



FW introduction -- A7105



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RF feature

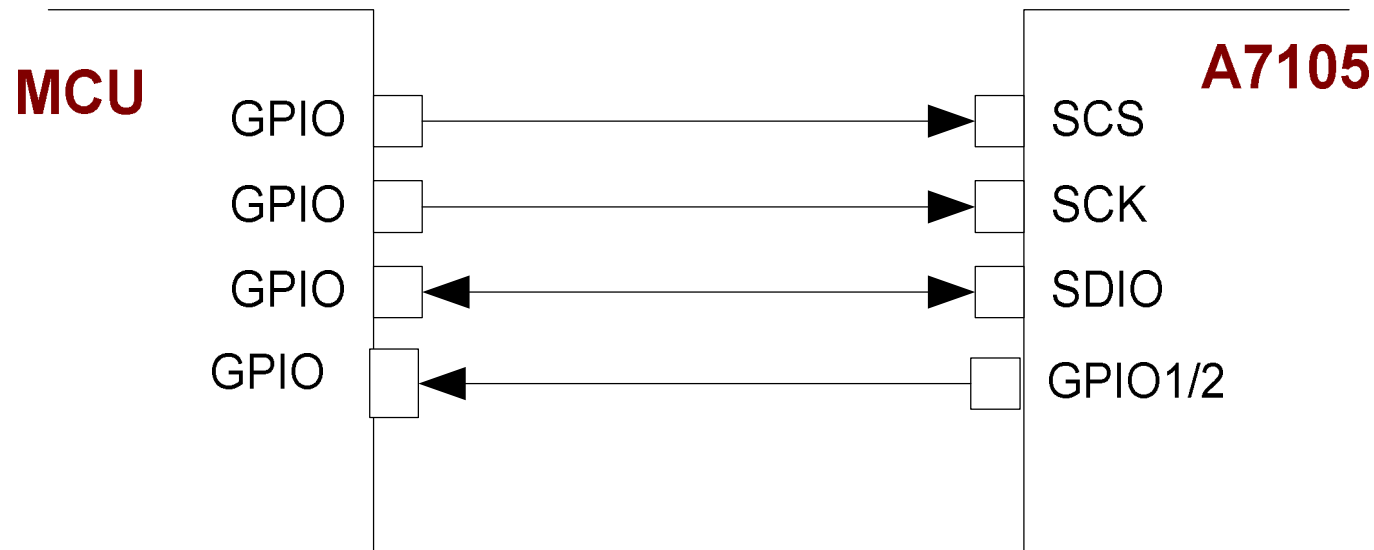
- Frequency bands: 2400 – 2483MHz ISM band @ FSK,GFSK
- RX : Low current consumption(16mA) and high sensitivity
(500Kbps@ **AMICCOM -96dbm[15mA]**, Chipcon : TI **-81dbm[22mA]**)
- Programmable RF TX output power: 0 ~ -10dbm
- On chip regulator, supply voltage 1.9 ~ 3.6V.
- On chip low power RC oscillator.
- Build in WWS(wireless wakeup system) for reduce power consumption
- Low current (< 1uA) in sleep mode
- Need only one crystal while working together with MCU
- Support 4 wire(SPI) and 3 wire interface to access RF control
- Build in RSSI, temperature sensor function
- Build in battery detection and 1ch external ADC function

RF feature

- **64 bytes TX/RX FIFO buffer**
- **Build in FIFO extension function with up to 256 bytes FIFO No**
- **Optional Manchester Data / FEC / CRC / data whitening (encryption)**
- **Oscillator clock out / External clock in**

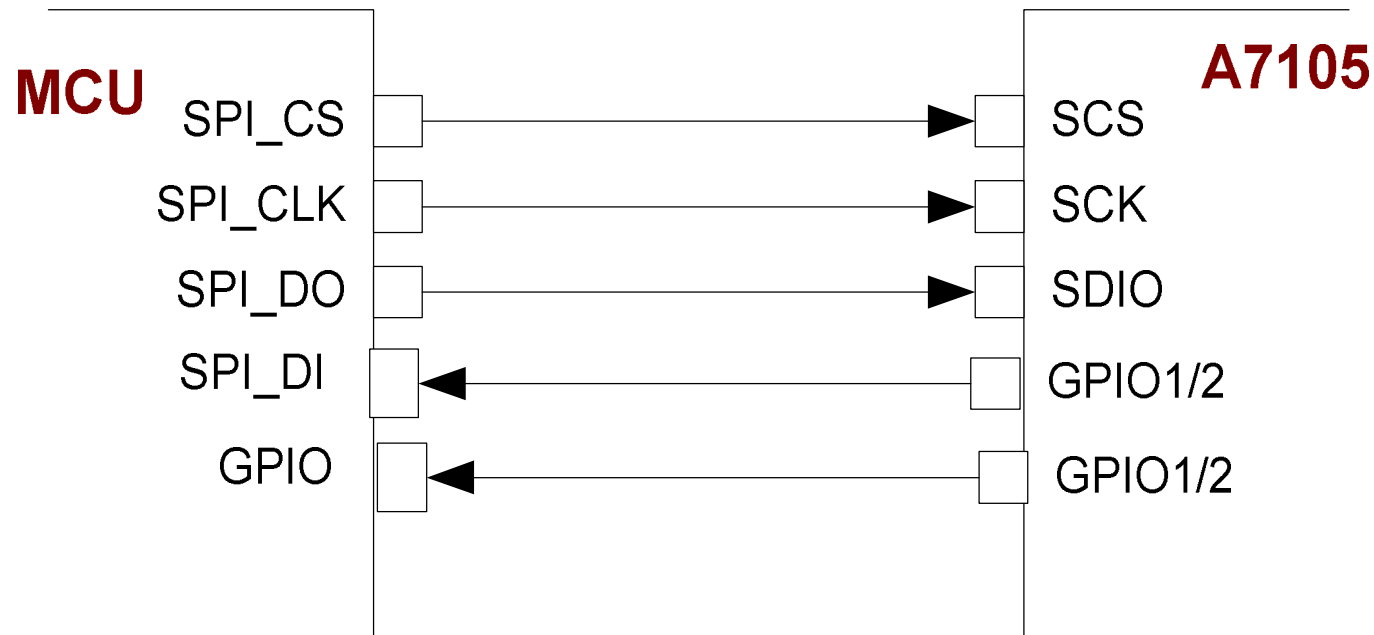
RF interface

■ 3 wire serial bus



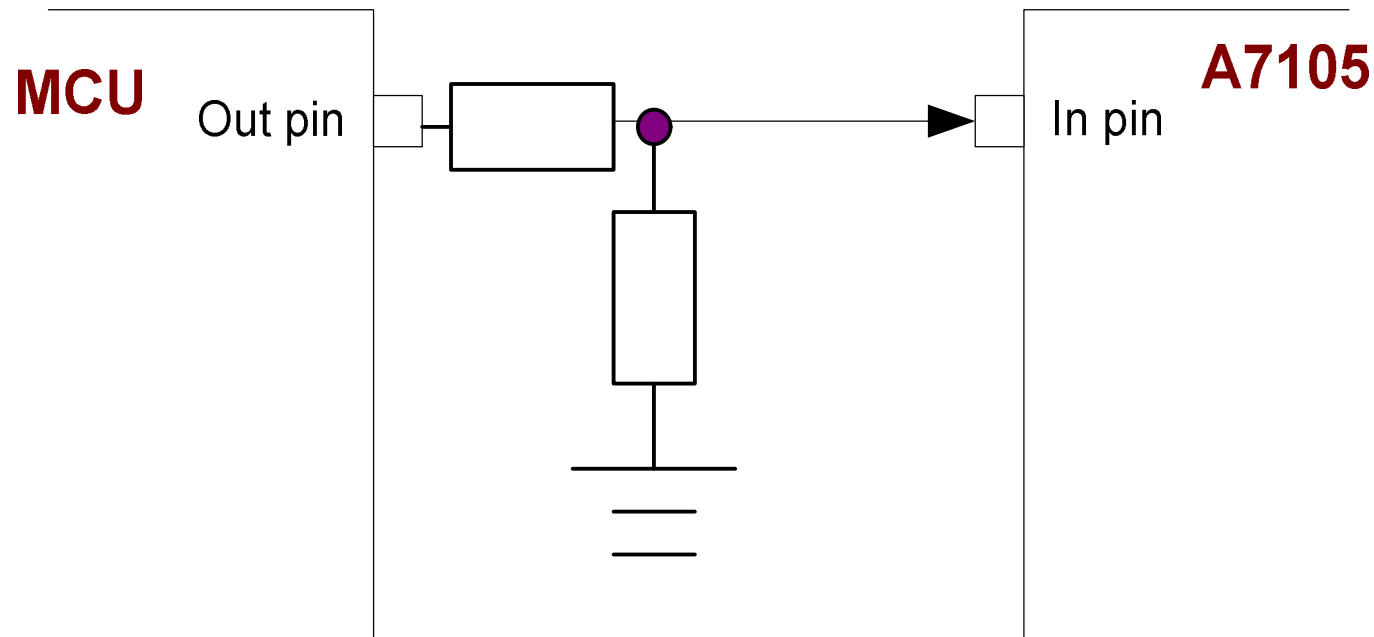
RF interface

■ 4 wire SPI serial bus



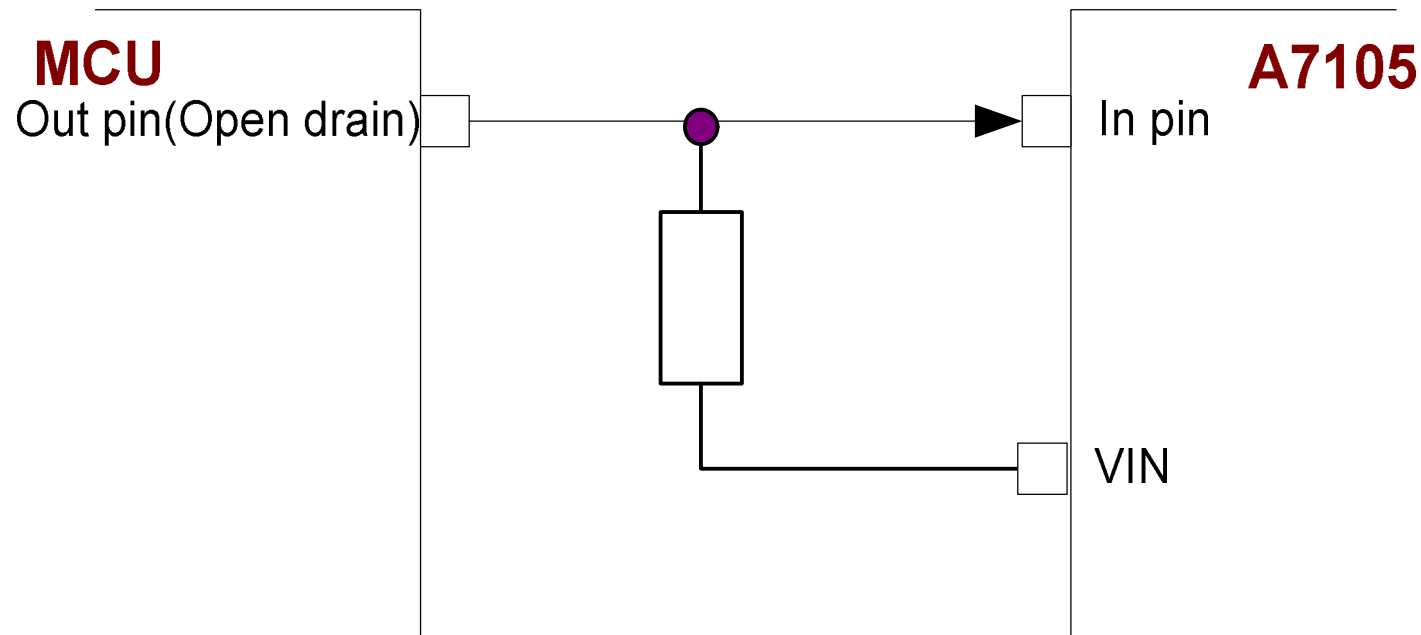
RF interface

■ 4 wire SPI serial bus with MCU 5V I/O



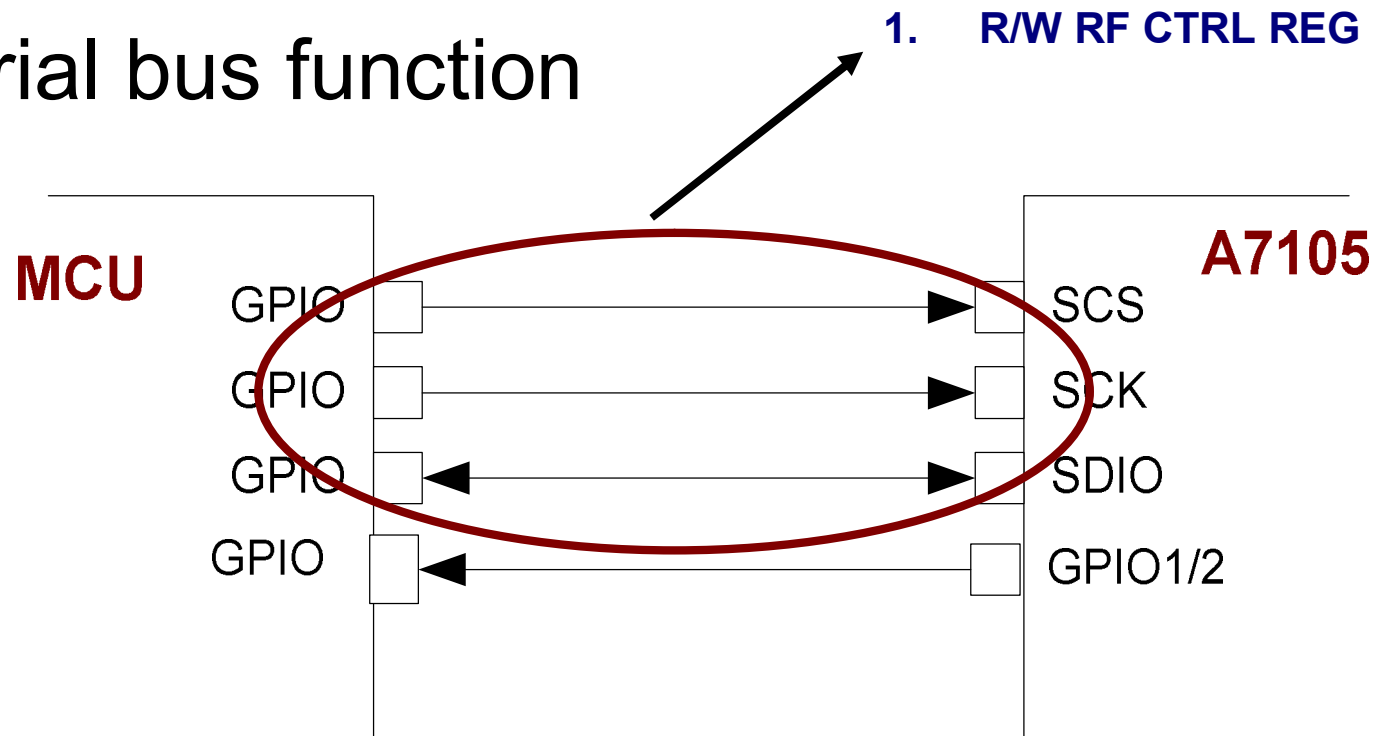
RF interface

■ 4 wire SPI serial bus with MCU 5V I/O



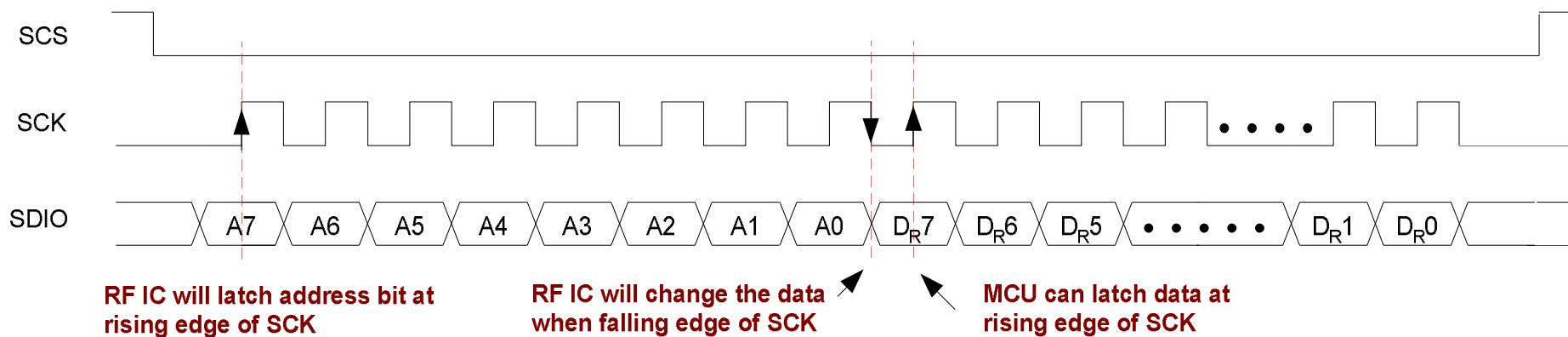
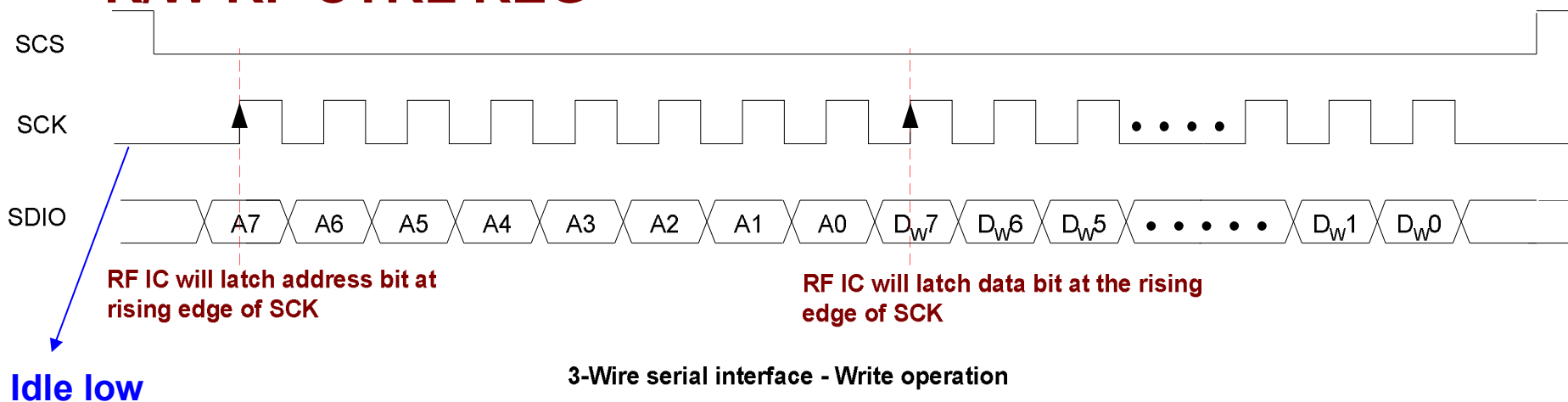
RF interface

■ serial bus function



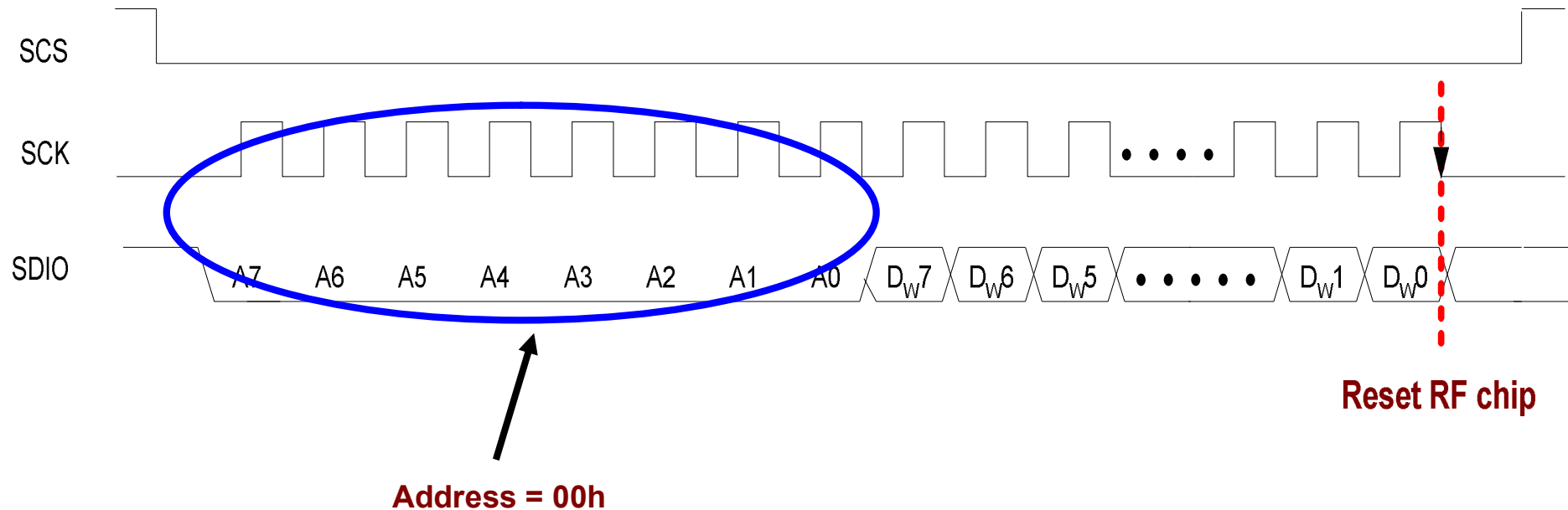
RF interface

● R/W RF CTRL REG



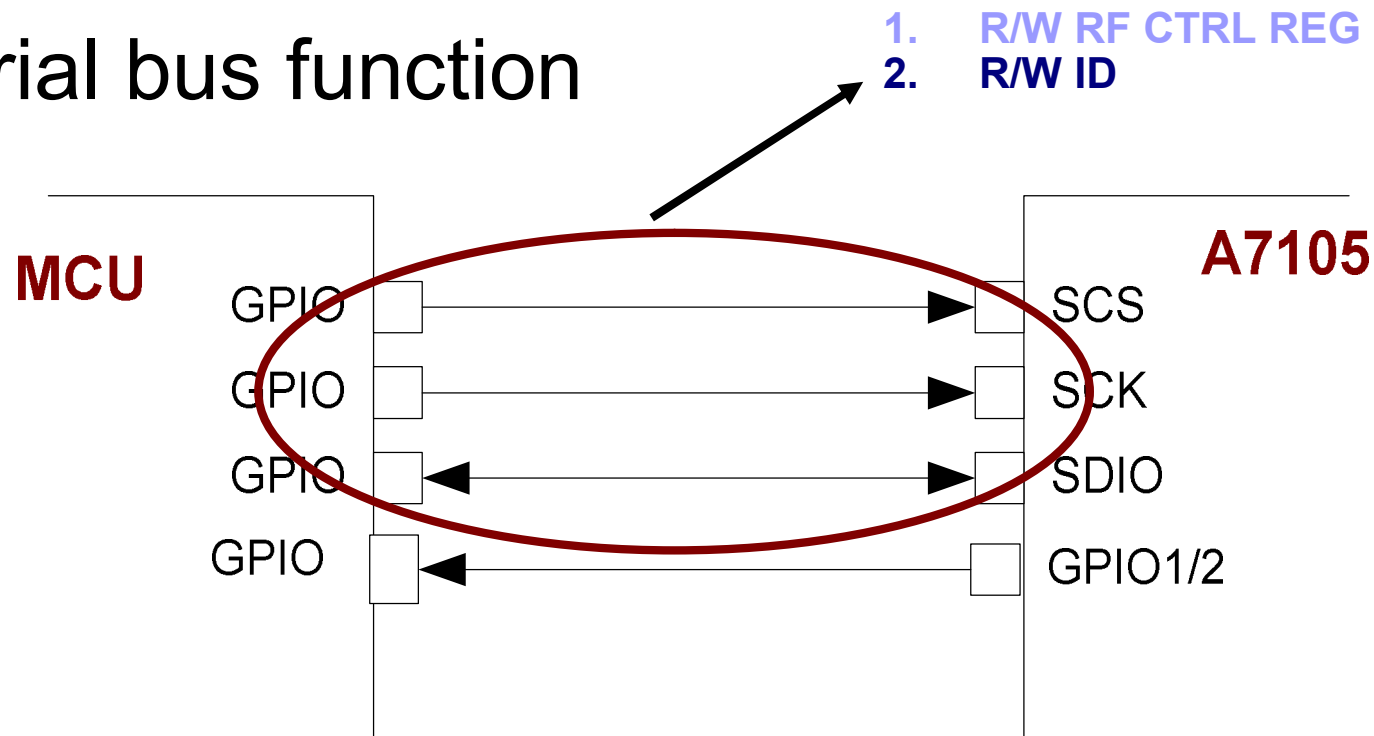
RF interface

- **R/W RF CTRL REG(RF IC reset command)**



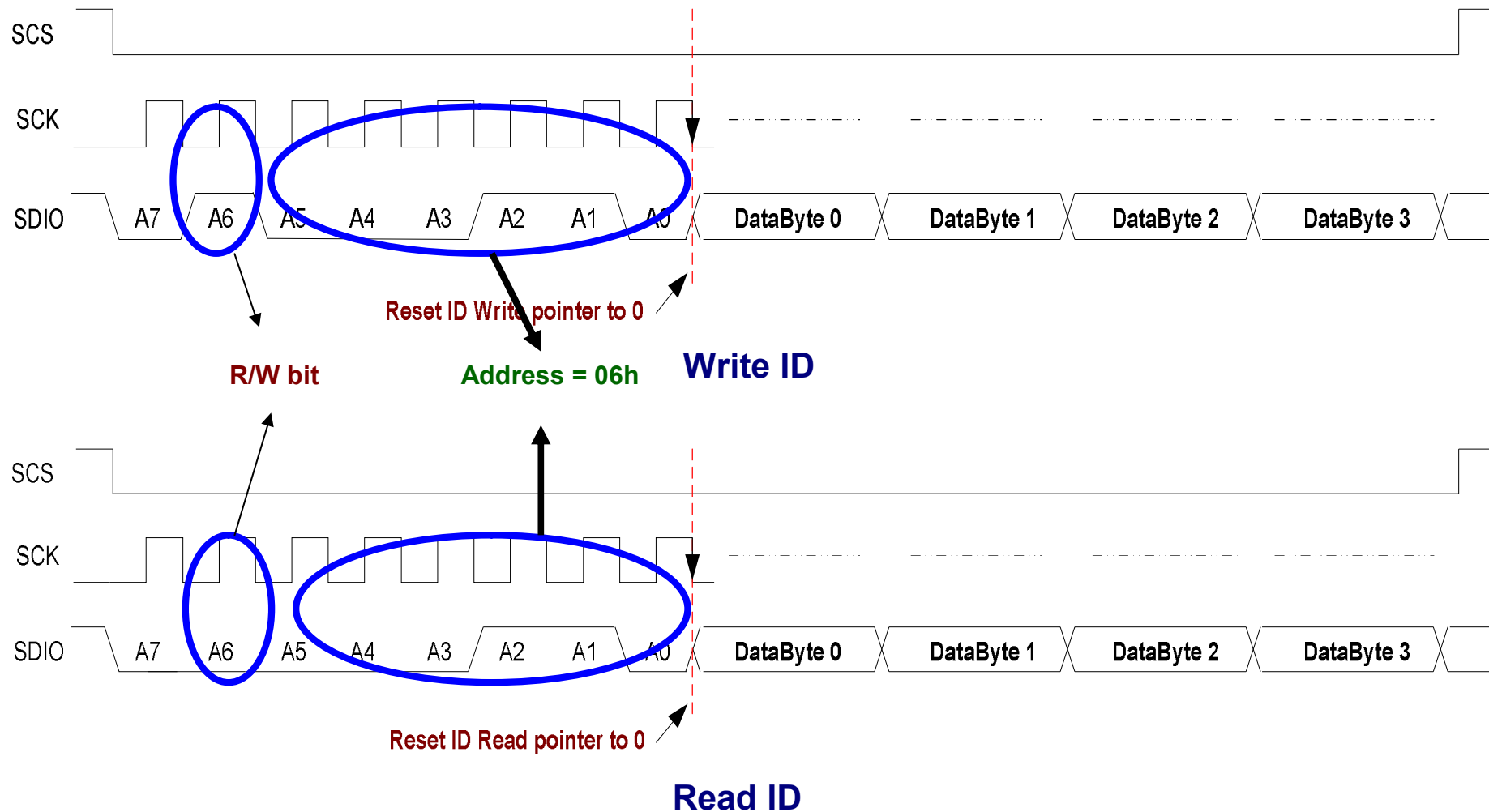
RF interface

■ serial bus function



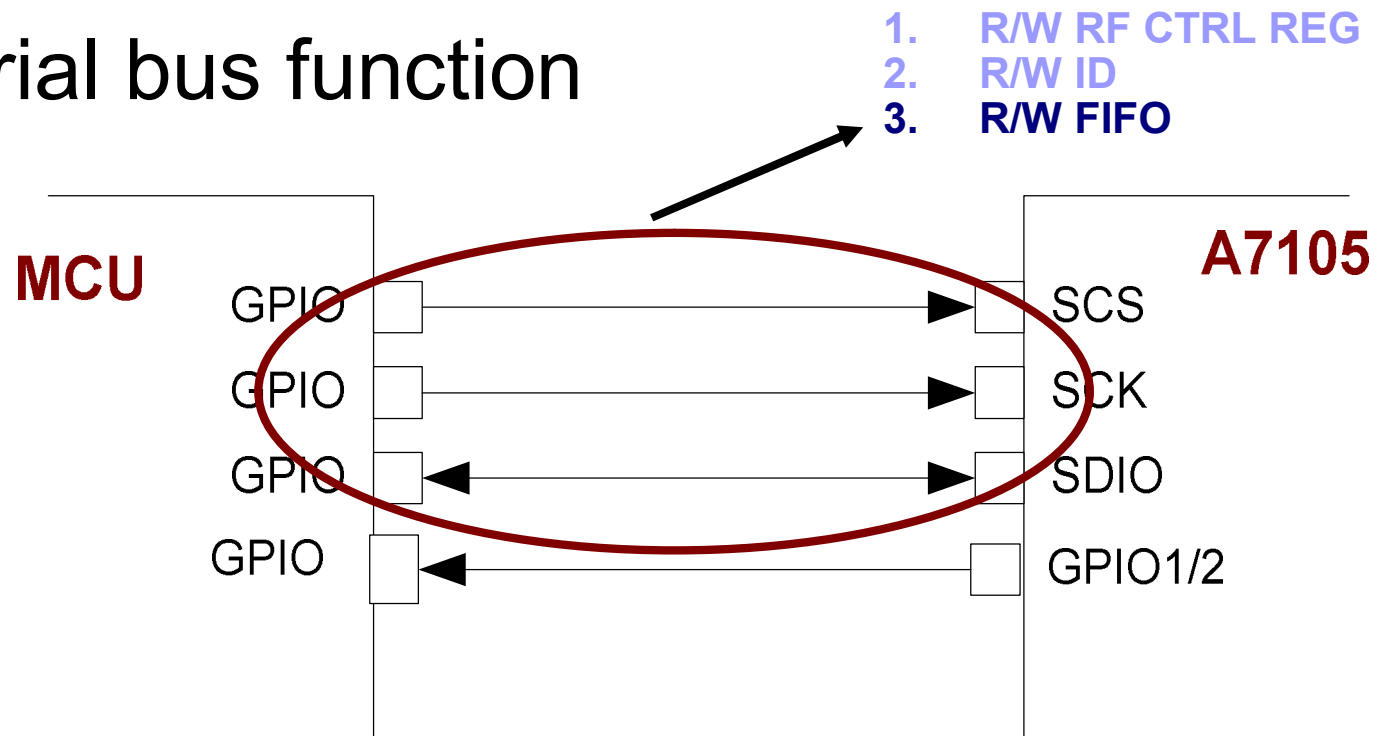
RF interface

● R/W ID



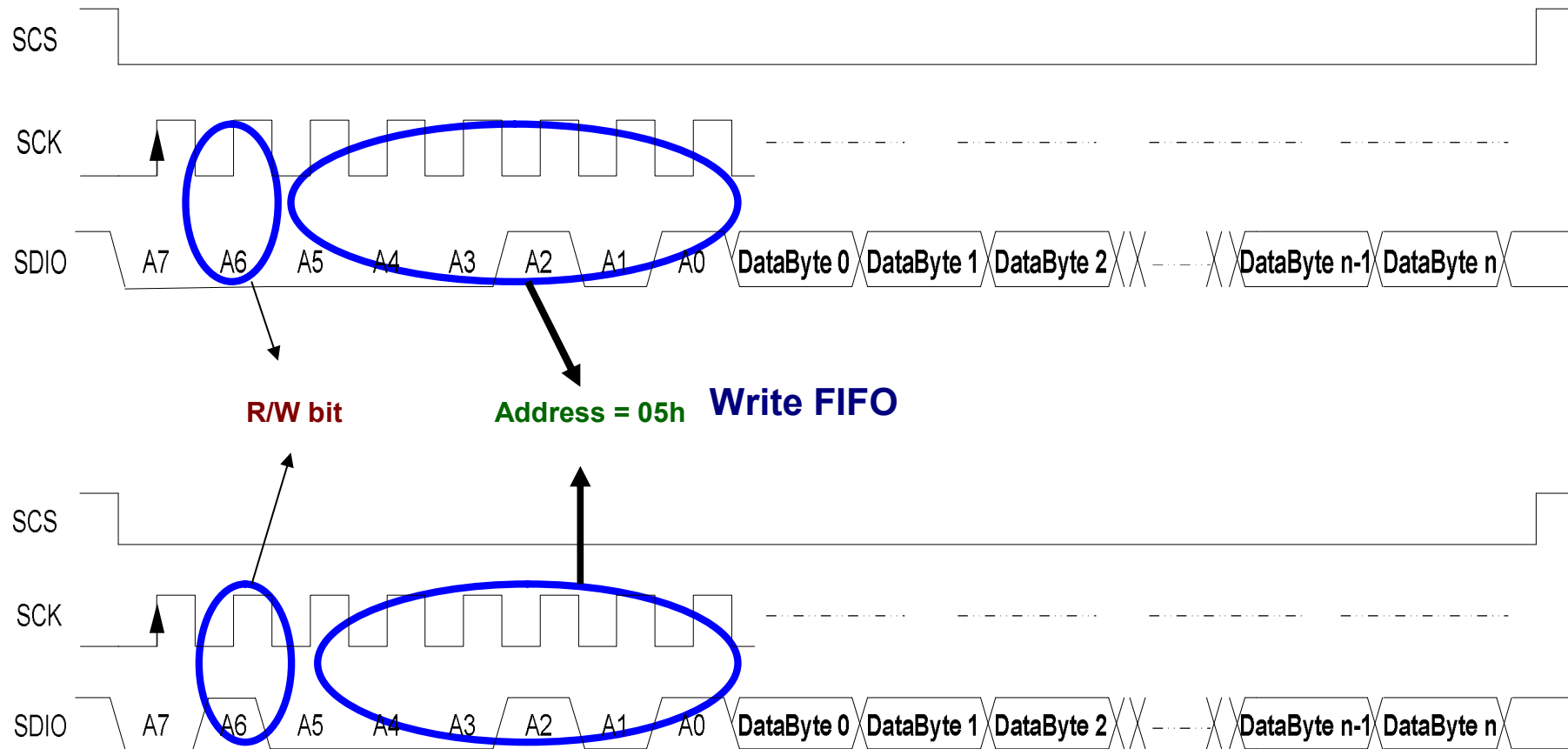
RF interface

■ serial bus function



RF interface

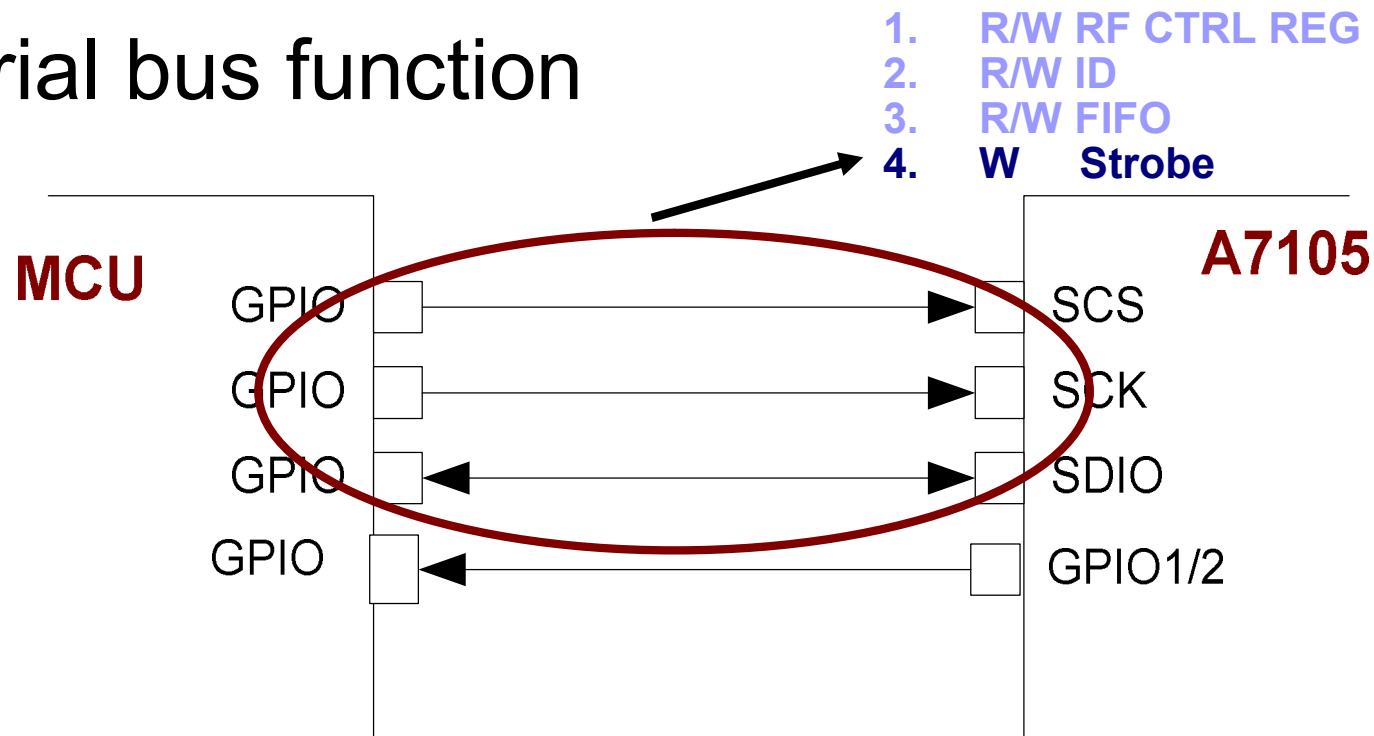
● R/W FIFO



Read FIFO

RF interface

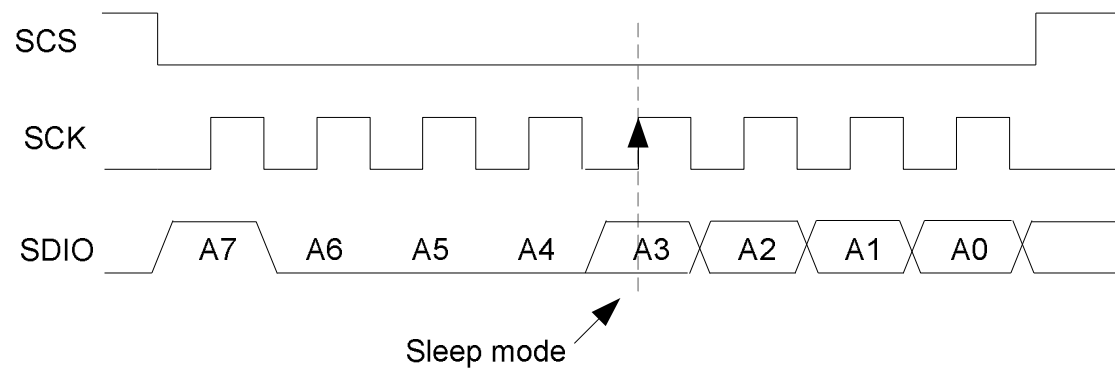
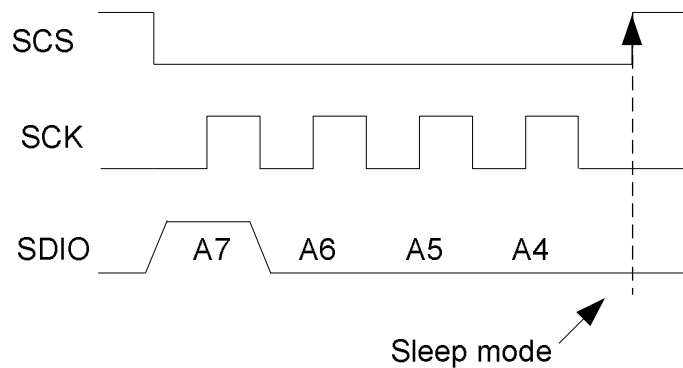
■ serial bus function



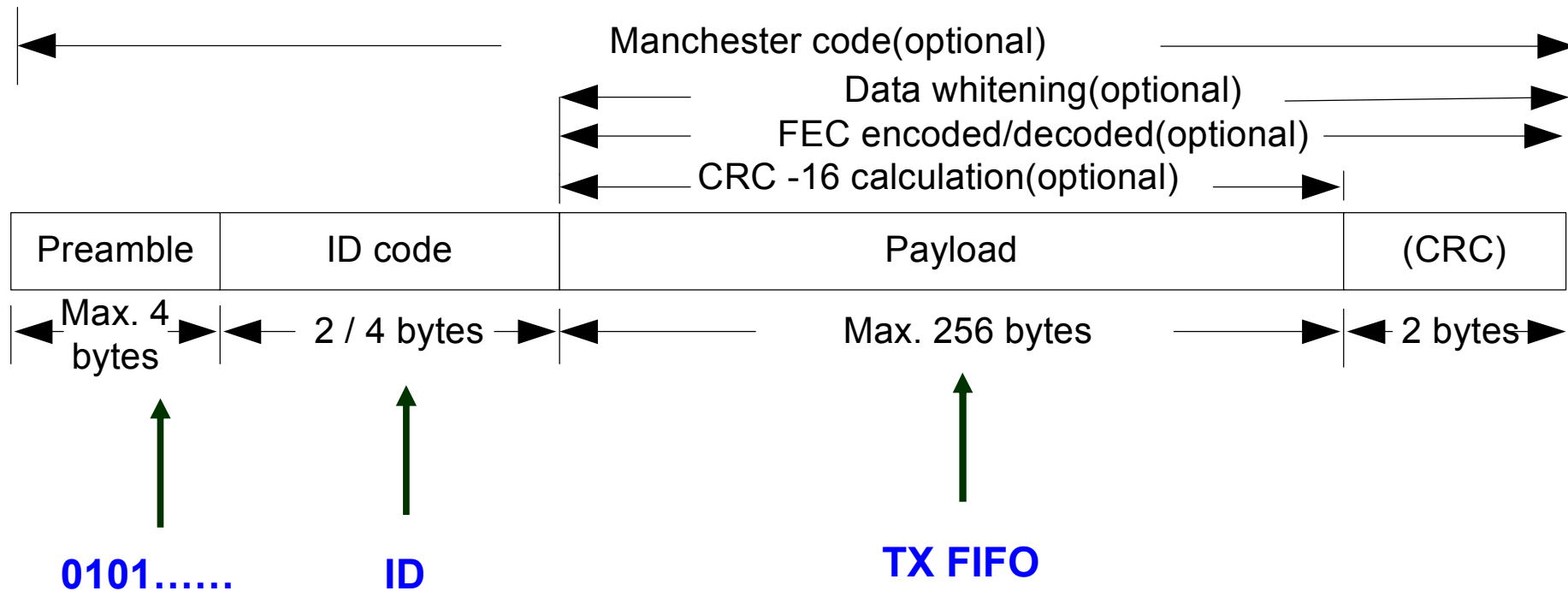
RF interface

● W Strobe

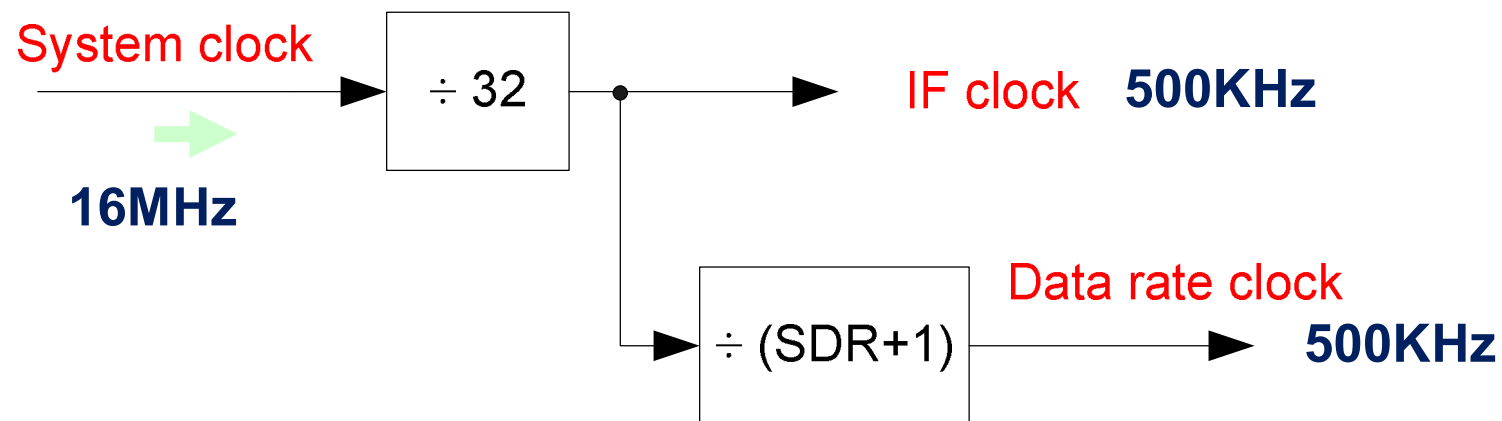
Strobe Command								說明
A7	A6	A5	A4	A3	A2	A1	A0	
1	0	0	0	x	x	x	x	Sleep mode
1	0	0	1	x	x	x	x	Idle
1	0	1	0	x	x	x	x	STBY
1	0	1	1	x	x	x	x	PLL
1	1	0	0	x	x	x	x	RX mode
1	1	0	1	x	x	x	x	TX mode
1	1	1	0	x	x	x	x	FIFO write reset
1	1	1	1	x	x	x	x	FIFO read reset



RF Format

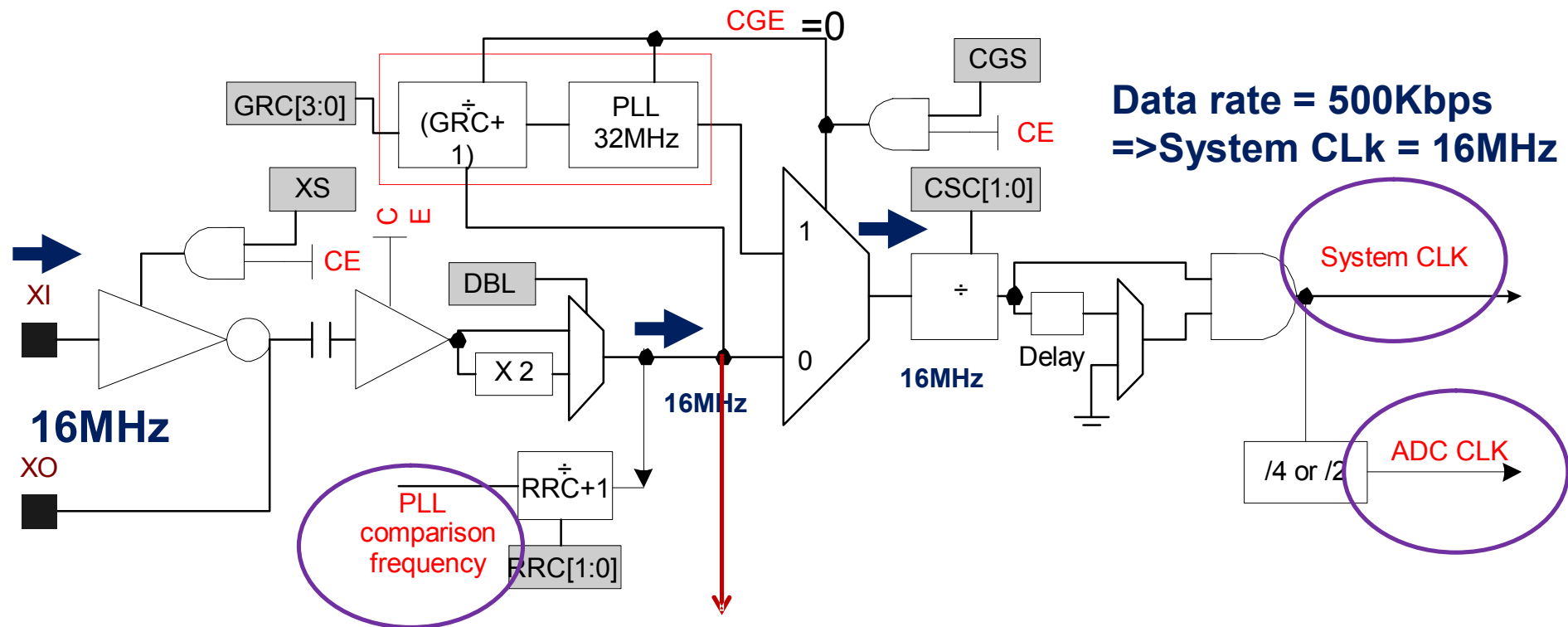


RF System Clock



Data rate	IF clock
Data rate \leq 2kbps	250kHz
2kbps < data rate \leq 250kbps	250k or 500kHz
250kbps < data rate \leq 500kbps	500kHz

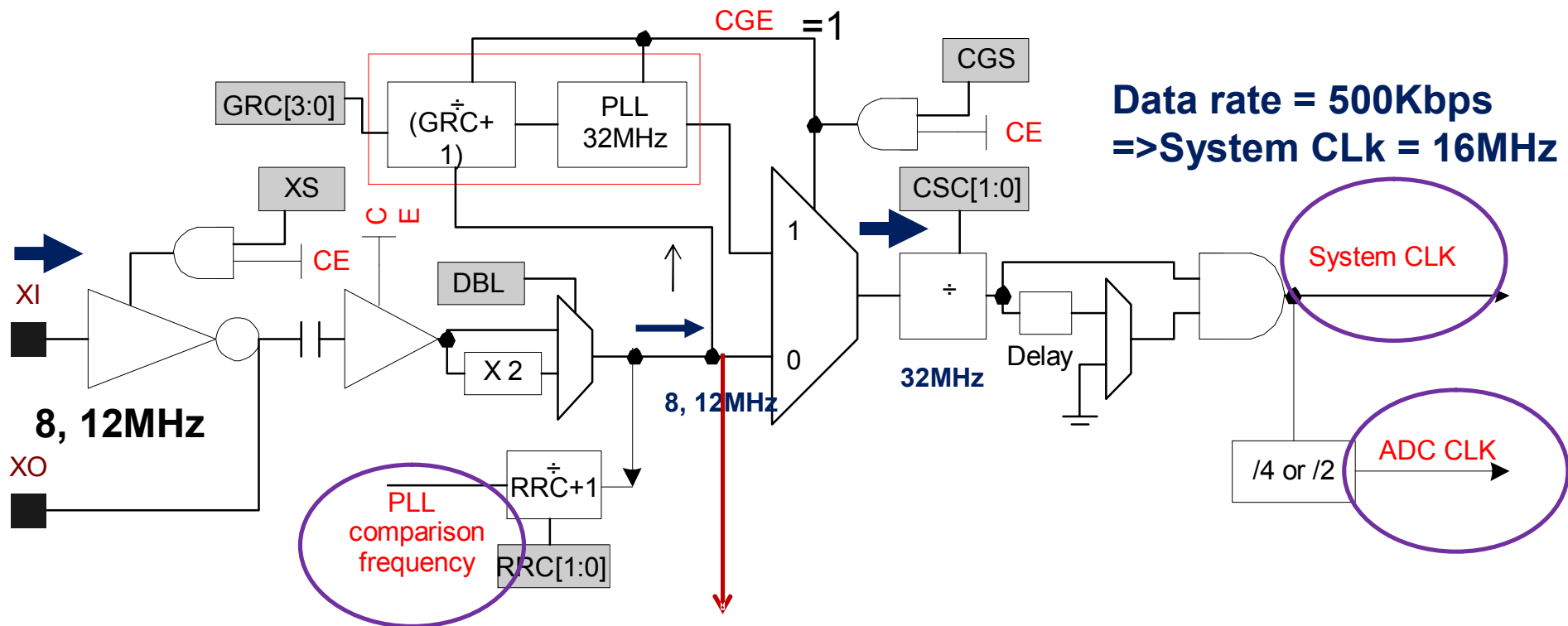
RF System Clock(16MHz, 500Kbps)



Data rate = 500Kbps
=>System CLK = 16MHz

For TX
Over sample → x16
 $500K \times 16 = 8MHz$
*** >= 8MHz**

RF System Clock(8, 12MHz , 500Kbps)



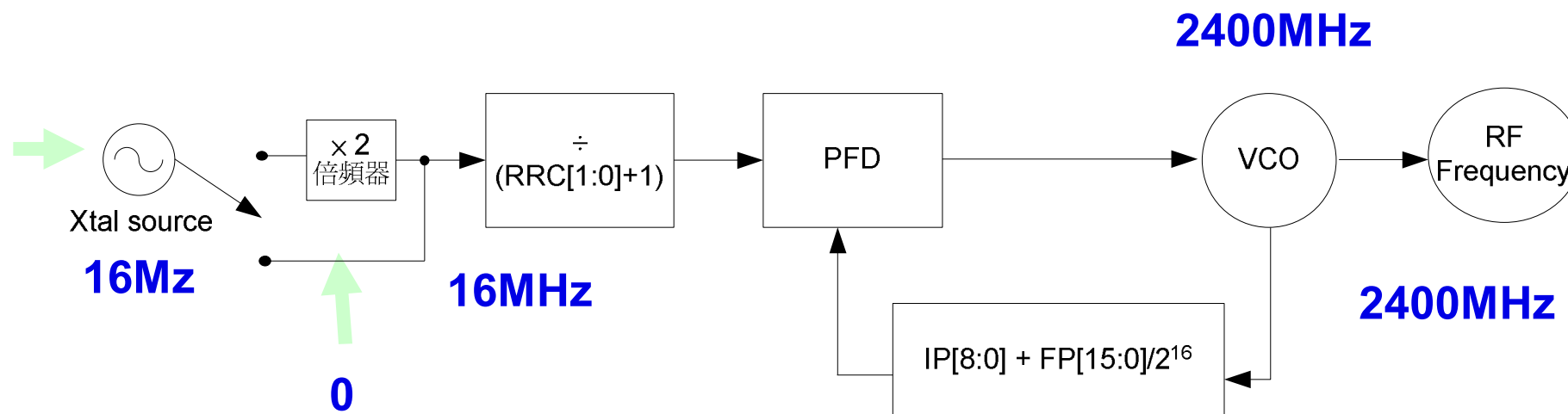
For TX

Over sample → x16

500K x 16 = 8MHz

*** ≥ 8MHz**

RF Carry Clock



$$2400\text{MHz} / 16\text{MHz} = 150.0$$

Integer part

$$BIP[7:0] = 0x96$$

Frac. part

$$BFP[15:0] = 0.0 \times 2^{16} = 0x0000$$

2400MHz + CHN No x channel step[500KHz]

RF Carry Clock

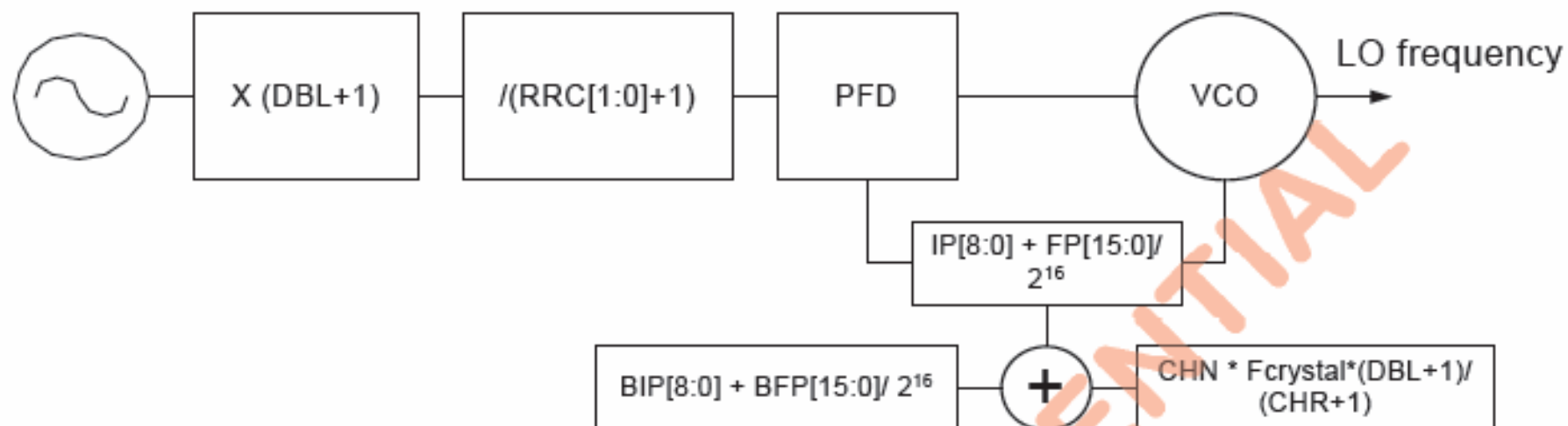


Fig19. VCO 基本方塊圖

2400MHz

+

CHN x 0.5MHz

RF Program Structure

-
- Reference code**
- **Initial RF**(ID, RF Freq, TX power.....)
 - Write data to RF SPI interface
 - **Cal. RF**(IF, VCO band, VCO current)
 - Begin → Write data to RF SPI interface (**set enable bit**)
 - End → Read data from RF SPI interface (**if enable bit is 0**)
 - Result → Read data from RF SPI interface (**signal / Cal. P**)
 - **Run system program**
 - TX / RX / standby → Write strobe command to RF SPI
 - Scan RSSI → Write RF channel command to RF SPI
 - Change Freq. → Write RF channel command to RF SPI
- 2400MHz**
CH step = 0.5MHz

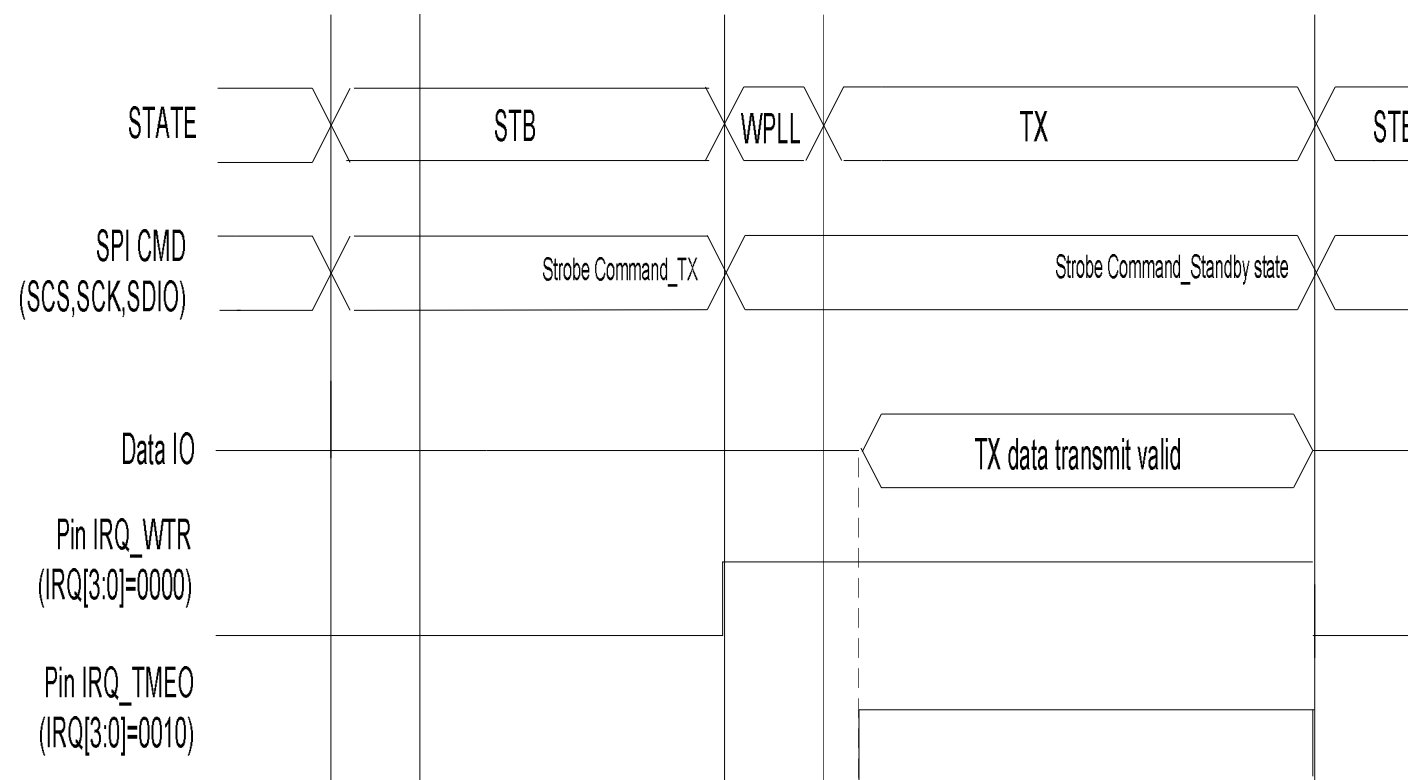
Change CHN only

RF Debug

- **Check SPI W/R**
- **Check Cal. Status**
- **Check TX Output / Frequency**
- **Check RX Carry Detection / RX Syn.**
- **Check RX Data(direct mode)**

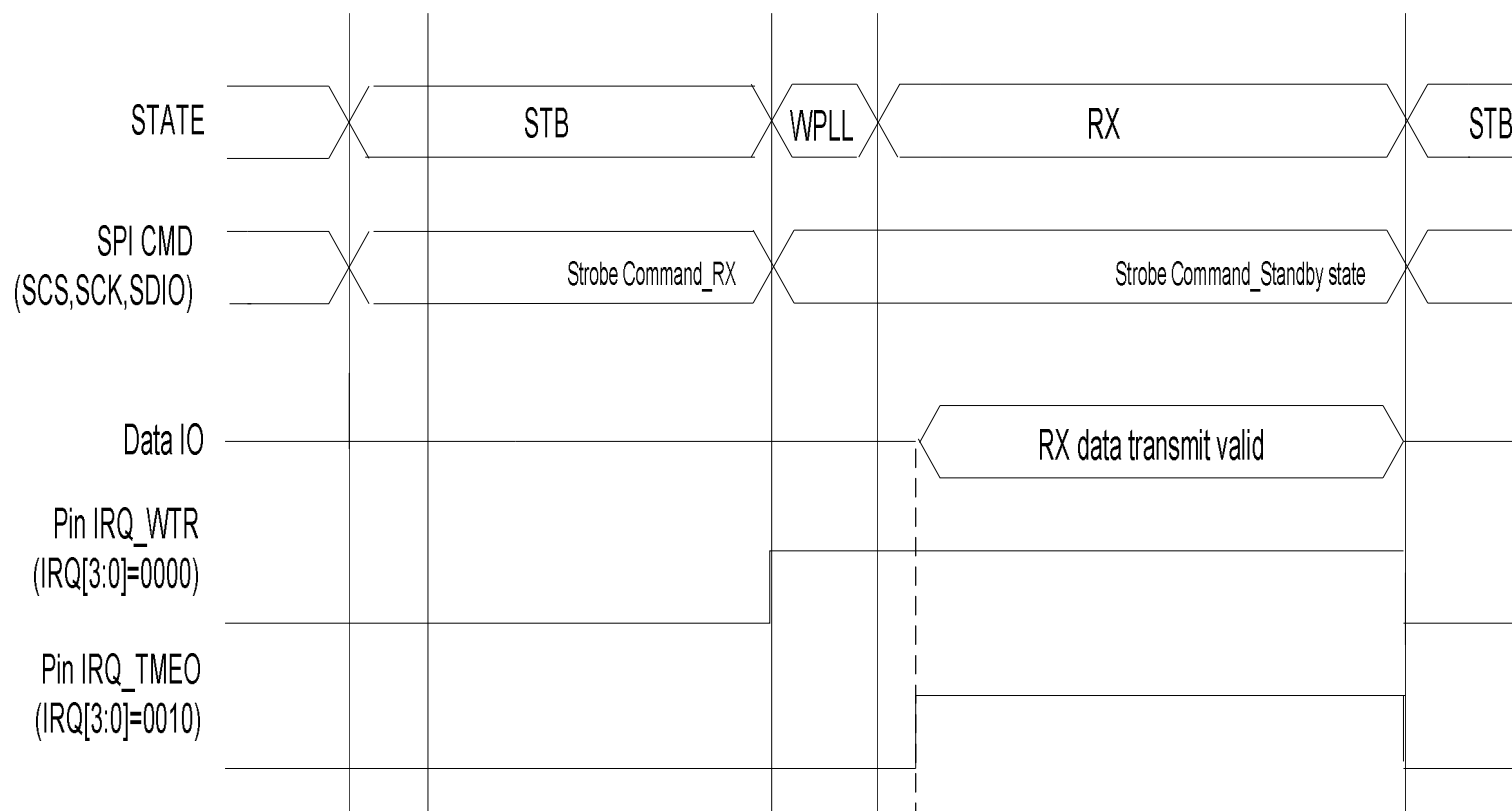
RF Operation

● FIFO TX

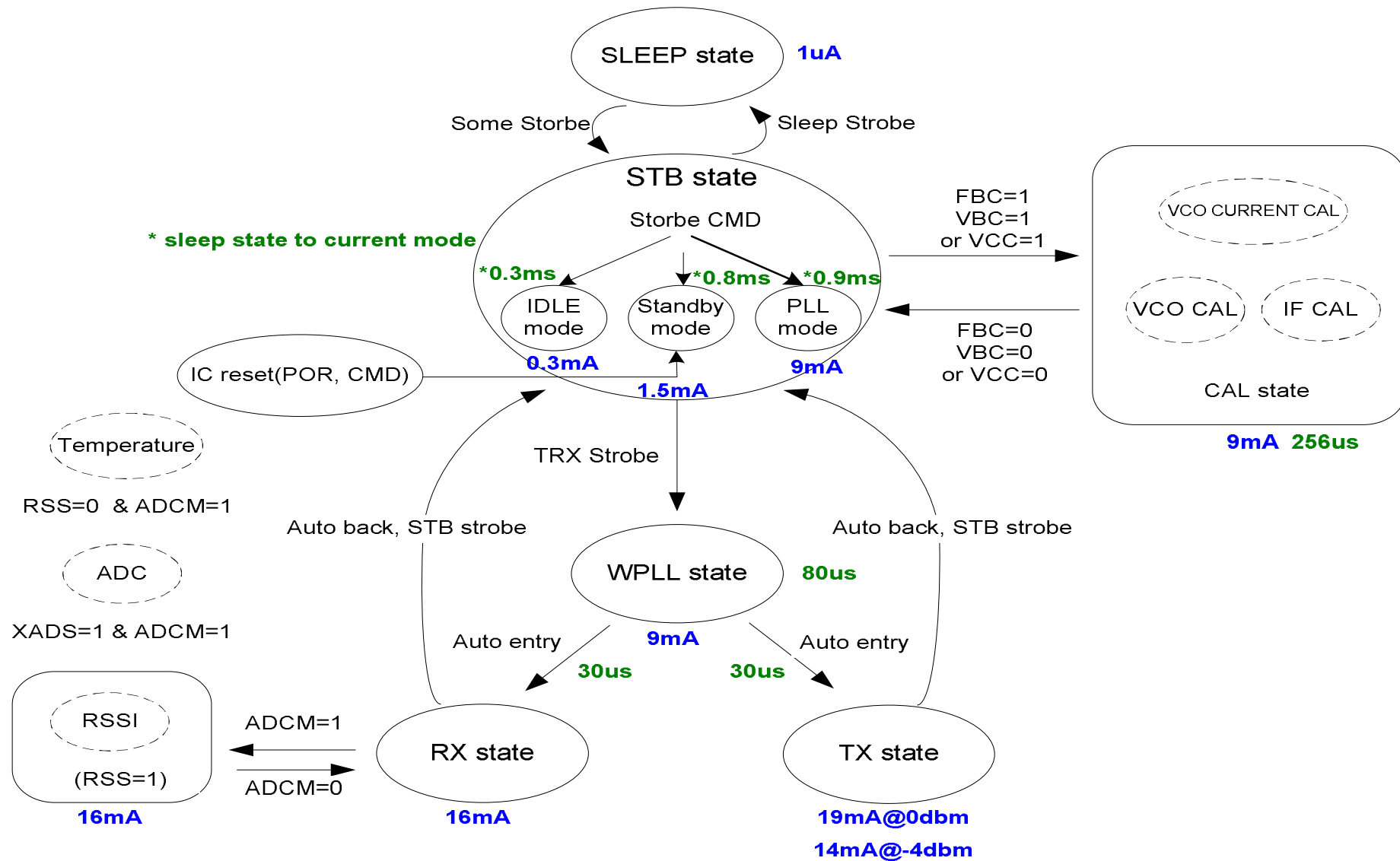


RF Operation

● FIFO RX



RF State Machine



RF Module

A01[2.5cmx2.15cm]



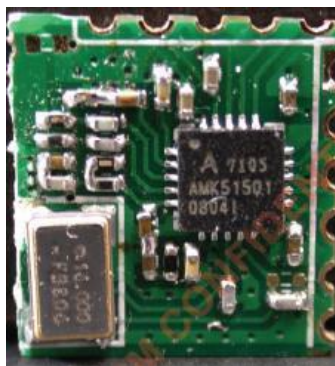
A05[2.21cmx1.24cm]



A06[2.33cmx1.24cm]



A04[1.27cmx1.3cm]



A07[1.0cmx1.0cm]

