



STM32F10xxx board

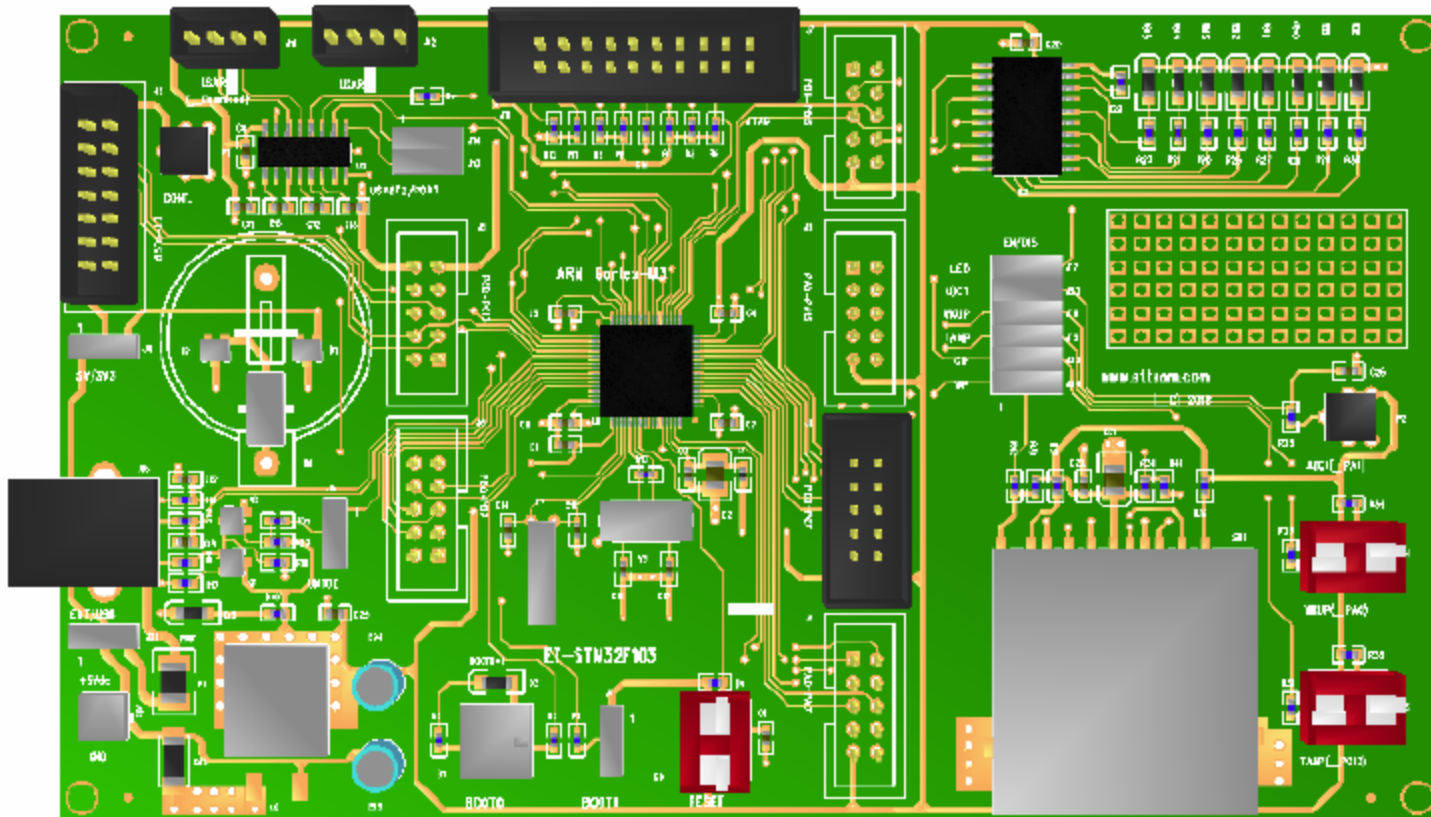
Board specification

- ARM Cortex-M3 32 bit MCU No. STM32F103RBT6 from STMicroelectronics
- 128 KB Flash memory + 20 KB RAM
- Crystal 8 MHz + Phase Lock Loop (PLL) that can run up to 72 MHz
- Real Time Clock with XTAL 32.768 KHz and battery backup
- 5 VDC supply with 3V/3A regulate internal board

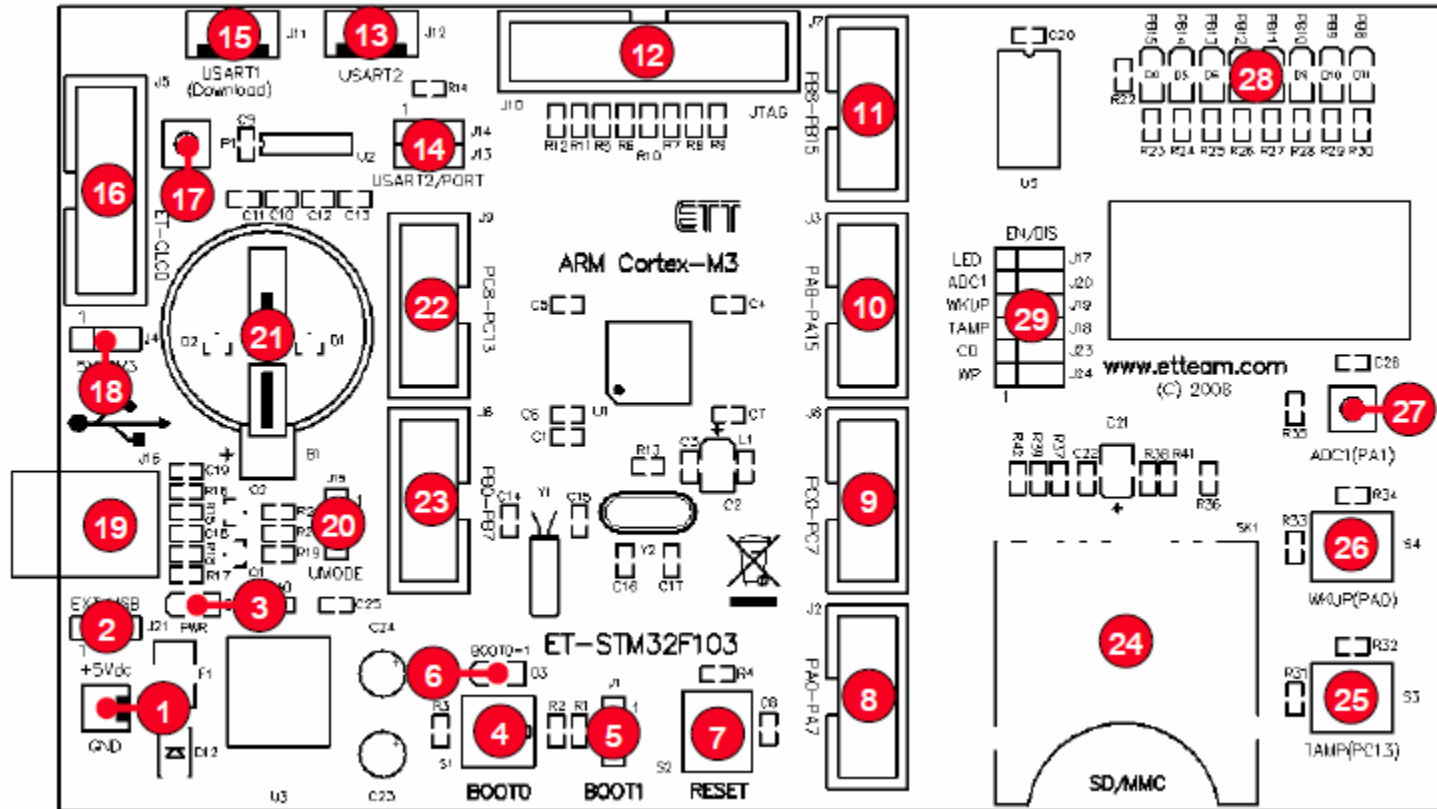
Board specification

- Standard full-speed USB 2.0
- Interface for SD-card using SPI
- Two channel RS-232
- Interface for Dot-Matrix LCD
- 2 push button switch
- 8 LED circuits
- Independent 46 bit GPIO (PA-PC)

Structure of the board



Components on the board



Components on the board

1. External 5V power supply connector
2. Jumper to select power source from connector or USB port
3. LED for power supply status
4. Boot0 switch for download or normal mode
5. Jumper J1 to use with Boot0 switch
6. LED for operation mode of the board, off means normal mode
7. Reset switch
8. GPIO connector (PA [0..7])
9. GPIO connector (PC [0..7])

Components on the board

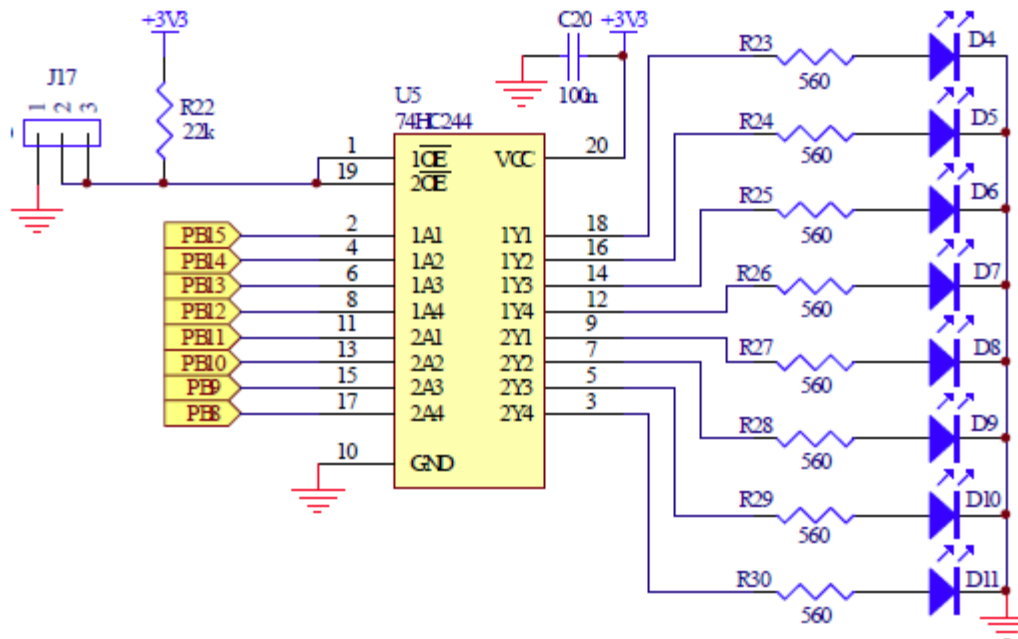
10. GPIO connector (PA[8..15])
11. GPIO connector (PB[8..15])
12. JTAG connector for debugging
13. USART2 (RS232) connector
14. Jumper J13 and J14 to set signal of PA2 and PA3 to use either USART2 or GPIO
15. USART1 for usage and data download
16. LCD connector
17. Variable resistor to adjust the brightness of LCD
18. Jumper J4 to select power supply of LCD 3.3V or 5V
19. USB connector to connect with USB Hub

Components on the board

20. Jumper to select connection mode of USB
21. 3V battery for power backup
22. GPIO connector (PC [8..13])
23. GPIO connector (PB [0.. 7])
24. Socket to insert SD card
25. S3 to test logic input of PC[13]
26. S4 to test logic input of PA[0]
27. Variable resistor to adjust to test A/D (PA[1])
28. LED to test logic output of (PB [8..15])
29. Jumper J17, J20, J19, J18, J23, J24 to enable/disable connection between GPIO pin and components

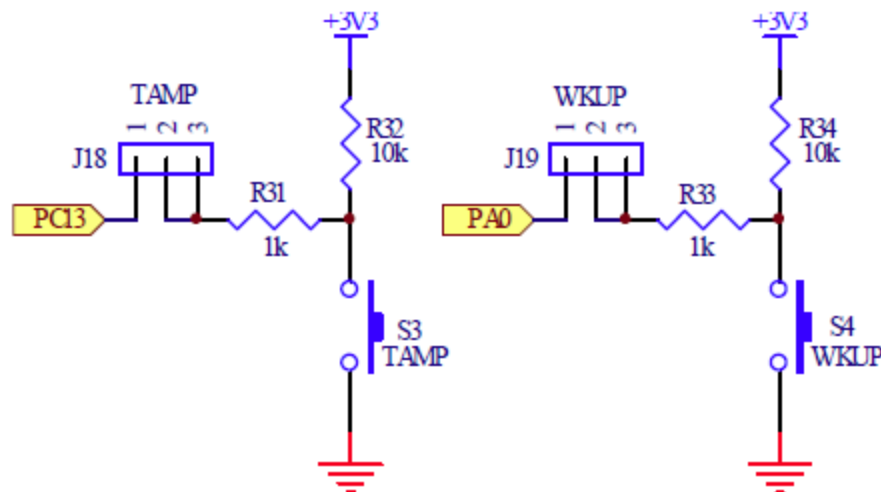
LED circuits

- There are 8 LED display on the board
- Jumper J17 can be used to on/off this LED



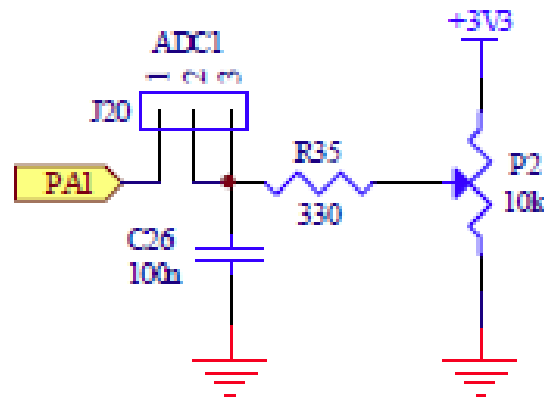
Push button switch

- Using pull-up circuit with 3.3 V
- If the switch is not pressed, the logic is '1'
- There are two switches
 - S3 (PC[13]) or Tamper detection
 - S4 (PA[0]) or Wakeup interrupt
- Jumper J18 and J19 are used for enable/disable



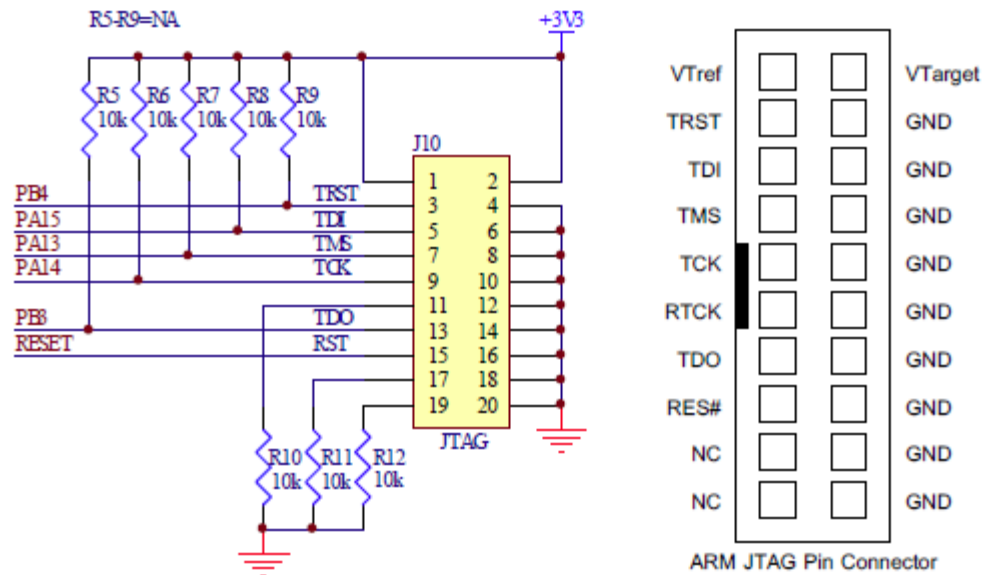
A/D converter testing

- Use variable resistor to adjust value from 3.3 V power supply
- The output is connected to pin PA[1]
- Jumper J20 is used for enable/disable



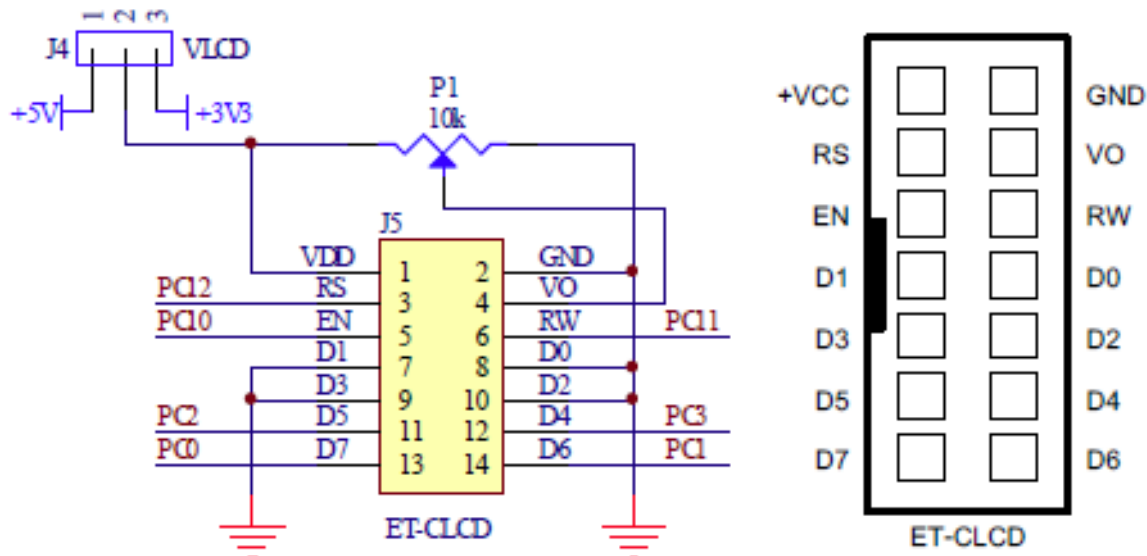
JTAG ARM

- JTAG ARM has 20 pin interface with JTAG debugger



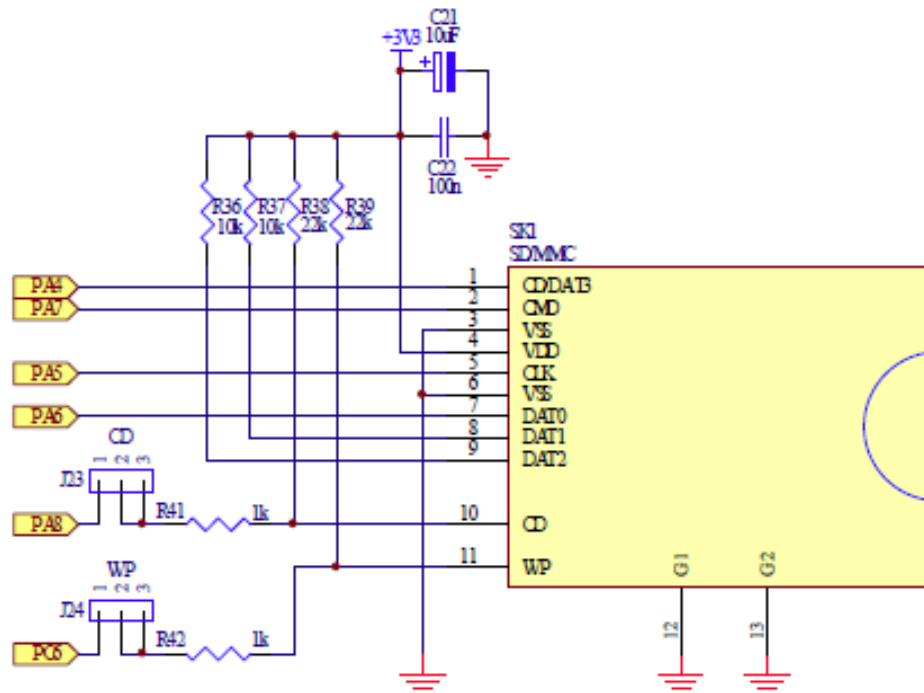
LCD

- LCD can be connected with dot-matrix LCD
- It uses 7-bit interface PC[0..3] and PC[10..12]
- J4 jumper is used for enable/disable



SD card memory

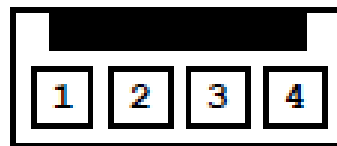
- Using SPI interface
- J23 and J24 jumpers are used for control



RS232

- USART1 uses signal pin from PA9 (TX) and PA10 (RX)
- USART2 uses signal from PA2 (TX) and PA3 (RX)
- Jumper J13, J14 uses to enable USART-2

USART-1(Download)



+3V3
RXD1
TXD1
GND

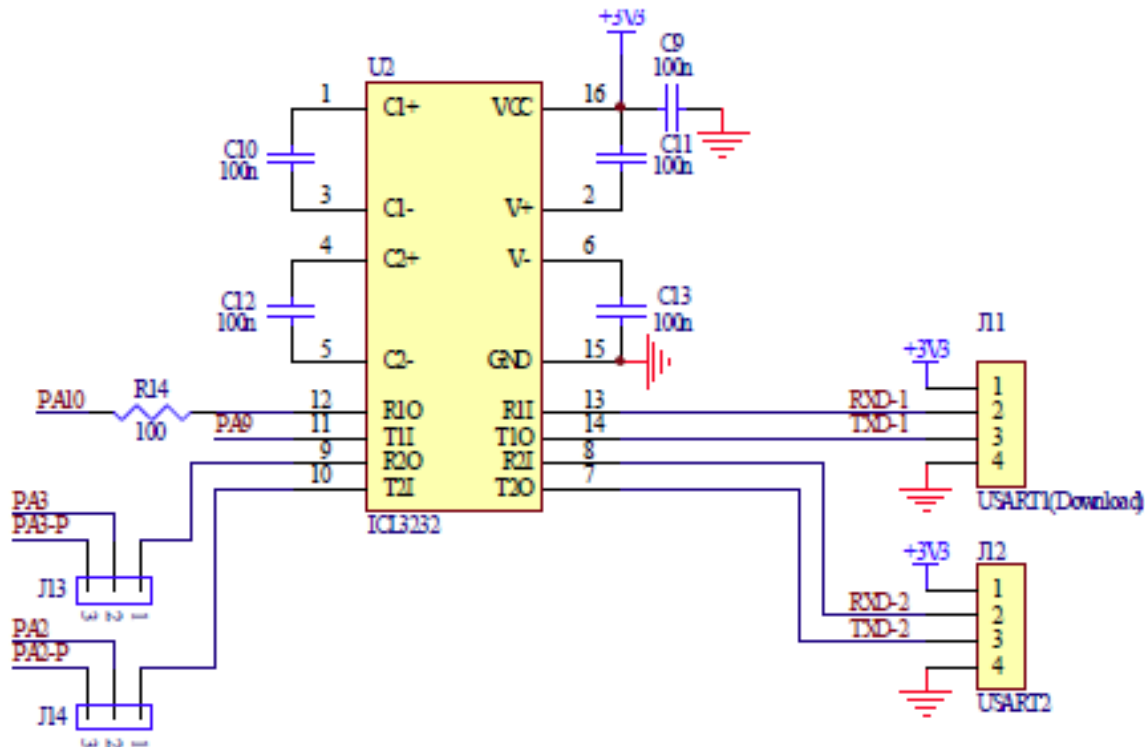
USART-2



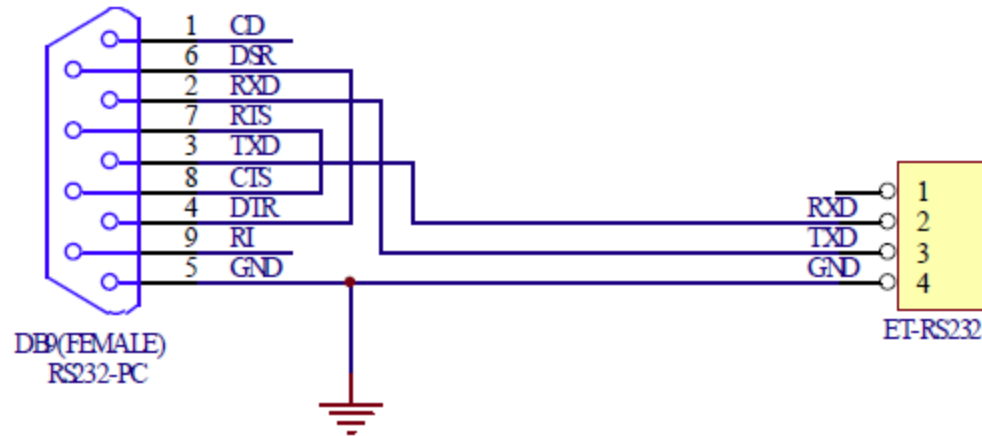
+3V3
RXD2
TXD2
GND

Operation mode

- Jumper J11 and J12 use to select operation mode of USART1



RS232 connection



Pin definition



Pins					Pin name	Type ⁽¹⁾	I / O Level ⁽²⁾	Main function ⁽²⁾ (after reset)	Alternate functions	
BGA100	LOFP48	LOFP64	LOFP100	VFOPFBG					Default	Remap
A3	-	-	1	-	PE2	I/O	FT	PE2	TRACECK	
B3	-	-	2	-	PE3	I/O	FT	PE3	TRACED0	
C3	-	-	3	-	PE4	I/O	FT	PE4	TRACED1	
D3	-	-	4	-	PE5	I/O	FT	PE5	TRACED2	
E3	-	-	5	-	PE6	I/O	FT	PE6	TRACED3	
B2	1	1	6	-	V _{BAT}	S		V _{BAT}		
A2	2	2	7	-	PC13-TAMPER-RTC ⁽⁴⁾	I/O		PC13 ⁽²⁾	TAMPER-RTC	
A1	3	3	8	-	PC14-OSC32_IN ⁽⁴⁾	I/O		PC14 ⁽²⁾	OSC32_IN	
B1	4	4	9	-	PC15-OSC32_OUT ⁽⁴⁾	I/O		PC15 ⁽²⁾	OSC32_OUT	
C2	-	-	10	-	V _{SS_5}	S		V _{SS_5}		
D2	-	-	11	-	V _{DD_5}	S		V _{DD_5}		
C1	5	5	12	2	OSC_IN	I		OSC_IN		
D1	6	6	13	3	OSC_OUT	O		OSC_OUT		
E1	7	7	14	4	NRST	I/O		NRST		
F1	-	8	15	-	PC0	I/O		PC0	ADC12_IN10	
F2	-	9	16	-	PC1	I/O		PC1	ADC12_IN11	
E2	-	10	17	-	PC2	I/O		PC2	ADC12_IN12	
F3	-	11	18	-	PC3	I/O		PC3	ADC12_IN13	
G1	8	12	19	5	V _{SSA}	S		V _{SSA}		
H1	-	-	20	-	V _{REF-}	S		V _{REF-}		
J1	-	-	21	-	V _{REF+}	S		V _{REF+}		
K1	9	13	22	6	V _{DDA}	S		V _{DDA}		
G2	10	14	23	7	PA0-WKUP	I/O		PA0	WKUP/USART2_CTS ⁽⁷⁾ / ADC12_IN0/ TIM2_CH1_ETR ⁽⁷⁾	
H2	11	15	24	8	PA1	I/O		PA1	USART2_RTS ⁽⁷⁾ / ADC12_IN1/ TIM2_CH2 ⁽⁷⁾	
J2	12	16	25	9	PA2	I/O		PA2	USART2_TX ⁽⁷⁾ / ADC12_IN2/ TIM2_CH3 ⁽⁷⁾	

Pins					Pin name	Type ⁽¹⁾	I/O Level ⁽²⁾	Main function ⁽³⁾ (after reset)	Alternate functions	
BCGA100	LO FPA8	LO FPA4	LO FPA100	VDDFPA05					Default	Remap
K2	13	17	26	10	PA3	VO	PA3	USART2_RX ⁽⁷⁾ ADC12_IN3 ⁽⁷⁾ TIM2_CH4 ⁽⁷⁾		
E4	-	18	27	-	V _{SS_4}	S	V _{SS_4}			
F4	-	19	28	-	V _{DD_4}	S	V _{DD_4}			
G3	14	20	29	11	PA4	VO	PA4	SPI1_NSS ⁽⁷⁾ USART2_CK ⁽⁷⁾ ADC12_IN4		
H3	15	21	30	12	PA5	VO	PA5	SPI1_SCK ⁽⁷⁾ ADC12_IN5		
J3	16	22	31	13	PA6	VO	PA6	SPI1_MISO ⁽⁷⁾ ADC12_IN6 ⁽⁷⁾ TIM3_CH1 ⁽⁷⁾	TIM1_BKIN	
K3	17	23	32	14	PA7	VO	PA7	SPI1_MOSI ⁽⁷⁾ ADC12_IN7 ⁽⁷⁾ TIM3_CH2 ⁽⁷⁾	TIM1_CH1N	
G4	-	24	33		PC4	VO	PC4	ADC12_IN14		
H4	-	25	34		PC5	VO	PC5	ADC12_IN15		
J4	18	26	35	15	PB0	VO	PB0	ADC12_IN8 ⁽⁷⁾ TIM3_CH3 ⁽⁷⁾	TIM1_CH2N	
K4	19	27	36	16	PB1	VO	PB1	ADC12_IN9 ⁽⁷⁾ TIM3_CH4 ⁽⁷⁾	TIM1_CH3N	
G5	20	28	37	17	PB2 / BOOT1	VO FT	PB2/BOOT1			
H5	-	-	38	-	PE7	VO FT	PE7		TIM1_ETR	
J5	-	-	39	-	PE8	VO FT	PE8		TIM1_CH1N	
K5	-	-	40	-	PE9	VO FT	PE9		TIM1_CH1	
G6	-	-	41	-	PE10	VO FT	PE10		TIM1_CH2N	
H6	-	-	42	-	PE11	VO FT	PE11		TIM1_CH2	
J6	-	-	43	-	PE12	VO FT	PE12		TIM1_CH3N	
K6	-	-	44	-	PE13	VO FT	PE13		TIM1_CH3	
G7	-	-	45	-	PE14	VO FT	PE14		TIM1_CH4	
H7	-	-	46	-	PE15	VO FT	PE15		TIM1_BKIN	
J7	21	29	47	-	PB10	VO FT	PB10	I2C2_SCL/ USART3_Tx ⁽⁹⁾⁽⁷⁾	TIM2_CH3	
K7	22	30	48	-	PB11	VO FT	PB11	I2C2_SDA/ USART3_Rx ⁽⁹⁾⁽⁷⁾	TIM2_CH4	
E7	23	31	49	18	V _{SS_1}	S	V _{SS_1}			

Pins					Pin name	Type ⁽¹⁾	I/O Level ⁽²⁾	Main function ⁽²⁾ (after reset)	Alternate functions	
BCA100	LQFP100	LQFP144	LQFP100	VQFP100					Default	Remap
F7	24	32	50	19	VDD_1	S		VDD_1		
K8	25	33	51	-	PB12	IO	FT	PB12	SPI2_NSS ⁽²⁾ / I2C2_SMBAL ⁽²⁾ / USART3_CK1 ⁽²⁾ / TIM1_BKIN ⁽²⁾	
J8	26	34	52	-	PB13	IO	FT	PB13	SPI2_SCK ⁽²⁾ / USART3_CTS ⁽²⁾ / TIM1_CH1N ⁽²⁾	
H8	27	35	53	-	PB14	IO	FT	PB14	SPI2_MISO ⁽²⁾ / USART3_RTS ⁽²⁾ / TIM1_CH2N ⁽²⁾	
G8	28	36	54	-	PB15	IO	FT	PB15	SPI2_MOSI ⁽²⁾ / TIM1_CH3N ⁽²⁾	
K9	-	-	55	-	PD8	IO	FT	PD8		USART3_TX
J9	-	-	56	-	PD9	IO	FT	PD9		USART3_RX
H9	-	-	57	-	PD10	IO	FT	PD10		USART3_CK
G9	-	-	58	-	PD11	IO	FT	PD11		USART3_CTS
K10	-	-	59	-	PD12	IO	FT	PD12		TIM4_CH1 / USART3_RTS
J10	-	-	60	-	PD13	IO	FT	PD13		TIM4_CH2
H10	-	-	61	-	PD14	IO	FT	PD14		TIM4_CH3
G10	-	-	62	-	PD15	IO	FT	PD15		TIM4_CH4
F10	-	37	63	-	PC6	IO	FT	PC6		TIM3_CH1
E10	-	38	64	-	PC7	IO	FT	PC7		TIM3_CH2
F9	-	39	65	-	PC8	IO	FT	PC8		TIM3_CH3
E9	-	40	66	-	PC9	IO	FT	PC9		TIM3_CH4
D9	29	41	67	20	PA8	IO	FT	PA8	USART1_CK/ TIM1_CH1 ⁽²⁾ /MCO	
C9	30	42	68	21	PA9	IO	FT	PA9	USART1_Tx ⁽²⁾ / TIM1_CH2 ⁽²⁾	
D10	31	43	69	22	PA10	IO	FT	PA10	USART1_Rx ⁽²⁾ / TIM1_CH3 ⁽²⁾	
C10	32	44	70	23	PA11	IO	FT	PA11	USART1_CTS/ CANRX ⁽²⁾ / TIM1_CH4 ⁽²⁾ / USBDM	

BGA100	Pins				Pin name	Type ⁽¹⁾	I/O Level ⁽²⁾	Main function ⁽³⁾ (after reset)	Alternate functions		
	LO FPA8	LO FPA4	LO FPA100	V POF PND6					Default	Remap	
B10	33	45	71	24	PA12	VO	FT	PA12	USART1_RTS/ CAN TX ⁽⁷⁾ / TIM1_ETR ⁽⁷⁾ / USBDP		
A10	34	46	72	25	PA13/JTMS/SWDIO	VO	FT	JTMS/SWDIO	PA13		
FB	-	-	73	-	Not connected						
E6	35	47	74	26	Vss_2	S		Vss_2			
FB	36	48	75	27	Vdd_2	S		Vdd_2			
A9	37	49	76	28	PA14/JTCK/SWCLK	VO	FT	JTCK/SWCLK	PA14		
A8	38	50	77	29	PA15/JTDI	VO	FT	JTDI	PA15	TIM2_CH1_ETR/ SPI1_NSS	
B9	-	51	78		PC10	VO	FT	PC10		USART3_TX	
B8	-	52	79		PC11	VO	FT	PC11		USART3_RX	
C8	-	53	80		PC12	VO	FT	PC12		USART3_CK	
D8	5	5	81	2	PD0	VO	FT	OBS_IN ⁽⁸⁾		CANRX	
E8	6	6	82	3	PD1	VO	FT	OBS_OUT ⁽⁸⁾		CANTX	
B7		54	83	-	PD2	VO	FT	PD2	TIM3_ETR		
C7	-	-	84	-	PD3	VO	FT	PD3		USART2_CTS	
D7	-	-	85	-	PD4	VO	FT	PD4		USART2_RTS	
B6	-	-	86	-	PD5	VO	FT	PD5		USART2_TX	
C6	-	-	87	-	PD6	VO	FT	PD6		USART2_RX	
D6	-	-	88	-	PD7	VO	FT	PD7		USART2_CK	
A7	39	55	89	30	PB3/JTDO	VO	FT	JTDO	PB3/TRACESWO	TIM2_CH2 / SPI1_SCK	
A6	40	56	90	31	PB4/JNTRST	VO	FT	JNTRST	PB4	TIM3_CH1 / SPI1_MISO	
C5	41	57	91	32	PB5	VO		PB5	I2C1_SMBAL	TIM3_CH2 / SPI1_MOSI	
B5	42	58	92	33	PB6	VO	FT	PB6	I2C1_SCL ⁽⁷⁾ / TIM4_CH1 ⁽⁷⁾	USART1_TX	
A5	43	59	93	34	PB7	VO	FT	PB7	I2C1_SDA ⁽⁷⁾ / TIM4_CH2 ⁽⁷⁾	USART1_RX	
D5	44	60	94	35	BOOT0	I		BOOT0			
B4	45	61	95	-	PB8	VO	FT	PB8	TIM4_CH3 ⁽⁷⁾	I2C1_SCL / CANRX	

Pins					Pin name	Type ⁽⁶⁾	I/O Level ⁽⁸⁾	Main function ⁽⁹⁾ (after reset)	Alternate functions	
BGA100	LQFP148	LQFP144	LQFP100	VQFP100					Default	Remap
A4	46	62	96	-	PE0	I/O	FT	PE0	TIM4_CH4 ⁽⁹⁾ (7)	I2C1_SDA / CANTX
D4	-	-	97	-	PE0	I/O	FT	PE0	TIM4_ETR ⁽⁹⁾	
C4	-	-	98	-	PE1	I/O	FT	PE1		
E5	47	63	99	38	V _{SS_3}	S		V _{SS_3}		
F5	48	64	100	1	V _{DD_3}	S		V _{DD_3}		



Questions?