
Migrating from STM32F407xx/417xx to STM32F427xx/429xx/437xx/439xx

Introduction

Designers of STM32 microcontroller applications must have the possibility to easily replace one microcontroller with another from the same product series. Reasons for migrating an application to a different microcontroller can be for example;

- to fulfill higher product requirements, extra demands on memory size, or an increased number of I/Os.
- to meet cost reduction constraints that require to switch to smaller components and shrink the PCB area.

This application note is written as a help with the analysis of the steps involved when migrating from an existing STM32F407xx/417xx-based design to the STM32F427xx/429xx/437xx/439xx one withing the high performance STM32F4 series.

This application note gathers the most important information and presents the main considerations to address.

Table 1 provides the list of products to which this document applies.

This application note is not exhaustive and comes as a complement of other product specifications available on www.st.com/stm32:

- Datasheets
 - DS8597 and DS8626 for STM32F407xx/417xx microcontrollers respectively,
 - DS9405 and DS9484 for STM32F427xx/429xx/437xx/439xx microcontrollers respectively.
- Errata sheets
 - STM32F405xx/407xx and STM32F415xx/417xx device limitations,
 - STM32F427xx/437xx and STM32F429xx/439xx line limitations.
- Reference manual
 - RM0090 - STM32F405xx/07xx, STM32F415xx/17xx, STM32F42xxx and STM32F43xxx advanced ARM®-based 32-bit MCUs
- Programming manual
 - PM0214 - STM32F3 and STM32F4 Series Cortex®-M4 programming manual
- Application note
 - AN4488 - Getting started with STM32F4xxxx MCU hardware development,
 - AN2606 - STM32 microcontroller system memory boot mode.

Table 1. Applicable products

Reference product	Part numbers
STM32F407xx	STM32F407IE, STM32F407IG, STM32F407VE, STM32F407VG, STM32F407ZE, STM32F407ZG
STM32F417xx	STM32F417IE, STM32F417IG, STM32F417VE, STM32F417VG, STM32F417ZE, STM32F417ZG, STM32F427AG, STM32F427AI
STM32F427xx	STM32F427IG, STM32F427II, STM32F427VG, STM32F427VI, STM32F427ZG, STM32F427ZI
STM32F429xx	STM32F429AG, STM32F429AI, STM32F429BE, STM32F429BG, STM32F429BI, STM32F429GDIE, STM32F429IDIE, STM32F429IE, STM32F429IG, STM32F429II, STM32F429JG, STM32F429JI, STM32F429NE, STM32F429NG, STM32F429NI, STM32F429VE, STM32F429VG, STM32F429VI, STM32F429ZE, STM32F429ZG, STM32F429ZI
STM32F437xx	STM32F437AI, STM32F437IG, STM32F437II, STM32F437VG, STM32F437VI, STM32F437ZG, STM32F437ZI
STM32F439xx	STM32F439AI, STM32F439BG, STM32F439BI, STM32F439GDIE, STM32F439IDIE, STM32F439IG, STM32F439II, STM32F439JG, STM32F439JI, STM32F439NG, STM32F439NI, STM32F439VG, STM32F439VI, STM32F439ZG, STM32F439ZI

1 Product feature comparison

Table 2 summarizes the main differences between the STM32F407xx/417xx and STM32F427xx/429xx/437xx/439xx product features, and the impact on the hardware and on the firmware of the application design when migrating from STM32F407xx/417xx to STM32F427xx/429xx/437xx/439xx microcontrollers.

Table 2. Main product feature differences for safe migration

Feature	STM32F407xx/417xx	STM32F427xx/429xx/437xx/439xx
Power supply	1.8 V to 3.6 V on the whole temperature range, reduced to 1.7 V in the 0°C to 70°C range	1.7 V to 3.6 V on the whole temperature range
Maximum frequency	168 MHz	180 MHz with overdrive mode enabled
Voltage Scaling Output (VOS)	Scale1 Scale 2 Can be changed on the fly	Scale1 Scale 2 Scale 3 Can be modified only when PLL is off
Flash size	Up to 1 Mbyte	Up to 2 Mbyte, split on two banks with two controllers. Supports dual bank (RWW)
RAM size and other memories	128 Kbyte of SRAM including 64 Kbyte of CCM, 4 Kbyte of backup RAM, 20 x 32-bit backup registers	256 Kbyte of SRAM including 64 Kbyte of CCM, 4 Kbyte of backup RAM, 20 x 32-bit backup registers
Enhanced peripherals	FSMC (16-bits)	FMC: extended with SDRAM controller and supporting 32-bit mode
	Crypto/Hash	Extended with GCM and SHA2 support
	Three I2C	Three I2C enhanced with digital filters to be programmed and enabled/disabled by firmware
	Up to three general purpose timers running at maximum system frequency	All general purpose timers running at maximum system frequency
Other peripherals	Up to three SPI (with two I2S in full duplex)	Up to six SPI (with two I2S in full duplex)
	Up to six U(S)ARTs	Up to eight U(S)ARTs
New peripherals	-	One Serial Audio Interface (SAI) with dedicated PLL
	-	LCD-TFT controller
	-	Chrom-ART accelerator
Bootloader version	Refer to application note AN2606	

Table 2. Main product feature differences for safe migration (continued)

Feature	STM32F407xx/417xx	STM32F427xx/429xx/437xx/439xx
Pin list and packages	Refer to STM32F407xx/417xx datasheets, STM32F427xx/429xx/437xx/439xx datasheets and AN4488	
Modified behavior or fixed limitations	Incorrect BOR option byte when consecutively programming BOR option byte	Resolved
	Configuration of PH10 and PI10 as external interrupts is erroneous	Resolved
	DMA2 data corruption when managing AHB and APB peripherals in a concurrent way	Resolved
	Slow down of APB clock during a DMA transfer	Resolved
	Battery charge monitoring lower than 2.4 V	Resolved but with changed behavior: the temperature sensor is connected to ADC_IN18 input, same as VBAT
	Internal noise impacting the ADC accuracy	Resolved with new behavior to enhance the accuracy
	I2S2 in full-duplex mode may not work properly when SCK and WS signals are mapped on PI1 and PI0 respectively	Recommendation added in the datasheet.
	SDIO clock divider BYPASS mode may not work properly	Resolved

2 Revision history

Table 3. Document revision history

Date	Revision	Changes
25-Jun-2014	1	Initial release.

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