DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

Test Report No:
81844RRF.003A1

Test Report
ETSI EN 303 413 V1.2.1 (2021-04)

(*) Identification of item tested	R2EX All-In-One Unit
(*) Trademark	Marelli
(*) Model and /or type reference	HUR2XE10B1
Other identification of the product	N/A
(*) Features	AM/FM/DAB rx, BT 5.0, WLAN 5.8GHz, 2G/3G/4G modem, GNSS rx HW version: PTD3 SW version: R19.2
Manufacturer	Marelli Europe S.p.A. V.le A. Borletti 61/63 - 20011 Corbetta (MI) - ITALY
Test method requested, standard	ETSI EN 303 413 V1.2.1 (2021-04): Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1164 MHz to 1300 MHz and 1559 MHz to 1610 MHz frequency bands; Harmonised Standard for access to radio spectrum.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2026-02-09
Report template No	FDT08_27 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Freq Rng	Frequency Range
Lvl Meas Pk	Level Pre Measurement Peak
MP	Measurement Point
Pol	Polarization
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl RMS	Unwanted Emissions Level RMS

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.

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.

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.
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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 S.A.U. and the Accreditation Bodies.

Uncertainty

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

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty ≤ ± 5,35 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 8.3 GHz is:
Measurement uncertainty ≤ ± 4,32 dB with factor (k = 2).

The total uncertainty of the measurement system for the conducted testing of EUT is:
Receiver blocking: Measurement uncertainty < ± 4,73 dB

The total uncertainty of the measurement system for the conducted emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty ≤ ± 0,55 dB with factor (k = 2).

The total uncertainty of the measurement system for the conducted emissions of EUT from 1 GHz to 8.3 GHz is:
Measurement uncertainty ≤ ± 1,53 dB with factor (k = 2).

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 a All-In-One Unit. AUtomotive All-In-One Unit, including Infotainment and Telematics functions.

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. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	81844B_79.1	R2EX All-In-One Unit	HUR2XE10B1	1J6JF900WC5F	2025-08-04	Element Under Test
S/01	81844B_13.1	Fakra to 4 Fakra Cable	-	-	2025-06-09	Auxiliary Element
S/01	81844B_44.1	MAIN Harness	-	-	2025-06-24	Auxiliary Element
S/02	81844B_88.1	R2EX All-In-One Unit	HUR2XE10B1	1JCGF902867F	2025-10-08	Element Under Test
S/02	81844B_13.1	Fakra to 4 Fakra Cable	-	-	2025-06-09	Auxiliary Element
S/02	81844B_44.1	MAIN Harness	-	-	2025-06-24	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	Samples used for radiated tests
S/02	Samples used for conducted tests

Test sample description

Ports…… :	**Port name and description**	**Cable**					
		Specified max length [m]	**Attached during test**	**Shielded**			
	Connector A (black, main harness)	>3	[X]	[ ]			
	Connector B (grey, main harness)	>3	[X]	[ ]			
	Connector C (FM/AM, DAB, WIFI/BT ANT1, WIFI/BT ANT2)	>3	[X]	[X]			
	Connector D (display)	>3	[X]	[X]			
	Connector E (GNSS, CAM, LTE, GSM)	>3	[X]	[X]			
	Connector F (USB)	>3	[X]	[X]			
Supplementary information to the ports…… :	the shielding in Connetor C and E is intended on each single signal, not on overall connector						
Rated power supply .....:	**Voltage and Frequency**		**Reference poles**				
			L1	**L2**	**L3**	**N**	**PE**
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: 13,5 Vdc (Vmin-Vmax: 9 - 16 Vdc)					
Rated Power .....:	.....						
Clock frequencies.....:	.....						
Other parameters .....:	.....						
Software version .....:	R19.2						
Hardware version .....:	PTD3						
Dimensions in cm (W x H x D) ....:	.....						
Mounting position .....:	[ ]	Table top equipment					
	[ ]	Wall/Ceiling mounted equipment					
	[ ]	Floor standing equipment					
	[ ]	Hand-held equipment					
	[X]	Other: automotive interior environment, installation in the dashboard of vehicles					
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**			
	.....		.....	.....			

Identification of the client

Marelli Europe S.p.A.
V.le A. Borletti 61/63 - 20011 Corbetta (MI) - ITALY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U. Severo Ochoa, 6 - Parque Tecnológico de Andalucía; 29590 Campanillas (Málaga) (Location B)
Date (start)	2025-09-15
Date (finish)	2025-10-24

Document history

Report number	Date	Description
81844RRF.003	2026-01-28	First release.
81844RRF.003A1	2026-02-09	Second release. Test report updated due to minor typos (SW version modification). This modified test report cancels and replaces test report 81844RRF.003.

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: Antonio Maireles, Pablo Redondo.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
04825	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
04826	SHIELDED ROOM	S101	ETS LINDGREN	N/A
07547	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-22
07548	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-22
04578	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2026-06-01
07611	PREAMPLIFIER BOX	--	INTERNAL	2026-01-23
06165	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2025-12-27
04611	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
05705	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2026-07-23
08835	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2026-04-15
09555	TWO-CHANNEL POWER SUPPLY, 32V, 10/5A, 188W	HMP2020	ROHDE AND SCHWARZ	N/A
07758	DIGITAL MULTIMETER	175	FLUKE	2026-11-06
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
06793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06611	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-21
02404	VECTOR SIGNAL GENERATOR 250kHz-6GHz	E4438C	AGILENT TECHNOLOGIES	2026-03-14
07793	SIGNAL GENERATOR 8kHz-6GHz	SMBV100B	ROHDE AND SCHWARZ	2026-03-11
00922	POWER SUPPLY DC 40 V / 40 A	NGPE 40/40	ROHDE AND SCHWARZ	2027-10-02
07760	DIGITAL MULTIMETER	179	FLUKE	2026-11-07

Testing verdicts

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

Summary

	ETSI EN 303 413		
Requirement – Test case	Verdict	Remark	Location
4.2.1. Receiver blocking	P	(1)	B
4.2.2. Receiver spurious emissions (conducted).	P	(1)	B
4.2.2. Receiver spurious emissions (radiated).	P	(1)	B
Supplementary information and remarks: (1) The equipment supports Galileo, GLONASS, GPS.			

Appendix A: Application form for testing.

Information to declare according to ETSI EN 303 413.

In accordance with ETSI EN 303 413 clause 5.4.3 and 5.4.4, the following information is provided by the manufacturer.

a) Supported GNSS:

GNSS Constellation	**GNSS Signals**			
BDS	B1I	B1C		
Galileo	E1	E5a	E5b	E6
GLONASS	G1	G2		
GPS	L1 C/A	L1C	L2C	L5
SBAS	L1	L5		

b) Voltage for device supply:

Nominal voltage (V)	Type
13.5	DC

c) Antenna type:

Antenna type	External

d) SBAS used for testing (if supported)

SBAS used	EGNOS
	GAGAN
	MSAS
	WAAS

Appendix B: Test results.

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	13.5 Vdc
Type of Power Supply:	External DC (Vehicle battery)

TEMPERATURE:

Tnominal:	+15 to +35 ºC

TEST FREQUENCIES (*):

Receiver:

Galileo E1 at 1575.42 MHz.

GLONASS G1 at 1605.375 MHz.

GPS L1 C/A at 1575.42 MHz.

TEST CASES DETAILS

4.2.1 Receiver Blocking

Limits

The clauses 4.2.1. and 5.4. of the standard ETSI EN 303 413 V1.2.1.

The C/N_0 metric reported by the GUE for all GNSS constellations and GNSS signals given in table 4-1 and supported by the GUE shall not degrade by more than the value given in equation (4-1) when a blocking signal is applied. The blocking signal is defined in table 4-4, with the frequencies and power levels defined in table 4-2 and/or in table 4-3 depending on the RNSS bands supported by the GUE.

Equation (4-1): Maximum degradation in C/N_0

$$\Delta C/N_0 \leq 1 \text{ dB}$$

Table 4-1: GNSS constellations, GNSS signals and RNSS frequency bands

GNSS Constellation	GNSS Signal Designations	RNSS Frequency Band (MHz)
BDS	B1I	1 559 to 1 610
	B1C	1 559 to 1 610
Galileo	E1	1 559 to 1 610
	E5a	1 164 to 1 215
	E5b	1 164 to 1 215
	E6	1 215 to 1 300
GLONASS	G1	1 559 to 1 610
	G2	1 215 to 1 300
GPS	L1 C/A	1 559 to 1 610
	L1C	1 559 to 1 610
	L2C	1 215 to 1 300
	L5	1 164 to 1 215
SBAS	L1	1 559 to 1 610
	L5	1 164 to 1 215

Table 4-2: Frequency bands, blocking signal test point centre frequencies and power levels for the 1 559 MHz to 1 610 MHz RNSS band

Frequency band (MHz)	Test point centre frequency (MHz)	Blocking signal power level (dBm)	Comments
1 518 to 1 525	1 524	-65	MSS (space-to-Earth) band
1 525 to 1 549	1 548	-95	MSS (space-to-Earth) band
1 549 to 1 559	1 554	-105	MSS (space-to-Earth) band
1 559 to 1 610	GUE RNSS band under test		
1 610 to 1 626	1 615	-105	MSS (Earth-to-space) band
1 626 to 1 640	1 627	-85	MSS (Earth-to-space) band

Table 4-3: Frequency bands, blocking signal test point centre frequencies and power levels for the 1 164 MHz to 1 300 MHz RNSS band

Frequency band (MHz)	Test point centre frequency (MHz)	Blocking signal power level (dBm)	Comments
960 to 1 164	1 154	-75	AM(R)S, ARNS band
1 164 to 1 215	GUE RNSS band under test		
1 215 to 1 260	GUE RNSS band under test		
1 260 to 1 300	GUE RNSS band under test		
1 300 to 1 350	1 310	-85	Radiolocation, ARNS, RNSS (Earth-to-space) band

Table 4-4: Blocking signal

Parameter	Value	Comments
Frequency	See table 4-2 and table 4-3	
Power level	See table 4-2 and table 4-3	
Bandwidth	1 MHz	See clause B.1 for details
Format	AWGN	

Results

GNSS supported: Galileo E1, Glonass G1, GPS L1 C/A

- Galileo E1 Maximum Signal level: -120.03 dBm
- Number of Satellites: 3.

- GLONASS G1 Maximum Signal level: -124.03 dBm
- Number of Satellites: 4.

- GPS L1 C/A Maximum Signal level: -121.53 dBm
- Number of Satellites: 6.

Frequency band (MHz)	Test point center frequency (MHz)	Adjacent frequency signal power level (dBm)	Adjacent frequency signal power level (dBm)	Measured C/No (dB-Hz)				
	From table 4-2	From table 4-2	Interfering level	No interfering signal	With interfering signal	Decrease of C/No	Decrease ≤ 1 dB	
[1518, 1525]	1524	-65	-58.05				Beidou_B1I:	
							Beidou_B1C (IGSO):	
							Beidou_B1C (MEO):	
				31	30.6	0.33	Galileo_E1:	P
				27	27	0	GLONASS_G1:	P
				33	33	0	GPS_L1C/A:	P
							GPS_L1C:	
							SBAS_L1:	
[1525, 1549]	1548	-95	-88.05				Beidou_B1I:	
							Beidou_B1C (IGSO):	
							Beidou_B1C (MEO):	
				31	30.6	0.33	Galileo_E1:	P
				27	27	0	GLONASS_G1:	P
				33	33	0	GPS_L1C/A:	P
							GPS_L1C:	
							SBAS_L1:	
[1549, 1559]	1554	-105	-98.05				Beidou_B1I:	
							Beidou_B1C (IGSO):	
							Beidou_B1C (MEO):	
				31	31	0	Galileo_E1:	P
				27	27	0	GLONASS_G1:	P
				33	32.6	0.33	GPS_L1C/A:	P
							GPS_L1C:	
							SBAS_L1:	
[1610, 1626]	1615	-105	-98.05				Beidou_B1I:	
							Beidou_B1C (IGSO):	
							Beidou_B1C (MEO):	
				31	30.3	0.66	Galileo_E1:	P
				27	27	0	GLONASS_G1:	P
				33	33	0	GPS_L1C/A:	P
							GPS_L1C:	
							SBAS_L1:	
[1626, 1640]	1627	-85	-78.05				Beidou_B1I:	
							Beidou_B1C (IGSO):	
							Beidou_B1C (MEO):	
				31	31	0	Galileo_E1:	P
				27	27	0	GLONASS_G1:	P
				33	32.83	0.16	GPS_L1C/A:	P
							GPS_L1C:	
							SBAS_L1:	

Measurement Uncertainty < ± 4.73 dB

Verdict

Pass

4.2.2 Receiver spurious emissions

Limits

The clauses 4.2.2. and 5.5. of the standard ETSI EN 303 413 V1.2.1.

The spurious emissions of the GUE shall not exceed the values given in table 4-5.

In case of a GUE with an external antenna connector, these limits apply to emissions at the antenna port (conducted).
For emissions radiated by the cabinet or for emissions radiated by a GUE with an integral antenna (without an antenna connector), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 4-5: Receiver spurious emission limits

Frequency range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 8,3 GHz	-47 dBm	1 MHz

Results

RADIATED:

Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl RMS (dBm)	Polarization
[0.03, 8.3]	774.172	-62.60	H
[0.03, 8.3]	798.755	-63.74	H
[0.03, 8.3]	3594.009	-53.61	V
[0.03, 8.3]	3622.297	-51.66	V

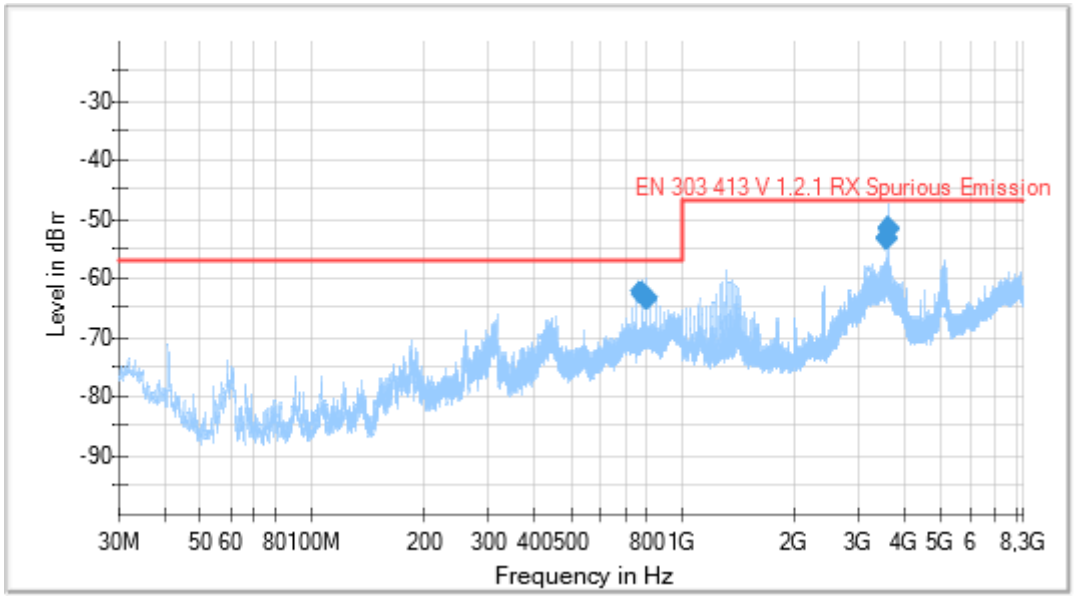
Verdict

Pass

Attachments

Frequency Range GHz = [0.03, 8.3]

Images:



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	50 kHz	RMS	100 kHz	0,03 s	OFF
1 GHz - 8,5 GHz	146,875 kHz	PK+	1 MHz	1 s	0 dB

CONDUCTED:

No spurious frequencies detected at less than 6 dB below the limit

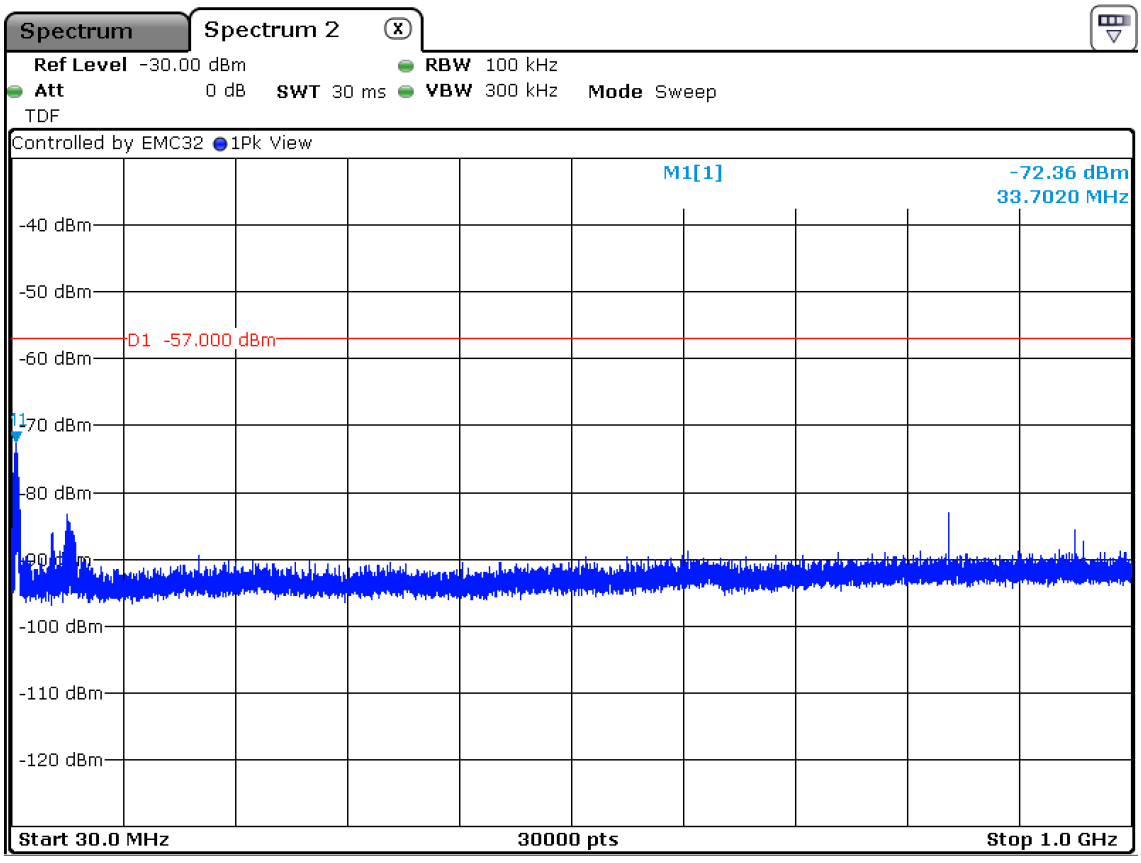
Verdict

Pass

Attachments

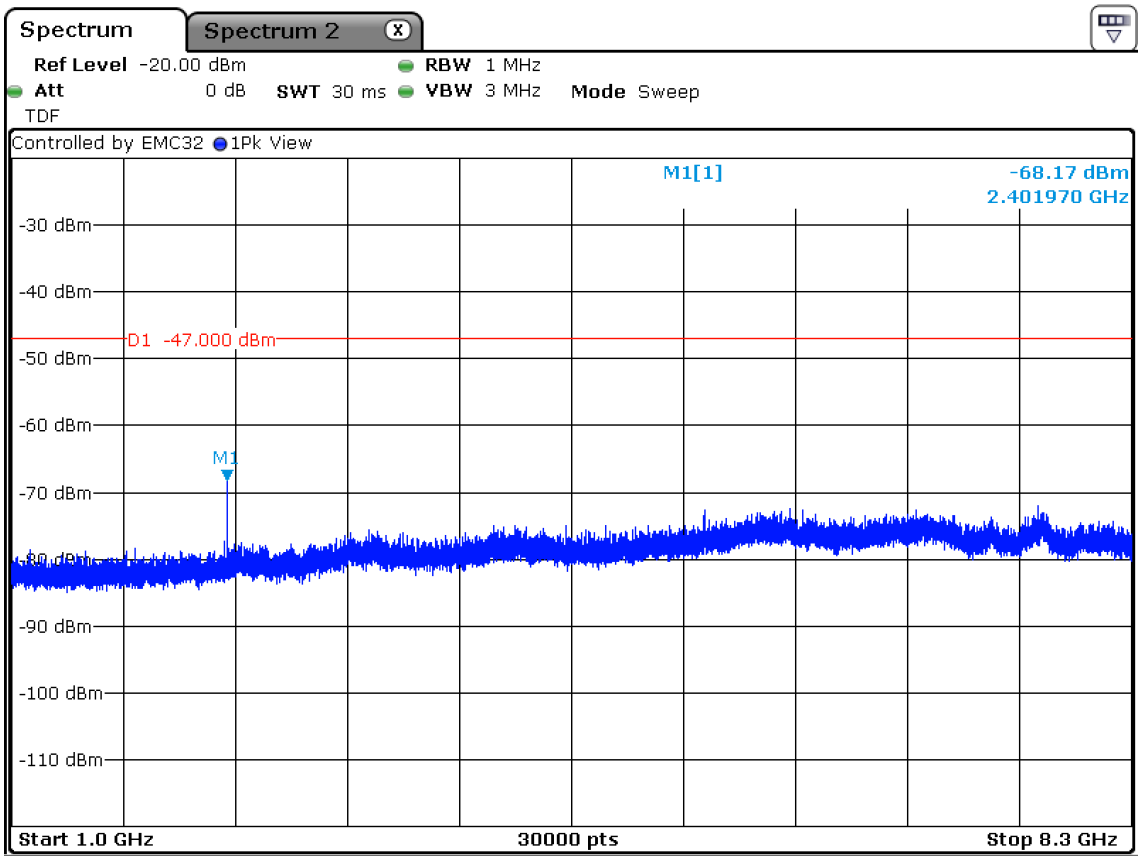
Frequency Range GHz = [0.03, 1]

Images:



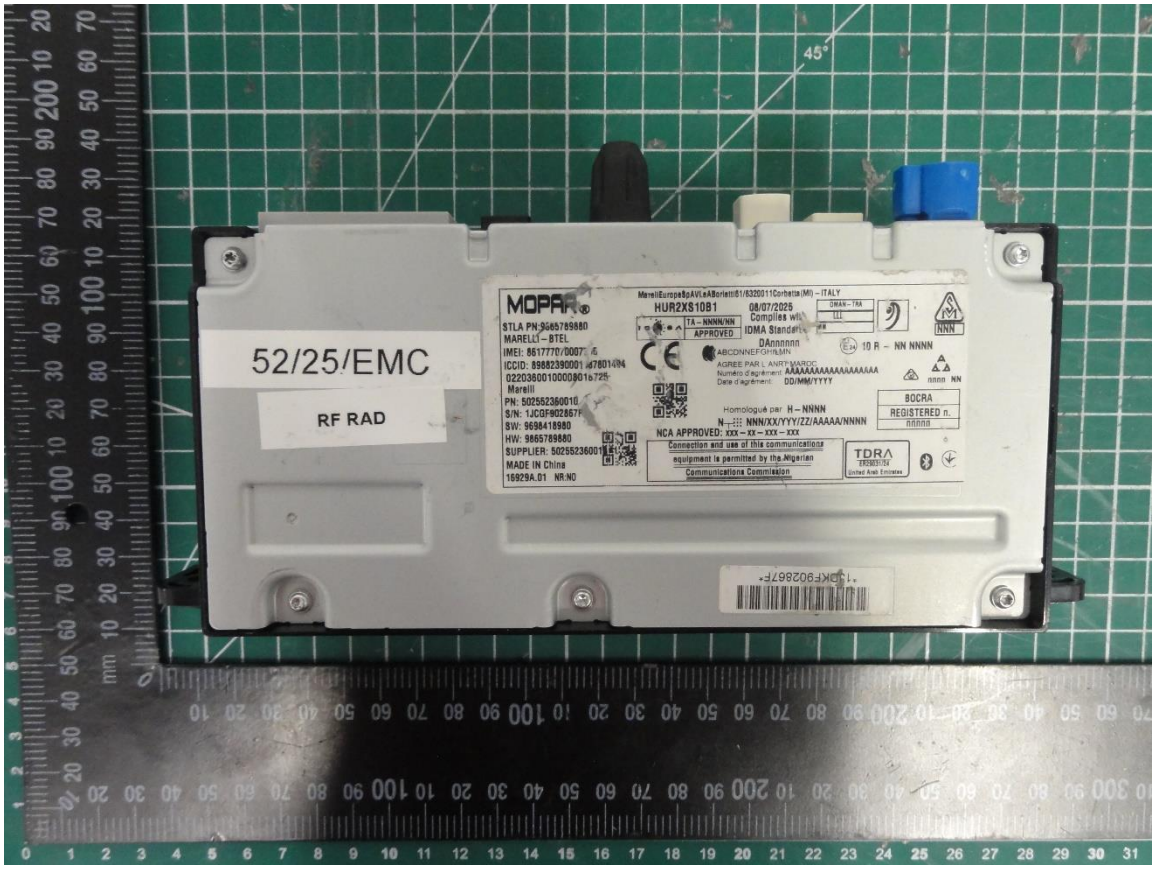
Frequency Range GHz = [1, 8.3]

Images:

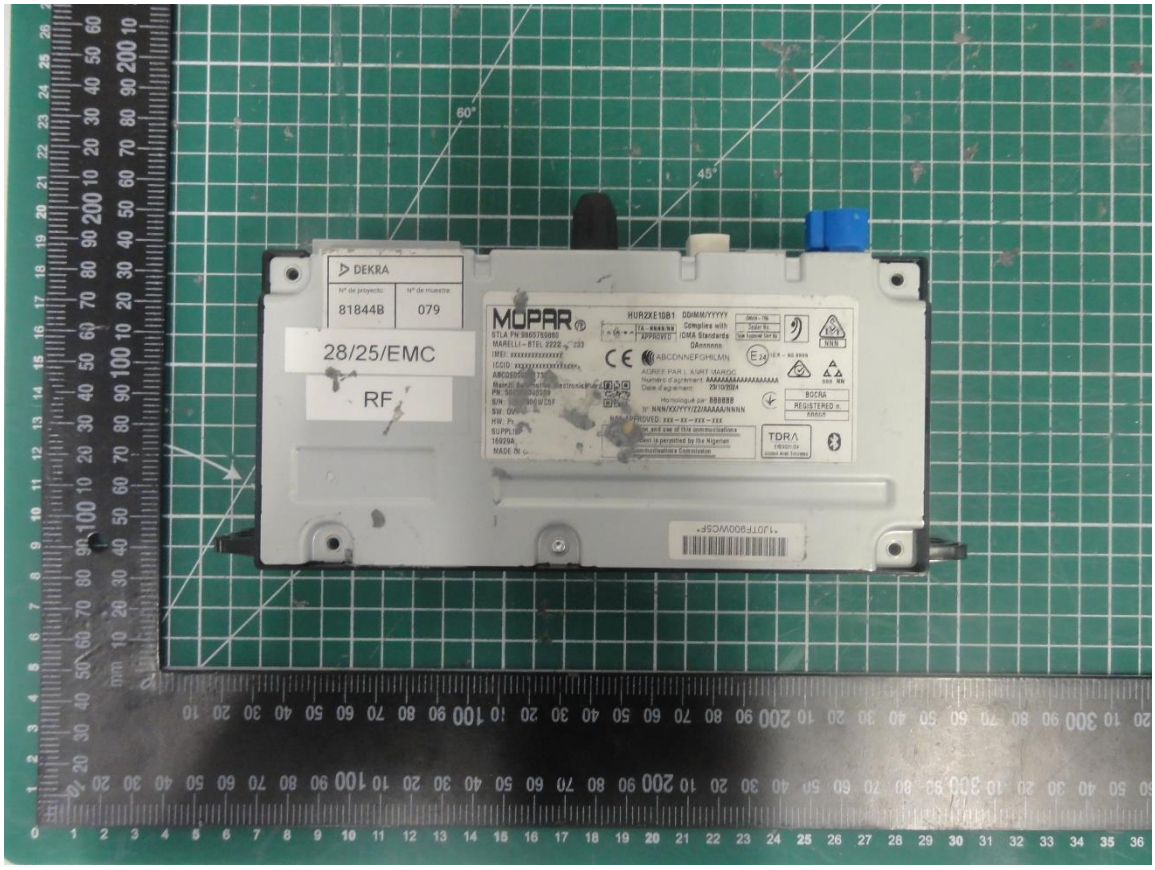


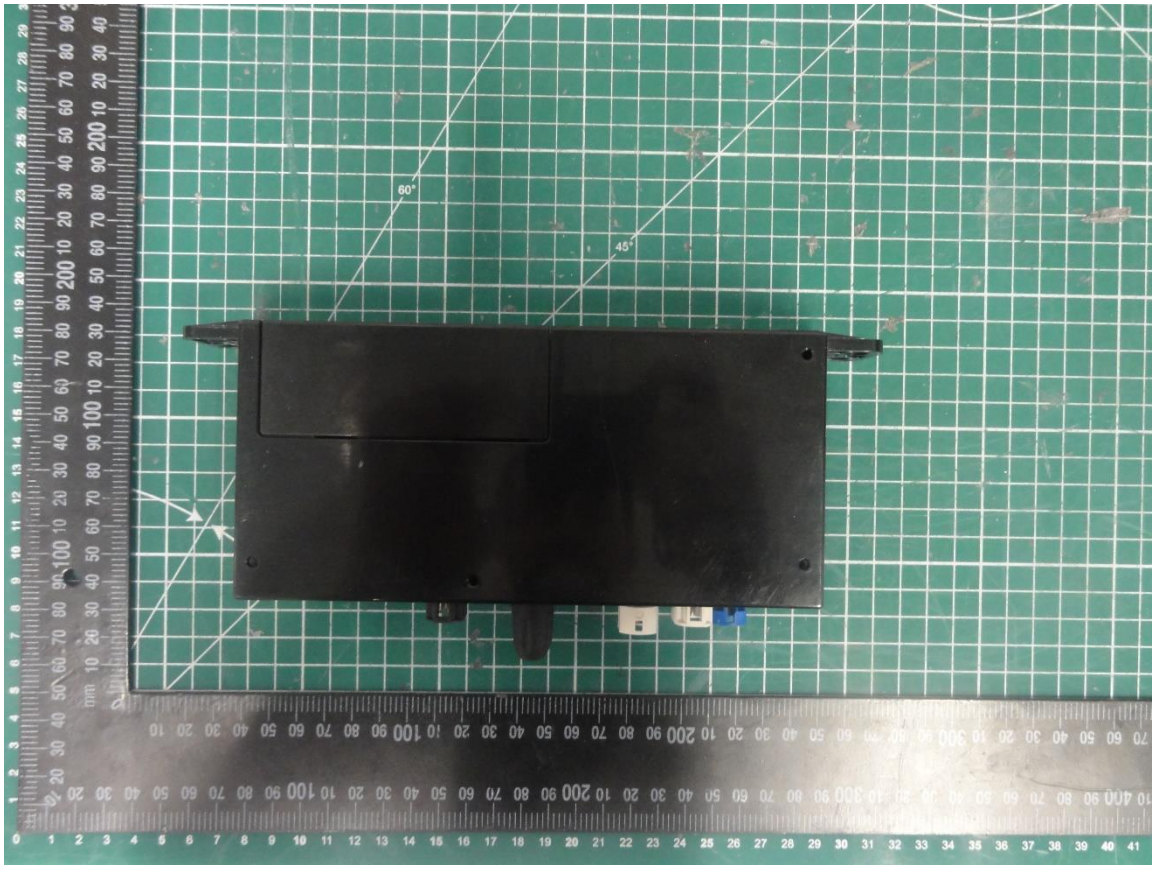
Appendix C: Photographs

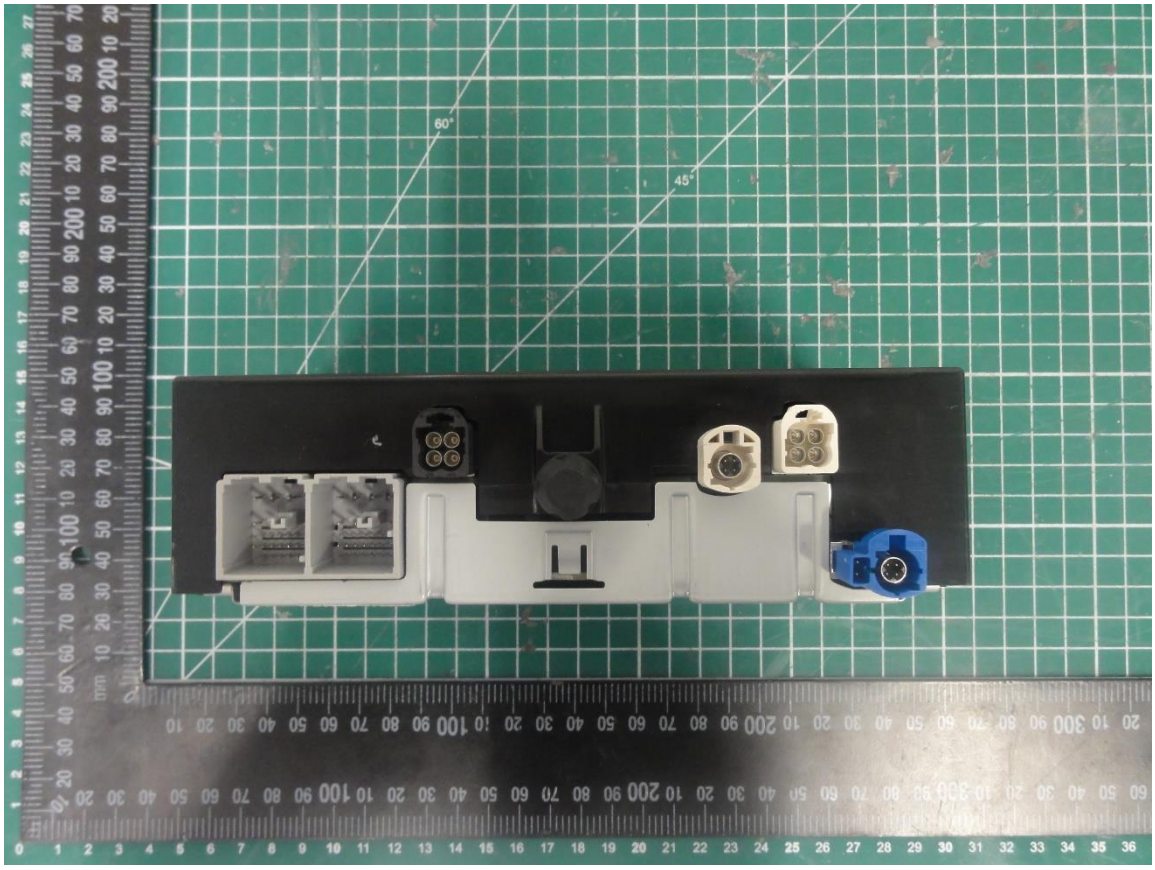
EQUIPMENT VIEW FOR CONDUCTED TESTS



EQUIPMENT VIEW FOR RADIATED TESTS






60°
45°