Microcontroller DMA Programming :
(Fundamentals to Advanced)

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Figure 23. DMA block diagram

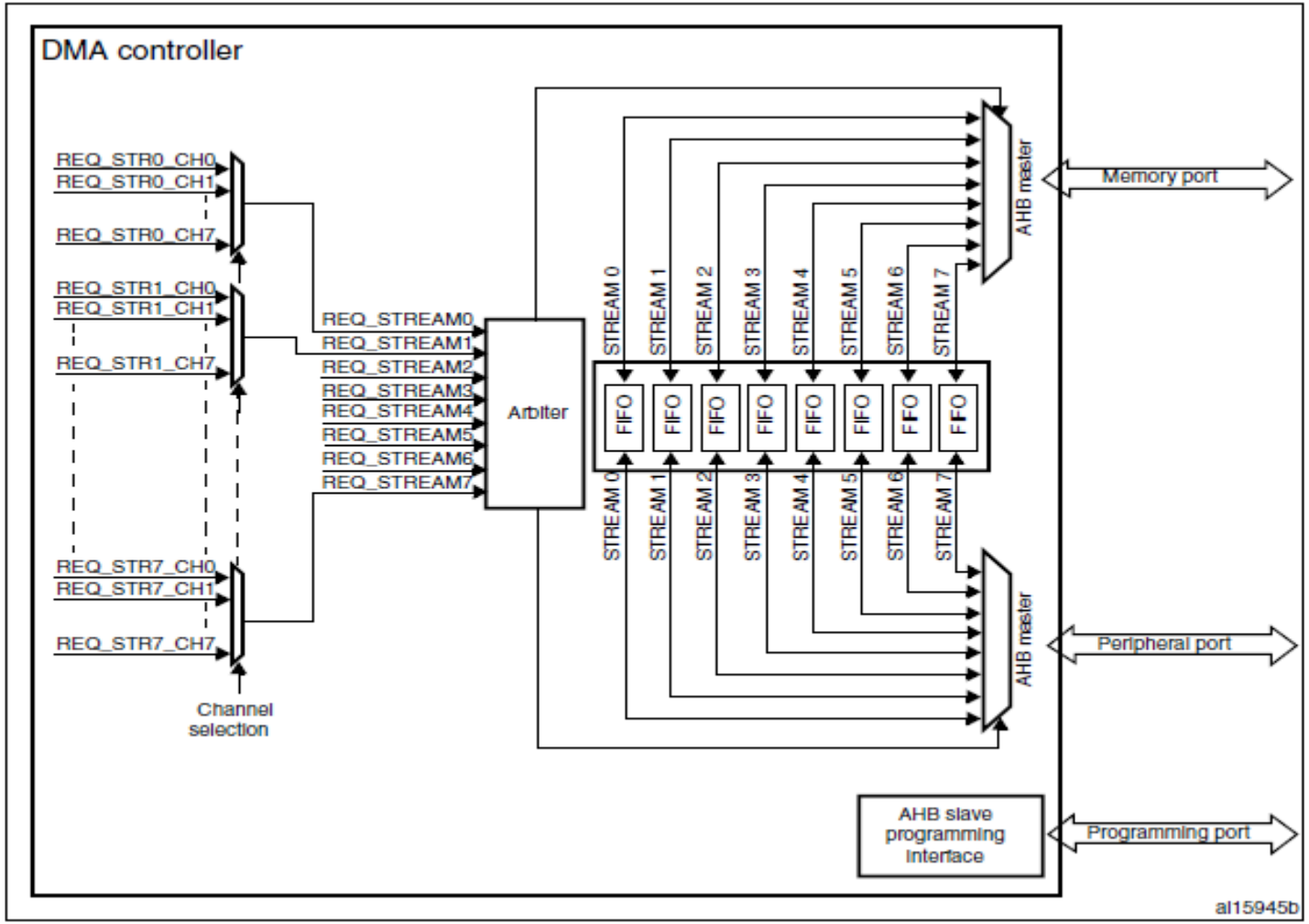
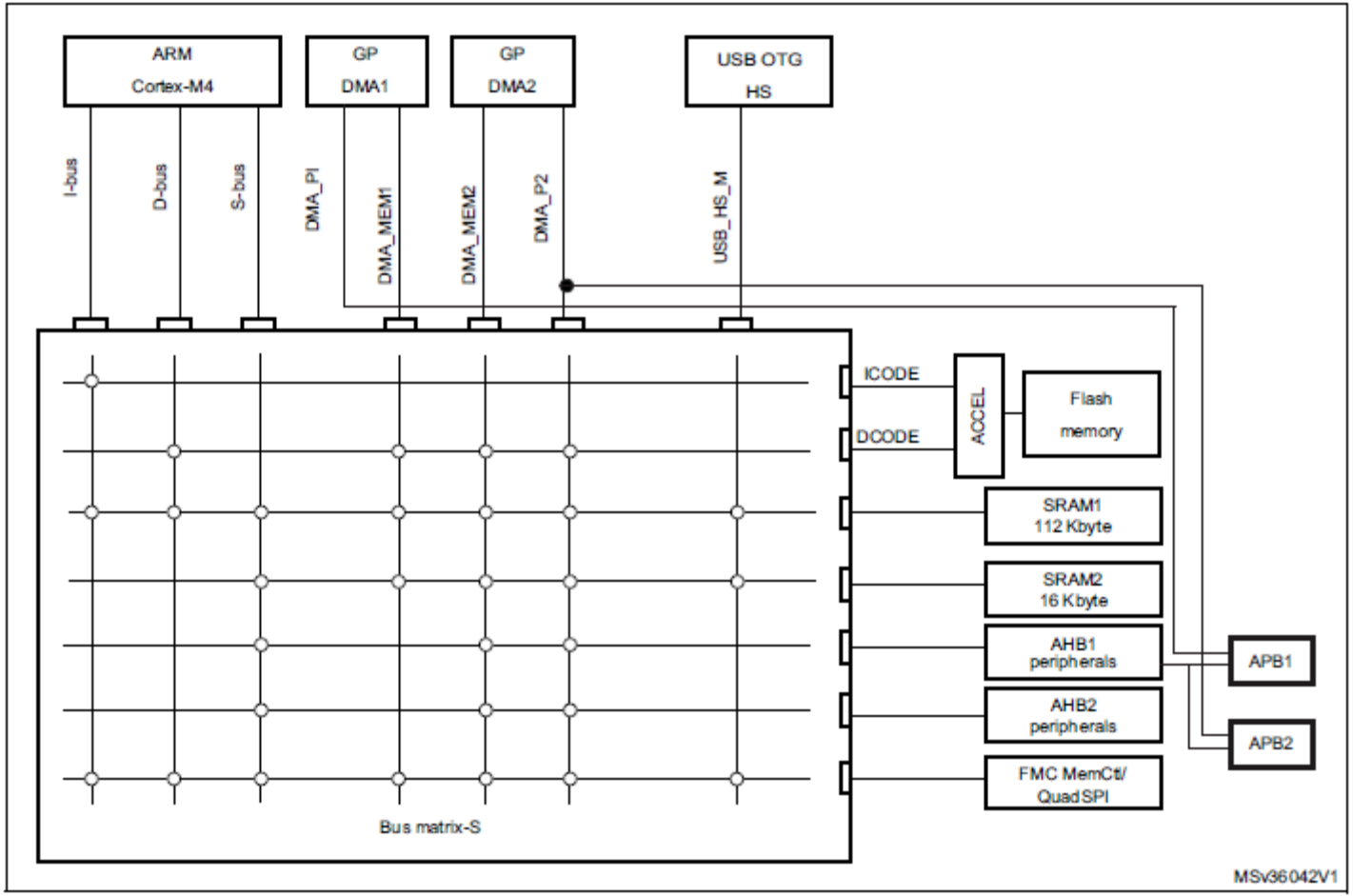
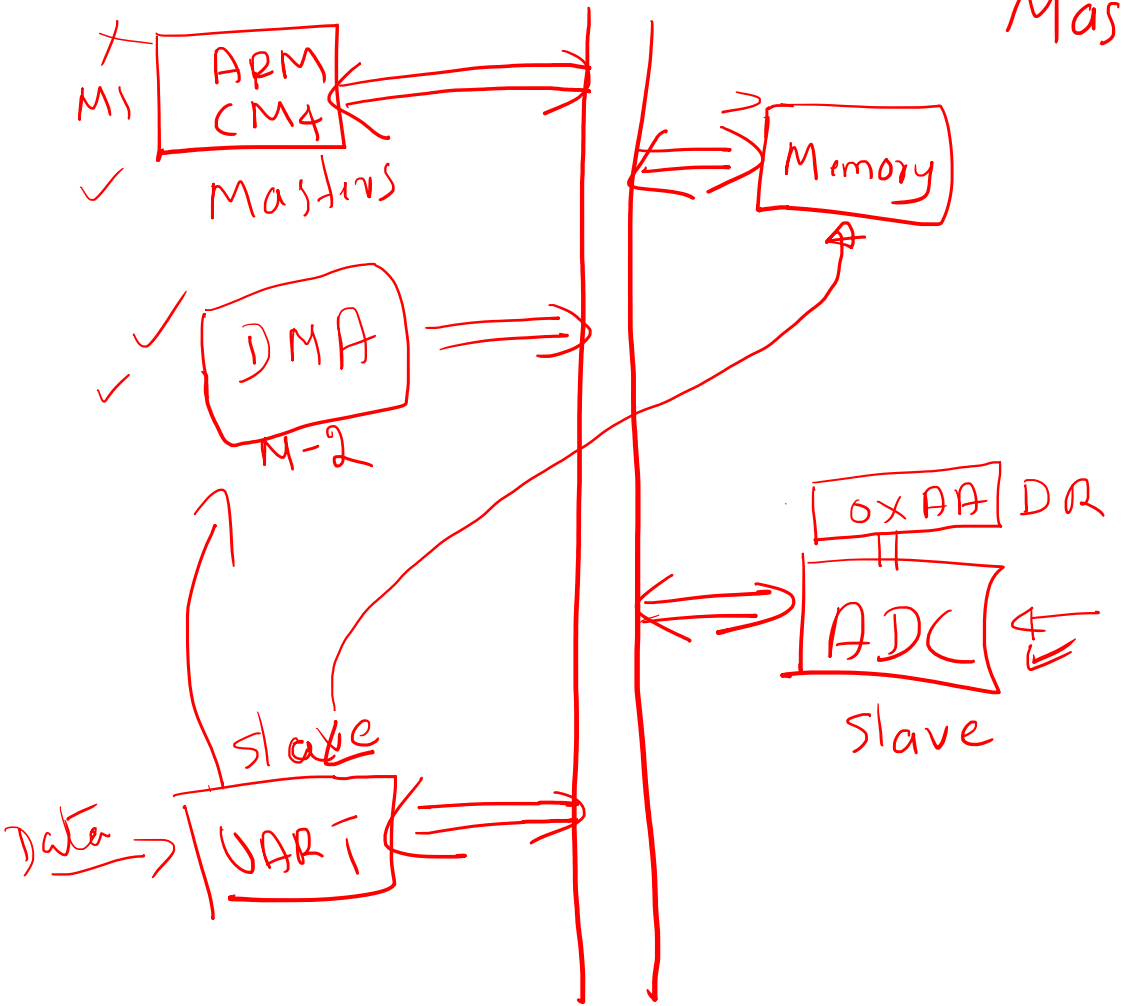


Figure 1. System architecture for STM32F446xx devices



Master-Slave Communication

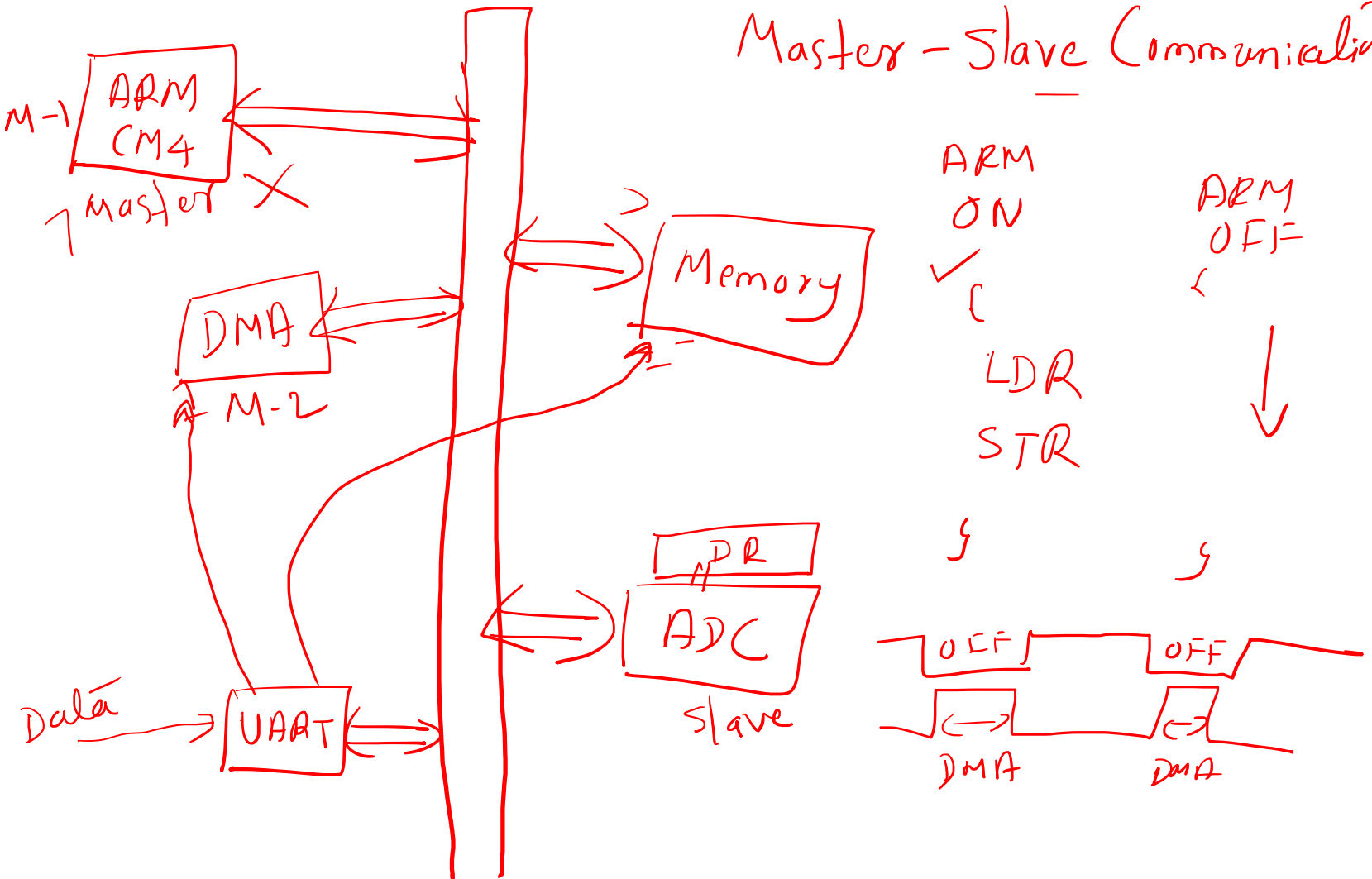


ARM
LD
STR

DMA

LDR
STR

Master - Slave Communication



Concurrent Data Transfer using ARM & DMA : Demonstration

1)Keep ARM busy in doing some data transfer to SRAM1
2)Send streams of bytes to board over UART from PC
3)Case 1 : Use UART interrupts to copy those streams of bytes on to SRAM2
4)Case 2: Use DMA to copy those streams of bytes on to SRAM2
5)Analyze the behavior

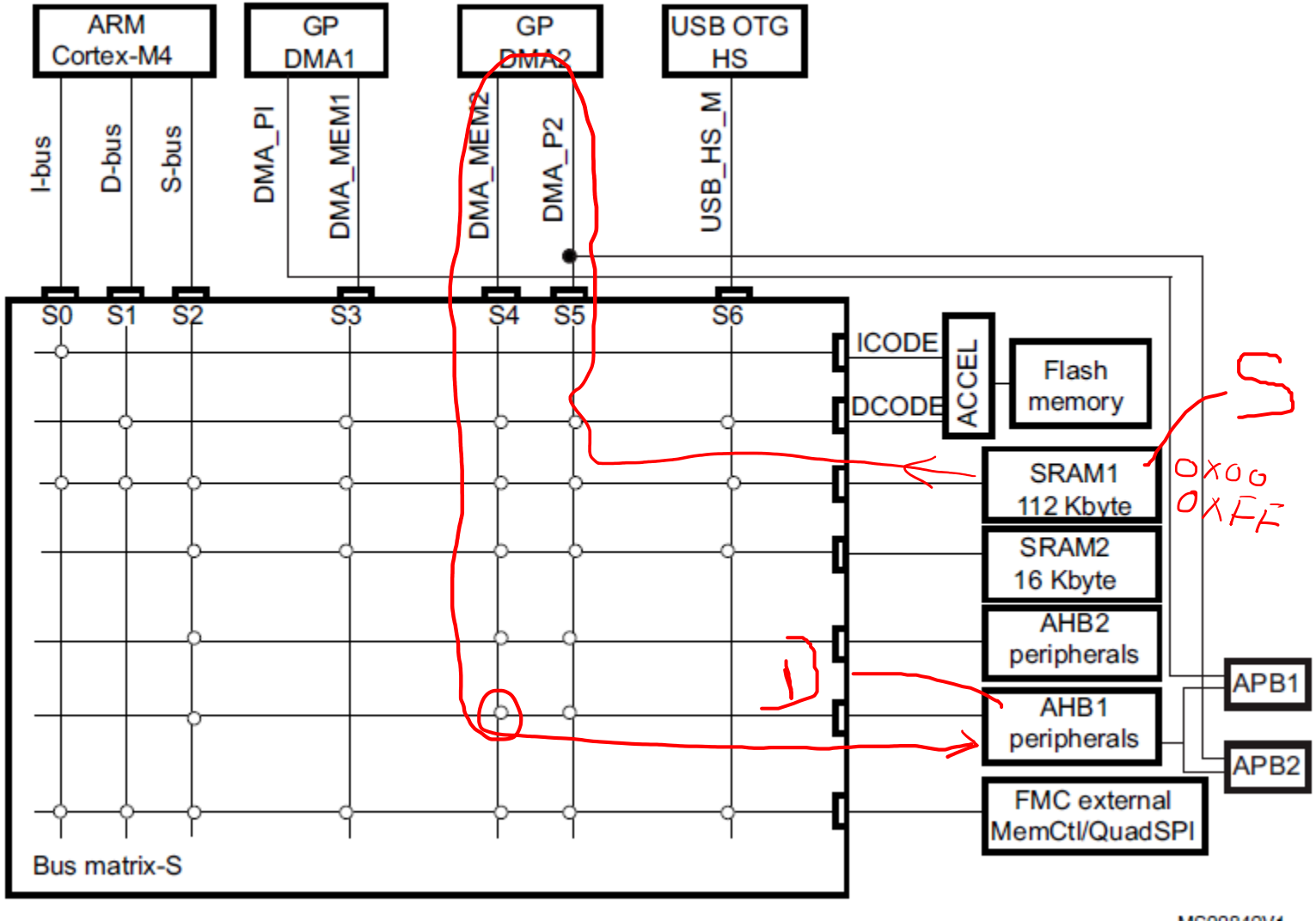

ARM Cortex-M4
GP DMA1
GP DMA2
USB OTG HS
I-bus
D-bus
S-bus
DMA_PI
DMA_MEM1
DMA_MEM2
DMA_P2
USB_HS_M
S0
S1
S2
S3
S4
S5
S6
ICODE
DCODE
ACCEL
Flash memory
SRAM1 112 Kbyte
SRAM2 16 Kbyte
AHB2 peripherals
AHB1 peripherals
APB1
APB2
FMC external MemCtl/QuadSPI
Bus matrix-S

Figure 4. STM32F446xC/E and Multi-AHB matrix

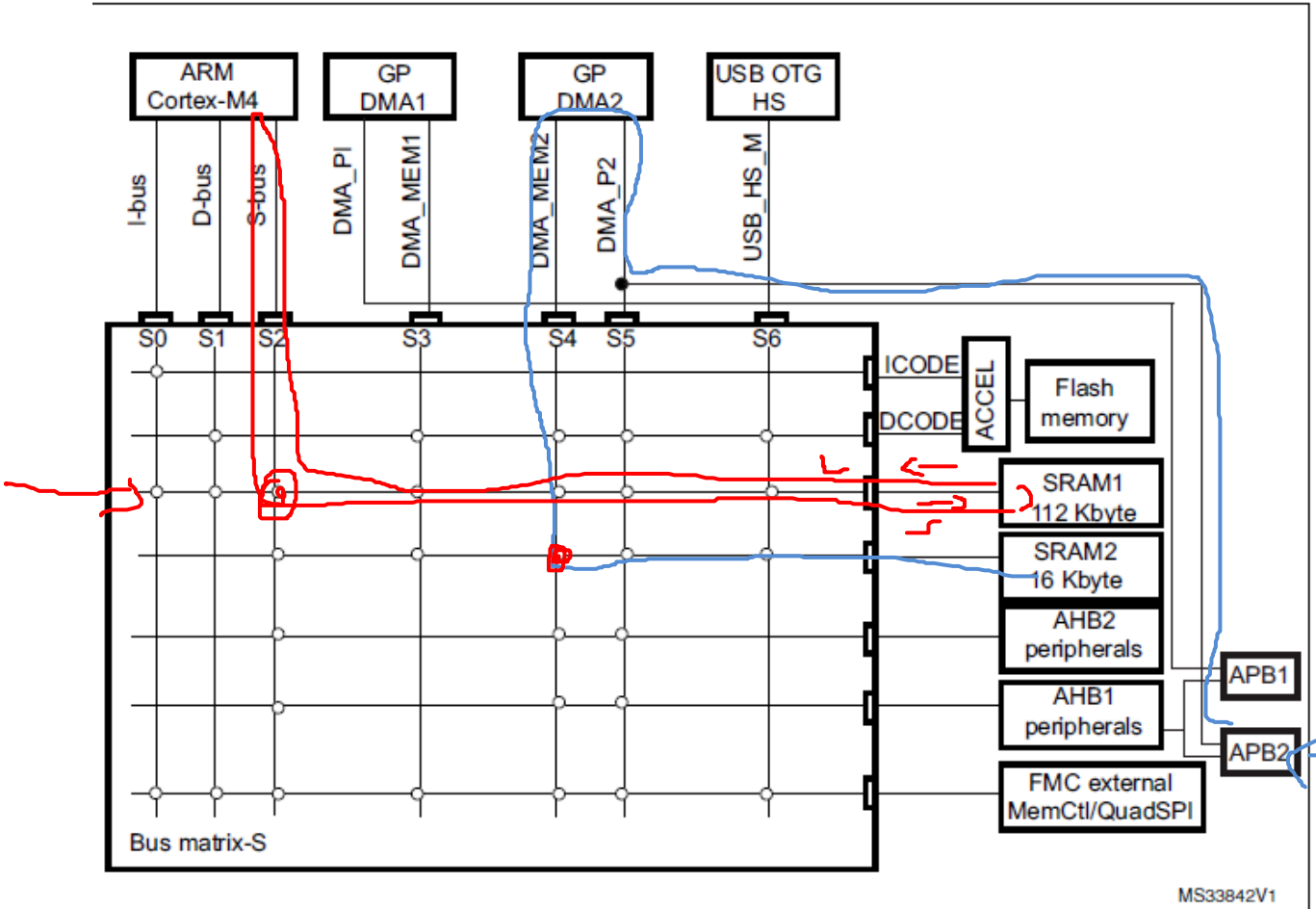
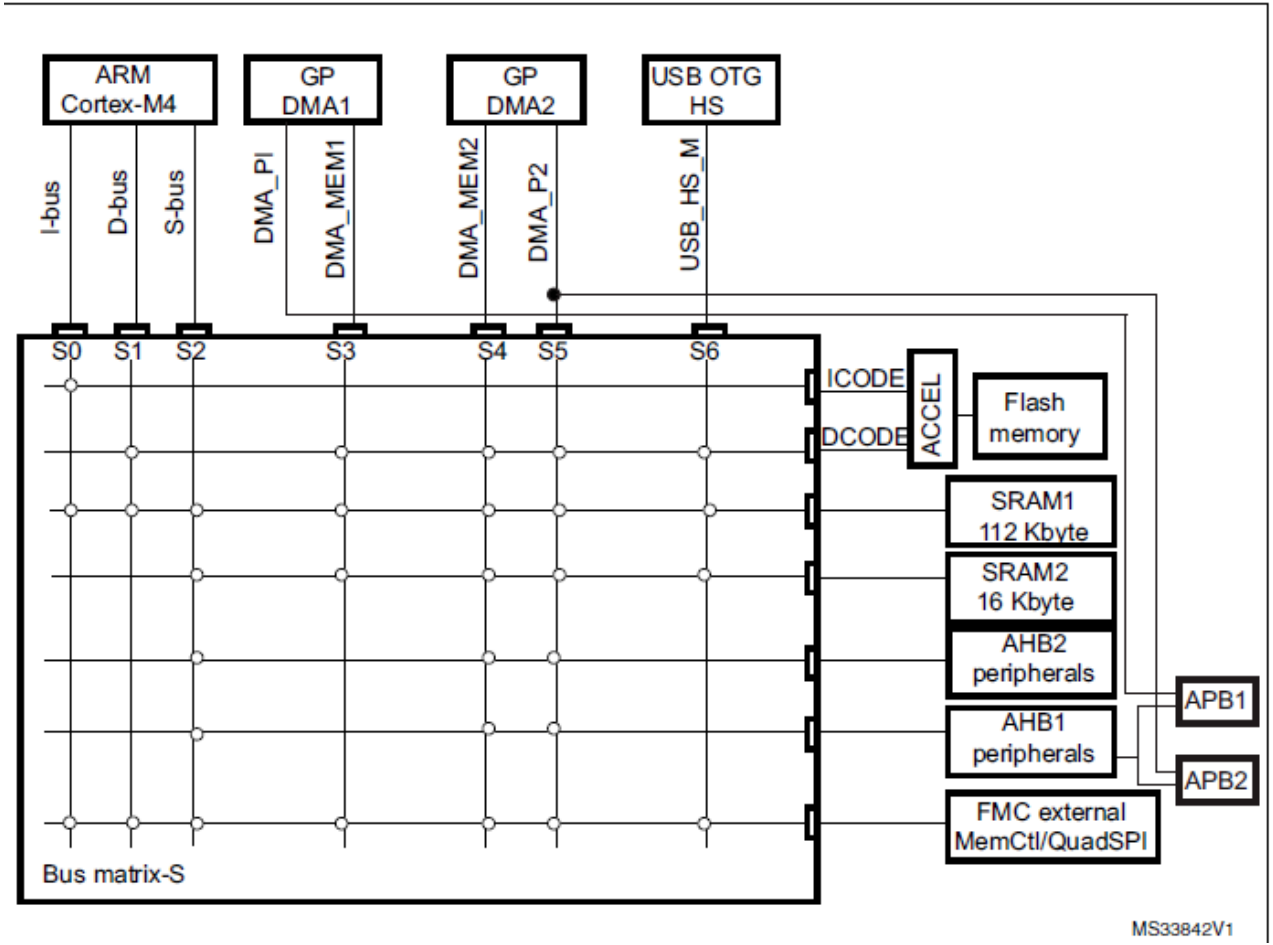


Figure 4. STM32F446xC/E and Multi-AHB matrix



DMA Exercises-1 (Polling and Interrupt)

1. Toggling of LED using DMA
2. Data Transfer from SRAM1 to SRAM2
3. Data Transfer from UART to SRAM1

Generic Steps to follow while using DMA in your Application

1) Identify the “Which DMAx Controller to use for your application”
2) Initialize the DMA
3) Trigger the DMA (Automatic trigger or manual trigger)
4) Wait for TC (poll) or get the callback from DMA driver (Interrupt)

Figure 2. Channel selection

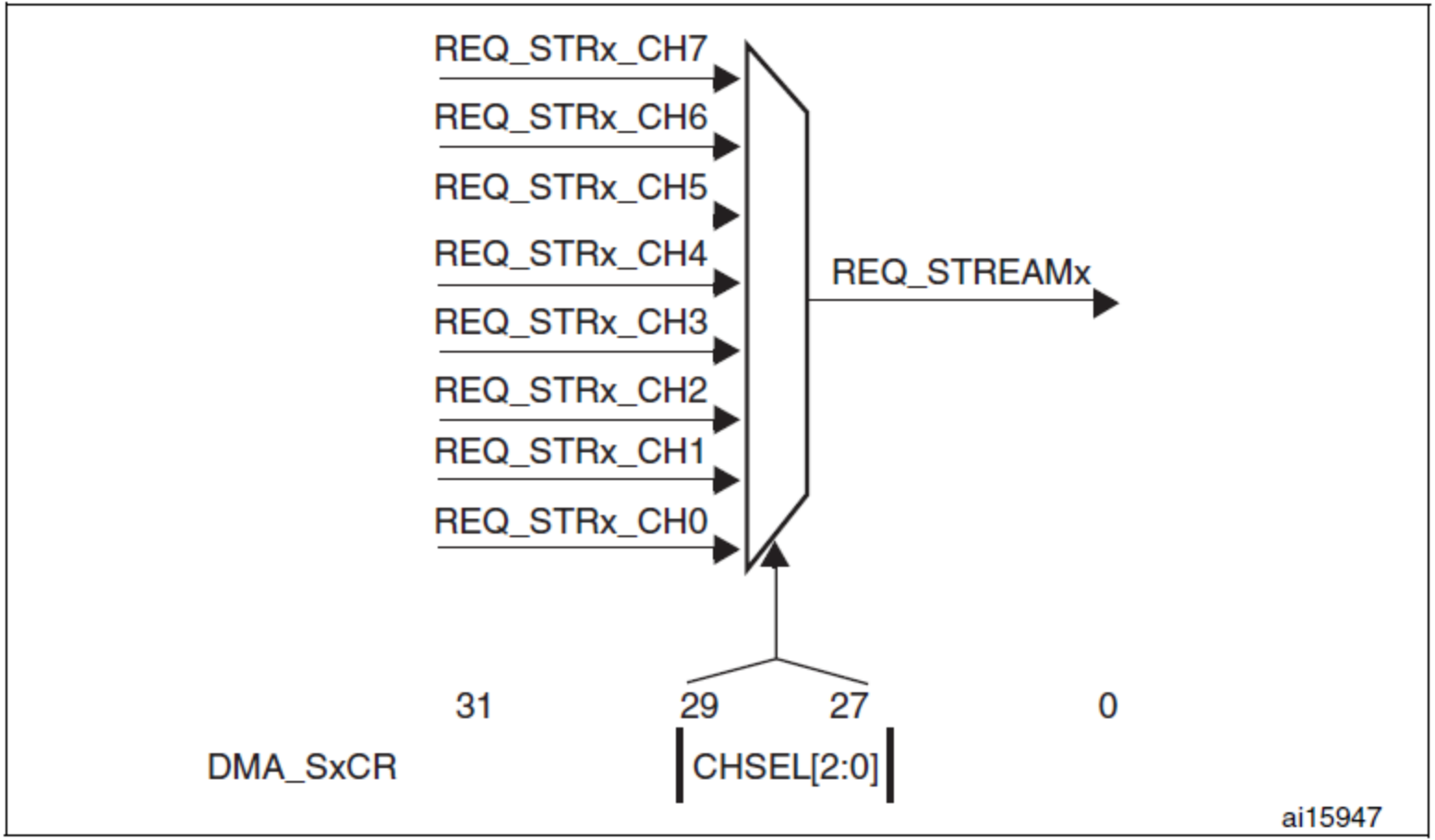


Figure 1. DMA block diagram