



Internal CO₂ Sensor for Automotive Applications



NDIR CO₂ Single Channel, Diffusion Sampling Method

The Telaire Internal Carbon Dioxide (CO₂) Sensor is a nondispersive infrared (NDIR) CO₂ sensor that implements a single channel diffusion sampling method for automotive HVAC applications, including automatic fresh air control and safety sensing for CO₂ refrigerants.

Along with the patented ABC Logic™ lifetime calibration warranty, its low power consumption, compact design and simple product integration, make this an affordable gas sensing solution. All units are factory-calibrated to measure CO₂ concentration levels up to 5,000 ppm.

Benefits

- Safety - Measure and control in-cabin CO₂ levels to prevent driver drowsiness.
- Energy Savings - Reduce variations in heating and cooling in-cabin through demand control ventilation.

Applications

- Automotive HVAC - In-cabin air quality and comfort control.

Features

- ABC Logic™ - Lifetime calibration warranty
- Lin 2.0 output
- Low power consumption
- Compact design
- Versatile interface for simple product integration
- Factory-calibrated to measure CO₂ concentration levels up to 5,000 ppm.
- Adjustable firmware variables
- Custom packaging options
- Subject to commercial consideration, customization of firmware, connector and enclosure is possible

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Specifications

General Performance:

ABC Logic

Automatic Background Calibration – The algorithm that uses ambient air concentrations to adjust the sensor and compensate sensor long-term drift.

Adjustment cycle period is 12 – 192 hours of operation in active mode. Practical adjustment cycle depends on operating conditions.

Please see notes section for more details

Measurement Range Configurable

Air Quality Control:

400 – 5,000 ppm CO₂

Safety Alarm for Air Quality Control and CO₂:

400 – 40,000 ppm CO₂

Output Range

0 – 65,000 ppm CO₂

Measurement Period

Active Mode: 5 seconds

Low Power Mode: 5 minutes

Sleep Mode: 12 hours

Timing of these modes can be configured per customer requirements.

Resolution and Repeatability

Internal Sensor Resolution: 1 ppm

Repeatability: 30 ppm at 1000 ppm (Typical)

Accuracy in Active Mode

Range: 400 ppm to 5,000 ppm

±200 ppm or 10% of the reading, whichever is greater @ 0 to 50°C

Range: 5,000 ppm to 40,000 ppm (4%)

10% of the reading @ 0 to 50°C

Temperature Dependence

Additional 0.5% of reading per °C or 5 PPM/C, whichever is greater outside the range 0 to 50°C

Pressure Dependence

0.135% of the reading per mm Hg

Response Time t_{90} (90% of Step Change)

Active Mode: <40 seconds, dependent on test regime (Typical)

Warm-Up Time

First measurements in:

< 5 sec after power-up

< 2 minutes maximum accuracy in Active Mode

Total Lifetime:

130,000 hours, limited by microcontroller flash retention specification

Operational Lifetime:

In Active Mode: 45,000 hours

Relative Humidity

0-95% non-condensing

Mechanical:

Enclosure

For 'courtesy light' insertion

Filters

Hydrophobic dust filter on the CO₂ sensor

Conformal Coating

Electronic components are conformal coated.

Environmental:

Operating Temperature Range

-40°C to + 90°C

Storage Temperature Range

-40°C to +110°C

Electrical:

Power Supply Voltage

9 16V VDC

Current Consumption (Typical)

Maximum Peak Current: < 100 mA

Average in Active Mode: < 10 mA

Average in Low Power Mode: < 100 uA

Average in Sleep Mode: < 25 uA

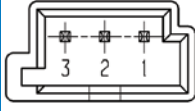
Specifications - Continued

Cable and Connector

Connector

Bare wire

Connection

Connector (T6743-E)	
Mating Connector	TE AMP 4-1718346-1
Socket Configuration	 1 ~ Ground (Common) 2 ~ LIN 3 ~ Supply +V
Connection (T6743)	
PCB Pads	1 ~ Supply +V (Square pad) 2 ~ LIN 3 ~ Ground (Common)

LIN Interface

The sensor implements a LIN interface defined by a generic LDF file.

LIN Output Signals

Carbon Dioxide

CO₂ Concentration: 1 ppm Resolution

Modes

Active Mode
Low Power Mode
Sleep Mode

DebugWord

Unused

Ready

Indicates when the sensor is ready to measure CO₂

InternalError

Indicates when there is an error in sensor operation

RespError

Indicates when there is an error on the LIN bus

LIN Diagnostic Transport Layer

Not implemented in this release

Notes:

ABC Logic™

This method periodically adjusts the sensor to ambient CO₂ concentration levels, assuming that lowest ambient levels are 400 ppm. It allows accurate and reliable operation of the sensor through extended lifetime and even recovery from catastrophic damages.

ABC Logic algorithm has variable adjustment time cycle that depends on frequency and duration of operational cycles of the vehicle. Current implementation can adjust the sensor as soon as every 12 hours of operation, up to 192 hours of operation, depending upon how long each operation cycles takes. A rule of thumb could be number of operation cycles x 48 or 192 hours of operation, whichever comes first.

ABC Logic requires that the sensor should never be exposed to CO₂ levels lower than 380 ppm.

Available Models

Part No.	Sampling Method	Range	Feature
T6743	Diffusion	0-40,000 ppm	PCB Only
T6743-E	Diffusion	0-40,000 ppm	Sensor with Enclosure

Note: Sensor can be customized subject to commercial consideration.

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