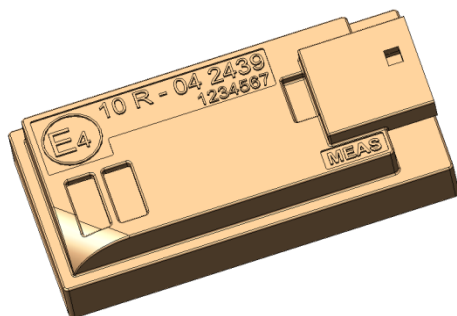


# H2TD3680 – Digital RH/T module



- Combo sensor (Relative Humidity, Air and Windscreen Temperature)
- Optimized design for high RH, high T°C environment
- Digital output as per LIN protocol J2602
- Rugged, automotive graded sensor
- High resistance to chemicals
- Optional and customizable Cover
- Dew Point through internal calculation

## DESCRIPTION

Based on the rugged MEAS FRANCE humidity sensor, H2TD3680 is a dedicated humidity and temperature plug and play transducer designed for Truck fogging prevention applications where a reliable and accurate measurement is needed.

H2TD3680 is designed for high volume and demanding applications.

## FEATURES

- Demonstrated reliability and long term stability
- Reliability not affected by repeated condensation

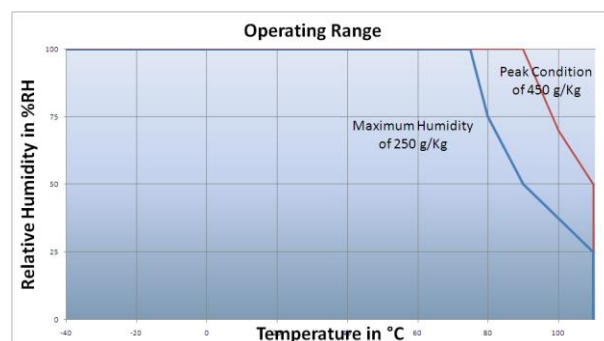
## APPLICATIONS

- Trucks and off road
- Cabin fogging prevention

## PERFORMANCE SPECS

| Characteristics             | Value |      |      | Unit |
|-----------------------------|-------|------|------|------|
|                             | Min   | Typ  | Max  |      |
| Supply Voltage (Peak)       | 9     | 12*  | 16   | V    |
| Current consumption         |       | 20   | 50   | mA   |
| Output impedance            |       |      | 50   | Ohms |
| Humidity operating range    | 0     |      | 100  | %RH  |
| Temperature Operating Range | -40   |      | +85  | °C   |
| Storage Temperature         | -40   |      | +125 | °C   |
| LIN baudrate                |       | 9600 |      | Bps  |

\*Supply Voltage Option: 24V Typ



# H2TD3680 – Digital RH/T module

## FUNCTION

### CABIN FOGGING PREVENTION

#### (A) Scope

Fog on the windscreen will impact dramatically the driver's field of vision.

With the increased use of air recirculation which uses a continuous low air flow along the windscreen, fogging is becoming more of a concern.

Air recirculation prevents the discharging of moisture out of the passenger compartment and accentuates fogging through the accumulation of moisture from various sources.

#### (B) Root Cause

Fogging on the windshield occurs when the glass temperature is below the dew point temperature of air.

#### (C) Fogging Scenarios

1- Rise of humidity in the passenger compartment, which in turn increases the dew point.

Contribution factors:

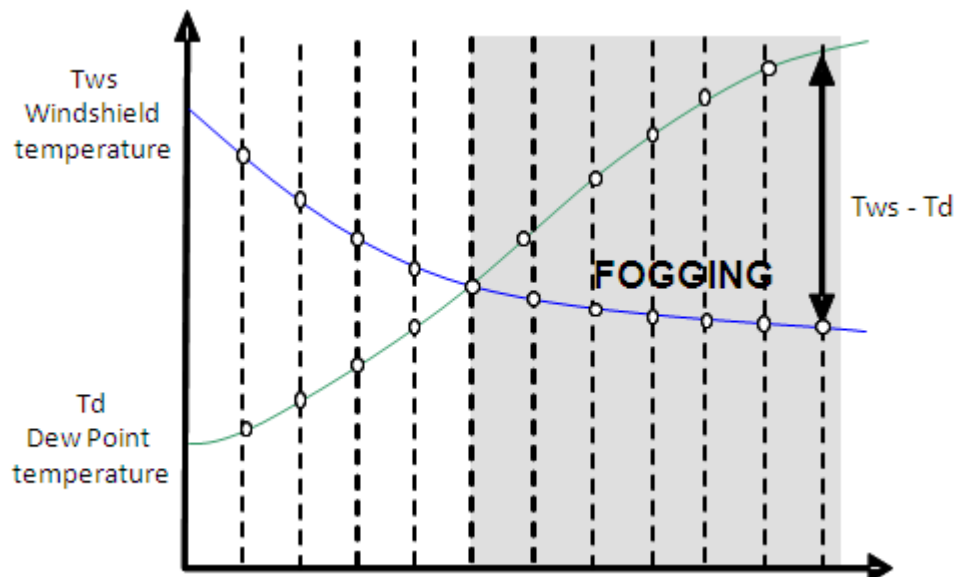
- Recirculation is closed, damper must be re-opened before fogging.
- The IC engine is stopped (Stop & Start / Hybrids), AC is off for a too long period of time.
- The occupant (new) comes inside the car with wet clothes, objects, AC must be activated before fogging.
- Someone opens a window (summer time), allow external humidity to enter in the cabin, AC must be activated before fogging.

#### (C) Fogging Scenarios (Context)

2- Decrease of windshield glass temperature:

Contribution factors :

- There is a slow or sudden change in sun load on the car surface (tunnel, night time, others), damper must be re-opened, AC must be activated.
- There is a sudden rain, snow fall (which will also increase the humidity content of the air at inlet), AC must be activated.
- There is a change in car speed (increase, typ. Highway), damper must be re-opened, AC must be activated.



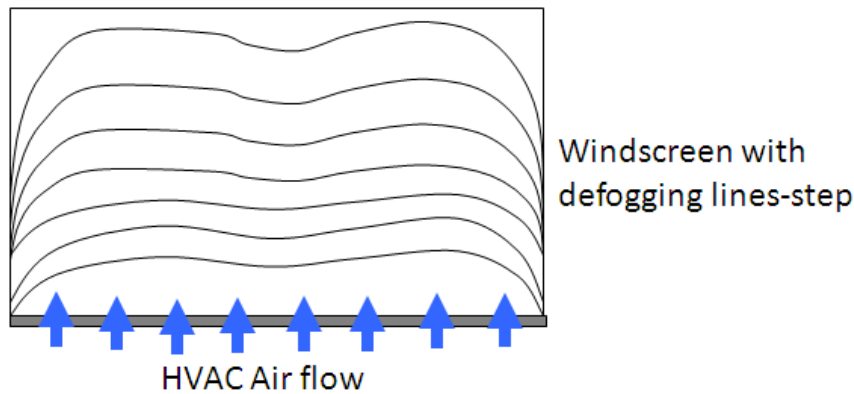
# H2TD3680 – Digital RH/T module

## Defogging and fogging prevention

When fogging occurs it's already too late: as shown on this sketch, defogging the driver's field of vision go through different line-step, which takes times and represent a safety problem and a waste of energy from the HVAC system.

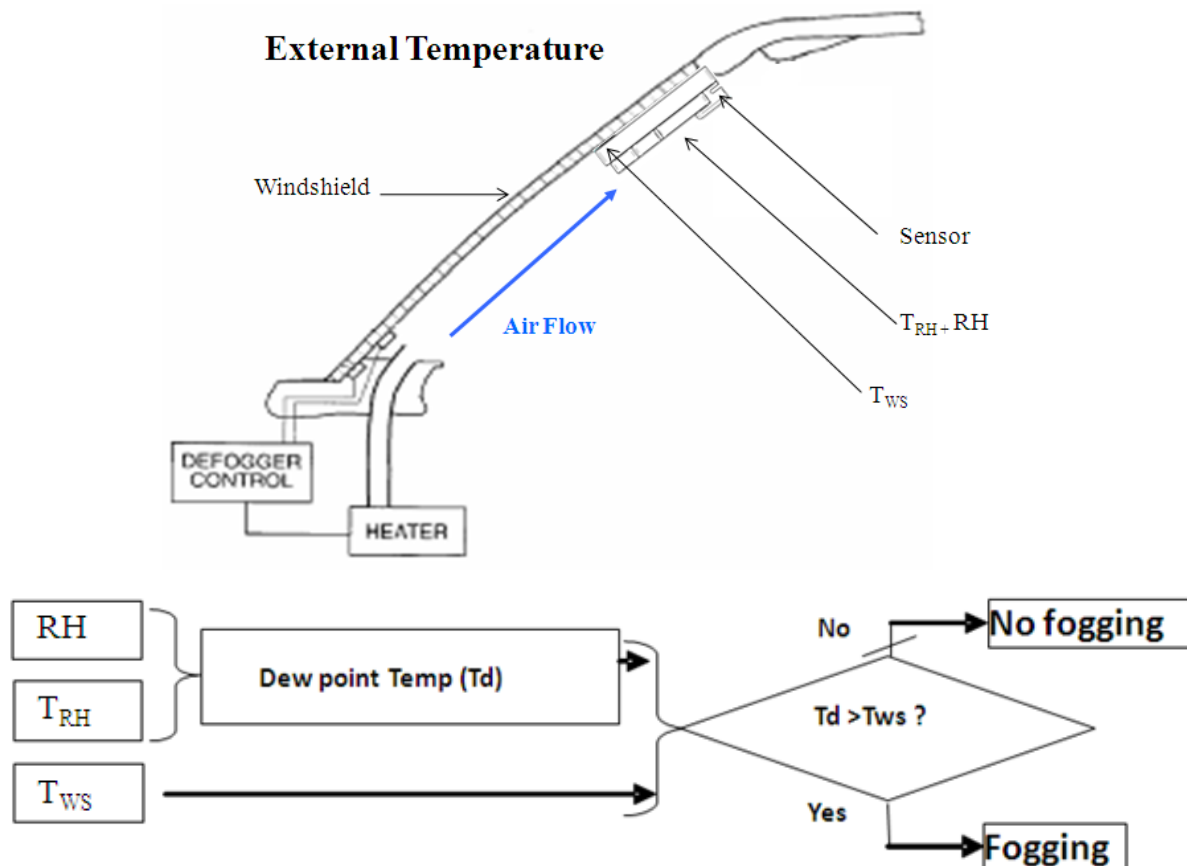
This confirms the importance of fogging prevention systems:

- Avoid fogging appearance and improve safety.
- Avoid defogging phase and save energy.
- Preventing to have to do fast defogging, will maintain perception of comfort (without sudden flow of air with different temperature gradients)



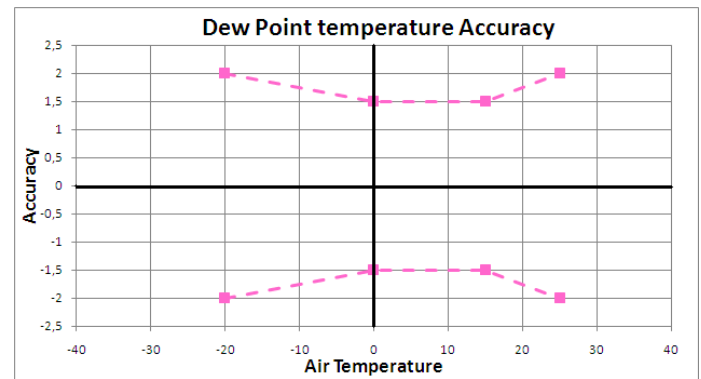
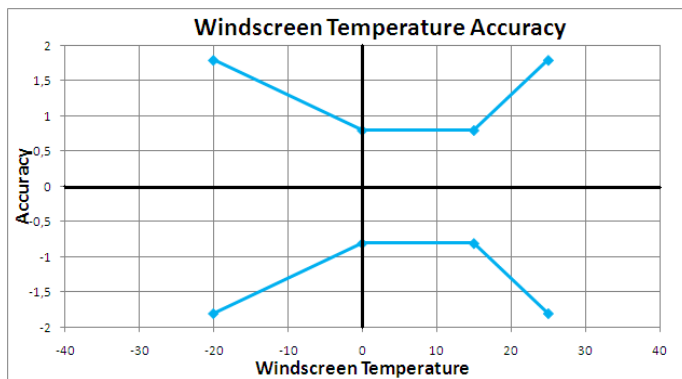
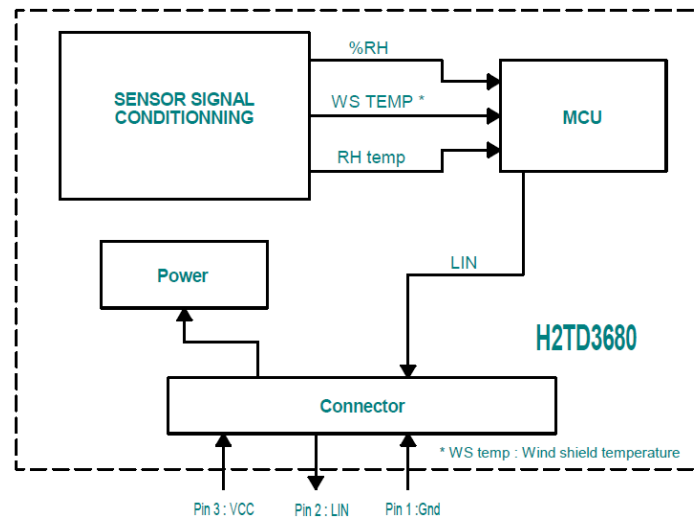
## Working principle:

Compare Windshield surface temperature ( $T_{ws}$ ) with Dew Point temperature measurement ( $T_d$ )  
When the glass temperature falls below the dew point temperature of air, fogging conditions are met.



# H2TD3680 – Digital RH/T module

## BLOCK DIAGRAM / TYPICAL PERFORMANCE CURVES



| LIN Product Information |          |         |
|-------------------------|----------|---------|
| ID                      | NAME     | ID Code |
| Supplier ID             | MEAS     | 0x7E    |
| Function ID             | HUM_SENS | 0x0026  |
| Variant ID              | Variant  | 0x01    |

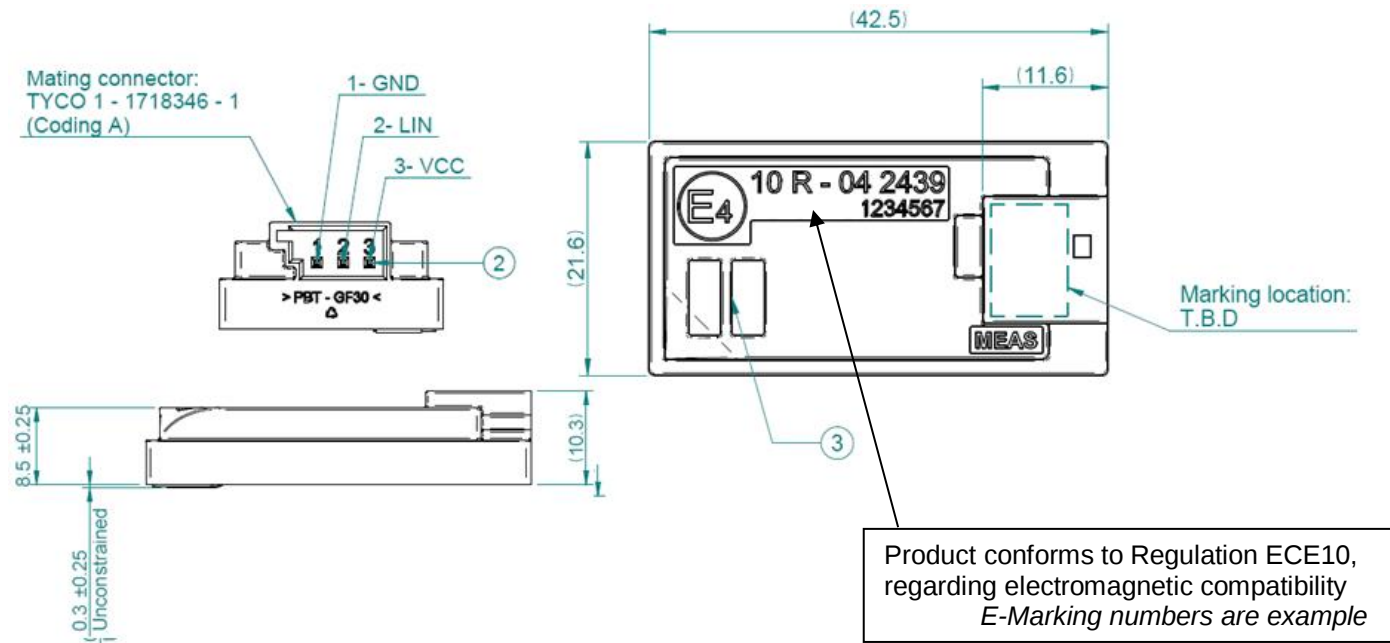
| Message Identifier |       |                                |      |          |
|--------------------|-------|--------------------------------|------|----------|
| From               | Bytes | Name                           | NAD  | Frame ID |
| Slave Response     | 8     | Humidity Sensor Response Frame | 0x6C | 0x30     |

| Message Identifier Implementation Book |    |    |    |    |                        |    |    |                      |                    |                         |                      |    |    |    |
|----------------------------------------|----|----|----|----|------------------------|----|----|----------------------|--------------------|-------------------------|----------------------|----|----|----|
| D1                                     |    |    |    |    |                        |    |    | D2                   | D3                 | D4                      | D5                   | D6 | D7 | D8 |
| B1                                     | B2 | B3 | B4 | B5 | B6                     | B7 | B8 | Glass<br>Temperature | Air<br>Temperature | Dewpoint<br>Temperature | Relative<br>Humidity |    |    |    |
| APINF00 *                              |    |    |    |    | J2602<br>Errors Fields |    |    |                      |                    |                         |                      |    |    |    |

\*APINF00 is set when a failure is detected (RH/Glass T° or Air T°) or if calibration is not valid

# H2TD3680 – Digital RH/T module

## TECHNICAL INFORMATION



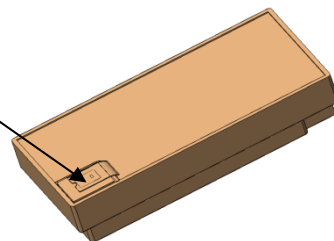
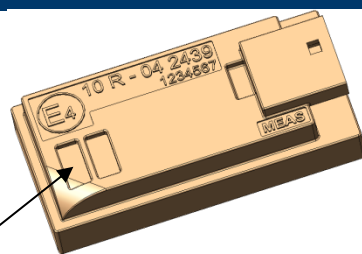
# H2TD3680 – Digital RH/T module

## 1. MOUNTING RECOMMENDATIONS

### 1.1. Sensor handling before installation

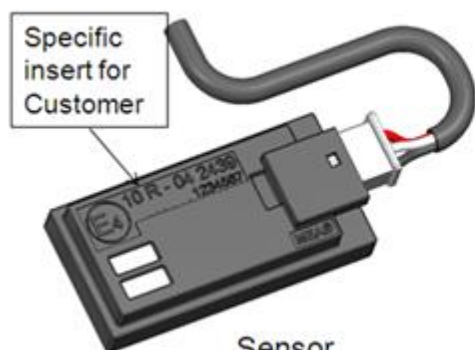
Following cares have to be taken before sensor installation :

- Do not touch PTFE membrane.
- Do not touch windscreen temperature sensor.
- If Fogging Sensor is dropped or shocked this parts must be:
  - o Rejected from production line
  - o Replaced by a new one.
- Connector protection: In order to ensure correct electrical contact, connector must be kept free of water, particles, dirt and dust.

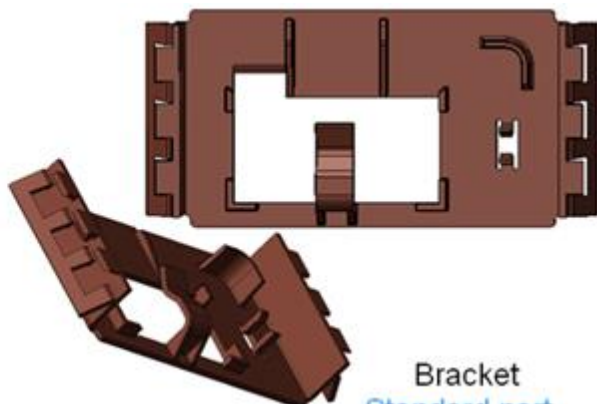


### 1.2. Interface:

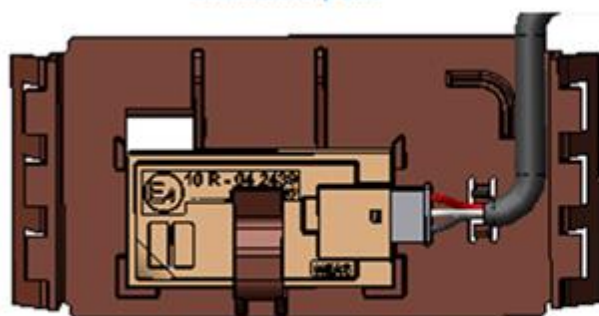
#### 1.2.1. Bracket with mounting base and clip



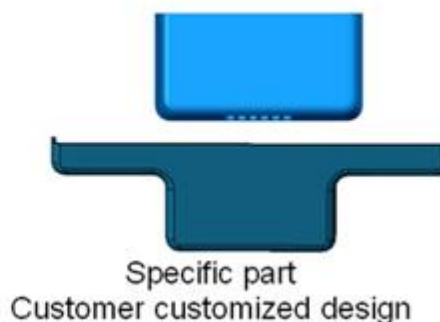
Sensor  
Standard part



Bracket  
Standard part



Sensor with Bracket  
Standard System



Specific part  
Customer customized design

# H2TD3680 – Digital RH/T module

## 1.2.2. Bracket glued on windscreen

MEAS recommends adhesive tape 3M VHB 5925 for this application.

## 1.2.3. Storage conditions before assembly on Windscreen

The tape has a shelf life of 24 months from date of manufacture when stored at 5°C to 35°C and 0 to 90%RH. The optimum Storage conditions are 22°C and 50%RH.

## 1.2.4. Assembly conditions (Temperature, pressure, time of pressure and cleaning)

Good surface contact can be attained by applying approximately 100kPa pressure during 3s. Ideal application temperature range is 21°C to 38°C.

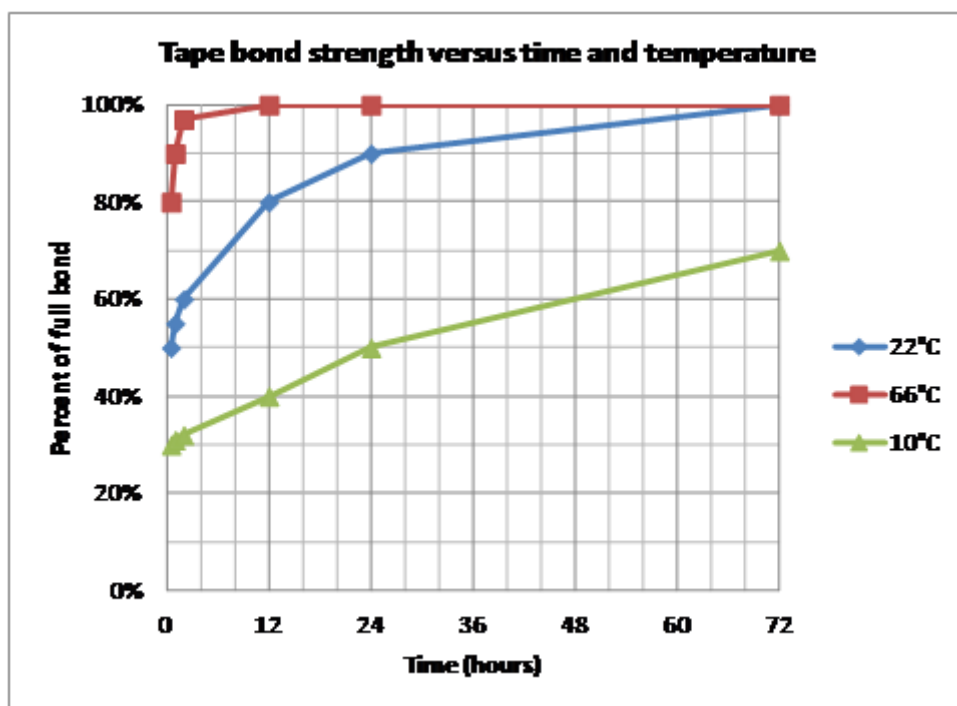
To obtain good performance, it's important to ensure that the surfaces are dry and free of condensed moisture.

Most substrates are best prepared by cleaning with a 50:50 mixture of isopropyl alcohol and water prior to applying the tape.

## 1.2.5. Conditions impacts after assembly

After application, the bond strength will increase as the adhesive flows onto the surface. At room temperature (22°C), 50% of ultimate bond strength will be achieved after 30 minutes, 90% after 24 hours and 100% after 72 hours.

This flow is faster at higher temperatures and slower at lower temperatures (see figure below).



# H2TD3680 – Digital RH/T module

## 1.3. Windscreen mounting area

Windscreen surface must be without serigraphy and totally cleaned (fingerprint/ grease or any dirtiness) before sensor mounting.

## 1.4. General mounting recommendations

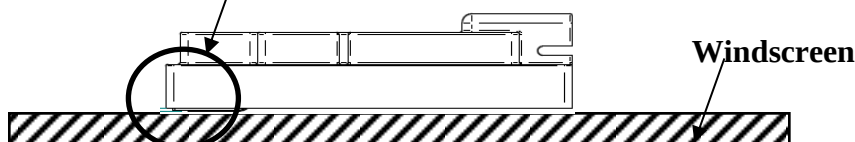
Fogging prevention sensor must be placed on windshield.

Placed above the visible area of the windscreen is one of recommended location.

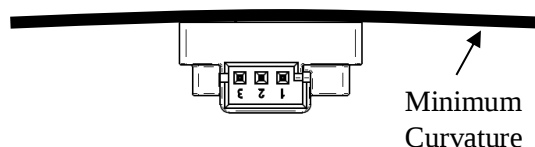
**Following points are only basis recommendations and must be confirmed on final system.**

- Glass surface must be clean, dry and without dust and particles before bracket application.
- Windscreen Temperature Sensor (WTS) must be in direct thermal contact to the windshield glass surface.

### Thermal contact between Windscreen and WTS



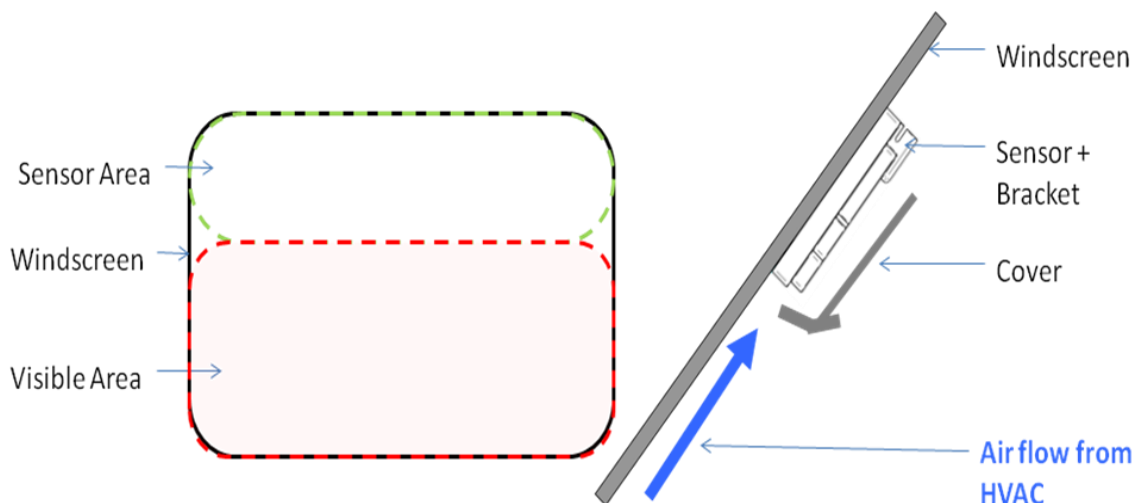
- Do not place close to warm parts (eg: light bulb / windscreen heater).
- The sensor is designed for a minimum windshield curvature radius of 1033mm.



- Sufficient air circulation ventilation should be allowed to flow through the ventilation slits and on the sensor opening by managing space\* between windshield and openings\* on cover.

*\*Exact dimensions have to be defined depending on car model.*

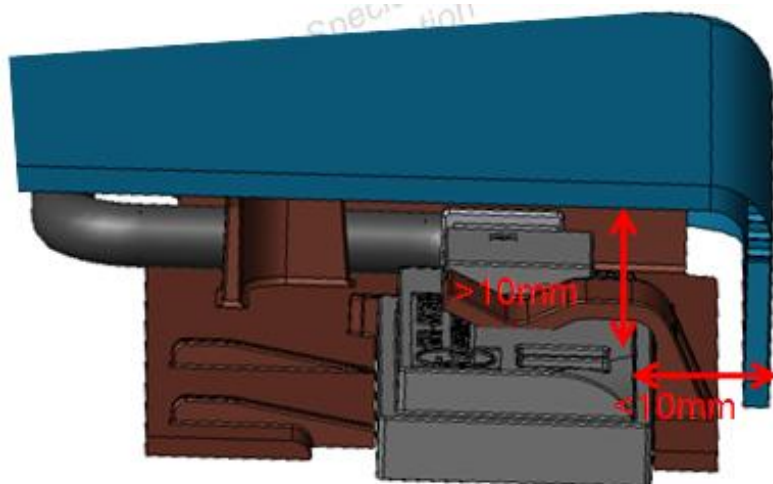
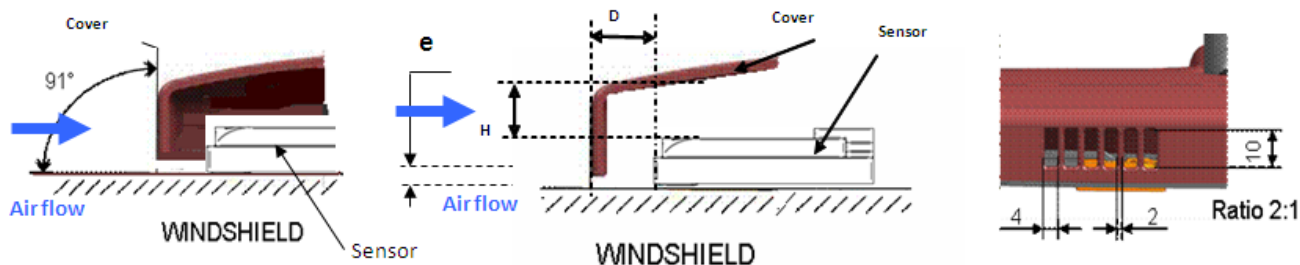
- Placement of sensor on windscreen.



# H2TD3680 – Digital RH/T module

## Cover and bracket design recommendations for optimal interface

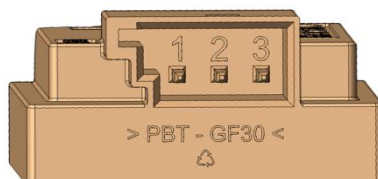
- Sensor membrane distance from inlet D : recommendation :  $D < 10\text{mm}$
- Inlet wall slope between windscreen and cover front: recommendation  $\alpha < 90^\circ$
- Inlet area configuration : recommendation Ratio = 2:1
- Inlet area S : recommendation :  $S > 180\text{mm}^2$
- Sensor top to cover height : recommendation  $H > 10\text{mm}$
- Cover edge to windscreen distance  $e = 2.5\text{mm} \pm 0.5\text{mm}$



# H2TD3680 – Digital RH/T module

## 2. WIRE INTERFACE

| Signal | Pin |
|--------|-----|
| GND    | 1   |
| LIN    | 2   |
| VCC    | 3   |



Mating connector:  
TYCO 1 - 1718346 - 1  
(Coding A)

## 3. ELECTRICAL DESCRIPTION. OUTPUT CHARACTERISTICS.

- Supply voltage: 12V typ, regulated (Max 16V).
  - 24 V optional
- Current consumption: 50mA max.

## 4. STORAGE

- The fogging prevention sensor has to be stored in their original packaging.
- Introduction of foreign substances in the humidity openings must be prevented.
- Storage temperature -40 to +125°C.

## 5. SUPPLIER CHECK OF INSTALLATION – PRODUCT APPLICATION ACCEPTANCE

In order to deliver the Product Application Acceptance document for the project, before installing this sensor in application, MEAS-SPEC needs to:

Validate Windscreen temperature/dew point temperature measurement with customer through a mission profile reviews.

- Validate the fogging detection function during fogging appearance and disappearance (in simulator / Vehicle test).
- Review vibration / temperature / heat / RH level on worst case conditions.
- Review windscreen mounting location and procedure for each model.

# H2TD3680 – Digital RH/T module

## ORDERING INFORMATION

- HPP827E : H2TD3680 - DIGITAL TEMPERATURE AND RELATIVE HUMIDITY MODULE

**Customer Service contact details** MEAS France

Impasse Jeanne Benozzi

CS 83 163

31027 Toulouse Cedex 3

FRANCE

Tél: +33 (0) 5 820 822 02

Fax: +33 (0) 5 820 821 51

Sales: [humidity.sales@meas-spec.com](mailto:humidity.sales@meas-spec.com)

| Revision | Comments                                                                    | Who      | Date          |
|----------|-----------------------------------------------------------------------------|----------|---------------|
| 1        | Document creation                                                           | P.METRAL | July 2013     |
| 2        | Presentation revision                                                       | P.METRAL | January 2014  |
| 3        | Application and product views updated<br>Mating connector information added | P.METRAL | February 2014 |
| 4        | Performance Curves and SW Frame updated                                     | P.METRAL | February 2014 |
|          |                                                                             |          |               |

The information in this sheet has been carefully reviewed and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of such devices any license under the patent rights to the manufacturer. Measurement Specialties, Inc. reserves the right to make changes without further notice to any product herein. Measurement Specialties, Inc. makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does Measurement Specialties, Inc. assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Typical parameters can and do vary in different applications. All operating parameters must be validated for each customer application by customer's technical experts. Measurement Specialties, Inc. does not convey any license under its patent rights nor the rights of others.