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

DEKRA

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2719ERM.004A1

Test report

USA FCC Part 15.247, 15.209
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	Digital Cluster with BTLE
(*) Trademark	Visteon Corporation
(*) Model and /or type reference tested	2W Cluster
Other identification of the product	--
(*) Features	BT 5.0 LE
Manufacturer	VISTEON CORPORATION One Village Center Drive. Van Buren Township, MI Postcode/Zip Code: 48111.
Test method requested, standard	USA FCC Part 15.247, 10-1-19 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209, 10-1-19 Edition: Radiated emission limits; general requirements CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (Amendment 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: 2020.08.06 21:21:54 -04'00'
Date of issue	08-06-2020
Report template No	FDT08_22 (*) "Data provided by the client"

Index

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
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 2W Cluster is a Digital Cluster for 2 wheels vehicles, features Bluetooth that allows receiving incoming call, read phone and mailing status, and provides navigation guidance to the user.

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:

Control Nº	Description	Model	Serial Nº	Date of reception
2719/07	RF Conducted MKTA Sample	2W Cluster	-	04/22/2020

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

   All conducted tests indicated in appendix B.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2719/11	EMC MKTA Sample	2W Cluster	-	04/22/2020

1. Sample S/02 has undergone following test(s):

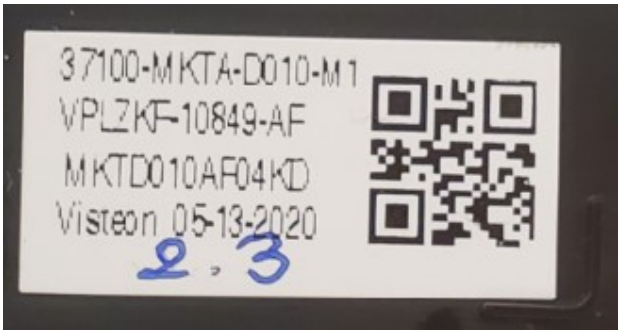
   All radiated tests indicated in appendix B.

S/01 & S/02 used the following accessory items for testing

Control Nº	Description	Model	Serial Nº	Date of reception
2719/18	CAN Interface	VN1610	007150-073450	06/23/2020
2719/19	CAN Cable 2Y	--	--	06/23/2020
2719/01	Harness Cable	--	--	04/22/2020

Test sample description

Ports……:	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded		
	24 Pin External Connector		☐	☒	☐		
Supplementary information to the ports…… :	*No provided data*						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: Nominal voltage DC 13.2V					
	☐	DC:					
Rated Power .....:	*No provided data*						
Clock frequencies .....:	*No provided data*						
Other parameters.....:	*No provided data*						
Software version .....:	01.07.03						
Hardware version.....:	PWB25146						
Dimensions in cm (L x W x D) ....:	161.4x98.8x49.3 mm						
Mounting position.....:	☐	*Table top equipment*					
	☐	*Wall/Ceiling mounted equipment*					
	☐	*Floor standing equipment*					
	☐	*Hand-held equipment*					
	☒	*Other:* Installed on 2 wheels vehicle					
Modules/parts .....:	Module/parts of test item		Type		Manufacturer		
	No provided data						
Accessories (not part of the test item).....:	Description		Type		Manufacturer		
	No provided data						
Documents as provided by the applicant.....:	Description		File name		Issue date		
	Equipment declaration data		FDT30_14				

Copy of marking plate:


Identification of the client

VISTEON CORPORATION

One Village Center Drive. Van Buren Township, MI 48111

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	06-23-2020
Date (finish)	07-06-2020

Document history

Report number	Date	Description
2719ERM.004	07-16-2020	First release
2719ERM.004A1	08-06-2020	Second release

Modifications to the reference test report

It was introduced the following modification in respect to the test report number 2719ERM.004 related with the same samples:

Clauses/ Sub-Clauses	Modification	Justification
Page 12 / Product Information	Antenna Gain updated.	Requested by the customer.
Page 20/Appendix A.3 Maximum Peak Conducted Output Power	Antenna Gain & E.I.R.P Values updated.	To compliant with customer declaration.

This modification test report cancels and replaces the test report 2719ERM.004A1.

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: Lakshmi Gollamudi, Divya Adusumilli, Lourdes Maria Valverde and Koji Nishimoto.

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-247 (Bluetooth Low Energy)					
Report Section	**FCC Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1	§ 2.1049	RSS-Gen 6.7	99% Occupied Bandwidth	P	N/A
A.2	§ 15.247 (a) (2)	RSS-247 5.2. (a)	6dB Emission Bandwidth	P	N/A
A.3	§ 15.247 (b) (3)	RSS-247 5.4. (d)	Maximum peak conducted output power and antenna gain	P	N/A
A.4	§ 15.247 (d)	RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	P	N/A
A.5	§ 15.247 (e)	RSS-247 5.2. (b)	Power spectral density	P	N/A
-	§15.207 (a)	RSS Gen 8.8	Conducted Emission Limits	N/A	Refer 1
A.6	§ 15.247 (d)	RSS-Gen 8.9 & 8.10.	Emission limitations radiated (Transmitter)	P	N/A

Supplementary information and remarks:

1. Device has an integral antenna.

List of equipment used during the test

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1039	FSV40 Signal analyzer 40 GHz	Rohde & Schwarz	FSV40	2018/10	2020/10
1309	Switch unit	Rohde & Schwarz	OSP120 / OSP-B157	2020/03	2022/03
1009	RF and Microwave Signal generator	Rohde & Schwarz	SMB100A	2019/08	2021/08
1042	RF Vector Signal generator	Rohde & Schwarz	SMBV100A	2020/03	2022/03

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber	Frankonia	SAC 3 plus “L”	N/A	N/A
1064	Biconical Log antenna	ETS LINDGREN	3142E	2018/01	2021/01
1057	Double-ridge Waveguide Horn antenna 1-18 GHz	ETS LINDGREN	3115	2020/06	2023/06
1056	Double-ridge Waveguide Horn antenna	ETS LINDGREN	3116C	2020/01	2023/01
1014	Spectrum analyzer	Rohde & Schwarz	FSV40	2019/04	2021/04
1012	EMI TEST RECEIVER	Rohde & Schwarz	ESR 26	2019/12	2021/12
0981	RF pre-amplifier 1-18 GHz	Bonn Elektronik	BLMA 0118-2A	2018/10	2020/10

Appendix A: Test results (Bluetooth Low Energy)

Appendix A Content

PRODUCT INFORMATION

The following information is provided by the client

Information	**Description**
Modulation	BFSK
Adaptive	Non-Adaptive equipment
Operation mode	
- Operating Frequency Range	2400 – 2483.5 MHz
- Nominal Channel Bandwidth	1 MHz
- RF Output Power	+3.5 dBm
Extreme operating conditions	
- Temperature range	-20 ºC to +60 ºC
Antenna type	Multi Layer Chip Antenna
Antenna gain	+0.2 dBi
Nominal Voltage	
- Supply Voltage	13.2 Vdc
- Type of power source	DC Voltage
Equipment type	Bluetooth Low Energy
Geo-location capability	No

DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01 (1 Mbps)	Power supply (V): $V_{nominal}$ = 13.2 Vdc Data Rate: 1 Mbps Bandwidth: 1 MHz Test Frequencies for Conducted/ Radiated tests: Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz

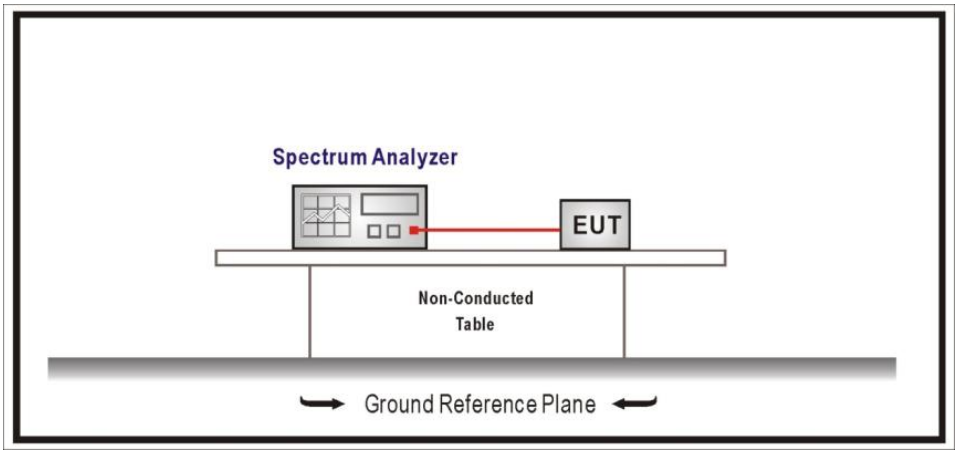
TEST A.1: 99% OCCUPIED BANDWIDTH

LIMITS:	Product standard:	§ 2.1049 and RSS-Gen
	Test standard:	§ 2.1049 and RSS-Gen 6.7

LIMITS

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

TEST SETUP	

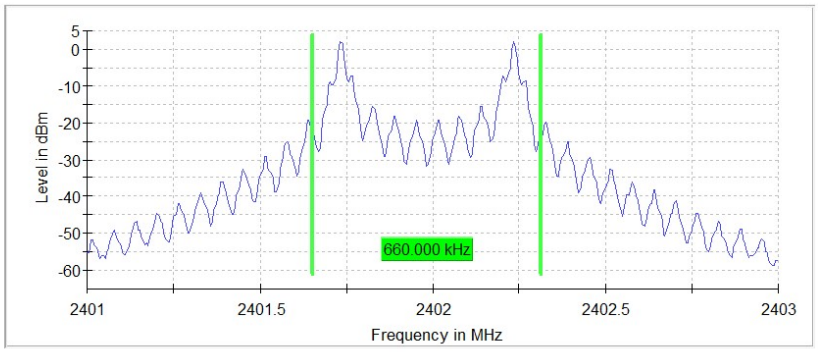


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

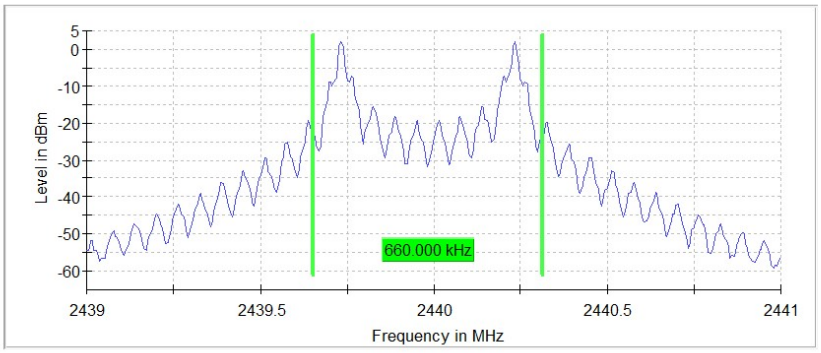
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
99% bandwidth (KHz)	660.0	660.0	660.0
Measurement uncertainty (kHz)	<± 8.33		

TEST RESULTS (Cont.):	

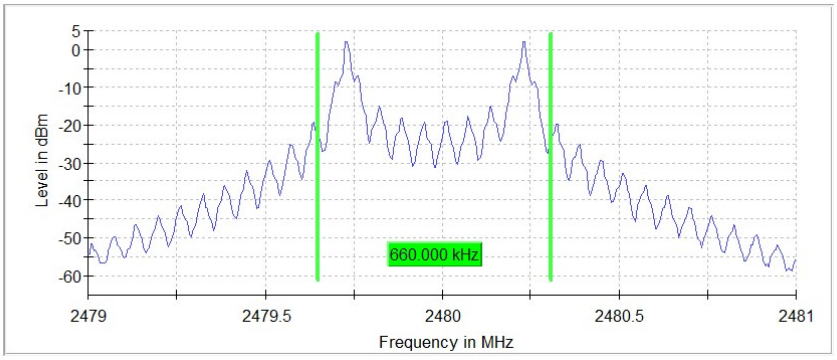
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40100 GHz	2.43900 GHz	2.47900 GHz
Stop Frequency	2.40300 GHz	2.44100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz	2.000 MHz
RBW	10.000 kHz	10.000 kHz	10.000 kHz
VBW	30.000 kHz	30.000 kHz	30.000 kHz
Sweep Points	400	400	400
Sweep time	189.648 µs	189.648 µs	189.648 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	Off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.30 dB	0.30 dB	0.30 dB
Run	7 / max. 150	5 / max. 150	7 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.21 dB	0.28 dB	0.20 dB

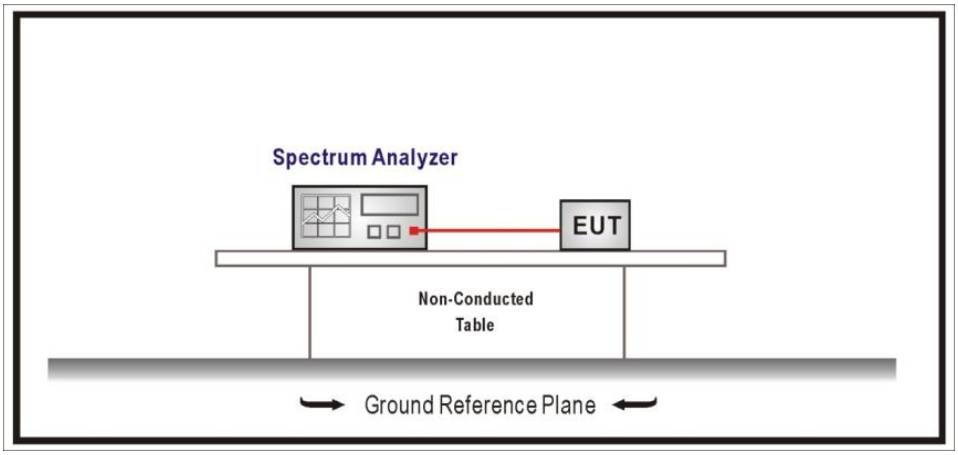
TEST A.2: 6DB BANDWIDTH

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(a)(2) and RSS-247 5.2(a)

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 SETUP	

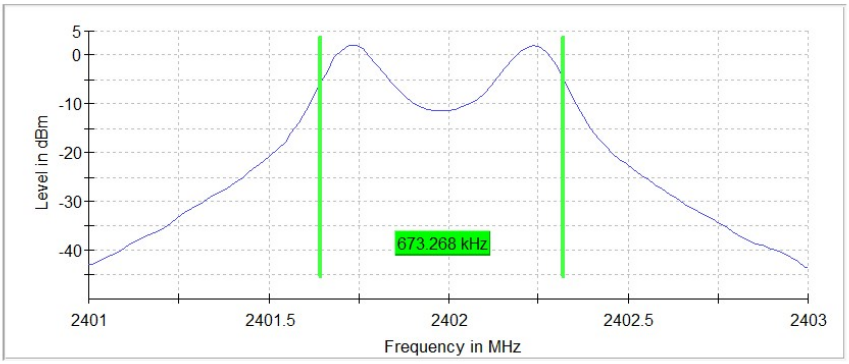


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

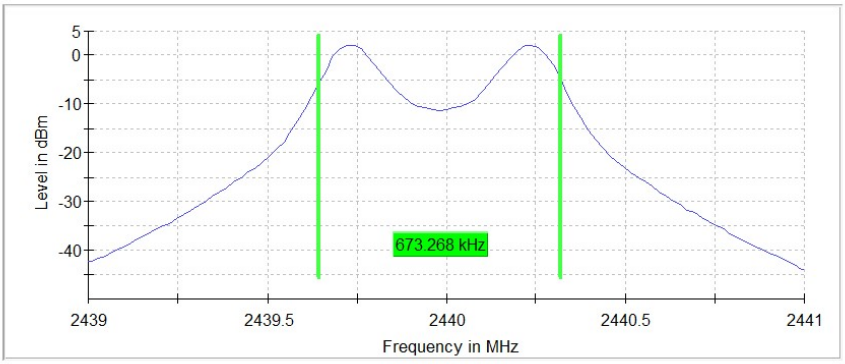
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (kHz)	673.268	673.268	673.268
Measurement uncertainty (kHz)	<±20.0		

TEST RESULTS (Cont.):	

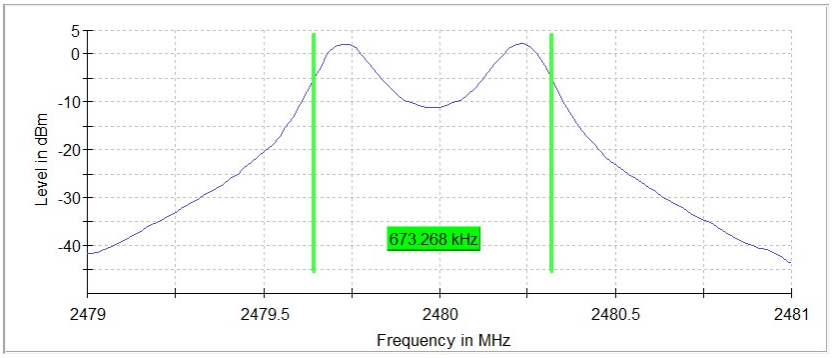
Lowest Channel:



Mid Channel:



High Channel:



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40100 GHz	2.43900 GHz	2.47900 GHz
Stop Frequency	2.40300 GHz	2.44100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz	2.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
Sweep Points	101	101	101
Sweep time	18.938 µs	18.938 µs	18.938 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	6 / max. 150	6 / max. 150	6 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.02 dB	0.04 dB	0.09 dB

TEST A.3: MAXIMUM PEAK CONDUCTED OUTPUT POWER AND ANTENNA GAIN

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(b)(3) and RSS-247 5.4(d)

LIMITS

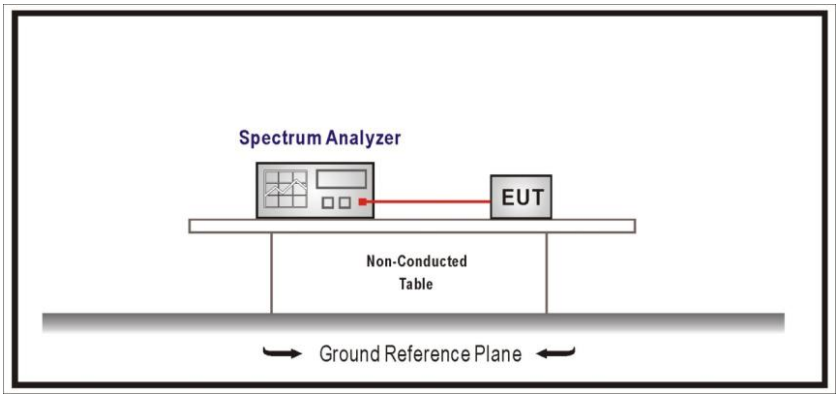
§15.247(b)(3) and RSS-247 5.4(d): For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

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

TEST SETUP	

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



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

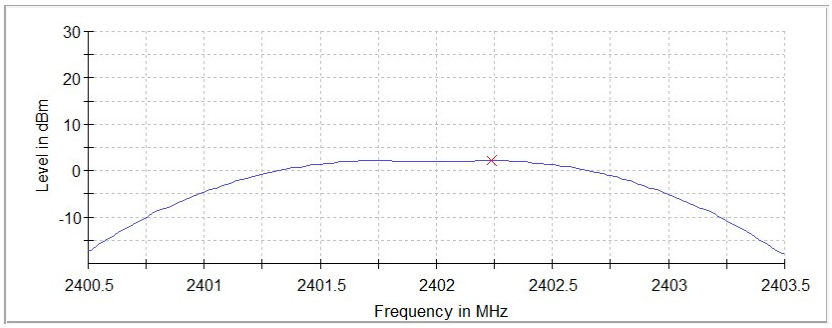
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	2.1	2.0	2.2
Maximum EIRP power (dBm)	2.3	2.2	2.4
Measurement uncertainty (dB)	<±0.78		

Maximum declared antenna gain: +0.2 dBi

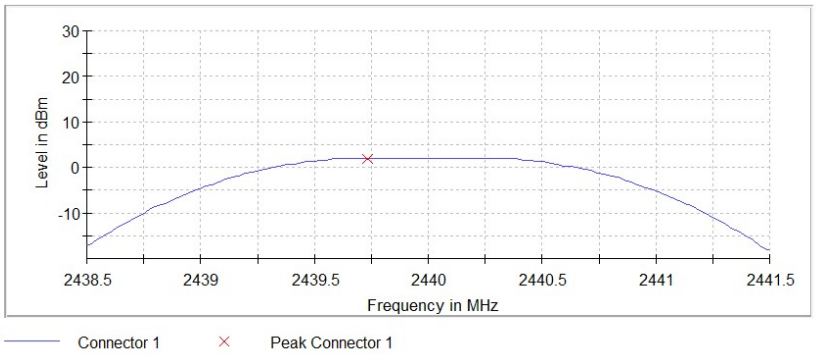
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

TEST RESULTS (Cont.):	CONDUCTED PEAK POWER

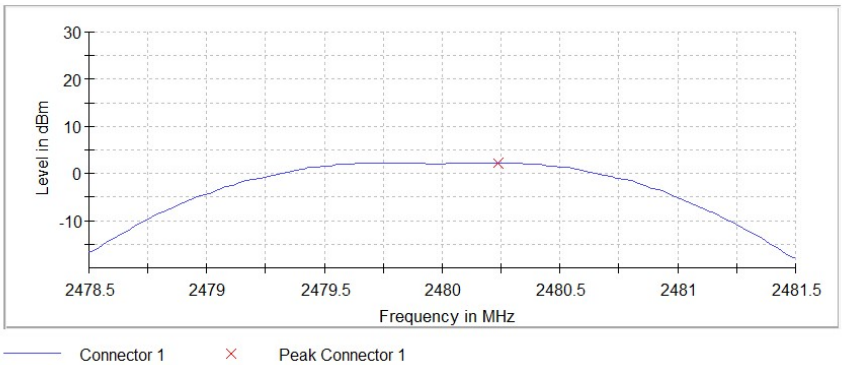
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40050 GHz	2.43850 GHz	2.47850 GHz
Stop Frequency	2.40350 GHz	2.44150 GHz	2.48150 GHz
Span	3.000 MHz	3.000 MHz	3.000 MHz
RBW	1.000 MHz	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz	3.000 MHz
Sweep Points	101	101	101
Sweep time	1.907 µs	1.907 µs	1.907 µs
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	4 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.03 dB	0.12 dB	0.21 dB

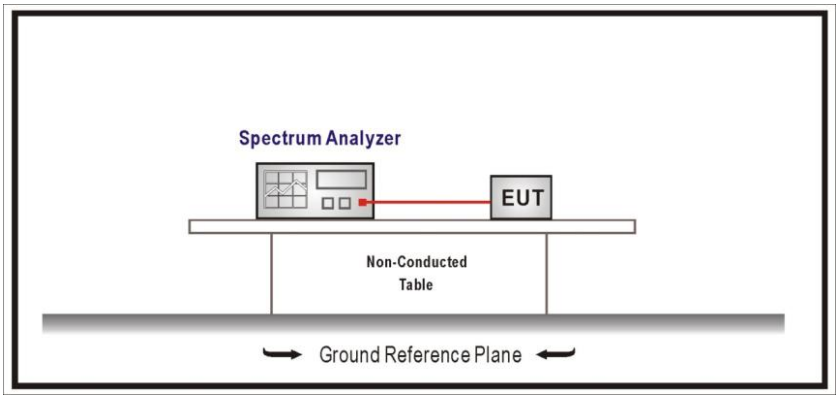
TEST A.4: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(d) and RSS-247 5.5

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

TEST SETUP	

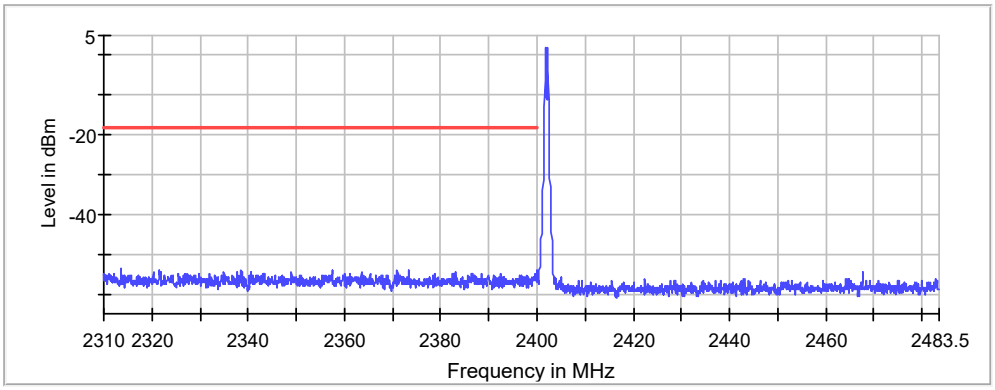


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

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

TEST RESULTS (Cont.):	Lowest Channel

Band Edge

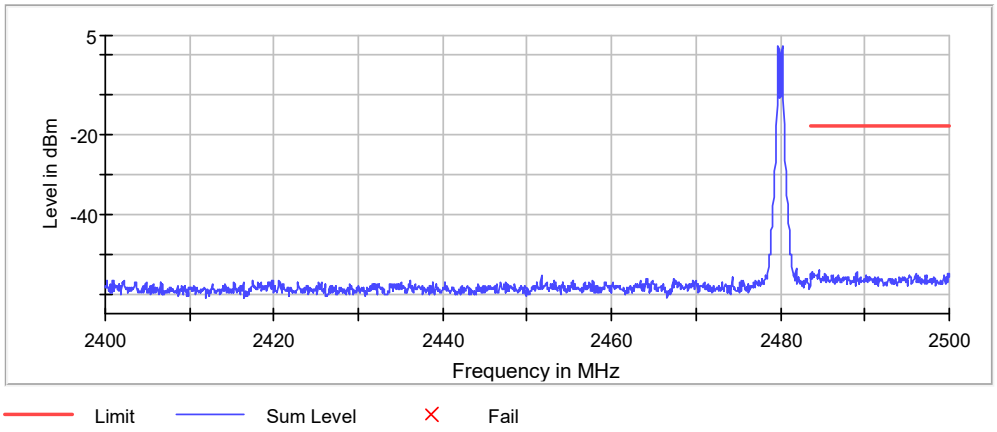


Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2313.625000	-53.5	35.4	-18.1	PASS
2313.675000	-53.6	35.4	-18.1	PASS
2370.975000	-53.9	35.8	-18.1	PASS
2338.575000	-53.9	35.8	-18.1	PASS
2373.425000	-54.1	36.0	-18.1	PASS
2357.425000	-54.2	36.1	-18.1	PASS
2357.475000	-54.2	36.1	-18.1	PASS
2399.875000	-54.3	36.1	-18.1	PASS
2321.625000	-54.3	36.2	-18.1	PASS
2338.525000	-54.3	36.2	-18.1	PASS
2373.375000	-54.3	36.2	-18.1	PASS
2340.525000	-54.4	36.3	-18.1	PASS
2337.775000	-54.4	36.3	-18.1	PASS
2320.325000	-54.4	36.3	-18.1	PASS
2338.625000	-54.4	36.3	-18.1	PASS

TEST RESULTS (Cont.):	Highest Channel

Band Edge



Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.575000	-54.3	36.5	-17.8	PASS
2484.525000	-54.4	36.6	-17.8	PASS
2483.775000	-54.6	36.8	-17.8	PASS
2483.825000	-54.7	36.9	-17.8	PASS
2489.025000	-54.7	36.9	-17.8	PASS
2483.975000	-54.7	36.9	-17.8	PASS
2496.025000	-54.8	37.0	-17.8	PASS
2496.075000	-54.8	37.0	-17.8	PASS
2483.925000	-54.8	37.0	-17.8	PASS
2499.925000	-54.9	37.1	-17.8	PASS
2483.675000	-54.9	37.1	-17.8	PASS
2499.875000	-55.0	37.2	-17.8	PASS
2483.625000	-55.0	37.3	-17.8	PASS
2483.525000	-55.1	37.3	-17.8	PASS
2488.975000	-55.1	37.3	-17.8	PASS

TEST A.5: POWER SPECTRAL DENSITY

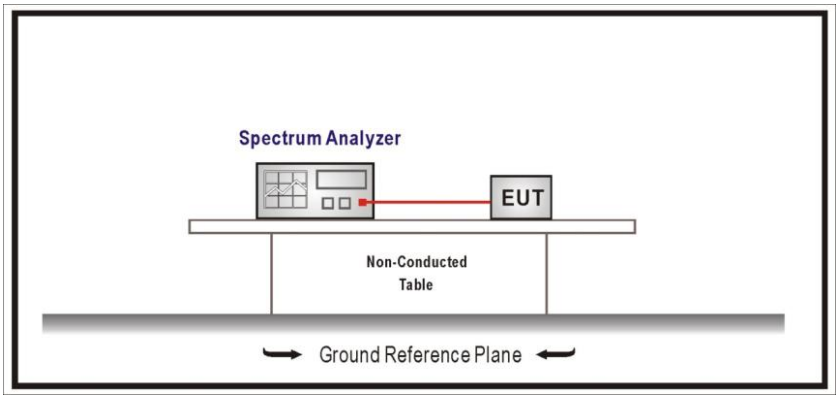
LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(e) and RSS-247 5.2 (b)

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.

TEST SETUP	

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 v04 dated 05/04/2017.

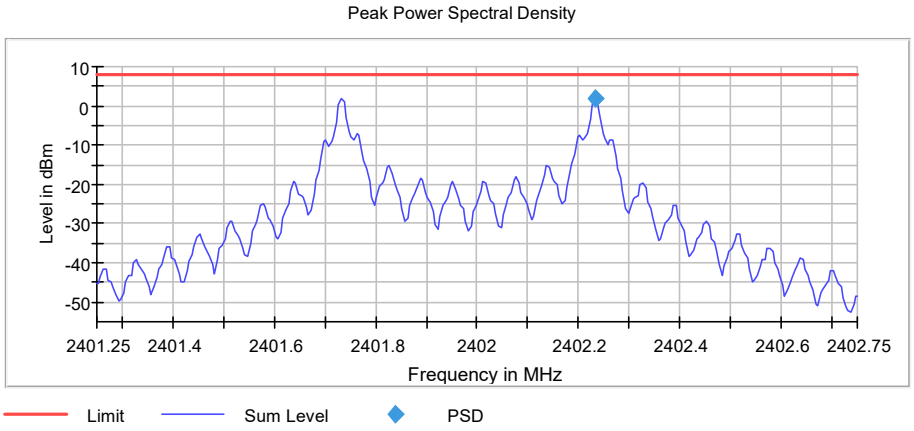


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01(1 Mbps)
TEST RESULTS:	PASS

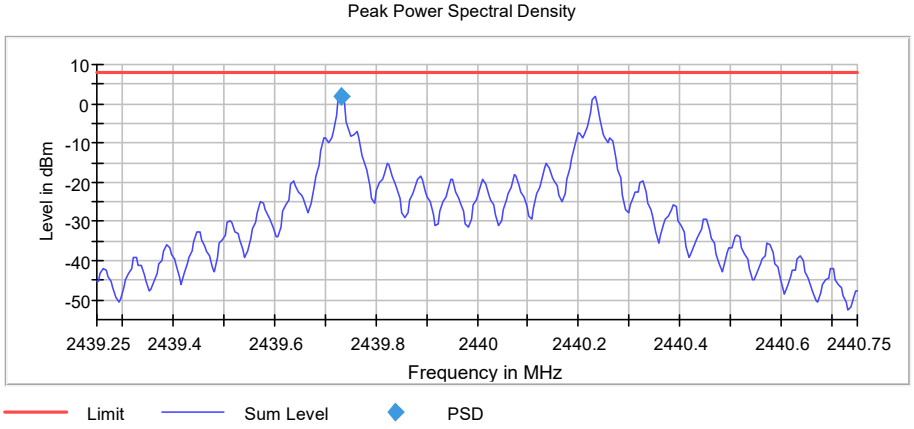
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Power spectral density (dBm)	1.963	1.920	2.146
Measurement uncertainty (dB)	<±0.78		

TEST RESULTS (Cont.):	

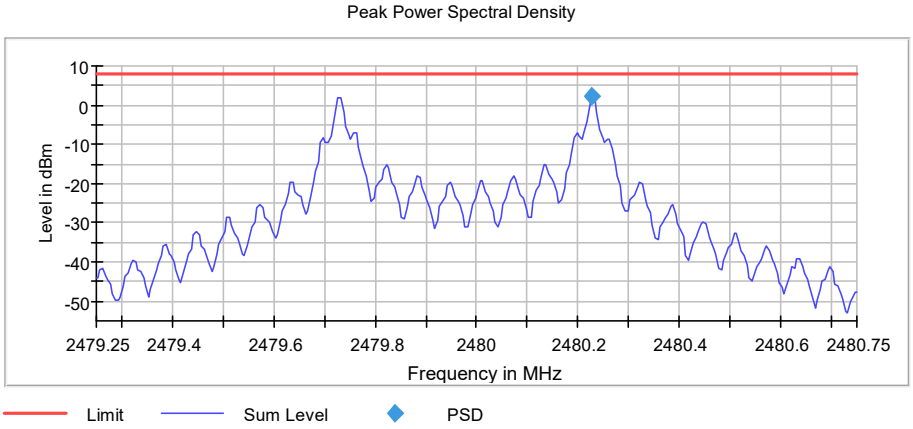
Lowest Channel:



Mid Channel:



High Channel:



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40125	2.43925	2.47925
Stop Frequency	2.40275	2.44075	2.48075
Span	1.500 MHz	1.500 MHz	1.500 MHz
RBW	10.000 kHz	10.000 kHz	10.000 kHz
VBW	30.000 kHz	30.000 kHz	30.000 kHz
Sweep Points	300	300	300
Sweep time	1.500 ms	1.500 ms	1.500 ms
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	Sweep	Sweep	Sweep
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	5 / max. 150	5 / max. 150	5 / max. 150
Stable	2 / 2	2 / 2	2 / 2
Max Stable Difference	0.08 dB	0.19 dB	0.05 dB

TEST A.6: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(d) and RSS-Gen 8.9 and 8.10

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 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.

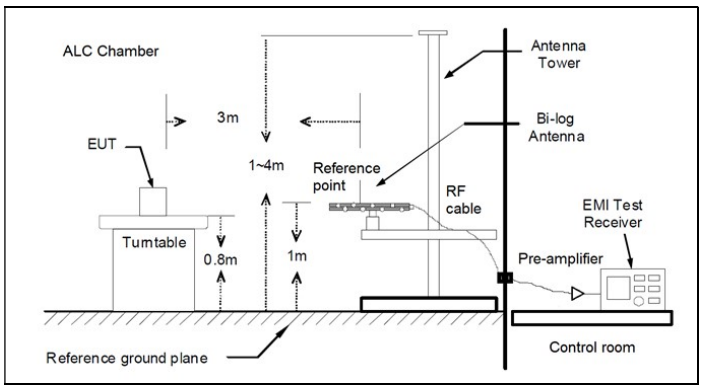
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

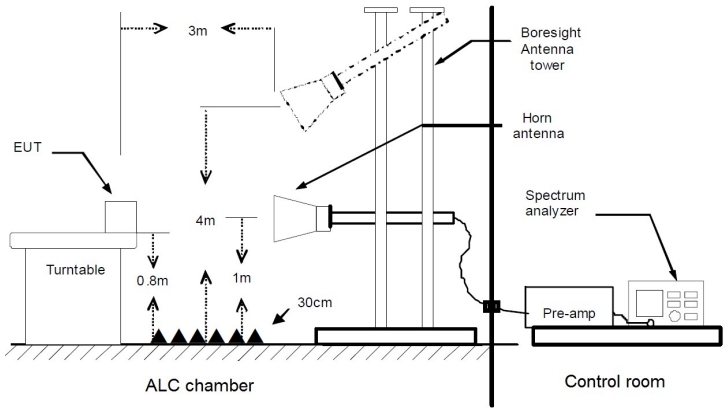
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)

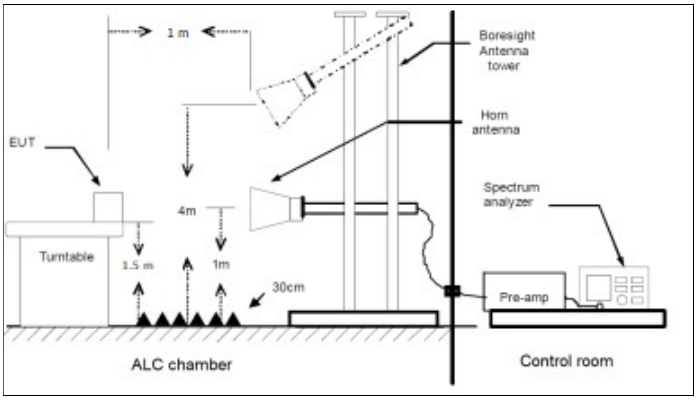
Radiated measurements Setup f < 1 GHz



Radiated measurements setup f > 1-18 GHz



Radiated measurements setup f > 18 GHz



TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#01(1 Mbps)
TEST RESULTS:	PASS

Frequency range 30 MHz – 1000 MHz

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

Frequency range 1 GHz – 26 GHz

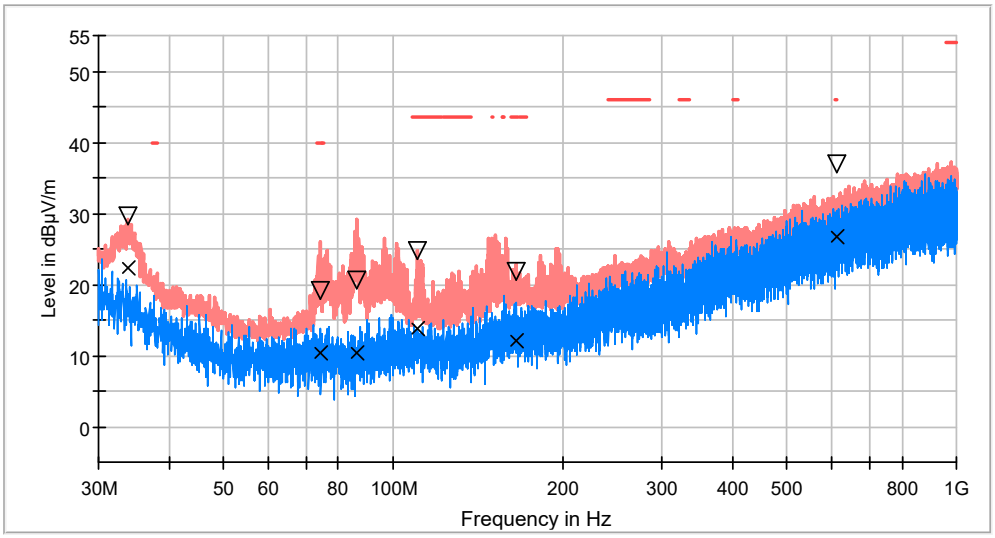
The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

For 18 GHz – 26 GHz frequency range the radiated spurious signals detected were more than 10 dB below the reference limit for lowest, middle and highest channels.

TEST RESULTS (Cont.):	30-1000 MHz

Middle Channel

RF_FCC_15.247_E Field_30MHz_1GHz

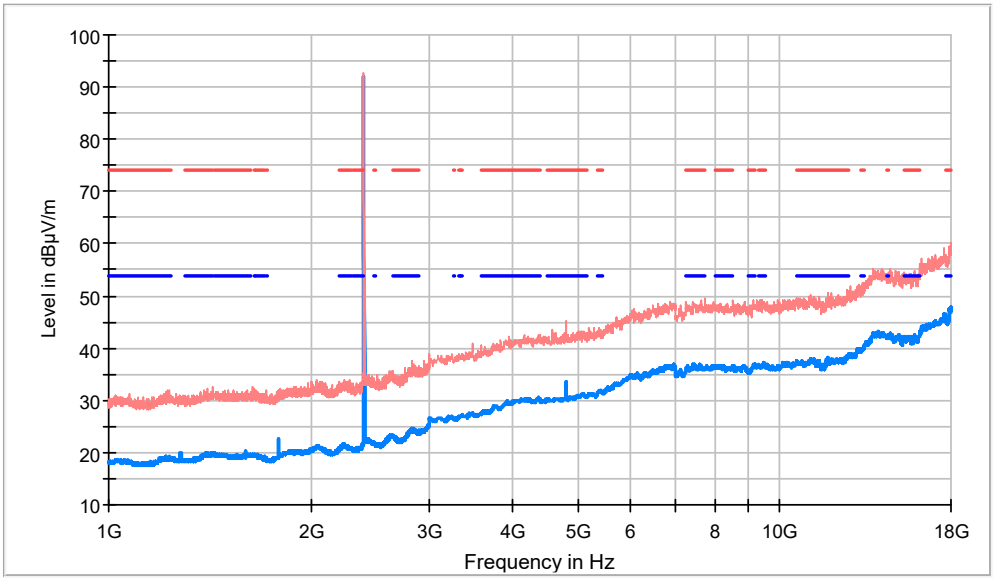


PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit
MaxPeak-PK+ (Single)
QuasiPeak-QPK (Single)

Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
33.734500	17.9	29.2	V	---	---
74.426000	10.7	25.9	H	14.1	40.0
86.308500	9.7	29.1	V	---	---
110.413000	10.1	24.8	V	18.7	43.5
165.751500	11.9	22.8	H	20.7	43.5
613.455000	26.7	31.8	V	14.2	46.0

TEST RESULTS (Cont.):	1-18 GHz (Lowest Channel)

Lowest Channel

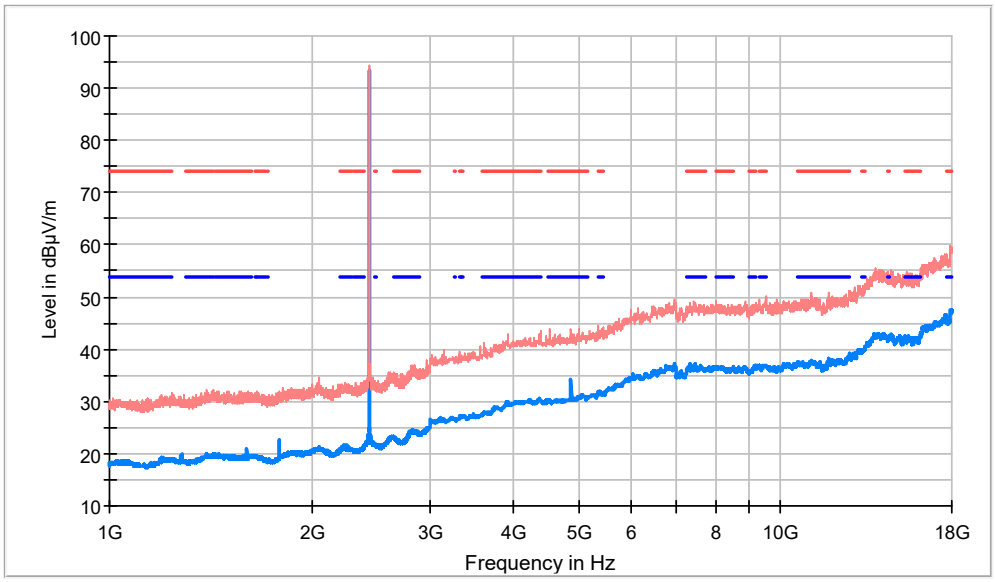


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1792.000000	31.8	22.7	H	---	---	
2402.000000	92.7	91.9	H	---	---	Fundamental
4803.750000	44.5	33.7	V	20.3	54.0	

TEST RESULTS (Cont.):	1-18 GHz (Middle Channel)

Middle Channel

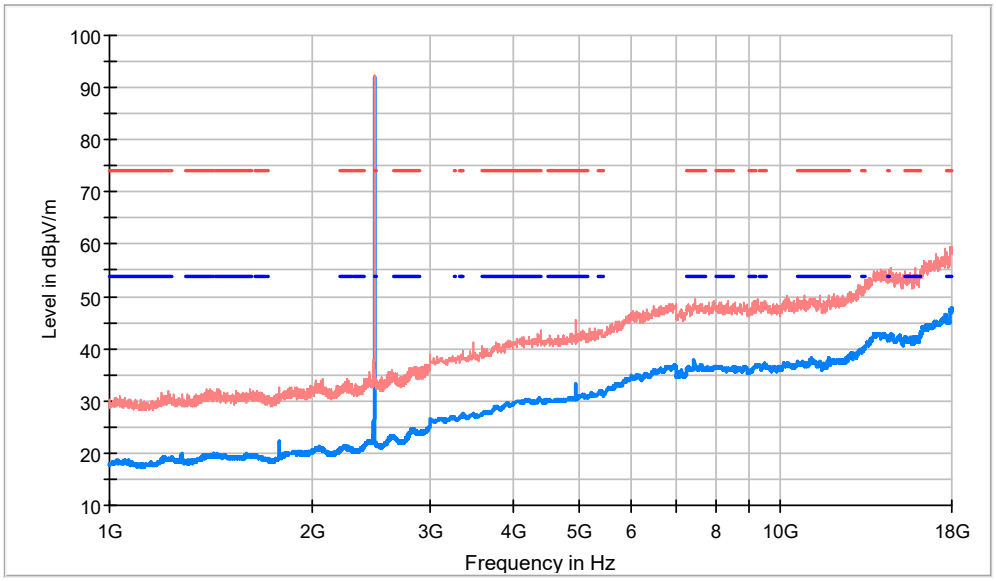


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1792.000000	31.8	22.6	H	---	---	
2440.000000	94.3	93.2	H	---	---	Fundamental
4878.750000	43.9	34.1	V	19.9	54.0	

TEST RESULTS (Cont.):	1-18 GHz (Highest Channel)

Highest Channel



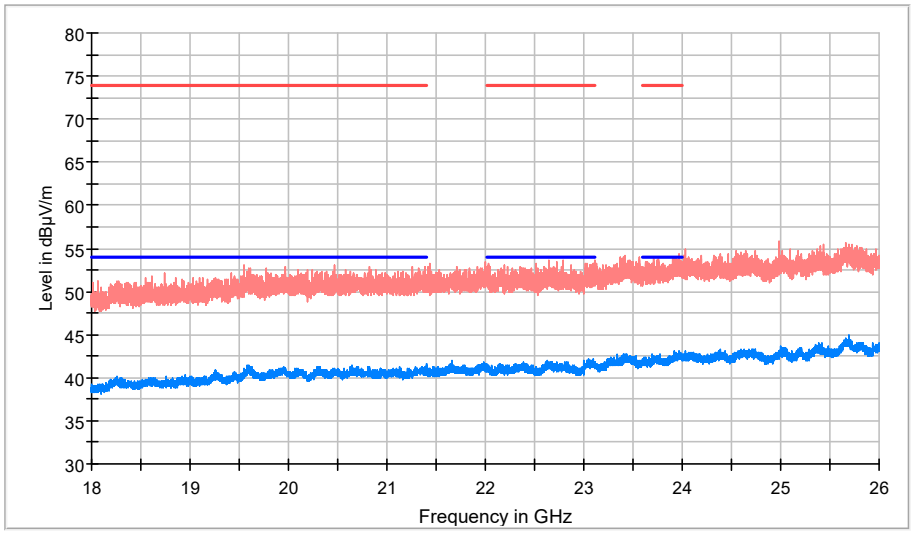
AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1792.000000	32.5	22.4	H	---	---	
2480.000000	92.5	91.9	H	---	---	Fundamental
4957.500000	45.4	33.1	V	20.9	54.0	

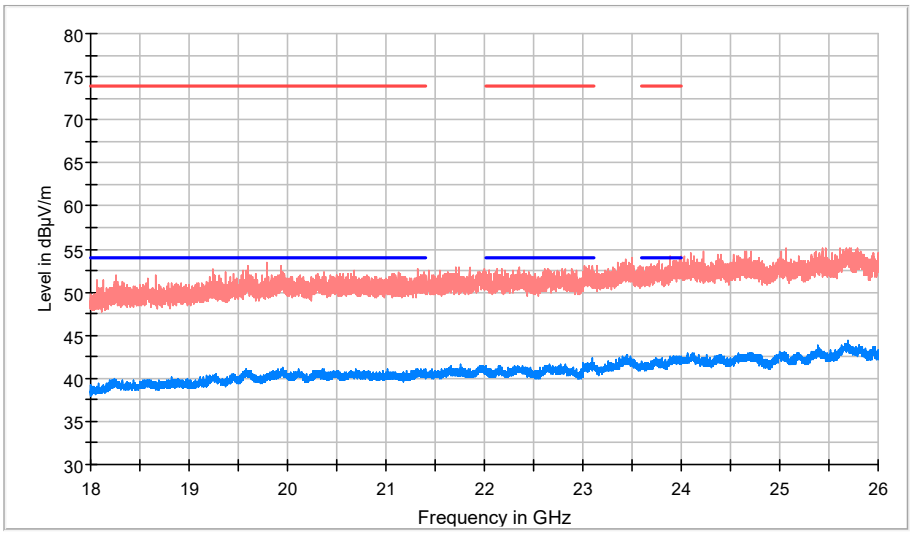
TEST RESULTS (Cont.):	18 – 26 GHz

Lowest Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

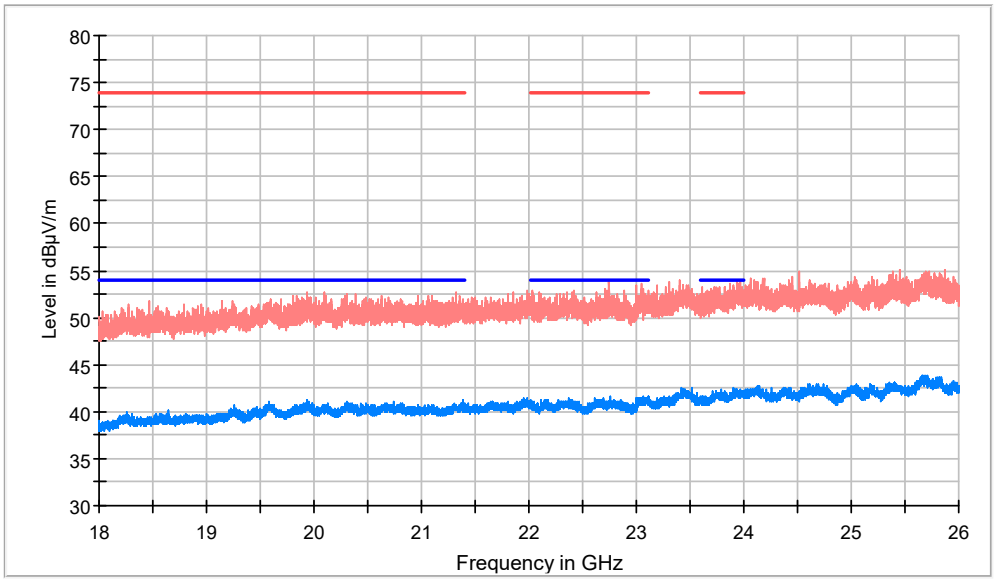
Middle Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.):	18 – 26 GHz

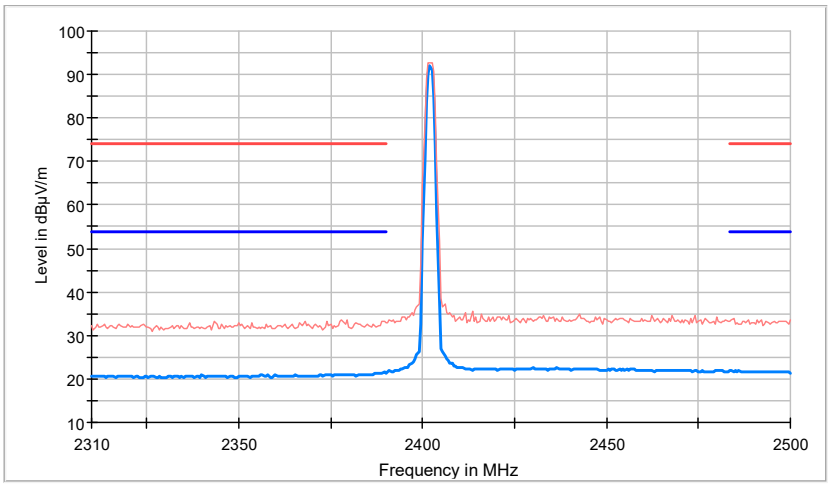
Highest Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

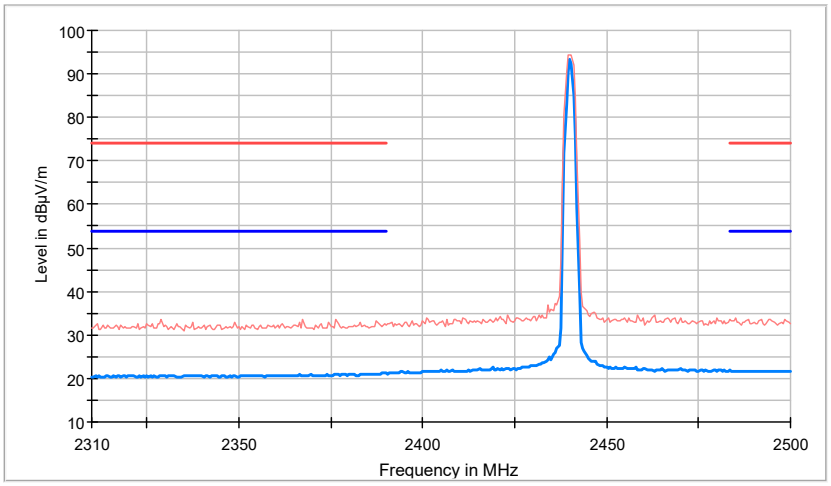
TEST RESULTS (Cont.):	Restricted Bands (2.31 GHz – 2.5 GHz)

Lowest Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

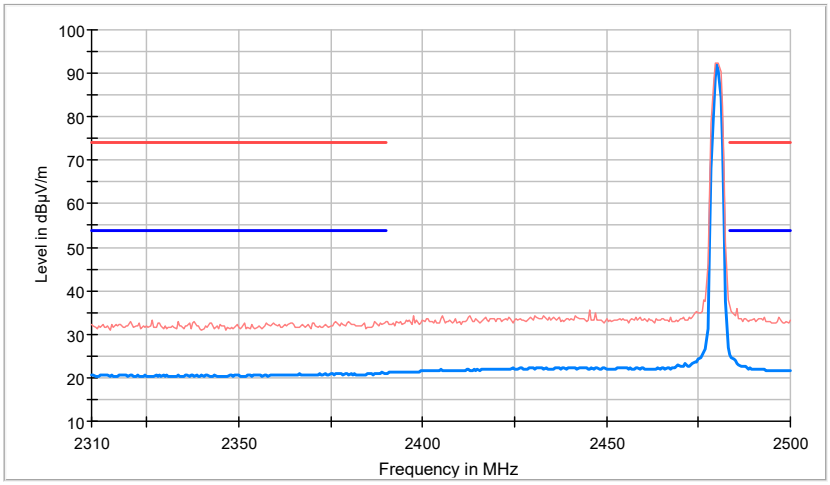
Middle Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.):	

Highest Channel



AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit