thus gives the widest dynamic output range. The analog output is available through J2 connector or X3 terminal block.

Voltage Reference

The LM4040-4.1 is a precision micropower shunt 4.096V reference. The LM4040 utilizes fuse and zener-zap reverse breakdownvoltage trim during wafer sort to ensure that the prime partshave an accuracy of better than ±0.1% (A grade) at 25°C. Bandgap reference temperature drift curvature correction and low dynamic impedance ensure stable reverse break-downvoltage accuracy over a wide range of operating temperatures and currents. The output of voltage reference is available through J2 connector or X3 terminal.

Expansion

All the control/data lines and the 5-Volt power supply connections are available on a 20-pin Expansion connector(J1) for interfacing to existing microcontroller boards. DAQ-2543 peripheral board can be connected either as a piggyback daughter-board on a microcontroller board using standoffs or can be placed up away from the microcontroller board using a 20-wire ribbon cable (Cable length should be limited to few inches for best performance). Table 1 shows the pin assignments for Expansion connector.

Expansion connector (J1)

Signal	Pin	Pin	Signal
P3.0	20	19	P3.1
P3.2	18	17	P3.3
P3.4	16	15	P3.5
P3.6	14	13	P3.7
P1.0	12	11	P1.1
P1.2	10	9	P1.3
P1.4	8	7	P1.5
P1.6	6	5	P1.7
VCC	4	3	GND
VCC	2	1	GND

Table 1

Analog Input/Output Terminals

11 analog inputs, 1 analog output, reference 4.096V output and 5-Volt power supply are also available on the Analog Input/Outputs terminals (X1,X2,X3) for interfacing to external circuitry and prototyping boards. Tables 2,3,4 show the pin assignments for Analog Input/Output Terminals.

Analog Input Terminal (X1)

Signal	Pin
ANALOG INPUT 0	1
ANALOG INPUT 1	2
ANALOG INPUT 2	3
ANALOG INPUT 3	4
ANALOG GROUND	5
VAN	6

Table 2

Analog Input Terminal (X2)

Signal	Pin
ANALOG INPUT 4	1
ANALOG INPUT 5	2
ANALOG INPUT 6	3
ANALOG INPUT 7	4
ANALOG GROUND	5
VAN	6

Table 3

Analog Input/Output Terminal (X3)

Signal	Pin
ANALOG INPUT 8	1
ANALOG INPUT 9	2
ANALOG INPUT 10	3
ANALOG OUT	4
VREF	5
ANALOG GROUND	6
VAN	7

Table 4

Analog Input/Output Connector

8 analog inputs, 1 analog output, reference 4.096V output and 5-Volt power supply are available on the 20-pin Analog Input Connector (J2) for interfacing to external circuitry and prototyping boards. Table 5 shows the pin assignments for Analog Input/Output Connector.

Analog Input/Output Connector (J2)

Signal	Pin	Pin	Signal
ANALOG GROUND	1	2	ANALOG GROUND
ANALOG INPUT 3	3	4	ANALOG INPUT 1
VAN	5	6	VAN
ANALOG GROUND	7	8	NOT CONNECTED
ANALOG INPUT 4	9	10	ANALOG GROUND
VAN	11	12	ANALOG INPUT 2
ANALOG GROUND	13	14	VAN
ANALOG INPUT 5	15	16	NOT CONNECTED
VAN	17	18	ANALOG GROUND
ANALOG GROUND	19	20	ANALOG INPUT 7
ANALOG INPUT 6	21	22	VAN
VAN	23	24	ANALOG OUT
ANALOG GROUND	25	26	V REF

Table 5

Resettable Fuse

DAQ-2543 can be powered from 5 Volts DC of external power source. Resettable device (F1) utilizes a unique polymer-based, Positive Temperature Coefficient (PTC) material to protect electrical circuits against overcurrent conditions.

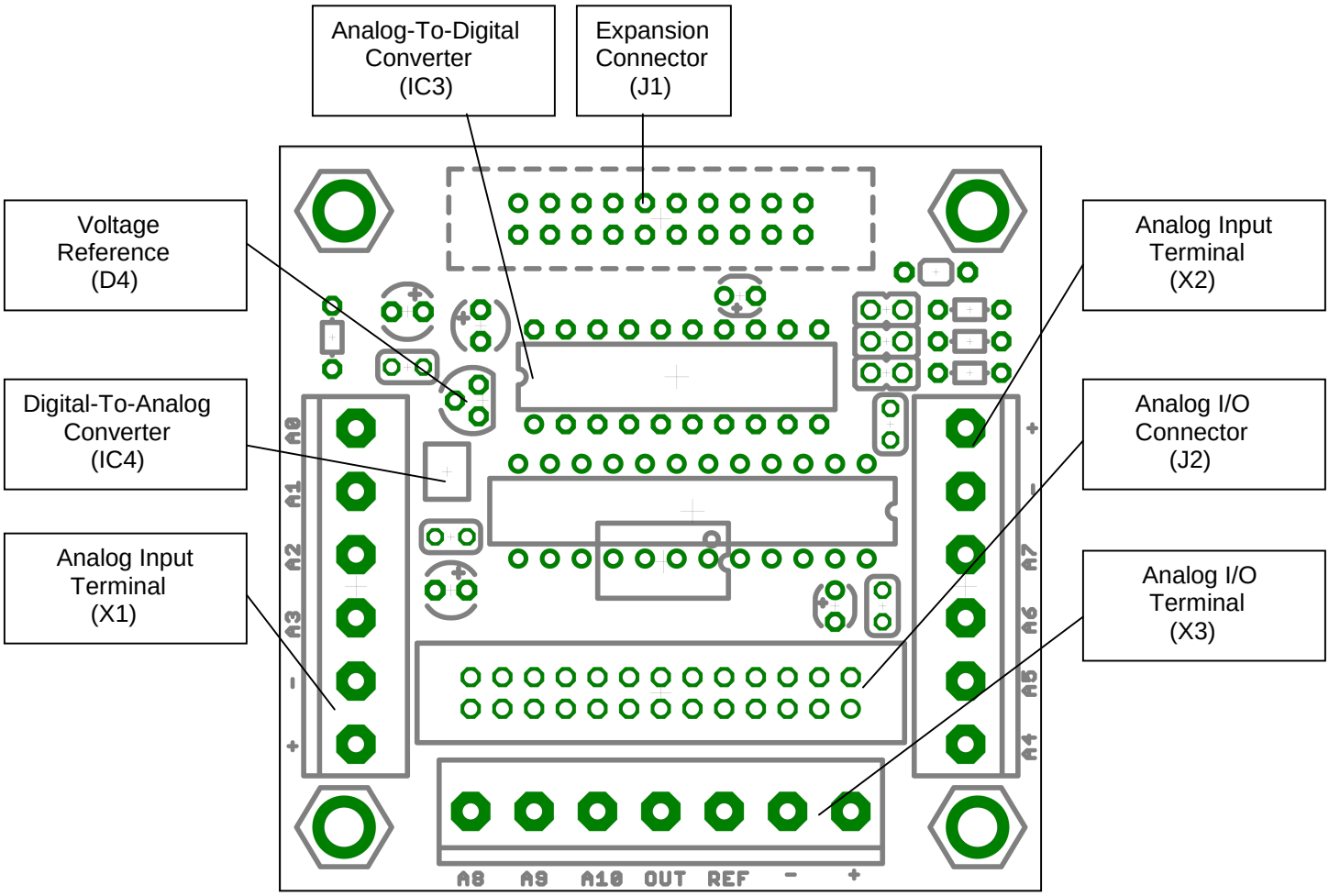
4. Software

Software project examples for interfacing with DAQ-2543 family of boards are available with our program development packages:

8051 Development System	http://www.bipom.com/products/us/202.html
BASCOM51	http://www.bipom.com/products/us/729.html

5. Board Layout

Figure 3 shows positions of major components, connectors and terminals on the DAQ-2453-DA board.



6. Schematics