

**Model 232SPDA**

RS-232 Data Acquisition Module and Digital to Analog Conversion Module

Description

The 232SPDA provides a low-cost, easy-to-use solution for serial port data acquisition. The 232SPDA offers 7 channels of 12-bit A/D inputs, 4 channels of 8-bit D/A outputs, 1 digital output and 2 digital inputs. With these features, the module can be used to sense a variety of external conditions, to output analog voltages, and to control a wide range of devices. The 232SPDA comes with a demo program in QuickBASIC. A data logging utility is included to provide a simple way to import data into other programs and spreadsheets (such as Excel). An RS-485 version is available from B&B Electronics (485SPDA).

Features

- 7 channels of 12-bit A/D
- 0.610mV A/D resolution (with 2.5Vdc Reference)
- 4 channels of 8-bit D/A
- 2 digital inputs (-30Vdc to +30Vdc)
- 1 digital output (0Vdc to 5Vdc)
- Automatic baud rate detection

Commands

There are only four commands required to control the 232SPDA: the read A/D command, the read digital I/O command, the output analog voltage command and the set output states command. The command string consists of four to six bytes: the "!" character, the "0" (zero) character, two command characters, and one or two data bytes (if required).

232SPDA Commands

Function	Command	Response
Read A/D Channels	!0RA{#}	{ch#msb}{ch#lsb}{ch(#-1)msb}... {ch0msb}{ch0lsb}
Read Digital I/O	!0RD	{I/O states}
Output Analog Voltage	!0SV{#}{#}	no response
Set Output States	!0SO{#}	no response

NOTE: Each {...} represents one byte.

A/D Converter

The 232SPDA has 7 channels of 12-bit A/D inputs. The full-scale voltage can be set anywhere from 2.5Vdc to 5.0Vdc. A 5Vdc reference is available to provide a 0 to 5Vdc range without any external components. The A/D converter has a conversion time around 10 microseconds, however the sampling rate is limited by the serial communications. The actual sampling rate for a single channel is around 120 samples per second (at 9600 baud). This rate drops to 37 samples per second when sampling all of the channels. The A/D inputs are available on a DB-25S (female) connector.

D/A Converter

The 232SPDA has 4 channels of 8-bit D/A outputs. The D/A channels can produce an analog voltage between 0V and 4.4V. One D/A channel is internally set to provide a full-scale voltage of 4.4V. The other three channels' full-scale voltage can be set anywhere between 0V and 4.4V. The D/A outputs are available on a DB-25S (female) connector.



International Headquarters: 707 Dayton Road PO Box 1040 Ottawa, IL 61350 USA
815-433-5100 Fax 433-5104 www.bb-elec.com orders@bb-elec.com support@bb-elec.com

European Headquarters: Westlink Commercial Park Oranmore Co. Galway Ireland
+353 91 792444 Fax +353 91 792445 www.bb-europe.com orders@bb-elec.com support@bb-europe.com

Digital I/O Lines

The 232SPDA has 2 digital inputs and 1 digital output. The digital output is CMOS compatible. The digital inputs are CMOS/TTL compatible and can handle voltages from -30Vdc to +30Vdc. The digital I/O lines are available on a DB-25S (female) connector.

I/O Connector Pinouts

DB-25S Pin #	Function	DB-25S Pin #	Function
1	GND	14	D/A Ref. 1
2	+12Vdc Output*	15	D/A Ref. 2
3	Digital Output #0	16	D/A Ref. 3
4	Digital Input #0	17	+5Vdc Output
5	Digital Input #1	18	A/D Ref. Input +
6	Digital GND	19	A/D Ref. Input -
7	Analog GND	20	No connection
8	A/D Input #0	21	A/D Input #6
9	A/D Input #1	22	D/A Output 0
10	A/D Input #2	23	D/A Output 1
11	A/D Input #3	24	D/A Output 2
12	A/D Input #4	25	D/A Output 3
13	A/D Input #5		

*Actual output is equal to power supply input minus 0.7Vdc

Communications

The 232SPDA connects to your computer's RS-232 serial port through a DB-25S connector. The unit automatically detects baud rates from 1200 to 9600. A data format of 8 data bits, 1 stop bit and no parity is used. The 232SPDA is configured as a DCE device.

RS-232 Connector Pinout

DB-25S Pin #	Signal	Direction to 232SPDA	Notes
2	Transmit Data (TD)	Input	Connection is required
3	Receive Data (RD)	Output	Connection is required
4	Request to Send (RTS)	Input	May be used to power unit if kept high
5	Clear to Send (CTS)		Internally looped back to RTS
6	Data Set Ready (DSR)		Internally looped back to DTR
7	Signal Ground (SG)	-	Connection is required
8	Data Carrier Detect (DCD)		Internally looped back to DTR
20	Data Terminal Ready (DTR)	Input	May be used to power unit if kept high

Specifications**Analog to Digital Converter**

Resolution:	12 bit
Channels:	7
Reference Range:	5.0 Vdc max. (1.221 mV per bit) 2.5 Vdc min. (0.610 mV per bit)
A/D Ref. Input -	0 Vdc to 2.5Vdc
A/D Ref. Input +	2.5 Vdc to 5.0 Vdc
Input Voltage Range:	-0.3 Vdc to 5.3 Vdc
Total Unadjusted Error:	+/- 1.75 LSB max.

A/D input channels must be driven from a source impedance less than 1 kΩ.

5 Volt Reference

Output Voltage:	4.975 Vdc to 5.025 Vdc (5.0 Vdc typical)
Accuracy:	+/- 0.5 %
Maximum Output Current:	5 milliamps max.



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Digital to Analog Converter

Resolution:	8 bit
Channels:	4
D/A References:	-0.3Vdc to 5.3Vdc (D/A Ref. 0 internally set to 5Vdc in 232SPDA Module)
Output Voltage Range:	0Vdc to 4.4Vdc
Total Unadjusted Error:	+/- 0.07V for voltages less than 3.83V +/- 0.14V for voltages greater than 3.83V

D/A output channels must have a resistive load greater than or equal to 10 k Ω and a capacitive load less than or equal to 100 pF.

Digital Inputs

Channels:	2
Voltage Range:	-30 Vdc to 30 Vdc
Low Voltage:	-30 Vdc to 1.0 Vdc
High Voltage:	2.0 Vdc to 30 Vdc
Leakage Current:	1 microamp max.

Digital Output

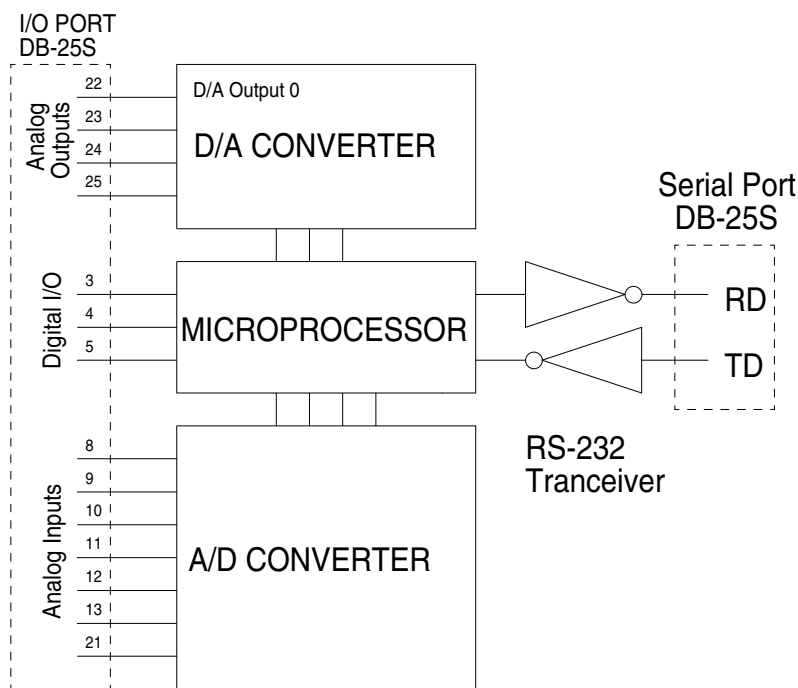
Channels:	1
Low Voltage:	0.6 Vdc @ 8.7 milliamps
High Voltage:	4.3 Vdc @ -5.4 milliamps

Power Supply

Connection:	Input Voltage: 12Vdc to 18Vdc @ 35 milliamps 2.5 mm jack
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Communications

Standard:	RS-232 (unit is DCE)
Baud Rate:	1200 to 9600 (automatic detection)
Format:	8 data bits, 1 stop bit, no parity
Connector:	DB-25S (female)

**232SPDA Block Diagram**