

TEST REPORT

Applicant:	Atlas Copco BLM s.r.l. Guglielmo Pepe 11, IT-20037 Paderno Dugnano - Italy		
Test item:	Electronic torque wrench		
Identification / Type No.:	MTRwrench85		
Order content:	Partial testing according to the following standard(s):		
Test specification:	Measurement antenna pattern		
Date of receipt:	15/11/2024		
Internal storage No.:	A003885774-001		
Testing period:	15/11/2024		
Place of testing:	TÜV Rheinland Italia S.r.l. Via E. Mattei, 3 20005 Pogliano Milanese (MI) - IT		
Testing laboratory:	TÜV Rheinland Italia S.r.l. Via E. Mattei,3 20005 Pogliano Milanese (MI) - IT		
Test result:	Pass		
Tested by:	Riccardo Morandi	Authorized by:	Riccardo Pfeiffer
			
Date:	03/01/2025	Date:	03/01/2025
Position	(Laboratory technician) Sachverständige(r)/Expert	Position	(Reviewer) Sachverständige(r)/Expert
Other:	---		
Condition of the test item at delivery:	Test item complete and undamaged		
Compliance with test requirements recorded in this technical report does not give presumption of compliance to all requirements by reference standard. The test results reported in this test report shall refer only to the samples tested as received. TÜV Rheinland Italia is not responsible for the sampling phase. This report may not be partially reproduced, except with the prior written permission of the issuing Laboratory TÜV Rheinland refuses any responsibility about information supplied by the customer contained in this test report (#) Test sample(s), as well sample information, description, product details and intended usage was provided by customer			

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.
2	As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.
3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.
4	Unless otherwise agreed with the customer, a conformity assessment is always carried out based on the applied standards. At the customer's request, the statement on the conformity of the product tested in this test report is carried out according to the criteria/requirements of the applied standards. Evaluation conditions deviating from these are documented separately in the respective chapters.
5	The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance to and ILAC-G8:09/2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.

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Product description
1. General description of test item(s)

Identification / Type No.:	MTRwrench85
Serial number	Prototype
Manufacturer	Atlas Copco BLM s.r.l.
Trade Mark	Atlas Copco
Rated voltage / frequency	1.5V / DC
Rated current / power	120mA / 0.18W
Number of phases	N.A.
Hardware version	4619032336-1D
Software version	1.2.1.19RT10
Dimensions	---
Weight	---
Other	---
Test sample obtaining:	☒ Sampling by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Product description

2. EUT identification



Product description

3. Radio type identification¹

Brand name and model of radio module	Texas Instrument CC1352P
Antenna model and Gain	Ignion NN02-224 PEAK GAIN BEFORE INTEGRATION: - 0.4dbi (868/915 MHz) - 3.4 dbi (2400 MHz)
Antenna type	☐ External antenna ☐ Dedicated antenna ☒ Integral antenna
Type of equipment	☐ stand-alone equipment ☒ combined equipment ☐ multi-radio equipment
Type of technology	Sub-1GHz Narrowband Proprietary; 2.4GHz - IEEE 802.15.4
Nominal voltage of stand-alone or combined equipment	1.5V
Operating frequency range	2402MHz to 2480MHz
Nominal channel bandwidth	44 kHz for sub 1GHz; 2MHz for 2.4GHz
Type of wideband data transmission equipment	Narrowband for Sub-1GHz; IEEE-802.15.4 – DSSS for 2.4GHz
Number of hopping channels	0
Transmit operating mode	☒ single antenna ☐ multiple antennas, no beamforming ☐ multiple antennas, with beamforming
With regard adaptivity, the type of equipment	☐ non-adaptive equipment ☐ adaptive equipment ☐ Equipment that can operate in both an adaptive and non-adaptive mode;
Spectrum access mechanism	☐ LBT (Listen Before Talk) Technique ☐ DAA (Detect And Avoid) Technique ☐ Duty cycle
Environmental equipment	☐ Test only in normal conditions ☐ Test in normal conditions and extreme conditions
Equipment that support a geo-location capability	☐ Yes ☐ No

¹ In acc.to Annex E of EN 300 328, this information are declared by the customer

Product description**4. Input/Output ports**

Nr.	Name	Type	Cable length	Cable shielded	Comments
1	Enclosure port	Conductive	—	—	Metallic enclosure
2	AC power port	---	—	---	Port not present
3	DC power port	Power	—	—	Connector for battery charging
4	Signal/control port	---	—	—	Port not present
5	Wired Network port	---	—	---	Port not present
6	Antenna port	Integral	—	—	—
7	Earth port	—	—	—	—

REVISION HISTORY**5. Equipment using during test****Equipment under test**

No.	Product type	Manufacturer	Model	Comments
1	Electronic torque wrench	Atlas Copco BLM s.r.l.		—
2	—	—	—	—

Auxiliary Equipment / Peripherals

No.	Product type	Manufacturer	Model	Comments
1	---	---	---	---

REVISION HISTORY

6. Operating modes

No.	Description
-----	-------------

- | | |
|---|--|
| 1 | EUT powered on, RF Module continuous transmission at 868,75MHz |
| 2 | EUT powered on, RF Module continuous transmission at 917,13MHz |
| 3 | EUT powered on, RF Module continuous transmission at 2440MHz |

REVISION HISTORY**7. Climatic conditions**

Ambient Temperature	15 - 35 °C
Relative Humidity	20 - 75 %
Air pressure	Not required.

**Ambient Temperature
Humidity Sensor**
(used to control climatic
conditions)

Type: 6152C (ID: 2782344; manufacturer: Davis
Instruments)
• Semi-Anechoic Chamber FACT 3

Calibration due date
01/2026

REVISION HISTORY

8. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the quality system acc. to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

The manufacturer has the sole responsibility of continued compliance of the device.

Test Method	Uncertainty (95%)	Coverage factor k
TX Carrier Power - Radiated (9 kHz - 1 GHz)	2.7 dB	2.3
TX Carrier Power - Radiated (1 - 8) GHz	3.3 dB	2.3
TX Carrier Power - Radiated (8 - 40) GHz	3.5 dB	2.3

REVISION HISTORY**9. Change history**

Test report number	List of revisions	Date
IT2490B8 001	First edition	03/01/2025

ADDITIONAL DOCUMENTATION

Polar diagram	
Test date	15/11/2024
Temperature	25° C
Humidity	44%
Tested by	Errore. L'origine riferimento non è stata trovata.
Model	Electronic torque wrench mod. MTRwrench85
Internal Storage No.	A003885774-001
Operating mode	1, 2, 3
Tested terminals	Integrated antenna (radiated mode)
Remarks	---

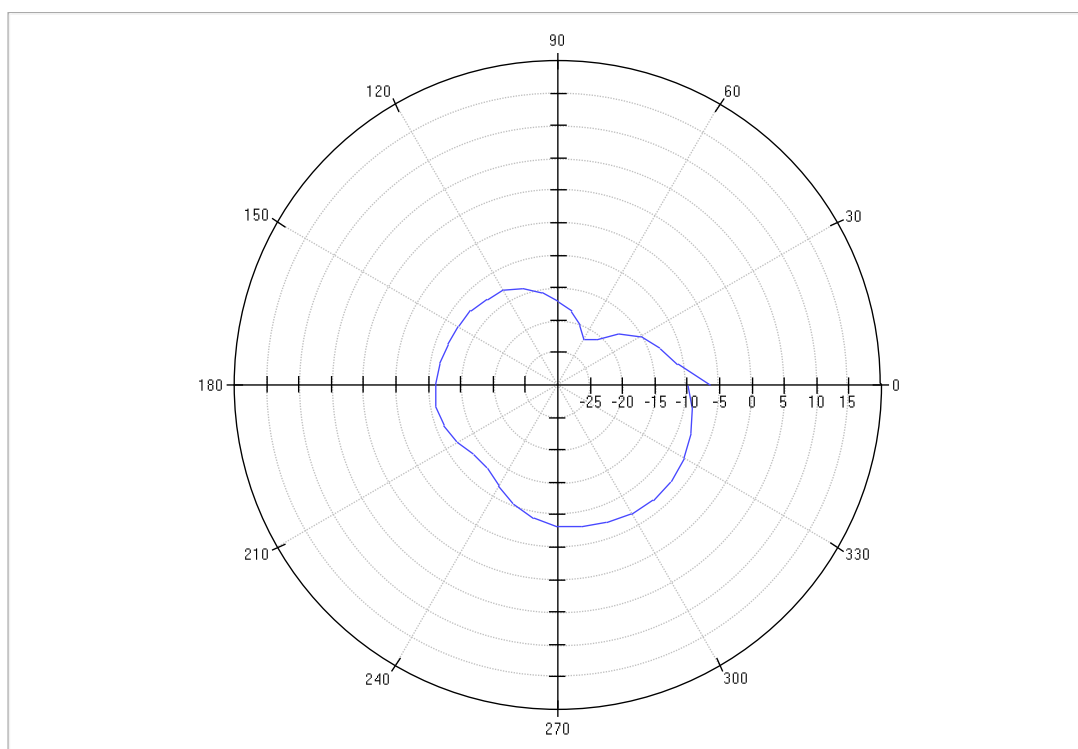
ADDITIONAL DOCUMENTATION

Operating condition: 1

EUT Axis: X

Antenna polarization: Horizontal

Azimuth Chart: Horizontal



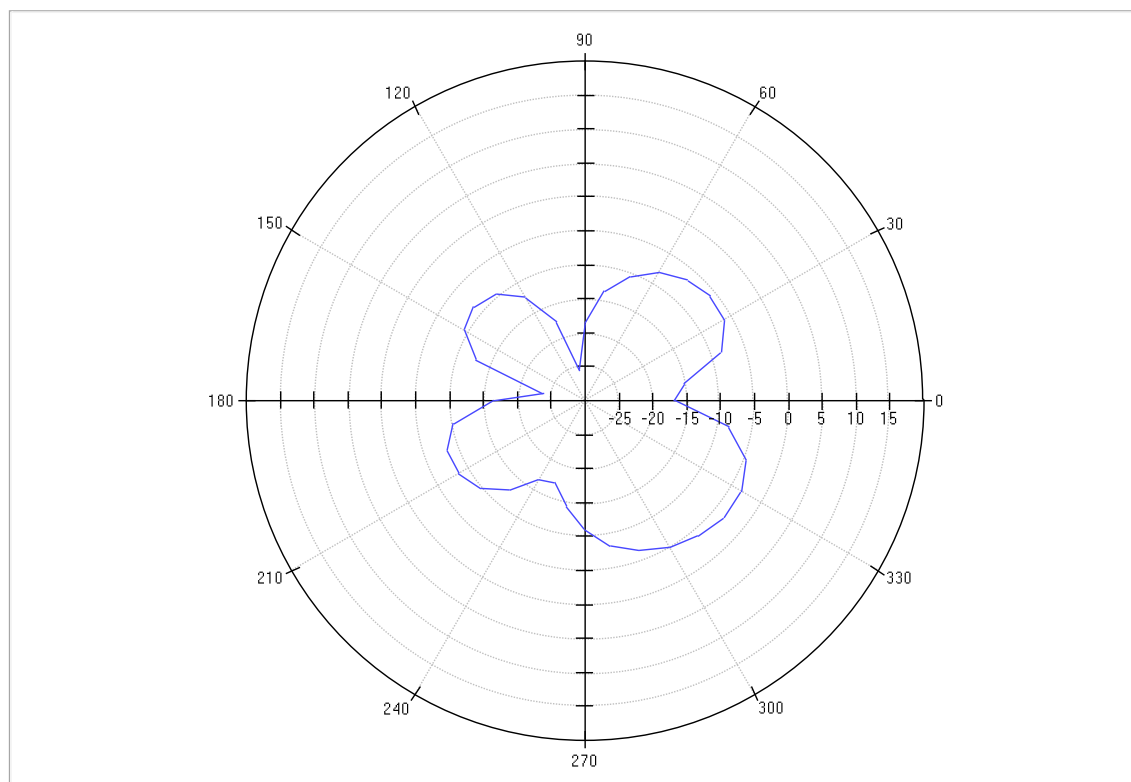
ADDITIONAL DOCUMENTATION

Operating condition: 1

EUT Axis: X

Antenna polarization: Vertical

Azimuth Chart Vertical



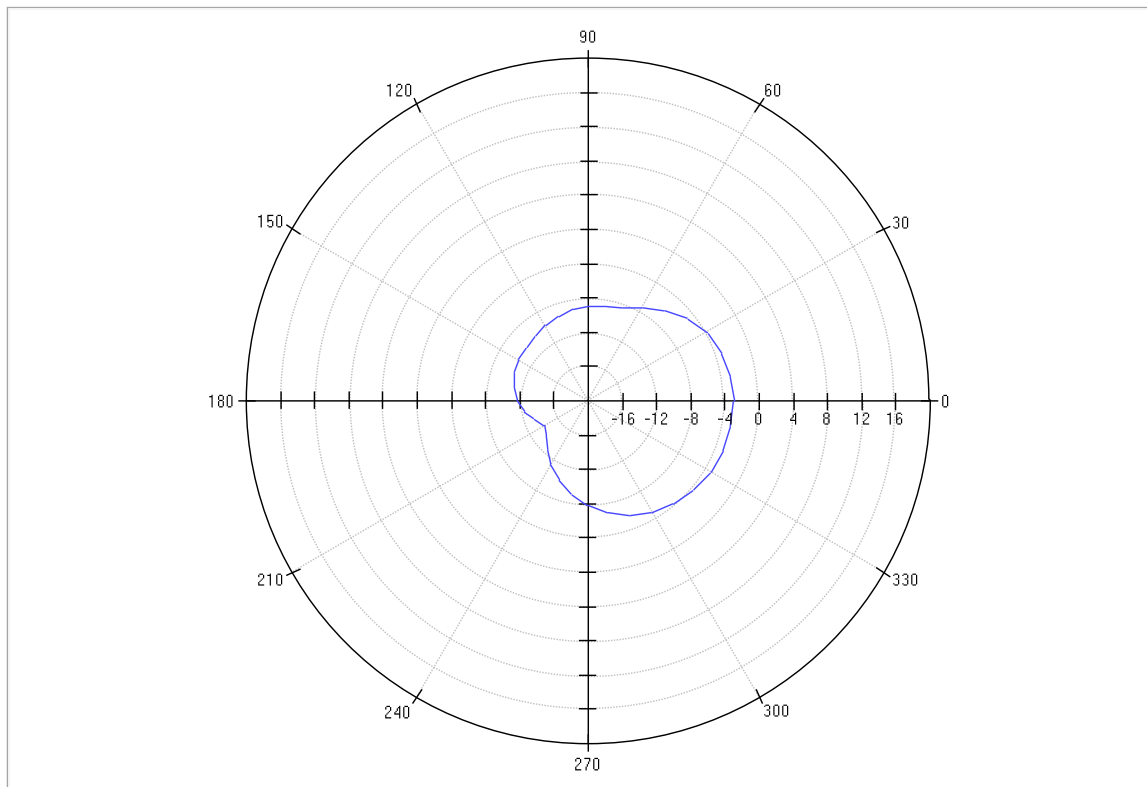
ADDITIONAL DOCUMENTATION

Operating condition: 1

EUT Axis: Y

Antenna polarization: Horizontal

Azimuth Chart Horizontal



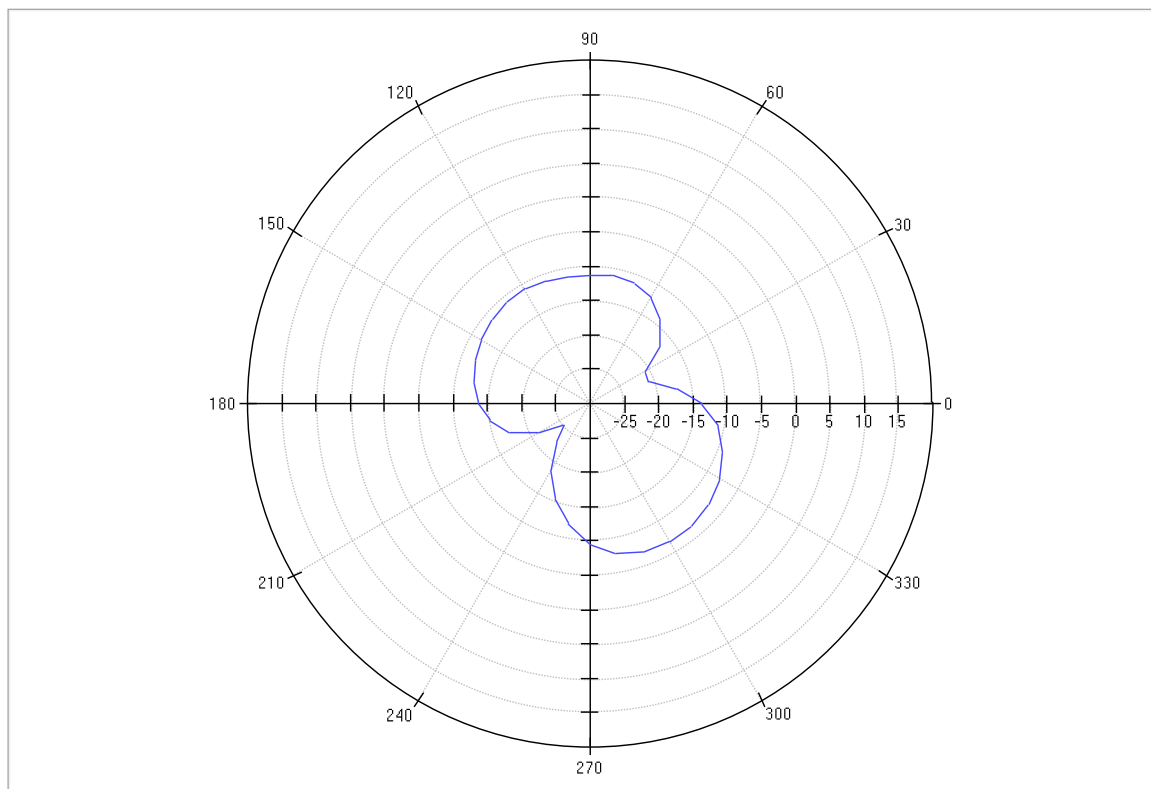
ADDITIONAL DOCUMENTATION

Operating condition: 1

EUT Axis: Y

Antenna polarization: Vertical

Azimuth Chart Vertical



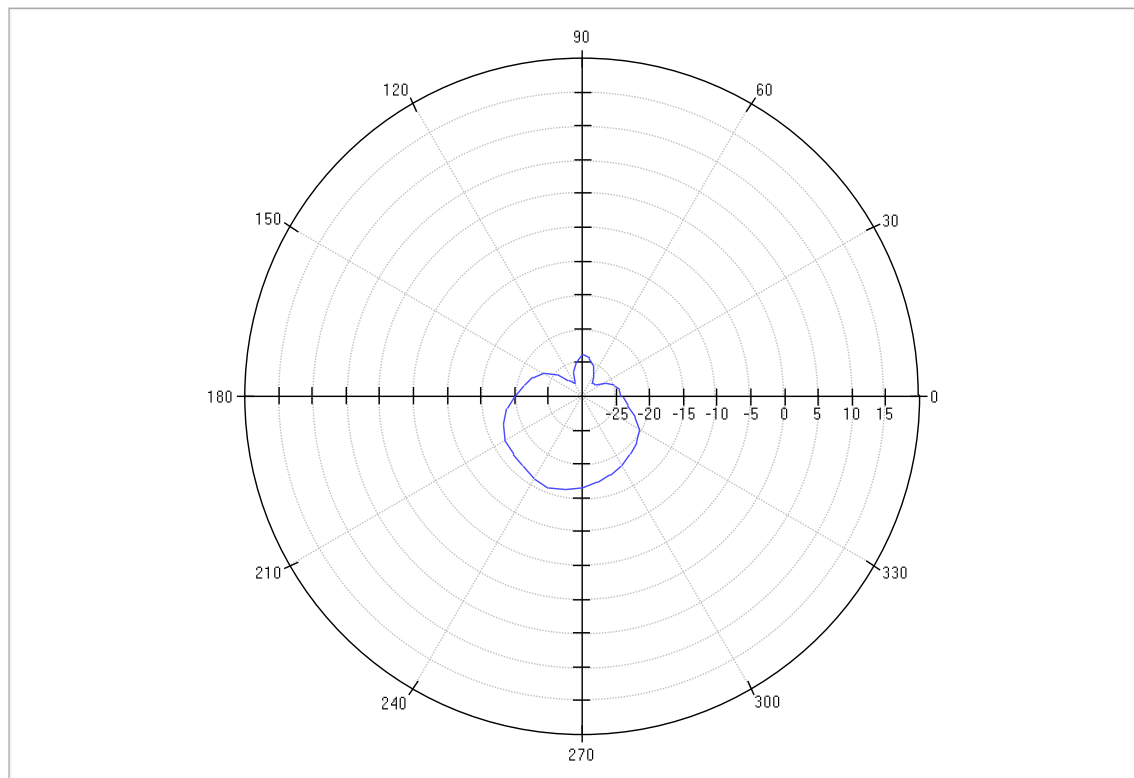
ADDITIONAL DOCUMENTATION

Operating condition: 2

EUT Axis: X

Antenna polarization: Horizontal

Azimuth Chart Horizontal



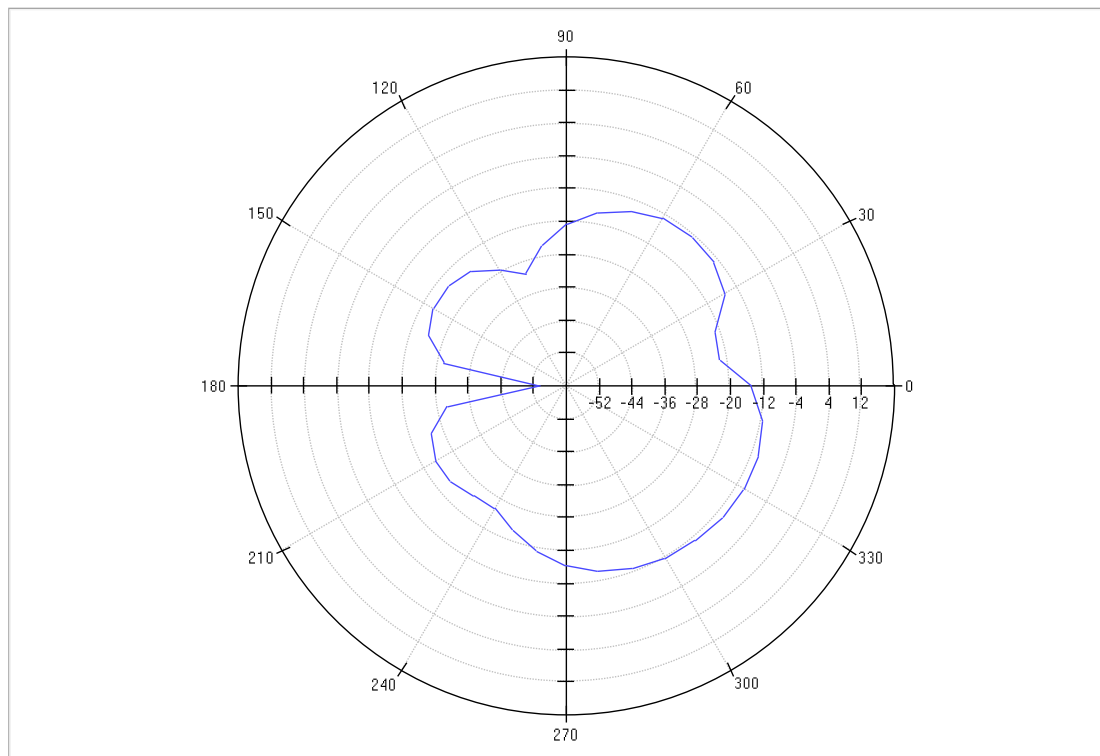
ADDITIONAL DOCUMENTATION

Operating condition: 2

EUT Axis: X

Antenna polarization: Vertical

Azimuth Chart: Vertical



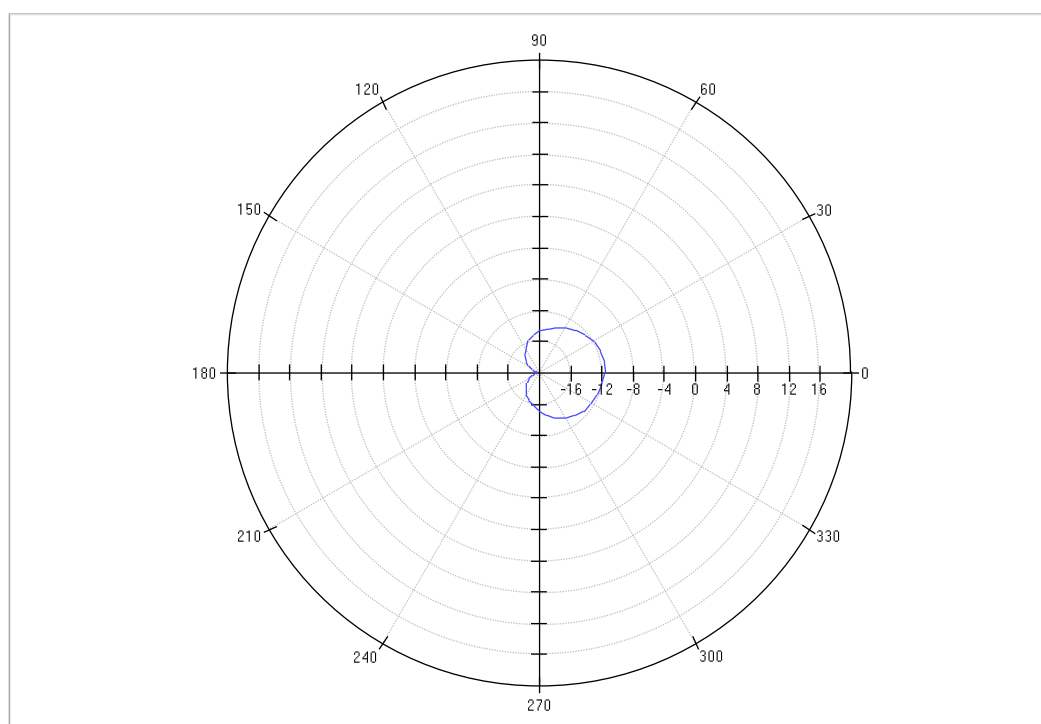
ADDITIONAL DOCUMENTATION

Operating condition: 2

EUT Axis: Y

Antenna polarization: Horizontal

Azimuth Chart Horizontal



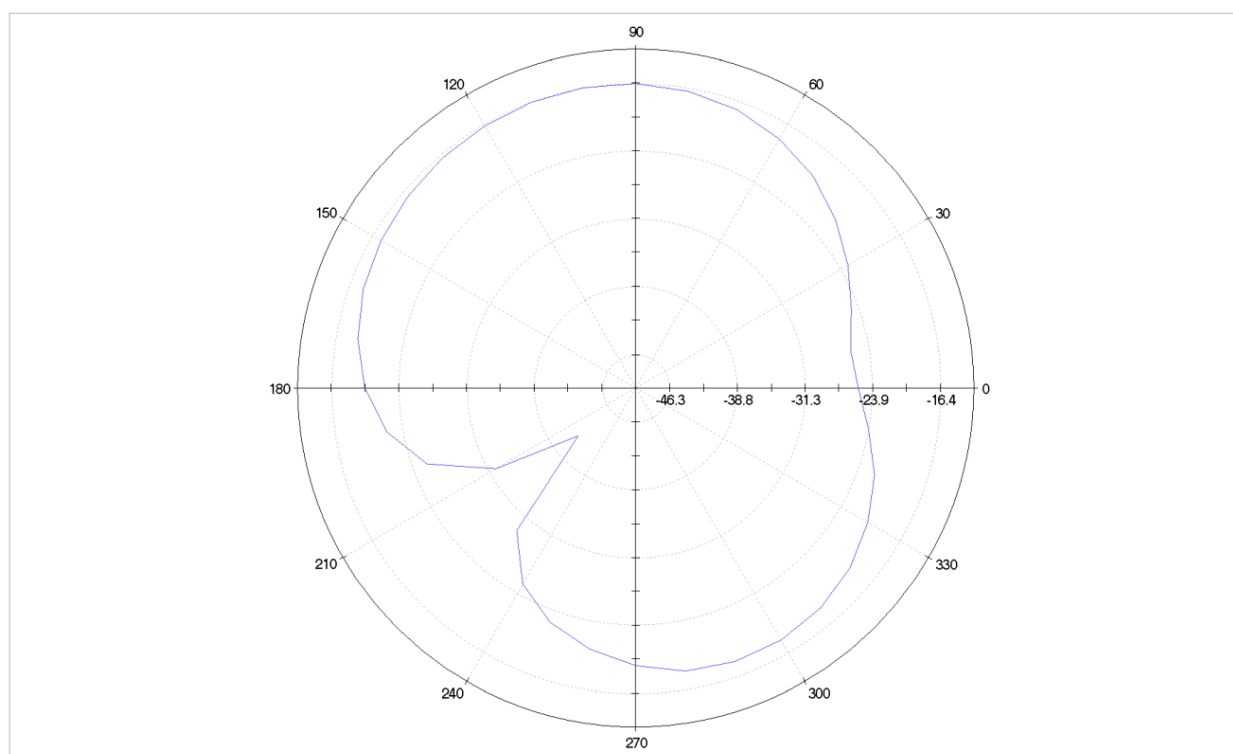
ADDITIONAL DOCUMENTATION

Operating condition: 2

EUT Axis: Y

Antenna polarization: Vertical

Azimuth Chart: Vertical



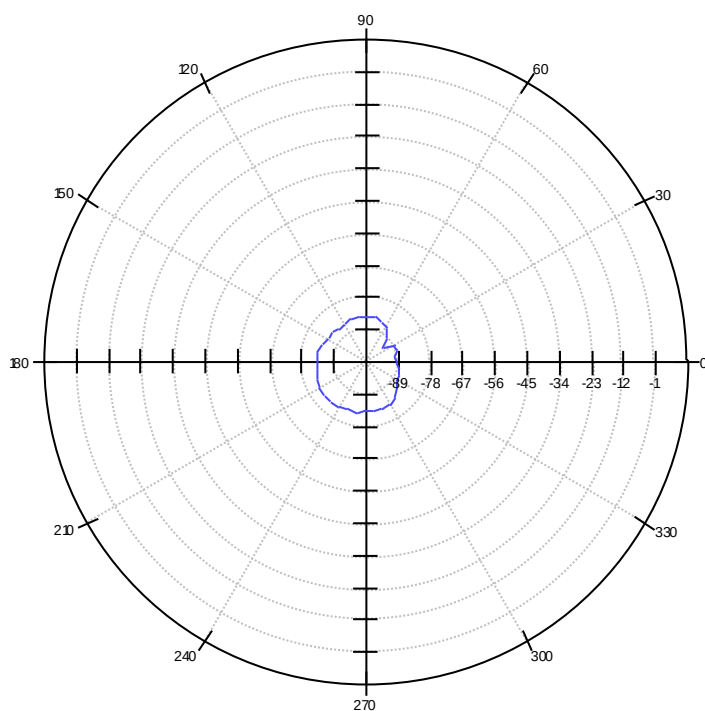
ADDITIONAL DOCUMENTATION

Operating condition: 3

EUT Axis: X

Antenna polarization: Horizontal

Azimuth Chart: Vertical



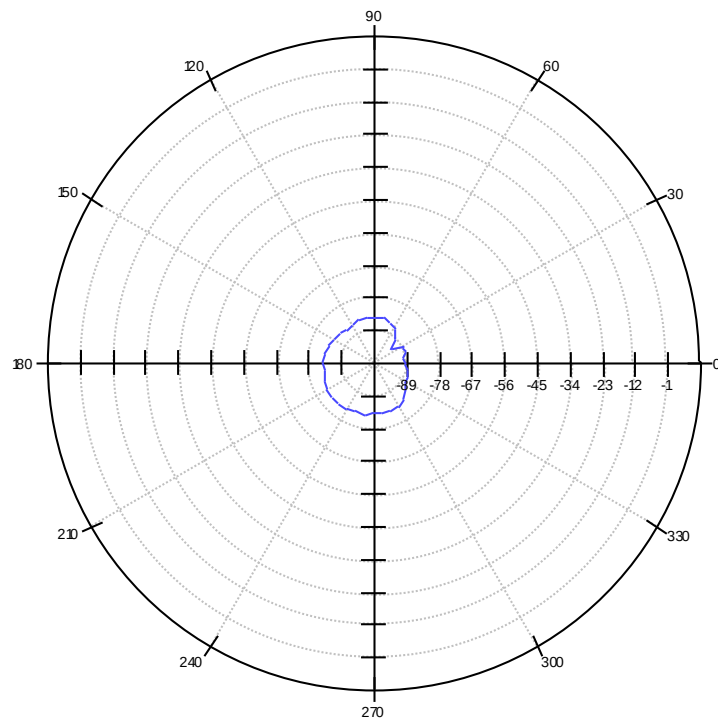
ADDITIONAL DOCUMENTATION

Operating condition: 3

EUT Axis: X

Antenna polarization: Vertical

Azimuth Chart: Horizontal



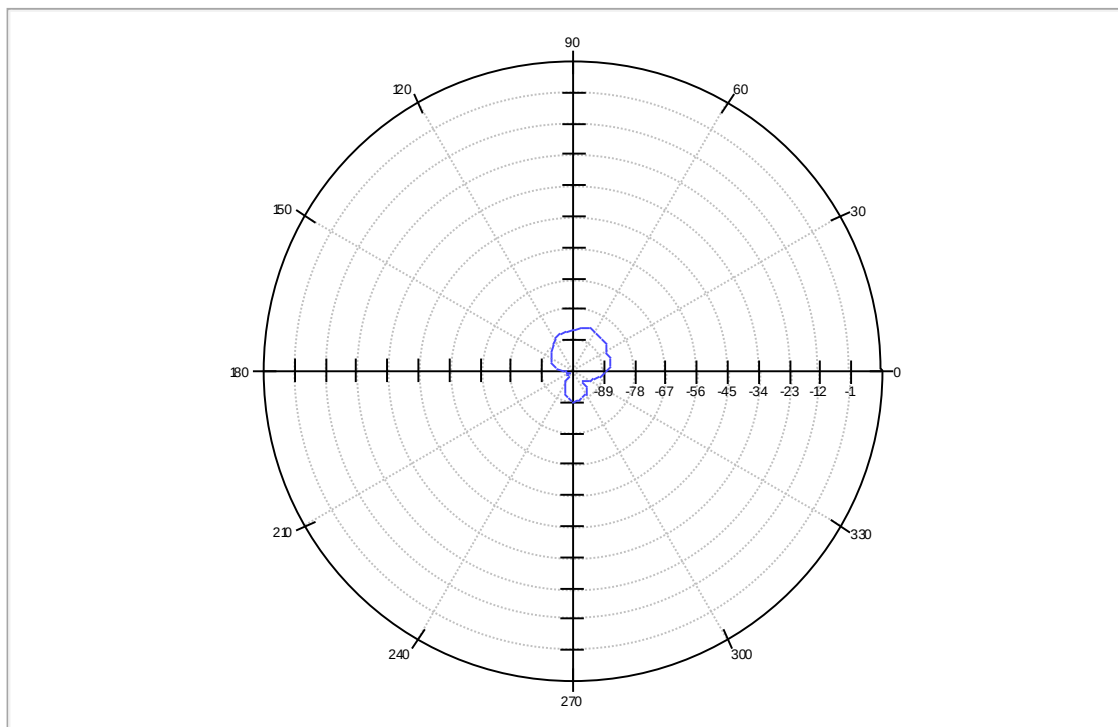
ADDITIONAL DOCUMENTATION

Operating condition: 3

EUT Axis: Y

Antenna polarization: Horizontal

Azimuth Chart: Vertical



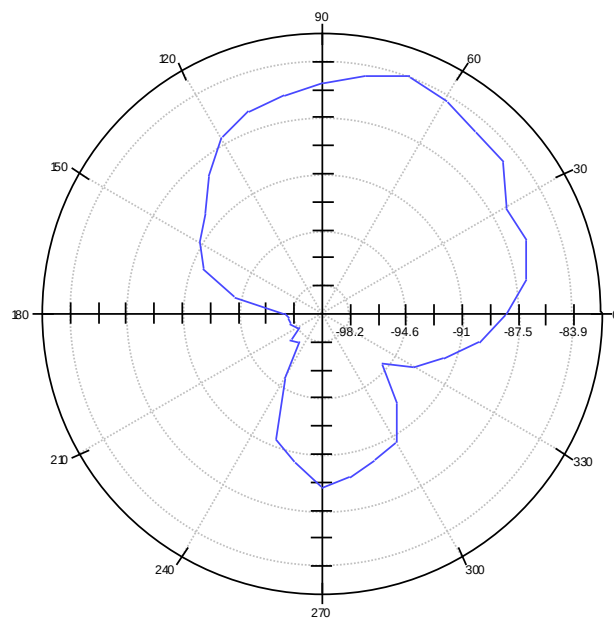
ADDITIONAL DOCUMENTATION

Operating condition: 3

EUT Axis: Y

Antenna polarization: Vertical

Azimuth Chart: Horizontal



ADDITIONAL DOCUMENTATION

10. Photographic documentation: EUT Test setup



Carrier frequency <1GHz



Carrier frequency <1GHz



Carrier frequency >1GHz



Carrier frequency >1GHz

ADDITIONAL DOCUMENTATION**11. List of test equipment**

Equipment	Type	Inventory no.	Manufacturer	Calibration due date
RF Output Power				
Semi-anechoic Chamber	FACT3	2782378	ETS Lindgren	06/2026
Horn Antenna (1-18)GHz	HF907	9017580	Rohde&Schwarz	03/2026
Preamplifier (1-18)GHz	BLMA 0118-5G	9017808	BONN Elektronik	04/2026
BiConiLog Antenna	3142-E	2782348	ETS Lindgren	11/2026
EMI Receiver	ESW44	2782867	Rohde&Schwarz	06/2025
Software EMC32	11.40.00	---	Rohde&Schwarz	---

---END OF TEST REPORT---