

1. Description

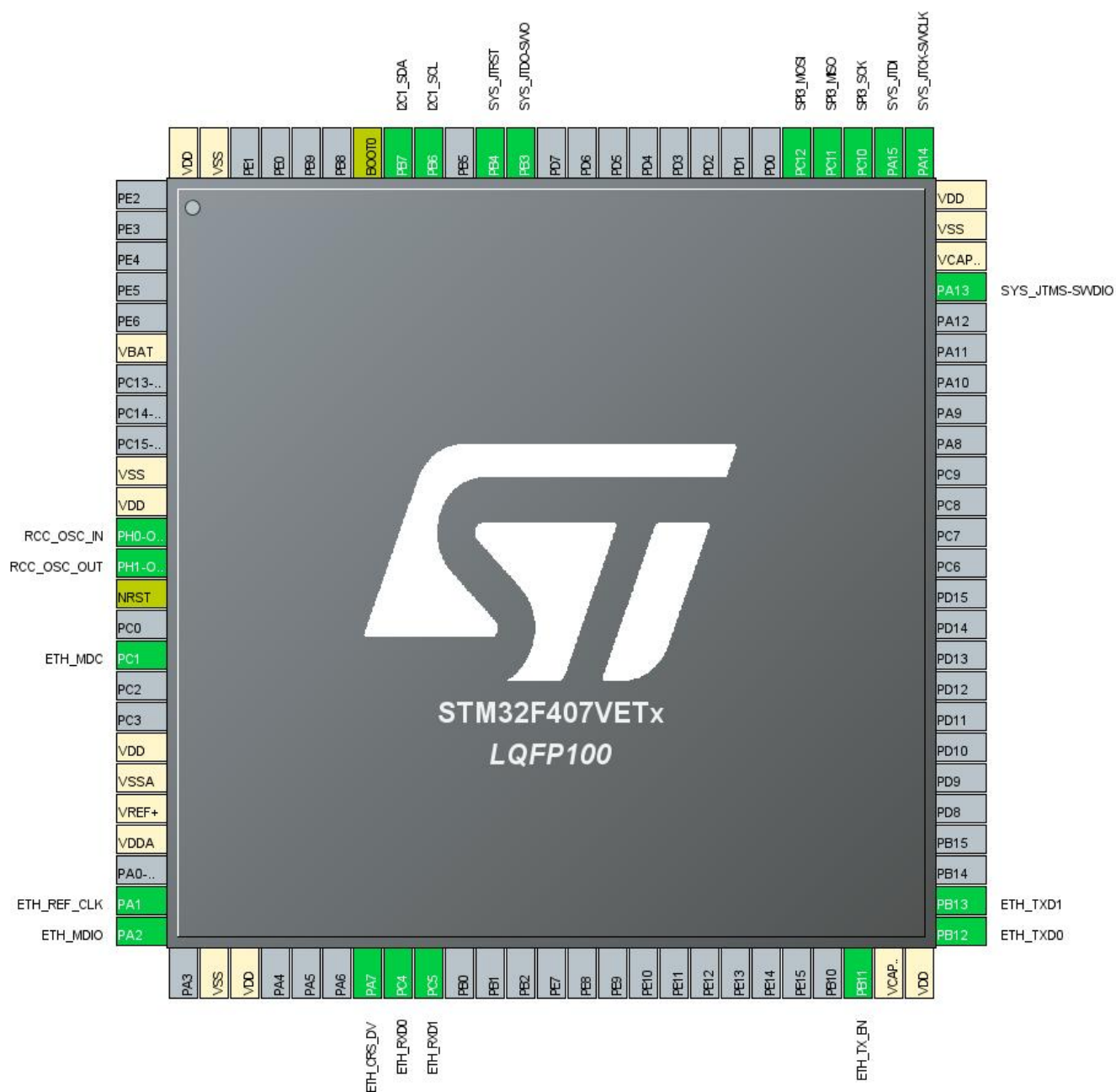
1.1. Project

Project Name	STM32F4_5MP_OV5642_TCP
Board Name	custom
Generated with:	STM32CubeMX 5.3.0
Date	12/28/2019

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VETx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration

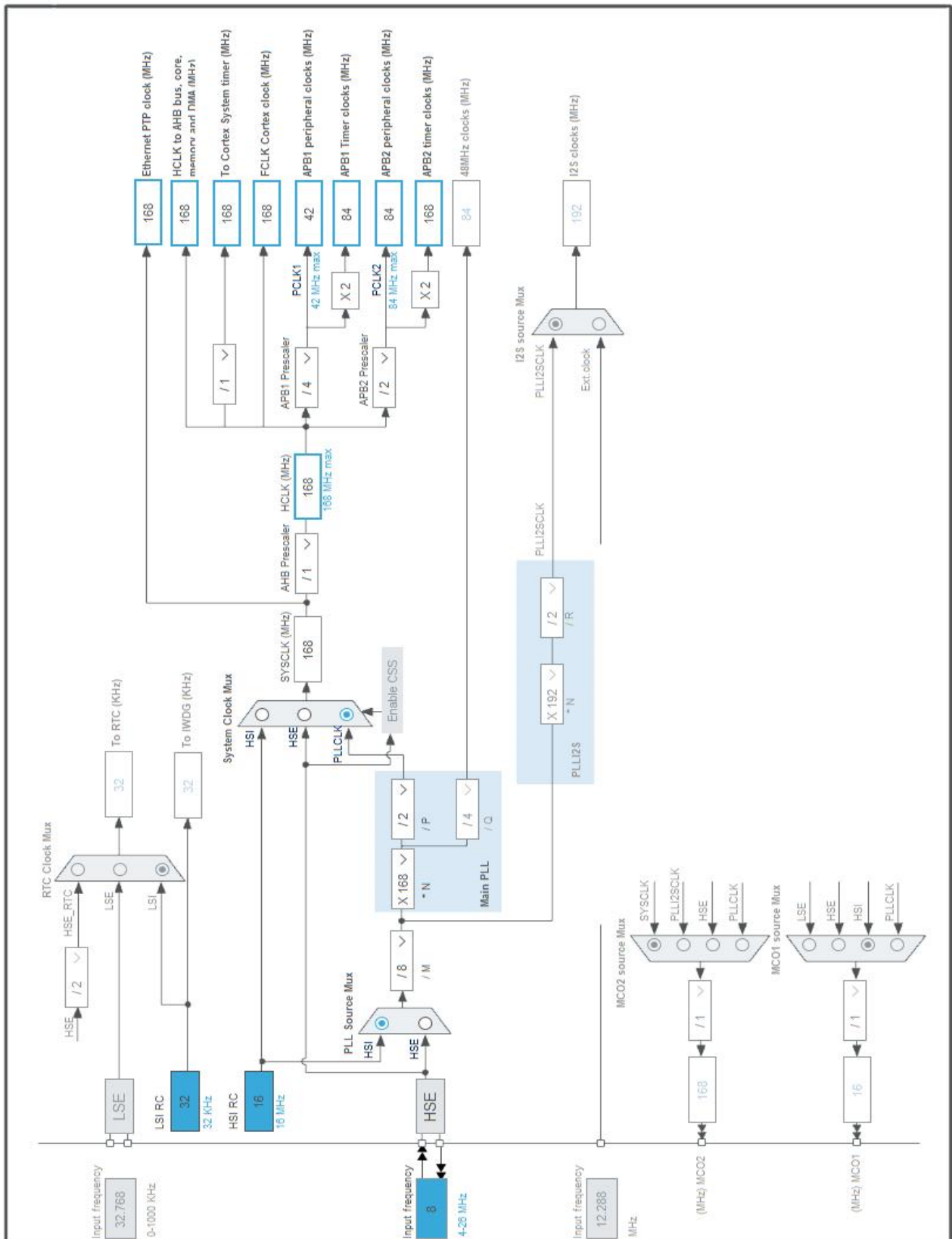


3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
16	PC1	I/O	ETH_MDC	
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
24	PA1	I/O	ETH_REF_CLK	
25	PA2	I/O	ETH_MDIO	
27	VSS	Power		
28	VDD	Power		
32	PA7	I/O	ETH_CRSDV	
33	PC4	I/O	ETH_RXD0	
34	PC5	I/O	ETH_RXD1	
48	PB11	I/O	ETH_TXEN	
49	VCAP_1	Power		
50	VDD	Power		
51	PB12	I/O	ETH_TXD0	
52	PB13	I/O	ETH_TXD1	
72	PA13	I/O	SYS_JTMS-SWDIO	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	
77	PA15	I/O	SYS_JTDI	
78	PC10	I/O	SPI3_SCK	
79	PC11	I/O	SPI3_MISO	
80	PC12	I/O	SPI3_MOSI	
89	PB3	I/O	SYS_JTDO-SWO	
90	PB4	I/O	SYS_JTRST	
92	PB6	I/O	I2C1_SCL	
93	PB7	I/O	I2C1_SDA	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
94	BOOT0	Boot		
99	VSS	Power		
100	VDD	Power		

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	STM32F4_5MP_OV5642_TCP
Project Folder	C:\Users\rlaw\Desktop\STM32
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.24.2

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy only the necessary library files
Generate peripheral initialization as a pair of '.c/.h' files	No
Backup previously generated files when re-generating	No
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VETx
Datasheet	022152_Rev8

6.2. Parameter Selection

Temperature	25
Vdd	3.3

7. IPs and Middleware Configuration

7.1. ETH

Mode: RMII

7.1.1. Parameter Settings:

Advanced : Ethernet Media Configuration:

Auto Negotiation	Disabled *
Speed	100 MBits/s
Duplex Mode	Full Duplex

General : Ethernet Configuration:

Ethernet MAC Address	D8:FC:93:E4:F9:B7 *
PHY Address	1

Ethernet Basic Configuration:

Rx Mode	Polling Mode
TX IP Header Checksum Computation	By hardware

7.1.2. Advanced Parameters:

External PHY Configuration:

PHY	DP83848_PHY_ADDRESS *
PHY Address Value	1
PHY Reset delay these values are based on a 1 ms Systick interrupt	0x000000FF *
PHY Configuration delay	0x00000FFF *
PHY Read TimeOut	0x0000FFFF *
PHY Write TimeOut	0x0000FFFF *

Common : External PHY Configuration:

Transceiver Basic Control Register	0x00 *
Transceiver Basic Status Register	0x01 *
PHY Reset	0x8000 *
Select loop-back mode	0x4000 *
Set the full-duplex mode at 100 Mb/s	0x2100 *
Set the half-duplex mode at 100 Mb/s	0x2000 *
Set the full-duplex mode at 10 Mb/s	0x0100 *
Set the half-duplex mode at 10 Mb/s	0x0000 *
Enable auto-negotiation function	0x1000 *
Restart auto-negotiation function	0x0200 *

Select the power down mode	0x0800 *
Isolate PHY from MII	0x0400 *
Auto-Negotiation process completed	0x0020 *
Valid link established	0x0004 *
Jabber condition detected	0x0002 *

Extended : External PHY Configuration:

PHY special control/status register Offset	0x1F *
PHY Speed mask	0x0004 *
PHY Duplex mask	0x0010 *
PHY Interrupt Source Flag register Offset	0x001D *
PHY Link down interrupt	0x000B *

7.2. I2C1

I2C: I2C

7.2.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

Slave Features:

Clock No Stretch Mode	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0
General Call address detection	Disabled

7.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled

Flash Latency(WS) 5 WS (6 CPU cycle)

RCC Parameters:

HSI Calibration Value 16
HSE Startup Timeout Value (ms) 100
LSE Startup Timeout Value (ms) 5000

Power Parameters:

Power Regulator Voltage Scale Power Regulator Voltage Scale 1

7.4. SPI3

Mode: Full-Duplex Master

7.4.1. Parameter Settings:

Basic Parameters:

Frame Format Motorola
Data Size 8 Bits
First Bit MSB First

Clock Parameters:

Prescaler (for Baud Rate) **8 ***
Baud Rate **5.25 MBits/s ***
Clock Polarity (CPOL) Low
Clock Phase (CPHA) 1 Edge

Advanced Parameters:

CRC Calculation Disabled
NSS Signal Type Software

7.5. SYS

Debug: JTAG (5 pins)

Timebase Source: SysTick

7.6. LWIP

mode: Enabled

Advanced parameters are not listed except if modified by user.

7.6.1. General Settings:

LwIP Version:

LwIP Version (Version of LwIP supported by CubeMX ** CubeMX specific **)

2.0.3

IPv4 - DHCP Options:

LWIP_DHCP (DHCP Module)

Disabled *

IP Address Settings:

IP_ADDRESS (IP Address)

192.168.001.111 *

NETMASK_ADDRESS (Netmask Address)

255.255.255.000 *

GATEWAY_ADDRESS (Gateway Address)

192.168.001.001 *

RTOS Dependency:

WITH_RTOS (Use FREERTOS ** CubeMX specific **)

Disabled

Protocols Options:

LWIP_ICMP (ICMP Module Activation)

Enabled

LWIP_IGMP (IGMP Module)

Disabled

LWIP_DNS (DNS Module)

Disabled

LWIP_UDP (UDP Module)

Enabled

MEMP_NUM_UDP_PCB (Number of UDP Connections)

4

LWIP_TCP (TCP Module)

Enabled

MEMP_NUM_TCP_PCB (Number of TCP Connections)

5

7.6.2. Key Options:

Infrastructure - OS Awareness Option:

NO_SYS (OS Awareness)

OS Not Used

Infrastructure - Timers Options:

LWIP_TIMERS (Use Support For sys_timeout)

Enabled

Infrastructure - Core Locking and MPU Options:

SYS_LIGHTWEIGHT_PROT (Memory Functions Protection)

Disabled

Infrastructure - Heap and Memory Pools Options:

MEM_SIZE (Heap Memory Size)

11680 *

Infrastructure - Internal Memory Pool Sizes:

MEMP_NUM_PBUF (Number of Memory Pool struct Pbufs)

16

MEMP_NUM_RAW_PCB (Number of Raw Protocol Control Blocks)

4

MEMP_NUM_TCP_PCB_LISTEN (Number of Listening TCP Connections)

8

MEMP_NUM_TCP_SEG (Number of TCP Segments simultaneously queued)

16

MEMP_NUM_LOCALHOSTLIST (Number of Host Entries in the Local Host List)

1

Pbuf Options:

PBUF_POOL_SIZE (Number of Buffers in the Pbuf Pool)

16

PBUF_POOL_BUFSIZE (Size of each pbuf in the pbuf pool)

1460 *

IPv4 - ARP Options:

LWIP_ARP (ARP Functionality)

Enabled

Callback - TCP Options:

TCP_TTL (Number of Time-To-Live Used by TCP Packets)	255
TCP_WND (TCP Receive Window Maximum Size)	5840
TCP_QUEUE_OOSEQ (Allow Out-Of-Order Incoming Packets)	Enabled
TCP_MSS (Maximum Segment Size)	1460 *
TCP_SND_BUF (TCP Sender Buffer Space)	2920
TCP_SND_QUEUELEN (Number of Packet Buffers Allowed for TCP Sender)	16 *

Network Interfaces Options:

LWIP_NETIF_STATUS_CALLBACK (Callback Function on Interface Status Changes)	Enabled *
LWIP_NETIF_LINK_CALLBACK (Callback Function on Interface Link Changes)	Enabled *

NETIF - Loopback Interface Options:

LWIP_NETIF_LOOPBACK (NETIF Loopback)	Disabled
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Thread Safe APIs - Socket Options:

LWIP_SOCKET (Socket API)	Disabled
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7.6.3. PPP:

PPP Options:

PPP_SUPPORT (PPP Module)	Disabled
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7.6.4. IPv6:

IPv6 Options:

LWIP_IPV6 (IPv6 Protocol)	Disabled
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7.6.5. HTTPD:

HTTPD Options:

LWIP_HTTPD (LwIP HTTPD Support ** CubeMX specific **)	Disabled
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7.6.6. SNMP:

SNMP Options:

LWIP_SNMP (LwIP SNMP Agent)	Disabled
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7.6.7. SNTP:

SNTP Options:

LWIP_SNTP (LWIP SNTP Support ** CubeMX specific **) Disabled

7.6.8. MDNS/TFTP:

MDNS Options:

LWIP_MDNS (Multicast DNS Support ** CubeMX specific **) Disabled

TFTP Options:

LWIP_TFTP (TFTP Support ** CubeMX specific **) Disabled

7.6.9. Perf/Checks:

Sanity Checks:

LWIP_DISABLE_TCP_SANITY_CHECKS (TCP Sanity Checks) Disabled

LWIP_DISABLE_MEMP_SANITY_CHECKS (MEMP Sanity Checks) Disabled

Performance Options:

LWIP_PERF (Performance Testing for LwIP) Disabled

7.6.10. Statistics:

Debug - Statistics Options:

LWIP_STATS (Statistics Collection) Disabled

7.6.11. Checksum:

Infrastructure - Checksum Options:

CHECKSUM_BY_HARDWARE (Hardware Checksum ** CubeMX specific **) Disabled

LWIP_CHECKSUM_CTRL_PER_NETIF (Generate/Check Checksum per Netif) Disabled

CHECKSUM_GEN_IP (Generate Software Checksum for Outgoing IP Packets) Disabled

CHECKSUM_GEN_UDP (Generate Software Checksum for Outgoing UDP Packets) Disabled

CHECKSUM_GEN_TCP (Generate Software Checksum for Outgoing TCP Packets) Disabled

CHECKSUM_GEN_ICMP (Generate Software Checksum for Outgoing ICMP Packets) Disabled

CHECKSUM_GEN_ICMP6 (Generate Software Checksum for Outgoing ICMP6 Packets) Disabled

CHECKSUM_CHECK_IP (Generate Software Checksum for Incoming IP Packets) Disabled

CHECKSUM_CHECK_UDP (Generate Software Checksum for Incoming UDP Packets) Disabled

CHECKSUM_CHECK_TCP (Generate Software Checksum for Incoming TCP Packets) Disabled

CHECKSUM_CHECK_ICMP (Generate Software Checksum for Incoming ICMP Packets) Disabled

CHECKSUM_CHECK_ICMP6 (Generate Software Checksum for Incoming ICMP6 Packets) Disabled

7.6.12. Debug:

LwIP Main Debugging Options:

LWIP_DBG_MIN_LEVEL (Minimum Level)

All

* User modified value

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ETH	PC1	ETH_MDC	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA1	ETH_REF_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA2	ETH_MDIO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA7	ETH_CRS_DV	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PC4	ETH_RXD0	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PC5	ETH_RXD1	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PB11	ETH_TX_EN	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PB12	ETH_TXD0	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PB13	ETH_TXD1	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	Very High *	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	Very High *	
RCC	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI3	PC10	SPI3_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PC11	SPI3_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PC12	SPI3_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA14	SYS_JTCK- SWCLK	n/a	n/a	n/a	
	PA15	SYS_JTDI	n/a	n/a	n/a	
	PB3	SYS_JTDO- SWO	n/a	n/a	n/a	
	PB4	SYS_JTRST	n/a	n/a	n/a	

8.2. DMA configuration

nothing configured in DMA service

8.3. NVIC configuration

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
Pre-fetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
System service call via SWI instruction	true	0	0
Debug monitor	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI3 global interrupt	unused		
Ethernet global interrupt	unused		
Ethernet wake-up interrupt through EXTI line 19	unused		
FPU global interrupt	unused		

* User modified value

9. Software Pack Report