

Test report

Number T251-0208/24

Project file: C20230681

Date: 2024-03-12

Pages: 9

Product: Communication module

Type reference: BLE IoT module

Ratings: 3,3 V d.c.
Class: III

Trademark: **FESTOOL**

Applicant: FESTOOL GmbH
Wertstrasse 20, 73240 Wendlingen, Germany

Manufacturer: FESTOOL GmbH
Wertstrasse 20, 73240 Wendlingen, Germany

Place of manufacture: FESTOOL GmbH
Wertstrasse 20, 73240 Wendlingen, Germany

Summary of testing

Testing method: Antenna pattern measurements

Testing location: SIQ Ljubljana
Mašera-Spasičeva ulica 10, SI-1000 Ljubljana, Slovenia

Remarks: Date of receipt of test items: 2022-03-23
Number of items tested: 1
Date of performance of tests: 2023-01-09
The test results presented in this report relate only to the items tested.
The test items were tested in the condition as received.
The product complies with the requirements of the testing methods.

Tested by: Luka Cvajnar

Approved by: Marjan Mak

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1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2024-03-12	T251-0208/24	Initial Test Report issued.	--

Environmental conditions:

Ambient temperature: 15 °C to 35 °C

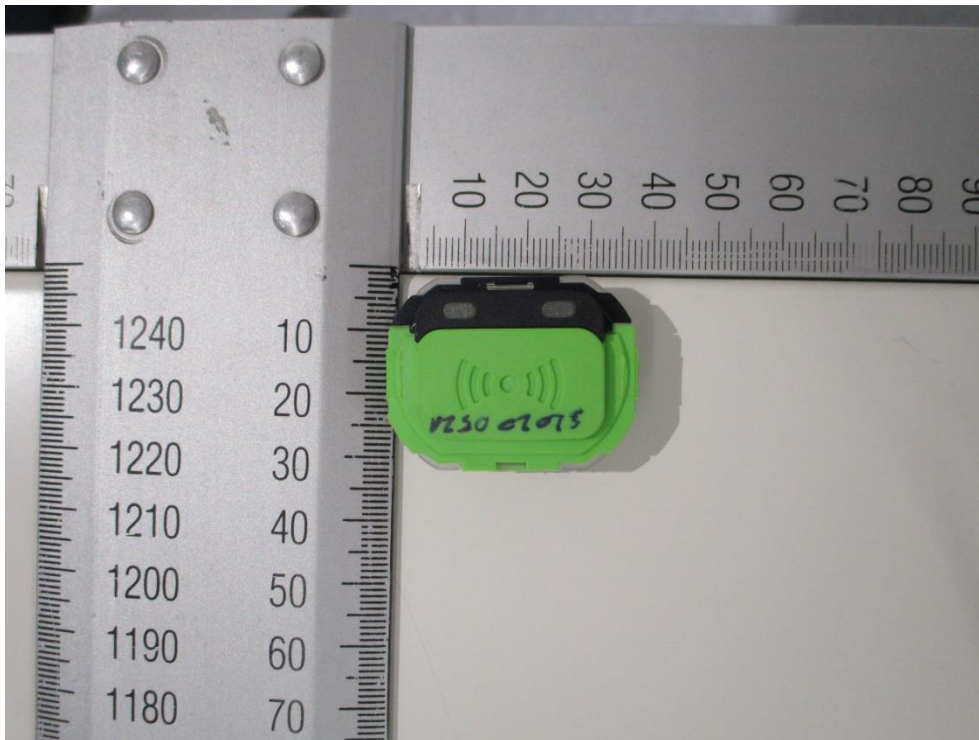
Relative humidity: 30 % to 60 %

Atmospheric pressure: 860 mbar to 1060 mbar

1.1 Equipment under test

Festool IoT module

Tested was antenna pattern of the sample below.



Picture of test sample – BLE Antenna



1.2 Antenna pattern measurement

1.2.1 Test procedure

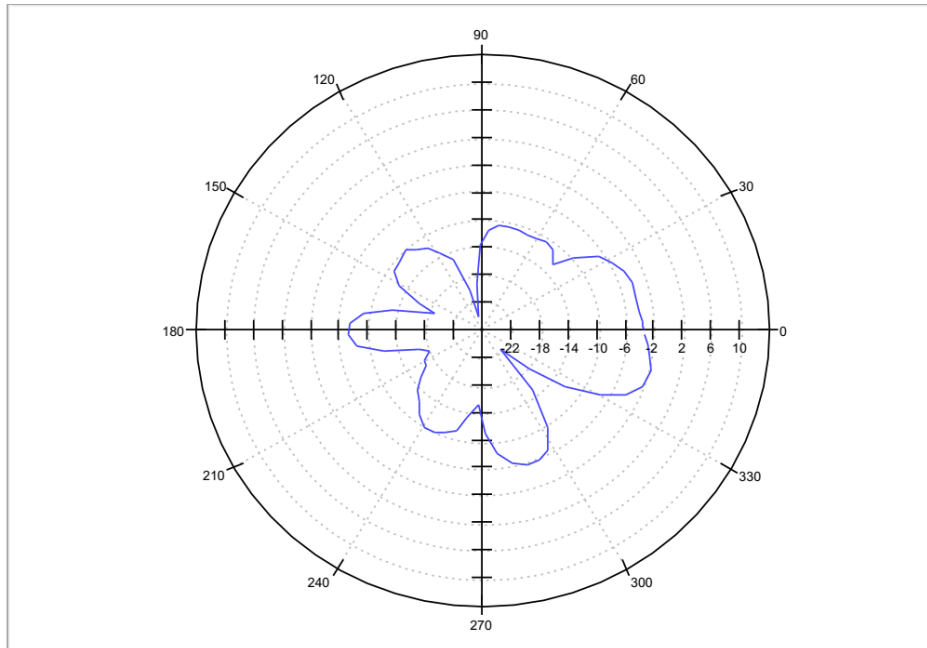
The radiation pattern for BLE antenna implemented to PCB reference design has been measured in an anechoic chamber with 3 meters test distance. Test results show radiation patterns for two planes, measured with vertical and horizontal polarization of measuring antenna. All measurements were performed at 2402, 2440 and 2480 MHz frequency.

1.3 Test results BLE Antenna

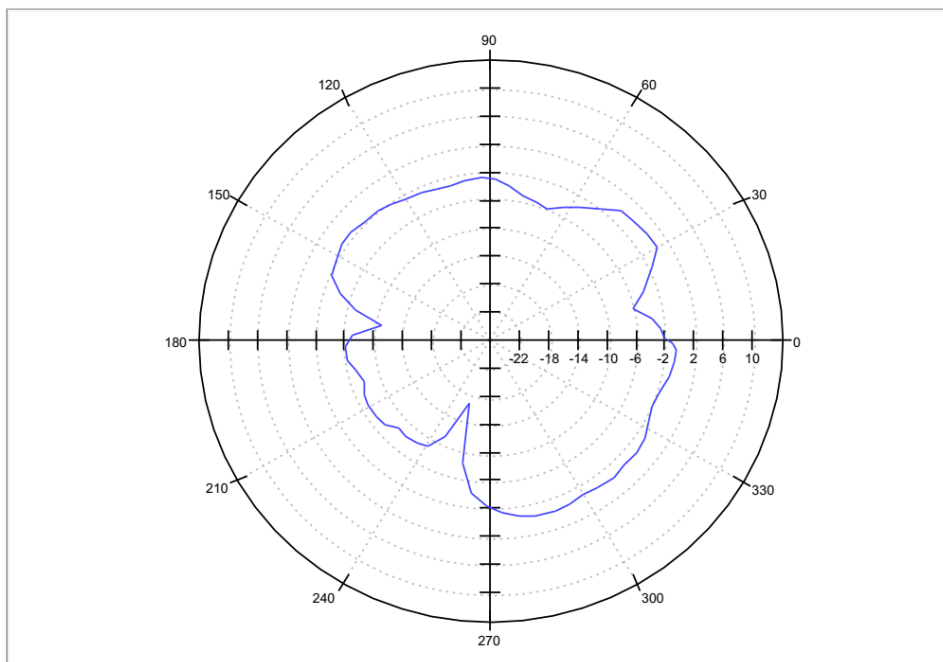
AziChart MinMax Eval

Frequency (MHz)	Max. Value (dBm)	Azimuth max. (deg)	Pol max.	Min. Value (dBm)	Azimuth min. (deg)	Pol min.
2402.000000	0.40	30	V	-23.96	102	H

Azimuth Chart: Horizontal



Azimuth Chart: Vertical

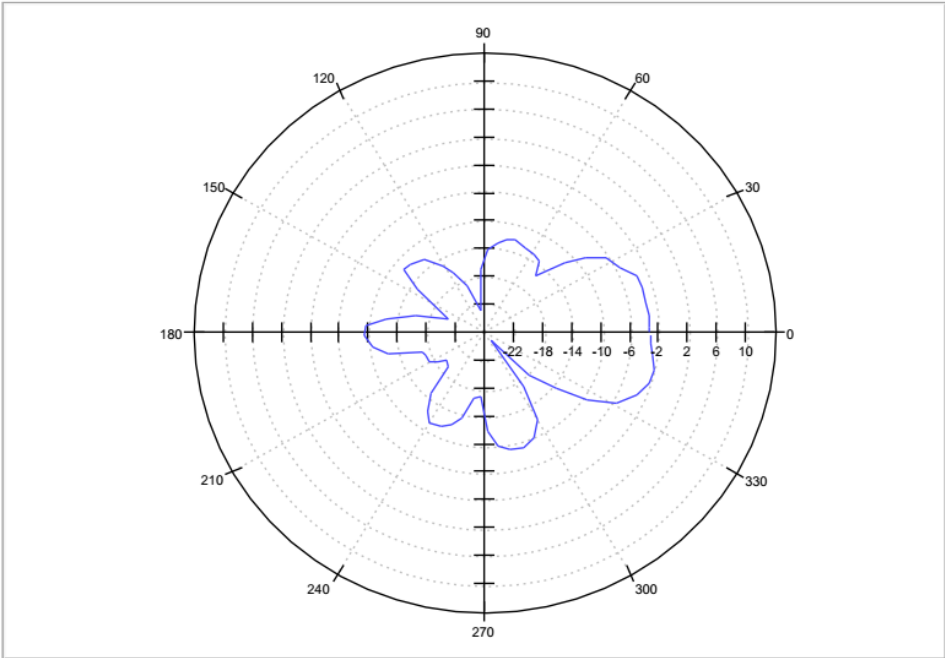




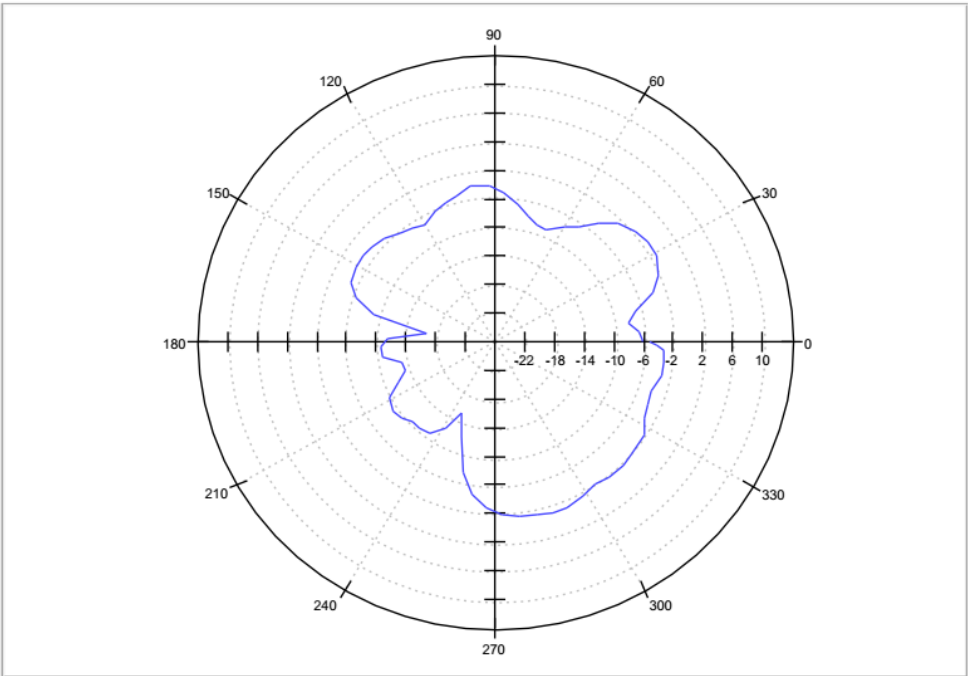
AziChart MinMax Eval

Frequency (MHz)	Max. Value (dBm)	Azimuth max. (deg)	Pol max.	Min. Value (dBm)	Azimuth min. (deg)	Pol min.
2440.000000	-0.90	293	V	-24.56	310	H

Azimuth Chart: Horizontal



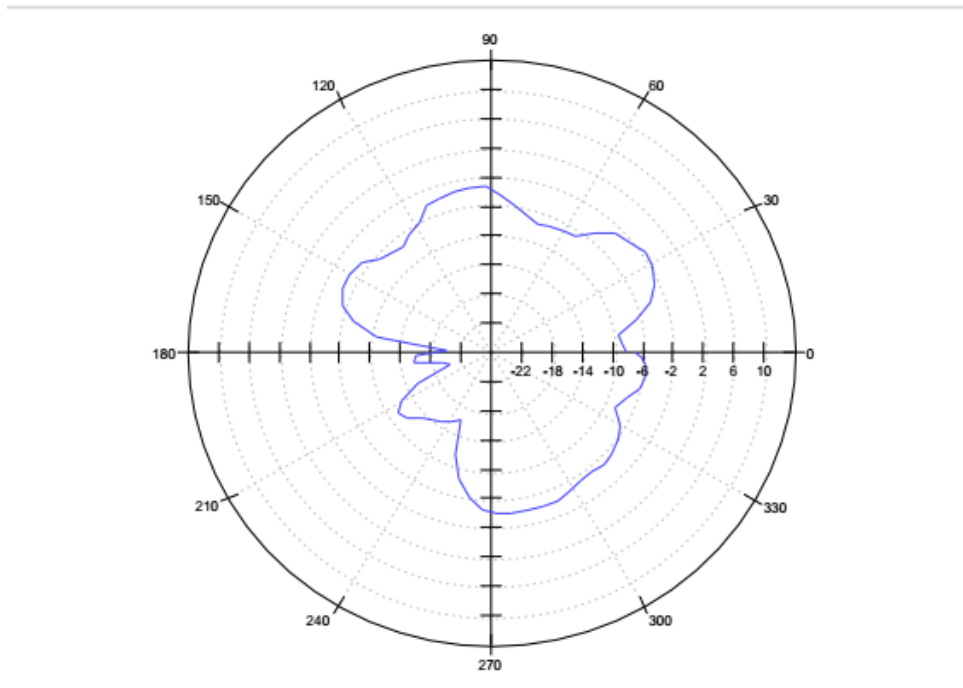
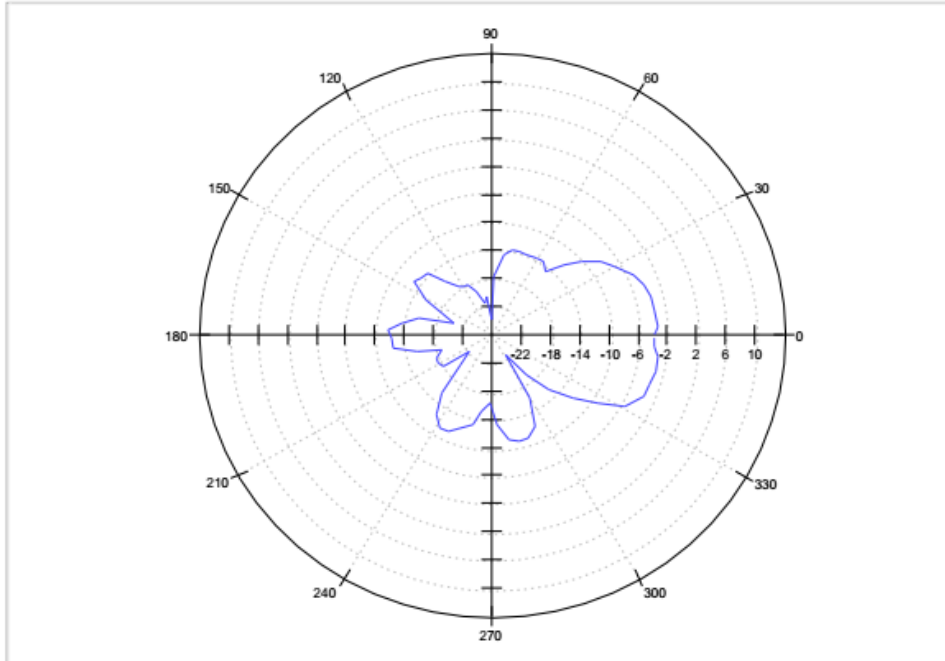
Azimuth Chart: Vertical



AziChart MinMax Eval

Frequency (MHz)	Max. Value (dBm)	Azimuth max. (deg)	Pol max.	Min. Value (dBm)	Azimuth min. (deg)	Pol min.
2480.000000	-1.58	34	V	-23.91	93	H

Azimuth Chart: Horizontal





1.4 Maximum BLE antenna gain

DUT Frequency (MHz)	Maximum antenna gain (dBi)
2402.000000	-3.6
2440.000000	-4.9
2480.000000	-5.58

2 USED TEST EQUIPMENT

Antenna pattern measurement

Manufacturer	Model No.	Used	Calibrated	Calibrated until
Comtest engineering, SAC2 (together with controlling equipment)	SAC 3m	X	2022-04-14	2025-04-14
Maturo, Turn table (2 m diameter)	TT 2.0 SI	X	/	/
Maturo, Bore-sight antenna mast	BAM-4.0-P	X	/	/
Maturo, positioning equipment	NCD	X	/	/
Rohde & Schwarz, RFI receiver	ESU 26	X	2022-01-04	2023-07-04
R&S, Ultra Broadband Antenna	HL562E		2020-09-30	2023-09-30
R&S, Horn Antenna	HF907	X	2020-08-21	2023-08-21