

<u>Test Technology:</u>	<u>Test Method(s)²:</u>
UICC	USIM/USAT/CSIM/ISIM Interaction Test Plan (LTE/WCDMA/GSM/CDMA/MM); 3GPP TS 31.121; 3GPP TS 31.124; ETSI TS 102 230; SIM Application Interaction Test Plan; UICC USIM ISIM Electrical; UICC USIM ISIM Protocol (LTE/WCDMA/GSM/CDMA); SWP/HCI ETSI TS 102 694-1; ETSI TS 102 695-1
SunSpec Alliance	SunSpec – CSIP (Common Smart Inverter Profile) Conformance Test Procedures; SunSpec – Advanced Function Inverter Test Lab Specification; SunSpec – UL1741 Supplement SA/Rule 21 Implementation Guide; IEEE 2030.5-2018 Smart Energy Profile Application Protocol
CBRS - OnGo/WinnForum	OnGo Alliance Certification Test Plan; WinnForum Conformance and Performance Test Technical Specification, WINNF-TS-0122

¹ This accreditation covers testing performed at the main laboratory listed above, and the three satellite laboratories listed below:

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC
(formerly PCTEST)
7195 Oakland Mills Rd, Suite A
Columbia, MD

<u>Test Technology:</u>	<u>Test Method(s)²:</u>
<i>Emissions</i> Radiated and Conducted	CFR 47, FCC Part 15B (using ANSI C63.4:2014); CFR 47, FCC Part 18 (using MP-5:1986); CFR 47, FCC Parts 15/C/E (without DFS)/F/G/H (using ANSI C63.10:2013); CFR 47, FCC Part 15E (with DFS) (using FCC KDB 905462 D02 (v02)); CFR 47, FCC Part 15D (using ANSI C63.17:2013); ANSI C63.10:2020; KDB 987594; ETSI TS 134 124 Universal Mobile Telecommunications System (UMTS); (3GPP TS 34.124); ETSI TS 136 124 LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); (3GPP TS 36.124); (3GPP TS38.124 NR; Electromagnetic Compatibility (EMC) Requirements for Mobile Terminals and Ancillary Equipment); ETSI TS 151 010-1 Digital Cellular Telecommunications System (Phase 2+) (GSM); 3GPP TS 51.010-1, Section 12 (Conducted and Radiated Spurious Emissions); EN55011; EN 55032;

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<u>Test Technology:</u>	<u>Test Method(s) ²:</u>
Radiated and Conducted (cont.)	CNS 13438 (up to 6 GHz); AS/NZS CISPR 11; IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003; KS C 9811; KS C 9832; VCCI V-3(2016.11); VCCI V-3 (2015.04); VCCI 32-1; VCCI-CISPR 32
Transmitter/Receiver	RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-248; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-Gen No IS
Hearing Aid Compatibility	ANSI C63.19:2011; ANSI C63.19:2019; CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017); RSS-HAC; ANSI/TIA-5050-2018
United States Radio	47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E, ANSI C63.26:2015)
European Radio	ETSI EN 302 065-1; ETSI EN 302 065-2; ETSI EN 302 065-3; ETSI EN 302 065-4; ETSI EN 302 291-1; ETSI EN 302 291-2; ETSI EN 302 502; ETSI EN 302 510-1; ETSI EN 302 510-2; ETSI EN 302 537; ETSI EN 301 511; ETSI EN 301 839; ETSI EN 301 893; ETSI EN 301 893; ETSI EN 301 908-1; ETSI EN 301 908-13; ETSI EN 300 220-1; ETSI EN 300 220-2; ETSI EN 300 328; ETSI EN 300 328; ETSI EN 300 330; ETSI EN 300 440; ETSI EN 300 440-2
Taiwan Radio	LP0002 (2020); DGT LP0002
Korean Radio	Regulations on Radio Equipment (MSIT Ordinance MSIT No. 86, Jan. 4, 2022); Unlicensed Radio Equipment Established Without Notice (MSIT Public Notification 2022-20, May 10, 2022); Technical Requirements for the Human Protection against Electromagnetic Waves (MSIT Public Notification 2019-4, January 16, 2019); Equipment to be Subject of the Test Procedure for Electromagnetic Field Strength and Specific Absorption Rate (RRA Public Notification (2021-16, October 12, 2021); Technical Requirements for Radio Equipment for Telecommunication Services (RRA Public Notification 2022-13 Jun 28, 2022);

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<u>Test Technology:</u>	<u>Test Method(s) ²:</u>
Korean Radio (cont.)	Technical Requirements for Measurement and Test Procedure of Specific Absorption Rate (RRA Public Notification 2018-18, Dec 7, 2018); Technical Requirements for Measurement of Electromagnetic Field Strength (RRA Public Notification 2021-22 Nov 29, 2021); KS X 3123; KS X 3142; KS X 3270; KS X 3271
Australia/New Zealand Radio	AS/NZS 4268:2017
OTA	CTIA Test Plan for Wireless Device Over-the-Air Performance PTCRB NAPRD03; PTCRB PPMD; VZW OTA Radiated Performance for CDMA & LTE Multimode Devices; VZW LTE Over the Air Radiated Performance Test Plan; VZW Location Determination Test Plan; VZW LTE-LBS Performance Test Plan; T-Mobile Radiated Performance TRD; AT&T 13340 OTA; AT&T IoT Accelerator; USCC CDMA Over The Air Radiated Test Plan; USCC LTE Over The Air Radiated Test Plan; CTIA Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices (Wi-Fi Alliance); GSMA TS.24 Operator Acceptance Values for Device Antenna Performance; 3GPP TS 34.114 Technical Specification UE/MS OTA Antenna Performance; 3GPP TS 37.544 Technical Specification UTRA & E-UTRA UE OTA Antenna Performance
<i>Wired and Wireless Conformance</i>	
CTIA IoT Security	CTIA Cybersecurity Certification Test Plan for IoT Devices
SunSpec Alliance	SunSpec – CSIP (Common Smart Inverter Profile) Conformance Test Procedures; SunSpec – Advanced Function Inverter Test Lab Specification; SunSpec – UL1741 Supplement SA/Rule 21 Implementation Guide; IEEE 2030.5-2018 Smart Energy Profile Application Protocol
CBRS - OnGo/WinnForum	OnGo Alliance Certification Test Plan; WinnForum Conformance and Performance Test Technical Specification, WINNF-TS-0122

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ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC
 (formerly PCTEST)
 9017-F/G Mendenhall Court
 Columbia, MD 21045

<u>Test Technology:</u>	<u>Test Method(s) ²:</u>
Battery Safety	IEEE 1725 Standard for Rechargeable Batteries for Cellular Telephones; CTIA Certification Requirements for Battery System Compliance to IEEE 1725; - Exclusions: Section 6.2 (DC-DC testing only); Section 7 (Certified Adapters only); IEEE 1625 Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices; CTIA Certification Requirements for Battery System Compliance to IEEE 1625; UL1642 Standard for Lithium Batteries; UL 2054 Household and Commercial Batteries; IEC 62133-2 Secondary Cells and Batteries containing Alkaline or other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells & Batteries made from them, for use in Portable Applications IEC 61960-3 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium and batteries for portable applications – Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them
UNDOT Battery Transportation Safety	United Nations Document ST/SG/AC.10/11/Section 38.3 Recommendations on the Transport of Dangerous Goods; Manual of Tests and Criteria; IEC 62281 – Safety of Primary and Secondary Lithium Cells and Batteries During Transport
Aerospace - Battery Performance and Safety	NASA Specification for Acceptance Testing of Commercial Lithium-Ion Cell Lots Engineering Directorate Propulsion & Power Division, EP-WI-031
Hardware Reliability	CTIA Device Hardware Reliability Test Plan
Determining Battery Life	CTIA Battery Life Test Plan
ESD Immunity	EN/IEC 61000-4-2

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3801 E. Plano Parkway, Ste 150
Plano, TX 75074

<u>Test Technology:</u>	<u>Test Method(s) ²:</u>
Radiated Emissions (10 Meter Test Distance) (Frequency Range, 30 MHz – 1 GHz)	CFR 47, FCC Parts 15B (using ANSI C63.4:2014); EN55011; EN 55032; CNS 13438 (up to 6 GHz); AS/NZS CISPR 11; IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003; KS C 9811; KS C 9832; VCCI V-3(2016.11); VCCI V-3 (2015.04); VCCI 32-1; VCCI-CISPR 32
EMC	ETSI EN 301 489-1; ETSI EN 301 489-3; ETSI EN 301 489-17; ETSI EN 301 489-19; ETSI EN 301 489-52; EN 55024
2.4 GHz Wi-Fi & BT RF	ETSI EN 300 328
5 GHz W-Fi	ETSI EN 301 893
GPS	ETSI EN 303 413
SRD1	ETSI EN 300 440; ETSI EN 300 330
LTE RF	ETSI EN 301 908-1; ETSI EN 301 908-13
WCDMA RF	ETSI EN 301 908-1; ETSI EN 301 908-2
GSM RF	ETSI EN 301 511


² When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA R101 - *General Requirements- Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.³:

Rule Subpart/Technology	Test Method	Maximum Frequency
<u>Unintentional Radiators</u> Part 15B	ANSI C63.4:2014	40000 MHz
<u>Industrial, Scientific, and Medical Equipment</u> Part 18	FCC MP-5 (February 1986)	330000 MHz
<u>Intentional Radiators</u> Part 15C	ANSI C63.10:2013	330000 MHz
<u>Unlicensed Personal Communication</u>		

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Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.³:

Rule Subpart/Technology	Test Method	Maximum Frequency
<u>Systems Devices</u>		
Part 15D	ANSI C63.17:2013	20000 MHz
<u>U-NII without DFS Intentional Radiators</u>		
Part 15E	ANSI C63.10:2013	40000 MHz
<u>U-NII with DFS Intentional Radiators</u>		
Part 15E	FCC KDB 905462 D02 (v02)	40000 MHz
<u>UWB Intentional Radiators</u>		
Part 15F	ANSI C63.10:2013	200000 MHz
<u>BPL Intentional Radiators</u>		
Part 15G	ANSI C63.10:2013	40000 MHz
<u>White Space Device Intentional Radiators</u>		
Part 15H	ANSI C63.10:2013	40000 MHz
<u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (non-cellular), 90 (below 3 GHz), 95 (below 3 GHz), 97 (below 3 GHz), and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u>		
Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Maritime and Aviation Radio Services</u>		
Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	330000 MHz
<u>Microwave and Millimeter Bands Radio Services</u>		
Parts 25, 30, 74, 90 (above 3 GHz), 95 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>Broadcast Radio Services</u>		
Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000 MHz
<u>RF Exposure</u>		

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Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.³:

Rule Subpart/Technology	Test Method	Maximum Frequency
Devices Subject to SAR Requirements	IEEE Std 1528:2013	6000 MHz
<u>Hearing Aid Compatibility</u> Part 20 (HAC for Commercial Mobile Services)	ANSI C63.19:2011	6000 MHz
<u>Signal Boosters</u> Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26:2015	330000 MHz

³Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.

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Accredited Laboratory

A2LA has accredited

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC

Columbia, MD

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 12th day of October 2022.

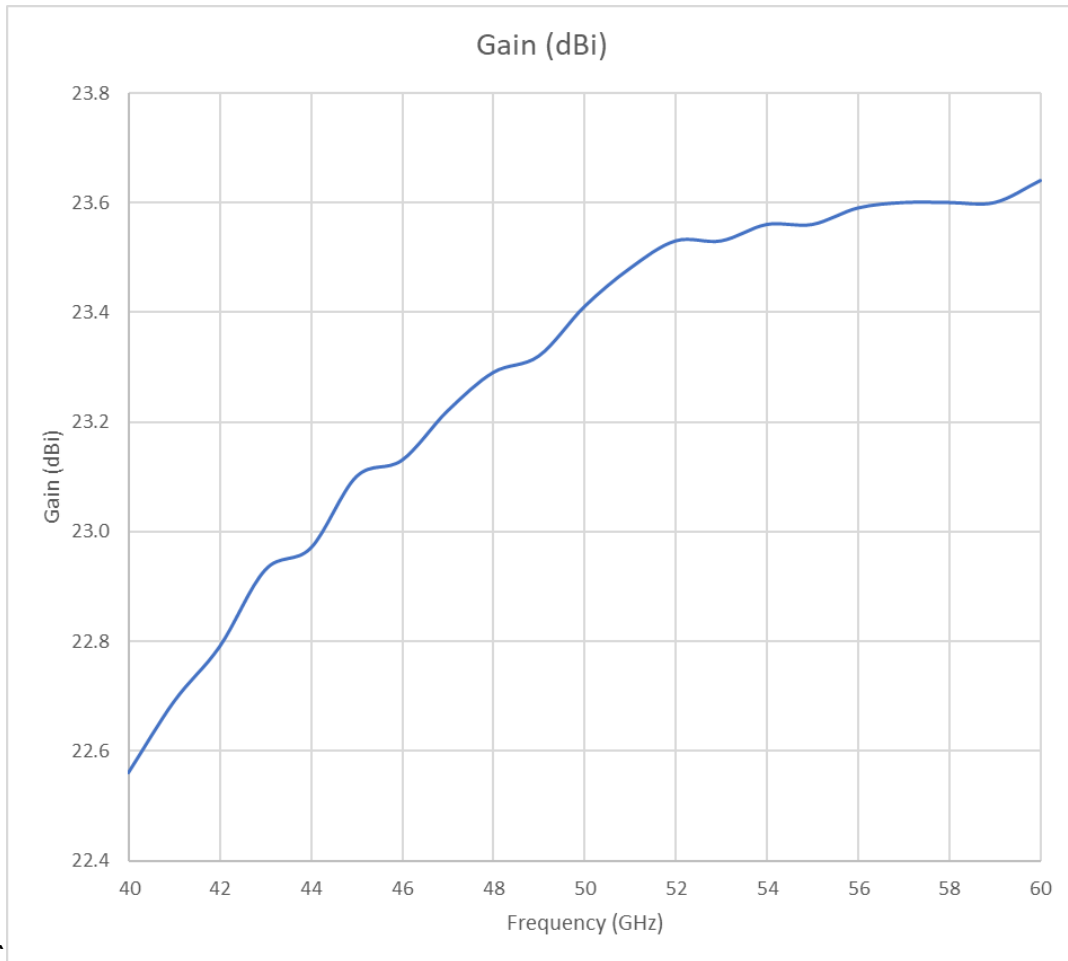
Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2041.01
Valid to May 31, 2024


For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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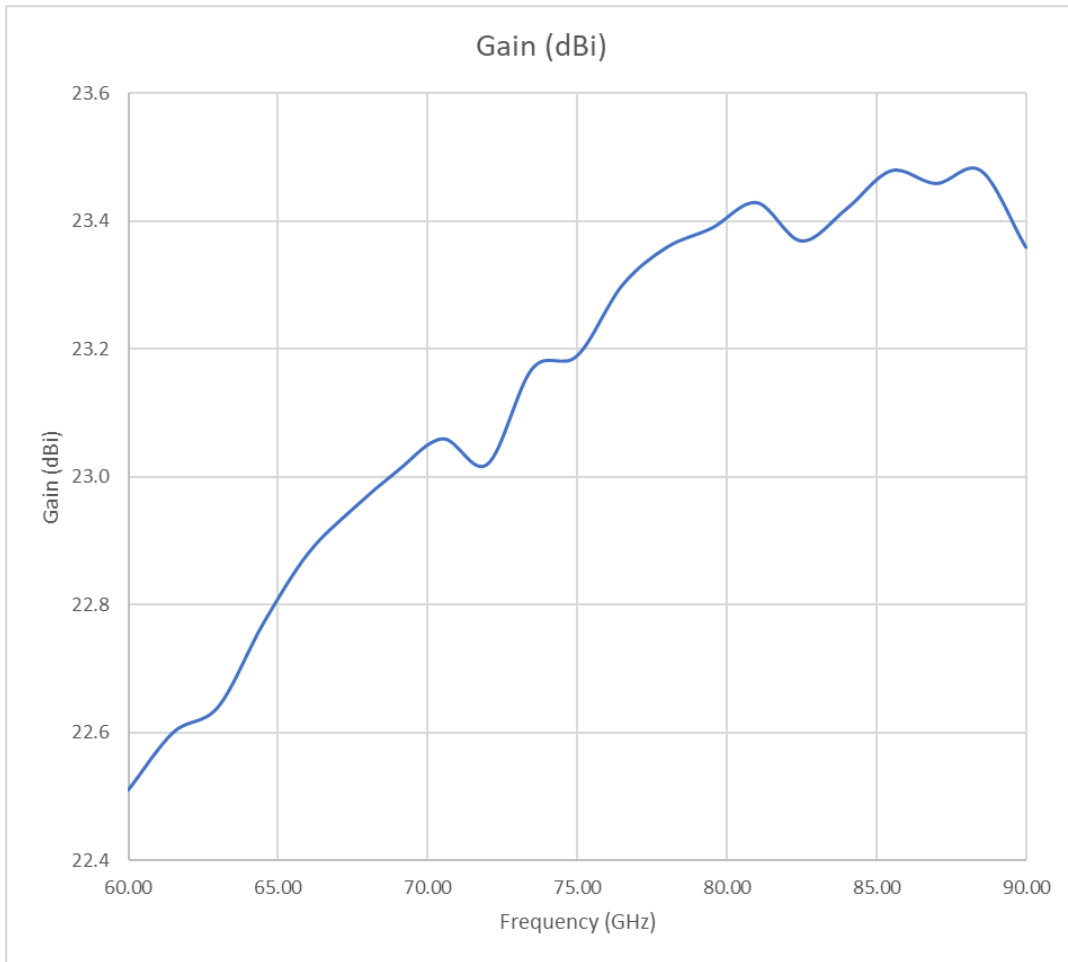
APPENDIX C – HORN ANTENNA GAIN CURVES


OML M19RH Horn Antenna Gain (40 – 60GHz)



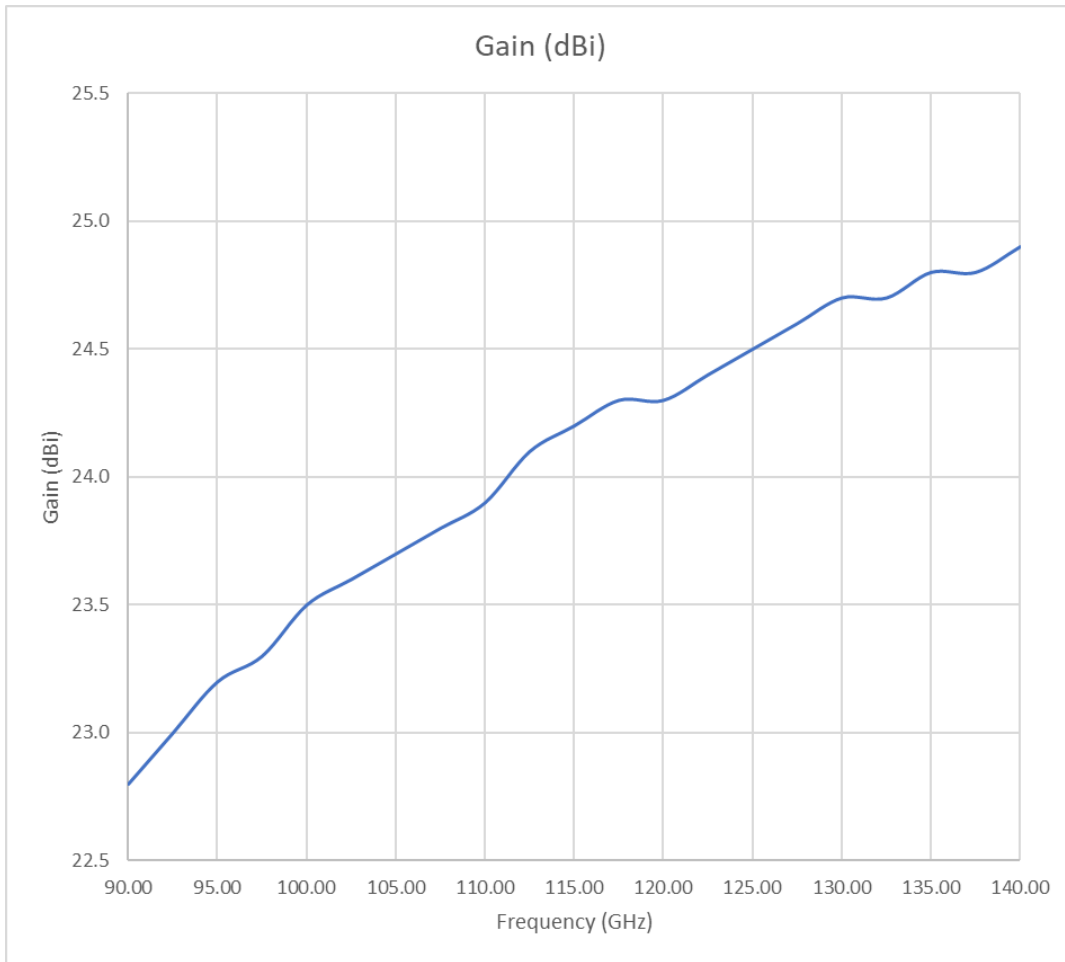
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OML M12RH Horn Antenna Gain (60 – 90GHz)



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OML M08RH Horn Antenna Gain (90 – 140GHz)



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