DTPA-UART-1616S

Non-contact 16x16 Pixel Infrared Temperature Sensor

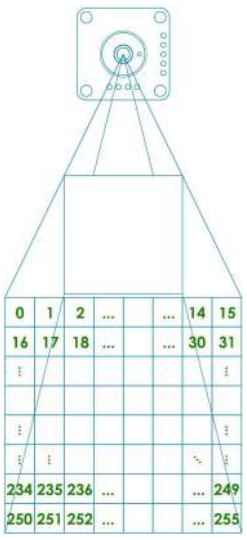
Product Specifications

laboratory temperature conditions: 25℃.

Parameter	min	Typ	Max	Unit
Supply voltage	4.5	5	9	V
Supply current		15		mA
pixels		256		px
Spectral range	5			㎛
Object temperature range	-20		200	℃
Operating temperature	-20		80	℃
IR refresh rate		10		Hz
Accuracy(*)		±3		%
Resolution digital		0.1		℃
Emissivity		1		ε
Standard start-up time		3		sec
Stabilization time	1			min
FOV	44° x 44°			
Weight (without cable)	6.3 g			
Communication interface	UART			
Relative humidity	95% Max. non-condensing			

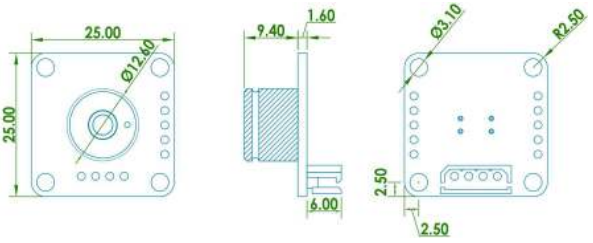
***: ±3% • |To-Ta| of reading or ±3℃ (whichever is greater) for 5℃<Ta<50℃. All accuracy specifications only apply under settled isothermal conditions and specified for the center pixel. Accuracy Measurement Distance: 15cm**

16 x 16 Optical Orientation

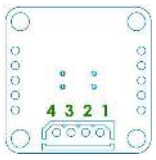


Dimensions / Pin Configuration

unit: mm



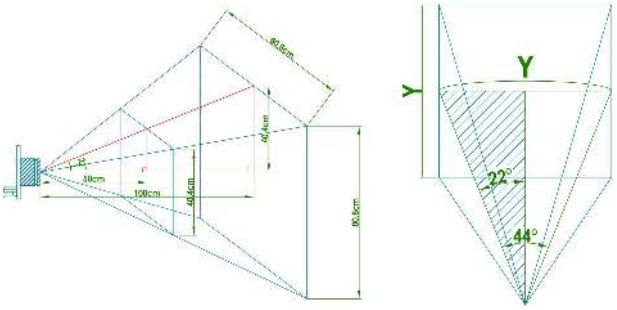
Top view Side view Bottom view

Bottom view	No.	Name	Description
	1	5V	supply voltage
	2	TX	UART Output 3.3V
	3	RX	UART Input 3.3V (with 5V tolerant)
	4	GND	ground

※ Connector information: molex
- pcb side 5267-04A (P/N 22035045)
- mates with 5264-04 (P/N 50375043)

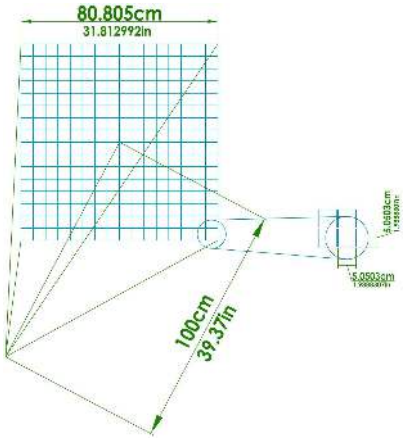
Calculate Field of View

The FOV determines the size of the infrared measurement area according to the distance.



$$Y = \text{distance(cm)} \times \tan(22°) \times 2$$

e.g. Y = 100cm*0.404*2 ≒ 80.8 cm
Y = 200cm*0.404*2 ≒ 161.6 cm



size of 1 pixel (distance: 1m)

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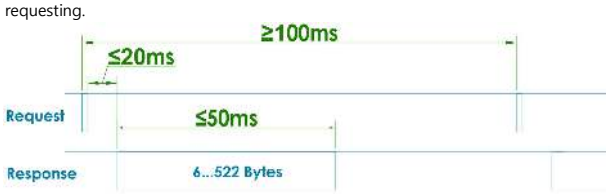
UART Protocol

- BaudRate: 115,200bps(fixed), data bit: 8, stop bit:1, parity: none, flow control: none
- I/O is 3.3V LV (5V tolerant)

Timing

- The sensor has a minimum data request cycle of 100ms, which means that you need to wait at least 100ms between each request, regardless of how many data you are requesting.



UART Data Format

- request command

- The frame of request data consists of 6 bytes. The byte structure is explained below. Note that an 'X' refers to a variable bit containing dynamic data.

Request (main → DTPA)			
Byte	**Field Name**	**data**	**DEC**
0	START	0x11	17
1	Start Address(MSB)	0b0000000X	0...258(*)
2	Start Address(LSB)	0bXXXXXXXX	
3	No. of Register(MSB)	0b0000000X	1...259(**)
4	No. of Register(LSB)	0bXXXXXXXX	
5	END	0x98	152

(*) Start Address(SA): minimum: 0 maximum: 258

(**) No. of Register(NR) ≤ (259-SA) , minimum:1, maximum: 259

Access to the sensor is limited to the addresses listed in the address map table. Attempting to access any other address will result in no response from the sensor. Please refer to the "Address map" for more information.

e.g. SA:257 NR: 1 (ok)

SA:257, NR: 10 (X) - no response

SA:1, NR: 256 (ok)

SA:1, NR: 270 (X) - no response

The (SA, NR, response data)structure would be: 0x[MSB][LSB], where MSB and LSB are each two hexadecimal numbers (8 bits).

- response data

The number of bytes in the response frame varies based on the value of NR.

Response (DTPA → main)			
Byte	**Field Name**	**data**	**DEC**
0	START(MSB)	0x16	22
1	START(LSB)	0x98	152
2	Temperature of the SA(MSB)	0xXX	
3	Temperature of the SA(LSB)	0xXX	
...	...		
...	Temperature of the end address(MSB)	0xXX	
...	Temperature of the end address(LSB)	0xXX	
...	END(MSB)	0x1A	26
...	END(LSB)	0x9C	156

e.g. No. of Register(NR): 2 → total response bytes: (2*2)+4 = 8 bytes

No. of Register: 259 → (259*2)+4= 522 bytes

Address map

Address		Data Length	Type	Description
HEX	**DEC**	**Short**		
0x0000	0	1	signed	Ambient Temperature(Ta)
0x0001	1	1	signed	Temperature of PIXEL 0
0x0002	2	1	signed	Temperature of PIXEL 1
0x0003	3	1	signed	Temperature of PIXEL 2
0x0004	4	1	signed	Temperature of PIXEL 3
:	:	:	:	:
0x00FF	255	1	signed	Temperature of PIXEL 254
0x0100	256	1	signed	Temperature of PIXEL 255
0x0101	257	1	signed	Maximum temperature
0x0102	258	1	signed	Minimum temperature

The data is in 2's complement format.

- Request command examples:

Read PIXEL 0...256 temperature: 0x11,0x00,0x01,0x01,0x00,0x98 (6-byte)
SA: 1 NR: 256

Read only Max, Min temperature : 0x11,0x01,0x01,0x00,0x02,0x98 (6-byte)
SA: 257 NR: 2

Temperature Calculation

The result is calculated by following expressions (valid for all temperature):

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

0xFFF1 = -15 → -1.5℃

0xFF9C = -100 → -10.0℃

0x00FF = 255 → 25.5℃

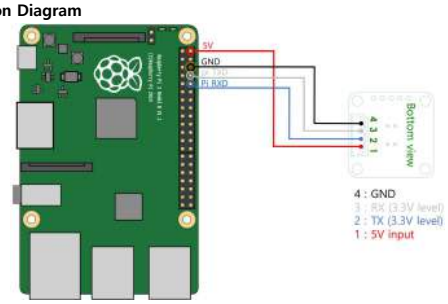
Tutorial(Raspberry Pi 2)

- Requirements

Hardware: Raspberry Pi 2 , DTPA-UART-1616S

Software: wiringPi library

- Connection Diagram



- Sample code

https://www.diwellshop.com/web/en/DTPA/DTPA-UART-S_raspberryPi.zip

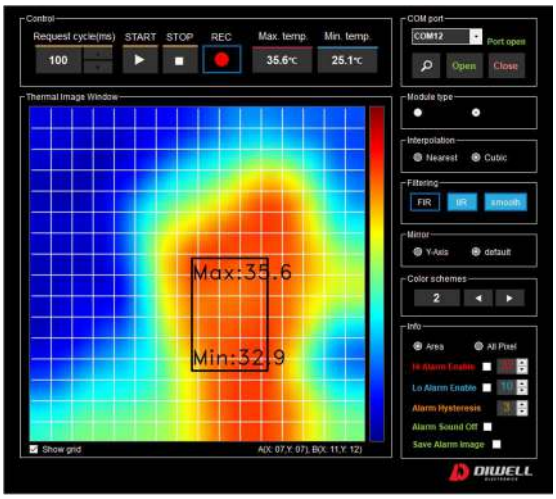
- Expected Results.

Products handling precaution

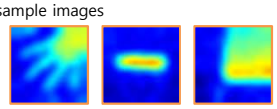
※ Always use the proper power supply and voltage when operating the product. Using an improper power supply can cause damage to the product or create a safety hazard.
※ Don't drop or hit the product, as this can cause physical damage to the product.
※ When not in use, it is recommended to store the product at room temperature and in a dry place
※ To remove dust, use a blower rather than compressed air.
※ Avoid pressing the lens with your hands or any other object.
※ Do not scratch the lens surface with sharp objects.
※ Do not disassemble or modify the product voluntarily.
※ Avoid exposing the product to direct sunlight, chemicals, heat, or fire.
※ This product is not water-resistant.
※ Do not remove the sensor during communication.
※ Do not touch the sensor, heatsink and PCB while measuring temperature.
※ For stable temperature measurement, avoid measuring immediately after turning on the sensor's power. The power must always be supplied and should not be turned on or off during measurement.
※ Placing heating components near the sensor inside the case can affect the accuracy of temperature measurement. It is strongly recommended to isolate them from the sensor if possible

PC Software

The software runs on Windows 10 environment.
For more information, refer to the Test Board manual.
https://www.diwellshop.com/web/en/DTPA/DTPA-UART-1616S_TestBoard_en.pdf

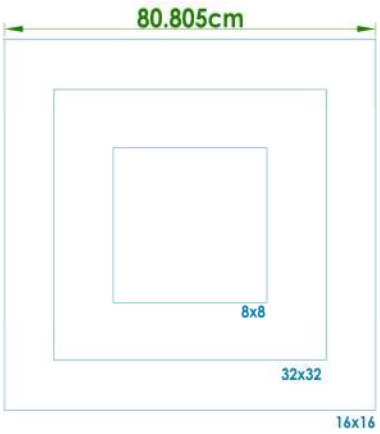


- sample images



Comparison of measurement areas

When measuring temperature from a distance of 1 meter, the measurement area may vary depending on the module used. Here is a comparison of the measurement areas for each module.



Additional information

Manufacturer: DIWELL Electronics Co., Ltd. (South Korea)
Technical support: mailto:expoeb2@diwell.com, mailto:dsjeong@diwell.com

Revision history

Version	Date(Y,M,D)	Description
1.0.0	2023. 4. 21.	First version is released