



FCC LISTED, REGISTRATION
NUMBER: 2764.01

ISED LISTED REGISTRATION
NUMBER: 23595-1

Test report No:
4569ERM.002

Partial 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	BLE Module
(*) Trademark	waterpik®
(*) Model and /or type reference	20028186 - BLE Module
(*) Other identification of the product	FCC ID: 2ANTU-20028186 IC ID: 23221-20028186
(*) Features	Bluetooth LE
Manufacturer	Water Pik, Inc. 1730 E. Prospect Rd., Fort Collins, Colorado, 80553, USA
Test method requested, standard	USA FCC Part 15.247, 6-1-20 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 3 (August 2023). 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	See Appendix A
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager
Date of issue	04-23-2024
Report template No	FDT08_23 (*) "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.

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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	2400-2483.5	0.88	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

Self contained Bluetooth transmitter and receiver for use in Water Pik oral irrigator devices to enable communication between the power handle and base during operation.

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 used for testing have been selected by: The client.

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
3739/50	Mod. Conducted LQG15HN2N2C02D Red spot	20028186	--	01/24/2024

Sample S/01 is composed of the following accessories:

Control N°	Description	Model	Serial N°	Date of reception
2772/38	PCB Module with circuit board	--	--	06/09/2021
2772/39	FTDI to USB Cable	--	--	06/09/2021

1. Sample S/01 was used for the following test(s): All conducted tests indicated in appendix B.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
4569/05	Mod.Radiated LQG15HN2N2C02D	20028186	--	04/09/2024

Sample S/02 is composed of the following accessories:

Control N°	Description	Model	Serial N°	Date of reception
2772/38	PCB Module with circuit board	--	--	06/09/2021
2772/39	FTDI to USB Cable	--	--	06/09/2021

1. Sample S/02 was used for the following test(s): All Radiated tests indicated in appendix B.

Test sample description

Ports..... :	Port name and description		Cable				
			Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	No Data provided		N/A	☐	☐	☐	
			N/A	☐	☐	☐	
			☐	☐	☐		
Supplementary information to the ports..... :	No Data provided						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 3.3 VDC, 25 mA (circuit on motherboard pcb)					
	☐	DC:					
Rated Power	0.1 Wmaximum						
Clock frequencies	No data provided						
Other parameters..... :	No data provided						
Software version	No data provided						
Hardware version..... :	No data provided						
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:					
Modules/parts	Module/parts of test item		Type		Manufacturer		

Accessories (not part of the test item)	Description	Type	Manufacturer
Documents as provided by the applicant.....	Description	File name	Issue date
	Waterpik 20028186 BLE Module	BLE Module	FDT30_04/03/2024
Copy of marking plate:			
			

Identification of the client

Water Pik, Inc.

1730 E. Prospect Rd., Fort Collins, Colorado, 80553, USA

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	01-24-2024
Date (finish)	04-10-2024

Document history

Report number	Date	Description
4569ERM.002	04-23-2024	First release

Environmental conditions

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

Temperature	Min. = 15 °C Max. = 35 °C
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 °C Max. = 35 °C
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 °C Max. = 35 °C
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: Ivy Yousuf Moutushi, Yuqi Wang, Fahim Tahiree 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
	§ 2.1049	RSS-Gen 6.7	99% Occupied Bandwidth	N/A	Refer 1
	§ 15.247 (a) (2)	RSS-247 5.2. (a)	6dB Emission Bandwidth	N/A	Refer 1
A.1	§ 15.247 (b) (3)	RSS-247 5.4. (d)	Maximum peak conducted output power and antenna gain	P	N/A
	§ 15.247 (d)	RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/A	Refer 1
	§ 15.247 (e)	RSS-247 5.2. (b)	Power spectral density	N/A	Refer 1
A.2	§ 15.247 (d)	RSS-Gen 8.9 & 8.10.	Emission limitations radiated (Transmitter)	P	N/A
<u>Supplementary information and remarks:</u> 1. Test is not requested.					

List of equipment used during the test

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

CONTROL NUMBER	DESCRIPTION	SERIAL NO	LAST CALIBRATION	NEXT CALIBRATION
1039	R & S FSV40 Signal analyzer 40 GHz	101627	2022-11-01	2024-11-01
1313	WIRELESS MEASUREMENT SOFTWARE R&S WMS32	-	N/A	N/A

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	SERIAL NO	LAST CALIBRATION	NEXT CALIBRATION
1012	R & S ESR26 EMI TEST RECEIVER	101478	2023-01-18	2025-01-18
1014	R & S FSV40 SIGNAL ANALYZER 40GHZ	101626	2022-08-01	2024-08-01
1056	3116C DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA 18-40 GHz	213179	2023-02-23	2026-02-23
1057	3115 DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA 1-18 GHz	211373	2023-07-18	2026-07-18
1064	3142E BICONILOG ANTENNA	208600	2021-12-13	2024-12-13
1111	ETHERNET SNMP THERMOMETER	60038026577	2022-10-18	2024-10-18
1179	SEMI-ANECHOIC CHAMBER	F169021	N/A	N/A
1314	WIRELESS MEASUREMENT SOFTWARE R&S EMC32	1040-OT102236	N/A	N/A
1461	Low Noise Preamplifier (1-18GHz)	2213857B	2022-06-01	2024-06-01

Appendix A: Test results (Bluetooth Low Energy)

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PRODUCT INFORMATION

The following information is provided by the client

Information	Description
Modulation	GFSK
Adaptive	Non-Adaptive equipment
Operation mode	
- Operating Frequency Range	2402 – 2480 MHz
- Nominal Channel Bandwidth	1 MHz
- RF Output Power	6 dBm
Extreme operating conditions	
- Temperature range	0 °C to +70 °C
Antenna type	RF Chip Antenna
Antenna gain	0.5 dBi
Nominal Voltage	
- Supply Voltage	3.3 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)	<u>Power supply (V):</u> $V_{\text{nominal}} = 3.3 \text{ Vdc}$ Data Rate: 1 Mbps Bandwidth: 1 MHz <u>Test Frequencies for Conducted/ Radiated tests:</u> Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz

See below the comparison table between previous test results (test report 2772ERM.002) and test results with the new sample shown in this test report:

Test case	Maximum conducted power (dBm)		Delta between 2772 samples and 3739 Sample 50 (dB)
Project	2772(test report 2772ERM.002)	3739	
Frequency (MHz)	Sample 12, 13, 14	Sample 50	
2402	5.6	4.6	-1.0
2440	5.5	4.7	-0.8
2480	5.5	4.4	-1.1

TEST A.1: 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

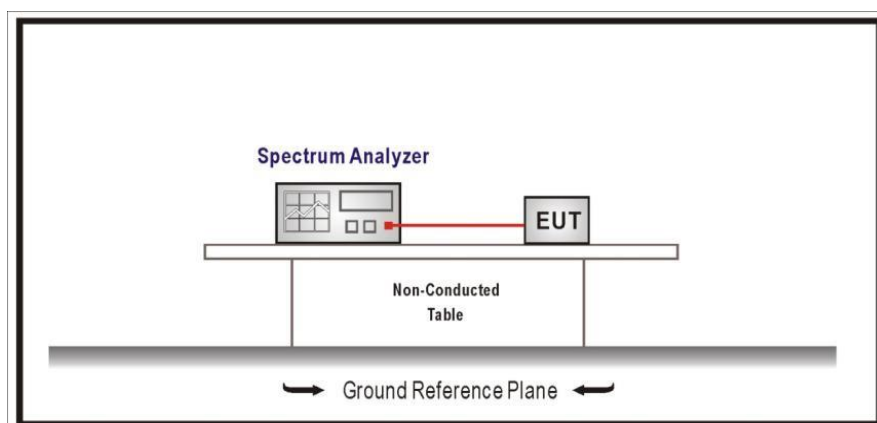
§15.247(b)(3) and RSS-247 5.4(d): For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

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)	4.6	4.7	4.4
Maximum EIRP power (dBm)	5.1	5.2	4.9

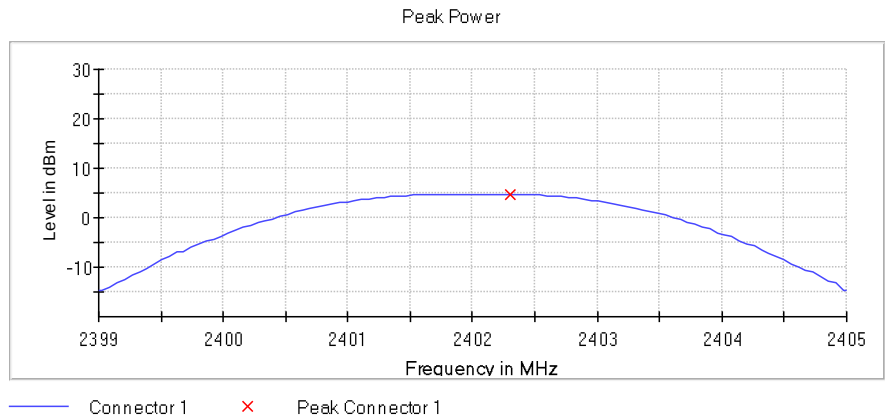
Maximum declared antenna gain: +0.50 dBi

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.

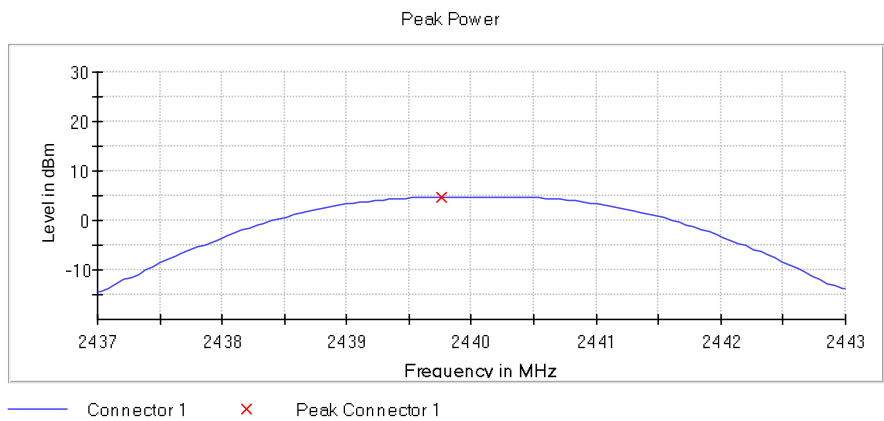
TEST RESULTS (Cont.):

CONDUCTED PEAK POWER

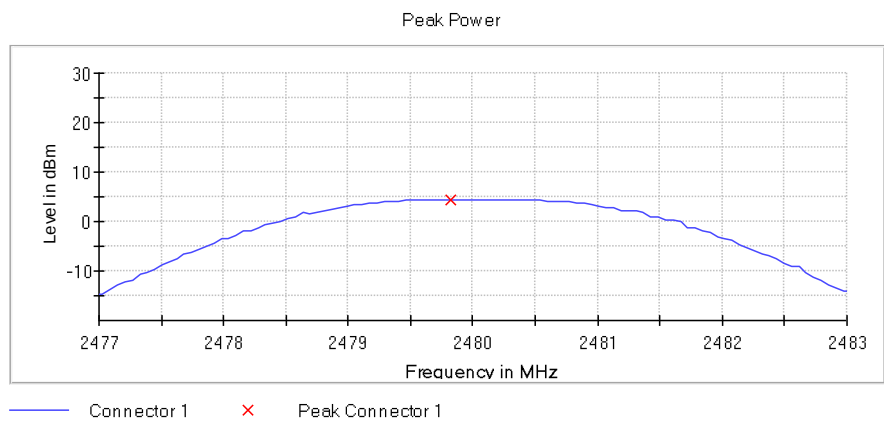
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.):

Measurement			
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39900 GHz	2.43700 GHz	2.47700 GHz
Stop Frequency	2.40500 GHz	2.44300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz	6.000 MHz
RBW	2.000 MHz	2.000 MHz	2.000 MHz
VBW	10.000 MHz	10.000 MHz	10.000 MHz
Sweep Points	101	101	101
Sweep time	1.000 ms	1.000 ms	1.000 ms
Reference Level	10.000 dBm	10.000 dBm	10.000 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	4 / max. 150	4 / max. 150	7 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.08 dB	0.06 dB	0.01 dB

TEST A.2: 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 antenna), 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 360° 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.)

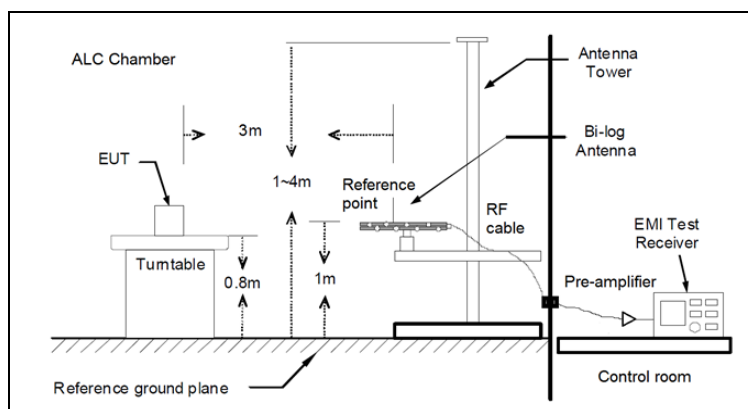


Fig A1: Radiated measurements Setup $f < 1$ GHz

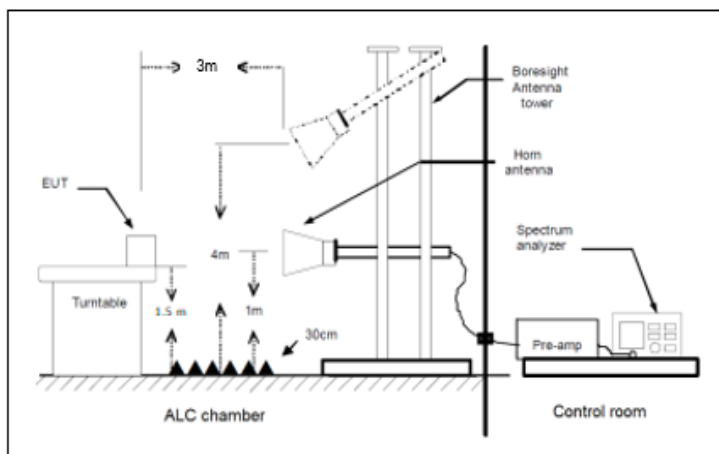


Fig A2: Radiated measurements setup $f > 1-18$ GHz

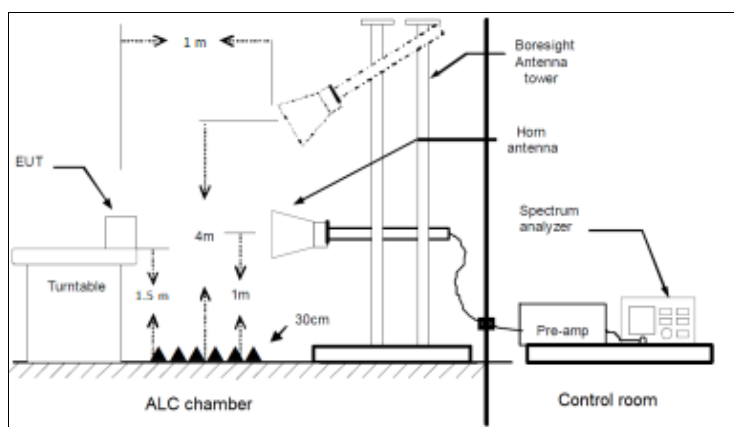


Fig A3: Radiated measurements setup $f > 18$ GHz

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.

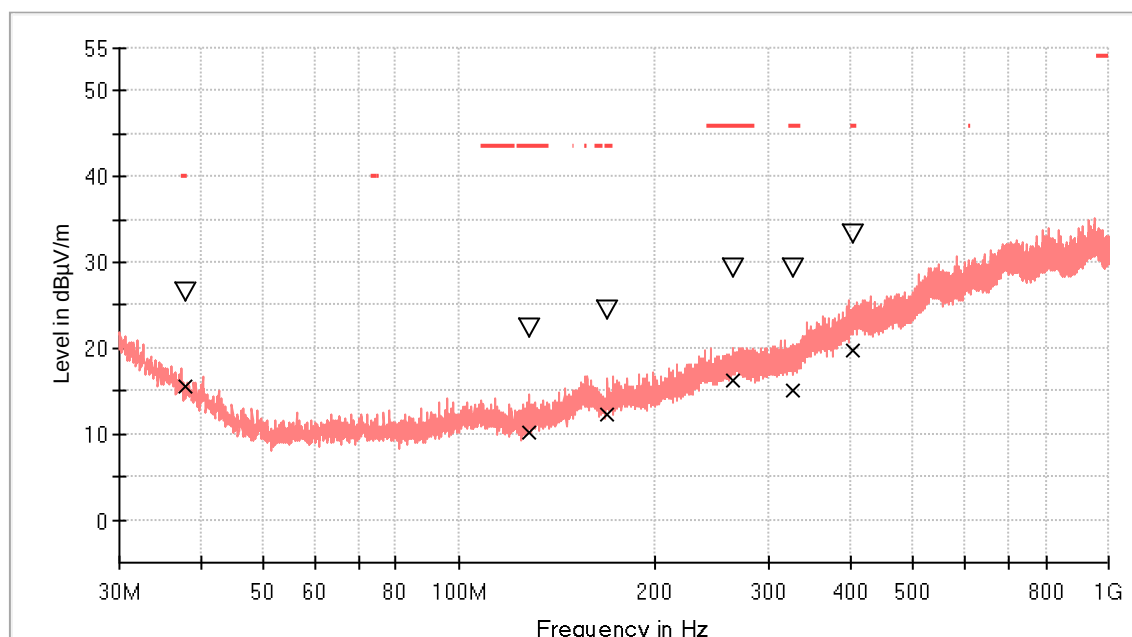
Frequency range 1 GHz – 26 GHz

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).

TEST RESULTS (Cont.):	30-1000 MHz
-----------------------	-------------

Middle Channel

RF_FCC_15.247_E Field_30MHz_1GHz_SAC2



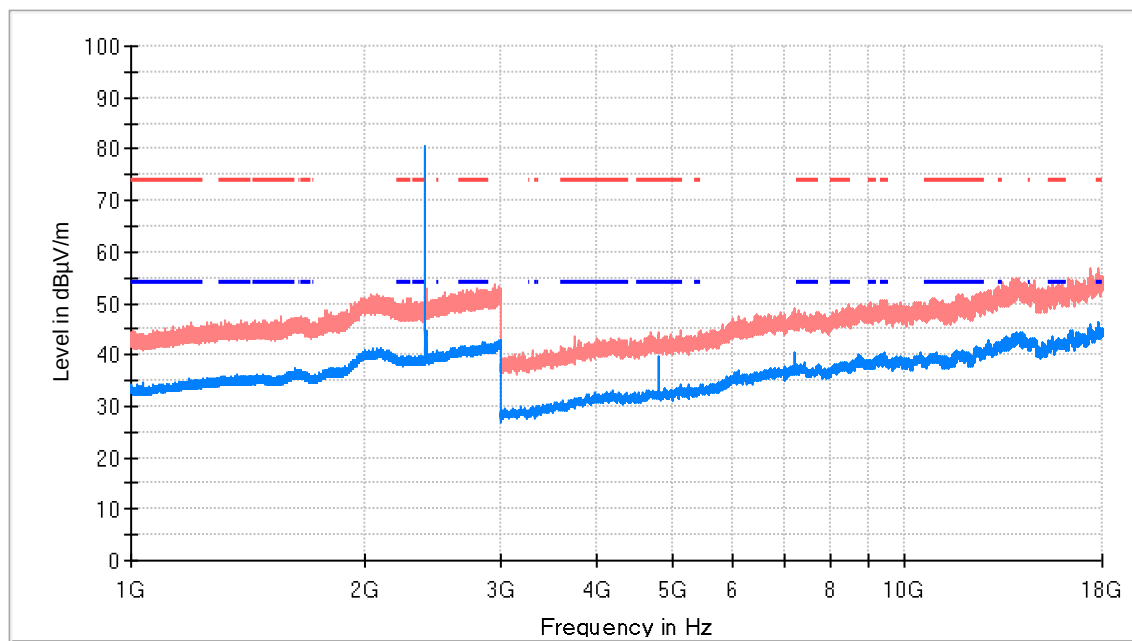
- PK+_MAXH
- - - TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit
- ▽ MaxPeak-PK+ (Single)
- x QuasiPeak-QPK (Single)

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBμV/m)
37.954000	26.6	15.6	V	24.4	40.0
128.455000	22.4	10.1	V	33.4	43.5
168.952500	24.4	12.3	V	31.2	43.5
264.158000	29.4	16.3	H	29.7	46.0
326.674500	29.4	15.2	H	30.8	46.0
404.323000	33.3	19.8	H	26.3	46.0

TEST RESULTS (Cont.):

1-18 GHz (Lowest Channel)

RF_FCC_15.247_E Field_1GHz_18GHz



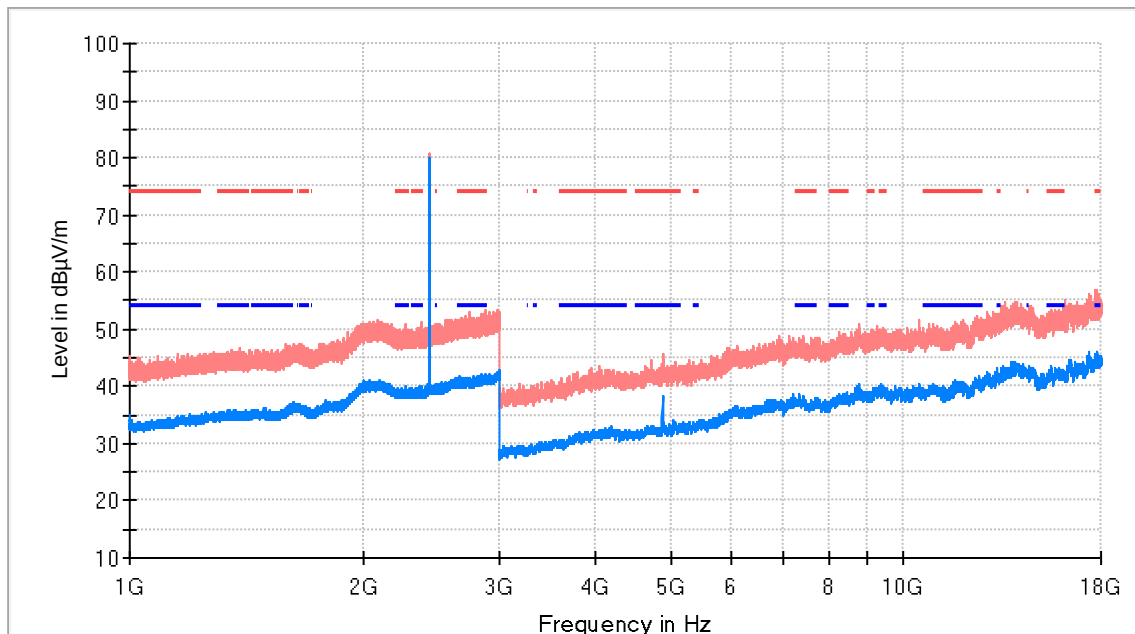
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit
- AVG_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBμV/m)	Comment
2402.000000	80.7	80.6	H	---	---	Fundamental
4803.750000	43.8	39.7	H	14.3	54.0	2nd Harmonic

TEST RESULTS (Cont.):

1-18 GHz (Middle Channel)

RF_FCC_15.247_E Field_1GHz_18GHz



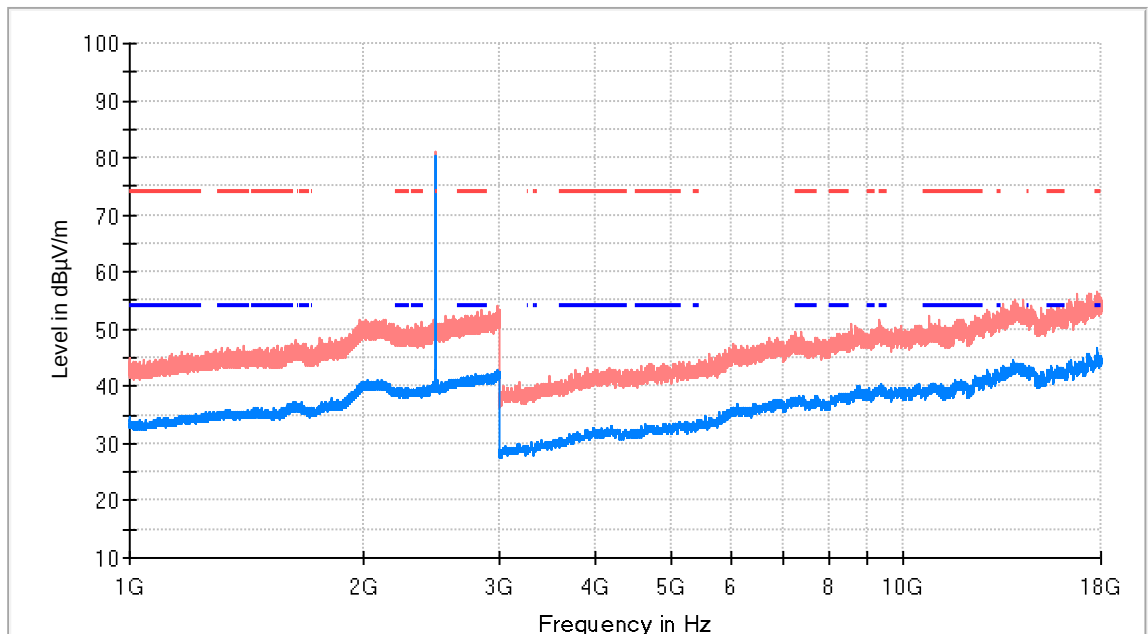
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit
- AVG_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBμV/m)	Comment
2440.062500	80.5	80.0	H	---	---	Fundamental
4880.156250	45.5	38.4	V	15.6	54.0	2nd Harmonic

TEST RESULTS (Cont.):

1-18 GHz (Highest Channel)

RF_FCC_15.247_E Field_1GHz_18GHz



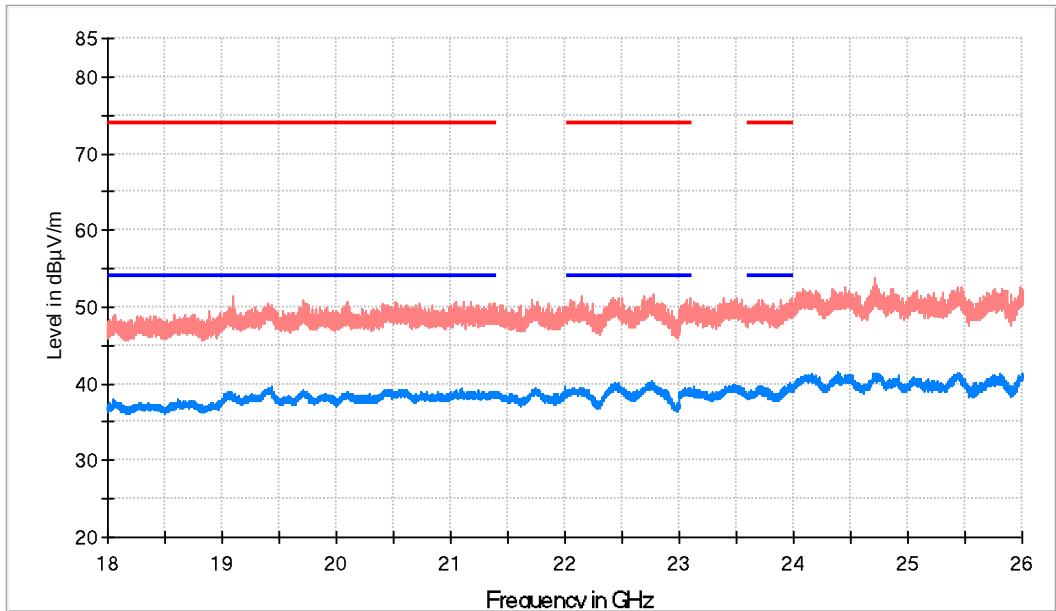
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit
- AVG_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBμV/m)	Comment
2480.125000	80.8	80.3	H	---	---	Fundamental
4006.875000	41.0	32.5	H	21.5	54.0	

TEST RESULTS (Cont.):

18 – 26 GHz

Low Channel



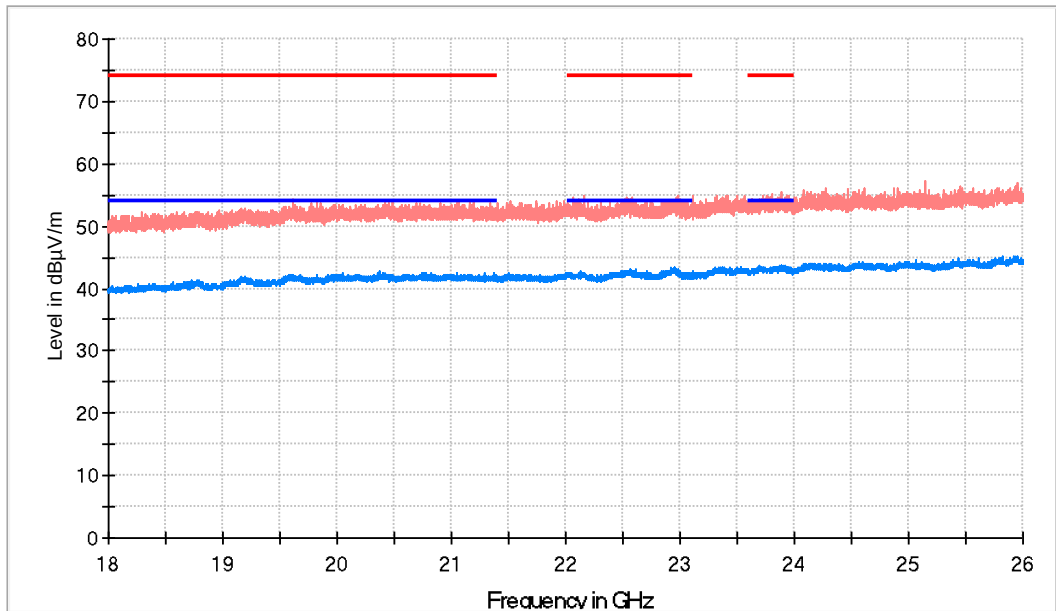
— AVG_MAXH
 — PK+_MAXH
 — TXlimits to Spurious Emission FCC15.247 Restricted Bands PK Limit
 — TXlimits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19429.500000	49.2	39.6	H	14.4	54.0
23728.500000	51.0	38.8	V	15.2	54.0

TEST RESULTS (Cont.):

18 – 26 GHz

Middle Channel



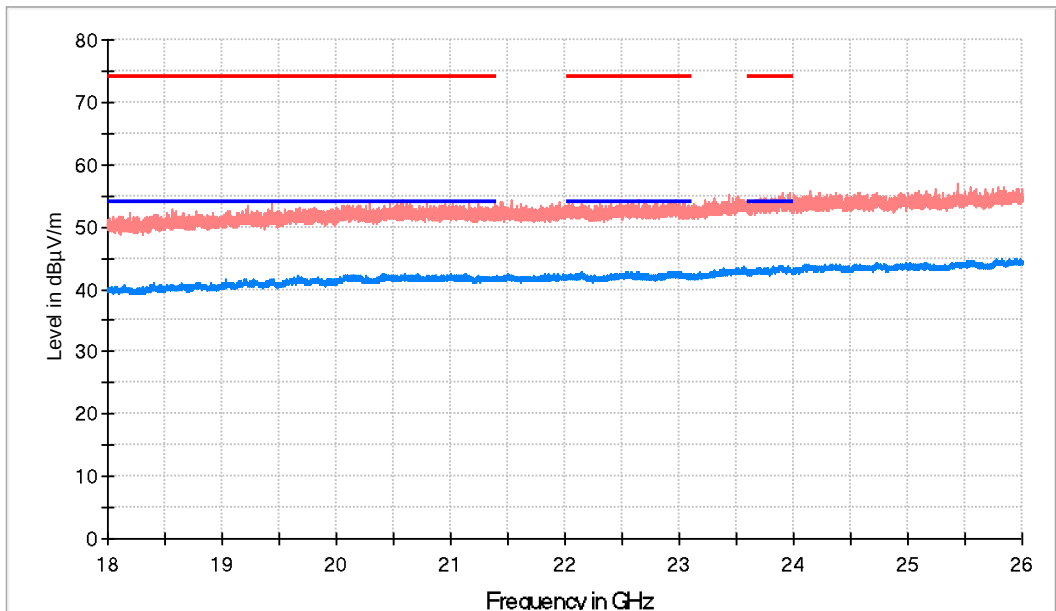
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19197.000000	51.1	42.0	H	12.0	54.0
23696.000000	54.0	43.6	V	10.4	54.0

TEST RESULTS (Cont.):

18 – 26 GHz

Highest Channel



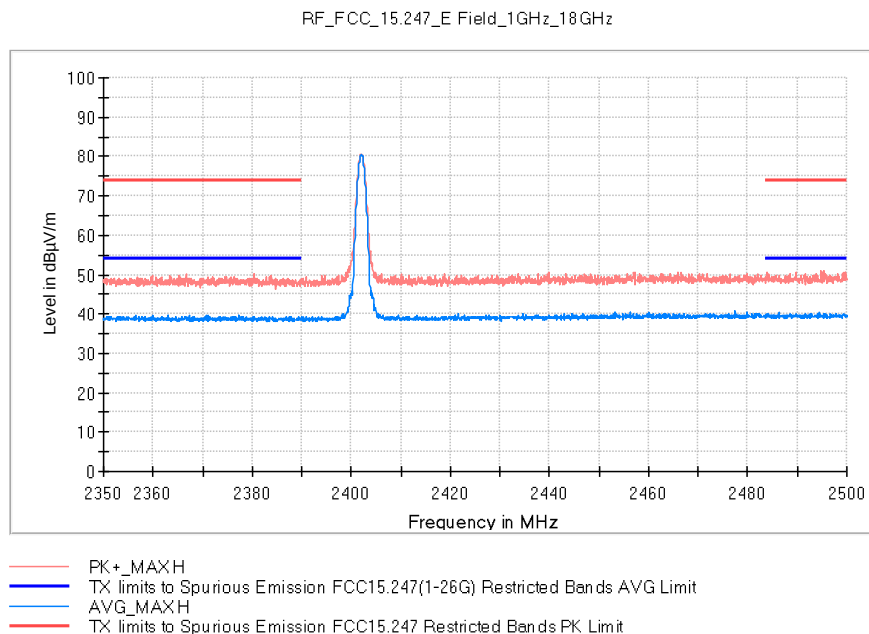
- AVG_MAXH
- PK+_MAXH
- TXlimits to Spurious Emission FCC15.247 Restricted Bands PK Limit
- TXlimits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBμV/m)
20403.000000	52.1	42.6	H	11.4	54.0
23884.000000	54.4	43.8	V	10.2	54.0

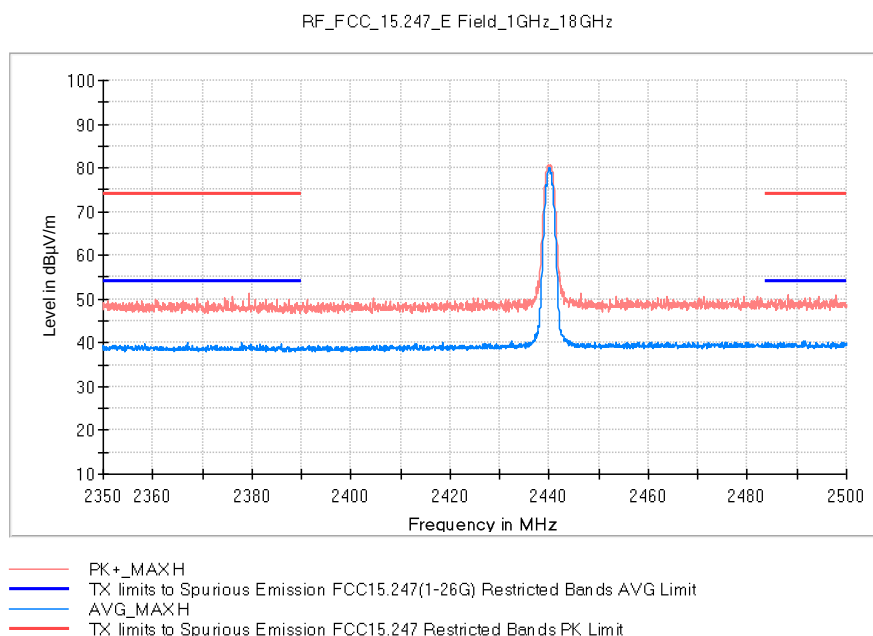
TEST RESULTS (Cont.):

Restricted Bands (2.31 GHz – 2.5 GHz)

Low Channel

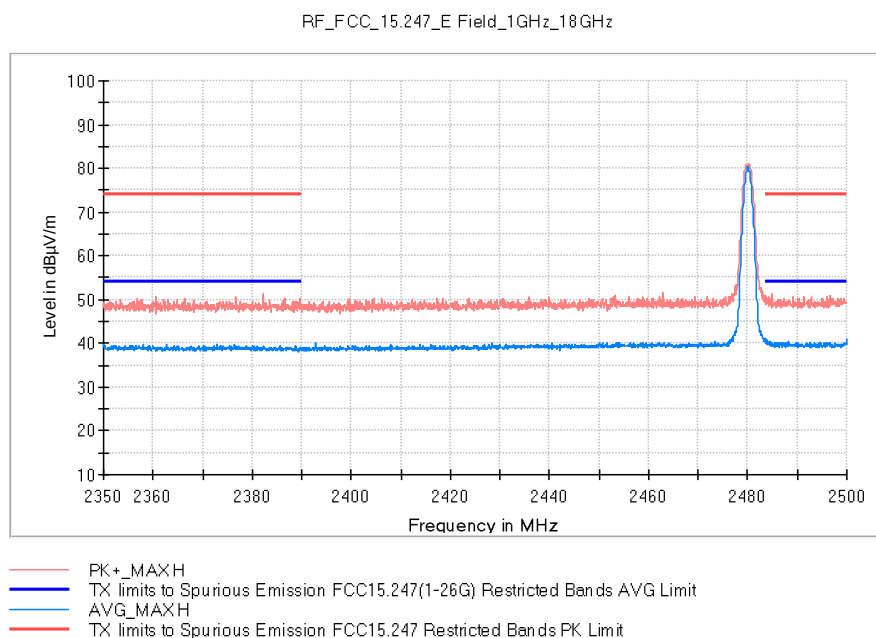


Middle Channel



TEST RESULTS (Cont.):

Highest Channel



Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
30 MHz - 1 GHz	48.5 kHz	PK+	100 kHz	1 s

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
1 GHz - 3 GHz	62.5 kHz	PK+ ; AVG	1 MHz	1 s
3 GHz - 18 GHz	468.75 kHz	PK+ ; AVG	1 MHz	1 s

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
18 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s