

1784845 Analog Data Serial Transmitter

Description:

The 1784845 model is a single channel serial data transmission device, which is fed by a joystick control, shown in **Fig. 1**. Meant for short distance wired transmission, it has a fast bit transfer rate to reduce latency issues. The device features a connection for two position channels of the joystick control, which can be communicated one at a time. Users can select a channel for transmission and view both channels in real-time on an LCD. The 1784845 is ideal for application in larger systems requiring a joystick control that communicates serially with the system, such as a game controller or robotic control.

How It Works:

The joystick module in the system can be tracked via its (x, y) coordinate position. The 1784845 evaluates the joystick position in real time using a high frequency analog to digital converter (ADC). When the user selects a channel to transmit on, the system will follow its firmware UART protocol and transmit either the x or y digital position data on a wire, which can be further processed external to the system.

Cautions:

- This device is **not** 100% accurate due to hardware imperfections.
- The device is not ideal in applications requiring a high sampling frequency.
- All electronic devices should be used within the operational constraints. Please refer to the Operating Conditions section for more information on device specifications.

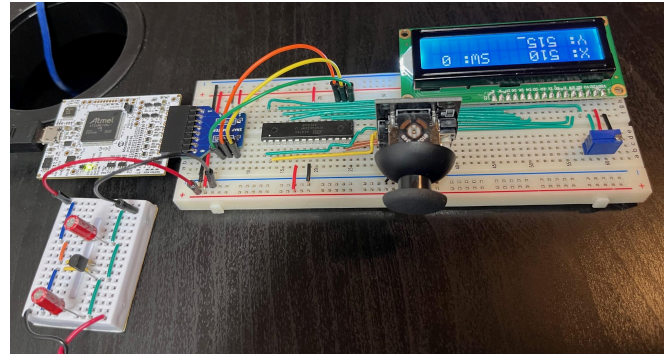


Fig. 1: The 1784845 Analog Data Serial Transmitter

Device Operation:

1. Supply power to the device via the wall adapter. The display will update to the resting (x, y) position of the joystick, within the x position as its default transmission.
2. Move the joystick and observe the position change on the LCD screen. The changing value is sampled at 10Hz and transmitted through the white TX wire.
3. Click the joystick button to change between channels.
3. Note that the device receiving the serial data must be connected to the same ground node.

Best Practices:

- Ensure that the receiving device is configured to handle a bit transfer rate (baud rate) of 38.4k bps and 2 byte sampling rate of 10Hz.
- The system transmits a byte in an 8N1 data frame (**Fig. 2**). Ensure the receiving device is configured to handle this data format.
- The joystick reaches its full scale values at approximately $\frac{2}{3}$ of the full motion range.
- Fast joystick motion will make it difficult to read data from the LCD, and will create larger gaps in the transmission samples.
- Use in short distance transmission applications. Long distance transmission at a high baud rate can lead to extra noise and data corruptions.

S	7	6	5	4	3	2	1	0	P
Stop Bit	Data Byte								Parity Bit

Fig. 2: 8N1 Frame = 8 data bits, No parity bit, 1 stop bit.

Device Specifications				
Parameter	Field			Unit
Electrical	Typical	Minimum	Maximum	Units
Voltage (Wall out)	120	100	240	V (RMS)
Frequency	60	50	-	Hz
Voltage (Device in)	5	3	6	VDC
Current (Device in)	44.3	1.5	200	mA
Power consumption	221.5	-	-	mW
Mechanical	Typical	Minimum	Maximum	Units
Button push force	-	0.98 ± 0.29	-	N
L x W x H	16.5 x 5.5 x 1	-	-	cm
Power Cord Length	180	-	-	cm
Inputs	Quantity	-	-	-
Analog	2	-	-	-
Digital	1	-	-	-
Serial Transmission	Typical	Minimum	Maximum	Units
Protocol	UART	-	-	-
Baud rate	37422	-	-	bit/s
Sampling rate	10.29	9.89	10.85	Hz
Data Frame	8N1	-	-	-
Frame Transmit Time	481	-	-	ms
Channels	2	-	-	-
Transmission Type	Single Channel	-	-	-
High Logic	5	-	-	V
Low Logic	0	-	-	V
Environment	Typical	Minimum	Maximum	Units
Temperature	25	-25	70	°C
Humidity	-	35%	85%	-

Testing:

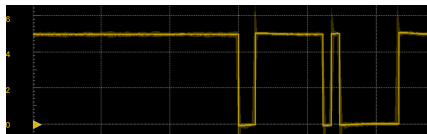


Fig. 3: Scope data from the transmission channel for the joystick at rest. The High logic level is 5V and the Low logic level is 0V. There is little noise in the signal for short distance transmission.



Fig. 4: Logic data, matching Fig. 1. When the joystick is at rest, its position is $511_{10} = 0x01FF$. The low byte is transmitted before the high byte. The width of 2 frames (2 bytes + 2 stop bits) carrying the position data of the joystick was found to be 481us, meaning the system has a measured baud rate of 37422 bps.

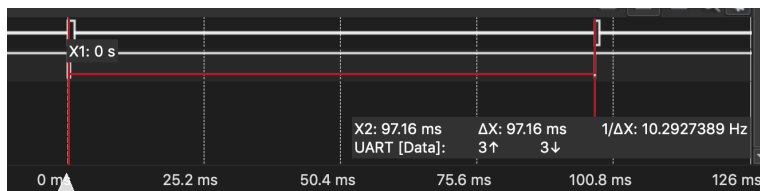


Fig. 5: Expanding the time base in Fig. 4, it was found that the joystick position is transmitted every 97.16 ms, for a sampling rate of 10.29Hz.