



FlexiPanel

HappyTerminal™

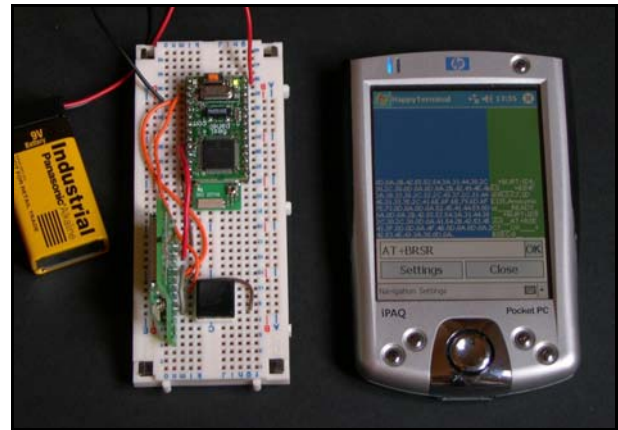
TTL Level Terminal Emulator for Serial I/O

Summary

HappyTerminal is a terminal emulator for monitoring and injecting TTL-level serial data in digital electronic circuits and prototypes. Its Bluetooth radio allows any Bluetooth-equipped Windows PC or Pocket PC to act as the user interface.

Hardware Features

- Baud rates 1220 to 115200 bits/s
- Green connection indicator LED
- Red serial error indicator LED
- On-board buffers / inverters for signal conditioning
- FCC / CE certified Class I Bluetooth V2.0 radio, 100m range, integral antenna
- Onboard power regulator, 3.3V – 10V supply.



HappyTerminal shown connected to a BlueMatik Bluetooth radio

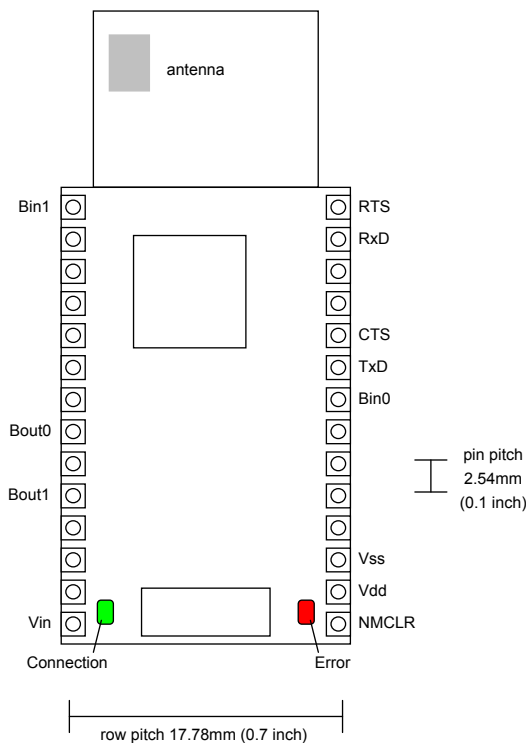
Firmware Features

HappyTerminal uses a FlexiPanel User Interface server allowing any Pocket PC or Windows PC with Bluetooth to display and enter data:

- ASCII data display or 'debug' mode with dual hexadecimal and ASCII display
- ASCII or hexadecimal data entry
- Transmit echo, CR and LF controls
- Receive line wrap and LF controls
- Actual baud rate achieved indicator
- Hardware flow control or no flow control.

Customization

- Firmware C source code available
- Customization possibilities include faster sampling rates and power saving modes



Manufactured to ISO9001:2000



FM76316

Pin & LED Descriptions

Pin Names	Description
Connection	Green LED, short flashes when operating but not connected to a Pocket PC or Windows PC, long flashes when connected.
CTS	Clear To Send: Flow control input to <i>HappyTerminal</i> . When low, <i>HappyTerminal</i> will output data on the TxD line.
Error	Red LED, glows for approximately half a second if a receive error occurs, before resetting the UART.
Bin0	Buffer/Inverter input 0 (see note 2)
Bin1	Buffer/Inverter input 1 (see note 2)
Bout0	Buffer/Inverter output 0, outputs the value of / inverse of Bin0 (see note 2)
Bout1	Buffer/Inverter output 1, outputs the value of / inverse of Bin1 (see note 2)
RTS	Flow control output from <i>HappyTerminal</i> . When high, do not send data to <i>HappyTerminal</i> .
RxD	Serial data input to <i>HappyTerminal</i> .
TxD	Serial data output from <i>HappyTerminal</i> .
NMCLR	50ms pulse low to reset. May be left unconnected.
Vdd	Regulated power +5V (see note 1)
Vin	Unregulated power input +5 to +10V (see note 1)
Vss	Power ground reference

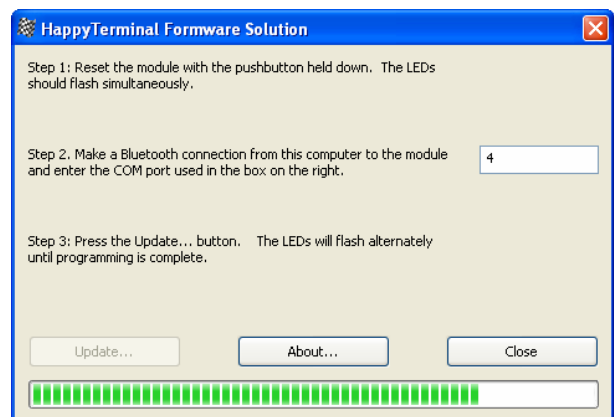
1. Either (i) regulated power should be provided on Vdd and Vin left unconnected or (ii) unregulated power should be provided on Vin and Vdd may be used as a regulated power output up to 200mA.
2. Buffers / inverters are configured in the settings dialog.

Loading HappyTerminal Firmware

HappyTerminal uses the ToothPIC module from FlexiPanel Ltd. ToothPIC is a general purpose microcontroller module with integral Bluetooth radio.

The ToothPIC module must be 'Field Programmed' with the HappyTerminal firmware. This takes a few seconds and requires either a Windows PC or a Pocket PC with Bluetooth. The procedure is as follows. (If required use the default PIN code "0000".)

1. Download the ToothPIC Development Kit from www.flexipanel.com and locate the appropriate HappyTerminal Service Pack, either HappyTerminalWin.exe (Windows) or HappyTerminalPPC.exe (Pocket PC).
2. Power-up the ToothPIC with the on-board pushbutton held down. The on-board LEDs will flash simultaneously.
3. Start running the HappyTerminal Service Pack and establish a serial connection from the computer to the ToothPIC using the computer's Bluetooth manager.
4. Enter the COM port used to connect to the ToothPIC in the box provided.
5. Press the Update button. Programming takes about 30 seconds. When the progress bar is full, field programming is complete.

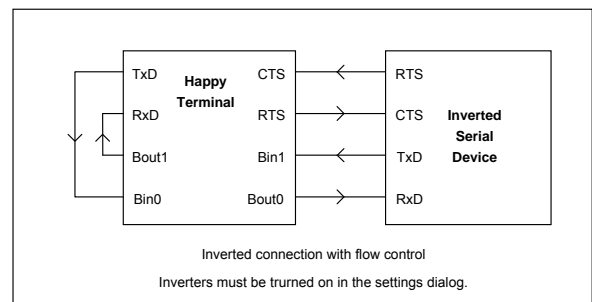
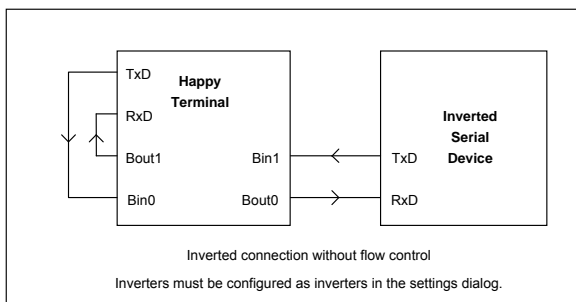
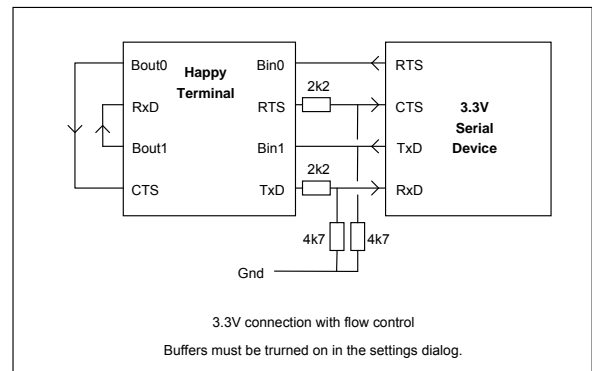
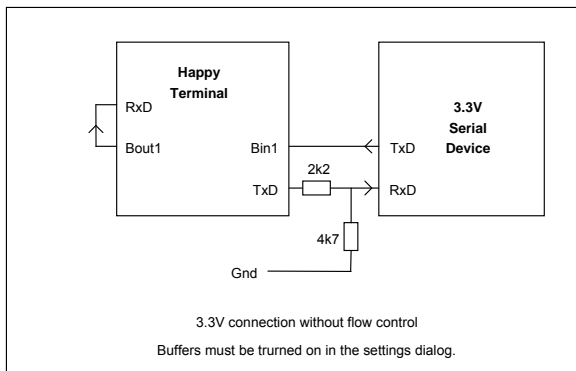
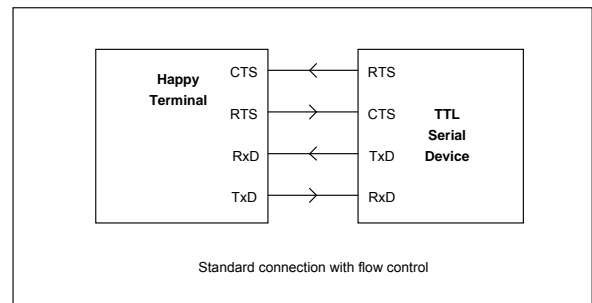
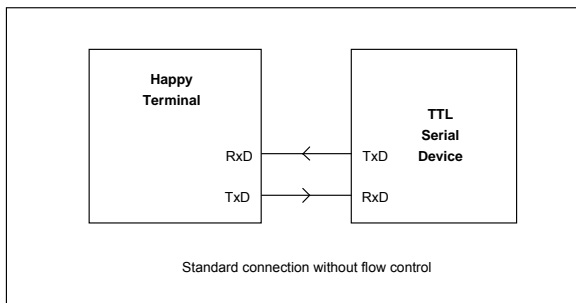


Configuring HappyTerminal

To use HappyTerminal you will need to load FlexiPanel Client software onto your Pocket PC or Windows PC.

- Download FlexiPanel Client software for Windows or Pocket PC from www.FlexiPanel.com as required. Although FlexiPanel Client software also exists for Smartphone and Java phones, they are not recommended because the HappyTerminal user interface is too complex.
- Apply power to ToothPIC and check that the green LED on flashing regularly. This indicates the HappyTerminal firmware is operating correctly. Connect TxD and RxD, and CTS and RTS if required, to the serial device you are going to communicate with. Refer to the schematic diagrams below.

Note: TTL-level serial data usually represents a '0' bit and the stop bit as logic high. A '1' bit and the start bit are represented as logic low. If for any reason the signals are inverted, use the inverters as shown below. If the logic levels are 3.3V, use the buffers as shown to boost the incoming signals to +5V. You will also need to turn on the buffers / inverters in the settings dialog and, if necessary, configure the flow control as inverted hardware flow control.



- Connect to HappyTerminal from the FlexiPanel Client as described in the instructions for the client. The green LED flashes will be longer, indicating that a successful connection was made. If the red LED illuminates it indicates a serial receive error. This may be because of a wrong connection or it may be because the baud rate needs to be changed. The red LED error indicator is self-resetting and

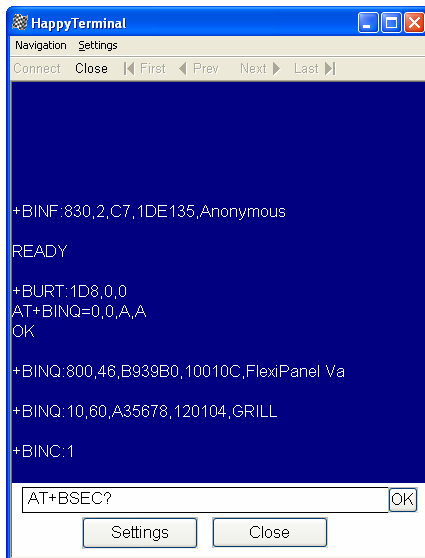
will extinguish after half a second unless the error re-occurs.

Using HappyTerminal

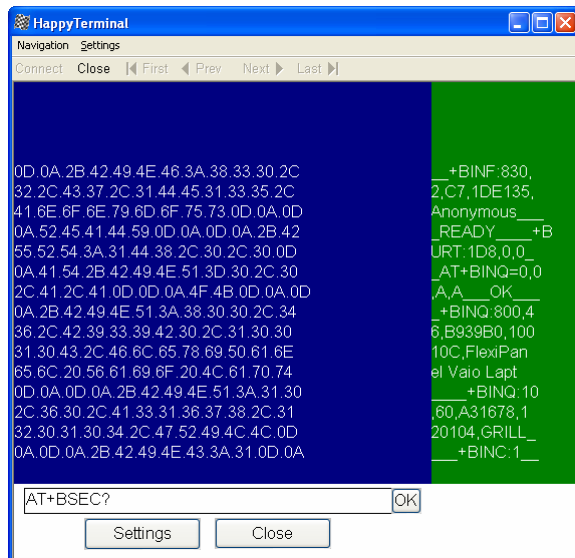
The main screen displays the last 20 lines of received data. HappyTerminal can display data in two modes, *ASCII mode* and *Debug mode*.

In *ASCII mode*, received data is displayed as ASCII characters in the main blue area of the screen, maximum 40 characters per line. Control characters except delete (DEL), carriage return (CR) and line feed (LF) are ignored. DEL moves the cursor back one position on the current line. CR moves the cursor to the beginning of the current line. LF scrolls the text line up and starts a new line.

In *Debug mode*, twelve bytes of received data are displayed as hexadecimal values in the main blue area of the screen. At the same time, the same data is displayed in ASCII in the green area to the right. Control characters are depicted using the underscore character.



ASCII mode



Debug mode

The edit box below the main display area is used to enter data for transmission. Type in the data to be transmitted and press OK to transmit it. Quite separately from the ASCII / Debug display modes, you can choose in the settings whether to enter transmit data as ASCII or hexadecimal values.

Press *Settings* to switch to the HappyTerminal Settings screen and *Close* to disconnect from HappyTerminal. Note that HappyTerminal will continue to receive data while you are unconnected and you can reconnect again later to see what was received.

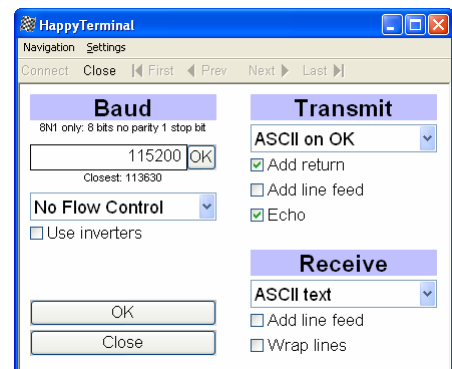
HappyTerminal Settings

Press *Settings* switch to the HappyTerminal Settings screen. The following settings can be specified:

Baud rate. Enter the baud rate in the edit box and press OK. The closest achievable baud rate will be calculated and displayed.

Flow control. Select between:

- No Flow Control:* RTS and CTS are not used.
- Hardware:* RTS and CTS are employed.



HW Inverted: RTS and CTS are employed, inverted in software.

Inverters / Buffers. Turns on the inverters so that TxD and RxD can be inverted in hardware as shown in the schematic diagrams above. Turn on the buffers so that 3.3V signals can be boosted to 5V for inputting to RxD and CTS.

Transmit. Select between:

ASCII on OK: Data typed into the transmit edit box are interpreted as ASCII.

Hex on OK: Data typed into the transmit edit box are interpreted as two-digit hexadecimal bytes.

Add return. A carriage return is appended to the data being transmitted.

Add line feed. A line is appended to the data being transmitted.

Echo. Transmitted data is also copied to the screen as if it were received data.

Receive. Select between:

ASCII text: Displays received data in ASCII mode as described above.

Hex on OK: Displays received data in Debug mode as described above.

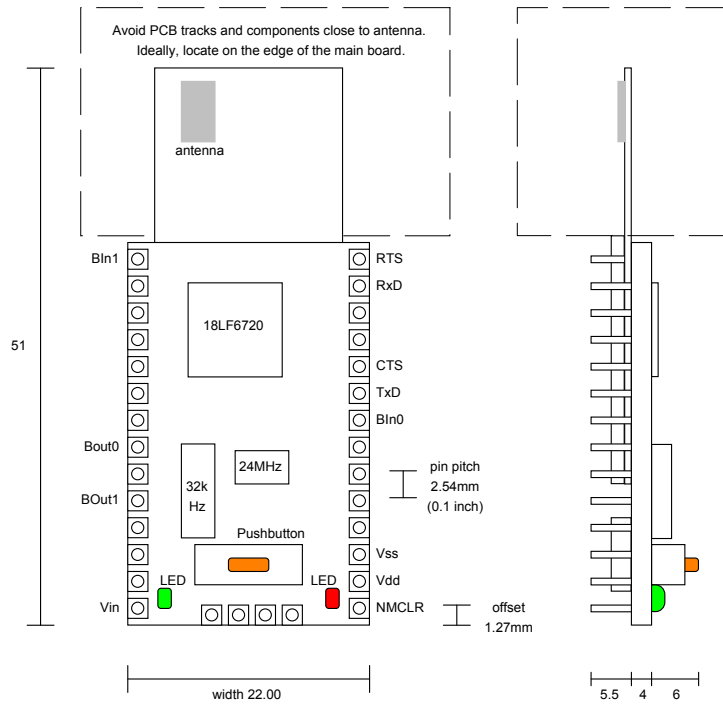
Wrap lines. Starts a new line if the current line fills (ASCII mode only).

Add line feed. A line is inserted after a carriage return has been received.

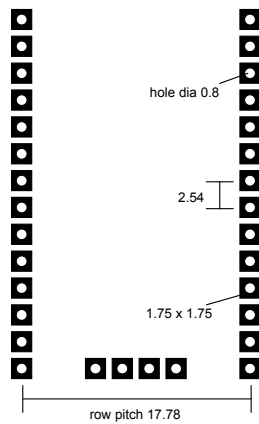
OK button. Press the *OK* button to switch back to the main HappyTerminal screen.

Close button. Press the *Close* button to disconnect from HappyTerminal. Note that HappyTerminal will continue to receive data while you are unconnected and you can reconnect again later to see what was received.

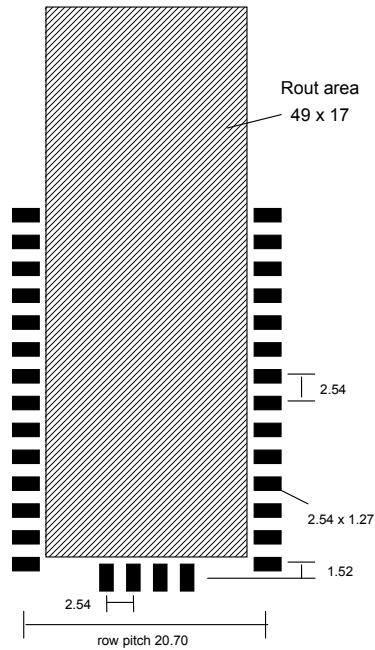
Mechanical Data



Dimensions in mm



DIL PCB pad layout



SO PCB pad layout

Pad design leaves exposed area as solder pool and test point

Notes: To remove the module from an IC socket or breadboard, lever it out using a screwdriver against the pin headers at the sides. Levering from either end may damage components.

Technical Specifications

Operating / storage temperature	-40°C to +85 °C
Dimensions L × W × H	51mm × 22mm × 10mm excluding pins

Electrical

Hardware platform	Toothpick	Toothpick Lite
Supply Voltage (unregulated)	3.2V to 10V	n/a
Supply Voltage Vdd (regulated)	3.2V to 5.5V	3.2V to 3.4V
Average current, Idle (3.3V supply)	10mA	10mA
Average current, during discovery and connecting	60mA	60mA
Average current, connected, transmitting	30mA	30mA
Average current, connected, receiving	40mA	40mA
Average current, lowest power sleep mode	370µA	370µA
Max voltage on I/O pins	-0.5V to Vdd+0.1V	-0.5V to Vdd+0.1V
Max voltage on PCM Audio pins	-0.4V to 3.4V (PCM pins)	-0.4V to 3.4V (PCM pins)
Maximum current on I/O pins CCP1, INT0, INT1, RxD, SCL, SDA, SDO, TxD	25mA	25mA
Maximum current on I/O pins AN5 – AN11, CCP2	25mA	8mA
Maximum current on I/O pins AN0 – AN4, CCP3 – CCP5	25mA	2mA
Maximum total current on all I/O pins	200mA	200mA

Radio

Max RF output power	Class I = 100mW = +20dBm
RF frequency range	2402MHz to 2480MHz
RF channels / frequency hop rate	79 / 1600 Hz
Range	100m nominal
Communication latency, µP to µP	8ms to 15ms
Maximum data rate	50-90 Kbaud depending on conditions

FCC, CE modular approval

The radio has been pre-qualified and is listed in the Bluetooth Qualified Products as B00524. The radio has 'modular approval' for USA and certain European countries, provided the existing integral antenna is used. The CE mark on the module indicates that it does not require further R&TTE certification. The exterior of the product should be marked as follows:

Contains Transmitter Module FCC ID: QOQWT11

Ordering Contact Details

HappyTerminal is manufactured and distributed by



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Technical Support

HappyTerminal is owned and designed by FlexiPanel Ltd:



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