

## FCC PART 15B, CLASS B TEST REPORT

For

**i.safe MOBILE GmbH**

i\_Park Tauberfranken 10 97922 Lauda-Koenigshofen, Germany

**FCC ID: 2AACZ-IS9101**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Intrinsically safe tablet PC
<b>Report Number:</b> RSZ180529003-00A	
<b>Report Date:</b> 2018-07-17 Rocky Kang	
<b>Reviewed By:</b> RF Engineer 	
<b>Prepared By:</b> 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 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

The *i.safe MOBILE GmbH*'s product, model number: *IS910.1* (FCC ID: 2AACZ-IS9101) or the "EUT" in this report was a *Intrinsically safe tablet PC*, which was measured approximately: 234.5 mm (L) \* 154 mm (W) \* 19.5 mm (H), rated with input voltage: DC 3.7 V battery or DC 5V from adapter. The highest operating frequency is 2690 MHz.

Adapter Information: (For model IS910.1)

Model: ICP12-050-2000B

Input: AC 100-240V, 50/60Hz, 0.3 A

Output: DC 5V, 2000 mA

Adapter Information: (For model RG910)

Model: HKC0115020-2B

Input: AC 100-240V, 50/60Hz, 0.5 A

Output: DC 5V, 2A

*Notes: This series products model: RG910 (Product name: Rugged Tablet Computer) and IS910.1 (Product name: Intrinsically safe tablet PC) are electrically identical, the detailed information can be referred to the declaration letter which was stated and guaranteed by the applicant.*

*\*All measurement and test data in this report was gathered from production sample serial number: 180529003A for IS910.1 and 180529003B for RG910 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-05-29.*

### Objective

This test report is prepared on behalf of *i.safe MOBILE GmbH* 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 DSS & DTS, FCC Part 22H&24E&27 PCB and FCC Part 15.225 DXX submissions with FCC ID: 2AACZ-IS9101.

### 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**

Parameter		uncertainty
Conducted Emissions		±1.95dB
Emissions, radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB

**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 operation mode: Charging & Downloading (data transfer with computer)

### EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

### Special Accessories

No special accessory.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

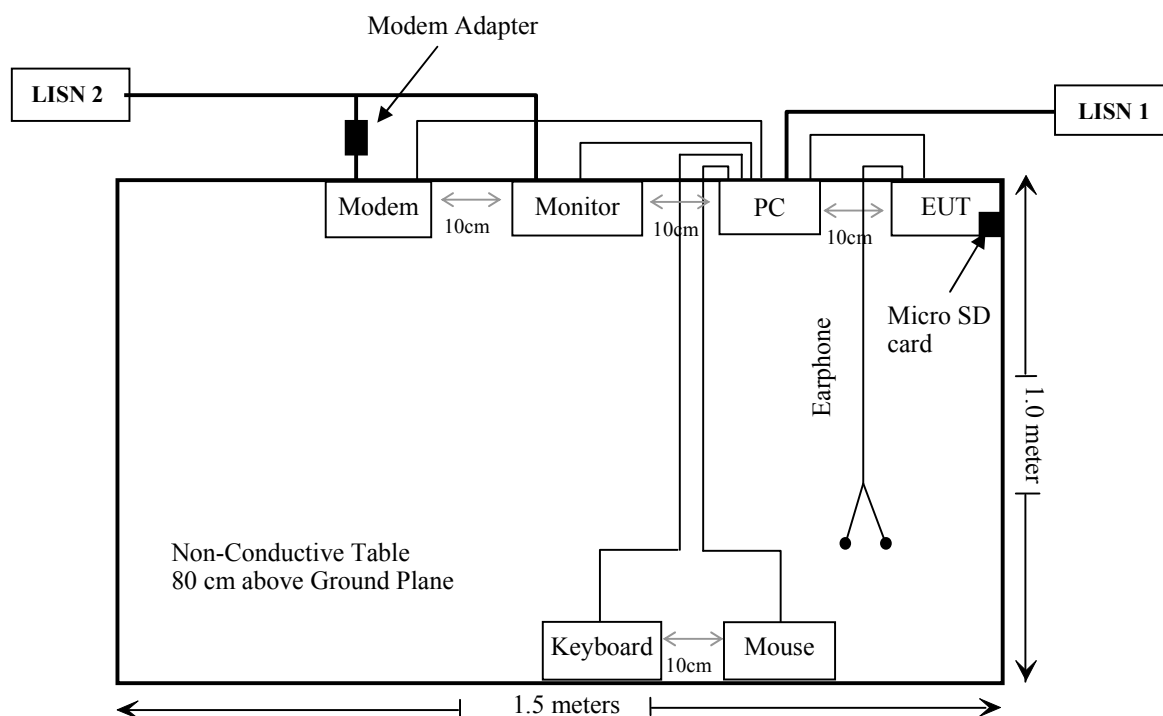
Manufacturer	Description	Model	Serial Number
DELL	Host PC	DCSCSF	127BP2X
TCL	Monitor	TFT1560PS	ALA560806C160409
Microsoft	Keyboard	1406	0200706128743
DELL	Mouse	MOC5UO	G1900NKD
SAST	Modem	AEM-2100	0293
Kingston	Micro SD card	1 GB	N/A

## External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-Shielding Detachable USB Cable	1.5	Host PC	Mouse
Shielding Detachable Serial Cable	1.2	Host PC	Modem
Shielding Detachable K/B Cable With Magnet Ring	1.5	Host PC	Keyboard
Shielding Detachable VGA Cable	1.5	Host PC	LCD Monitor
Un-Shielding Detachable USB Cable	1.0	EUT	Host PC
Un-Shielding Detachable USB Cable (With one case, for model IS910.1)	1.0	EUT	Host PC
Un-shielding Detachable Earphone Cable	1.2	EUT	Earphone

## Block Diagram of Test Setup

For conducted emission:



**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
<b>AC Line Conducted Emission Test</b>					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2018-05-12	2018-11-12
<b>Radiated Emission Test</b>					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-04-24	2019-04-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-05-21	2019-05-21
HP	Amplifier	HP8447E	1937A01046	2018-05-21	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-04-01	2018-10-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2019-11-19
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2019-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-22	2018-11-22
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).

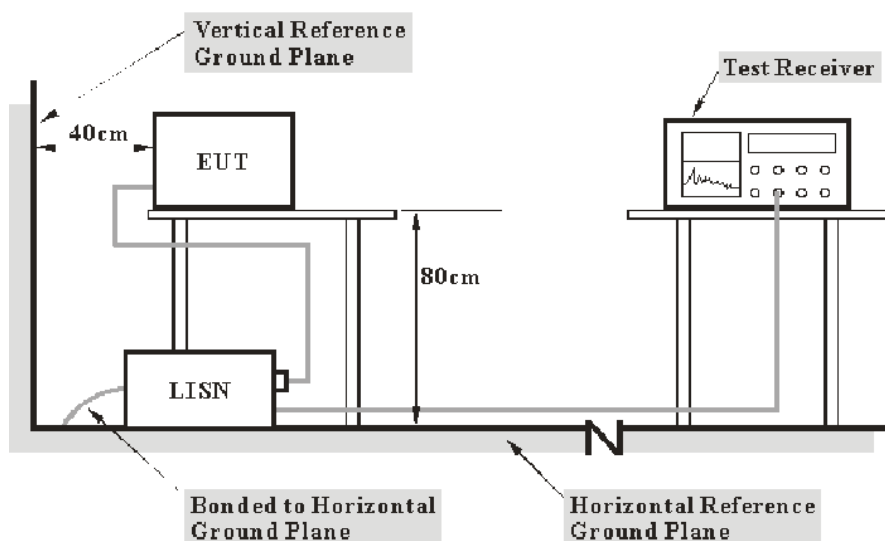


## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### 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

During the conducted emission test, the host PC was connected to the first LISN and the other relevant equipments were connected to the second LISN.

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,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{\text{lim}} + U_{\text{cisp}}r$$

In BACL.,  $U_{(Lm)}$  is less than  $U_{\text{cisp}r}$ , if  $L_m$  is less than  $L_{\text{lim}}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

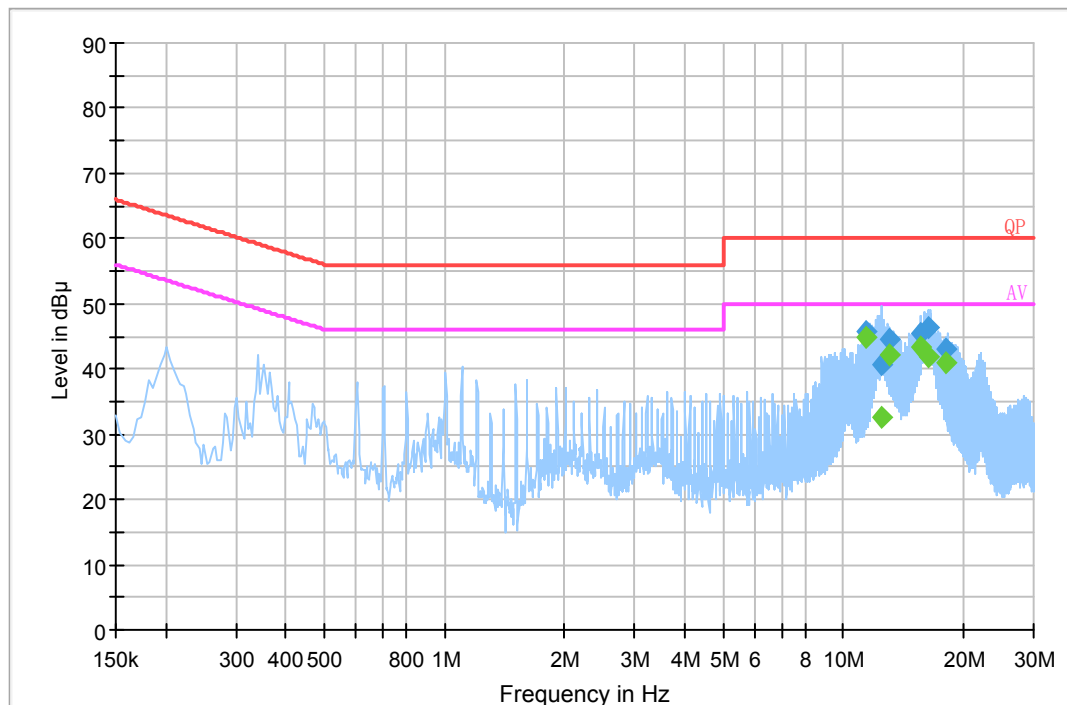
Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

*The testing was performed by Nancy Wang on 2018-07-14.*

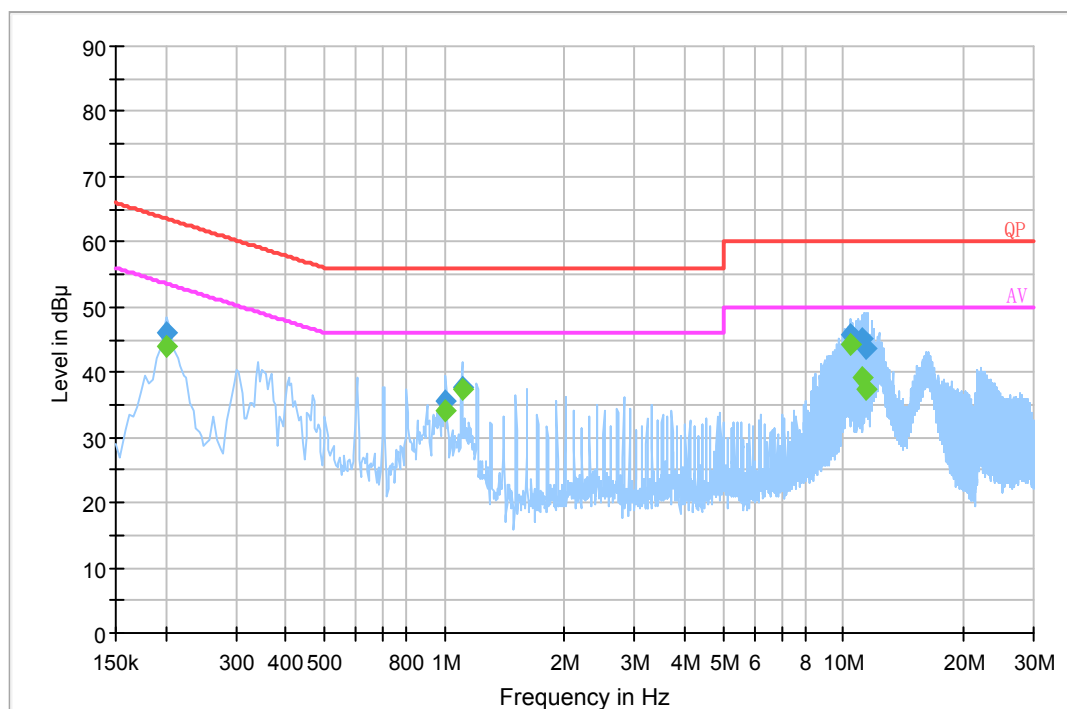
*EUT Operation Mode: Downloading*

**For model IS910.1:**

**AC 120V/60 Hz, Line**



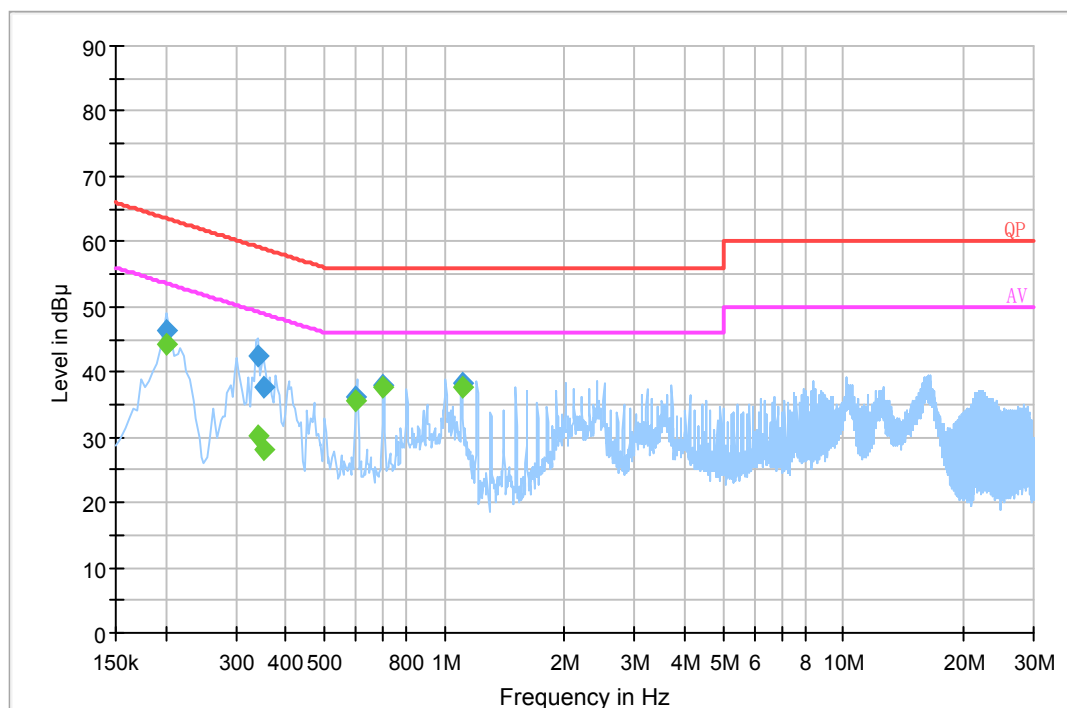
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
11.367510	45.6	19.9	60.0	14.4	QP
12.462950	40.5	19.9	60.0	19.5	QP
13.075390	44.5	20.0	60.0	15.5	QP
15.592090	45.4	20.0	60.0	14.6	QP
16.400030	46.3	20.0	60.0	13.7	QP
18.104970	43.0	20.0	60.0	17.0	QP
11.367510	44.9	19.9	50.0	5.1	Ave.
12.462950	32.6	19.9	50.0	17.4	Ave.
13.075390	42.1	20.0	50.0	7.9	Ave.
15.592090	43.3	20.0	50.0	6.7	Ave.
16.400030	41.8	20.0	50.0	8.2	Ave.
18.104970	40.8	20.0	50.0	9.2	Ave.

**AC 120V/60 Hz, Neutral**

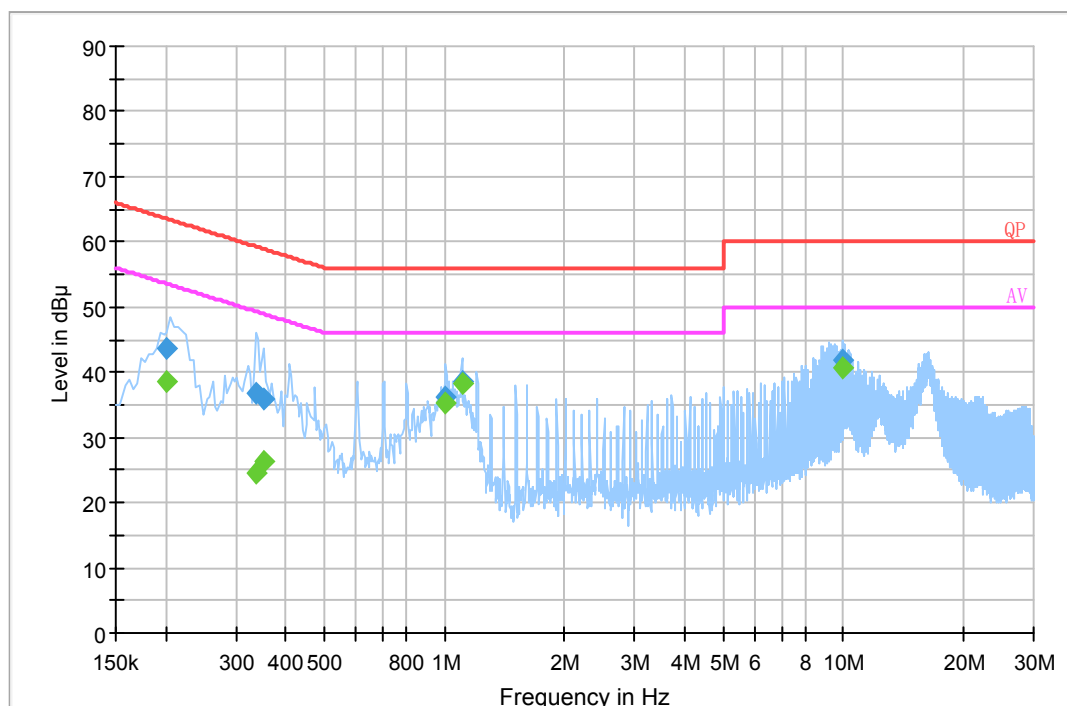
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.201500	46.1	20.1	63.5	17.4	QP
1.006910	35.6	20.0	56.0	20.4	QP
1.105410	37.6	20.0	56.0	18.4	QP
10.462630	45.8	19.9	60.0	14.2	QP
11.161010	45.2	19.9	60.0	14.8	QP
11.460570	43.7	19.9	60.0	16.3	QP
0.201500	44.0	20.1	53.5	9.5	Ave.
1.006910	34.2	20.0	46.0	11.8	Ave.
1.105410	37.2	20.0	46.0	8.8	Ave.
10.462630	44.3	19.9	50.0	5.7	Ave.
11.161010	39.1	19.9	50.0	10.9	Ave.
11.460570	37.4	19.9	50.0	12.6	Ave.

**For model RG910:**

**AC 120V/60 Hz, Line**



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.201500	46.5	20.1	63.5	17.0	QP
0.340870	42.5	20.1	59.2	16.7	QP
0.352690	37.8	20.1	58.9	21.1	QP
0.600970	36.2	20.0	56.0	19.8	QP
0.703470	38.0	19.9	56.0	18.0	QP
1.105410	38.2	20.0	56.0	17.8	QP
0.201500	44.2	20.1	53.5	9.3	Ave.
0.340870	30.2	20.1	49.2	19.0	Ave.
0.352690	28.1	20.1	48.9	20.8	Ave.
0.600970	35.7	20.0	46.0	10.3	Ave.
0.703470	37.8	19.9	46.0	8.2	Ave.
1.105410	37.8	20.0	46.0	8.2	Ave.

**AC 120V/60 Hz, Neutral**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.201500	43.7	20.1	63.5	19.8	QP
0.336930	36.9	20.1	59.3	22.4	QP
0.352690	35.9	20.1	58.9	23.0	QP
1.006910	36.3	20.0	56.0	19.7	QP
1.105410	38.6	20.0	56.0	17.4	QP
9.960630	41.8	19.9	60.0	18.2	QP
0.201500	38.6	20.1	53.5	14.9	Ave.
0.336930	24.5	20.1	49.3	24.8	Ave.
0.352690	26.2	20.1	48.9	22.7	Ave.
1.006910	35.4	20.0	46.0	10.6	Ave.
1.105410	38.3	20.0	46.0	7.7	Ave.
9.960630	40.6	19.9	50.0	9.4	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

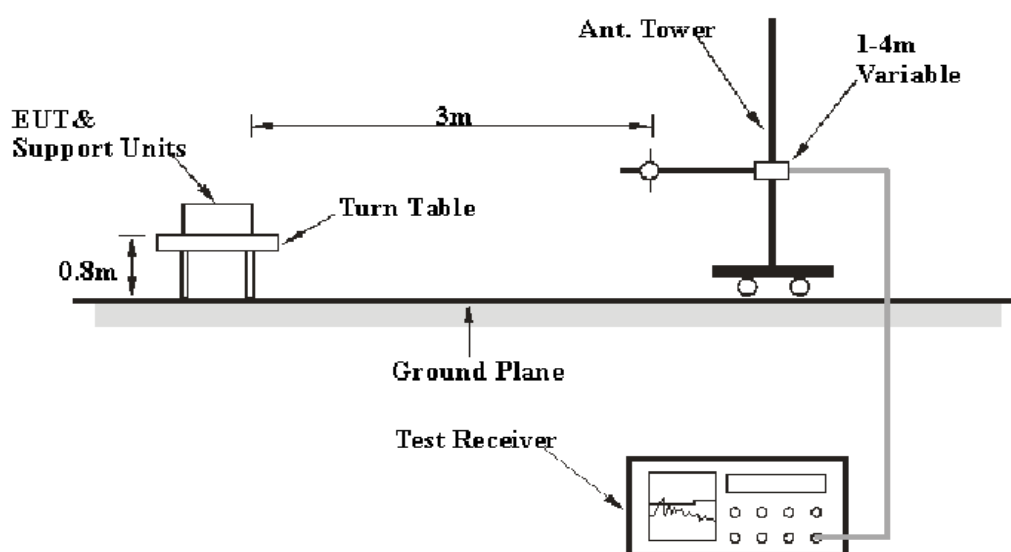
## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

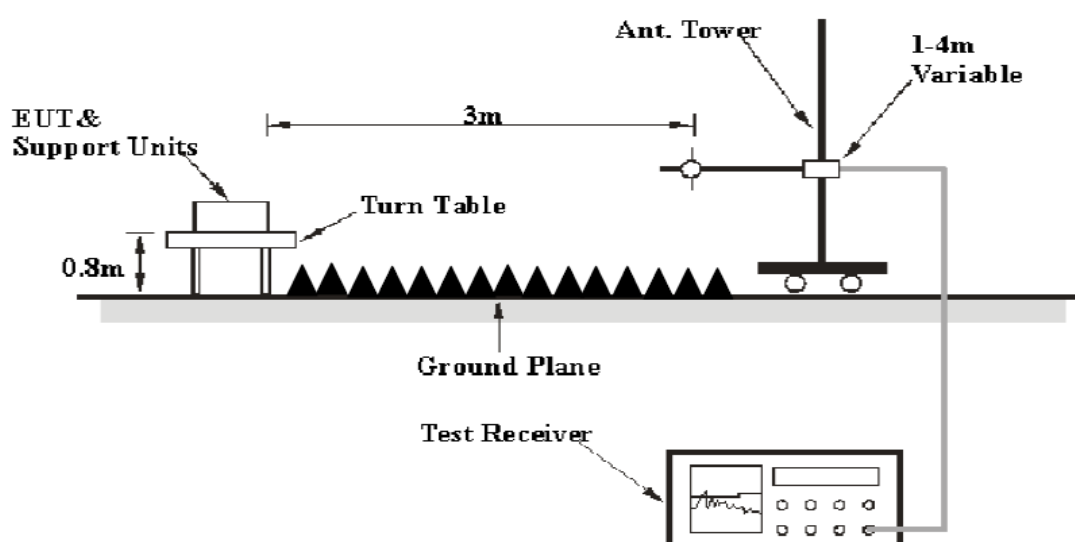
FCC §15.109

### 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 13.5 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	Measurment
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 data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.



**Test Data****Environmental Conditions**

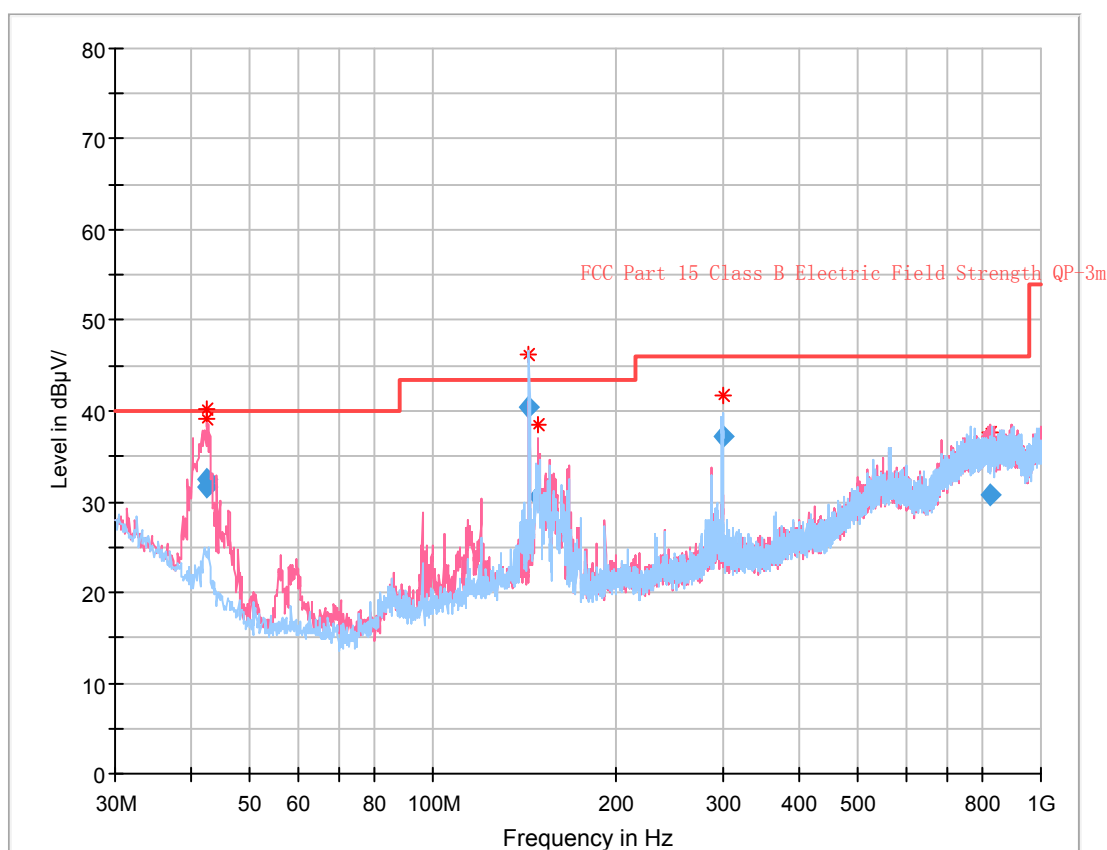
Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2018-07-14.

EUT Operation Mode: Downloading

For model IS910.1:

30 MHz~1 GHz:



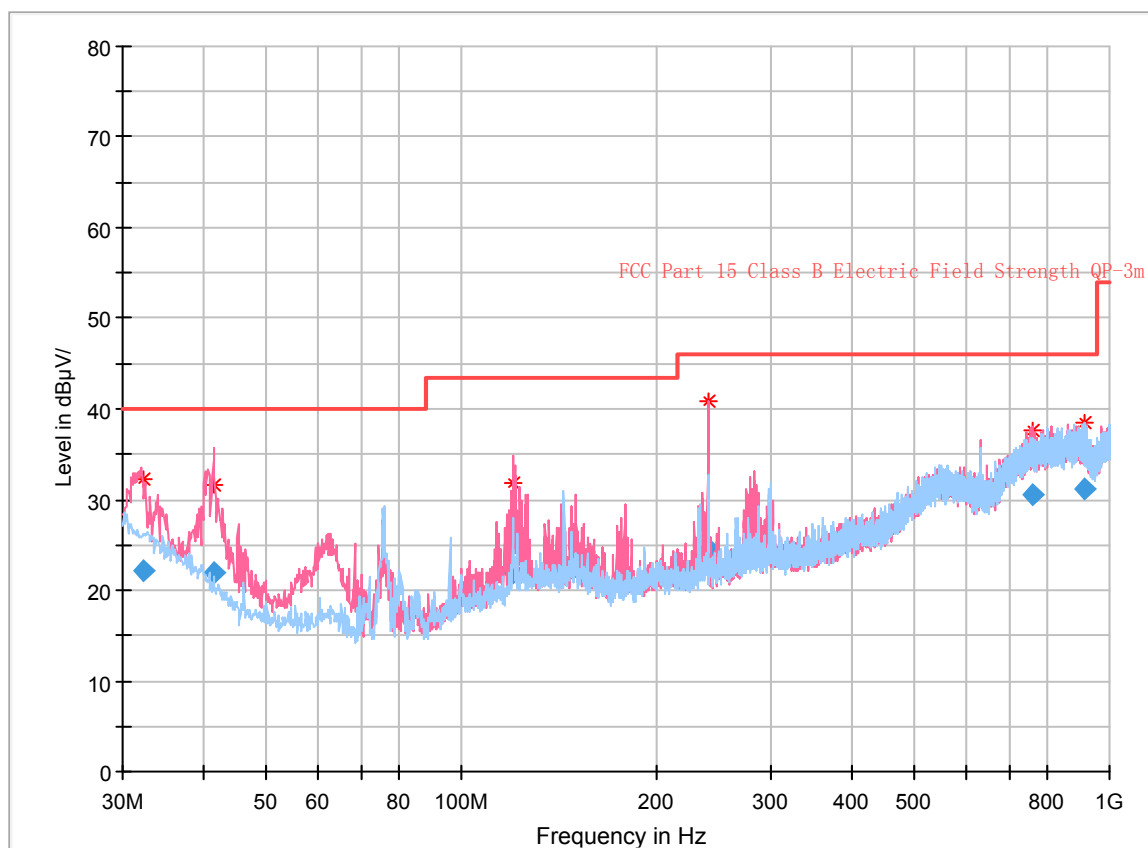
Frequency (MHz)	Corrected Amplitude (dB $\mu$ V/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dB $\mu$ V/m)	Margin (dB)
42.337125	32.41	100.0	V	232.0	-7.4	40.00	7.59
42.458625	31.66	107.0	V	255.0	-7.5	40.00	8.34
144.004500	40.45	181.0	H	289.0	-4.9	43.50	3.05
148.887375	30.58	107.0	V	87.0	-4.6	43.50	12.92
299.823750	37.27	110.0	H	83.0	-2.0	46.00	8.73
826.801250	30.86	314.0	V	58.0	9.4	46.00	15.14

**1 GHz – 13.5 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dB $\mu$ V/m)	FCC Part 15B	
	Reading (dB $\mu$ V)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dB $\mu$ V/m)	Margin (dB)
1546.24	47.69	PK	294	2.4	H	-5.52	42.17	74	31.83
1546.24	30.27	Ave.	294	2.4	H	-5.52	24.75	54	29.25
1546.24	43.65	PK	287	1.3	V	-5.52	38.13	74	35.87
1546.24	28.76	Ave.	287	1.3	V	-5.52	23.24	54	30.76
2027.00	59.33	PK	275	2.1	H	-0.99	58.34	74	15.66
2027.00	31.08	Ave.	275	2.1	H	-0.99	30.09	54	23.91
2027.00	45.53	PK	53	1.2	V	-0.99	44.54	74	29.46
2027.00	29.58	Ave.	53	1.2	V	-0.99	28.59	54	25.41

**For model RG910:**

**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)
32.196625	22.11	148.0	V	103.0	-0.8	40.00	17.89
41.454500	22.03	120.0	V	356.0	-6.7	40.00	17.97
120.003500	21.95	329.0	V	126.0	-6.4	43.50	21.55
240.016375	24.44	100.0	V	174.0	-3.2	46.00	21.56
758.596750	30.60	258.0	V	180.0	8.7	46.00	15.40
913.772750	31.24	291.0	H	228.0	9.6	46.00	14.76

**1 GHz – 13.5 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1347.80	45.79	PK	358	1.2	H	-8.04	37.75	74	36.25
1347.80	29.64	Ave.	358	1.2	H	-8.04	21.60	54	32.40
1347.80	44.23	PK	247	1.6	V	-8.04	36.19	74	37.81
1347.80	29.12	Ave.	247	1.6	V	-8.04	21.08	54	32.92
1974.24	49.27	PK	114	1.6	H	-0.99	48.28	74	25.72
1974.24	30.64	Ave.	114	1.6	H	-0.99	29.65	54	24.35
1974.24	43.28	PK	41	1.3	V	-0.99	42.29	74	31.71
1974.24	29.36	Ave.	41	1.3	V	-0.99	28.37	54	25.63

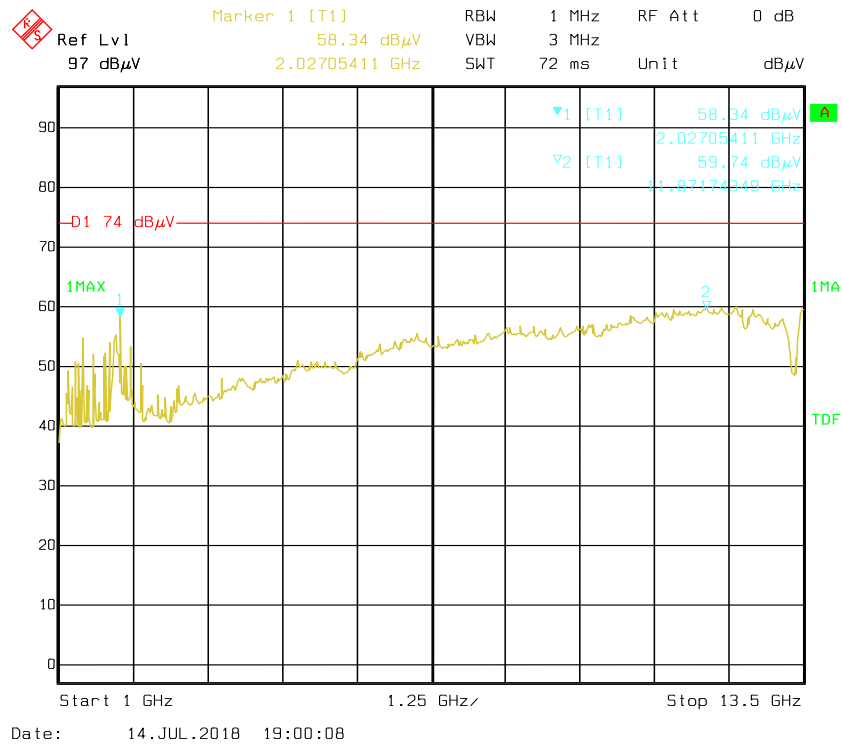
**Note:**

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

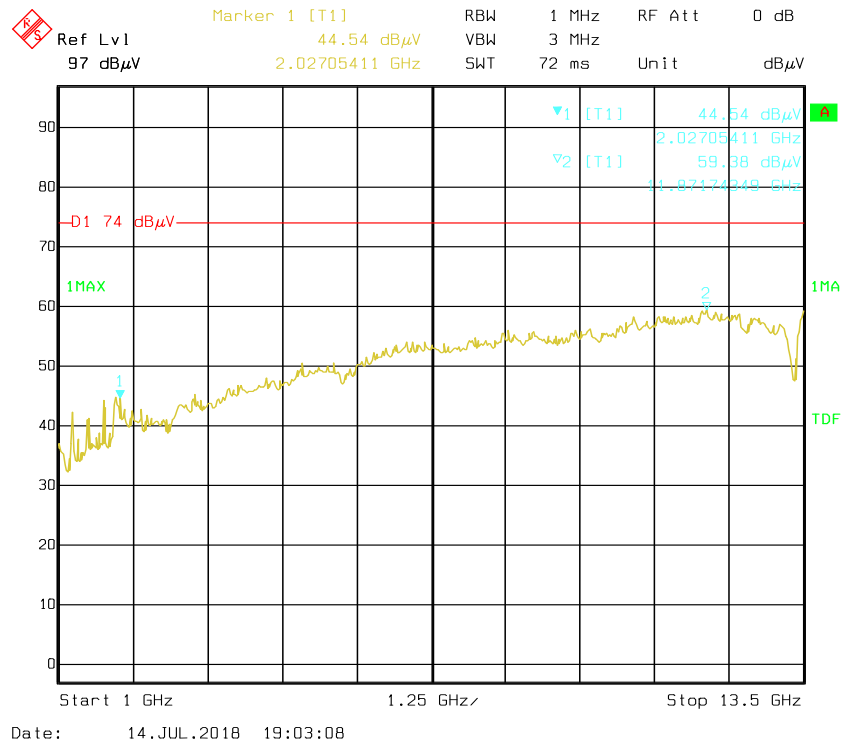
The worst case is model IS910.1:

Pre-scan for peak

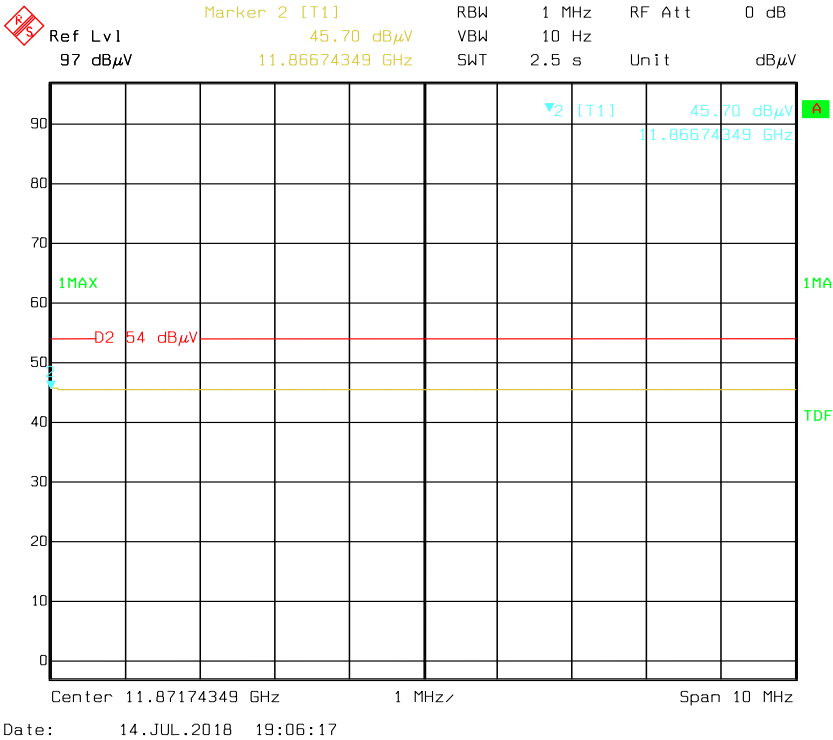
Horizontal – Peak



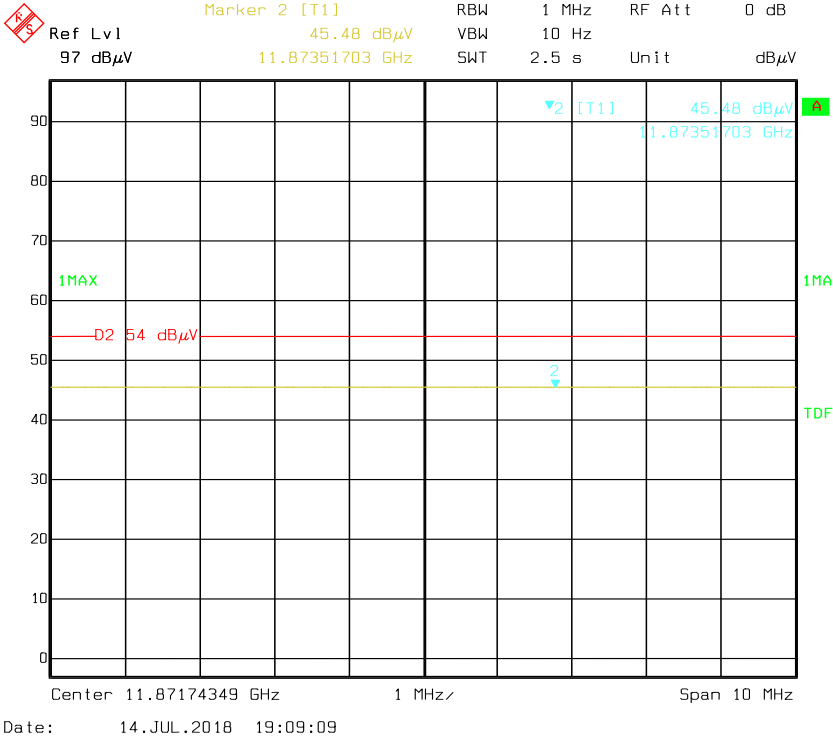
Vertical – Peak



Horizontal – Average



Vertical - Average



\*\*\*\*\* END OF REPORT \*\*\*\*\*