

1. Description

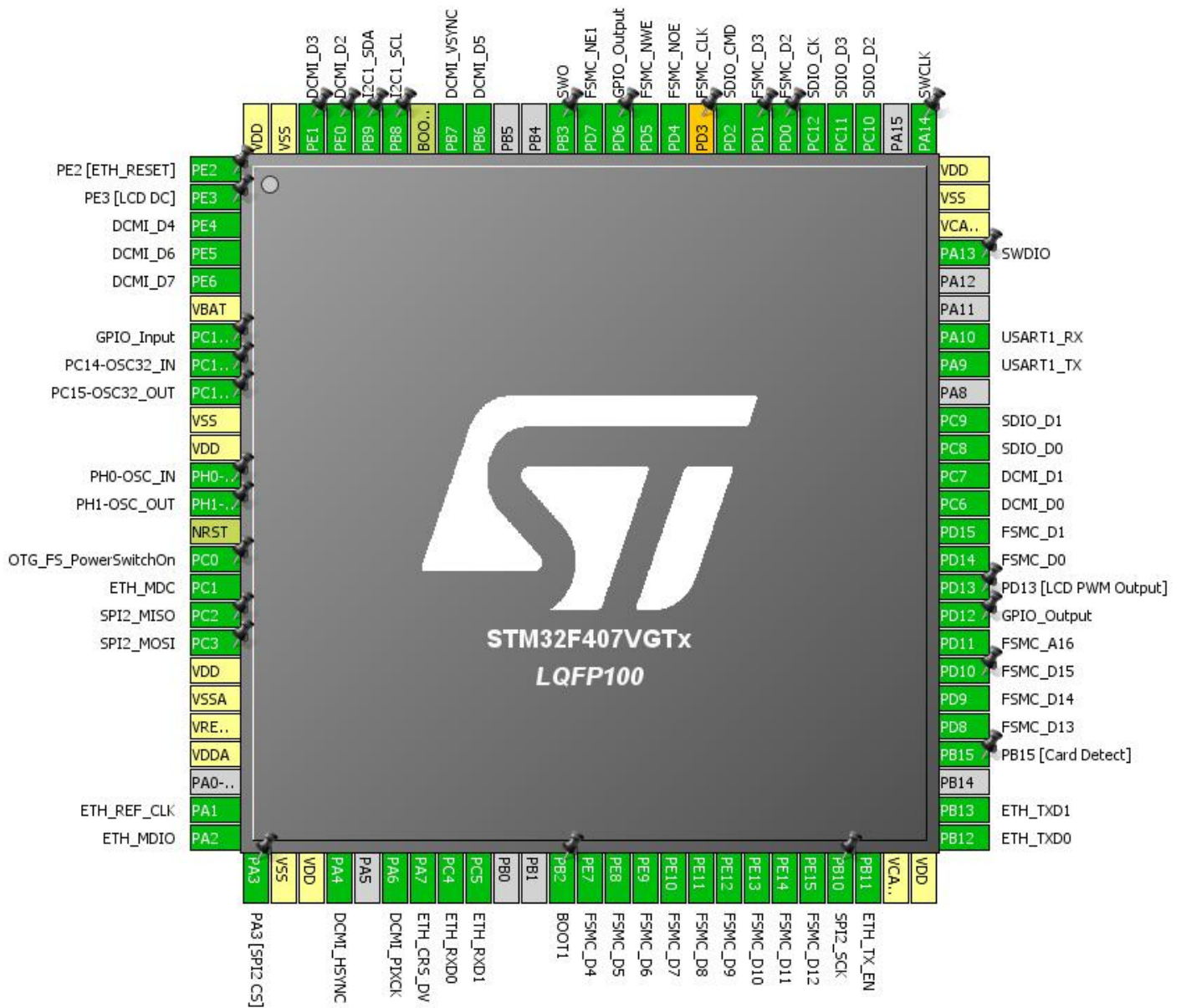
1.1. Project

| | |
|-----------------|--------------------|
| Project Name | EmbestBoard |
| Board Name | STM32F407G-DISC1 |
| Generated with: | STM32CubeMX 4.12.0 |
| Date | 01/27/2016 |

1.2. MCU

| | |
|----------------|---------------|
| MCU Series | STM32F4 |
| MCU Line | STM32F407/417 |
| MCU name | STM32F407VGTx |
| 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 |
|-----------------------|---------------------------------------|----------|--------------------------|----------------------|
| 1 | PE2 * | I/O | GPIO_Output | PE2 [ETH_RESET] |
| 2 | PE3 * | I/O | GPIO_Output | PE3 [LCD DC] |
| 3 | PE4 | I/O | DCMI_D4 | |
| 4 | PE5 | I/O | DCMI_D6 | |
| 5 | PE6 | I/O | DCMI_D7 | |
| 6 | VBAT | Power | | |
| 7 | PC13-ANTI_TAMP * | I/O | GPIO_Input | |
| 8 | PC14-OSC32_IN | I/O | RCC_OSC32_IN | PC14-OSC32_IN |
| 9 | PC15-OSC32_OUT | I/O | RCC_OSC32_OUT | PC15-OSC32_OUT |
| 10 | VSS | Power | | |
| 11 | VDD | Power | | |
| 12 | PH0-OSC_IN | I/O | RCC_OSC_IN | PH0-OSC_IN |
| 13 | PH1-OSC_OUT | I/O | RCC_OSC_OUT | PH1-OSC_OUT |
| 14 | NRST | Reset | | |
| 15 | PC0 * | I/O | GPIO_Output | OTG_FS_PowerSwitchOn |
| 16 | PC1 | I/O | ETH_MDC | |
| 17 | PC2 | I/O | SPI2_MISO | |
| 18 | PC3 | I/O | SPI2_MOSI | |
| 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 | |
| 26 | PA3 * | I/O | GPIO_Output | PA3 [SPI2 CS] |
| 27 | VSS | Power | | |
| 28 | VDD | Power | | |
| 29 | PA4 | I/O | DCMI_HSYNC | |
| 31 | PA6 | I/O | DCMI_PIXCK | |
| 32 | PA7 | I/O | ETH_CRS_DV | |
| 33 | PC4 | I/O | ETH_RXD0 | |
| 34 | PC5 | I/O | ETH_RXD1 | |
| 37 | PB2 * | I/O | GPIO_Input | BOOT1 |
| 38 | PE7 | I/O | FSMC_D4 | |
| 39 | PE8 | I/O | FSMC_D5 | |
| 40 | PE9 | I/O | FSMC_D6 | |

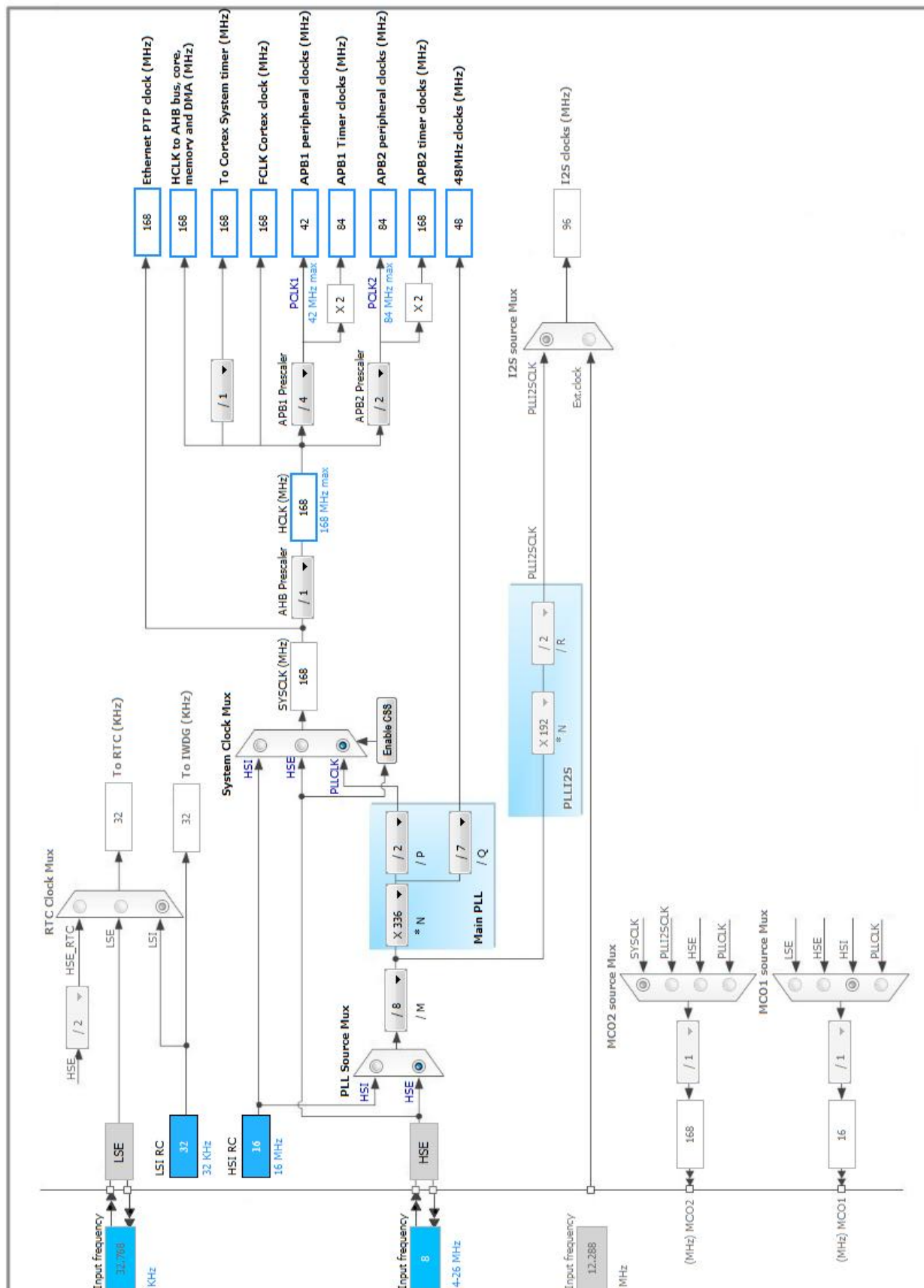
| Pin Number LQFP100 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|-----------------------|---------------------------------------|----------|--------------------------|-----------------------|
| 41 | PE10 | I/O | FSMC_D7 | |
| 42 | PE11 | I/O | FSMC_D8 | |
| 43 | PE12 | I/O | FSMC_D9 | |
| 44 | PE13 | I/O | FSMC_D10 | |
| 45 | PE14 | I/O | FSMC_D11 | |
| 46 | PE15 | I/O | FSMC_D12 | |
| 47 | PB10 | I/O | SPI2_SCK | |
| 48 | PB11 | I/O | ETH_TX_EN | |
| 49 | VCAP_1 | Power | | |
| 50 | VDD | Power | | |
| 51 | PB12 | I/O | ETH_TXD0 | |
| 52 | PB13 | I/O | ETH_TXD1 | |
| 54 | PB15 * | I/O | GPIO_Input | PB15 [Card Detect] |
| 55 | PD8 | I/O | FSMC_D13 | |
| 56 | PD9 | I/O | FSMC_D14 | |
| 57 | PD10 | I/O | FSMC_D15 | |
| 58 | PD11 | I/O | FSMC_A16 | |
| 59 | PD12 * | I/O | GPIO_Output | |
| 60 | PD13 * | I/O | GPIO_Output | PD13 [LCD PWM Output] |
| 61 | PD14 | I/O | FSMC_D0 | |
| 62 | PD15 | I/O | FSMC_D1 | |
| 63 | PC6 | I/O | DCMI_D0 | |
| 64 | PC7 | I/O | DCMI_D1 | |
| 65 | PC8 | I/O | SDIO_D0 | |
| 66 | PC9 | I/O | SDIO_D1 | |
| 68 | PA9 | I/O | USART1_TX | |
| 69 | PA10 | I/O | USART1_RX | |
| 72 | PA13 | I/O | SYS_JTMS-SWDIO | SWDIO |
| 73 | VCAP_2 | Power | | |
| 74 | VSS | Power | | |
| 75 | VDD | Power | | |
| 76 | PA14 | I/O | SYS_JTCK-SWCLK | SWCLK |
| 78 | PC10 | I/O | SDIO_D2 | |
| 79 | PC11 | I/O | SDIO_D3 | |
| 80 | PC12 | I/O | SDIO_CK | |
| 81 | PD0 | I/O | FSMC_D2 | |
| 82 | PD1 | I/O | FSMC_D3 | |
| 83 | PD2 | I/O | SDIO_CMD | |
| 84 | PD3 ** | I/O | FSMC_CLK | |

| Pin Number LQFP100 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|-----------------------|---------------------------------------|----------|--------------------------|-------|
| 85 | PD4 | I/O | FSMC_NOE | |
| 86 | PD5 | I/O | FSMC_NWE | |
| 87 | PD6 * | I/O | GPIO_Output | |
| 88 | PD7 | I/O | FSMC_NE1 | |
| 89 | PB3 | I/O | SYS_JTDO-SWO | SWO |
| 92 | PB6 | I/O | DCMI_D5 | |
| 93 | PB7 | I/O | DCMI_VSYNC | |
| 94 | BOOT0 | Boot | | |
| 95 | PB8 | I/O | I2C1_SCL | |
| 96 | PB9 | I/O | I2C1_SDA | |
| 97 | PE0 | I/O | DCMI_D2 | |
| 98 | PE1 | I/O | DCMI_D3 | |
| 99 | VSS | Power | | |
| 100 | VDD | Power | | |

* The pin is affected with an I/O function

** The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. DCMI

DCMI: Slave 8 bits External Synchro

5.1.1. Parameter Settings:

Mode Config:

| | |
|-------------------------------------|-------------------------|
| Pixel clock polarity | Active on Falling edge |
| Vertical synchronization polarity | Active Low |
| Horizontal synchronization polarity | Active Low |
| Frequency of frame capture | All frames are captured |
| JPEG mode | Disabled |

5.2. ETH

Mode: RMII

5.2.1. Parameter Settings:

Advanced : Ethernet Media Configuration:

| | |
|------------------|---------|
| Auto Negotiation | Enabled |
|------------------|---------|

General : Ethernet Configuration:

| | |
|----------------------|-------------------|
| Ethernet MAC Address | 00:80:E1:00:00:00 |
| PHY Address | 1 |

Ethernet Basic Configuration:

| | |
|-----------------------------------|----------------|
| Rx Mode | Interrupt Mode |
| TX IP Header Checksum Computation | By hardware |

5.2.2. Advanced Parameters:

External PHY Configuration:

| | |
|---|--------------|
| 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 status register Offset | 0x10 * |
| MII Interrupt Control Register | 0x11 * |
| MII Interrupt Status and Misc. Control Register | 0x12 * |
| PHY Link mask | 0x0001 * |
| PHY Speed mask | 0x0002 * |
| PHY Duplex mask | 0x0004 * |
| PHY Enable interrupts | 0x0002 * |
| PHY Enable output interrupt events | 0x0001 * |
| Enable Interrupt on change of link status | 0x0020 * |
| HY link status interrupt mask | 0x2000 * |

5.3. FSMC

NOR Flash/PSRAM/SRAM/ROM/LCD 1

Chip Select: set

Memory type: LCD Interface

LCD Register Select: A16

Data: 16 bits

5.3.1. NOR/PSRAM 1:

NOR/PSRAM control:

| | |
|-----------------|--------------------|
| Memory type | LCD Interface |
| Bank | Bank 1 NOR/PSRAM 1 |
| Write operation | Enabled |
| Extended mode | Disabled |

NOR/PSRAM timing:

| | |
|---|-----|
| Address setup time in HCLK clock cycles | 15 |
| Data setup time in HCLK clock cycles | 255 |
| Bus turn around time in HCLK clock cycles | 15 |

5.4. I2C1

I2C: I2C

5.4.1. 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 |

5.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

5.5.1. 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 |
| Power Parameters: | |
| Power Regulator Voltage Scale | Power Regulator Voltage Scale 1 |

5.6. SDIO

Mode: SD 4 bits Wide bus

5.6.1. Parameter Settings:

SDIO parameters:

| | |
|-----------------------------|---|
| SDIOCLK clock divide factor | 0 |
|-----------------------------|---|

5.7. SPI2

Mode: Full-Duplex Master

5.7.1. Parameter Settings:

Basic Parameters:

| | |
|--------------|-----------|
| Frame Format | Motorola |
| Data Size | 8 Bits |
| First Bit | MSB First |

Clock Parameters:

| | |
|---------------------------|-----------------------|
| Prescaler (for Baud Rate) | 2 |
| Baud Rate | 21.0 MBits/s * |
| Clock Polarity (CPOL) | Low |
| Clock Phase (CPHA) | 1 Edge |

Advanced Parameters:

| | |
|-----------------|----------|
| CRC Calculation | Disabled |
| NSS Signal Type | Software |

5.8. SYS

Debug: SWD and Asynchronous Trace

5.9. USART1

Mode: Asynchronous

5.9.1. Parameter Settings:

Basic Parameters:

| | |
|-------------|---------------------------|
| Baud Rate | 115200 |
| Word Length | 8 Bits (including Parity) |
| Parity | None |
| Stop Bits | 1 |

Advanced Parameters:

| | |
|----------------|----------------------|
| Data Direction | Receive and Transmit |
| Over Sampling | 16 Samples |

5.10. FATFS

mode: SD Card

5.10.1. Set Defines:

Version:

| | |
|---------------|-------|
| FATFS version | R0.11 |
|---------------|-------|

Function Parameters:

| | |
|-------------------------------------|------------------------------------|
| FS_TINY (Tiny mode) | Disabled |
| FS_READONLY (Read-only mode) | Disabled |
| FS_MINIMIZE (Minimization level) | Disabled |
| USE_STRFUNC (String functions) | Enabled with LF -> CRLF conversion |
| USE_FIND (Find functions) | Disabled |
| USE_MKFS (Make filesystem function) | Enabled |
| USE_FORWARD (Forward function) | Disabled |
| USE_LABEL (Volume label functions) | Disabled |
| USE_FASTSEEK (Fast seek function) | Enabled |

Locale and Namespace Parameters:

| | |
|---------------------------------|-------------------|
| CODE_PAGE (Code page on target) | Latin 1 (Windows) |
| USE_LFN (Use Long Filename) | Disabled |

| | |
|----------------------------------|----------|
| MAX_LFN (Max Long Filename) | 255 |
| LFN_UNICODE (Enable Unicode) | ANSI/OEM |
| STRF_ENCODE (Character encoding) | UTF-8 |
| FS_RPATH (Relative Path) | Disabled |

Physical Drive Parameters:

| | |
|---|----------|
| VOLUMES (Logical drives) | 1 |
| MAX_SS (Maximum Sector Size) | 512 |
| MIN_SS (Minimum Sector Size) | 512 |
| MULTI_PARTITION (Volume partitions feature) | Disabled |
| USE_TRIM (Erase feature) | Disabled |
| FS_NOFSINFO (Force full FAT scan) | 0 |

System Parameters:

| | |
|---|-------------------|
| FS_NORTC (Timestamp feature) | Dynamic timestamp |
| NORTC_YEAR (Year for timestamp) | 2015 |
| NORTC_MON (Month for timestamp) | 6 |
| NORTC_MDAY (Day for timestamp) | 4 |
| WORD_ACCESS (Platform dependent access option) | Byte access |
| FS_REENTRANT (Re-Entrancy) | Enabled |
| FS_TIMEOUT (Timeout ticks) | 1000 |
| SYNC_t (O/S sync object) | osSemaphoreId |
| FS_LOCK (Number of files opened simultaneously) | 2 |

5.10.2. IPs instances:

SDIO/SDMMC:

| | |
|---------------|-------|
| SDIO instance | SDIO1 |
|---------------|-------|

5.11. FREERTOS

mode: Enabled

5.11.1. Config parameters:

Versions:

| | |
|--------------------|-------|
| CMSIS-RTOS version | 1.02 |
| FreeRTOS version | 8.2.1 |

Kernel settings:

| | |
|----------------|-----------------|
| USE_PREEMPTION | Enabled |
| CPU_CLOCK_HZ | SystemCoreClock |
| TICK_RATE_HZ | 1000 |

| | |
|-----------------------------------|----------|
| MAX_PRIORITIES | 7 |
| MINIMAL_STACK_SIZE | 128 |
| MAX_TASK_NAME_LEN | 16 |
| USE_16_BIT_TICKS | Disabled |
| IDLE_SHOULD_YIELD | Enabled |
| USE_MUTEXES | Enabled |
| USE_RECURSIVE_MUTEXES | Enabled |
| USE_COUNTING_SEMAPHORES | Enabled |
| QUEUE_REGISTRY_SIZE | 8 |
| USE_APPLICATION_TASK_TAG | Disabled |
| TOTAL_HEAP_SIZE | 15360 |
| Memory Management scheme | heap_4 |
| USE_ALTERNATIVE_API | Disabled |
| ENABLE_BACKWARD_COMPATIBILITY | Enabled |
| USE_PORT_OPTIMISED_TASK_SELECTION | Disabled |
| USE_TICKLESS_IDLE | Disabled |

Hook function related definitions:

| | |
|--------------------------|----------|
| USE_IDLE_HOOK | Disabled |
| USE_TICK_HOOK | Disabled |
| USE_MALLOC_FAILED_HOOK | Disabled |
| CHECK_FOR_STACK_OVERFLOW | Disabled |

Run time and task stats gathering related definitions:

| | |
|-------------------------|----------|
| USE_TRACE_FACILITY | Enabled |
| GENERATE_RUN_TIME_STATS | Disabled |

Co-routine related definitions:

| | |
|---------------------------|----------|
| USE_CO_ROUTINES | Disabled |
| MAX_CO_ROUTINE_PRIORITIES | 2 |

Software timer definitions:

| | |
|---------------------|----------|
| USE_TIMERS | Disabled |
| TIMER_TASK_PRIORITY | 2 |
| TIMER_QUEUE_LENGTH | 10 |

Interrupt nesting behaviour configuration:

| | |
|--|----|
| LIBRARY_LOWEST_INTERRUPT_PRIORITY | 15 |
| LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY | 5 |

5.11.2. Include parameters:

Include definitions:

| | |
|-------------------|---------|
| vTaskPrioritySet | Enabled |
| uxTaskPriorityGet | Enabled |
| vTaskDelete | Enabled |

| | |
|-----------------------------|----------|
| vTaskCleanUpResources | Disabled |
| vTaskSuspend | Enabled |
| vTaskDelayUntil | Disabled |
| vTaskDelay | Enabled |
| xTaskGetSchedulerState | Enabled |
| xTaskResumeFromISR | Enabled |
| xQueueGetMutexHolder | Disabled |
| xSemaphoreGetMutexHolder | Disabled |
| pcTaskGetTaskName | Disabled |
| uxTaskGetStackHighWaterMark | Disabled |
| xTaskGetCurrentTaskHandle | Disabled |
| eTaskGetState | Disabled |
| xEventGroupSetBitFromISR | Disabled |
| xTimerPendFunctionCall | Disabled |

5.12. LWIP

mode: Enabled

Advanced parameters are not listed except if modified by user.

5.12.1. General:

LwIP Version:

LwIP Version (Version of LwIP supported by CubeMX) 1.4.1

DHCP Option:

LWIP_DHCP (DHCP Module) Enabled

RTOS Settings:

WITH_RTOS (Use FREERTOS ** CubeMX specific **) Enabled

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 |

5.12.2. All LwIP Options:

Platform Specific Locking:

| | |
|--|-------------------------|
| SYS_LIGHTWEIGHT_PROT (Memory Functions Protection) | Disabled |
| NO_SYS (LwIP Facilities) | LwIP Facilities Enabled |
| NO_SYS_NO_TIMERS (Drop Support For sys_timeout) | Disabled |

Memory Options:

| | |
|-----------------------------|------|
| MEM_SIZE (Heap Memory Size) | 1600 |
|-----------------------------|------|

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) | 592 |

ARP Options:

| | |
|------------------------------|---------|
| LWIP_ARP (ARP Functionality) | Enabled |
|------------------------------|---------|

SNMP Options:

| | |
|-------------------------|----------|
| LWIP_SNMP (SNMP Module) | Disabled |
|-------------------------|----------|

TCP Options:

| | |
|--|---------|
| TCP_TTL (Number of Time-To-Live Used by TCP Packets) | 255 |
| TCP_WND (TCP Receive Window Maximum Size) | 2144 |
| TCP_QUEUE_OOSEQ (Allow Out-Of-Order Incoming Packets) | Enabled |
| TCP_MSS (Maximum Segment Size) | 536 |
| TCP_SND_BUF (TCP Sender Buffer Space) | 1072 |
| TCP_SND_QUEUELEN (Number of Packet Buffers Allowed for TCP Sender) | 9 |

Network Interfaces Options:

| | |
|--|----------|
| LWIP_NETIF_STATUS_CALLBACK (Callback Function on Interface Status Changes) | Disabled |
| LWIP_NETIF_LINK_CALLBACK (Callback Function on Interface Link Changes) | Disabled |
| LWIP_NETIF_LOOPBACK (NETIF Loopback) | Disabled |

Thread Options:

| | |
|---|----------------|
| TCPIP_THREAD_NAME (TCPIP Thread Name) | "tcpip_thread" |
| TCPIP_THREAD_STACKSIZE (TCPIP Thread Stack Size) | 1024 |
| TCPIP_THREAD_PRIO (TCPIP Thread Priority Level) | 3 |
| TCPIP_MBOX_SIZE (TCPIP Mailbox Size) | 0 |
| DEFAULT_THREAD_NAME (Default LwIP Thread Name) | "lwip" |
| DEFAULT_THREAD_STACKSIZE (Default LwIP Thread Stack Size) | 1024 |
| DEFAULT_THREAD_PRIO (Default LwIP Thread Priority Level) | 3 |
| DEFAULT_RAW_RECVMBOX_SIZE (Default Mailbox Size on a NETCONN Raw) | 0 |
| DEFAULT_TCP_RECVMBOX_SIZE (Default Mailbox Size on a NETCONN TCP) | 0 |
| DEFAULT_ACCEPTMBOX_SIZE (Default Mailbox Size for Incoming Connections) | 0 |

Sequential Layer options:

LWIP_NETCONN (NETCONN API) Enabled

Socket Options:

LWIP_SOCKET (Socket API) Enabled

LWIP_COMPAT_SOCKETS (BSD-style Socket Functions Names) Enabled

Statistics Options:

LWIP_STATS (Statistics Collection) Disabled

Checksum Options:

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

5.12.3. Debug:

Debugging Options:

LWIP_DBG_MIN_LEVEL (Minimum Level) All

* User modified value

6. System Configuration

6.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|------|------|-------------|------------------------------|-----------------------------|-----------|------------|
| DCMI | PE4 | DCMI_D4 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PE5 | DCMI_D6 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PE6 | DCMI_D7 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA4 | DCMI_HSYNC | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA6 | DCMI_PIXCK | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PC6 | DCMI_D0 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PC7 | DCMI_D1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB6 | DCMI_D5 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB7 | DCMI_VSYNC | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PE0 | DCMI_D2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PE1 | DCMI_D3 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| ETH | PC1 | ETH_MDC | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PA1 | ETH_REF_CLK | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PA2 | ETH_MDIO | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PA7 | ETH_CRS_DV | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PC4 | ETH_RXD0 | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PC5 | ETH_RXD1 | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PB11 | ETH_TX_EN | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PB12 | ETH_TXD0 | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PB13 | ETH_TXD1 | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| FSMC | PE7 | FSMC_D4 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE8 | FSMC_D5 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE9 | FSMC_D6 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE10 | FSMC_D7 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE11 | FSMC_D8 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE12 | FSMC_D9 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE13 | FSMC_D10 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE14 | FSMC_D11 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PE15 | FSMC_D12 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD8 | FSMC_D13 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD9 | FSMC_D14 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD10 | FSMC_D15 | Alternate Function Push Pull | No pull-up and no pull-down | High | |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|-----------------------|----------------|----------------|-------------------------------|-----------------------------|-----------|-----------------|
| | PD11 | FSMC_A16 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD14 | FSMC_D0 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD15 | FSMC_D1 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD0 | FSMC_D2 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD1 | FSMC_D3 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD4 | FSMC_NOE | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD5 | FSMC_NWE | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD7 | FSMC_NE1 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| I2C1 | PB8 | I2C1_SCL | Alternate Function Open Drain | Pull-up | High * | |
| | PB9 | I2C1_SDA | Alternate Function Open Drain | Pull-up | High * | |
| RCC | PC14-OSC32_IN | RCC_OSC32_IN | n/a | n/a | n/a | PC14-OSC32_IN |
| | PC15-OSC32_OUT | RCC_OSC32_OUT | n/a | n/a | n/a | PC15-OSC32_OUT |
| | PH0-OSC_IN | RCC_OSC_IN | n/a | n/a | n/a | PH0-OSC_IN |
| | PH1-OSC_OUT | RCC_OSC_OUT | n/a | n/a | n/a | PH1-OSC_OUT |
| SDIO | PC8 | SDIO_D0 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PC9 | SDIO_D1 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PC10 | SDIO_D2 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PC11 | SDIO_D3 | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PC12 | SDIO_CK | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| | PD2 | SDIO_CMD | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| SPI2 | PC2 | SPI2_MISO | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PC3 | SPI2_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| | PB10 | SPI2_SCK | Alternate Function Push Pull | No pull-up and no pull-down | High * | |
| SYS | PA13 | SYS_JTMS-SWDIO | n/a | n/a | n/a | SWDIO |
| | PA14 | SYS_JTCK-SWCLK | n/a | n/a | n/a | SWCLK |
| | PB3 | SYS_JTDO-SWO | n/a | n/a | n/a | SWO |
| USART1 | PA9 | USART1_TX | Alternate Function Push Pull | Pull-up | High * | |
| | PA10 | USART1_RX | Alternate Function Push Pull | Pull-up | High * | |
| Single Mapped Signals | PD3 | FSMC_CLK | Alternate Function Push Pull | No pull-up and no pull-down | High | |
| GPIO | PE2 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | PE2 [ETH_RESET] |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|----|--------------------|-------------|------------------|-----------------------------|-----------|-----------------------|
| | PE3 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | PE3 [LCD DC] |
| | PC13- ANTI_TAMP | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PC0 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | OTG_FS_PowerSwitchOn |
| | PA3 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | PA3 [SPI2 CS] |
| | PB2 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | BOOT1 |
| | PB15 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | PB15 [Card Detect] |
| | PD12 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |
| | PD13 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | PD13 [LCD PWM Output] |
| | PD6 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |

6.2. DMA configuration

| DMA request | Stream | Direction | Priority |
|-------------|--------------|----------------------|----------|
| DCMI | DMA2_Stream1 | Peripheral To Memory | Low |

DCMI: DMA2_Stream1 DMA request Settings:

Mode: **Circular ***
Use fifo: **Enable ***
FIFO Threshold: Full
Peripheral Increment: Disable
Memory Increment: Disable
Peripheral Data Width: **Word ***
Memory Data Width: Word
Peripheral Burst Size: Single
Memory Burst Size: Single

6.3. NVIC configuration

| Interrupt Table | Enable | Preenmption Priority | SubPriority |
|---|--------|----------------------|-------------|
| System tick timer | true | 15 | 0 |
| DMA2 stream1 global interrupt | true | 5 | 0 |
| Ethernet global interrupt | true | 5 | 0 |
| DCMI global interrupt | true | 5 | 0 |
| Non maskable interrupt | unused | | |
| Hard fault interrupt | unused | | |
| Memory management fault | unused | | |
| Pre-fetch fault, memory access fault | unused | | |
| Undefined instruction or illegal state | unused | | |
| Debug monitor | unused | | |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| I2C1 event interrupt | unused | | |
| I2C1 error interrupt | unused | | |
| SPI2 global interrupt | unused | | |
| USART1 global interrupt | unused | | |
| SDIO global interrupt | unused | | |
| Ethernet wake-up interrupt through EXTI line 19 | unused | | |

* User modified value

7. Power Plugin report

7.1. Microcontroller Selection

| | |
|-----------|---------------|
| Series | STM32F4 |
| Line | STM32F407/417 |
| MCU | STM32F407VGTx |
| Datasheet | 022152_Rev5 |

7.2. Parameter Selection

| | |
|-------------|-----|
| Temperature | 25 |
| Vdd | 3.3 |

8. Software Project

8.1. Project Settings

| Name | Value |
|-----------------------------------|---|
| Project Name | EmbestBoard |
| Project Folder | C:\Users\Vergil\Documents\Projects\EmbestBB\EmbestBoard |
| Toolchain / IDE | MDK-ARM V5 |
| Firmware Package Name and Version | STM32Cube FW_F4 V1.10.1 |

8.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube Firmware Library Package | Copy all used libraries into the project folder |
| Generate peripheral initialization as a pair of '.c/.h' files | Yes |
| 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 |