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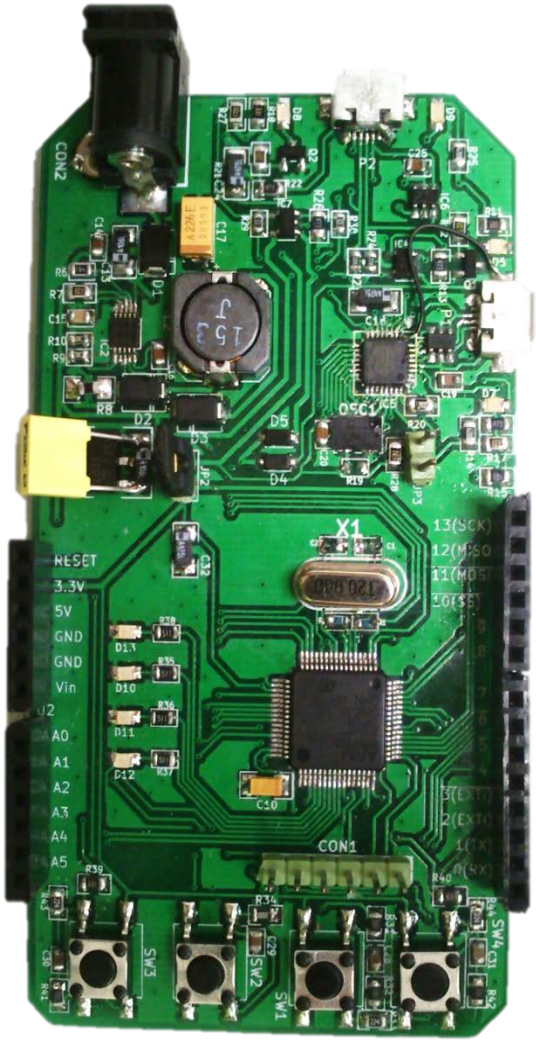
TIBUBOARD

INTRODUCTION

The TibuBoard has been designed to develop USB OTG FS/HS applications. It's based on STM32F4XX ARM microcontrollers. Furthermore, it's compatible with most of Arduino Shields and includes user buttons, LEDs and USB micro A-B connectors in order to make the developer's work easier.



CONTENTS

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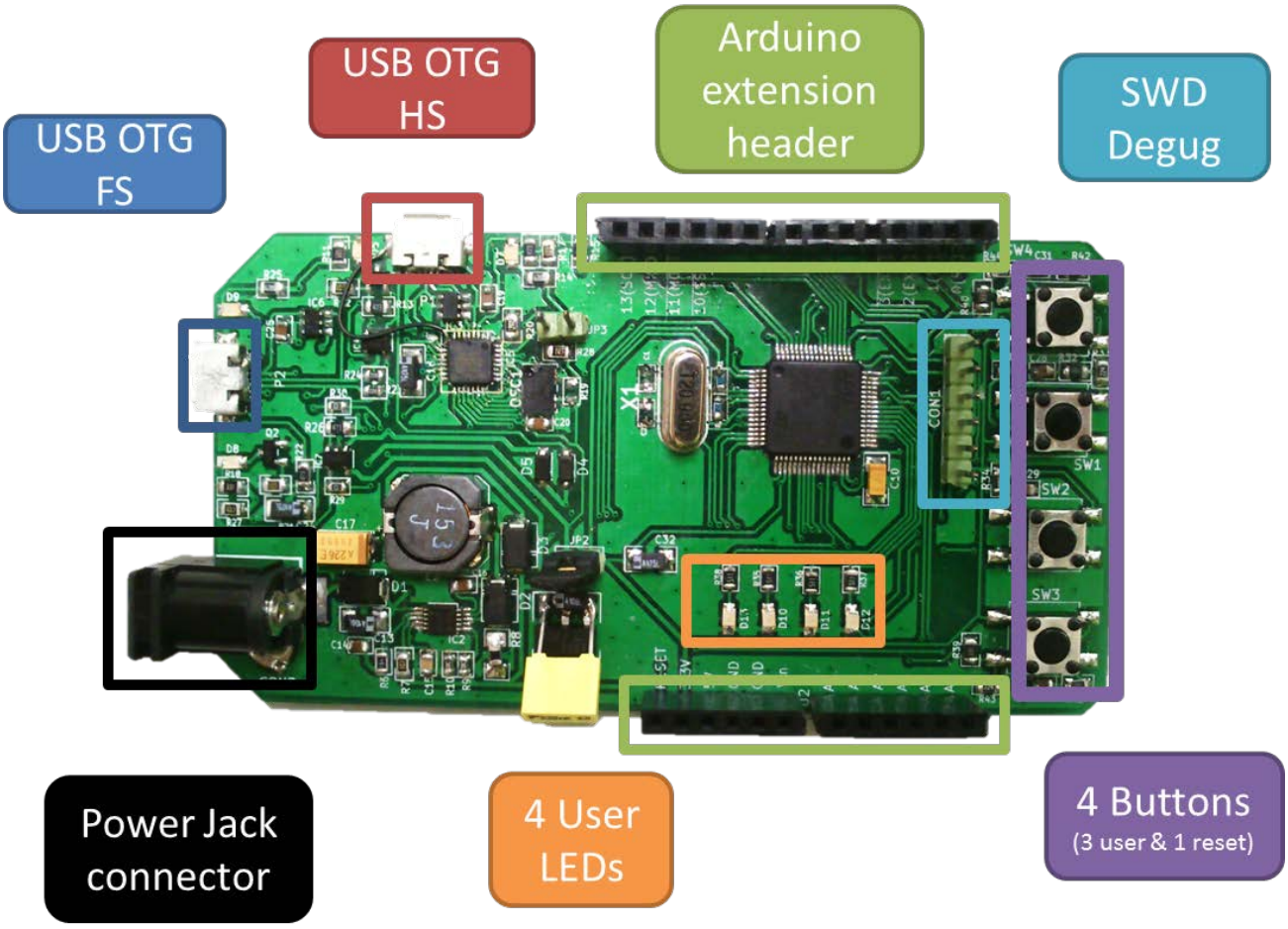
FEATURES

- STM32F405RGT6 microcontroller featuring 32-bit ARM Cortex-M4F core, 1 MB Flash, 192 KB RAM in an LQFP64 package
- Extension header fully compatible with Arduino™ form-factor
- USB3300: USB OTG HS with micro-AB connector
- USB OTG FS with micro-AB connector
- Board power supply: through USB bus or from an external supply voltage
- External application power supply: 3.3 V and 5 V
- Four green user LEDs
- Four push buttons (three user and one reset)

HARDWARE

Figure 2 illustrates the connections between the STM32F405RGT6 and its peripherals.



JUMPERS

Jumper	State	Function
JP1 (solder bridge)	ON	BOOT0 signal is held low
	OFF	BOOT0 signal is held high
JP2	ON	MCU is powered from 3.3V
	OFF	MCU is not powered from 3.3V
JP3	ON	ULPI REG_EN is held low (inactive)
	OFF	ULPI REG_EN is held high (active)

PIN MAP

Pin	LQFP64	Board Function	Pin number (Arduino extension header)	Other Function
PA0	14	UART_TX	1	TIM2_CH1_ETR/ TIM5_CH1 / TIM8_ETR/ADC123_IN0/WKUP
PA1	15	UART_RX	0	TIM5_CH2 / TIM2_CH2 /ADC123_IN1
PA2	16	PUSH_BUTTON_2	-	-
PA3	17	USB_ULPI_D0	-	-
PA4	20	PUSH_BUTTON_3	-	-
PA5	21	USB_ULPI_CLK	-	-
PA6	22	GPIO1	2	TIM8_BKIN/TIM13_CH1 / TIM3_CH1 / TIM1_BKIN /ADC12_IN6
PA7	23	GPIO2	4	TIM8_CH1N / TIM14_CH1/TIM3_CH2/ TIM1_CH1N/ADC12_IN7
PA8	41	I2C_SCL	A5	MCO1 / USART1_CK/TIM1_CH1/ OTG_FS_SOF/
PA9	42	USB_VBUS_FS	-	-
PA10	43	USB_ID_FS	-	-
PA11	44	USB_DM_FS	-	-
PA12	45	USB_DP_FS	-	-
PA13	46	DEBUG_SWDIO	-	-
PA14	49	DEBUG_SWCLK	-	-
PA15	50	SPI_NSS	10	I2S3_WS/TIM2_CH1_ETR
PB0	26	USB_ULPI_D1	-	-
PB1	27	USB_ULPI_D2	-	-
PB2	28	PUSH_BUTTON_1	-	-
PB3	55	DEBUG_SWO	-	-
PB4	56	USB_EN_HS	-	-
PB5	57	USB_ULPI_D7	-	-

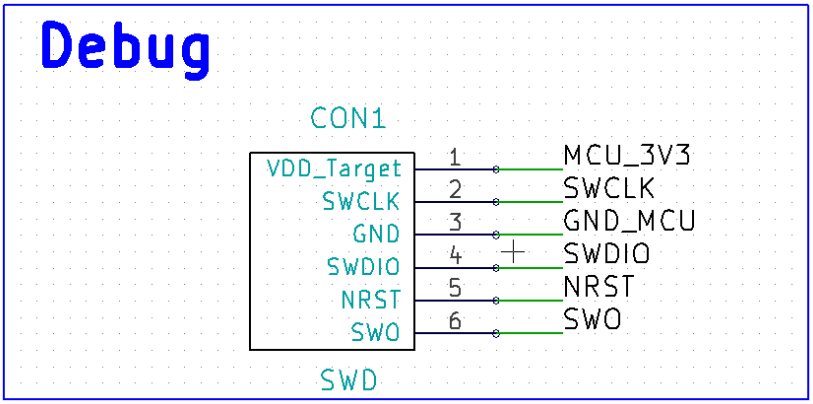
PB6	58	PWM1	3	I2C1_SCL / USART1_TX
PB7	59	PWM2	5	I2C1_SDA / USART1_RX
PB8	61	PWM3	6	TIM10_CH1 / I2C1_SCL/ SDIO_D4/ CAN1_RX(*)
PB9	62	PWM4	9	TIM11_CH1/ I2C1_SDA / SDIO_D5/ CAN1_TX(*)
PB10	29	USB_ULPI_D3	-	-
PB11	30	USB_ULPI_D4	-	-
PB12	33	USB_ULPI_D5	-	-
PB13	34	USB_ULPI_D6	-	-
PB14	35	USB_EN_FS	-	-
PB15	36	LED4	-	TIM1_CH3N / TIM8_CH3N / TIM12_CH2 /
PC0	8	USB_ULPI_STP	-	-
PC1	9	A3	A3	ADC123_IN11
PC2	10	USB_ULPI_DIR	-	-
PC3	11	USB_ULPI_NXT	-	-
PC4	24	GPIO3	7	ADC12_IN14
PC5	25	GPIO4	8	ADC12_IN15
PC6	37	LED1	-	TIM8_CH1/ USART6_TX/TIM3_CH1/SDIO_D6
PC7	38	LED2	-	I2S3_MCK / TIM8_CH2/ USART6_RX /TIM3_CH2/ /SDIO_D7
PC8	39	LED3	-	TIM8_CH3/TIM3_CH3/ USART6_CK / SDIO_D0
PC9	40	I2C_SDA	A4	I2S_CKIN/ MCO2 / TIM8_CH4/TIM3_CH4/SDIO_D1
PC10	51	SPI_SCLK	13	I2S3_CK/ UART4_TX/USART3_TX/SDIO_D2
PC11	52	SPI_MISO	12	UART4_RX/ SDIO_D3 / USART3_RX / I2S3ext_SD/
PC12	53	SPI_MOSI	11	SDIO_CK /I2S3_SD / USART3_CK
PC13	2	A0	A0	-
PC14	3	A1	A1	OSC32IN
PC15	4	A2	A2	OSC32OUT
PD2	54	USB_FAULT	-	SDIO_CMD (**)
PH0	5	OSC_IN	-	-
PH1	6	OSC_OUT	-	-
NRST	7	PUSH_BUTTON_4	-	-

(*) page 660 - Reference Manual - RM0090 - http://www.st.com/st-web-ui/static/active/jp/resource/technical/document/reference_manual/DM00031020.pdf
(**) Only with external power supply

DEBUG

You can program and debug your applications through SWD protocol.

CONNECTIONS



EXAMPLE (WITH STM32F0DISCOVERY)

1. Put off CN2 jumpers from stm32f0discovery
2. Connect CON1 of the Tibuboard to CN3 of the stm32f0discovery
3. Connect Tibuboard power through any USB
4. Connect stm32f0discovery power
5. Use STM32 ST-LINK Utility to program your applications
6. Also you can use CoIDE (or another Software Develop Environment) to program and debug your applications.

POWER

TibuBoard, can be powered by three different supplies:

- USB OTG FS – 5V
- USB OTG HS – 5V
- External Power Supply – 7 to 18 V approx.

USB OTG FS

TibuBoard allows developing USB OTG FS applications through a USB micro-AB connector, so the developer can connect host and device components.

USB OTG HS (WITH ULPI INTERFACE)

TibuBoard allows developing USB OTG HS applications through a USB micro-AB connector, so the developer can connect host and device component.

ARDUINO FORM FACTOR

TibuBoard has female headers fully compatible with Arduino Shields which makes it easier to develop applications that extend the main functionality of the TibuBoard.

USER LEDS

TibuBoard has four green user LEDs connected to pins with Timer peripheral. That way you can control their brightness using Timer PWM.

In the TibuBoard's Library this LEDs are identified as:

Software Identifier	Board Identifier
LED1	D10
LED2	D11
LED3	D12
LED4	D13

PUSH BUTTONS

TibuBoard has four push Buttons; three for developers and the other is the reset button. All of them are connected to and external interrupt from μC as you can see below:

Software Identifier	Board Identifier	External Interrupt
USER_BUTTON1	SW1	EXTI2
-	SW2	-
USER_BUTTON3	SW3	EXTI2
USER_BUTTON4	SW4	EXTI4

Note that USER_BUTTON1 and USER_BUTTON3 are connected to the same external interrupt, so you have to take it into account when programming.

REVISION HISTORY

Date	Revision	Changes
01/07/2013	1	Initial version
27/07/2013	2	Modified introduction abstract. Modified PIN MAP table