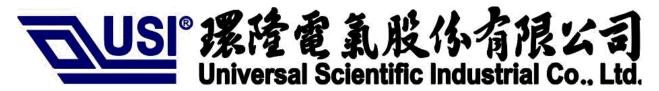


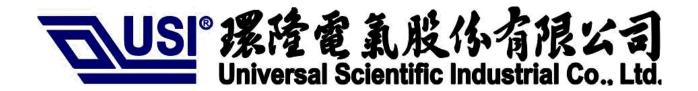
WM-SG-SM-42 Application Note For Region AS923-Thailand

Version: 1.0



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1. The AS923-Thailand 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
923600000	DR5 ~ DR0
923800000	DR5 ~ DR0
924000000	DR5 ~ DR0
924200000	DR5 ~ DR0
924400000	DR5 ~ DR0
924600000	DR5 ~ DR0
924500000	DR6 ~ DR6

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-Thailand 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:

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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

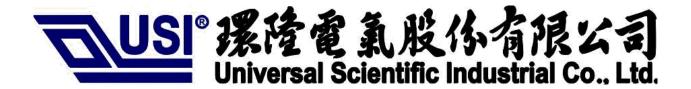
The following parameters are default values in device for the AS923-Thailand band.

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

2. AT Command Example for AS923-Thailand

1) Configuration command sequence for AS923

```
/* factory reset */
# AT+WDCT=0
# ATZ
                           /* reset module */
                          /* disable duty cycle (optinal) */
# AT+DC=0
# AT+ADDR=<dev addr>
                           /* set lora device address */
# AT+APPEUI=<app eui>
                          /* set application eui */
                          /* set NSK (for ABP) */
# AT+NSK=<nsk>
# AT+ASK=<ask>
                          /* set ASK (for ABP) */
# AT+AK=<ak>
                           /* set AK (for OTAA) */
# AT+WDCT
                         /* save changes to eeprom */
                         /* reset module */
# ATZ
# AT+BAND=64
                           /* switch to AS923 Thailand BAND */
# AT+WDCT
                         /* save changes to eeprom */
# ATZ
                         /* reset module */
# AT+DR=2
                         /* change TX data rate to DR2 */
                         /* change RX2 data rate to DR2 */
# AT+RX2DR=2
# AT+WDCT
                         /* save changes to eeprom */
                         /* reset module */
# ATZ
```



2) Join command sequence for OTAA

```
# AT+JOIN=1
          /* join GW with OTAA protocol */
          /* wait until this event happended */
+JoinAccepted
/* 7: port number, last 0: no ask needed */
                           /* 0000000000000fa000000000000005 : payload */
/* 7: port number, last 0: no ask needed */
                          /* 0000000000000fa0000000000000005 : payload */
3) Join command sequence for ABP
# AT+JOIN=0
          /* join GW with ABP protocol */
/* 7: port number, last 0: no ask needed */
                          /* 0000000000000fa000000000000005 : payload */
/* 7: port number, last 0: no ask needed */
                           /* 00000000000000fa0000000000000005 : payload */
```