

| <b>ANTENNA TEST REPORT</b>                                       |                                                     |
|------------------------------------------------------------------|-----------------------------------------------------|
| <b>Antenna operating within the 2400.0 MHz - 2483.5 MHz band</b> |                                                     |
| <b>Report Reference No</b>                                       | G0M-2109-1013-TFCAUT-V01                            |
| <b>Testing Laboratory</b>                                        | Eurofins Product Service GmbH                       |
| <b>Address</b>                                                   | Storkower Str. 38c<br>15526 Reichenwalde<br>Germany |
| <b>Applicant</b>                                                 | wenglor sensoric GmbH                               |
| <b>Address</b>                                                   | wenglor Straße 3<br>88069 Tettnang<br>DE            |
| <b>Equipment under Test (EUT):</b>                               |                                                     |
| Product Description                                              | Bluetooth module                                    |
| Model(s)                                                         | DC1392                                              |
| Additional Model(s)                                              | None                                                |
| Brand Name(s)                                                    | None                                                |
| Hardware Version(s)                                              | 1.0                                                 |
| Software Version(s)                                              | 1.0                                                 |
| FCC ID                                                           | 2A3OLDC1392                                         |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|
| <b>Testing:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                     |
| Test Lab Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 20 °C - 30 °C    |                                                                                     |
| Test Lab Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 25 % - 55 %      |                                                                                     |
| Date of receipt of test item                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2022-12-19       |                                                                                     |
| <b>Report:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                                                                                     |
| Compiled by                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Radwan Jaafar    |                                                                                     |
| Tested by (+ signature)<br>(Responsible for Test)                                                                                                                                                                                                                                                                                                                                                                                                                              | Radwan Jaafar    |  |
| Approved by (+ signature)<br>(Test Lab Engineer)                                                                                                                                                                                                                                                                                                                                                                                                                               | Wilfried Treffke |  |
| Date of Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2023-02-22       |                                                                                     |
| Total number of pages                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 18               |                                                                                     |
| <b>General Remarks:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                                                                                     |
| <p>The test results presented in this report relate only to the object tested.</p> <p>The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p> |                  |                                                                                     |
| <b>Additional Comments:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                     |

## VERSION HISTORY

| Version History |            |                 |            |
|-----------------|------------|-----------------|------------|
| Version         | Issue Date | Remarks         | Revised By |
| 01              | 2023-02-22 | Initial Release |            |

## ABBREVIATIONS AND ACRONYMS

| Acronyms         |                                   |
|------------------|-----------------------------------|
| Acronym          | Description                       |
| EUT              | Equipment Under Test              |
| FCC              | Federal Communications Commission |
| V <sub>NOM</sub> | Nominal supply voltage            |

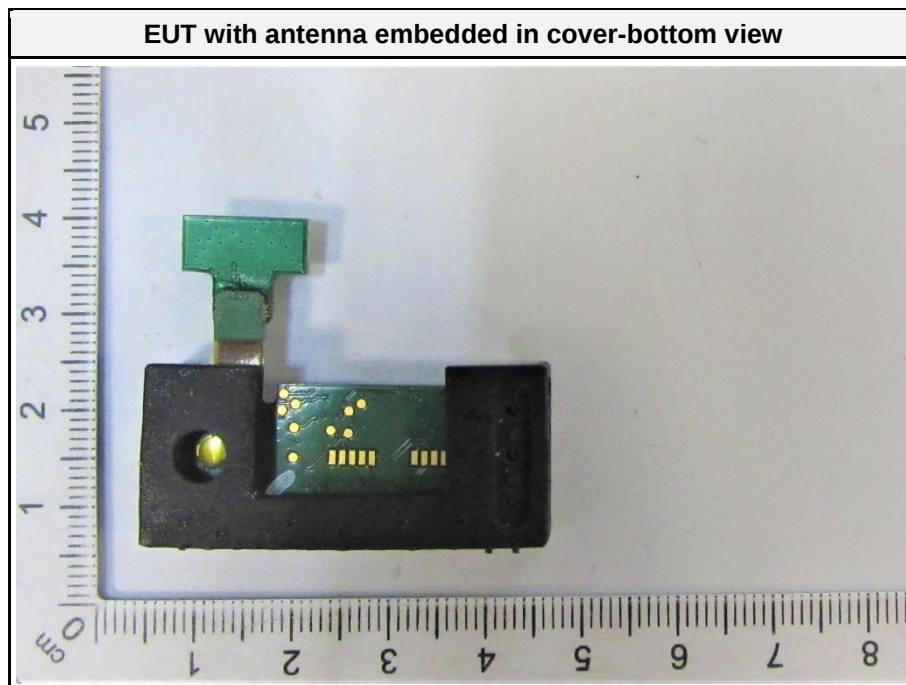
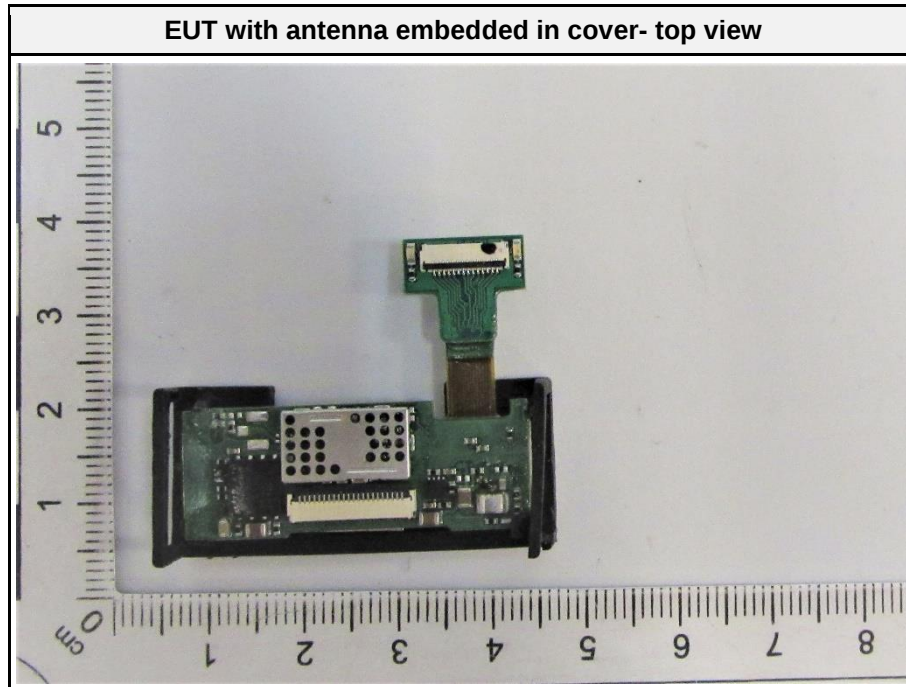
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## 1 Equipment (Test Item) Under Test

|                          |                                                                   |                           |
|--------------------------|-------------------------------------------------------------------|---------------------------|
| Description              | Bluetooth module                                                  |                           |
| Model                    | DC1392C                                                           |                           |
| Additional Model(s)      | None                                                              |                           |
| Brand Name(s)            | None                                                              |                           |
| Serial Number(s)         | 0003246                                                           |                           |
| Test Sample Id(s)        | 41260                                                             |                           |
| Hardware Version(s)      | 1.0                                                               |                           |
| Software Version(s)      | 1.0                                                               |                           |
| FCC ID                   | 2A3OLDC1392                                                       |                           |
| Equipment type           | End Product                                                       |                           |
| Radio type               | Transceiver                                                       |                           |
| Assigned frequency bands | 2400.0 MHz - 2483.5 MHz                                           |                           |
| Radio technology         | Bluetooth LE 5.1                                                  |                           |
| Modulation               | GFSK                                                              |                           |
| Number of antenna ports  | 1                                                                 |                           |
| Antenna                  | Type                                                              | Embedded                  |
|                          | Model                                                             | Stamped Metal Antenna     |
|                          | Manufacturer                                                      | wenglor sensoric GmbH     |
|                          | Gain                                                              | 1.98 dBi (by measurement) |
| Supply Voltage           | V <sub>NOM</sub>                                                  | 5 VDC                     |
| Operating Temperature    | T <sub>NOM</sub>                                                  | 25 °C                     |
| AC/DC-Adaptor            | None                                                              |                           |
| Manufacturer             | wenglor sensoric GmbH<br>wenglor Straße 3<br>88069 Tettnang<br>DE |                           |

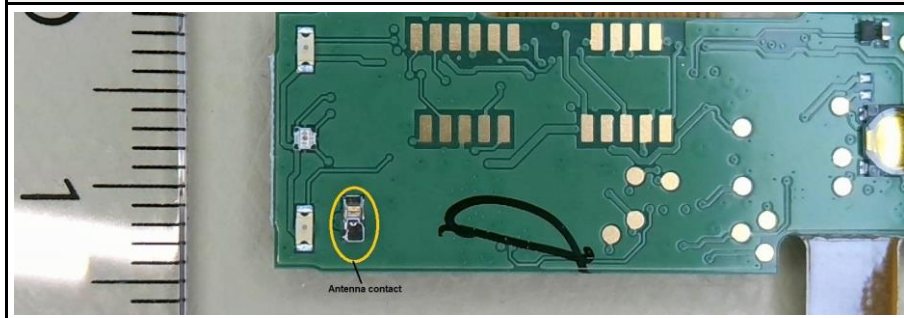
## 1.1 Photos



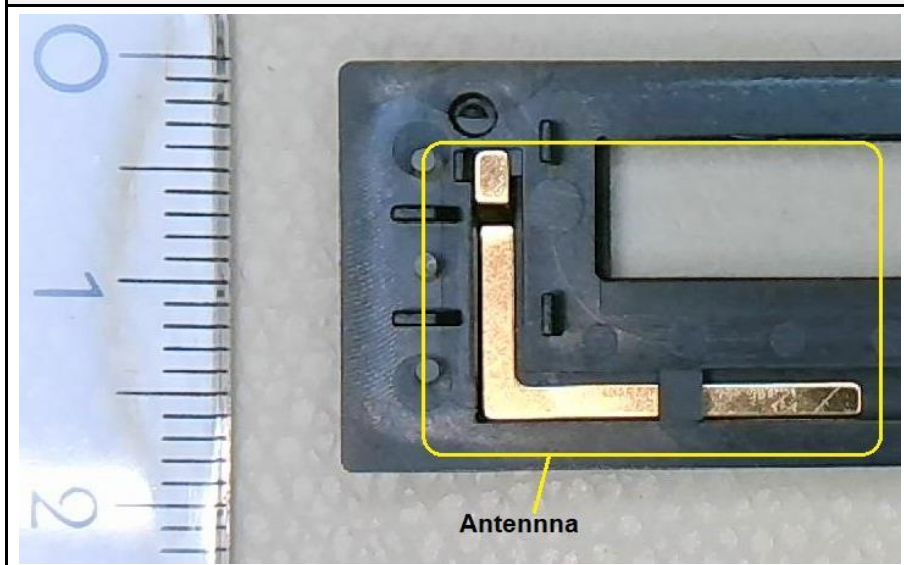
EUT without shield- front close view-



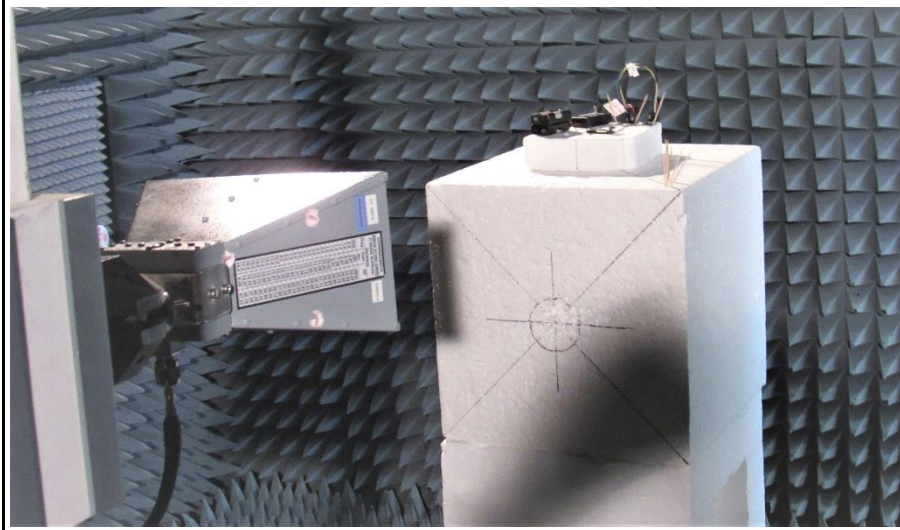
EUT without cover- bottom close view-



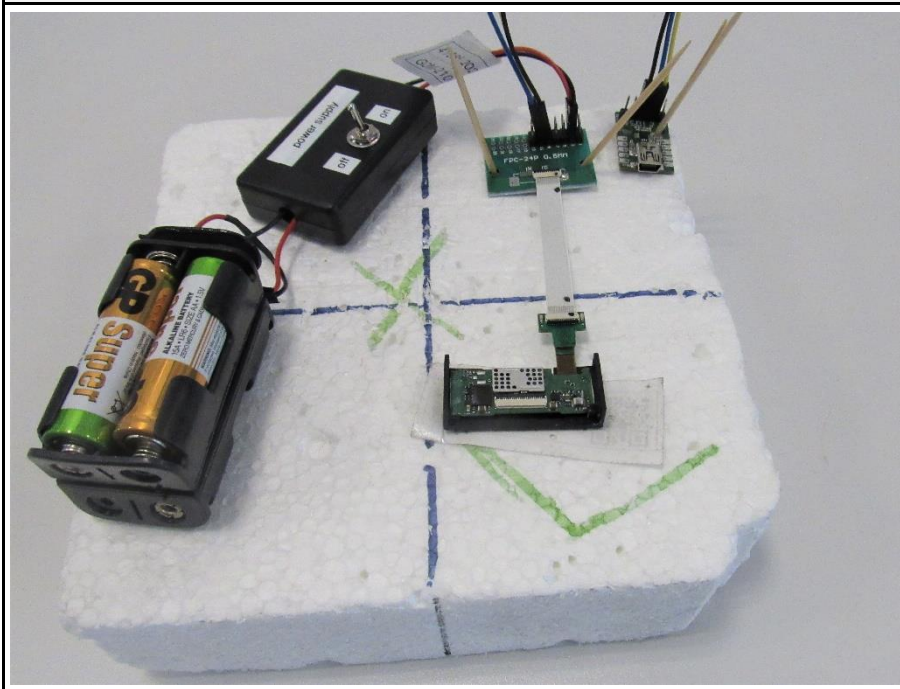
Antenna in cover embedded



Test setup

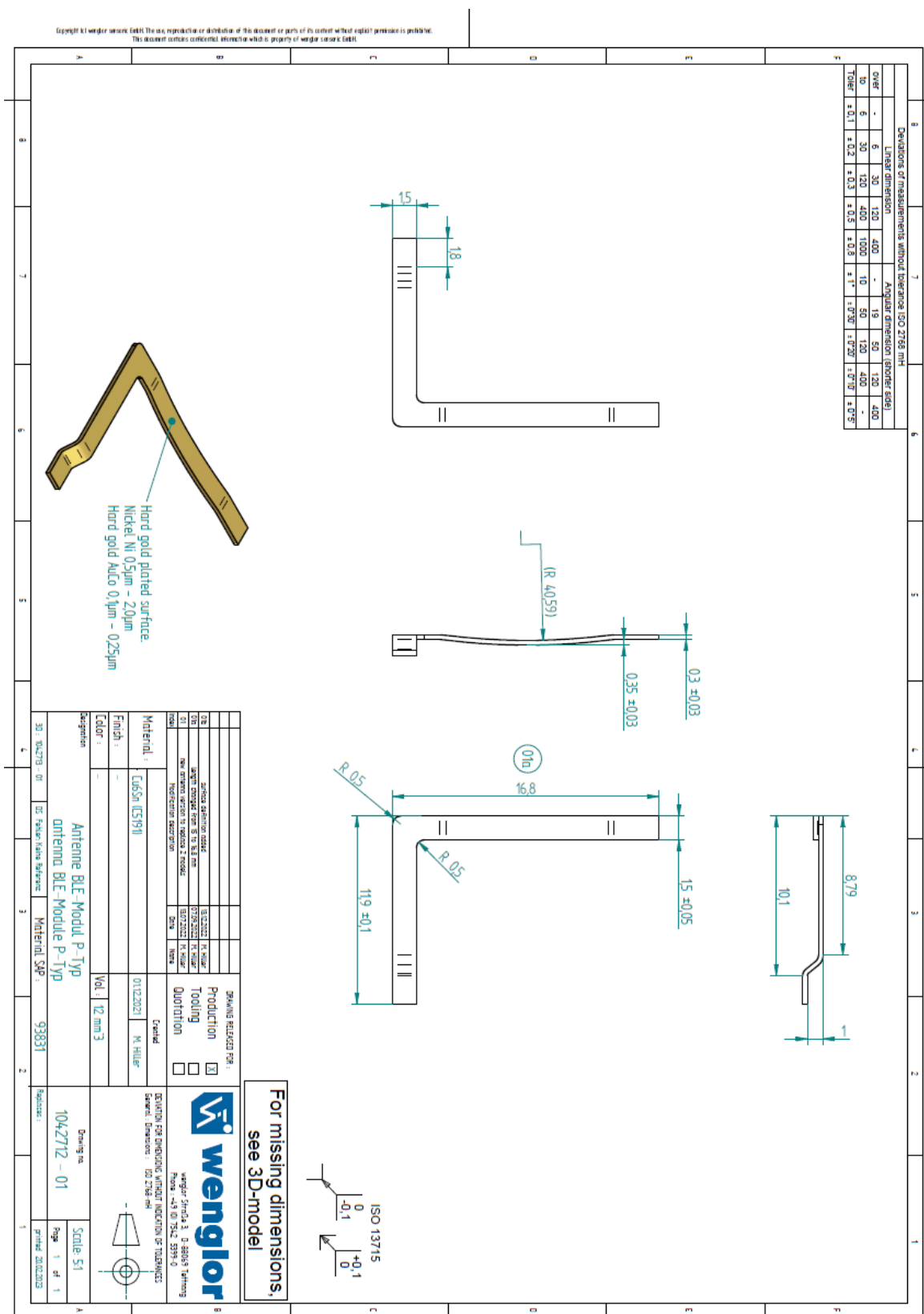


Test setup- close view



## 1.2 Mechanical Properties

See drawing below



### 1.3 Support Equipment

| Product Type | Device                     | Manufacturer | Model | Comment                    |
|--------------|----------------------------|--------------|-------|----------------------------|
| AE           | Notebook                   | Lenovo       | T450  | To run configuration tool  |
| CBL          | USB to UART                | -            | -     | -                          |
| SFT          | Bluetooth LE DTM over UART | -            | -     | for configuring test modes |
| Description: |                            |              |       |                            |
| AE           | Auxiliary Equipment        |              |       |                            |
| SIM          | Simulator                  |              |       |                            |
| CBL          | Connecting Cable           |              |       |                            |
| SFT          | Software                   |              |       |                            |
| Comment:     |                            |              |       |                            |

#### 1.4 Test Modes

| Mode             | Description                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GFSK<br>1 Mbit/s | Mode = Transmit<br>Modulation = GFSK<br>Spreading = None<br>Packet Type = PRBS9<br>Packet Length = 193 Bytes<br>Duty cycle = 87%<br>Power = +6 dBm (Software Setting) |
| Comment:         |                                                                                                                                                                       |

#### 1.5 Test Frequencies

| Designator | Mode | Channel | Frequency [MHz] |
|------------|------|---------|-----------------|
| F1         | Tx   | 19      | 2440            |

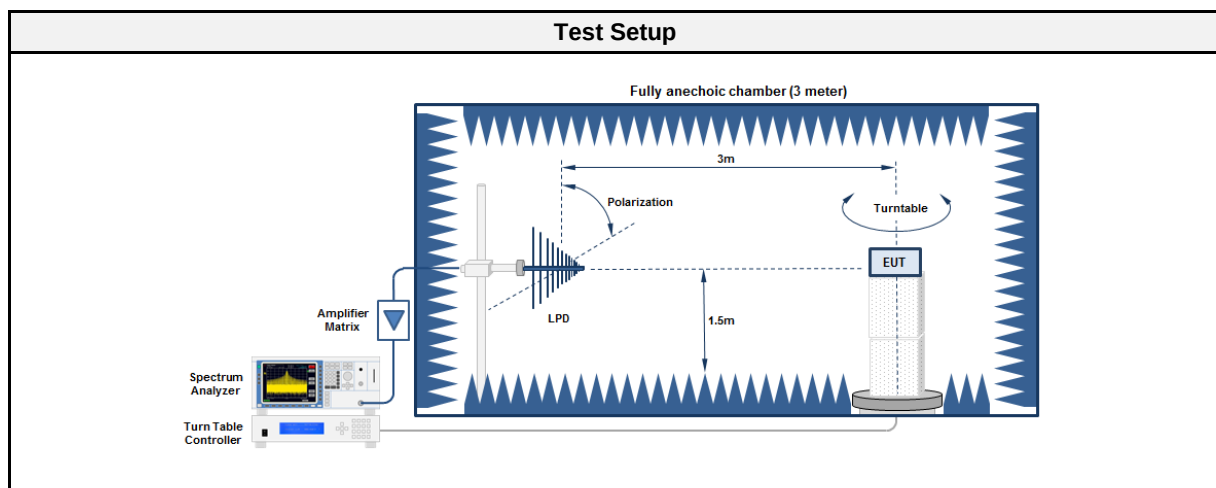
## 2 Test Conditions and Results

### 2.1 Test Conditions and Results – Antenna pattern

#### 2.1.1 Information

| Test Information |               |
|------------------|---------------|
| Operator         | Radwan Jaafar |
| Date             | 2022-10-17    |

#### 2.1.2 Setup



#### 2.1.3 Equipment

| Test Software            |                               |                          |         |
|--------------------------|-------------------------------|--------------------------|---------|
| Description              | Manufacturer                  | Name                     | Version |
| Antenna pattern software | Eurofins Product Service GmbH | Eurofins Antenna Pattern | 1.9     |

| Test Equipment    |              |            |            |           |          |
|-------------------|--------------|------------|------------|-----------|----------|
| Description       | Manufacturer | Model      | Identifier | Cal. Date | Cal. Due |
| Anechoic chamber  | Frankonia    | AC 4       | EF00200    | ---       | ---      |
| Spectrum analyzer | R&S          | FSU26      | EF01407    | 2022-07   | 2023-07  |
| Antenna           | Schwarzbeck  | BBHA 9120D | EF00019    | 2020-11   | 2023-11  |

#### 2.1.4 Procedure

| Test Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground</li> <li>2. EUT set to the test mode here the highest conducted output power has been measured</li> <li>3. The receiver is set to peak detection with max hold</li> <li>4. The EUT is rotated through 360° in horizontal plane</li> <li>5. The measurement procedure is repeated for all possible EUT positions.</li> </ol> |

## 2.1.5 Results

| Test Result – EUT horizontal |                      |                               |                         |
|------------------------------|----------------------|-------------------------------|-------------------------|
| Channel [MHz]                | Antenna polarization | Max. rad. Power [dBm e.i.r.p] | Max. antenna gain [dBi] |
| 2440                         | vertical             | 0.11                          | 1.11                    |
| 2440                         | horizontal           | 0.62                          | 1.62                    |

| Test Result – EUT vertical |                      |                               |                         |
|----------------------------|----------------------|-------------------------------|-------------------------|
| Channel [MHz]              | Antenna polarization | Max. rad. Power [dBm e.i.r.p] | Max. antenna gain [dBi] |
| 2440                       | vertical             | 0.98                          | 1.98                    |
| 2440                       | horizontal           | 0.32                          | 1.32                    |

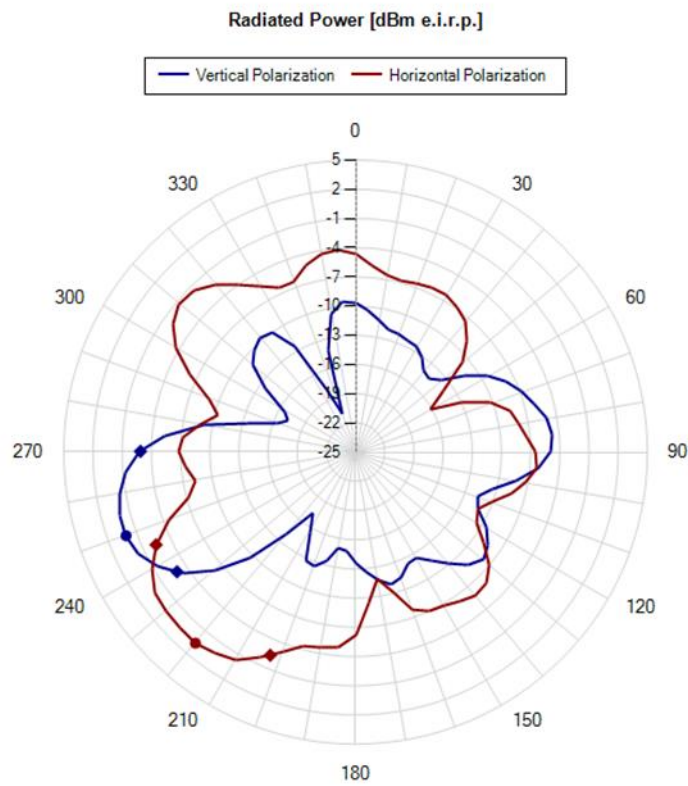
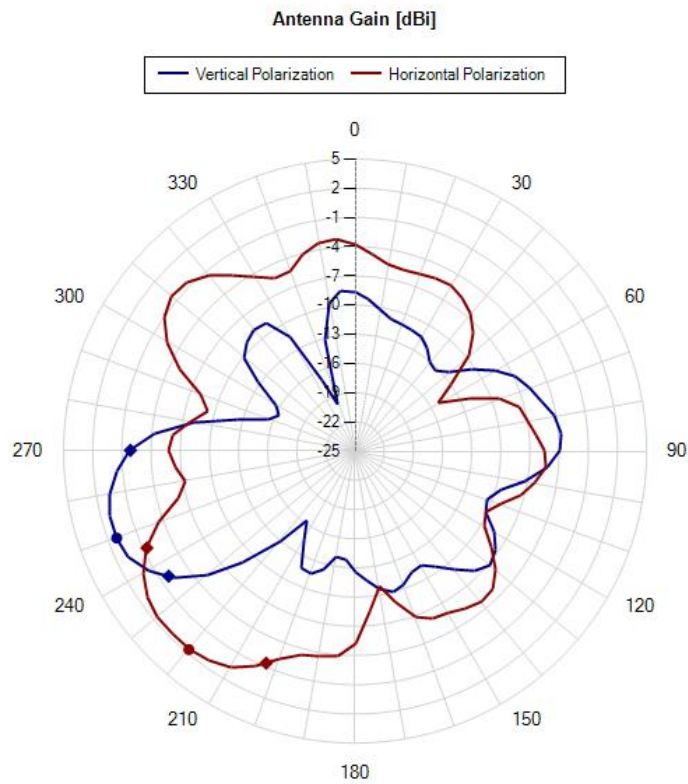
## ANNEX A Antenna patterns

### Antenna Pattern

Project Number: G0M-2109-1013  
 Product: Bluetooth module  
 Model: DC1392C  
 Sample ID: 41260  
 EUT Position: Horizontal  
 EUT Antenna: Integrated  
 Operating Conditions: Tnom / Vnom  
 Operating Frequency: 2440 MHz  
 Detector: Peak  
 RBW: 1 MHz  
 VBW: 3 MHz  
 Sweep Time: 5 ms  
 Conducted Power: -1.003 dBm  
 Operator: Radwan Jaafar  
 Date: 2022-10-17

### Result Summary

| Antenna Polarization | Turn table Angle [°] | Max. rad. power [dBm e.i.r.p.] | Max. antenna gain [dBi] |
|----------------------|----------------------|--------------------------------|-------------------------|
| Vertical             | 250                  | 0.11                           | 1.11                    |
| Horizontal           | 220                  | 0.62                           | 1.62                    |

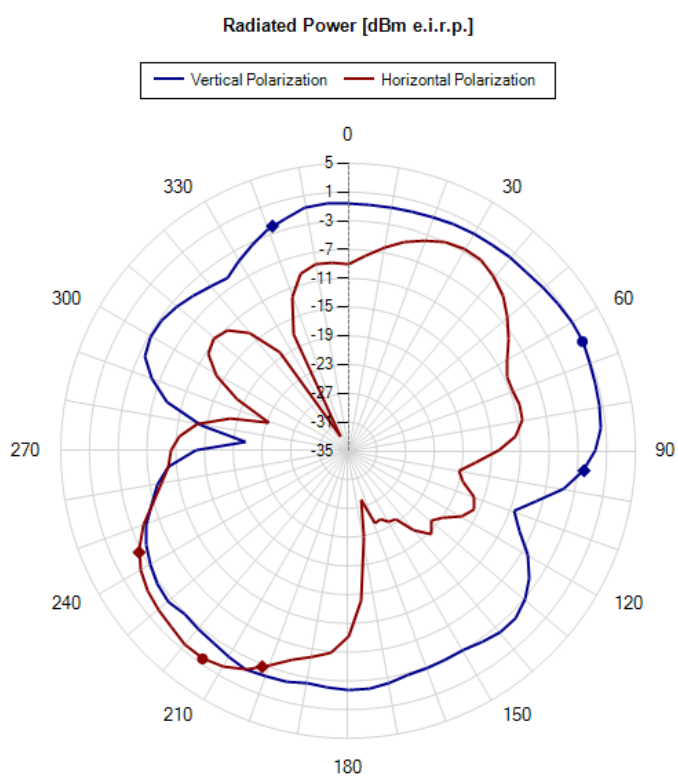
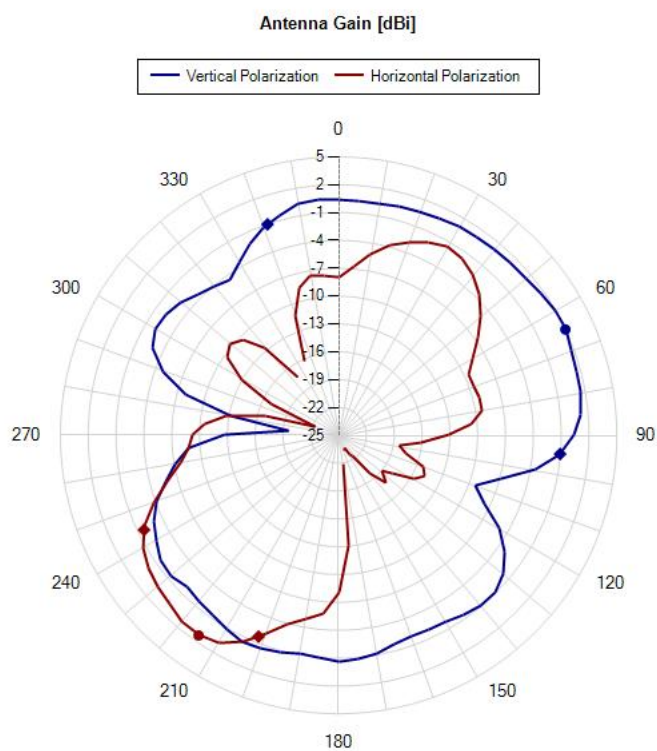


## Antenna Pattern

Project Number: G0M-2109-1013  
 Product: Bluetooth module  
 Model: DC1392C  
 Sample ID: 41260  
 EUT Position: Vertical  
 EUT Antenna: Integrated  
 Operating Conditions: Tnom / Vnom  
 Operating Frequency: 2440 MHz  
 Detector: Peak  
 RBW: 1 MHz  
 VBW: 3 MHz  
 Sweep Time: 5 ms  
 Conducted Power: -1.003 dBm  
 Operator: Radwan Jaafar  
 Date: 2022-10-17

## Result Summary

| Antenna Polarization | Turn table Angle [°] | Max. rad. power [dBm e.i.r.p.] | Max. antenna gain [dBi] |
|----------------------|----------------------|--------------------------------|-------------------------|
| Vertical             | 65                   | 0.98                           | 1.98                    |
| Horizontal           | 215                  | 0.32                           | 1.32                    |



== = END OF TEST REPORT == =