

## UART Driver for STM32F103

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# Chapter 1

## Data Structure Index

### 1.1 Data Structures

Here are the data structures with brief descriptions:

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## Chapter 2

# File Index

### 2.1 File List

Here is a list of all documented files with brief descriptions:

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## Chapter 3

# Data Structure Documentation

### 3.1 DataBuffer\_t Struct Reference

#### Data Fields

- uint\_8t \* **Data**
- uint\_32t **Position**
- uint\_32t **Size**
- uint\_8t **BufferState**

The documentation for this struct was generated from the following file:

- UART/[UART.c](#)

### 3.2 UART\_t Struct Reference

#### Data Fields

- uint\_32t **SR**
- uint\_32t **DR**
- uint\_32t **BRR**
- uint\_32t **CR1**
- uint\_32t **CR2**
- uint\_32t **CR3**
- uint\_32t **GTPR**

The documentation for this struct was generated from the following file:

- UART/[UART\\_Private.h](#)



## Chapter 4

# File Documentation

### 4.1 UART/UART.c File Reference

This file is the Implementation for UART Driver in STM32F103.

```
#include "STD_TYPES.h"
#include "DNVIC.h"
#include "UART.h"
#include "UART_Private.h"
```

#### Data Structures

- struct [DataBuffer\\_t](#)

#### Macros

- #define [STATE\\_IDLE](#) 0  
*Idle State.*
- #define [STATE\\_BUSY](#) 1  
*Busy State.*
- #define [USART\\_DEFAULT\\_CONFIG\\_MASK](#) 0x0000200C  
*Default Configuration Mask For Usart.*
- #define [USART\\_TXE\\_FLAG](#) 0x00000080  
*Flag used in Transmit.*
- #define [USART\\_RXNE\\_FLAG](#) 0x00000020  
*Flag used in Receive.*
- #define [USART\\_LBD\\_FLAG](#) 0x00000100  
*Flag used in LIN Break.*
- #define [DATA\\_SIZE\\_CLEAR\\_MASK](#) 0xFFFFEFFF  
*Clear Mask For Data Bits.*
- #define [PARITY\\_BIT\\_CLEAR\\_MASK](#) 0xFFFF3FFF  
*Clear Mask For Parity Bit.*
- #define [STOP\\_BITS\\_CLEAR\\_MASK](#) 0xFFFFCFFF  
*Clear Mask For Parity Bit.*
- #define [BREAK\\_ENABLE](#) 0x00000001UL  
*Enable Break.*

## Functions

- uint\_8t [UART\\_Init](#) (uint\_32t BaudRateMantissa, uint\_32t BaudRateFraction, uint\_32t ParityBits, uint\_32t DataSize, uint\_32t StopBits)  
*Function initializes UART.*
- uint\_8t [UART\\_Send](#) (uint\_8t \*Buffer, uint\_16t Length)  
*Function sends buffer of data through uart using Interrupt or DMA modes.*
- uint\_8t [UART\\_Receive](#) (uint\_8t \*Buffer, uint\_16t Length)  
*Function receives a buffer of data using interrupt or DMA.*
- uint\_8t [UART\\_Config](#) (uint\_32t BaudRateMantissa, uint\_32t BaudRateFraction, uint\_32t ParityBits, uint\_32t DataSize, uint\_32t StopBits)  
*Function configure the UART*
- uint\_8t [UART\\_SetTxCbf](#) (TxCbf\_t TxCbf)  
*Function that sets the call back function of the transmission complete*
- uint\_8t [UART\\_SetRxCbf](#) (RxCbf\_t RxCbf)  
*Function that sets the call back function of the receiving is complete.*
- uint\_8t [UART\\_SetLBDCbf](#) (LBDCbf\_t LBDCbf)  
*Function that sets the call back function of the LIN break detection.*
- void [USART1\\_IRQHandler](#) (void)
- void [DMA\\_ChannelFour\\_Finish](#) (void)  
*Function called when UART finishes transmission through DMA.*
- void [DMA\\_ChannelFive\\_Finish](#) (void)  
*Function called when UART finishes receiving through DMA.*
- void [UART\\_SendBreak](#) (void)  
*Function that enables the bit that send a LIN break.*

## Variables

- uint\_8t **UART\_mode**

### 4.1.1 Detailed Description

This file is the Implementation for UART Driver in STM32F103.

#### Author

Mostafa Nader ( [mnader96@gmail.com](mailto:mnader96@gmail.com) )

#### Version

0.1

#### Date

2020-06-07

#### Copyright

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## 4.1.2 Function Documentation

### 4.1.2.1 DMA\_ChannelFive\_Finish()

```
void DMA_ChannelFive_Finish (  
    void )
```

Function called when UART finishes receiving through DMA.

#### Parameters

NA	
----	--

#### Returns

NA

### 4.1.2.2 DMA\_ChannelFour\_Finish()

```
void DMA_ChannelFour_Finish (  
    void )
```

Function called when UART finishes transmission through DMA.

#### Parameters

NA	
----	--

#### Returns

NA

### 4.1.2.3 UART\_Config()

```
uint_8t UART_Config (  
    uint_32t BaudRateMantissa,  
    uint_32t BaudRateFraction,  
    uint_32t ParityBits,  
    uint_32t DataSize,  
    uint_32t StopBits )
```

Function configure the UART

**Parameters**

<i>BaudRateMantissa</i>	Variable of uint_32t, Baudrate's mantissa paramter
<i>BaudRateFraction</i>	Variable of uint_32t, Baudrate's fraction paramter
<i>ParityBits</i>	Variable of uint_32t, even parity , odd parity
<i>ParityBits</i>	Variable of uint_32t, Data length 5->9 bits
<i>StopBits</i>	Variable of uint_32t, one stop bit , two stop bits

**Returns**

uint\_8t : OK | NOK

**4.1.2.4 UART\_Init()**

```
uint_8t UART_Init (
    uint_32t BaudRateMantissa,
    uint_32t BaudRateFraction,
    uint_32t ParityBits,
    uint_32t DataSize,
    uint_32t StopBits )
```

Function initializes UART.

**Parameters**

<i>BaudRate</i>	Variable of uint_32t, variable that contains Baud Rate
<i>ParityBits</i>	Variable of uint_32t, variable that contains ParityState ex (PARITY_DISABLED, PARITY_EVEN)
<i>DataSize</i>	Variable of uint_32t, variable that contains DataSize (DATA_8_BITS OR DATA_9_BITS)
<i>StopBits</i>	Variable of uint_32t, variable that contains number of StopBits (ONE_STOP_BIT OR TWO_STOP_BIT)

**Returns**

uint\_8t : OK | NOT\_OK

**4.1.2.5 UART\_Receive()**

```
uint_8t UART_Receive (
    uint_8t * Buffer,
    uint_16t Length )
```

Function receives a buffer of data using interrupt or DMA.

**Parameters**

<i>Buffer</i>	Pointer of uint_8t, buffer that store the received data
<i>Length</i>	Variable of uint_16t, Length of data to be received

**Returns**

uint\_8t : OK | NOK

**4.1.2.6 UART\_Send()**

```
uint_8t UART_Send (
    uint_8t * Buffer,
    uint_16t Length )
```

Function sends buffer of data thorught uart using Interrupt or DMA modes.

**Parameters**

<i>Buffer</i>	Pointer of uint_8t, Buffer that contains data to be sent
<i>Length</i>	Variable of uint_16t, Length of data to be received

**Returns**

uint\_8t : OK | NOK

**4.1.2.7 UART\_SendBreak()**

```
void UART_SendBreak (
    void )
```

Function that enables the bit that send a LIN break.

**Parameters**

NA	
----	--

**Returns**

NA

#### 4.1.2.8 UART\_SetLBDCbf()

```
uint_8t UART_SetLBDCbf (
    LBDCbf_t LBDCbf )
```

Function that sets the call back function of the LIN break detection.

##### Parameters

<i>LBDCbf</i>	pointer to function, Call Back Function
---------------	---

##### Returns

uint\_8t : OK | NOK

#### 4.1.2.9 UART\_SetRxCbf()

```
uint_8t UART_SetRxCbf (
    RxCbf_t RxCbf )
```

Function that sets the call back function of the receiving is complete.

##### Parameters

<i>RxCbf</i>	pointer to function, Call Back Function
--------------	---

##### Returns

uint\_8t : OK | NOK

#### 4.1.2.10 UART\_SetTxCbf()

```
uint_8t UART_SetTxCbf (
    TxCbf_t TxCbf )
```

Function that sets the call back function of the transmission complete

##### Parameters

<i>TxCbf</i>	pointer to function, Call Back Function
--------------	---



## Returns

uint\_8t : OK | NOK

## 4.2 UART/UART.h File Reference

This file is User Interface for UART Driver in STM32F103.

### Macros

- #define [USART\\_TCEIE\\_ENABLE](#) 0x00000040  
*Uart Transmit Complete Interrupt Enable.*
- #define [USART\\_TXEIE\\_ENABLE](#) 0x00000080  
*Uart Transmit Interrupt Enable.*
- #define [USART\\_RXNEIE\\_ENABLE](#) 0x00000020  
*Uart Receive Interrupt Enable.*

### Typedefs

- typedef void(\* [TxCb\\_t](#)) (void)  
*Pointer to function of TX Call Back Function.*
- typedef void(\* [RxCb\\_t](#)) (void)  
*Pointer to function of RX Call Back Function.*
- typedef void(\* [LBDCb\\_t](#)) (void)  
*Pointer to function of LBDCb Call Back Function.*

### Functions

- uint\_8t [UART\\_Init](#) (uint\_32t BaudRateMantissa, uint\_32t BaudRateFraction, uint\_32t ParityBits, uint\_32t DataSize, uint\_32t StopBits)  
*Function initializes UART.*
- uint\_8t [UART\\_Send](#) (uint\_8t \*Buffer, uint\_16t Length)  
*Function sends buffer of data through uart using Interrupt or DMA modes.*
- uint\_8t [UART\\_SendDMA](#) (uint\_8t \*Buffer, uint\_16t Length)  
*Function receives a buffer of data DMA.*
- uint\_8t [UART\\_Receive](#) (uint\_8t \*Buffer, uint\_16t Length)  
*Function receives a buffer of data using interrupt or DMA.*
- uint\_8t [UART\\_Config](#) (uint\_32t BaudRateMantissa, uint\_32t BaudRateFraction, uint\_32t ParityBits, uint\_32t DataSize, uint\_32t StopBits)  
*Function configure the UART*
- uint\_8t [UART\\_SetTxCb](#) ([TxCb\\_t](#) TxCb)  
*Function that sets the call back function of the transmission complete*
- uint\_8t [UART\\_SetRxCb](#) ([RxCb\\_t](#) RxCb)  
*Function that sets the call back function of the receiving is complete.*
- uint\_8t [UART\\_SetLBDCb](#) ([LBDCb\\_t](#) LBDCb)  
*Function that sets the call back function of the LIN break detection.*
- void [DMA\\_ChannelFour\\_Finish](#) (void)  
*Function called when UART finishes transmission through DMA.*
- void [DMA\\_ChannelFive\\_Finish](#) (void)  
*Function called when UART finishes receiving through DMA.*
- void [UART\\_SendBreak](#) (void)  
*Function that enables the bit that send a LIN break.*

### 4.2.1 Detailed Description

This file is User Interface for UART Driver in STM32F103.

#### Author

Mostafa Nader ( [mnader96@gmail.com](mailto:mnader96@gmail.com) )

#### Version

0.1

#### Date

2020-06-07

#### Copyright

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### 4.2.2 Function Documentation

#### 4.2.2.1 DMA\_ChannelFive\_Finish()

```
void DMA_ChannelFive_Finish (  
    void )
```

Function called when UART finishes receiving through DMA.

#### Parameters

NA	
----	--

#### Returns

NA

#### 4.2.2.2 DMA\_ChannelFour\_Finish()

```
void DMA_ChannelFour_Finish (  
    void )
```

Function called when UART finishes transmission through DMA.

## Parameters

NA	
----	--

## Returns

NA

### 4.2.2.3 UART\_Config()

```
uint_8t UART_Config (
    uint_32t BaudRateMantissa,
    uint_32t BaudRateFraction,
    uint_32t ParityBits,
    uint_32t DataSize,
    uint_32t StopBits )
```

Function configure the UART

## Parameters

<i>BaudRateMantissa</i>	Variable of uint_32t, Baudrate's mantissa paramter
<i>BaudRateFraction</i>	Variable of uint_32t, Baudrate's fraction paramter
<i>ParityBits</i>	Variable of uint_32t, even parity , odd parity
<i>ParityBits</i>	Variable of uint_32t, Data length 5->9 bits
<i>StopBits</i>	Variable of uint_32t, one stop bit , two stop bits

## Returns

uint\_8t : OK | NOK

### 4.2.2.4 UART\_Init()

```
uint_8t UART_Init (
    uint_32t BaudRateMantissa,
    uint_32t BaudRateFraction,
    uint_32t ParityBits,
    uint_32t DataSize,
    uint_32t StopBits )
```

Function initializes UART.

**Parameters**

<i>BaudRate</i>	Variable of uint_32t, variable that contains Baud Rate
<i>ParityBits</i>	Variable of uint_32t, variable that contains ParityState ex (PARITY_DISABLED, PARITY_EVEN)
<i>DataSize</i>	Variable of uint_32t, variable that contains DataSize (DATA_8_BITS OR DATA_9_BITS)
<i>StopBits</i>	Variable of uint_32t, variable that contains number of StopBits (ONE_STOP_BIT OR TWO_STOP_BIT)

**Returns**

uint\_8t : OK | NOT\_OK

**4.2.2.5 UART\_Receive()**

```
uint_8t UART_Receive (
    uint_8t * Buffer,
    uint_16t Length )
```

Function receives a buffer of data using interrupt or DMA.

**Parameters**

<i>Buffer</i>	Pointer of uint_8t, buffer that store the received data
<i>Length</i>	Variable of uint_16t, Length of data to be received

**Returns**

uint\_8t : OK | NOK

**4.2.2.6 UART\_Send()**

```
uint_8t UART_Send (
    uint_8t * Buffer,
    uint_16t Length )
```

Function sends buffer of data throught uart using Interrupt or DMA modes.

**Parameters**

<i>Buffer</i>	Pointer of uint_8t, Buffer that contains data to be sent
<i>Length</i>	Variable of uint_16t, Length of data to be received

**Returns**

uint\_8t : OK | NOK

**4.2.2.7 UART\_SendBreak()**

```
void UART_SendBreak (
    void )
```

Function that enables the bit that send a LIN break.

**Parameters**

NA	
----	--

**Returns**

NA

**4.2.2.8 UART\_SendDMA()**

```
uint_8t UART_SendDMA (
    uint_8t * Buffer,
    uint_16t Length )
```

Function receives a buffer of data DMA.

**Parameters**

<i>Buffer</i>	Pointer of uint_8t, buffer that store the received data
<i>Length</i>	Variable of uint_16t, Length of data to be received

**Returns**

uint\_8t : OK | NOK

**4.2.2.9 UART\_SetLBDCbf()**

```
uint_8t UART_SetLBDCbf (
    LBDCbf_t LBDCbf )
```

Function that sets the call back function of the LIN break detection.

**Parameters**

<i>LBDCbf</i>	pointer to function, Call Back Function
---------------	---

**Returns**

uint\_8t : OK | NOK

**4.2.2.10 UART\_SetRxCbf()**

```
uint_8t UART_SetRxCbf (
    RxCbf_t RxCbf )
```

Function that sets the call back function of the receiving is complete.

**Parameters**

<i>RxCbf</i>	pointer to function, Call Back Function
--------------	---

**Returns**

uint\_8t : OK | NOK

**4.2.2.11 UART\_SetTxCbf()**

```
uint_8t UART_SetTxCbf (
    TxCbf_t TxCbf )
```

Function that sets the call back function of the transmission complete

**Parameters**

<i>TxCbf</i>	pointer to function, Call Back Function
--------------	---

**Returns**

uint\_8t : OK | NOK

**4.3 UART/UART\_Private.h File Reference**

This file is Private from user for UART Driver in STM32F103.

## Data Structures

- struct [UART\\_t](#)

## Macros

- #define [USART\\_TC\\_FLAG](#) 0x00000040  
*Transfer Complete Flag.*
- #define [UART](#) (([UART\\_t\\*](#))0x40013800)  
*Base Address of Uart Driver.*

### 4.3.1 Detailed Description

This file is Private from user for UART Driver in STM32F103.

#### Author

Mostafa Nader ( [mnader96@gmail.com](mailto:mnader96@gmail.com) )

#### Version

0.1

#### Date

2020-06-05

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