



Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION
NUMBER: 2764.01

ISED LISTED REGISTRATION
NUMBER: 23595-1

Test report No:
2271ERM.001A1

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_BT
Other identification of the product	FCC ID: WUQ-MIB3HBT IC: 216R-MIB3HBT PN: 654.035.867.A HW Version: X31 SW Version: X450
Features	Bluetooth, FM, AM, 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  Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US Date: 2019.02.25 20:03:32 -05'00'
Date of issue	02-25-2019
Report template No	FDT08_21

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Competences and guarantees

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

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

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

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

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

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

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General conditions

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

Uncertainty

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

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

Automotive Head Unit to be installed in cars with the following features: Bluetooth, AM, FM, 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
2271.045	Car Radio	MIB3E_MQB_BT	04S PM6- 00124.07.18413E0041	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.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2271.044	Car Radio	MIB3E_MQB_BT	04S PM6- 00124.07.18413E007	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.

Test sample description

Ports..... :	Port name and description		Cable				
			Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	Not Provided Data			☐	☐	☐	
			☐	☐	☐		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					
☒	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..... :	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☒	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

Test Location	DEKRA Certification Inc.
Date (start)	12-26-2018
Date (finish)	02-25-2019

Document history

Report number	Date	Description
2271ERM.001	01-22-2018	First release
2271ERM.001A1	02-25-2019	Second release

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 2271ERM.001 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 41/Maximum Output Power Test	Added Test Method description	Requested by the reviewer

This modification test report cancels and replaces the test report 2271ERM.001

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, Koji Nishimoto and Nasir Khan.

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-247 (Bluetooth EDR)					
Report 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)	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
Supplementary information and remarks:					
1) Device supports 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)

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PRODUCT INFORMATION

The following information is provided by the client

Information	Description
Modulation	FHSS
Adaptive	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	-35 °C to +70 °C
Antenna type	Integral antenna
Antenna gain	+1.3 dBi
Nominal Voltage	
Supply Voltage	12 Vdc
Type of power source	DC voltage from battery
Equipment type	Bluetooth EDR
Geo-location capability	No

DESCRIPTION OF TEST CONDITIONS

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

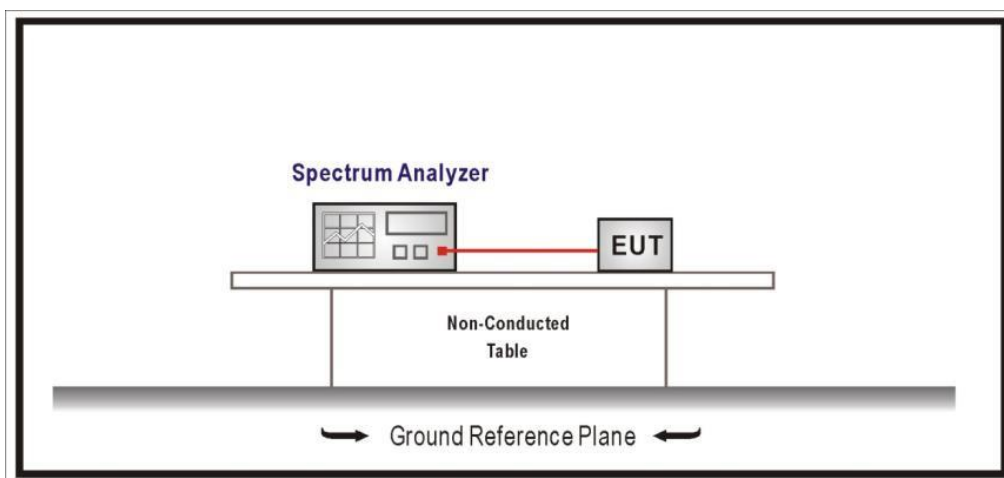
TEST A.1: 20DB EMISSION BANDWIDTH, OCCUPIED BANDWIDTH AND CARRIER FREQUENCY SEPARATION

LIMITS:	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:



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

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20dB Bandwidth (MHz)	1.149	1.149	1.149
Occupied bandwidth (kHz)	900	900	890
Measurement uncertainty (kHz)	<± 1.80		

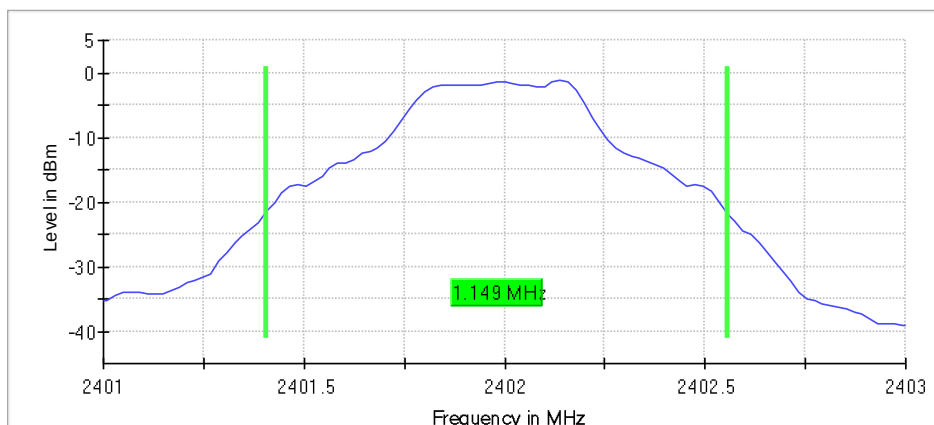
Measurement Set up

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	11 / max. 150	12 / max.	7 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.03 dB	0.01 dB	0.04 dB

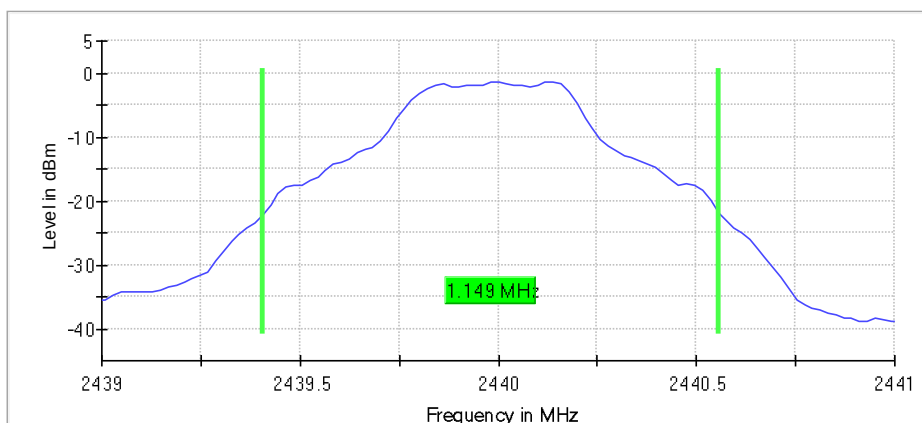
TEST RESULTS (Cont.):

20 dB BANDWIDTH

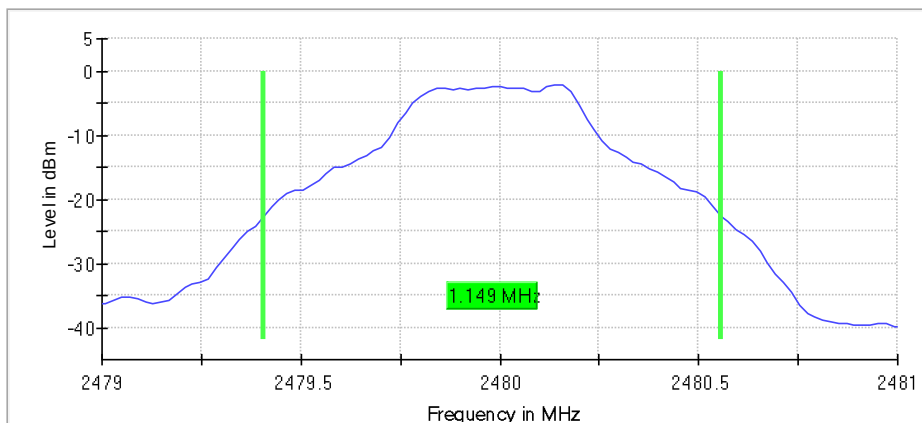
Lowest Channel



Middle Channel



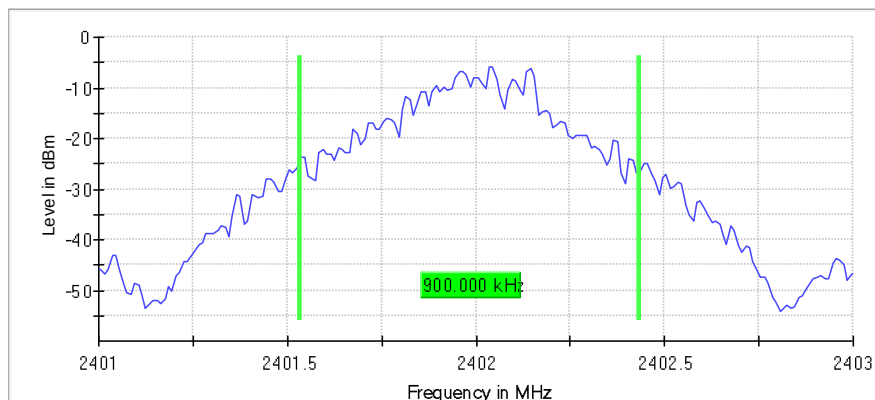
Highest Channel



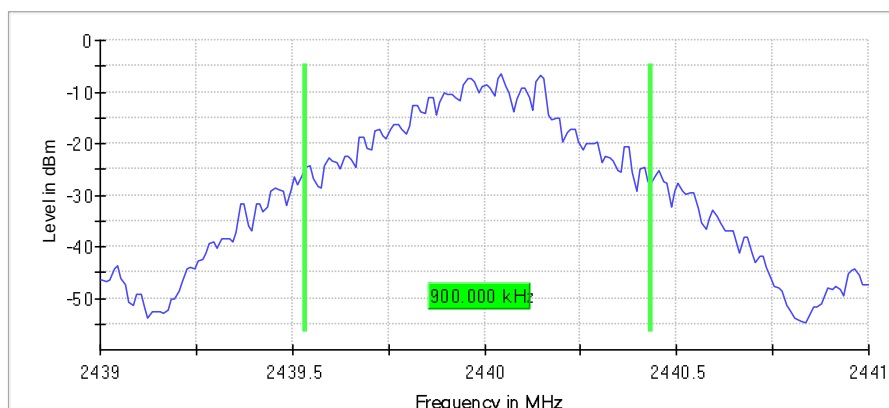
TEST RESULTS (Cont.):

OCCUPIED BANDWIDTH

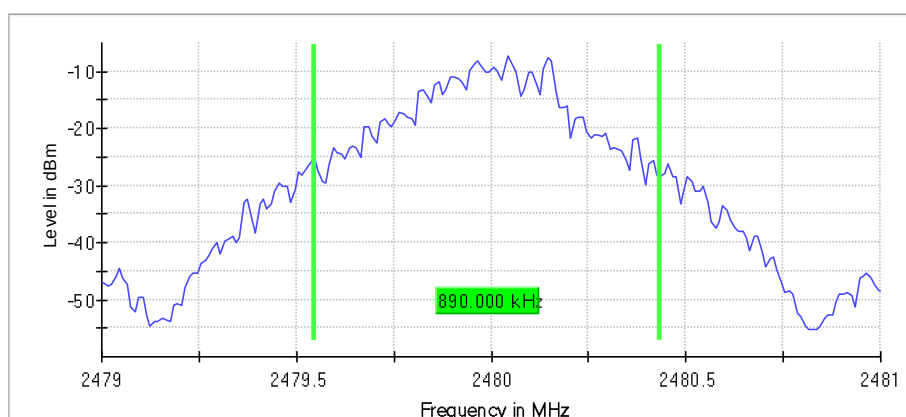
Lowest Channel



Middle Channel

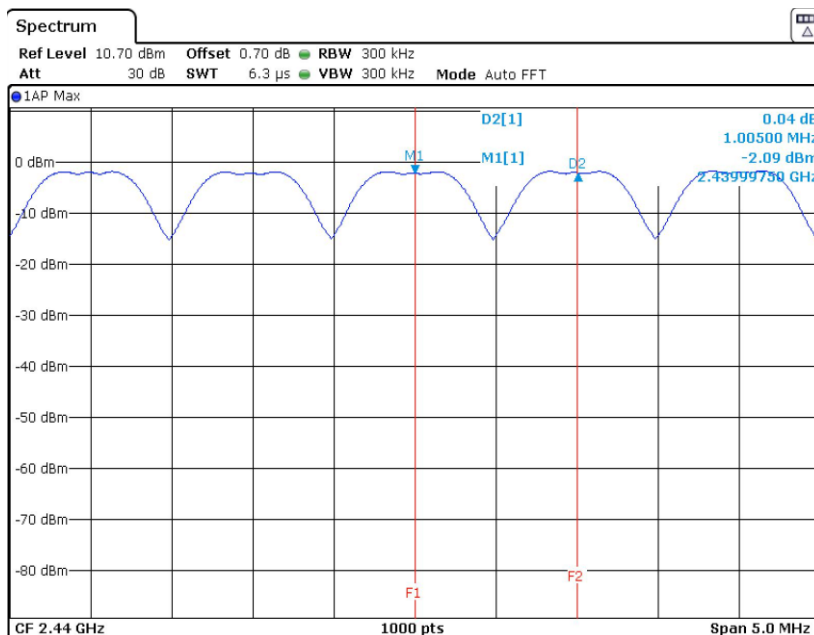


Highest Channel



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.

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

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20dB bandwidth (MHz)	1.446	1.446	1.465
Occupied bandwidth (MHz)	1.21	1.21	1.21
Measurement uncertainty (kHz)	<± 1.80		

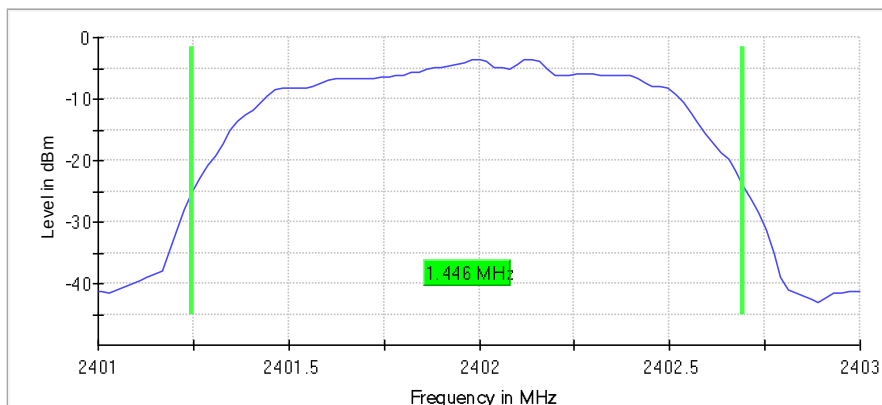
Measurement Set up

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	2.00 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	10 / max. 150	20 / max. 150	10 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.05 dB	0.06 dB	0.18 dB

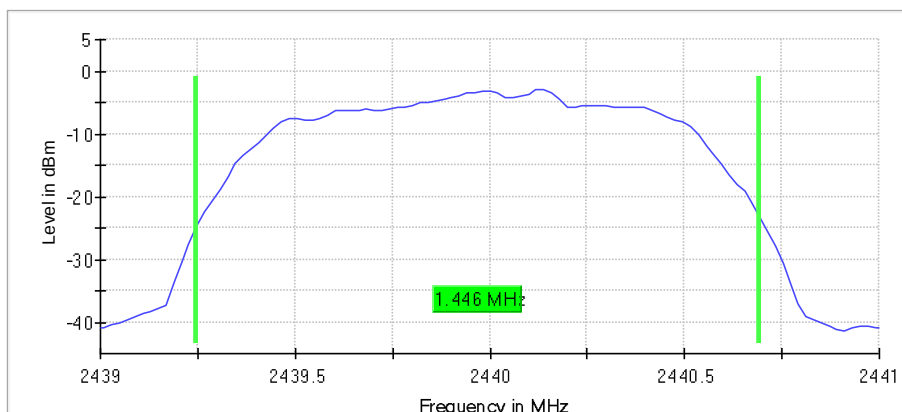
TEST RESULTS (Cont.):

20 dB BANDWIDTH

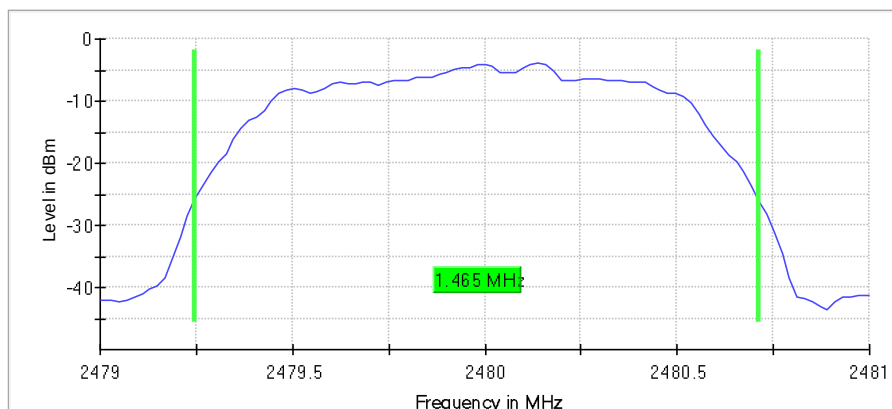
Lowest Channel



Middle Channel



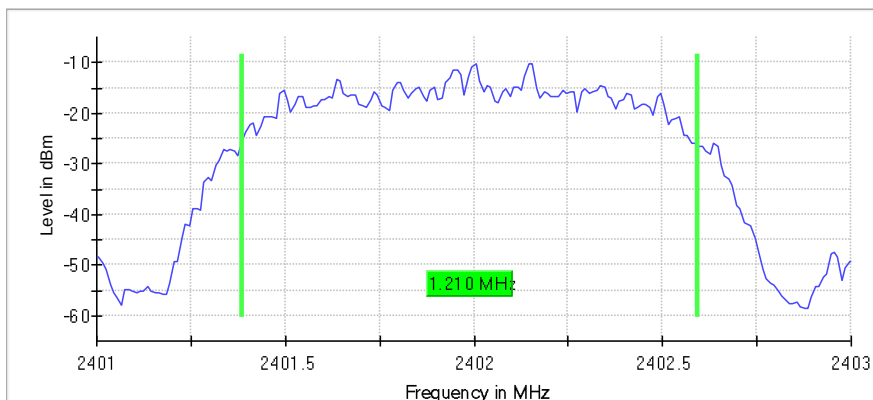
Highest Channel



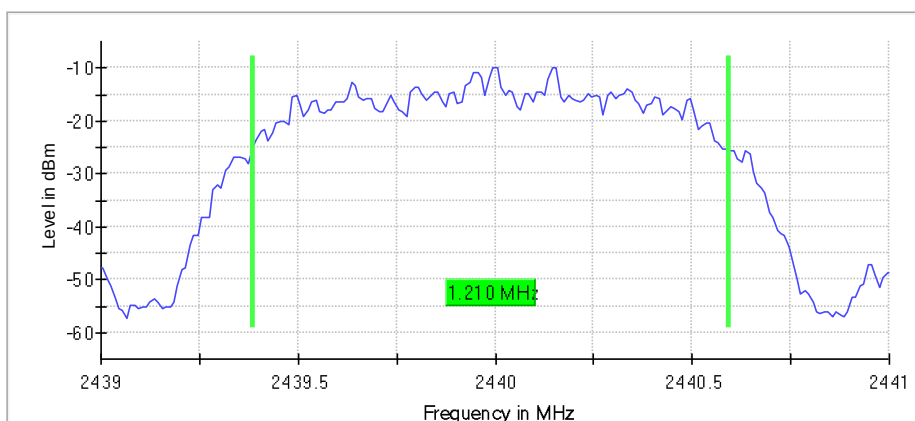
TEST RESULTS (Cont.):

OCCUPIED BANDWIDTH

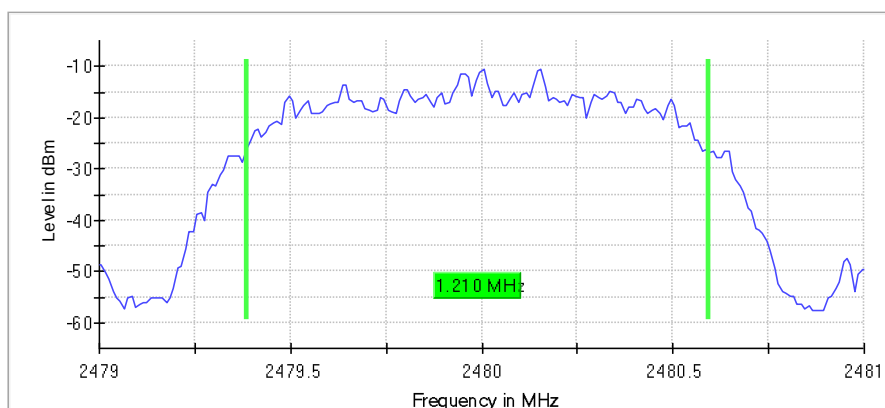
Lowest Channel



Middle Channel

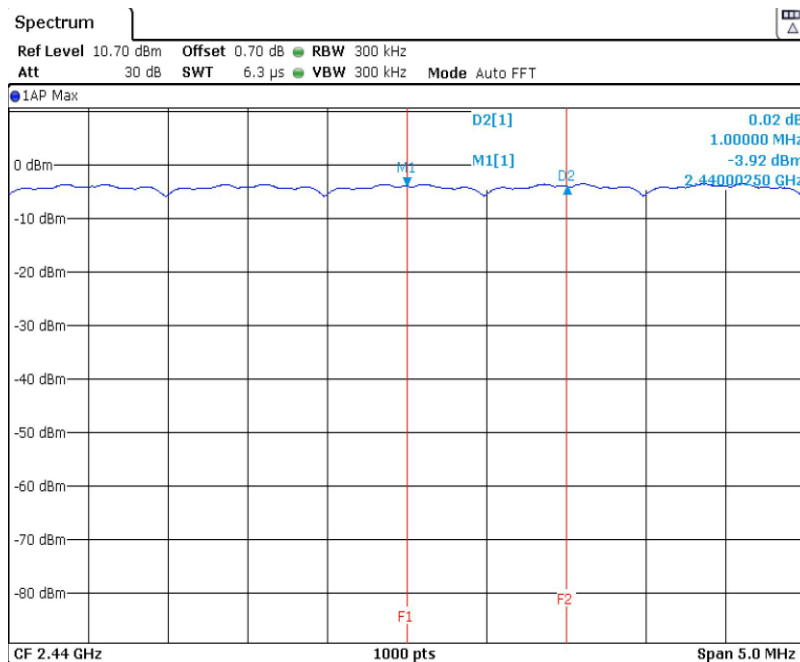


Highest Channel



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.

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

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20db bandwidth (MHz)	1.446	1.426	1.426
Occupied bandwidth (MHz)	1.212	1.212	1.212
Measurement uncertainty (kHz)	<± 1.80		

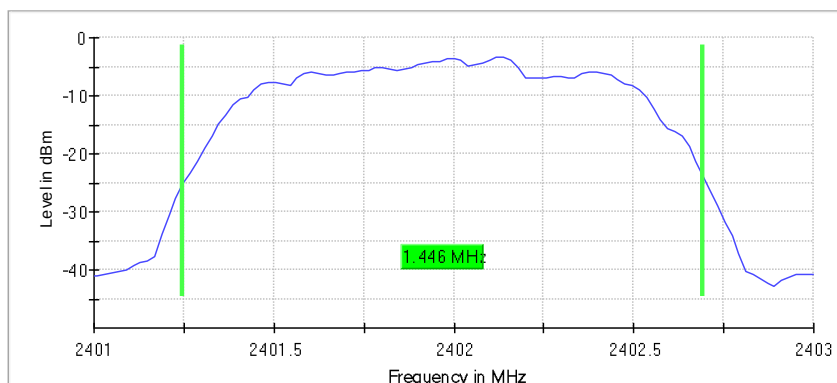
Measurement Set up

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	2.00 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	12 / max. 150	10 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.05 dB	0.03 dB	0.05 dB

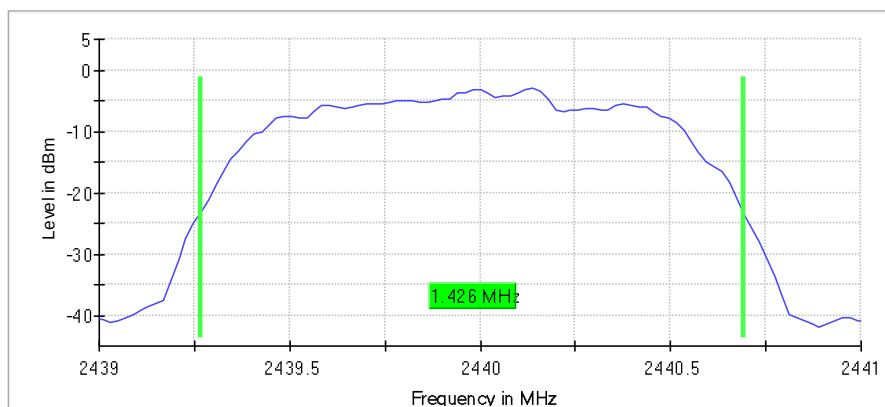
TEST RESULTS (Cont.):

20dB BANDWIDTH

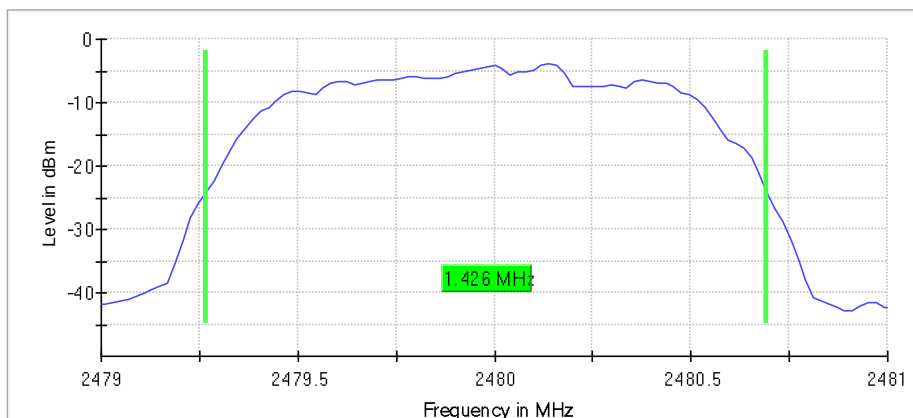
Lowest Channel



Middle Channel



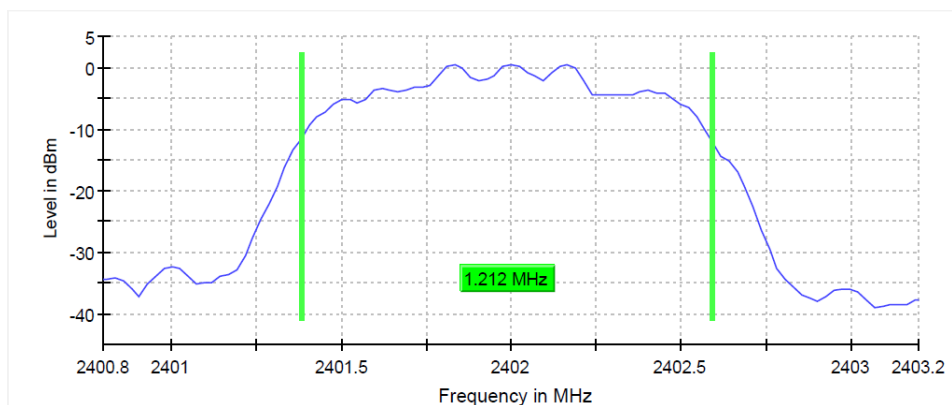
Highest Channel



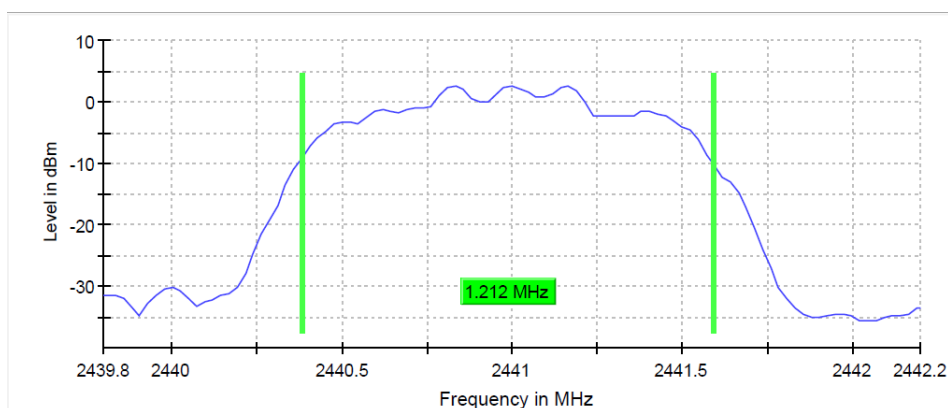
TEST RESULTS (Cont.)

OCCUPIED BANDWIDTH

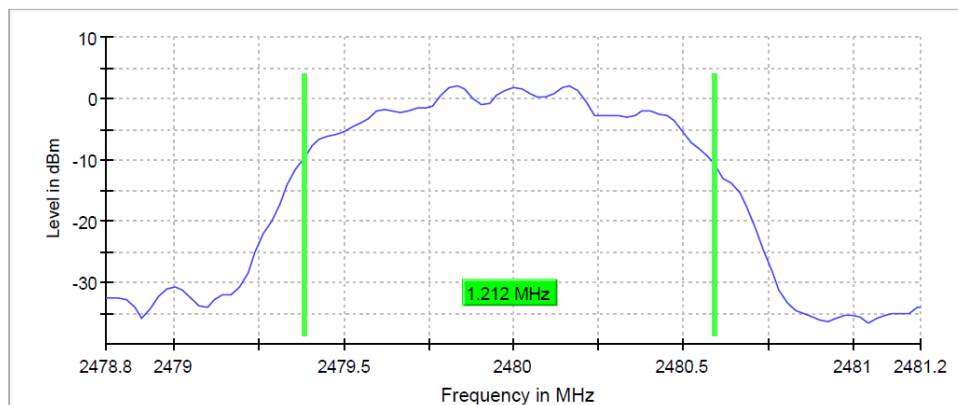
Lowest Channel



Middle Channel

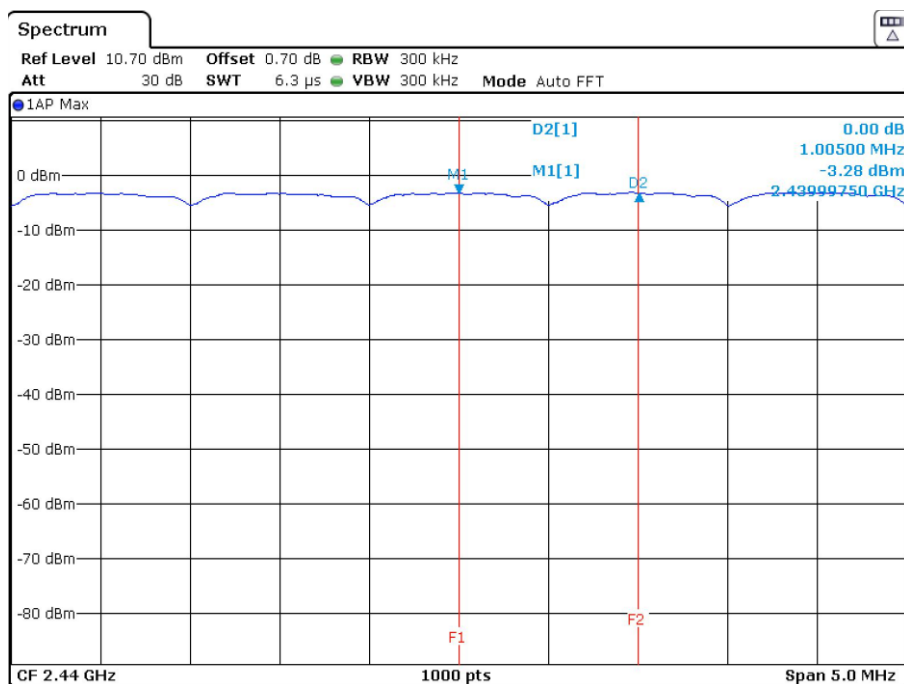


Highest Channel



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.

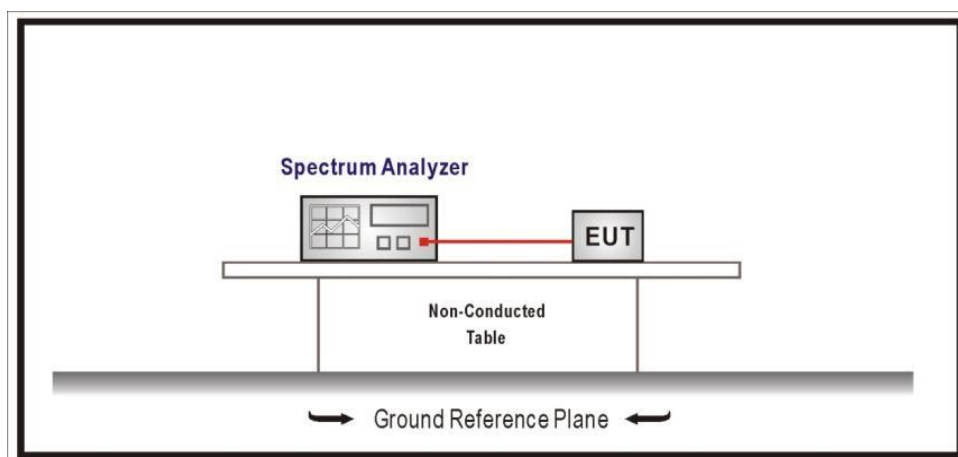
TEST A.2: NUMBER OF HOPPING CHANNELS

LIMITS:	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)

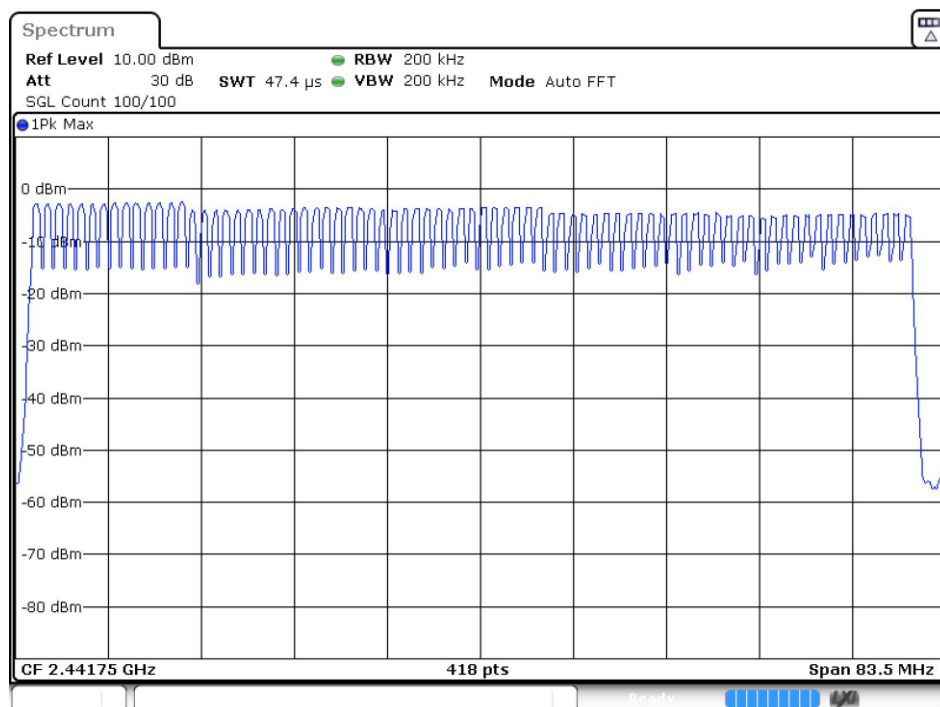
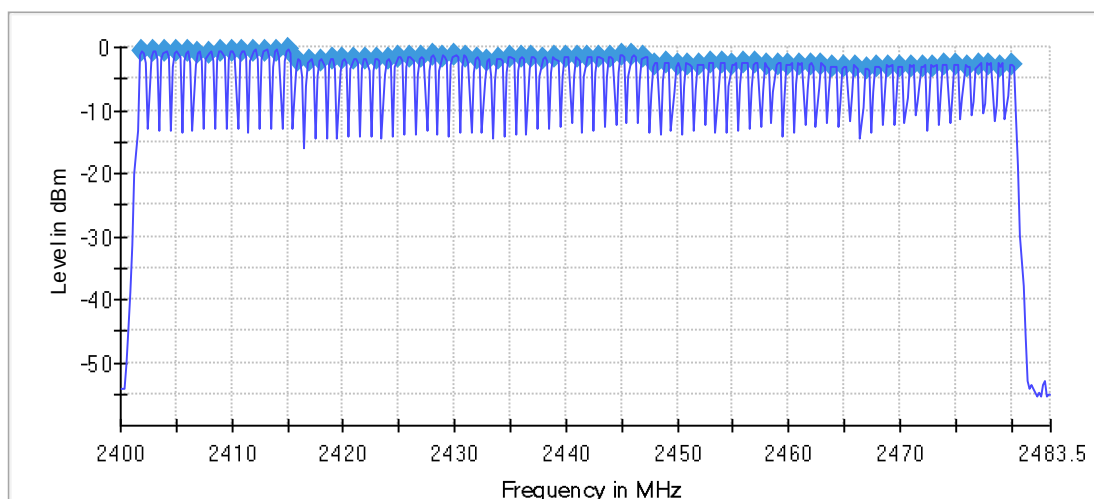
LIMITS

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

TEST SETUP:



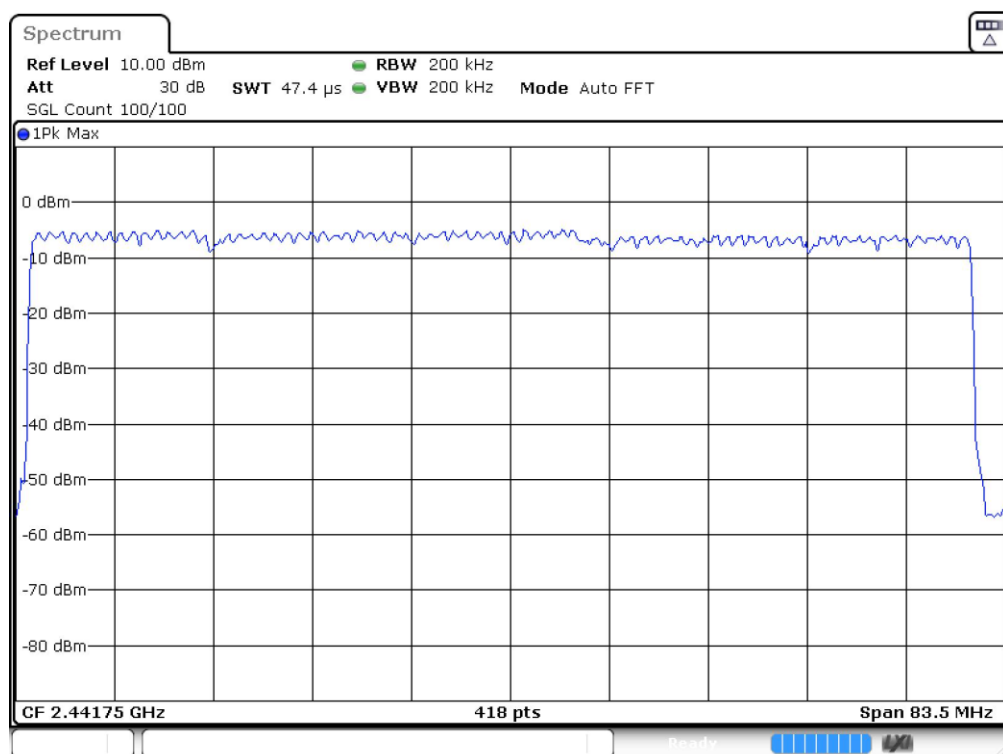
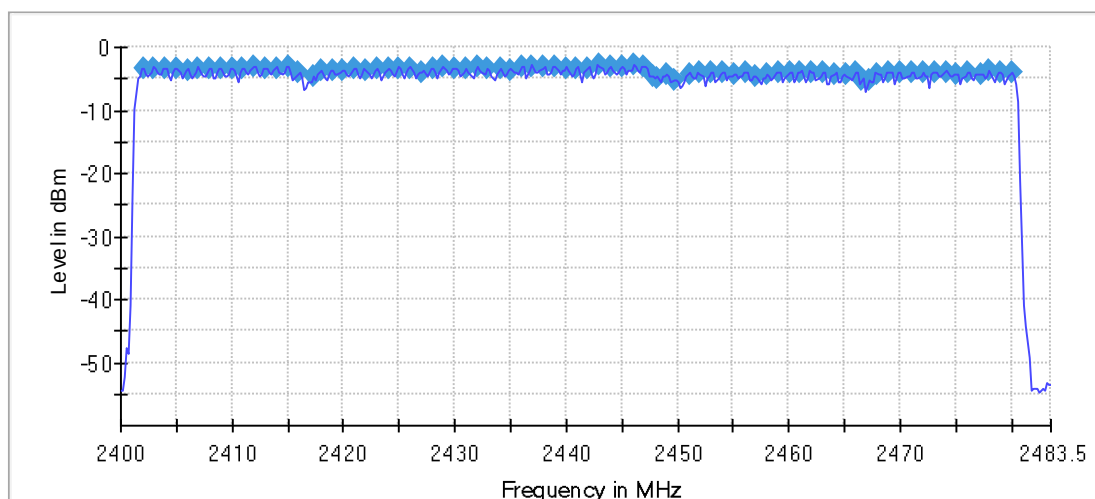
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS



Date: 21.DEC.2018 13:13:18

Number of Hopping Frequencies: 79

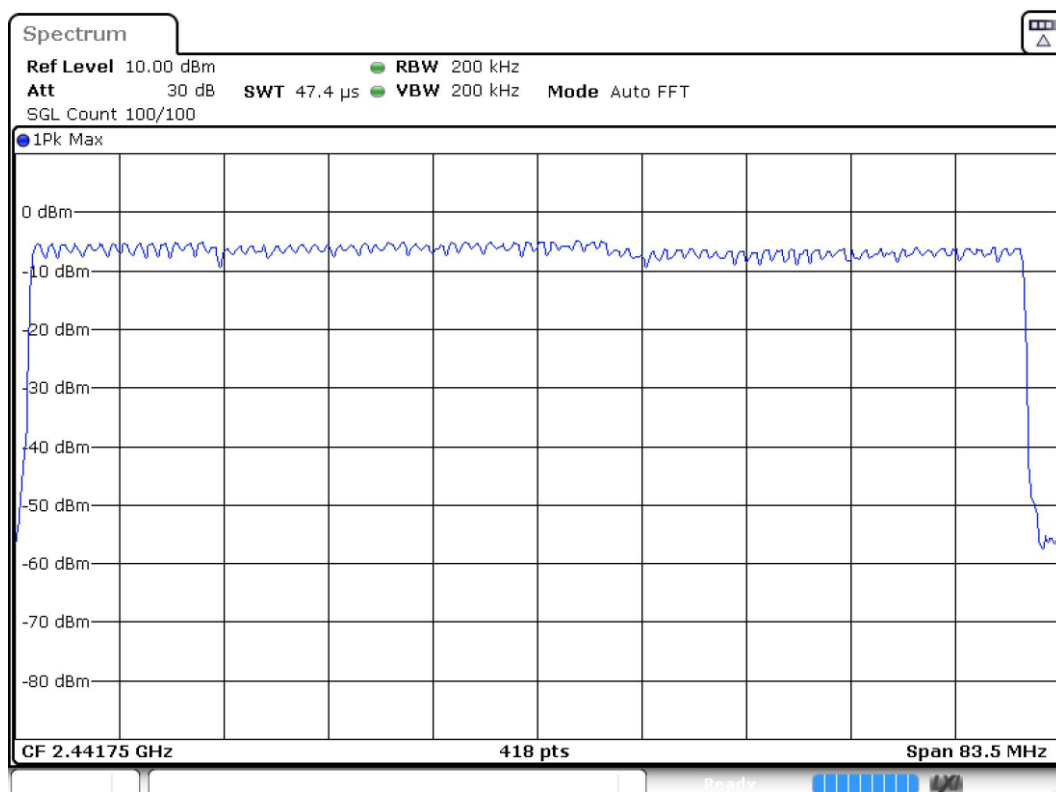
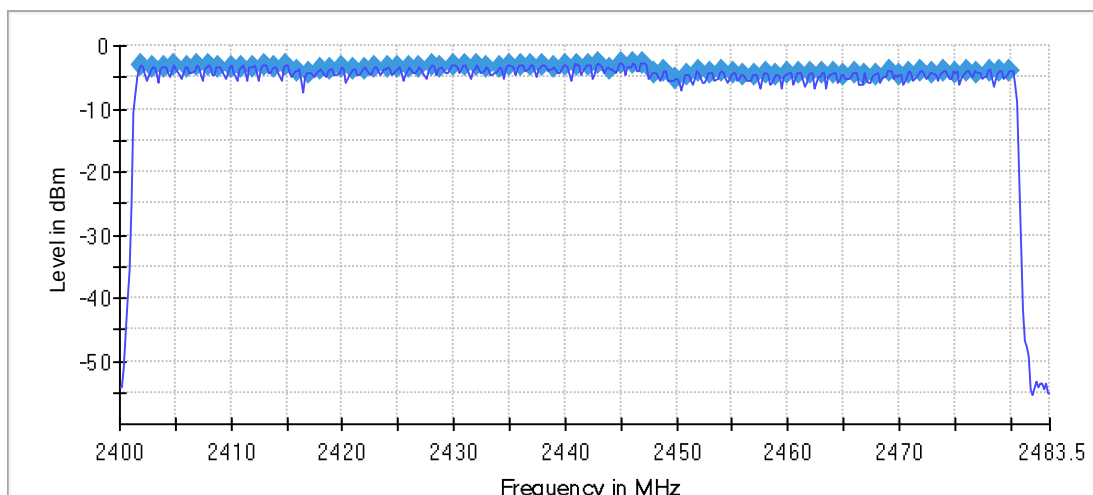
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02
TEST RESULTS:	PASS



Date: 21.DEC.2018 15:47:45

Number of Hopping Frequencies: 79

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



Date: 21.DEC.2018 17:03:16

Number of Hopping Frequencies: 79

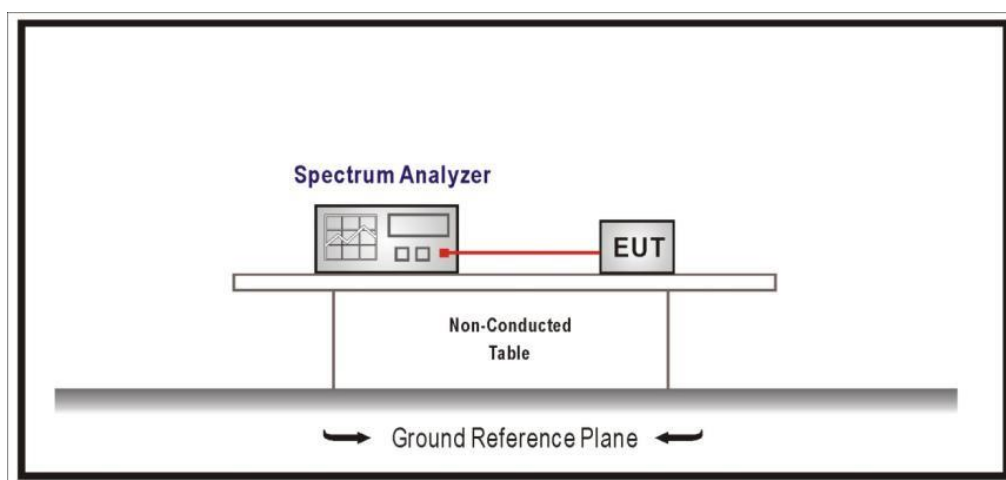
TEST A.3: TIME OF OCCUPANCY (DWELL TIME)

LIMITS:	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:

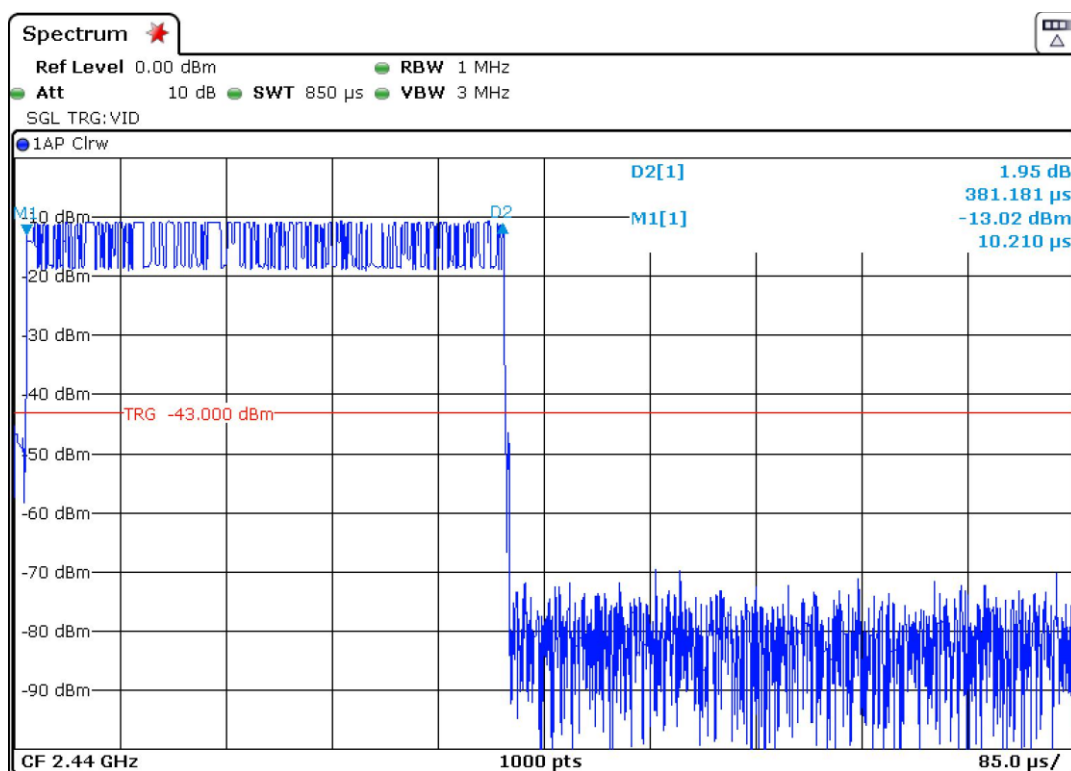


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS
TEST RESULTS (Cont.)	PACKET TYPE DH1

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μ 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 μ s (See next plot).

So we have 320.11 x 381.181 μ s = 122.02 ms per 31.6 seconds.



Measurement uncertainty (%)

< $\pm$ 0.12

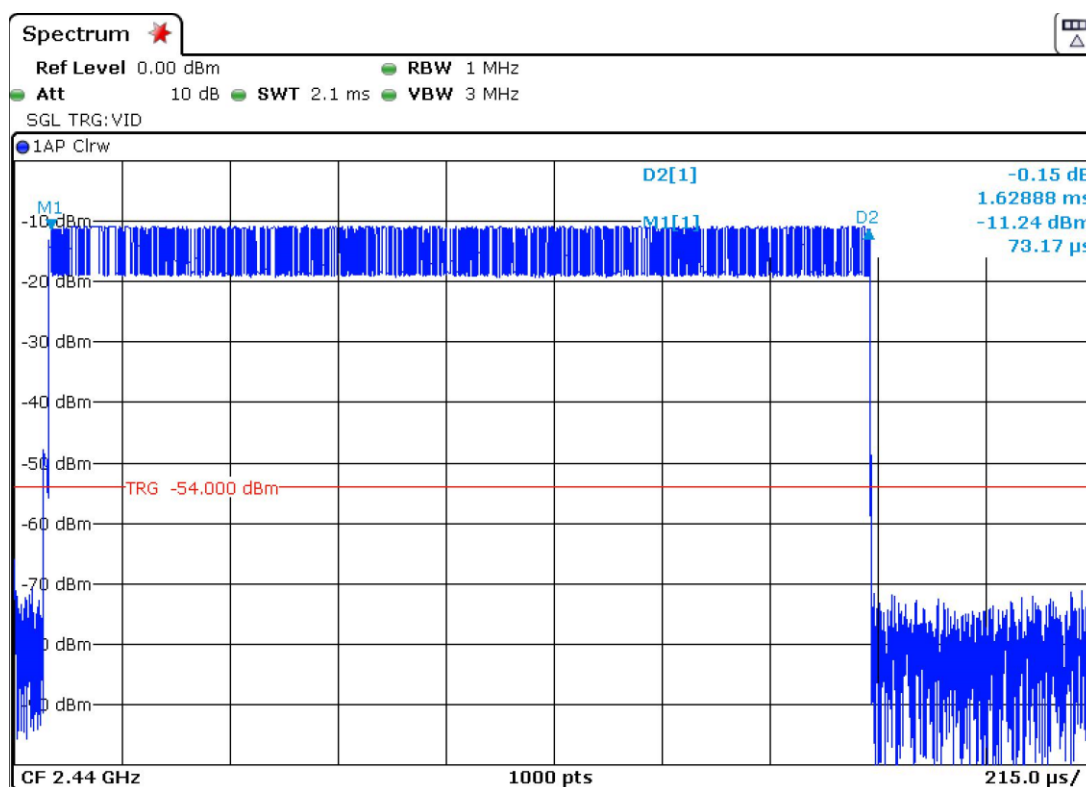
TEST RESULTS (Cont.)

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 $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance.

Each Tx – Time per appearance is 1.62888 ms (See next plot).

So we have $161.16 \times 1.62888 = 262.51$ ms per 31.6 seconds.



Measurement uncertainty (%)

<±0.12

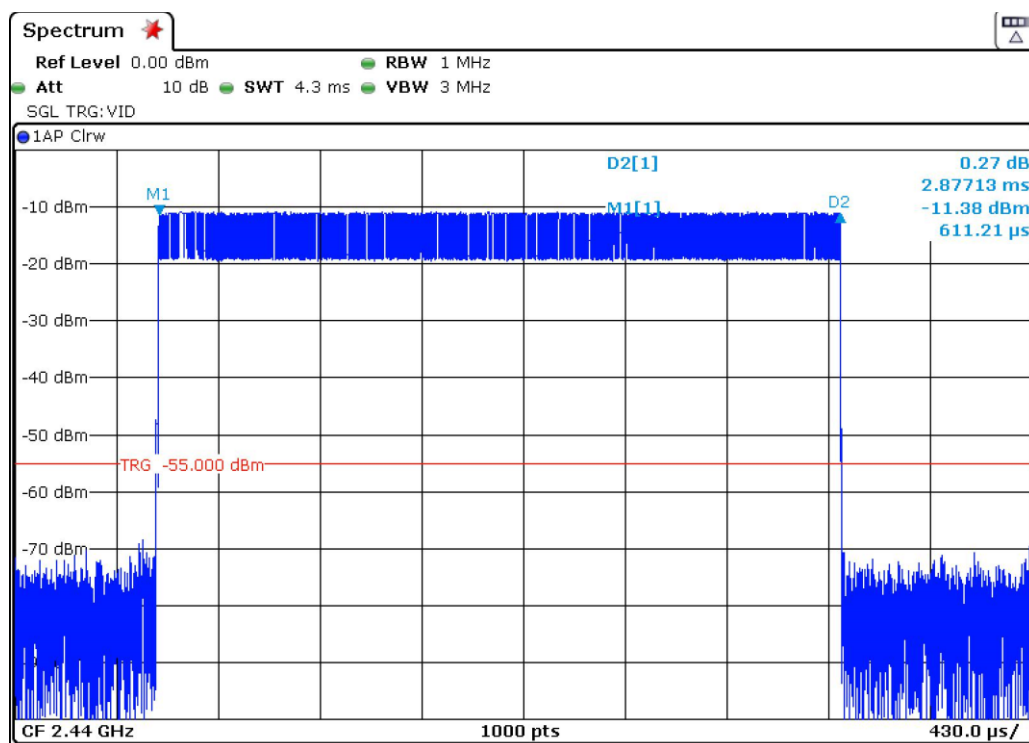
TEST RESULTS (Cont.)

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 $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance.

Each Tx – Time per appearance is 2.87713 ms (See next plot).

So we have $106.49 \times 2.87713 = 306.385$ ms per 31.6 seconds.



Measurement uncertainty (%)

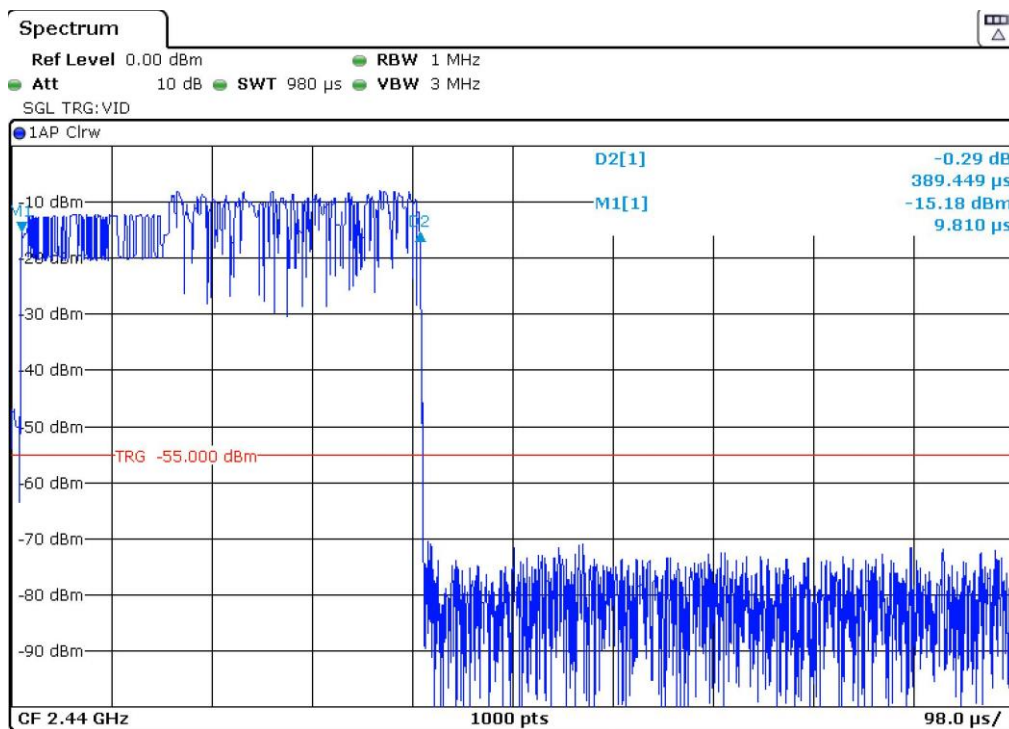
<±0.12

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

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μ 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 389.449 μ s (See next plot).

So we have 320.11 x 389.449 μ s = 124.666 ms per 31.6 seconds.



Measurement uncertainty (%)

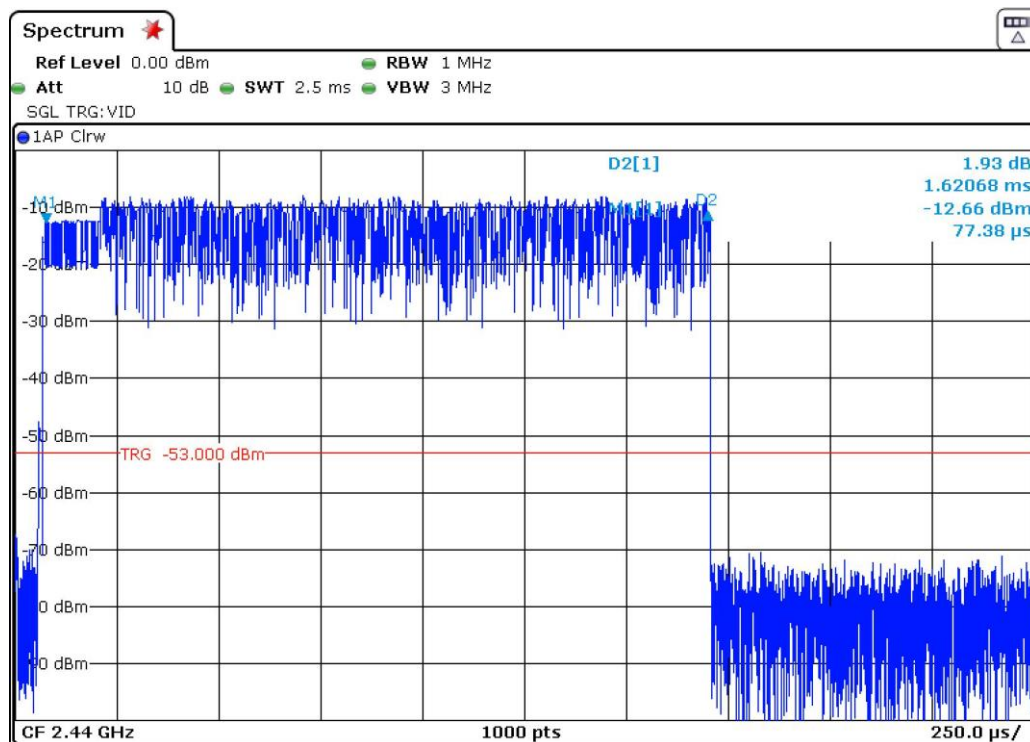
<±0.12

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 $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance.

Each Tx – Time per appearance is 1.62068 ms (See next plot).

So we have $161.16 \times 1.62068 = 261.19$ ms per 31.6 seconds.



Measurement uncertainty (%)

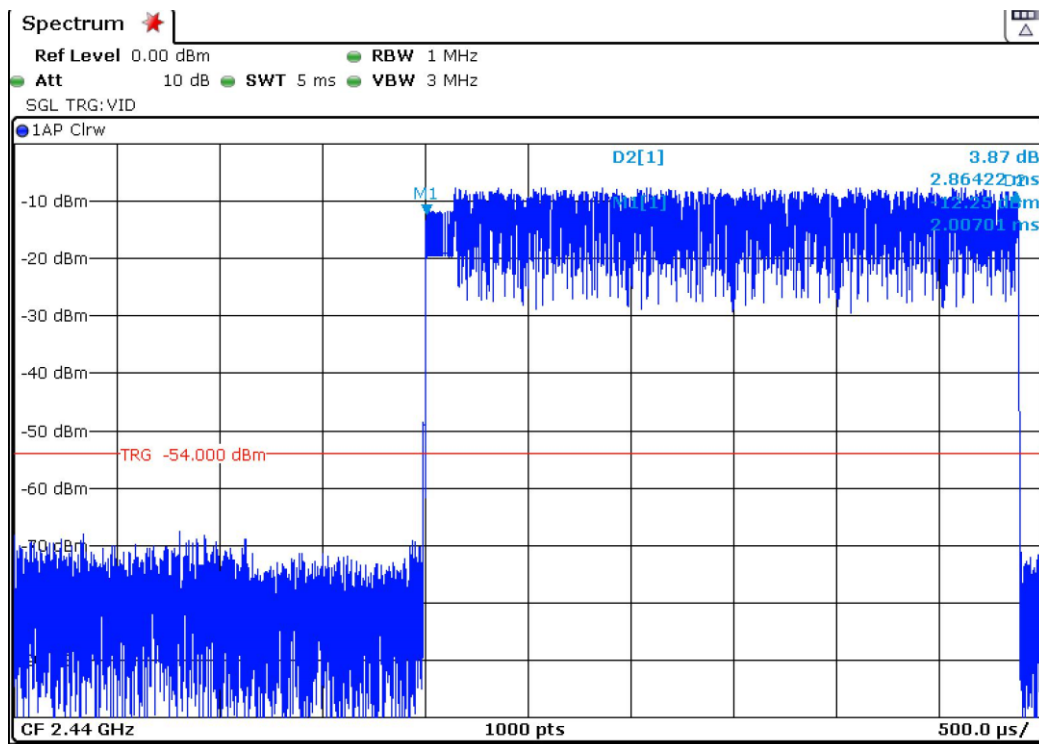
<±0.12

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 $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance.

Each Tx – Time per appearance is 2.86422 ms (See next plot).

So we have $106.49 \times 2.88778 = 305.01$ ms per 31.6 seconds.



Measurement uncertainty (%)

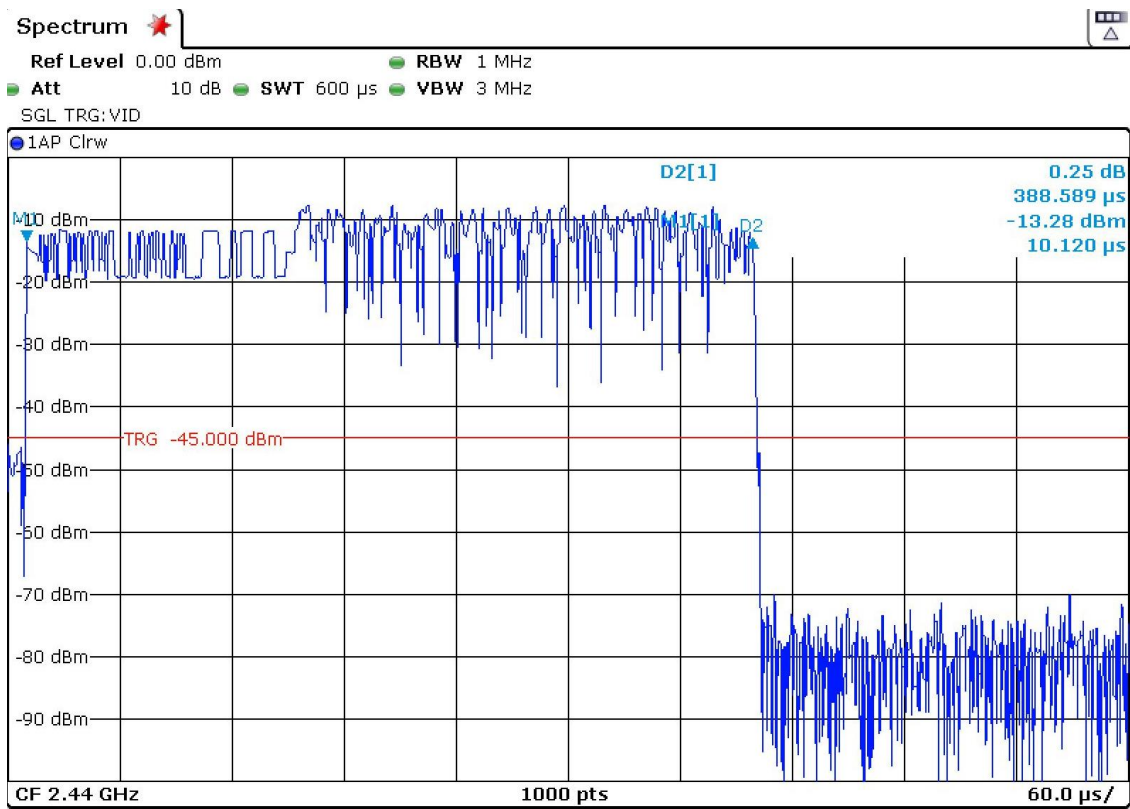
$<\pm 0.12$

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03
TEST RESULTS:	PASS
TEST RESULTS (Cont.)	PACKET TYPE 3DH1

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μ 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 388.589 μ s (See next plot).

So we have 320.11 x 388.589 μ s = 124.391 ms per 31.6 seconds.



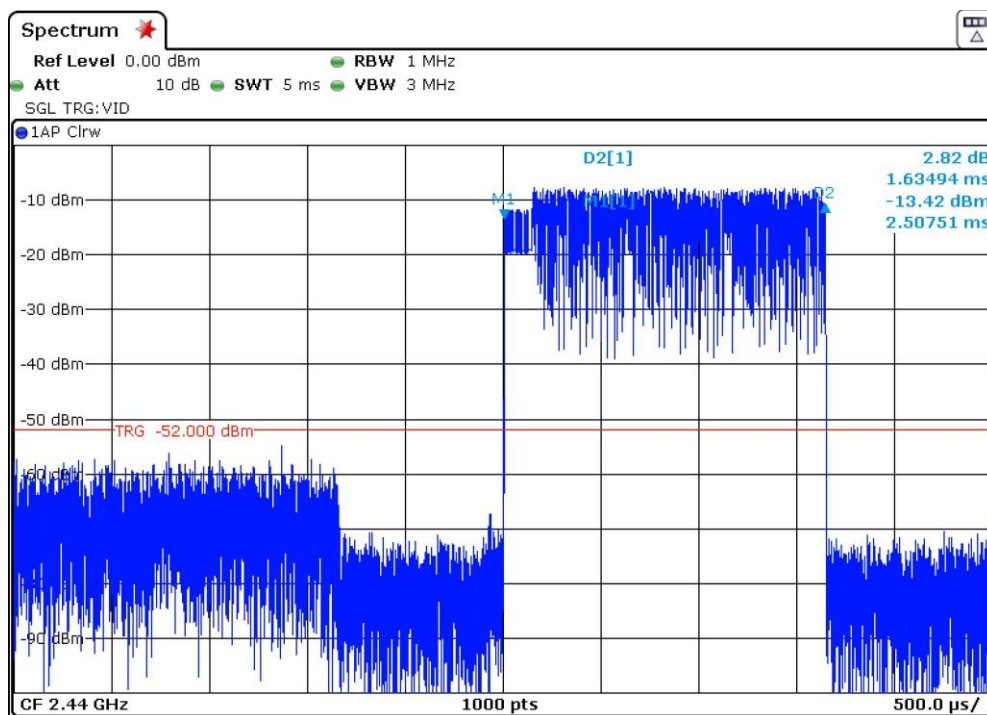
Measurement uncertainty (%)	<±0.12
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PACKET TYPE 3DH3

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 $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance.

Each Tx – Time per appearance is 1.63494 ms (See next plot).

So we have $161.16 \times 1.63494 = 261.487$ ms per 31.6 seconds.



Measurement uncertainty (%)

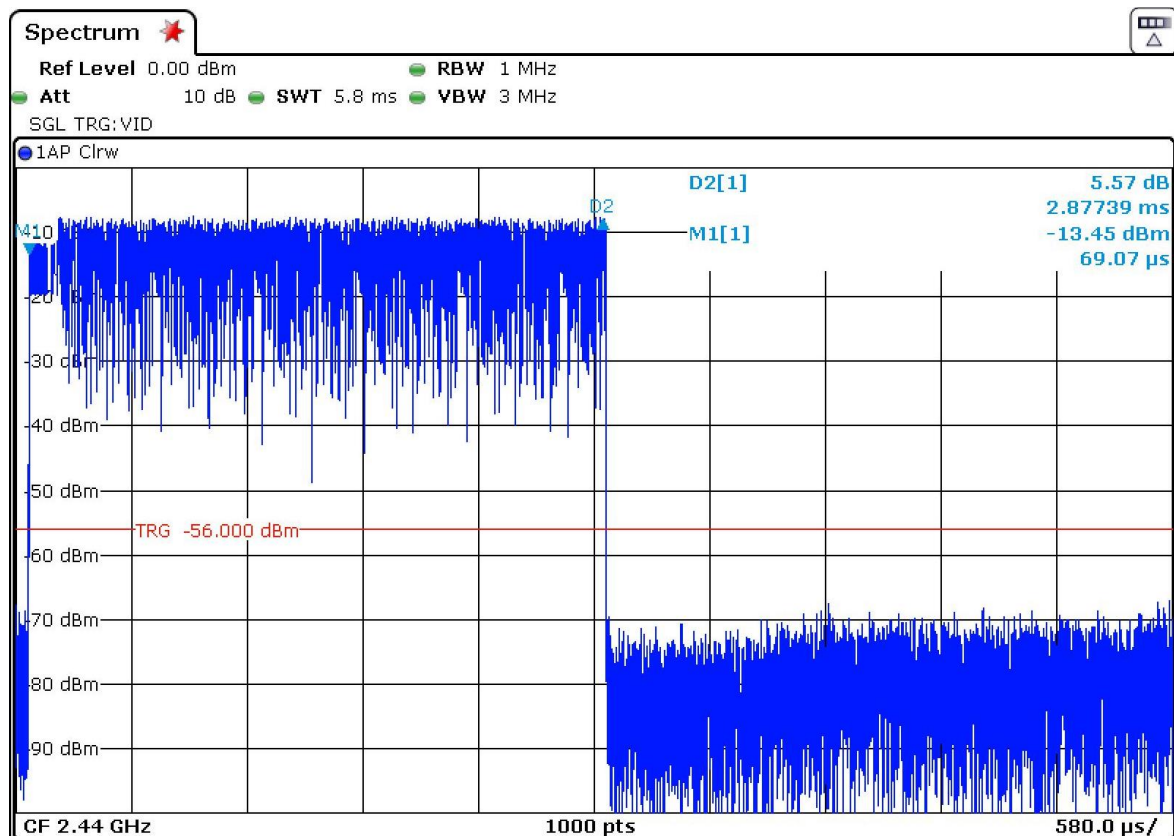
$<\pm 0.12$

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 $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance.

Each Tx – Time per appearance is 2.87739 ms (See next plot).

So we have $106.49 \times 2.87739 = 306.413$ ms per 31.6 seconds.



Measurement uncertainty (%)

<±0.12

TEST A.4: MAXIMUM PEAK CONDUCTED OUTPUT POWER AND ANTENNA GAIN

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

LIMITS

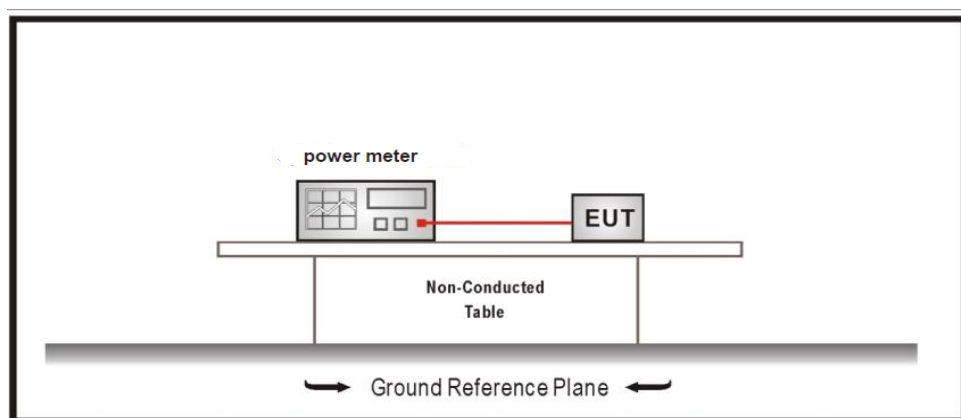
For Frequency Hopping systems operating in the 2400 – 2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm). (Part 15 Subpart C §15.247).

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



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

Maximum declared antenna gain: +1.3 dBi

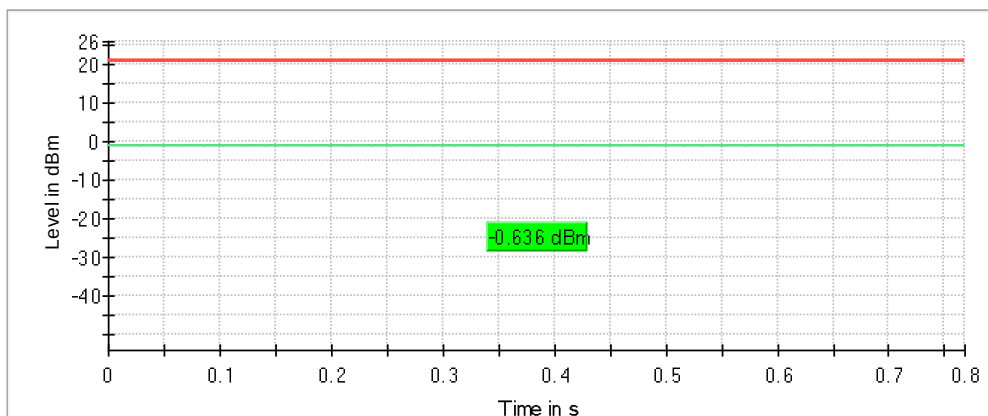
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-0.636	0.229	-1.514
Maximum EIRP power (dBm)	0.664	1.529	-0.2.14
Measurement uncertainty (dB)	<±0.78		

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.):

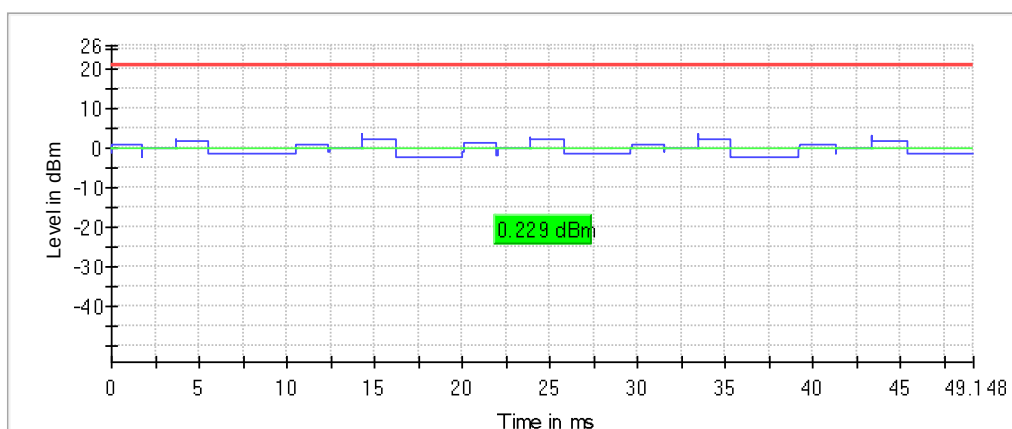
CONDUCTED OUTPUT POWER

Lowest Channel



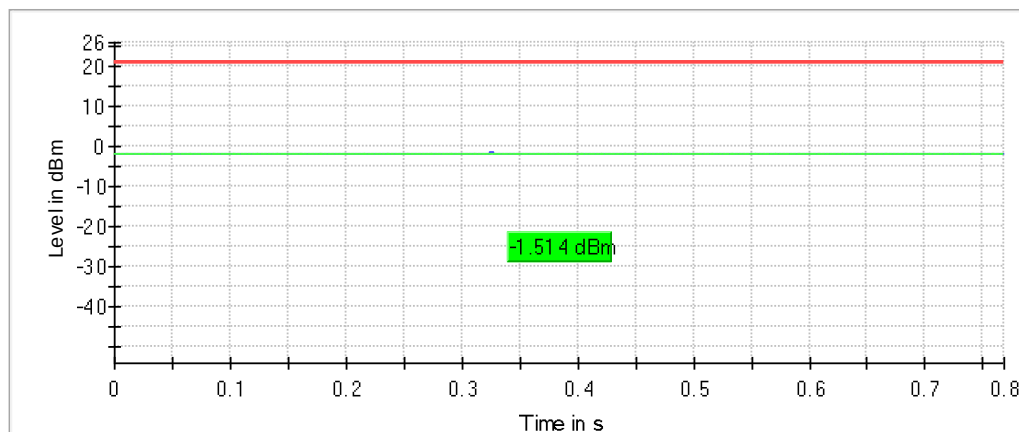
— Gated Trace — Overall — Limit

Middle Channel



— Gated Trace — Overall — Limit

Highest Channel



— Gated Trace — Overall — Limit

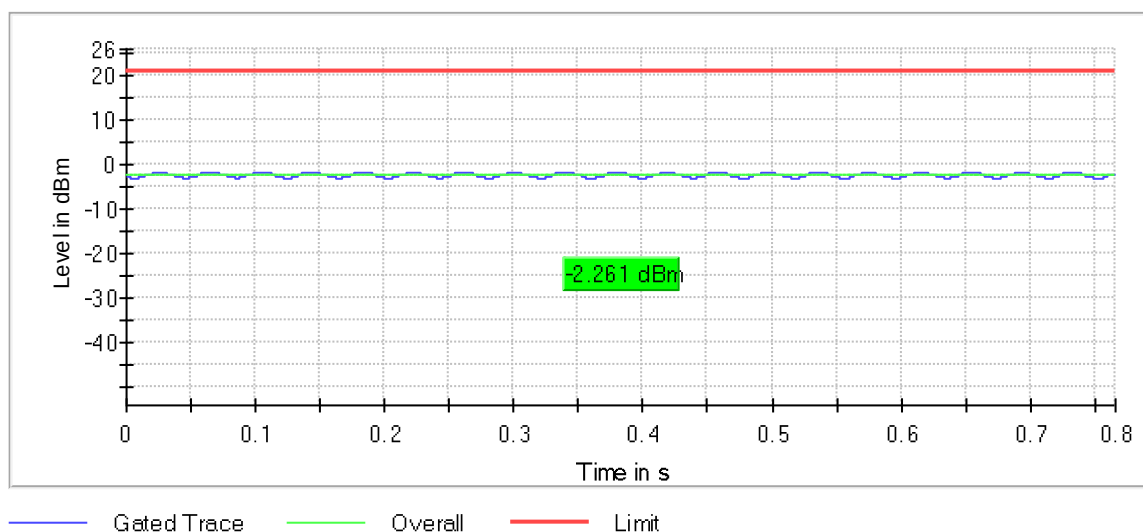
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02
TEST RESULTS:	PASS

Maximum declared antenna gain: +1.3 dBi

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-2.261	-2.0	-2.618
Maximum EIRP power (dBm)	-0.961	-0.7	-1.318
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.

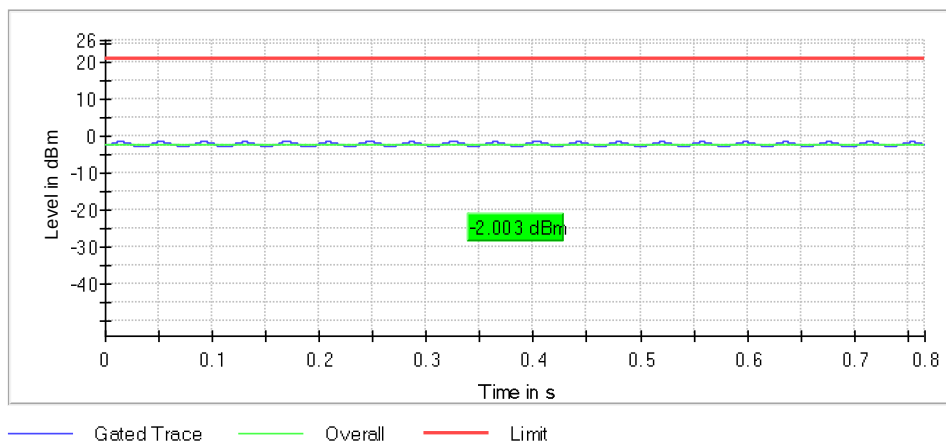
Lowest Channel



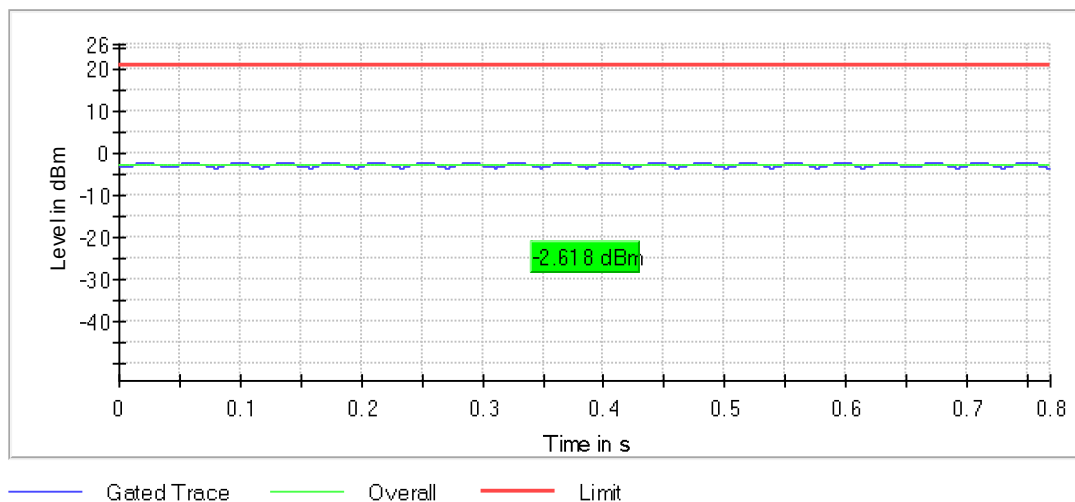
TEST RESULTS (Cont.)

CONDUCTED OUTPUT POWER

Middle Channel



Highest Channel



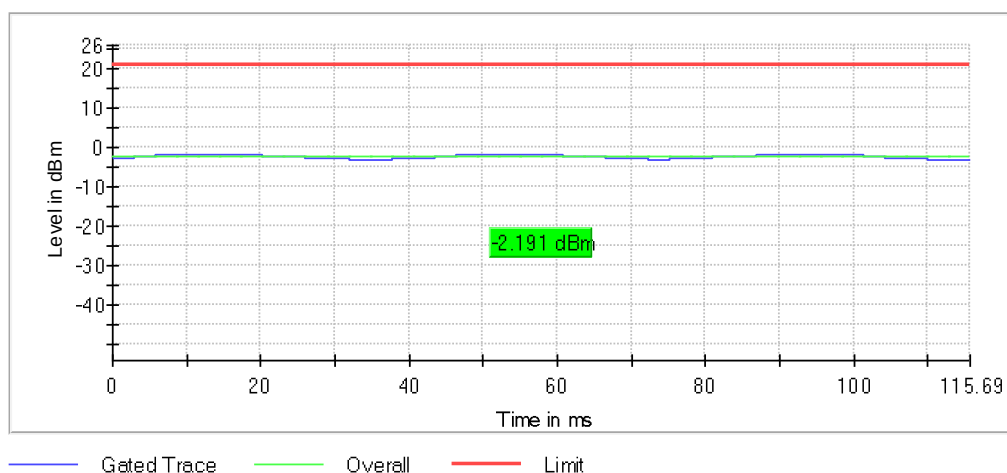
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03
TEST RESULTS:	PASS

Maximum declared antenna gain: +1.3 dBi

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	-2.2	-2.0	-2.9
Maximum EIRP power (dBm)	-0.891	-0.7	-1.6
Measurement uncertainty (dB)	<±0.78		

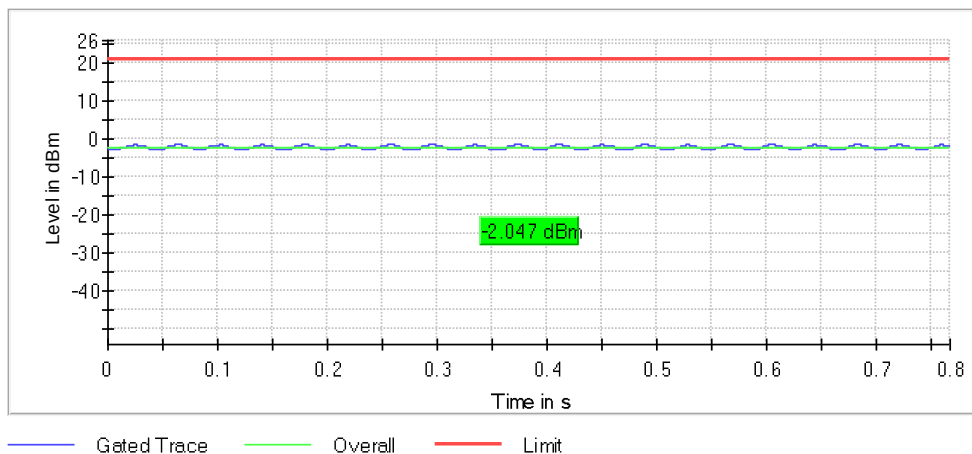
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Lowest Channel

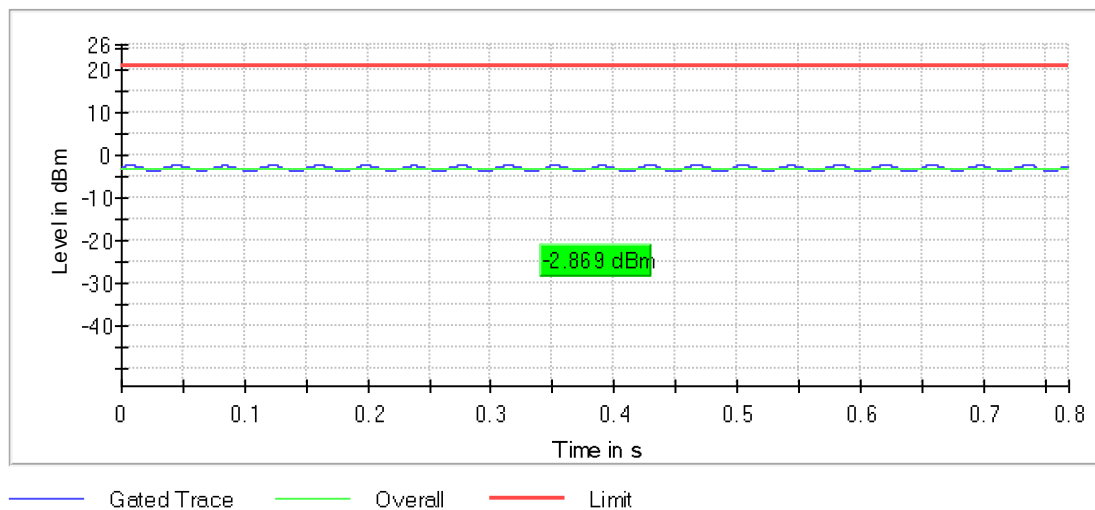


TEST RESULTS (Cont.)

Middle Channel



Highest Channel



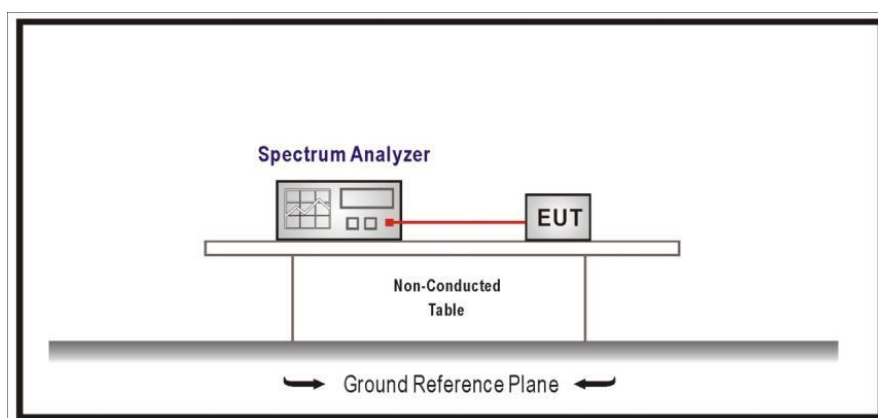
TEST A.5: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

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

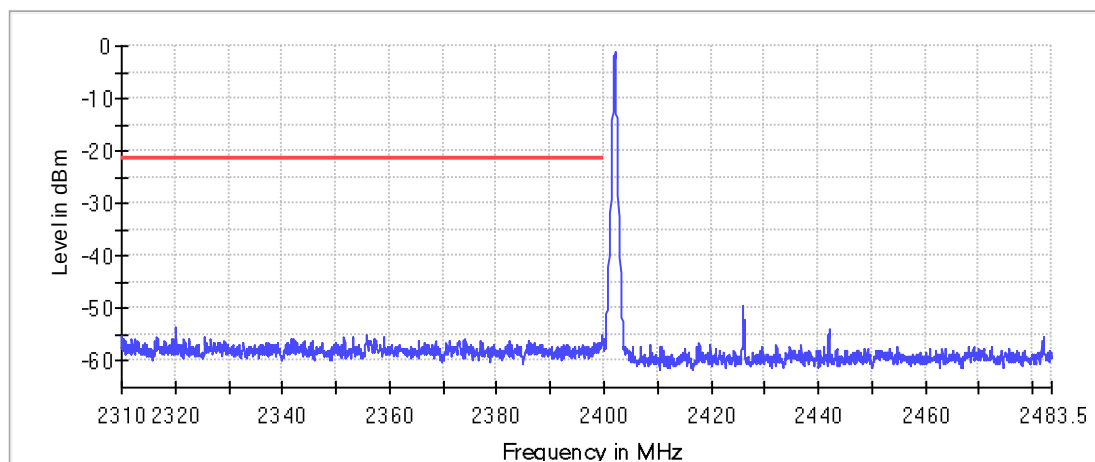
LIMITS

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



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



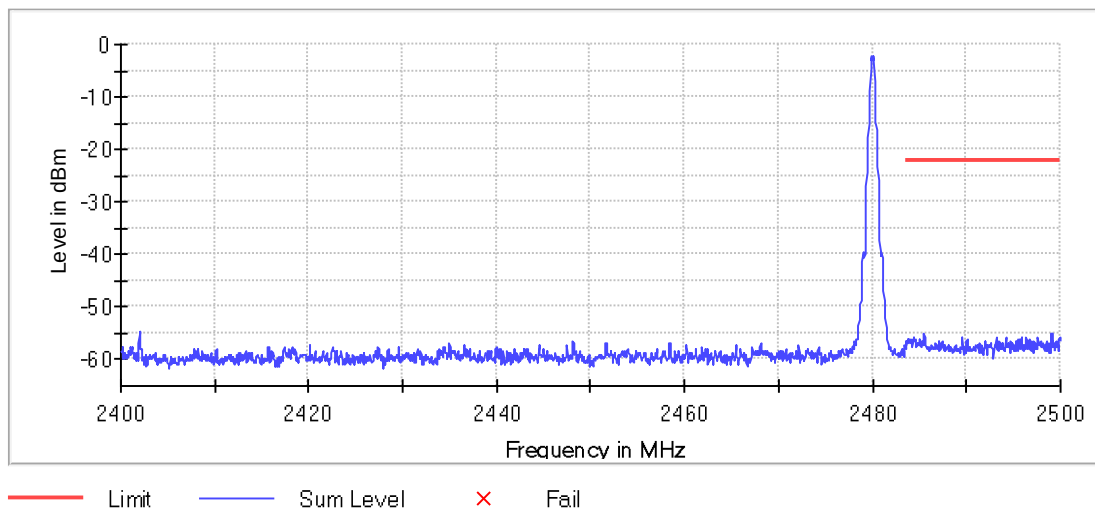
— Limit — Sum Level × Fail

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 μ s	94.727 μ 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
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	6 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.12 dB

TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)

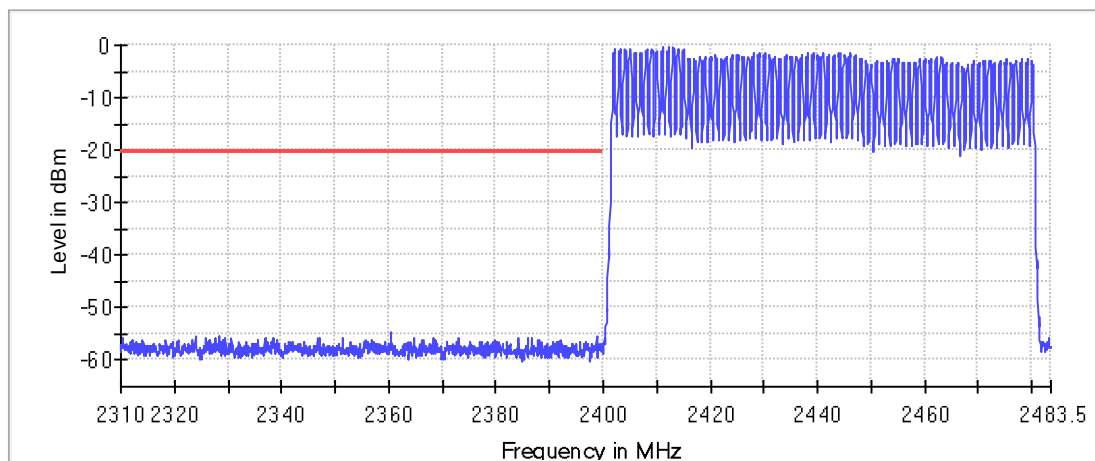


Measurement

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 μ s	18.945 μ 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	0.28 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING ON (Lowest channel)



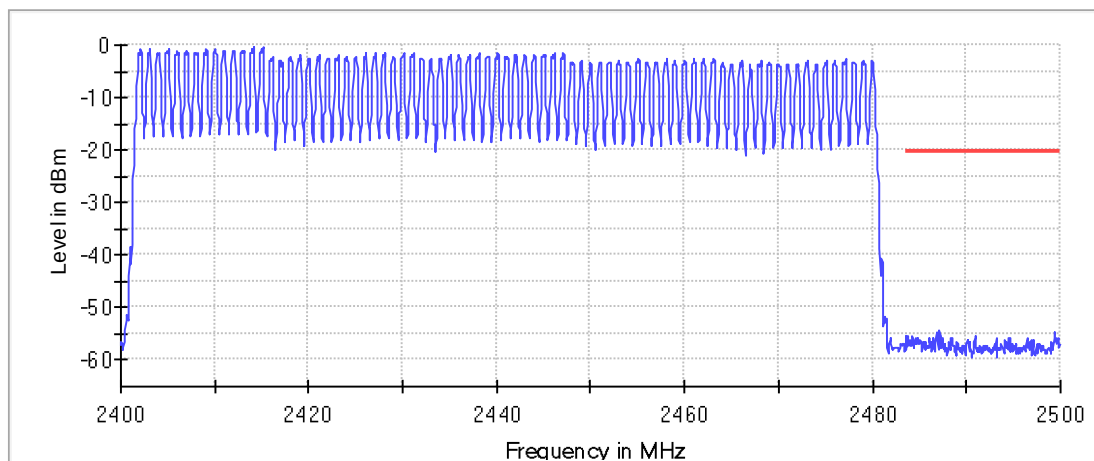
— Limit — Sum Level × Fail

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 μ s	94.727 μ 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	0.76 dB

TEST RESULTS (Cont.):

HOPPING ON (Highest channel)

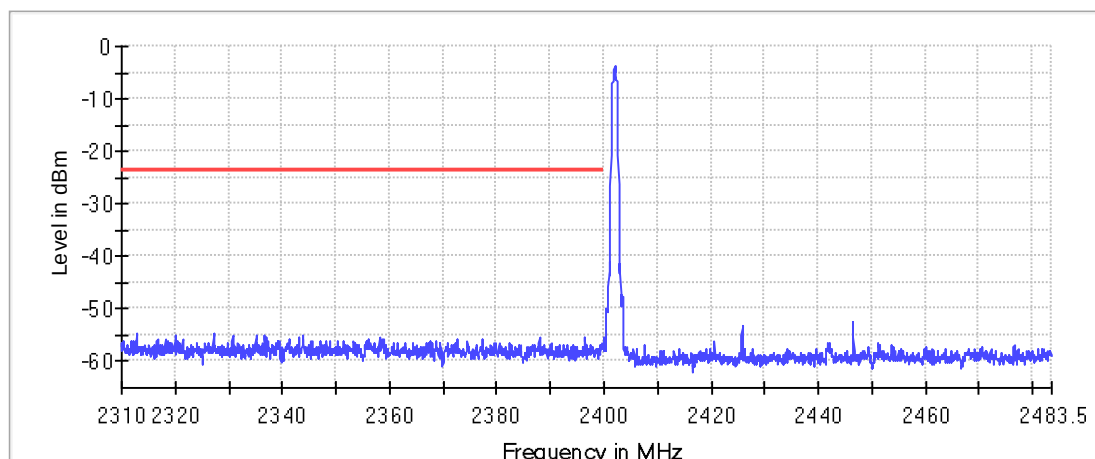


— Limit — Sum Level × Fail

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 μ s	18.945 μ 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
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	115 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.13 dB	0.00 dB

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



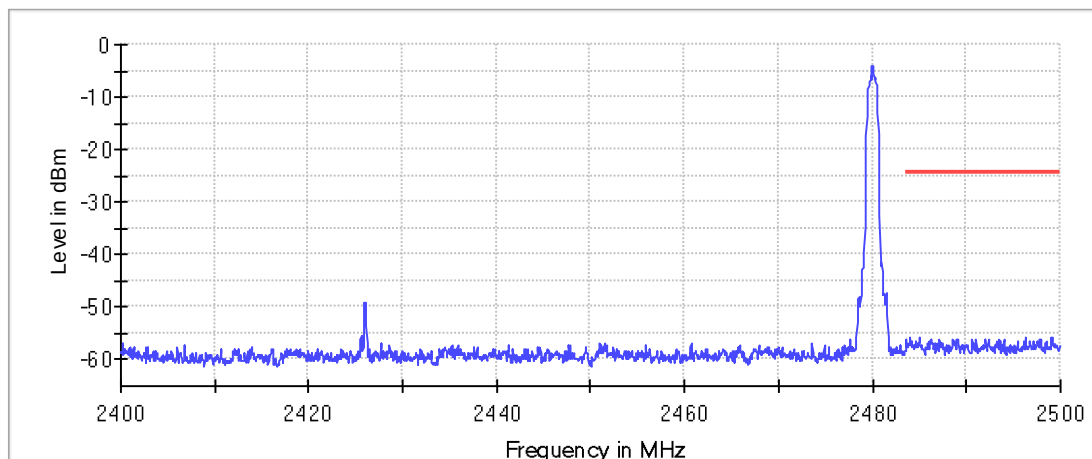
— Limit — Sum Level × Fail

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 μ s
Reference Level	113.672 μ 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
Preamplifier	FFT	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	9 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.41 dB

TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)



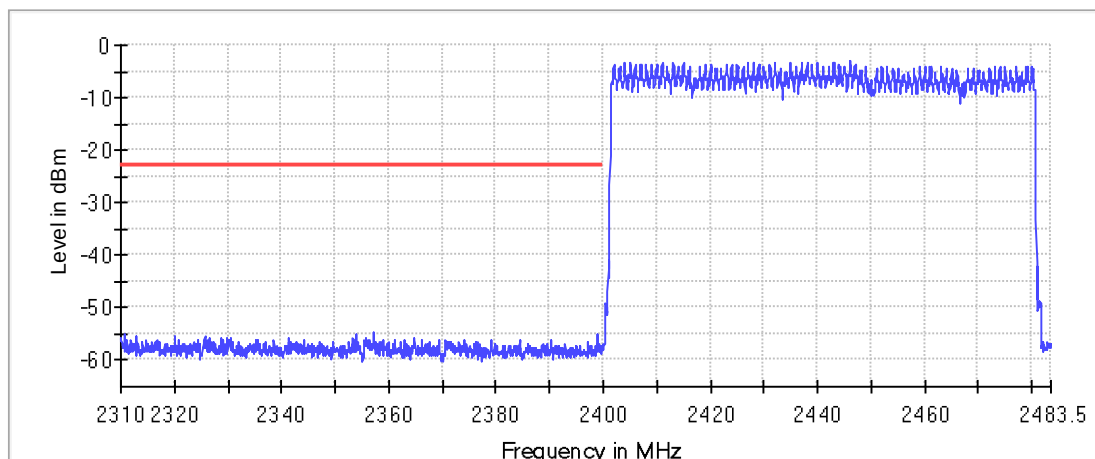
— Limit — Sum Level X Fail

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 μ s	18.945 μ 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
Preamplifier	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	0.27 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING ON (Lowest channel)



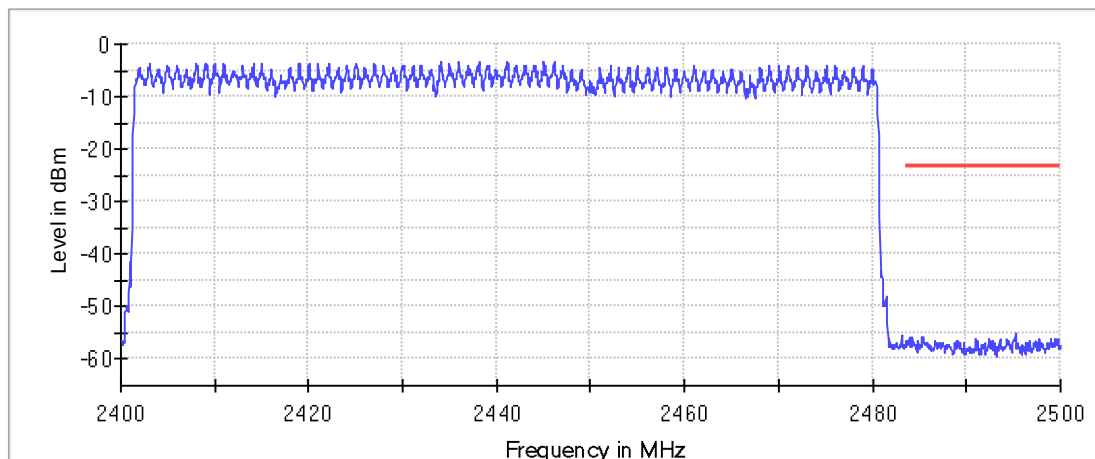
— Limit — Sum Level × Fail

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 μ s	94.727 μ 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
Preamplifier	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	1.58 dB

TEST RESULTS (Cont.):

HOPPING ON (Highest channel)

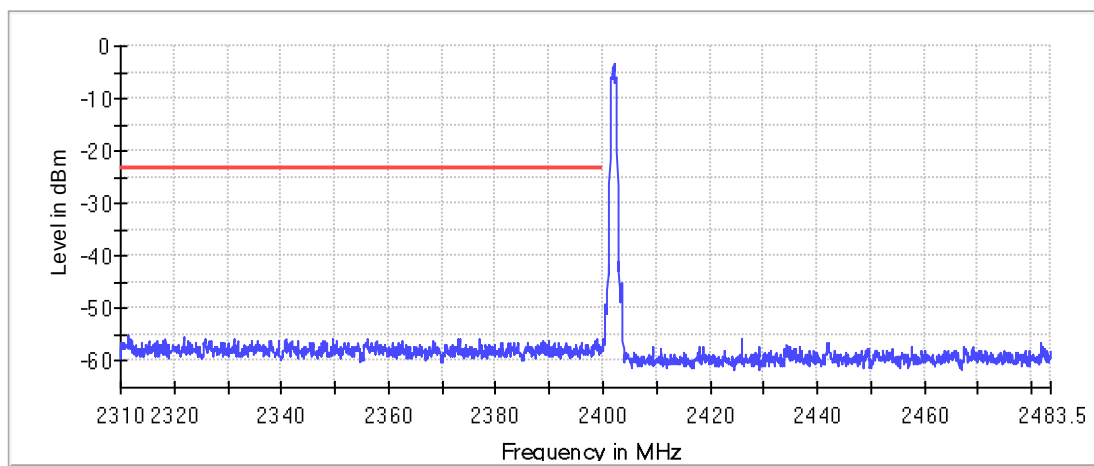


— Limit — Sum Level × Fail

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 μ s	18.945 μ 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	1.63 dB	0.00 dB

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



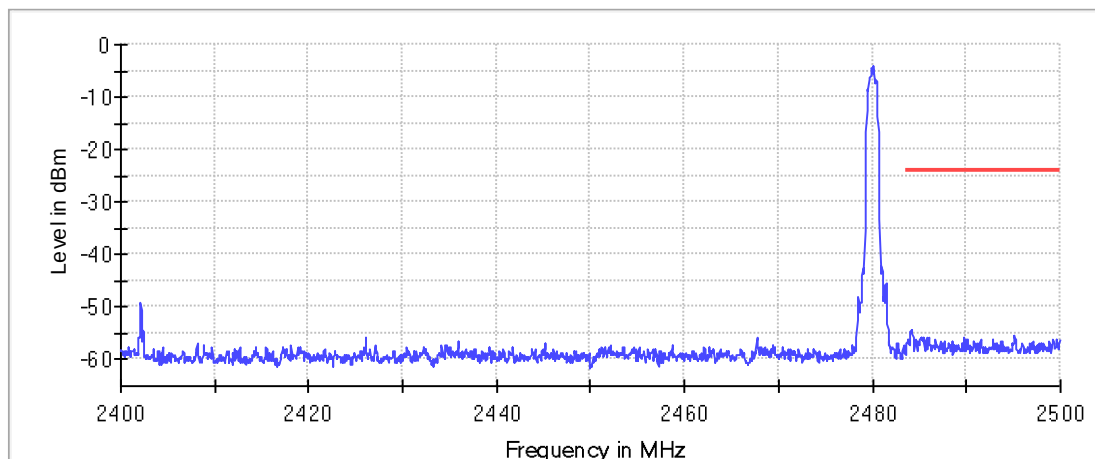
— Limit — Sum Level × Fail

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 μ s	94.727 μ 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	6 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.15 dB

TEST RESULTS (Cont.):

HOPPING OFF (Highest channel)



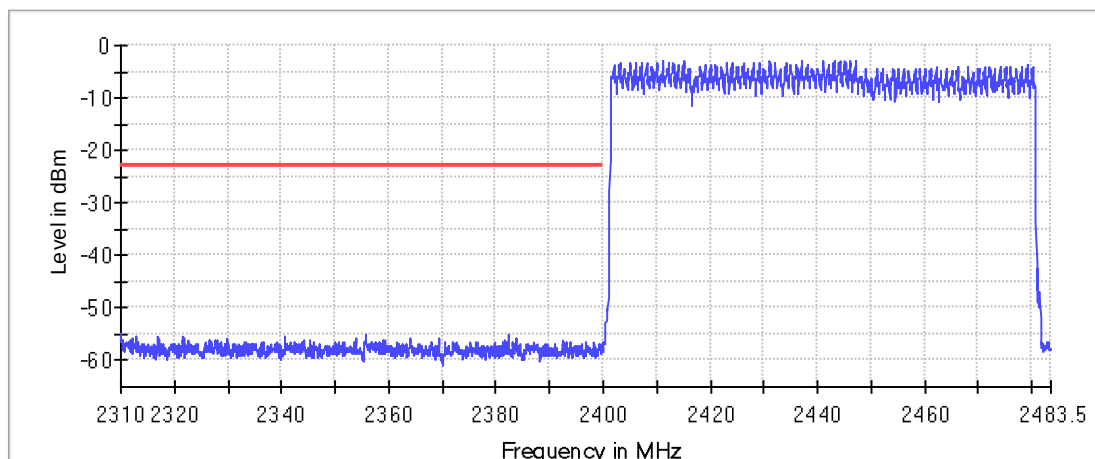
— Limit — Sum Level × Fail

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 μ s	18.945 μ 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
Preamplifier	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	0.04 dB	0.00 dB

TEST RESULTS (Cont.):

HOPPING ON (Lowest channel)



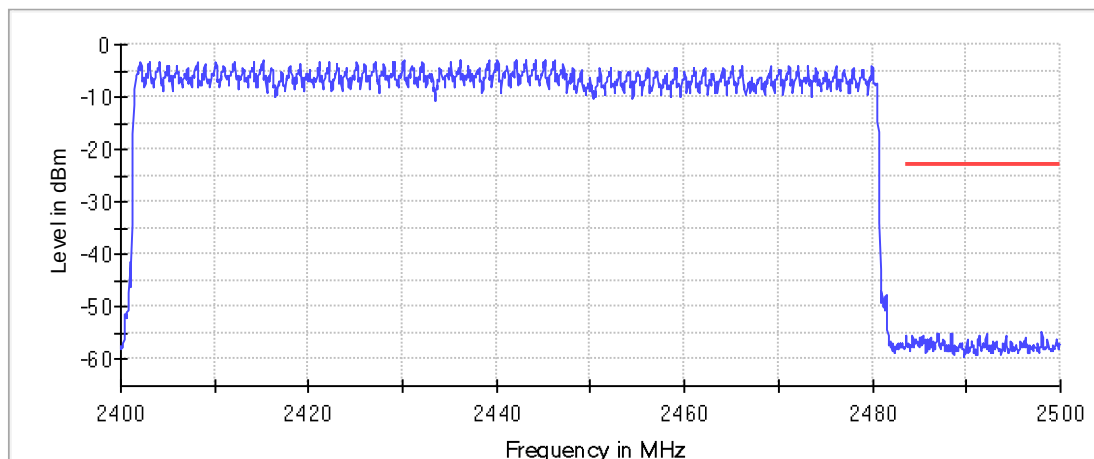
— Limit — Sum Level × Fail

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 μ s	94.727 μ 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
Preamplifier	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	2.61 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 μ s	18.945 μ 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
Preamplifier	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	1.32 dB	0.00 dB

TEST A.6: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

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

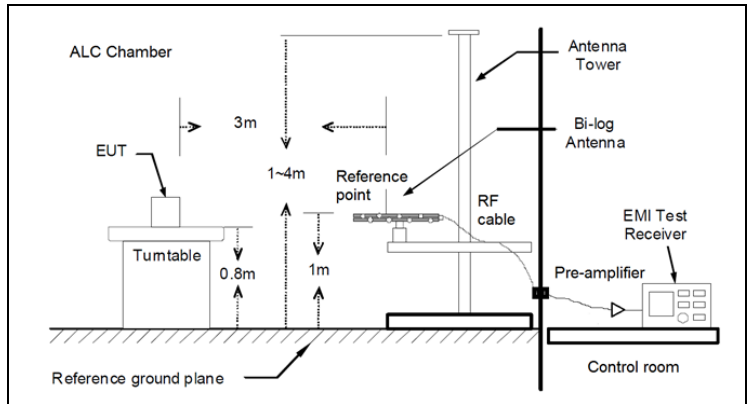
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

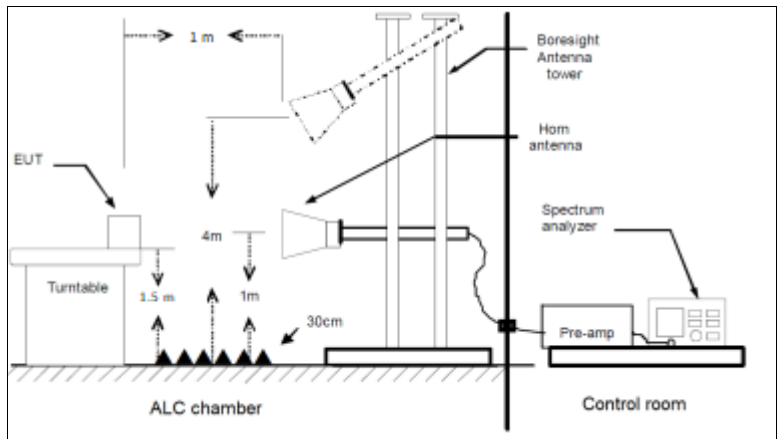
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)

Radiated measurements Setup $f < 1$ GHz



Radiated measurements setup $f > 1$ GHz



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

Frequency range 30 MHz – 1000 MHz

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

Frequency range 1 GHz – 26 GHz

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

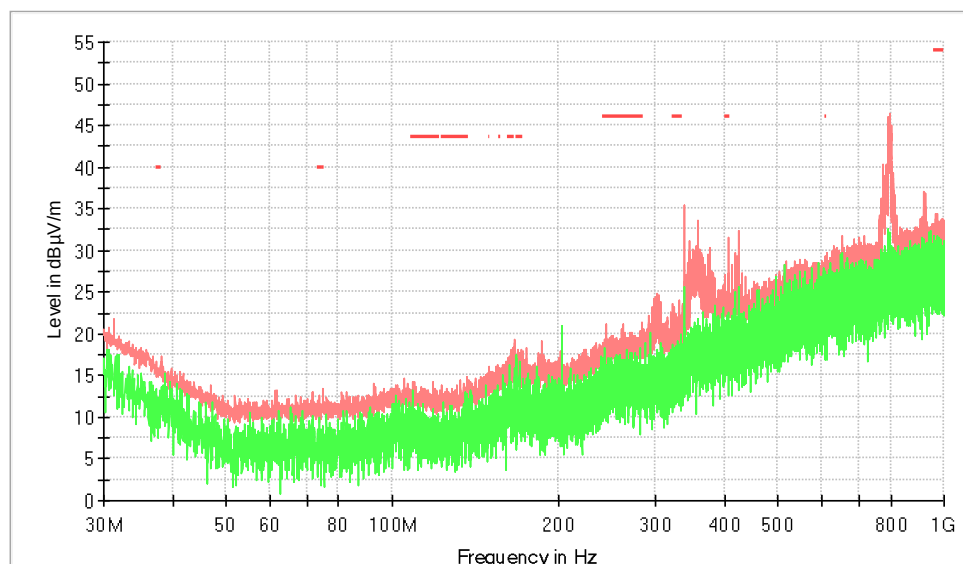
The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.

TEST RESULTS (Cont.):

FREQUENCY RANGE

30 MHz – 1000 MHz (GFSK)

RF_FCC_15.247_E Field_30MHz_1GHz



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

Result Table_Single

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Pol
797.561000	38.1	26.7	H
921.478500	36.7	28.9	H
357.569000	30.4	19.3	H
338.654000	39.8	36.8	H
406.408500	31.4	23.4	H
31.358000	23.7	13.1	H

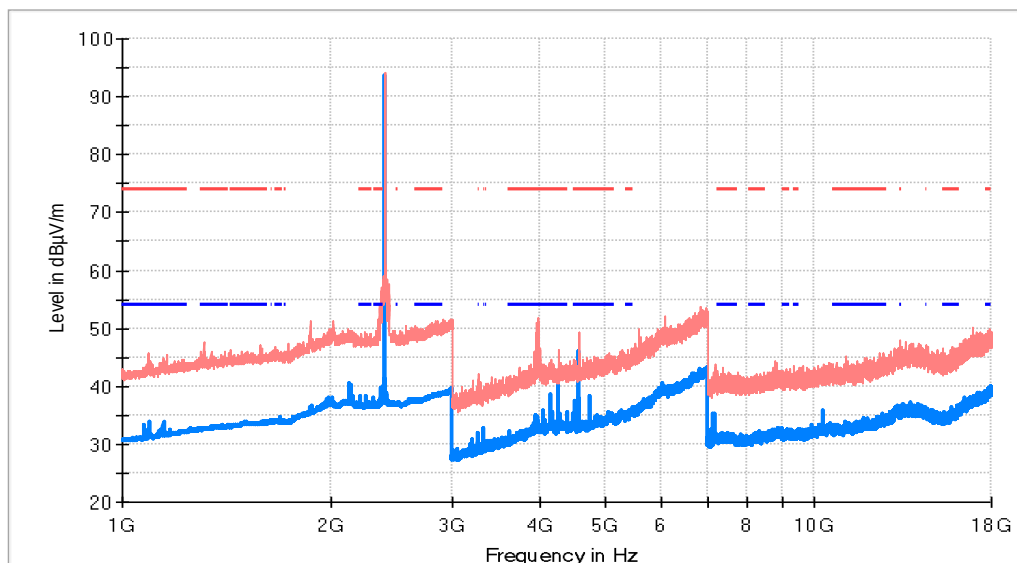
TEST RESULTS (Cont.)

FREQUENCY RANGE

1 GHz – 18 GHz (GFSK)

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

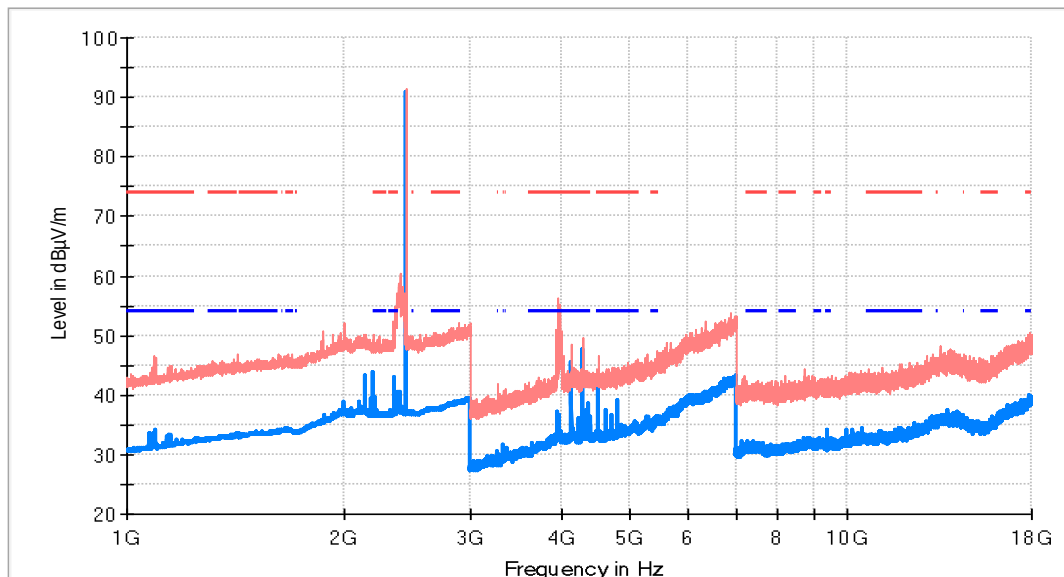
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2402.000000	94.27	93.71	H	Fundamental
4170.500000	44.50	38.58	V	
4269.000000	46.27	41.00	V	
4566.000000	49.26	45.90	V	
7183.500000	41.45	35.11	V	
10327.500000	43.77	35.85	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 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

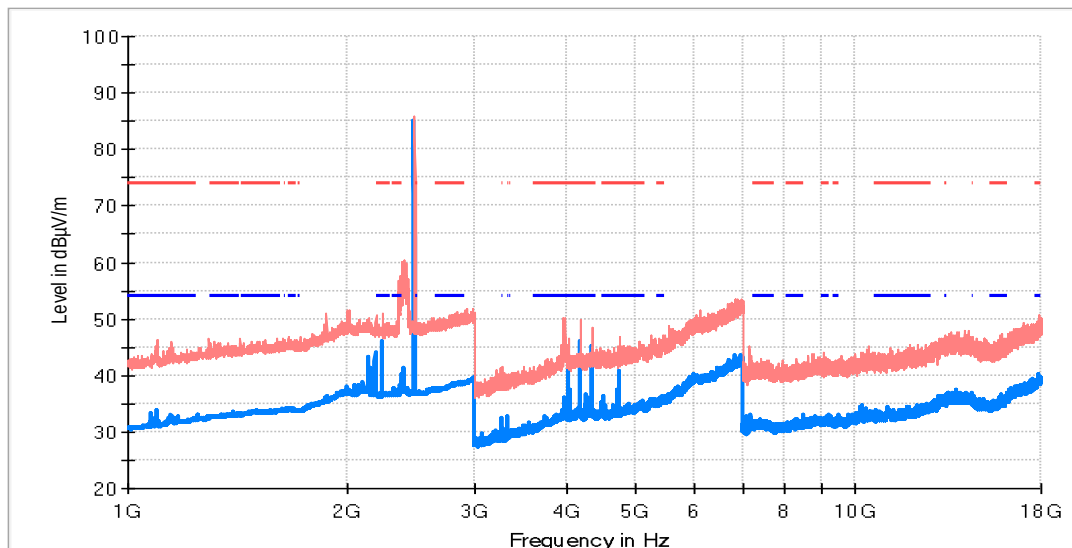
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2441.000000	91.54	90.93	H	Fundamental
4150.500000	48.51	45.34	V	
4287.500000	49.40	47.61	V	
4513.000000	46.44	42.19	V	
12183.000000	42.81	34.47	H	
13792.500000	45.53	37.43	V	

TEST RESULTS (Cont.)

CHANNEL: Middle (2480 MHz)

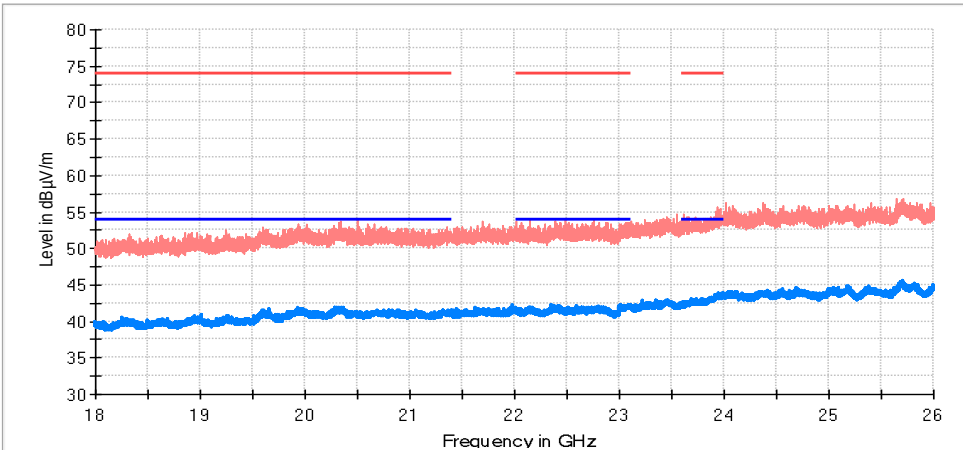
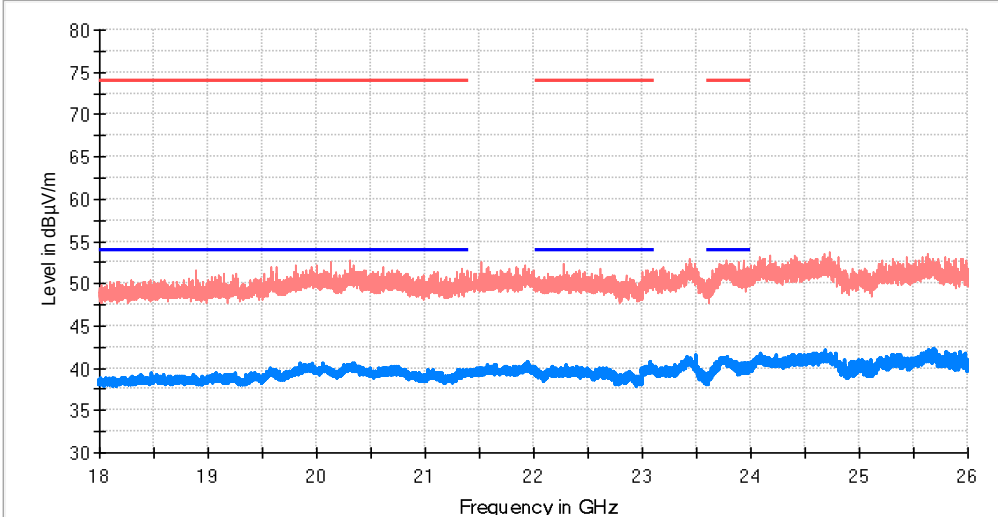
RF_FCC_15.247_E Field_1GHz_18GHz



— 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

Maximizations

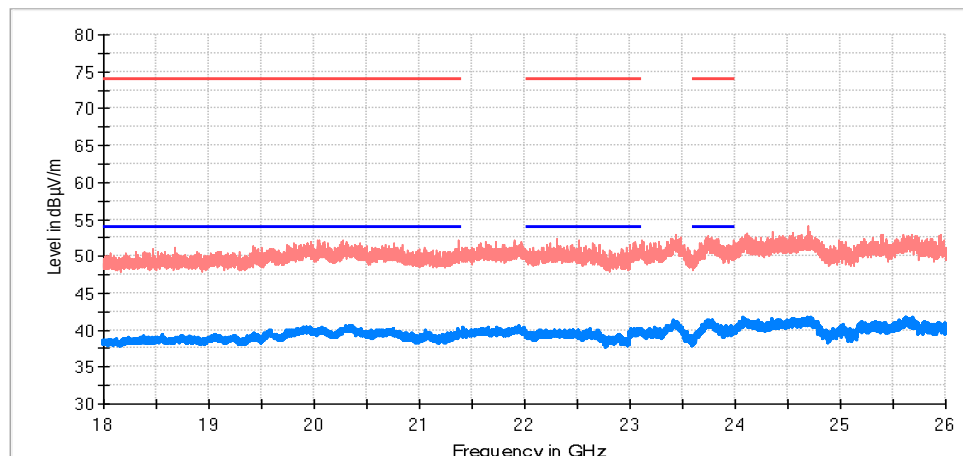
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2242.500000	51.01	46.00	V	
2480.000000	85.76	85.12	H	Fundamental
4026.500000	46.49	43.59	V	
4194.500000	48.74	45.97	V	
4350.000000	48.43	45.23	V	
4750.500000	45.40	40.74	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	18 GHz – 26 GHz (GFSK)
CHANNEL: Lowest (2402 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	
CHANNEL: Middle (2440 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 (2480 MHz).

RF_FCC_15.247_E Field_18GHz_26GHz



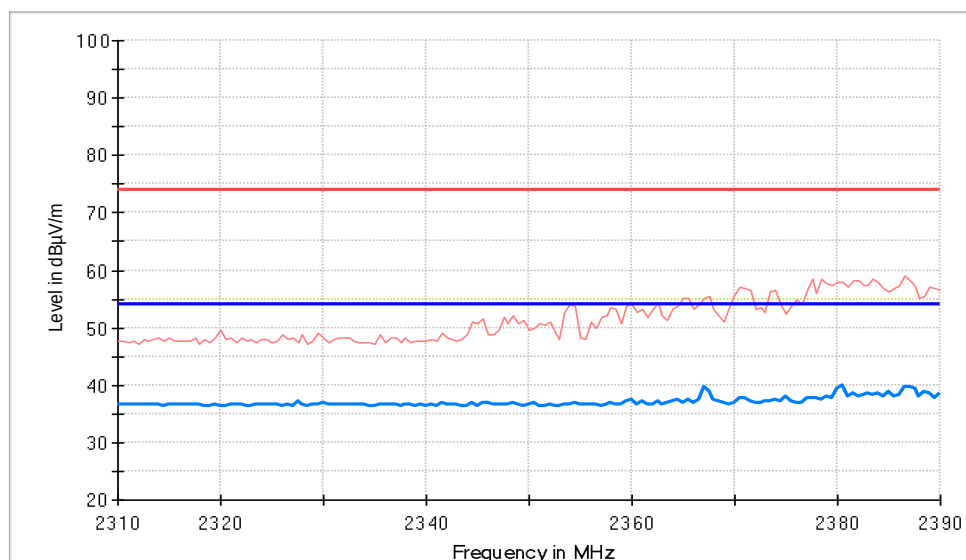
AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

RESTRICTED BANDS

2.31 GHz – 2.39 GHz (GFSK)

CHANNEL: Lowest (2402 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz

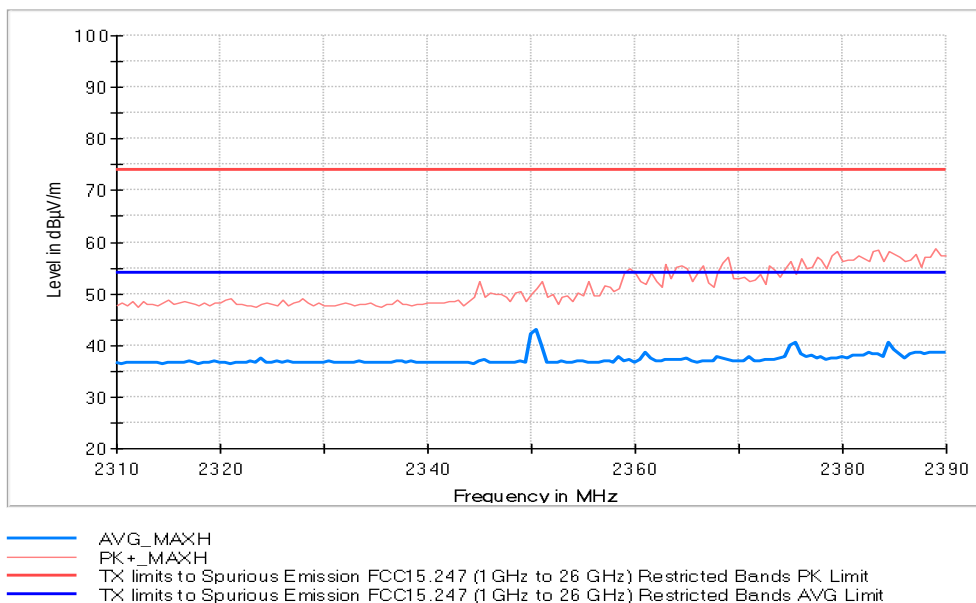


AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.)

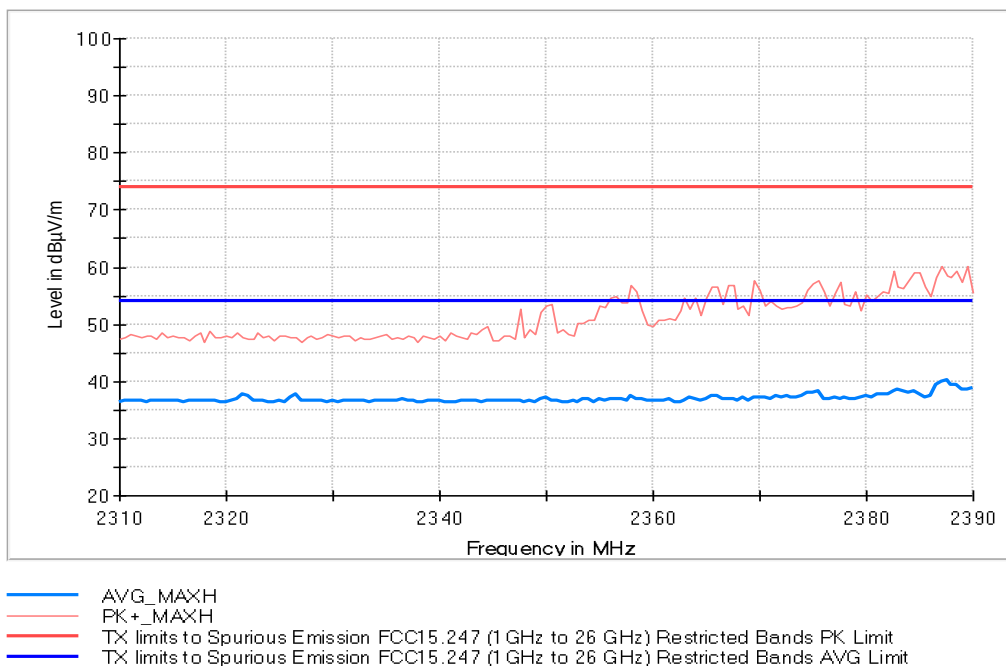
CHANNEL: Middle (2440 MHz)

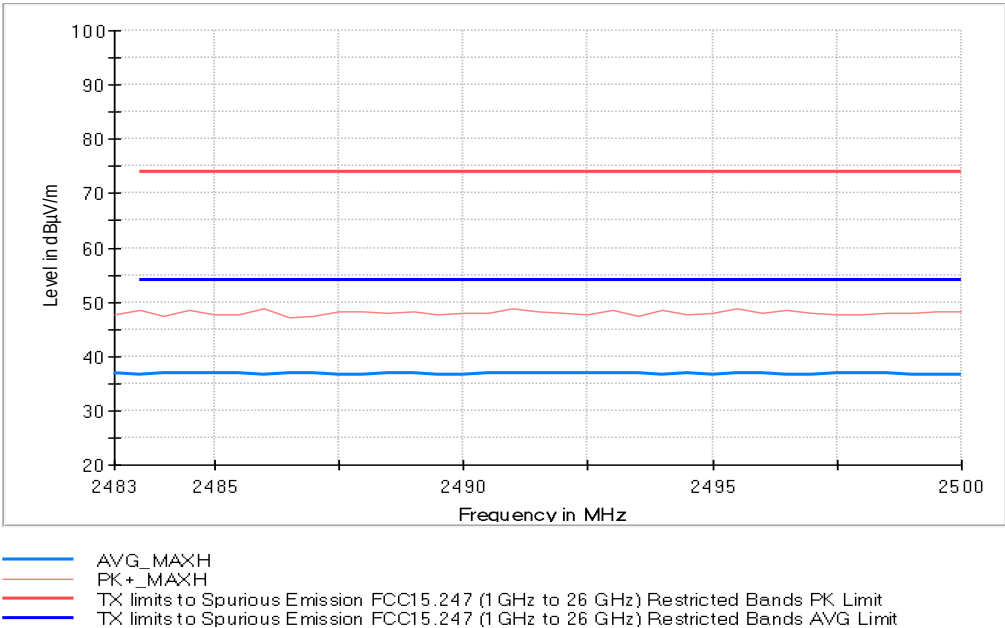
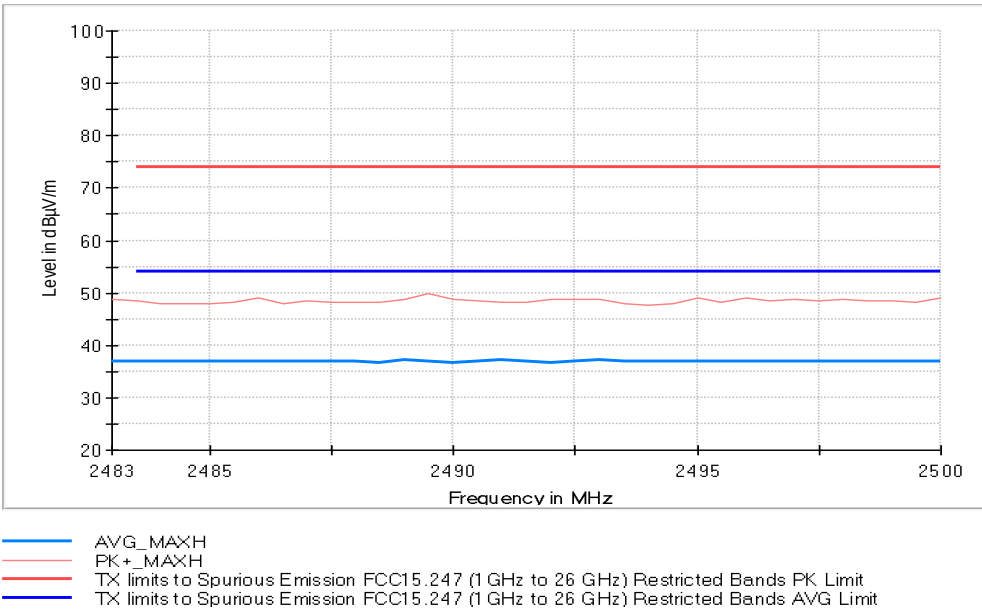
RF_FCC_15.247_E Field_1GHz_18GHz



CHANNEL: Highest (2480 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz

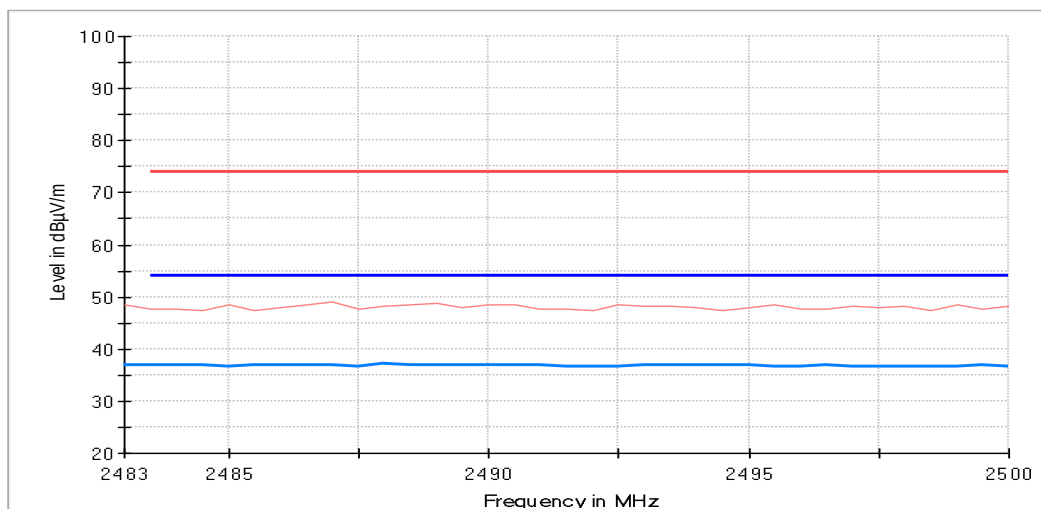


TEST RESULTS (Cont.)	
RESTRICTED BANDS	2.483 GHz – 2.5 GHz (GFSK)
CHANNEL: Lowest (2402 MHz) RF_FCC_15.247_E Field_1GHz_18GHz  Legend: - AVG_MAXH - PK+_MAXH - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit - TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit CHANNEL: Middle (2440 MHz) RF_FCC_15.247_E Field_1GHz_18GHz  Legend: - 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)

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

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

Frequency range 30 MHz – 1000 MHz

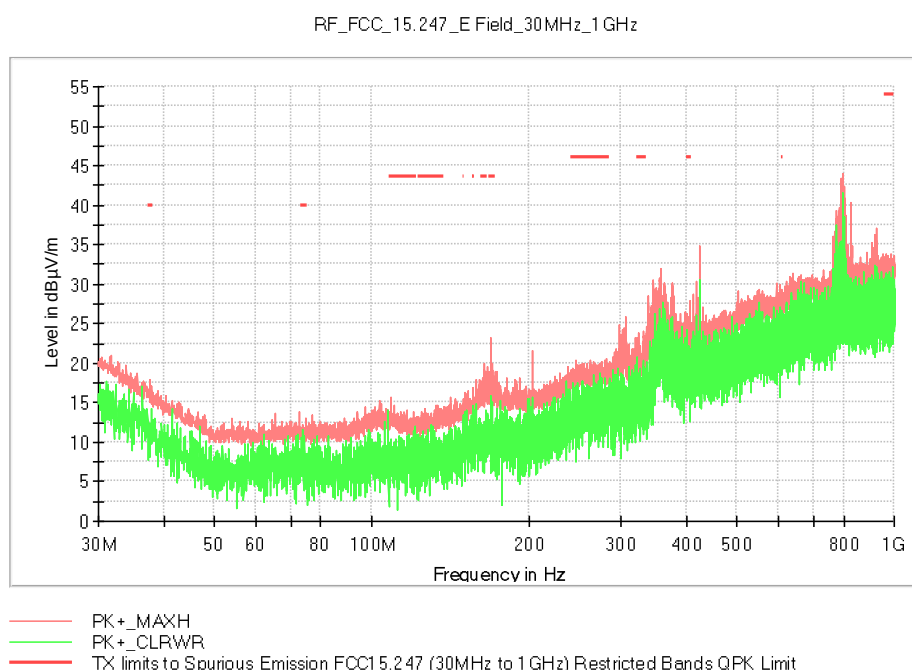
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Frequency range 1 GHz – 26 GHz

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

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)
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Maximizations

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Pol
169.437500	15.52	23.18	V
346.753500	19.83	30.65	H
425.129500	30.58	34.77	H
638.190000	22.88	31.41	H
799.743500	32.47	43.90	H
921.915000	28.60	37.04	V

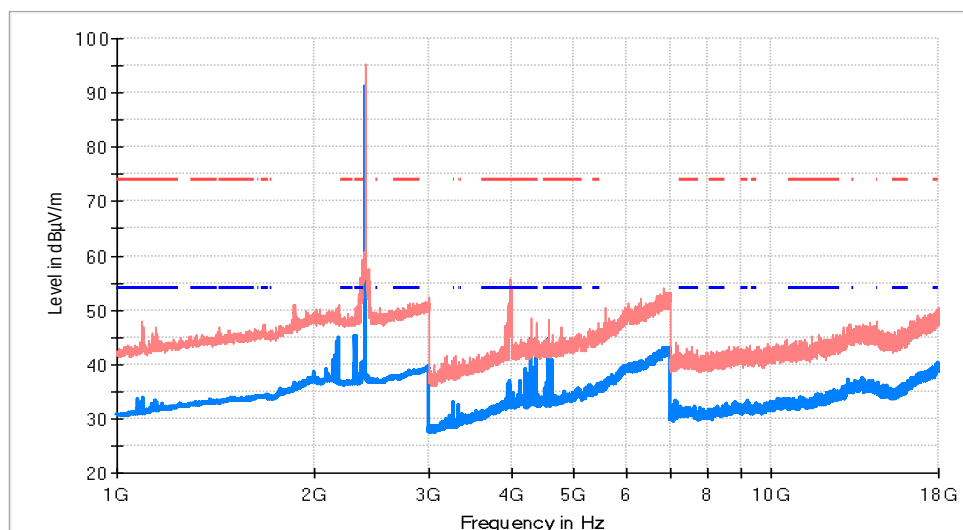
TEST RESULTS (Cont.)

FREQUENCY RANGE

1 GHz – 18 GHz (PI4DQPSK)

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

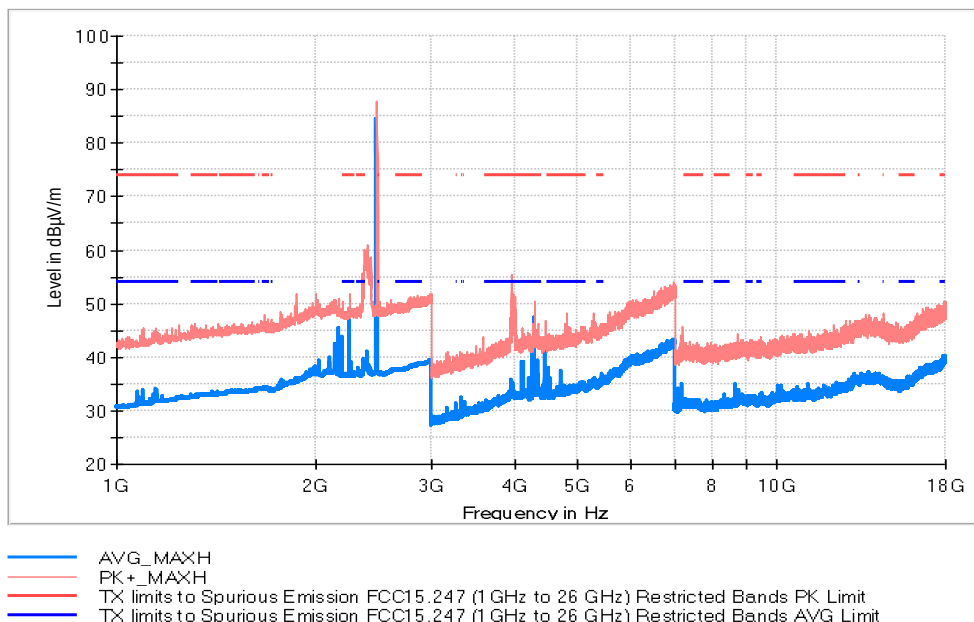
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2402.000000	94.41	91.16	H	Fundamental
4290.500000	48.29	44.69	V	
4369.000000	42.35	32.80	V	
4561.000000	47.97	44.70	V	
4633.000000	45.39	40.76	V	
4801.500000	41.61	33.29	H	

TEST RESULTS (Cont.)

CHANNEL: Middle (2440 MHz).

RF_FCC_15.247_E Field_1GHz_18GHz



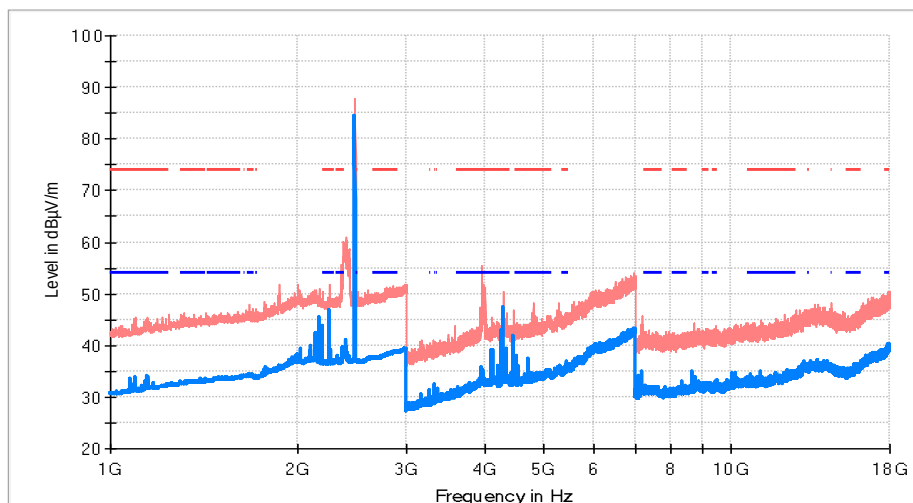
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2441.000000	93.17	90.04	H	Fundamental
3967.000000	58.52	38.74	V	
4298.500000	49.57	46.98	V	
4371.000000	47.96	43.00	V	
7176.500000	42.73	34.08	H	
10779.500000	42.24	34.94	V	

TEST RESULTS (Cont.)

CHANNEL: Highest (2480 MHz)

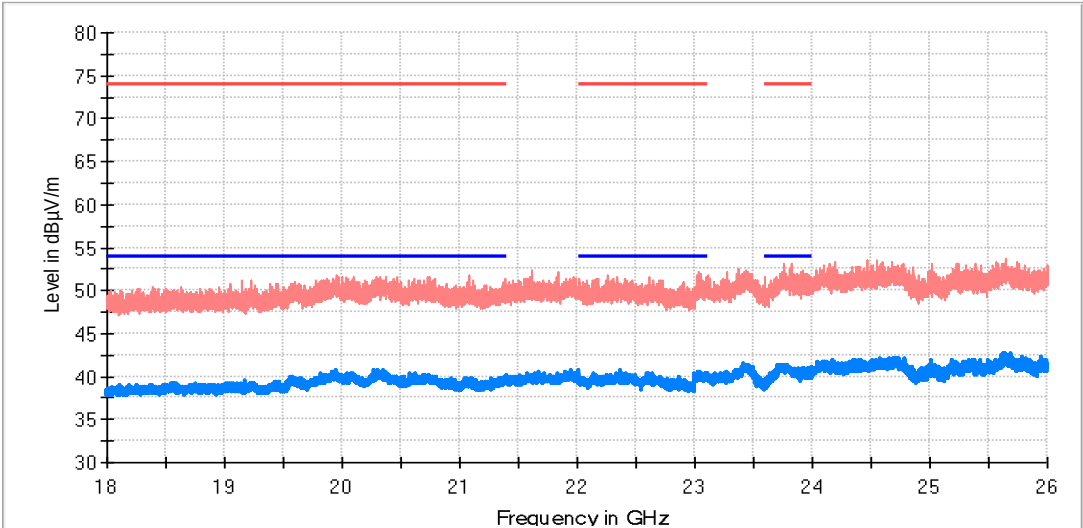
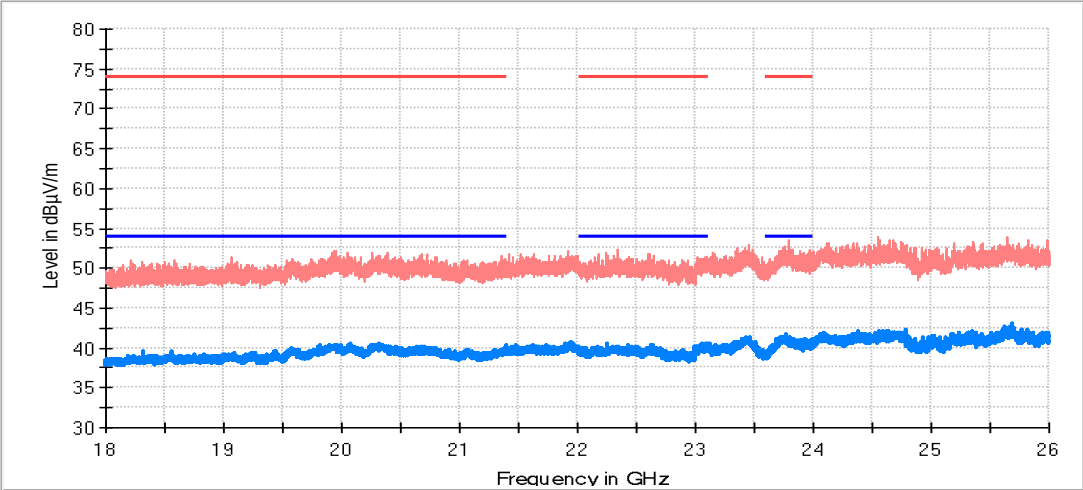
RF_FCC_15.247_E Field_1GHz_18GHz



PK+ MAXH
 AVG 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)	Pol	Comments
2256.500000	51.22	46.98	V	
2480.000000	87.80	84.47	H	Fundamental
3967.000000	51.40	35.74	V	
4286.500000	50.53	47.46	V	
4455.500000	46.72	41.90	V	
4523.000000	44.45	37.89	H	

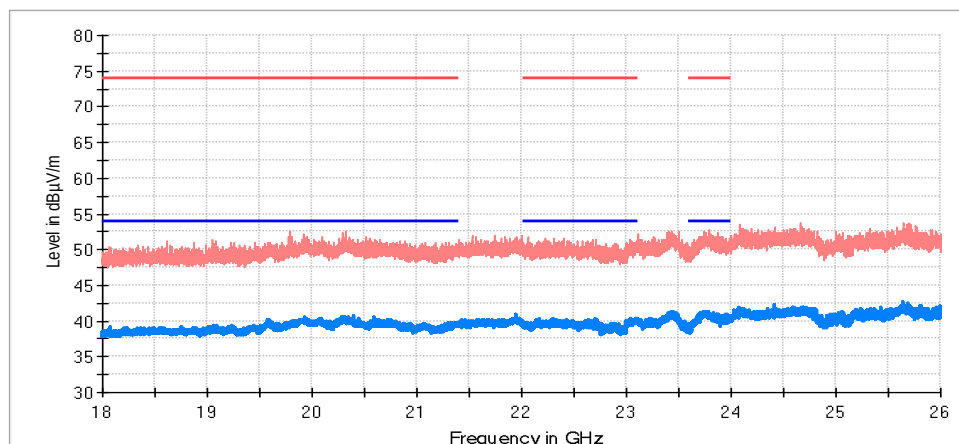
TEST RESULTS (Cont.)	
FREQUENCY RANGE	18 GHz – 26 GHz (PI4DQPSK)
CHANNEL: Lowest (2402 MHz) RF_FCC_15.247_E Field_18GHz_26GHz  Level in dBµV/m Frequency in GHz — AVG_MAXH — PK+_MAXH — TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit — TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit CHANNEL: Middle (2440 MHz) RF_FCC_15.247_E Field_18GHz_26GHz  Level in dBµV/m Frequency in GHz — AVG_MAXH — PK+_MAXH — TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit — TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit	

TEST RESULTS (Cont.)

18 GHz – 26 GHz (PI4DQPSK)

CHANNEL: Highest (2480 MHz)

RF_FCC_15.247_E Field_18GHz_26GHz



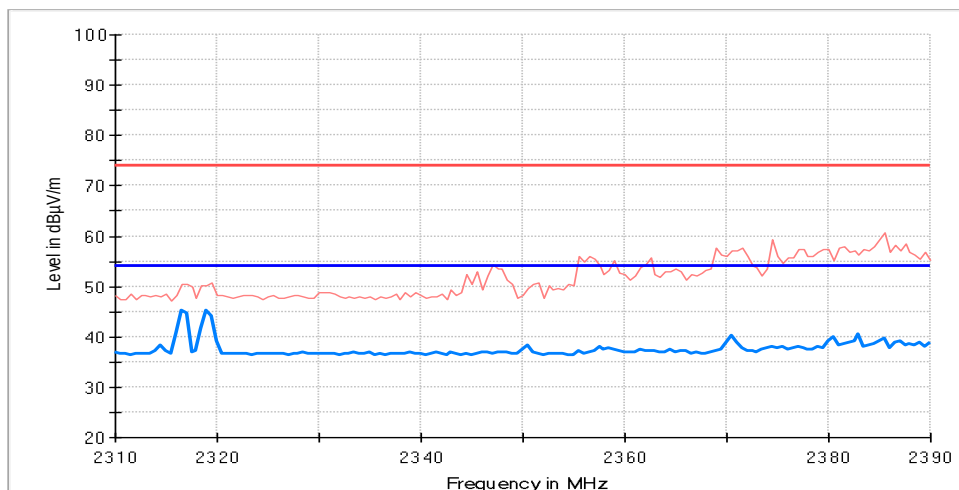
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

RESTRICTED BANDS

2.31 GHz – 2.39 GHz (PI4DQPSK)

CHANNEL: Lowest (2402 MHz)

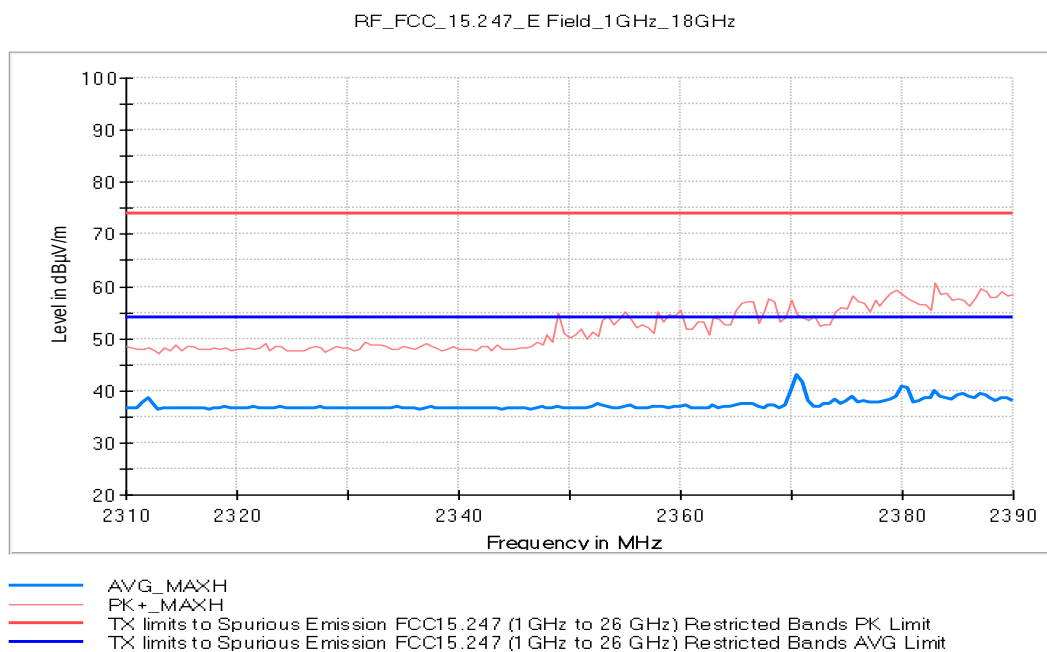
RF_FCC_15.247_E Field_1GHz_18GHz



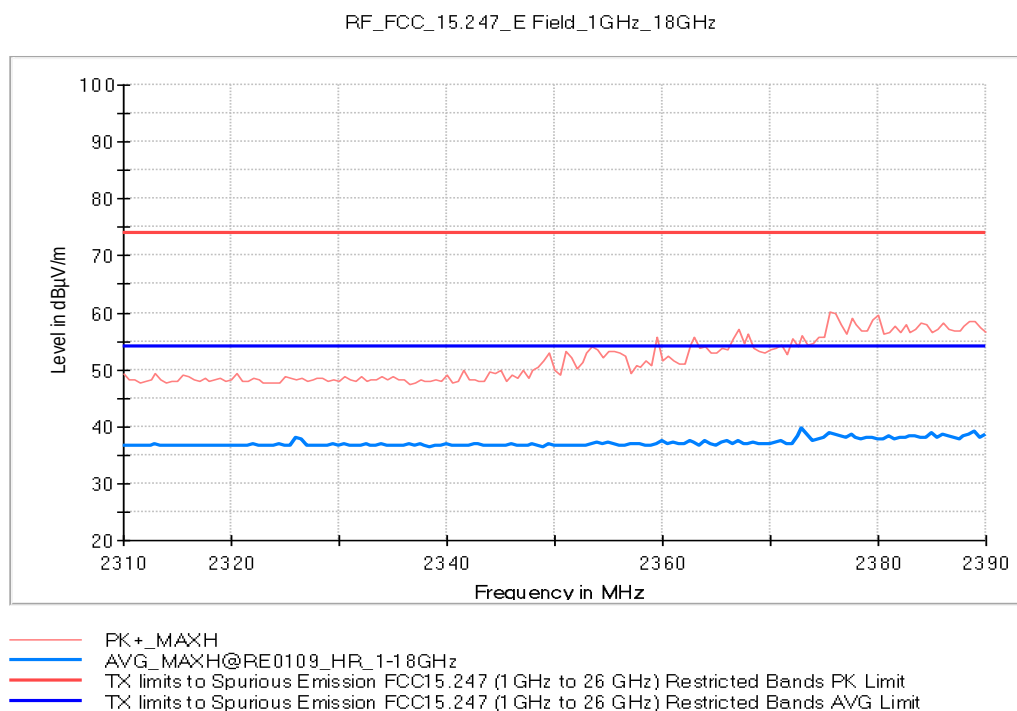
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

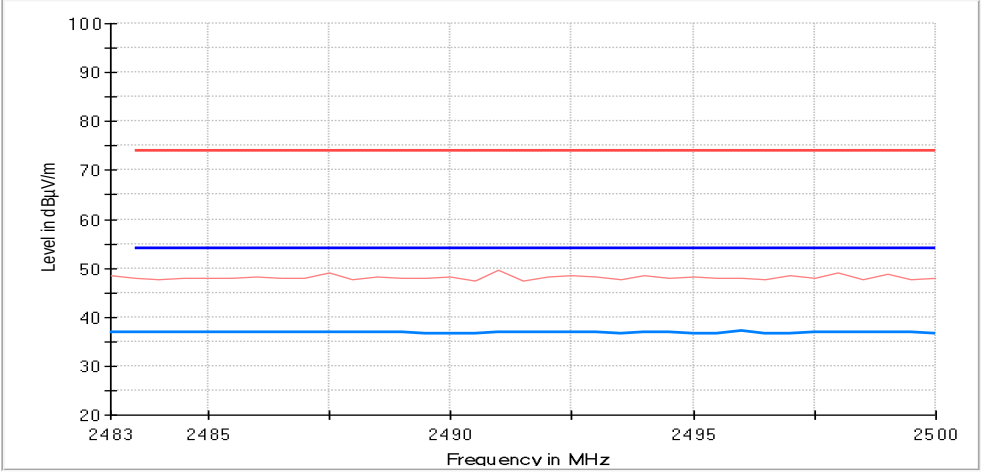
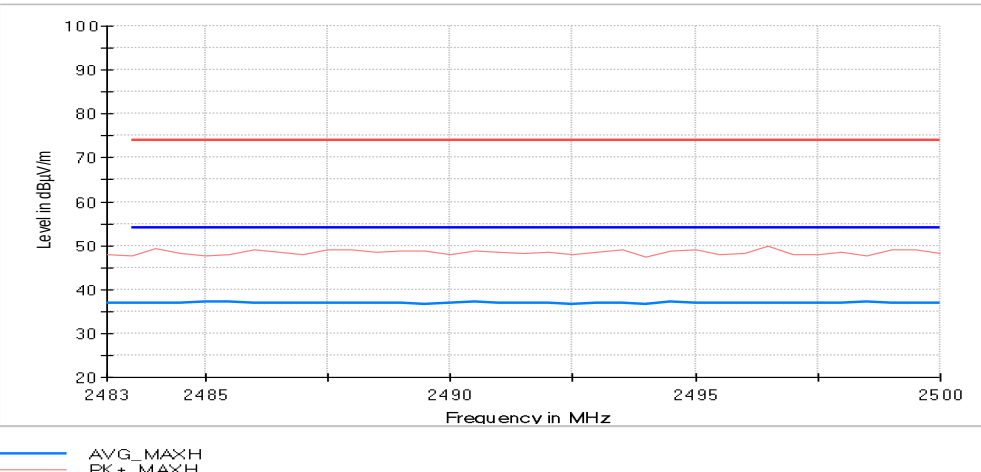
TEST RESULTS (Cont.)

CHANNEL: Middle (2440 MHz)



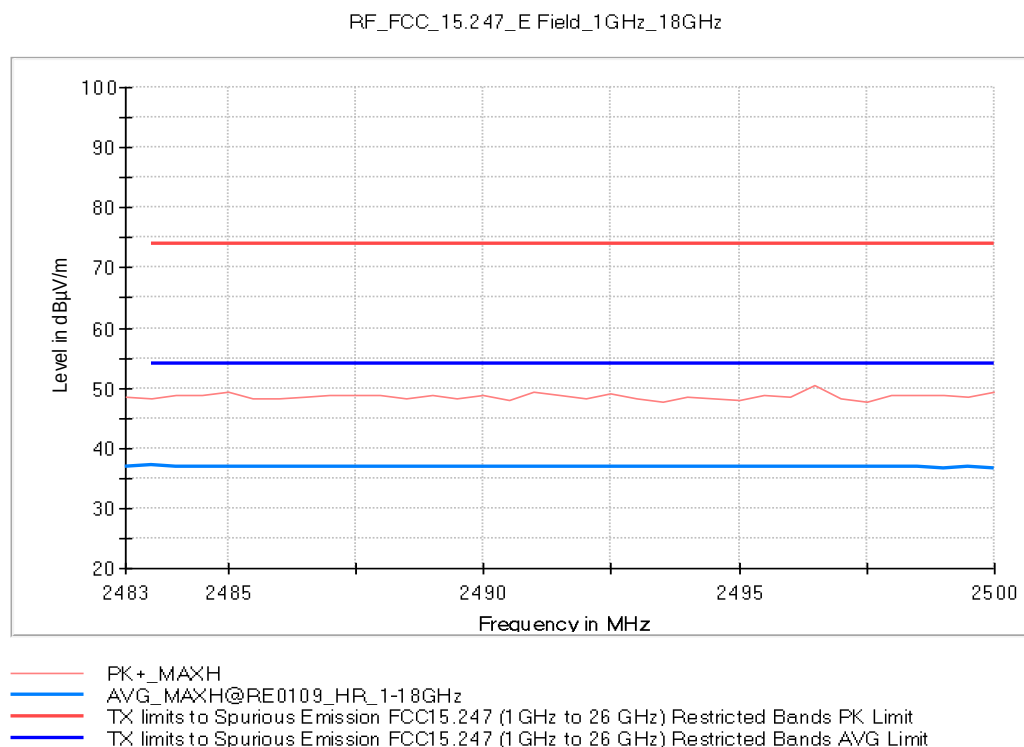
CHANNEL: Highest (2480 MHz)



TEST RESULTS (Cont.)	
RESTRICTED BANDS	2.483 GHz – 2.5 GHz (PI4DQPSK)
CHANNEL: Lowest (2402 MHz) RF_FCC_15.247_E Field_1GHz_18GHz  Level in dBµV/m Frequency in 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) RF_FCC_15.247_E Field_1GHz_18GHz  Level in dBµV/m Frequency in 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)



TESTED SAMPLES:

S/02

TESTED CONDITIONS MODES:

TC#03

TEST RESULTS:

PASS

Frequency range 30 MHz – 1000 MHz

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

Frequency range 1 GHz – 26 GHz

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

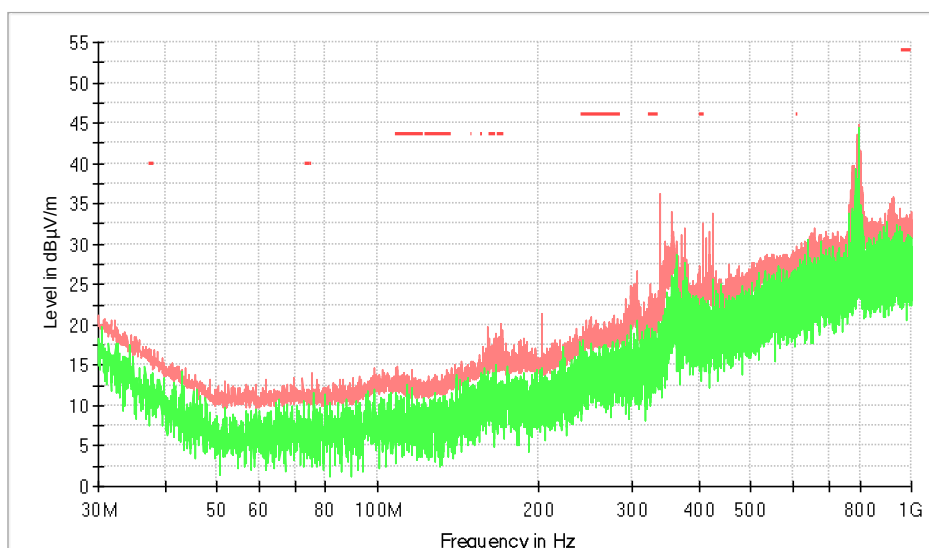
The radiated spurious signals detected at less than 10 dB respect to the limit for the lowest, middle and highest operating channels are showed in the tables below of each frequency range.

TEST RESULTS (Cont.)

FREQUENCY RANGE

30 MHz – 1000 MHz (8DPSK)

RF_FCC_15.247_E Field_30MHz_1GHz



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

Maximizations

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Pol
30.048500	16.0	21.2	H
338.654000	16.6	36.3	H
356.308000	22.7	33.9	H
659.869500	22.1	32.0	H
797.464000	27.2	44.8	H
922.303000	25.6	35.9	V

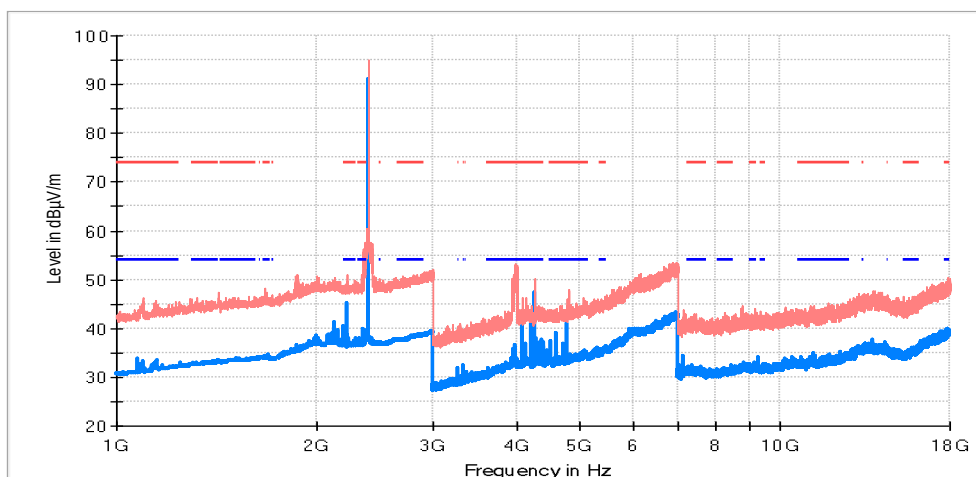
TEST RESULTS (Cont.)

FREQUENCY RANGE

1 GHz – 18 GHz (8DPSK)

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

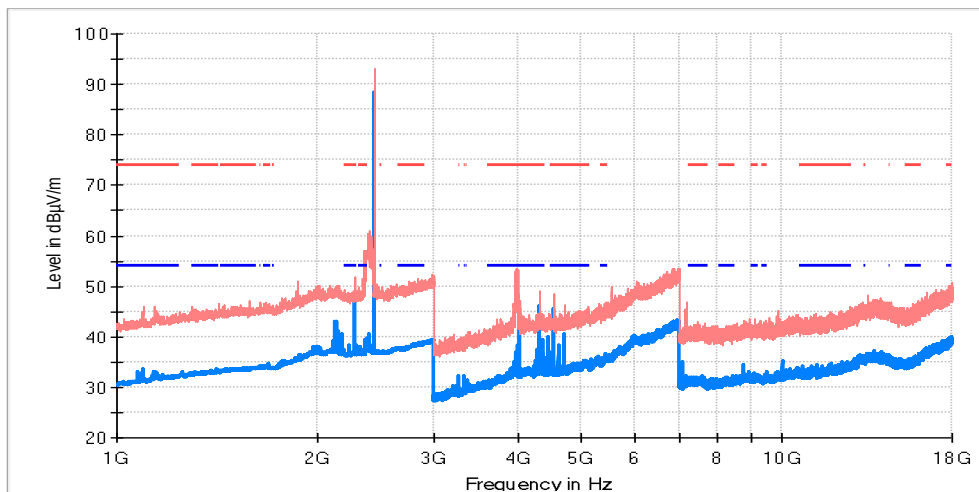
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2402.000000	95.09	91.13	H	Fundamental
4273.500000	49.58	47.32	V	
4765.000000	45.95	41.05	V	
7126.000000	40.83	34.52	H	
11259.500000	41.52	34.95	H	
13790.000000	46.29	37.71	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 (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

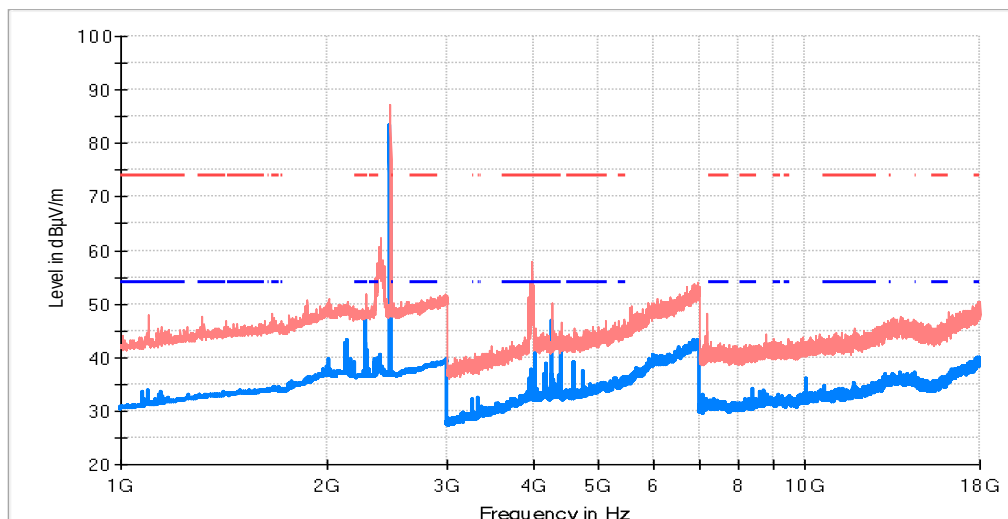
Maximizations

Frequency (MHz)	PK+_MAXH (dBμV/m)	AVG_MAXH (dBμV/m)	Pol	Comments
2441.000000	93.1	88.3	H	Fundamental
4316.500000	49.2	46.0	V	
4549.000000	48.4	45.4	V	
4715.000000	46.2	40.5	V	
7094.000000	39.9	35.0	H	
10017.000000	41.0	35.2	H	

TEST RESULTS (Cont.)

CHANNEL: Highest (2480 MHz)

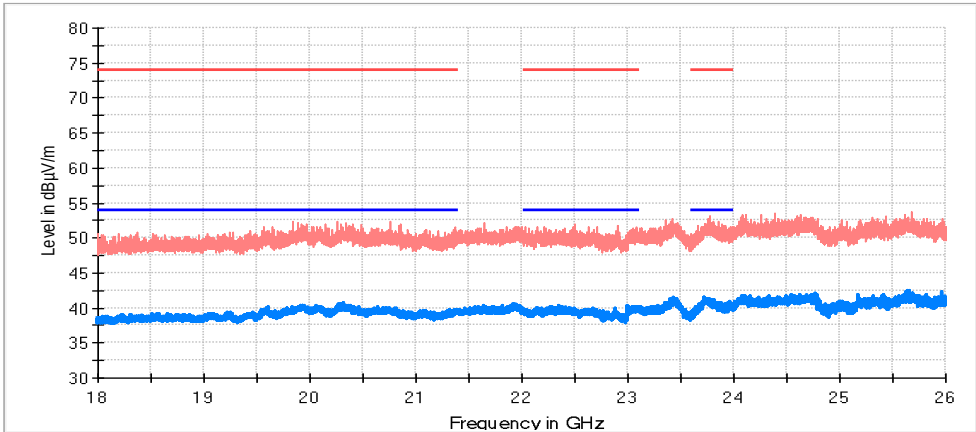
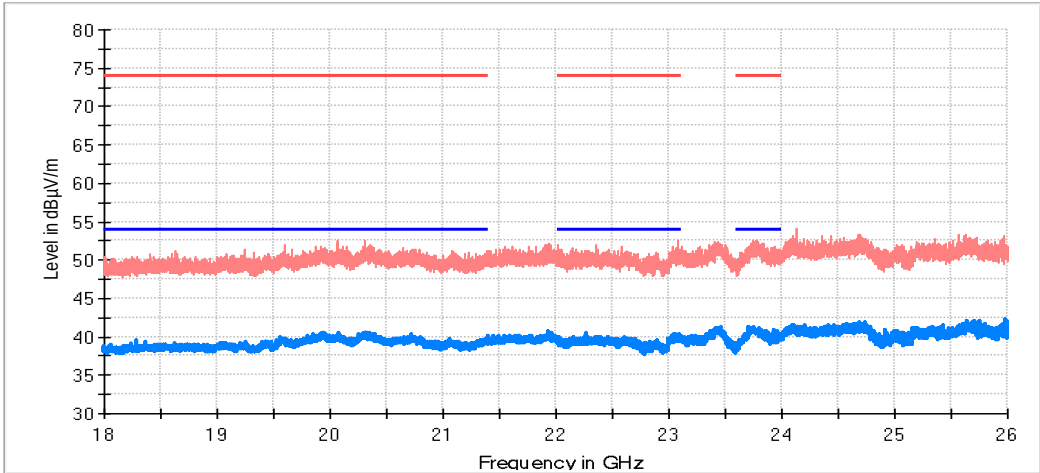
RF_FCC_15.247_E Field_1GHz_18GHz



— AVG_MAXH
 — PK+ MAXH
 — TX limits to Spurious Emission FCC15.247 (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

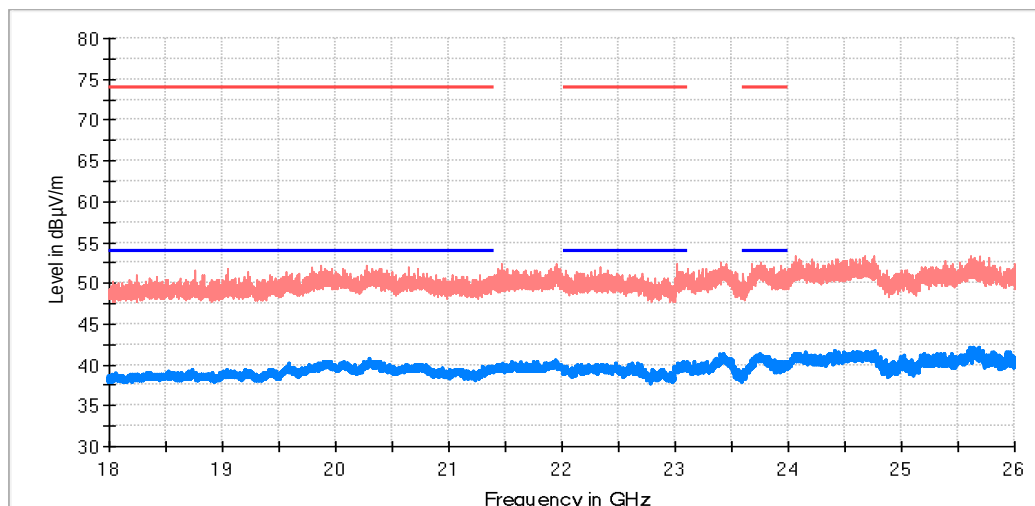
Frequency (MHz)	PK+ MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2279.500000	51.76	47.84	V	
2480.000000	87.17	83.37	H	Fundamental
4030.500000	45.39	40.63	V	
4262.500000	50.05	46.94	V	
4398.000000	46.63	42.32	V	
10077.500000	41.17	36.12	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	18 GHz – 26 GHz (8DPSK)
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



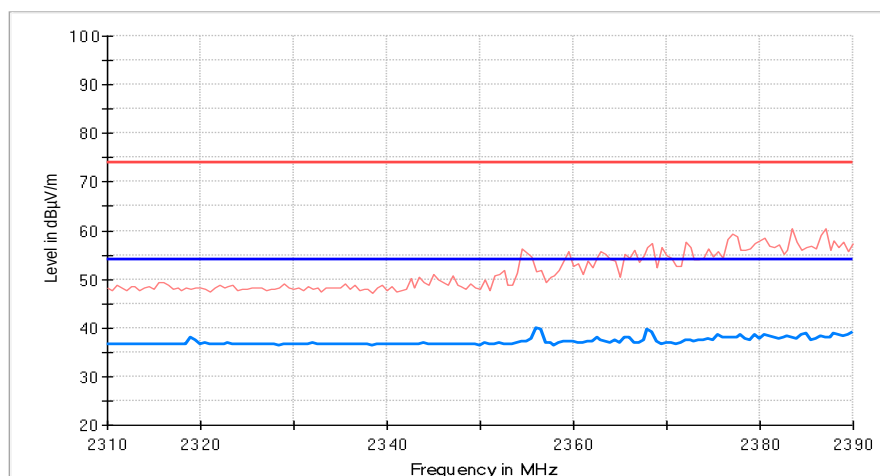
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

RESTRICTED BANDS

2.31 GHz – 2.39 GHz (8DPSK)

CHANNEL: Lowest (2402 MHz)

RF_FCC_15.247_E Field_1GHz_18GHz

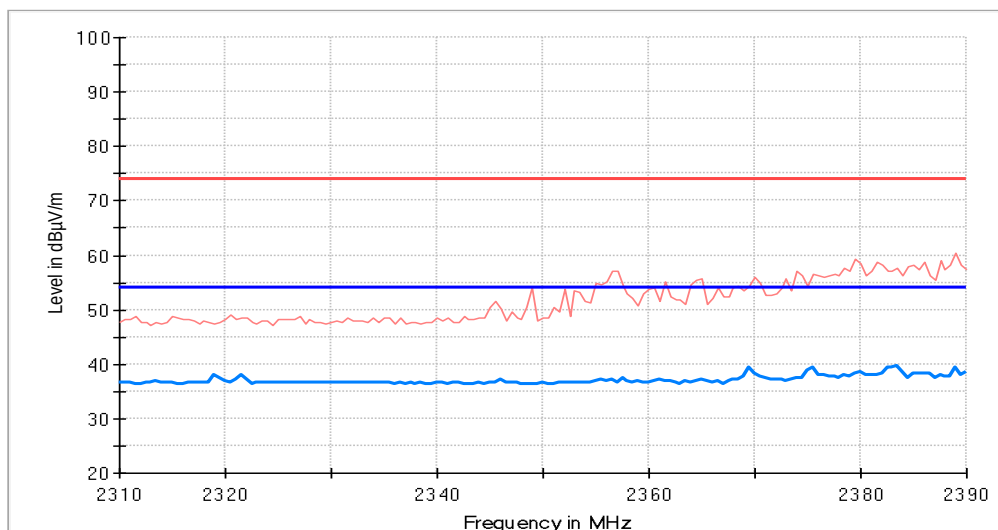


- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

TEST RESULTS (Cont.)

CHANNEL: Middle (2440 MHz)

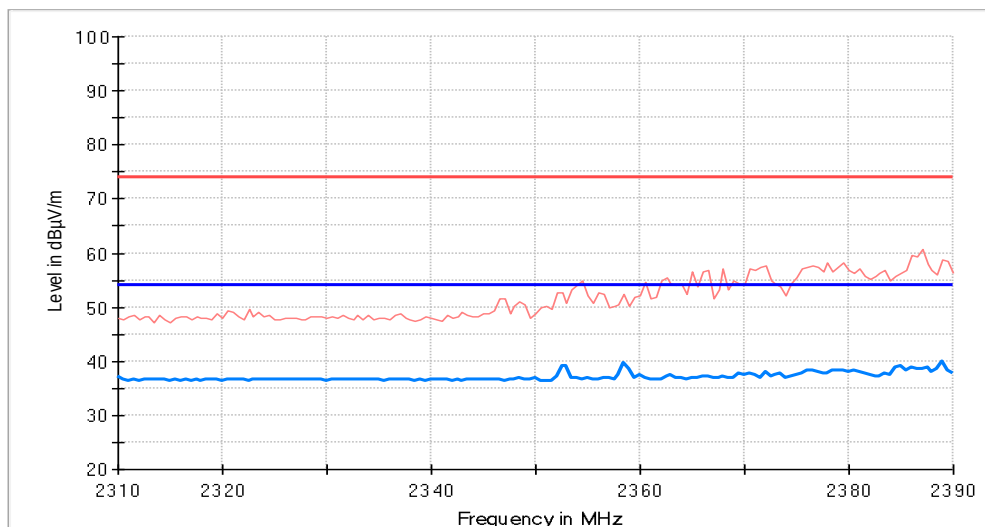
RF_FCC_15.247_E Field_1GHz_18GHz



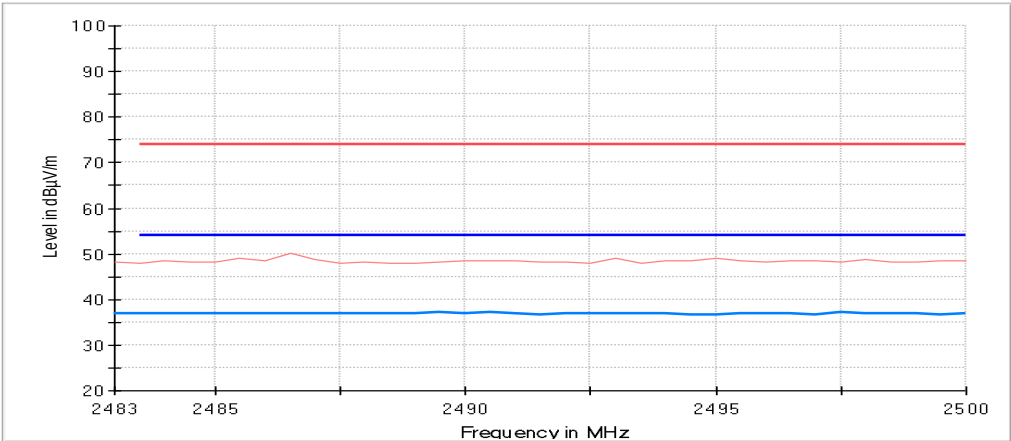
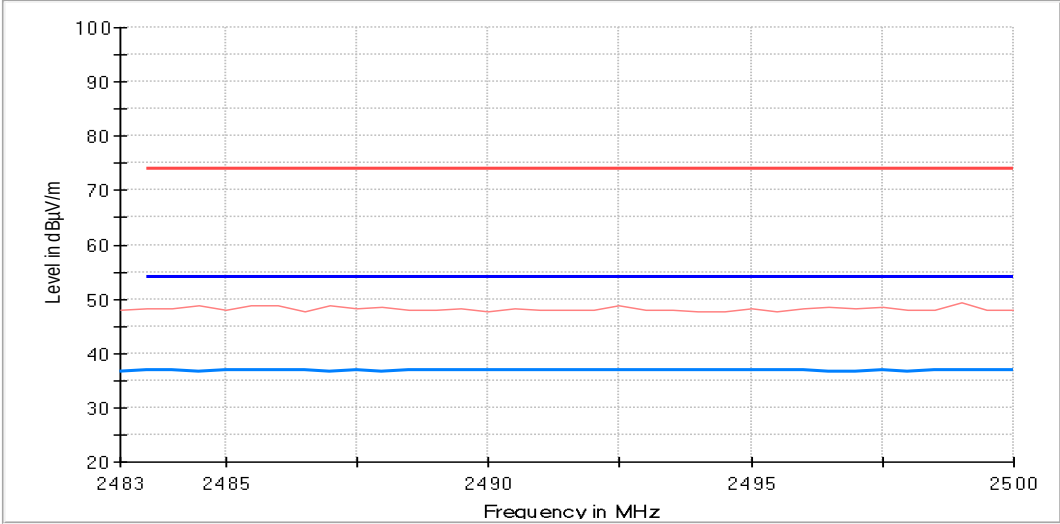
- AVG_MAXH
- PK+_MAXH
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1 GHz to 26 GHz) Restricted Bands AVG Limit

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

TEST RESULTS (Cont.)	
RESTRICTED BANDS	2.483 GHz – 2.5 GHz (8DPSK)
CHANNEL: Lowest (2402 MHz) RF_FCC_15.247_E Field_1GHz_18GHz  Level in dBµV/m Frequency in 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) RF_FCC_15.247_E Field_1GHz_18GHz  Level in dBµV/m Frequency in 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)

