



FCC LISTED, REGISTRATION NUMBER: 2764.01

Test report No: 2602ERM.004A2

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report

USA FCC Part 15.247, 15.209 CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices.

Identification of item tested	CP1150 Sound Processor
Trademark	Cochlear
Model and /or type reference	CP1150
Other identification of the product	FCC ID: WTO-CP1150 IC: 8039A-CP1150 HW Version: Build W SW Version: 0922B02T00 (02.02.00#766564)
Features	
Manufacturer	Cochlear LTD 1 University Avenue, Macquarie University, NSW, Australia – 2109.
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). 558074 D01 15.247 Meas Guidance v05r02. Guidance for Compliance Measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under section §15.247 of the FCC Rules ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager
Date of issue	02-26-2020
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
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

CP1150 Sound Processor is part of a cochlear implant system. It is worn off the ear and its purpose is to capture and digitally process sound, as well as to transfer the audio data and power to the cochlear implant over a transcutaneous link.

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
2602B/04	Conducted Sample 2	CP1150	1010151025569	09/10/2019

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 Nº	Description	Model	Serial Nº	Date of reception
2602B/02	Radiated Sample 2	CP1150	1010151026054	09/10/2019

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

All radiated tests indicated in appendix A.

Following accessory items were used to Charge the DUT

Control Nº	Description	Model	Serial Nº	Date of reception
2602B/06	Portable Charger	2819x		09/10/2019
2602B/07	Portable Charger Cable			09/10/2019

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



Test sample description

Test sumple description							
Ports:			Cable				
	Port name and description		Specified At		Attach	ed	Shielded
					during	during test	
		. 5					
Supplementary information to the ports:	No D	ata Provided					
·				Re	ference p	noles	
Rated power supply:	Volta	ge and Frequency			, crener	,	
			L1	L2		L1	L2
		AC:			AC:		
	\vdash	AC:			AC:	\vdash_{\vdash}	
		DC: 3-4.2 V					
		DC:					
Rated Power:	No D	ata Provided					
Clock frequencies:	No Data Provided						
Other parameters:	No Data Provided						
Software version:	0922B02T00 (02.02.00#766564)						
Hardware version:	Build W						
Dimensions in cm (L x W x D):	34mr	n x 38mm x 11.6mm					
Mounting position:		Table top equipment					
	☐ Wall/Ceiling mounted equipment						
	☐ Floor standing equipment						
		Hand-held equipment					
		Other: Body Worn – off the	ear				
Modules/parts:	Modu	lle/parts of test item		7	Гуре	Mar	nufacturer
	No pi	rovided data					
Accessories (not part of the test	Desc	ription		Туре)	Man	ufacturer
item):							



Documents as provided by the applicant:	Description	File name	Issue date
' '	Equipment declaration Data	FDT30_15 Declaration	09-12-2019
		Equipment Data	
		CP1150 V1	

Copy of marking plate:



Identification of the client

Cochlear LTD

1 University Avenue, Macquarie University, NSW, Australia – 2109.

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	09-11-2019
Date (finish)	09-12-2019

Document history

Report number	Date	Description
2602ERM.004	09-25-2019	First release
2602ERM.004A1	12-03-2019	Second release
2602ERM.004A2	02-26-2020	Third release



Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 2602ERM.004A1 related

with the same samples, in the next clauses and sub-clauses:

Clauses/ Sub-Clauses	Modification	Justification
Page 12/Product Information	Modified the antena gain	To comply with the FDT30 Doc
Test Results/ A.3 Maximum Peak conducted output power and antena gain	Modified the antena gain and EIRP vlaues	To comply with the FDT30 Doc

This modification test report cancels and replaces the test report 2602ERM.004A1

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 semianechoic 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: Divya Adusumilli, Poojita Bhattu and Koji

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

DEKRA

Nishimoto.

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-247 (Bluetooth Low Energy)					
Report Section	15.247 Spec Clause	RSS Spec Clause	Test Description	Verdict	Remark
A.1	§ 2.1049	RSS-Gen 6.7	99% Occupied Bandwidth	Р	N/A
A.2	§ 15.247 (a) (2)	RSS-247 5.2. (a)	6dB Emission Bandwidth	Р	N/A
A.3	§ 15.247 (b) (3)	RSS-247 5.4. (d)	Maximum peak conducted output power and antenna gain	Р	N/A
A.4	§ 15.247 (d)	RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	Р	N/A
A.5	§ 15.247 (e)	RSS-247 5.2. (b)	Power spectral density	Р	N/A
A.6	§15.207 (a)	RSS Gen 8.8	Conducted Emission Limits	Р	N/A
A.7	§ 15.247 (d)	RSS-Gen 8.9 & 8.10.	Emission limitations radiated (Transmitter)	Р	N/A
Supplem N/A	nentary informatio	on and remarks:		•	



List of equipment used during the test

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1039	Signal analyzer Rohde & Schwarz FSV40	2017/03	2020/03
1040	Switch unit Rohde & Schwarz with power detector OSP120 / OSP-B157	2017/03	2020/03
1041	RF generator Rohde & Schwarz SMB100A	2017/04	2020/04
1042	RF generator Rohde & Schwarz SMBV100A	2018/01	2020/01

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus "L"	N/A	N/A
1064	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
1057	Double-ridge Waveguide Horn antenna 1-18 GHz	2017/03	2020/03
1056	Double-ridge Waveguide Horn antenna 18- 40 GHz	2017/03	2020/03
1014	Spectrum analyzer Rohde & Schwarz FSV40	2017/03	2020/03
1015, 1017, 1019, 1020	Rohde & Schwarz EMC32 software	N/A	N/A



Appendix A: Test results (Bluetooth Low Energy)



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PRODUCT INFORMATION

The following information is provided by the client

Description
FHSS
Adaptive Equipment operating in Non-Adaptive mode
2402 – 2480 MHz
1 MHz & 2 MHz
0 dBm
5 °C to +40 °C
Integral Antenna
2.1 dBi
3-4.2 Vdc
DC Voltage
Bluetooth Low Energy
No



DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01 (1 Mbps)	Power supply (V): Vnominal = 3.8 Vdc Data Rate: 1 Mbps Bandwidth: 1 MHz Test Frequencies for Conducted/ Radiated tests: Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz
TC#02 (2 Mbps)	Power supply (V): Vnominal = 3.8 Vdc Data Rate: 2 Mbps Bandwidth: 2 MHz Test Frequencies for Conducted/ Radiated tests: Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz



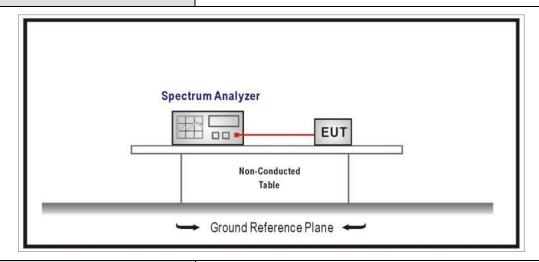
TEST A.1: 99% OCCUPIED BANDWIDTH

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

LIMITS

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

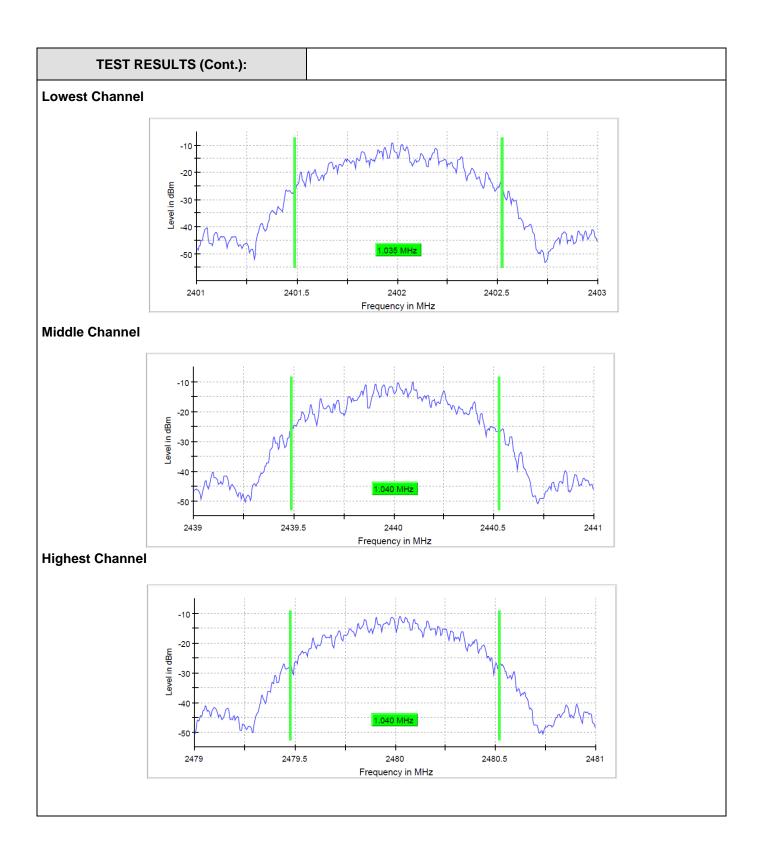
TEST SETUP



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

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
99% bandwidth (MHz)	1.035	1.040	1.040
Measurement uncertainty (kHz)		<± 8.33	







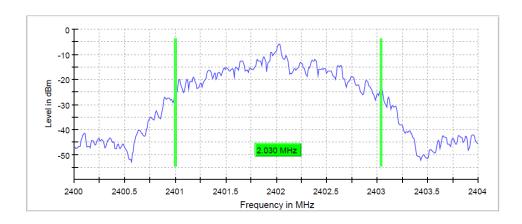
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000	2.43900	2.47900
Stop Frequency	2.40300	2.44100	2.48100
Span	2.000 MHz	2.000 MHz	2.000 MHz
RBW	10.000 kHz	10.000 kHz	10.000 kHz
VBW	30.000 kHz	30.000 kHz	30.000 kHz
Sweep Points	400	400	400
Sweep time	189.648 us	189.648 us	189.648 us
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.30 dB	0.30 dB	0.30 dB
Run	11 / max.	19 / max.	14 / max.
Stable	3/3	3/3	3/3
Max Stable	0.22 dB	0.03 dB	0.26 dB



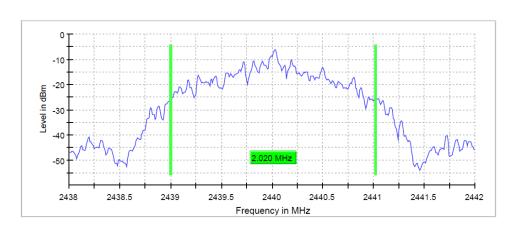
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (2Mbps)
TEST RESULTS:	PASS

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
99% bandwidth (MHz)	2.030	2.020	2.010
Measurement uncertainty (kHz)		<± 8.33	

Lowest Channel

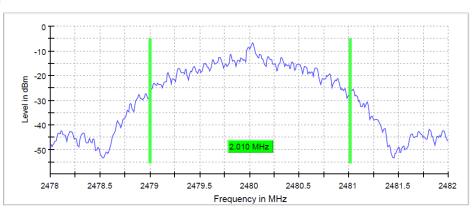


Middle Channel





Highest Channel



Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.43800 GHz	2.47800 GHz
Stop Frequency	2.40400 GHz	2.44200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	20.000 kHz	20.000 kHz	20.000 kHz
VBW	100.000 kHz	100.000 kHz	100.000 kHz
Sweep Points	400	400	400
Sweep time	94.824 µs	94.824 µs	94.824 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.30 dB	0.30 dB	0.30 dB
Run	11 / max. 150	11 / max. 150	13 / max. 150
Stable	3/3	3/3	3/3
Max Stable Difference	0.19 dB	0.21 dB	0.10 dB



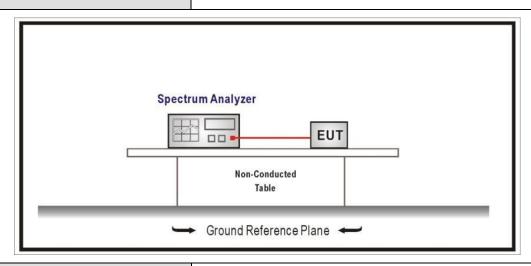
TEST A.2: 6DB BANDWIDTH

LIMITS:	Product standard:	Part 15 Subpart C §15.247 and RSS-247
LIIVII I 5:	Test standard:	Part 15 Subpart C §15.247(a)(2) and RSS-247 5.2(a)

LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST SETUP

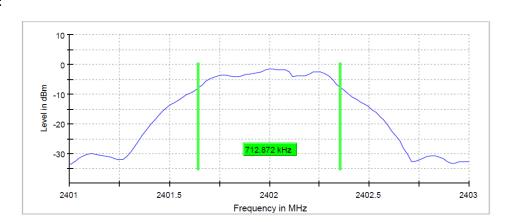


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

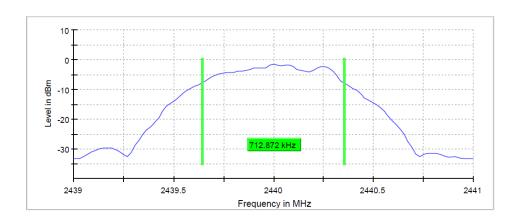
	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
6 dB Spectrum bandwidth (kHz)	712.872	712.872	712.872
Measurement uncertainty (kHz)		<±20.0	



Low Channel:

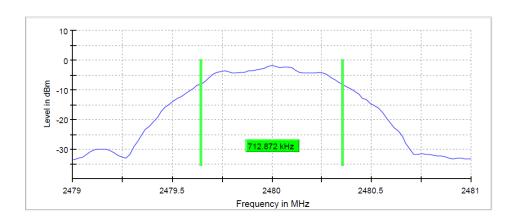


Mid Channel:





High Channel:



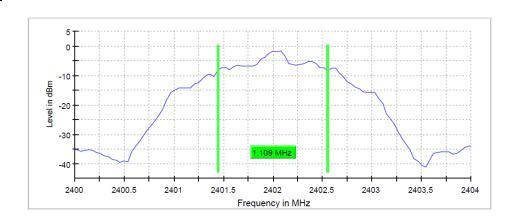
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40100	2.43900	2.47900
Stop Frequency	2.40300	2.44100	2.48100
Span	2.000 MHz	2.000 MHz	2.000 MHz
RBW	100.000	100.000	100.000
VBW	300.000	300.000	300.000
Sweep Points	101	101	101
Sweep time	18.938 us	18.938 us	18.938 us
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	14 / max.	10 / max.	12 / max.
Stable	5/5	5/5	5/5
Max Stable	0.10 dB	0.03 dB	0.00 dB



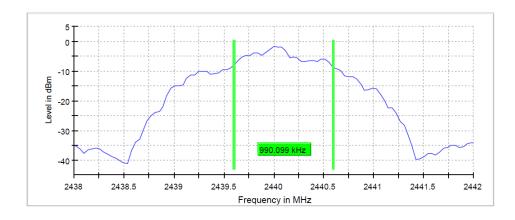
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)
TEST RESULTS:	PASS

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (MHz)	1.109	0.990	0.990
Measurement uncertainty (kHz)		<±20.0	

Low Channel:

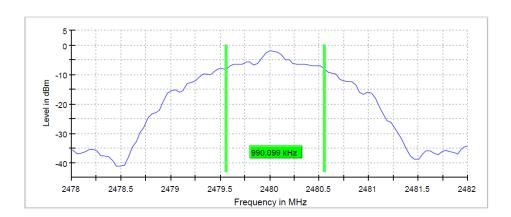


Mid Channel:





High Channel:



Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000	2.43800	2.47800
Stop Frequency	2.40400	2.44200	2.48200
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	100.000	100.000	100.000
VBW	300.000	300.000	300.000
Sweep Points	101	101	101
Sweep time	18.938 µs	18.938 µs	18.938 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	11 / max.	12 / max.	12 / max.
Stable	5/5	5/5	5/5
Max Stable	0.13 dB	0.15 dB	0.08 dB



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

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

LIMITS

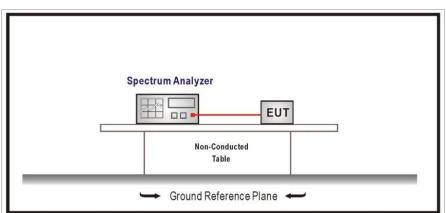
§15.247(b)(3) and RSS-247 5.4(d): For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

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

TEST SETUP

The maximum peak conducted output power was measured using the method according to point 9.1.1. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

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



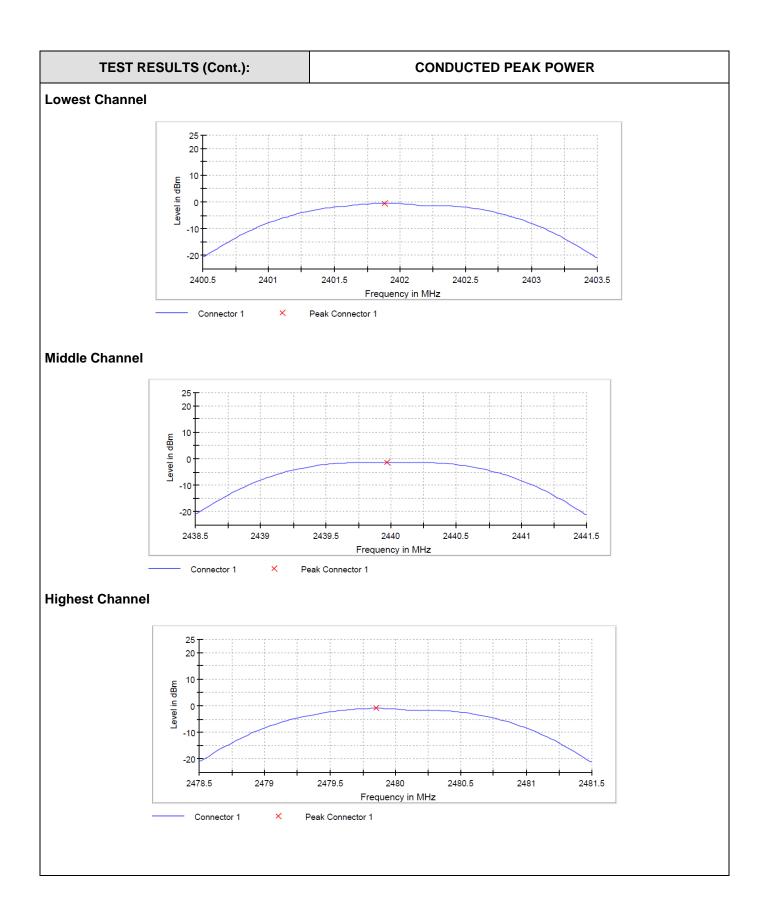
TESTED SAMPLES:	S/01	
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)	
TEST RESULTS:	PASS	

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
Maximum conducted power (dBm)	-0.6	-1.3	-1.0
Maximum EIRP power (dBm)	1.5	0.8	1.1
Measurement uncertainty (dB)	<±0.78		

Maximum declared antenna gain: 2.1 dBi

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







Setting	Instrument	Instrument	Instrument
octung	Value	Value	Value
Start Frequency	2.40050	2.43850	2.47850
Stop Frequency	2.40350	2.44150	2.48150
Span	3.000 MHz	3.000 MHz	3.000 MHz
RBW	1.000 MHz	1.000 MHz	1.000 MHz
VBW	3.000 MHz	3.000 MHz	3.000 MHz
Sweep Points	101	101	101
Sweep time	1.907 us	1.907 us	1.907 us
Reference Level	10.000	10.000	10.000
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	6 / max.	4 / max.	5 / max.
Stable	3/3	3/3	3/3
Max Stable	0.17 dB	0.00 dB	0.01 dB



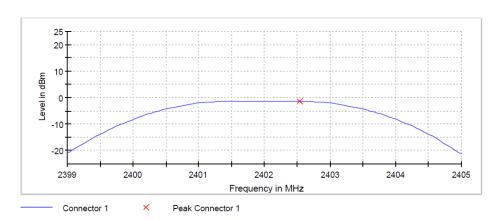
TESTED SAMPLES:	S/01	
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)	
TEST RESULTS:	PASS	

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency
Maximum conducted power (dBm)	-1.4	-1.5	-1.0
Maximum EIRP power (dBm)	0.7	0.6	1.1
Measurement uncertainty (dB)	<±0.78		

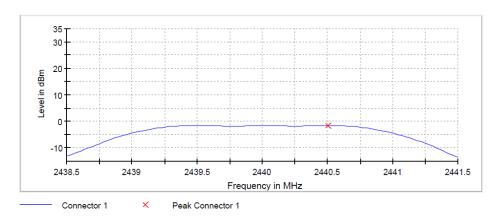
Maximum declared antenna gain: 2.1 dBi

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

Lowest Channel



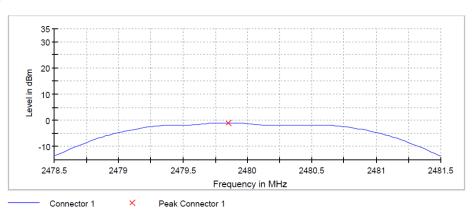
Middle Channel





CONDUCTED PEAK POWER

Highest Channel



Weasurement			
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39900	2.43850	2.47850
Stop Frequency	2.40500	2.44150	2.48150
Span	6.000 MHz	3.000 MHz	3.000 MHz
RBW	2.000 MHz	1.000 MHz	1.000 MHz
VBW	10.000	3.000 MHz	3.000 MHz
Sweep Points	101	101	101
Sweep time	953.450 ns	1.907 µs	1.907 µs
Reference Level	10.000	10.000	10.000
Attenuation	30.000 dB	30.000 dB	30.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	4 / max.	4 / max.	5 / max.
Stable	3/3	3/3	3/3
Max Stable	0.00 dB	0.00 dB	0.00 dB



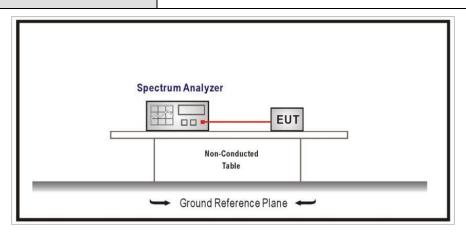
TEST A.4: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

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

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

TEST SETUP

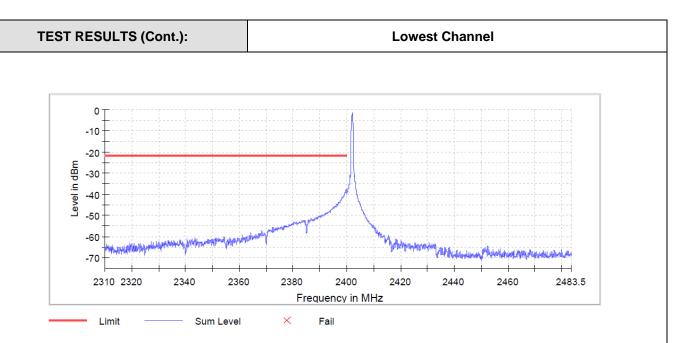


TESTED SAMPLES:	S/01	
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)	
TEST RESULTS:	PASS	

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

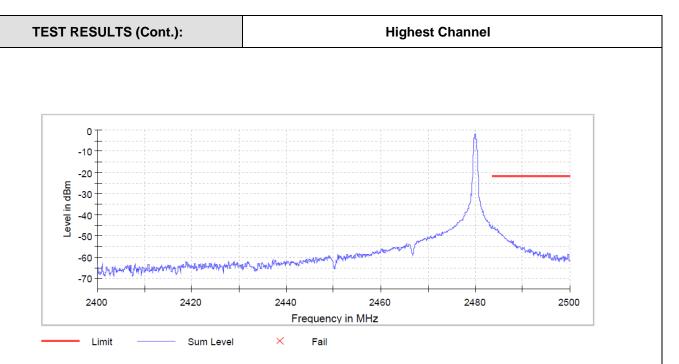
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Setting	Instrument Value	Instrument Value
Start Frequency	2.31000	2.40000 GHz
Stop Frequency	2.40000	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000	100.000 kHz
VBW	300.000	300.000 kHz
Sweep Points	1800	1670
Sweep time	113.672 us	94.727 us
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	FFT
Preamp	off	Off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	6 / max. 150	5 / max. 150
Stable	3/3	3/3
Max Stable	0.00 dB	0.17 dB



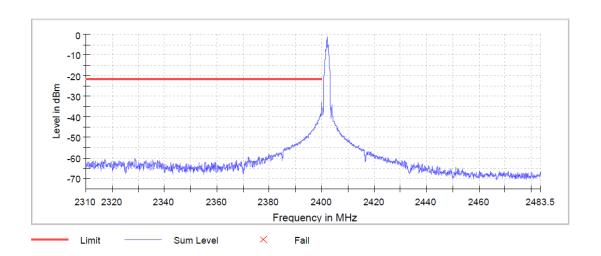


Setting	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.48350 GHz
Stop Frequency	2.48350 GHz	2.50000 GHz
Span	83.500 MHz	16.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
Sweep Points	1670	330
Sweep time	94.727 us	18.945 us
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	FFT
Preamp	off	Off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	5 / max. 150	7 / max. 150
Stable	3/3	3/3
Max Stable	0.10 dB	0.00 dB



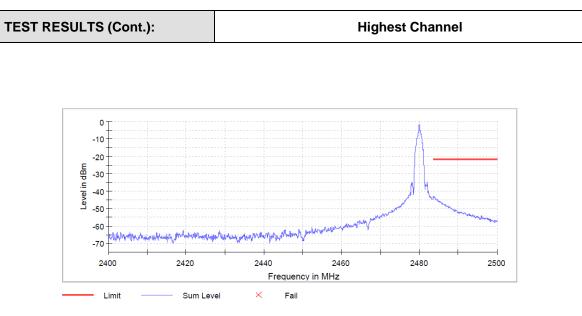
TESTED SAMPLES:	S/01	
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)	
TEST RESULTS	PASS	

Lowest Channel



Setting	Instrument Value	Instrument Value
Start Frequency	2.31000	2.40000 GHz
Stop Frequency	2.40000	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000	100.000 kHz
VBW	300.000	300.000 kHz
Sweep Points	1800	1670
Sweep time	113.672 us	94.727 us
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	FFT
Preamp	off	Off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	7 / max. 150	12 / max. 150
Stable	3/3	3/3
Max Stable	0.00 dB	0.19 dB





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	
Sweep Points	1670	330	
Sweep time	94.727 us	18.945 us	
Reference Level	0.000 dBm	0.000 dBm	
Attenuation	20.000 dB	20.000 dB	
Detector	MaxPeak	MaxPeak	
Sweep Count	100	100	
Filter	3 dB	3 dB	
Trace Mode	Max Hold	Max Hold	
Sweep type	FFT	FFT	
Preamp	off	Off	
Stable mode	Trace	Trace	
Stable value	0.50 dB	0.50 dB	
Run	8 / max. 150	10 / max. 150	
Stable	3/3	3/3	
Max Stable	0.19 dB	0.00 dB	



TEST A.5: POWER SPECTRAL DENSITY

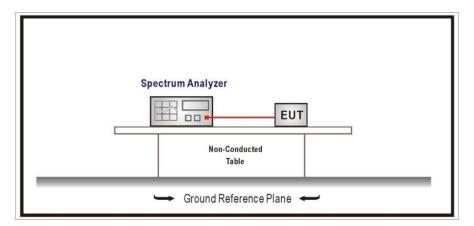
I IMITO.	Product standard:	Part 15 Subpart C §15.247 and RSS-247
LIMITS:	Test standard:	Part 15 Subpart C §15.247(e) and RSS-247 5.2 (b)

LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST SETUP

The maximum power spectral density level in the fundamental emission was measured using the method PKPSD (Peak PSD) according to point 10.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

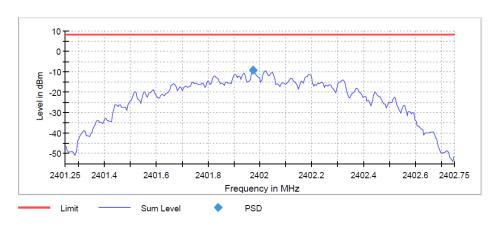


TESTED SAMPLES:	S/01	
TESTED CONDITIONS MODES:	TC#01(1 Mbps)	
TEST RESULTS:	PASS	

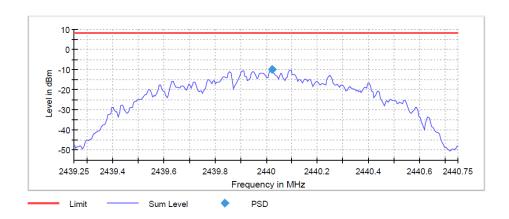
	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
Power spectral density (dBm)	-9.065	-10.069	-11.119
Measurement uncertainty (dB)	<±0.78		



Low Channel:

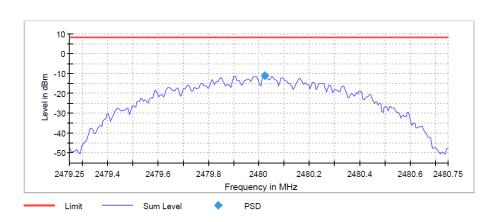


Mid Channel:





High Channel:



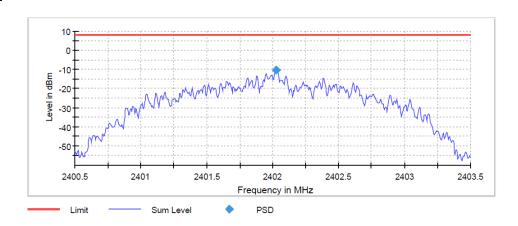
Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40125	2.43925	2.47925
Stop Frequency	2.40275	2.44075	2.48075
Span	1.500 MHz	1.500 MHz	1.500 MHz
RBW	10.000 kHz	10.000 kHz	10.000 kHz
VBW	30.000 kHz	30.000 kHz	30.000 kHz
Sweep Points	300	300	300
Sweep time	1.500 ms	1.500 ms	1.500 ms
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	Sweep	Sweep	Sweep
Preamp	off	Off	off
Stable mode	Trace	Trace	Trace
Stable value	0.50 dB	0.50 dB	0.50 dB
Run	6 / max.	6 / max.	6 / max.
Stable	2/2	2/2	2/2
Max Stable	0.34 dB	0.48 dB	0.30 dB



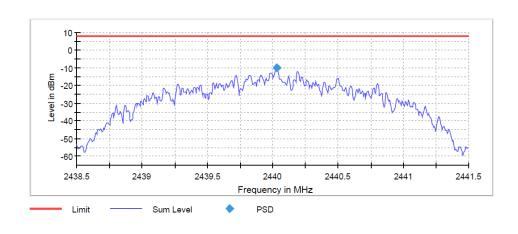
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)
TEST RESULTS:	PASS

	Lowest frequency	Middle frequency	Highest frequency
	2402 MHz	2440 MHz	2480 MHz
Power spectral density (dBm)	-10.205	-10.122	-10.772
Measurement uncertainty (dB)	<±0.78		

Low Channel:



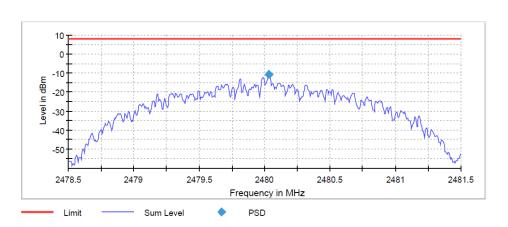
Mid Channel:





TEST RESULTS (Cont.):

High Channel:



Measurement

mododi omone				
Setting	Instrument	Instrument	Instrument	
_	Value	Value	Value	
Start Frequency	2.40050	2.43850	2.47850	
Stop Frequency	2.40350	2.44150	2.48150	
Span	3.00 MHz	3.00 MHz	3.00 MHz	
RBW	10.000 kHz	10.000 kHz	10.000 kHz	
VBW	30.000 kHz	30.000 kHz	30.000 kHz	
Sweep Points	600	600	600	
Sweep time	3.000 ms	3.000 ms	3.000 ms	
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm	
Attenuation	20.000 dB	20.000 dB	20.000 dB	
Detector	MaxPeak	MaxPeak	MaxPeak	
Sweep Count	100	100	100	
Filter	3 dB	3 dB	3 dB	
Trace Mode	Max Hold	Max Hold	Max Hold	
Sweep type	Sweep	Sweep	Sweep	
Preamp	off	Off	off	
Stable mode	Trace	Trace	Trace	
Stable value	0.50 dB	0.50 dB	0.50 dB	
Run	7 / max.	8 / max.	7 / max.	
Stable	2/2	2/2	2/2	
Max Stable	0.38 dB	0.37 dB	0.43 dB	



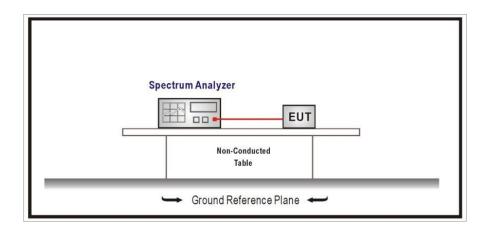
TEST A.6: EMISSION LIMITATIONS CONDUCTED (TRANSMITTER)
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I IMITO.	Product standard:	Part 15 Subpart C §15.247 and RSS-247
LIMITS:	Test standard:	Part 15 Subpart C §15.247(d) and RSS-Gen 8.9 and 8.10

SPECIFICATION

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

TEST SETUP



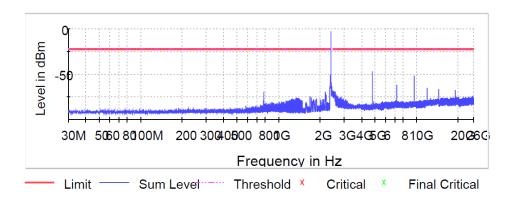


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (1 Mbps)
TEST RESULTS:	PASS

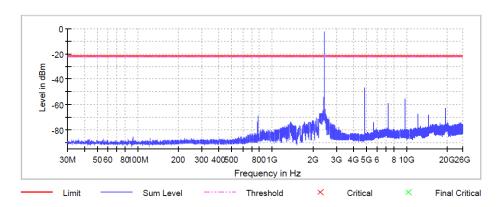
Frequency range 30 MHz - 26 GHz

Conducted spurious signals detected were more than 20 dB respect to the reference limit for low and high operating channels.

Low Channel:



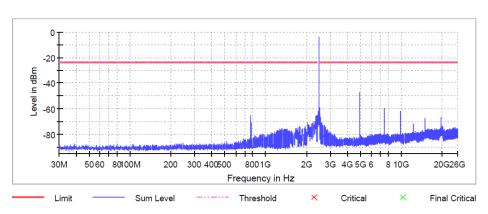
Mid Channel:





TEST RESULTS (Cont.):

High Channel:



Measurement

Weasurement				
Setting	Instrument Value	Instrument Value	Instrument Value	
RBW	100.000	100.000	100.000	
VBW	300.000	300.000	300.000	
Sweep Points	29400	29400	29400	
Sweep time	29.4 ms	29.4 ms	29.4 ms	
Reference Level	-30.000	-30.000	-30.000	
Attenuation	0.000 dB	0.000 dB	0.000 dB	
Detector	MaxPeak	MaxPeak	MaxPeak	
Sweep Count	30	30	30	
Filter	3 dB	3 dB	3 dB	
Trace Mode	Max Hold	Max Hold	Max Hold	
Sweep type	FFT	FFT	FFT	
Preamp	off	Off	Off	
Stable mode	Trace	Trace	Trace	
Stable value	1.00 dB	1.00 dB	1.00 dB	
Run	4 / max. 40	22 / max.	9 / max. 40	
Stable	1/1	1/1	1/1	
Max Stable	0.44 dB	0.00 dB	0.00 dB	

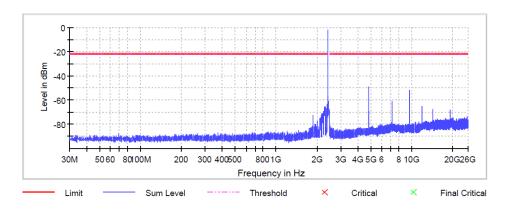


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)
TEST RESULTS:	PASS

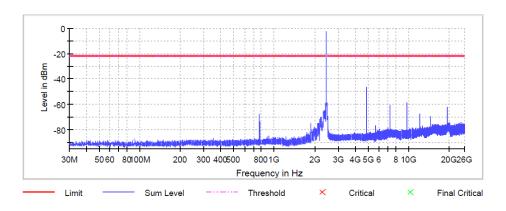
Frequency range 30 MHz - 26 GHz

Conducted spurious signals detected were more than 20 dB respect to the reference limit for low and high operating channels.

Low Channel:



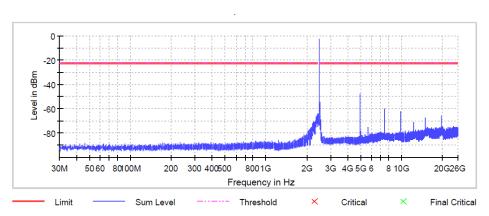
Mid Channel:





TEST RESULTS (Cont.):

High Channel:



Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
RBW	100.000	100.000	100.000
VBW	300.000	300.000	300.000
Sweep Points	29400	29400	29400
Sweep time	29.4 ms	29.4 ms	29.4 ms
Reference Level	-30.000	-30.000	-30.000
Attenuation	0.000 dB	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
Sweep Count	30	30	30
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep type	FFT	FFT	FFT
Preamp	off	Off	Off
Stable mode	Trace	Trace	Trace
Stable value	1.00 dB	1.00 dB	1.00 dB
Run	2 / max. 40	5 / max. 40	2 / max. 40
Stable	1/1	1/1	1/1
Max Stable	0.00 dB	0.00 dB	0.00 dB



TEST A.7: EMISSION LIMITATIONS RADIATED	(TRANSMITTER)
---	---------------

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

LIMITS

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength (μV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and at 1m for the frequency range 1-26 GHz (1 GHz-18 GHz and 18 GHz- 26 GHz Double ridge horn antennas).

For radiated emissions in the range 1- 26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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

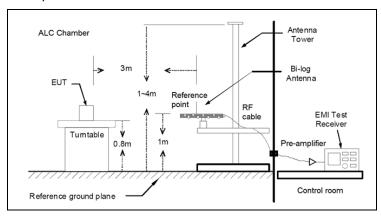
Measurements were made in both horizontal and vertical planes of polarization.

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

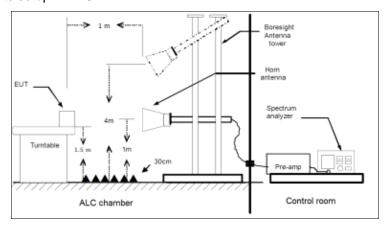


TEST SETUP (CONT.)

Radiated measurements Setup f < 1 GHz



Radiated measurements setup f > 1 GHz



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

Frequency range 30 MHz - 1000 MHz

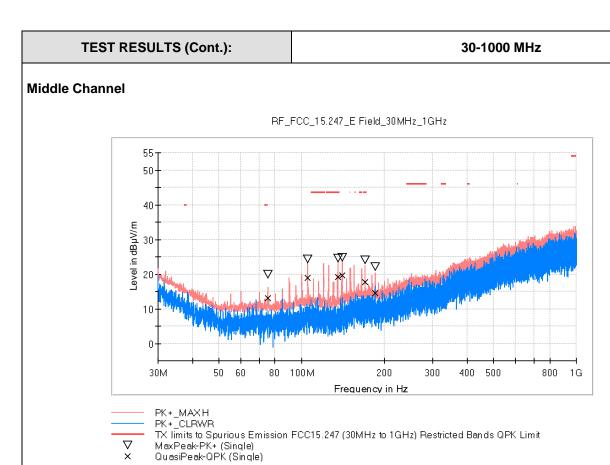
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Frequency range 1 GHz - 26 GHz

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

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

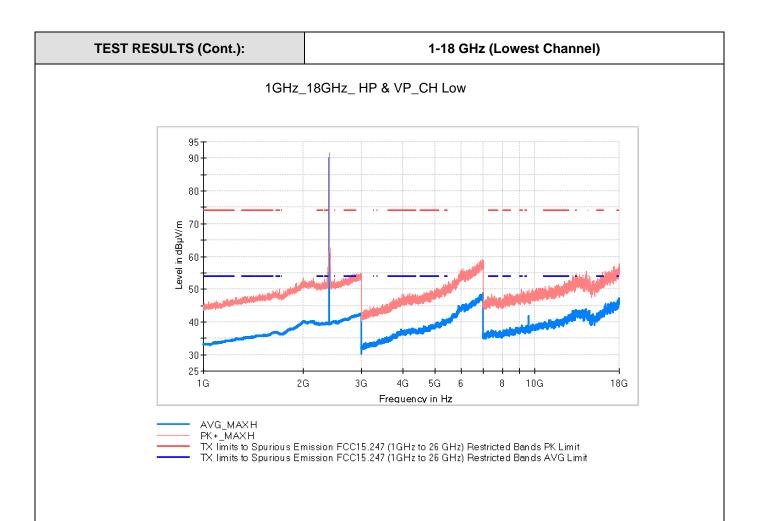




Result Table_Single

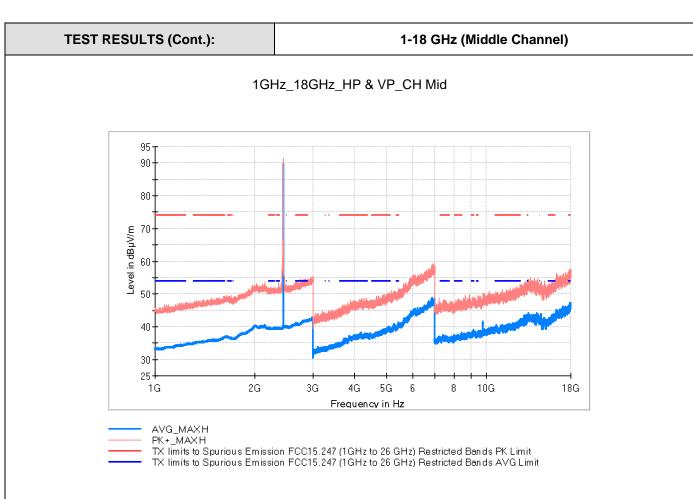
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol
75.153500	19.8	13.1	Н
105.223500	24.2	18.9	Н
135.293500	24.4	19.2	Н
140.289000	24.6	19.5	Н
170.359000	24.0	17.8	Н
185.394000	22.1	14.6	Н





Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comment
2402.000000	91.5	90.1	Н	Fundamental
9608.500000	48.5	41.8	Η	





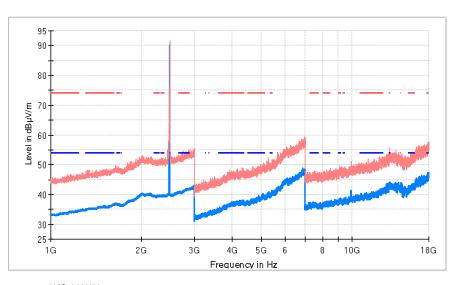
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBμV/m)	Pol	Comment
2440.000000	91.3	89.9	Н	Fundamental
9761.000000	49.5	41.4	٧	





1-18 GHz (Highest Channel)

1GHz_18GHz_HP & VP_CH High

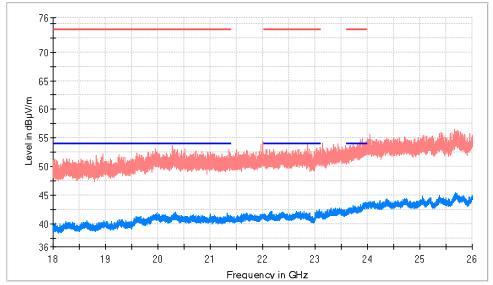


AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comment
2480.000000	91.6	90.1	Н	Fundamental
9921.000000	49.0	41.2	Н	

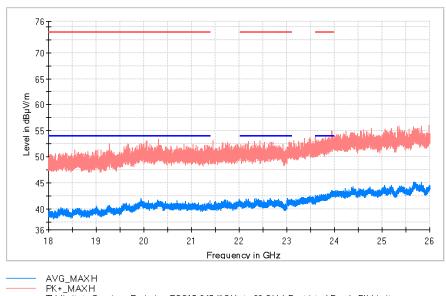




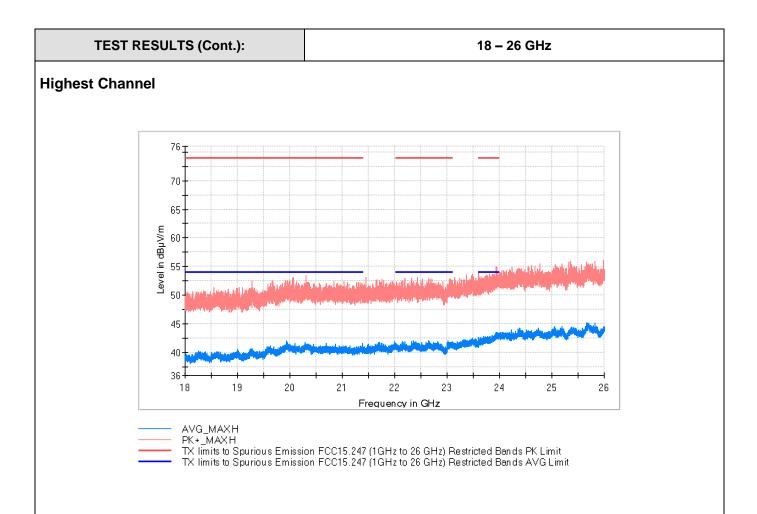


AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz) Restricted Bands AVG Limit

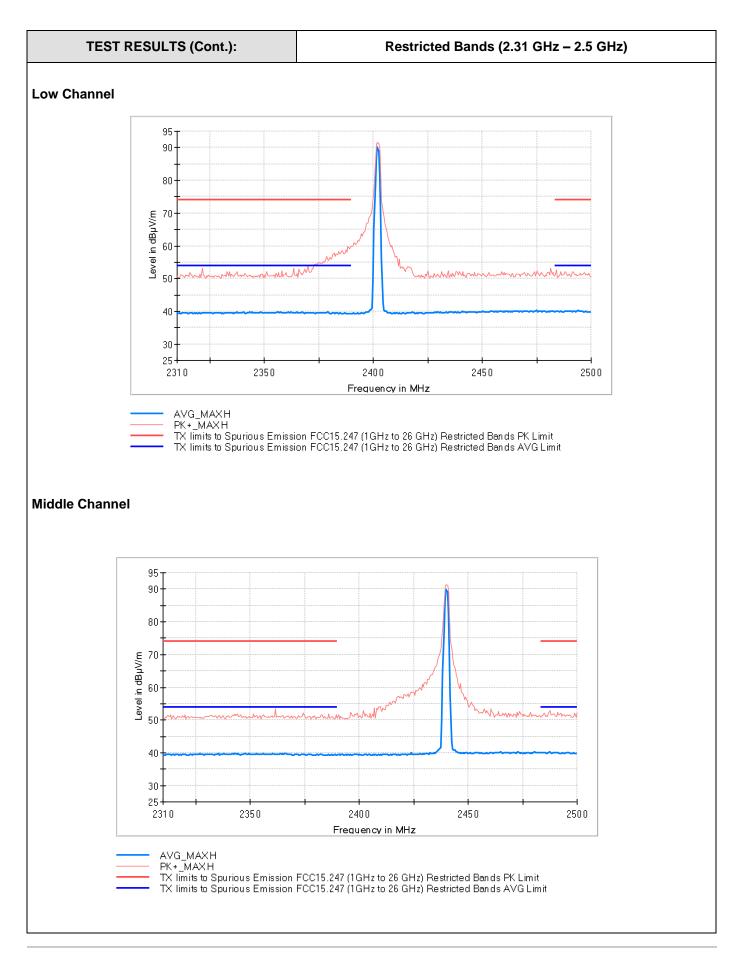
Middle Channel



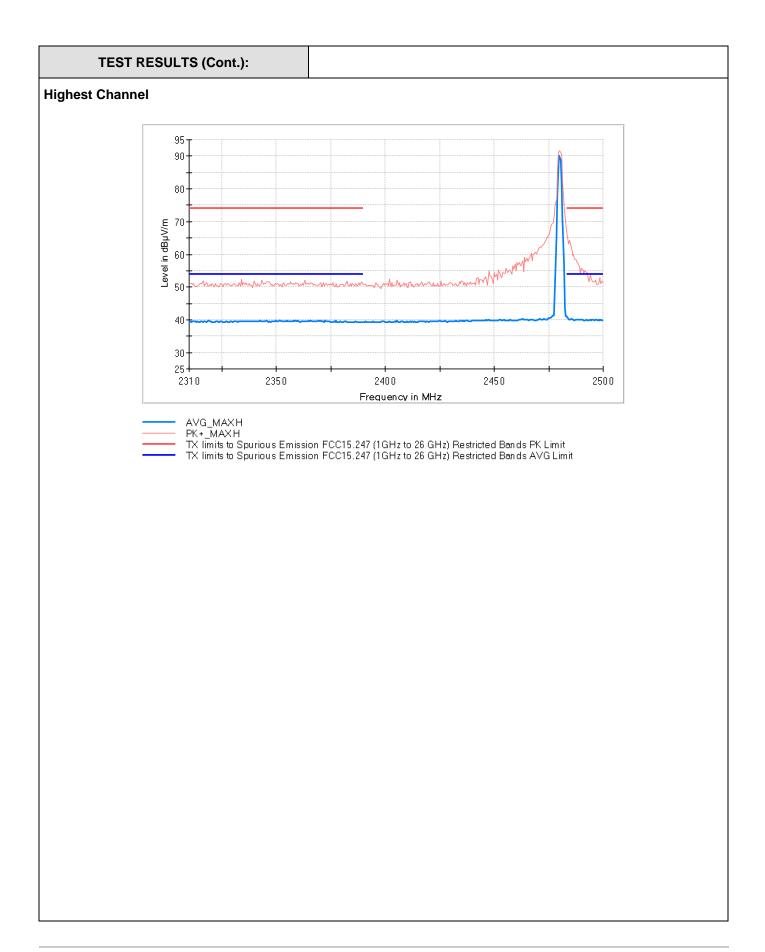














TESTED SAMPLES:	S/02		
TESTED CONDITIONS MODES:	TC#02 (2 Mbps)		
TEST RESULTS:	PASS		

Frequency range 30 MHz - 1000 MHz

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

Radiated spurious signals levels detected were above 20 dB below the limit.

Frequency range 1 GHz - 26 GHz

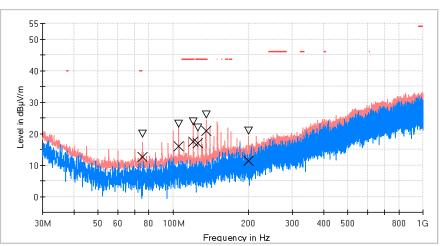
The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

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

TEST DESIGN TO (Comt.).	20 4000 MH-
TEST RESULTS (Cont.):	30-1000 MHz

Middle Channel

RF_FCC_15.247_E Field_30MHz_1GHz

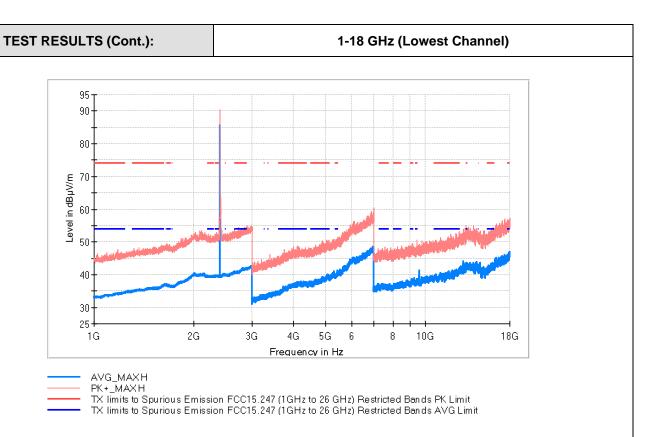


PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit
MaxPeak-PK+ (Single)
X QuasiPeak-QPK (Single)

Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol		
75.153500	19.8	12.6	Н		
105.175000	22.9	16.1	Н		
120.210000	23.7	17.3	Н		
125.254000	21.9	16.9	Н		
135.293500	26.0	20.9	Н		
200.477500	20.9	11.3	Н		
75.153500	19.8	12.6	Н		



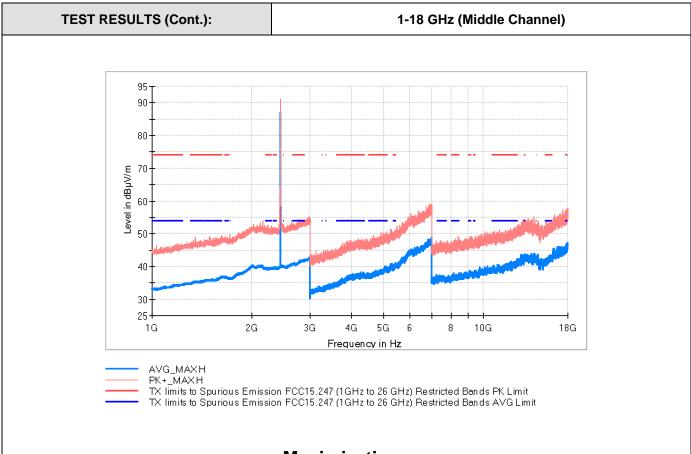


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comment
2402.000000	90.4	85.8	Н	Fundamental
9608.000000	47.7	41.2	Н	

Result Table_Single

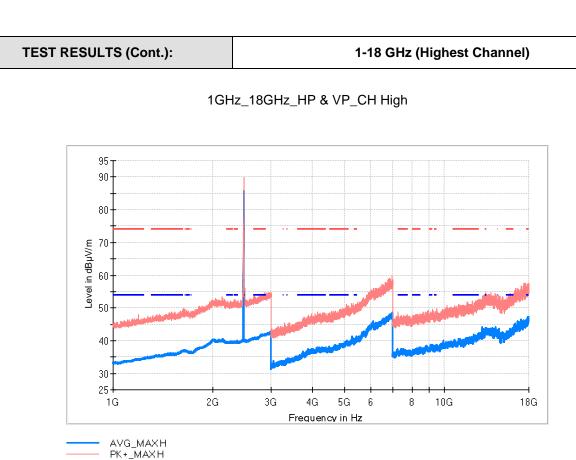
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol
75.153500	19.8	12.6	Н
105.175000	22.9	16.1	Н
120.210000	23.7	17.3	Н
125.254000	21.9	16.9	Н
135.293500	26.0	20.9	Н
200.477500	20.9	11.3	Н
75.153500	19.8	12.6	Н





Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBμV/m)	Pol	Comment
2440.000000	91.1	87.0	Н	Fundamental
9760.500000	49.1	39.7	Н	





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

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Comment
2480.500000	89.7	85.6	Н	Fundamental
9920.000000	48.4	40.0	Н	



