DEKRA Certification, Inc.
405 Glenn Dr. Suite 12,
Sterling, VA 20164
United States of America

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test Report No:
3825ERM.003A1

Test Report

USA FCC Part 15.247, 15.209, 15.207; & CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices.

(*) Identification of item tested	Detects Audio Levels
(*) Trademark	Alarm.com
(*) Model and /or type reference	Smart Noise Monitor
Other identification of the product	FCC ID: YL6-143N10N IC ID: 9111A-143N10N
(*) Features	Z-Wave
Manufacturer	Alarm.com, Inc 8281 Greensboro Dr, Suite 100 Tyson, VA 22102 USA
Test method requested, standard	USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 amendment 1 (March 2019). 558074 D01 15.247 Meas Guidance v05r02. Guidance for Compliance Measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under section §15.247 of the FCC Rules ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US
Date of issue	12-14-2022
Report template No	FDT08_24 (*) "Data provided by the client"

Index

Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
26Ebw	Emission Bandwidth
Avg COT	Average Channel Occupancy Time
BW	Bandwidth
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Freq Sep	Frequency Separation
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
NHC	Number of Hopping Channels
NHp	Number of hops over the period
Occ Ch BW	Occupied Channel Bandwidth
Peak Power	Maximum Peak Conducted Output Power
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

Test case	Frequency (MHz)	U (k=2)	Units
RF Power and PSD	5150-5850	0.88	dB
Occupied Bandwidth		1.87	%
Band Edge		0.64	dB
Radiated Spurious Emission	30-180	4.27	dB
	180-1000	3.14	dB
	1000-18000	3.30	dB
	18000-40000	3.49	dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. Noise Monitor that detects audio levels and communicates data via Z-Wave to a controller

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer/Model	Serial Nº	Date of Reception	Application
S/01	3825/03	Radiated Sample	Alarm.com / ADC-N10-N	46819	2022-08-11	Element Under Test
S/01	3825/04	USB debug cable	-	-	2022-09-15	Accessory

Sample S/01 was used for the following test(s): All Radiated test indicated in appendix A.

Sample S/02 is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer/Model	Serial Nº	Date of Reception	Application
S/02	3825/09	Radiated Sample	Alarm.com / ADC-N10-N	49177	2022-08-11	Element Under Test
S/02	3825/04	USB debug cable	-	-	2022-09-15	Accessory

Sample S/02, was used for the following test(s): All Conducted test indicated in appendix A.

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Test sample description

Test Sample description (compulsory information for EMC and RF testing services

Ports……:	Port name and description	Cable				
		Specified length [m]	Attached during test	Shielded	Coupled to patient	
	No Data Provided		☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
Supplementary information to the ports…… :	No Data Provided					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☒	AC: 86~305VAC, 47-63Hz	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					
	☐	DC:					
Rated Power .....:	2W						
Clock frequencies.....:	32.768 kHz , 100 kHz , 3 MHz						
Other parameters.....:	No Data Provided						
Software version .....:	1						
Hardware version.....:	1						
Dimensions in cm (W x H x D) ....:	No Data Provided						
Mounting position.....:	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☐	Other: Plugged into wall outlet					

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	ZGM130S037HGN2R	Z-Wave	SIlicon Labs
	WSM-BL241-ADA-008	Bluetooth	Murata
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	No Data Provided		
Documents as provided by the applicant.....:	Description	File name	Issue date
	Declaration Equipment Data	Alarm.com ADC-N10-N - FDT30_18 Declaration Equipment Data v3	12/13/2022
Copy of marking plate:			
NO MARKING PLATE FOUND			

Identification of the client

Alarm.com, Inc
8281 Greensboro Dr, Suite 100
Tyson, VA 22102
USA

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	2022-08-08
Date (finish)	2022-08-22

Document history

Report number	Date	Description
3825ERM.003	12-14-2022	First release.
3825ERM.003A1	12-14-2022	Second release. Antenna gain and EIRP power values updated. This modification of the test report cancels and replaces the test report 3825ERM.003.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Lakshmi Gollamudi, Juliana Cherry, Yuri Barone, Nasir Khan, Qi Zhang, and Koji Nishimoto.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Z-Wave

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
FCC 2.1049 / RSS-GEN 6.7	99dBw Occupied Channel Bandwidth 99%	Pass	N/A
RSS-247 5.2 (a) / FCC 15.247 (a) (2)	6dB Bandwidth	Pass	N/A
RSS-247 5.4 (d) / FCC 15.247 (b) (3)	Maximum Peak Conducted output power & Antenna gain	Pass	N/A
RSS-247 5.5 / FCC 15.247 (d)	Band-edge emissions compliance (Transmitter) - Conducted	Pass	N/A
RSS-247 5.2 (b) / FCC 15.247 (d)	Power Spectral Density	Pass	N/A
RSS-247 5.5 / FCC 15.247 (d)	Emissions compliance (Transmitter) - Conducted	N/A	Refer 1
RSS-247 5.5 / FCC 15.247 (d)	Emissions compliance (Transmitter) - Radiated	Pass	N/A

Supplementary information and remarks:

1. DUT has an integral antenna, and no conducted testing is required

List of equipment used during the test

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
981	LOW NOISE PREAMPLIFIER	1711156B	2020-11-10	2022-11-10
1012	ESR26 EMI TEST RECEIVER	101478	2022-04-12	2024-04-12
1014	FSV40 SIGNAL ANALYZER 40GHZ	101626	2021-05-19	2023-05-19
1056	3116C DOUBLE-RIDGED WAVEGUIDE HORN ANTENNAS	213179	2020-01-10	2023-01-10
1057	3115 DOUBLE-RIDGED WAVEGUIDE HORN ANTENNAS	211373	2020-06-03	2023-06-03
1065	3142E BICONILOG ANTENNA	208587	2020-08-13	2023-08-13
1108	ETHERNET SNMP THERMOMETER	60038026954	2020-09-16	2022-09-16
1111	ETHERNET SNMP THERMOMETER	60038026577	2020-09-16	2022-09-16
1179	SEMI-ANECHOIC CHAMBER	F169021	N/A	N/A
1314	WIRELESS MEASUREMENT SOFTWARE R&S EMC32	1040-OT102236	N/A	N/A

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
1042	SMBV 100A VECTOR SIGNAL GENERATOR	262575	2022-03-16	2024-03-16
1107	ETHERNET SNMP THERMOMETER	60038026952	2020-09-16	2022-09-16
1313	WIRELESS MEASUREMENT SOFTWARE R&S WMS32	-	N/A	N/A
1374	ESR7 EMI TEST RECEIVER	102390	2022-05-26	2024-05-26

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Appendix A: Test results. Z-Wave

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PRODUCT INFORMATION

The following information is provided by the client

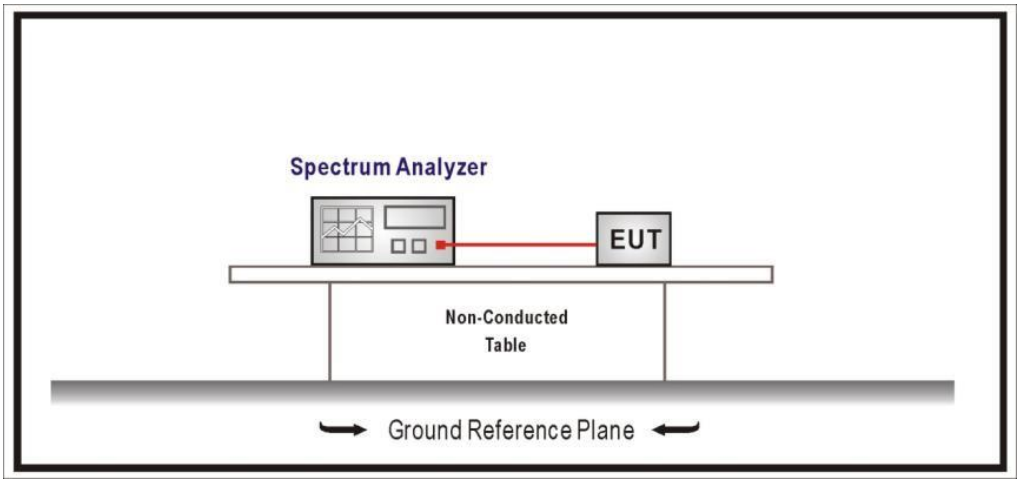
Information	Description
Modulation	O-QPSK
Operation mode	
- Operating Frequency Range	912/920 MHz
- RF Output Power	14 dBm
Antenna type	Copper Wire
Antenna gain	-0.96 dBi (Peak)
Nominal Voltage	
- Supply Voltage	120 Vac
- Type of power source	AC Power
Equipment type	Z-wave Long Range

TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01	Power supply (V): $V_{nominal}$ = 120 Vac Modulation: O-QPSK Bandwidth: 1 MHz Test Frequencies for Conducted/ Radiated tests: Low channel (0): 912 MHz High channel (1): 920 MHz

CONDUCTED MEASUREMENTS:



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and 1-18 GHz Double ridge horn antennas, and 1m for the frequency range 18 GHz- 26 GHz Double ridge horn antenna.

For radiated emissions in the range 18 - 26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

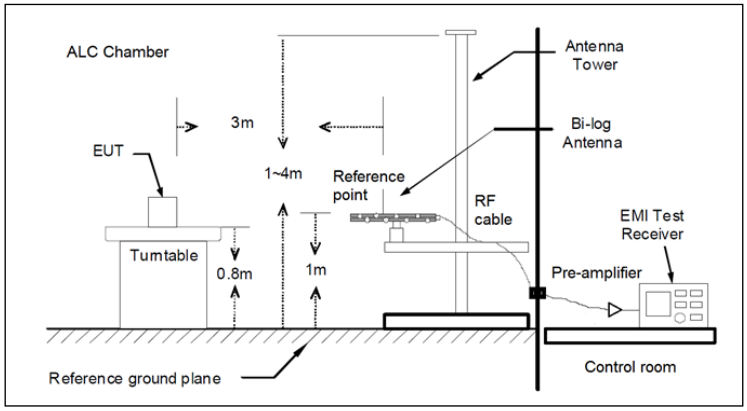


Fig A1: Radiated measurements Setup f < 1 GHz

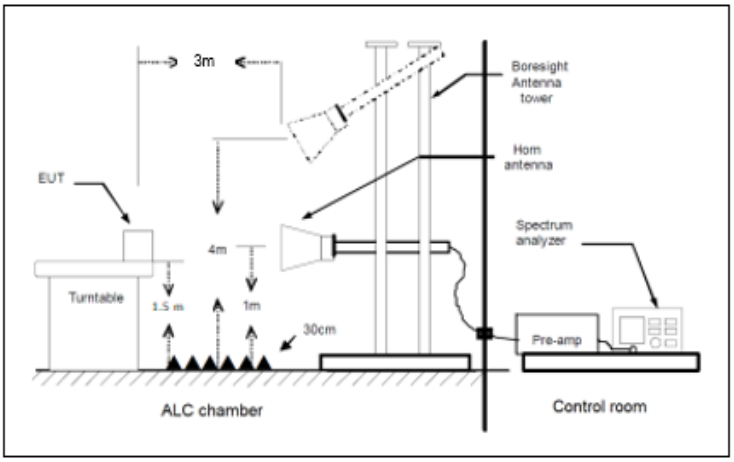


Fig A2: Radiated measurements setup f > 1-18 GHz

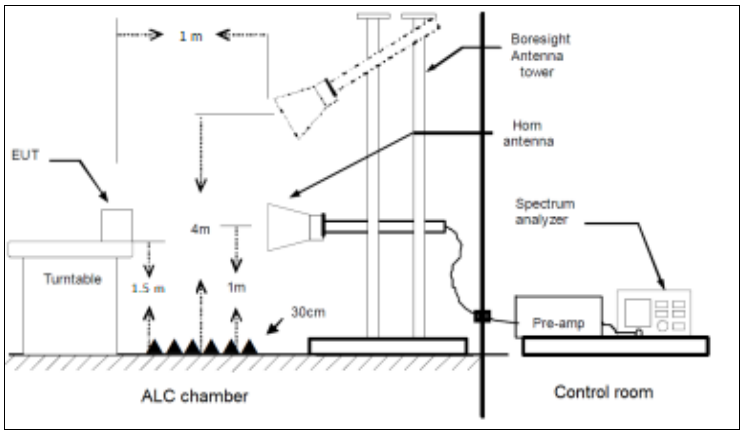


Fig A3: Radiated measurements setup f > 18 GHz

RSS-247 5.2 (a) / RSS-GEN 6.7 FCC 15.247 (a) (2) 99dBw Occupied Channel Bandwidth 99%

Limits

The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs

Test conditions modes: TC#01
Results

	Lowest frequency 912MHz	Highest frequency 920MHz
99% bandwidth (kHz)	937.77	933.43

Verdict

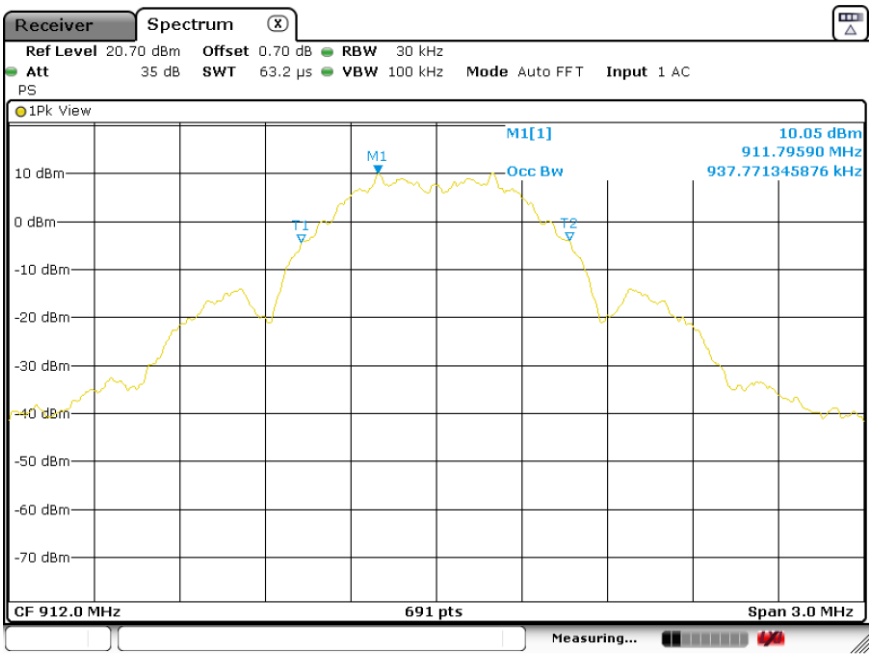
Pass

Results

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Lowest Channel

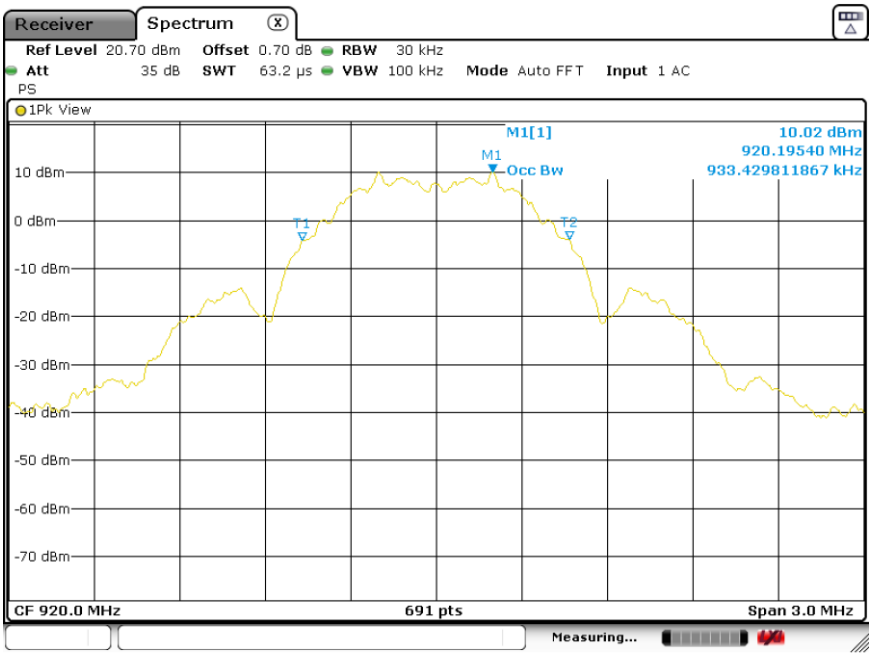
Images:



Date: 20.SEP.2022 01:08:13

Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Highest Channel

Images:



Date: 20.SEP.2022 01:14:50

RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6dB Bandwidth

Limits

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test conditions modes: TC#01

Results

	Lowest frequency 912MHz	Highest frequency 920MHz
6 dB Spectrum bandwidth (kHz)	912.20	919.80

Verdict

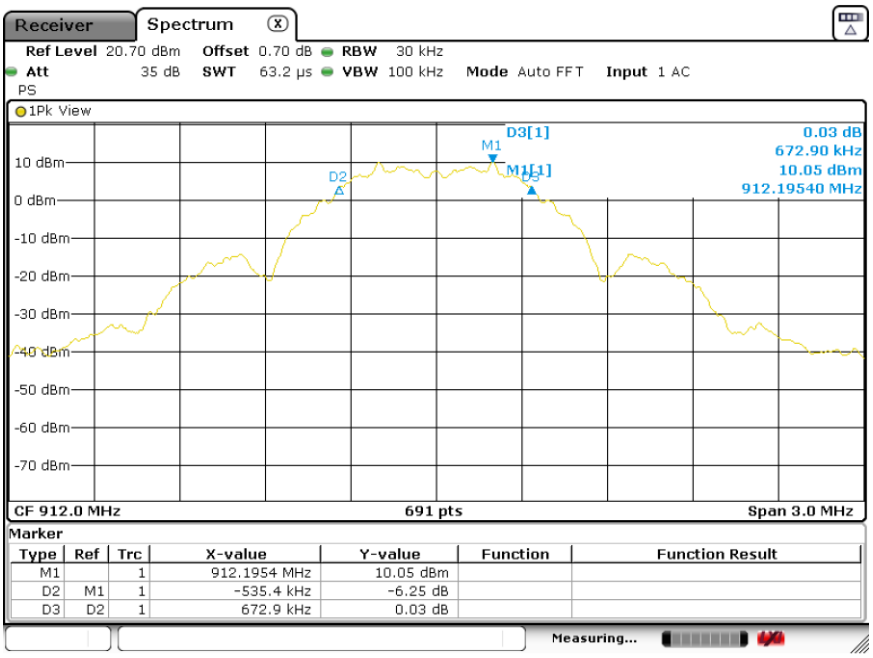
Pass

Results

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Lowest Channel

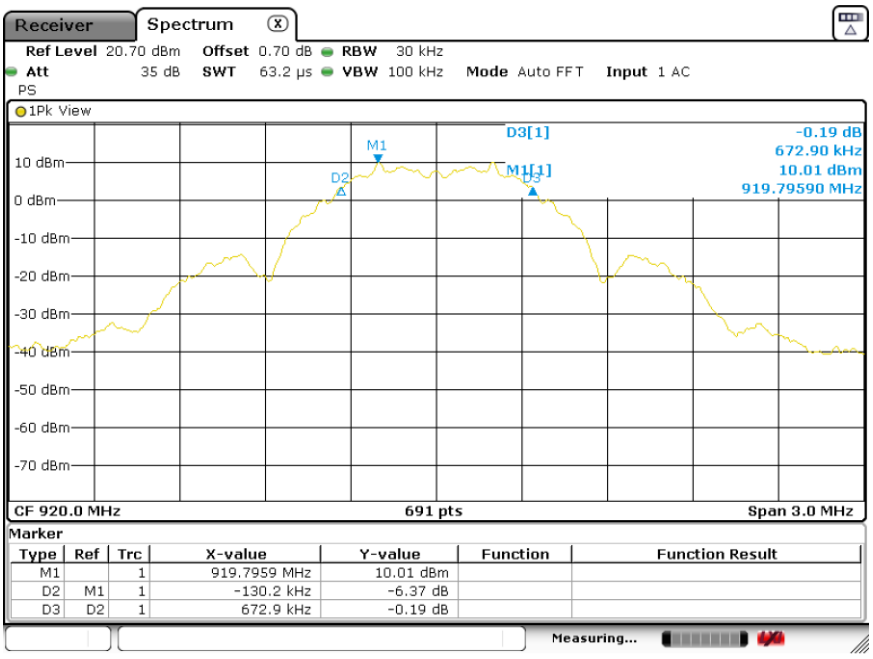
Images:



Date: 20.SEP.2022 00:52:04

Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Highest Channel

Images:



Date: 20.SEP.2022 01:13:35

RSS-247 5.4 (d) / FCC 15.247 (b) (3) Maximum Peak Conducted output power & Antenna gain

Limits

§15.247(b)(3) and RSS-247 5.4(d): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 watt (30 dBm).

RSS-247 5.4(d): The e.i.r.p. shall not exceed 4 W (36 dBm)

The maximum peak conducted output power was measured using the method according to point 9.1.1. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

Maximum declared antenna gain: -0.96 dBi

Test conditions modes: TC#01

Results

	Lowest frequency 912MHz	Highest frequency 920MHz
Maximum conducted power (dBm)	13.94	13.90
Maximum EIRP power (dBm)	12.98	12.94

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power limit is not required to be reduced from the stated values.

Verdict

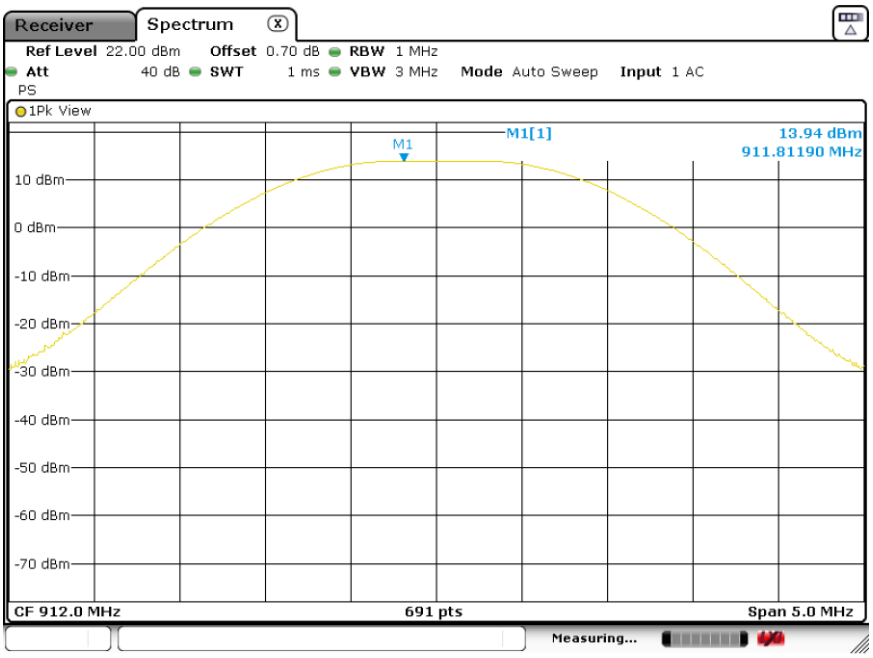
Pass

Results

Attachments

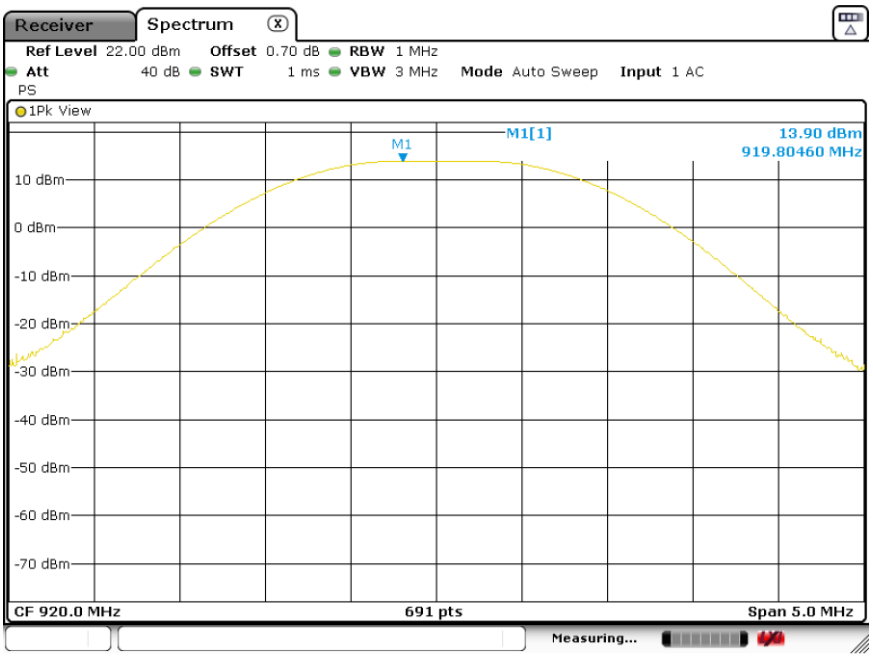
Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Lowest Channel

Images:



Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Highest Channel

Images:



RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter) - Conducted

Limits

In any 100 kHz bandwidths outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Note: Radiated measurements are also used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Test conditions modes: TC#01

Results

Verdict

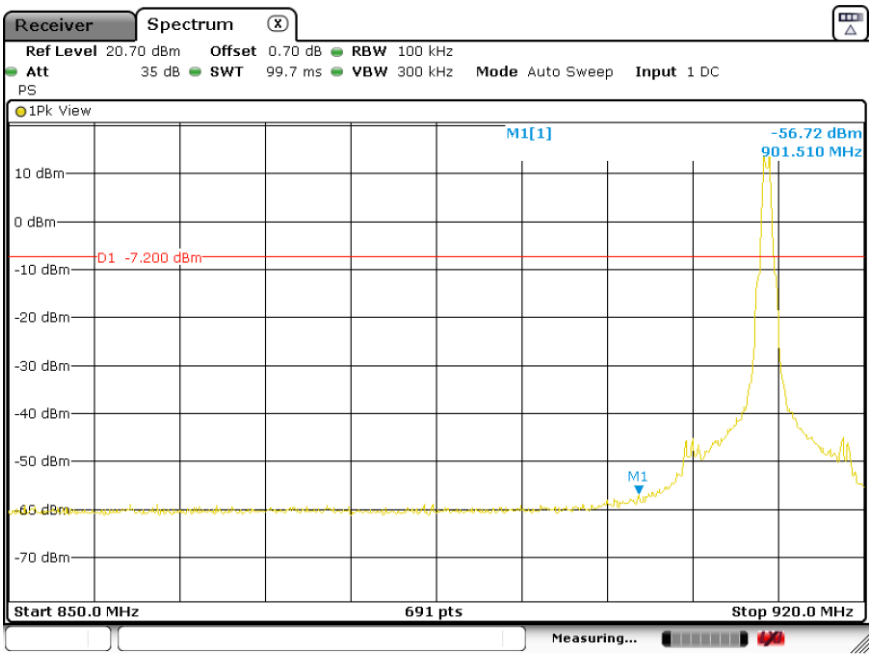
Pass

Results

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Lowest Channel

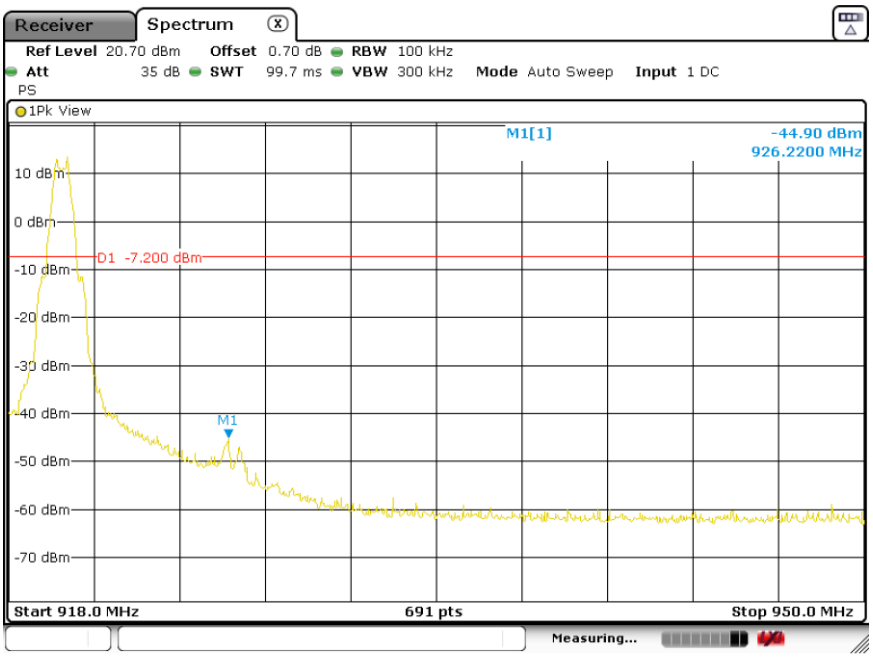
Images:



Date: 20.SEP.2022 01:07:34

Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Highest Channel

Images:



Date: 20.SEP.2022 01:16:48

RSS-247 5.2 (b) / FCC 15.247 (d) Power Spectral Density

Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

The maximum power spectral density level in the fundamental emission was measured using the method PKPSD (Peak PSD) according to point 10.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v05r02 (April 2019).

Test conditions modes: TC#01

Results

	Lowest frequency 912MHz	Highest frequency 920MHz
Power spectral density (dBm)	1.88	1.84

Verdict

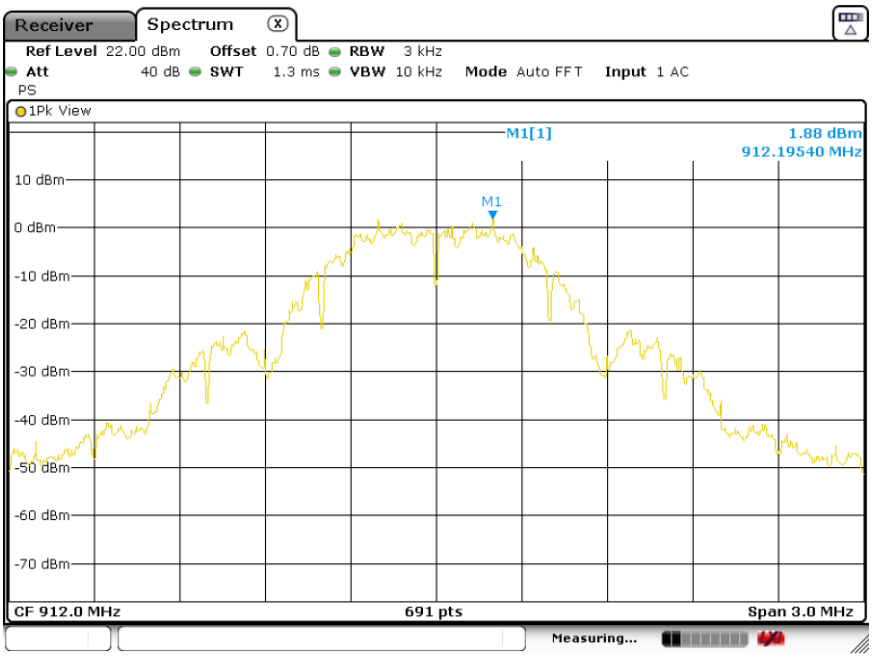
Pass

Results

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Lowest Channel

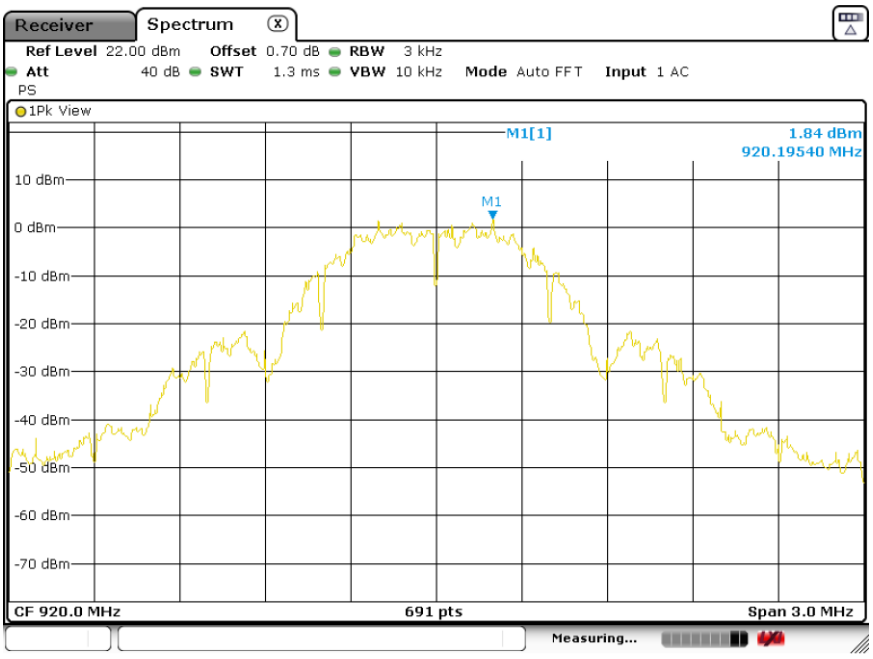
Images:



Date: 20.SEP.2022 01:11:14

Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Highest Channel

Images:



Date: 20.SEP.2022 01:15:23

RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
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	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Verdict

Pass

Test conditions modes: TC#01

Results: Frequency range 0.03 - 1 GHz

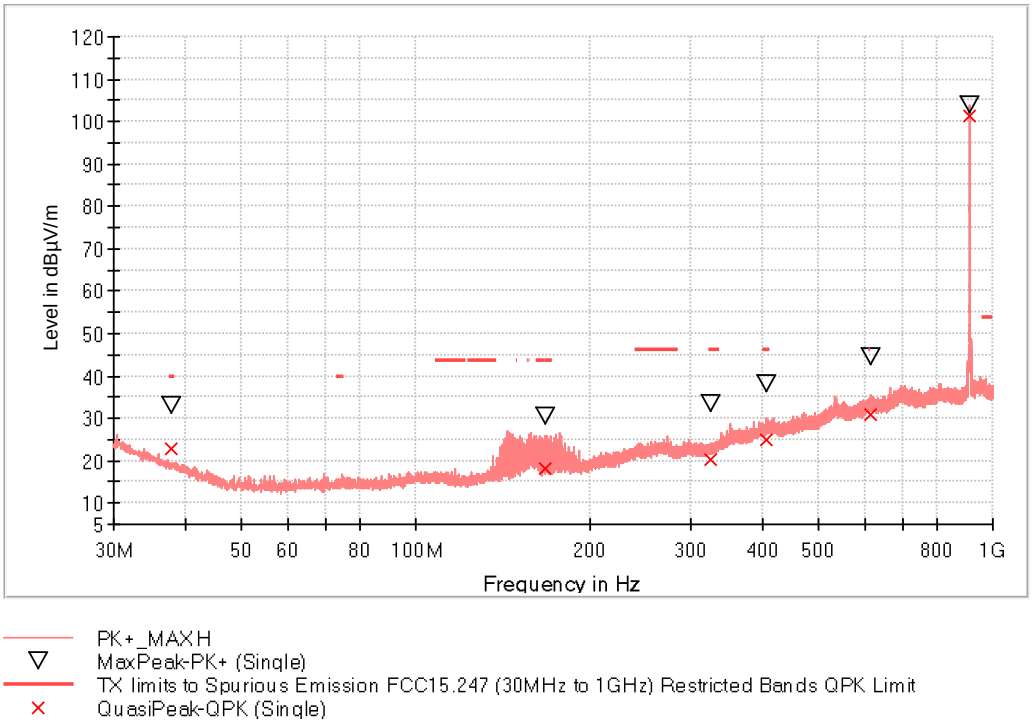
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Lowest Channel

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Frequency Range GHz = [0.03, 1]

Images:



Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)	Comments
37.711500	33.1	23.0	H	17.0	40.0	
167.206500	30.3	18.2	V	---	---	
325.219500	33.4	20.4	H	25.6	46.0	
405.002000	38.1	25.1	H	20.9	46.0	
612.242500	44.3	30.8	H	15.2	46.0	
911.827000	103.8	101.2	H	---	---	Fundamental

Test conditions modes: TC#01

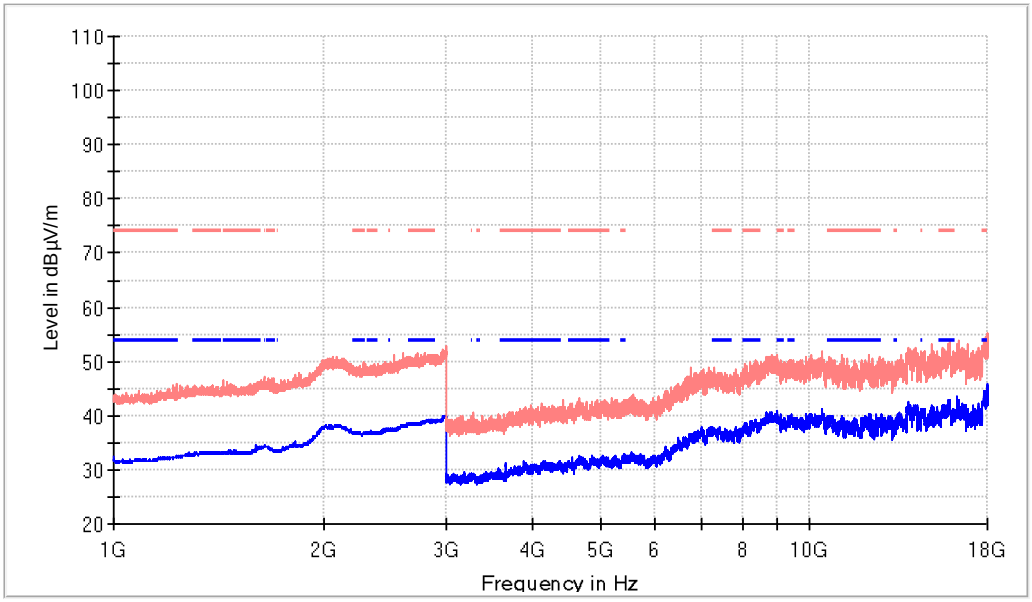
Results: Frequency range 1 - 18 GHz

Lowest Channel

Attachments

Frequency MHz = 912.00000, Bandwidth MHz = 1, Channel = 0, Frequency Range GHz = [1, 18]

Images:



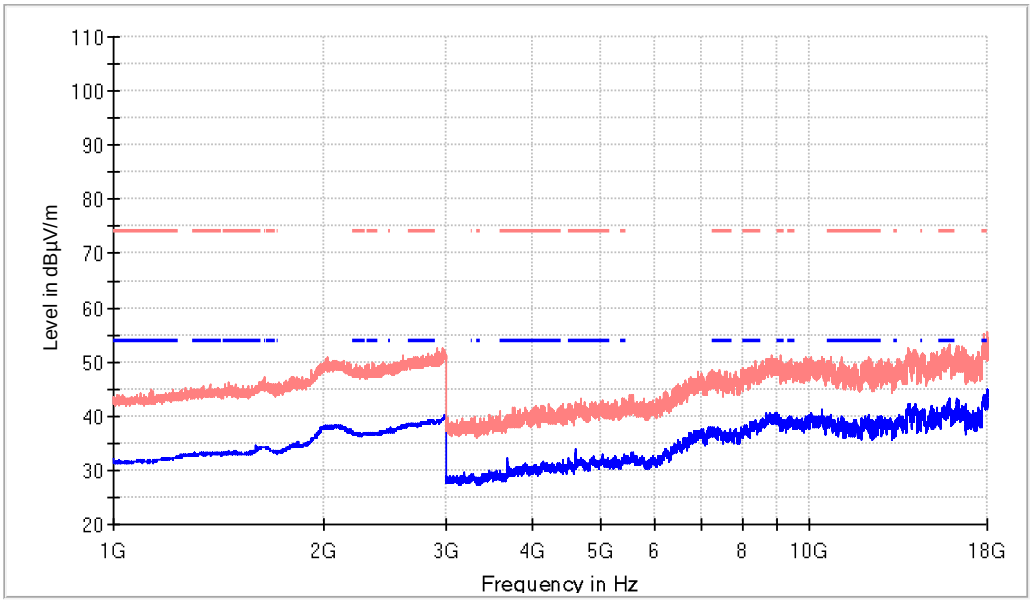
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
17993.000000	53.6	46.0	V	8.0	54.0

Highest Channel

Attachments

Frequency MHz = 920.00000, Bandwidth MHz = 1, Channel = 1, Frequency Range GHz = [1, 18]

Images:



Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
17986.000000	53.9	45.0	H	9.0	54.0