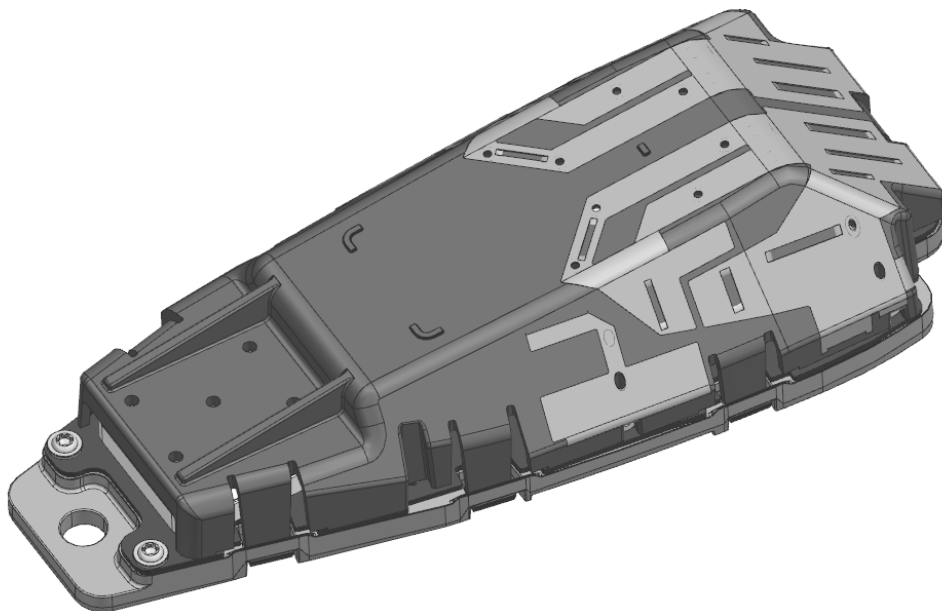


Product – Specification of the BMW ICON SF26 US roof antenna 5A7F527



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Vidyadhar Bhalchandra Kulkarni (Mech. Eng.)
Christiane Rother (Staff Eng.)

Approver: Ahmed Ameri (Eng. Dir.)

Location: Molex CVS Hildesheim GmbH

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1. INTRODUCTION

This document defines the specification for the variant of the BMW ICON SF26 roof antenna 5A7F527

Molex CVS products are directly delivered to OEMs automotive. The OEM is responsible for the assembly process of this products to the car. The end-user does not have to do any installations or adjustments.

Company	Molex CVS Hildesheim GmbH
Address	Daimlerring 31, D-31135 Hildesheim
Production site (address, country)	Molex CVS Shanghai, China

2. GENERAL REMARKS

For all specified values appearing in this document, the following definitions are valid:

Min.: Minimal limit, minimal adjustable value of respective parameter

Nom.: Nominal or typical value of respective parameter with tolerance range at room temperature (25°C).
This tolerance range does not include the temperature response.

Max.: Maximal limit, maximal adjustable value of respective parameter

Design-range: This range defines the limits for all component parameters that must not be exceeded.

The Nominal – value must be chosen from within the Design – range.

Frequency-range: In this case the Min. and Max. value stands for that frequency-range within which the parameters, stated in this document, need to be met.

3. GENERAL CONCEPT

US

Homologation Number: DG70DA1D

Model: RAN-201

Type: RAN-201a

3.1 Variants

Model	Type	Customer Part number	Molex Part number	Functions
RAN-201	RAN-201a	5A7F527	34120	GNSS L1 + L5; SDARS; 2x MIMO 5G; 2 x WiFi Dual 2.4 & 5/6 GHz;

3.2 Pin Definition

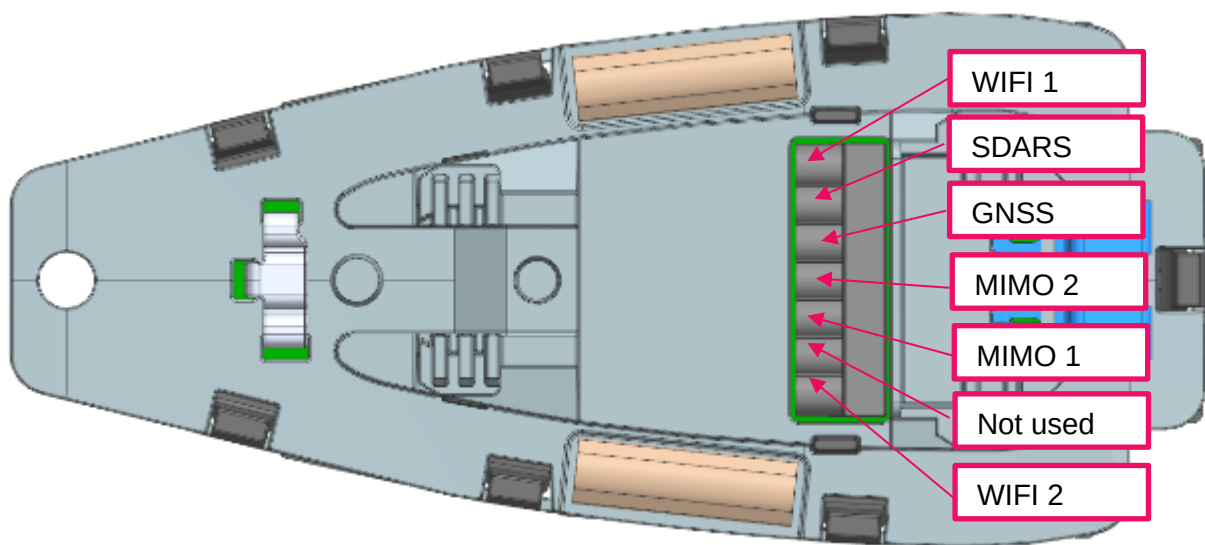


Figure 1: Pin definition

3.3 Mechanical Properties

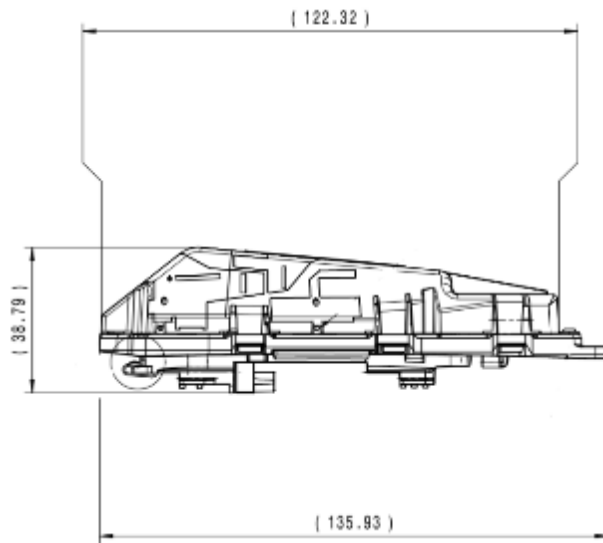


Figure 2: side view of antenna showing the length and height for variant 5A7F527

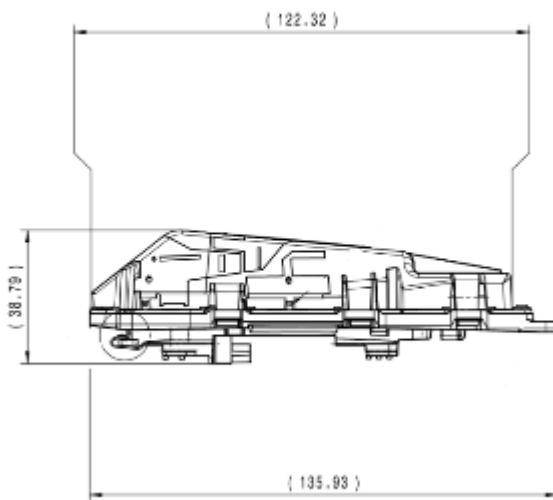


Figure 3: side view of antenna showing the length and height for variant 5A7F528 and 5A7F529

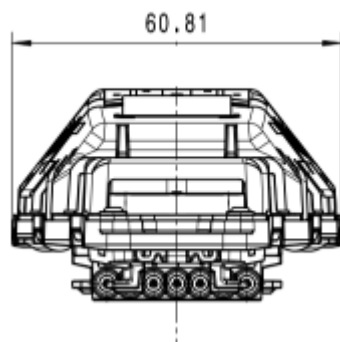


Figure 4: Front view of antenna showing the width for all three variants.

3.4 Mechanical interface

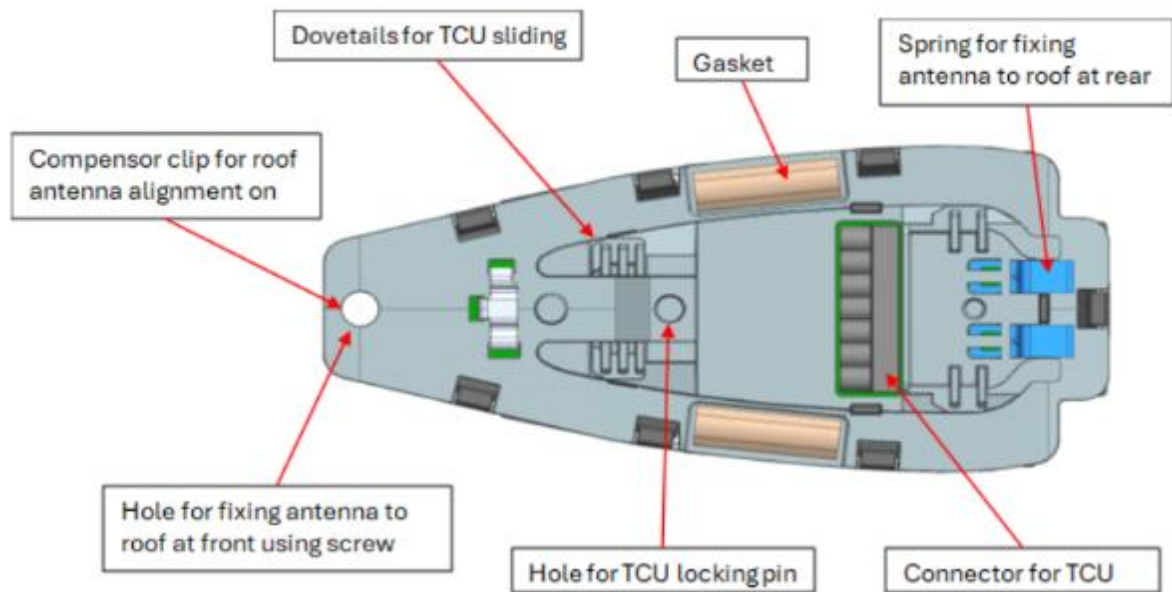


Figure 4: Mechanical interface.

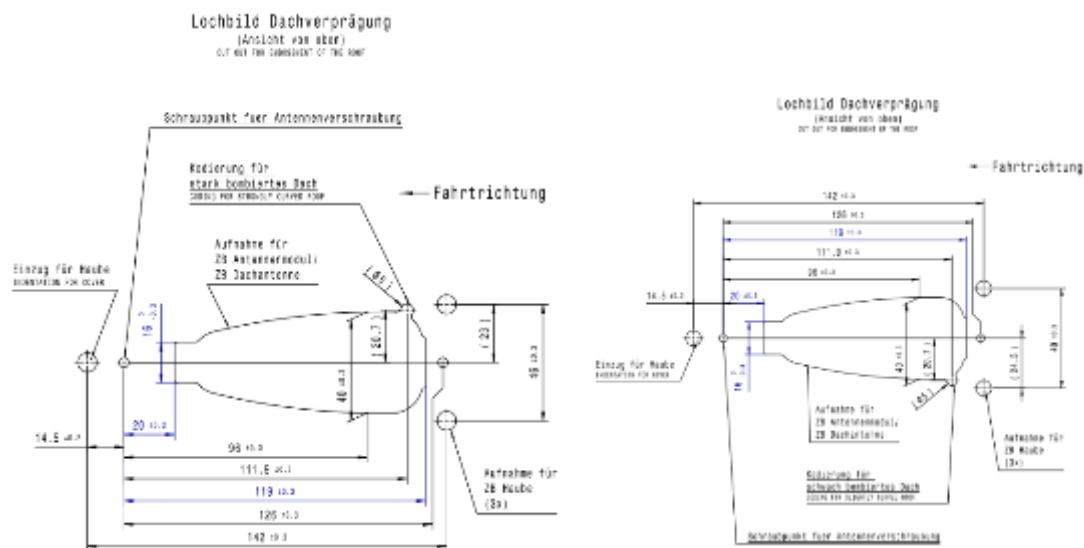


Figure 5: Roof hole

Sheet metal thickness: 0.6 to 1.8mm

Only on conductive metal roofs

Torque of the central screw for vehicle fixation: 4,0 Nm

3.5 Topology

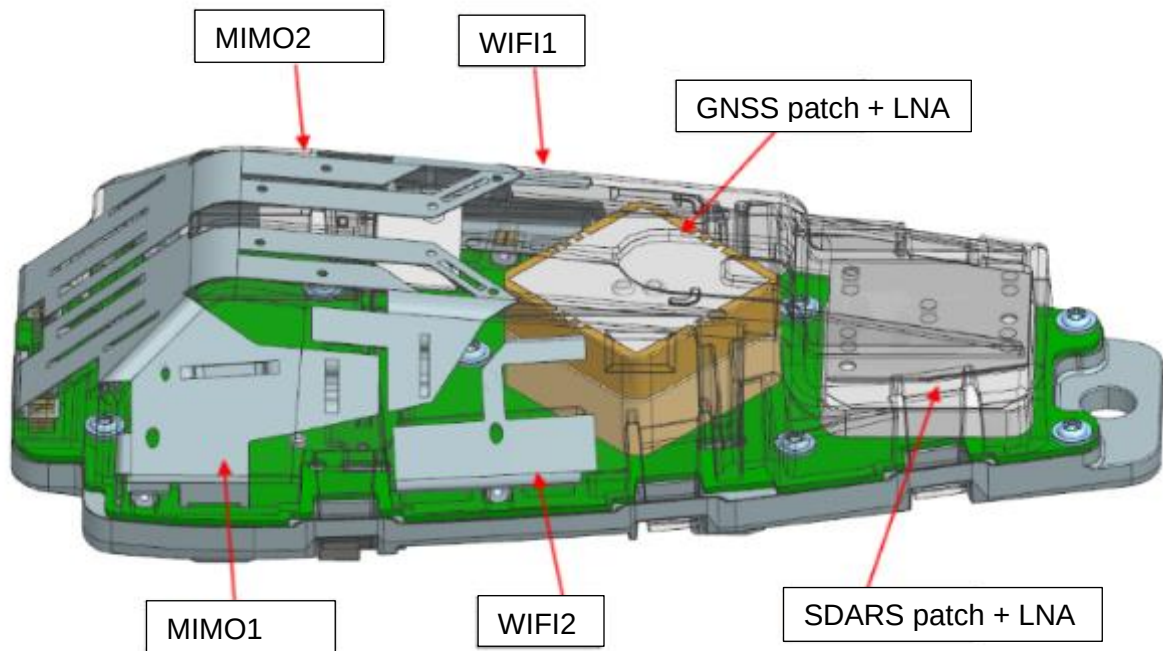


Figure 6: Topology side view of 5A7F527

4. ELECTRICAL PROPERTIES 5A7F527

Unless otherwise stated, all data in this document apply for nominal requirements at 25°C.

Radiated measurements were done mounted on 1m ground plane

LNA measurements were done without housing and with SMA connector at the LNA input

4.1 Measurement setup passive antennas (1 meter GND)

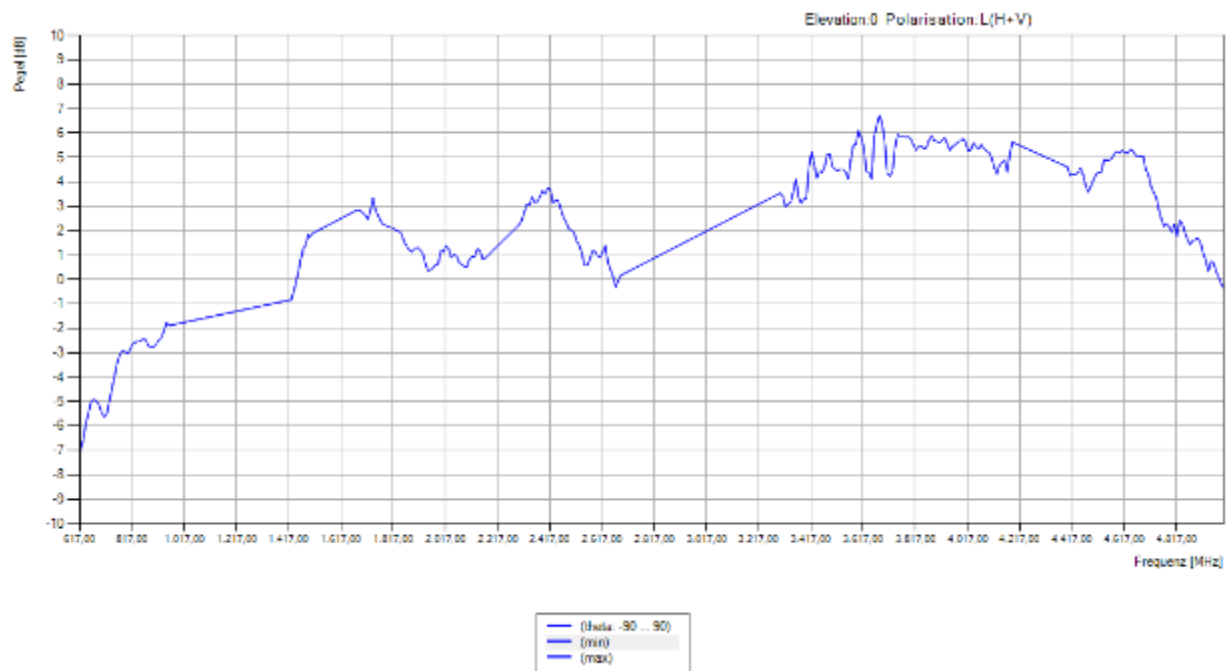
Measuring principle	Type of Measurement	Near Field
	AUT<-> Sender Antenna	Satimo Measurement Chamber Molex Hildesheim SG64
	Near /Far field transformation	Yes
	Reference document	
Measurement Parameters	Measurement Condition	Chamber Room
	Frequency Range	600 MHz – 6000 MHz
	Angle Range	
	Elevation	0° bis 180°
	Azimuth	0° - 360°
	Angle Step	-
	Elevation	1°
	Azimuth	1°
	Time Domain	No
	Gate Start, Gate Stop	
	Gate Function	
	Translated Spherical Wave Expansion	No
	Probe Pattern Compensation	No
	AnyGround	No
	Measured Polarisations	Vertical / Horizontal

Measuring principle	Type of Measurement	Near Field
	AUT<-> Sender Antenna	Satimo Measurement Chamber Molex Hildesheim SG3000
	Near /Far field transformation	Yes
	Reference document	
Measurement Parameters	Measurement Condition	Chamber Room
	Frequency Range	6,0 GHz – 7,15 GHz
	Angle Range	
	Elevation	0° bis 180°
	Azimuth	0° - 360°
	Angle Step	-
	Elevation	1°
	Azimuth	1°
	Time Domain	No
	Gate Start, Gate Stop	
	Gate Function	
	Translated Spherical Wave Expansion	No
	Probe Pattern Compensation	No
	AnyGround	No
	Measured Polarisations	Vertical / Horizontal

4.2 MIMO1 Peak Gain

Frequency band (MHz)	maximum gain
663-698	-4,9
699-716	-5,4
777-787	-2,9
814-824	-2,6
824-849	-2,6
1710-1780	3,3
1850-1910	1,9
1850-1915	1,9
2496-2690	2,0
2500-2570	2,0
2500-2690	2,0
2570-2620	1,2
3300-4200	6,7
3450-3550	5,1
3450-3600	6,1
3450-3900	6,7
3550-3700	6,7
3700-3980	6,0
3900-3980	5,8
4400-5000	5,3

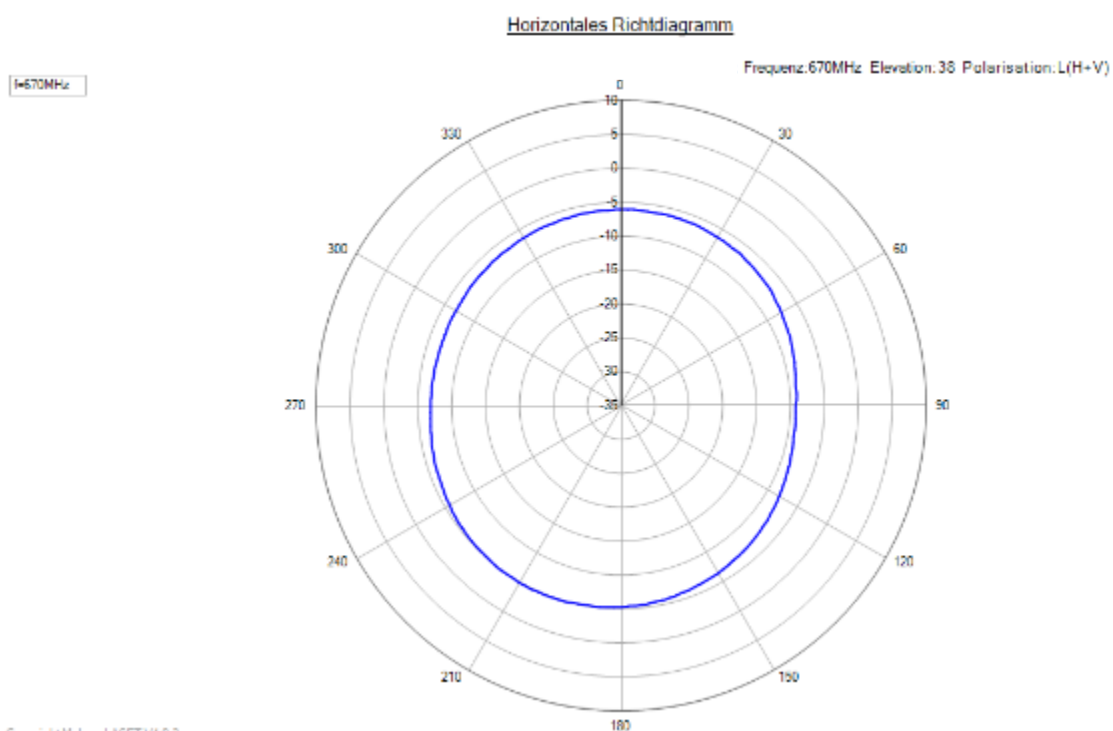
4.2.1 Peak gain over Frequency



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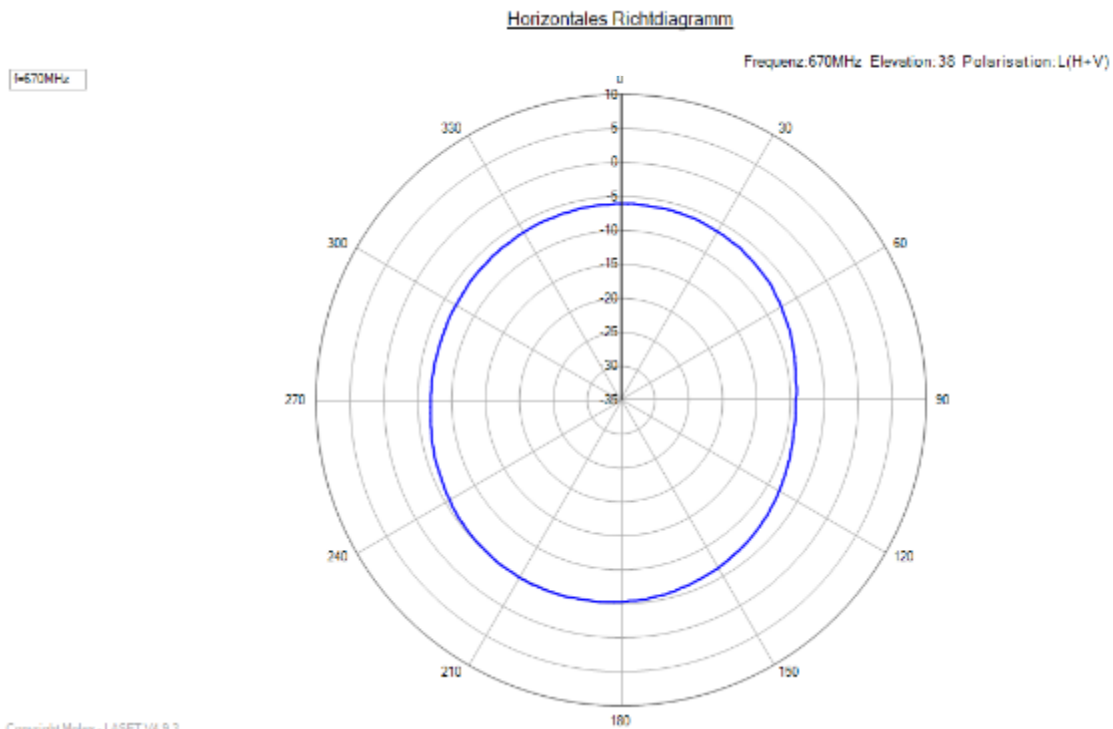
4.2.2 Radiation Pattern for Gain @ frequency range 663-698MHz



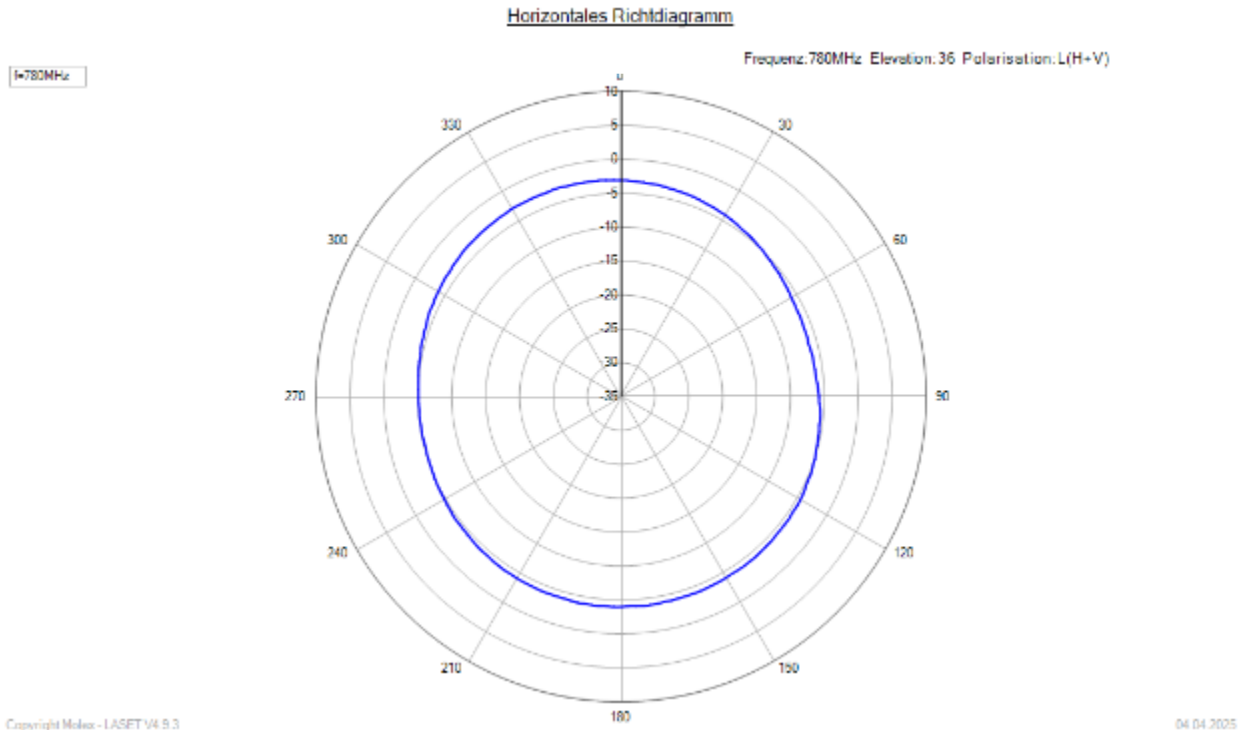
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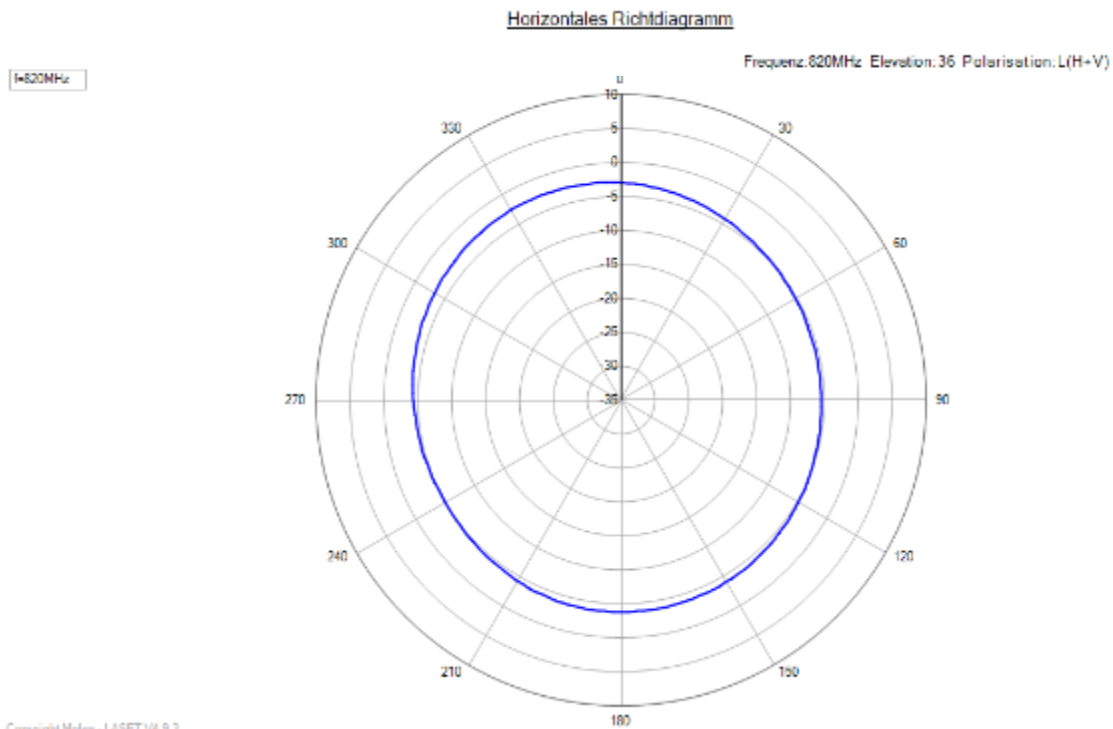
4.2.3 Radiation Pattern for Gain @ frequency range 699-716MHz



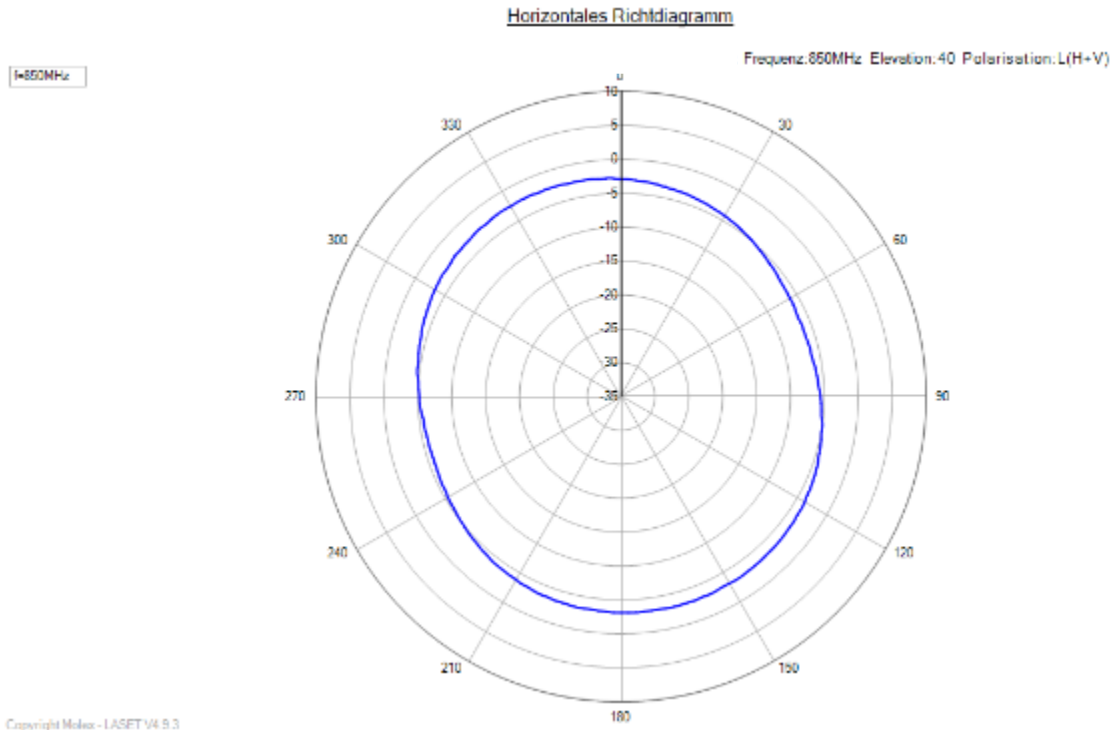
4.2.4 Radiation Pattern for Gain @ frequency range 777-787MHz



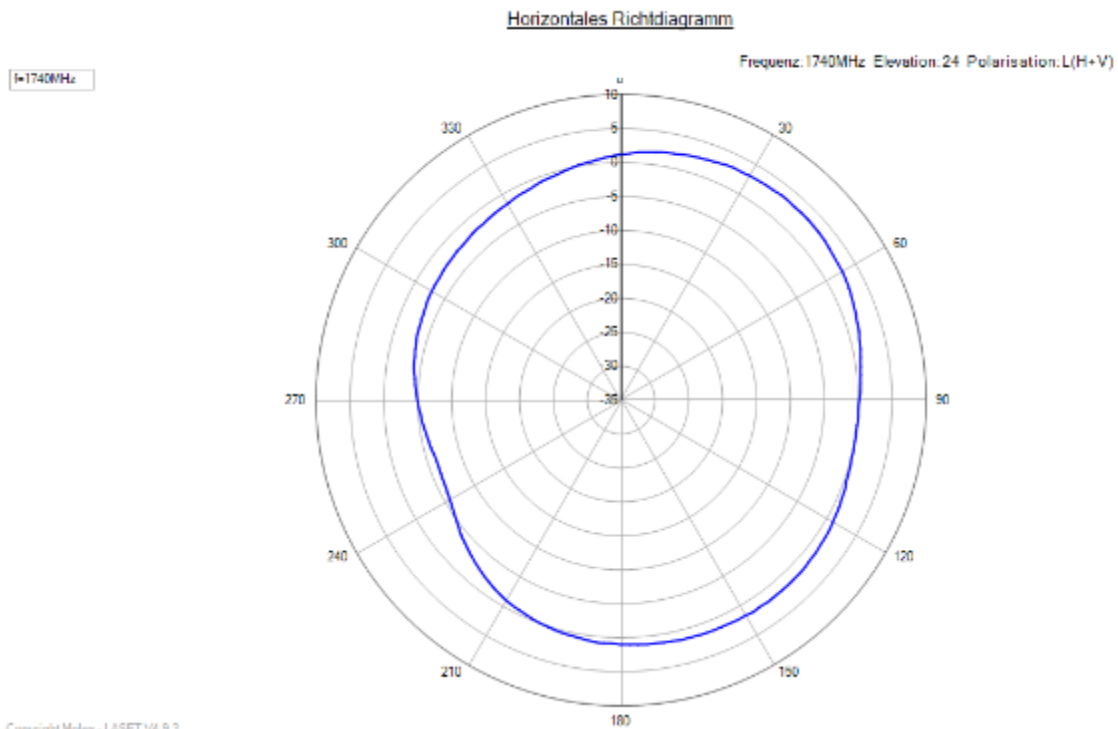
4.2.5 Radiation Pattern for Gain @ frequency range 814-824MHz



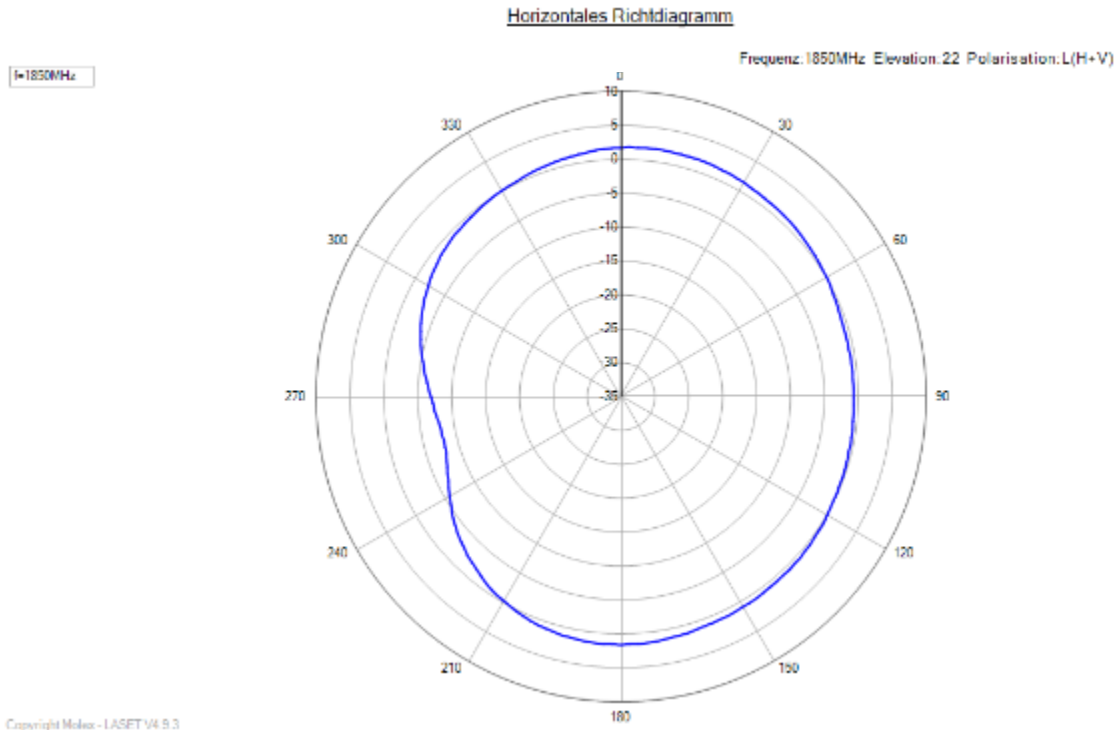
4.2.6 Radiation Pattern for Gain @ frequency range 824-849MHz



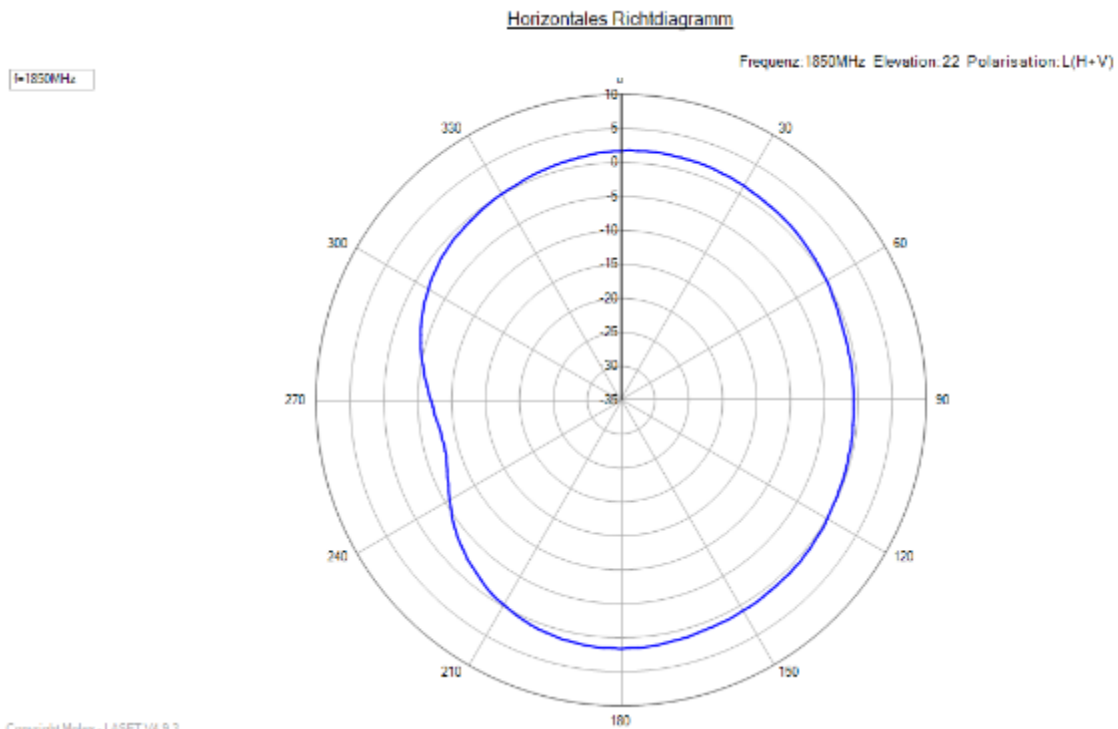
4.2.7 Radiation Pattern for Gain @ frequency range 1710-1780MHz



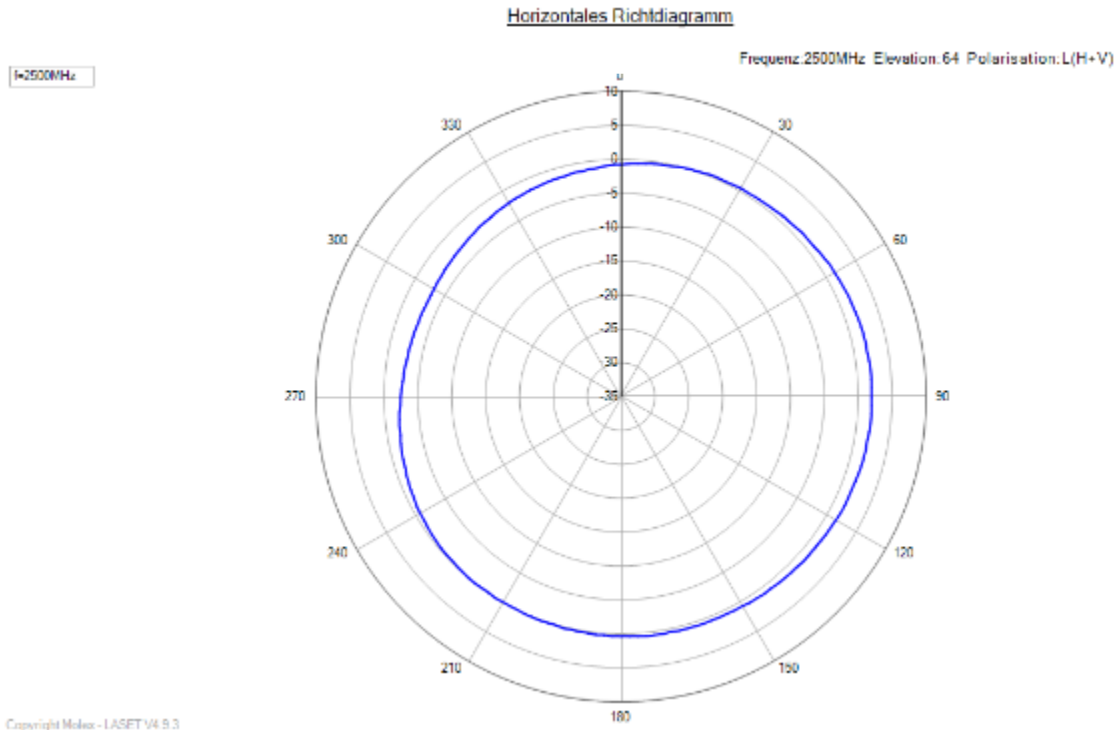
4.2.8 Radiation Pattern for Gain @ frequency range 1850-1910MHz



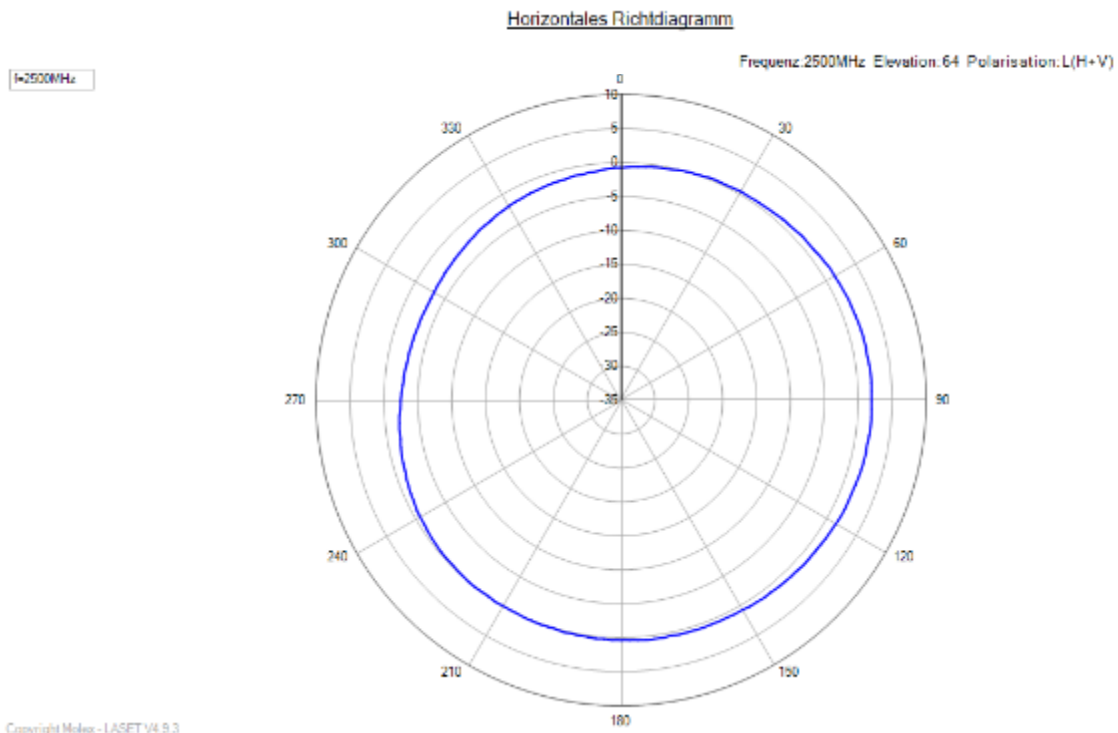
4.2.9 Radiation Pattern for Gain @ frequency range 1850-1915MHz



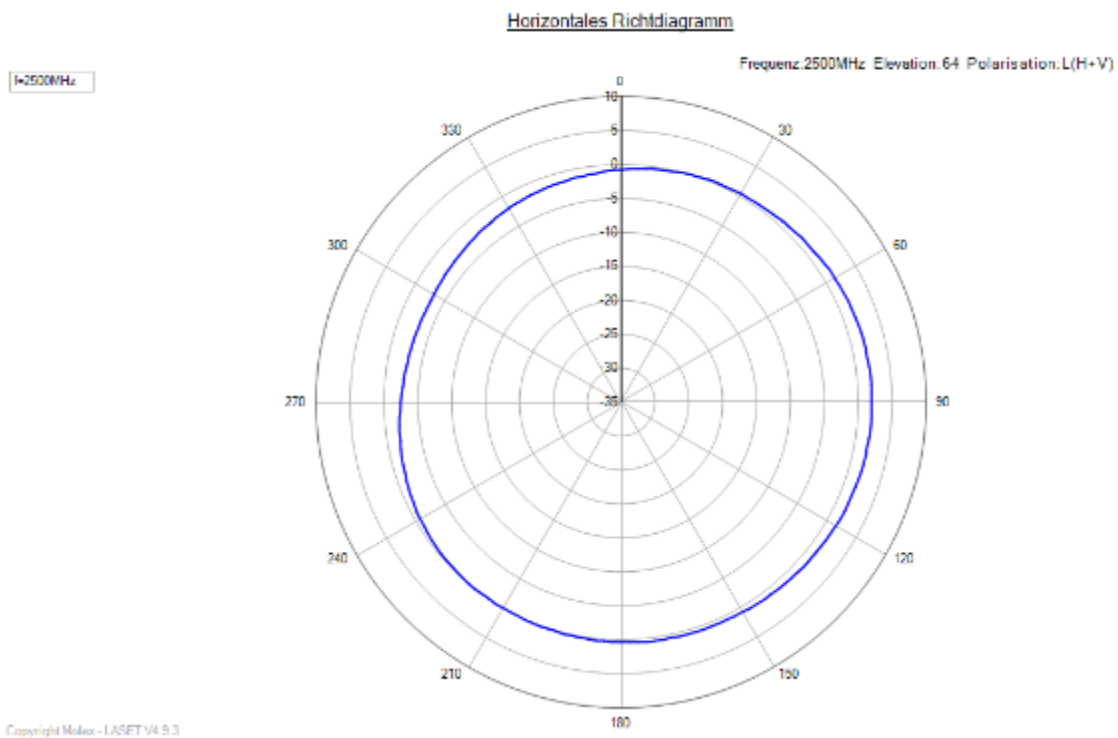
4.2.10 Radiation Pattern for Gain @ frequency range 2496-2690MHz



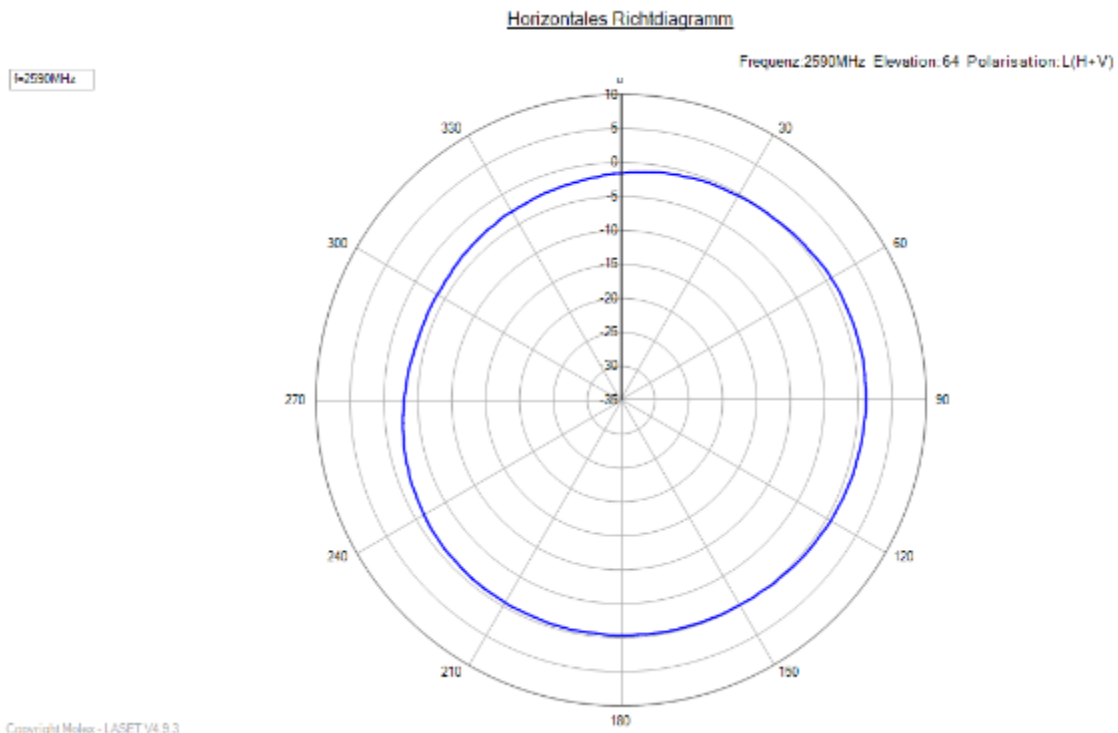
4.2.11 Radiation Pattern for Gain @ frequency range 2500-2570MHz



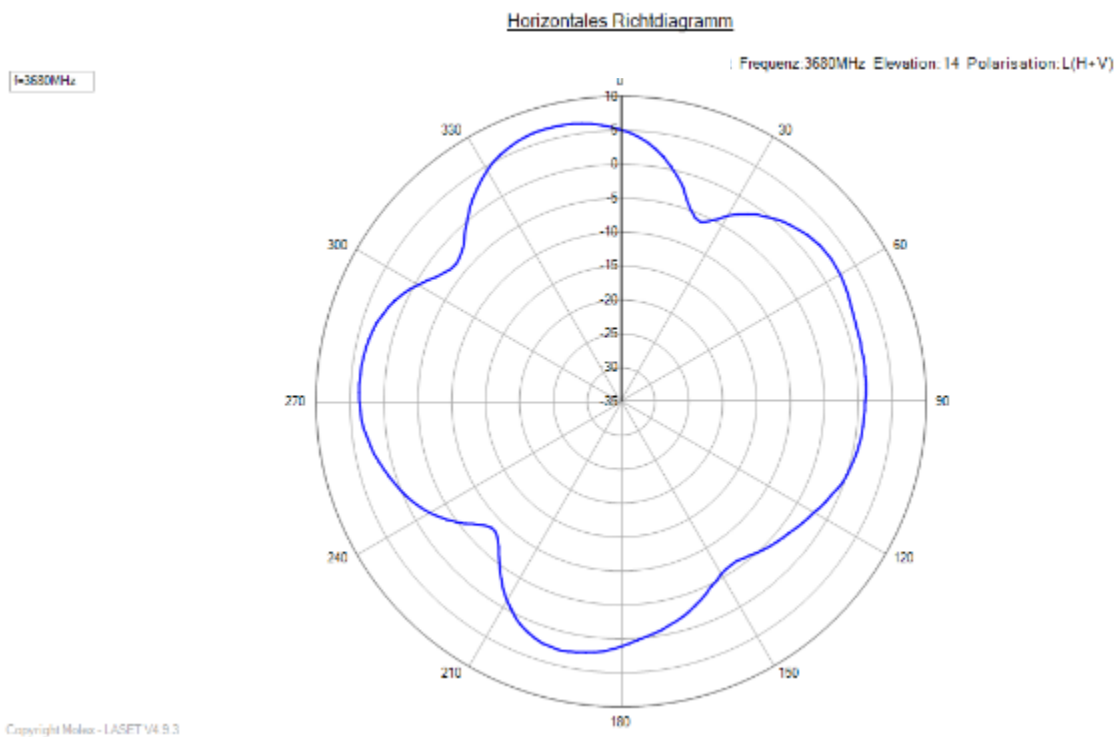
4.2.12 Radiation Pattern for Gain @ frequency range 2500-2690MHz



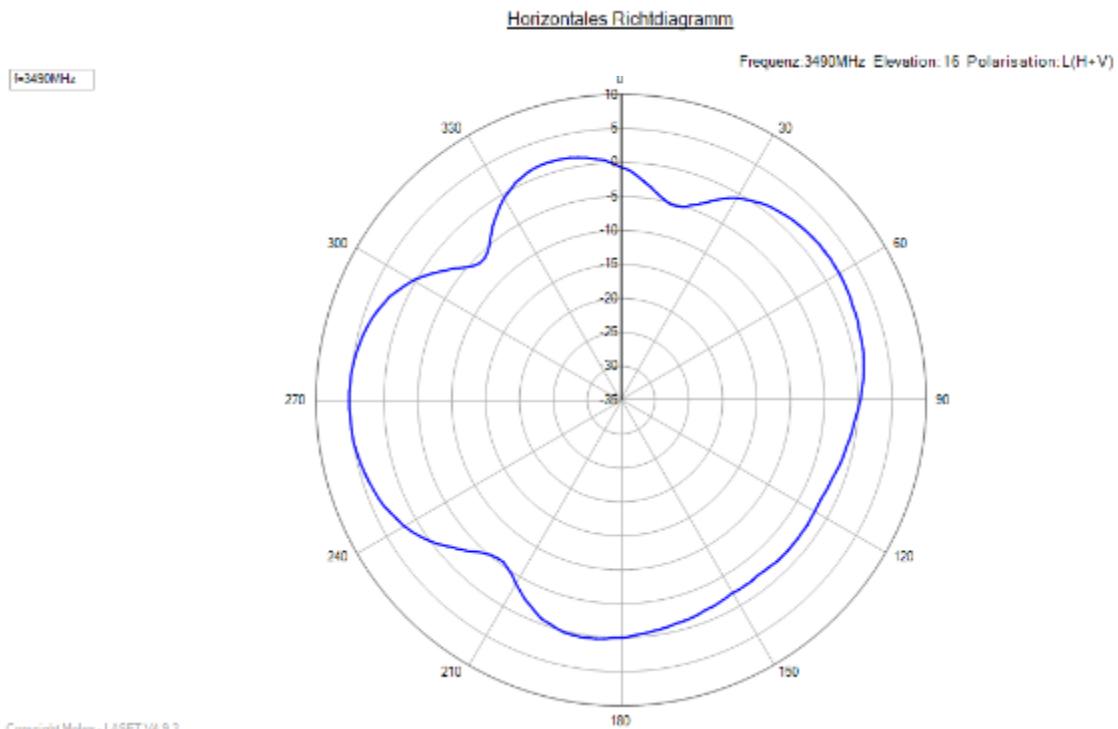
4.2.13 Radiation Pattern for Gain @ frequency range 2570-2620MHz



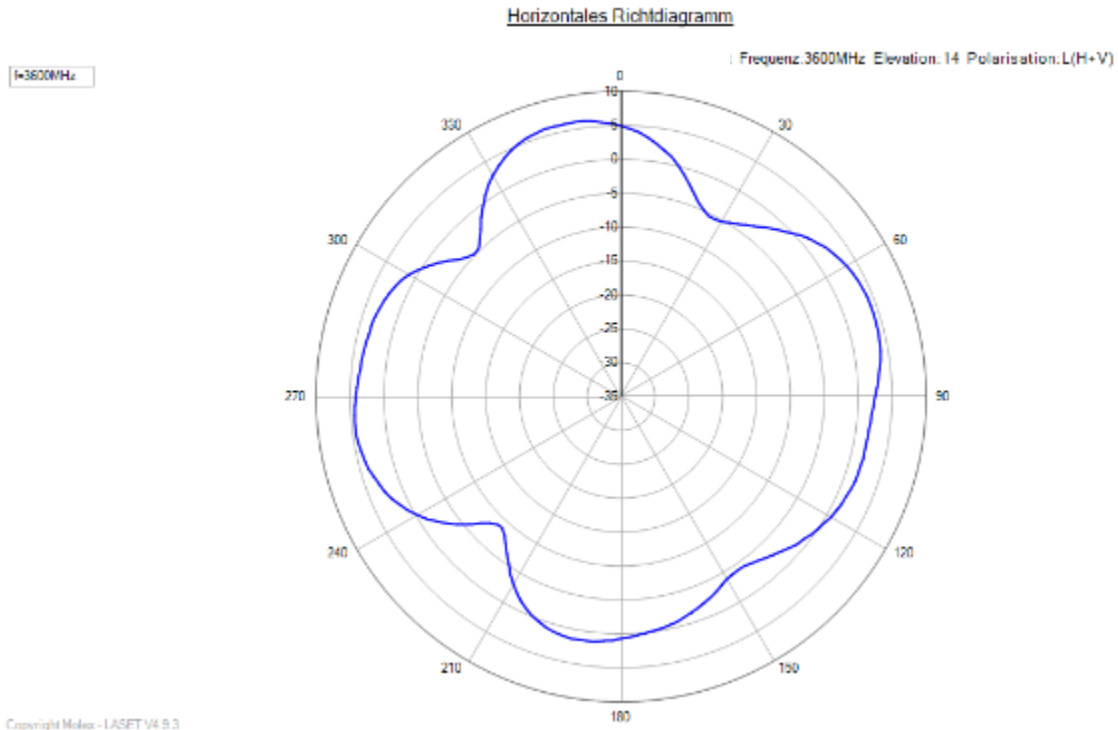
4.2.14 Radiation Pattern for Gain @ frequency range 3300-4200MHz



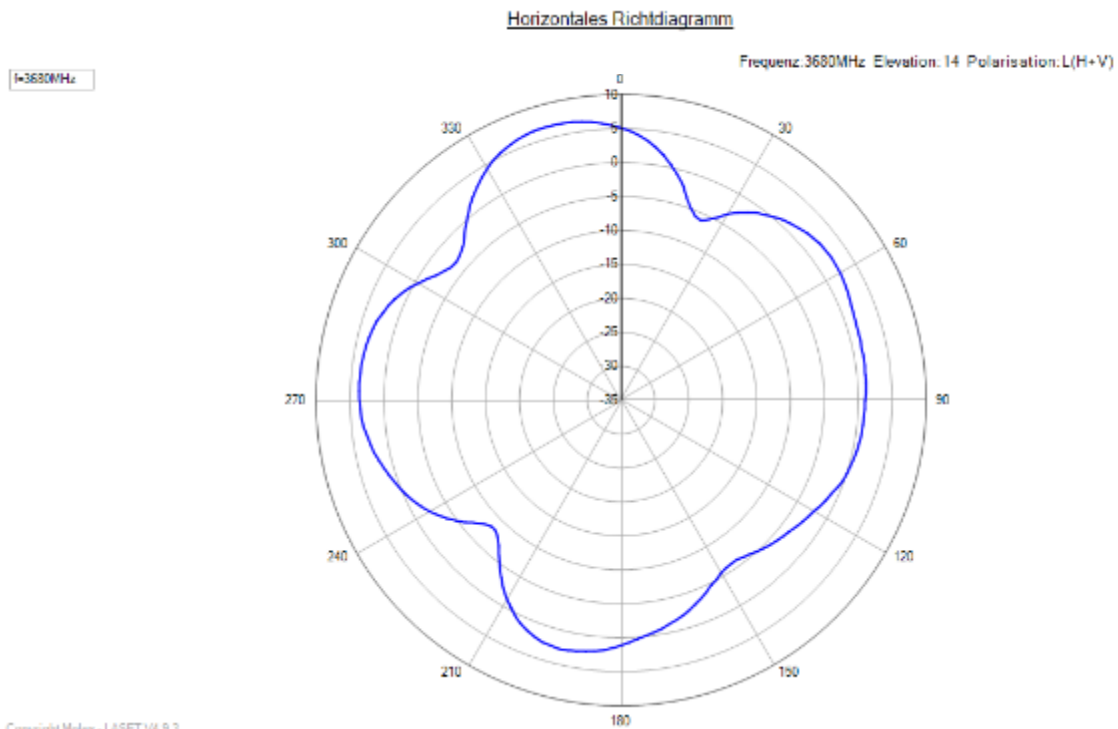
4.2.15 Radiation Pattern for Gain @ frequency range 3450-3550MHz



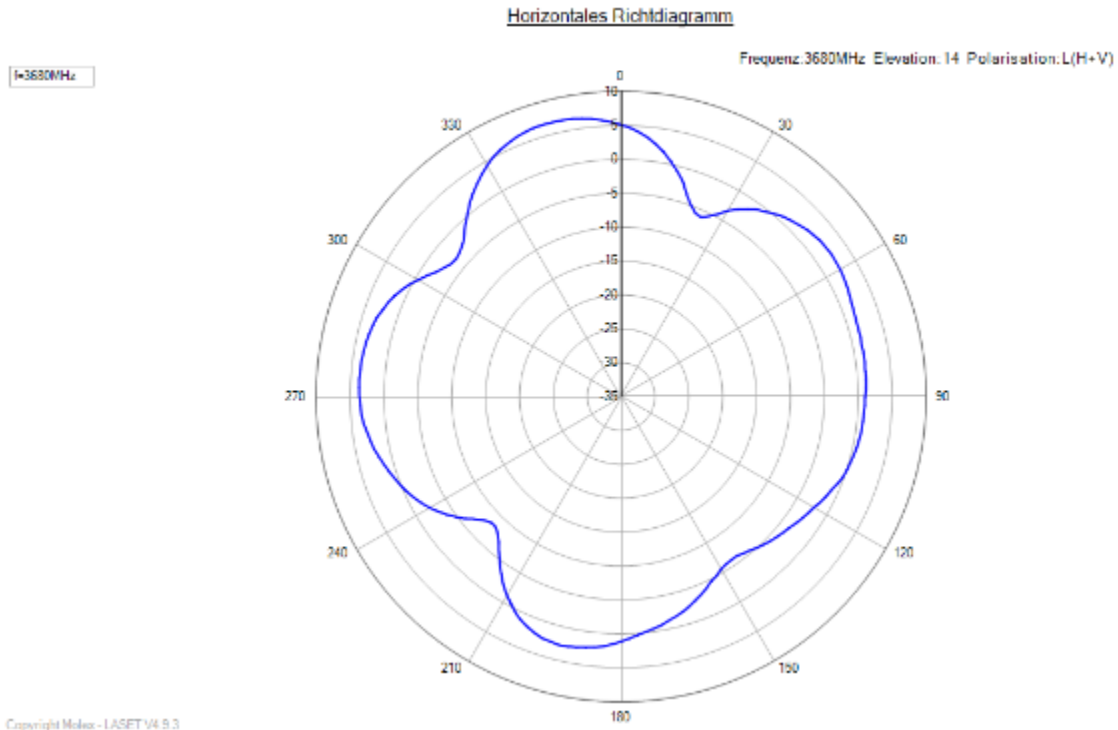
4.2.16 Radiation Pattern for Gain @ frequency range 3450-3600MHz



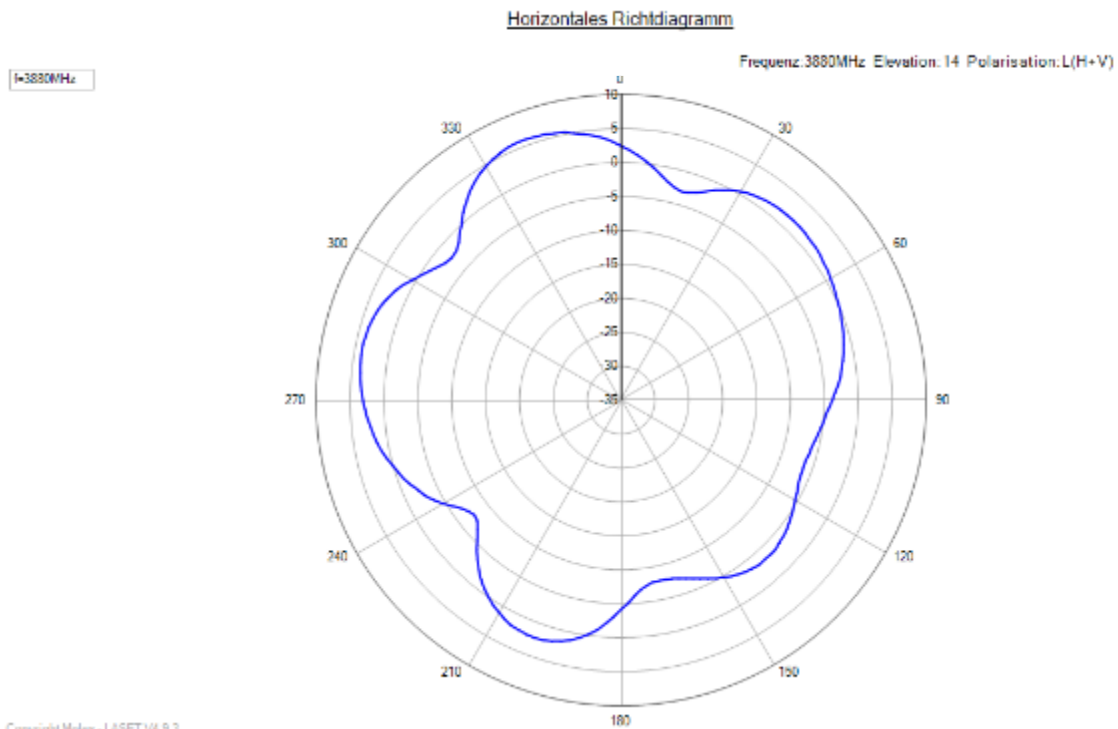
4.2.17 Radiation Pattern for Gain @ frequency range 3450-3900MHz



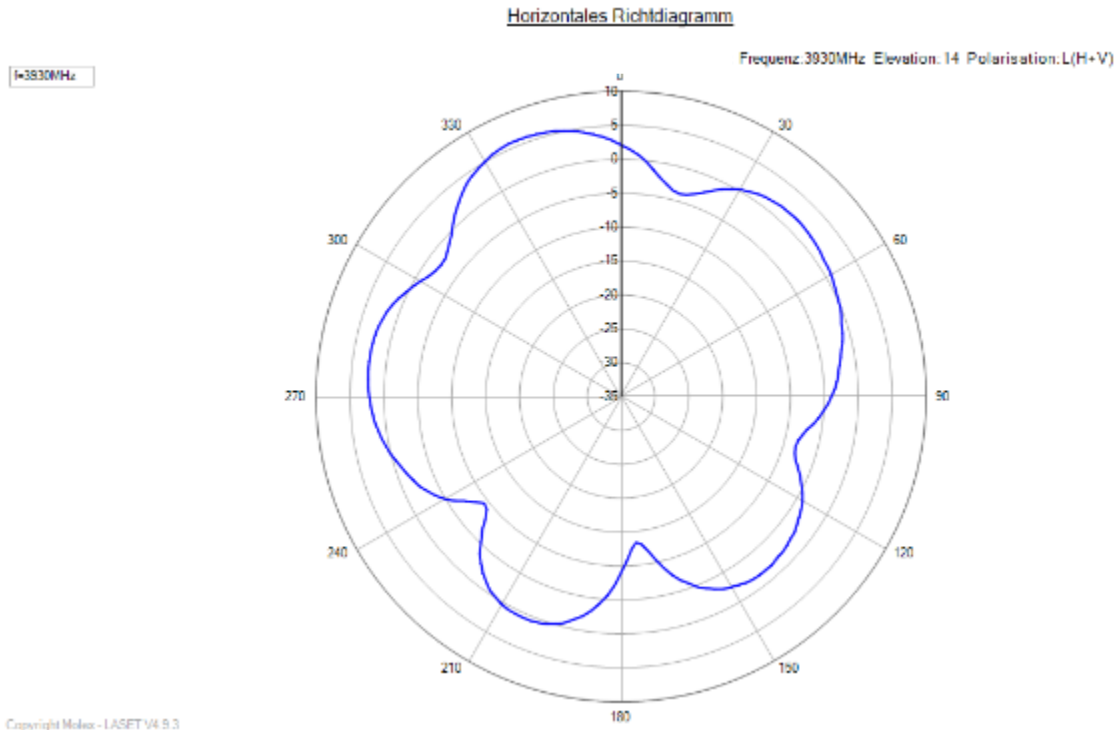
4.2.18 Radiation Pattern for Gain @ frequency range 3550-3700MHz



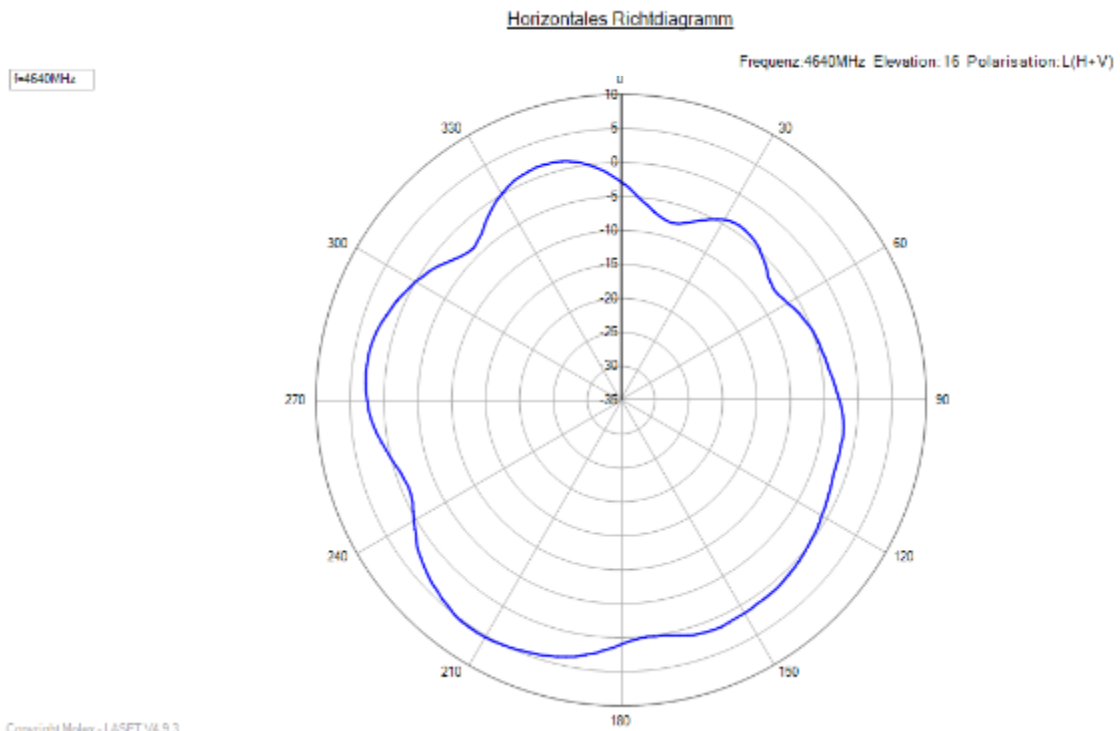
4.2.19 Radiation Pattern for Gain @ frequency range 3700-3980MHz



4.2.20 Radiation Pattern for Gain @ frequency range 3900-3980MHz



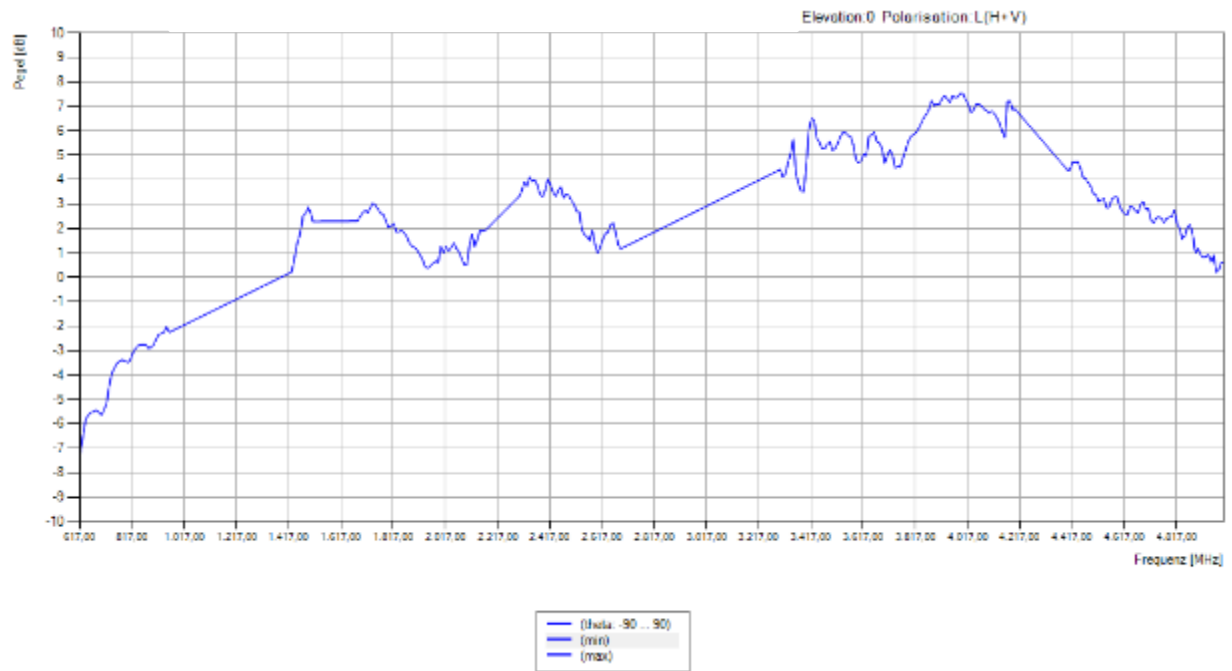
4.2.21 Radiation Pattern for Gain @ frequency range 4400-5000MHz



4.3 MIMO2 Peak Gain

Frequency band (MHz)	maximum gain
663-698	-5,4
699-716	-5,3
777-787	-3,4
814-824	-3,1
824-849	-2,8
1710-1780	3,0
1850-1910	1,9
1850-1915	1,9
2496-2690	3,2
2500-2570	3,1
2500-2690	3,1
2570-2620	1,9
3300-4200	7,5
3450-3550	5,9
3450-3600	5,9
3450-3900	7,2
3550-3700	5,9
3700-3980	7,4
3900-3980	7,4
4400-5000	4,7

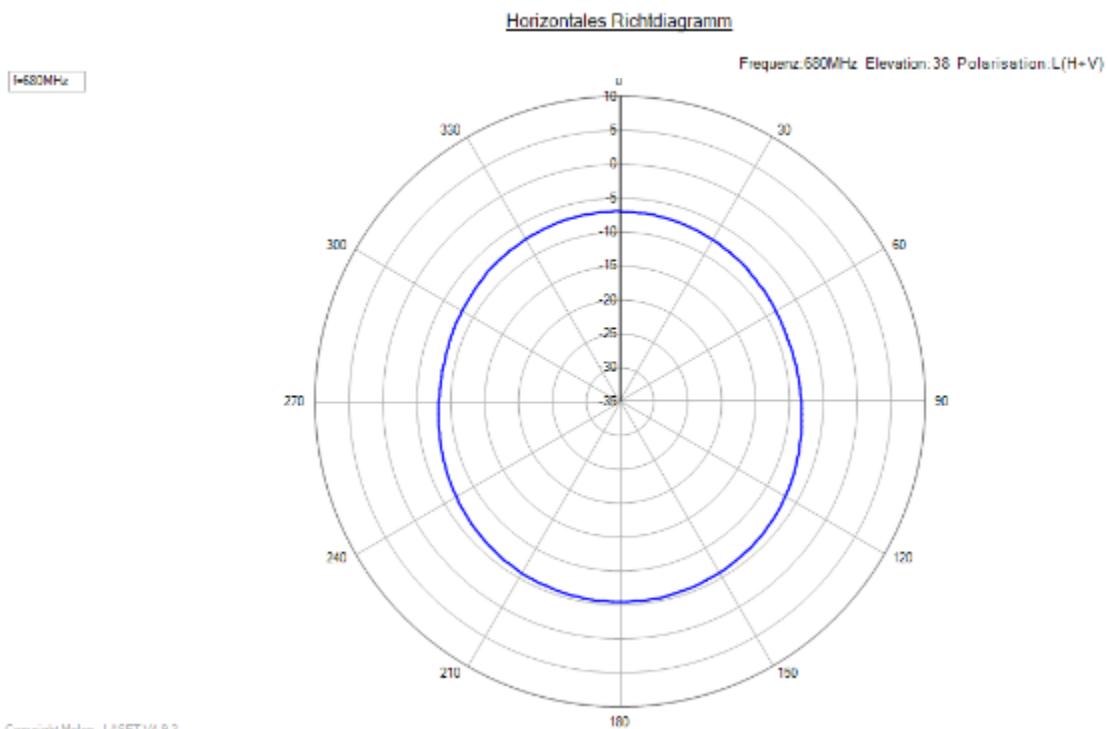
4.3.1 Peak gain over Frequency



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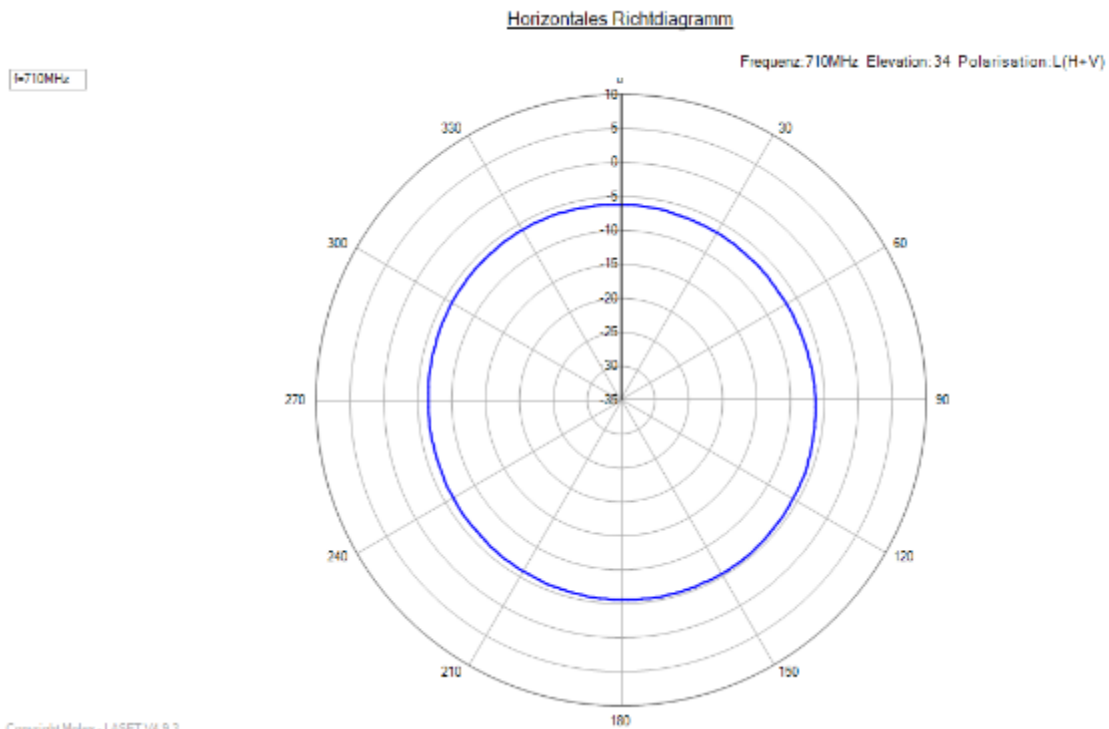
4.3.2 Radiation Pattern for Gain @ frequency range 663-698MHz



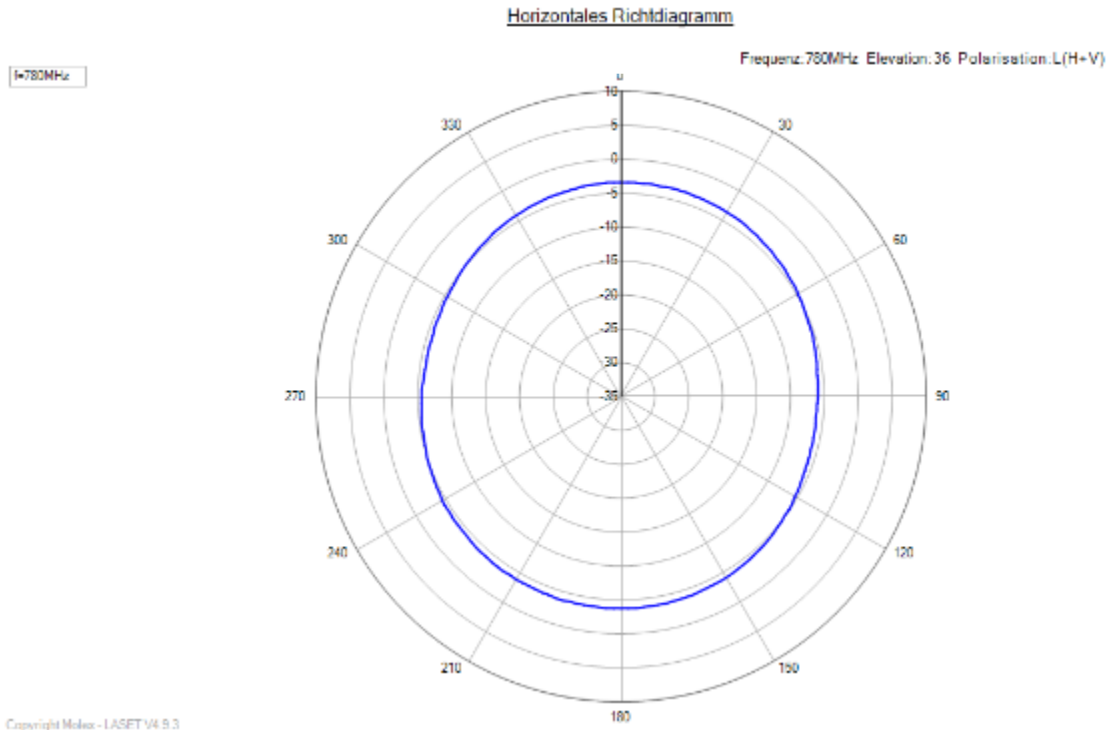
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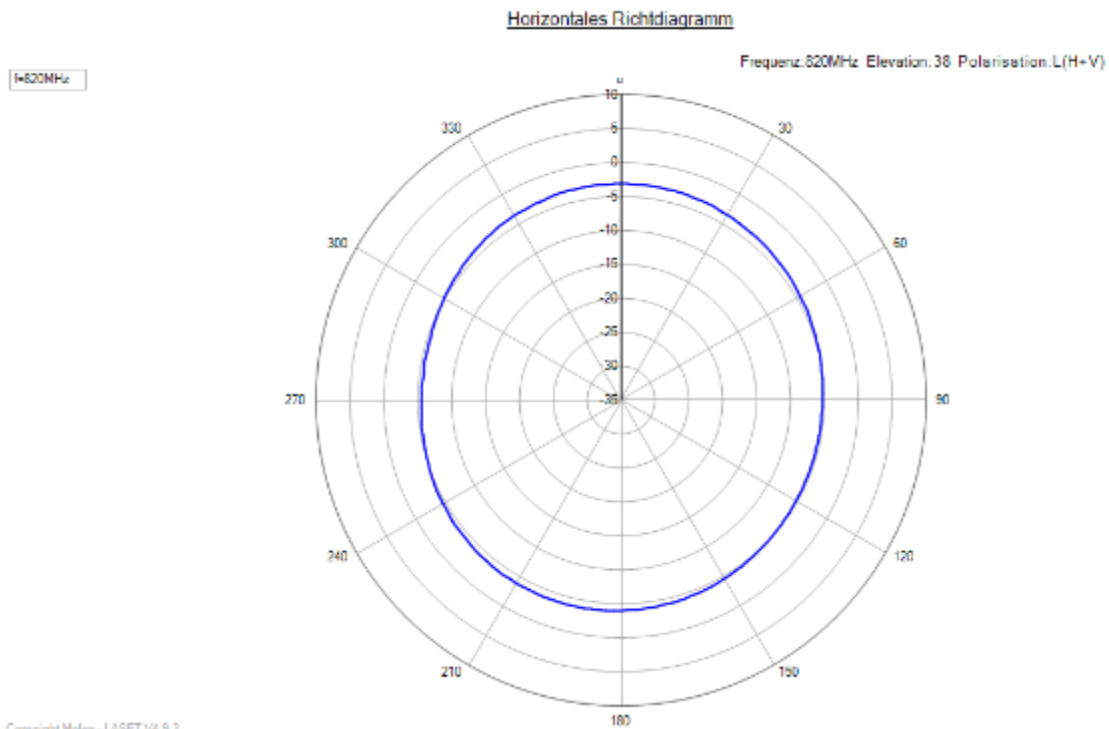
4.3.3 Radiation Pattern for Gain @ frequency range 699-716MHz



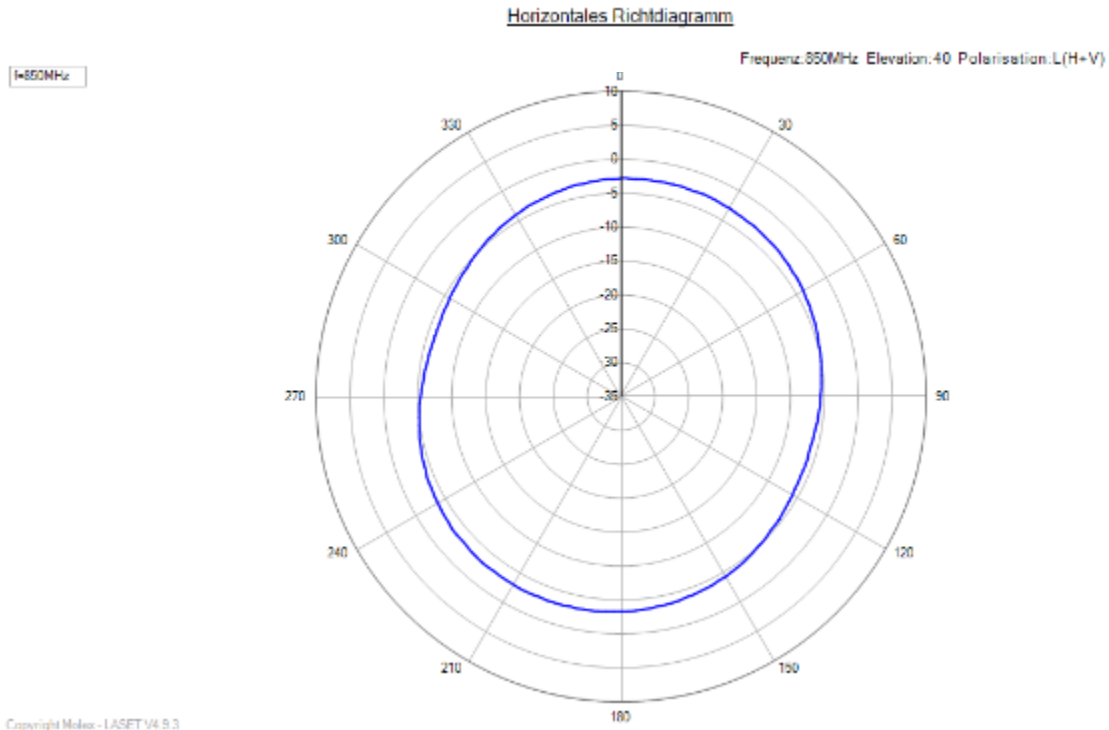
4.3.4 Radiation Pattern for Gain @ frequency range 777-787MHz



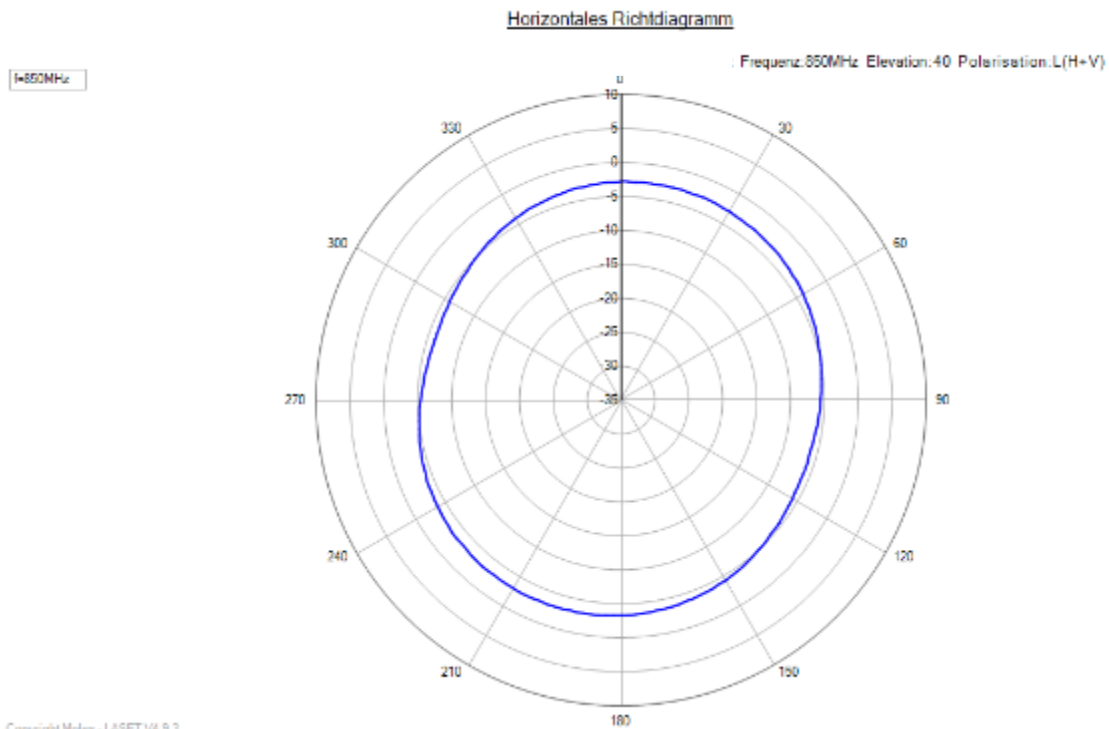
4.3.5 Radiation Pattern for Gain @ frequency range 814-824MHz



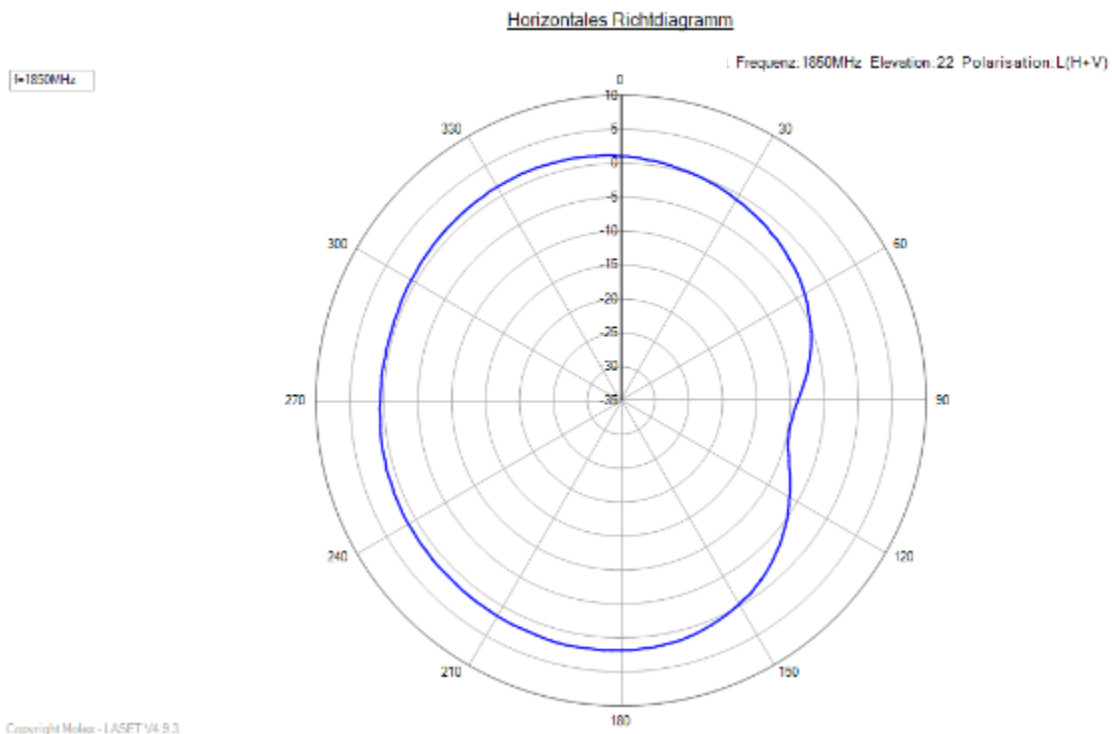
4.3.6 Radiation Pattern for Gain @ frequency range 824-849MHz



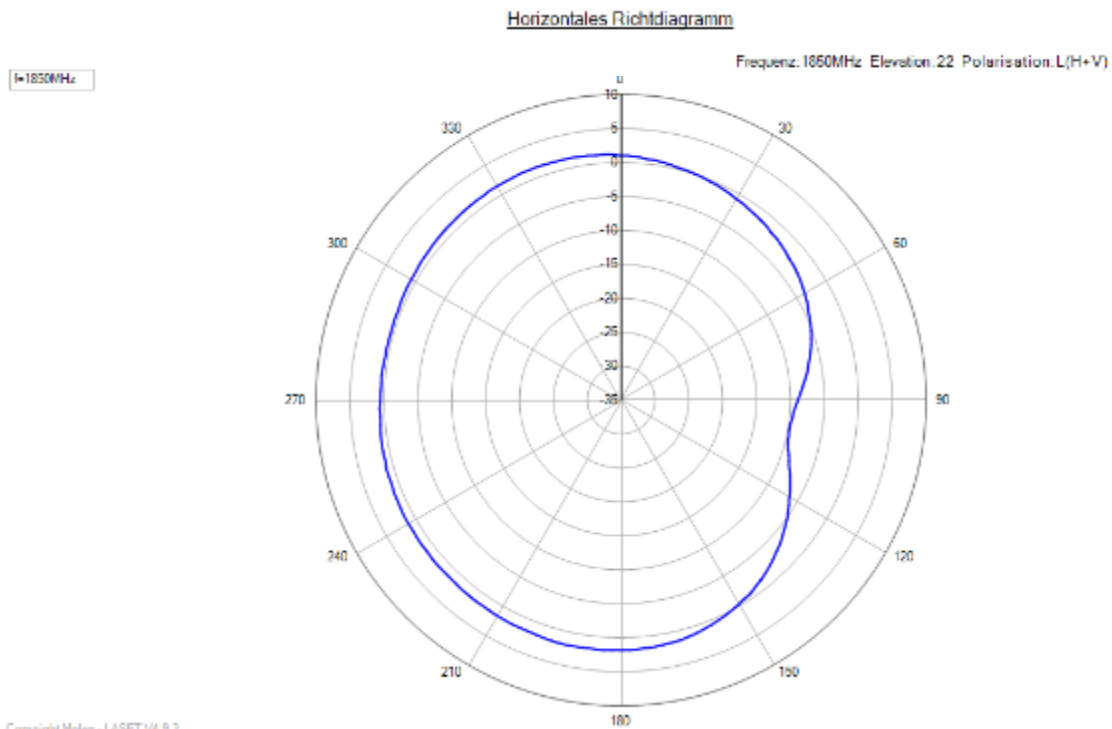
4.3.7 Radiation Pattern for Gain @ frequency range 1710-1780MHz



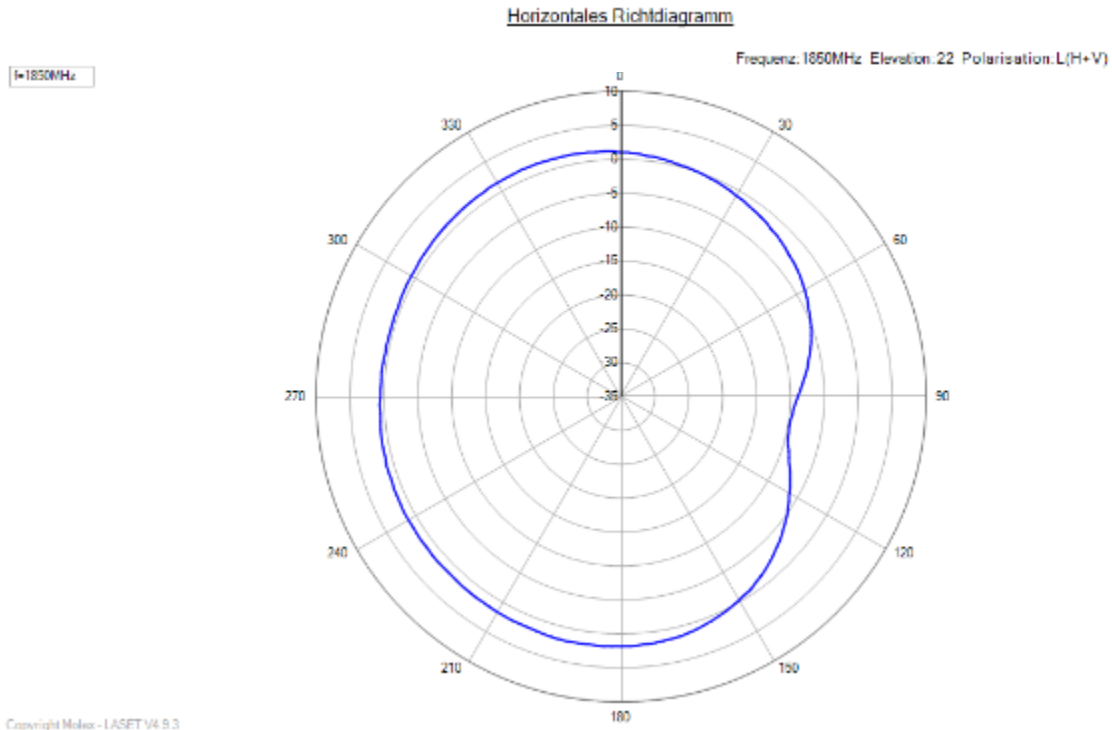
4.3.8 Radiation Pattern for Gain @ frequency range 1850-1910MHz



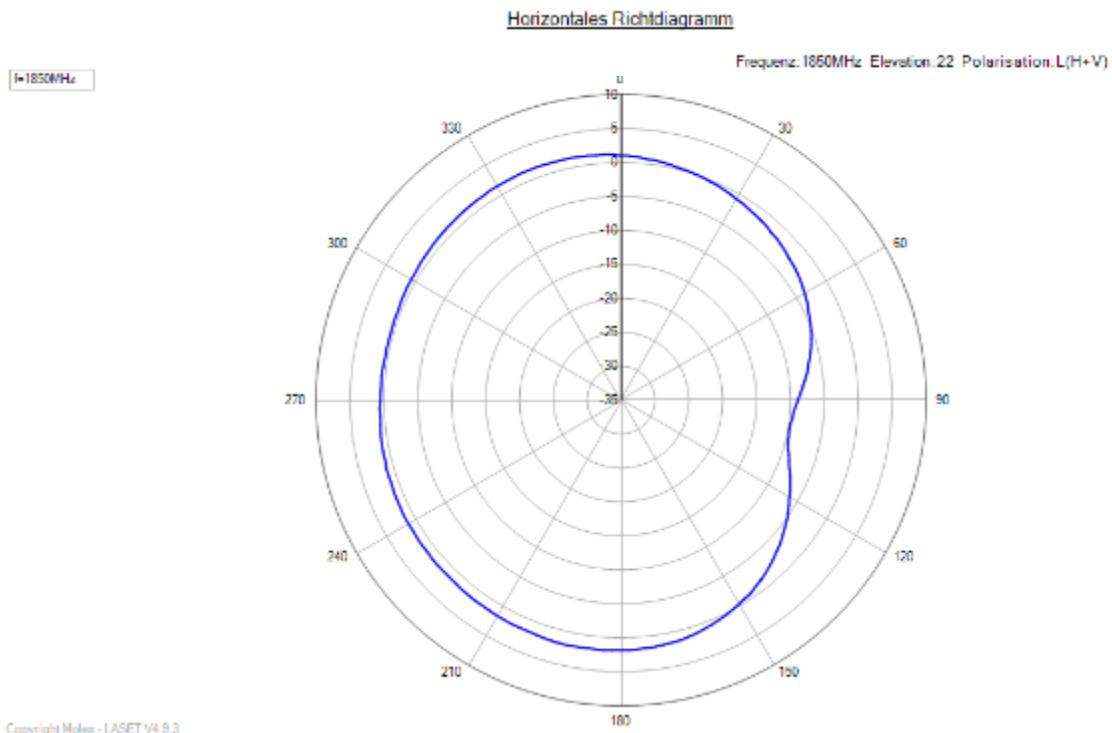
4.3.9 Radiation Pattern for Gain @ frequency range 1850-1915MHz



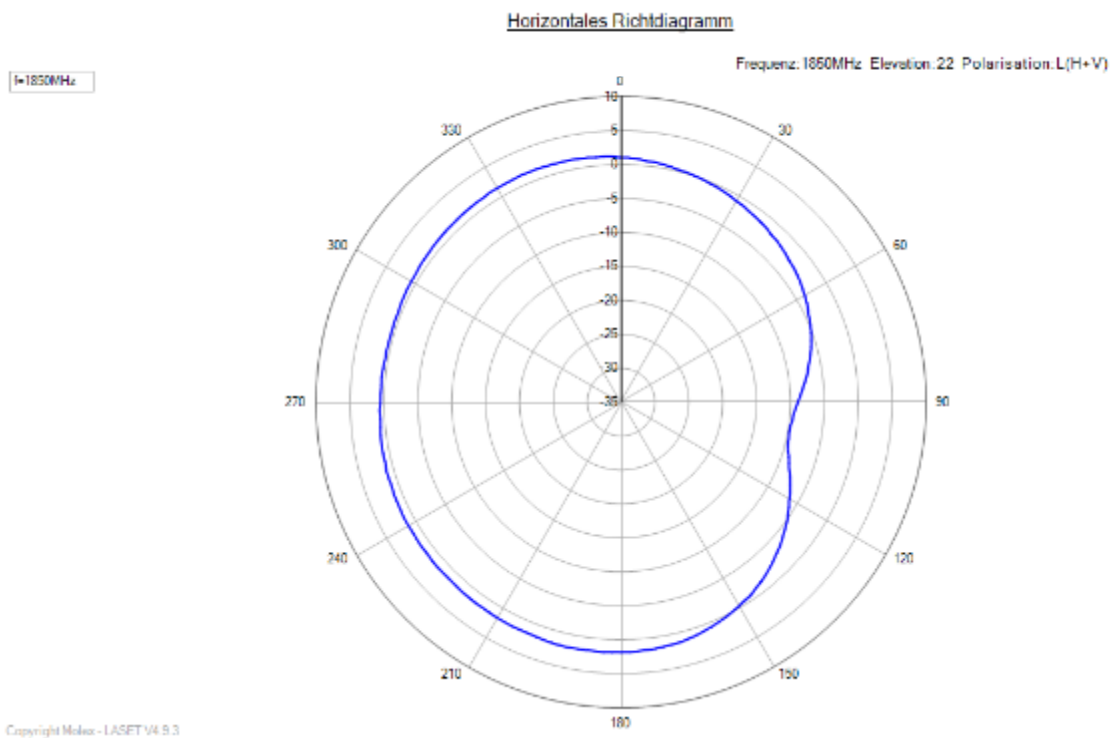
4.3.10 Radiation Pattern for Gain @ frequency range 2496-2690MHz



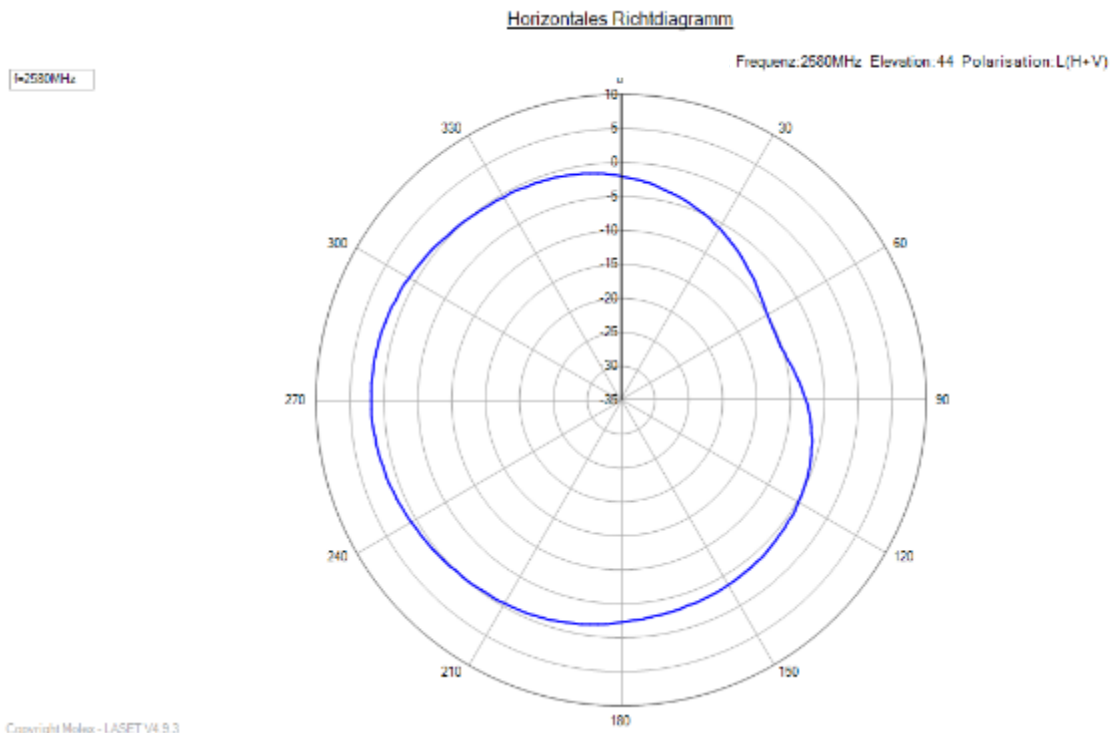
4.3.11 Radiation Pattern for Gain @ frequency range 2500-2570MHz



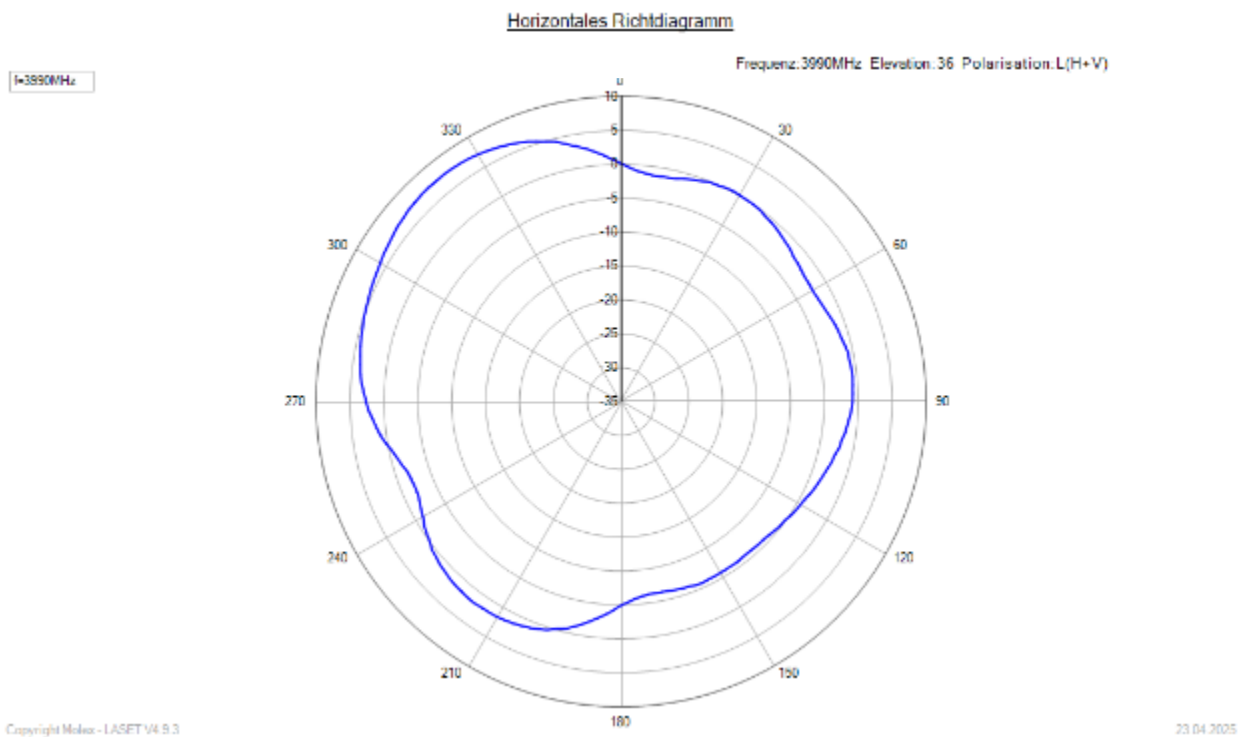
4.3.12 Radiation Pattern for Gain @ frequency range 2500-2690MHz



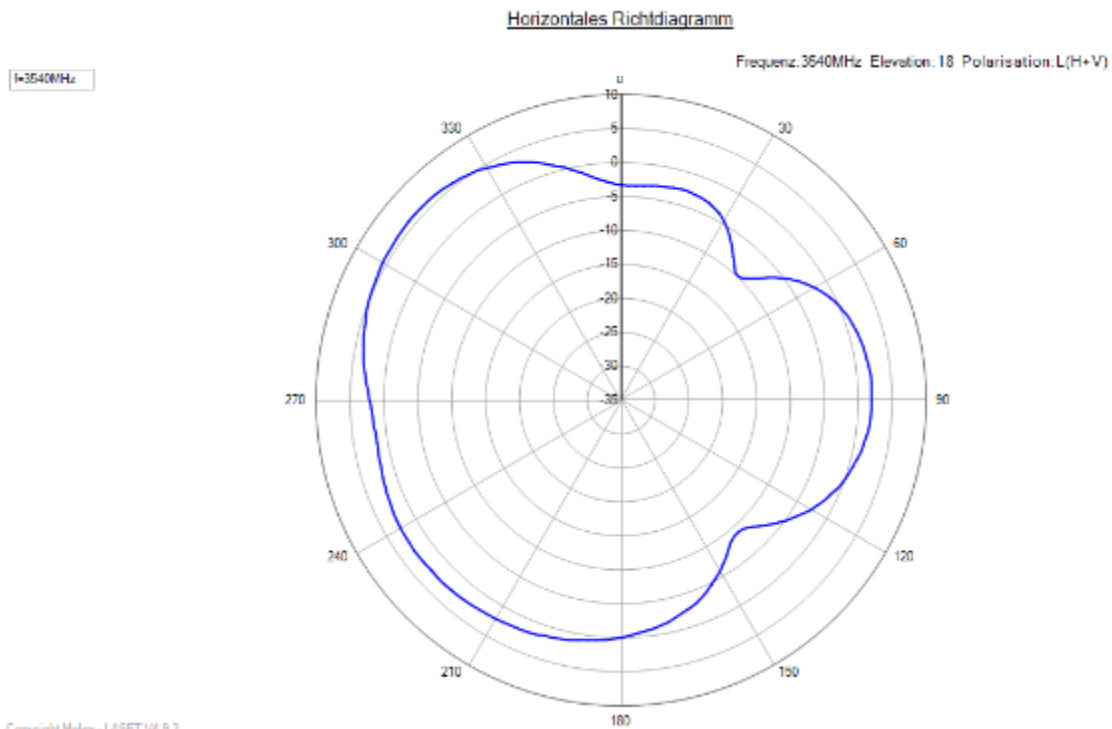
4.3.13 Radiation Pattern for Gain @ frequency range 2570-2620MHz



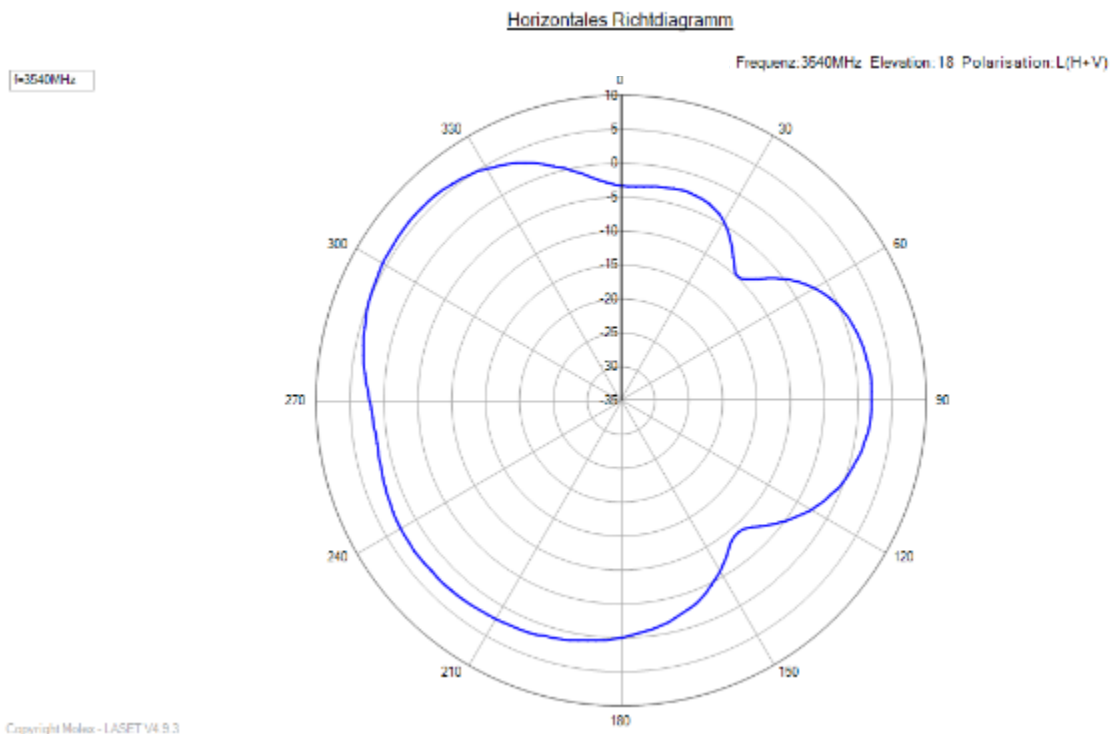
4.3.14 Radiation Pattern for Gain @ frequency range 3300-4200MHz



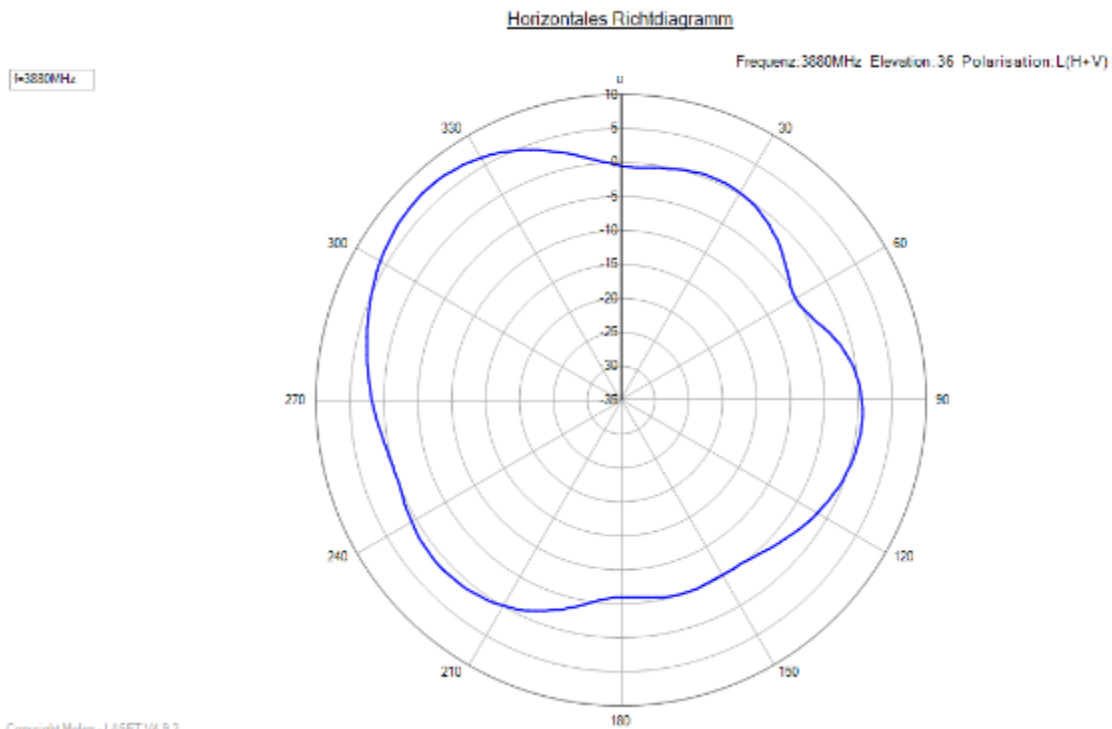
4.3.15 Radiation Pattern for Gain @ frequency range 3450-3550MHz



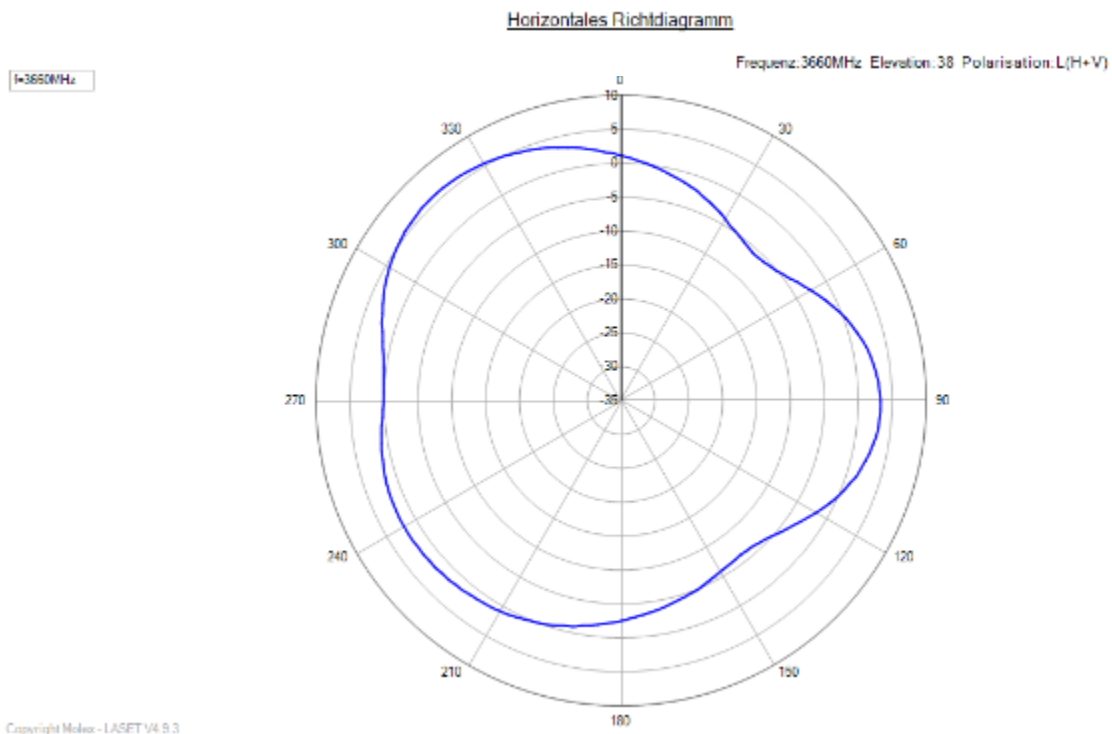
4.3.16 Radiation Pattern for Gain @ frequency range 3450-3600MHz



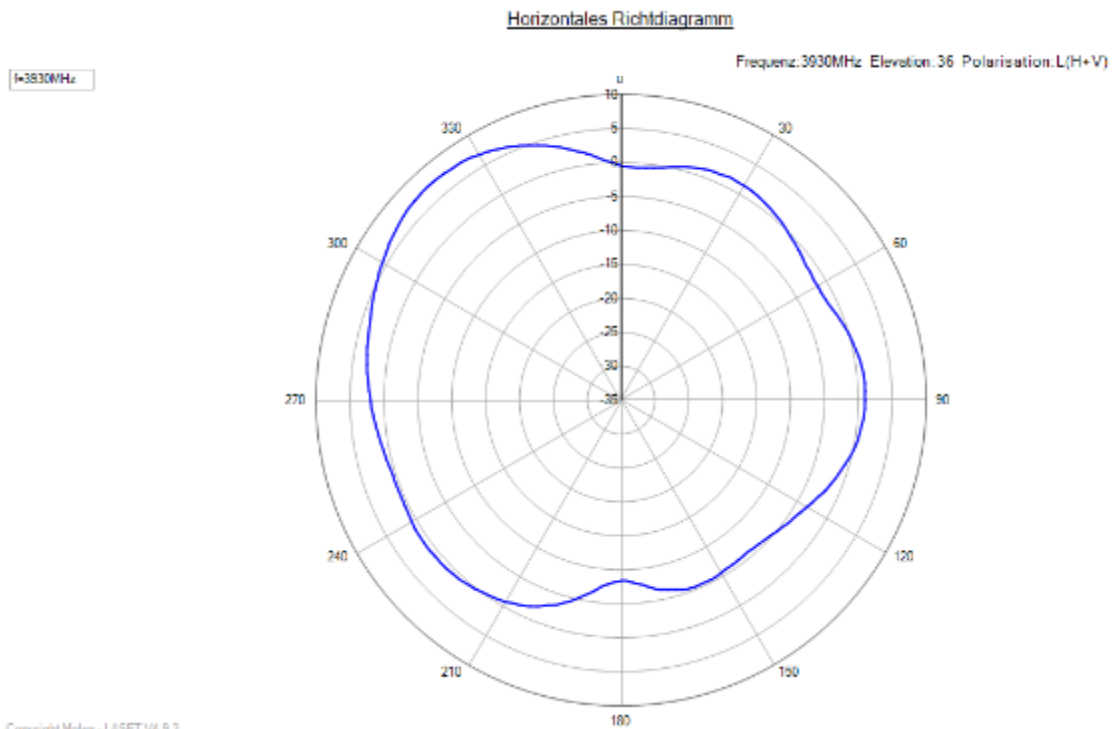
4.3.17 Radiation Pattern for Gain @ frequency range 3450-3900MHz



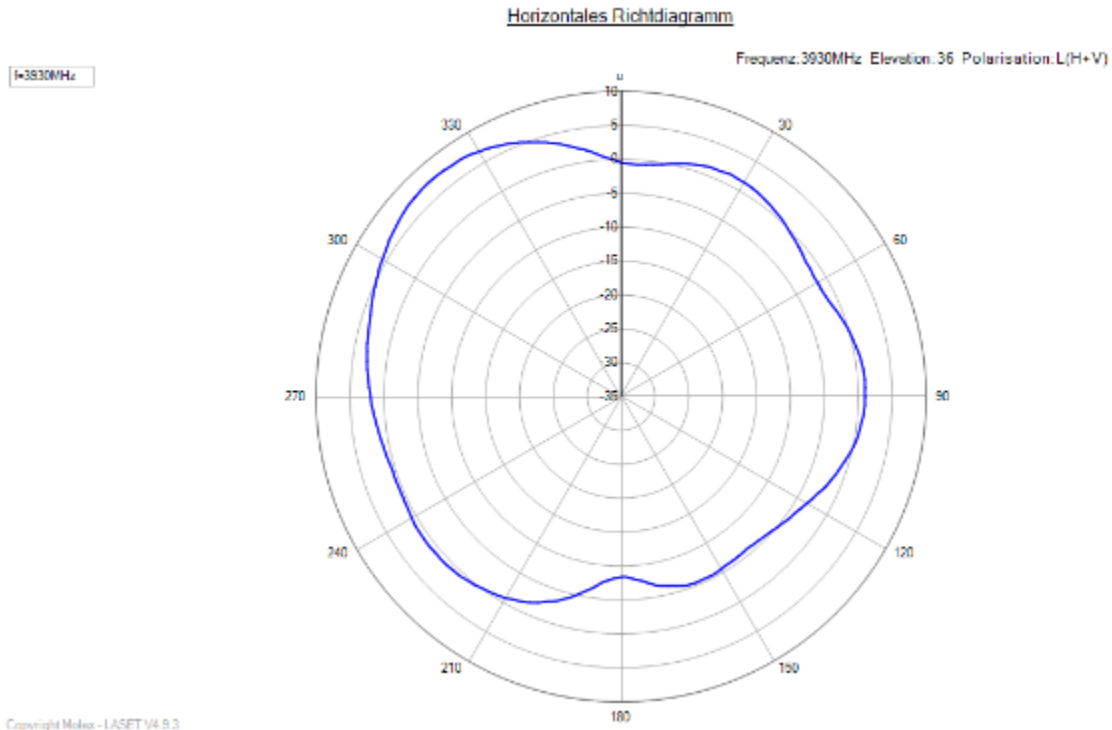
4.3.18 Radiation Pattern for Gain @ frequency range 3550-3700MHz



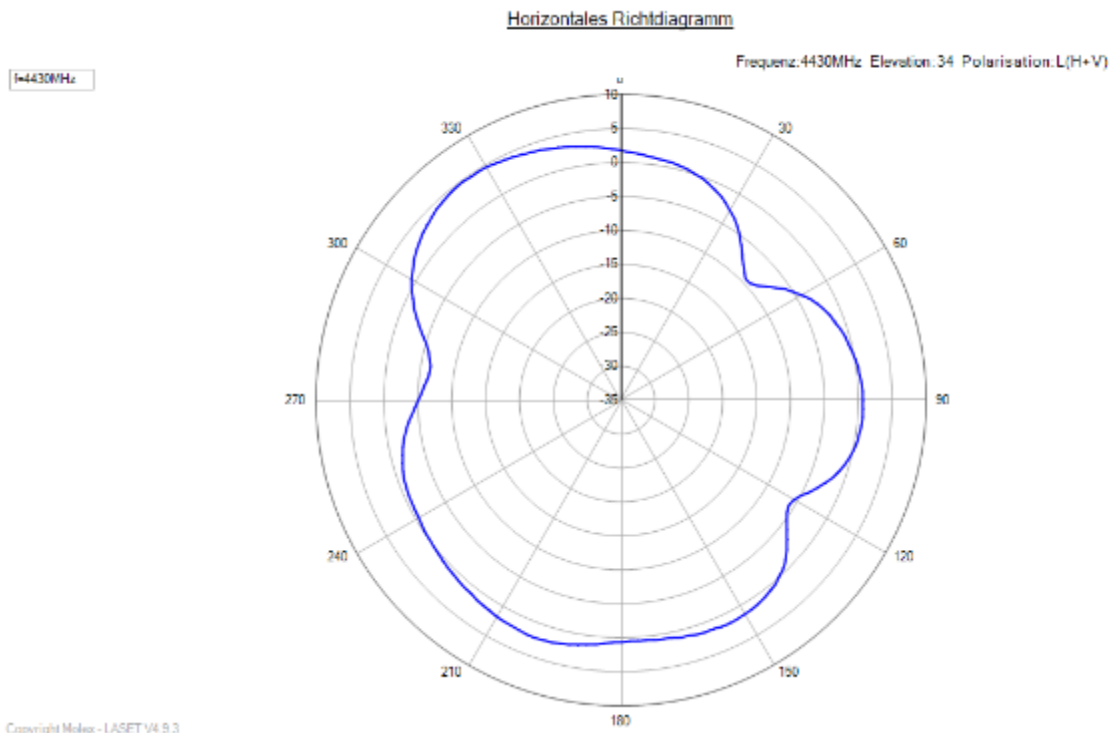
4.3.19 Radiation Pattern for Gain @ frequency range 3700-3980MHz



4.3.20 Radiation Pattern for Gain @ frequency range 3900-3980MHz



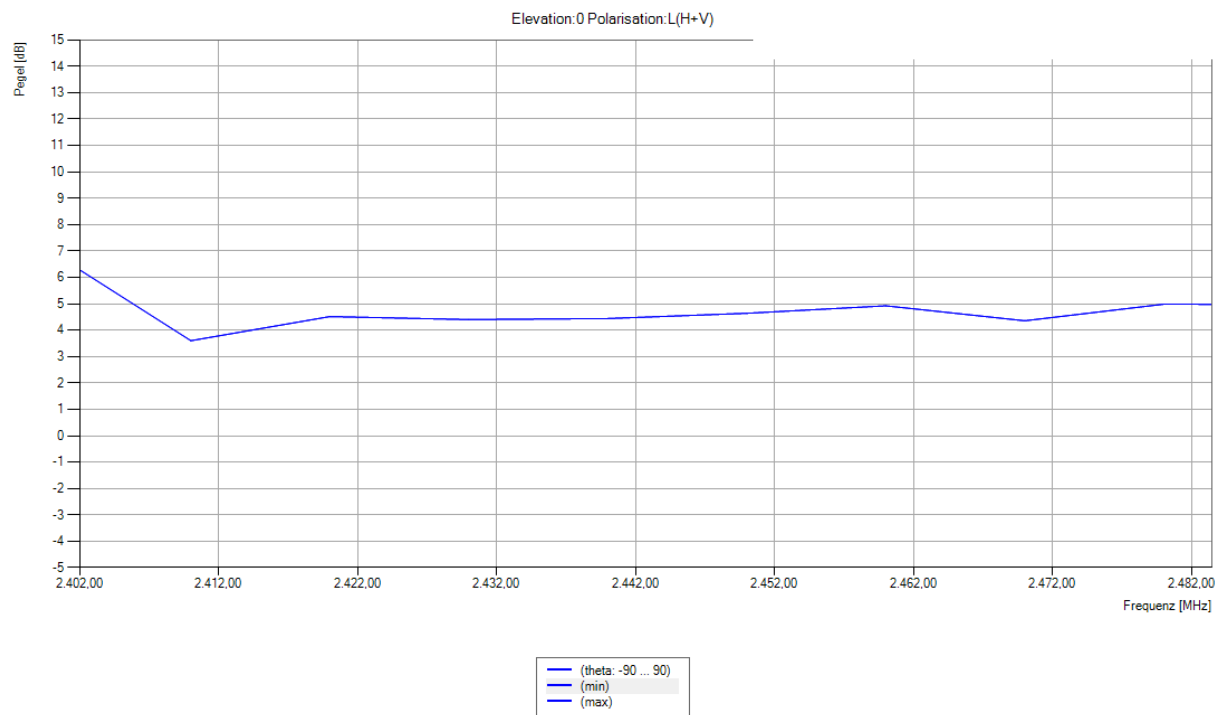
4.3.21 Radiation Pattern for Gain @ frequency range 4400-5000MHz



4.4 WiFi 1 2.4 & 5/6 GHz Peak Gain

Band	frequency band in MHz		maximum gain
	begin	end	in freq. band in dBi
2,4 GHz	2402	2483,5	4,99
U-NII-1	5150	5250	8,18
U-NII-2A	5250	5350	6,78
U-NII-2C	5470	5725	7,82
U-NII-3	5725	5850	8,67
U-NII-5	5925	6425	9,04
U-NII-6	6425	6525	8,80
U-NII-7	6525	6875	10,04
U-NII-8	6875	7125	8,42

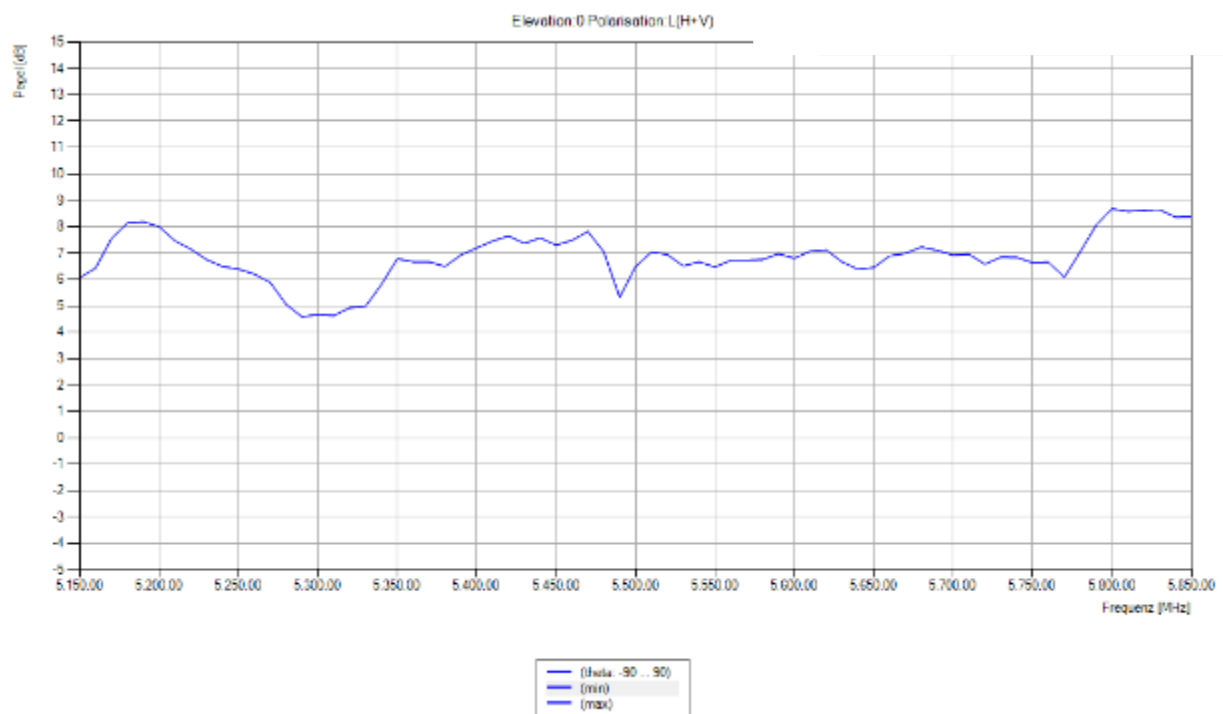
4.4.1 Peak gain over Frequency 2,4 GHz



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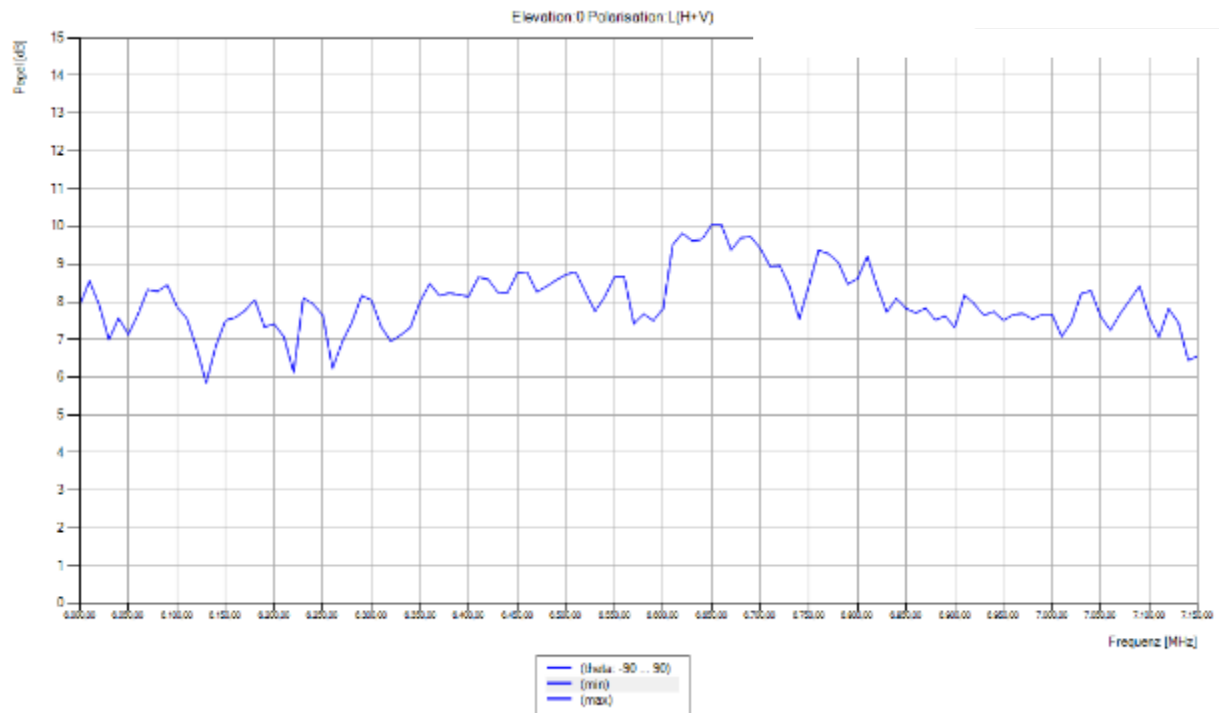
4.4.2 Peak gain over Frequency 5 GHz



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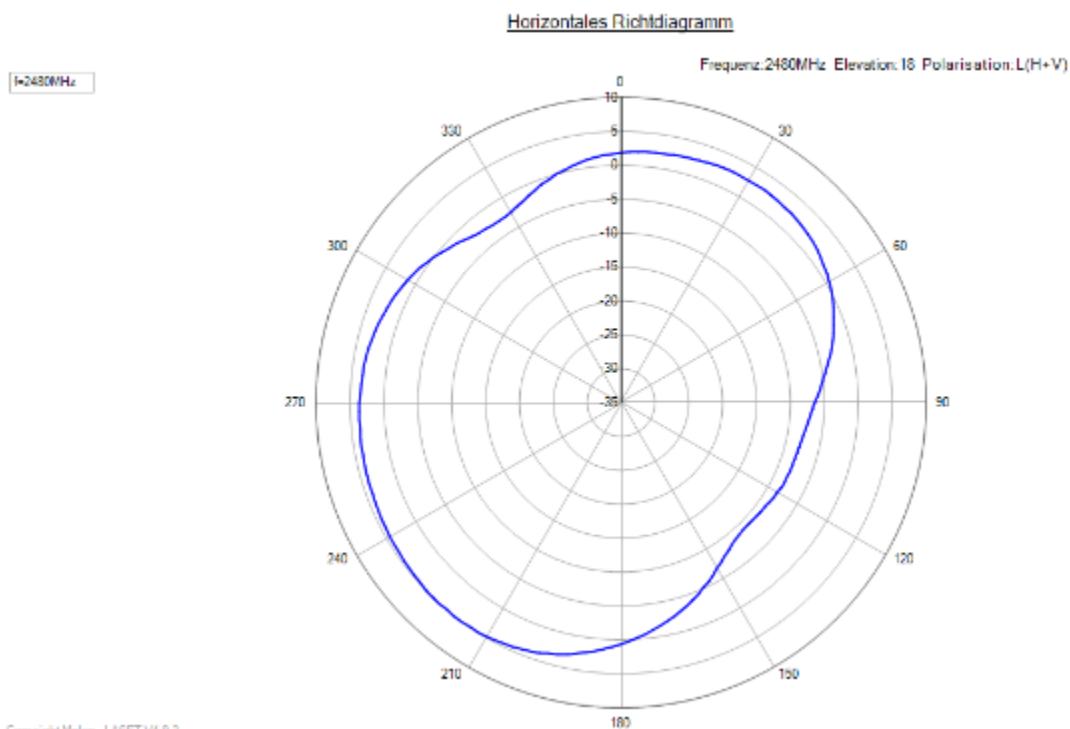
4.4.3 Peak gain over Frequency 6 GHz



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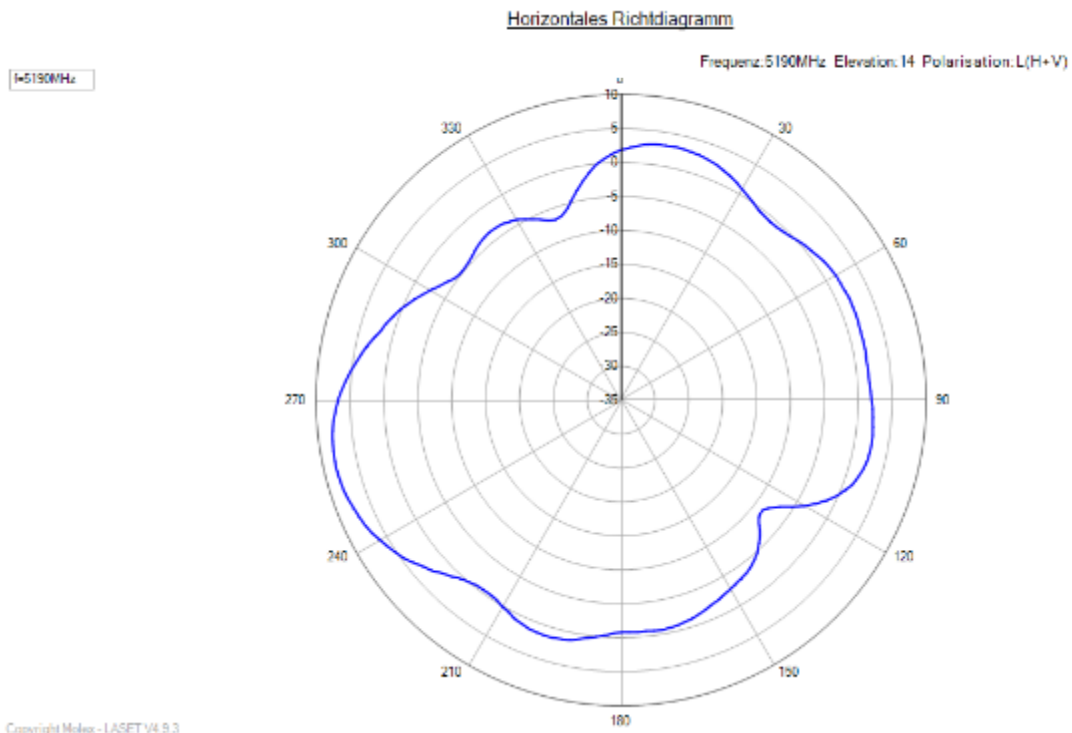
4.4.4 Radiation Pattern for Gain @ frequency range 2402 MHz -2483,5 MHz



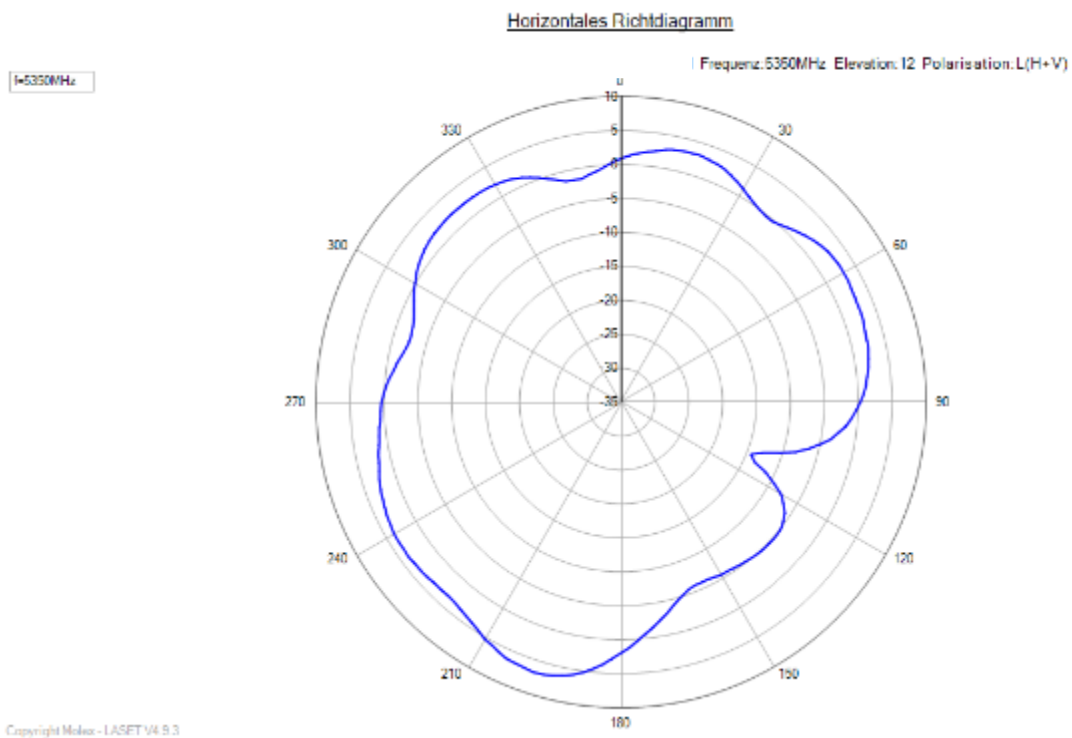
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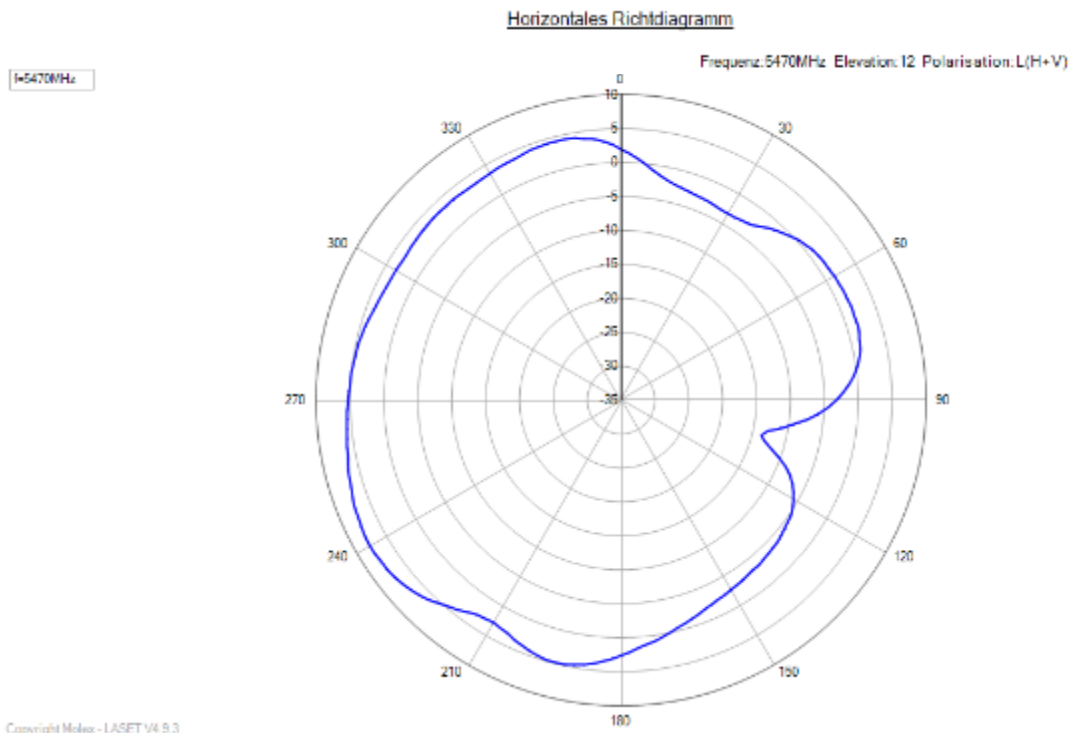
4.4.5 Radiation Pattern for Gain @ frequency range 5150 MHz -5250 MHz



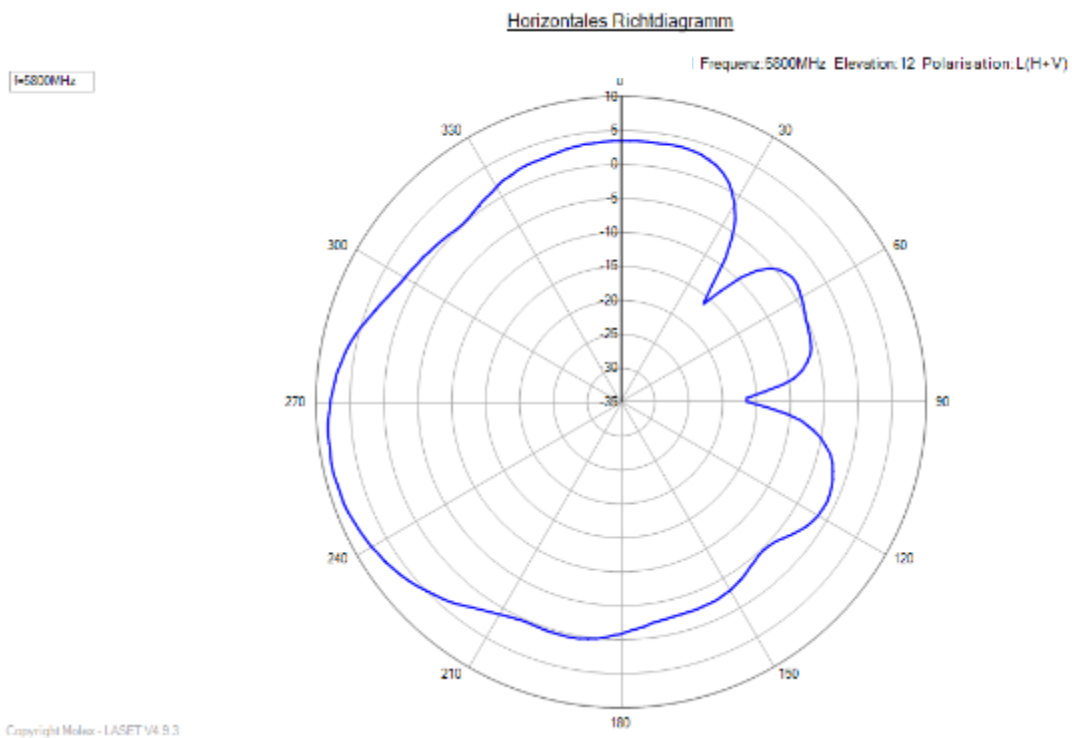
4.4.6 Radiation Pattern for Gain @ frequency range 5250 MHz -5350 MHz



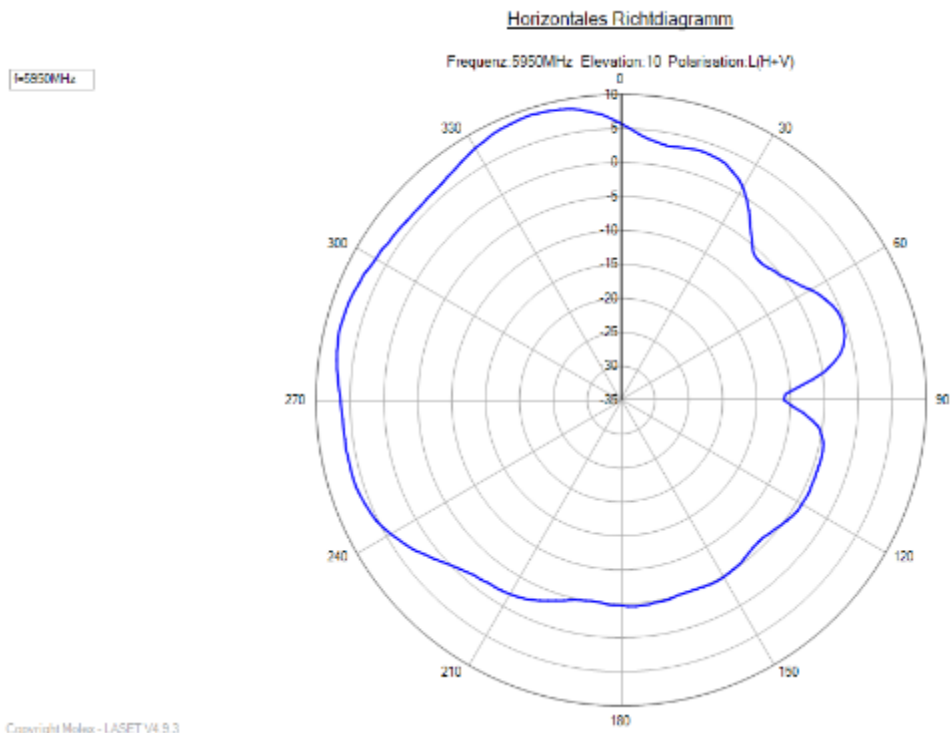
4.4.7 Radiation Pattern for Gain @ frequency range 5470 MHz -5725 MHz



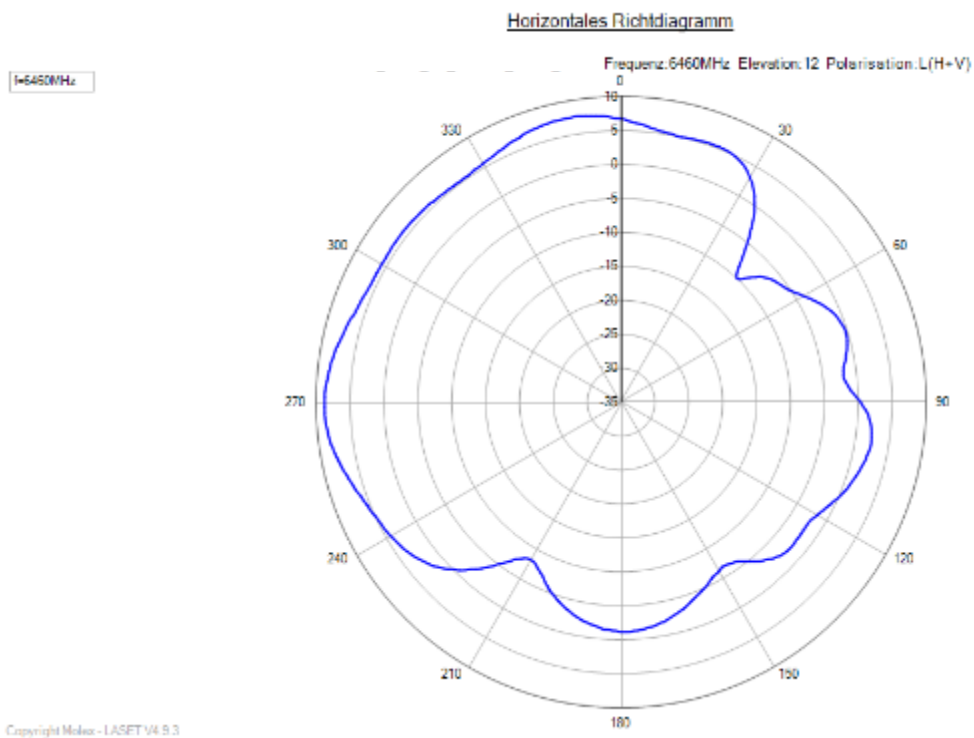
4.4.8 Radiation Pattern for Gain @ frequency range 5725 MHz -5850 MHz



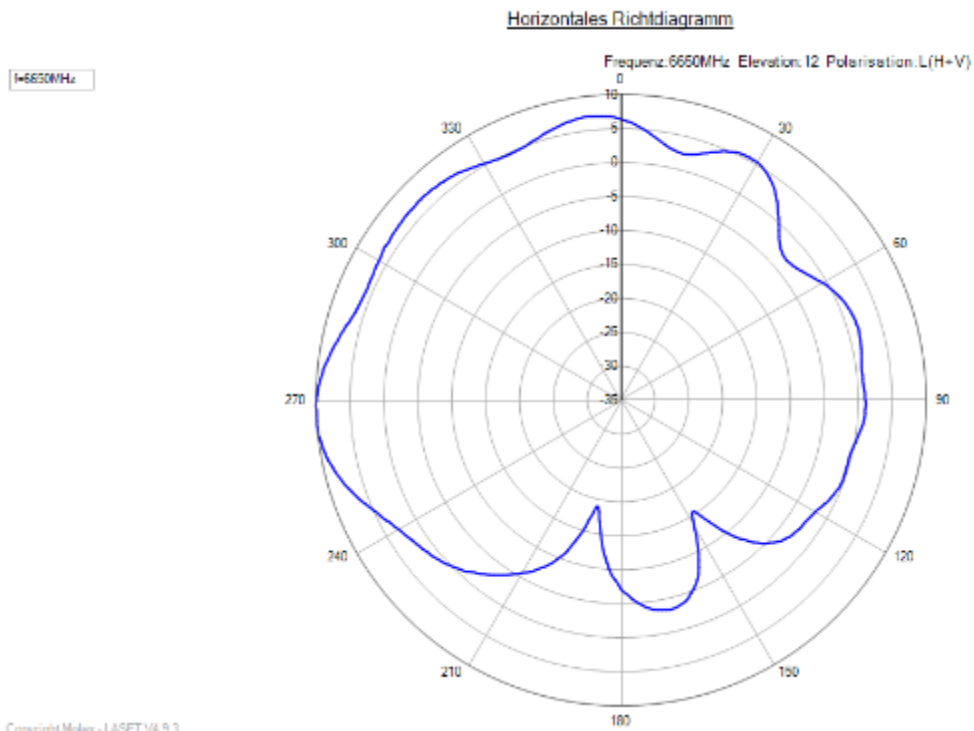
4.4.9 Radiation Pattern for Gain @ frequency range 5925 MHz -6425 MHz



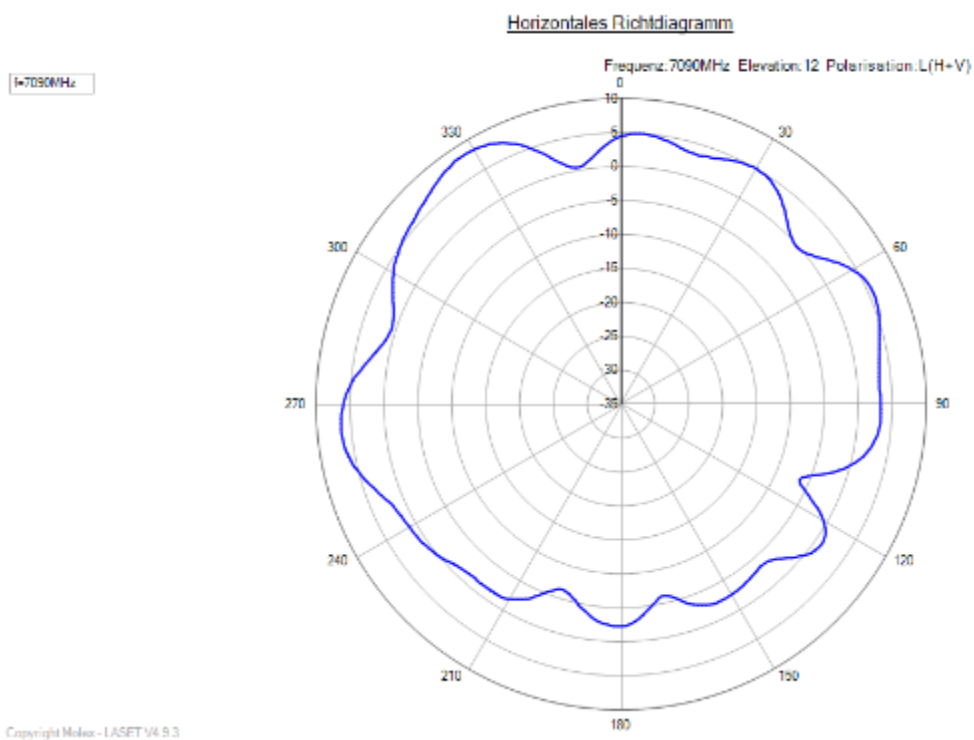
4.4.10 Radiation Pattern for Gain @ frequency range 6425 MHz -6525 MHz



4.4.11 Radiation Pattern for Gain @ frequency range 6525 MHz -6875 MHz



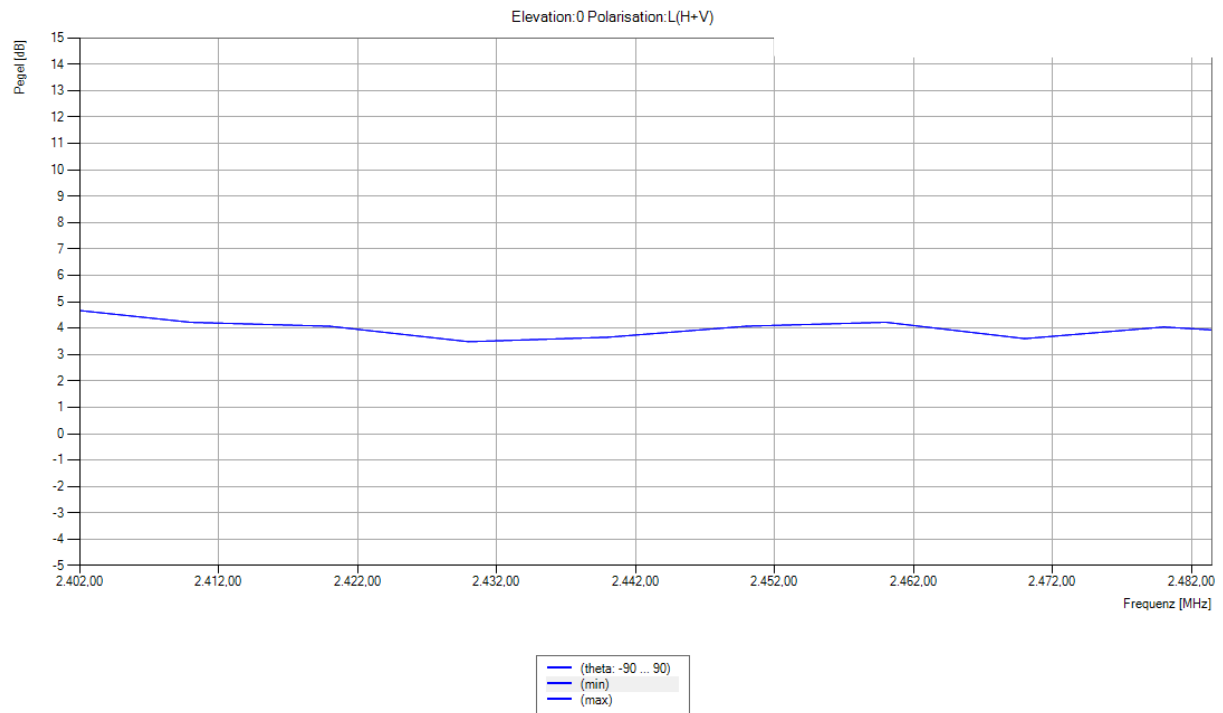
4.4.12 Radiation Pattern for Gain @ frequency range 6875 MHz -7125 MHz



4.5 WiFi 2 2.4 & 5/6 GHz Peak Gain

Band	frequency band in MHz		maximum gain
	begin	end	in freq. band in dBi
2,4 GHz	2402	2483,5	4,23
U-NII-1	5150	5250	7,73
U-NII-2A	5250	5350	7,95
U-NII-2C	5470	5725	5,40
U-NII-3	5725	5850	6,15
U-NII-5	5925	6425	9,01
U-NII-6	6425	6525	8,60
U-NII-7	6525	6875	9,34
U-NII-8	6875	7125	8,22

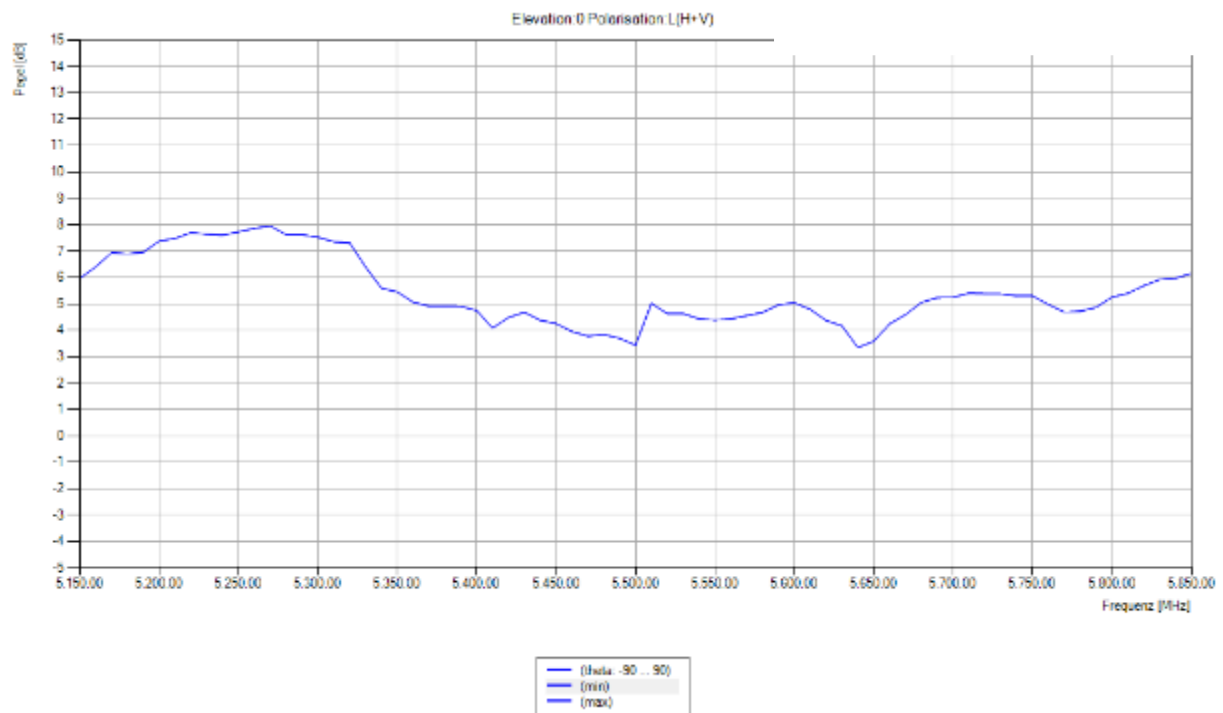
4.5.1 Peak gain over Frequency 2,4 GHz



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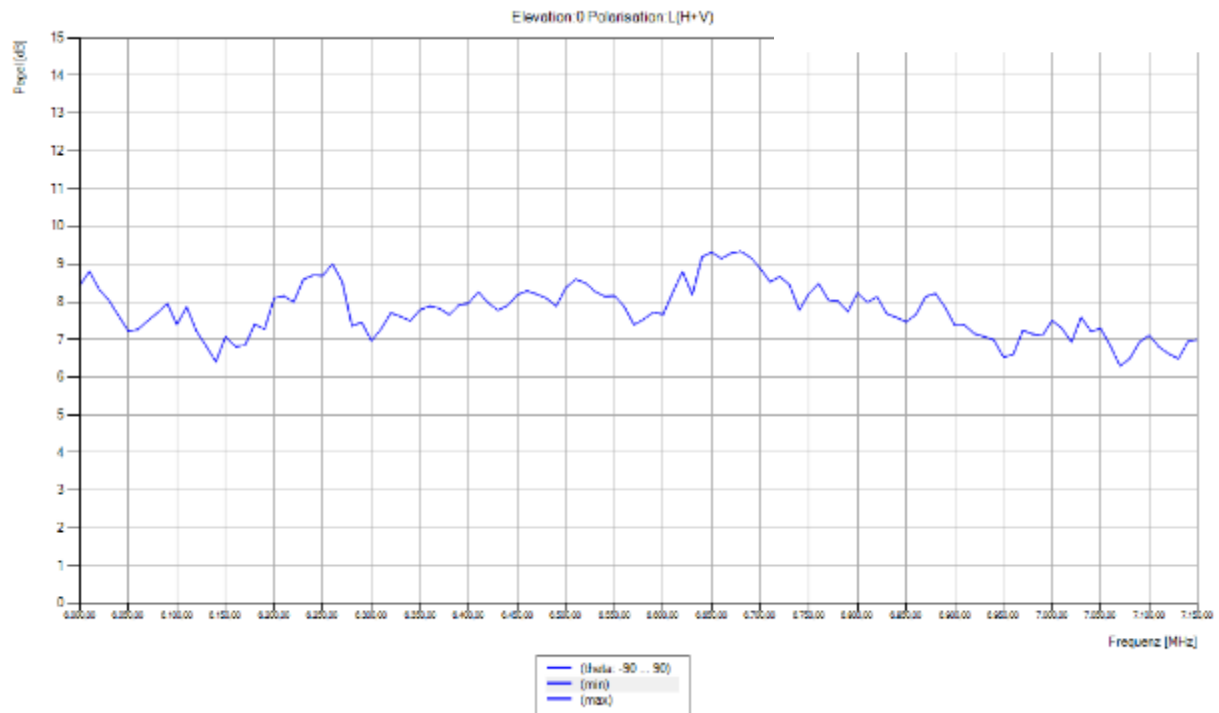
4.5.2 Peak gain over Frequency 5 GHz



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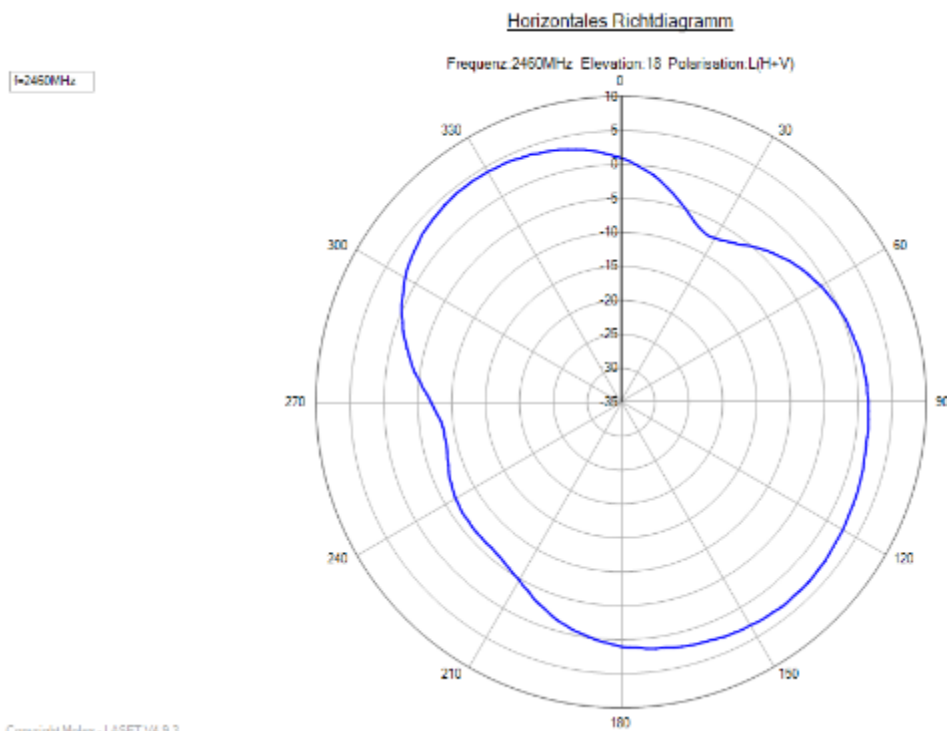
4.5.3 Peak gain over Frequency 6 GHz



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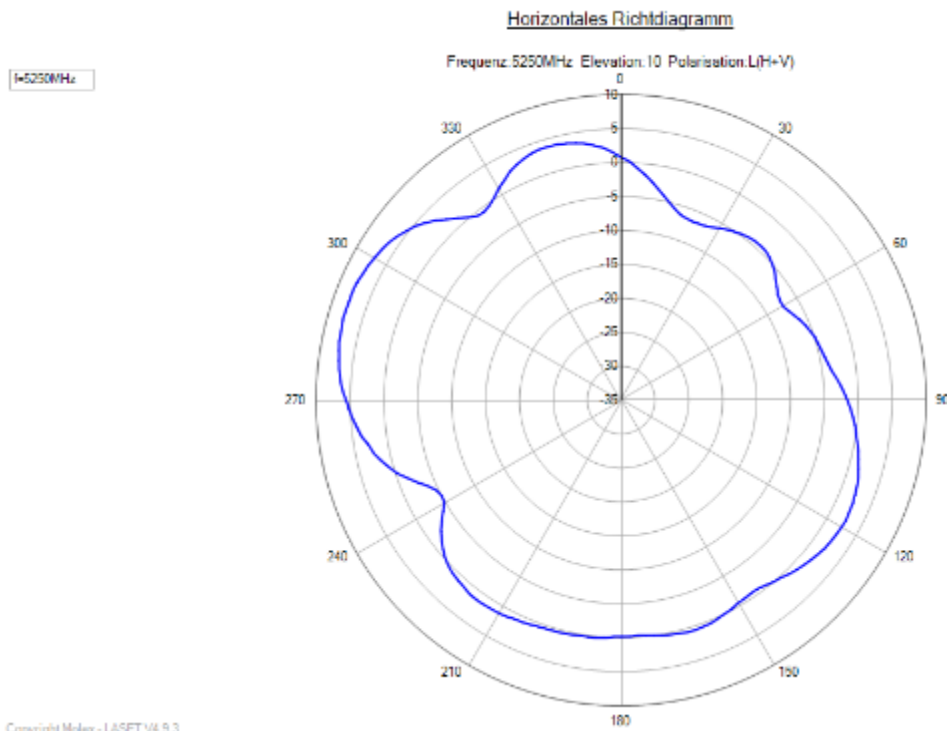
4.5.4 Radiation Pattern for Gain @ frequency range 2402 MHz -2483,5 MHz



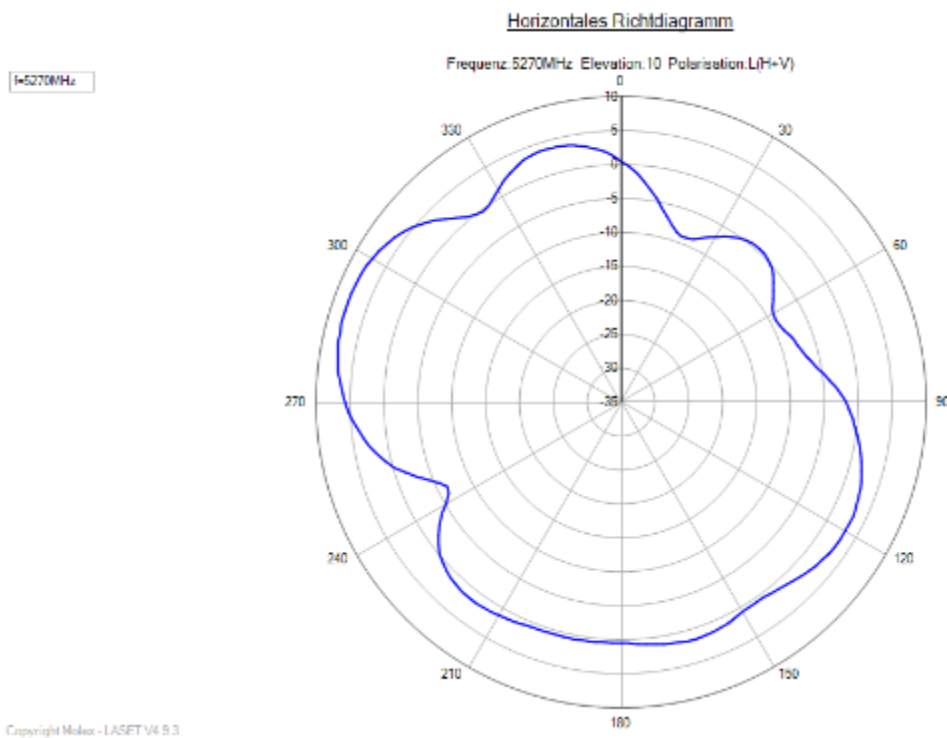
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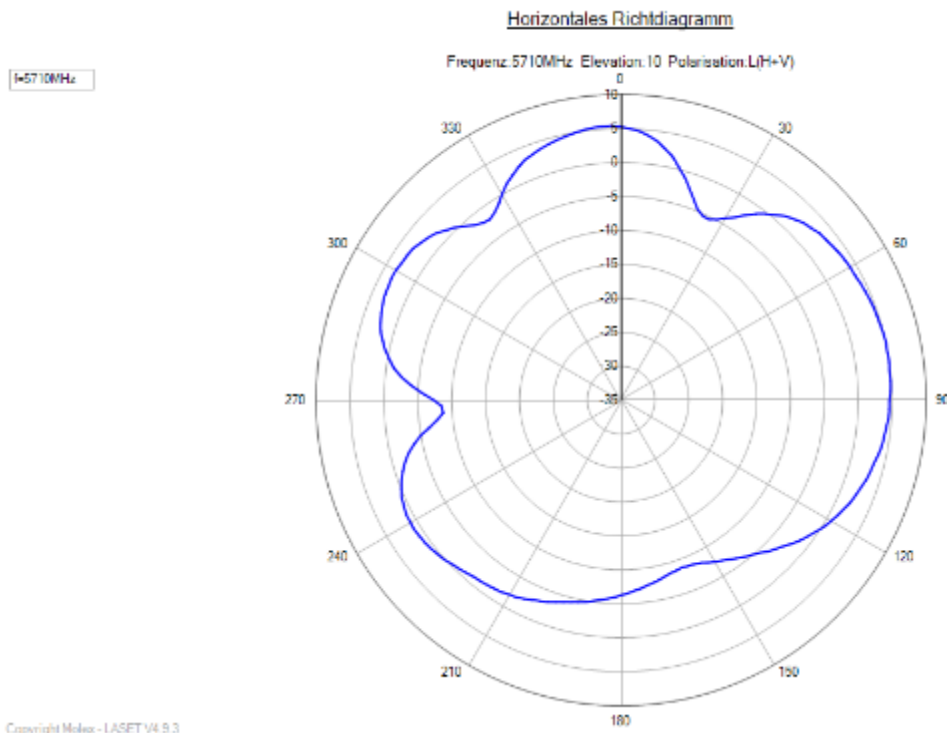
4.5.5 Radiation Pattern for Gain @ frequency range 5150 MHz -5250 MHz



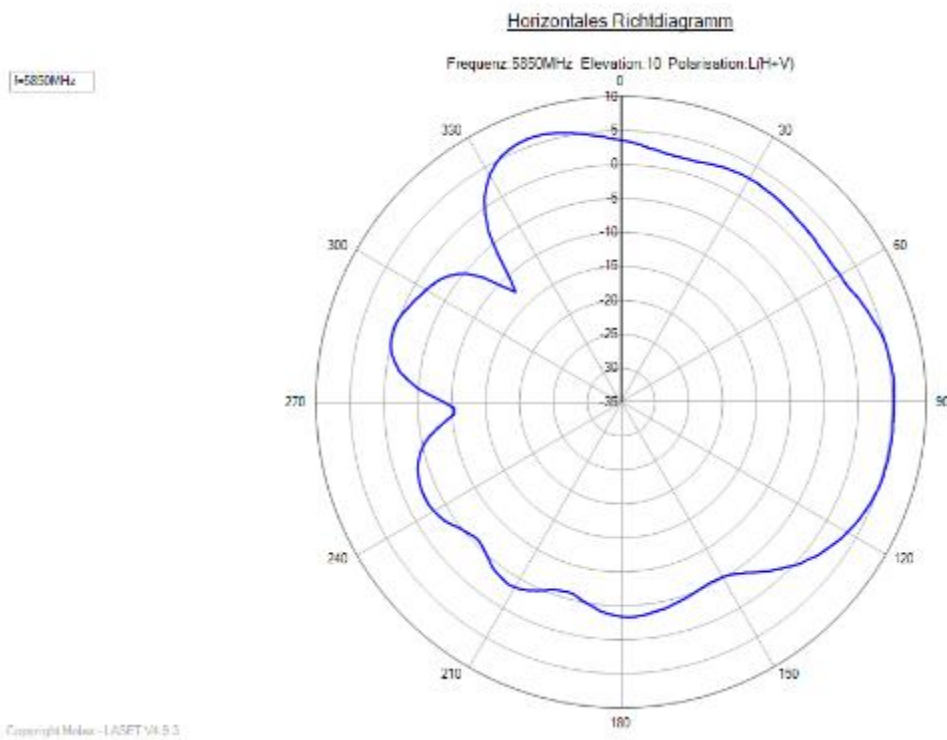
4.5.6 Radiation Pattern for Gain @ frequency range 5250 MHz -5350 MHz



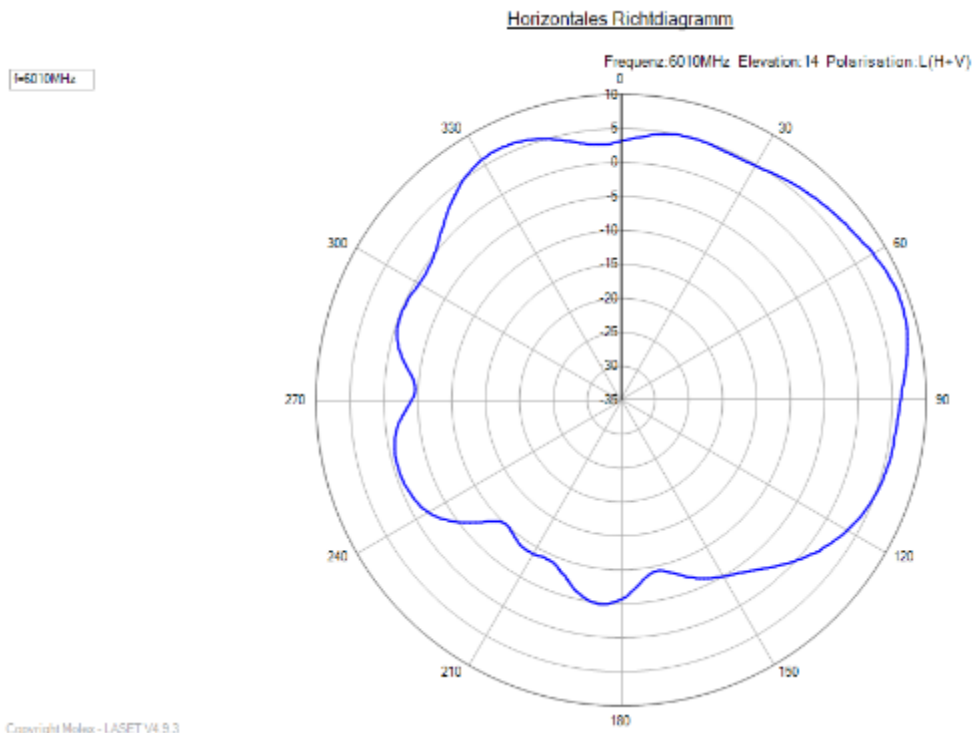
4.5.7 Radiation Pattern for Gain @ frequency range 5470 MHz -5725 MHz



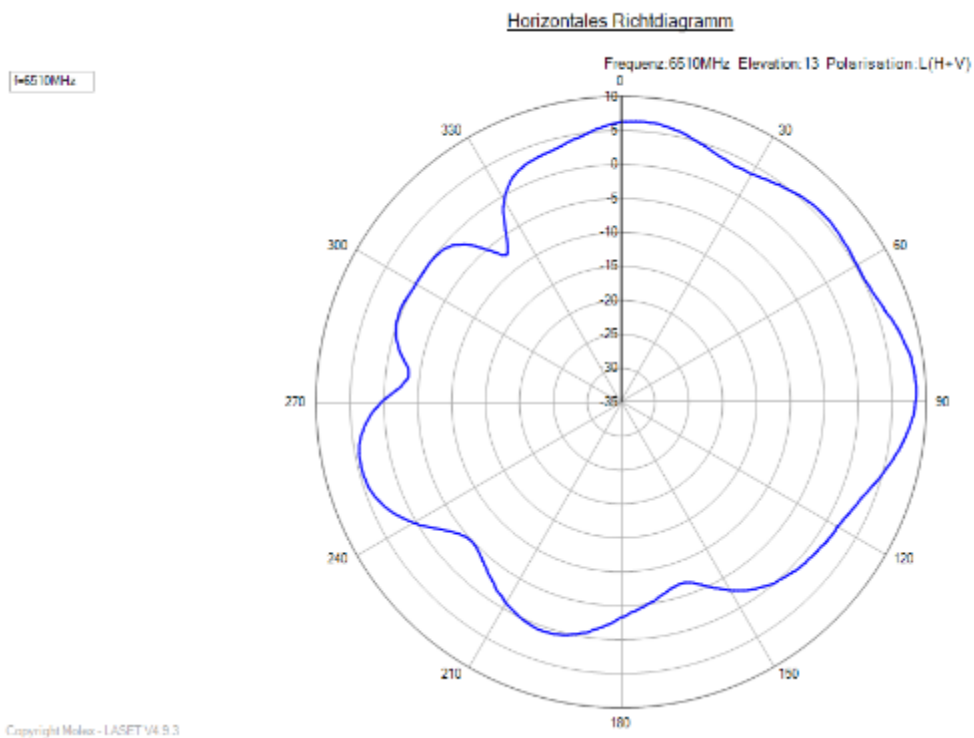
4.5.8 Radiation Pattern for Gain @ frequency range 5725 MHz -5850 MHz



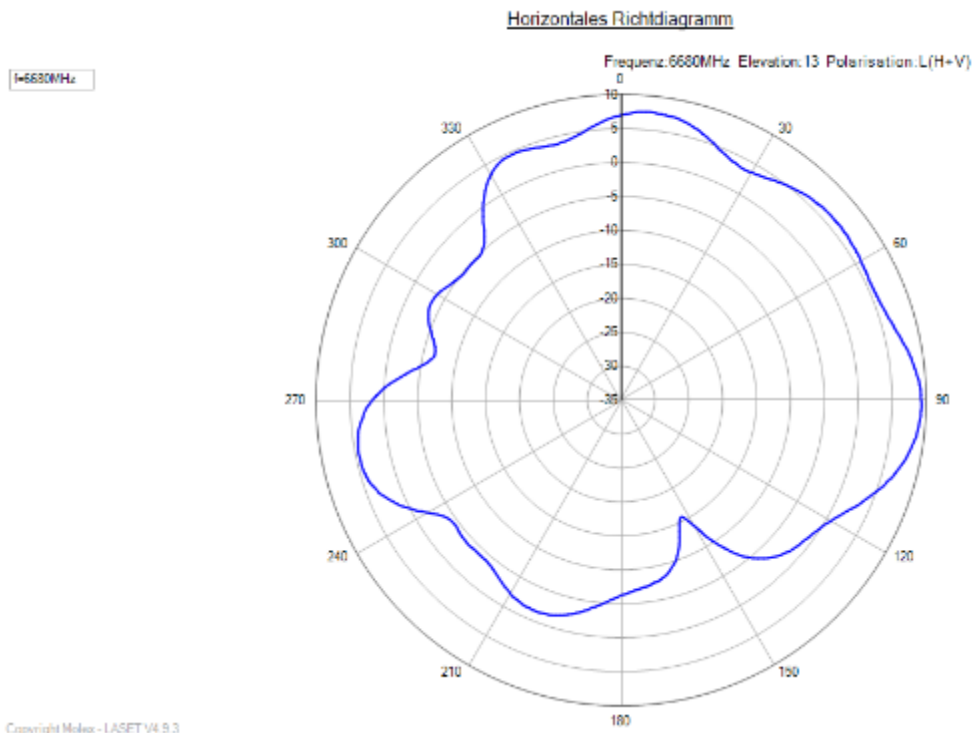
4.5.9 Radiation Pattern for Gain @ frequency range 5925 MHz -6425 MHz



4.5.10 Radiation Pattern for Gain @ frequency range 6425 MHz -6525 MHz



4.5.11 Radiation Pattern for Gain @ frequency range 6525 MHz -6875 MHz



4.5.12 Radiation Pattern for Gain @ frequency range 6875 MHz -7125 MHz

