



Standard Space Antennas

SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

Datasheet

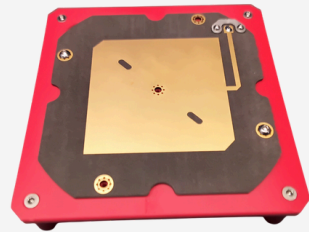
PN: SSA052C

Last Update: 07/08/26

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PN: SSA052D

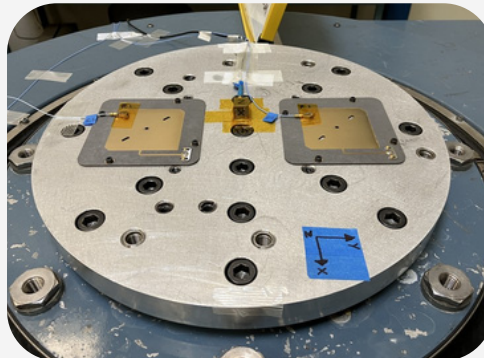
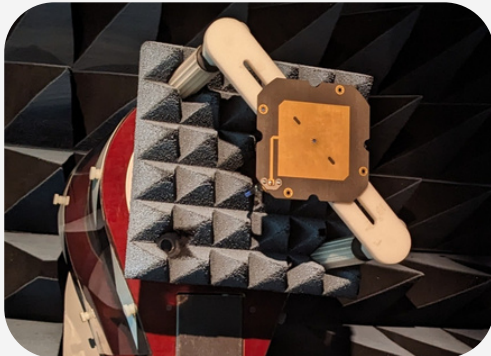
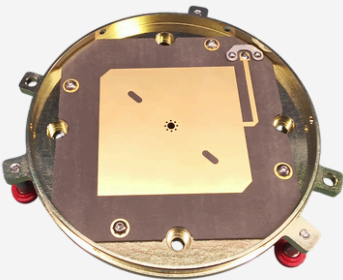


L1 Band Antenna

ET.patch™

Hemispherical Coverage

TRL 9



Features

- **Enhanced bandwidth through a slotted patch (~50MHz) to withstand manufacturing deviations, thermal cycling, and degradation over its lifespan**

Classic design @ $\epsilon_r=2.20$ covers the L1 range of 24MHz only marginally

- **A high Multipath Ratio reduces interference from the backplane and nearby objects**

Surface currents in ceramic-based small patches significantly distort performance under operating conditions

- **Reinforced microstrip-to-connector transition construction to prevent cracking or detachment during the launching**

A sandwich structure is used to reduce joint and solder area stress





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Benefits

- **Designed for assembly, automation suitability, and optimal cost-effectiveness for high production batches**

Low profile suitable for high-reliability GPS-L1 service in satellite constellations or critical missions

- **Low-loss by Teflon-based substrate**

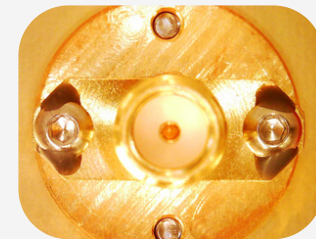
RT/DUROID 5880 has extensive testing and proven flight heritage by NASA

- **There is no floating potential and consistent thermal conductivity to the joint**

Direct thermal and electrostatic discharge path from the exposed patch to the interface joint surface through internal metallic vias

- **Optional: Flange adapter for Hat**

Test Cap





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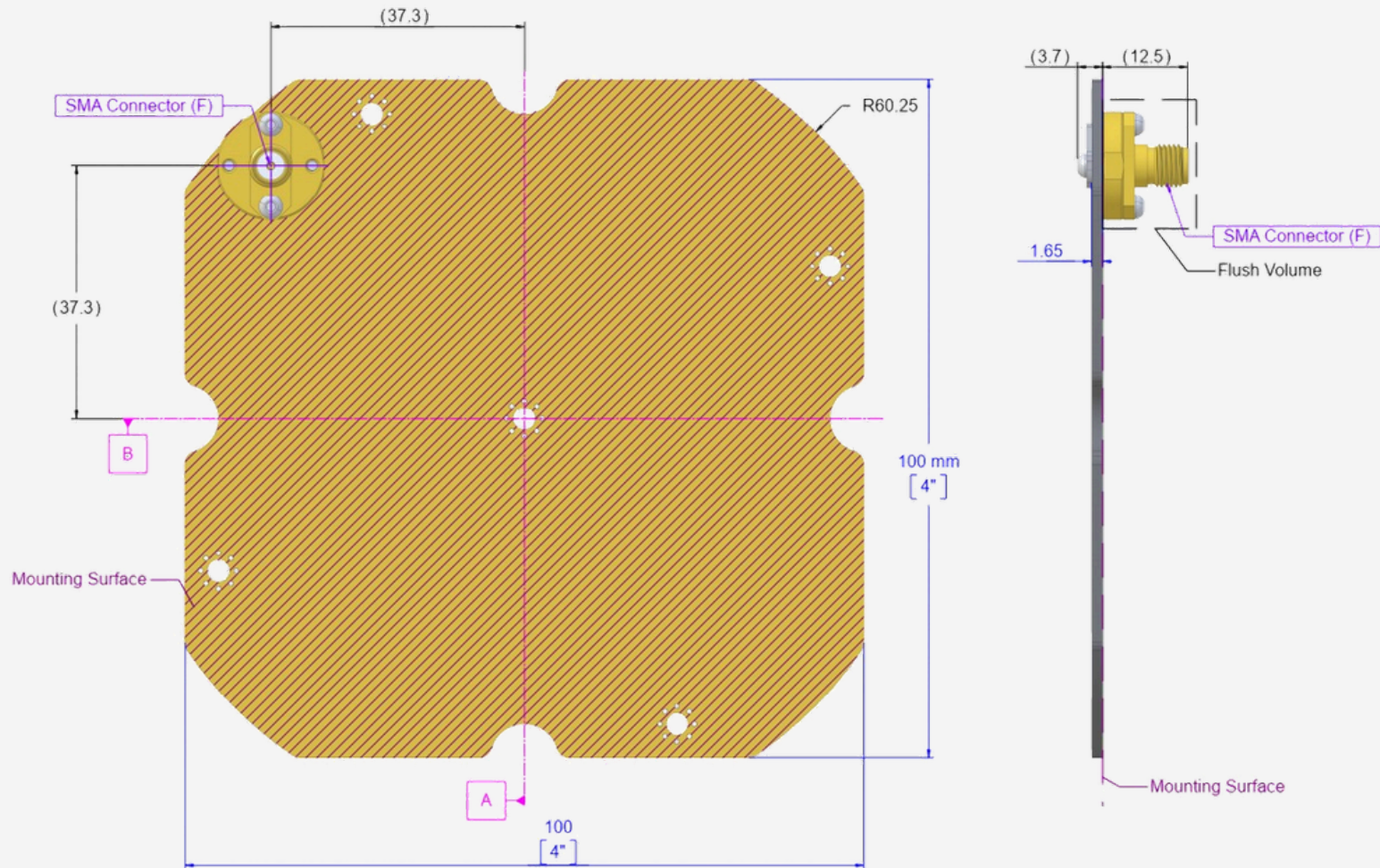
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Mechanical Envelope - Isolated Antenna (Option 1)





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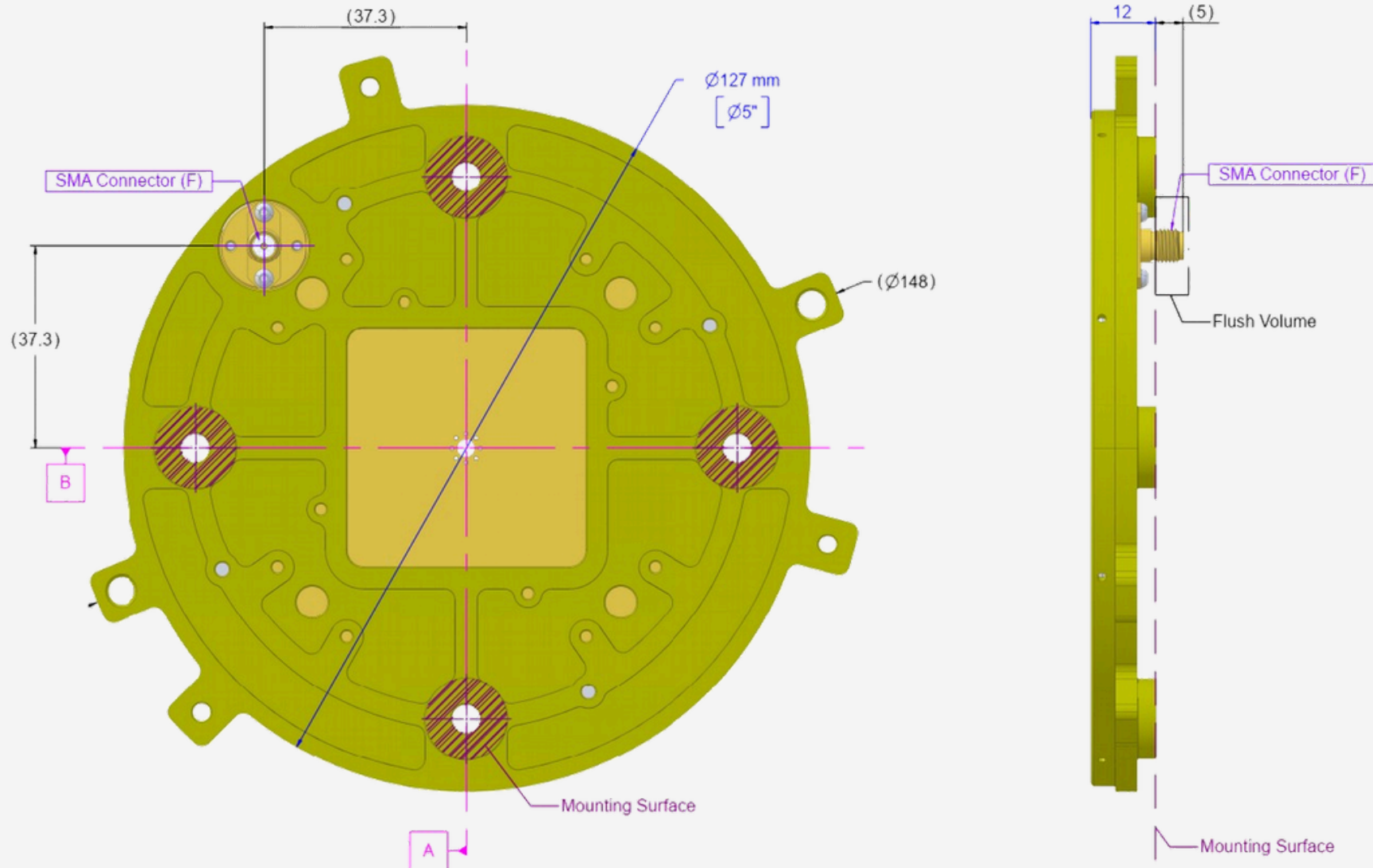
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Mechanical Envelope - With Hat Adapter (Option 2)





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Typical Functional Specifications @ Isolated condition

Parameter	Values	Remark
Frequency Range [GHz]	1.563 – 1.587	Designed for GPS L1 Band
Reflection Coefficient [dB] (VSWR) Isolated Antenna	-17.8 (1.3), -16.51 (1.35), -21.09 (1.19)	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 1]
Reflection Coefficient [dB] (VSWR) With Hat Adapter	-17.62 (1.3) -15.75 (1.39) -19.07(1.25)	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 1]
Port to Port Isolation [dB]	NA	Single Port
Radiation Efficiency [%] Worst Case -3%	85.28, 85.88, 86.73	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 15]
Radiation Pattern Envelope	Hemispherical	Cardioid [AD 2]
Phase Center [mm]	10	Relative to Antenna Coordinated System. Z=0 $\equiv$ Mounting Joint Surfac
Realized Gain [dBi] RHCP @ Boresight	5.36, 5.94, 5.82	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 3]
HPBW [°] @ Phi = 0° (@ Phi = 90°)	86 (84), 84 (82), 82 (84)	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 2]
Polarization Sense	Circular	RHCP Confirmed by Measurements [AD 3]
Polarization Ratio [dB] (Axial Ratio [dB]) @ Boresight	7.26 (8.06) 18.44 (2.09) 10.23 (5.53)	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 3]
Multipath Ratio [dB] Worst Case @ theta < 60° Ref: G_RHCP(theta)/G_LHCP(180-theta)	14.11, 17.21, 15.23	@ GPS L1: 1565 MHz, 1575 MHz, 1585 MHz [AD 16]
Multipactor Margin [dB]	NA	Receiver Antenna
Corona Discharge Margin [dB]	NA	Receiver Antenna





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Typical Environmental & Interface Specification

Parameter	Values	Remark
Mass [g]	43	Center of Mass: [4.4, 4.4, 0.3] mm from Mounting Joint Surface [AD 9]
Size [mm]	100 X 100	Max Envelope. [AD 9]
Height [mm]	1.6 (3.7)	Overall Height measured from Mounting Joint Surface [AD 9]. (Max. Envelope, includes Screws Heads) (Flush: 12.5 mm)
RF Interface	SMA Female	[AD 9]
Electrostatic Discharge	ESD Free	Verified by Review of Design
Outgassing	TML < 1.00 % CVCM < 0.05%	According to Declared Material, Component and Processes List
Temperature Range [°C]	(-55; 140)	Thermal Vacuum Test, Four Cycles, 4 hours Dwell. Verified by Analysis in [AD 10]
Vacuum [Hpa]	$\leq 1.33 \times 10^{-5} \pm 80\%$	In Thermal Vacuum Test
1st Natural Frequency [Hz]	447	Verified by Analysis in [AD 12]
Dynamic Acceleration Loads [Grms]	20 Hz: 0.026 g ² /Hz 20 - 50 Hz: +6 dB/Oct 50 - 800 Hz: 0.16 g ² /Hz 800 - 2000 Hz: +6 dB/Oct 2000 Hz: 0.026 g ² /Hz Overall: 14.1	• Shaker Test @ Random Vibration, Three Axis, 2 min / axis. [AD 5] • Baseline $\approx$ 6.8 Grms (Maximum Expected Environment according to Review of Typical Launch Vehicles) • Acceptance $\approx$ 10 Grms, 1.41* Baseline (ASD + 3 dB) • Qualification $\approx$ 14.1 Grms, 1.41* Acceptance (ASD + 6 dB) • <i>This Model was tested successfully @ 22.7 Grms</i>
Static Acceleration Loads [G]	Peak: 42.3	Shaker Test @ Sine Burst, Three Axis [AD 5]. Qualification Level, according to NASA GEVS
Shock [G]	42 @ 100 Hz 1400 @ 1000 Hz 1400 @ 10000 Hz	• Shock Test, 1 Shock/Axis. • Shock Response Spectrum Baseline: 1000 G (Maximum Expected Environment according to Review of Typical Launch Vehicles) • Acceptance: 1000 G, Same as Baseline Level • Qualification: 1400 G, 1.4* Acceptance, according to NASA GEVS Criteria





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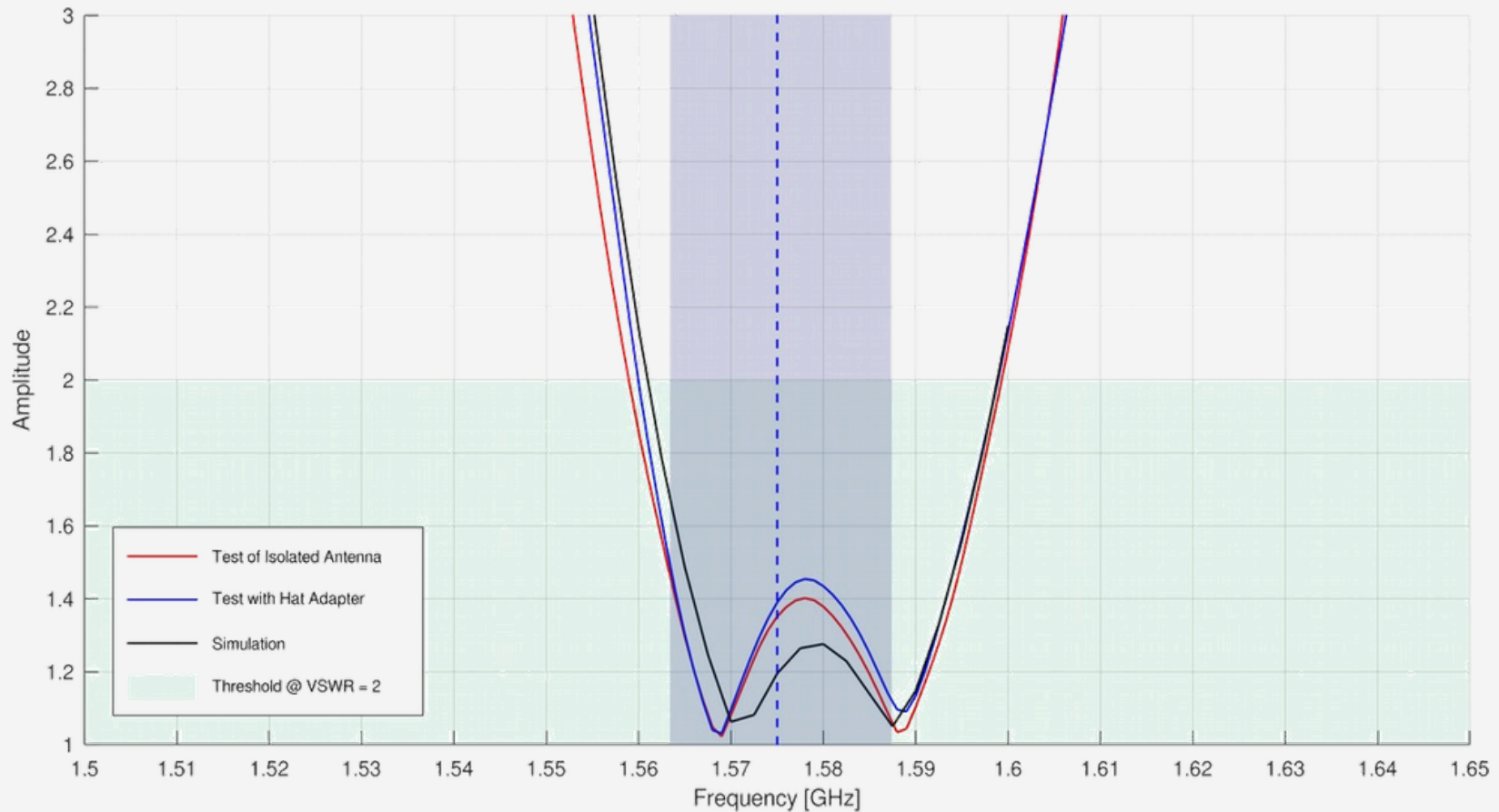
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VSWR

Verification by Test vs Simulation of VSWR @ PN: SSA052D-001-001

Frequency: [1.5:0.05:1.65] GHz, Instrument: VNA S5085, Calibration: Full 1-Port OSL, S911T 3.5 CalKit, Boundary Conditions: MGSE-M2





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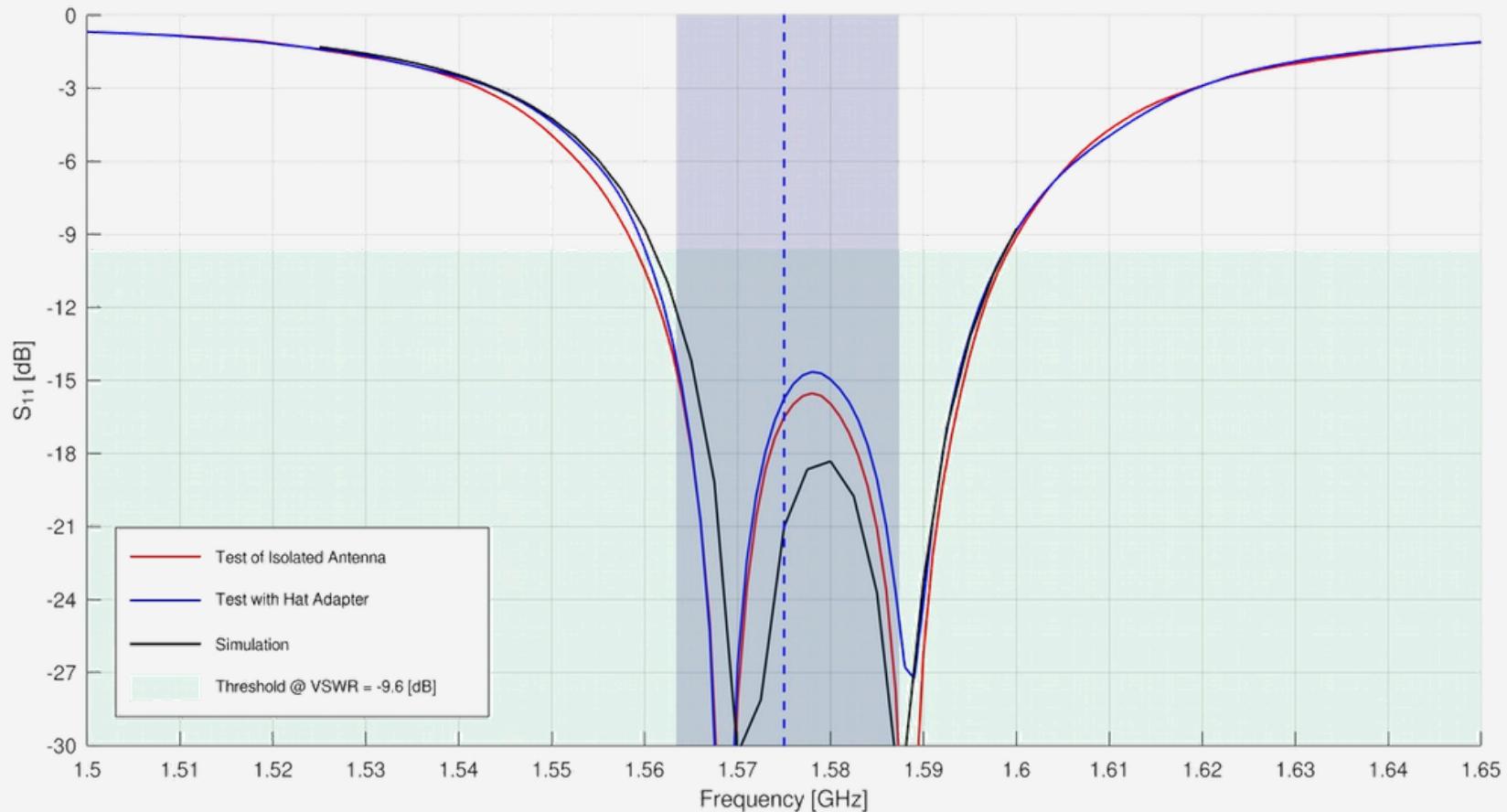
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Reflection Coefficient

Verification by Test vs Simulation of Reflection Coefficient @ PN: SSA052D-001-001

Frequency: [1.5:0.05:1.65] GHz, Instrument: VNA S5085, Calibration: Full 1-Port OSL, S911T 3.5 CalKit, Boundary Conditions: MGSE-M2





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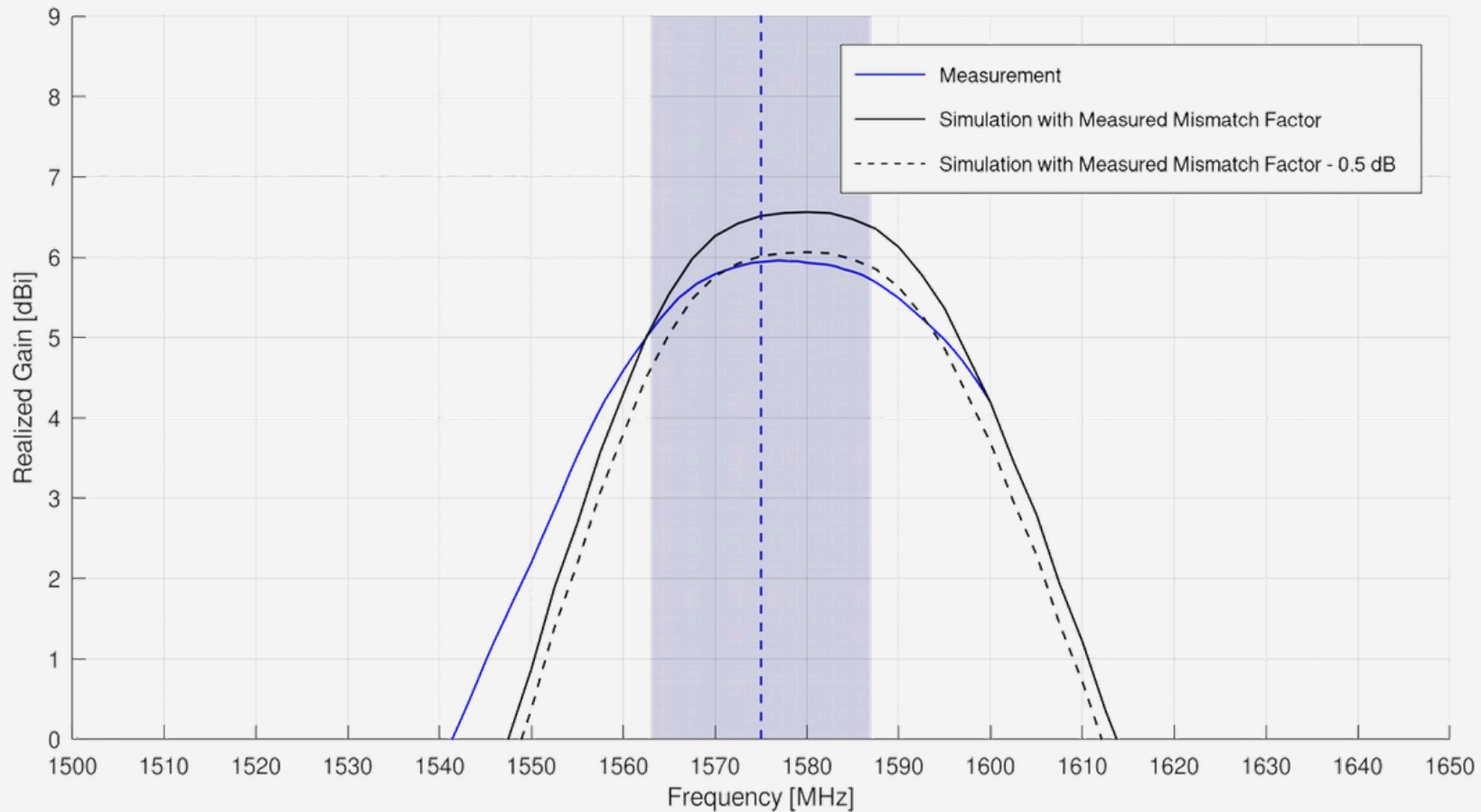
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Realized Gain RHCP @ Boresight vs Frequency

Verification by Test of Realized Gain RHCP versus Frequency - PN: SSA052D-001
Boresight, Source Antenna: Linear, Gain Method: Comparison, Technique: Direct Far-Field





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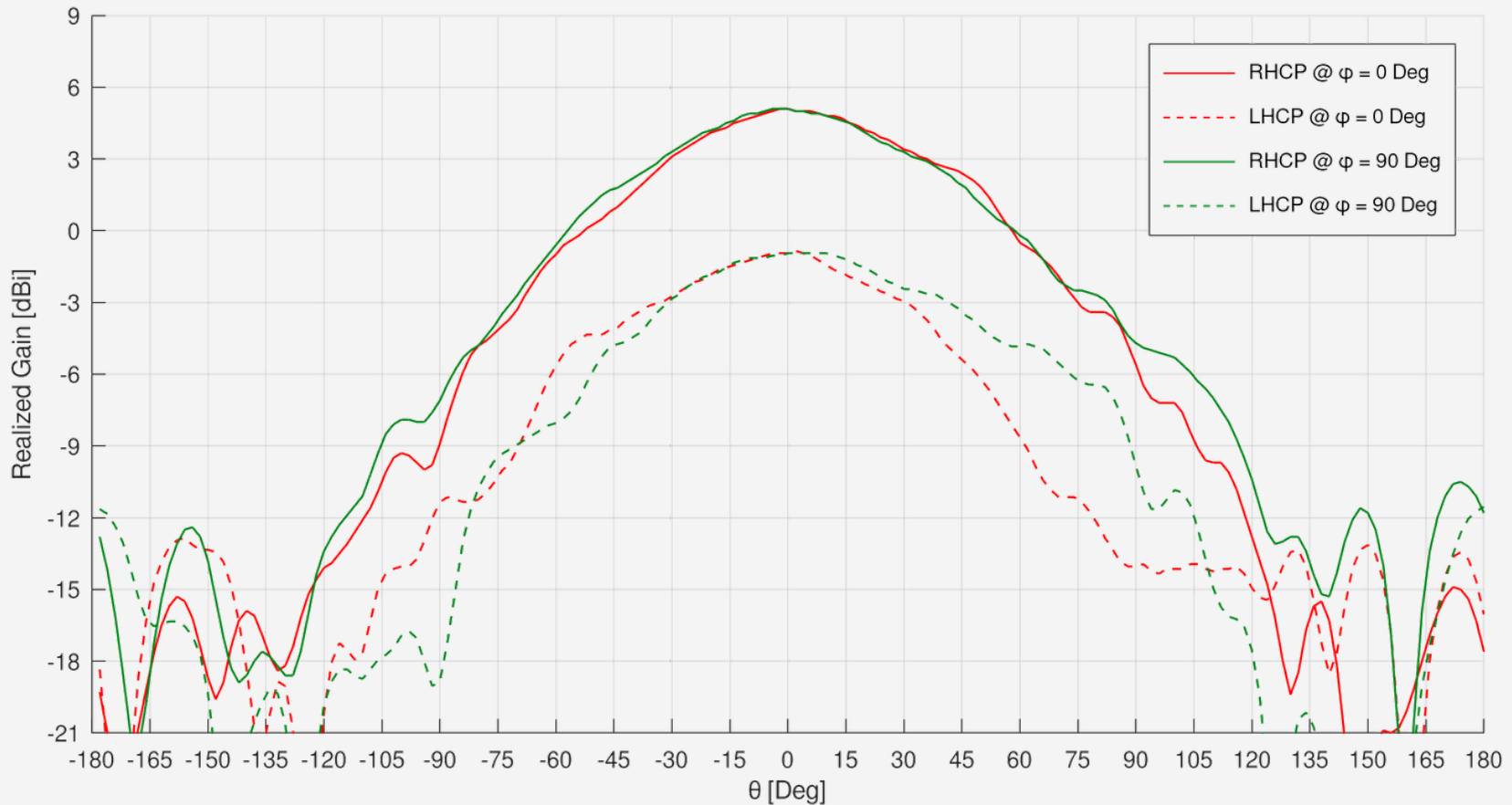
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Realized Gain Pattern @ Frequency: 1.563 GHz

Verification by Test of Realized Gain Pattern- PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0;90]$ deg, Freq. 1.563 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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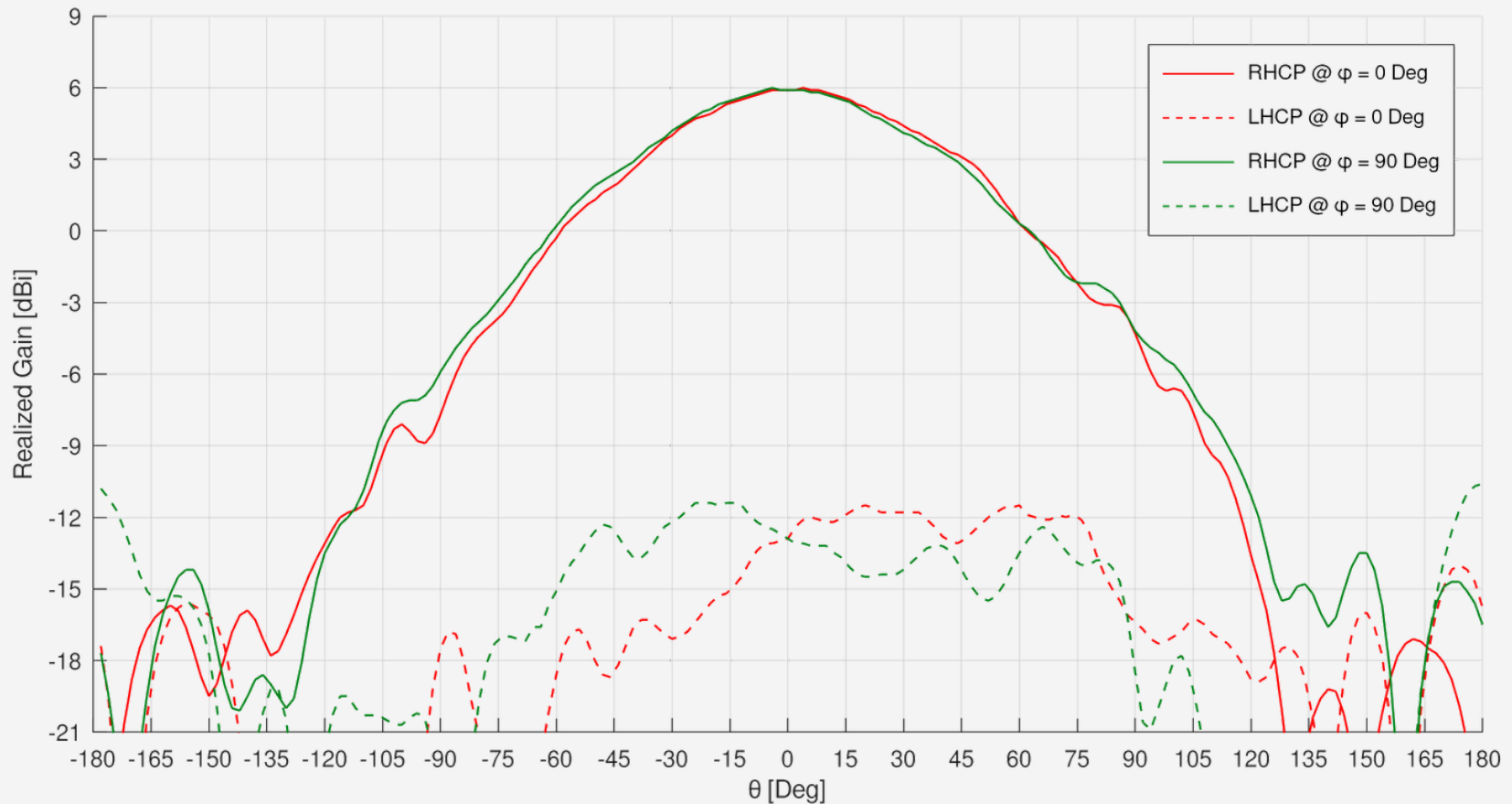
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Realized Gain Pattern @ Frequency: 1.575 GHz

Verification by Test of Realized Gain Pattern- PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0;90]$ deg, Freq. 1.575 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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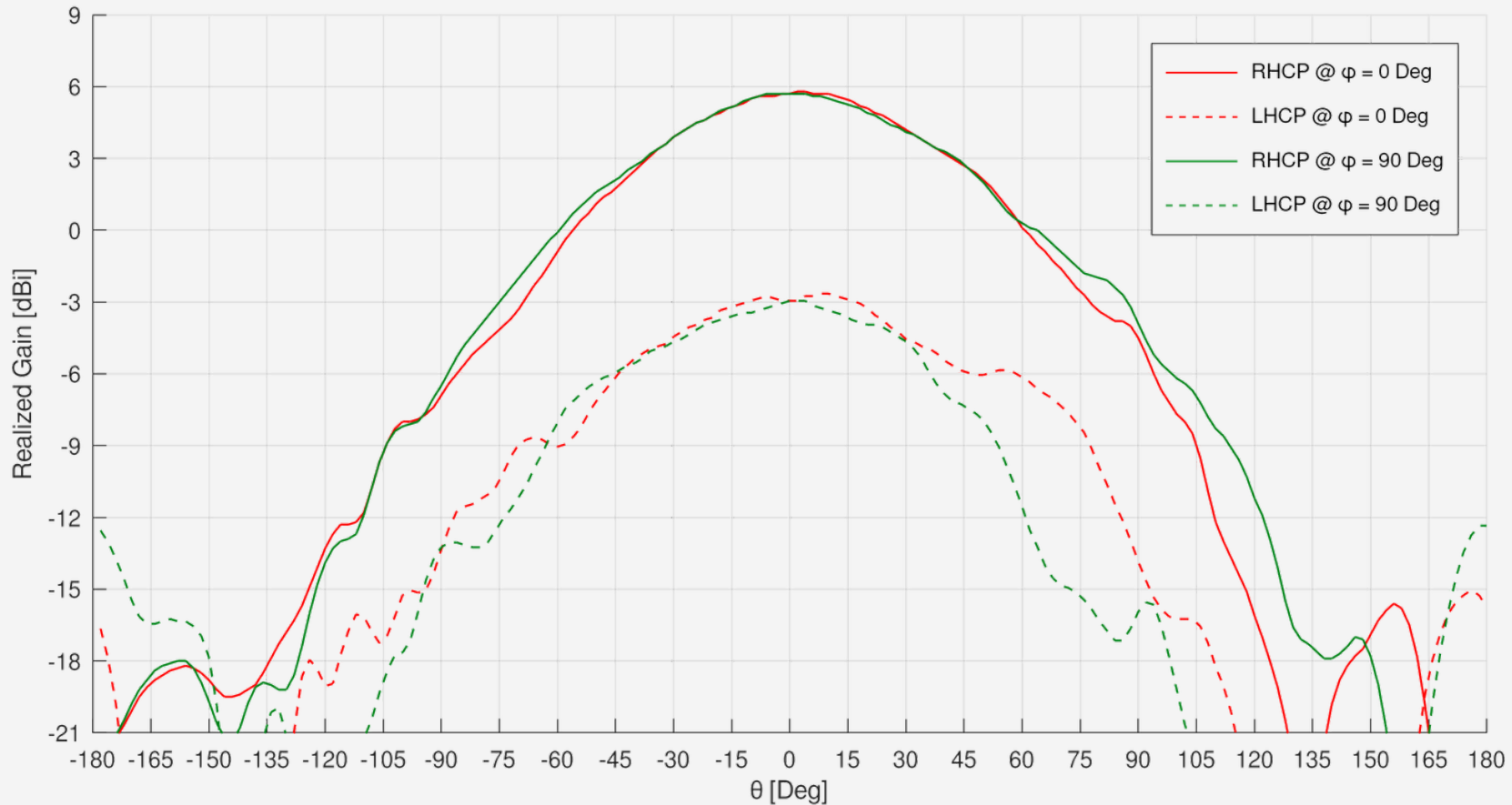
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Realized Gain Pattern @ Frequency: 1.587 GHz

Verification by Test of Realized Gain Pattern- PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0;90]$ deg, Freq. 1.587 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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PN: SSA052C

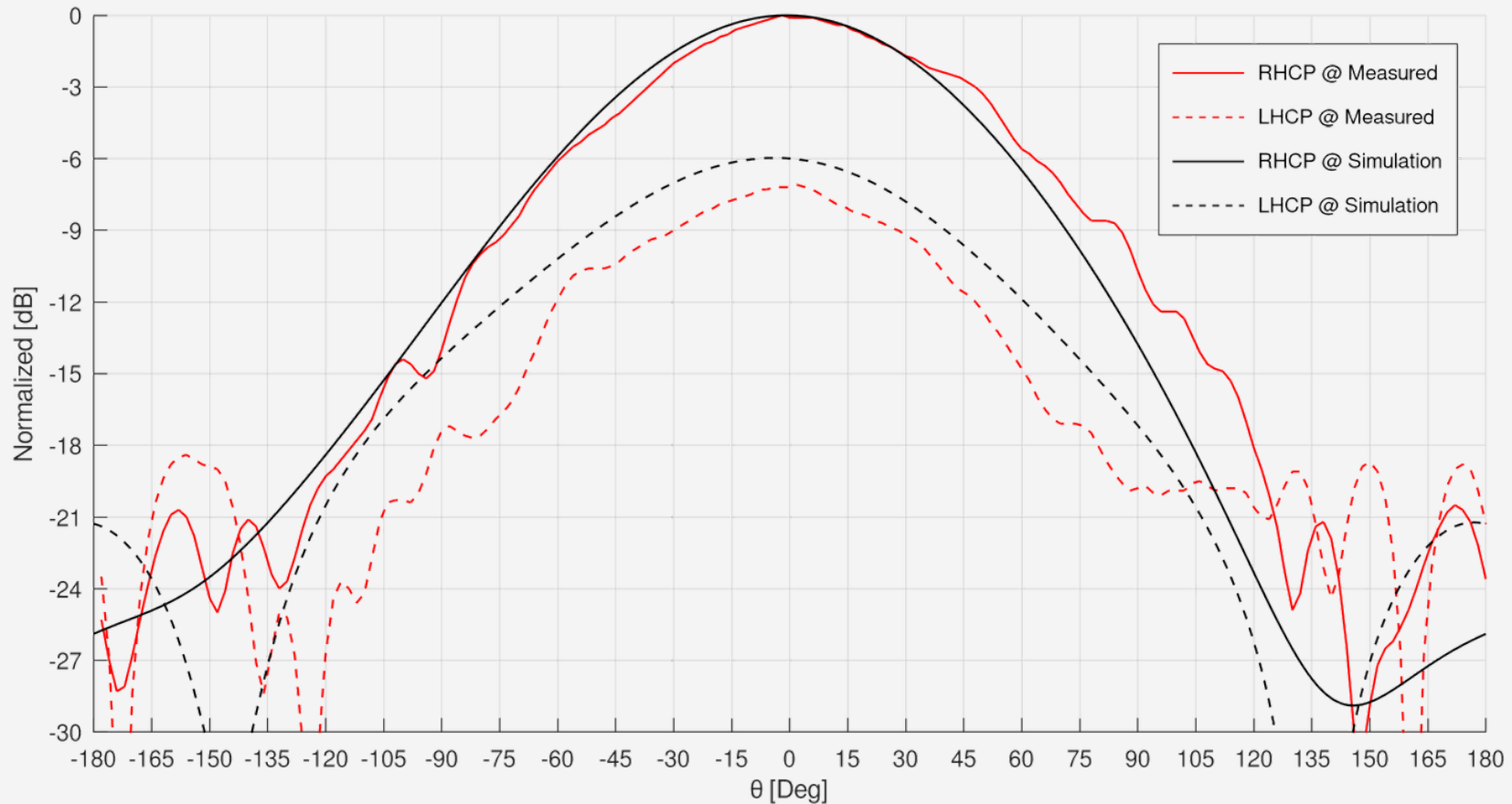
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Radiation Pattern Principal Cuts @ $\Phi = 0$ Degrees, Frequency: 1.565 GHz

Verification by Test of Radiation Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0]$ deg, Freq. 1.565 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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PN: SSA052C

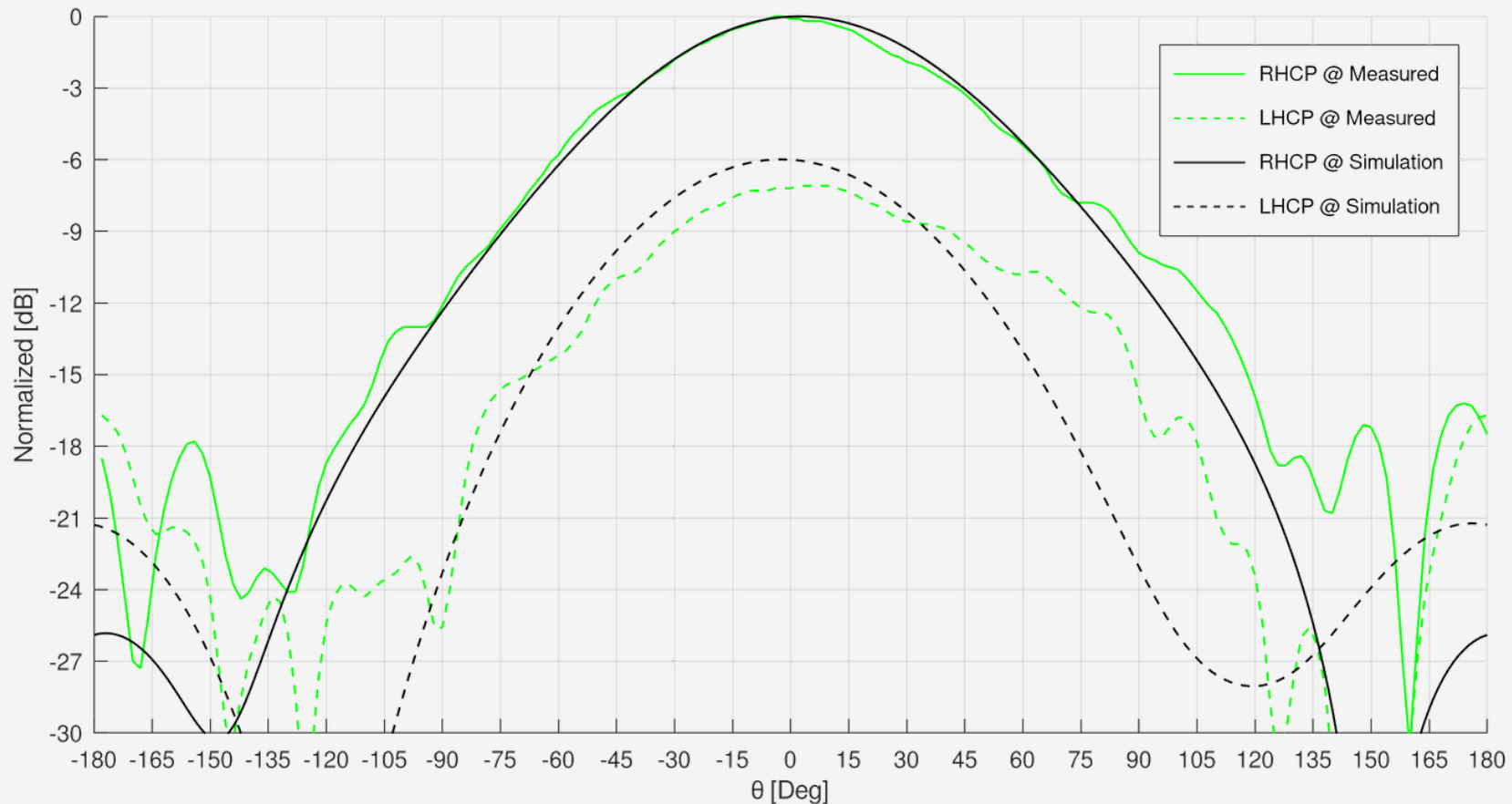
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Radiation Pattern Principal Cuts @ $\Phi = 90$ Degrees, Frequency: 1.565 GHz

Verification by Test of Radiation Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [90]$ deg, Freq. 1.565 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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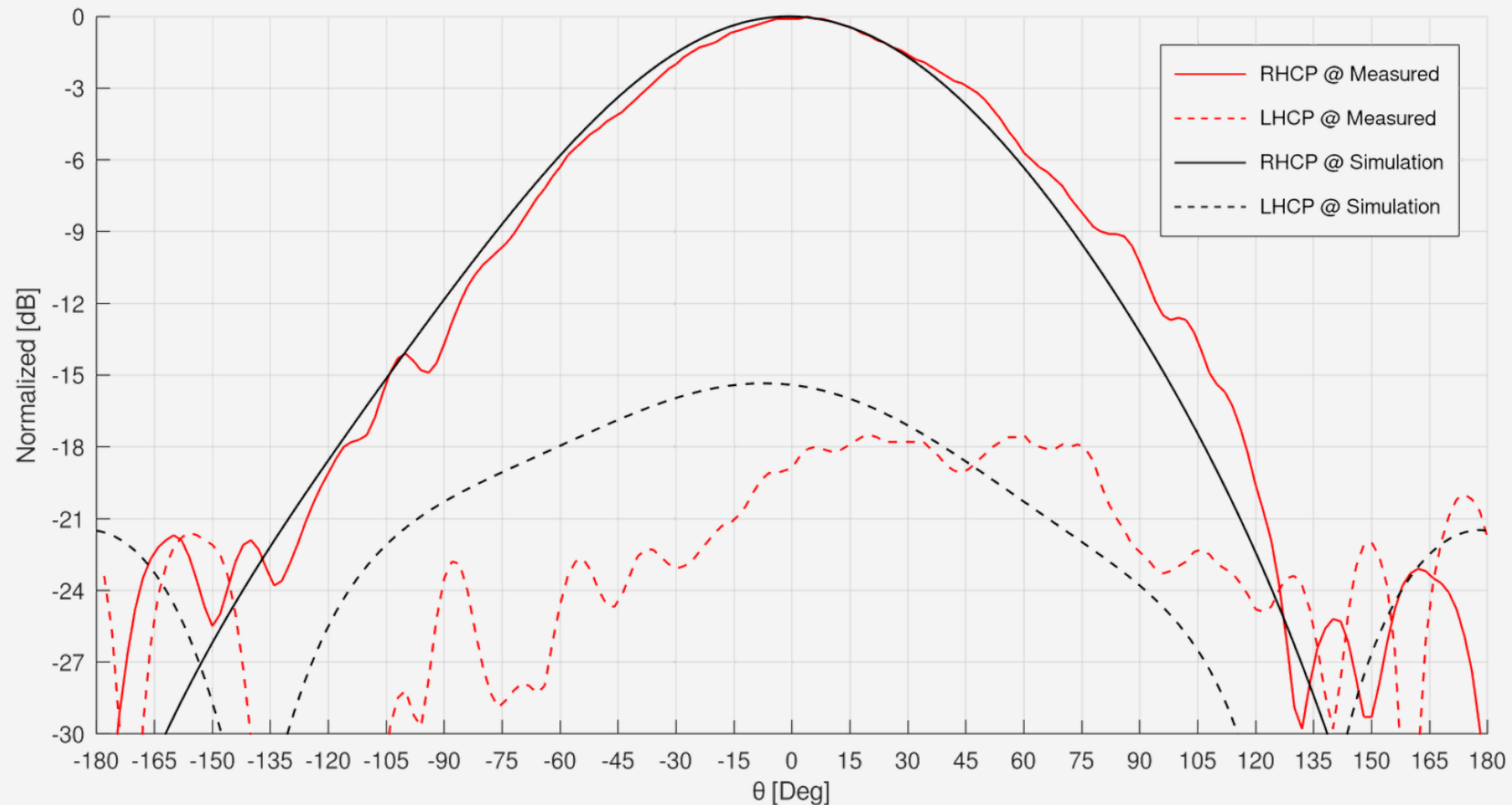
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Radiation Pattern Principal Cuts @ $\Phi = 0$ Degrees, Frequency: 1.575 GHz

Verification by Test of Radiation Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0]$ deg, Freq. 1.575 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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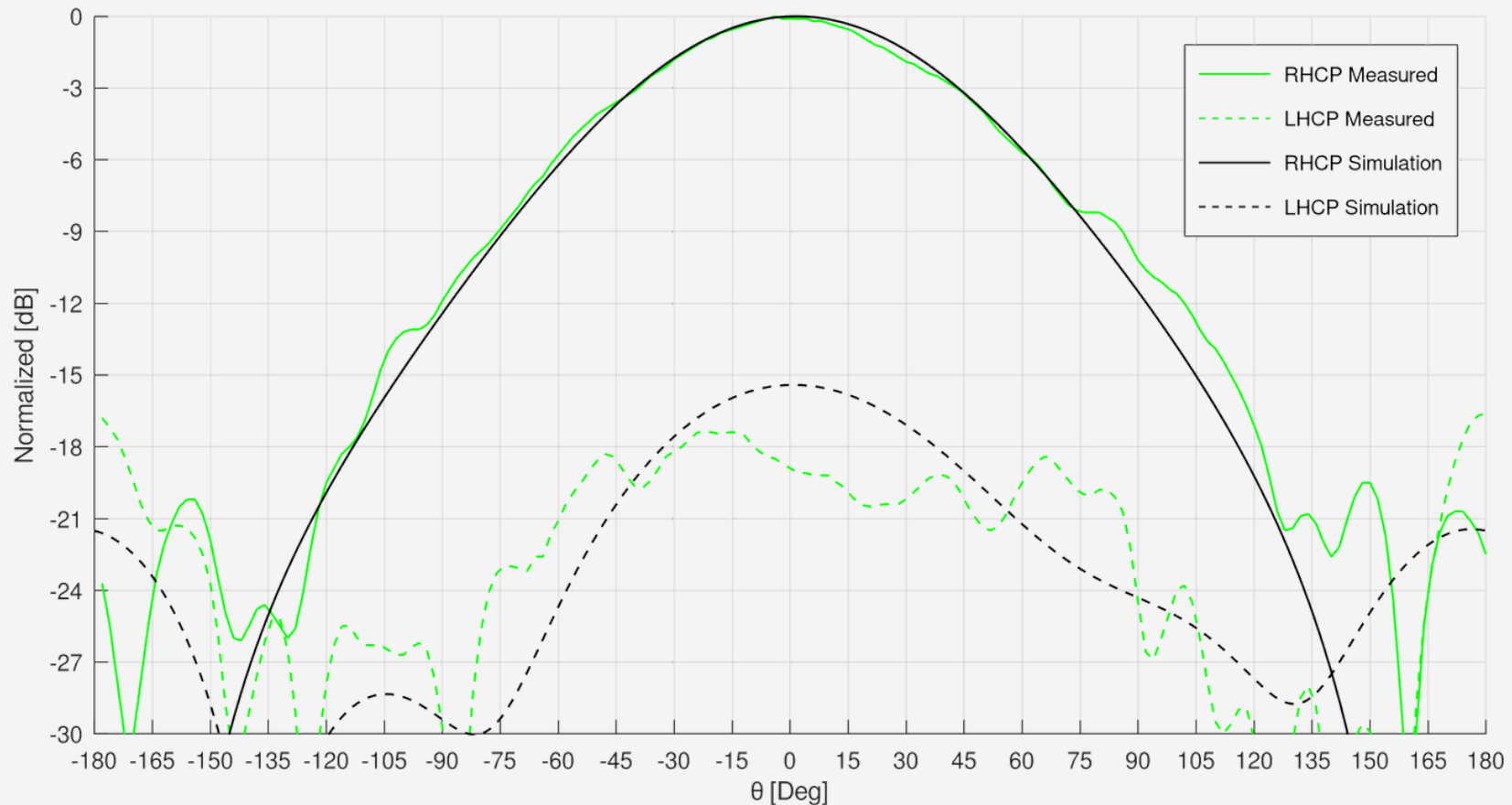
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Radiation Pattern Principal Cuts @ $\Phi = 0$ Degrees, Frequency: 1.575 GHz

Verification by Test of Radiation Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [90]$ deg, Freq. 1.575 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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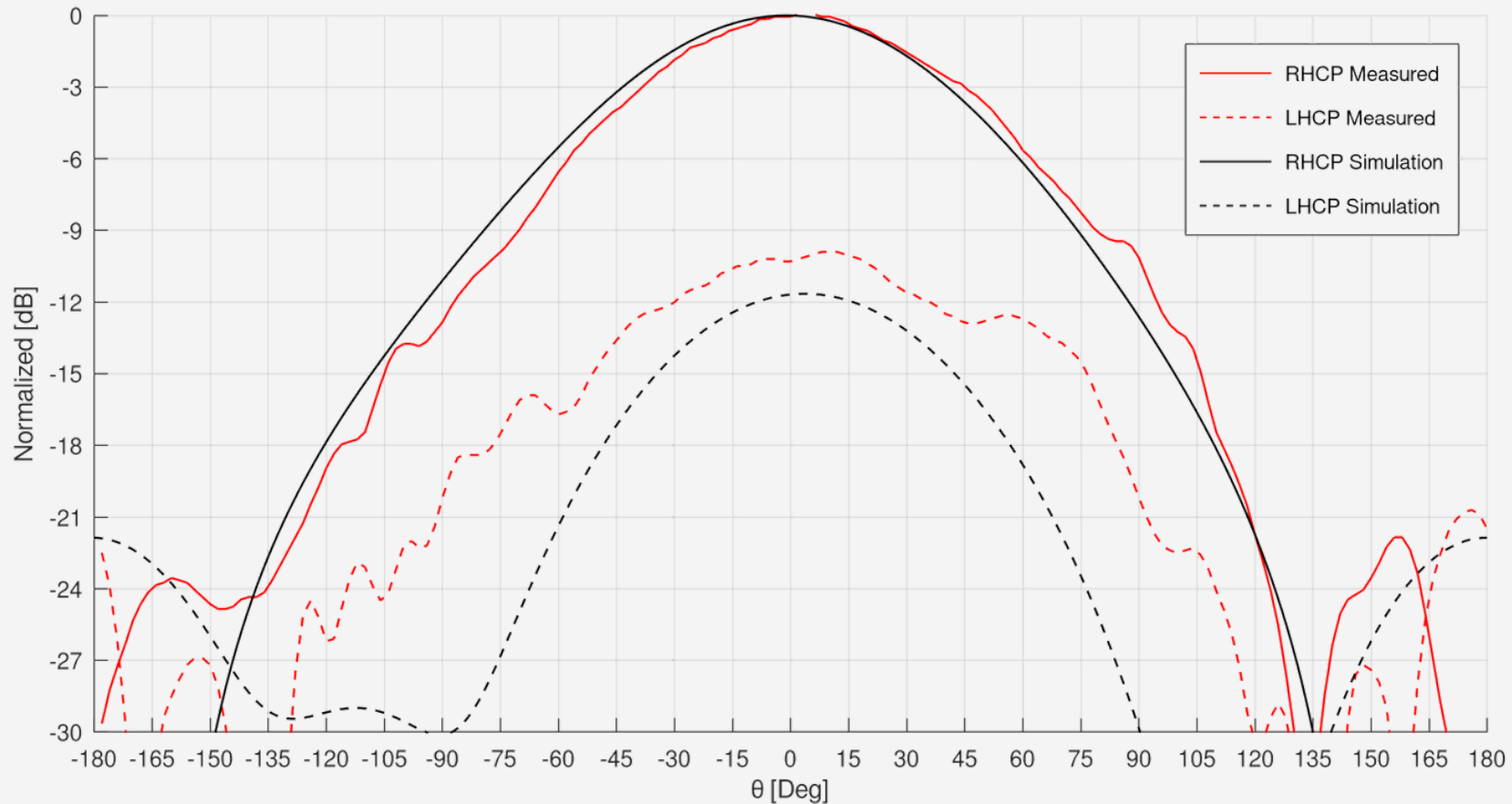
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Radiation Pattern Principal Cuts @ $\Phi = 90$ Degrees, Frequency: 1.585 GHz

Verification by Test of Radiation Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [0]$ deg, Freq. 1.585 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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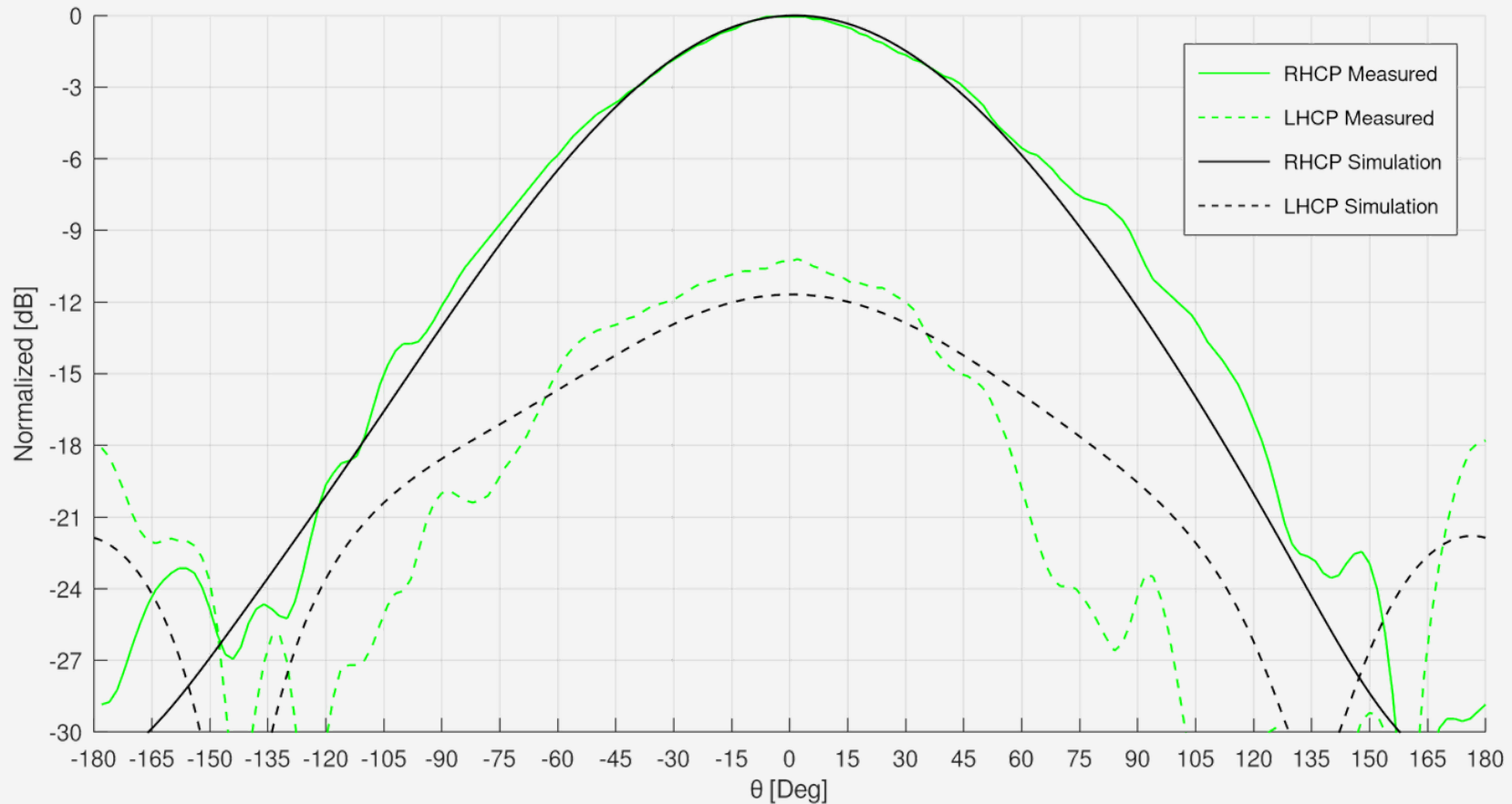
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Radiation Pattern Principal Cuts @ $\Phi = 90$ Degrees, Frequency: 1.585 GHz

Verification by Test of LHCP and RHCP Gain - PN: SSA052D-001

Principal Cuts, $\theta = [-180:2:180]$, $\phi = [90]$ deg, Freq. 1.585 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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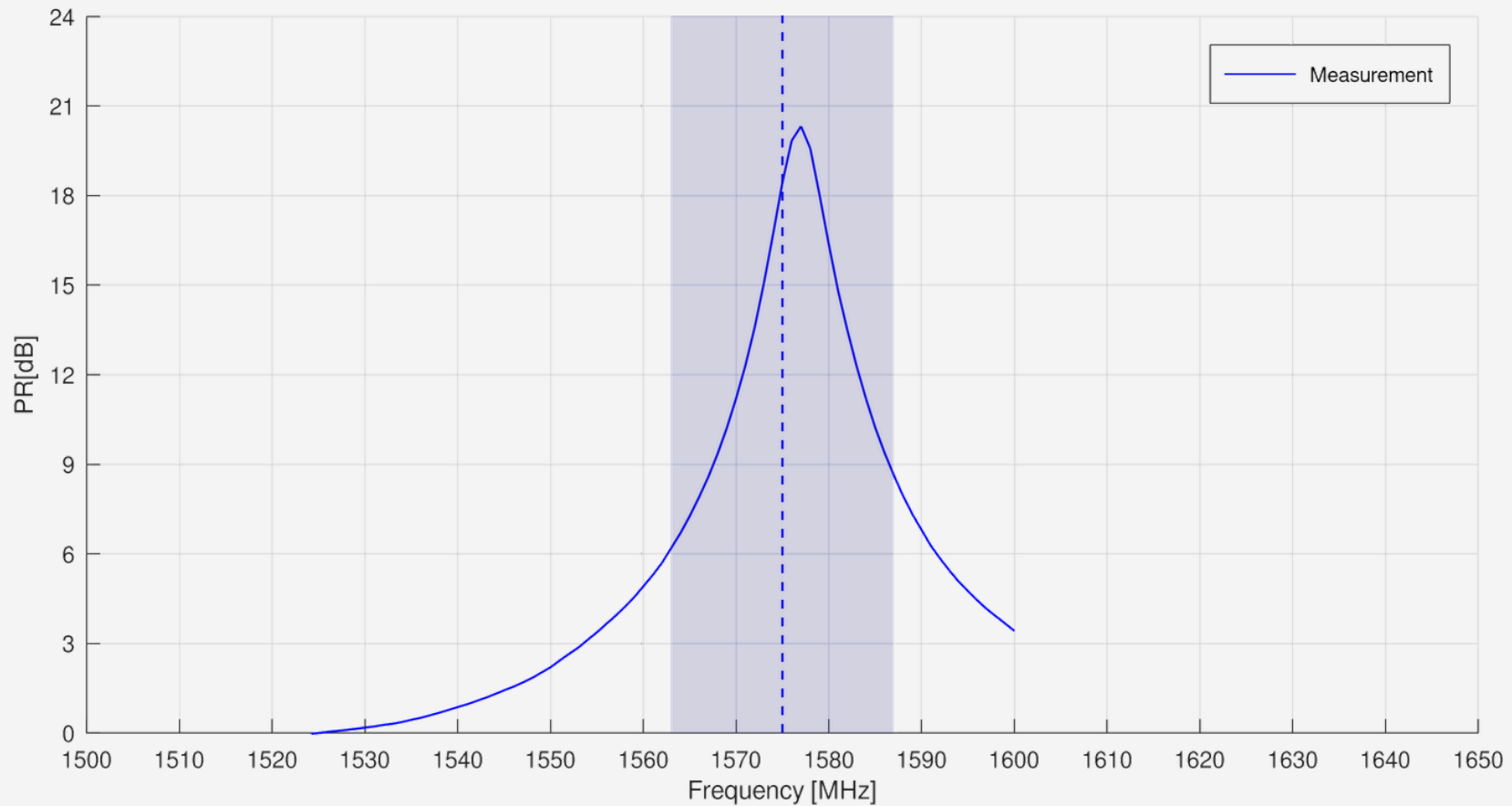
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Polarization Ratio @ Boresight vs Frequency

Verification by Test of Polarization Ratio - PN: SSA052D-001

Boresight, Source Antenna: Linear, Gain Method: Comparison, Technique: Direct Far-Field





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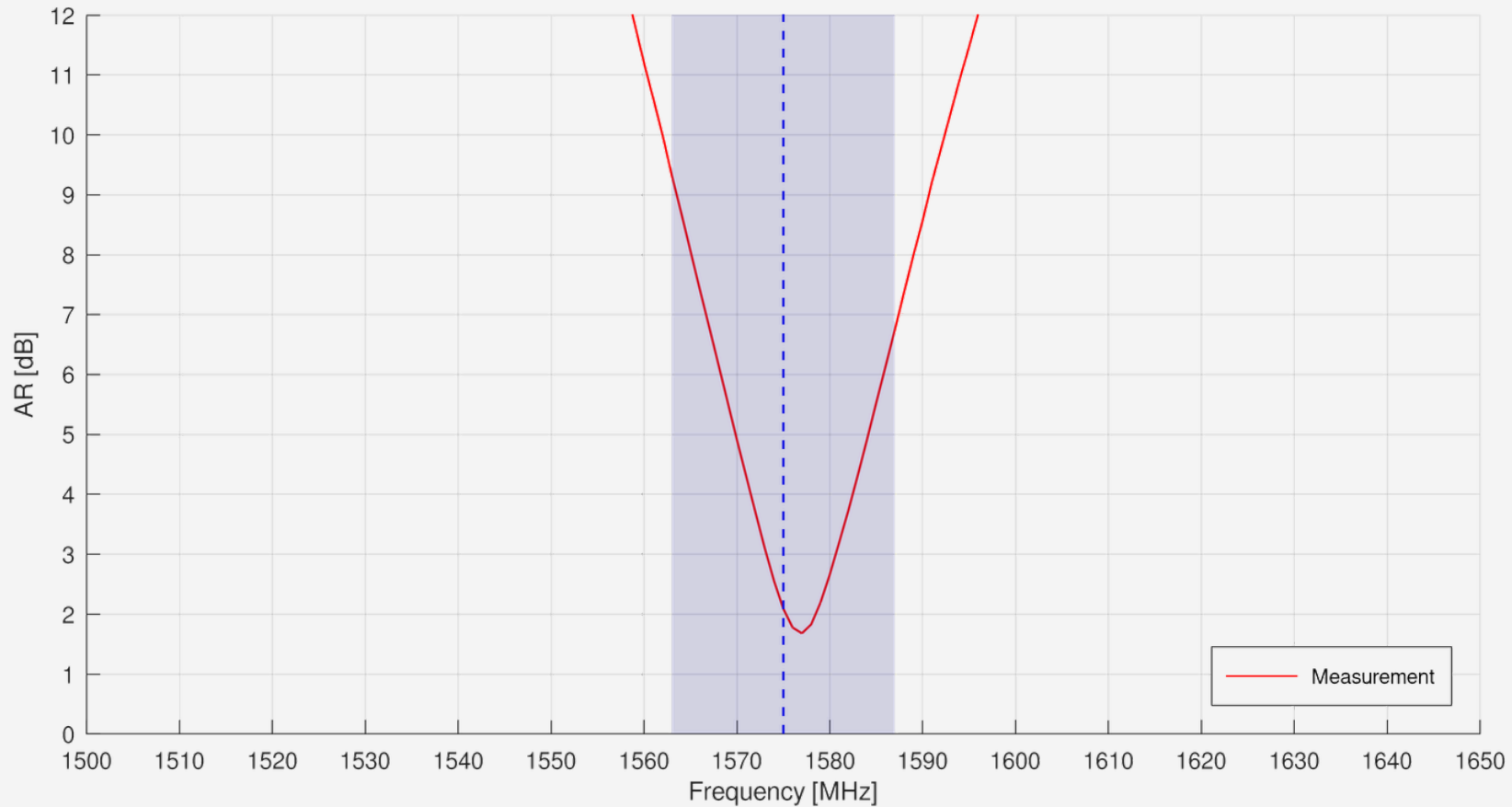
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Axial Ratio @ Boresight vs Frequency

Verification by Test of Axial Ratio - PN: SSA052D-001

Boresight, Source Antenna: Linear, Gain Method: Comparison, Technique: Direct Far-Field





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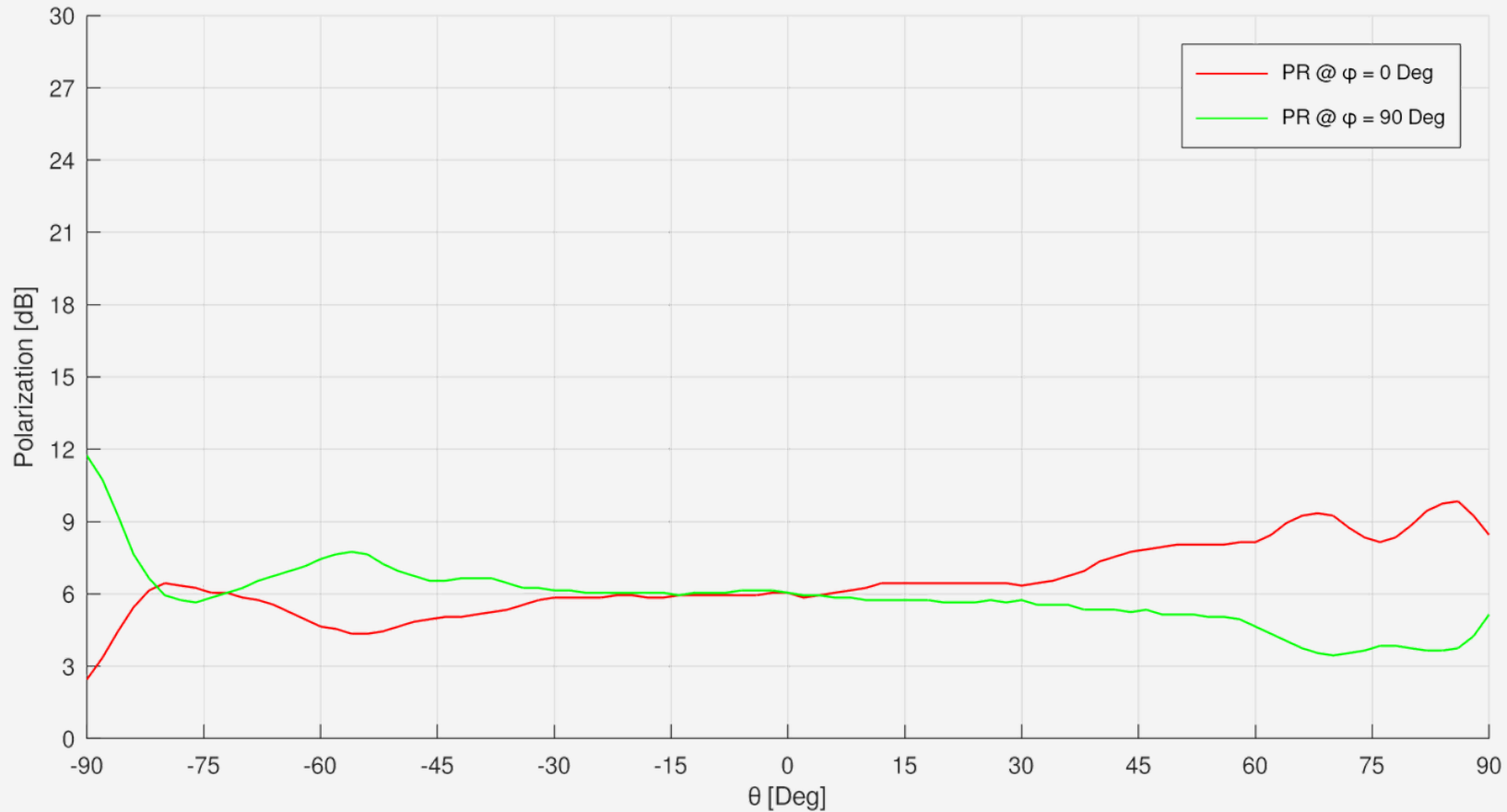
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Polarization Ratio Pattern @ Frequency: 1.565 GHz

Verification by Test of Polarization Ratio Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-90:2:90]$, $\phi = [0;90]$ deg, Freq. 1.565 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

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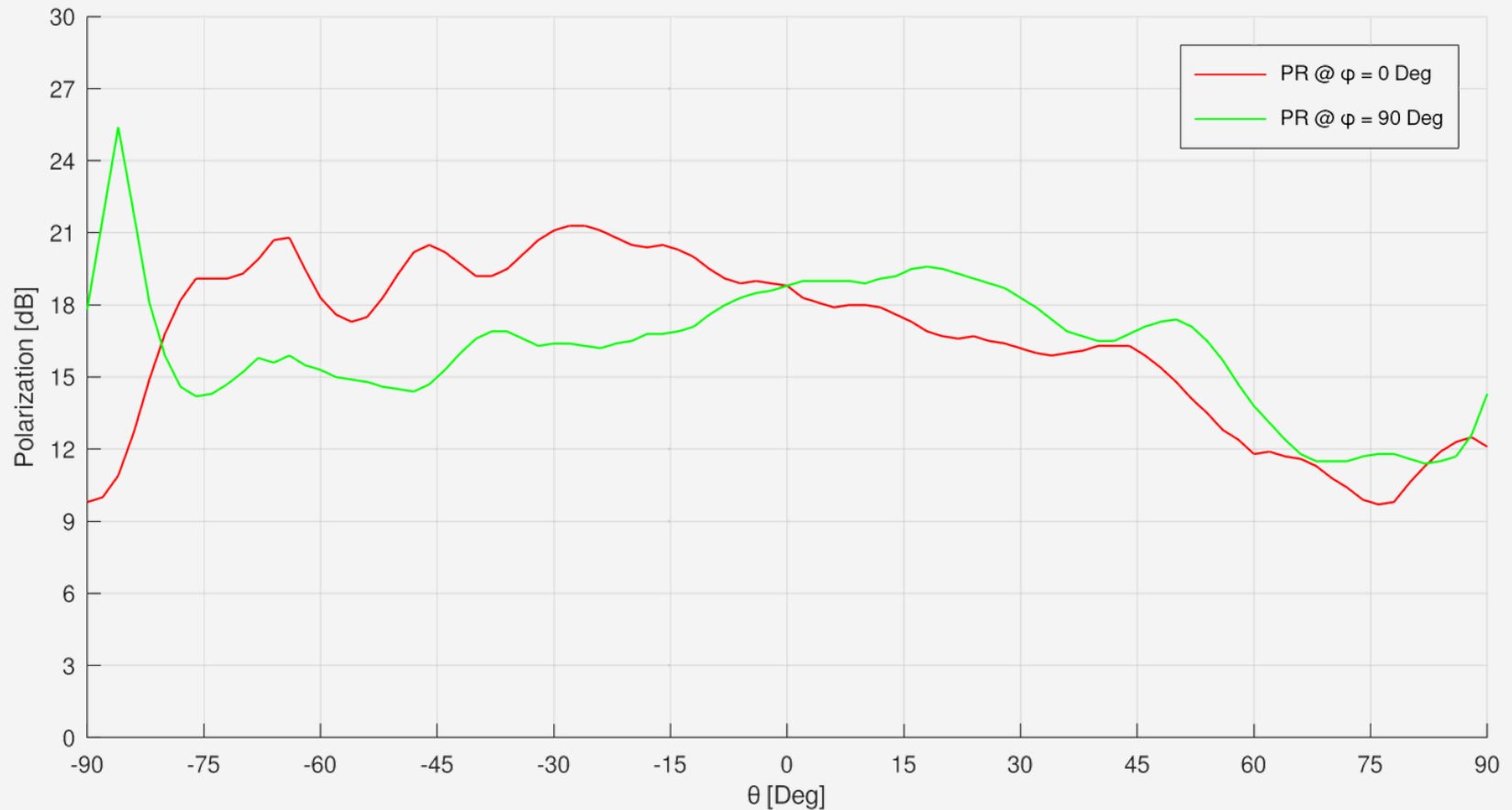
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Polarization Ratio Pattern @ Frequency: 1.575 GHz

Verification by Test of Polarization Ratio Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-90:2:90]$, $\phi = [0;90]$ deg, Freq. 1.575 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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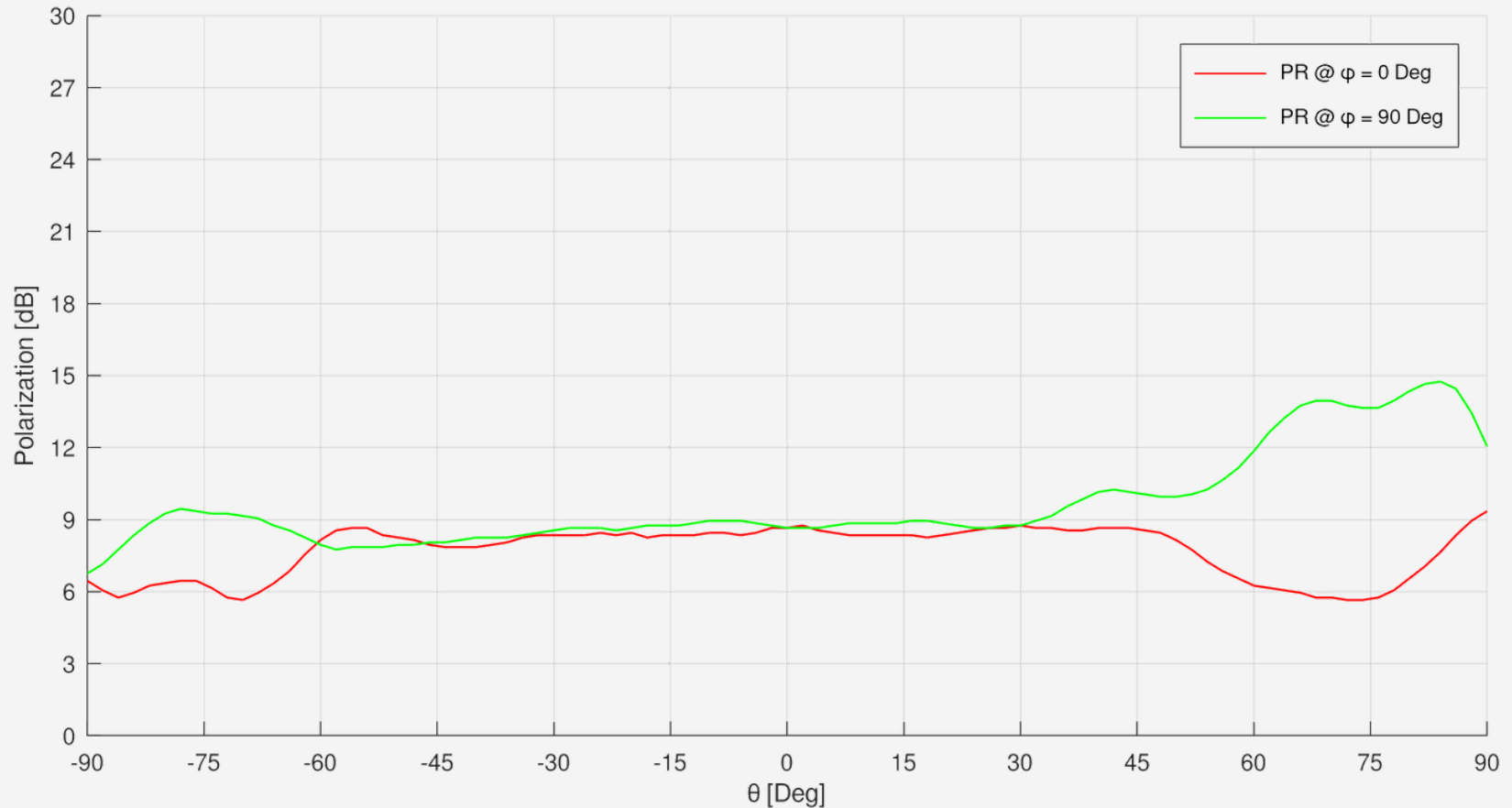
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Polarization Ratio Pattern @ Frequency: 1.585 GHz

Verification by Test of Polarization Ratio Pattern - PN: SSA052D-001

Principal Cuts, $\theta = [-90:2:90]$, $\phi = [0;90]$ deg, Freq. 1.585 GHz, Method: Direct Far-Field, deg, Boundary Conditions: Isolated Antenna





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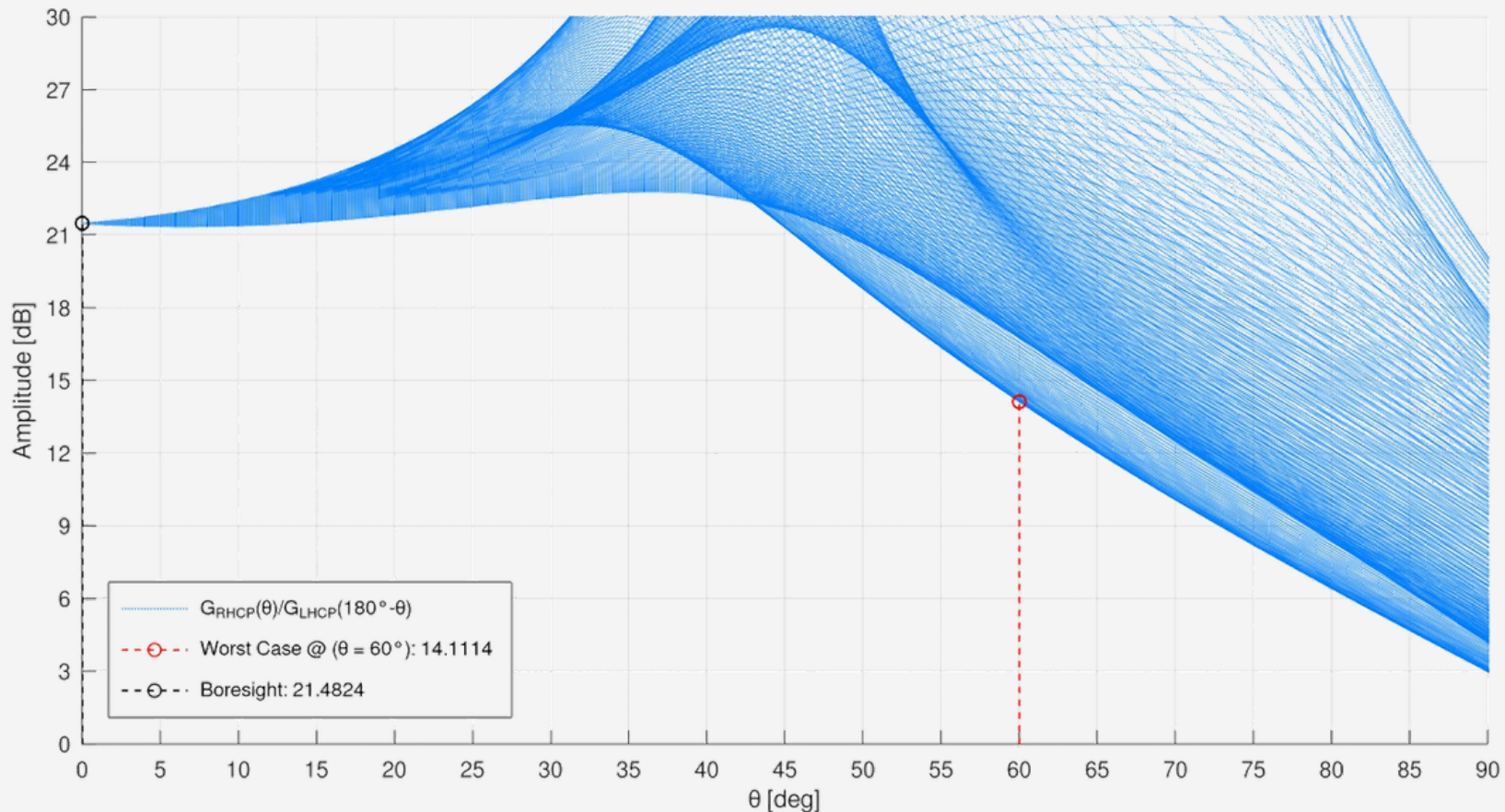
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Multipath Ratio Pattern @ Frequency: 1.565 GHz

Verification by Simulation of Multipath Ratio - PN: SSA052C

Full Spherical Cuts, Freq. 1.565 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:1:180]$ deg, Boundary Conditions: Isolated Antenna





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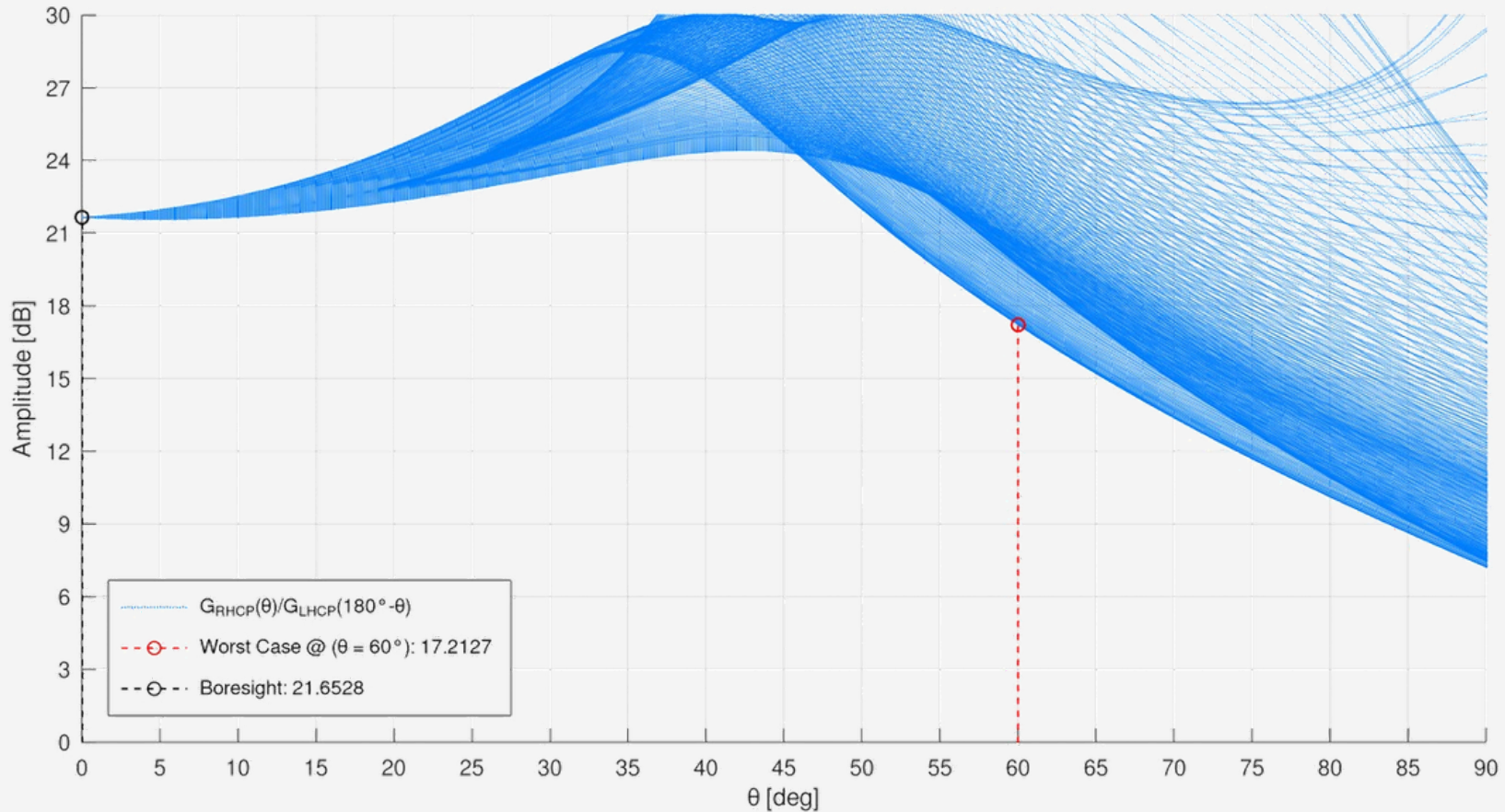
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Multipath Ratio Pattern @ Frequency: 1.575 GHz

Verification by Simulation of Multipath Ratio - PN: SSA052C

Full Spherical Cuts, Freq. 1.575 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:1:180]$ deg, Boundary Conditions: Isolated Antenna





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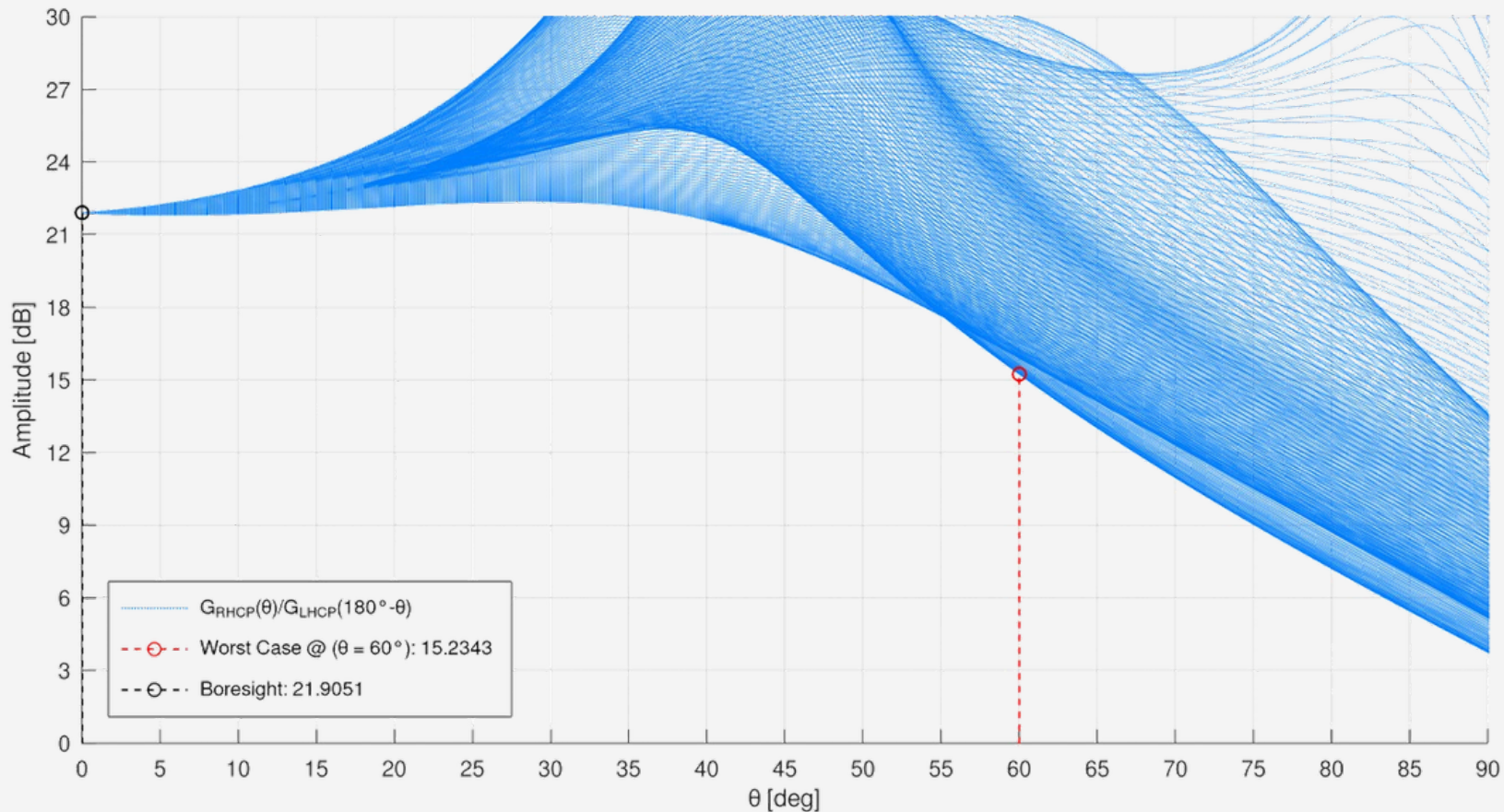
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Multipath Ratio Pattern @ Frequency: 1.585 GHz

Verification by Simulation of Multipath Ratio - PN: SSA052C

Full Spherical Cuts, Freq. 1.585 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:1:180]$ deg, Boundary Conditions: Isolated Antenna





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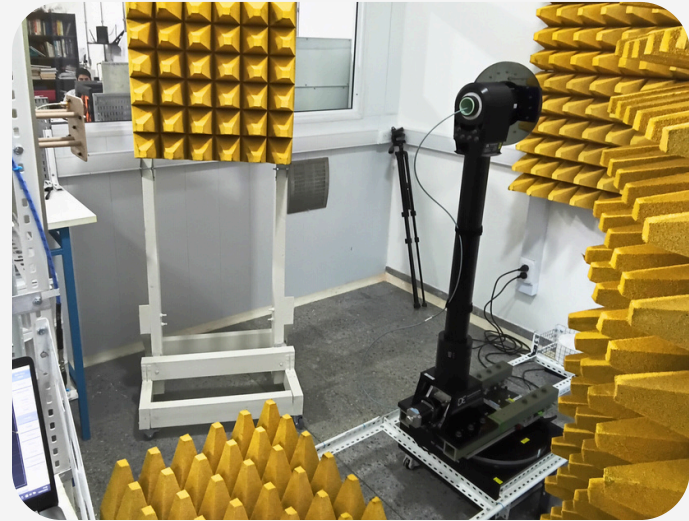
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- **Environmental Test: Shaker, Thermal vacuum**
- **Antenna Bracket Design & Supply**
- **Electrical Ground Support Equipment (Hat)**

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