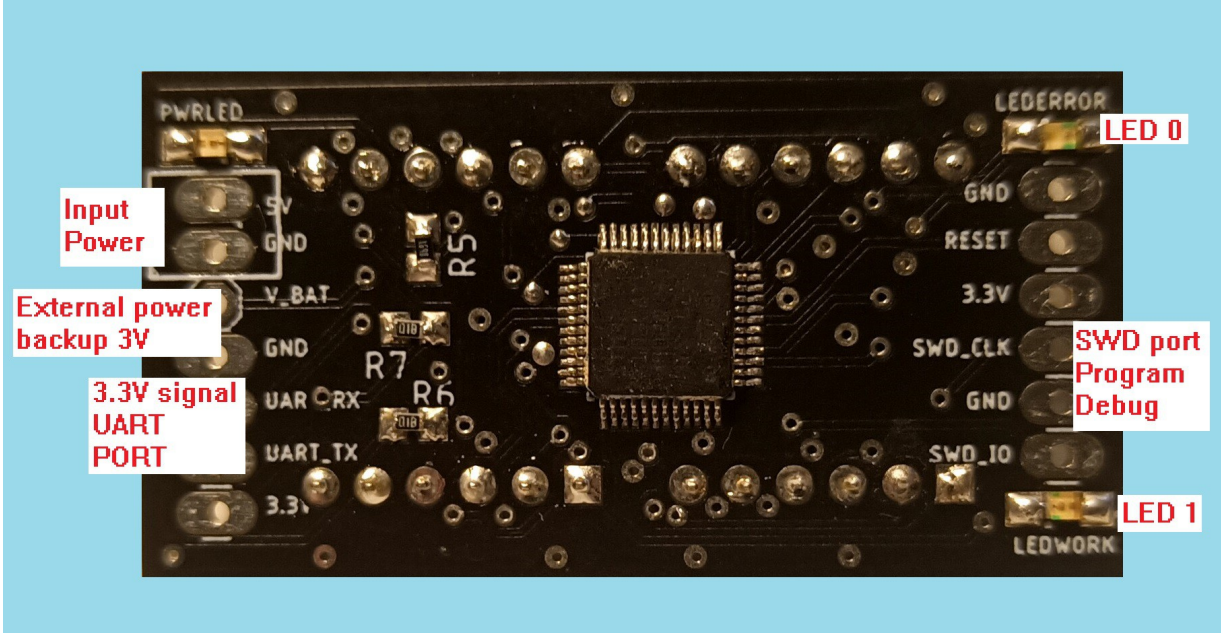
Raging Bits HPDL1414 8 CHAR DISPLAY v1.0

Top level specs

STM32F103C8T6 64MHz 32bit arm core.
Fully programable.
Demo code with AT command set.
8 char display able to have battery backed up RTC + backup ram data.
2 configurable Led.
SWD access for programing.

Device interface



Input Power - GND and 5V Supply.
External Backup power – 3v (usually a coincell).
UART PORT. Organized as GND, RX, TX and 3.3v power access. May be used for input or output of power. NEVER connect both 3.3 and 5V at same time.
LED 0 – RED LED connected to a microcontroller IO to be used as error signaling.
LED 1 – RED LED connected to a microcontroller IO to be used as heartbeat signaling.
SWD port – Access to program debug the STM32 mocrocontroller. It includes physican reset line, 3.3v with gnd power access and SWD pins.

Power

Power consumption at 5V is aproximatly 80mA.
This board has a lm1117 3.3v regulator feeding the 3.3v power line.

!!! IMPORTANTE! NEVER POWER 5V and 3.3V bus SIMULTANEOUSLY !!!
This could damage the device!

Hardware configuration

Uart is set such:

Uart RX – PB7

Uart TX – PB6

Note:
In order to use these pins as UART, they need to be set as alternate function.

The leds are set such:

LED 0 – Error led – PB0

LED 1 – Work led – PB1

Both HPDL1414 Ics are in the same data bus, but have their nWR pins separated for work selection. The setup is such that all of them fall in the same port organized in sequential addressing so that coding access is simple and fast.

Common pins:

HPDL1414 D0 – PA0

HPDL1414 D1 – PA1

HPDL1414 D2 – PA2

HPDL1414 D3 – PA3

HPDL1414 D4 – PA4

HPDL1414 D5 – PA5

HPDL1414 D6 – PA6

HPDL1414 A0 – PA7

HPDL1414 A1 – PA8

Individual pins:

HPDL1414 nWR IC1 – PA9

HPDL1414 nWR IC2 – PA10

The board does NOT have an external high speed crystal. The device clock needs to be setup using the internal high speed RC oscillator. It can be set from 8 to 64MHz.

This microcontroller does have an RTC and respective backup domain. For an accurate time keeping, an external 32.768Khz 20ppm crystal is connected to the respective pins.

The internal RTC works based on a tick counter.

DEMO CODE

The demo code has the ability to collect AT commands from the serial port and execute them with the respective OK/NOK replies.

The Uart interface speed is set to 115200bps.

This Uart does NOT allow access to the device bootloader. In order to program the device, an STLink or other SWD capable tool must be used.

The code also has the RTC enabled and working, set to a tick rate of 1 second, by setting the internal counter match to 32767 counts.

The demo code is available at

https://github.com/RagingBits/HPDL1414-RagingDisplay

The demo code has been developed in Eclipse and debugged using a ST-Link or j-Link probe.

The code is provided AS IS, and no responsability is taken from its usage or modification.
With that said, is free for full use and modification oly limited by the respective STM32 libraries.

Demo code Commands

The system is designed to have the commands syncronized using Line Feed character termination or Carriage Return followed by Line Feed ternination.

AT+GET_TIME\r\n

Returns the current RTC time and date in a text format such:
Time: HH:MM:SS Date: DD/mm/YYYY
Back throught the serial port.

Ex:
>AT+GET_TIME\n
<Time: 15:32:51 Date: 25/06/2021\n
<OK

AT+SET_TIME:\r\n

Sets the current RTC time and date and MUST be sent in a text format such:
Time: HH:MM:SS Date: DD/mm/YYYY

Ex:
>AT+SET_TIME:Time: 15:32:51 Date: 25/06/2021\n
<OK

AT+SHOW_TIME\r\n

Sets the display to start showing the currernt time in a HH:MM:SS format.

The time will show until another 'show' command overwrites it.
Ex:
>AT+SHOW_TIME\n
<OK

AT+SHOW_DATE:\r\n

Sets the display to start showing the current date. This may be shown in 2 different ways,

AT+SHOW_DATE:0 command will set the display to static DD/mm/YY format.
AT+SHOW_DATE:1 command will set the display to a scrolling DD/mm/YYYY format.
The date will show/scroll until another 'show' command overwrites it.

Ex:
>AT+SHOW_DATE:0\n
<OK
>AT+SHOW_DATE:1\n
<OK

AT+SET_LED:\r\n

Sets the new state of the selected LED.
There are 2 leds that can be controlled, the led 0 (work led) and the led 1 (error led).
The command format is AT+SET_LED:<LED number>,<new state>.

Setting work led on and error led off:
Ex:
>AT+SET_LED:0,1\n
<OK
>AT+SET_LED:1,0\n
<OK

AT+SHOW_TEXT:\r\n

Sets the display to start scrolling a message that has been sent in the command.
The command format is
AT+SHOW_TEXT:<text to be shown>\r\n
The text will scroll until another 'show' command overwrites it.

Showing a scrilling text " HELLO WORLD!!! :) "
Ex:
>AT+SHOW_TEXT:HELLO WORLD!!! :)\n
<OK

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 D_3 D_2 D_1 D_0	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
D_6 D_5 D_4	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
STM32 libraries.
STM32F103C8 datasheet.
STM32F103 manual.