

# Porting Guide

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## STM32F405/415 Series to N32H482 Series

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### Introduction

The migration guide primarily outlines the disparities between the STM32F405/415 series and the N32H482 series, facilitating a seamless transition from developing with the STM32F405/415 series to the N32H482 series.

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# 1 Overview

The N32H482 series is the latest high-performance general-purpose secure MCU product developed by Nsing Technologies based on the Cortex-M4 core. It supports multiple packaging forms such as LQFP64, LQFP100, and LQFP128, and is compatible with the corresponding packaging pins of the STM32F405/415 series.

This guide mainly introduces the differences in resources and IO functions between two series of chips, as follows:

- Resource Differences: Introduce the differences in resources such as general basic modules, communication peripherals, analog peripherals, timers, etc. under various corresponding packaging
- Hardware differences: Introduction includes differences in pin layout and functional mapping
- Minimum System Design: N32H482 Minimum System Design Considerations
- Main functional differences: Introduce the main functional differences of each module

## 2 Resource Differences

### 2.1 LQFP64 Packaging Resource Differences

The comparison of resource differences between STM32F405/415 LQFP64 package and N32H482 LQFP64 package is shown in the following table:

| Device model               |              | STM32F405RGT6<br>STM32F405RGT7 | STM32F415RGT6                                               | N32H482VEL7                                                                                  |
|----------------------------|--------------|--------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| FLASH(KB)                  |              | 1024                           | 1024                                                        | 512                                                                                          |
| SRAM<br>(KB)               | General SRAM | 112+16                         |                                                             | 160                                                                                          |
|                            | CCM SRAM     | 64                             |                                                             | 32                                                                                           |
|                            | Backup SRAM  | 4                              |                                                             | 4                                                                                            |
| Core                       |              | Cortex-M4F                     |                                                             | Cortex-M4F                                                                                   |
| Maximum frequency          |              | 168MHz                         |                                                             | 240MHz                                                                                       |
| Work environment           |              | 1.8~3.6V/-40~85°C/105°C        |                                                             | 1.8~3.6V/-40~105°C                                                                           |
| Storage<br>Expansion       | FEMC         | -                              |                                                             | -                                                                                            |
|                            | SDIO         | Yes                            |                                                             | Yes                                                                                          |
|                            | xSPI         | -                              |                                                             | Yes                                                                                          |
| DMA                        |              | 2*8CH                          |                                                             | 2*8CH                                                                                        |
| Timer                      | Advanced     | 2*16bit                        |                                                             | 3*16bit                                                                                      |
|                            | General      | 8*16bit+2*32bit                |                                                             | 7*16bit+3*16bit                                                                              |
|                            | Basic        | 2*16bit                        |                                                             | 2*32bit                                                                                      |
|                            | Lower power  | -                              |                                                             | 2*16bit                                                                                      |
|                            | SysTick      | 1                              |                                                             | 1                                                                                            |
|                            | IWDG         | 1*12bit                        |                                                             | 1*12bit                                                                                      |
|                            | WWDG         | 1*7bit                         |                                                             | 1*14bit                                                                                      |
| Communication<br>interface | SPI          | 3                              |                                                             | 5                                                                                            |
|                            | I2S          | 2                              |                                                             | 2                                                                                            |
|                            | I2C          | 3                              |                                                             | 4                                                                                            |
|                            | USART        | 4                              |                                                             | 4                                                                                            |
|                            | UART         | 2                              |                                                             | 4                                                                                            |
|                            | CAN          | 2*CAN                          |                                                             | 2*FDCAN                                                                                      |
|                            | USB FS       | Yes                            |                                                             | Yes                                                                                          |
|                            | USB HS       | Yes                            |                                                             | Yes                                                                                          |
| RTC                        |              | Yes                            |                                                             | Yes                                                                                          |
| Tamper pins                |              | 1                              |                                                             | 2                                                                                            |
| CORDIC                     |              | -                              |                                                             | Yes                                                                                          |
| FMAC                       |              | -                              |                                                             | Yes                                                                                          |
| GPIO                       |              | 51                             |                                                             | 54                                                                                           |
| Wakeup pins                |              | 1                              |                                                             | 4                                                                                            |
| 12bit ADC                  |              | 3                              |                                                             | 4                                                                                            |
| ADC channels               |              | 16                             |                                                             | 26                                                                                           |
| 12bit DAC                  |              | Yes                            |                                                             | 2                                                                                            |
| DAC channels               |              | 2                              |                                                             | 2                                                                                            |
| VREFBUF                    |              | -                              |                                                             | Yes                                                                                          |
| Algorithm support          |              | TRNG、CRC32                     | TRNG、CRC32、DES/3DES、<br>AES、SHA1/SHA224/SHA256、<br>MD5、HMAC | DES/3DES、AES、<br>SHA1/SHA224/SHA256、SM3、<br>SM4、MD5、CRC16/CRC32、TRNG                         |
| Safety protection          |              | RDP、PCROP、WRP                  |                                                             | Read write protection (RDP/WRP),<br>storage encryption, partition protection,<br>secure boot |
| Package                    |              | LQFP64                         |                                                             | LQFP64                                                                                       |

## 2.2 LQFP100 Packaging Resource Differences

The comparison of resource differences between STM32F405/415 LQFP100 package and N32H482 LQFP100 package is shown in the following table:

| Device model               |              | STM32F405VGT6<br>STM32F405VGT7 |                                                             | STM32F415VGT6<br>STM32F415VGT7 |      | N32H482VEL7                                                                                  |
|----------------------------|--------------|--------------------------------|-------------------------------------------------------------|--------------------------------|------|----------------------------------------------------------------------------------------------|
| FLASH(KB)                  |              | 512                            | 1024                                                        | 512                            | 1024 | 512                                                                                          |
| SRAM<br>(KB)               | General SRAM | 112+16                         |                                                             |                                |      | 160                                                                                          |
|                            | CCM SRAM     | 64                             |                                                             |                                |      | 32                                                                                           |
|                            | Backup SRAM  | 4                              |                                                             |                                |      | 4                                                                                            |
| Core                       |              | Cortex-M4F                     |                                                             |                                |      | Cortex-M4F                                                                                   |
| Maximum frequency          |              | 168MHz                         |                                                             |                                |      | 240MHz                                                                                       |
| Work environment           |              | 1.8~3.6V/-40~85°C/105°C        |                                                             |                                |      | 1.8~3.6V/-40~105°C                                                                           |
| Storage<br>Expansion       | FEMC         | Address Data Bus Reuse Mode    |                                                             |                                |      | Address Data Bus Reuse Mode                                                                  |
|                            | SDIO         | Yes                            |                                                             |                                |      | Yes                                                                                          |
|                            | xSPI         | -                              |                                                             |                                |      | Yes                                                                                          |
| DMA                        |              | 2*8CH                          |                                                             |                                |      | 2*8CH                                                                                        |
| Timer                      | Advanced     | 2*16bit                        |                                                             |                                |      | 3*16bit                                                                                      |
|                            | General      | 8*16bit+2*32bit                |                                                             |                                |      | 7*16bit+3*16bit                                                                              |
|                            | Basic        | 2*16bit                        |                                                             |                                |      | 2*32bit                                                                                      |
|                            | Lower power  | -                              |                                                             |                                |      | 2*16bit                                                                                      |
|                            | SysTick      | 1                              |                                                             |                                |      | 1                                                                                            |
|                            | IWDG         | 1*12bit                        |                                                             |                                |      | 1*12bit                                                                                      |
|                            | WWDG         | 1*7bit                         |                                                             |                                |      | 1*14bit                                                                                      |
| Communication<br>interface | SPI          | 3                              |                                                             |                                |      | 6                                                                                            |
|                            | I2S          | 2                              |                                                             |                                |      | 2                                                                                            |
|                            | I2C          | 3                              |                                                             |                                |      | 4                                                                                            |
|                            | USART        | 4                              |                                                             |                                |      | 4                                                                                            |
|                            | UART         | 2                              |                                                             |                                |      | 4                                                                                            |
|                            | CAN          | 2*CAN                          |                                                             |                                |      | 3*FDCAN                                                                                      |
|                            | USB FS       | Yes                            |                                                             |                                |      | Yes                                                                                          |
|                            | USB HS       | Yes                            |                                                             |                                |      | Yes                                                                                          |
|                            | RTC          | Yes                            |                                                             |                                |      | Yes                                                                                          |
| Tamper pins                |              | 1                              |                                                             |                                |      | 3                                                                                            |
| CORDIC                     |              | -                              |                                                             |                                |      | Yes                                                                                          |
| FMAC                       |              | -                              |                                                             |                                |      | Yes                                                                                          |
| GPIO                       |              | 82                             |                                                             |                                |      | 85                                                                                           |
| Wakeup pins                |              | 1                              |                                                             |                                |      | 5                                                                                            |
| 12bit ADC                  |              | 3                              |                                                             |                                |      | 4                                                                                            |
| ADC channels               |              | 16                             |                                                             |                                |      | 42                                                                                           |
| 12bit DAC                  |              | Yes                            |                                                             |                                |      | 2                                                                                            |
| DAC channels               |              | 2                              |                                                             |                                |      | 2                                                                                            |
| VREFBUF                    |              | -                              |                                                             |                                |      | Yes                                                                                          |
| Algorithm support          |              | TRNG、CRC32                     | TRNG、CRC32、DES/3DES、<br>AES、SHA1/SHA224/SHA256、<br>MD5、HMAC |                                |      | DES/3DES、AES、<br>SHA1/SHA224/SHA256、SM3、<br>SM4、MD5、CRC16/CRC32、TRNG                         |
| Safety protection          |              | RDP、PCROP、WRP                  |                                                             |                                |      | Read write protection (RDP/WRP),<br>storage encryption, partition protection,<br>secure boot |
| Package                    |              | LQFP100                        |                                                             |                                |      | LQFP100                                                                                      |

## 2.3 LQFP144 Packaging Resource Differences

The comparison of resource differences between STM32F405/415 LQFP144 package and N32H482 LQFP144 package is shown in the following table:

| Device model               |              | STM32F405ZGT6<br>STM32F405ZGT7 |      | STM32F415ZGT6                                               |      | N32H482ZEL7                                                                                  |
|----------------------------|--------------|--------------------------------|------|-------------------------------------------------------------|------|----------------------------------------------------------------------------------------------|
| FLASH(KB)                  |              | 512                            | 1024 | 512                                                         | 1024 | 512                                                                                          |
| SRAM<br>(KB)               | General SRAM | 112+16                         |      |                                                             |      | 160                                                                                          |
|                            | CCM SRAM     | 64                             |      |                                                             |      | 32                                                                                           |
|                            | Backup SRAM  | 4                              |      |                                                             |      | 4                                                                                            |
| Core                       |              | Cortex-M4F                     |      |                                                             |      | Cortex-M4F                                                                                   |
| Maximum frequency          |              | 168MHz                         |      |                                                             |      | 240MHz                                                                                       |
| Work environment           |              | 1.8~3.6V/-40~85°C/105°C        |      | 1.8~3.6V/-40~85°C                                           |      | 1.8~3.6V/-40~105°C                                                                           |
| Storage<br>Expansion       | FEMC         | Yes                            |      |                                                             |      | Yes                                                                                          |
|                            | SDIO         | Yes                            |      |                                                             |      | Yes                                                                                          |
|                            | xSPI         | -                              |      |                                                             |      | Yes                                                                                          |
| DMA                        |              | 2*8CH                          |      |                                                             |      | 2*8CH                                                                                        |
| Timer                      | Advanced     | 2*16bit                        |      |                                                             |      | 3*16bit                                                                                      |
|                            | General      | 8*16bit+2*32bit                |      |                                                             |      | 7*16bit+3*16bit                                                                              |
|                            | Basic        | 2*16bit                        |      |                                                             |      | 2*32bit                                                                                      |
|                            | Lower power  | -                              |      |                                                             |      | 2*16bit                                                                                      |
|                            | SysTick      | 1                              |      |                                                             |      | 1                                                                                            |
|                            | IWDG         | 1*12bit                        |      |                                                             |      | 1*12bit                                                                                      |
|                            | WWDG         | 1*7bit                         |      |                                                             |      | 1*14bit                                                                                      |
| Communication<br>interface | SPI          | 3                              |      |                                                             |      | 6                                                                                            |
|                            | I2S          | 2                              |      |                                                             |      | 2                                                                                            |
|                            | I2C          | 3                              |      |                                                             |      | 4                                                                                            |
|                            | USART        | 4                              |      |                                                             |      | 4                                                                                            |
|                            | UART         | 2                              |      |                                                             |      | 4                                                                                            |
|                            | CAN          | 2*CAN                          |      |                                                             |      | 3*FDCAN                                                                                      |
|                            | USB FS       | Yes                            |      |                                                             |      | Yes                                                                                          |
|                            | USB HS       | Yes                            |      |                                                             |      | Yes                                                                                          |
| RTC                        |              | Yes                            |      |                                                             |      | Yes                                                                                          |
| Tamper pins                |              | 1                              |      |                                                             |      | 3                                                                                            |
| CORDIC                     |              | -                              |      |                                                             |      | Yes                                                                                          |
| FMAC                       |              | -                              |      |                                                             |      | Yes                                                                                          |
| GPIO                       |              | 114                            |      |                                                             |      | 118                                                                                          |
| Wakeup pins                |              | 1                              |      |                                                             |      | 5                                                                                            |
| 12bit ADC                  |              | 3                              |      |                                                             |      | 4                                                                                            |
| ADC channels               |              | 24                             |      |                                                             |      | 51                                                                                           |
| 12bit DAC                  |              | Yes                            |      |                                                             |      | 2                                                                                            |
| DAC channels               |              | 2                              |      |                                                             |      | 2                                                                                            |
| VREFBUF                    |              | -                              |      |                                                             |      | Yes                                                                                          |
| Algorithm support          |              | TRNG、CRC32                     |      | TRNG、CRC32、DES/3DES、<br>AES、SHA1/SHA224/SHA256、<br>MD5、HMAC |      | DES/3DES、AES、<br>SHA1/SHA224/SHA256、SM3、<br>SM4、MD5、CRC16/CRC32、TRNG                         |
| Safety protection          |              | RDP、PCROP、WRP                  |      |                                                             |      | Read write protection (RDP/WRP),<br>storage encryption, partition protection,<br>secure boot |
| Package                    |              | LQFP100                        |      |                                                             |      | LQFP100                                                                                      |

### 3 Hardware Differences

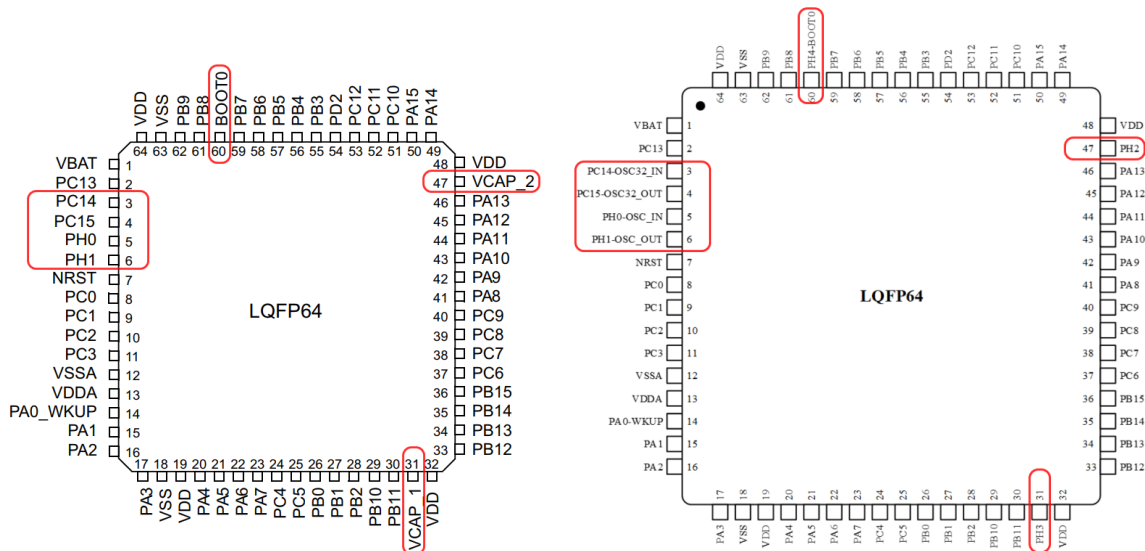
#### 3.1 Pin Layout

The N32H482 series is basically compatible with the STM32F405/415 series pins, with the following specific differences:

- STM32F405/415 PC14/PC15 can also be used as a low-speed clock port, which is different from N32H482 only in terms of pin naming.
- STM32F405/415 PH0/PH1 can also be used as a high-speed clock port, which is different from N32H482 only in terms of pin naming.
- N32H482 does not have VCAP\_1/VCAP\_2 pins and does not require external capacitors. The corresponding pins have been changed to GPIO PH3/PH2.
- The N32H482 BOOT0 pin can be reused as GPIO PH4.
- The N32H482 LQFP144 package does not support PDR\_ON function, and the corresponding pin has been changed to GPIO PH5.

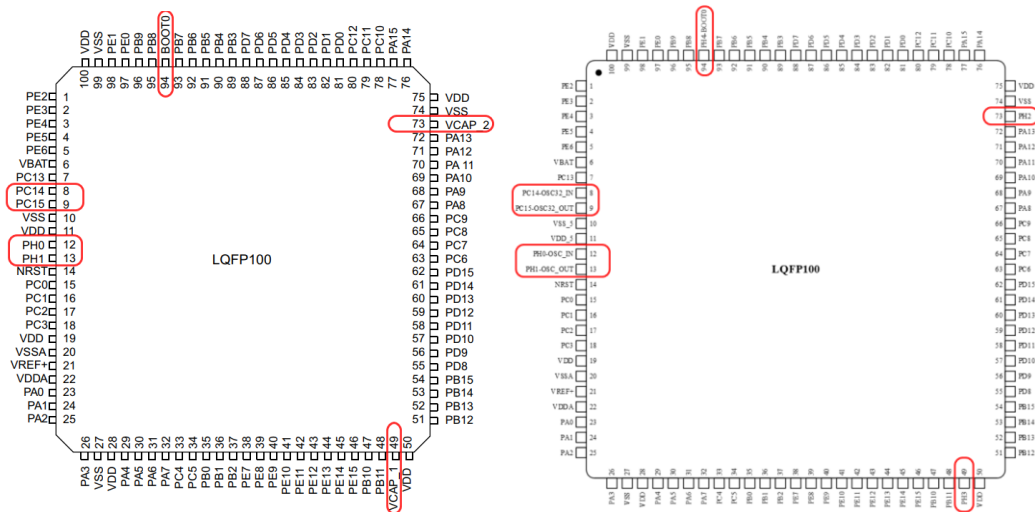
##### 3.1.1 LQFP64

On the left is the pin distribution diagram of STM32F405/415 series LQFP64, and on the right is the pin distribution diagram of N32H482 series LQFP64:



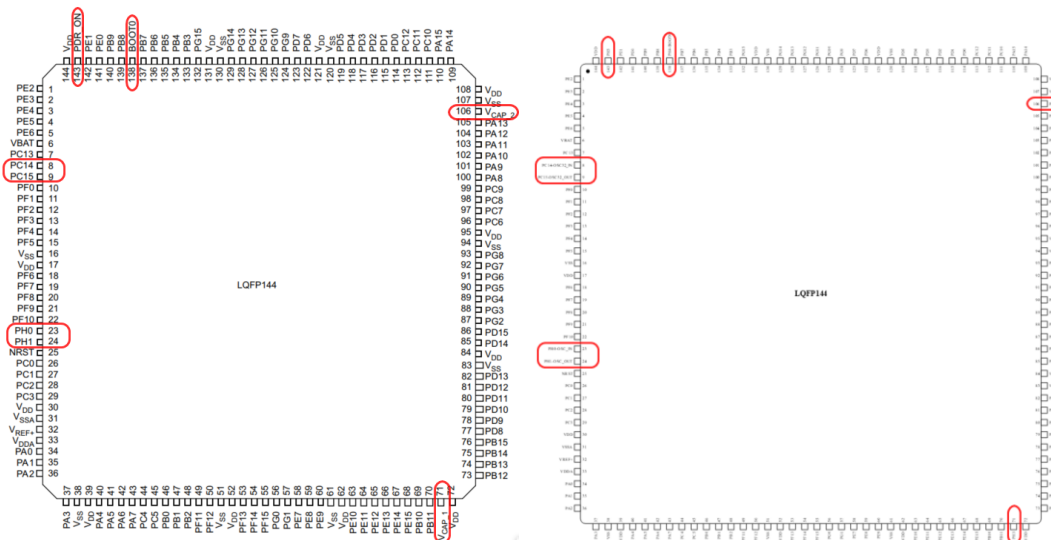
##### 3.1.2 LQFP100

On the left is the pin distribution diagram of STM32F405/415 series LQFP100, and on the right is the pin distribution diagram of N32H482 series LQFP100:



### 3.1.3 LQFP144

On the left is the pin distribution diagram of STM32F405/415 series LQFP144, and on the right is the pin distribution diagram of N32H482 series LQFP144:



## 3.2 Pin Function Mapping

The N32H482 series provides more peripheral multiplexing functionality on each pin, making practical applications more flexible. Some of the pin functions have differences or do not meet the requirements. Based on the multiplexing function of STM32F405/415, the main differences are as follows:

- The RTS\_DE, TX, and RX signals of the N32H482 series USART3, USART5, and UART8 can be mapped to any IO
- The TX and RX signals of the N32H482 series FDCAN1, FDCAN2, and FDCAN3 can be mapped to any IO
- N32H482 series supports XSPI
- N32H482 series supports LPTIM

The differences in pin reuse function are detailed in the table below. Based on the reuse function of STM32F405/415 series, the highlighted red parts are the pins with differences or that do not meet the function requirements:

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                         |                                                                                                                               |
|--------|---------|---------|----------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                               | N32H482                                                                                                                       |
| -      | 1       | 1       | PE2      | TRACECLK<br>FSMC_A23<br>EVENTOUT            | FEMC_A23<br>GTIM2_CH1<br>SPI4_SCK<br>ATIM3_CH1<br>USART4_TX<br>EVENTOUT                                                       |
| -      | 2       | 2       | PE3      | TRACED0<br>FSMC_A19<br>EVENTOUT             | FEMC_A19<br>GTIM2_CH2<br>SPI4_NSS<br>ATIM3_CH2<br>USART4_RX<br>EVENTOUT                                                       |
| -      | 3       | 3       | PE4      | TRACED1<br>FSMC_A20<br>EVENTOUT             | FEMC_A20<br>GTIM2_CH3<br>SPI4_NSS<br>ATIM3_CH1N<br>-EVENTOUT                                                                  |
| -      | 4       | 4       | PE5      | TRACED2<br>FSMC_A21<br>EVENTOUT<br>TIM9_CH1 | -FEMC_A21<br>GTIM5_CH1<br>GTIM2_CH4<br>SPI4_MISO<br>ATIM3_CH2N<br>EVENTOUT                                                    |
| -      | 5       | 5       | PE6      | TRACED3<br>FSMC_A22<br>EVENTOUT<br>TIM9_CH2 | FEMC_A22<br>GTIM5_CH2<br>SPI4_MOSI<br>ATIM3_CH3N<br>LPTIM2_IN1<br>EVENTOUT<br>WKUP3<br>RTC_TAMP3                              |
| 1      | 6       | 6       | VBAT     | VBAT                                        | VBAT                                                                                                                          |
| 2      | 7       | 7       | PC13     | EVENTOUT<br>RTC_OUT<br>RTC_TAMP1<br>RTC_TS  | RTC_OUT1<br>ATIM1_CH1N<br>ATIM1_BKIN<br>ATIM2_CH4N<br>LPTIM2_ETR<br>XSPI_RXDS<br>ATIM3_BKIN<br>EVENTOUT<br>WKUP2<br>RTC_TAMP1 |
| 3      | 8       | 8       | PC14     | EVENTOUT<br>OSC32_IN                        | GTIM7_CH3<br>EVENTOUT<br>OSC32_IN                                                                                             |
| 4      | 9       | 9       | PC15     | EVENTOUT<br>OSC32_OUT                       | GTIM7_CH4<br>EVENTOUT<br>OSC32_OUT                                                                                            |
| -      | -       | 10      | PF0      | FSMC_A0<br>EVENTOUT<br>I2C2_SDA             | FEMC_A0<br>I2C2_SDA<br>ATIM3_CH1<br>XSPI_NSS1                                                                                 |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                             |                                                                                                                           |
|--------|---------|---------|----------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                   | N32H482                                                                                                                   |
|        |         |         |          |                                                 | UART8_CTS<br>EVENTOUT                                                                                                     |
| -      | -       | 11      | PF1      | FSMC_A1<br>EVENTOUT<br>I2C2_SCL                 | FEMC_A1<br>I2C2_SCL<br>ATIM3_CH2<br>XSPI_CLK<br>EVENTOUT                                                                  |
| -      | -       | 12      | PF2      | FSMC_A2<br>EVENTOUT<br>I2C2_SMBA                | FEMC_A2<br>I2C2_SMBA<br>ATIM3_CH3<br>XSPI_IO0<br>EVENTOUT<br>ADC1_IN13                                                    |
| -      | -       | 13      | PF3      | FSMC_A3<br>EVENTOUT<br>ADC3_IN9                 | FEMC_A3<br>ATIM3_CH4<br>I2C3_SCL<br>XSPI_IO1<br>EVENTOUT<br>ADC3_IN17                                                     |
| -      | -       | 14      | PF4      | FSMC_A4<br>EVENTOUT<br>ADC3_IN14                | FEMC_A4<br>ATIM3_CH1N<br>I2C3_SDA<br>XSPI_IO2<br>GTIM5_CH1<br>I2C3_SCL<br>EVENTOUT<br>ADC3_IN0                            |
| -      | -       | 15      | PF5      | FSMC_A5<br>EVENTOUT<br>ADC3_IN15                | FEMC_A5<br>ATIM3_CH2N<br>XSPI_IO3<br>GTIM5_CH2<br>I2C3_SDA<br>EVENTOUT<br>ADC3_IN13                                       |
| -      | 10      | 16      | VSS      | VSS                                             | VSS                                                                                                                       |
| -      | 11      | 17      | VDD      | VDD                                             | VDD                                                                                                                       |
| -      | -       | 18      | PF6      | FSMC_NIORD<br>EVENTOUT<br>TIM10_CH1<br>ADC3_IN4 | GTIM6_CH1<br>GTIM4_ETR<br>GTIM3_CH4<br>I2C2_SCL<br>GTIM4_CH1<br>XSPI_IO3<br>SPI5_NSS<br>UART7_RX<br>EVENTOUT<br>ADC2_IN16 |
| -      | -       | 19      | PF7      | FSMC_NREG<br>EVENTOUT<br>TIM11_CH1<br>ADC3_IN5  | GTIM7_CH1<br>ATIM3_BKIN<br>GTIM4_CH2<br>XSPI_IO2<br>FEMC_A1<br>SPI5_SCK                                                   |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                             |                                                                                                                              |
|--------|---------|---------|----------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                   | N32H482                                                                                                                      |
|        |         |         |          |                                                 | UART7_TX<br>GTIM8_ETR<br>EVENTOUT<br>ADC1_IN15                                                                               |
| -      | -       | 20      | PF8      | FSMC_NIOWR<br>EVENTOUT<br>TIM13_CH1<br>ADC3_IN6 | GTIM9_CH1<br>ATIM3_BKIN2<br>GTIM4_CH3<br>XSPI_IO0<br>FEMC_A24<br>SPI5_MISO<br>EVENTOUT<br>ADC2_IN1                           |
| -      | -       | 21      | PF9      | FSMC_CD<br>EVENTOUT<br>TIM14_CH1<br>ADC3_IN7    | GTIM10_CH1<br>ATIM3_BKIN<br>GTIM8_CH1<br>SPI2_SCK<br>GTIM4_CH4<br>XSPI_IO1<br>FEMC_A25<br>SPI5_MOSI<br>EVENTOUT<br>ADC4_IN17 |
| -      | -       | 22      | PF10     | FSMC_INTR<br>EVENTOUT<br>ADC3_IN8               | ATIM3_BKIN2<br>GTIM8_CH2<br>SPI2_SCK<br>XSPI_CLK<br>FEMC_A0<br>EVENTOUT<br>ADC4_IN0                                          |
| 5      | 12      | 23      | PH0      | EVENTOUT<br>OSC_IN                              | I2C2_SDA<br>SPI2_NSS/I2S2_WS<br>ATIM1_CH3N<br>USART2_RX<br>GTIM5_CH3<br>ATIM3_CH1N<br>EVENTOUT<br>OSC_IN<br>ADC1_IN10        |
| 6      | 13      | 24      | PH1      | EVENTOUT<br>OSC_OUT                             | I2C2_SCL<br>SPI2_SCK/I2S2_CK<br>USART2_TX<br>GTIM5_CH4<br>ATIM3_CH2N<br>EVENTOUT<br>OSC_OUT<br>ADC2_IN10                     |
| 7      | 14      | 25      | NRST     | NRST                                            | NRST                                                                                                                         |
| 8      | 15      | 26      | PC0      | EVENTOUT<br>OTG_HS_ULPI_STP<br>ADC123_IN10      | LPTIM1_IN1<br>ATIM1_CH1<br>UART7_RX<br>I2C3_SCL<br>USART4_TX<br>XSPI_RXDS                                                    |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                              |                                                                                                                                                           |
|--------|---------|---------|----------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                    | N32H482                                                                                                                                                   |
|        |         |         |          |                                                                                                  | GTIM10_CH1<br>EVENTOUT<br>ADC12_IN6                                                                                                                       |
| 9      | 16      | 27      | PC1      | EVENTOUT<br>ADC123_IN11                                                                          | LPTIM1_OUT<br>ATIM1_CH2<br>UART7_TX<br>XSPI_IO4<br>SPI3_MOSI/I2S3_SD<br>SPI2_MOSI/I2S2_SD<br>I2C3_SDA<br>USART4_RX<br>GTIM10_CH2<br>EVENTOUT<br>ADC12_IN7 |
| 10     | 17      | 28      | PC2      | SPI2_MISO<br>I2S2ext_SD<br>EVENTOUT<br>OTG_HS_ULPI_DIR<br>ADC123_IN12                            | SPI2_MISO<br>I2S2_AUX_SD<br>LPTIM1_IN2<br>ATIM1_CH3<br>ATIM3_CH2<br>XSPI_IO5<br>SPI3_NSS/I2S3_WS<br>GTIM10_CH3<br>UART7_TX<br>EVENTOUT<br>ADC12_IN8       |
| 11     | 18      | 29      | PC3      | SPI2_MOSI<br>I2S2_SD<br>EVENTOUT<br>OTG_HS_ULPI_NXT<br>ADC123_IN13                               | SPI2_MOSI/I2S2_SD<br>LPTIM1_ETR<br>ATIM1_CH4<br>ATIM1_BKIN2<br>XSPI_IO6<br>SPI3_SCK/I2S3_CK<br>GTIM10_CH4<br>UART7_RX<br>EVENTOUT<br>ADC12_IN9            |
| -      | 19      | 30      | VDD      | VDD                                                                                              | VDD                                                                                                                                                       |
| 12     | 20      | 31      | VSSA     | VSSA                                                                                             | VSSA                                                                                                                                                      |
| -      | 21      | 32      | VREF+    | VREF+                                                                                            | VREF+                                                                                                                                                     |
| 13     | 22      | 33      | VDDA     | VDDA                                                                                             | VDDA                                                                                                                                                      |
| 14     | 23      | 34      | PA0/WKUP | EVENTOUT<br>TIM2_CH1_ETR<br>TIM5_CH1<br>TIM8_ETR<br>UART4_TX<br>USART2_CTS<br>WKUP<br>ADC123_IN0 | USART2_CTS<br>UART6_TX<br>GTIM1_CH1_ETR<br>GTIM4_CH1<br>ATIM2_ETR<br>ATIM2_BKIN<br>SPI3_MISO<br>ATIM3_CH3N<br>EVENTOUT<br>ADC12_IN3<br>WKUP1<br>RTC_TAMP2 |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                             |                                                                                                                                                                                         |
|--------|---------|---------|----------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                   | N32H482                                                                                                                                                                                 |
| 15     | 24      | 35      | PA1      | EVENTOUT<br>TIM5_CH2<br>TIM2_CH2<br>UART4_RX<br>USART2_RTS<br>ADC123_IN1                        | USART2_RTS_DE<br>UART6_RX<br>GTIM4_CH2<br>GTIM1_CH2<br>GTIM8_CH1N<br>SPI4_MOSI<br>SPI3_MOSI/I2S3_SD<br>SPI6_SCK<br>ATIM3_CH4N<br>EVENTOUT<br>ADC12_IN4<br>RTC_REFIN                     |
| 16     | 25      | 36      | PA2      | EVENTOUT<br>TIM5_CH3<br>TIM9_CH1<br>TIM2_CH3<br>USART2_TX<br>ADC123_IN2                         | USART2_TX<br>GTIM4_CH3<br>GTIM5_CH1<br>GTIM1_CH3<br>GTIM8_CH1_ETR<br>XSPI_NSS0<br>UART7_TX<br>I2S_CKIN<br>SPI6_NSS<br>EVENTOUT<br>ADC1_IN5<br>WKUP4<br>LSCO                             |
| 17     | 26      | 37      | PA3      | EVENTOUT<br>TIM5_CH4<br>TIM9_CH2<br>TIM2_CH4<br>USART2_RX<br>OTG_HS_ULPI_D0<br>ADC123_IN3       | USART2_RX<br>GTIM4_CH4<br>GTIM5_CH2<br>GTIM1_CH4<br>GTIM8_CH2<br>XSPI_CLK<br>UART7_RX<br>I2S2_MCK<br>MCO2<br>EVENTOUT<br>ADC1_IN2                                                       |
| 18     | 27      | 38      | VSS      | VSS                                                                                             | VSS                                                                                                                                                                                     |
| 19     | 28      | 39      | VDD      | VDD                                                                                             | VDD                                                                                                                                                                                     |
| 20     | 29      | 40      | PA4      | SPI1_NSS<br>SPI3_NSS<br>I2S3_WS<br>EVENTOUT<br>USART2_CK<br>OTG_HS_SOF<br>ADC12_IN4<br>DAC_OUT1 | SPI1_NSS<br>SPI3_NSS/I2S3_WS<br>USART2_CK<br>USB_HS_SOF<br>GTIM2_CH2<br>XSPI_NSS1<br>I2C2_SCL<br>SPI6_MISO<br>GTIM7_CH1<br>LPTIM2_IN2<br>USART1_TX<br>EVENTOUT<br>ADC2_IN17<br>DAC1_OUT |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                          |                                                                                                                                                         |
|--------|---------|---------|----------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                | N32H482                                                                                                                                                 |
| 21     | 30      | 41      | PA5      | SPI1_SCK<br>EVENTOUT<br>TIM2_CH1_ETR<br>TIM8_CH1N<br>OTG_HS_ULPI_CK<br>ADC12_IN5<br>DAC_OUT2 | SPI1_SCK<br>GTIM1_CH1_ETR<br>ATIM2_CH1N<br>XSPI_CLK<br>I2C2_SDA<br>SPI6_MOSI<br>USART1_RX<br>XSPI_IO0<br>GTIM7_CH2<br>EVENTOUT<br>ADC2_IN13<br>DAC2_OUT |
| 22     | 31      | 42      | PA6      | SPI1_MISO<br>EVENTOUT<br>TIM8_BKIN<br>TIM13_CH1<br>TIM3_CH1<br>TIM1_BKIN<br>ADC12_IN6        | SPI1_MISO<br>ATIM2_BKIN<br>GTIM9_CH1<br>GTIM2_CH1<br>ATIM1_BKIN<br>XSPI_IO3<br>UART7_CTS<br>I2S2_MCK<br>SDIO_CMD<br>XSPI_IO0<br>EVENTOUT<br>ADC2_IN0    |
| 23     | 32      | 43      | PA7      | SPI1_MOSI<br>EVENTOUT<br>TIM8_CH1N<br>TIM14_CH1<br>TIM3_CH2<br>TIM1_CH1N<br>ADC12_IN7        | SPI1_MOSI<br>ATIM2_CH1N<br>GTIM7_CH1<br>GTIM2_CH2<br>ATIM1_CH1N<br>GTIM10_CH1<br>XSPI_IO2<br>XSPI_IO1<br>MCO1<br>GTIM9_CH2<br>EVENTOUT<br>ADC2_IN2      |
| 24     | 33      | 44      | PC4      | EVENTOUT<br>ADC12_IN14                                                                       | ATIM1_ETR<br>I2C2_SCL<br>USART1_TX<br>XSPI_IO7<br>XSPI_IO2<br>UART7_TX<br>I23_SCL<br>LPTIM2_OUT<br>ATIM3_CH3N<br>EVENTOUT<br>ADC2_IN5                   |
| 25     | 34      | 45      | PC5      | EVENTOUT<br>ADC12_IN15                                                                       | GTIM8_BKIN<br>ATIM1_CH4N<br>USART1_RX<br>XSPI_IO3<br>UART7_RX<br>I2C3_SDA                                                                               |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                           |                                                                                                                                                                                       |
|--------|---------|---------|----------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                 | N32H482                                                                                                                                                                               |
|        |         |         |          |                                                                               | GTIM5_ETR<br>EVENTOUT<br>ADC2_IN11<br>WKUP5                                                                                                                                           |
| 26     | 35      | 46      | PB0      | EVENTOUT<br>TIM3_CH3<br>TIM8_CH2N<br>TIM1_CH2N<br>OTG_HS_ULPI_D1<br>ADC12_IN8 | GTIM2_CH3<br>ATIM2_CH2N<br>ATIM1_CH2N<br>XSPI_IO1<br>SPI5_SCK<br>SPI3_MOSI/I2S3_SD<br>SDIO_D1<br>USART4_TX<br>EVENTOUT<br>ADC3_IN12<br>ADC1_IN1                                       |
| 27     | 36      | 47      | PB1      | EVENTOUT<br>TIM3_CH4<br>TIM8_CH3N<br>TIM1_CH3N<br>OTG_HS_ULPI_D2<br>ADC12_IN9 | GTIM2_CH4<br>ATIM2_CH3N<br>ATIM1_CH3N<br>XSPI_IO0<br>UART7_RTS_DE<br>SPI5_NSS<br>SDIO_D2<br>USART4_RX<br>EVENTOUT<br>ADC1_IN12<br>ADC3_IN1                                            |
| 28     | 37      | 48      | PB2      | EVENTOUT<br>BOOT1                                                             | RTC_OUT2<br>LPTIM1_OUT<br>GTIM4_CH1<br>ATIM3_CH1<br>I2C3_SMBA<br>XSPI_IO5<br>GTIM1_CH4<br>SPI3_MOSI/I2S3_SD<br>SDIO_CLK<br>UART6_TX<br>SPI1_NSS<br>GTIM6_ETR<br>EVENTOUT<br>ADC2_IN12 |
| -      | -       | 49      | PF11     | EVENTOUT                                                                      | ATIM3_ETR<br>FEMC_NE4<br>SPI5_MOSI<br>EVENTOUT                                                                                                                                        |
| -      | -       | 50      | PF12     | FSMC_A6<br>EVENTOUT                                                           | FEMC_A6<br>ATIM3_CH1<br>EVENTOUT                                                                                                                                                      |
| -      | -       | 51      | VSS      | VSS                                                                           | VSS                                                                                                                                                                                   |
| -      | -       | 52      | VDD      | VDD                                                                           | VDD                                                                                                                                                                                   |
| -      | -       | 53      | PF13     | FSMC_A7<br>EVENTOUT                                                           | FEMC_A7<br>ATIM3_CH2<br>I2C4_SMBA<br>MCO1                                                                                                                                             |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function              |                                                                                                            |
|--------|---------|---------|----------|----------------------------------|------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                    | N32H482                                                                                                    |
|        |         |         |          |                                  | EVENTOUT                                                                                                   |
| -      | -       | 54      | PF14     | FSMC_A8<br>EVENTOUT              | FEMC_A8<br>ATIM3_CH3<br>I2C4_SCL<br>MCO2<br>EVENTOUT                                                       |
| -      | -       | 55      | PF15     | FSMC_A9<br>EVENTOUT              | FEMC_A9<br>ATIM3_CH4<br>I2C4_SDA<br>EVENTOUT                                                               |
| -      | -       | 56      | PG0      | FSMC_A10<br>EVENTOUT             | FEMC_A10<br>ATIM3_CH1N<br>UART7_TX<br>GTIM7_CH2<br>EVENTOUT                                                |
| -      | -       | 57      | PG1      | FSMC_A11<br>EVENTOUT             | FEMC_A11<br>ATIM3_CH2N<br>UART7_RX<br>GTIM7_CH3<br>EVENTOUT                                                |
| -      | 38      | 58      | PE7      | FSMC_D4<br>EVENTOUT<br>TIM1_ETR  | FEMC_D4<br>ATIM1_ETR<br>UART7_RX<br>UART6_RX<br>SPI1_SCK<br>GTIM4_CH2<br>GTIM9_CH4<br>EVENTOUT<br>ADC3_IN4 |
| -      | 39      | 59      | PE8      | FSMC_D5<br>EVENTOUT<br>TIM1_CH1N | FEMC_D5<br>ATIM1_CH1N<br>GTIM4_CH3<br>UART7_TX<br>SDIO_D0<br>SPI1_MISO<br>EVENTOUT<br>ADC34_IN6            |
| -      | 40      | 60      | PE9      | FSMC_D6<br>EVENTOUT<br>TIM1_CH1  | FEMC_D6<br>ATIM1_CH1<br>GTIM4_CH4<br>SDIO_D1<br>SPI1_MOSI<br>EVENTOUT<br>ADC3_IN2                          |
| -      | -       | 61      | VSS      | VSS                              | VSS                                                                                                        |
| -      | -       | 62      | VDD      | VDD                              | VDD                                                                                                        |
| -      | 41      | 63      | PE10     | FSMC_D7<br>EVENTOUT<br>TIM1_CH2N | FEMC_D7<br>ATIM1_CH2N<br>XSPI_CLK<br>SDIO_D2<br>SPI2_NSS/I2S2_WS<br>ATIM1_CH1N                             |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function               |                                                                                                                                 |
|--------|---------|---------|----------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                     | N32H482                                                                                                                         |
|        |         |         |          |                                   | GTIM2_CH1<br>GTIM9_CH1<br>USART4_TX<br>EVENTOUT<br>ADC34_IN14                                                                   |
| -      | 42      | 64      | PE11     | FSMC_D8<br>EVENTOUT<br>TIM1_CH2   | FEMC_D8<br>ATIM1_CH2<br>SPI4_NSS<br>XSPI_NSS0<br>SPI5_NSS<br>SDIO_D3<br>SPI2_SCK/I2S2_CK<br>USART4_RX<br>EVENTOUT<br>ADC34_IN15 |
| -      | 43      | 65      | PE12     | FSMC_D9<br>EVENTOUT<br>TIM1_CH3N  | FEMC_D9<br>ATIM1_CH3N<br>SPI4_SCK<br>XSPI_IO0<br>SPI5_SCK<br>SDIO_CLK<br>SPI2_MISO<br>GTIM7_CH4<br>EVENTOUT<br>ADC34_IN16       |
| -      | 44      | 66      | PE13     | FSMC_D10<br>EVENTOUT<br>TIM1_CH3  | FEMC_D10<br>ATIM1_CH3<br>SPI4_MISO<br>XSPI_IO1<br>SPI5_MISO<br>SPI2_MOSI/I2S2_SD<br>SDIO_CMD<br>EVENTOUT<br>ADC3_IN3            |
| -      | 45      | 67      | PE14     | FSMC_D11<br>EVENTOUT<br>TIM1_CH4  | FEMC_D11<br>ATIM1_CH4<br>SPI4_MOSI<br>ATIM1_BKIN2<br>XSPI_IO2<br>SPI5_MOSI<br>EVENTOUT<br>ADC4_IN5                              |
| -      | 46      | 68      | PE15     | FSMC_D12<br>EVENTOUT<br>TIM1_BKIN | FEMC_D12<br>ATIM1_BKIN<br>ATIM1_CH4N<br>XSPI_IO3<br>I2C1_SDA<br>USART4_RX<br>GTIM10_CH1<br>EVENTOUT<br>ADC4_IN2                 |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                                              |                                                                                                                                                                  |
|--------|---------|---------|----------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                                    | N32H482                                                                                                                                                          |
| 29     | 47      | 69      | PB10     | SPI2_SCK<br>I2S2_CK<br>EVENTOUT<br>TIM2_CH3<br>USART3_TX<br>OTG_HS_ULPI_D3<br>I2C2_SCL                           | SPI2_SCK/I2S2_CK<br>I2C2_SCL<br>GTIM1_CH3<br>UART7_RX<br>XSPI_CLK<br>ATIM1_BKIN<br>SDIO_D7<br>FEMC_D11<br>EVENTOUT                                               |
| 30     | 48      | 70      | PB11     | EVENTOUT<br>TIM2_CH4<br>USART3_RX<br>OTG_HS_ULPI_D4<br>I2C2_SDA                                                  | I2C2_SDA<br>GTIM1_CH4<br>UART7_TX<br>XSPI_NSS0<br>I2S_CKIN<br>FEMC_D12<br>EVENTOUT<br>ADC12_IN14                                                                 |
| 31     | 49      | 71      | VCAP_1   | -                                                                                                                | LPTIM2_IN1<br>UART8_CTS<br>ATIM3_BKIN<br>ATIM2_CH4N<br>GTIM5_CH1<br>EVENTOUT<br>PH3                                                                              |
| 32     | 50      | 72      | VDD      | VDD                                                                                                              | VDD                                                                                                                                                              |
| 33     | 51      | 73      | PB12     | SPI2_NSS<br>I2S2_WS<br>EVENTOUT<br>TIM1_BKIN<br>USART3_CK<br>CAN2_RX<br>OTG_HS_ULPI_D5<br>OTG_HS_ID<br>I2C2_SMBA | SPI2_NSS/I2S2_WS<br>I2C2_SMBA<br>USART3_CK<br>ATIM1_BKIN<br>USB_HS_ID<br>GTIM4_ETR<br>UART7_RTS_DE<br>SPI4_NSS<br>GTIM9_CH3<br>EVENTOUT<br>ADC1_IN11<br>ADC4_IN1 |
| 34     | 52      | 74      | PB13     | SPI2_SCK<br>I2S2_CK<br>EVENTOUT<br>TIM1_CH1N<br>USART3_CTS<br>CAN2_TX<br>OTG_HS_ULPI_D6<br>OTG_HS_VBUS           | SPI2_SCK/I2S2_CK<br>USART3_CTS<br>ATIM1_CH1N<br>UART7_CTS<br>SPI4_SCK<br>ATIM1_CH2<br>GTIM10_CH2<br>GTIM9_CH4<br>EVENTOUT<br>USB_HS_VBUS<br>ADC3_IN5             |
| 35     | 53      | 75      | PB14     | SPI2_MISO<br>I2S2ext_SD<br>EVENTOUT<br>TIM1_CH2N                                                                 | SPI2_MISO<br>ATIM1_CH2N<br>GTIM8_CH1<br>ATIM2_CH2N                                                                                                               |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                               |                                                                                                                                                                                                              |
|--------|---------|---------|----------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                     | N32H482                                                                                                                                                                                                      |
|        |         |         |          | TIM12_CH1<br>TIM8_CH2N<br>USART3_RTS<br>OTG_HS_DM                                                 | I2S2_AUX_SD<br>GTIM9_CH2<br><b>USART4_CK</b><br>EVENTOUT<br>USB_HS_DM <sup>(6)</sup><br><b>ADC4_IN4</b><br><b>ADC1_IN0</b>                                                                                   |
| 36     | 54      | 76      | PB15     | SPI2_MOSI<br>I2S2_SD<br>EVENTOUT<br>TIM1_CH3N<br>TIM8_CH3N<br>TIM12_CH2<br>OTG_HS_DP<br>RTC_REFIN | SPI2_MOSI/I2S2_SD<br>ATIM1_CH3N<br>ATIM2_CH3N<br>GTIM8_CH2<br>GTIM8_CH1N<br><b>ATIM2_CH4</b><br><b>UART8_CTS</b><br>EVENTOUT<br>USB_HS_DP <sup>(6)</sup><br>RTC_REFIN<br><b>ADC2_IN15</b><br><b>ADC4_IN3</b> |
| -      | 55      | 77      | PD8      | FSMC_D13<br>EVENTOUT<br>USART3_TX                                                                 | FEMC_D13<br><b>SPI3_NSS/I2S3_WS</b><br><b>ATIM1_CH3</b><br><b>GTIM10_CH1</b><br>EVENTOUT<br><b>ADC4_IN12</b>                                                                                                 |
| -      | 56      | 78      | PD9      | FSMC_D14<br>EVENTOUT<br>USART3_RX                                                                 | FEMC_D14<br><b>SPI3_SCK/I2S3_CK</b><br><b>ATIM1_CH3N</b><br><b>GTIM9_CH3</b><br><b>GTIM7_ETR</b><br><b>GTIM10_CH2</b><br>EVENTOUT<br><b>ADC4_IN13</b>                                                        |
| -      | 57      | 79      | PD10     | FSMC_D15<br>EVENTOUT<br>USART3_CK                                                                 | FEMC_D15<br>USART3_CK<br><b>ATIM1_CH4</b><br><b>ATIM3_ETR</b><br>EVENTOUT<br><b>ADC34_IN7</b>                                                                                                                |
| -      | 58      | 80      | PD11     | FSMC_CLE<br>FSMC_A16<br>EVENTOUT<br>USART3_CTS                                                    | FEMC_CLE/FEMC_A16<br>USART3_CTS<br><b>GTIM4_ETR</b><br><b>I2C4_SMBA</b><br><b>SPI3_MISO</b><br><b>USART4_TX</b><br><b>I2C1_SCL</b><br><b>GTIM10_CH3</b><br>EVENTOUT<br><b>ADC34_IN8</b>                      |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                        |                                                                                                               |
|--------|---------|---------|----------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                              | N32H482                                                                                                       |
| -      | 59      | 81      | PD12     | FSMC_ALE<br>FSMC_A17<br>EVENTOUT<br>TIM4_CH1<br>USART3_RTS | FEMC_ALE/FEMC_A17<br>GTIM3_CH1<br>SPI3_MOSI/I2S3_SD<br>GTIM6_CH1<br>EVENTOUT<br>ADC34_IN9                     |
| -      | 60      | 82      | PD13     | FSMC_A18<br>EVENTOUT<br>TIM4_CH2                           | FEMC_A18<br>GTIM3_CH2<br>XSPI_RXDS<br>GTIM6_CH2<br>EVENTOUT<br>ADC34_IN10                                     |
| -      | -       | 83      | VSS      | VSS                                                        | VSS                                                                                                           |
| -      | -       | 84      | VDD      | VDD                                                        | VDD                                                                                                           |
| -      | 61      | 85      | PD14     | FSMC_D0<br>EVENTOUT<br>TIM4_CH3                            | FEMC_D0<br>GTIM3_CH3<br>I2C4_SCL<br>ATIM2_CH1<br>GTIM10_CH4<br>GTIM6_CH3<br>EVENTOUT<br>ADC34_IN11            |
| -      | 62      | 86      | PD15     | FSMC_D1<br>EVENTOUT<br>TIM4_CH4                            | FEMC_D1<br>GTIM3_CH4<br>SPI2_NSS<br>I2C4_SDA<br>ATIM2_CH2<br>ATIM2_CH1N<br>GTIM8_CH1<br>GTIM6_CH4<br>EVENTOUT |
| -      | -       | 87      | PG2      | FSMC_A12<br>EVENTOUT                                       | FEMC_A12<br>ATIM3_CH3N<br>SPI1_SCK<br>I2C2_SCL<br>GTIM5_ETR<br>EVENTOUT                                       |
| -      | -       | 88      | PG3      | FSMC_A13<br>EVENTOUT                                       | FEMC_A13<br>ATIM3_BKIN<br>I2C4_SCL<br>SPI1_MISO<br>ATIM3_CH4N<br>I2C2_SDA<br>EVENTOUT                         |
| -      | -       | 89      | PG4      | FSMC_A14<br>EVENTOUT                                       | FEMC_A14<br>ATIM3_BKIN2<br>I2C4_SDA<br>SPI1_MOSI<br>GTIM6_ETR<br>EVENTOUT                                     |
| -      | -       | 90      | PG5      | FSMC_A15<br>EVENTOUT                                       | FEMC_A15<br>ATIM3_ETR                                                                                         |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                  |                                                                                                                                                                                                  |
|--------|---------|---------|----------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                        | N32H482                                                                                                                                                                                          |
|        |         |         |          |                                                                      | <b>SPI1_NSS</b><br><b>UART7_CTS</b><br>EVENTOUT                                                                                                                                                  |
| -      | -       | 91      | PG6      | FSMC_INT2<br>EVENTOUT                                                | FEMC_INT2<br><b>ATIM3_BKIN</b><br><b>I2C3_SMBA</b><br><b>UART7_RTS_DE</b><br>EVENTOUT                                                                                                            |
| -      | -       | 92      | PG7      | FSMC_INT3<br>EVENTOUT<br>USART6_CK                                   | FEMC_INT3<br>USART4_CK<br><b>I2C3_SCL</b><br><b>UART7_TX</b><br>EVENTOUT                                                                                                                         |
| -      | -       | 93      | PG8      | EVENTOUT<br>USART6_RTS                                               | USART4_RTS_DE<br><b>I2C3_SDA</b><br><b>UART7_RX</b><br>FEMC_NE3<br><b>XSPI_NSS1</b><br>EVENTOUT                                                                                                  |
| -      | -       | 94      | VSS      | VSS                                                                  | VSS                                                                                                                                                                                              |
| -      | -       | 95      | VDD      | VDD                                                                  | VDD                                                                                                                                                                                              |
| 37     | 63      | 96      | PC6      | I2S2_MCK<br>EVENTOUT<br>TIM8_CH1<br>TIM3_CH1<br>USART6_TX<br>SDIO_D6 | I2S2_MCK<br>ATIM2_CH1<br>SDIO_D6<br>USART4_TX<br>GTIM2_CH1<br><b>I2C4_SCL</b><br><b>SPI2_NSS/I2S2_WS</b><br><b>USART2_CTS</b><br><b>FEMC_A16</b><br>ATIM2_CH2<br>EVENTOUT                        |
| 38     | 64      | 97      | PC7      | I2S3_MCK<br>EVENTOUT<br>TIM8_CH2<br>TIM3_CH2<br>USART6_RX<br>SDIO_D7 | I2S3_MCK<br>ATIM2_CH2<br>SDIO_D7<br>USART4_RX<br>GTIM2_CH2<br><b>I2C4_SDA</b><br><b>SPI2_SCK/I2S_CK</b><br><b>USART2_RTS_DE</b><br><b>FEMC_A17</b><br><b>ATIM2_CH2N</b><br>GTIM8_CH2<br>EVENTOUT |
| 39     | 65      | 98      | PC8      | EVENTOUT<br>TIM8_CH3<br>TIM3_CH3<br>USART6_CK<br>SDIO_D0             | ATIM2_CH3<br>SDIO_D0<br>GTIM2_CH3<br>USART4_CK<br>ATIM3_CH3<br><b>I2C3_SCL</b><br><b>SPI2_MISO</b><br><b>USART2_TX</b><br>EVENTOUT                                                               |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                         |                                                                                                                                                                                  |
|--------|---------|---------|----------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                               | N32H482                                                                                                                                                                          |
| 40     | 66      | 99      | PC9      | I2S_CKIN<br>EVENTOUT<br>TIM8_CH4<br>TIM3_CH4<br>I2C3_SDA<br>SDIO_D1<br>MCO2 | I2S_CKIN<br>MCO2<br>ATIM2_CH4<br>SDIO_D1<br>I2C3_SDA<br>GTIM2_CH4<br>ATIM2_BKIN2<br>SPI2_MOSI/I2S2_SD<br>USART2_RX<br>FEMC_NOE<br>ATIM2_CH3N<br>GTIM8_CH3<br>EVENTOUT            |
| 41     | 67      | 100     | PA8      | EVENTOUT<br>TIM1_CH1<br>USART1_CK<br>OTG_FS_SOF<br>I2C3_SCL<br>MCO1         | MCO1<br>USART1_CK<br>ATIM1_CH1<br>I2C3_SCL<br>I2C2_SDA<br>I2S2_MCK<br>I2C2_SMBA<br>GTIM3_ETR<br>SDIO_D1<br>EVENTOUT<br>ADC3_IN18                                                 |
| 42     | 68      | 101     | PA9      | EVENTOUT<br>TIM1_CH2<br>USART1_TX<br>OTG_FS_VBUS<br>I2C3_SMBA               | USART1_TX<br>ATIM1_CH2<br>I2C3_SMBA<br>I2C2_SCL<br>I2S3_MCK<br>GTIM8_BKIN<br>GTIM1_CH3<br>SPI2_SCK/I2S2_CK<br>SDIO_D2<br>I2C4_SCL<br>I2C1_SCL<br>EVENTOUT<br>ADC4_IN18           |
| 43     | 69      | 102     | PA10     | EVENTOUT<br>TIM1_CH3<br>USART1_RX<br>OTG_FS_ID                              | USART1_RX<br>ATIM1_CH3<br>GTIM10_BKIN<br>I2C2_SMBA<br>SPI2_MISO<br>GTIM1_CH4<br>ATIM2_BKIN<br>I2C2_SDA<br>I2S2_AUX_SD<br>SPI5_MOSI<br>I2C4_SDA<br>FEMC_NWE<br>EVENTOUT<br>PVD_IN |
| 44     | 70      | 103     | PA11     | EVENTOUT<br>TIM1_CH4                                                        | USART1_CTS<br>ATIM1_CH4                                                                                                                                                          |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                        |                                                                                                                                               |
|--------|---------|---------|----------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                              | N32H482                                                                                                                                       |
|        |         |         |          | USART1_CTS<br>CAN1_RX<br>OTG_FS_DM                         | USB_FS_DM<br>SPI2_MOSI/I2S2_SD<br>ATIM1_CH1N<br>GTIM3_CH1<br>ATIM1_BKIN2<br>SPI4_MISO<br>USART4_TX<br>ATIM2_CH3N<br>EVENTOUT                  |
| 45     | 71      | 104     | PA12     | EVENTOUT<br>TIM1_ETR<br>USART1_RTS<br>CAN1_TX<br>OTG_FS_DP | USART1_RTS_DE<br>ATIM1_ETR<br>USB_FS_DP<br>GTIM9_CH1<br>I2S_CKIN<br>ATIM1_CH2N<br>GTIM3_CH2<br>SPI4_MOSI<br>USART4_RX<br>SPI2_NSS<br>EVENTOUT |
| 46     | 72      | 105     | PA13     | EVENTOUT<br>JTMS-SWDIO                                     | JTMS-SWDIO<br>GTIM9_CH1N<br>I2C4_SCL<br>I2C1_SCL<br>IR_OUT<br>USART3_CTS<br>GTIM3_CH3<br>UART6_TX<br>GTIM8_CH3<br>EVENTOUT                    |
| 47     | 73      | 106     | VCAP_2   | VCAP_2                                                     | USART4_RTS_DE<br>USART1_RX<br>GTIM3_CH4<br>GTIM9_CH3<br>EVENTOUT<br>PH2                                                                       |
| -      | 74      | 107     | VSS      | VSS                                                        | VSS                                                                                                                                           |
| 48     | 75      | 108     | VDD      | VDD                                                        | VDD                                                                                                                                           |
| 49     | 76      | 109     | PA14     | EVENTOUT<br>JTCK-SWCLK                                     | JTCK-SWCLK<br>LPTIM1_OUT<br>I2C4_SMBA<br>I2C1_SDA<br>ATIM2_CH2<br>ATIM1_BKIN<br>USART2_TX<br>UART6_RX<br>GTIM8_CH4<br>EVENTOUT                |
| 50     | 77      | 110     | PA15     | SPI3_NSS<br>SPI1_NSS<br>I2S3_WS<br>EVENTOUT                | JTDI<br>SPI3_NSS/I2S3_WS<br>GTIM1_CH1_ETR<br>SPI1_NSS<br>ATIM2_CH1                                                                            |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                     |                                                                                                                                      |
|--------|---------|---------|----------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                           | N32H482                                                                                                                              |
|        |         |         |          | TIM2_CH1_ETR<br>JTDI                                                    | I2C1_SCL<br>USART2_RX<br>UART6_RTS_DE<br>ATIM1_BKIN<br>UART1_TX<br>USART2_CTS<br>ATIM2_CH1N<br>ATIM3_ETR<br>EVENTOUT                 |
| 51     | 78      | 111     | PC10     | SPI3_SCK<br>I2S3_CK<br>EVENTOUT<br>UART4_TX<br>USART3_TX<br>SDIO_D2     | SPI3_SCK/I2S3_CK<br>UART6_TX<br>SDIO_D2<br>ATIM2_CH1N<br>XSPI_NSS1<br>GTIM9_CH4<br>EVENTOUT                                          |
| 52     | 79      | 112     | PC11     | SPI3_MISO<br>I2S3ext_SD<br>EVENTOUT<br>UART4_RX<br>USART3_RX<br>SDIO_D3 | UART6_RX<br>SPI3_MISO<br>SDIO_D3<br>I2S3_AUX_SD<br>ATIM2_CH2N<br>I2C3_SDA<br>XSPI_CLK<br>GTIM10_ETR<br>ATIM3_CH2<br>EVENTOUT         |
| 53     | 80      | 113     | PC12     | SPI3_MOSI<br>I2S3_SD<br>EVENTOUT<br>UART5_TX<br>USART3_CK<br>SDIO_CK    | SDIO_CLK<br>SPI3_MOSI/I2S3_SD<br>USART3_CK<br>GTIM4_CH2<br>ATIM2_CH3N<br>I2C2_SDA<br>XSPI_IO0<br>ATIM2_CH2N<br>ATIM3_CH3<br>EVENTOUT |
| -      | 81      | 114     | PD0      | FSMC_D2<br>EVENTOUT<br>CAN1_RX                                          | FEMC_D2<br>ATIM2_CH4N<br>SPI4_MISO<br>SPI3_MOSI<br>UART6_TX<br>XSPI_IO1<br>ATIM3_CH4<br>EVENTOUT                                     |
| -      | 82      | 115     | PD1      | FSMC_D3<br>EVENTOUT<br>CAN1_TX                                          | FEMC_D3<br>ATIM2_CH4<br>ATIM2_BKIN2<br>SPI2_NSS/I2S2_WS<br>UART6_RX<br>XSPI_IO2<br>I2C1_SDA<br>EVENTOUT                              |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                            |                                                                                                                                                                 |
|--------|---------|---------|----------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                  | N32H482                                                                                                                                                         |
| 54     | 83      | 116     | PD2      | EVENTOUT<br>TIM3_ETR<br>UART5_RX<br>SDIO_CMD   | GTIM2_ETR<br>SDIO_CMD<br>ATIM2_BKIN<br>SPI3_NSS/I2S3_WS<br>XSPI_IO3<br>ATIM2_CH3N<br>SPI2_MOSI<br>ATIM1_CH4<br>ATIM2_CH4N<br>ATIM3_CH4<br>GTIM5_CH2<br>EVENTOUT |
| -      | 84      | 117     | PD3      | FSMC_CLK<br>EVENTOUT<br>USART2_CTS             | FEMC_CLK<br>USART2_CTS<br>GTIM1_CH1_ETR<br>XSPI_NSS0<br>SPI2_SCK/I2S2_CK<br>EVENTOUT                                                                            |
| -      | 85      | 118     | PD4      | FSMC_NOE<br>EVENTOUT<br>USART2_RTS             | FEMC_NOE<br>USART2_RTS_DE<br>GTIM1_CH2<br>XSPI_IO4<br>EVENTOUT                                                                                                  |
| -      | 86      | 119     | PD5      | FSMC_NWE<br>EVENTOUT<br>USART2_TX              | FEMC_NWE<br>USART2_TX<br>XSPI_IO5<br>GTIM6_CH1<br>ATIM1_CH4N<br>EVENTOUT                                                                                        |
| -      | -       | 120     | VSS      | VSS                                            | VSS                                                                                                                                                             |
| -      | -       | 121     | VDD      | VDD                                            | VDD                                                                                                                                                             |
| -      | 87      | 122     | PD6      | FSMC_NWAIT<br>EVENTOUT<br>USART2_RX            | FEMC_NWAIT<br>USART2_RX<br>GTIM1_CH4<br>XSPI_IO6<br>SPI3_MOSI/I2S3_SD<br>GTIM9_ETR<br>EVENTOUT                                                                  |
| -      | 88      | 123     | PD7      | FSMC_NE1<br>FSMC_NCE2<br>EVENTOUT<br>USART2_CK | USART2_CK<br>FEMC_NE1/FEMC_NCE2<br>GTIM1_CH3<br>XSPI_IO7<br>EVENTOUT                                                                                            |
| -      | -       | 124     | PG9      | FSMC_NE2<br>FSMC_NCE3<br>EVENTOUT<br>USART6_RX | USART4_RX<br>FEMC_NE2/FEMC_NCE3<br>SPI3_SCK<br>USART1_TX<br>GTIM8_CH1N<br>SPI2_MOSI<br>GTIM6_CH2<br>SPI2_MISO<br>EVENTOUT                                       |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                         |                                                                                                                                                                            |
|--------|---------|---------|----------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                               | N32H482                                                                                                                                                                    |
| -      | -       | 125     | PG10     | FSMC_NCE4_1<br>FSMC_NE3<br>EVENTOUT                                         | FEMC_NE3<br>XSPI_IO2<br>GTIM7_CH1<br>EVENTOUT                                                                                                                              |
| -      | -       | 126     | PG11     | FSMC_NCE4_2<br>EVENTOUT                                                     | XSPI_IO3<br>SPI4_SCK<br>GTIM7_CH2<br>EVENTOUT                                                                                                                              |
| -      | -       | 127     | PG12     | FSMC_NE4<br>EVENTOUT<br>USART6_RTS                                          | FEMC_NE4<br>USART4_RTS_DE<br>XSPI_D1<br>SPI4_MISO<br>GTIM7_CH3<br>EVENTOUT                                                                                                 |
| -      | -       | 128     | PG13     | FSMC_A24<br>EVENTOUT<br>USART6_CTS                                          | FEMC_A24<br>USART4_CTS<br>XSPI_CLK<br>SPI4_MOSI<br>GTIM7_CH4<br>EVENTOUT                                                                                                   |
| -      | -       | 129     | PG14     | FSMC_A25<br>EVENTOUT<br>USART6_TX                                           | FEMC_A25<br>USART4_TX<br>XSPI_D0<br>SPI4_NSS<br>SPI2_MISO<br>I2C1_SCL<br>GTIM6_CH3<br>ATIM2_CH4<br>EVENTOUT                                                                |
| -      | -       | 130     | VSS      | VSS                                                                         | VSS                                                                                                                                                                        |
| -      | -       | 131     | VDD      | VDD                                                                         | VDD                                                                                                                                                                        |
| -      | -       | 132     | PG15     | EVENTOUT<br>USART6_CTS                                                      | USART4_CTS<br>GTIM6_CH4<br>I2C1_SDA<br>SPI6_NSS<br>ATIM2_CH4N<br>USART1_RX<br>EVENTOUT                                                                                     |
| 55     | 89      | 133     | PB3      | TRACESWO<br>SPI3_SCK<br>SPI1_SCK<br>I2S3_CK<br>EVENTOUT<br>TIM2_CH2<br>JTDO | JTDO<br>SPI3_SCK/I2S3_CK<br>GTIM1_CH2<br>SPI1_SCK<br>GTIM3_ETR<br>ATIM2_CH1N<br>USART2_TX<br>GTIM2_ETR<br>USART1_RX<br>I2C2_SDA<br>USART2_RTS_DE<br>ATIM2_BKIN<br>EVENTOUT |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                                 |                                                                                                                                                                                                    |
|--------|---------|---------|----------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                                       | N32H482                                                                                                                                                                                            |
| 56     | 90      | 134     | PB4      | SPI1_MISO<br>SPI3_MISO<br>I2S3ext_SD<br>EVENTOUT<br>TIM3_CH1<br>NJTRST                              | NJTRST<br>SPI3_MISO<br>GTIM2_CH1<br>SPI1_MISO<br>I2S3_AUX_SD<br>GTIM9_CH1_ETR<br>ATIM2_CH2N<br>USART2_RX<br>GTIM10_BKIN<br>I2C3_SDA<br>SDIO_D0<br>ATIM2_ETR<br>LPTIM2_IN1<br>USART2_TX<br>EVENTOUT |
| 57     | 91      | 135     | PB5      | SPI1_MOSI<br>SPI3_MOSI<br>I2S3_SD<br>EVENTOUT<br>TIM3_CH2<br>CAN2_RX<br>OTG_HS_ULPI_D7<br>I2C1_SMBA | I2C1_SMBA<br>GTIM2_CH2<br>SPI1_MOSI<br>SPI3_MOSI/I2S3_SD<br>GTIM9_BKIN<br>ATIM2_CH3N<br>USART2_CK<br>I2C3_SDA<br>GTIM10_CH1<br>LPTIM1_IN1<br>UART5_CTS<br>USART2_RX<br>EVENTOUT                    |
| 58     | 92      | 136     | PB6      | EVENTOUT<br>TIM4_CH1<br>USART1_TX<br>CAN2_TX<br>I2C1_SCL                                            | I2C1_SCL<br>GTIM3_CH1<br>USART1_TX<br>GTIM9_CH1N<br>ATIM2_CH1<br>ATIM2_ETR<br>ATIM2_BKIN2<br>LPTIM1_ETR<br>FEMC_NE2/FEMC_NCE3<br>EVENTOUT                                                          |
| 59     | 93      | 137     | PB7      | FSMC_NL<br>EVENTOUT<br>TIM4_CH2<br>USART1_RX<br>I2C1_SDA                                            | I2C1_SDA<br>FEMC_NADV<br>USART1_RX<br>GTIM3_CH2<br>GTIM10_CH1N<br>ATIM2_BKIN<br>GTIM2_CH4<br>I2C4_SDA<br>LPTIM1_IN2<br>UART6_CTS<br>EVENTOUT<br>PVD_IN                                             |
| 60     | 94      | 138     | BOOT0    | VPP                                                                                                 | GTIM4_CH1<br>GTIM10_CH1N<br>USART1_TX                                                                                                                                                              |

| LQFP64 | LQFP100 | LQFP144 | Pin name | Pins Reuse function                                                                        |                                                                                                                                                        |
|--------|---------|---------|----------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |         |         |          | STM32F405/415                                                                              | N32H482                                                                                                                                                |
|        |         |         |          |                                                                                            | EVEVTOUT<br>PH4                                                                                                                                        |
| 61     | 95      | 139     | PB8      | EVENTOUT<br>TIM4_CH3<br>TIM10_CH1<br>CAN1_RX<br>I2C1_SCL<br>SDIO_D4                        | GTIM3_CH3<br>SDIO_D4<br>GTIM6_CH1<br>I2C1_SCL<br>GTIM9_CH1<br>ATIM2_CH2<br>ATIM1_BKIN<br>SPI5_MOSI<br>FMEC_NWAIT<br>GTIM9_CH4<br>EVENTOUT              |
| 62     | 96      | 140     | PB9      | SPI2_NSS<br>I2S2_WS<br>EVENTOUT<br>TIM4_CH4<br>TIM11_CH1<br>CAN1_TX<br>I2C1_SDA<br>SDIO_D5 | SPI2_NSS/I2S2_WS<br>GTIM3_CH4<br>GTIM7_CH1<br>SDIO_D5<br>I2C1_SDA<br>GTIM10_CH1<br>ATIM2_CH3<br>ATIM1_CH3N<br>FEMC_NE1/FEMC_NCE2<br>EVENTOUT<br>IR-OUT |
| -      | 97      | 141     | PE0      | FSMC_NBL0<br>EVENTOUT<br>TIM4_ETR                                                          | GTIM3_ETR<br>FEMC_NBL0<br>ATIM3_ETR<br>ATIM3_CH4N<br>GTIM9_CH1<br>USART1_TX<br>EVENTOUT                                                                |
| -      | 98      | 142     | PE1      | FSMC_NBL1<br>EVENTOUT                                                                      | FEMC_NBL1<br>GTIM10_CH1<br>ATIM3_CH4<br>USART1_RX<br>EVENTOUT                                                                                          |
|        | -       | 143     | PDR_ON   | PDR_ON                                                                                     | EVENTOUT<br>PH5                                                                                                                                        |
| 63     | -       | -       | VSS      | -                                                                                          | -                                                                                                                                                      |
| 64     | 100     | 144     | VDD      | VDD                                                                                        | VDD                                                                                                                                                    |

## 4 Minimum System Design

The minimum system design for N32H482 has the following considerations, which can be referred to in the hardware design guide "CN\_UG\_N32H47X&N32H48X Series Hardware Design Guide":

### ● Power supply

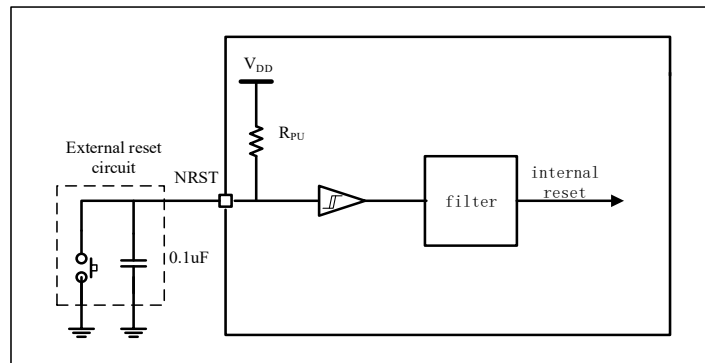
VDD is the main power supply for MCU and must be powered by a stable external power supply with a voltage range of 1.8V~3.6V. A 0.1uF decoupling capacitor should be placed nearby for all VDD pins, and an additional 10uF decoupling capacitor should be added to one VDD pin. Please refer to the hardware design guide for the specific design of decoupling capacitors.

VDDA is an analog power supply that provides power to ADC, DAC, and COMP. It is recommended to place a 0.1uF and a 10uF capacitor on the VDDA input pin.

VREF+ serves as the reference voltage, providing reference levels for ADC and DAC. When VREF+ uses the built-in reference source VREFBUF, it is recommended to place a 0.1uF and a 1uF capacitor near the VREF+ pin. When VREF+ is powered externally, it is recommended to place a 0.1uF and a 10uF capacitor near the VREF+ pin.

### ● External pin reset circuit

When a low level (external reset) appears on the NRST pin, a system reset will occur. The external NRST pin reset reference circuit is as follows:



*Note: The reset pin NRST cannot be left hanging during design. The external capacitor 0.1uF is given as a typical reference value. If the reset time needs to be accelerated, the NRST pin can be pulled up. In addition, users can decide whether to add a reset button according to their actual product needs.*

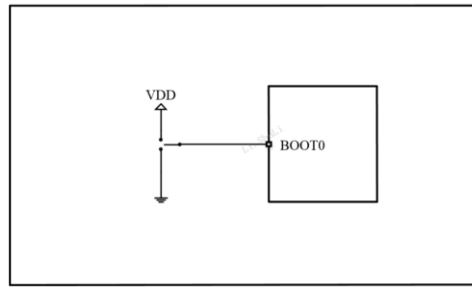
### ● External clock circuit

The N32H482 series MCU includes two external clocks: an external high-speed clock HSE (4MHz~32MHz) and an external low-speed clock LSE (typically using 32.768KHz).

HSE and LSE are configured with corresponding load capacitors based on the crystal oscillator characteristics. For details, please refer to the external clock characteristic description in the relevant data manual.

### ● Boot pin connection

The following figure shows the external connections required for selecting a boot memory for the N32H482 series chip. Please refer to the relevant sections of the user manual for the startup mode.



## 5 Main Functional Differences

The following table only lists the main differences. For other detailed functions, please refer to the data manual and user manual:

| Device model           | STM32F405/415 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N32H482 series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| System Clock           | Main frequency 168M, AHB bus up to 168M                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Main frequency 200M, AHB bus up to 200M                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| External clock source  | HSE 4-26M (Bypass 1-50M)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | HSE 4-32M (Bypass 1-50M)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Internal clock source  | HSI(16M)、LSI(32K)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | HSI(8M)、LSI(32K)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| operation temperature  | -40~85°C or -40~105°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -40~105°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| External interrupt     | <ul style="list-style-type: none"> <li>➢ 16 configurable external pin interrupts</li> <li>➢ 7 configurable peripheral interrupts</li> </ul>                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>➢ 16 configurable external pin interrupts, supporting full pin mapping</li> <li>➢ 16 configurable peripheral interrupts</li> </ul>                                                                                                                                                                                                                                                                                                                                      |
| BOR                    | ➢ Three configurable gears                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ➢ Five configurable gears                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PVD                    | ➢ Eight configurable gears                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>➢ Two configurable detection voltage intervals</li> <li>➢ Each detection voltage interval supports 8 configurable gears</li> </ul>                                                                                                                                                                                                                                                                                                                                      |
| low power mode         | <ul style="list-style-type: none"> <li>➢ Four low-power modes: Sleep mode</li> <li>➢ Stop mode</li> <li>➢ Standby mode</li> <li>➢ VBAT mode</li> </ul>                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>➢ Four low-power modes: Sleep mode</li> <li>➢ Stop mode</li> <li>➢ Standby mode</li> <li>➢ VBAT mode</li> </ul>                                                                                                                                                                                                                                                                                                                                                         |
| Low speed clock output | ➢ Not supported                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ➢ Supports low-speed clock output in Stop0/Standby mode                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Standby wake-up        | ➢ 1 configurable wake-up pin                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ➢ 5 configurable wake-up pins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Storage                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| FLASH                  | <ul style="list-style-type: none"> <li>➢ Page size 16KB (4 pieces)</li> <li>➢ Page size 64KB (1 piece)</li> <li>➢ Page size 128KB (7 pieces)</li> </ul>                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>➢ Page size 8KB</li> <li>➢ Support ECC verification</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          |
| SRAM                   | <ul style="list-style-type: none"> <li>➢ 112KB Universal SRAM1</li> <li>➢ 16KB Universal SRAM2</li> <li>➢ 64KB CCM SRAM, can only be used for data storage and only supports CPU access</li> <li>➢ 4KB Backup SRAM</li> </ul>                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>➢ 160KB general-purpose SRAM, supporting parity check</li> <li>➢ 32KB CCM SRAM, supporting ECC</li> <li>➢ 4KB Backup SRAM, supports ECC</li> </ul>                                                                                                                                                                                                                                                                                                                      |
| Expanded storage       | <ul style="list-style-type: none"> <li>➢ XSPI: Not supported</li> <li>➢ FSMC: Support PC Card</li> <li>➢ SDIO: Compatible with SD 2.0, SDIO 2.0, MMC 4.2</li> <li>➢ Support CE-ATA V1.1</li> </ul>                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>➢ XSPI: 1/2/4/8-bit data cable</li> <li>➢ The size of the data can be configured during read and write operations</li> <li>➢ FEMC: Not supported PC Card</li> <li>➢ SDIO: Compatible with SD 2.0、SDIO 2.0、MMC 4.2</li> <li>➢ Not supported CE-ATA</li> </ul>                                                                                                                                                                                                            |
| Peripherals            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Advanced Timer         | <ul style="list-style-type: none"> <li>➢ Name: TIM1/8</li> <li>➢ The highest resolution is 5.95ns</li> <li>➢ 4 comparison outputs, including 4 external input/output channels and 3 pairs of complementary output channels</li> </ul>                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>➢ Name: ATIM1/2/3</li> <li>➢ The highest resolution is 5ns</li> <li>➢ 9-way comparison output</li> <li>➢ Four external input/output channels</li> <li>➢ Four complementary output channels</li> </ul>                                                                                                                                                                                                                                                                   |
| General Timer          | <ul style="list-style-type: none"> <li>➢ Name: TIM2/3/4/5/9/10/11/12/13/14</li> <li>➢ TIM2/3/4/5/12/13/14 maximum resolution 11.9ns</li> <li>➢ TIM9/10/11 maximum resolution 5.95ns</li> <li>➢ TIM2/5 supports 32-bit counting</li> <li>➢ TIM3/4/9/10/11/12/13/14 supports 16 bit counting</li> <li>➢ TIM2/3/4/5 supports 4 comparison outputs, including 4 external input/output channels</li> <li>➢ TIM9/10/11/12/13/14 supports 2 comparison outputs, including 2 external input/output</li> </ul> | <ul style="list-style-type: none"> <li>➢ Name: GTIM1~10</li> <li>➢ GTIM1-7 has a maximum resolution of 5.56ns</li> <li>➢ GTIM8-10 with a maximum resolution of 5ns</li> <li>➢ GTIM1~10 supports 16 bit counting</li> <li>➢ GTIM1-7 supports 4 comparison outputs, including 4 external input/output channels</li> <li>➢ GTIM8/9/10 supports 5 comparison outputs, including 4 external input/output channels and 1 pair of complementary output channels</li> <li>➢ GTIM8/9/10 supports brake input</li> </ul> |

|             |                                                                                                                                                                                                           |                                                                                                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | channels                                                                                                                                                                                                  |                                                                                                                                                                                                                                                       |
| Basic timer | <ul style="list-style-type: none"> <li>➤ Name: TIM6/7</li> <li>➤ The highest resolution is 11.9ns</li> <li>➤ Supports 16 bit counting</li> </ul>                                                          | <ul style="list-style-type: none"> <li>➤ Name: BTIM1/2</li> <li>➤ The highest resolution is 5.56ns</li> <li>➤ Supports 32-bit counting</li> </ul>                                                                                                     |
| LPTIM       | ➤ Not supported                                                                                                                                                                                           | ➤ 2                                                                                                                                                                                                                                                   |
| WWDG        | ➤ 7bit                                                                                                                                                                                                    | ➤ 14bit                                                                                                                                                                                                                                               |
| IWDG        | ➤ Freezing is not supported                                                                                                                                                                               | ➤ Support freezing IWDG in low-power mode                                                                                                                                                                                                             |
| SPI         | <ul style="list-style-type: none"> <li>➤ 3*SPI</li> <li>➤ Maximum 75MHz</li> </ul>                                                                                                                        | <ul style="list-style-type: none"> <li>➤ 6*SPI</li> <li>➤ Maximum 60MHz</li> </ul>                                                                                                                                                                    |
| I2S         | ➤ 2 * I2S, supports full duplex communication                                                                                                                                                             | ➤ 2 * I2S, supports full duplex communication                                                                                                                                                                                                         |
| I2C         | <ul style="list-style-type: none"> <li>➤ 3*I2C</li> <li>➤ Maximum 400KHz</li> </ul>                                                                                                                       | <ul style="list-style-type: none"> <li>➤ 4*I2C</li> <li>➤ Maximum 1MHz</li> </ul>                                                                                                                                                                     |
| USART       | <ul style="list-style-type: none"> <li>➤ 4*USART</li> <li>➤ Pin swapping is not supported</li> <li>➤ Does not support RS-485 hardware flow control</li> </ul>                                             | <ul style="list-style-type: none"> <li>➤ 4*USART</li> <li>➤ Support pin swapping</li> <li>➤ Supports RS-485 hardware flow control</li> <li>➤ USART3 TX/RX/RTS de supports full pin mapping</li> </ul>                                                 |
| UART        | <ul style="list-style-type: none"> <li>➤ 2*UART</li> <li>➤ Pin swapping is not supported</li> <li>➤ Does not support RS-485 hardware flow control</li> </ul>                                              | <ul style="list-style-type: none"> <li>➤ 4*UART</li> <li>➤ Support pin swapping</li> <li>➤ Supports RS-485 hardware flow control</li> <li>➤ UART5/8 TX/RX/RTS de supports full pin mapping</li> </ul>                                                 |
| CAN         | <ul style="list-style-type: none"> <li>➤ Only supports CAN 2.0A/B</li> <li>➤ Not supporting full pin mapping</li> </ul>                                                                                   | <ul style="list-style-type: none"> <li>➤ Supports CAN 2.0A/B and FDCAN</li> <li>➤ Support full pin mapping</li> </ul>                                                                                                                                 |
| USB FS      | ➤ 1*USB FS OTG                                                                                                                                                                                            | ➤ 1*USB FS Device                                                                                                                                                                                                                                     |
| USB HS      | <ul style="list-style-type: none"> <li>➤ 1*USB HS OTG</li> <li>➤ Built in FS PHY</li> <li>➤ HS requires an external PHY chip</li> </ul>                                                                   | ➤ 1*USB HS DualRole                                                                                                                                                                                                                                   |
| RTC         | <ul style="list-style-type: none"> <li>➤ Two intrusion detection pins</li> <li>➤ One timestamp triggers the input pin</li> </ul>                                                                          | <ul style="list-style-type: none"> <li>➤ 3 intrusion detection pins: PC13/PE6/PA0</li> <li>➤ 16 external interrupts EXTI0~15 can be configured as timestamp trigger sources</li> </ul>                                                                |
| ADC         | <ul style="list-style-type: none"> <li>➤ 3*ADC</li> <li>➤ Up to 24 external channels</li> <li>➤ Single channel maximum 2.4MSPS</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>➤ 4*ADC</li> <li>➤ Up to 51 external channels</li> <li>➤ Maximum 4.7MSPS</li> </ul>                                                                                                                            |
| DAC         | <ul style="list-style-type: none"> <li>➤ 2*DAC</li> <li>➤ Up to 2 external channels</li> </ul>                                                                                                            | <ul style="list-style-type: none"> <li>➤ 8*DAC</li> <li>➤ Up to 4 external channels</li> </ul>                                                                                                                                                        |
| VREFBUF     | ➤ Not supported                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>➤ Can be configured with 2.048, 2.5, and 2.9V</li> <li>➤ Configurable output</li> </ul>                                                                                                                        |
| Algorithm   | <ul style="list-style-type: none"> <li>➤ Supported CRC32</li> <li>➤ STM32F415支持DES/3DES</li> <li>➤ STM32F415支持AES128/192/256</li> <li>➤ STM32F415支持SHA1/224/256</li> <li>➤ STM32F415支持MD5/HMAC</li> </ul> | <ul style="list-style-type: none"> <li>➤ Supported CRC16/32</li> <li>➤ Supported AES128/192/256</li> <li>➤ Supported DES/3DES</li> <li>➤ Supported SM4</li> <li>➤ Supported SHA1/224/256</li> <li>➤ Supported MD5</li> <li>➤ Supported SM3</li> </ul> |
| Secure      | <ul style="list-style-type: none"> <li>➤ RDP</li> <li>➤ PCROP</li> <li>➤ WRP</li> </ul>                                                                                                                   | <ul style="list-style-type: none"> <li>➤ RDP</li> <li>➤ WRP</li> <li>➤ Storage encryption</li> <li>➤ Partition protection</li> <li>➤ Safe startup</li> </ul>                                                                                          |
| Pin         |                                                                                                                                                                                                           |                                                                                                                                                                                                                                                       |
| GPIO        | <ul style="list-style-type: none"> <li>➤ Does not support digital filtering</li> <li>➤ Other differences can be found in the pin function mapping</li> </ul>                                              | <ul style="list-style-type: none"> <li>➤ Configurable digital filtering</li> <li>➤ Other differences can be found in the pin function mapping</li> </ul>                                                                                              |

## 6 Version History

| Version | Date       | Changes         |
|---------|------------|-----------------|
| V1.0.0  | 2024.11.12 | Initial version |

## 7 Disclaimer

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