DEKRA Testing and Certification, S.A.U.
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C.I.F. A29 507 456

DEKRA

ENAC
E N S A Y O S
Nº 51/LE147

Test report No:

NIE: 51929RRF.032

Partial Test report

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

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400-2483.5 MHz, and 5725 - 5850 MHz.
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
General Requirements and Information for the Certification of Radio Apparatus.

(*) Identification of item tested	Headunit with radio and Bluetooth
(*) Trademark	Panasonic
(*) Model and /or type reference	MIB3E_MQB_BT
Other identification of the product	HW version: X40 SW version: X820 Part number: 575.035.888 FCC ID: WUQ-MIB3HBT IC: 216R-MIB3HBT
(*) Features	Bluetooth, FM, AM, USB
Applicant	PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH Robert Bosch Str. 27-29, 63225, Langen, Germany
Test method requested, standard	USA FCC Part 15.247 10-1-17 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 10-1-17 Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (April 2018). Section 15.247 Subclause (d) / RSS-247 5.5.: Emission limitations radiated (Transmitter) 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 v05 dated August 24, 2018. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager RAFAEL LÓPEZ MARTÍN 2020.05.07 13:51:03 +02'00'
Date of issue	2020-05-07
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report

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

DEKRA Testing and Certification S.A.U. 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 Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. 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 Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

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

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 of the model MIB3E_MQB_BT is an automotive head unit to be installed in cars with the following features: Bluetooth, FM, AM, USB.

DEKRA Testing and Certification S.A.U. 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
51929B/636	Automotive Head Unit	MIB3E_MQB_BT	PM6-00124.10.19413F0424	2019/12/27
51929B/538	Harness	--	--	2019/06/05

Sample M/01 has undergone the following test(s): All RADIATED tests indicated in Appendix A.

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient[3]
			☐	☐	☐
Supplementary information to the ports…… :					
Rated power supply .....:	Voltage and Frequency	Reference poles			
		L1	L2	L3	N	PE
	☒ DC: 12 Vdc				
Rated Power .....:					
Clock frequencies .....:					
Other parameters.....:					
Software version .....:	X820				
Hardware version.....:	X40 Part number: 575.035.888				
Dimensions in cm (W x H x D)....:					
	☒ Other: Installed in cars				
Modules/parts .....:	Module/parts of test item	Type	Manufacturer		
	-				
Accessories (not part of the test item) .....:	Description	Type	Manufacturer		
	-				
Documents as provided by the applicant.....:	Description	File name	Issue date		
	-				

[3] Only for Medical Equipment

Identification of the client

PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH

Robert Bosch Str. 27-29, 63225, Langen, Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-01-09
Date (finish)	2020-01-09

Document history

Report number	Date	Description
51929RRF.032	2020-05-07	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 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Jaime Barranquero and Miguel Ángel Torres.

Used instrumentation:

Radiated Measurements

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	Spectrum Analyzer ROHDE AND SCHWARZ FSW50	2018/02	2020/02
3.	EMI Test Receiver ROHDE AND SCHWARZ ESR7	2018/10	2020/10
4.	Pre-Amplifier G>40dB 10MHz-6GHz, BONN ELEKTRONIK, BLNA 0160-01N	2019/02	2020/02
5.	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2017/04	2020/04
6.	RF Pre-amplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2019/04	2020/04
7.	Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2018/01	2021/01
8.	DC Power Supply Keysight Technologies U8002A	---	---
9.	Digital multimeter FLUKE 179	2019/06	2020/06
10.	RF pre-amplifier 18-40 GHz NARDA JS44-18004000-33-8P	2019/02	2020/02
11.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2018/07	2021/07

Testing verdicts

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

Summary

1. Bluetooth EDR.

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a) (1) / RSS-247 5.1 (b)	20 dB Bandwidth and Carrier frequency separation	N/M	(1)
FCC 15.247 (a)(1)(iii) / RSS-247 5.1 (d)	Number of hopping channels	N/M	(1)
FCC 15.247 (a)(1)(iii) / RSS-247 5.1 (d)	Time of occupancy (Dwell Time)	N/M	(1)
FCC 15.247 (b) / RSS-247 5.4 (b)	Maximum peak output power and antenna gain	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5.	Band-edge compliance of conducted emissions (Transmitter)	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5	Emission limitations conducted (Transmitter)	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5	Emission limitations radiated (Transmitter)	P	
Supplementary information and remarks: (1): Test not requested by the client.			

Appendix A: Test results.

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TEST CONDITIONS

POWER SUPPLY (V):

V nonimal:	12 Vdc
Type of Power Supply:	Battery.

ANTENNA:

Type of Antenna:	Integral.
Maximum Declared Antenna Gain:	+1.3 dBi

TEST FREQUENCIES:

Low Channel:	2402 MHz
Middle Channel:	2441 MHz
High Channel:	2480 MHz

The sample was used to configure the EUT to continuously transmit at a specified output power in all channels.

RADIATED MEASUREMENTS:

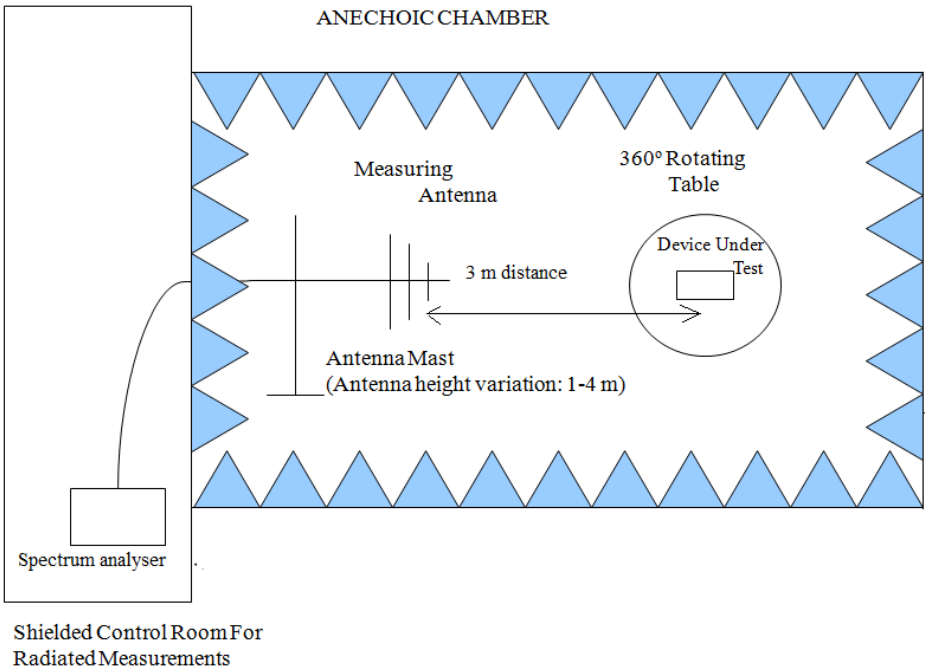
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 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.

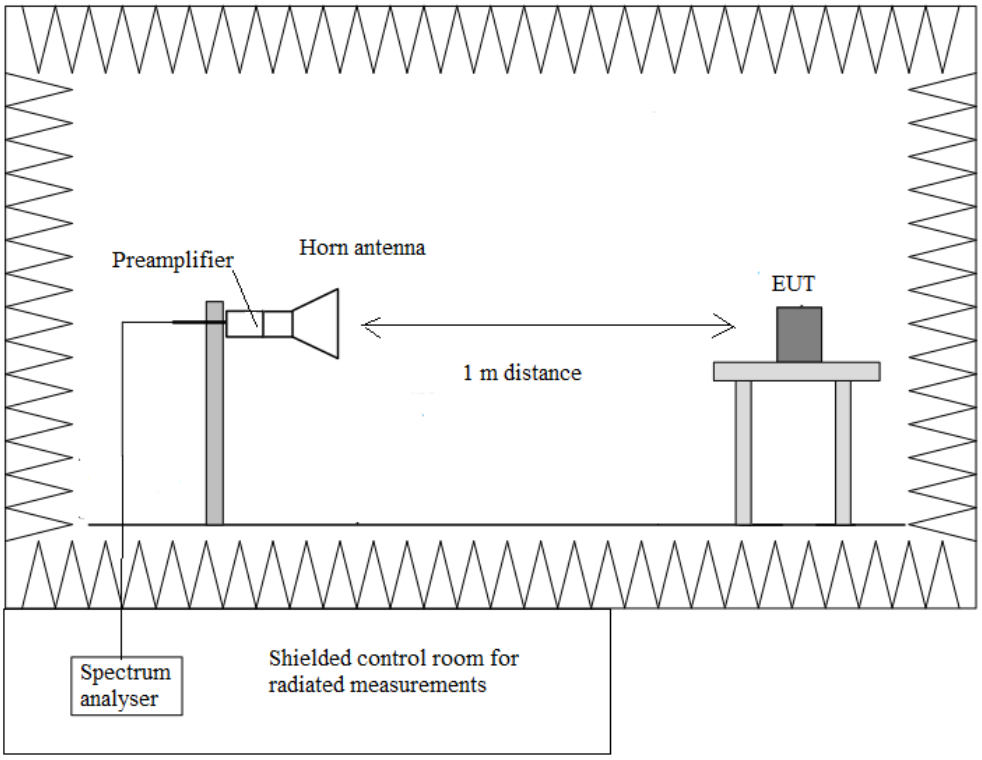
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup f < 1 GHz



Radiated measurements setup f > 1 GHz



15.247 (d) / RSS-247 5.5. Emission limitations radiated (Transmitter)

SPECIFICATION:

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.

RESULTS:

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.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

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.

Frequency range 30 MHz - 1 GHz:

The spurious frequencies do not depend on the operating channel.

Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
437.416	26.4	46	V	Quasi peak	<± 3.81
796.025	32.8	46	H	Quasi peak	<± 3.81

<< SEE GRAPHICS IN THE ATTACHED FILE: 51929RRF032 _Graphics.7z >>

Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

- **GFSK modulation:**

  - LOW CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.36073	Peak	49.25	V	<± 2.78
1.422008	Peak	51.53	V	<± 2.78
2.029367	Peak	44.57	V	<± 2.78
2.363567	Peak	55.51	V	<± 2.78
	Average	37.71		<± 2.78
2.3735	Peak	59.32	V	<± 2.78
	Average	39.82		<± 2.78
1.3197	Peak	47.7	H	<± 2.78
1.370967	Peak	51.1	H	<± 2.78
2.394033	Peak	61.94	H	<± 2.78
	Average	40.57		<± 2.78
2.3634736	Peak	53.93	V	<± 2.78
2.3741533	Peak	58.83	V	<± 2.78
	Average	40.26		<± 2.78
2.387956	Peak	58.94	V	<± 2.78
	Average	39.5		<± 2.78
3.54203	Peak	50.92	V	<± 4.72
3.9695	Peak	51.08	V	<± 4.72
5.58603	Peak	46.35	V	<± 4.72
7.18157	Peak	48.81	V	<± 4.72

- MIDDLE CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.401833	Peak	49.36	V	<± 2.78
2.370567	Peak	58.42	V	<± 2.78
	Average	50.54		<± 2.78
2.393833	Peak	64.04	V	<± 2.78
	Average	44.3		<± 2.78
2.415367	Peak	58.02	H	<± 2.78
	Average	38.47		<± 2.78
2.3633453	Peak	54.79	V	<± 2.78
	Average	37.1		<± 2.78
2.3737827	Peak	59.56	V	<± 2.78
	Average	40.7		<± 2.78
2.3894947	Peak	57.84	V	<± 2.78
	Average	40.93		<± 2.78
3.54203	Peak	50.71	V	<± 4.72
3.99003	Peak	51.81	V	<± 4.72
5.58603	Peak	45.69	V	<± 4.72
7.1825	Peak	46.83	V	<± 4.72

- HIGH CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.3999	Peak	48.32	V	<± 2.78
2.111433	Peak	45.47	V	<± 2.78
2.3737	Peak	58.28	V	<± 2.78
	Average	40.42		<± 2.78
2.3945	Peak	64.99	V	<± 2.78
	Average	44.11		<± 2.78
2.414155	Peak	57.24	H	<± 2.78
	Average	37.97		<± 2.78
2.3633776	Peak	55.24	V	<± 2.78
	Average	37.9		<± 2.78
2.3739293	Peak	59.44	V	<± 2.78
	Average	40.98		<± 2.78
2.3890627	Peak	57.69	V	<± 2.78
	Average	42.48		<± 2.78
3.54203	Peak	50.8	V	<± 4.72
3.99003	Peak	51.68	V	<± 4.72
7.1797	Peak	47.62	V	<± 4.72
5.5865	Peak	47.18	H	<± 4.72

<< SEE GRAPHICS IN THE ATTACHED FILE: 51929RRF032 _Graphics.7z >>

Verdict: PASS

- **Pi/4-DQPSK modulation:**

- LOW CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.3971	Peak	49.2	V	<± 2.78
1.422167	Peak	49.45	V	<± 2.78
2.363633	Peak	52.31	V	<± 2.78
2.373767	Peak	56.49	V	<± 2.78
	Average	45.23		<± 2.78
1.320033	Peak	50.56	H	<± 2.78
1.3609	Peak	53.63	H	<± 2.78
2.37364	Peak	58.84	V	<± 2.78
	Average	43.09		<± 2.78
2.3885987	Peak	58.84	V	<± 2.78
	Average	42.33		<± 2.78
3.54203	Peak	51.13	V	<± 4.72
3.9905	Peak	51.1	V	<± 4.72
5.58557	Peak	48.1	V	<± 4.72
7.18157	Peak	47.32	V	<± 4.72

- MIDDLE CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.402833	Peak	51.98	V	<± 2.78
2.266233	Peak	47.69	V	<± 2.78
2.3633	Peak	53.95	V	<± 2.78
2.373833	Peak	56.52	V	<± 2.78
	Average	39.74		<± 2.78
2.393833	Peak	63.76	V	<± 2.78
	Average	45.22		<± 2.78
1.319967	Peak	51.09	H	<± 2.78
1.360833	Peak	52.94	H	<± 2.78
2.373668	Peak	59.11	V	<± 2.78
	Average	43.7		<± 2.78
2.3898013	Peak	57.61	V	<± 2.78
	Average	40.8		<± 2.78
3.54203	Peak	51.15	V	<± 4.72
3.99003	Peak	53.01	V	<± 4.72
5.58603	Peak	48.76	V	<± 4.72
7.1811	Peak	47.83	V	<± 4.72

- HIGH CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.402433	Peak	51.6	V	<± 2.78
2.3633	Peak	54.61	V	<± 2.78
	Average	42.53		<± 2.78
2.373633	Peak	57.29	V	<± 2.78
	Average	46.97		<± 2.78
2.3937	Peak	63.41	V	<± 2.78
	Average	43.9		<± 2.78
2.4131	Peak	59.76	V	<± 2.78
	Average	40.05		<± 2.78
1.3611	Peak	51.87	H	<± 2.78
2.3736573	Peak	60.4	V	<± 2.78
	Average	47.43		<± 2.78
2.389241	Peak	57.26	V	<± 2.78
	Average	46.93		<± 2.78
3.54203	Peak	50.75	V	<± 4.72
3.9905	Peak	53.45	V	<± 4.72
5.5851	Peak	48.57	V	<± 4.72
7.1811	Peak	48.96	V	<± 4.72

<< SEE GRAPHICS IN THE ATTACHED FILE: 51929RRF032 _Graphics.7z >>

Verdict: PASS

- **8DPSK modulation:**

- LOW CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.396767	Peak	48.62	V	<± 2.78
2.309567	Peak	48.95	V	<± 2.78
2.393433	Peak	63.53	V	<± 2.78
	Average	43.32		<± 2.78
2.414167	Peak	57.5	V	<± 2.78
	Average	37.32		<± 2.78
1.319323	Peak	49.63	H	<± 2.78
1.350256	Peak	48.63	H	<± 2.78
2.363476	Peak	54.59	V	<± 2.78
	Average	37.83		<± 2.78
2.3741427	Peak	59.42	V	<± 2.78
	Average	39.38		<± 2.78
2.3895853	Peak	57.4	V	<± 2.78
	Average	37.79		<± 2.78
3.54203	Peak	50.7	V	<± 4.72
3.96997	Peak	52	V	<± 4.72
7.18203	Peak	47.82	V	<± 4.72
5.5865	Peak	45.51	H	<± 4.72

- MIDDLE CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
1.397033	Peak	49.58	V	<± 2.78
2.3635	Peak	53.48	V	<± 2.78
2.3739	Peak	56.92	V	<± 2.78
	Average	38.16		<± 2.78
1.349732	Peak	47.41	H	<± 2.78
2.03539	Peak	44.4	H	<± 2.78
2.393967	Peak	59.72	H	<± 2.78
	Average	41.74		<± 2.78
2.424767	Peak	52.42	H	<± 2.78
2.3632653	Peak	55.66	V	<± 2.78
	Average	37.6		<± 2.78
2.3735587	Peak	59.01	V	<± 2.78
	Average	39.84		<± 2.78
2.3845613	Peak	58.13	V	<± 2.78
	Average	35.12		<± 2.78
3.54203	Peak	50.86	V	<± 4.72
3.9695	Peak	51.25	V	<± 4.72
7.18157	Peak	48.77	V	<± 4.72
5.5865	Peak	47.16	H	<± 4.72

- HIGH CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBµV/m)	Polarization	Measurement Uncertainty (dB)
2.3635	Peak	53.67	V	<± 2.78
2.373833	Peak	57.6	V	<± 2.78
	Average	38.13		<± 2.78
1.350124	Peak	49.58	H	<± 2.78
1.402096	Peak	48.78	H	<± 2.78
2.3633317	Peak	55.14	V	<± 2.78
	Average	35.85		<± 2.78
2.3736493	Peak	60.97	V	<± 2.78
	Average	38.88		<± 2.78
2.389964	Peak	58.83	V	<± 2.78
	Average	38.03		<± 2.78
3.54203	Peak	50.86	V	<± 4.72
3.9695	Peak	52.26	V	<± 4.72
7.18157	Peak	47.56	V	<± 4.72
5.58557	Peak	48.24	H	<± 4.72

<< SEE GRAPHICS IN THE ATTACHED FILE: 51929RRF032 _Graphics.7z >>

Verdict: PASS