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<i>Client:</i>	MYLAPS BV Zuiderhoutlaan 4, 2012PJ Haarlem, Netherlands	
<i>Test Item:</i>	Digital Transmission System (DTS)	
<i>Identification:</i>	X2 BaseLink	<i>Serial Number:</i> -
<i>Project No.:</i>	18120402	<i>Date of Receipt:</i> March 10, 2019
<i>Testing Location:</i>	TÜV Rheinland Nederland B.V. Eiberkamp 10 9351VT Leek	
<i>Test Specification:</i>	FCC 47 CFR Part 15, Subpart C, Section 15.247 (10-1-18 Edition) ANSI C63.10-2013 KDB 558074 D01 DTS Meas Guidance v05.02	
<i>Test Result:</i>	The test item passed the test specification(s).	
<i>Testing Laboratory:</i>	TÜV Rheinland Nederland B.V. Eiberkamp 10 9351 VT Leek	
<i>Tested by:</i>		<i>Reviewed & Approved by:</i> 
2019-12-11	R. van der Meer / Inspector	2019-12-11 E. van der Wal / Snr Engineer
<i>Date</i>	<i>Name/Position</i>	<i>Signature</i>
<i>Other Aspects: report issue date is equal to review & approval date..</i>		
<div style="text-align: right;"> Abbreviations: <i>P(ass)</i> = passed <i>F(ail)</i> = failed <i>N/A</i> = not applicable <i>N/T</i> = not tested </div>		
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TEST SUMMARY

5.1.1 CONDUCTED MEASUREMENTS AT ANTENNA PORT

RESULT: PASS

5.1.2 6dB AND 20 dB BANDWIDTH

RESULT: PASS

5.1.3 PEAK POWER SPECTRAL DENSITY

RESULT: PASS

5.1.4 CONDUCTED OUT OF BAND SPURIOUS EMISSIONS

RESULT: Pass

5.1.5 RADIATED SPURIOUS EMISSIONS OF TRANSMITTER

RESULT: PASS

5.2.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER

RESULT: Pass

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1. General Remarks

1.1 Complementary Materials

There is no attachment to this test report.

2. Test Sites

2.1 Test Facilities

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland Nederland B.V., located in Leek, 9351VT Eiberkamp 10, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 786213. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 120 VAC.

()When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.*

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For Antenna Port Conducted Emissions					
Temperature-Humiditymeter	Extech	SD500	2789216 (A00446)	07/2019	07/2020
Spectrum Analyzer	Rohde & Schwarz	FSV	2790260 (A01744)	07/2018	07/2020
RF Cable	Huber + Suhner	Sucoflex 102	A00347	07/2019	07/2020
For Radiated Emissions					
Measurement Receiver	Rohde & Schwarz	ERC7	2790497 (A01980)	07/2018	07/2020
RF Cable S-AR	Gigalink	APG0500	2789217 (A00447)	03/2019	03/2020
Controller	Maturo	SCU/088/8090811	2789220 (A00450)	N/A	N/A
Controller	EMCS	DOC202	2789031 (A00257)	N/A	N/A
Test facility	Comtest	FCC listed: 786213 IC: 2932G-2	A00235	10/2017	10/2020
Spectrum Analyzer	Rohde & Schwarz	FSV	2790260 (A01744)	07/2018	07/2020
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A
Temperature-Humiditymeter	Extech	SD500	2789214 (A00444)	06/2018	06/2020
Guidehorn 1-18 GHz	EMCO	3115	2788776 (A00008)	12/2017	12/2020
Guidehorn 18-40 GHz	EMCO	RA42-K-F-4B-C	A00012	01/2018	01/2021
Biconilog Testantenna	Teseq	CBL 6111D	2789237 (A00466)	11/2018	11/2019
2.4 GHz bandreject filter	BSC	XN-1783	A00065	N/A	N/A
Bandpass filter 4-10 GHz	Reactel	7AS-7G-6G-511	A00131	N/A	N/A
Bandpass filter 10-26 GHz	Reactel	9HS-10G/26.5G-S11	A00151	N/A	N/A
Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	A00247	N/A	N/A
Filterbox	EMCS	RFS06S	2789029 (A00255)	04/2018	04/2020

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Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For AC Powerline Conducted Emissions					
Pulse limiter	R&S	ESH3-Z2	2788823 (A00051)	11/2018	11/2019
Variac	RFT	LSS020	A00171	NA	NA
LISN	R&S	ESH-2	2788791 (A00019)	06/2019	06/2020
Measurement Receiver	Rohde & Schwarz	ESCS30	2789421 (A00726)	07/2019	07/2020
RF Cable	-	-	A01844	NA	NA
Shielded room for Conducted emissions	--	--	A00437	NA	NA
Temperature-Humidity meter	Extech	SD500	2789211 (A00441)	06/2019	06/2020

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing. NA= Not Applicable

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1.3GHz	1.7dB
	1.3 - 40GHz	2.9 – 3.4dB
Radiated Emission	150kHz - 30MHz	±5.0dB
	30MHz - 1GHz	±5.22dB
	> 1GHz	±5.22dB
AC Power Line Conducted Emissions	150kHz - 30MHz	±3.6dB

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3. General Product Information

3.1 Product Function and Intended Use

The brand MYLAPS model X2 BaseLink, hereafter referred to as EUT, is a transmitter used in sportstiming.

The content of this report and measurement results have not been changed other than the way of presenting the data.

3.2 System Details

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Digital Transmission System, DTS
Manufacturer	:	MYLAPS BV
Brand	:	MYLAPS
Model(s)	:	X2 BaseLink
Firmware version	:	0.19
hardware version	:	7
Voltage input rating	:	48 Vdc (through AUX2)
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Internal, integrated on the PCB
Antenna Gain	:	+ 5 dBi
Operating frequency	:	2403 MHz-2479 MHz.
Modulation	:	GFSK
Data-rate	:	1 Mbps
Remarks	:	n.a.

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Table 3: Interfaces present on the EUT

There are no interface ports present on the EUT.

3.3 Countermeasures to achieve compliance

No additional measures were employed to achieve compliance.

4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209, 15.247.

The test methods, which have been used, are based on ANSI C63.10-2013 and KDB 558074.

4.2 Operation Modes

Testing was performed at the lowest operating frequency (2403 MHz), at the operating frequency in the middle of the specified frequency band (2439 MHz) and at the highest operating frequency (2479 MHz). These operation modes were selected after review of the capabilities and characteristics of the EUT. The test software as mentioned in section 4.4 enabled the settings of these modes.

The EUT has been tested in the modes as described in table below

Operation Mode	EUT Status	Frequency (MHz)	TX power control setting
Transmit (Tx)	On	2403	2
Transmit (Tx)	On	2439	2
Transmit (Tx)	On	2479	2

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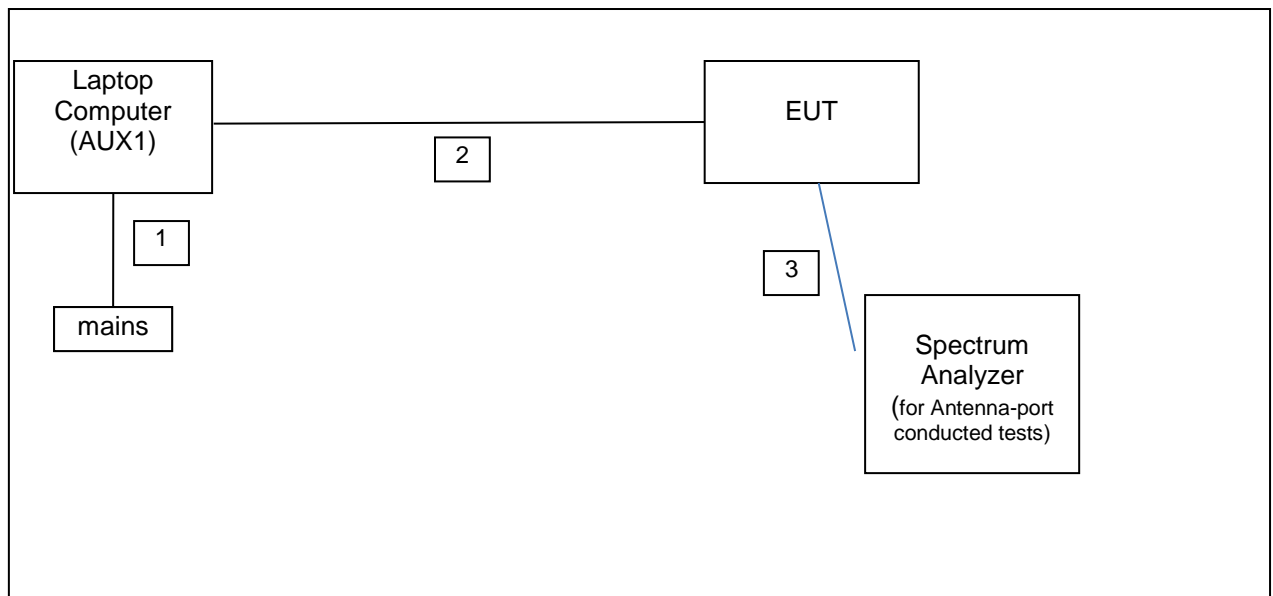
4.3 Physical Configuration for Testing

For programming purposes only the EUT was connected to the usb port of a laptop computer. The laptop computer was used to configure the EUT to continuously transmit at a specified output power and channel as specified in the test data. See section 4.5 for Auxiliary details.

The EUT was tested on a stand-alone basis.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10-2013.

Figure 1a: Test Setup Diagram – antenna port conducted tests and programming.



No.	Port	From	To	Remarks
1.	Mains	Mains	Laptop (AUX1)	Through a power supply
2.	Data com.	Laptop USB	EUT	--
3.	Antenna port	EUT	Spectrum analyzer	Conducted tests

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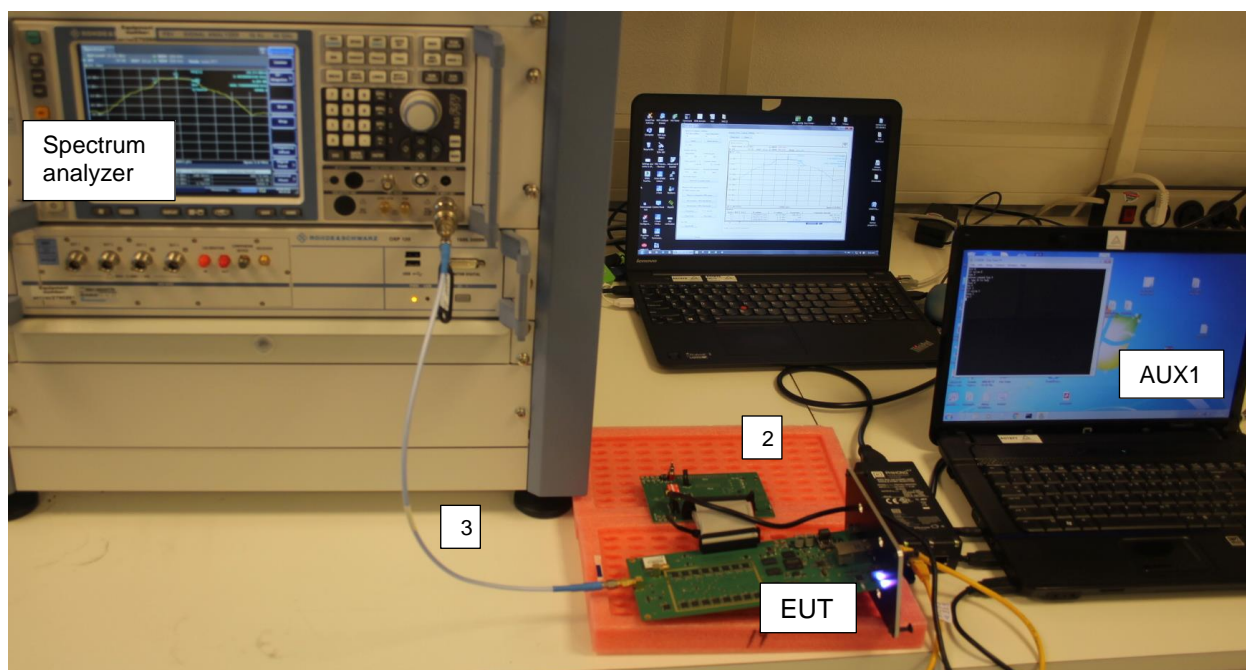


Figure 2: Test Setup Photos – conducted tests and programming

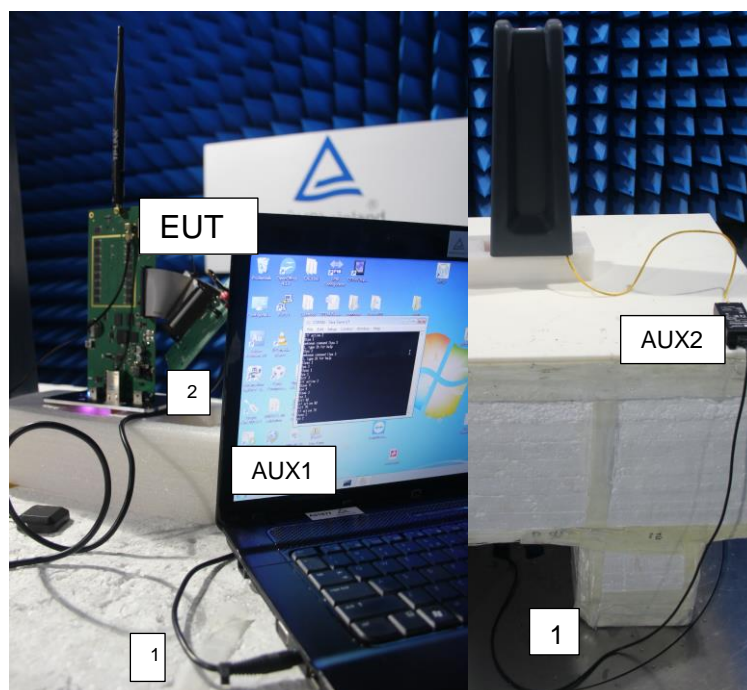


Figure 3: Test Setup Photos – radiated tests(R) and programming(L)

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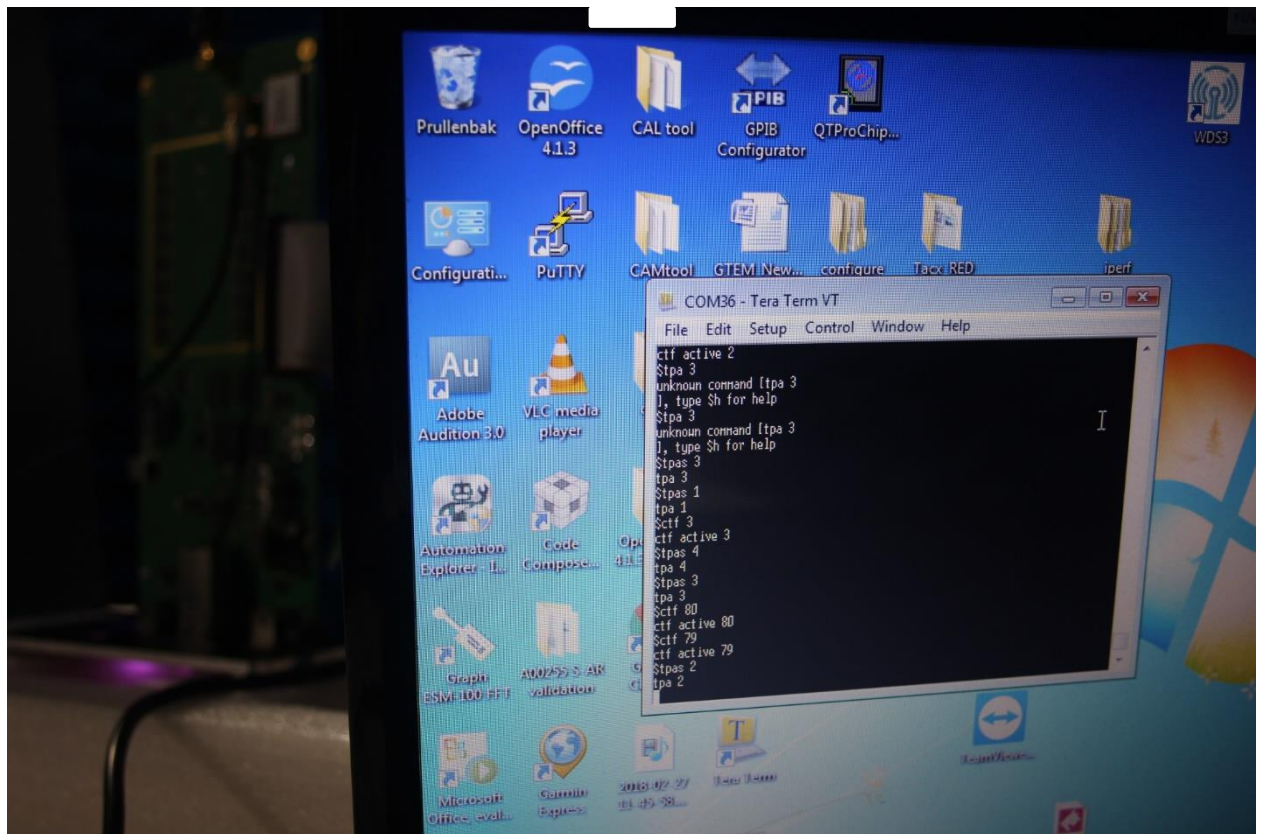
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4.4 Test Software

A continuous transmit mode could be initiated by using test software as supplied by the applicant. The test software was used to define various different operational modes of the EUT for the purpose of compliance testing. The version of the test software, as supplied by the applicant and used during all tests is:

Test software : Tera Term VT

This software was running on a laptop computer (AUX1). It was used to enable the test operation modes listed in section 4.2 as appropriate.



Screenshot of the software as used on AUX1

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4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

The auxiliary items were not used during testing, but instead are only used to make the required settings for testing. For setting the transmit frequency, enable modulation etc.

1. AUX1

Product:	Laptop Computer
Brand:	HP
Model:	Compaq 610
Serial Number:	CNU94710WB
Remark:	host for test software, property test lab (Inv Nr. A01877)

2. AUX2

Product:	Power Supply (POE)
Brand:	PHIHONG
Model:	PSA16U-480(POE)
Serial Number:	P62700683B1
Remark:	connects to EUT, as supplied with EUT



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5. Test Results

5.1 Conducted Measurements at Antenna Port

5.1.1 Conducted Output Power

RESULT: PASS

Date of testing: 2019-08-21

Requirements:

FCC 15.247(b)(3)

For systems using digital modulation in the 2400-2483.5 MHz band, the maximum peak output power is 1W (+30dBm).

Test procedure:

The Peak Conducted Output Power was measured using the method according to section 11.9.1.1 in ANSI C63.10-2013.

The maximum peak output power (conducted) was measured at the antenna connector with a spectrum analyzer. The final measurement takes into account the loss generated by all the involved cables.

Measurement uncertainty is +/- 2.5 dB.

Notes: $mW = 10^{(dBm/10)}$
 $dBm = 10 \times \log(mW)$

plots : Peak power plots,

Figures 1a, 1b and 1c show plots of the Peak Power outputs, correction factors (= 0.1dB Cableloss) included in the reading.

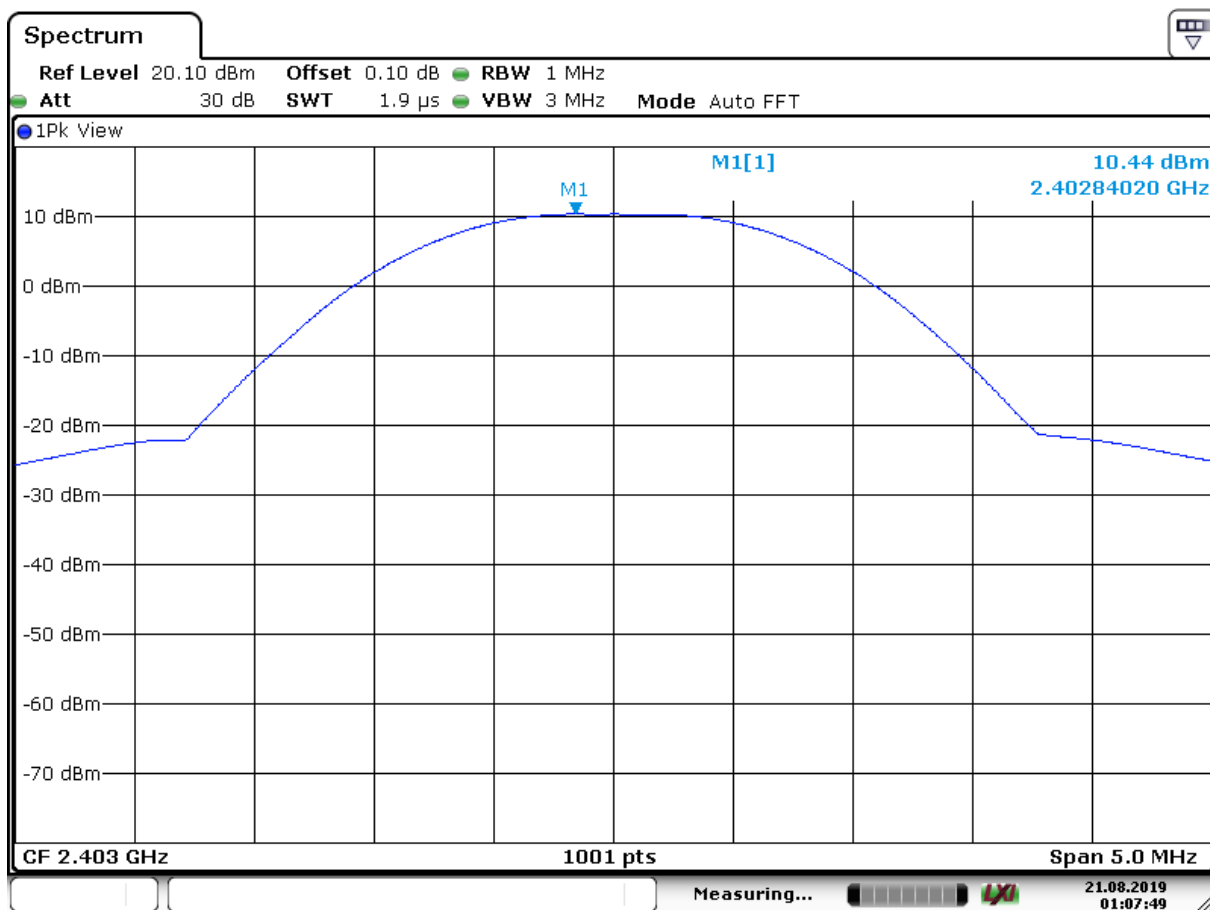
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Conducted Output Power

Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Verdict [Pass/Fail]	Plot number
2403	10.44 (0.0111 W)	+30 (1W)	Pass	A
2439	9.33 (0.0086 W)	+30 (1W)	Pass	B
2479	8.57 (0.0072 W)	+30 (1W)	Pass	C



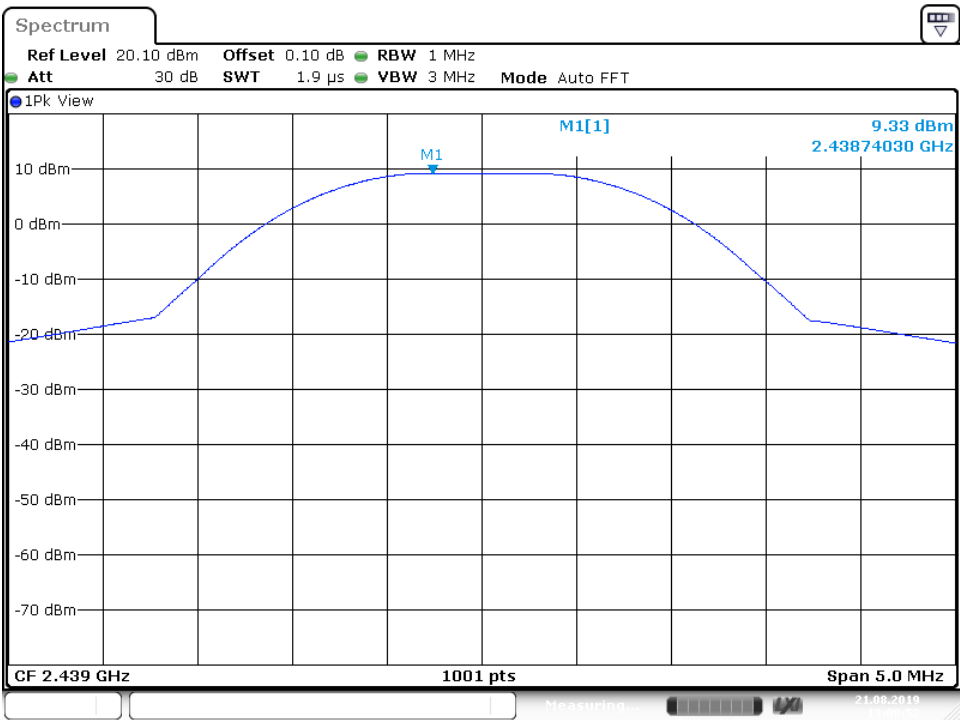
Date: 21 AUG 2019 01:07:49

Plot A

Test Report No.:

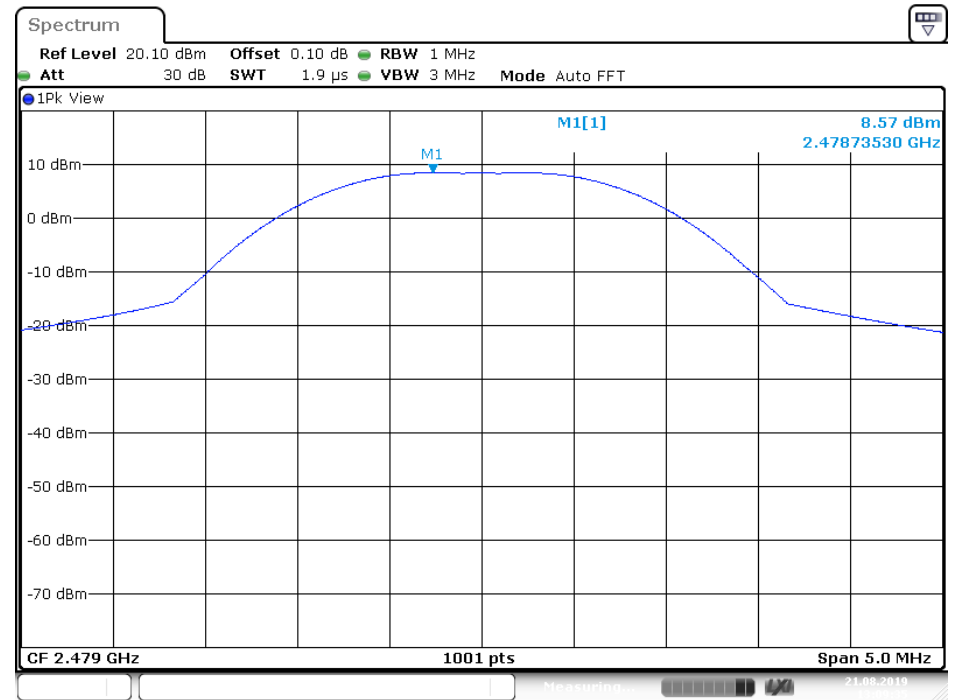
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Date: 21 AUG 2019 13:08:52

Plot B



Date: 21 AUG 2019 13:09:35

Plot C

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5.1.2 6dB and 20 dB Bandwidth

RESULT: Pass

Date of testing:

2019-08-21

Requirements:

FCC 15.247(a)(2)

For systems using digital modulation in the 2400-2483.5MHz band, the 6dB bandwidth shall be at least 500kHz.

Test procedure 6dB bandwidth:

ANSI C63.10-2013 section 11.8.1 Option 1

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 100kHz, video bandwidth to 300kHz and the span wide enough to capture the modulated carrier.

For 20 dB Bandwidth:

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1% of the selected span, Video bandwidth was set to 3 times the resolution bandwidth. The span was set to capture the whole modulation process. Measurement uncertainty is +/- 26kHz.

Plots A1,B1 and C1 shown on the next pages are of the 6 dB bandwidth.
Plots A2,B2 and C2 shown on the next pages are of the 20 dB bandwidth

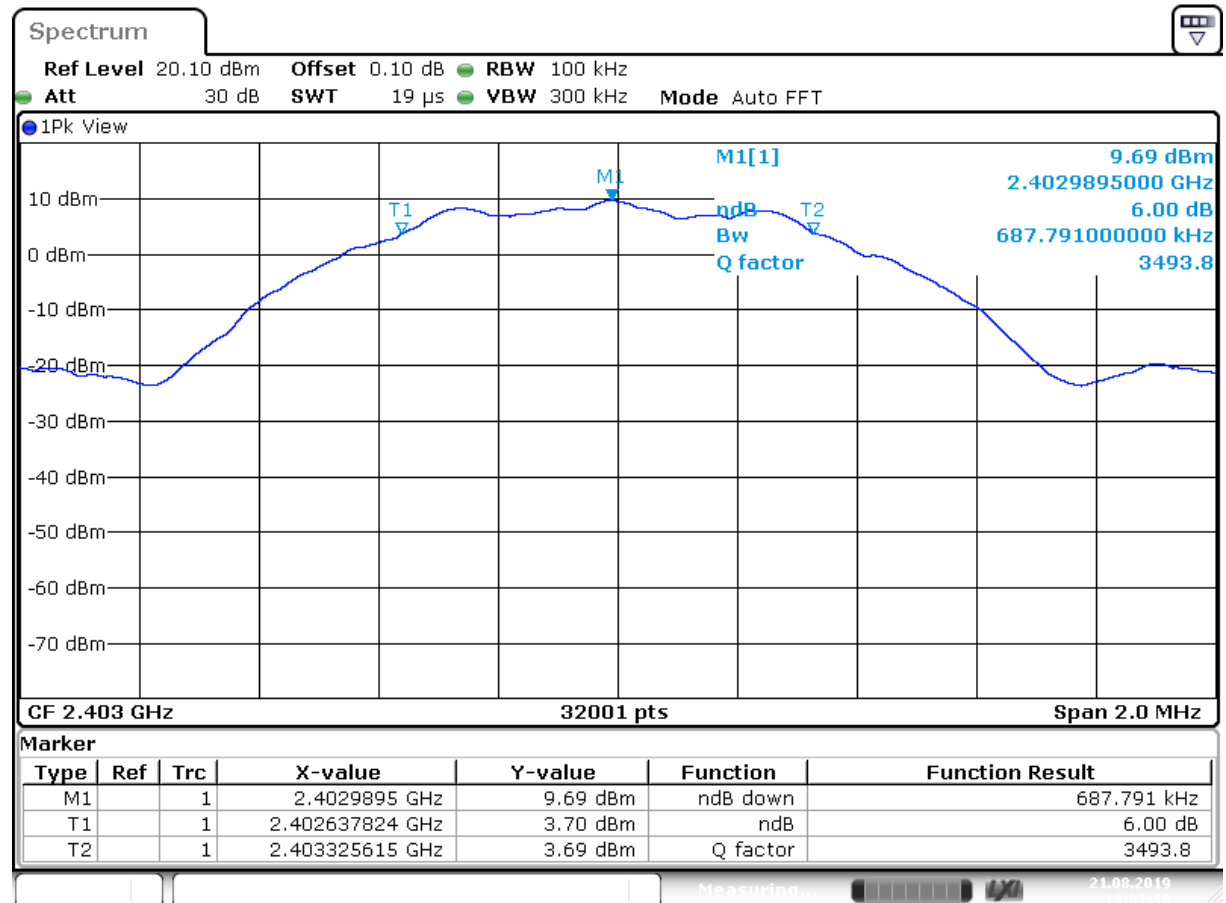
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6dB Bandwidth

Operating Frequency [MHz]	20 dB Bandwidth [kHz]	6dB Bandwidth [kHz]	Limit 6dB BW [kHz]	Verdict [Pass/Fail]	Plot number
2403	1172.8	687.8	>500	Pass	A1/A2
2439	1170.8	684.0	>500	Pass	B1/B2
2479	1144.9	673.5	>500	Pass	C1/C2



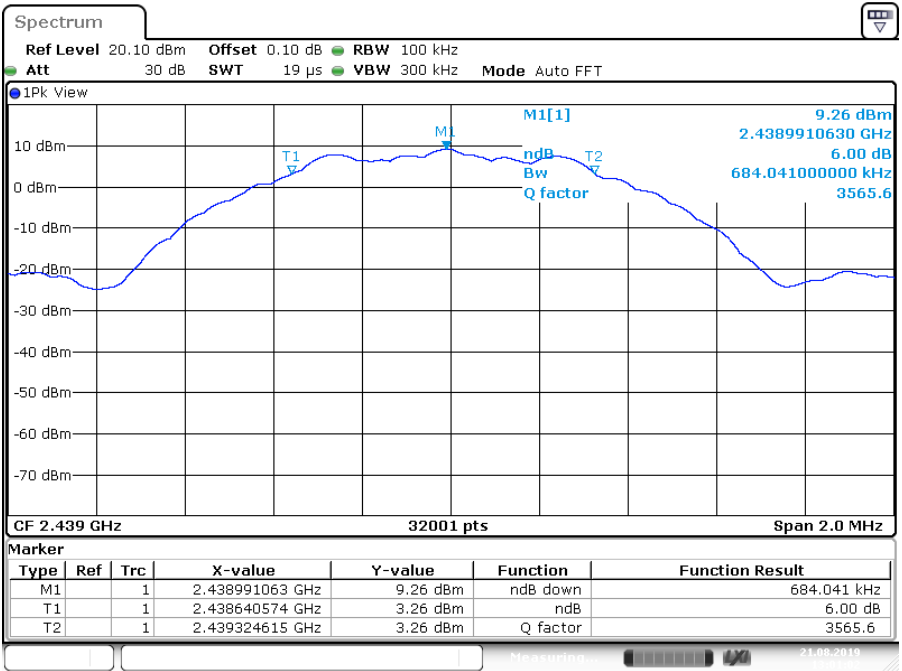
Date: 21.AUG.2019 13:01:59

Plot A1

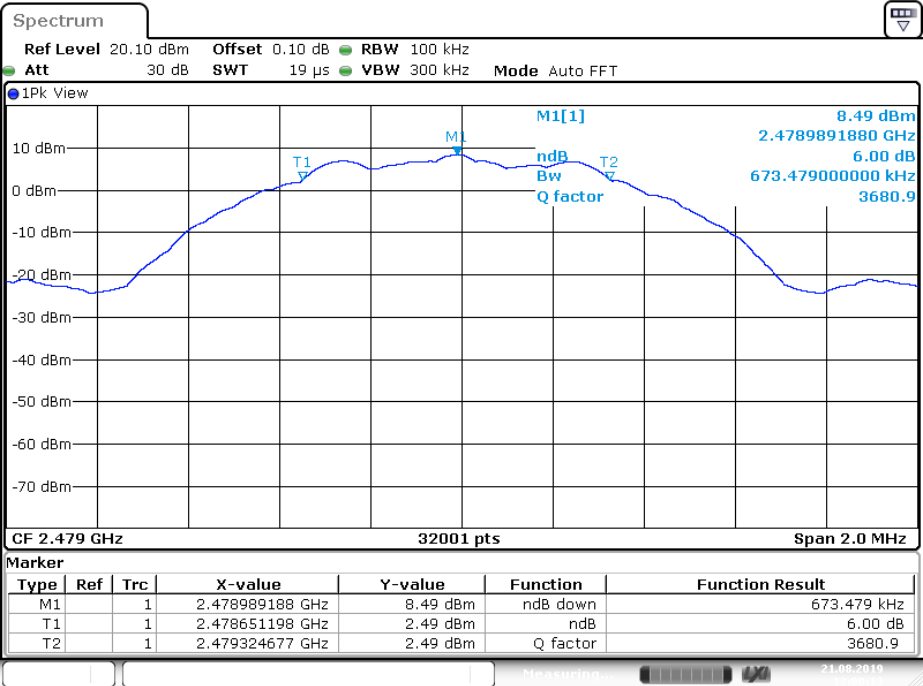
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Plot B1

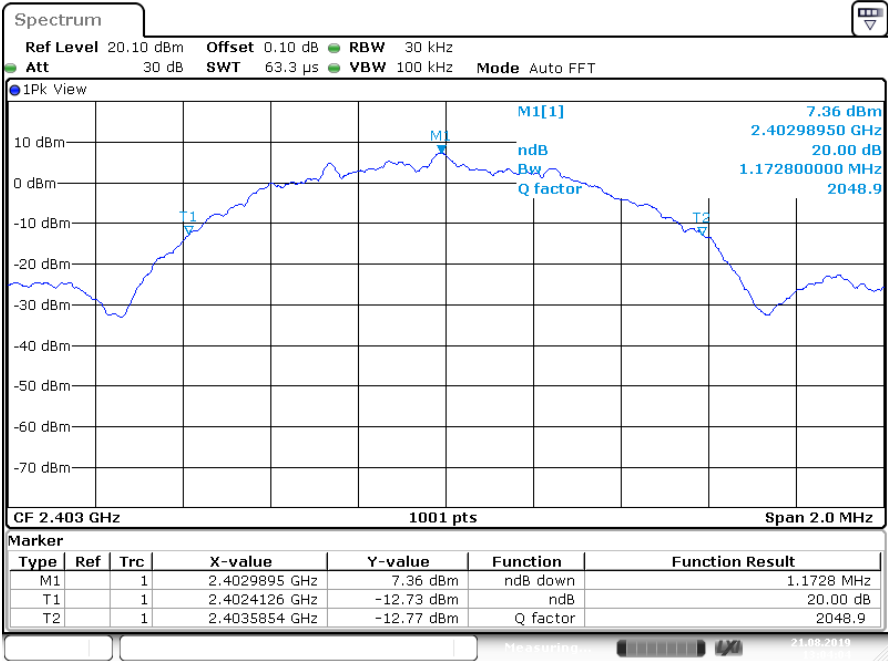


Plot C1

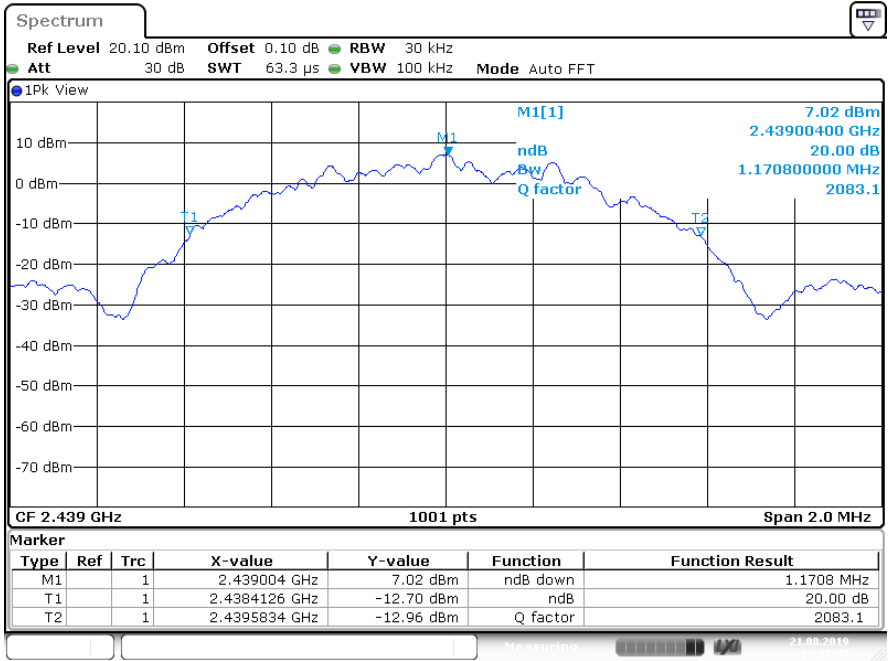
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Plot A2

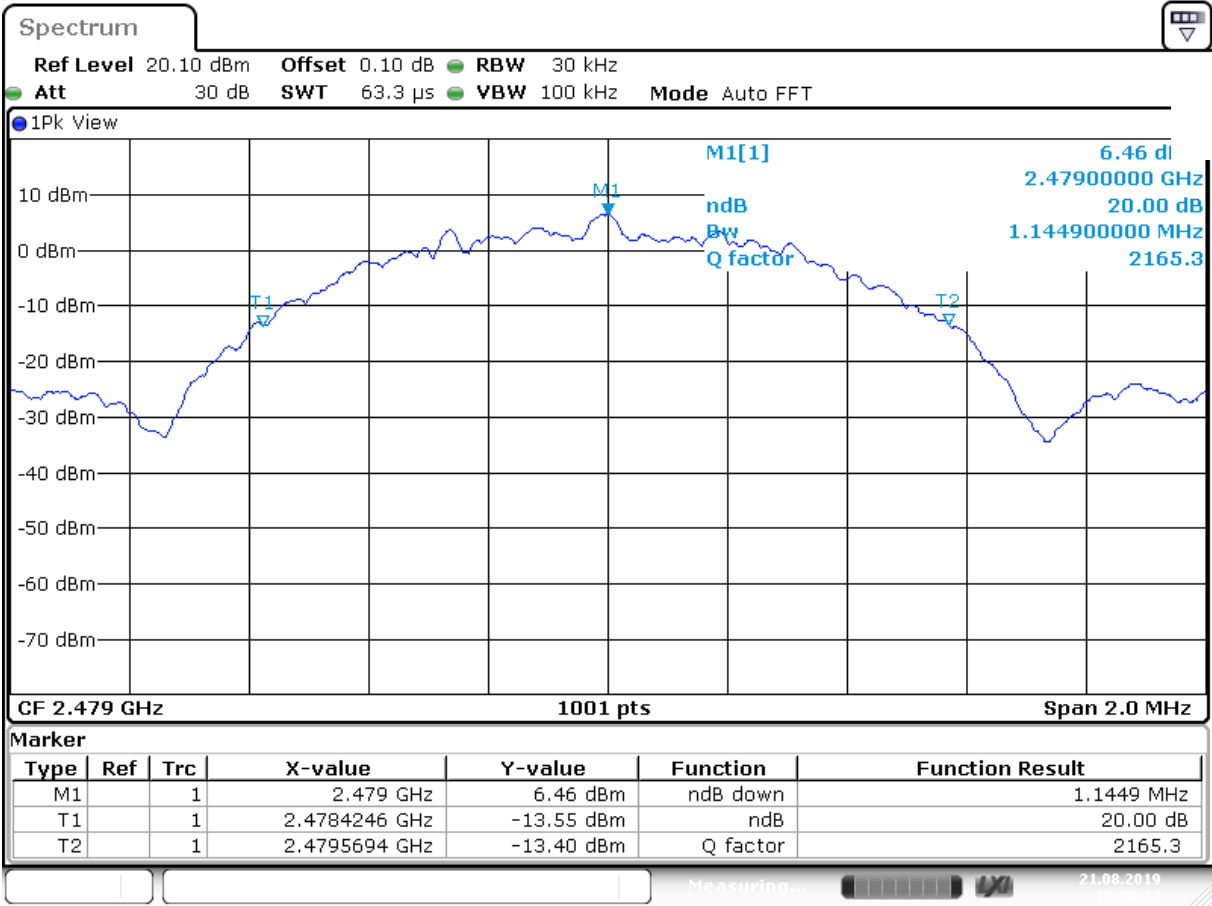


Plot B2

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Date: 21 AUG 2019 13:06:42

Plot C2

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5.1.3 Peak Power Spectral Density

RESULT: Pass

Date of testing:

2019-08-21

Requirements:

FCC 15.247(e)

For digitally modulated systems, the power spectral density (PSD) conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

Test procedure:

ANSI C63.10-2013

The section 11.10.2 PKPSD peak PSD procedure was used. A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 3kHz and the video bandwidth was set to 10kHz. The sweep time was set to auto couple and the trace was allowed to stabilize before making the final measurement. By using the Peak marker function the maximum amplitude was determined. The final measurement takes into account the loss generated by all the involved cables.

Measurement uncertainty is +/- 1.1 dB.

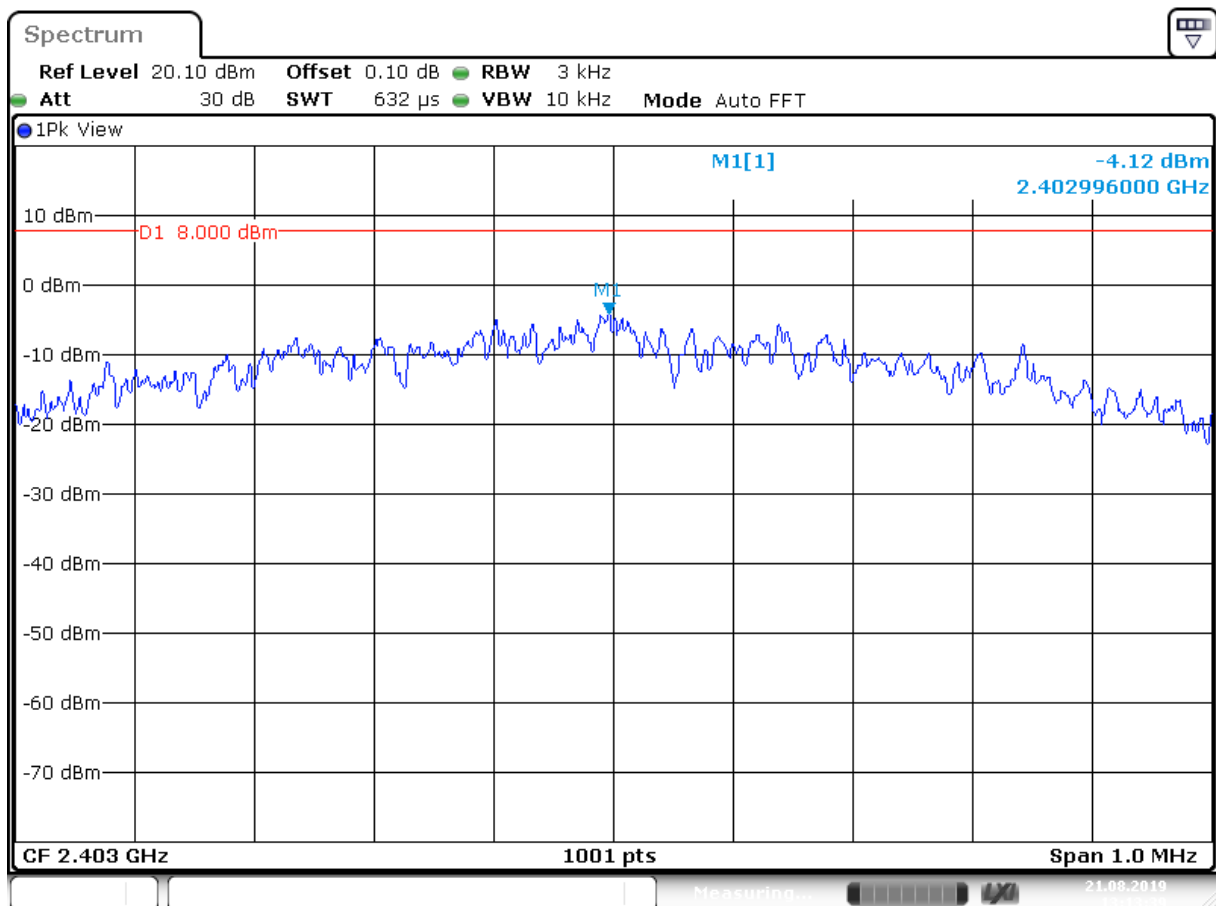
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Peak Power Spectral Density

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Verdict [Pass/Fail]	Plot
2403	-4.12	8	Pass	A
2439	-3.61	8	Pass	B
2479	-4.82	8	Pass	C



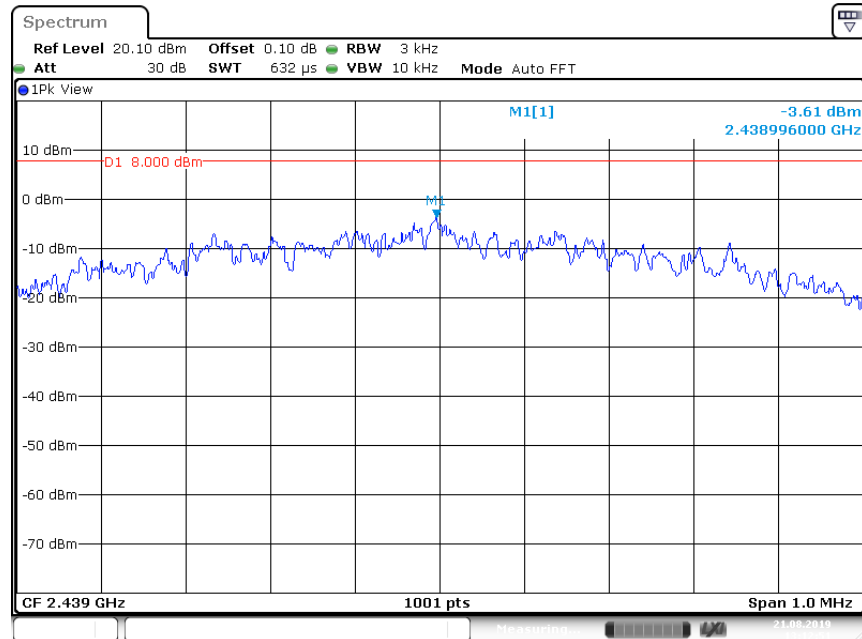
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Plot A

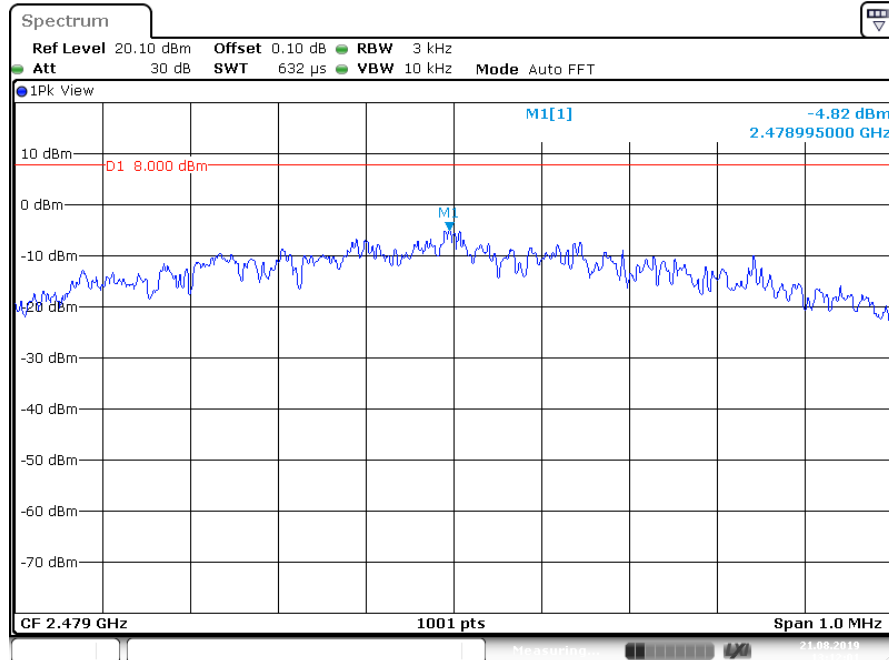
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Plot B



Plot C

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5.1.4 Conducted Out Of Band Spurious Emissions

RESULT: Pass

Date of testing:

2019-08-21

Requirements:

FCC 15.205, FCC 15.209, FCC 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test procedure:

ANSI C63.10-2013

KDB 558074 D01 DTS Meas Guidance v05.02

An RF conducted measurement was done using the marker-delta method, as described in ANSI C63.10.

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings:

RBW = 100kHz, VBW = 300kHz.

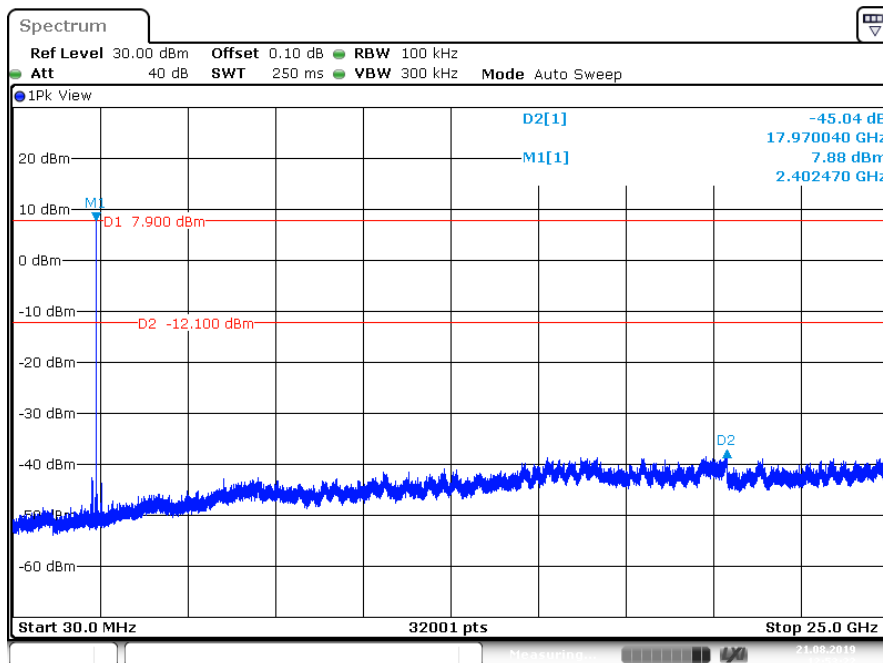
The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. Measurement uncertainty is +/- 2.5 dB.

Results: All out of band spurious emissions are more than 20 dB below the fundamental. See the figures on the following pages.

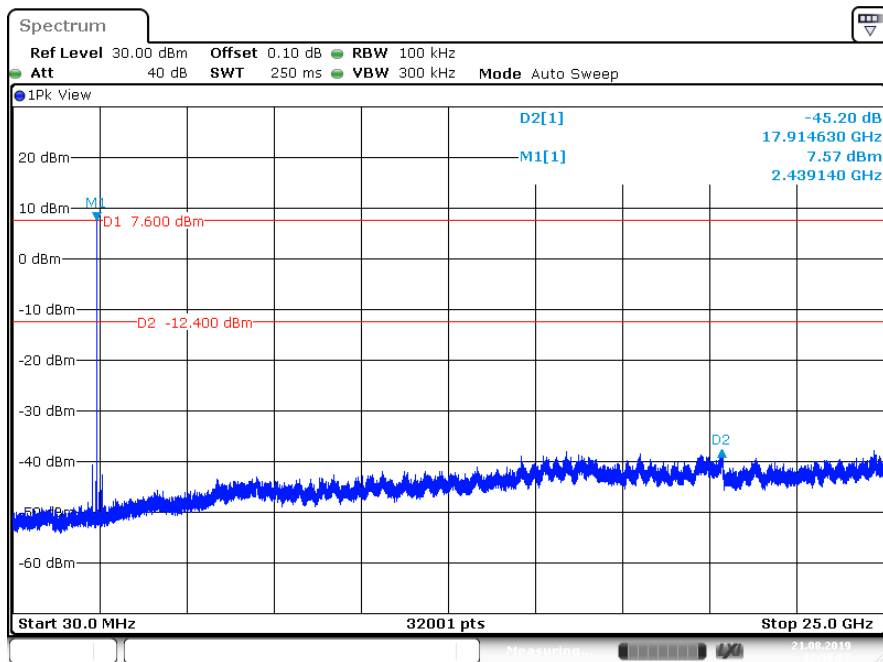
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Plot: Conducted Unwanted Emission, 2403 MHz- Peak values

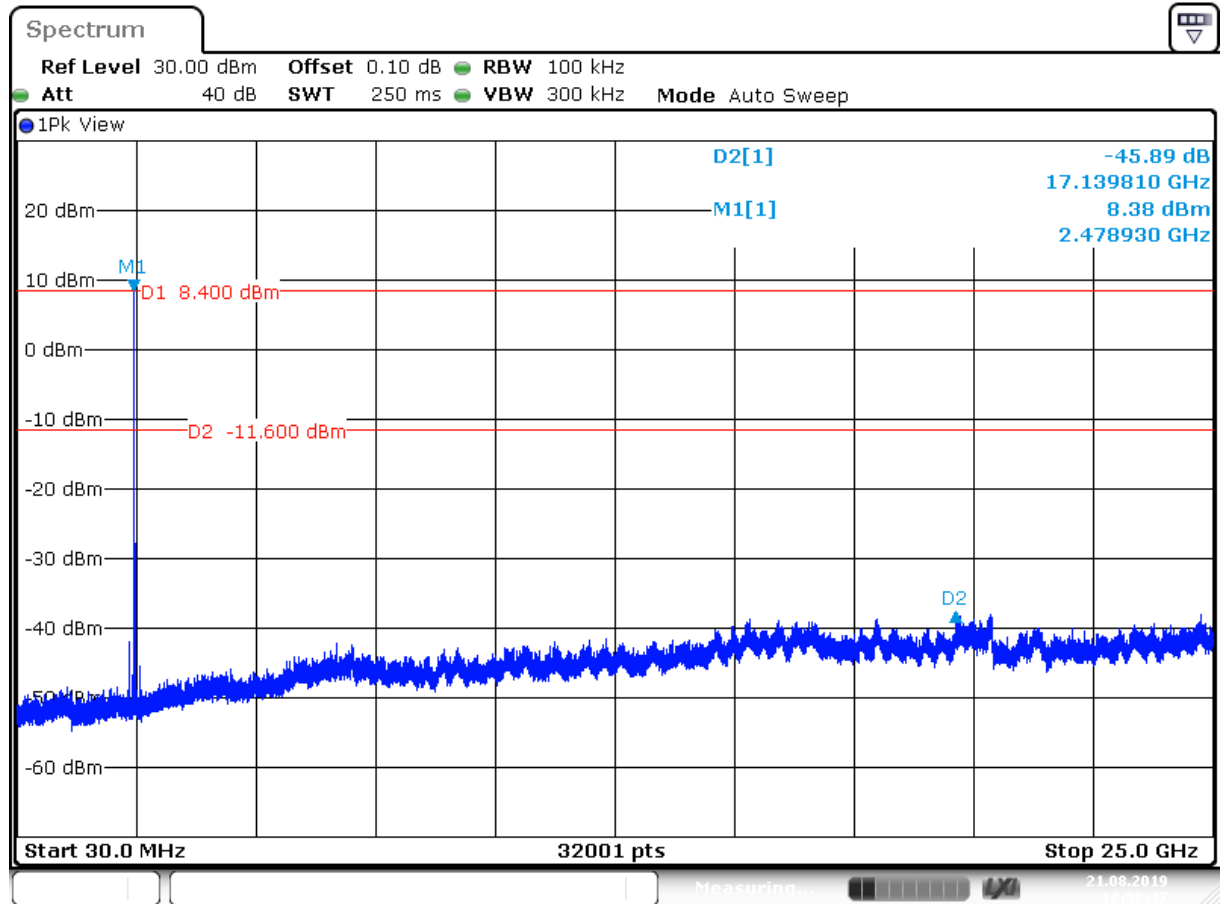


Plot: Conducted Unwanted Emission, 2439 MHz- Peak values

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Date: 21 AUG 2019 12:58:48

Plot: Conducted Unwanted Emissions, 2479 MHz. Peak values.

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5.1.5 Radiated Spurious Emissions of Transmitter

RESULT: Pass

Date of testing: 2019-07-31

Frequency range: 30MHz - 25GHz

Requirements:

FCC 15.209 and FCC 15.247(d)

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

Test procedure:

ANSI C63.10-2013

KDB 558074 D01 DTS Meas Guidance v05.02

The EUT was placed on the test site turntable. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 30MHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit. Where Peak (Pk) values were at least 6 dB under the Average (Av) limits, Av value was not tested. Where Average values were tested, Average values were measured using at least 10 kHz Video Bandwidth.

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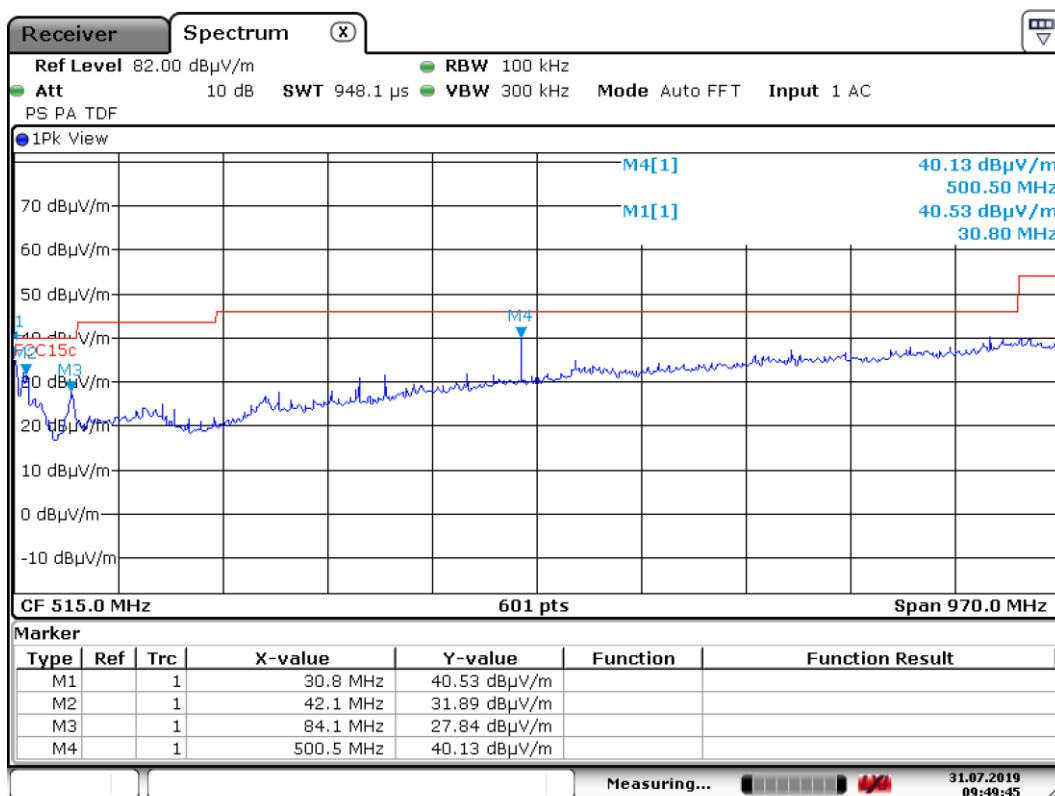
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Radiated Emissions, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations

Frequency [MHz]	EUT orientation	Antenna Orientation	Level QP [dB μ V/m]	Limit QP [dB μ V/m]	Verdict [Pass/Fail]
30.8	Vertical	Vertical	34.2	40.0	Pass
350	Vertical	Horizontal	34.3	43.5	Pass
375	Vertical	Horizontal	29.4	46.0	Pass
400	Vertical	Horizontal	29.9	46.0	Pass
500	Vertical	Vertical	38.5	46.0	Pass
800-960 noise	Vertical	Vertical	35.0	46.0	Pass

- Notes:
- Level QP = Reading QP + Factor
 - Tested in modes as described in section 4.2, the 6 highest values noted. Preliminary measurements indicated that the radiated emissions from EUT were not affected by the EUT's operating mode or frequency.
 - *R refers to a frequency in a restricted band
 - Quasi Peak detector used with a bandwidth of 120 kHz.
 - Measurement uncertainty is +/- 5.22 dB.



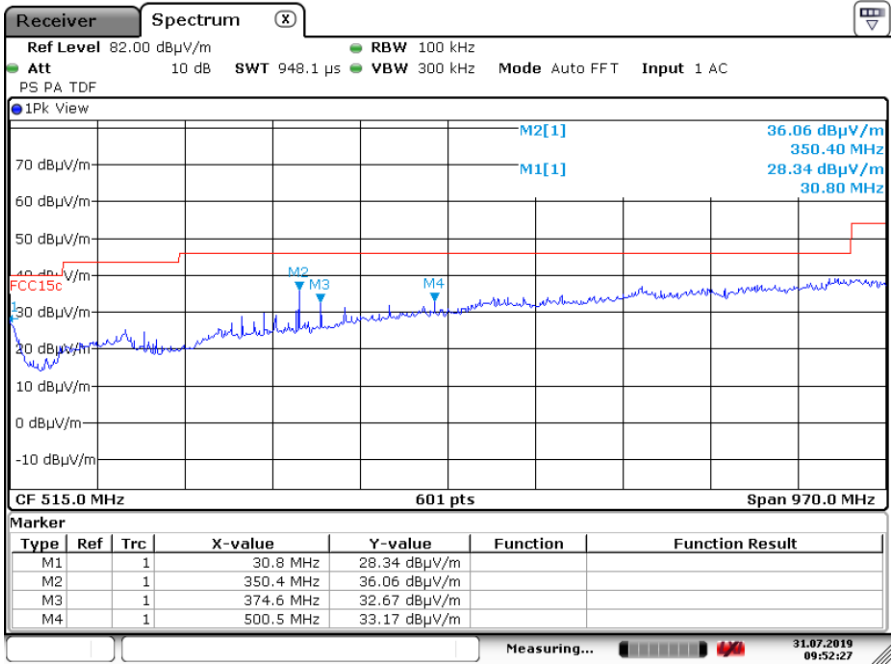
Date: 31.JUL.2019 09:49:45

Plot of the emissions (Peak detector values shown) @2403 MHz, Antenna Vertical

Test Report No.:

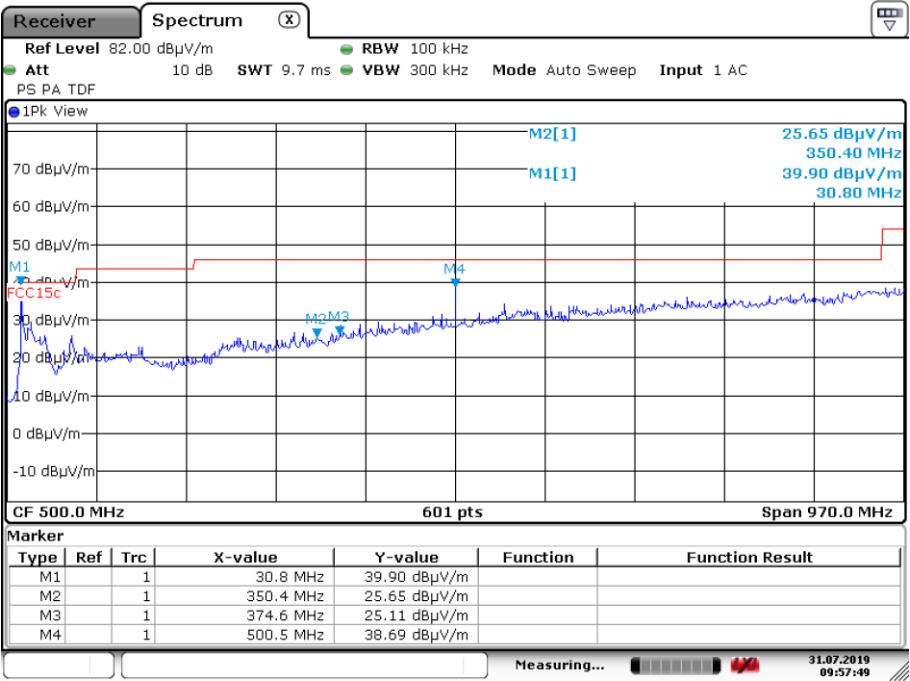
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Date: 31.JUL.2019 09:52:28

Plot of the emissions (Peak detector values shown) @2403 MHz, Antenna Horizontal



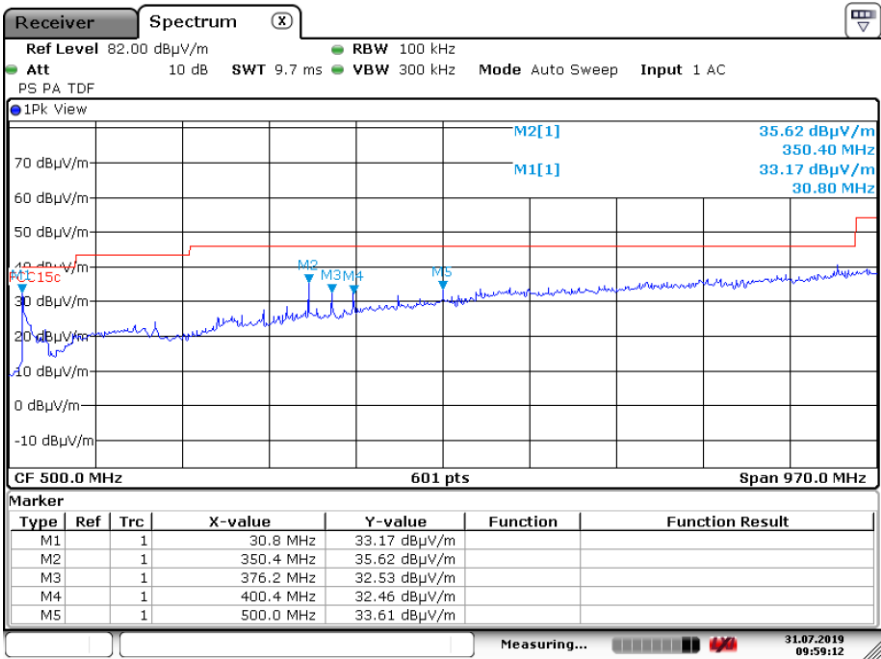
Date: 31.JUL.2019 09:57:49

Plot of the emissions (Peak detector values shown) @2439 MHz, Antenna Vertical

Test Report No.:

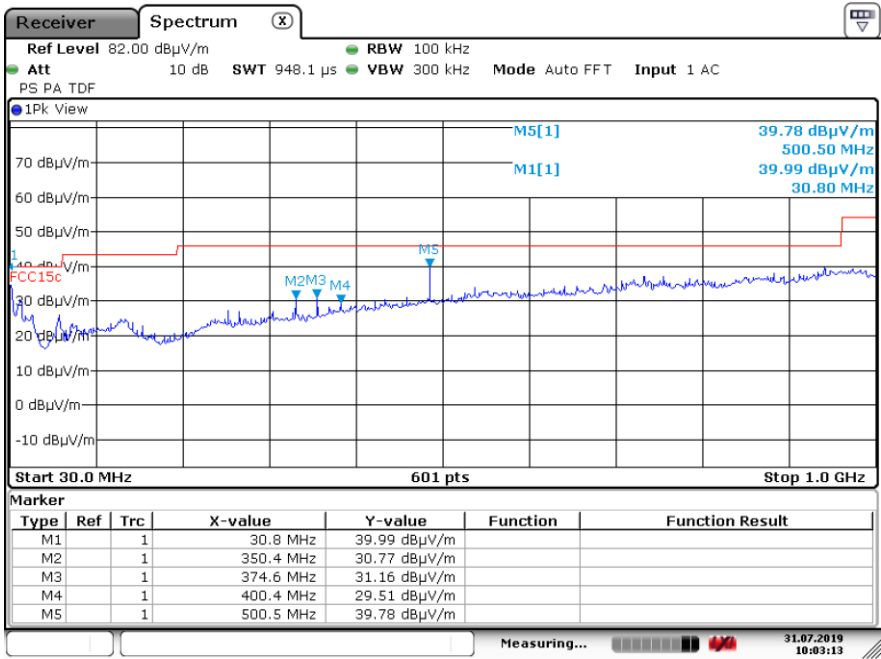
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Date: 31.JUL.2019 09:59:12

Plot of the emissions (Peak detector values shown) @2439 MHz, Antenna Horizontal



Date: 31.JUL.2019 10:03:13

Plot of the emissions (Peak detector values shown) @2479 MHz, Antenna Vertical

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Radiated Emissions, 1 - 25GHz, 2403 MHz.

Frequency [MHz]	Antenna Orientation	Detector	Bandwidth (MHz)	Level [dBµV/m]	Limit [dBµV/m]	Result
1103.6*R	Horizontal	Pk	1	45.6	54 (Av) 74 (Pk)	Pass
1999.7	Vertical	Pk	1	48.0	54 (Av) 74 (Pk)	Pass
4806*H*R	Vertical	Pk	1	59.2 Pk 53.2 Av	54 (Av) 74 (Pk)	Pass
7209 *H	Vertical	Pk	1	60.3 Pk 53.2 Av	54 (Av) 74 (Pk)	Pass
12014*R	Vertical	Pk	1	54.5 Pk 52.2 Av	54 (Av) 74 (Pk)	Pass

Radiated Emissions, 1 - 25GHz, 2439 MHz.

Frequency [MHz]	Antenna Orientation	Detector	Bandwidth (MHz)	Level [dBµV/m]	Limit [dBµV/m]	Result
1796	Horizontal	Pk	1	42.3	54 (Av) 74 (Pk)	Pass
1991	Vertical	Pk	1	46.0	54 (Av) 74 (Pk)	Pass
4878*H*R	Vertical	Pk	1	53.6	54 (Av) 74 (Pk)	Pass
7318*H*R	Horizontal	Pk	1	54.8 Pk 52.7 Av	54 (Av) 74 (Pk)	Pass
9756	Horizontal	Pk	1	48.0	54 (Av) 74 (Pk)	Pass
12195*R	Vertical	Pk	1	56.3 Pk 52.5 Av	54 (Av) 74 (Pk)	Pass

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Radiated Emissions, 1 - 25GHz, 2479 MHz.

Frequency [MHz]	Antenna Orientation	Detector	Bandwidth (MHz)	Level [dBµV/m]	Limit [dBµV/m]	Result
1797	Vertical	Pk	1	48.6	54 (Av) 74 (Pk)	Pass
1995	Vertical	Pk	1	53.4	54 (Av) 74 (Pk)	Pass
4958 ^{*H*R}	Vertical	Pk	1	48.9	54 (Av) 74 (Pk)	Pass
7437 ^{*H*R}	Vertical	Pk	1	59.5 Pk 53.4 Av	54 (Av) 74 (Pk)	Pass
10025 ^{*H}	Vertical	Pk	1	50.5	54 (Av) 74 (Pk)	Pass
12393 ^{*H*R}	Horizontal	Pk	1	53.5	54 (Av) 74 (Pk)	Pass

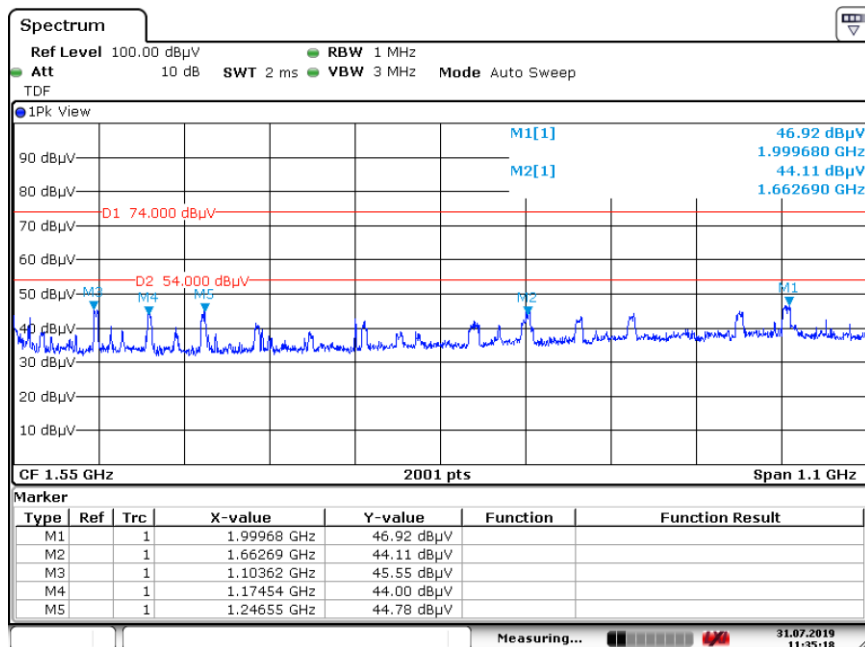
- Notes:
- *R refers to a frequency in a restricted band,
 - *H refers to a frequency which is a harmonic of the fundamental.
 - Field strength values of radiated emissions not listed in the tables above are more than 20 dB below the applicable limit.
 - Measurement uncertainty is +/- 5.5 dB.
 - a selection of plots is provided on the next pages

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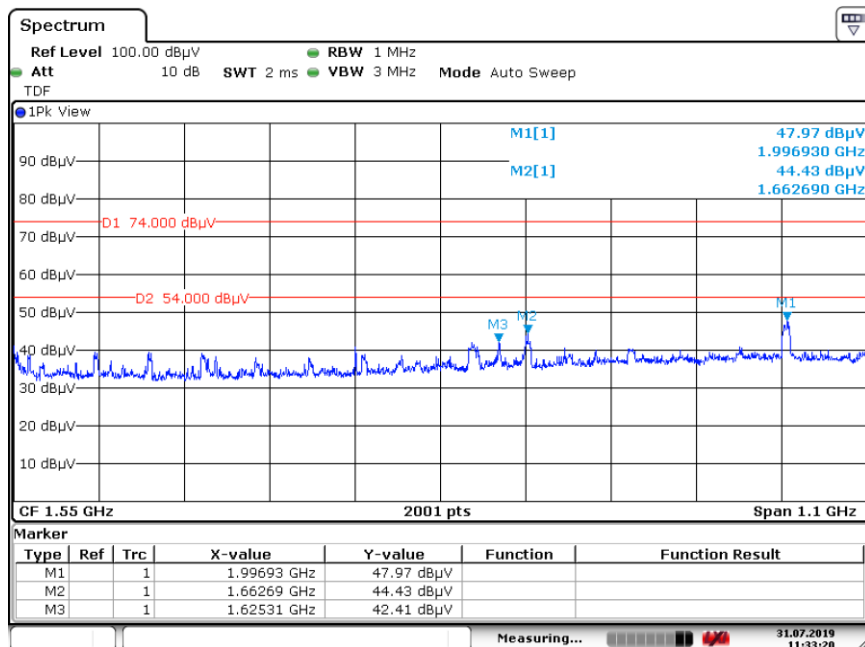
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Plots of the radiated emissions



Date: 31.JUL 2019 11:35:18

Plot of the emissions at 2403 MHz, Horizontal polarization, Peak values shown



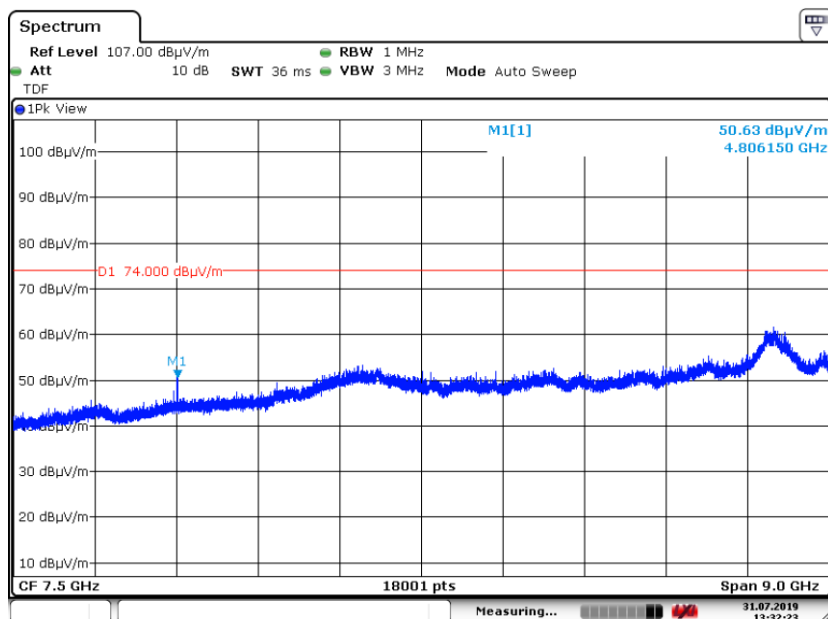
Date: 31.JUL 2019 11:33:20

Plot of the emissions at 2403 MHz, Vertical polarization, Peak values shown

Test Report No.:

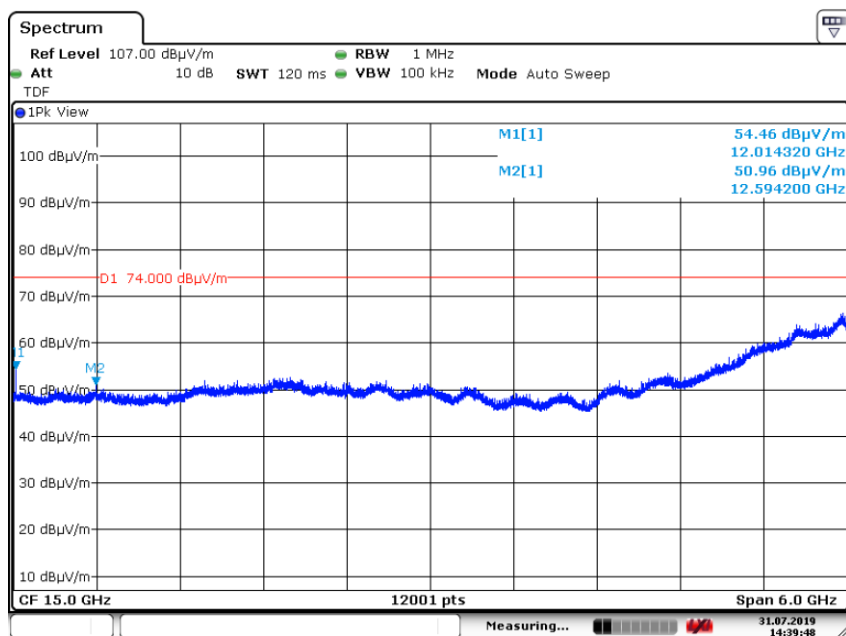
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Date: 31.JUL.2019 13:32:23

Plot of the emissions at 2403 MHz, Vertical polarization, in the range 3 – 12 GHz. Peak values shown



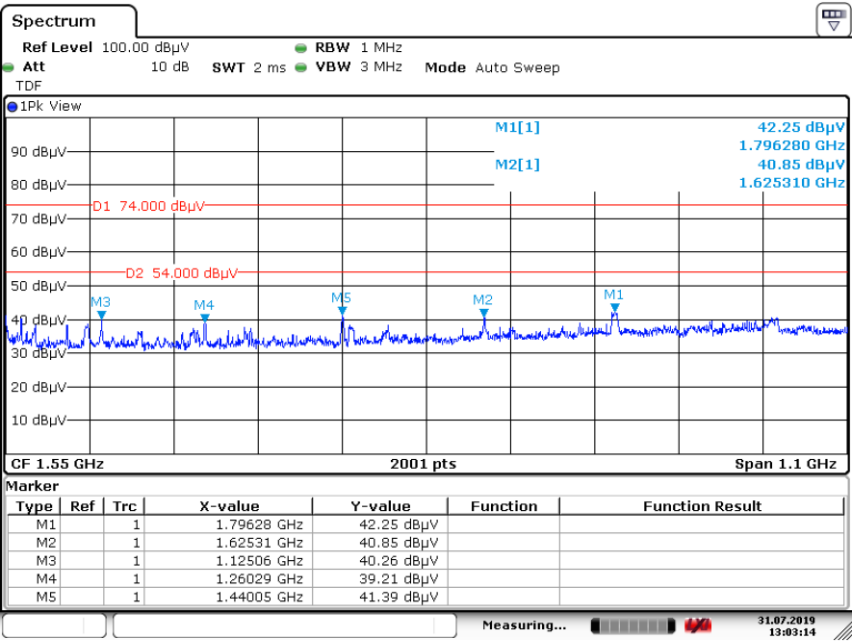
Date: 31.JUL.2019 14:39:47

Plot of the emissions at 2403 MHz, range 12 to 18 GHz, Horizontal polarization, Peak values shown

Test Report No.:

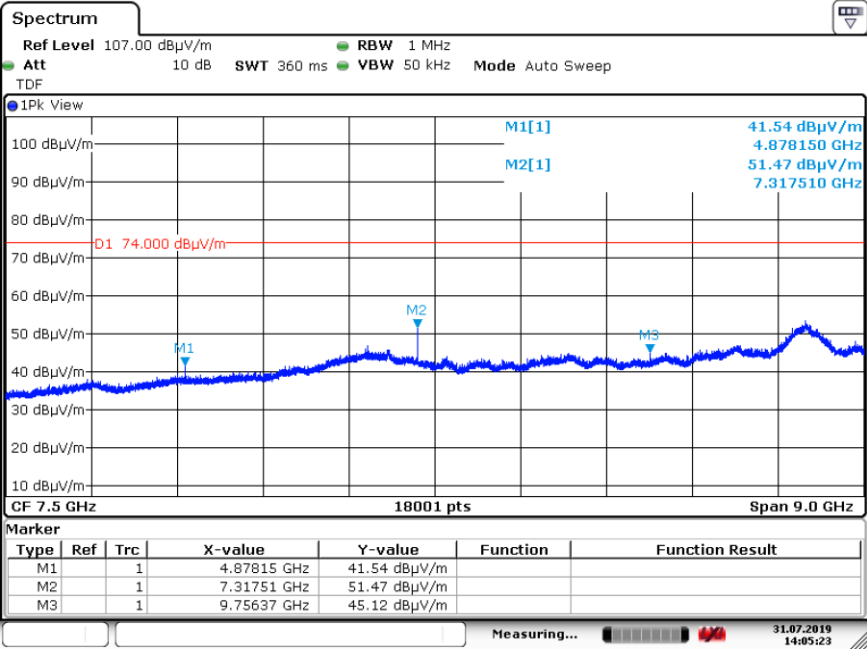
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Date: 31.JUL.2019 13:03:14

Plot of the emissions at 2439 MHz, Horizontal polarization, Peak values shown

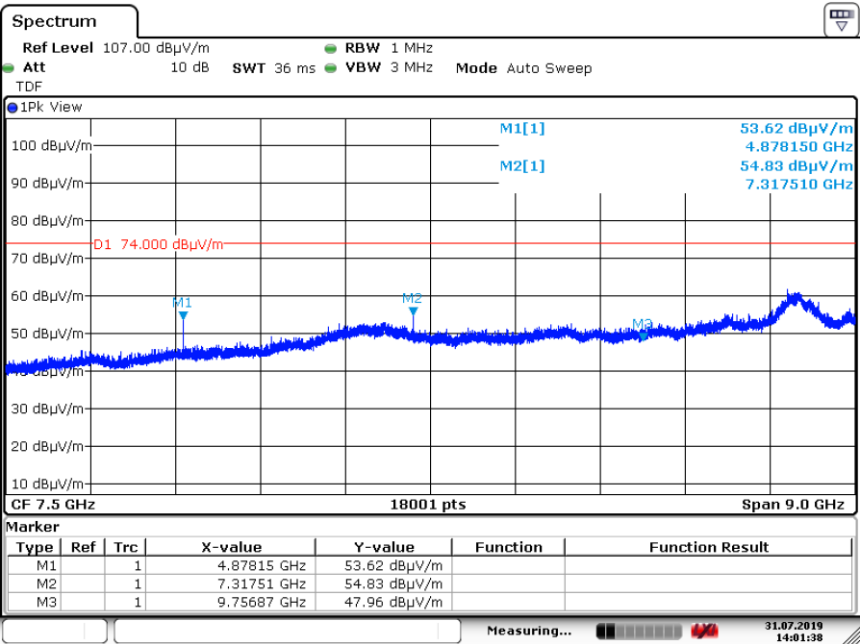


Date: 31.JUL.2019 14:05:23

Plot of the emissions at 2439 MHz, in the range 3 to 12 GHz, Horizontal polarization, Peak values shown (reduced VBW to show Pk level is below Avg limit).

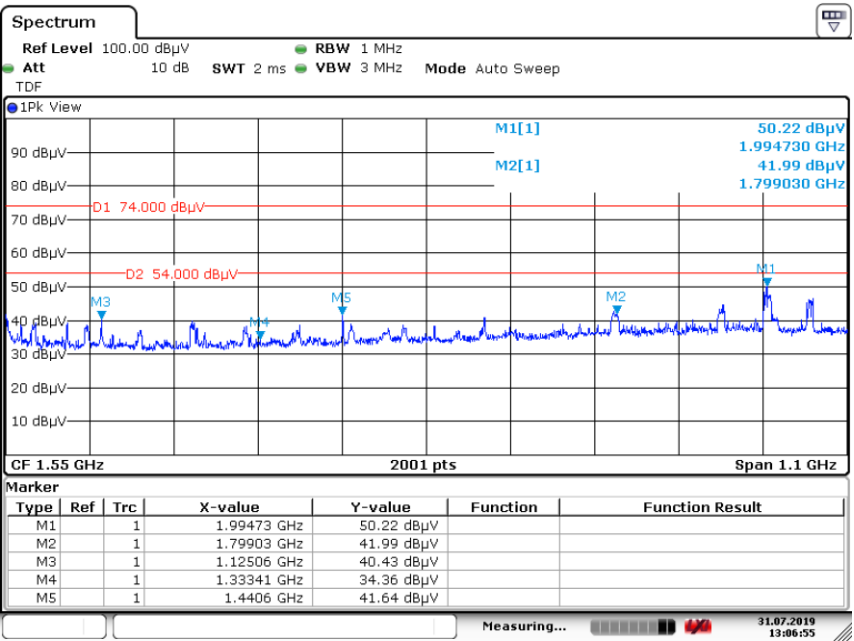
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Date: 31.JUL.2019 14:01:38

Plot of the emissions at 2439 MHz, in the range 12 to 18 GHz, Vertical polarization, Peak values shown



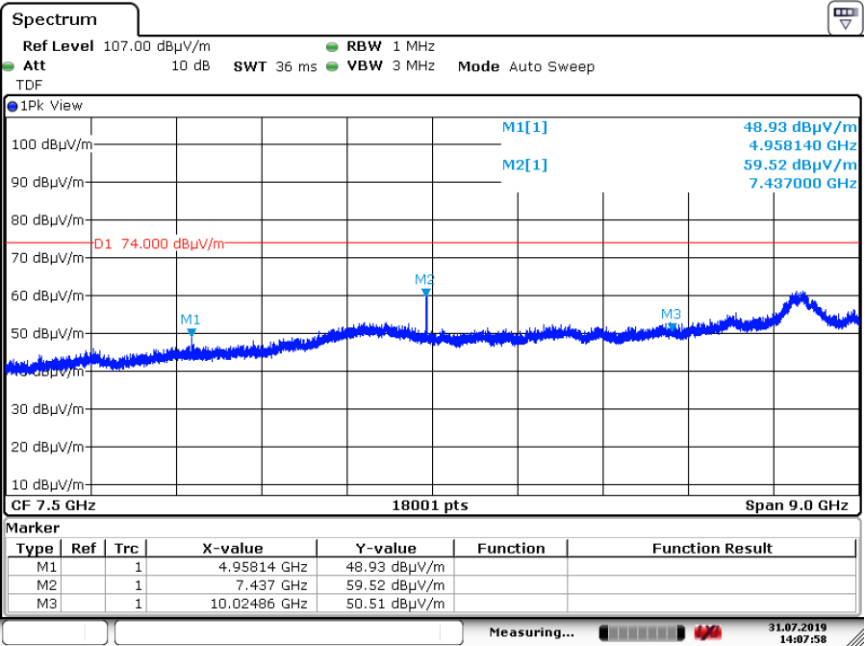
Date: 31.JUL.2019 13:06:55

Plot of the emissions at 2479 MHz, in the range 1 to 2.31 GHz, Vertical polarization, Peak values shown

Test Report No.:

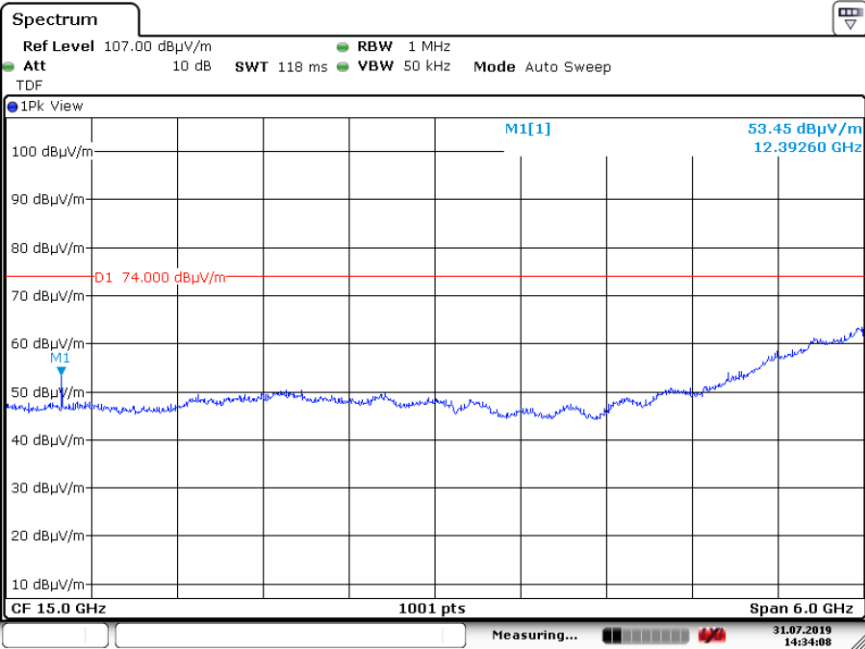
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Date: 31.JUL.2019 14:07:58

Plot of the emissions at 2479 MHz, in the range 3 to 12 GHz, Vertical polarization, Peak values shown



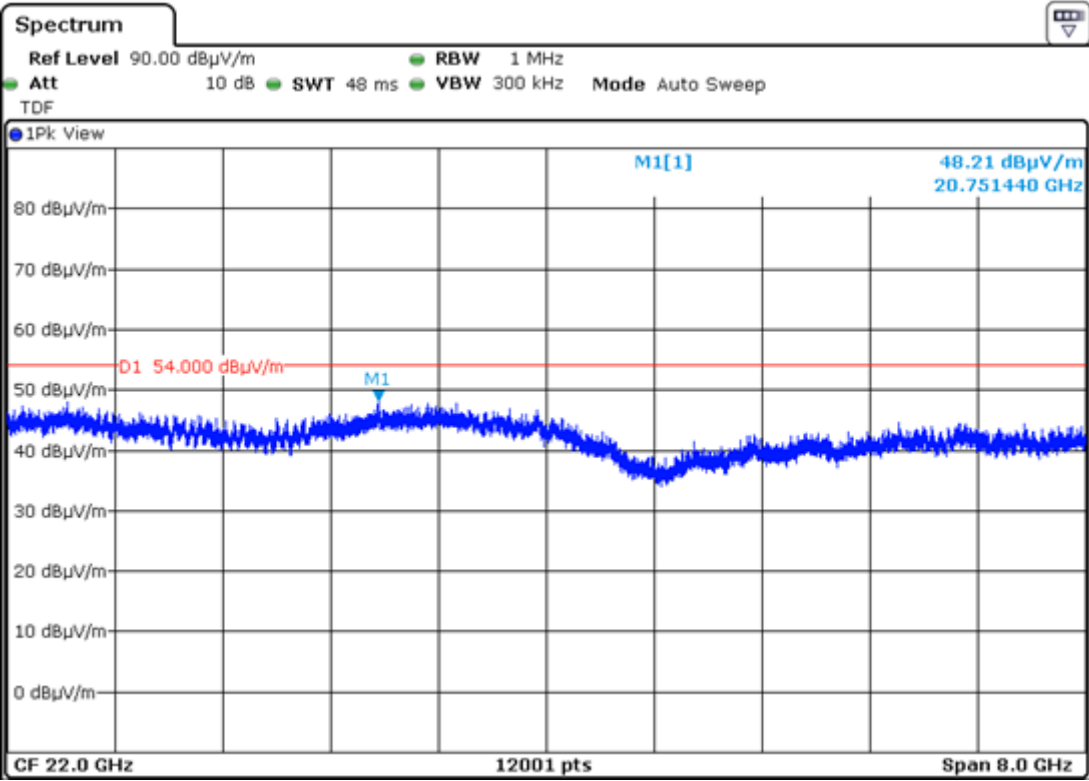
Date: 31.JUL.2019 14:34:08

Plot of the emissions at 2479 MHz, in the range 12 to 18 GHz, Horizontal polarization, Peak values shown- (reduced VBW to show Pk level is below Avg limit).

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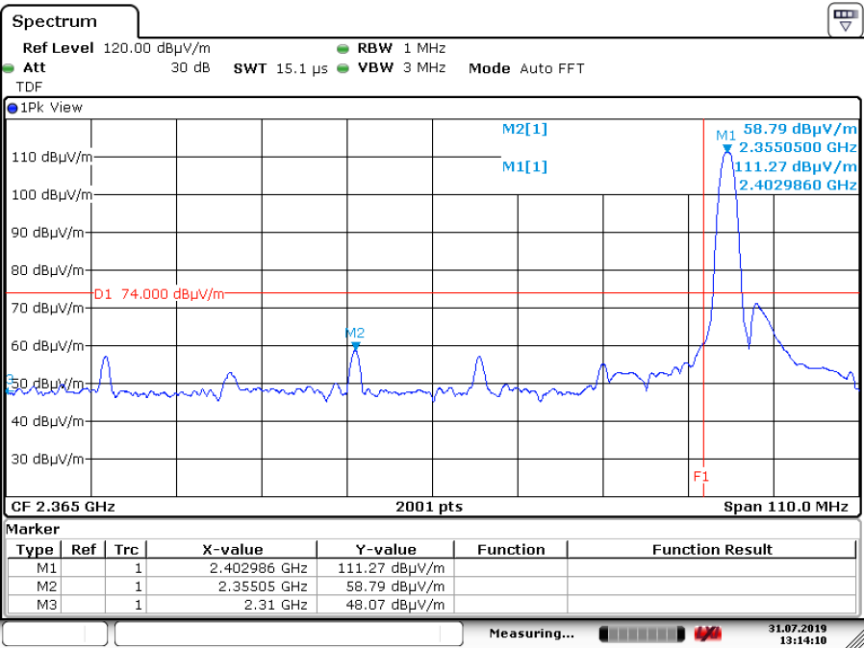


Plot Radiated unwanted emissions in the range 18 – 25 GHz at 2479 MHz,
(reduced VBW to show Pk level is below Avg limit).

Test Report No.:

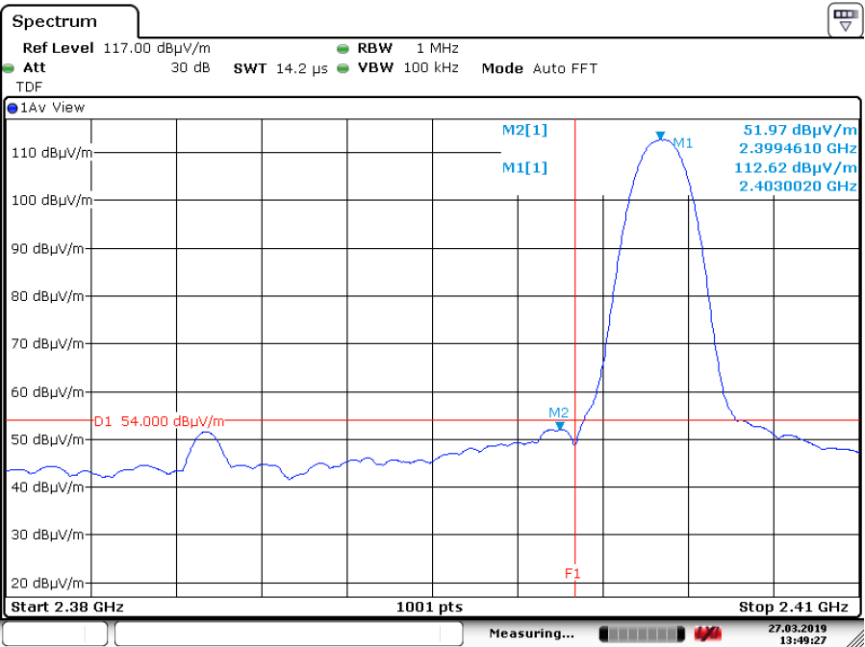
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Date: 31.JUL.2019 13:14:09

Plot of the band edge emission, Peak values @ 2403 MHz, F1 shows the band edge at 2400 MHz. M2 denotes a Peak emission in the restricted band 2310-2390 MHz, which is below the limit.



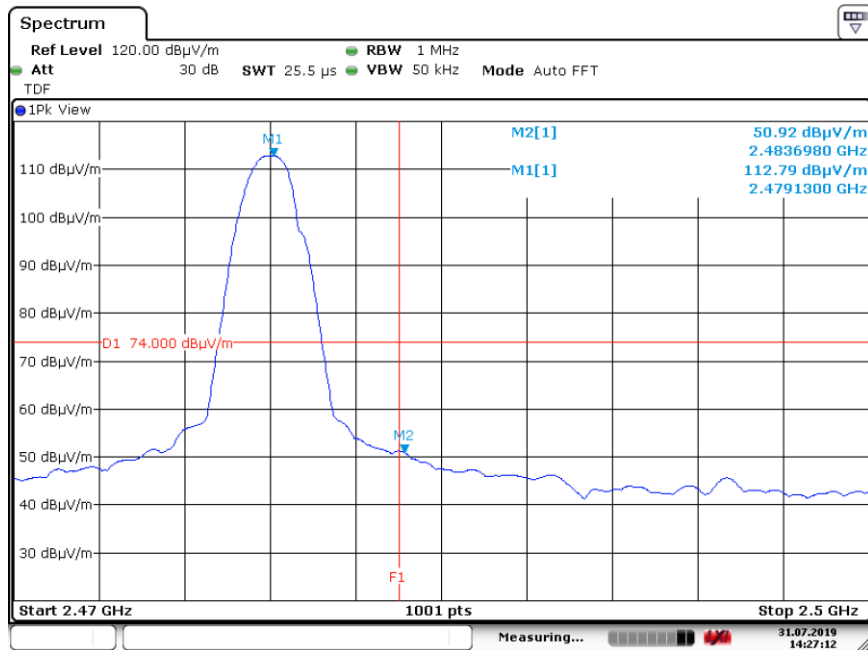
Date: 27.MAR.2019 13:49:28

Plot of the band edge emission, Average values @ 2403 MHz, F1 shows the band edge at 2400 MHz. Average emissions in the restricted band 2310-2390 MHz are below the limit. M2 marks the highest emission which is within limits, just outside the assigned band.

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Date: 31.JUL.2019 14:27:13

Plot of the band edge emission @ 2479 MHz, F1 shows the band edge at 2483.5 MHz.
All Peak emissions are already below average limits. (reduced VBW to show Pk level is below Avg limit).

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5.2 AC Power Line Conducted Measurements

RESULT: Pass.

Date of testing:

2019-08-15

Requirements: for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V) Quasi-Peak	Conducted Limit (dB μ V) Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	46	50

*Decreases with the logarithm of the frequency.

Test procedure:

ANSI C63.10-2013.

Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50 μ H / 50 Ω LISN. The frequency range from 150kHz to 30MHz was searched. The six highest EUT emissions relative to the limit were noted. The EUT was positioned at least 80cm from the LISN. The power cable was routed over the non-conductive plate to the LISN.

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5.2.1 AC Power Line Conducted Emission of Transmitter

Frequency (MHz)	Measurement results (dBµV) L1		Measurement results (dBµV) L2/Neutral		Limits (dBµV)		Verdict (Pass/Fail)
	QP	AV	QP	AV	QP	AV	
0.1539	45.1	*2	35.0	*2	66.0	56.0	Pass
0.1891	42.5	*2	42.1	*2	64.0	54.0	Pass
0.2320	38.3	*2	38.6	*2	62.4	52.4	Pass
0.2398	28.2	*2	36.0	*2	62.1	52.1	Pass
2.3020	33.2	*2	25.3	*2	56.0	46.0	Pass
21.650	28.4	*2	22.0	*2	60.0	50.0	Pass

The results of the AC power line conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207(a), at the 120 Volts/ 60 Hz AC mains connection terminals of the power supply adapter that connects to the EUT, are depicted in the table above.

Notes:

1. The resolution bandwidth used was 9 kHz.
2. Qp values were already within Av limits, therefor Av not tested. Worst case values noted.
3. Measurement uncertainty is +/- 3.5 dB.
4. Plots are provided on the next pages.

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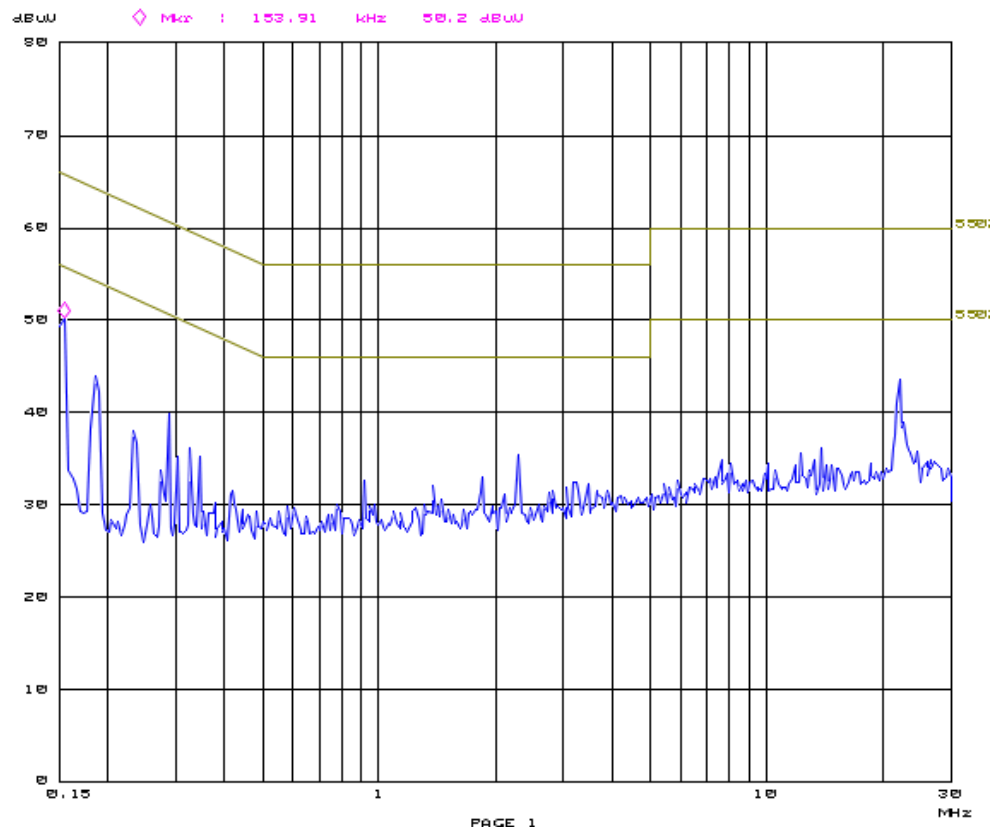
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5.2.2 Plots of the AC Power-line Conducted Emissions

15. Aug 19 13:17

Overview Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	30M	3.9k	9k	PK	0.10ms	20dB LN	OFF	



Plot of the AC Power-line Conducted emissions on L1

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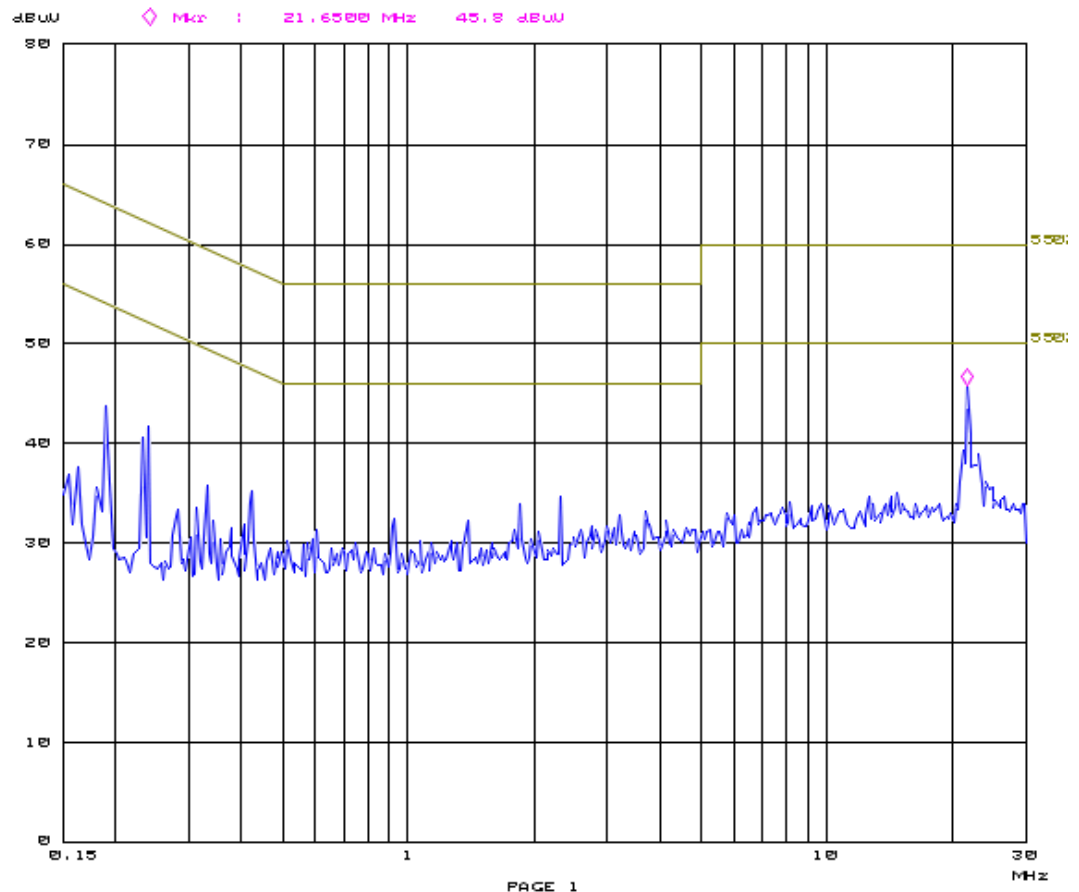
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15. Aug 19 13:13

Overview Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	3.9k	9k	PK	0.10ms	20dB LN	OFF



Plot of the AC Power-line Conducted emissions N

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End of report