WM-SG-SM-42 Application Note For Region AS923

Version: 1.0

Contents

1. The AS923 configuration in device

1. Preamble Format

Modulation	Sync word	Preamble Length
LORA	0x34	8 symbols
GFSK	0xC194C1	5 bytes

2. Default Channels

Frequency(Hz)	Data Rate
923200000	DR5 ~ DR0
923400000	DR5 ~ DR0

3. Data Rate and Output Power Encoding

Data Rate	Configuration	Bit Rate
DR0	LoRa: SF12 / 125KHz	250
DR1	LoRa: SF11 / 125KHz	440
DR2	LoRa: SF10 / 125KHz	980
DR3	LoRa: SF9 / 125KHz	1760
DR4	LoRa: SF8 / 125KHz	3125
DR5	LoRa: SF7 / 125KHz	5470
DR6	LoRa: SF7 / 250KHz	11000
DR7	FSK: 50Kbps	50000
DR8 ~ DR15	RFU	

4. Power Table

TxPower	Configuration
0	20 dBm
1	14 dBm
2	11 dBm
3	8 dBm
4	5 dBm
5	2 dBm
6 ~ 15	RFU

5. LinkAdrReq Command

The AS923 LoRaWAN only supports a maximum of 16 channels. When ChMaskCntl field is 0 the chMask field individually enables/disables each of the 16 channels.

ChMaxCntl	ChMask applies to
0	Channels 1 to 16
1	RFU
2	RFU
3	RFU
4	RFU
5	RFU

6. Maximum Payload size

The maximum MACPayload size length (M) is given by the following table. It is derived from limitation of the PHY layer depending on the effective modulation rate used taking into account a possible repeater encapsulation layer. The maximum application payload length in the absence of the optional FOpt control field (N) is also given for information only. The value of N might be smaller if the FOpt field is not empty:

Data Rate	M	N
DR0	59	51
DR1	59	51
DR2	59	51
DR3	123	115

DR4	230	222
DR5	230	222
DR6	230	222
DR7	230	222
DR8 ~ DR15	Not defined	

If the end-device will never operate with a repeater then the maximum application payload length in the absence of the optional FOpt control field should be:

Data Rate	**M**	**N**
DR0	59	51
DR1	59	51
DR2	59	51
DR3	123	115
DR4	250	242
DR5	250	242
DR6	250	242
DR7	250	242
DR8 ~ DR15	Not defined	

7. Receive Window

   The RX1 receive window uses the same channel than the preceding uplink. The data rate is a function of the uplink data rate and the RX1DROffset as following:

RX1DROffset (Code value)	0	1	2	3	4	5	6	7
Effective	0	1	2	3	4	5	-1	-2

   Downstream data rate in RX1 slot = MIN (5, MAX (MinDR, Upstream data rate – Effective_RX1DROffset))

   The RX2 receive window uses a fixed frequency and data rate. The default parameters are: **923.2 MHz / DR2 (SF10/125KHz).**

8. Default Setting
   The following parameters are default values in device for the AS923 band.

ITEM	Value
RECEIVE_DELAY1	1s
RECEIVE_DELAY2	2s
JOIN_ACCEPT_DELAY1	5s
JOIN_ACCEPT_DELAY2	6s

2. AT Command Example for AS923

1) Configuration command sequence for AS923

```
# AT+WDCT=0                 /*  factory reset */
# ATZ                       /* reset module */
# AT+DC=0                   /* disable duty cycle (optinal) */
# AT+ADDR=<dev_addr>        /* set lora device address */
# AT+APPEUI=<app_eui>       /* set application eui */
# AT+NSK=<nsk>              /* set NSK (for ABP) */
# AT+ASK=<ask>              /* set ASK (for ABP) */
# AT+AK=<ak>                /* set AK (for OTAA) */
# AT+WDCT                   /* save changes to eeprom */
# ATZ                       /* reset module */
# AT+BAND=3                 /* switch to AS923 BAND */
# AT+WDCT                   /* save changes to eeprom */
# ATZ                       /* reset module */
# AT+DR=2                   /* change TX data rate to DR2 */
# AT+RX2DR=2                /* change RX2 data rate to DR2 */
# AT+WDCT                   /* save changes to eeprom */
# ATZ                       /* reset module */
```

2) Join command sequence for OTAA

```
# AT+JOIN=1         /* join GW with OTAA protocol */
+JoinAccepted       /* wait until this event happended */
```

AT+SEND=7 00000000000000fa0000000000000005 0 /* send 1st packet to gateway */
/* 7: port number, last 0: no ask needed */
/* 00000000000000fa0000000000000005 : payload */
AT+SEND=7 00000000000000fa0000000000000005 0 /* send 2nd packet to gateway */
/* 7: port number, last 0: no ask needed */
/* 00000000000000fa0000000000000005 : payload */

3) Join command sequence for ABP

AT+JOIN=0 /* join GW with ABP protocol */
AT+SEND=7 00000000000000fa0000000000000005 0 /* send 1st packet to gateway */
/* 7: port number, last 0: no ask needed */
/* 00000000000000fa0000000000000005 : payload */
AT+SEND=7 00000000000000fa0000000000000005 0 /* send 2nd packet to gateway */
/* 7: port number, last 0: no ask needed */
/* 00000000000000fa0000000000000005 : payload */