



LoRaWAN[®] Controller

UC50x Series

Communication Protocol



Revision History

Date	Doc Version	Description
Feb. 2, 2021	V 1.0	Initial version
Dec. 1, 2021	V 1.1	Add collect failed package

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1. Overview

UC50x Series use the standard Milesight IoT payload format based on IPSO. All data are based on following format:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...

Channel	Description
01	Battery
03	GPIO1
04	GPIO2
05	Analog Input1
06	Analog Input2
ff	Device information or RS485 data

Note:

- 1) All explanations and examples in this document are based on HEX format.
- 2) For all Milesight IoT decoder examples please find files on <https://github.com/Milesight-IoT/SensorDecoders>

2. Uplink Payload

Uplink payloads of UC50x Series are made up of device information and sensor data.

2.1 Device Information

UC500 series report basic device information of device everytime joining the network.

Channel	Type	Data Size/Byte	Description
ff	01(Protocol Version)	1	01=>V1
	08 (Device SN)	6	12 digits
	09 (Hardware Version)	2	02 10=>V2.1
	0a(Software Version)	2	01 01=>V1.1
	0b (Power On)	1	Device is on
	0f(Device Type)	1	00=Class A 02=Class C
	14 (Analog Type)	1	Bit0~Bit 3: 0: 4-20 mA 1: 0-10 V Bit4~Bit 7: 1: AI1 2: AI2

Examples:

ff 0b ff ff 01 01					
Channel	Type	Value	Channel	Type	Value
ff	0b (Power On)	ff (reserved)	ff	01 (Protocol Version)	01(V1)

ff 08 61 22 91 36 34 79		
Channel	Type	Value
ff	08(Device SN)	61 22 91 36 34 79

ff 09 01 20 ff 0a 01 10					
Channel	Type	Value	Channel	Type	Value
ff	09 (Hardware version)	0120 (V1.2)	ff	0a (Software version)	0110 (V1.10)

ff 14 11 ff 14 20							
Channel	Type	Analog Input	Analog Input Signal Type	Channel	Type	Analog Input	Analog Input Signal Type
ff	14 (AI Type)	1 (AI 1)	1 (0-10 V)	ff	14 (AI Type)	2 (AI 2)	0 (4-20 mA)

2.2 Sensor Data

UC500 series report sensor data according to reporting interval (10min by default).

Battery level is reported every 6 hours for UC501 and 12 hours for UC502.

Channel	Type	Data Size/Byte	Description
01	75(Battery Level)	1	Unit: %
03(GPIO 1)	00 (Digital Input)	1	00=low, 01=high
	01 (Digital Output)	1	00=low, 01=high
	c8(Counter)	4	Unsigned
04(GPIO 2)	00 (Digital Input)	1	00=low, 01=high
	01 (Digital Output)	1	00=low, 01=high
	c8(Counter)	4	Unsigned
05(AI 1)	02(Analog Input)	8	Byte 1-2: Current value
06(AI 2)			Byte 3-4: Min value
			Byte 5-6: Max value
			Byte 7-8: Average value
ff	0e(RS485)	Mutable (6-8)	Total: Byte 1+Byte 2+Value Byte 1: Channel ID+6 Byte 2: Bit 0~2: Data Type 001: Coil 001: Discrete 010: Input Register (INT16) Input Register (INT32 with upper 16 bits) Input Register (INT32 with lower 16 bits) 011: Holding Register (INT16) Holding Register (INT32 with upper 16 bits)

			Holding Register (INT32 with lower 16 bits) 100: Holding Register (INT32) 101: Holding Register (Float) 110: Input Register (INT32) 111: Input Register (Float) Bit 3~7: Data Length
ff	15	1	Modbus data collection failed package. The device will return the failed Modbus channel ID.

Note: Channel ID can be configured in ToolBox. If channel ID is 1, device will send 07.

Examples:

1. Battery

01 75 5a		
Channel	Type	Value
01	75 (Battery)	5a => 90%

2. Digital Input

03 00 00		
Channel	Type	Value
03 (GPIO1)	00 (Digital Input)	00=>low

3. Digital Output

04 01 01		
Channel	Type	Value
04 (GPIO2)	01 (Digital Output)	01=>high

4. Pulse Counter

04 c8 78 05 00 00		
Channel	Type	Value
04 (GPIO2)	c8 (Counter)	78 05 00 00 =>00 00 05 78=1400

5. Analog Input

05 02 c302 c302 c302 c302					
Channel	Type	Ccy Value	Min Value	Max Value	Avg Value
05 (Analog Input1)	02 (Analog Input)	C3 02 => 02 c3 = 707 means 7.07	C3 02 => 02 c3 = 707 means 7.07	C3 02 => 02 c3 = 707 means 7.07	C3 02 => 02 c3 = 707 means 7.07

6. RS485

ff 0e 08 25 00000000				
Channel	Type	Channel ID	Data Type	Value
ff	0e (RS485)	08 means RS485 (Modbus Master) Channel 2	25 => 00100101 Bit0-bit2: 101 means Holding Register (Float) Bit3-Bit7: 00100=>4 Means data length = 4	00000000

ff 15 08		
Channel	Type	Value
ff	15 (collect failed)	08 means RS485(Modbus Master) Channel 2

3. Downlink Payload

Downlink is used for controlling the UC50x via network server remotely. Downlink port (Application port) can be configured via ToolBox.

When the channel range is 1~253, the format is:

Channel1	Data1	Reserved	Channel2	Data2	Reserved	Channel 3	...
1 Byte	2 Byte	ff	1 Byte	2 Byte	ff	1 Byte	...

When the channel is 255(ff), the format is:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...

Examples:

1. DO Control

04 01 00 ff		
Channel	Type	Reversed
04(GPIO2)	01 00(High)	00 ff

2. Reporting Interval

ff 03 b0 04		
Channel	Type	Value
ff	03(Set Reporting Interval)	b0 04 => 04 b0 = 1200s

-END-