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

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test Report No:
3818ERM.016

Partial Test Report

USA FCC Part 15.247, 15.209, 15.207; & 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	Headunit with radio and bluetooth
(*) Trademark	Panasonic
(*) Model and /or type reference	MIB3E_MQB_BT
Other identification of the product	FCC ID: WUQ-MIB3HBT IC: 216R-MIB3HBT
(*) Features	Bluetooth, FM, AM, DAB USB.
Manufacturer	PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH Robert Bosch Str. 27-29 – 63225 Langen Germany
Test method requested, standard	USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. 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 amendment 1 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. 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 Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US
Date of issue	10-03-2022
Report template No	FDT08_24 (*) "Data provided by the client"

Index

Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
26Ebw	Emission Bandwidth
Avg COT	Average Channel Occupancy Time
BW	Bandwidth
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Freq Sep	Frequency Separation
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
NHC	Number of Hopping Channels
NHp	Number of hops over the period
Occ Ch BW	Occupied Channel Bandwidth
Peak Power	Maximum Peak Conducted Output Power
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

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.

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
Radiated Spurious Emission	30-180	4.27	dB
	180-1000	3.14	dB
	1000-18000	3.30	dB
	18000-40000	3.49	dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of an Automotive head unit to be installed in cars with the following features: Automotive head unit to be installed in cars with the following features: Bluetooth, FM, AM, DAB, USB.

3. Additional information: PN: 654.035.869.J

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, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial Nº	Date of Reception	Application
S/01	3818/15	Car radio Scala 6.5 - VE CV-RV4BXEAEB	Panasonic / MIB3E_MQB_BT	PM6-00105 08 22413G0396	2022-08-28	Element Under Test
S/01	3818/40	AM/FM TL Dummy	MIB-LSW-TLD-022	-	2022-08-28	Accessory
S/01	3818/41	BNC to Fakra(Dual) RF cable	-	-	2022-08-28	Accessory
S/01	3818/66	USB CAN Adapter	-	-	2022-08-28	Accessory
S/01	2271/16	Fakra antenna cable	-	-	2018-12-21	Accessory
S/01	2271/23	Harness (with Speaker, & load box)	-	-	2018-12-21	Accessory
S/01	2271/24	USB Hub power cables	-	-	2018-12-21	Accessory
S/01	2271/29	USB Hub	-	-	2018-12-21	Accessory
S/01	2271/30	BT Antenna	-	-	2018-12-21	Accessory
S/01	2271/39	Fakra to Fakra cable	-	-	2018-12-21	Accessory
S/01	Dekra 47	FM/AM antenna	-	-	-	Auxiliary Element

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

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United States of America

Test sample description

Test Sample description (compulsory information for EMC and RF testing services

Ports…… :	Port name and description		Cable			
			Specified length [m]	Attached during test	Shielded	Coupled to patient
	No Data Provided			☐	☐	☐
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
Supplementary information to the ports…… :	No Data Provided					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 12 Vdc					
	☐	DC:					
Rated Power .....:	4.5 A						
Clock frequencies.....:	No Data Provided						
Other parameters .....:	External fuse of 20 A						
Software version .....:	Y780						
Hardware version .....:	Y10						
Dimensions in cm (W x H x D) ....:	No Data Provided						
Mounting position .....:	☐	*Table top equipment*					
	☐	*Wall/Ceiling mounted equipment*					
	☐	*Floor standing equipment*					
	☐	*Hand-held equipment*					
	☒	*Other:* Installed in a vehicle					
Modules/parts.....:	Module/parts of test item		Type		Manufacturer		
	No Data Provided						

Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	No Data Provided		
Documents as provided by the applicant .....:	Description	File name	Issue date
	Declaration Equipment Data	FDT30_18 Declaration Equipment Data_Scala_BT_DAB_6.5_VE_Signed	08/23/2022

Copy of marking plate:

Identification of the client

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

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	2022-09-26
Date (finish)	2022-09-27

Document history

Report number	Date	Description
3818ERM.016	10-03-2022	First release.

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. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

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. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Nasir Khan, Qi Zhang, and Koji Nishimoto.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth EDR

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.1 (b) / FCC 15.247 (a) (1) 20 dB Bandwidth		N/M	Refer 1
FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%		N/M	Refer 1
RSS-247 5.1 (b) / FCC 15.247 (a) (1) Carrier Frequency Separation		N/M	Refer 1
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Time of Occupancy (Dwell Time)		N/M	Refer 1
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Number of hopping channels		N/M	Refer 1
RSS-247 5.4 (b) / FCC 15.247 (b) (1) Maximum Peak Conducted output power & Antenna gain		N/M	Refer 1
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter) - Conducted		N/M	Refer 1
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Conducted		N/M	Refer 1
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated		Pass	N/A

Supplementary information and remarks:

1. Test is not requested by the customer

List of equipment used during the test

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
981	LOW NOISE PREAMPLIFIER	1711156B	2020/11	2022/11
1012	ESR26 EMI TEST RECEIVER	101478	2022/04	2024/04
1014	FSV40 SIGNAL ANALYZER 40GHZ	101626	2021/05	2023/05
1056	3116C DOUBLE-RIDGED WAVEGUIDE HORN ANTENNAS	213179	2020/01	2023/01
1057	3115 DOUBLE-RIDGED WAVEGUIDE HORN ANTENNAS	211373	2020/06	2023/06
1065	3142E BICONILOG ANTENNA	208587	2020/08	2023/08
1108	ETHERNET SNMP THERMOMETER	60038026954	2020/09	2022/09
1111	ETHERNET SNMP THERMOMETER	60038026577	2020/09	2022/09
1179	SEMI-ANECHOIC CHAMBER	F169021	N/A	N/A
1314	WIRELESS MEASUREMENT SOFTWARE R&S EMC32	1040-OT102236	N/A	N/A

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Appendix A: Test results. Bluetooth BD/EDR

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PRODUCT INFORMATION

Information	Description
Modulation	FHSS
- Number of Hopping Frequencies:	79
- Dwell Time:	0.625 ms (DH1), 1.875 ms (DH3), 3.125 ms (DH5)
Operating Frequency Range	2402 - 2480 MHz
Nominal Channel Bandwidth	1 MHz
RF Output Power	4 dBm
Extreme operating conditions	
- Temperature range	-35 ºC to +70 ºC
Antenna type	Integral
Antenna gain	Min: -6.6 Max:1.3 dBi
Nominal Voltage	
- Supply Voltage	12 Vdc
- Type of power source	External power supply (battery car).
Equipment type	Bluetooth EDR

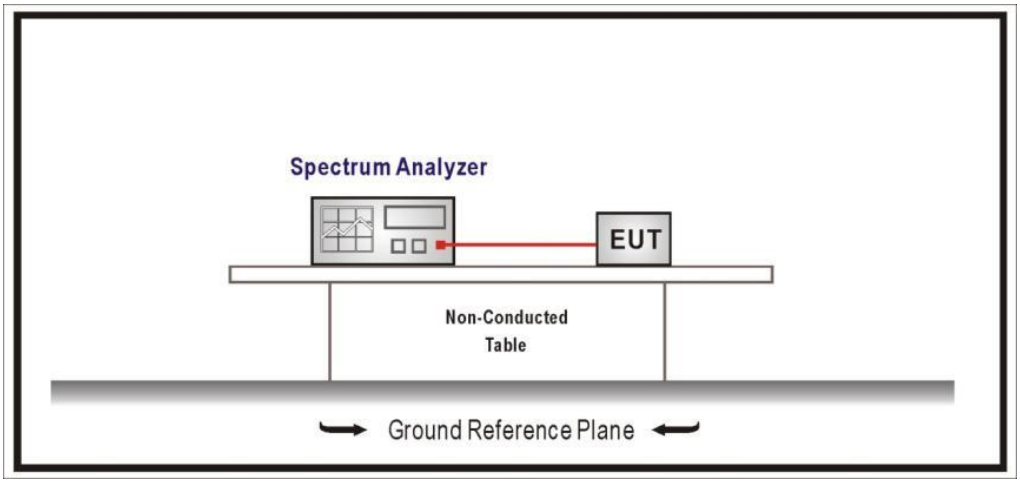
TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: GFSK Test Frequencies for Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz
TC#02	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: π/4-DQPSK Test Frequencies for Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz
TC#03	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: 8DPSK Test Frequencies for Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz

Note: A preliminary scan was performed and the data rates of DH1 for GFSK modulations was considered as a worst case.

CONDUCTED MEASUREMENTS:



RADIATED MEASUREMENTS:

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 antennas, 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 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.

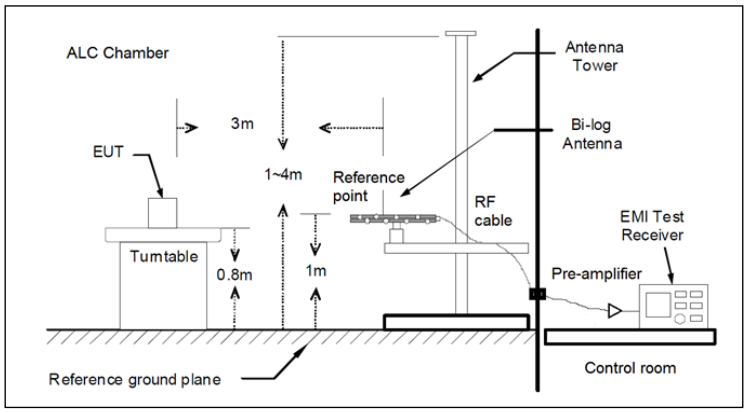


Fig A1: Radiated measurements Setup f < 1 GHz

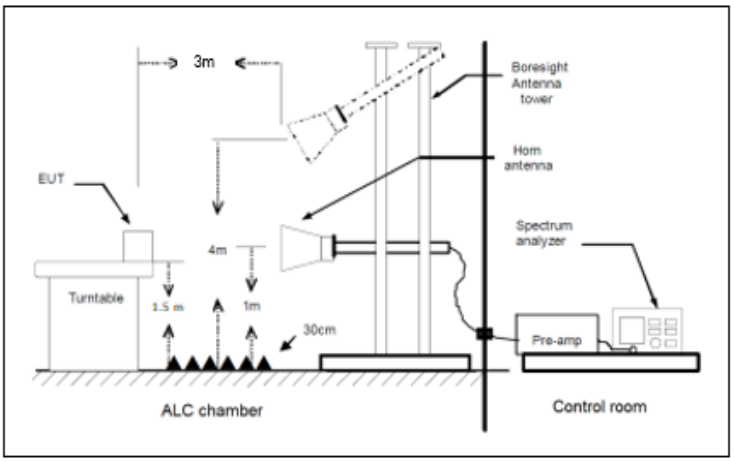


Fig A2: Radiated measurements setup f > 1-18 GHz

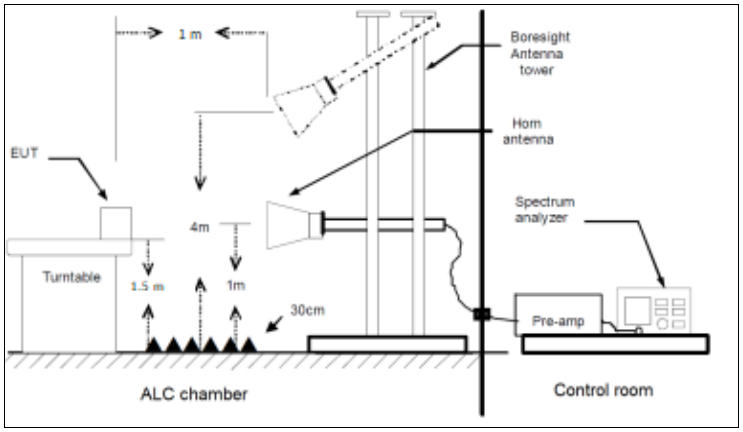


Fig A3: Radiated measurements setup f > 18 GHz

RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 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
Above 960	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.

RESULTS:

The followings show the test results for the worst case in GFSK modulation.

Verdict: PASS

Modulation: BT (GFSK DH1)

Results: Frequency range 0.03 - 1 GHz

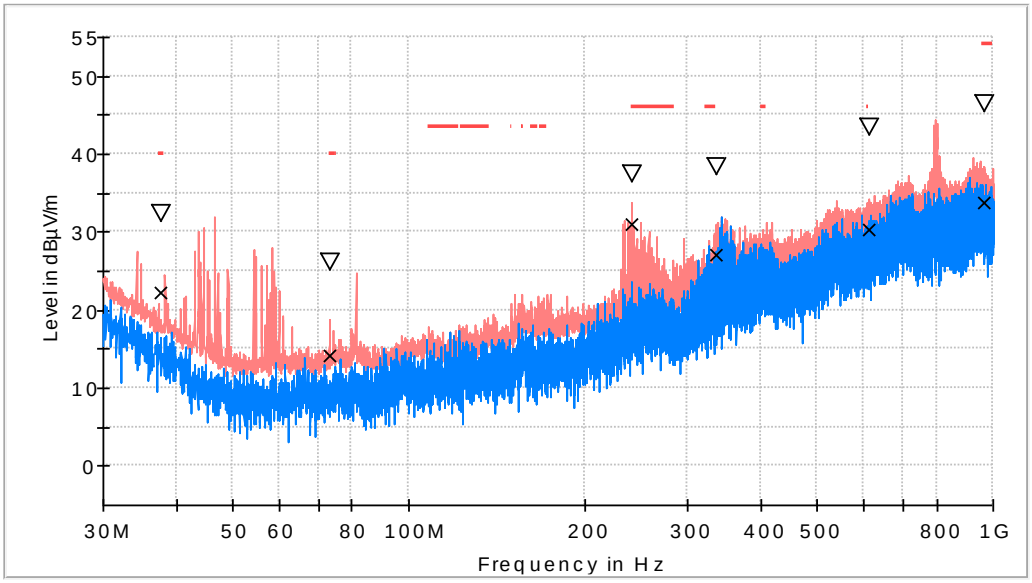
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Middle Channel

Attachments

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [0.03, 1]

Images:



Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.663000	32.5	22.1	H	17.9	40.0
73.262000	26.1	14.2	V	25.8	40.0
240.975000	37.5	31.0	V	15.0	46.0
335.307500	38.4	27.1	H	18.9	46.0
612.776000	43.4	30.3	V	15.7	46.0
963.867500	46.4	33.7	V	20.3	54.0

Modulation: BT (GFSK DH1)

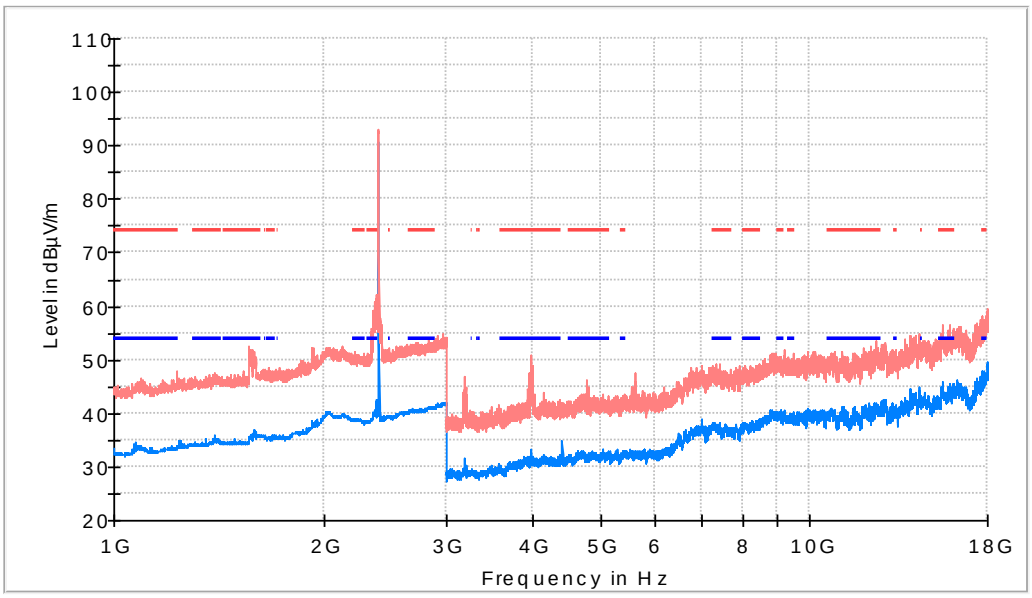
Results: Frequency range 1 - 18 GHz

Lowest Channel

Attachments

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images:



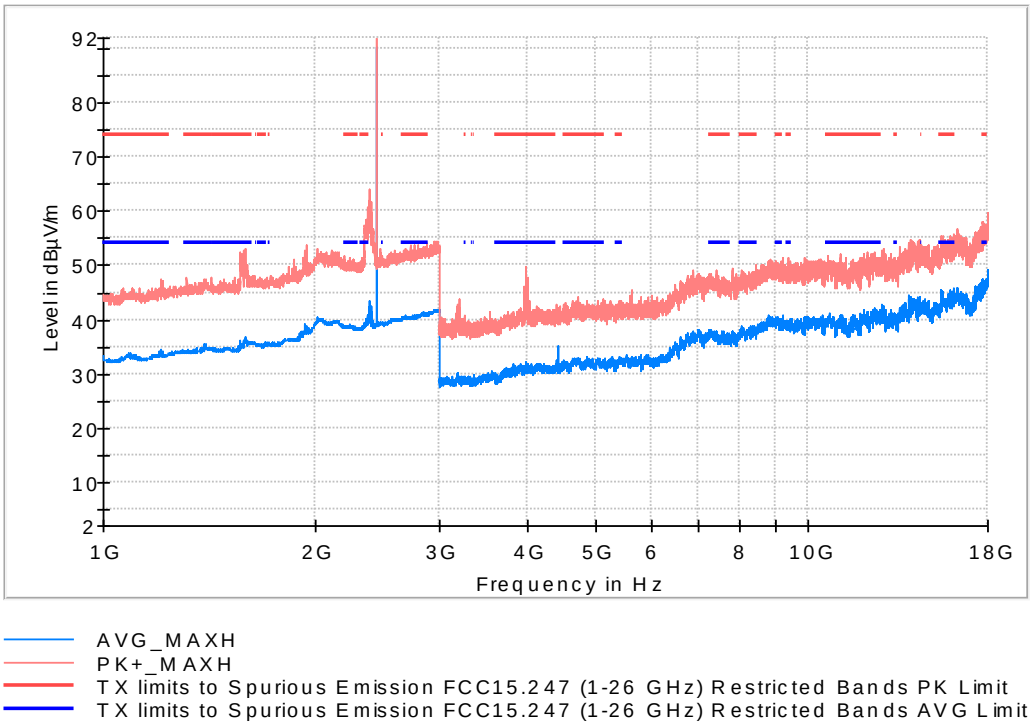
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2402.500000	93.0	88.7	H	---	---	Fundamental
3973.000000	51.0	33.1	H	20.9	54.0	
9191.500000	50.6	40.7	H	13.3	54.0	
15486.000000	53.6	45.7	H	8.3	54.0	
17983.000000	59.5	48.2	H	5.8	54.0	

Middle Channel

Attachments

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images:



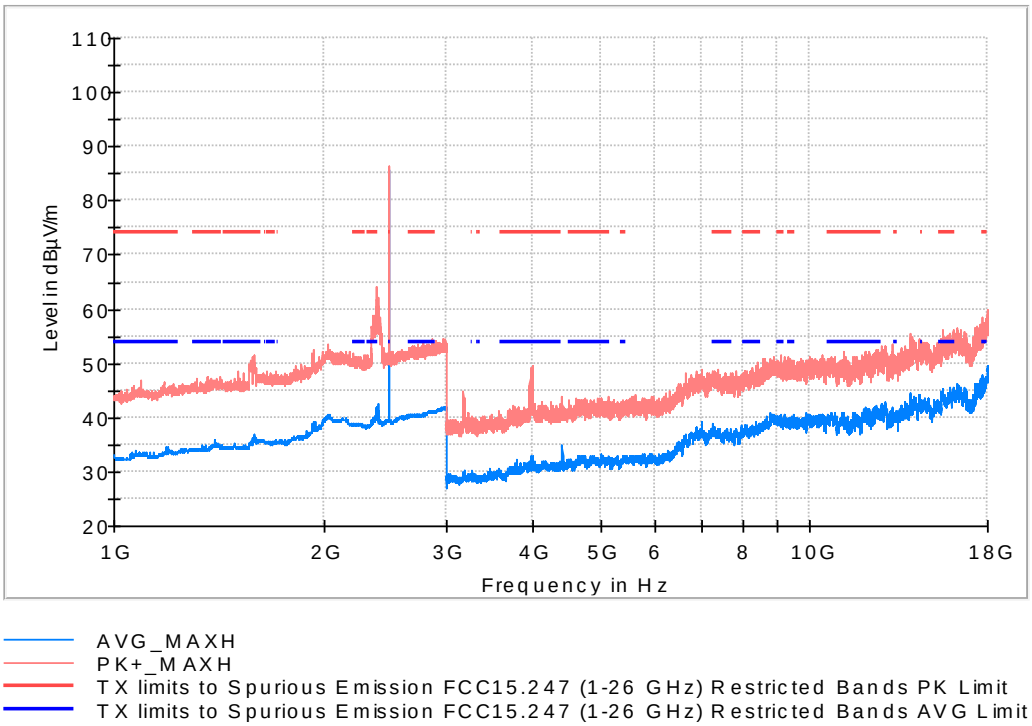
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2389.500000	60.8	42.3	H	11.7	54.0	
2441.500000	92.3	90.2	H	---	---	Fundamental
9190.500000	49.3	40.8	V	13.2	54.0	
15479.000000	54.3	45.5	H	8.5	54.0	
17997.000000	59.7	48.9	H	5.1	54.0	

Highest Channel

Attachments

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images:



Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2480.000000	86.6	85.7	H	---	---	Fundamental
2871.500000	54.7	41.2	V	12.8	54.0	
16057.500000	55.5	45.6	V	8.4	54.0	
17998.000000	59.9	49.6	H	4.4	54.0	

Modulation: BT (GFSK DH1)

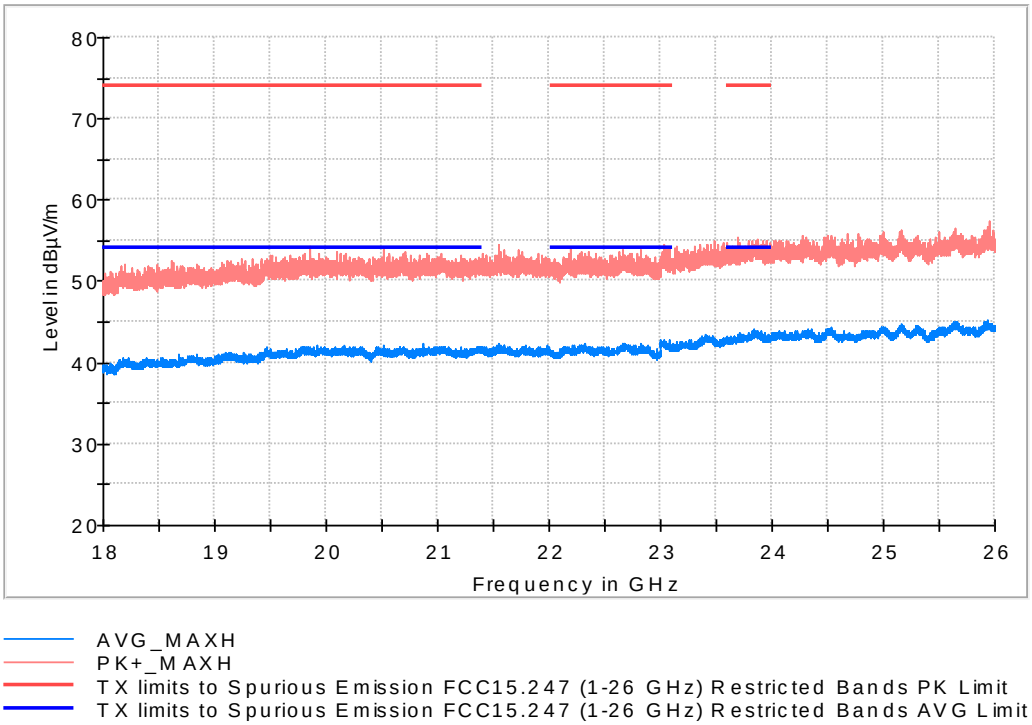
Results: Frequency range 18 - 26 GHz

Lowest Channel

Attachments

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [18, 26]

Images:



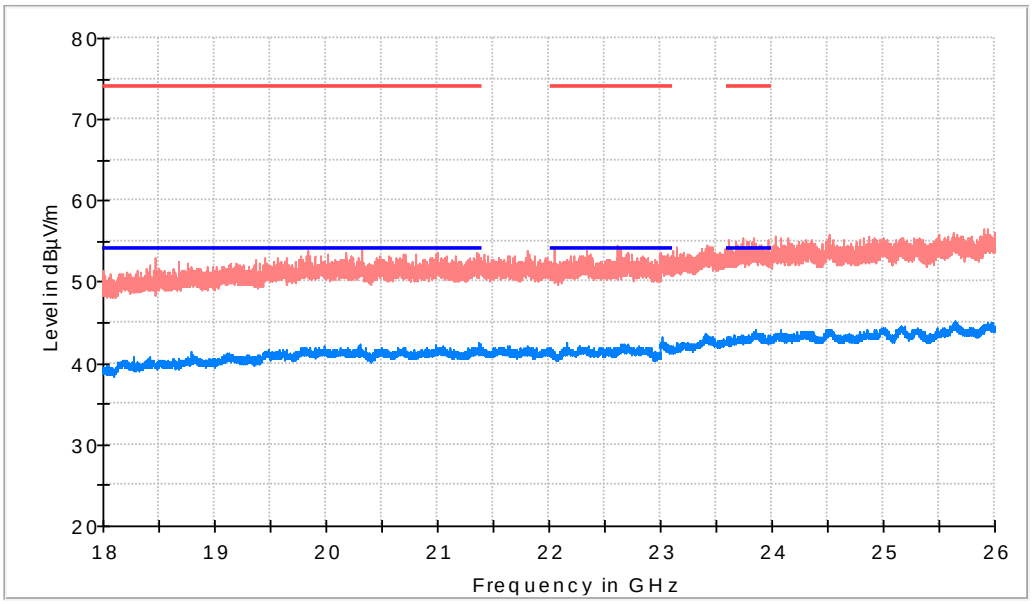
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
23832.500000	53.7	44.1	H	9.9	54.0

Middle Channel

Attachments

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [18, 26]

Images:



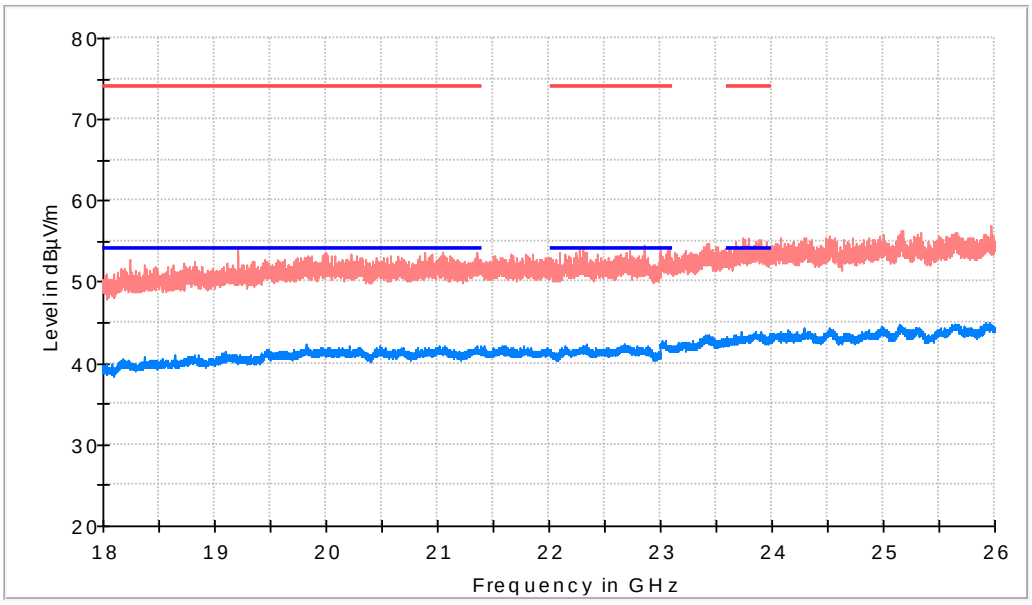
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
23853.000000	53.0	44.1	H	9.9	54.0

Highest Channel

Attachments

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [18, 26]

Images:



Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
23851.500000	53.4	43.9	H	10.1	54.0

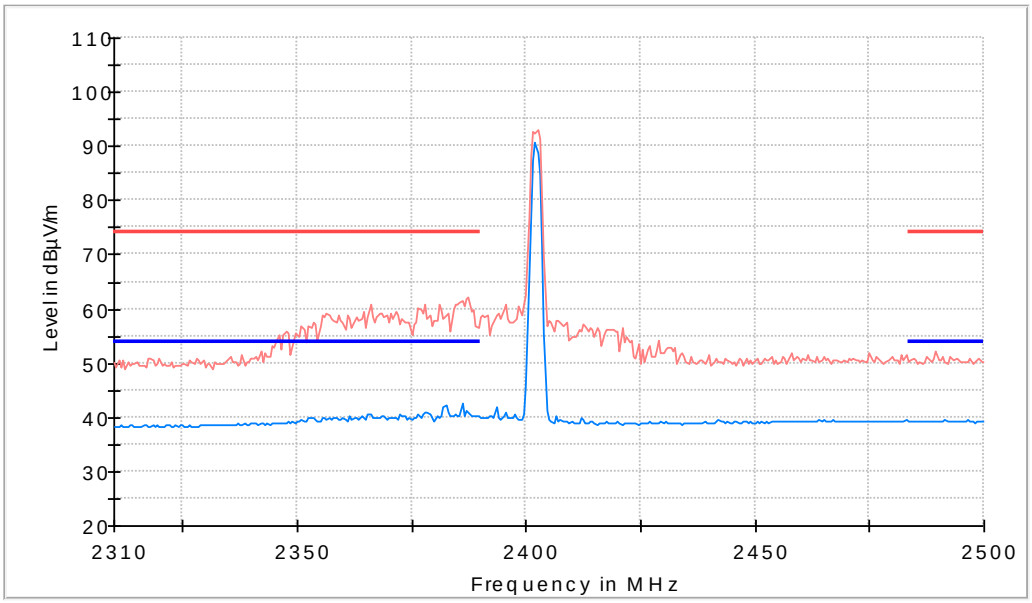
Restricted Bands (2.31 GHz - 2.5 GHz)

Lowest Channel

Attachments

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images:

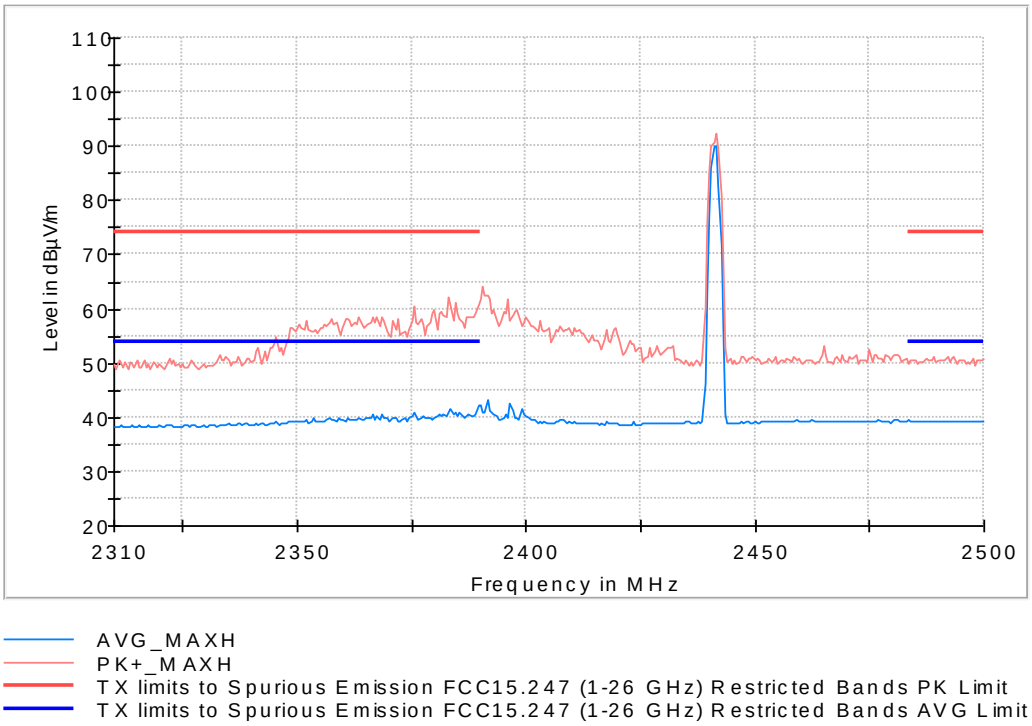


Middle Channel

Attachments

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images:



Highest Channel

Attachments

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK DH1), Frequency Range GHz = [1, 18]

Images: