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

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2818ERM.007A1

Partial Test report

Reference Standard:
USA FCC Part 15.247, 15.407 & ISED RSS-247

Identification of item tested	Automotive infotainment System
Trademark	Mercedes-Benz
Model and /or type reference	NTG7 PREMIUMPLUS LFT2
Other identification of the product	FCC ID: 2AOUZ NTG7PRPLFT2 IC: 23650-NTG7PRPLFT2
Features	FM/AM/DAB/DVBT, USB, Bluetooth, WLAN, GNSS.
Manufacturer	CONTINENTAL AUTOMOTIVE GMBH VDO-Strasse 1, 64832 Babenhausen, GERMANY
Test method requested, standard	FCC Part 15.407 (10-1-16 Edition) FCC Part 15.247 10-1-18 Edition CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (April 2018). 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: 2020.08.27 20:53:08 -04'00'
Date of issue	08-26-2020
Report template No	FDT08_22 (*) "Data provided by the client"

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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.

	Frequency (MHz)	U(k=2)	Units
Radiated Spurious Emission	30-180	3.82	dB
	180-1000	2.61	dB
	1000-18000	2.92	dB
	18000-40000	2.15	dB

Data provided by the client

The test sample consist of an automotive head unit to be installed in cars with the following features: FM/AM/DAB/DVBT, USB, Bluetooth, WLAN and GNSS.

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.

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2818/01	Automotive Infotainment System	NTG7 PREMIUMPLUS LFT2	COM620LB0000001	04/07/2020

Sample S/01 has undergone following test(s):

All radiated tests indicated in appendix A.

Accessory elements used for Testing with S/01:

Control Nº	Description	Model	Serial Nº	Date of reception
2818/03	SMA adapter cable	--	--	04/07/2020
2818/04	Harness	--	--	04/07/2020

1. Accessory elements were used for the following test(s):

   All radiated tests indicated in appendix A.

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)
	Car Connector A	>3m(x1)	☒	☐	☐
	Car Connector B	>3m(x1)	☒	☐	☐
	Display Connector CID/PIP / RVC	>3m(x1)	☒	☒	☐
	USB Connector	<3m(x2)	☒	☒	☐
	Eth Connector	>3m(x1)	☒	☐	☐
	BT/WLAN-Antenna	>3m(x1)	☒	☒	☐
	FM/AM, TV/SDARS Ant	>3m(x1)	☒	☒	☐
	GNSS Antenna	>3m(x1)	☒	☒	☐

Supplementary information to the ports…… :	

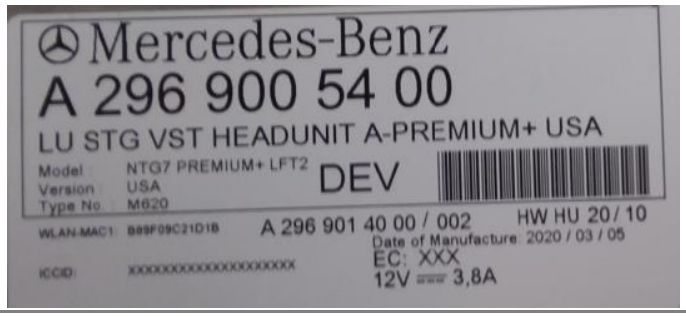
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 12V Car battery / attenuator (9,5-15,5V normal operation)					
	☐	DC:					

Rated Power .....:	9,5-15,5V normal operation
Clock frequencies .....:	see schematics
Other parameters.....:	See Technical Description
Software version .....:	**E17.100**

Hardware version.....:	**D5**			
Dimensions in cm (W x H x D)....:	182 x 78 x 160 mm			
Mounting position.....:	☐	Table top equipment		
	☐	Wall/Ceiling mounted equipment		
	☐	Floor standing equipment		
	☐	Hand-held equipment		
	☒	Other: automotive headunit		
Modules/parts .....:	Module/parts of test item		Type	Manufacturer
	n/a		-	
			-	
			-	
			-	
Accessories (not part of the test item) .....:	Description		Type	Manufacturer
	Display		-	LG.
	HARMANeco RasPi / headless		-	HBAS
	Cable harness		-	HBAS
	BT/WLAN-Antenna		-	Hirschmann

Documents as provided by the applicant.....:	Description	File name	Issue date
	Technical Description	Technical Description NTG7_A15 200324 SOP2 AllVariant.doc	

Copy of marking plate:



Identification of the client

CONTINENTAL AUTOMOTIVE GMBH
VDO-Strasse 1, 64832 Babenhausen, GERMANY.

Testing period and place

Test Location	DEKRA Certification, Inc.
Date (start)	05-01-2020
Date (finish)	05-07-2020

Document history

Report number	Date	Description
2818ERM.007	08-13-2020	First release
2818ERM.007A1	08-26-2020	Second release

Modifications to the reference test report

It was introduced the following modification in respect to the test report number 2818ERM.007 related with the same samples:

Clauses/ Sub-Clauses	Modification	Justification
Title Page	Modified FCC and IC ID	Requested by the customer.

This modification test report cancels and replaces the test report 2818ERM.007

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. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Poojita Bhattu and Koji Nishimoto.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC PART 15 PARAGRAPH / RSS-247 (WIFI 5GHz) 5.15 GHz -5.25 GHz Band					
Report Section	**FCC Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
--	§ 15.403 (i) KDB 789033 D02	RSS 247 6.2.1	26dB Emission Bandwidth & Occupied Bandwidth	N/A	Refer 2
--	§ 15.407 (a) (1) (4) KDB 662911 D01 E (1)	RSS 247 6.2.1.1	Power Limits. Maximum Output Power	N/A	Refer 2
--	§ 15.407 (a) (1) (5)	RSS-247 6.2.1.1	Maximum Power Spectral Density	N/A	Refer 2
--	§ 15.407 (b) (1)	RSS-247 6.2.1.2	Band-edge radiated emissions compliance (Transmitter)	N/A	Refer 2
--	§ 15.407 (b)(6) § 15.207	RSS-Gen 8.8	Emission limitations Conducted (Transmitter)	N/A	Refer 2
A.1	§ 15.407 (b)(1)(6)(7) § 15.209 § 15.205	RSS-247 6.2.1.2 RSS-Gen 8.9 & 8.10	Undesirable radiated emissions (Transmitter)	P	N/A
--	§ 15.407 (g)	RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 1

Supplementary information and remarks:

The test set-up was made in accordance to the general provisions of ANSI C63.10: 2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated 12/14/2017

1) The compliance is checked through a description of how this requirement is met that is provided by the applicant.

2) Test not performed. Only Radiated Spurious tests were requested.

Summary

FCC PART 15 PARAGRAPH / RSS-247 (WIFI 5GHz) 5.725 GHz -5.85 GHz Band					
Report Section	**FCC Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
--	§ 15.403 (i) KDB 789033 D02	RSS 247 6.2.4	26dB Emission Bandwidth & Occupied Bandwidth	N/A	Refer 2
--	§ 15.407 (e)	RSS 247 6.2.4.1	6 dB Emission	N/A	Refer 2
--	§ 15.407 (a)(3)(4) KDB 662911 D01 E (1)	RSS 247 6.2.4.1	Power Limits. Maximum Output Power	N/A	Refer 2
--	§ 15.407 (a)(3)(5)	RSS-247 6.2.4.1	Maximum Power Spectral Density	N/A	Refer 2
--	§ 15.407 (b)(4)	RSS-247 6.2.4.2	Band-edge radiated emissions compliance (Transmitter)	N/A	Refer 2
--	§ 15.407 (b)(6) § 15.207	RSS-Gen 8.8	Emission limitations Conducted (Transmitter)	N/A	Refer 2
A.1	§ 15.407 (b)(4)(6)(7) § 15.209 § 15.205	RSS-247 6.2.4.2 RSS-Gen 8.9 & 8.10	Undesirable radiated emissions (Transmitter)	P	N/A
--	§ 15.407 (g)	RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 1

Supplementary information and remarks:

The test set-up was made in accordance to the general provisions of ANSI C63.10: 2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated 12/14/2017

1) The compliance is checked through a description of how this requirement is met that is provided by the applicant.

2) Test not performed. Only Radiated Spurious tests were requested.

List of equipment used during the test

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber	FRANKONIA	SAC 3 plus “L”	2017/08	2020/08
1064	Biconical Log antenna	ETS LINDGREN	3142E	2018/01	2021/01
1057	Double-ridge Waveguide Horn antenna 1-18 GHz	ETS LINDGREN	3115	2017/05	2020/05
1056	Double-ridge Waveguide Horn antenna 18-40 GHz	ETS LINDGREN	3116C	2020/01	2023/01
1012	EMI Test Receiver	ROHDE & SCHWARZ	ESR26	2019/12	2021/12
1014	SIGNAL ANALYSER	ROHDE & SCHWARZ	FSV40	2019/04	2021/04

Appendix A: FCC Multi-transmitters Test Results

Appendix A Content

Description of Test Conditions

The worst case was found when positioned as the table below. Following channels were selected for the final test as listed below:

<table>
<tr><th>TEST CONDITIONS</th><th>DESCRIPTION</th></tr>
<tr><td>TC#01</td><td>
Power supply (V):
$V_{nominal}$ = 13.2 Vdc
Type of power supply:
DC voltage from power supply.
Temperature (ºC):
T_{nom} = +15 to + 35
T_{min} = -20
T_{max} = +55
Test Frequency for Radiated test:
<table>
<tr><th>Available Frequencies (MHz)</th><th>Tested Frequency (MHz)</th><th>BW (MHz)</th><th>Modulation</th><th>Mode</th></tr>
<tr><td>2402-2483.5</td><td>2402</td><td>20</td><td>FHSS</td><td>GFSK</td></tr>
<tr><td>2402-2483.5</td><td>2412</td><td>20</td><td>DSSS</td><td>g mode</td></tr>
<tr><td>5170-5835</td><td>5180</td><td>20</td><td>OFDM</td><td>a mode</td></tr>
</table>
The test was performed with the equipment transmitting with BT, Wi-Fi 2.4Hz and 5GHz radios simultaneously. These measurements have been performed in order to check the impact of the multi-transmitter of all radio interfaces that can be transmitting simultaneously.
</td></tr>
</table>

<table>
<tr><th>TEST CONDITIONS</th><th>DESCRIPTION</th></tr>
<tr><td>TC#02</td><td>
Power supply (V):
$V_{nominal}$ = 13.2 Vdc
Type of power supply:
DC voltage from power supply.
Temperature (ºC):
T_{nom} = +15 to + 35
T_{min} = -20
T_{max} = +55
Test Frequency for Radiated test:
<table>
<tr><th>Available Frequencies (MHz)</th><th>Tested Frequency (MHz)</th><th>BW (MHz)</th><th>Modulation</th><th>Mode</th></tr>
<tr><td>2402-2483.5</td><td>2402</td><td>20</td><td>FHSS</td><td>GFSK</td></tr>
<tr><td>2402-2483.5</td><td>2462</td><td>20</td><td>DSSS</td><td>g mode</td></tr>
<tr><td>5170-5835</td><td>5785</td><td>20</td><td>OFDM</td><td>a mode</td></tr>
</table>
The test was performed with the equipment transmitting with BT, Wi-Fi 2.4Hz and 5GHz radios simultaneously. These measurements have been performed in order to check the impact of the multi-transmitter of all radio interfaces that can be transmitting simultaneously.
</td></tr>
</table>

A.1: RADIATED EMISSIONS (Multi-Transmitters)

LIMITS:	Product standard:	FCC 15.247, 15.407 & RSS - 247
	Test standard:	Part 15 Subpart C §15.407(b) (1)(6)(7) and RSS-247 6.2.1.2

LIMITS

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §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
960 - 25000	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

TEST SETUP

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 at 1m for the frequency range 1-40 GHz (1 GHz-18 GHz and 18 GHz-40 GHz Double ridge horn antennas).

For radiated emissions in the range 1-40 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.

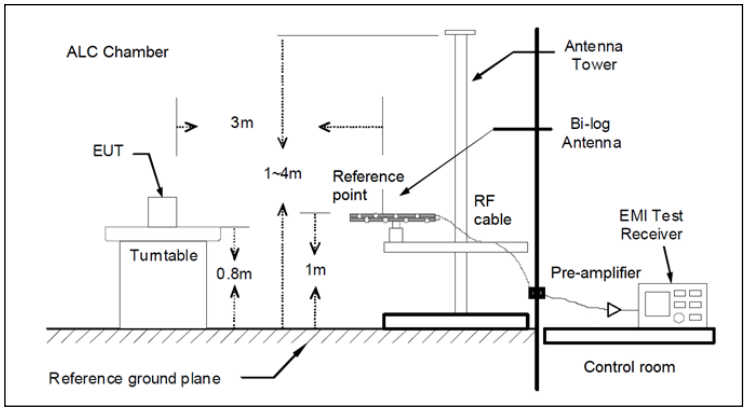
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

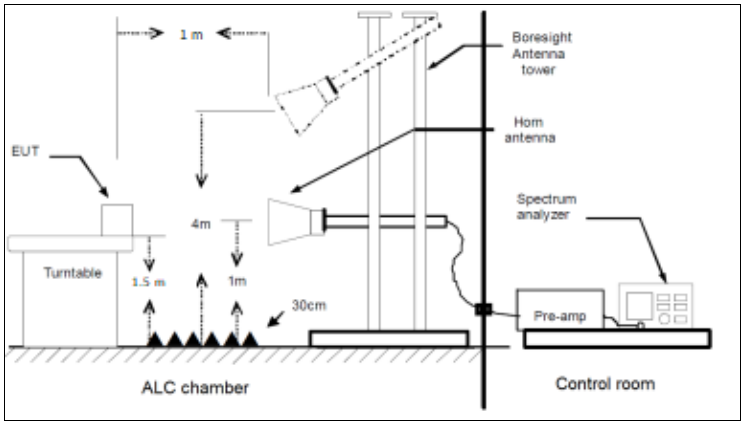
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)	

Radiated measurements Setup f < 1 GHz



Radiated measurements setup f > 1 GHz

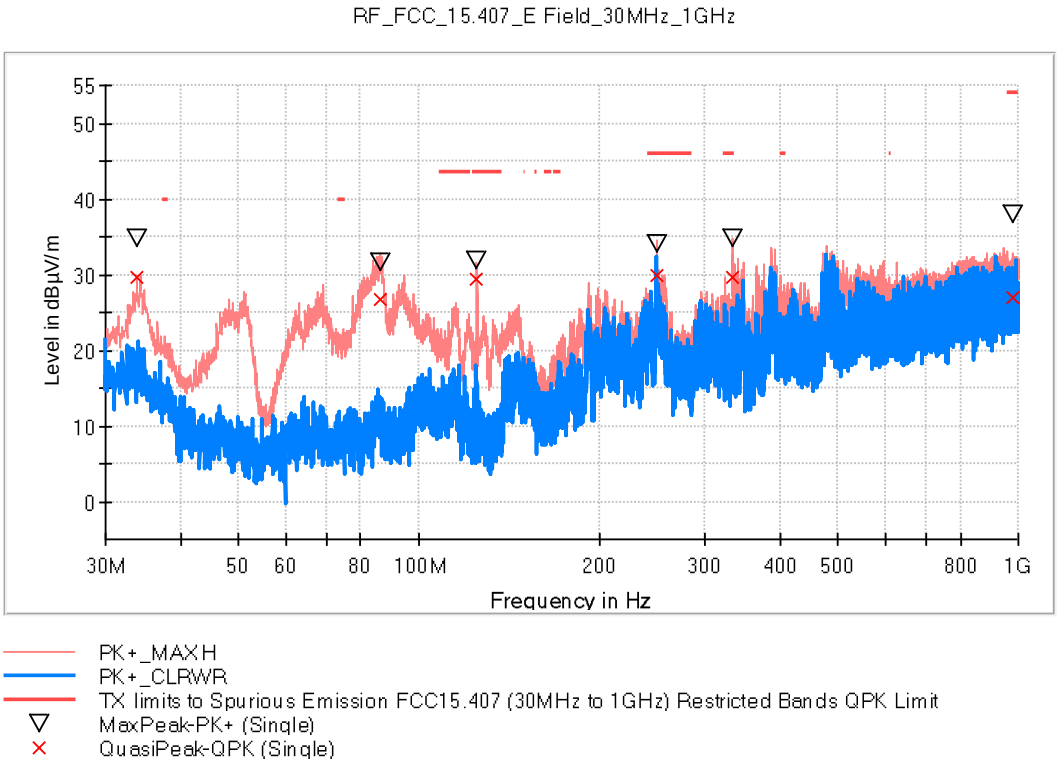


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

FREQUENCY RANGE: 30-1000 MHz

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

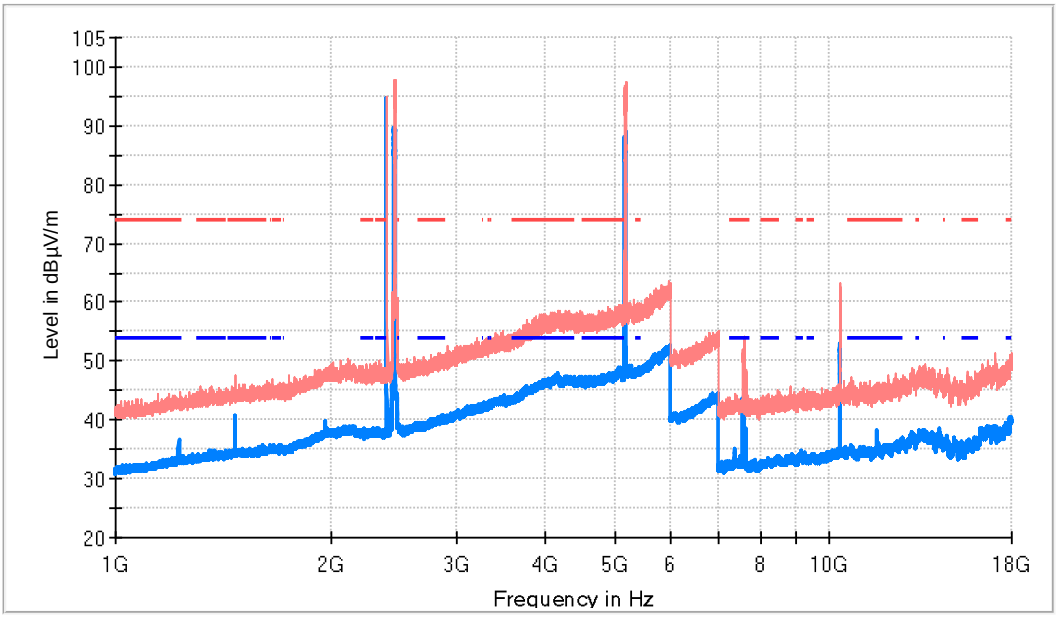
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol
33.8	34.8	29.7	V
86.2	31.6	26.8	V
125.0	31.9	29.3	V
249.9	34.1	29.8	H
334.0	34.8	29.5	H
976.9	37.9	27.0	V



TEST RESULTS (Cont.):	

FREQUENCY RANGE: 1-18 GHz

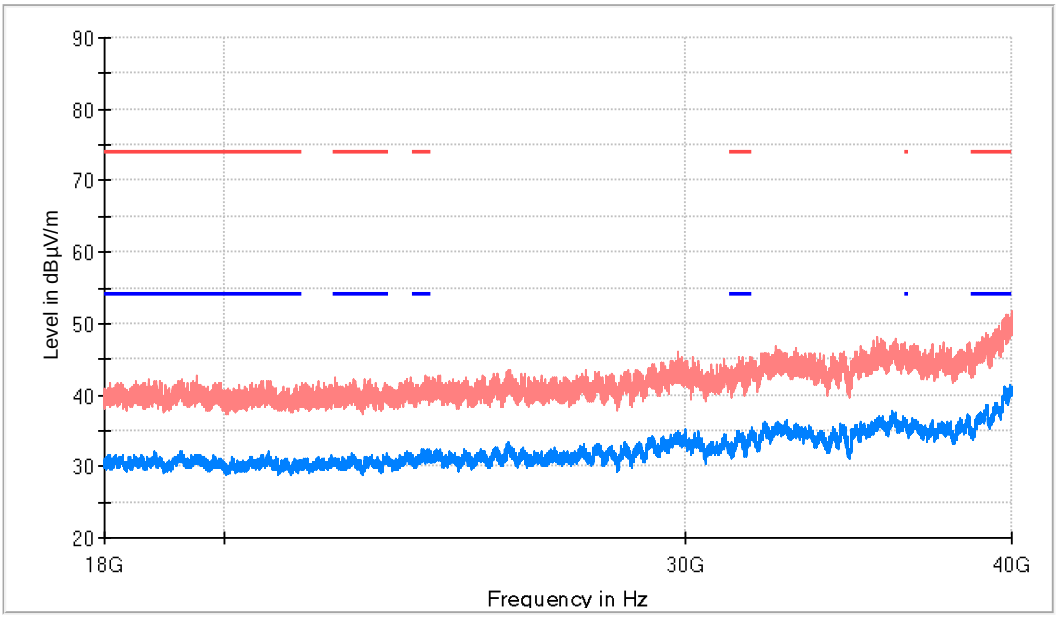
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1228.0	42.8	36.7	V	17.3	54.0	
1474.5	47.5	40.7	V	13.3	54.0	
2401.8	95.0	94.5	H	---	---	Fundamental BT
2461.8	96.4	88.6	V	---	---	Fundamental Wi-Fi 2.4GHz
5180.7	96.7	88.8	H	---	---	Fundamental Wi-Fi 5GHz
7581.8	51.9	45.3	H	8.7	54.0	
7640.2	47.5	38.1	H	15.9	54.0	
10358.7	61.2	53.0	H	---	---	
11673.8	46.4	38.3	V	15.7	54.0	



TEST RESULTS (Cont.):	

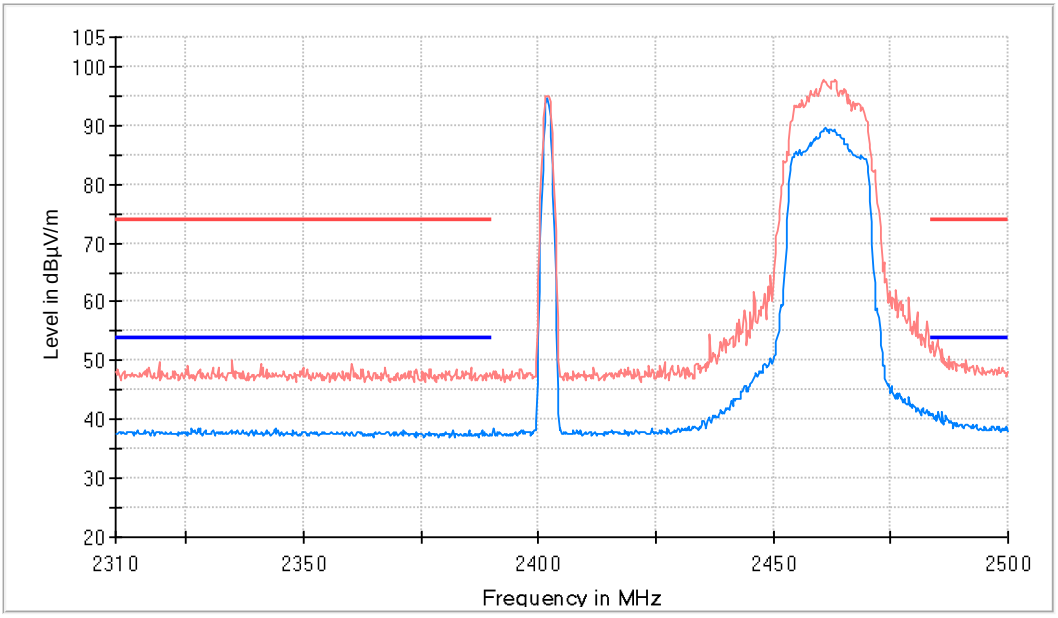
FREQUENCY RANGE: 18-40 GHz

The radiated spurious signals detected were more than 20 dB below the reference limit.



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.):	Restricted bands (2.31 GHz – 2.5 GHz)

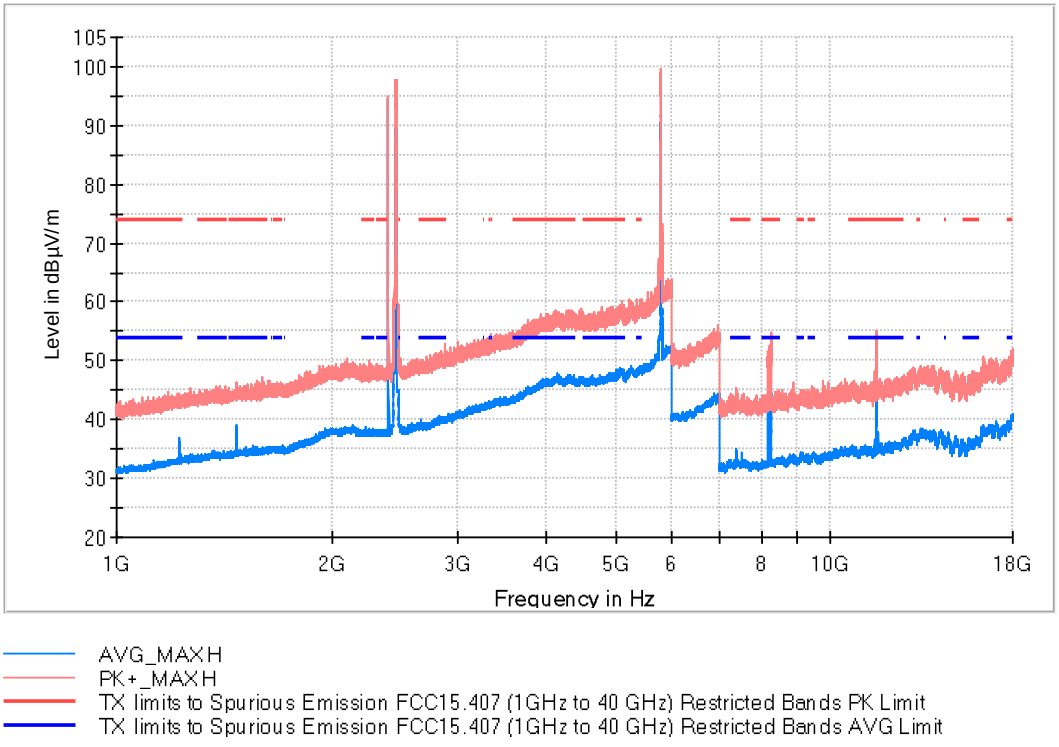


AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands AVG Limit

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02
TEST RESULTS :	PASS

FREQUENCY RANGE: 1-18 GHz

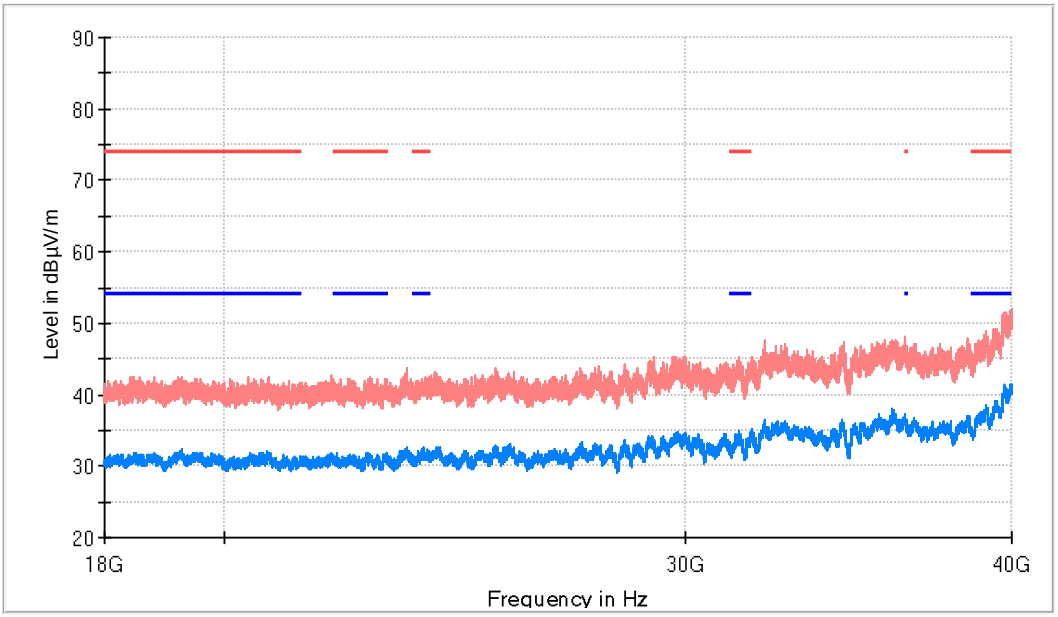
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1226.8	43.9	36.8	V	17.2	54.0	
1472.7	46.4	39.1	H	14.9	54.0	
2402.3	95.0	93.4	H	---	---	Fundamental BT
2461.6	96.2	89.5	V	---	---	Fundamental Wi-Fi 2.4GHz
5785.2	97.9	89.5	V	---	---	Fundamental Wi-Fi 5GHz
8186.2	52.5	43.6	H	10.4	54.0	
8247.3	53.5	44.7	V	9.3	54.0	
11569.6	52.1	43.5	V	10.5	54.0	



TEST RESULTS (Cont.):	

FREQUENCY RANGE: 18-40 GHz

The radiated spurious signals detected were more than 20 dB below the reference limit.



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.):	Restricted bands (2.31 GHz – 2.5 GHz)