PHYCHIPS

PR9200 AN010-03
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Module mode control & Timing information

Contents

1 Revision History

Version	Date	Description
01	2013-06-10	first edition
02	2016-05-18	Modified table 1 and figure 1of section 2 operation mode control Modified table of section 3.2 Inventory round time
03	2016-10-28	Modified initialize time of section 2 operation mode control

2 Operation mode control

PR9200 is configured in 4 main modes of operation.
The following table describes block condition and current according to each operation state.

Operation state

State name	H/W set	PR9200		PAM	current	Function
		Analog	Digital	PA		
POWER DOWN	CSE=0	OFF	OFF	OFF	0.8mA	Module power off
SLEEP	CSE=1	OFF	Sleep	OFF	14mA	Sleep mode, Wake-up internal/external interrupt.
IDLE	CSE=1	OFF	ON	OFF	20mA	Block initialization
ACTIVE	CSE=1	ON	ON	ON	530mA[1)]	Ramp-up Tag read / write / access / lock .. Ramp-down

Table 1

[Note] 1) Active current is measured at Tx CW condition.

The state diagram (figure 1) shows the modes PR9200 can operate in. it also includes transition time between the states. When PR9200 enter ACTIVE mode, RF Block is activated and ramp-up the system and it start to read RFID tag. Entering IDLE mode from POWER DOWN mode, initial time is needed. Initialize time is 21ms including system power ON peripheral initialize.

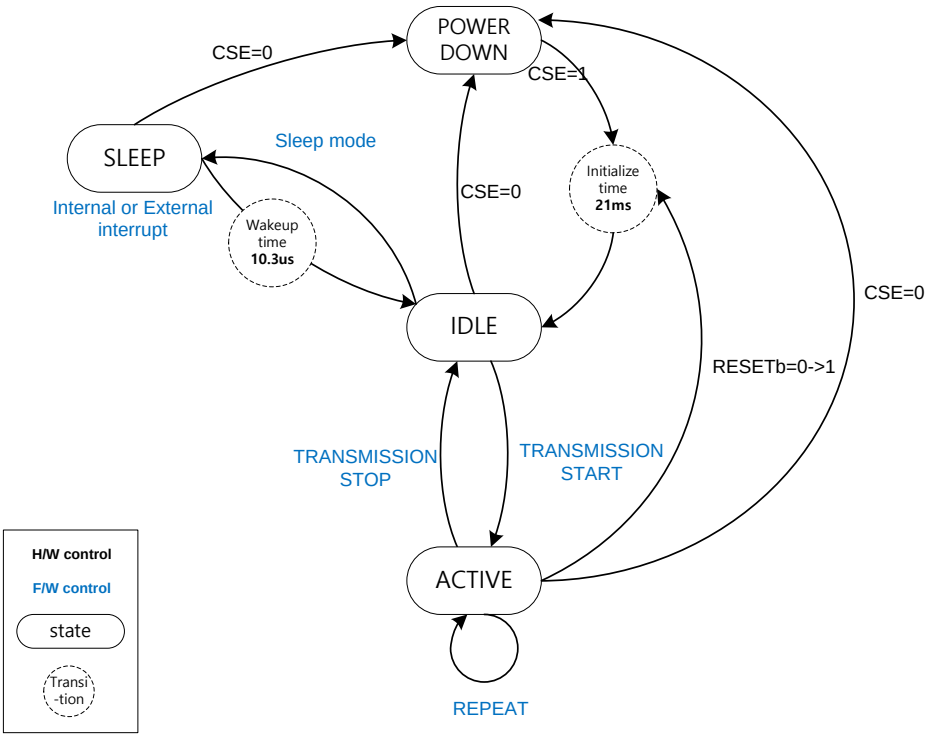

Figure 1

3 Timing Information

3.1 Link time

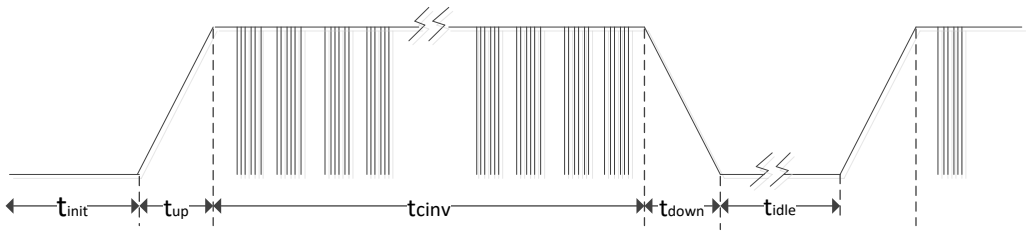

Table1 show link time of module.

parameter	description	time (typ.)	conditions
t_{init}	initialize time	10ms	This is from power up to idle state.
t_{up}	ramp-up time	204us	According to EPC global Gen2, maximum value is 500us.
t_{cinv}[1) 2)]	Continuous inventory round time	400ms	According to FCC, set to 400ms. Can be set from 10ms to 40sec.
t_{down}	ramp-down time	210us	According to EPC global Gen2, maximum value is 500us.
t_{idle}[1) 3)]	idle time	100ms	Can be set from 10ms to 40sec

Table 2

Notes

1) t_{inv} and t_{idle} can be adjusted by "Set FH and LBT Parameters" RCP command.
2) t_{cinv} is continuous inventory round time. It does not mean how fast a tag read.
   This value is set according to FCC regulation related to Frequency hopping.
   If you want to know reading time per tag according to modulation and link frequency, please refer to inventory round time (t_{inv}) at next section.
3) During t_{idle}, module send data read from tag to GUI through serial interface like UART.

3.2 Inventory round time (t_{inv})

This section shows actual inventory round time according to modulation, link frequency and number of tag. Our default setting value is M4,250kHz.

No.	Modulation	LF	Q	No. of tag	t_{inv}
1	FM0	250kHz	0	1	4.5ms
2	FM0	250kHz	4	5	24.8ms
3	M2	250kHz	0	1	5.9ms
4	M2	250kHz	4	5	25.2ms
5	M4	250kHz	0	1	6.5ms
6	M4	250kHz	4	5	30.4ms
7	M8	250kHz	0	1	9.1ms
8	M8	250kHz	4	5	47.7ms

3.3 Tag report time (t_{report})

The t_{report} is time for reporting the tag ID to host during t_{idle}. The acquired all tag IDs during t_{cinv} is reported for next t_{idle}. The t_{report} depends on the length of tag ID or serial communication type like UART, SPI and I2C.

If 96 bit EPC is reported with UART 115200bps, the time to report one tag ID is as follows.

Preamble	Msg Type	Code	PL (MSB)	PL (LSB)	PC(MSB)	PC(LSB)	EPC (MSB)
0xBB	0x02	0x22	0x00	0x0E	0x30	0x00	0xE2
0x00	0x34	0x11	0xB8	0x02	0x01	0x13	0x83

		EPC (LSB)	End Mark	CRC-16
0x25	0x85	0x66	0x7E	0xNNNN

- UART(115200 bps) 1 byte time: 86 us .

- RCP packet length to report a tag ID: 22 bytes
  - Fixed length (RCP Header+Tail): 8 bytes
  - Variable length (PC + EPC): 14 bytes

- t_{report} = 86us X (8 bytes + 14bytes)
  = 1.9 ms

4 Address Information

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