DTP-UART protocol

UART protocol

- BaudRate: 19,200 bps(fixed), data bit: 8, stop bit: 1, parity: none, flow control: none.
- 5V tolerant inputs not supported.

Application schematics

Do not connect the 5V TX output to the RX(DTP-UART) pin directly. DTP-UART does not have a 5V tolerant input. When connecting with a 5V operating system, you can simply make a voltage divider with a pair of resistors. Refer to the 5V or 3.3V output connection example below.

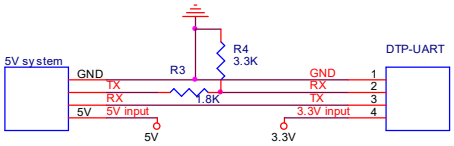


Fig. 1. Connection with 5V

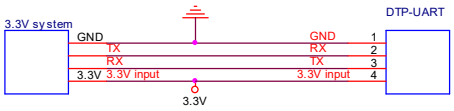
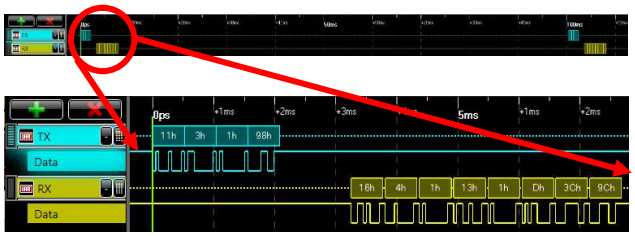


Fig. 2. Connection with 3.3V

Timing

- data request cycle ≥ 100ms
- first data request time after power-on ≥ 200ms
- response delay ≥1~5ms



Get temperature data

- Request message (4-byte)

Byte	Field Name	Hex	Dec
1	1st data	0x11	17
2	2nd data	0x03	3
3	3rd data	0x01	1
4	4th data	0x98	152

- Response message (8-byte)

Byte	Field Name	Hex	Dec
1	START	0x16	22
2	FUNCTION	0x04	4
3	Object Temperature(MSB) – To Hi	0xXX	
4	Object Temperature (LSB) – To Lo	0xXX	
5	Ambient Temperature(MSB) – Ta Hi	0xXX	
6	Ambient Temperature(LSB) – Ta Lo	0xXX	
7	DTP Checksum	0xXX	
8	END	0x9C	156

Checksum Calculation

1. Add all bytes of the packet, except the last 2-bytes of the message.
2. Keep only the lowest 8 bits(1byte) from the result.

i.e. response message(8-byte) : 0x16, 0x04, 0x01, 0x6D, 0x00, 0xFA, 0x82, 0x9C

0x16+0x04+0x01+0x6D+0x00+0xFA = 0x182

lowest 8 bits = 0x82

Temperature Calculation

The result is calculated by following expressions (valid for both To and Ta):

1. Convert it to decimal value i.e. 0x016D = 365d
2. Multiply by 0.1(or divide by 10) i.e. 365 / 10 = 36.5℃

0xFFF1 = -15 → -1.5℃

0xFF9C = -100 → -10.0℃

0x00FF = 255 → 25.5℃

Output Data Limit

Ta: 0xFE83(-38.1℃) ... 0x4E2(120.0℃)

To: 0xFE70(-40.0℃) ... 0xED8(380.0℃)

Get emissivity setting

- Request message (4-byte)

Byte	Field Name	Hex	Dec
1	1st data	0x11	17
2	2nd data	0x03	3
3	3rd data	0x05	5
4	4th data	0x98	152

- Response message (5-byte)

Byte	Field Name	Hex	Dec
1	START	0x16	22
2	FUNCTION	0x01	1
3	Emissivity	0xXX	
4	DTP Checksum	0xXX	
5	END	0x9C	156

i.e. 0x16, 0x01, 0x61, 0x78, 0x9C

Checksum: 0x16+0x01+0x61 = 0x78

Emissivity: 0x61(hex) = 97(dec)

97/100 = 0.97

Factory default : 97

Emissivity adjustment

- Request message (4-byte)

Byte	Field Name	Hex	Dec
1	1st data	0x11	17
2	2nd data	0x06	6
3	3rd data (emissivity)	0x0A...0x64	10~100
4	4th data	0x98	152

It can be adjustable for emissivity in the range 10...100.

10 means emissivity 0.1 and 100 means 1.0. (10/100 = 0.1, 100/100 = 1.0)

- Response message (5-byte)

Byte	Field Name	Hex	Dec
1	START	0x16	22
2	FUNCTION	0x01	1
3	Emissivity	0xXX	
4	DTP Checksum	0xXX	
5	END	0x9C	156

Additional information

Manufacturer: DIWELL Electronics Co., Ltd. (South Korea)
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Revision history

Version	Date(Y,M,D)	Description
1.0.0	2022. 7. 21.	First version is released