FCC PART 90

TEST REPORT

For

Ondas Networks Inc.

165 Gibraltar Court,
Sunnyvale, CA 94089, USA

FCC ID: X27-NGWCP-1

Report Type:	Product Type:
Permissive II Change Report	Remote Station

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Report Number:	R2201031-90	
Report Date:	2023-01-11	
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ACCREDITED
CERTIFICATE #3297.02

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" (Rev.3)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2201031-90	Permissive II Change Report	2023-01-11

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test report was prepared on behalf of *Ondas Networks Inc.* and their product model: ATCS-200F-900, FCC ID: X27-NGWCP-1, which will henceforth be referred to as the EUT (Equipment under Test). The EUT is a remote station and operates in the frequency range of 896.8875-897.9875 MHz, 896-896.125 MHz and 935-935.125 MHz.

1.2 Mechanical Description

The EUT measured approximately 22.9 cm (L) x 25.4 cm (W) x 26.9 cm (H) and weighs approximately 8.95 kg.

The test data gathered are from typical production sample with BACL assigned serial number: R2201031-1

1.3 Objective

This report was prepared on behalf of *Ondas Networks Inc.* in accordance with Part 90 Subparts I and S and Part 2 Subpart J of the Federal Communication Commission's rules.

The objective was to determine compliance with FCC rules for RF output power, occupied bandwidth, frequency tolerance, emission limitations at band edges, spurious emissions at antenna terminal and field strength of spurious radiation.

1.4 Related Submittal(s)/Grant(s)

None

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 90 Subparts I and S and Part 2 Subpart J.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)*****,** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2017 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report.

BACL's ISO/IEC 17025:2017 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.26-2015.

2.2 EUT Exercise Software

The test firmware used was Putty, provided by *Ondas Networks,* the software is compliant with the standard requirements being tested against.

Modulation	Frequency (MHz)	Rated Power (dBm)	SW Attenuation Setting	SW Bandwidth Setting
2FSK	896.0625	45	12	Default
QPSK	896.0625	45	12	Default
16QAM	896.0625	45	12	Default
64QAM	896.0625	45	12	Default
QPSK	935.0625	45	12	Default
16QAM	935.0625	45	12	Default
64QAM	935.0625	45	12	Default

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Remote Support Equipment List and Details

Manufacturer	Descriptions	Models	Serial Numbers
Lenovo	Laptop	Thinkpad	-

2.5 Power Supply

Manufacturer	Descriptions	Models	Serial Numbers
Meanwell	Power Supply	RS-150-24	-

2.6 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	< 1	EUT Output	Attenuator Input
RF cable	< 1	Attenuator Output	Combiner
RF cable	< 1	Combiner	GPS Receiver
RF cable	< 1	Combiner	Spectrum Analyzer
USB A to RJ45 Cable	1	Support Equipment	EUT Input

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§1.1307, §2.1091, §90.223	RF Exposure	Compliant
§2.1046, §90.205(k), §90.635(b)	RF Output Power	Compliant
§2.1049, §90.209	Occupied Bandwidth	Compliant
§2.1053, §90.210	Spurious Radiated Emissions	Compliant
§2.1051, §90.210	Spurious Emissions at Antenna Terminals	Compliant
§90.210	Emission Mask	Compliant
§2.1055, §90.213	Frequency Tolerance	Compliant

BACL is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report. Information provided by the customer, e.g., antenna gain, can affect the validity of results.

4 FCC §1.1307(b) (1), §2.1091 & §90.223 - RF Exposure

4.1 Applicable Standards

According to FCC KDB 447498 D04 Interim General RF Exposure Guidance v01, Section 2.1 RF Exposure Test Exemptions for Single Source,

2.1.1 General RF Exposure Test Exemption Considerations

RF exposure test exemptions provide means to obtain certification without the need of showing data (measurements, or analytical/numerical modeling) to demonstrate compliance. Hereafter, in this context, an RF source is referred to as "exempt RF device" in the sense that it is not required to show data demonstrating compliance to RF exposure limits.

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.8 However, it is always possible, especially when the potential for exposure cannot be easily determined, that an RF exposure evaluation may become required according §§ 1.1307(c) and (d).

As detailed in Section 2.1.2, the 1 mW and SAR-based test exemption conditions are in terms of source-based available maximum time-averaged (matched conducted) output power for all operating configurations, adjusted for tune-up tolerance, and at the minimum test separation distance required for the particular RF exposure scenario under consideration. This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.
To qualify for SAR test exemption, the test separation distances applied must be fully explained and justified (typically in the SAR measurement, or SAR analysis report, according to KDB Pub. 865664) by showing the actual operating configurations and exposure conditions of the transmitter, and applicable host platform requirements (e.g., KDB Pubs. 648474, 616217, 941225)

When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exemption.

If RF exposure testing requirements for a specific device are covered in a KDB Publication, those requirements must be satisfied before applying any SAR test exemption provisions. For example, this is the case for handheld PTT two-way radios, handsets, laptops, and tablets, etc.9

Finally, when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

2.1.2 1-mW Test Exemption

Per §1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

2.1.3 SAR-Based Exemption

A more comprehensive exemption, considering a variable power threshold that depends on both the separation distance and power, is provided in §1.1307(b)(3)(ii)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with test separation distances between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

Accordingly, a RF source is considered an RF exempt device if its available maximum time-averaged (matched conducted) power or its effective radiated power (ERP), whichever is greater, are below a specified threshold. This exemption threshold was derived based on general population 1-g SAR requirements and is detailed in Appendix C.

2.1.4 MPE-Based Exemption

An alternative to the SAR-based exemption is provided in §1.1307(b)(3)(ii)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the

[8] Specific test exemption thresholds for operations under occupational/controlled limits are not established.

[9] When SAR evaluation is required by the hotspot mode or UMPC mini-tablet procedures, that is, where an antenna is ≤ 2.5 cm from a surface or edge, the *test separation distance* from the phantom to the antenna or device enclosure, as appropriate, should be applied to determine SAR test exemption for such configurations, according to the criteria in this document. For that case, the *test separation distance* cannot be determined from the distance of the antenna to the device surface or edge.

According to ISED RSS-102 Issue 5 Section 2.5.1 Exemption Limits for Routine Evaluation-SAR Evaluation:

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in table below,

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71	101	132	162	193
450	52	70	88	106	123
835	17	30	42	55	67
1900	7	10	18	34	60
2450	4	7	15	30	52
3500	2	6	16	32	55
5800	1	6	15	27	41

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223	254	284	315	345
450	141	159	177	195	213
835	80	92	105	117	130
1900	99	153	225	316	431
2450	83	123	173	235	309
3500	86	124	170	225	290
5800	56	71	85	97	106

4.2 FCC RF Exposure Exemption Evaluation Procedures

According to FCC KDB 447498 D04 Interim General RF Exposure Guidance v01, Annex B Exemptions for Single Source,

B.1 General

This appendix provides the exemption criteria and summarizes relevant parameters and usage considerations based on descriptions in FCC 19-126.

B.2 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of § 1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance. The 1 mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph § 1.1307(b)(3)(ii)(A). The 1 mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

B.3 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1 – THRESHOLD FOR SINGLE RF SOURCE SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L/2\pi$		$\lambda_H/2\pi$	W
0.3	-	1.34	159 m	-	35.6 m	1,920 R^2
1.34	-	30	35.6 m	-	1.6 m	3,450 R^2/f^2
30	-	300	1.6 m	-	159 mm	3.83 R^2
300	-	1,500	159 mm	-	31.8 mm	0.0128 $R^2 f$
1,500	-	100,000	31.8 mm	-	0.5 mm	19.2 R^2
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

The table applies to any RF source (i.e., single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least λ/2π. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP20cm in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th}\,(\text{mW}) = ERP_{20\,cm}\,(\text{mW}) = 2040f \quad 0.3\ \text{GHz} \le f < 1.5\ \text{GHz}$$
$$P_{th}\,(\text{mW}) = ERP_{20\,cm}\,(\text{mW}) = 3060 \quad 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \qquad \text{(B.1)}$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

B.4 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of λ/4.

As for devices with antennas of length greater than λ/4 where the gain is not well defined, but always less than that of a half-wave dipole (length λ/2), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th}\,(\text{mW}) = ERP_{20\,\text{cm}}\,(d/20\,\text{cm})^{x} \quad d \le 20\,\text{cm}$$
$$P_{th}\,(\text{mW}) = ERP_{20\,\text{cm}} \quad 20\,\text{cm} < d \le 40\,\text{cm} \qquad \text{(B.2)}$$

Where

$$x = -\log_{10}\,(60/(ERP_{20\,\text{cm}}\sqrt{f}))$$

and f is in GHz, d is the separation distance (cm), and EPR20cm is per Formula (B.1).

The example values shown in Table B.2 are for illustration only.

Table B.2 – Example Power Thresholds (mW)

Frequency (MHz)	**Distance (mm)**										
		5	10	15	20	25	30	35	40	45	50
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

4.3 RF exposure evaluation exemption for FCC

Prediction frequency[f](MHz)			896.0625
Maximum time-averaged output power (dBm)			42
Maximum time-averaged output power (W)			15.85
Prediction distance[R] (m)			9.1
Maximum allowed antenna gain (dBi)			19.93
Max ERP assuming Max allowed antenna gain (W)			949.798
Option C	*λ/2π (m)*	*R > λ/2π ?*	MPE-based Exemption Threshold
	0.05	Yes	P_{th} (W)
			949.798

Prediction frequency[f](MHz)			935.0625
Maximum time-averaged output power (dBm)			42
Maximum time-averaged output power (W)			15.85
Prediction distance[R] (m)			9.1
Maximum allowed antenna gain (dBi)			20.111
Max ERP assuming Max allowed antenna gain (W)			991.136
Option C	*λ/2π (m)*	*R > λ/2π ?*	MPE-based Exemption Threshold
	0.05	Yes	P_{th} (W)
			991.136

The maximum time-averaged output power was derived from the maximum tune up power (i.e. 45 dBm) and duty cycle (50%). For example,

The time-averaged output power = peak output power – 10*log(1/duty cycle) =
45 dBm – 10*log(1/.5) = 45 dBm – 3 = 42 dBm

Note: Duty Cycle declared by customer
Note: Prediction distance declared by customer

Results

For 896-896.125MHz range:
In order to pass the ERP exemption threshold limit of 949.798 W with the maximum tune up power being 45 dBm, 50% duty cycle, and prediction distance of 9.1 m, the EUT can have a maximum antenna gain of 19.93 dBi.

For 935-935.125 MHz range:
In order to pass the ERP exemption threshold limit of 991.136 W with the maximum tune up power being 45 dBm, 50% duty cycle, and prediction distance of 9.1 m, the EUT can have a maximum antenna gain of 20.111 dBi.

5 FCC §2.1046, §90.205(k) & §90.635(b) - RF Output Power

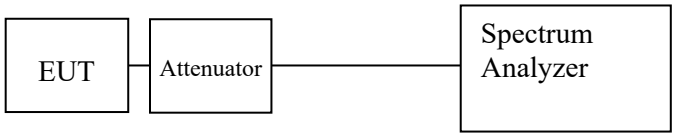
5.1 Applicable Standards

According to FCC §90.635(b), The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

5.2 Test Procedure

Span > 2 * OBW
RBW > OBW
VBW ≥ 3 * RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.3 Test Setup Diagram



5.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
655	Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2022-02-07	24 months
912	Rohde & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2022-04-26	12 months
-	-	RF Cable	-	-	Each time[1]	N/A
-	-	30dB Attenuator	-	-	Each time[1]	N/A

Note[1]: Equipment was calibrated for each test.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

5.5 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Christian McCaig from 2022-02-09 to 2023-01-11 in the RF Site.

5.6 Test Results

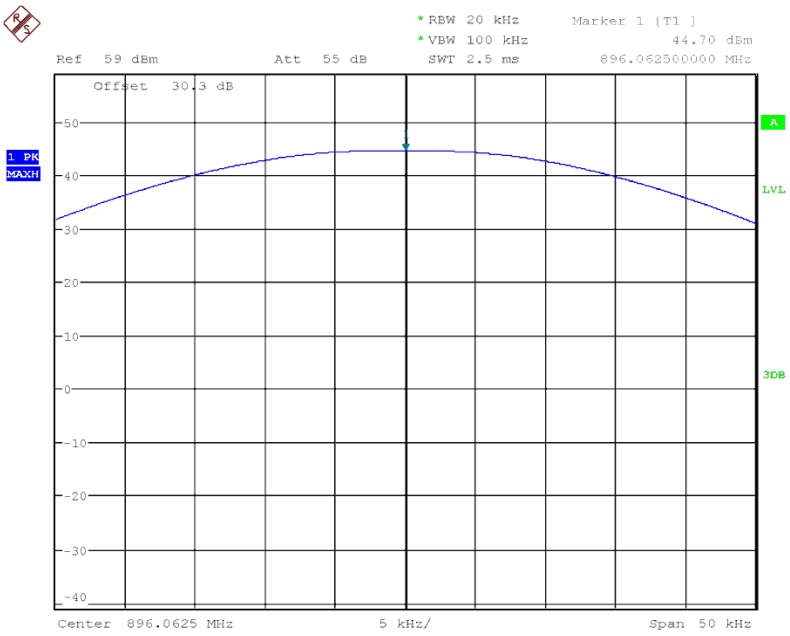
Modulation	Frequency (MHz)	Output Power (dBm)	Output Power (Watts)	Limit (Watts)
2FSK	896.0625	44.70	29.51	100
QPSK	896.0625	44.81	30.27	100
16QAM	896.0625	44.84	30.48	100
64QAM	896.0625	44.95	31.26	100

Modulation	Frequency (MHz)	Output Power (dBm)	Output Power (Watts)	Limit (Watts)
QPSK	935.0625	44.74	29.79	100
16QAM	935.0625	44.91	30.97	100
64QAM	935.0625	44.94	31.19	100

Please refer to the following plots.

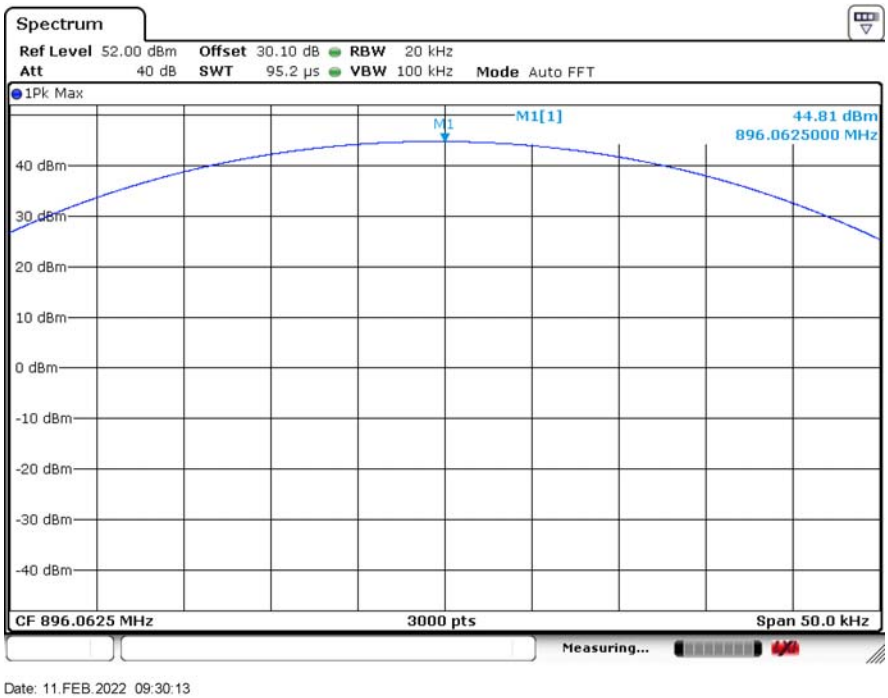
2FSK

896.0625 MHz



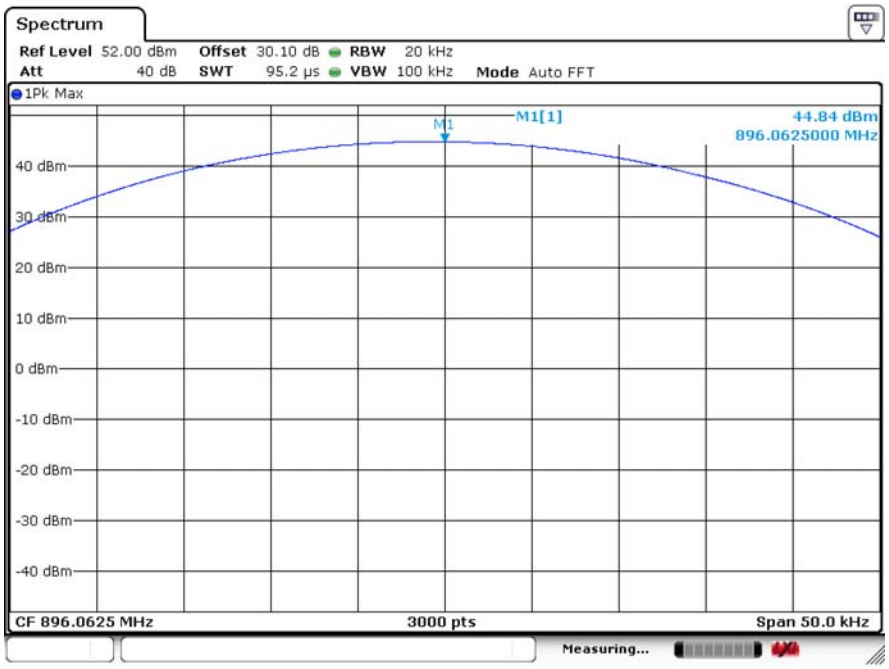
QPSK

896.0625 MHz



16QAM

896.0625 MHz

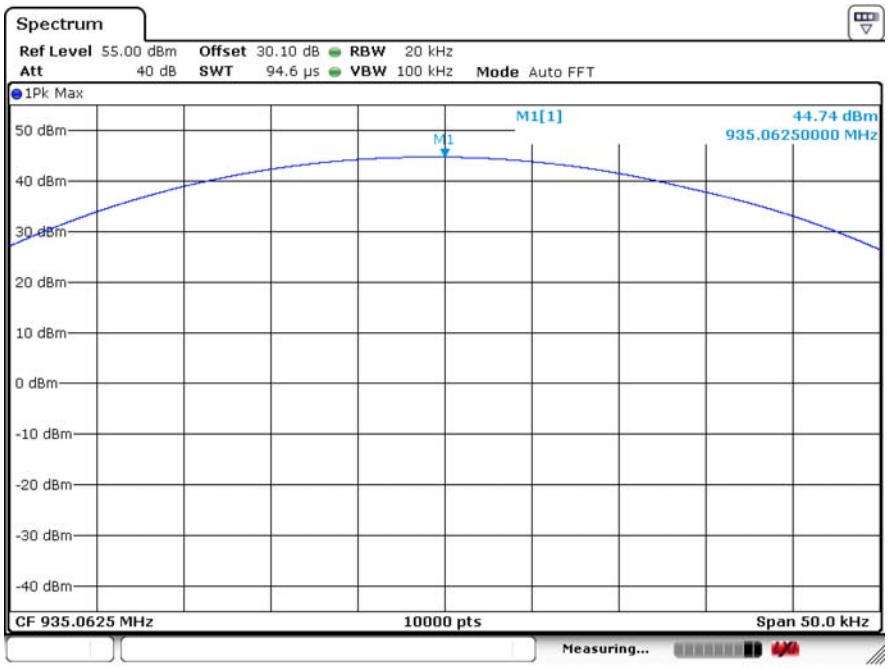


64QAM

896.0625 MHz

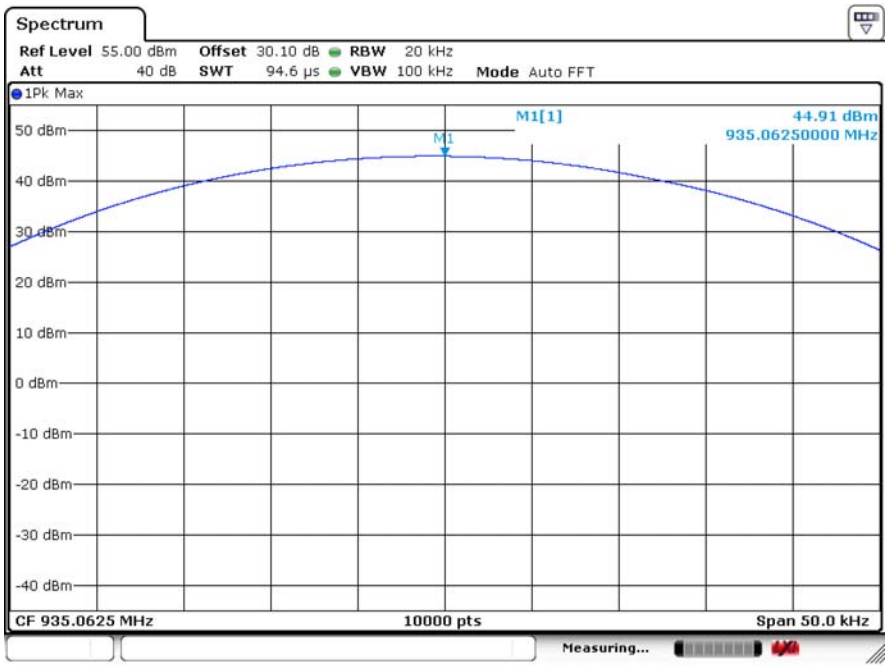
QPSK

935.0625 MHz



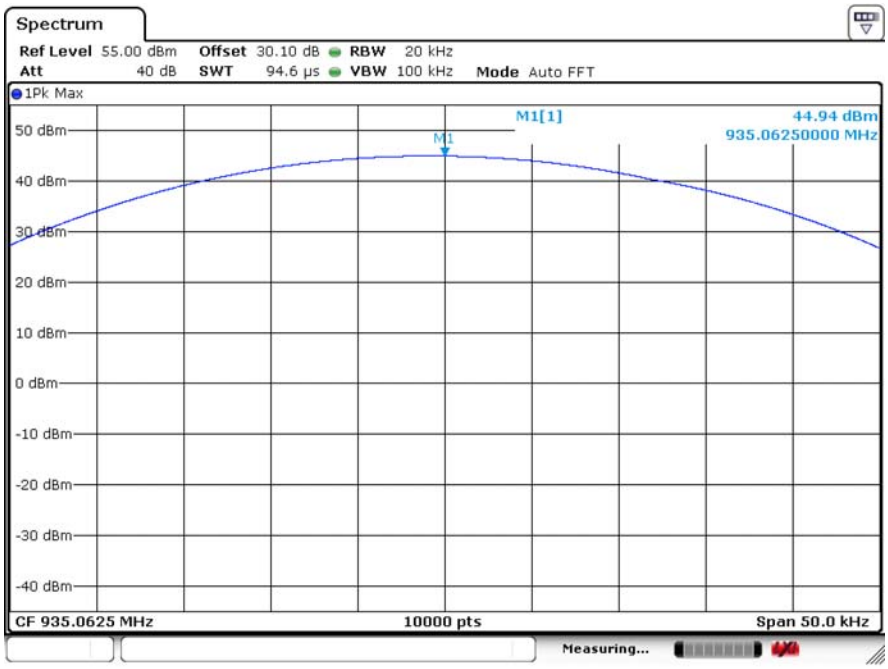
16QAM

935.0625 MHz



64QAM

935.0625 MHz



6 FCC §2.1049 & §90.209 - Occupied Bandwidth

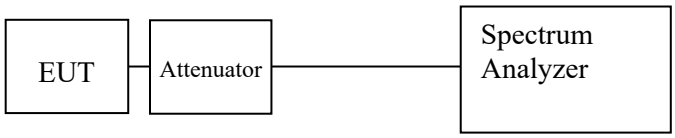
6.1 Applicable Standards

According to FCC §90.209 table 1, the authorized bandwidth within the frequency band of 896-901/935-940MHz is 13.6 kHz.

6.2 Test Procedure

Span = approximately 2 to 5 times the occupied bandwidth, centered on the transmitting channel
RBW = 1% to 5 % of the occupied bandwidth
VBW = 3 * RBW
Sweep = auto
Detector function = peak
Trace = max hold

6.3 Test Setup Diagram



6.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
655	Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2022-02-07	24 months
912	Rohde & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2022-04-26	12 months
-	-	RF Cable	-	-	Each time[1]	N/A
-	-	30dB Attenuator	-	-	Each time[1]	N/A

Note[1]: Equipment was calibrated for each test.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.5 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Christian McCaig from 2022-02-09 to 2023-01-11 in the RF Site.

6.6 Test Results

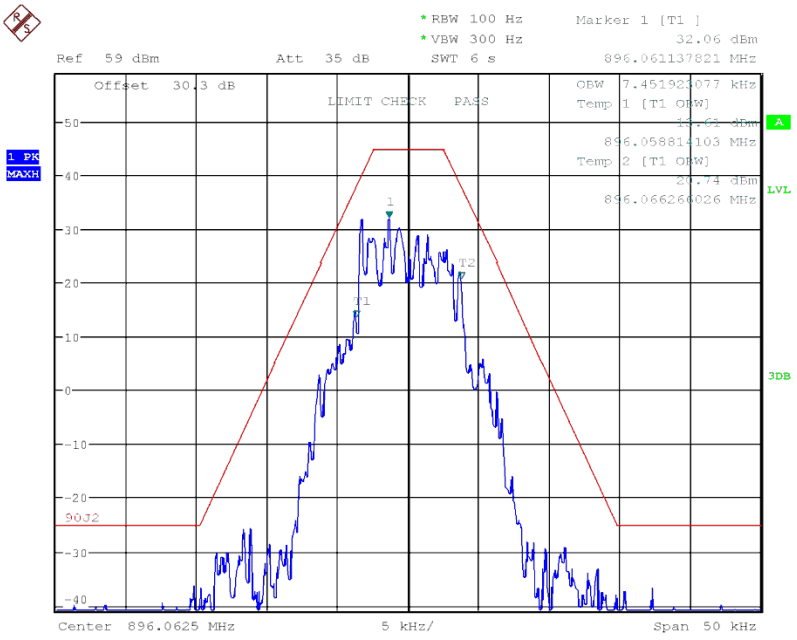
Modulation	Frequency (MHz)	99% OBW (kHz)	OBW Limit (kHz)
2FSK	896.0625	7.4519	< 13.6
QPSK	896.0625	9.2333	< 13.6
16QAM	896.0625	9.8667	< 13.6
64QAM	896.0625	9.6333	< 13.6

Modulation	Frequency (MHz)	99% OBW (kHz)	OBW Limit (kHz)
QPSK	935.0625	9.6400	< 13.6
16QAM	935.0625	9.8750	< 13.6
64QAM	935.0625	9.6400	< 13.6

Please refer to the following plots.

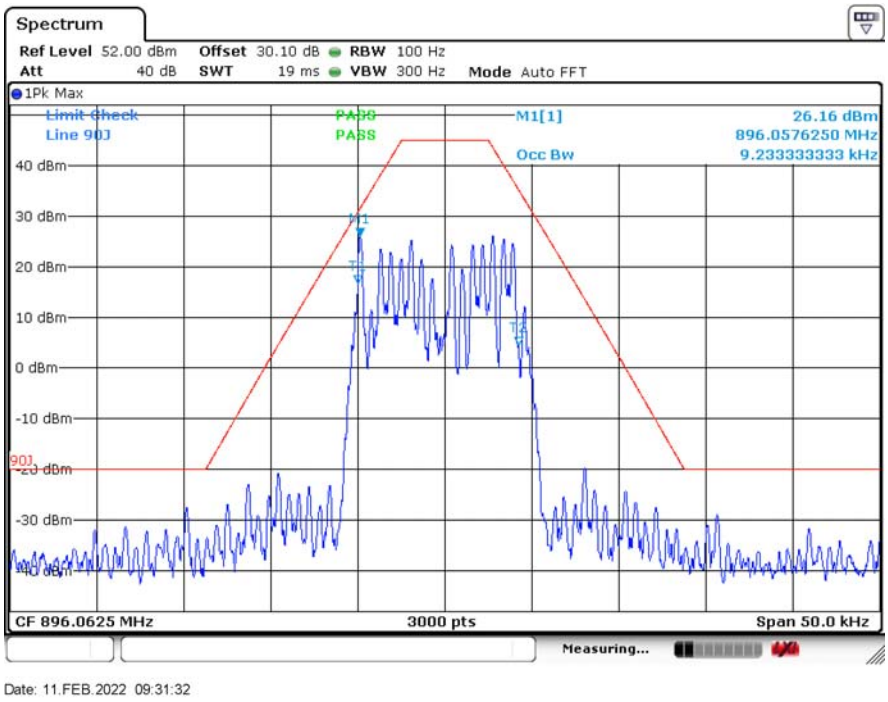
2FSK

896.0625 MHz



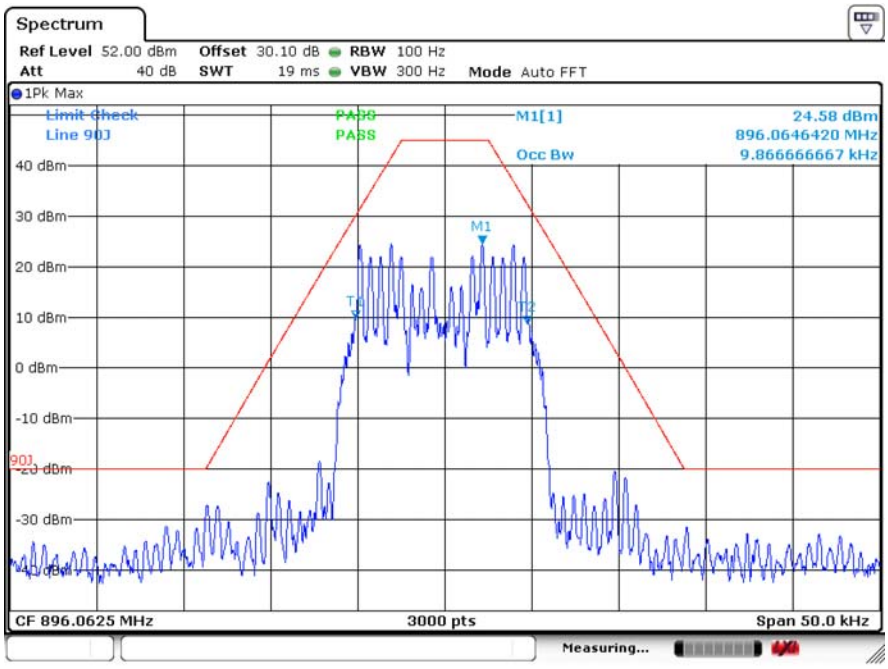
QPSK

896.0625 MHz



16QAM

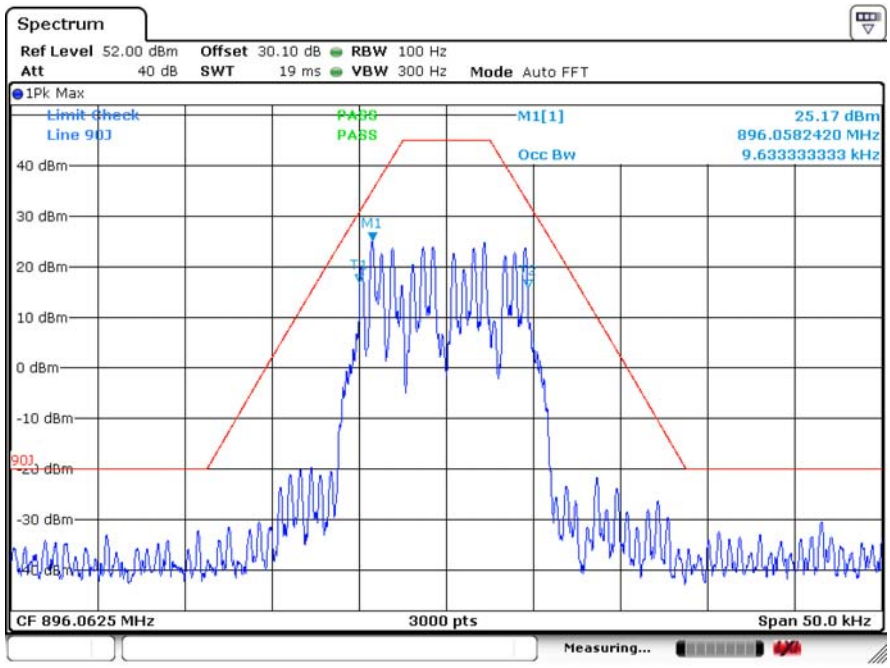
896.0625 MHz



Date: 11.FEB.2022 09:33:27

64QAM

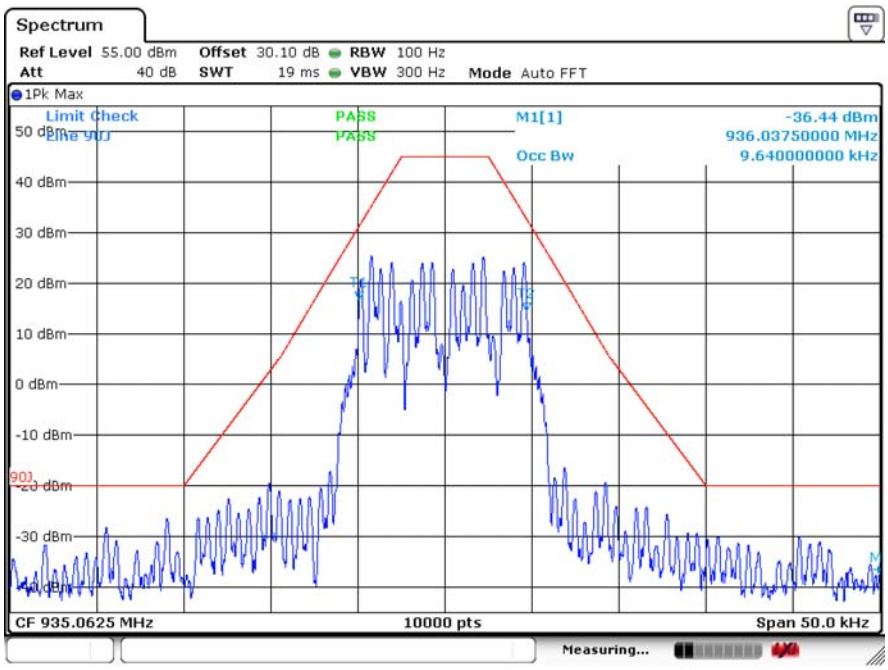
896.0625 MHz



Date: 11.FEB.2022 09:36:24

QPSK

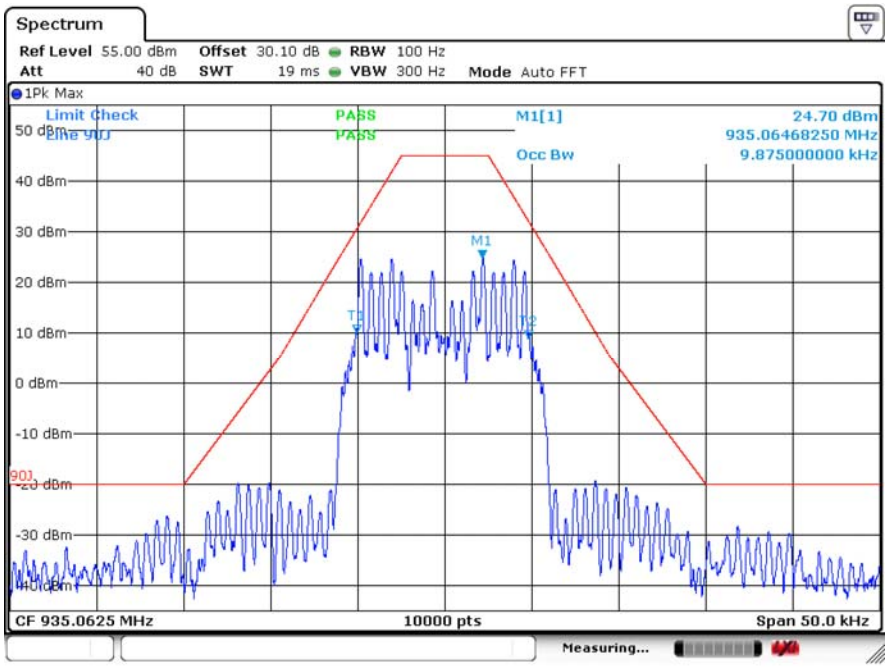
935.0625 MHz



Date: 23.FEB.2022 10:26:10

16QAM

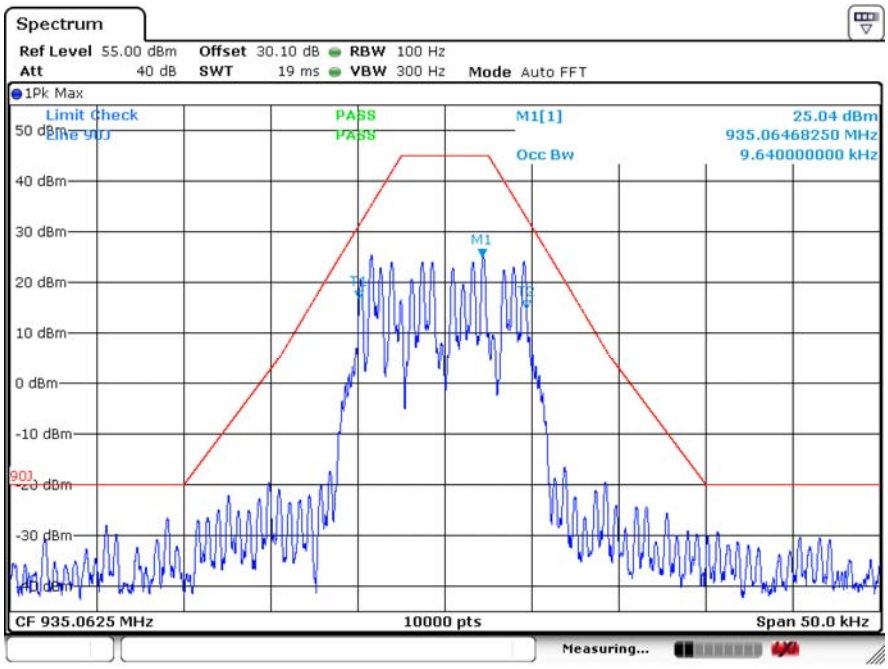
935.0625 MHz



Date: 23.FEB.2022 10:28:19

64QAM

935.0625 MHz



7 FCC §2.1053 & §90.210 - Spurious Radiated Emissions

7.1 Applicable Standards

According to FCC §90.210

TABLE 1 TO §90.210—APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25[1]	A or B	A or C
25-50	B	C
72-76	B	C
150-174[2]	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512[2 5]	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925[4]		
All other bands	B	C

7.2 Test Procedure

The transmitter was place onto a Styrofoam block. The unit was normally transmitting with a 50 ohm terminator connected to the antenna terminal.

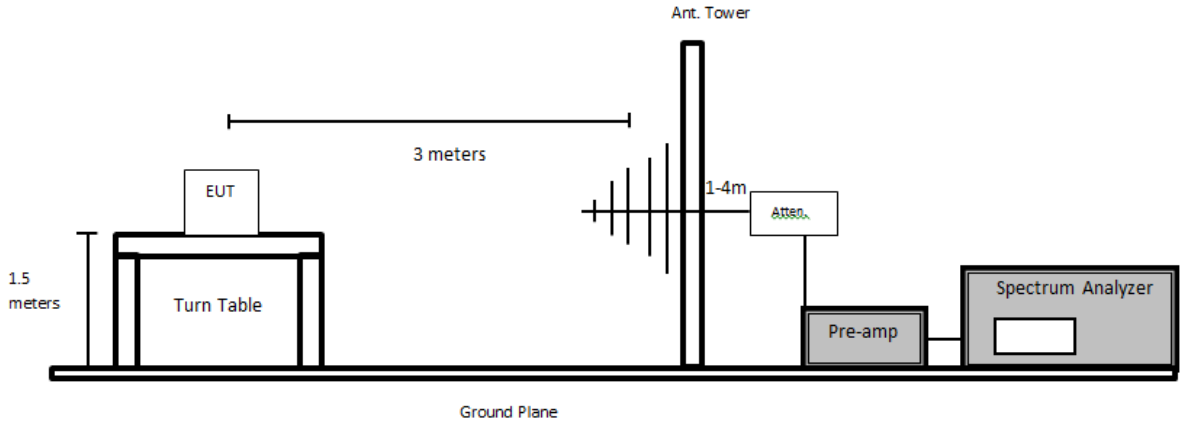
The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

Emissions were investigated up to the tenth harmonic of the fundamental frequency.

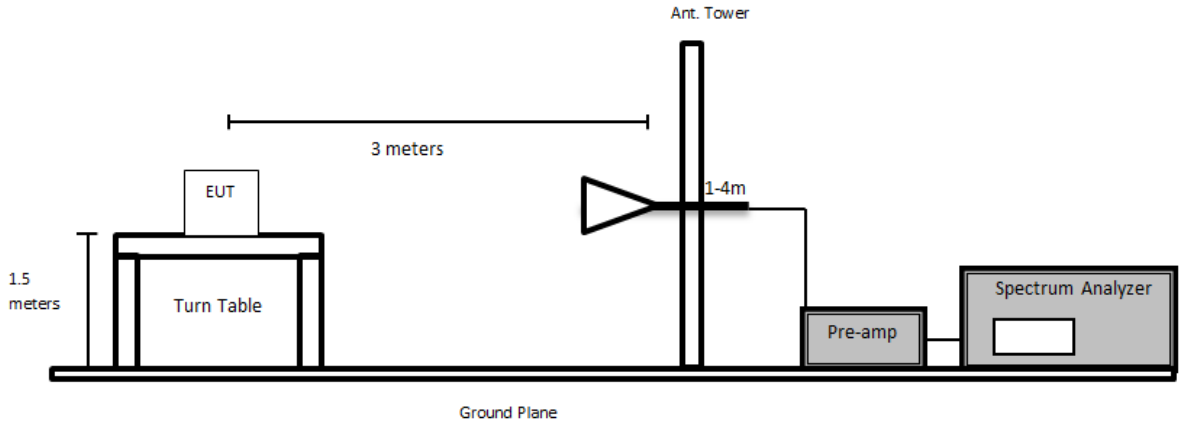
After the emissions were found, the EUT was removed and replaced by a substituting antenna. A signal generator was connected to the substituting antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

7.3 Test Setup Diagram

Below 1 GHz:



Above 1 GHz:



7.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
287	HP	Spectrum Analyzer	E4446A	US44300386	2022-05-05	1 year
655	Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2022-02-07	2 years
459	HP	Pre-Amplifier	8447D	2443A04374	2022-07-27	6 months
658	HP/ Agilent	Pre-Amplifier	8449B OPT HO2	3008A0113	2022-07-22	1 year
327	Sunol Science Corp	System Controller	SC110V	011003-1	N/R	N/A
688	Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2022-07-28	1 year
1130	Aglient	MXG Signal Generator	N5183A	MY50140453	2022-09-20	1 year
187	A.R.A.	Antenna, Horn	DRG-118/A	1132	2022-03-17	2 years
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2021-11-22	2 years
568	COM-POWER	Dipole Antennas	AD-100 DB-4	721033DB1,721033DB2,721033DB3,521921	2021-04-30	2 years
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
1228	Pasternack	Coaxial Cable, RG213	PE3496-800CM	2111301	2021-11-30	1 year
1250	Florida RF Labs	1-18GHz, 26.5-40 GHz Coaxial cable	KMS-160-120.0-KMS	51	2022-05-10	1 year
-	-	RF cable	-	-	Each time[1]	N/A
-	-	SMA cable	-	C0003	Each Time[1]	Each Time[1]
-	-	SMA cable	-	C0006	Each Time[1]	Each Time[1]
-	-	30 dB Attenuator	-	-	Each time[1]	N/A
-	-	Notch Filter	-	-	Each time[1]	N/A

Note[1]: This equipment was calibrated for each test.
***Statement of Traceability: BACL Corp.** attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.5 Test Environmental Conditions

Temperature:	20-21°C
Relative Humidity:	47-49 %
ATM Pressure:	101.4-101.6 kPa

The testing was performed by Arturo Reyes on 2022-10-19 in 5 Meter Chamber 3.

7.6 Test Results

CW, Middle channel tested (896.0625 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)		
300	65.47	72	189	H	300	-38.38	1.1	0.3	-37.58	-20	-17.58
300	65.2	285	140	V	300	-36.65	1.1	0.3	-35.85	-20	-15.85
1792.125	68.03	90	243	H	1792.125	-40.43	9.289902	1.21	-32.3501	-20	-12.3501
1792.125	66.02	128	150	V	1792.125	-42.44	9.289902	1.21	-34.3601	-20	-14.3601
2688.188	70.17	102	150	H	2688.188	-34.52	9.28058	1.57	-26.8094	-20	-6.80942
2688.188	69.57	130	150	V	2688.188	-35.11	9.28058	1.57	-27.3994	-20	-7.39942
3584.25	61.54	206	152	H	3584.25	-41.84	10.22355	1.99	-33.6065	-20	-13.6065
3584.25	61.6	131	220	V	3584.25	-41.78	10.22355	1.99	-33.5465	-20	-13.5465
4480.313	63.8	255	146	H	4480.313	-38.4	11.3561	2.3	-29.3439	-20	-9.3439
4480.313	64.25	237	140	V	4480.313	-37.95	11.3561	2.3	-28.8939	-20	-8.8939
5376.375	67.94	220	160	H	5376.375	-31.26	10.68712	2.84	-23.4129	-20	-3.41288
5376.375	69.63	346	155	V	5376.375	-29.57	10.68712	2.84	-21.7229	-20	-1.72288
6272.438	51.69	150	150	H	6272.438	-46.44	10.50933	3.32	-39.2507	-20	-19.2507
6272.438	57.45	161	100	V	6272.438	-40.68	10.50933	3.32	-33.4907	-20	-13.4907
7168.5	53.24	126	160	H	7168.5	-43.32	8.865565	3.73	-38.1844	-20	-18.1844
7168.5	57.22	145	102	V	7168.5	-39.34	8.865565	3.73	-34.2044	-20	-14.2044
8064.563	50.12	300	150	H	8064.563	-46.75	9.568558	4.21	-41.3914	-20	-21.3914
8064.563	50.39	190	100	V	8064.563	-46.48	9.568558	4.21	-41.1214	-20	-21.1214
8960.625	51.83	260	150	H	8960.625	-44.68	10.59665	4.89	-38.9734	-20	-18.9734
8960.625	52.52	146	100	V	8960.625	-43.99	10.59665	4.89	-38.2834	-20	-18.2834

CW, Middle channel tested (935.0625 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)		
300	62.85	51	186	H	300	-41	1.4	0.29	-39.89	-20	-19.89
300	57.77	287	148	V	300	-44.08	1.4	0.29	-42.97	-20	-22.97
1870.125	70.89	177	205	H	1870.125	-37.57	9.289902	1.21	-29.4901	-20	-9.4901
1870.125	71.93	135	150	V	1870.125	-36.53	9.289902	1.21	-28.4501	-20	-8.4501
2805.188	70.42	76	150	H	2805.188	-34.27	9.28058	1.57	-26.5594	-20	-6.55942
2805.188	71.77	176	150	V	2805.188	-32.91	9.28058	1.57	-25.1994	-20	-5.19942
3740.25	63.31	252	200	H	3740.25	-40.07	10.22355	1.99	-31.8365	-20	-11.8365
3740.25	64.71	37	170	V	3740.25	-38.67	10.22355	1.99	-30.4365	-20	-10.4365
4675.313	72.18	318	125	H	4675.313	-30.02	10.776	2.86	-22.104	-20	-2.107
4675.313	71.63	190	245	V	4675.313	-30.57	10.776	2.86	-22.654	-20	-2.654
5610.375	62.62	290	180	H	5610.375	-36.58	10.68712	2.84	-28.7329	-20	-8.73288
5610.375	60.76	46	145	V	5610.375	-38.44	10.68712	2.84	-30.5929	-20	-10.5929
6545.438	49.13	360	150	H	6545.438	-49.54	10.50933	3.32	-42.3507	-20	-22.3507
6545.438	50.76	165	110	V	6545.438	-47.91	10.50933	3.32	-40.7207	-20	-20.7207
7480.5	59.11	231	150	H	7480.5	-35.86	8.865565	3.73	-30.7244	-20	-10.7244
7480.5	62.89	5	105	V	7480.5	-32.08	8.865565	3.73	-26.9444	-20	-6.94444
8415.563	49.14	360	150	H	8415.563	-45.73	9.568558	4.21	-40.3714	-20	-20.3714
8415.563	49.5	360	150	V	8415.563	-45.37	9.568558	4.21	-40.0114	-20	-20.0114
9350.625	49.99	360	150	H	9350.625	-49.02	10.59665	4.89	-43.3134	-20	-23.3134
9350.625	50.52	360	150	V	9350.625	-48.49	10.59665	4.89	-42.7834	-20	-22.7834

8 FCC §2.1051 & §90.210 - Spurious Emissions at Antenna Terminals

8.1 Applicable Standards

According to FCC §90.210

TABLE 1 TO §90.210—APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25[1]	A or B	A or C
25-50	B	C
72-76	B	C
150-174[2]	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512[2 5]	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925[4]		
All other bands	B	C

(j) *Emission Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: At least 53 log (f_d/2.5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: At least 103 log (f_d/3.9) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: At least 157 log (f_d/5.3) dB, or 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

8.2 Test Procedure

Conducted spurious emissions:

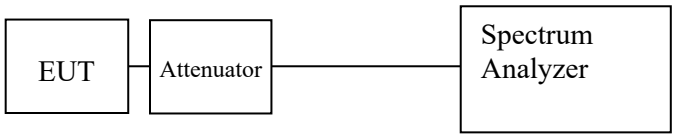
The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for measurements up to 1GHz and set to 1 MHz for measurements up to the 10th harmonic.

Band-edge emissions:

According to ANSI C63.26-2015 section 5.7 Unwanted (out-of-band and spurious) conducted emissions measurement procedures (conducted test at antenna port):

A RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW).

8.3 Test Setup Diagram



8.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
655	Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2022-02-07	24 months
912	Rohde & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2022-04-26	12 months
-	-	RF Cable	-	-	Each time[1]	N/A
-	-	30dB Attenuator	-	-	Each time[1]	N/A

Note[1]: Equipment was calibrated for each test.
***Statement of Traceability: BACL Corp.** attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

8.5 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Christian McCaig from 2022-02-09 to 2023-01-11 in the RF Site.

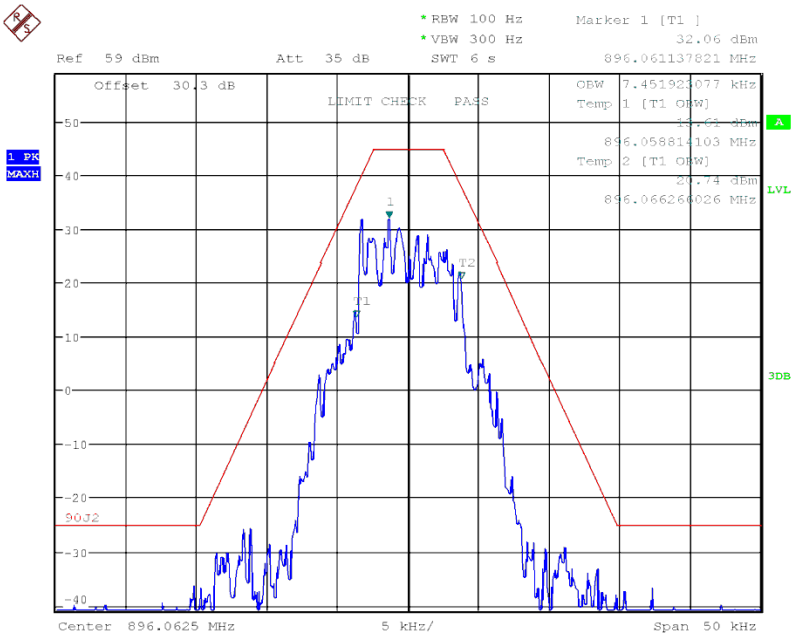
8.6 Test Results

Please refer to the following plots.

Emission Mask J:

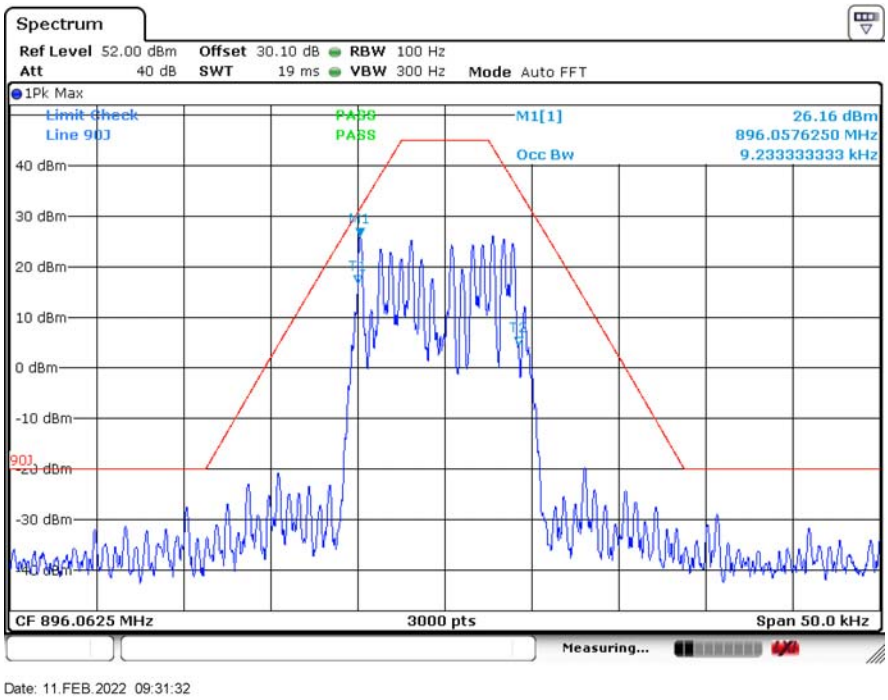
2FSK

896.0625 MHz



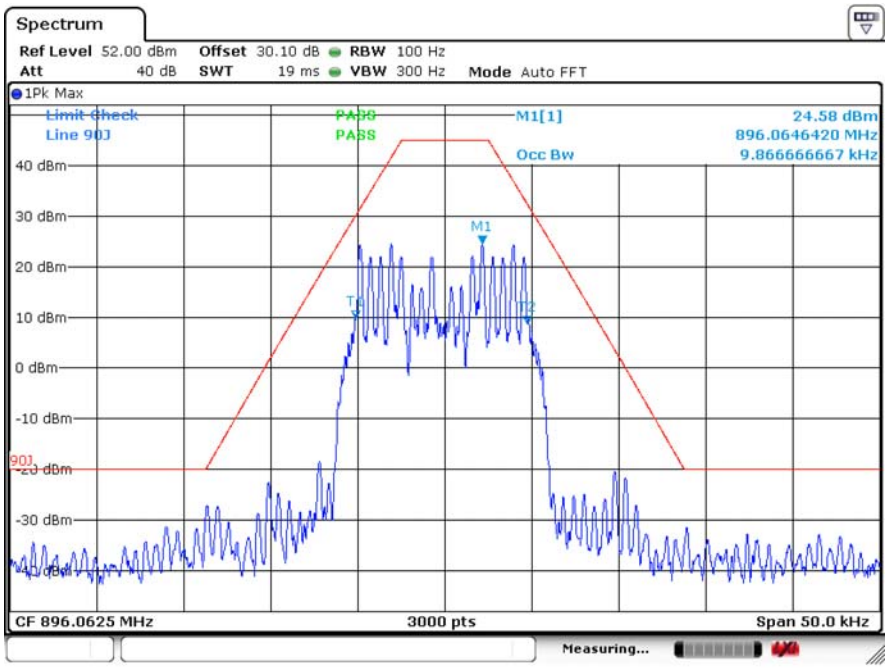
QPSK

896.0625 MHz



16QAM

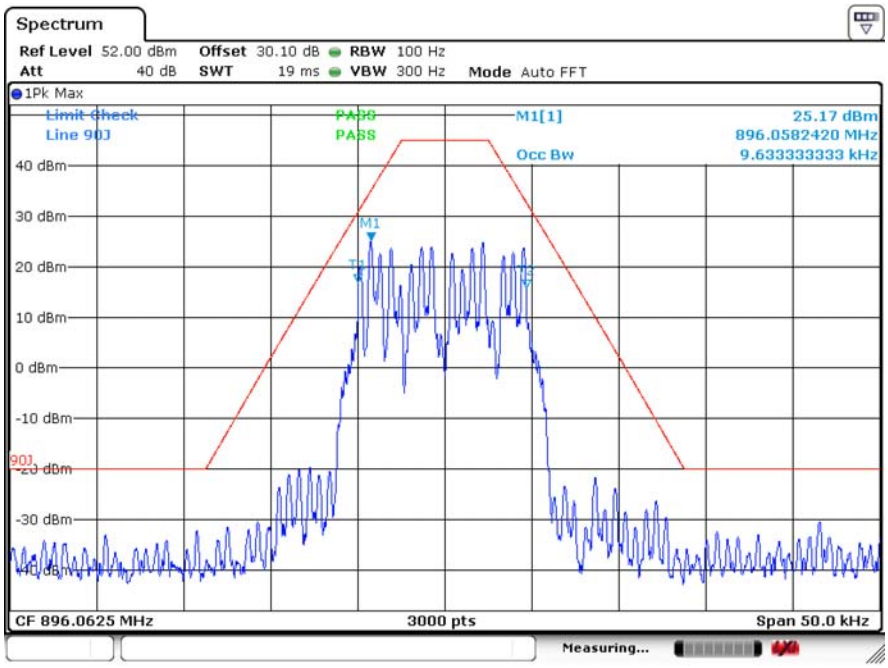
896.0625 MHz



Date: 11.FEB.2022 09:33:27

64QAM

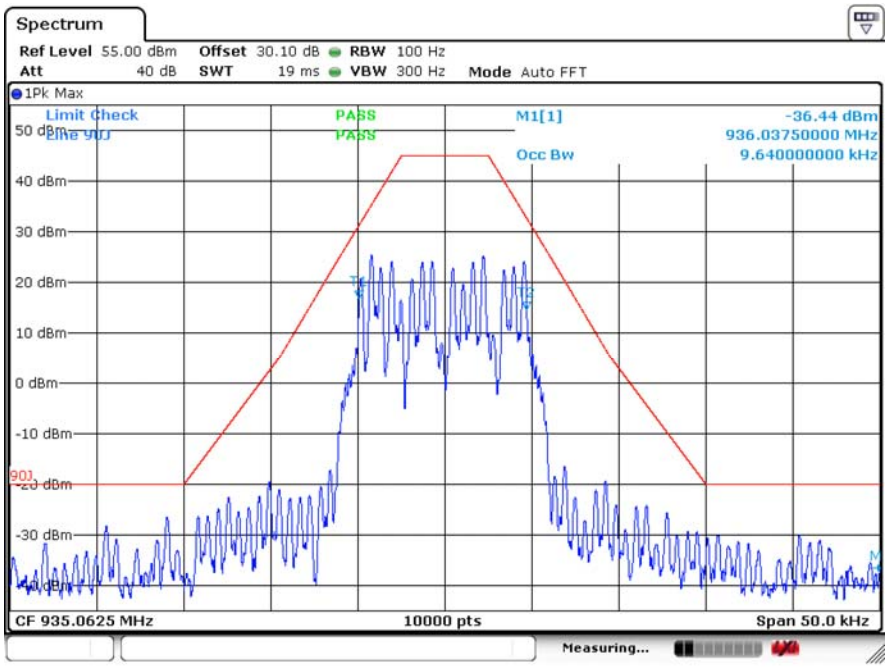
896.0625 MHz



Date: 11.FEB.2022 09:36:24

QPSK

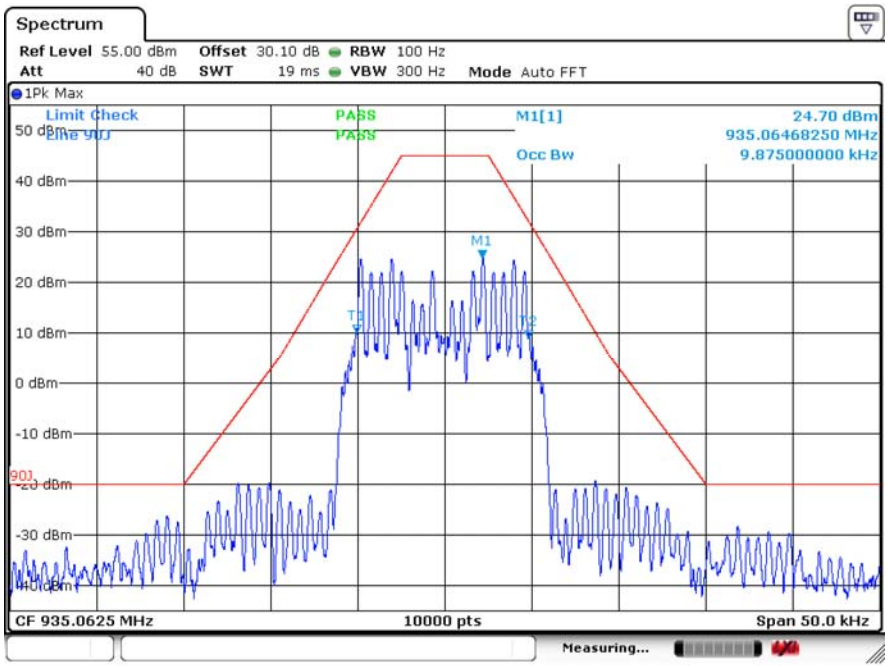
935.0625 MHz



Date: 23.FEB.2022 10:26:10

16QAM

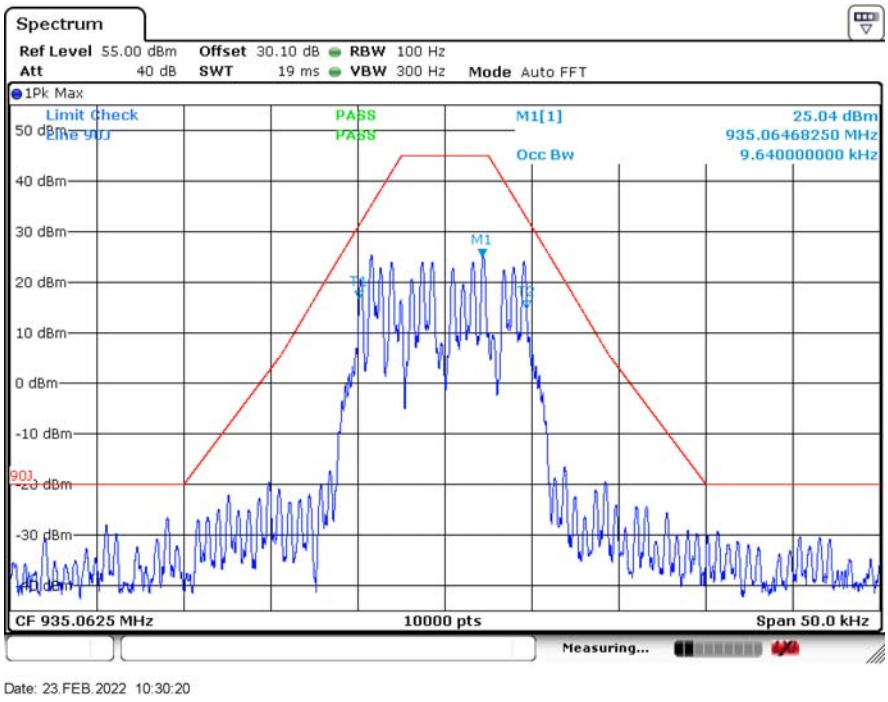
935.0625 MHz



Date: 23.FEB.2022 10:28:19

64QAM

935.0625 MHz



Note: Spurious Emissions outside Emission Mask were evaluated in the radiated spurious emissions section.

9 FCC §2.1055 & §90.213 - Frequency Tolerance

9.1 Applicable Standard

According to FCC Part 90.213,

§90.213 Frequency stability.

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

TABLE 1 TO §90.213(a)—MINIMUM FREQUENCY STABILITY

[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1 2 3]100	100	200
25-50	20	20	50
72-76	5		50
150-174	[5 11]5	[6]5	[4 6]50
216-220	1.0		1.0
220-222[12]	0.1	1.5	1.5
421-512	[7 11 14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928[13]	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	[9]300	300	300
Above 2450[10]			

9.2 Test Procedure

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and + 30° centigrade with no primary power applied.

(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.

(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.

(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

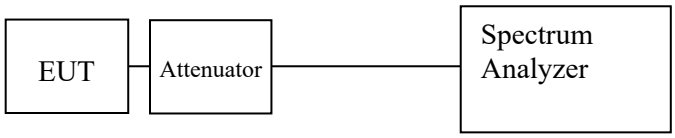
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

9.3 Test Setup Diagram



9.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
655	Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2022-02-07	24 months
912	Rohde & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2022-04-26	12 months
-	-	RF Cable	-	-	Each time[1]	N/A
-	-	30dB Attenuator	-	-	Each time[1]	N/A

Note[1]: Equipment was calibrated for each test.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

9.5 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	32 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Arturo Reyes from 2022-10-20 to 2022-10-21 in the RF Site.

9.6 Test Results

Note: Testing done using CW mode.

896.0625 MHz:

Temperature (°C)/ Voltage Conditions	Reference Frequency (MHz)	Tested Frequency (MHz)	Frequency Deviation (ppm)	Limit (ppm)	Result
-30/normal voltage (24V)	896.0625	896.062459936	-0.044711	±1.5	pass
-20/normal voltage (24V)	896.0625	896.062459936	-0.044711	±1.5	pass
-10/normal voltage (24V)	896.0625	896.062459936	-0.044711	±1.5	pass
0/normal voltage (24V)	896.0625	896.062459936	-0.044711	±1.5	pass
10/normal voltage (24V)	896.0625	896.062467490	-0.036281	±1.5	pass
20/normal voltage (24V)	896.0625	896.062508013	0.008942	±1.5	pass
30/normal voltage (24V)	896.0625	896.062508013	0.008942	±1.5	pass
40/normal voltage (24V)	896.0625	896.062508013	0.008942	±1.5	pass
50/normal voltage (24V)	896.0625	896.062508013	0.008942	±1.5	pass
20/Low Voltage (20.4V)	896.0625	896.062508013	0.008942	±1.5	pass
20/High Voltage (27.6V)	896.0625	896.062508013	0.008942	±1.5	pass

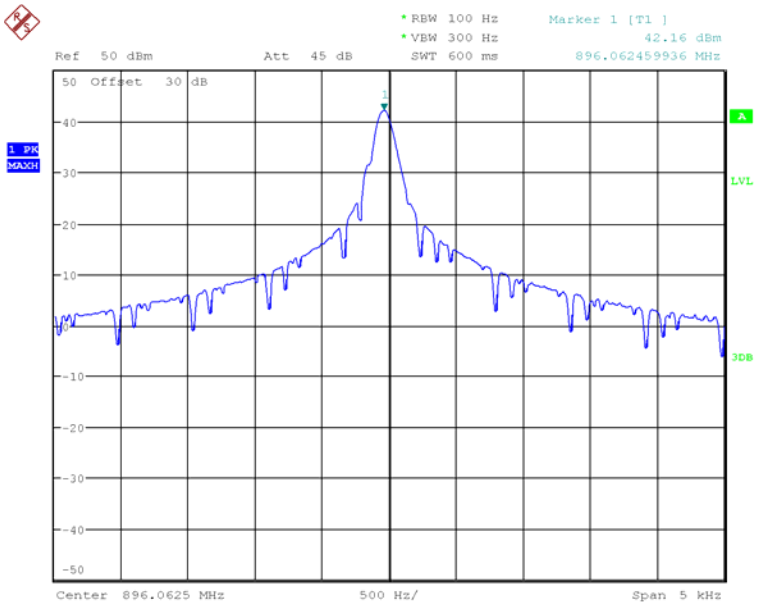
935.0625 MHz:

Temperature (°C)/ Voltage Conditions	Reference Frequency (MHz)	Tested Frequency (MHz)	Frequency Deviation (ppm)	Limit (ppm)	Result
-30/normal voltage (24V)	935.0625	935.062500000	0.000000	±0.1	pass
-20/normal voltage (24V)	935.0625	935.062491987	-0.008569	±0.1	pass
-10/normal voltage (24V)	935.0625	935.062508013	0.008569	±0.1	pass
0/normal voltage (24V)	935.0625	935.062524038	0.025707	±0.1	pass
10/normal voltage (24V)	935.0625	935.062532051	0.034277	±0.1	pass
20/normal voltage (24V)	935.0625	935.062540064	0.042846	±0.1	pass
30/normal voltage (24V)	935.0625	935.062540064	0.042846	±0.1	pass
40/normal voltage (24V)	935.0625	935.062548077	0.051416	±0.1	pass
50/normal voltage (24V)	935.0625	935.062500000	0.000000	±0.1	pass
20/Low Voltage (20.4V)	935.0625	935.062540064	0.042846	±0.1	pass
20/High Voltage (27.6V)	935.0625	935.062483974	-0.017139	±0.1	pass

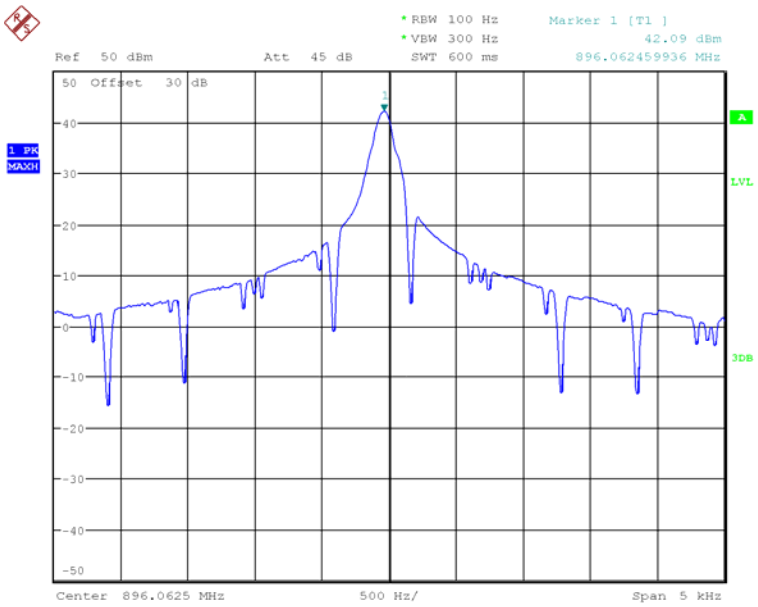
Please refer to the following plots for measurement results.

896.0625 MHz

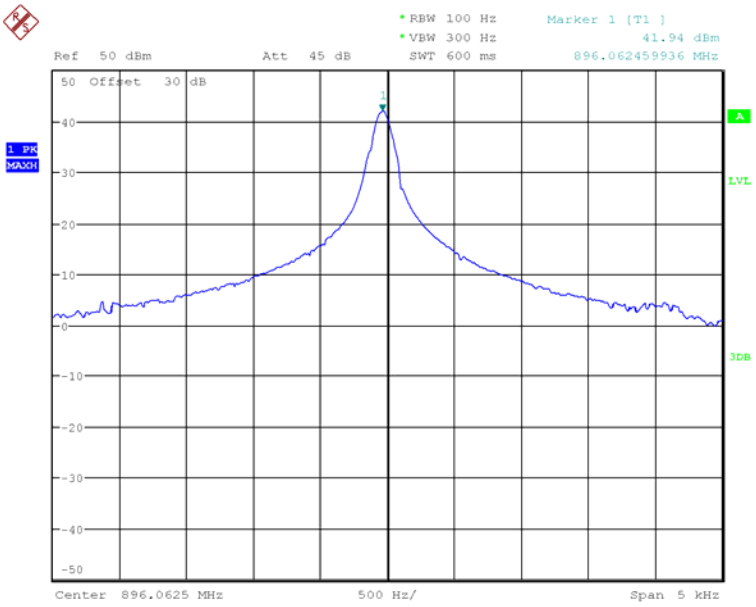
-30 °C



-20 °C



-10 °C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VBW 300 Hz
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Marker 1 [T1]
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896.062459936 MHz
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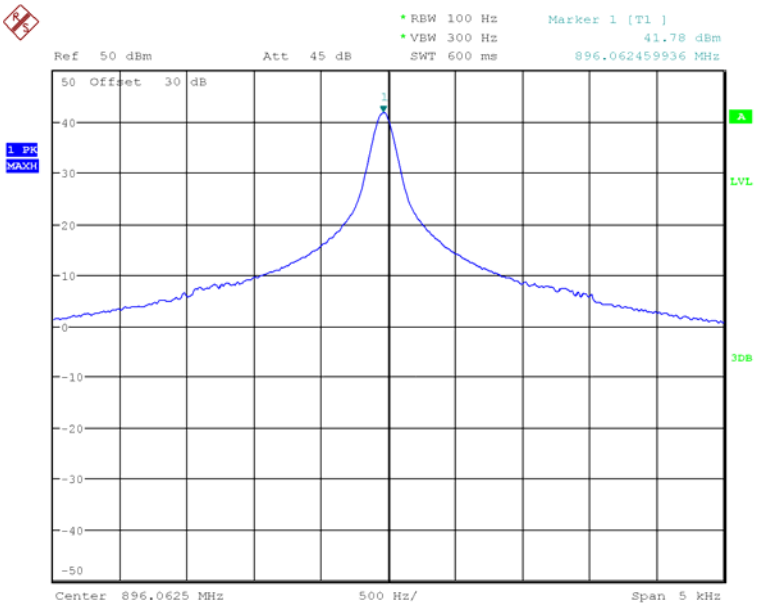
50 Offset 30 dB
1 PK
MAXH
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

0 °C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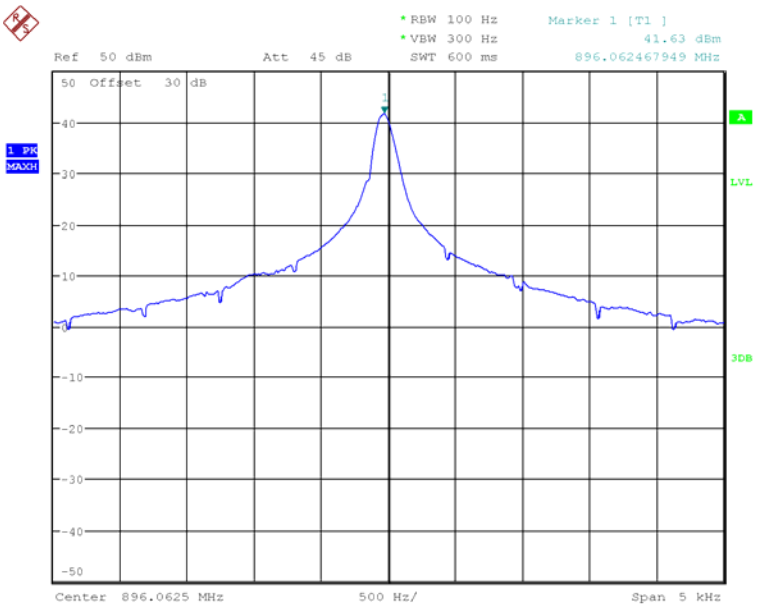
MAXH
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

10 °C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Att 45 dB
50 Offset 30 dB
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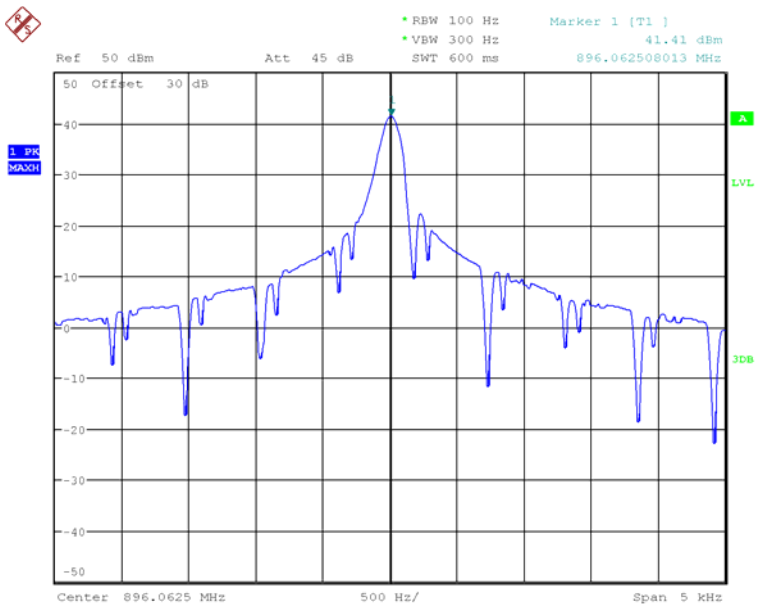
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

20 °C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896.062508013 MHz
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Att 45 dB
50 Offset 30 dB
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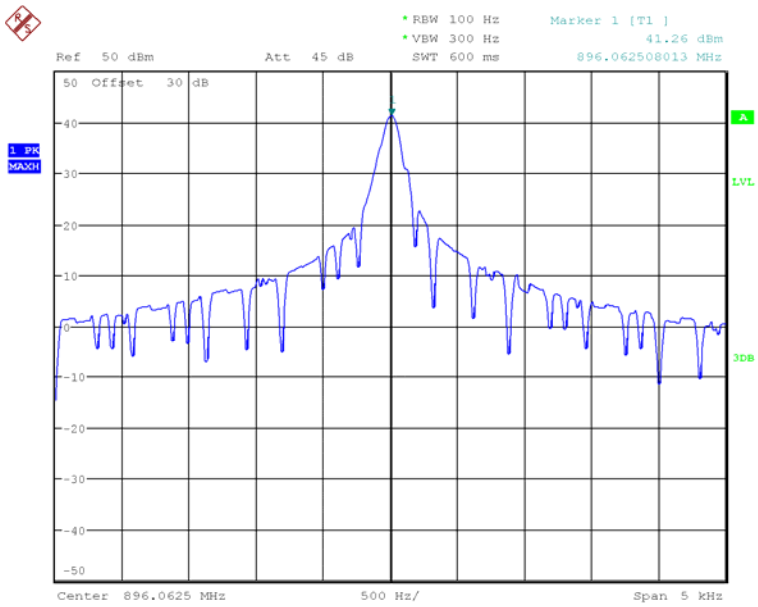
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

30 °C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Att 45 dB
50 Offset 30 dB
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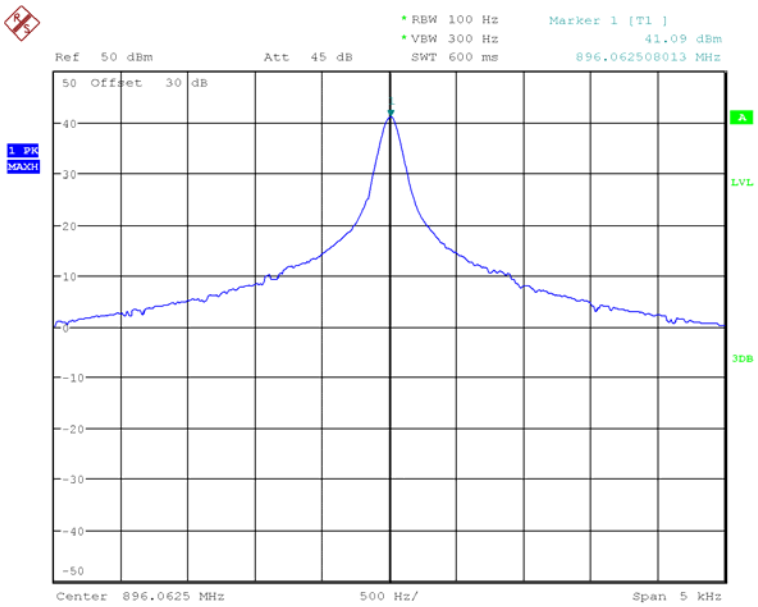
MAXH
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

40 °C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896.062508013 MHz
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50 Offset 30 dB
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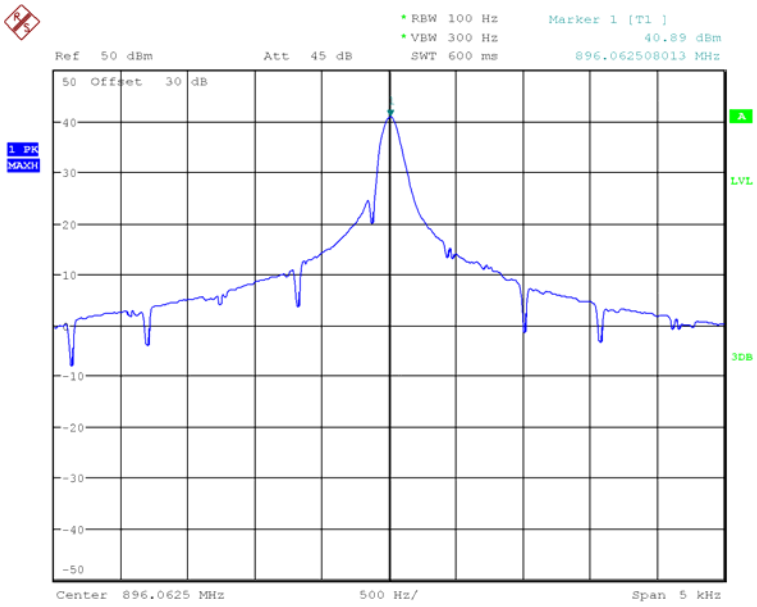
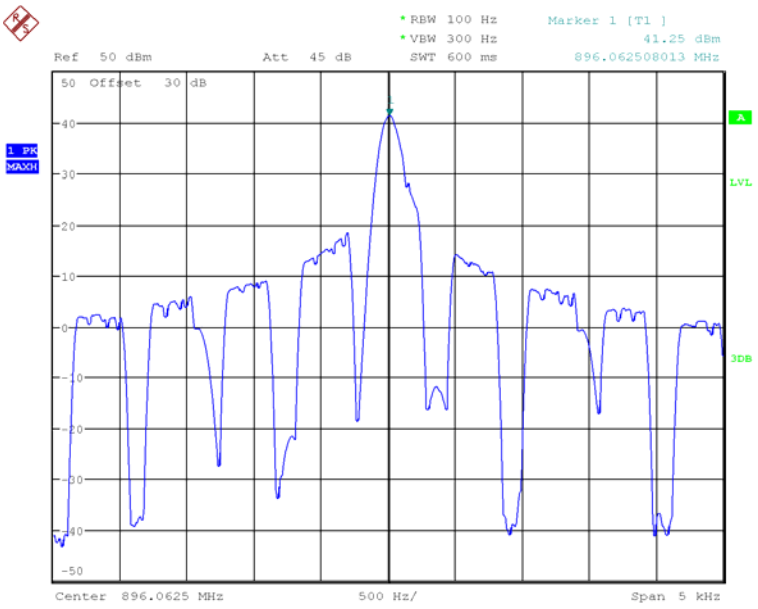
MAXH
A
LVL
3DB
Center 896.0625 MHz
500 Hz/
Span 5 kHz

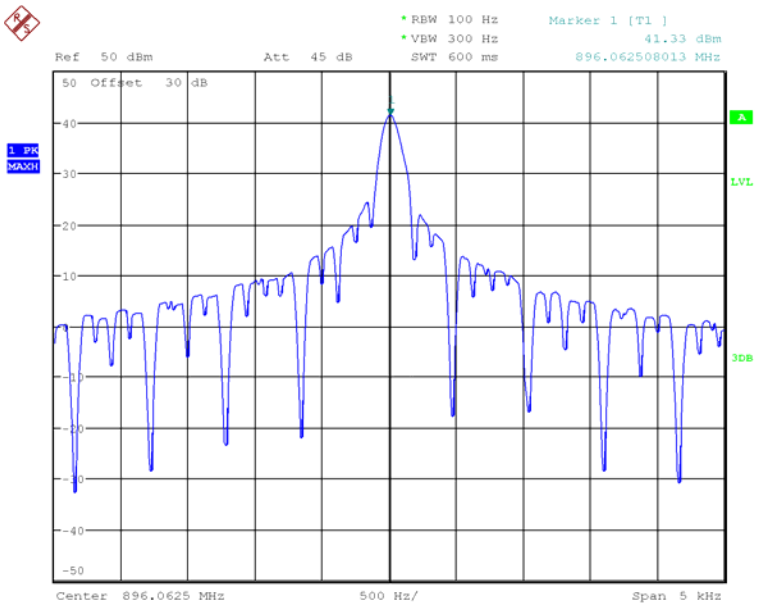
50 °C



Low Voltage (20.4 V)

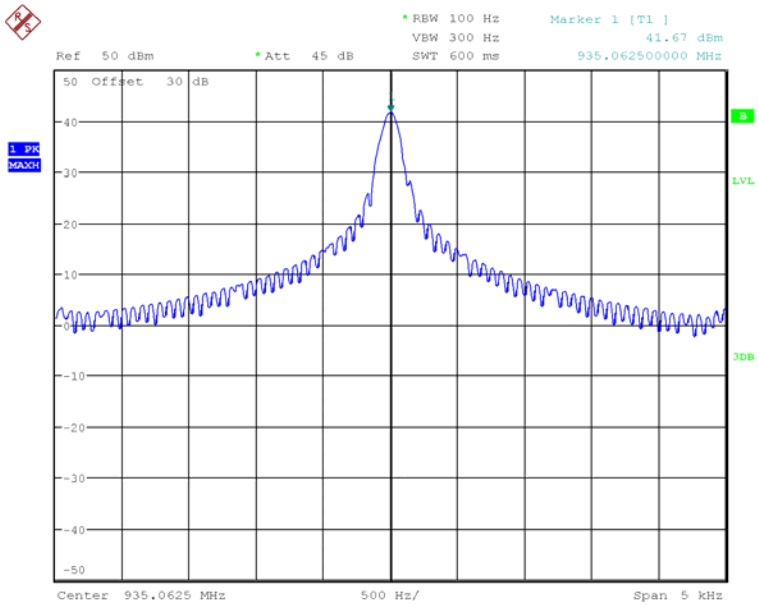


High Voltage (27.6 V)

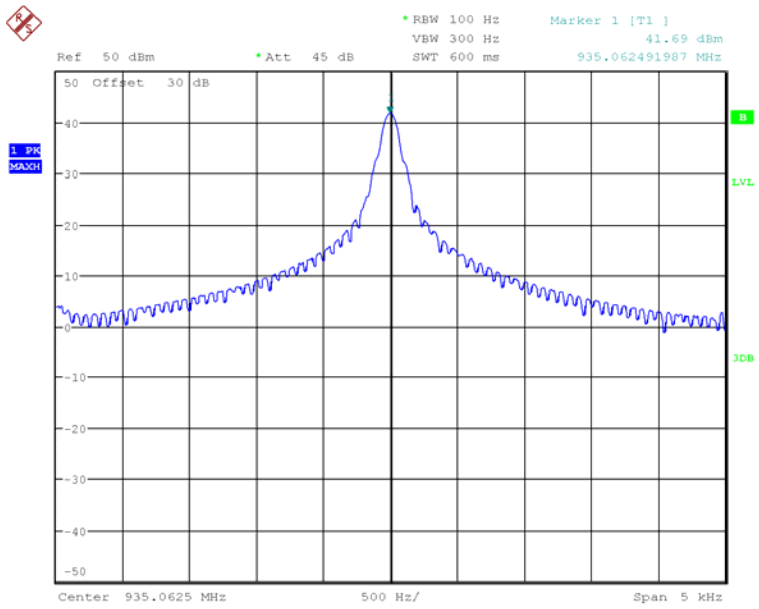


935.0625 MHz

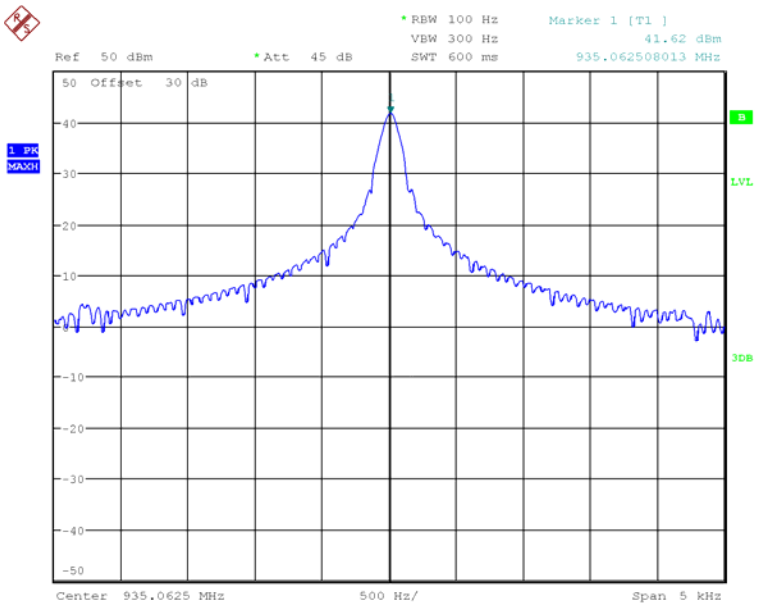
-30 °C



-20 °C



-10 °C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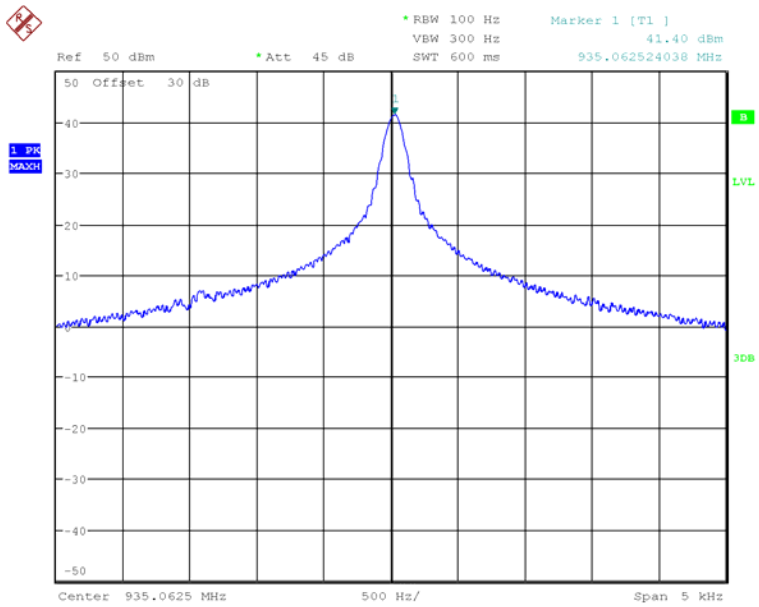
935.062508013 MHz
Ref 50 dBm
Att 45 dB
50 Offset 30 dB
1 PK
MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

0 °C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935.062524038 MHz
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50 Offset 30 dB
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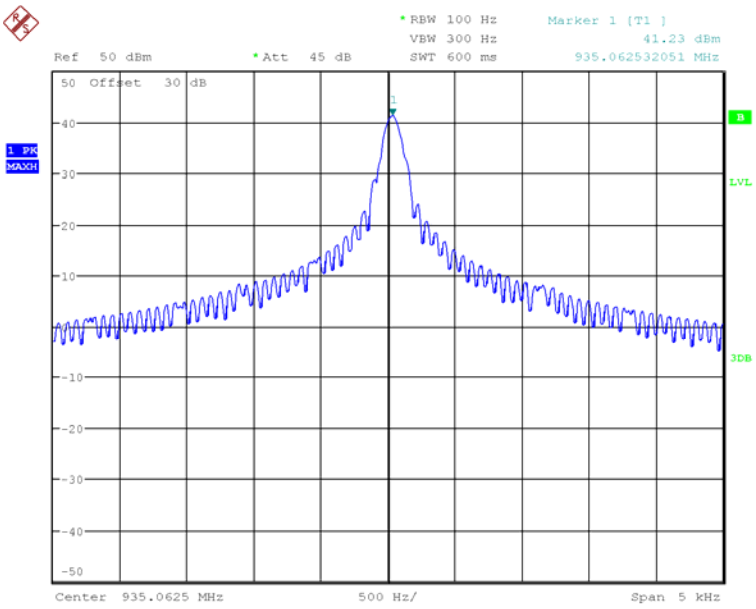
MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

10 °C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VBW 300 Hz
SWT 600 ms
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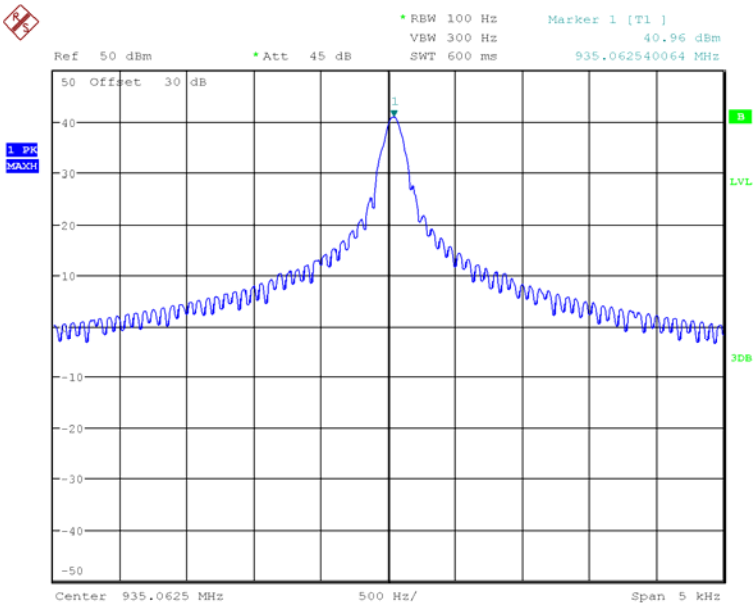
935.062532051 MHz
Ref 50 dBm
Att 45 dB
50 Offset 30 dB
1 PK MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

20 °C


RBW 100 Hz
VBW 300 Hz
SWT 600 ms
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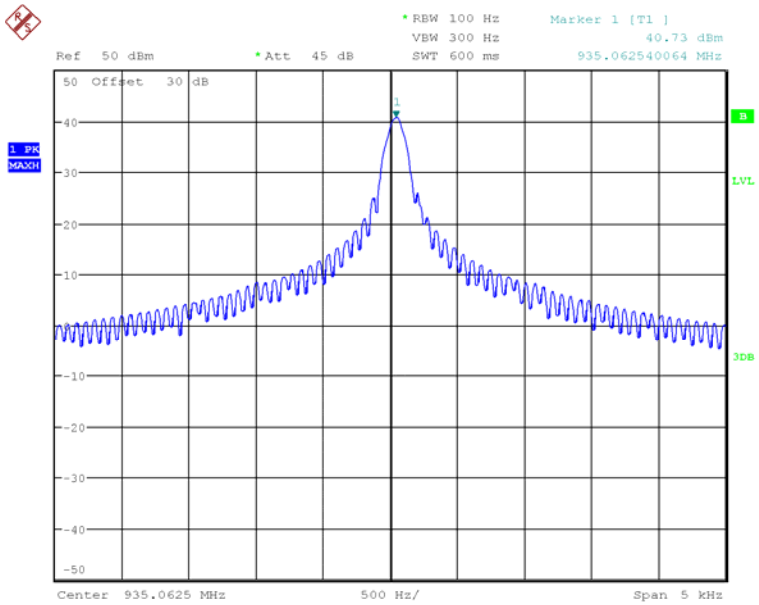
40.96 dBm
935.062540064 MHz
Ref 50 dBm
Att 45 dB
50 Offset 30 dB
1 PK MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

30 °C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VBW 300 Hz
SWT 600 ms
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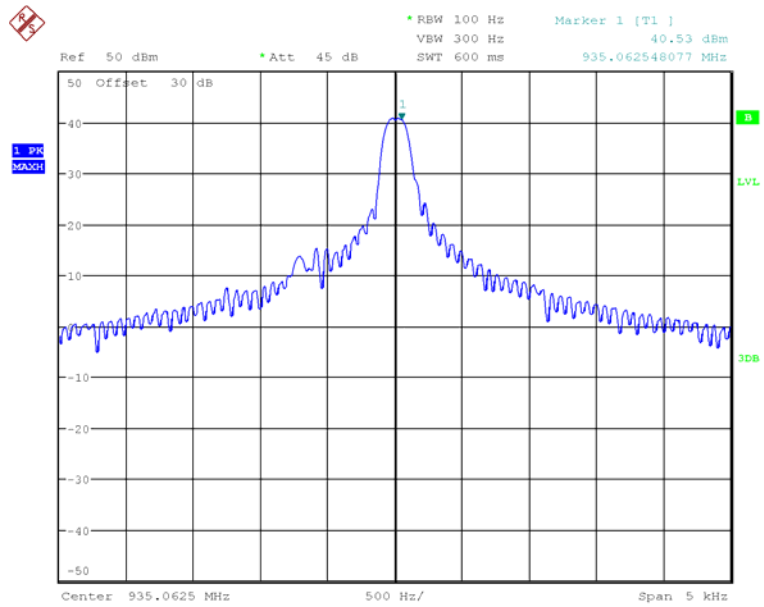
935.062540064 MHz
Ref 50 dBm
Att 45 dB
50 Offset 30 dB
1 PK
MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

40 °C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935.062548077 MHz
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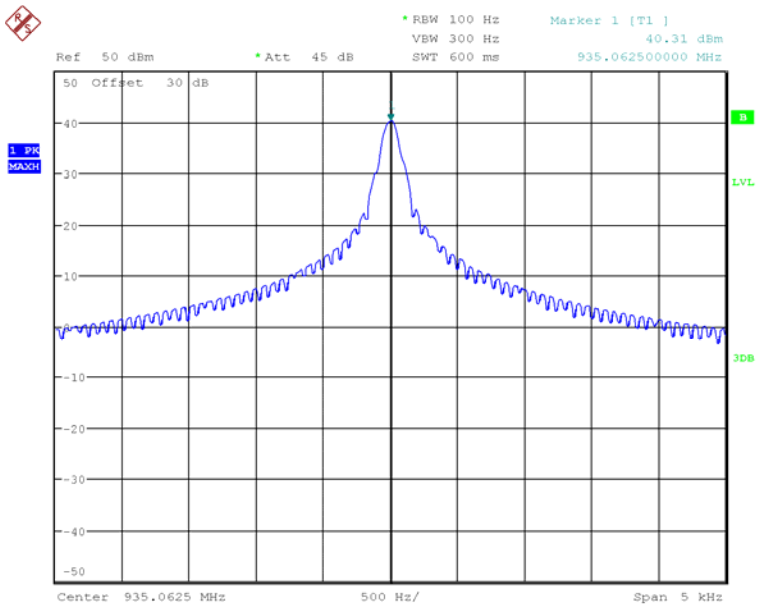
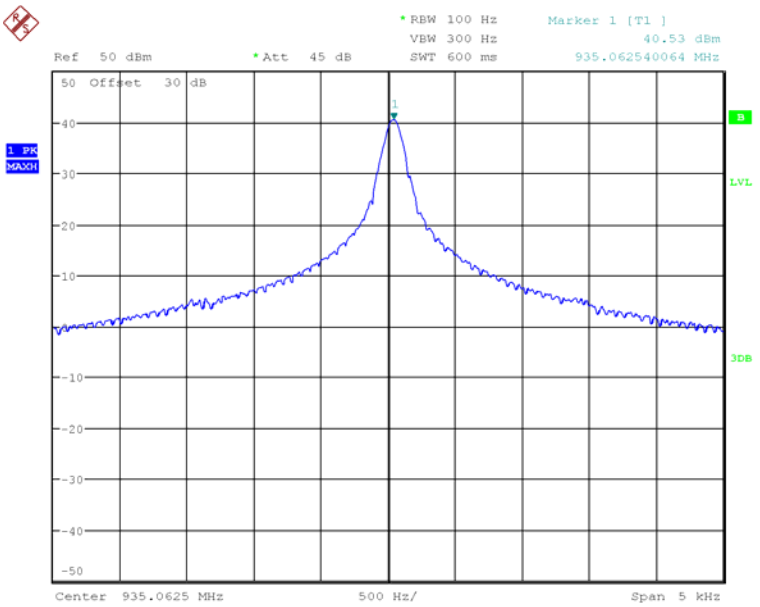
MAXH
B
LVL
3DB
Center 935.0625 MHz
500 Hz/
Span 5 kHz

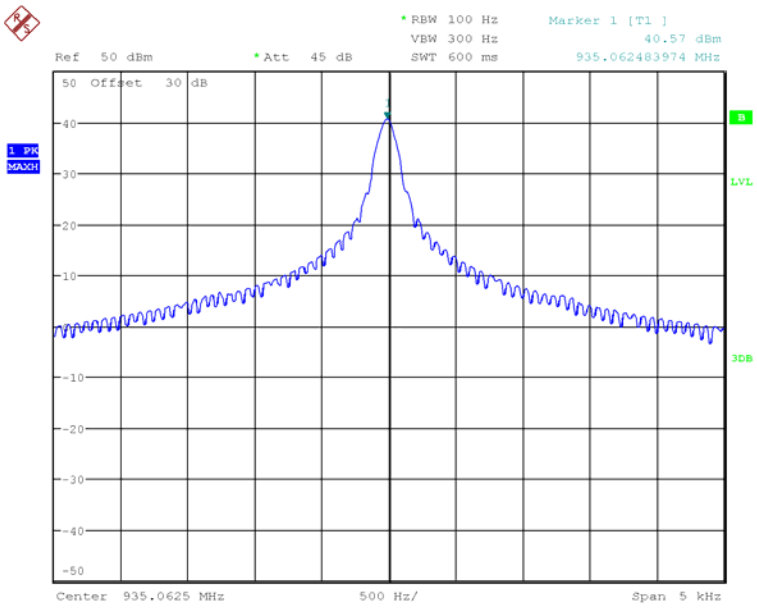
50 °C



Low Voltage (20.4 V)



High Voltage (27.6 V)



10 Annex A (Normative) - EUT Setup Photographs

Please refer to the attachment

11 Annex B (Normative) - EUT External Photographs

Please refer to the attachment

12 Annex C (Normative) - EUT Internal Photographs

Please refer to the attachment

13 Annex D (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

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 laboratory also meets A2LA R222 - *Specific Requirements EPA ENERGY STAR Accreditation Program*. 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 10th day of March 2021.

Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to November 30, 2022
Revised September 16, 2022

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

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---