RAK11300 Module AT Command Manual

Introduction

RAK11300 WisDuo LPWAN Module is based on the Raspberry Pi RP2040 chip and SX1262 RF transceiver. It provides an easy-to-use, small-size, low-power solution for long-range wireless data applications. This module complies with Class A & C of LoRaWAN 1.0.2 specifications. It can easily connect to different LoRaWAN server platforms like TheThingsNetwork (TTN), Chirpstack, Helium, etc. It also supports LoRa Point-to-Point (P2P) communication mode which helps you in implementing your own customized long-range LoRa network quickly.

The AT commands can be interfaced via USB acting as a serial port (Pin 2 **USB_DM** and Pin 3 **USB_DP**) or via UART1 (Pin 10 **TX1** and Pin 9 **RX1**). The default parameter of the AT commands is fixed to **115200 / 8-N-1**. The firmware upgrade is only possible via USB. To get familiar with the pin distribution of this module and find a schematic circuit of a reference application, refer to the RAK11300 Module Datasheet.

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AT Command Syntax

The AT command is based on ASCII characters. In general, the AT Command starts with the prefix AT and ends with <CR><LF> (i.e. \r\n). For the rest of the document, the \r\n part is omitted for the sake of clarity.

The AT commands have the standard format "AT+XXX", with XXX denoting the command.

There are four available command formats:

AT COMMAND FORMAT	Description
AT+XXX?	Provides a short description of the given command
AT+XXX=?	Reading the current value on the command
AT+XXX= <input parameter=""/>	Writing configuration on the command
AT+XXX	Used to run a command

The output of the commands is returned via UART.

The format of the reply is divided into two parts: returned value and the status return code.



- <value><CR><LF> is the first reply when (AT+XXX?) command description or (AT+XXX=?) reading value is executed then it will be followed by the status return code. The formats with no return value like (AT+XXX= <input parameter>) writing configuration command and (AT+XXX) run command will just reply to the status return code.
- 2. <cr><LF><status><cr><LF> is the second part of the reply which is the status return code.

The possible status codes are:

STATUS RETURN CODE	Description
ОК	Command executed correctly without error.
+CME ERROR:1	Generic error or input is not supported.
+CME ERROR:2	Command not allowed.
+CME ERROR:5	The input parameter of the command is wrong.
+CME ERROR:6	The parameter is too long.
+CME ERROR:8	Value out of range.

More details on each command description and examples are given in the remainder of this section.

NOTE

After changing LoRaWAN parameters, the device must be reset by either the ATZ command or pushing the reset button.

The Serial port connection is lost after the ATZ command or pushing the reset button. The connection must be re-established on the connected computer before log output can be seen or AT commands can be entered again.

AT?

Description: Help

Returns a list of all available commands with a short description

Command	Input Parameter	Return Value	Return Code
AT?	-	List of commands	OK

```
AT?
AT?
+++++++++++++
AT command list
+++++++++++++
       AT commands
AT?
      Restore default
ATR
      ATZ Trig a MCU reset
ATZ
AT+APPEUI
              Get or set the application EUI
AT+APPKEY Get or set the application key
AT+DEVEUI Get or set the device EUI
AT+APPSKEY Get or set the application session key
AT+NWKSKEY Get or Set the network session key
AT+DEVADDR Get or set the device address
AT+CFM Get or set the confirm mode
AT+JOIN Join network
AT+NJS Get the join status
AT+NJM Get or set the network join mode
AT+SENDFREQ Get or Set the automatic send time
AT+SEND Send data
AT+ADR Get or set the adaptive data rate setting
AT+CLASS Get or set the device class
AT+DR Get or Set the Tx DataRate=[0..7]
AT+TXP Get or set the transmit power
AT+BAND Get and Set number corresponding to active regions
AT+MASK Get and Set channels mask
AT+BAT Get battery level
AT+RSSI Last RX packet RSSI
AT+SNR Last RX packet SNR
AT+VER Get SW version
AT+STATUS
           Show LoRaWAN status
+++++++++++++
0K
```

ATR

This command is used to restore all parameters to the initial default values of the module.

Command	Input Parameter	Return Value	Return Code
ATR?	-	-	ОК
ATR	-	-	ОК

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ATZ

Description: MCU reset

This command is used to trigger an MCU reset.

Command	Input Parameter	Return Value	Return Code
ATZ?	-	ATZ: Trig a MCU reset	ОК
ATZ	-	No return. MCU resets.	ОК

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AT+APPEUI

Description: Application unique identifier

This command is used to access and configure the APPEUI.

Command	Input Parameter	Return Value	Return Code
AT+APPEUI?	-	AT+APPEUI: Get or set the App Eui	ОК
AT+APPEUI=?	-	< 8 hex >	ОК
AT+APPEUI= <input parameter=""/>	< 8 hex >	-	OK Or AT_PARAM_ERROR

```
AT+APPEUI: Get or set the application EUI
OK

AT+APPEUI=?

AT+APPEUI:70b3d57ed00201e1
OK

AT+APPEUI=70b3d57ed00201e1
OK

AT+APPEUI=70b3d57ed00201e1

OK

AT+APPEUI=70b3d57ed00201eh
+CME ERROR:5
```

AT+APPKEY

Description: Application key

This command is used to access and configure the APPKEY.

Command	Input Parameter	Return Value	Return Code
AT+APPKEY?	-	AT+APPKEY: Get or set the Application Key	OK
AT+APPKEY=?	-	< 16 hex >	ОК
AT+APPKEY= <input parameter=""/>	< 16 hex >	-	OK Or AT_PARAM_ERROR

AT+APPKEY: Get or set the application key
OK

AT+APPKEY=?

AT+APPKEY: 2b84e0b09b68e5cb42176fe753dcee79
OK

AT+APPKEY=2b84e0b09b68e5cb42176fe753dcee79
OK

AT+APPKEY=2b84e0b09b68e5cb42176fe753dcee79

OK

AT+APPKEY=2b84e0b09b68e5cb42176fe753dcee7x

+CME ERROR:5

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AT+DEVEUI

Description: Device EUI or DEVEUI

This command is used to access and configure the device EUI or DEVEUI.

Command	Input Parameter	Return Value	Return Code
AT+DEVEUI?	-	AT+DEVEUI: Get or set the Device EUI	OK
AT+DEVEUI=?	-	< 8 hex >	ОК
AT+DEVEUI= <input parameter=""/>	< 8 hex >	-	OK Or AT_PARAM_ERROR

```
AT+DEVEUI: Get or set the device EUI
OK

AT+DEVEUI=?

+DEVEUI:ac1f09fffe03efdc
OK

AT+DEVEUI=ac1f09fffe03efdc
OK

AT+DEVEUI=ac1f09fffe03efdc

OK

AT+DEVEUI=ac1f09fffe03efdx

+CME ERROR:5
```

AT+APPSKEY

Description: Application session key

This command is used to access and configure the application session key or APPSKEY.

Command	Input Parameter	Return Value	Return Code
AT+APPSKEY?	-	AT+APPSKEY: Get or set the Application Session Key	ОК
AT+APPSKEY=?	-	< 16 hex >	ОК
AT+APPSKEY= <input parameter=""/>	< 16 hex >	-	OK Or AT_PARAM_ERROR

AT+APPSKEY: Get or set the application session key
OK

AT+APPSKEY=?

AT+APPSKEY:3f6a66459d5edca63cbc4619cd61a11e
OK

AT+APPSKEY=3f6a66459d5edca63cbc4619cd61a11e
OK

AT+APPSKEY=3f6a66459d5edca63cbc4619cd61a11x

+CME ERROR:5

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AT+NWKSKEY

Description: Network session keys

This command is used to access and configure the network session keys or NWKSKEY.

Command	Input Parameter	Return Value	Return Code
AT+NWKSKEY?	-	AT+NWKSKEY: Get or set the Network Session Key	ОК
AT+NWKSKEY=?	-	< 16 hex >	ОК
AT+NWKSKEY= <input parameter=""/>	< 16 hex >	-	OK Or AT_PARAM_ERROR

AT+NWKSKEY: Get or Set the network session key
OK

AT+NWKSKEY=?

AT+NWKSKEY:323d155a000df335307a16da0c9df53f
OK

AT+NWKSKEY=323d155a000df335307a16da0c9df53f
OK

AT+NWKSKEY=323d155a000df335307a16da0c9df53f

OK

AT+NWKSKEY=323d155a000df335307a16da0c9df53f0

+CME ERROR:5

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AT+DEVADDR

Description: Device address or DEVADDR

This command is used to access and configure the device address or DEVADDR.

Command	Input Parameter	Return Value	Return Code
AT+DEVADDR?	-	AT+DEVADDR: Get or set the device address	ОК
AT+DEVADDR=?	-	< 4 hex >	ОК
AT+DEVADDR= <input parameter=""/>	< 4 hex >	-	OK Or AT_PARAM_ERROR

AT+DEVADDR?
AT+DEVADDR: Get or set the device address OK
AT+DEVADDR=?
AT+DEVADDR:26021FB0
ок
AT+DEVADDR=26021FB0
ок
AT+DEVADDR=26021FBX
+CME ERROR:5

AT+CFM

Description: Confirmed payload mode

This command is used to access and configure the type of payload of the device.

Command	Input Parameter	Return Value	Return Code
AT+CFM?	-	AT+CFM: Get or set the confirm mode	OK
AT+CFM=?	-	0 (Unconfirmed) or 1 (Confirmed)	ОК
AT+CFM= <input parameter=""/>	0 or 1	-	OK Or AT_PARAM_ERROR

AT+CFM?
AT+CFM: Get or set the confirm mode OK
AT+CFM=?
AT+CFM:0 OK
AT+CFM=0
ОК
AT+CFM=3
+CME ERROR:5

AT+JOIN

Description: Join the LoRaWAN network

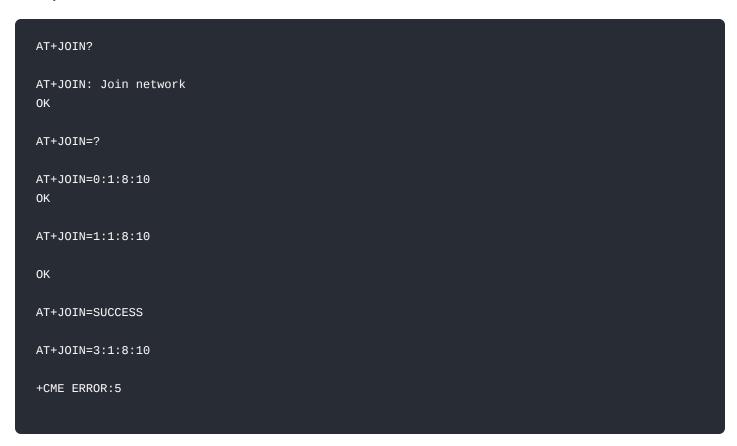
This command is used to join a LoRaWAN network.

Command	Input Parameter	Return Value	Return Code
AT+JOIN?	-	AT+JOIN: Join network	ОК
AT+JOIN=?	-	Param1, Param2, Param3, Param4	OK Or AT_BUSY_ERROR
AT+JOIN= <input Parameter></input 	Param1:Param2:Param3:Param4	-	ОК
	Param1 = Join command : 1 for joining the network, 0 for stop joining		
	Param2 = Auto-Join config: 1 for Auto-join on power up), 0 for no auto-join. (0 is default)		
	Param3 = Reattempt interval : 7 - 255 seconds (30 is default)		
	Param4 = No. of join attempts: 0 - 255 (0 is default)		



- This is an asynchronous command. OK means that the device is joining. The completion of the JOIN can be verified with AT+NJS=? command.
- Param3 is not supported yet and is fixed to 30 seconds always.

Examples:



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AT+NJS

Description: Network join status

This command is used to check the status of the devices if it is connected to a LoRaWAN network.

Command	Input Parameter	Return Value	Return Code
AT+NJS?	-	AT+NJS : Get the join status	ОК
AT+NJS=?	-	0 (not joined) or 1 (joined)	ОК

```
AT+NJS: Get the join status
OK
AT+NJS=?
AT+NJS:1
OK
```

AT+NJM

Description: LoRaWAN network join mode

This command is used to access and configure the activation method of the device either OTAA or ABP. A value of 1 means OTAA join mode, a value of 0 means ABP join mode

Command	Input Parameter	Return Value	Return Code
AT+NJM?	-	AT+NJM: Get or set the network join mode	ОК
AT+NJM=?	-	0 or 1	ОК
AT+NJM= <input parameter=""/>	0 or 1	-	OK Or AT_PARAM_ERROR

Examples:

```
AT+NJM: Get or set the network join mode
OK

AT+NJM=?

AT+NJM:0
OK

AT+NJM=0
OK

AT+NJM=2
+CME ERROR:5
```

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AT+SENDFREQ

Description: Set the automatic transmission period

This command is used to set the period in seconds between automatic packet transmissions. If set to 0, automatic packet transmission is disabled.

Command	Input Parameter	Return Value	Return Code
AT+SENDFREQ?	-	AT+SENDFREQ : Get or set the automatic send time	ОК
AT+SENDFREQ=?	-	<pre><period in="" seconds=""></period></pre>	OK
AT+SENDFREQ= <input parameter=""/>	<pre><period in="" seconds=""></period></pre>	-	OK Or AT_PARAM_ERROR

Examples:



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AT+SEND

Description: Send payload data

This command is used to send the LoRaWAN payload to a specific port.

Command	Input Parameter	Return Value	Return Code
AT+SEND?	-	AT+SEND : Send data	ОК
AT+SEND= <input parameter=""/>	port:payload	-	OK , AT_NO_NETWORK_JOINED , AT_PARAM_ERROR , Or AT_BUSY_ERROR

AT+SEND?

AT+SEND: Send data

0K

Unconfirmed Payload

AT+SEND=2:1234

OK

AT+SEND=SUCCESS

Confirm Payload

AT+SEND=2:1234

0K

AT+SEND=SUCCESS

Downlink packet received

NOTE

- If there is a pending downlink message from the LNS (LoRaWAN Network Server), the downlink payload will be received after the AT+SEND command with the format <fport>:<data length>: <rssi>:<snr>:<data> .
- In this example, the format has the corresponding values:

• **fport**: 2

data length: 6rssi: -46 dBmsnr: 11 dB

o data payload: 48656C6C6F0A

AT+SEND=5:10AAFF45

0K

AT+SEND=SUCCESS

RX:2:6:-46:11:48656C6C6F0A

0K

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AT+ADR

Description: Adaptive data rate

This command is used to access and configure the adaptive data rate of the module.

Command	Input Parameter	Return Value	Return Code
AT+ADR?	-	AT+ADR: Get or set the Adaptive Data Rate setting	ОК
AT+ADR=?	-	0 (ADR off) or 1 (ARD on)	ОК
AT+ADR= <input parameter=""/>	0 or 1	-	OK O r AT_PARAM_ERROR

Examples:

```
AT+ADR?

+ADR: Get or set the adaptive data rate setting
OK

AT+ADR=?

AT+ADR:0
OK

AT+ADR=0
OK

AT+ADR=3
+CME ERROR:5
```

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AT+CLASS

Description: LoRaWAN class

This command is used to access and configure the LoRaWAN class of the module.

Command	Input Parameter	Return Value	Return Code
AT+CLASS?	-	AT+CLASS: Get or set the Device Class (A, B, C)	ОК
AT+CLASS=?	-	A or C (B not supported)	ОК
AT+CLASS= <input parameter=""/>	A or C	-	OK Or AT_PARAM_ERROR

This FW of the device supports the LoRaWAN V1.0.2 stack.

Examples:

```
AT+CLASS?

+CLASS: Get or set the device class
OK

AT+CLASS=?

AT++CLASS:A
OK

AT+CLASS=A
OK

AT+CLASS=F

+CME ERROR:5
```

Back

AT+DR

Description: Data rate settings

This command is used to access and configure data rate settings.

Command	Input Parameter	Return Value	Return Code
AT+DR?	-	AT+DR= <datarate><cr>: Get or set the Tx Data Rate</cr></datarate>	ОК
AT+DR=?	-	0,1,2,3,4,5,6,7	ОК
AT+DR= <input parameter=""/>	0,1,2,3,4,5,6,7	-	OK Or AT_PARAM_ERROR

Check Appendix I for the input parameter depending on the frequency band selected.

```
AT+DR: Get or Set the Tx DataRate=[0..7]
OK

AT+DR=?

AT+DR:3
OK

AT+DR=3
OK
```

AT+TXP

Description: Transmit Power

This command is used to access and configure the transmit power.

Command	Input Parameter	Return Value	Return Code
AT+TXP?	-	AT+TXP : Get or set the transmit power	ОК
AT+TXP=?	-	< value >	OK Or AT+PARAM_ERROR
AT+TXP= <input parameter=""/>	< value >	-	OK OF AT_PARAM_ERROR

Check Appendix II for the input parameter depending on the frequency band selected.

For example, at EU868, a value of 2 represents **MaxEIRP - 4 dB** where MaxEIRP = +16 dBm.

```
AT+TXP?

AT+TXP: Get or set the transmit power
OK

AT+TXP=?

AT+TXP:0
OK

AT+TXP=0
OK
```

AT+BAND

Description: Regional frequency band

This command is used to access and configure the regional frequency band.

Command	Input Parameter	Return Value	Return Code
AT+BAND?	-	AT+BAND: Get and Set number corresponding to active regions	ОК
AT+BAND=?	-	0,1,2,3,4,5,6,7,8,	ОК
AT+BAND= <input parameter=""/>	< 0 to 12 >	-	OK Or AT_PARAM_ERROR

List of Band Parameter Options

Code	Regional Band	Code	Regional Band
0	AS923-1	7	IN865
1	AU915	8	US915
2	CN470	9	AS923-2
3	CN779	10	AS923-3
4	EU433	11	AS923-4
5	EU868	12	RU864
6	KR920		

```
AT+BAND: Get and Set number corresponding to active regions
OK

AT+BAND=?

AT+BAND:10
OK

AT+BAND=10
OK

AT+BAND=22
+CME ERROR:8
```

AT+MASK

Description: Regional channel mask

This command is used to access and configure the regional channel mask. Channel mask can only be set for the following regions: AU915, CN470, and US915

Command	Input Parameter	Return Value	Return Code
AT+MASK?	-	AT+MASK: Get and Set channels mask	ОК
AT+MASK=?	-	1,2,3,4,5,6,7,8,9,	ОК
AT+MASK= <input parameter=""/>	< 0 to 12 >	-	OK Or AT_PARAM_ERROR

List of mask channels per region

Mask (Sub-Band)	US915	AU915	CN470
1	0-7	0-7	0-7
2	8-15	8-15	8-15
3	16-23	16-23	16-23
4	24-31	24-31	24-31
5	32-39	32-39	32-39
6	40-47	40-47	40-47
7	48-55	48-55	48-55
8	56-63	56-63	56-63
9	-	-	64-71
10	-	-	72-79
11	-	-	80-87
12	-	-	88-95

Examples:

```
AT+MASK: Get and Set channels mask
OK

AT+MASK=?

AT+MASK:10
OK

AT+MASK=10
OK

AT+MASK=13
+CME ERROR:8
```

Back

AT+BAT

Description: Read the battery voltage

This command is used to read the battery voltage of the device

Command	Input Parameter	Return Value	Return Code
AT+BAT?	-	AT+BAT : Get battery level	ОК
AT+BAT=?	-	< value >	OK Or AT+PARAM_ERROR
NOTE The battery le	evel is returned as a valu	ue between 0 and 255.	

Examples:



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AT+RSSI

Description: Receive signal strength indicator

This command is used to get the RSSI value of the last packet received.

Command	Input Parameter	Return Value	Return Code
AT+RSSI?	-	AT+RSSI: Get the RSSI of the last received packet	ОК
AT+RSSI=?	-	< integer > in dBm	ОК
NOTE The reply will	be '0' if there is no last	packet received yet.	

```
AT+RSSI: Last RX packet RSSI
OK
AT+RSSI=?
AT+RSSI:-41
OK
```

AT+SNR

Description: Signal to Noise Ratio

This command is used to get the SNR value of the last packet received.

The reply will be '0' if there is no last packet received yet.

Command	Input Parameter	Return Value	Return Code
AT+SNR?	-	AT+SNR: Get the SNR of the last received packet	ОК
AT+SNR=?	-	< integer > in dB	ОК
 ✓ NOTE			

Examples:

```
AT+SNR: Last RX packet SNR
OK
AT+SNR=?
AT+SNR:11
OK
```

Back

AT+VER

Description: Version of the firmware

This command is used to get the firmware version installed on the device.

Command	Input Parameter	Return Value	Return Code
AT+VER?	-	AT+VER: Get the version of the firmware	ОК
AT+VER=?	-	< V.x.y >	ОК

Examples:



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AT+STATUS

Description: Show device status

This command is used to get the current device status.

Command	Input Parameter	Return Value	Return Code
AT+STATUS?	-	AT+STATUS: Show LoRaWAN status	ОК
AT+STATUS=?	-	< status >	ОК

```
AT+STATUS?
AT+STATUS: Show LoRaWAN status
OK
AT+STATUS=?
LoRaWAN status:
  Auto join disabled
  OTAA enabled
  Dev EUI 5032333338350012
  App EUI 1200353833333250
   App Key 50323333383500121200353833333250
  NWS Key 50323333333500121200353833333250
  Apps Key 50323333333500121200353833333250
  Dev Addr 83986D12
  Repeat time 120000
  ADR disabled
  Public Network
  Dutycycle disabled
  Join trials 10
  TX Power 0
  DR 3
  Class 0
  Subband 1
  Fport 2
  Unconfirmed Message
  Region 10
  Network joined
  Mode User
+STATUS:
OK
```

Appendix

Appendix I Data Rate by Region

EU433/EU868/RU864/AS923

Data Rate	Configuration	Indicative Physical Bit Rate [bit/s]
0	LoRa: SF12 / 125 kHz	250
1	LoRa: SF11 / 125 kHz	440
2	LoRa: SF10 / 125 kHz	980
3	LoRa: SF9 / 125 kHz	1760
4	LoRa: SF8 / 125 kHz	3125
5	LoRa: SF7 / 125 kHz	5470
6	LoRa: SF7 / 250 kHz	11000
7	FSK: 50 kbps	50000
8 ~ 15	RFU	

CN470/KR920

Data Rate	Configuration	Indicative Physical Bit Rate [bit/s]
0	LoRa: SF12 / 125 kHz	250
1	LoRa: SF11 / 125 kHz	440
2	LoRa: SF10 / 125 kHz	980
3	LoRa: SF9 / 125 kHz	1760
4	LoRa: SF8 / 125 kHz	3125
5	LoRa: SF7 / 125 kHz	5470
6 ~ 15	RFU	

US915

Data Rate	Configuration	Indicative Physical Bit Rate [bit/s]
0	LoRa: SF10 / 125 kHz	980
1	LoRa: SF9 / 125 kHz	1760
2	LoRa: SF8 / 125 kHz	3125
3	LoRa: SF7 / 125 kHz	5470
4	LoRa: SF8 / 500 kHz	12500
5 ~ 7	RFU	
8	LoRa: SF12 / 500 kHz	980
9	LoRa: SF11 / 500 kHz	1760
10	LoRa: SF10 / 500 kHz	3900
11	LoRa: SF9 / 500 kHz	7000
12	LoRa: SF8 / 500 kHz	12500
13	LoRa: SF7 / 500 kHz	21900
14 ~ 15	RFU	

AU915

Data Rate	Configuration	Indicative Physical Bit Rate [bit/s]
0	LoRa: SF12 / 125 kHz	250
1	LoRa: SF11 / 125 kHz	440
2	LoRa: SF10 / 125 kHz	980
3	LoRa: SF9 / 125 kHz	1760
4	LoRa: SF8 / 125 kHz	3125
5	LoRa: SF7 / 125 kHz	5470
6	LoRa: SF8 / 500 kHz	12500
7	RFU	RFU
8	LoRa: SF12 / 500 kHz	980
9	LoRa: SF11 / 500 kHz	1760
10	LoRa: SF10 / 500 kHz	3900
11	LoRa: SF9 / 500 kHz	7000
12	LoRa: SF8 / 500 kHz	12500

IN865

Data Rate	Configuration	Indicative Physical Bit Rate [bit/s]
0	LoRa: SF12 / 125 kHz	250
1	LoRa: SF11 / 125 kHz	440
2	LoRa: SF10 / 125 kHz	980
3	LoRa: SF9 / 125 kHz	1760
4	LoRa: SF8 / 125 kHz	3125
5	LoRa: SF7 / 125 kHz	5470
6	RFU	RFU
7	FSK: 50 kbps	50000
8 ~ 15	RFU	RFU

Appendix II TX Power by Region

EU868

By default, MaxEIRP is considered to be +16 dBm.

Configuration (EIRP)
MaxEIRP
MaxEIRP - 2 dB
MaxEIRP - 4 dB
MaxEIRP - 6 dB
MaxEIRP - 8 dB
MaxEIRP - 10 dB
MaxEIRP - 12 dB
MaxEIRP - 14 dB

8 ~ 15 RFU

US915

TXPower	Configuration (Conducted Power)
0	30 dBm - 2*TXpower
1	28 dBm
2	26 dBm
3 ~ 9	-
10	10 dBm
11 ~ 15	RFU

AU915

By default, MaxEIRP is considered to be +30 dBm.

TXPower	Configuration (EIRP)
0	MaxEIRP
1 ~ 10	MaxEIRP - 2*TXPower
11 ~ 10	REU

KR920

By default, MaxEIRP is considered to be +14 dBm.

TXPower	Configuration (EIRP)
0	MaxEIRP
1	MaxEIRP - 2 dB
2	MaxEIRP - 4 dB
3	MaxEIRP - 6 dB
4	MaxEIRP - 8 dB
5	MaxEIRP - 10 dB
6	MaxEIRP - 12 dB
7	MaxEIRP - 14 dB
8 ~ 15	RFU

AS923

By default, Max EIRP is considered to be 16 dBm.

TXPower	Configuration (EIRP)	
0	MaxEIRP	
1	MaxEIRP - 2 dB	
2	MaxEIRP - 4 dB	
3	MaxEIRP - 6 dB	
4	MaxEIRP - 8 dB	
5	MaxEIRP - 10 dB	
6	MaxEIRP - 12 dB	
7	MaxEIRP - 14 dB	
8 ~ 15	RFU	

IN865

By default, MaxEIRP is considered to be 30 dBm.

TXPower	Configuration (EIRP)
0	MaxEIRP
1	MaxEIRP - 2 dB
2	MaxEIRP - 4 dB
3	MaxEIRP - 6 dB
4	MaxEIRP - 8 dB
5	MaxEIRP - 10 dB
6	MaxEIRP - 12 dB
7	MaxEIRP - 14 dB
8	MaxEIRP - 16 dB
9	MaxEIRP - 18 dB
10	MaxEIRP - 20 dB
11 ~ 15	RFU

RU864

By default, MaxEIRP is considered to be +16 dBm.

TXPower	Configuration (EIRP)
0	MaxEIRP
1	MaxEIRP - 2 dB
2	MaxEIRP - 4 dB
3	MaxEIRP - 6 dB
4	MaxEIRP - 8 dB
5	MaxEIRP - 10 dB
6	MaxEIRP - 12 dB
7	MaxEIRP - 14 dB
8 ~ 15	RFU

CN470

By default, MaxEIRP is considered to be +19.15 dBm.

TXPower	Configuration (EIRP)	
0	MaxEIRP	
1	MaxEIRP 2 dB	
2	MaxEIRP 4 dB	
3	MaxEIRP 6 dB	
4	MaxEIRP 8 dB	
5	MaxEIRP - 10 dB	
6	MaxEIRP - 12 dB	
7	MaxEIRP - 14 dB	
8 ~ 15	RFU	

EU433

By default, MAxEIRP is considered to be +12.15 dBm.

TXPower	Configuration (EIRP)
0	MaxEIRP
1	MaxEIRP - 2 dB
2	MaxEIRP - 4 dB
3	MaxEIRP - 6 dB
4	MaxEIRP - 8 dB
5	MaxEIRP - 10 dB
6 ~ 15	RFU

Appendix III Maximum Transmission Load by Region



M in the following list is the length with MAC header, N is the maximum usable payload size for the user data without MAC header.

EU868

Data Rate	M	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6	250	242
7	250	242

8 ~ 15 Not Defined Not Defined

Data Rate	M	N
0	19	11
1	61	53
2	133	125
3	250	242
4	250	242
5 ~ 7	Not Defined	Not Defined
8	61	53
9	137	129
10	250	242
11		
11	250	242
12	250	242

AU915

Data Rate	M	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6	250	242
7	Not Defined	Not Defined
8	Not Defined 61	Not Defined 53
8	61	53
9	61 137	53 129
9	61 137 250	53 129 242
8 9 10 11	61 137 250 250	53 129 242 242

KR920

Data Rate	М	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6 ~ 15	Not Defined	Not Defined

AS923

Data Rate	Uplink MAC Pa	yload Size (M)	Downlink MAC I	Payload Size (M)
	UplinkDwellTime = 0	UplinkDwellTime = 1	DownlinkDwellTime = 0	DownlinkDwellTime = 1
0	59	N/A	59	N/A
1	59	N/A	59	N/A
2	59	19	59	19
3	123	61	123	61
4	250	133	250	133
5	250	250	250	250
6	250	250	250	250
7	250	250	250	250
8	RI	=U	RI	=U

IN865

Data Rate	M	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6	250	242
7	250	242
8 ~ 15	Not Defined	Not Defined

RU864

Data Rate	M	N
0	59	51
1	59	51
2	59	51
3	123	115
4	230	222
5	230	222
6	230	222
7	230	222
8 ~ 15	Not Defined	Not Defined

CN470

Data Rate	M	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6 ~ 15	Not Defined	Not Defined

EU433

Data Rate	М	N
0	59	51
1	59	51
2	59	51
3	123	115
4	250	242
5	250	242
6	250	242
7	250	242
8 ~ 15	Not Defined	Not Defined

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