Infrared Data Association

Infrared Dongle Interface

Version 1.1

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1.0 SCOPE

The intent of this proposal is to define an interface that allows interoperation between IR dongles and desktop systems from different manufacturers.

This specification covers two common IR technologies: IrDA-Data and Consumer-IR. Each of these technologies separately meets certain cost and performance parameters for various user applications. There is no guarantee that these IR technologies can operate concurrently in the same location without interference.

Connector types, pin assignments, and the IR module identification method are specified. Timing specifications are a function of the various available IR transceivers and are not covered by this specification.

The document titled 'Recommended Serial Interface for Transceiver Control' describes the serial communication protocol for use with next generation transceiver modules.

Some examples are included to clarify how the various signals should be used.

2.0 HOST CONNECTORS

The infrared dongle must use an 8-pin Miniature DIN (MiniDIN-8) plug to connect to the HOST external MiniDIN-8 receptacle. The HOST motherboard PC must use a dual row header connector to connect to the MiniDIN-8 receptacle as shown in figure 2-1. The pin assignments for these connectors are shown in figures 2-2 and 2-3. Figure 2-4 defines the 8-pin MiniDIN receptacle and plug along with recommended manufacturers' part number. Table 2-1 defines the dongle interface signals. The signal functions depend upon the optical transceiver used by the dongle, and whether single-ended or differential signaling is used.

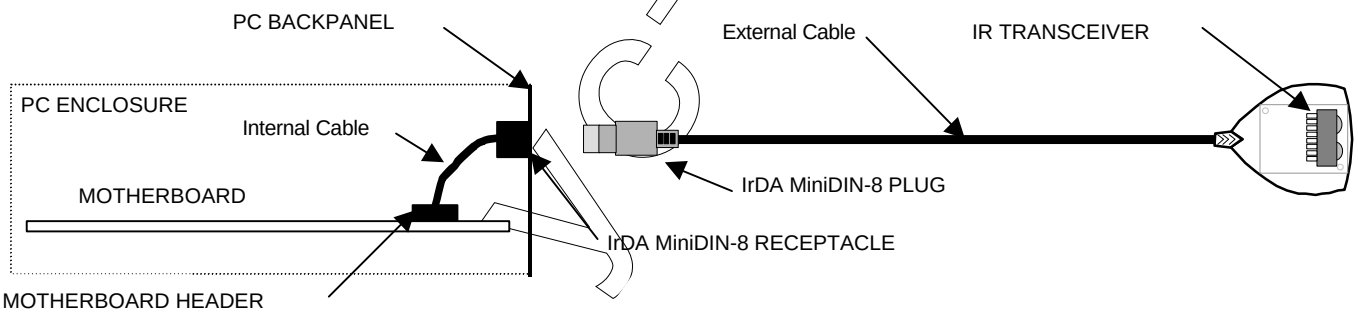


Figure 2-1. Infrared dongle connection in a typical desktop PC.

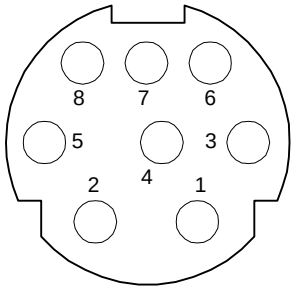
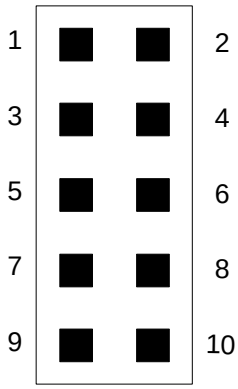
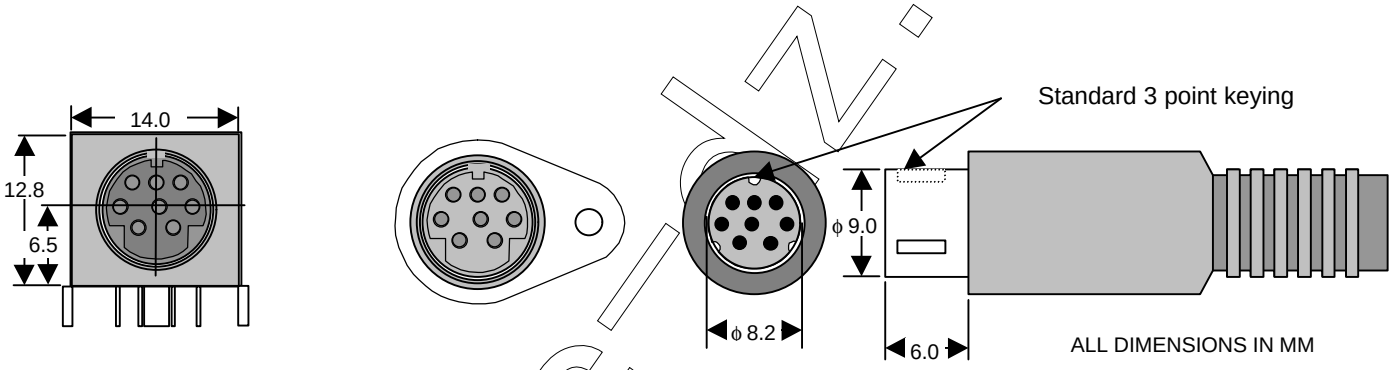


Figure 2-2. 8-pin Miniature DIN Receptacle (Front View)



Note : Pins 9 and 10 are reserved and should be left unconnected.

Figure 2-3. Motherboard Infrared HEADER (component side view) Double Row (2.54 x 2.54 [0.100 x 0.100] Centerline).



PCB Receptacle		Panel Receptacle		Cable Plug	
AMP	: 749179-1	AMP	: 750338-1		
Maxconn	: MMDF-8SNB-4	Maxconn	: MMDV-8	Maxconn	: MMDM-8SB-2
Singatron	: DJ-010-8PS(A)	Singatron	: YE-1368A	Singatron	: YE-1158A
CUI Stack	: SDF-80J	CUI Stack	: SD-80SN	CUI Stack	: SD-80

Figure 2-4. 8-pin Miniature DIN Receptacle & Plug Dimensions and Recommended Manufacturers' Part Number.

CAUTION: The MiniDIN-8 receptacle and plug specified for the IrDA dongle connector has the potential to interfere with MiniDIN-8 connectors found on audio/video consumer electronics and Apple's Localtalk connector. Appropriate warning to the end user is strongly recommended. Use of the IrDA logo on both the receptacle and plug is strongly recommended to identify the function of the connector and avoid misconnection to similar connectors. Please refer to Appendix A or the 'IrDA Logo Use and Guidelines' document available from IrDA.

Table 2-1. Dongle Interface Signals

Signal Name	Type	MiniDIN-8 pin #	HEADER pin #	Description
IRTX/IRTX+	O	1	1	- Infrared transmit data for single-ended or differential signaling
IRRX1/IRRX+	I	2	7	- Infrared receive data for single-ended or differential signaling
GND	O	3	3	- Ground
VCC	O	4	4	- 5V supply
ID0/IRSL0/IRRX2/IRRX-	I/O	5	8	- Identification signal 0, or - Infrared mode select 0, or - Infrared receive data for transceivers with two RX channels (note 1), or - Infrared receive data for differential signaling
ID1/IRSL1/IRTX-	I/O	6	2	- Identification signal 1, or - Infrared mode select 1, or - Infrared transmit data for differential signaling
ID2/IRSL2/SCLK+	I/O	7	5	- Identification signal 2, or - Infrared mode select 2, or - Clock for differential serial control interface
ID3/SCLK-	I/O	8	6	- Identification signal 3, or - Clock for differential serial control interface
Reserved		N/A	9	
Reserved		N/A	10	

Note 1: IRRX2 connects to the high-speed RX channel.

3.0 CABLE CHARACTERISTICS

Two different cables are required in a typical (non ATX) desktop PC implementation to provide infrared connectivity, one internal and one external. These cables are shown in figure 2-1.

3.1 Internal Cable

The internal cable provides for the interconnection between the motherboard IR header and the external connector mounted on the back panel. There are no special requirements for this cable. In most cases a ribbon cable should suffice.

3.2 External Cable

A multi-core shielded cable should be used by the dongle to minimize electromagnetic interference. The cable characteristics are given in table 3-1.

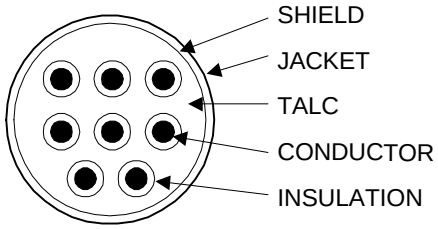


Figure 3-1. External cable cross-section.

Table 3-1. External Cable Characteristics

ELECTRICAL		
Characteristic Impedance		70 - 120 ohm
DC Resistance		200 - 300 ohm / km
Capacitance		30 - 90 pF / m
MECHANICAL		
Conductor	Minimum Gauge	28 AWG
	Material	Copper Stranding

4.0 ELECTRICAL SPECIFICATIONS

Table 4-1 provides the electrical characteristics at the external connector. Only the DC characteristics are specified in this document. The signal timings are provided in the controller and transceiver data sheets from the various manufacturers. The timings for the serial interface are provided in the document titled "Recommended Serial Interface for Transceiver Control" available from IrDA.

Table 4-1. Electrical Characteristics

Vcc = 5.0V +/- 5%, GND = 0V

Symbol	Parameter	Test Conditions	Min.	Max.	Units
POWER SUPPLY PIN					
Vcc	Supply Voltage		4.75	5.25	V
Icca	Supply Average Current			300	mA
Iccp	Supply Peak Current	(note 1)		600	mA
SINGLE ENDED SIGNALS					
Vih	High Level Input Voltage		2.0	Vcc+0.5	V
Vil	Low Level Input Voltage		-0.5	0.8	V
Voh	High Level Output Voltage		2.4		V
Vol	Low Level Output Voltage			0.4	V
Ildtx	Input Load Current, (IRTX signal)	0 ≤ Vin ≤ Vcc (note 2)		6	mA
Ild	Input Load Current, (all signals except IRTX)	0 ≤ Vin ≤ Vcc		1.5	mA
DIFFERENTIAL SIGNALS (EIA-644 Standard)					
Vod	Differential Output Voltage	R_L = 100 ohm	247	454	mV
Vos	Offset Voltage		1.125	1.375	V
Isc	| Short Circuit Current |			24	mA
Iin	| Input Load Current |	Vod = 454 mV		5	mA
Vth	| Input Threshold Voltage |			100	mV
Vin	Input Voltage Range		0	2.4	V

Note 1: A current limiting/protection mechanism should be provided on the Vcc line.

Note 2: The input current may be higher during switching due to transmission line effects of the cable.

5.0 DONGLE IDENTIFICATION AND INFRARED MODE SELECTION

The identification scheme described below allows the software to identify the dongle capabilities as well as the type of the infrared transceiver or transceivers being used. This is needed so that the software driver can correctly select the transceiver operational mode.
The identification is performed in two phases due to the limited number of ID signals. These phases are referred to as primary and secondary.

5.1 Primary Identification Phase

This phase represents the first step in the dongle identification process. It is used to identify the basic dongle type and, if non-serial transceivers are used, it also identifies the characteristics of the IrDA-Data transceiver. The infrared controller sets the pins 5 through 8 to input mode and reads their logical levels. The encoding listed in table 5-1 below are provided by the dongle on these pins. The dongle uses pull-up or pull-down resistors to drive these pins to the appropriate levels.

Table 5-1. Primary ID Encoding

ID3, ID2, ID1, ID0	**Basic Dongle Information** (notes 1a, 2a)
1, 1, 1, 1	No dongle connected (note 3a)
1, 1, 1, 0	IrDA-Data transceiver supports SIR mode only
1, 1, 0, x	IrDA-Data transceiver is: HP HSDL-1100 or HP HSDL-2100 or TI TSML1100 or Sharp RY6FD11E (note 4a)
1, 0, 1, x	Reserved
1, 0, 0, 1	IrDA-Data transceiver is: IBM 31T1100 or Vishay-Telefunken TFDS6000 or Vishay-Telefunken TFDS6500
1, 0, 0, 0	IrDA-Data transceiver is: HP HSDL-2300 or HP HSDL-3600
0, 1, 1, 1	Infrared transceiver supports Consumer-IR modes only
0, 1, 1, 0	Infrared transceiver with serial interface and single-ended signaling
0, 1, 0, 1	Reserved
0, 1, 0, 0	IrDA-Data transceiver is: Sharp RY5HD01 or Sharp RY5KD01
0, 0, 1, x	Reserved
0, 0, 0, x	Infrared transceiver with serial interface and differential signaling

Note 1a: During the primary identification phase the host controller uses single-ended signaling. Differential signaling is used during the secondary identification phase only if it is supported by the dongle.

Note 2a: It is assumed that all dongles supporting FIR mode (4.0 Mbps) support MIR mode (576 kbps and 1.152 Mbps) as well.

Note 3a: Weak pull-ups (e.g. 100 kohm) are provided on the infrared controller side on pins 5 through 8 to ensure that these pins will read as logic 1 when no dongle is connected.

Note 4a: The ID0 signal is not available in dongles using IrDA-Data transceivers with two receiver channels. This is because the transceiver drives this signal and therefore its level cannot be controlled by pull-up or pull-down resistors.

Note 5a: When the host software changes the direction of the ID signals from output to input, a minimum delay of 50 us should be allowed before reading the primary ID code. This is to allow the ID signal levels to stabilize. The 50 us delay does not have any effect on performance since the dongle identification is performed only once, when the infrared driver in the host is first initialized.

5.2 Secondary Identification Phase

This phase is used to further identify the dongle. For dongles that use non-serial transceivers, it identifies the Consumer-IR capabilities. In such cases the infrared controller switches pins 6 and 7 to output mode and drives each of them to either the same or the opposite level as the one returned during the primary

identification phase. The dongle will respond by driving appropriate levels on pins 5 and 8 to indicate its support for various Consumer-IR modes as shown in table 5-2.
The identification procedure for a dongle that uses a serial transceiver is described in the document titled "Recommended Serial Interface for Transceiver Control" available from IrDA.

Table 5-2. Secondary ID Encoding

IRSL2	**IRSL1**	**ID3**	**ID0** (note 1b)
NCH	*INV*	*NCH*: No Support. *INV*: 36 kHz demodulation support. (RC-5 and RC-6 protocols)	Reserved.
INV	*NCH*	*NCH*: No Support. *INV*: 38 kHz demodulation support. (NEC protocol)	*NCH*: No Support. *INV*: 40 kHz demodulation support. (JVC, Panasonic protocols)
INV	*INV*	*NCH*: No Support. *INV*: 56.9 kHz demodulation support. (RCA protocol)	Reserved

Note 1b: ID0 is not available and the protocols listed in this column are not supported when an IrDA-Data transceiver with two receiver channels is used.

Note 2b: *NCH* stands for '*No Change*'. The signal level is the same as the one returned during the primary identification phase.
INV stands for '*Invert*'. The signal level is the opposite of the one returned during the primary identification phase.

5.3 Infrared Mode Selection

The operational mode of an infrared dongle that uses non-serial transceivers is selected by driving the IRSL[2:0] signals to the logical levels shown in table 5-3.
The mode selection of an infrared dongle that uses a serial transceiver is described in the document titled "Recommended Serial Interface for Transceiver Control" available from IrDA.

Table 5-3. Mode Selection Encoding

IRSL2	**IRSL1**	**IRSL0**	**Selected Infrared Mode (note 1c)**
0	0	x	IrDA-Data Modes (note 2c)
0	1	0	Reserved
0	1	1	36 kHz Consumer-IR
1	0	0	40 kHz Consumer-IR
1	0	1	38 kHz Consumer-IR

1	1	0	Reserved
1	1	1	56.9 kHz Consumer-IR

Note 1c: If the dongle uses an IrDA-Data transceiver with two receiver channels, only the IRSL[2:1] signals can be used for mode selection. This is because pin 5 is used by The secondary receiver data line and therefore IRSL0 is not available. In this case, 40 kHz Consumer-IR modes are not supported.

Note 2c: If a single channel IrDA-Data transceiver is used, IRSL0 must be connected to the mode select pin.

Note 3c: Infrared transceivers require a certain stabilization time whenever their operating mode is changed. Therefore, the software must delay resumption of normal operation, after selecting a new mode, in order to comply with the transceiver requirements. Refer to the transceiver data sheet for information on the minimum stabilization time.

6.0 INFRARED DONGLE EXAMPLES

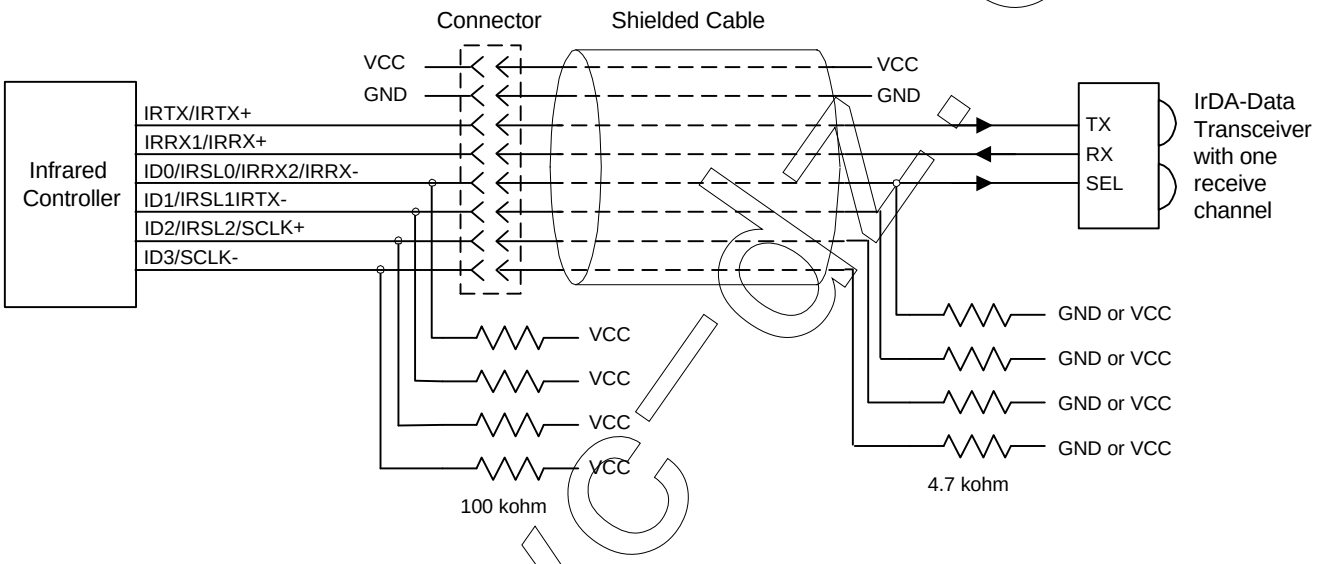


Figure 6-1. Generic Infrared Dongle using single-ended signaling and any IrDA-Data transceiver with single receiver channel. The 4.7 kohm resistors provide the transceiver ID code.

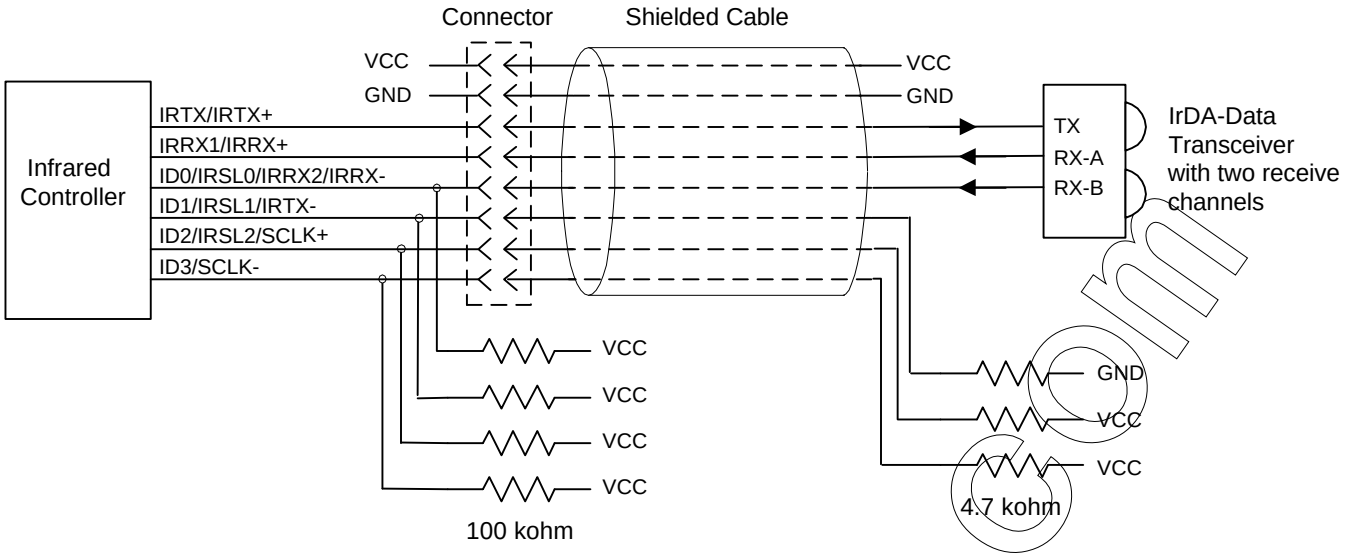


Figure 6-2. Infrared Dongle using single-ended signaling and dual RX channel optical transceiver.

The IrDA-Data transceiver can be any dual RX channel transceiver listed in table 5-1 having an ID code value of 110xb.

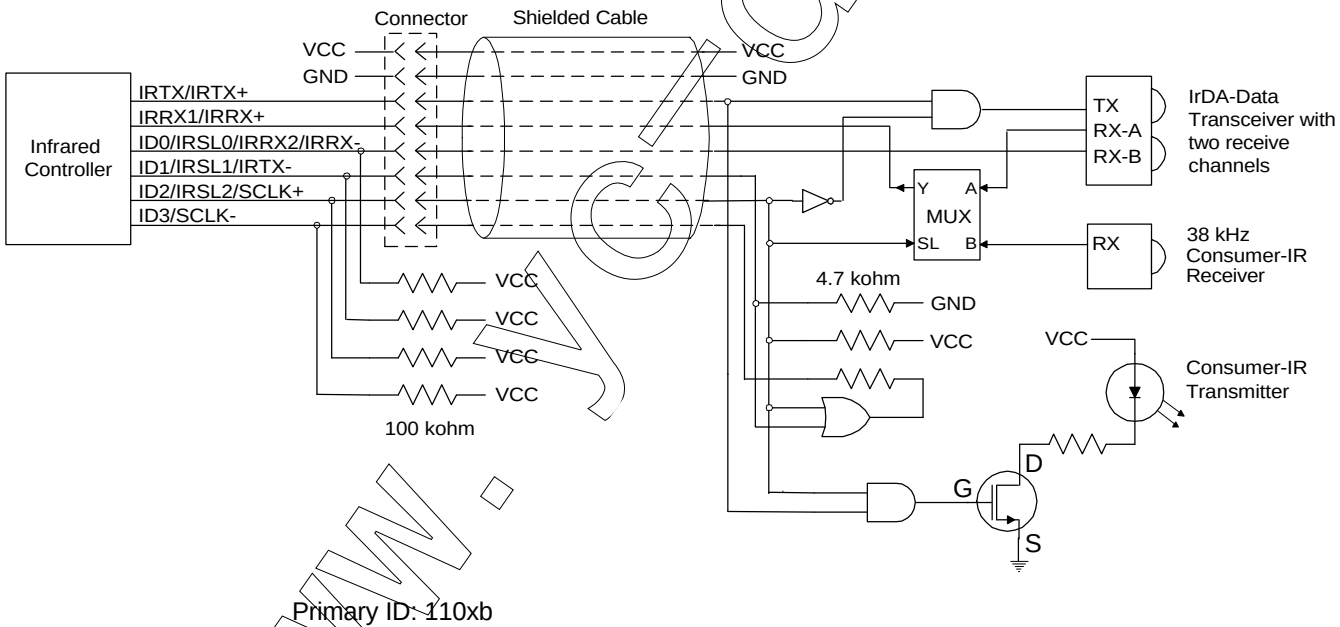
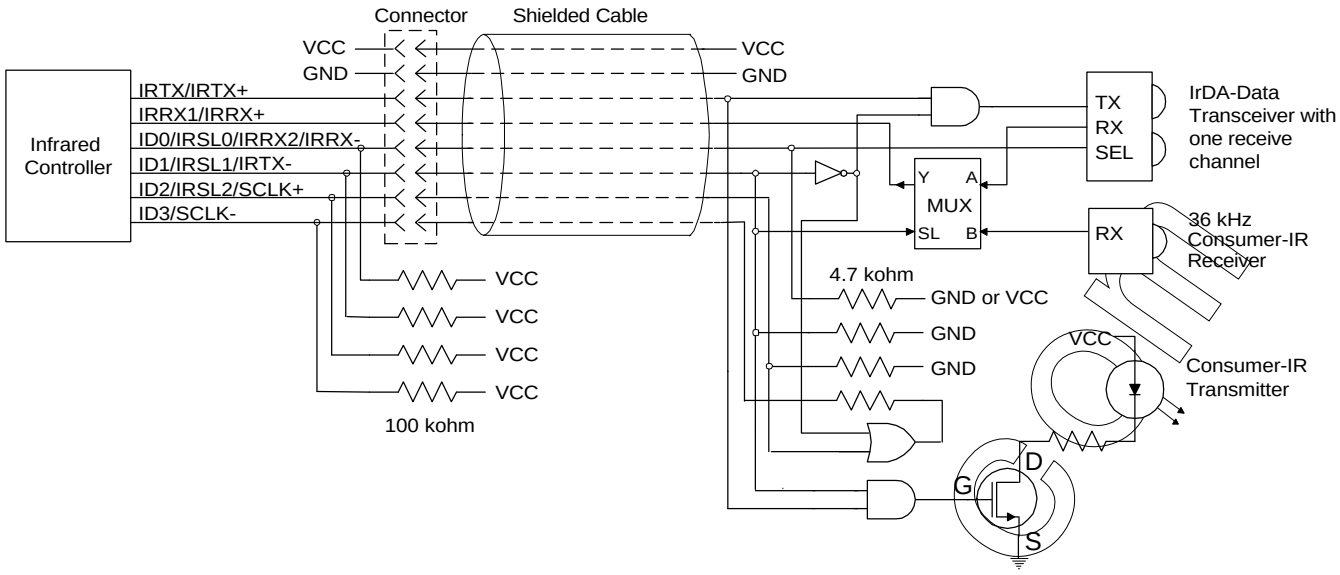


Figure 6-3. Infrared Dongle supporting IrDA-Data and Consumer-IR modes with 38 kHz subcarrier frequency.

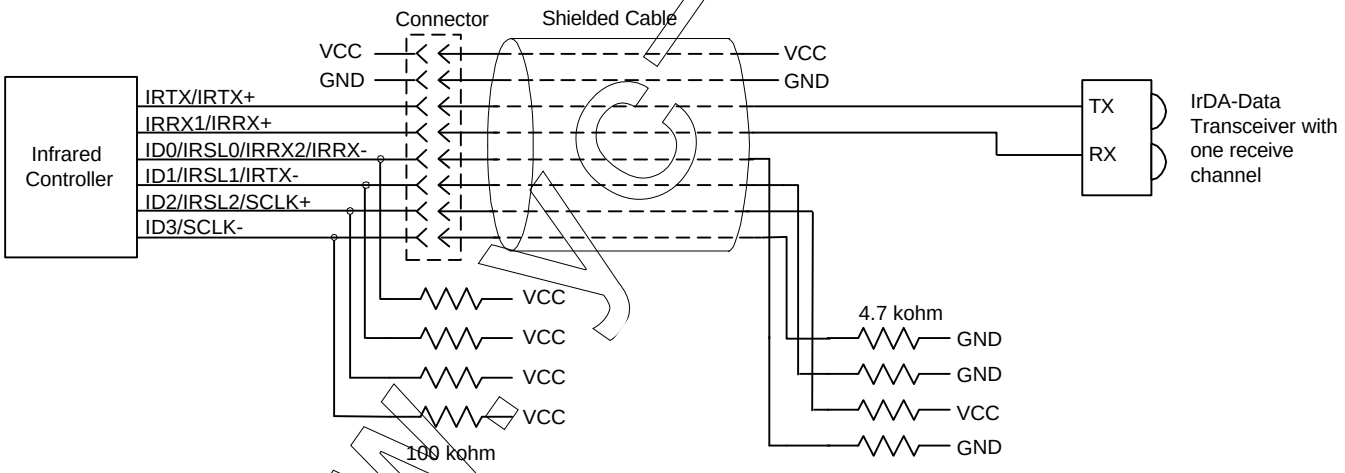
The IrDA-Data transceiver can be any dual RX channel transceiver listed in table 5-1 having an ID code value of 110xb.

Note: If the transmitter spectral characteristics on the IrDA-Data transceiver are acceptable to the Consumer-IR receivers, then the Consumer-IR transmitter logic can be eliminated and the IrDA-Data transmitter can be used instead.



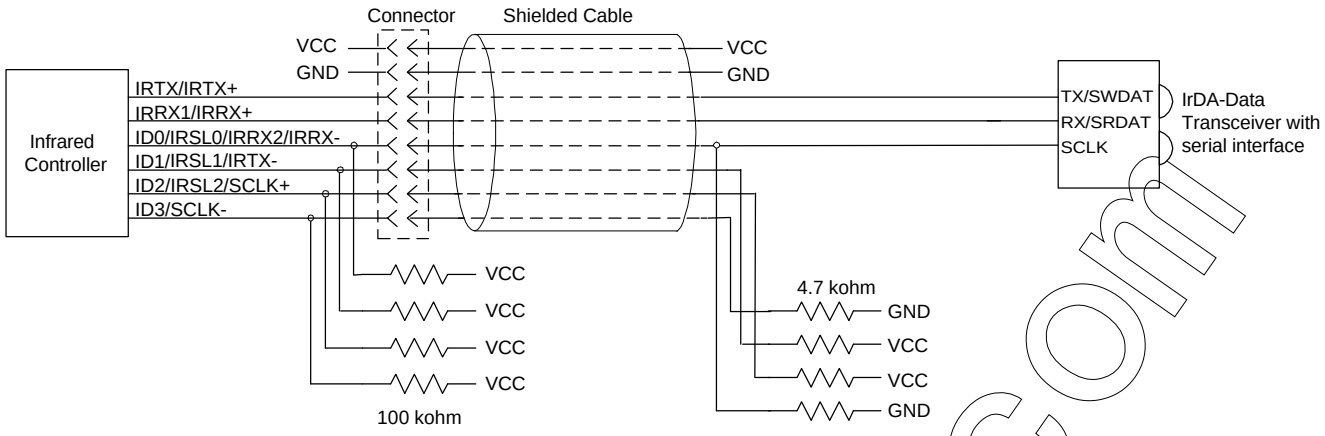
Primary ID: 1000b or 1001b

Figure 6-4. Infrared Dongle supporting IrDA-Data and Consumer-IR modes with 36 kHz subcarrier frequency.
The IrDA-Data transceiver can be any single RX channel transceiver listed in table 5-1 having an ID code value of 1000b or 1001b.



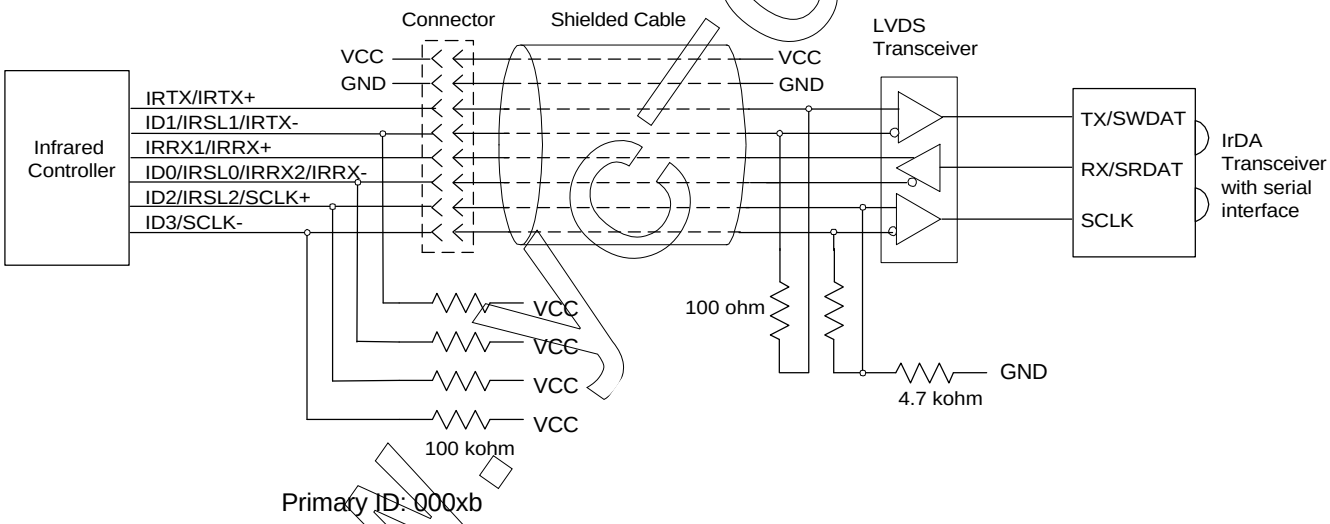
Primary ID: 0100b

Figure 6-5. Infrared Dongle supporting IrDA-Data modes.
The IrDA-Data transceiver can be any single RX channel transceiver listed in table 5-1 having an ID code value of 0100b.



Primary ID: 0110b

Figure 6-6. Infrared Dongle supporting IrDA-Data modes. The infrared transceiver implements the serial interface.



Primary ID: 000xb

Figure 6-7. Infrared Dongle with Differential Signaling and serial control interface. The transceiver control data is multiplexed with the transmit and receive infrared data.