EMC Test Report

Project Number:	**4533138**	**Proposal Number:**	**9655**
Report Number:	**4533138EMC01**	**Revision Level:**	**0**
Client:	**Humatics Corporation**		

Equipment Under Test:	**UWB Radio**
Model Name:	**Beacon-Node**
Model Number:	**Beacon – 200-00064** **Node – 200-00063**
FCC ID:	**NUF- C445-A**

Applicable Standards:	**FCC Part 15, Subpart F**
	ANSI C63.10:2013

Report issued on:	**7 February 2020**
Test Result:	**Compliant**

Tested by: Brandon E. Osborn
Brandon Osborn, Project Engineer

Reviewed by: David J Schramm
David Schramm, Operations Manager

Remarks:
This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 Summary of Test Results

Reference	Description	Test Result
15.519(a)	Transmission Timing	-- [1]
15.519(b)	10dB bandwidth contained within 3100 to 10600 MHz	Compliant
15.503(d)	10dB bandwidth greater than 500 MHz	Compliant
15.519(c)	Radiated emissions above 960 MHz	Compliant
15.519(d)	Radiated emissions in GPS receive band	Compliant
15.519(e)	Peak emission in a 50 MHz bandwidth	Compliant
15.519(c)	Radiated emissions below 960 MHz per 15.209	Compliant
15.207	Conducted emissions	Compliant

Note 1: See Technical Description for details of the transmission timing.

1.1 *Modifications Required to Compliance*

None

2 General Information

2.1 *Client Information*

Name:	Humatics Corporation
Address:	101 Main Street Suite 1400
City, State, Zip, Country:	Cambridge, MA 02142

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA

2.3 *General Information of EUT*

Model Number:	Beacon – 200-00064; Node – 200-00063
Hardware:	Rev 4
Serial Number:	UWB Testing: 021909B020028 Unintentional Radiated Emissions: 021908B020197 AC Mains Conducted Emissions:502220N07N0010
Voltage:	P.O.E. (Power over Ethernet) 54 VDC Auxiliary input: 48 VDC
Sample Received Date:	14-October-2019: UWB Testing 11-November-2019: Unintentional Radiated Emissions 15-January-2020: AC Mains Conducted Emissions
Dates of testing:	14-15 October 2019: UWB Testing 11-November-2019: Unintentional Radiated Emissions 15-January-2020: AC Mains Conducted Emissions

2.4 *Operating Modes and Conditions*

Manufacturer provided software to interface and control the EUT to transmit continuously at max transmit power

EUT was rotated through 3 orthogonal axes. This report contains the worst-case data.

2.5 *System Configurations*

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Humatics Corporation	UWB Radio	Beacon-Node	First:021909B020028 Second: 021908B020197

2.6 *Support Equipment*

Device reference	Manufacturer	Description	Model Number	Serial Number
B	BV Tech	POE Switch	POE-SW501	NSN
C	Apple	Laptop	MacBook	-
D	Delta Electronics	External Power Supply	ADP-480R	13

2.7 *Cable List*

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	Ethernet	Laptop	POE Switch	10.0	No	Yes
2	Ethernet	POE Switch	EUT	1.0	No	Yes
3	Aux DC In	External Power Supply	EUT	1.0	No	No

3 UWB Bandwidth requirements

3.1 *Test Result*

Test Description	Reference	Test Result
10dB bandwidth contained within 3100 MHz and 10,600 MHz	15.519(b)	Compliant
10dB bandwidth greater than 500 MHz	15.503(d)	Compliant

3.2 *Test Method*

The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3,100 MHz and 10,600 MHz.

Test method: ANSI C63.10, Clause 10.2

Ultra-wideband (UWB) transmitter: An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

3.3 *Test Site*

10m Absorber Lined Shielded Enclosure, SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 22.6°C
Relative Humidity: 50.7 %

3.4 *Test Equipment*

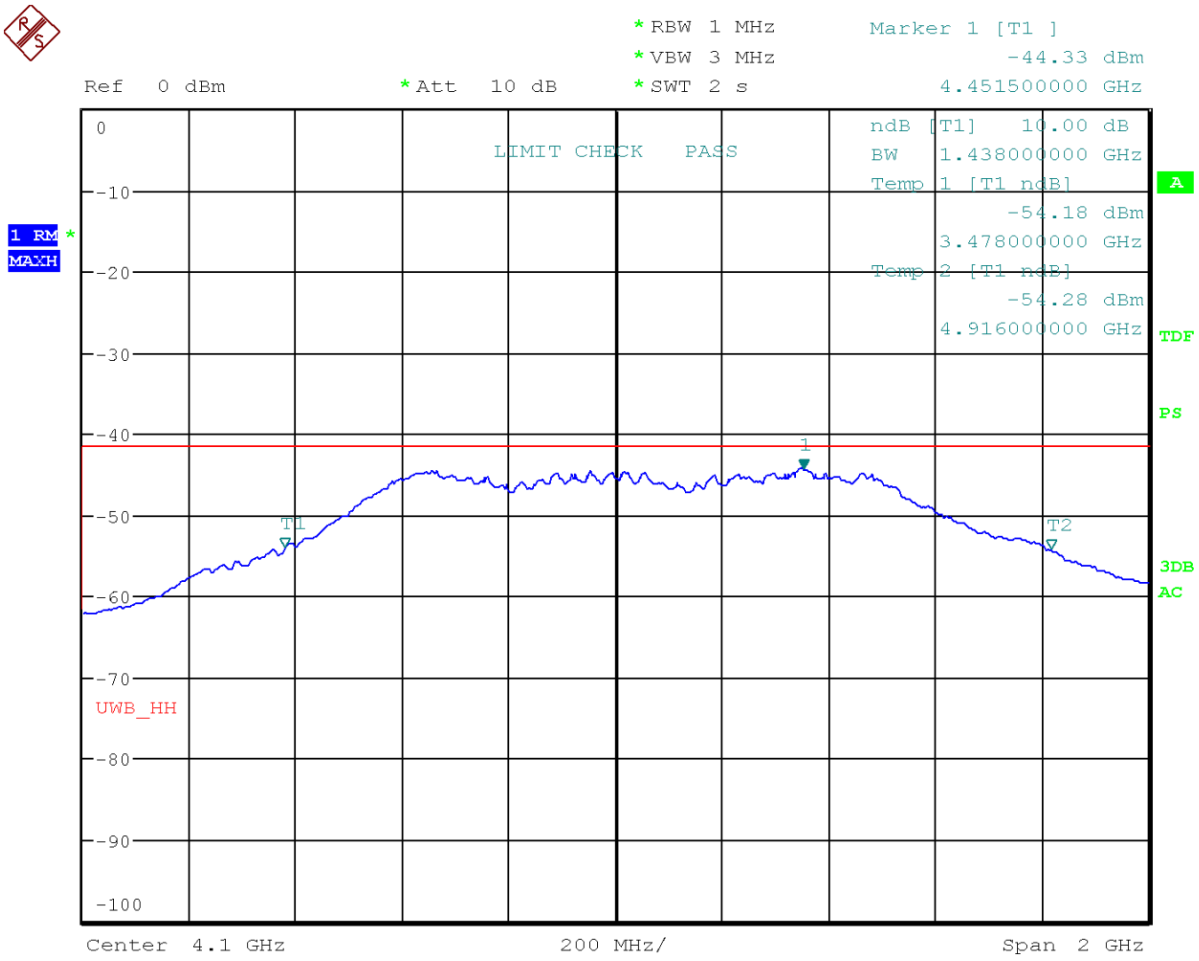
Test End Date: 14-Oct-2019 Tester: BEO

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SF102	Huber & Suhner	B079822	17-Jul-2020
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079691	10-Aug-2020
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	5-Sep-2020

Note: The calibration period for this equipment is 1 year.

3.5 *Test Data*

Vertical Bandwidth Plot



Date: 14.OCT.2019 11:39:36

Bandwidth Results						
Antenna Polarity	f_M, Frequency of Max level, MHz	f_L, Frequency 10dB below Max MHz	f_H, Frequency 10dB above Max MHz	($f_H - f_L$), 10 dB bandwidth MHz	Bandwidth requirement >500 MHz	Detectors / RBW / VBW
Vertical	4451.5	3478	4916	1438.0	Compliant	RMS 1MHz / 3MHz

Note: This measurement was the worst case.

4 Radiated emissions above 960 MHz

4.1 *Test Result*

Test Description	Reference	Test Result
Radiated emissions above 960 MHz	15.519(c)	Compliant

4.2 *Test Method*

Test method: ANSI C63.10, Clause 10.3

Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

1) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following RMS average limits based on measurements using a 1 MHz resolution bandwidth:

Frequency (MHz)	EIRP in dBm
960–1610	-75.3
1610–1990	-63.3
1990–3100	-61.3
3100–10600	-41.3
Above 10600	-61.3

A measurement distance of 1 meter was determined to provide the optimum dynamic range. Because the limits are so low, some frequency ranges may have been scanned at a distance closer than 1 meter. The actual distance for final measurement was indicated in the measurement data.

4.3 *Test Site*

10m Absorber Lined Shielded Enclosure, SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 22.6°C
Relative Humidity: 50.7%

4.4 *Test Equipment*

1-18 GHz

Test End Date: 14-Oct-2019 Tester: BEO

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SF102	Huber & Suhner	B079822	17-Jul-2020
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079691	10-Aug-2020
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	5-Sep-2020

18-40 GHz

Test End Date: 14-Oct-2019 Tester: BEO

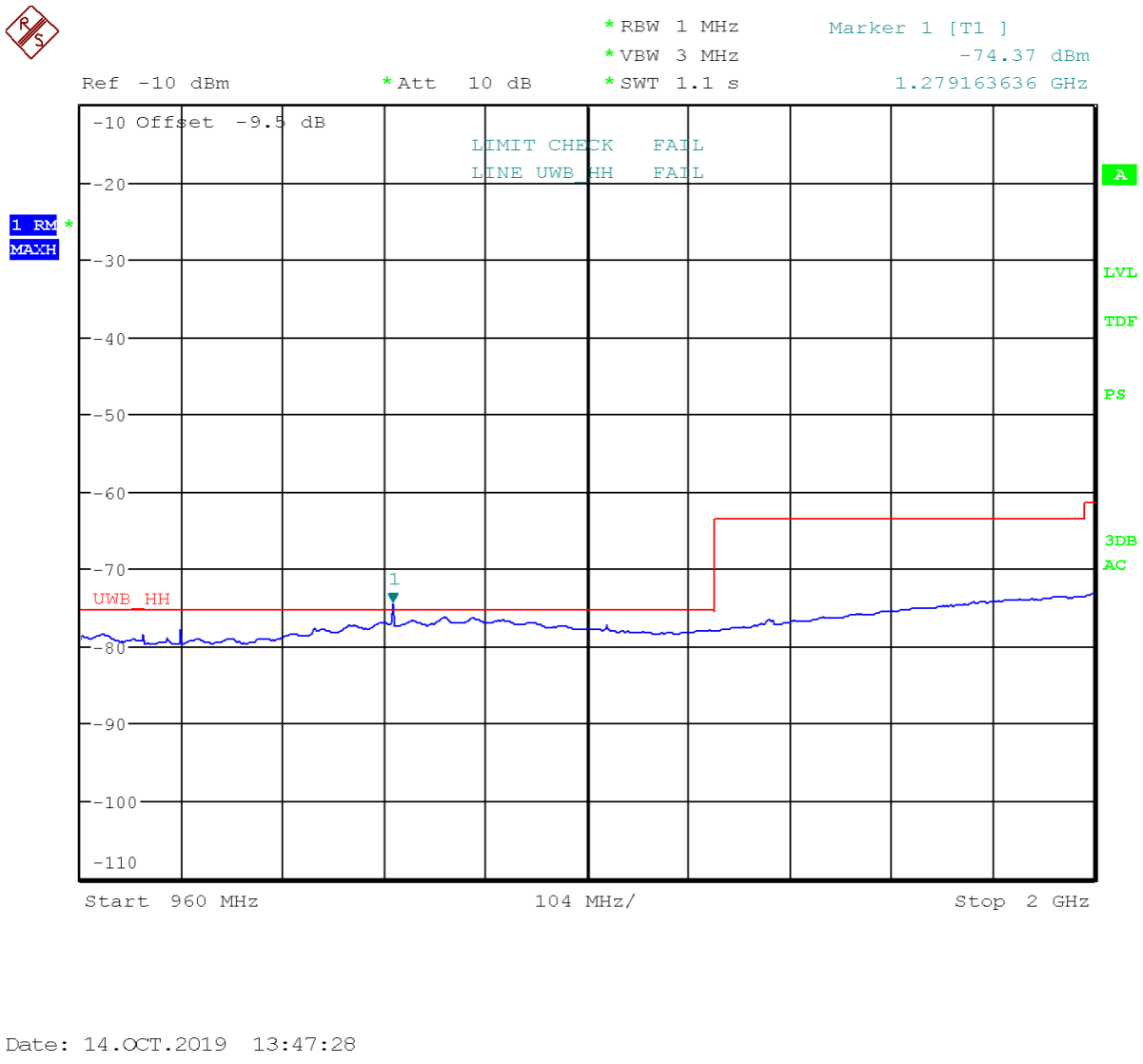
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	7-Oct-2020
RF CABLE	SF102	Huber & Suhner	B079822	17-Jul-2020
ANTENNA, HORN (SMALL)	LB-180400-20-C-KF	A-INFO	15007	30-Mar-2020
RF CABLE	SF102	Huber & Suhner	B079823	17-Jul-2020

Note: The equipment calibration period is 1 year.

Software:
“Radiated Emissions 1-18GHz.TIL” TILE! profile dated Dec 2018
“Radiated Emissions 18-40GHz.TIL” TILE! profile dated Dec 2015

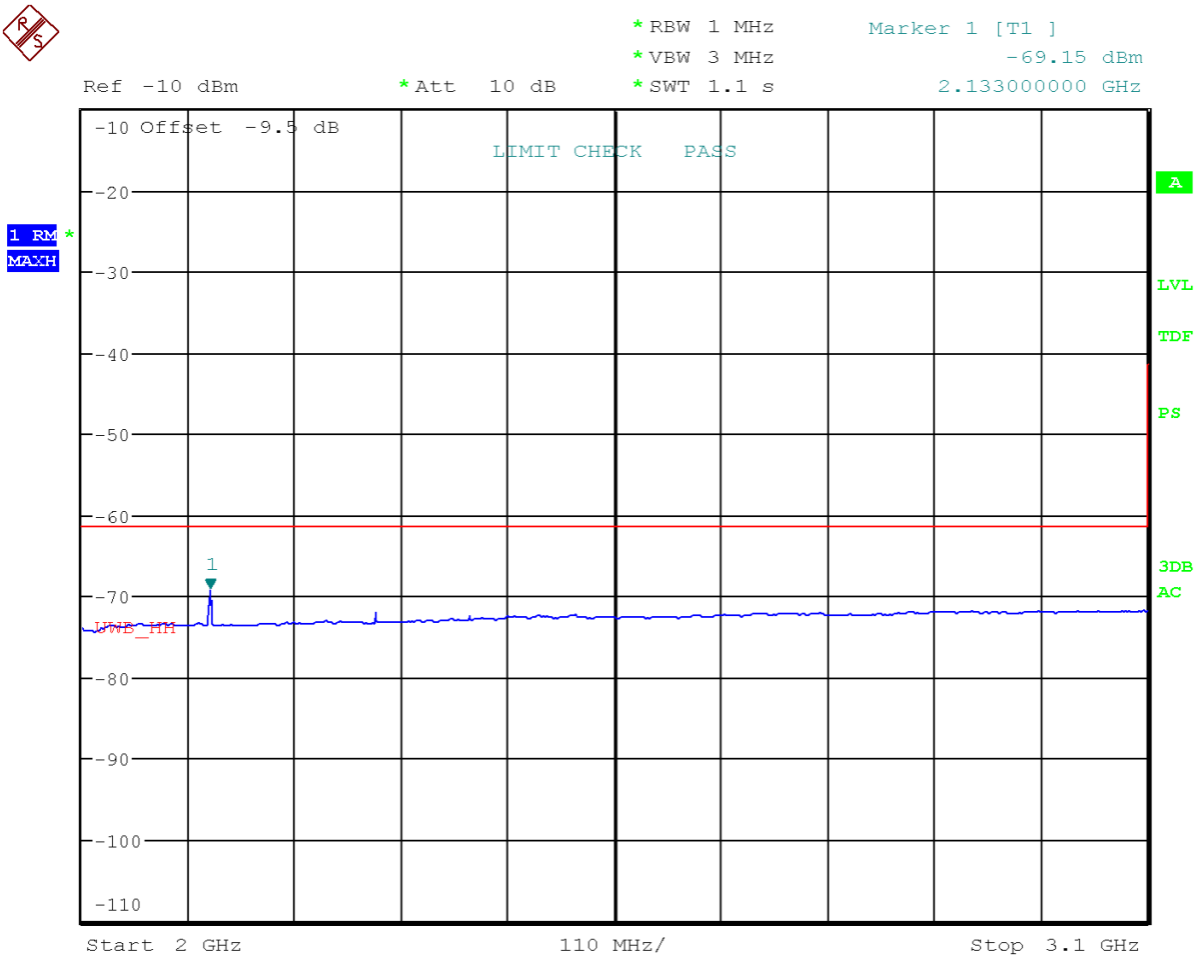
4.5 *Test Data – Horizontal*

Radiated Emissions (960MHz – 2GHz) – Horizontal
Test Distance = 1 meter



Emission at 1.28 GHz was a digital emission and did not change when transmitter was turned off.

Radiated Emissions (2 GHz – 3.1GHz) – Horizontal
Test Distance = 1 meter



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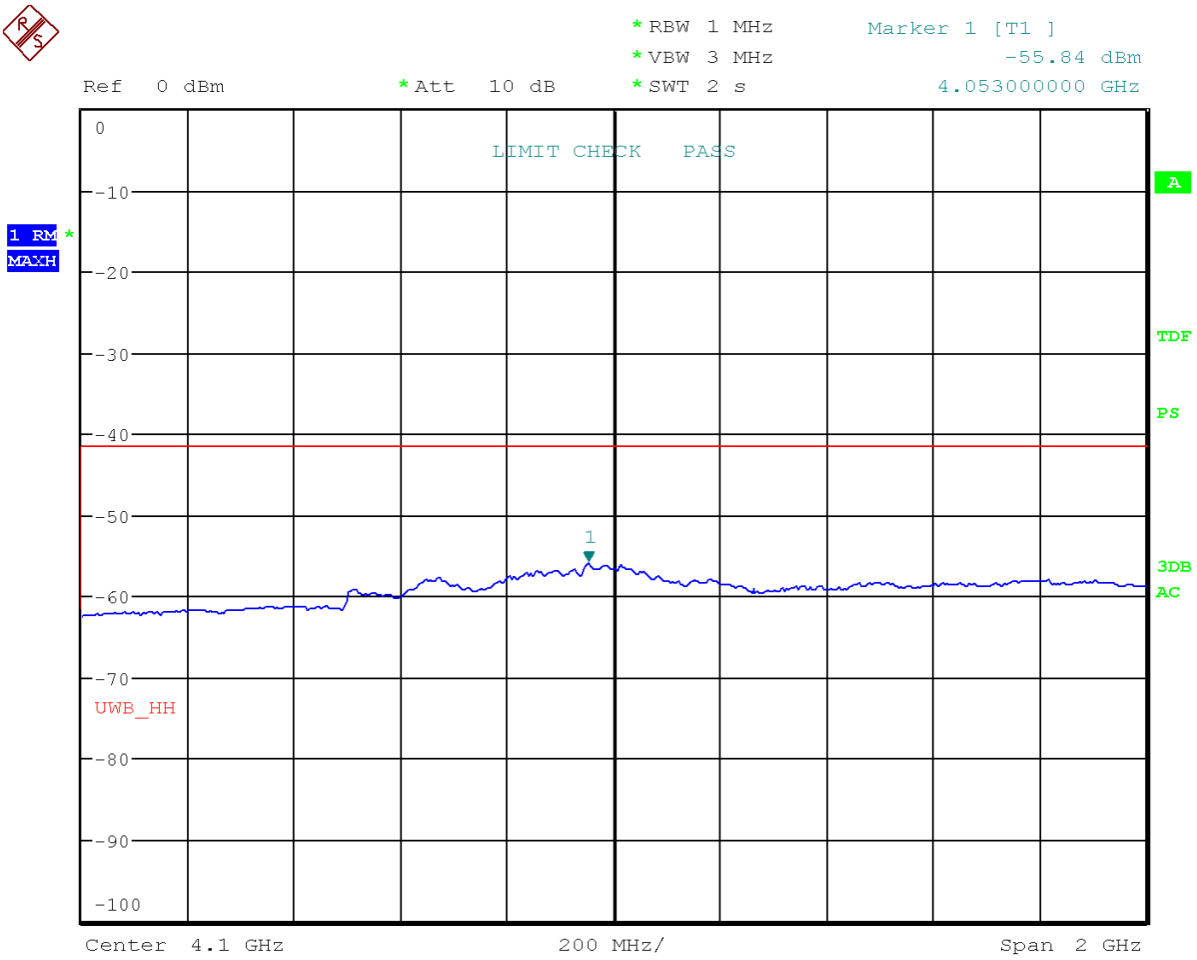
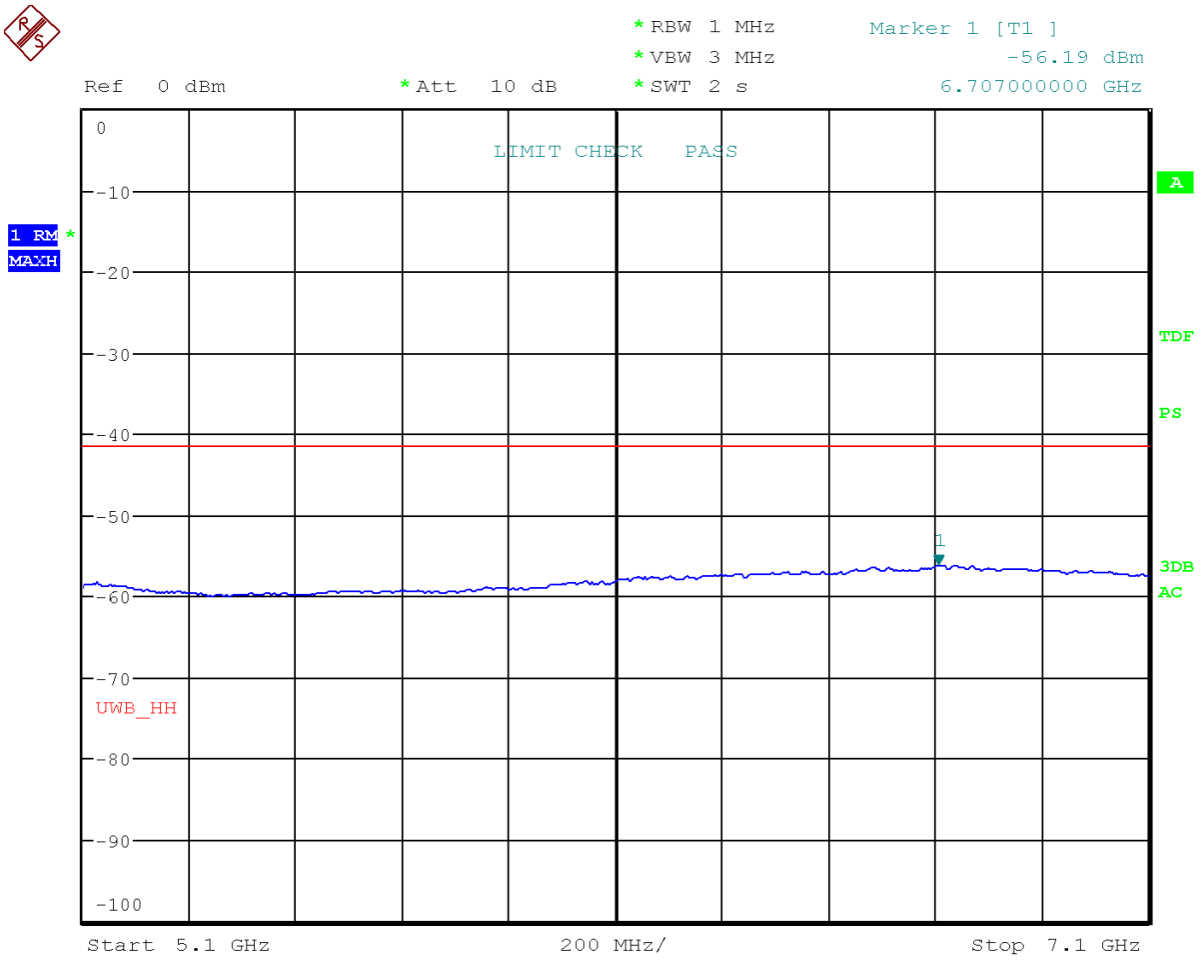
Radiated Emissions (3.1GHz – 5.1GHz) – Horizontal
Test Distance = 3 meter



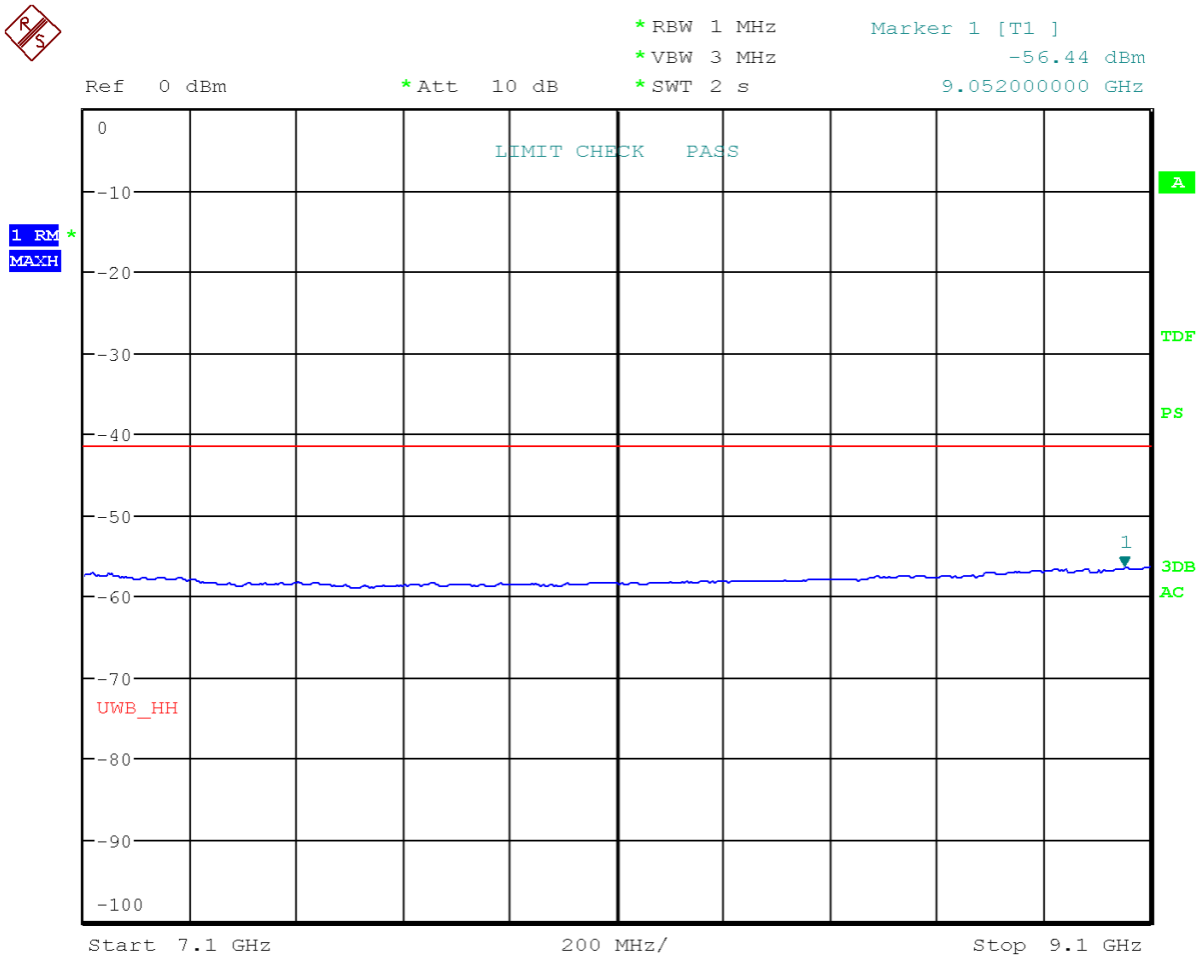
Date: 14.OCT.2019 12:09:56

Radiated Emissions (5.1GHz – 7.1GHz) – Horizontal
Test Distance = 3 meter



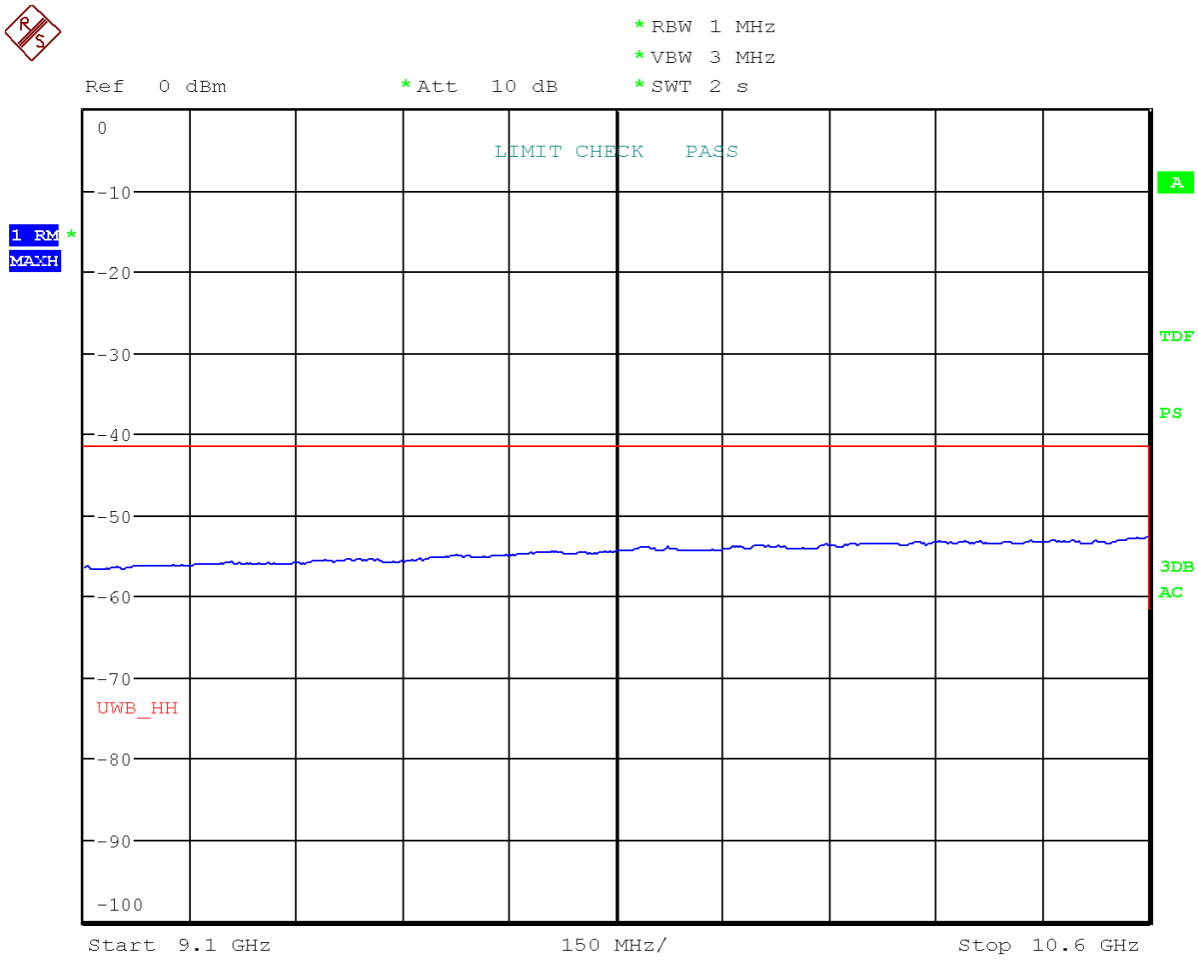
Date: 14.OCT.2019 12:11:06

Radiated Emissions (7.1GHz – 9.1GHz) – Horizontal
Test Distance = 3 meter



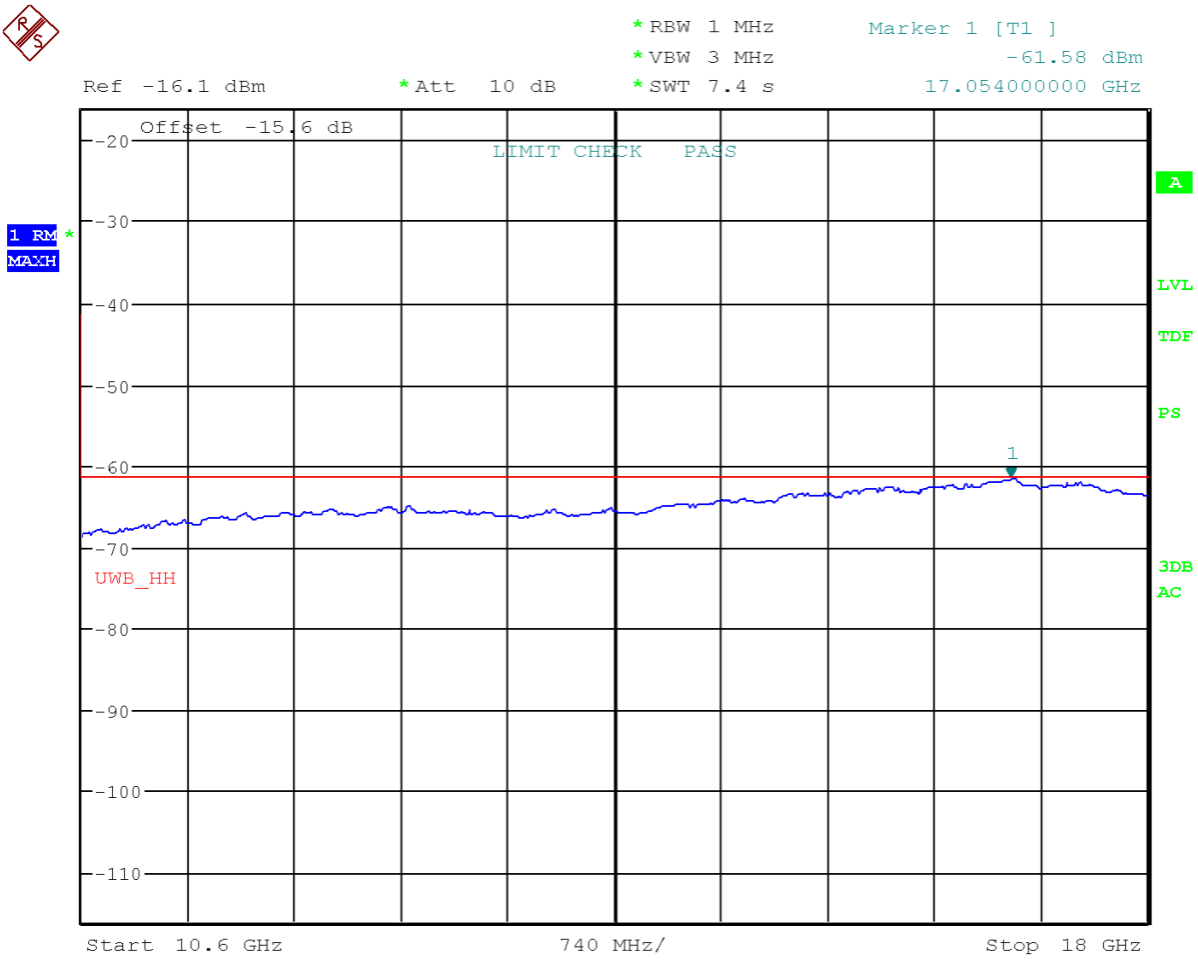
Date: 14.OCT.2019 12:12:16

Radiated Emissions (9.1GHz – 10.6GHz) – Horizontal
Test Distance = 3 meter



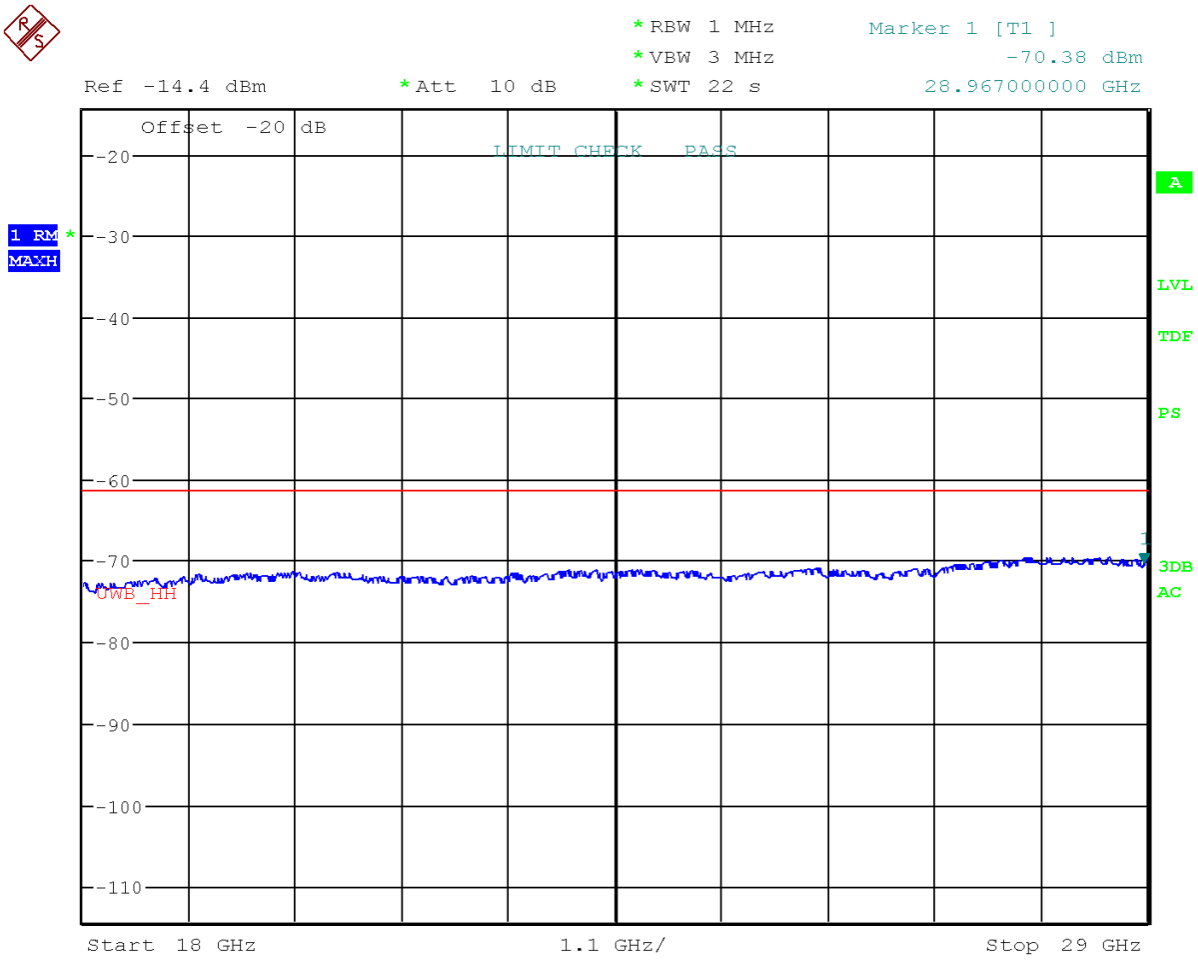
Date: 14.OCT.2019 12:14:56

Radiated Emissions (10.6GHz – 18GHz) – Horizontal
Test Distance = 0.5 meter



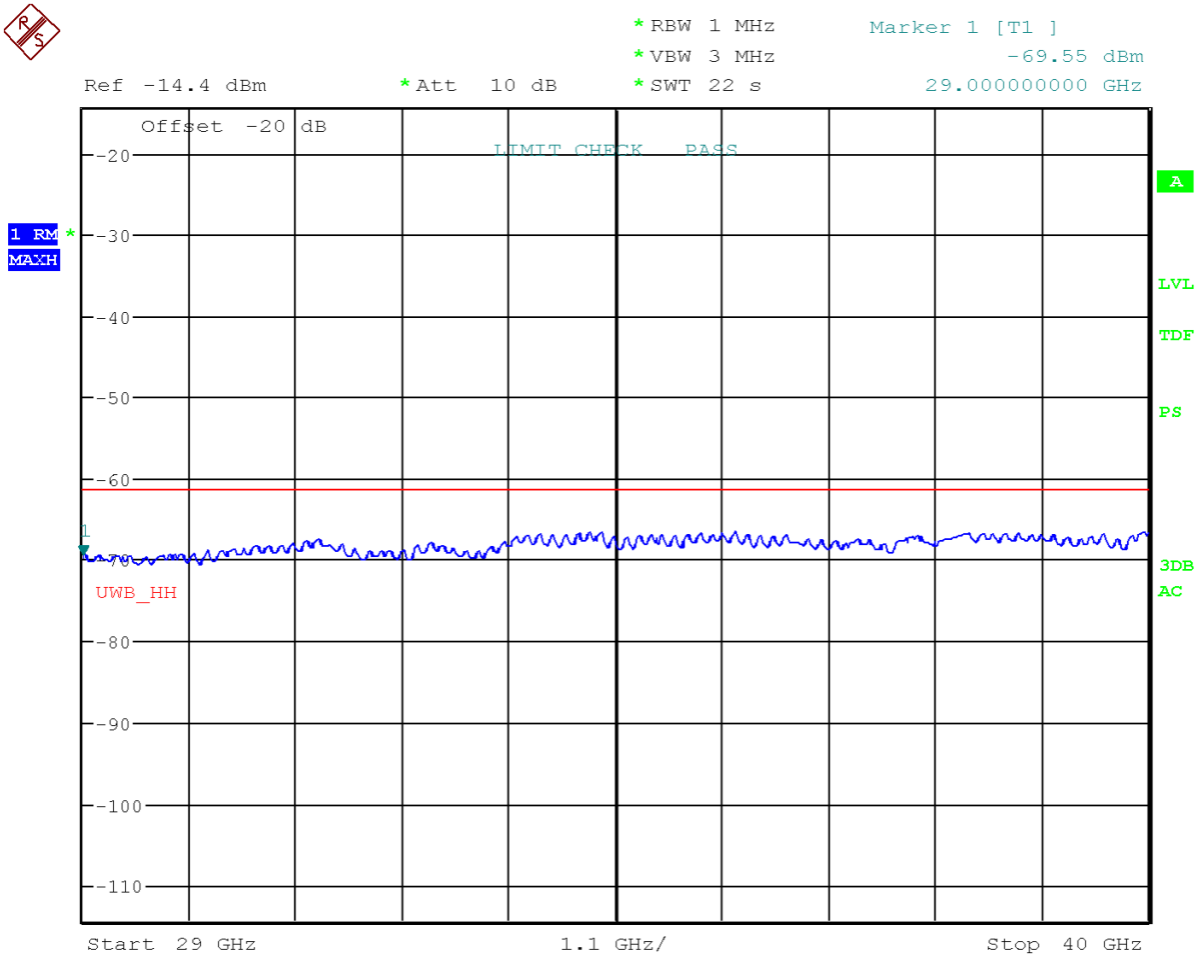
Date: 14.OCT.2019 14:26:08

Radiated Emissions (18GHz – 29GHz) – Horizontal
Test Distance = 0.3 meter



Date: 14.OCT.2019 16:10:04

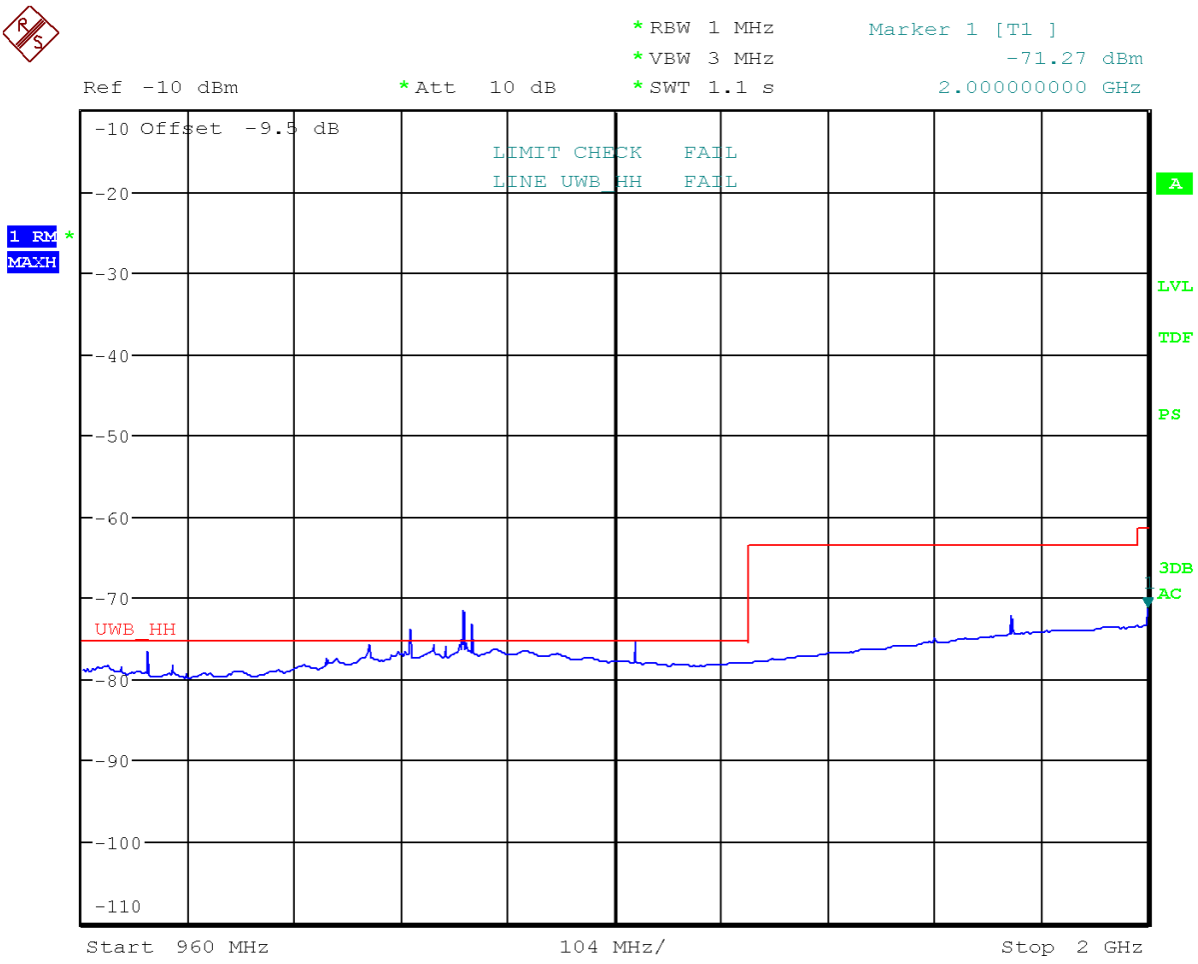
Radiated Emissions (29GHz – 40GHz) – Horizontal
Test Distance = 0.3 meter



Date: 14.OCT.2019 16:11:41

4.6 *Test Data – Vertical*

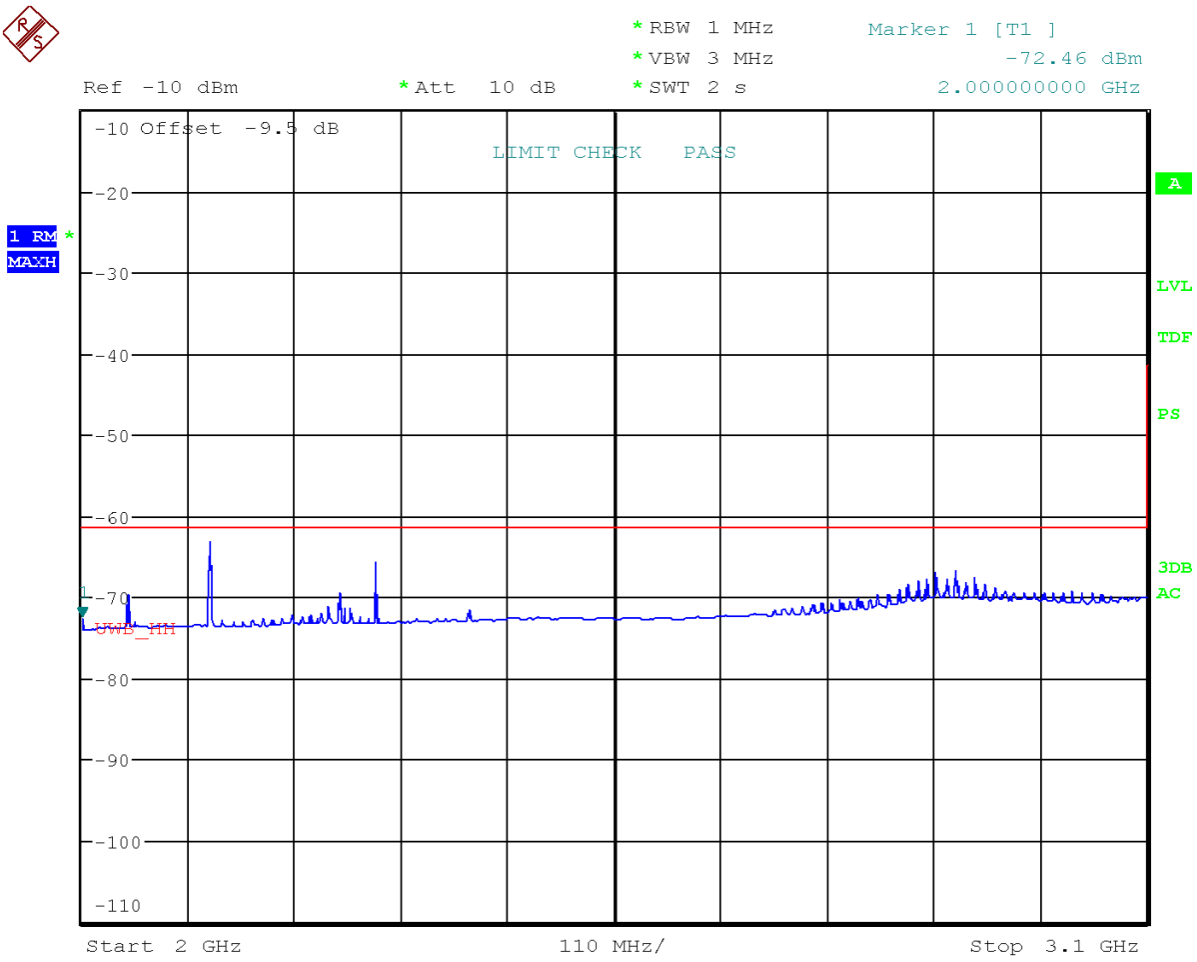
Radiated Emissions (960MHz – 2GHz) – Vertical
Test Distance = 1 meter



Date: 14.OCT.2019 13:57:48

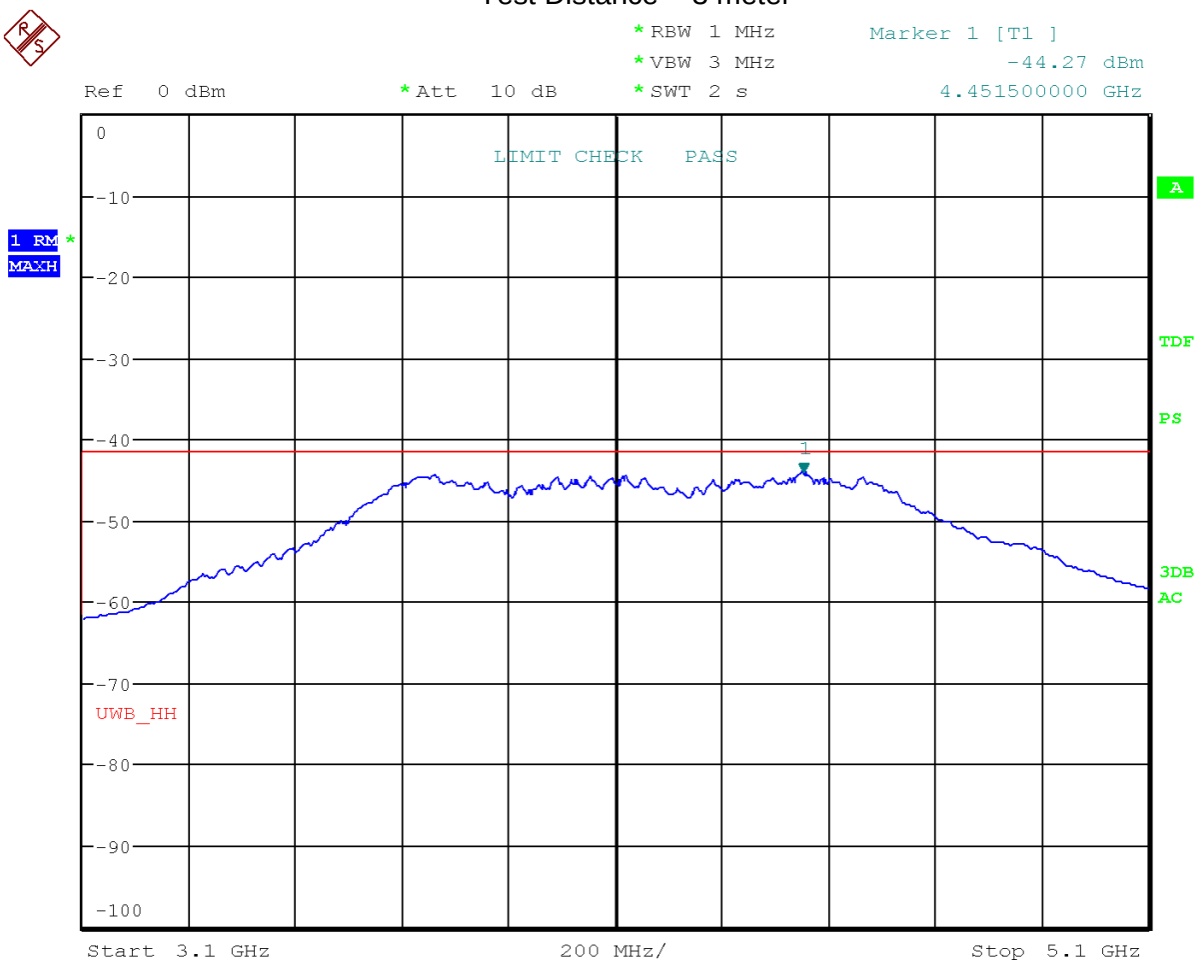
Emissions were a digital emission and did not change when transmitter was turned off.

Radiated Emissions (2.0GHz – 3.1GHz) – Vertical
Test Distance = 1 meter



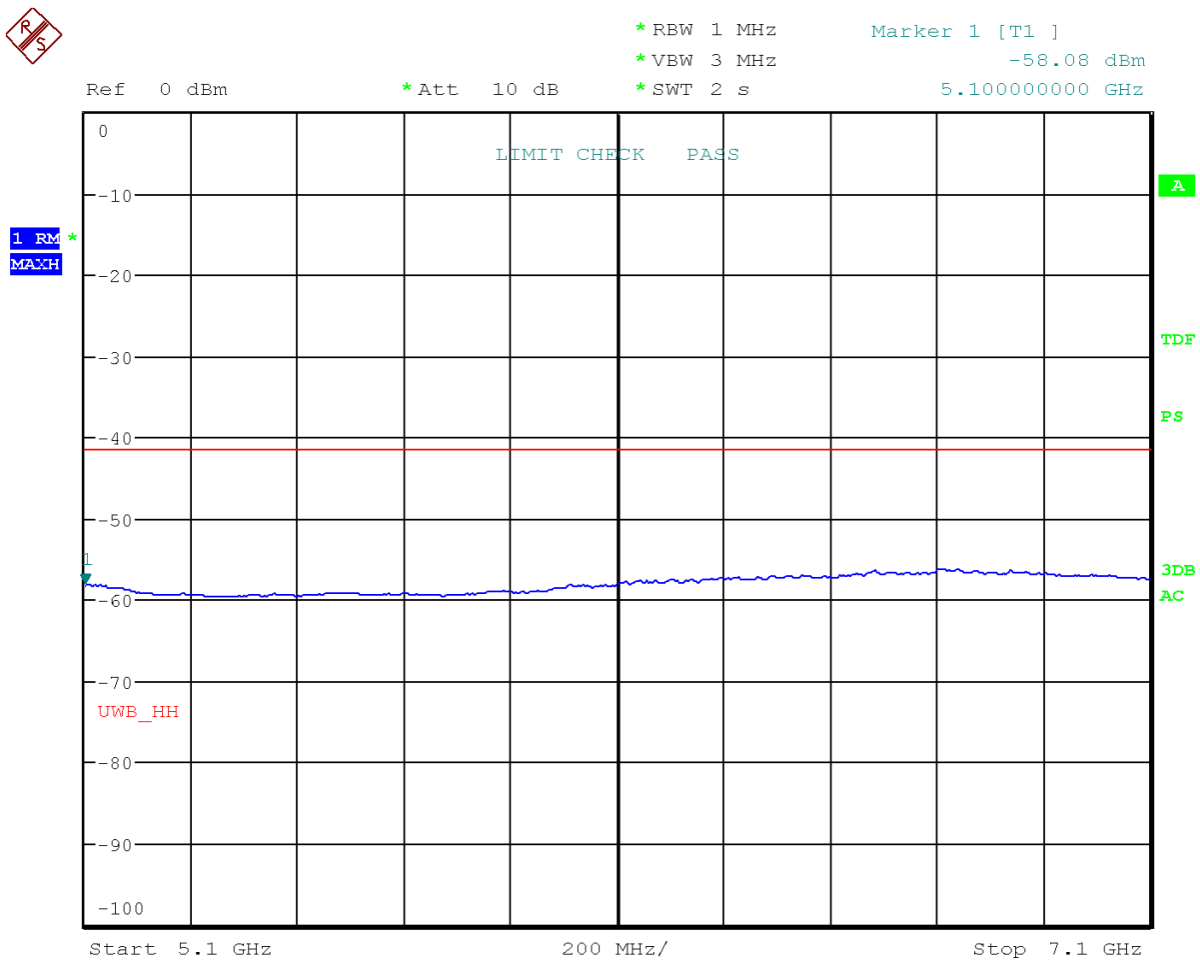
Date: 14.OCT.2019 14:08:47

Radiated Emissions (3.1GHz – 5.1GHz) – Vertical
Test Distance = 3 meter



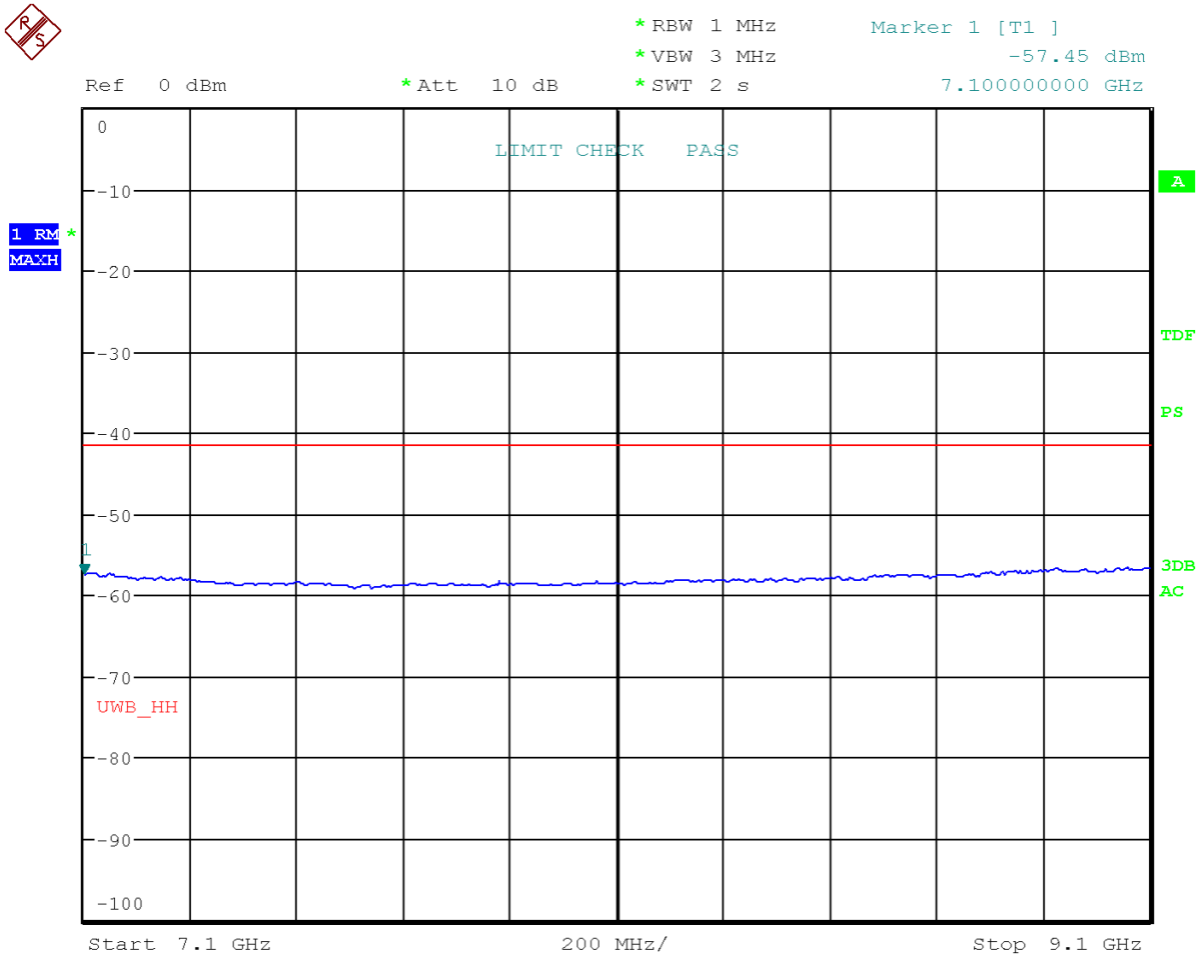
Date: 14.OCT.2019 11:41:05

Radiated Emissions (5.1GHz – 7.1GHz) – Vertical
Test Distance = 3 meter



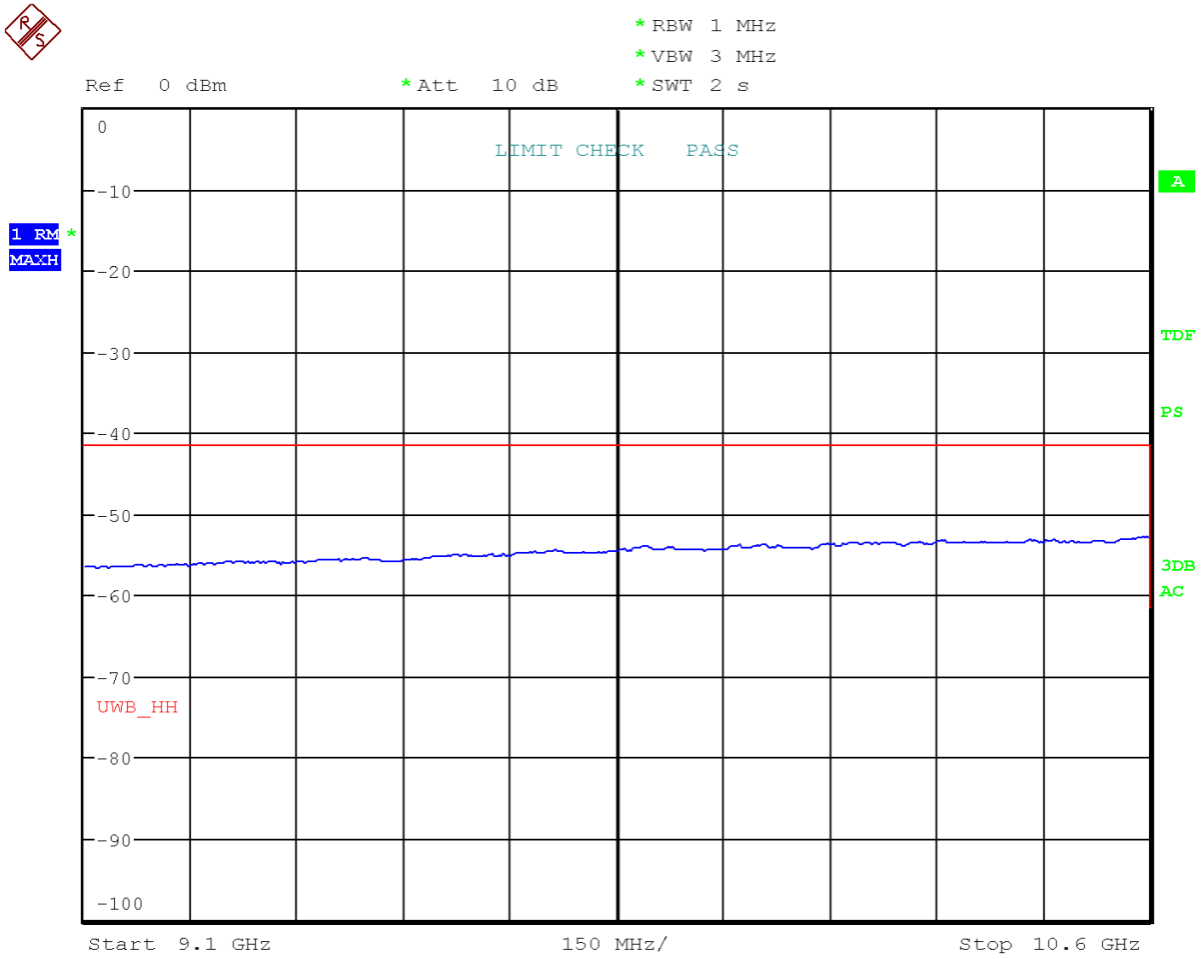
Date: 14.OCT.2019 11:41:56

Radiated Emissions (7.1GHz-9.1GHz) – Vertical
Test Distance = 3 meter



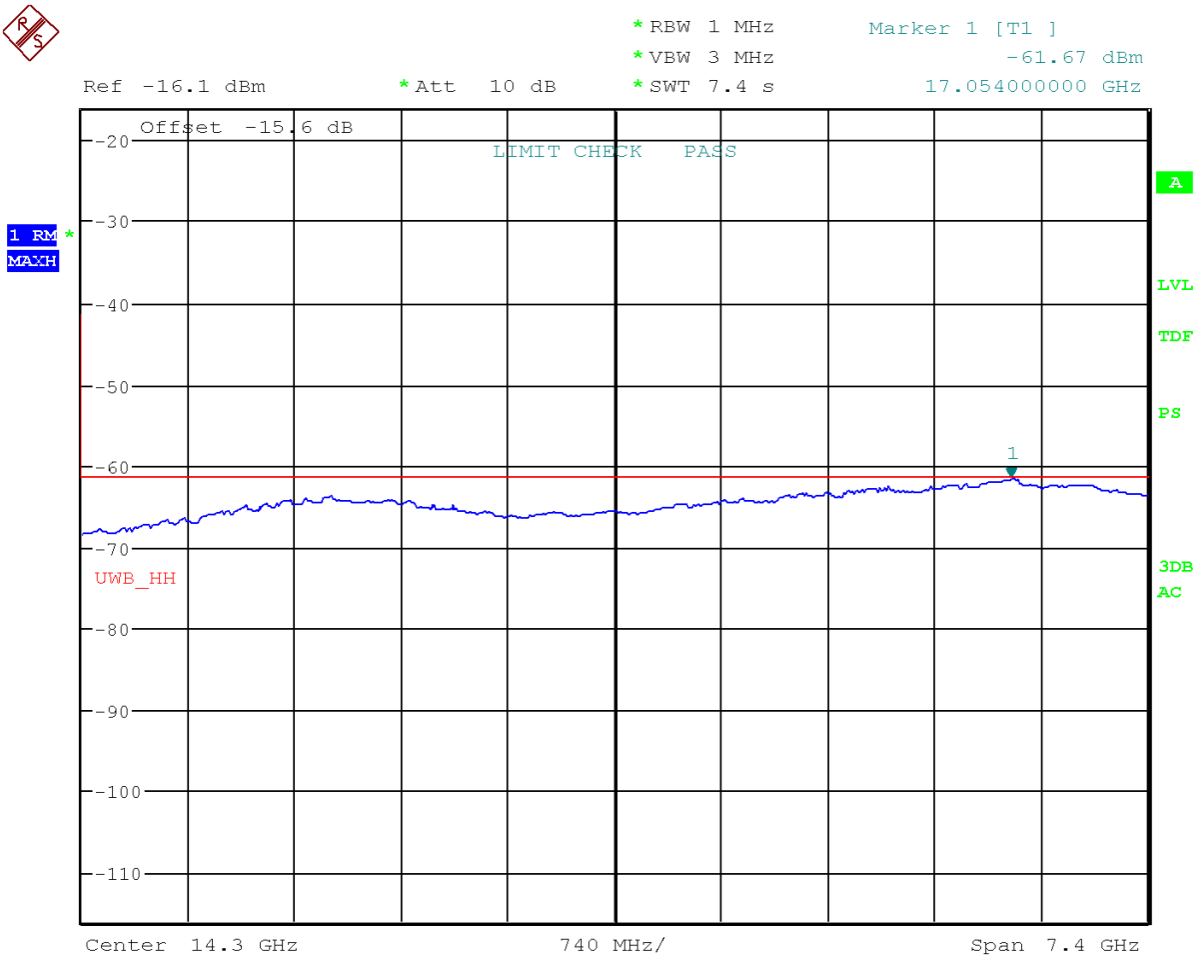
Date: 14.OCT.2019 11:43:25

Radiated Emissions (9.1GHz-10.6GHz) – Vertical
Test Distance = 3 meter



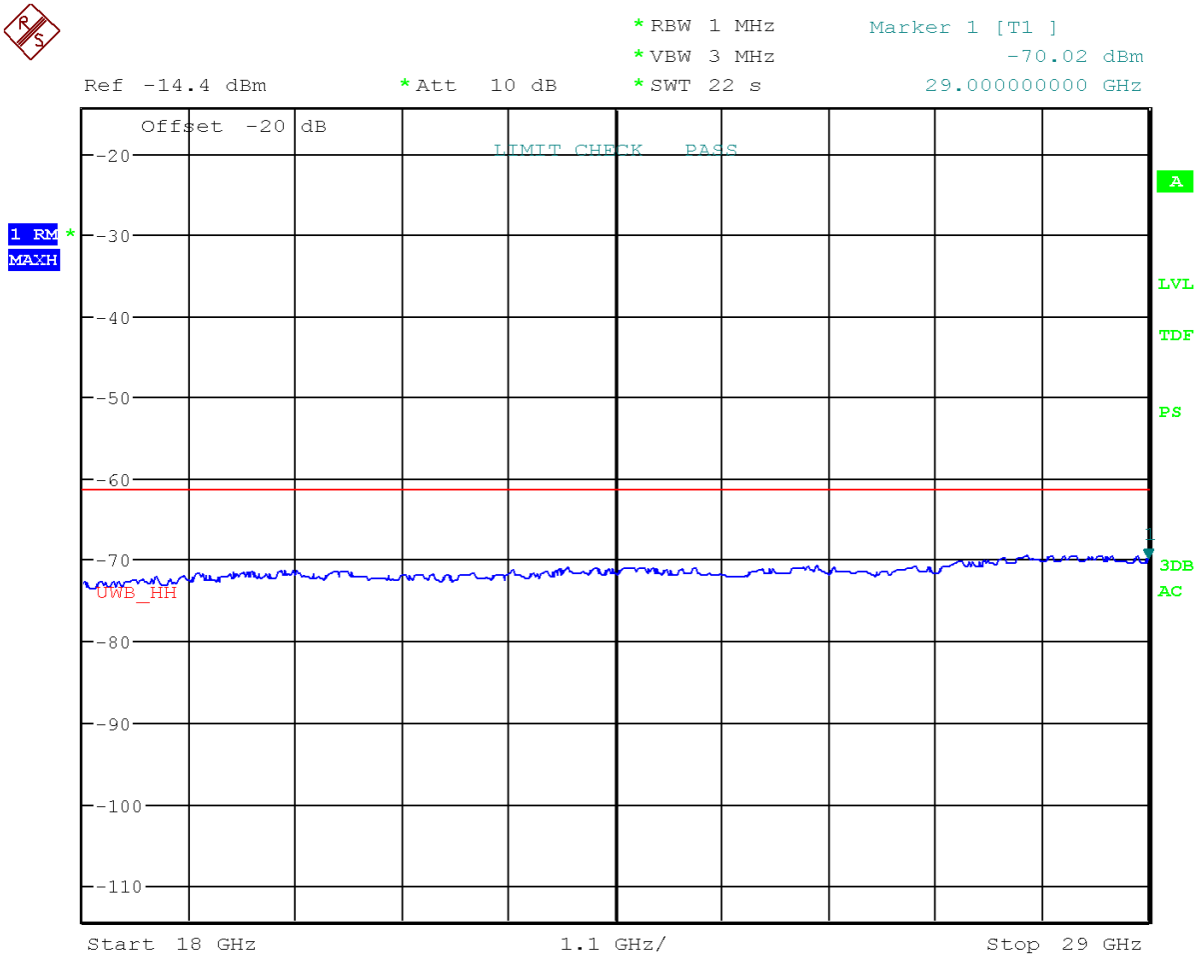
Date: 14.OCT.2019 11:46:05

Radiated Emissions (10.6-18GHz) – Vertical
Test Distance = 0.5 meter



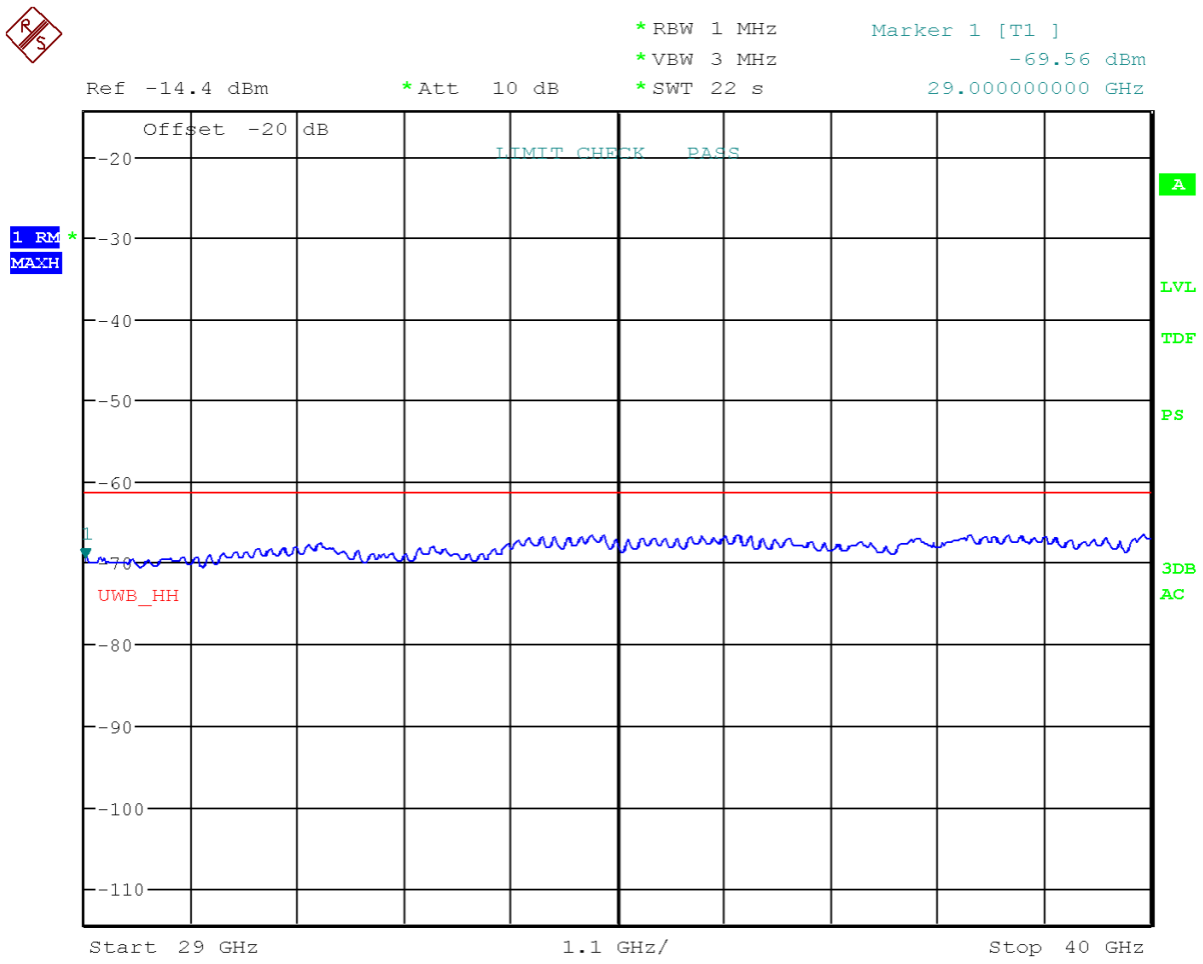
Date: 14.OCT.2019 14:32:38

Radiated Emissions (18-29 GHz) – Vertical
Test Distance = 0.3 meter



Date: 14.OCT.2019 16:17:29

Radiated Emissions (29-40 GHz) – Vertical
Test Distance = 0.3 meter



Date: 14.OCT.2019 16:23:49

5 Radiated emissions in GPS receive band

5.1 *Test Result*

Test Description	Reference	Test Result
Radiated emissions in GPS receive band	15.519(d)	Compliant

5.2 *Test Method*

Test method: ANSI C63.10, Clause 10.3

In addition to the radiated emission limits specified in the table in paragraph (c) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency (MHz)	EIRP dBm
1164–1240	-85.3
1559–1610	-85.3

5.3 *Test Site*

10m Absorber Lined Shielded Enclosure, SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 22.6°C
Relative Humidity: 50.7 %

5.4 *Test Equipment*

Test End Date: 14-Oct-2019 Tester: BEO

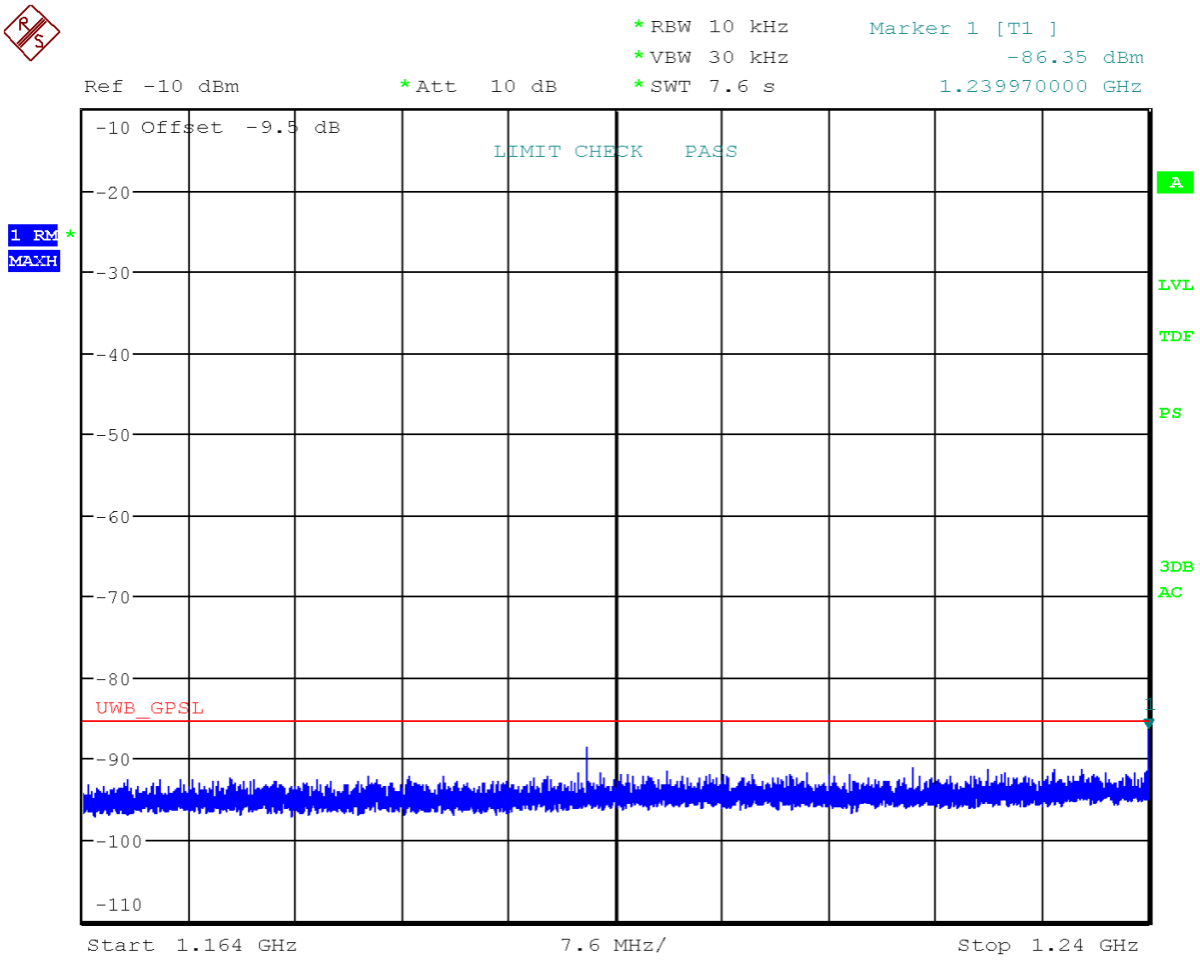
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SF102	Huber & Suhner	B079822	17-Jul-2020
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079691	10-Aug-2020
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	5-Sep-2020

Note: The equipment calibration period is 1 year.

Software:
“Radiated Emissions 1-18GHz.TIL” TILE! profile dated May 2019

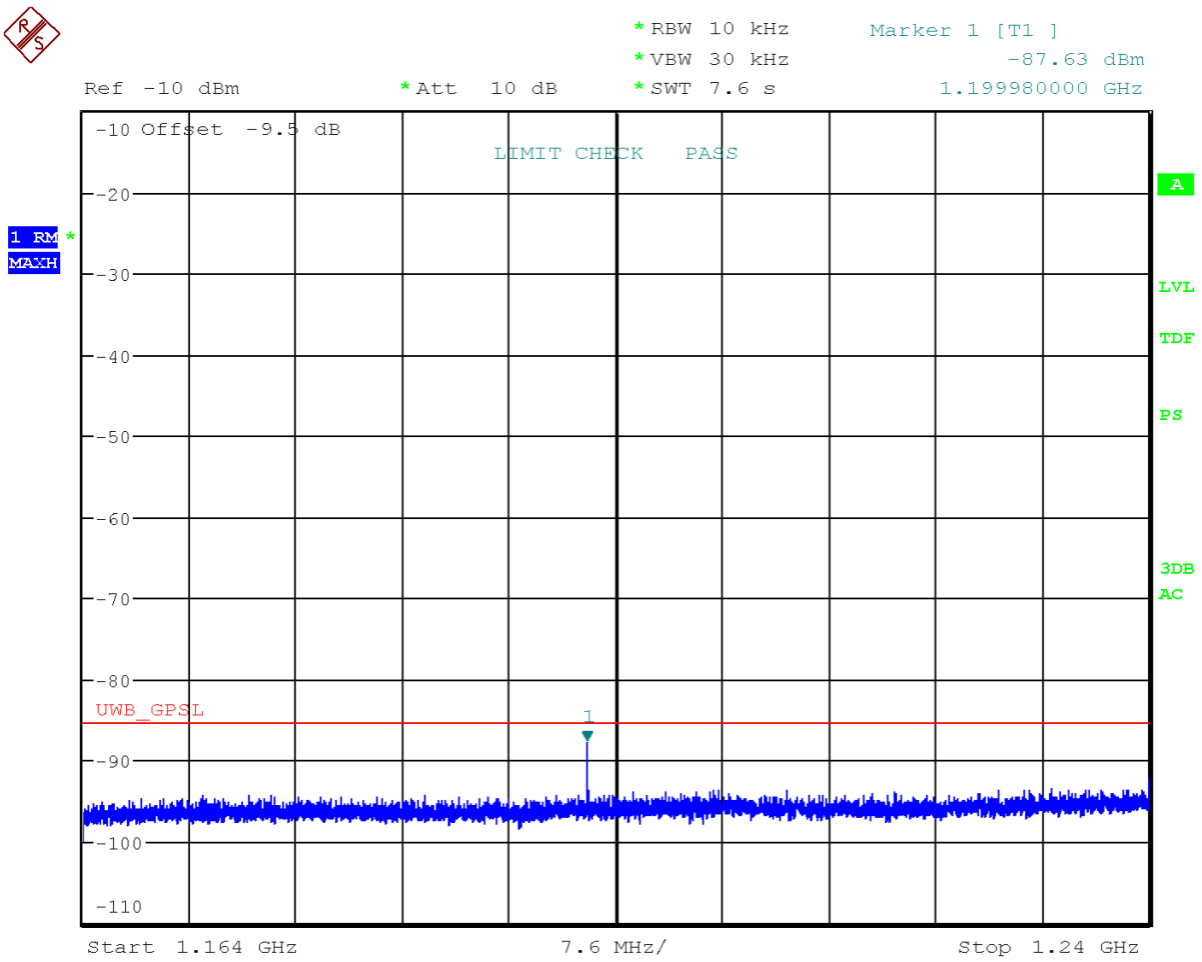
5.5 *Test Data*

Vertical Radiated Emissions in lower GPS Receive Band
Distance: 1 meter



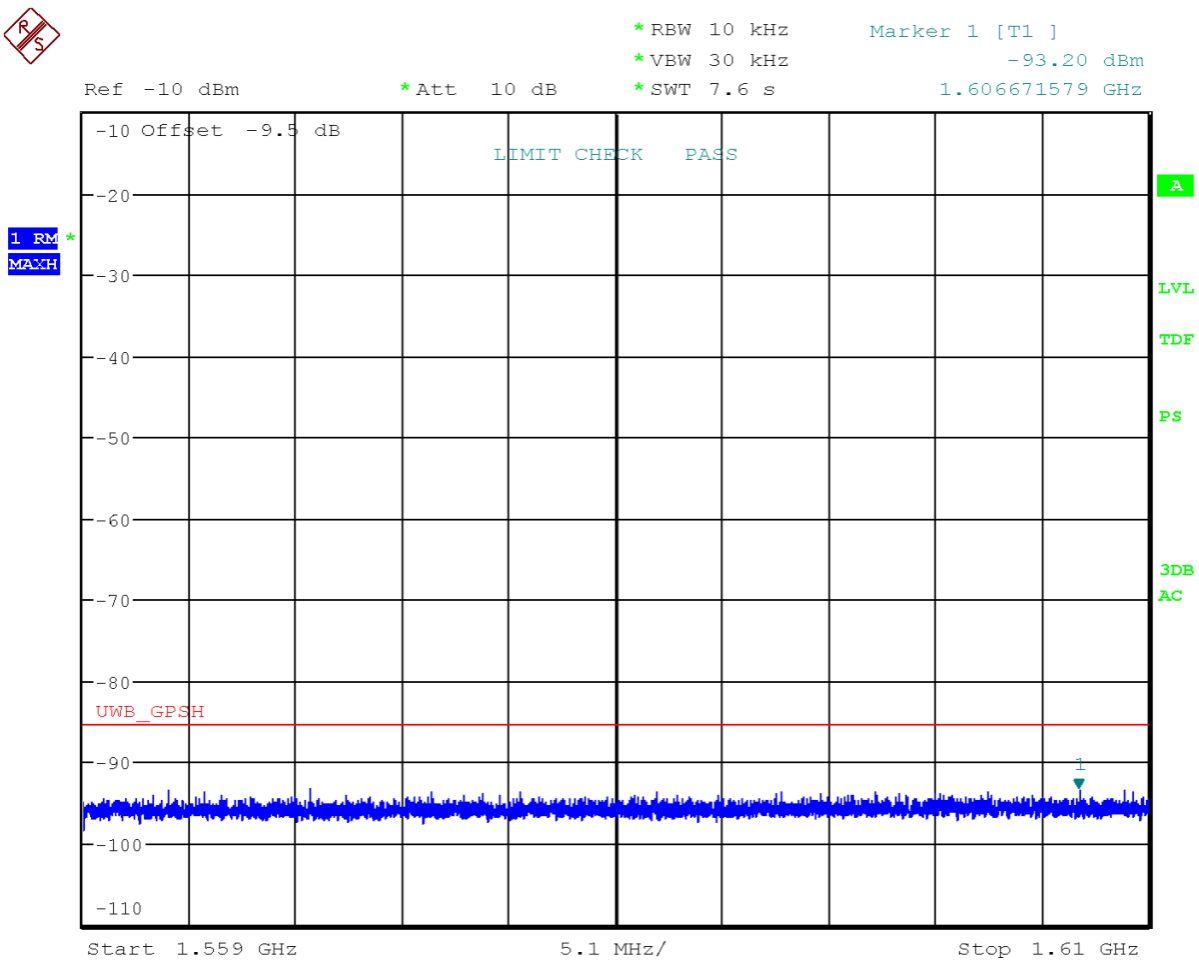
Date: 14.OCT.2019 13:29:19

Horizontal Radiated Emissions in lower GPS Receive Band
Distance: 1 meter



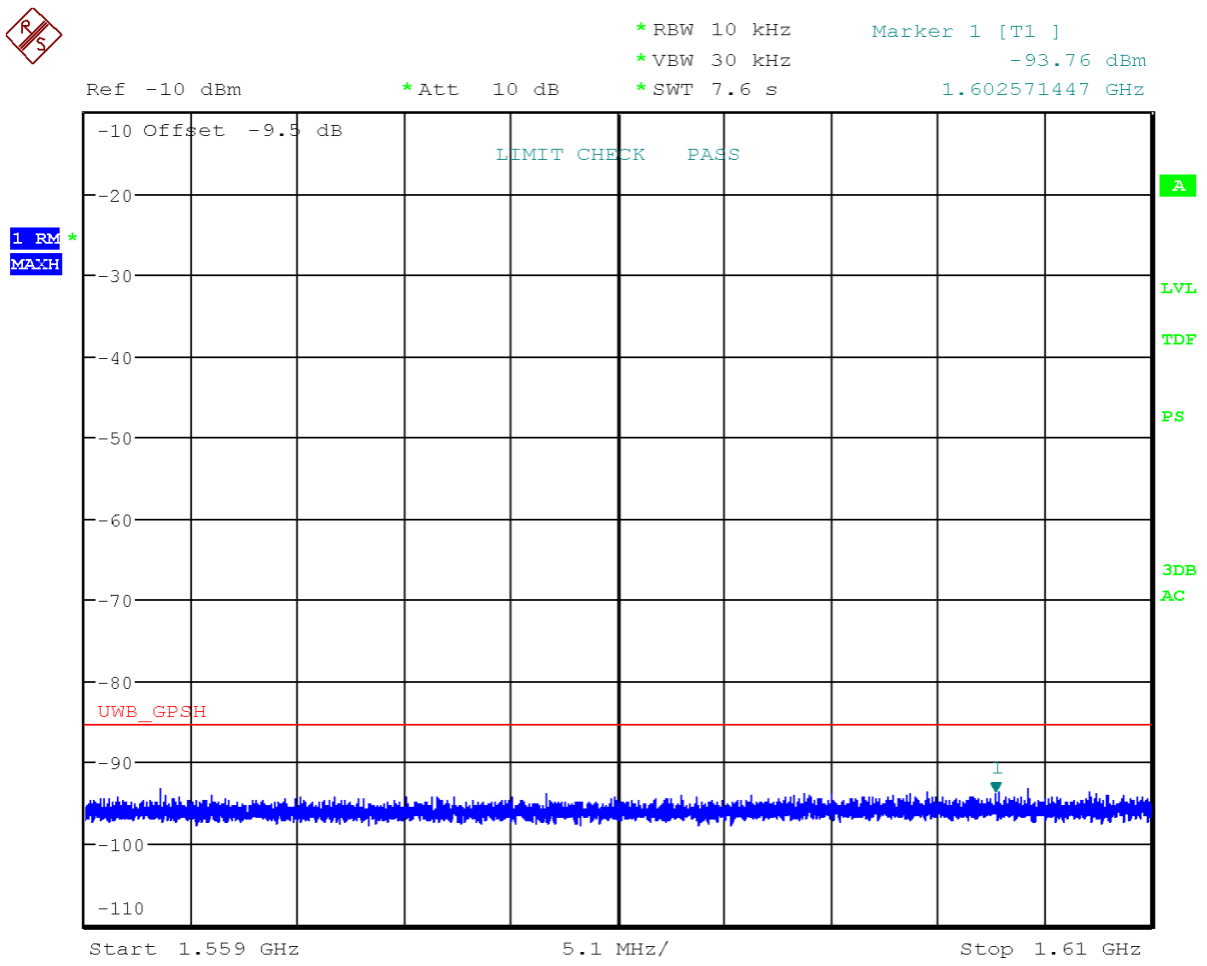
Date: 14.OCT.2019 13:39:18

Vertical Radiated Emissions in upper GPS Receive Band
Distance: 1 meter



Date: 14.OCT.2019 13:32:57

Horizontal Radiated Emissions in upper GPS Receive Band
Distance: 1 meter



Date: 14.OCT.2019 13:37:00

Data: Radiated Emissions in GPS Receive Bands
Test Distance: 1m

GPS Band	Frequency MHz	Antenna Polarity	Measured RMS value	RMS Limit dBm	Margin dB
Low	1239.9	V	-86.35	-85.3	-1.05
Low	1199.9	H	-87.63	-85.3	-2.33
High	1606.6	V	-93.20	-85.3	-7.90
High	1602.5	H	-93.76	-85.3	-8.46

6 Peak Power within a 50 MHz bandwidth

6.1 *Test Result*

Test Description	Basic Standards	Test Result
Peak Power in a 50 MHz Bandwidth	15.519(e)	Compliant

6.2 *Test Method*

Test method: ANSI C63.10, Clause 10.3

1) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occur and this 50 MHz bandwidth must be contained within the 3100–10600 MHz band.
2) The peak EIRP limit is 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than RBW.
3) The Limit is 0dBm EIRP.

6.3 *Test Site*

10m Absorber Lined Shielded Enclosure, SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	22.6°C
Relative Humidity:	50.7 %

6.4 *Test Equipment*

Test End Date: 14-Oct-2019 Tester: BEO

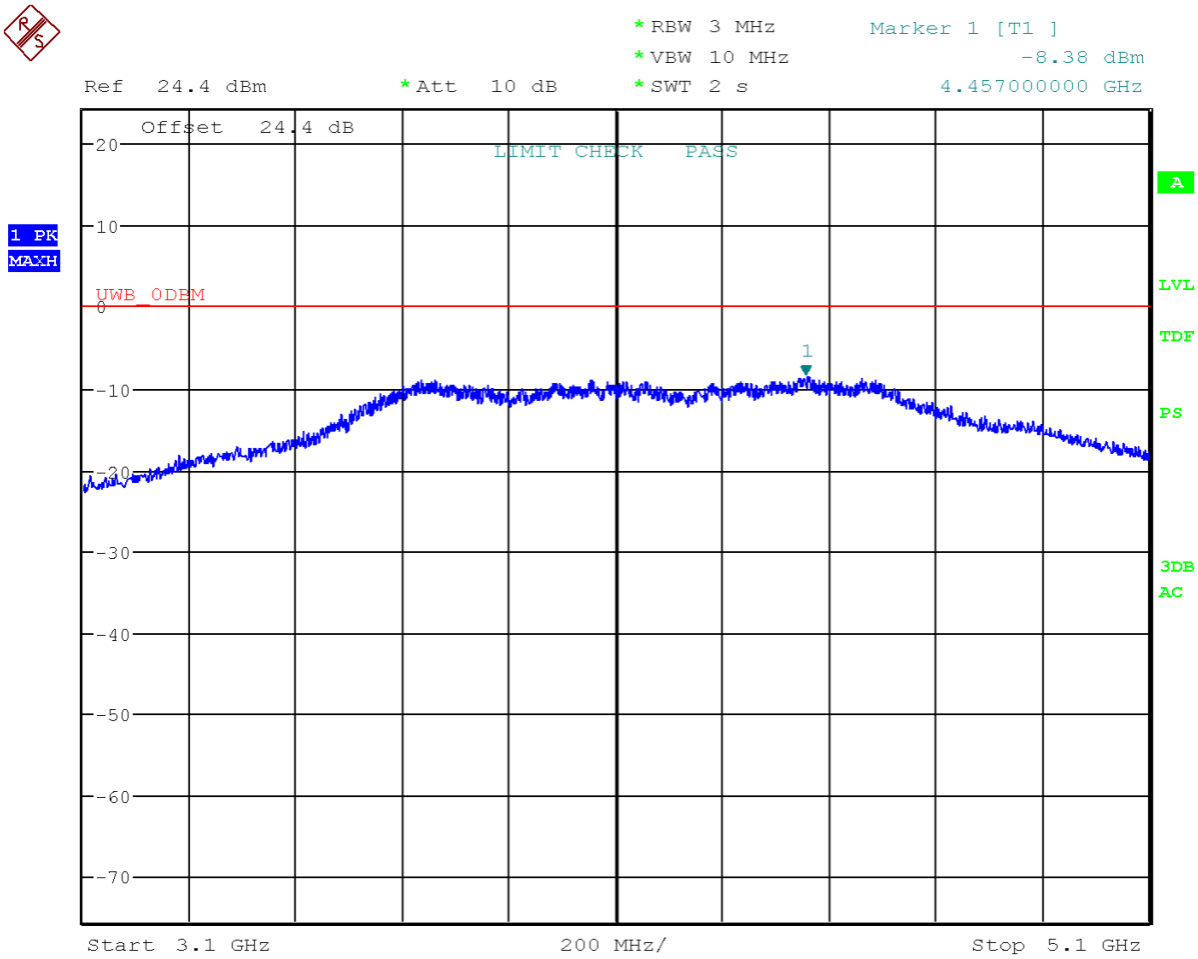
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SF102	Huber & Suhner	B079822	17-Jul-2020
ANTENNA, DRG HORN (MEDIUM)	3117	ETS Lindgren	B079691	10-Aug-2020
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	5-Sep-2020

Note: The calibration period for this equipment is 1 year.

6.5 *Test Data*

Peak Power per 50MHz – Vertical

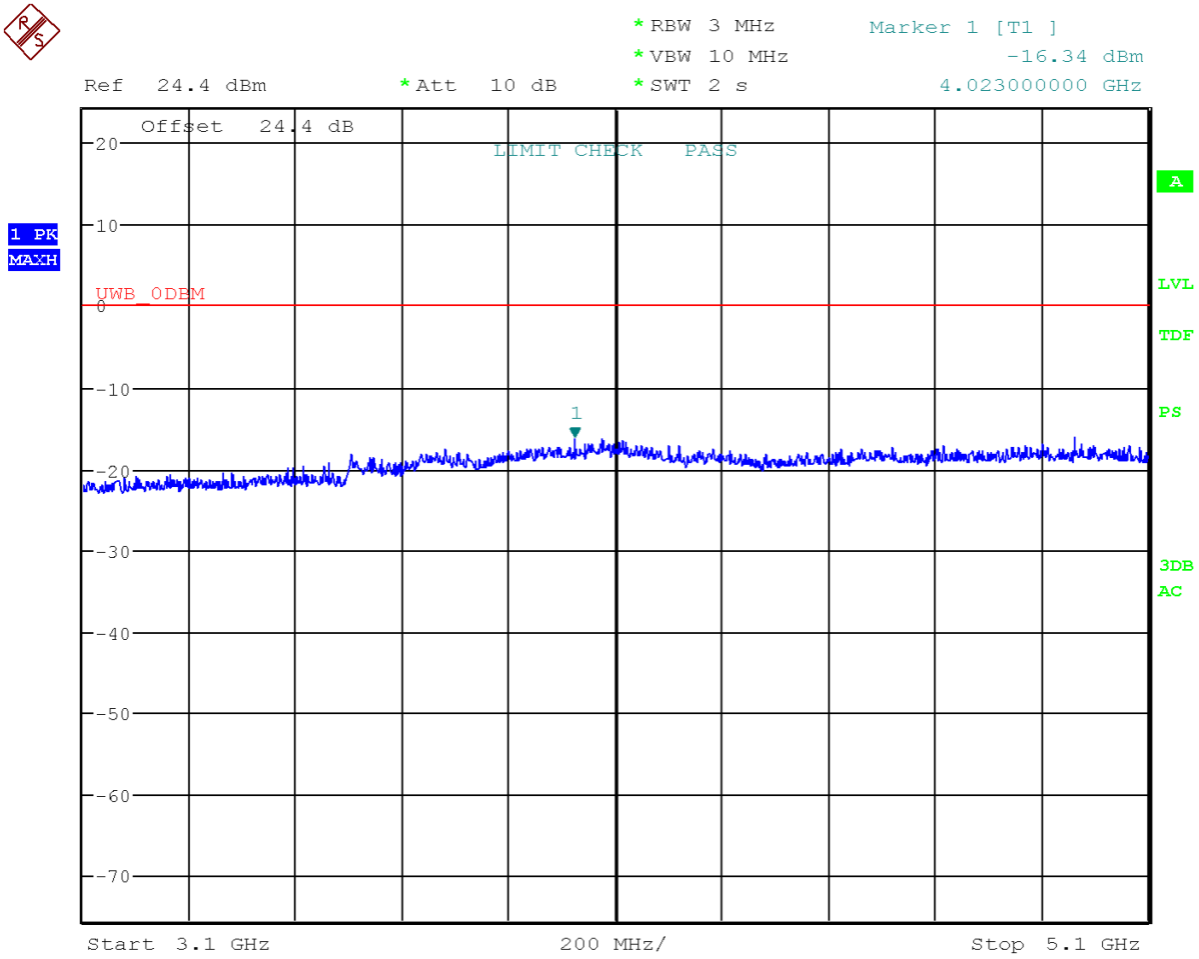
Note: Offset value is equal to 20*log(50MHz/3MHz)



Date: 14.OCT.2019 11:54:40

Peak Power per 50MHz - Horizontal

Note: Offset value is equal to 20*log(50MHz/3MHz)



Date: 14.OCT.2019 12:03:36

6.6 *Data Table*

Tested Frequency	Polarity	Corrected Value 50 MHz RBW dBm	Limit, dBm 50 MHz RBW	Result
4023	Horizontal	-16.34	0	Compliant
4023	Vertical	-8.38	0	Compliant

7 Radiated emissions below 960 MHz

7.1 *Test Result*

Test Description	Basic Standards	Test Result
Radiated Emissions	FCC Part 15.519(c) and 15.209	Compliant

7.2 *Test Method*

Test method: ANSI C63.10, Clause 10.2

The initial scans were performed over the frequency range as indicated in the tables below using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector. The receiver's resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Radiated emissions limit below 1 GHz		
Frequency Range(MHz)	Limit(QP dBµV/m)	Distance
30 – 88	40	3m
88 – 216	43.5	3m
216 – 960	46	3m

7.3 *Test Site*

10m Absorber Lined Shielded Enclosure, SGS EMC Laboratory, Suwanee, GA

Environmental Conditions	11-Nov-2019
Temperature:	20.1°C
Relative Humidity:	39.5 %

7.4 *Test Equipment*

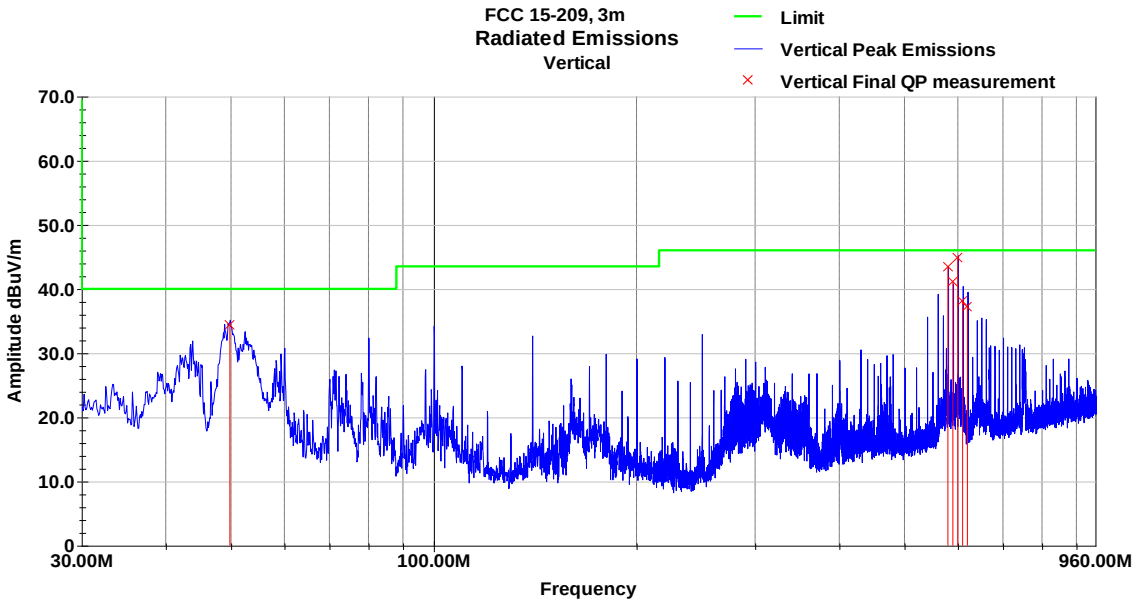
Test End Date: 11-Nov-2019 Tester: PV

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	1-Aug-2020
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SF106	HUBER & SUHNER	B079712	5-Sep-2020
RF CABLE	SF106	HUBER & SUHNER	B079717	7-Sep-2020
RF CABLE	SF104	Huber & Suhner	B085896	11-Sep-2020
RF CABLE	SUCOFLEX 100	Huber & Suhner	B108523	5-Sep-2020

Note: The equipment calibration period is 1 year.
Software: “Radiated Emissions” TILE! profile dated Dec 2018

7.5 *Test Data*

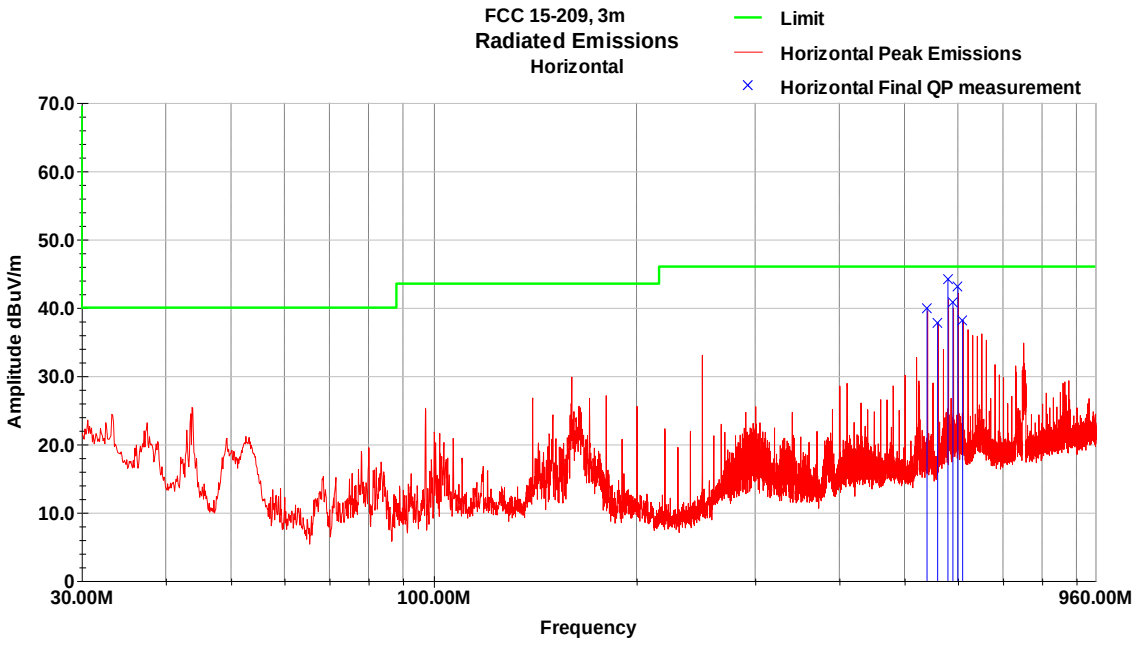
Vertical Radiated Emissions Plot



Vertical Radiated Emissions Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.81	58.2	V	42.0	129.0	8.8	0.8	33.4	34.4	40.0	-5.6
579.99	55.8	V	268.0	157.0	19.4	2.8	34.5	43.4	46.0	-2.6
589.97	53.4	V	0.0	175.0	19.5	2.8	34.5	41.1	46.0	-4.9
599.97	56.9	V	1.0	189.0	19.7	2.8	34.5	44.9	46.0	-1.1
609.97	50.1	V	1.0	196.0	19.8	2.8	34.5	38.2	46.0	-7.9
619.97	49.0	V	227.0	181.0	19.9	2.9	34.5	37.3	46.0	-8.8
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

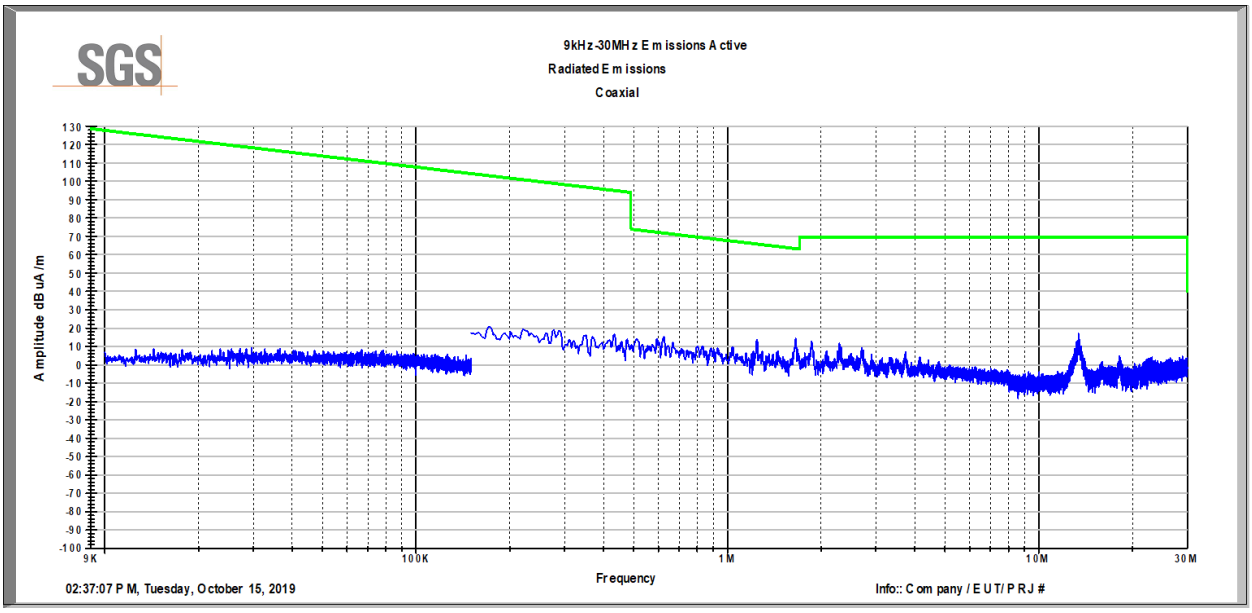
Horizontal Radiated Emissions Plot



Horizontal Radiated Emissions Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
539.97	53.2	H	72.0	158.0	18.6	2.6	34.6	39.9	46.0	-6.1
559.98	50.6	H	5.0	149.0	19.1	2.7	34.6	37.9	46.0	-8.2
579.98	56.5	H	198.0	144.0	19.4	2.8	34.5	44.1	46.0	-1.9
589.98	53.1	H	47.0	145.0	19.5	2.8	34.5	40.9	46.0	-5.2
599.97	55.1	H	37.0	157.0	19.7	2.8	34.5	43.1	46.0	-3.0
609.97	50.1	H	64.0	140.0	19.8	2.8	34.5	38.2	46.0	-7.8
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

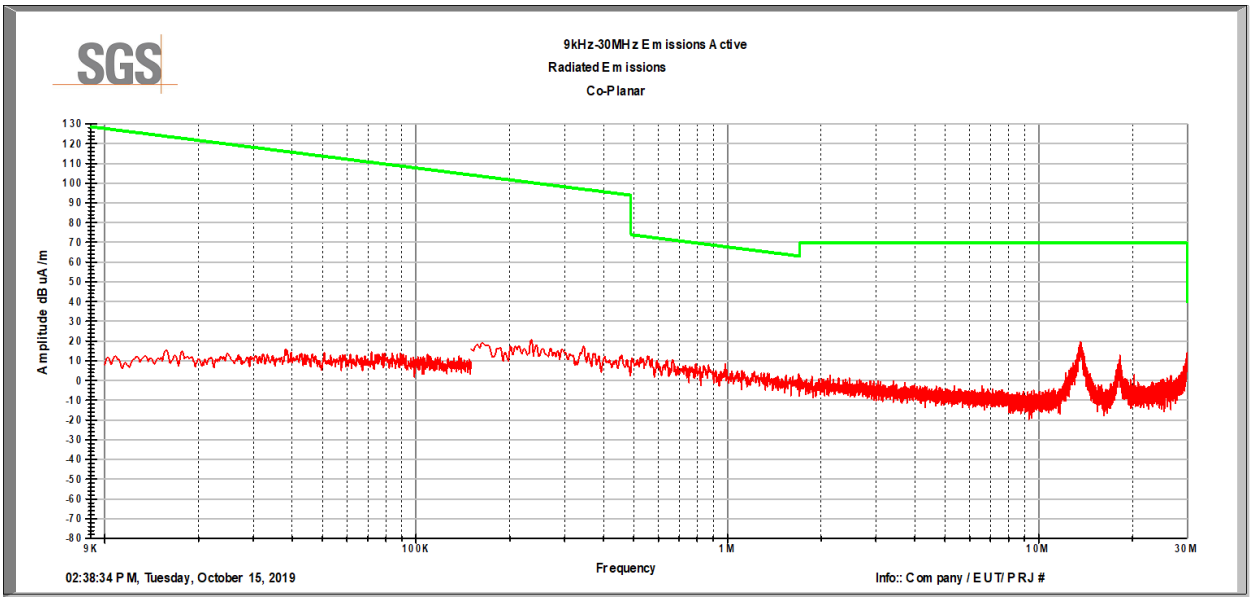
CoAxial Radiated Emissions Plot



CoAxial Radiated Emissions Data

No emissions were within 20dBuV from peak Limit and therefore final data not performed.

CoPlanar Radiated Emissions Plot



Horizontal Radiated Emissions Data

No emissions were within 20dBuV from peak Limit and therefore final data not performed.

8 Conducted Emissions

8.1 *Test Result*

Test Description	Basic Standards	Test Result
Conducted Emissions, Class B	FCC Part 15, Subpart B	Compliant

8.2 *Test Method*

Test Method: ANSI C63.10, Clause 6.2

With the receiver's resolution bandwidth set to 9 kHz the initial preliminary exploratory scans were performed over the measuring frequency range (0.15MHz to 30MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Class A Limits (dBuV)	Class B Limits (dBuV)
0.15 to 0.5 MHz	Avg 66 QP 79	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 60 QP 73	Avg 46 Pk 56
5 to 30 MHz	Avg 60 QP 73	Avg 50 Pk 60

8.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions	11-Nov-2019	15-Jan-2020
Temperature:	20.1°C	22.6°C
Relative Humidity:	39.5 %	56.0 %

8.4 *Test Equipment*

Test End Date: 11-Nov-2019 Tester: PV

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Aug-2020
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17016	5-Sep-2020
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B085882	5-Apr-2020
CONDUCTED COMB GENERATOR	CGC-255	Com-Power Corporation	B079696	CNR

Test End Date: 15-Jan-2020 Tester: BEO

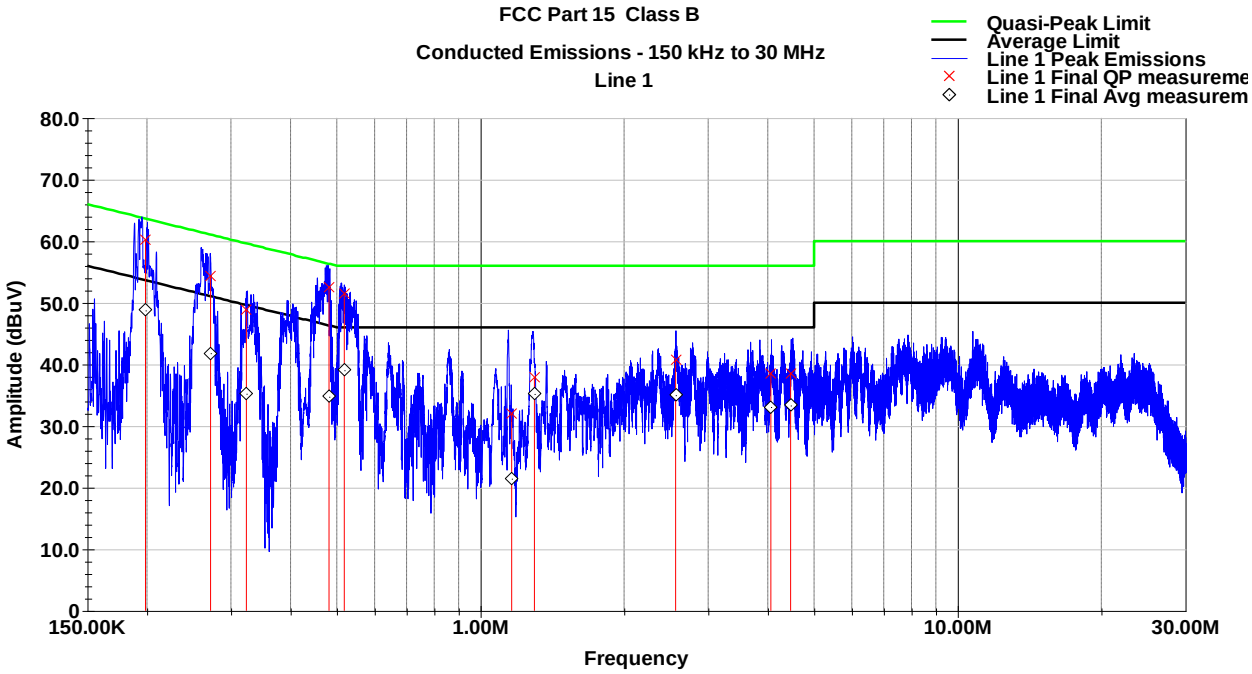
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Aug-2020
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	16-Dec-2020
CONDUCTED COMB GENERATOR	CGC-255	Com-Power Corporation	B079696	CNR
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	5-Sep-2020

Note: The equipment calibration period is 1 year.

Software:
“Conducted Emissions” TILE! profile dated Nov 2018

8.6 *Test Data – POE*

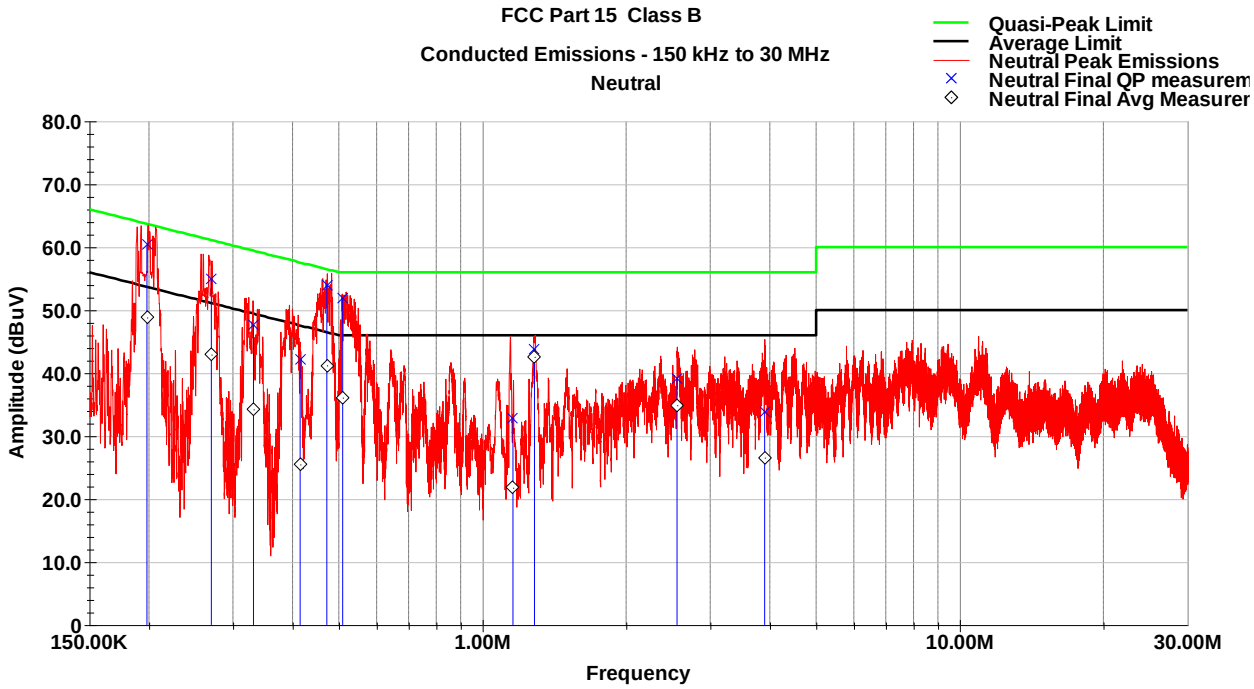
Line 1 Conducted Emissions Plot



Line 1 Conducted Emissions Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.199	60.3	63.7	-3.3	48.8	53.7	-4.9
0.272	54.4	61.1	-6.7	41.8	51.1	-9.2
0.323	48.8	59.6	-10.8	35.2	49.6	-14.4
0.482	52.6	56.3	-3.7	34.8	46.3	-11.5
0.518	51.5	56.0	-4.5	39.1	46.0	-6.9
1.163	32.1	56.0	-23.9	21.5	46.0	-24.5
1.297	37.9	56.0	-18.1	35.2	46.0	-10.8
2.564	40.8	56.0	-15.2	35.0	46.0	-11.0
4.059	38.5	56.0	-17.5	33.1	46.0	-12.9
4.467	38.5	56.0	-17.5	33.3	46.0	-12.7

Neutral Conducted Emissions Plot

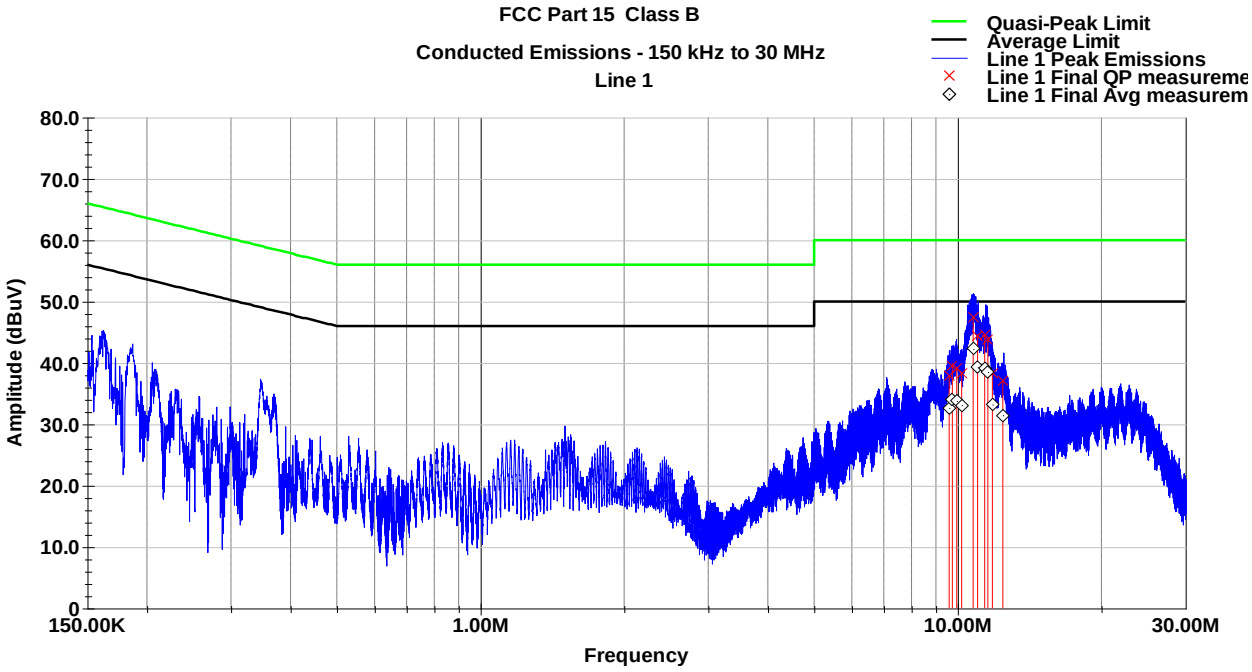


Neutral Conducted Emissions Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.198	60.3	63.7	-3.3	48.9	53.7	-4.8
0.270	54.9	61.1	-6.2	42.9	51.1	-8.2
0.331	47.6	59.4	-11.8	34.3	49.4	-15.2
0.415	42.2	57.5	-15.3	25.5	47.5	-22.0
0.472	53.9	56.5	-2.6	41.2	46.5	-5.2
0.509	51.9	56.0	-4.1	36.1	46.0	-9.9
1.158	32.9	56.0	-23.1	21.8	46.0	-24.2
1.285	43.8	56.0	-12.2	42.6	46.0	-3.4
2.556	39.1	56.0	-16.9	34.9	46.0	-11.1
3.901	33.7	56.0	-22.3	26.6	46.0	-19.4

8.7 *Test Data – DC Aux Port*

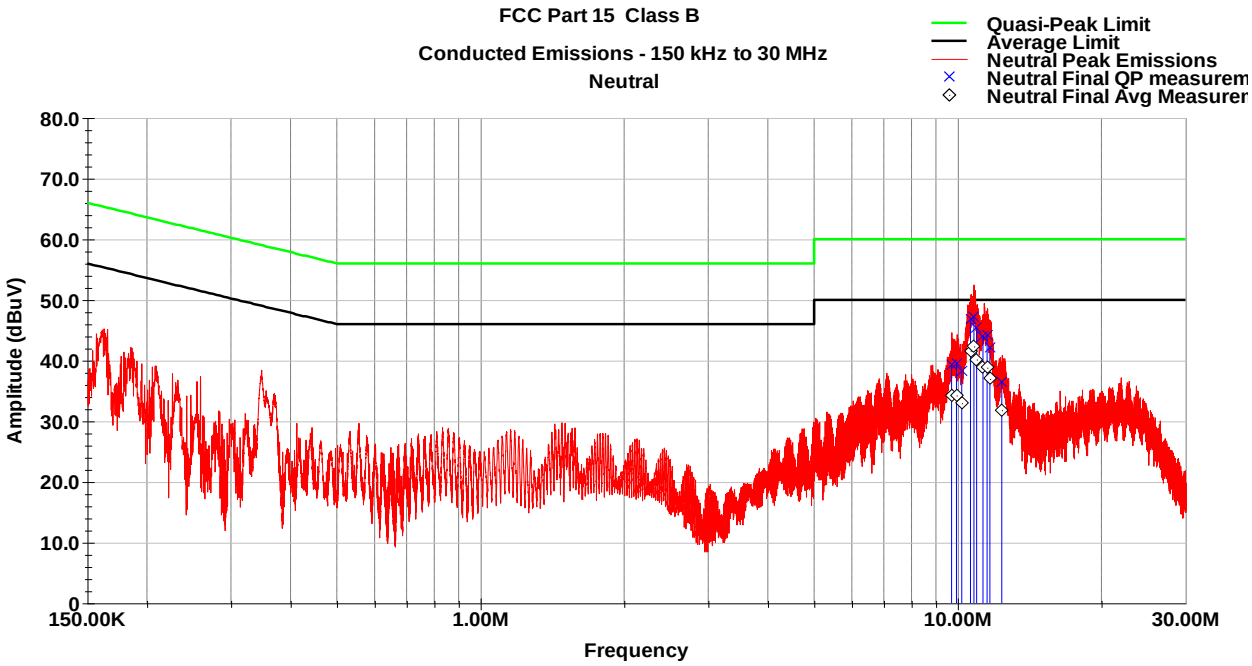
Line 1 Conducted Emissions Plot



Line 1 Conducted Emissions Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
9.597	37.9	60.0	-22.1	32.6	50.0	-17.4
9.743	39.4	60.0	-20.6	34.1	50.0	-15.9
9.951	39.2	60.0	-20.8	33.8	50.0	-16.2
10.191	38.4	60.0	-21.6	33.1	50.0	-16.9
10.774	47.4	60.0	-12.6	42.3	50.0	-7.7
11.004	44.4	60.0	-15.6	39.3	50.0	-10.7
11.386	44.6	60.0	-15.4	39.1	50.0	-10.9
11.562	43.8	60.0	-16.2	38.5	50.0	-11.5
11.819	38.4	60.0	-21.6	33.2	50.0	-16.8
12.431	37.1	60.0	-22.9	31.5	50.0	-18.5

Neutral Conducted Emissions Plot



Neutral Conducted Emissions Data

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
9.707	39.3	60.0	-20.7	34.2	50.0	-15.8
9.937	39.6	60.0	-20.4	34.3	50.0	-15.7
10.196	38.3	60.0	-21.7	33.0	50.0	-17.0
10.635	46.9	60.0	-13.1	41.6	50.0	-8.4
10.811	47.1	60.0	-12.9	42.3	50.0	-7.7
10.951	45.3	60.0	-14.7	40.2	50.0	-9.8
11.294	44.1	60.0	-15.9	39.0	50.0	-11.0
11.518	44.2	60.0	-15.8	38.8	50.0	-11.2
11.674	42.1	60.0	-17.9	37.0	50.0	-13.0
12.364	36.5	60.0	-23.5	31.8	50.0	-18.2

9 Revision History

Revision Level	Description of changes	Revision Date
DRAFT	-	16 October 2019
0	Initial release	7 February 2020