Nemko Korea Co., Ltd.

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FCC & IC EVALUATION REPORT FOR CERTIFICATION

Project No. : NK-24-R-082
Applicant : Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea, Republic of

Dates of receipt : February 20, 2024
Dates of Issue : May 22, 2024
Test Site :
Nemko Korea Co., Ltd.

FCC ID :	**A3LEPQQ503**
IC :	**649E-EPQQ503**
Applicant :	**Samsung Electronics Co., Ltd.**
Brand Name :	**SAMSUNG**
Model:	**EP-QQ503**
Additional Model(s):	**EP-QQ505, EP-QQ506, EP-QQ507, EP-QQ508, EP-QQ509, EP-QQ500, EP-QQ501, EP-QQ502**
EUT Type:	**Cradle**
Classification:	**FCC Part 15 Low Power Communication Device Transmitter**
Date of Test:	**April 19, 2024 ~ May 8, 2024**
Applied Standard:	**FCC 47 CFR Part 15.225** **RSS-Gen Issue 5, RSS-210 Issue 10**

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By : Jaehyong Lee
Test Engineer

Reviewed By : Hoonpyo Lee
Technical Manager

Revision History

Rev.	Issue Date	Revisions	Revised By
00	May 22, 2024	Initial issue	Jaehyong Lee

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1. INTRODUCTION

1.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**
The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

1.2 Accreditation and listing

Accreditation type		Accreditation number
FC	CAB Accreditation for DOC	Designation No. KR0026
KOLAS	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
Industry Canada	Canada IC Registered site	Site No. 29506
VCCI	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
IECEE CB SCHEME	EMC CBTL	TL124
KC	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications

EUT Type	Cradle
Model Name	EP-QQ503
Frequency of Operation	13.56 MHz
Modulation type	ASK
Number of Channels	1 CH
Antenna Specification	Internal type
EUT Rated Voltage	DC 3.88 V Power Supply: DC 5 V
Remarks	-

2.2 Operation During Test

During the test, the Galaxy ring was charged on the EUT to ensure continuous measurement of the RFID signal.

2.2.1 Additional Information Related to Testing

The cable and attenuator loss from 9 kHz to 1 GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

2.2.2 Worst-case Configuration and Mode

Radiated emission below 1GHz was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

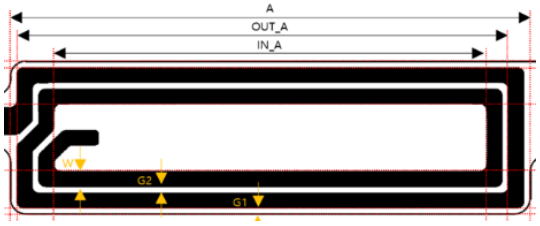
For transmitter radiated spurious domain emission testing, the EUT attached with AC Adapter for the worst case condition.

The fundamentals of the EUT were investigated in three orthogonal orientations X, Y, Z.
It was determined that X-axis orientation was the worst-case orientation.
The worst case scenario for radiated spurious measurements is based on the fundamental emission measurements investigation results.

2.2.3 Additional model covered by this report

- The variant models shell use materials and electric circuits that are the same as the basic model except for the difference as below table.
- The difference between basic and variant models:

Variant model name	Description
EP-QQ505	Ring mounting size: 5, Antenna length(A): 14.6
EP-QQ506	Ring mounting size: 6, Antenna length(A): 15.1
EP-QQ507	Ring mounting size: 7, Antenna length(A): 15.1
EP-QQ508	Ring mounting size: 8, Antenna length(A): 15.8
EP-QQ509	Ring mounting size: 9, Antenna length(A): 15.8
EP-QQ500	Ring mounting size: 10, Antenna length(A): 16.6
EP-QQ501	Ring mounting size: 11, Antenna length(A): 16.6
EP-QQ502	Ring mounting size: 12, Antenna length(A): 17.2



Antenna Length (A)

2.2.4 List of test reduction and EUT models covering other models

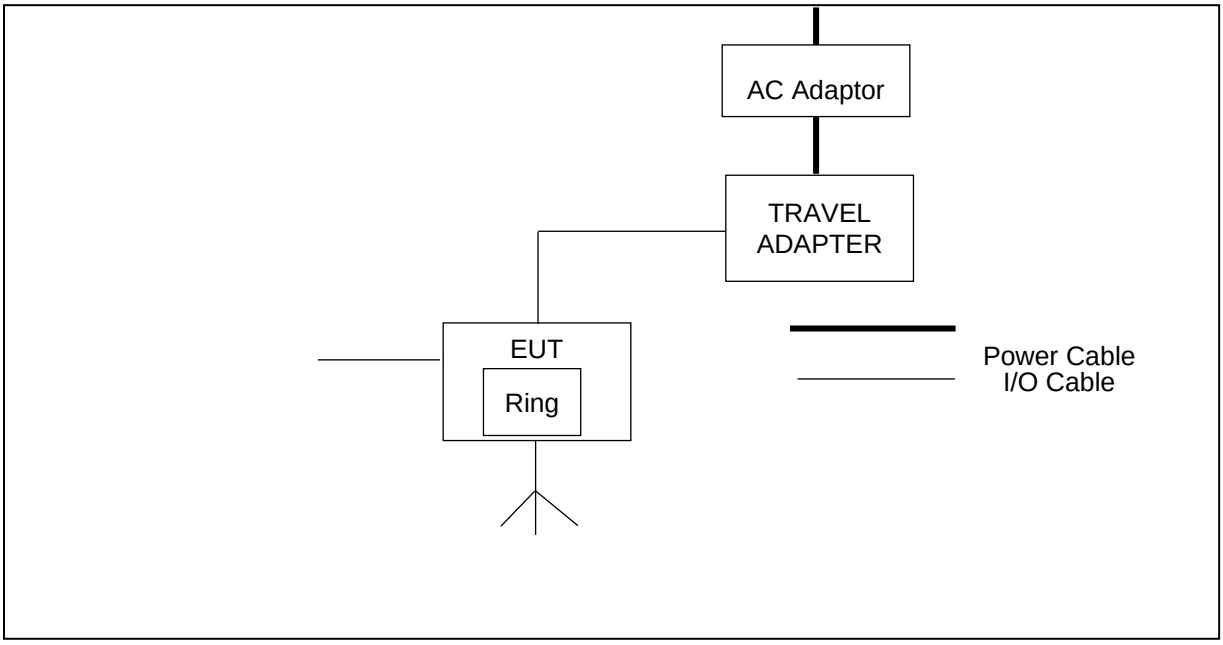
- Basic model and variant models were tested for each RFID antenna pattern size, and only representative models were tested for the same antenna size.
- The Fundamental emission on covered EUT's cradle models are equal to or less than one reference.

EUT Model	Galaxy Ring Model	Covered by
EP-QQ503 (Basic model)	SM-Q503	
EP-QQ505	SM-Q505	
EP-QQ506	SM-Q506	SM-Q507 & EP-QQ507
EP-QQ507	SM-Q507	
EP-QQ508	SM-Q508	SM-Q509 & EP-QQ509
EP-QQ509	SM-Q509	
EP-QQ500	SM-Q500	SM-Q501 & EP-QQ501
EP-QQ501	SM-Q501	
EP-QQ502	SM-Q502	SM-Q503 & EP-QQ503

2.3 Support Equipment

EUT	Samsung Electronics Co., Ltd. Model : SM-Q503	S/N: N/A Identical Proto-type
TRAVEL ADAPTER	Samsung Electronics Co., Ltd. Model : EP-TA800	FCC DOC S/N : N/A
Galaxy Ring	Samsung Electronics Co., Ltd. Model : SM-Q505, SM-Q507, SM-Q509, SM-Q501, SM-Q503	-

2.4 Setup Drawing



3. ANTENNA REQUIREMENTS

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15 and RSS-Gen.

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

RSS-Gen Section 6.8

: The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below)

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

The transmitter has permanently attached PCB embedded antenna (Internal antenna) on board.

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	IC Paragraph No.	Test Condition	Result	Remark
20dB Bandwidth	15.215(c) 2.1049	RSS-Gen (6.7)	Conducted	Complies	-
Occupied Bandwidth	-	RSS-Gen (6.7)		Complies	
Radiated Emission	15.225(b)(c)(d), 15.209	RSS-210 B.6 (a) RSS-Gen (8.9)	Radiated	Complies	-
Frequency Stability Tolerance	15.225(e)	RSS-210 B.6 (b)	Conducted	Complies	-
AC Line Conducted Emission	15.207	RSS-Gen (8.8)	Line Conducted	Complies	-

5. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 414788 D01 Radiated Test Site v01r01.
4. RSS-Gen Issue 5
5. RSS-210 Issue 10
6. ANSI C63.10-2013.

6. DESCRIPTION OF TESTS

6.1 20 dB Bandwidth / Occupied Bandwidth

Test Setup

Test Measurement Method

ANSI C63.10-2013, Section 6.9.2
RSS-Gen section 6.7

Limit

According to §15.215(c), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

According to §15.225, Operation within the band 13.110MHz – 14.010 MHz

According to RSS-Gen (6.7), The emission bandwidth (x dB) is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

Test Procedure

- 20 dB Bandwidth
EUTs 20 dB bandwidth is measured at channels with a spectrum analyzer
connected to the antenna terminal while the EUTs operating at its maximum power control level.
The spectrum analyzer setting is as follows.
RBW = 1-5% of emission BW
VBW > 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
Allow trace to fully stabilize.
The bandwidth measurement function on the spectrum analyzer is used to measure the 20 dB bandwidth.

- Occupied Bandwidth

EUTs occupied bandwidth is measured at channels with a spectrum analyzer
connected to the antenna terminal while the EUTs operating at its maximum power control level.
The spectrum analyzer setting is as follows.
RBW = 1-5% of emission BW
VBW > 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
Allow trace to fully stabilize.

The bandwidth measurement function on the spectrum analyzer is used to measure the Occupied bandwidth.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

6.2 Radiated Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.4, 6.5
KDB 558074 D01 v05r02, Section 8.6, Section 8.7

Limit

§15.225

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

RSS-210 B.6 (a)

i. 15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz

ii. 334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz

iii. 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz

iv. RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz

Test Procedure

The measurement was performed at the test site that is specified in accordance with ANSI C63.10-2013. The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna and 30 to 1000 MHz using Trilog broadband test antenna were used.
For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0˚ to 360˚ and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

Radiated Emissions Limits per 47 CFR 15.209(a) & RSS-Gen (8.9)

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Notes:

1. f < 30 MHz; extrapolation factor of 40 dB/decade of distance.
   Distance factor(dB) = 40log(Measurement distance in meters/Specification distance in meters)
   f ≥ 30 MHz; extrapolation factor of 20 dB/decade of distance.
   Distance factor(dB) = 20log(Measurement distance in meters/Specification distance in meters)
2. When below 30 MHz frequency range measurement, all orientations about parallel, perpendicular and ground-parallel were investigated then reported and the worse orientations of Horizontal and Vertical were set for final test. (Horizontal = Parallel, Vertical = Perpendicular)
3. Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
   Therefore, sufficient tests were mad to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field base on KDB 414788.

6.3 Frequency Stability

Test Setup

Test Measurement Method

ANSI C63.10-2013, Section 6.8

Limit

§15.225
The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

RSS-210 B.6 (b)
The carrier frequency stability shall not exceed ±100 ppm

6.4 AC Line Conducted Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.2

Limit

§15.207(a) & RSS-Gen (8.8)
for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Test Procedure

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6. A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room. Rohde & Schwarz (ENV216) of the 50 ohm/50 μH Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN. Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ”. If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1 meter length. Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time. The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCI). The detector functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data

exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

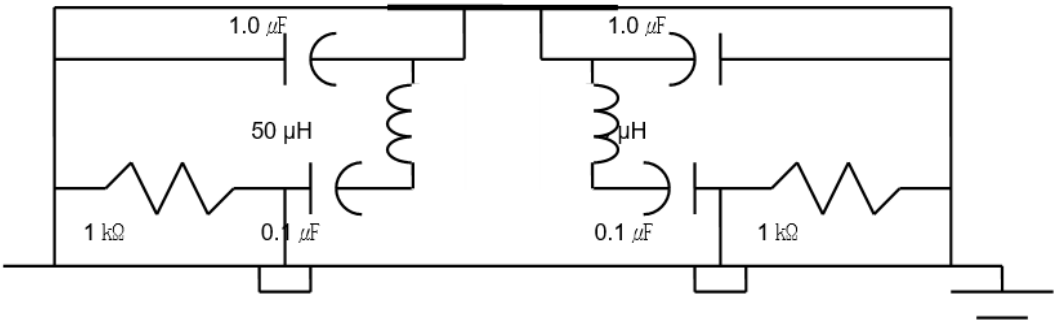


Fig. 2. LISN Schematic Diagram

7. TEST DATA

7.1 20 dB Bandwidth / Occupied Bandwidth

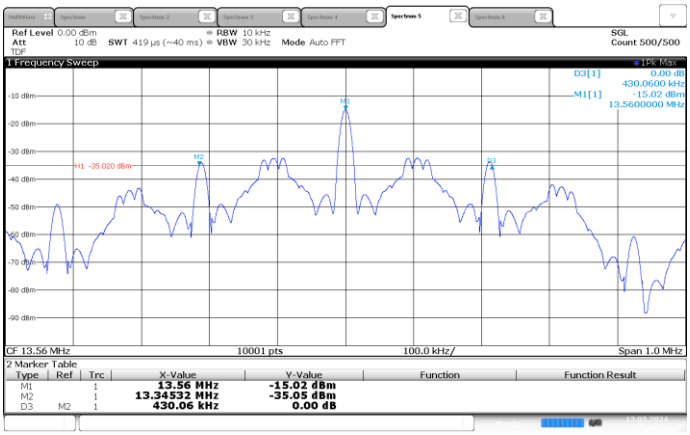
FCC §15.215(c)
RSS-Gen (6.7)

Result

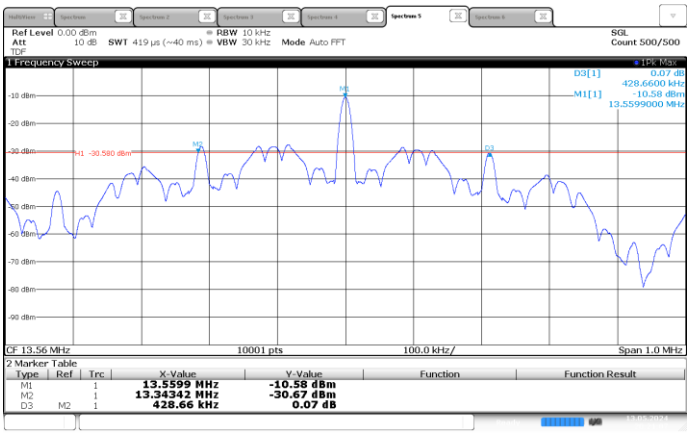
Model Name	Frequency (MHz)	20 dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
EP-QQ503	13.56	0.430	0.569
EP-QQ505	13.56	0.429	0.548
EP-QQ507	13.56	0.434	0.437
EP-QQ509	13.56	0.431	0.560
EP-QQ501	13.56	0.432	0.528

PLOTS OF EMISSIONS

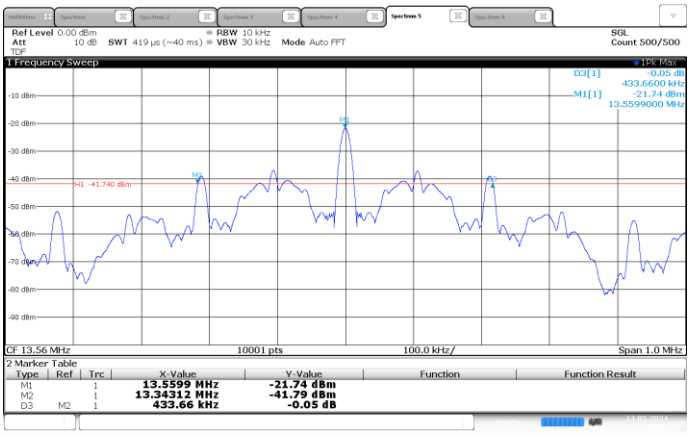
20 dB Bandwidth, EP-QQ503



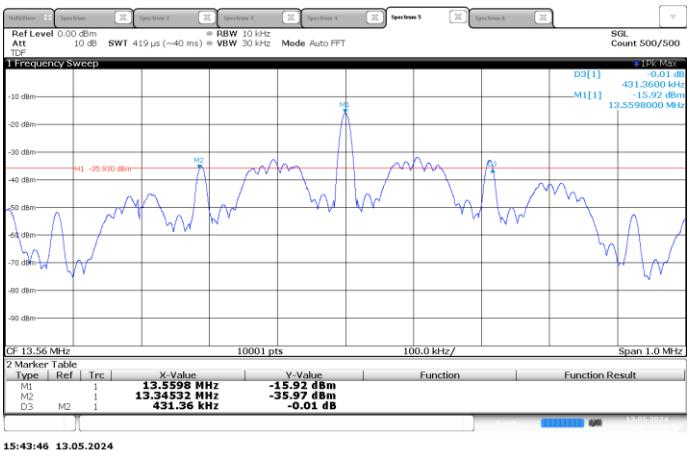
20 dB Bandwidth, EP-QQ505



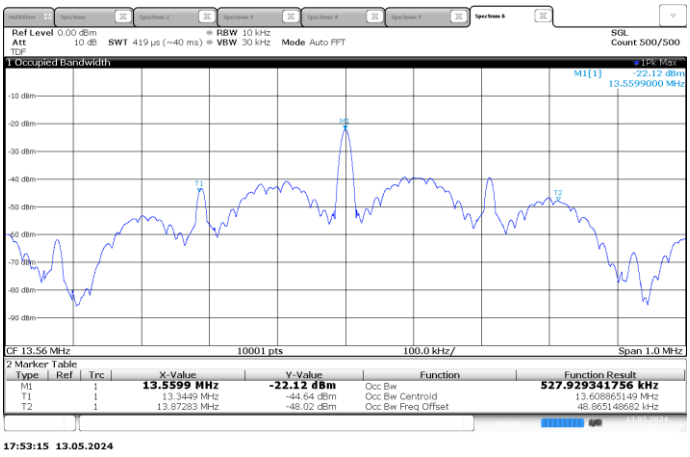
20 dB Bandwidth, EP-QQ507



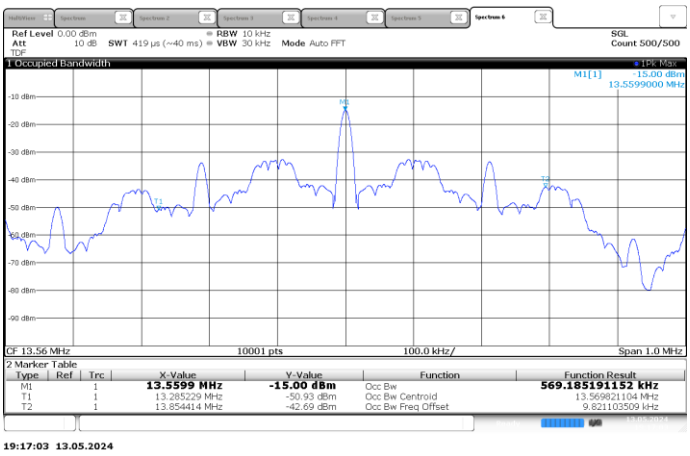
20 dB Bandwidth, EP-QQ509



20 dB Bandwidth, EP-QQ501



Occupied Bandwidth, EP-QQ503



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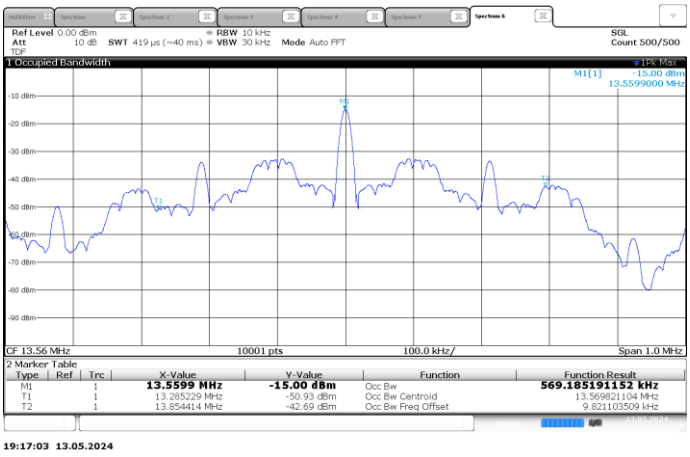
Occupied Bandwidth, EP-QQ505



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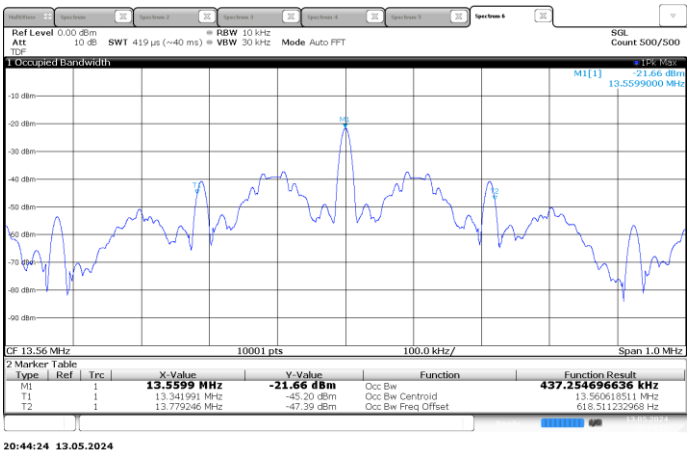
Occupied Bandwidth, EP-QQ507



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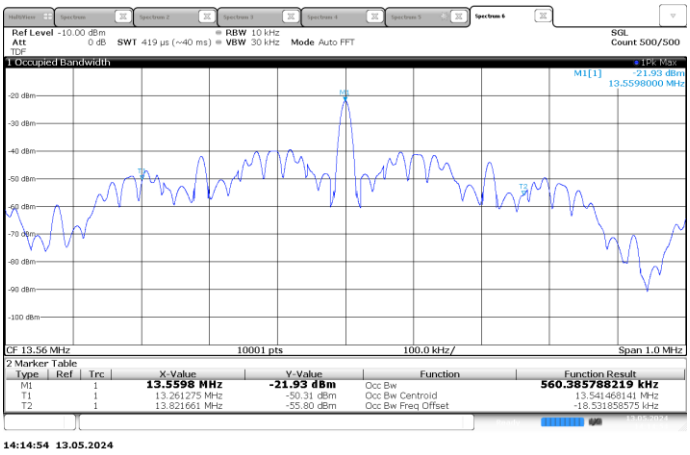
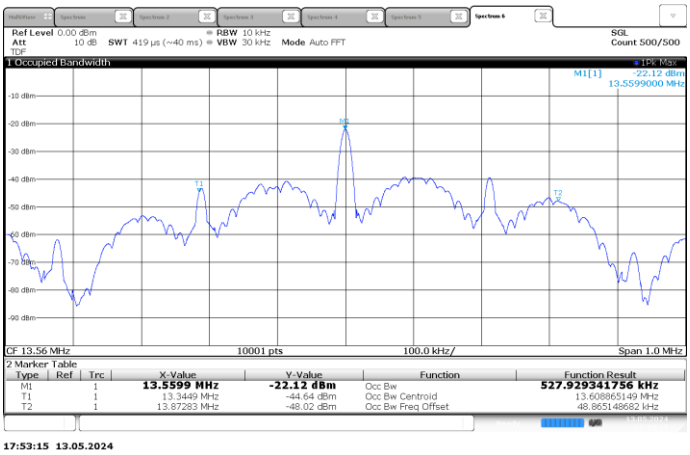
Occupied Bandwidth, EP-QQ509



Occupied Bandwidth, EP-QQ501



7.2 Radiated Emissions

FCC §15.225(b)(c)(d), §15.209
RSS-Gen (8.9), RSS-210 B.6 (a)

Result

Test Mode : Fundamental and spurious emission (13.110 MHz to 14.010 MHz)

EP-QQ503

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.924	0.76	V	QP	20.73	40.00	-18.51	29.54	48.05
13.316	0.96	V	QP	20.70	40.00	-18.34	40.51	58.85
13.460	0.69	V	QP	20.69	40.00	-18.62	50.47	69.09
13.560	11.70	V	QP	20.68	40.00	-7.62	84.00	91.62
13.560	13.80	H	QP	20.68	40.00	-5.52	84.00	89.52
13.704	0.71	V	QP	20.66	40.00	-18.63	50.47	69.10
13.908	0.55	H	QP	20.64	40.00	-18.81	40.51	59.32
14.680	0.72	H	QP	20.70	40.00	-18.58	29.54	48.12

EP-QQ505

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.924	0.80	V	QP	20.61	40.00	-18.59	29.54	48.13
13.312	0.60	V	QP	20.70	40.00	-18.70	40.51	59.21
13.440	0.92	H	QP	20.69	40.00	-18.39	50.47	68.86
13.560	12.87	H	QP	20.68	40.00	-6.45	84.00	90.45
13.560	10.27	V	QP	20.68	40.00	-9.05	84.00	93.05
13.656	0.85	H	QP	20.67	40.00	-18.48	50.47	68.95
13.888	0.57	V	QP	20.64	40.00	-18.79	40.51	59.30
14.280	0.56	V	QP	20.66	40.00	-18.78	29.54	48.32

Notes:
1. *Pol. : H = Horizontal, V = Vertical, Mode : QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier – Distance Factor
4. Other spurious was under 20 dB below Fundamental.

EP-QQ507

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.484	0.99	H	QP	20.68	40.00	-18.33	29.54	47.87
13.348	0.71	H	QP	20.70	40.00	-18.59	40.51	59.10
13.508	0.62	V	QP	20.68	40.00	-18.70	50.47	69.17
13.560	10.17	V	QP	20.68	40.00	-9.15	84.00	93.15
13.560	12.02	H	QP	20.68	40.00	-7.30	84.00	91.30
13.680	0.53	H	QP	20.67	40.00	-18.80	50.47	69.27
13.988	0.67	H	QP	20.63	40.00	-18.70	40.51	59.21
14.760	0.77	H	QP	20.71	40.00	-18.52	29.54	48.06

EP-QQ509

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.568	0.78	H	QP	20.69	40.00	-18.53	29.54	48.07
13.232	0.60	H	QP	20.71	40.00	-18.69	40.51	59.20
13.468	0.70	H	QP	20.69	40.00	-18.61	50.47	69.08
13.560	16.49	H	QP	20.68	40.00	-2.83	84.00	86.83
13.560	11.09	V	QP	20.68	40.00	-8.23	84.00	92.23
13.616	0.81	V	QP	20.67	40.00	-18.52	50.47	68.99
13.768	0.75	H	QP	20.66	40.00	-18.59	40.51	59.10
15.408	0.67	H	QP	20.79	40.00	-18.54	29.54	48.08

Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier – Distance Factor
4. Other spurious was under 20 dB below Fundamental.

EP-QQ501

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.168	0.77	V	QP	20.64	40.00	-18.59	29.54	48.13
13.236	1.07	V	QP	20.71	40.00	-18.22	40.51	58.73
13.488	0.56	H	QP	20.69	40.00	-18.75	50.47	69.22
13.560	13.09	H	QP	20.68	40.00	-6.23	84.00	90.23
13.560	12.09	V	QP	20.68	40.00	-7.23	84.00	91.23
13.644	0.54	H	QP	20.67	40.00	-18.79	50.47	69.26
13.888	0.70	H	QP	20.64	40.00	-18.66	40.51	59.17
14.916	0.47	V	QP	20.73	40.00	-18.80	29.54	48.34

Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier – Distance Factor
4. Other spurious was under 20 dB below Fundamental.

Test Mode : Spurious emission (9 kHz to 30 MHz)

EP-QQ503

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.375	1.91	H	QP	20.51	40.00	-17.58	24.84	42.42
1.634	1.56	V	QP	20.50	40.00	-17.94	23.34	41.28
26.910	0.52	V	QP	22.00	40.00	-17.48	29.54	47.02
29.956	0.59	H	QP	21.64	40.00	-17.77	29.54	47.31

EP-QQ505

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.537	1.58	V	QP	20.50	40.00	-17.92	23.87	41.79
5.062	1.00	H	QP	20.71	40.00	-18.29	29.54	47.83
23.516	0.72	H	QP	21.90	40.00	-17.38	29.54	46.92
27.603	0.78	V	QP	21.88	40.00	-17.34	29.54	46.88

EP-QQ507

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.265	2.14	V	QP	20.51	40.00	-17.35	25.56	42.91
1.686	1.13	H	QP	20.49	40.00	-18.38	23.07	41.45
24.772	1.02	V	QP	21.96	40.00	-17.02	29.54	46.56
24.947	0.65	H	QP	21.97	40.00	-17.38	29.54	46.92

Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier – Distance Factor
4. Other spurious was under 20 dB below Fundamental.

EP-QQ509

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.594	1.62	V	QP	20.50	40.00	-17.88	23.55	41.43
1.673	1.24	H	QP	20.49	40.00	-18.27	23.13	41.40
26.545	0.52	H	QP	22.03	40.00	-17.45	29.54	46.99
29.693	0.91	V	QP	21.70	40.00	-17.39	29.54	46.93

EP-QQ501

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.511	1.59	H	QP	20.50	40.00	-17.91	24.02	41.93
3.517	0.93	V	QP	20.65	40.00	-18.42	29.54	47.96
26.778	0.74	V	QP	22.01	40.00	-17.25	29.54	46.79
27.397	0.77	H	QP	21.92	40.00	-17.31	29.54	46.85

Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier – Distance Factor
4. Other spurious was under 20 dB below Fundamental.

Test Mode : Spurious emission (30 MHz to 1 000 MHz)

EP-QQ503

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.261	35.43	V	QP	-10.25	25.18	40.00	14.82
34.074	29.81	V	QP	-9.95	19.86	40.00	20.14
40.670	34.01	V	QP	-7.41	26.60	40.00	13.40
67.765	34.68	V	QP	-9.59	25.09	40.00	14.91
122.021	36.02	H	QP	-10.60	25.42	43.50	18.08
900.349	20.26	V	QP	2.02	22.28	46.00	23.72

EP-QQ505

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.520	28.05	V	QP	-10.32	17.73	40.00	22.27
47.945	20.75	V	QP	-6.18	14.57	40.00	25.43
50.338	20.69	V	QP	-6.27	14.42	40.00	25.58
98.450	23.64	H	QP	-8.29	15.35	43.50	28.15
847.645	20.38	H	QP	1.30	21.68	46.00	24.32
933.975	20.21	V	QP	2.32	22.53	46.00	23.47

EP-QQ507

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.649	29.41	V	QP	-10.39	19.02	40.00	20.98
34.074	23.51	V	QP	-9.95	13.56	40.00	26.44
44.453	20.76	V	QP	-6.55	14.21	40.00	25.79
48.980	20.74	H	QP	-6.24	14.50	40.00	25.50
98.353	27.28	V	QP	-8.31	18.97	43.50	24.53
966.309	20.05	V	QP	2.37	22.42	54.00	31.58

Notes:

1. The worst-case emission was reported.
2. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, QP = Qusi-Peak
3. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
4. Measurements using CISPR quasi-peak mode below 1 GHz.
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
6. The limit is on the FCC §15.209.

EP-QQ509

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.390	28.32	V	QP	-10.28	18.04	40.00	21.96
34.300	24.23	V	QP	-9.82	14.41	40.00	25.59
53.991	20.81	V	QP	-6.33	14.48	40.00	25.52
98.353	26.12	V	QP	-8.31	17.81	43.50	25.69
917.550	20.26	H	QP	2.50	22.76	46.00	23.24
931.971	20.30	H	QP	2.35	22.65	46.00	23.35

EP-QQ501

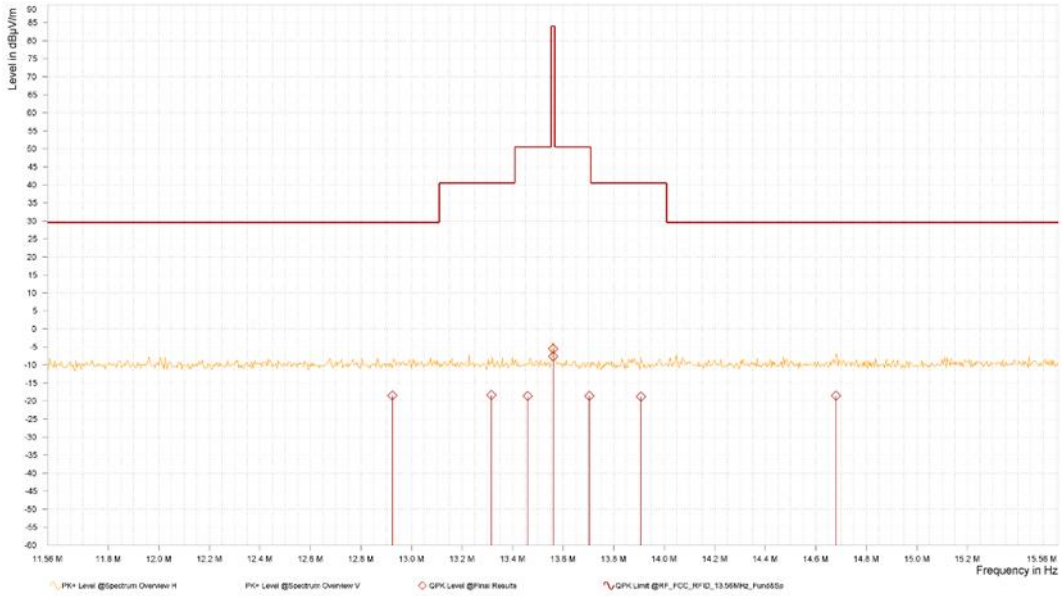
Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.905	34.84	V	QP	-10.19	24.65	40.00	15.35
40.670	33.55	V	QP	-7.41	26.14	40.00	13.86
67.798	23.06	V	QP	-9.62	13.44	40.00	26.56
121.988	31.12	V	QP	-10.60	20.52	43.50	22.98
865.396	20.52	V	QP	1.60	22.12	46.00	23.88
939.407	20.31	V	QP	2.37	22.68	46.00	23.32

Notes:
1. The worst-case emission was reported.
2. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, QP = Qusi-Peak
3. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
4. Measurements using CISPR quasi-peak mode below 1 GHz.
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
6. The limit is on the FCC §15.209.

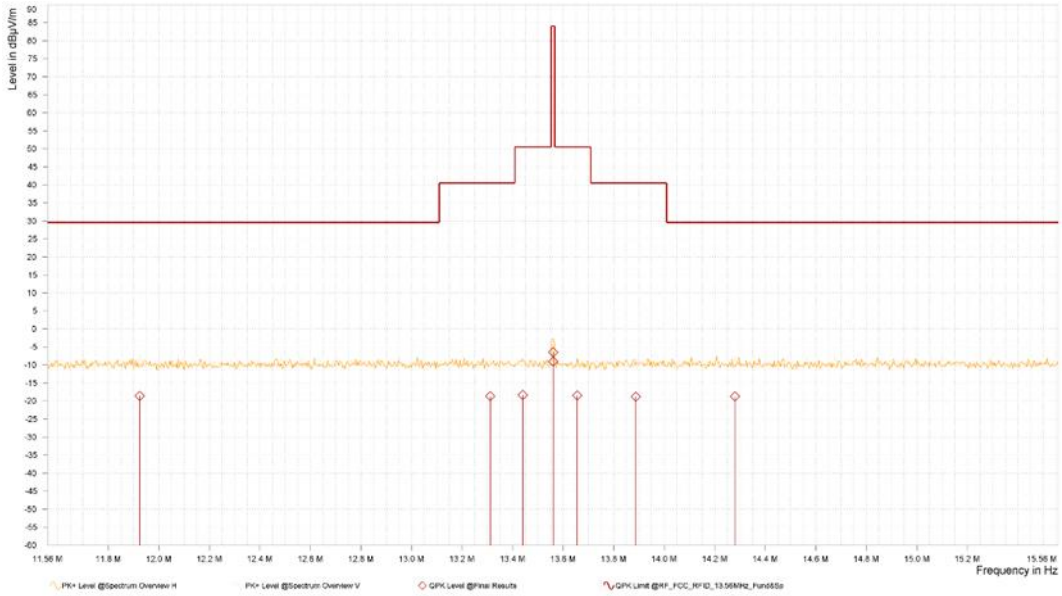
PLOTS OF EMISSIONS

Test Plot : Fundamental and spurious emission (13.110 MHz to 14.010 MHz)

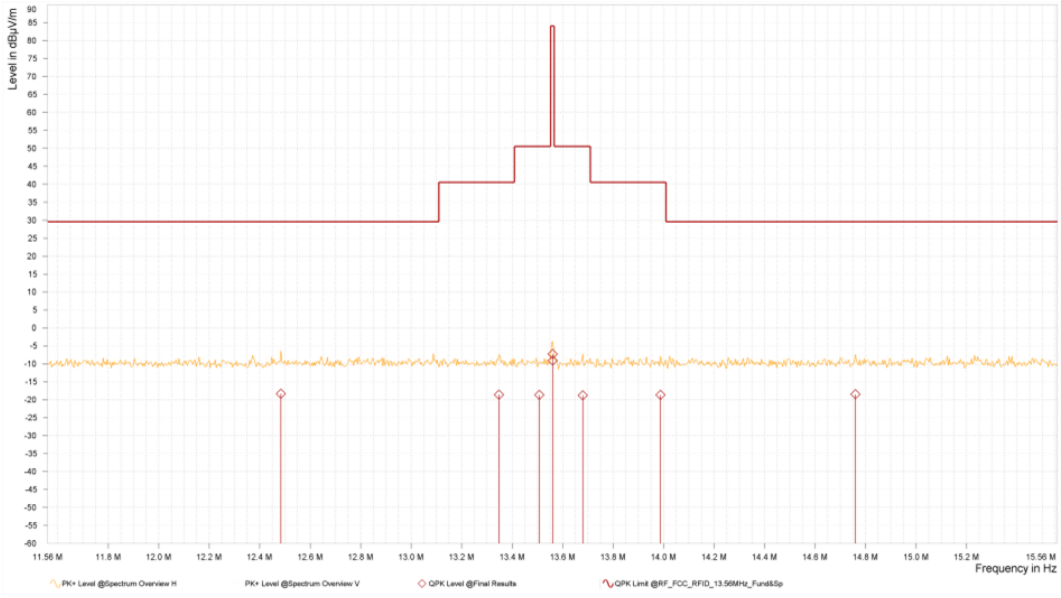
EP-QQ503



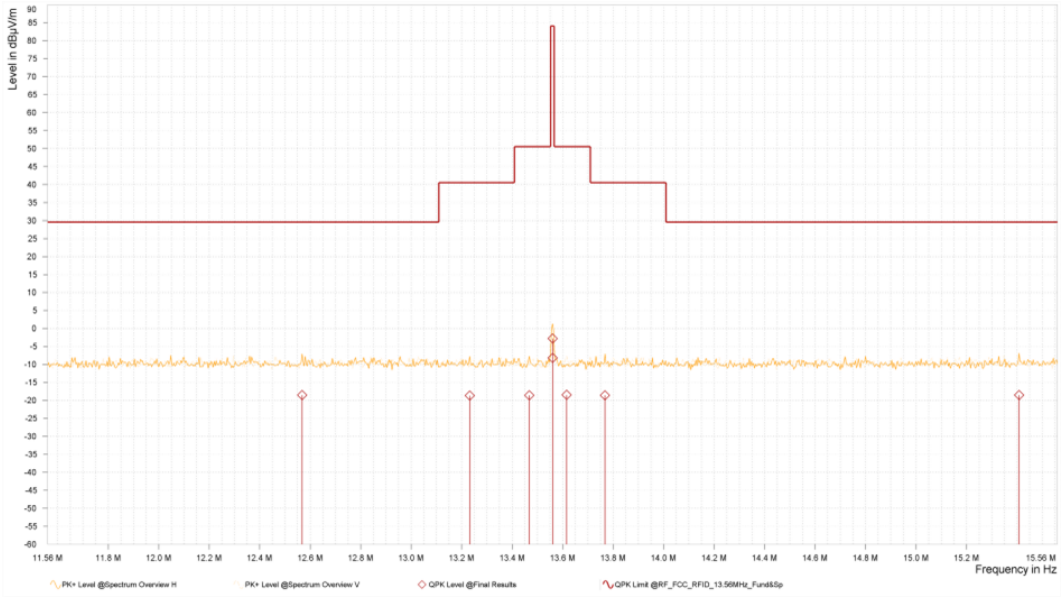
EP-QQ505



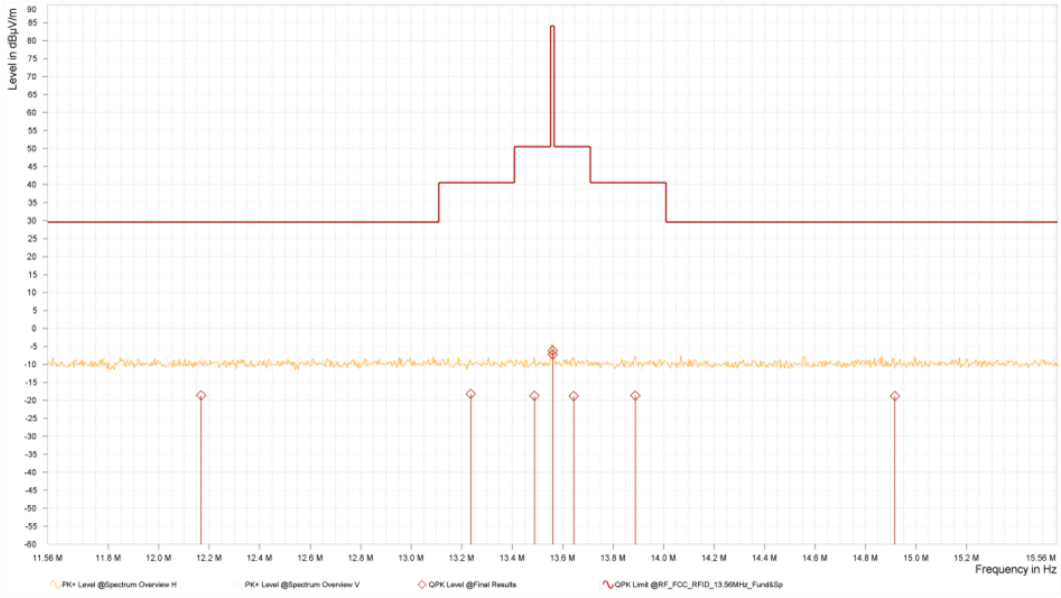
EP-QQ507



EP-QQ509



EP-QQ501


Level in dBµV/m
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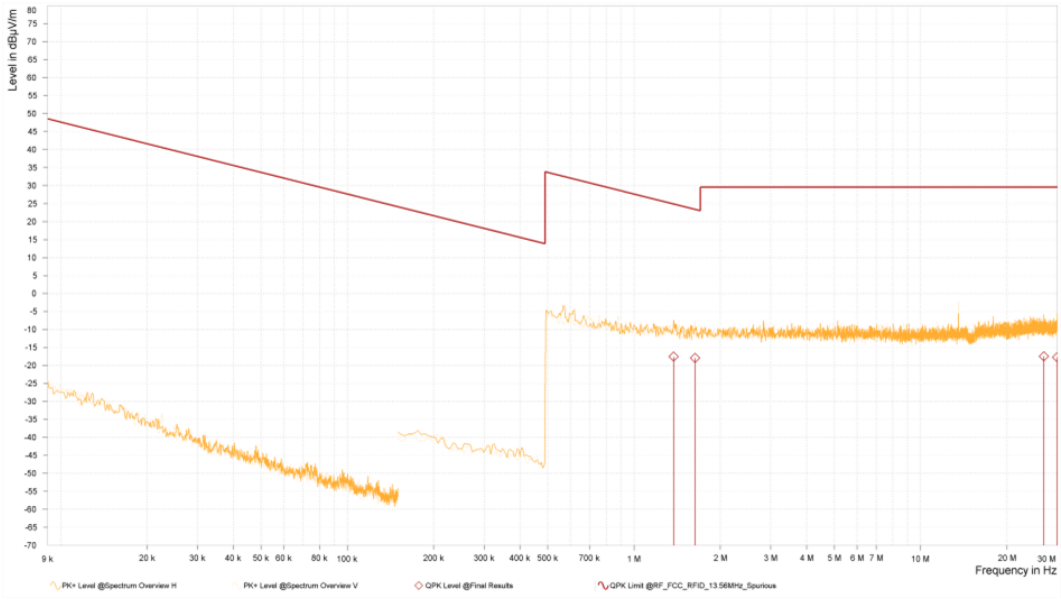
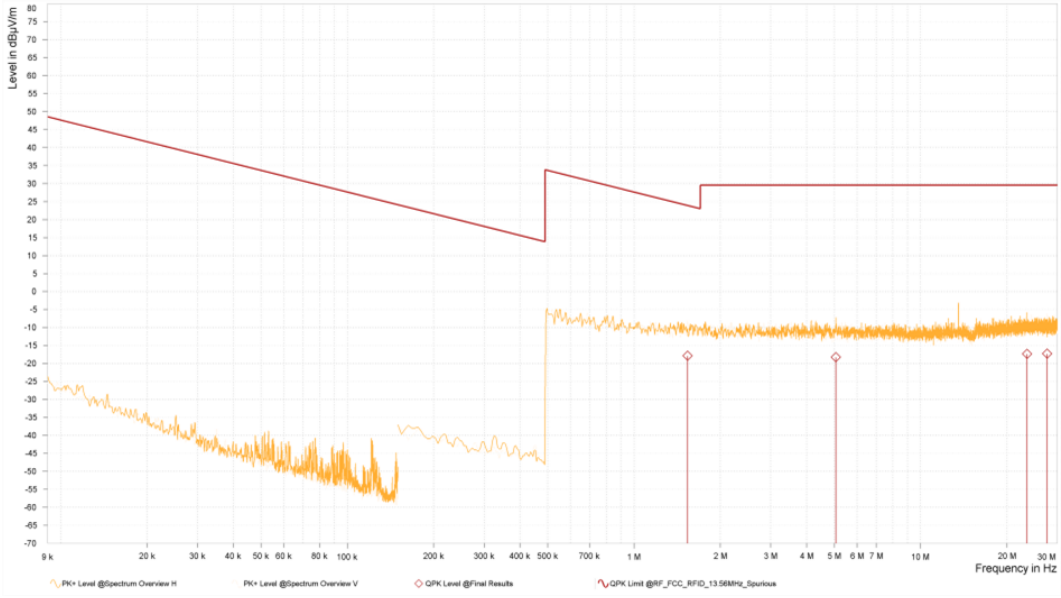
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
11.56 M
11.8 M
12.0 M
12.2 M
12.4 M
12.6 M
12.8 M
13.0 M
13.2 M
13.4 M
13.6 M
13.8 M
14.0 M
14.2 M
14.4 M
14.6 M
14.8 M
15.0 M
15.2 M
15.56 M
Frequency in Hz
PK+ Level @Spectrum Overview H
PK+ Level @Spectrum Overview V
QPK Level @Final Results
QPK Limit @RF_FCC_RFID_13.56MHz_Fund&Sp

Test Plot : Spurious emission (9 kHz to 30 MHz)

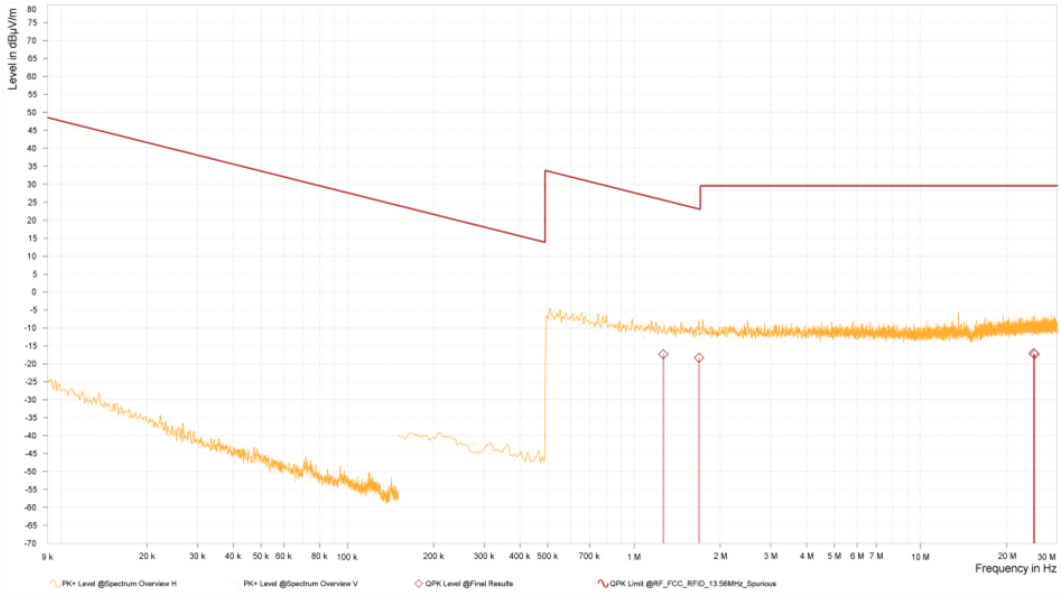
EP-QQ503



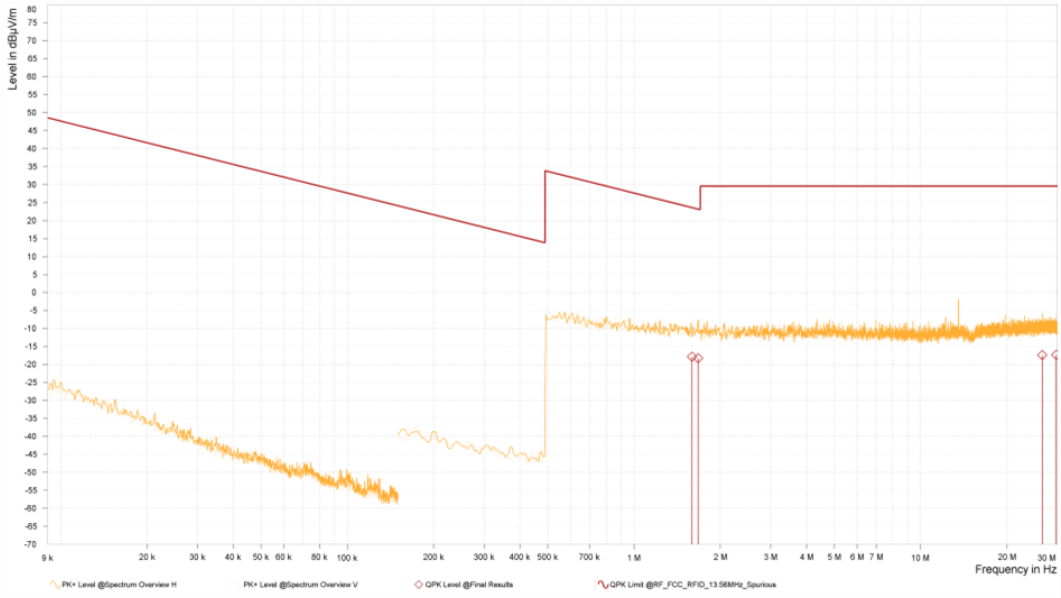
EP-QQ505



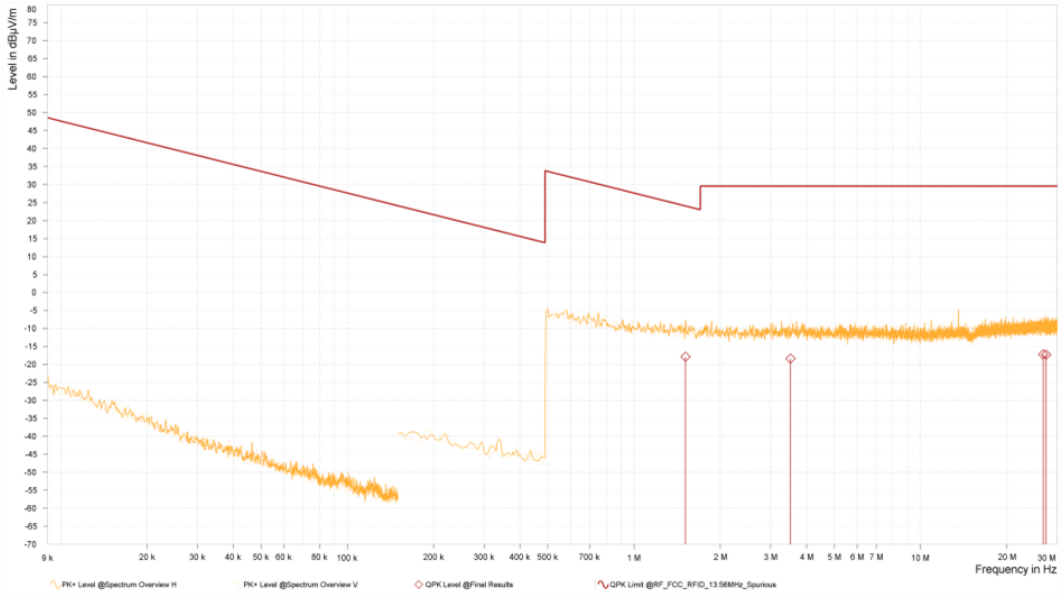
EP-QQ507



EP-QQ509

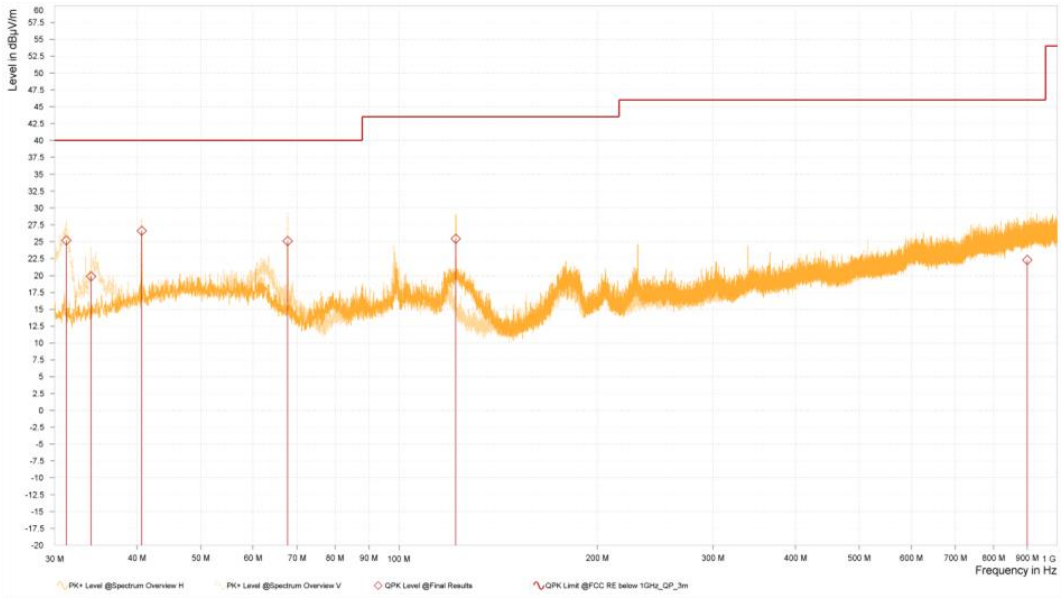


EP-QQ501

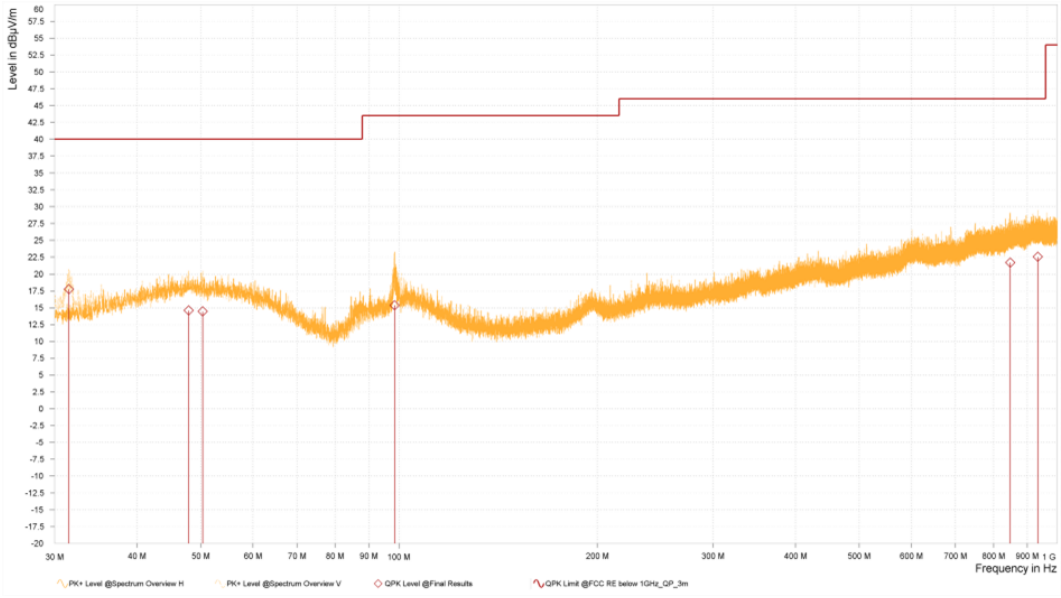

Level in dBµV/m
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
9 k
20 k
30 k
40 k
50 k
60 k
80 k
100 k
200 k
300 k
400 k
500 k
700 k
1 M
2 M
3 M
4 M
5 M
6 M
7 M
10 M
20 M
30 M
Frequency in Hz
PK+ Level @Spectrum Overview H
PK+ Level @Spectrum Overview V
QPK Level @Final Results
QPK Limit @RF_FCC_RFID_13.56MHz_Spurious

Test Plot : Spurious emission (30 MHz to 1 000 MHz)

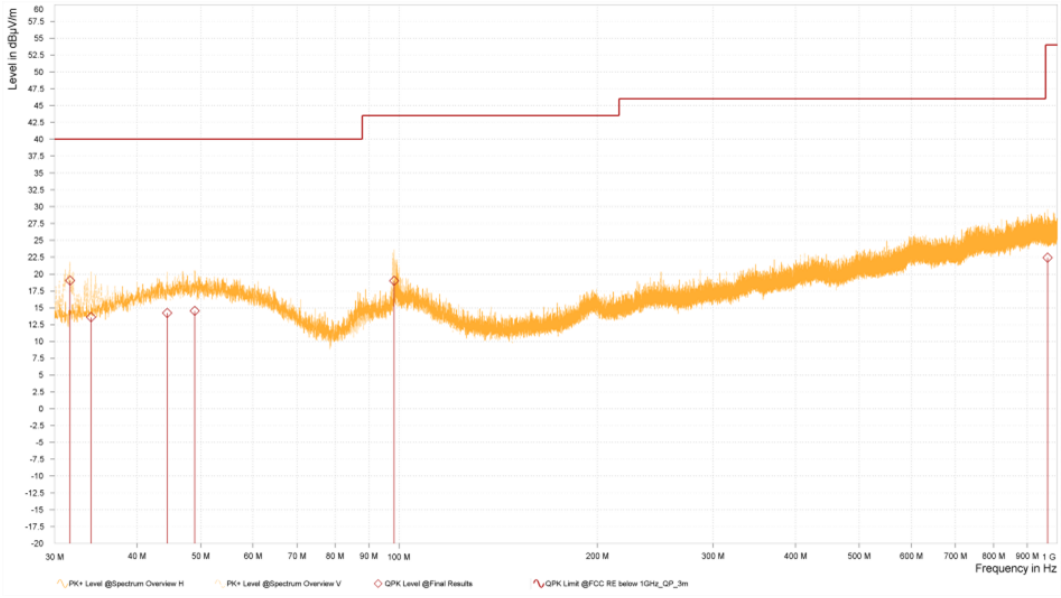
EP-QQ503



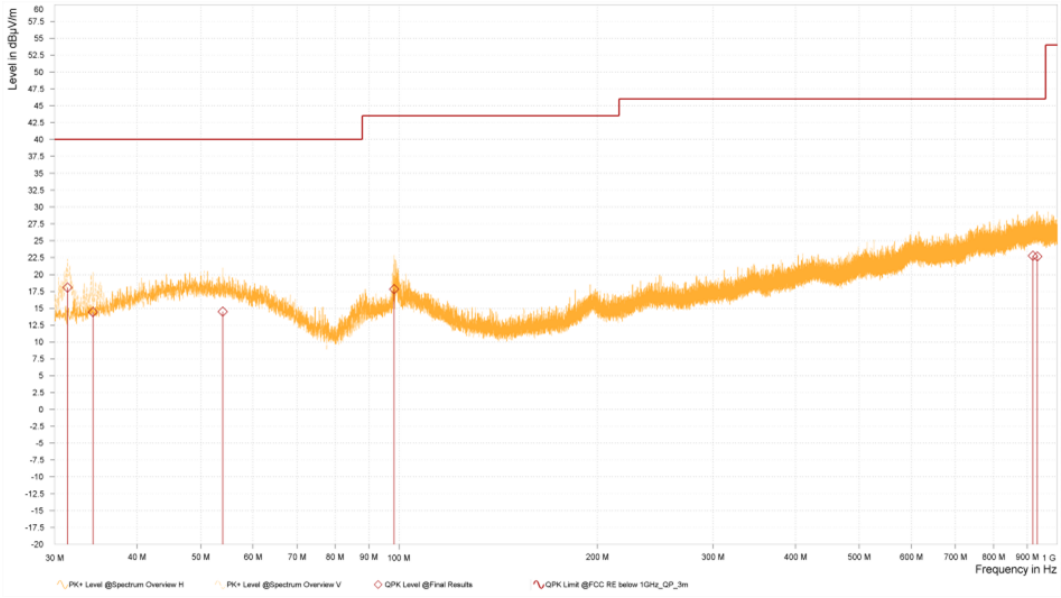
EP-QQ505



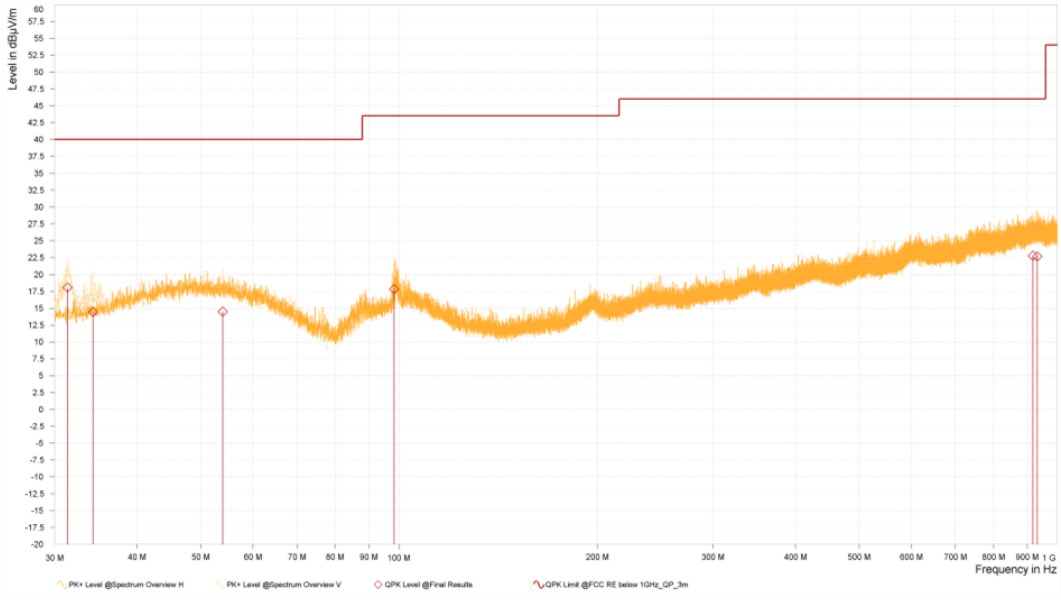
EP-QQ507



EP-QQ509



EP-QQ501


Level in dBµV/m
60
57.5
55
52.5
50
47.5
45
42.5
40
37.5
35
32.5
30
27.5
25
22.5
20
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20
30 M
40 M
50 M
60 M
70 M
80 M
90 M
100 M
200 M
300 M
400 M
500 M
600 M
700 M
800 M
900 M
1 G
Frequency in Hz
PK+ Level @Spectrum Overview H
PK+ Level @Spectrum Overview V
QPK Level @Final Results
QPK Limit @FCC RE below 1GHz_QP_3m

7.3 Frequency Stability

FCC §15.225(e)
RSS-210 B.6 (b)

Result

EP-QQ503

Test Voltage (V)	Temperature (℃)	Maintaining Time	Measured Frequency (MHz)	Frequency Deviation		Limit (%)
				(Hz)	(%)	
3.88	50	Start UP	13.559 909	-90.90	-0.000 670	±0.01
		2 Minutes	13.559 908	-91.70	-0.000 676	
		5 Minutes	13.559 915	-84.80	-0.000 625	
		10 Minutes	13.559 917	-83.10	-0.000 613	
	40	Start UP	13.559 986	-14.50	-0.000 107	±0.01
		2 Minutes	13.559 980	-20.10	-0.000 148	
		5 Minutes	13.559 960	-40.10	-0.000 296	
		10 Minutes	13.560 010	10.40	0.000 077	
	30	Start UP	13.559 975	-24.70	-0.000 182	±0.01
		2 Minutes	13.559 957	-43.50	-0.000 321	
		5 Minutes	13.560 001	1.00	0.000 007	
		10 Minutes	13.560 005	5.30	0.000 039	
	20	**Start UP**	13.559 999	-0.80	-0.000 006	±0.01
		2 Minutes	13.559 990	-10.20	-0.000 075	
		5 Minutes	13.559 989	-11.40	-0.000 084	
		10 Minutes	13.559 988	-11.90	-0.000 088	
	10	Start UP	13.560 145	144.60	0.001 066	±0.01
		2 Minutes	13.560 156	155.80	0.001 149	
		5 Minutes	13.560 153	153.00	0.001 128	
		10 Minutes	13.560 148	148.40	0.001 094	
	0	Start UP	13.560 182	181.50	0.001 338	±0.01
		2 Minutes	13.560 139	139.30	0.001 027	
		5 Minutes	13.560 167	166.50	0.001 228	
		10 Minutes	13.560 170	169.70	0.001 251	
	-10	Start UP	13.560 207	207.00	0.001 527	±0.01
		2 Minutes	13.560 228	227.50	0.001 678	
		5 Minutes	13.560 158	158.20	0.001 167	
		10 Minutes	13.560 228	228.00	0.001 681	
	-20	Start UP	13.560 177	177.20	0.001 307	±0.01
		2 Minutes	13.560 233	232.80	0.001 717	
		5 Minutes	13.560 229	228.50	0.001 685	
		10 Minutes	13.560 176	176.20	0.001 299	
	-30	Start UP	13.560 160	159.60	0.001 177	±0.01
		2 Minutes	13.560 148	147.70	0.001 089	
		5 Minutes	13.560 142	141.60	0.001 044	
		10 Minutes	13.560 178	177.60	0.001 310	
3.30	20	Start UP	13.559 992	-7.80	-0.000 058	±0.01
		2 Minutes	13.559 988	-12.20	-0.000 090	
		5 Minutes	13.559 988	-12.40	-0.000 091	
		10 Minutes	13.559 987	-13.10	-0.000 097	
4.46	20	Start UP	13.559 992	-8.50	-0.000 063	±0.01
		2 Minutes	13.559 987	-12.60	-0.000 093	
		5 Minutes	13.559 988	-12.10	-0.000 089	
		10 Minutes	13.559 988	-11.70	-0.000 086	

EP-QQ505

Test Voltage (V)	Temperature (℃)	Maintaining Time	Measured Frequency (MHz)	Frequency Deviation		Limit (%)
				(Hz)	(%)	
3.88	50	Start UP	13.559 829	-170.80	-0.001 260	±0.01
		2 Minutes	13.559 834	-165.80	-0.001 223	
		5 Minutes	13.559 815	-185.00	-0.001 364	
		10 Minutes	13.559 830	-170.00	-0.001 254	
	40	Start UP	13.559 838	-162.20	-0.001 196	±0.01
		2 Minutes	13.559 867	-133.20	-0.000 982	
		5 Minutes	13.559 897	-102.80	-0.000 758	
		10 Minutes	13.559 832	-168.20	-0.001 240	
	30	Start UP	13.559 903	-96.90	-0.000 715	±0.01
		2 Minutes	13.559 878	-121.70	-0.000 897	
		5 Minutes	13.559 869	-131.30	-0.000 968	
		10 Minutes	13.559 861	-139.10	-0.001 026	
	20	**Start UP**	13.559 933	-66.90	-0.000 493	±0.01
		2 Minutes	13.559 940	-60.30	-0.000 445	
		5 Minutes	13.559 911	-88.90	-0.000 656	
		10 Minutes	13.559 917	-83.30	-0.000 614	
	10	Start UP	13.559 947	-53.30	-0.000 393	±0.01
		2 Minutes	13.559 925	-75.40	-0.000 556	
		5 Minutes	13.559 929	-71.20	-0.000 525	
		10 Minutes	13.559 932	-68.10	-0.000 502	
	0	Start UP	13.560 054	54.20	0.000 400	±0.01
		2 Minutes	13.560 032	32.20	0.000 237	
		5 Minutes	13.560 023	22.60	0.000 167	
		10 Minutes	13.560 013	13.40	0.000 099	
	-10	Start UP	13.560 060	59.60	0.000 440	±0.01
		2 Minutes	13.560 044	43.80	0.000 323	
		5 Minutes	13.560 044	43.50	0.000 321	
		10 Minutes	13.560 044	43.70	0.000 322	
	-20	Start UP	13.560 073	72.70	0.000 536	±0.01
		2 Minutes	13.560 069	69.20	0.000 510	
		5 Minutes	13.560 018	18.20	0.000 134	
		10 Minutes	13.560 070	70.30	0.000 518	
	-30	Start UP	13.560 043	43.40	0.000 320	±0.01
		2 Minutes	13.560 039	38.60	0.000 285	
		5 Minutes	13.560 006	6.30	0.000 046	
		10 Minutes	13.560 017	17.20	0.000 127	
3.30	20	Start UP	13.559 917	-82.80	-0.000 611	±0.01
		2 Minutes	13.559 893	-107.30	-0.000 791	
		5 Minutes	13.559 888	-111.80	-0.000 824	
		10 Minutes	13.559 885	-114.80	-0.000 847	
4.46	20	Start UP	13.559 892	-108.00	-0.000 796	±0.01
		2 Minutes	13.559 883	-117.20	-0.000 864	
		5 Minutes	13.559 882	-117.90	-0.000 869	
		10 Minutes	13.559 891	-109.20	-0.000 805	

EP-QQ507

Test Voltage (V)	Temperature (℃)	Maintaining Time	Measured Frequency (MHz)	Frequency Deviation		Limit (%)
				(Hz)	(%)	
3.88	50	Start UP	13.559 877	-123.30	-0.000 909	±0.01
		2 Minutes	13.559 880	-120.00	-0.000 885	
		5 Minutes	13.559 876	-124.10	-0.000 915	
		10 Minutes	13.559 879	-120.80	-0.000 891	
	40	Start UP	13.559 953	-46.80	-0.000 345	±0.01
		2 Minutes	13.559 944	-56.00	-0.000 413	
		5 Minutes	13.559 915	-84.80	-0.000 625	
		10 Minutes	13.559 902	-97.60	-0.000 720	
	30	Start UP	13.559 945	-55.20	-0.000 407	±0.01
		2 Minutes	13.559 932	-67.90	-0.000 501	
		5 Minutes	13.559 926	-73.90	-0.000 545	
		10 Minutes	13.559 921	-79.40	-0.000 586	
	20	**Start UP**	13.559 928	-71.90	-0.000 530	±0.01
		2 Minutes	13.559 928	-72.40	-0.000 534	
		5 Minutes	13.559 927	-72.80	-0.000 537	
		10 Minutes	13.559 926	-74.10	-0.000 546	
	10	Start UP	13.560 019	19.00	0.000 140	±0.01
		2 Minutes	13.560 010	10.40	0.000 077	
		5 Minutes	13.560 009	9.10	0.000 067	
		10 Minutes	13.560 009	8.90	0.000 066	
	0	Start UP	13.560 136	135.60	0.001 000	±0.01
		2 Minutes	13.560 123	122.60	0.000 904	
		5 Minutes	13.560 115	114.70	0.000 846	
		10 Minutes	13.560 112	111.60	0.000 823	
	-10	Start UP	13.560 168	168.30	0.001 241	±0.01
		2 Minutes	13.560 138	138.00	0.001 018	
		5 Minutes	13.560 193	193.30	0.001 426	
		10 Minutes	13.560 140	139.50	0.001 029	
	-20	Start UP	13.560 150	150.00	0.001 106	±0.01
		2 Minutes	13.560 134	134.20	0.000 990	
		5 Minutes	13.560 181	181.40	0.001 338	
		10 Minutes	13.560 207	206.90	0.001 526	
	-30	Start UP	13.559 957	-43.20	-0.000 319	±0.01
		2 Minutes	13.559 973	-27.40	-0.000 202	
		5 Minutes	13.560 075	75.10	0.000 554	
		10 Minutes	13.560 082	81.80	0.000 603	
3.30	20	Start UP	13.559 928	-71.60	-0.000 528	±0.01
		2 Minutes	13.559 928	-72.00	-0.000 531	
		5 Minutes	13.559 928	-72.30	-0.000 533	
		10 Minutes	13.559 925	-74.80	-0.000 552	
4.46	20	Start UP	13.559 929	-70.90	-0.000 523	±0.01
		2 Minutes	13.559 927	-72.60	-0.000 535	
		5 Minutes	13.559 927	-73.10	-0.000 539	
		10 Minutes	13.559 923	-76.80	-0.000 566	

EP-QQ509

Test Voltage (V)	Temperature (℃)	Maintaining Time	Measured Frequency (MHz)	Frequency Deviation		Limit (%)
				(Hz)	(%)	
3.88	50	Start UP	13.559 757	-243.40	-0.001 795	±0.01
		2 Minutes	13.559 808	-191.90	-0.001 415	
		5 Minutes	13.559 770	-229.70	-0.001 694	
		10 Minutes	13.559 756	-244.10	-0.001 800	
	40	Start UP	13.559 831	-169.10	-0.001 247	±0.01
		2 Minutes	13.559 805	-195.30	-0.001 440	
		5 Minutes	13.559 798	-202.10	-0.001 490	
		10 Minutes	13.559 794	-206.20	-0.001 521	
	30	Start UP	13.559 866	-134.10	-0.000 989	±0.01
		2 Minutes	13.559 853	-147.50	-0.001 088	
		5 Minutes	13.559 843	-156.90	-0.001 157	
		10 Minutes	13.559 834	-165.60	-0.001 221	
	20	**Start UP**	13.559 827	-173.20	-0.001 277	±0.01
		2 Minutes	13.559 826	-174.30	-0.001 285	
		5 Minutes	13.559 825	-175.20	-0.001 292	
		10 Minutes	13.559 824	-175.80	-0.001 296	
	10	Start UP	13.559 973	-26.70	-0.000 197	±0.01
		2 Minutes	13.559 951	-48.90	-0.000 361	
		5 Minutes	13.559 946	-54.20	-0.000 400	
		10 Minutes	13.559 944	-56.50	-0.000 417	
	0	Start UP	13.560 010	10.30	0.000 076	±0.01
		2 Minutes	13.560 002	2.20	0.000 016	
		5 Minutes	13.559 999	-1.40	-0.000 010	
		10 Minutes	13.559 997	-3.40	-0.000 025	
	-10	Start UP	13.560 020	20.20	0.000 149	±0.01
		2 Minutes	13.560 016	16.30	0.000 120	
		5 Minutes	13.560 022	21.80	0.000 161	
		10 Minutes	13.560 022	21.90	0.000 162	
	-20	Start UP	13.560 012	11.60	0.000 086	±0.01
		2 Minutes	13.560 010	10.30	0.000 076	
		5 Minutes	13.560 008	7.70	0.000 057	
		10 Minutes	13.560 025	24.80	0.000 183	
	-30	Start UP	13.559 982	-17.60	-0.000 130	±0.01
		2 Minutes	13.559 989	-11.00	-0.000 081	
		5 Minutes	13.559 959	-40.70	-0.000 300	
		10 Minutes	13.559 965	-35.30	-0.000 260	
3.30	20	Start UP	13.559 825	-175.00	-0.001 291	±0.01
		2 Minutes	13.559 822	-177.90	-0.001 312	
		5 Minutes	13.559 822	-177.80	-0.001 311	
		10 Minutes	13.559 821	-179.40	-0.001 323	
4.46	20	Start UP	13.559 822	-177.90	-0.001 312	±0.01
		2 Minutes	13.559 821	-179.10	-0.001 321	
		5 Minutes	13.559 821	-179.10	-0.001 321	
		10 Minutes	13.559 820	-179.70	-0.001 325	

EP-QQ501

Test Voltage (V)	Temperature (℃)	Maintaining Time	Measured Frequency (MHz)	Frequency Deviation		Limit (%)
				(Hz)	(%)	
3.88	50	Start UP	13.559 877	-123.50	-0.000 911	±0.01
		2 Minutes	13.559 889	-110.80	-0.000 817	
		5 Minutes	13.559 881	-119.40	-0.000 881	
		10 Minutes	13.559 887	-112.90	-0.000 833	
	40	Start UP	13.559 936	-63.60	-0.000 469	±0.01
		2 Minutes	13.559 915	-85.50	-0.000 631	
		5 Minutes	13.559 908	-92.10	-0.000 679	
		10 Minutes	13.559 904	-96.30	-0.000 710	
	30	Start UP	13.559 978	-22.00	-0.000 162	±0.01
		2 Minutes	13.559 955	-45.30	-0.000 334	
		5 Minutes	13.559 947	-53.00	-0.000 391	
		10 Minutes	13.559 943	-56.90	-0.000 420	
	20	**Start UP**	13.559 935	-65.50	-0.000 483	±0.01
		2 Minutes	13.559 935	-65.10	-0.000 480	
		5 Minutes	13.559 932	-67.90	-0.000 501	
		10 Minutes	13.559 927	-72.60	-0.000 535	
	10	Start UP	13.560 111	110.80	0.000 817	±0.01
		2 Minutes	13.560 082	81.80	0.000 603	
		5 Minutes	13.560 076	76.00	0.000 560	
		10 Minutes	13.560 069	68.70	0.000 507	
	0	Start UP	13.560 148	148.10	0.001 092	±0.01
		2 Minutes	13.560 135	134.90	0.000 995	
		5 Minutes	13.560 131	131.20	0.000 968	
		10 Minutes	13.560 129	129.30	0.000 954	
	-10	Start UP	13.560 184	184.10	0.001 358	±0.01
		2 Minutes	13.560 179	179.20	0.001 322	
		5 Minutes	13.560 181	181.10	0.001 336	
		10 Minutes	13.560 174	173.80	0.001 282	
	-20	Start UP	13.560 194	194.30	0.001 433	±0.01
		2 Minutes	13.560 196	195.70	0.001 443	
		5 Minutes	13.560 198	197.70	0.001 458	
		10 Minutes	13.560 180	180.00	0.001 327	
	-30	Start UP	13.560 157	156.60	0.001 155	±0.01
		2 Minutes	13.560 154	153.50	0.001 132	
		5 Minutes	13.560 155	155.30	0.001 145	
		10 Minutes	13.560 146	145.70	0.001 074	
3.30	20	Start UP	13.559 941	-59.20	-0.000 437	±0.01
		2 Minutes	13.559 934	-65.80	-0.000 485	
		5 Minutes	13.559 932	-68.40	-0.000 504	
		10 Minutes	13.559 931	-69.00	-0.000 509	
4.46	20	Start UP	13.559 939	-61.00	-0.000 450	±0.01
		2 Minutes	13.559 930	-70.30	-0.000 518	
		5 Minutes	13.559 934	-66.40	-0.000 490	
		10 Minutes	13.559 935	-65.30	-0.000 482	

7.4 AC Line Conducted

FCC §15.207
RSS-Gen(8.8)

Result

EP-QQ503

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150000	---	22.69	55.46	32.77	N	9.8
0.150000	44.54	---	65.46	20.92	N	9.8
0.167910	---	20.99	54.57	33.58	N	10.0
0.167910	43.61	---	64.57	20.96	N	10.0
0.179850	---	19.33	54.03	34.70	N	10.0
0.179850	42.79	---	64.03	21.24	N	10.0
0.203730	---	18.88	53.05	34.17	N	9.9
0.203730	41.75	---	63.05	21.30	N	9.9
0.215670	---	18.03	52.61	34.58	N	9.8
0.215670	40.94	---	62.61	21.66	N	9.8
0.606705	---	19.07	46.00	26.93	N	9.9
0.606705	35.23	---	56.00	20.77	N	9.9
13.558620	46.90	---	60.00	13.10	L1	10.2
13.558620	---	42.38	50.00	7.62	L1	10.2

Line Conducted Emissions Tabulated Data

EP-QQ505

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.200745	40.54	---	63.17	22.63	L1	9.9
0.200745	---	18.79	53.17	34.38	L1	9.9
0.218655	38.60	---	62.50	23.90	L1	9.8
0.218655	---	16.83	52.50	35.67	L1	9.8
0.230595	---	15.28	52.08	36.80	N	9.8
0.230595	37.75	---	62.08	24.33	N	9.8
0.266415	---	13.51	50.95	37.44	N	9.7
0.266415	36.05	---	60.95	24.89	N	9.7
0.597750	36.84	---	56.00	19.16	N	9.9
0.597750	---	21.74	46.00	24.26	N	9.9
0.606705	---	25.52	46.00	20.48	L1	9.9
0.606705	37.79	---	56.00	18.21	L1	9.9
13.561605	---	40.43	50.00	9.57	L1	10.2
13.561605	44.83	---	60.00	15.17	L1	10.2

Line Conducted Emissions Tabulated Data

Notes:

1. Measurements using CISPR quasi-peak mode & average mode.
2. The worst channel was investigated and the worst -case emission are reported. See attached Plots.
3. Lowest channel (2 402MHz) is the worst case.
*4. *) Factor = LISN + Cable Loss*
*5. **) LINE : L = Line , N = Neutral*
6. The limit is on the FCC §15.207(a) & RSS-Gen(8.8)

EP-QQ507

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.194775	37.17	---	63.41	26.24	N	9.9
0.194775	---	15.06	53.41	38.35	N	9.9
0.257460	35.36	---	61.21	25.85	N	9.7
0.257460	---	14.05	51.21	37.17	N	9.7
0.290295	---	11.72	50.27	38.55	N	9.7
0.290295	32.96	---	60.27	27.31	N	9.7
0.457455	---	9.25	46.70	37.44	N	9.9
0.457455	28.74	---	56.70	27.96	N	9.9
0.600735	---	20.50	46.00	25.50	N	9.9
0.600735	35.92	---	56.00	20.08	N	9.9
13.558620	45.33	---	60.00	14.67	L1	10.2
13.558620	---	40.85	50.00	9.15	L1	10.2
27.122460	---	38.68	50.00	11.32	L1	10.6
27.122460	43.46	---	60.00	16.54	L1	10.6

Line Conducted Emissions Tabulated Data

EP-QQ509

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150000	---	23.64	55.46	31.82	N	9.8
0.150000	45.49	---	65.46	19.97	N	9.8
0.191790	---	20.36	53.53	33.17	N	9.9
0.191790	43.11	---	63.53	20.41	N	9.9
0.221640	---	18.59	52.39	33.80	N	9.8
0.221640	41.34	---	62.39	21.05	N	9.8
0.233580	---	18.28	51.98	33.70	N	9.7
0.233580	40.53	---	61.98	21.45	N	9.7
0.332085	---	15.68	49.22	33.54	N	9.8
0.332085	36.11	---	59.22	23.11	N	9.8
0.609690	---	20.33	46.00	25.67	N	9.9
0.609690	35.87	---	56.00	20.13	N	9.9
13.561605	41.25	---	60.00	18.75	L1	10.2
13.561605	---	36.48	50.00	13.52	L1	10.2

Line Conducted Emissions Tabulated Data

Notes:

1. Measurements using CISPR quasi-peak mode & average mode.
2. The worst channel was investigated and the worst -case emission are reported. See attached Plots.
3. Lowest channel (2 402MHz) is the worst case.
*4. *) Factor = LISN + Cable Loss*
*5. **) LINE : L = Line , N = Neutral*
6. The limit is on the FCC §15.207(a) & RSS-Gen(8.8)

EP-QQ501

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150000	---	23.18	55.46	32.27	N	9.8
0.150000	45.18	---	65.46	20.28	N	9.8
0.170895	---	21.75	54.43	32.68	N	10.1
0.170895	43.93	---	64.43	20.51	N	10.1
0.176865	---	20.89	54.16	33.28	N	10.0
0.176865	43.12	---	64.16	21.05	N	10.0
0.203730	---	19.27	53.05	33.78	N	9.9
0.203730	42.28	---	63.05	20.78	N	9.9
0.600735	---	18.80	46.00	27.20	N	9.9
0.600735	35.41	---	56.00	20.59	N	9.9
13.558620	---	38.44	50.00	11.56	N	10.1
13.558620	41.46	---	60.00	18.54	N	10.1
27.122460	43.08	---	60.00	16.92	L1	10.6
27.122460	---	38.23	50.00	11.77	L1	10.6

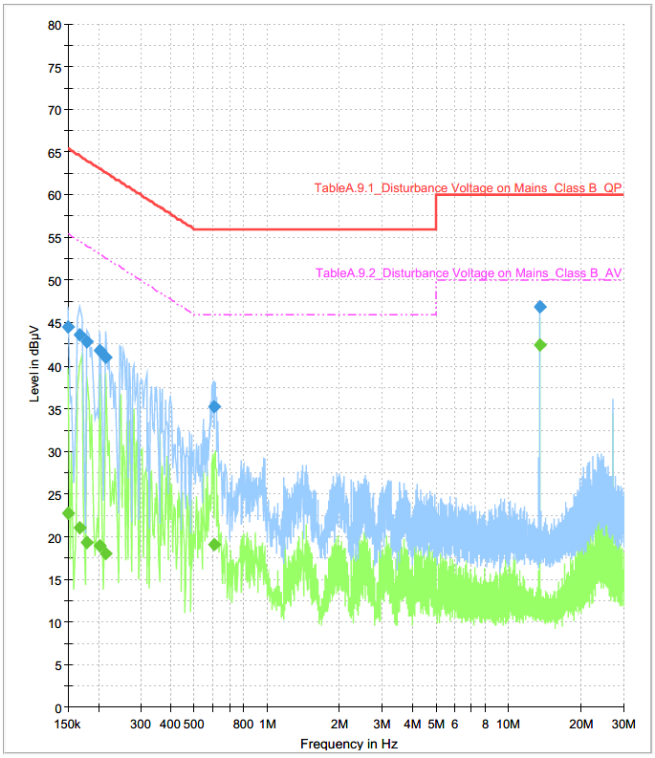
Line Conducted Emissions Tabulated Data

Notes:

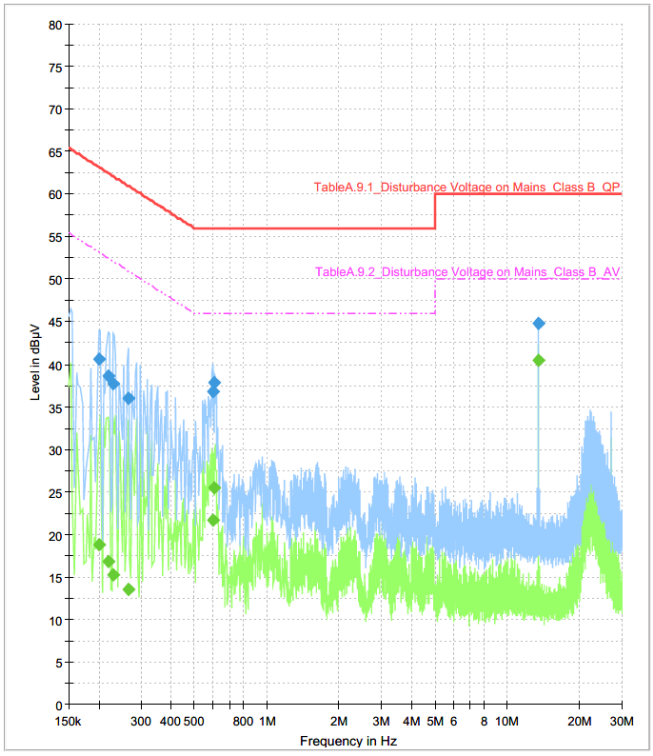
1. Measurements using CISPR quasi-peak mode & average mode.
2. The worst channel was investigated and the worst -case emission are reported. See attached Plots.
3. Lowest channel (2 402MHz) is the worst case.
*4. *) Factor = LISN + Cable Loss*
*5. **) LINE : L = Line , N = Neutral*
6. The limit is on the FCC §15.207(a) & RSS-Gen(8.8)

PLOTS OF AC Line EMISSIONS

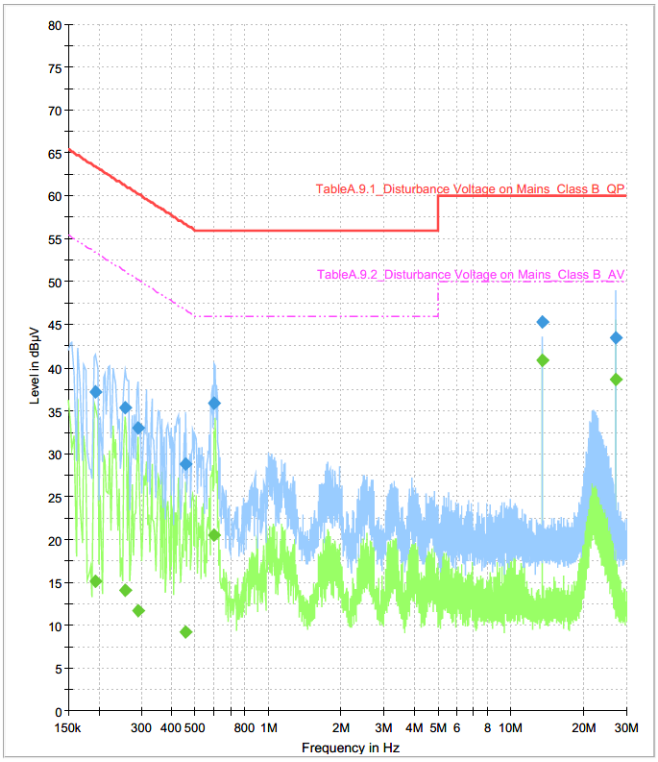
EP-QQ503



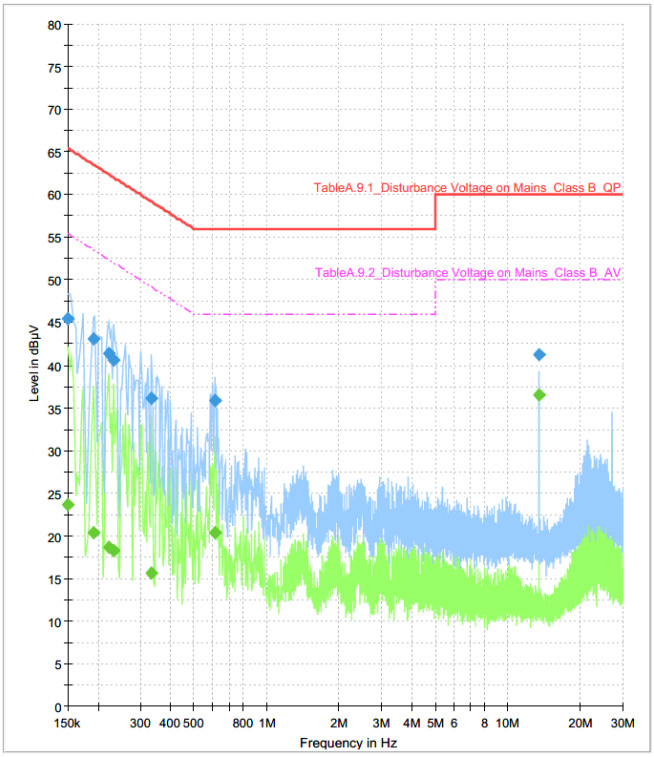
EP-QQ505



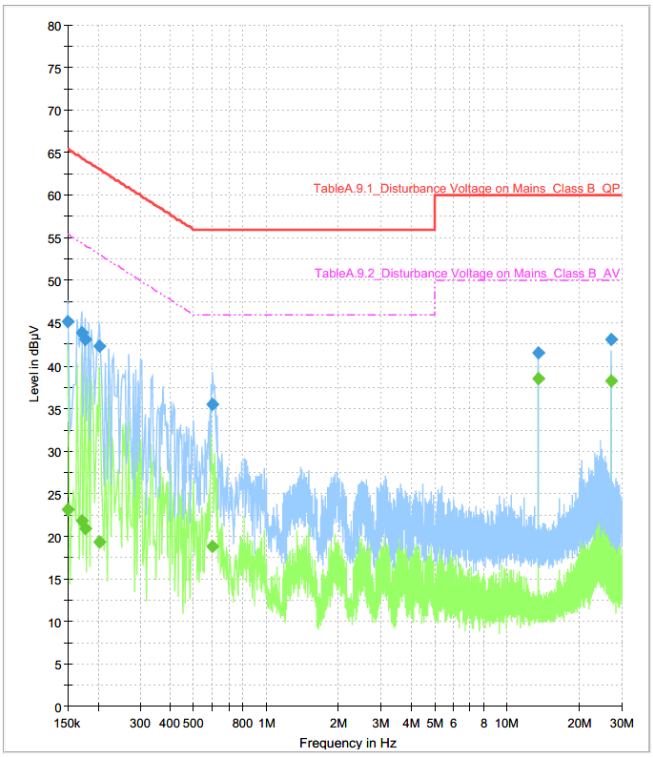
EP-QQ507



EP-QQ509



EP-QQ501


TableA.9.1_Disturbance Voltage on Mains_Class B_QP
TableA.9.2_Disturbance Voltage on Mains_Class B_AV
Level in dBµV
Frequency in Hz
150k
300
400 500
800 1M
2M
3M
4M 5M 6
8 10M
20M
30M

8. TEST EQUIPMENT

No.	Instrument	Manufacture	Model	Serial No.	Calibration Date	Next Calibration Date
1	DIGITAL MULTIMETER	EZ DIGITAL	DM-334	2111395	2023-10-11	2024-10-11
2	Humidity Temperature Recorder	Lutron	MHB-382SD	AK.26553	2023-10-18	2024-10-18
3	Signal & Spectrum Analyzer	R&S	FSW43	100732	2024-03-28	2025-03-28
4	10 dB Attenuator	API technologies corp	40A2W-10	1914	2023-07-05	2024-07-05
5	Temp&Humid Chamber	ESPEC	PL-4J	15018186	2023-07-03	2024-07-03
6	Signal Generator	R&S	SMB100A	175861	2024-03-29	2025-03-29
7	Vector Signal Generator	R&S	SMBV100A	257152	2023-10-11	2024-10-11
8	TRILOG Broadband Test Antenna	Schwarzbeck	VULB 9163	01431	2022-11-16	2024-11-16
9	EMI TEST RECEIVER	R&S	ESW44	103318	2024-01-08	2025-01-08
10	AMPLIFIER	H.P	8447F	2805A03406	2024-01-09	2025-01-09
11	Active Loop Antenna	R&S	HFH2-Z2E	101190	2024-01-11	2025-01-11
12	BIAS UNIT	R&S	IN 600	101621	N/A	N/A
13	TWO-LINE V-NETWORK	R&S	ENV216	102829	2023-07-04	2024-07-04
14	EMI TEST RECEIVER	R&S	ESR3	102930	2023-07-03	2024-07-03

9. ACCURACY OF MEASUREMENT & DECISION RULE

9.1 Uncertainty Calculation

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

PARAMETER	UNCERTAINTY
Radiated Disturbance, Below 30 MHz	4.5 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.4 dB
Radiated Disturbance, Above 1 GHz	3.7 dB

9.2 Decision rule

The choice of whether or not to include the measurement uncertainty of the measuring system used in the test in the conformance determination.:

☐ Application of internal procedures used in type testing where traceability of measurement uncertainty is established.
☒ Applying the decision that the standard used for type testing does not require it.

END REPORT