The CDS Super C.A.T. Universal digital interface Technical manual V1.0.12.

The unit uses a FT232 device that works under Windows, Linux and MacOS. The standard FTDI drivers will work and the latest drivers can be downloaded from the FTDI web site. Url for driver download is http://www.ftdichip.com/FTDrivers.htm It is meant to be powered from the PC USB socket and requires about 100mA peak. Make sure that your powered USB socket can deliver this current, the unit may not function properly if it is used via an unpowered multi port hub.

Each output and input pin can be individually inverted via a strap on the DB25 interface connector, this implies that the super CAT would work with any radio as long as it requires a 1.8V to 5.0V VCCio interface. Each output has an in line Ferrite bead for RF suppression complemented with a 1nF decoupling capacitor.

The CAT unit makes the internal isolated 5Volt supply available on Pin 1, so strapping Pin 1 and Pin 14 together will set the VCCio voltage level to 5Volt. As there was not enough pins on the connector for individual VCCio connections. There is only a common VCCio voltage bus, it is shared by all the Input and Output pins.

The Open collector Transmit data (TXDOC Pin 9) is a direct connection to the 2N2222 collector. If Pin 8 is tied to VCCio or any other voltage (up to 28V) it will enable Pin 9 to swing between 0V and the applied voltage (Pin 8) through the internal 1kΩ pull up resistor.

PTT IO options.
The open collector RTS/PTT line (Pin 7) is a direct connection to the 2N2222 collector. If Pin 6 is tied to VCCio or any other voltage (up to 28V) it will enable Pin 7 to swing between 0V and the applied voltage through a 1kΩ pull up resistor. If Pin 5 is tied to VCCio or any other voltage (up to 28V) it will enable Pin 7 to swing between 0V and the applied voltage through a 3.3kΩ pull up resistor.
By tying the radio PTT to Pin 6 the PTT line has an effective impedance of 1kΩ and tying it to Pin 5 will give an effective impedance of 3.3kΩ.

Please note these diagrams are provided for reference purposes only and may not be accurate, device values may differ in the shipped devices.

Figure 1 shows the DB25 IO connections to the internal circuitry.
Figure 2 shows the isolation barriers and the isolated power supply.
Figure 3 shows the FT232RL FTDI device.

Interface specifications.
Fully isolated 1.0 Mbit/s Isolated serial interface, the isolation barrier will handle 2.5 kV but the isolation PSU will only handle 1 kV.
VCCio range is 1.8V to 5.0V.
Open Collector outputs is a 2N2222 transistor that has a maximum V_{CEO} of 30 Volt. The maximum continuous current should not exceed 50 ma and instantaneous peak should not exceed 200 ma.

Making up your own cables.
The FT232 requires the following logic to function, a '0' symbol is +5V and a '1' symbol is 0V.
The super cat give the user the ability to control this input/output interface polarities with the control lines on Pin 25,24,23,22.

Following our circuit diagram remember the H11L1 uses negative logic, no current flowing through the diode produces a +5V output, when current flows through the diode it produces a 0V output.

The 74HC86 is used to control the output signal polarity, it also controls the input signal polarity. Radios like the Yaesu FT817/FT857/FT897 uses positive logic for its communications, this implies that at steady state condition the RXD and TXD lines should be at +5V. From the setting table its is clear that the shorts for Pin 23/Pin 11 and Pin 25/Pin13 should be installed.

DB25 Female pin description:

Pin Number	Description
1	+5V output from isolation PSU, do not draw more than 50mA
2	RX data input 3k3 pull up to VCCio
3	NC
4	PTT/RTS line voltage level set with VCCio pin
5	PTT/RTS line with series 2k2 resistor from OC driver
6	PTT/RTS line with series 1k0 resistor from OC driver
7	PTT/RTS line direct collector from driver 30V 50mA maximum
8	TXD line with series 1k0 resistor from OC driver
9	TXD line direct collector from driver 30V 50mA maximum
10	0V line for inversion jumper pin 22
11	0V line for inversion jumper pin 23
12	0V line for inversion jumper pin 24
13	0V line for inversion jumper pin 25
14	VCCio line, located here so its easy to strap to pin 1 (+5v IO voltages)
15	NC
16	NC
17	NC
18	INPUT 5V only, no level translation (CTS line)
19	VCCio line for easy strapping to pins 5 or 6
20	VCCio line for easy strapping to pin 8
21	TXD output 3k3 pull up to VCCio
22	Inversion control for PTT/RTS line, strap to pin 10 to make 0V
23	Inversion control for RXD line, strap to pin 11 to make 0V
24	Inversion control for INPUT/CTS line, strap to pin 12 to make 0V
25	Inversion control for TXD line, strap to pin 13 to make 0V

Logic control levels Table 2:

Control pin	FTDI Logic level IOpin = +5V	Logic level FTDI IOpin = +5V
22 (PTT/RTS pin 4)	Short- Pin 4 is 0V	Open- Pin 4 is VCCio
22 (PTTOC pin 7)	Short- Pin 7 is inactive or float	Open- Pin 7 is pulled to 0V
23 (RXD pin 2)	Open- FTDI input 0V, IOpin=5V	Short- FTDI input 5V, IOpin=5V
24 (INP/CTS pin 18)	Open- FTDI input 0V, IOpin=5V	Short- FTDI input 5V, IOpin=5V
25 (TXD pin 21)	Open- Pin 21 is 0V	Short- Pin 21 is VCCio
25 (TXDOC pin 9)	Open- Pin 9 is inactive or float	Short- Pin 9 is pulled to 0V

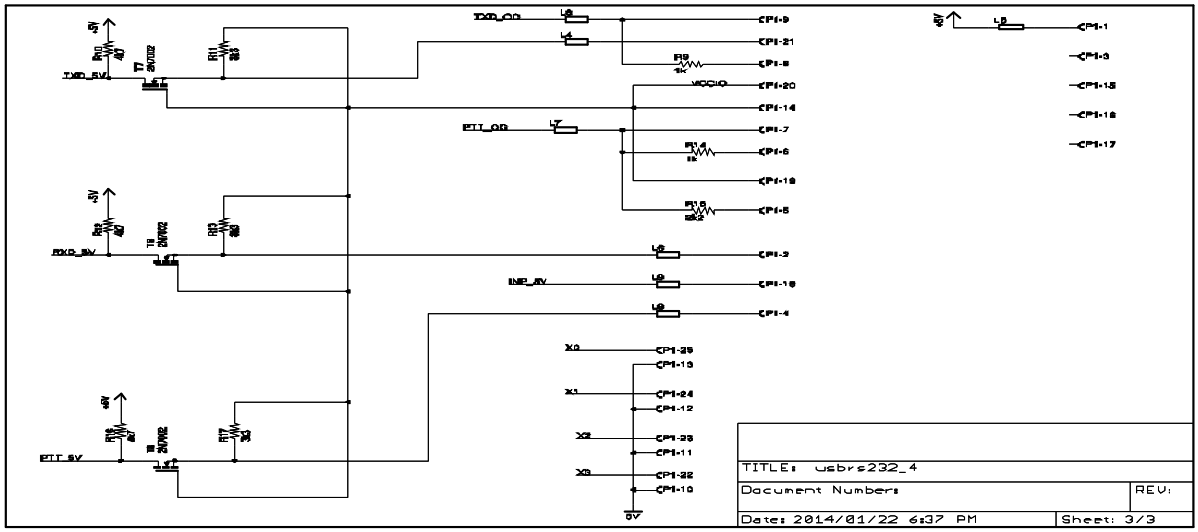


Figure 1: DB 25 interface connections with level translators

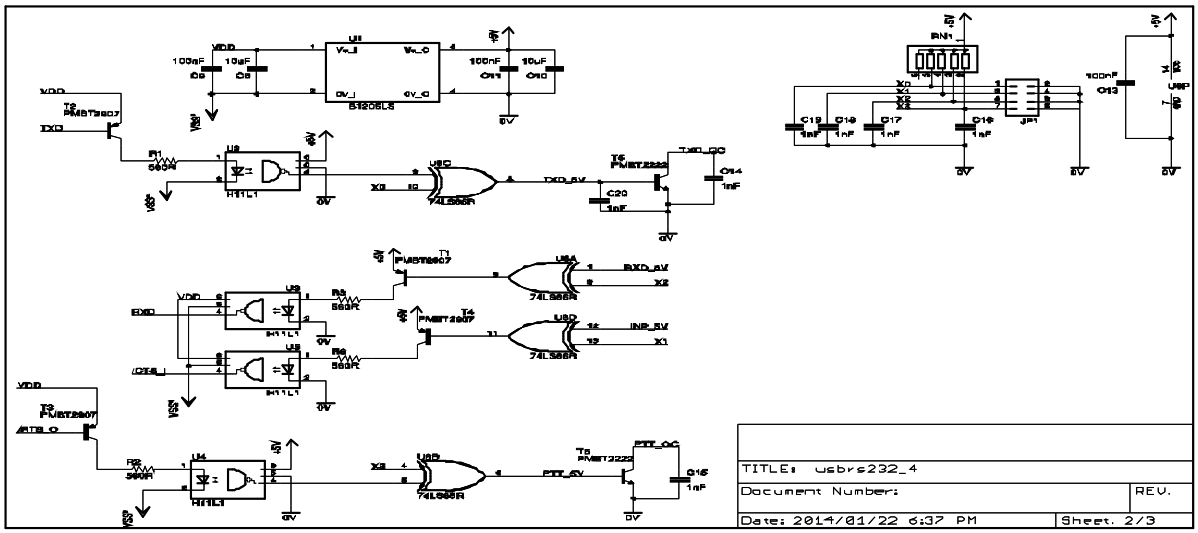


Figure 2: Isolation barriers and isolation PSU

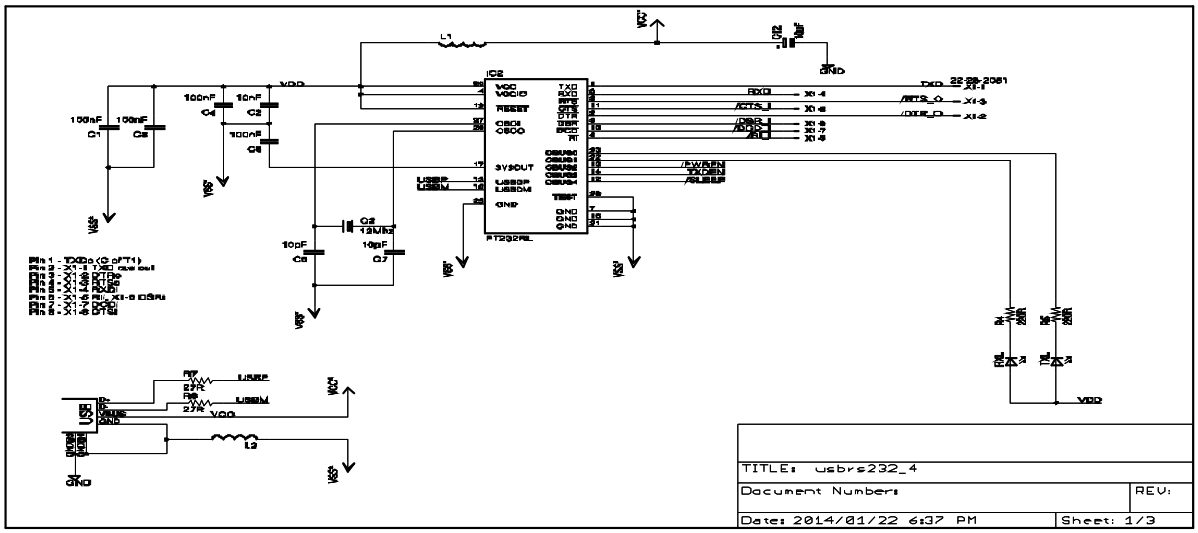
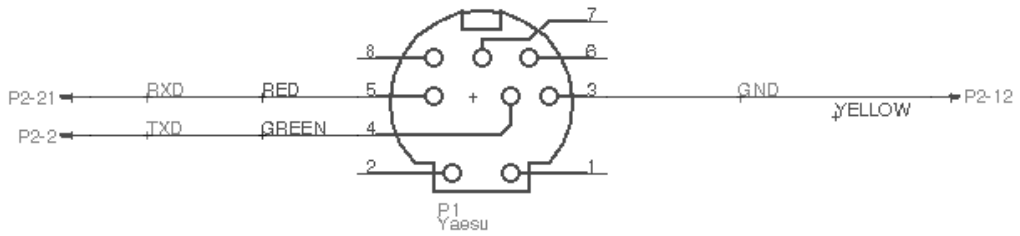


Figure 3: FT232RL device

Yaesu FT857/FT897 Wiring diagram
This radio uses 5V signalling so it is required to strap 1/14 if there is not external +5V available. The recessive state on this interface is +5V so looking at table 2 would indicate that both 25/13 and 23/11 needs to be installed to get the TXD and RXD pin for the correct polarity.

DB25 male	**Operation/Connection**
Pin25 & Pin13	Short (TXD line inversion control)
Pin1 & Pin14	Short (Set VCCio to 5V)
Pin23 & Pin11	Short (RXD line inversion control)
Pin21	TXD output to pin 5 on 8pin mini din (Red)
Pin2	RXD input to pin 4 on 8pin mini din (Green)
Pin13/Pin12	GND to pin 3 on 8pin mini din (Yellow)

Remember to set the interface on the radio port to CAT and not TUNER, check baud rate plug in and go.



ICOM CIV Wiring diagram
This radio uses 5V signalling so it is required to strap 1/14 if there is not external +5V available. The CIV requires an open collector on the transmit line. In the recessive state the TXD needs to “float” or sitting at +5V. The receive line does not have the extra transistor in it like the transmit line, so the inversion control line 23/11 needs to be fitted.

DB25 male	**Operation/Connection**
Pin2(RX) & Pin9(TX OC)	Sort together and take to tip of 3.5mm (Conductor)
Pin25	0V to radio, take to ring of 3.5mm (Shield)
Pin1 & Pin14	Short (Set VCCio to 5V)
Pin23 & Pin11	Short (RXD line inversion control)

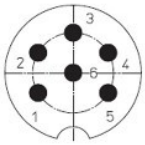
KENWOOD Wiring diagram TS450/TS850/TS690 6 pin 240 degree DIN connector:

This radio uses 5V signalling so it is required to strap 1/14, if there is not external +5V available. This is an inverted interface, meaning that +5V on the FTDI IO-pin indicates a 0V level at the radio side. So Looking at Table 2 we know the TXD pin 21 needs to be at 0V in the recessive state, this indicates that the inversion jumper 25/13 must not be installed. Likewise we need a 0V on the RXD input pin to get +5V on the FTDI IO-pin, consulting Table 2 indicates that jumper 23/11 should not be fitted. The same goes for the CTS line where 24/12 should not be fitted.

For remote PTT use pin 8 (open collector drive) and not fit 22/10, if the CAT software cannot change its polarity use 22/10 to set the correct polarity.
Some software require pin 4 and 5 to be shorted on the 240 degree DIN connector.

DB25 male	**Operation/Connection**
Pin 13 (Blue)	0V to pin1 of DIN connector
Pin 1 & Pin 14	Short (Set VCCio to 5V)
Pin 18 (Black)	CTS input to Pin 5 of DIN connector
Pin 21 (Red)	TXD output OC to Pin 3 of DIN connector
Pin 2 (Yellow)	RXD input to Pin 2 of DIN connector
	Short pin 4 and pin 5 on DIN

DIN 45322 Looking into the female connector or from the back of the male connector.



X1M pro Wiring diagram
This radio uses 5V signalling so it is required to strap 1/14 if there is not external +5V available. The recessive state on this interface is +5V so looking at table 2 would indicate that both 25/13 and 23/11 needs to be installed to get the TXD and RXD pin for the correct polarity.

DB25 male	**Operation/Connection**
Pin25 & Pin13	Short (TXD line inversion control)
Pin1	To input of 3.3V regulator
Pin 14	Output of 3.3V regulator
Pin 10	GND connection of 3.3V regulator
Pin23 & Pin11	Short (RXD line inversion control)
Pin21	TXD output to pin 2 on DB9 male (Red)
Pin2	RXD input to pin 3 on DB9 male (Green)
Pin12	GND to pin 5 on DB9 male (Yellow)

RS232 DB9 interface:
Pin 2 requires a 1N4148 connected to ground, Anode to pin 13 and cathode to pin 2. a 3300 ohm resistor is placed in series with the DB9 pin 2 and cathode of the diode. This is to protect the input of the super cat against high voltages from the RS232 interface.

If the output voltage swing is not enough break pin20 & 8 pins and connect Pin 8 to 12 Volt supply.

DB25 male	**Operation/Connection**
Pin 13 (Black)	0V to pin5 of DB9 connector
Pin 1 & Pin 14	Short (Set VCCio to 5V)
Pin 20 & 8	Output voltage strapping
Pin 9 (Red)	TXD output OC to Pin 3 of DIN connector
Pin 2 (Yellow)	RXD input to Pin 2 of DB9 connector
Pin 25 & 13	Short (TXD line inversion control)