



Engineering Datasheet

28 June 2001

SPC Data Transmission Format

The SPC data format used by Accurate Technology, Inc. devices is a derivative of data protocol used by Mitutoyo, Federal and other quality measurement technology manufactures.

It uses a synchronous serial data transfer topology using a simplex transmission format. The basic interface consists of three I/O lines: Clock, Data and Request. Data is transmitted in 13 four-bit words for a total of 52-clocked bits. Data is transmitted with **least significant bit first**. Data is in BCD format.

The table below illustrates the transmission frame.

Word 1	Word 2	Word 3	Word 4	Word 5
All 'F' (1111)	All 'F' (1111)	All 'F' (1111)	All 'F' (1111)	Sign + = 0 (0000) - = 8 (0001)

Word 6	Word 7	Word 8	Word 9	Word 10	Word 11	Word 12	Word 13
MSD Value	Value	Value	Value	Value	LSD Value	Decimal Point Pos	Units MM = 0 INCH = 1

Words 1 through 4 are fixed at 'F'.

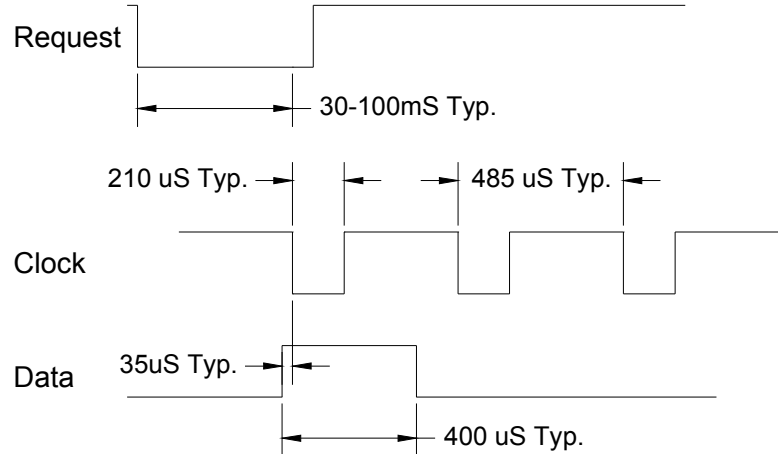
Word 5 indicates the sign of the data value. 0 = positive, 8 = negative.

Words 6 – 11 are the BCD values to be transmitted (received). Word 6 is the most significant digit, word 11 is the least significant digit. Values can range from 0 – 9.

Word 12 is the decimal point position. Values for this word range from 2 to 5 indicating the position of the decimal from the LSD value. Example: A value of 2 = xxxx.xx

Word 13 is measurement units. 0 = mm, 1 = inches.

Data Timing Diagram



Timing with respect to slave (SPC) device.

Request Line: An input to the slave (SPC) device. This line is typically pulled high via a 10K ohm resistor in the SPC device. The host device begins the data transfer by pulling this line low via open collector (drain) driver.

Clock Line: This synchronous output is derived by the SPC device (not the host) and acts to clock out the data at a prescribed rate.

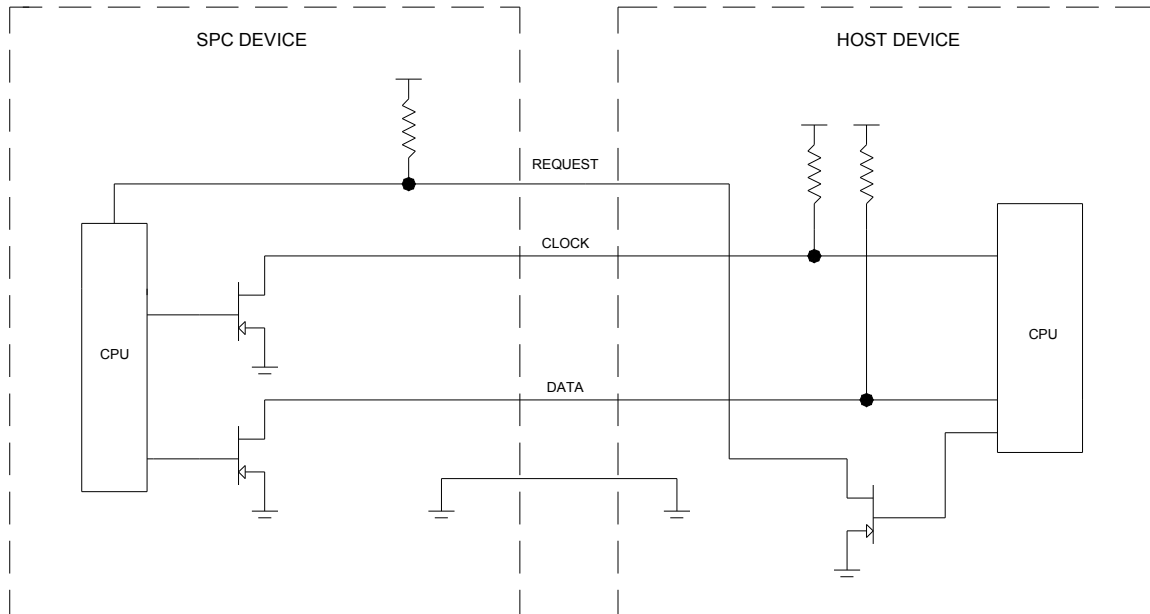
Data Line: This line provides the serial data based on the clock transfer and uses an active high to represent logic 1.

Data Transfer Interaction

The data transfer begins with the host pulling the SPC device request line low and waiting for the clock transitions to begin. Clock activity must occur within 20 to 100 milliseconds from the time of the request or the host will assume the data transfer has failed.

The host will clock in the data on the falling edge of each clock cycle. At the end of the 52 bits, the data transfer is complete. The host releases the request line typically after the first SPC clock cycle has occurred.

Typical Electrical Interface



As illustrated, the host pulls down the SPC device request line via open collector (drain) device. The SPC device drives the clock and data line input of the host via open collector (drain) devices. This configuration allows for independent supply voltages on each device without adverse interaction. All resistors are 10K typical.

To provide electrical isolation, opto-couplers could be used as replacements for the open collector devices.

Data Transfer Initiation From SPC Device (Not Illustrated)

In some cases, the SPC device may need to signal the host that an SPC data transfer is required. This is typically initiated by a push-button on the SPC device. To facilitate this feature, an additional data line is needed by both the SPC device and the host. An open collector output on the SPC device pulls down an input on the host when the push-button is activated. The host input is pulled up via internal resistor. This low pulse should last for typically 5 milliseconds. After this action, the host drives the SPC request line low and completes a normal SPC data transfer.

Connector Pin-out (Referenced to the SPC Device)

The Accurate Technology, Inc. SPC interface utilizes a 10-pin IDC connector (2 rows of 5). A typical connector is available from AMP and is part number 103310-1.

Pin-out is as follows:

- Pin 1 – Signal Ground
- Pin 2 – SPC Data
- Pin 3 – SPC Clock
- Pin 4 – SPC Device Read Initiate (Optional, see previous section)
- Pin 5 – SPC Request

- Pin 6 through 10 – N/C

Connector Pin-out for 6 pin modular telephone jack (Encoder)

- Pin 1 – Ground (Blue)
- Pin 2 – No connection (Yellow)
- Pin 3 – Request (Green)
- Pin 4 – Serial Data (Red)
- Pin 5 – Serial Clock (Black)
- Pin 6 – 1.8 volt DC supply, 100uA (White)