



Standard Space Antennas

SPACE-READY ANTENNAS, WHEN TIME AND RELIABILITY MATTER

Datasheet

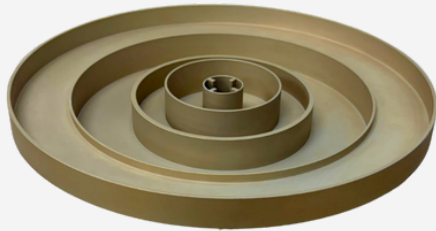
PN: SSA093A

Last Update: 09/02/26

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X Band Antenna

Isoflux

TRL 9

Mass: 565g

Features

- **Choke-based beamformer that maximizes gain at the end of coverage**

4.5 dBi at Theta=60deg, Third approximation for an “isoflux” pattern, see page 3

- **Proprietary Ultra-Compact All-Metal Polarizer**

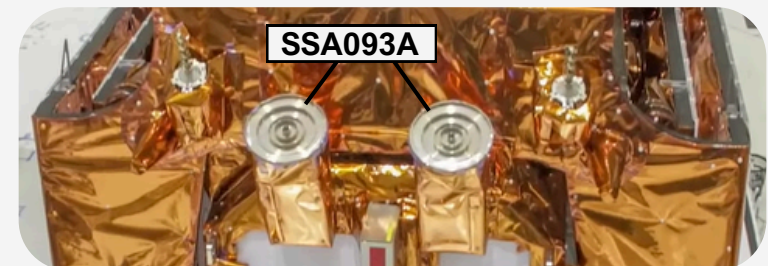
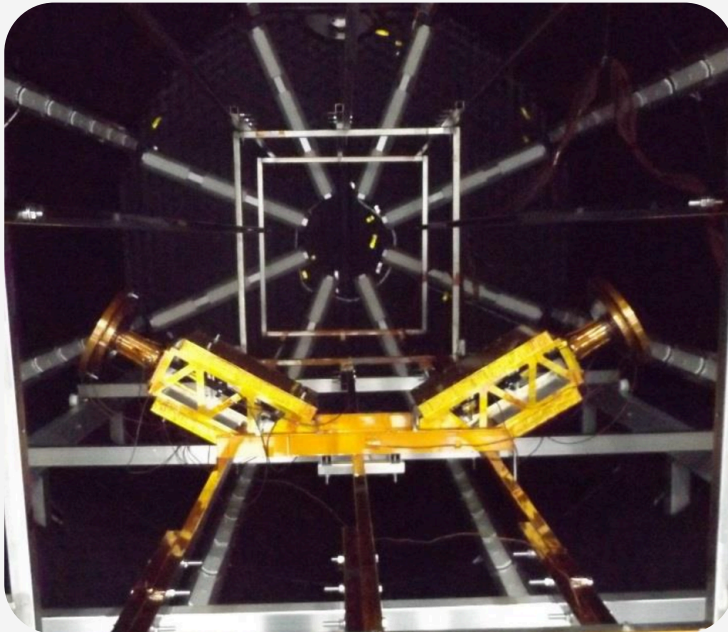
Approximately 50 mm

- **Low Insertion Loss**

No internal gaps or joints in the central waveguide

- **Minimal gain ripple or fading is expected under operational conditions with surrounding and back objects**

High multipath ratio at broad angles across the entire data downlink bandwidth 8.0-8.4 GHz





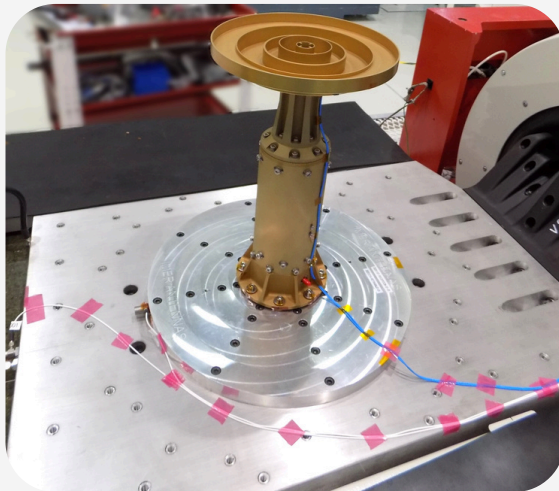
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Benefits

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

Suitable for high-reliability data downlink service in satellite constellations, earth observation missions, or exploration probes

- **High power handling and compact solution for LGA Channel**

Ideal for high bit rate communications

- **Compensate Gain at the end of coverage**

+4.5 dB compared to the patch version at Theta = 60 degrees

- **Lossless by design**

No hidden coupling power exists through the Cross Polarization Port, unlike the Septum Polarizer

- **No performance degradation at end-of-life by design**

Without a dielectric or ceramic-loaded waveguide, sensitivity to space ionizing radiation and temperature is not an issue





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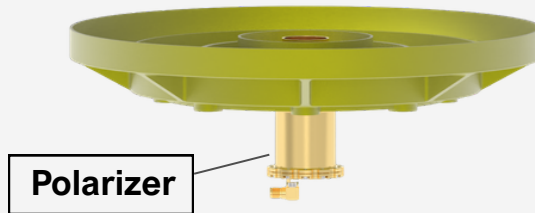
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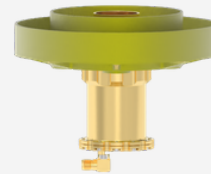
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Models



SSA093A



SSA093B

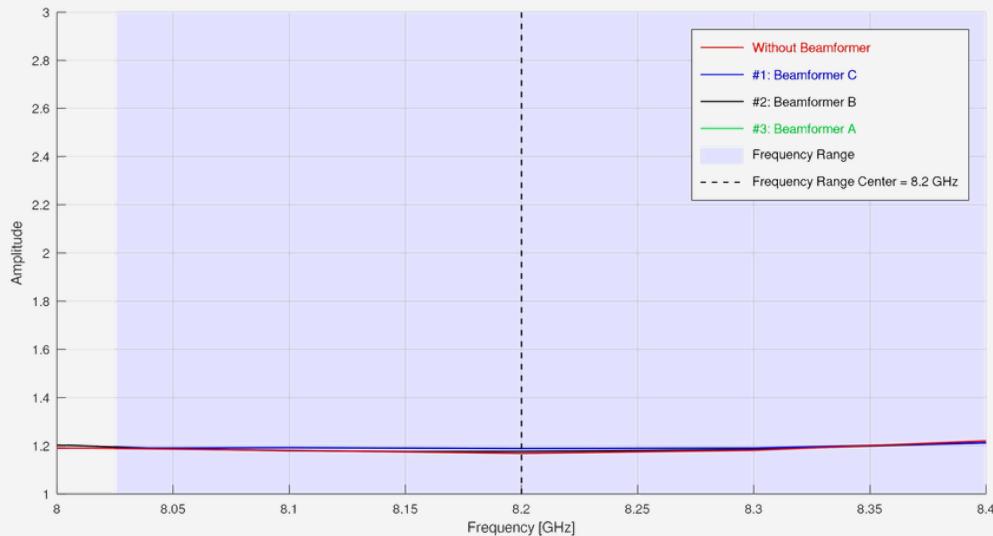


SSA093C

VSWR

Verification by Simulation of VSWR @ PN: SSA093 Models A, B & C

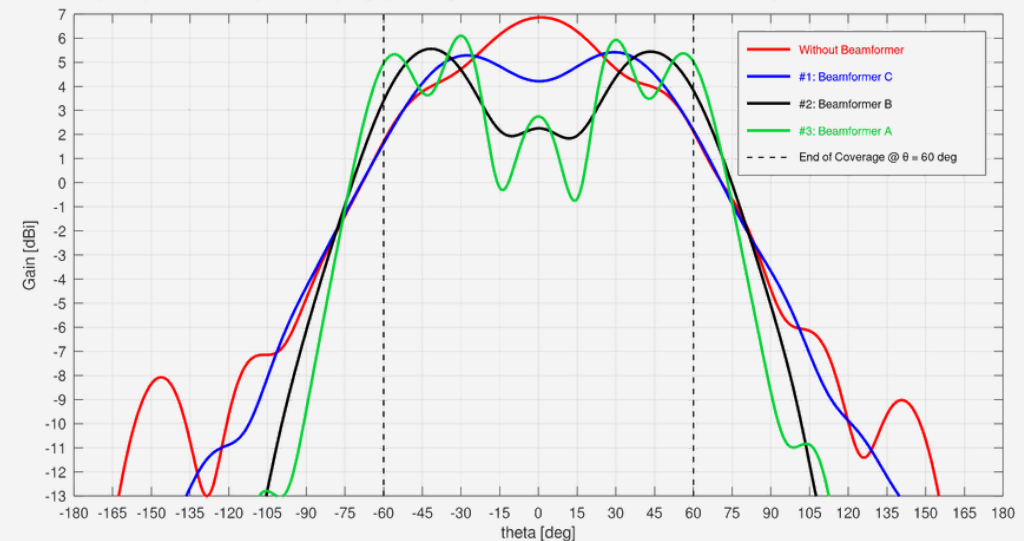
Frequency: [8.0:8.4] GHz, Method: Full Wave Simulation, Boundary Conditions: Isolated Antenna



Pattern Formation Process

Verification by Simulation of RHCP Gain Pattern @ Boresight - PN: SSA093 Models A, B & C

Frequency: 8.2 GHz, $\theta = [-180; 180]$ deg, $\phi = 0$ deg, Method: Full Wave Simulation, Boundary Conditions: Isolated Antenna





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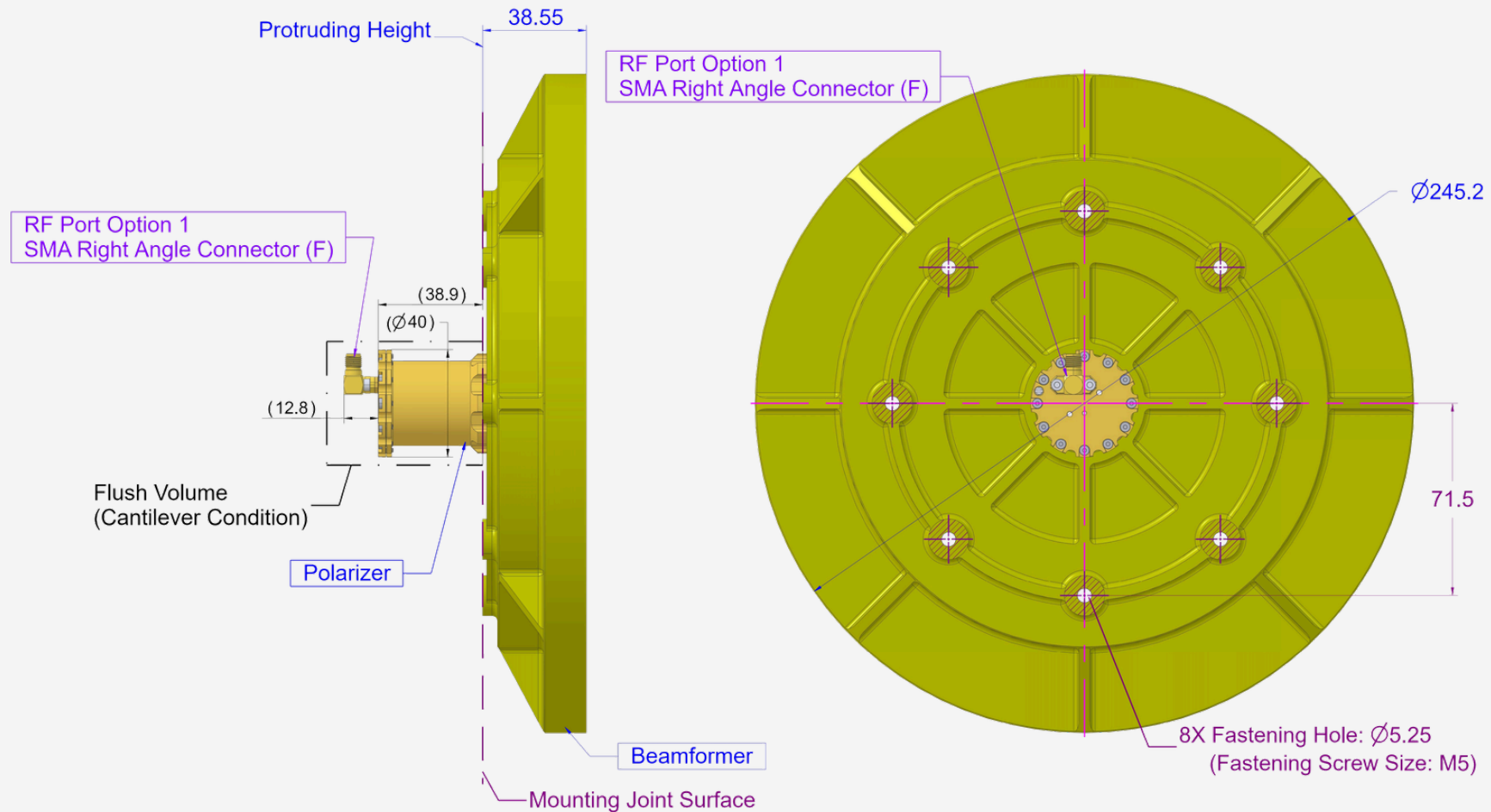
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Mechanical Envelope - Option 1





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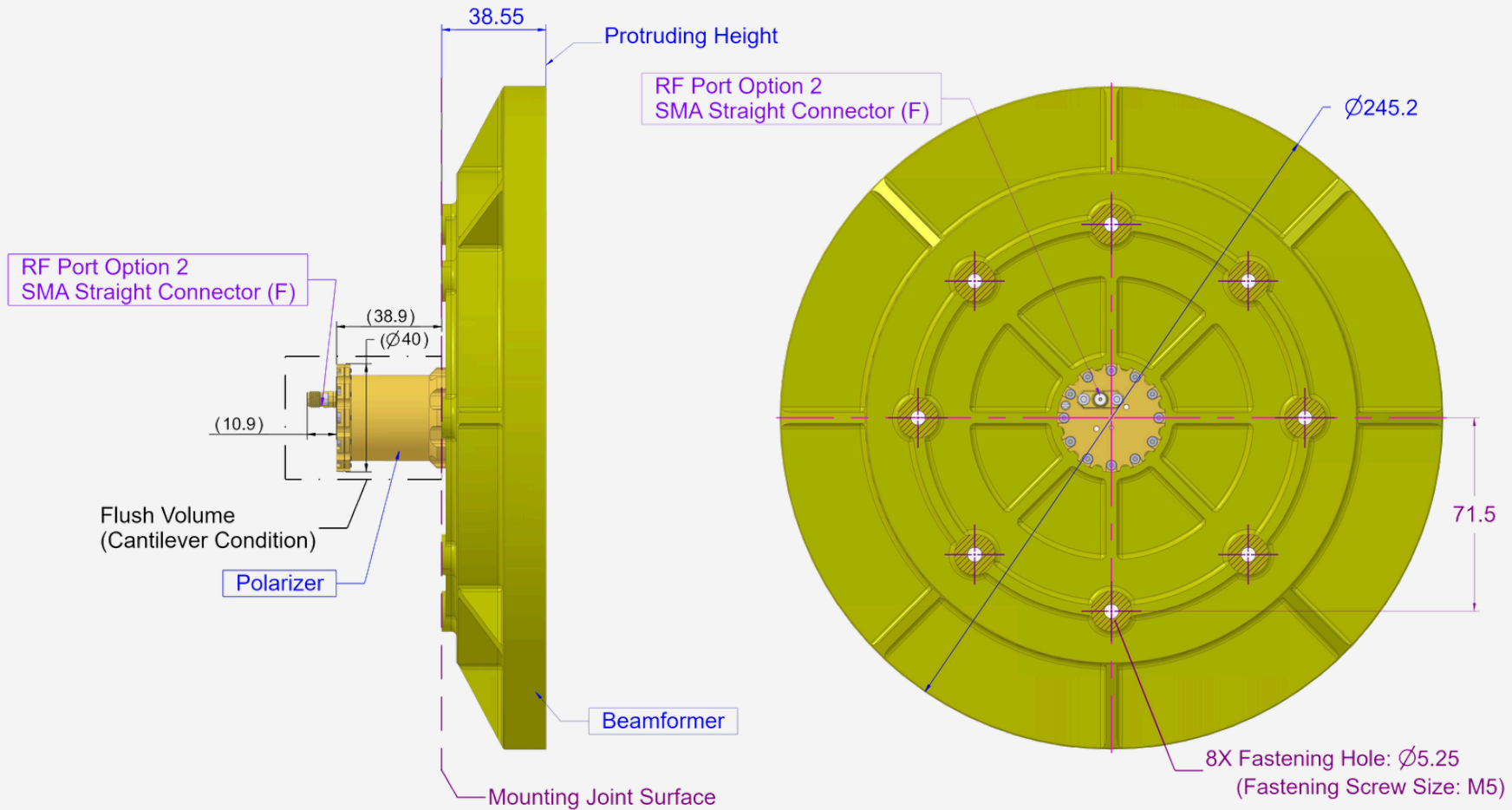
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Mechanical Envelope - Option 2





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Typical Specifications @ Isolated condition

Parameter	Values	Remark
Frequency Range [GHz]	8.025 – 8.4	
VSWR	1.2	Worst Case @ Frequency Range [AD 12]
Bandwidth @ VSWR = 1.2 [GHz]	8 – 8.4 GHz	Antenna Bandwidth [AD 12]
Port to Port Isolation [dB]	NA	Single Port
Radiation Efficiency [%]	96.4	@ Frequency Range, Assuming a 3% degradation from expected [AD 10]
Total Efficiency [%]	95.7	@ Frequency Range, Assuming a 3% degradation from expected [AD 10]
Radiation Pattern Envelope	Sectoral	Quasi Isoflux Form Factor (Third Approximation)
Phase Center [mm]	X= 0 ; Y= 0 ; Z= 31	Relative to Antenna Coordinated System. Z=0 $\equiv$ Mounting Joint Surface
Gain @ End of Coverage [dBi]	> 4.5	RHCP @ theta= 60°. [AD 4]
HPBW [°]	~130	@ Frequency Range [AD 2]
Polarization Sense	Circular	RHCP
Polarization Ratio [dB] Worst Case	11.9 @theta < 60°	@ Frequency Range. [AD 4]
Multipath Ratio [dB] Worst Case Ref: G_RHCP(theta)/G_LHCP(180-theta)	21.75 @theta < 60°	@ Frequency Range. [AD 4]
Multipactor Margin [dB]	> 9	@ 70 W. Obtained via Aerospace Corporation Model Analysis, by Similarity with SSA071A
Corona Discharge Margin [dB]	NA	Non Operative during Launch





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Enviromental Test & Mechanical Interface

Parameter	Values	Remark
Mass [g]	565	Center of Mass: [0, 0, 13] mm from Mounting Joint Surface ($\equiv Z=0$ of Antenna Coordinate System). [AD 1]
Size [mm]	245	Cavity Diameter (Max Envelope) [AD 1]
Height [mm]	38.65	Overall Height measured from Mounting Joint Surface. [AD 7] (Flush: 49.7 mm)
RF Interface	SMA Female	[AD1]
Electrostatic Discharge	ESD Free	Verified by Review of Design
Outgassing	TML < 1.00 % CVCM < 0.05%	According to Declared Material, Component and Processes List [AD 7]
Temperature Range [°C]	Ref 1: (-105; 125) °C Ref 2: (-70, 100) °C	Ref 1: Thermal Vacuum Test, Four Cycles, 2 hours Dwell. [AD 8] Ref 2: Thermal Vacuum Test, Eight Cycles, 4 hours Dwell. [AD 2] (Heritage by Similarity with SSA071A)
Vacuum [Hpa]	$\leq 1.33 \times 10^{-5} \pm 80\%$	In Thermal Vacuum Test [AD 8]
1st Natural Frequency [Hz]	1165	Analysis in [AD 11] Success with several Mast and Bracket Configuration [AD 2]. Numerical versus Test Deviation < 4%
Dynamic Acceleracion Loads [Grms]	20 - 50 Hz: +6 dB/oct 50 - 70 Hz: 0.16 g ² /Hz 70 - 80 Hz: +6 dB/oct 80 - 350 Hz: 0.2 g ² /Hz 350 - 400 Hz: -6 dB/oct 400 - 800 Hz: 0.16 g ² /Hz 800 - 2000 Hz: -6 dB/oct <u>Overall: 14.55</u>	Shaker Test @ Random Vibration, Three Axis, 2 min / axis. [AD 2] According to NASA GEVS (General Environmental Verification Standard). 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) (Heritage by Similarity with SSA071A) Verified by Analysis in [AD 5]
Static Acceleration Loads [G]	Peak: 65	Shaker Test @ Sine Burst, Three Axis [AD 2], Qualification Level





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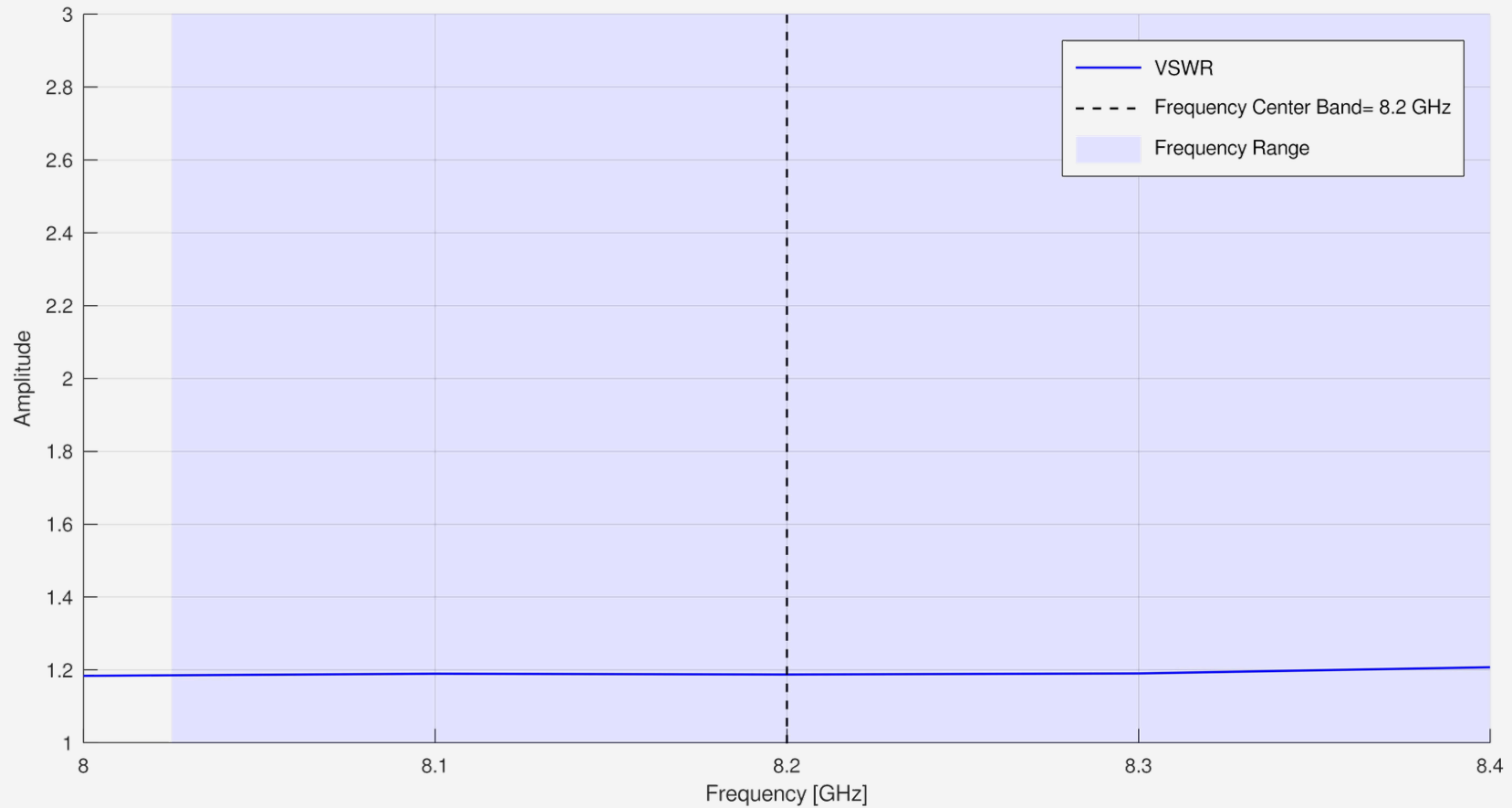
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VSWR

Verification by Simulation of VSWR @ SSA093A

Frequency: [8:0.1:8.4] GHz, Method: Full Wave Simulation, Boundary Conditions: Isolated Antenna





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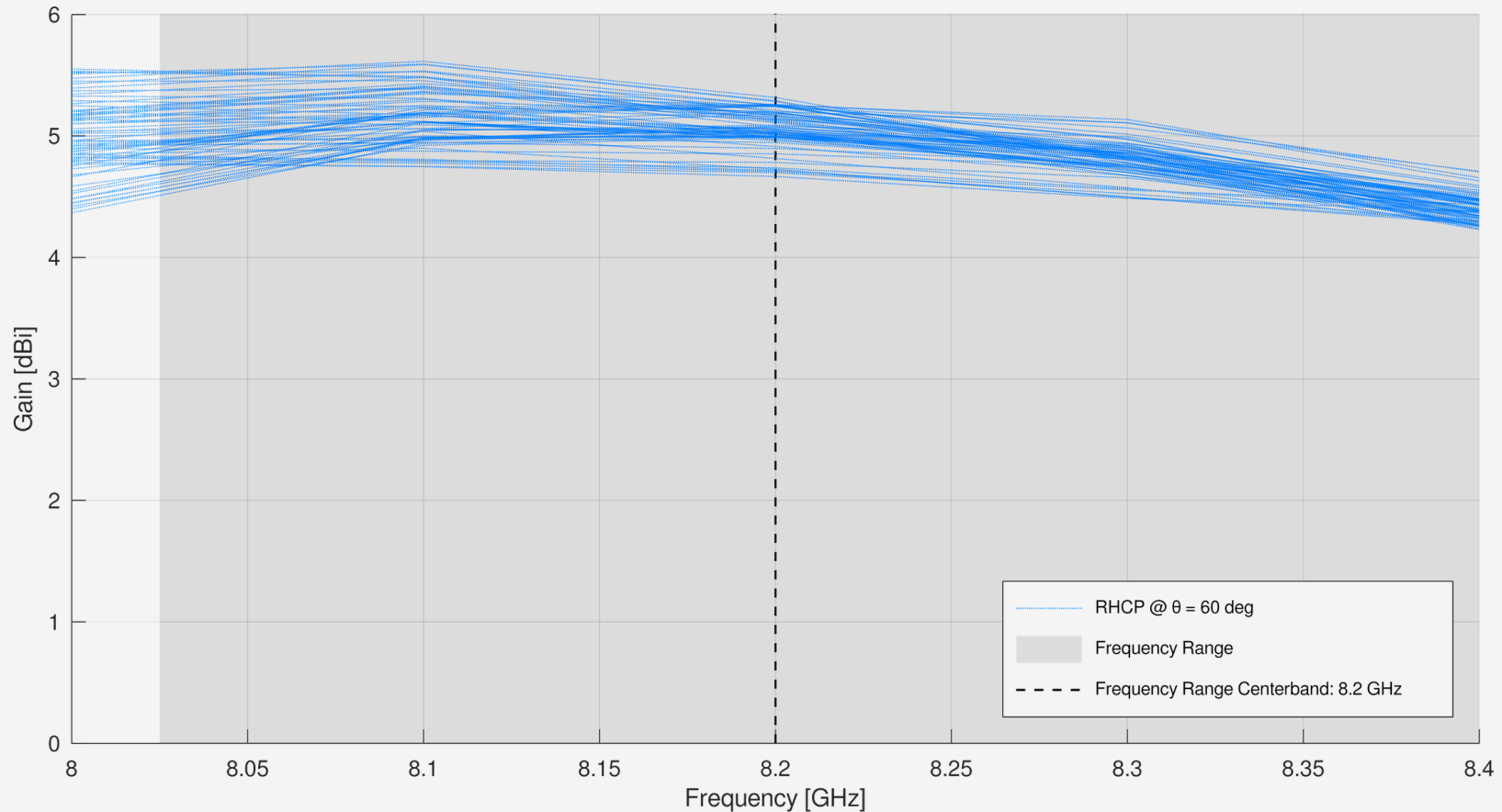
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Gain vs Frequency @ EoC ($\theta = 60^\circ$)

Verification by Simulation of RHCP Gain @ EoC - PN: SSA093A

Frequency: [8:0.1:8.4] GHz, $\theta = 60$ deg, $\phi = [0:5:360]$ deg, Method: Full Wave Simulation, Boundary Conditions: Isolated Antenna





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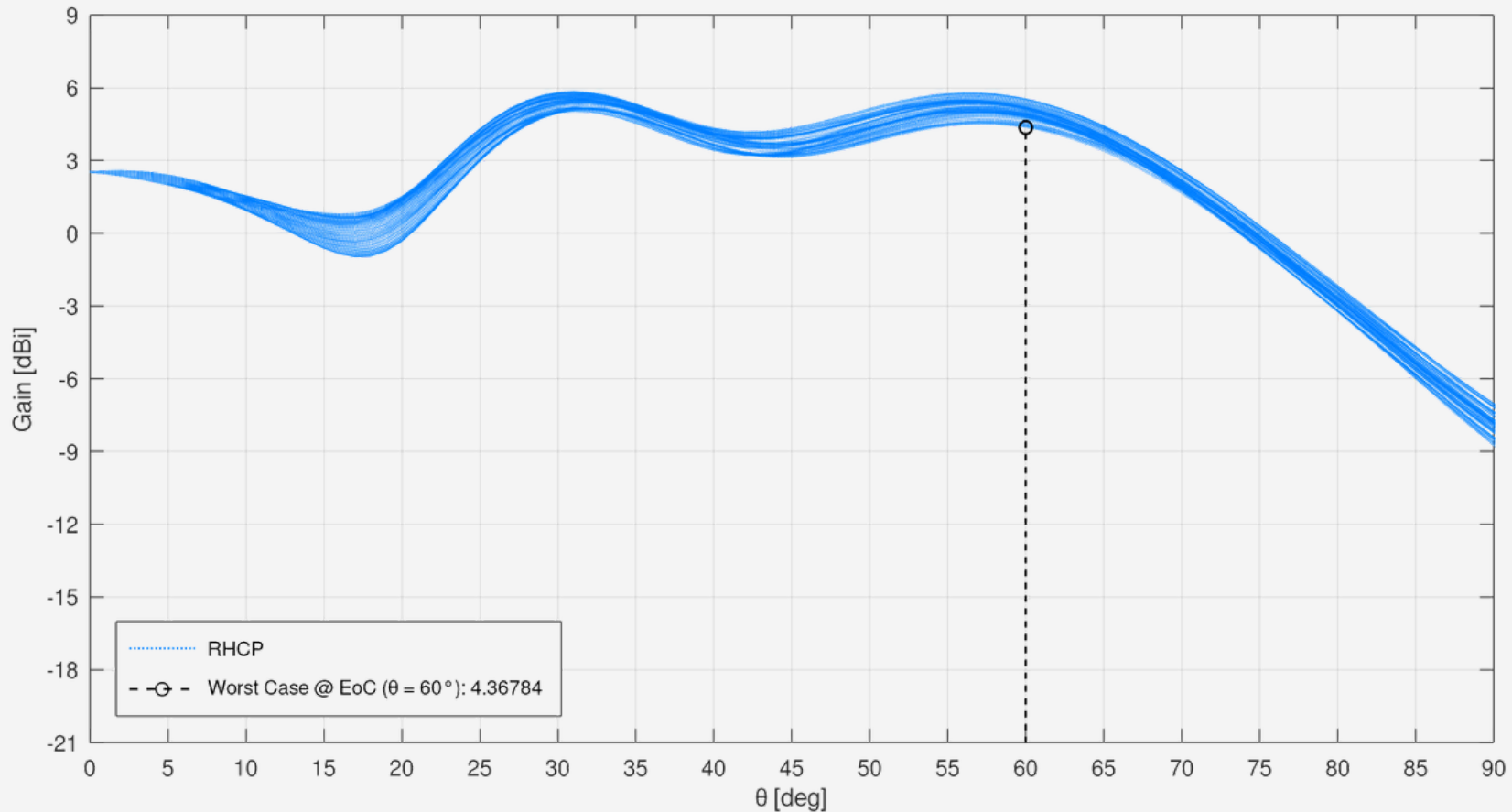
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Gain Pattern @ 8 GHz

Verification by Simulation of RHCP Gain Pattern - PN: SSA093A

Freq. 8.0 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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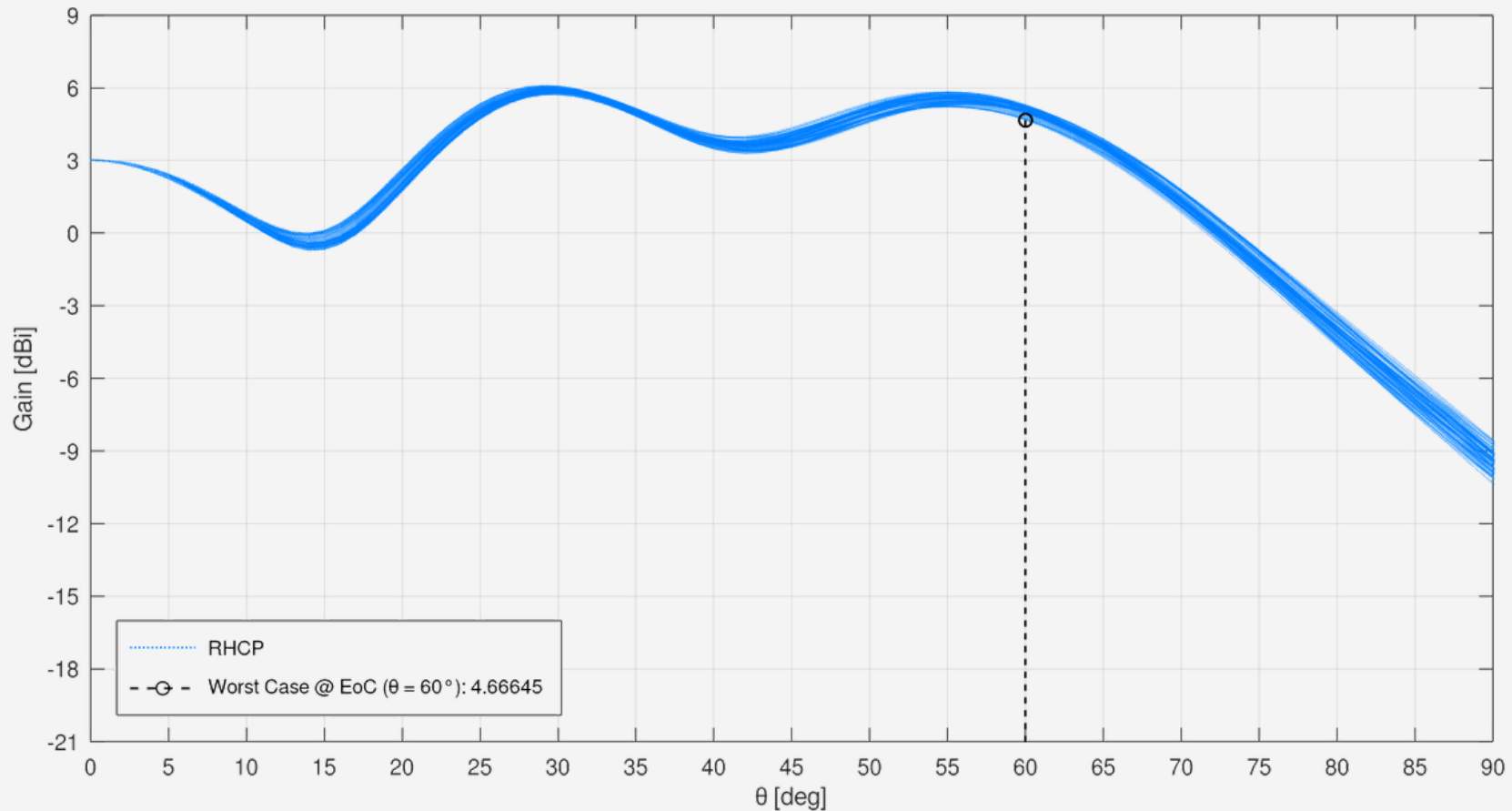
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Gain Pattern @ 8.2 GHz

Verification by Simulation of RHCP Gain Pattern - PN: SSA093A

Freq. 8.2 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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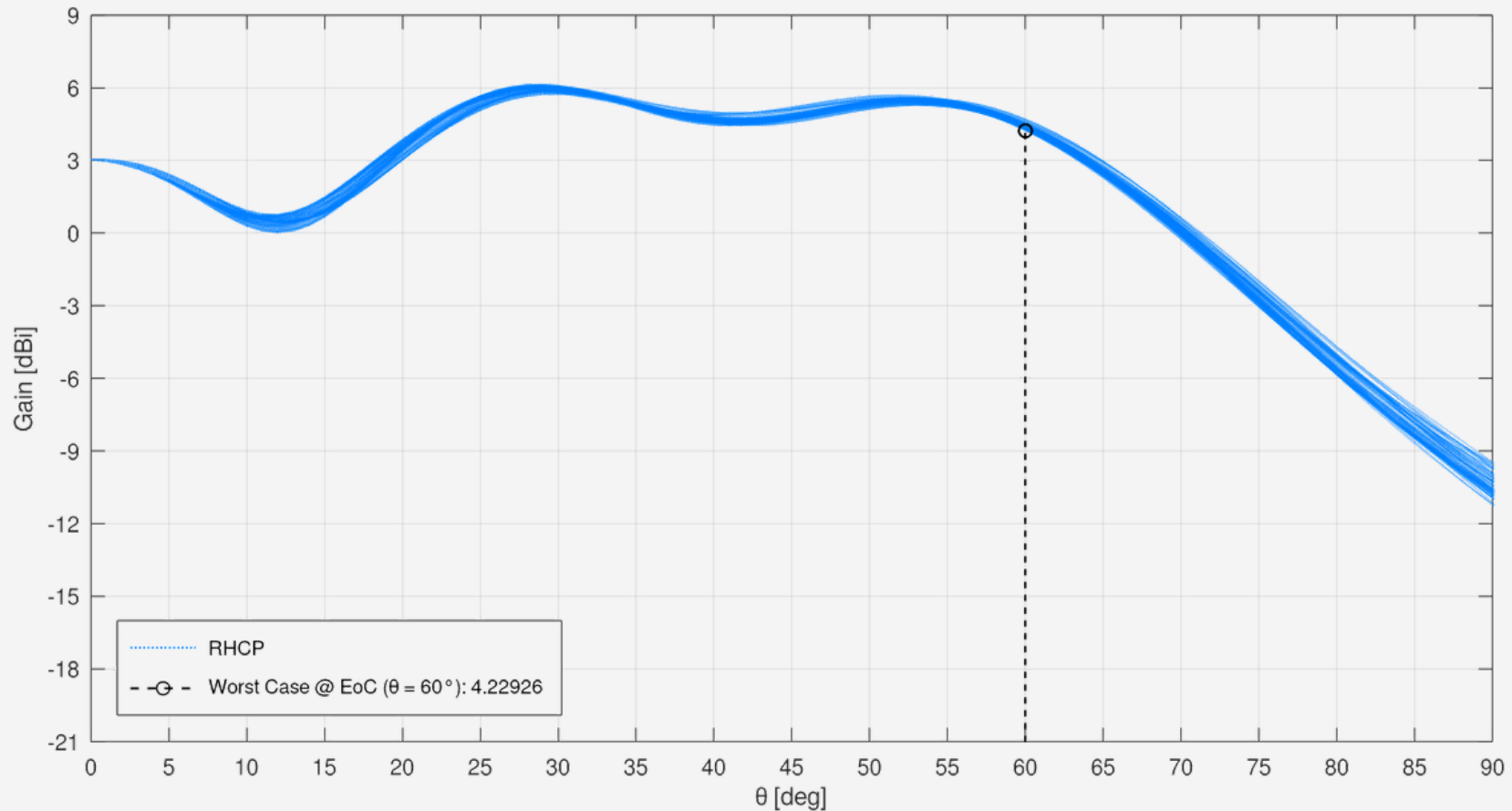
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Gain Pattern @ 8.4 GHz

Verification by Simulation of RHCP Gain Pattern - PN: SSA093A

Freq. 8.4 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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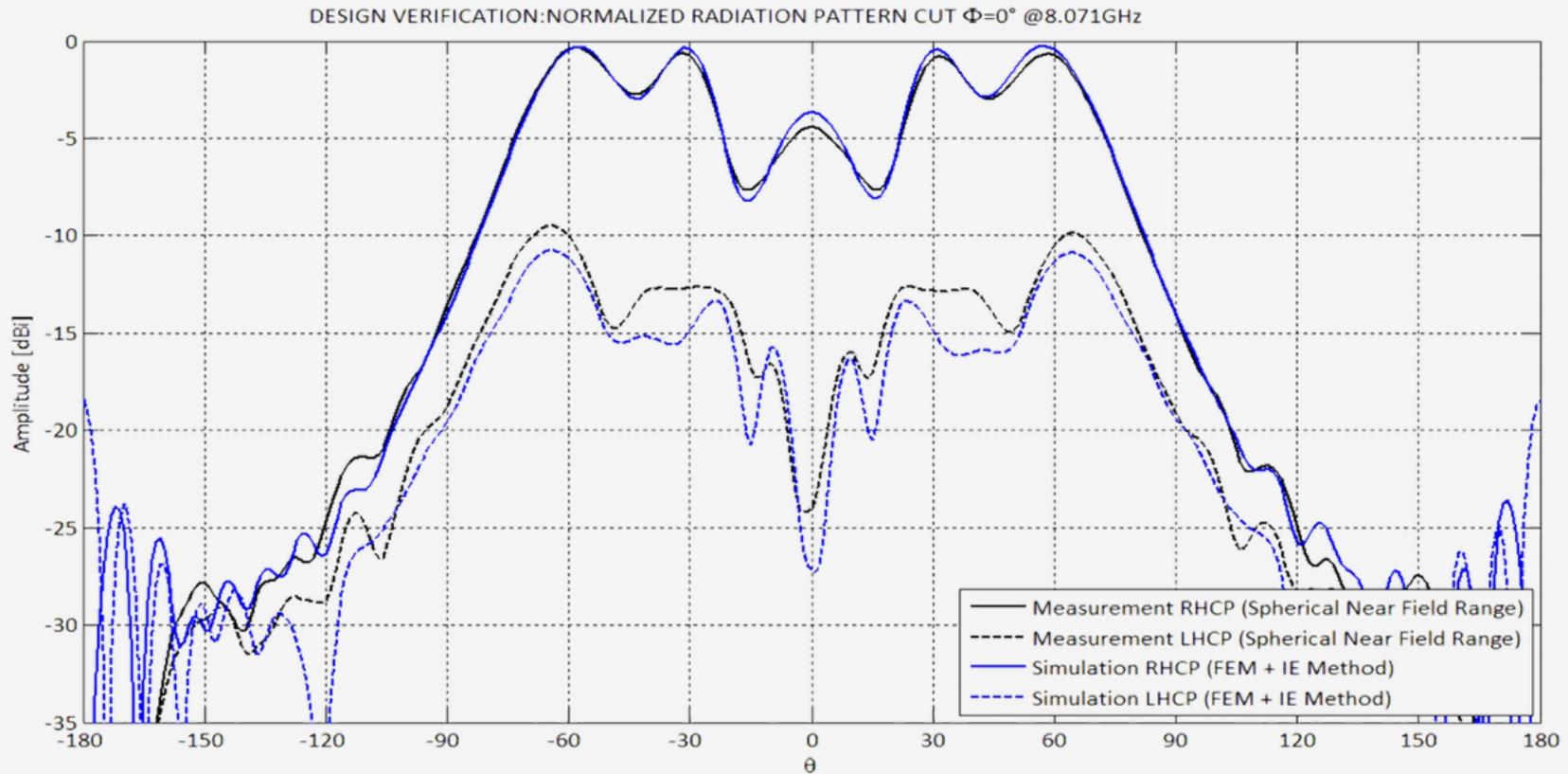
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Radiation Pattern Principal Cuts @ 8.071 GHz





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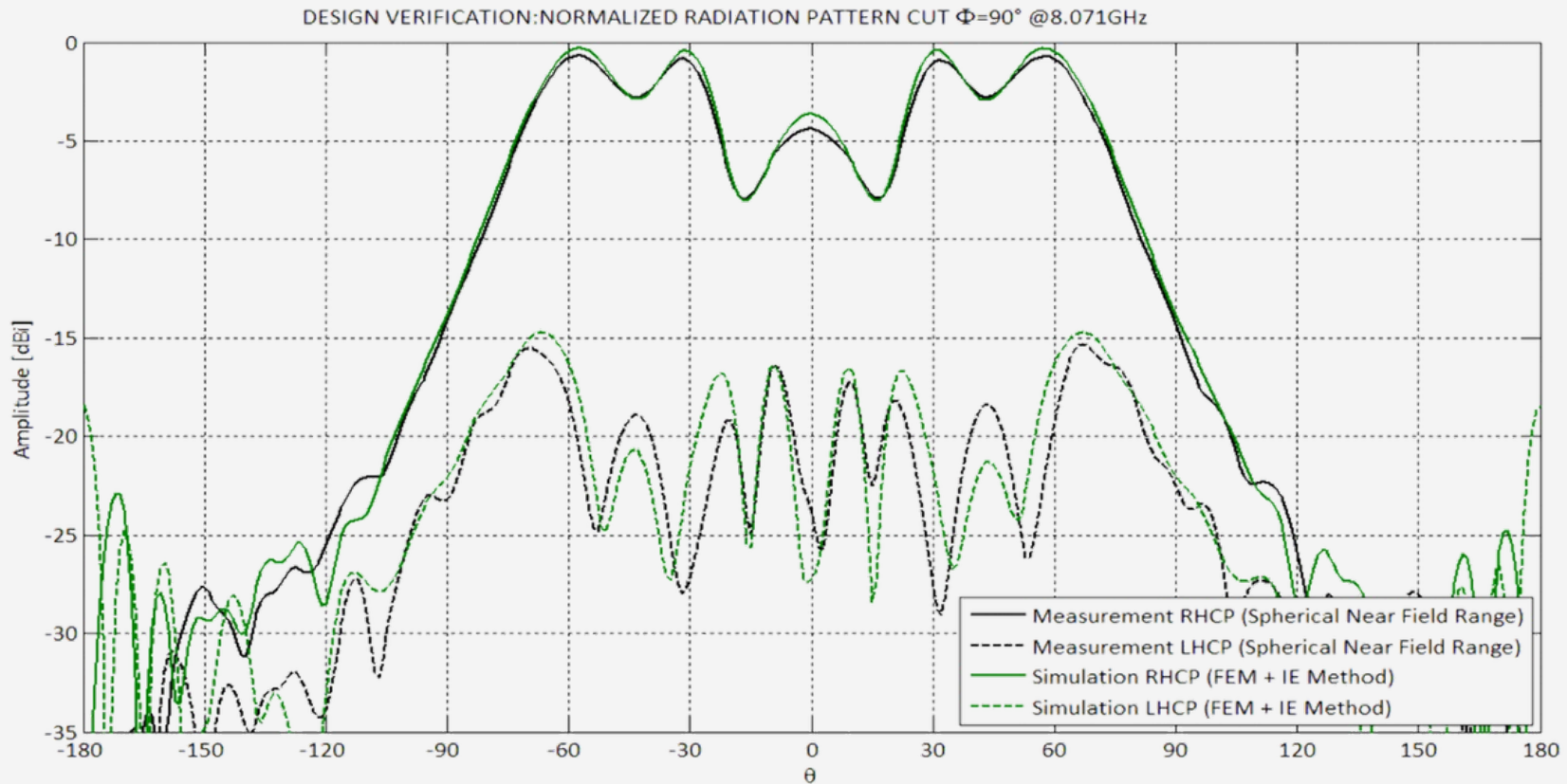
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Radiation Pattern Principal Cuts @ 8.071 GHz





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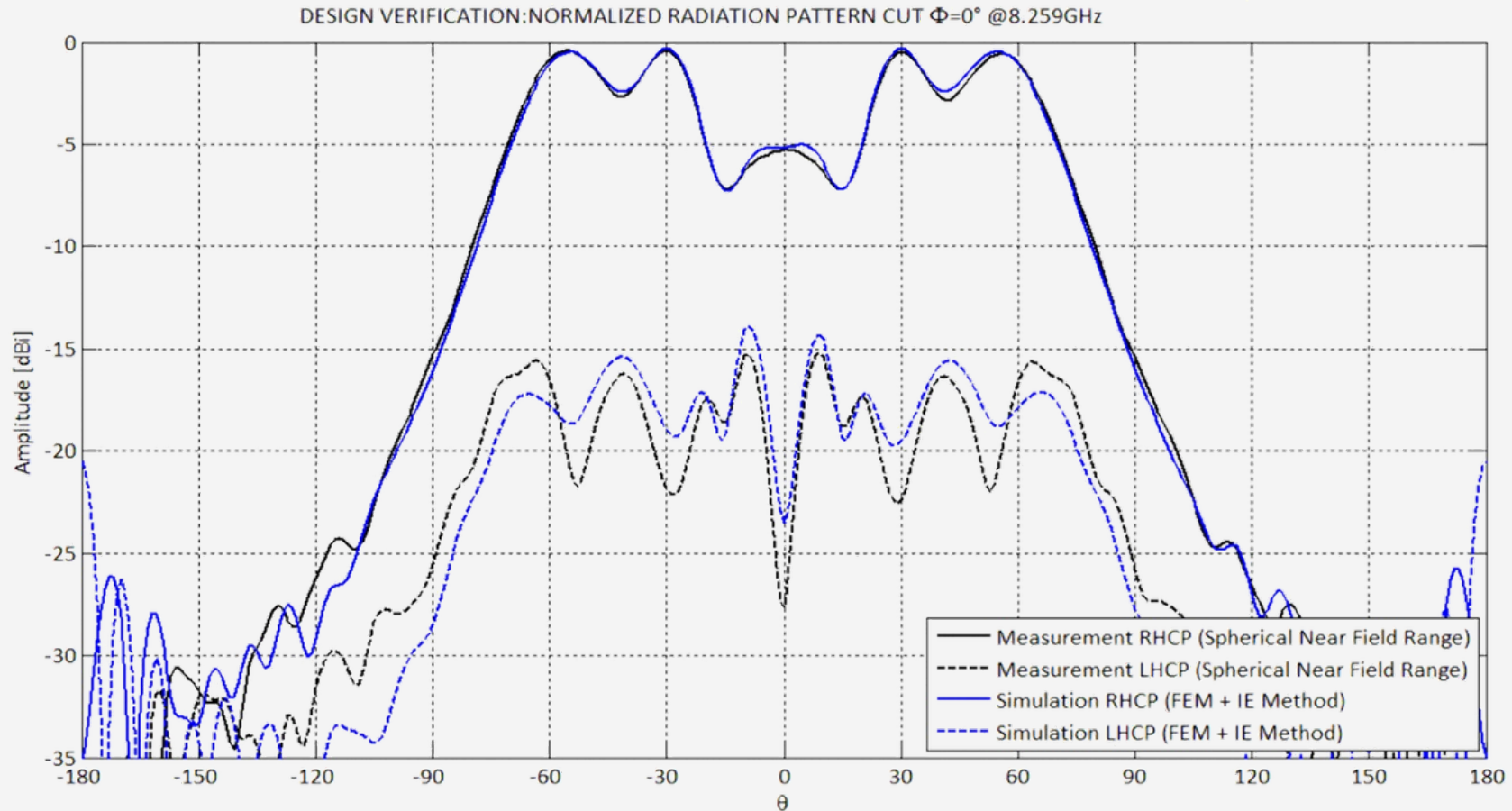
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Radiation Pattern Principal Cuts @ 8.259 GHz





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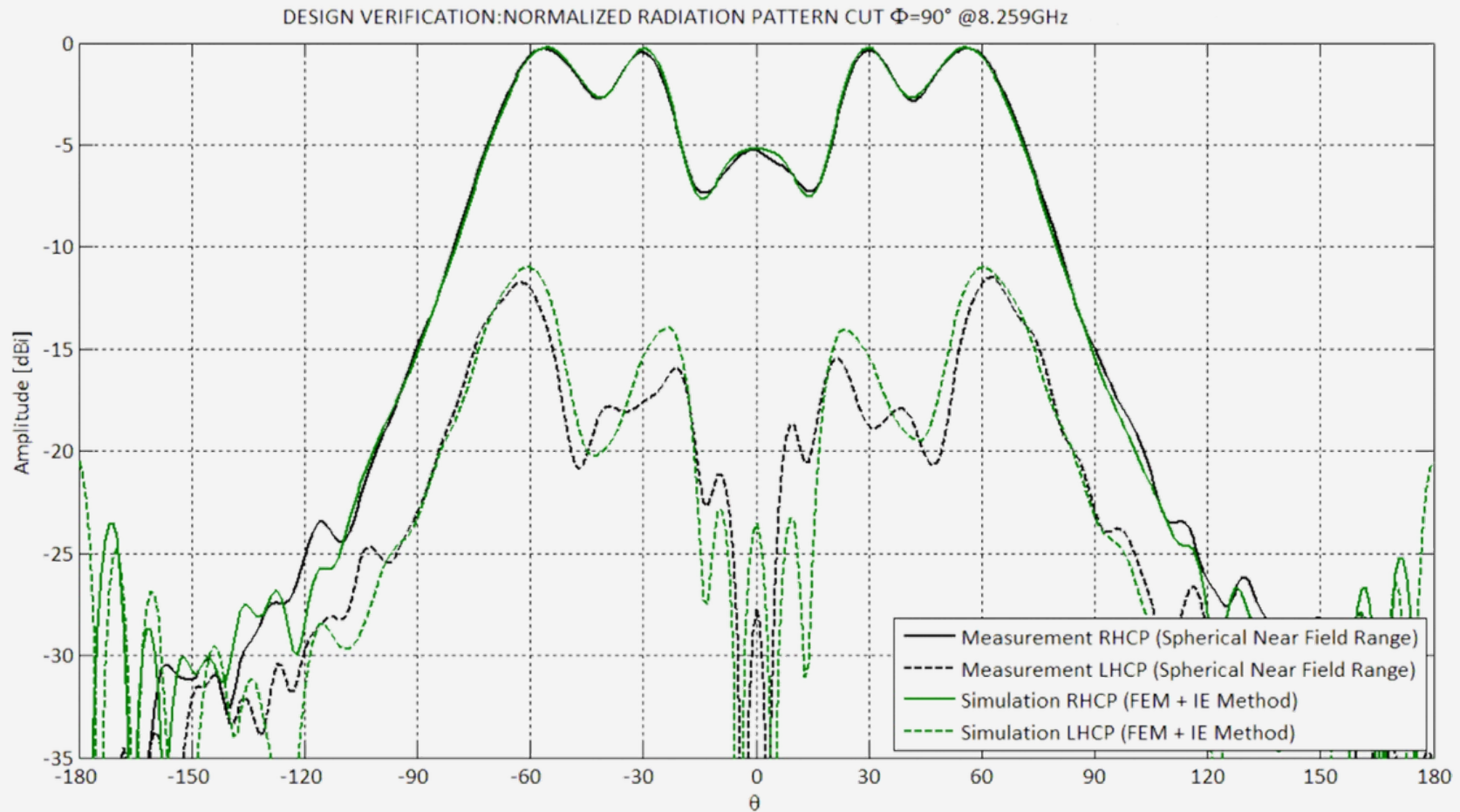
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Radiation Pattern Principal Cuts @ 8.259 GHz





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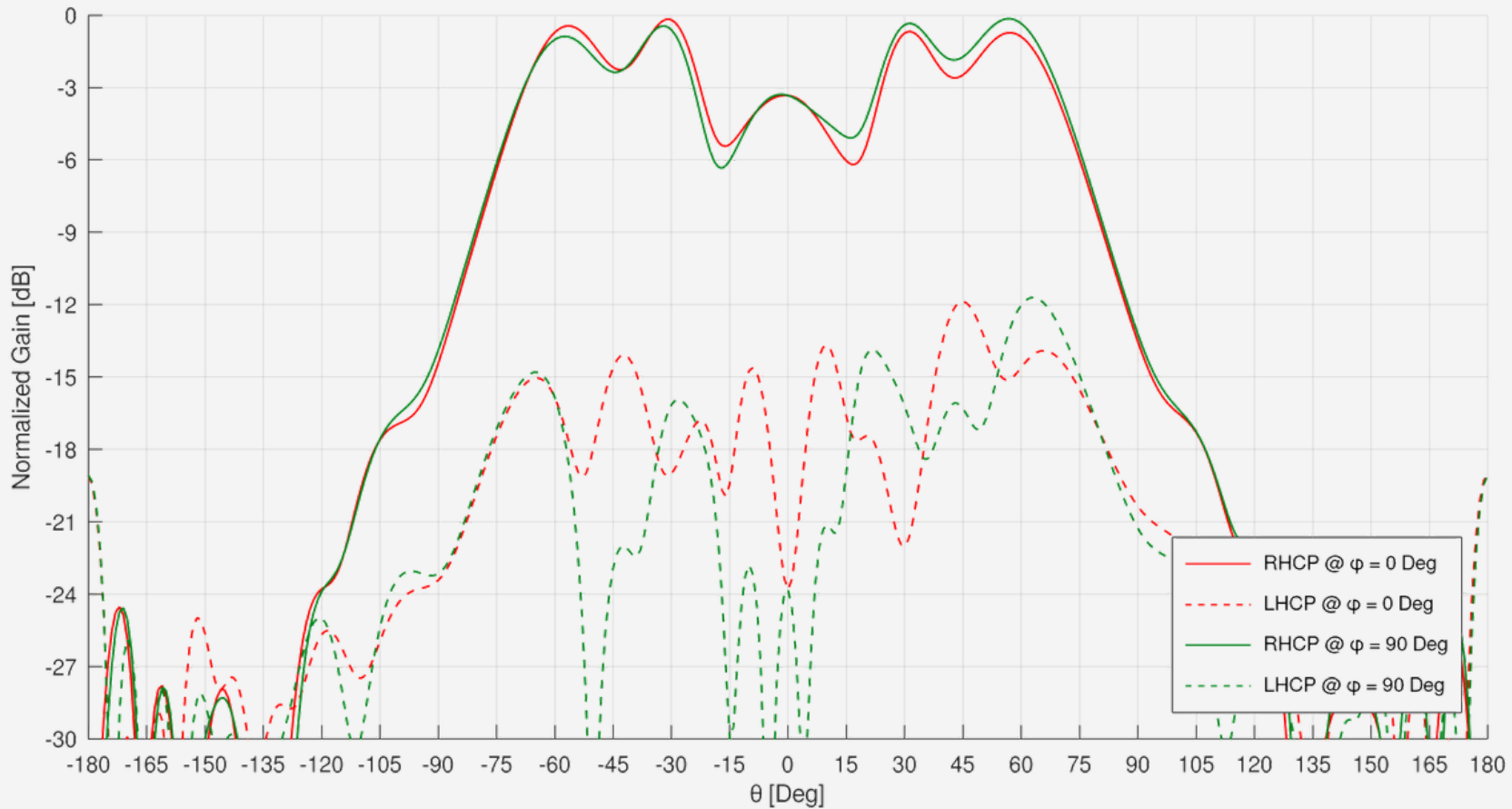
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Radiation Pattern Principal Cuts @ 8.0 GHz

Verification by Simulation of RHCP & LHCP Radiation Pattern - PN: SSA093A

Principal Cuts, $\phi = [0;90]$ deg, Freq. 8.0 GHz, Method: Full Wave Simulation, $\theta = [-180:1:180]$ deg, Boundary Conditions: Isolated Antenna





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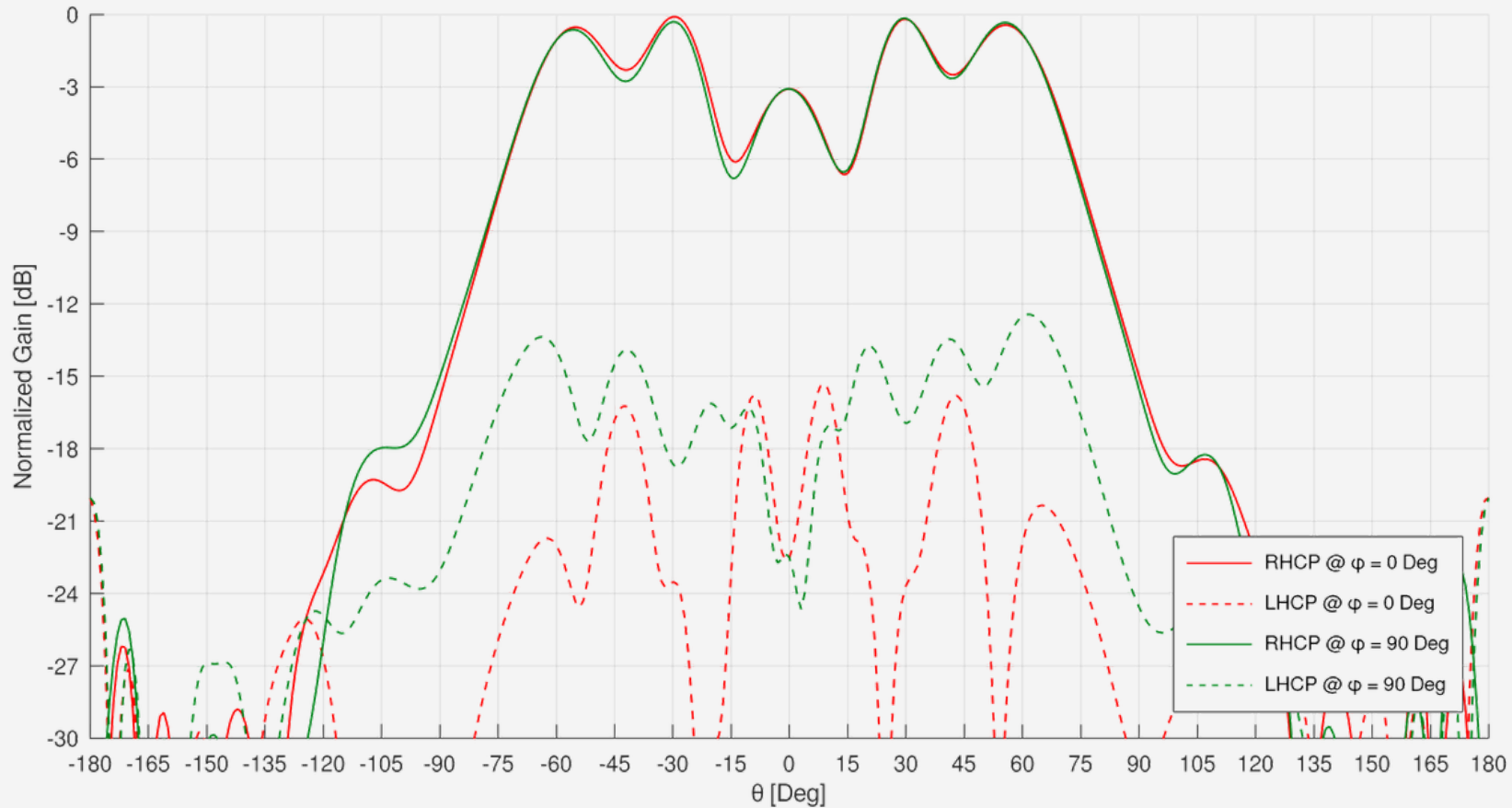
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Radiation Pattern Principal Cuts @ 8.2 GHz

Verification by Simulation of RHCP & LHCP Radiation Pattern - PN: SSA093A

Principal Cuts, $\phi = [0;90]$ deg, Freq. 8.2 GHz, Method: Full Wave Simulation, $\theta = [-180:1:180]$ deg, Boundary Conditions: Isolated Antenna





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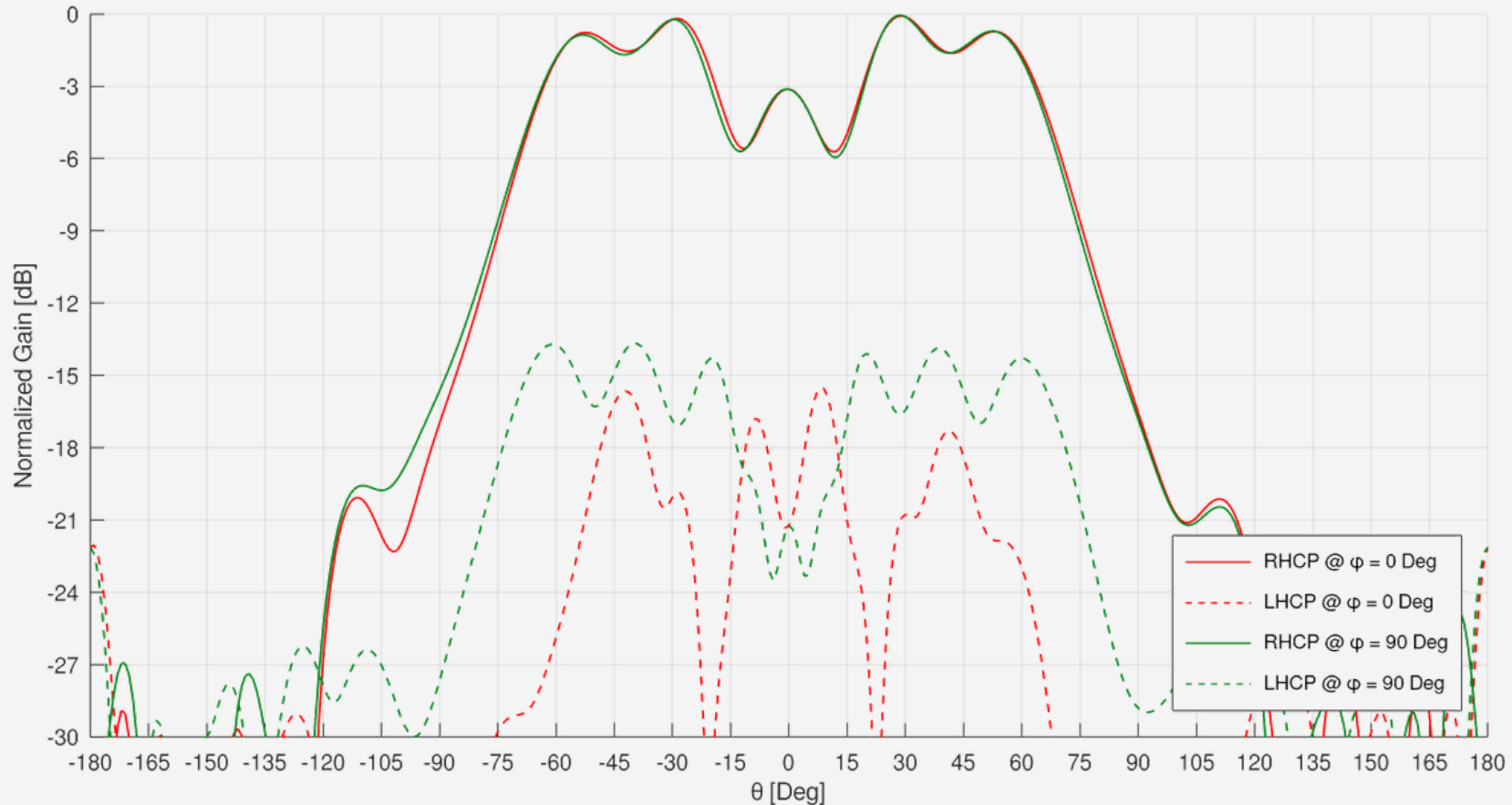
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Radiation Pattern Principal Cuts @ 8.4 GHz

Verification by Simulation of RHCP & LHCP Radiation Pattern - PN: SSA093A

Principal Cuts, $\phi = [0; 90]$ deg, Freq. 8.4 GHz, Method: Full Wave Simulation, $\theta = [-180:1:180]$ deg, Boundary Conditions: Isolated Antenna





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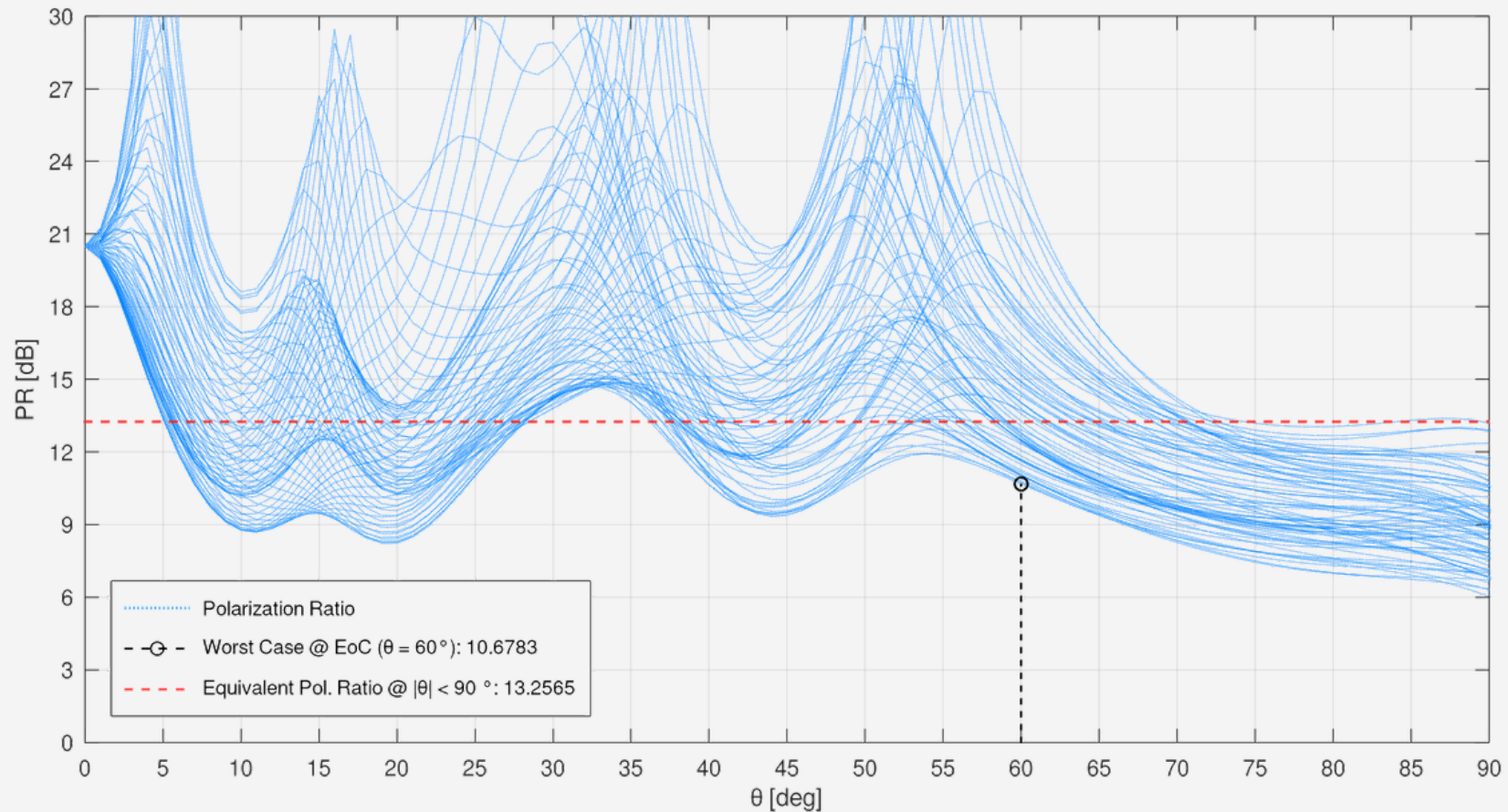
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Polarization Ratio Pattern @ 8 GHz

Verification by Simulation of Polarization Ratio Pattern - PN: SSA093A

Freq. 8.0 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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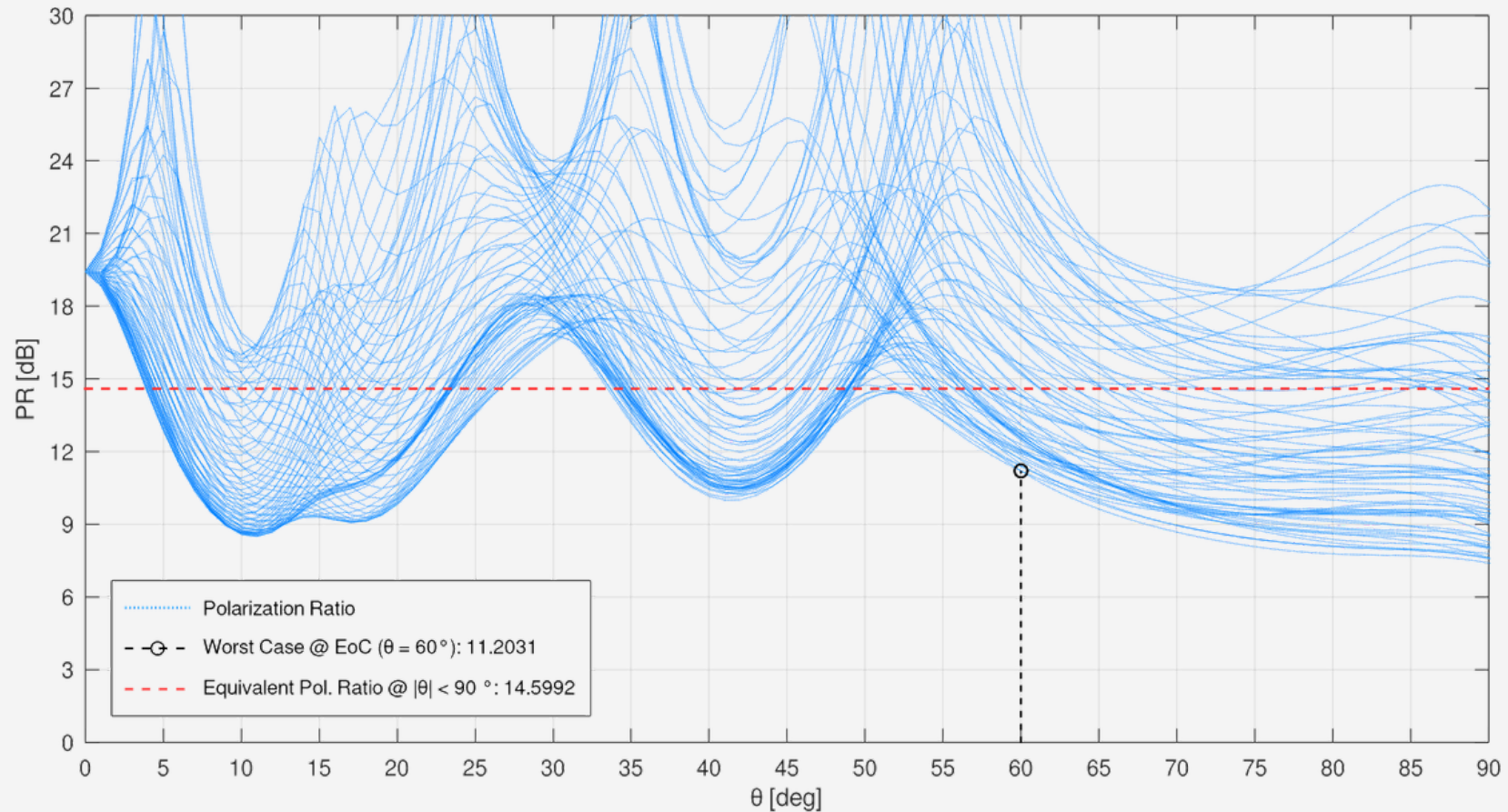
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Polarization Ratio Pattern @ 8.2 GHz

Verification by Simulation of Polarization Ratio Pattern - PN: SSA093A

Freq. 8.2 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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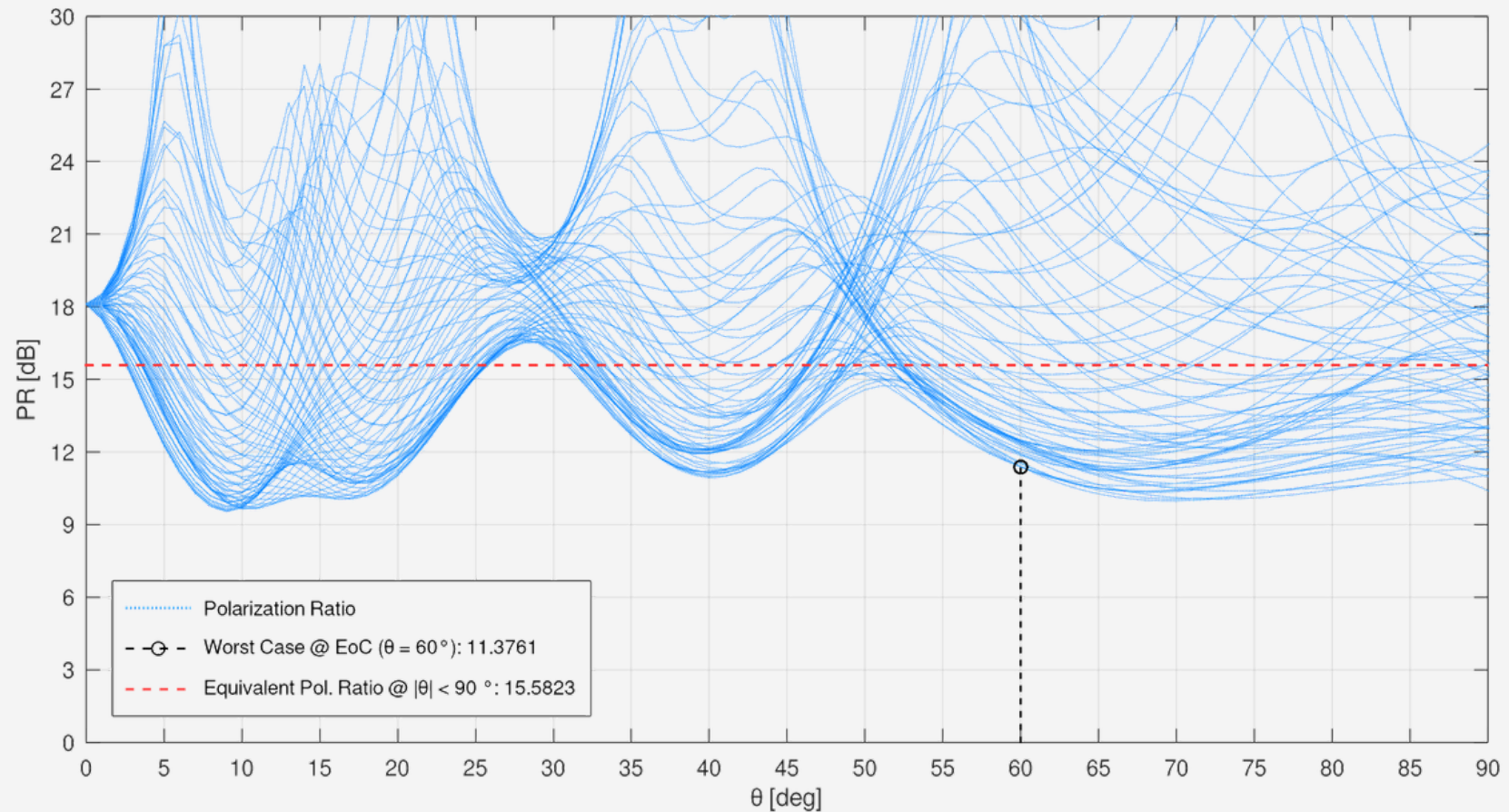
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Polarization Ratio Pattern @ 8.4 GHz

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Freq. 8.4 GHz, Method: Full Wave Simulation, $\theta = [0:1:90]$ deg, $\phi = [0:5:360]$ deg, Boundary Conditions: Isolated Antenna





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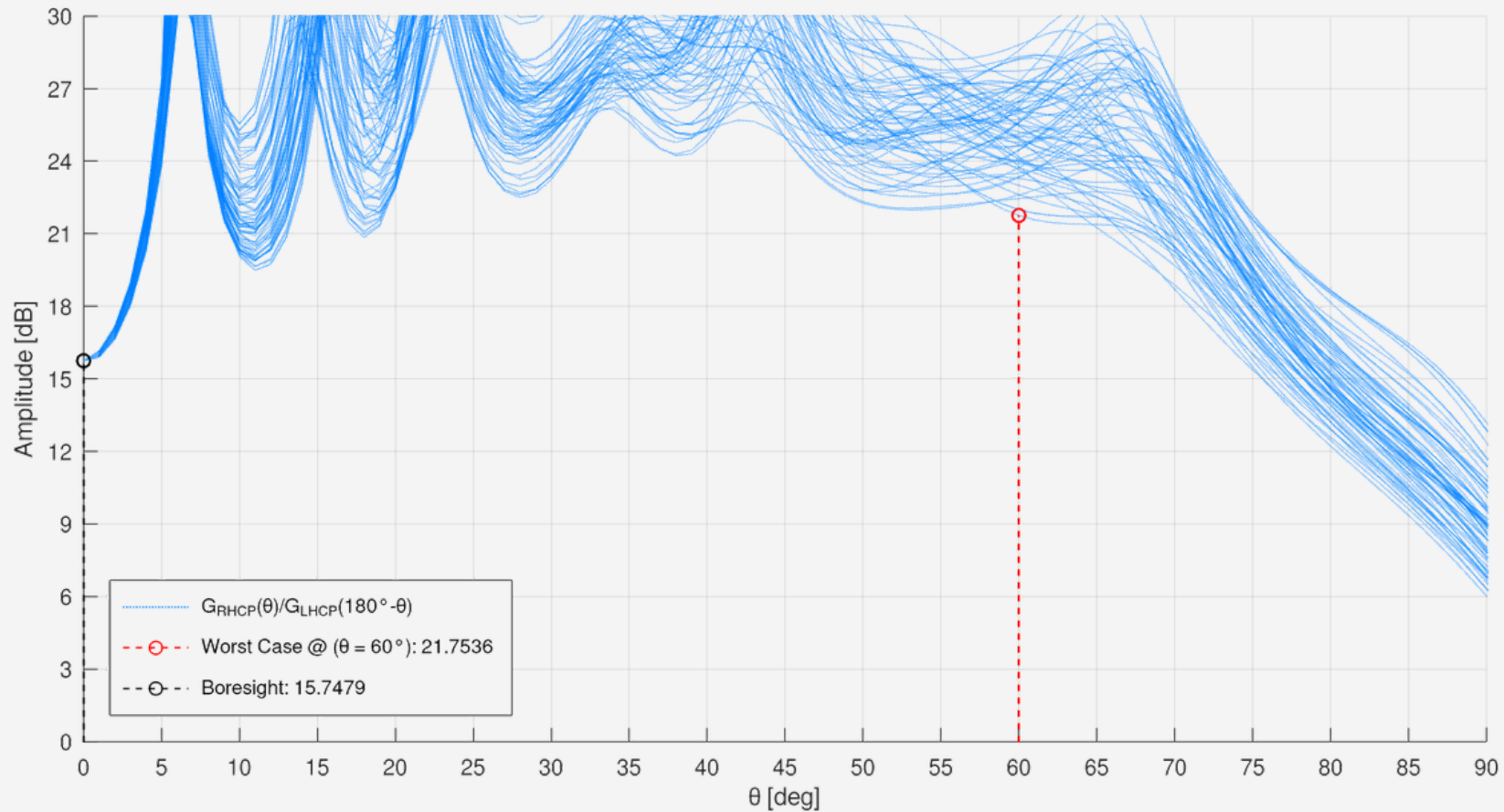
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Multipath Ratio Pattern @ Frequency: 8 GHz

Verification by Simulation of Multipath Ratio - PN: SSA093A

Full Spherical Cuts, Freq. 8.0 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:5:180]$ deg, Boundary Conditions: Isolated Antenna





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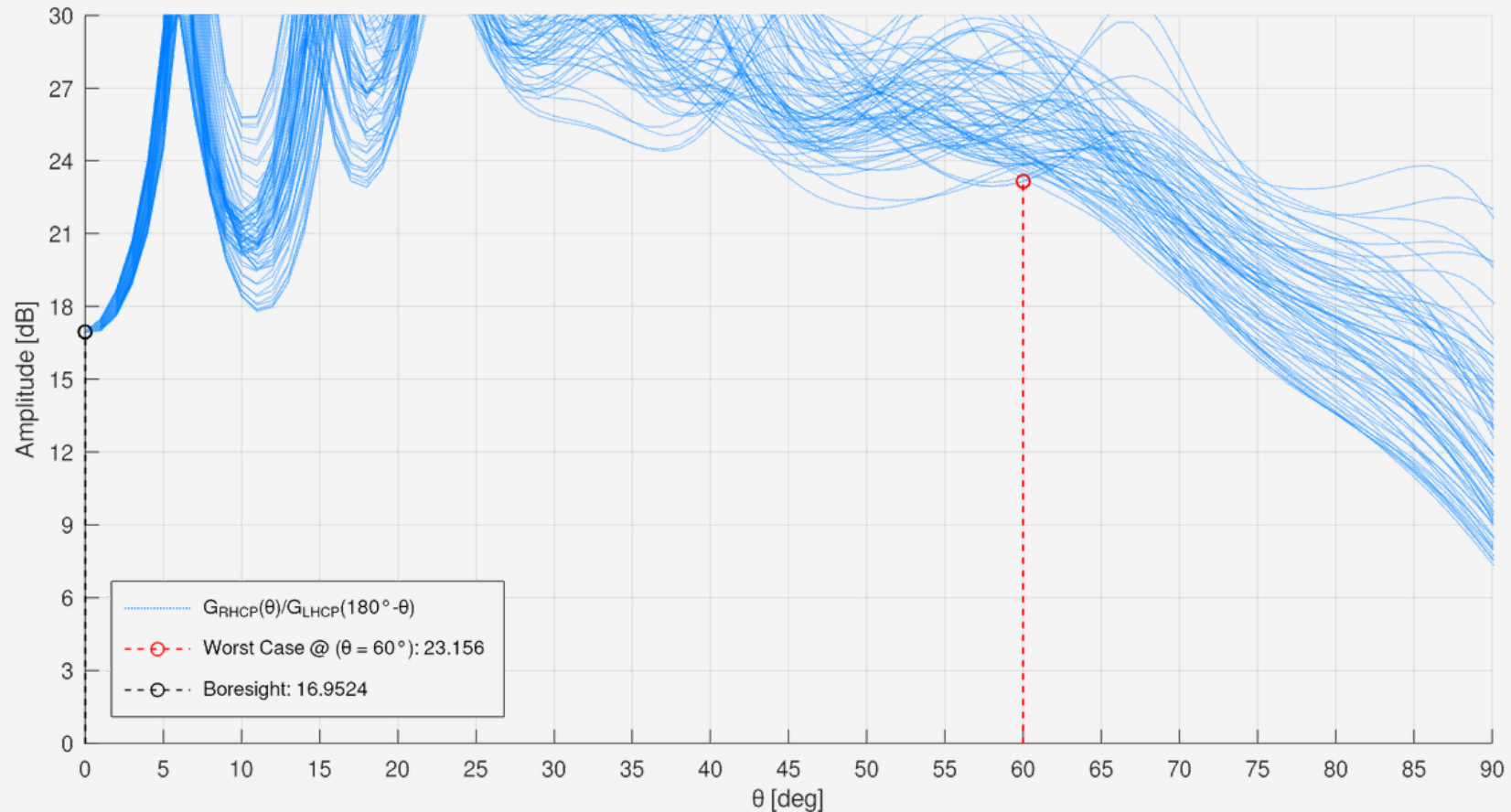
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Multipath Ratio Pattern @ Frequency: 8.2 GHz

Verification by Simulation of Multipath Ratio - PN: SSA093A

Full Spherical Cuts, Freq. 8.2 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:5:180]$ deg, Boundary Conditions: Isolated Antenna





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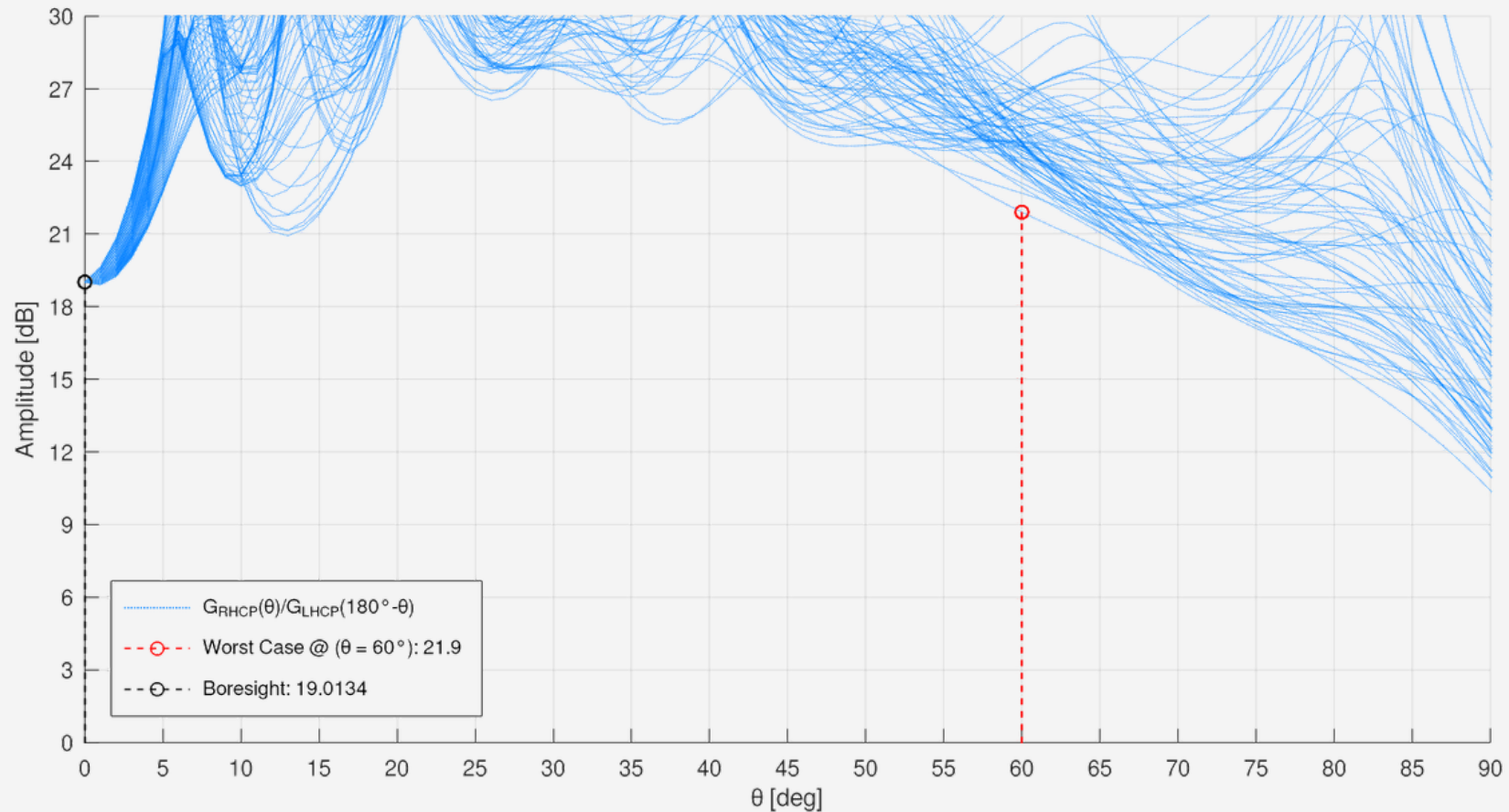
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Multipath Ratio Pattern @ Frequency: 8.4 GHz

Verification by Simulation of Multipath Ratio - PN: SSA093A

Full Spherical Cuts, Freq. 8.4 GHz, $\theta = [0:1:90]$ deg, $\phi = [0:5:180]$ deg, Boundary Conditions: Isolated Antenna





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

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