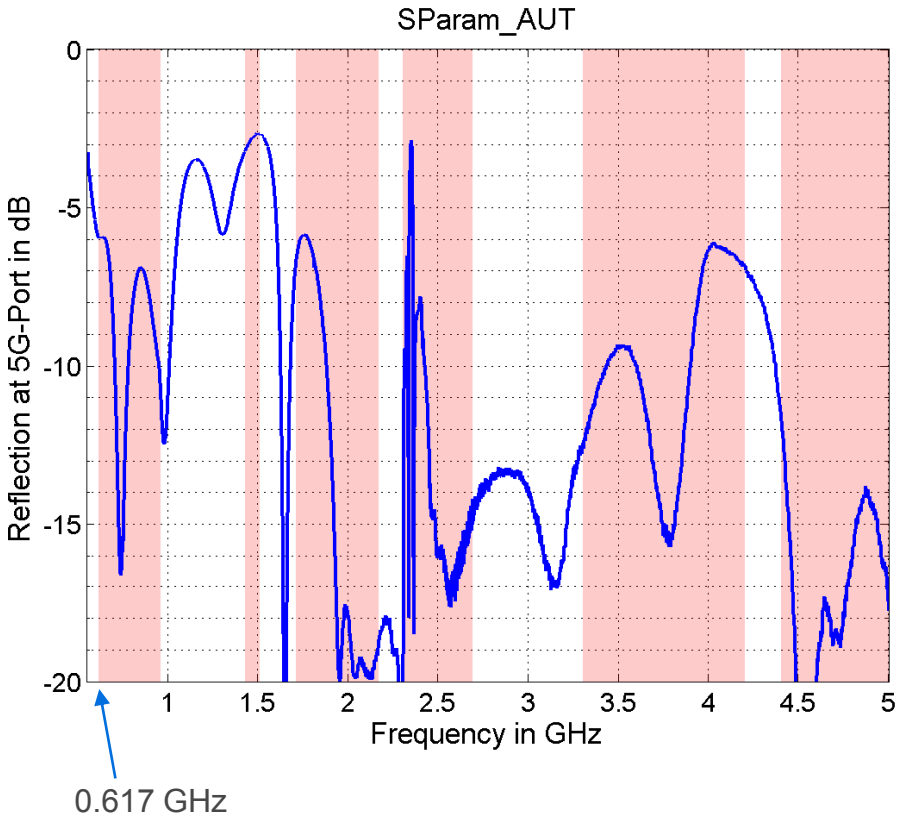
4. Data Variant B

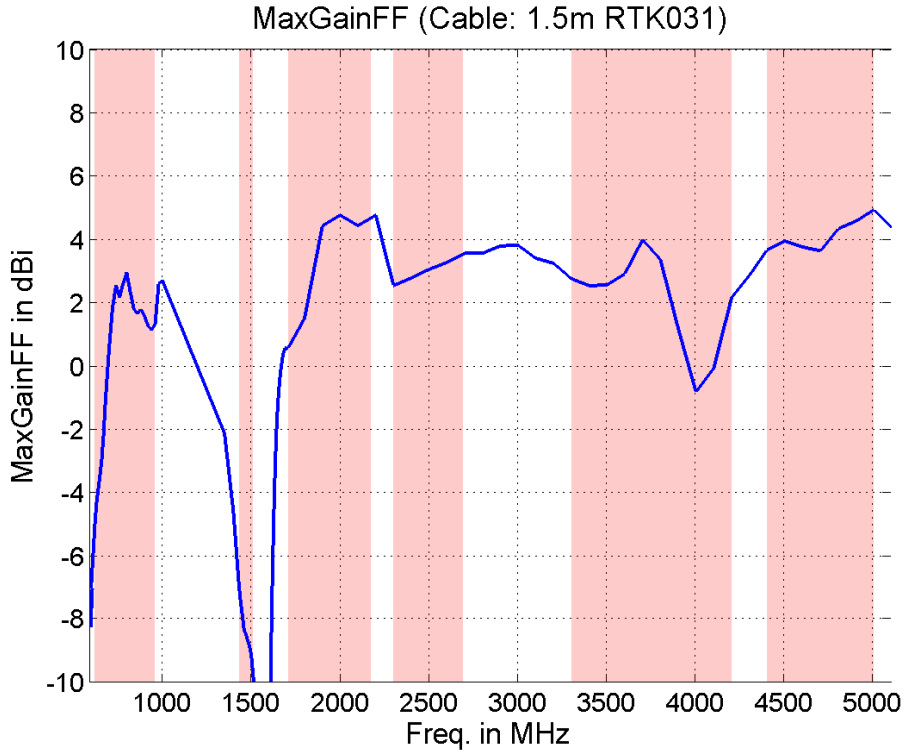
2xLTE, 1xGNSS, BT, SDARS

4.1 LTE Front

4.1 Variant B: LTE Antenna Performance Matching (LTE front)

Chamber

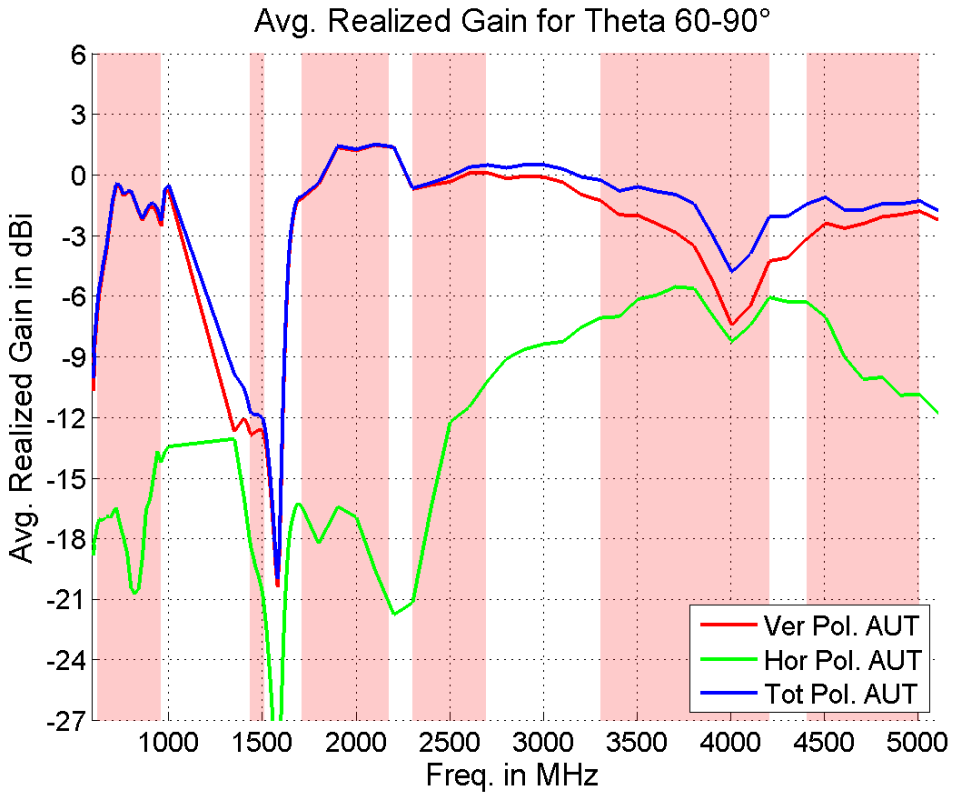


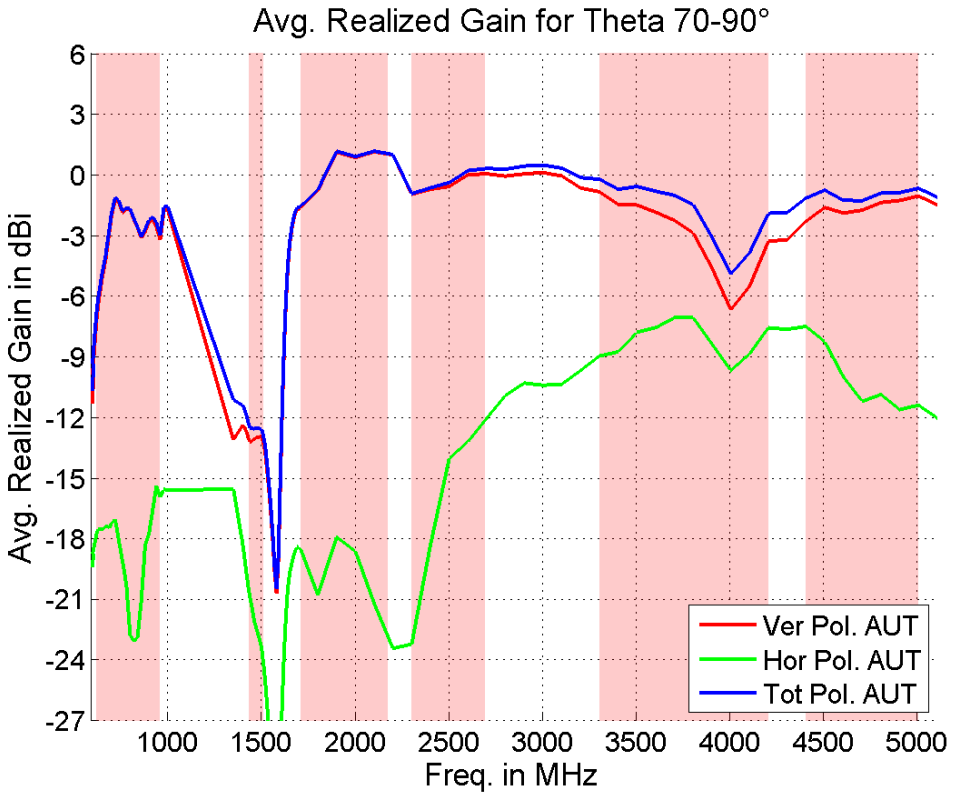


- The MaxGainFF-values are determined with 1.5m RTK031 cable (attenuation added to the measurement results).
- See attached file “Audi_CS_S10_VariantB_LTEf_gain_maxFF.csv” for the equivalent raw MaxGainFF-data.

4.1 Variant B: LTE Antenna Performance Gain and Efficiency (LTE front)

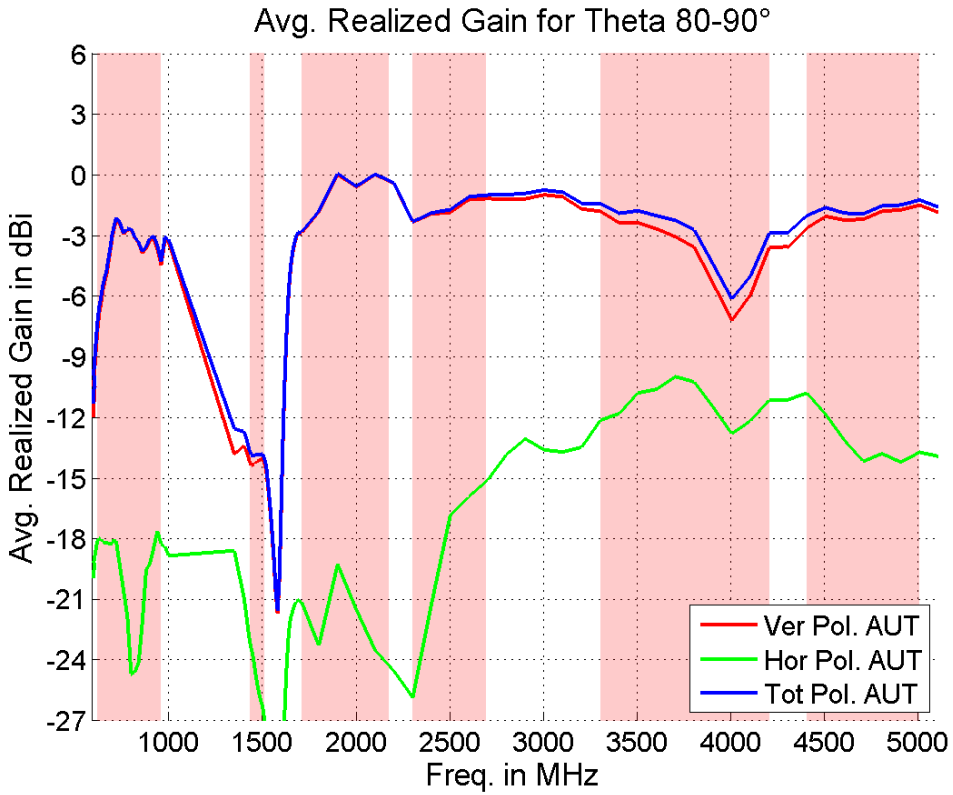
Chamber

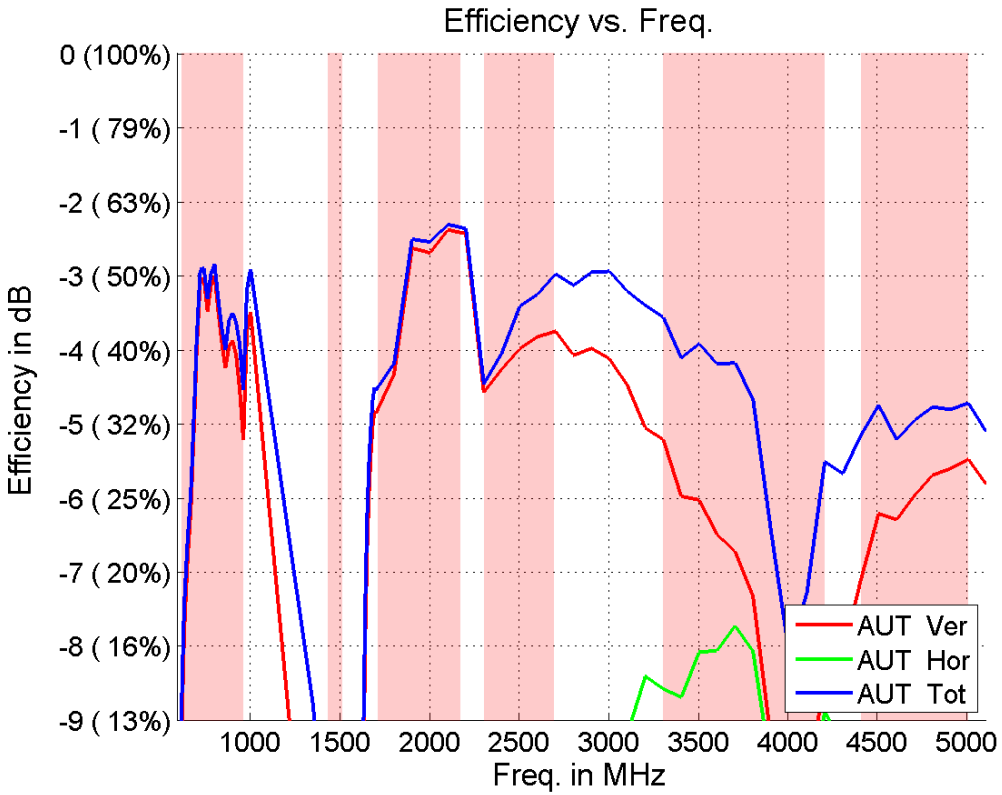




4.1 Variant B: LTE Antenna Performance Gain and Efficiency (LTE front)

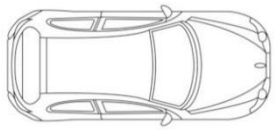
Chamber



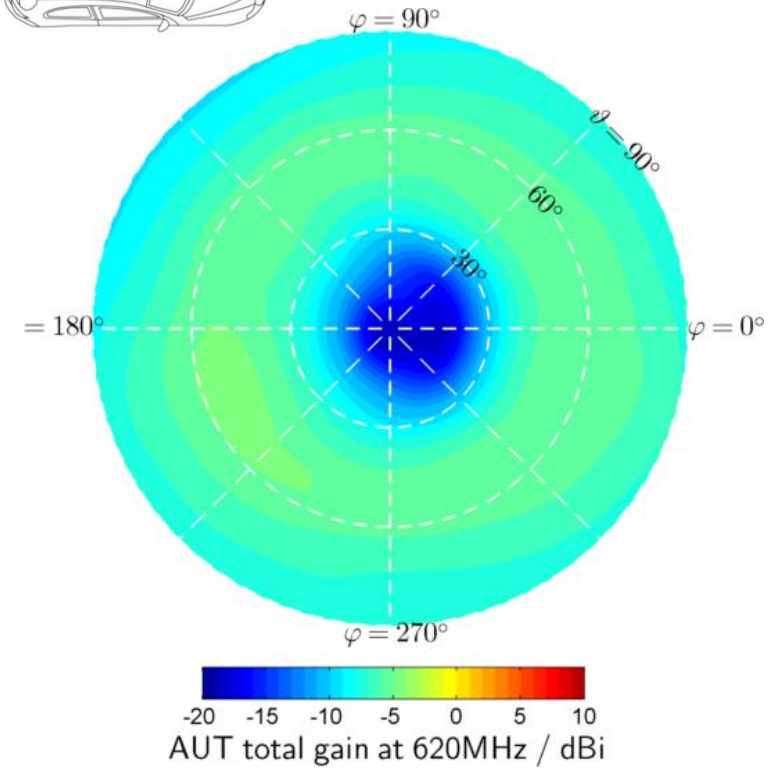


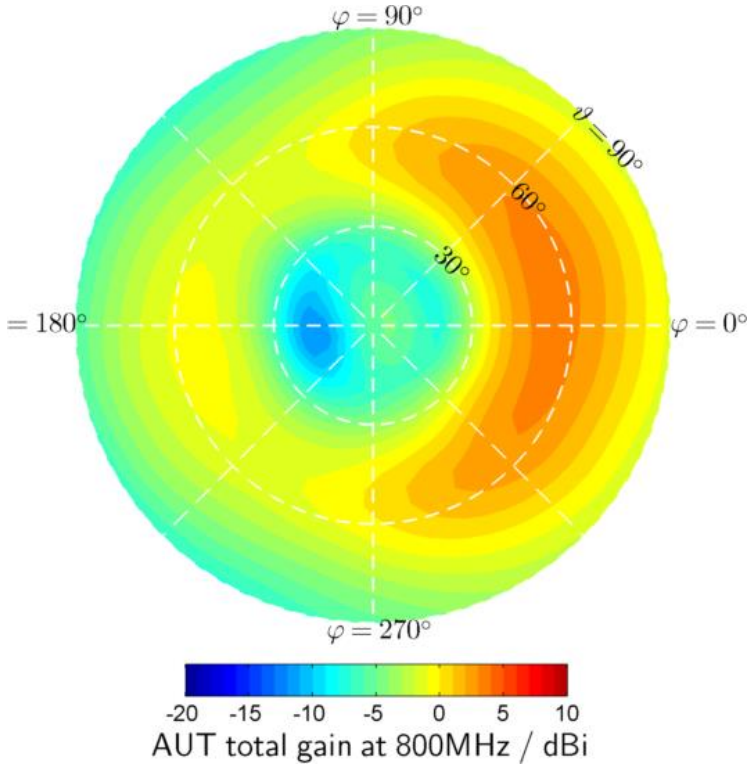
4.1 Variant B: LTE Antenna Performance 3D-Chart (LTE front)

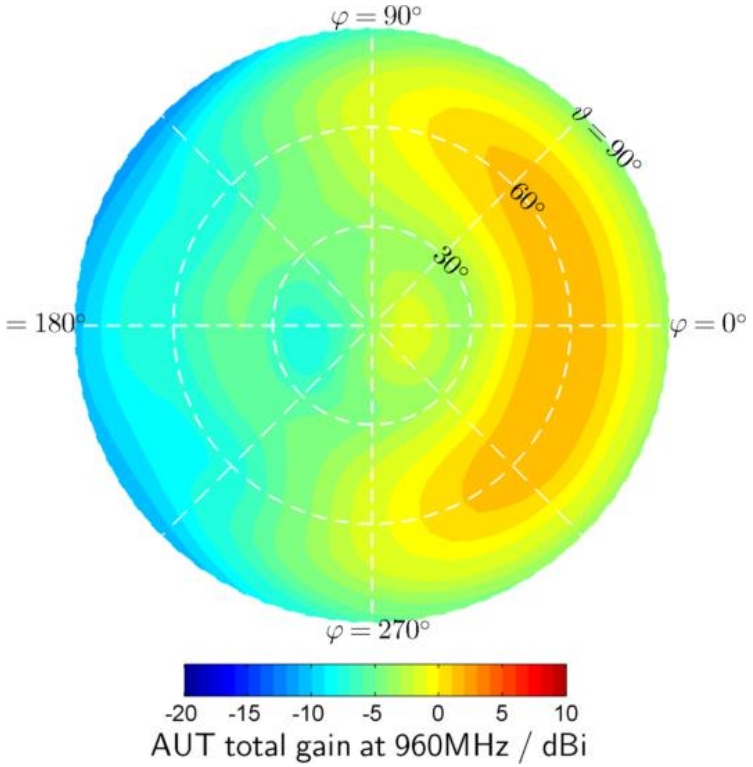
Chamber



Driving Direction

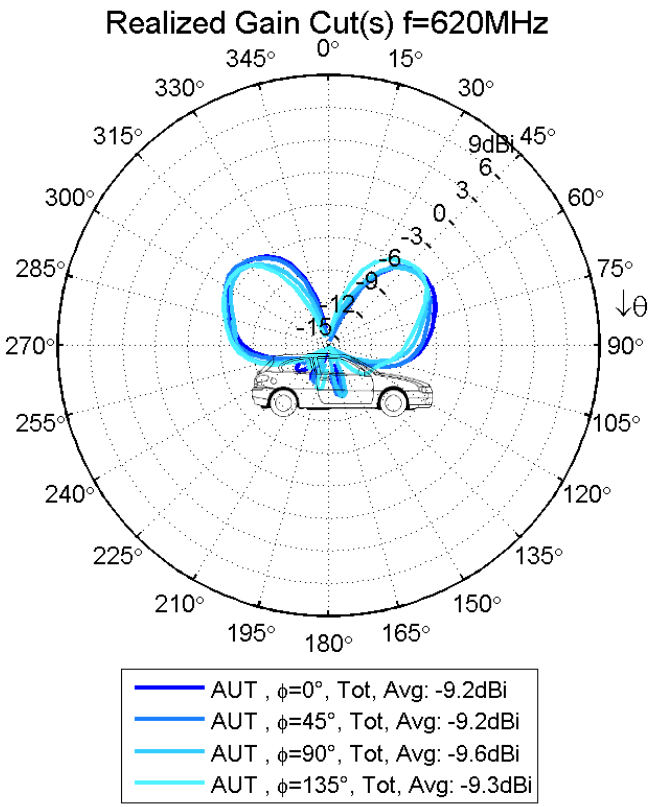


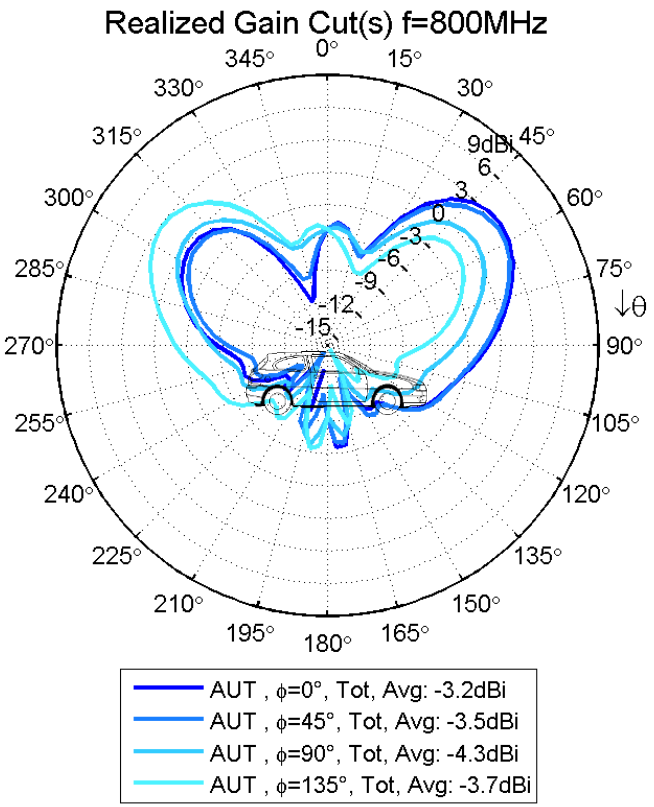


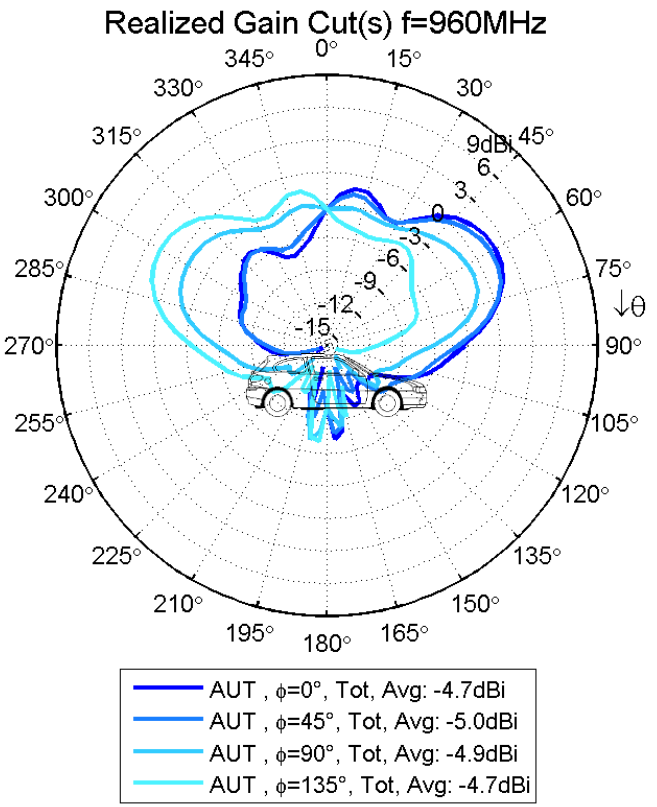


4.1 Variant B: LTE Antenna Performance Gain-Cuts (LTE front)

Chamber

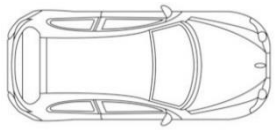




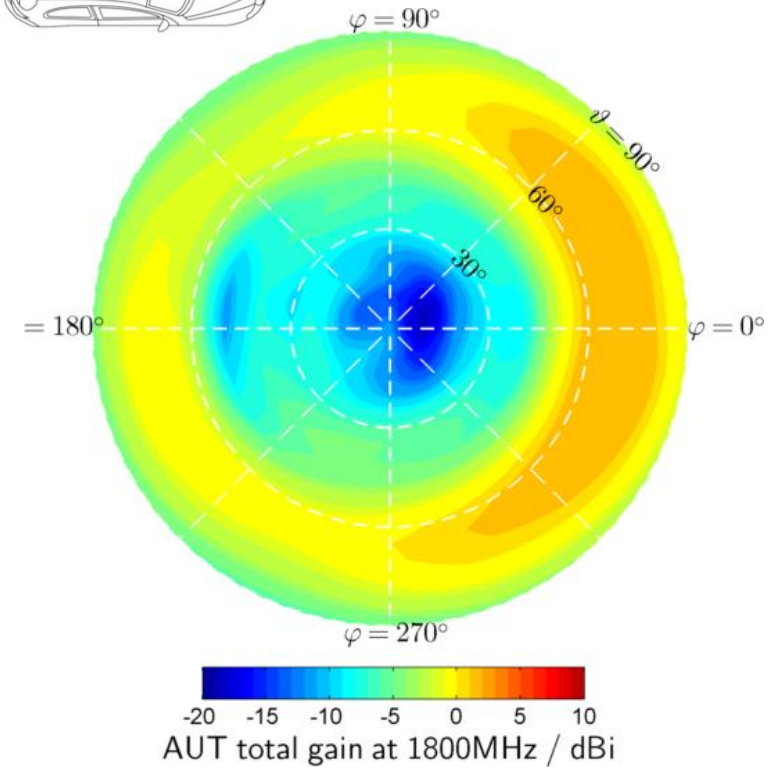


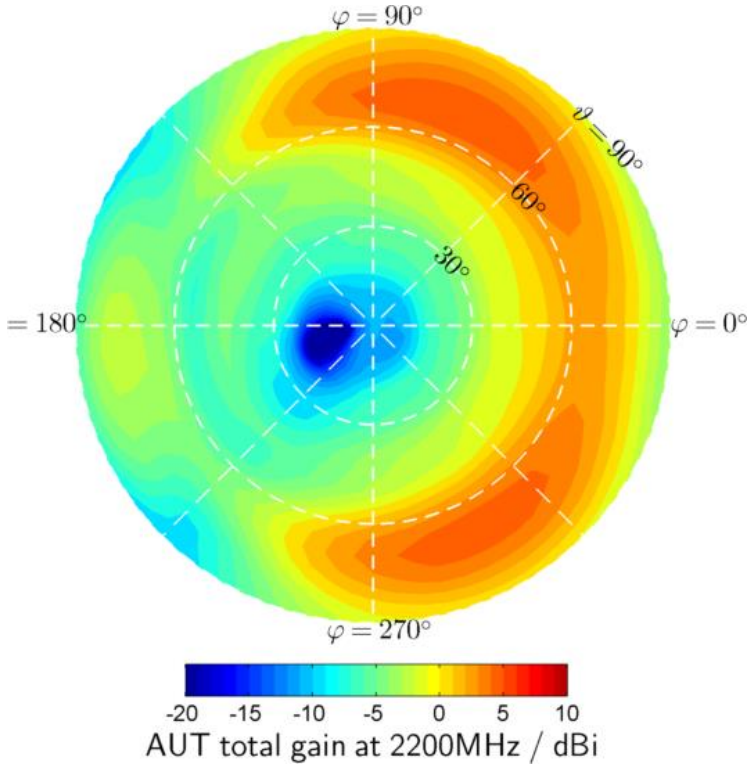
4.1 Variant B: LTE Antenna Performance 3D-Chart (LTE front)

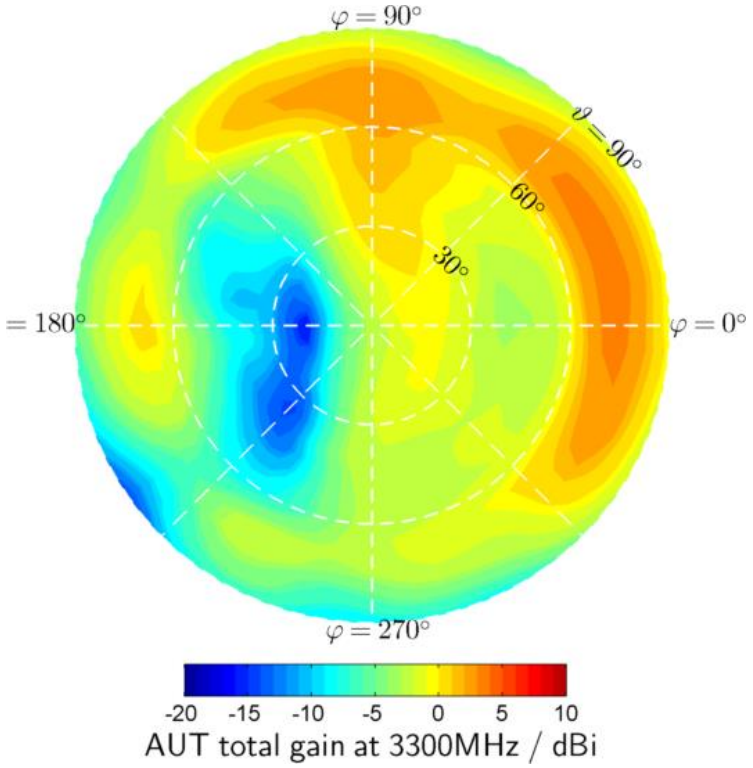
Chamber



Driving Direction

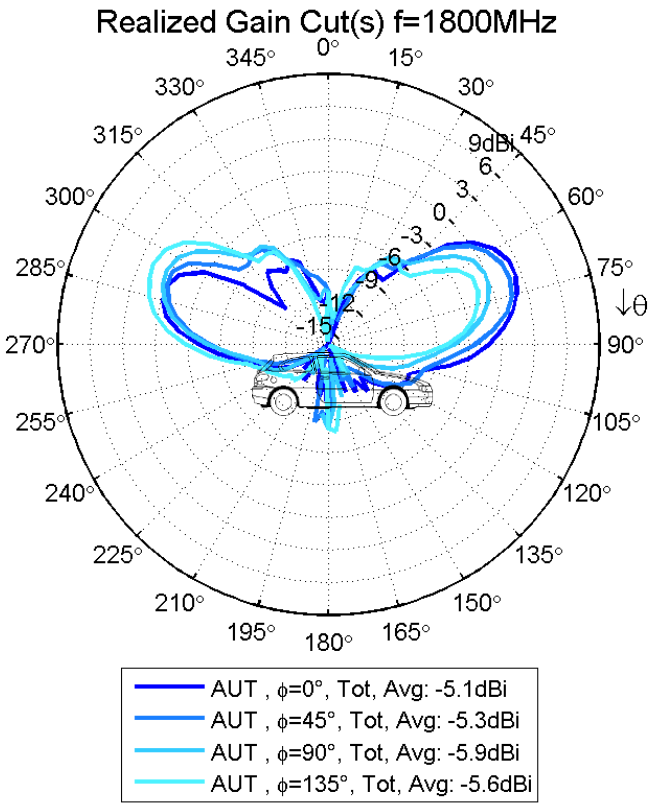


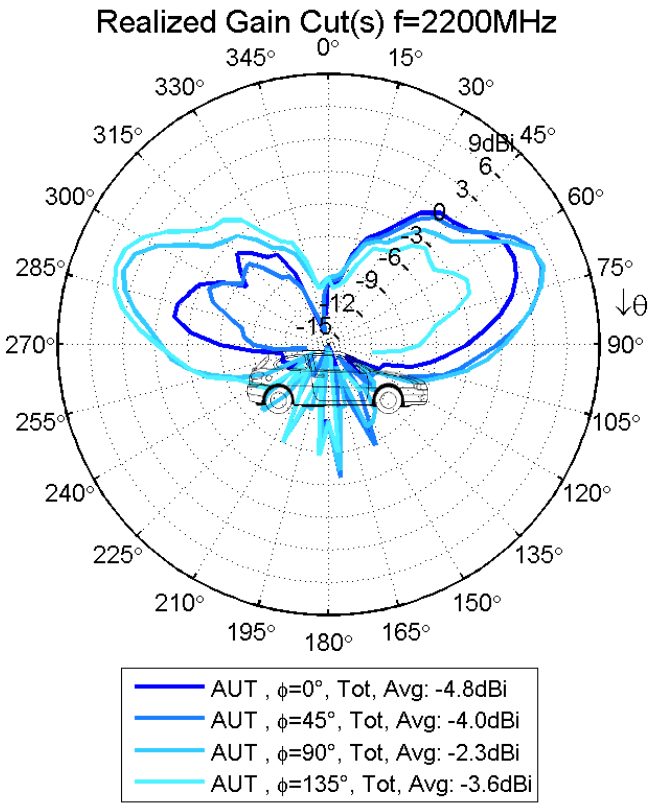


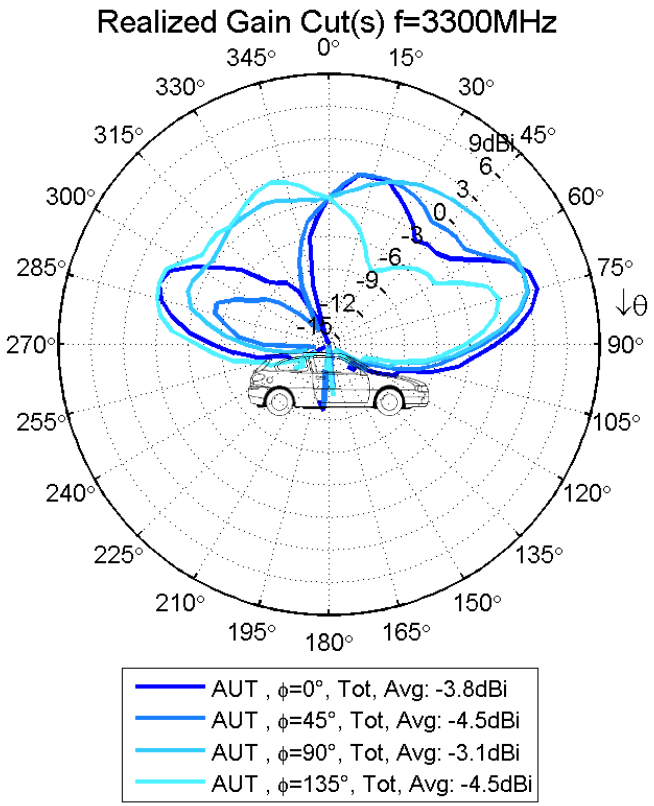


4.1 Variant B: LTE Antenna Performance Gain-Cuts (LTE front)

Chamber

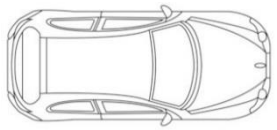




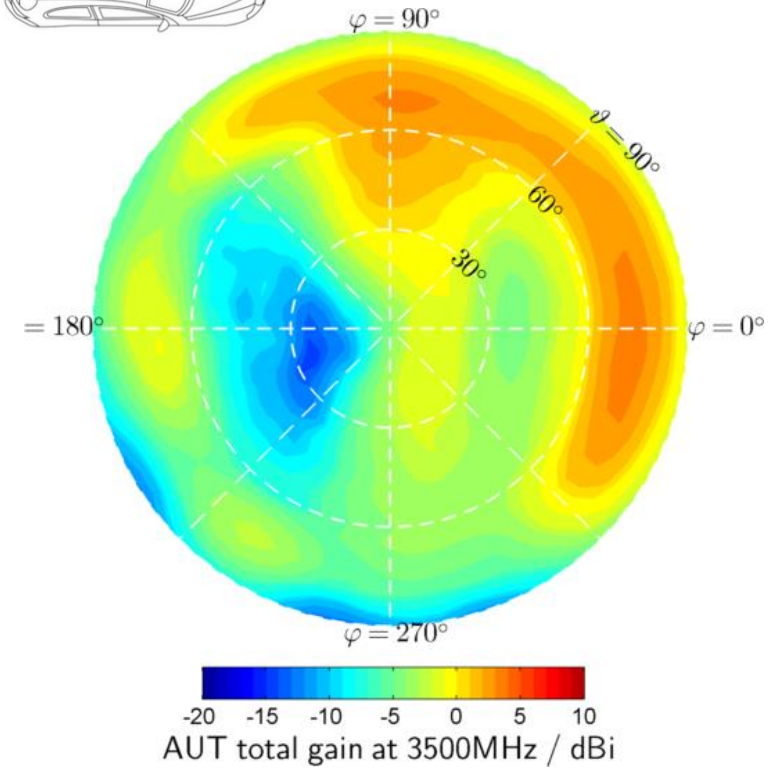


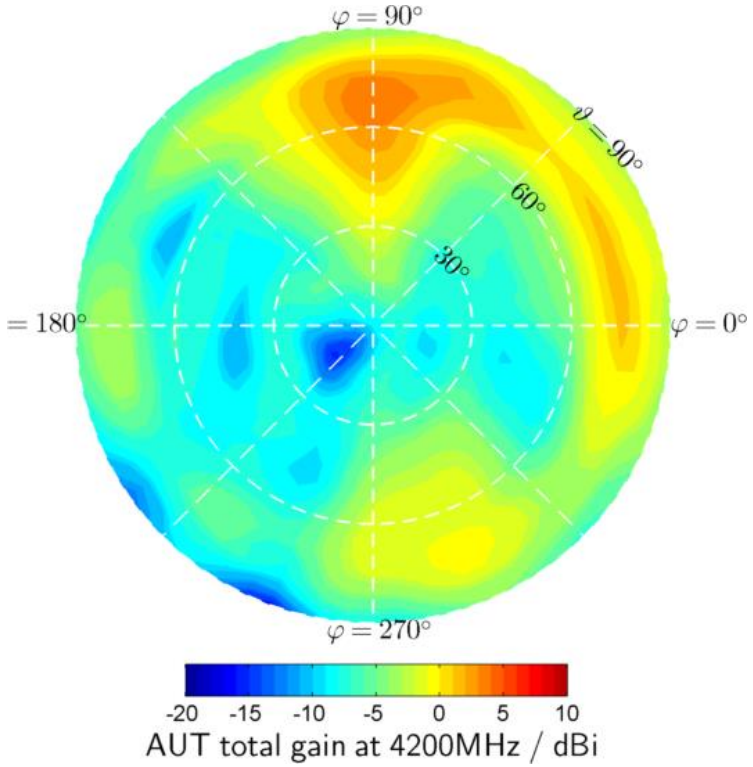
4.1 Variant B: LTE Antenna Performance 3D-Chart (LTE front)

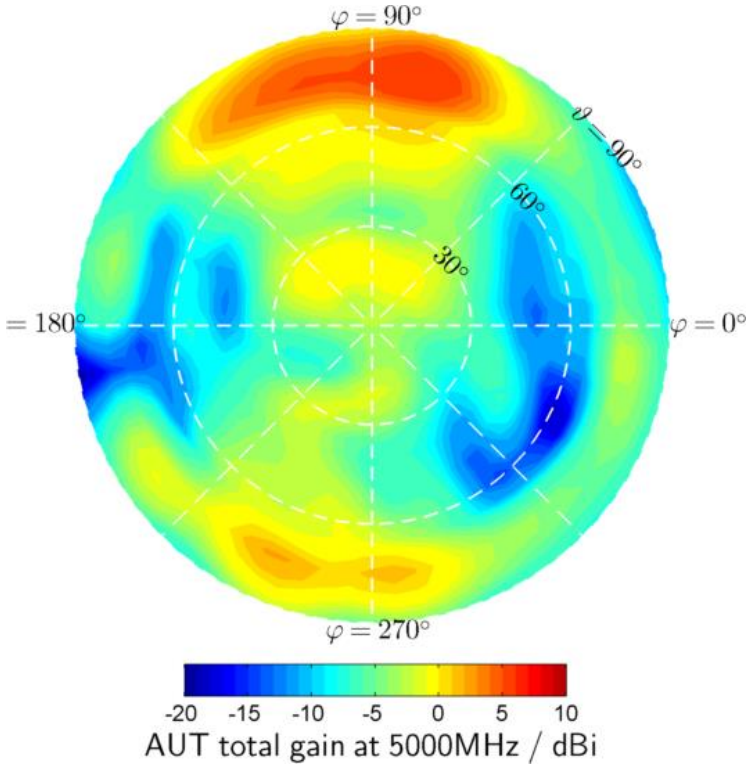
Chamber



Driving Direction

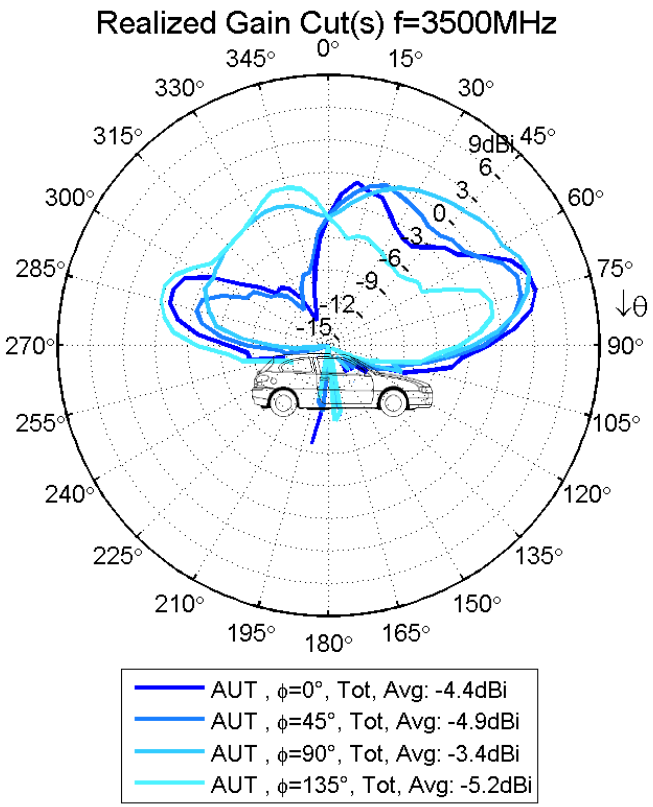


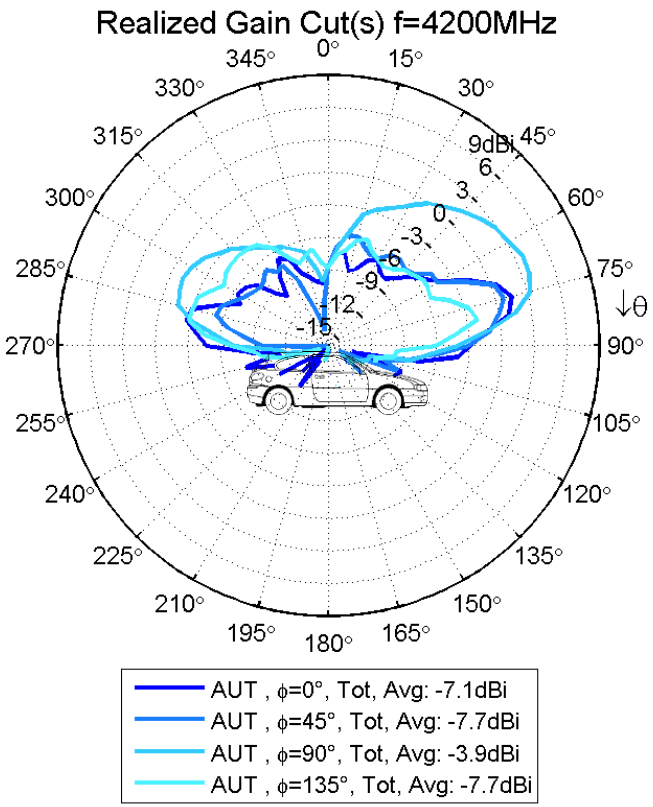


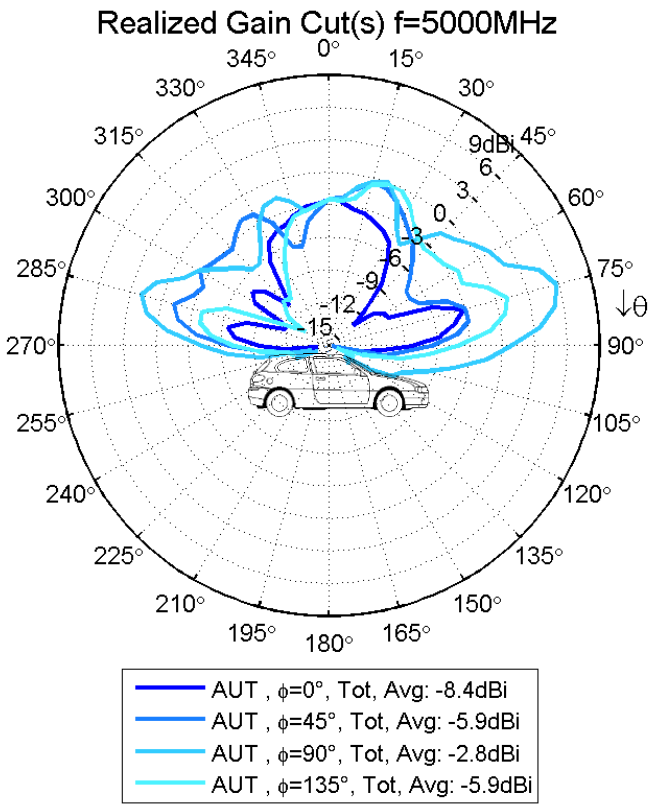


4.1 Variant B: LTE Antenna Performance Gain-Cuts (LTE front)

Chamber



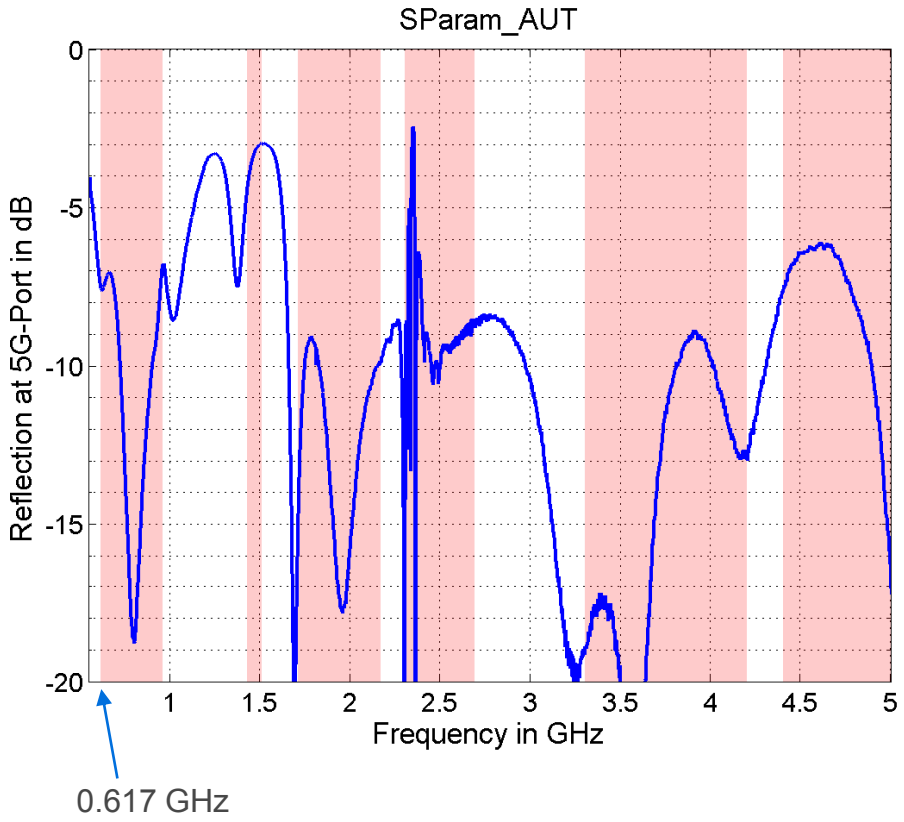


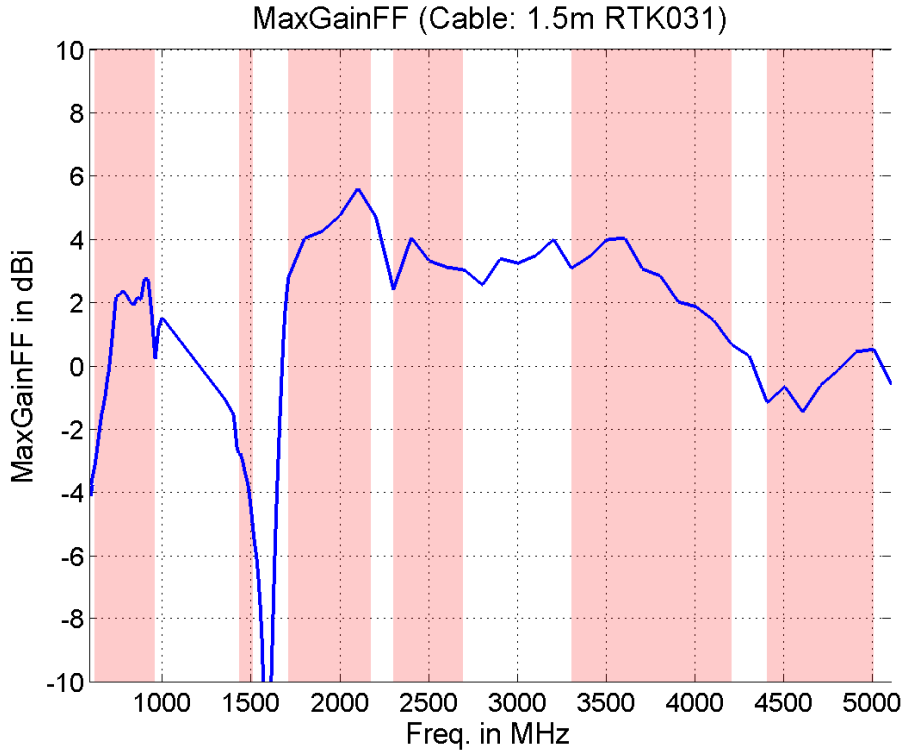


4.2 LTE Back

4.2 Variant B: LTE Antenna Performance Matching (LTE back)

Chamber

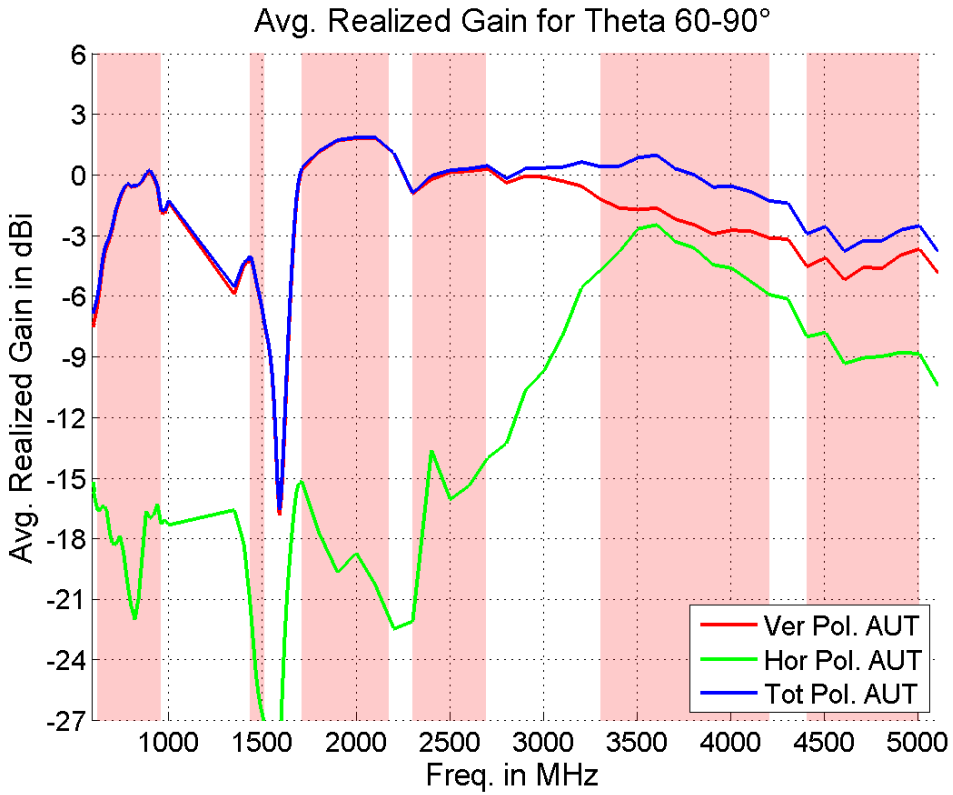


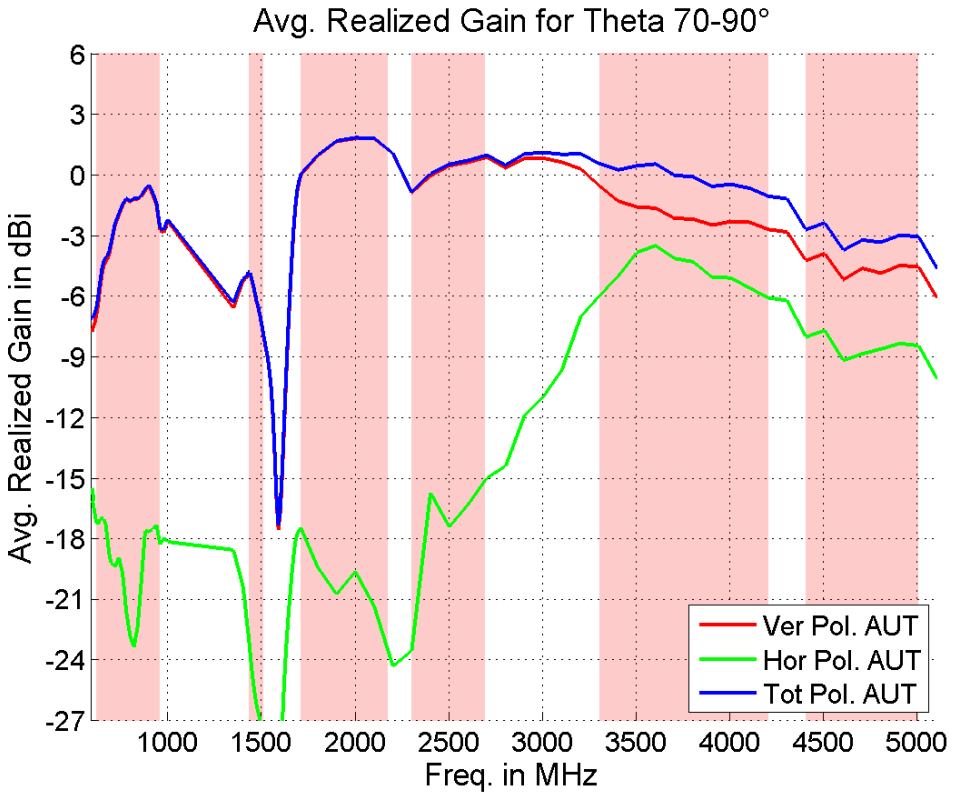


- The MaxGainFF-values are determined with 1.5m RTK031 cable (attenuation added to the measurement results).
- See attached file “Audi_CS_S10_VariantB_LTEb_gain_maxFF.csv” for the equivalent raw MaxGainFF-data.

4.2 Variant B: LTE Antenna Performance Gain and Efficiency (LTE back)

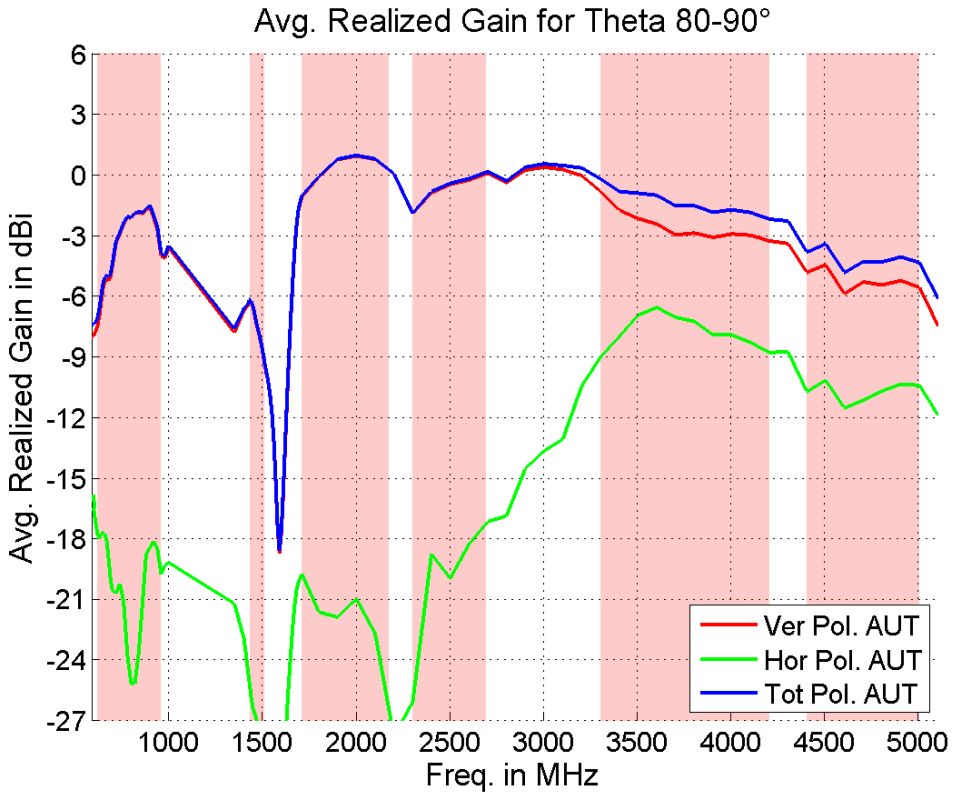
Chamber

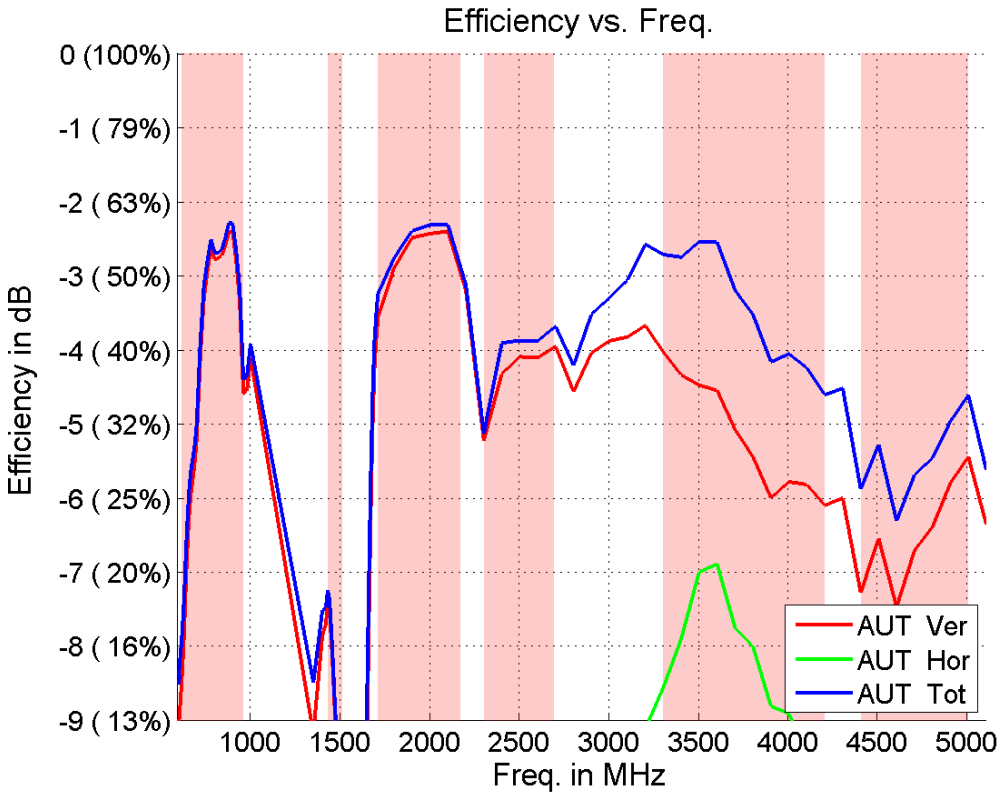




4.2 Variant B: LTE Antenna Performance Gain and Efficiency (LTE back)

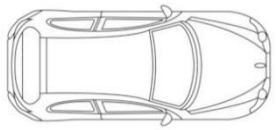
Chamber



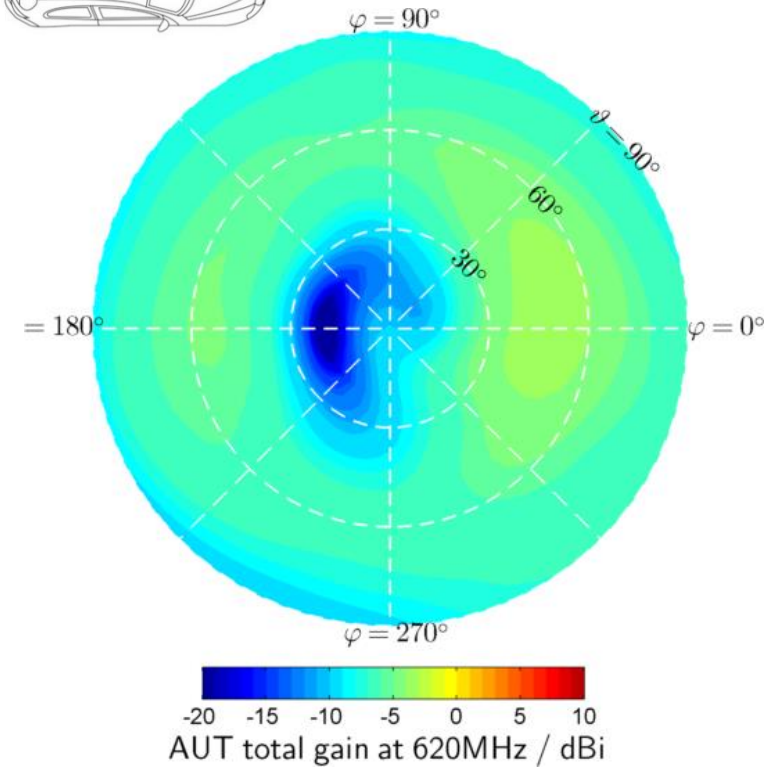


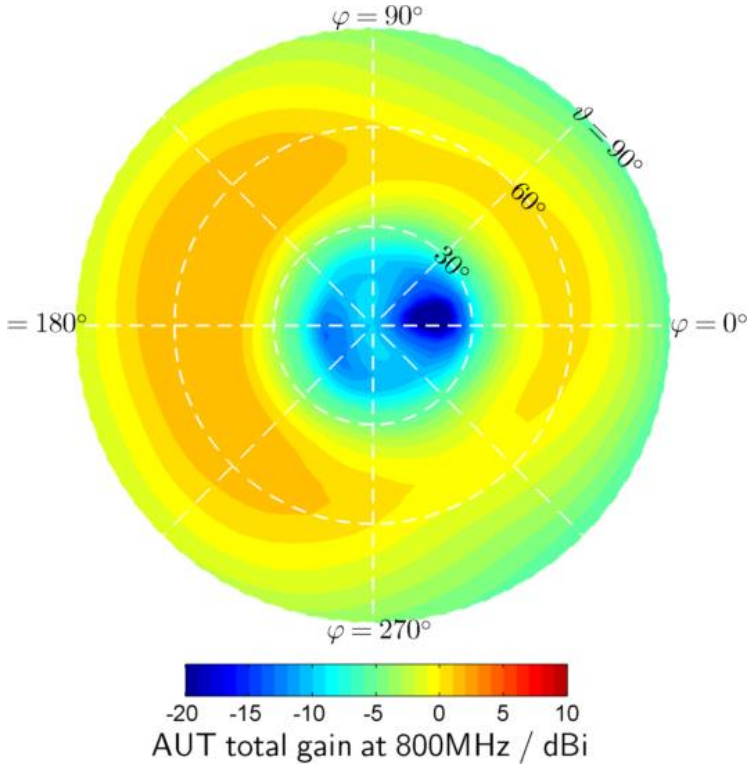
4.2 Variant B: LTE Antenna Performance 3D-Chart (LTE back)

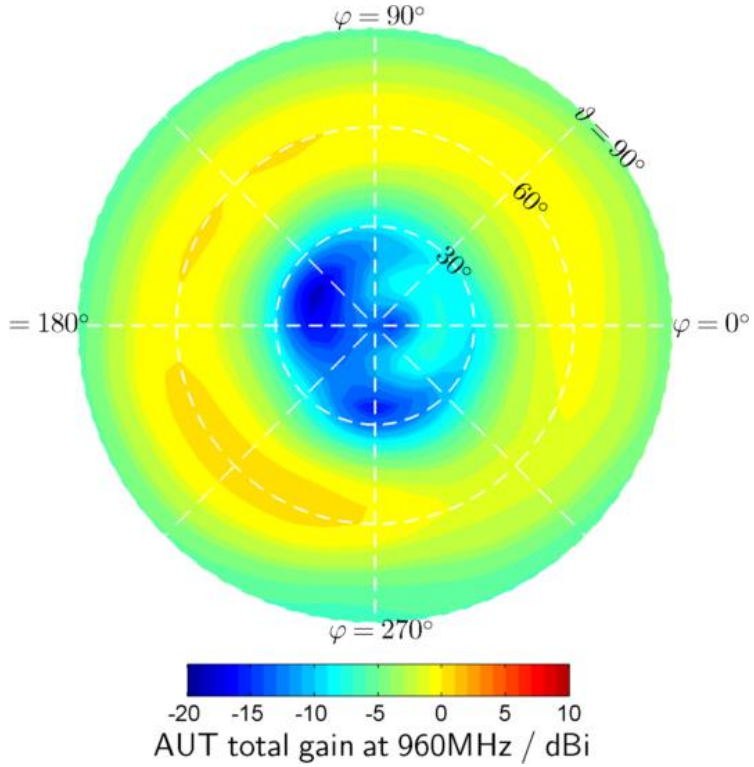
Chamber



Driving Direction

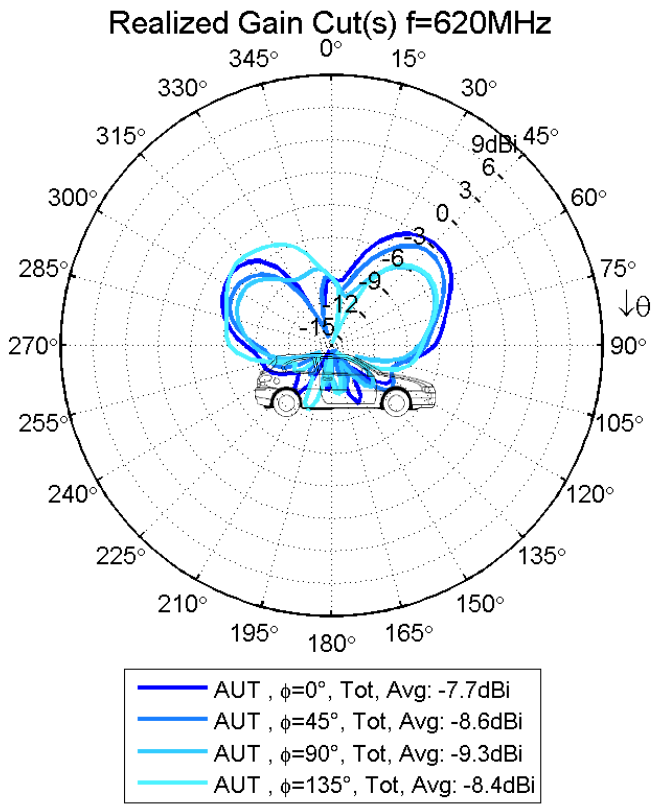


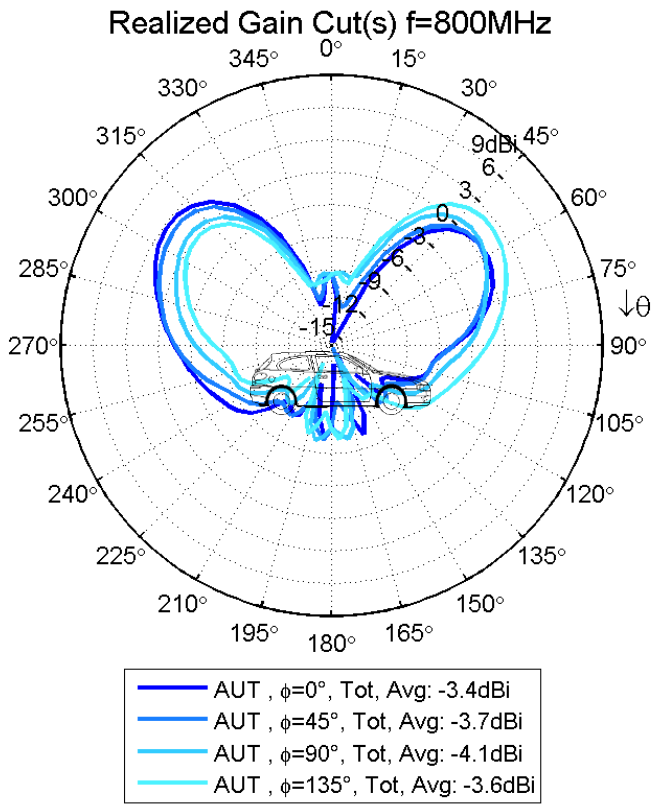


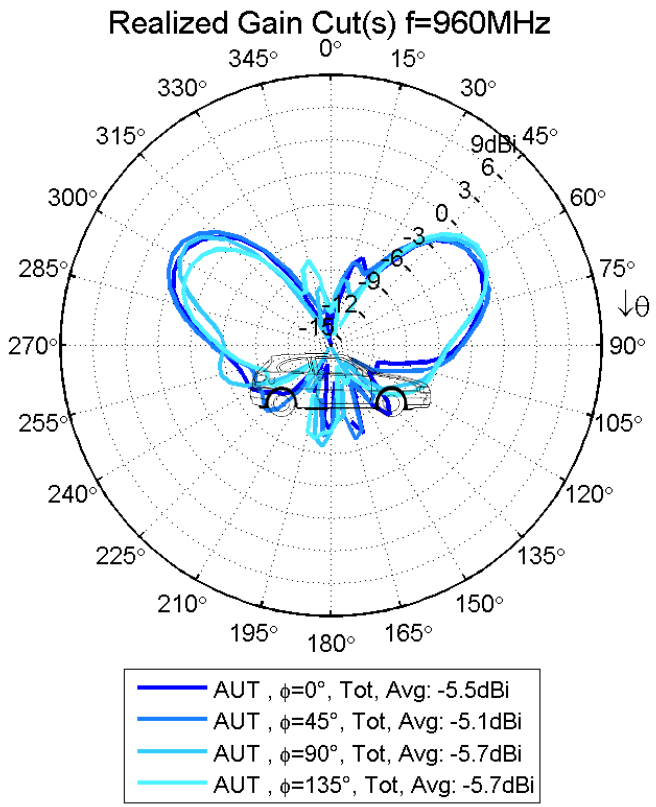


4.2 Variant B: LTE Antenna Performance Gain-Cuts (LTE back)

Chamber

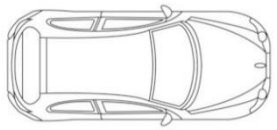




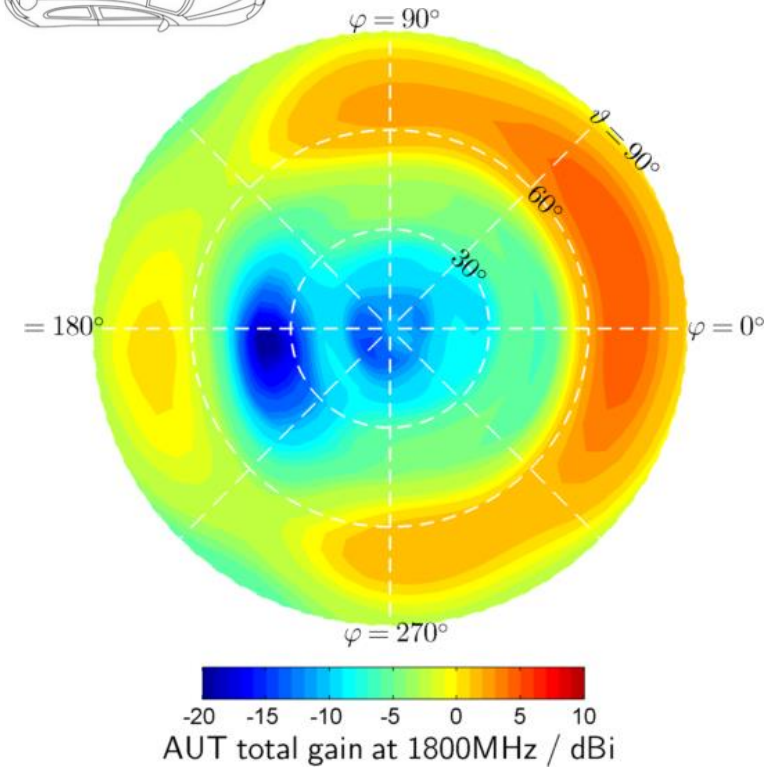


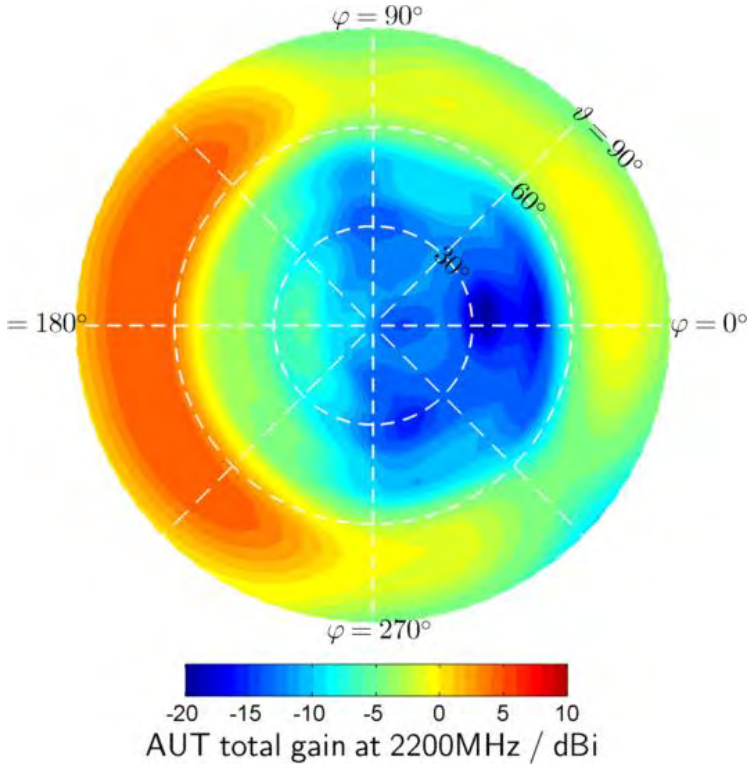
4.2 Variant B: LTE Antenna Performance 3D-Chart (LTE back)

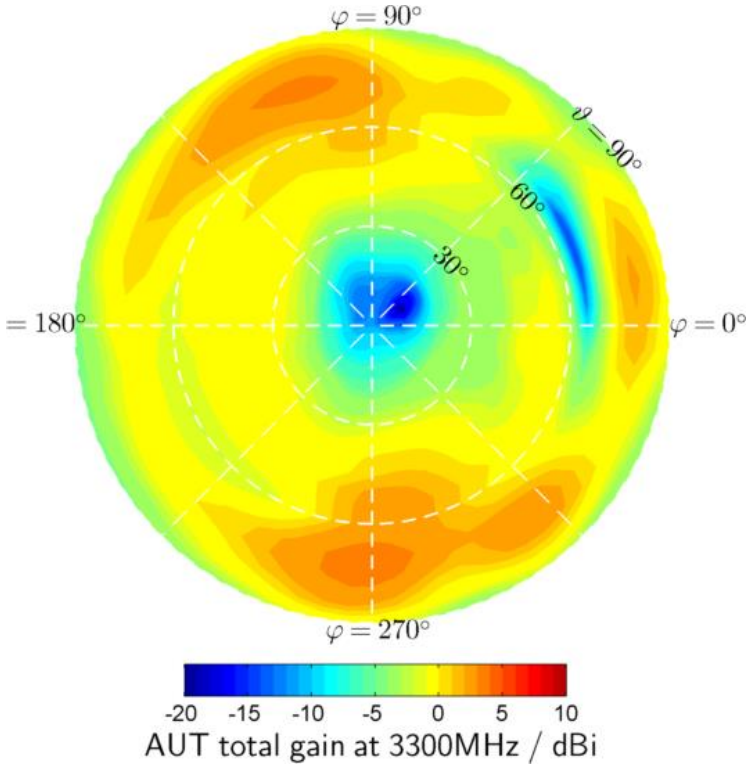
Chamber



Driving Direction

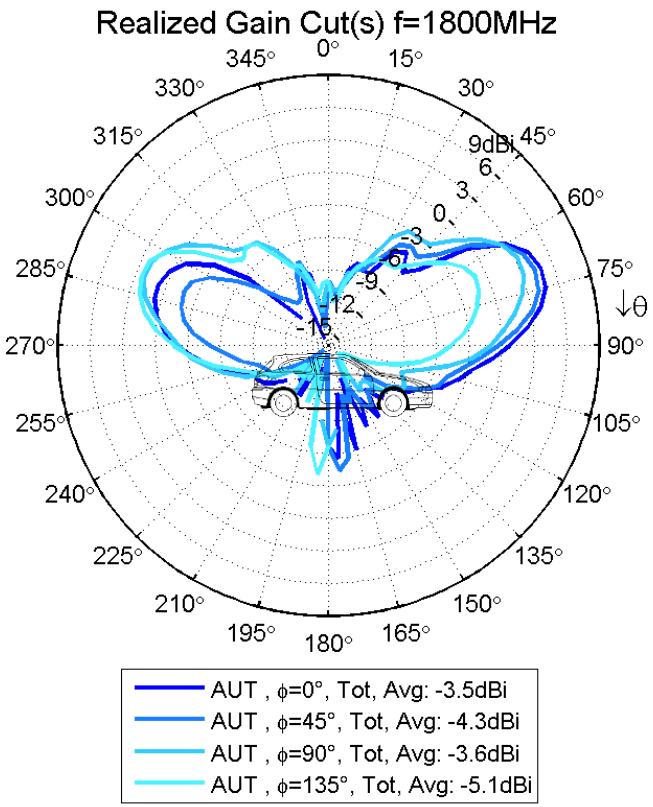


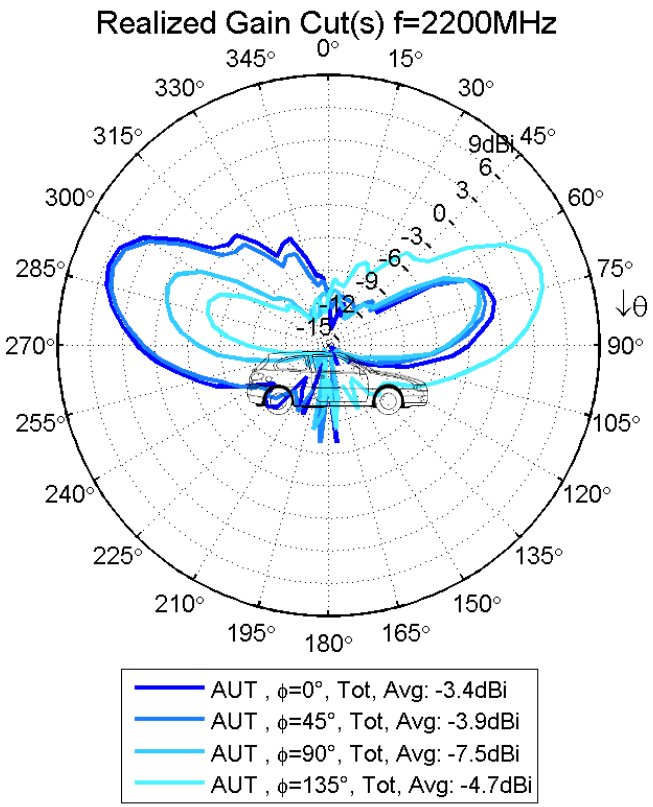


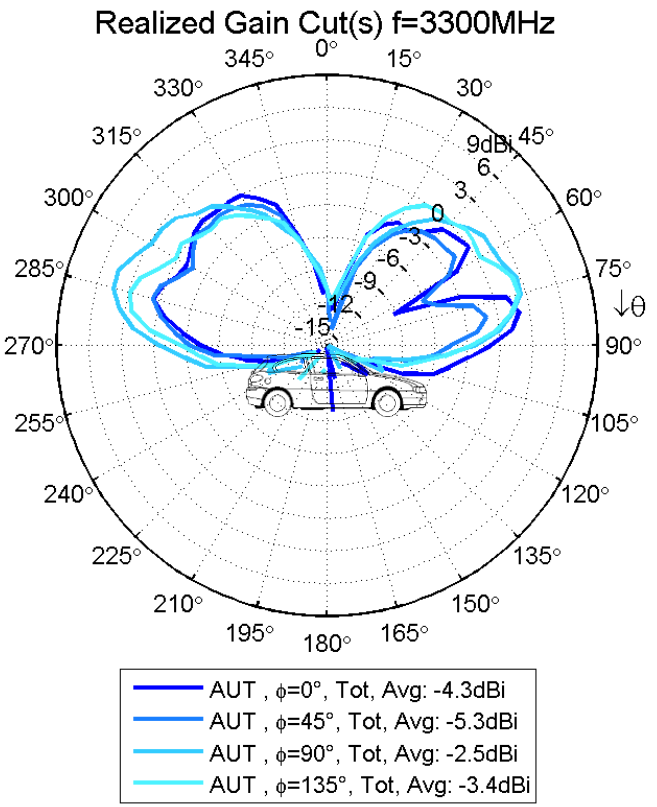


4.2 Variant B: LTE Antenna Performance Gain-Cuts (LTE back)

Chamber

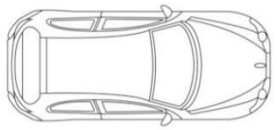




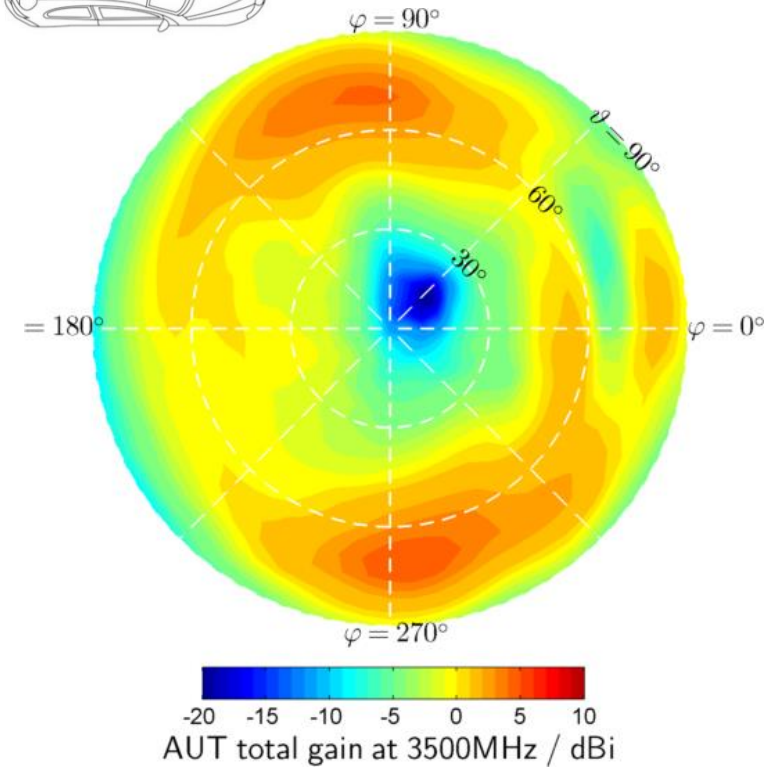


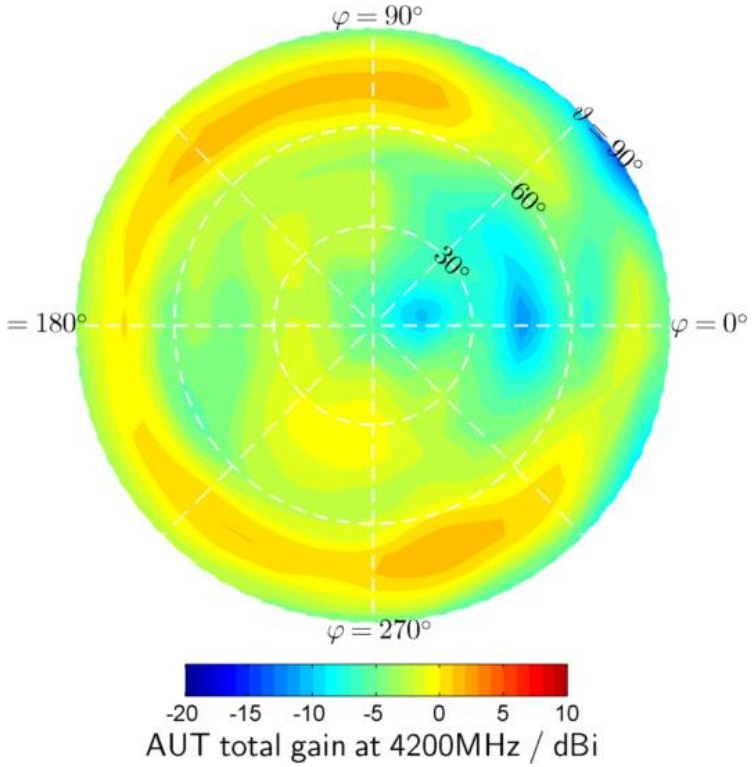
4.2 Variant B: LTE Antenna Performance 3D-Chart (LTE back)

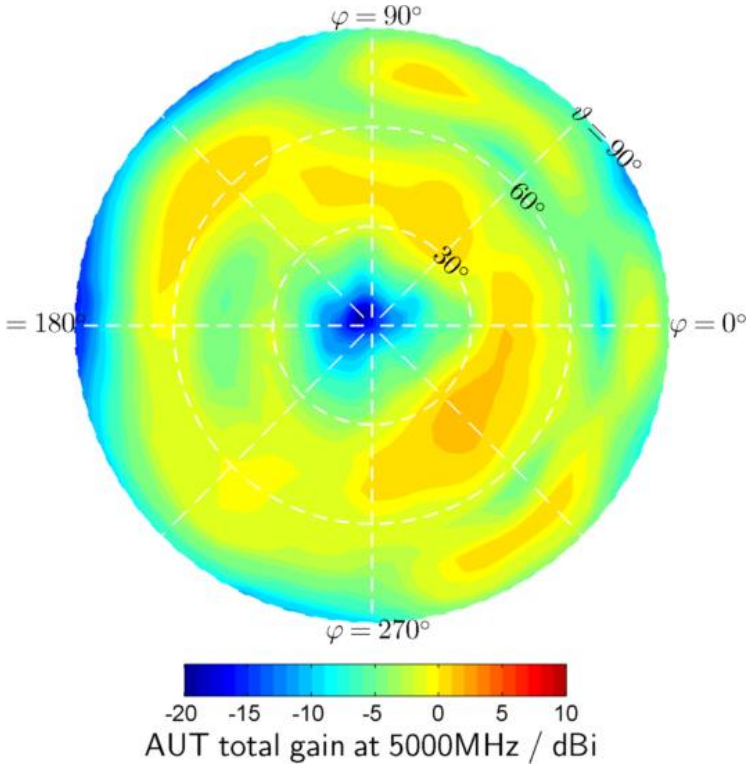
Chamber



Driving Direction

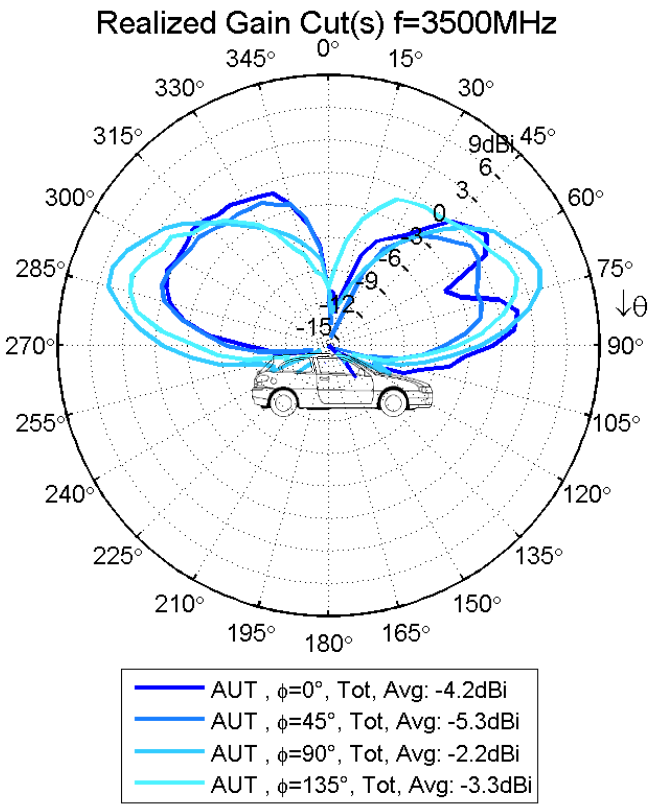


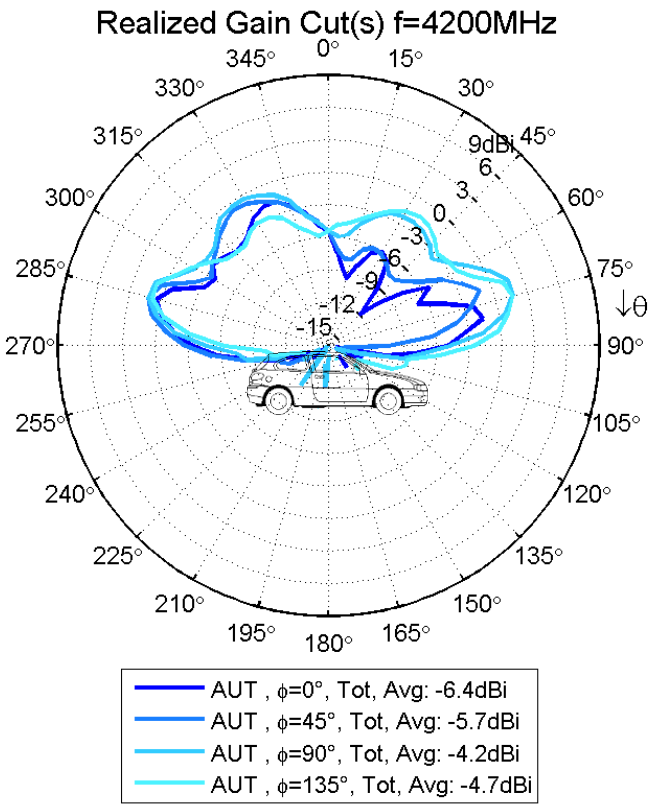


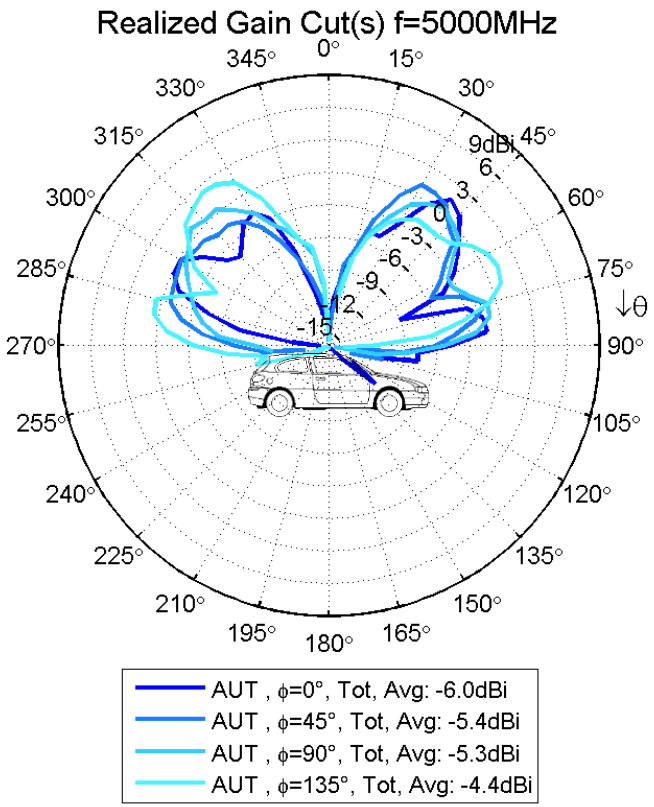


4.2 Variant B: LTE Antenna Performance Gain-Cuts (LTE back)

Chamber



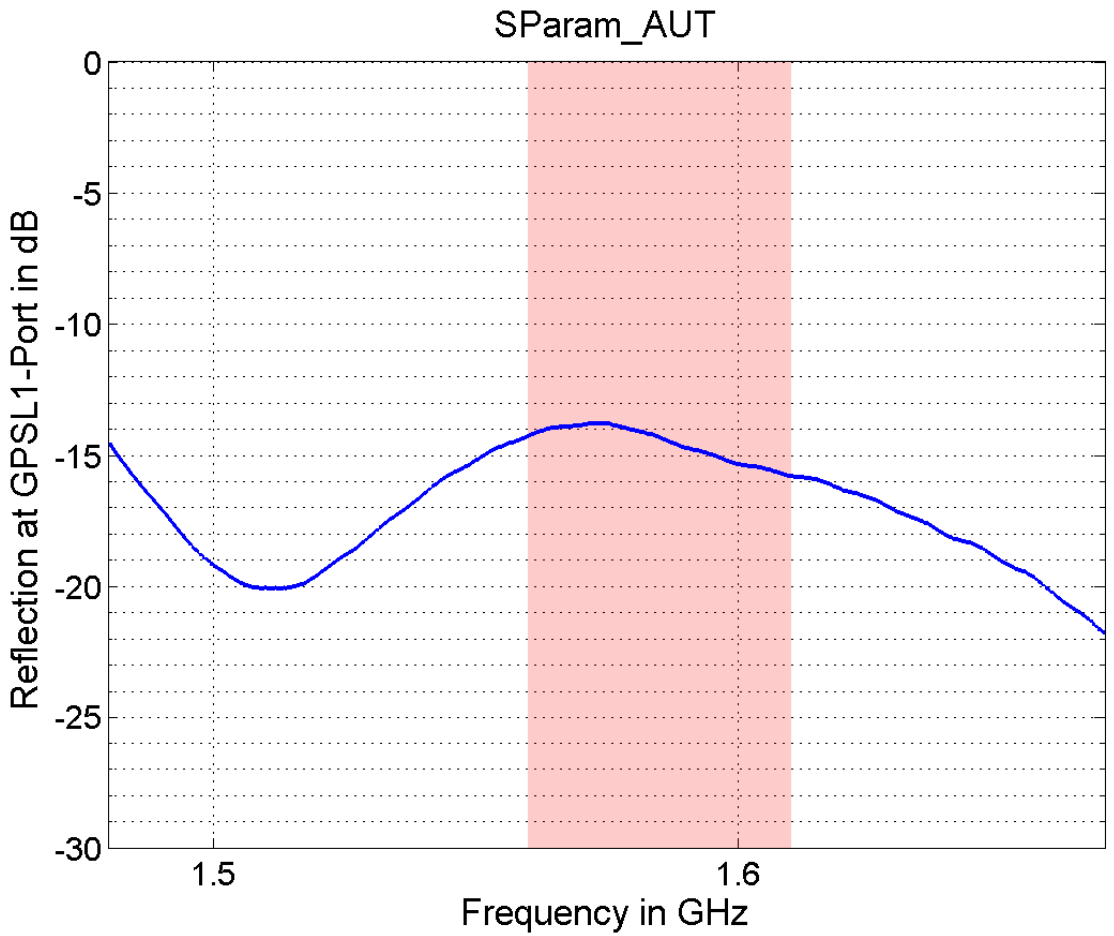




4.3 GNSS L1

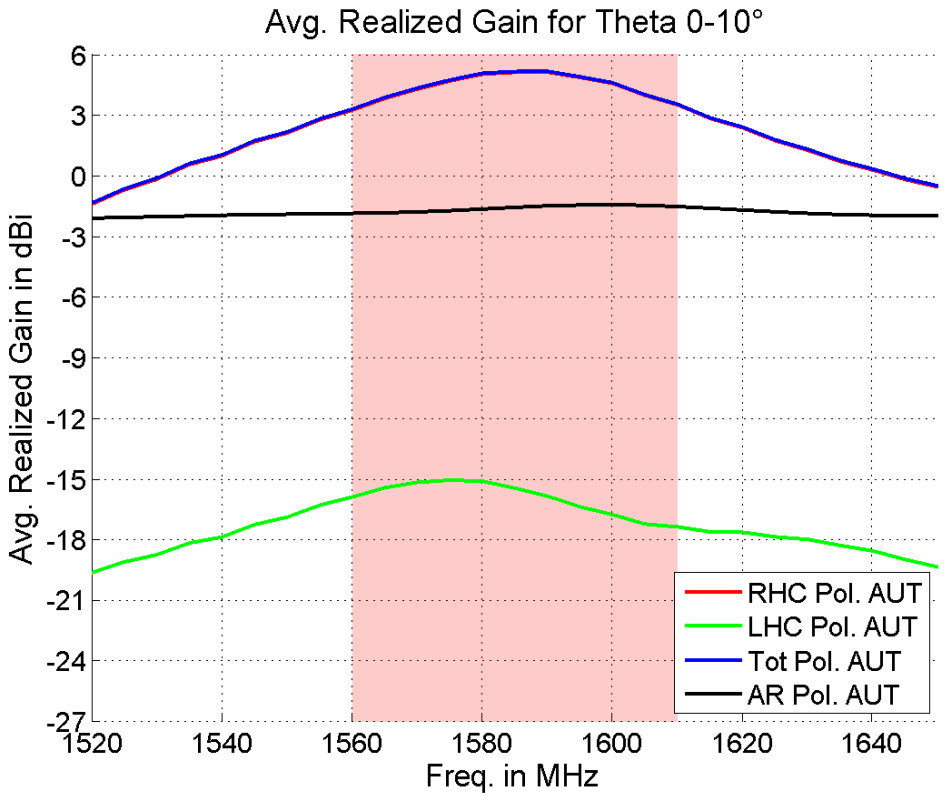
4.3 Variant B: Satellite Antenna Performance Matching (GNSS L1)

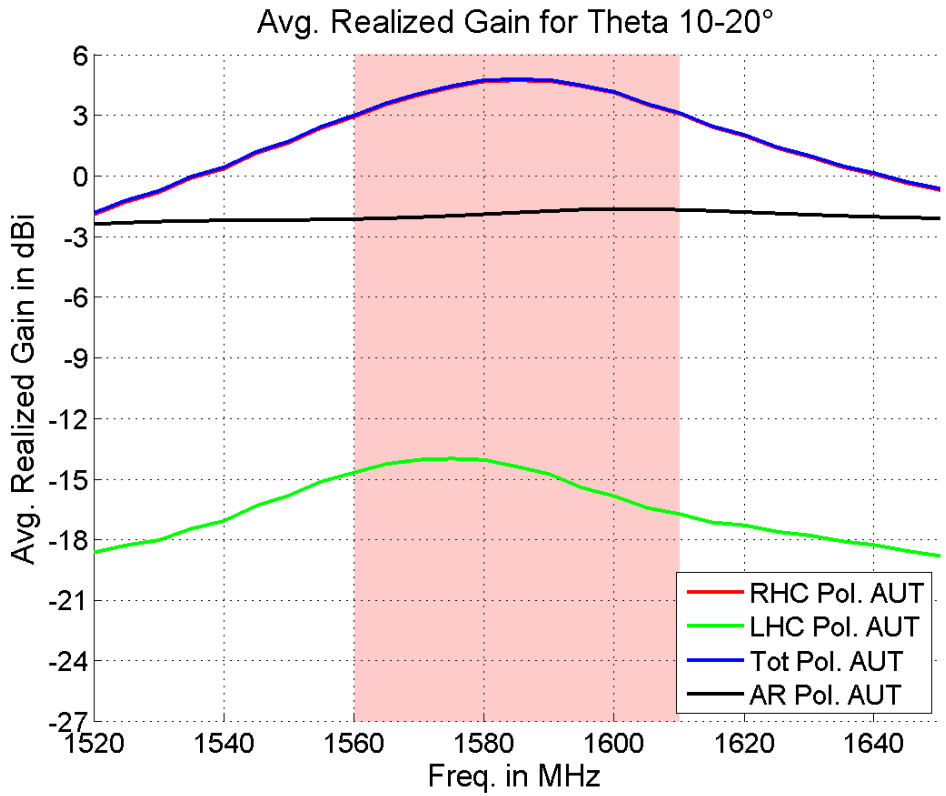
Chamber



4.3 Variant B: Satellite Antenna Performance Gain and Efficiency (GNSS L1)

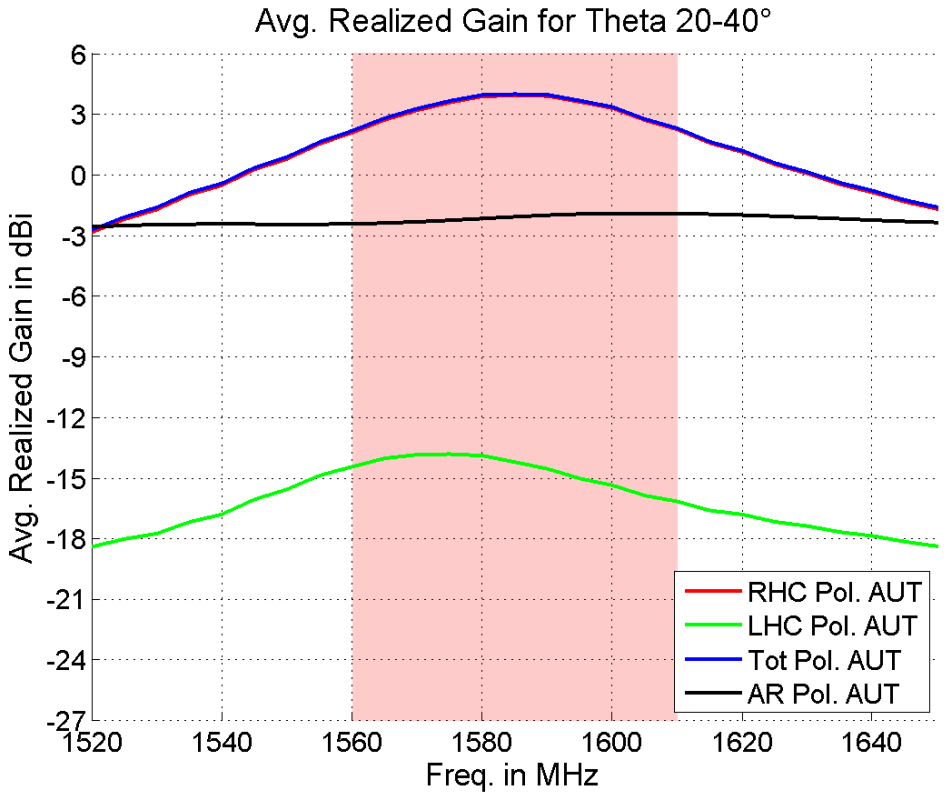
Chamber

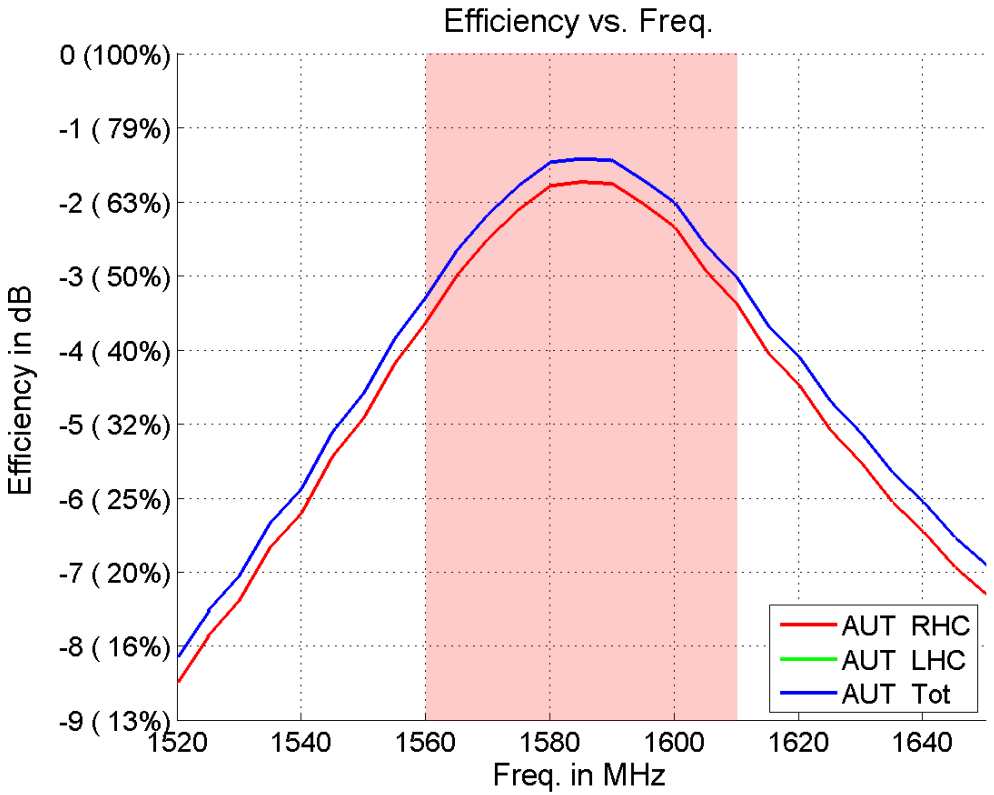




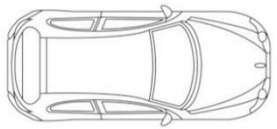
4.3 Variant B: Satellite Antenna Performance Gain and Efficiency (GNSS L1)

Chamber



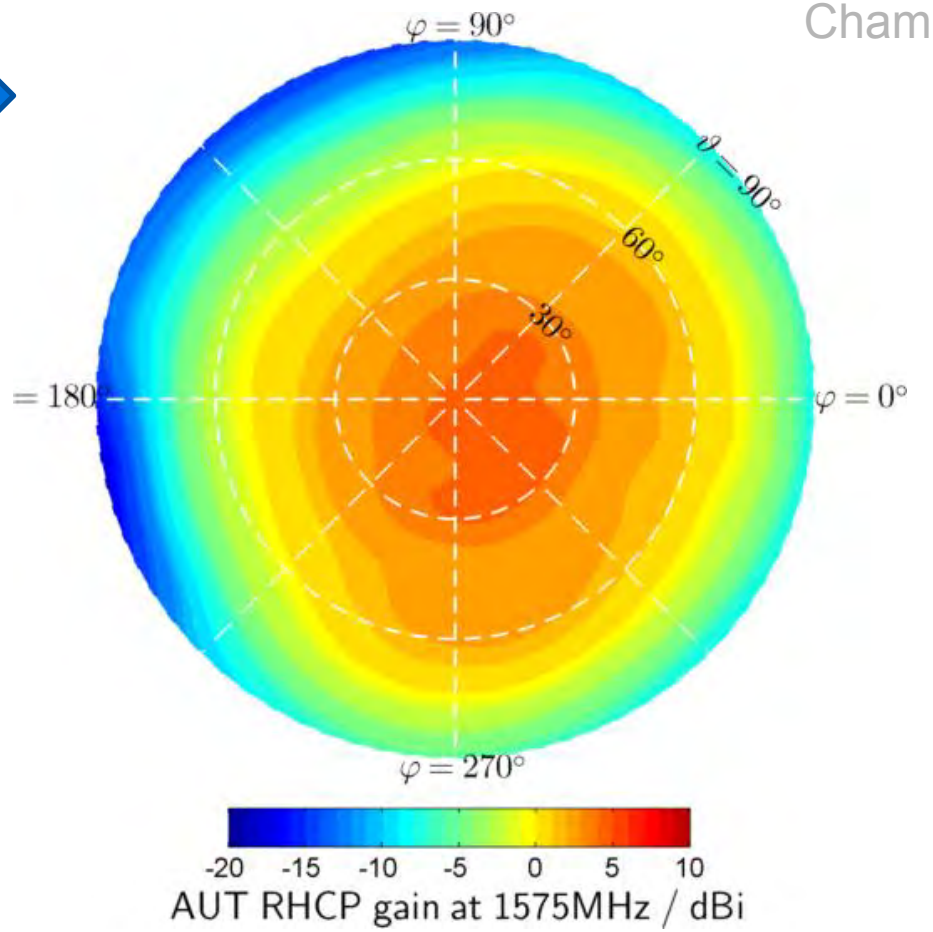


4.3 Variant B: Satellite Antenna Performance 3D-Chart (GNSS L1)



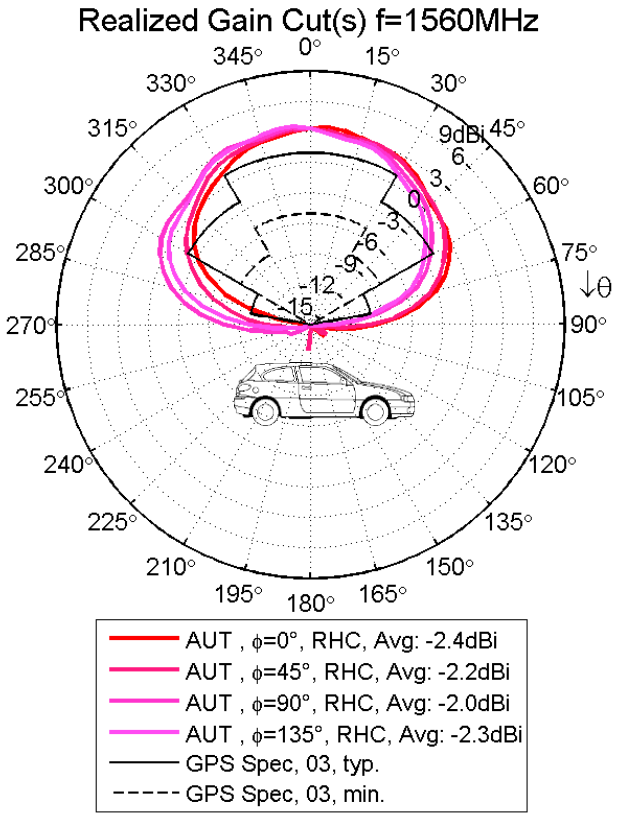
Driving Direction

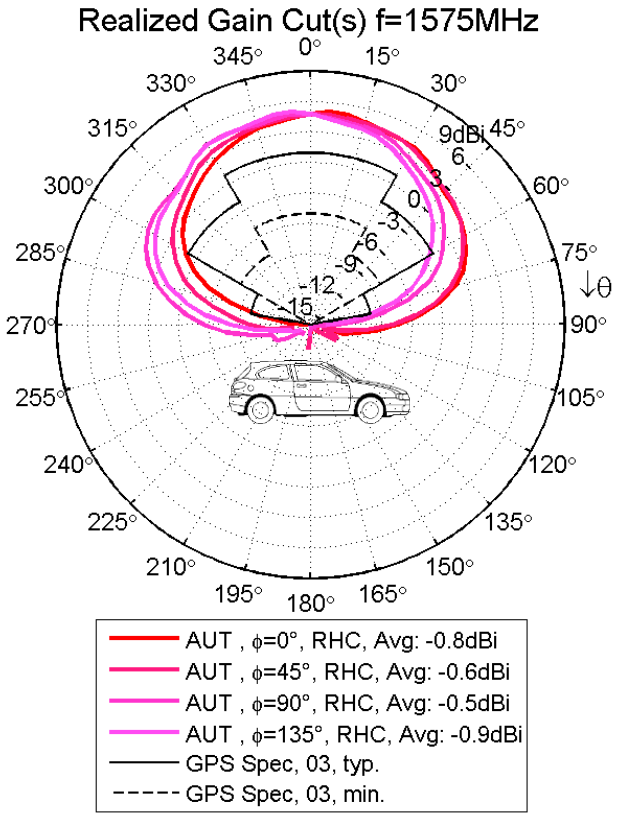
Chamber

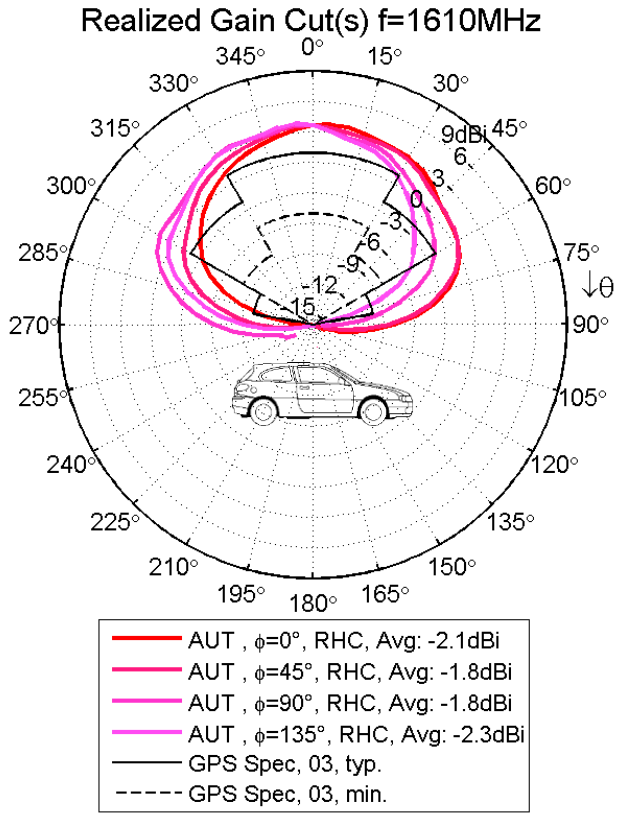


4.3 Variant B: Satellite Antenna Performance Gain-Cuts (GNSS L1)

Chamber



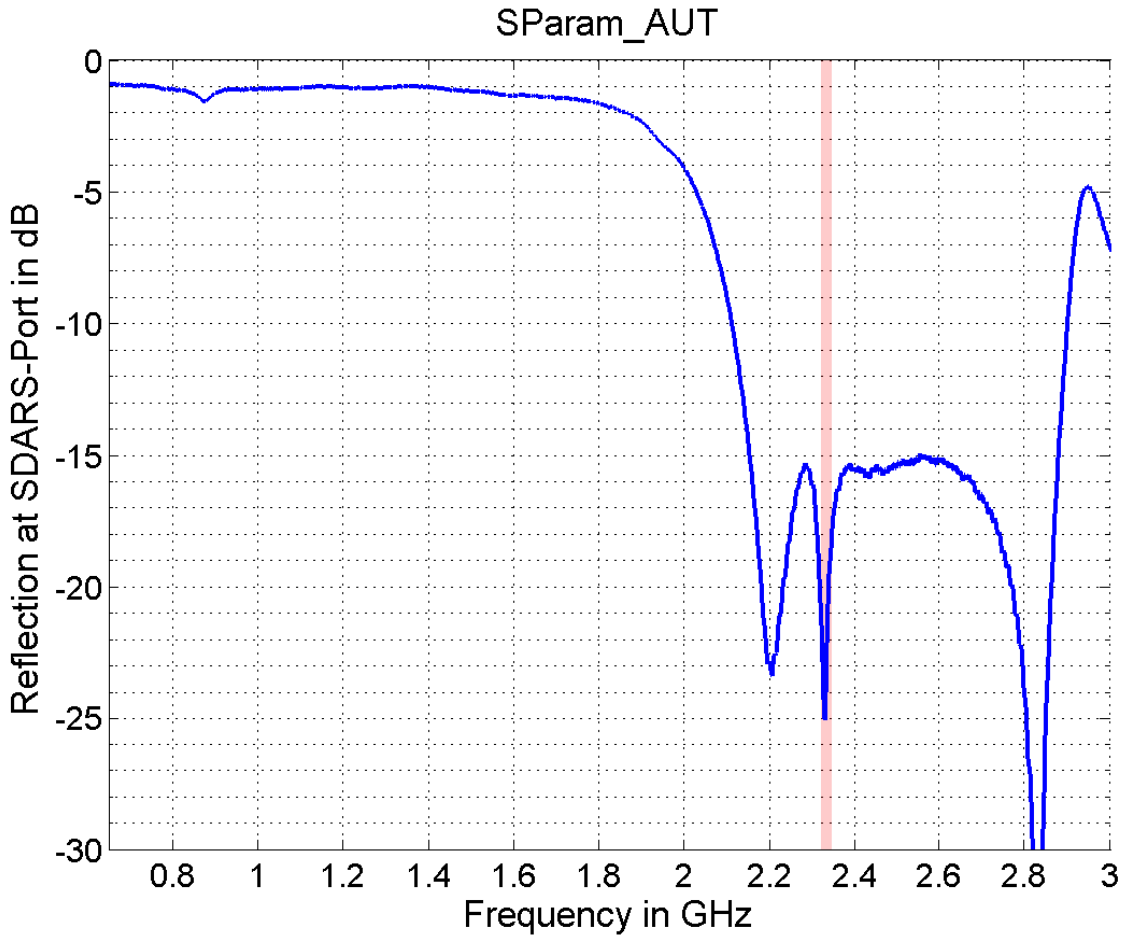




4.4 SDARS

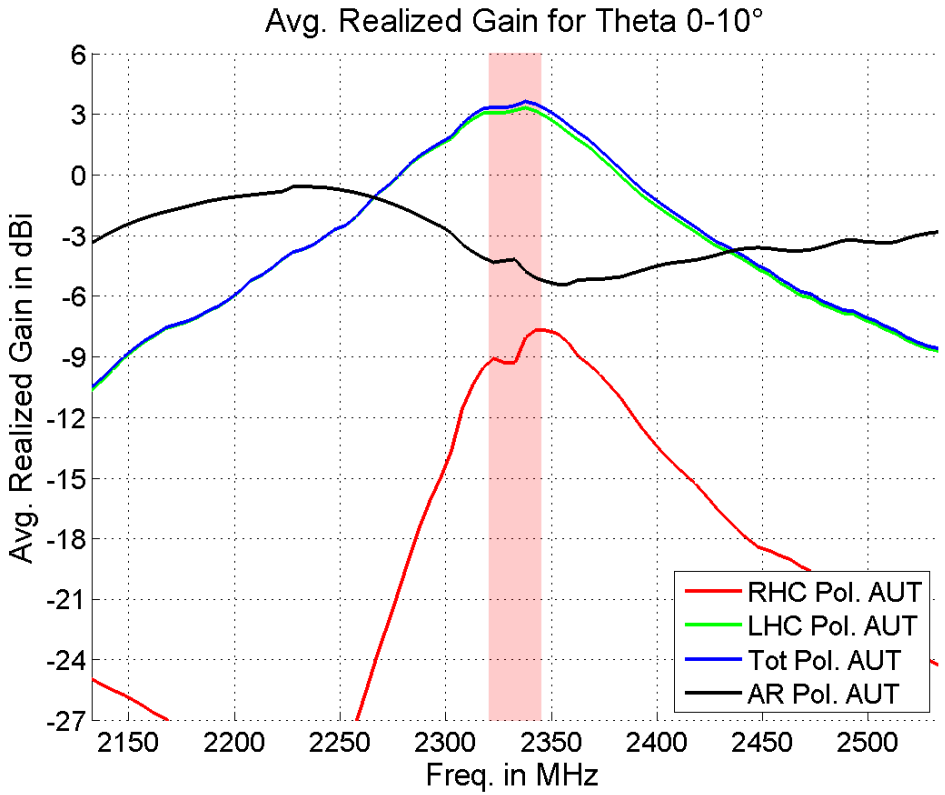
4.4 Variant B: Satellite Antenna Performance Matching (SDARS)

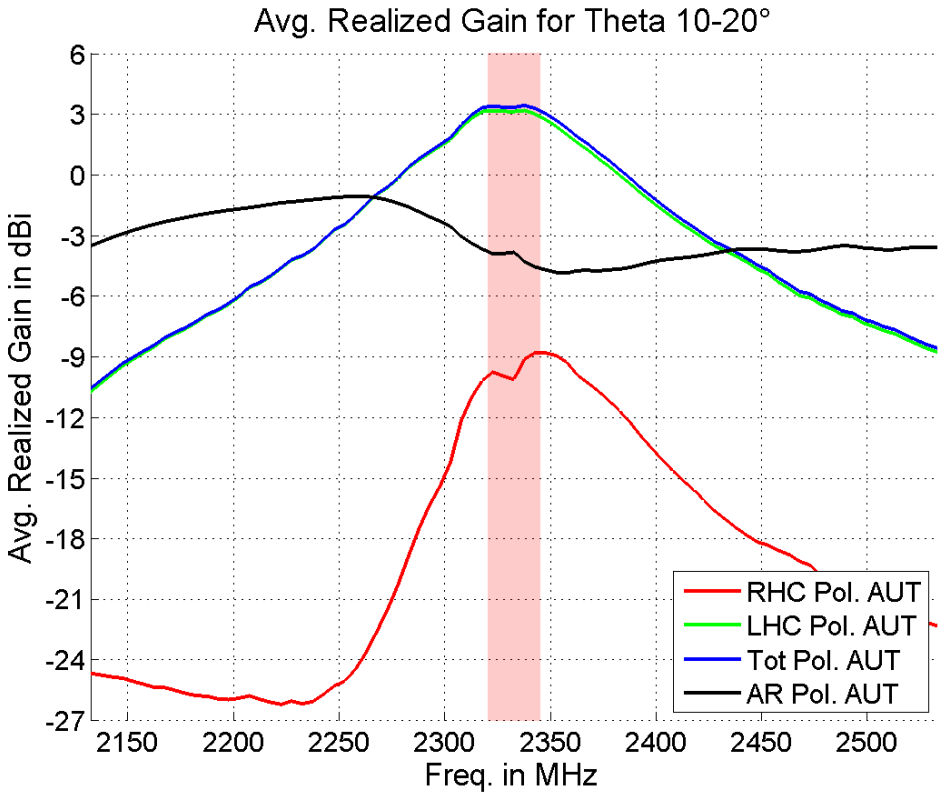
Chamber



4.4 Variant B: Satellite Antenna Performance Gain and Efficiency (SDARS)

Chamber

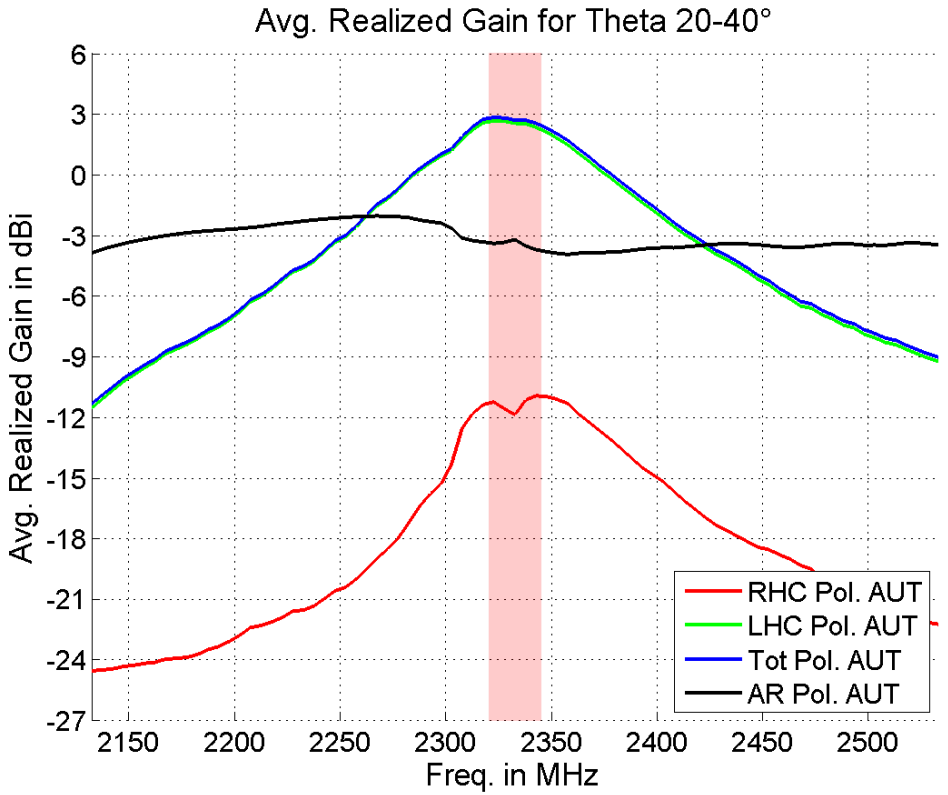


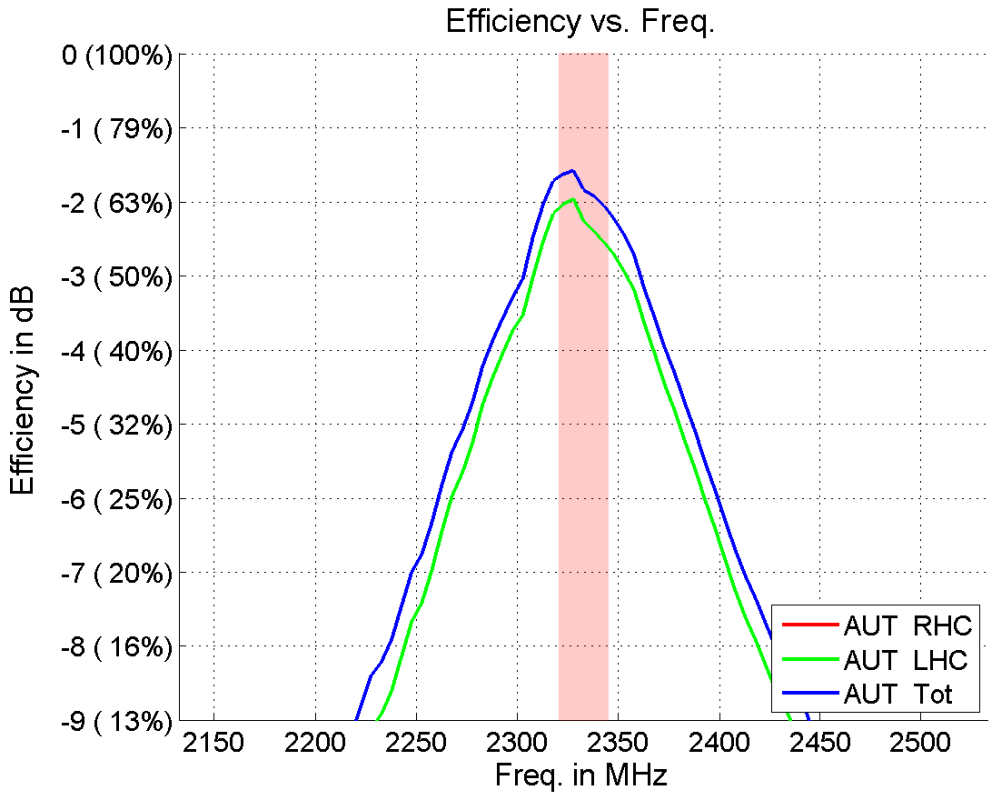


* 60MHz shifted

4.4 Variant B: Satellite Antenna Performance Gain and Efficiency (SDARS)

Chamber

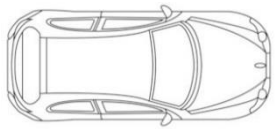




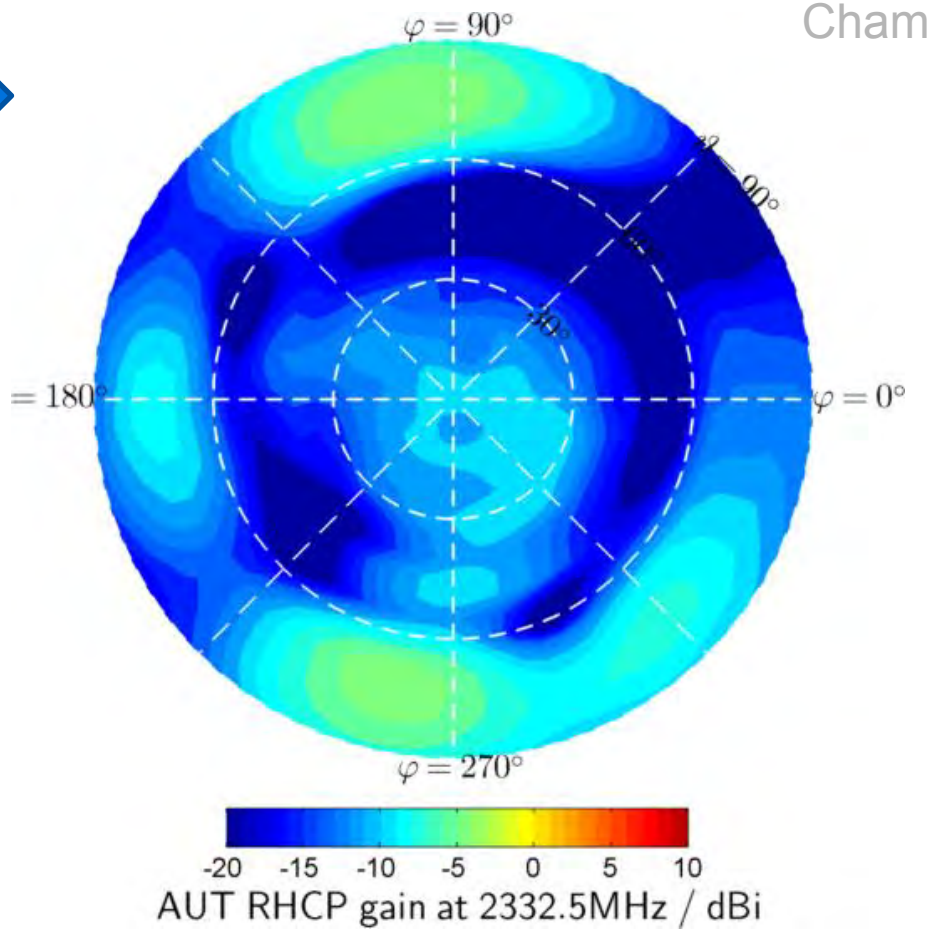
* 60MHz shifted

4.4 Variant B: Satellite Antenna Performance 3D-Chart (SDARS)

Chamber

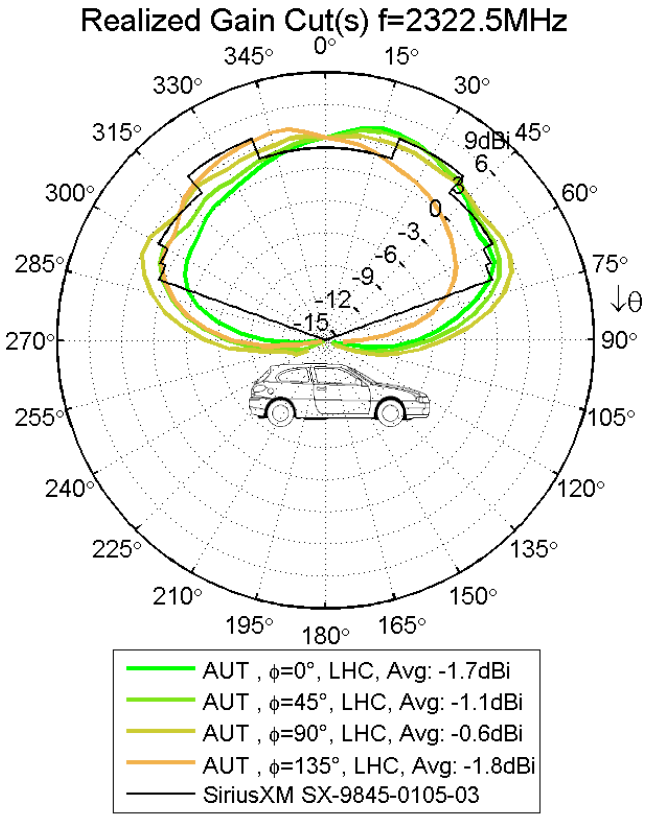


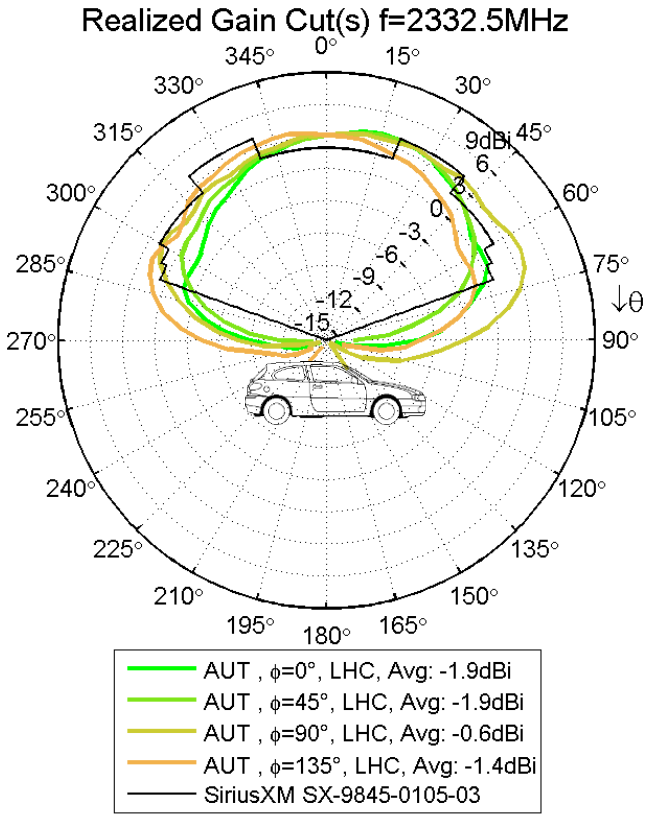
Driving Direction

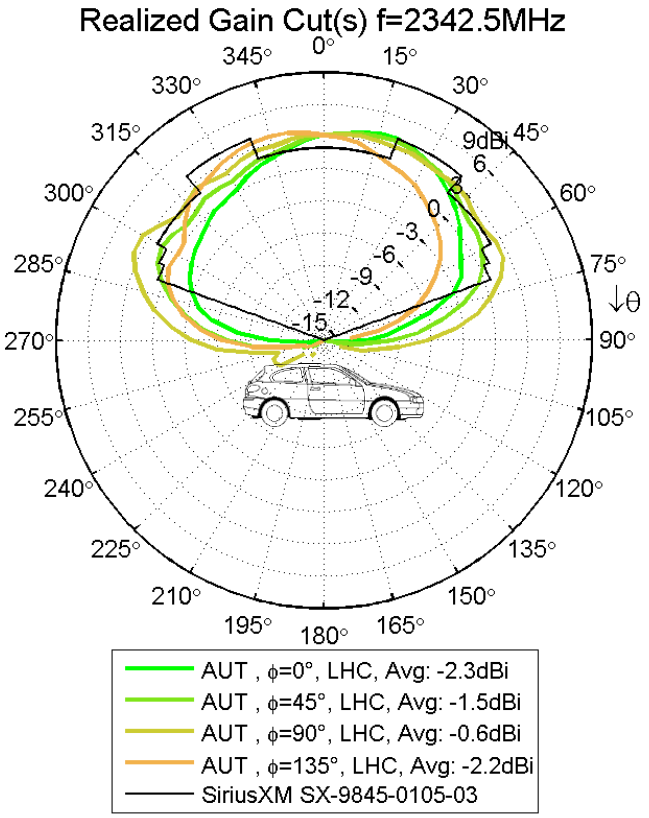


4.4 Variant B: Satellite Antenna Performance Gain-Cuts (SDARS)

Chamber



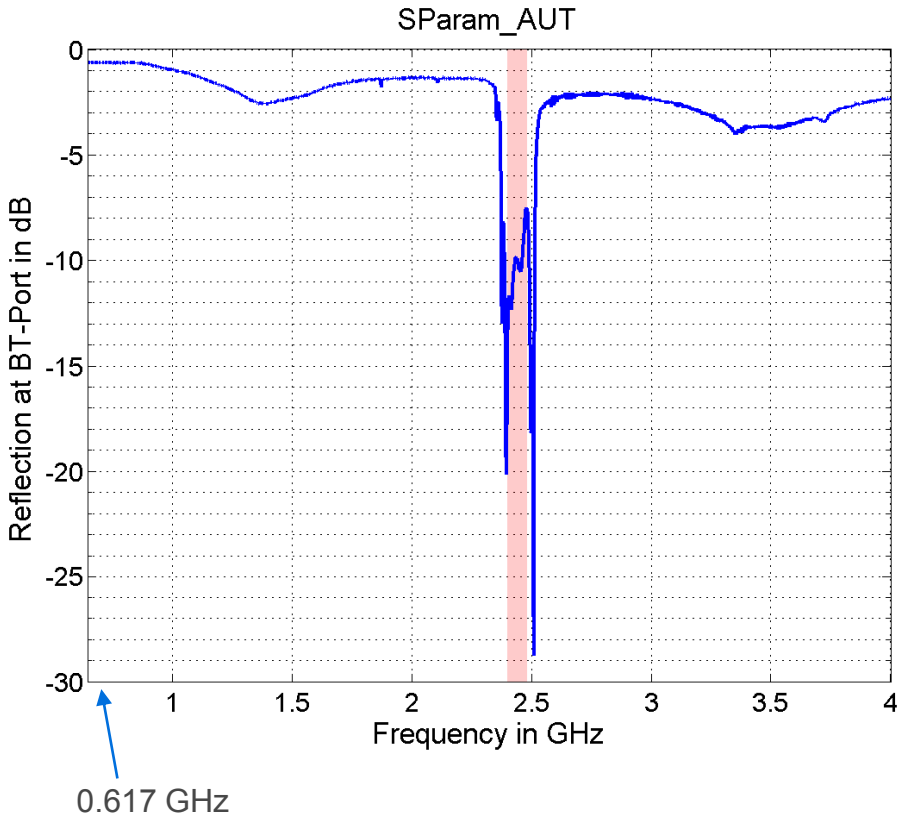


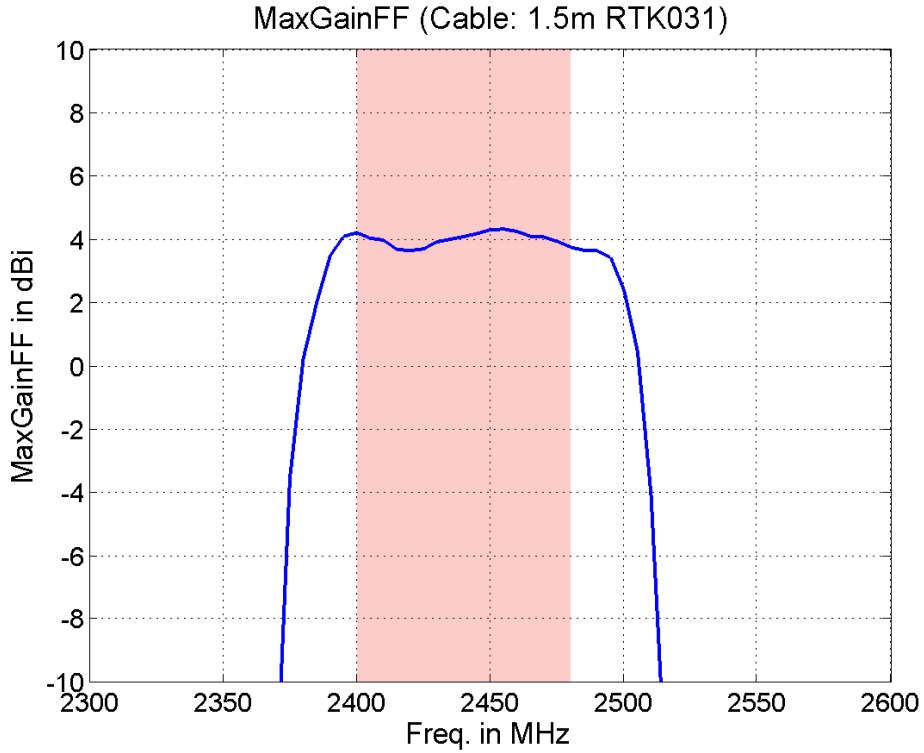


4.5 Bluetooth

4.5 Variant B: Bluetooth Antenna Performance Matching (BT)

Chamber

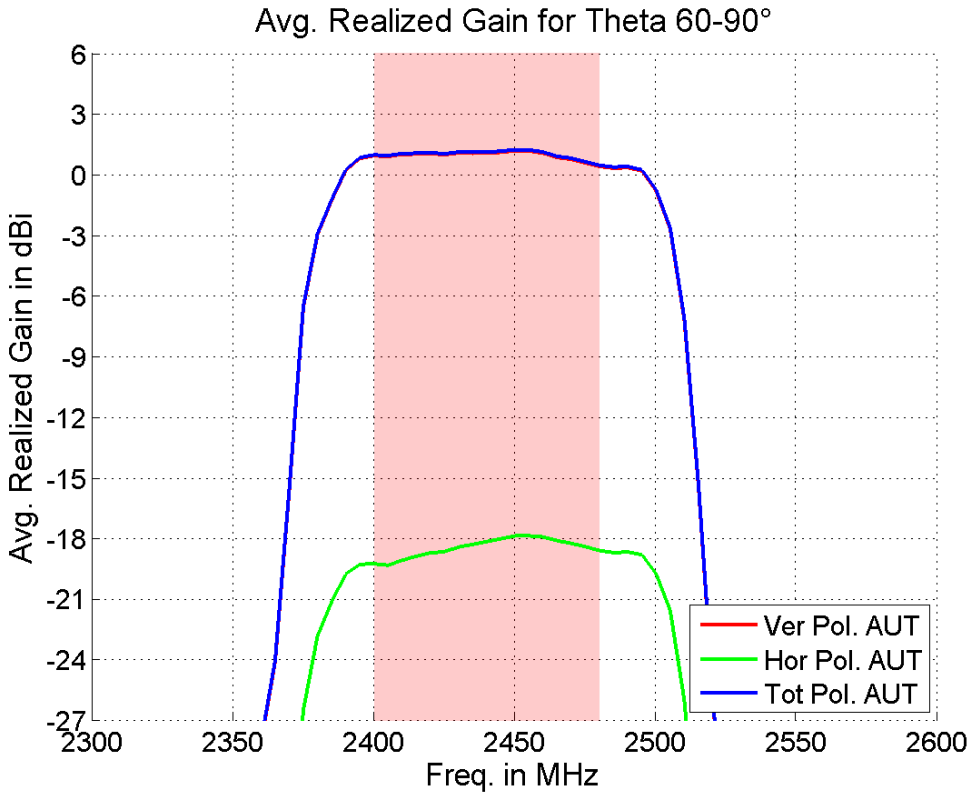


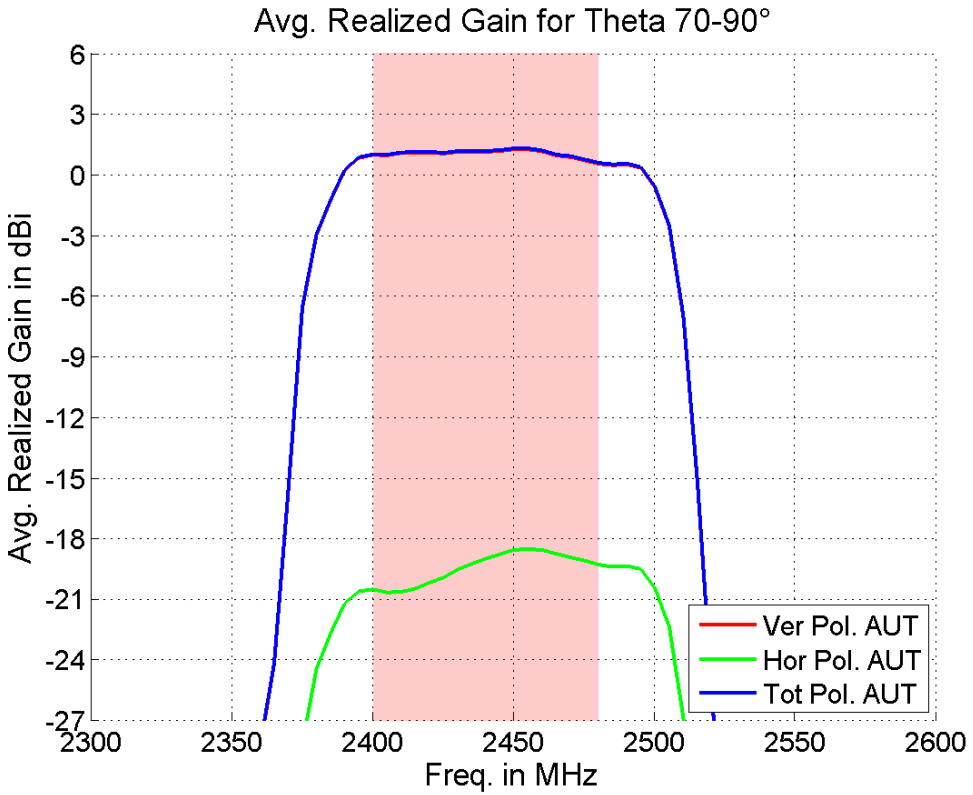


- The MaxGainFF-values are determined with 1.5m RTK031 cable (attenuation added to the measurement results).
- See attached file “Audi_CS_S10_VariantB_BT_gain_maxFF.csv” for the equivalent raw MaxGainFF-data.

4.5 Variant B: Bluetooth Antenna Performance Gain and Efficiency (BT)

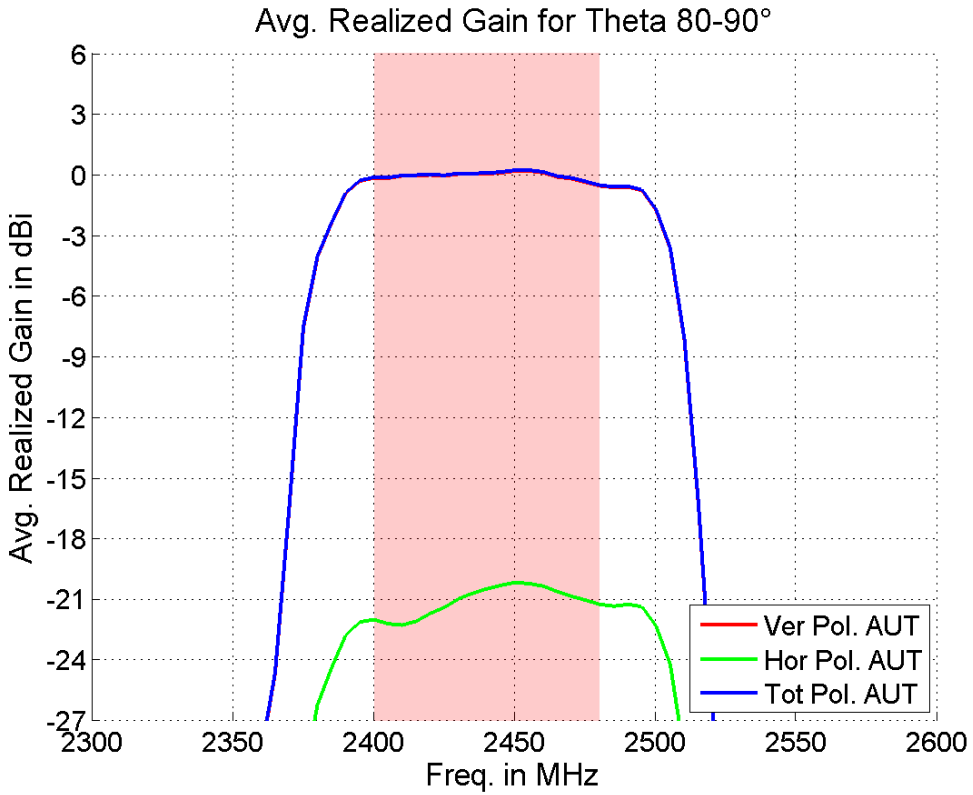
Chamber

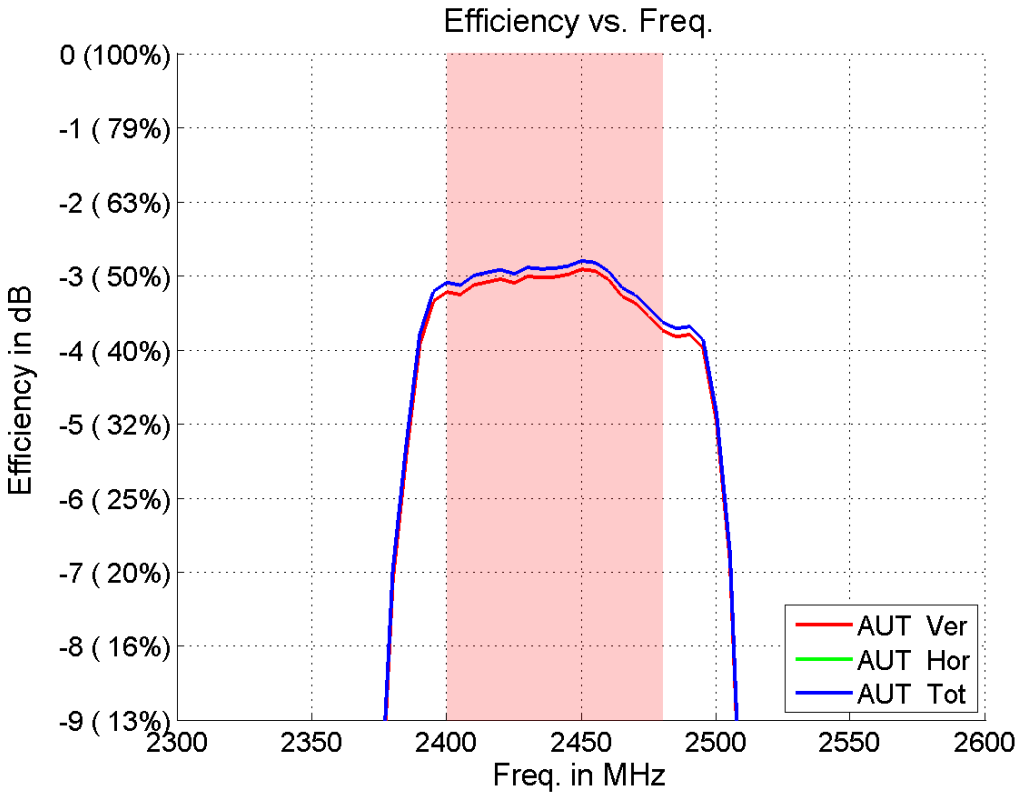




4.5 Variant B: Bluetooth Antenna Performance Gain and Efficiency (BT)

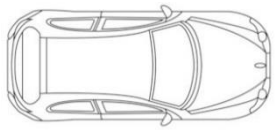
Chamber



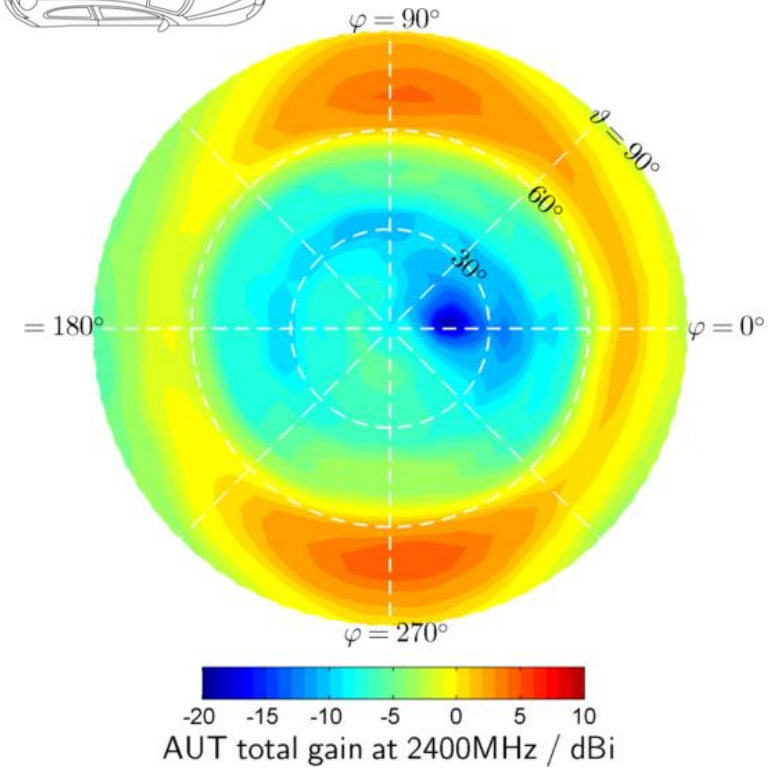


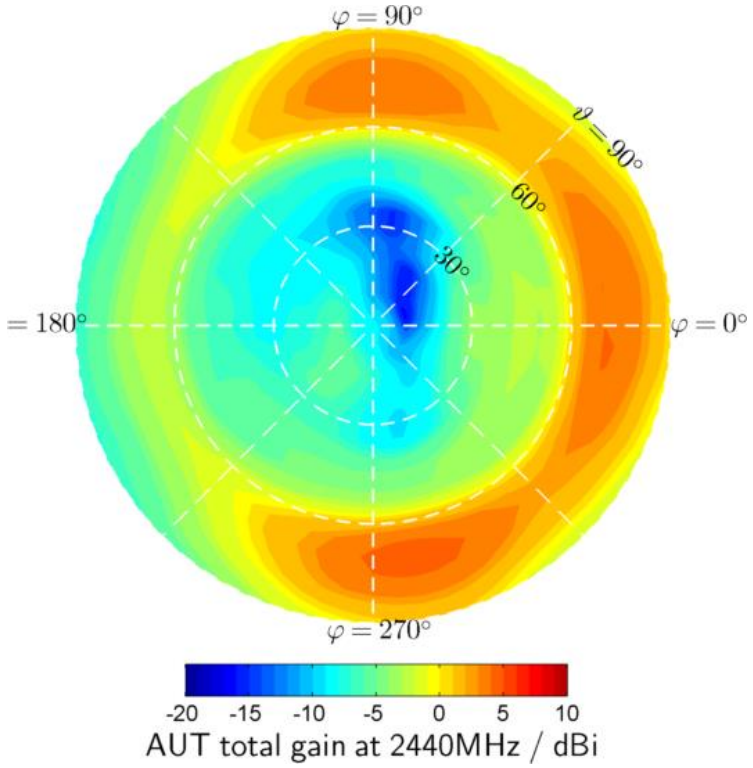
4.5 Variant B: Bluetooth Antenna Performance 3D-Chart (BT)

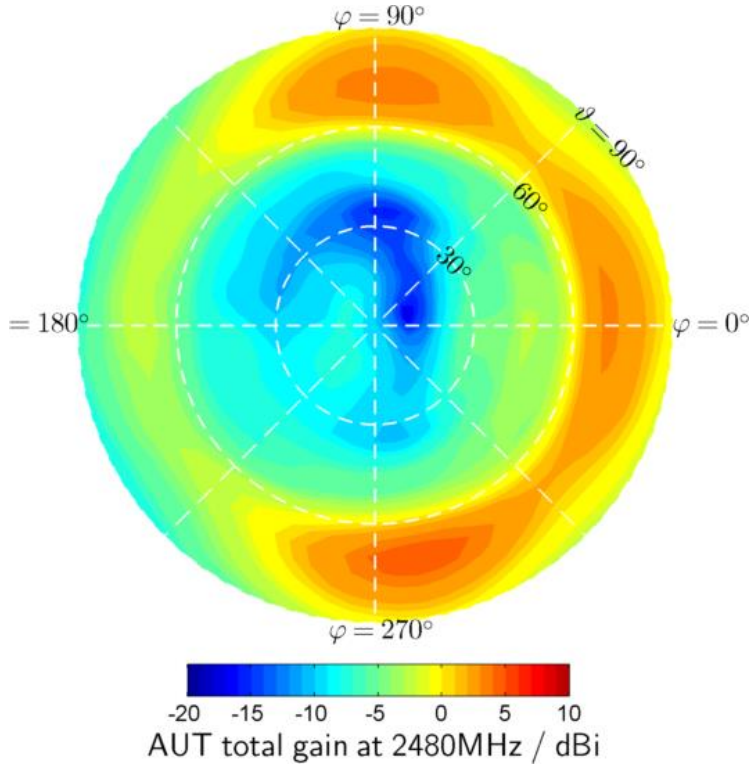
Chamber



Driving Direction

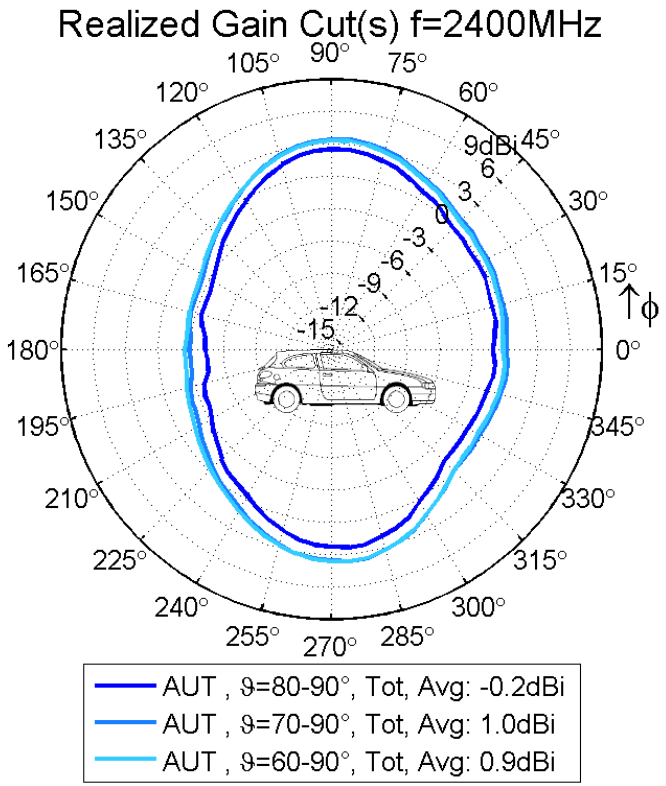


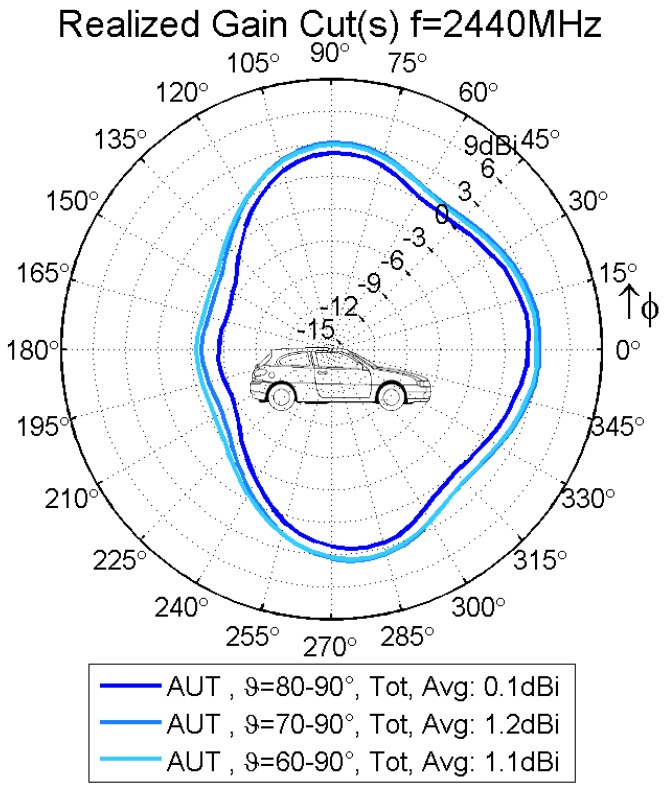


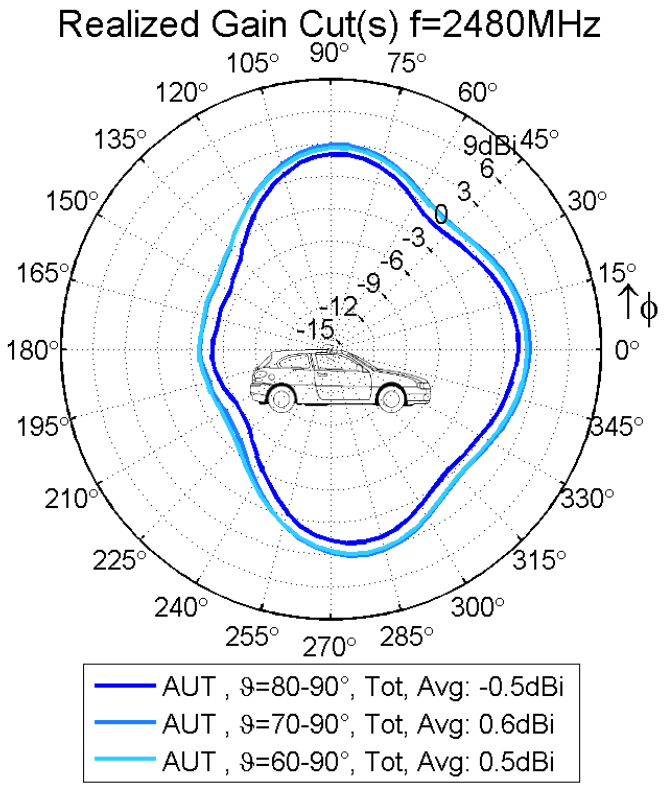


4.5 Variant B: Bluetooth Antenna Performance Gain-Cuts (BT)

Chamber

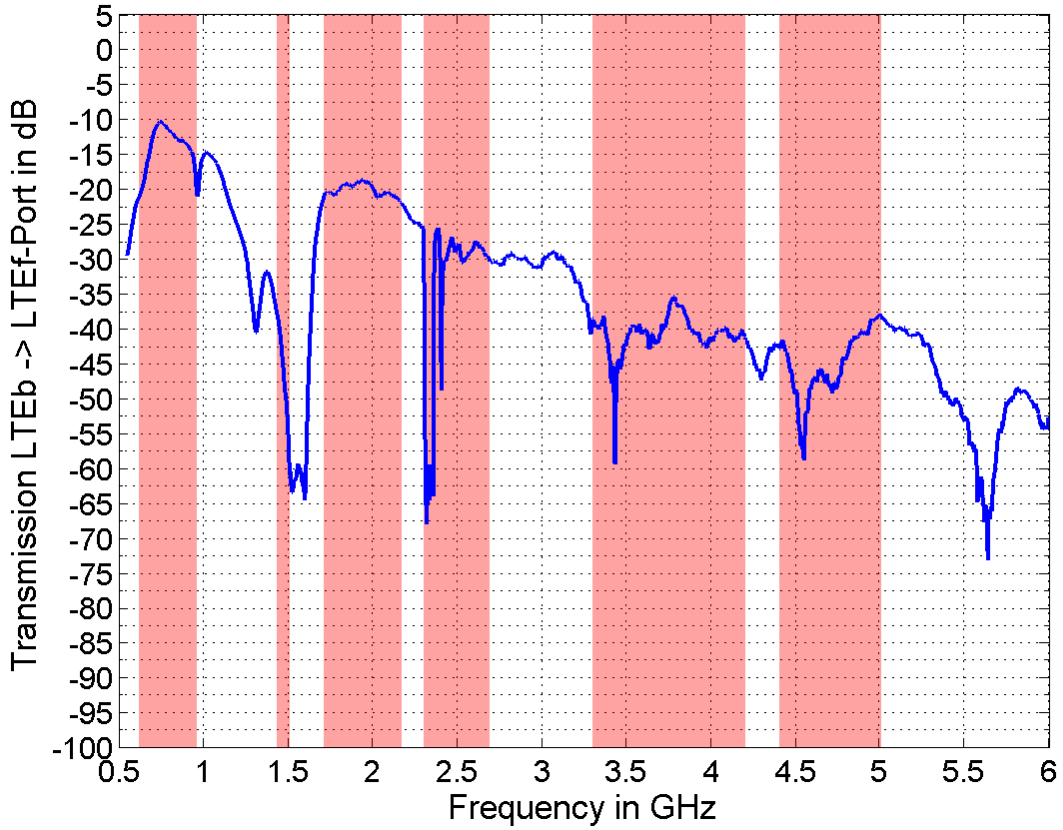




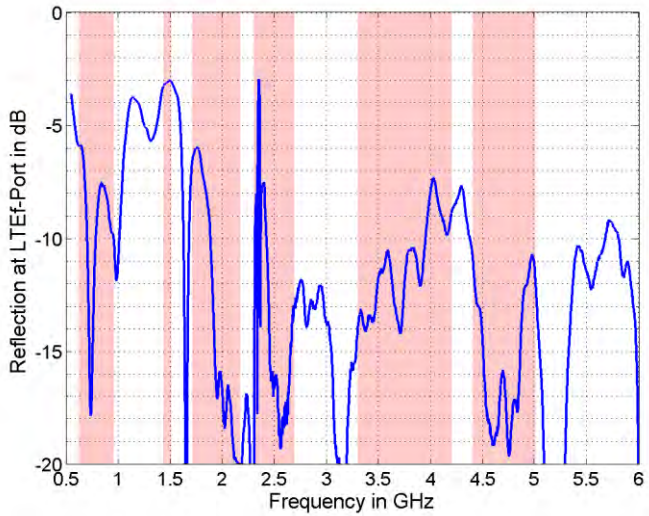


4.6 Decoupling

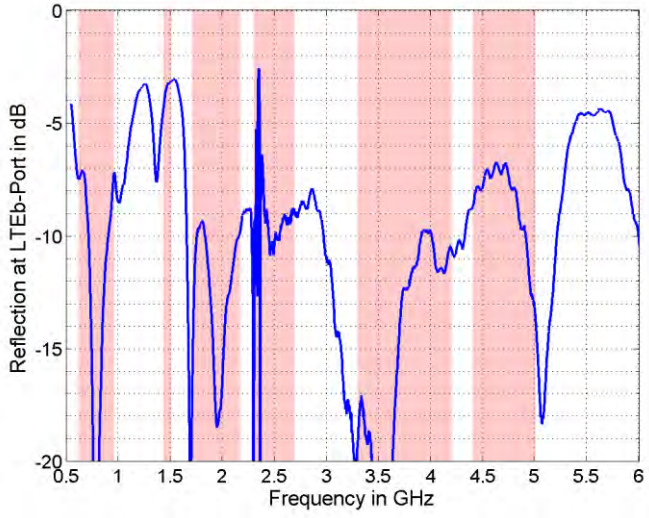
4.6 Variant B: Decoupling LTE front <=> LTE back



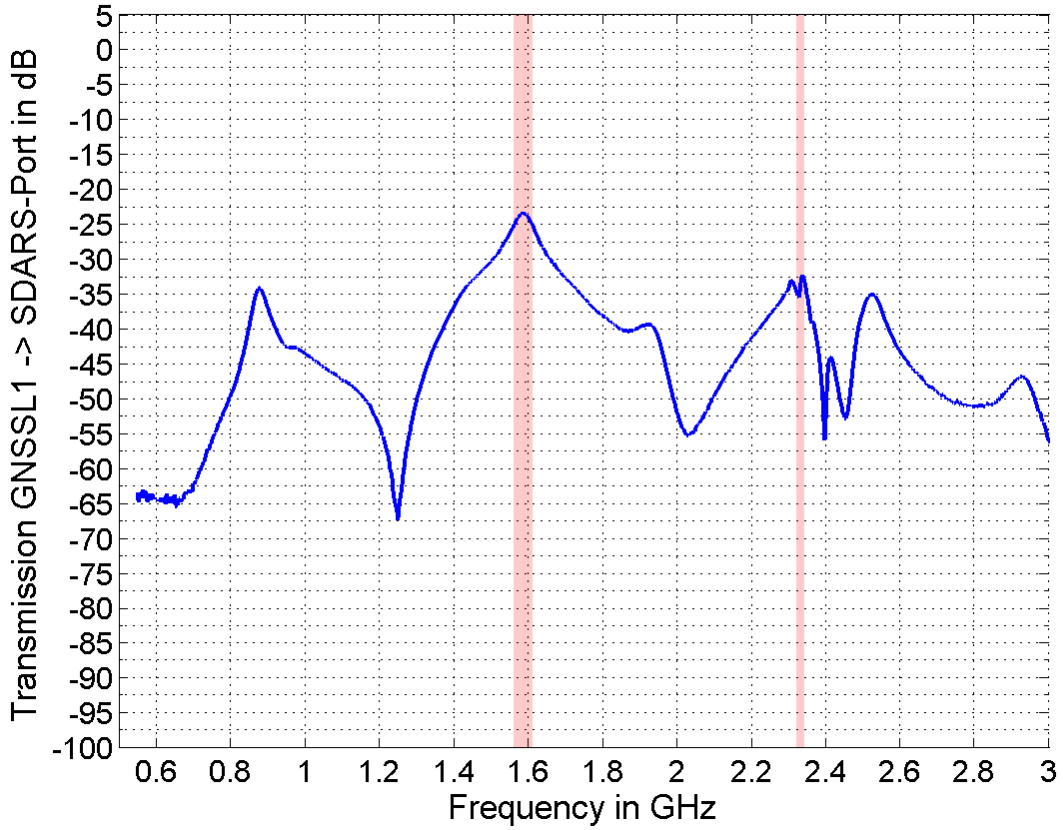
LTE front



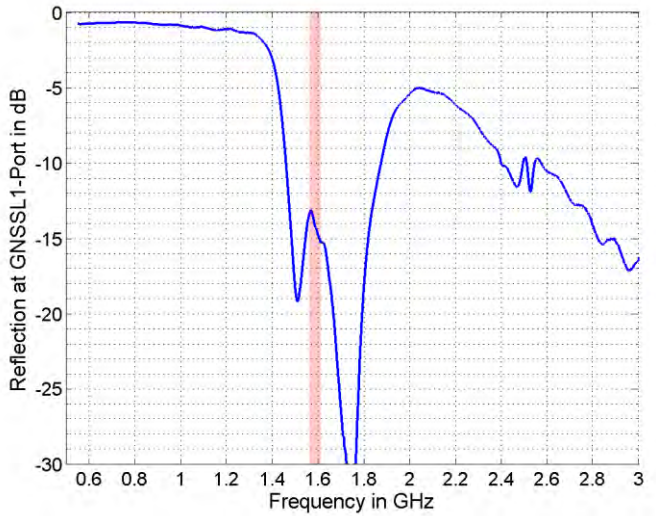
LTE back



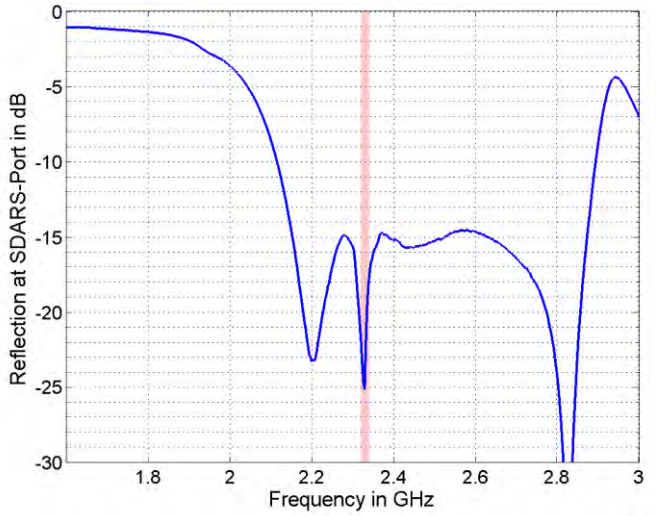
4.6 Variant B: Decoupling GNSS L1 <=> SDARS



GNSS L1

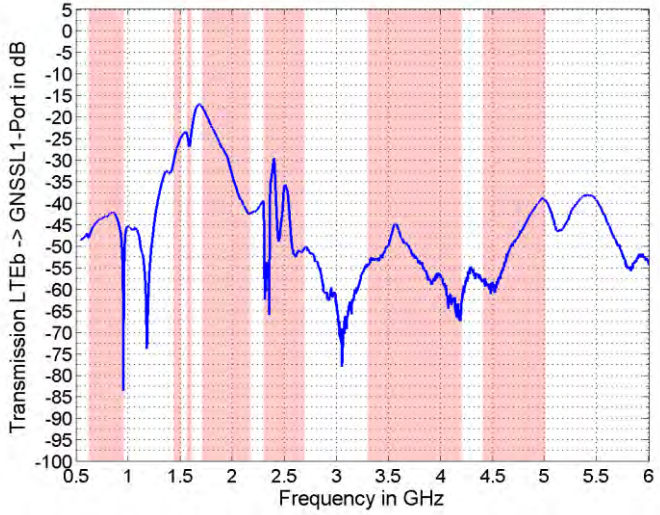


SDARS

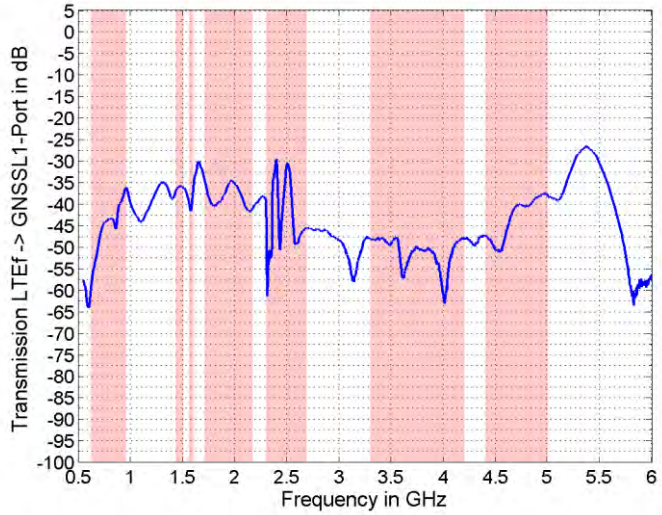


4.6 Variant B: Decoupling LTEs <=> SATs

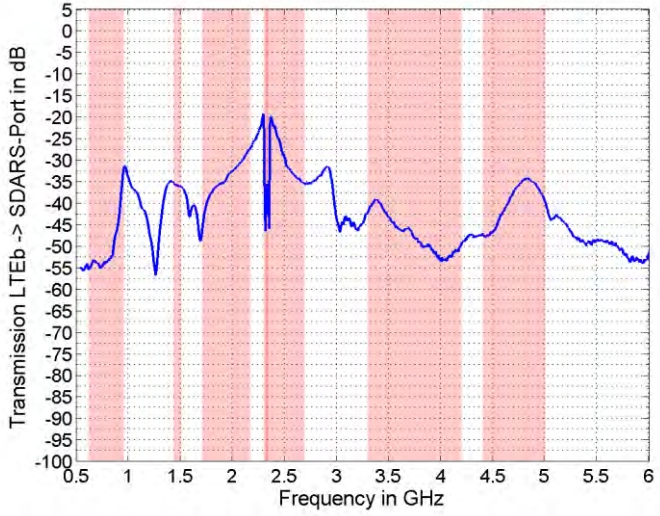
LTE back ⇔ GNSS L1



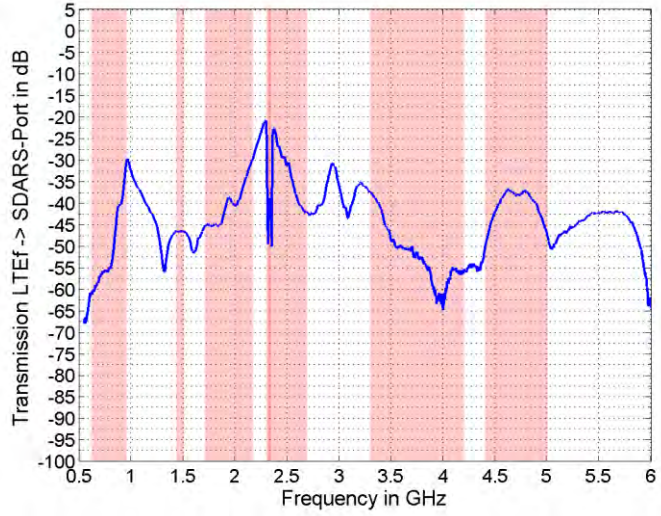
LTE front ⇔ GNSS L1



LTE back ⇔ SDARS

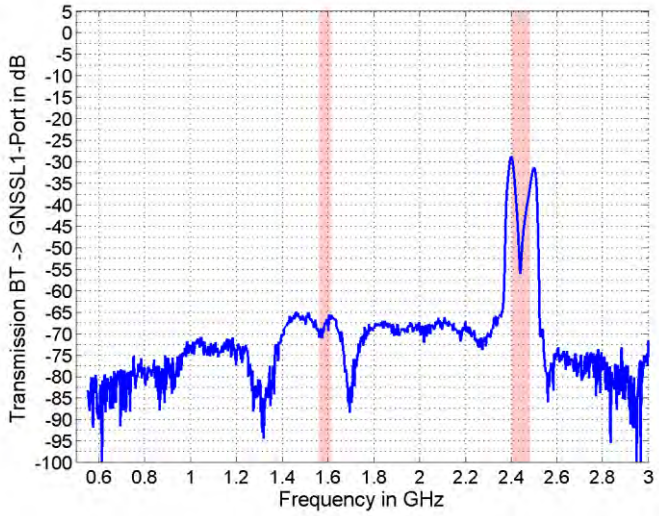


LTE front ⇔ SDARS

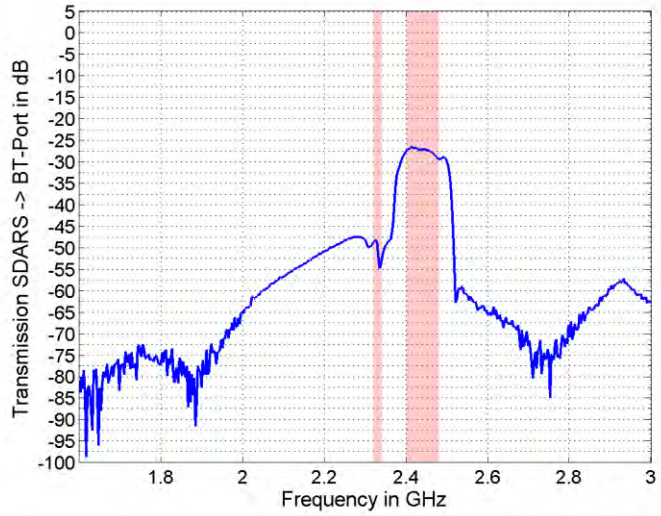


4.6 Variant B: Decoupling SAT/ LTE <=> BT

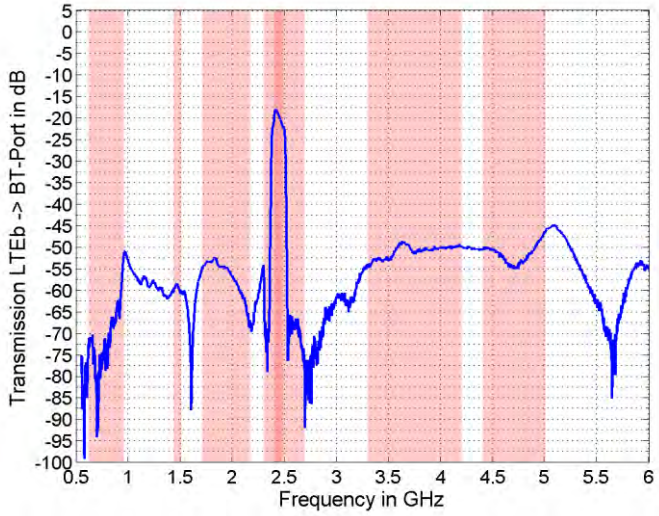
GNSS L1 ⇔ BT



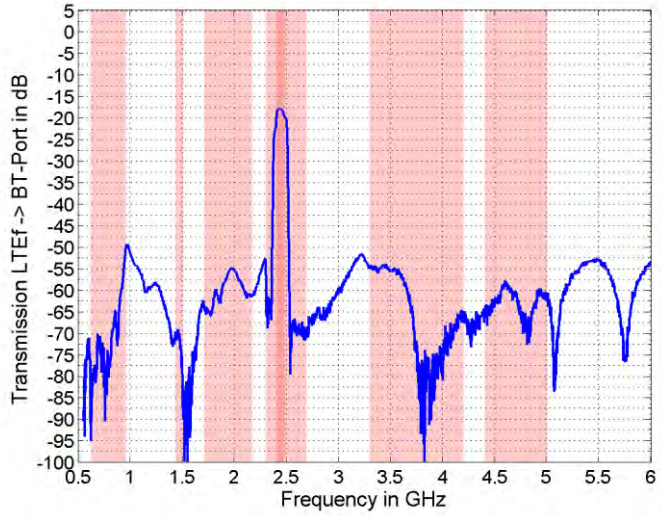
SDARS ⇔ BT



LTE back ⇔ BT



LTE front ⇔ BT



Mobilfunkstoßfängerantenne
Cellular Bumper Antenna

TE Wireless: 920-654-001
VW/Audi: 4M0.035.507.A

5G weltweit
5G worldwide

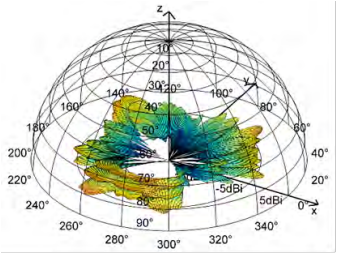
- Montage auf elektrischem Gegengewicht
- metal mount

Änderungen vorbehalten / *Subject to alterations*

Technische Daten / *Technical Data*

Impedanz / *Impedance*	50 Ohm
Anschluss / *Connector*	FAKRA Kodierung A / *code A*
Abmessungen / *Dimensions*	62x46x85 mm³
Abmessungen ohne Gehäuse (nur Leiteplatte) / *Dimensions without casing (only PCB)*	1,6x29,1x79,9 mm³
Hersteller / *Manufacturer*	Hirschmann Car Communication GmbH Stuttgarter Strasse 45 - 51 D - 72654 Neckartenzlingen
Frequenzbänder / *Frequency Bands*	617 MHz– 698 MHz 698 MHz – 960 MHz 1427,9 MHz – 1510,9 MHz 1710 MHz – 1990 MHz 1990 MHz – 2170 MHz 2300 MHz – 2690 MHz 3300 MHz – 4200 MHz 4400 MHz – 5000 MHz

Berechnungsvorschrift integraler Antennengewinn / Calculation formula of partial antenna gain



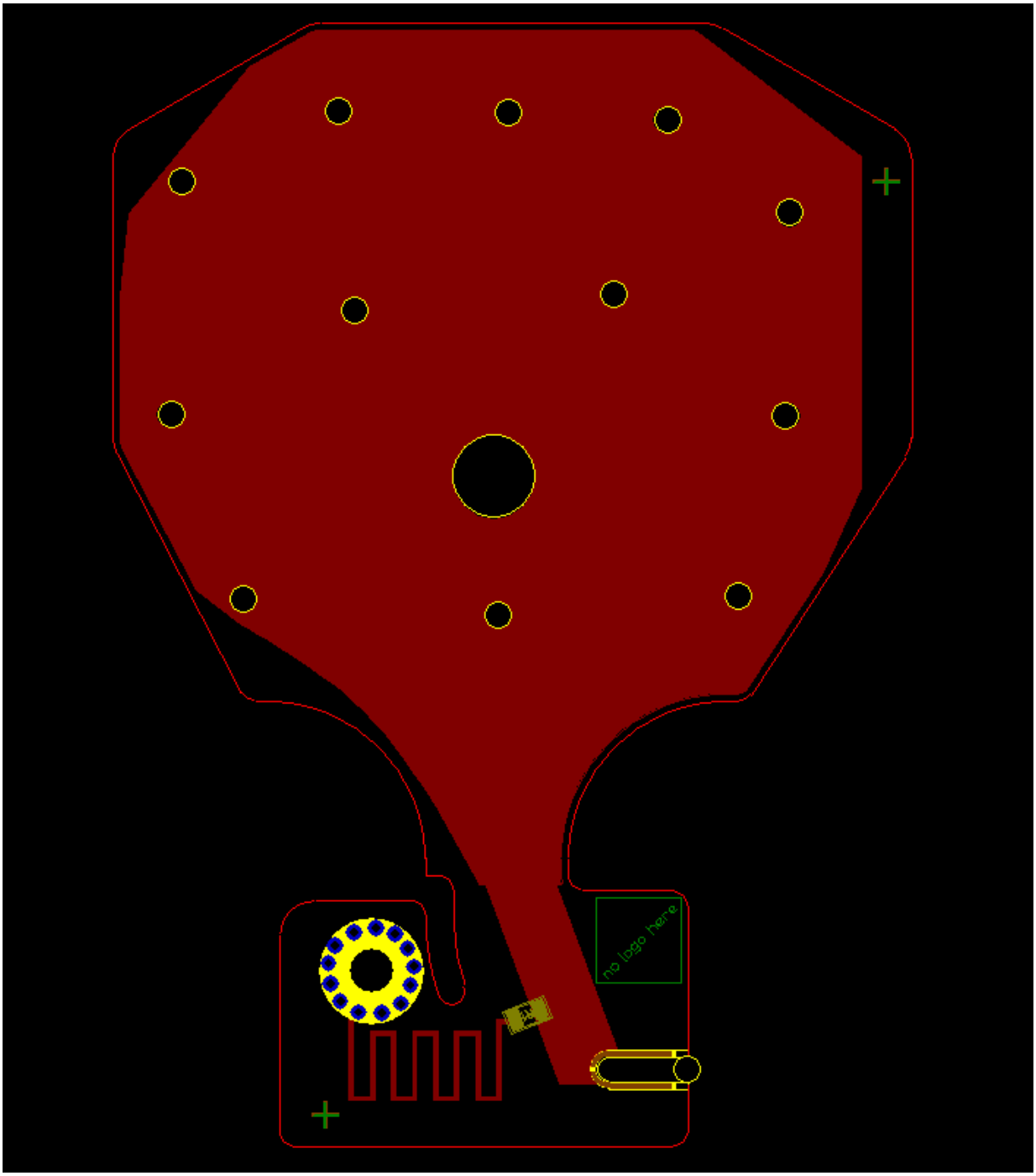
$$\text{p.ave.gain} = 10\log\left(\frac{\sum_{iPhi=0°}^{360°}\sum_{iTheta=70°}^{90°} G(iTheta, iPhi)\sin(iTheta)}{nPhi\sum_{iTheta=70°}^{90°}\sin(iTheta)}\right) = x\,\text{dBi}$$

$nPhi$ => number of elevation cuts

G => total gain ($G_{Theta} + G_{Phi}$)

p.ave.gain => partial average gain

Antennenlayout / *Antenna Layout*

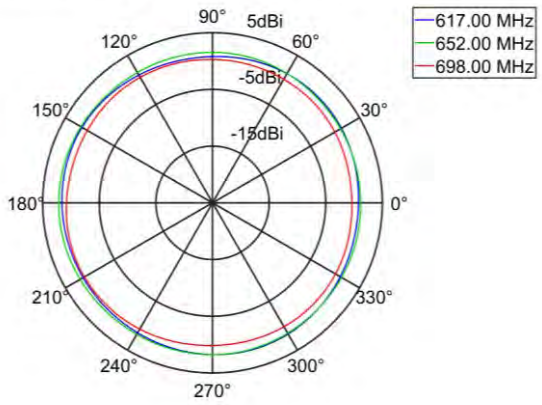


Antennengewinn / *Antenna Gain*
Mounted on sirius ground plane

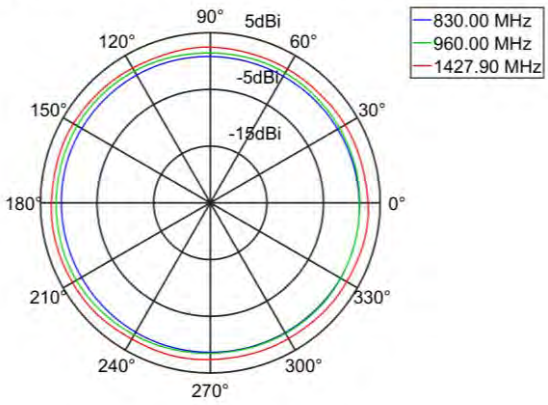
frequency band in MHz			partial average gain of freq. band in dBi (Theta=[60-90]°)		max. gain in partial area (Theta=[60-90]°)	absolut maximum gain (Theta=[0-180]°)
begin		end	average	maximum	in freq. band in dBi	in freq. band in dBi
617	-	698	1,2	1,7	4,2	4,3
698	-	960	1,3	1,9	4,0	4,5
1427,9	-	1510,9	2,9	3,2	5,1	5,1
1710	-	1990	3,6	3,9	6,5	6,5
1990	-	2170	3,6	4,0	6,9	6,9
2300	-	2690	2,9	3,4	8,6	8,6
3300	-	4200	2,2	2,7	7,3	7,3
4400	-	4990	0,8	1,6	6,7	7,0

Horizontale Antennendiagramme / Horizontal Radiation Patterns
Mounted on sirius ground plane

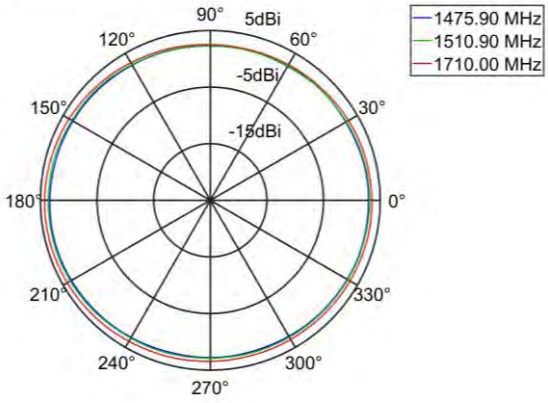
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



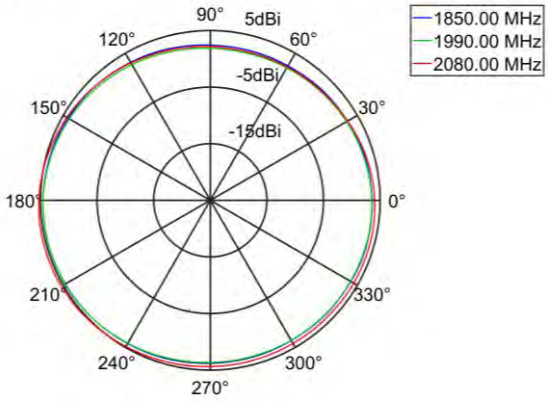
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



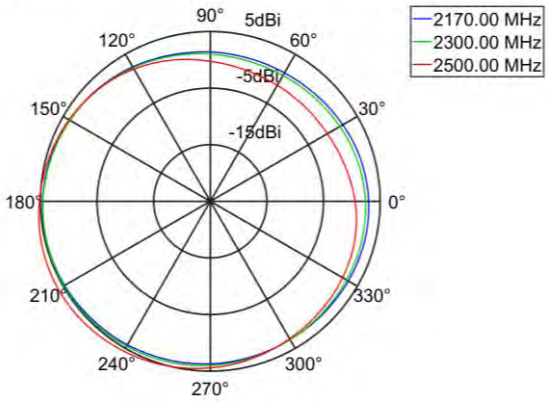
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



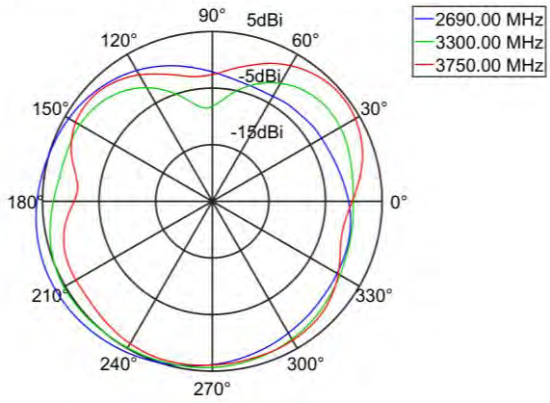
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



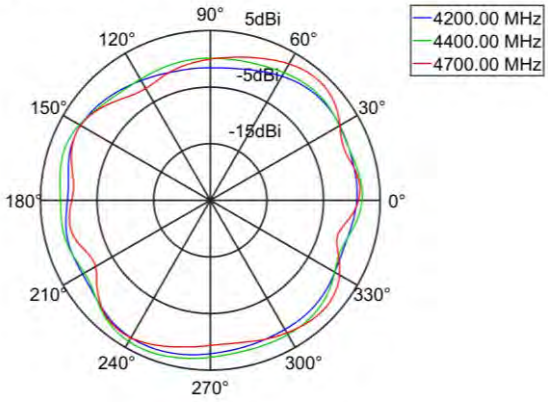
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



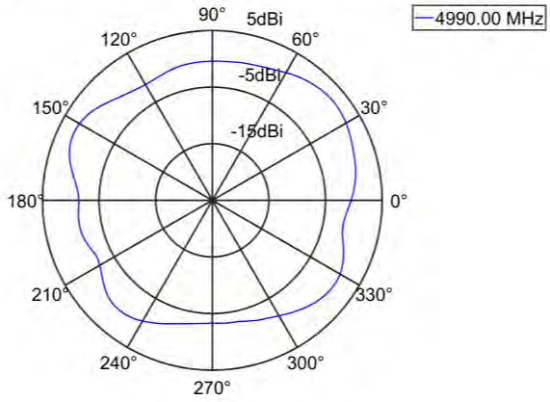
radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)



radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)

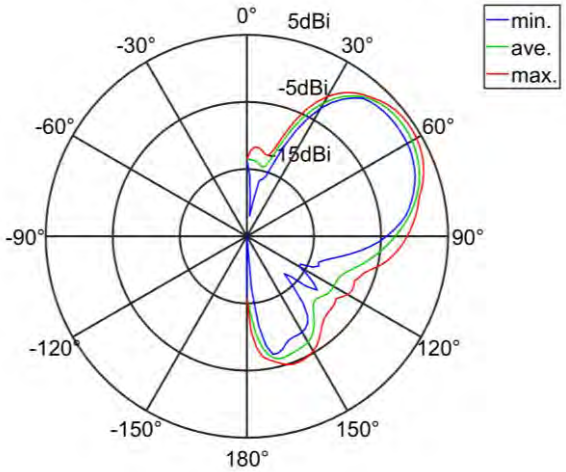


radiation pattern of the antenna
realized partial average gain (E_Total, Theta = [60.00 - 90.00]°)

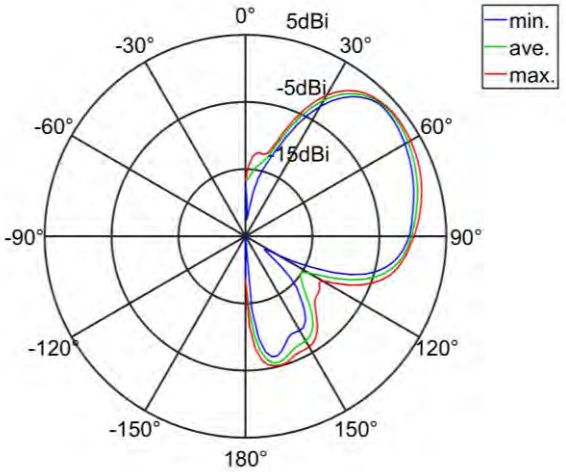


Vertikale Antennendiagramme / Vertical Radiation Patterns
Mounted on sirius ground plane

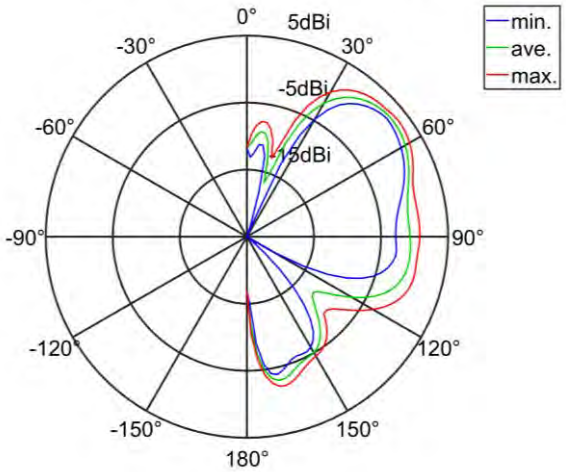
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 617.00 MHz)



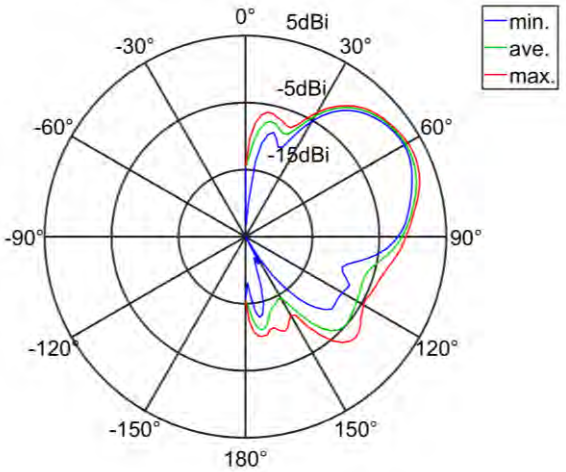
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 652.00 MHz)



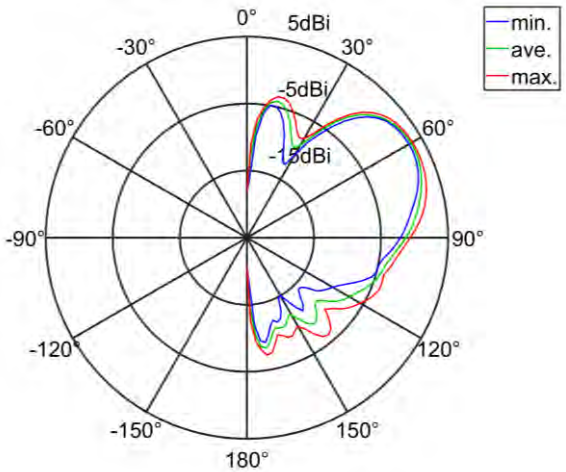
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 698.00 MHz)



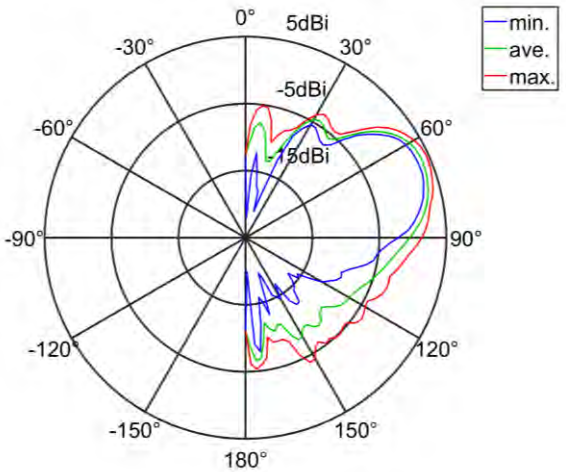
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 830.00 MHz)



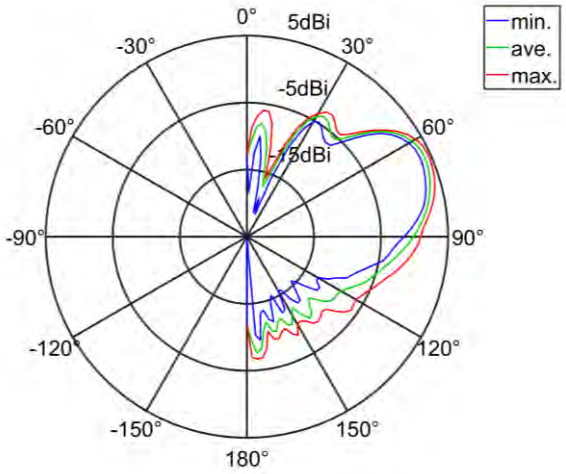
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 960.00 MHz)



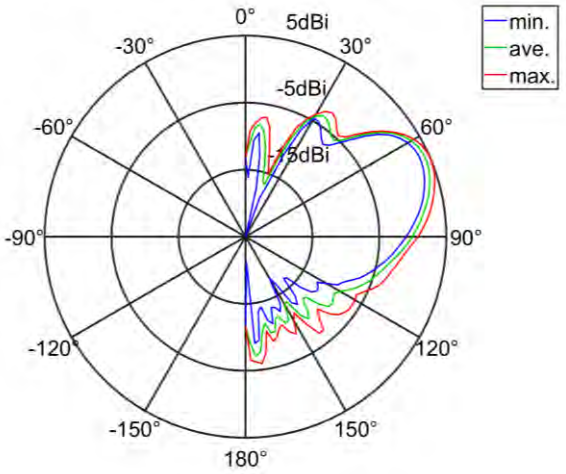
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1427.90 MHz)



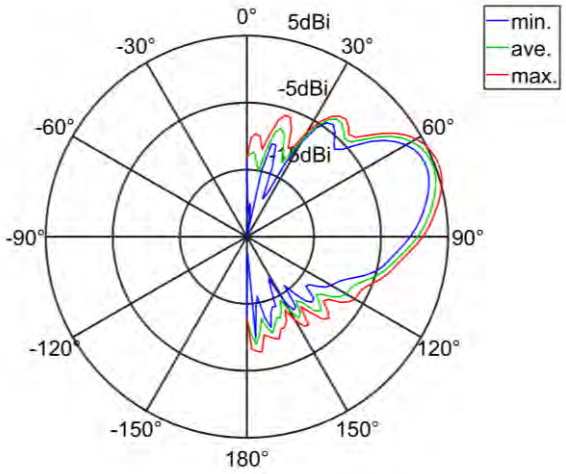
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1475.90 MHz)



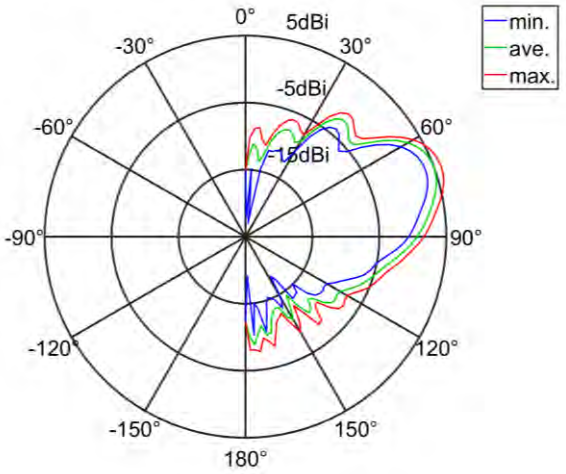
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1510.90 MHz)



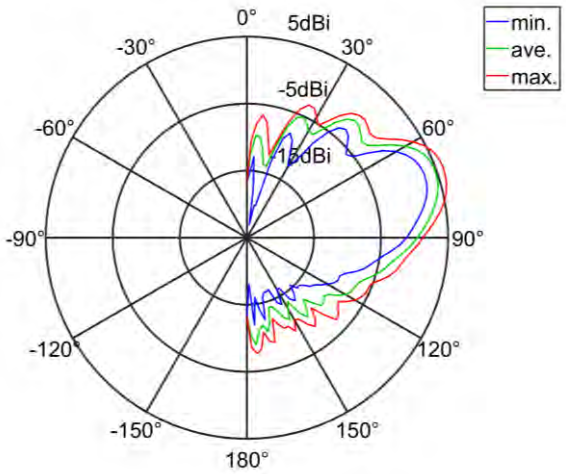
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1710.00 MHz)



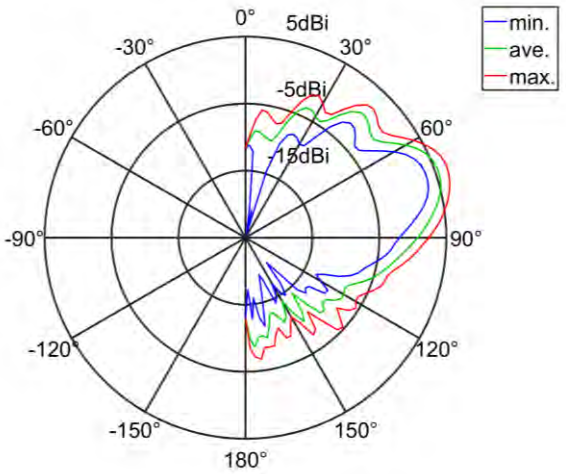
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1850.00 MHz)



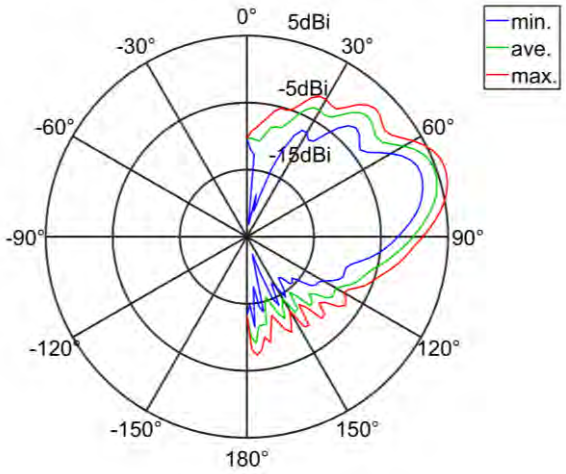
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 1990.00 MHz)



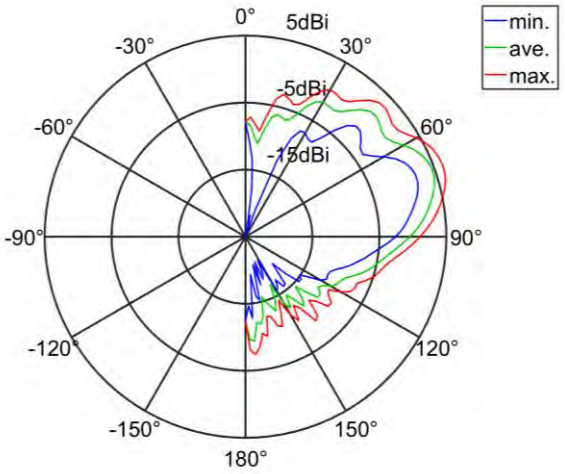
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 2080.00 MHz)



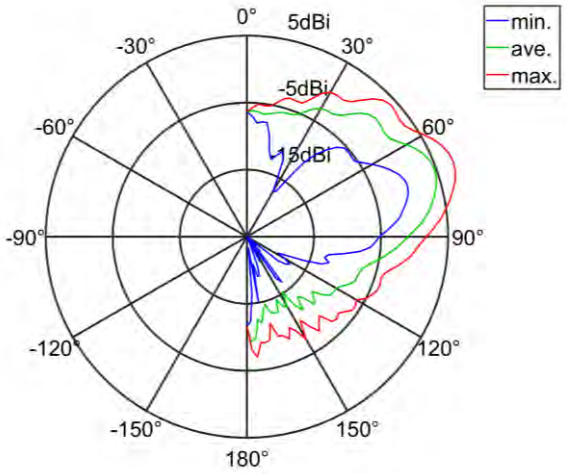
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 2170.00 MHz)



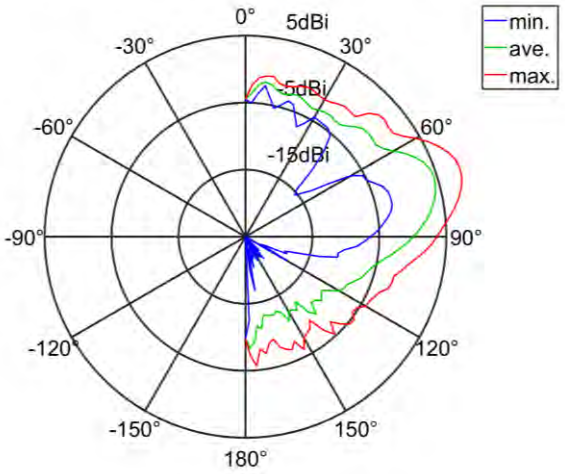
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 2300.00 MHz)



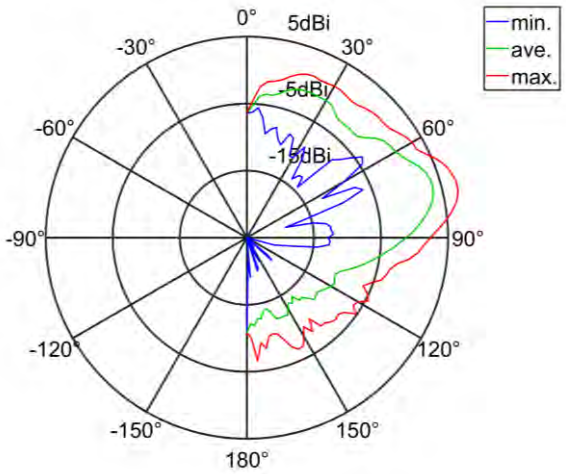
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 2500.00 MHz)



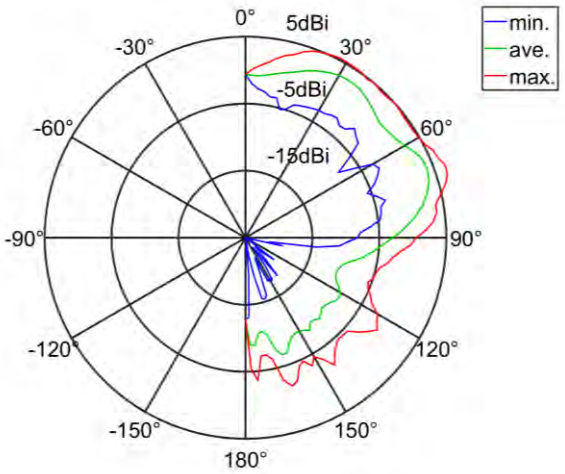
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 2690.00 MHz)



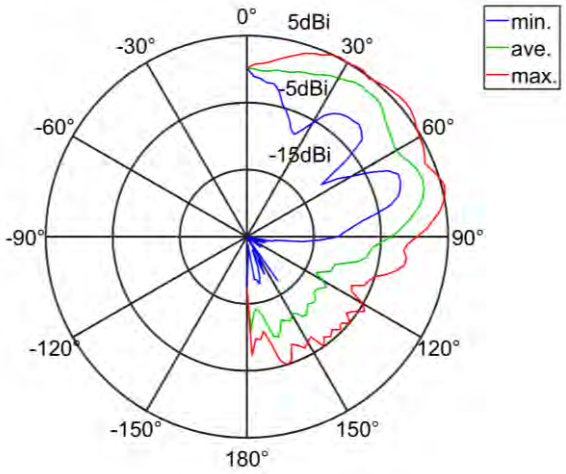
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 3300.00 MHz)



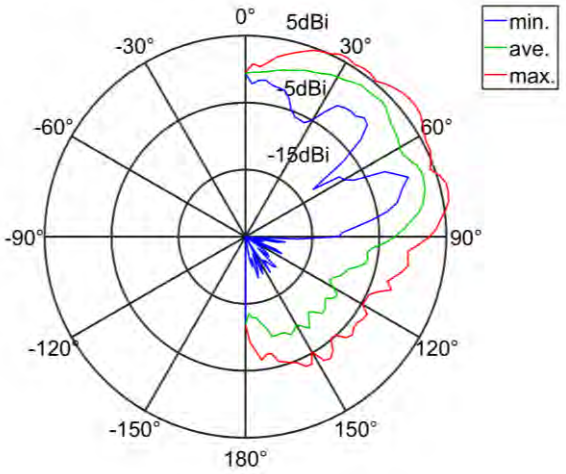
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 3750.00 MHz)



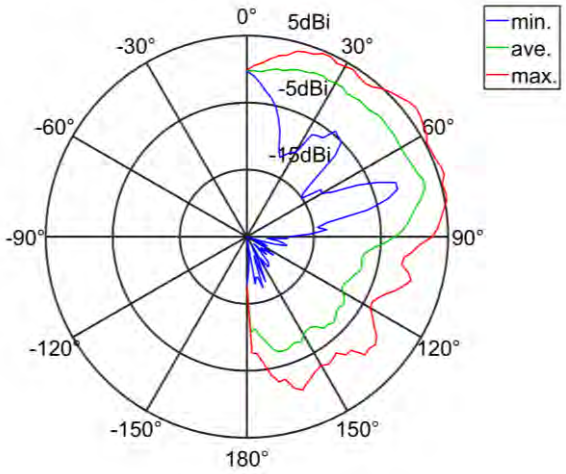
radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 4200.00 MHz)



radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 4400.00 MHz)



radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 4700.00 MHz)



radiation pattern of the antenna (elevation cut)
realized gain (E_Total, Freq = 4990.00 MHz)