

## STM32H750xB and STM32H753xl device limitations

### Applicability

This document applies to the part numbers of STM32H750xB and STM32H753xl devices listed in [Table 1](#) and their variants shown in [Table 2](#).

[Section 1](#) gives a summary and [Section 2](#) a description of workarounds for device limitations, with respect to the device datasheet and reference manual RM0433.

**Table 1. Device summary**

Reference	Part numbers
STM32H750xB	STM32H750VB, STM32H750IB, STM32H750XB
STM32H753xl	STM32H753VI, STM32H753ZI, STM32H753II, STM32H753BI, STM32H753XI, STM32H753AI

**Table 2. Device variants**

Reference	Silicon revision codes	
	Device marking <sup>(1)</sup>	REV_ID <sup>(2)</sup>
STM32H750xB	Y	0x1003
STM32H750xB	X	0x2001
STM32H750xB	V	0x2003
STM32H753xl	Y	0x1003
STM32H753xl	X	0x2001
STM32H753xl	V	0x2003

1. Refer to the device datasheet for how to identify this code on different types of package.
2. REV\_ID[15:0] bit field of DBGMCU\_IDC register. Refer to the reference manual.

# Contents

- 1 Summary of device limitations ..... 6**
- 2 Description of device limitations ..... 10**
  - 2.1 Arm® 32-bit Cortex®-M7 core ..... 10
    - 2.1.1 Cortex®-M7 data corruption when using Data cache configured in write-through ..... 10
    - 2.1.2 Cortex®-M7 FPU interrupt not present on NVIC line 81 ..... 11
  - 2.2 System ..... 11
    - 2.2.1 Timer system breaks do not work ..... 11
    - 2.2.2 Clock recovery system synchronization with USB SOF does not work . 11
    - 2.2.3 SysTick external clock is not HCLK/8 ..... 12
    - 2.2.4 Option byte loading can be done with the user wait-state configuration 12
    - 2.2.5 Flash BusFault address register may not be valid when an ECC double error occurs ..... 12
    - 2.2.6 Flash ECC address register may not be updated ..... 12
    - 2.2.7 PCROP-protected areas in Flash memory may be unprotected ..... 13
    - 2.2.8 Flash memory bank swapping might impact embedded Flash memory interface behavior ..... 13
    - 2.2.9 Reading from AXI SRAM may lead to data read corruption ..... 13
    - 2.2.10 Clock switching does not work when LSE failure is detected by CSS .. 13
    - 2.2.11 RTC stopped when a system reset occurs while the LSI is used as a clock source ..... 14
    - 2.2.12 USB OTG\_FS PHY drive limit on DP/DM pins ..... 14
    - 2.2.13 Unexpected leakage current on I/Os when VIN higher than VDD ..... 14
    - 2.2.14 LSE oscillator driving capability selection bits are swapped ..... 14
    - 2.2.15 HRTIM internal synchronization does not work ..... 15
    - 2.2.16 Device stalled when two consecutive level regressions occur without accessing from/to backup SRAM ..... 15
    - 2.2.17 Invalid Flash memory CRC ..... 15
    - 2.2.18 GPIO assigned to DAC cannot be used in output mode when the DAC output is connected to on-chip peripheral ..... 15
    - 2.2.19 Unstable LSI when it clocks RTC or CSS on LSE ..... 16
    - 2.2.20 480 MHz maximum CPU frequency not available on silicon revision Y . 16
    - 2.2.21 VDDLDO is not available on TFBGA100 package on devices revision Y and V ..... 16

2.2.22	WWDG not functional when VDD is lower than 2.7 V and VOS0 or VOS1 voltage level is selected	17
2.2.23	A tamper event does not erase the backup RAM when the backup RAM clock is disabled	17
2.2.24	LSE CSS parasitic detection even when disabled	17
2.2.25	Output current sunk or sourced by Pxy_C pins	18
2.3	FMC	18
2.3.1	Dummy read cycles inserted when reading synchronous memories	18
2.3.2	Wrong data read from a busy NAND Flash memory	18
2.3.3	Missed clocks with continuous clock feature enabled	19
2.4	QUADSPI	19
2.4.1	First nibble of data is not written after a dummy phase	19
2.4.2	QUADSPI hangs when QUADSPI_CCR is cleared	19
2.4.3	QUADSPI cannot be used in Indirect read mode when only data phase is activated	20
2.4.4	Memory-mapped read of last memory byte fails	20
2.5	ADC	20
2.5.1	Conversion overlap may impact the ADC accuracy	20
2.5.2	ADC resolution limited by LSE activity	21
2.5.3	ADC maximum sampling rate when VDDA is lower than 2 V	21
2.5.4	ADC maximum resolution when VDDA is higher than 3.3 V	21
2.5.5	First ADC injected conversion in a sequence may be corrupted	21
2.5.6	Writing the ADC_JSQR register when JADCSTART = 1 and JQDIS = 1 may lead to incorrect behavior	22
2.5.7	Conversion may be triggered by context queue register update	22
2.5.8	Updated conversion sequence may be triggered by context queue update	22
2.6	VREFBUF	23
2.6.1	Overshoot on VREFBUF output	23
2.6.2	VREFBUF Hold mode cannot be used	23
2.7	OPAMP	23
2.7.1	OPAMP high-speed mode must not be used	23
2.8	LCD-TFT	24
2.8.1	Device stalled when accessing LTDC registers while pixel clock is disabled	24
2.9	TIM	24
2.9.1	One-pulse mode trigger not detected in master-slave reset + trigger configuration	24

- 2.9.2 Consecutive compare event missed in specific conditions . . . . . 24
- 2.9.3 Output compare clear not working with external counter reset . . . . . 25
- 2.10 LPTIM . . . . . 26
  - 2.10.1 MCU may remain stuck in LPTIM interrupt when entering Stop mode . 26
- 2.11 RTC . . . . . 26
  - 2.11.1 RTC calendar registers are not locked properly . . . . . 26
- 2.12 I2C . . . . . 27
  - 2.12.1 10-bit master mode: new transfer cannot be launched if first part of the address is not acknowledged by the slave . . . . . 27
  - 2.12.2 Wrong behavior in Stop mode when wakeup from Stop mode is disabled in I2C . . . . . 27
  - 2.12.3 Wrong data sampling when data setup time ( $t_{SU,DAT}$ ) is shorter than one I2C kernel clock period . . . . . 28
  - 2.12.4 Spurious bus error detection in Master mode . . . . . 28
  - 2.12.5 Last-received byte loss in Reload mode . . . . . 29
  - 2.12.6 Spurious master transfer upon own slave address match . . . . . 30
  - 2.12.7 START bit is cleared upon setting ADDRCONF, not upon address match . 31
- 2.13 USART . . . . . 31
  - 2.13.1 Underrun flag is set when the USART is used in SPI Slave receive mode . . . . . 31
  - 2.13.2 DMA stream locked when transferring data to/from USART/UART . . . . 31
- 2.14 SPI . . . . . 32
  - 2.14.1 Spurious DMA Rx transaction after simplex Tx traffic . . . . . 32
  - 2.14.2 Master data transfer stall at system clock much faster than SCK . . . . 32
  - 2.14.3 Corrupted CRC return at non-zero UDRDET setting . . . . . 32
  - 2.14.4 TXP interrupt occurring while SPI/I2Sdisabled . . . . . 32
- 2.15 SDMMC . . . . . 33
  - 2.15.1 Busy not detected when a write operation suspended during busy phase resumes . . . . . 33
  - 2.15.2 Wrong data line 2 generation between two blocks during DDR transfer with Read wait mode enabled . . . . . 33
  - 2.15.3 Unwanted overrun detection when an AHB error is reported whereas all bytes have been received . . . . . 33
  - 2.15.4 Consecutive multiple block transfers can induce incorrect data length . 34
  - 2.15.5 Clock stop reported during Read wait mode sequence . . . . . 34
- 2.16 FDCAN . . . . . 34
  - 2.16.1 Writing FDCAN\_TTTS during initialization corrupts FDCAN\_TTTMC . . 34
  - 2.16.2 Wrong data may be read from Message RAM by the CPU when using two FDCANs . . . . . 35

2.16.3	Mis-synchronization in Edge filtering mode when the falling edge at FDCAN_Rx input pin coincides with the end of the integration phase	35
2.16.4	Tx FIFO messages inverted when both Tx buffer and FIFO are used and the messages in the Tx buffer have higher priority than in the Tx FIFO	35
2.17	USB OTG_HS	36
2.17.1	Possible drift of USB PHY pull-up resistor	36
2.18	ETH	37
2.18.1	Incorrect L4 inverse filtering results for corrupted packets	37
2.18.2	Rx DMA may fail to recover upon DMA restart following a bus error, with Rx timestamping enabled	37
2.18.3	Tx DMA may halt while fetching TSO header under specific conditions	37
2.18.4	Spurious receive watchdog timeout interrupt	38
2.18.5	Incorrect flexible PPS output interval under specific conditions	38
2.18.6	Packets dropped in RMI 10Mbps mode due to fake dribble and CRC error	38
2.18.7	ARP offload function not effective	39
2.19	HDMI-CEC	39
2.19.1	Unexpected switch to Receive mode without automatic transmission retry and notification	39
2.19.2	CEC header not received due to unjustified Rx-Overrun detection	40
<b>3</b>	<b>Important security notice</b>	<b>41</b>
<b>4</b>	<b>Revision history</b>	<b>42</b>

# 1 Summary of device limitations

The following table gives a quick references to all documented device limitations of STM32H750xB and STM32H753xI and their status:

A = limitation present, workaround available

N = limitation present, no workaround available

P = limitation present, partial workaround available

“-” = limitation absent

Applicability of a workaround may depend on specific conditions of target application. Adoption of a workaround may cause restrictions to target application. Workaround for a limitation is deemed partial if it only reduces the rate of occurrence and/or consequences of the limitation, or if it is fully effective for only a subset of instances on the device or in only a subset of operating modes, of the function concerned.

**Table 3. Summary of device limitations**

Function	Section	Limitation	Status		
			Rev. Y	Rev. X <sup>(1)</sup>	Rev. V
Arm® 32-bit Cortex®-M7 core	2.1.1	Cortex®-M7 data corruption when using Data cache configured in write-through	A	A	A
	2.1.2	Cortex®-M7 FPU interrupt not present on NVIC line 81	A	A	A
System	2.2.1	Timer system breaks do not work	N	-	-
	2.2.2	Clock recovery system synchronization with USB SOF does not work	A	-	-
	2.2.3	SysTick external clock is not HCLK/8	A	-	-
	2.2.4	Option byte loading can be done with the user wait-state configuration	A	-	-
	2.2.5	Flash BusFault address register may not be valid when an ECC double error occurs	A	-	-
	2.2.6	Flash ECC address register may not be updated	N	-	-
	2.2.7	PCROP-protected areas in Flash memory may be unprotected	A	-	-
	2.2.8	Flash memory bank swapping might impact embedded Flash memory interface behavior	N	-	-
	2.2.9	Reading from AXI SRAM may lead to data read corruption	A	-	-
	2.2.10	Clock switching does not work when LSE failure is detected by CSS	A	-	-
	2.2.11	RTC stopped when a system reset occurs while the LSI is used as a clock source	A	-	-
	2.2.12	USB OTG_FS PHY drive limit on DP/DM pins	N	-	-
	2.2.13	Unexpected leakage current on I/Os when VIN higher than VDD	A	-	-
	2.2.14	LSE oscillator driving capability selection bits are swapped	A	-	-
	2.2.15	HRTIM internal synchronization does not work	N	-	-
2.2.16	Device stalled when two consecutive level regressions occur without accessing from/to backup SRAM	-	A	A	

Table 3. Summary of device limitations (continued)

Function	Section	Limitation	Status		
			Rev. Y	Rev. X <sup>(1)</sup>	Rev. V
System (continued)	2.2.17	Invalid Flash memory CRC	P	-	-
	2.2.18	GPIO assigned to DAC cannot be used in output mode when the DAC output is connected to on-chip peripheral	N	N	N
	2.2.19	Unstable LSI when it clocks RTC or CSS on LSE	A	A	A
	2.2.20	480 MHz maximum CPU frequency not available on silicon revision Y	P	P	P
	2.2.21	VDDLDO is not available on TFBGA100 package on devices revision Y and V	N	N	N
	2.2.22	WWDG not functional when VDD is lower than 2.7 V and VOS0 or VOS1 voltage level is selected	N	N	N
	2.2.23	A tamper event does not erase the backup RAM when the backup RAM clock is disabled	A	A	A
	2.2.24	LSE CSS parasitic detection even when disabled	P	P	P
FMC	2.3.1	Dummy read cycles inserted when reading synchronous memories	N	N	N
	2.3.2	Wrong data read from a busy NAND Flash memory	A	A	A
	2.3.3	Missed clocks with continuous clock feature enabled	A	-	-
QUADSPI	2.4.1	First nibble of data is not written after a dummy phase	A	-	-
	2.4.2	QUADSPI hangs when QUADSPI_CCR is cleared	A	A	A
	2.4.3	QUADSPI cannot be used in Indirect read mode when only data phase is activated	A	A	A
	2.4.4	Memory-mapped read of last memory byte fails	A	A	A
ADC	2.5.1	Conversion overlap may impact the ADC accuracy	A	-	-
	2.5.2	ADC resolution limited by LSE activity	A	-	-
	2.5.3	ADC maximum sampling rate when VDDA is lower than 2 V	A	-	-
	2.5.4	ADC maximum resolution when VDDA is higher than 3.3 V	A	-	-
	2.5.5	First ADC injected conversion in a sequence may be corrupted	A	-	-
	2.5.6	Writing the ADC_JSQR register when JADCSTART = 1 and JQDIS = 1 may lead to incorrect behavior	A	-	-
	2.5.7	Conversion may be triggered by context queue register update	A	A	A
	2.5.8	Updated conversion sequence may be triggered by context queue update	A	A	A
VREFBUF	2.6.1	Overshoot on VREFBUF output	A	A	A
	2.6.2	VREFBUF Hold mode cannot be used	N	N	N
OPAMP	2.7.1	OPAMP high-speed mode must not be used	N	-	-
LCD-TFT	2.8.1	Device stalled when accessing LTDC registers while pixel clock is disabled	A	A	A
TIM	2.9.1	One-pulse mode trigger not detected in master-slave reset + trigger configuration	P	P	P
	2.9.2	Consecutive compare event missed in specific conditions	N	N	N
	2.9.3	Output compare clear not working with external counter reset	P	P	P

Table 3. Summary of device limitations (continued)

Function	Section	Limitation	Status		
			Rev. Y	Rev. X <sup>(1)</sup>	Rev. V
LPTIM	2.10.1	MCU may remain stuck in LPTIM interrupt when entering Stop mode	A	-	-
RTC	2.11.1	RTC calendar registers are not locked properly	A	-	-
I2C	2.12.1	10-bit master mode: new transfer cannot be launched if first part of the address is not acknowledged by the slave	A	A	A
	2.12.2	Wrong behavior in Stop mode when wakeup from Stop mode is disabled in I2C	A	A	A
	2.12.3	Wrong data sampling when data setup time ( $t_{SU,DAT}$ ) is shorter than one I2C kernel clock period	P	-	-
	2.12.4	Spurious bus error detection in Master mode	A	A	A
	2.12.5	Last-received byte loss in Reload mode	P	-	-
	2.12.6	Spurious master transfer upon own slave address match	P	P	P
	2.12.7	START bit is cleared upon setting ADDRCF, not upon address match	P	P	P
USART	2.13.1	Underrun flag is set when the USART is used in SPI Slave receive mode	A	A	A
	2.13.2	DMA stream locked when transferring data to/from USART/UART	-	A	A
SPI	2.13.1	Spurious DMA Rx transaction after simplex Tx traffic	A	-	-
SPI	2.14.2	Master data transfer stall at system clock much faster than SCK	A	A	A
	2.14.3	Corrupted CRC return at non-zero UDRDET setting	P	P	P
	2.14.4	TXP interrupt occurring while SPI/I2Sdisabled	A	A	A
SDMMC	2.15.1	Busy not detected when a write operation suspended during busy phase resumes	A	-	-
	2.15.2	Wrong data line 2 generation between two blocks during DDR transfer with Read wait mode enabled	A	-	-
	2.15.3	Unwanted overrun detection when an AHB error is reported whereas all bytes have been received	A	-	-
	2.15.4	Consecutive multiple block transfers can induce incorrect data length	A	-	-
	2.15.5	Clock stop reported during Read wait mode sequence	A	-	-
FDCAN	2.16.1	Writing FDCAN_TTTS during initialization corrupts FDCAN_TTTMC	A	A	A
	2.16.2	Wrong data may be read from Message RAM by the CPU when using two FDCANs	A	-	-
	2.16.3	Mis-synchronization in Edge filtering mode when the falling edge at FDCAN_Rx input pin coincides with the end of the integration phase	A	A	A
	2.16.4	Tx FIFO messages inverted when both Tx buffer and FIFO are used and the messages in the Tx buffer have higher priority than in the Tx FIFO	A	A	A
USB OTG_HS	2.17.1	Possible drift of USB PHY pull-up resistor	P	-	-



**Table 3. Summary of device limitations (continued)**

Function	Section	Limitation	Status		
			Rev. Y	Rev. X <sup>(1)</sup>	Rev. V
ETH	2.18.1	<i>Incorrect L4 inverse filtering results for corrupted packets</i>	N	N	N
	2.18.2	<i>Rx DMA may fail to recover upon DMA restart following a bus error, with Rx timestamping enabled</i>	P	P	P
	2.18.3	<i>Tx DMA may halt while fetching TSO header under specific conditions</i>	A	A	A
	2.18.4	<i>Spurious receive watchdog timeout interrupt</i>	A	A	A
	2.18.5	<i>Incorrect flexible PPS output interval under specific conditions</i>	A	A	A
	2.18.6	<i>Packets dropped in RMI 10Mbps mode due to fake dribble and CRC error</i>	A	A	A
	2.18.7	<i>ARP offload function not effective</i>	A	A	A
HDMI-CEC	2.19.1	<i>Unexpected switch to Receive mode without automatic transmission retry and notification</i>	A	A	A
	2.19.2	<i>CEC header not received due to unjustified Rx-Overrun detection</i>	A	A	A

1. Engineering samples only.

**Table 4. Summary of device documentation errata**

Function	Section	Documentation erratum
System	2.2.25	<i>Output current sunk or sourced by Pxy_C pins</i>

## 2 Description of device limitations

The following sections describe device limitations of the applicable Arm<sup>(a)</sup> core devices and provide workarounds if available. They are grouped by device functions.



### 2.1 Arm<sup>®</sup> 32-bit Cortex<sup>®</sup>-M7 core

Errata notice for the Arm<sup>®</sup> processor Cortex<sup>®</sup>-M7 core revision r1p1 is available from <http://infocenter.arm.com>.

#### 2.1.1 Cortex<sup>®</sup>-M7 data corruption when using Data cache configured in write-through

##### Description

This limitation is registered under Arm<sup>®</sup> ID number 1259864 and classified into “Category A”.

If a particular sequence of stores and loads is performed to write-through memory, and some timing-based internal conditions are met, then a load might not get the last data stored to that address.

This erratum can only occur if the loads and stores are to write-through memory. This could be due to any of the following:

- The MPU has been programmed to set this address as write-through.
- The default memory map is being used and this address is write-through in that map.
- The memory is cacheable, and the CM7\_CACR.FORCEWT bit is set.
- The memory is cacheable, shared, and the CM7\_CACR.SIWT bit is set.

The following sequence is required for this erratum to occur:

1. The address of interest must be in the cache.
2. A write-through store to the same doubleword as the address of interest.
3. One of the following:
  - A linefill is started (to a different cacheline to the address of interest) that allocates to the same set as the address of interest.
  - An ECC error.
  - A cache maintenance operation without a following DSB.
4. A store to the address of interest.
5. A load from the address of interest.

If certain specific timing conditions are met, the load will get the data from the first store, or from what was in the cache at the start of the sequence instead of the data from the second store.

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The effect of this erratum is that load operations can return incorrect data.

### Workaround

There is no direct workaround for this erratum.

Where possible, Arm® recommends that you use the MPU to change the attributes on any write-through memory to write-back memory. If this is not possible, it might be necessary to disable the cache for sections of code that access write-through memory.

## 2.1.2 Cortex®-M7 FPU interrupt not present on NVIC line 81

### Description

Arm® Cortex®-M7 FPU interrupt is not mapped on NVIC line 81.

*Note: This limitation is due to an error of implementation of the Arm core on the die, as opposed to a limitation of the core itself.*

### Workaround

None.

## 2.2 System

### 2.2.1 Timer system breaks do not work

#### Description

System break sources (processor LOCKUP output, PVD detection, RAM ECC error, Flash ECC error or clock security system detection) do not generate a break event on TIM1, TIM8 and HRTIM.

#### Workaround

None

### 2.2.2 Clock recovery system synchronization with USB SOF does not work

#### Description

The clock recovery system (CRS) synchronization by USB start-of-frame signal (SOF) does not work.

#### Workaround

When available, use the LSE oscillator as synchronization source.

### 2.2.3 SysTick external clock is not HCLK/8

#### Description

The SysTick external clock is the system clock, instead of the system clock divided by 8 (HCLK/8).

#### Workaround

Use the system clock (HCLK) as external clock and multiply the reload value by 8 in STK\_LOAD register (take care that the maximum value is  $2^{24}-1$ ).

### 2.2.4 Option byte loading can be done with the user wait-state configuration

#### Description

After an option byte change, the option byte loading is performed with the user wait-state configuration instead of the default configuration.

#### Workaround

When performing option byte loading (modification), configure the correct number of wait-states or use the default value (7 wait states).

### 2.2.5 Flash BusFault address register may not be valid when an ECC double error occurs

#### Description

When a first read operation is performed without ECC error and a master accesses data with wait states, if a new access is done and contains an ECC double detection error, then the error message returns the address of the first data which has not generated the error.

#### Workaround

When a double ECC error flag is raised, check the failing address in the Flash interface (FAIL\_ECC\_ADDR1/2 in FLASH\_ECC\_FA1R/FA2R) and disregard the content of the BusFault address register.

### 2.2.6 Flash ECC address register may not be updated

#### Description

When two consecutive ECC errors occur, the content of the FLASH\_ECC\_FA1/2 register cannot be updated if the error correction flag (SNECCERR1/2 or DBECCERR1/2 in FLASH\_SR1/2 register) is cleared at the same time as a new ECC error occurs.

#### Workaround

None.

## 2.2.7 PCROP-protected areas in Flash memory may be unprotected

### Description

In case of readout protection level regression from level 1 to level 0, the PCROP protected areas in Flash memory may become unprotected.

### Workaround

The user application must set the readout protection level to level 2 to avoid PCROP-protected areas from being unprotected.

## 2.2.8 Flash memory bank swapping might impact embedded Flash memory interface behavior

### Description

When Flash memory bank swapping feature is enabled, the embedded Flash memory interface behavior might become unpredictable.

### Workaround

Do not enable the Flash memory bank swapping feature on devices revision Y.

## 2.2.9 Reading from AXI SRAM may lead to data read corruption

### Description

Read data may be corrupted when the following conditions are met:

- Several read transactions are performed to the AXI SRAM,
- and a master delays its data acceptance while a new transfer is requested.

### Workaround

Set the READ\_ISS\_OVERRIDE bit in the AXI\_TARG7\_FN\_MOD register. This will reduce the read issuing capability to 1 at AXI interconnect level and avoid data corruption.

## 2.2.10 Clock switching does not work when LSE failure is detected by CSS

### Description

When a failure on the LSE oscillator is detected by a clock security system (CSS), the backup domain clock source cannot be changed.

### Workaround

When a clock security system detects a LSE failure, reset the backup domain and select a functional clock source.

### 2.2.11 RTC stopped when a system reset occurs while the LSI is used as a clock source

#### Description

When the LSI clock is used as RTC clock source, the RTC is stopped (it does not received the clock anymore) when a system reset occurs.

#### Workaround

1. Check the RTC clock source after each system reset.
2. If the LSI clock is selected, enable it again.

### 2.2.12 USB OTG\_FS PHY drive limit on DP/DM pins

#### Description

To avoid damaging parts, the user application must avoid to load more than 5 mA on OTG\_FS\_DP/DM pins.

#### Workaround

None

### 2.2.13 Unexpected leakage current on I/Os when $V_{IN}$ higher that $V_{DD}$

#### Description

When  $V_{IN}$  is higher than  $V_{DD}$  and depending on the waveform applied to I/Os, an unexpected leakage current might be observed when  $V_{IN}$  decreases.

*Note:* This leakage does not impact the product reliability.

#### Workaround

The application must maintain  $V_{IN}$  lower that  $V_{DD}$  to avoid current leakage on I/Os.

### 2.2.14 LSE oscillator driving capability selection bits are swapped

#### Description

The LSEDRV[1:0] bits in the RCC\_BDCR register, which are used to select LSE oscillator driving capability, are swapped (see [Table 5](#)).

**Table 5. Expected vs effective LSE driving mode**

LSEDRV[1:0]	LSE driving mode	
	Expected mode	Effective mode
01	Medium-low drive	Medium-high drive
10	Medium-high drive	Medium-low drive

**Workaround**

- Use LSEDRV[1:0]=01 to select LSE medium-high drive
- Use LSEDRV[1:0]=10 to select LSE medium-low drive

**2.2.15 HRTIM internal synchronization does not work****Description**

HRTIM synchronization input source from internal event (SYNCIN[1:0]=10 in the HRTIM\_MCR register) does not work. Consequently, it is not possible to use the on-chip TIM1\_TRGO output as synchronization event for HRTIM.

**Workaround**

None.

**2.2.16 Device stalled when two consecutive level regressions occur without accessing from/to backup SRAM****Description**

The device might stall when two consecutive level regressions (switching from RDP level 1 to RDP level 0) are performed without accessing (reading/writing) from/to backup SRAM.

A power-on reset is required to recover from this failure.

**Workaround**

Perform a dummy access to backup SRAM before executing the level regression sequence (switching from RDP level 1 to RDP level 0).

**2.2.17 Invalid Flash memory CRC****Description**

The CRC result might be corrupted when FLASH CRC end address register for bank 1/2 (FLASH\_CRCEADD1/2R) targets last address in sector 7.

**Workaround**

Do not use the Flash memory CRC calculation feature.

**2.2.18 GPIO assigned to DAC cannot be used in output mode when the DAC output is connected to on-chip peripheral****Description**

When a DAC output is connected only to an on-chip peripheral, the corresponding GPIO is expected to be available as an output for any other functions.

However, when the DAC output is configured for on-chip peripheral connection only, the GPIO output buffer remains disabled and cannot be used in output mode (GPIO or alternate function). It can still be used in input or analog mode.

This limitation applies to DAC1\_OUT1 and DAC1\_OUT2 connected to PA4 and PA5, respectively.

**Workaround**

None.

**2.2.19 Unstable LSI when it clocks RTC or CSS on LSE****Description**

The LSI clock might become unstable (duty cycle different from 50 %) and its maximum frequency can become significantly higher than 32 kHz, when:

- The LSI oscillator clocks the RTC, or it clocks the clock security system (CSS) on LSE (enabled when the LSECSSON bit of RCC\_BDCR is set), and
- the  $V_{DD}$  power domain is reset while the backup domain is not reset, which happens:
  - if  $V_{BAT}$  and  $V_{DD}$  are separate and  $V_{DD}$  is switched off and then on,
  - if  $V_{BAT}$  is tied to  $V_{DD}$  (internally in the package for products that do not feature the  $V_{BAT}$  pin, or externally) and a short  $V_{DD}$  drop under  $V_{DD(min)}$  occurs (less than 1 ms).

**Workaround**

Apply one of the following measures:

- Clock the RTC with LSE or HSE/RTCPRE, without using the CSS on LSE.
- If the LSI oscillator clocks the RTC or when the LSECSSON bit is set, reset the backup domain upon each  $V_{DD}$  power-up (when the BORRSTF flag is set in RCC\_RSR).

**2.2.20 480 MHz maximum CPU frequency not available on silicon revision Y****Description**

VOS0 voltage scaling level is not available on silicon revision Y devices. This limits the maximum CPU frequency to 400 MHz.

**Workaround**

Use silicon revision V devices to reach a maximum frequency of 480 MHz.

**2.2.21 VDDLDO is not available on TFBGA100 package on devices revision Y and V****Description**

On devices revision Y and V, VDDLDO pin is not available on TFBGA100 package. F4 ball is internally connected to  $V_{DD}$ .

**Workaround**

None.



### 2.2.22 WWDG not functional when $V_{DD}$ is lower than 2.7 V and VOS0 or VOS1 voltage level is selected

#### Description

The system window watchdog (WWDG) is not functional, that is, it does not generate a correct system reset and/or the WWDG reset flag is not asserted, when  $V_{DD}$  is lower than 2.7 V and VOS0 or VOS1 voltage level is selected. There is no dependency on  $V_{DDLDO}$ .

#### Workaround

None.

### 2.2.23 A tamper event does not erase the backup RAM when the backup RAM clock is disabled

#### Description

Upon a tamper event, the backup RAM is normally reset and its content erased. However, when the backup RAM clock is disabled (BKPRAMEN bit set to 0 in RCC\_AHB4ENR register), the backup RAM reset fails and the memory is not erased.

#### Workaround

Enable the backup RAM clock by setting BKPRAMEN bit to 1 in the RCC\_AHB4 clock register (RCC\_AHB4ENR). This can be done either during device initialization or during a tamper service routine

### 2.2.24 LSE CSS parasitic detection even when disabled

#### Description

The LSECSSD flag in RCC\_BDCR register can be spuriously set in case of ESD stress when the device is in VBAT mode, even if the CSS on LSE is disabled. The LSE clock is no longer propagated to the RTC and the system, even if the LSE oscillates, as long as the LSECSSD flag is set. LSECSSD can be cleared only by a Backup domain reset.

During ST functional ESD tests, the failure was observed by stressing PC13, PC14, VBAT, PE5, PE6. No failure is detected when both VDD and VBAT are present. The sensitivity observed on these five pins can be quantified through IEC1000-4-2 (ESD immunity) standard, with severity estimated between 1 (low immunity) and 2 (medium immunity) according to the same standard.

**Workaround**

To achieve good overall EMC robustness, follow the general EMC recommendations to increase equipment immunity (see *EMC design guide for STM8, STM32 and Legacy MCUs* application note (AN1709)). Robustness can be further improved for the impacted pins other than VBAT by inserting, where possible, serial resistors with the value as high as possible until 1 kΩ close to the microcontroller.

**2.2.25 Output current sunk or sourced by Pxy\_C pins****Description**

Some datasheets may not state that the current sunk or sourced by Pxy\_C pins is limited to 1 mA when the analog switch between Pxy and Pxy\_C pads is closed.

**Workaround**

No application workaround is required.

**2.3 FMC****2.3.1 Dummy read cycles inserted when reading synchronous memories****Description**

When performing a burst read access from a synchronous memory, two dummy read accesses are performed at the end of the burst cycle whatever the type of AXI burst access. The extra data values read are not used by the FMC and there is no functional failure.

**Workaround**

None.

**2.3.2 Wrong data read from a busy NAND Flash memory****Description**

When a read command is issued to the NAND memory, the R/B signal gets activated upon the de-assertion of the chip select. If a read transaction is pending, the NAND controller might not detect the R/B signal (connected to NWAIT) previously asserted and sample a wrong data. This problem occurs only when the MEMSET timing is configured to 0x00 or when ATTHOLD timing is configured to 0x00 or 0x01.

**Workaround**

Either configure MEMSET timing to a value greater than 0x00 or ATTHOLD timing to a value greater than 0x01.

### 2.3.3 Missed clocks with continuous clock feature enabled

#### Description

When the continuous clock feature is enabled, the FMC\_CLK clock can be switched OFF in the following conditions:

- The FMC\_CLK clock is divided by 2.
- An asynchronous byte transaction is performed on an FMC bank configured in 32-bit memory data width.

*Note:* When the FMC\_CLK clock is switched OFF on static memories, it can be switched ON by issuing a synchronous transaction or any asynchronous transaction different from a byte access on 32-bit data bus width.

#### Workaround

When the continuous clock feature is enabled, do not use the FMC\_CLK clock divider ratio of 2 when issuing a byte transaction to 32-bit asynchronous memories.

## 2.4 QUADSPI

### 2.4.1 First nibble of data is not written after a dummy phase

#### Description

The first nibble of data to be written to the external Flash memory is lost in the following conditions:

- The QUADSPI is used in the Indirect write mode,
- and at least one dummy cycle is used.

#### Workaround

Use an alternate-bytes phase instead of a dummy phase in order to add a latency period between the address phase and the data phase. This workaround works only if the number of dummy cycles corresponds to a multiple of 8 bits of data.

As an example:

- To generate 1 dummy cycle, send 1 alternate-byte in 4 data line DDR mode or Dual-Flash SDR mode.
- To generate 2 dummy cycles, send 1 alternate-byte in 4 data line SDR mode
- To generate 4 dummy cycles, send 2 alternate-bytes in 4 data line SDR mode or send 1 alternate-byte in 2 data line SDR mode
- To generate 8 dummy cycles, send 1 alternate-byte in 1 data line SDR mode.

### 2.4.2 QUADSPI hangs when QUADSPI\_CCR is cleared

#### Description

Writing 0x0000 0000 to the QUADSPI\_CCR register causes the QUADSPI peripheral to hang while the BUSY flag of the QUADSPI\_SR register. remains set. Even an abort does not allow exiting this status.

**Workaround**

Clear then set the EN bit in the QUADSPI\_CR register.

**2.4.3 QUADSPI cannot be used in Indirect read mode when only data phase is activated****Description**

When the QUADSPI is configured in Indirect read with only the data phase activated (in Single, Dual, Quad or Dual-quad I/O mode), the QUADSPI peripheral hangs and the BUSY flag remains of the QUADSPI\_SR register remains high. An abort must be performed to reset the BUSY flag and exit from the hanging state.

**Workaround**

Insert a dummy phase with at least two dummy cycles.

**2.4.4 Memory-mapped read of last memory byte fails****Description**

Regardless of the number of I/O lines used (1, 2 or 4), a memory-mapped read of the last byte of the memory region defined through the FSIZE[4:0] bitfield of the QUADSPI\_DCR register always yields 0x00, whatever the memory byte content is. A repeated attempt to read that last byte causes the AXI bus to stall.

**Workaround**

Apply one of the following measures:

- Avoid reading the last byte of the memory region defined through FSIZE, for example by taking margin in FSIZE bitfield setting.
- If the last byte is read, ignore its value and abort the ongoing process so as to prevent the AXI bus from stalling.
- For reading the last byte of the memory region defined through FSIZE, use indirect read.

**2.5 ADC****2.5.1 Conversion overlap may impact the ADC accuracy****Description**

The following conditions may impact the ADC accuracy

- Several ADC conversions are running simultaneously
- ADC and DAC conversions are running simultaneously

**Workaround**

Avoid conversion overlapping. The application should ensure that conversions are performed sequentially.

## 2.5.2 ADC resolution limited by LSE activity

### Description

The following ADC3 input pins may be impacted by adjacent LSE activity:

- ADC3 channels on pins PF3 to PF10

### Workaround

16-bit and 14-bit data resolutions are not recommended on these pins. This limits data resolution configuration to 8 bits, 10 bits or 12 bits.

## 2.5.3 ADC maximum sampling rate when $V_{DDA}$ is lower than 2 V

### Description

If  $V_{DDA}$  is lower than 2 V, the ADC conversion accuracy is not guaranteed over the full ADC sampling rate.

### Workaround

The application should avoid a sampling rate higher than 1.5 MSPS when operating with  $V_{DDA}$  below 2 V.

## 2.5.4 ADC maximum resolution when $V_{DDA}$ is higher than 3.3 V

### Description

If  $V_{DDA}$  is higher than 3.3V, the ADC conversion accuracy is not guaranteed for all data resolutions.

### Workaround

16-bit, 14-bit and 12-bit data resolutions are not useful in this configuration. This limits available data resolution configuration to 8 bits and 10 bits.

## 2.5.5 First ADC injected conversion in a sequence may be corrupted

### Description

The ADC injected conversion that follows a regular conversion may be corrupted if the following conditions are met:

- A regular conversion successive approximation is ongoing (sampling phase finished)
- An injected conversion sequence is triggered during the regular conversion successive approximation phase.

In this case, the first injected conversion returns an invalid result. Other conversions are not impacted.

**Workaround**

Apply one of the following measures:

- Use a sequence of at least two injected conversions, ignore the first injected value and consider the other ones.
- Synchronize regular and injected conversion to prevent regular channels and injected channels from overlapping.

**2.5.6 Writing the ADC\_JSQR register when JADCSTART = 1 and JQDIS = 1 may lead to incorrect behavior****Description**

Writing the ADCx\_JSQR register when an injected conversion is ongoing (JADCSTART=1) may lead to unpredictable ADC behavior if the queue of context is not enabled (JQDIS=1).

**Workaround**

Apply one of the following measures:

- Use the context queue (JQDIS=0) to allow on-the-fly ADCx\_JSQR modification
- Ensure that no injected conversion is ongoing (JADCSTART=0) before modifying ADC\_JSQR register.

**2.5.7 Conversion may be triggered by context queue register update****Description**

Modifying the trigger selection or the edge polarity detection may trigger the conversion of the new context without waiting for the trigger edge when the following conditions are met:

- The injected queue conversion is enabled (JQDIS = 0 in ADC\_CGFR register) and
- the queue is never empty (JQM = 0 in ADC\_CGFR register).

**Workaround**

Apply one of the following measures:

- Ignore the first converted sequence.
- Use the queue of context with JQM = 1 in ADC\_CGFR.
- Use the queue of context with JQM = 0 in ADC\_CGFR and change the sequence without modifying the trigger and the polarity.

**2.5.8 Updated conversion sequence may be triggered by context queue update****Description**

Modifying the context queue for injected conversions may trigger the conversion of the new context without waiting for the trigger edge when the following conditions are met:

- The injected queue conversion is enabled (JQDIS = 0 in ADC\_CGFR register) and
- the queue is not empty (JQM = 0 in ADC\_CGFR register) and
- the context queue is programmed five cycles before the JEOS flag is set to 1 in the ADC\_ISR register.

**Workaround**

Apply one of the following measures:

- Use the queue of context with JQM = 1 in ADC\_CGFR.
- Synchronize the programming of the new context with the next trigger edge to make sure it is performed after JEOS flag is set in ADC\_ISR (for example at the trigger rising edge).

**2.6 VREFBUF****2.6.1 Overshoot on VREFBUF output****Description**

An overshoot might occur on VREFBUF output if VREF+ pin has residual voltage when VREFBUF is enabled (ENVR set to 1 in VREFBUF\_CSR register).

**Workaround**

Let the voltage on the VREF+ pin drop to a level lower than 1 V below the target VREFBUF\_OUT. This can be achieved by switching VREFBUF buffer off (ENVR = 0 and HIZ = 0 in VREFBUF\_CSR register) during sufficient time to discharge the capacitor on the VREF+ pin through VREFBUF pull-down resistor.

**2.6.2 VREFBUF Hold mode cannot be used****Description**

VREFBUF can be configured to operate in Hold mode to reduce current consumption.

When VREFBUF enters Hold mode (by setting both HIZ and ENVR bits of the VREFBUF\_CSR register), the VREF+ I/O transits to high impedance mode. If not discharged externally, the capacitor on the VREF+ pin keeps its charge and voltage. Exiting VREFBUF Hold mode (by clearing the HIZ bit) in this condition might lead to a voltage overshoot on the VREF+ output.

**Workaround**

None.

**2.7 OPAMP****2.7.1 OPAMP high-speed mode must not be used****Description**

Signal limitations might be observed if the OPAMP high-speed mode is used (OPAHSM bit set in OPAMPx\_CSR register).

**Workaround**

None.

## 2.8 LCD-TFT

### 2.8.1 Device stalled when accessing LTDC registers while pixel clock is disabled

#### Description

The device might hang if an access to the LTDC register interface is performed while the pixel clock (*ltdc\_ker\_ck*) is disabled.

#### Workaround

Enable the pixel clock before accessing LTDC registers. Apply the following sequence to enable the LTDC clock:

1. Enable *pll3\_r\_ck* to feed the LTDC pixel clock (*ltdc\_ker\_ck*).
2. Enable the LTDC register interface clock by setting the LTDCEN bit in the RCC\_APB3ENR register.

## 2.9 TIM

### 2.9.1 One-pulse mode trigger not detected in master-slave reset + trigger configuration

#### Description

The failure occurs when several timers configured in one-pulse mode are cascaded, and the master timer is configured in combined reset + trigger mode with the MSM bit set:

OPM = 1 in TIMx\_CR1, SMS[3:0] = 1000 and MSM = 1 in TIMx\_SMCR.

The MSM delays the reaction of the master timer to the trigger event, so as to have the slave timers cycle-accurately synchronized.

If the trigger arrives when the counter value is equal to the period value set in the TIMx\_ARR register, the one-pulse mode of the master timer does not work and no pulse is generated on the output.

#### Workaround

None. However, unless a cycle-level synchronization is mandatory, it is advised to keep the MSM bit reset, in which case the problem is not present. The MSM = 0 configuration also allows decreasing the timer latency to external trigger events.

### 2.9.2 Consecutive compare event missed in specific conditions

#### Description

Every match of the counter (CNT) value with the compare register (CCR) value is expected to trigger a compare event. However, if such matches occur in two consecutive counter



clock cycles (as consequence of the CCR value change between the two cycles), the second compare event is missed for the following CCR value changes:

- in edge-aligned mode, from ARR to 0:
  - first compare event:  $CNT = CCR = ARR$
  - second (missed) compare event:  $CNT = CCR = 0$
- in center-aligned mode while up-counting, from ARR-1 to ARR (possibly a new ARR value if the period is also changed) at the crest (that is, when  $TIMx\_RCR = 0$ ):
  - first compare event:  $CNT = CCR = (ARR-1)$
  - second (missed) compare event:  $CNT = CCR = ARR$
- in center-aligned mode while down-counting, from 1 to 0 at the valley (that is, when  $TIMx\_RCR = 0$ ):
  - first compare event:  $CNT = CCR = 1$
  - second (missed) compare event:  $CNT = CCR = 0$

This typically corresponds to an abrupt change of compare value aiming at creating a timer clock single-cycle-wide pulse in toggle mode.

As a consequence:

- In toggle mode, the output only toggles once per counter period (squared waveform), whereas it is expected to toggle twice within two consecutive counter cycles (and so exhibit a short pulse per counter period).
- In center mode, the compare interrupt flag does not rise and the interrupt is not generated.

*Note:* The timer output operates as expected in modes other than the toggle mode.

### Workaround

None.

## 2.9.3 Output compare clear not working with external counter reset

### Description

The output compare clear event (`ocref_clr`) is not correctly generated when the timer is configured in the following slave modes: Reset mode, Combined reset + trigger mode, and Combined gated + reset mode.

The PWM output remains inactive during one extra PWM cycle if the following sequence occurs:

1. The output is cleared by the `ocref_clr` event.
2. The timer reset occurs before the programmed compare event.

### Workaround

Apply one of the following measures:

- Use BKIN (or BKIN2 if available) input for clearing the output, selecting the Automatic output enable mode ( $AOE = 1$ ).
- Mask the timer reset during the PWM ON time to prevent it from occurring before the compare event (for example with a spare timer compare channel open-drain output connected with the reset signal, pulling the timer reset line down).

## 2.10 LPTIM

### 2.10.1 MCU may remain stuck in LPTIM interrupt when entering Stop mode

#### Description

This limitation occurs when disabling the low-power timer (LPTIM).

When the user application clears the ENABLE bit in the LPTIM\_CR register within a small time window around one LPTIM interrupt occurrence, then the LPTIM interrupt signal used to wake up the MCU from Stop mode may be frozen in active state. Consequently, when trying to enter Stop mode, this limitation prevents the MCU from entering low-power mode and the firmware remains stuck in the LPTIM interrupt routine.

This limitation applies to all Stop modes and to all instances of the LPTIM. Note that the occurrence of this issue is very low.

#### Workaround

In order to disable a low power timer (LPTIMx) peripheral, do not clear its ENABLE bit in its respective LPTIMx\_CR register. Instead, reset the whole LPTIMx peripheral via the RCC controller by setting and resetting its respective LPTIMxRST bit in RCC\_APB1RSTRz register.

## 2.11 RTC

### 2.11.1 RTC calendar registers are not locked properly

#### Description

When reading the calendar registers with BYPSHAD = 0, the RTC\_TR and RTC\_DR registers may not be locked after reading the RTC\_SSR register. This happens if the read operation is initiated one APB clock period before the shadow registers are updated. This can result in a non-consistency of the three registers. Similarly, the RTC\_DR register can be updated after reading the RTC\_TR register instead of being locked.

#### Workaround

Apply one of the following measures:

- Use BYPSHAD = 1 mode (bypass shadow registers), or
- If BYPSHAD = 0, read SSR again after reading SSR/TR/DR to confirm that SSR is still the same, otherwise read the values again.

## 2.12 I2C

### 2.12.1 10-bit master mode: new transfer cannot be launched if first part of the address is not acknowledged by the slave

#### Description

An I<sup>2</sup>C-bus master generates STOP condition upon non-acknowledge of I<sup>2</sup>C address that it sends. This applies to 7-bit addresses as well as to each byte of 10-bit addresses.

When the device set as I<sup>2</sup>C-bus master transmits a 10-bit address of which the first byte (5-bit header + 2 MSBs of the address + direction bit) is not acknowledged, the device duly generates a STOP condition but it then cannot start any new I<sup>2</sup>C-bus transfer. In this spurious state, the NACKF flag of the I2C\_ISR register and the START bit of the I2C\_CR2 register are both set, while the START bit should normally be cleared.

#### Workaround

In 10-bit-address master mode, if both NACKF flag and START bit get simultaneously set, proceed as follows:

1. Wait for the STOP condition detection (STOPF = 1 in I2C\_ISR register).
2. Disable the I2C peripheral.
3. Wait for a minimum of three APB cycles.
4. Enable the I2C peripheral again.

### 2.12.2 Wrong behavior in Stop mode when wakeup from Stop mode is disabled in I2C

#### Description

If the wakeup from Stop mode by I2C is disabled (WUPEN = 0), the correct use of the I2C peripheral is to disable it (PE = 0) before entering Stop mode, and re-enable it when back in Run mode.

Some reference manual revisions may omit this information.

Failure to respect the above while the MCU operating as slave or as master in multi-master topology enters Stop mode during a transfer ongoing on the I<sup>2</sup>C-bus may lead to the following:

1. BUSY flag is wrongly set when the MCU exits Stop mode. This prevents from initiating a transfer in Master mode, as the START condition cannot be sent when BUSY is set.
2. If clock stretching is enabled (NOSTRETCH = 0), the SCL line is pulled low by I2C and the transfer stalled as long as the MCU remains in Stop mode.  
The occurrence of such condition depends on the timing configuration, peripheral clock frequency, and I<sup>2</sup>C-bus frequency.

This is a description inaccuracy issue rather than a product limitation.

#### Workaround

No application workaround is required.

### 2.12.3 Wrong data sampling when data setup time ( $t_{\text{SU;DAT}}$ ) is shorter than one I2C kernel clock period

#### Description

The I<sup>2</sup>C-bus specification and user manual specify a minimum data setup time ( $t_{\text{SU;DAT}}$ ) as:

- 250 ns in Standard mode
- 100 ns in Fast mode
- 50 ns in Fast mode Plus

The MCU does not correctly sample the I<sup>2</sup>C-bus SDA line when  $t_{\text{SU;DAT}}$  is smaller than one I2C kernel clock (I<sup>2</sup>C-bus peripheral clock) period: the previous SDA value is sampled instead of the current one. This can result in a wrong receipt of slave address, data byte, or acknowledge bit.

#### Workaround

Increase the I2C kernel clock frequency to get I2C kernel clock period within the transmitter minimum data setup time. Alternatively, increase transmitter's minimum data setup time. If the transmitter setup time minimum value corresponds to the minimum value provided in the I<sup>2</sup>C-bus standard, the minimum I2CCLK frequencies are as follows:

- In Standard mode, if the transmitter minimum setup time is 250 ns, the I2CCLK frequency must be at least 4 MHz.
- In Fast mode, if the transmitter minimum setup time is 100 ns, the I2CCLK frequency must be at least 10 MHz.
- In Fast-mode Plus, if the transmitter minimum setup time is 50 ns, the I2CCLK frequency must be at least 20 MHz.

### 2.12.4 Spurious bus error detection in Master mode

#### Description

In Master mode, a bus error can be detected spuriously, with the consequence of setting the BERR flag of the I2C\_SR register and generating bus error interrupt if such interrupt is enabled. Detection of bus error has no effect on the I<sup>2</sup>C-bus transfer in Master mode and any such transfer continues normally.

#### Workaround

If a bus error interrupt is generated in Master mode, the BERR flag must be cleared by software. No other action is required and the ongoing transfer can be handled normally.

## 2.12.5 Last-received byte loss in Reload mode

### Description

If in Master receiver mode or Slave receive mode with SBC = 1 the following conditions are all met:

- I<sup>2</sup>C-bus stretching is enabled (NOSTRETCH = 0)
- RELOAD bit of the I2C\_CR2 register is set
- NBYTES bitfield of the I2C\_CR2 register is set to N greater than 1
- byte N is received on the I<sup>2</sup>C-bus, raising the TCR flag
- N - 1 byte is not yet read out from the data register at the instant TCR is raised,

then the SCL line is pulled low (I<sup>2</sup>C-bus clock stretching) and the transfer of the byte N from the shift register to the data register inhibited until the byte N-1 is read and NBYTES bitfield reloaded with a new value, the latter of which also clears the TCR flag. As a consequence, the software cannot get the byte N and use its content before setting the new value into the NBYTES field.

For I2C instances with independent clock, the last-received data is definitively lost (never transferred from the shift register to the data register) if the data N - 1 is read within four APB clock cycles preceding the receipt of the last data bit of byte N and thus the TCR flag raising. Refer to the product reference manual or datasheet for the I2C implementation table.

### Workaround

- In Master mode or in slave mode with SBC = 1, use the Reload mode with NBYTES = 1.
- In Master receiver mode, if the number of bytes to transfer is greater than 255, do not use the Reload mode. Instead, split the transfer into sections not exceeding 255 bytes and separate them with repeated START conditions.
- Make sure, for example through the use of DMA, that the byte N - 1 is always read before the TCR flag is raised. Specifically for I2C instances with independent clock, make sure that it is always read earlier than four APB clock cycles before the receipt of the last data bit of byte N and thus the TCR flag raising.

The last workaround in the list must be evaluated carefully for each application as the timing depends on factors such as the bus speed, interrupt management, software processing latencies, and DMA channel priority.

## 2.12.6 Spurious master transfer upon own slave address match

### Description

When the device is configured to operate at the same time as master and slave (in a multi-master I<sup>2</sup>C-bus application), a spurious master transfer may occur under the following condition:

- Another master on the bus is in process of sending the slave address of the device (the bus is busy).
- The device initiates a master transfer by writing the I2C\_CR2 register with its START bit set before the slave address match event (the ADDR flag set in the I2C\_ISR register) occurs.
- After the ADDR flag is set:
  - the device does not write I2C\_CR2 before clearing the ADDR flag, or
  - the device writes I2C\_CR2 earlier than three I2C kernel clock cycles before clearing the ADDR flag

In these circumstances, even though the START bit is automatically cleared by the circuitry handling the ADDR flag, the device spuriously proceeds to the master transfer as soon as the bus becomes free. The transfer configuration depends on the content of the I2C\_CR2 register when the master transfer starts. Moreover, if the I2C\_CR2 is written less than three kernel clocks before the ADDR flag is cleared, the I2C peripheral may fall into an unpredictable state.

### Workaround

Upon the address match event (ADDR flag set), apply the following sequence.

Normal mode (SBC = 0):

1. Set the ADDRCONF bit.
2. Before Stop condition occurs on the bus, write I2C\_CR2 with the START bit low.

Slave byte control mode (SBC = 1):

1. Write I2C\_CR2 with the slave transfer configuration and the START bit low.
2. Wait for longer than three I2C kernel clock cycles.
3. Set the ADDRCONF bit.
4. Before Stop condition occurs on the bus, write I2C\_CR2 again with its current value.

The time for the software application to write the I2C\_CR2 register before the Stop condition is limited, as the clock stretching (if enabled), is aborted when clearing the ADDR flag.

Polling the BUSY flag before requesting the master transfer is not a reliable workaround as the bus may become busy between the BUSY flag check and the write into the I2C\_CR2 register with the START bit set.

## 2.12.7 START bit is cleared upon setting ADDRCF, not upon address match

### Description

Some reference manual revisions may state that the START bit of the I2C\_CR2 register is cleared upon slave address match event.

Instead, the START bit is cleared upon setting, by software, the ADDRCF bit of the I2C\_ICR register, which does not guarantee the abort of master transfer request when the device is being addressed as slave. This product limitation and its workaround are the subject of a separate erratum.

### Workaround

No application workaround is required for this description inaccuracy issue.

## 2.13 USART

### 2.13.1 Underrun flag is set when the USART is used in SPI Slave receive mode

#### Description

When the USART is used in SPI Slave receive mode, the underrun flag (UDR bit in USART\_ISR register) may be set even if the transmitter is disabled (TE bit set to 0 in USAR\_CR1 register).

#### Workaround

Three workarounds are possible

- Ignore the UDR flag when the transmitter is disabled.
- Clear the UDR flag every time it is set, even if the Transmitter is disabled.
- Write dummy data in the USART\_TDR register to avoid setting the UDR flag.

### 2.13.2 DMA stream locked when transferring data to/from USART/UART

#### Description

When a USART/UART is issuing a DMA request to transfer data, if a concurrent transfer occurs, the requested transfer may not be served and the DMA stream may stay locked.

#### Workaround

Use the alternative peripheral DMA channel protocol by setting bit 20 of the DMA\_SxCR register.

This bit is reserved in the documentation and must be used only on the stream that manages data transfers for USART/UART peripherals.

## 2.14 SPI

### 2.14.1 Spurious DMA Rx transaction after simplex Tx traffic

#### Description

With empty RXFIFO, SPI/I2S can spuriously generate a DMA read request upon enabling DMA receive traffic (by setting RXDMAEN bit), provided that the preceding completed transaction is a simplex transmission.

#### Workaround

Before enabling DMA Rx transfer following a completed Tx simplex transfer, perform hardware reset of the SPI/I2S peripheral.

### 2.14.2 Master data transfer stall at system clock much faster than SCK

#### Description

With the system clock (spi\_pclk) substantially faster than SCK (spi\_ker\_ck divided by a prescaler), SPI/I2S master data transfer can stall upon setting the CSTART bit within one SCK cycle after the EOT event (EOT flag raise) signaling the end of the previous transfer.

#### Workaround

Apply one of the following measures:

- Disable then enable SPI/I2S after each EOT event.
- Upon EOT event, wait for at least one SCK cycle before setting CSTART.
- Prevent EOT events from occurring, by setting transfer size to undefined (TSIZE = 0) and by triggering transmission exclusively by TXFIFO writes.

### 2.14.3 Corrupted CRC return at non-zero UDRDET setting

#### Description

With non-zero setting of UDRDET[1:0] bitfield, the SPI/I2S slave can transmit the first bit of CRC pattern corrupted, coming wrongly from the UDRCFG register instead of SPI\_TXCRC. All other CRC bits come from the SPI\_TXCRC register, as expected.

#### Workaround

Keep TXFIFO non-empty at the end of transfer.

### 2.14.4 TXP interrupt occurring while SPI/I2S disabled

#### Description

SPI/I2S peripheral is set to its default state when disabled (SPE = 0). This flushes the FIFO buffers and resets their occupancy flags. TXP and TXC flags become set (the latter if the TSIZE field contains zero value), triggering interrupt if enabled with TXPIE or EOTIE bit, respectively. The resulting interrupt service can be spurious if it tries to write data into TXFIFO to clear the TXP and TXC flags, while both FIFO buffers are inaccessible (as the peripheral is disabled).



**Workaround**

Keep TXP and TXC (the latter if the TSIZE field contains zero value) interrupt disabled whenever the SPI/I2S peripheral is disabled.

**2.15 SDMMC****2.15.1 Busy not detected when a write operation suspended during busy phase resumes****Description**

When a card accepts a suspend command during a block write operation busy phase, the card may drive the data line 0 (SDMMC\_D0) when the write transfer is resumed. The SDMMC does not detect that the data line 0 is Low when the write transfer resumes.

**Workaround**

To suspend a write transfer:

1. Set DTHOLD bit in the SDMMC\_CMDR register.
2. Wait till the DHOLD status flag is set in SDMMC\_STAR register to make sure the busy line has been released.
3. Send a suspend command to the card (CMDSPEND = 1, CMDTRANS = 0 and CPSMEN = 1 in SDMMC\_CMDR).

**2.15.2 Wrong data line 2 generation between two blocks during DDR transfer with Read wait mode enabled****Description**

The Read wait mode allows suspending an SDIO multiple block read operation when the host is not ready to receive the next bytes. The host can request the card to suspend temporarily the transfer by driving data line 2 (SDMMC\_D2) low between two blocks.

When a double data rate (DDR) read operation is ongoing, data line 2 is not driven low but toggles constantly. Consequently, some bytes are not received and a CRC error failure is reported.

**Workaround**

Use the clock stretching method (RWMOD = 1) instead of data line 2 to suspend temporarily the transfer between two blocks.

**2.15.3 Unwanted overrun detection when an AHB error is reported whereas all bytes have been received****Description**

When the internal DMA is used and a write transfer initiated by the SDMMC on the AHB fails, the IDMATE flag is set in SDMMC\_STAR and the transfer is aborted by flushing the FIFO.

When an AHB error occurs on the three last bursts of a successful read transfer, the FIFO is considered as empty (DATAEND flag set in SDMMC\_STAR) but some bytes, not yet transferred to the FIFO, may still be present in the internal receive buffer. As a result, the following read operation will fail and report an overrun error.

#### Workaround

1. When DATAEND = 1, check IDMATE flag.
2. If IDMATE = 1 and DTDIR = 1 in SDMMC\_DCTRL, reset SDMMC.

### 2.15.4 Consecutive multiple block transfers can induce incorrect data length

#### Description

When a new transfer is started by setting the DTEN bit in SDMMC\_DCTRL control register while less than eight SDMMC clock cycles elapsed since the end of the previous transfer, the second transfer is performed with the number of blocks configured for the previous transfer. This is due to the fact that the new number of data to be transferred has not been reloaded in the internal data block counter.

#### Workaround

The user application must ensure that at least 8 SDMMC clock cycles elapsed between the successful completion of a transfer and the moment DTEN bit is set.

### 2.15.5 Clock stop reported during Read wait mode sequence

#### Description

When the SDMMC clock is stopped at low level, CKSTOP flag may be wrongly set in the SDMMC\_STAR register.

#### Workaround

When the multiple block transfer completes (DATAEND = 1 in SDMMC\_STAR), simultaneously set CKSTOPC and DATAENDC to 1 in SDMMC\_ICR register.

## 2.16 FDCAN

### 2.16.1 Writing FDCAN\_TTTS during initialization corrupts FDCAN\_TTTMC

#### Description

During TTCAN initialization, writing to FDCAN TT Trigger Select Register (FDCAN\_TTTS) also affects FDCAN TT Trigger Memory Configuration Register (FDCAN\_TTTMC).

#### Workaround

The user application must avoid writing to FDCAN\_TTTS register during TTCAN initialization phase.

*Note:* Outside of TTCAN initialization phase, write operations to FDCAN\_TTTS do not impact FDCAN\_TTTMC since this register is write protected.

### 2.16.2 Wrong data may be read from Message RAM by the CPU when using two FDCANs

#### Description

When using two FDCAN controllers, and the CPU and FDCANs simultaneously request read accesses from Message RAM, the CPU read request may return erroneous data.

The issue is not present if the CPU requests write access to Message RAM.

#### Workaround

To avoid concurrent read accesses between the CPU and FDCANs, use only one FDCAN at a time.

### 2.16.3 Mis-synchronization in Edge filtering mode when the falling edge at FDCAN\_Rx input pin coincides with the end of the integration phase

#### Description

The FDCAN may synchronize itself badly and may not correctly receive the first bit of the frame when the following conditions are met:

- The edge filtering is enabled (EFBI bit of FDCAN\_CCCR set to 1) and
- the end of the integration phase coincides with a falling edge detected at the FDCAN\_Rx input pin.

In this case the CRC detects that the first bit of the received frame is incorrect, flags the received frame as faulty and responds with an error frame. This issue does not affect the reception of standard frames.

#### Workaround

Disable edge filtering or wait for frame retransmission.

### 2.16.4 Tx FIFO messages inverted when both Tx buffer and FIFO are used and the messages in the Tx buffer have higher priority than in the Tx FIFO

#### Description

Two consecutive messages from the Tx FIFO may be inverted in the transmit sequence when the following conditions are met:

- The FDCAN uses both a dedicated Tx buffer and a Tx FIFO (TFQM bit of FDCAN\_TXBC set to 0) and
- the messages contained in the Tx buffer have a higher internal CAN priority than the messages in the Tx FIFO.

## Workaround

Choose one of the following workarounds

- Ensure that only one Tx FIFO element is pending for transmission at any time:  
The Tx FIFO elements may be filled at any time with messages to be transmitted, but their transmission requests are handled separately. Each time a Tx FIFO transmission has completed and the Tx FIFO gets empty (TFE bit of FDACN\_IR set to 1) the next Tx FIFO element is requested.
- Use only a Tx FIFO:  
Send both messages from a Tx FIFO, including the message with the higher priority. This message has to wait until the preceding messages in the Tx FIFO have been sent.
- Use two dedicated Tx buffers (e.g. use Tx buffer 4 and 5 instead of the Tx FIFO):  
The pseudo-code below replaces the function in charge of filling the Tx FIFO:

```
Write message to Tx Buffer 4
Transmit Loop:
    Request Tx Buffer 4 - write AR4 bit in FDCAN_TXBAR
    Write message to Tx Buffer 5
    Wait until transmission of Tx Buffer 4 complete (IR bit in FDCAN_IR),
read TO4 bit in FDCAN_TXBTO
    Request Tx Buffer 5 - write AR5 bit of FDCAN_TXBAR
    Write message to Tx Buffer 4
    Wait until transmission of Tx Buffer 5 complete (IR bit in FDCAN_IR),
read TO5 bit in FDCAN_TXBTO
```

## 2.17 USB OTG\_HS

### 2.17.1 Possible drift of USB PHY pull-up resistor

#### Description

When the  $V_{DDUSB33}$  equals 3.6 V and the USB Idle resistor (pull-up 1 connected between 3.6 V and ground) remains activated for a long period of time, the pull-up resistor value might drift, reaching the maximum value defined in USB Specification.

This issue occurs only during device Transmit and Reset states in device mode. Other device states are not impacted.

The degradation can be observed after USB PHY pull-up continuous activation in the following conditions:

- 10 years of continuous transmit operations or
- A 86 million reset operations (from the USB host) provided that the reset period is 2.5 ms (duration might vary depending on host reset duration).

The above results are based on design simulation.

#### Workaround

For USB OTG\_HS1, use the external USB PHY instead of the internal PHY.

For USB OTG\_HS2: no workaround is available.

## 2.18 ETH

### 2.18.1 Incorrect L4 inverse filtering results for corrupted packets

#### Description

Received corrupted IP packets with payload (for IPv4) or total (IPv6) length of less than two bytes for L4 source port (SP) filtering or less than four bytes for L4 destination port (DP) filtering are expected to cause a mismatch. However, the inverse filtering unduly flags a match and the corrupted packets are forwarded to the software application. The L4 stack gets incomplete packet and drops it.

*Note:* The perfect filtering correctly reports a mismatch.

#### Workaround

None

### 2.18.2 Rx DMA may fail to recover upon DMA restart following a bus error, with Rx timestamping enabled

#### Description

When the timestamping of Rx packets is enabled, some or all of the received packets can have Rx timestamp which is written into a descriptor upon the completion of the Rx packet/status transfer.

However, due to a defect, when bus error occurs during the descriptor read (that is subsequently used as context descriptor to update the Rx timestamp), the context descriptor write is skipped by DMA. Also, Rx DMA does not flush the Rx timestamp stored in the intermediate buffers during the error recovery process and enters Stop state. Due to this residual timestamp in the intermediate buffer, Rx DMA, after being restarted, does not transfer packets.

#### Workaround

Issue a soft reset to drop all Tx packets and Rx packets present inside the controller at the time of bus error. After the soft reset, reconfigure the controller and re-create the descriptors.

*Note:* The workaround introduces additional latency.

### 2.18.3 Tx DMA may halt while fetching TSO header under specific conditions

#### Description

When fetching header bytes from the system memory by issuing a one-beat request in TSO mode, Tx DMA may get into a deadlock state if

- address-aligned beats are enabled (AAL bit of the ETH\_DMASBMR register is set),
- DMA start address of a burst transfer request (BUF1AP of TDES0 descriptor) is not aligned on a boundary of the configured data width (64 bits), and
- DMA start address of a burst transfer request is not aligned on a boundary of the programmed burst length (TxPBL bit of the ETH\_DMACTXCR register).

**Workaround**

Ensure that Tx DMA initiates a burst of at least two beats when fetching header bytes from the system memory, through one of the following measures:

- Disable address-aligned beats by clearing the AAL bit of the ETH\_DMASBMR register.
- Align the buffer address pointing to the packet start to a data width boundary (set the bits[2:0] of the address to zero, for 64-bit data width).
- Set the buffer address pointing to the packet start to a value that ensures a burst of minimum two beats when AAL = 1.

**2.18.4 Spurious receive watchdog timeout interrupt****Description**

Setting the RWTU[1:0] bitfield of the ETH\_DMARXWTR register to a non-zero value while the RWT[7:0] bitfield is at zero leads to a spurious receive watchdog timeout interrupt (if enabled) and, as a consequence, to executing an unnecessary interrupt service routine with no packets to process.

**Workaround**

Ensure that the RWTU[1:0] bitfield is not set to a non-zero value while the RWT[7:0] bitfield is at zero. For setting RWT[7:0] and RWTU[1:0] bitfields each to a non-zero value, perform two successive writes. The first is either a byte-wide write to the byte containing the RWT[7:0] bitfield, or a 32-bit write that only sets the RWT[7:0] bitfield and keeps the RWTU[1:0] bitfield at zero. The second is either a byte-wide write to the RWTU[1:0] bitfield or a 32-bit write that sets the RWTU[1:0] bitfield while keeping the RWT[7:0] bitfield unchanged.

**2.18.5 Incorrect flexible PPS output interval under specific conditions****Description**

The use of the fine correction method for correcting the IEEE 1588 internal time reference, combined with a large frequency drift of the driving clock from the grandmaster source clock, leads to an incorrect interval of the flexible PPS output used in Pulse train mode. As a consequence, external devices synchronized with the flexible PPS output of the device can go out of synchronization.

**Workaround**

Use the coarse method for correcting the IEEE 1588 internal time reference.

**2.18.6 Packets dropped in RMI 10Mbps mode due to fake dribble and CRC error****Description**

When operating with the RMI interface at 10 Mbps, the Ethernet peripheral may generate a fake extra nibble of data repeating the last packet (nibble) of the data received from the PHY interface. This results in an odd number of nibbles and is flagged as a dribble error. As the RMI only forwards to the system completed bytes of data, the fake nibble would be ignored

and the issue would have no consequence. However, as the CRC error is also flagged when this occurs, the error-packet drop mechanism (if enabled) discards the packets.

*Note: Real dribble errors are rare. They may result from synchronization issues due to faulty clock recovery.*

### Workaround

When using the RMII 10 MHz mode, disable the error-packet drop mechanism by setting the FEP bit of the ETH\_MTLRXQOMR register. Accept packets of transactions flagging both dribble and CRC errors.

## 2.18.7 ARP offload function not effective

### Description

When the Target Protocol Address of a received ARP request packet matches the device IP address set in the ETH\_MACARPAR register, the source MAC address in the SHA field of the ARP request packet is compared with the device MAC address in ETH\_MACA0LR and ETH\_MACA0HR registers (Address0), to filter out ARP packets that are looping back.

Instead, a byte-swapped comparison is performed by the device. As a consequence, the packet is forwarded to the application as a normal packet with no ARP indication in the packet status, and the device does not generate an ARP response.

For example, with the Address0 set to 0x665544332211:

- If the SHA field of the received ARP packet is 0x665544332211, the ARP response is generated while it should not.
- If the SHA field of the received ARP packet is 0x112233445566, the ARP response not is generated while it should.

### Workaround

Parse the received frame by software and send the ARP response if the source MAC address matches the byte-swapped Address0.

## 2.19 HDMI-CEC

### 2.19.1 Unexpected switch to Receive mode without automatic transmission retry and notification

#### Description

If the HDMI-CEC peripheral starts a transmit operation, and at the same time another CEC initiator attempts to perform the same operation but with a wrong start-bit timing and/or without following the signal free timing rules, the transmission is aborted and never restarts, and the HDMI switch to Receive mode. The user application is not informed of the bus error.

#### Workaround

Use transmission timeout: when a timeout occurs, to enable again the transmission of the pending message, disable and enable again the HDMI-CEC peripheral to clear TXSOM bit in CEC\_CR register.

## 2.19.2 CEC header not received due to unjustified Rx-Overrun detection

### Description

In a multinode CEC network, two messages are sent to two different followers. The CEC device which is the destination of the second message should ignore the first message and receive the second one. However, the header of the second message is not received and an Rx-Overrun is wrongly detected and signaled by setting the RXOVR flag in the CEC\_ISR register and the RXOVRIE interrupt in the CEC\_IER register.

The issue is not present:

- in Listen mode,
- when the first message is a broadcast message
- when the first message is a ping message (header only),
- or when the first message header is not acknowledged.

### Workaround

Configure the HDMI-CEC to operate in Listen mode and apply message filtering based on destination address. In this case all the messages sent over the CEC bus will be received and it is up to the user application to discard the messages that are not sent to its address or that are broadcast.



### 3 Important security notice

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## 4 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
19-Jun-2017	1	Initial release.
2-Nov-2017	2	<p>Added STM32H743AI part number.</p> <p>Removed JPEG limitation.</p> <p>Updated <a href="#">Section 2.3.1: Dummy read cycles inserted when reading synchronous memories</a> and <a href="#">Section 2.3.2: Wrong data read from a busy NAND Flash memory</a>.</p> <p>Added <a href="#">Section 2.16.2: Wrong data may be read from Message RAM by the CPU when using two FDCANs</a>.</p>
31-May-2018	3	<p><b>System limitations:</b></p> <ul style="list-style-type: none"> <li>– Reorganized to group together Flash memory and RAM limitations</li> <li>– Removed limitations “48 MHz RC oscillator user calibration values lost after system reset” and “Flash memory write sequence error flag not set”</li> <li>– Replaced “Accessing the system memory may stall the system when Flash memory banks are swapped” and “Write flags are not swapped when Flash memory banks are swapped” limitations by <a href="#">Section 2.2.8: Flash memory bank swapping might impact embedded Flash memory interface behavior</a>.</li> </ul> <p><b>ADC limitations:</b></p> <ul style="list-style-type: none"> <li>– Moved all ADC limitations under <a href="#">Section 2.5: ADC</a>.</li> <li>– Added <a href="#">Section 2.5.5: First ADC injected conversion in a sequence may be corrupted</a> and <a href="#">Section 2.5.6: Writing the ADC_JSQR register when JADCSTART = 1 and JQDIS = 1 may lead to incorrect behavior</a>.</li> </ul> <p>Added <a href="#">Section 2.11.1: RTC calendar registers are not locked properly</a>.</p> <p>Added <a href="#">Section 2.4.2: QUADSPI hangs when QUADSPI_CCR is cleared</a> and <a href="#">Section 2.4.3: QUADSPI cannot be used in Indirect read mode when only data phase is activated</a>.</p>

**Table 6. Document revision history (continued)**

Date	Revision	Changes
31-May-2018	3 (continued)	<p><b>I2C limitations:</b></p> <ul style="list-style-type: none"> <li>– Updated <a href="#">Section 2.12.1: 10-bit master mode: new transfer cannot be launched if first part of the address is not acknowledged by the slave</a> and <a href="#">Section 2.12.3: Wrong data sampling when data setup time (<math>t_{SU,DAT}</math>) is shorter than one I2C kernel clock period.</a></li> <li>– Added <a href="#">Section 2.12.2: Wrong behavior in Stop mode when wakeup from Stop mode is disabled in I2C</a>, <a href="#">Section 2.12.4: Spurious bus error detection in Master mode</a>, <a href="#">Section 2.12.5: Last-received byte loss in Reload mode</a>, <a href="#">Section 2.12.6: Spurious master transfer upon own slave address match</a> and <a href="#">Section 2.12.7: START bit is cleared upon setting ADDRCF, not upon address match.</a></li> </ul> <p>Removed limitation “NOSTRETCH setting may impact Master mode”.</p> <p><b>SPI/I2S limitations:</b></p> <ul style="list-style-type: none"> <li>– Removed limitation “Wrong DMA receive requests may be generated in Half-duplex mode”</li> </ul> <p>Added <a href="#">Section 2.14.1: Spurious DMA Rx transaction after simplex Tx traffic</a>, <a href="#">Section 2.14.2: Master data transfer stall at system clock much faster than SCK</a>, <a href="#">Section 2.14.3: Corrupted CRC return at non-zero UDRDET setting</a> and <a href="#">Section 2.14.4: TXP interrupt occurring while SPI/I2Sdisabled.</a></p>
19-Jun-2018	4	<p>Removed revision from document title.</p> <p>Added STM32H750xB part numbers.</p> <p>Added revision X in <a href="#">Table 2: Device variants</a>.</p> <p>Replaced “new silicon revision” by revision X in <a href="#">Table 3: Summary of device limitations</a>.</p> <p>Added <a href="#">Section 2.2.13: Unexpected leakage current on I/Os when VIN higher than VDD.</a></p> <p>Specified that <a href="#">Section 2.2.8: Flash memory bank swapping might impact embedded Flash memory interface behavior</a> does not apply to STM32H750xB devices.</p>
27-Mar-2019	5	<p>Added revision V for all devices.</p> <p>Added <a href="#">Arm® 32-bit Cortex®-M7 core</a> limitations.</p> <p><b>System:</b> added <a href="#">Section 2.2.16: Device stalled when two consecutive level regressions occur without accessing from/to backup SRAM</a>, <a href="#">Section 2.2.17: Invalid Flash memory CRC</a> and <a href="#">Section 2.2.18: GPIO assigned to DAC cannot be used in output mode when the DAC output is connected to on-chip peripheral.</a></p> <p>Added <a href="#">OPAMP</a> limitation.</p> <p>Updated <a href="#">Section 2.4.2: QUADSPI hangs when QUADSPI_CCR is cleared.</a></p> <p>Updated <a href="#">Section 2.12.1: 10-bit master mode: new transfer cannot be launched if first part of the address is not acknowledged by the slave</a></p> <p>Added <a href="#">LCD-TFT</a> limitation.</p> <p>Added <a href="#">USB OTG_HS</a> limitation.</p>

Table 6. Document revision history (continued)

Date	Revision	Changes
19-Jun-2019	6	<p>Added <a href="#">Section 2.5.7: Conversion may be triggered by context queue register update</a> and <a href="#">Section 2.5.8: Updated conversion sequence may be triggered by context queue update</a>.</p> <p>Added <a href="#">Section 2.18: ETH</a>.</p> <p>Added <a href="#">Section 2.16.3: Mis-synchronization in Edge filtering mode when the falling edge at FDCAN_Rx input pin coincides with the end of the integration phase</a> and <a href="#">Section 2.16.4: Tx FIFO messages inverted when both Tx buffer and FIFO are used and the messages in the Tx buffer have higher priority than in the Tx FIFO</a>.</p>
10-Mar-2020	7	<p>Changed Arm Cortex core revision to r1p1.</p> <p>Added new system limitation <a href="#">Section 2.2.21: VDDLDO is not available on TFBGA100 package on devices revision Y and V</a>.</p> <p>Added new DMA limitation <a href="#">Section 2.13.2: DMA stream locked when transferring data to/from USART/UART</a>.</p> <p>Added new VREFBUF limitations:</p> <ul style="list-style-type: none"> <li>– <a href="#">Section 2.6.1: Overshoot on VREFBUF output</a></li> <li>– <a href="#">Section 2.6.2: VREFBUF Hold mode cannot be used</a></li> </ul>
12-Feb-2021	8	<p>SYSTEM limitations:</p> <ul style="list-style-type: none"> <li>– Added <a href="#">Section 2.2.22: WWDG not functional when VDD is lower than 2.7 V and VOS0 or VOS1 voltage level is selected</a>, <a href="#">Section 2.2.23: A tamper event does not erase the backup RAM when the backup RAM clock is disabled</a> and <a href="#">Section 2.2.24: LSE CSS parasitic detection even when disabled</a></li> </ul> <p>QUADSPI limitations:</p> <ul style="list-style-type: none"> <li>– Added <a href="#">Section 2.4.4: Memory-mapped read of last memory byte fails</a>.</li> <li>– Updated <a href="#">Section 2.4.2: QUADSPI hangs when QUADSPI_CCR is cleared</a> title.</li> </ul> <p>Added TIM limitations: <a href="#">Section 2.9.1: One-pulse mode trigger not detected in master-slave reset + trigger configuration</a>, <a href="#">Section 2.9.2: Consecutive compare event missed in specific conditions</a> and <a href="#">Section 2.9.3: Output compare clear not working with external counter reset</a>.</p> <p>Moved <a href="#">Section 2.13.2: DMA stream locked when transferring data to/from USART/UART</a> from DMA to USART section.</p>
07-Jun-2022	9	<p>Updated <a href="#">Section 2.2.24: LSE CSS parasitic detection even when disabled</a>.</p> <p>Added <a href="#">Section 2.2.25: Output current sunk or sourced by Pxy_C pins</a>.</p> <p>Added <a href="#">Section 3: Important security notice</a>.</p>

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