



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

AMBIMATE Sensor Module

1. SCOPE

1.1. The AMBIMATE Sensor Module is a PCB subsystem that includes temperature, humidity, occupancy(motion), light level, optional CO₂ (VOC) gas sensor, and optional audio (microphone) that can be connected to an external system via an I²C bus. Applications include:

- ◆ Smart Home / Office
- ◆ Thermostat
- ◆ Indoor Lighting Control

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- ◆ 114-133092: Application Specification
- ◆ 501-TBD: Qualification Test Report (TBD)

2.2. Industry Documents

Standard	Description
I ² C	Inter-Integrated Circuit bus protocol. Multi-master, multi-slave, single-ended, serial computer bus (AN10216-01, NXP)
EIA-364	Electrical Connector/Socket Test Procedures Including Environmental Classifications
JEDEC JS-001-2014	Joint JEDEC/ESDA Standard For Electrostatic Discharge Sensitivity Test - Human Body Model (HBM) - Component Level
FCC Title 47, Part 15	Radio Frequency Devices

2.3. Reference Document

- ◆ [109-197](#) Test Specification (TE Test Specification vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

3.2. Ratings

Input voltage range: 3.1 to 3.5VDC

Maximum system current draw: 33mA

Operating Temperature: -5 to +50°C

Operating Humidity (non-condensing): 5 – 95%

Storage Temperature: -40 to 85°C

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing and Application Specification	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing. Baseline functionality measurement of all populated sensors on module, per Table 1
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection. Post-exposure functionality measurement of all populated sensors on module, per Table 1

ELECTRICAL

Conducted/Radiated Emissions	FCC Part 15 Limits	FCC
ESD Testing	Module must meet functionality requirements before and after exposure.	JS-001-2017, Class 2 Voltage 4kV

MECHANICAL

Vibration	Module must meet functionality requirements before and after exposure.	EIA-364-28, Test condition VII, Condition Letter D. Specimen unpowered (3.10 G RMS, 20 to 500 Hz, 15 minutes in each of 3 mutually perpendicular planes).
Mechanical shock.	Module must meet functionality requirements before and after exposure.	EIA-365-27, Method A. Specimen unpowered (30 G, half sine shock pulses of 11 milliseconds duration, 3 shock in each direction applied along 3 mutually perpendicular planes, 18 total shocks).

Test Description	Requirement	Procedure
ENVIRONMENTAL		
Thermal shock.	Module must meet functionality requirements before and after exposure.	EIA-364-32, Test Condition I. Subject unmated specimens to 100 cycles between -40 and 85°C with 30 minute dwells at temperature extremes and 1 minute transition between temperatures.

i **NOTE**
Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1

3.4. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group	
	1	2
Test Sequence (a)		
Initial examination of product	1	1
Conducted/Radiated Emissions		2
ESD		3
Vibration	2	
Mechanical shock	3	
Thermal shock	4	
Final examination of product	5	4

i **NOTE**
 (a) Numbers indicate sequence in which tests are performed.
 (b) Three samples of each part number listed in Table 1 are required for qualification.

Figure 2

Table 1, Functionality Tests**

Part Number	Functionality Test #1A Room Temperature	Functionality Test #1B Room Temperature	Functionality Test #2 Low Temperature (-5°C)	Functionality Test #3 High Temperature (+50°C)
	Power Module with 3.1VDC	Power Module with 3.5VDC	Power Module with 3.3VDC	
	Load Condition A		Load Condition B	Load Condition C
1-2314277-1	<ul style="list-style-type: none"> ◆ Module temperature measurement +/-0.3°C to reference NIST measurement source, ◆ Module Humidity measurement +/-2%, to reference NIST measurement source ◆ Verify functionality of module's motion sensor, ◆ Verify module's light sensor (each sensor must measure within +/-5% of the average of all sensors), ◆ Optional verify module's microphone both thru the I²C bus and the analog output on the 2-pin connector. (each sensor must measure within +/-5% of the average of all sensors), ◆ Optional module's CO²/VOC (each sensor must measure within +/-5% of the average of all sensors) 			
1-2314277-2				
1-2314291-1				
1-2314291-2				

**Note: Measurements to be made after the modules have been turned on and stabilized for 60 minutes.

Table 2, Load Conditions

Load Condition	Temperature	Humidity	Motion	Light	Microphone	CO2/VOC
A	Not Controlled, measured in typical office environment between 20-25°C, confirmed with NIST Traceable source	Not Controlled, measured in room and compared with NIST Traceable source	Output when Triggered with incandescent lamp; otherwise no output	Not Controlled, but all modules must meet requirement of Table 1 over uniformly lit surface	Not Controlled, but all modules must meet requirement in Table 1	Not Controlled, but all modules must meet requirement in Table 1
B	In Chamber set at -5°C and confirmed with NIST traceable source	Not Controlled, measured in chamber and compared with NIST Traceable source		Not Controlled, but LUX measurement should be near zero in darkened chamber		
C	In Chamber set at 50°C and confirmed with NIST traceable source					

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.