Report on HSDL-1100 Interoperability with Infrared Controllers at IrDA 4 Mb/s

Application Note 1111

Introduction

4 Mb/s Ir link distances of 1.1 – 2.0 meters between transmitter and receiver have been demonstrated using typical HSDL-1100 units, and either the National Semiconductor PC87108 I/O chip, the VLSI VL82C147 I/O chip, or the SMC FDC37C957 I/O chip. A 4Mb/s IrDA link can be created with a direct connection from the HSDL-1100 to any of these infrared controllers.

Test Procedure:

1. Send a file in packet form from one PC to another using the infrared controller evaluation ISA card, connected to the HSDL-1100 evaluation board. The receiving PC reports what fraction of the file was received without errors.

2. Pulses from the transmitting controller are sent through a pulse generator to the transmitting HSDL-1100. The transmitting HSDL-1100's pulse widths are monitored with an oscilloscope. The pulse generator is used to adjust the transmitted pulse's widths to 115 – 135ns.

3. Operating distance is measured by adjusting the optical link distance between transmitting HSDL-1100 and receiving HSDL-1100, while checking for errorless file transfer.

4. Minimum acceptable pulse width is measured by monitoring the receiving HSDL-1100's pulse width as the link distance is increased until errors occur. The smallest pulse width in a file where no errors occured is taken as the minimum acceptable pulse width.

5. Maximum acceptable pulse width is measured by adjusting the transmitted pulse width until file transfer errors occur. The link distance is set to 0 - 3 cm to obtain a maximum pulse width on the receiving HSDL-1100's RxdB pin. The maximum pulse width of the receiving HSDL-1100's RxdB pin where no errors occur in the file transfer is taken as the maximum acceptable pulse width.

National Semiconductor PC87108, PC87338

The National Semiconductor PC87108 and PC87338 produce the same infrared link performance when connected to the HSDL-1100 infrared transceiver.

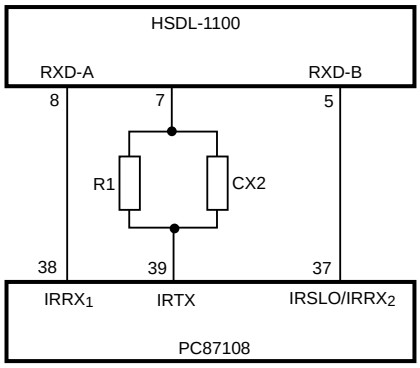

Figure 1.

For the National Semiconductor PC87108 I/O chip, the Ir link can be realized with the following connections:

(The connections to the PC87338 use the same pin names (IRRX1, IRTX, IRSLO/IRRX2), but the pin numbers may be different).

Connect IRTX pin 39 of the PC87108 to the I/O side of R1/CX2.

Connect $IRRX_1$ pin 38 of the PC87108 to RXD-A (pin 8 of the HSDL-1100).

Connect $IRSLO/IRRX_2$ pin 37 of the PC87108 to RXD-B (pin 5 of the HSDL-1100).

For Sharp ASK/DASK using the NS PC87108, the PC87108 should be configured by the ASK/DASK software to:

1. Receive data from only one receive pin.

2. Set the receive to the AUX input $IRRX_2$.

Test Results:
(All HSDL-1100 process corners measured at T_A = 25°C. Results reported are the worst case for the entire sample group.)

Data Type	Operating Distance (meters)	Min. Pulse Width (ns)	Max. Pulse Width (ns)	Conditions
4 Mb/s 4 PPM	0 - 2	75	185	Typical HSDL-1100's used as transmitter and receiver
4Mb/s 4 PPM	0 - 1.2	75	—	HSDL-1100 transmitter calibrated to 100 mW/sr
1.15 Mb/s IrDA	0 - 2	—	—	Typical HSDL-1100's used as transmitter and receiver
9.6 - 115.2 kb/s IrDA	0 - 1.6	—	—	HSDL-1100 transmitter calibrated to 40 mW/sr
500 kHz carrier DASK	0 - 1.95	—	—	Typical HSDL-1100's used as transmitter and receiver. (Use RxdB channel.)

VLSI VL82C147

For the VLSI VL82C147 I/O chip, the Ir link can be realized with the following connections:

Connect SIRIN pin 67 of the VL82C147 to RXD-A (pin 8 of the HSDL-1100).

Connect IROUT pin 66 of the VL82C147 to the I/O side of R1/CX2.

Connect FIRIN pin 65 of the VL82C147 to RXD-B (pin 5 of the HSDL-1100).

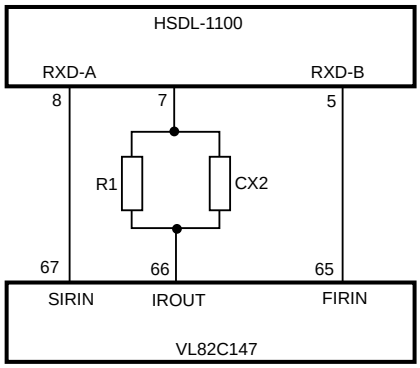

Figure 2.

Test Results:

Data Type	Operating Distance	Min. Pulse Width (ns)	Max. Pulse Width (ns)	Conditions
4 Mb/s 4 PPM	0 cm to >1 meter	—	—	Typical HSDL-1100's used as transmitter and receiver
9.6-115.2 kb/s IrDA	0 cm to >1 meter	—	—	Typical HSDL-1100's used as transmitter and receiver
1.15 Mb/s IrDA	0 cm to >1 meter	—	—	Typical HSDL-1100's used as transmitter and receiver

SMC FDC37C669, FDC37C957

The SMC FDC37C669 and FDC37C957 produce the same infrared link performance when connected to the HSDL-1100 infrared transceiver.

For the SMCFDC37C957 I/O chip, the Ir link can be realized with the following connections:
(The connections to the FDC37C669 use the same pin names (IRRX, IRTX, IRMODE), but the pin numbers may be different).

Connect IRTX pin 204 of the FDC37C957 to the 0.1 µF capacitor connected to R1/CX2 of the HSDL-1100 diagram.

Connect IRRX pin 203 of the FDC37C957 to RXD-A (pin 8 of the HSDL-1100).

Connect IRMODE pin 190 of the FDC37C957 to RXD-B (pin 5 of the HSDL-1100).

CX3 must be 1000 pF in the application circuit (other I/O chips use 4700 pF).

Note that the 0.1 µF capacitor connected to the transmit line is necessary since the SMC I/O chip IRTX pin could be left in a logic high state for an indeterminate period of time. Connection of the IRTX directly to R1/CX2 would damage the HSDL-1100's LED if the IRTX line was left in the logic high state.

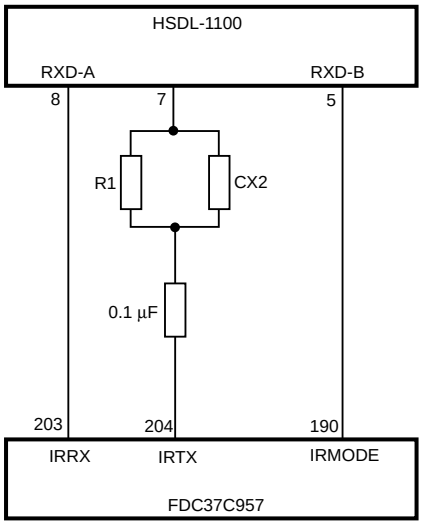

Figure 3.

Test Results:

Data Type	Operating Distance (meters)	Min. Pulse Width (ns)	Max. Pulse Width (ns)	Conditions
4 Mb/s 4 PPM	0 – 1.8	75	175	Typical HSDL-1100's used as transmitter and receiver
1.15 Mb/s IrDA	0 – 1.8	—	—	Typical HSDL-1100's used as transmitter and receiver
0.576 Mb/s IrDA	0 – 1.8	—	—	Typical HSDL-1100's used as transmitter and receiver
4 Mb/s 4 PPM	0 – 1.1	75	*	HSDL-1100 transmitter calibrated to 100 mW/sr
9.6 – 115.2 kb/s	0 – 1.6	—	—	HSDL-1100 transmitter calibrated to 40 mW/sr

* Certain combinations of detector die and ICs in the HSDL-1100 product will produce RxdB pulse widths exceeding 175 ns when receiving from a transmitter positioned 1-5 cm away. RxdB pulse widths may exceed 175 ns when the receiver is positioned 1 - 3 cm from a 0 – 300 mW/sr transmitter, or when the receiver is positioned 3 - 5 cm from a 300 - 500 mW/sr transmitter.

Approximately 10% of the yearly production distribution of HSDL-1100 product may behave in this manner. Approximately 90% of the yearly production distribution of HSDL-1100 product will never have RxdB pulse widths > 175 ns under IrDA conditions. RxdB pulse widths > 175 ns may cause sampling errors in the SMC I/O chip's demodulation process.

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