



FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1 Test report No:

4158ERM.009

Partial Test report

USA FCC Part 15.247, 15.407 15.209, 15.207 CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Infotainment Head Unit
(*) Trademark	Garmin
(*) Model and /or type reference tested	IDC23 High 8185
Other identification of the product	HW version: AA3911 FCC ID: IPH-03911 IC:1792A-03911
(*) Features	Bluetooth classic; BLE; Wi-Fi 2.4GHz; Wi-Fi 5GHz; GNSS
Manufacturer	Garmin International, Inc. 1200 E. 151st Street, Olathe, Kansas 66062, USA
Test method requested, standard	USA FCC Part 15.247, 10-1-20 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz
	USA FCC Part 15.407 10-1-20 Edition : Unlicensed National Information Infrastructure Devices. General technical requirements.
	USA FCC Part 15.209 10-1-20 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	See Appendix A
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager
Date of issue	10-09-2023
Report template No	FDT08_23 (*) "Data provided by the client"



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Competences and guarantees

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

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

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

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

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

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

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General conditions

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

Uncertainty

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

Test case	Frequency (MHz)	U (k=2)	Units
	30-180	4.27	dB
Dedicted Spurious Emission	180-1000	3.14	dB
Radiated Spurious Emission	1000-18000	3.30	dB
	18000-40000	3.49	dB



Data provided by the client

The sample consists of an Infotainment Head Unit. The main functionalities are: Navigation, USB, voice recognition and several interfaces to the vehicle and Bluetooth / WLAN. The Head-unit provides different interfaces like: AR-CAM input, Video-out APIX3 (for the connection of an external Display), 3 USB interfaces.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples used for test have been selected by: The client.

Sample S/01 is composed of the following elements:

ld	Control Number	Description	Model	Serial N⁰	Date of Reception	Application
S/01	4158/01	Automotive infotainment head unit	IDC23 HIGH 8185	GAB429P0001748	6/14/2023	Element Under Test
S/01	3428/32	BMW Antenna-DA Fakra 5G-GNSS		6520 8705915-04	06/01/2022	Element Under Test

Sample S/01 is composed of the following accessories:

ld	Control Number	Description	Model	Serial N⁰	Date of Reception	Application
S/01	2874/11	Fakra to SMA Connector	-	-	03/26/2021	Accessory
S/01	2874/13	OABR Connector cable	-	-	03/26/2021	Accessory
S/01	3428/08	Ethernet Cable (1.8m)	NA / 5E	-	06/01/2022	Accessory
S/01	3428/10	USB-3.0 to Gigabit Ethernet Adapter	Trendnet / TU3-ETG	RA9AU31003569	06/01/2022	Accessory
S/01	3428/33	Fakra to Fakra Cable	-	-	06/01/2022	Accessory
S/01	3428/41	WLAN/Bluetooth Antena with Fakra SF connector	λ/4 coax cable antenna BMW 9.289.029.3	-	06/01/2022	Accessory
S/01	3428/42	USB to Fakra cable 1	-	-	06/01/2022	Accessory
S/01	3428/51	OABR to OABR cable	-	-	06/01/2022	Accessory
S/01	3582/20	Harness	-	-	03/03/2022	Accessory

Sample S/01 was used for the test(s): All test indicated in appendix A.



Test sample description

Ports:					Cab	ble	
	Port name and description		Specified length [m	n] dur		Shielded	Coupled to patient
	BT/W	i-Fi Antenna	2		3		
	USB ·	1/2	2		3		
	Powe	r	2		3		
	CID		2		3		
	AR-C	am	2		3		
	100 B	ase T1	2		\triangleleft		
	1G Ba	ase T1	2		3		
	GPS		2		⊴		
	DCS		2		3		
	HUD		2		3		
	DFE		2		3		
Supplementary information to the ports:	No Data Provided						
Rated power supply :			Reference poles				
	Volta	ge and Frequency	L1	L2	L	3 N	PE
		AC:					
		AC:					
		DC: : 8 - 16 Vdc					
		DC:					
Rated Power :		ata Provided					
Clock frequencies		ata Provided					
Other parameters:		ata Provided					
Software version :	No Data Provided						
Hardware version:	No Data Provided						
Dimensions in cm (W x H x D) :	No Data Provided						
Mounting position:		Table top equipment	-				
		Wall/Ceiling mounted eq	-				
		Floor standing equipmen	t				
		Hand-held equipment					
		Other: Automotive					



Modules/parts:	Module/parts of test item	Туре	Manufacture
	No Data Provided		
Accessories (not part of the test item)	Description	Туре	Manufacturer
:	No Data Provided		
	Description	File name	Issue date
	Declaration Equipment Data	FDT30_18 Declaration Equipment Data_IDC23 High 8185 signed	August 23, 2023
	Copy of marking	plate:	
Made in Input / 铺 FCC ID: ●●Dolb Audio THIS DEVICE LICENSE-EXE TWO CONDIT (1) THIS DEVI (2) THIS DEVI (2) THIS DEVI (2) THIS DEVI (3) THIS DEVI (3) THIS DEVI (4) THIS D	2E MAY NOT CAUSE HARMUL INTERFERENCE, AND E MAYST ACENT ANY INTERFERENCE RECEIVED, INCLUDING IN CAUSE UNDESIRED OPERATION. LE MOPTI (REPUBLIQUE DE DUBOUTI) ement: x000000000000000000000000000000000000	Interference Interference Interference Interference	

Identification of the client

Garmin International, Inc. 1200 E. 151st Street, Olathe, Kansas 66062,USA



Testing period and place

Test Location	DEKRA Certification Inc.	
Date (start)	07-17-2023	
Date (finish)	07-31-2023	

Document history

Report number	Date	Description
4158ERM.009	10-09-2023	First release.

Environmental conditions

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

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

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. = 860mbar Max. = 1060mbar

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. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

1. The tests have been performed by the technical personnel: Qi Zhang and Yuri Barone.



Testing verdicts

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

Summary

15.247 Spec Clause RSS Spec Clause		Test Description	Verdict	Remark
§ 2.1049 & § 15.247 (a) (1)	RSS-247 5.1 (b)	20dB Emission Bandwidth, Occupied Bandwidth & Carrier Frequency Separation	N/M	Refer 1
§ 15.247 (a) (1) (iii)	RSS-247 5.1 (d)	Number of hopping channels	N/M	Refer 1
§ 15.247 (a) (1) (iii)	RSS-247 5.1 (d)	Time of Occupancy (Dwell Time)	N/M	Refer 1
§ 15.247 (b) (3)	RSS-247 5.4 (b)	Maximum peak conducted output power and antenna gain	N/M	Refer 1
§ 15.247 (d)	RSS-247 5.5	Band-edge conducted emissions compliance (Transmitter)	N/M	Refer 1
§ 15.247 (d)	RSS-247 5.5	Emission limitations Conducted (Transmitter)	N/M	Refer 1
§ 15.247 (d)	RSS-247 5.5	Emission limitations Radiated (Transmitter)	Р	N/A



15.247 Spec Clause	RSS Spec Clause	Test Description	Verdict	Remark
§ 2.1049 & §15.247 (a) (2)	RSS-247 5.2 (a)	99% Occupied Bandwidth & 6dB Bandwidth	N/M	Refer 1
§ 15.247 (b)	RSS-247 5.4 (d)	Maximum Output Power and antenna gain	N/M	Refer 1
§ 15.247 (d)	RSS-247 5.5	Band-edge conducted emissions compliance (Transmitter)	N/M	Refer 1
§ 15.247 (e)	RSS-247 5.2 (b)	Power Spectral Density	N/M	Refer 1
§15.247(d)	RSS-247 5.5	Emission limitations Conducted (Transmitter)	N/M	Refer 1
§15.247 (d)	RSS-247 5.5	Emission limitations Radiated (Transmitter)	Р	N/A
· · · ·	prmation and remarks: ansmitter radiated spurious	s emission test was requested.		

15.407 Spec Clause	RSS Spec Clause	Test Description	Verdict	Remark
§ 15.403 KDB 789033 D02	RSS 247 6.2.4	26dB Emission Bandwidth & Occupied Bandwidth	N/M	Refer 1
§ 15.407 (e)	RSS 247 6.2.4.1	6dB Bandwidth	N/M	Refer 1
§ 15.407 (a)(3)	RSS 247 6.2.4.1	Power Limits. Maximum Output Power	N/M	Refer 1
§ 15.407 (a)(3)	RSS-247 6.2.4.1	Maximum Power Spectral Density	N/M	Refer 1
§ 15.407 (b)(4)	RSS-247 6.2.4.2	Band-edge conducted emissions compliance (Transmitter)	N/M	Refer 1
§ 15.407 (b)(6) § 15.207	RSS-Gen 8.8	Emission limitations Conducted (Transmitter)	N/M	Refer 1
§ 15.407 (b)(4),(7) § 15.209 § 15.205	RSS-247 6.2.4.2 RSS-Gen 8.9 & 8.10	Undesirable radiated emissions (Transmitter)	Р	N/A
§ 15.407 (g)	RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 1

1. Only multi-transmitter radiated spurious emission test was requested.



List of equipment used during the test

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
878	Power supply (AMETEK / PROG-DC-PS)	1707A01783	N/A	N/A
1012	ESR26 Emi Test Receiver	101478	2022-04-12	2024-04-12
1014	FSV40 Signal Analyzer 40ghz	101626	2022-08-01	2024-08-01
1056	3116C Double-Ridged Waveguide Horn Antenna 18-40 GHz	213179	2023-02-23	2026-02-23
1058	3115 Double-Ridged Waveguide Horn Antenna 1-18 GHz	211373	2023-06-26	2026-06-26
1065	3142E Biconilog Antenna	208587	2020-08-13	2023-08-13
1108	Ethernet SNMP Thermometer- CR Room	60038026954	2022-10-18	2024-10-18
1111	Ethernet SNMP Thermometer	60038026577	2022-10-18	2024-10-18
1179	SEMI-ANECHOIC CHAMBER	F169021	N/A	N/A
1314	Wireless Measurement Software R&S Emc32	1040- OT102236	N/A	N/A
1461	Low Noise Preamplifier (1-18GHz)	2213857B	2022-06-01	2024-06-01



Appendix A: Test results (Multi-transmitter)



Appendix A Content

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TEST A.1: EMISSION LIMITATIONS RADIATED (TRANSMITTER)	15



PRODUCT INFORMATION

Information	Description
Modulation	BR/EDR: GFSK, π/4-DQPSK, 8-DPSK Wi-Fi 2.4 GHz: DSSS, OFDM, MIMO-OFDM Wi-Fi 5 GHz: DSSS, OFDM, MIMO-OFDM
Operation mode 1: Single Antenna Equipment	
- Operating Frequency Range	BR/EDR: 2400 - 2483.5 MHz Wi-Fi 2.4 GHz: 2.402 - 2.483.5 GHz Wi-Fi 5 GHz: 5.150 - 5.250 GHz 5.725 - 5.875 GHz
- Nominal Channel Bandwidth	BR/EDR: 1 MHz Wi-Fi 2.4 GHz: 20MHz, 40MHz Wi-Fi 5GHZ: 20MHz, 40MHz, 80MHz
- RF Output Power	BR/EDR: 4 dBm Wi-Fi 2.4 GHz: 14 dBm Wi-Fi 5 GHz: 14 dBm
Antenna type	1/4 wave coax
Antenna gain	BR/EDR: -2.5 dBi Wi-Fi 2.4 GHz: -2.5 dBi Wi-Fi 5 GHz: -2.8 dBi
Nominal Voltage	
- Supply Voltage	12 Vdc
- Type of power source	DC voltage
Equipment type	Bluetooth, Wi-Fi 2.4 GHz, and Wi-Fi 5 GHz
Geo-location capability	No



DESCRIPTION OF TEST CONDITIONS

NDITIONS	DESCRIPTION							
	Power :	supply (V):						
	DC 12 V							
	Test Fr	equencies for Radiated	<u>tests:</u>					
		Technology	Tested Frequency	BW (MHz)	Modulation	Mode		
TC#01 ⁽¹⁾		Bluetooth	2402	3	FHSS	8DPSK		
		Wi-Fi 2.4 GHz MIMO (non - beamforming)	2437	20	OFDM	b mode		
		neously.						
		supply (V):						
	Powers	supply (V):	tests:					
	Powers	supply (V): V	tests: Tested Frequency	BW (MHz)	Modulation	Mode		
TC#02 ⁽¹⁾	Powers	supply (V): V equencies for Radiated	Tested		Modulation	Mode 8DPSK		
TC#02 ⁽¹⁾	Powers	supply (V): V equencies for Radiated Technology	Tested Frequency	(MHz)				

worst case in MIMO (2.4 GHz or 5 GHz) + BT.



TEST A.1: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

LIMITS:	Product standard:	Part 15 Subpart C §15.247, Part 15.31(h), and RSS-247
Limit 0.	Test standard:	Part 15 Subpart C §15.247 (d) and RSS-Gen 8.9 and 8.10

<u>LIMITS</u>

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	1.705 - 30.0 30 -		30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	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 1-18 GHz (Double ridge horn antenna), and 1m for the frequency range 18 GHz- 26 GHz (Double ridge horn antenna).

For radiated emissions in the range 18 - 26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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

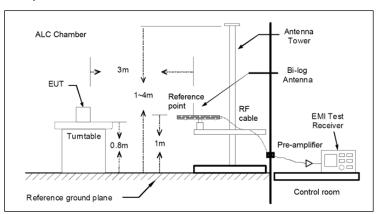
Measurements were made in both horizontal and vertical planes of polarization.

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

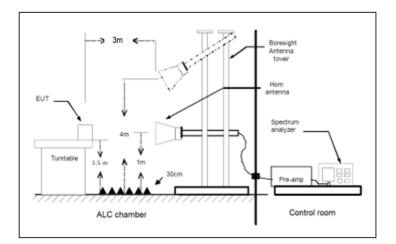


TEST SETUP (CONT.)

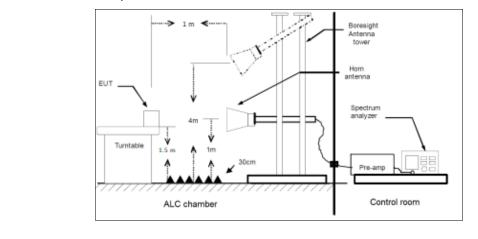




Radiated measurements setup f > 1-18 GHz



Radiated measurements setup f > 18 GHz





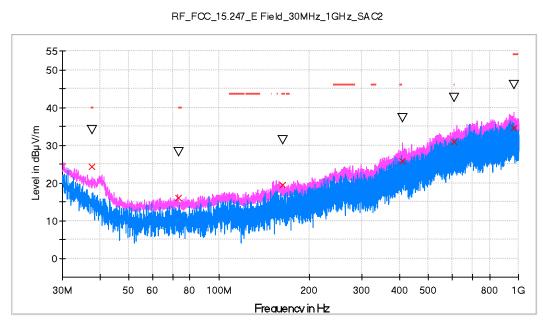
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS :	30-1000 MHz

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 following plots and tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.5 GHz



PK+_MAXH PK+_CLRWR

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

MaxPeak-PK+ (Single) ∇

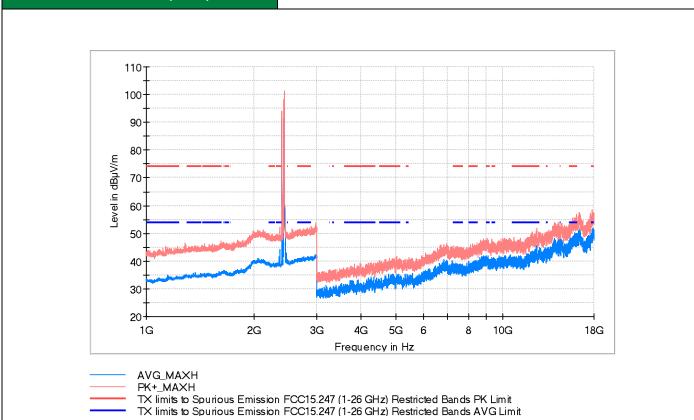
QuasiPeak-QPK (Single) ×

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.760000	34.1	24.3	V	15.7	40.0
73.310500	28.2	16.0	Н	24.1	40.0
162.938500	31.3	19.3	Н	24.3	43.5
409.464000	37.2	25.7	Н	20.3	46.0
609.284000	42.6	30.9	Н	15.1	46.0
961.879000	45.9	34.4	V	19.6	54.0



1-18 GHz

TEST RESULTS (Cont.):

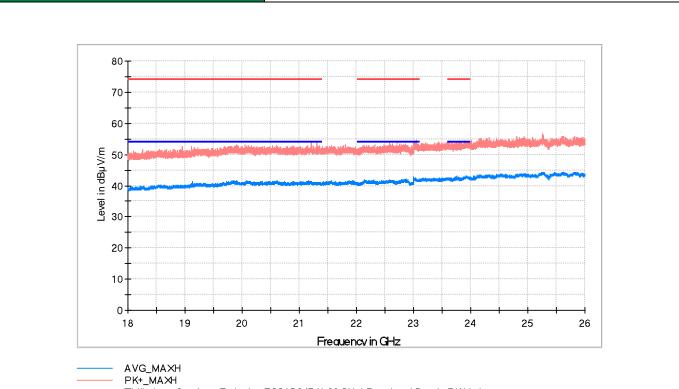


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2365.000000	52.2	44.1	Н	9.9	54.0	
2402.000000	94.2	91.2	Н			Fundamental
2436.000000	101.5	95.5	Н			Fundamental
15399.000000	52.9	48.6	V	5.4	54.0	
17920.500000	56.4	51.9	V	2.1	54.0	



18 – 26 GHz

TEST RESULTS (Cont.):

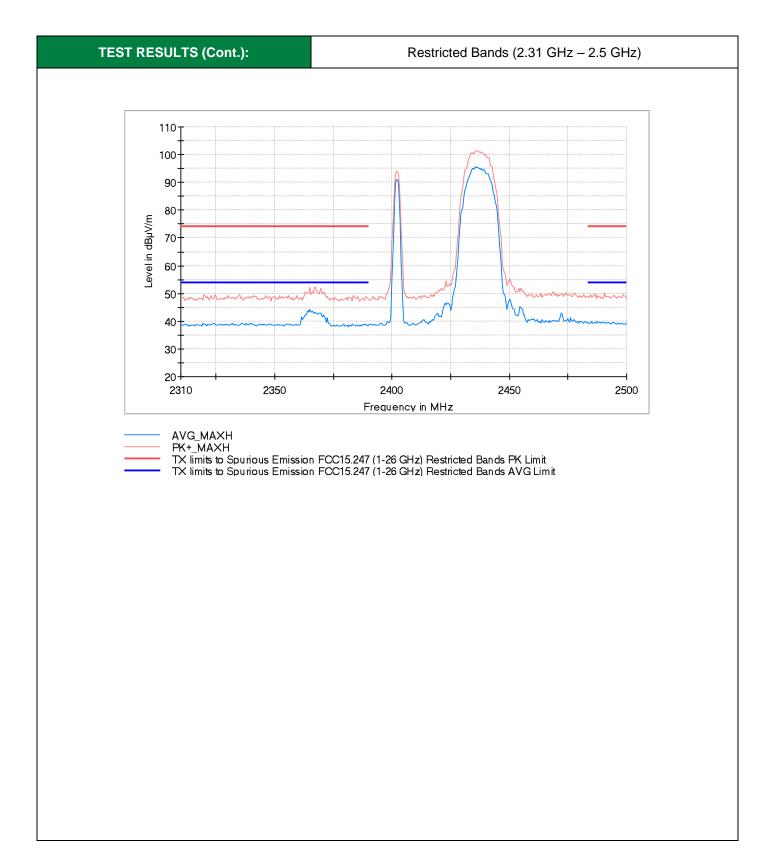


TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands PK Limit

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

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20049.000000	53.2	40.6		13.4	54.0
23047.500000	54.6	42.0		12.0	54.0
23882.500000	54.5	42.7		11.3	54.0







TESTED SAMPLES: TESTED CONDITIONS MODES: TEST RESULTS :			S/02 TC#02 1-18 GHz												
									Level in dBµV/m		ous Emission FCC1	5.407 (1 5.407 (1		stricted Bands PK Lim	
									Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
	92.3	88.9	Н			Fundamental									
	103.0	93.8	Н			Fundamental									
2402.000000 5178.500000			1 1 1	4.0	F40										
2402.00000 5178.500000 5368.500000	61.4	49.2	Н	4.8	54.0										
2402.00000 5178.500000 5368.500000 0350.000000 7782.000000	61.4) 48.1	49.2 39.3 40.6	H H H	4.6 13.4	54.0 54.0										



TEST RESULTS (Cont.): 18 - 40 GHz

AVG_MAXH PK+_MAXH

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

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

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
23792.875000	46.8	33.9		20.1	54.0
31580.875000	50.4	38.8		15.2	54.0
39979.375000	54.6	42.8		11.2	54.0



