

FCC PART 15B, CLASS B MEASUREMENT AND TEST REPORT

For

Grandstream Networks, Inc.

126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

FCC ID: YZZGWN7605LR

Report Type: Original Report	Product Type: Outdoor Long-Range Wi-Fi Access Point
Report Number: RSZ200305002-00C	
Report Date: 2020-05-08	
Joson Xiao	
Reviewed By: EMC Engineer	<i>Joson Xiao</i>
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn	

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Outdoor Long-Range Wi-Fi Access Point
Tested Model	GWN7605LR
Voltage Range	DC 48V from POE
Highest operating frequency	5850MHz
Date of Test	2020-03-11 to 2020-05-08
Sample serial number	RSZ200305002-EM-S1 (Assigned by BACL, Shenzhen)
Received date	2020-03-05
Sample/EUT Status	Good condition

Objective

This test report is prepared on behalf of *Grandstream Networks, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS and Part 15.407 NII submissions with FCC ID: YZZGWN7605LR.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will be taken into consideration for the test data recorded in the report

Parameter		uncertainty
Conducted Emissions		$\pm 1.95\text{dB}$
Radiated Emissions	Below 1GHz	$\pm 4.75\text{dB}$
	Above 1GHz	$\pm 4.88\text{dB}$

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
TP-LINK	POE	TL-POE160S	1177643000674
HP	PC	Compaq CQ45	5CG33407QL
Dell	PC	Latitude E5430	11429208685
HP	PC Adapter	SeriesHSTNN-LA15	159753
DELL	PC Adapter	PA-10	159753

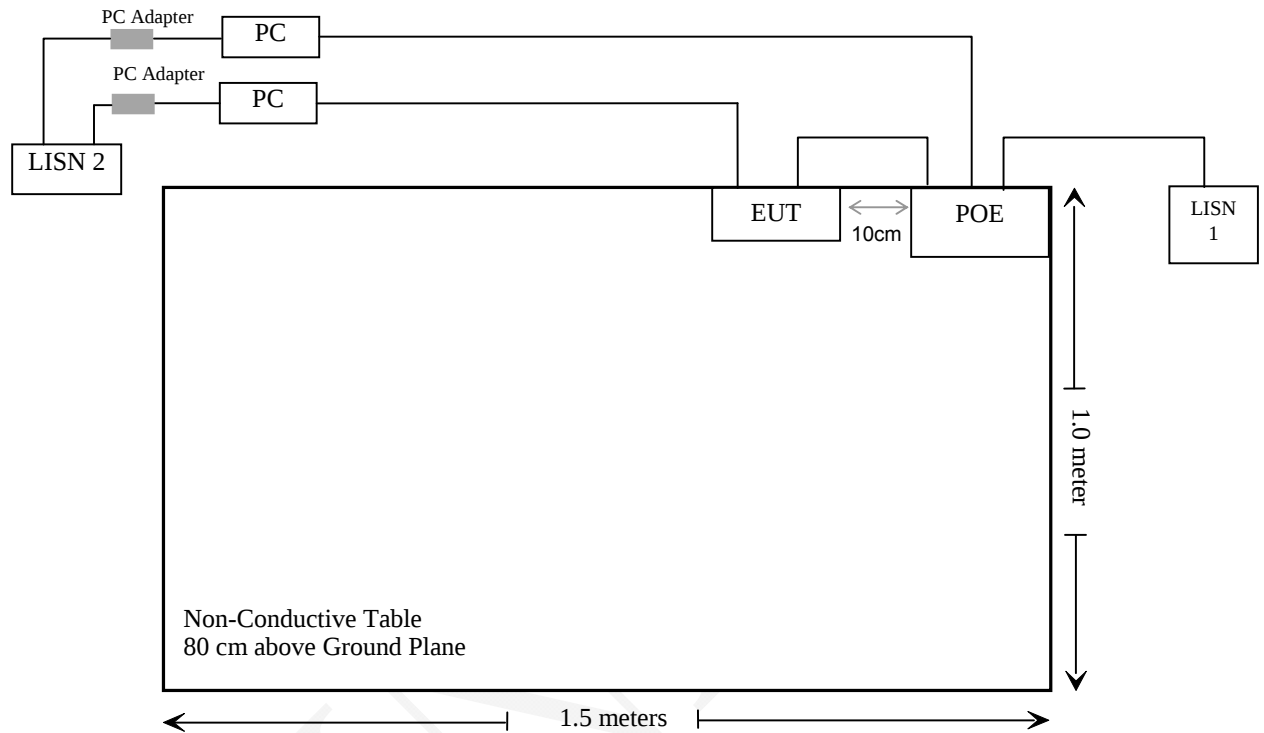
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded detachable AC cable	1.0	LISN 1	POE
Unshielded detachable Network cable	1.0	POE	EUT
Unshielded detachable Network cable	5.0	EUT	PC
Unshielded detachable Network cable	5.0	POE	PC
Unshielded Un-detachable DC cable	1.0	PC	PC adapter
Unshielded detachable AC cable	1.2	PC adapter	LISN 2

Block Diagram of Test Setup

For conducted emission:

Adapter



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious Emissions	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2019/4/20	2020/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/07/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107.

Test Data

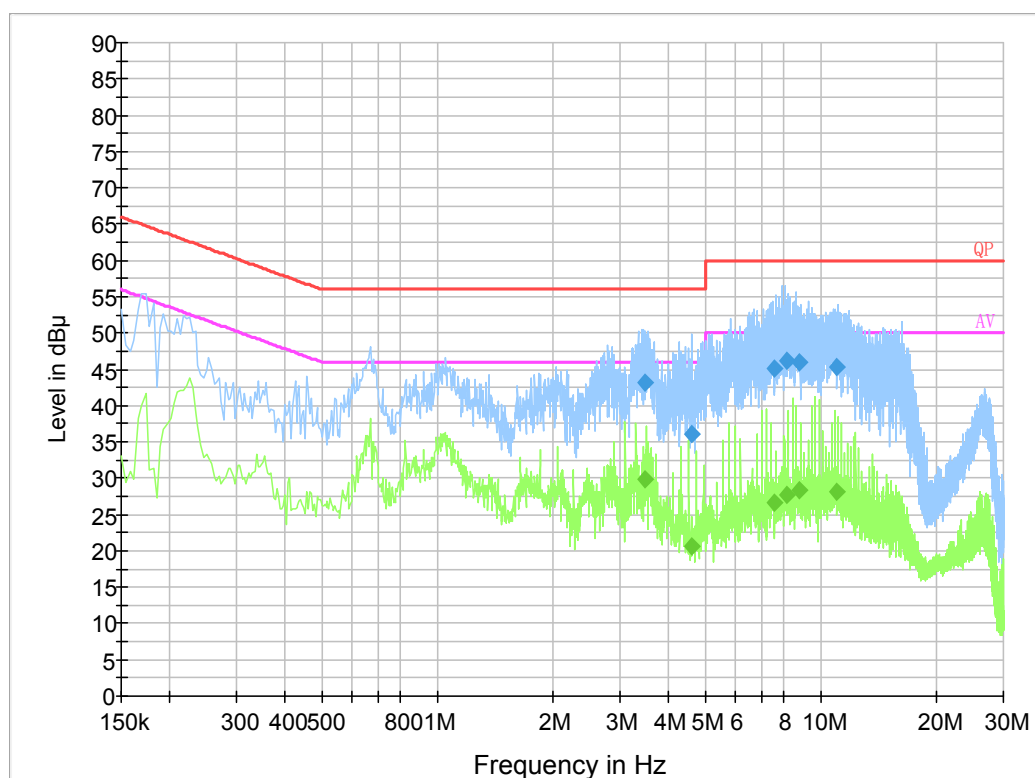
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

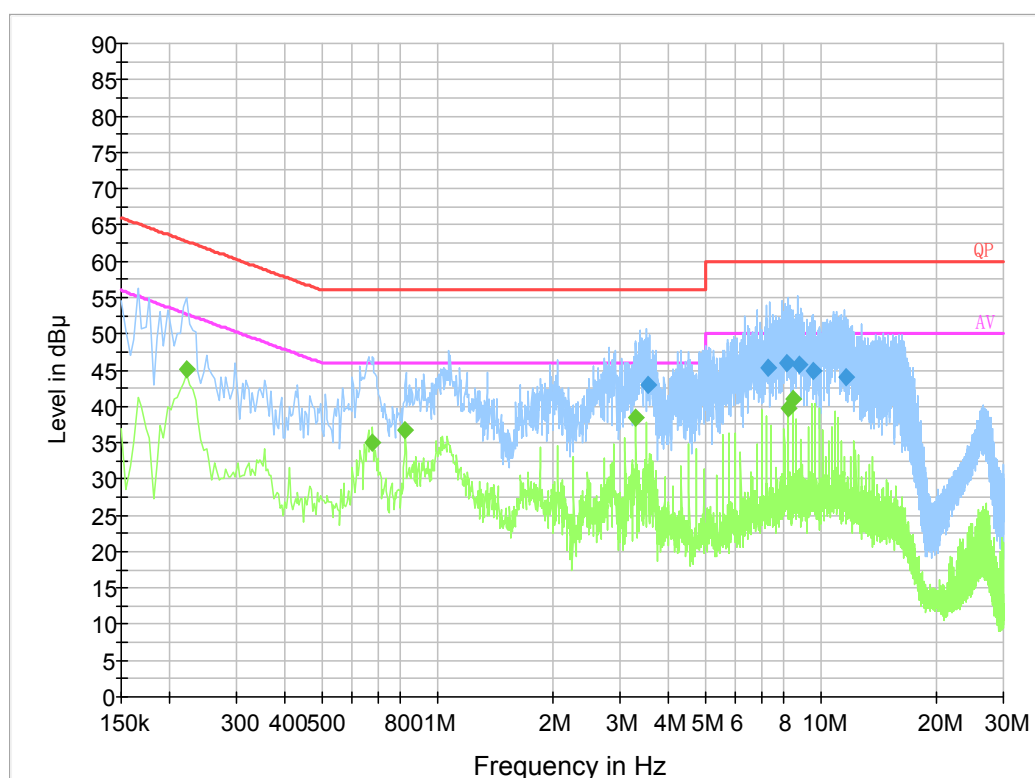
The testing was performed by Haiguo Li on 2020-03-11.

EUT Operation Mode: Working

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
3.494070	43.1	19.9	56.0	12.9	QP
4.600790	36.0	19.9	56.0	20.0	QP
7.581350	45.1	19.9	60.0	14.9	QP
8.199170	46.2	19.9	60.0	13.8	QP
8.772190	45.9	20.0	60.0	14.1	QP
11.035170	45.3	20.0	60.0	14.7	QP
3.494070	29.9	19.9	46.0	16.1	Ave.
4.600790	20.7	19.9	46.0	25.3	Ave.
7.581350	26.7	19.9	50.0	23.3	Ave.
8.199170	27.7	19.9	50.0	22.3	Ave.
8.772190	28.3	20.0	50.0	21.7	Ave.
11.035170	28.1	20.0	50.0	21.9	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
3.562650	42.9	19.9	56.0	13.1	QP
7.311690	45.3	19.9	60.0	14.7	QP
8.170430	46.0	19.9	60.0	14.0	QP
8.814750	45.8	19.9	60.0	14.2	QP
9.550690	45.0	19.9	60.0	15.0	QP
11.648750	44.0	20.0	60.0	16.0	QP
0.222000	45.1	19.8	52.7	7.6	Ave.
0.678000	35.0	19.8	46.0	11.0	Ave.
0.826000	36.8	19.8	46.0	9.2	Ave.
3.302000	38.4	19.9	46.0	7.6	Ave.
8.254000	39.7	19.9	50.0	10.3	Ave.
8.462000	41.0	19.9	50.0	9.0	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

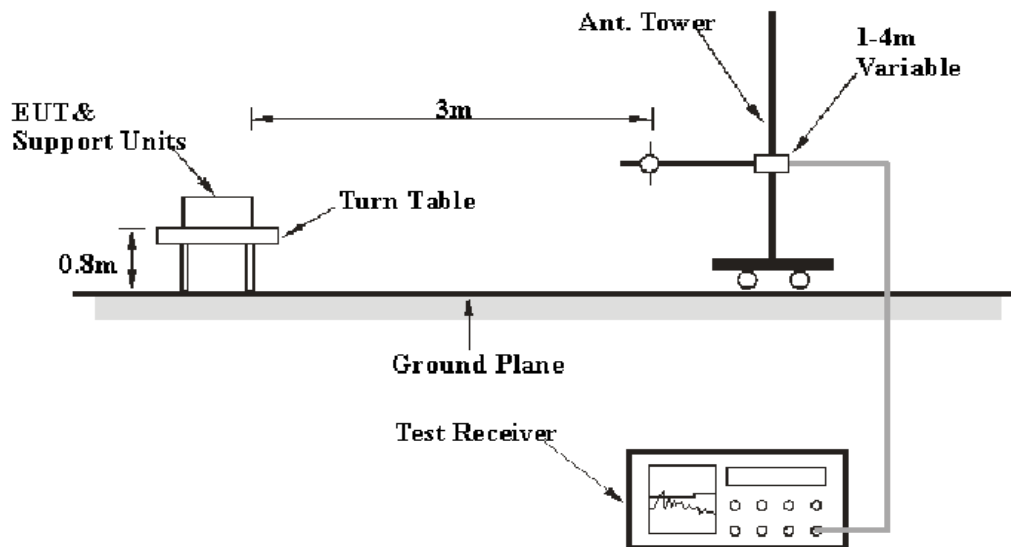
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

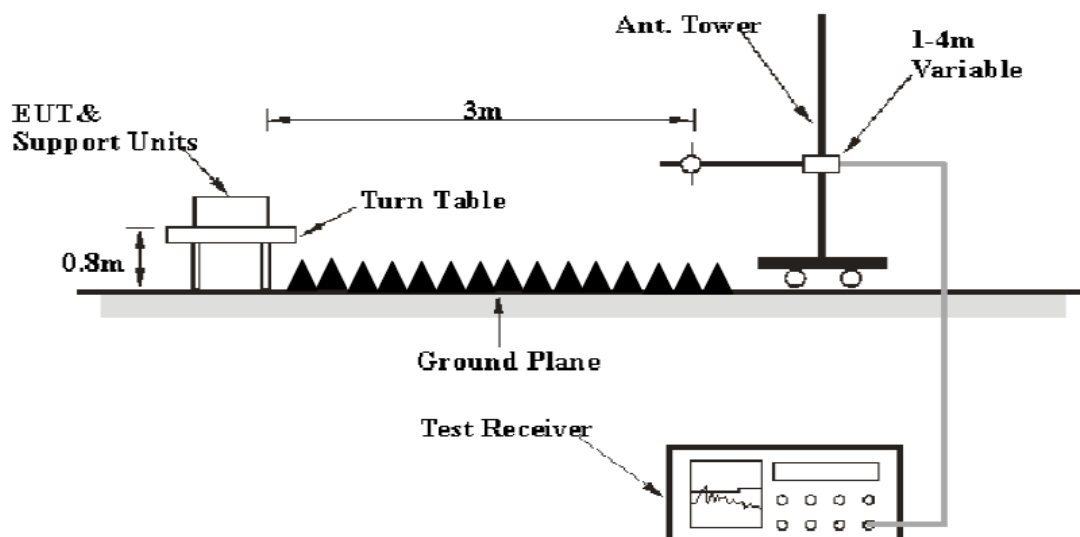
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 29.3 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

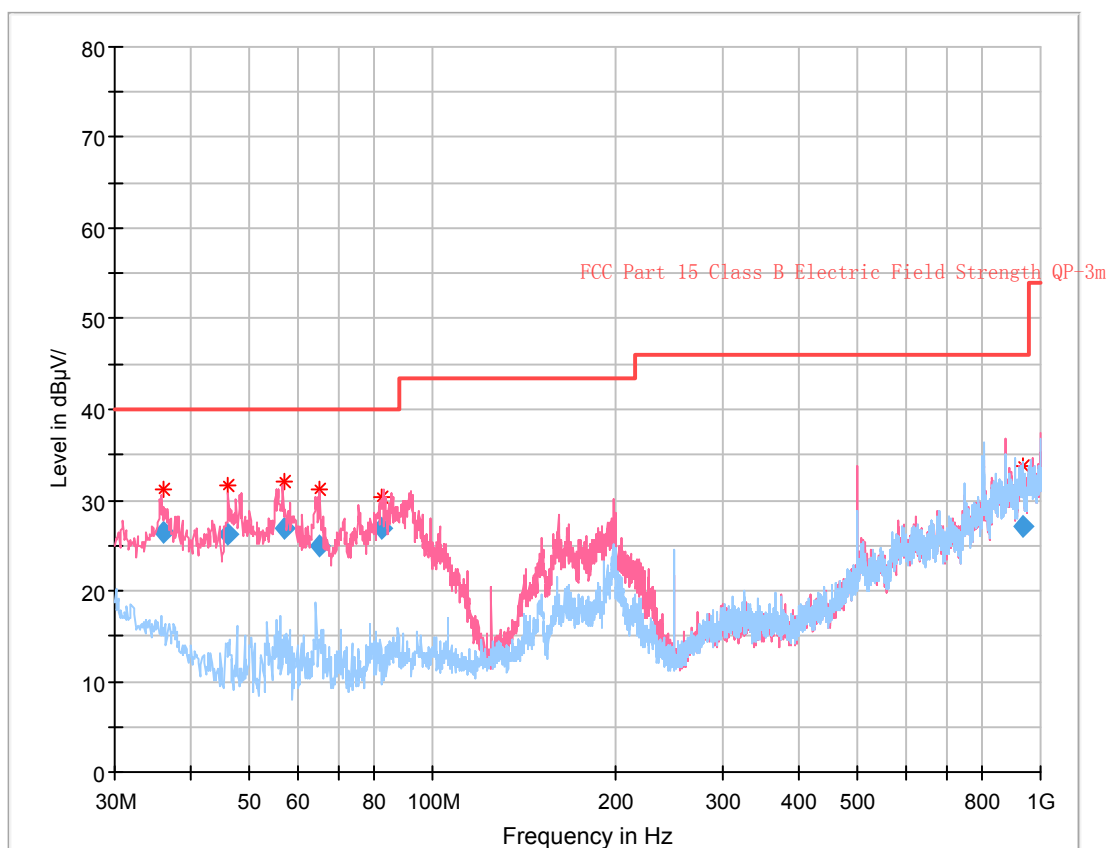
According to the recorded data in following table, the EUT complied with the FCC §15.109 Class B.

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	50~55 %
ATM Pressure:	101.0 kPa

The testing was performed by Zero Yan on 2020-04-13 for below 1G and Leo Huang on 2020-04-23 and 2020-05-08 for above 1G.

*EUT Operation Mode: Working***30 MHz – 1 GHz:**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
36.138375	26.38	101.0	V	110.0	-11.3	40.00	13.62
45.937875	26.13	108.0	V	345.0	-17.7	40.00	13.87
57.005250	26.88	108.0	V	77.0	-20.0	40.00	13.12
64.887125	24.91	101.0	V	272.0	-20.4	40.00	15.09
82.574250	26.82	126.0	V	295.0	-19.7	40.00	13.18
932.442250	27.06	238.0	V	0.0	4.8	46.00	18.94

Above 1 GHz:

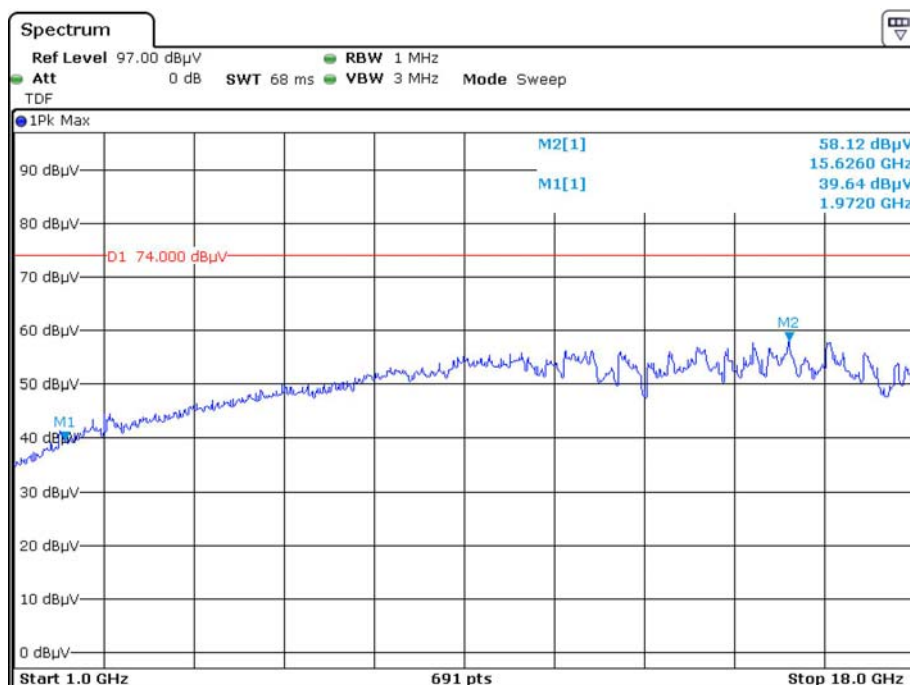
Frequency (MHz)	Measurement		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dB μ V/m)	FCC Part 15B	
	Reading (dB μ V)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dB μ V/m)	Margin (dB)
1286.43	48.19	PK	8	2.5	H	-4.41	43.78	74	30.22
1286.43	28.42	Ave.	8	2.5	H	-4.41	24.01	54	29.99
1286.43	47.63	PK	69	1.2	V	-4.41	43.22	74	30.78
1286.43	28.24	Ave.	69	1.2	V	-4.41	23.83	54	30.17
2083.24	44.32	PK	146	1.8	H	-0.91	43.41	74	30.59
2083.24	28.21	Ave.	146	1.8	H	-0.91	27.30	54	26.70
2083.24	44.51	PK	293	1.5	V	-0.91	43.60	74	30.40
2083.24	28.35	Ave.	293	1.5	V	-0.91	27.44	54	26.56

Note:

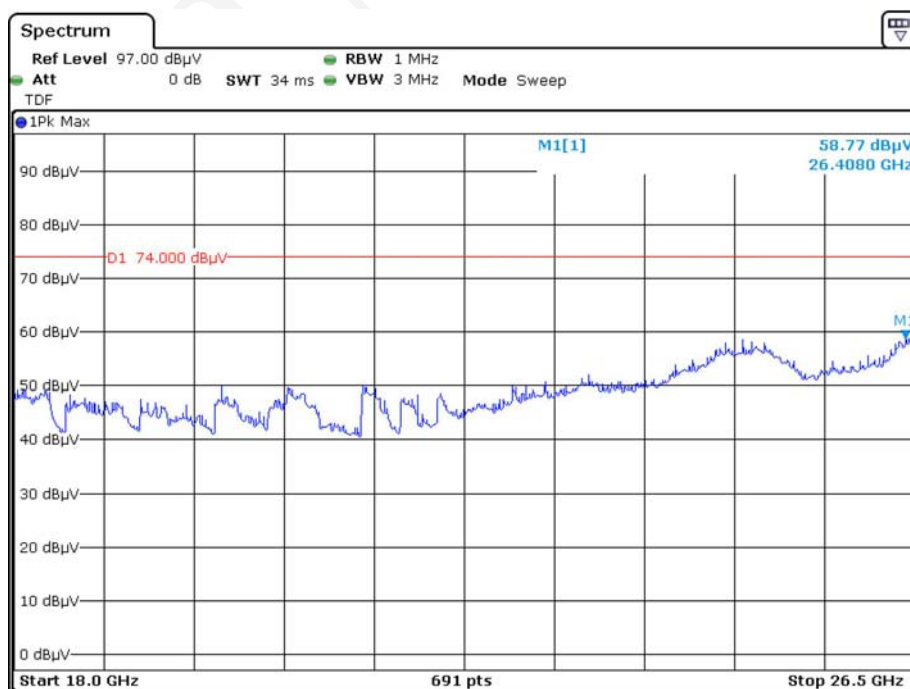
- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

Pre-scan for peak

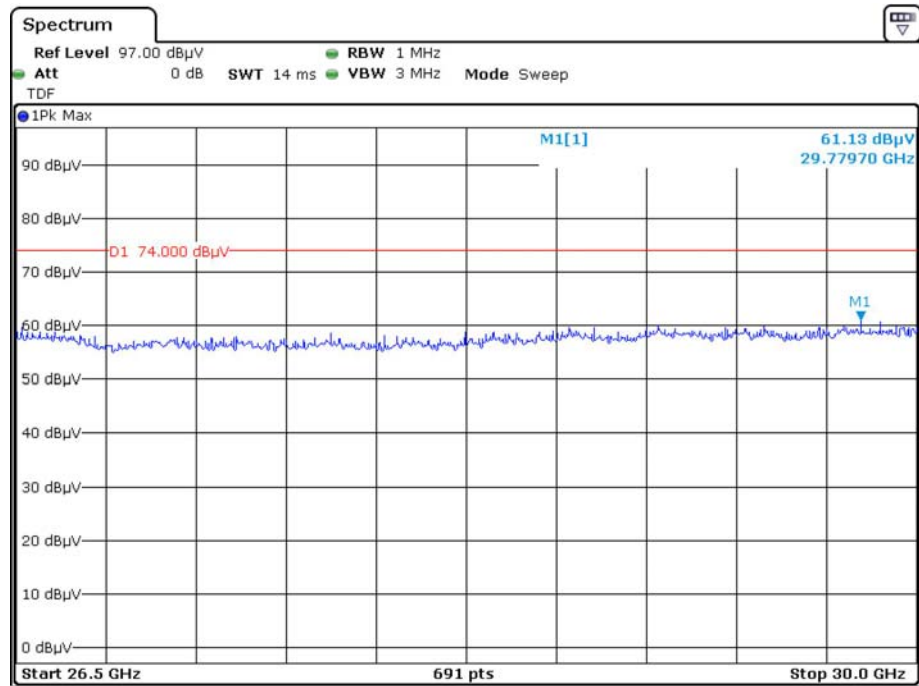
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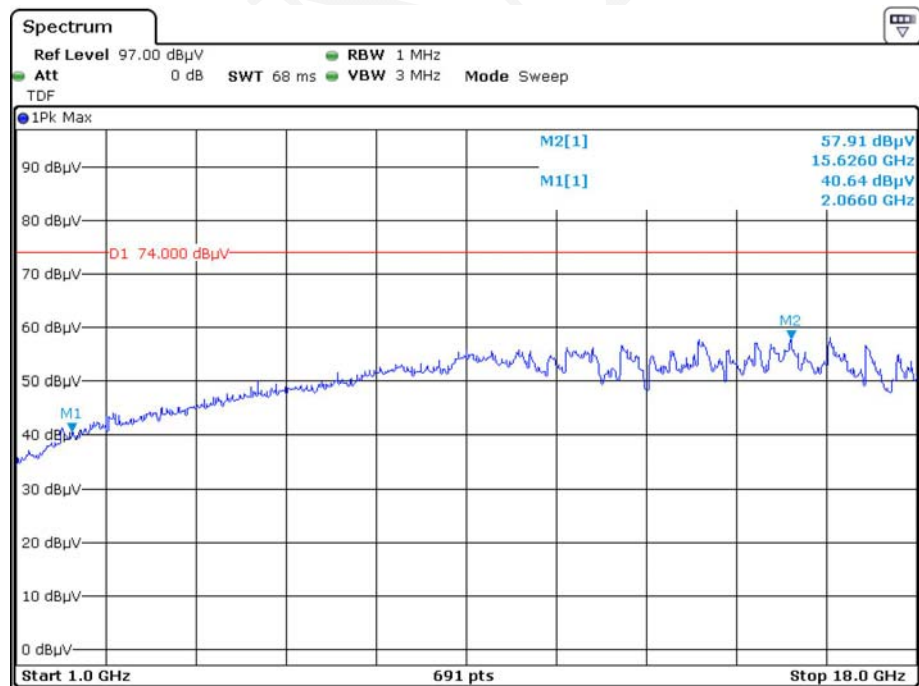


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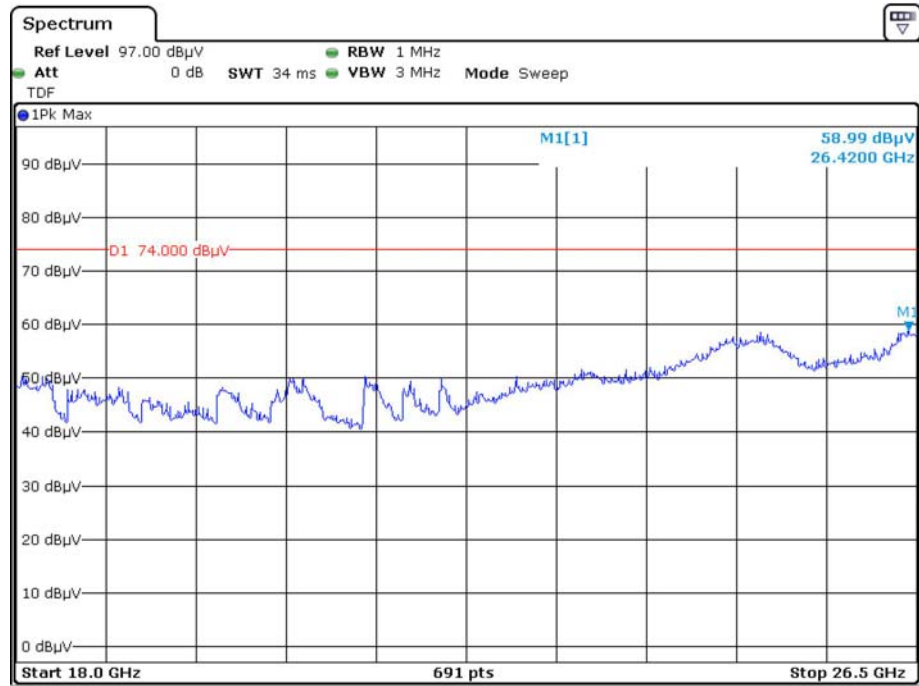


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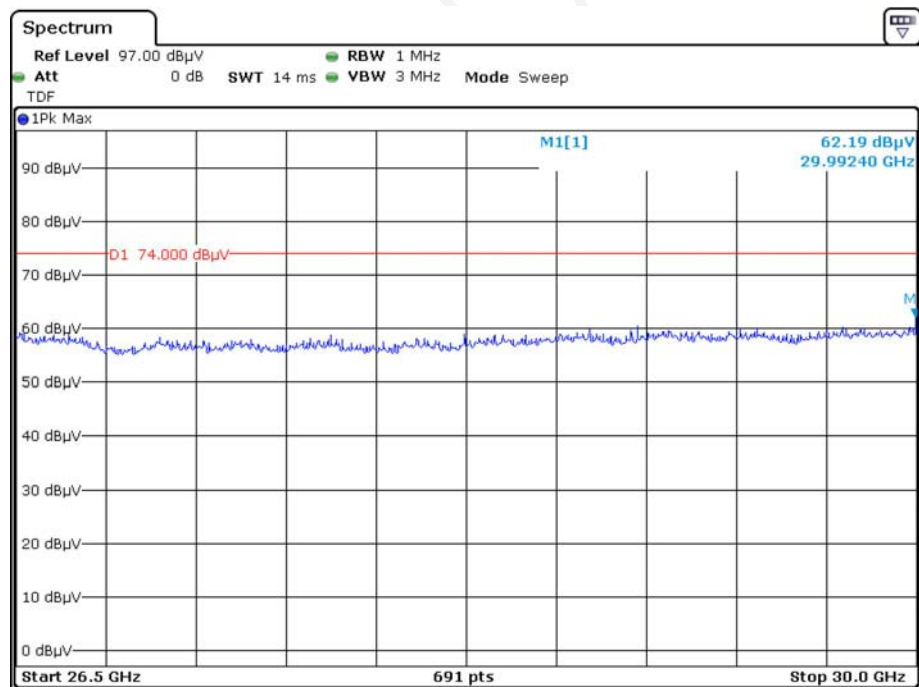
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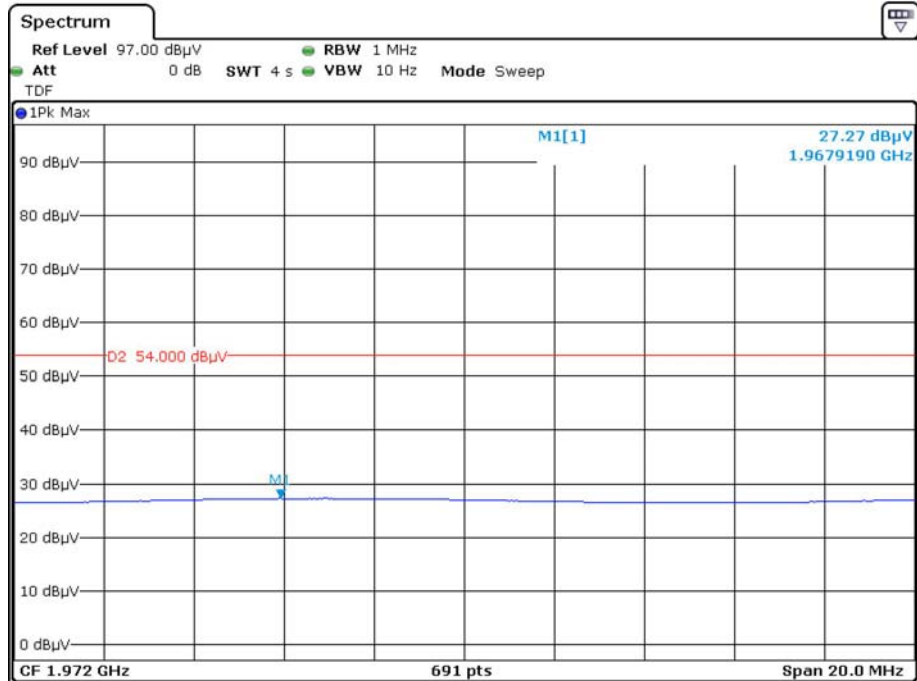
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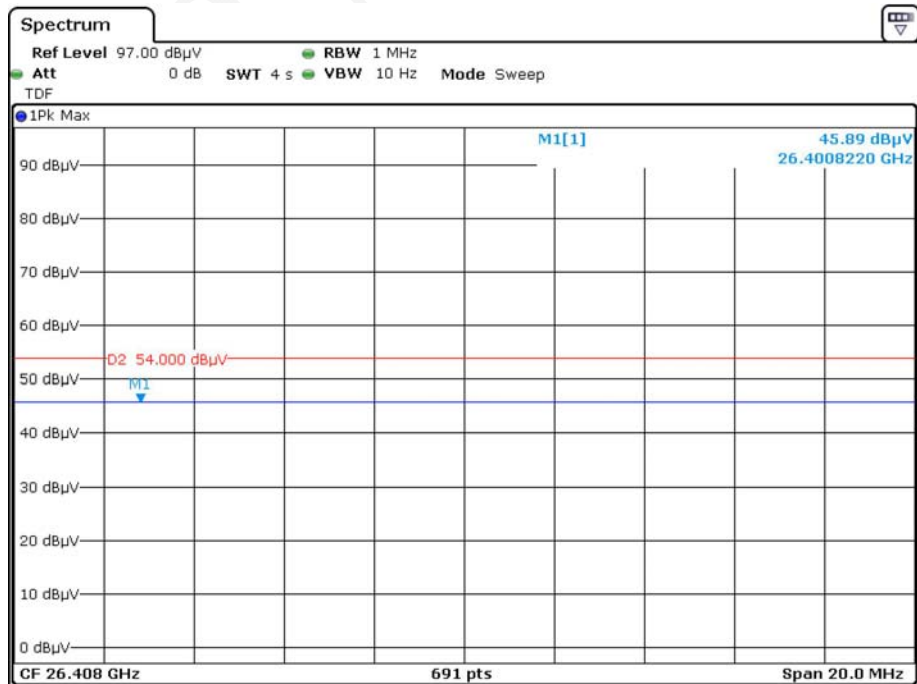
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Pre-scan for Average

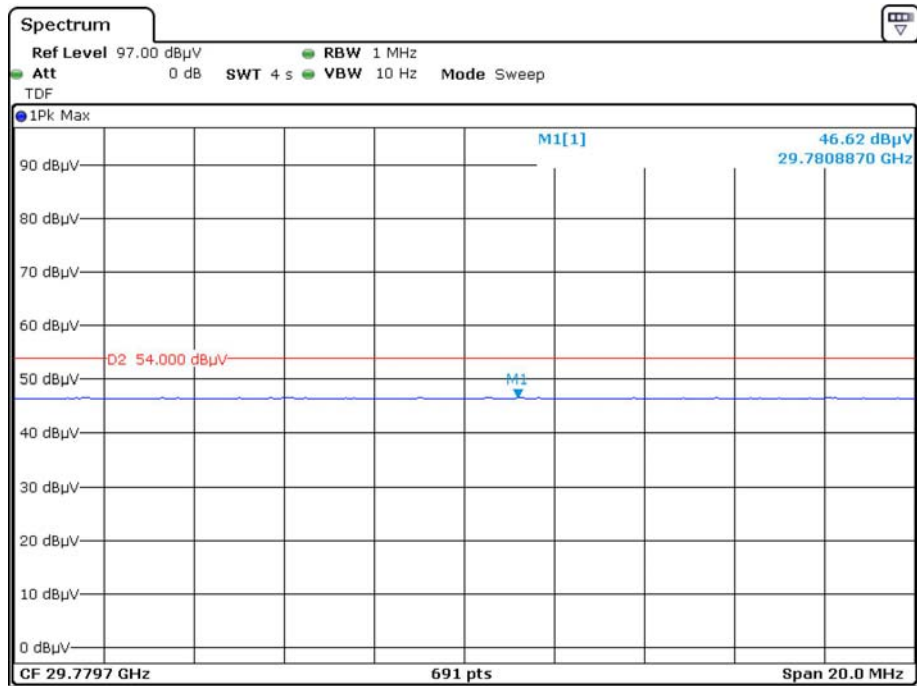
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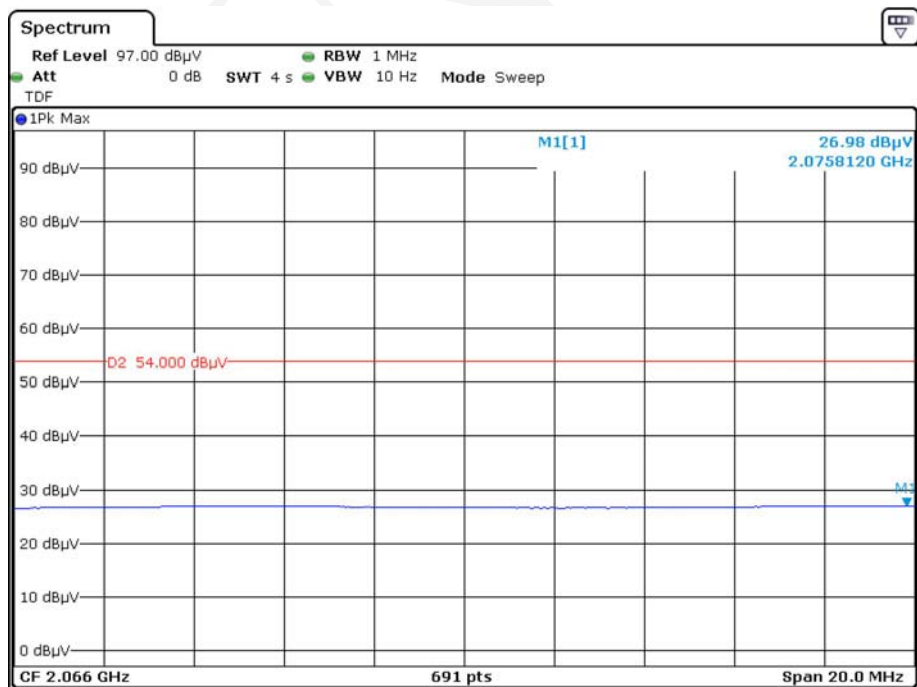


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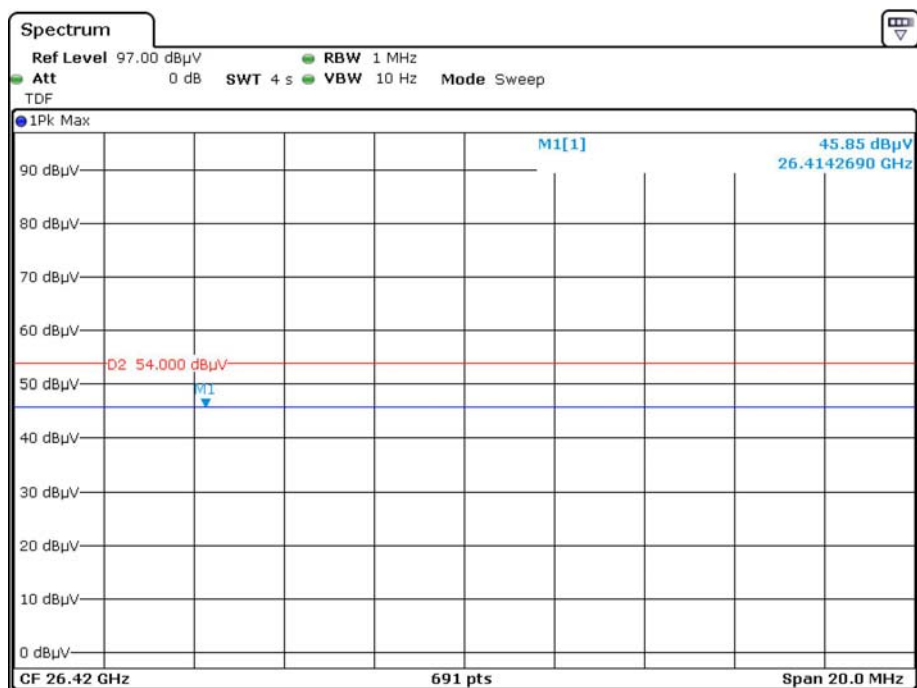


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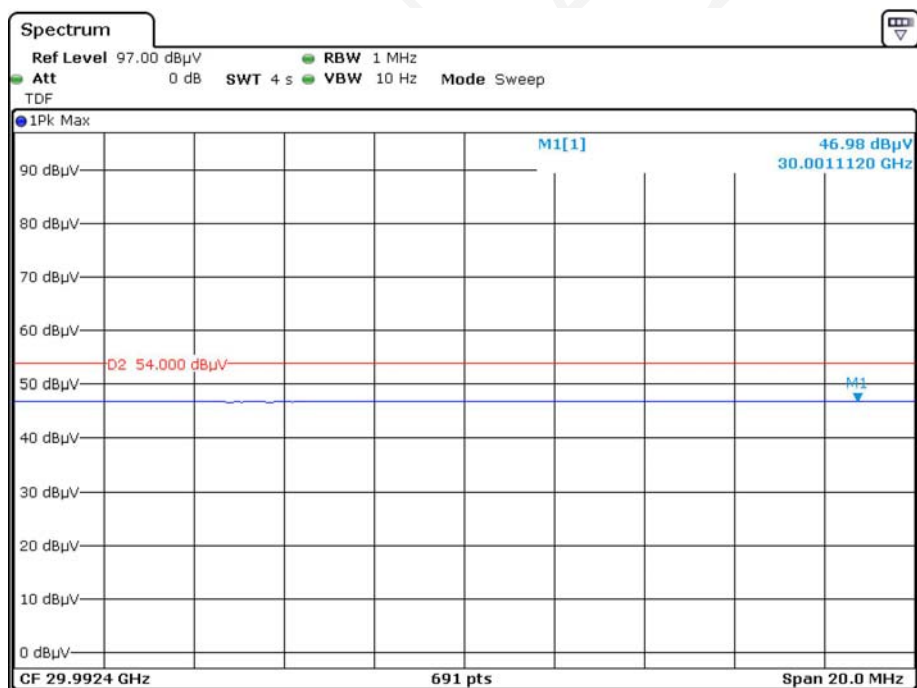
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