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File Number **22/36403917_M1**

TEST REPORT
FCC/ICES Test Report

Petitioner's Reference: Arrival LTD			
Customer Address :	Beaumont House, Kensington Village, London, W14 8TS6 Mr. Alexey Prokofyev		
Received material:			
Brand:	ARRIVAL	Model:	COMM10U
S/N:	YCGJqtpHKaxSHJYUTZzC	Applus Id:	8834-0001
Result: complies			
It has been tested and complies the standard specifications Applicable / s. See specifications applied on page 8.			
Applicable Standards			
Emission standard/s:	**FCC 47 CFR Part 15 Subpart B (October 2020)[1]** *[1]The latest modifications of the standard, published at the date of the tests reported in this document, have been considered* **ICES-003 Issue 7 – 2020 (updated October 2020)**		

Date of issue: Bellaterra, September 19, 2022

M1: This report replaces and annuls the report with certificate number 22/36403917 dated 31-08-2022.
Modifications performed: Added the frequency range from 26 GHz to 30 GHz according to the fifth armonic of the maximum internal frequency declared by the manufacturer on page 20 and its setup pictures on page 22. It is responsibility of the petitioner to replace the previous version with this one.

Firmado digitalmente por LUIS GUARDIOLA ECHEVARRIA
Fecha: 2022.09.19 11:07:13 +02'00'

Luis Guardiola Echevarría
EMC & Wireless Technical Manager
Electrical and Electronics
LGAI Technological Center S.A.

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1. EQUIPMENT RECEIVED AND TESTED

EQUIPMENT SPECIFICATIONS:			
Brand:	ARRIVAL	**Model:**	87205144009752
s/n:	YCGJqtpHKaxSHJYUTZzC	**Power Supply:**	12 V_{DC}
HW Version	0.99.44	**SW Version**	0.XXX
Maximum internal frequency:	5.8 GHz		

Equipment information:
(Information declared by the manufacturer, Applus+ is not responsible)

Communication Platform, Secure connectivity and access gateway for vehicle health and telematics

RF FEATURES:

GNSS Module
Radio chipset: --
Brand: uBlox; Model: NEO-M8N-0-10

BLE Module
Radio chipset: --
Brand:Silex Technology; Model: SX-SDPAC-2830-SP

Cellular Module
Radio chipset: --
Brand: Gemalto; Model: ELS81-E

WiFi Module
Radio chipset: -- ,
Brand: Silex Technology; Model: SX-SDPAC-2830-SP

Test product reception:	2022-07-01
Test initial date:	2022-07-23
Test final date:	2022-09-16

1.1. Test configuration

Power Supply:	12 VDC
Set-up:	Table-top
Test exercise:	The DUT is supplied at 12 VDC and it is programmed to enable all functions at the same time: LTE, WiFi, BLE, GPS and Ethernet communication. The EUT is communicating continuously by Ethernet with an auxiliary laptop. For emission tests, the RF ports used for Bluetooth, Wi-Fi, LTE and GNSS intentional radiators are loaded with a 50 Ω load.
Equipment size:	100 mm x 100 mm x 40 mm

1.2. Auxiliary and control equipment

- Laptop to configure the DUT via Ethernet provided by customer.

1.3. Input/output wires

- Power supply wires shorter than 3 m.
- 8 x CAN bus wires twisted unshielded shorter than 3.
- 2 x CAN bus wires untwisted and unshielded shorter than 3 m.
- Ethernet unshielded cable shorter than 3 m.

1.4. Modification performed

No modifications were performed.

2. APPLICABLE STANDARDS

2.1. TEST APPLICABLE STANDARDS

Standard: ANSI C63.4:2014 and ICES-003 issue 7
Basic standard: ANSI C63.4:2014
☒ Radio-frequency radiated emissions (30 MHz – 26 GHz)[1] : FCC Part 15.109, ICES-003 Issue 7(3.2.2) [1]Upper limit according to the fifth harmonic of the maximum internal frequency declared by the manufacturer or to 40 GHz, whichever is lower.
Basic standard: ANSI C63.4:2014
☐ Power line conducted emissions (150 kHz – 30 MHz): FCC Part 15.107, ICES-003 Issue 7(3.2.1) **Note**: The EUT is supplied at DC voltage to automotive battery. Therefore, the Power line conducted emission test not apply.

2.1.1. Acceptance criteria for the test

According to standard **FCC 47 CFR Part 15 Subpart B and ICES-003 Issue 7**

2.1.2. Test facilities ID

FCC Test Firm Registration Number:	507478
ISED Assigned Code:	5766A

2.1.3. Competences and Guarantees

LGAI Technological Center, S.A. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 9/LE894. In order to assure the traceability to other national and international laboratories, Applus+ Laboratories has a calibration and maintenance program for its measurement equipment.
Applus+ Laboratories 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 Applus+ Laboratories at the time of performance of the test.
Applus+ Laboratories 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.
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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 Applus+ Laboratories and the Accreditation Bodies.

2.1.4. Measuring uncertainties

Radio-frequency radiated emissions:	± 4.30 dB

Expanded uncertainty measurement is obtained multiplying the typical uncertainty measurement with a coverage factor k=2, which corresponds to a confidence level of 95% for a normal distribution.

2.2. Used Equipment

RADIO-FREQUENCY RADIATED EMISSIONS (SAC2)					
EQUIPMENT	**BRAND**	**MODEL**	**NUMBER**	**LAST CALIBRATION**	**NEXT CALIBRATION**
EMI RECEIVER	R&S	ESW 26	1041791	21/01/2022	21/01/2023
BILOG ANTENNA	SCHAWARZBECK	VULB 9162	1042229	11/01/2022	11/01/2023
HORN ANTENNA	EMCO	3115	05-ER-182	04/11/2021	04/11/2022
ATENUADOR 3 DB	HUBER/SUHNER	6803.17.B	1042020	10/08/2021	10/08/2022
RF PREAMPLIFIER	BONN ELEKTRONIK	BLMA 0118-M	1041733	16/03/2022	16/03/2023
CABLE	HUBER/SUHNER	SF103/11N/16N/4000MM	1041909	01/02/2022	01/02/2023
CABLE	HUBER+SUHNER	SUCOFLEX 106	1041415	15/02/2022	15/02/2023
RF CABLE (WALL PANEL),	--	--	104572	23/08/2021	23/08/2022
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	17/09/2021	17/09/2022
EMI RECEIVER	R&S	ESU 40	1041155	30/12/2021	30/12/2022
HORN ANTENNA	MVG	EH 1840	1042685	14/04/2022	14/04/2024
CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	17/03/2022	17/03/2023
CABLE	HUBER/SUHNER	SF102	1042546	17/05/2022	17/05/2023
RF PREAMPLIFIER	BONN ELEKTRONIK	BLMA 1826-4A	1041808	03/08/2022	03/08/2023
HORN ANTENNA	MVG	EH 1840	1042685	14/04/2022	14/04/2024
CABLE	HUBER/SUHNER	SF102	1042546	17/05/2022	17/05/2023
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	--	--
AUTOMATIC ANTENNA MAST	MATURO		1042591		
MAST-TABLE CONTROLLER	MATURO		1042590	--	--

AUXILIARY EQUIPMENT					
EQUIPMENT	**BRAND**	**MODEL**	**NUMBER**	**LAST CALIBRATION**	**NEXT CALIBRATION**
THERMO-HIGROMETER	PCE	THB 40	1042022	05/10/2021	05/10/2022
MULTIMETER	FLUKE	115	1041346	02/03/2022	02/03/2023

2.3. Environmental conditions

See results sheets

3. RESULT

PRODUCT:			
Brand:	ARRIVAL	**Model:**	87205144009752
S/N:	YCGJqtpHKaxSHJYUTZzC	**Internal Id:**	8834-0001
Class:	B		

TESTING	RESULTS	NOTES
Radio-frequency radiated emissions. (FCC Part 15.109, ICES-003 Issue 7 (3.2.2))	Pass	Note: 3
Power Line conducted emissions. (FCC Part 15.107, ICES-003 Issue 7 (3.2.1))	N/A	Note: N/A

The criteria to give conformity in those cases where it is not implicit in the standard or specification will be, for EMC emissions tests, a non-simple binary decision rule will be followed with a safety zone equal to the value of the uncertainty (w = U).
In this case, the upper limit of the value of the probability of false acceptance, according to ILAC G8, is 2.5% and the criteria notes are:

1: The measured results are above the upper limit, even considering the uncertainty interval**.**
2: The measured results are above the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that non-compliance is more probable than compliance
3: The measured results are below the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that compliance is more probable than non-compliance
4: The measured results are within the limits, including the uncertainty interval.

4. ANNEXES

4.1 Test Results

4.1.1 Radio-frequency radiated emissions

Test Procedures:

The test site, 3 or 10 m semi-anechoic chamber, has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4-2014

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz to 1 GHz in semi-anechoic chambers. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

EMI Receiver configuration:
During the radiated emission test, the EMI receiver was set with the following configurations:

Frequency band (MHz)	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

Pre-measurement

- The turntable rotates from 0° to 315° using 45° steps
- The antenna is polarized vertical and horizontal
- The antenna height changes from 1 m to 4 m
- At each turntable position, antenna polarization and height the receiver finds the maximum of all emissions

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position 360 º and antenna height between 1 and 4 m
- The final measurement is done with quasi-peak detector (as described in ANSI C63.4) for 30MHz to 1GHz emissions test
- The final measurement is done in the position (azimuth, height and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C63.4) for 1GHz to 18GHz test
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factors, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is shown

Correction Factor:

Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss – Ampli.Gain (if applies) + Attenuator (if applies))

Limits:

According to FCC Part 15.109:

- Limits of Radiated Emission Measurement (Below 1000 MHz)

Frequency (MHz)	Class B (dBµV/m) (at 3 m)
	QuasiPeak
30 – 88	40
88 – 216	43.5
216 – 960	46
960 – 1000	54

Frequency (MHz)	Class A (dBµV/m) (at 10 m)
	QuasiPeak
30 – 88	39
88 – 216	43.5
216 – 960	46.4
960 – 1000	49.5

- Limits of Radiated Emission Measurement (Above 1000 MHz)

Frequency (MHz)	Class B (dBµV/m) (at 3 m)	
	Peak	Average
Above 1000	74	54

Frequency (MHz)	Class A (dBµV/m) (at 10 m)	
	Peak	Average
Above 1000	69.5	49.5

According to ICES-003 Issue 7 (3.2.2):

- Limits of Radiated Emission Measurement (Below 1000 MHz)

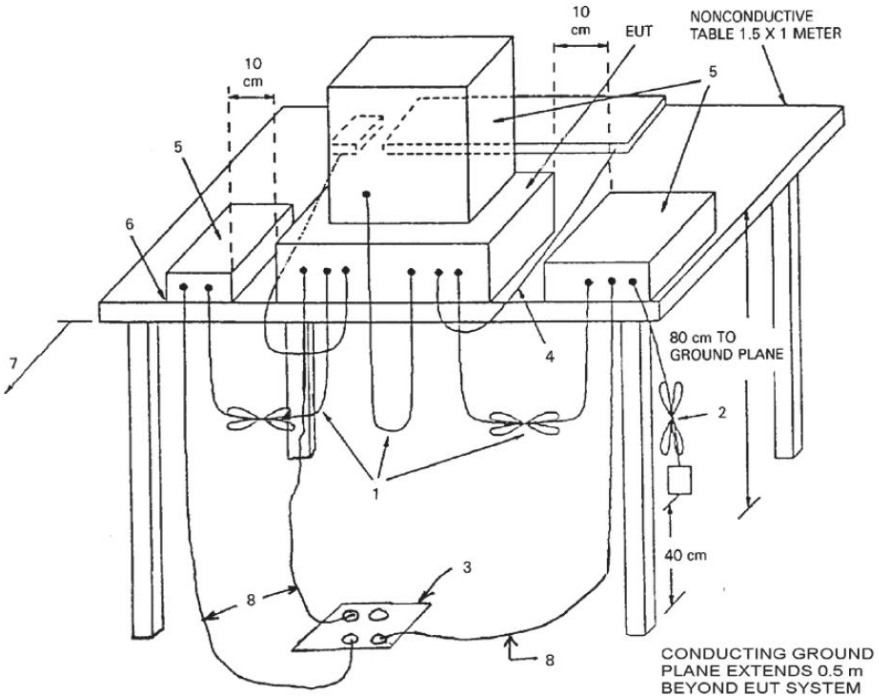
Frequency range (MHz)	Class A (3 m) Quasi-peak (dBµV/m)	Class A (10 m) Quasi-peak (dBµV/m)	Class B (3 m) Quasi-peak (dBµV/m)	Class B (10 m) Quasi-peak (dBµV/m)
30 – 88	50.0	40.0	40.0	30.0
88 – 216	54.0	43.5	43.5	33.1
216 – 230	56.9	46.4	46.0	35.6
230 – 960	57.0	47.0	47.0	37.0
960 – 1000	60.0	49.5	54.0	43.5

- Limits of Radiated Emission Measurement (Above 1000 MHz)

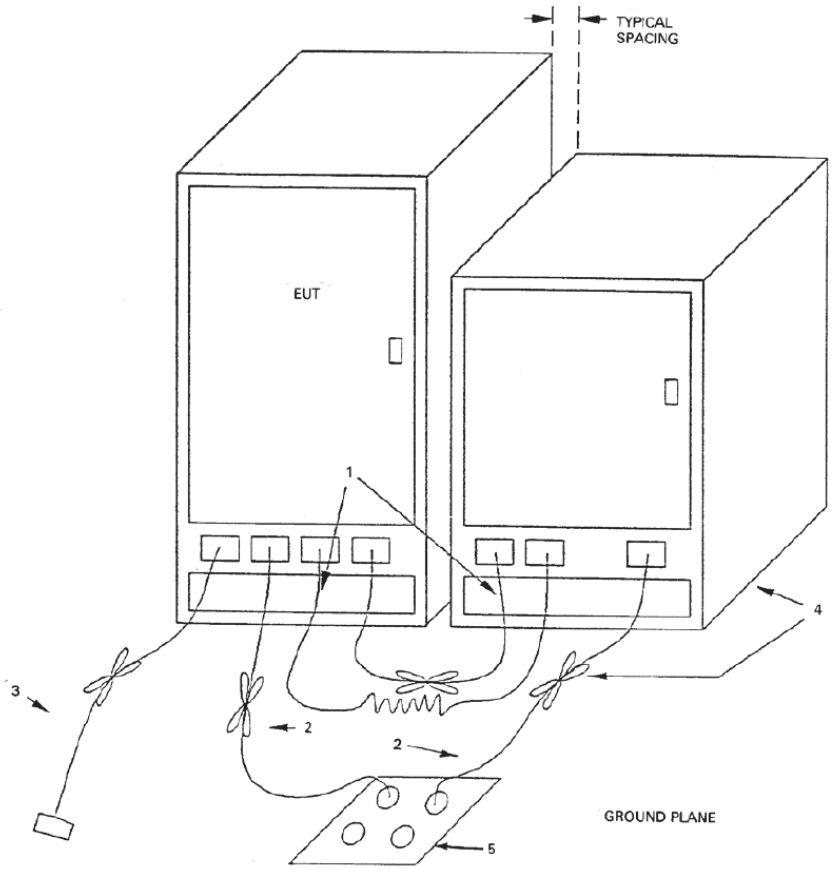
Frequency range (GHz)	Class A (3 m) Average dB(µV/m)	Class A (3 m) Peak dB(µV/m)	Class B (3 m) Average dB(µV/m)	Class B (3 m) Peak dB(µV/m)
1 - 26	60	80	54	74

If using a different measurement distance, the measured levels shall be extrapolated using a factor of 20 dB per decade of distance. The measurement distance shall place the measurement antenna in the far field of the ITE or digital apparatus under test.

Test Setup (depending on the EUT arrangement):



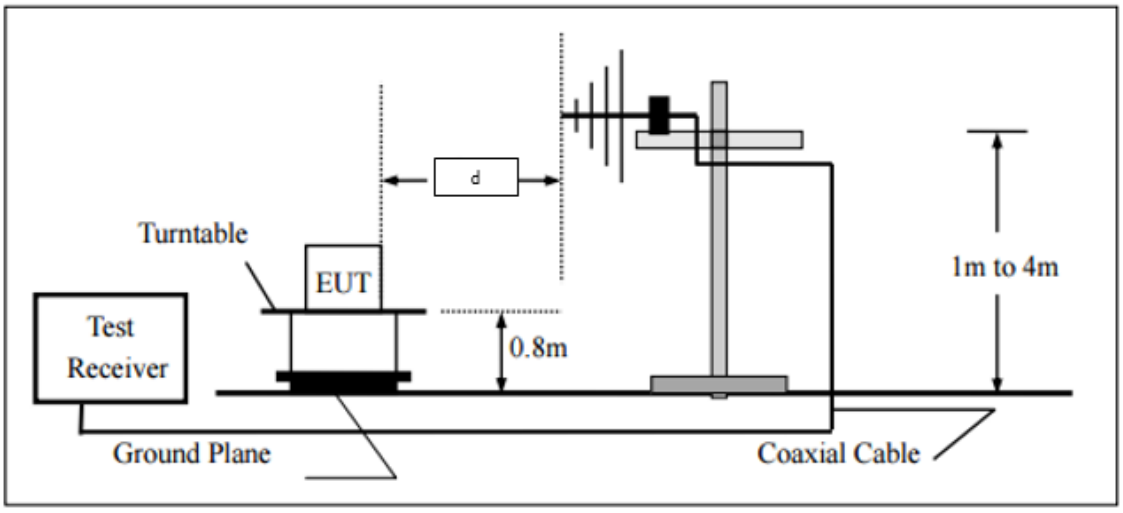
Radio-frequency radiated emissions of tabletop equipment.



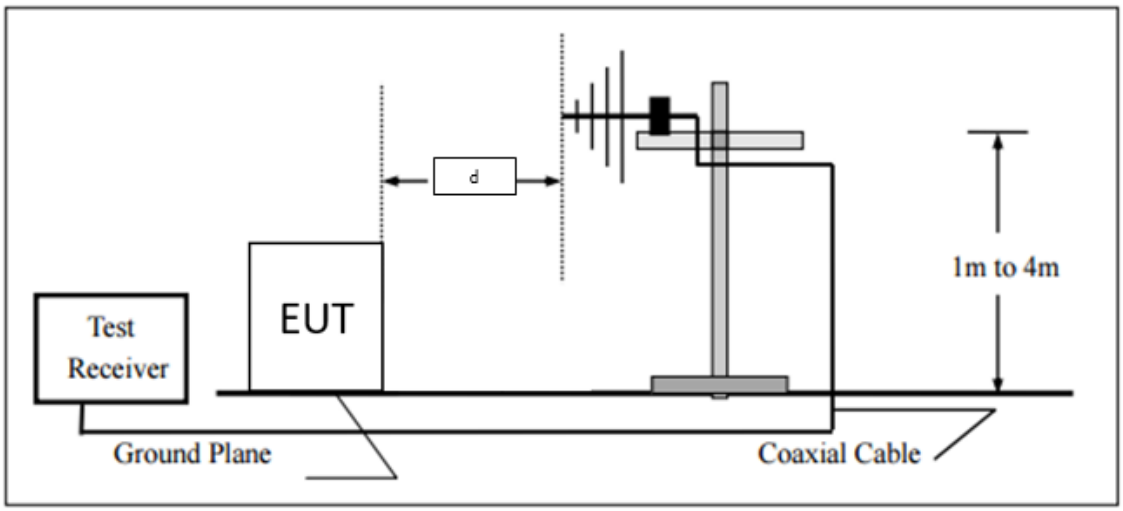
Radio-frequency radiated emissions of floor-standing equipment.

Test Configuration (depending on the EUT arrangement):

- **For radiated emissions from 30 MHz to 1000 MHz:**



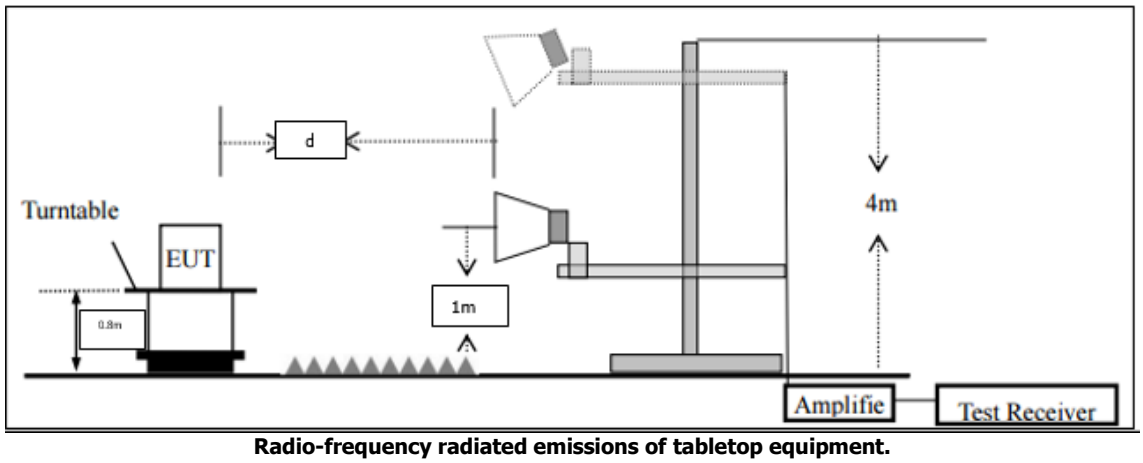
Radio-frequency radiated emissions of tabletop equipment.



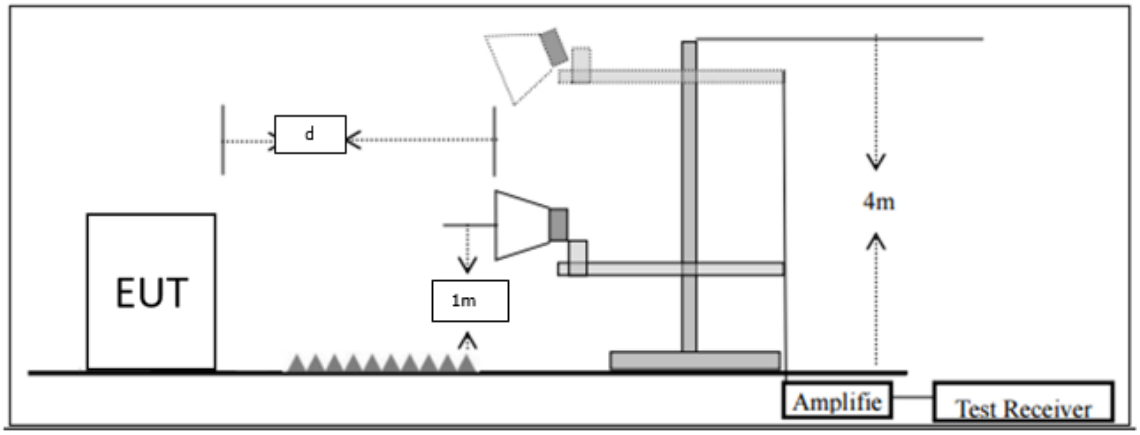
Radio-frequency radiated emissions of floor-standing equipment.

Distance "d" depends on test chamber.

- **For radiated emissions above 1000 MHz:**



Radio-frequency radiated emissions of tabletop equipment.



Radio-frequency radiated emissions of floor-standing equipment.

Distance "d" depends on test chamber.

RADIO-FREQUENCY RADIATED EMISSIONS (below 1 GHz)

Technician: R.Montoya **Frequency range:** 30 MHz – 1 GHz

Test date: 2022-07-23

Basic standard: ANSI C63.4:2014

Temperature:	23.5	ºC
Humidity:	60.5	%
Atm. Pressure:	996.6	hPa

EUT:	Class	Test Area	Distance	PreScan	Evaluation
Table Top	B	SAC2	3 m (30 MHz – 26 GHz) 1 m (26 GHz – 30 GHz)	8 faces (45º step)	Individual

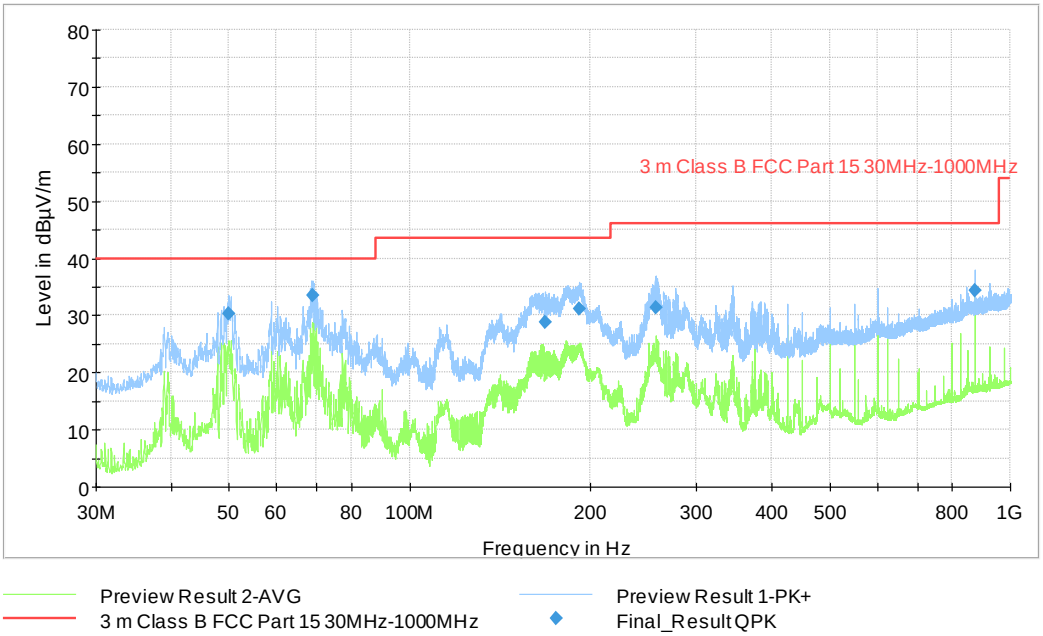
RESULTS: Pass

Identification	Emissions	Main emission source and type
DUT: Device under test BB: Broadband NB: Narrowband SPU: Spurs QP: Quasi-peak U: Uncertainty	QP < Limit - I	EBP, NB

Comments

RADIO-FREQUENCY RADIATED EMISSIONS (below 1 GHz)

PRESCAN 30 MHz – 1 GHz



FINAL MEASUREMENTS

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.98	30.33	40.00	9.67	100.00	V	308.00	18.10
69.00	33.52	40.00	6.48	104.00	V	253.00	14.10
168.03	28.73	43.50	14.77	103.00	V	260.00	13.60
191.61	31.25	43.50	12.25	103.00	V	254.00	15.80
256.41	31.43	46.00	14.57	139.00	V	103.00	18.00
874.95	34.30	46.00	11.70	100.00	H	273.00	29.40

Comments:

Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss + Attenuator)

Note: radiated emissions from 30 MHz to 1 GHz has been made at 3 meters of distance from DUT to antenna.
The limits has been modified according to the applicable standard applying the formula L2=$L1$-20 Log ($d2/d1$) , where:

L2: New Limit.
L1: Limit at 10 meters.
d1: 10 meters (standard distance).
d2: 3 meters (new measurement distance).

RADIO-FREQUENCY RADIATED EMISSIONS (above 1 GHz)

Technician: R.Montoya / Andreu Tey / O. Merchan **Frequency range:** 1 GHz – 30 GHz

Test date: 2022-08-02 / 2022-08-09 / 2022-09-16

Basic standard: ANSI C63.4:2014

Temperature:	23.5	23.0	ºC
Humidity:	60.5	62.3	%
Atm. Pressure:	996.6	999.7	hPa

EUT:	Class	Test Area	Distance	PreScan	Evaluation
Table-Top	B	SAC2	3 m (1 GHz – 30 GHz)	8 faces (45º step)	Individual

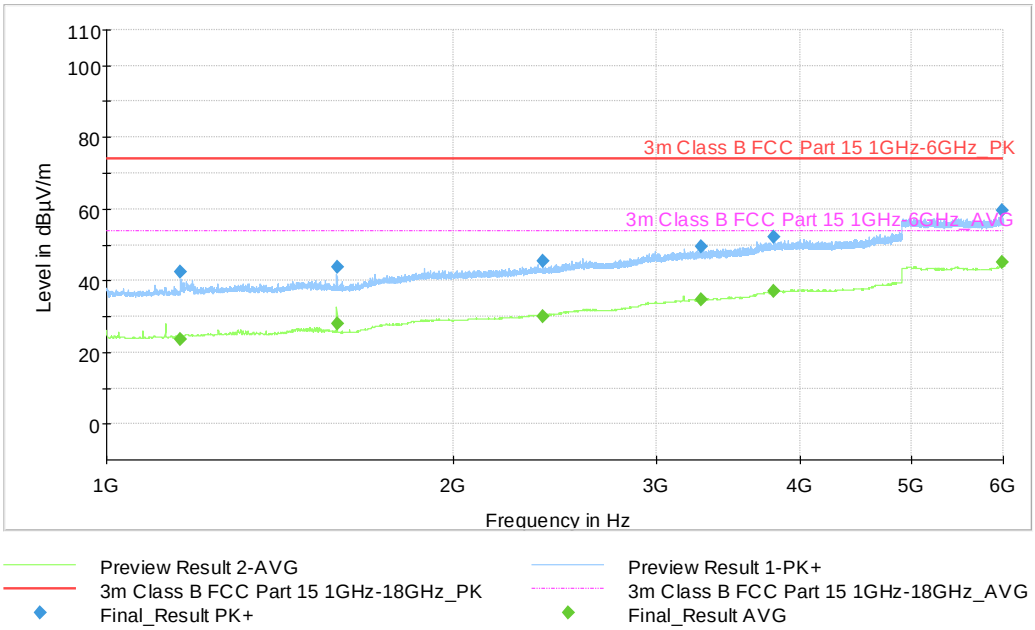
RESULTS: Pass

Identification	Emissions	Main emission source and type
DUT: Device under test BB: Broadband NB: Narrowband SPU: Spurs QP: Quasi-peak U: Uncertainty	QP < Limit - I	EBP, NB

Comments

RADIO-FREQUENCY RADIATED EMISSIONS (above 1 GHz)

PRESCAN 1 GHz – 6 GHz



FINAL MEASUREMENTS

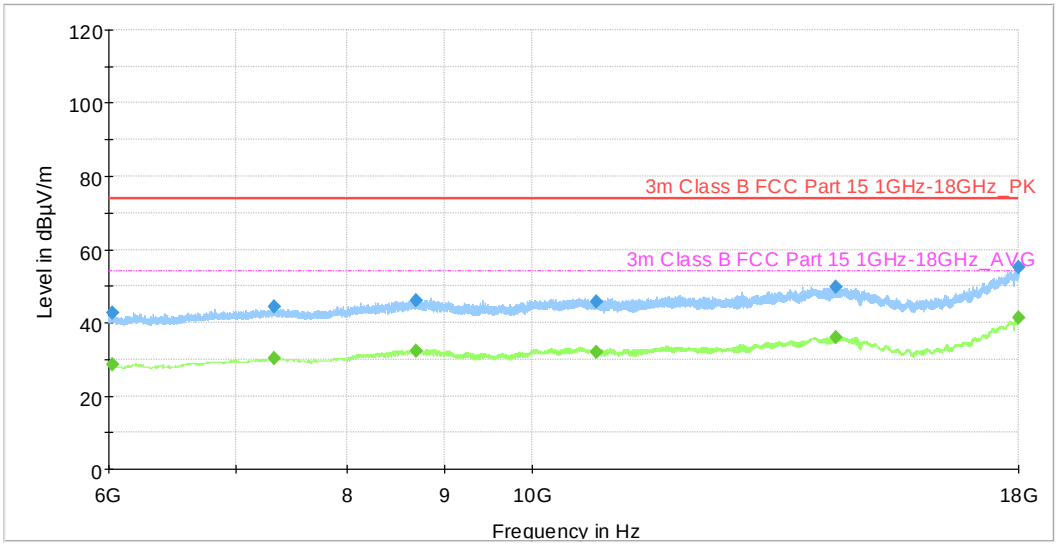
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1160.00	42.45	74.00	31.55	23.68	54.00	30.32	150.00	V	60.00	26.50
1584.25	43.76	74.00	30.24	27.95	54.00	26.05	150.00	H	334.00	27.40
2392.25	45.59	74.00	28.41	29.86	54.00	24.14	150.00	V	38.00	31.40
3277.25	49.49	74.00	24.51	34.81	54.00	19.19	150.00	V	297.00	34.50
3796.50	52.26	74.00	21.74	37.18	54.00	16.82	150.00	V	156.00	36.40
5982.50	59.62	74.00	14.38	45.16	54.00	8.84	150.00	V	326.00	38.70

Comments:

Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss – Ampli.Gain) + Attenuator)

RADIO-FREQUENCY RADIATED EMISSIONS (above 1 GHz)

PRESCAN 6 GHz – 18 GHz



Preview Result 2-AVG
3m Class B FCC Part 15 1GHz-18GHz_PK
Final_Result PK+
Preview Result 1-PK+
3m Class B FCC Part 15 1GHz-18GHz_AVG
Final_Result AVG

FINAL MEASUREMENTS

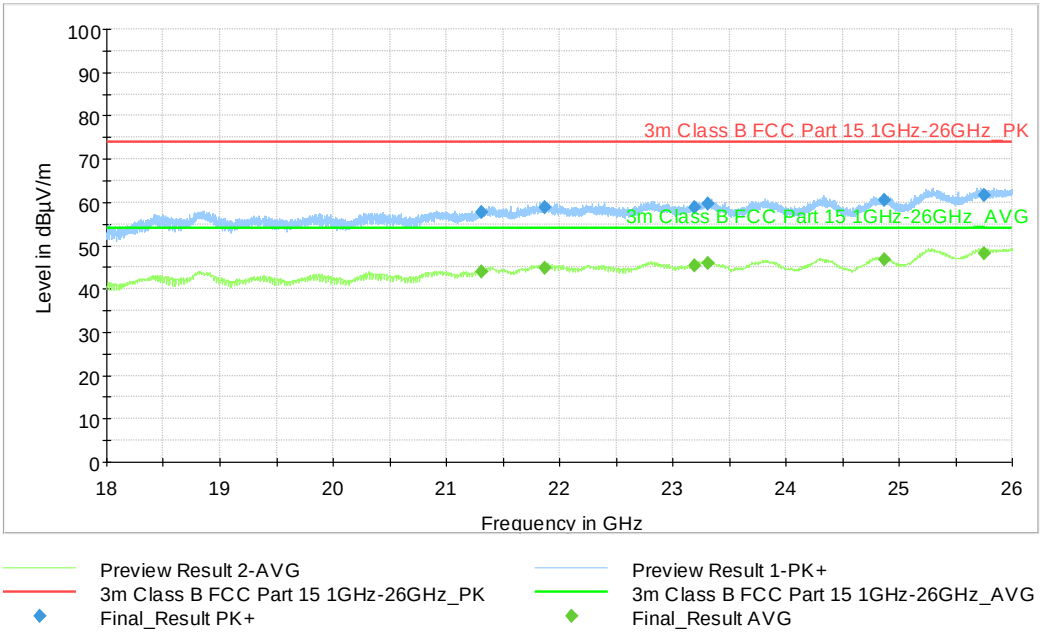
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6030.75	42.54	74.00	31.46	28.42	54.00	25.58	143.00	H	153.00	-12.80
7326.50	44.36	74.00	29.64	30.24	54.00	23.76	106.00	H	193.00	-10.40
8694.75	46.19	74.00	27.81	32.40	54.00	21.60	400.00	H	346.00	-8.90
14434.25	49.78	74.00	24.22	35.80	54.00	18.20	137.00	H	33.00	-2.80
17995.00	55.28	74.00	18.72	41.30	54.00	12.70	400.00	H	302.00	5.70
10817.50	45.67	74.00	28.33	32.04	54.00	21.96	105.00	H	127.00	-6.90

Comments:

Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss – Ampli.Gain) + Attenuator)

RADIO-FREQUENCY RADIATED EMISSIONS (above 1 GHz)

PRESCAN 18 GHz – 26 GHz



FINAL MEASUREMENTS

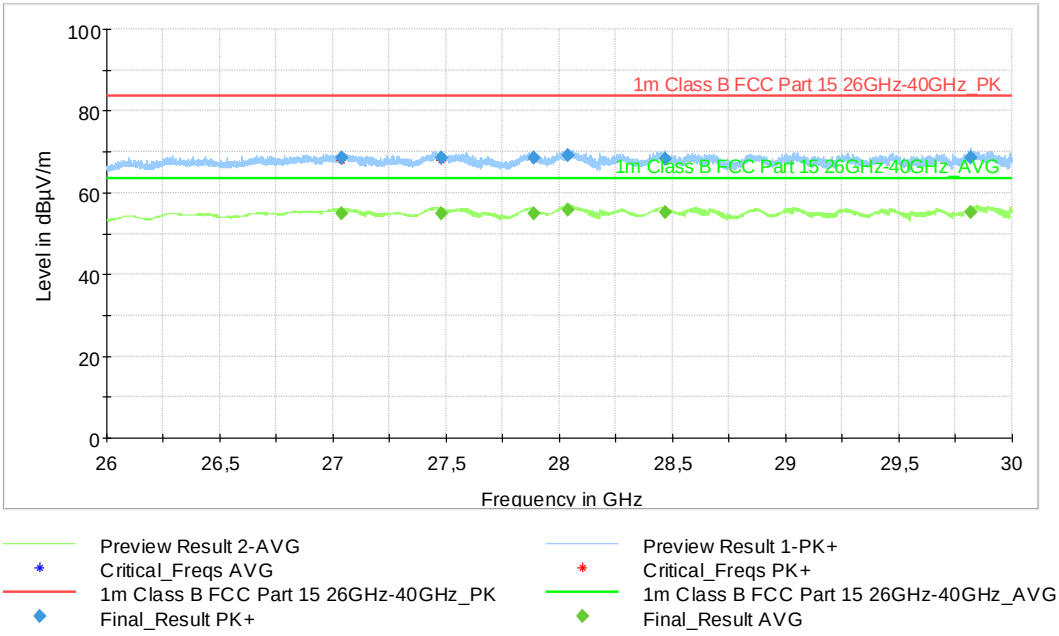
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
21307.75	57.69	74.00	16.31	43.92	54.00	10.08	293.00	H	34.00	20.40
21872.25	58.92	74.00	15.08	44.92	54.00	9.08	251.00	V	70.00	21.50
23196.25	58.73	74.00	15.27	45.34	54.00	8.66	400.00	V	180.00	23.20
23313.75	59.66	74.00	14.34	45.81	54.00	8.19	366.00	V	89.00	23.60
24870.75	60.42	74.00	13.58	46.72	54.00	7.28	255.00	V	199.00	23.90
25754.75	61.55	74.00	12.45	48.06	54.00	5.94	289.00	H	173.00	23.60

Comments:

Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss – Ampli.Gain) + Attenuator)

RADIO-FREQUENCY RADIATED EMISSIONS (above 1 GHz)

PRESCAN 26 GHz – 30 GHz



FINAL MEASUREMENTS

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27035.75	68.61	83.54	14.93	54.89	63.54	8.65	236.00	H	170.00	52.50
27480.00	68.45	83.54	15.09	54.95	63.54	8.59	282.00	H	269.00	52.20
27886.75	68.42	83.54	15.12	54.82	63.54	8.72	371.00	H	349.00	52.10
28038.75	69.13	83.54	14.41	55.81	63.54	7.73	228.00	H	49.00	52.20
28466.00	68.32	83.54	15.22	55.12	63.54	8.42	258.00	H	314.00	52.30
29816.25	68.53	83.54	15.01	55.18	63.54	8.36	120.00	H	54.00	52.30

Comments:

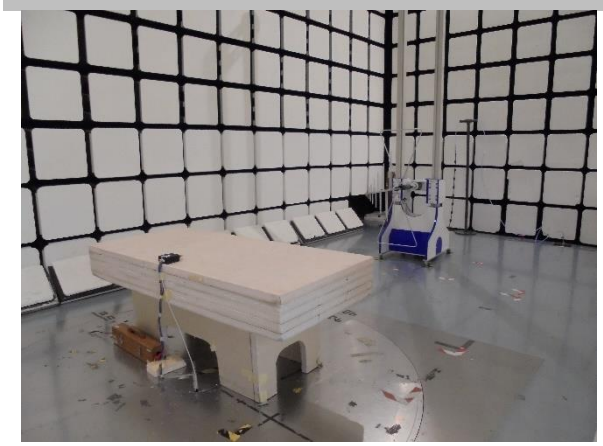
Emission Level = Read Level + Corrections (Ant.Factor + Cable Loss – Ampli.Gain) + Attenuator)

Note: radiated emissions from 26 GHz to 30 GHz has been done at 1 meters of distance from EUT to antenna. The limits has been modified according to the standard using the following formula: $L_2 = L_1 + 20\log(d_1/d_2)$, where:

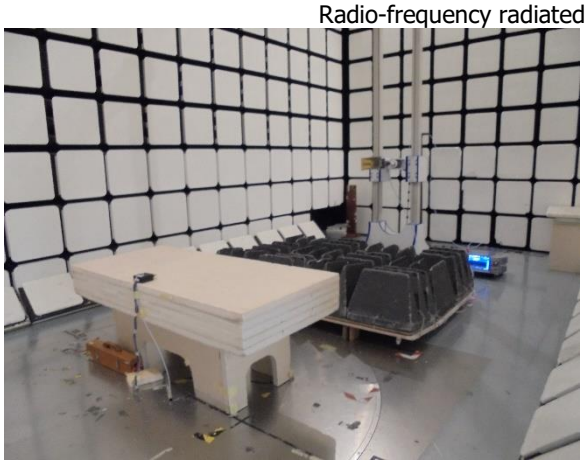
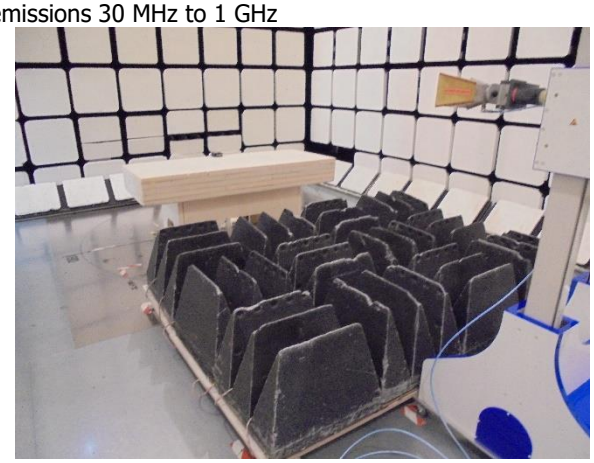
L_2: New limit
L_1: Limit at 3 meters
d_1: 3 meters (standard distance)
d_2: 1 meters (new measurement distance)

4.2. Test Setup Configuration

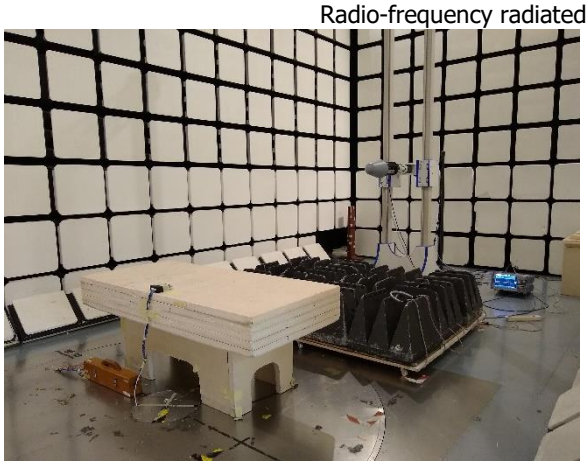
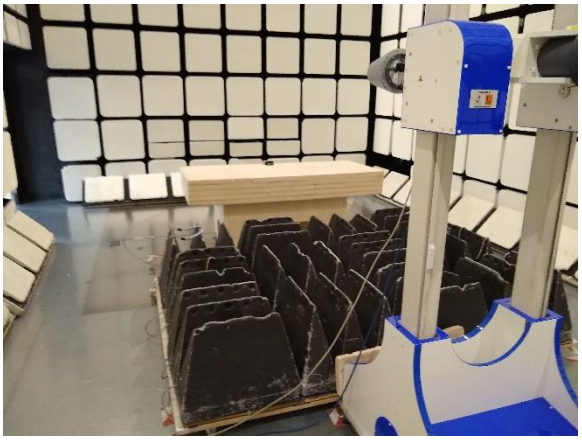
From file number: 22/36403917_M1



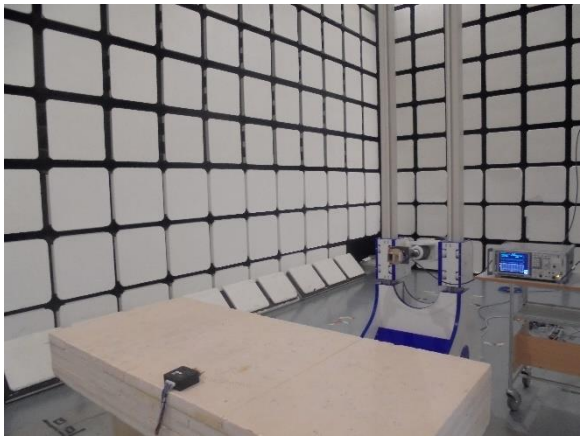
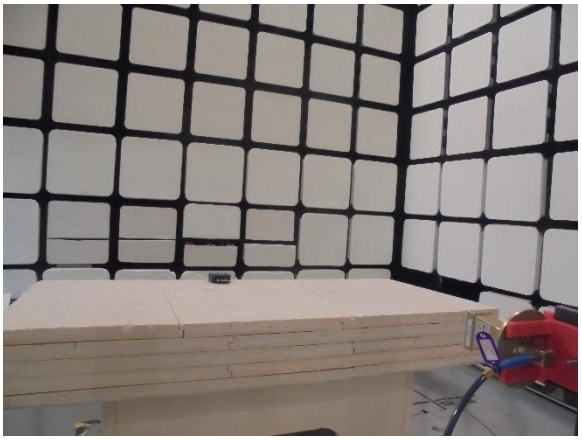

Radio-frequency radiated emissions 30 MHz to 1 GHz

Radio-frequency radiated emissions 1 GHz to 18 GHz

Radio-frequency radiated emissions 18 GHz to 26 GHz

Radio-frequency radiated emissions 26 GHz to 30 GHz

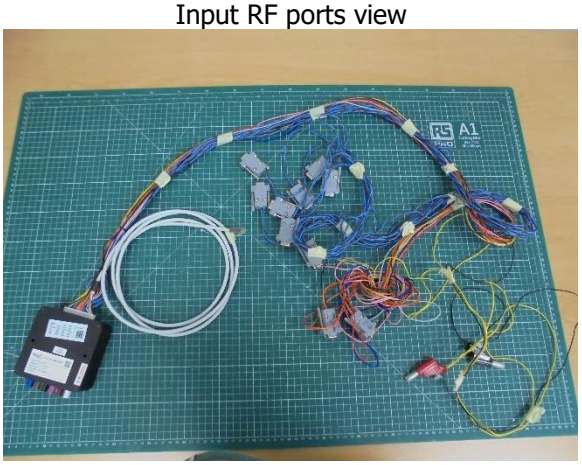
4.3. Identification pictures

From file number: 22/36403917_M1

Frontal view

Input RF ports view

Input/Output ports view



General view

Manufacturer Label

Internal ID

End of document