TRUEYES

Flame Detection Sensor

Rev. 0.94

TF100 User Manual

The TF100 is a sensitive flame detection sensor. This sensor has been developed with efficient algorithm on the basis of actual flame conditions, using accurate calibration apparatus. This sensor can detect flame in the vicinity of up to 35 meters perpendicular to the front cover. This sensor can detect either of big or small size flame. It is easy to use. This sensor supports various communication interfaces like a serial command interface, two TTL level GPIOs (active high or active low) and two status LEDs. This compact sized sensor can be used in a wide range of applications with other circuits or devices.

Features

- Highly sensitive flame detection
- Detection up to 35 meters
- Quick response speed
- Easy to use.
- Low power consumption, 3.3 VDC
- Compact size, 16 x 16 mm

Model : TF100

Interfaces

- 2 Channel TTL Level GPIOs
- UART, 9600 Baud Rate, TTL Level 3.3V
- Status LEDs

Specifications

Table 1. Electrical Specifications

Parameter	Min	Typ.	Max	Unit	Notes
Operating Voltage	3.25	3.3	3.35	V	
Current Consumption	11	-	19	mA	
Storage Temperature	-30	-	70	℃	

Table 2. Sensor Specifications

Parameter	Min	Typ.	Max	Unit	Notes
Field of View	-	80	90	degrees	
Detection Distance	-	-	35	meter	
Initialization Time	2	-	30	sec	

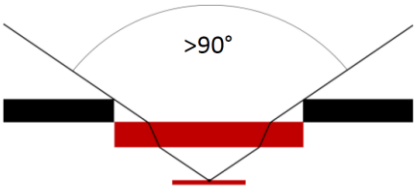
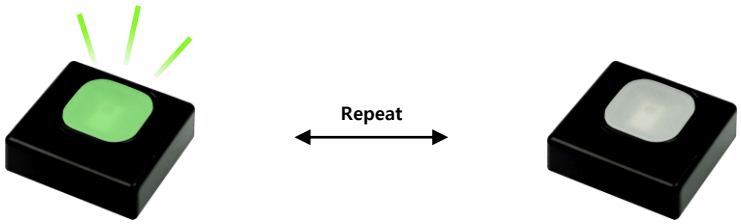


Figure 1. Field of View

Getting Started with Flame Detection Sensor

When sensor startup, It follows following sequence. User can refer it to know sensor`s status.

① When sensor is under initialization situation, The green led will be blinking.



Green LED ON **Green LED OFF**

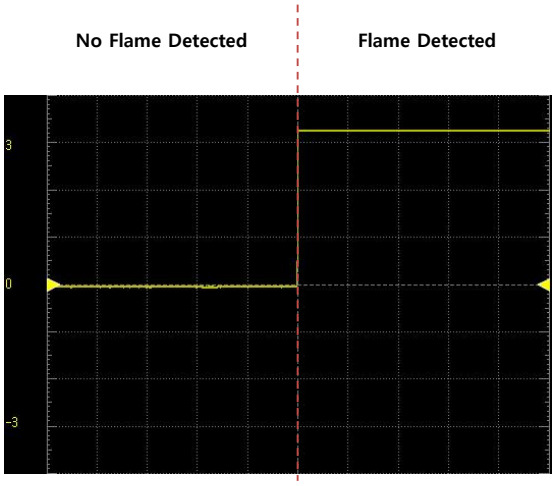
② After sensor is stabilized, Only green led will be glowing, indicating no flame is detected. else, If red LED is on, indicating Flame is detected.

Green LED ON
No Flame Detected

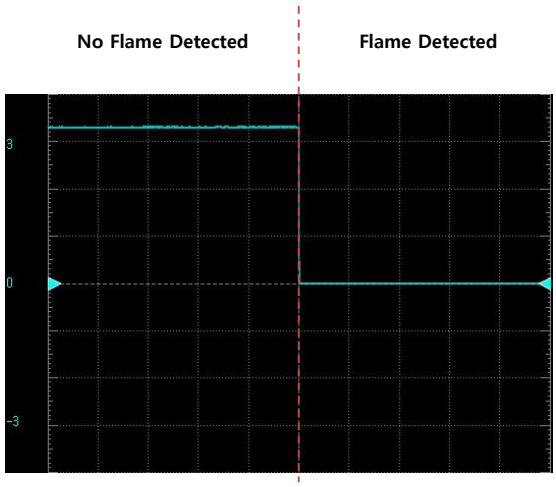
RED LED ON
Flame Detected

GPIOs Output

This sensor supports two GPIOs. User can easily distinguish between flame and no flame conditions. Also, User can conne ct external relay, alarm, led etc. when such an external inductive device is connected to GPIOs output. the sensor GPIOs might not be stable initially. It might cause damage sensor or external devices. To prevent product from such incidences, GPIO outputs are initially disabled.



Graph 1. GPIO 0



Graph 2. GPIO 1

Table 3. Interface Specifications, VCC= 3.3 VDC

Parameter	Min	Typ.	Max	Unit	Notes
GPIO low voltage	-	0	1.06	V	
GPIO high voltage	1.87	3.3	-	V	

UART Interface

This sensor comes with a serial command interface for user to change some parameters and read sensor configuration information using simple commands.

Table 4, shows serial interface configuration of this sensor.

Table 4. Communication Configuration

Baud Rate	9600 bps
Stop Bits	1 bit
Parity Check	None
Data Length	8 bits
TTL Level	3.3 V

This sensor supports several commands for user. Table 5, enlists user commands. The default detection range of sensor is set to 10 meters with high sensitive edge, LED outputs are enabled and GPIO outputs are disabled, initially. If user want t o change these parameters, they should follow the command rules, as mentioned in the user manual, below. Descriptions and examples of each command are mentioned in Page 7 to 11.

Important Points to keep in mind while using following serial commands:
1. This protocol format conform to ASCII code.
1. There should not be any space within a command.
2. All commands should be delimited by<CR><LF>.

Table 5. Command List

Command	Description
SETRANGE	Set the detection range, in meters.
SETRNGCORN	Set the detection range, in meters and sensitivity corner.
DISPRANGE	Display currently set range, in meters.
LEDEN	Enable or Disable LED Outputs.
GPIOEN	Enable or Disable GPIO Outputs.
DEFAULT	Reinitialize the sensor with default settings.
SYSRST	Reset the sensor.

Getting Started with Commands

User can communicate with sensor using PC software / terminal program or another device which supports serial communication on same baud rate as mentioned in serial interface specification. If user has connected their serial device correctly, then, They will receive initial messages from sensor.

Example

```
RX> Trueyes<SP>Flame<SP>Sensor<SP>Model:<SP>TF-100<SP>is<SP>Starting.<CR><LF>
RX> Range<SP>is<SP>set<SP>to<SP>high<SP>sensitive<SP>10<SP>meter<SP>range.<CR><LF>
RX> Wait<SP>for<SP>the<SP>sensor<SP>to<SP>respond.<CR><LF>
```

Example 1. Initial Message

Sensor will respond with following messages, when it is activated and ready, till that time, the green led will keep blinking and after 'Sensor is Activated' is received, green led will stop blinking and remain on, until flame is not detected.

Example

```
RX> <ACK><CR><LF>
RX> Sensor<SP>is<SP>Activated.<CR><LF>
RX> <CR><LF>
```

Example 2. Ready Message

Checking Flame Detection

When sensor detect a flame (Refer, Page 3), Below string messages will be displayed. When detection is started, as <ACK> with 'Flame Start' message is displayed then the 'Flame Detected' will be displayed with cycle about 2 second. if there is no more flame detected, then <NAK> with 'Flame Stop' message is received.

Example

```
RX> <ACK>Flame<SP>Start.<CR><LF>
RX> Flame<SP>Detected.<CR><LF>
RX> Flame<SP>Detected.<CR><LF>
RX> Flame<SP>Detected.<CR><LF>
RX> <NAK>Flame<SP>Stop.<CR><LF>
```

Example 3. Flame Detection Message

Entry Command Mode

To enter in command mode, User should send ATTN<CR><LF>, Otherwise, The commands will not recognized by the sensor.

Example

```
TX> ATTN<CR><LF>
RX> ATTN<CR><LF>
RX> <ACK><CR><LF>
RX> ==============<SP>Command<SP>Mode<SP>Started<SP>==============><CR><LF>
```

Example 4. ATTN Message

Exit Command Mode

To exit from the command mode, User should send RUN<CR><LF>. When user is not using serial interface, to continue with running mode.

Example

```
TX> RUN<CR><LF>
RX> RUN<CR><LF>
RX> <ACK><CR><LF>
RX> =x===========<SP>Command<SP>Mode<SP>Exit<SP>============x=<CR><LF>
```

Example 5. RUN Message

Parameters Configuration Command

SETRANGE<range on meters><CR><LF>

Sensor has only 7 standard ranges, which are 10, 15, 18, 20, 25, 30, 35 meters. Put the range at <range on meters>.
If user put any range between 1 to 35, even if they are not any of above absolute values, the nearest higher standard range mentioned above, will be considered.

Example

```
TX> SETRANGE25<CR><LF>
RX> SETRANGE25<CR><LF>
RX> <ACK>Range<SP>is<SP>set<SP>to<SP>approx.<SP>25<SP>meters.<CR><LF>
```

Example 6. SETRANGE Message

The detection range is set 25 meters.

Example

```
TX> SETRANGE07<CR><LF>
RX> SETRANGE07<CR><LF>
RX> <ACK>Range<SP>is<SP>set<SP>to<SP>approx.<SP>10<SP>meters.<CR><LF>
```

Example 7. SETRANGE Message

Although, the 7 meters is put, the detection range will be set 10 meters.

SETRNGCORN<range on meters><sensitivity corner><CR><LF>

Sensitivity of sensor can be regulated one of high(0), medium(1), low(2) within the set range.

Example

```
TX> SETRNGCORN241<CR><LF>
RX> SETRNGCORN241<CR><LF>
RX> <ACK>Range<SP>is<SP>set<SP>to<SP>medium<SP>sensitive<SP>25<SP>meter<SP>range.<CR><LF>
```

Example 8. SETRNGCORN Message

The detection range is set 25 meters with medium sensitivity.

DISPRANGE<CR><LF>

It will display the currently set range.

Example

```
TX> DISPRANGE<CR><LF>
RX> DISPRANGE<CR><LF>
RX> <ACK>Range<SP>is<SP>at<SP>medium<SP>sensitive<SP>edge<SP>of<SP>10<SP>Meters.<CR><LF>
```

Example 9. DISPRANGE Message

The sensitivity and range information will be displayed, in response from sensor.

Interface Configuration Command

This sensor supports interface configuration. User can change some settings of sensor.

LEDEN<selection><CR><LF>

User can enable or disable the LED outputs. This feature is given to prevent some potential situations in which the optical p erformance of sensor is hindered by led emission.

Example

```
TX> LEDEN0<CR><LF>
RX> LEDEN0<CR><LF>
RX> <ACK>LED<SP>Outputs<SP>are<SP>disabled<SP>
    (for<SP>current<SP>session<SP>as<SP>well<SP>as<SP>at<SP>power-up).<CR><LF>
```

Example 10. LEDEN Message

The LED outputs will be disabled.

Example

```
TX> LEDEN1<CR><LF>
RX> LEDEN1<CR><LF>
RX> <ACK>LED<SP>Outputs<SP>are<SP>enabled<SP>
    (for<SP>current<SP>session<SP>as<SP>well<SP>as<SP>at<SP>power-up).<CR><LF>
```

Example 11. LEDEN Message

The LED outputs will be enabled.

GPIOEN<selection><CR><LF>

User can select whether they want to use GPIO outputs or not. If GPIO outputs are disabled, then, both GPIO 0 and GPIO 1 will be always low.

Example

```
TX> GPIOEN0<CR><LF>
RX> GPIOEN0<CR><LF>
RX> <ACK>GPIO<SP>Outputs<SP>are<SP>disabled<SP>
    (Only<SP>for<SP>currently<SP>running<SP>session).<CR><LF>
```

Example 12. GPIOEN Message

The GPIO outputs will be disabled.

Example

```
TX> GPIOEN1<CR><LF>
RX> GPIOEN1<CR><LF>
RX> <ACK>GPIO<SP>Outputs<SP>are<SP>enabled<SP>
    (Only<SP>for<SP>currently<SP>running<SP>session).<CR><LF>
```

Example 13. GPIOEN Message

The GPIO outputs will be enabled.

Sensor Configuration Command

DEFAULT<CR><LF>

This command will reinitialize this sensor with default settings.

Example

```
TX> DEFAULT<CR><LF>
RX> DEFAULT<CR><LF>
RX> <ACK>Sensor<SP>is<SP>initializing<SP>with<SP>default<SP>parameter<SP>values<CR><LF>
RX> Range<SP>is<SP>set<SP>to<SP>high<SP>sensitive<SP>10<SP>meter<SP>range.<CR><LF>
RX> Wait<SP>for<SP>the<SP>sensor<SP>to<SP>respond.<CR><LF>
```

Example 14. DEFAULT Message

SYSRST<CR><LF>

This command will reset the sensor. After reset, sensor will display initialization messages.

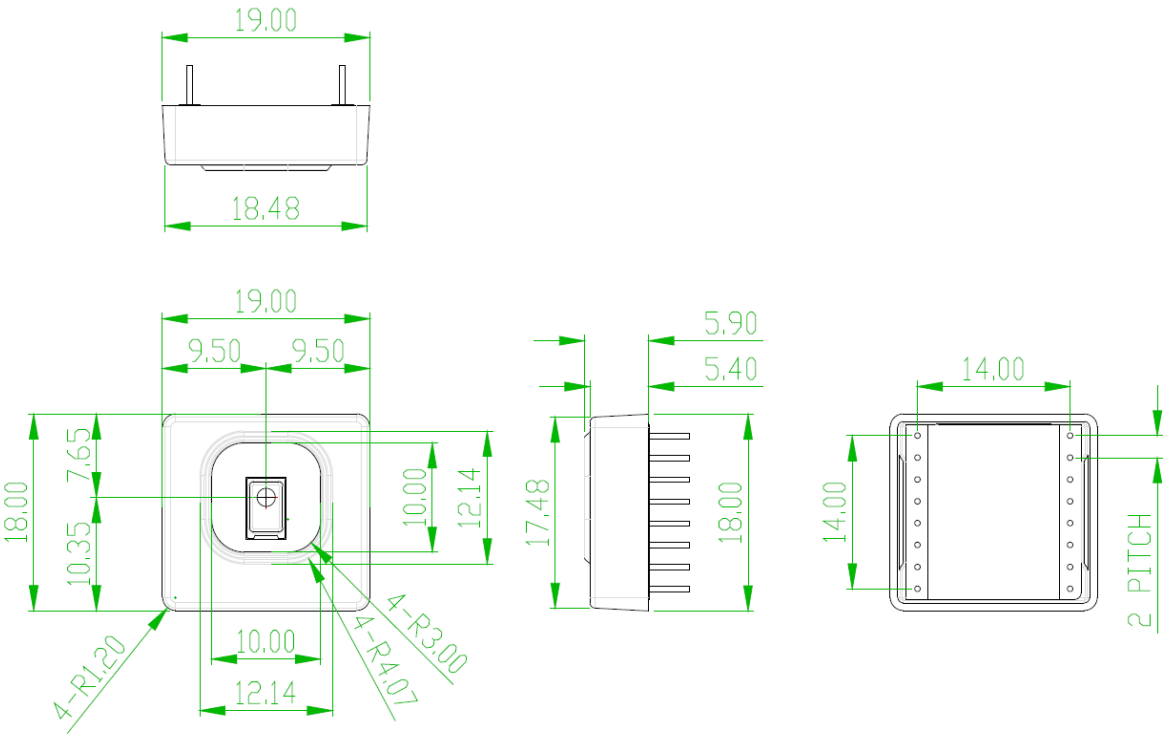
Example

```
TX> SYSRST<CR><LF>
RX> SYSRST<CR><LF>
RX> <ACK>Processor<SP>is<SP>Restarting...<CR><LF>
```

Example 15. SYSRST Message

Gross weight : 2.5g (Without Epoxy bond)

Package Dimension



※ Caution : Do not attempt to reassemble or give physical stress while handling.

Pin Description

Table 6. Upper Pin Description

No.	Pin Assigned
1	Reserved
2	Reserved
3	GPIO 0
4	GPIO 1
5	UART TXD
6	UART RXD
7	VCC
8	GND

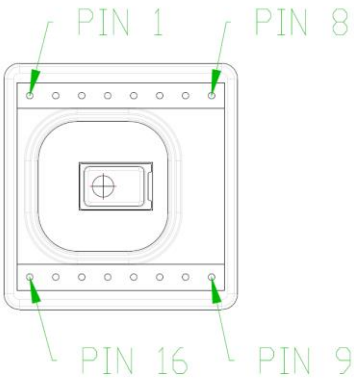


Table 7. Lower Pin Description

No.	Pin Assigned
9	GND
10	Reserved
11	Reserved
12	RESET
13	Reserved
14	Reserved
15	Reserved
16	GND

Revision History

Revision	Description	Date
0.9	Initial release	August 2017
0.91	Specification was modified. GPIO contents were added. Pin description was changed. UART Commands were changed. Contents in last page was changed.	November 2017
0.92	The initialization time was changed.	December 2017
0.93	- Product Dimension was be details. - Assigned pin was modified.	9 January 2018
0.94	The sequence while initialization was changed. Messages on UART was modified. Table number were reassigned.	16 January 2018
0.95	- Add Gross weight at package dimension page	31 January 2018

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We do not guarantee the performance of this device in case of disassembling, operating without complying with instructions in this document.

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