
STM32
CubeMX

1. Description

1.1. Project

Project Name	BallGameGyro
Board Name	STM32F429I-DISC1
Generated with:	STM32CubeMX 6.0.0
Date	04/17/2023

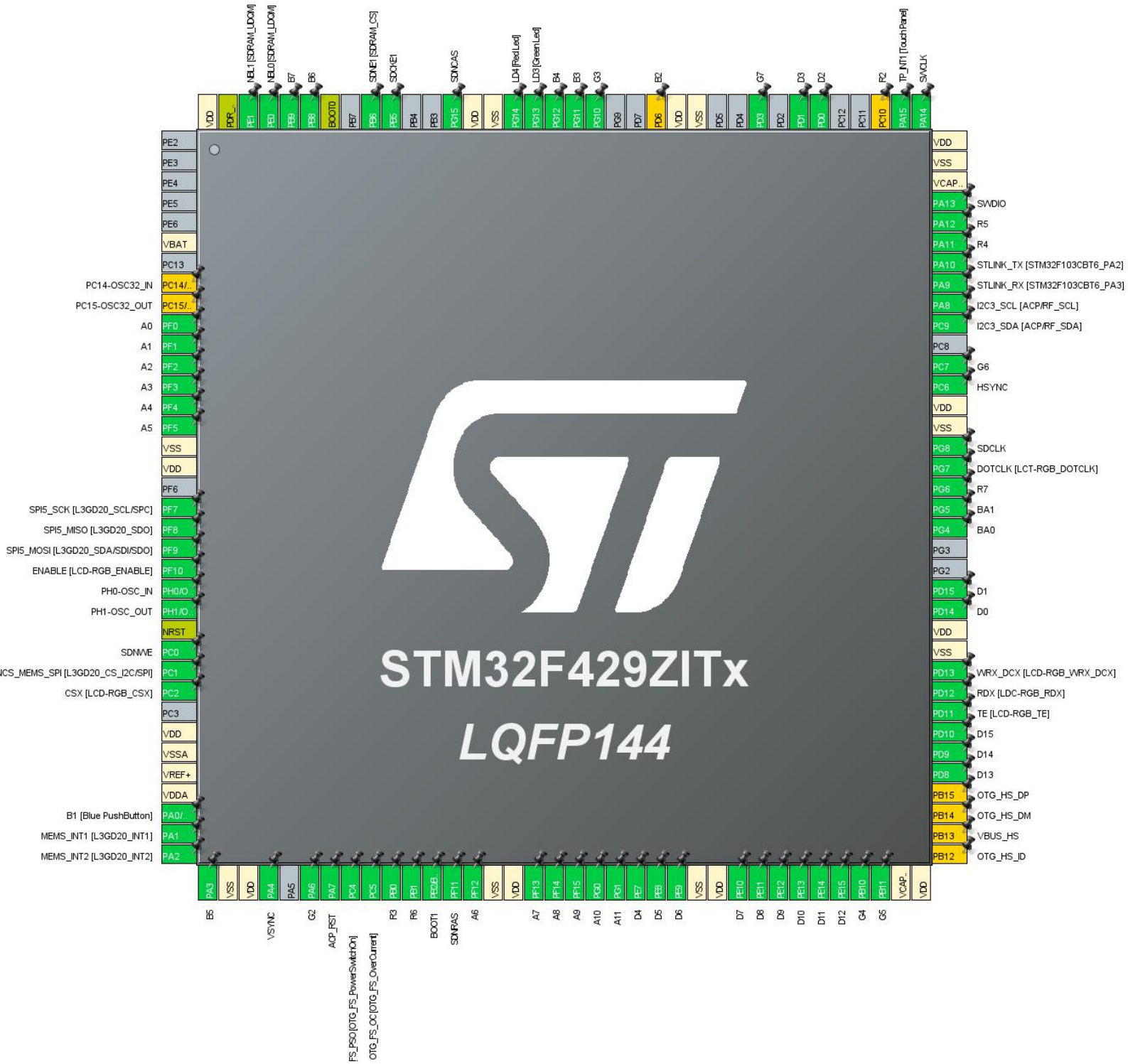
1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F429/439
MCU name	STM32F429ZITx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
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	PF0	I/O	FMC_A0	A0
11	PF1	I/O	FMC_A1	A1
12	PF2	I/O	FMC_A2	A2
13	PF3	I/O	FMC_A3	A3
14	PF4	I/O	FMC_A4	A4
15	PF5	I/O	FMC_A5	A5
16	VSS	Power		
17	VDD	Power		
19	PF7	I/O	SPI5_SCK	SPI5_SCK [L3GD20_SCL/SPC]
20	PF8	I/O	SPI5_MISO	SPI5_MISO [L3GD20_SDO]
21	PF9	I/O	SPI5_MOSI	SPI5_MOSI [L3GD20_SDA/SDI/SDO]
22	PF10	I/O	LTDC_DE	ENABLE [LCD-RGB_ENABLE]
23	PH0/OSC_IN	I/O	RCC_OSC_IN	PH0-OSC_IN
24	PH1/OSC_OUT	I/O	RCC_OSC_OUT	PH1-OSC_OUT
25	NRST	Reset		
26	PC0	I/O	FMC_SDNWE	SDNWE
27	PC1 **	I/O	GPIO_Output	NCS_MEMS_SPI [L3GD20_CS_I2C/SPI]
28	PC2 **	I/O	GPIO_Output	CSX [LCD-RGB_CSX]
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
34	PA0/WKUP	I/O	GPIO_EXTI0	B1 [Blue PushButton]
35	PA1	I/O	GPIO_EXTI1	MEMS_INT1 [L3GD20_INT1]
36	PA2	I/O	GPIO_EXTI2	MEMS_INT2 [L3GD20_INT2]
37	PA3	I/O	LTDC_B5	B5
38	VSS	Power		
39	VDD	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
40	PA4	I/O	LTDC_VSYNC	VSYNC
42	PA6	I/O	LTDC_G2	G2
43	PA7 **	I/O	GPIO_Output	ACP_RST
44	PC4 **	I/O	GPIO_Output	OTG_FS_PSO [OTG_FS_PowerSwitchOn]
45	PC5	I/O	GPIO_EXTI5	OTG_FS_OC [OTG_FS_OverCurrent]
46	PB0	I/O	LTDC_R3	R3
47	PB1	I/O	LTDC_R6	R6
48	PB2/BOOT1 **	I/O	GPIO_Input	BOOT1
49	PF11	I/O	FMC_SDNRAS	SDNRAS
50	PF12	I/O	FMC_A6	A6
51	VSS	Power		
52	VDD	Power		
53	PF13	I/O	FMC_A7	A7
54	PF14	I/O	FMC_A8	A8
55	PF15	I/O	FMC_A9	A9
56	PG0	I/O	FMC_A10	A10
57	PG1	I/O	FMC_A11	A11
58	PE7	I/O	FMC_D4	D4
59	PE8	I/O	FMC_D5	D5
60	PE9	I/O	FMC_D6	D6
61	VSS	Power		
62	VDD	Power		
63	PE10	I/O	FMC_D7	D7
64	PE11	I/O	FMC_D8	D8
65	PE12	I/O	FMC_D9	D9
66	PE13	I/O	FMC_D10	D10
67	PE14	I/O	FMC_D11	D11
68	PE15	I/O	FMC_D12	D12
69	PB10	I/O	LTDC_G4	G4
70	PB11	I/O	LTDC_G5	G5
71	VCAP_1	Power		
72	VDD	Power		
73	PB12 *	I/O	USB_OTG_HS_ID	OTG_HS_ID
74	PB13 *	I/O	USB_OTG_HS_VBUS	VBUS_HS
75	PB14 *	I/O	USB_OTG_HS_DM	OTG_HS_DM
76	PB15 *	I/O	USB_OTG_HS_DP	OTG_HS_DP
77	PD8	I/O	FMC_D13	D13
78	PD9	I/O	FMC_D14	D14

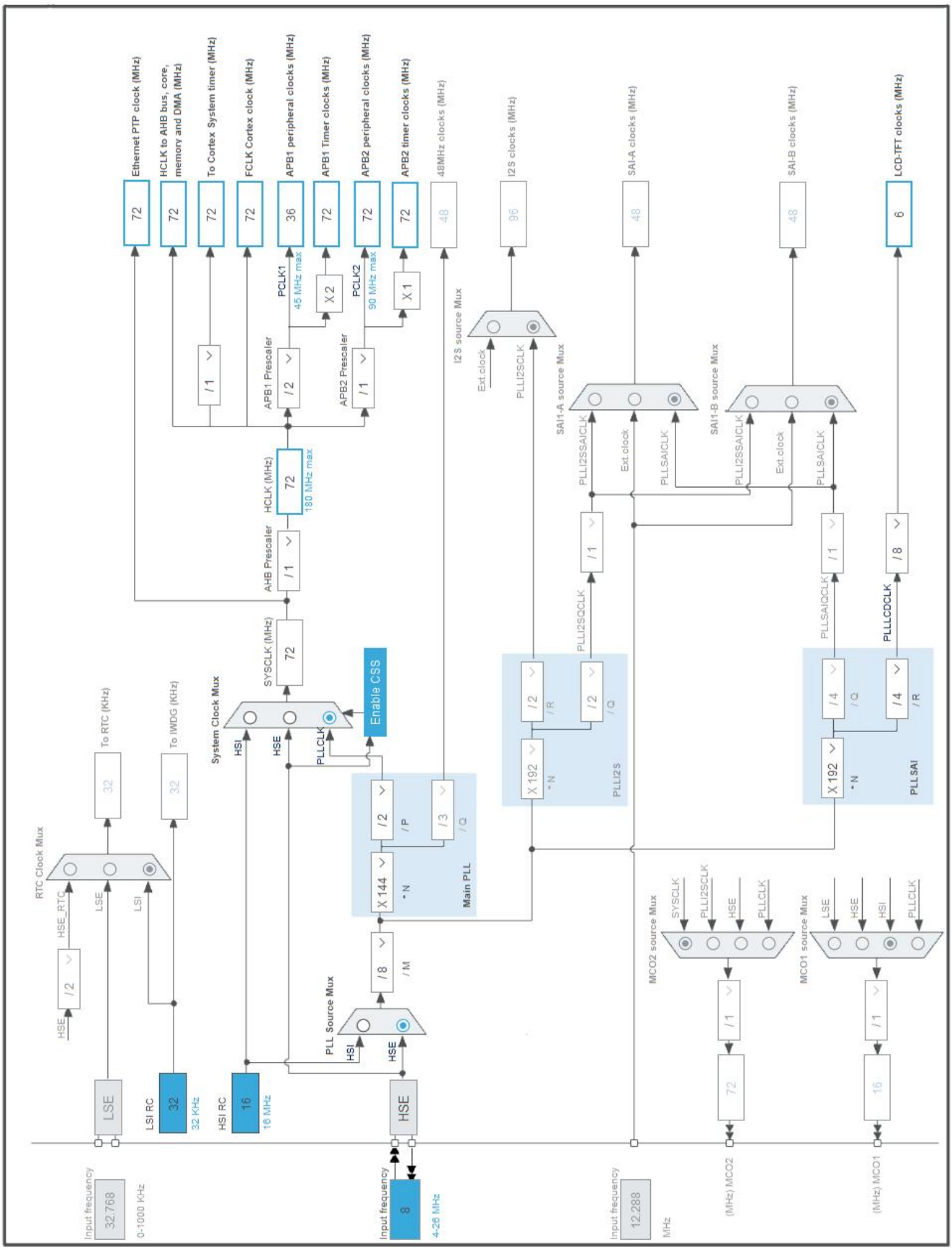
Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
79	PD10	I/O	FMC_D15	D15
80	PD11 **	I/O	GPIO_Input	TE [LCD-RGB_TE]
81	PD12 **	I/O	GPIO_Output	RDX [LDC-RGB_RDX]
82	PD13 **	I/O	GPIO_Output	WRX_DCX [LCD-RGB_WRX_DCX]
83	VSS	Power		
84	VDD	Power		
85	PD14	I/O	FMC_D0	D0
86	PD15	I/O	FMC_D1	D1
89	PG4	I/O	FMC_BA0	BA0
90	PG5	I/O	FMC_BA1	BA1
91	PG6	I/O	LTDC_R7	R7
92	PG7	I/O	LTDC_CLK	DOTCLK [LCT-RGB_DOTCLK]
93	PG8	I/O	FMC_SDCLK	SDCLK
94	VSS	Power		
95	VDD	Power		
96	PC6	I/O	LTDC_HSYNC	HSYNC
97	PC7	I/O	LTDC_G6	G6
99	PC9	I/O	I2C3_SDA	I2C3_SDA [ACP/RF_SDA]
100	PA8	I/O	I2C3_SCL	I2C3_SCL [ACP/RF_SCL]
101	PA9	I/O	USART1_TX	STLINK_RX [STM32F103CBT6_PA3]
102	PA10	I/O	USART1_RX	STLINK_TX [STM32F103CBT6_PA2]
103	PA11	I/O	LTDC_R4	R4
104	PA12	I/O	LTDC_R5	R5
105	PA13	I/O	SYS_JTMS-SWDIO	SWDIO
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14	I/O	SYS_JTCK-SWCLK	SWCLK
110	PA15	I/O	GPIO_EXTI15	TP_INT1 [Touch Panel]
111	PC10 *	I/O	LTDC_R2	R2
114	PD0	I/O	FMC_D2	D2
115	PD1	I/O	FMC_D3	D3
117	PD3	I/O	LTDC_G7	G7
120	VSS	Power		
121	VDD	Power		
122	PD6 *	I/O	LTDC_B2	B2

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
125	PG10	I/O	LTDC_G3	G3
126	PG11	I/O	LTDC_B3	B3
127	PG12	I/O	LTDC_B4	B4
128	PG13 **	I/O	GPIO_Output	LD3 [Green Led]
129	PG14 **	I/O	GPIO_Output	LD4 [Red Led]
130	VSS	Power		
131	VDD	Power		
132	PG15	I/O	FMC_SDNCAS	SDNCAS
135	PB5	I/O	FMC_SDCKE1	SDCKE1
136	PB6	I/O	FMC_SDNE1	SDNE1 [SDRAM_CS]
138	BOOT0	Boot		
139	PB8	I/O	LTDC_B6	B6
140	PB9	I/O	LTDC_B7	B7
141	PE0	I/O	FMC_NBL0	NBL0 [SDRAM_LDQM]
142	PE1	I/O	FMC_NBL1	NBL1 [SDRAM_UDQM]
143	PDR_ON	Reset		
144	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. Software Project

5.1. Project Settings

Name	Value
Project Name	BallGameGyro
Project Folder	C:\Users\chedo\OneDrive\Dokumenty\GitHub\PSZ_Sterowniki_Robotow_Projekt\
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.25.2
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

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
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	IP Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_CRC_Init	CRC
4	MX_DMA2D_Init	DMA2D
5	MX_FMC_Init	FMC
6	MX_LTDC_Init	LTDC
7	MX_SPI5_Init	SPI5
8	MX_TIM1_Init	TIM1
9	MX_USART1_UART_Init	USART1
10	MX_I2C3_Init	I2C3

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F429/439
MCU	STM32F429ZITx
Datasheet	DS9405_Rev9

6.2. Parameter Selection

Temperature	25
Vdd	3.3

6.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

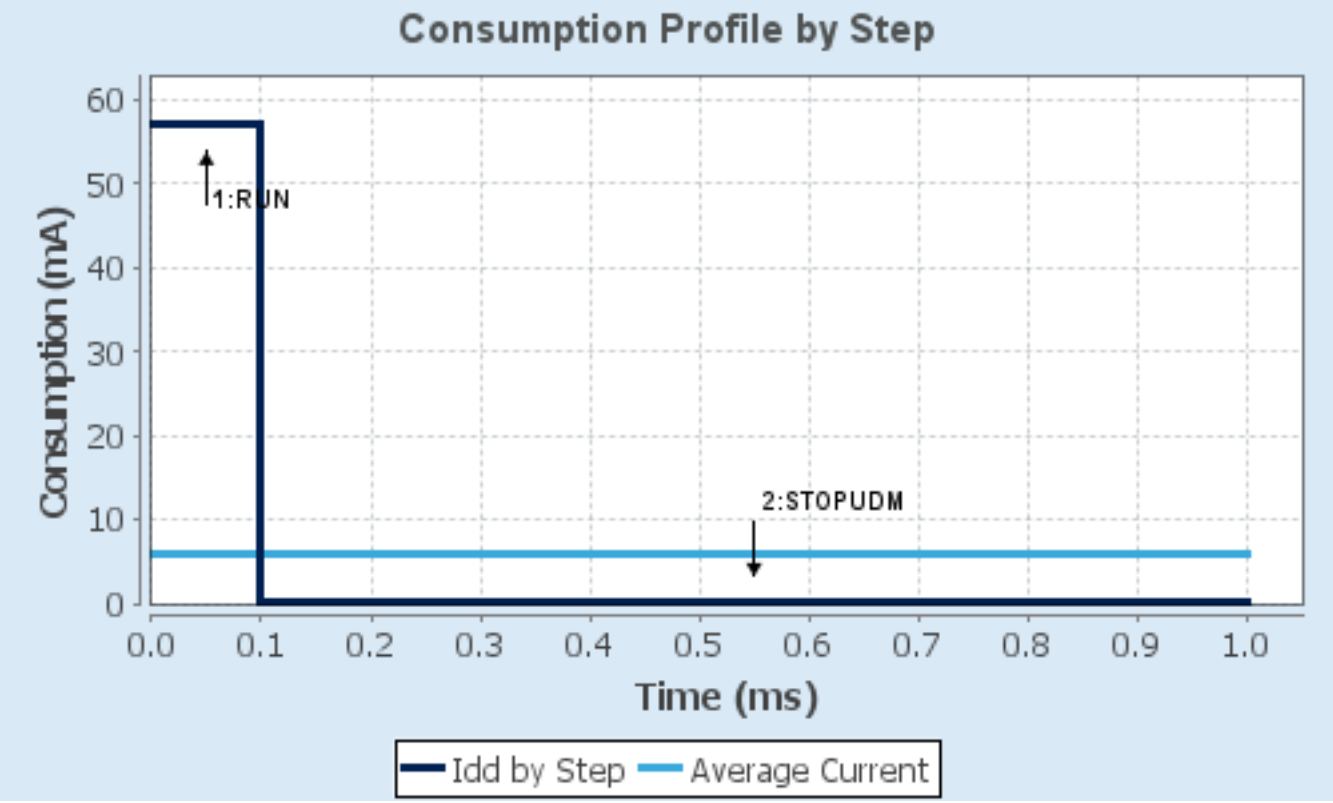
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP_UDM (Under Drive)
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	180 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	57 mA	100 µA
Duration	0.1 ms	0.9 ms
DMIPS	225.0	0.0
Ta Max	97.48	104.99
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	5.79 mA
Battery Life	24 days, 10 hours	Average DMIPS	225.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
60
50
40
30
20
10
0
1:RUN
2:STOPUDM
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

7. IPs and Middleware Configuration

7.1. CRC

mode: Activated

7.2. DMA2D

mode: Activated

7.2.1. Parameter Settings:

Basic Parameters:

Transfer Mode	Memory to Memory
Color Mode	ARGB8888
Output Offset	0
DMA2D Bytes Swap	Bytes in regular order in output FIFO
DMA2D Line Offset Mode	Line offsets expressed in pixels

Foreground layer Configuration:

DMA2D Input Color Mode	ARGB8888
DMA2D ALPHA MODE	No modification of the alpha channel value
Input Alpha	0
Input Offset	0

7.3. FMC

SDRAM 1

Clock and chip enable: SDCKE1+SDNE1

Internal bank number: 4 banks

Address: 12 bits

Data: 16 bits

Byte enable: set

7.3.1. SDRAM 1:

SDRAM control:

Bank	SDRAM bank 2
Number of column address bits	8 bits
Number of row address bits	12 bits
CAS latency	**3 memory clock cycles ***
Write protection	Disabled
SDRAM common clock	**2 HCLK clock cycles ***
SDRAM common burst read	Disabled

SDRAM common read pipe delay	**1 HCLK clock cycle ***

SDRAM timing in memory clock cycles:

Load mode register to active delay	**2 ***
Exit self-refresh delay	**7 ***
Self-refresh time	**4 ***
SDRAM common row cycle delay	**7 ***
Write recovery time	**3 ***
SDRAM common row precharge delay	**2 ***
Row to column delay	**2 ***

7.4. GPIO

7.5. I2C3

I2C: I2C

7.5.1. Parameter Settings:

Master Features:

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

Timing configuration:

Coefficient of Digital Filter	0
Analog Filter	Enabled

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

7.6. LTDC

Display Type: RGB565 (16 bits)

7.6.1. Parameter Settings:

Synchronization for Width:

Horizontal Synchronization Width	**10 ***

Horizontal Back Porch	**20 ***
Active Width	**240 ***
Horizontal Front Porch	**10 ***
HSync Width	9
Accumulated Horizontal Back Porch Width	29
Accumulated Active Width	269
Total Width	279

Synchronization for Height:

Vertical Synchronization Height	**2 ***
Vertical Back Porch	2
Active Height	**320 ***
Vertical Front Porch	**4 ***
VSync Height	1
Accumulated Vertical Back Porch Height	3
Accumulated Active Height	323
Total Height	327

Signal Polarity:

Horizontal Synchronization Polarity	Active Low
Vertical Synchronization Polarity	Active Low
Not Data Enable Polarity	Active Low
Pixel Clock Polarity	Normal Input

BackGround Color:

Red	0
Green	0
Blue	0

7.6.2. Layer Settings:

BackGround Color:

Layer 0 - Blue	0
Layer 0 - Green	**255 ***
Layer 0 - Red	0
Layer 1 - Blue	0
Layer 1 - Green	0
Layer 1 - Red	0

Windows Position:

Layer 0 - Window Horizontal Start	0
Layer 0 - Window Horizontal Stop	**240 ***
Layer 0 - Window Vertical Start	0
Layer 0 - Window Vertical Stop	**320 ***

Layer 1 - Window Horizontal Start	0
Layer 1 - Window Horizontal Stop	**60 ***
Layer 1 - Window Vertical Start	0
Layer 1 - Window Vertical Stop	**60 ***

Pixel Parameters:

Layer 0 - Pixel Format	**RGB565 ***
Layer 1 - Pixel Format	**RGB565 ***

Blending:

Layer 0 - Alpha constant for blending	**255 ***
Layer 0 - Default Alpha value	0
Layer 0 - Blending Factor1	**Alpha constant x Pixel Alpha ***
Layer 0 - Blending Factor2	**Alpha constant x Pixel Alpha ***
Layer 1 - Alpha constant for blending	**255 ***
Layer 1 - Default Alpha value	**255 ***
Layer 1 - Blending Factor1	**Alpha constant x Pixel Alpha ***
Layer 1 - Blending Factor2	**Alpha constant x Pixel Alpha ***

Frame Buffer:

Layer 0 - Color Frame Buffer Start Adress	0x0
Layer 0 - Color Frame Buffer Line Length (Image Width)	**240 ***
Layer 0 - Color Frame Buffer Number of Lines (Image Height)	**320 ***
Layer 1 - Color Frame Buffer Start Adress	0
Layer 1 - Color Frame Buffer Line Length (Image Width)	**56 ***
Layer 1 - Color Frame Buffer Number of Lines (Image Height)	**57 ***

Number of Layers:

Number of Layers	2 layers

7.7. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.7.1. Parameter Settings:

System Parameters:

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

Data Cache	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 3
Power Over Drive	Disabled

7.8. SPI5

Mode: Full-Duplex Master

7.8.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**16 ***
Baud Rate	**4.5 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.9. SYS

Debug: Serial Wire

Timebase Source: TIM6

7.10. TIM1

Clock Source : Internal Clock

7.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.11. USART1

Mode: Asynchronous

7.11.1. 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

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
FMC	PF0	FMC_A0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A0
	PF1	FMC_A1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A1
	PF2	FMC_A2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A2
	PF3	FMC_A3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A3
	PF4	FMC_A4	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A4
	PF5	FMC_A5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A5
	PC0	FMC_SDNWE	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDNWE
	PF11	FMC_SDNRAS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDNRAS
	PF12	FMC_A6	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A6
	PF13	FMC_A7	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A7
	PF14	FMC_A8	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A8
	PF15	FMC_A9	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A9
	PG0	FMC_A10	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A10
	PG1	FMC_A11	Alternate Function Push Pull	No pull-up and no pull-down	Very High	A11
	PE7	FMC_D4	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D4
	PE8	FMC_D5	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D5
	PE9	FMC_D6	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D6
	PE10	FMC_D7	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D7
	PE11	FMC_D8	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D8
	PE12	FMC_D9	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D9
	PE13	FMC_D10	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D10
	PE14	FMC_D11	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D11
	PE15	FMC_D12	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D12
	PD8	FMC_D13	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D13
	PD9	FMC_D14	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D14
	PD10	FMC_D15	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D15
	PD14	FMC_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D0
	PD15	FMC_D1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D1
	PG4	FMC_BA0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	BA0
	PG5	FMC_BA1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	BA1
	PG8	FMC_SDCLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDCLK
	PD0	FMC_D2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D2
	PD1	FMC_D3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	D3
	PG15	FMC_SDNCAS	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDNCAS
	PB5	FMC_SDCKE1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDCKE1
	PB6	FMC_SDNE1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	SDNE1 [SDRAM_CS]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PE0	FMC_NBL0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	NBL0 [SDRAM_LDQM]
	PE1	FMC_NBL1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	NBL1 [SDRAM_UDQM]
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	Pull-up	Low	I2C3_SDA [ACP/RF_SDA]
	PA8	I2C3_SCL	Alternate Function Open Drain	Pull-up	Low	I2C3_SCL [ACP/RF_SCL]
LTDC	PF10	LTDC_DE	Alternate Function Push Pull	No pull-up and no pull-down	Low	ENABLE [LCD-RGB_ENABLE]
	PA3	LTDC_B5	Alternate Function Push Pull	No pull-up and no pull-down	Low	B5
	PA4	LTDC_VSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	VSYNC
	PA6	LTDC_G2	Alternate Function Push Pull	No pull-up and no pull-down	Low	G2
	PB0	LTDC_R3	Alternate Function Push Pull	No pull-up and no pull-down	Low	R3
	PB1	LTDC_R6	Alternate Function Push Pull	No pull-up and no pull-down	Low	R6
	PB10	LTDC_G4	Alternate Function Push Pull	No pull-up and no pull-down	Low	G4
	PB11	LTDC_G5	Alternate Function Push Pull	No pull-up and no pull-down	Low	G5
	PG6	LTDC_R7	Alternate Function Push Pull	No pull-up and no pull-down	Low	R7
	PG7	LTDC_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Low	DOTCLK [LCT-RGB_DOTCLK]
	PC6	LTDC_HSYNC	Alternate Function Push Pull	No pull-up and no pull-down	Low	HSYNC
	PC7	LTDC_G6	Alternate Function Push Pull	No pull-up and no pull-down	Low	G6
	PA11	LTDC_R4	Alternate Function Push Pull	No pull-up and no pull-down	Low	R4
	PA12	LTDC_R5	Alternate Function Push Pull	No pull-up and no pull-down	Low	R5
	PD3	LTDC_G7	Alternate Function Push Pull	No pull-up and no pull-down	Low	G7
	PG10	LTDC_G3	Alternate Function Push Pull	No pull-up and no pull-down	Low	G3
	PG11	LTDC_B3	Alternate Function Push Pull	No pull-up and no pull-down	Low	B3
	PG12	LTDC_B4	Alternate Function Push Pull	No pull-up and no pull-down	Low	B4
	PB8	LTDC_B6	Alternate Function Push Pull	No pull-up and no pull-down	Low	B6
	PB9	LTDC_B7	Alternate Function Push Pull	No pull-up and no pull-down	Low	B7
RCC	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
SPI5	PF7	SPI5_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI5_SCK [L3GD20_SCL/SPC]
	PF8	SPI5_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI5_MISO [L3GD20_SDO]
	PF9	SPI5_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Low	SPI5_MOSI [L3GD20_SDA/SDI/SDO]
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	SWDIO
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWCLK
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down		STLINK_RX

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					Very High *	[STM32F103CBT6_PA3]
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	STLINK_TX [STM32F103CBT6_PA2]
Single Mapped Signals	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
	PB12	USB_OTG_HS_ID	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_HS_ID
	PB13	USB_OTG_HS_VBUS	Input mode	No pull-up and no pull-down	n/a	VBUS_HS
	PB14	USB_OTG_HS_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_HS_DM
	PB15	USB_OTG_HS_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	OTG_HS_DP
	PC10	LTDC_R2	Alternate Function Push Pull	No pull-up and no pull-down	Low	R2
	PD6	LTDC_B2	Alternate Function Push Pull	No pull-up and no pull-down	Low	B2
GPIO	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NCS_MEMS_SPI [L3GD20_CS_I2C/SPI]
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CSX [LCD-RGB_CSX]
	PA0/WKUP	GPIO_EXTI0	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	B1 [Blue PushButton]
	PA1	GPIO_EXTI1	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	MEMS_INT1 [L3GD20_INT1]
	PA2	GPIO_EXTI2	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	MEMS_INT2 [L3GD20_INT2]
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ACP_RST
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	OTG_FS_PSO [OTG_FS_PowerSwitchOn]
	PC5	GPIO_EXTI5	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	OTG_FS_OC [OTG_FS_OverCurrent]
	PB2/BOOT1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BOOT1
	PD11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	TE [LCD-RGB_TE]
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RDX [LDC-RGB_RDX]
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	WRX_DCX [LCD-

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
						RGB_WRX_DCX]
	PA15	GPIO_EXTI15	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	TP_INT1 [Touch Panel]
	PG13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Green Led]
	PG14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD4 [Red Led]

8.2. DMA configuration

nothing configured in DMA service

8.3. NVIC configuration

8.3.1. NVIC

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	15	0
System tick timer	true	0	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
LTDC global interrupt	true	5	0
DMA2D global interrupt	true	5	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM1 update interrupt and TIM10 global interrupt	unused		
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused		
TIM1 capture compare interrupt	unused		
USART1 global interrupt	unused		
FMC global interrupt	unused		
I2C3 event interrupt	unused		
I2C3 error interrupt	unused		
FPU global interrupt	unused		
SPI5 global interrupt	unused		
LTDC global error interrupt	unused		

8.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	true	true	false
Hard fault interrupt	true	true	false
Memory management fault	true	true	false
Pre-fetch fault, memory access fault	true	true	false
Undefined instruction or illegal state	true	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
System service call via SWI instruction	true	true	false
Debug monitor	true	true	false
Pendable request for system service	true	true	false
System tick timer	true	true	false
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	true	true
LTDC global interrupt	true	true	true
DMA2D global interrupt	true	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current

10. Docs & Resources

Type	Link
Datasheet	http://www.st.com/resource/en/datasheet/DM00071990.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00031020.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00046982.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00068628.pdf
Application note	http://www.st.com/resource/en/application_note/CD00167594.pdf
Application note	http://www.st.com/resource/en/application_note/CD00211314.pdf
Application note	http://www.st.com/resource/en/application_note/CD00249778.pdf
Application note	http://www.st.com/resource/en/application_note/CD00259245.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264321.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264342.pdf
Application note	http://www.st.com/resource/en/application_note/CD00264379.pdf
Application note	http://www.st.com/resource/en/application_note/DM00024853.pdf
Application note	http://www.st.com/resource/en/application_note/DM00040802.pdf
Application note	http://www.st.com/resource/en/application_note/DM00040808.pdf
Application note	http://www.st.com/resource/en/application_note/DM00042534.pdf
Application note	http://www.st.com/resource/en/application_note/DM00046011.pdf
Application note	http://www.st.com/resource/en/application_note/DM00050879.pdf
Application note	http://www.st.com/resource/en/application_note/DM00072315.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073742.pdf
Application note	http://www.st.com/resource/en/application_note/DM00073853.pdf
Application note	http://www.st.com/resource/en/application_note/DM00080497.pdf
Application note	http://www.st.com/resource/en/application_note/DM00081379.pdf
Application note	http://www.st.com/resource/en/application_note/DM00115714.pdf
Application note	http://www.st.com/resource/en/application_note/DM00123028.pdf
Application note	http://www.st.com/resource/en/application_note/DM00129215.pdf

Application note	http://www.st.com/resource/en/application_note/DM00154959.pdf
Application note	http://www.st.com/resource/en/application_note/DM00160482.pdf
Application note	http://www.st.com/resource/en/application_note/DM00161778.pdf
Application note	http://www.st.com/resource/en/application_note/DM00164538.pdf
Application note	http://www.st.com/resource/en/application_note/DM00172465.pdf
Application note	http://www.st.com/resource/en/application_note/DM00213525.pdf
Application note	http://www.st.com/resource/en/application_note/DM00220769.pdf
Application note	http://www.st.com/resource/en/application_note/DM00257177.pdf
Application note	http://www.st.com/resource/en/application_note/DM00272912.pdf
Application note	http://www.st.com/resource/en/application_note/DM00226326.pdf
Application note	http://www.st.com/resource/en/application_note/DM00236305.pdf
Application note	http://www.st.com/resource/en/application_note/DM00281138.pdf
Application note	http://www.st.com/resource/en/application_note/DM00296349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
Application note	http://www.st.com/resource/en/application_note/DM00287603.pdf
Application note	http://www.st.com/resource/en/application_note/DM00354244.pdf
Application note	http://www.st.com/resource/en/application_note/DM00373474.pdf
Application note	http://www.st.com/resource/en/application_note/DM00315319.pdf
Application note	http://www.st.com/resource/en/application_note/DM00380469.pdf
Application note	http://www.st.com/resource/en/application_note/DM00395696.pdf
Application note	http://www.st.com/resource/en/application_note/DM00431633.pdf
Application note	http://www.st.com/resource/en/application_note/DM00493651.pdf
Application note	http://www.st.com/resource/en/application_note/DM00536349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00725181.pdf