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United States of America

DEKRA

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2271ERM.007A1

Test report

USA FCC Part 15.407 (U-NIII), 15.209
CANADA RSS-210, RSS-Gen
Unlicensed National Information Infrastructure Devices. General technical requirements.
Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment. General Requirements and Information for the Certification of Radio Apparatus.

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 15.407 10-1-18 Edition: Unlicensed National Information Infrastructure Devices. General technical requirements. 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 Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General UNII Test Procedures New Rules v02r01 dated 12/14/2018. 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

Index

Competences and guarantees 3
General conditions 3
Uncertainty 3
Data provided by the client 4
Usage of samples 4
Test sample description 5
Identification of the client 6
Testing period and place 6
Document history 6
Modifications to the reference test report 7
Environmental conditions 7
Remarks and comments 8
Testing verdicts 8
Summary 9
List of equipment used during the test 10
Appendix A: Test results for 5.15 GHz – 5.25 GHz Band 10
Appendix B: Test results for 5.725 GHz – 5.85 GHz Band 93

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, 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 Nº	Description	Model	Serial Nº	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 & B.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2271.047	Car Radio	MIB3E_MQB_BTWIFI	04S PM6-00124.08.18413E0167	12/21/2018
2271.019	Antenna	-	380	10/2/2018
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

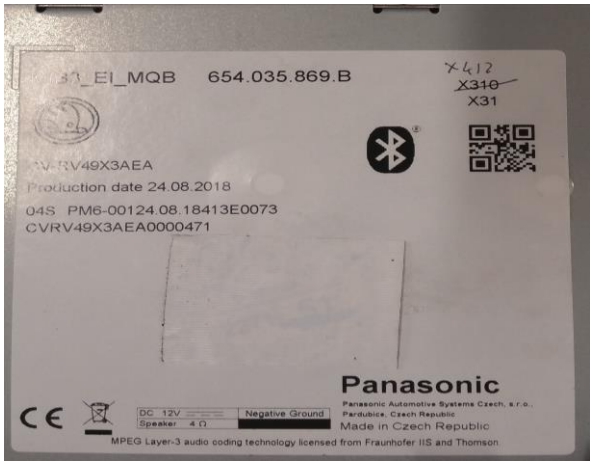
1. Sample S/02 has undergone following test(s):

   All radiated tests indicated in appendix A & B.

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: 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 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)	02-19-2019

Document history

Report number	Date	Description
2271ERM.007	01-25-2019	First release
2271ERM.007A1	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.007 related with the same samples, in the next clauses and sub-clauses:

Clauses/ Sub-Clauses	Modification	Justification
Page 32/ Maximum Output Power	Added Test Setup Description	Requested by the reviewer

This modification test report cancels and replaces the test report 2271ERM.007

Environmental conditions

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

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

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

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

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

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

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-247 (WIFI 5GHz) 5.15 GHz -5.25 GHz Band					
Report Section	**15.407 Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1	§ 15.403 (i) KDB 789033 D02	RSS 247 6.2.1	26dB Emission Bandwidth & Occupied Bandwidth	P	N/A
A.2	§ 15.407 (a) (1) (4)	RSS 247 6.2.1.1	Power Limits. Maximum Output Power	P	N/A
A.3	§ 15.407 (a) (1) (5)	RSS-247 6.2.1.1	Maximum Power Spectral Density	P	N/A
A.4	§ 15.407 (b) (1)	RSS-247 6.2.1.2	Band-edge conducted emissions compliance (Transmitter)	P	N/A
--	§ 15.407 (b)(6) § 15.207	RSS-Gen 8.8	Emission limitations Conducted (Transmitter)	N/A	Refer 1
A.5	§ 15.407 (b)(1)(6)(7) § 15.209 § 15.205	RSS-247 6.2.1.2 RSS-Gen 8.9 & 8.10	Undesirable radiated emissions (Transmitter)	P	N/A
--	§ 15.407 (g)	RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 2

Supplementary information and remarks:

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

1) DUT has an integral antenna, so tested in Radiated process.
2) The compliance is checked through a description of how this requirement is met that is provided by the applicant.

FCC PART 15 PARAGRAPH / RSS-247 (WIFI 5GHz) 5.725 GHz -5.85 GHz Band					
Report Section	**15.247 Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
B.1	§ 15.403 (i) KDB 789033 D02	RSS 247 6.2.4	26dB Emission Bandwidth & Occupied Bandwidth	P	N/A
B.2	§ 15.407 (e)	RSS 247 6.2.4.1	6dB Bandwidth	P	N/A
B.3	§ 15.407 (a)(3)(4)	RSS 247 6.2.4.1	Power Limits. Maximum Output Power	P	N/A
B.4	§ 15.407 (a)(3)(5)	RSS-247 6.2.4.1	Maximum Power Spectral Density	P	N/A
B.5	§ 15.407 (b)(4)	RSS-247 6.2.4.2	Band-edge conducted emissions compliance (Transmitter)	P	N/A
--	§ 15.407 (b)(6) § 15.207	RSS-Gen 8.8	Emission limitations Conducted (Transmitter)	N/A	Refer 1
B.6	§ 15.407 (b)(4)(6)(7) § 15.209 § 15.205	RSS-247 6.2.4.2 RSS-Gen 8.9 & 8.10	Undesirable radiated emissions (Transmitter)	P	N/A
--	§ 15.407 (g)	RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 2

Supplementary information and remarks:

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

1) DUT has an integral antenna, so tested in Radiated process.
2) The compliance is checked through a description of how this requirement is met that is provided by the applicant.

FCC PART 15 PARAGRAPH / RSS-247 (WIFI 5GHz) Common Requirements for all bands					
Report Section	**15.247 Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1	§ 15.407 (c)	--	Transmission in case of absence of information to transmit, or operational failure.	N/M	Refer 1

Supplementary information and remarks:

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

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
5.15 GHz – 5.25 GHz Band

Appendix A Content

PRODUCT INFORMATION 12
DESCRIPTION OF TEST CONDITIONS 13
TEST A.1: 26DB EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH 14
TEST A.2: POWER LIMITS. MAXIMUM OUTPUT POWER 31
TEST A.3: POWER SPECTRAL DENSITY 40
TEST A.4: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER) 51
TEST A.5: UNDESIRABLE RADIATED EMISSIONS (TRANSMITTER) 63

PRODUCT INFORMATION

The following information is provided by the client

Information	Description
Modulation	Other forms of modulation
Adaptive	Adaptive Equipment without the possibility to switch to a non-adaptive equipment.
Maximum RF Output Power	14 dBm
Operation mode 1: Single Antenna Equipment	Equipment with only one antenna
- Operating Frequency Range	5150 - 5250 MHz
- Nominal Channel Bandwidth	20/ 40/ 80 MHz
Extreme operating conditions	
- Temperature range	-38 ºC to +70 ºC
Antenna type	Integral antenna
Antenna gain	0.7 dBi
Nominal Voltage	
- Supply Voltage	12 Vdc
- Type of power source	DC voltage from battery
Equipment type	WIFI 5GHz
Geo-location capability	No

DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01(1) **(a mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Test Frequencies for Conducted/Radiated tests: **(20 MHz)** Lowest range: 5180 MHz Middle channel: 5220 MHz Highest range: 5240 MHz
TC#02(1) **(n mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Test Frequencies for Conducted/Radiated tests: **(20 MHz)** Lowest channel: 5180 MHz Middle channel: 5220 MHz Highest channel: 5240 MHz Test Frequencies for Conducted/Radiated tests: **(40 MHz)** Lowest channel: 5180 MHz Highest channel: 5240 MHz
TC#03(1) **(ac mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Test Frequencies for Conducted/Radiated tests: **(20 MHz)** Lowest channel: 5180 MHz Middle channel: 5220 MHz Highest channel: 5240 MHz Test Frequencies for Conducted/Radiated tests: **(40 MHz)** Lowest channel: 5180 MHz Highest channel: 5240 MHz Test Frequencies for Conducted/Radiated tests: **(80 MHz)** Middle channel: 5180 MHz

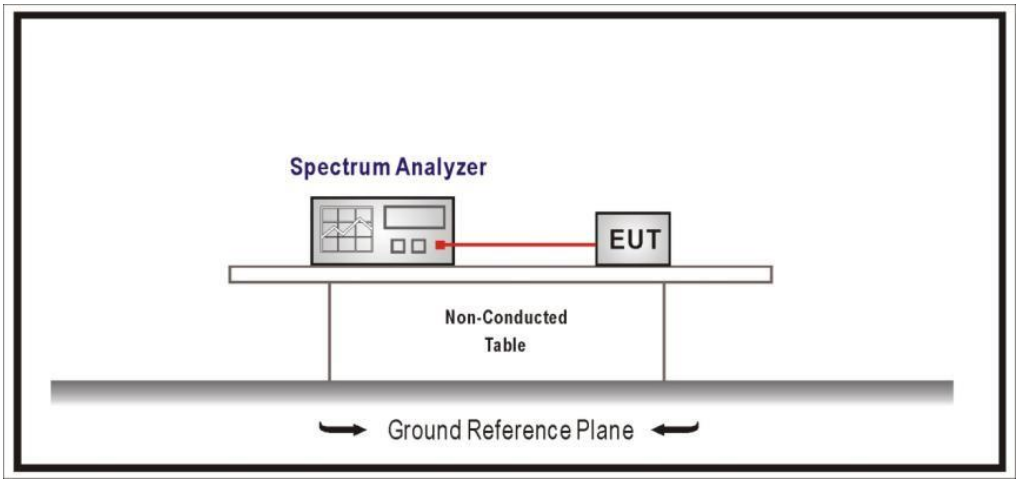
Note (1): For spurious emissions for OFDM modes 802.11a, 802.11n20/40 and 802.11ac20/40/80 a preliminary scan was performed to determine the worst case.
The data rates of 6Mb/s for 802.11a, HT0 (SISO) for 802.11n20/ac20 and n40/ac40, and VHT0 (SISO) for 802.11 ac80 were selected based on preliminary testing that identified those rates corresponding to the worst cases.

TEST A.1: 26DB EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH

LIMITS:	Product standard:	Part 15 Subpart C §15.403 and RSS-247
	Test standard:	Part 15 Subpart C §15.403 and RSS-247 6.2.1

No requirements requested

TEST SETUP:	



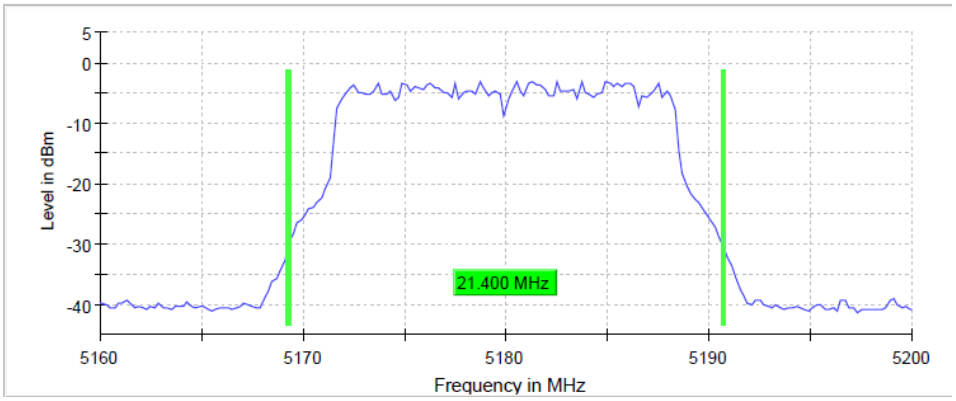
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 **(a mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

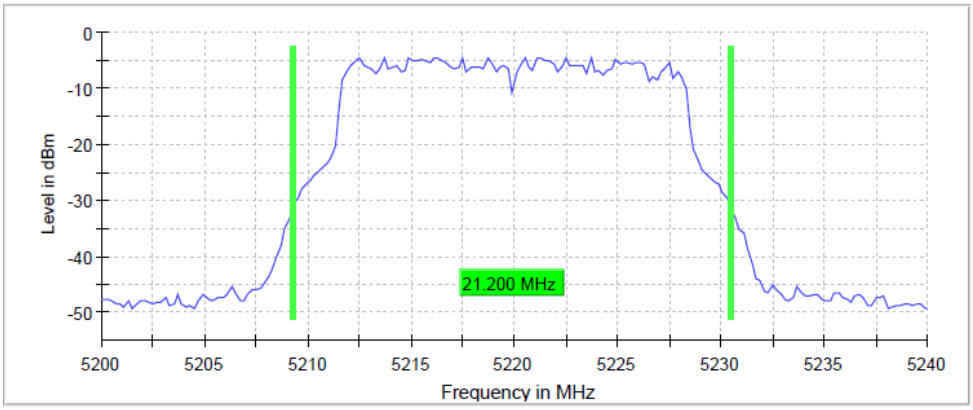
	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
26dB Bandwidth (MHz)	21.4	21.2	21.2
Occupied bandwidth (MHz)	16.6	16.6	16.6
Measurement uncertainty (kHz)	<± 8.33		

TEST RESULTS (Cont.):	26 dB BANDWIDTH

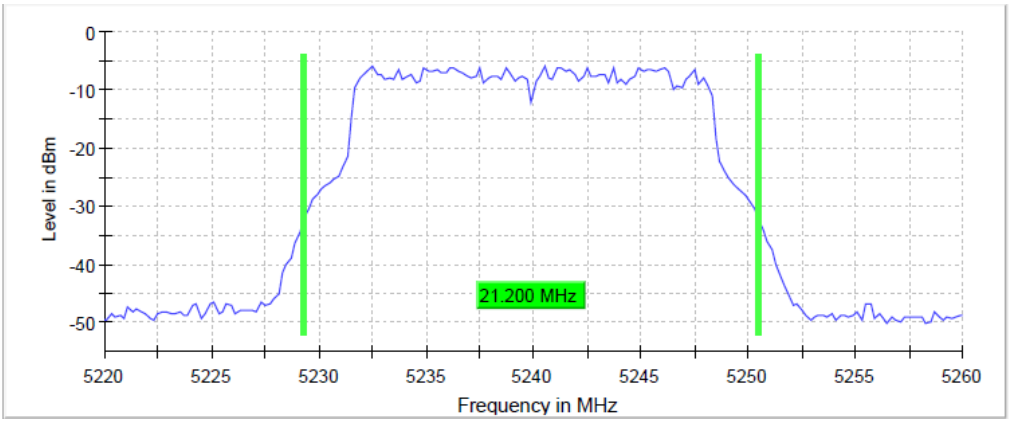
Lowest Channel



Middle Channel

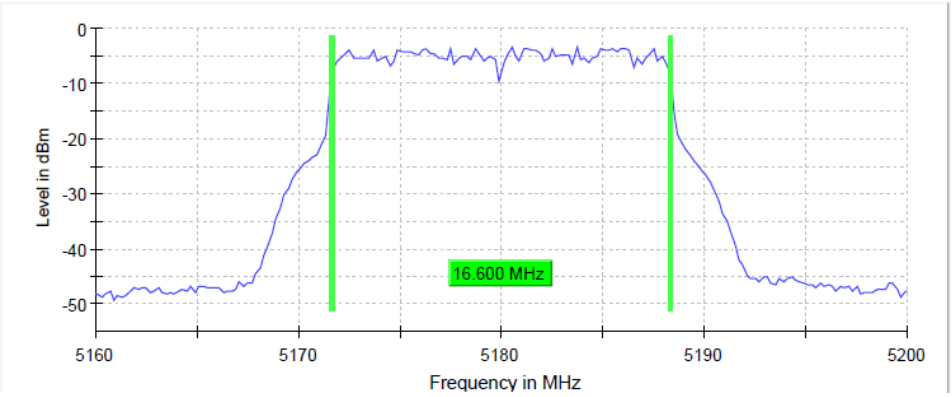


Highest Channel

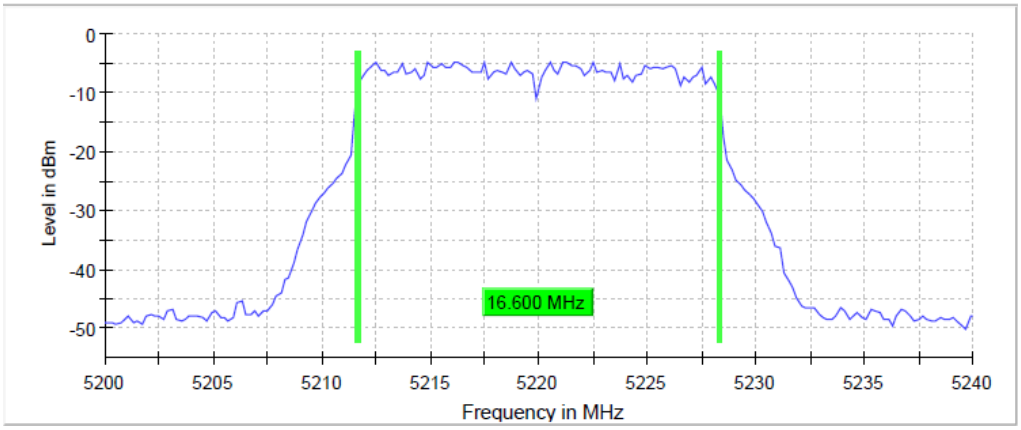


TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

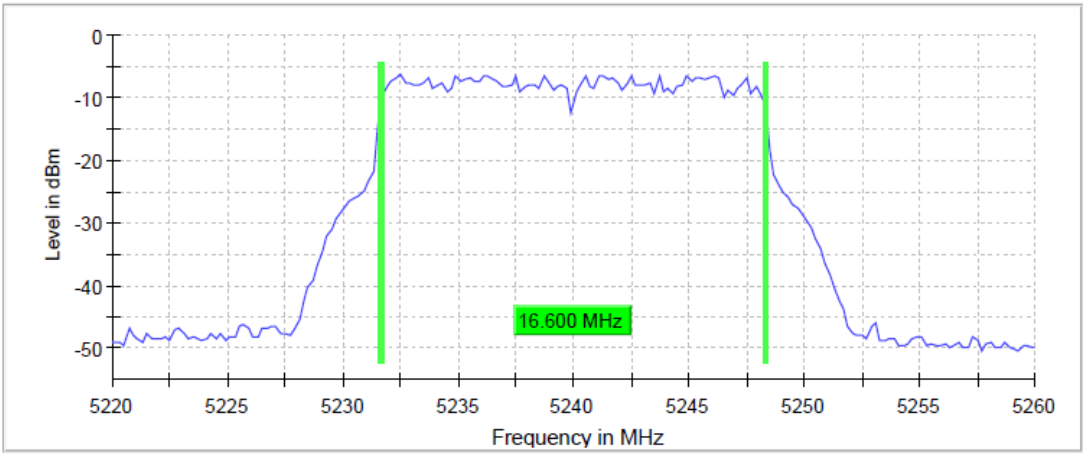
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.)	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.16000 GHz	5.20000 GHz	5.22000 GHz
Stop Frequency	5.20000 GHz	5.24000 GHz	5.26000 GHz
Span	40.000 MHz	40.000 MHz	40.000 MHz
RBW	200.000 kHz	200.000 KHkHz	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	20.000 dBm	10.000 dBm	10.000 dBm
Attenuation	40.000 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	0.30 dB	0.30 dB	0.30 dB
Run	18 / max. 150	20 / max. 150	14 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.13 dB	0.00 dB	0.12 dB

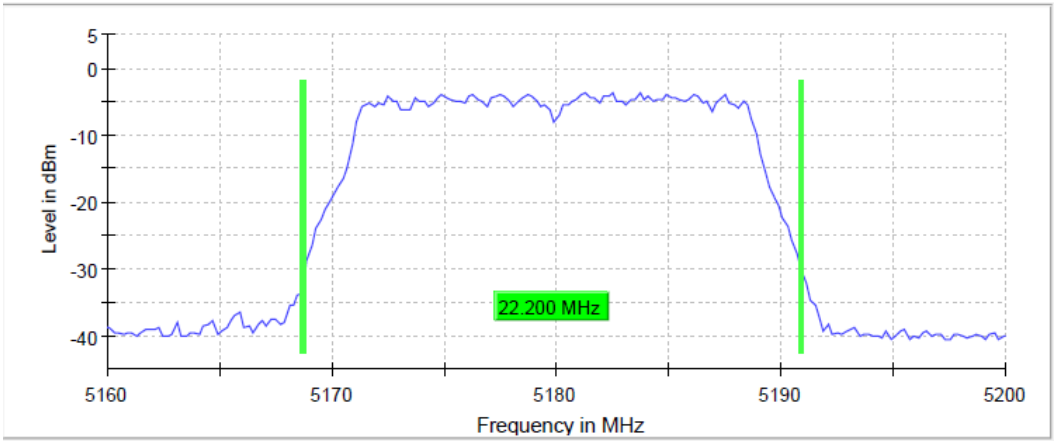
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 **(n Mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

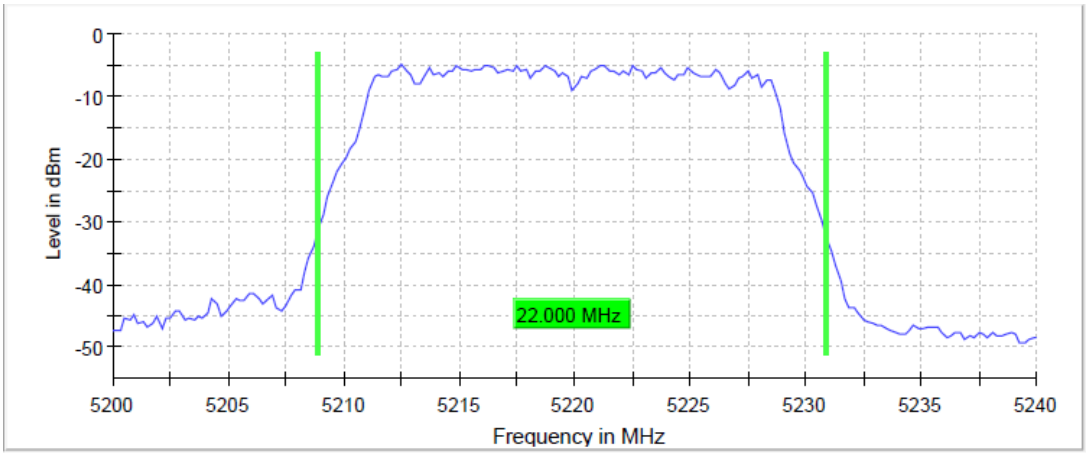
	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
26dB bandwidth (MHz)	22.2	22	22.4
Occupied bandwidth (MHz)	18	18	18.2
Measurement uncertainty (kHz)	<± 8.33		

TEST RESULTS (Cont.):	26 dB BANDWIDTH

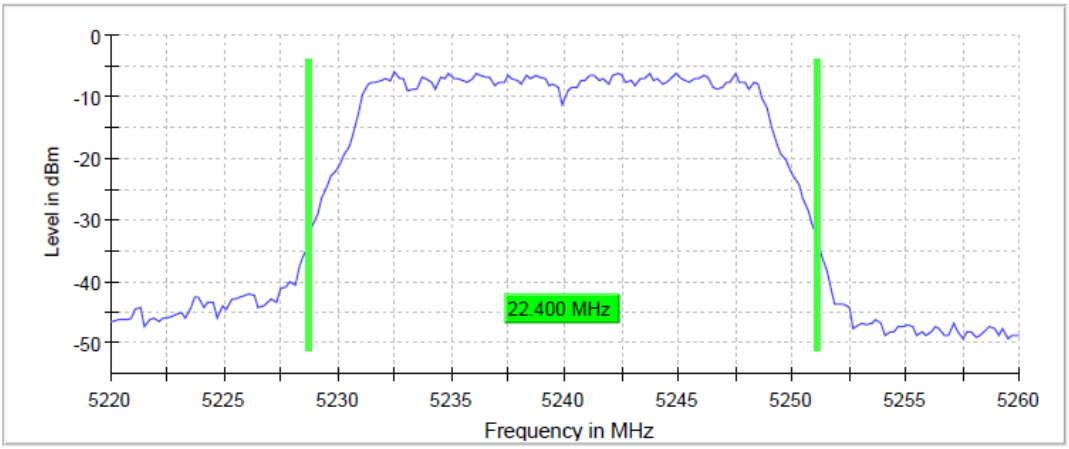
Lowest Channel



Middle Channel

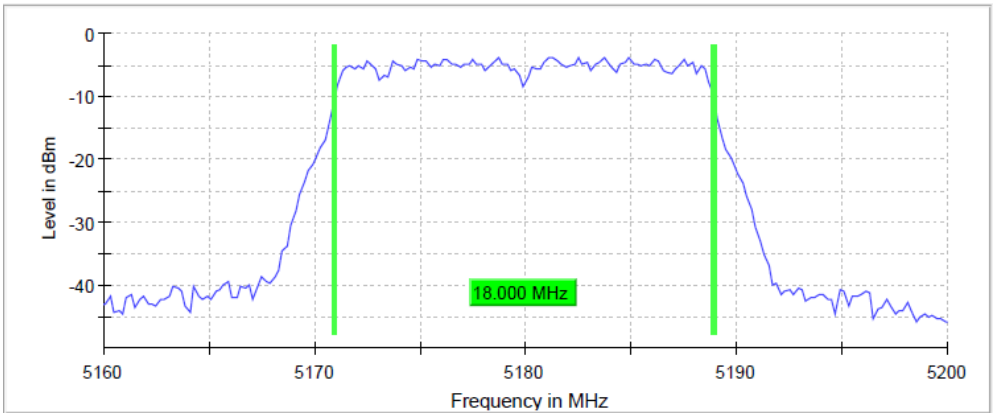


Highest Channel

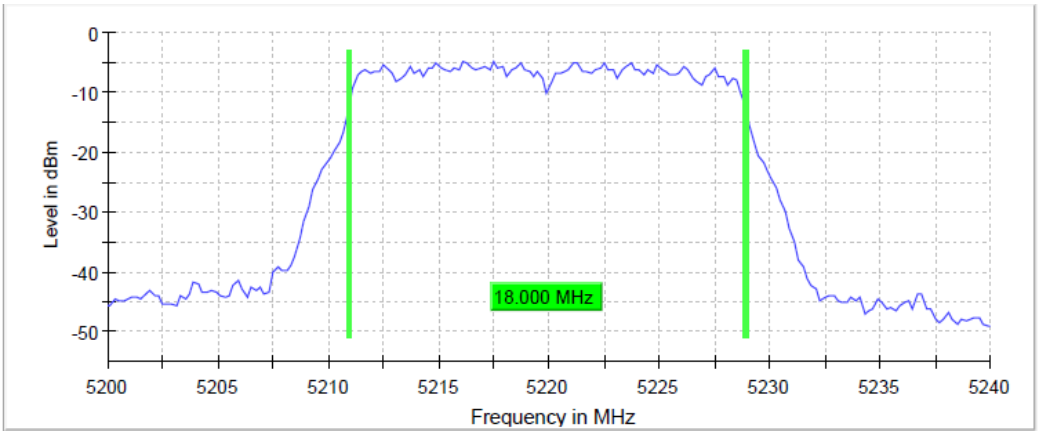


TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

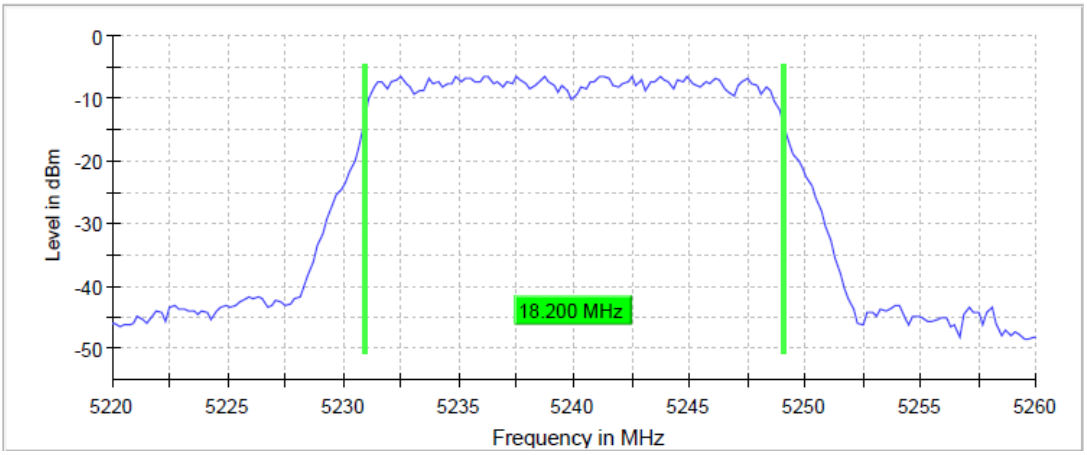
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.)	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.16000 GHz	5.20000 GHz	5.22000 GHz
Stop Frequency	5.20000 GHz	5.24000 GHz	5.26000 GHz
Span	40.000 MHz	40.000 MHz	40.000 MHz
RBW	200.000 kHz	200.000 KHkHz	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	20.000 dBm	10.000 dBm	10.000 dBm
Attenuation	40.000 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	0.30 dB	0.30 dB	0.30 dB
Run	40 / max. 150	40 / max. 150	40 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.16 dB	0.06 dB	0.00 dB

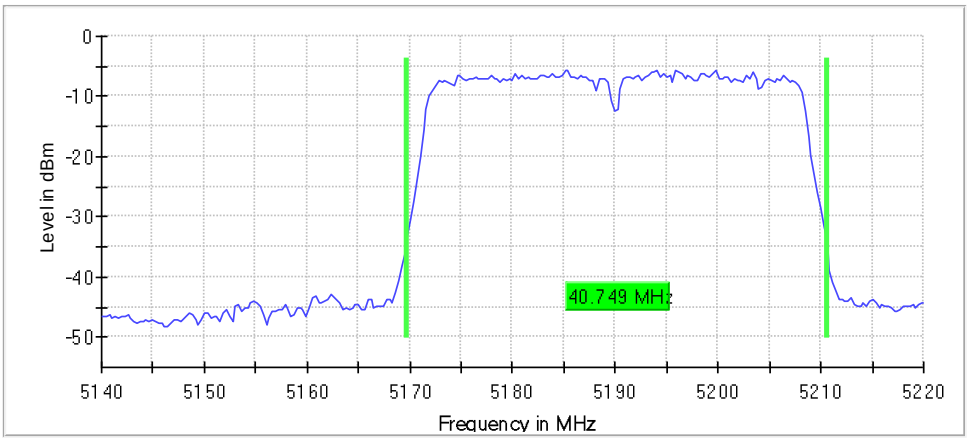
TEST RESULTS (Cont.)	n Mode

Bandwidth: 40 MHz

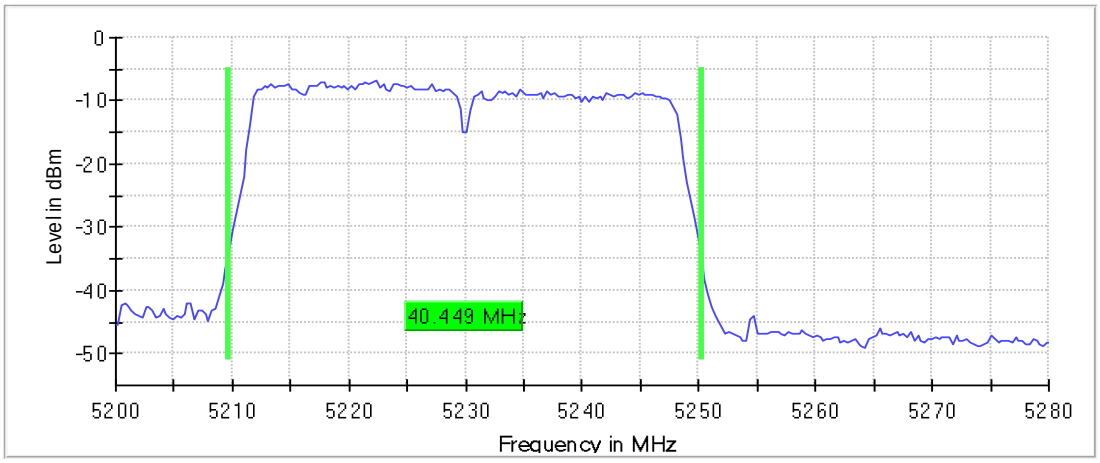
	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
26dB bandwidth (MHz)	40.749	40.449
Occupied bandwidth (MHz)	36.554	36.255
Measurement uncertainty (kHz)	<± 8.33	

TEST RESULTS (Cont.):	26 dB BANDWIDTH

Lowest Channel

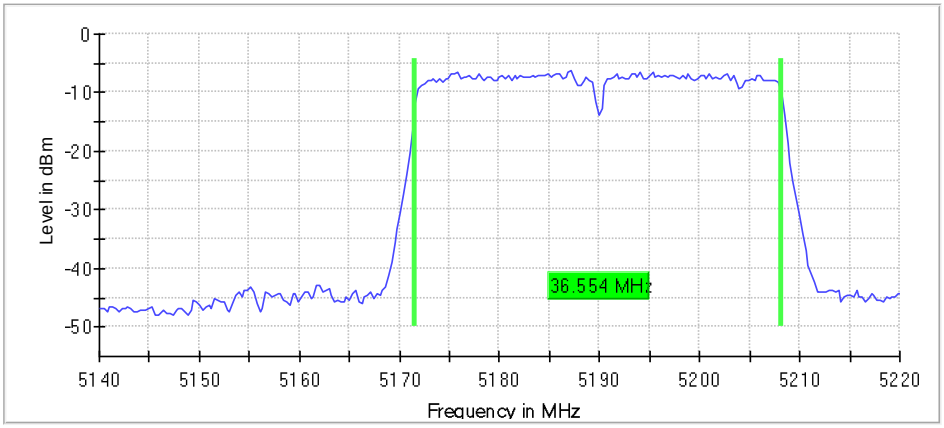


Highest Channel

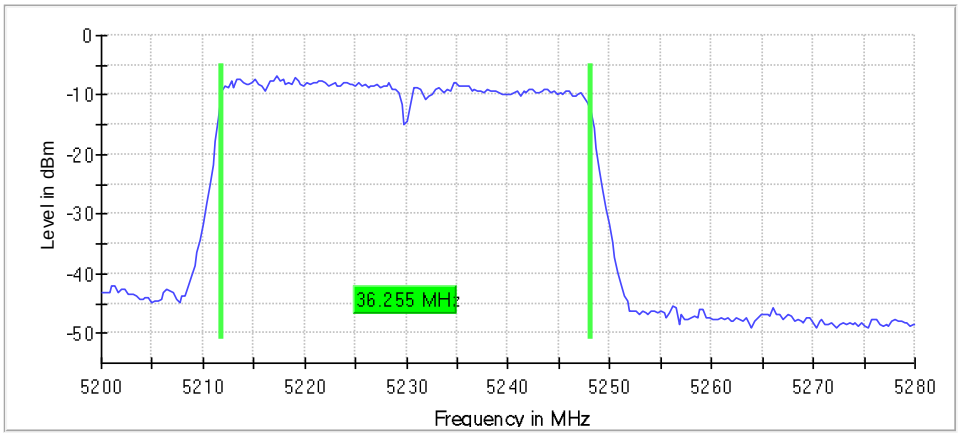


TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

Lowest Channel



Highest Channel



TEST RESULTS (Cont.)	

Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.14000 GHz	5.20000 GHz
Stop Frequency	5.22000 GHz	5.28000 GHz
Span	80.000 MHz	80.000 MHz
RBW	300.000 kHz	300.000
VBW	1.000 MHz	1.000 MHz
SweepPoints	267	267
Sweeptime	31.603 us	31.603 us
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	200	200
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	50 / max. 150	124 / max. 150
Stable	5 / 5	5 / 5
Max Stable	0.00 dB	0.18 dB

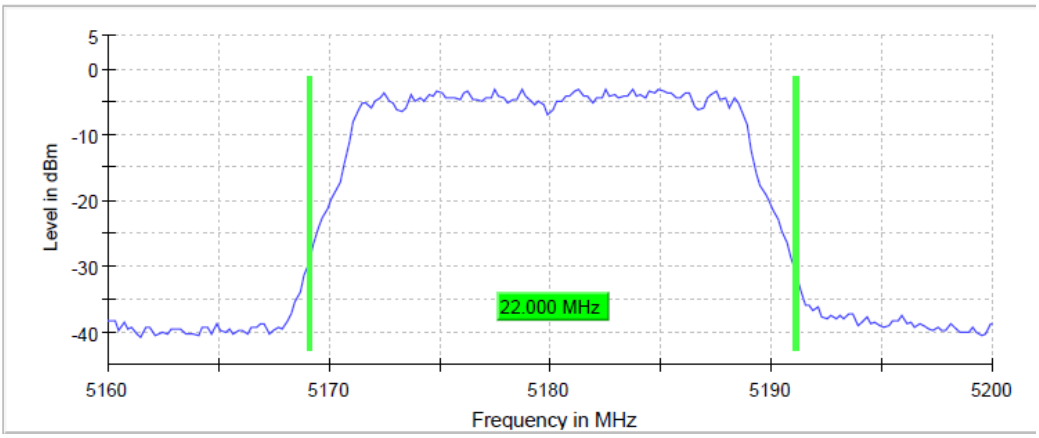
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (ac mode)
TEST RESULTS:	PASS

Bandwidth: 20 MHz

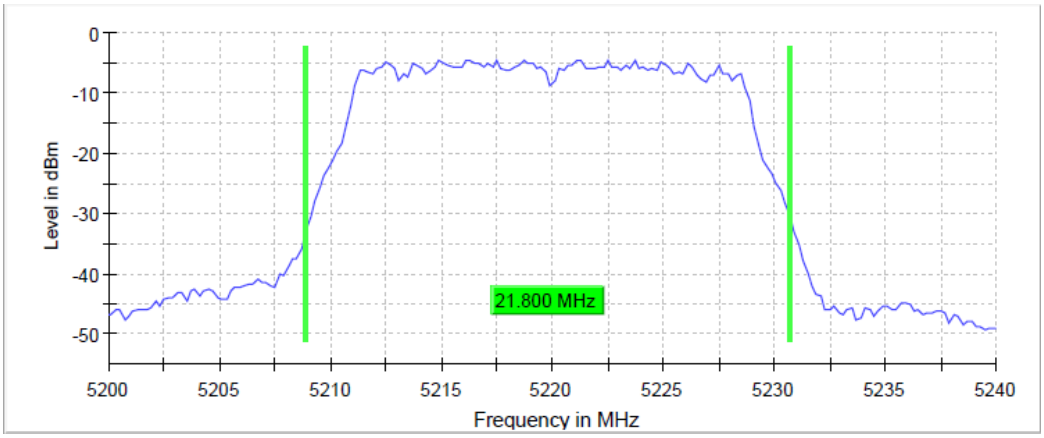
	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
26db bandwidth (MHz)	22	21.8	22
Occupied bandwidth (MHz)	18.2	18	18
Measurement uncertainty (kHz)	<± 8.33		

TEST RESULTS (Cont.):	26 dB BANDWIDTH

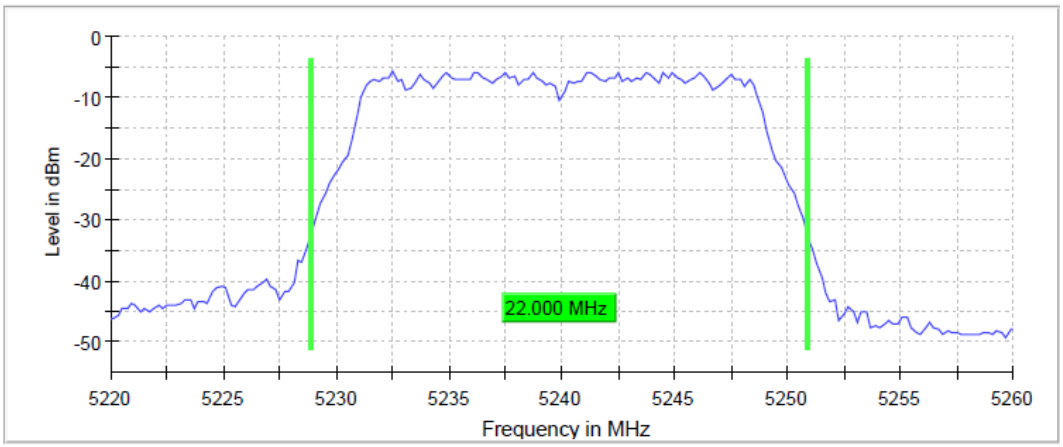
Lowest Channel



Middle Channel

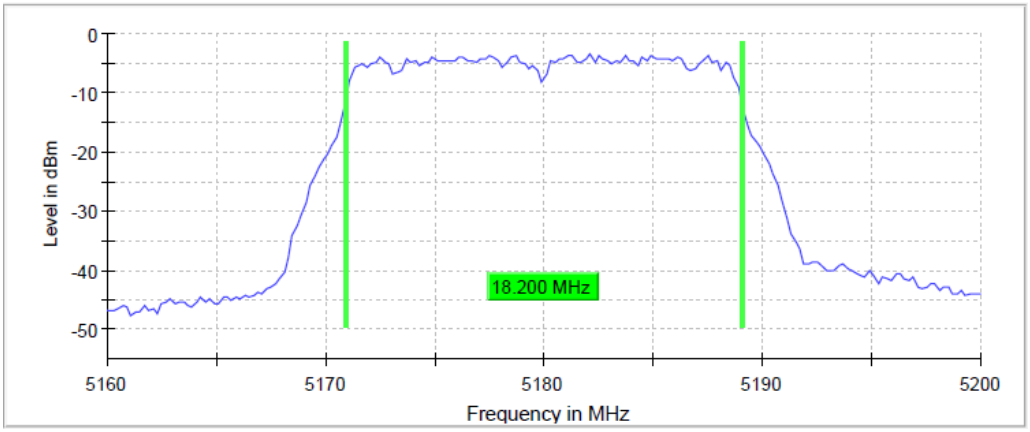


Highest Channel

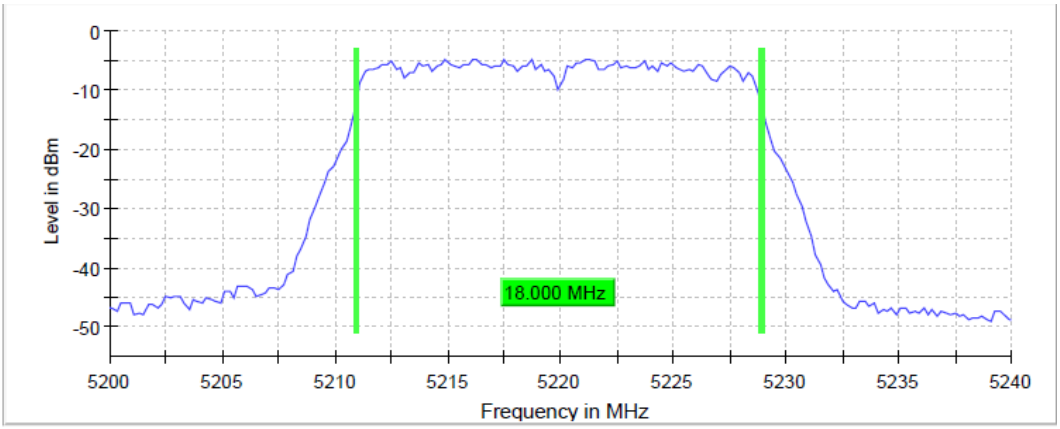


TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

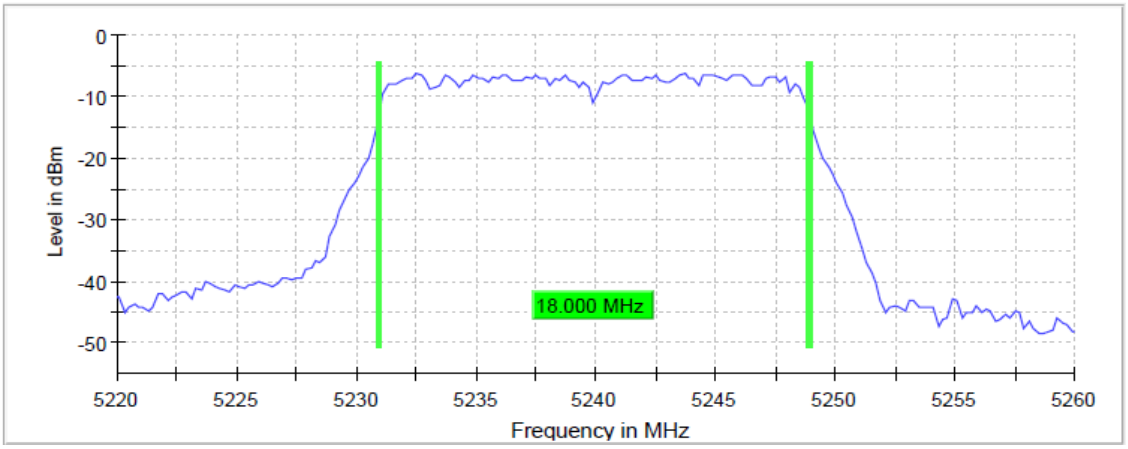
Lowest Channel



Middle Channel



Highest Channel



TEST RESULTS (Cont.)	

Measurement

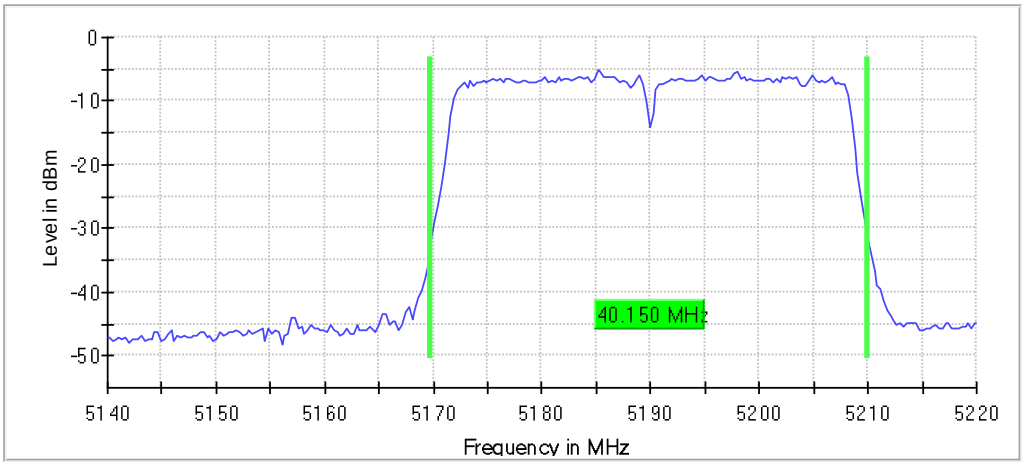
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.16000 GHz	5.20000 GHz	5.22000 GHz
Stop Frequency	5.20000 GHz	5.24000 GHz	5.26000 GHz
Span	40.000 MHz	40.000 MHz	40.000 MHz
RBW	200.000 kHz	200.000 KHkHz	200.000 kHz
VBW	1.000 MHz	1.000 MHz	1.000 MHz
SweepPoints	200	200	200
Sweeptime	28.443 µs	28.443 µs	28.443 µs
Reference Level	20.000 dBm	10.000 dBm	10.000 dBm
Attenuation	40.000 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	0.30 dB	0.30 dB	0.30 dB
Run	21 / max. 150	25 / max. 150	41 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.30 dB	0.04 dB	0.11 dB

TEST RESULTS	ac mode (40 MHz)

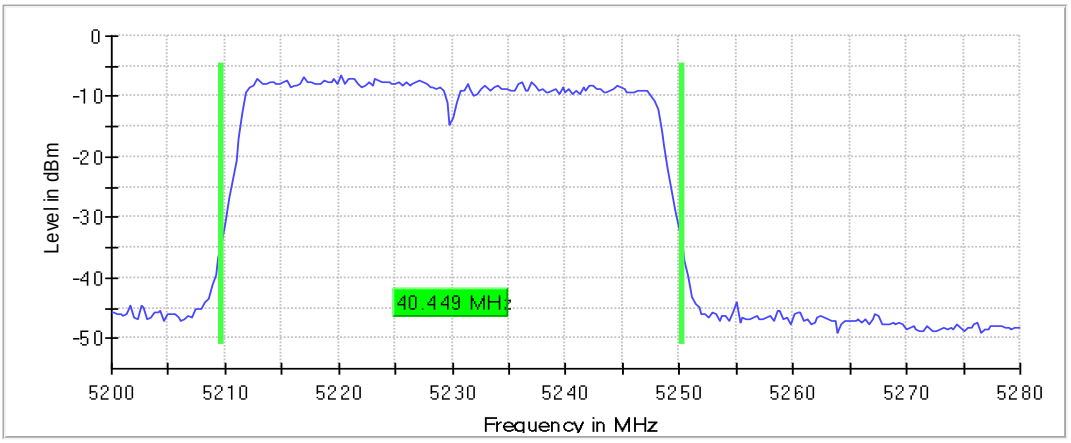
	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
26dB bandwidth (MHz)	40.150	40.449
Occupied bandwidth (MHz)	36.255	36.255
Measurement uncertainty (kHz)	<± 8.33	

TEST RESULTS (Cont.):	26 dB BANDWIDTH

Lowest Channel

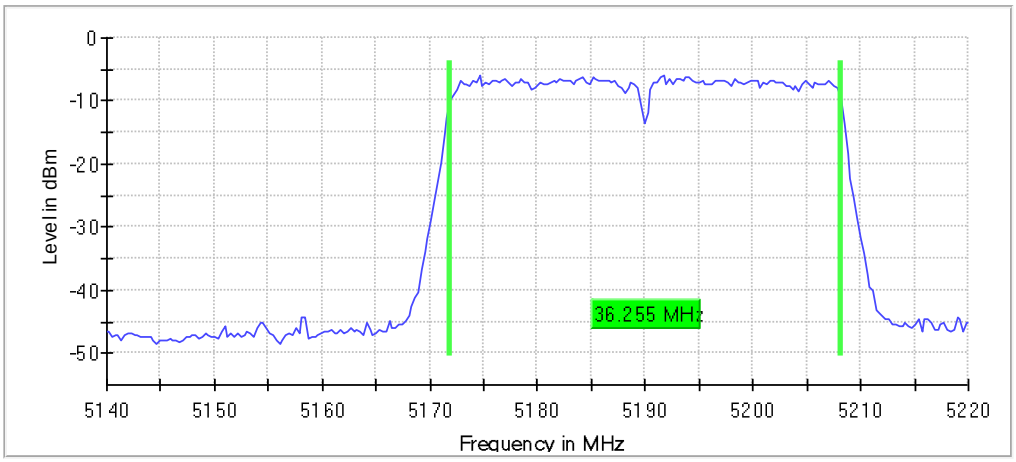


Highest Channel

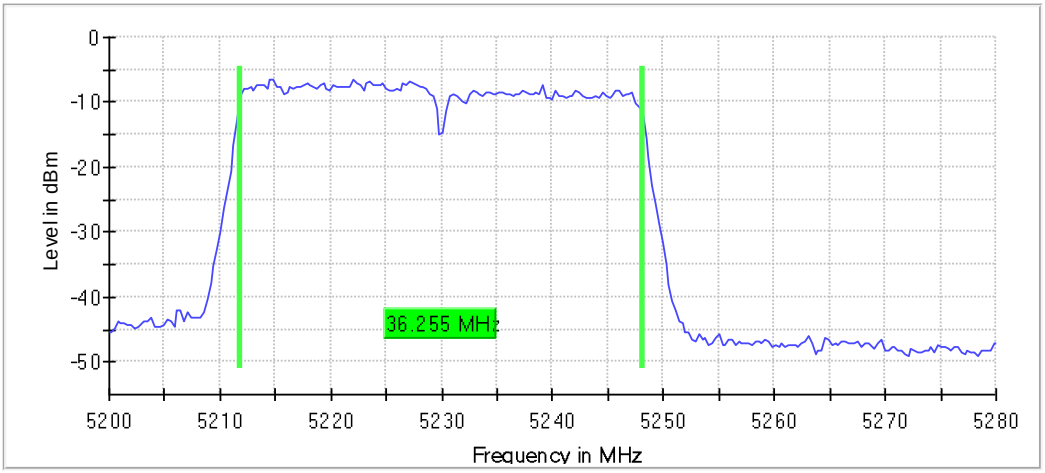


TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

Lowest Channel



Highest Channel



TEST RESULTS (Cont.)	

Measurement

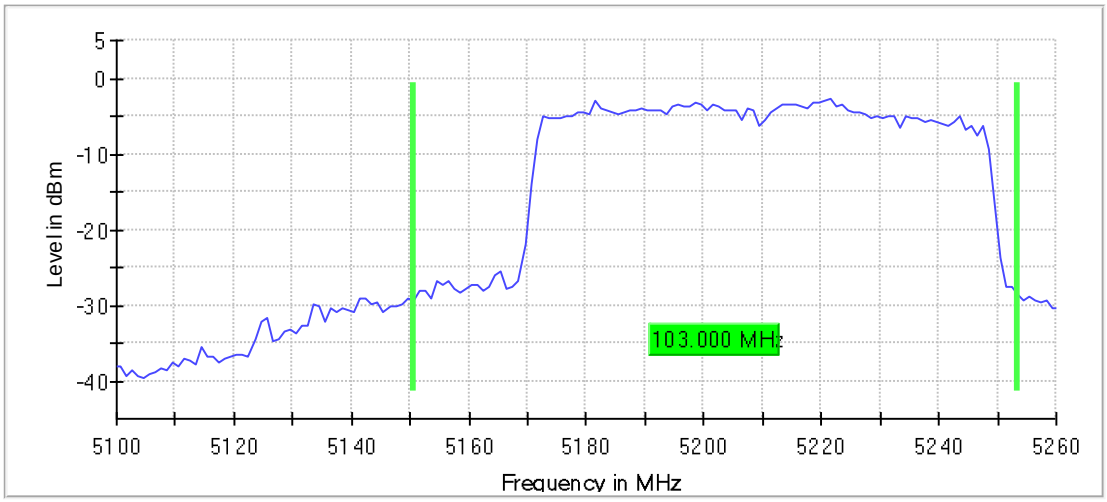
Setting	Instrument Value	Instrument Value
Start Frequency	5.14000 GHz	5.20000 GHz
Stop Frequency	5.22000 GHz	5.28000 GHz
Span	80.000 MHz	80.000 MHz
RBW	300.000 kHz	~ 400.000
VBW	1.000 MHz	>= 900.0 KHz
SweepPoints	267	~ 267
Sweeptime	31.603 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	47 / max. 150	124 / max. 150
Stable	5 / 5	5 / 5
Max Stable Difference	0.00 dB	0.3 dB

TEST RESULTS	ac mode (80 MHz)

	Lowest frequency 5180 MHz
26dB bandwidth (MHz)	103
Occupied bandwidth (MHz)	76.5
Measurement uncertainty (kHz)	<± 8.33

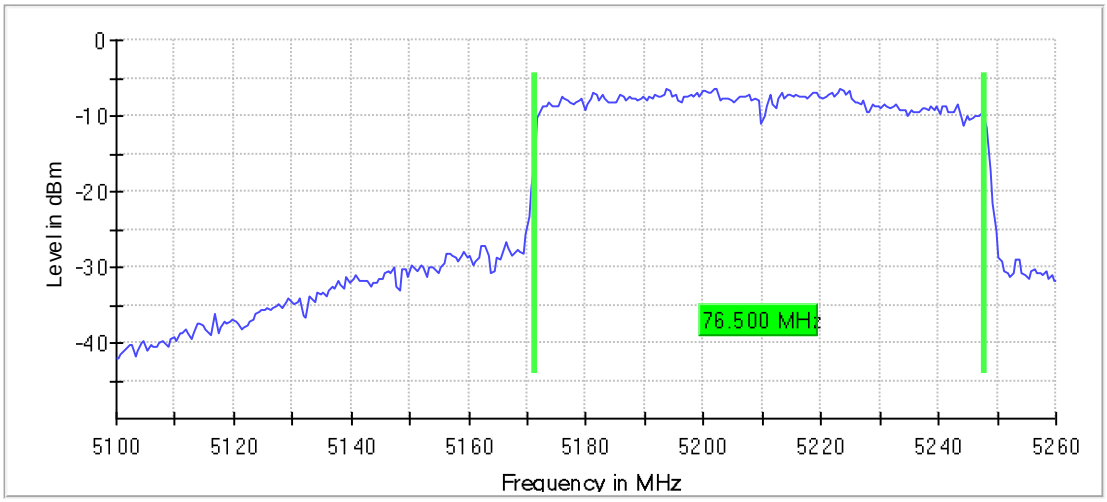
TEST RESULTS (Cont.):	26 dB BANDWIDTH

Lowest Channel



TEST RESULTS (Cont.):	OCCUPIED BANDWIDTH

Lowest Channel



Measurement

Setting	Instrument Value
Start Frequency	5.10000 GHz
Stop Frequency	5.26000 GHz
Span	160.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	160
Sweeptime	22.754 µs
Reference Level	10.000 dBm
Attenuation	30.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	21 / max. 150
Stable	5 / 5
Max Stable Difference	0.06 dB

TEST A.2: POWER LIMITS. MAXIMUM OUTPUT POWER

LIMITS:	Product standard:	Part 15 Subpart C §15.407 and RSS-247
	Test standard:	Part 15 Subpart C §15.407(a) (1) (4) and RSS-247 6.2.1.1

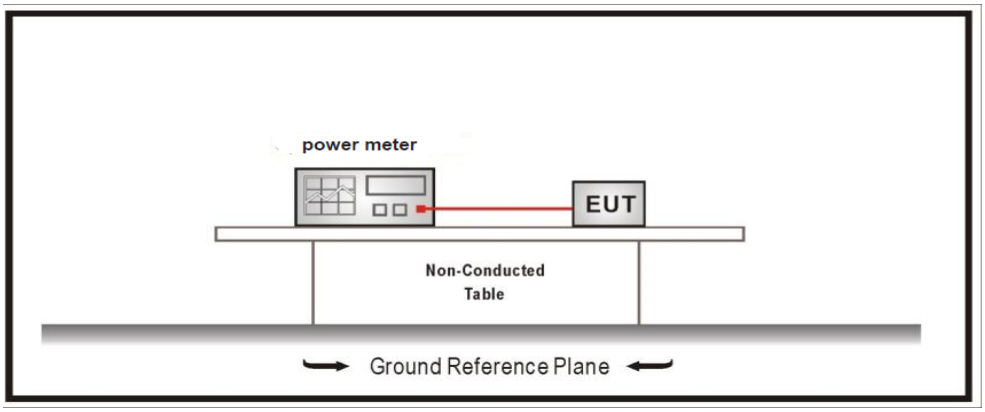
LIMITS

In band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 (**a mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

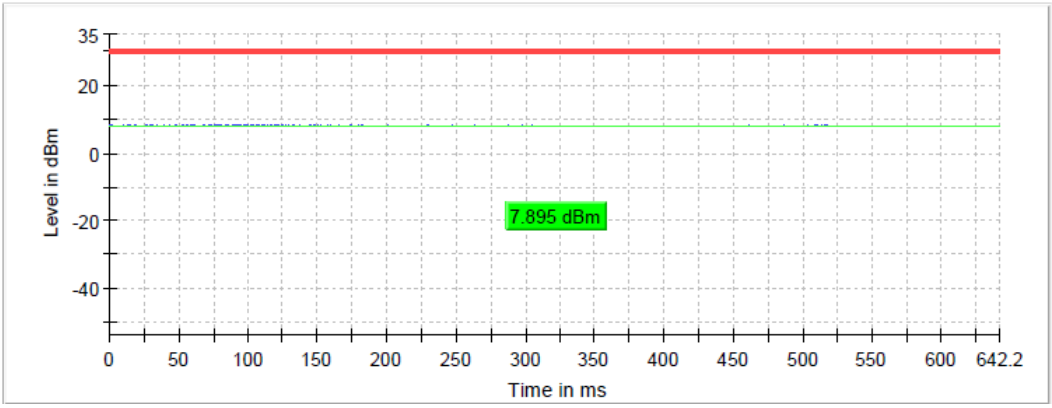
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Maximum conducted power (dBm)	7.9	6.5	5.3
Maximum EIRP power (dBm)	8.6	7.2	6
Measurement uncertainty (dB)	<±0.78		

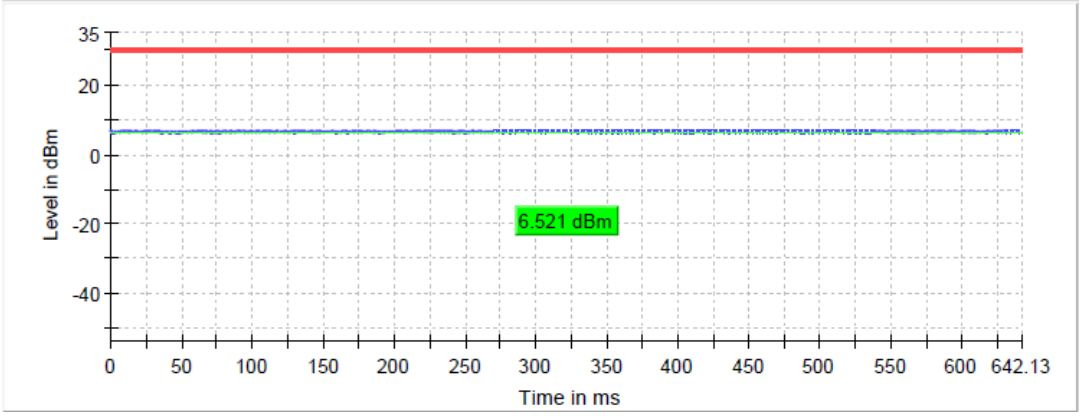
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

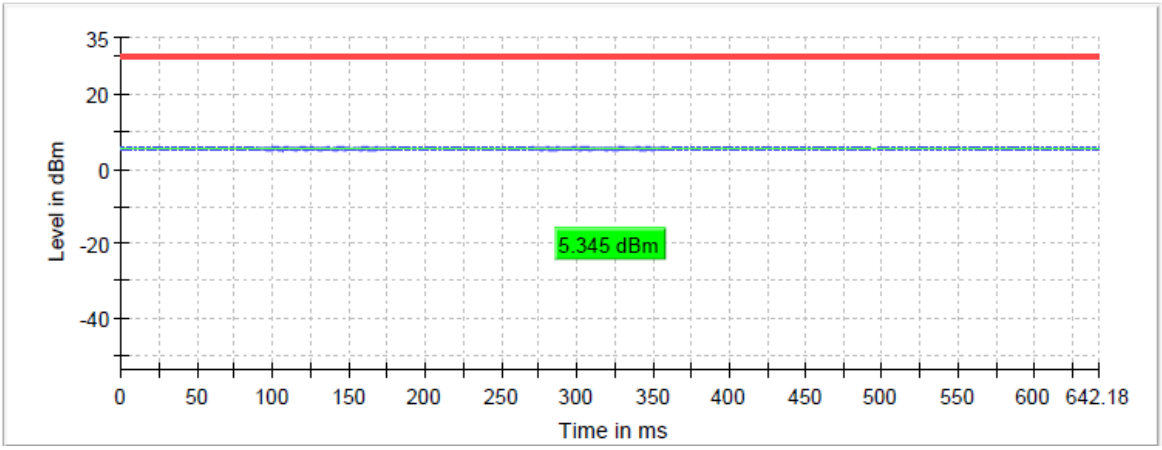
Lowest Channel



Middle Channel



Highest Channel



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 **(n mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

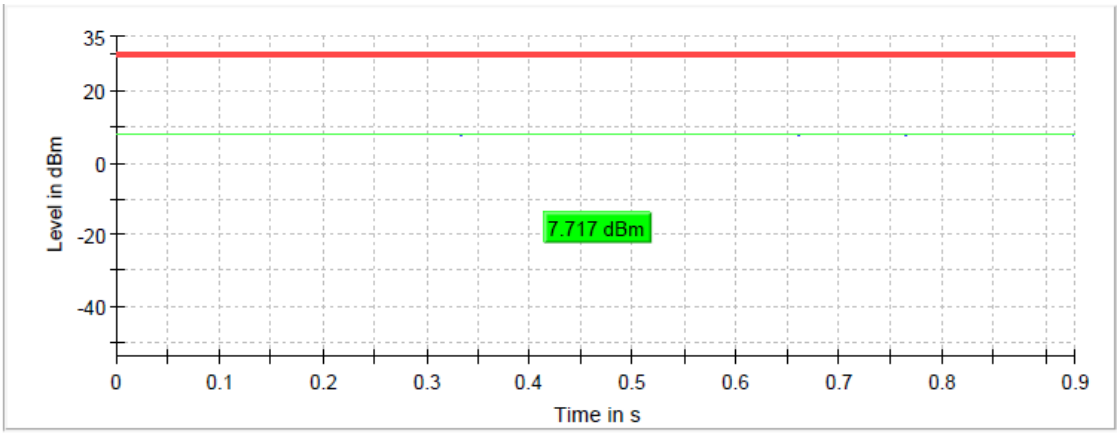
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Maximum conducted power (dBm)	7.7	6.4	5.3
Maximum EIRP power (dBm)	8.4	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.

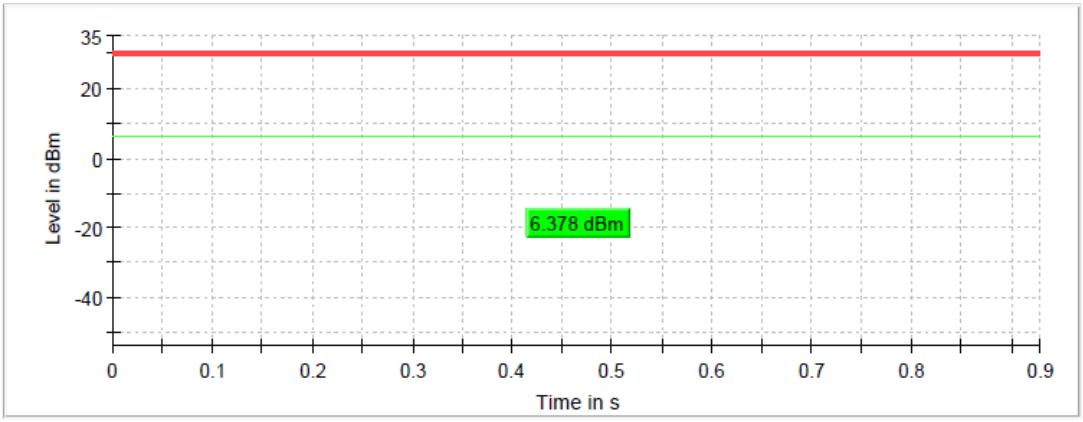
TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

Lowest Channel

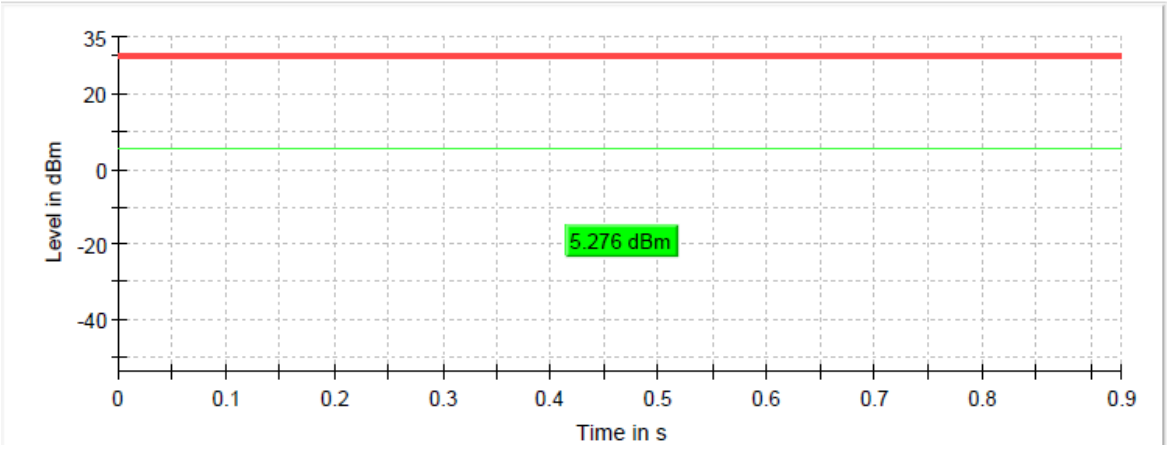


TEST RESULTS (Cont.)	

Middle Channel



Highest Channel



TEST RESULTS	n Mode (40 MHz)

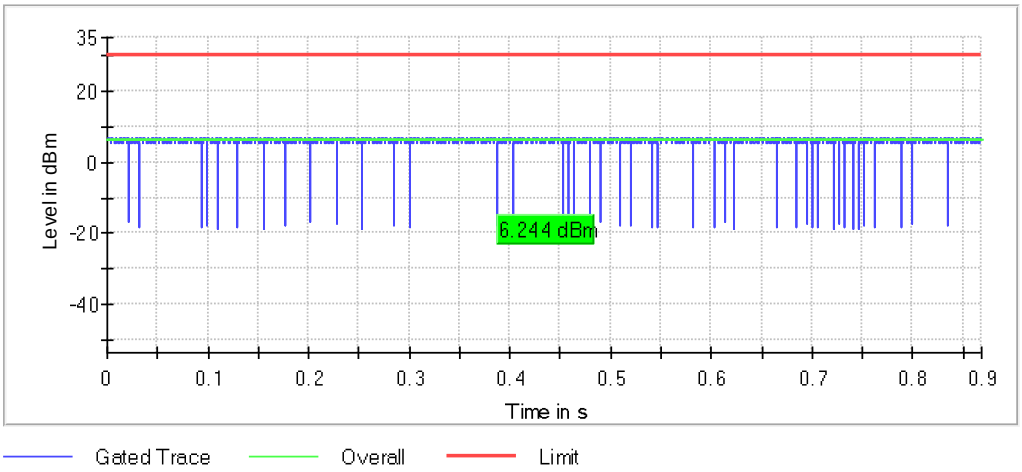
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
Maximum conducted power (dBm)	6.2	4.7
Maximum EIRP power (dBm)	6.9	5.4
Measurement uncertainty (dB)	<±0.78	

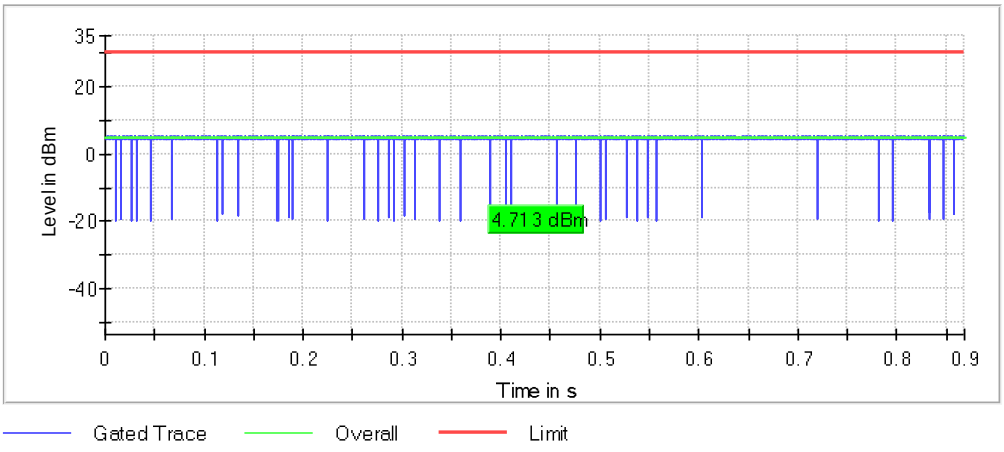
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

Lowest Channel



Highest Channel



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 **(ac mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

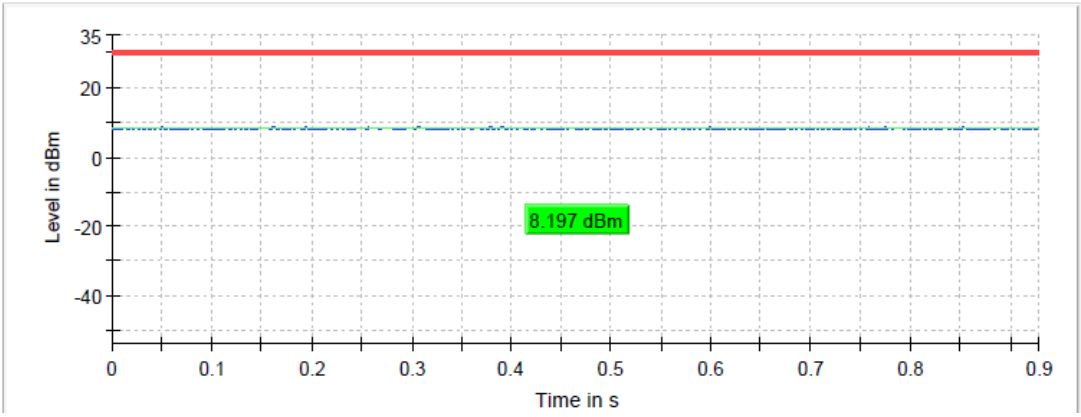
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Maximum conducted power (dBm)	8.2	6.7	5.5
Maximum EIRP power (dBm)	8.9	7.4	6.2
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.

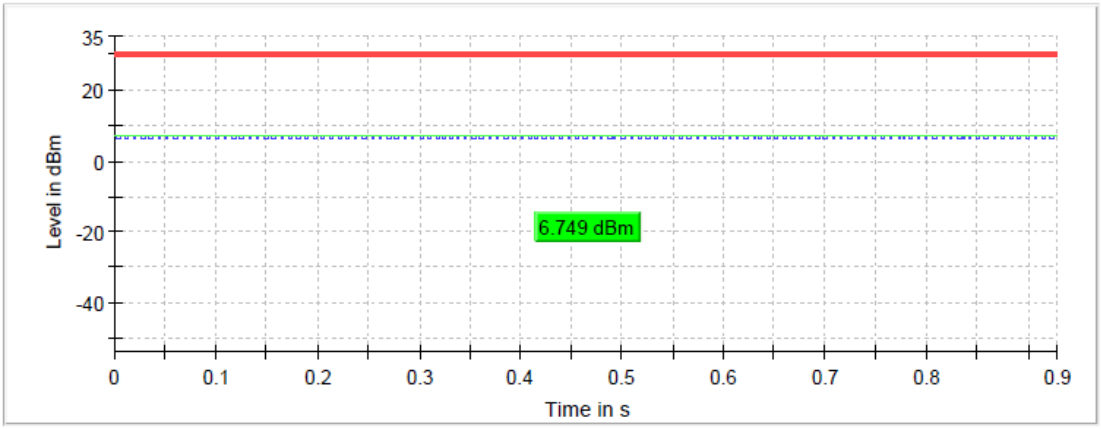
TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

Lowest Channel

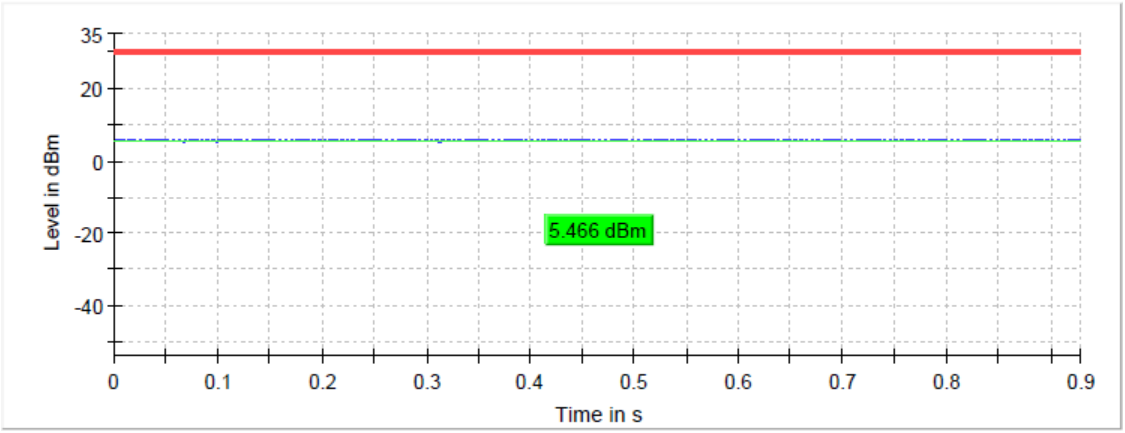


TEST RESULTS (Cont.)	

Middle Channel



Highest Channel



TEST RESULTS	ac mode (40 MHz)

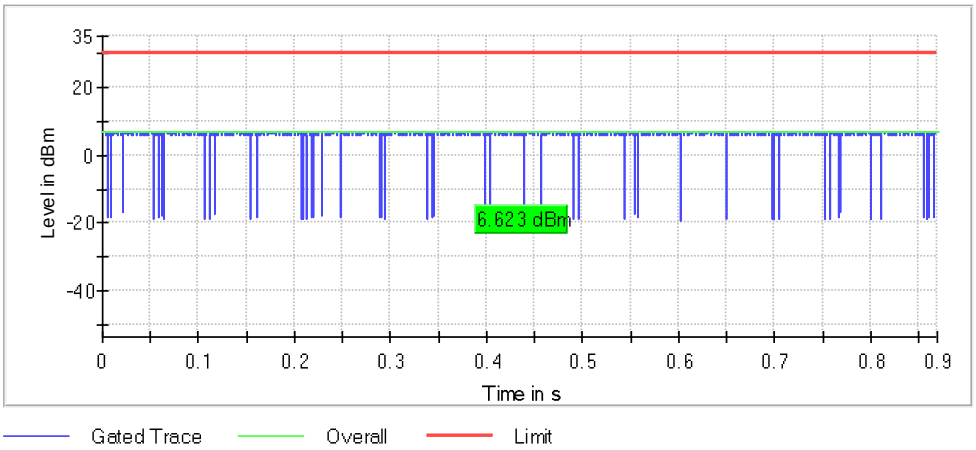
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
Maximum conducted power (dBm)	6.6	5.3
Maximum EIRP power (dBm)	7.3	6
Measurement uncertainty (dB)	<±0.78	

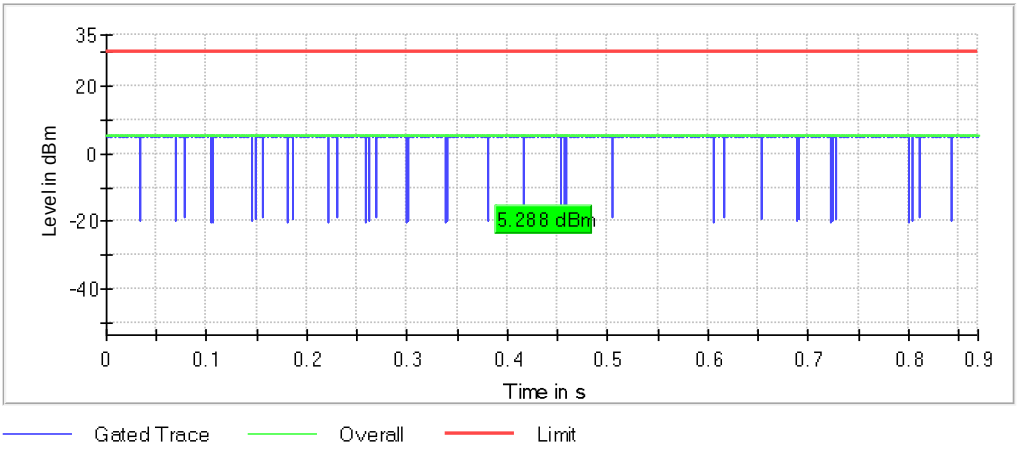
The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

Lowest Channel



Highest Channel



TEST RESULTS	ac mode (80 MHz)

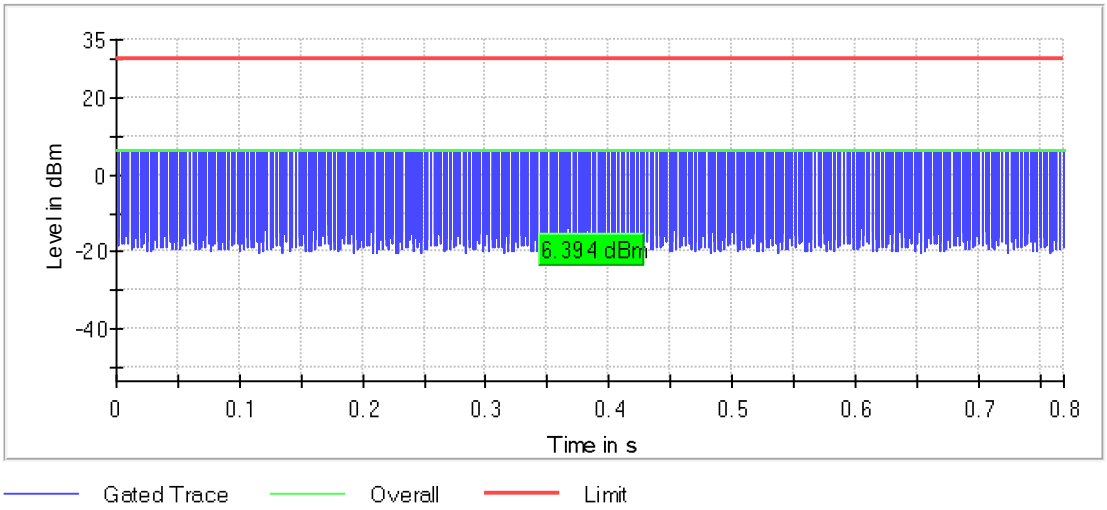
Maximum declared antenna gain: 0.7 dBi

	Lowest frequency 5180 MHz
Maximum conducted power (dBm)	6.4
Maximum EIRP power (dBm)	7.1
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.

TEST RESULTS (Cont.):	CONDUCTED OUTPUT POWER

Lowest Channel



TEST A.3: POWER SPECTRAL DENSITY

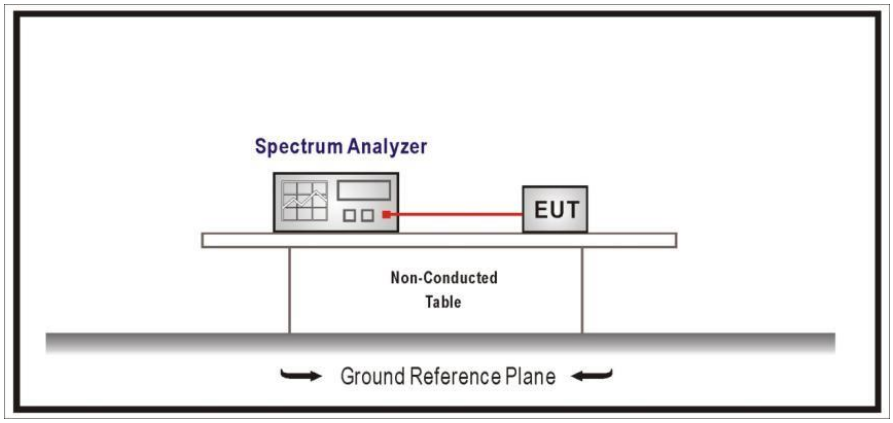
LIMITS:	Product standard:	Part 15 Subpart C §15.407 and RSS-247
	Test standard:	Part 15 Subpart C §15.407(a) (1) (5) and RSS-247 6.2.1.1

LIMITS

In the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST SETUP	

For all modes, the maximum power spectral density level in the fundamental emission was measured using the method according to point F) (Method SA-1) of Guidance 789033 D02 General UNII Test Procedures New Rules v01.



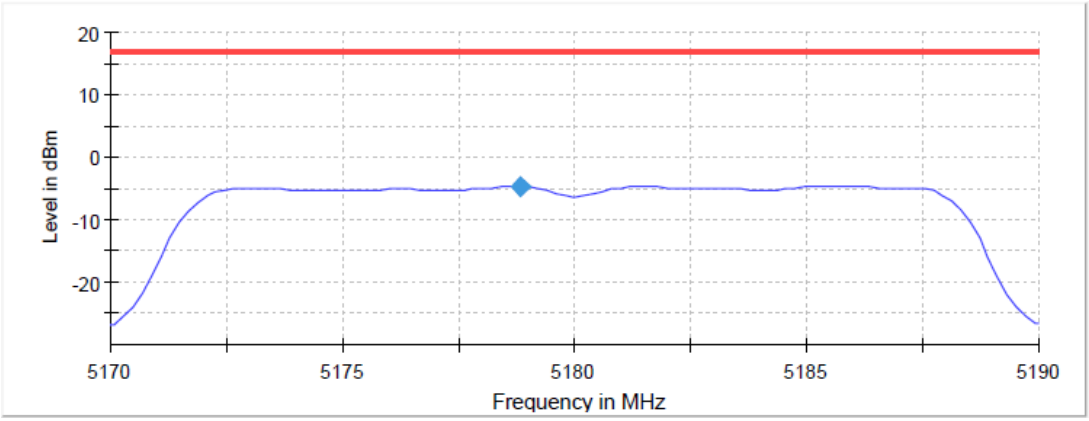
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 **(a mode)**
TEST RESULTS:	PASS

Bandwidth: 20 MHz

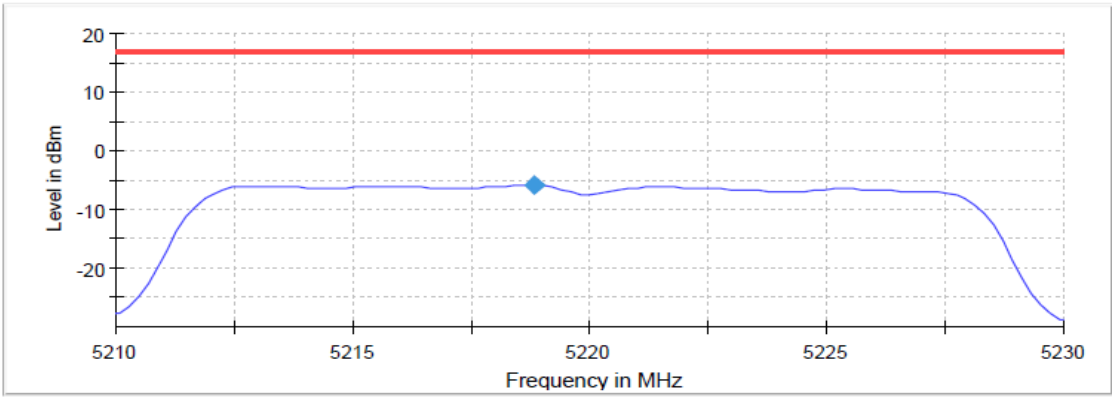
	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Power spectral density (dBm)	-4.631	-5.817	-7.282
Measurement uncertainty (dB)	<±0.78		

TEST RESULTS (Cont.):	

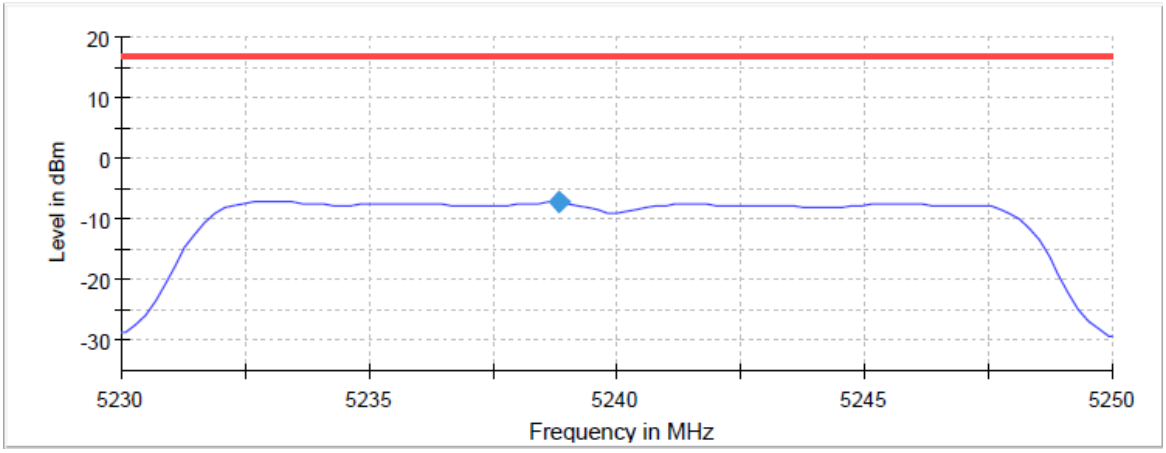
Low Channel



Middle Channel



High Channel



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.17000	5.21000	5.23000
Stop Frequency	5.19000	5.23000	5.25000
Span	20.000	20.000	20.000
RBW	1.000 MHz	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz	3.000 MHz
SweepPoints	101	101	101
Sweeptime	2.020 s	2.020 s	2.020 s
Reference Level	10.000	10.000	10.000
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	RMS	RMS	RMS
SweepCount	3	3	3
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	0.30 dB	0.30 dB	0.30 dB
Run	4 / max.	4 / max.	4 / max.
Stable	3 / 3	3 / 3	3 / 3
Max Stable	0.00 dB	0.06 dB	0.02 dB

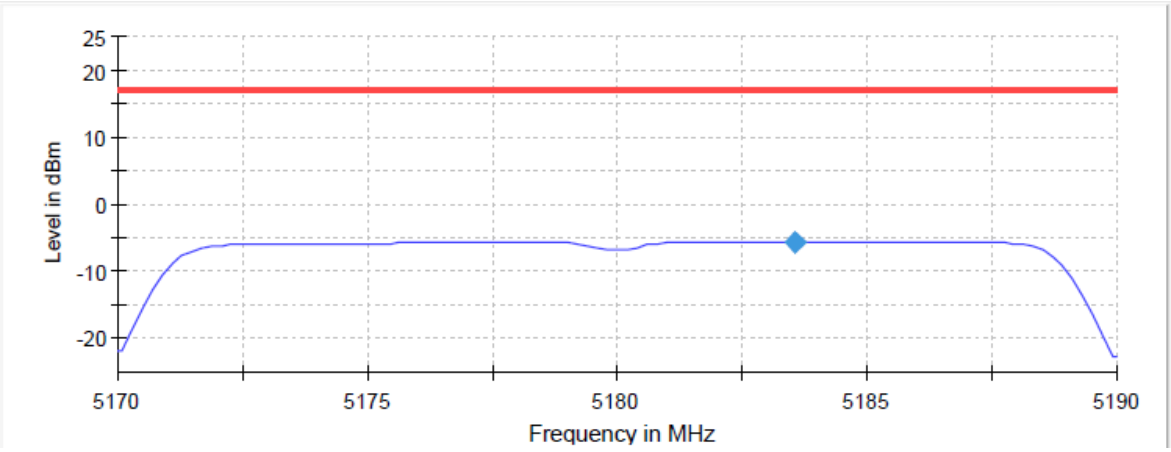
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (n mode)
TEST RESULTS:	PASS

Bandwidth: 20 MHz

	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Power spectral density (dBm)	-5.589	-6.640	-7.796
Measurement uncertainty (dB)	<±0.78		

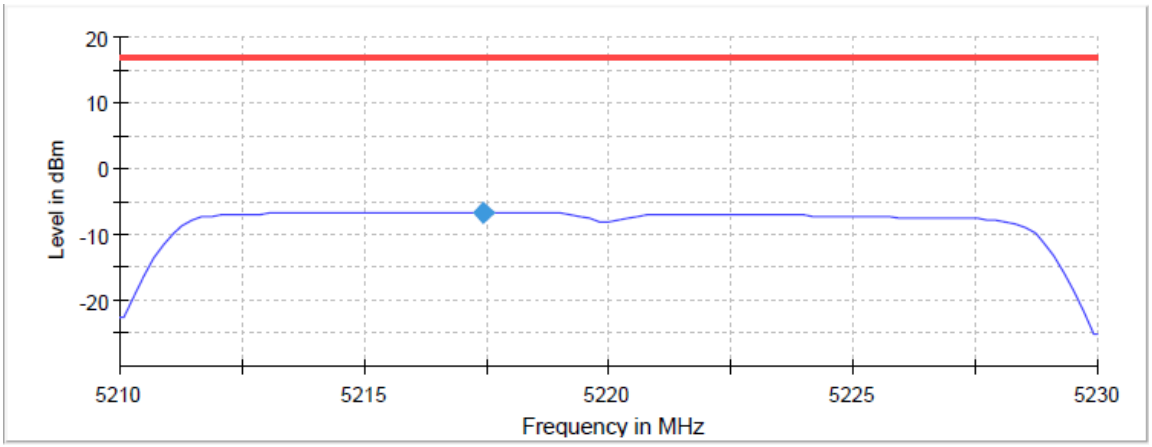
TEST RESULTS (Cont.):	

Low Channel

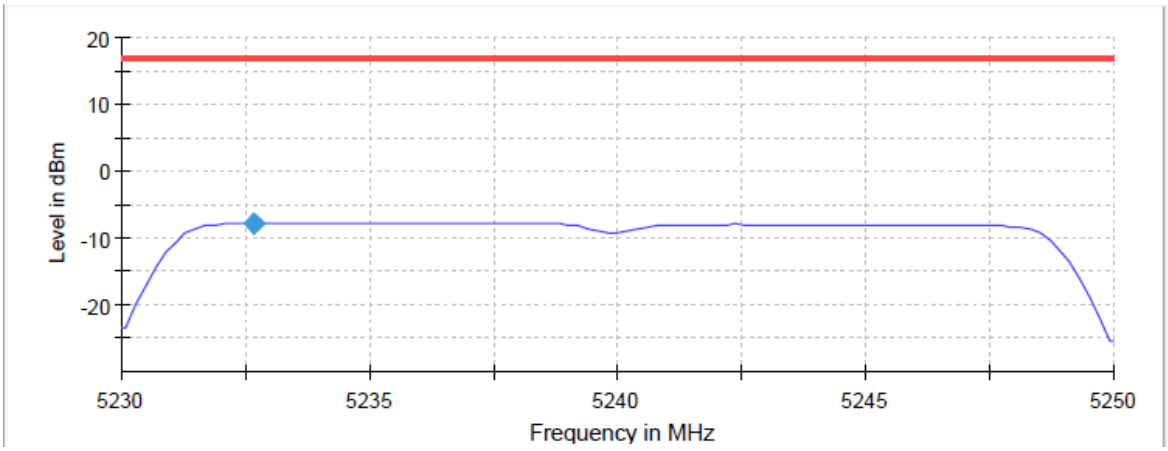


TEST RESULTS (Cont.):	

Middle Channel



High Channel



TEST RESULTS (Cont.):	

Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.17000	5.21000	5.23000
Stop Frequency	5.19000	5.23000	5.25000
Span	20.000 MHz	20.000 MHz	20.000 MHz
RBW	1.000 MHz	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz	3.000 MHz
SweepPoints	101	101	101
Sweeptime	2.020 s	2.020 s	2.020 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	3	3	3
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	0.30 dB	0.30 dB	0.30 dB
Run	4 / max. 150	4 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.00 dB	0.03 dB

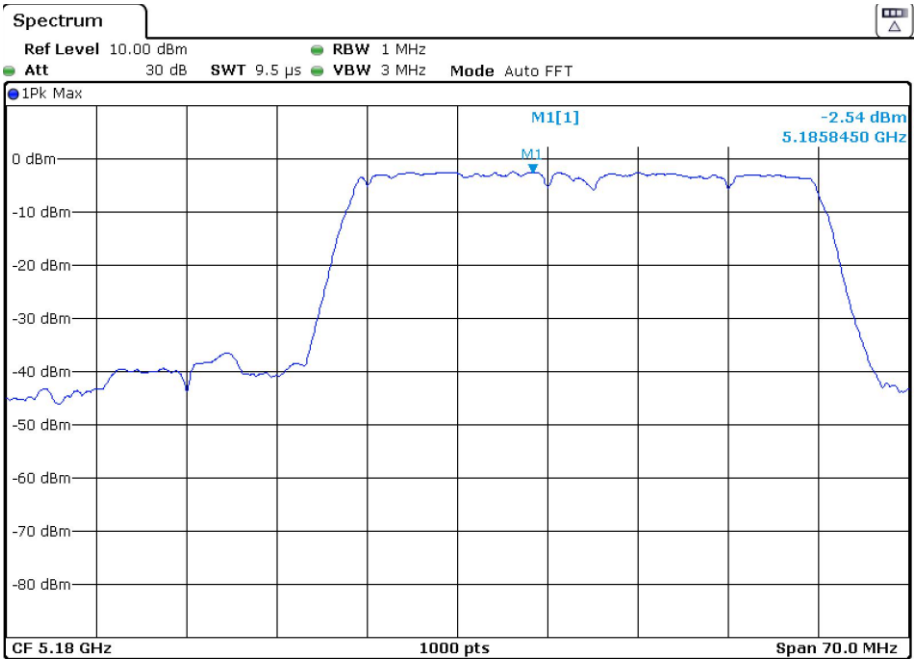
TEST RESULTS (Cont.):	n Mode

Bandwidth: 40 MHz

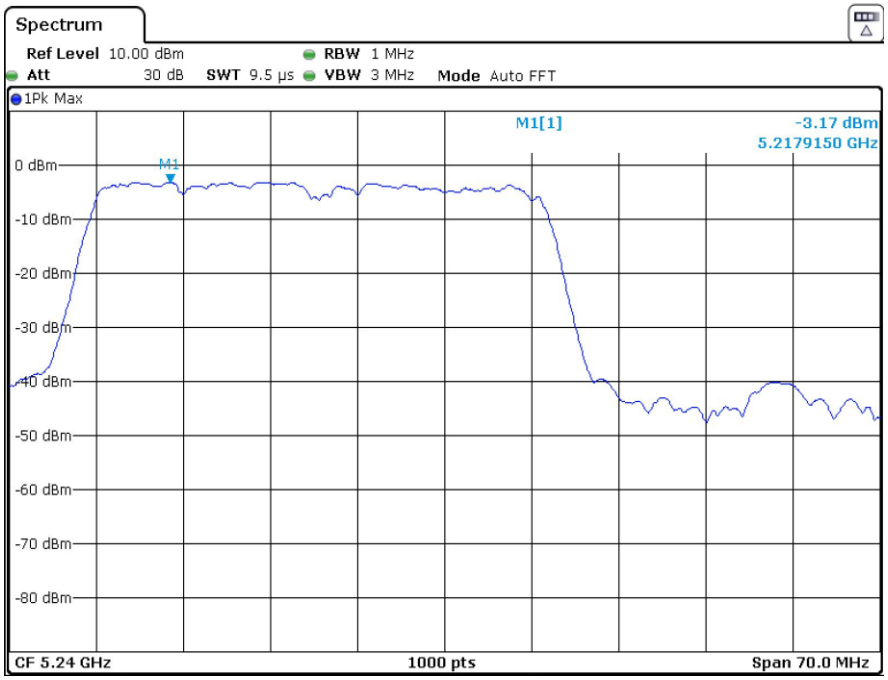
	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
Power spectral density (dBm)	-2.54	-3.17
Measurement uncertainty (dB)	<±0.78	

TEST RESULTS (Cont.):	

Lowest Channel



Highest Channel

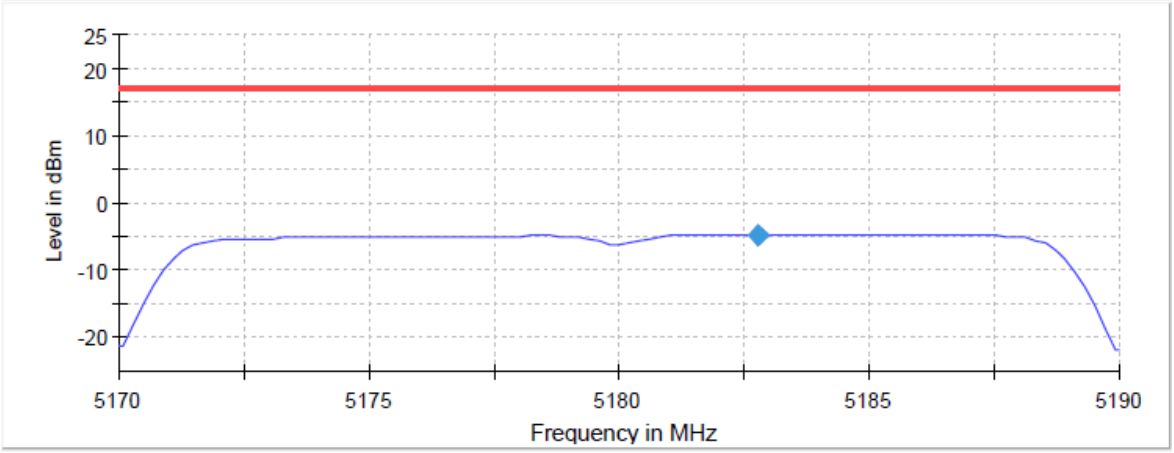


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 **(ac mode)**
TEST RESULTS:	PASS

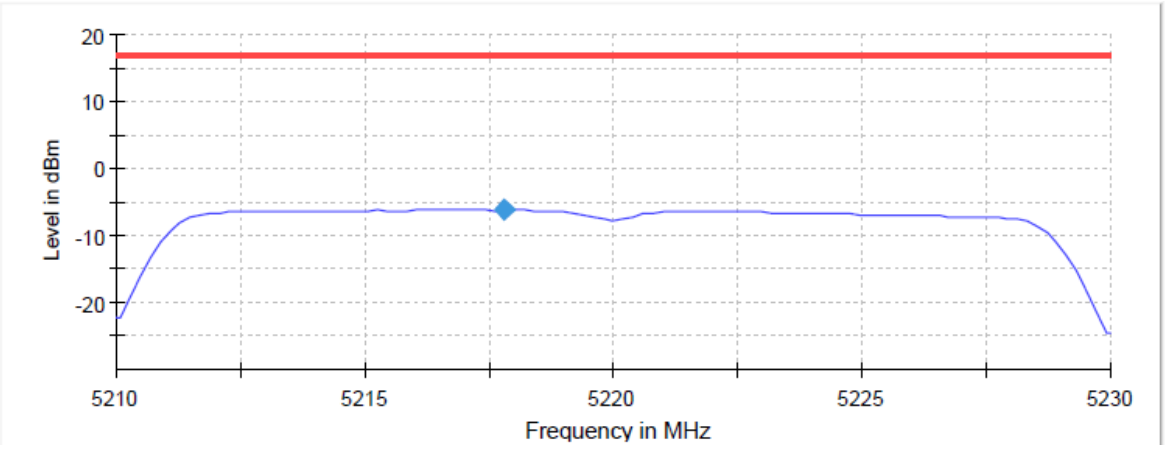
Bandwidth: 20 MHz

	Lowest frequency 5180 MHz	Middle frequency 5220 MHz	Highest frequency 5240 MHz
Power spectral density (dBm)	-4.793	-6.248	-7.555
Measurement uncertainty (dB)	<±0.78		

Lowest Channel

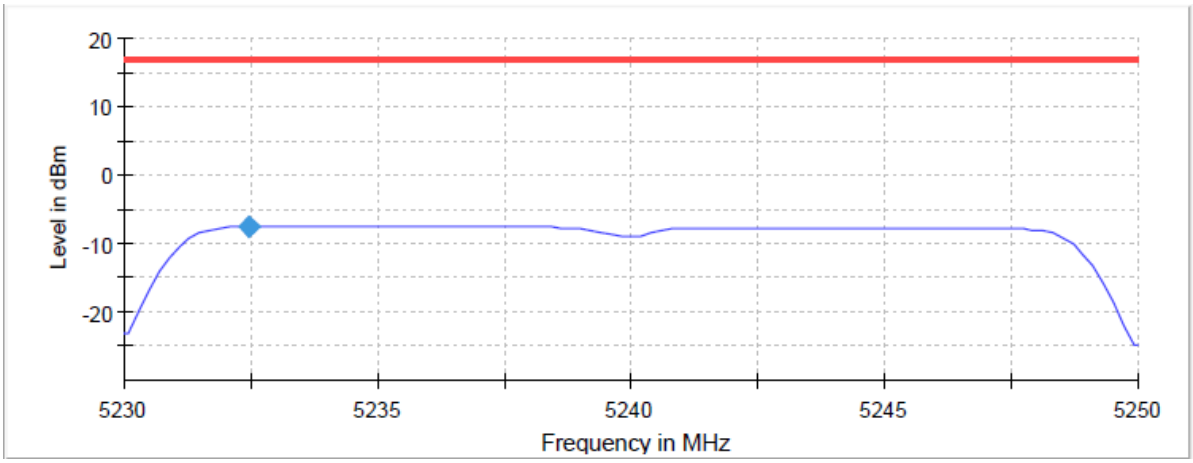


Middle Channel



TEST RESULTS (Cont.)	

Highest Channel



Measurement

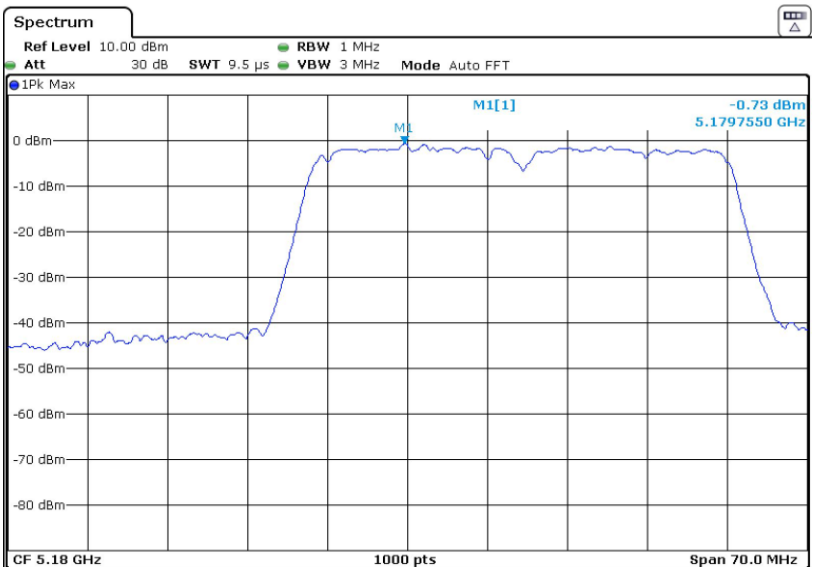
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	5.17000 GHz	5.21000 GHz	5.23000 GHz
Stop Frequency	5.19000 GHz	5.23000 GHz	5.25000 GHz
Span	20.000 MHz	20.000 MHz	20.000 MHz
RBW	1.000 MHz	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz	3.000 MHz
SweepPoints	101	101	101
Sweeptime	2.020 s	2.020 s	2.020 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	3	3	3
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	0.30 dB	0.30 dB	0.30 dB
Run	4 / max. 150	4 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.10 dB	0.00 dB	0.10 dB

TEST RESULTS	ac Mode (40 MHz)

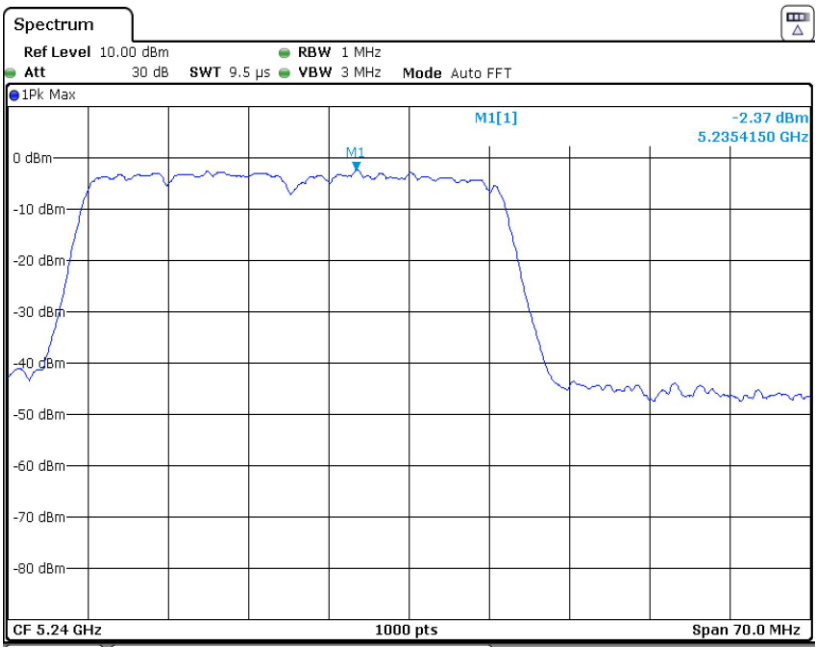
	Lowest frequency 5180 MHz	Highest frequency 5240 MHz
Power spectral density (dBm)	-0.73	-2.37
Measurement uncertainty (dB)	<±0.78	

TEST RESULTS (Cont.):

Lowest Channel



Highest Channel

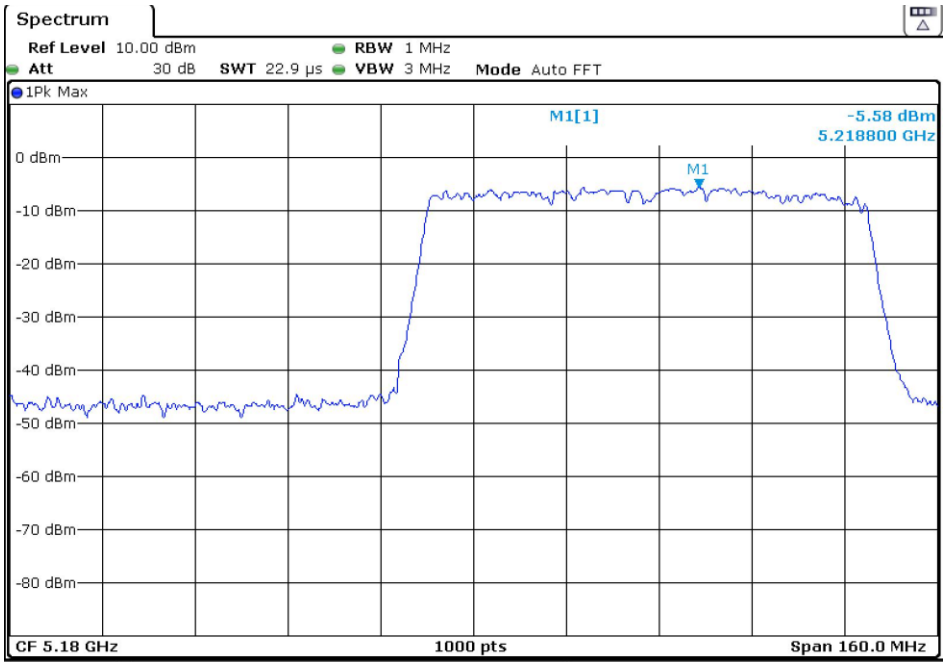


TEST RESULTS	ac Mode (80 MHz)

	Lowest frequency 5180 MHz
Power spectral density (dBm)	-5.58
Measurement uncertainty (dB)	<±0.78

TEST RESULTS (Cont.):	

Lowest Channel



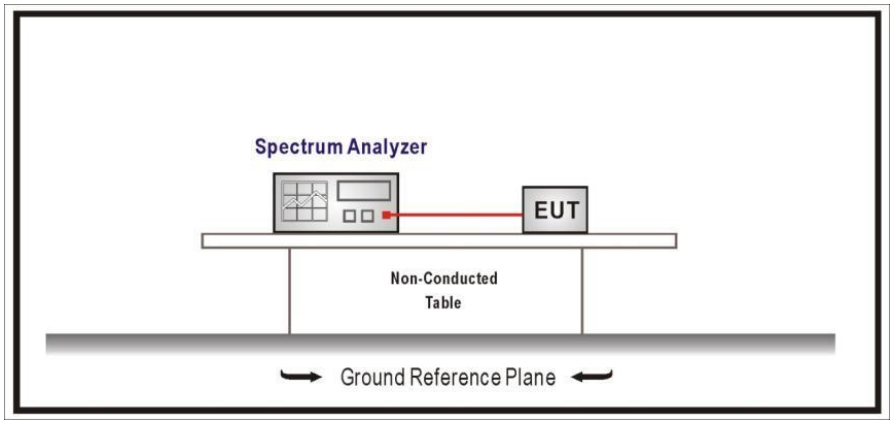
TEST A.4: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.407 and RSS-247
	Test standard:	Part 15 Subpart C §15.407(b)(1) and RSS-247 6.2.1.2

LIMITS

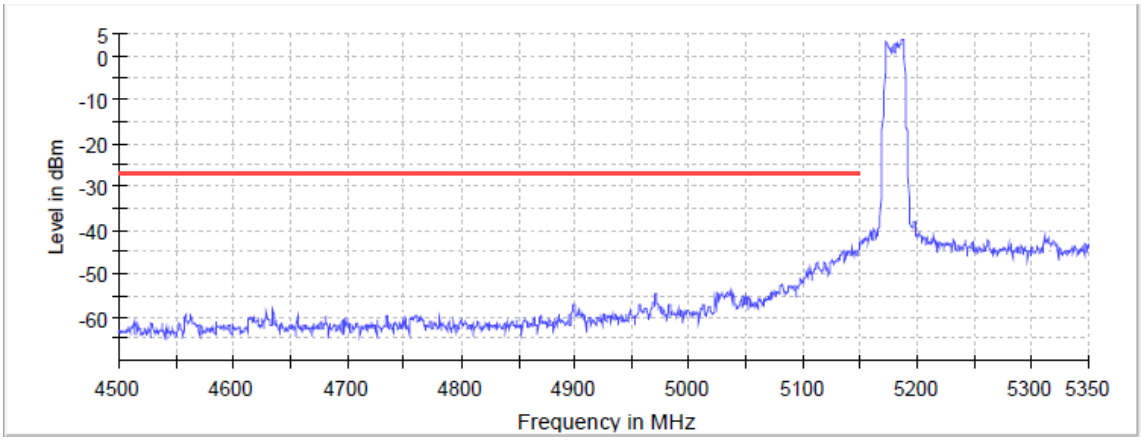
For transmitters operating in the 5.15 – 5.25 GHz band: all emissions outside the frequency band shall not exceed an EIRP of -27 dBm /MHz

TEST SETUP	



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

Lowest Channel

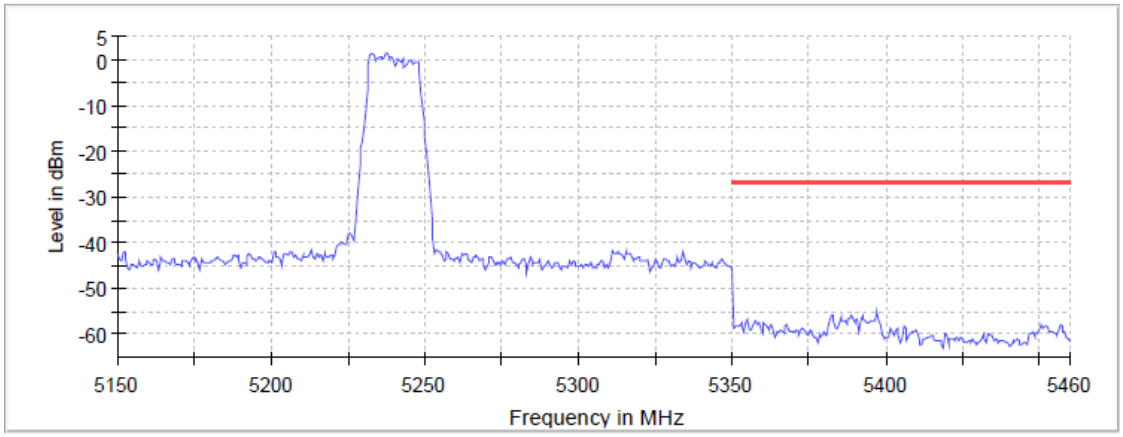


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 µs	87.688 µs
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	18 / max. 150	21 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.41 dB	0.00 dB

TEST RESULTS (Cont.):	

Highest Channel



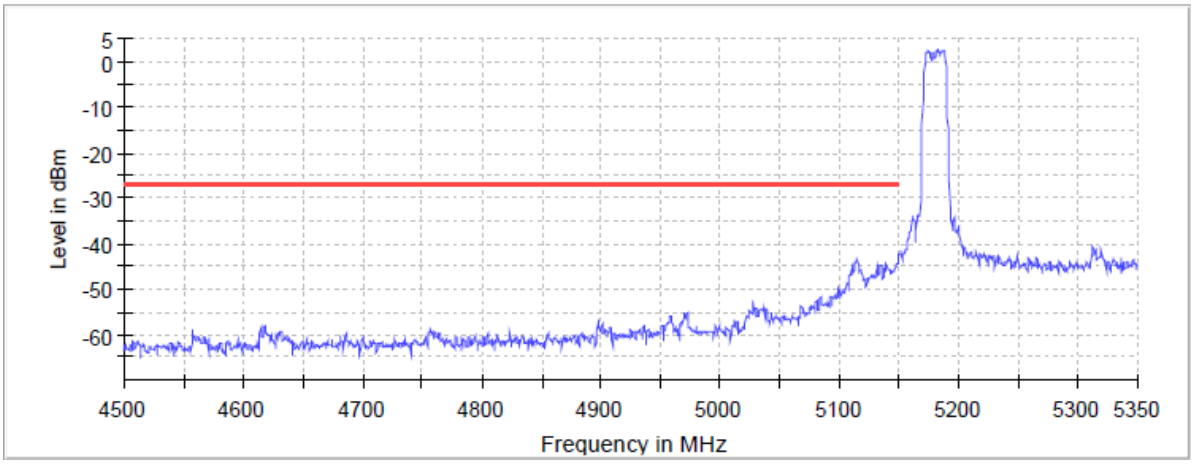
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	5.35000 GHz
Stop Frequency	5.35000 GHz	5.46000 GHz
Span	200.000 MHz	110.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	220
Sweeptime	28.594 us	15.250 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	16 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.49 dB	0.00 dB

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

Bandwidth: 20 MHz

Lowest Channel

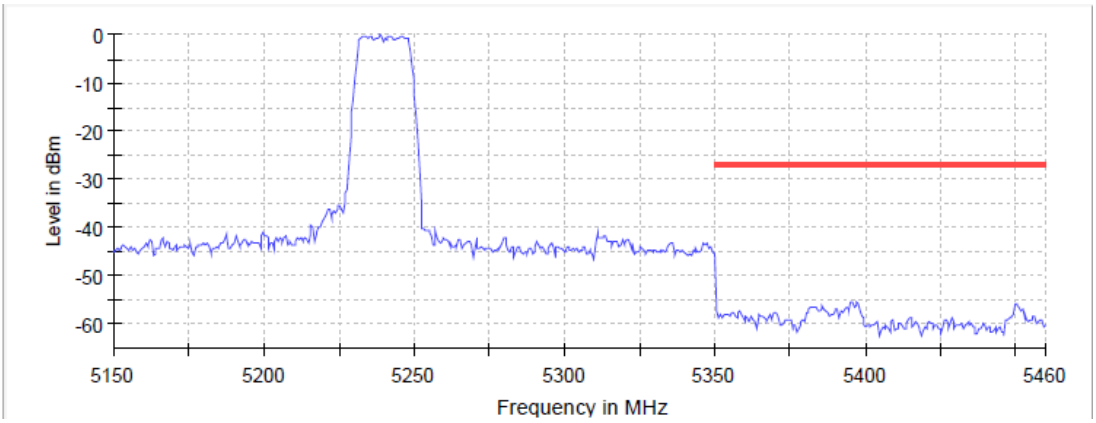


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 us	87.688 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	16 / max. 150	26 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.50 dB

TEST RESULTS (Cont.):	

Highest Channel

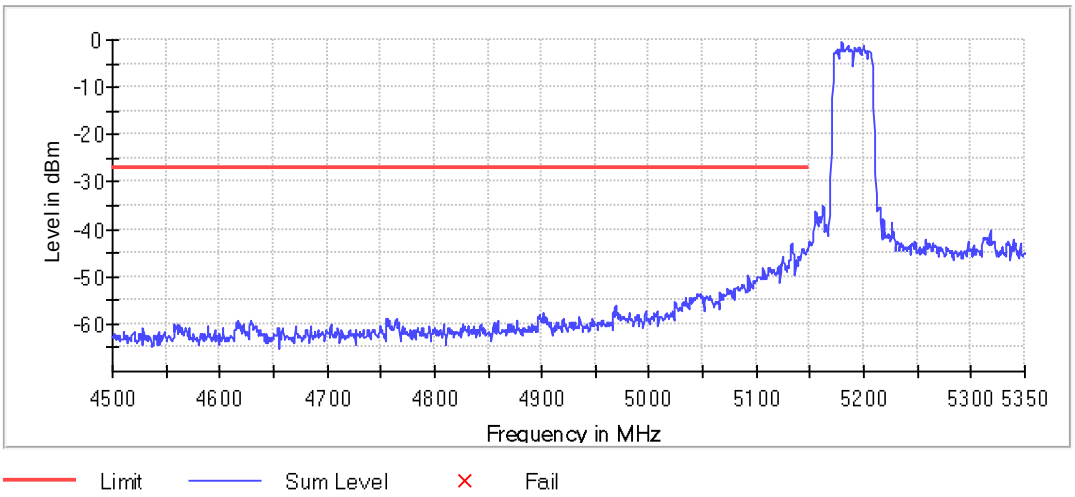


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	5.35000 GHz
Stop Frequency	5.35000 GHz	5.46000 GHz
Span	200.000 MHz	110.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	220
Sweeptime	28.594 us	15.250 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	13 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.49 dB	0.00 dB

TEST RESULTS (Cont.):	n Mode (40 MHz)

Lowest Channel

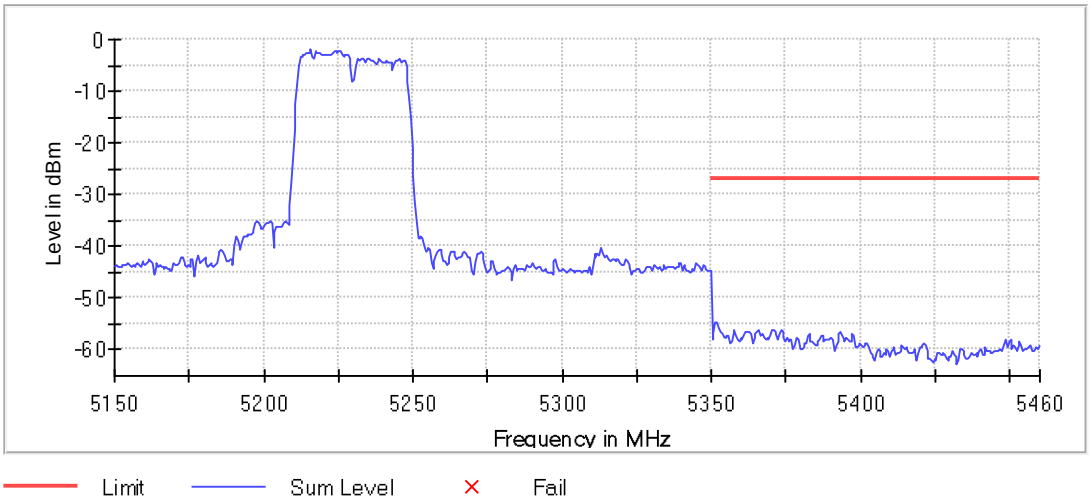


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 us	87.688 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	18 / max. 150	16 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.40 dB	0.00 dB

TEST RESULTS (Cont.):	

Highest Channel



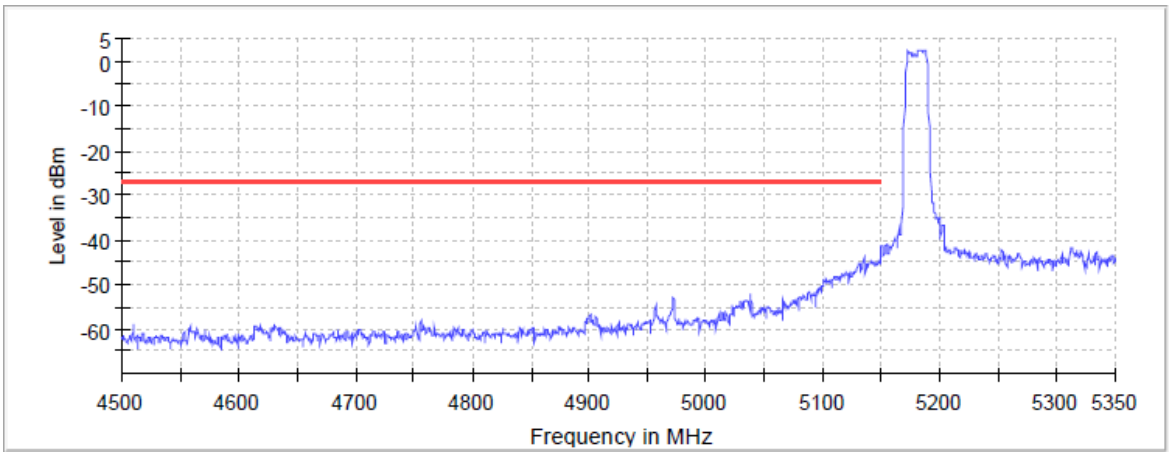
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	5.35000 GHz
Stop Frequency	5.35000 GHz	5.46000 GHz
Span	200.000 MHz	110.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	220
Sweeptime	28.594 us	15.250 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	30 / max. 150	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.21 dB	0.00 dB

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#03 (ac mdoe)
TEST RESULTS:	PASS

Bandwidth: 20 MHz

Lowest Channel:

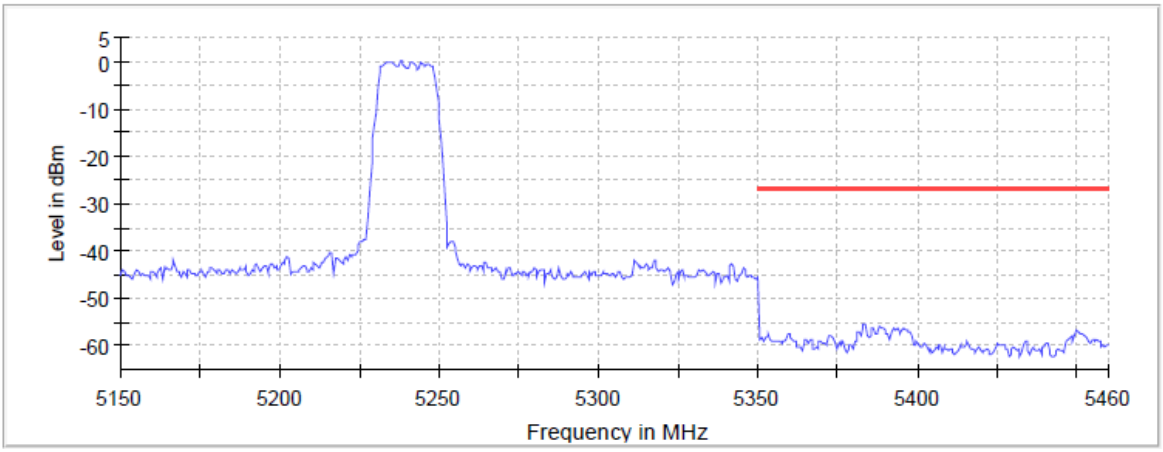


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 us	87.688 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	16 / max. 150	54 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.00 dB	0.06 dB

TEST RESULTS (Cont.):	

Higuest Channel



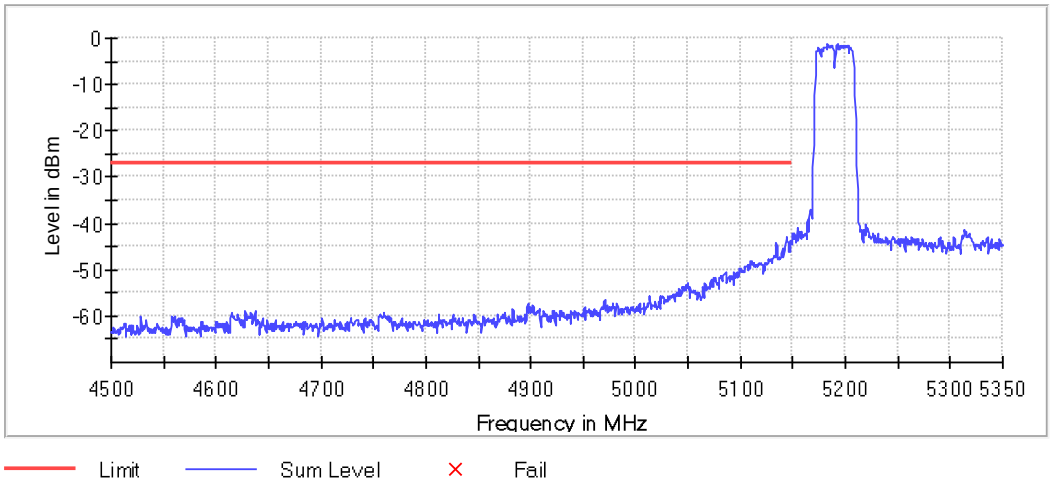
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	5.35000 GHz
Stop Frequency	5.35000 GHz	5.46000 GHz
Span	200.000 MHz	110.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	220
Sweeptime	28.594 us	15.250 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	0.34 dB	0.00 dB

TEST RESULTS (Cont.):	ac mode (40 MHz)

Bandwidth: 40 MHz

Lowest Channel

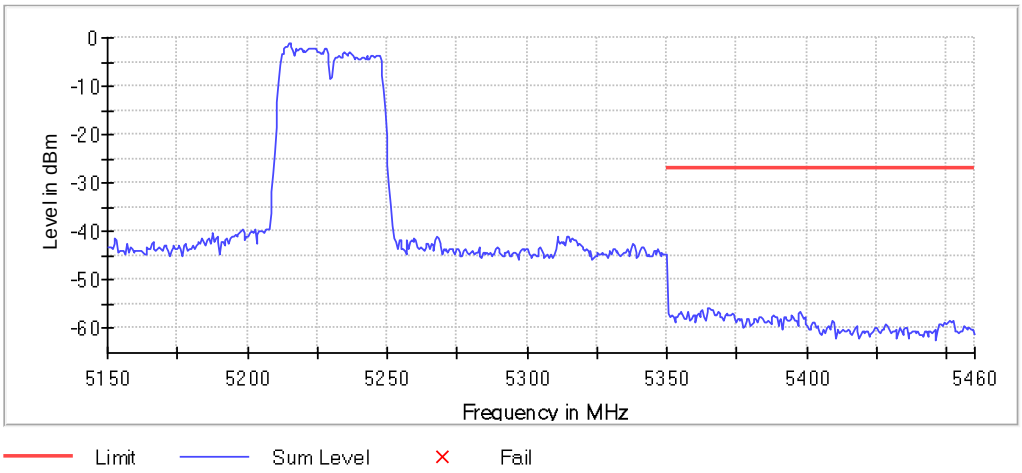


Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 µs	87.688 µs
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	17 / max. 150	21 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.43 dB	0.19 dB

TEST RESULTS (Cont.):	

Highest Channel



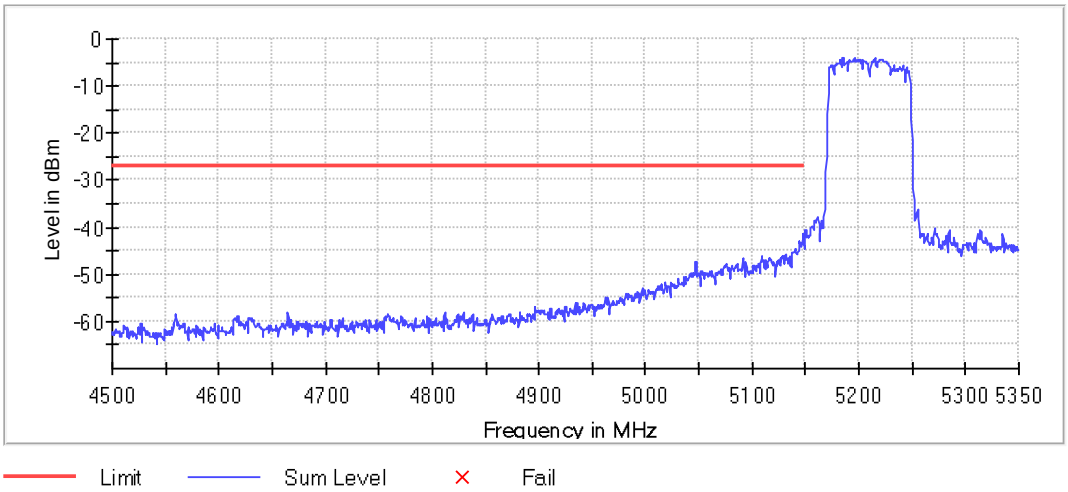
Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	5.35000 GHz
Stop Frequency	5.35000 GHz	5.46000 GHz
Span	200.000 MHz	110.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	220
Sweeptime	28.594 us	15.250 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	4 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.43 dB	0.00 dB

TEST RESULTS (Cont.):	ac mode (80 MHz)

Bandwidth: 80 MHz

Lowest Channel



Measurement

Setting	Instrument Value	Instrument Value
Start Frequency	5.15000 GHz	4.50000 GHz
Stop Frequency	5.35000 GHz	5.15000 GHz
Span	200.000 MHz	650.000 MHz
RBW	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz
SweepPoints	400	1300
Sweeptime	28.594 us	87.688 us
Reference Level	10.000 dBm	-10.000 dBm
Attenuation	30.000 dB	10.000 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	26 / max. 150	38 / max. 150
Stable	3 / 3	3 / 3
Max Stable	0.35 dB	0.00 dB

TEST A.5: UNDESIRABLE RADIATED EMISSIONS (TRANSMITTER)

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

LIMITS

For transmitters operating in the 5.15 – 5.25 GHz band: all emissions outside of the 5.15 – 5.25 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.23 dBµ V/m at 3m distance).

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

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and at 1m for the frequency range 1-40 GHz (1 GHz-18 GHz and 18 GHz-40 GHz Double ridge horn antennas).

For radiated emissions in the range 1-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

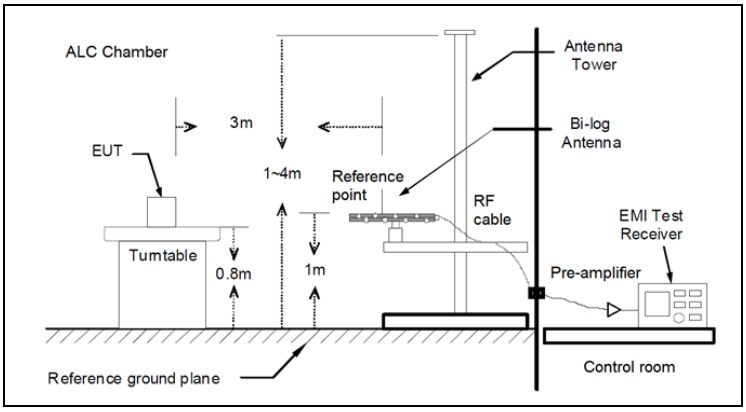
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

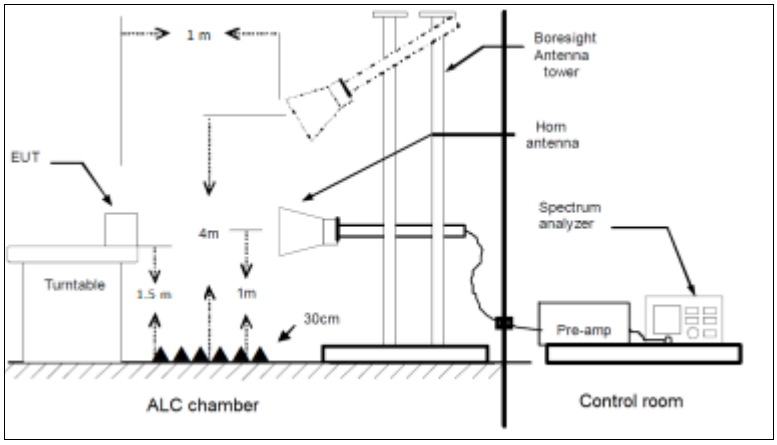
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)	

Radiated measurements Setup f < 1 GHz



Radiated measurements setup f > 1 GHz



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

Co-Location

The test was performed with the equipment transmitting first with only the WiFi 5 GHz (WLAN0 CORE0) radio and repeated with the 2.4 GHz BT-EDR (WLAN 0), WiFi 2.4GHz (WLAN0 CORE1) 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

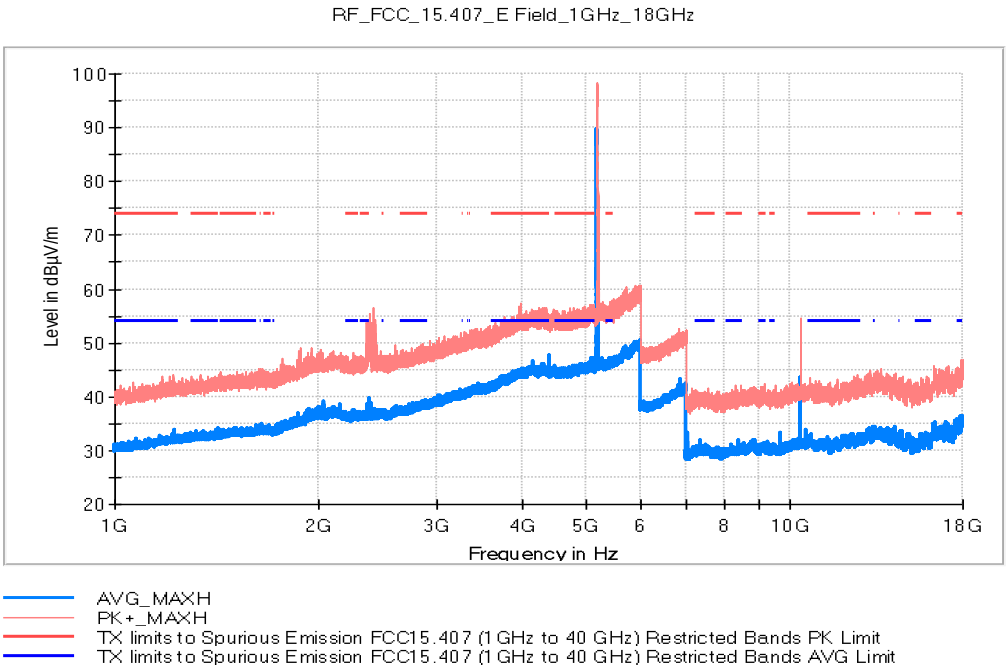
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT. See worst operation mode selected for this range (n mode 20 MHz and Mid channel) as a worst case.

Frequency range 1 GHz – 40 GHz

The results and plots below show the maximum measured levels in the 1- 40 GHz range and the restricted band 4.5 – 5.15 GHz.

TEST RESULTS (Cont.)	
FREQUENCY RANGE	1 GHz – 18 GHz

Low Channel

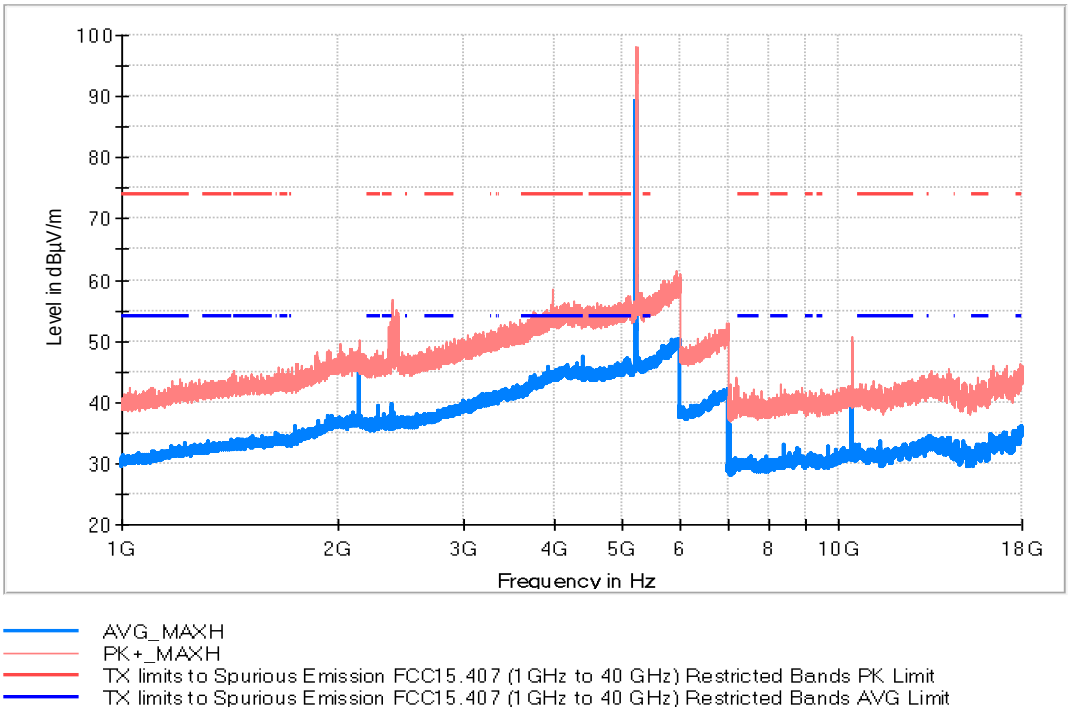


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2380.625000	52.77	39.76	V	
4409.375000	54.52	47.58	V	
5185.312500	97.41	89.72	H	Fundamental
10360.000000	51.03	43.65	H	

TEST RESULTS (Cont.)	

Middle Channel

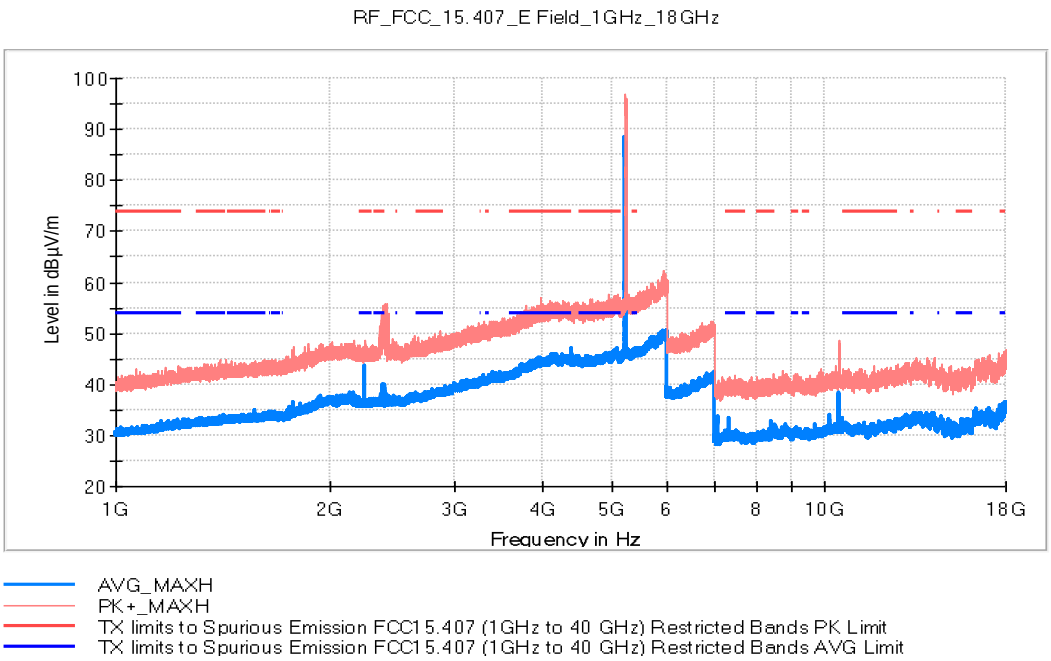


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2143.437500	50.18	45.69	V	
5223.437500	96.29	89.20	V	Fundamental
6993.200000	50.77	42.19	H	
10440.800000	48.75	41.02	V	
13428.800000	42.72	34.38	V	
17996.000000	45.28	35.97	V	

TEST RESULTS (Cont.)	

High Channel

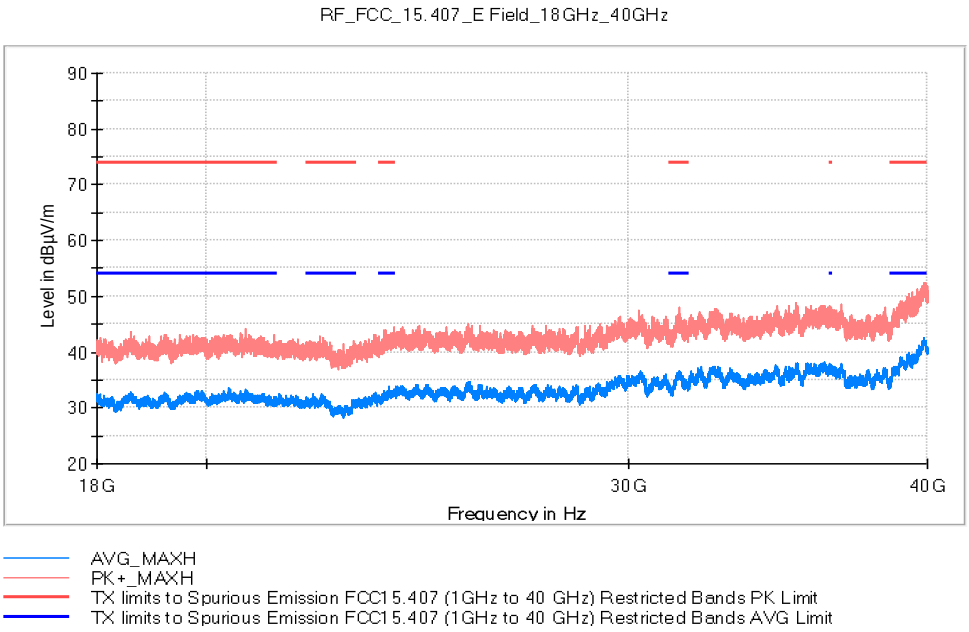


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
5232.343750	95.65	88.56	H	Fundamental
10480.000000	47.77	38.34	V	

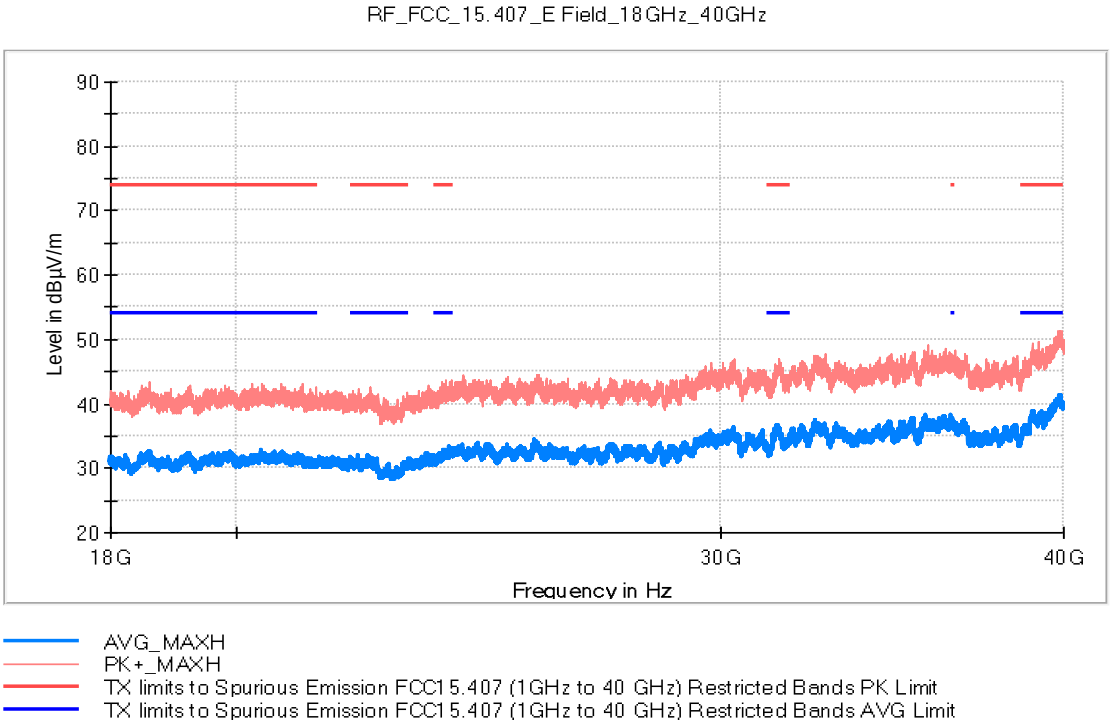
FREQUENCY RANGE	18 GHz – 40 GHz

Low Channel

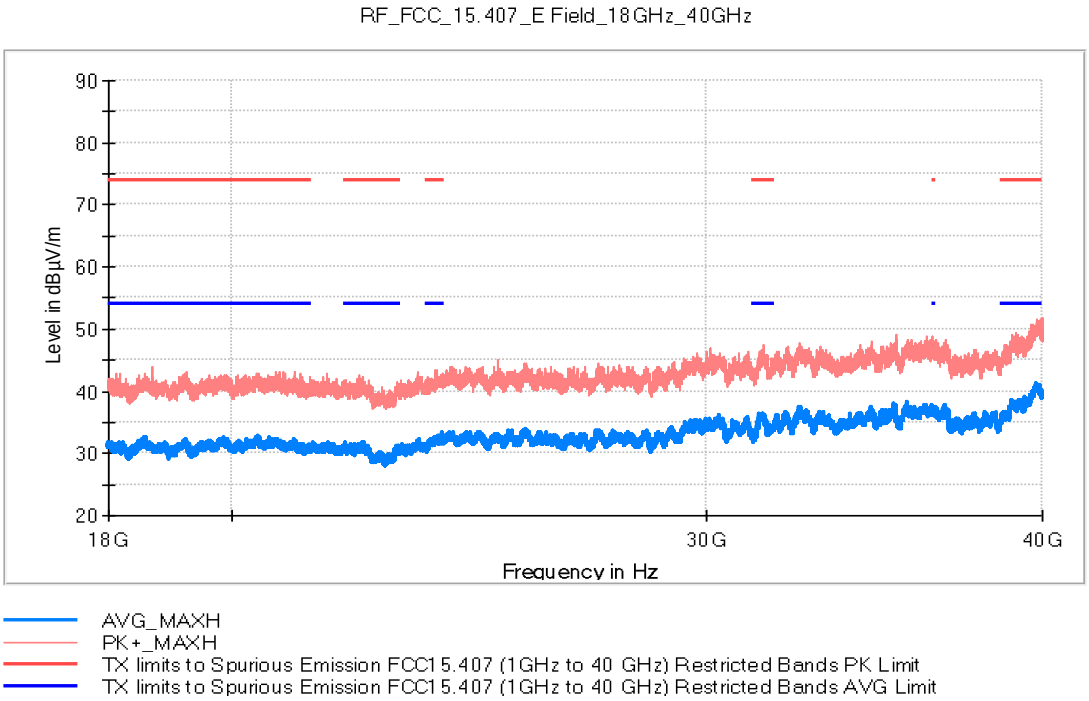


TEST RESULTS (Cont.)	

Middle Channel

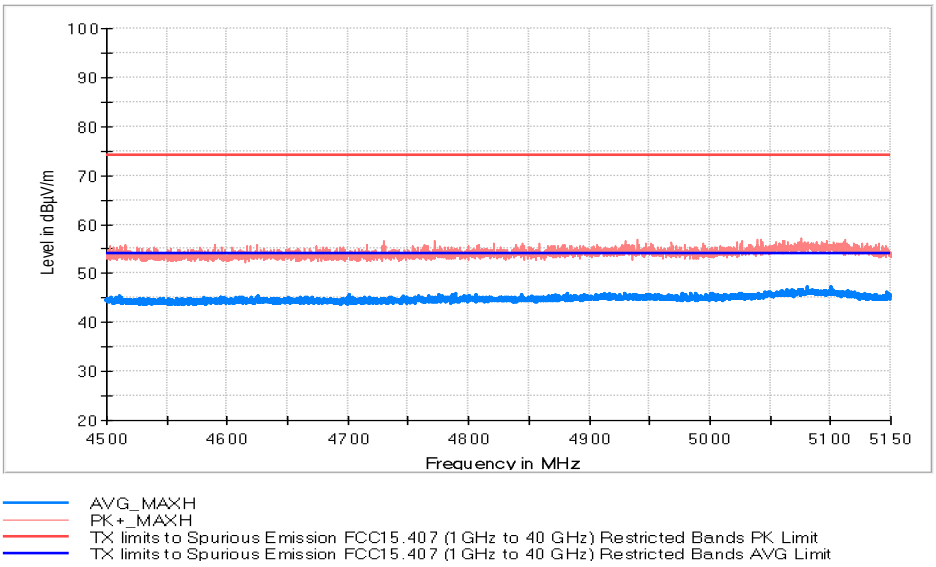


High Channel

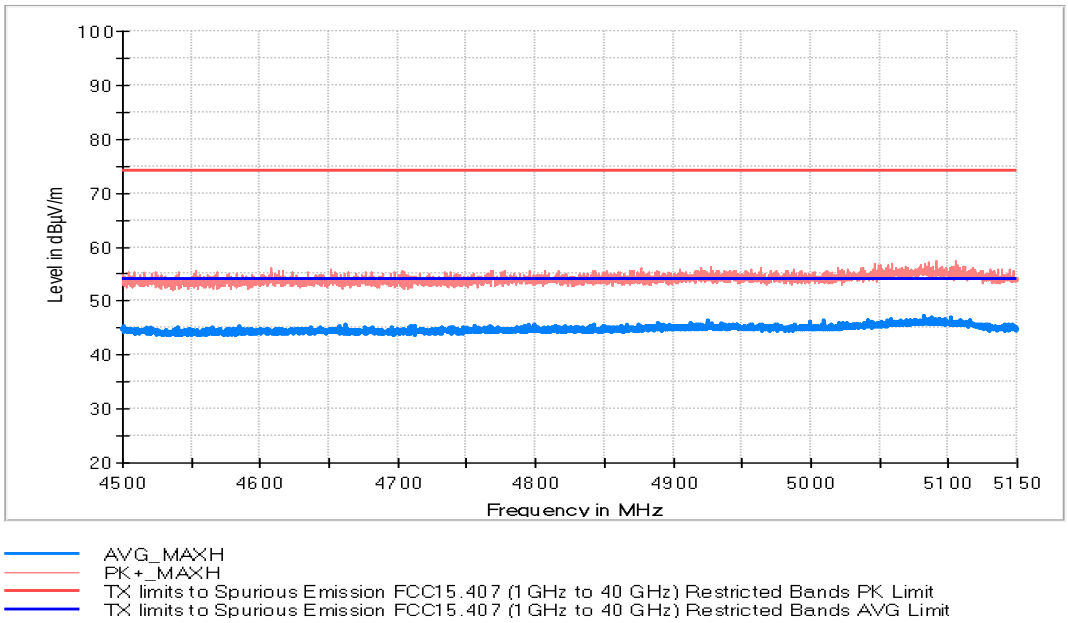


RESTRICTED BANDS	4.5 GHz – 5.15 GHz

Low Channel



Mid Channel



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

Co-Location

The test was performed with the equipment transmitting first with only the WiFi 5 GHz (WLAN0 CORE0) radio and repeated with the 2.4 GHz BT-EDR (WLAN 0), WiFi 2.4GHz (WLAN0 CORE1) 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.

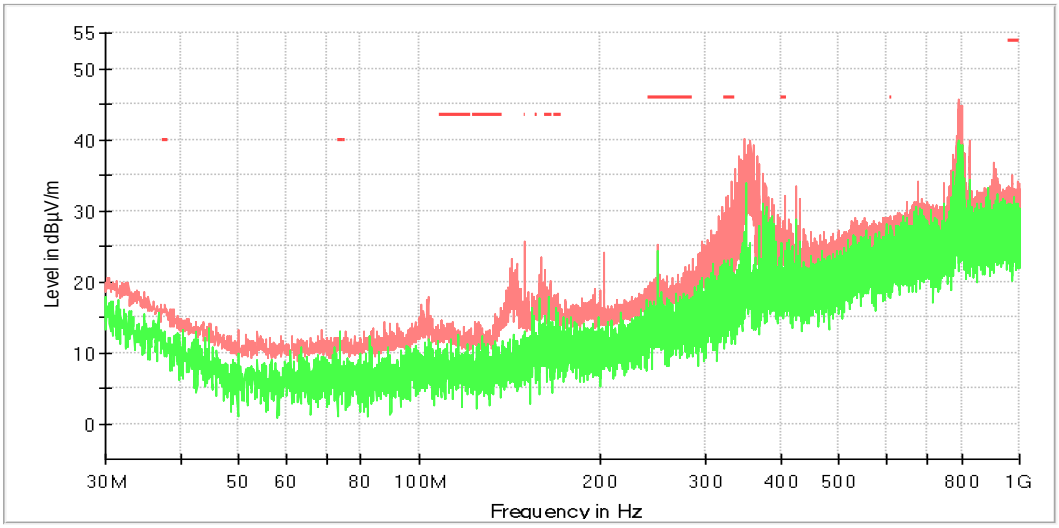
Frequency range 30 MHz – 1000 MHz

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

Frequency range 1 GHz – 40 GHz
The results and plots below show the maximum measured levels in the 1- 40 GHz range and the restricted band 4.5 – 5.15 GHz.

FREQUENCY RANGE	30 MHz – 1000 MHz

RF_FCC_15.247_E Field_30MHz_1GHz



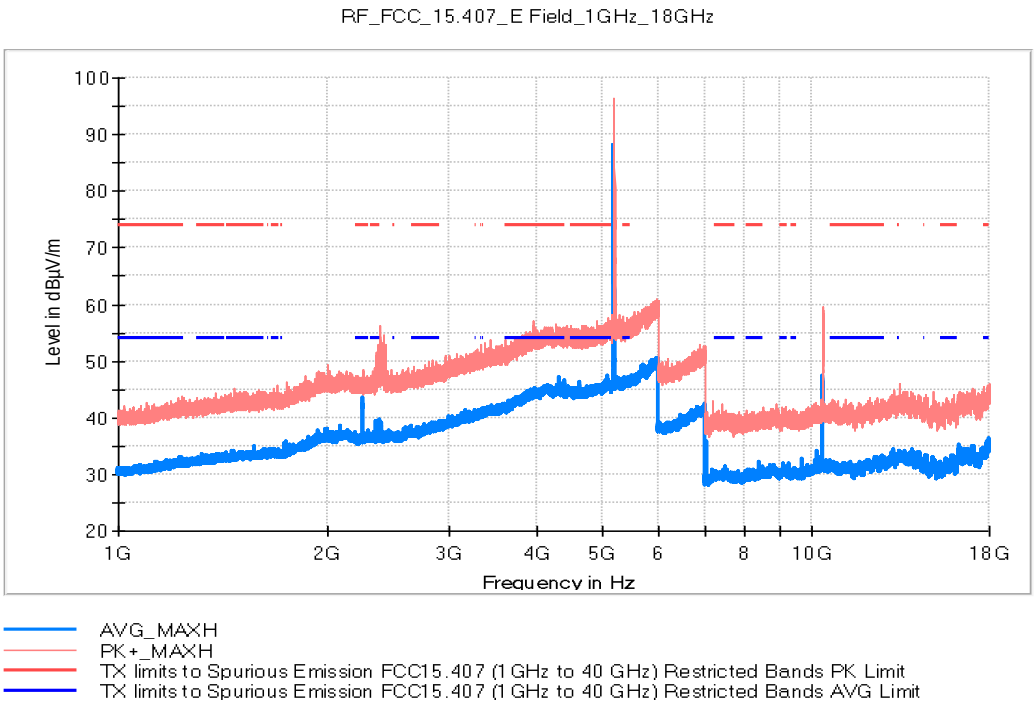
PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit

Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol
793.244500	43.5	34.6	H
406.408500	35.4	30.1	H
348.354000	40.6	36.5	H
356.744500	40.6	37.5	H
340.060500	38.8	36.4	H
159.543500	23.6	11.4	H
974.974000	39.9	32.6	V
906.298000	36.3	26.0	V
149.989000	27.4	24.1	V

TEST RESULTS (Cont.)	n mode (20 MHz)
FREQUENCY RANGE	1 GHz – 18 GHz

Low Channel

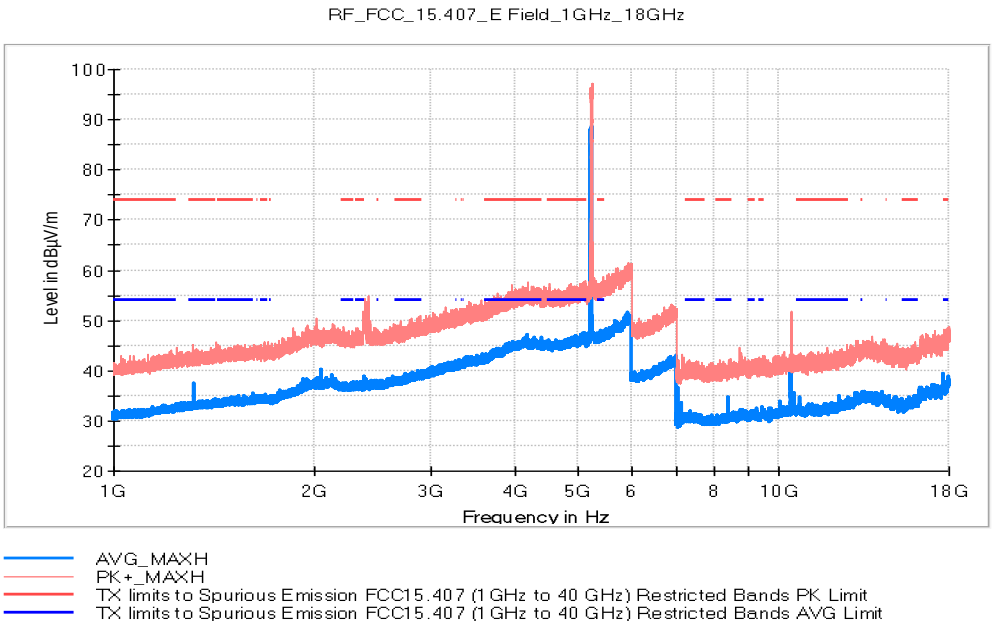


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
5176.250000	93.84	88.17	H	Fundamental
10358.400000	59.04	47.31	H	

TEST RESULTS (Cont.)	

Middle Channel

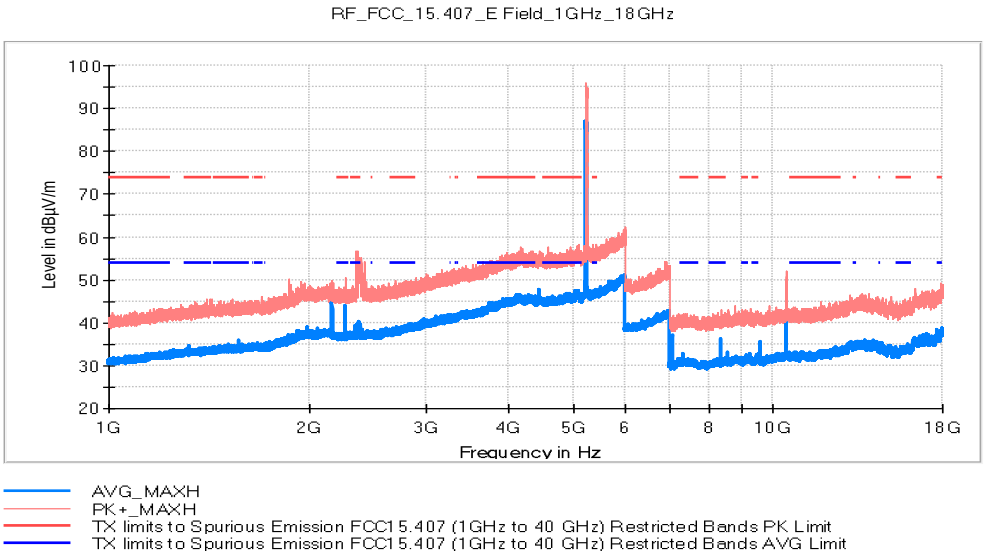


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
1322.812500	43.36	37.33	H	
5226.718750	94.62	88.64	V	Fundamental
7054.800000	42.07	36.59	V	
8378.000000	40.55	34.57	V	
10435.200000	47.84	40.95	V	
17638.000000	45.86	39.35	H	

TEST RESULTS (Cont.)	

High Channel

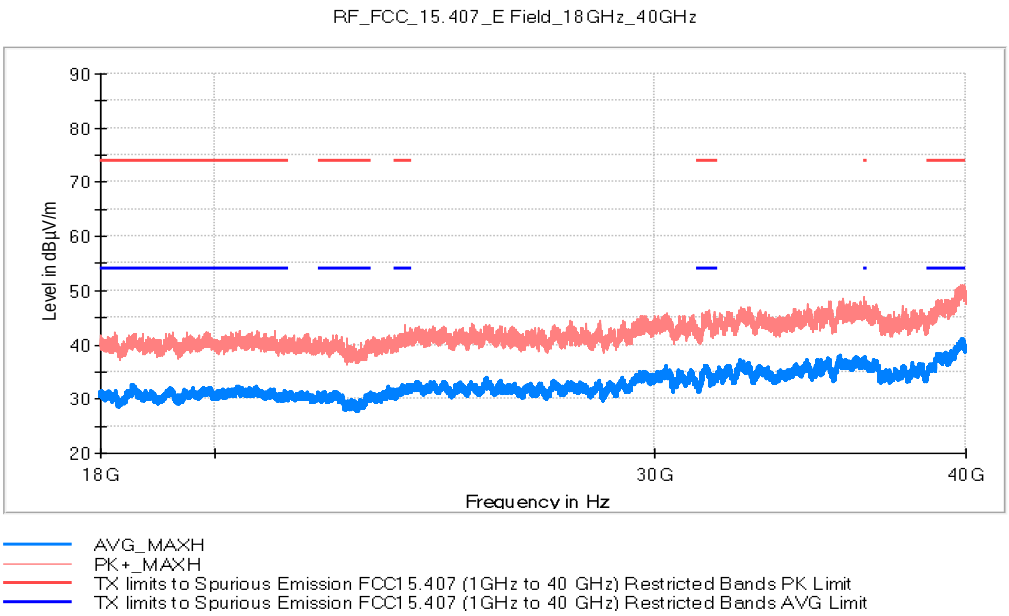


Maximizations

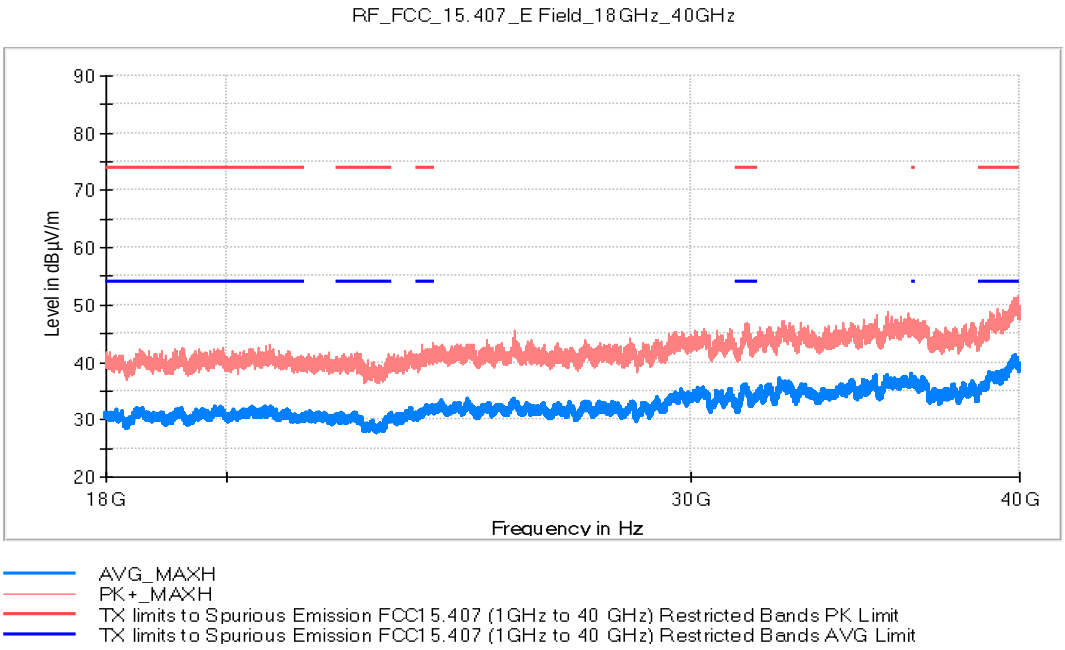
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2172.656250	49.71	46.06	V	
2276.875000	50.63	44.12	V	
5234.687500	93.48	87.00	V	Fundamental
7054.800000	41.79	37.11	H	
8378.000000	43.09	36.20	V	
10480.000000	47.67	40.50	V	
17638.400000	45.95	38.32	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	**18 GHz – 40 GHz**

Low Channel

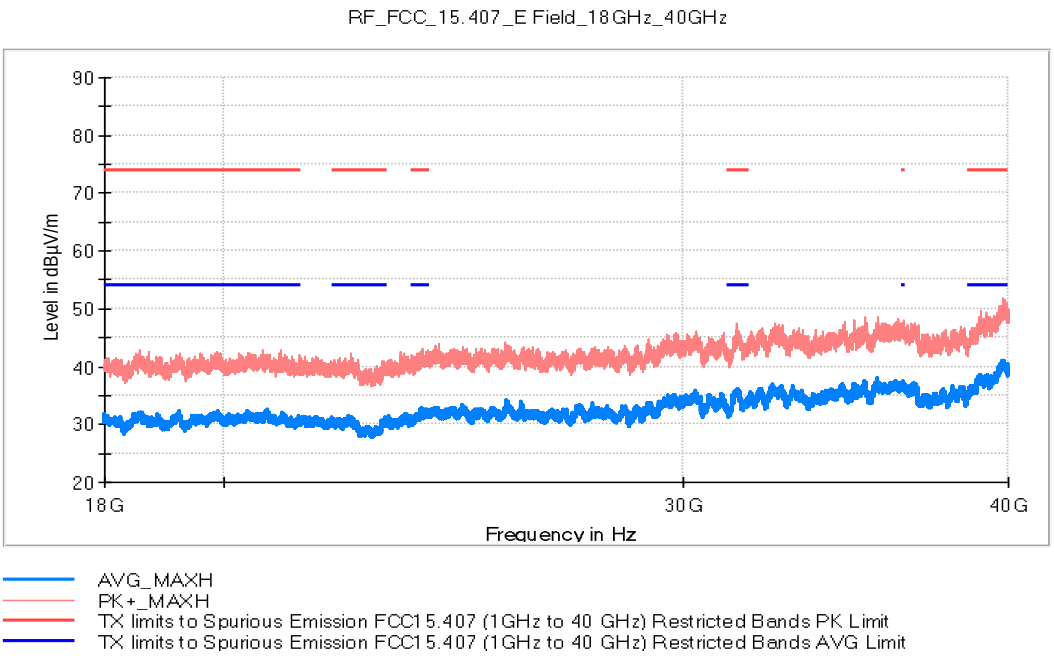


Middle Channel



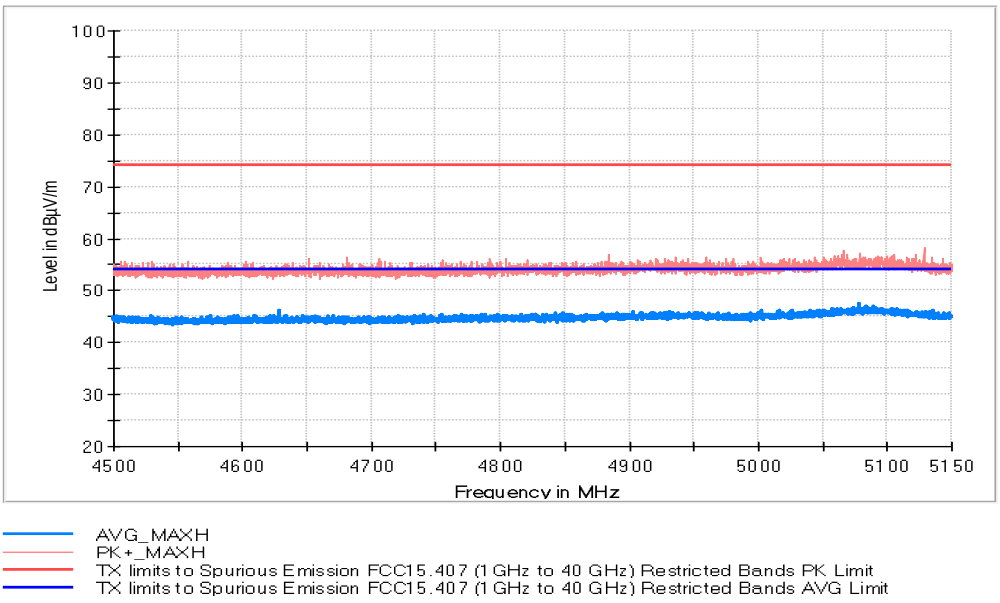
TEST RESULTS (Cont.)	

High Channel



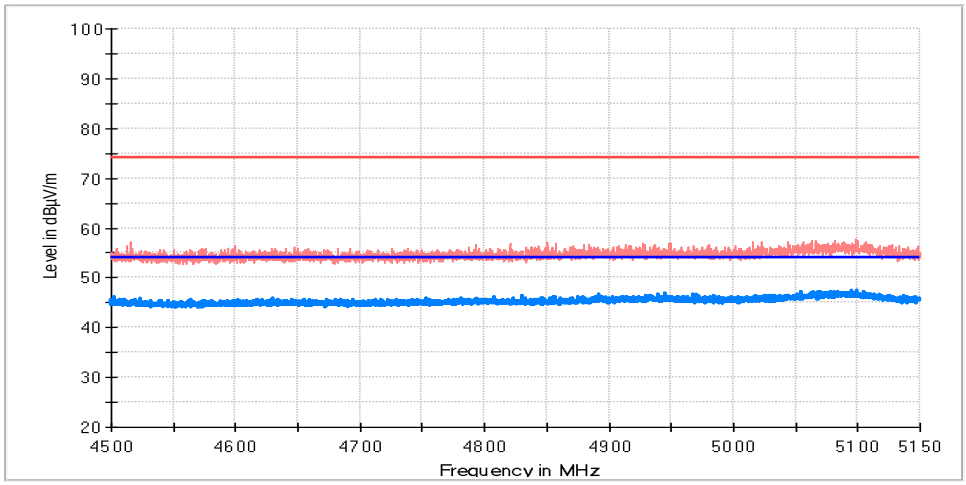
RESTRICTED BANDS	4.5 GHz – 5.15 GHz

Low Channel



TEST RESULTS (Cont.)	

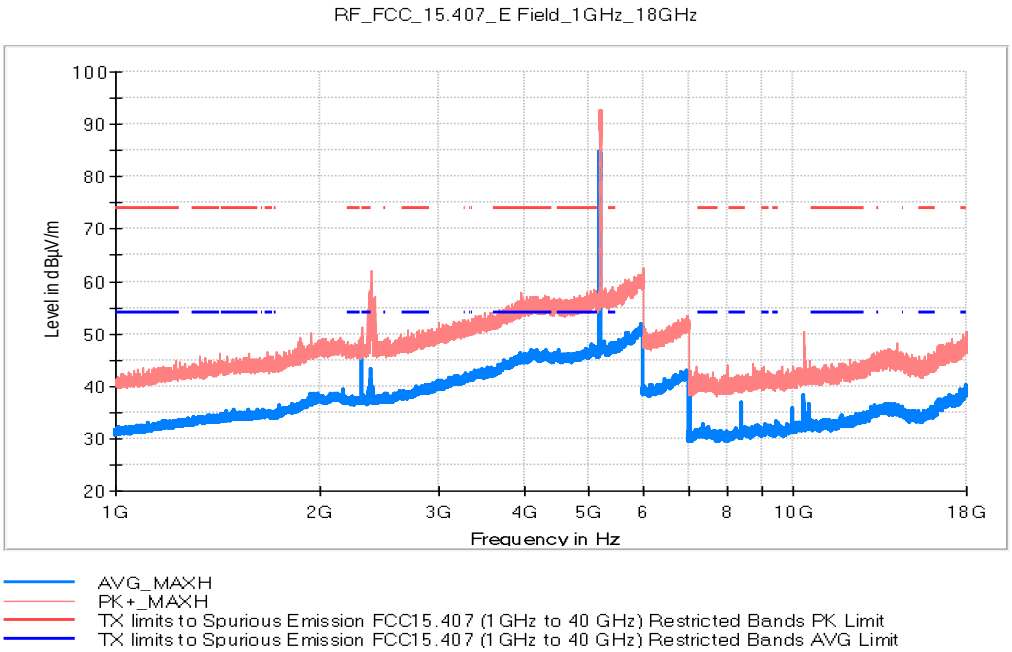
Middle Channel



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

TEST RESULTS (Cont.)	n mode (40 MHz)
FREQUENCY RANGE	1 GHz – 18 GHz

Low Channel

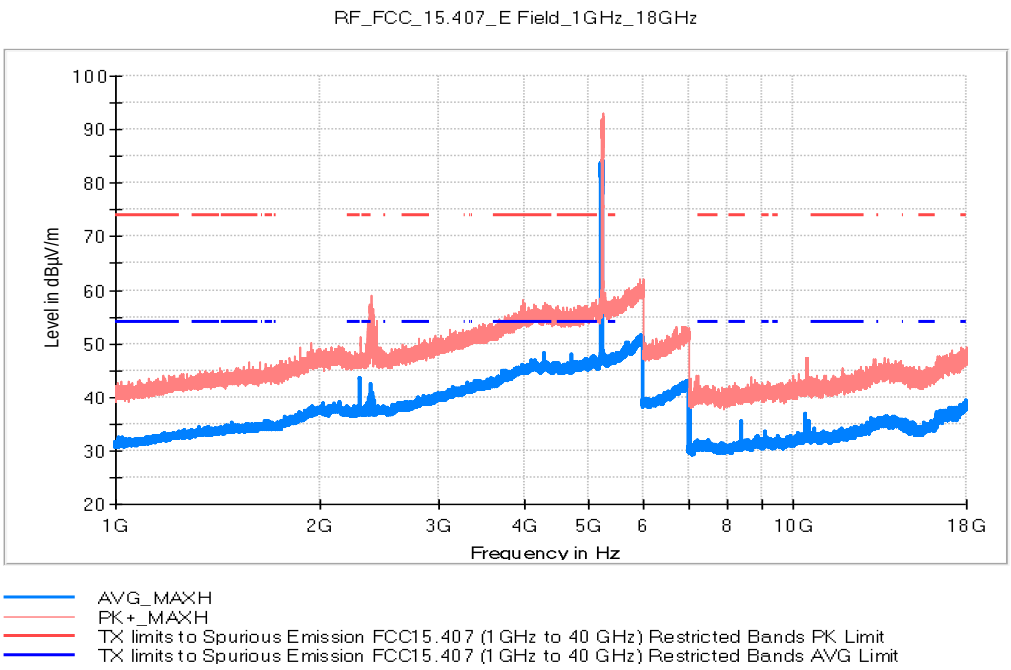


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2307.031250	51.15	47.00	V	
2380.312500	62.00	43.33	V	
5183.437500	90.44	84.72	H	Fundamental
7055.200000	42.52	38.98	H	
8378.000000	40.85	36.84	V	
10381.200000	47.61	38.34	V	

TEST RESULTS (Cont.)	

High Channel

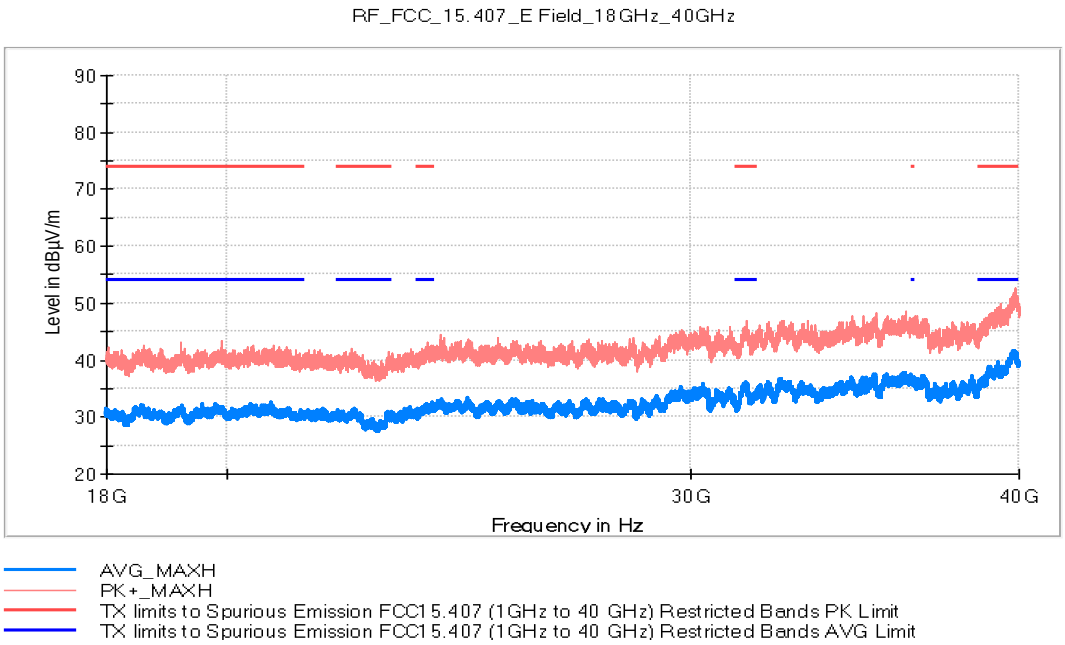


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2302.031250	49.56	43.61	V	
2380.468750	50.81	42.30	V	
5224.375000	90.50	84.35	V	Fundamental
7055.200000	42.65	37.68	V	
8378.000000	41.72	35.56	V	
10458.000000	44.30	36.89	H	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	**18 GHz – 40 GHz**

Low Channel



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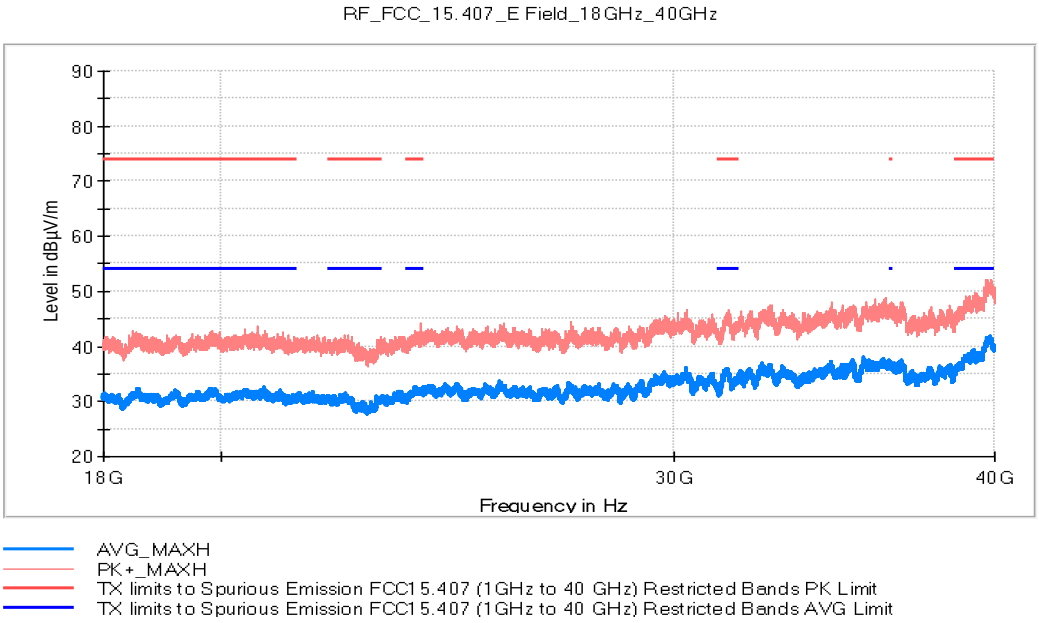
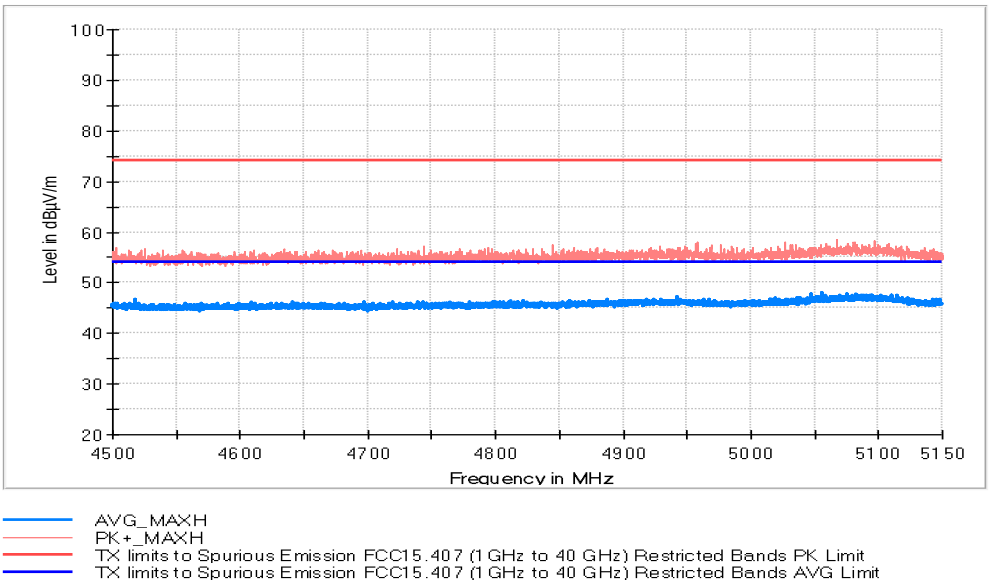
High Channel

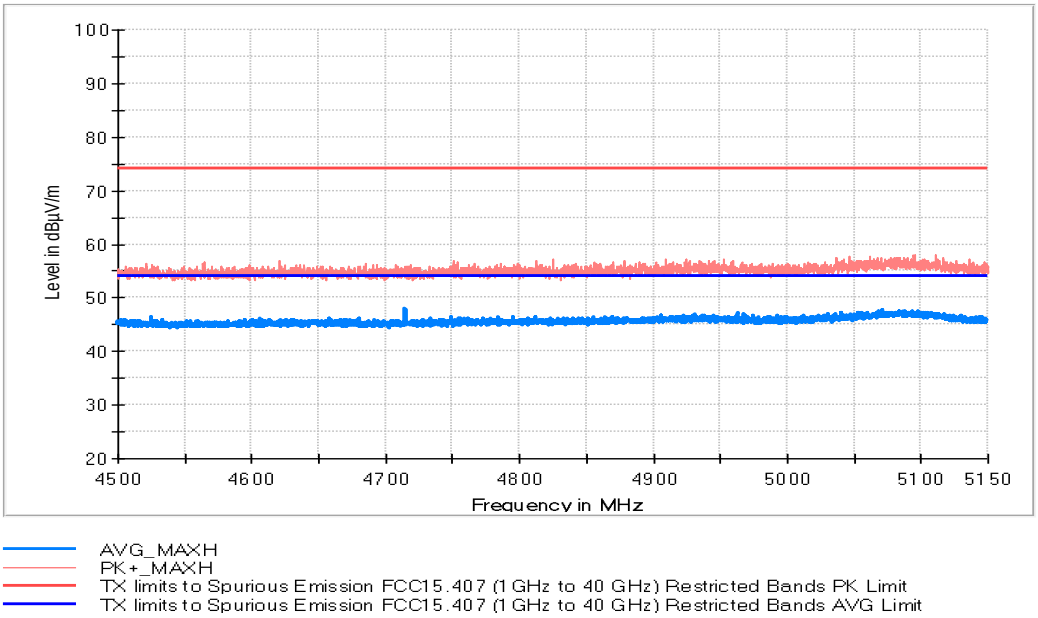


RESTRICTED BANDS	4.5 GHz – 5.15 GHz

Low Channel



High Channel



TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#03 (ac mode)
TEST RESULTS:	PASS

Co-Location

The test was performed with the equipment transmitting first with only the WiFi 5 GHz (WLAN0 CORE0) radio and repeated with the 2.4 GHz BT-EDR (WLAN 0), WiFi 2.4GHz (WLAN0 CORE1) 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.

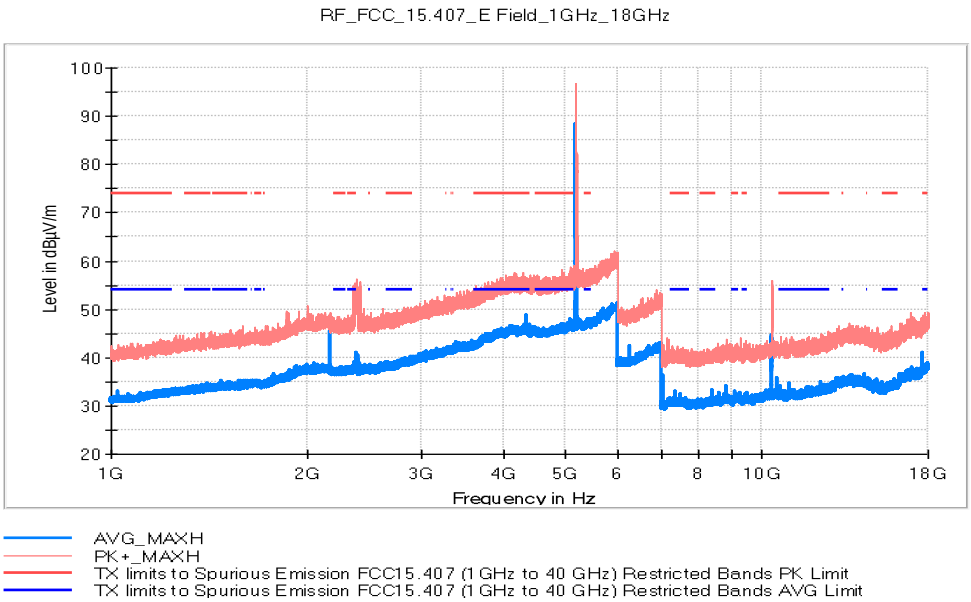
Frequency range 30 MHz – 1000 MHz

The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT. See worst operation mode selected for this range (n mode 20 MHz and Mid channel) as a worst case.

Frequency range 1 GHz – 40 GHz
The results and plots below show the maximum measured levels in the 1- 40 GHz range and the restricted band 4.5 – 5.15 GHz.

TEST RESULTS (Cont.)	**ac mode (20 MHz)**
FREQUENCY RANGE	**1 GHz – 18 GHz**

Low Channel

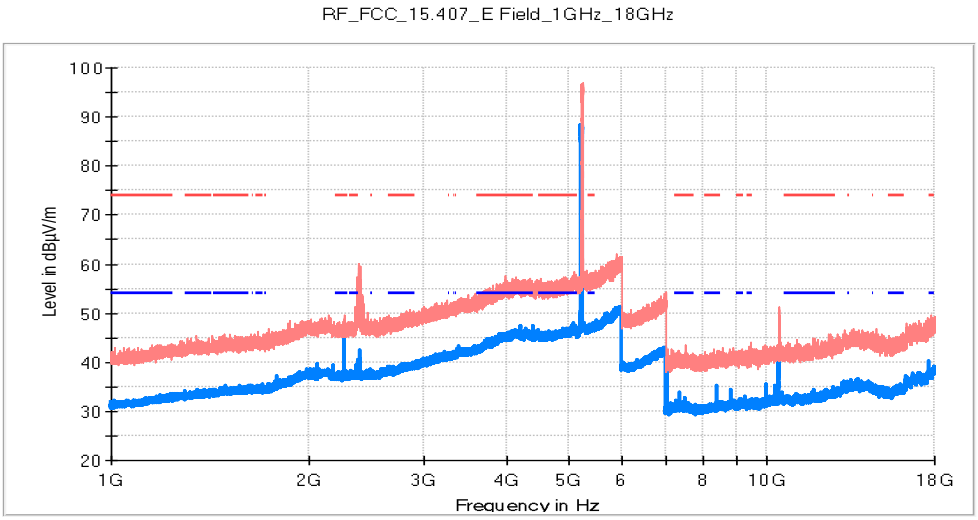


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2170.312500	49.23	45.48	V	
4359.687500	55.45	48.83	V	
5185.156250	94.58	88.39	V	Fundamental
10362.000000	54.30	44.71	V	
14368.400000	44.39	36.52	V	
17638.400000	47.95	41.07	V	

TEST RESULTS (Cont.)	

Mid Channel



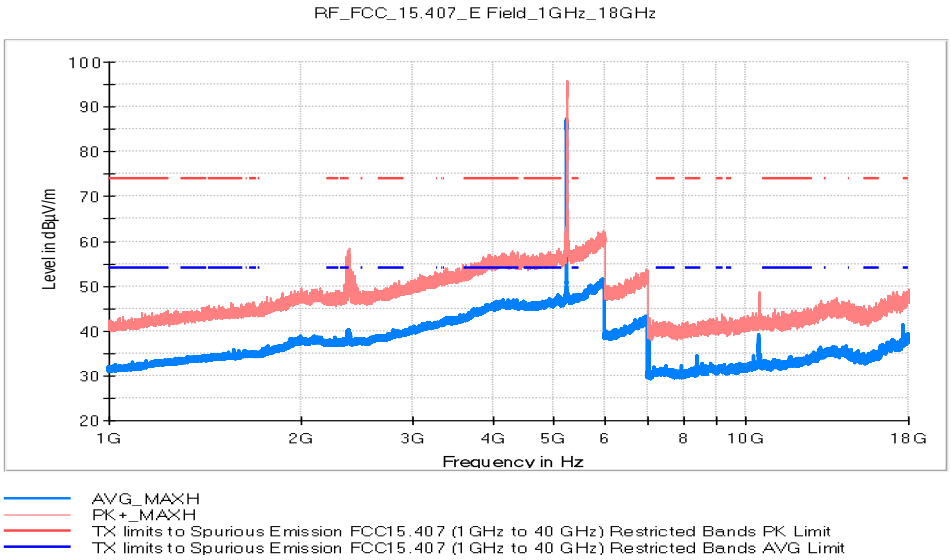
AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.407 (1 GHz to 40 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.407 (1 GHz to 40 GHz) Restricted Bands AVG Limit

Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2263.750000	49.60	45.48	V	
2396.875000	50.76	42.35	V	
5213.906250	95.23	88.50	V	Fundamental
10440.000000	51.04	40.76	V	
13759.200000	44.06	36.57	V	
17638.000000	47.20	40.20	V	

TEST RESULTS (Cont.)	

High Channel

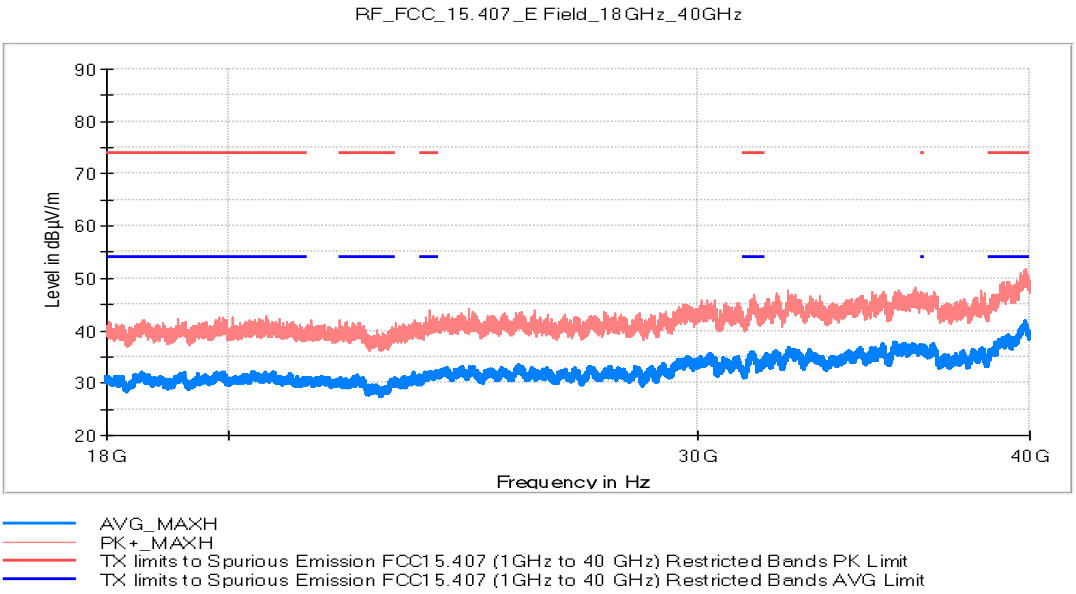


Maximizations

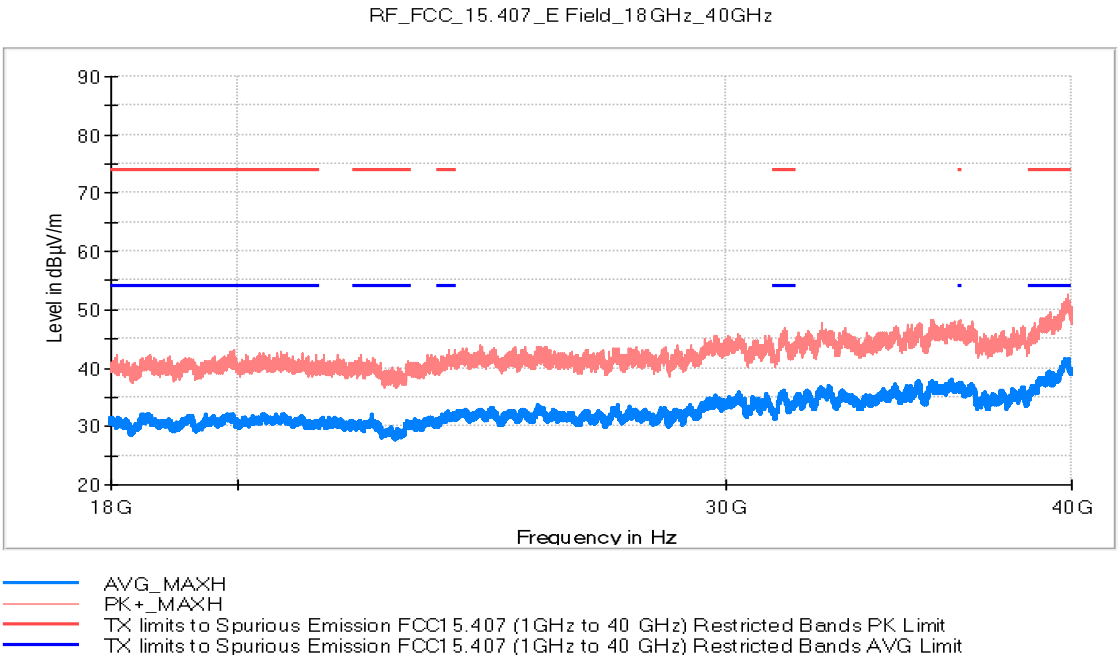
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2387.031250	53.52	40.30	V	
5241.718750	94.02	87.14	V	Fundamental
7055.200000	41.85	38.25	H	
8377.600000	40.03	34.33	V	
10483.600000	46.56	39.04	V	
17638.000000	46.85	41.36	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	**18 GHz – 40 GHz**

Low Channel

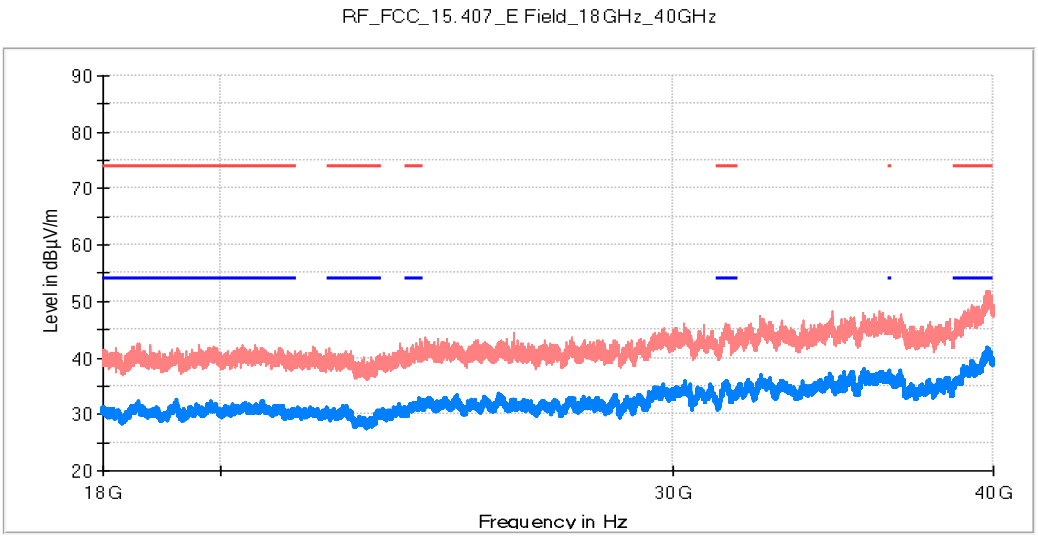


Middle Channel



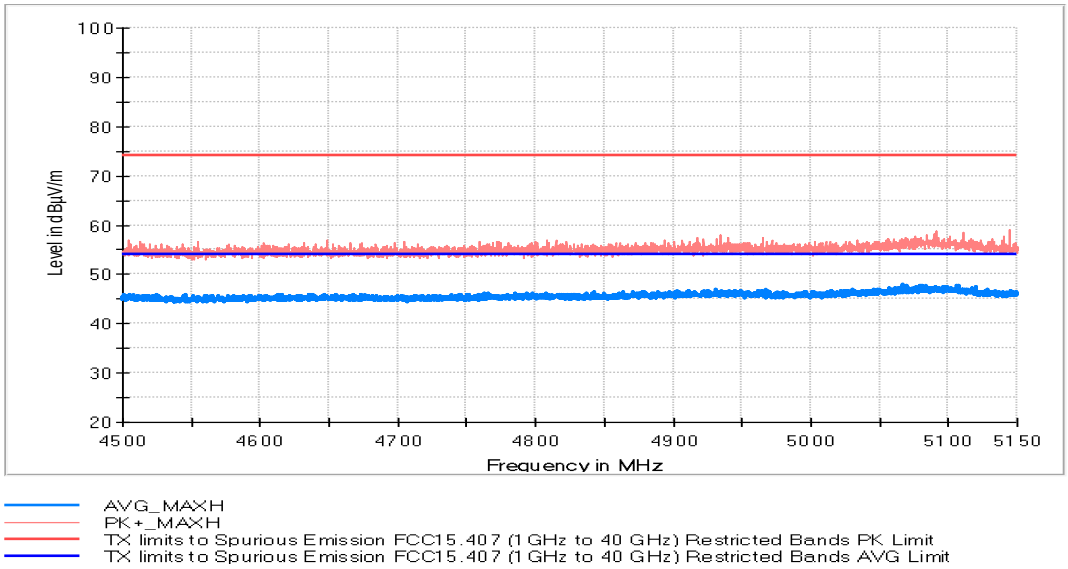
TEST RESULTS (Cont.)	

High Channel



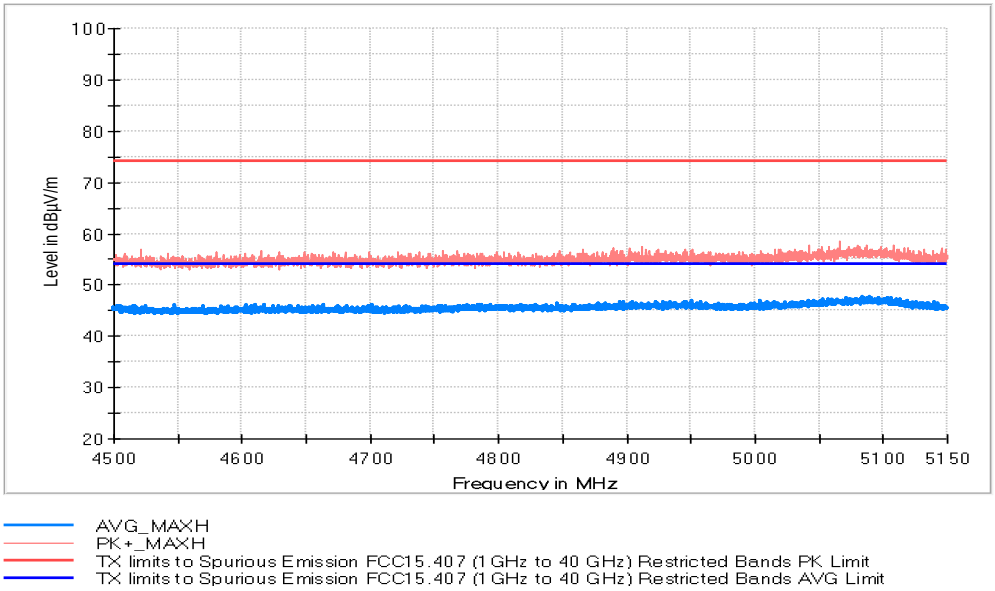
RESTRICTED BANDS	4.5 GHz – 5.15 GHz

Low Channel



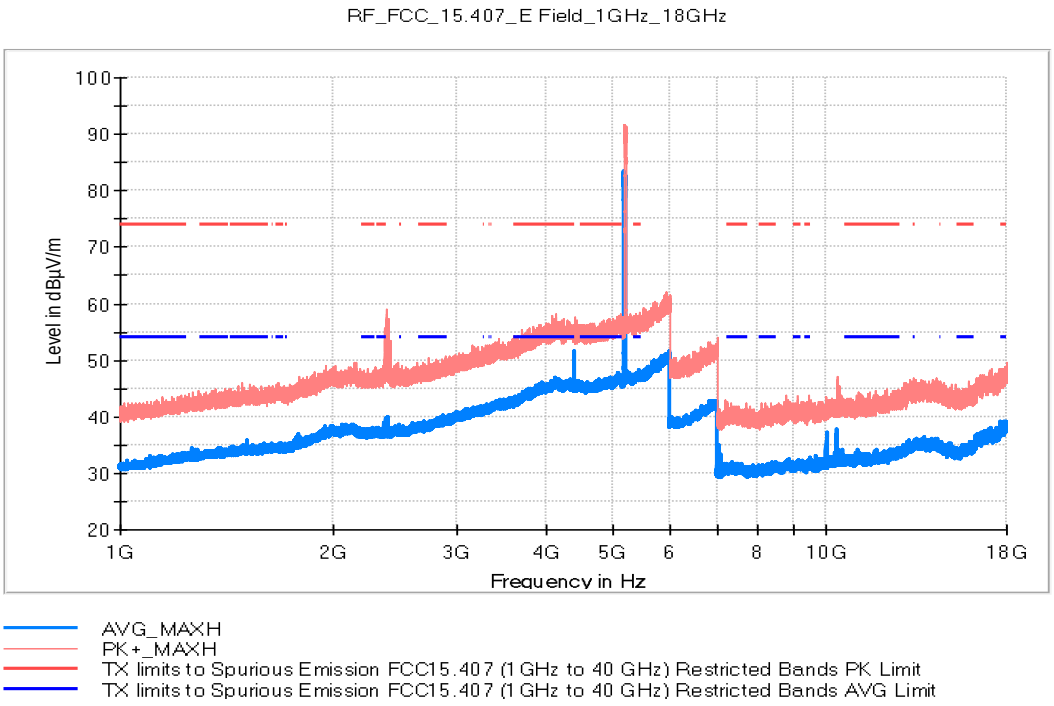
TEST RESULTS (Cont.)	

Middle Channel



TEST RESULTS (Cont.)	ac mode (40 MHz)
FREQUENCY RANGE	1 GHz – 18 GHz

Low Channel

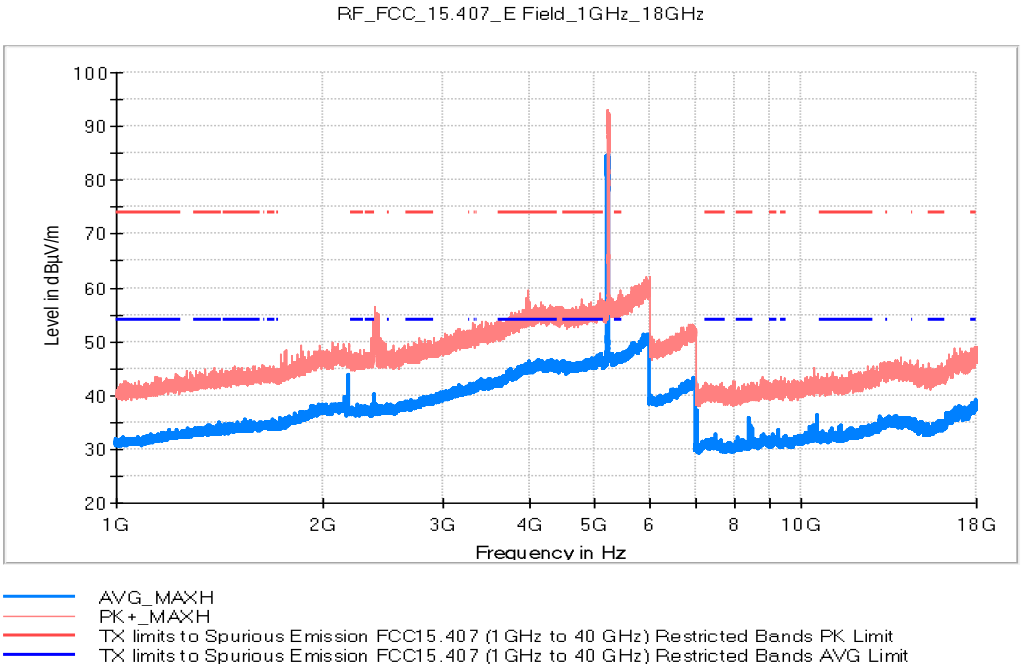


Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2393.906250	55.76	39.91	V	
4393.437500	56.48	51.46	V	
5185.312500	89.65	83.47	V	Fundamental
10017.200000	42.74	37.21	V	
10378.800000	45.18	37.84	H	
17638.400000	46.61	39.14	V	

TEST RESULTS (Cont.)	

High Channel



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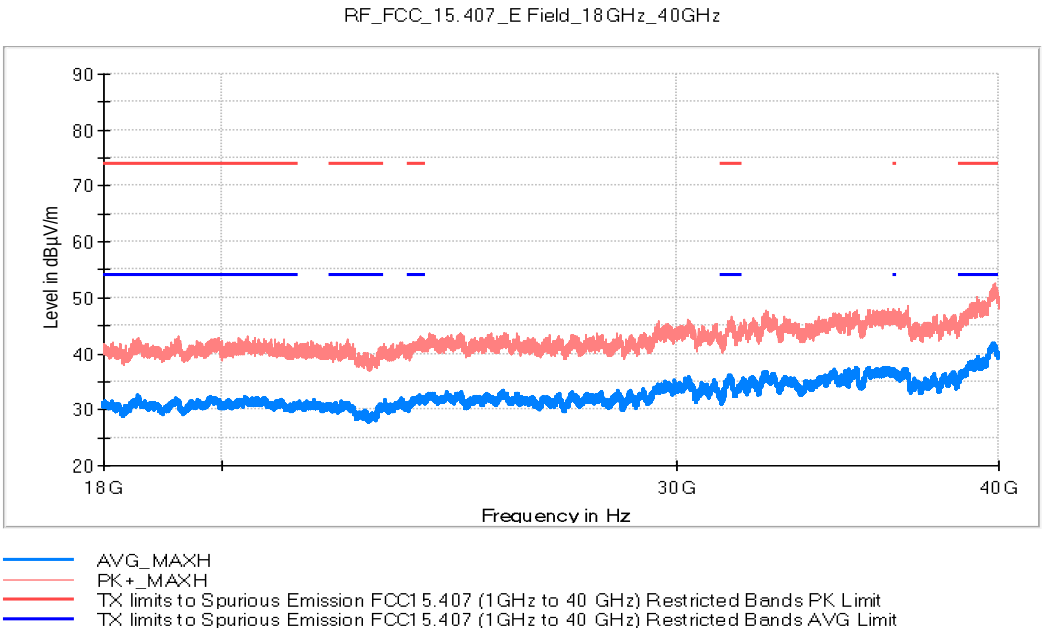
Maximizations

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comments
2187.187500	49.65	43.75	V	
2381.875000	55.44	40.10	H	
4000.468750	53.70	46.43	V	
5227.343750	90.05	84.81	H	Fundamental
7055.200000	42.23	37.06	H	
8378.000000	41.59	35.68	V	
10582.800000	42.95	36.39	V	

TEST RESULTS (Cont.)	
FREQUENCY RANGE	**18 GHz – 40 GHz**

Low Channel



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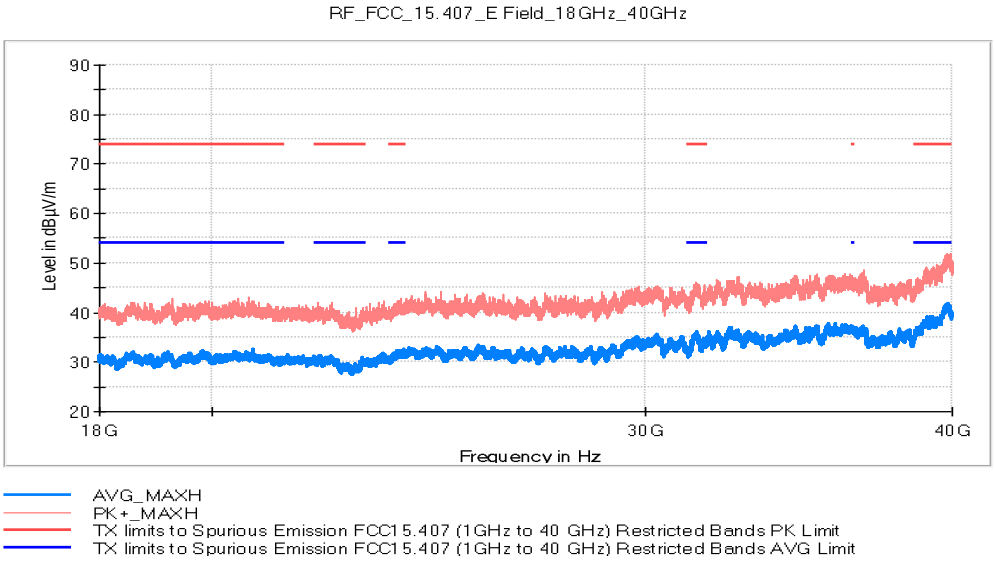
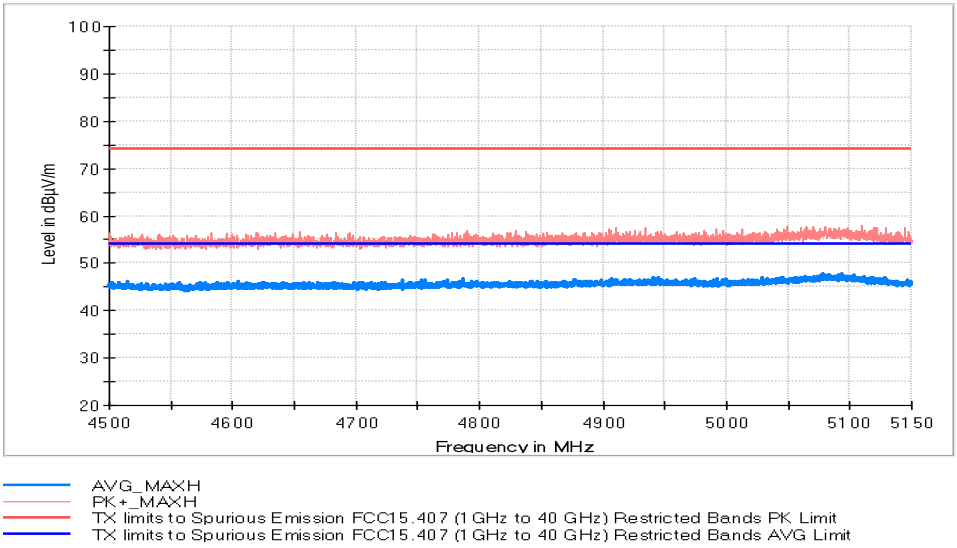
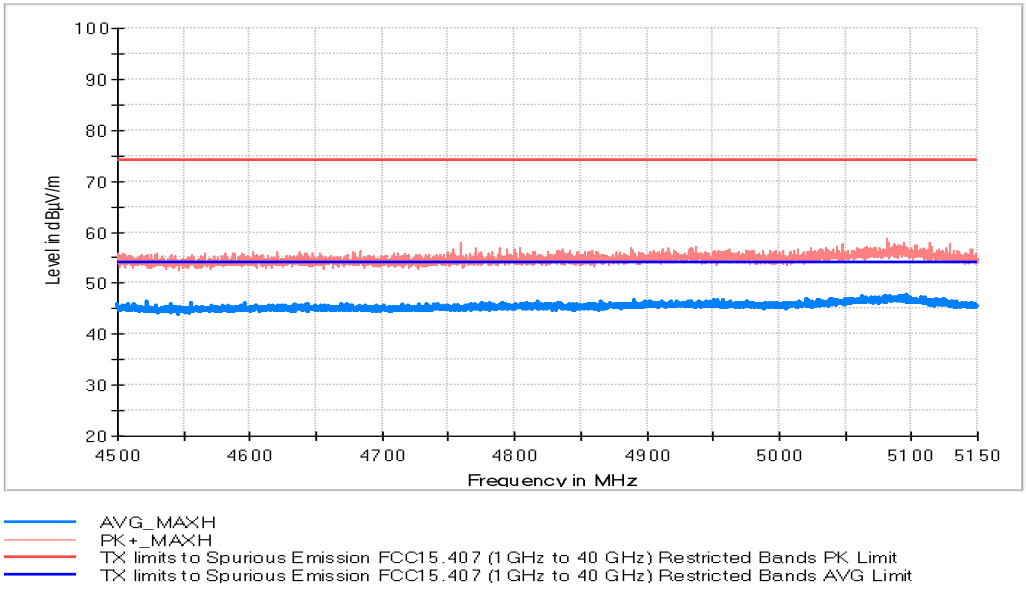
High Channel



RESTRICTED BANDS	4.5 GHz – 5.15 GHz

Low Channel



High Channel