



FCC LISTED, REGISTRATION  
NUMBER: 2764.01


ISED LISTED REGISTRATION  
NUMBER: 23595-1

Test report No:  
**2271ERM.006A1**

## 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 Licence-Exempt Local Area Network (LE-LAN) Devices.**

Identification of item tested	Head unit with radio and Bluetooth
Trademark	Panasonic
Model and /or type reference	MIB3E_MQB_BTWIFI
Other identification of the product	FCC ID: WUQ-MIB3HBTWIFI IC: 216R-MIB3HBTWIFI PN: 654.035.869.B HW Version: X31 SW Version: X450
Features	Bluetooth, WLAN, FM, AM, DAB, USB.
Manufacturer	PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH Robert Bosch Str. 27-29-63225 Langen- Germany
Test method requested, standard	USA FCC Part 15.247, 10-1-18 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz USA FCC Part 15.209, 10-1-18 Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (April 2018). Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas. Guidance v04 dated 05/04/2017. 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 
Date of issue	02-21-2019
Report template No	FDT08_21

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## Competences and guarantees

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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.

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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

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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

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

Frequency (MHz)	U(k=2)	Units
0,009 - 30	2.69	dB
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

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Automotive head unit to be installed in cars with the following features: Bluetooth, WLAN, FM, AM, DAB, USB

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 N°	Description	Model	Serial N°	Date of reception
2271.048	Car Radio	MIB3E_MQB_BTWIFI	04S PM6- 00124.08.18413E0026	12/21/2018
2271.037	Power Cable	-	-	12/21/2018

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

All conducted tests indicated in appendix A and B.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2271.047	Car Radio	MIB3E_MQB_BTWIFI	04S PM6- 00124.08.18413E0167	12/21/2018
2271.019	Antenna	-	380	10/02/2018
2271.038	Power Cable	-	-	12/21/2018
2271.052	BNC to FAKRA RF cable			12/28/2018
2271.053	SMA to FAKRA RF cable			12/28/2018
2271.054	BNC to FAKRA RF cable	-	-	12/28/2018
2271.055	BNC 1 to 2-way splitter			12/28/2018

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

All radiated tests indicated in appendix A and B.

## Test sample description

Ports..... :	Port name and	Cable

	description	Specified max length [m]	Attached during test	Shielded	Coupled to patient <sup>(3)</sup>		
	Not Provided Data		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Supplementary information to the ports..... :							
Rated power supply .....	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	DC: 12 Vdc						
Rated Power .....	Data not provided						
Clock frequencies .....	Data not provided						
Other parameters..... :	Data not provided						
Software version .....	X450						
Hardware version..... :	X31						
Dimensions in cm (W x H x D).... :	Data not provided						
Mounting position..... :	<input type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input checked="" type="checkbox"/>	Other: Car Equipment					
Modules/parts .....	Module/parts of test item		Type	Manufacturer			
	Not Provided Data						
Accessories (not part of the test item) .....	Description		Type	Manufacturer			
	Not Provided Data						
Documents as provided by the applicant..... :	Description		File name	Issue date			
	FDT30_14 Data Declaration Equipment Data						

**Copy of marking plate:**



## Identification of the client

PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH  
 Robert Bosch Str. 27-29-63225 Langen- Germany.

## Testing period and place

<b>Test Location</b>	DEKRA Certification Inc.
<b>Date (start)</b>	12-26-2018
<b>Date (finish)</b>	02-19-2019

## Document history

Report number	Date	Description
2271ERM.006	01-22-2019	First release
2271ERM.006A1	02-21-2019	Second release

## Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 2271ERM.006 related with the same samples, in the next clauses and sub-clauses:

Clauses/ Sub-Clauses	Modification	Justification
Page 32/A3.Time of OCCUPANCY Test	Re-corrected the graphs with details	Detailed description provided
Page 42, 107/Maximum Output Power Test	Added Test Method description	Requested by the reviewer
Page 92/Channels for Canada	Added the test results for Canada Channels	Documentation error

This modification test report cancels and replaces the test report 2271ERM.006

## 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: Lakshmi Gollamudi, Nasir khan and Poojita Bhattu.

## Testing verdicts

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

## Summary

FCC PART 15 PARAGRAPH / RSS-247 (Bluetooth EDR)					
Section	15.247 Spec Clause	RSS Spec Clause	Test Description	Verdict	Remark
A.1	§ 15.247 (a) (1)	RSS-247 5.1 (b)	20dB Emission Bandwidth, Occupied Bandwidth & Carrier Frequency Separation	P	N/A
A.2	§ 15.247 (a) (1) (iii)	RSS-247 5.1 (d)	Number of hopping channels	P	N/A
A.3	§ 15.247 (a) (1) (iii)	RSS-247 5.1 (d)	Time of Occupancy (Dwell Time)	P	N/A
A.4	§ 15.247 (b) (3)	RSS-247 5.4 (b)	Maximum peak conducted output power and antenna gain	P	N/A
A.5	§ 15.247 (d)	RSS-247 5.5	Band-edge conducted emissions compliance (Transmitter)	P	N/A
--	§ 15.247 (d)	RSS-247 5.5	Emission limitations Conducted (Transmitter)	N/A	Refer 1
A.6	§ 15.247 (d)	RSS-247 5.5	Emission limitations Radiated (Transmitter)	P	N/A
<u>Supplementary information and remarks:</u>					
1) Device is incorporated with integral antenna.					

FCC PART 15 PARAGRAPH (WIFI 2.4GHz)					
Section	15.247 Spec Clause	RSS Spec Clause	Test Description	Verdict	Remark
B.1	§ 15.247 (a) (2)	RSS-247 5.2 (a)	99% Occupied Bandwidth & 6dB Bandwidth	P	N/A
B.2	§ 15.247 (b)	RSS-247 5.4 (d)	Maximum Output Power and antenna gain	P	N/A
--	§15.247(d)	RSS-247 5.5	Emission limitations Conducted (Transmitter)	N/A	Refer 1
B.3	§ 15.247 (d)	RSS-247 5.5	Band-edge conducted emissions compliance (Transmitter)	P	N/A
B.4	§ 15.247 (e)	RSS-247 5.2 (b)	Power Spectral Density	P	N/A
B.5	§15.247 (d)	RSS-247 5.5	Emission limitations Radiated (Transmitter)	P	N/A
<u>Supplementary information and remarks:</u>					
1) Device is incorporated with 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	Signal Analyzer	ROHDE & SCHWARZ	FSV40	2017/03	2019/03
1040	EMI Test Receiver	ROHDE & SCHWARZ	OSP120 / OSPB157	2017/03	2019/03
1041	RF generator	ROHDE & SCHWARZ	SMB100A	2017/04	2019/04
1042	RF generator	ROHDE & SCHWARZ	SMBV100A	2018/01	2019/01
0101	Climatic Chamber	ESPEC NA	ESL-2CA	2019/01	2020/01

### Radiated Measurements

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1014	Signal Analyzer	ROHDE & SCHWARZ	FSV40	2017/03	2019/03
1012	EMI Test Receiver	ROHDE & SCHWARZ	ESR26	2018/09	2020/09
1058	Double Ridged Waveguide Horn Antenna	ETS LINDGREN	3115	2017/03	2020/03
1055	Double Ridged Waveguide Horn Antenna	ETS LINDGREN	3116C	2016/12	2019/12
1065	Biconilog Antenna	ETS LINDGREN	3142E	2017/03	2020/03
0981	Preamplifier	BONN ELEKTRONIK	BLMA 0118-2A	2017/05	2019/05
0980	Preamplifier	BONN ELEKTRONIK	BLNA 0360-01N	2017/05	2019/05
0982	Preamplifier	BONN ELEKTRONIK	BLMA1840-1M	2017/05	2019/05
1017	EMC measurement software	ROHDE & SCHWARZ	EMC32 V9.01	---	---

## Appendix A: Test results (Bluetooth EDR)

## Appendix A Content

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## PRODUCT INFORMATION

The following information is provided by the client

Information	Description
Modulation	FHSS
Adaptive	Adaptive Equipment without the possibility to switch to a non-adaptive equipment.
Operation mode 1: Single Antenna Equipment	Equipment with only one antenna
Operating Frequency Range	2402 – 2480 MHz
Nominal Channel Bandwidth	1 MHz
RF Output Power	4 dBm
Extreme operating conditions	
Temperature range	-38 °C to +70 °C
Antenna type	Integral antenna
Antenna gain	BT: 1.3 dBi Wifi 2.4GHz: 0.4 dBi
Nominal Voltage	
Supply Voltage	12 Vdc
Type of power source	DC voltage from battery
Equipment type	Bluetooth EDR and WIFI
Geo-location capability	No

## DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01	<p><u>Power supply (V):</u>  <math>V_{\text{nominal}} = 12 \text{ Vdc}</math></p> <p><u>Modulation:</u>            GFSK</p> <p><u>Test Frequencies for Radiated tests:</u>            Lowest range: 2402 MHz            Middle channel: 2440 MHz            Highest range: 2480 MHz</p>
TC#02	<p><u>Power supply (V):</u>  <math>V_{\text{nominal}} = 12 \text{ Vdc}</math></p> <p><u>Modulation:</u>            PI4DQPSK</p> <p><u>Test Frequencies for Radiated tests:</u>            Lowest range: 2402 MHz            Middle channel: 2440 MHz            Highest range: 2480 MHz</p>
TC#03	<p><u>Power supply (V):</u>  <math>V_{\text{nominal}} = 12 \text{ Vdc}</math></p> <p><u>Modulation:</u>            8DPSK</p> <p><u>Test Frequencies for Radiated tests:</u>            Lowest range: 2402 MHz            Middle channel: 2440 MHz            Highest range: 2480 MHz</p>

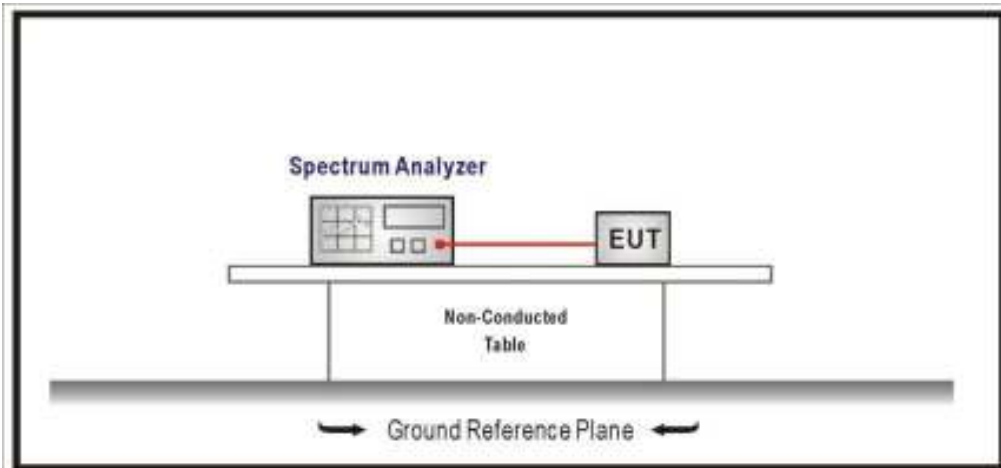
**TEST A.1: 20DB EMISSION BANDWIDTH, OCCUPIED BANDWIDTH AND CARRIER FREQUENCY SEPARATION**

<b>LIMITS:</b>	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(a) (1) and RSS-247 5.1 (b)

LIMITS

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

**TEST SETUP:**



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

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
20dB Bandwidth (MHz)	1.149	1.129	1.149
Occupied bandwidth (kHz)	880	880	880
Measurement uncertainty (kHz)	<± 1.80		

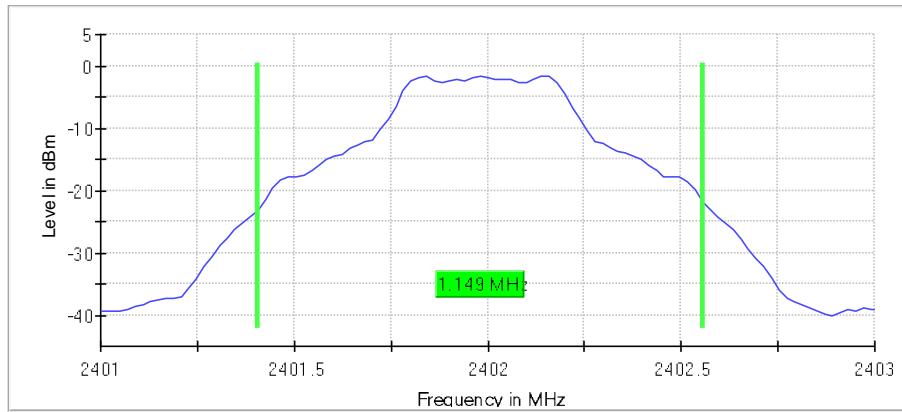
#### Measurement Set up

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
SweepPoints	101	101	101
Sweeptime	18.938 µs	18.938 µs	18.938 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
SweepCount	200	200	200
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	7 / max. 150	9 / max.	12 / max.
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.02 dB	0.15 dB	0.05 dB

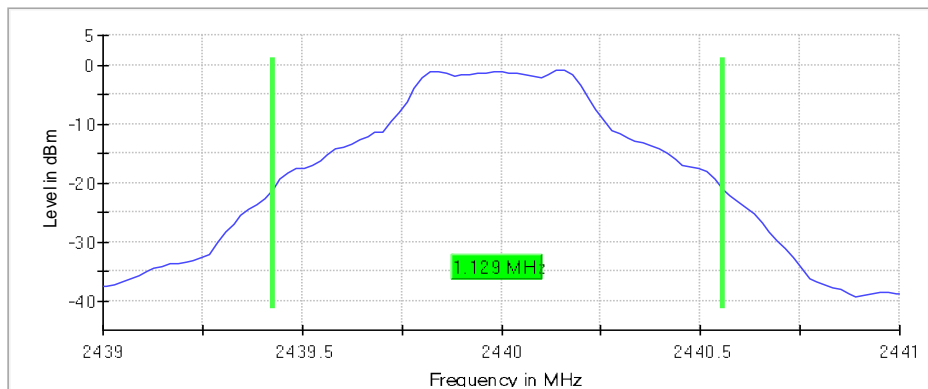
TEST RESULTS (Cont.):

20 dB BANDWIDTH

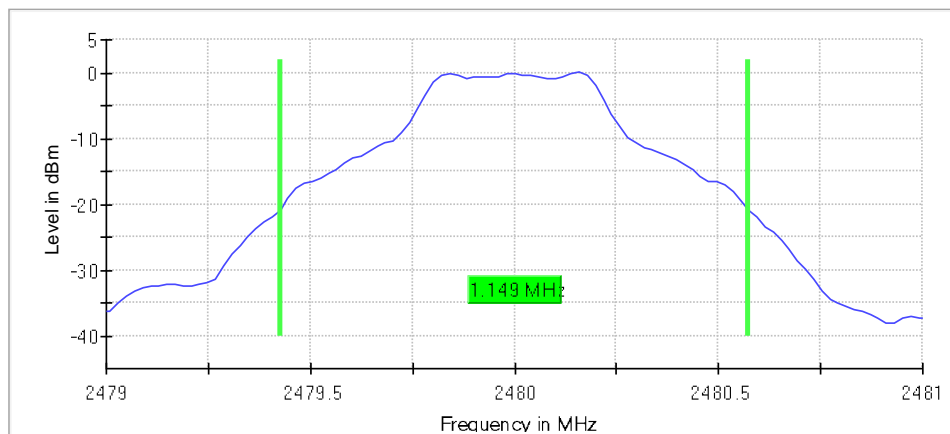
Lowest Channel



Middle Channel



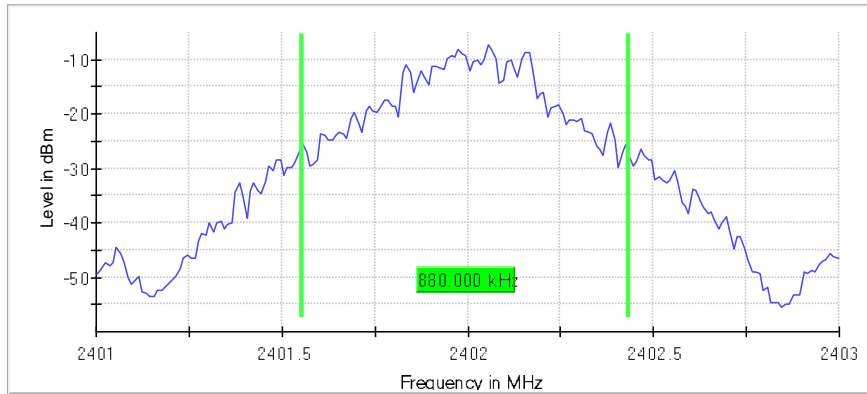
Highest Channel



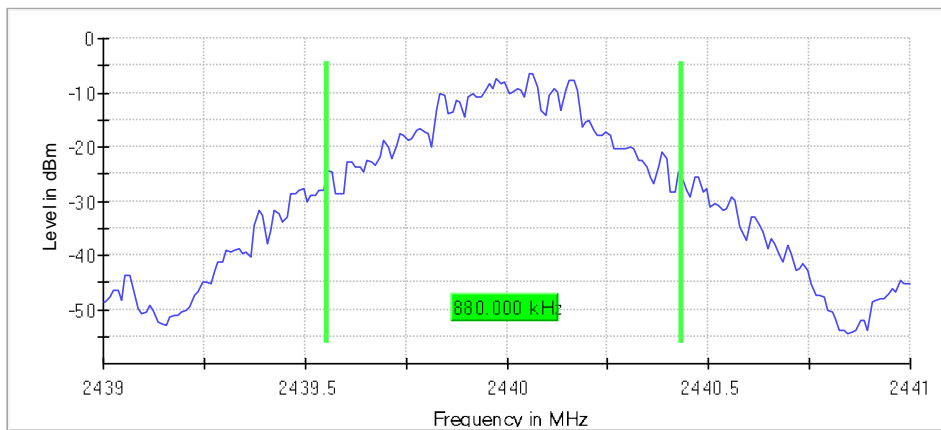


<b>TEST RESULTS (Cont.):</b>	<b>OCCUPIED BANDWIDTH</b>
------------------------------	---------------------------

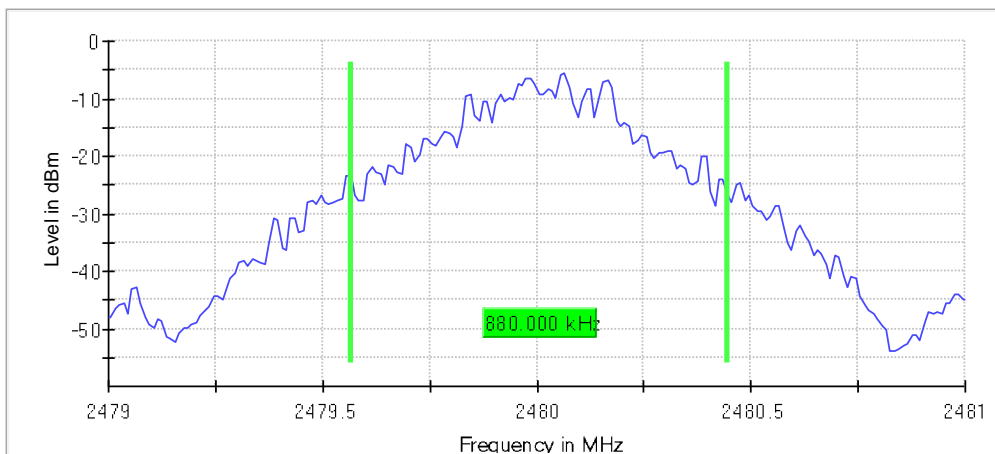
**Lowest Channel**



**Middle Channel**

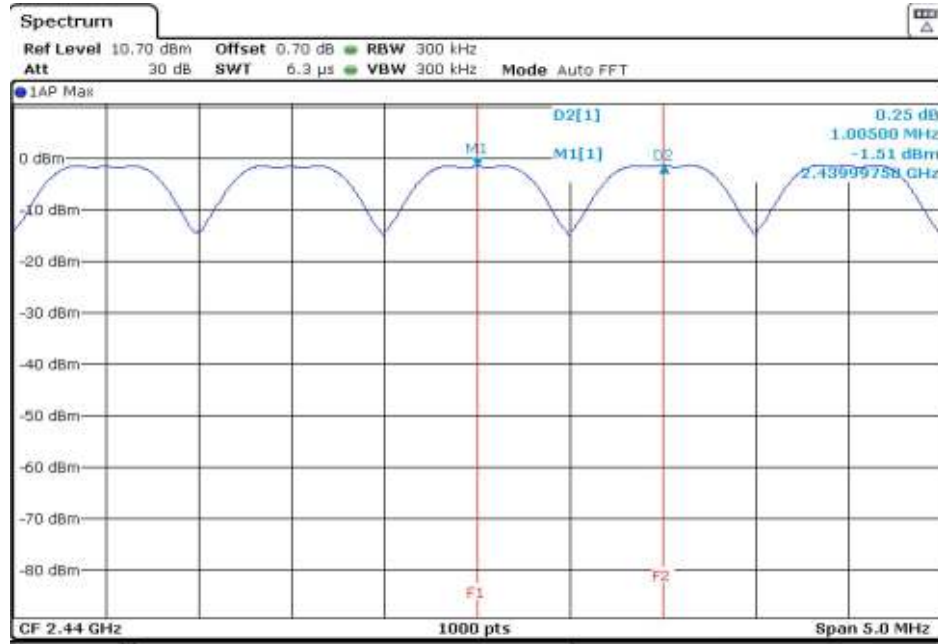


**Highest Channel**



TEST RESULTS (Cont.)

CARRIER FREQUENCY SEPARATION



The hopping channel carrier frequencies are separated by a minimum of the two-thirds of the 20 dB bandwidth of the hopping channel.

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

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20dB bandwidth (MHz)	1.446	1.446	1.446
Occupied bandwidth (MHz)	1.21	1.210	1.20
Measurement uncertainty (kHz)	<± 1.80		

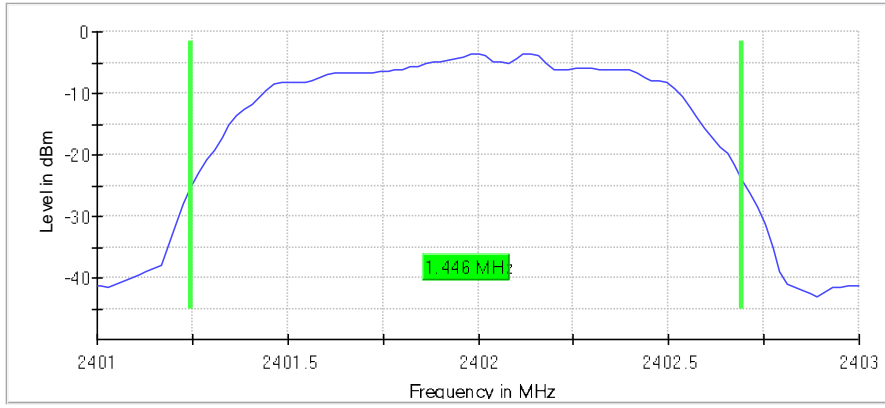
### Measurement Setup

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	2.00 MHz	2.00 MHz	2.00 MHz
RBW	100.000 KHzkHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	101	101	101
Sweeptime	18.938 µs	18.938 µs	18.938 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
SweepCount	200	200	200
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	15 / max. 150	8 / max. 150	11 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.01 dB	0.08 dB	0.05 dB

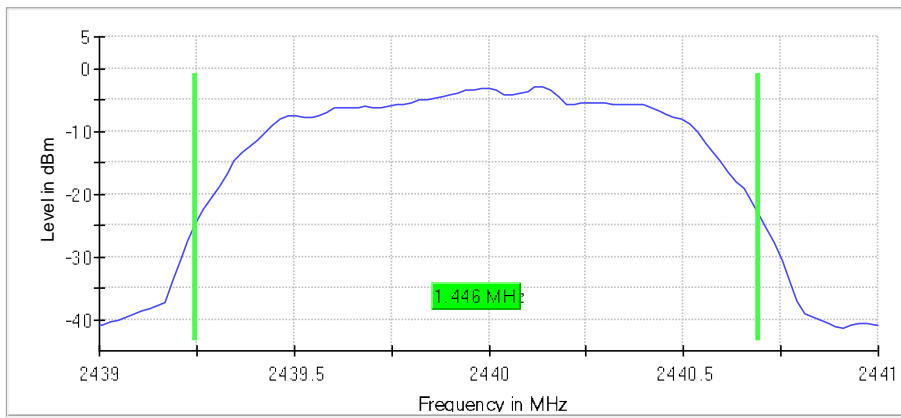
TEST RESULTS (Cont.):

20 dB BANDWIDTH

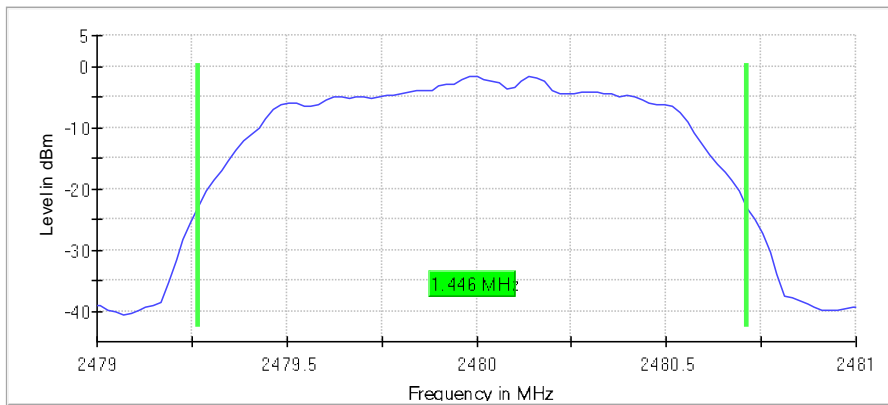
Lowest Channel

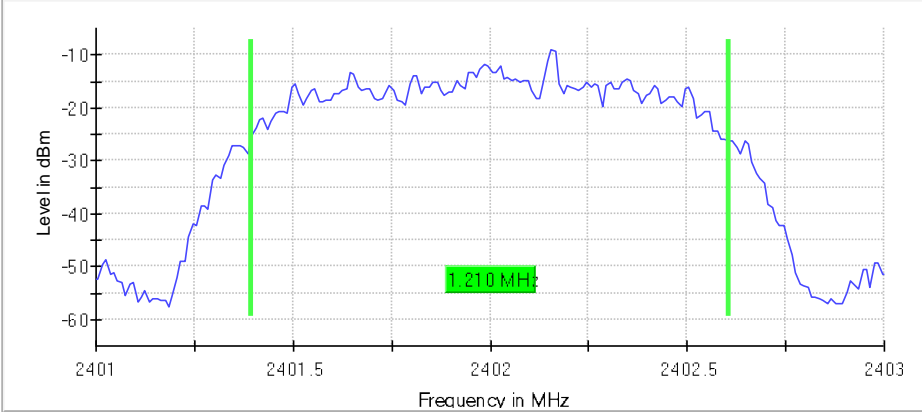
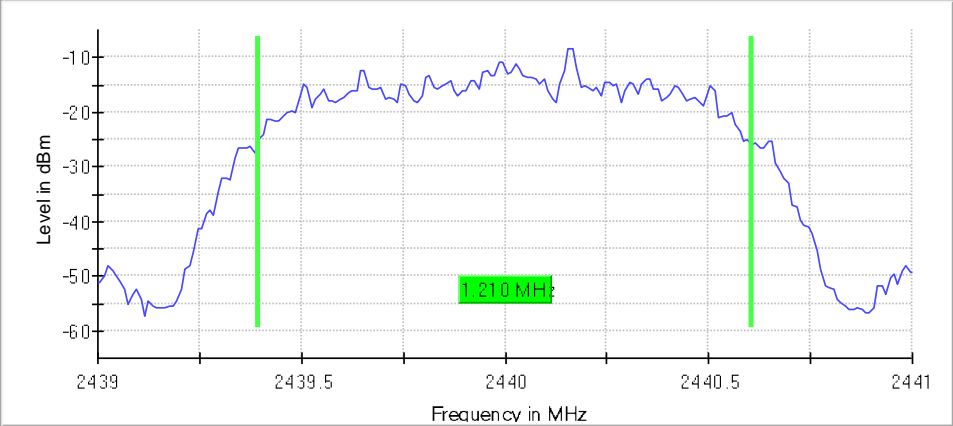
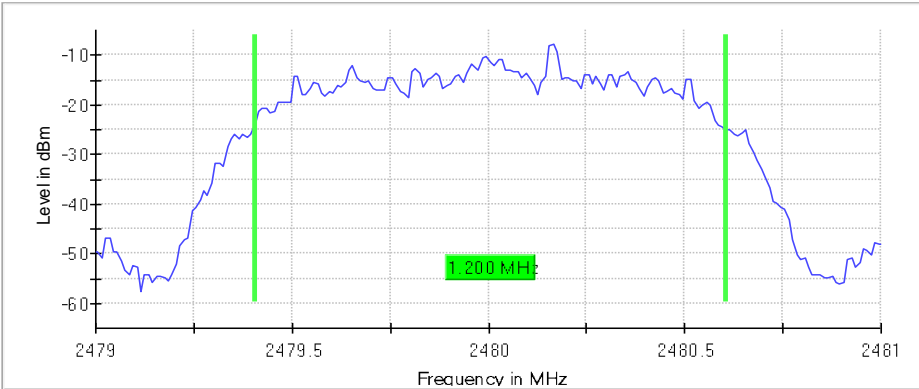


Middle Channel



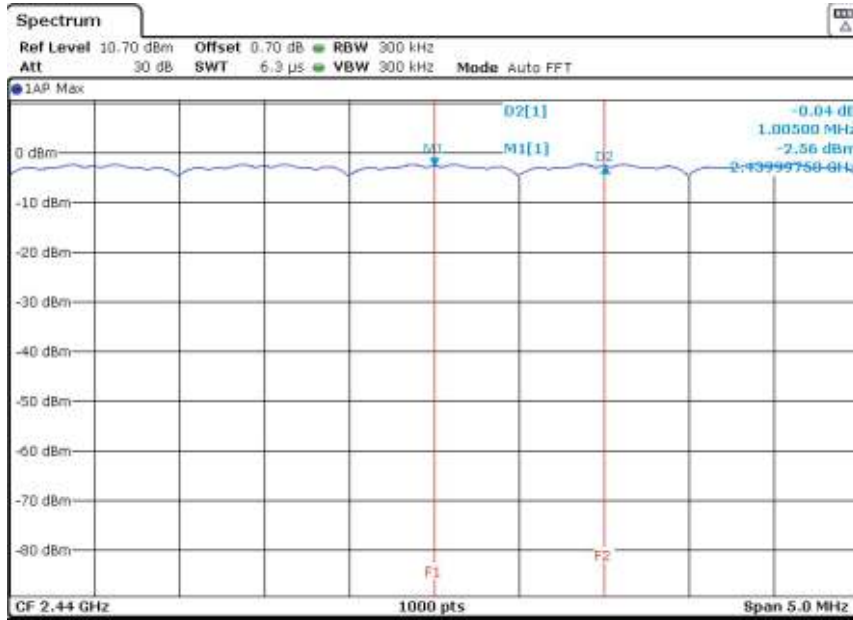
Highest Channel



TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH
<p><b>Lowest Channel</b></p> 	
<p><b>Middle Channel</b></p> 	
<p><b>Highest Channel</b></p> 	

TEST RESULTS (Cont.)

CARRIER FREQUENCY SEPARATION



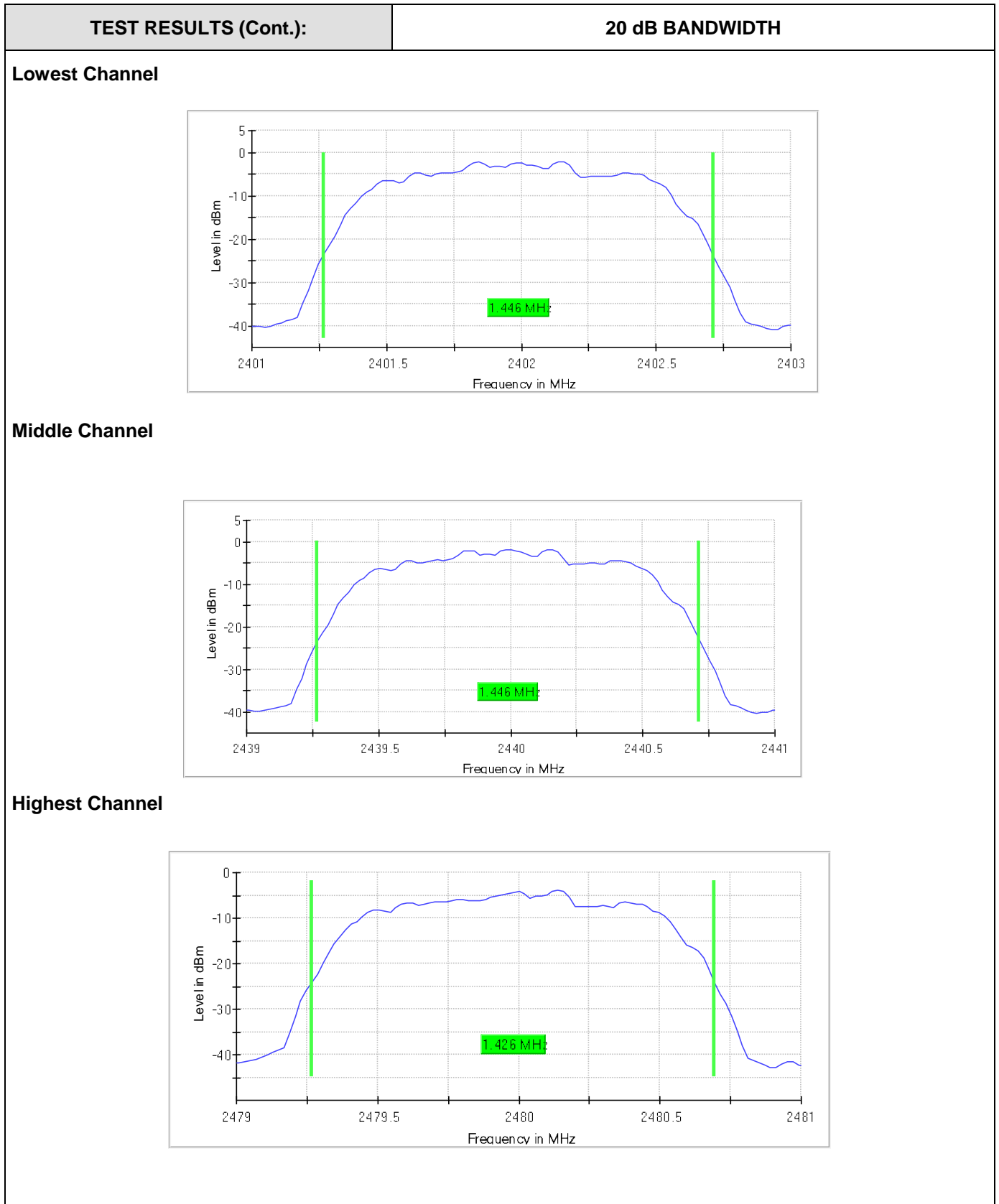
The hopping channel carrier frequencies are separated by a minimum of the two-thirds of the 20 dB bandwidth of the hopping channel.

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#03
<b>TEST RESULTS:</b>	PASS

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20db bandwidth (MHz)	1.446	1.446	1.426
Occupied bandwidth (MHz)	1.210	1.210	1.200
Measurement uncertainty (kHz)	<± 1.80		

### Measurement Setup

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	2.00 MHz	2.00 MHz	2.00 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	101	101	101
SweepTime	18.938 µs	18.938 µs	18.938 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
SweepCount	200	200	200
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
SweepType	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	15 / max. 150	5 / max. 150	10 / max. 150
Stable	5 / 5	3 / 3	5 / 5
Max Stable Difference	0.09 dB	0.34 dB	0.50 dB

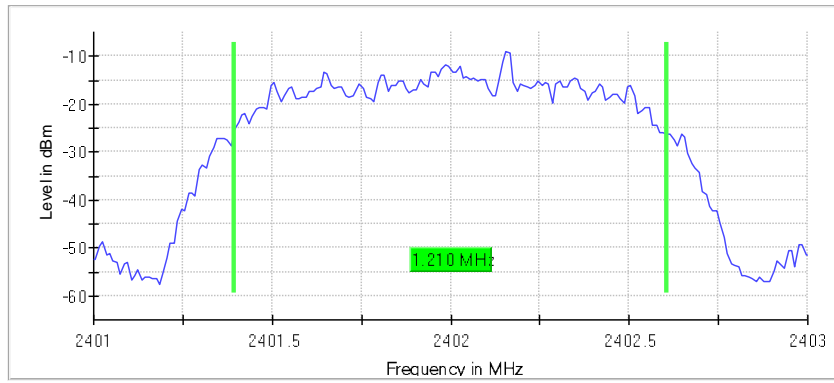




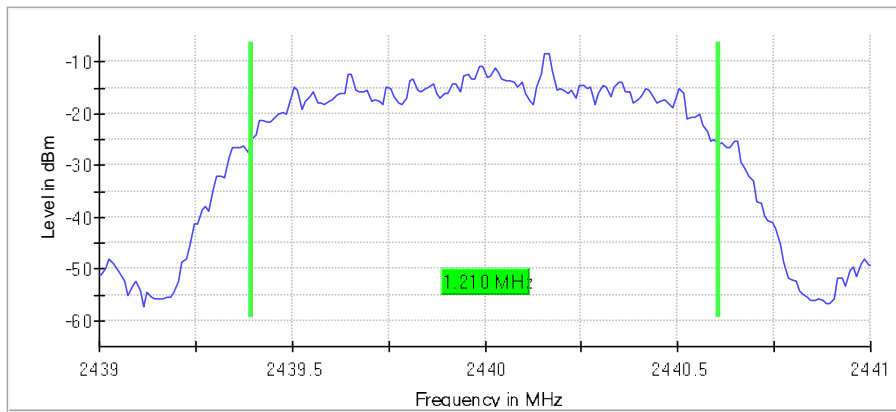
TEST RESULTS (Cont.)

OCCUPIED BANDWIDTH

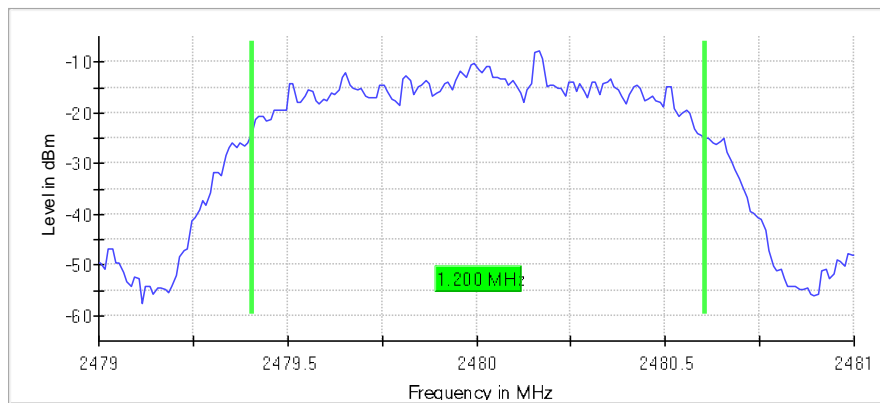
Lowest Channel



Middle Channel

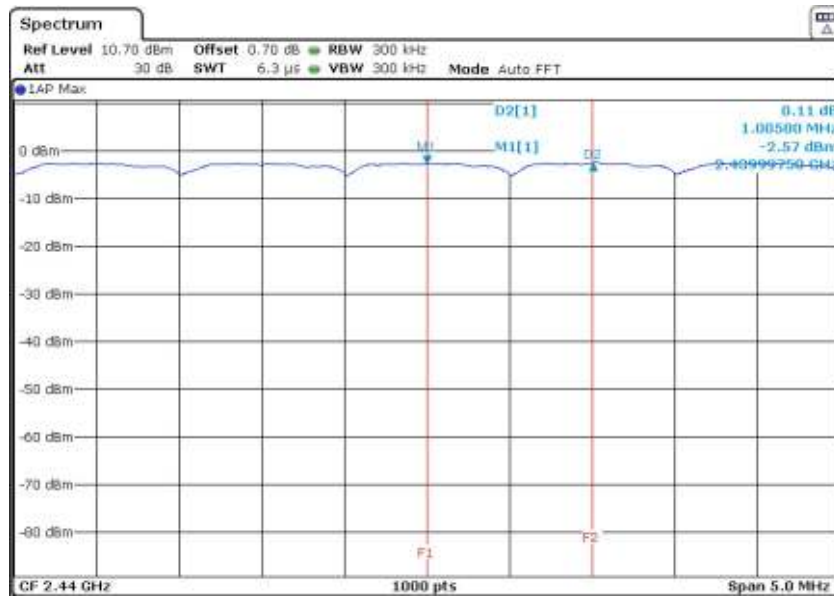


Highest Channel



TEST RESULTS (Cont.)

CARRIER FREQUENCY SEPARATION



The hopping channel carrier frequencies are separated by a minimum of the two-thirds of the 20 dB bandwidth of the hopping channel.

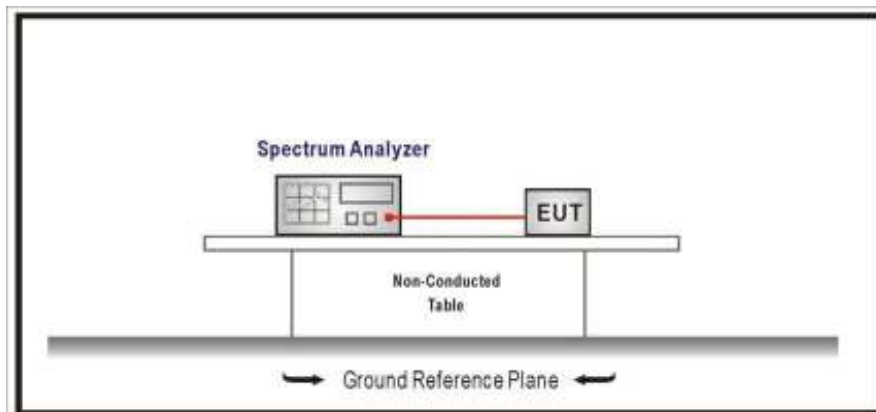
**TEST A.2: NUMBER OF HOPPING CHANNELS**

<b>LIMITS:</b>	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(a) (1) (iii) and RSS-247 5.1 (d)

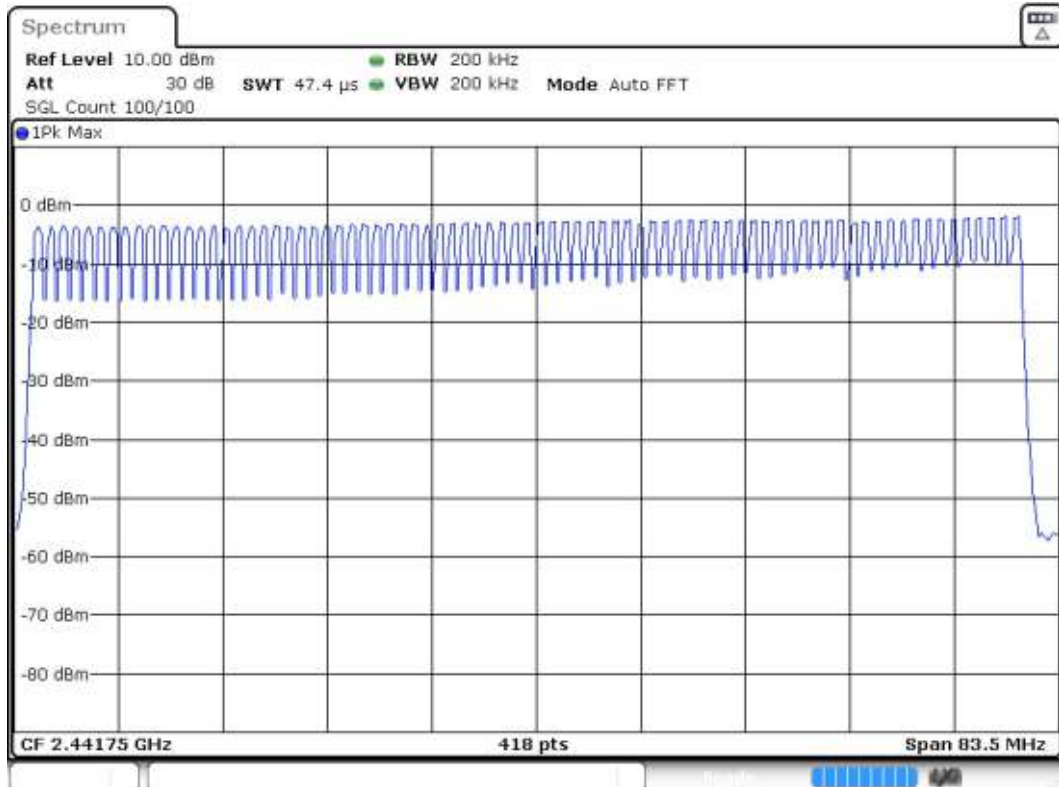
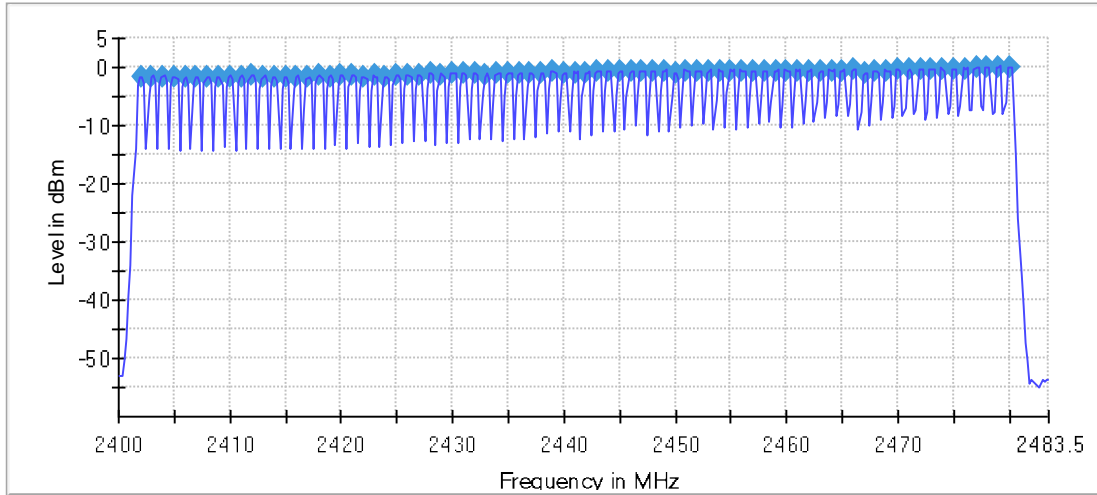
LIMITS

Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 channels.

**TEST SETUP:**



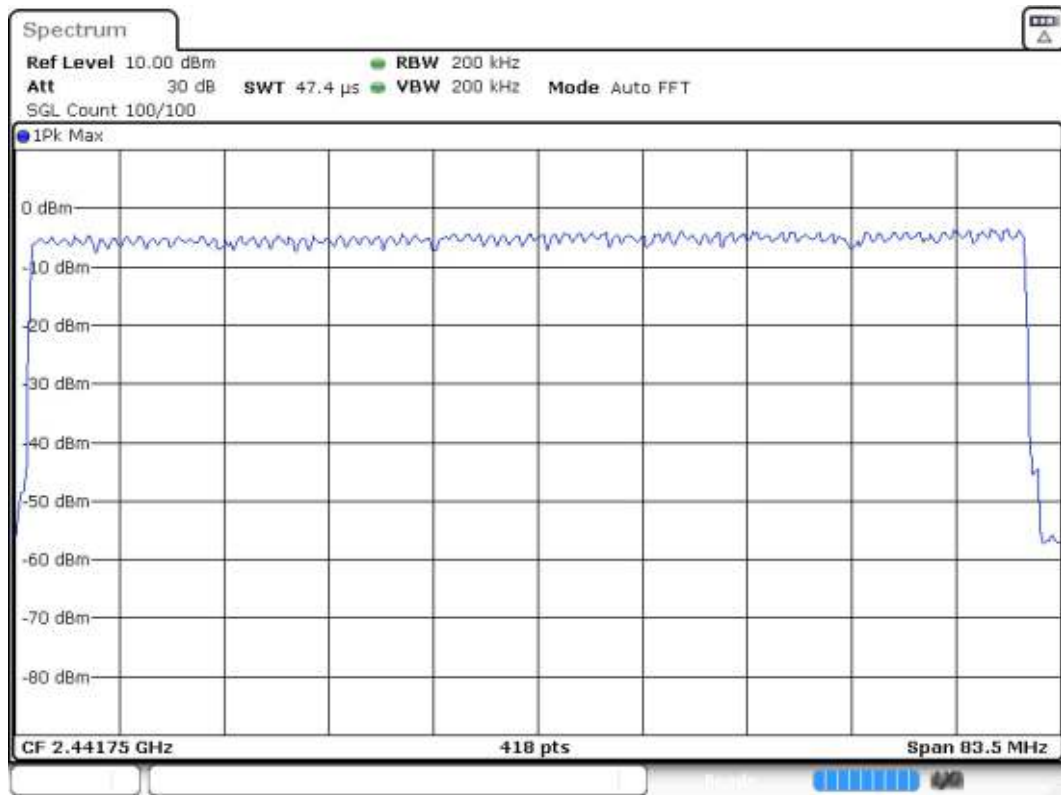
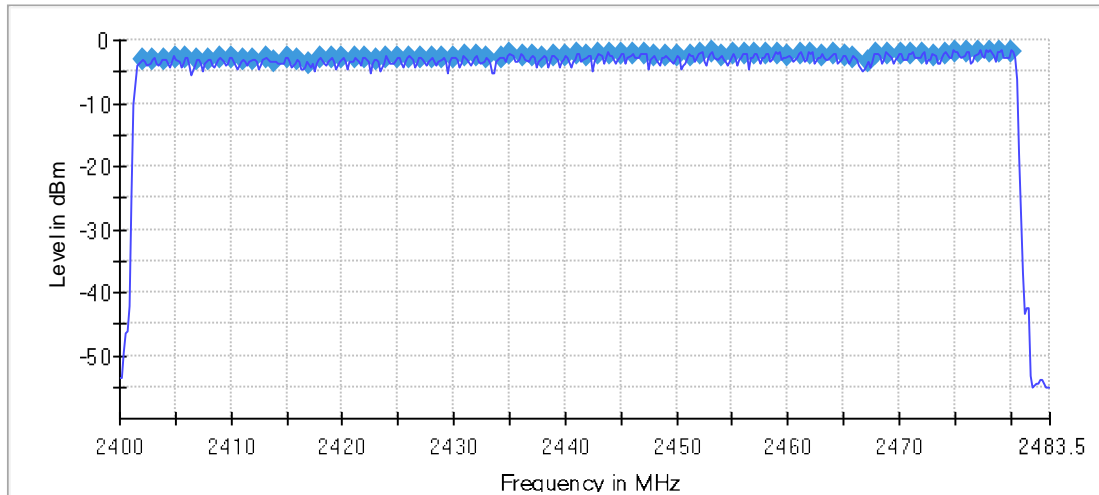
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01
<b>TEST RESULTS:</b>	PASS



Date: 26 DEC 2018 13:18:02

Number of Hopping Frequencies: 79

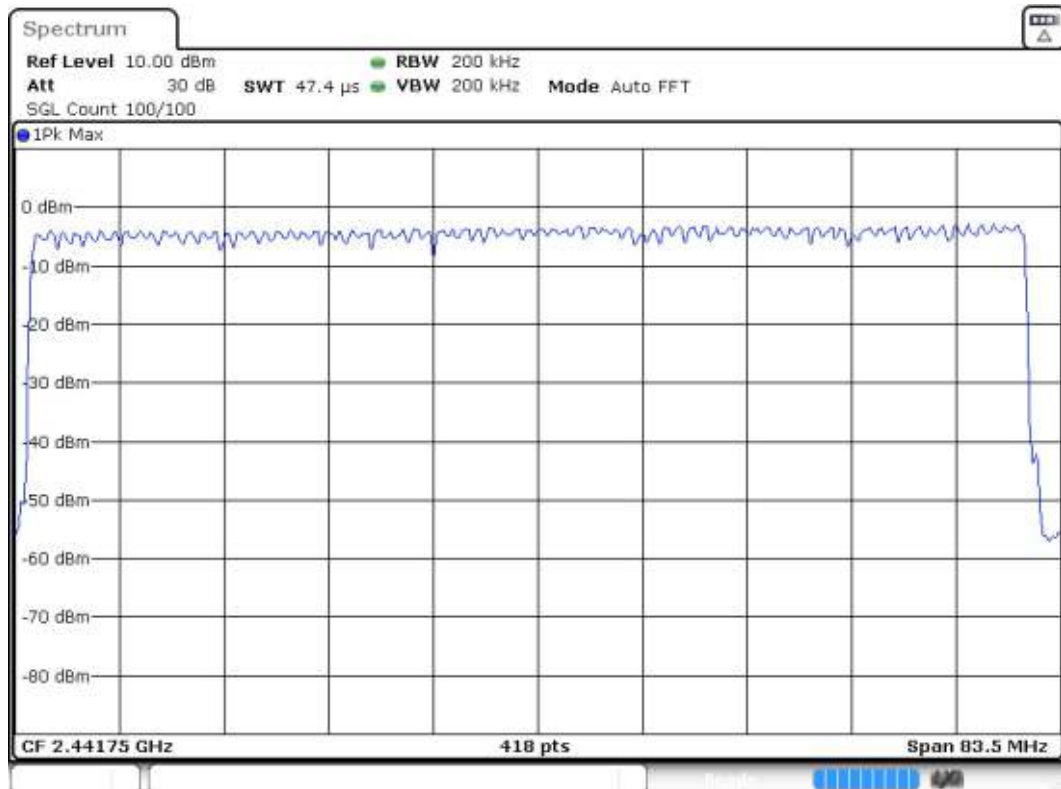
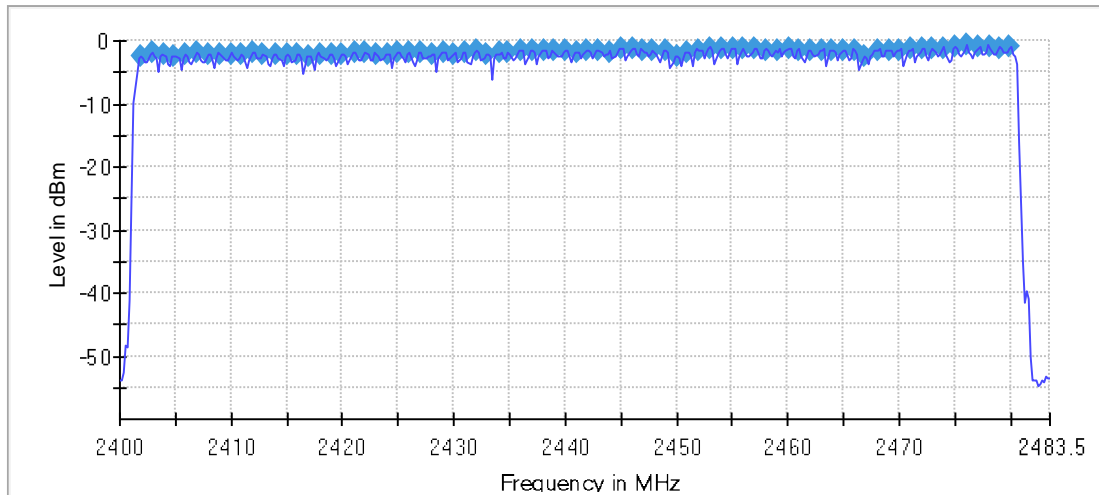
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02
<b>TEST RESULTS:</b>	PASS



Date: 26 DEC 2018 15:58:14

Number of Hopping Frequencies: 79

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#03
<b>TEST RESULTS:</b>	PASS



Date: 27 DEC 2018 10:08:20

Number of Hopping Frequencies: 79

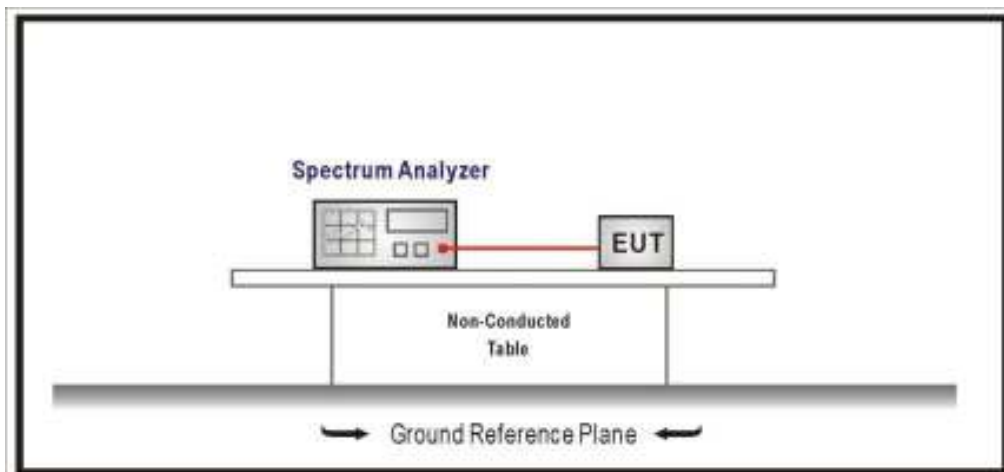
### TEST A.3: TIME OF OCCUPANCY (DWELL TIME)

<b>LIMITS:</b>	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(a)(1)(iii) and RSS-247 5.1(d)

LIMITS

The average time of occupancy on any channel shall not be greater than 0.4 seconds (400 ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed =  $0.4 \times 79 = 31.6$  seconds.

**TEST SETUP:**

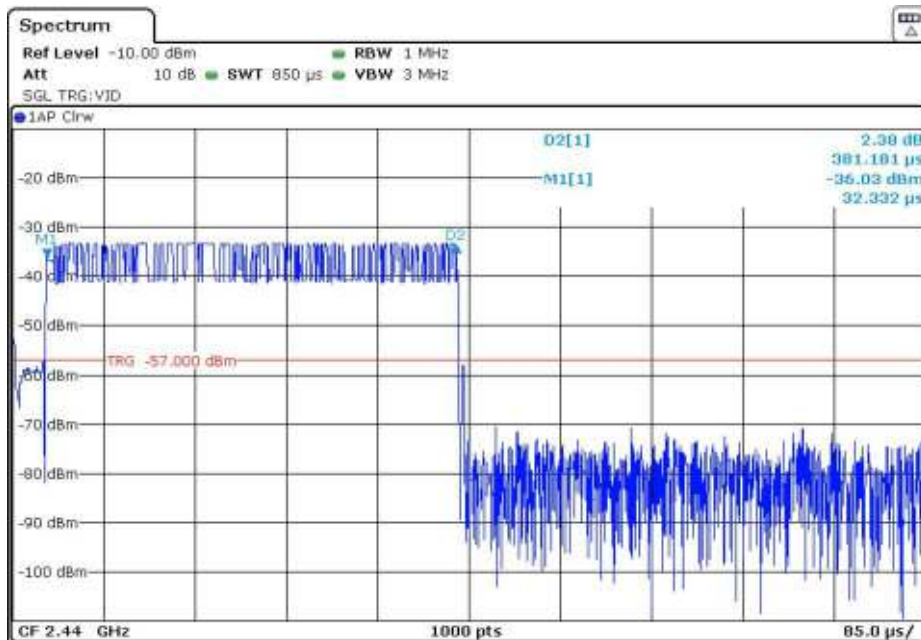


<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (GFSK)
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>PACKET TYPE DH1</b>

The system makes worst case 1600 hops per second or 1 time slot has a length of 625  $\mu$ s with 79 channels. A DH1 packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. So you have each channel 800/79 = 10.13 per second and so for a period of 0.4\*79 = 31.6 seconds you have 10.13 \* 31.6 = 320.11 times of appearance.

Each Tx – Time per appearance is 381.181  $\mu$ s (See next plot).

So we have 320.11 x 381.181  $\mu$ s = 122.02 ms per 31.6 seconds.



Measurement uncertainty (%)	<±0.12
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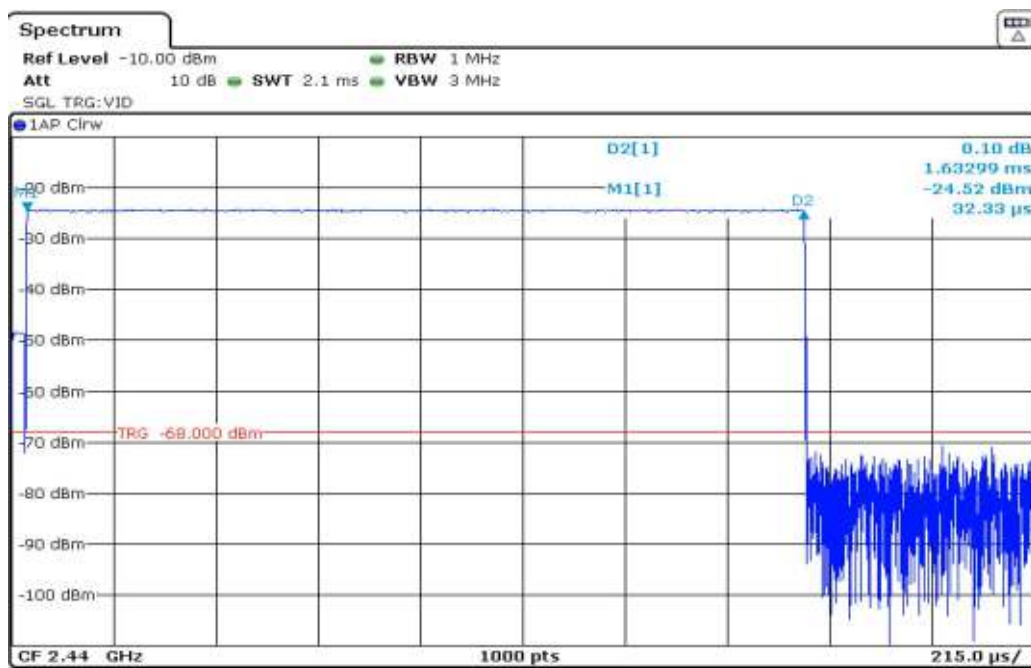
**TEST RESULTS (Cont.)**

**PACKET TYPE DH3**

A DH3 packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/4 = 400$  hops per second with 79 channels. So you have each channel  $400/79 = 5.1$  times per second and so for a period of  $0.4 * 79 = 31.6$  seconds you have  $5.1 * 31.6 = 161.16$  times of appearance.

Each Tx – Time per appearance is 1.63299 ms (See next plot).

So we have  $161.16 * 1.63299 = 263.17$  ms per 31.6 seconds.



Measurement uncertainty (%)	<±0.12
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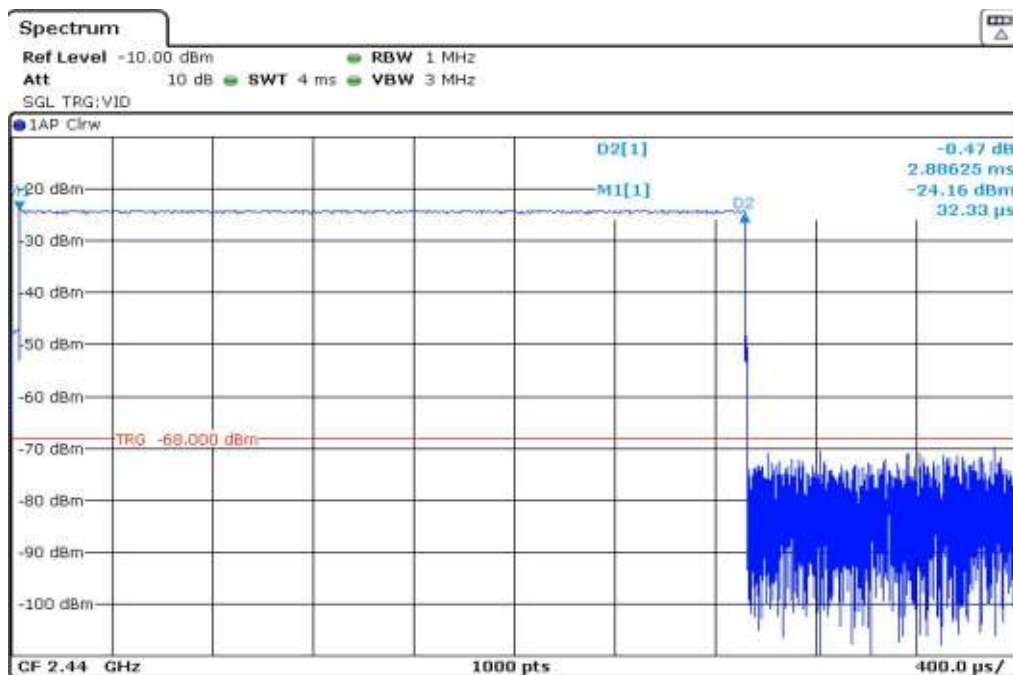
**TEST RESULTS (Cont.)**

**PACKET TYPE DH5**

A DH5 packet needs 5 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/6 = 266.67$  hops per second with 79 channels. So you have each channel  $266.67/79 = 3.37$  times per second and so for a period of  $0.4 * 79 = 31.6$  seconds you have  $3.37 * 31.6 = 106.49$  times of appearance.

Each Tx – Time per appearance is 2.88625 ms (See next plot).

So we have  $106.49 * 2.88625 = 307.357$  ms per 31.6 seconds.



Measurement uncertainty (%)

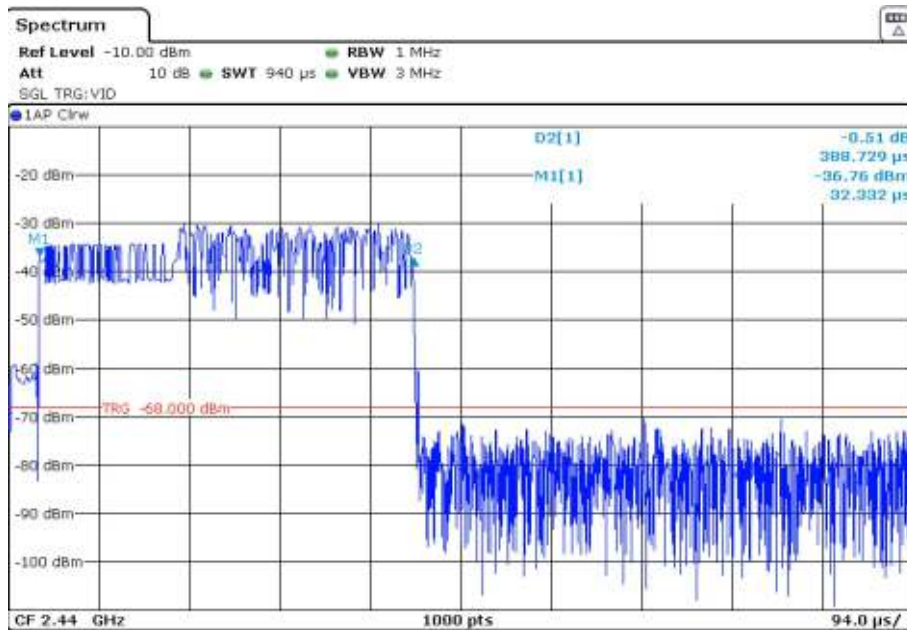
<±0.12

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (PI4DQPSK)
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>PACKET TYPE 2DH1</b>

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μs with 79 channels. A DH1 packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. So you have each channel 800/79 = 10.13 per second and so for a period of 0.4\*79 = 31.6 seconds you have 10.13 \* 31.6 = 320.11 times of appearance.

Each Tx – Time per appearance is 388.729 μs (See next plot).

So we have 320.11 x 388.729 μs = 124.436 ms per 31.6 seconds.



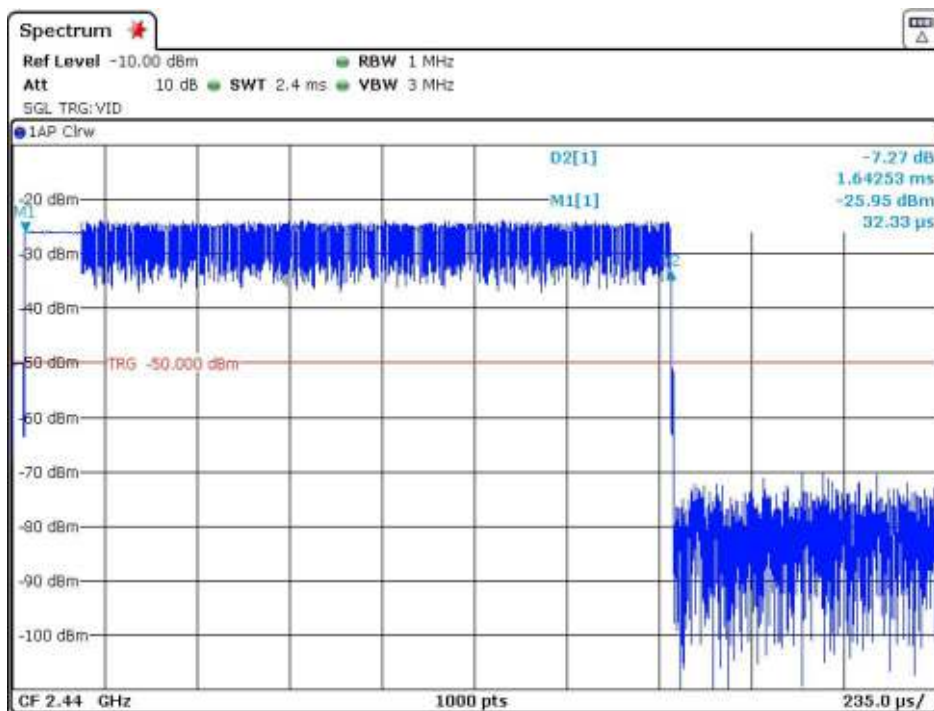
Measurement uncertainty (%)	<±0.12
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**PACKET TYPE 2DH3**

A DH3 packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/4 = 400$  hops per second with 79 channels. So you have each channel  $400/79 = 5.1$  times per second and so for a period of  $0.4 * 79 = 31.6$  seconds you have  $5.1 * 31.6 = 161.16$  times of appearance.

Each Tx – Time per appearance is 1.64253 ms (See next plot).

So we have  $161.16 * 1.64253 = 264.71$  ms per 31.6 seconds.



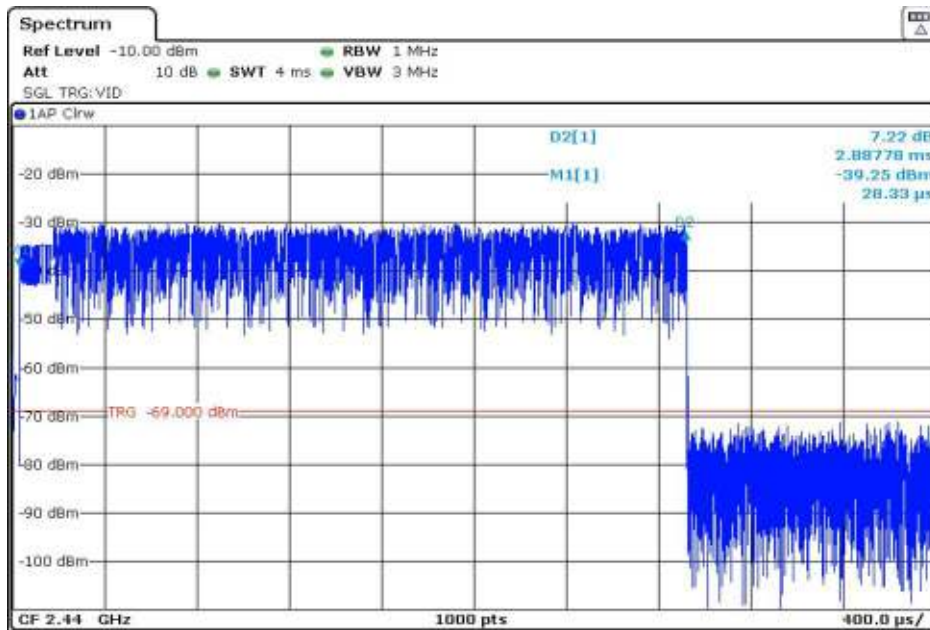
Measurement uncertainty (%)	<±0.12
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**PACKET TYPE 2DH5**

A DH5 packet needs 5 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/6 = 266.67$  hops per second with 79 channels. So you have each channel  $266.67/79 = 3.37$  times per second and so for a period of  $0.4 * 79 = 31.6$  seconds you have  $3.37 * 31.6 = 106.49$  times of appearance.

Each Tx – Time per appearance is 2.88778 ms (See next plot).

So we have  $106.49 * 2.88778 = 307.52$  ms per 31.6 seconds.



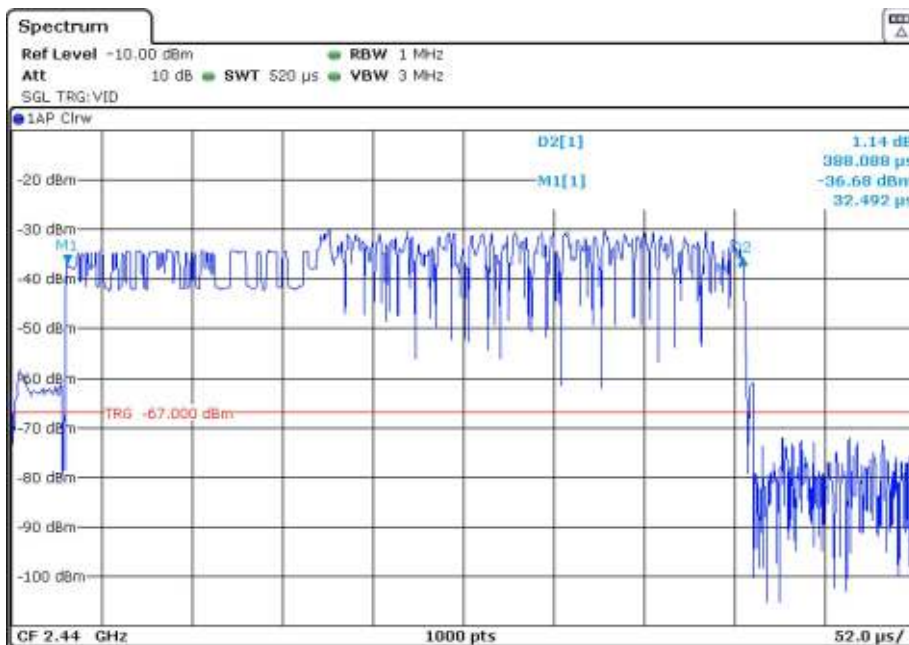
Measurement uncertainty (%)	<±0.12
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<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#03 (8DPSK)
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>PACKET TYPE 3DH1</b>

The system makes worst case 1600 hops per second or 1 time slot has a length of 625  $\mu$ s with 79 channels. A DH1 packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. So you have each channel 800/79 = 10.13 per second and so for a period of 0.4\*79 = 31.6 seconds you have 10.13 \* 31.6 = 320.11 times of appearance.

Each Tx – Time per appearance is 388.088  $\mu$ s (See next plot).

So we have 320.11 x 388.088  $\mu$ s = 124.231 ms per 31.6 seconds.



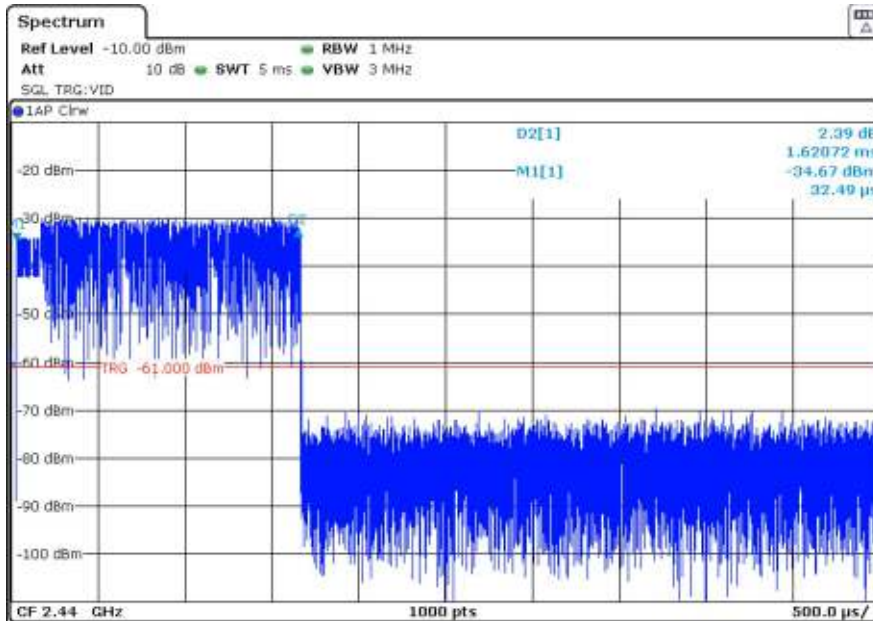
Measurement uncertainty (%)	< $\pm$ 0.12
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**PACKET TYPE 3DH3**

A DH3 packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/4 = 400$  hops per second with 79 channels. So you have each channel  $400/79 = 5.1$  times per second and so for a period of  $0.4 \cdot 79 = 31.6$  seconds you have  $5.1 \cdot 31.6 = 161.16$  times of appearance.

Each Tx – Time per appearance is 1.62072 ms (See next plot).

So we have  $161.16 \times 1.62072 = 261.196$  ms per 31.6 seconds.



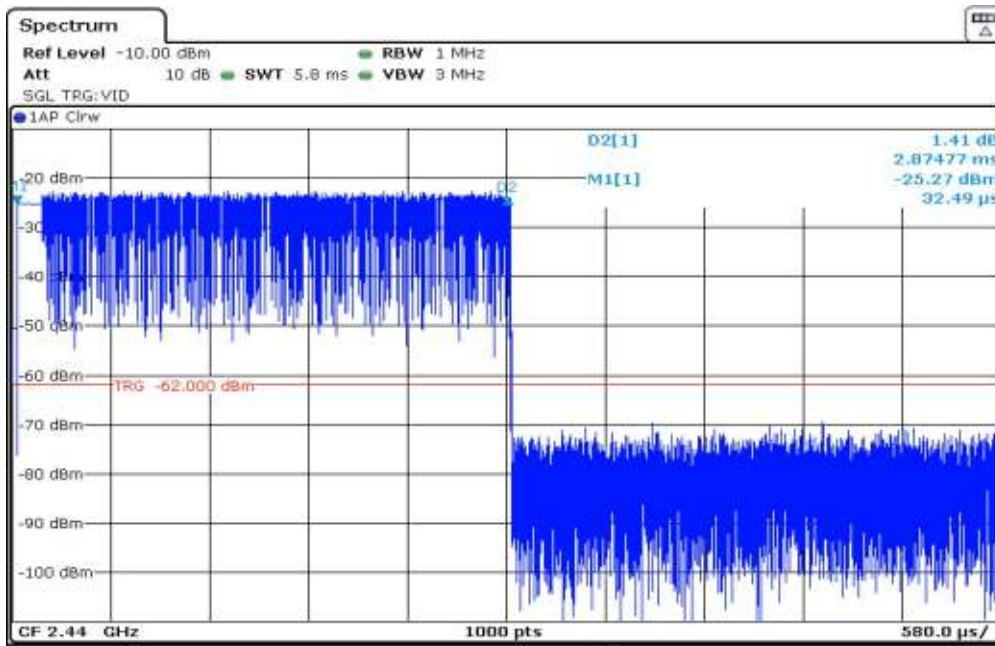
Measurement uncertainty (%)	<±0.12
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**PACKET TYPE 3DH5**

A DH5 packet needs 5 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case  $1600/6 = 266.67$  hops per second with 79 channels. So you have each channel  $266.67/79 = 3.37$  times per second and so for a period of  $0.4 * 79 = 31.6$  seconds you have  $3.37 * 31.6 = 106.49$  times of appearance.

Each Tx – Time per appearance is 2.87477 ms (See next plot).

So we have  $106.49 * 2.87477 = 306.134$  ms per 31.6 seconds.



Measurement uncertainty (%)	<±0.12
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## TEST A.4: MAXIMUM PEAK CONDUCTED OUTPUT POWER AND ANTENNA GAIN

<b>LIMITS:</b>	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(b)

### LIMITS

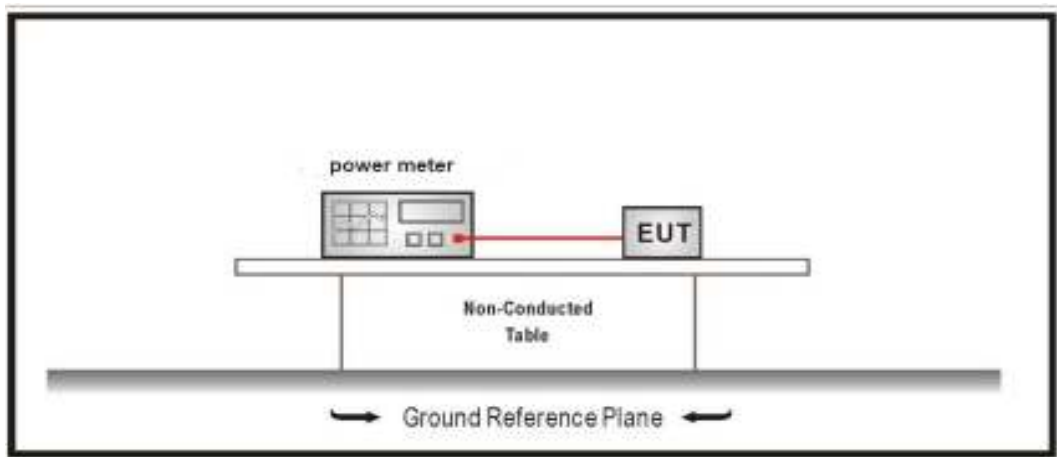
For Frequency Hopping systems operating in the 2400 – 2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm). (Part 15 Subpart C §15.247).

The e.i.r.p. shall not exceed 4 W (RSS-247).

### TEST SETUP

Measured according to ANSI C63.10, Section 11.9.2.3.2 Method AVGPM-G

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



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

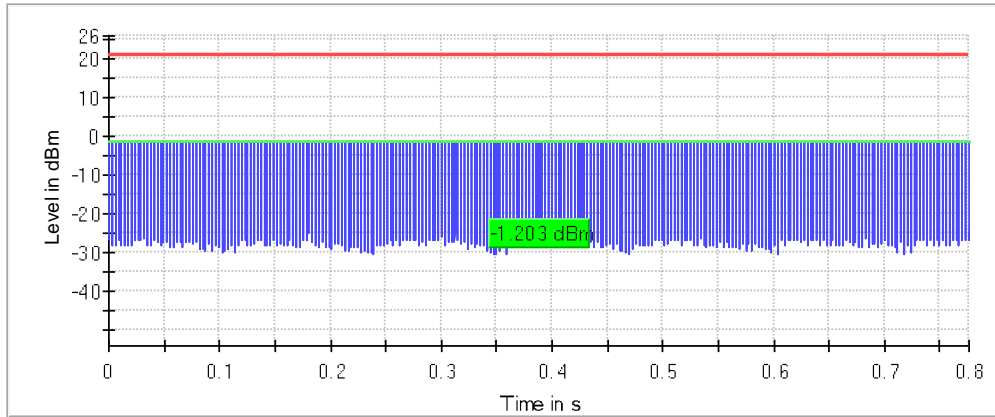
Maximum declared antenna gain: +1.3 dBi

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-1.2	0.0	0.8
Maximum EIRP power (dBm)	0.1	1.3	2.1
Measurement uncertainty (dB)	<±0.78		

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.

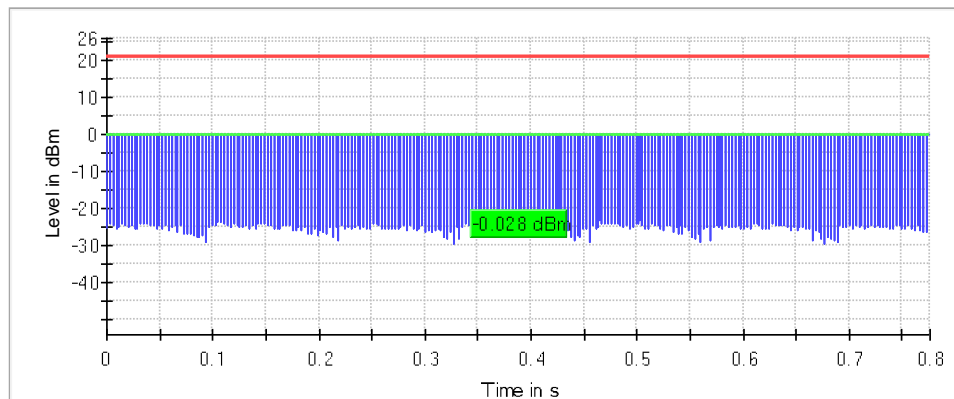
<b>TEST RESULTS (Cont.):</b>	<b>CONDUCTED OUTPUT POWER</b>
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**Lowest Channel**



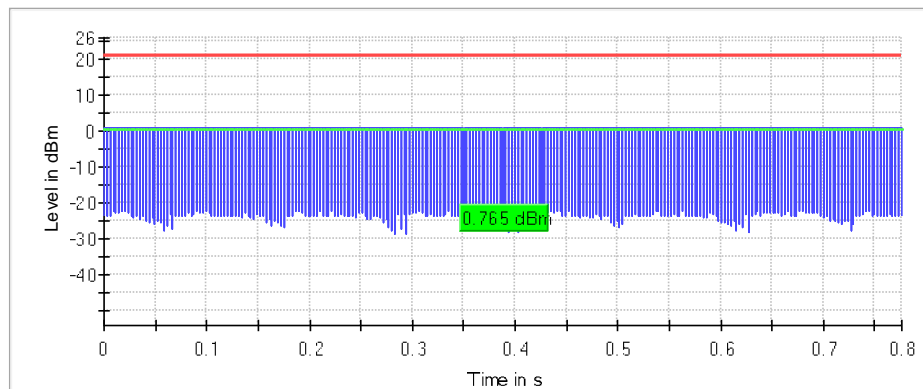
— Gated Trace    — Overall    — Limit

**Middle Channel**



— Gated Trace    — Overall    — Limit

**Highest Channel**



— Gated Trace    — Overall    — Limit

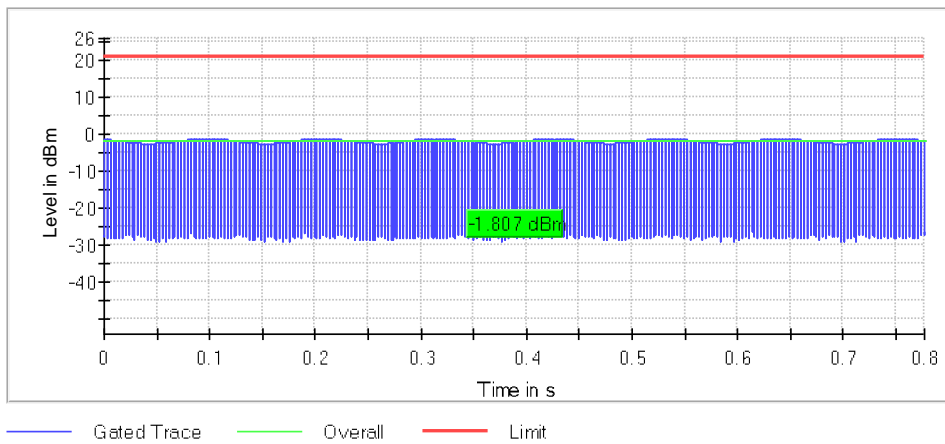
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02
<b>TEST RESULTS:</b>	PASS

Maximum declared antenna gain: +1.3 dBi

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-1.8	-1.1	-0.3
Maximum EIRP power (dBm)	-0.5	0.2	1.0
Measurement uncertainty (dB)	<±0.78		

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.

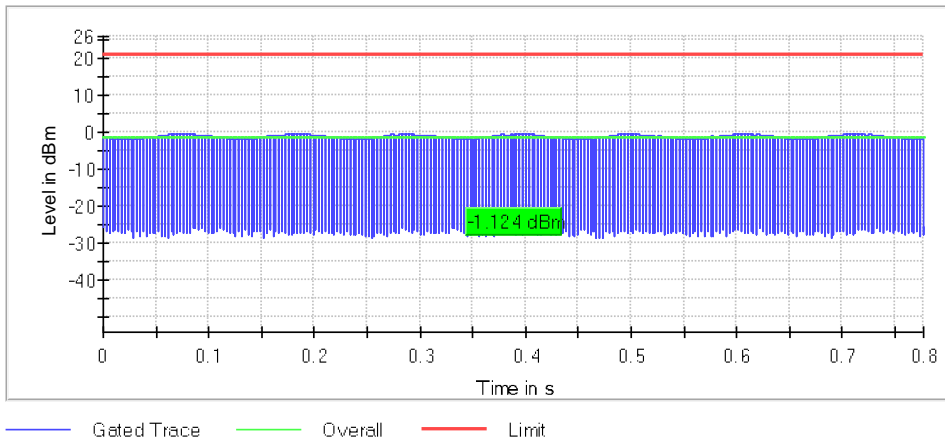
### Lowest Channel



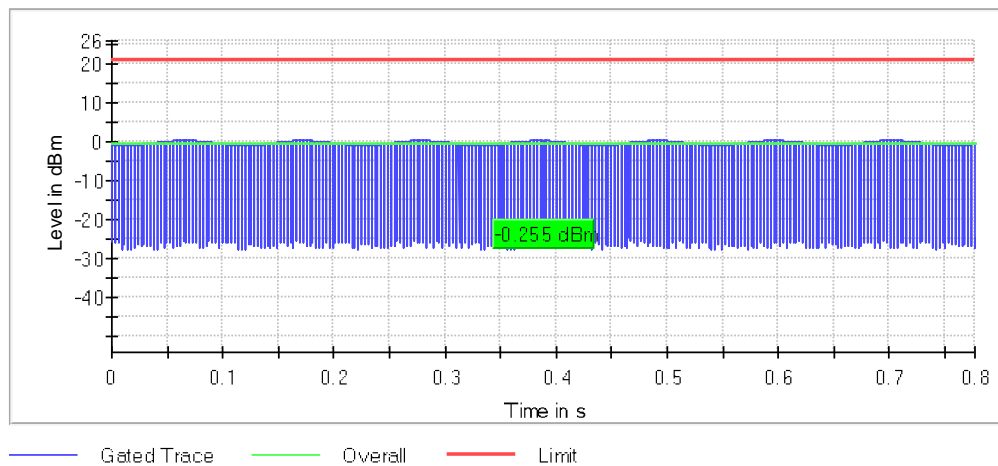
**TEST RESULTS (Cont.)**

**CONDUCTED OUTPUT POWER**

**Middle Channel**



**Highest Channel**



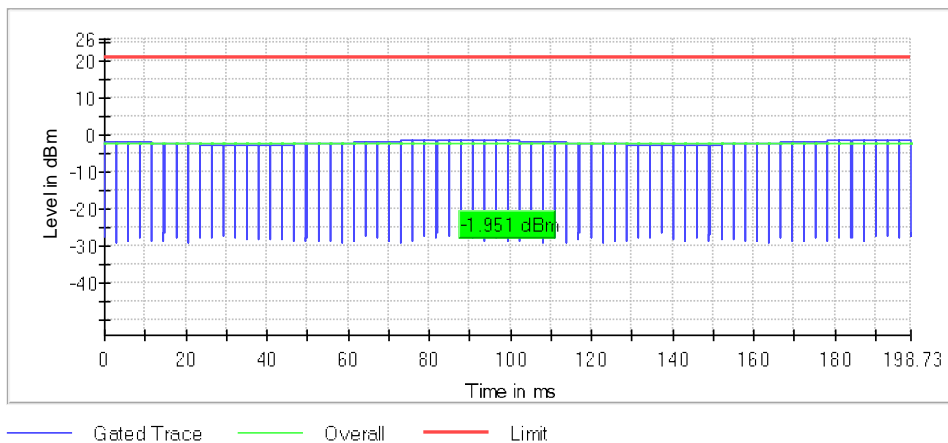
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#03
<b>TEST RESULTS:</b>	PASS

Maximum declared antenna gain: +1.3 dBi

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-2.0	-1.2	-0.4
Maximum EIRP power (dBm)	-0.7	0.1	0.9
Measurement uncertainty (dB)	<±0.78		

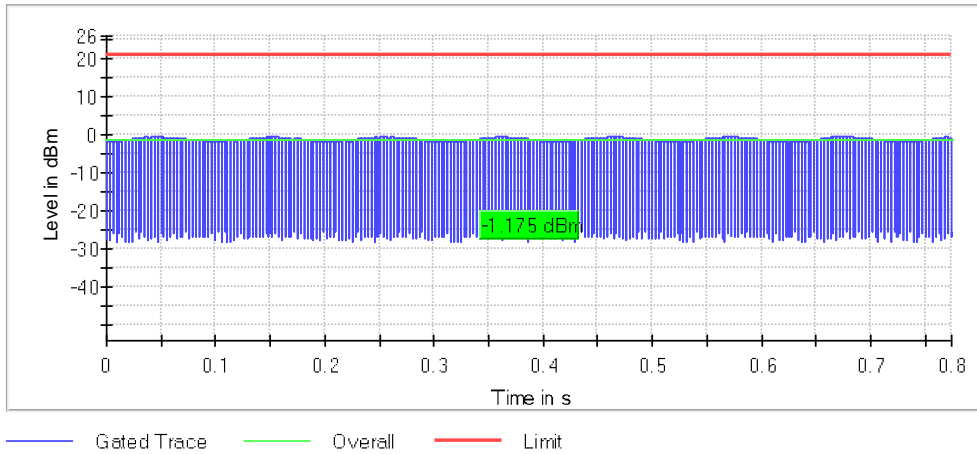
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

### Lowest Channel

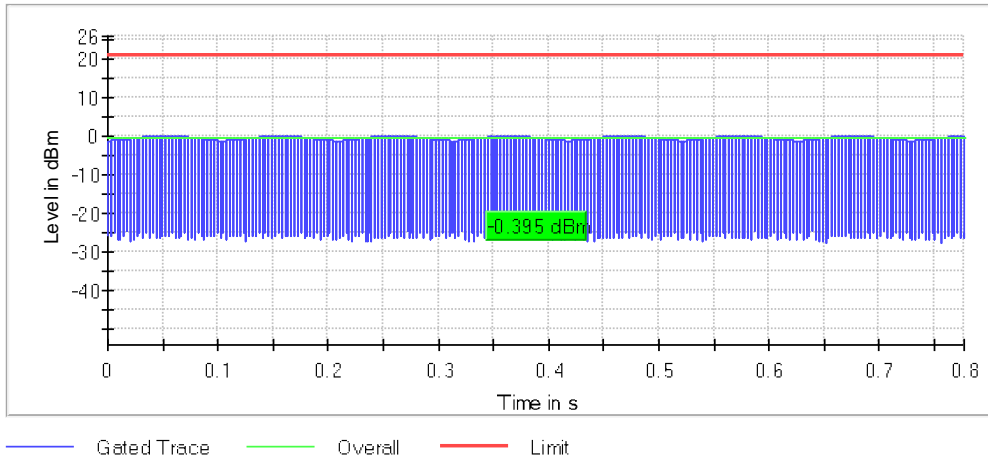


TEST RESULTS (Cont.)

Middle Channel



Highest Channel



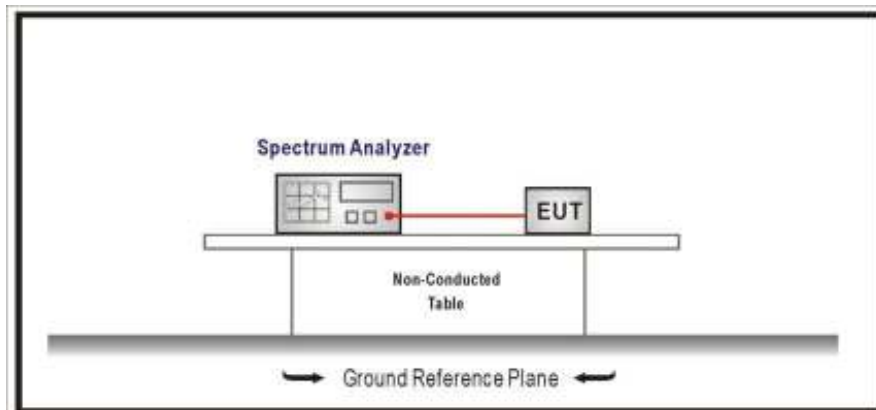
## TEST A.5: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

<b>LIMITS:</b>	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

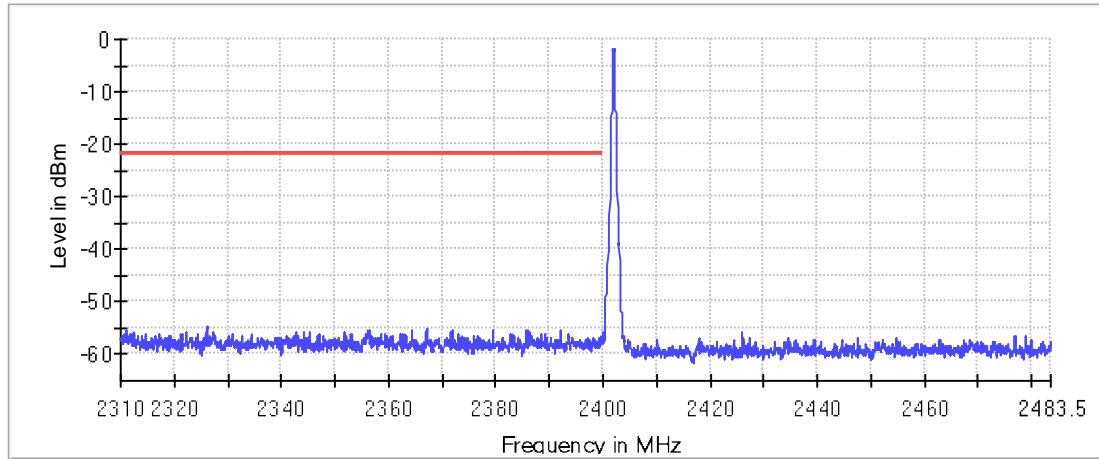
### LIMITS

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20dB below the highest level of the desired power.

### TEST SETUP



<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>HOPPING OFF (Lowest channel)</b>



— Limit    — Sum Level    × Fail

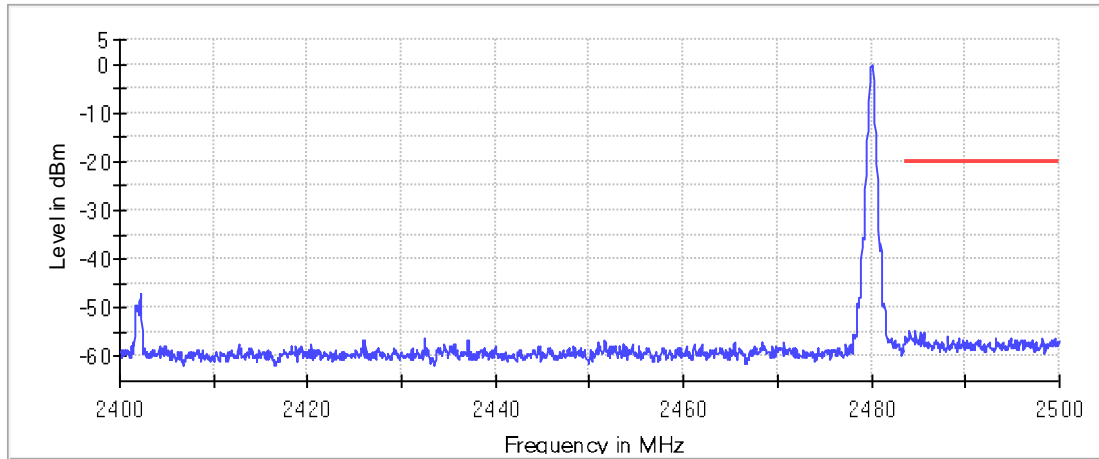
### Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	10 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.05 dB



TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)



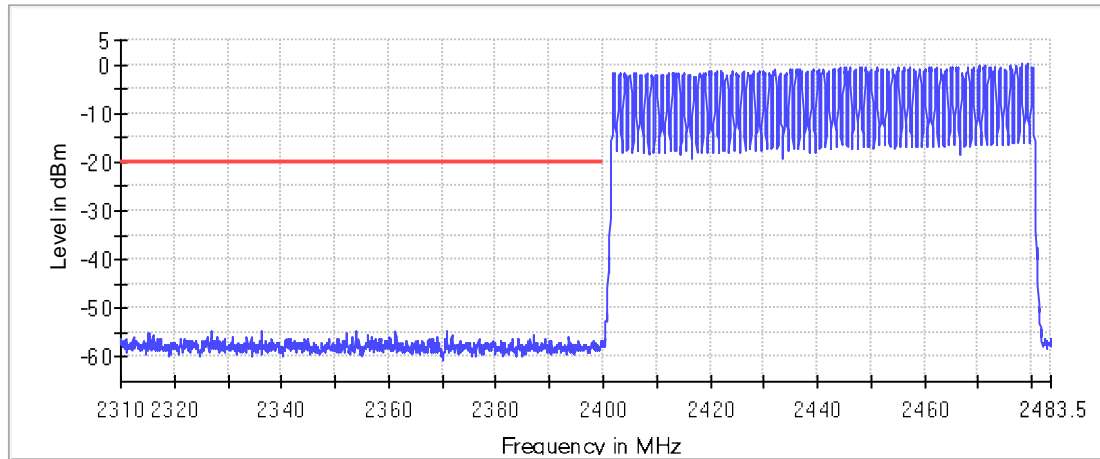
— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.18 dB	0.50 dB

**TEST RESULTS (Cont.):**

**HOPPING ON (Lowest channel)**



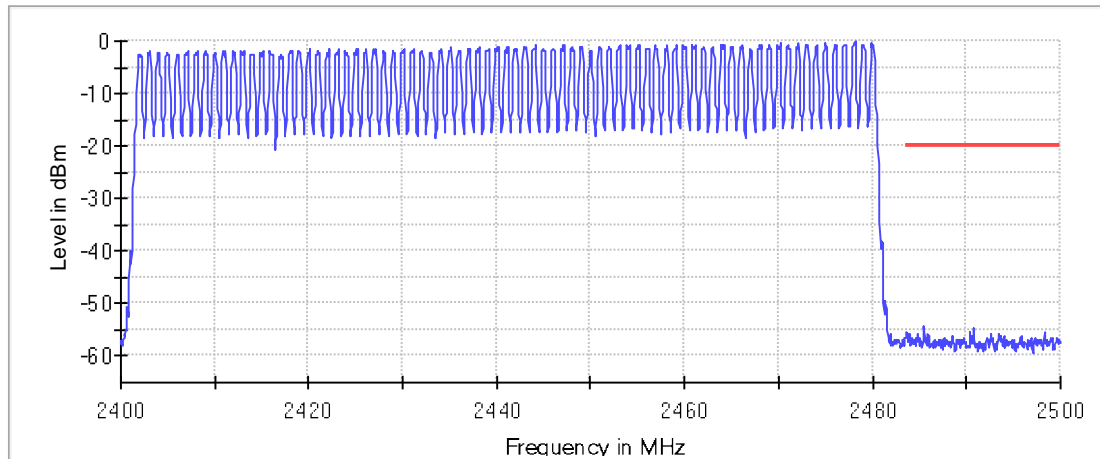
— Limit    — Sum Level    × Fail

**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
SweepTime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	150 / max. 150
Stable	3 / 3	0 / 3
Max Stable Difference	0.58 dB	0.50 dB

**TEST RESULTS (Cont.):**

**HOPPING ON (Highest channel)**

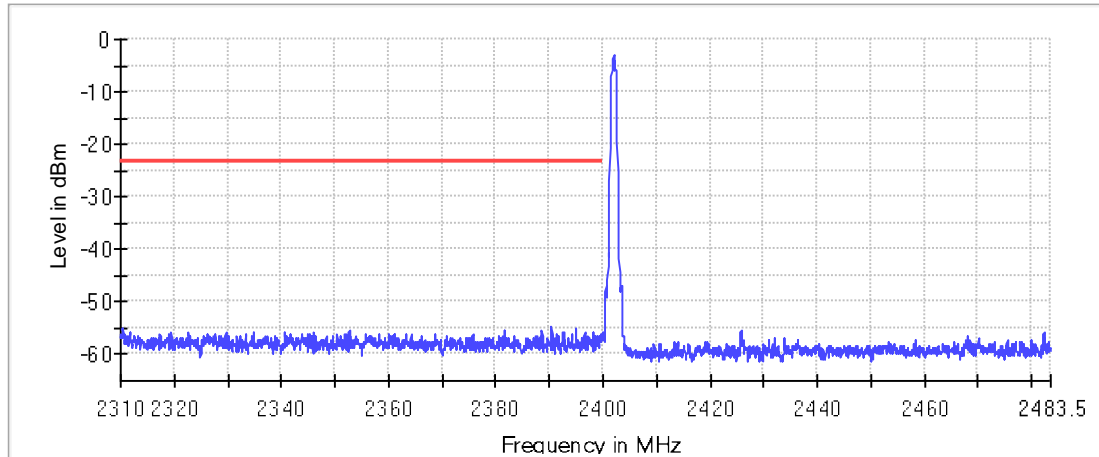


— Limit    — Sum Level    × Fail

**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
SweepTime	94.727 µs	18.945 µs
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	128 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.32 dB	0.50 dB

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (PI4DQPSK)
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>HOPPING OFF (Lowest channel)</b>



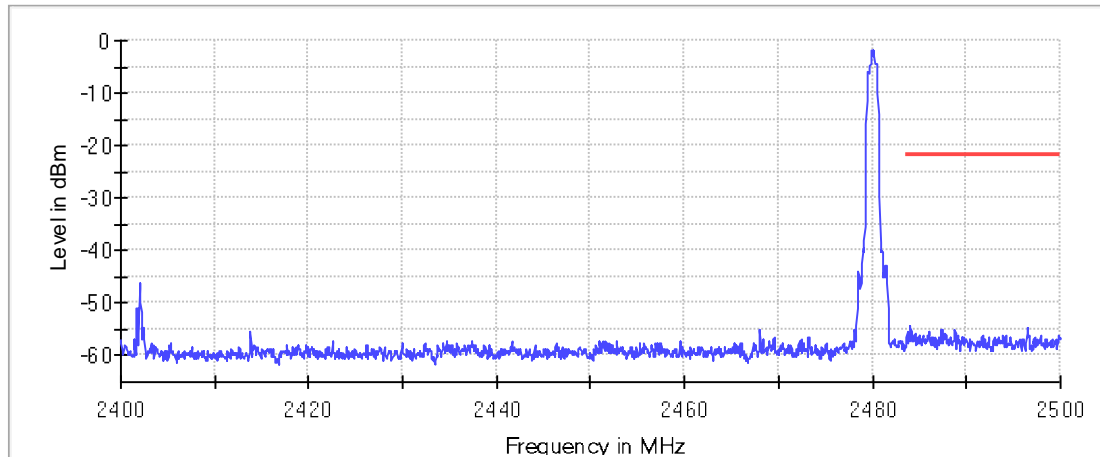
— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	Instrument	2.40000 GHz
Stop Frequency	2.31000 GHz	2.48350 GHz
Span	2.40000 GHz	83.500 MHz
RBW	90.000 MHz	100.000 kHz
VBW	100.000 kHz	300.000 kHz
SweepPoints	300.000 kHz	1670
Sweeptime	1800	94.727 $\mu$ s
Reference Level	113.672 $\mu$ s	10.000 dBm
Attenuation	10.000 dBm	30.000 dB
Detector	30.000 dB	MaxPeak
SweepCount	MaxPeak	100
Filter	100	3 dB
Trace Mode	3 dB	Max Hold
Sweeptype	Max Hold	FFT
Preamp	FFT	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	8 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)



— Limit    — Sum Level    × Fail

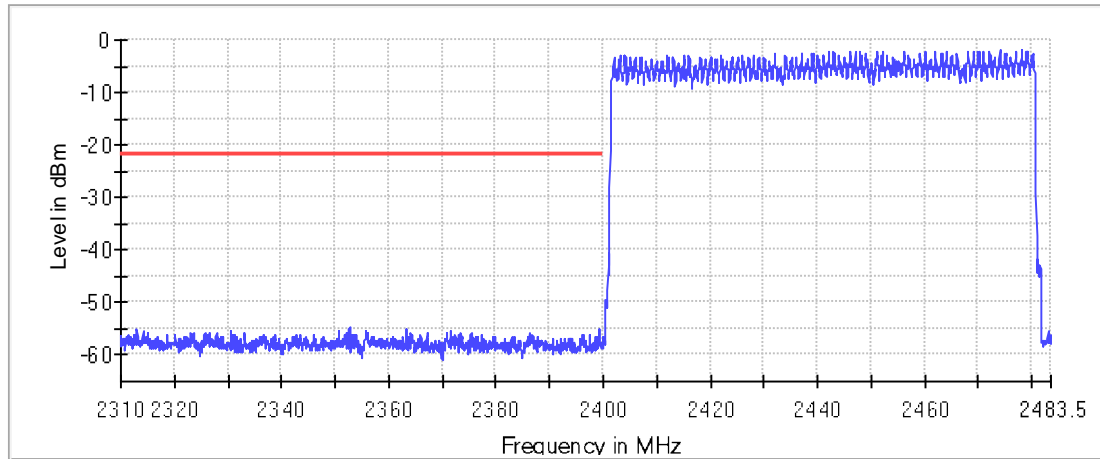
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.02 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING ON (Lowest channel)

Lowest Channel



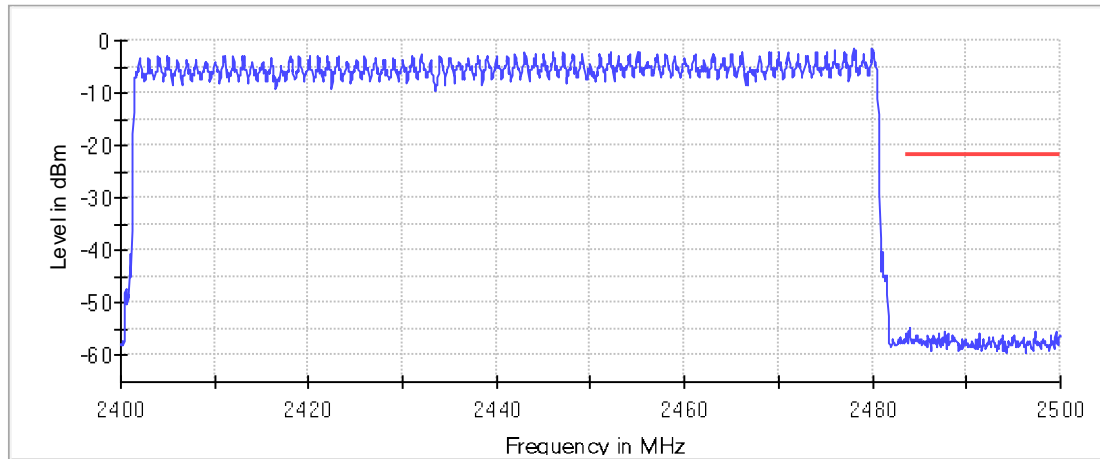
— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	150 / max. 150
Stable	3 / 3	0 / 3
Max Stable Difference	0.00 dB	0.91 dB

**TEST RESULTS (Cont.):**

**HOPPING ON (Highest channel)**

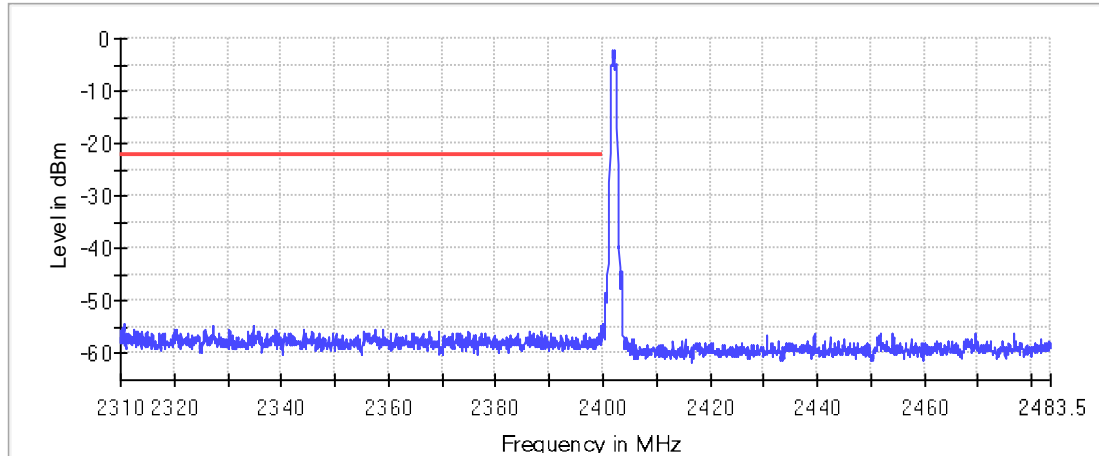


— Limit    — Sum Level    × Fail

**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	150 / max. 150	4 / max. 150
Stable	0 / 3	3 / 3
Max Stable Difference	1.12	0.00 dB

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#03 (8DPSK)
<b>TEST RESULTS:</b>	PASS
<b>TEST RESULTS (Cont.)</b>	<b>HOPPING OFF (Lowest channel)</b>



— Limit    — Sum Level    × Fail

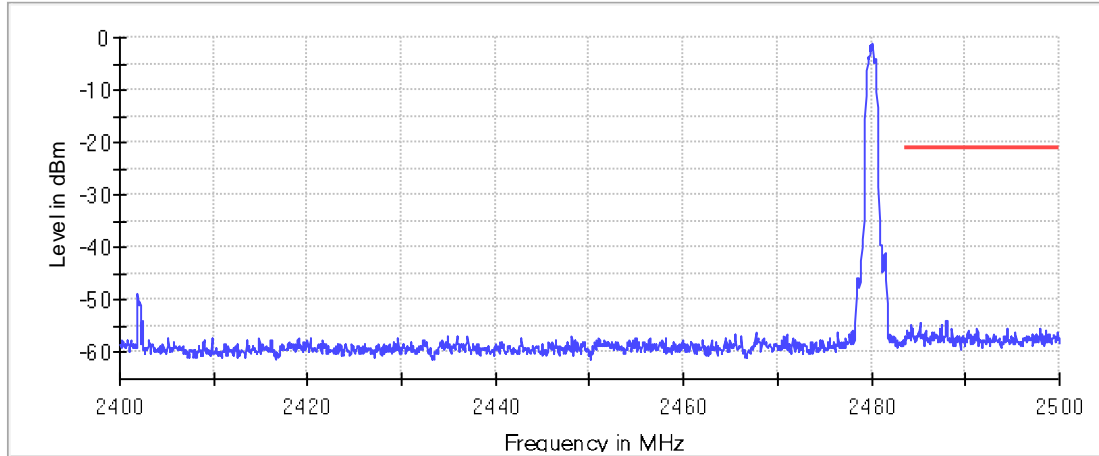
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	7 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.29 dB



TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)



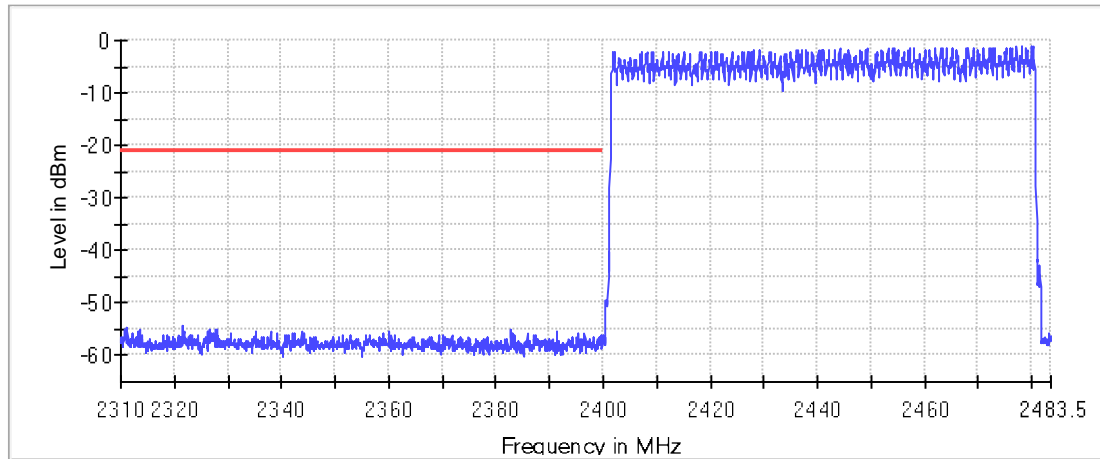
— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.24 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING ON (Lowest channel)



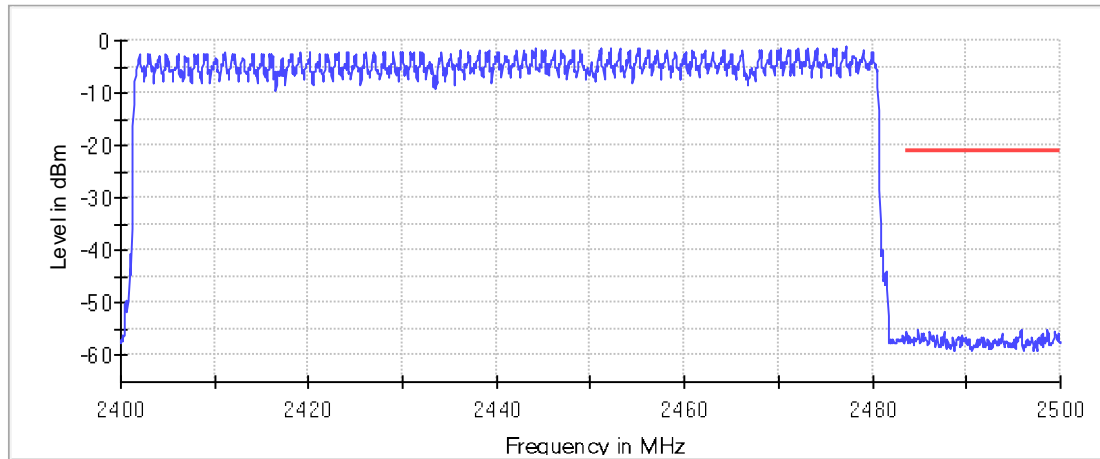
— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	150 / max. 150
Stable	3 / 3	0 / 3
Max Stable Difference	0.00 dB	2.41 dB

TEST RESULTS (Cont.):

HOPPING ON (Highest channel)



— Limit    — Sum Level    × Fail

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	150 / max. 150	4 / max. 150
Stable	0 / 3	3 / 3
Max Stable Difference	1.36 dB	0.00 dB

## TEST A.6: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

<b>LIMITS:</b>	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

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.

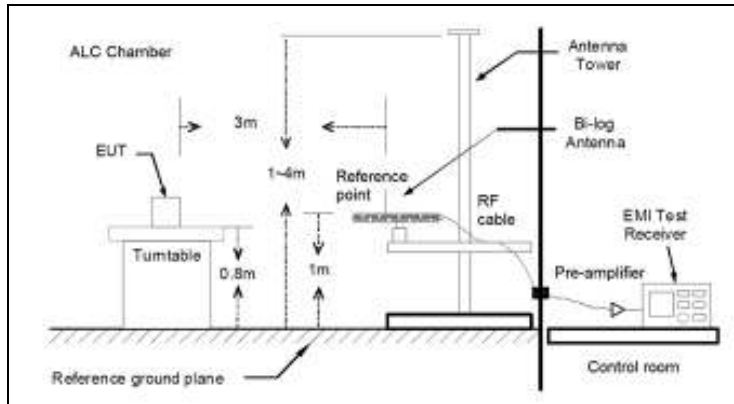
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

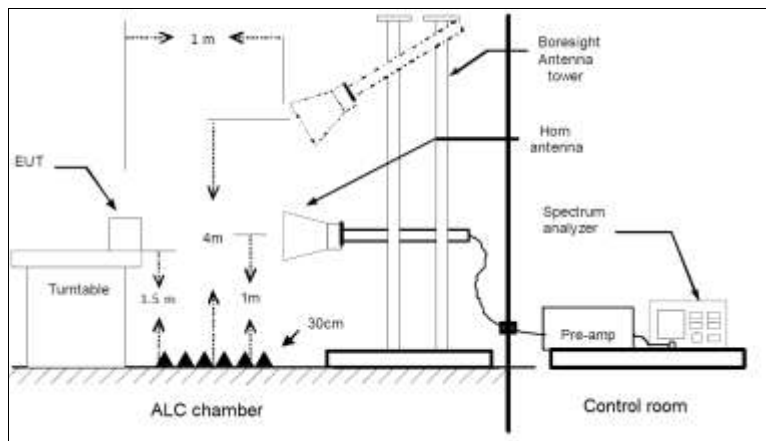
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

**TEST SETUP (CONT.)**

**Radiated measurements Setup  $f < 1$  GHz**



**Radiated measurements setup  $f > 1$  GHz**



<b>TESTED SAMPLES:</b>	S/02
<b>TESTED CONDITIONS MODES:</b>	TC#01 (GFSK)
<b>TEST RESULTS:</b>	PASS

**Co-Location**

The test was performed with the equipment transmitting first with only the 2.4 GHz BT-EDR radio and repeated with the WiFi 2.4GHz (WLAN0 CORE1), and WiFi 5 GHz (WLAN0 CORE0) radios transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

**Frequency range 30 MHz – 1000 MHz**

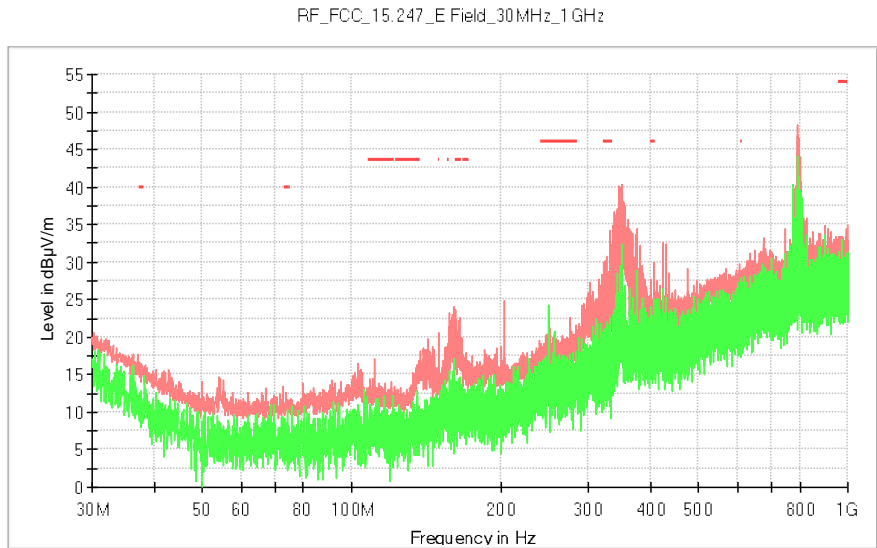
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

**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).

The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.

<b>TEST RESULTS (Cont.):</b>	
<b>FREQUENCY RANGE</b>	<b>30 MHz – 1000 MHz (GFSK)</b>



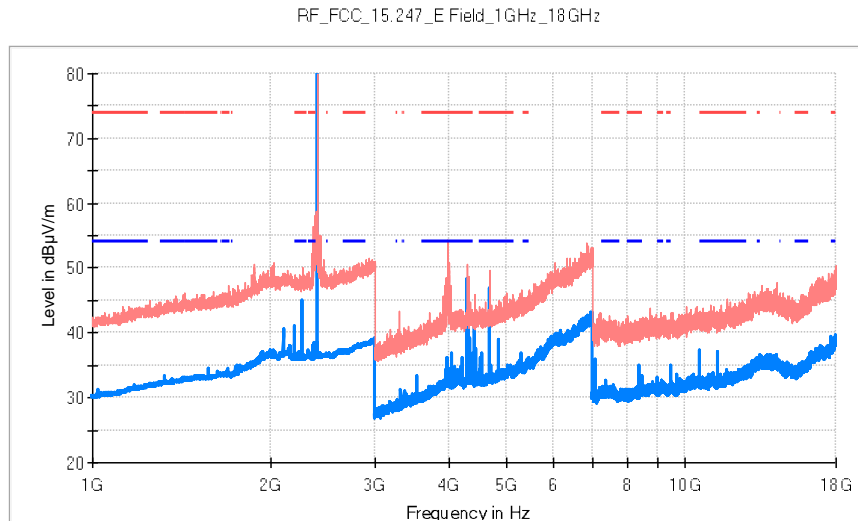
— PK+ \_MAXH  
— PK+ \_CLRWR  
- - - TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit

**Result Table\_Single**

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol
350.003000	41.6	37.2	H
160.853000	25.0	13.3	H
793.099000	43.9	36.0	H
249.996000	26.8	20.0	H
1000.000000	40.0	32.4	V
406.457000	32.3	25.4	V

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>1 GHz – 18 GHz (GFSK)</b>

**CHANNEL: Lowest (2402 MHz).**



- 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

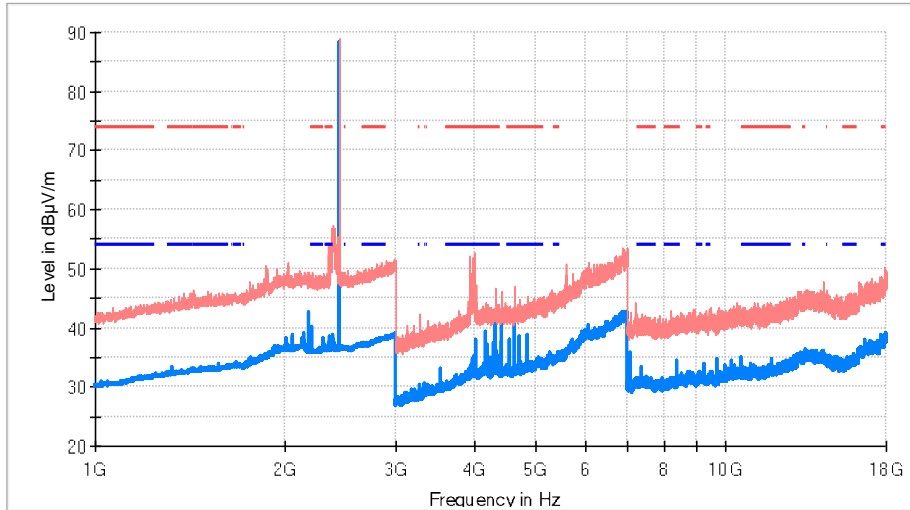
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2259.000000	50.03	44.94	V	
2402.000000	87.66	87.14	H	Fundamental
4300.000000	50.62	48.27	V	
4700.000000	49.56	45.96	V	
10583.000000	42.83	37.38	H	
11403.500000	42.41	37.02	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- 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**

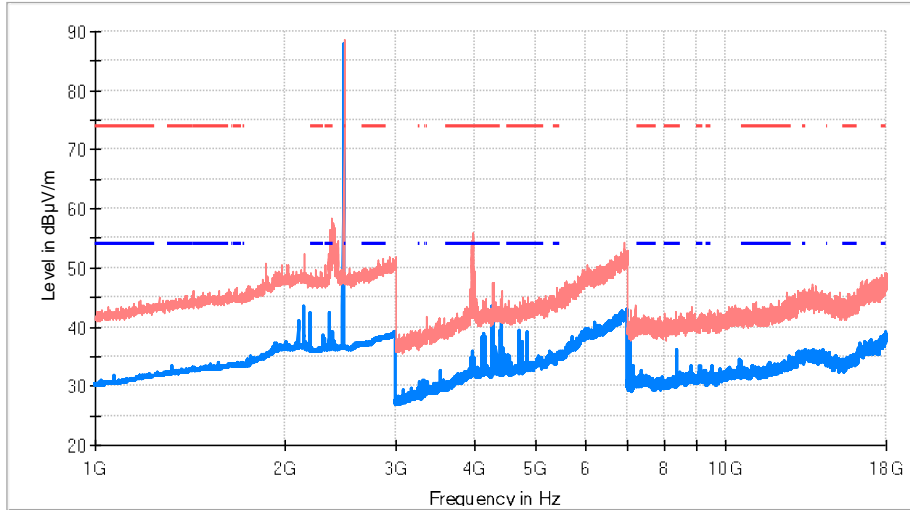
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2441.000000	88.91	88.25	H	Fundamental
4321.000000	46.59	43.01	V	
4409.500000	46.08	41.54	V	
4642.500000	46.52	41.78	V	
8378.000000	42.00	34.46	V	
11828.500000	41.97	34.82	V	



**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



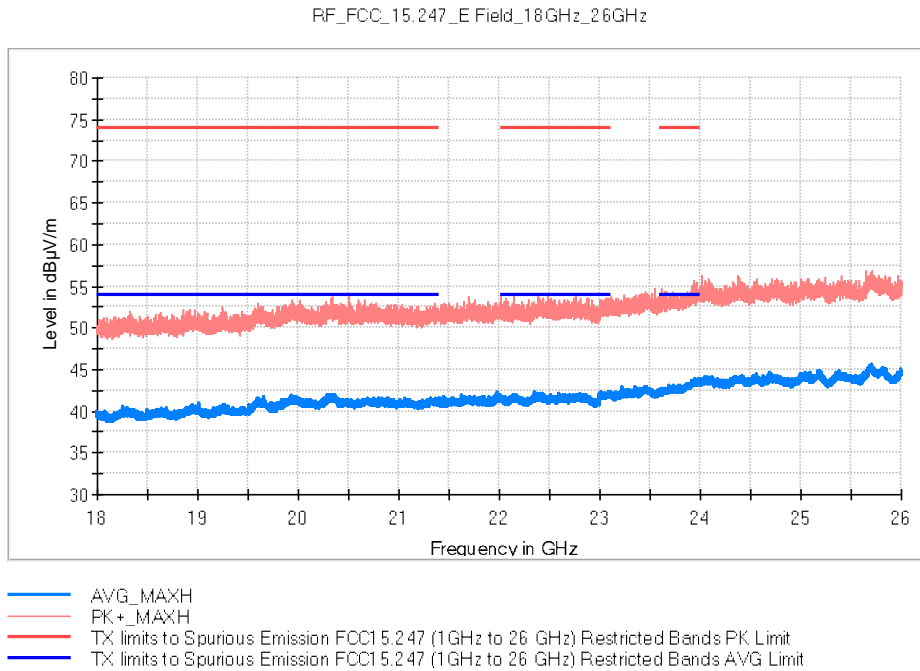
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

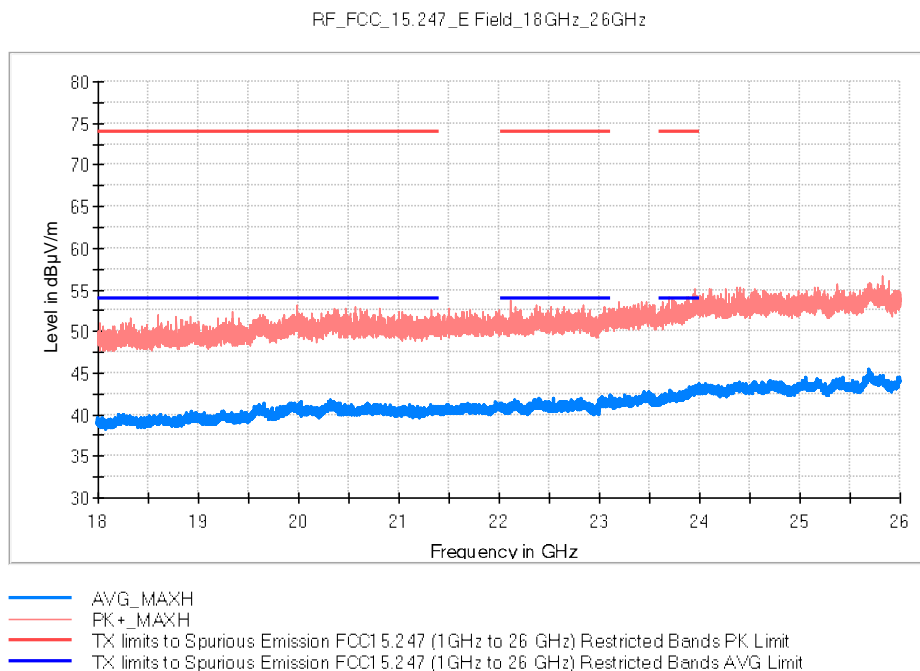
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2480.000000	88.55	87.80	H	Fundamental
4273.500000	47.63	43.48	V	
4302.000000	47.55	43.27	V	
4715.000000	44.12	39.21	V	
10539.000000	41.99	34.33	H	
13389.500000	45.28	36.04	V	
17999.000000	47.74	38.98	V	

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>18 GHz – 26 GHz (GFSK)</b>

**CHANNEL: Lowest (2402 MHz).**



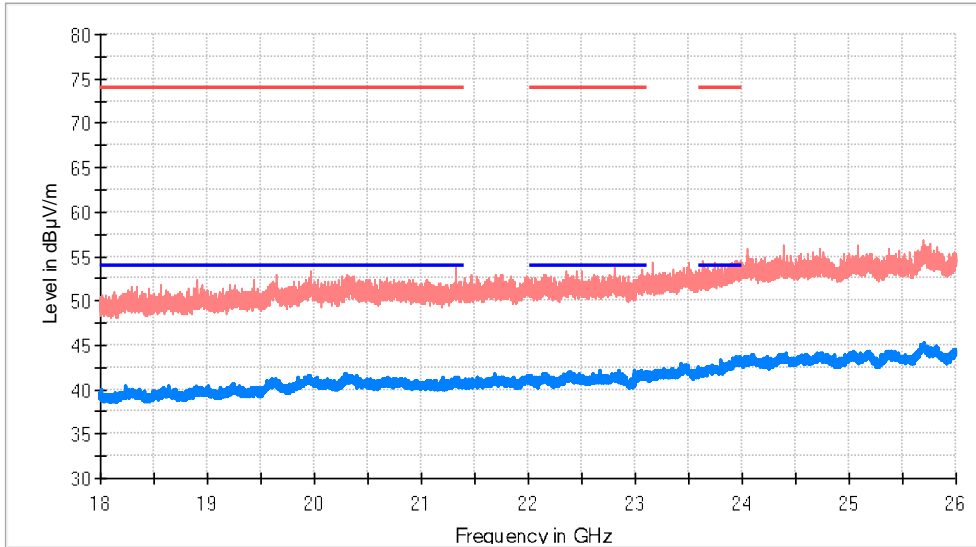
**CHANNEL: Middle (2440 MHz).**



**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz).**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



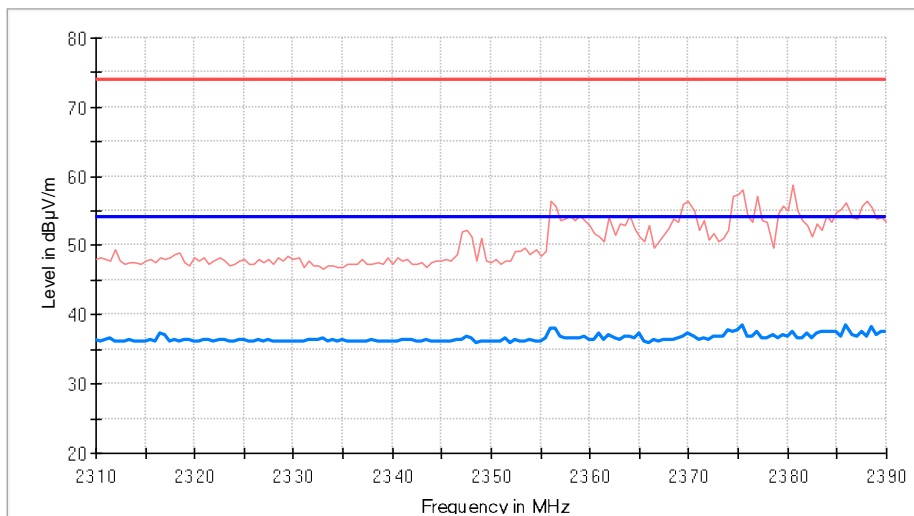
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**RESTRICTED BANDS**

**2.31 GHz – 2.39 GHz (GFSK)**

**CHANNEL: Lowest (2402 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz

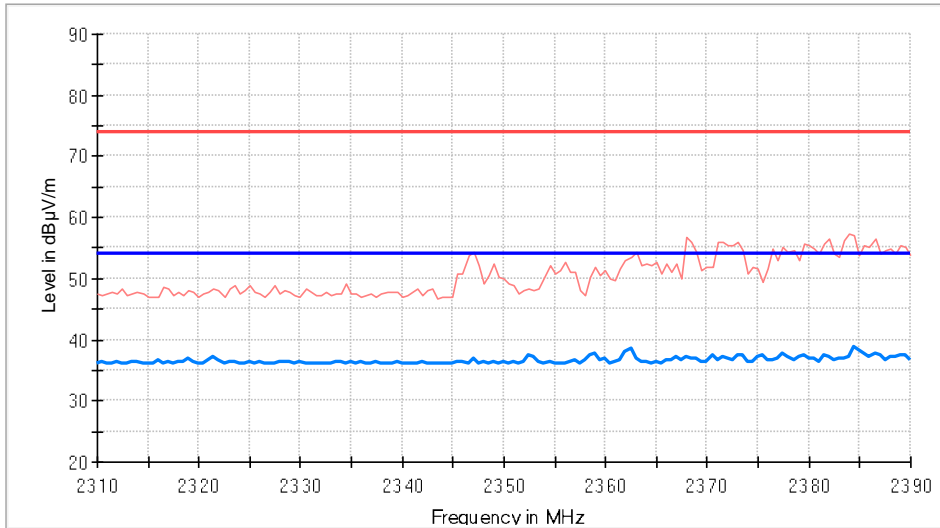


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz)**

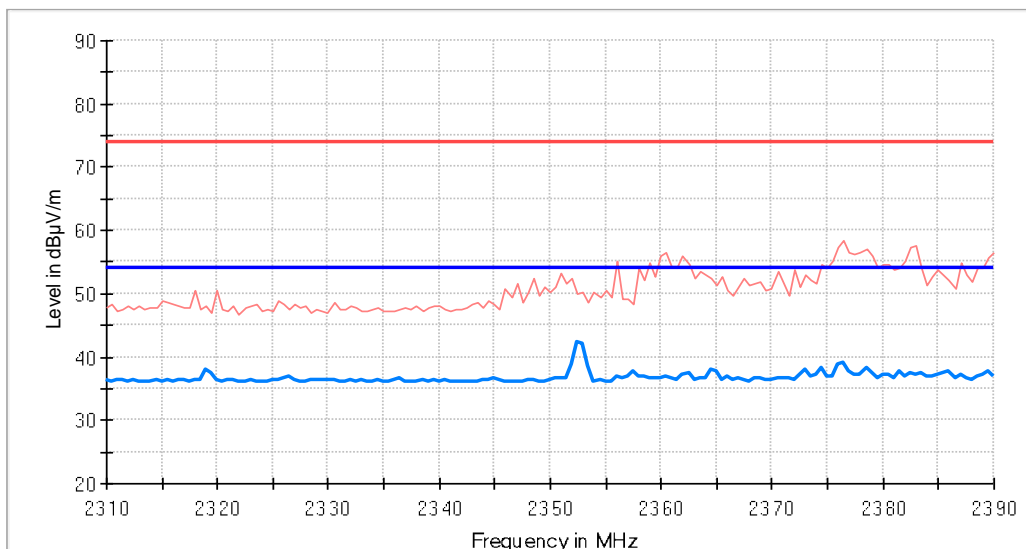
RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- 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

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz

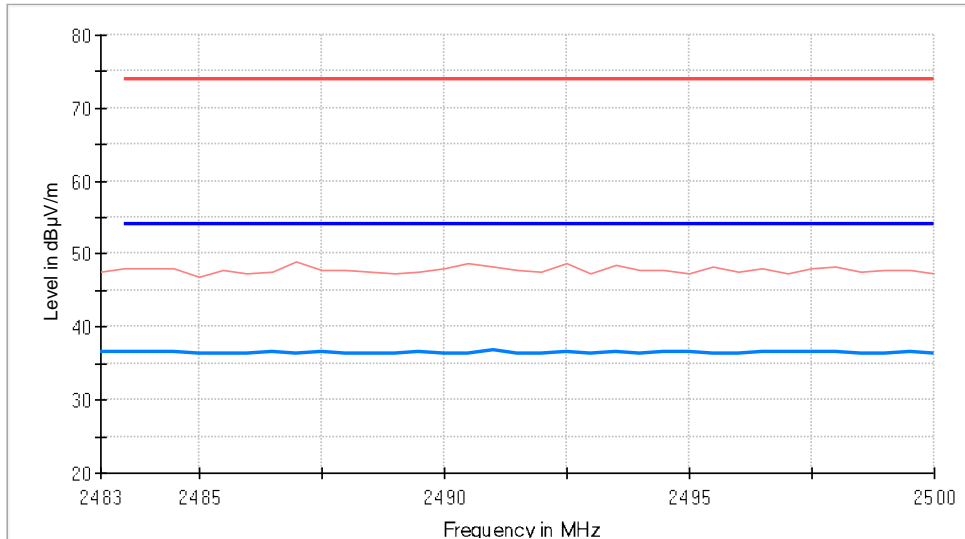


- AVG\_MAXH
- PK+ MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz (GFSK)</b>

**CHANNEL: Lowest (2402 MHz)**

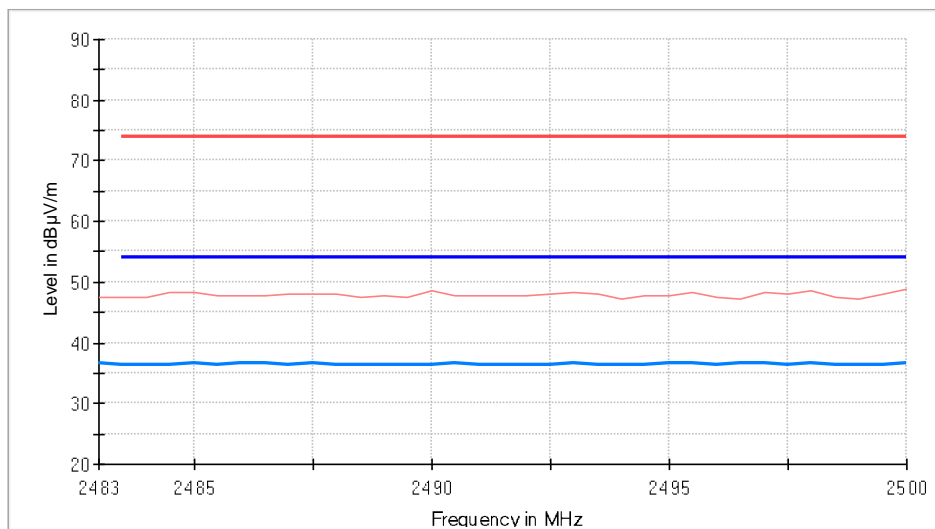
RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**CHANNEL: Middle (2440 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz

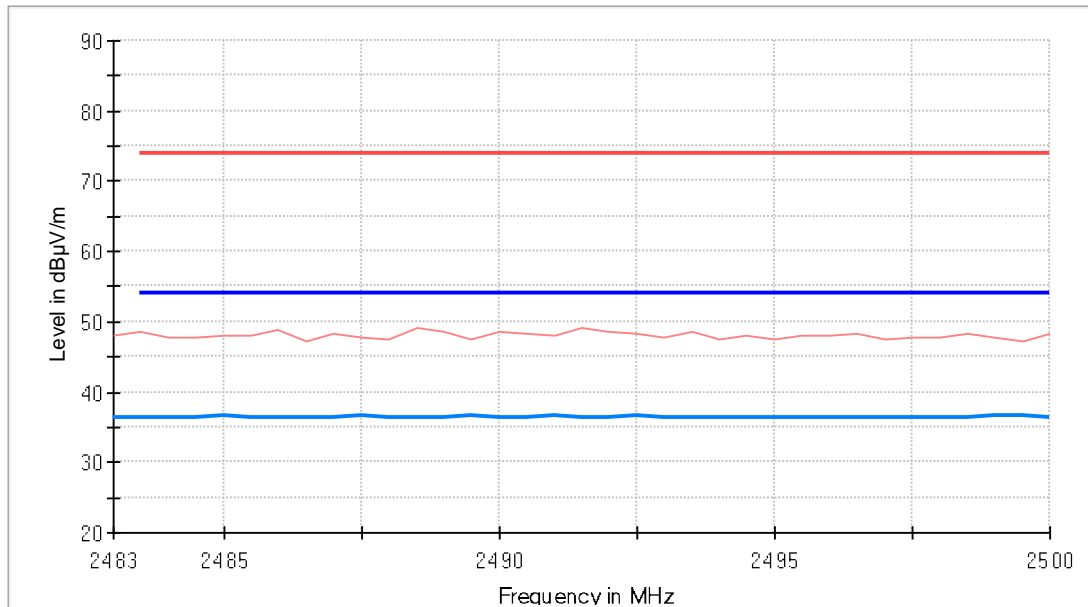


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- 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

<b>TESTED SAMPLES:</b>	S/02
<b>TESTED CONDITIONS MODES:</b>	TC#02 (PI4DQPSK)
<b>TEST RESULTS:</b>	PASS

**Co-Location**

The test was performed with the equipment transmitting first with only the 2.4 GHz BT-EDR radio and repeated with the WiFi 2.4GHz (WLAN0 CORE1), and WiFi 5 GHz (WLAN0 CORE0) radios transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

**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**

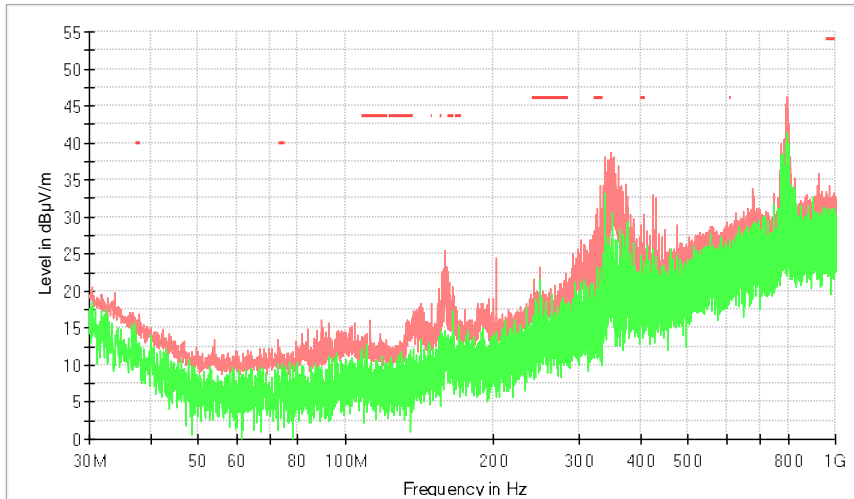
The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range

**FREQUENCY RANGE**

**30 MHz – 1000 MHz (PI4DQPSK)**

RF\_FCC\_15.247\_E Field\_30MHz\_1GHz



- PK+ MAXH
- PK+ CLRWR
- - - TX limits to Spurious Emission FCC15.247 (30MHz to 1 GHz) Restricted Bands QPK Limit

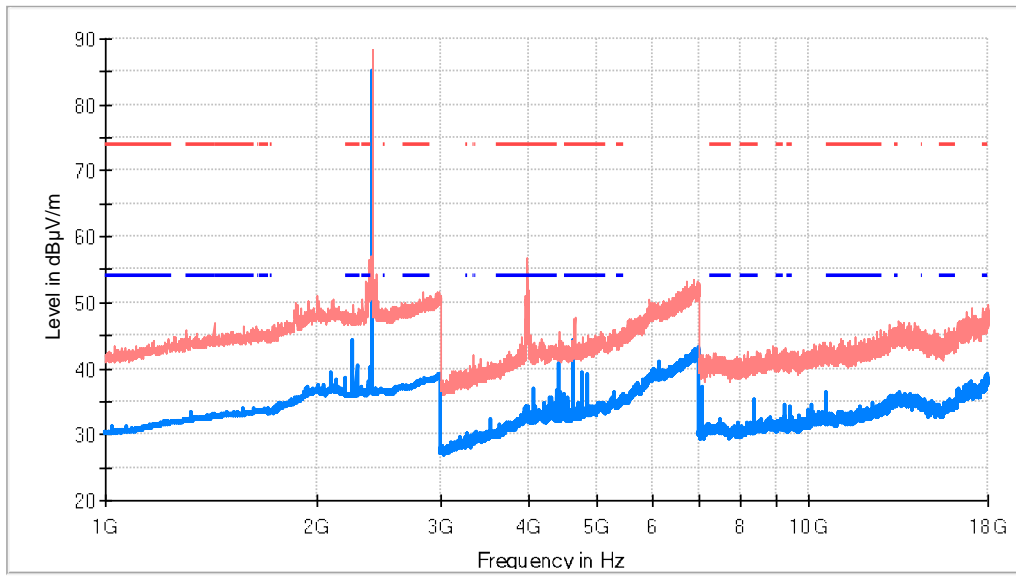
**Result Table\_Single**

Frequency (MHz)	MaxPeak (dBuV/m)	QuasiPeak (dBuV/m)	Pol
338.702500	39.6	37.2	H
348.305500	41.0	37.4	H
797.949000	46.2	37.0	H
160.028500	23.5	10.8	V
921.915000	36.9	26.9	V
975.022500	38.6	29.7	V

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>1 GHz – 18 GHz (PI4DQPSK)</b>

**CHANNEL: Lowest (2402 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- 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**

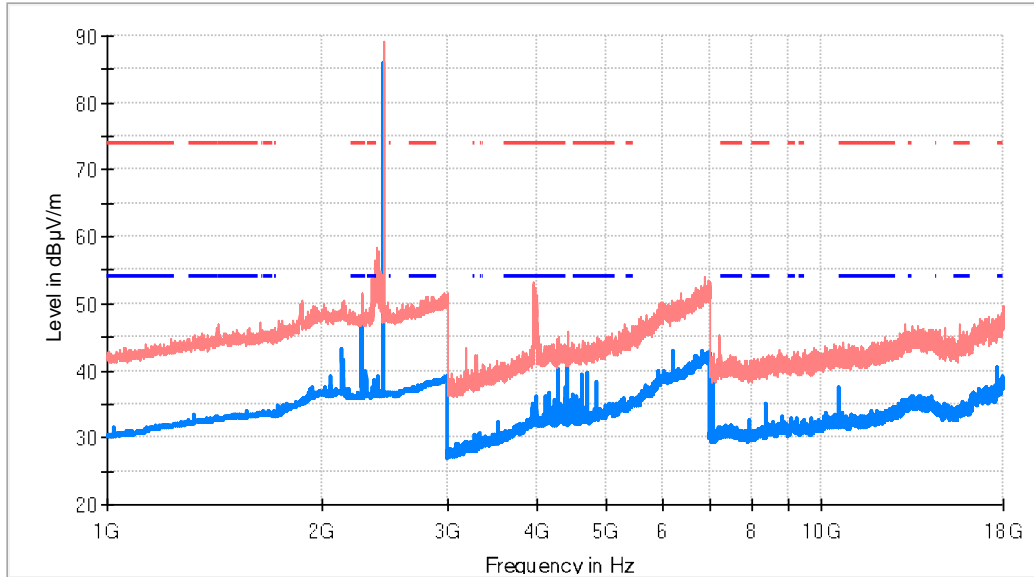
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2402.000000	88.41	85.15	H	Fundamental
4409.500000	45.59	40.83	V	
4638.000000	47.55	44.13	V	
4760.000000	44.81	39.35	H	
7055.000000	42.17	37.26	H	
10582.500000	42.75	36.40	H	



**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+\_MAXH
- - - TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- - - TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

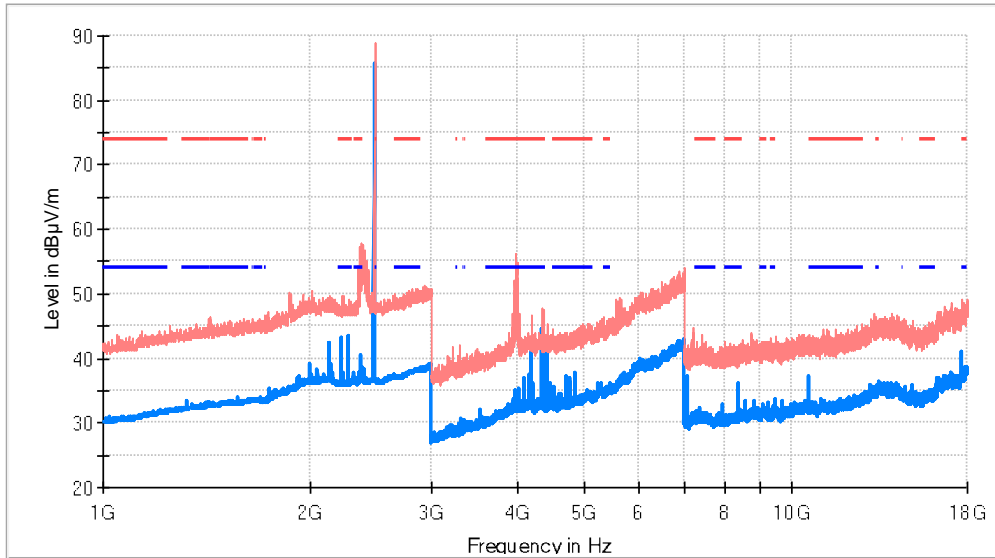
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2441.000000	89.29	86.02	H	Fundamental
4409.500000	45.86	41.88	V	
4721.500000	43.72	39.62	V	
6214.000000	50.28	42.78	V	
10583.000000	43.78	37.32	H	
17638.500000	46.60	40.53	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+\_MAXH
- - - TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- - - TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

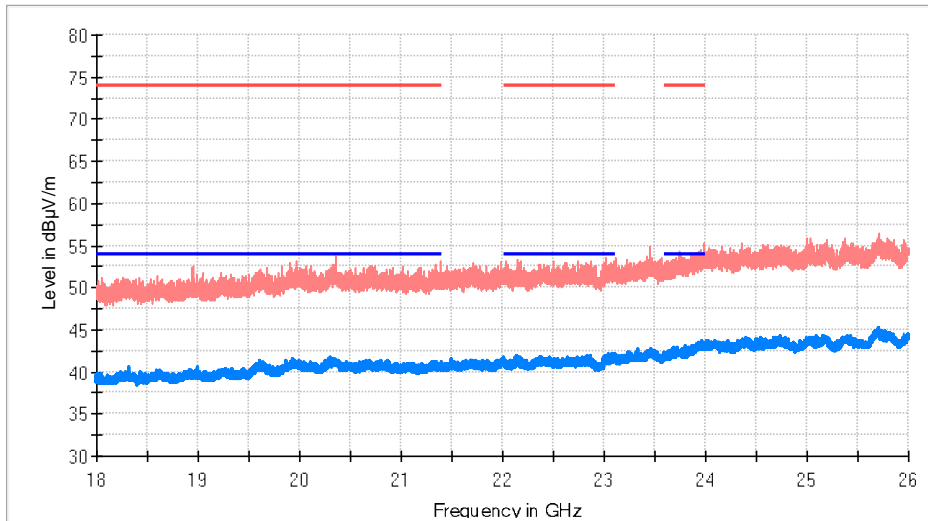
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2480.000000	88.98	85.58	H	Fundamental
4335.500000	47.82	44.42	V	
6996.000000	52.61	42.83	V	
10583.000000	43.76	37.03	H	
13397.500000	44.61	36.39	V	
17638.500000	49.06	40.92	V	

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>18 GHz – 26 GHz (PI4DQPSK)</b>

**CHANNEL: Lowest (2402 MHz)**

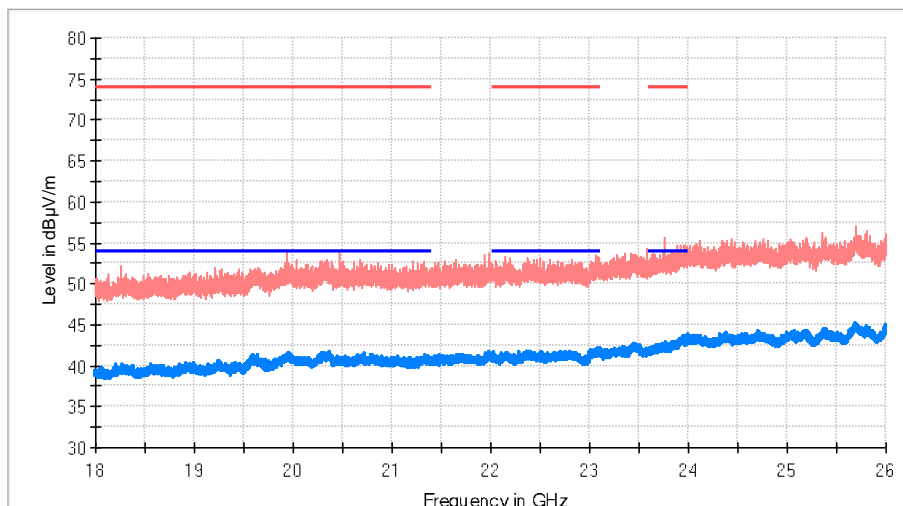
RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**CHANNEL: Middle (2440 MHz)**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz

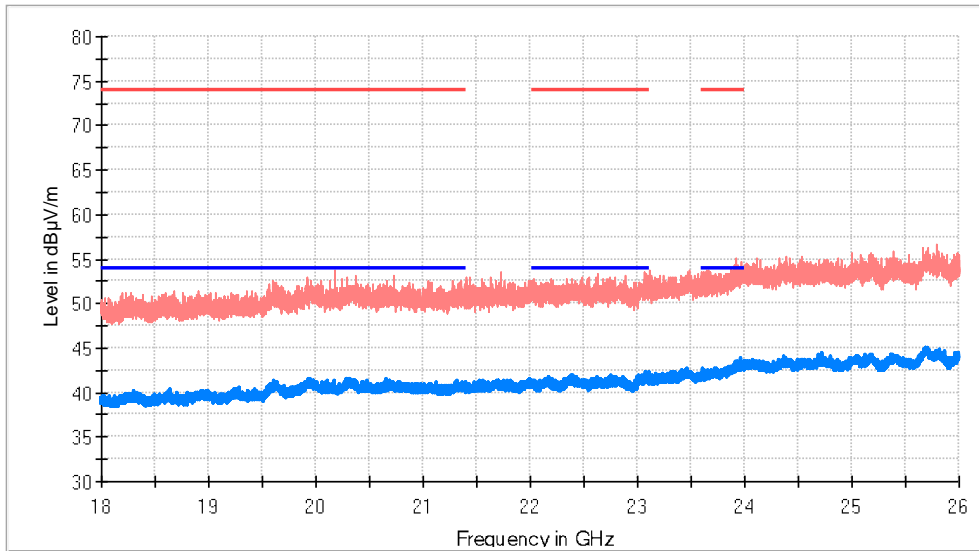


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



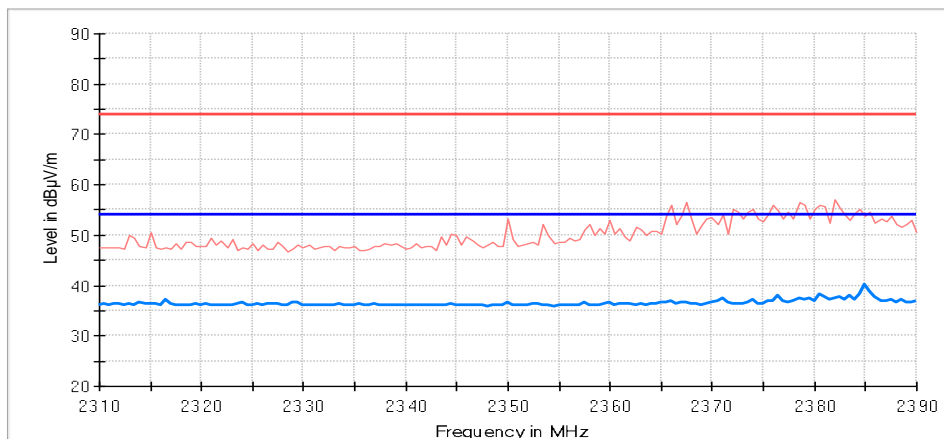
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**RESTRICTED BANDS**

**2.31 GHz – 2.39 GHz (PI4DQPSK)**

**CHANNEL: Lowest (2402 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz

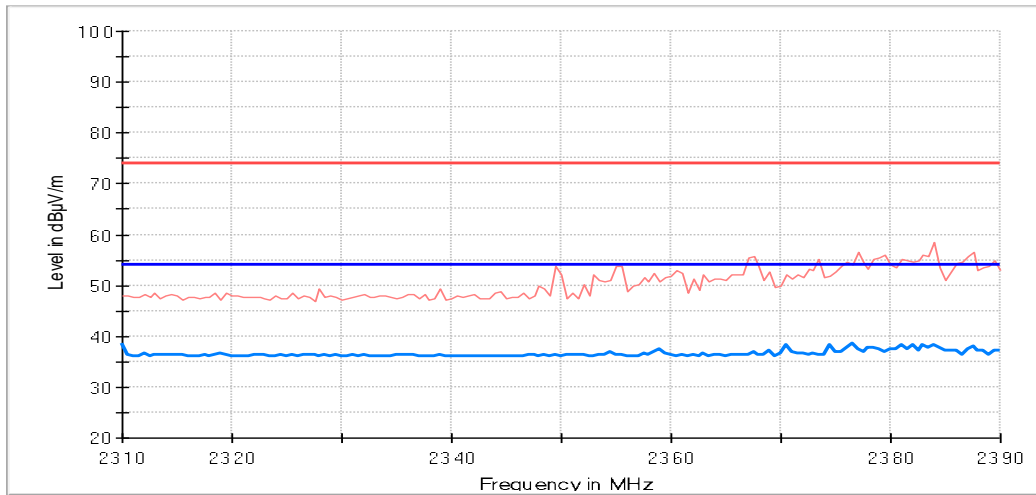


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz)**

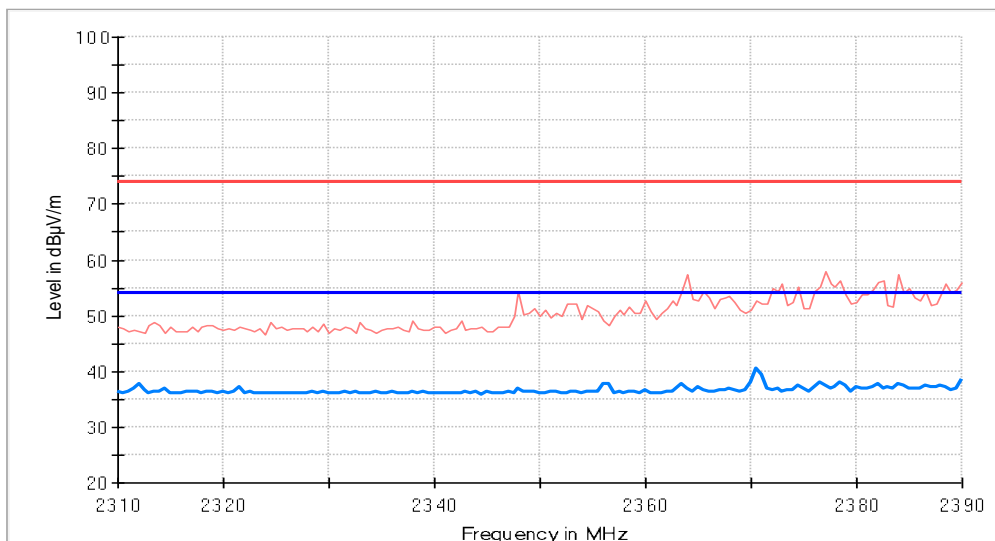
RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



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

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz

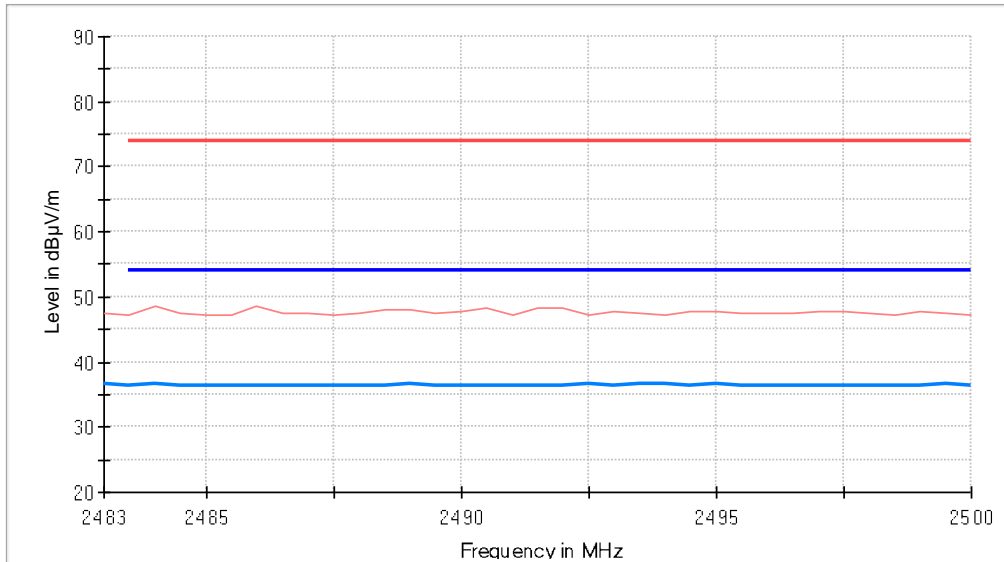


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz (PI4DQPSK)</b>

**CHANNEL: Lowest (2402 MHz)**

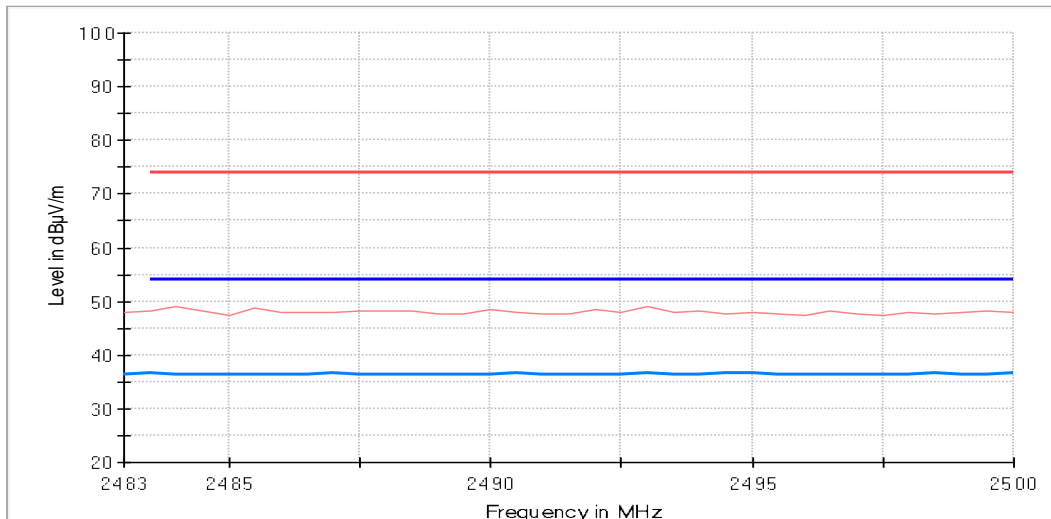
RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



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

**CHANNEL: Middle (2440 MHz)**

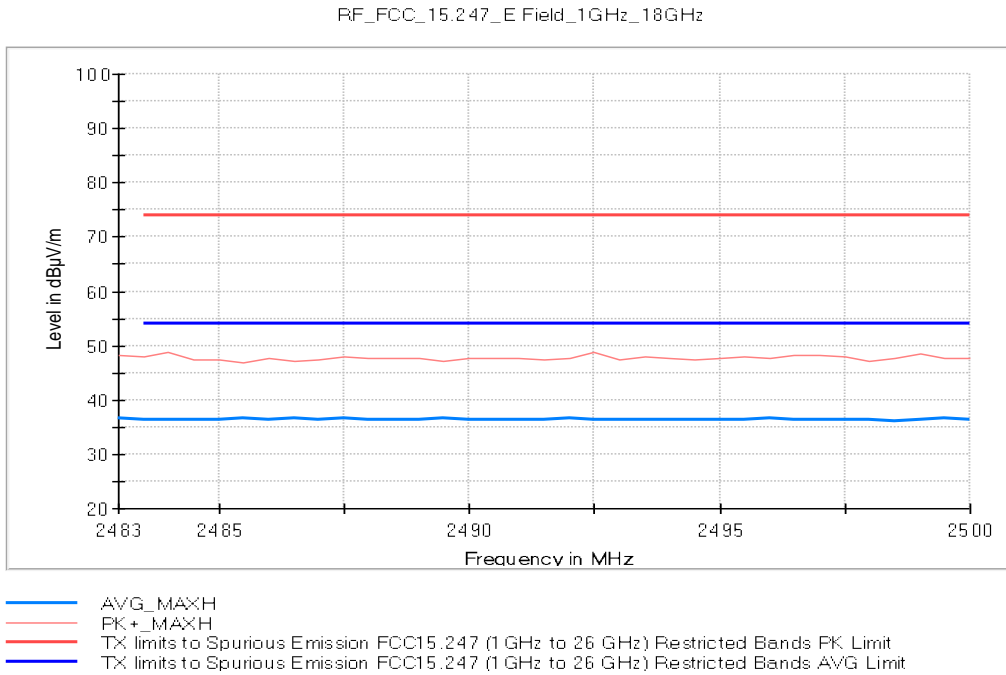
RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



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

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**



<b>TESTED SAMPLES:</b>	S/02
<b>TESTED CONDITIONS MODES:</b>	TC#03 (8DPSK)
<b>TEST RESULTS:</b>	PASS

**Co-Location**

The test was performed with the equipment transmitting first with only the 2.4 GHz BT-EDR radio and repeated with the WiFi 2.4GHz (WLAN0 CORE1), and WiFi 5 GHz (WLAN0 CORE0) radios transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

**Frequency range 30 MHz – 1000 MHz**

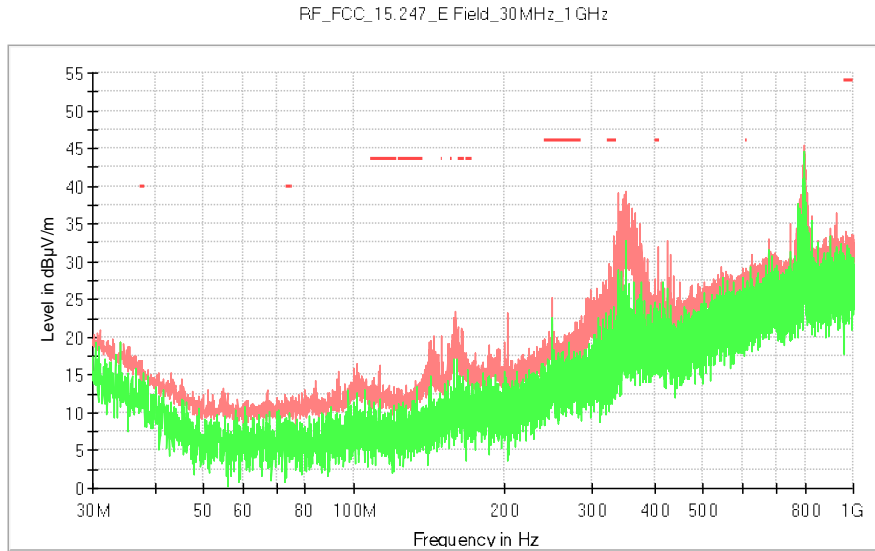
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

**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).

The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>30 MHz – 1000 MHz (8DPSK)</b>



- PK+ MAXH
- PK+ CLRWR
- - - TX limits to Spurious Emission FCC1 5.247 (30MHz to 1GHz) Restricted Bands QPK Limit

**Result Table\_Single**

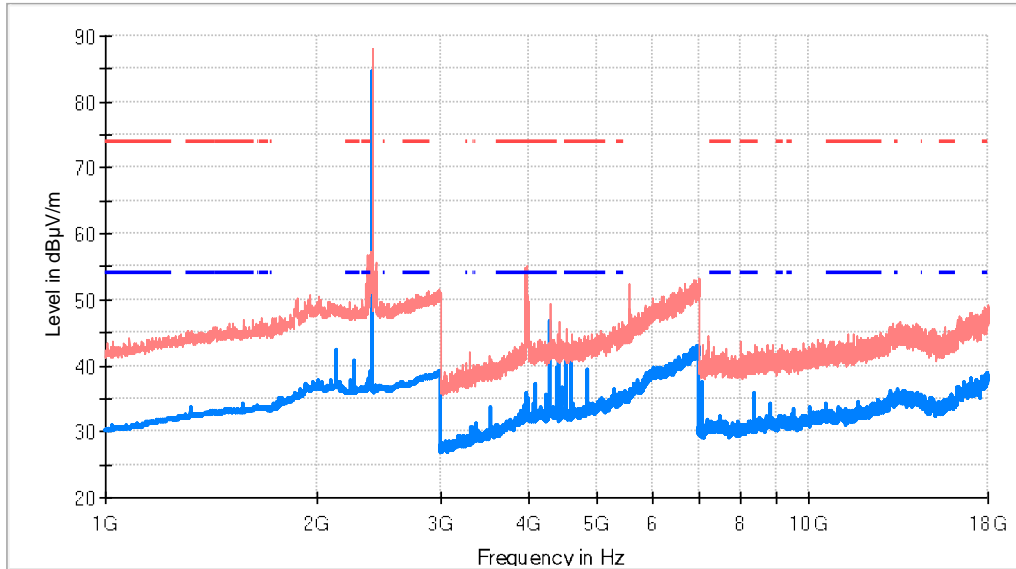
Frequency (MHz)	MaxPeak (dBuV/m)	QuasiPeak (dBuV/m)	Pol
338.702500	40.7	38.1	H
160.125500	23.3	13.1	H
350.003000	40.3	37.2	H
797.803500	47.0	37.1	H
921.866500	37.3	27.1	V
406.457000	33.6	25.5	V



<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>1 GHz – 18 GHz (8DPSK)</b>

**CHANNEL: Lowest (2402 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

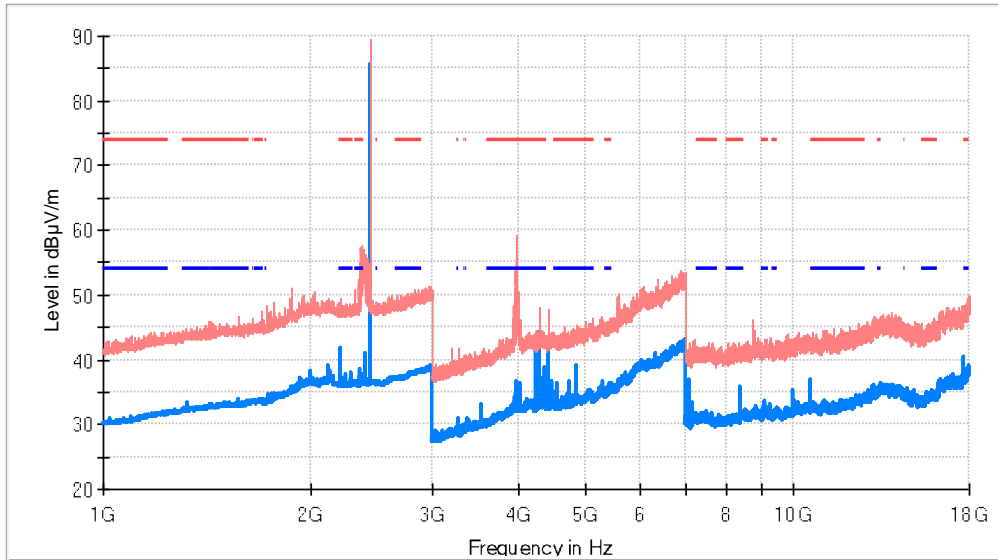
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2402.000000	88.18	84.55	H	Fundamental
4297.000000	49.55	46.67	V	
4518.000000	45.66	41.94	V	
4850.000000	44.34	39.35	V	
8378.000000	43.16	35.76	V	
11758.500000	42.38	34.41	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

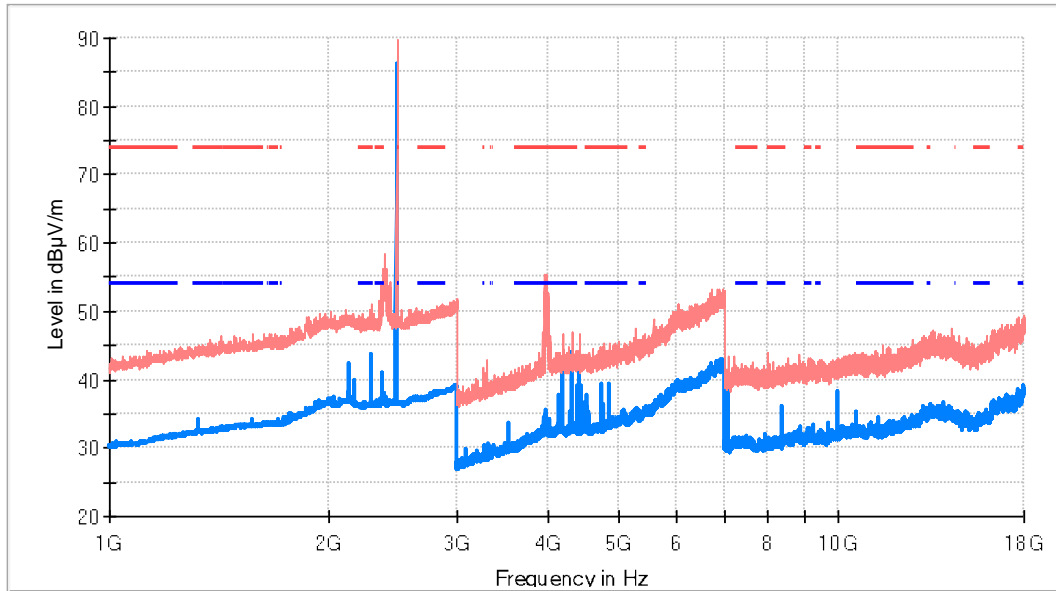
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2441.000000	89.37	85.71	H	Fundamental
4282.500000	47.96	44.37	V	
4409.500000	47.72	43.53	V	
8378.000000	41.22	35.88	V	
10583.000000	42.51	36.97	V	
17638.500000	47.21	40.34	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- AVG\_MAXH
- PK+ MAXH
- - - TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- - - TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

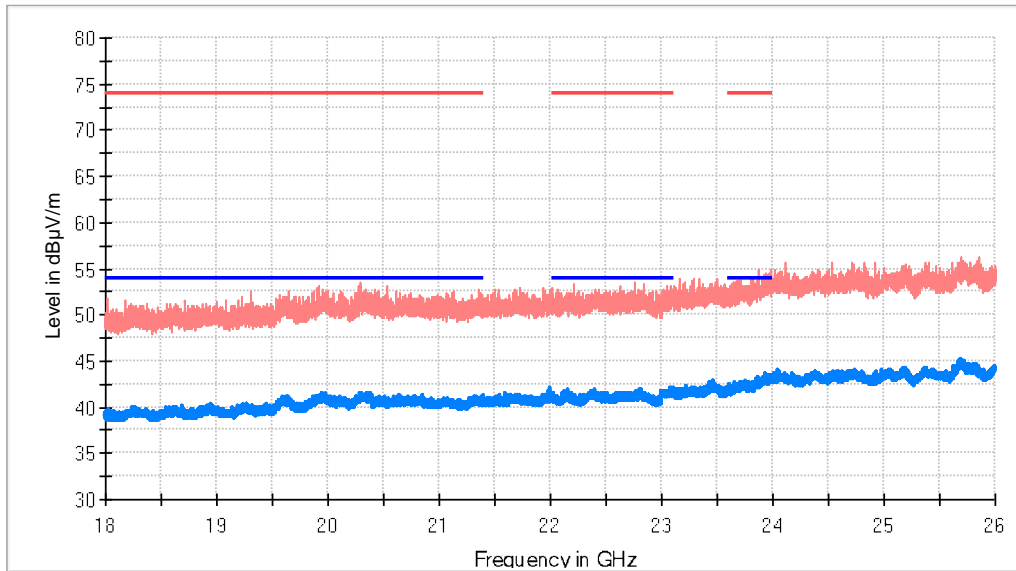
Frequency (MHz)	PK+ MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2480.000000	89.81	86.17	H	Fundamental
4182.500000	46.67	41.77	V	
4326.000000	46.90	43.97	V	
4409.500000	46.63	43.50	V	
8378.000000	41.72	35.94	V	
9997.000000	42.84	38.21	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	18 GHz – 26 GHz (8DPSK)
<b>CHANNEL: Lowest (2402 MHz)</b>	
<p style="text-align: center;">RF_FCC_15.247_E Field_18GHz_26GHz</p> <p style="text-align: center;">Frequency in GHz</p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> AVG_MAXH</li> <li><span style="color: red;">—</span> PK+_MAXH</li> <li><span style="color: orange;">—</span> TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit</li> <li><span style="color: blue;">—</span> TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit</li> </ul>	
<b>CHANNEL: Middle (2440 MHz)</b>	
<p style="text-align: center;">RF_FCC_15.247_E Field_18GHz_26GHz</p> <p style="text-align: center;">Frequency in GHz</p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> AVG_MAXH</li> <li><span style="color: red;">—</span> PK+_MAXH</li> <li><span style="color: orange;">—</span> TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit</li> <li><span style="color: blue;">—</span> TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit</li> </ul>	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz

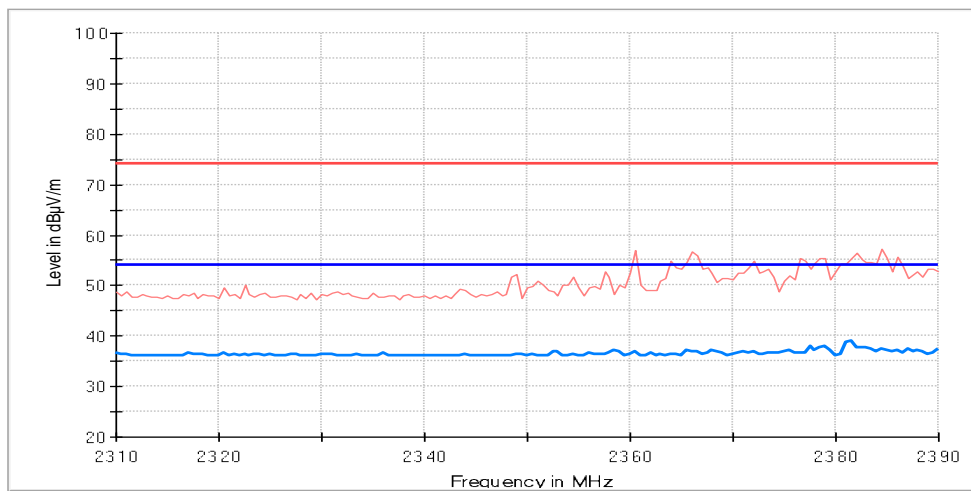


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**RESTRICTED BANDS**

**2.31 GHz – 2.39 GHz (8DPSK)**

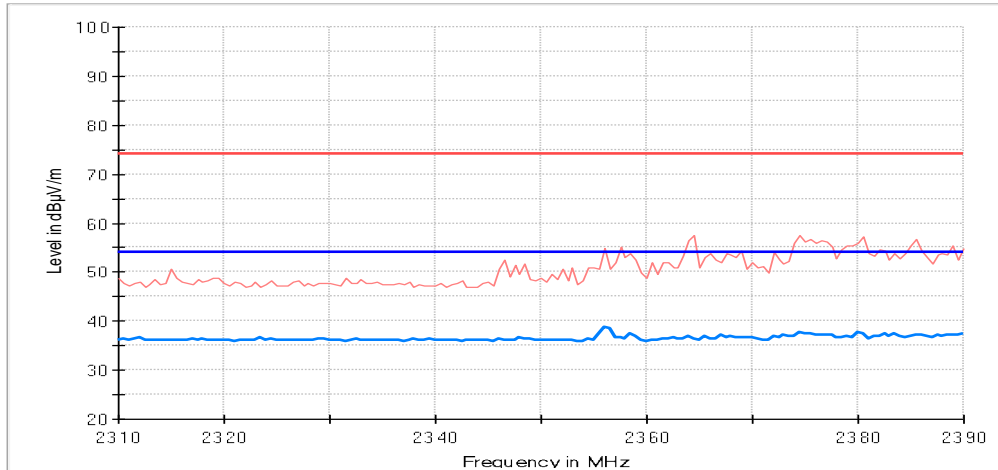
**CHANNEL: Lowest (2402 MHz)**



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

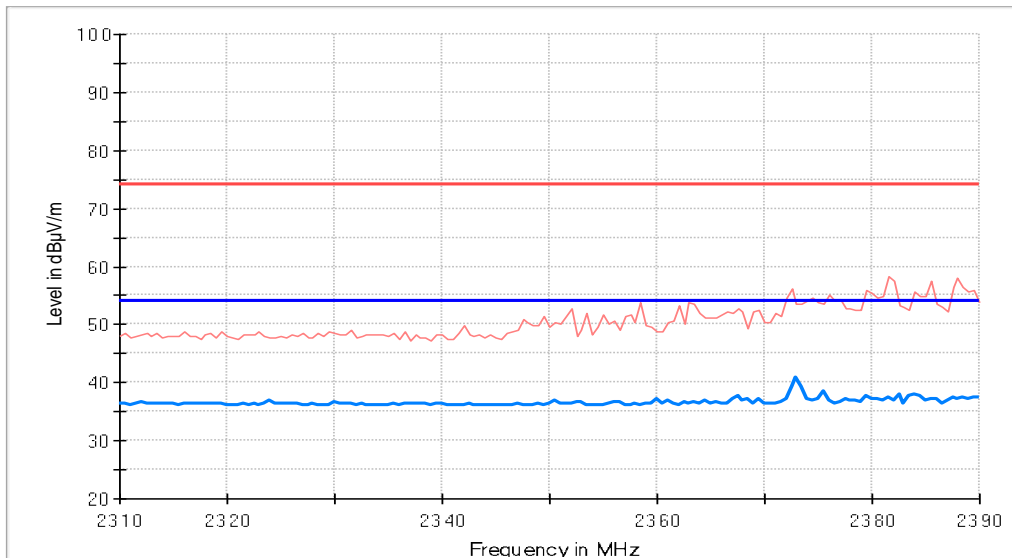
**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2440 MHz)**



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

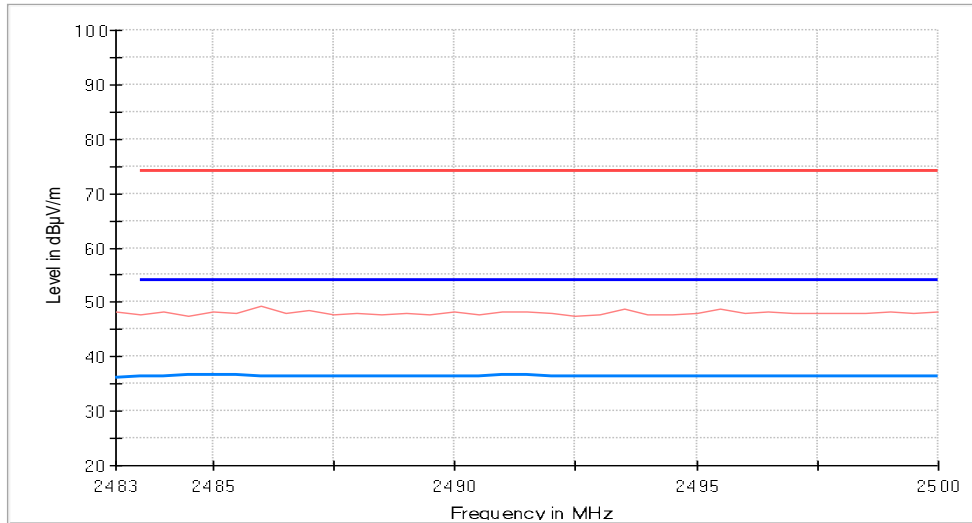
**CHANNEL: Highest (2480 MHz)**



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

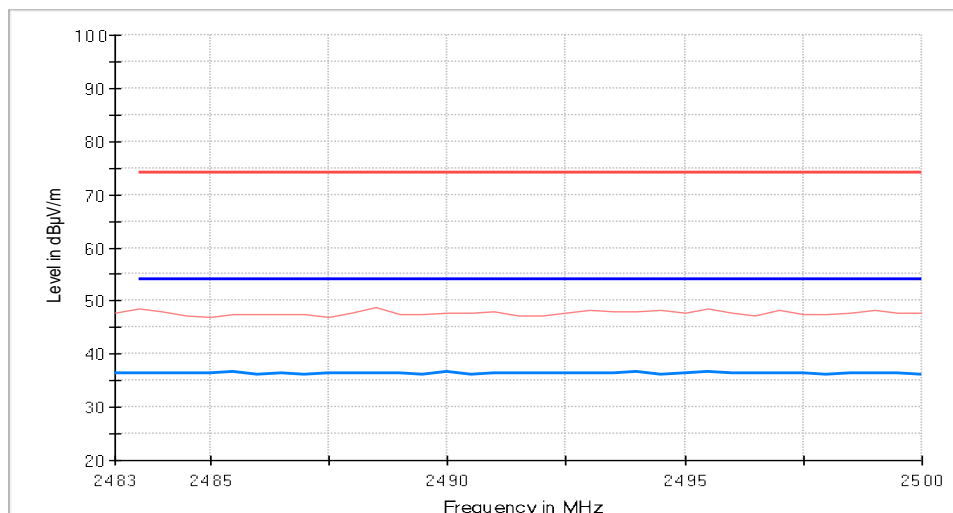
<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz (8DPSK)</b>

**CHANNEL: Lowest (2402 MHz)**



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

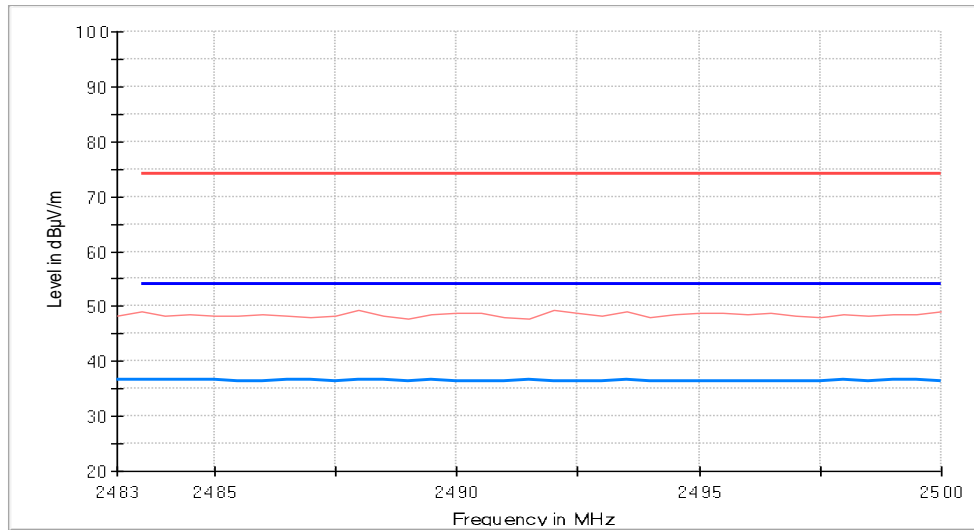
**CHANNEL: Middle (2440 MHz)**



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

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2480 MHz)**



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



## Appendix B: Test results (WIFI 2.4GHz)

## Appendix B Content

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## PRODUCT INFORMATION

The following information is provided by the supplier, in accordance with clause 5.4.1:

Information	Description
Modulation	Other forms of Modulation
Adaptive	Adaptive Equipment without the possibility to switch to non-adaptive equipment.
Maximum RF Output Power	17 dBm
Operation mode 1: Single Antenna Equipment	Equipment with only one antenna
- Operating Frequency Range	2412 – 2462 MHz (USA) 2412 – 2472 MHz (CANADA)
- Nominal Channel Bandwidth	20 MHz
Extreme operating conditions	
- Temperature range	-38 °C to +70 °C
Antenna type	Integral Antenna
Antenna gain	0.4 dBi
Nominal Voltage	
- Supply Voltage	12V
- Type of power source	DC voltage
Equipment type	WIFI 2.4GHz b/g/n20
Geo-location capability	No

Test modes available (USA & CANADA)

- Continuous modulated carrier at 2412 MHz, 2437 MHz, 2442 MHz, 2462 MHz and 2472 MHz
- Continuous reception at 2412 MHz, 2437 MHz, 2442 MHz, 2462 MHz and 2472 MHz

## DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS <sup>(1)(2)</sup>	DESCRIPTION
<p>TC#01  <b>(WIFI 2.4GHz  b mode)</b></p>	<p><u>Power supply (V):</u>  <math>V_{\text{nominal}} = 12 \text{ Vdc}</math></p> <p><u>Channel Bandwidth:</u> 20 MHz</p> <p><u>Test Frequencies for Conducted/Radiated tests: (USA &amp; CANADA)</u></p> <p>Lowest channel (1): 2412 MHz  Middle channel (6/7): 2437 MHz and 2442 MHz  Highest channel (11/13): 2462 MHz and 2472 MHz</p> <p>During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.</p>
<p>TC#02  <b>(WIFI 2.4GHz  n mode)</b></p>	<p><u>Power supply (V):</u>  <math>V_{\text{nominal}} = 12 \text{ Vdc}</math></p> <p><u>Channel Bandwidth:</u> 20 MHz</p> <p><u>Test Frequencies for Conducted/Radiated tests: (USA &amp; CANADA)</u></p> <p>Lowest channel (1): 2412 MHz  Middle channel (6/7): 2437 MHz and 2442 MHz  Highest channel (11/13): 2462 MHz and 2472 MHz</p>

Note (1): For spurious emissions for OFDM modes 802.11g and 802.11n20 a preliminary scan was performed to determine the worst case. The next tables and plots show the results for the worst case to DSSS modulation (802.11b) and OFDM modulation (802.11g).

Note (2): For conducted measurements for OFDM modes 802.11g and 802.11n20 a preliminary scan was performed to determine the worst case. The next tables and plots show the results for the worst case to DSSS modulation (802.11b) and OFDM modulation (802.11n).  
The data rates of 1Mb/s for 802.11b, 6.5Mb/s for 802.11g, MSC0 for 802.11n20 were selected based on preliminary testing that identified those rates corresponding to the worst cases.

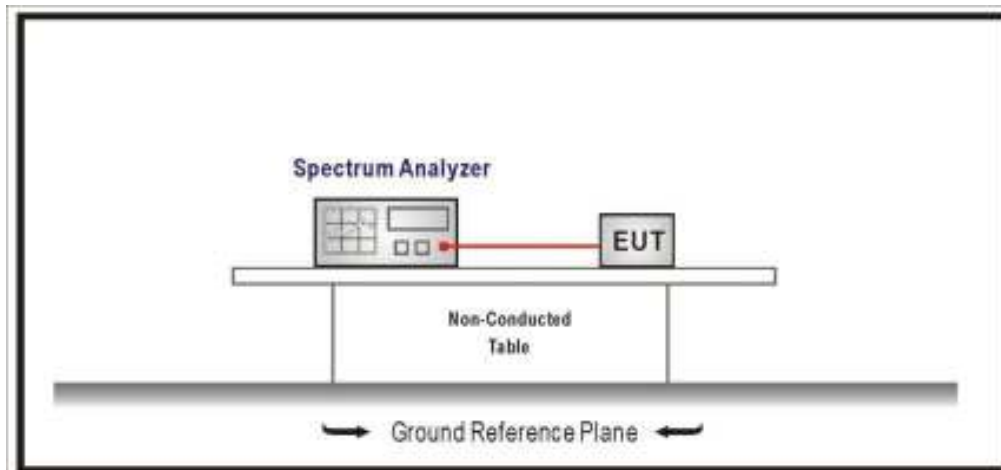
### TEST B.1: 99% OCCUPIED BANDWIDTH AND 6DB BANDWIDTH

<b>LIMITS:</b>	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



<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

Type of equipment: Adaptive equipment without the possibility to switch to a non-adaptive mode.

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
6dB Bandwidth (MHz)	8.5	8.9	8.7
Occupied bandwidth (kHz)	11.4	11.4	11.2
Measurement uncertainty (kHz)	<± 1.80		

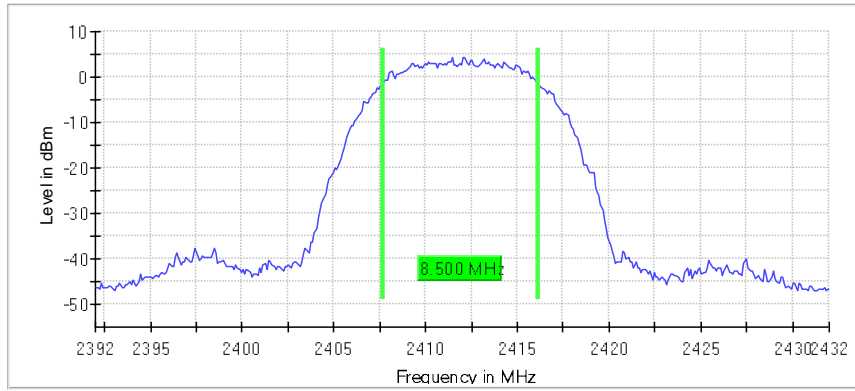
**Measurement**

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39200 GHz	2.41700 GHz	2.44200 GHz
Stop Frequency	2.43200 GHz	2.45700 GHz	2.48200 GHz
Span	40.00 MHz	40.000 MHz	40.000 MHz
RBW	200.000 kHz	100.000 kHz	100.000 kHz
VBW	1.000 MHz	300.000 kHz	300.000 kHz
SweepPoints	200	400	400
Sweeptime	28.443 µs	56.886 µs	56.886 µs
Reference Level	20.000 dBm	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.30 dB	0.50 dB	0.50 dB
Run	39 / max. 150	35 / max. 150	34 / max. 150
Stable	3 / 3	5 / 5	5 / 5
Max Stable Difference	0.00 dB	0.06 dB	0.29 dB

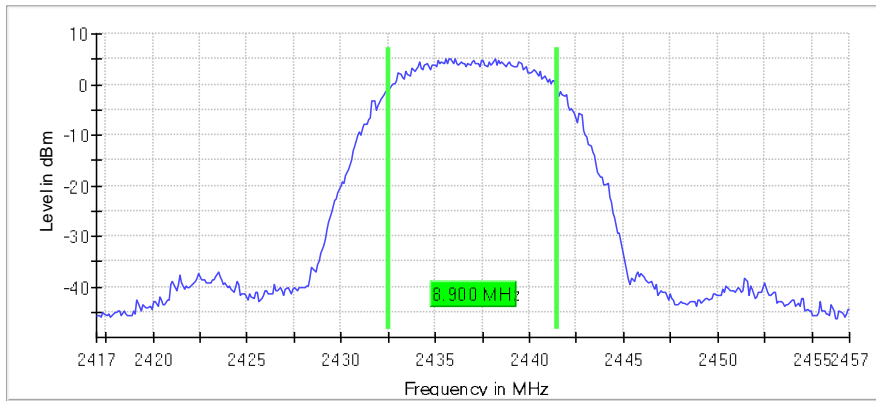
TEST RESULTS (Cont.):

6 dB BANDWIDTH

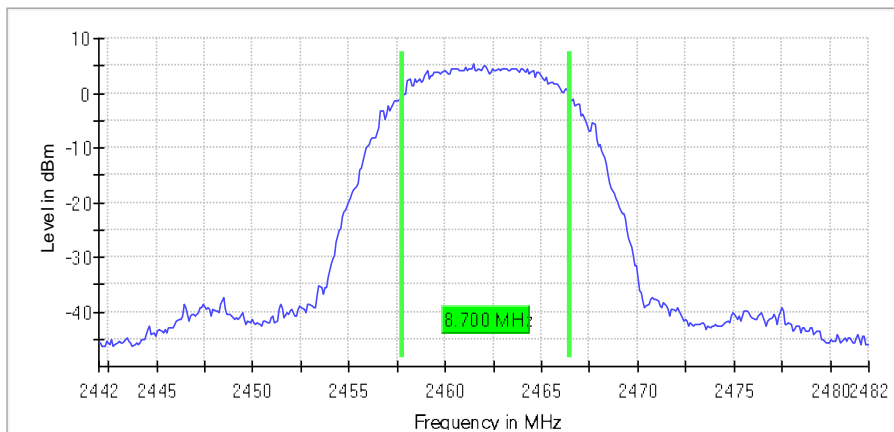
Lowest Channel



Middle Channel



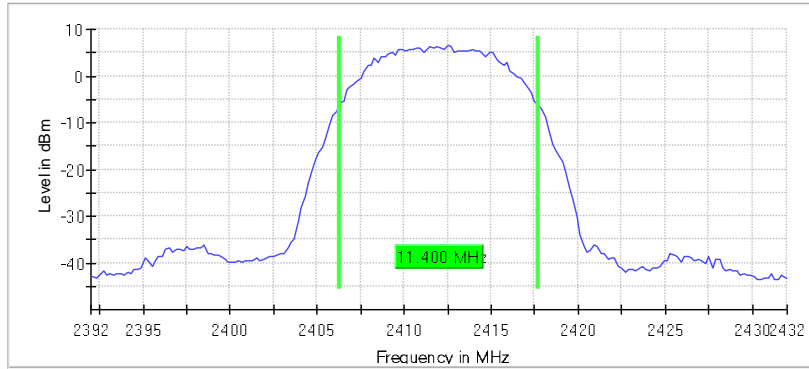
Highest Channel



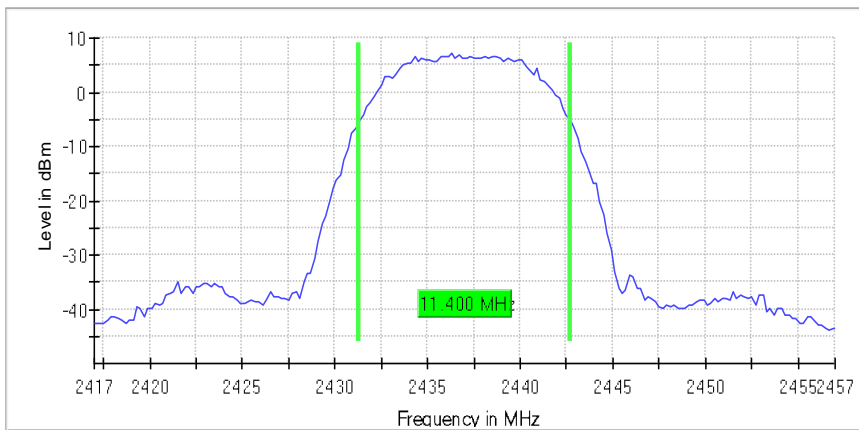
TEST RESULTS (Cont.):

OCCUPIED BANDWIDTH

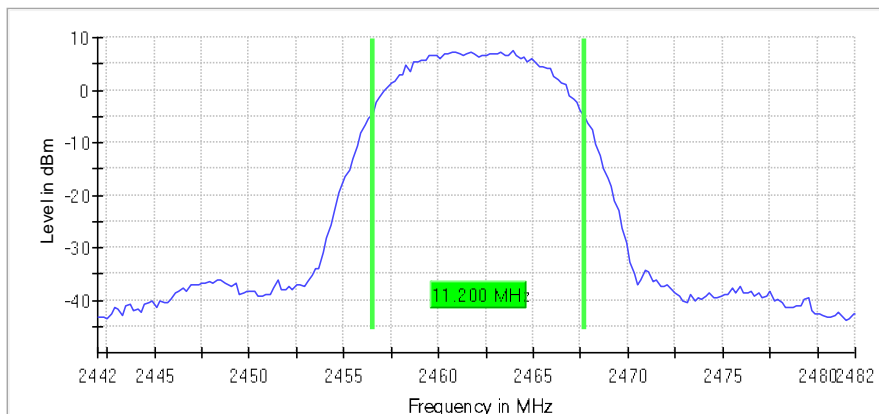
Lowest Channel



Middle Channel



Highest Channel





<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

Type of equipment: Adaptive equipment without the possibility to switch to a non-adaptive mode.

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
6dB Bandwidth (MHz)	8.9	8.9
Occupied bandwidth (kHz)	11.4	11.4
Measurement Uncertainty (KHz)	<± 1.80	

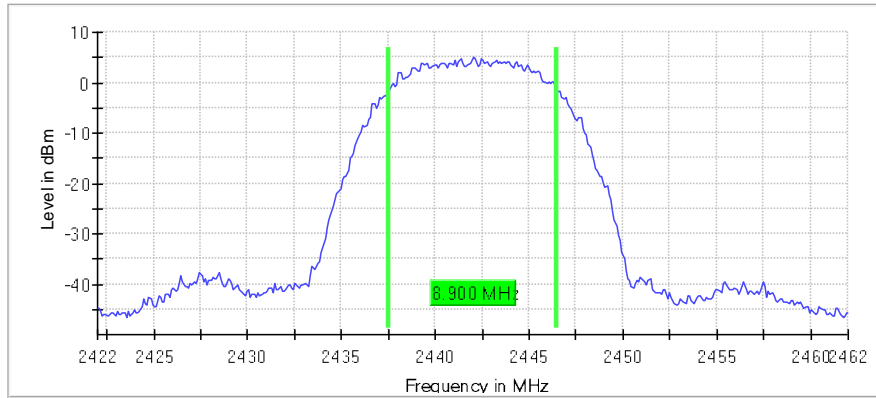
**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.42200 GHz	2.45200 GHz
Stop Frequency	2.46200 GHz	2.49200 GHz
Span	40.00 MHz	40.00 MHz
RBW	200.000 kHz	200.000 kHz
VBW	1.000 MHz	1.000 MHz
SweepPoints	200	200
Sweeptime	28.443 μs	28.443 μs
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	34 / max. 150	28 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.16 dB	0.04 dB

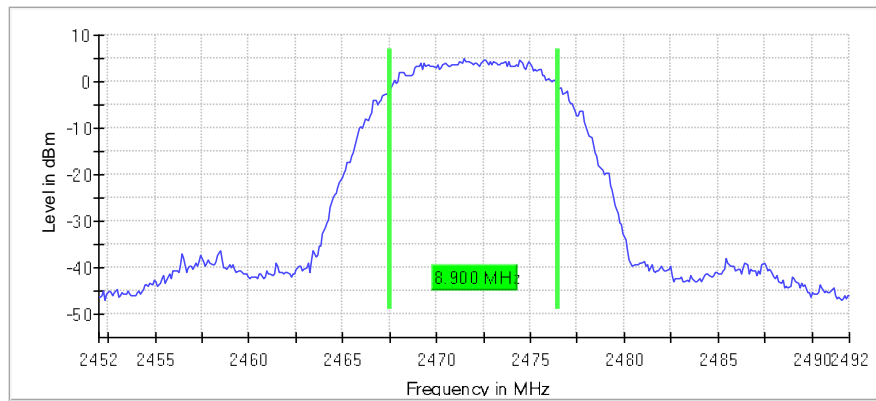
TEST RESULTS (Cont.):

6 dB BANDWIDTH

Middle Channel



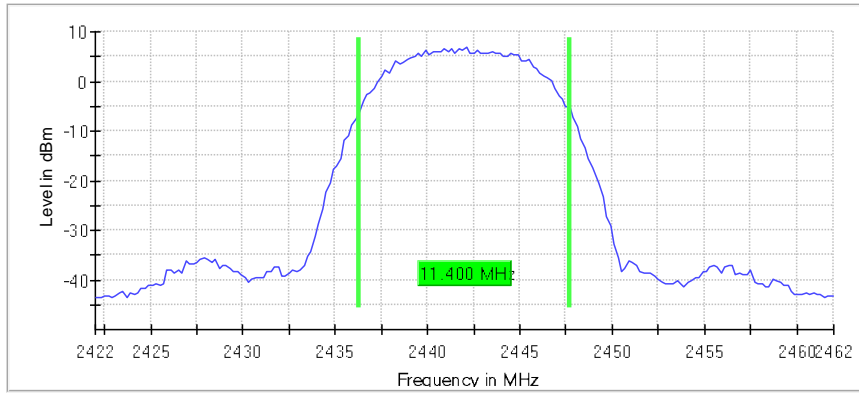
Highest Channel



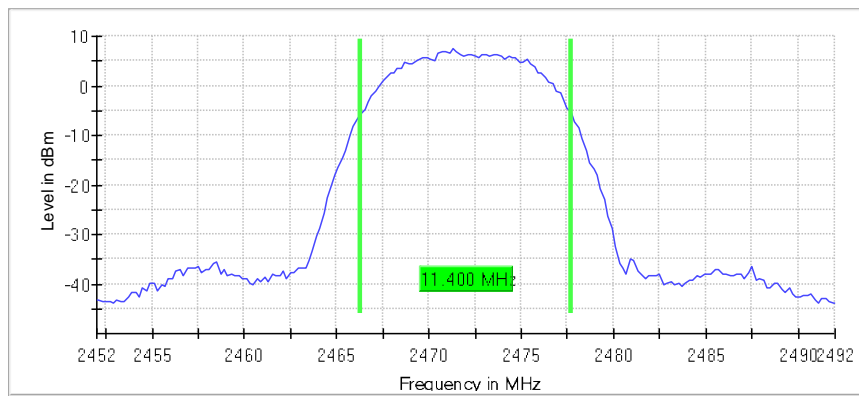
TEST RESULTS (Cont.):

OCCUPIED BANDWIDTH

Middle Channel



Highest Channel



<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02(N Mode)
<b>TEST RESULTS:</b>	PASS

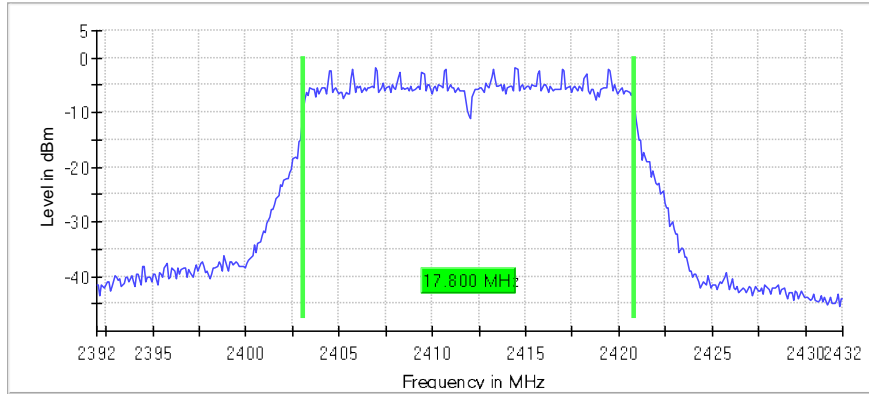
	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
6dB bandwidth (MHz)	17.8	17.8	17.7
Occupied bandwidth (MHz)	18.2	18.2	18
Measurement uncertainty (kHz)	<± 1.80		

**Measurement**

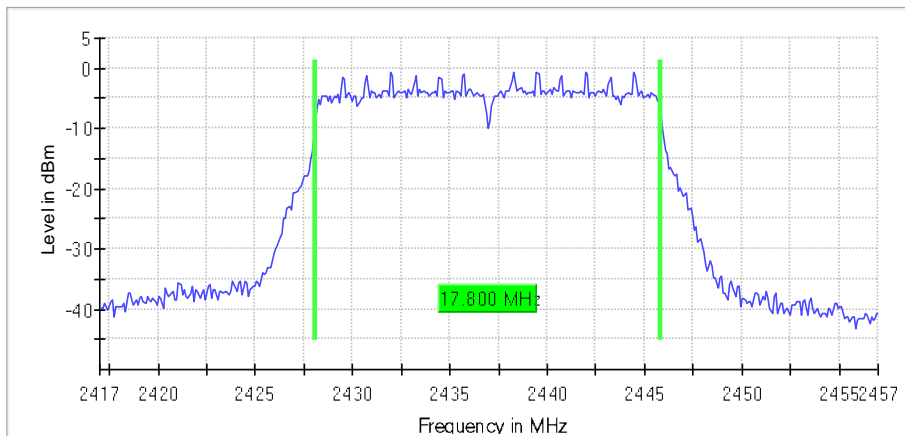
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39200 GHz	2.41700 GHz	2.44200 GHz
Stop Frequency	2.43200 GHz	2.45700 GHz	2.48200 GHz
Span	40.00 MHz	40.000 MHz	40.000 MHz
RBW	200.000 kHz	100.000 kHz	100.000 kHz
VBW	1.000 MHz	300.000 kHz	300.000 kHz
SweepPoints	200	400	400
Sweeptime	28.443 µs	56.886 µs	56.886 µs
Reference Level	10.000 dBm	20.000 dBm	10.000 dBm
Attenuation	30.000 dB	40.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
SweepType	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.30 dB	0.50 dB	0.50 dB
Run	45 / max. 150	51 / max. 150	47 / max. 150
Stable	3 / 3	5 / 5	5 / 5
Max Stable Difference	0.09 dB	0.14 dB	0.14 dB

<b>TEST RESULTS (Cont.):</b>	<b>6 dB BANDWIDTH</b>
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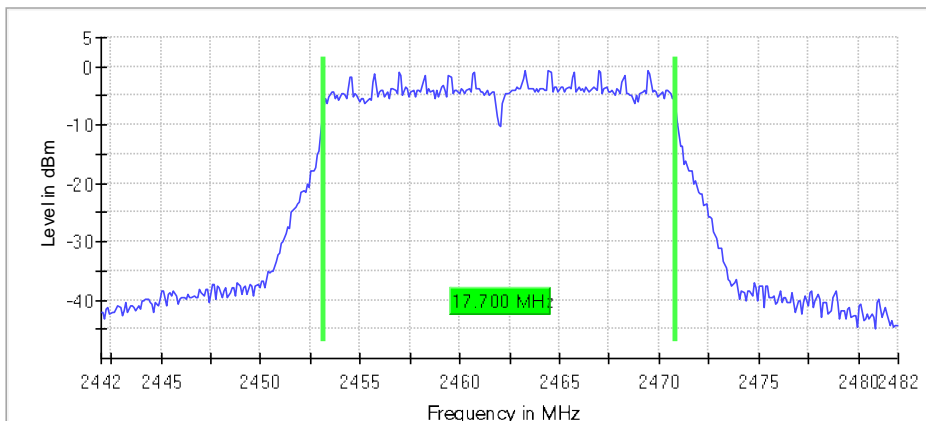
**Lowest Channel**

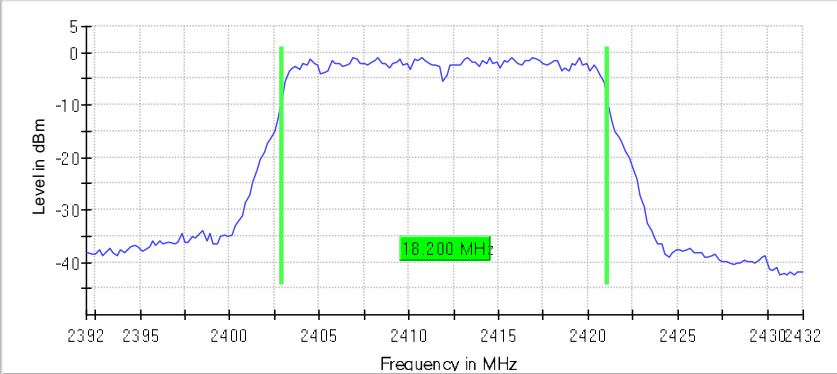
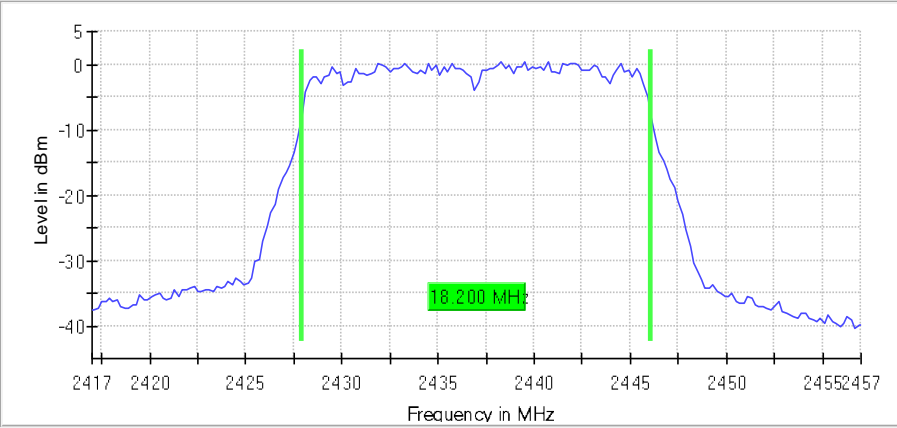
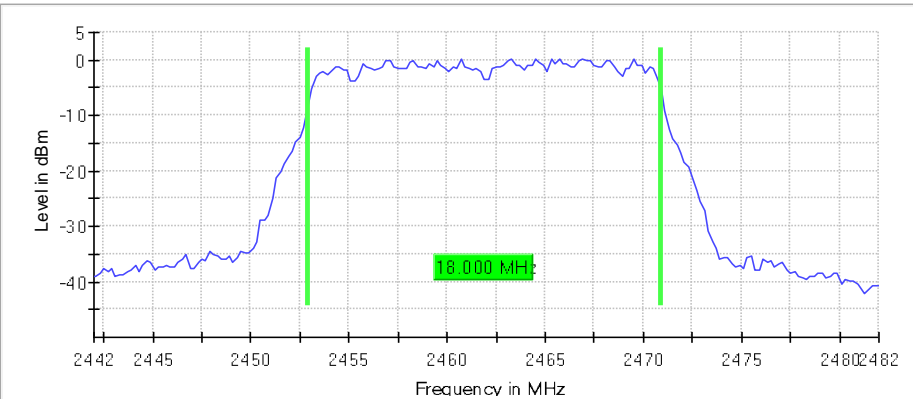


**Middle Channel**



**Highest Channel**



TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH
<p><b>Lowest Channel</b></p> 	
<p><b>Middle Channel</b></p> 	
<p><b>Highest Channel</b></p> 	

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02(N Mode)
<b>TEST RESULTS:</b>	PASS

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
6dB bandwidth (MHz)	17.8	17.8
Occupied bandwidth (MHz)	18	18.2
Measurement uncertainty (kHz)	<± 1.80	

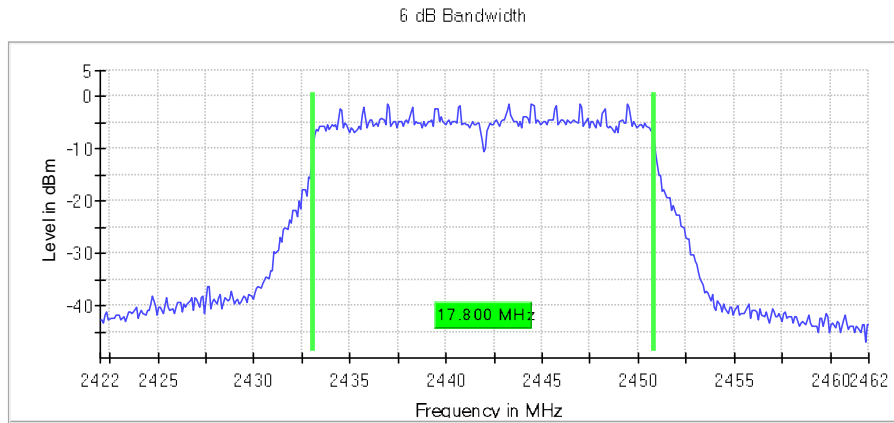
**Measurement**

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39200 GHz	2.42200 GHz	2.45200 GHz
Stop Frequency	2.43200 GHz	2.46200 GHz	2.49200 GHz
Span	40.00 MHz	40.00 MHz	40.00 MHz
RBW	200.000 kHz	200.000 kHz	200.000 kHz
VBW	1.000 MHz	1.000 MHz	1.000 MHz
SweepPoints	200	200	200
Sweeptime	28.443 μs	28.443 μs	28.443 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
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.30 dB	0.30 dB	0.30 dB
Run	45 / max. 150	37 / max. 150	36 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.09 dB	0.00 dB	0.20 dB

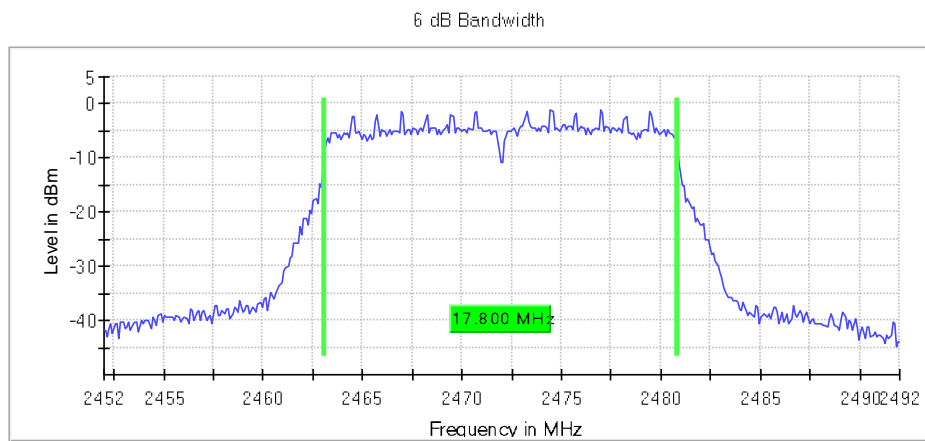
TEST RESULTS (Cont.):

6 dB BANDWIDTH

Middle Channel



Highest Channel

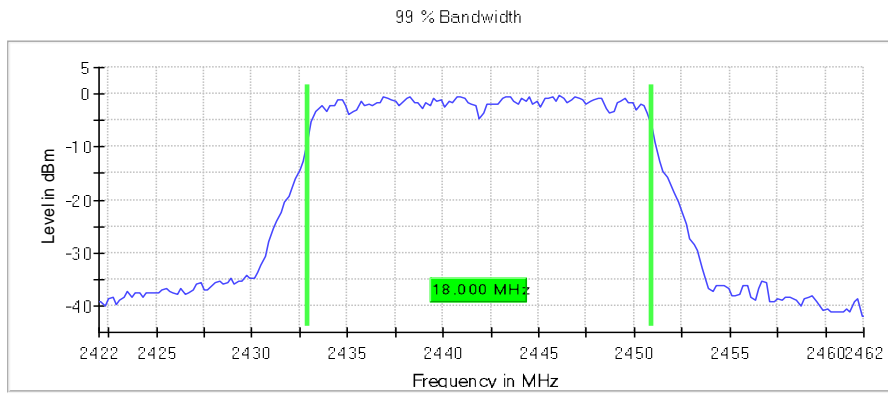




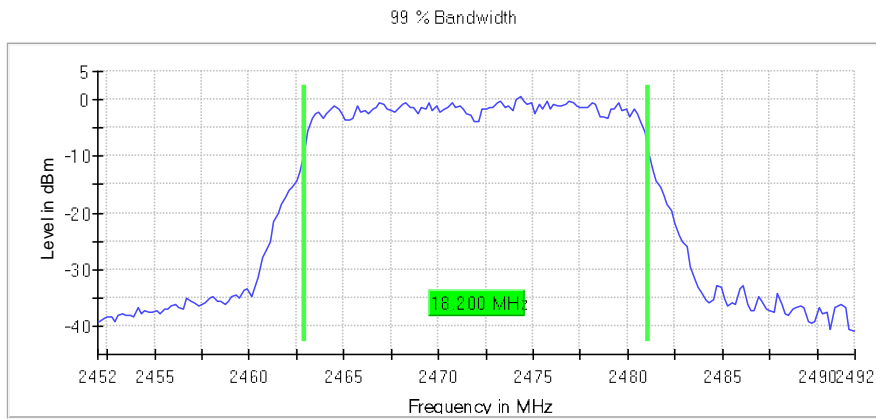
TEST RESULTS (Cont.):

OCCUPIED BANDWIDTH

Middle Channel



Highest Channel



## TEST B.2: MAXIMUM CONDUCTED OUTPUT POWER AND ANTENNA GAIN

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

### LIMITS

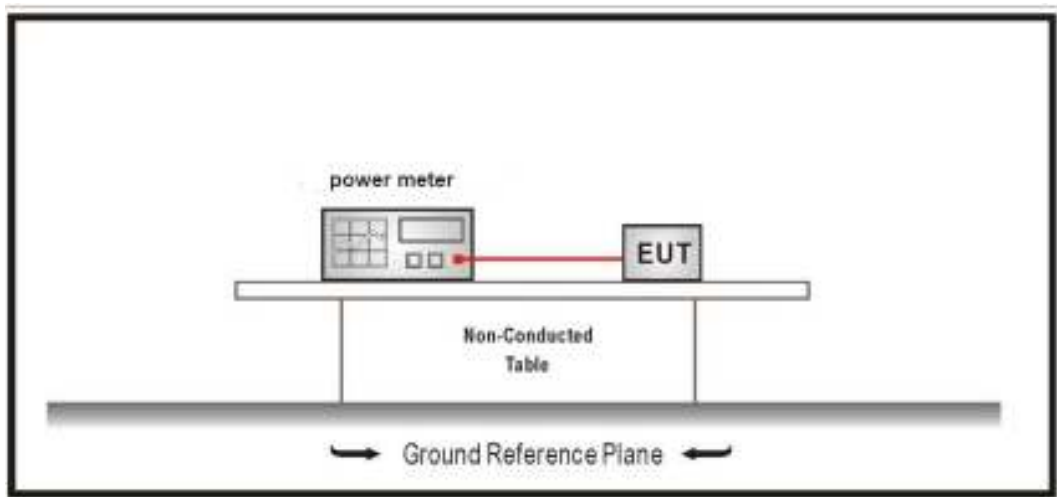
For systems using digital modulation in the 2400 -2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (RSS-247).

### TEST SETUP

Measured according to ANSI C63.10, Section 11.9.2.3.2 Method AVGPM-G

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



<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

Maximum declared antenna gain: 0.4 dBi

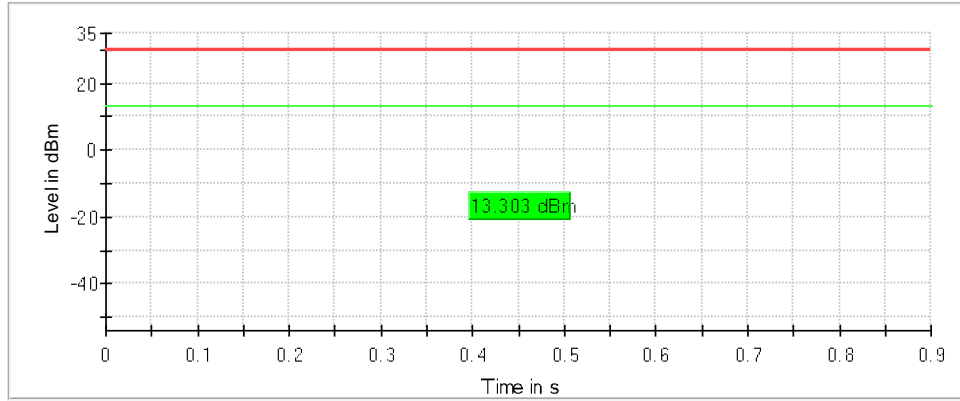
	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum conducted power (dBm)	13.3	13.3	13.8
Maximum EIRP power (dBm)	13.7	13.7	14.2
Measurement uncertainty (dB)	<±0.78		

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.):

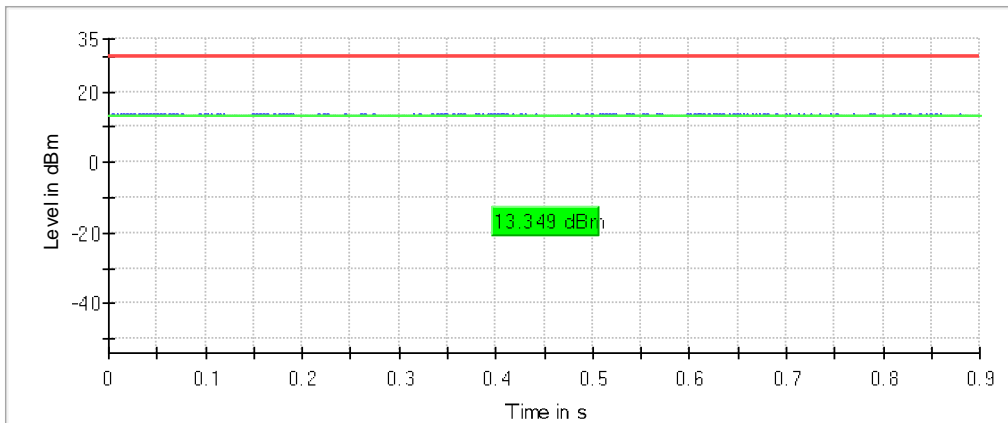
CONDUCTED OUTPUT POWER

Lowest Channel



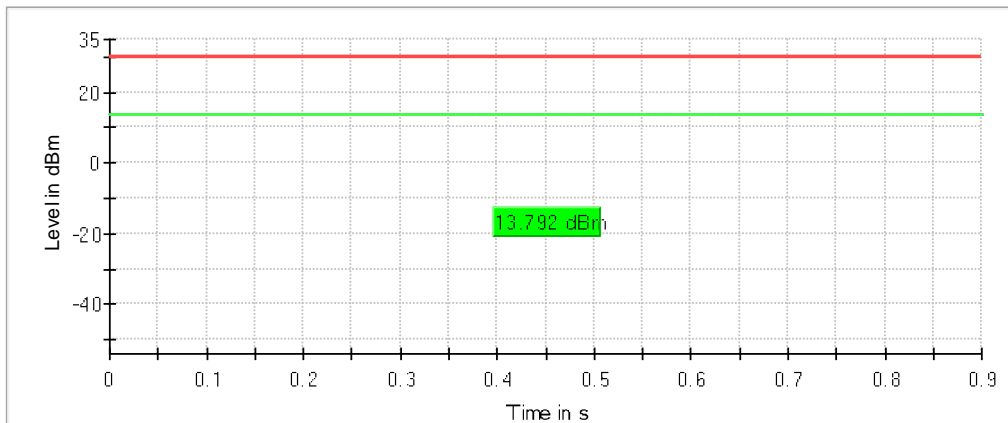
— Gated Trace — Overall — Limit

Middle Channel



— Gated Trace — Overall — Limit

Highest Channel



— Gated Trace — Overall — Limit

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

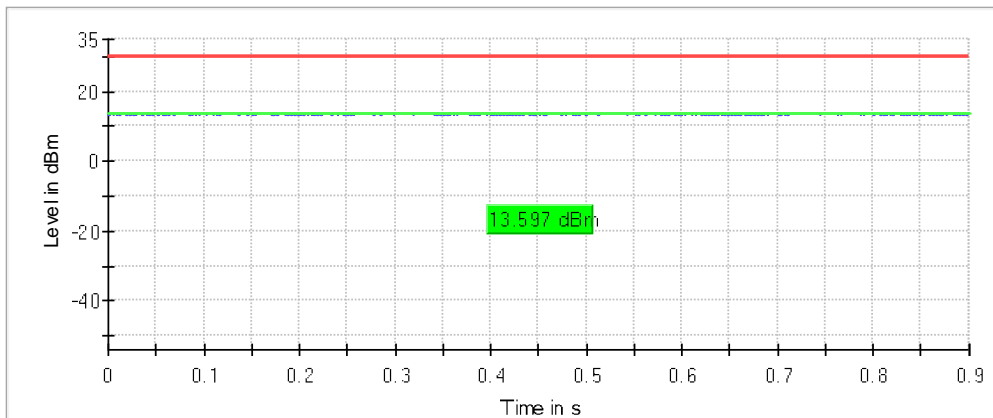
Maximum declared antenna gain: 0.4 dBi

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
Maximum conducted power (dBm)	13.6	14
Maximum EIRP power (dBm)	14.0	14.4
Measurement uncertainty (dB)	<±0.78	

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.

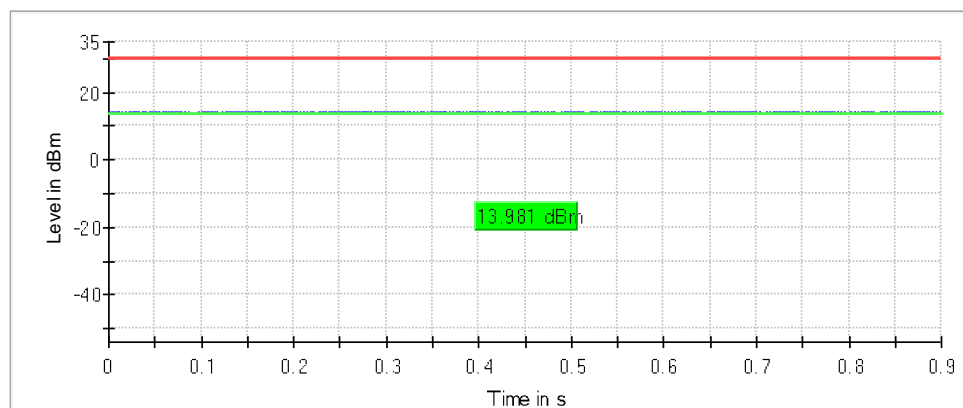
<b>TEST RESULTS (Cont.):</b>	<b>CONDUCTED OUTPUT POWER</b>
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**Middle Channel**



— Gated Trace — Overall — Limit

**Highest Channel**



— Gated Trace — Overall — Limit

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

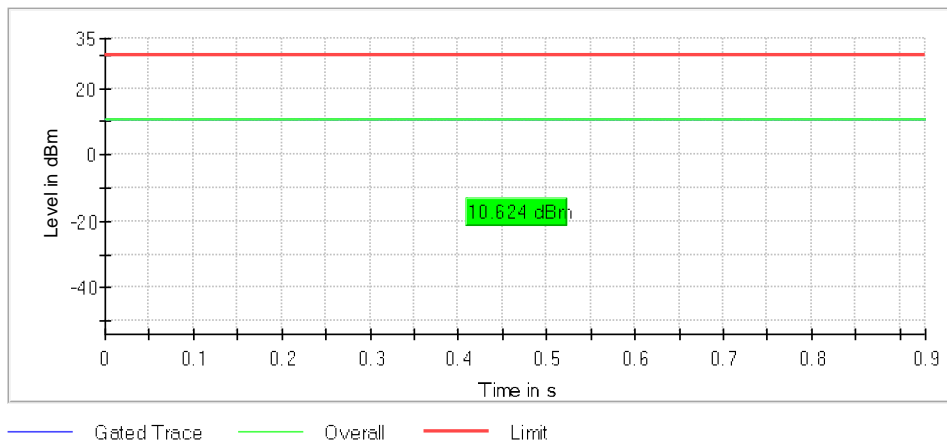
Maximum declared antenna gain: 0.4 dBi

	Lowest frequency 2412 MHz	Middle frequency 2437 MHz	Highest frequency 2462 MHz
Maximum conducted power (dBm)	10.6	10.7	10.9
Maximum EIRP power (dBm)	11.0	11.1	11.3
Measurement uncertainty (dB)	<±0.78		

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.

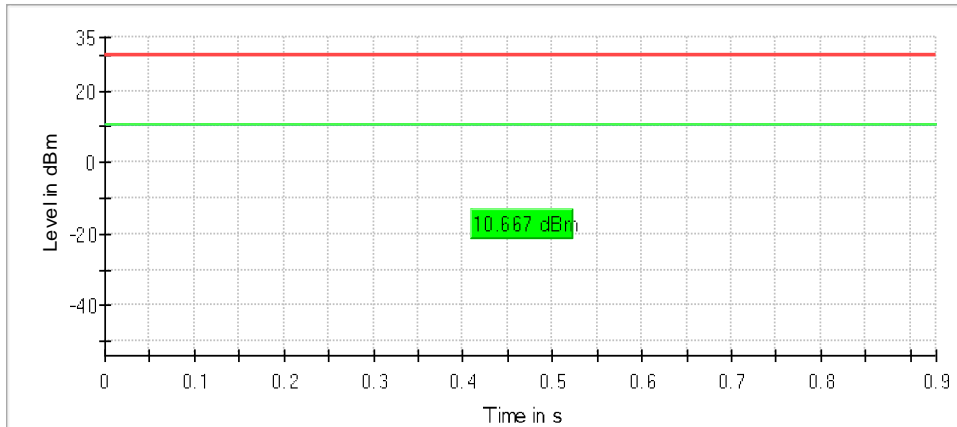
<b>TEST RESULTS (Cont.):</b>	<b>CONDUCTED OUTPUT POWER</b>
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**Lowest Channel**



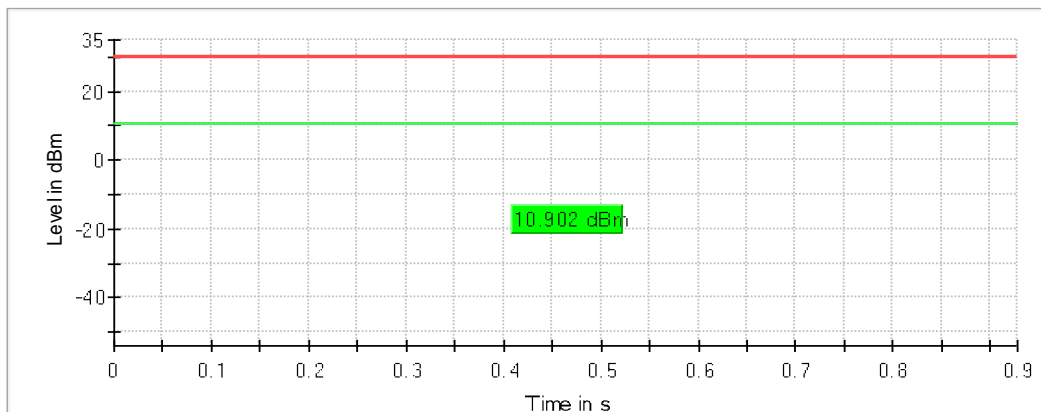
### TEST RESULTS (Cont.)

#### Middle Channel



— Gated Trace — Overall — Limit

#### Highest Channel



— Gated Trace — Overall — Limit

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

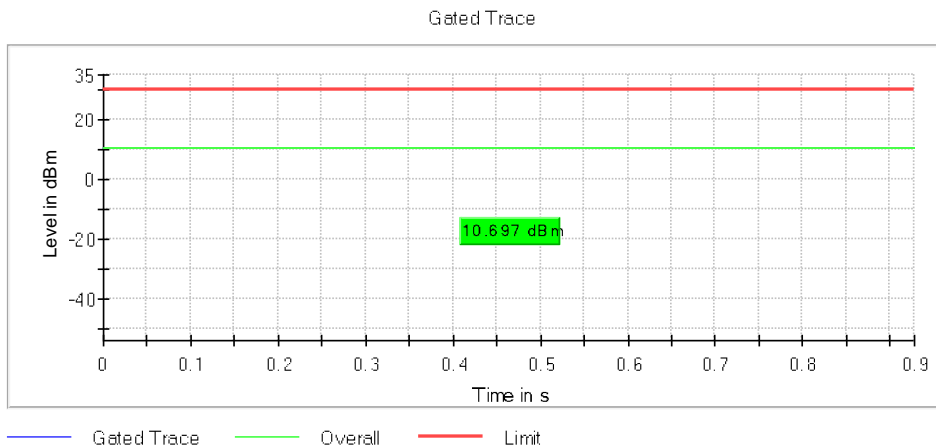
Maximum declared antenna gain: 0.4 dBi

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
Maximum conducted power (dBm)	10.7	11
Maximum EIRP power (dBm)	11.1	11.4
Measurement uncertainty (dB)	<±0.78	

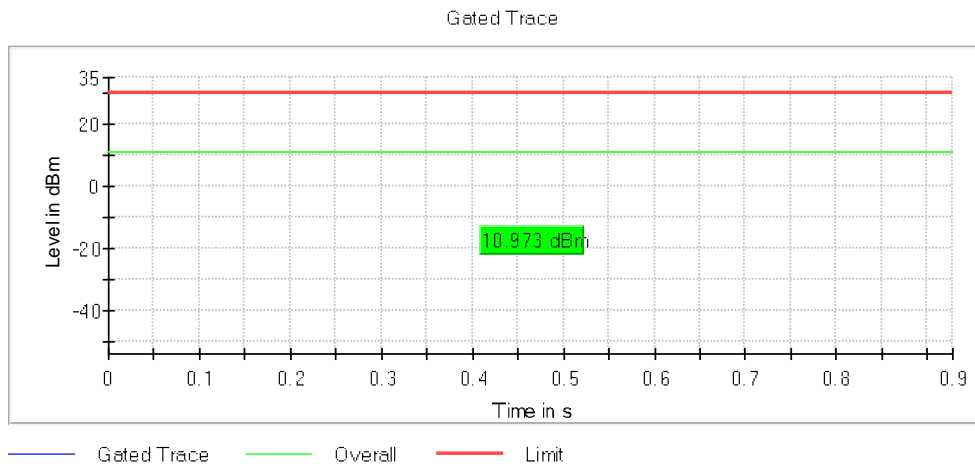
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

**TEST RESULTS (Cont.)**

**Middle Channel**



**Highest Channel**



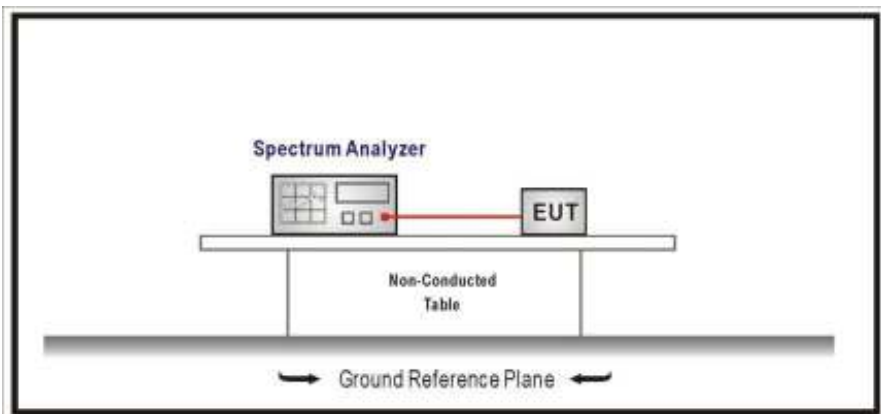
### TEST B.3: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

<b>LIMITS:</b>	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**



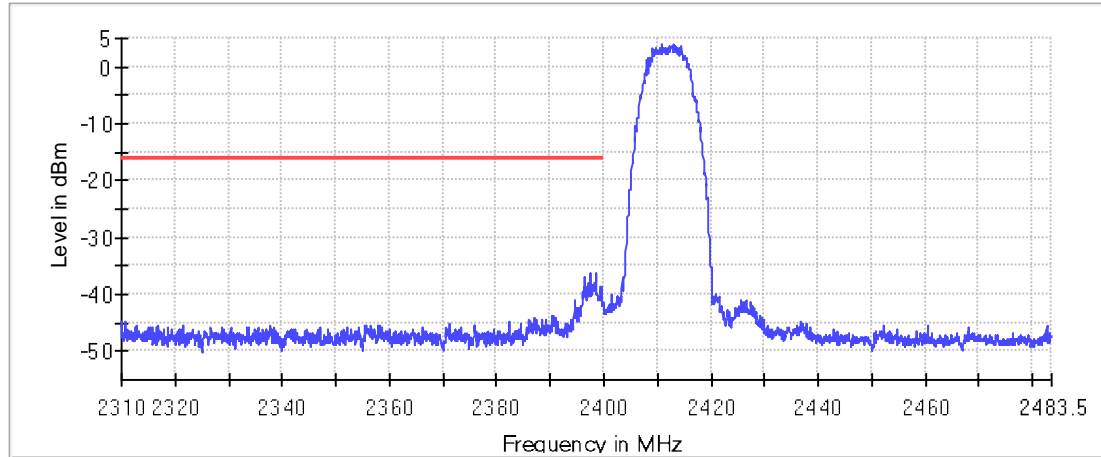
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

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.

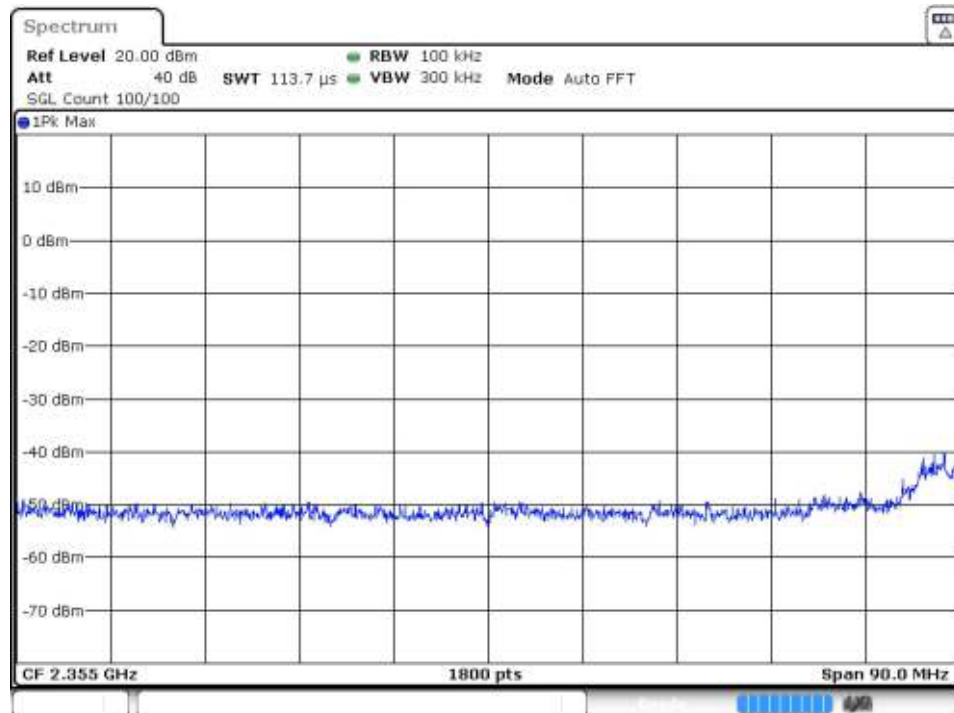


TEST RESULTS (Cont.):

Lowest Channel



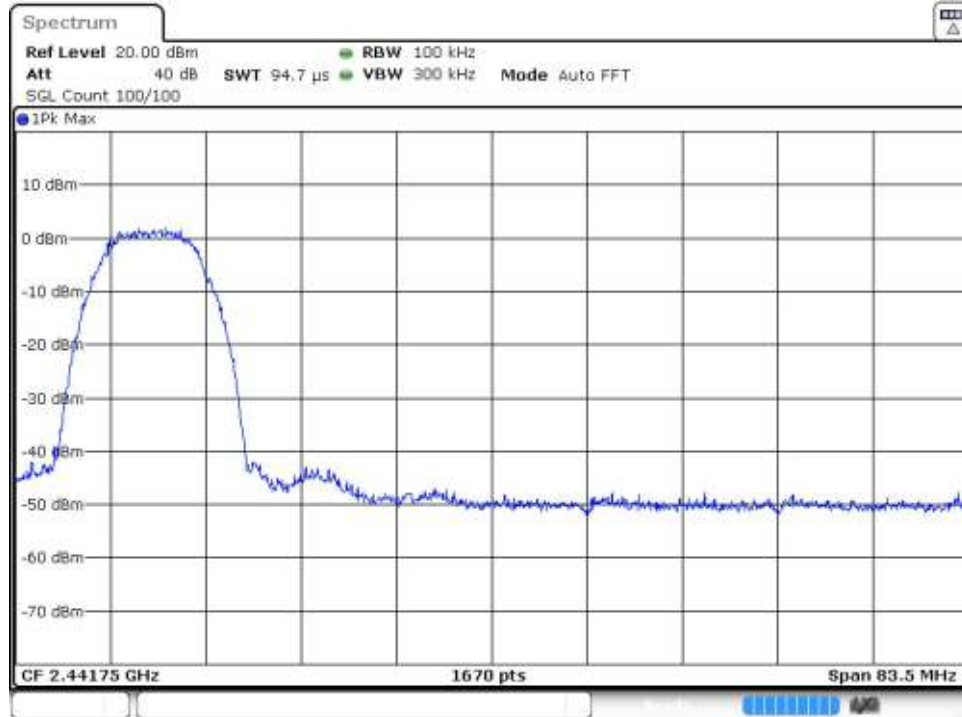
— Limit    — Sum Level    × Fail



Date: 27. DEC. 2018 15:00:40

**TEST RESULTS (Cont.):**

**Lowest Channel**



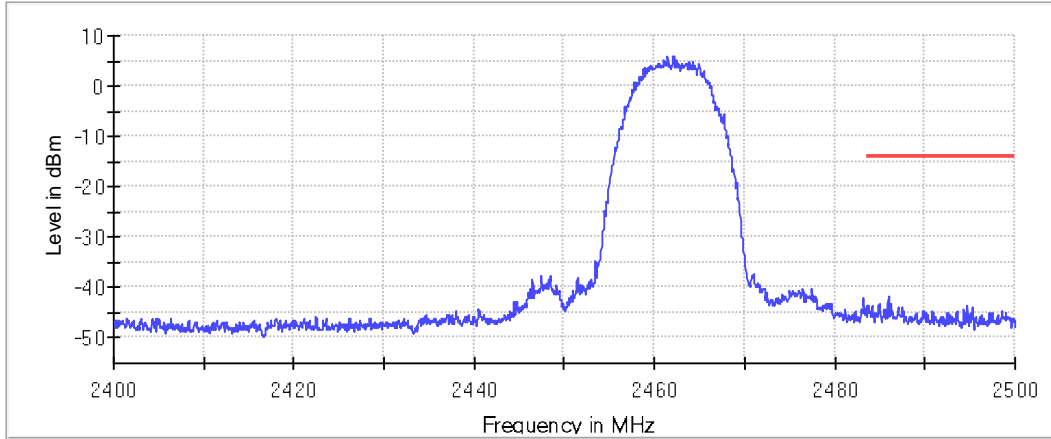
Date: 27.DEC.2018 15:01:31

**Measurement**

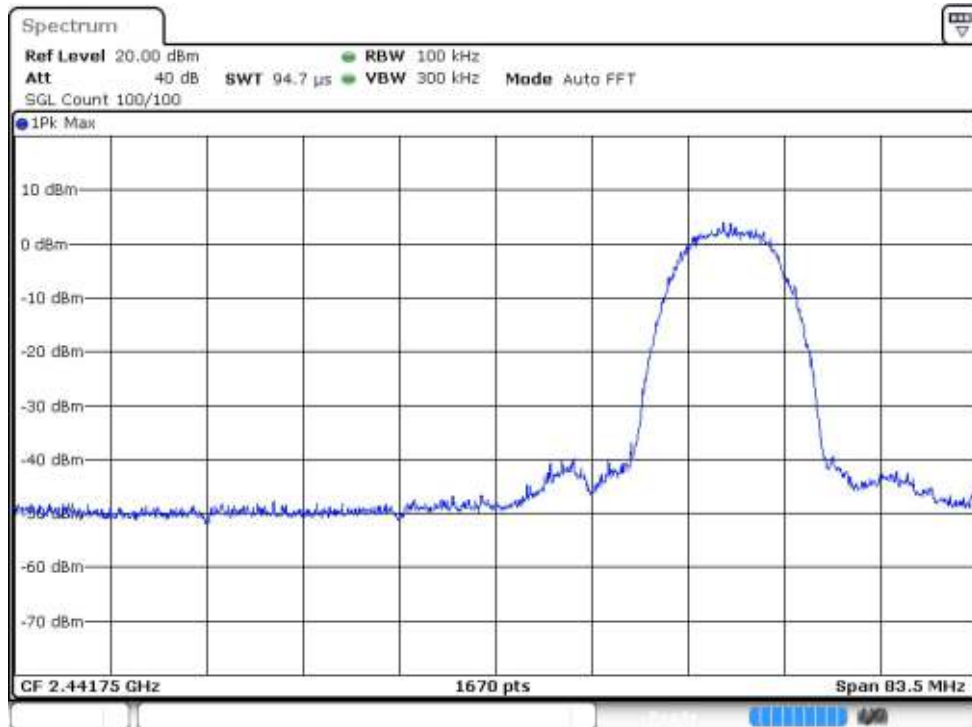
Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	42 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.38 dB

TEST RESULTS (Cont.):

Highest Channel



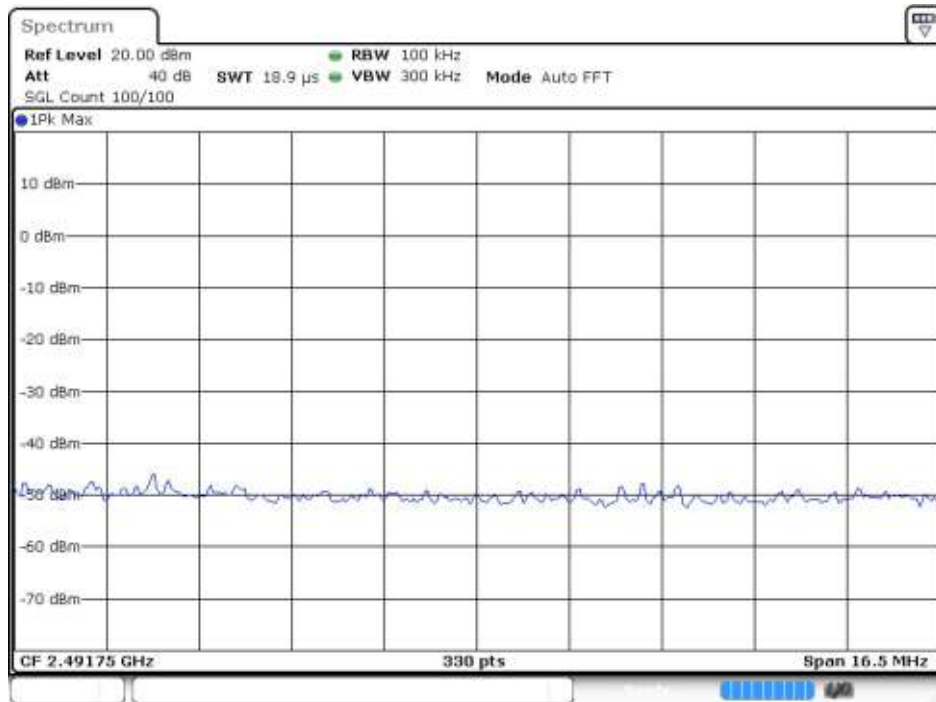
— Limit    — Sum Level    × Fail



Date: 11.FEB.2019 11:10:50

TEST RESULTS (Cont.):

Highest Channel



Date: 11.FEB.2019 11:10:56

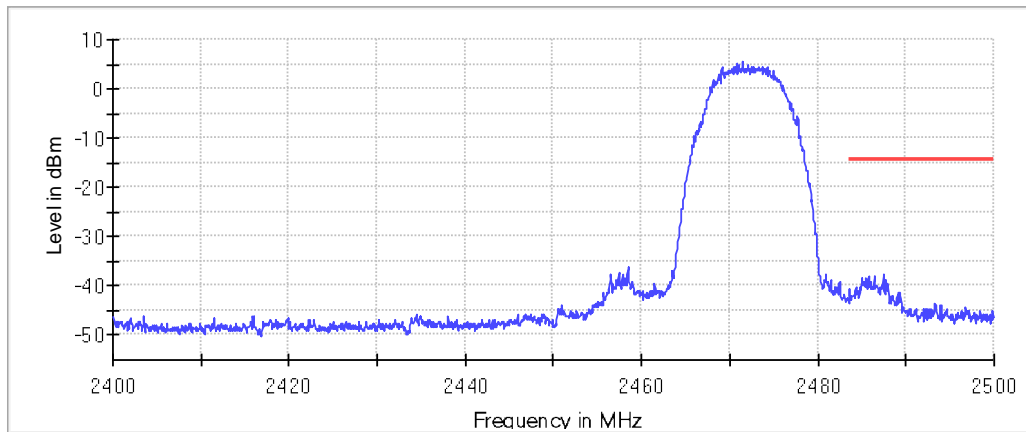
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 μs	18.945 μs
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	42 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.31 dB	0.00 dB

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	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.

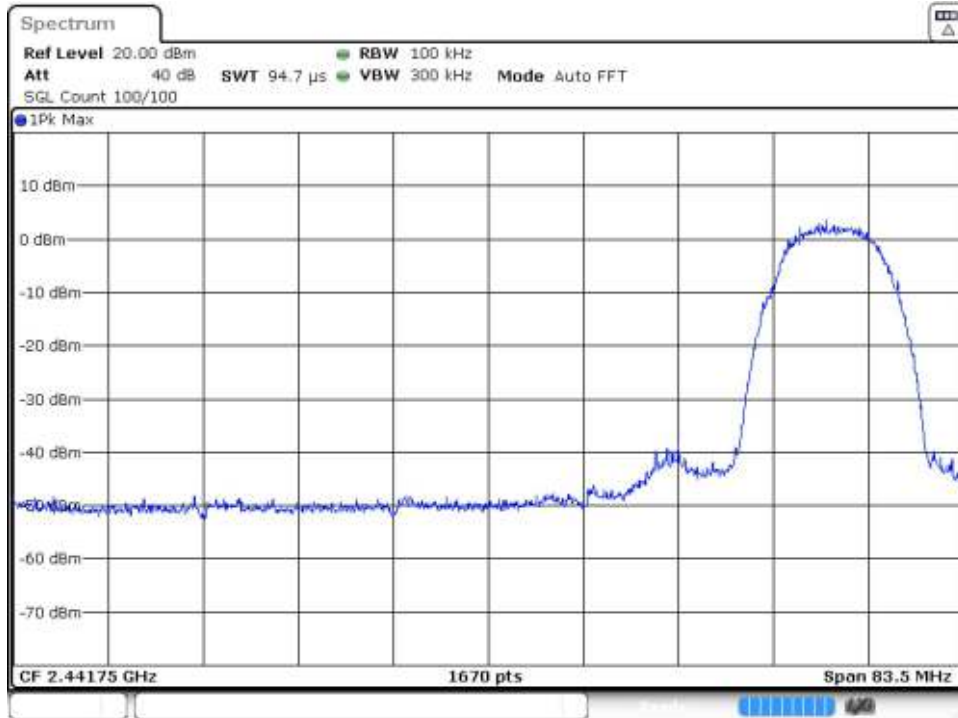
**Highest Channel (2472 MHz)**



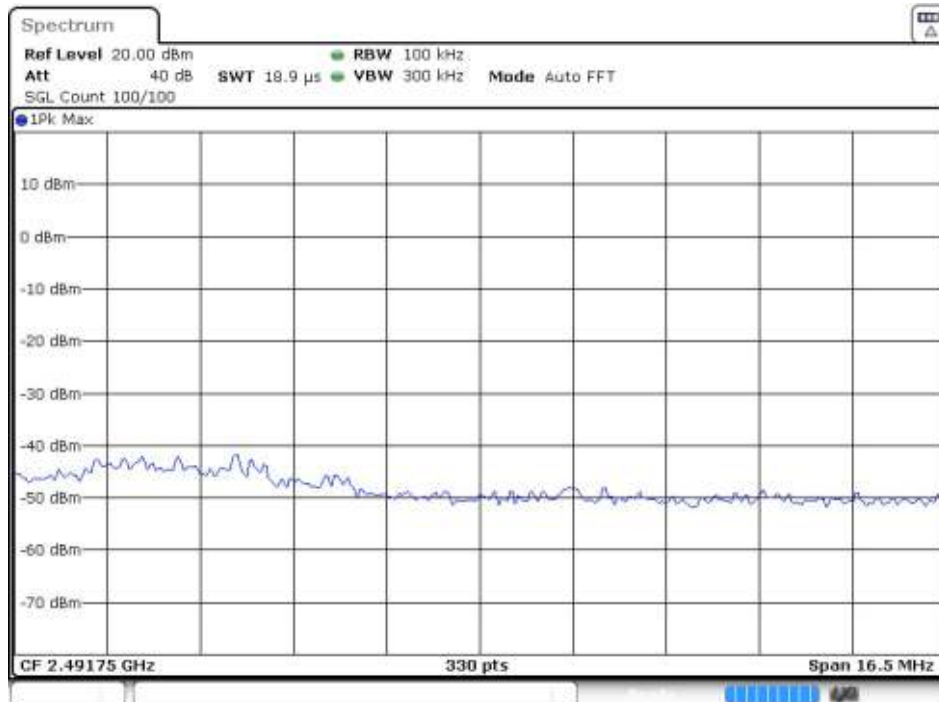
— Limit    — Sum Level    × Fail

TEST RESULTS (Cont.):

Highest Channel



Date: 27 DEC 2016 15:19:47

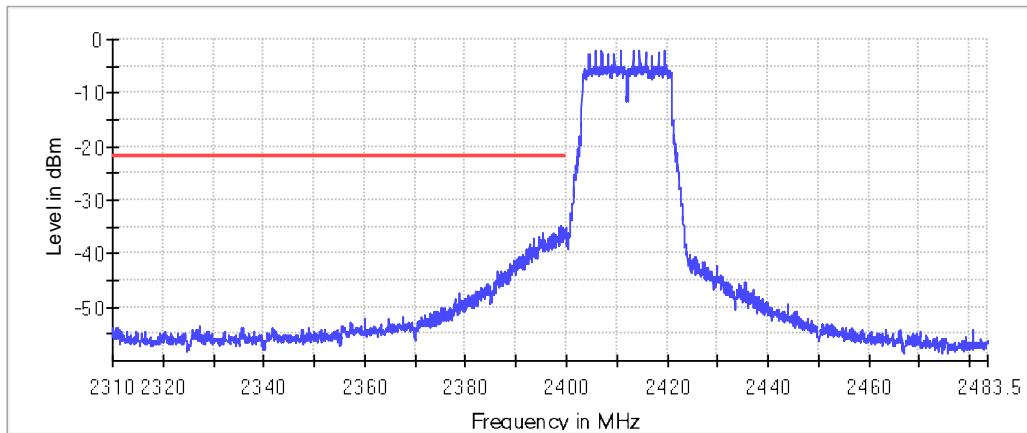


Date: 27 DEC 2018 15:19:52

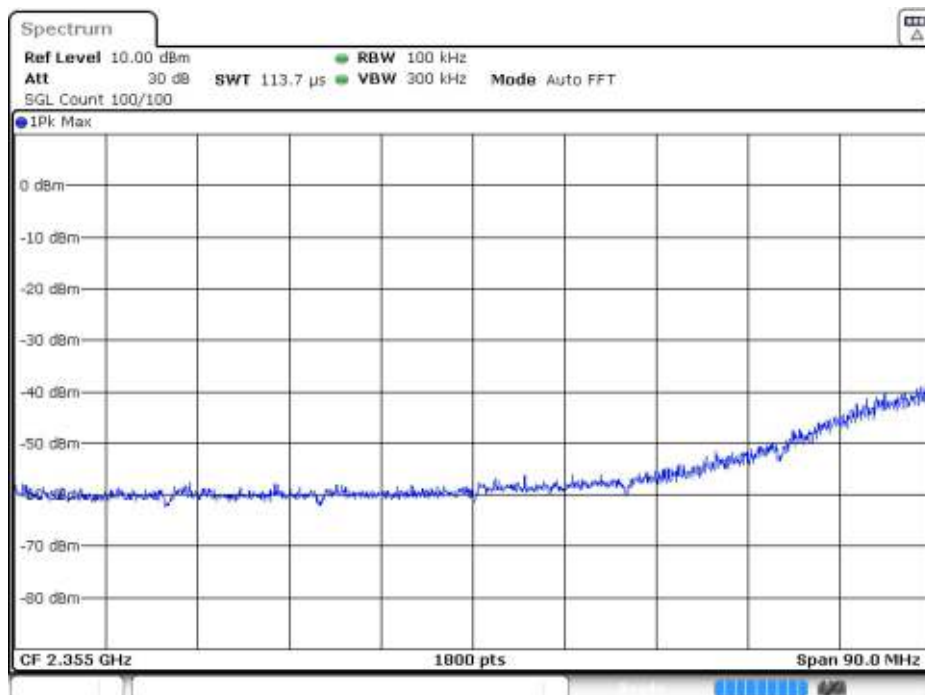
TEST RESULTS (Cont.):	Highest Channel	
Measurement		
Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 µs	18.945 µs
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	58 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.32 dB	0.00 dB

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

**Low Channel**



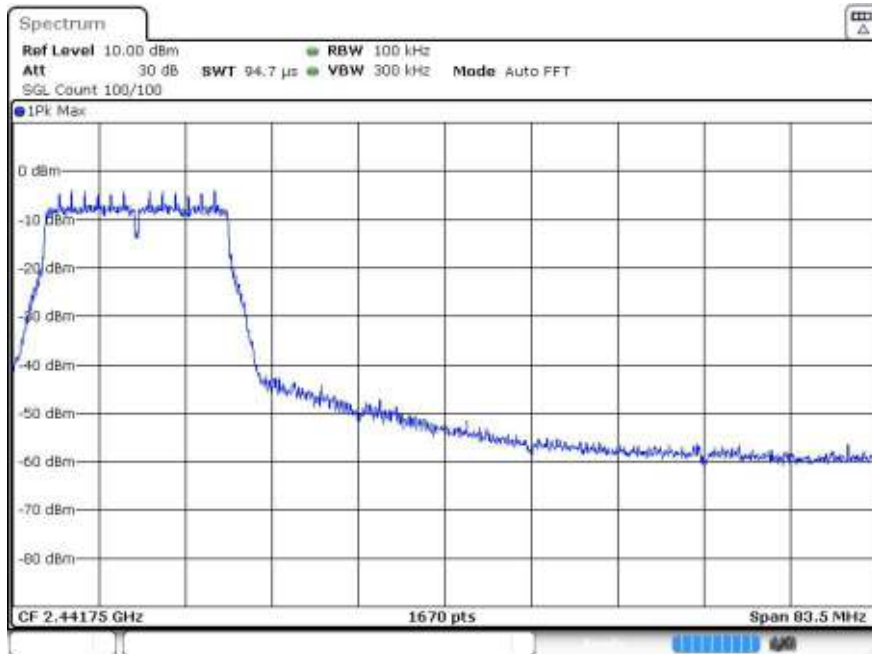
— Limit    — Sum Level    × Fail



Date: 27 DEC 2018 16:05:16



**TEST RESULTS (Cont.):**



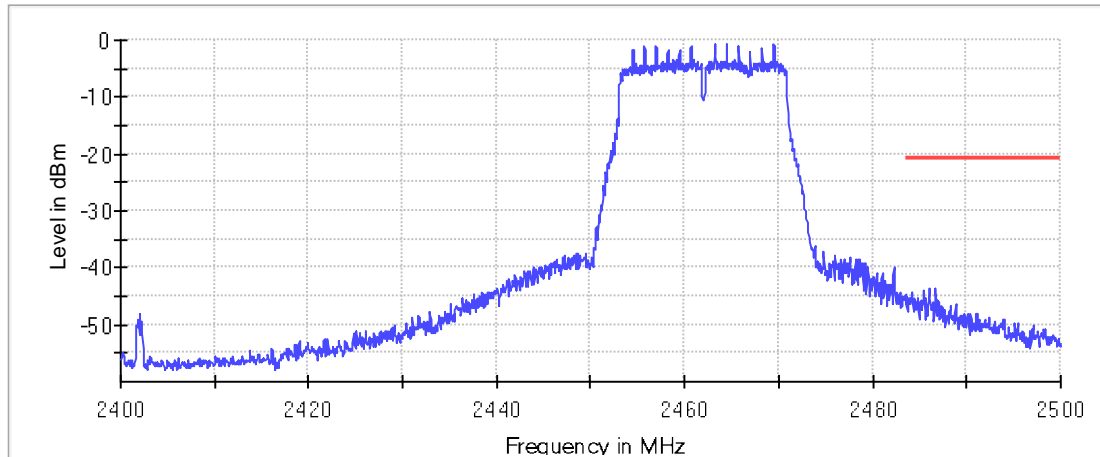
Date: 27 DEC 2018 16:05:56

**Measurement**

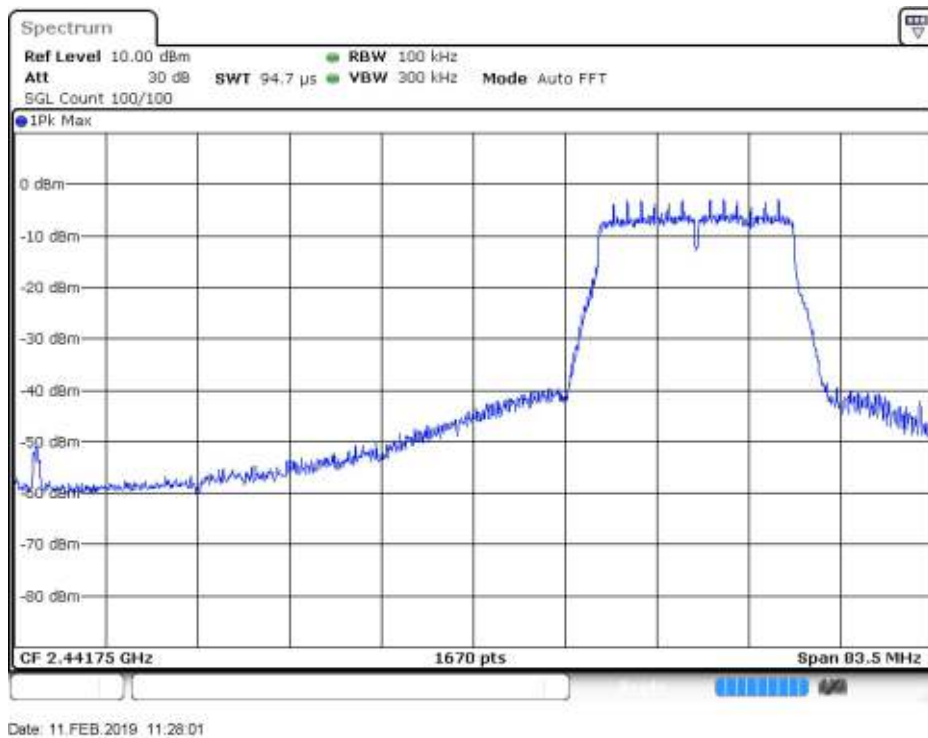
Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweptime	113.672 $\mu$ s	94.727 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	55 / max. 150	32 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.43 dB

TEST RESULTS (Cont.):

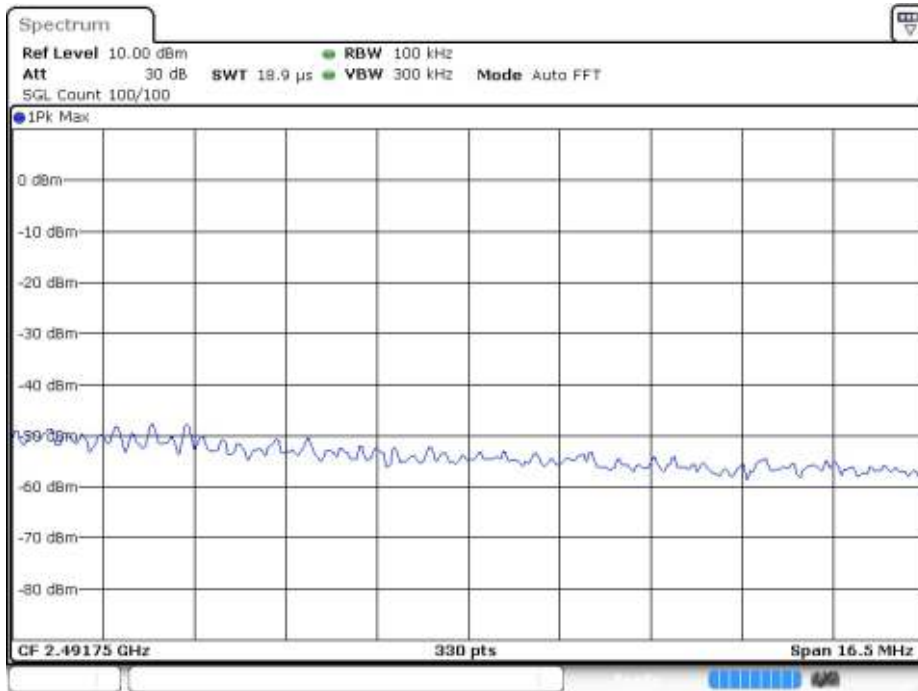
Highest Channel



— Limit    — Sum Level    × Fail



**TEST RESULTS (Cont.):**



Date: 11.FEB.2019 11:28:06

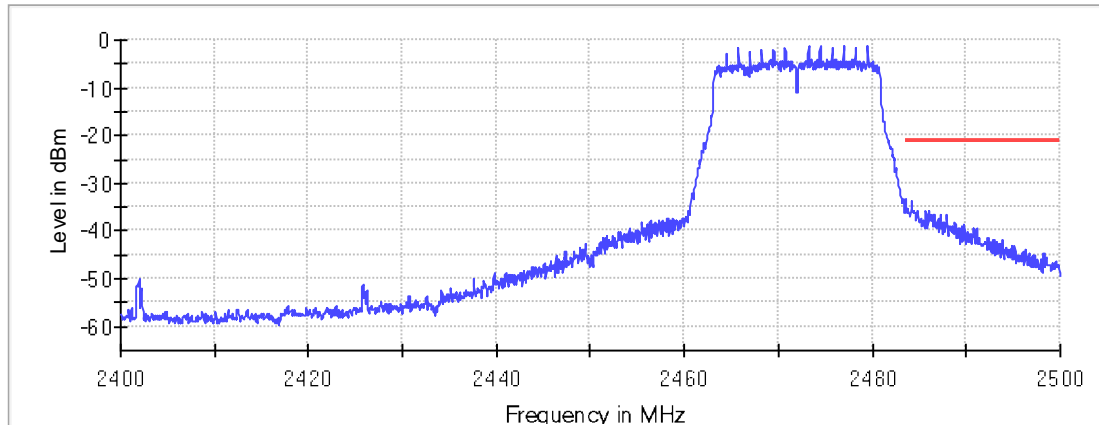
**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
SweepTime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	34 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.36 dB	0.00 dB

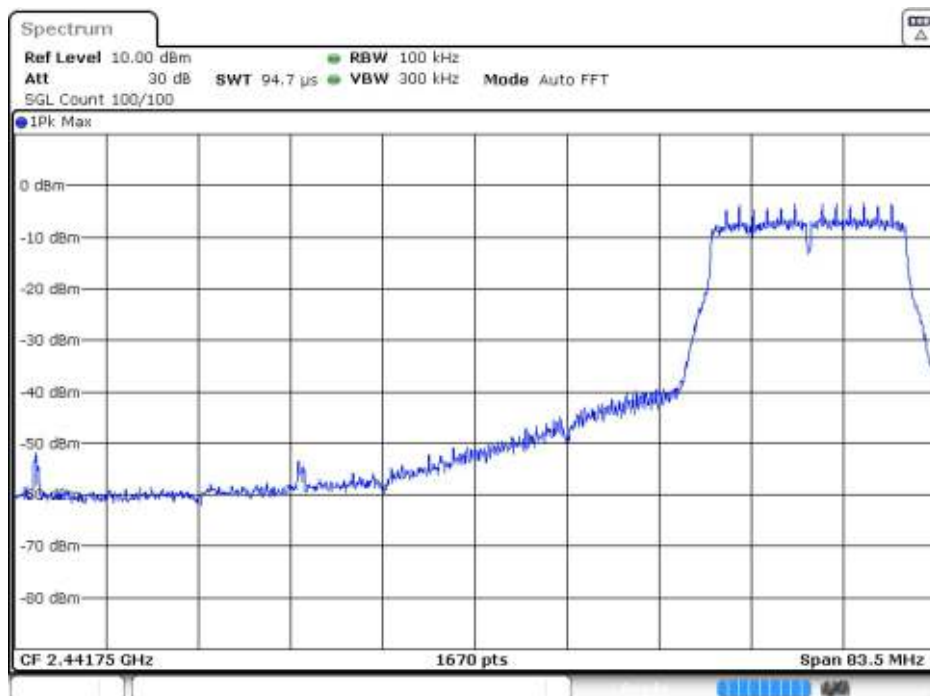
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

**High Channel (2472 MHz)**

Band Edge

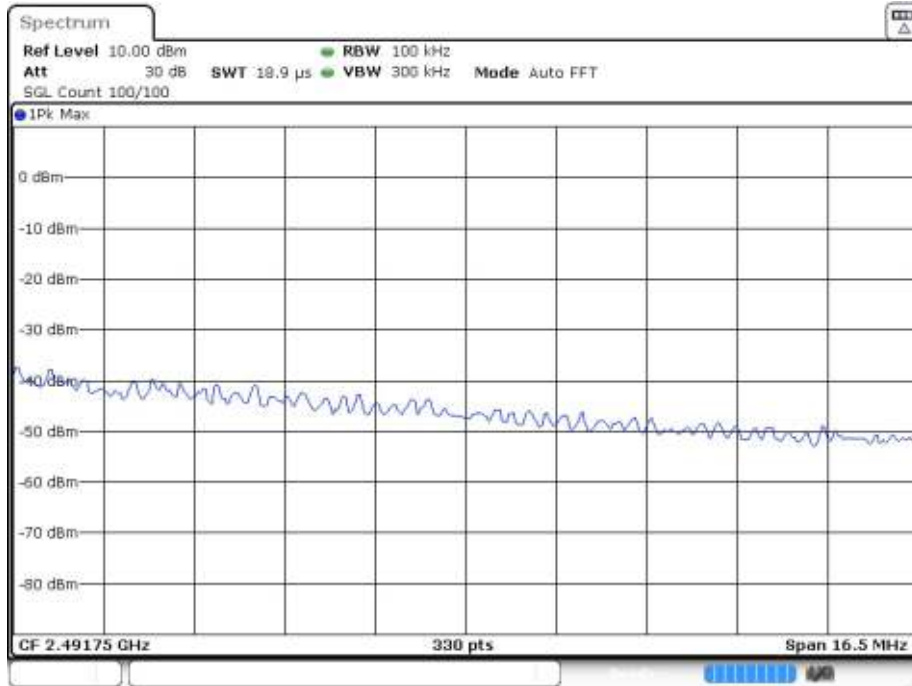


— Limit    — Sum Level    × Fail



Date: 27 DEC. 2018 16:18:01

**TEST RESULTS (Cont.):**



Date: 27.DEC.2018 16:18:09

**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1670	330
Sweeptime	94.727 $\mu$ s	18.945 $\mu$ s
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	23 / max. 150	20 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.45 dB	0.00 dB

### TEST B.4: POWER SPECTRAL DENSITY

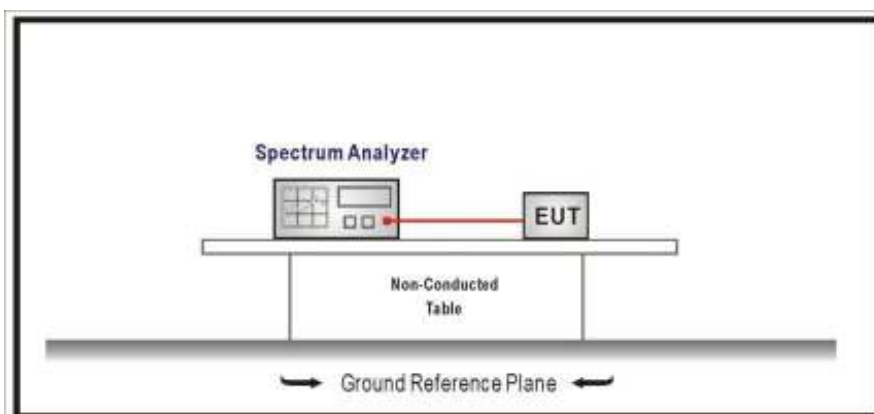
<b>LIMITS:</b>	Product standard:	Part 15 Subpart C §15.247 and RSS-247
	Test standard:	Part 15 Subpart C §15.247(e) and RSS-247 5.2 (b)

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**

For all modes, the maximum power spectral density level in the fundamental emission was measured using the method AVGPSD-1 according to point 10.3. 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.

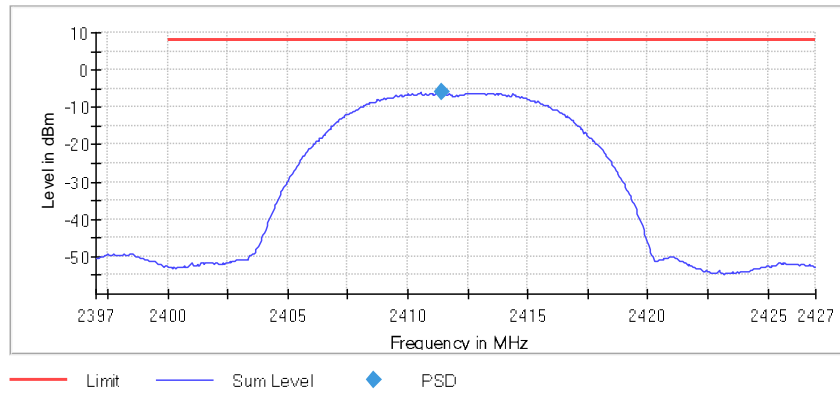


<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

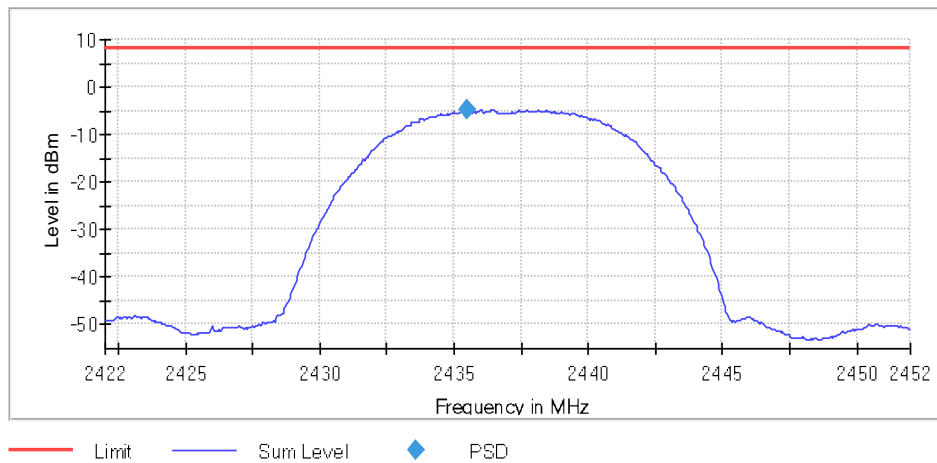
	Lowest frequency	Middle frequency	Highest frequency
	2412 MHz	2437 MHz	2462 MHz
Power spectral density (dBm)	-5.957	-4.719	-4.652
Measurement uncertainty (dB)	<±0.78		

TEST RESULTS (Cont.):

Low Channel

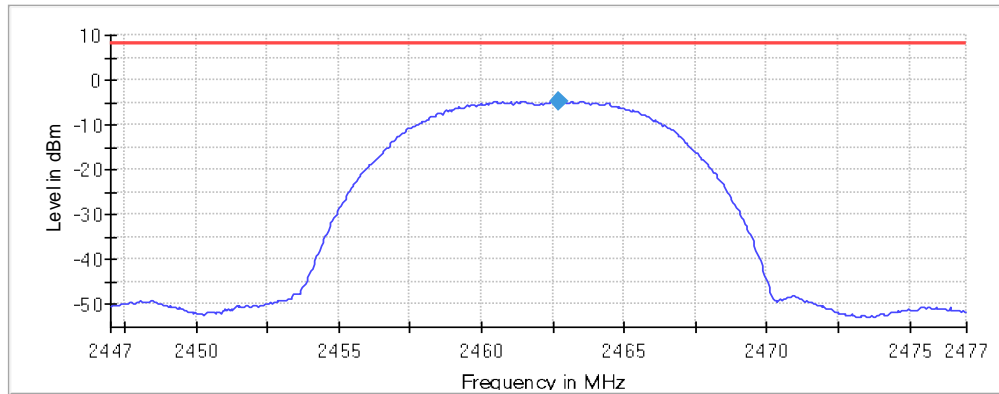


Middle Channel



**TEST RESULTS (Cont.):**

**High Channel**



— Limit    — Sum Level    ◆ PSD

**Measurement**

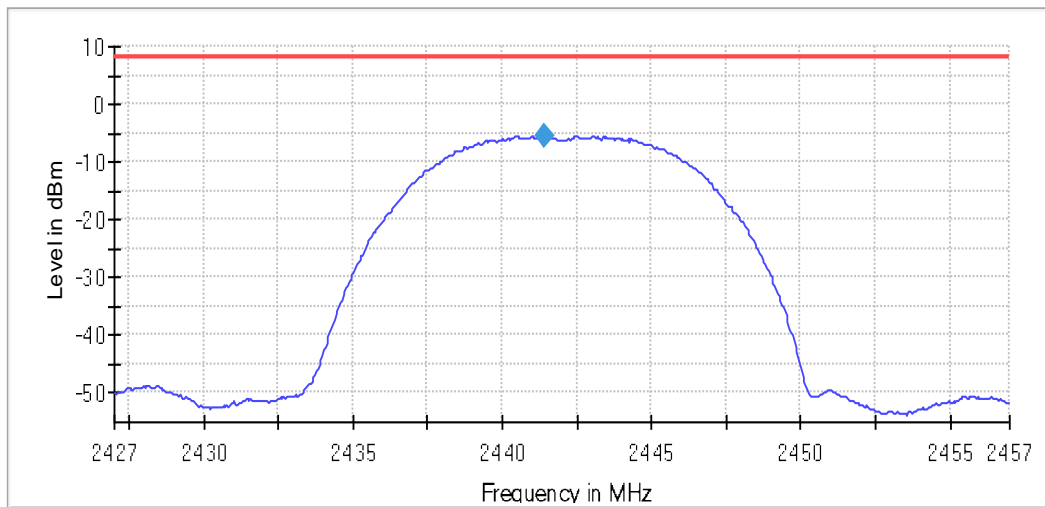
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39700	2.42200	2.44700
Stop Frequency	2.42700	2.45200	2.47700
Span	30.000 MHz	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	600	600	600
Sweeptime	3.000 s	3.000 s	3.000 s
Reference Level	20.000 dBm	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB	40.000 dB
Detector	RMS	RMS	RMS
SweepCount	1	1	1
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	5 / max. 150	6 / max. 150	6 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.24 dB	0.33 dB	0.25 dB



<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
Power spectral density (dBm)	-5.419	-5.140
Measurement uncertainty (dB)	<±0.78	

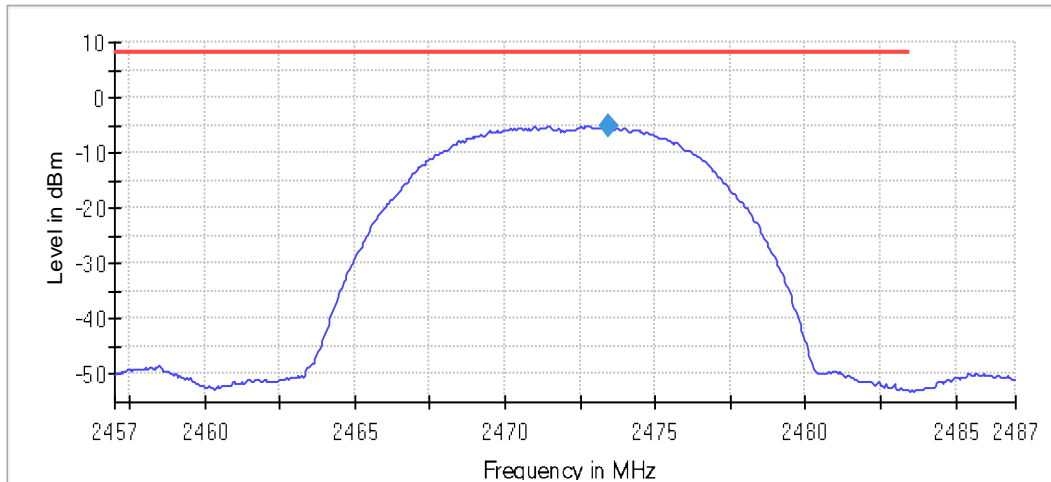
**Middle Channel (2442 MHz)**



— Limit    — Sum Level    ◆ PSD

**TEST RESULTS (Cont.):**

**High Channel**



— Limit    — Sum Level    ◆ PSD

**Measurement**

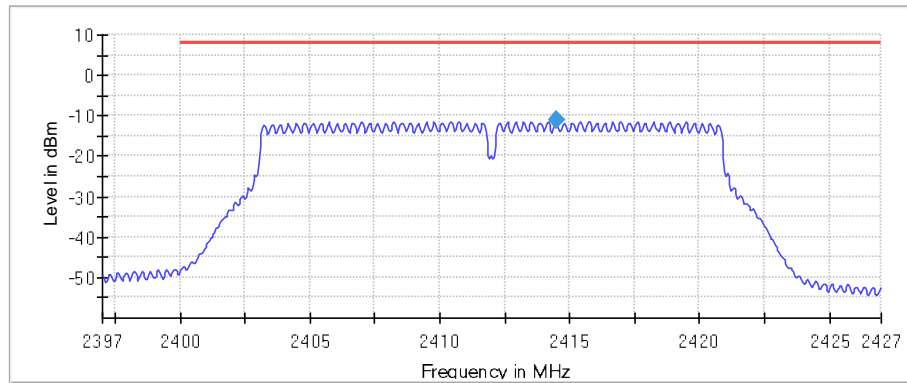
Setting	Instrument Value	Instrument Value
Start Frequency	2.42700 GHz	2.45700 GHz
Stop Frequency	2.45700 GHz	2.48700 GHz
Span	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	600	600
Sweeptime	3.000 s	3.000 s
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 dB	40.000 dB
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.37 dB	0.30 dB

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

	Lowest frequency	Middle frequency	Highest frequency
	2412 MHz	2437 MHz	2462 MHz
Power spectral density (dBm)	-11.278	-9.990	-9.923
Measurement uncertainty (dB)	<±0.78		

<b>TEST RESULTS (Cont.):</b>	
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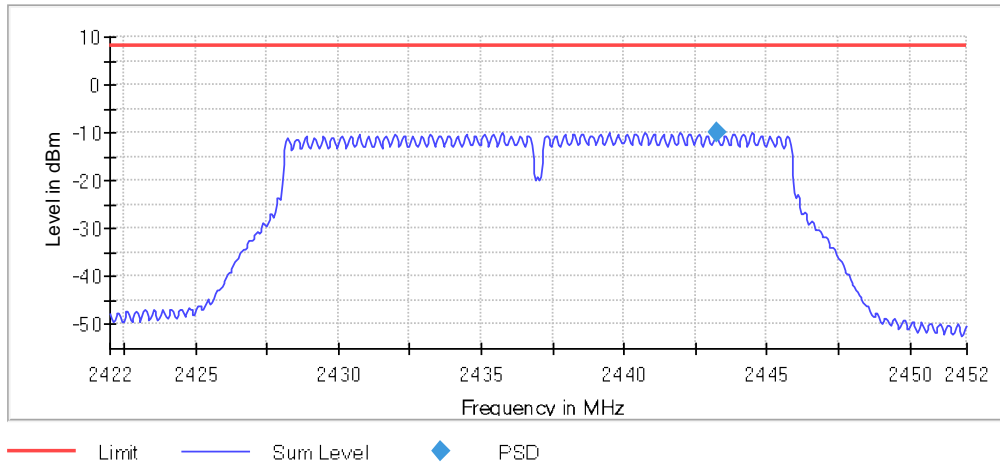
**Low Channel**



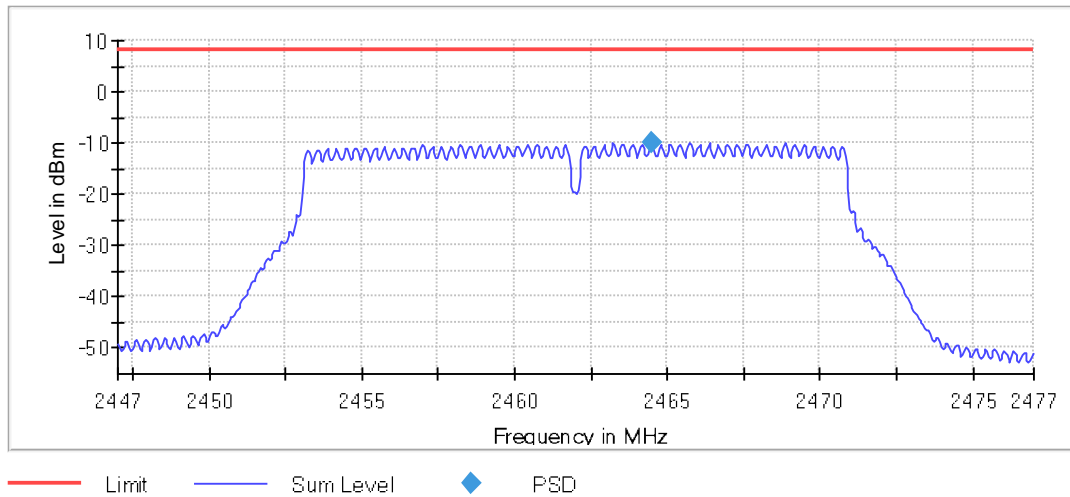
— Limit    — Sum Level    ◆ PSD

TEST RESULTS (Cont.):

Middle Channel



High Channel



**TEST RESULTS (Cont.):**

Measurement			
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39700	2.42200	2.44700
Stop Frequency	2.42700	2.45200	2.47700
Span	30.000 MHz	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	600	600	600
Sweeptime	3.000 s	3.000 s	3.000 s
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	RMS	RMS	RMS
SweepCount	1	1	1
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	6 / max. 150	6 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.40 dB	0.34 dB	0.36 dB

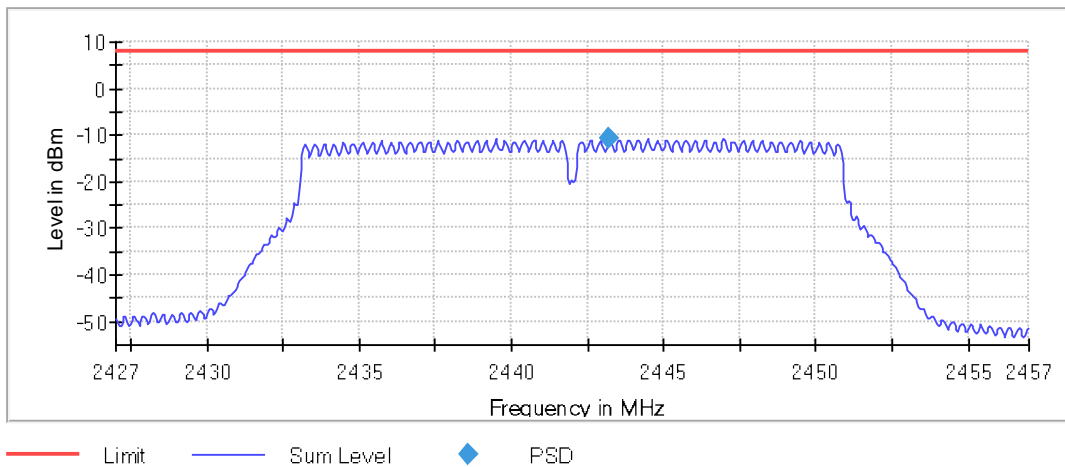
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED CONDITIONS MODES:</b>	TC#02 (N mode)
<b>TEST RESULTS:</b>	PASS

	Middle frequency 2442 MHz	Highest frequency 2472 MHz
Power spectral density (dBm)	-10.839	-10.624
Measurement uncertainty (dB)	<±0.78	

<b>TEST RESULTS (Cont.):</b>	
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**Mid Channel**

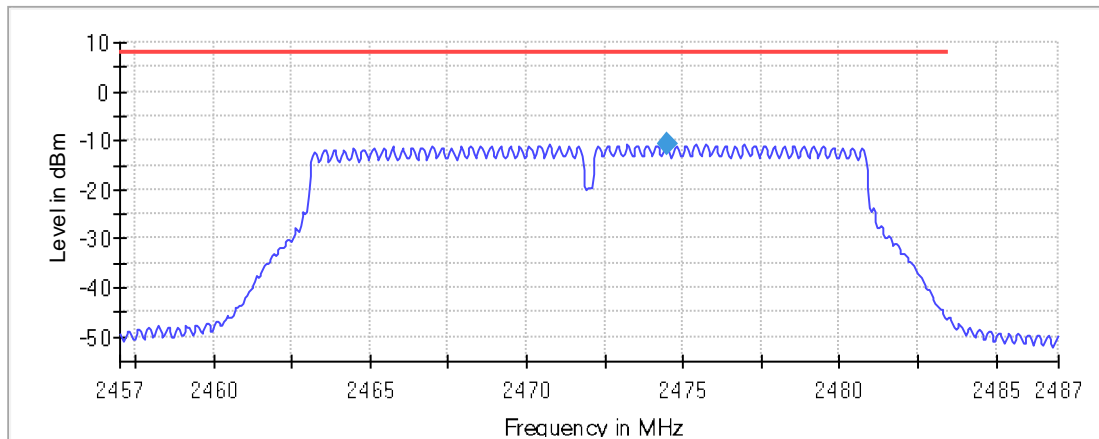
Power Spectral Density



**TEST RESULTS (Cont.):**

**High Channel**

Power Spectral Density



— Limit    — Sum Level    ◆ PSD

**Measurement**

Setting	Instrument Value	Instrument Value
Start Frequency	2.42700 GHz	2.45700 GHz
Stop Frequency	2.45700 GHz	2.48700 GHz
Span	30.000 MHz	30.000 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	600	600
Sweeptime	3.000 s	3.000 s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.27 dB	0.32 dB

## TEST B.5: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

<b>LIMITS:</b>	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

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 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

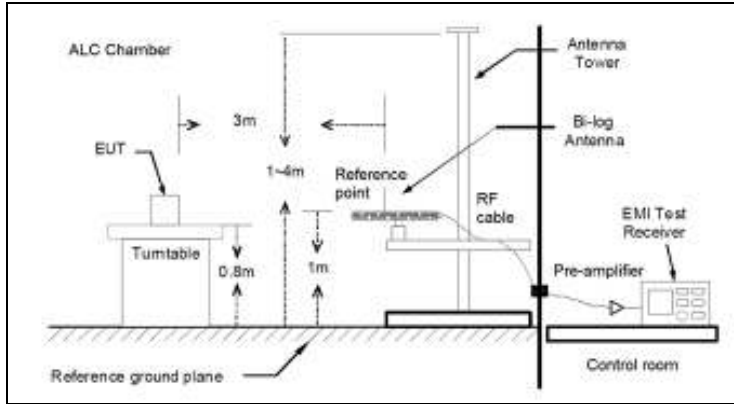
Measurements were made in both horizontal and vertical planes of polarization.

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.

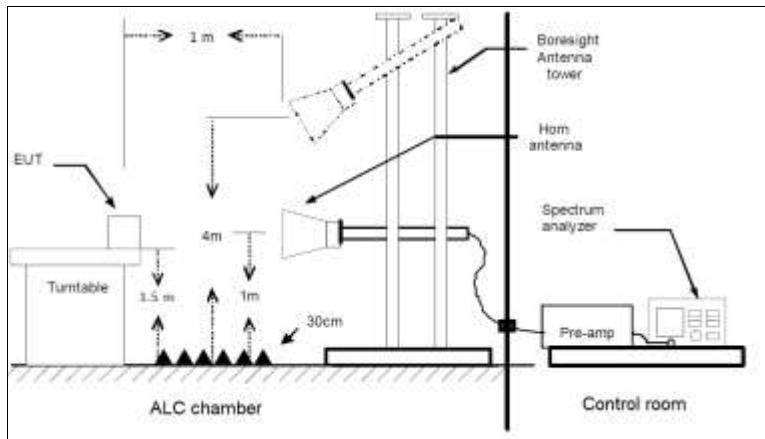


**TEST SETUP (CONT.)**

**Radiated measurements Setup  $f < 1$  GHz**



**Radiated measurements setup  $f > 1$  GHz**



<b>TESTED SAMPLES:</b>	S/02
<b>TESTED CONDITIONS MODES:</b>	TC#01 (b mode)
<b>TEST RESULTS:</b>	PASS

**Co-Location**

The test was performed with the equipment transmitting first with only the WiFi 2.4GHz (WLAN1 CORE1) and repeated with the 2.4 GHz BT-EDR (WLAN 0), and WiFi 5 GHz (WLAN0 CORE0) radios transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

**Frequency range 30 MHz – 1000 MHz**

The spurious emissions below 1 GHz do not depend on the operating channel and mode selected in the EUT. See worst operation mode selected for this range (N mode).

**Frequency range 1 GHz – 26 GHz**

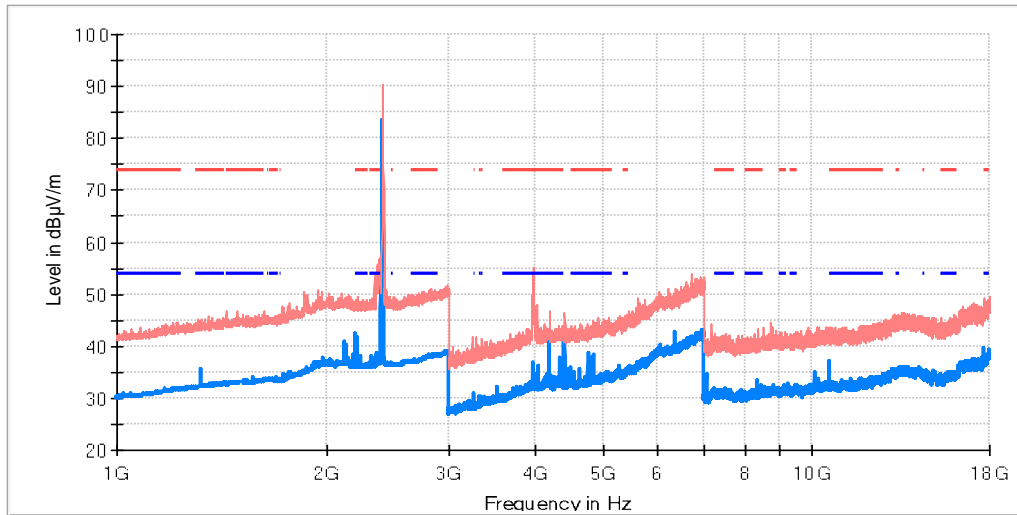
The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>1 GHz – 18 GHz</b>

**CHANNEL: Lowest (2412 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



- 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

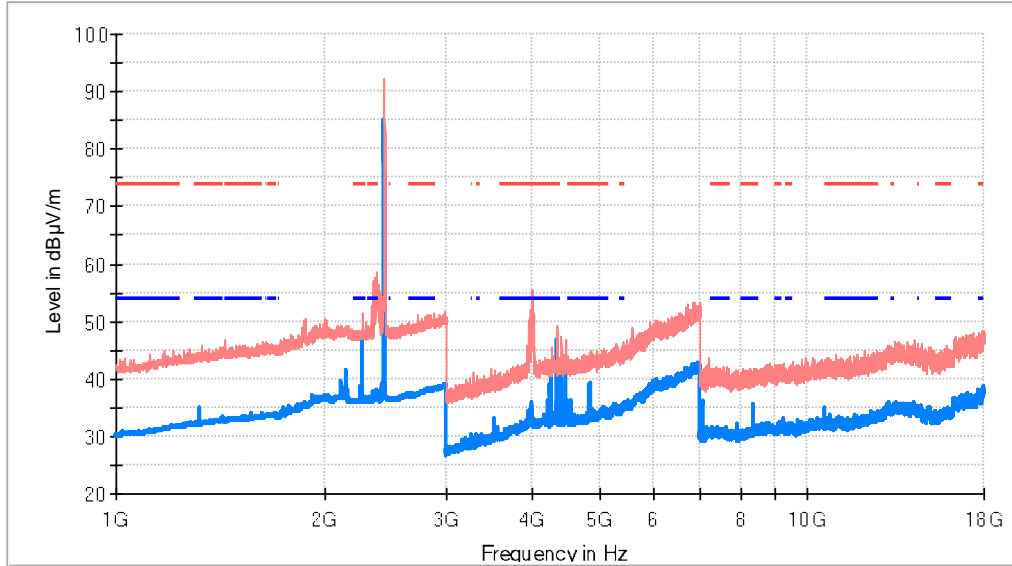
**Maximizations**

Frequency (MHz)	PK+ MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2412.500000	90.46	83.50	H	Fundamental
4202.500000	45.25	41.69	V	
4409.500000	46.52	42.96	V	
4850.500000	44.71	38.42	V	
10583.000000	43.64	37.16	H	
17638.500000	46.74	39.53	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2437 MHz).**

RF\_FCC\_15\_247\_E Field\_1GHz\_18GHz



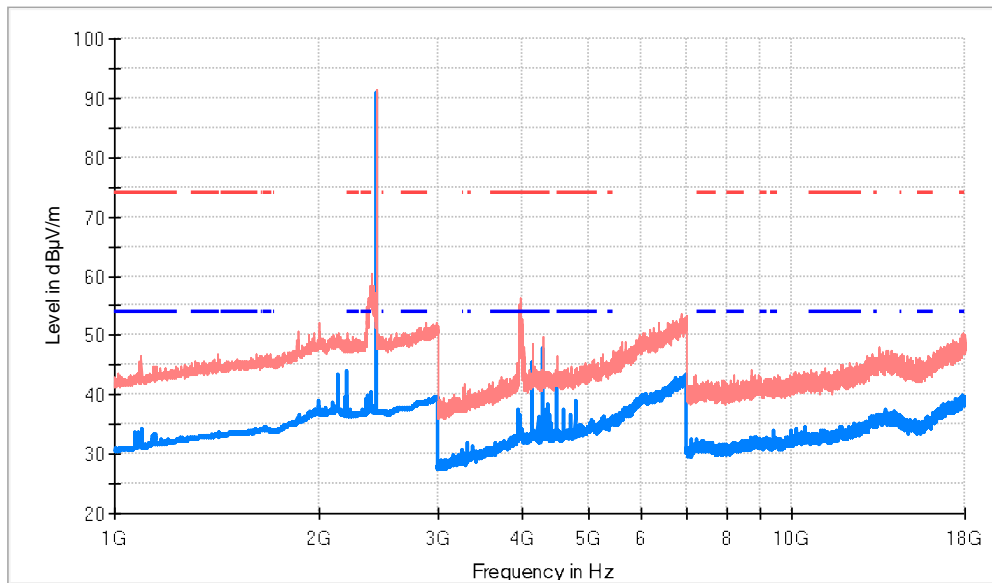
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

Frequency (MHz)	PK+_MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2438.500000	91.71	85.16	H	Fundamental
4345.000000	49.36	46.81	V	
4409.500000	47.28	43.23	V	
4850.500000	44.62	39.15	V	
8378.000000	40.99	35.70	V	
10583.000000	41.90	34.88	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2442 MHz).**



- 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

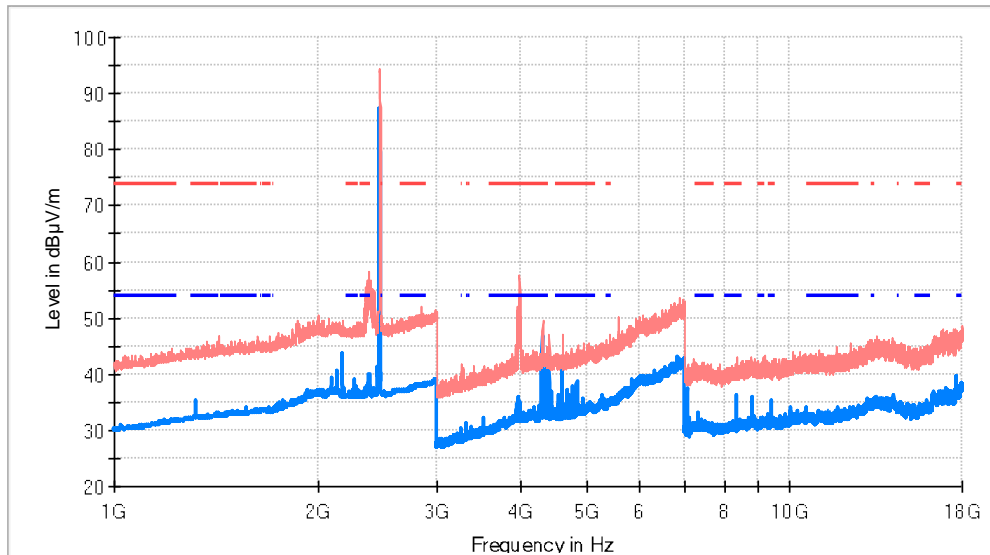
**Maximizations**

Frequency (MHz)	PK+ MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2442.500000	90.71	89.49	H	Fundamental
4151.500000	47.41	44.61	V	
4288.500000	49.40	47.61	V	
4513.000000	45.76	41.44	V	
12185.000000	42.73	33.58	H	
13793.800000	44.07	36.76	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2462 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



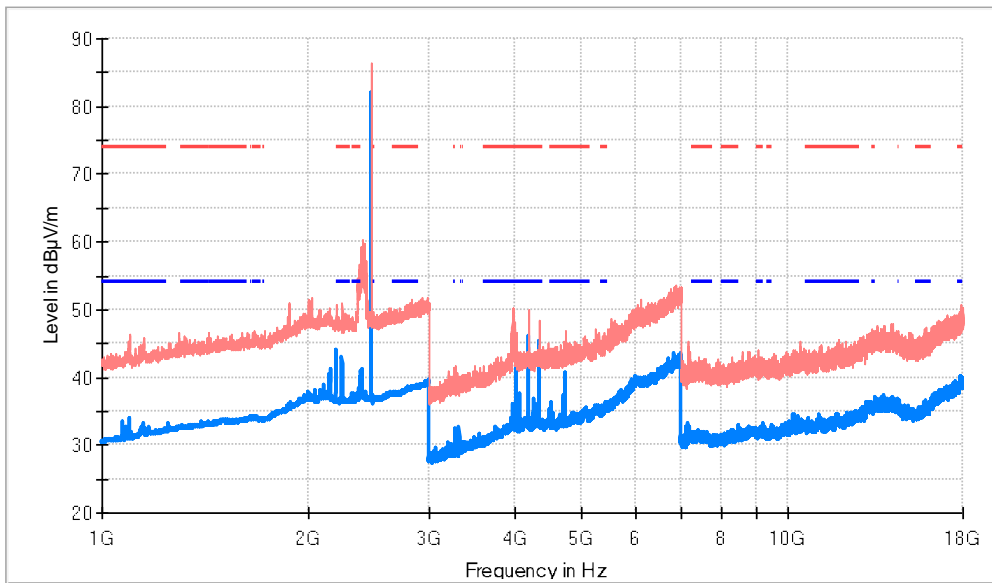
- AVG\_MAXH
- PK+\_MAXH
- - - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- - - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Height (cm)	Comments
2464.000000	94.34	87.15	H	Fundamental
4306.500000	49.19	46.75	V	
6835.500000	50.66	42.92	V	
10077.000000	41.67	34.03	H	
14244.500000	44.61	36.11	V	
17638.000000	47.05	39.54	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2472 MHz).**



- 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

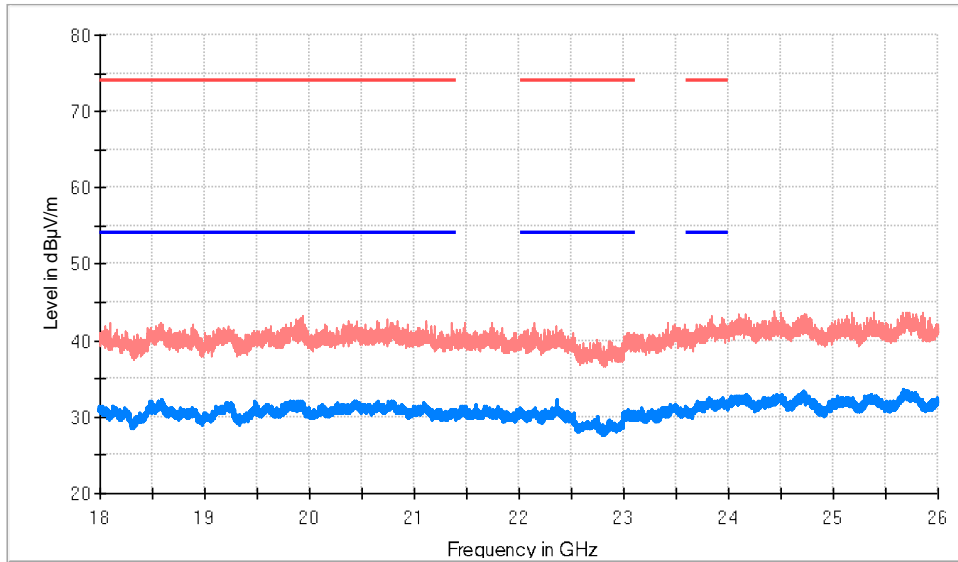
**Maximizations**

Frequency (MHz)	PK+ MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2192.000000	50.78	43.98	H	I
2473.000000	86.34	81.92	V	Fundamental
4026.000000	45.39	42.74	V	
4026.500000	46.49	43.59	V	
4194.000000	47.47	44.86	V	
4350.000000	44.92	42.34	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	18 GHz – 26 GHz
<b>CHANNEL: Lowest (2412 MHz).</b>	
<p style="text-align: center;">RF_FCC_15.247_E Field_18GHz_26GHz</p> <p style="text-align: center;">Frequency in GHz</p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> AVG_MAXH</li> <li><span style="color: red;">—</span> PK+_MAXH</li> <li><span style="color: red;">—</span> TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit</li> <li><span style="color: blue;">—</span> TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit</li> </ul>	
<b>CHANNEL: Middle (2437 MHz).</b>	
<p style="text-align: center;">RF_FCC_15.247_E Field_18GHz_26GHz</p> <p style="text-align: center;">Frequency in GHz</p> <ul style="list-style-type: none"> <li><span style="color: blue;">—</span> AVG_MAXH</li> <li><span style="color: red;">—</span> PK+_MAXH</li> <li><span style="color: red;">—</span> TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit</li> <li><span style="color: blue;">—</span> TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit</li> </ul>	

**TEST RESULTS (Cont.)**

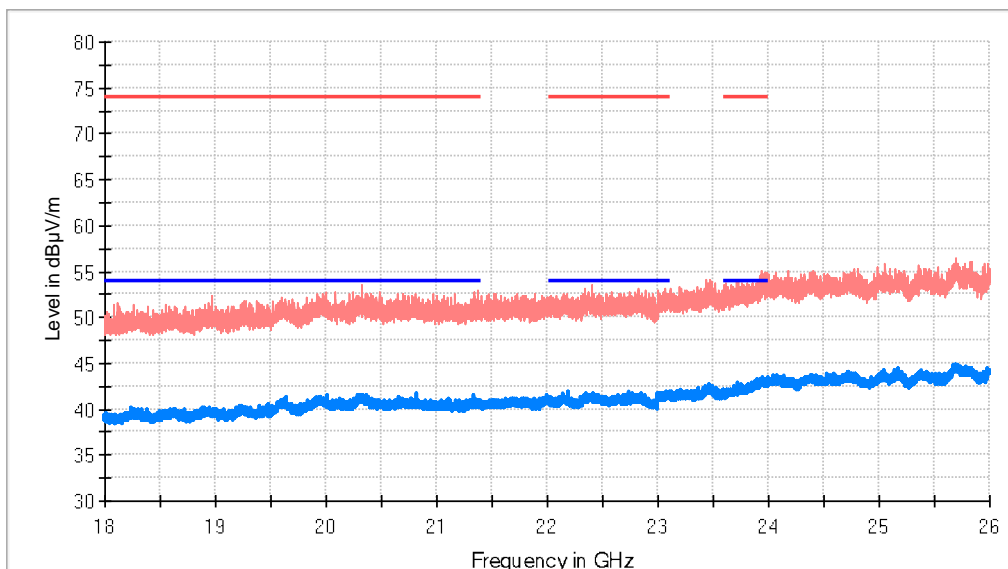
**CHANNEL: Middle (2442 MHz).**



- 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

**CHANNEL: Highest (2462 MHz).**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



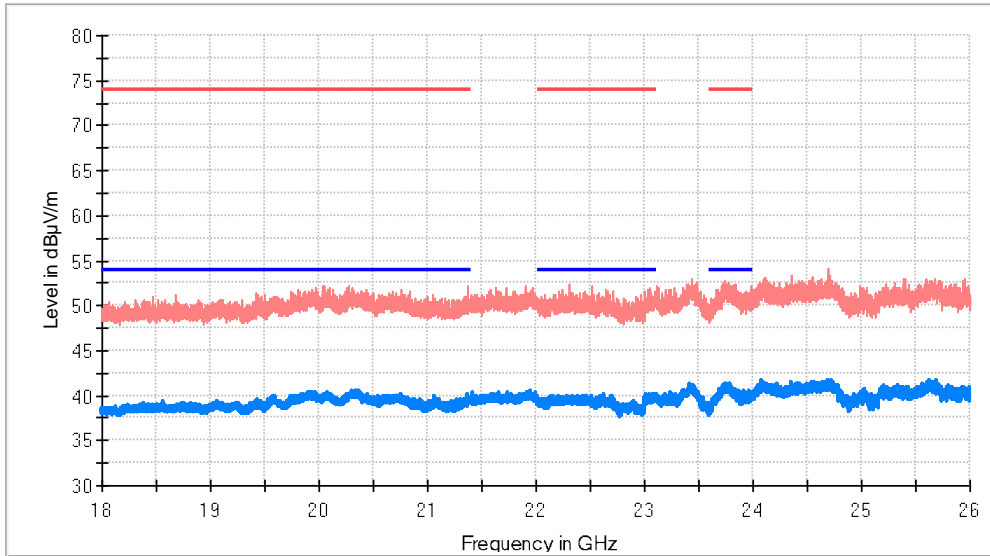
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit



**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2472 MHz).**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz

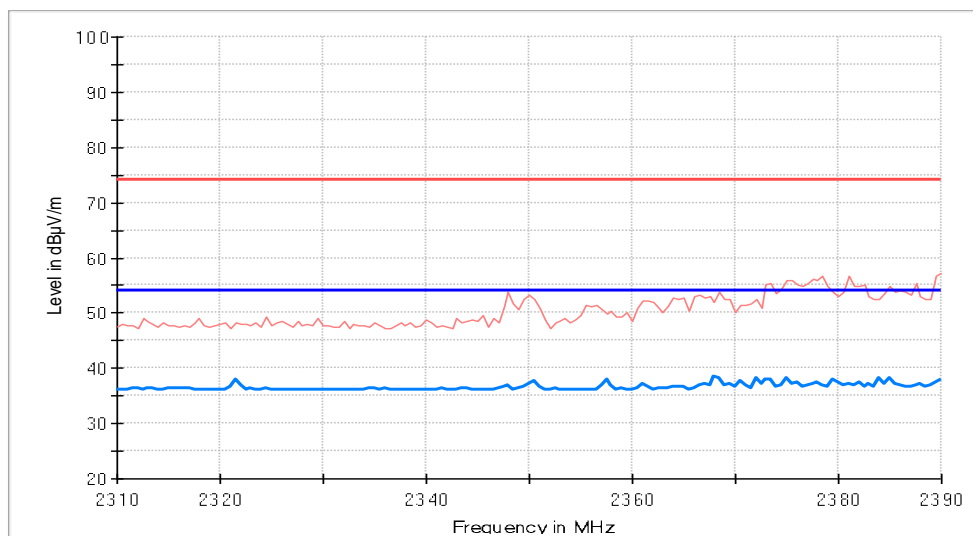


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**RESTRICTED BANDS**

**2.31 GHz – 2.39 GHz**

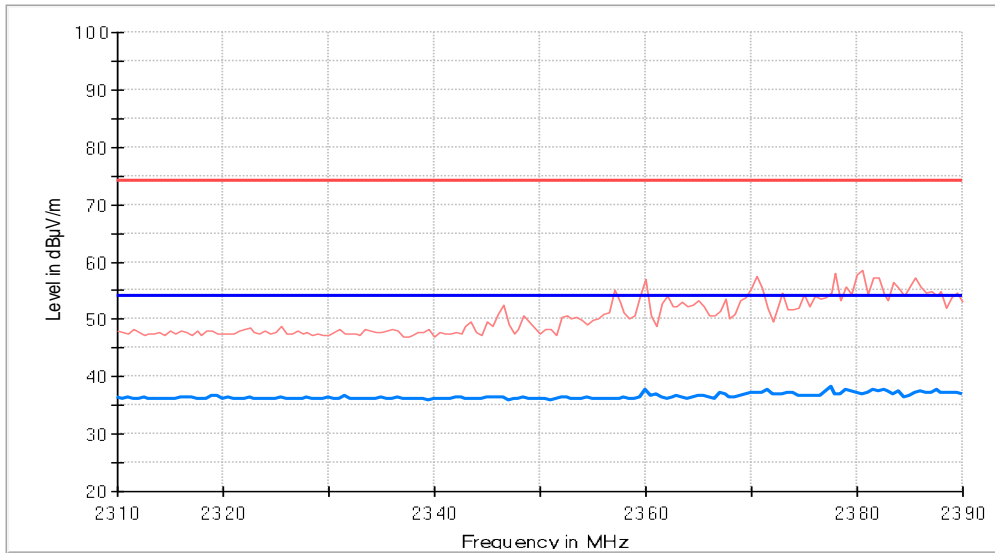
**CHANNEL: Lowest (2412 MHz)**



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

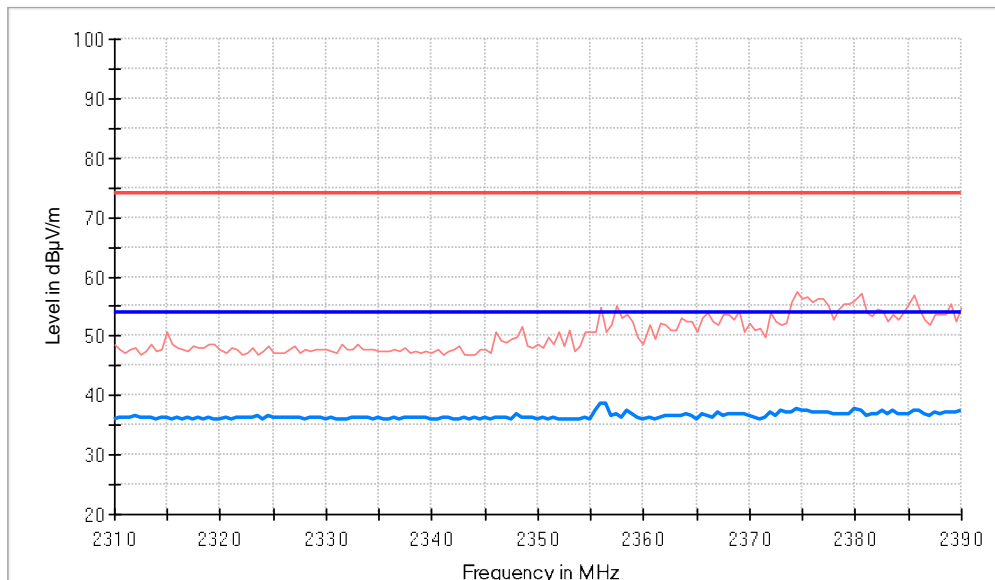
**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2437 MHz)**



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

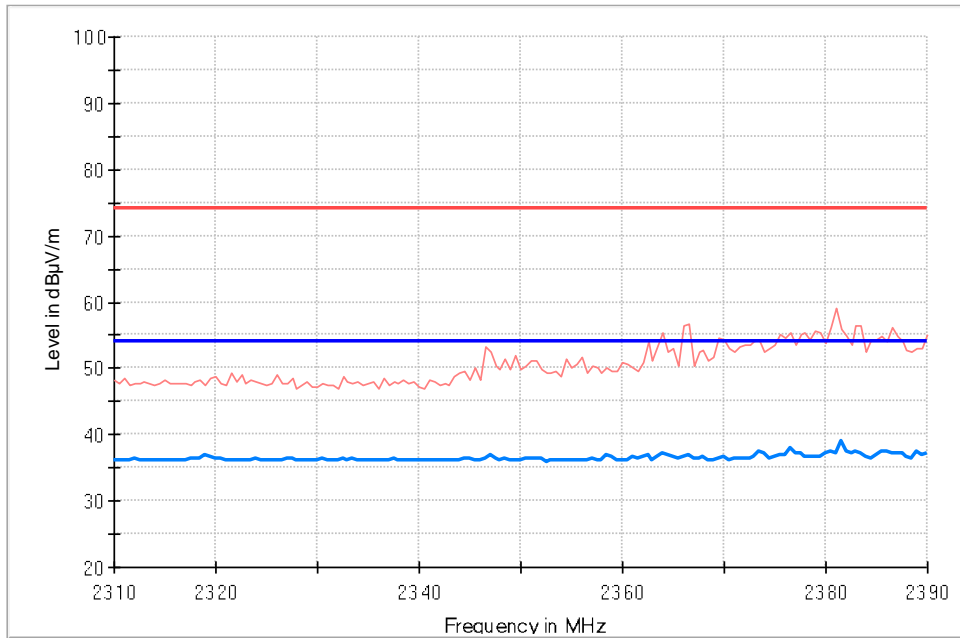
**CHANNEL: Middle (2442 MHz)**



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

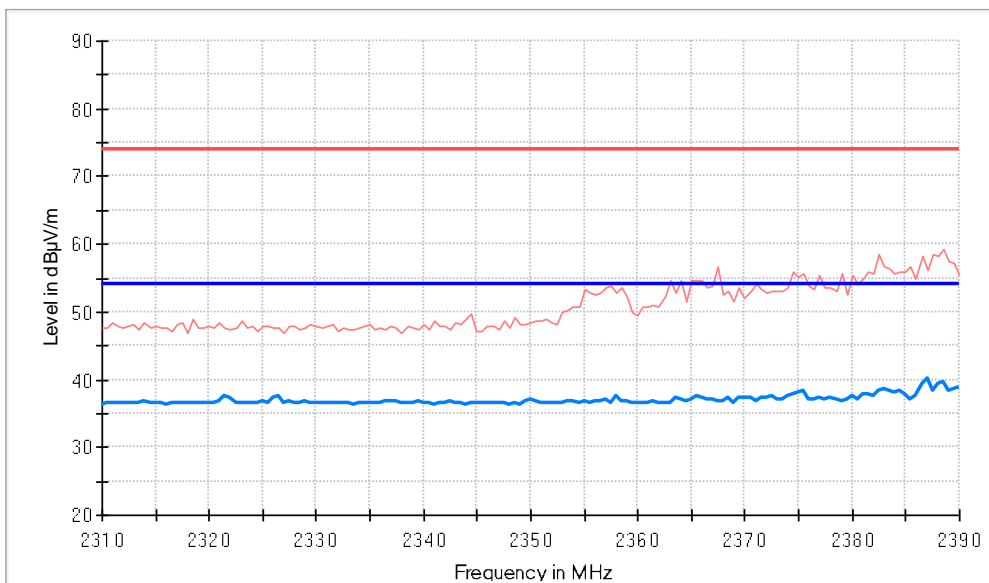
**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2462 MHz)**



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

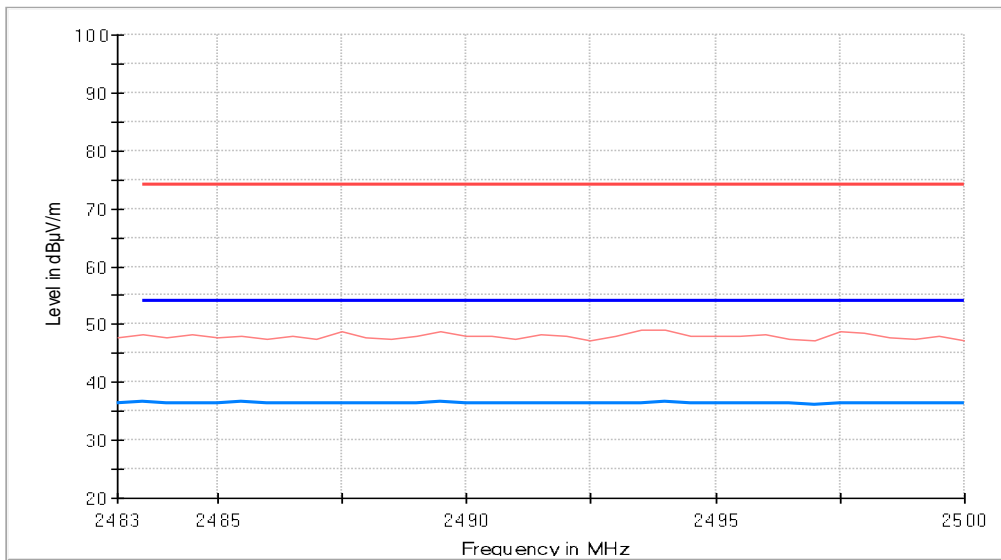
**CHANNEL: Highest (2472 MHz)**



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

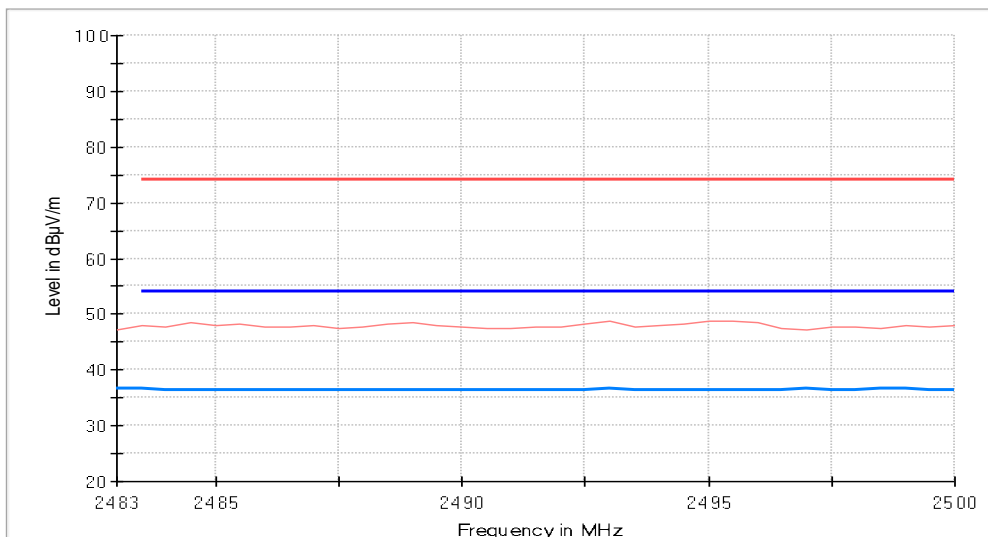
<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz</b>

**CHANNEL: Lowest (2412 MHz)**



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

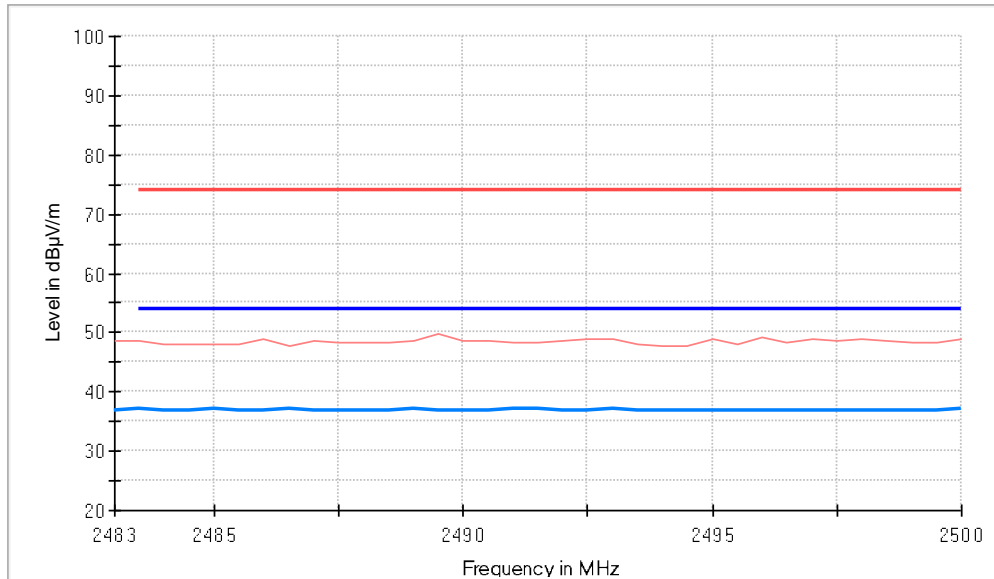
**CHANNEL: Middle (2437 MHz)**



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

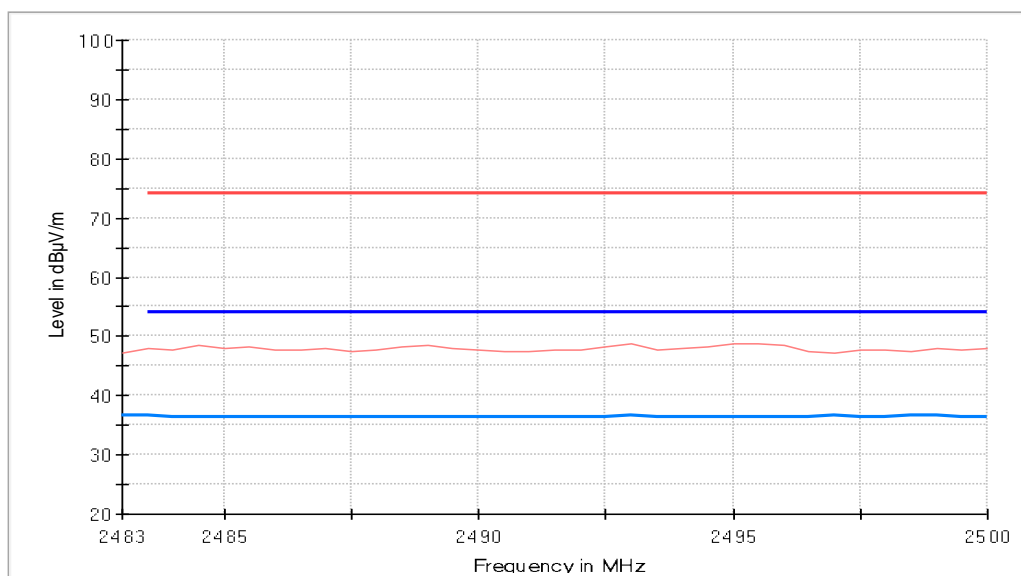
**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2442 MHz)**



- 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

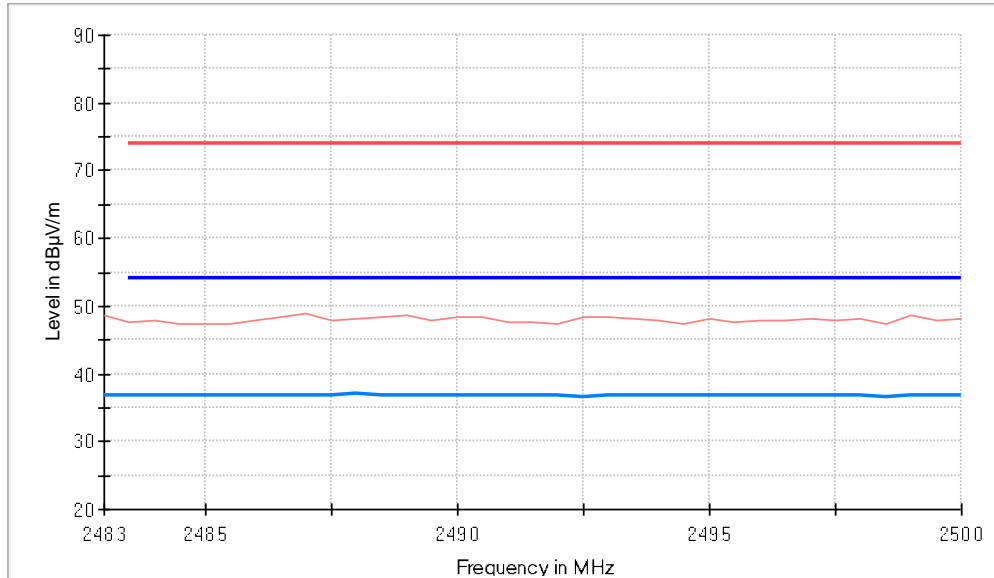
**CHANNEL: Highest (2462 MHz)**



- 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.)**

**CHANNEL: Highest (2472 MHz)**



- 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

<b>TESTED SAMPLES:</b>	S/02
<b>TESTED CONDITIONS MODES:</b>	TC#02 (n mode)
<b>TEST RESULTS:</b>	PASS

**Co-Location**

The test was performed with the equipment transmitting first with only the WiFi 2.4GHz (WLAN1 CORE1) and repeated with the 2.4 GHz BT-EDR (WLAN 0), and WiFi 5 GHz (WLAN0 CORE0) radios transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

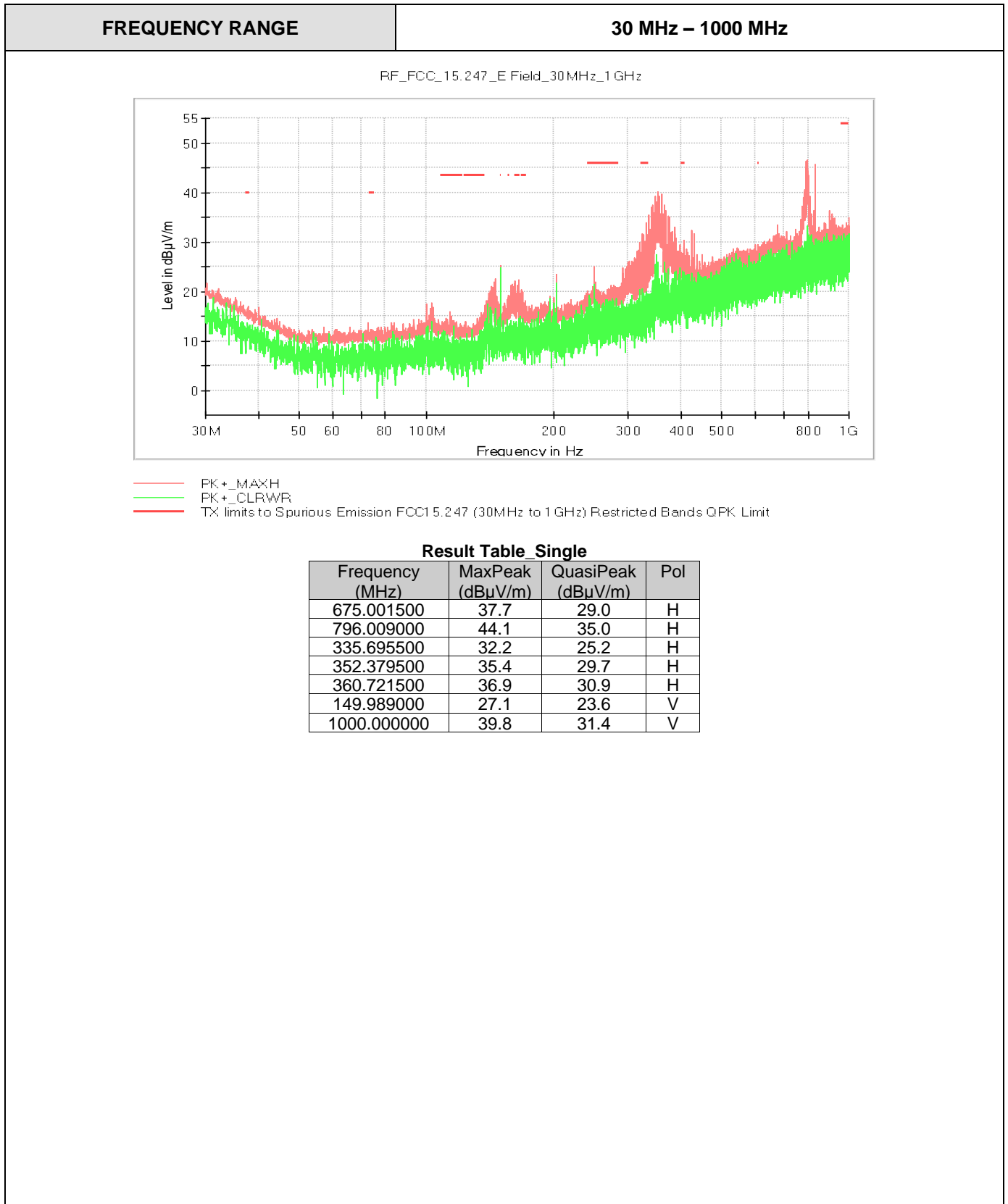
**Frequency range 30 MHz – 1000 MHz**

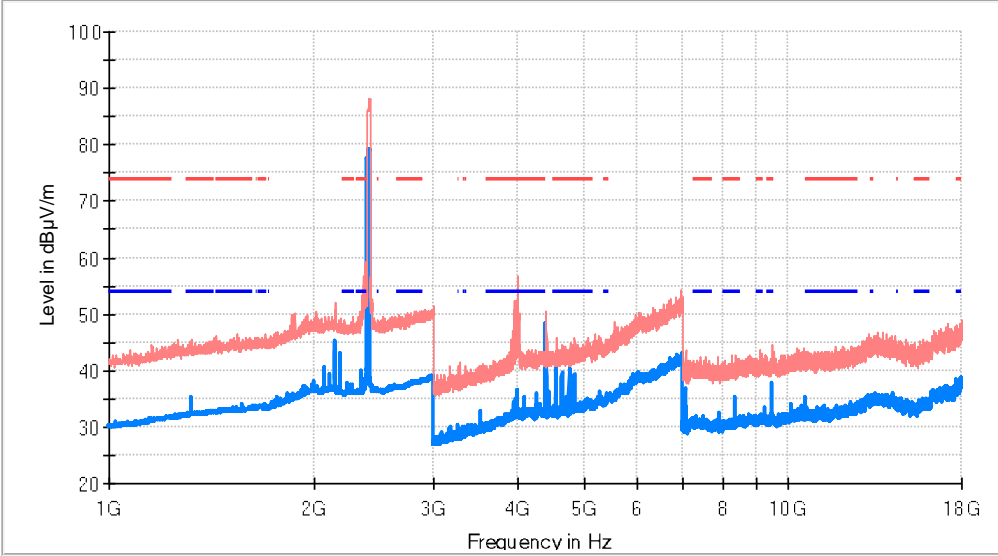
The spurious emissions below 1 GHz do not depend on the operating channel and mode selected in the EUT. See worst operation mode selected for this range (N mode).

**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).

The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.



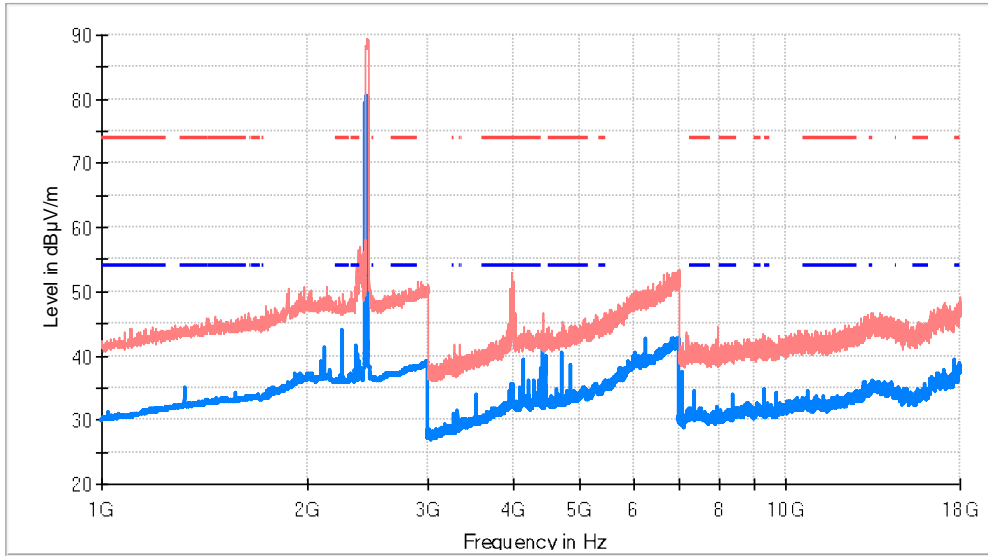
TEST RESULTS (Cont.)																																									
FREQUENCY RANGE	1 GHz – 18 GHz																																								
CHANNEL: Lowest (2412 MHz).																																									
<p style="text-align: center;">RF_FCC_15.247_E Field_1GHz_18GHz</p>  <p> <span style="color: blue;">—</span> AVG_MAXH  <span style="color: red;">—</span> PK+ MAXH  <span style="color: red;">- - -</span> TX limits to Spurious Emission FCC1 5.2.47 (1GHz to 26 GHz) Restricted Bands PK Limit  <span style="color: blue;">- - -</span> TX limits to Spurious Emission FCC1 5.2.47 (1GHz to 26 GHz) Restricted Bands AVG Limit         </p>																																									
<b>Maximizations</b>																																									
<table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>PK+ MAXH (dBµV/m)</th> <th>AVG_MAXH (dBµV/m)</th> <th>Pol</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>2417.500000</td> <td>88.16</td> <td>79.30</td> <td>H</td> <td>Fundamental</td> </tr> <tr> <td>4390.500000</td> <td>50.44</td> <td>48.43</td> <td>V</td> <td></td> </tr> <tr> <td>4551.500000</td> <td>45.76</td> <td>42.33</td> <td>V</td> <td></td> </tr> <tr> <td>4850.500000</td> <td>44.54</td> <td>39.41</td> <td>V</td> <td></td> </tr> <tr> <td>7055.000000</td> <td>43.53</td> <td>36.95</td> <td>V</td> <td></td> </tr> <tr> <td>9468.000000</td> <td>42.49</td> <td>37.77</td> <td>V</td> <td></td> </tr> <tr> <td>10583.000000</td> <td>41.92</td> <td>35.12</td> <td>H</td> <td></td> </tr> </tbody> </table>		Frequency (MHz)	PK+ MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments	2417.500000	88.16	79.30	H	Fundamental	4390.500000	50.44	48.43	V		4551.500000	45.76	42.33	V		4850.500000	44.54	39.41	V		7055.000000	43.53	36.95	V		9468.000000	42.49	37.77	V		10583.000000	41.92	35.12	H	
Frequency (MHz)	PK+ MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments																																					
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7055.000000	43.53	36.95	V																																						
9468.000000	42.49	37.77	V																																						
10583.000000	41.92	35.12	H																																						



**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2437 MHz).**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



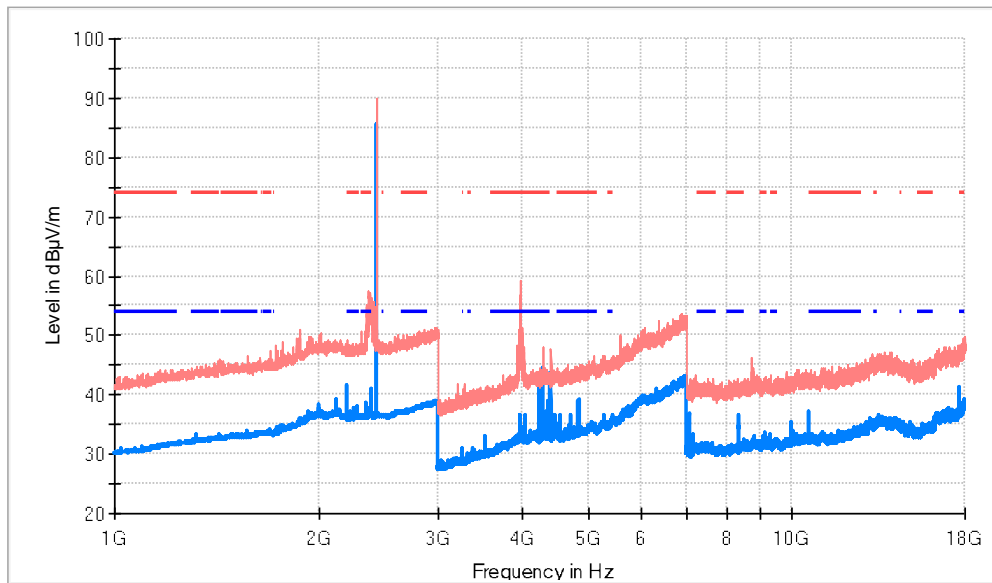
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC1 5.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2439.500000	89.20	80.59	H	Fundamental
4409.500000	45.28	42.11	V	
4850.000000	44.58	38.46	V	
6268.000000	48.57	42.52	V	
10815.500000	41.48	34.35	V	
17638.500000	46.12	39.25	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2442 MHz).**



- 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

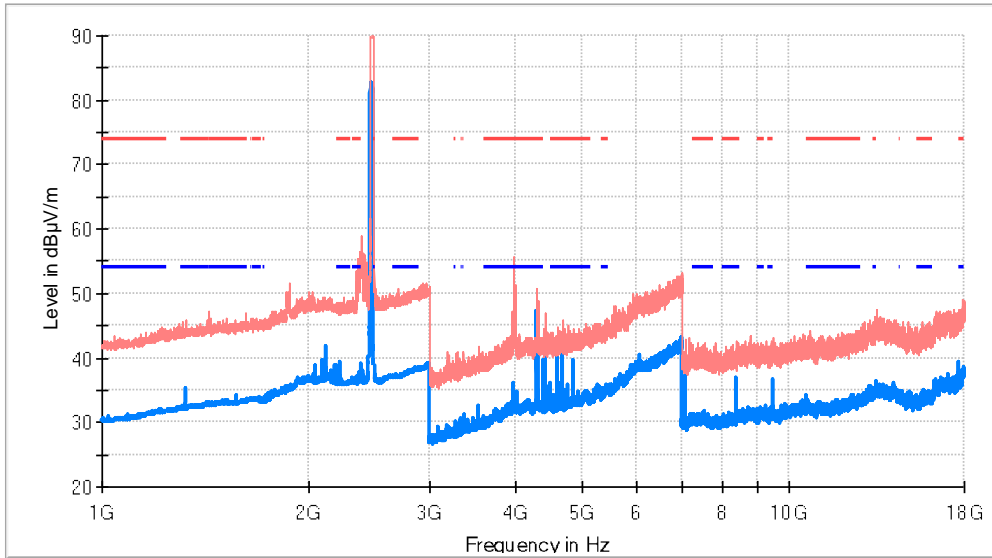
**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2442.000000	89.90	85.48	H	Fundamental
4283.000000	47.22	43.38	V	
4409.000000	46.33	42.82	V	
8379.000000	41.21	36.48	V	
10583.500000	43.01	37.22	V	
17639.000000	48.06	41.21	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2462 MHz)**

RF\_FCC\_15.247\_E Field\_1GHz\_18GHz



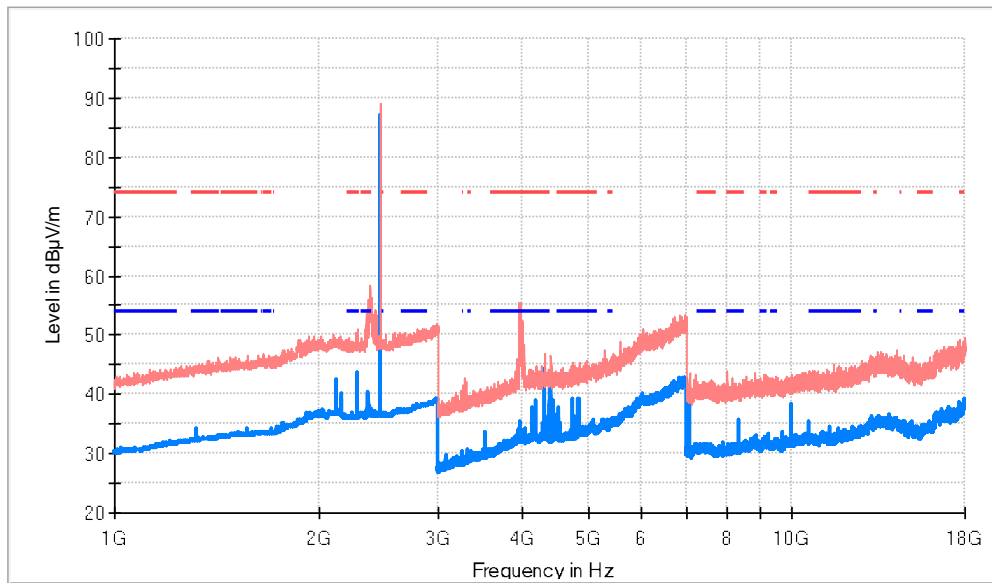
- AVG\_MAXH
- PK+\_MAXH
- - - TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- - - TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**Maximizations**

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2463.500000	91.67	82.76	H	Fundamental
4304.000000	49.73	47.33	V	
4700.500000	45.89	41.66	V	
4850.500000	43.89	39.73	V	
8378.000000	42.74	36.81	V	
17638.500000	45.87	39.33	V	

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2472 MHz).**



- 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

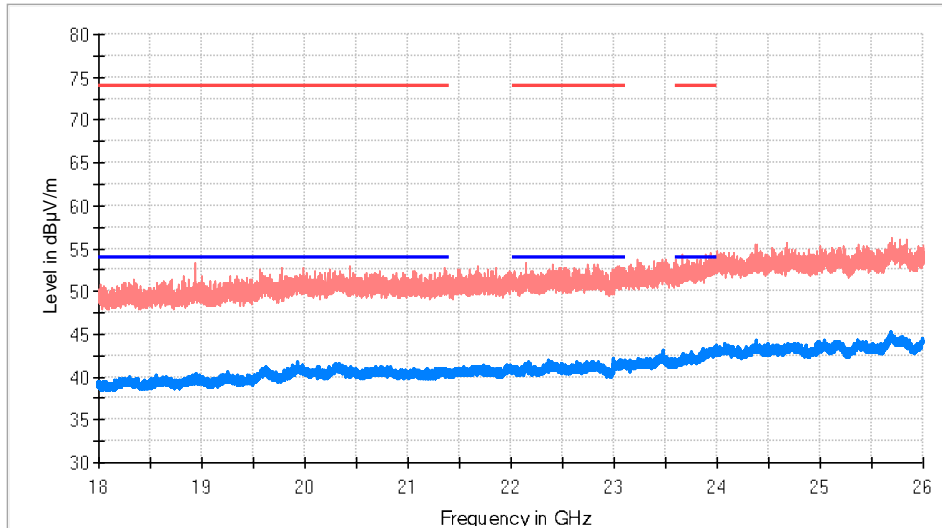
**Maximizations**

Frequency (MHz)	PK+ MAXH (dBuV/m)	AVG_MAXH (dBuV/m)	Pol	Comments
2472.000000	89.19	86.94	V	Fundamenta
4325.500000	46.82	44.26	V	
4409.500000	46.63	43.50	V	
4738.500000	44.66	39.24	V	
8377.500000	41.94	35.73	V	
9996.000000	42.10	38.38	V	

<b>TEST RESULTS (Cont.)</b>	
<b>FREQUENCY RANGE</b>	<b>18 GHz – 26 GHz</b>

**CHANNEL: Lowest (2412 MHz)**

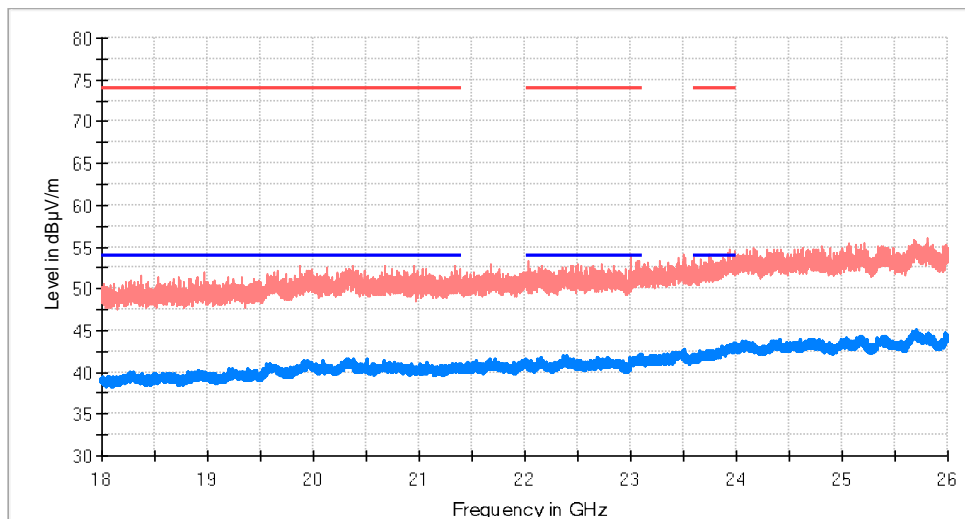
RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



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

**CHANNEL: Middle (2437 MHz)**

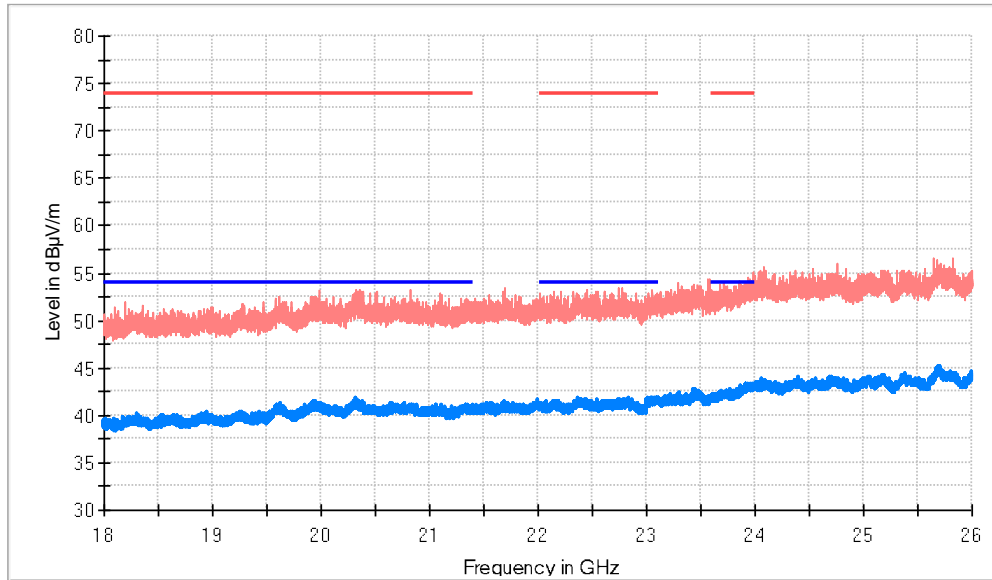
RF\_FCC\_15.247\_E Field\_18GHz\_26GHz



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

**TEST RESULTS (Cont.)**

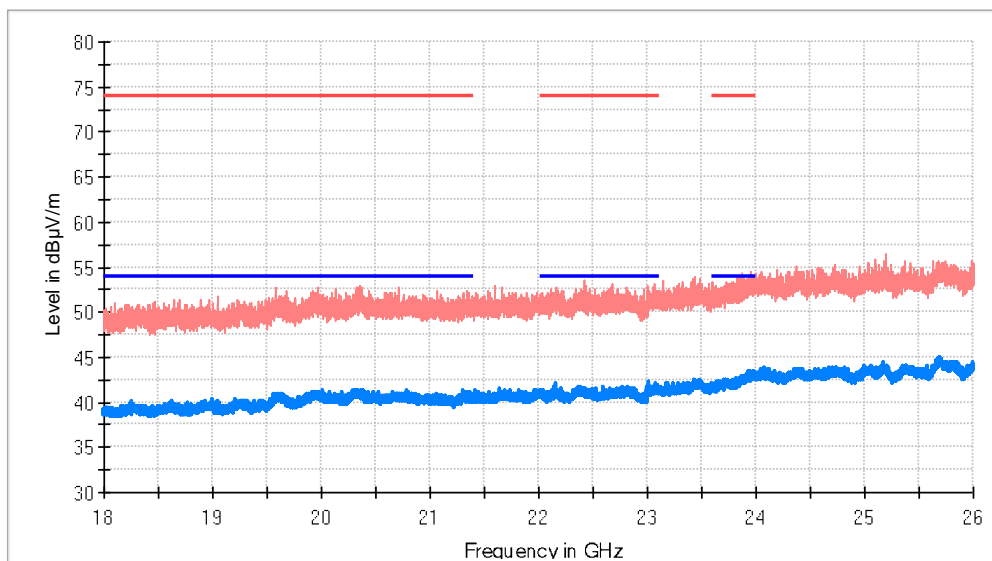
**CHANNEL: Middle (2442 MHz)**



- 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

**CHANNEL: Highest (2462 MHz)**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz

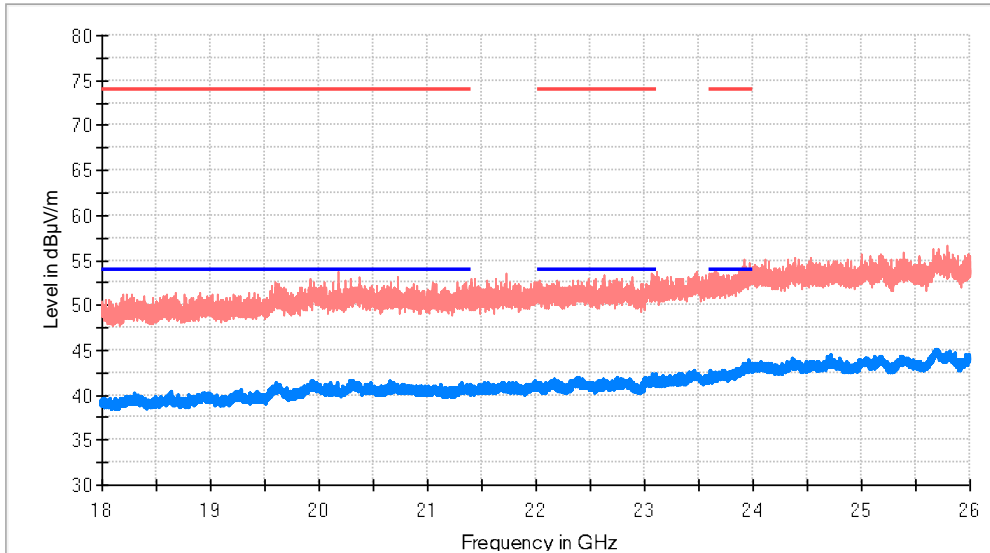


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2472 MHz)**

RF\_FCC\_15.247\_E Field\_18GHz\_26GHz

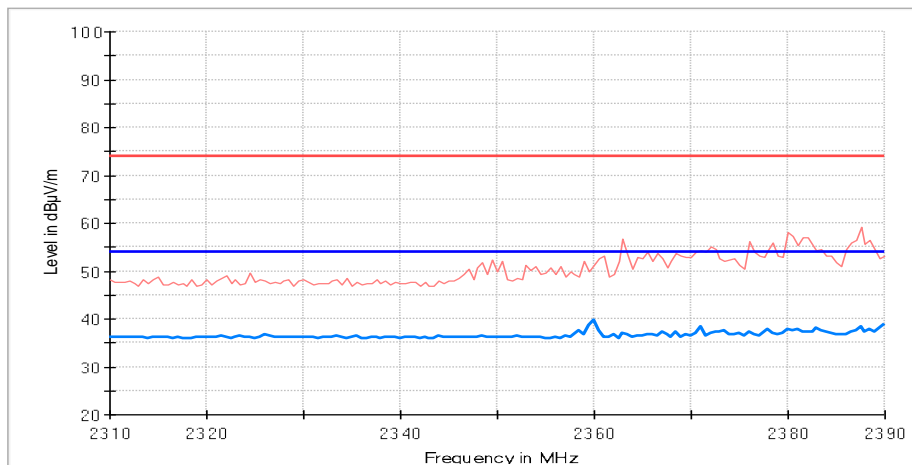


- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

**RESTRICTED BANDS**

**2.31 GHz – 2.39 GHz**

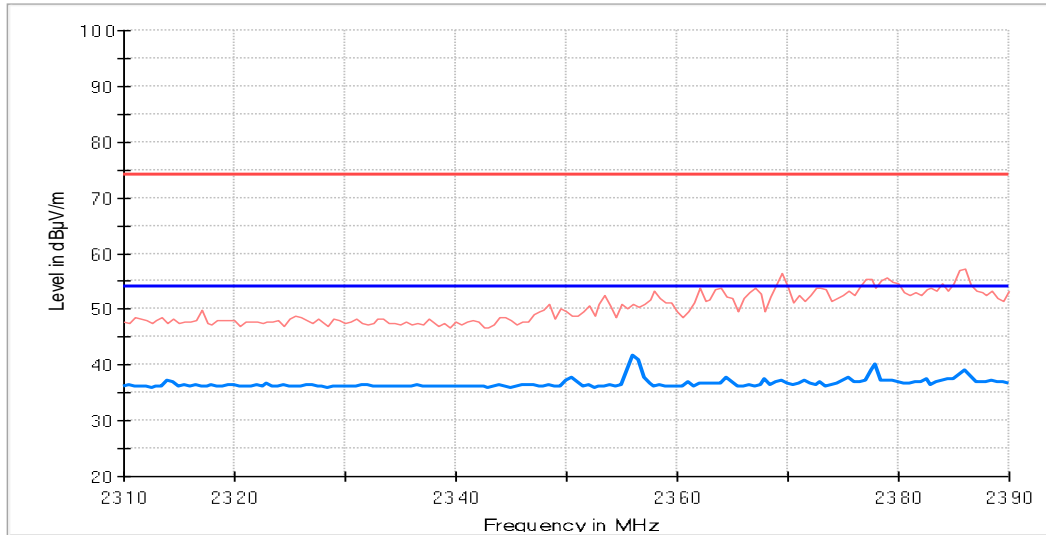
**CHANNEL: Lowest (2412 MHz)**



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit
- ▽ AVG\_MAXH(1)@RE0104\_HR\_1-18GHz

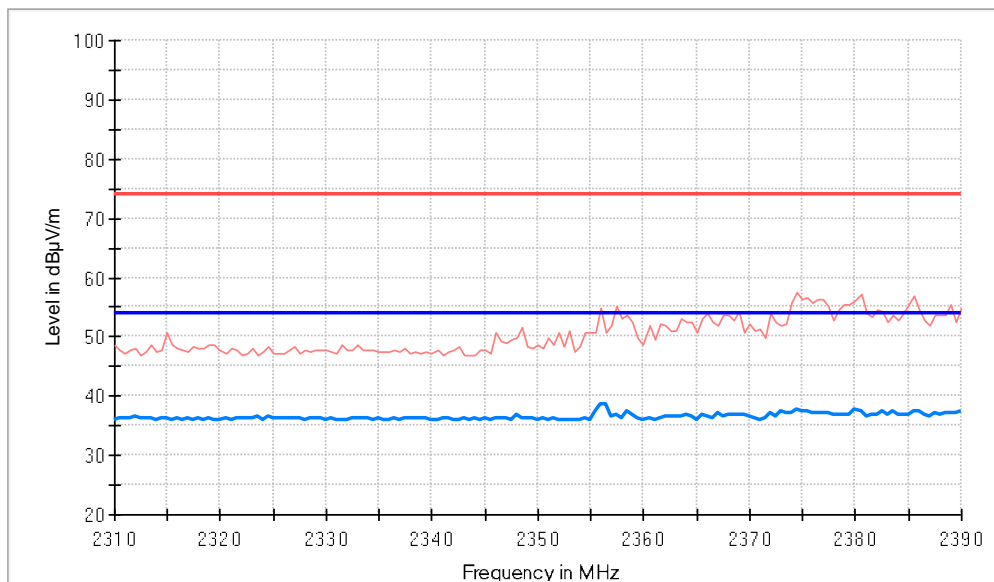
**TEST RESULTS (Cont.)**

**CHANNEL: Middle (2437 MHz)**



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

**CHANNEL: Middle (2442 MHz)**

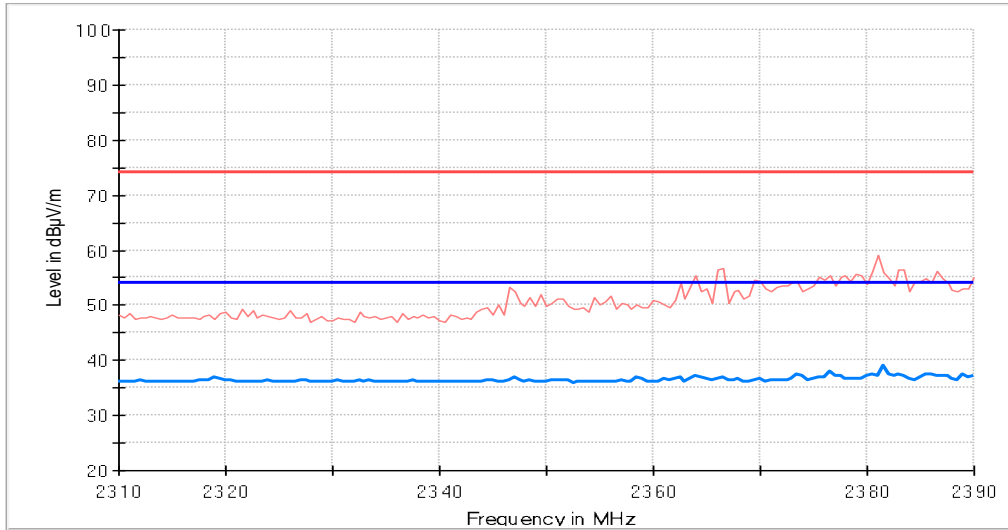


- AVG\_MAXH
- PK+ MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit



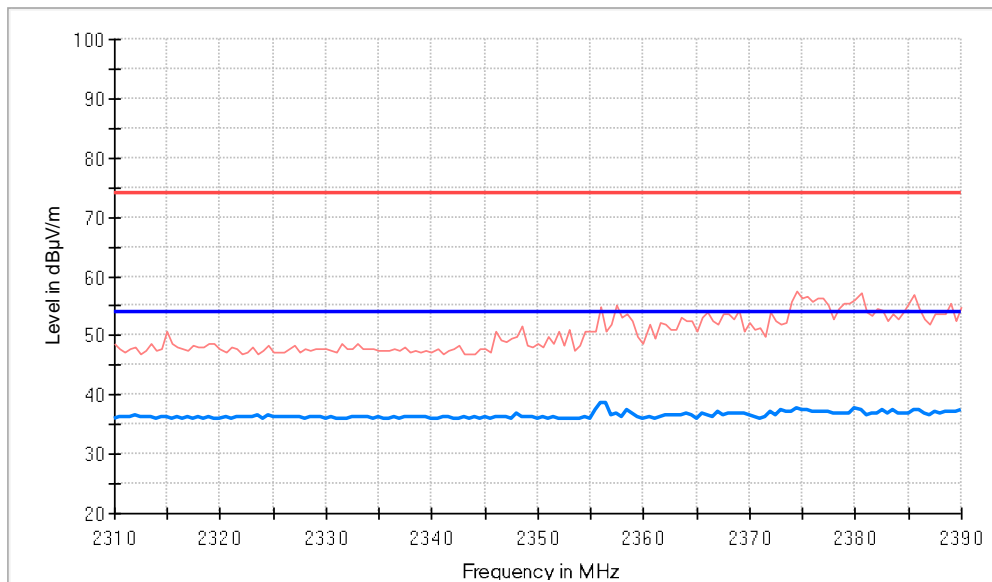
**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2462 MHz)**



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

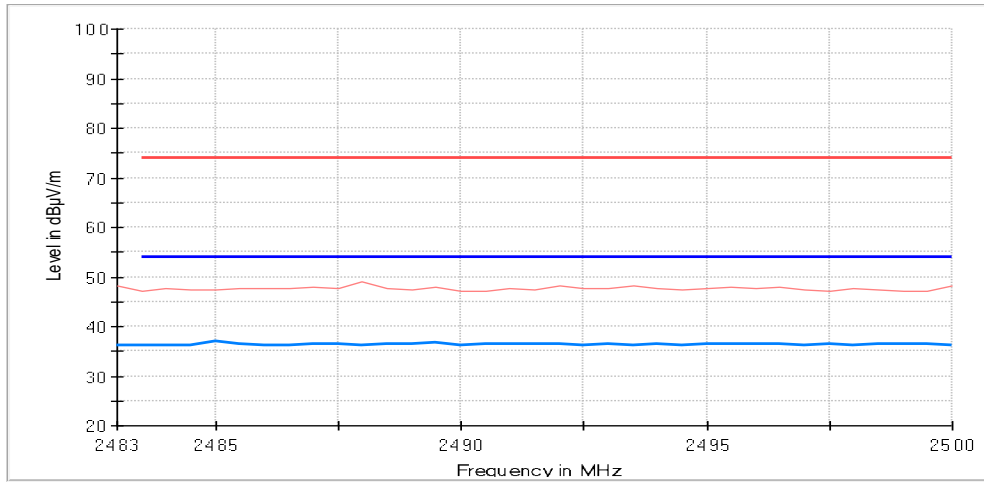
**CHANNEL: Highest (2472 MHz)**



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

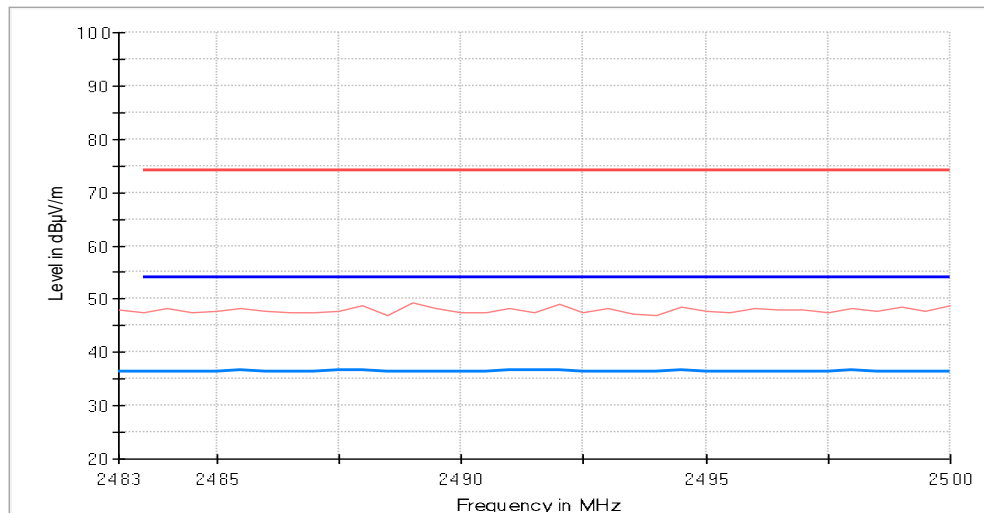
<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz</b>

**CHANNEL: Lowest (2412 MHz)**



- AVG\_MAXH
  - PK+\_MAXH
  - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
  - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit
- ▽ AVG\_MAXH(1)@RE0104\_HR\_1-18GHz

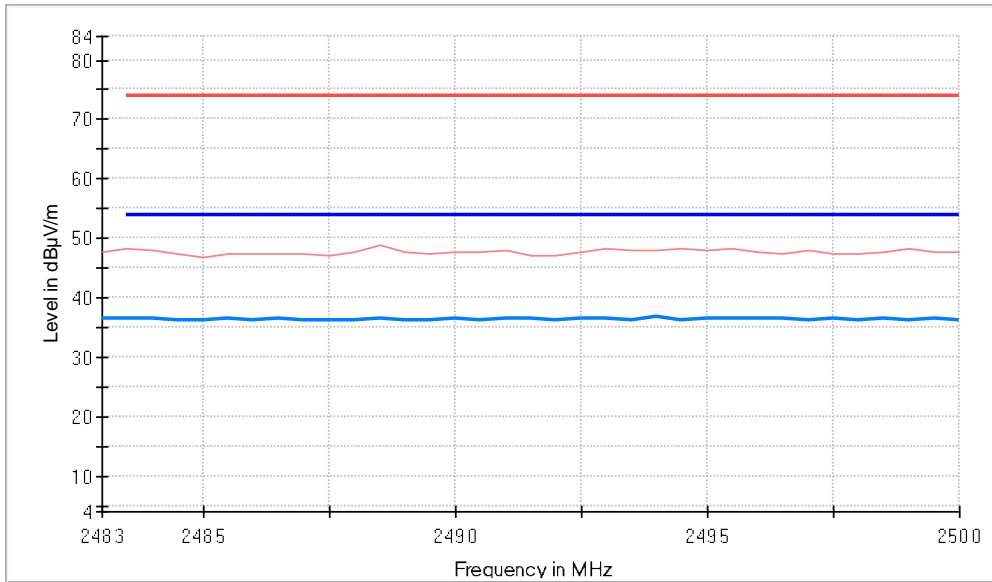
**CHANNEL: Middle (2437 MHz)**



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

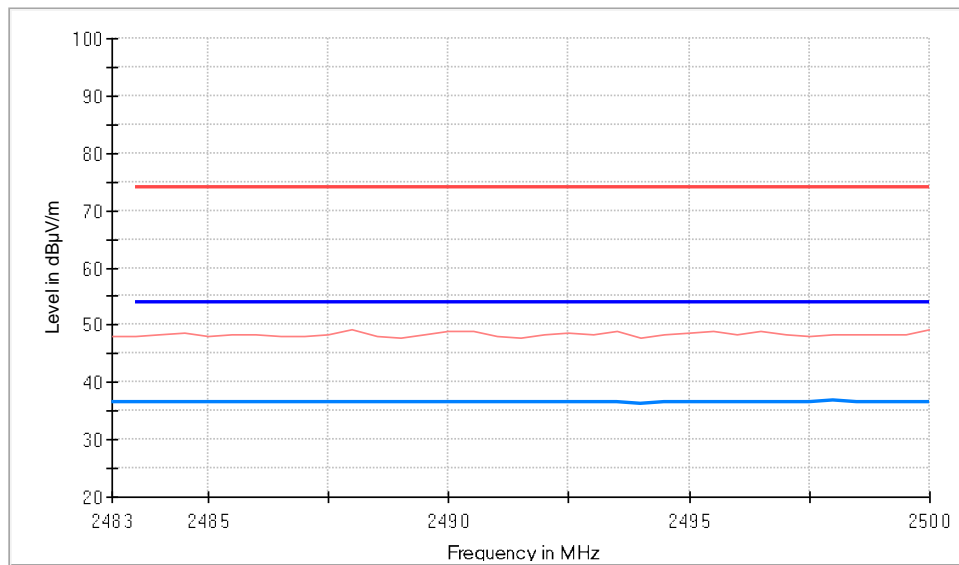
<b>TEST RESULTS (Cont.)</b>	
<b>RESTRICTED BANDS</b>	<b>2.483 GHz – 2.5 GHz</b>

**CHANNEL: Middle (2442 MHz)**



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 2.6 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 2.6 GHz) Restricted Bands AVG Limit

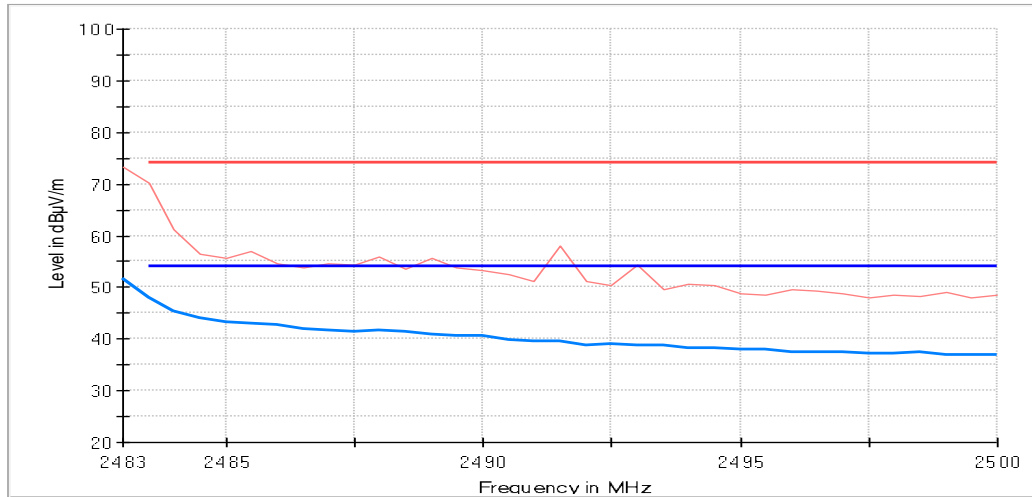
**CHANNEL: Highest (2462 MHz)**



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 2.6 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 2.6 GHz) Restricted Bands AVG Limit

**TEST RESULTS (Cont.)**

**CHANNEL: Highest (2472 MHz)**



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