

Address:
CSA Group Bayern GmbH
 Straubinger Straße 100
 94447 Plattling
 GERMANY

Phone: +49(0)9931-98360
 E - mail: info@csagroup.org
 Internet: http://www.csagroup.org

Test – Results

Order-No.:

80240901-00 Rev_0

Client	race result AG, Joseph-von-Fraunhofer-Str. 11, 76327 Pfinztal, GERMANY		
Manufacturer	race result AG, Joseph-von-Fraunhofer-Str. 11, 76327 Pfinztal, GERMANY		
Product Description	PCB antenna		
Type / Model Name	RR21		
Testing commenced on	2025-02-11	Pretest is made according to Customer specific	
Testing concluded on	2025-02-11		
Serial - No.	N/A		

Remarks:

Customer specific tests in order to determine antenna gain and antenna performance.

This test result consists of 23 page(s). The test result only corresponds to the tested sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

Date	Checked by	Tested by	Result
2025-03-24	 Klaus Gegenfurtner I confirm the correctness and integrity of this document 2025.03.25 08:07:21 +01'00'	 Franz-Xaver Schrettenbrunner I am the author of this document 2025.03.24 09:16:38 +01'00'	Not applicable, no standards used

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

Photo documentation and setup description

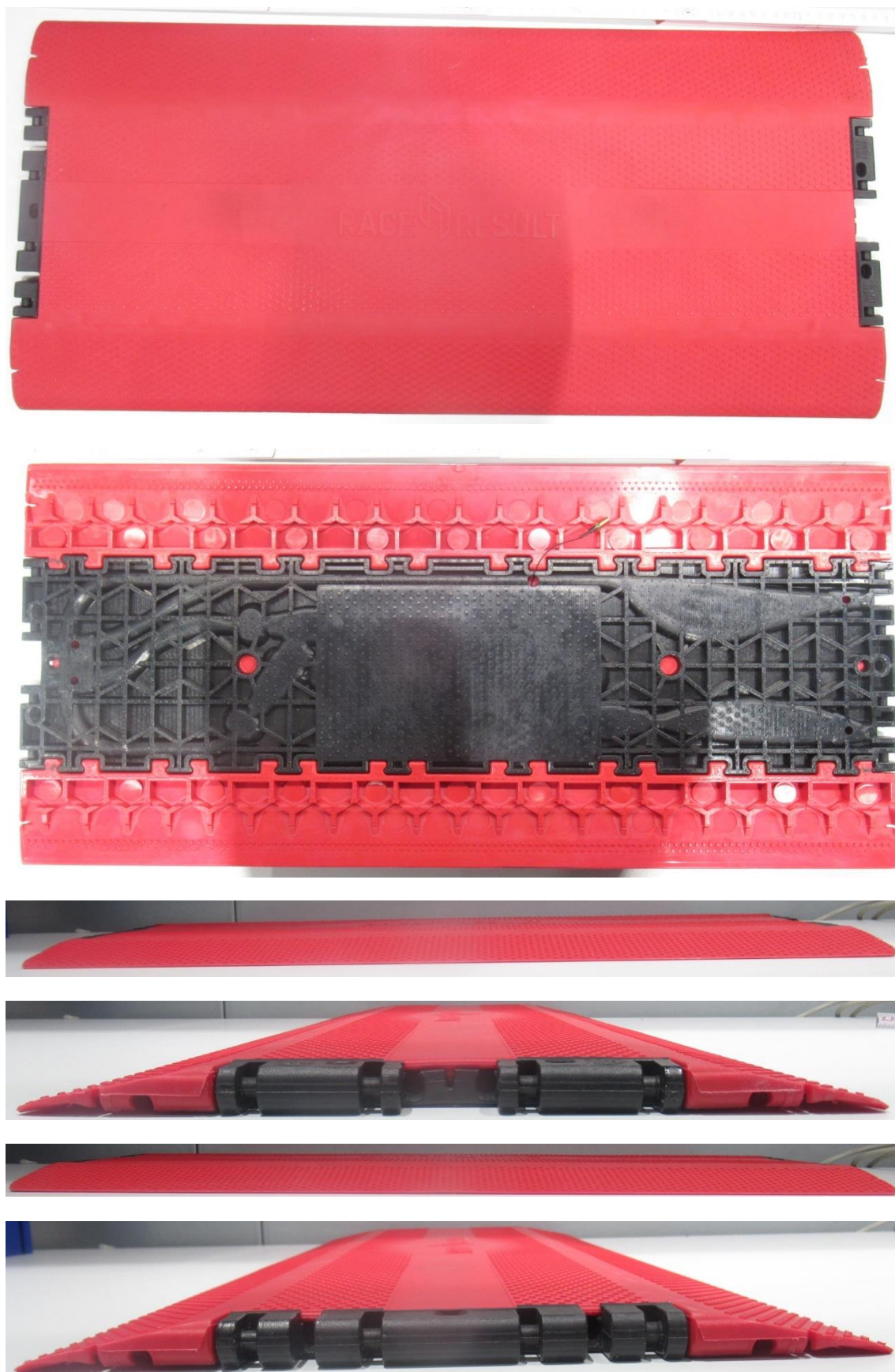
Measurements are performed with a 3-meter test setup in fully anechoic chamber FAR1. The verified measurement system 09-16/30-25-001 for EIRP measurements is used.

Height of EUT:	1.5 m
Height of receiving antenna:	1.5 m
Test distance:	3.0 m
Polarisation of receiving antenna	horizontal, vertical
Measured frequencies:	865 MHz, 868 MHz, 900 MHz, 915 MHz, 930 MHz
Output power of signal generator	0.0 dBm
Attenuator and cable loss	20.6 dB at 865/868 MHz, 20.5 dB at 900/915/930 MHz
Power at antenna	- 20.6 dBm / - 20.5 dBm



The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

Photo documentation of EUT with temporary antenna connector

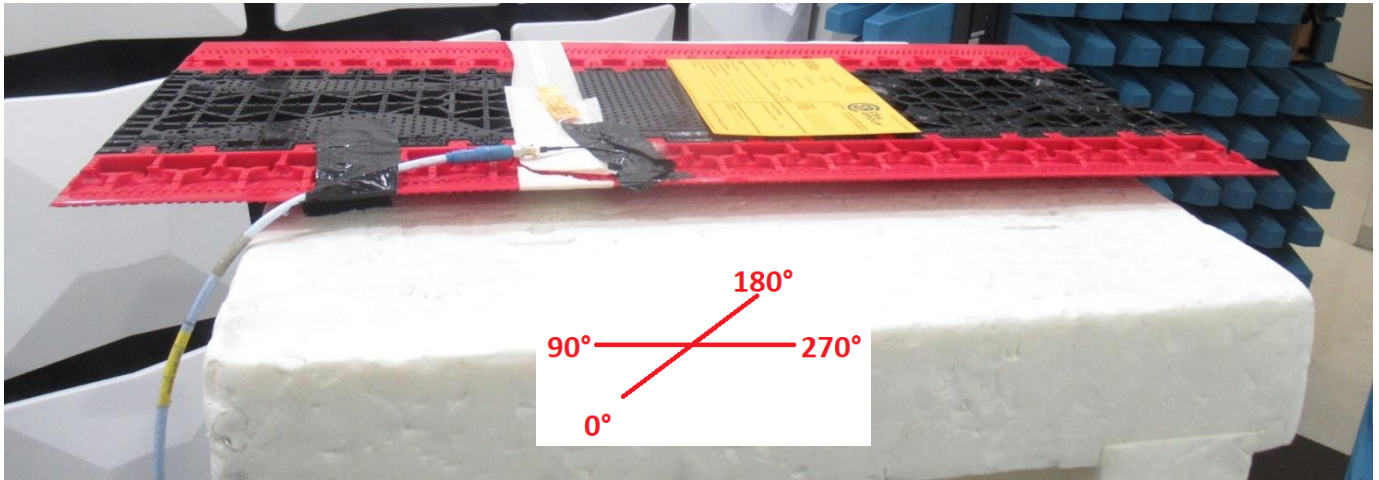




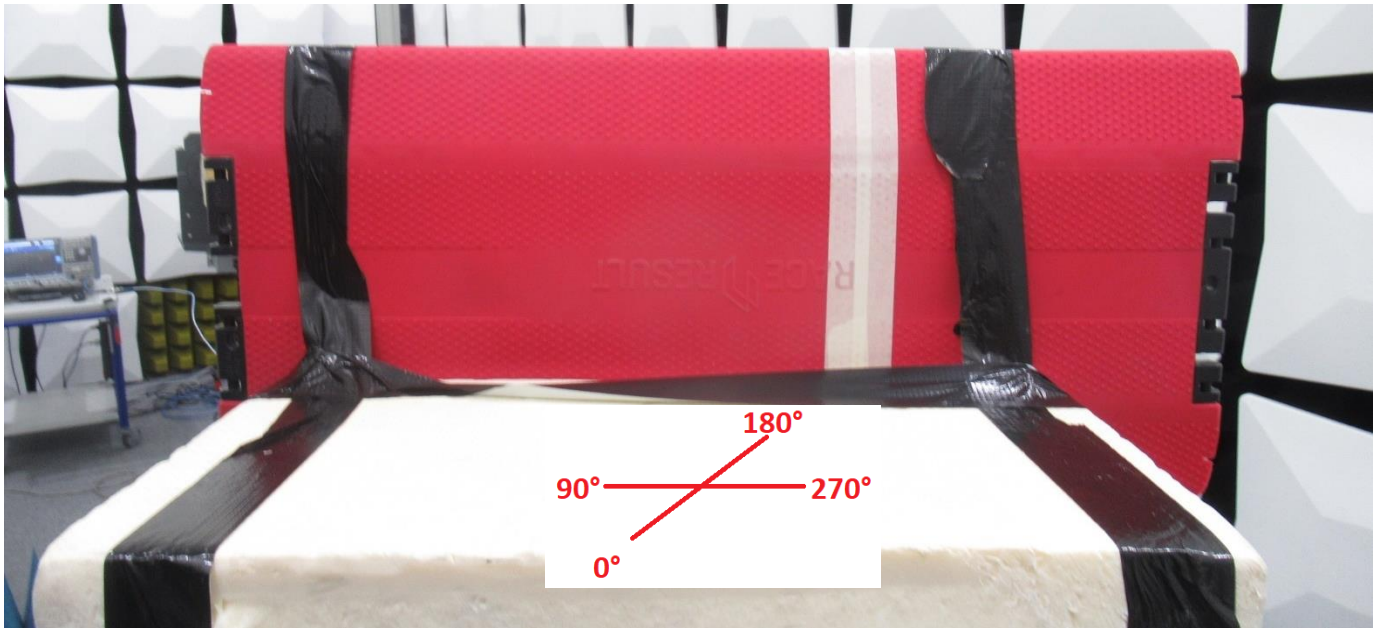
The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

The turntable is rotated counter-clockwise. The starting point of the measurement is the position shown in the test setup photos. This leads to the following relationship in the polar plots of the test result graphs:

EUT X position

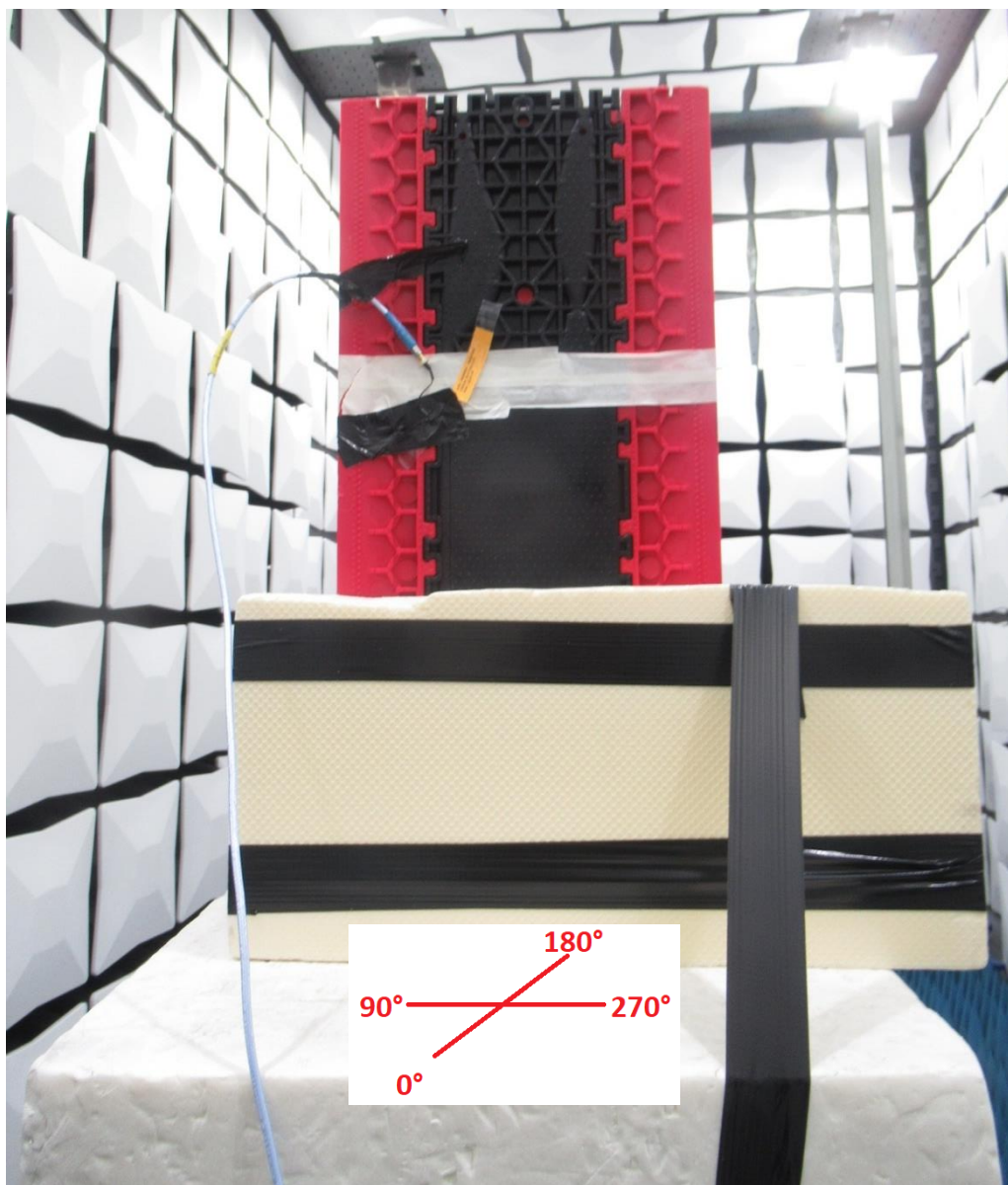


EUT Y position



The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

EUT Z position:



Test results

for test instruments and accessories used see **CPR 3**

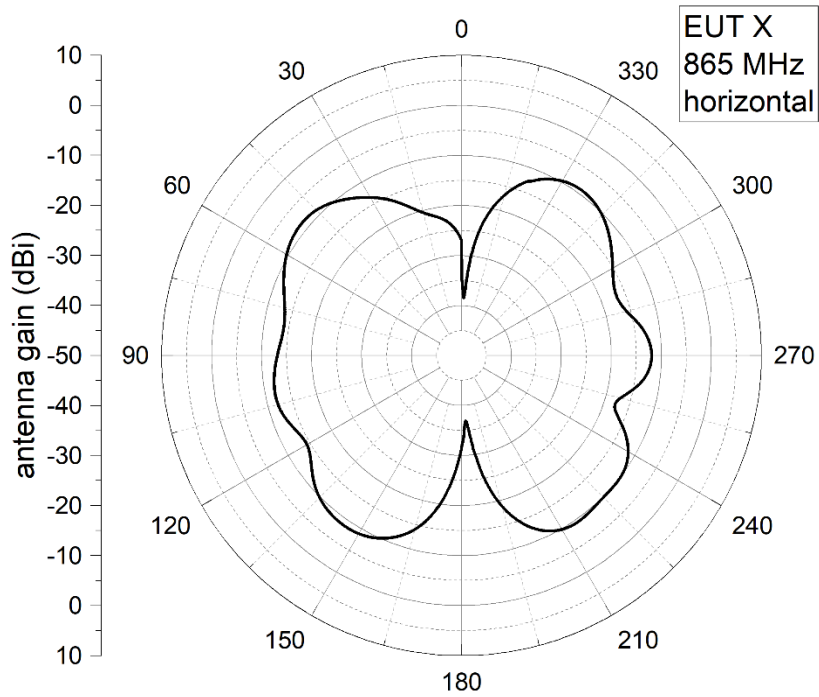
Peak performance overview

Peak Gain (dBi)	X hor	X ver	Y hor	Y ver	Z hor	Z ver
865 MHz	-8.6	-4.9	-21.1	1.2	1.8	-19.2
868 MHz	-8.4	-5.0	-18.8	1.2	1.8	-18.9
900 MHz	-6.6	-5.8	-16.8	2.9	2.6	-14.7
915 MHz	-6.3	-6.6	-17.8	3.0	2.5	-14.0
930 MHz	-6.2	-7.3	-17.3	3.7	2.4	-13.2

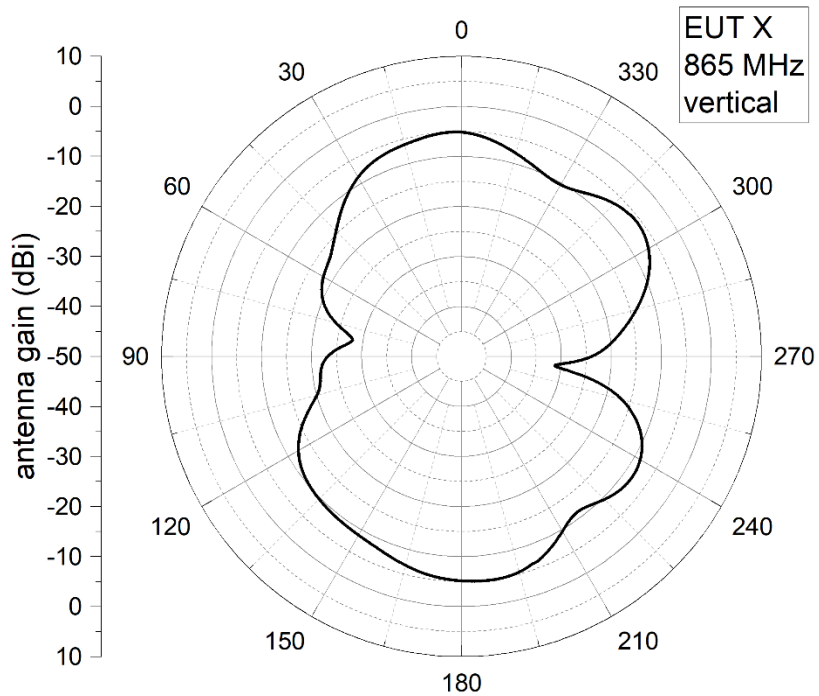
The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

Detailed graphical representation

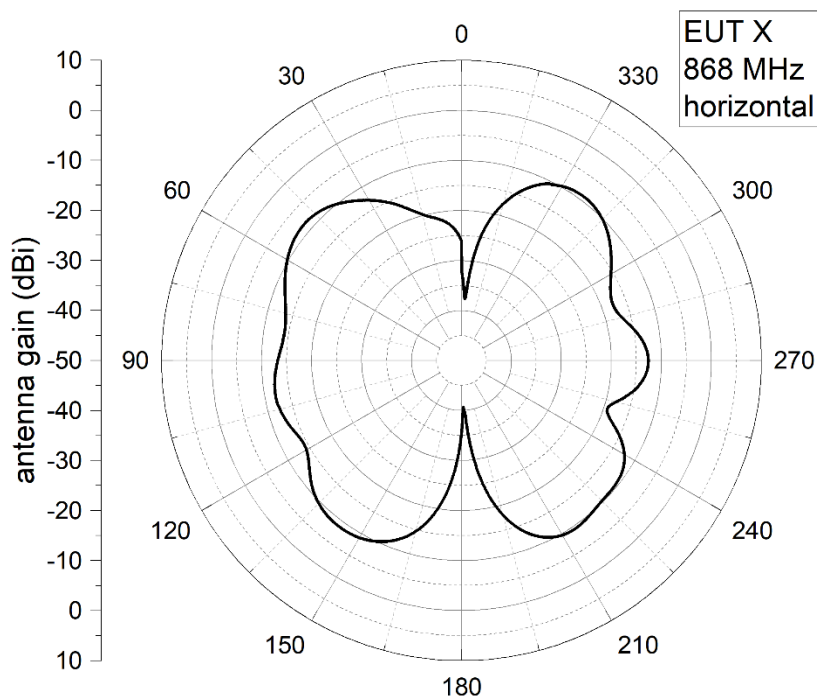
x direction, 865 MHz, horizontal



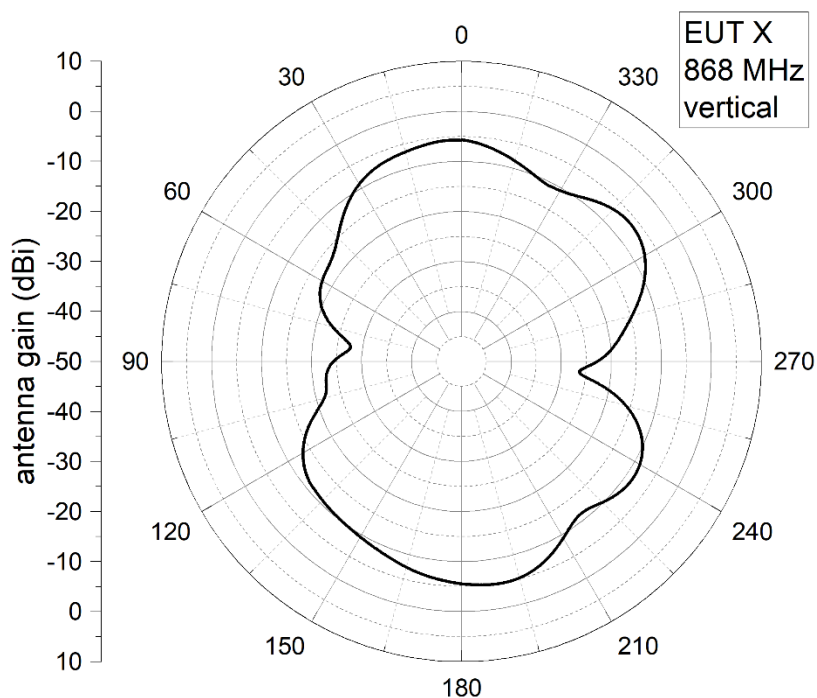
x direction, 865 MHz, vertical



x direction, 868 MHz, horizontal

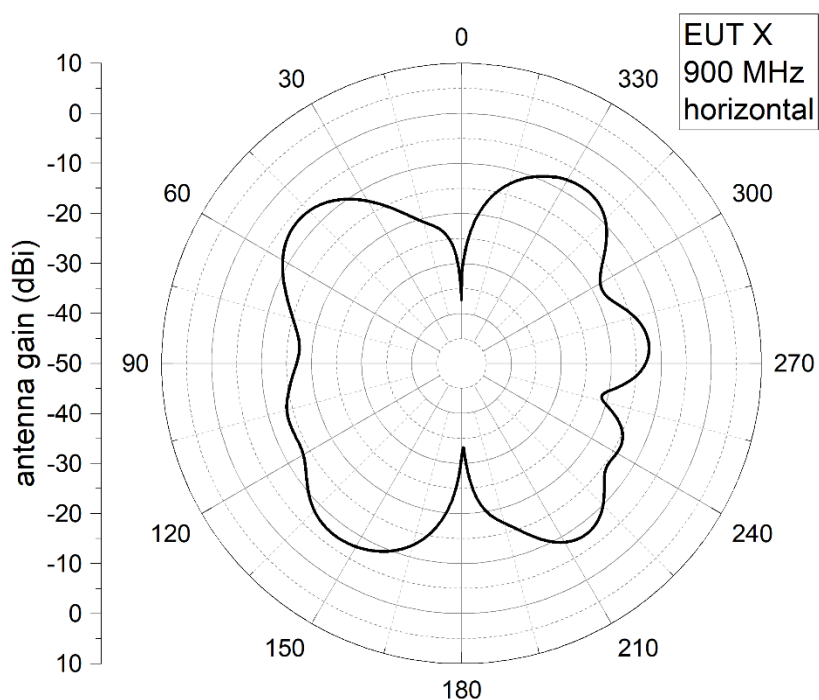


x direction, 868 MHz, vertical

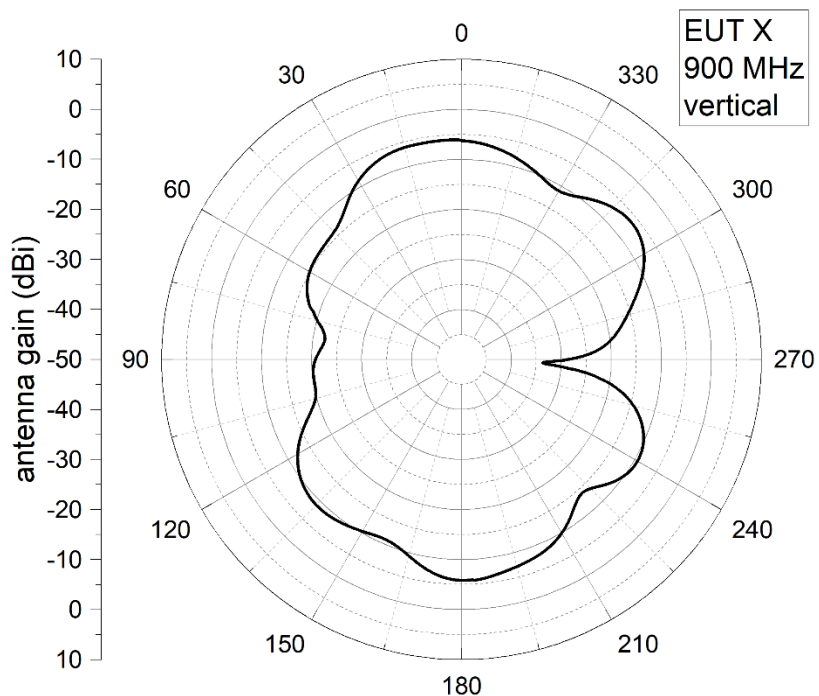


The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

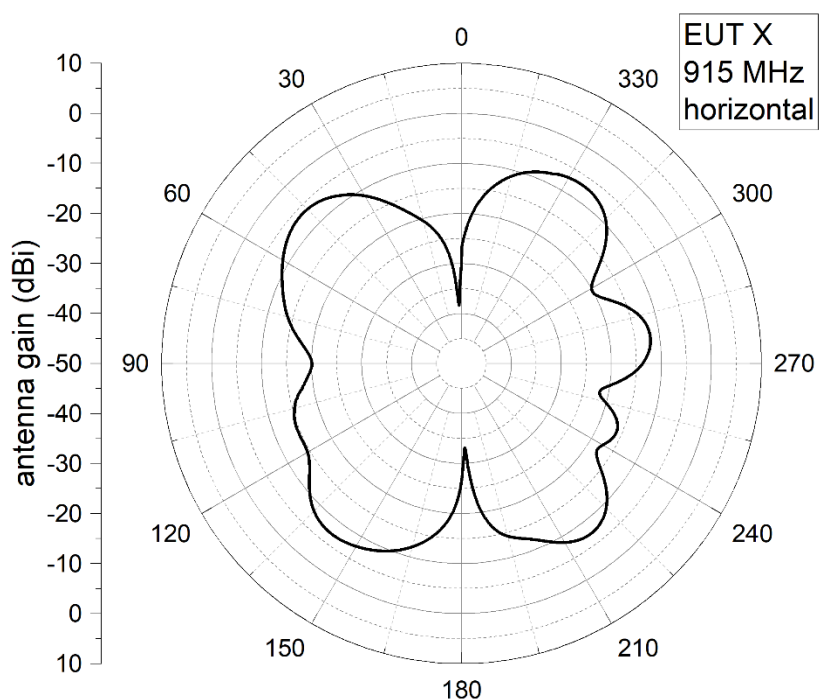
x direction, 900 MHz, horizontal



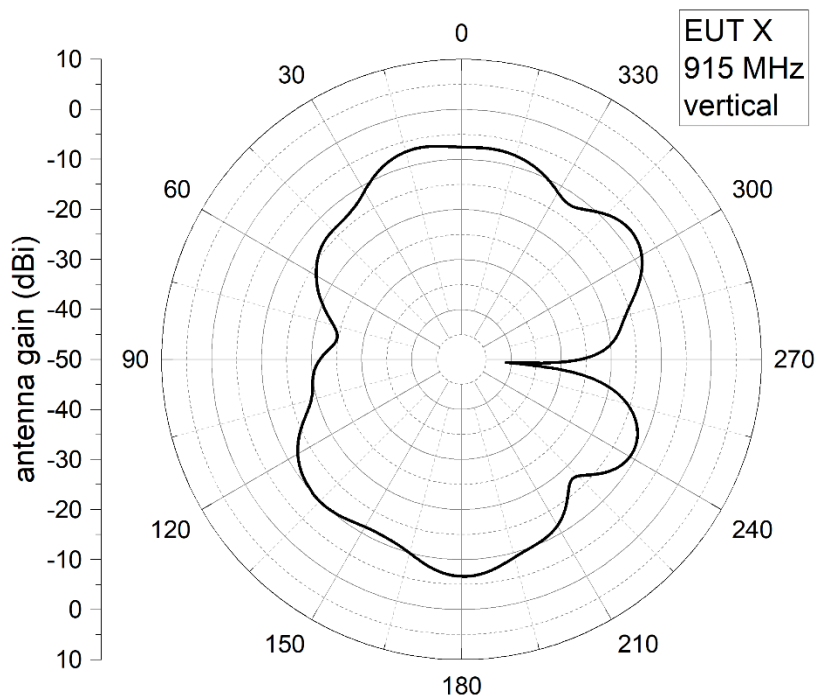
x direction, 900 MHz, vertical



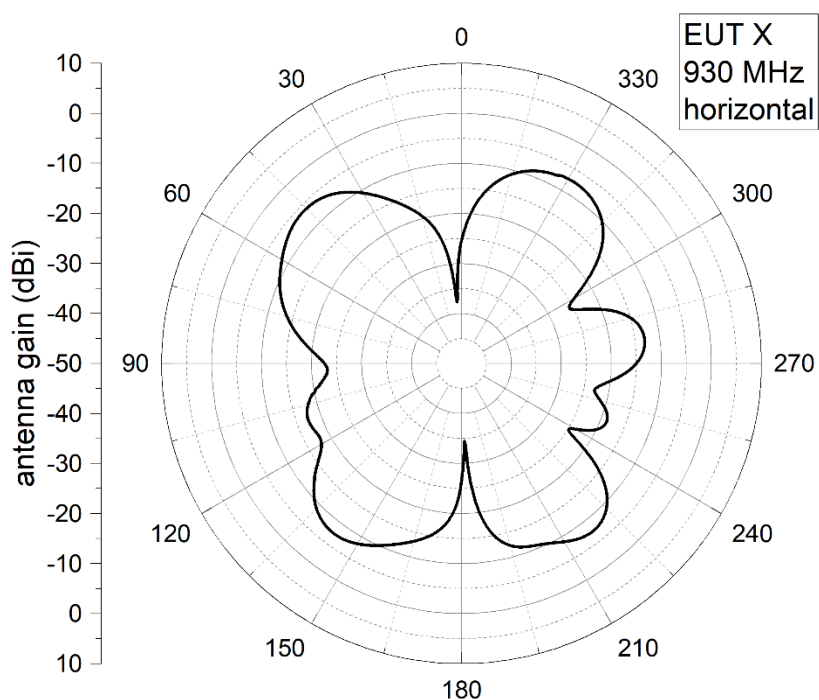
x direction, 915 MHz, horizontal



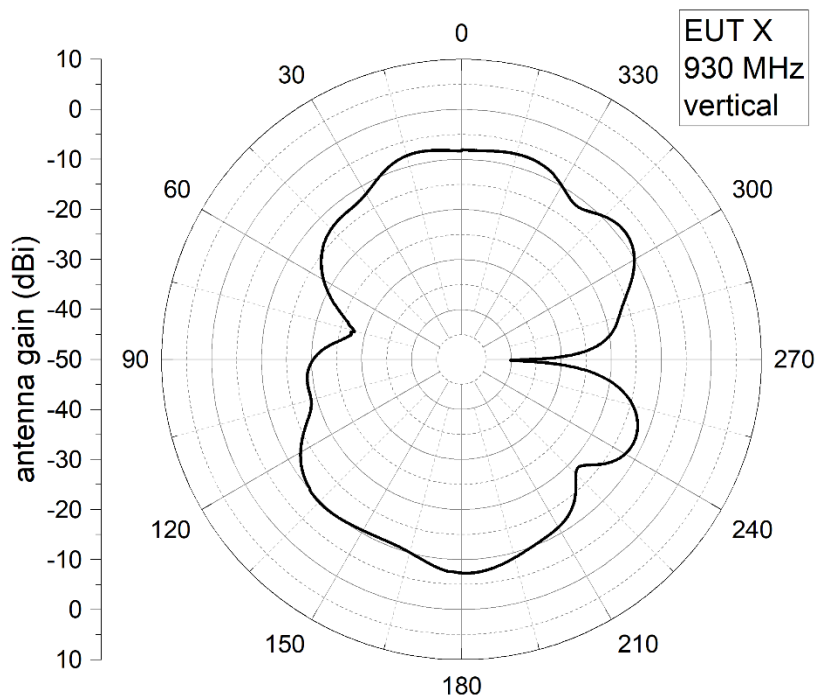
x direction, 915 MHz, vertical



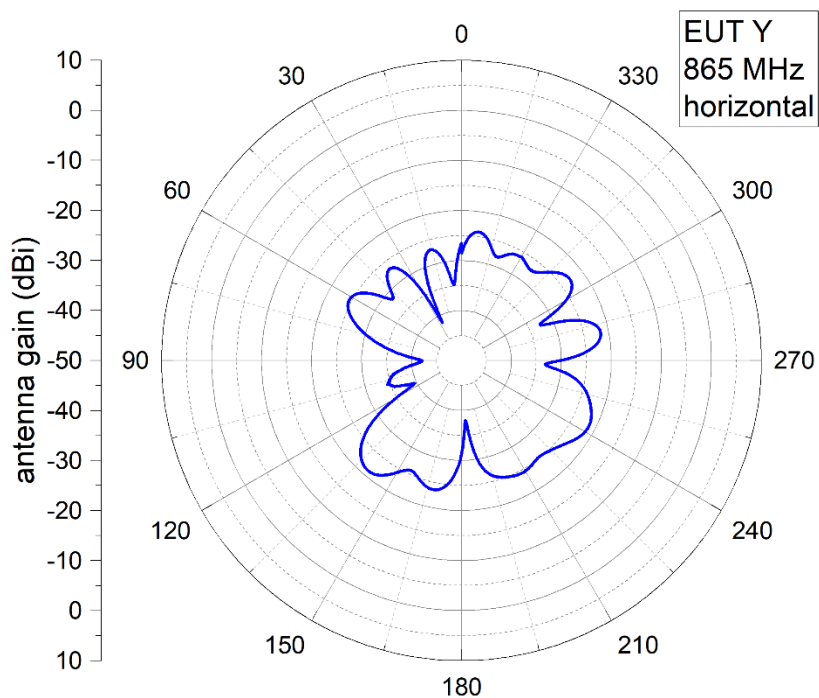
x direction, 930 MHz, horizontal



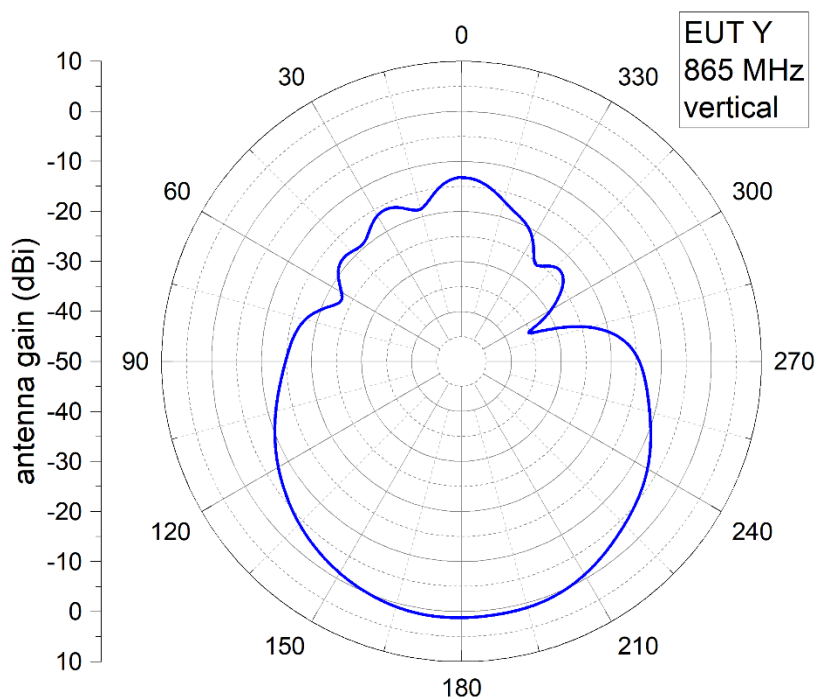
x direction, 930 MHz, vertical



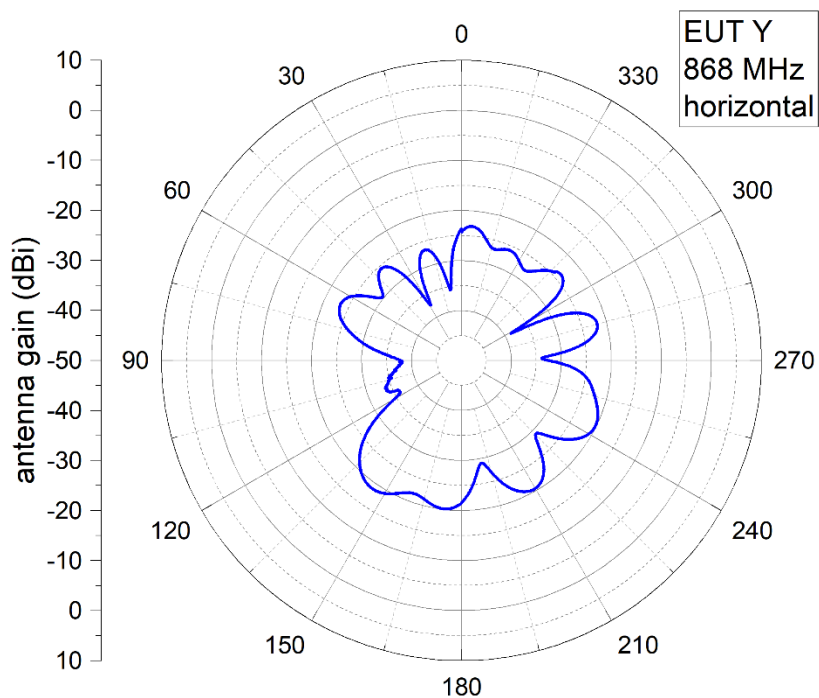
y direction, 865 MHz, horizontal



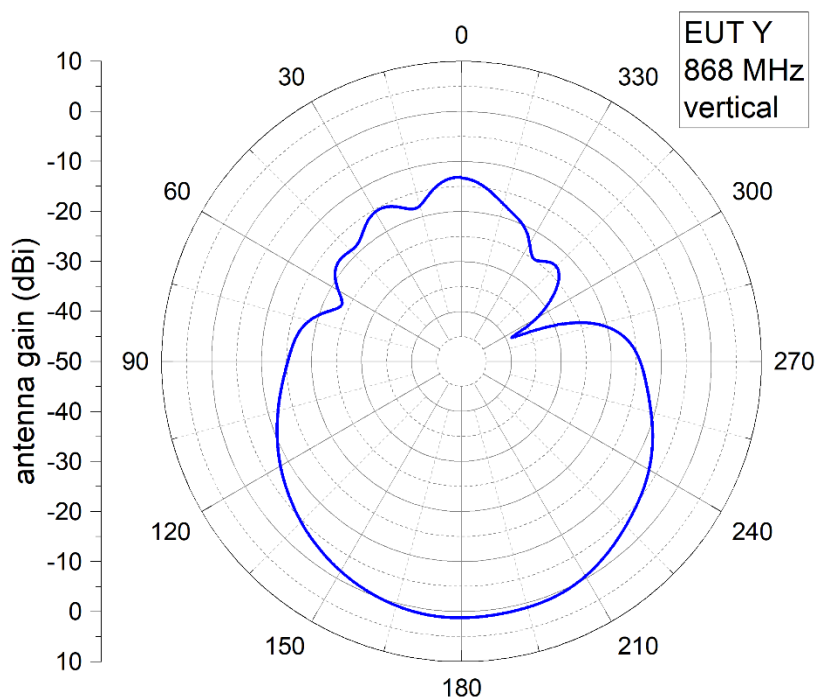
y direction, 865 MHz, vertical



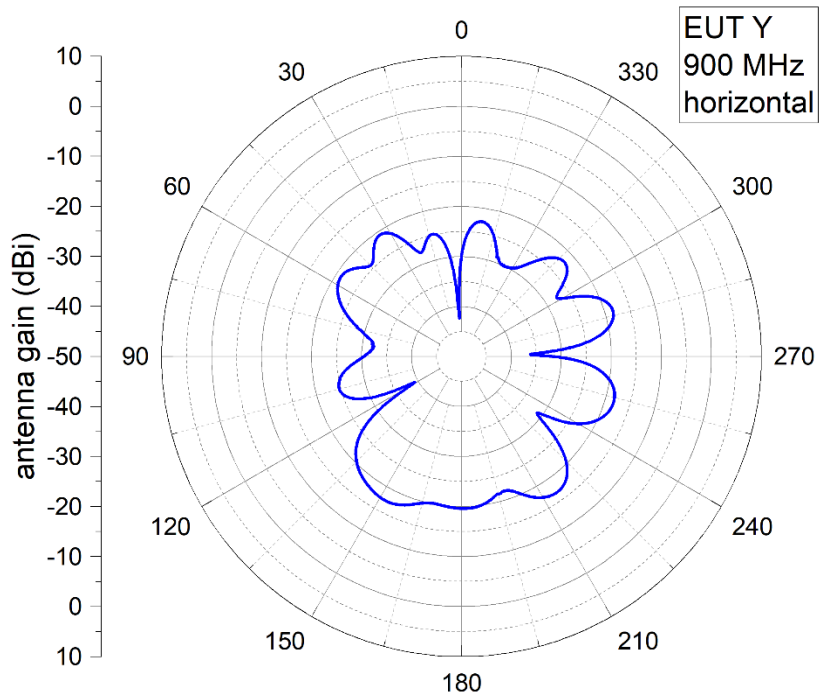
y direction, 868 MHz, horizontal



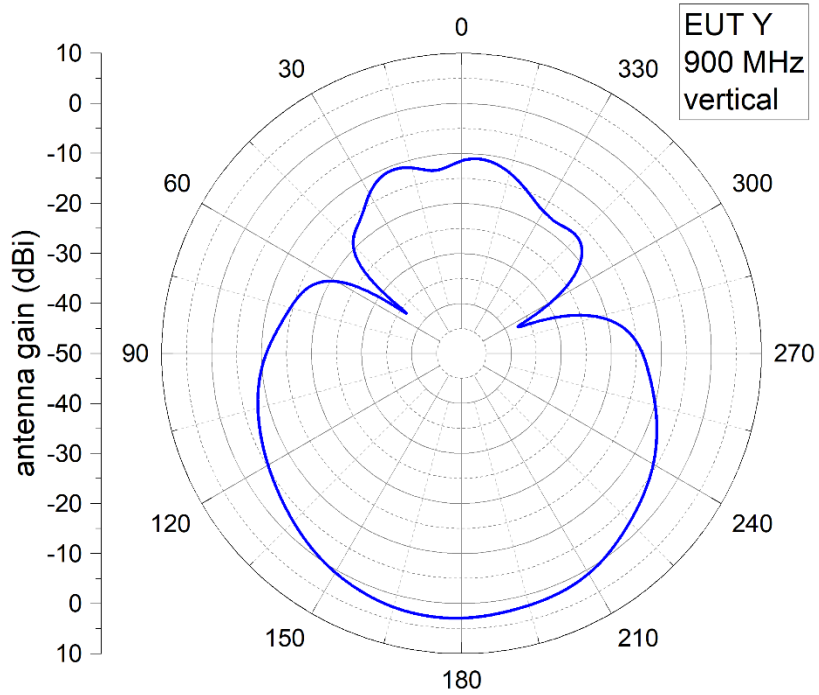
y direction, 868 MHz, vertical



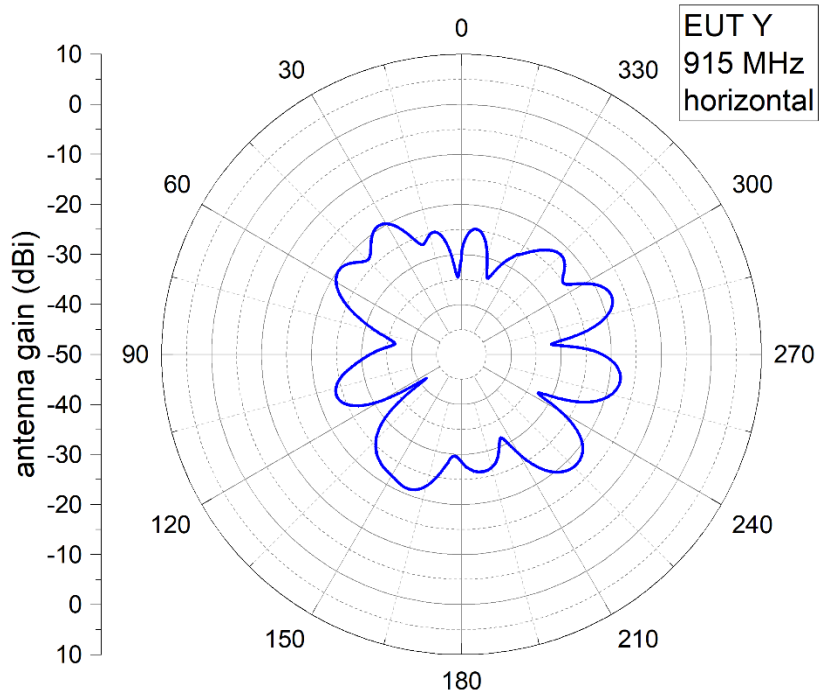
y direction, 900 MHz, horizontal



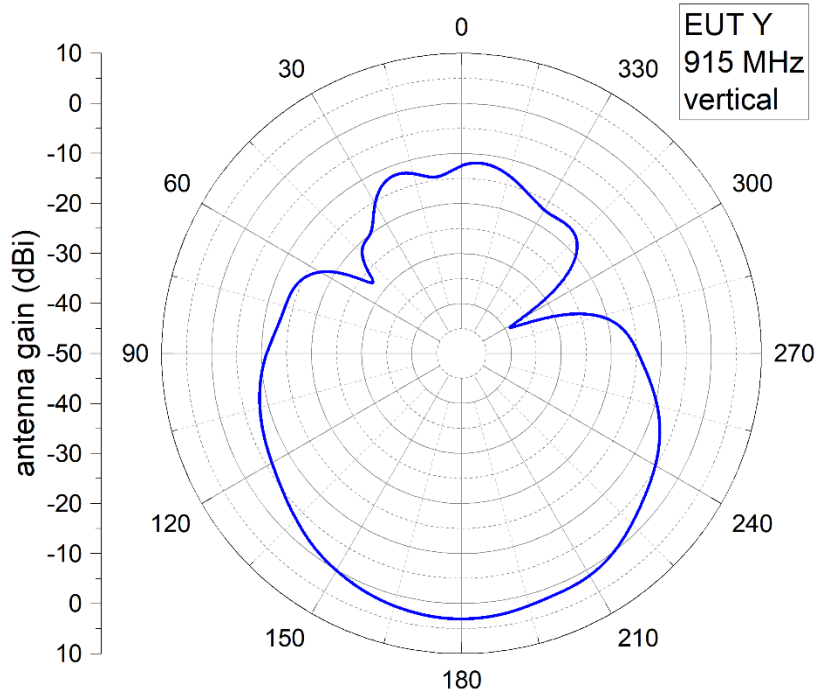
y direction, 900 MHz, vertical



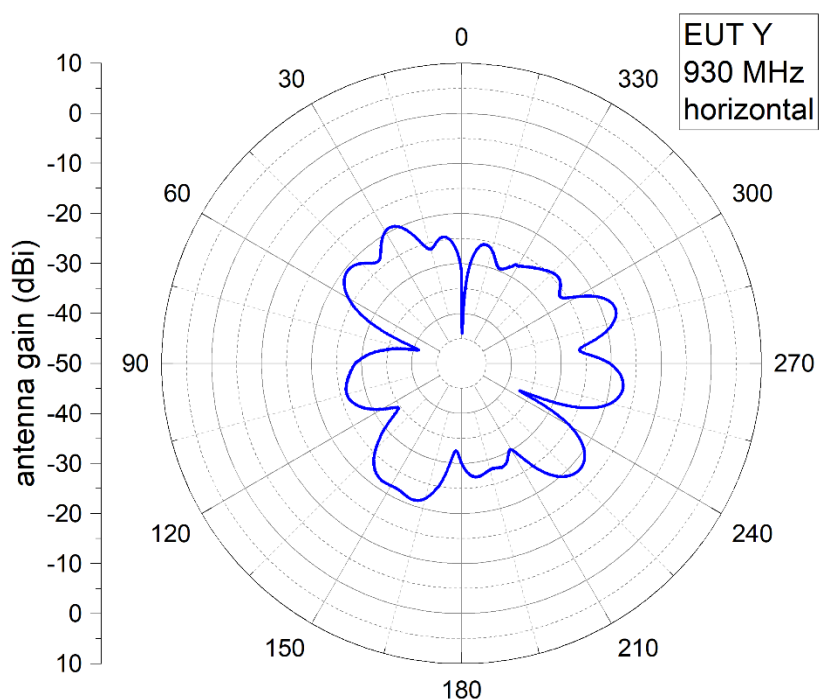
y direction, 915 MHz, horizontal



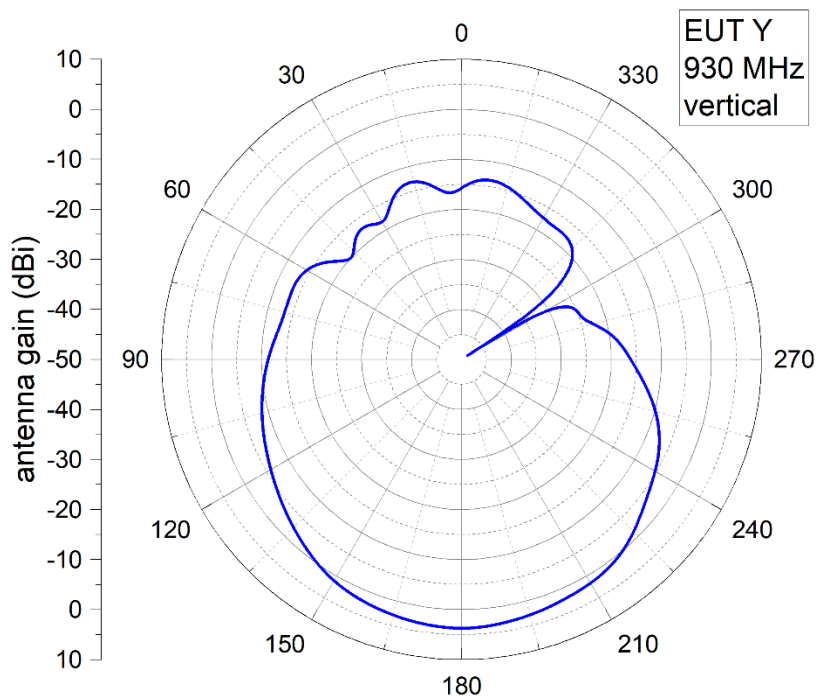
y direction, 915 MHz, vertical



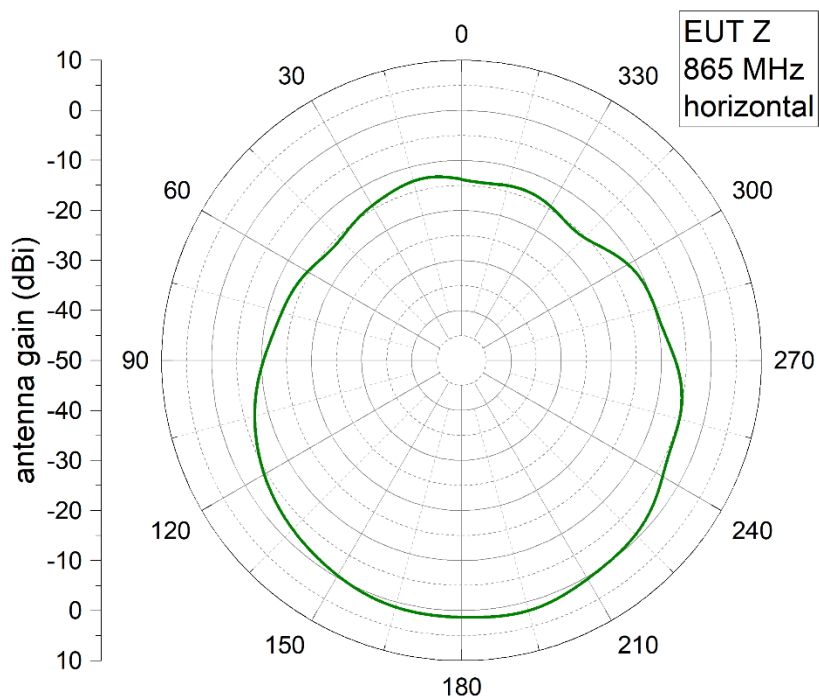
y direction, 930 MHz, horizontal



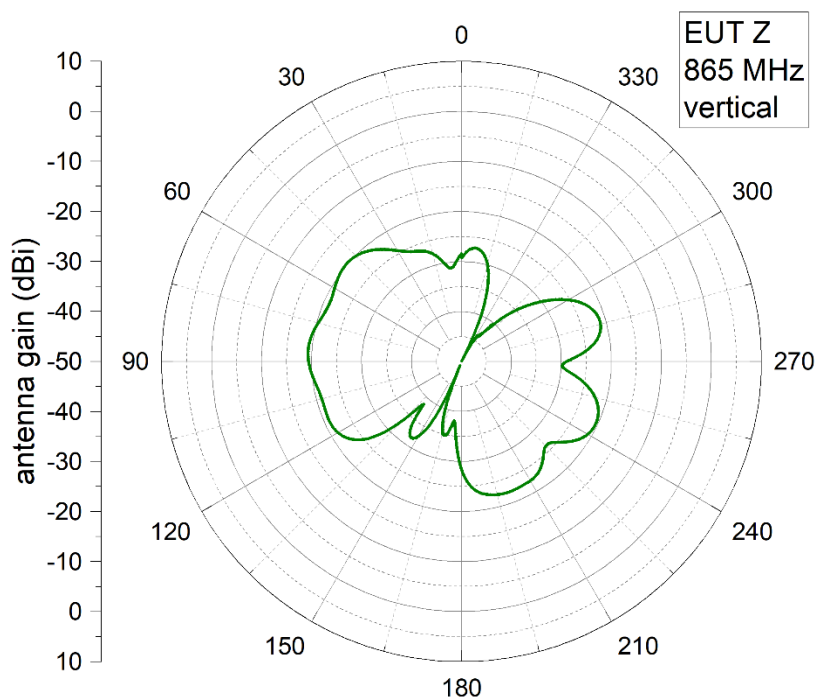
y direction, 930 MHz, vertical



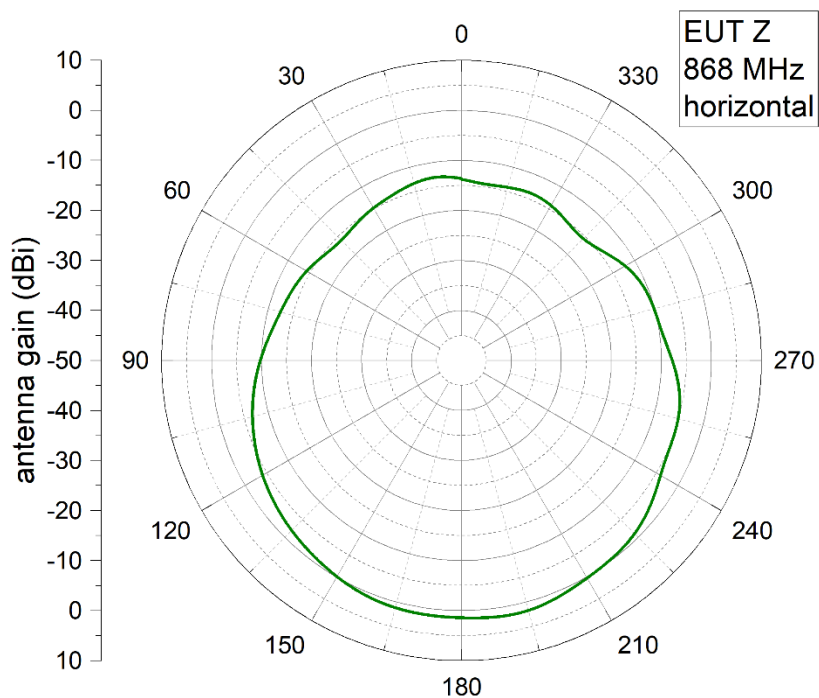
z direction, 865 MHz, horizontal



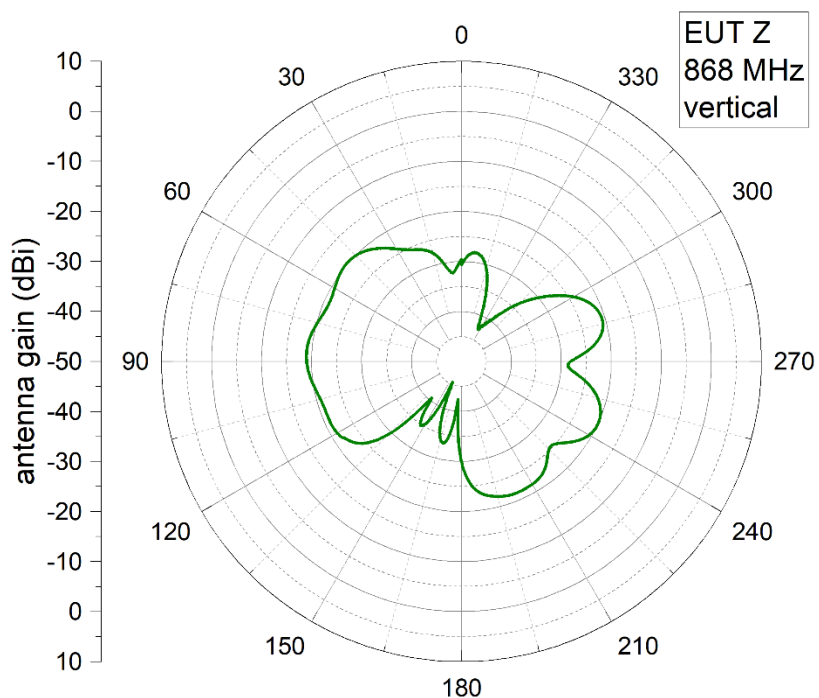
z direction, 865 MHz, vertical



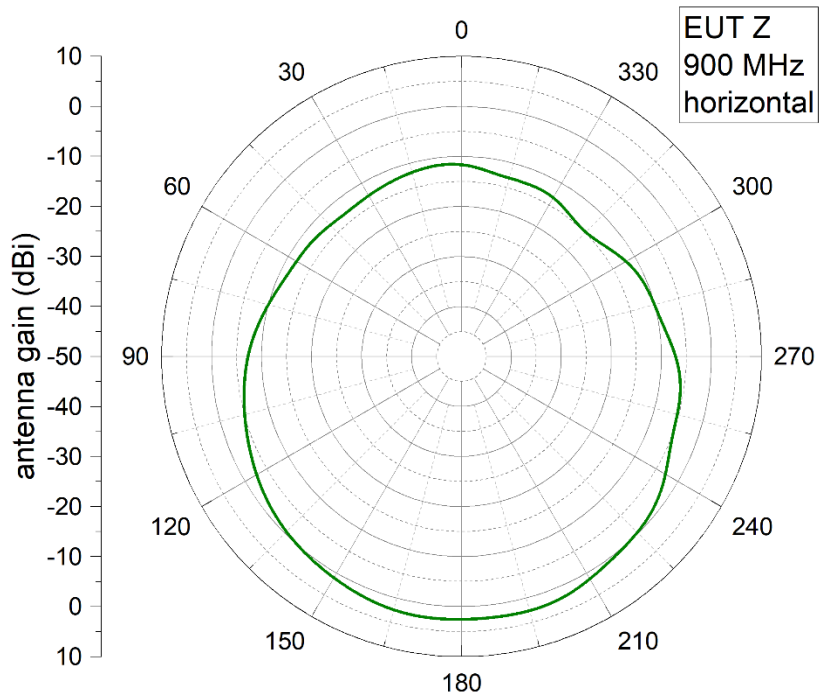
z direction, 868 MHz, horizontal



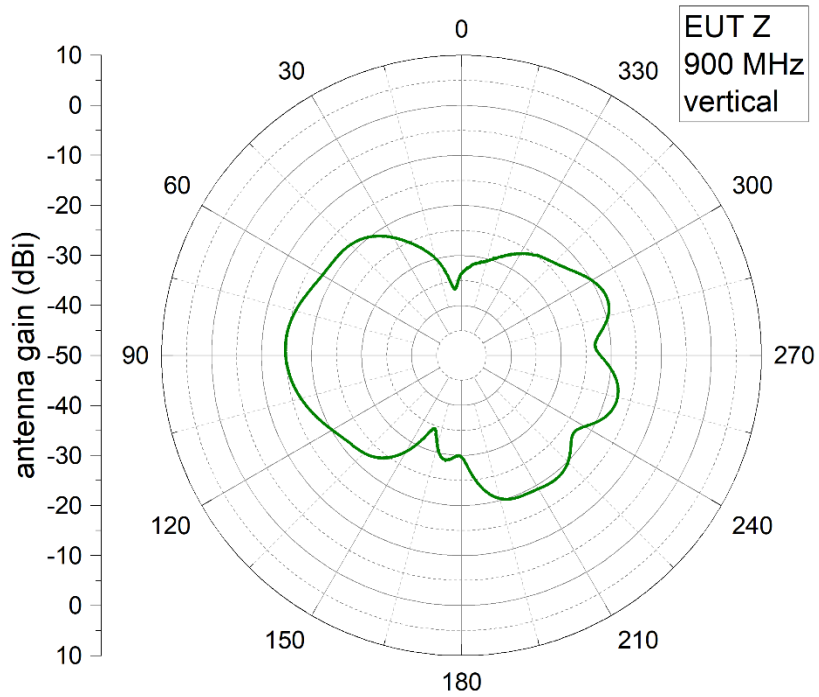
z direction, 868 MHz, vertical



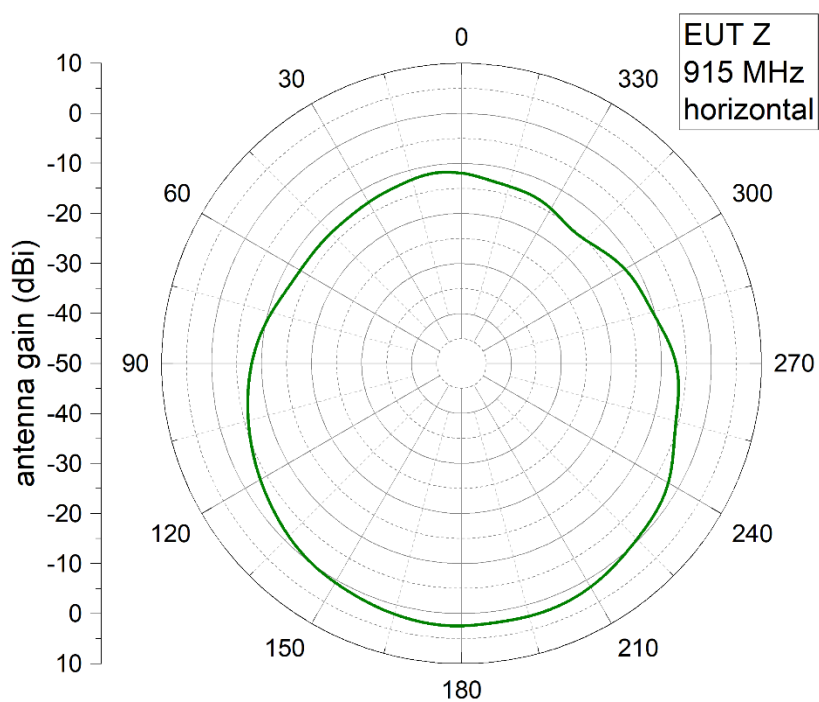
z direction, 900 MHz, horizontal



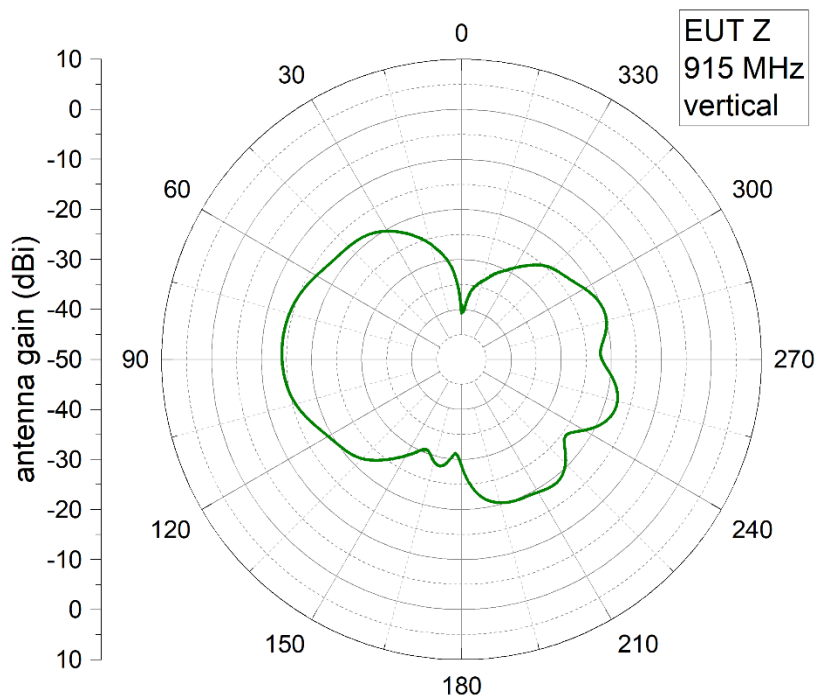
z direction, 900 MHz, vertical



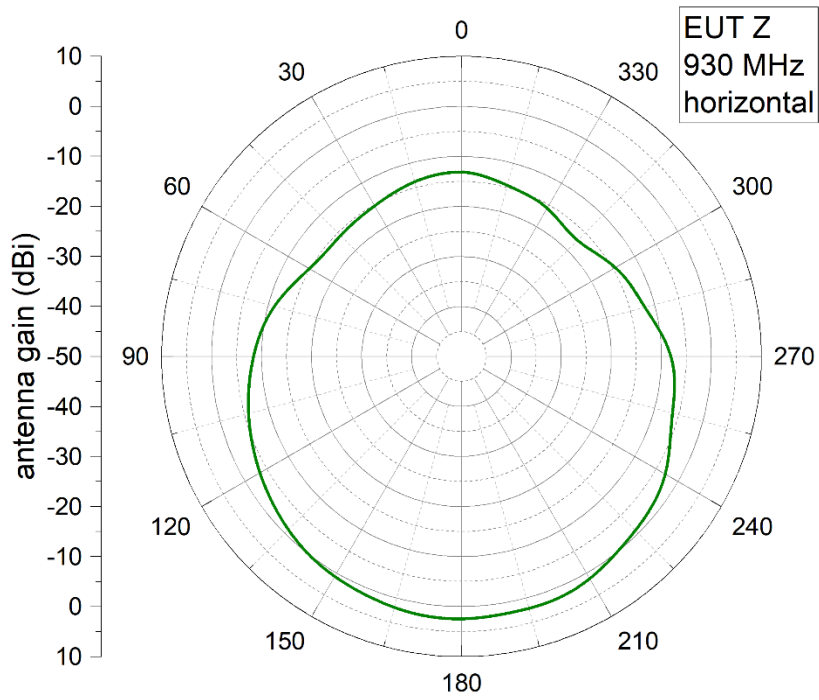
z direction, 915 MHz, horizontal



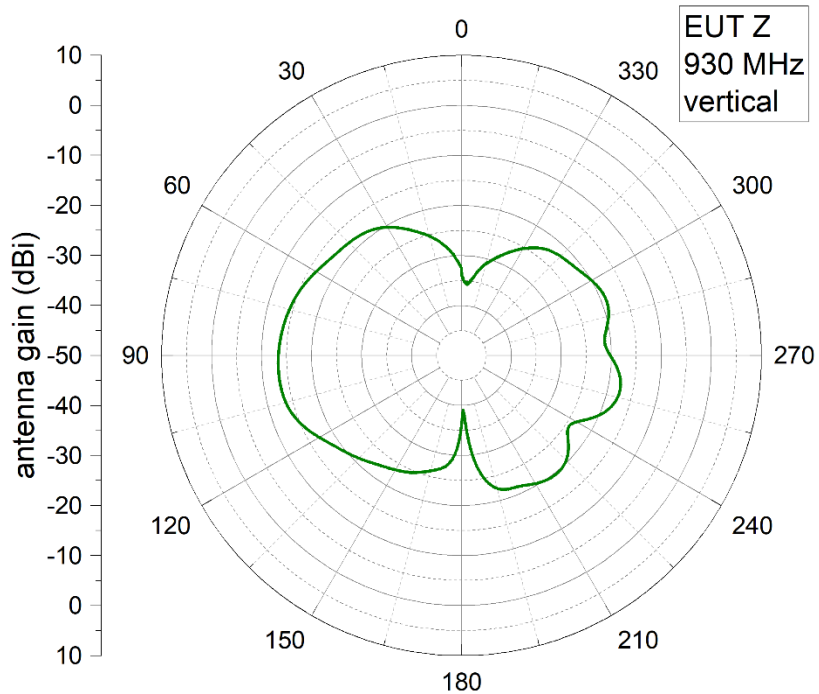
z direction, 915 MHz, vertical



z direction, 930 MHz, horizontal



z direction, 930 MHz, vertical



USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
CPR 3	ESW26	EMI Test Receiver	Rohde & Schwarz München	02-02/03-17-002
	SMBV100A	Vector Signal Generator	Rohde & Schwarz	02-02/05-09-001
	AFS4-01000400-10-10P-4	RF Amplifier 1 - 4 GHz	MITEQ, Inc.	02-02/17-13-002
	BBHA 9120 E 251	Broadband Horn Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-006
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-075
	WHJS 1000-10EF	High Pass Filter	EMCO Elektronik GmbH	02-02/50-13-003
	KK-SF104-11SMA-11N-2M	RF Cable 2 m	Tactron Elektronik	02-02/50-14-002
	SF104/11SMA/11N/2000MM	RF Cable	Huber + Suhner	02-02/50-15-004
	18N-20	Coax Attenuator 20dB	Tactron Elektronik	02-02/50-21-009

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.