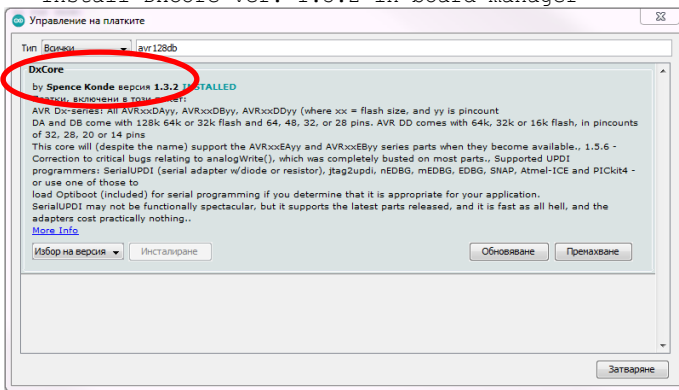# AVR128db48 Arduino boards

- For using AVR128DB48 boards from Anton do:
- Add URL in Preferences:
  http://drazzy.com/package_drazzy.com_index.json
- Install DxCore ver. 1.3.2 in board manager

- Connect CP2102 USB to UART Bridge to Windows PC
- Install CP2102 USB driver if needed and verify the port: COM10 for example

UPDI programmer (to burn bootloader)

- Connect CP2102 USB to UART Bridge to the board
- o Rx ← 4.7k res. → Tx → AVR128DB48 UPDI (pin 41),
- o DTR → 200nF → RST (p. 40), GND, VCC (3.3V)
- Programmer: "Serial Port + 4.7k Resistor (pyupdi style)"
- Usage: Tools → Burn Bootloader
- Usage: Sketch → Upload Using Programmer

Regular serial programmer

- Connect CP2102 USB to UART Bridge to the board
- o CP2102/TTL-232R Tx → AVR128DB48 Rx0 (p. 45)
- o CP2102/TTL-232R Rx ← AVR128DB48 Tx0 (p. 44)
- o DTR → 200nF → RST (p. 40), GND, VCC (3.3V)
- Usage: Sketch → Upload
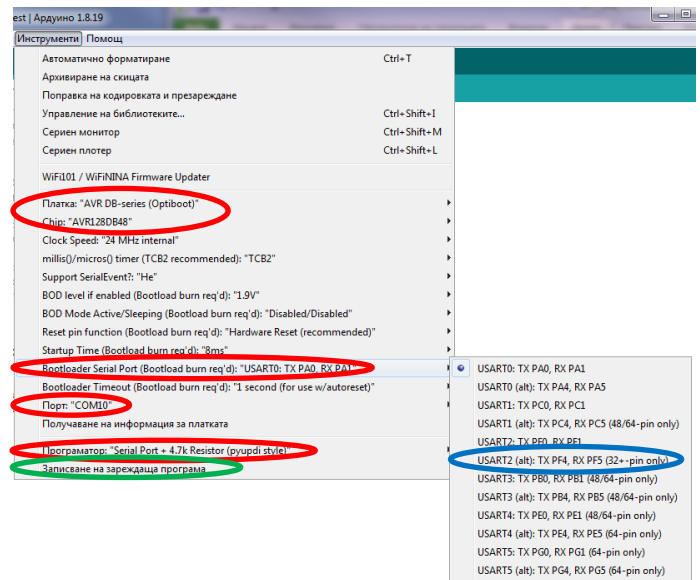
Bootloader serial port could be USART2 (alt), but using USART0 the PC COM port for both programming and serial communication with the sketch will be the same.

"Blinking LED" test for avr128db48

```
void setup() {
  // PIN_PC3 for avr128db48
  // may be different for other boards!
  pinMode(17, OUTPUT);
}
void loop() {
  digitalWrite(17, 1);
  delay(100);
  digitalWrite(17, 0);
  delay(100);
}
```

AVR128DB48 on 48 pin QFP adapter board
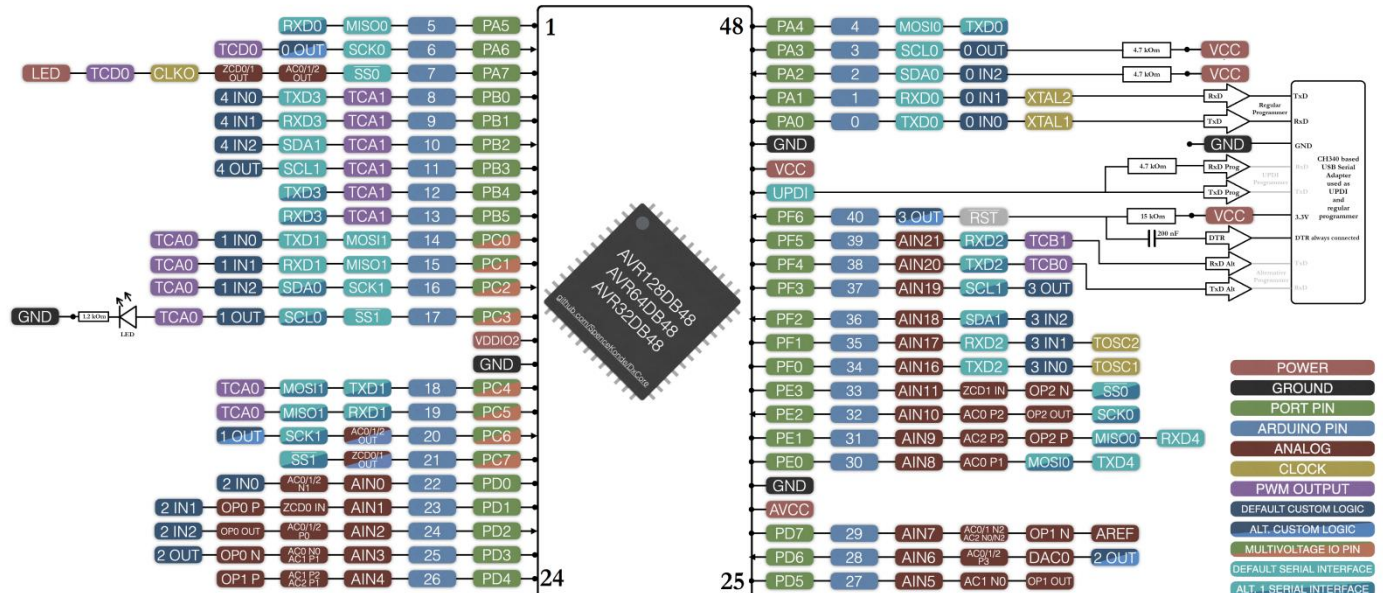
Other boards notes:

- Arduino UNO – install windows driver for USB-Serial CH340 adapter,
- Olimexino Nano – install windows driver for Arduino Leonardo compatible boards,
- Set in Tools → Board → Arduino AVR Boards → Arduino UNO or Arduino Leonardo respectively,
- Set in Tools → Port → corresponding COM port,
- LED pin may be different for different boards – change it in "Blinking LED" test sketch.

Connection setup for 3.2" 240x320 pixels TFT display with SPI interface

	Display Pin	Arduino UNO ATMega328	Optiboot AVR128db48	Olimexino-Nano pin	ATMega32u4 pin	Description
1	VCC	VCC-3.3V	VCC-3.3V	VCC-3.3V	VCC-3.3V	3.3V power input (do not connect to 5V)
2	GND	GND	GND	GND	GND	GND
3	CS	D10	0,#SS, PA7	D13	PC7/ICP3/CLK0/OC4A	LCD chip select signal, low level enable
4	RESET	D8	PA2 (0,SDA)	D4	PD4/ICP1/ADC8	LCD reset signal, low level reset
5	DC/RS	D9	PA3 (0,SCL)	D11	PB7/PCINT7/OC0A/OC1C/#RTS	LCD register / data selection signal, high level: register, low level: data
6	SDI(MOSI)	D11	0,MOSI, PA4	D16	PB2/PDI/PCINT2/MOSI	SPI bus write data signal
7	SCK	D13	0,SCK, PA6	D15	PB1/PCINT1/SCLK	SPI bus clock signal
8	LED	VCC-5V	VCC-5V	VCC-5V	VCC-5V	Backlight control, high level lighting, if not controlled, connect 5V for always bright
9	SDO(MISO)	D12	0,MISO, PA5	D14	PB3/PDO/PCINT3/MISO	SPI bus read data signal, if you do not need to the read function, you cannot connect it

All 3 boards are connected to 3.2"SPI TFT display and running Unified graphic test
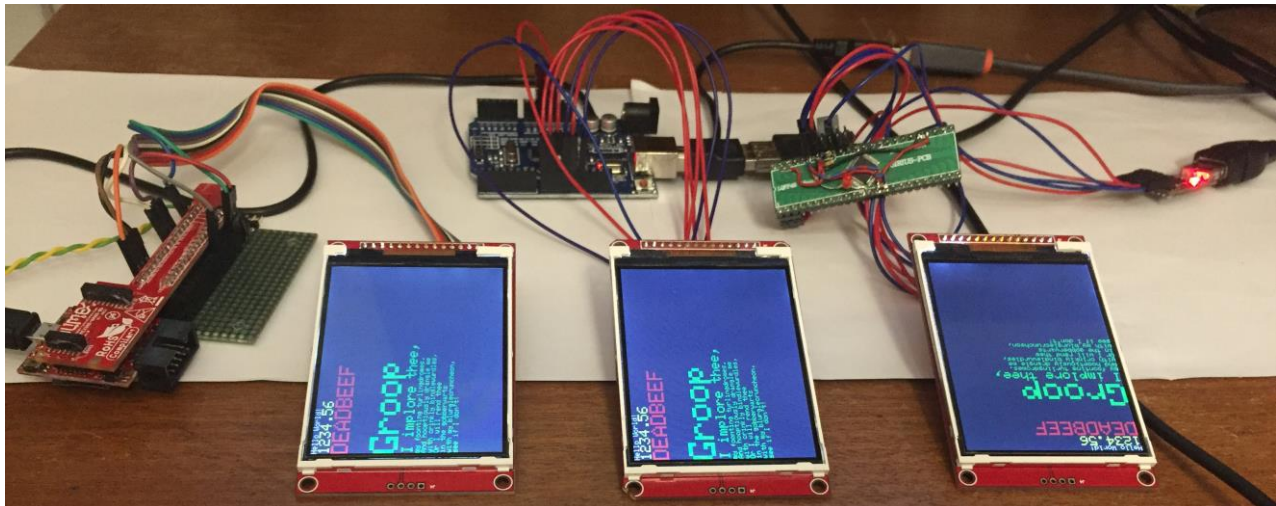
Olimexino Nano (ATMega32u4)   Arduino UNO (ATMega328)   Optiboot like (AVR128db48)

Benchmark of unified graphic and scroll tests built on Adafruit_ILI9341 and TFT_ ILI9341 libraries

Arduino board / MCU	UNO / atmega328			Leonardo / atmega32u4			Optiboot / avr128db48		
ILI9341 Library used	Adafruit	TFT	Speed up	Adafruit	TFT	Speed up	Adafruit	TFT	Speed up
Memory usage [B]									
Flash used Flash total percentage	23,736 of 32,256 (73.59%)	21,870 of 32,256 (67.80%)		25,874 of 28,672 (90.24%)	23,992 of 28,672 (83.68%)		24,354 of 130,560 (18.65%)		
SRAM used SRAM total percentage	950 of 2,048 (46.39%)	746 of 2,048 (36.43%)		915 of 2,560 (35.74%)	711 of 2,560 (27.77%)		1,087 of 16,384 (6.63%)		
Benchmarks [us]									
Screen fill	1,496,456	870,220	1.720	1,503,900	874,600	1.720	1,603,604		
Text	147,088	60,416	2.435	147,820	60,724	2.434	114,885		
Lines	1,172,116	242,732	4.829	1,178,004	243,988	4.828	946,199		
Horiz/Vert Lines	125,064	71,336	1.753	125,656	71,696	1.753	132,637		
Rectangles (outline)	82,228	45,844	1.794	82,632	46,076	1.793	85,703		
Rectangles (filled)	3,107,060	1,807,436	1.719	3,122,844	1,816,740	1.719	3,329,307		
Circles (filled)	452,728	284,064	1.594	454,916	285,536	1.593	423,221		
Circles (outline)	497,252	135,580	3.668	499,604	136,148	3.670	404,412		
Triangles (outline)	261,056	59,496	4.388	262,392	59,808	4.387	213,681		
Triangles (filled)	1,330,720	694,456	1.916	1,337,200	698,032	1.916	1,279,412		
Rounded rects (outline)	228,892	100,004	2.289	230,024	100,532	2.288	200,582		
Rounded rects (filled)	3,127,968	1,976,936	1.582	3,143,588	1,987,180	1.582	3,330,751		
Fill screen by pixels	3,369,992	918,732	3.668	3,387,308	923,492	3.668	2,964,859		
Fill screen by bitmaps	528,576	855,088	0.618	531,112	859,520	0.618	453,099		
Scroll and fill screen	532,988	855,696	0.623	535,808	860,132	0.623	457,946		

Notes:

- Memory usage numbers are as reported in runtime and slightly different than one reported by the compiler;
- Preparing of the data for filling the screen by pixels or bitmaps are made to be as fast as possible;
- Speed up figure means the operation is that many times faster.