

File Number **20/36400490M4****TEST REPORT****Radiofrequency****Petitioner's Reference: MYSPHERA S.L.**

Customer Ronda Auguste y Louis Lumière, 23,
Address : 46980 Paterna, València

Equipment: ALARM SYSTEM

Brand: MYSPHERA Model: IOTAS10101
s/n: T(X)continuaCH37+
T(X)continuaCH38+
T(X)continuaCH39+17371_0021
Internal Id: 8991/1+8991/2+8991/3+8990/1

Result: complies

It has been tested and complies the standard specifications Applicable / s
See specifications applied on page 11

Applicable Standards

ERM standard/s: **FCC Rules 47 CFR Part 15 Subpart B: Radio Frequency Devices (Unintentional Radiators)**
FCC Rules 47 CFR Part 15 Subpart C: Radio Frequency Devices (Intentional Radiators)

Date of issue: Bellaterra, June 12, 2020**M4:** This report replaces and annuls the report with certificate number 20/36400490M3 dated 03-30-2020.**Modifications performed:** Changes in the Equipment Type and information about FDD ID. Added clarifications on the tests records.

Fernando Rivas Fernández
Technical Manager
Electrical and Electronics
LGAi Technological Center S.A.

The results refer only and exclusively to the sample, or material delivered for testing in "Equipment Received" section below. The equipment has been tested under conditions stipulated by standard(s) quoted in this document.
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This is the first page of the document, which consists of 40 pages of which -13 are annexes.

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1. EQUIPMENT RECEIVED AND TESTED

EQUIPMENT: ALARM SYSTEM			
Brand:	MYSHERA	Model:	IOTAS10101
s/n:	T(X)continuaCH37+ T(X)continuaCH38+ T(X)continuaCH39+17371_0021	Power Supply:	DC 5V - USB supply

Product description:

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

MYSHERA IOTAS10101 Alarm System activates 4 LEDs and 1 whistle to advice health staff when it receives an specific alarm signal by BLE

Type of Equipment	Combined equipment. Adaptive equipment operating in a non-adaptive mode	Antenna Type	Integrated PCB Antenna with a maximum gain of 0dBi
Modulation	GFSK	Equipment Type	Transceiver
Radio technology	Bluetooth 5.0	Operation frequency	2402MHz-2480MHz
HW Version	1.0.1	FW Version	1.0.0

Family description:

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

According with the information provided by customer, the units tested are part of the families of products shown below.

Product ID	FCC ID	IC ID	PCB	PCB assembly version	Product Name	RX	TX
IOTPS10101	2ACLYIOTPS10101	-	MSIOTS-10	1.0.0	Presence sensor	-	BLE
IOTAS10101	2ACLYIOTAS10101	-	MSIOTS-10	1.0.1	Alarm siren	BLE	-

Test product reception:	2019-12-04
Test initial date:	2020-01-27
Test final date:	2020-02-04

Test configuration

Power Supply: DC 5V - USB supply
Set-up: Top Table
Test exercise: Three equipment transmitting continuously in 37, 38 or 39 channel, respectively, plus a fourth equipment in reception mode
Normal test temperature: 15°C to 35°C

Test Modes
(Worst case modes)

s/n	Test exercise
T(X)continuaCH37*	Tx continuous Channel 37: 2402 MHz
T(X)continuaCH38*	Tx continuous Channel 38: 2442 MHz
T(X)continuaCH39*	Tx continuous Channel 39: 2480 MHz
16370_00145	Reception mode

***Special FW version used to operate in the described test mode**

Auxiliary and control equipment

The DUT does not have any auxiliary or control equipment

Input/output wires

The DUT does not have any input/output cable longer than 3m.

Modification performed

No modification was performed

2. APPLICABLE STANDARDS

TEST APPLICABLE STANDARDS

Standard: FCC Rules 47 CFR Part 15 B and FCC Rules 47 CFR Part 15 C based on standards.	
Basic standard: ANSI C63.4:2014	
☒	Radio-frequency radiated emissions (30 MHz -12.5GHz): FCC 47 CFR Part 15 Subpart B:15.109(a)
Basic standard: ANSI C63.10:2013	
☒	Unwanted emissions into Restricted Frequency Bands (Radiated) (9kHz -26000MHz): 15.209 (a) / 15.205 (a)
☒	Unwanted emissions into non-Restricted Frequency Bands (Radiated) (30MHz -25000MHz): 15.247 (d)
☒	Unwanted Emissions (Radiated) / Band Edge: 15.247 (d)
Basic standard: ANSI C63.10:2013	
☒	Maximum Conducted Output Power: FCC 15.247 (b) (1)*
*The DUT does not have external antenna connector, thus the test is performed using radiated method	
Basic standard: ANSI C63.10:2013	
☒	Occupied Bandwidth 6dB: FCC 15.247 (a) (2)
Basic standard: ANSI C63.10:2013	
☒	Maximum Power Spectral Density: FCC 15.247 (e)
Basic standard: FCC Title 47 part 15 Subpart C	
☒	Antenna Requirements: FCC 15.203

Acceptance criteria for the test

According to standards	FCC Title 47 part 15 Subpart B FCC Title 47 part 15 Subpart C ANSI C63.4:2014 ANSI C63.10:2013
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Test facilities ID	
FCC Test Firm Registration Number:	507478
ISED Assigned Code:	5766A
CABID	ES0002

Test procedures

Radio-frequency radiated emissions	C5401665
Unwanted Radiated Emission / Band Edge and Unwanted emissions into Restricted Frequency Bands	C5401665
Maximum Conducted Output Power	C5401665
Occupied Channel Bandwidth	C5401665
Maximum Power Spectral Density	C5401665
Antenna Requirements	C5401665

Measuring uncertainties

Radio-frequency radiated emissions	± 4.3 dB
Radiated emission tests (9 kHz to 1 GHz)	± 4.3 dB
Radiated emission tests above 1 GHz to 40 GHz	± 4.3 dB
RF output power measurements [Radiated]	± 4.3 dB
RF bandwidth measurements	± 2.31 kHz
Power spectral density measurements [Radiated]	± 4.3 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.

Modifications

No modifications were made.

USED EQUIPMENT

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (9 kHz -30MHz)					
INSTRUMENT	BRAND	MODEL	NUMBER	LAST CALIBRATION	NEXT CALIBRATION
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	1041155	06/09/2019	06/09/2020
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	04/07/2019	04/07/2020
ACTIVE LOOP ANTENNA	EMCO	6502	05-ER-019	04/12/2018	26/02/2021
3 dB ATTENUATOR	HUBER+SUHNER	6803.17.B	1042020	29/08/2019	29/08/2020
RF CABLE	HUBER+SUHNER	SF103/11N/16N/4000MM	1041909	06/02/2019	03/02/2021
RF CABLE	HUBER+SUHNER	SF104	1042242	12/08/2019	12/08/2020
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	N/A	N/A

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (30 MHz -1 GHz)					
INSTRUMENT	BRAND	MODEL	NUMBER	LAST CALIBRATION	NEXT CALIBRATION
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	1041155	06/09/2019	06/09/2020
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	04/07/2019	04/07/2020
BILOG ANTENNA	SCHWARZBECK	VULB 9162	1042229	24/04/2019	24/10/2020
3 dB ATTENUATOR	HUBER+SUHNER	6803.17.B	1042020	29/08/2019	29/08/2020
RF CABLE	HUBER+SUHNER	SF103/11N/16N/4000MM	1041909	06/02/2019	03/02/2021
RF CABLE	HUBER+SUHNER	SF104	1042242	12/08/2019	12/08/2020
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	N/A	N/A

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (1 GHz -18 GHz)					
INSTRUMENT	BRAND	MODEL	NUMBER	LAST CALIBRATION	NEXT CALIBRATION
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	1041155	06/09/2019	06/09/2020
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	04/07/2019	04/07/2020
HORN ANTENNA	EMCO	3115	05-ER-182	29/08/2019	29/08/2020
PREAMPLIFIER	BONN ELEKTRONIK	BLMA 0118-M	1041733	10/05/2019	28/04/2021
BAND REJECT FILTER	Wainwright Instruments GmbH	WRCGV10-2363.5-2400-2483.5-2520-60EE-100	1042349	04/09/2019	04/09/2020
RF CABLE	HUBER+SUHNER	ST26	1041826	19/09/2019	19/09/2020
RF CABLE	HUBER+SUHNER	SUCOFLEX 100	1041627	22/03/2019	22/03/2020*
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	N/A	N/A

*Note: The tests performed with this equipment were carried out within its calibration period. Calibration Interval of this instrument is one year.

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UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (18 GHz -26 GHz)					
INSTRUMENT	BRAND	MODEL	NUMBER	LAST CALIBRATION	NEXT CALIBRATION
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	1041791	07/05/2019	07/05/2020*
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	04/07/2019	04/07/2020
LOGOPERIODIC ANTENNA	ROHDE & SCHWARZ	HL050	1041226	12/03/2019	12/03/2022
PREAMPLIFIER	BONN ELEKTRONIK	BLMA 1826-4A	1041808	09/08/2019	09/08/2020
RF CABLE	ASTROLAB	32026-29094-290954-48TC	1041547	20/09/2019	20/09/2020
RF CABLE	HUBER+SUHNER	SUCOFLEX 100	1041627	22/03/2019	22/03/2020*
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	N/A	N/A

AUXILIARY EQUIPMENT					
INSTRUMENT	BRAND	MODEL	NUMBER	LAST CALIBRATION	NEXT CALIBRATION
THERMOHIGROMETER	PCE	THB 40	1042022	19/06/2019	19/06/2020

*Note: The tests performed with this equipment were carried out within its calibration period. Calibration Interval of this instrument is one year.

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 = 20% Max = 80%
Shielding Effectiveness	>100dB
Reference Resistance to Earth	< 1 Ohm

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

Temperature	Min = 15°C Max = 35°C
Relative Humidity	Min = 45% Max = 60%
Air Pressure	Min = 860 mbar Max = 1060 mbar
Shielding Effectiveness	>100dB
Reference Resistance to Earth	< 1 Ohm
Normal Site Attenuation (NSA)	< ±4 dB at 3 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Site VSWR	< ±6 dB at 3m distance between item under test and receiver antenna, (1 GHz to 18 GHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 18 GHz).

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 = 45% Max = 60%
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding Effectiveness	>100dB
Reference Resistance to Earth	< 1 Ohm

See results sheets

3. RESULT

PRODUCT: ALARM SYSTEM			
Brand:	MYSHERA	PMN:	IOTAS10101
s/n:	T(X)continuaCH37+ T(X)continuaCH38+ T(X)continuaCH39+17371_0021	Power Supply:	DC 5V - USB supply
TESTING		RESULTS	
Radio-frequency radiated emissions (30MHz-12.5GHz)		Pass	Note: 4
Unwanted emissions into Restricted Frequency Bands		Pass	Note: 4
Maximum Conducted Output Power		Pass	Note: 4
Occupied Bandwidth (6dB)		Pass	Note: 4
Maximum Power Spectral Density		Pass	Note: 4
Antenna Requirements		Pass	
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.			

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Within our improvement program we would be grateful if you would send us any commentary that you consider opportune, to the person in charge who signs this document, or to the Quality Manager of Applus+, in the following e-mail address: satisfaccion.cliente@applus.com

4. ANNEXES

Test Results

Radiated Emissions

Test Procedures

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

Up to 18GHz, the test distance is 3m.

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 EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. 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.

Premeasurement

- 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 analyzer sweeps three times in peak to find 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 $\pm 45^\circ$ and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4) for 30MHz to 1GHz emissions test
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4) for 1GHz to 18GHz test.
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, 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 stored.

$$FS = UR + CA + AF$$

(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

During the radiated emission test, the EMI receiver or the Spectrum Analyzer 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	1 MHz
	Average	1 MHz	10 Hz

Limits:

According to FCC Part 15.109(b):

Limits of Radiated Emission Measurement (30 – 1000 MHz)

Frequency (MHz)	Class B (dBuV/m) (at 3m)
	Quasi Peak
30 – 88	39
88 – 216	43.5
216 – 960	46
960 – 1000	50

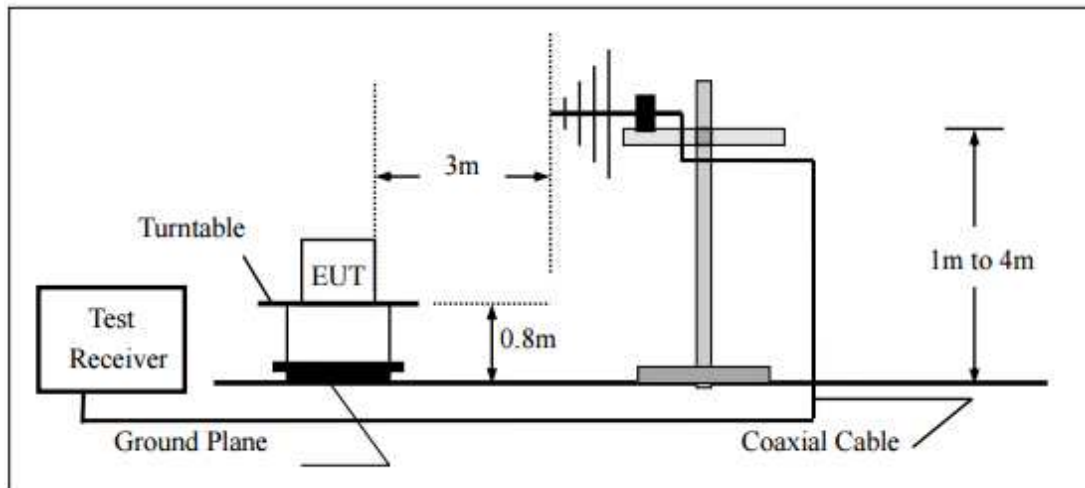
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Limits of Radiated Emission Measurement (Above 1000 MHz)

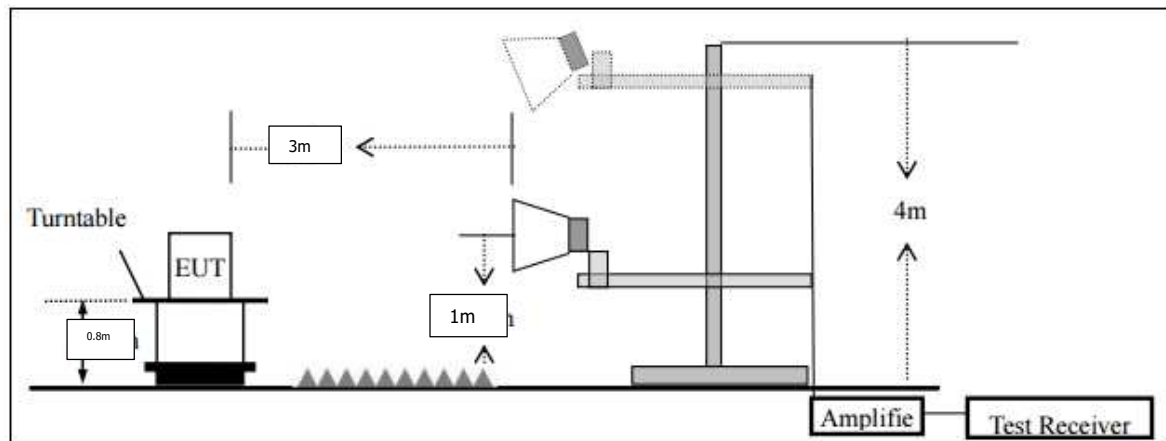
Frequency (MHz)	Class B (dBuV/m) (at 3m)	
	Peak	Average
Above 1000	74	54

General Test Setup:

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



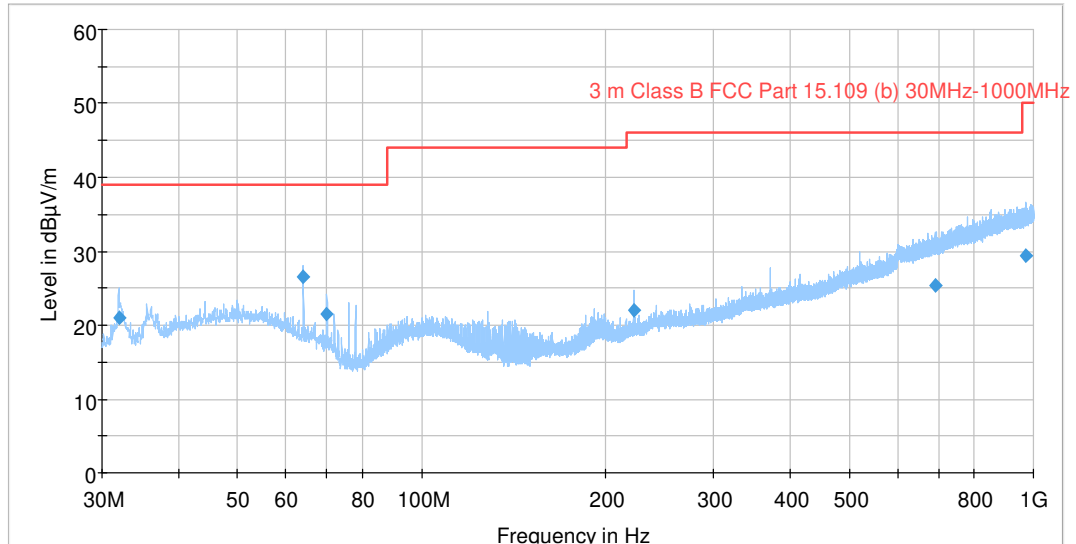
- **For radiated emissions above 1000MHz up to 18GHz:**



RADIO-FREQUENCY RADIATED EMISSIONS														
Technician: Pau Aguilà			Frequency range: 30 MHz – 12.5 GHz											
Test date: 2020-02-12														
Basic standard: ANSI C63.4:2014														
<table border="1"> <tr> <td>Temperature:</td> <td>25.1</td> <td>°C</td> </tr> <tr> <td>Humidity:</td> <td>34.6</td> <td>%</td> </tr> <tr> <td>Atm. Pressure:</td> <td>1007.4</td> <td>hPa</td> </tr> </table>						Temperature:	25.1	°C	Humidity:	34.6	%	Atm. Pressure:	1007.4	hPa
Temperature:	25.1	°C												
Humidity:	34.6	%												
Atm. Pressure:	1007.4	hPa												
EUT:	Class	Test Area	Distance	PreScan	Evaluation									
Top Table	B	SAC2	3m	4 faces	Individual									
RESULTS: Pass														
Identification		Emissions		Main emission source and type										
DUT: Device under test AUX: Auxiliary Devices SYS: DUT + AUX BB : Broad-band NB : Narrow-band QP: Quasi-peak		QP < Limit - I I=Uncertainty		DUT, BB										
Comments														
Note: All Channels have been evaluated for the frequency range 30 MHz – 12.5 GHz, but only the worst case has been included in the test report														

RADIO-FREQUENCY RADIATED EMISSIONS (CHANNEL 38) I

PRESCAN 30 MHz – 1 GHz



— 3 m Class B FCC Part 15.109 (b) 30MHz-1000MHz
— Preview Result 1-PK+
◆ Final_Result QPK

FINAL MEASUREMENTS

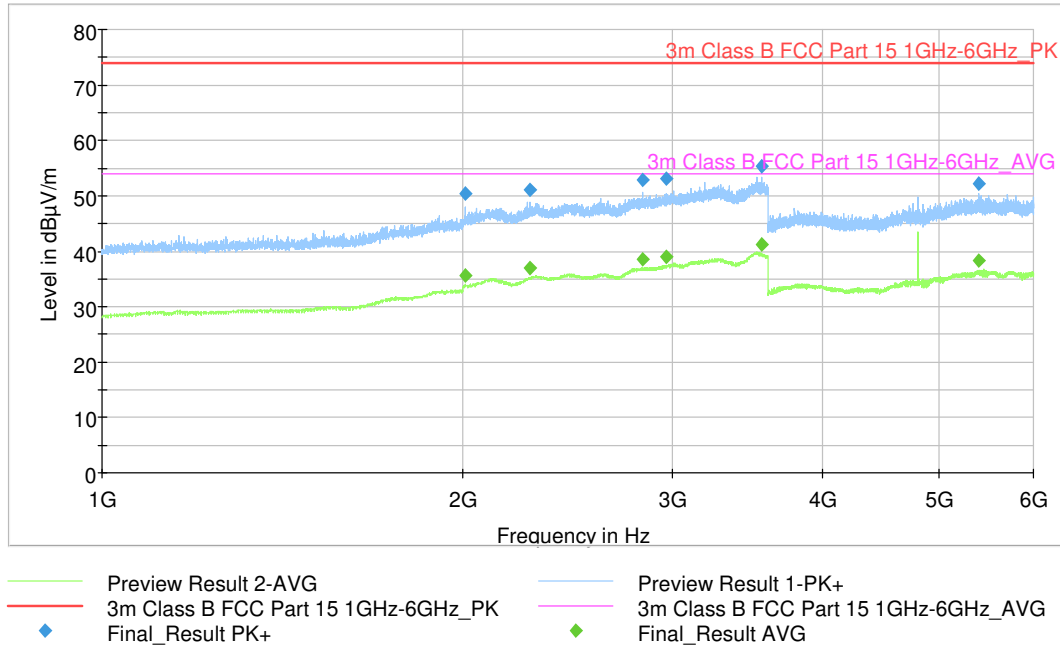
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.980000	20.99	39.00	18.01	129.0	V	278.0	15
63.990000	26.61	39.00	12.39	105.0	V	0.0	16
69.990000	21.45	39.00	17.55	104.0	V	3.0	13
222.750000	21.98	46.00	24.02	351.0	H	86.0	16
689.910000	25.46	46.00	20.54	335.0	H	230.0	25
972.330000	29.38	50.00	20.62	351.0	V	223.0	29

Comments:

Emission Level = Antenna Factor + Cable Loss + Read Level – Preamp Factor

RADIO-FREQUENCY RADIATED EMISSIONS (CHANNEL 38) II

PRESCAN 1 – 6 GHz



FINAL MEASUREMENTS

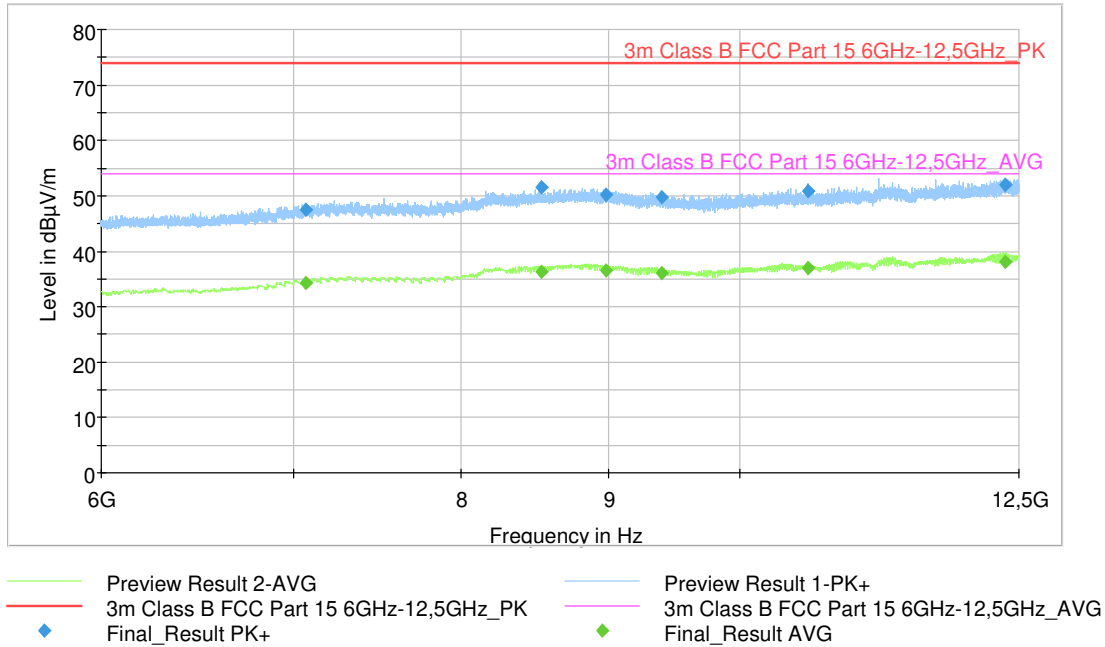
Frequency (MHz)	MaxPeak (dBμV/m)	Limit PK (dBμV/m)	Average (dBμV/m)	Margin PK (dB)	Limit AVG (dBμV/m)	Margin AVG (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2013.500000	50.47	74.00	35.71	23.53	54.00	18.29	150.0	V	223.0	30
2276.750000	51.09	74.00	36.88	22.91	54.00	17.12	150.0	V	256.0	31
2831.500000	52.79	74.00	38.54	21.21	54.00	15.46	150.0	V	26.0	32
2961.000000	53.00	74.00	39.09	21	54.00	14.91	150.0	V	181.0	33
3561.500000	55.31	74.00	41.25	18.69	54.00	12.75	150.0	V	228.0	34
5408.250000	52.24	74.00	38.26	21.76	54.00	15.74	150.0	V	160.0	38

Comments:

Emission Level = Antenna Factor + Cable Loss + Read Level – Preamp Factor

RADIO-FREQUENCY RADIATED EMISSIONS (CHANNEL 38) III

PRESCAN 6 – 12.5 GHz



FINAL MEASUREMENTS

Frequency (MHz)	MaxPeak (dBμV/m)	Limit PK (dBμV/m)	Margin PK (dB)	Average (dBμV/m)	Limit AVG (dBμV/m)	Margin AVG (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7064.750000	47.51	74.00	26.49	34.25	54.00	19.75	228.0	V	221.0	-12
8530.500000	51.48	74.00	22.52	36.41	54.00	17.59	355.0	H	218.0	-10
8987.750000	50.26	74.00	23.74	36.52	54.00	17.48	326.0	H	188.0	-10
9396.250000	49.79	74.00	24.21	35.97	54.00	18.03	194.0	V	179.0	-10
10556.250000	50.85	74.00	23.15	36.93	54.00	17.07	164.0	V	223.0	-9
12360.000000	51.97	74.00	22.03	38.20	54.00	15.80	148.0	V	354.0	-6

Comments:

Emission Level = Antenna Factor + Cable Loss + Read Level – Preamp Factor

Test Results

Unwanted emissions into Restricted Frequency Bands

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

According to FCC Part 15.247(d): 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)). According to FCC Part 15.205, Restricted bands.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

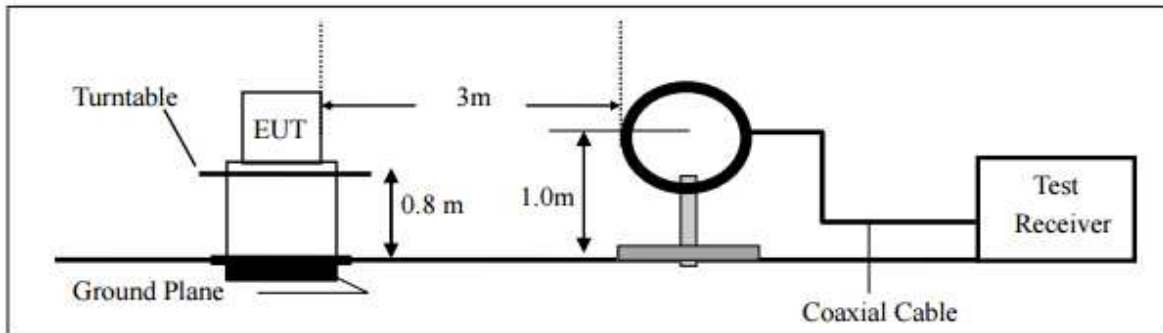
Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement (Above 1000MHz)

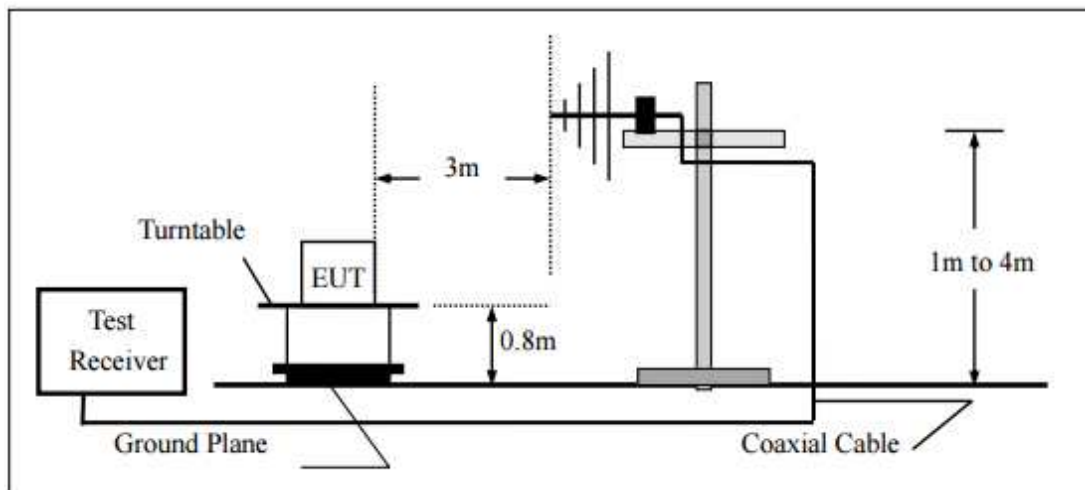
Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Test Configuration

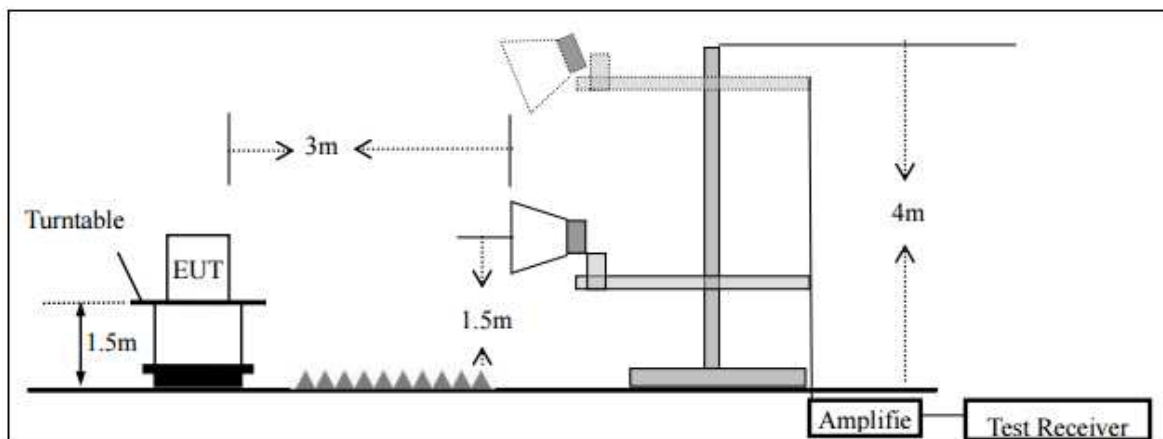
- **For radiated emissions below 30MHz:**



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



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



Test Procedures

The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

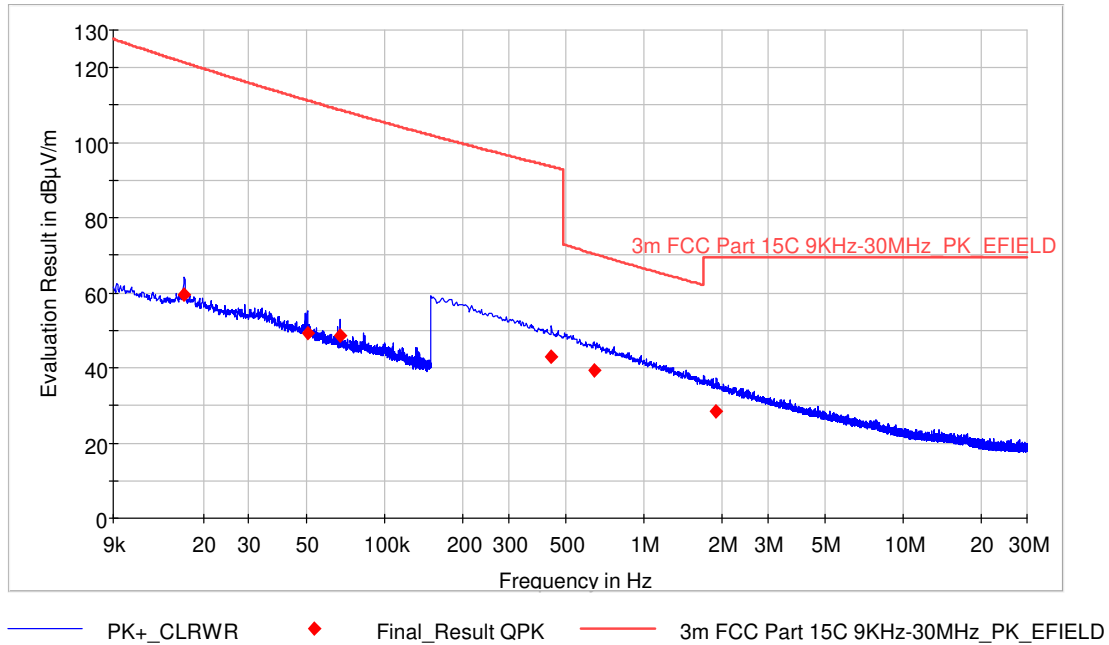
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where $RBWCF [dB] = 10 \cdot \lg(100 [kHz] / \text{narrower RBW [kHz]})$. The narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (RADIATED)														
Technician: Pau Aguilà			Frequency range: 9KHz – 26 GHz											
Test date: 2020-01-23														
Basic standard: ANSI C63.10:2013														
<table border="1"> <tr> <td>Temperature:</td> <td>25.9</td> <td>°C</td> </tr> <tr> <td>Humidity:</td> <td>39.3</td> <td>%</td> </tr> <tr> <td>Atm. Pressure:</td> <td>1016.6</td> <td>hPa</td> </tr> </table>						Temperature:	25.9	°C	Humidity:	39.3	%	Atm. Pressure:	1016.6	hPa
Temperature:	25.9	°C												
Humidity:	39.3	%												
Atm. Pressure:	1016.6	hPa												
EUT:	Class	Test Area	Distance	PreScan	Evaluation									
Top Table	B	SAC2	3 m	Worst-case mode	Individual									
RESULTS: Pass														
Identification		Emissions		Main emission source and type										
DUT: Device under test AUX: Auxiliary Devices SYS: DUT + AUX BB : Broad-band NB : Narrow-band QP: Quasi-peak		Limit + I <= QP I=Uncertainty		DUT, NB										
Comments														
Note: All Channels have been evaluated for the frequency range 9 kHz – 26GHz, but only the worst case has been included in the test report.														

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (CHANNEL 37) I

PRESCAN 9 kHz – 30 MHz



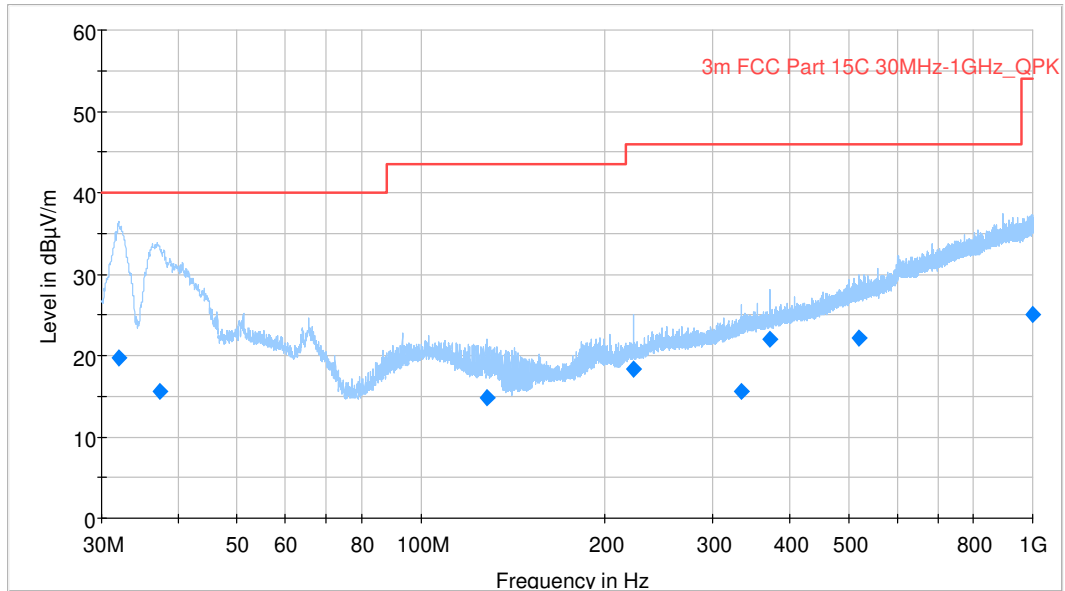
FINAL MEASUREMENTS

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.016900	59.53	117.18	57.65	120.0	H	98.0	-31
0.050450	49.36	108.04	58.68	120.0	H	124.0	-37
0.067300	48.66	105.85	57.19	120.0	H	235.0	-38
0.440250	42.96	93.51	50.55	120.0	H	78.0	-39
0.640500	39.46	69.90	30.44	120.0	H	242.0	-39
1.902750	28.58	69.50	40.92	120.0	H	127.0	-40

Comments:

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (CHANNEL 37) II

PRESCAN 30 - 1000 MHz



— Preview Result 1-PK+ ♦ Final_Result — 3m FCC Part 15C 30MHz-1GHz_QPK

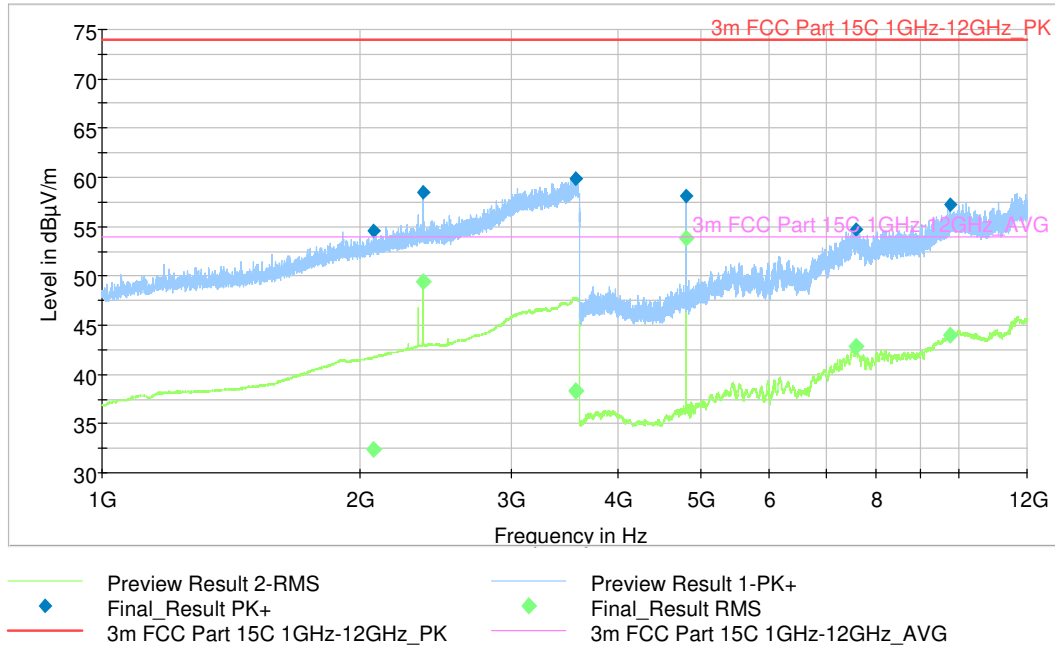
FINAL MEASUREMENTS

Frequency (MHz)	Final Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Corr. (dB/m)
32.000000	19.71	40.0	20.29	120.0	V	15
37.425000	15.62	40.0	24.38	120.0	V	16
128.025000	14.87	43.5	28.63	120.0	H	13
222.750000	18.35	46.0	27.65	370.0	H	16
334.125000	15.62	46.0	30.38	220.0	H	19
371.250000	21.98	46.0	24.02	120.0	H	20
519.750000	22.09	46.0	23.91	370.0	H	23
999.875000	25.01	54.0	28.99	400.0	V	29

Comments:

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (CHANNEL 37) III

PRESCAN 1 - 12 GHz



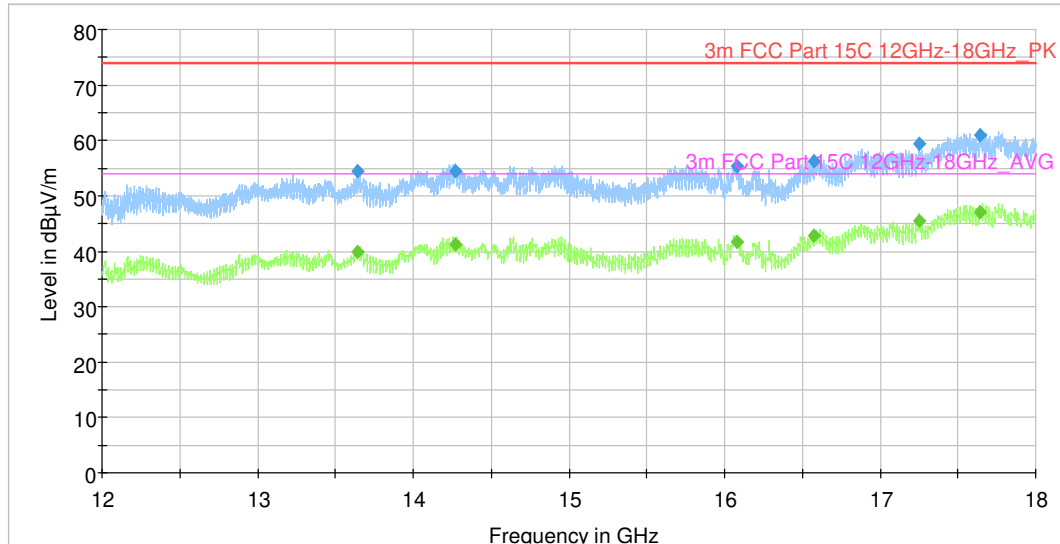
FINAL MEASUREMENTS

Frequency (MHz)	MaxPeak (dBμV/m)	Limit PK (dBμV/m)	Margin PK (dB)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Corr. (dB/m)
2076.500000	54.59	74.00	19.41	32.44	54.00	21.56	320.0	V	30
2370.000000	58.51	74.00	15.49	49.35	54.00	4.65	320.0	H	31
3565.250000	59.88	74.00	14.12	38.38	54.00	15.62	220.0	V	35
3572.750000	59.84	74.00	14.16	38.28	54.00	15.72	220.0	H	35
4803.500000	58.08	74.00	15.92	53.77	54.00	0.23	220.0	H	36
7578.250000	54.71	74.00	19.29	42.80	54.00	11.2	220.0	H	41
9756.500000	57.20	74.00	16.8	43.95	54.00	10.05	120.0	H	43
12589.500000	59.31	74.00	14.69	46.07	54.00	7.93	320.0	V	44

Comments:

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (CHANNEL 37) IV

PRESCAN 12 - 18 GHz



—◆ Preview Result 2-AVG
— 3m FCC Part 15C 12GHz-18GHz_PK
—◆ Preview Result 1-PK+
— 3m FCC Part 15C 12GHz-18GHz_AVG
◆ Final_Result AVG

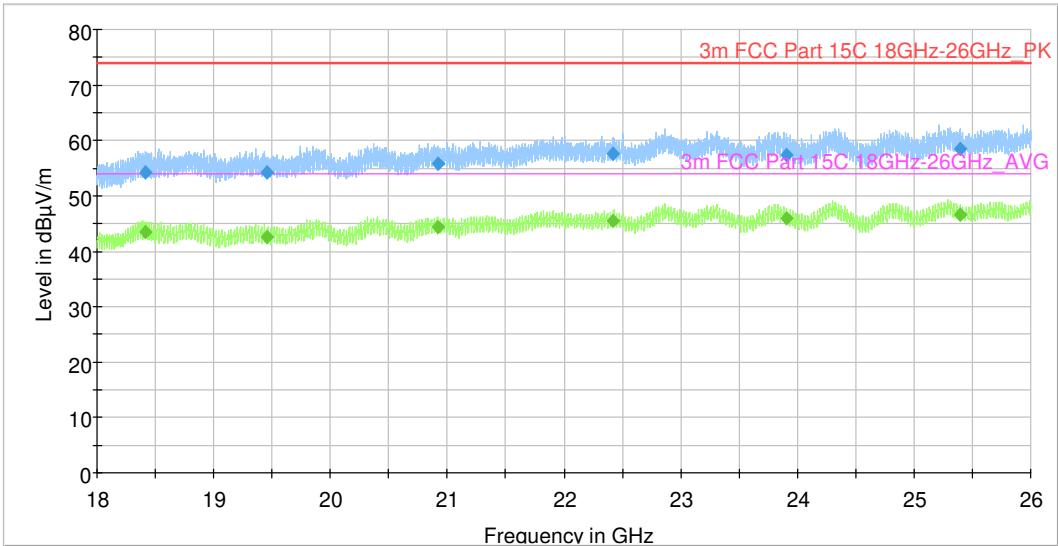
FINAL MEASUREMENTS

Frequency (MHz)	MaxPeak (dBµV/m)	Limit PK (dBµV/m)	Margin PK (dB)	Average (dBµV/m)	Limit AVG (dBµV/m)	Margin AVG (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
13639.250000	54.37	74.00	19.63	39.83	54.00	14.17	333.0	H	273.0	-4
14274.000000	54.56	74.00	19.44	41.17	54.00	12.83	132.0	V	54.0	-4
16080.250000	55.42	74.00	18.58	41.62	54.00	12.38	176.0	H	215.0	-3
16573.250000	56.31	74.00	17.69	42.75	54.00	11.25	210.0	H	308.0	-2
17248.000000	59.33	74.00	14.67	45.47	54.00	8.53	400.0	H	335.0	2
17639.500000	60.89	74.00	13.11	47.09	54.00	6.91	175.0	H	288.0	3

Comments:

UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS (CHANNEL 37) V

PRESCAN 18 - 26 GHz



Preview Result 2-AVG
3m FCC Part 15C 18GHz-26GHz_PK
Final_Result PK+
Preview Result 1-PK+
3m FCC Part 15C 18GHz-26GHz_AVG
Final_Result AVG

FINAL MEASUREMENTS

Frequency (MHz)	MaxPeak (dBµV/m)	Limit PK (dBµV/m)	Margin PK (dB)	Average (dBµV/m)	Limit AVG (dBµV/m)	Margin AVG (dB)	Height (cm)	PoI	Azimuth (deg)	Corr. (dB/m)
18419.000000	54.32	74.00	19.68	43.43	54.00	10.57	100.0	V	340.0	16
19457.000000	54.33	74.00	19.67	42.59	54.00	11.41	300.0	H	202.0	16
20917.750000	55.76	74.00	18.24	44.39	54.00	9.61	400.0	H	180.0	19
22424.500000	57.59	74.00	16.41	45.52	54.00	8.48	200.0	V	326.0	20
23909.250000	57.46	74.00	16.54	46.02	54.00	7.98	200.0	H	130.0	22
25390.500000	58.38	74.00	15.62	46.59	54.00	7.41	400.0	H	201.0	22

Comments:

Unwanted emissions into non-Restricted Frequency Bands and Band Edge

Limits

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

Test Setup

The actual test setup configuration is identical to the one described previously for the Unwanted emissions into Restricted Frequency Bands test in case of Radiated emissions above 1000MHz.

Test Procedure

Reference Level Measurement

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Set Sweep time = auto couple, Trace mode = max hold.
3. Allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

Unwanted Emissions Level Measurement

1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Trace Mode = max hold, Sweep = auto couple.
3. Allow the trace to stabilize.

Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AND BAND EDGE
Technician: Pau Aguilà**Test date:** 2020-02-03**Basic standard:** ANSI C63.10:2013

Temperature:	25.1	°C
Humidity:	41.3	%
Atm. Pressure:	1021.6	hPa

RESULTS: Pass
Unwanted emissions into Non-Restricted Frequency Bands

Channel	Frequency (MHz)	Power difference from carrier level (dB)	Limit (dB)	Result	Comment
37	2402	Above 30 dB	At least 30 dB	PASS	Maximum Radiation Position Height: 150 cm Pol.: V Azimuth: 35 deg
38	2442	Above 30 dB	At least 30 dB	PASS	
39	2480	Above 30 dB	At least 30 dB	PASS	

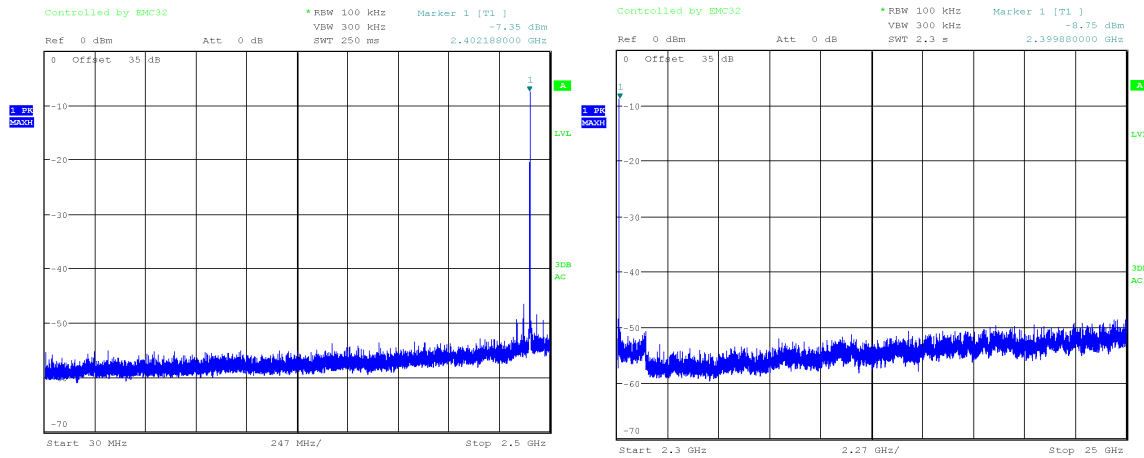
Band-Edge Emissions

Channel	Frequency (MHz)	Power difference from carrier level (dB)	Limit (dB)	Result	Comment
37	2402	Above 30 dB	At least 30 dB	PASS	Maximum Radiation Position Height: 150 cm Pol.: V Azimuth: 35 deg
39	2480	Above 30 dB	At least 30 dB	PASS	

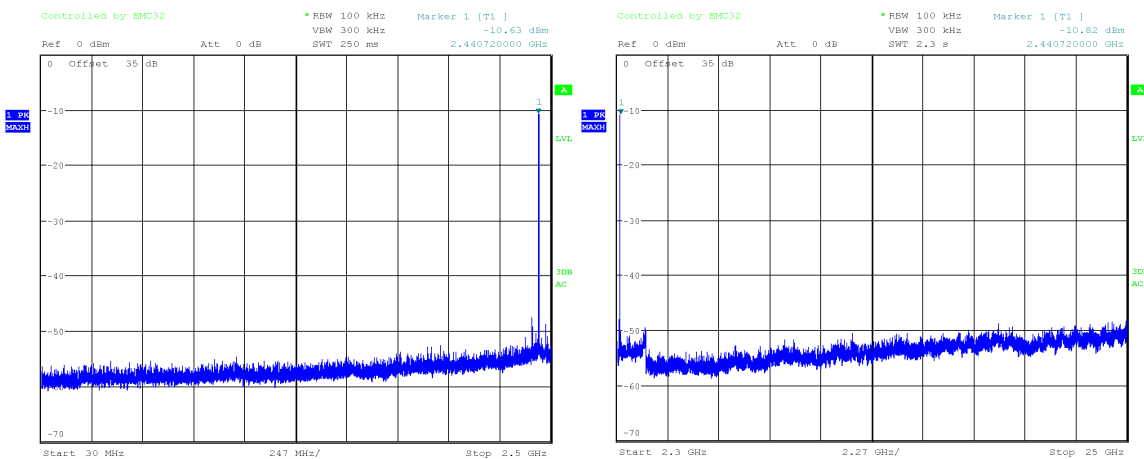
Comments:

UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AND BAND EDGE

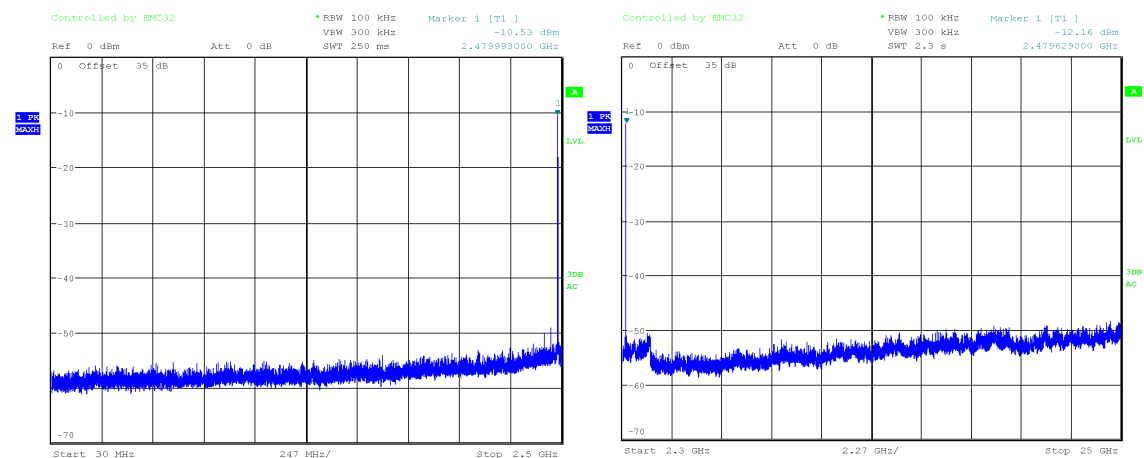
Channel 37 (30MHz to 25GHz)



Channel 38 (30MHz to 25GHz)

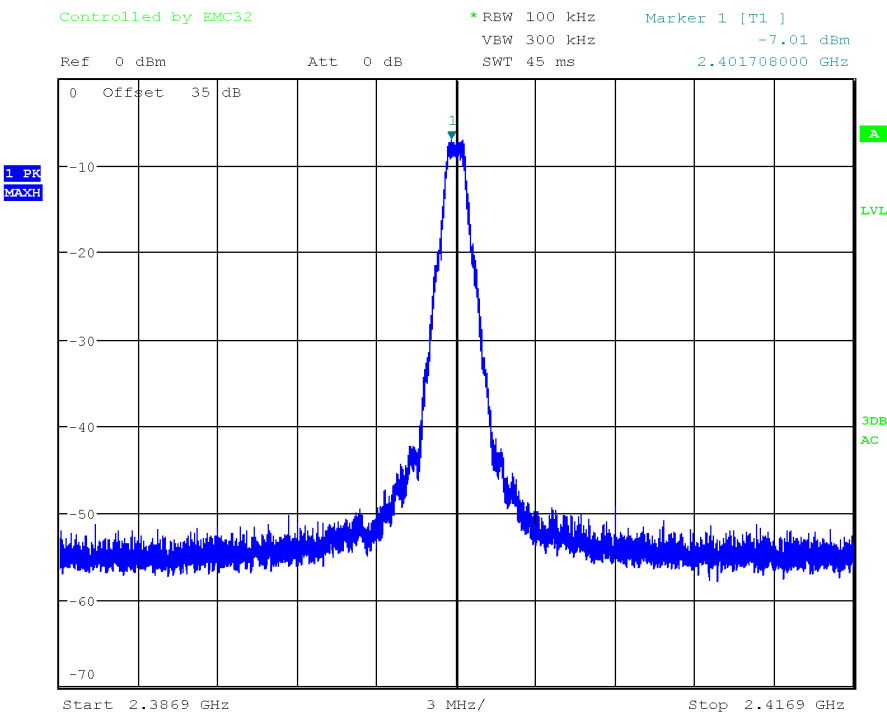


Channel 39 (30MHz to 25GHz)

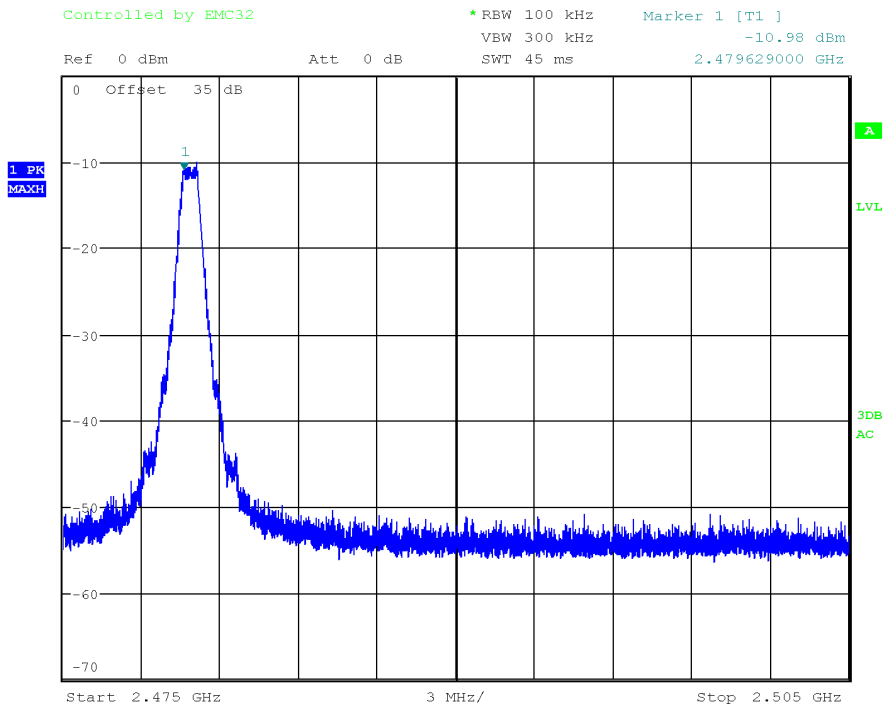


UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AND BAND EDGE

Channel 37 (Band-edge compliance)



Channel 39 (Band-edge compliance)



Maximum Conducted Output Power

Limits

According to FCC Part 15.247(b), maximum conducted output power shall not exceed 1 Watt (30 dBm). The conducted output power limit specified of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Thus, the limit E.I.R.P considered ins 4 Watt (36dBm)

Test Setup

The actual test setup configuration is identical to the one described previously for the Unwanted emissions into Restricted Frequency Bands test in case of Radiated emissions above 1000MHz.

Test Procedure

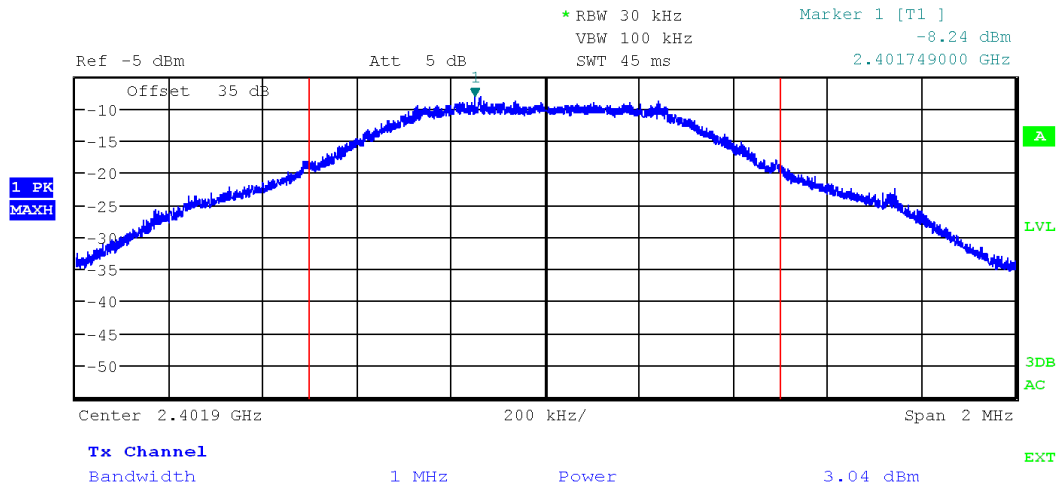
The testing follows KDB 558074 DTS 01 Meas. Guidance v03r05

- 1) The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
- 3) Use the following spectrum analyzer settings:
 - Span = the frequency band of operation
 - Sweep = auto
 - Detector function = Avg
 - Trace = max hold

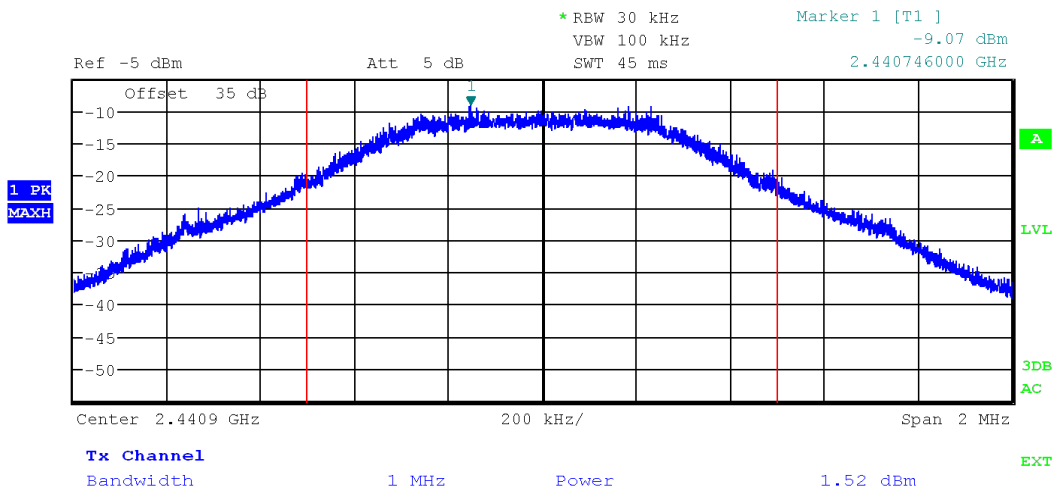
MAXIMUM CONDUCTED OUTPUT POWER																																	
Technician: Pau Aguilà Test date: 2020-02-03																																	
Basic standard: ANSI C63.10:2013																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Temperature:</td> <td style="width: 20%;">25.1</td> <td style="width: 20%;">°C</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td>Humidity:</td> <td>41.3</td> <td>%</td> <td></td> <td></td> </tr> <tr> <td>Atm. Pressure:</td> <td>1021.6</td> <td>hPa</td> <td></td> <td></td> </tr> </table>						Temperature:	25.1	°C			Humidity:	41.3	%			Atm. Pressure:	1021.6	hPa															
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Humidity:	41.3	%																															
Atm. Pressure:	1021.6	hPa																															
RESULTS: Pass																																	
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #d3d3d3;"> <th>Channel</th> <th>Frequency (MHz)</th> <th>Max EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Result</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>37</td> <td>2402</td> <td>3.04</td> <td>36</td> <td>PASS</td> <td rowspan="3" style="text-align: left; padding: 10px;"> Maximum Radiation Position Height: 150 cm Pol.: V Azimuth: 35 deg </td> </tr> <tr> <td>38</td> <td>2442</td> <td>1.52</td> <td>36</td> <td>PASS</td> </tr> <tr> <td>39</td> <td>2480</td> <td>-0.18</td> <td>36</td> <td>PASS</td> </tr> </tbody> </table>						Channel	Frequency (MHz)	Max EIRP (dBm)	Limit (dBm)	Result	Comment	37	2402	3.04	36	PASS	Maximum Radiation Position Height: 150 cm Pol.: V Azimuth: 35 deg	38	2442	1.52	36	PASS	39	2480	-0.18	36	PASS						
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39	2480	-0.18		-0.18	30	PASS																											
Comments:																																	
Test performed using radiated method according to KDB 558074 D01 15.247 Meas Guidance Correction obtained using substitution method Maximum Conducted Output Power Calculated = Max. EIRP measured – Max Antenna Gain																																	

MAXIMUM CONDUCTED OUTPUT POWER

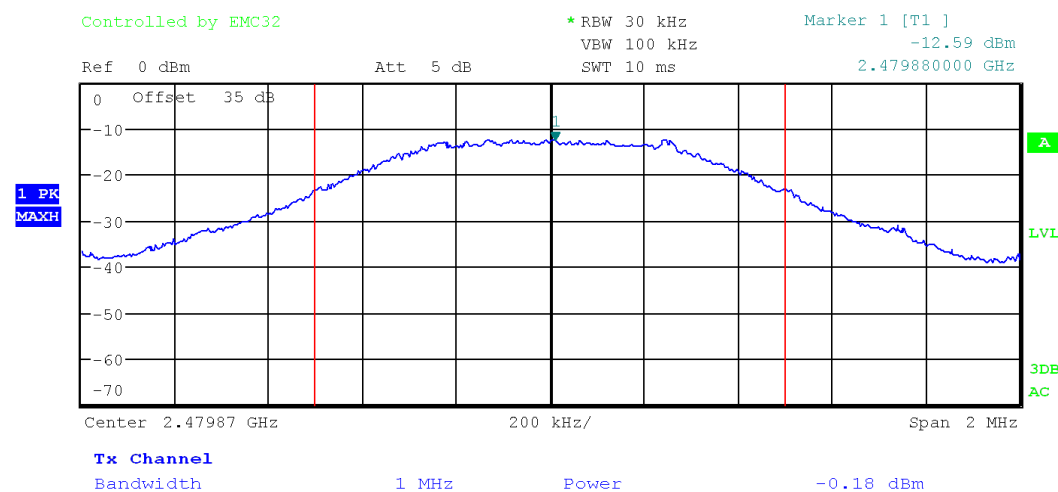
Channel 37 (2402 MHz)



Channel 38 (2442 MHz)



Channel 39 (2480 MHz)



Occupied Bandwidth

Limits

According to FCC Part 15.247(a)(2), the minimum 6 dB bandwidth shall be at least 500 kHz.

Test Setup

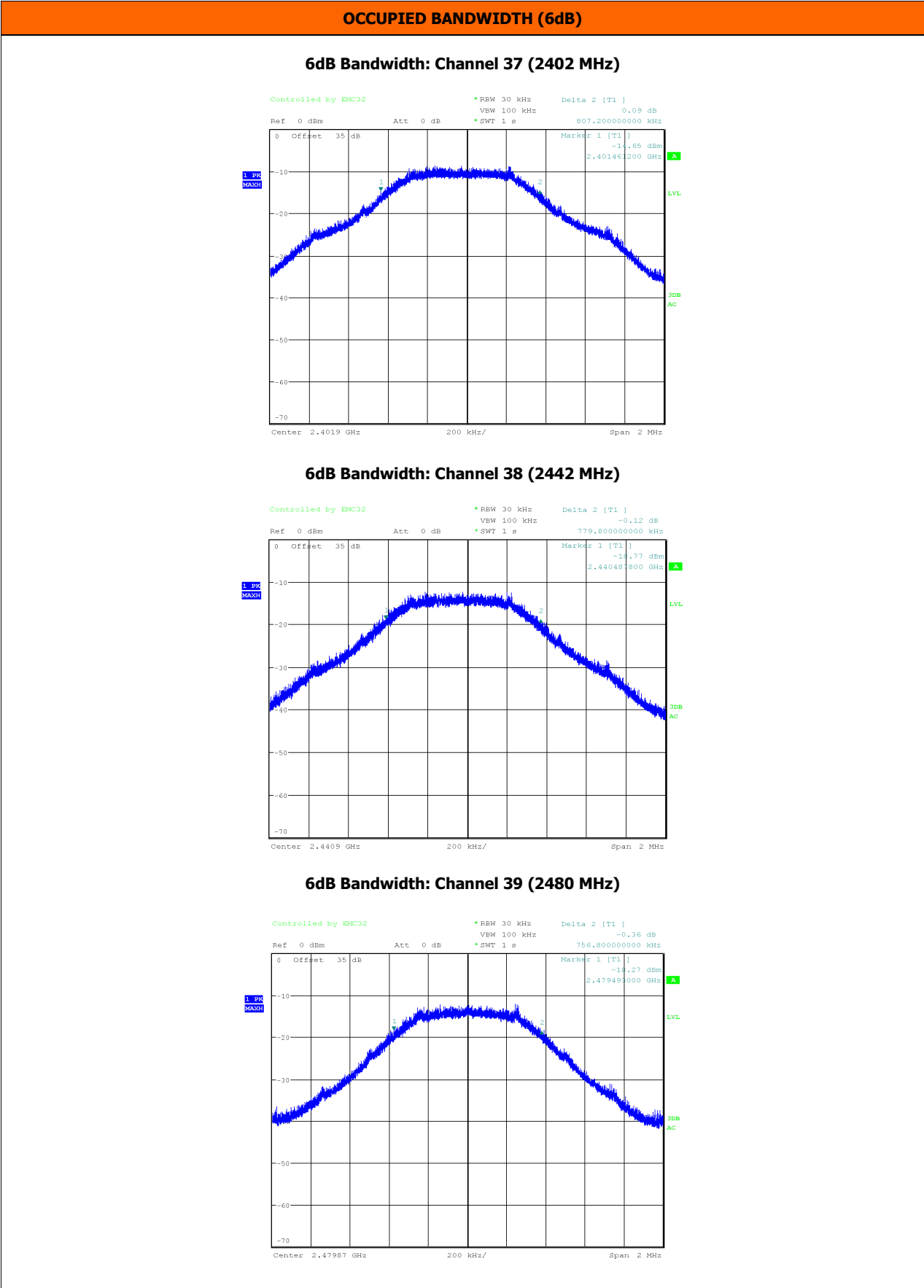
The actual test setup configuration is identical to the one described previously for the Unwanted emissions into Restricted Frequency Bands test in case of Radiated emissions above 1000MHz.

Test Procedure

The testing follows KDB 558074 DTS 01 Meas. Guidance v03r05

- 1) The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
- 3) Use the following spectrum analyzer settings:
 - Span = the frequency band of operation
 - RBW = 100KHz
 - VBW $\geq 3 \times$ RBW
 - Sweep = auto
 - Detector function = peak
 - Trace = max hold

OCCUPIED BANDWIDTH (6dB)																											
Technician: Pau Aguilà																											
Test date: 2020-02-03																											
Basic standard: ANSI C63.10:2013																											
<table border="1"><tr><td>Temperature:</td><td>25.1</td><td>°C</td></tr><tr><td>Humidity:</td><td>41.3</td><td>%</td></tr><tr><td>Atm. Pressure:</td><td>1021.6</td><td>hPa</td></tr></table>						Temperature:	25.1	°C	Humidity:	41.3	%	Atm. Pressure:	1021.6	hPa													
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RESULTS: Pass																											
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39	2480	756.8	At least 500 kHz	PASS																							
Comments:																											



Maximum Power Spectral Density

Limits

According to FCC Part 15.247(e), The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission

Test Setup

The actual test setup configuration is identical to the one described previously for the Unwanted emissions into Restricted Frequency Bands test in case of Radiated emissions above 1000MHz.

Test Procedure

Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.

- 1) The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
- 3) Use the following spectrum analyzer settings: Set the RBW = 3kHz, VBW = 10kHz.
- 4) Detector = RMS, Sweep time = auto couple.
- 5) Employ trace averaging (RMS) mode over a minimum of 100 traces
- 6) Use the peak marker function to determine the maximum amplitude level. Use the peak marker function to determine the maximum amplitude level

MAXIMUM POWER SPECTRAL DENSITY

Technician: Pau Aguilà

Test date: 2020-02-03

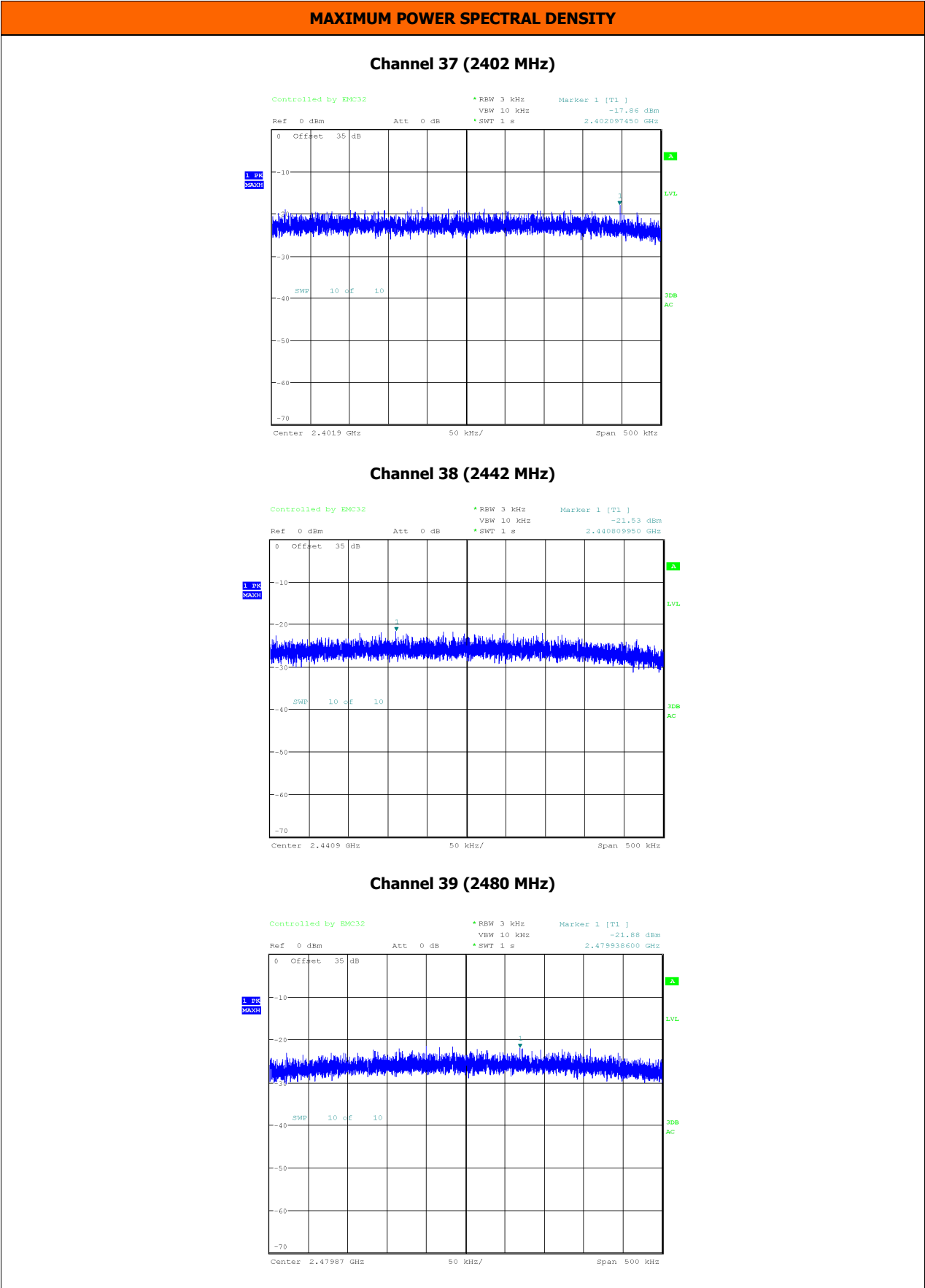
Basic standard: ANSI C63.10:2013

Temperature:	25.1	°C
Humidity:	41.3	%
Atm. Pressure:	1021.6	hPa

RESULTS: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result	Comment
37	2402	-17.86	8dBm/3kHz	PASS	Maximum Radiation Position Height: 150 cm Pol.: V Azimuth: 35 deg
38	2442	-21.53	8dBm/3kHz	PASS	
39	2480	-21.88	8dBm/3kHz	PASS	

Comments:



Antenna Requirements

ANTENNA REQUIREMENTS	
Basic standard: FCC Title 47 part 15 Subpart C	
Procedure: C5401665	
RESULTS: Pass	
Comments:	
Excerpt from 15.203 of the FCC Rules/Regulations: "An intentional radiator antenna shall be designed to ensure that no antenna other than furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section." The antennas of the ALARM SYSTEM are permanently attached. There are no provisions for connection to an external antenna.	

END OF TEST REPORT