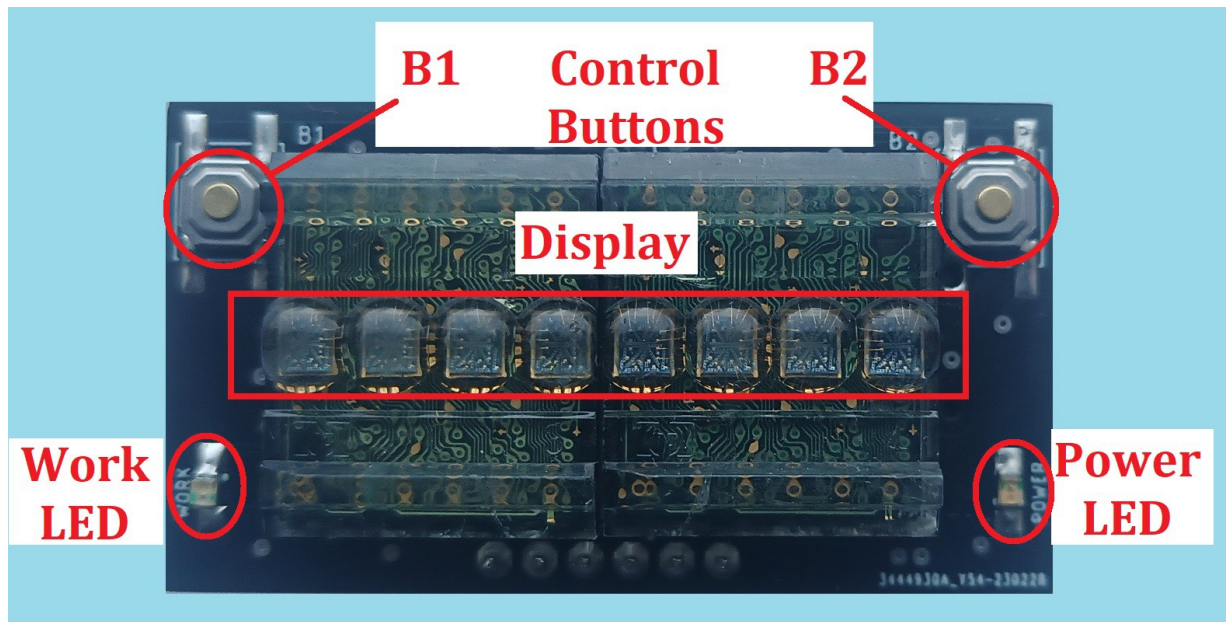# Raging Bits HPDL1414 8 CHAR DISPLAY v1.2

Top level specs

8 char display
Battery backed up RTC. (CR1220 coincell)
1 configurable Led.
4 IOs
1 Serial Port (fixed 9600bps)
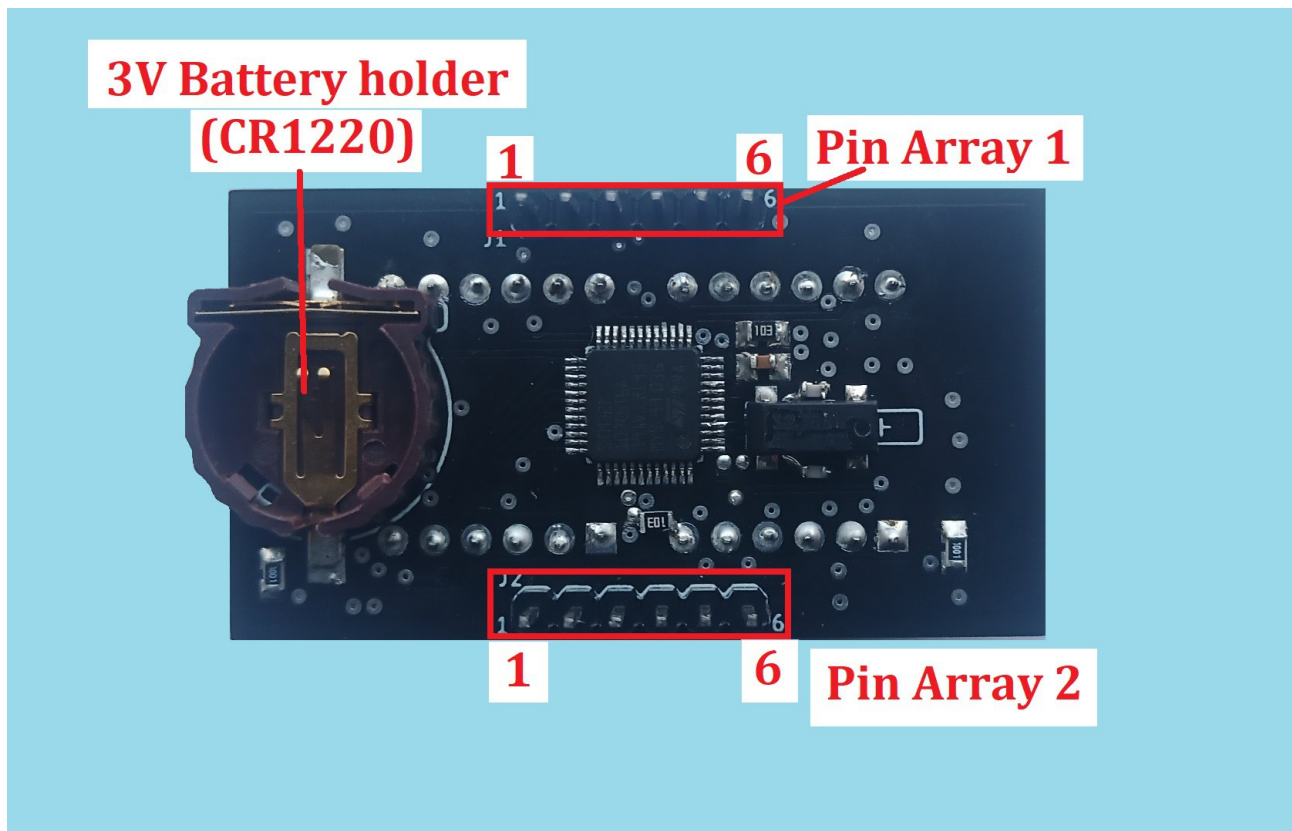2 buttons for clock control interface
Standard 5V power

Device interface

Power

Power consumption at 5V is aproximatly 100mA (200mA if using the 3.3V output line).
This board has a lm1117 3.3v regulator feeding the 3.3v power line, capable of a maximum 100mA.

Hardware connectors

Connector Pin Array 1

Pin 1 – 5V input
Pin 2 – Ground GND input
Pin 3 – 3V3 output (100mA max)
Pin 4 – Ground GND output
Pin 5 – UART TX
Pin 6 – UART RX

Connector Pin Array 2

Pin 1 – IO1
Pin 2 – IO2
Pin 3 – Ground GND output
Pin 4 – Ground GND output
Pin 5 – IO3
Pin 6 – IO4

Uart

The UART is fixed at 9600bps, 1 start bit, 1 stop bit, no flow control and no parity.

IOs

The IOs are quasi-IOs, where they can act as both Input and Output at same time.

The maximum input voltage range is from 0V to 3.3V.

As output

The IO pin is set as output high/low using a 25KOhm pull resistor.

As input

The IO is read as low if pulled to the GND, and as high if pulled to 3.3V.

If the IO is connected externally to GND/3.3V, it will always read as low/high, independently of the output value set, but once left floating or connected to a high impedance, then will read as the set output state.

Buttons

The buttons are used to directly interface and make use of the display as a clock calendar.

Show time and date in a rotating screen.

Click pressing once the left button B1, will set the display to rotate time and date continuously.
A second click press will bring it back to normal clock time display.

Show date momentarily.

Hold pressing the right button B2, will set the display to show the current date in DD/MM/YY format. Releasing the button will bring it back normal clock time display.

Date time setup.

Press and holding both B1 and B2 buttons will bring up the RTC setup menu.

Changing the set value

Press clicking the right button B2 will issue a modification to the current value of the date time element to set. Press and hold the B2 button will automatically run up the values with a wrap around to the lowest possible value of the element, when the highest possible value is achieved.

Moving to the next element to set

Press clicking the left button B1 will move onto the next element.

Once the menu setup starts the menu will go through the elements in the following order with the given range of values:

Year	(2023 to 2099)
Month	(1 to 12)
Day	(1 to 28/28/30 or 31 depending on the previous combination of year month)
Hour	(0 to 23)
Minute	(0 to 59)
Second	(0 to 59)
Save	(yes/no)

Commands

The system is designed to have the commands syncronized using a simple framing system.
The frame starts with a Line Feed character, followed by the command identification, the command data if any, and ends with a Carriage Return.
This means all command data will be in ASCII not binary.

[\n] [Command ID] [Data (if any)] [\r]

Show Text – '1' (0x31)

Every new text entry resets the display rotation point.
Due to the nature of the HPDL1414, only a limited set of characters are supported,
Numbers, only Upper Case letters and some signs.
(There is a table with the full supported contents in the Notes.)

[\n] [1] [Text to show] [\r]

Serial > n1HELLO WORLD   \r
Serial < \nOK\r

Display now rotates the message "HELLO WORLD   ".

Show Time – '2 (0x32)

[\n] [2] [\r]

Serial > n2\r
Serial < \nOK\r

Display will now show the time.

Show Time Date – '3' (0x33)

[\n] [3] [\r]

Serial > n3\r
Serial < \nOK\r

Display will now show the time and date rotating.

Get Time-Date – '4' (0x34)

[\n] [4] [\r]

Serial > n4\r
Serial < \n00:10:13 01 FEB 2023\r

Display will return the time and date.

Set Time-Date – '5' (0x35)

The time and date format MUST BE EXACTLY as follow.

hh:mm:ss dd/MM/yyyy
where:

      hh – 2 digit hours
      mm – 2 digit minutes
      ss – 2 digit seconds
      dd – 2 digit day
      MM – 2 digit month
      yyy – 4 digit year

[\n] [5] [hh:mm:ss dd/MM/yyyy] [\r]

Serial > \n500:10:13 01/02/23\r
Serial < \nOK\r

Display will return the time and date.

Set IO – '6' (0x36)

All IOs are low at power up. IOs are not held in memory during power down.

Each IO setup has 2 chars, the first char is the IO number and the second the respective IO state.

Each command can have up to 4 setups.

[\n] [6] [IO setup1 ... IO setup N] [\r]

Serial > \n61141\r
Serial < \nOK\r
Set IO 1 and 4, as High.

Serial > \n610213140\r
Serial < \nOK\r
Set all IOs, as Low.

Get IO – '7' (0x37)

[\n] [7] [\r]

Serial > \n7\r
Serial < \n10213140\r

IO 1 is low, IO 2 is high, IO 3 is high and IO 4 is low.

Set Work LED – '8' (0x38)

[\n] [8] [Status] [\r]

Serial > \n80\r
Serial < \nOK\r

Led is now OFF.

Serial > \n81\r
Serial < \nOK\r

Led is now ON.

Toggle Work LED – '9' (0x39)

Simple led blink feature.

The blinking speed is faster as the delay decrements.

The delay can be set in integers from 0 to 9 inclusively.

[\n] [9] [Delay] [\r]

Serial > \n90\r
Serial < \nOK\r

Led blinks at maximum speed.

Serial > \n99\r
Serial < \nOK\r

Led blinks at minimum speed.

Notes

The HPDL1414 has a limited set of characters that it has the ability to display.
Please check the HP1414 datasheet, page 5, to verify the display capabilities.
For example, it can only display Upper Case alphanumeric letters, numbers and a few other.

Character Set

BITS	D3 D2 D1 D0	0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1
D6 D5 D4	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 1 0	2	(space)	!	"	#	$	%	&	/	(	)	*	+	,	—	.	/
0 1 1	3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
1 0 0	4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1 0 1	5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_

The UART interface is done with 3.3v signals.
The TX pin will only be able to output 3.3v. The RX pin is capable of 5v input signals.

References

hpdl-1414.pdf