


# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



**Applicant:** LG Electronics USA, Inc.  
111 Sylvan Avenue, North Building, Englewood Cliffs, New  
Jersey 07632, United States

**Product Name:** Notebook Computer

**Brand Name:** LG or  LG

**Model No.:** 16T90TP

**Series Model:** 16T90TP\*\*, 16TD90TP\*\*, 16TG90TP\*\*, 16TB90TP\*\*, 16TS90TP\*\*  
Remark "\*\*" can be 0 to 9 or A to Z or dash or blank

**Model Difference:** For marketing purposes only

**Report Number:** TERF2409002611ER

**FCC ID** BEJNT-16T90TP

**Date of EUT Received:** September 3, 2024

**Date of Test:** September 4, 2024~November 4, 2024

**Issue Date:** November 12, 2024

Approved By

CHUN, CHIEH, CHEN

**Chun Chieh Chen**

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.225.

The results of this report relate only to the sample identified in this report.

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## Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2409002611ER	00	Original	October 22, 2024	Karen Huang	
TERF2409002611ER	01	Update section 2.5 and 7.5	November 4, 2024	Karen Huang	*
TERF2409002611ER	02	Update section 6.1 and 7.5	November 12, 2024	Karen Huang	*

**Note:**

- 1、The remark "\*" indicates modification of the report upon requests from certification body.
- 2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.  
And are assessed as electrically identical in RF characteristics, therefore, no further assessment required for the variant(s).

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# 1 GENERAL INFORMATION

## 1.1 Product Description

Product Name:	Notebook Computer
Brand Name:	LG or  LG
Model No.:	16T90TP
Series Model:	16T90TP**, 16TD90TP**, 16TG90TP**, 16TB90TP**, 16TS90TP** Remark "*" can be 0 to 9 or A to Z or dash or blank
Model Difference:	For marketing purposes only
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	408PGVC937455
Power Supply:	15.52 Vdc from rechargeable battery or 5 / 9 / 15 / 20 Vdc from adapter
Test Software (Name/Version)	Put pen to transmit signal

## 1.2 RF specification

Radio Technology:	NFC
Operating Frequency	13.56MHz
Transmit Power	< 18.32dBuV/m at 30m. (INPAQ) < 16.75dBuV/m at 30m. (AWAN)
Number of Channels	1
Modulation Type	ASK

## 1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Remark
Loop	AWAN	AFF00-000115 (Black)	Main source
		AFF00-000116 (White)	Main source
Loop	INPAQ	NF-C-F9-R0-238 (Black)	2nd source
		NF-C-F9-R0-239 (White)	2nd source

**Note:** Antenna information is provided by the applicant.

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## 1.4 Test Methodology

FCC Part 15, Subpart C §15.225

ANSI C63.10:2013.

## 1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

## 1.6 Special Accessories

There is no other accessory attached. This is the worst case condition.

## 1.7 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

#### 2.3.3 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

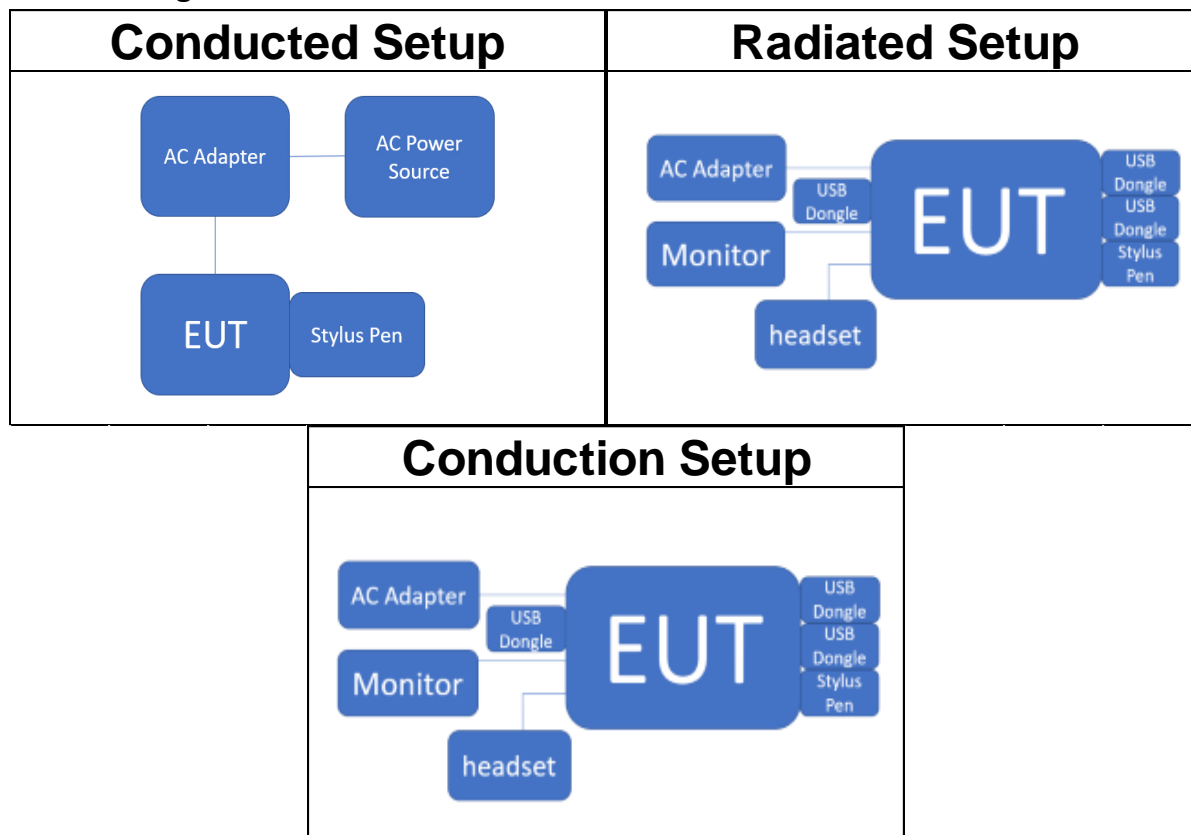
Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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## 2.4 Test Configuration



## 2.5 Control Unit(s)

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
AC Adapter	LG	LP65WFC20P-NJ	N/A	N/A	N/A
Stylus Pen	LGE	PEW8 (FCC ID:BEJSP-PEW8)	N/A	N/A	N/A
Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
AC Adapter	LG	LP65WFC20P-NJ	N/A	N/A	N/A
Type C to Type C cable	Luxshare	L1LUC022-CS-H	N/A	N/A	N/A
Stylus Pen	LGE	PEW8 (FCC ID:BEJSP-PEW8)	N/A	N/A	N/A
Monitor	Dell	U2413f	CN-06VNX5-72872-34D-A6YL	N/A	N/A
Headset	Apple	A1472	N/A	N/A	N/A
USB Dongle	SanDisk	SDCZ600-032G	N/A	N/A	N/A
USB Dongle	SanDisk	SDDDC4	N/A	N/A	N/A
USB Dongle	TEAMGROUP	C175	N/A	N/A	N/A
HDMI Cable	Hotron	E246588	N/A	N/A	N/A

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AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
AC Adapter	LG	LP65WFC20P-NJ	N/A	N/A	N/A
Type C to Type C cable	Luxshare	L1LUC022-CS-H	N/A	N/A	N/A
Stylus Pen	LGE	PEW8 (FCC ID:BEJSP-PEW8)	N/A	N/A	N/A
Monitor	Dell	U2413f	CN-06VNX5-72872-34D-A6YL	N/A	N/A
Headset	Apple	A1472	N/A	N/A	N/A
USB Dongle	SanDisk	SDCZ600-032G	N/A	N/A	N/A
USB Dongle	SanDisk	SDDDC4	N/A	N/A	N/A
USB Dongle	TEAMGROUP	C175	N/A	N/A	N/A
HDMI Cable	Hotron	E246588	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.225 (a)-(d)	Radiated Emission	Compliant
§15.209	Radiated Emission Limits, general requirement	Compliant
§15.225 (e)	Frequency Stability	Compliant
§2.1049 §15.215 (c)	Emission Bandwidth	Compliant
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Bands	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 The Worst Test Modes and Channel Details

1. The EUT stay in continuous transmission mode.
2. The frequency 13.56 MHz is the default channel to test, where it is the only manipulative channel as this application supports.
3. Only one configuration is supported/applicable as follows.

RADIATED EMISSION TEST			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
FREQUENCY STABILITY			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK
20dB and 99% BANDWIDTH			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION
NFC	1	1	ASK

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 1.54 dB
Frequency Stability	+/- 1.48 Hz
Emission Bandwidth	+/- 1.38 Hz
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	1.89 dB	9kHz~30MHz
	+/-	4.15 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89 dB	9kHz~30MHz
	+/-	4.02 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2 dB	33GHz-50GHz
	+/-	1.59 dB	50GHz-60GHz
	+/-	1.7 dB	60GHz-90GHz
	+/-	1.64 dB	90GHz-140GHz
	+/-	3.83 dB	140GHz-220GHz

### Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 6 MEASUREMENT EQUIPMENT USED

### 6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM-3000	161207	06/22/2024	06/21/2025
EMI Test Receiver	R&S	ESCI 7	100759	08/28/2024	08/27/2025
LISN	SCHWARZBECK	NSLK 8127	1040	09/07/2024	09/06/2025
LISN	SCHWARZBECK	NSLK 8127	1041	10/26/2023	10/25/2024
LISN	SCHWARZBECK	NSLK 8127	1041	11/04/2024	11/03/2025
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2024	06/21/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

### 6.2 Conducted Measurement

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
AC Power Source	Gwinstek	APS-7050E	GEV171679	10/26/2023	10/25/2024
DC Block	Mini-Circuits	BLK-18-S+	13	12/12/2023	12/11/2024
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60240503	12/18/2023	12/17/2024
H-Loop Near Field Antenna	EMCI	LF-R 400	02-1637	N/A	N/A
Temperature Chamber	TERCHY	MHG-120LE	1110435	06/05/2024	06/04/2025

### 6.3 Radiated Measurement

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	378	08/09/2024	08/08/2025
Coaxial Cables	EMCI+Huber Suhner	EMC107-SM-SM-1000 +SUCOFLEX 104PEA +EMC107-SM-SM-1500 +SUCOFLEX 106	RX Cable 9K-18G (221110+MY4251/4 PEA+221106+76096 /6)	08/30/2024	08/29/2025
EMI Test Receiver	R&S	ESCI 7	100759	08/28/2024	08/27/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY63440386	02/06/2024	02/05/2025
Loop Antenna	COM-POWER	AL-130R	10160104	12/04/2023	12/03/2024
Pre-Amplifier	HP	8447D	2944A07676	08/30/2024	08/29/2025
Site Cal	SGS	SAC 3	N/A	08/30/2024	08/29/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

**NOTE:** N.C.R refers to Not Calibrated Required.

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## 7 CONDUCTED EMISSIONS TEST

### 7.1 Standard Applicable

Frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

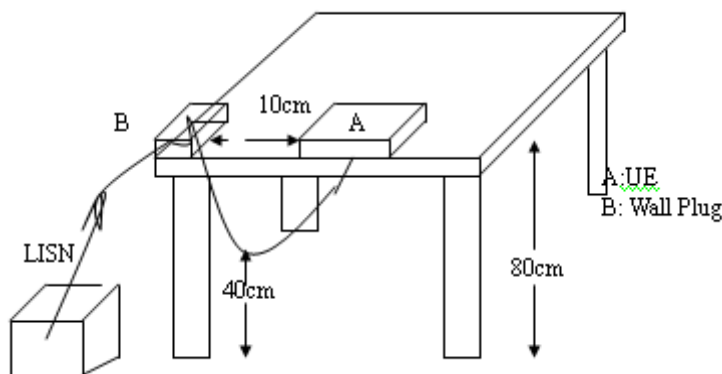
#### Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 7.2 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

### 7.3 Test SET-UP (Block Diagram of Configuration)



### 7.4 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

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## 7.5 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closest to the limit.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number :TERF2409002611ER

Test Site :Conduction 1

Operation Mode :NFC

Test Date :2024-09-11

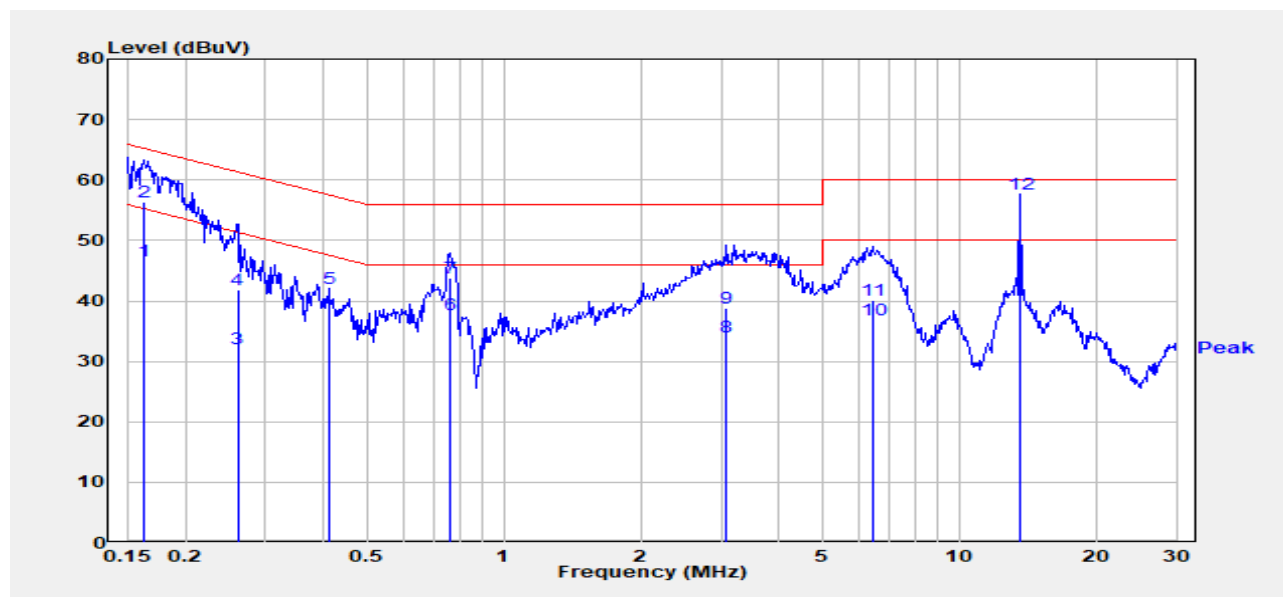
Power :120V/60Hz

Temp./Humi. :26.4℃/51%

Probe :L

Engineer :Nick Lin

Note: :Link



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.162	Average	36.40	10.25	46.65	55.34	-8.69
0.162	QP	46.10	10.25	56.35	65.34	-8.99
0.260	Average	21.90	10.25	32.15	51.42	-19.27
0.260	QP	31.60	10.25	41.85	61.42	-19.57
0.413	Peak	31.72	10.25	41.97	57.59	-15.63
0.763	Average	27.30	10.32	37.62	46.00	-8.38
0.763	QP	33.50	10.32	43.82	56.00	-12.18
3.090	Average	23.30	10.81	34.11	46.00	-11.89
3.090	QP	28.10	10.81	38.91	56.00	-17.09
6.454	Average	26.20	10.58	36.78	50.00	-13.22
6.454	QP	29.50	10.58	40.08	60.00	-19.92
13.560	Peak	46.83	10.77	57.59		

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Report Number :TERF2409002611ER

Operation Mode :NFC

Power :120V/60Hz

Probe :N

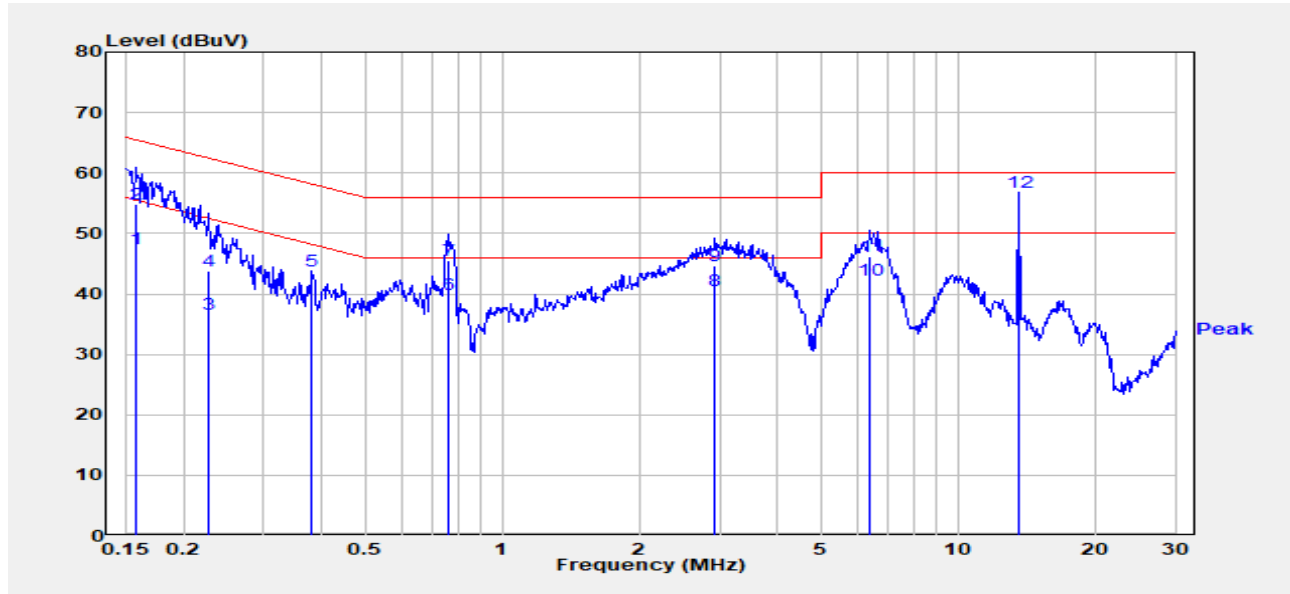
Note: :Link

Test Site :Conduction 1

Test Date :2024-09-11

Temp./Humi. :26.4°C/51%

Engineer :Nick Lin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBuV	dB	dBuV	dBuV	dB
0.156	Average	37.20	10.25	47.45	55.65	-8.20
0.156	QP	44.70	10.25	54.95	65.65	-10.70
0.228	Average	26.40	10.25	36.65	52.52	-15.87
0.228	QP	33.60	10.25	43.85	62.52	-18.67
0.383	Peak	33.65	10.25	43.90	58.21	-14.32
0.759	Average	29.60	10.32	39.92	46.00	-6.08
0.759	QP	35.20	10.32	45.52	56.00	-10.48
2.931	Average	29.80	10.85	40.65	46.00	-5.35
2.931	QP	33.80	10.85	44.65	56.00	-11.35
6.420	Average	31.80	10.58	42.38	50.00	-7.62
6.420	QP	35.70	10.58	46.28	60.00	-13.72
13.560	Peak	46.14	10.77	56.90		

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Report Number :TERF2409002611ER

Operation Mode :NFC

Power :120V/60Hz

Probe :L

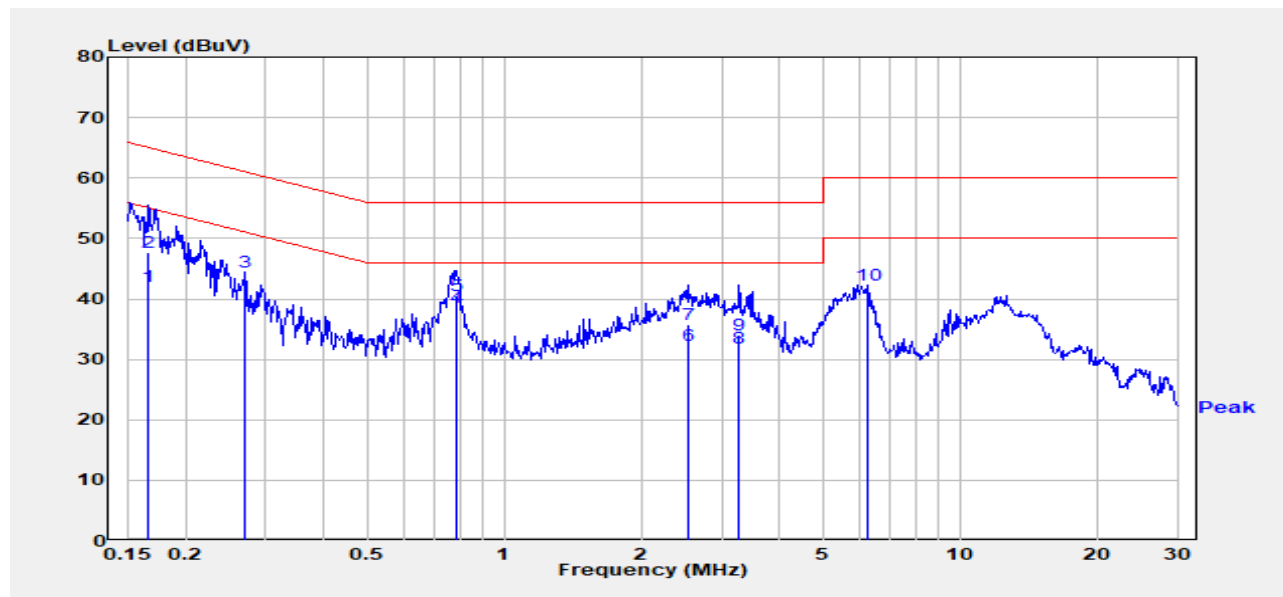
Note: :Idle

Test Site :Conduction 1

Test Date :2024-09-11

Temp./Humi. :26.4°C/51%

Engineer :Nick Lin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBμV	dB	dBμV	dBμV	dB
0.166	Average	31.80	10.25	42.05	55.16	-13.11
0.166	QP	37.50	10.25	47.75	65.16	-17.41
0.270	Peak	34.27	10.25	44.52	61.12	-16.60
0.783	Average	28.20	10.32	38.52	46.00	-7.48
0.783	QP	30.30	10.32	40.62	56.00	-15.38
2.527	Average	21.30	10.94	32.24	46.00	-13.76
2.527	QP	24.80	10.94	35.74	56.00	-20.26
3.276	Average	21.20	10.78	31.98	46.00	-14.02
3.276	QP	23.30	10.78	34.08	56.00	-21.92
6.252	Peak	31.78	10.57	42.35	60.00	-17.65

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Report Number :TERF2409002611ER

Operation Mode :NFC

Power :120V/60Hz

Probe :N

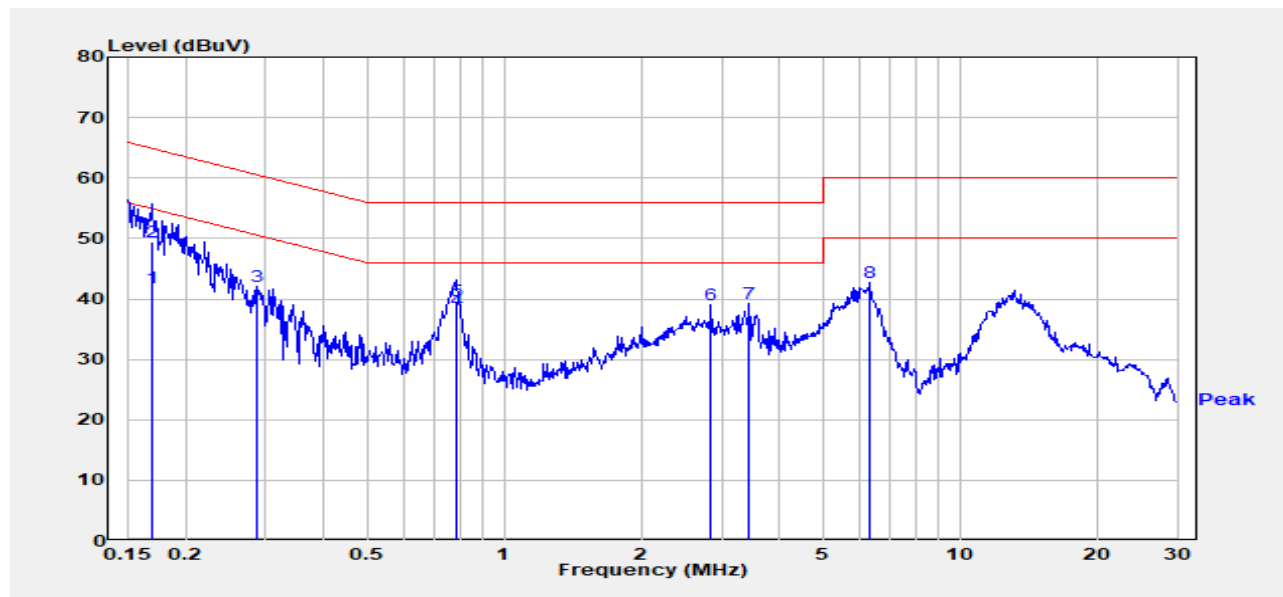
Note: :Idle

Test Site :Conduction 1

Test Date :2024-09-11

Temp./Humi. :26.4°C/51%

Engineer :Nick Lin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBuV	dB	dBuV	dBuV	dB
0.169	Average	31.50	10.25	41.75	55.03	-13.28
0.169	QP	39.10	10.25	49.35	65.03	-15.68
0.288	Peak	31.90	10.25	42.15	60.59	-18.44
0.783	Average	27.80	10.32	38.12	46.00	-7.88
0.783	QP	29.40	10.32	39.72	56.00	-16.28
2.839	Peak	28.12	10.87	38.99	56.00	-17.01
3.454	Peak	28.50	10.75	39.24	56.00	-16.76
6.352	Peak	32.05	10.58	42.62	60.00	-17.38

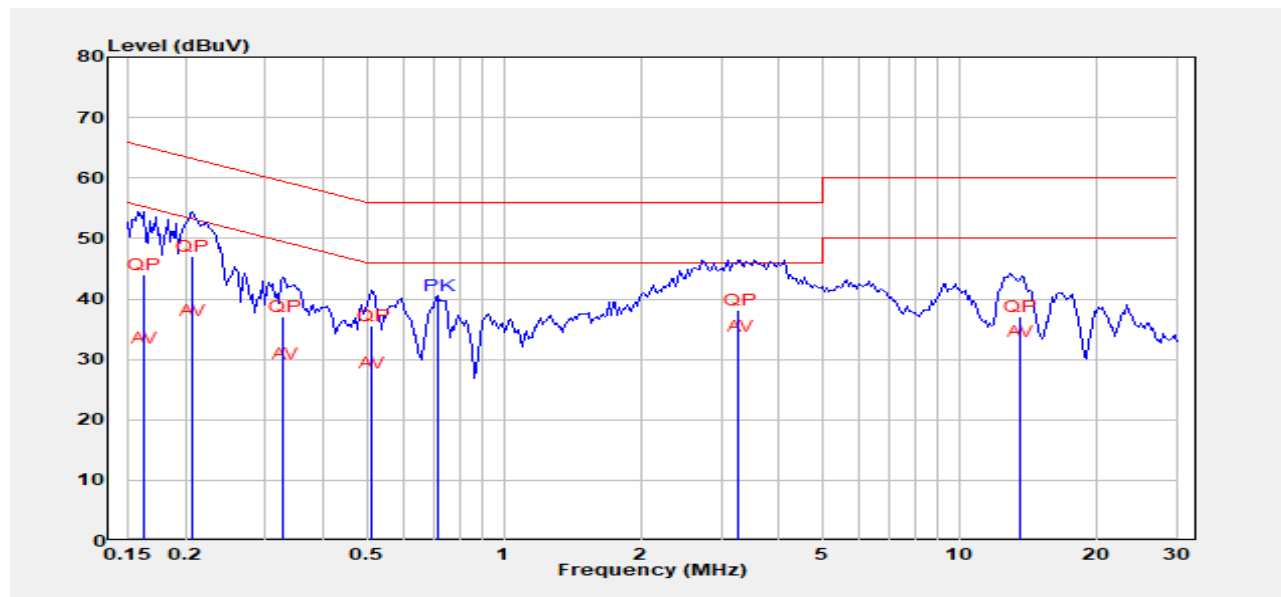
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Report Number :TERF2409002611ER  
Operation Mode :NFC  
Power :120V/60Hz  
Probe :L  
Note: : Remove NFC Antenna

Test Site :Conduction 1  
Test Date :2024-11-04  
Temp./Humi. :26.5°C/55%  
Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.162	Average	21.68	10.25	31.93	55.38	-23.45
0.162	QP	33.77	10.25	44.02	65.38	-21.36
0.206	Average	26.22	10.25	36.47	53.36	-16.89
0.206	QP	36.87	10.25	47.12	63.36	-16.24
0.329	Average	19.08	10.25	29.33	49.49	-20.16
0.329	QP	26.93	10.25	37.18	59.49	-22.31
0.513	Average	17.47	10.26	27.73	46.00	-18.27
0.513	QP	25.33	10.26	35.59	56.00	-20.41
0.720	Peak	30.33	10.31	40.64	56.00	-15.36
3.276	Average	23.07	10.78	33.85	46.00	-12.15
3.276	QP	27.33	10.78	38.11	56.00	-17.89
13.560	Average	22.17	10.77	32.94	50.00	-17.06
13.560	QP	26.23	10.77	37.00	60.00	-23.00

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Report Number :TERF2409002611ER

Test Site :Conduction 1

Operation Mode :NFC

Test Date :2024-11-04

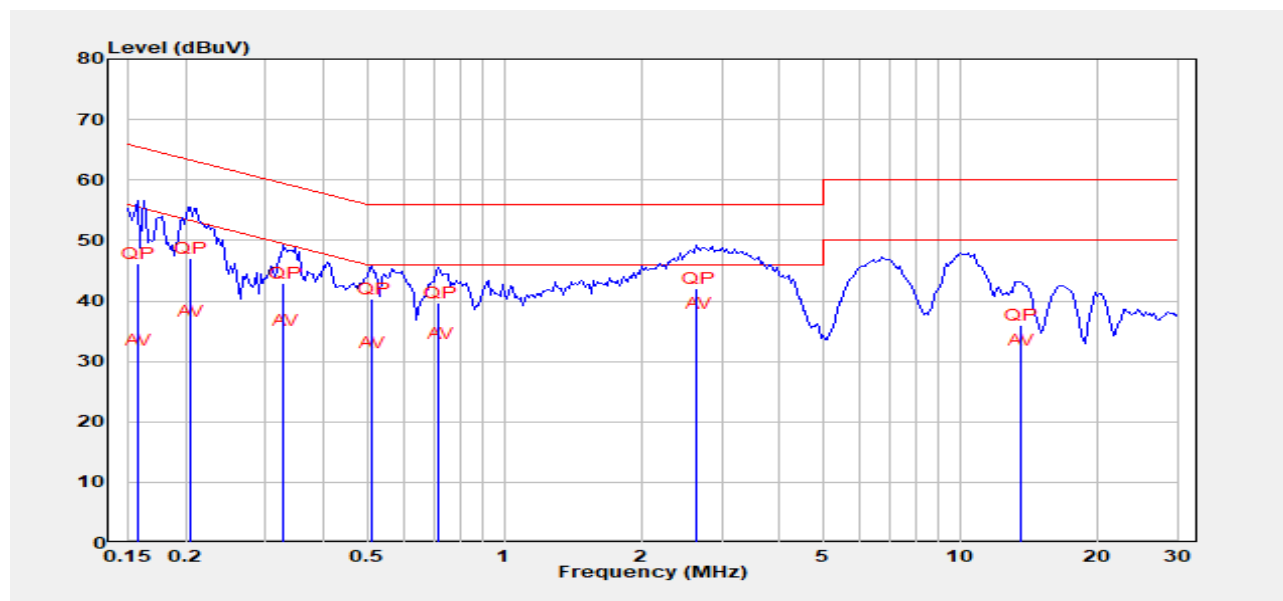
Power :120V/60Hz

Temp./Humi. :26.5°C/55%

Probe :N

Engineer :Nick Lin

Note: : Remove NFC Antenna



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV	Limit dBuV	Margin dB
0.156	Average	21.57	10.25	31.82	55.65	-23.83
0.156	QP	35.88	10.25	46.13	65.65	-19.52
0.204	Average	26.33	10.25	36.58	53.45	-16.87
0.204	QP	36.83	10.25	47.08	63.45	-16.37
0.329	Average	24.81	10.25	35.06	49.49	-14.43
0.329	QP	32.57	10.25	42.82	59.49	-16.67
0.513	Average	21.27	10.26	31.53	46.00	-14.47
0.513	QP	30.03	10.26	40.29	56.00	-15.71
0.720	Average	22.67	10.31	32.98	46.00	-13.02
0.720	QP	29.33	10.31	39.64	56.00	-16.36
2.650	Average	27.12	10.92	38.04	46.00	-7.96
2.650	QP	31.06	10.92	41.98	56.00	-14.02
13.560	Average	21.17	10.72	31.89	50.00	-18.11
13.560	QP	25.23	10.72	35.95	60.00	-24.05

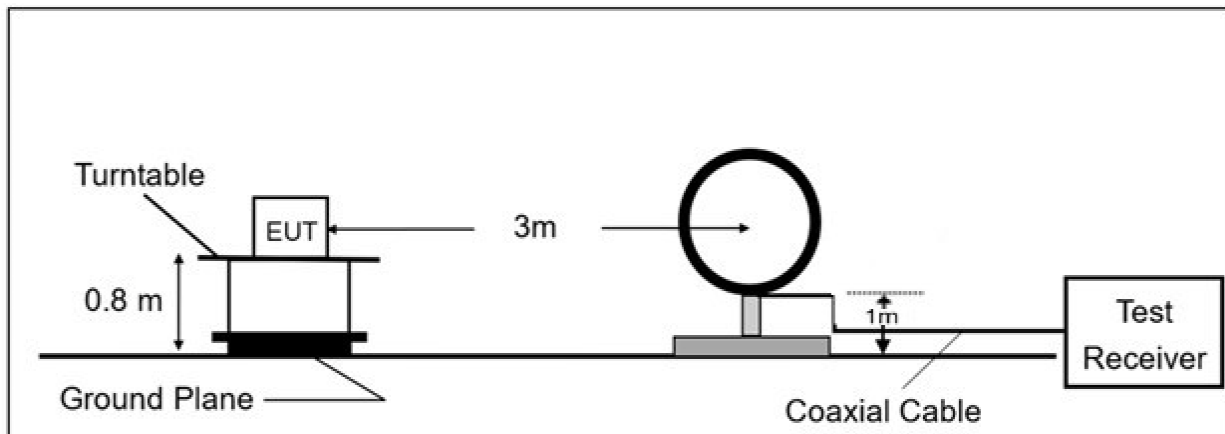
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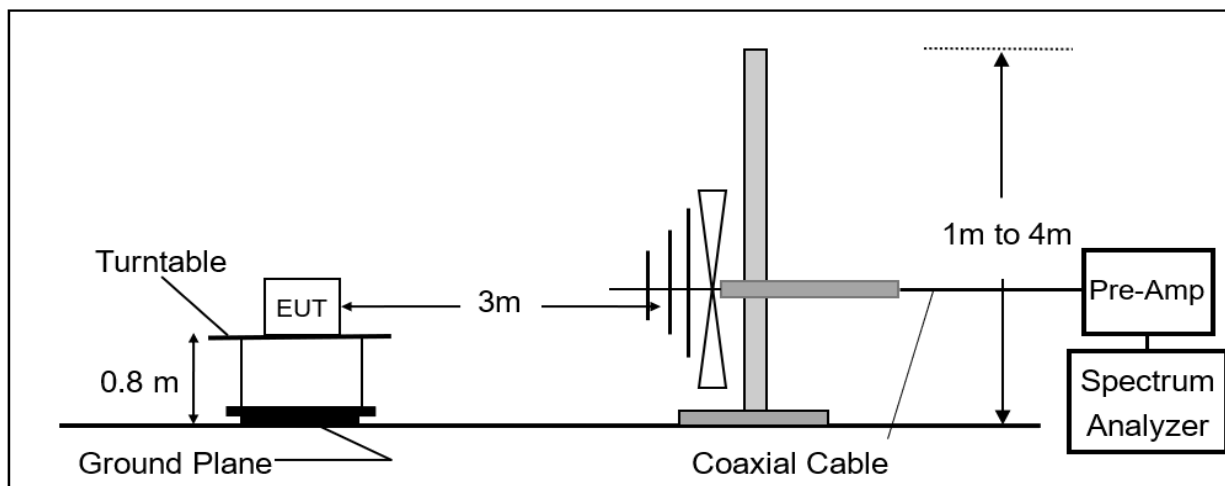
## 8 RADIATED EMISSION TEST

### 8.1 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



### 8.2 Measurement Procedure

1. Configure the EUT according to ANSI C63.10.
2. The EUT was placed on a turn table which is 0.8m above ground plane and been measured in the frequency range between 0.009MHz to 30MHz and 30MHz to 1GHz.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all default test channel measured were complete.

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### 8.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

### 8.4 Field Strength of Fundamental Emission

#### 8.4.1 Applicable standard

Rules and specifications	CFR 47 Part 15 section 15.225(a)-(d)	
Frequency of Emission (MHz)	Field Strength (μV/m)at 30m	Field Strength (dBμV/m)at 30m
1.705~13.110	30	29.5
13.110~13.410	106	40.5
13.410~13.553	334	50.5
13.553~13.567	15848	84
13.567~13.710	334	50.5
13.710~14.010	106	40.5
14.010~30.00	30	29.5

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#### 8.4.2 Distance Extrapolation Factor

##### 30m to 3m

Distance extrapolation =  $40 \cdot \log(30/3) = 40 \text{ dB}$

##### 30m to 10m

Distance extrapolation =  $40 \cdot \log(30/10) = 19.08 \text{ dB}$

##### 10m to 3m

Distance extrapolation =  $40 \cdot \log(10/3) = 20.92 \text{ dB}$

#### Note:

1. Distance extrapolation factor =  $40 \log(\text{required distance} / \text{test distance}) \text{ (dB)}$
2. The lower limit shall apply at the transition frequencies.
3. KDB 414788 D01 OATS and 3m semi-anechoic chamber Justification:  
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. OATS and 3m SAC chamber testing had been performed and 3m SAC measured test result is the worst case test result.

Actual FS(dBμV/m) = Spectrum. Reading level(dBμV) + Factor(dB)

Below 30 MHz of Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Distance Factor (dB)

Above 30 MHz of Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amp Gain (dB)

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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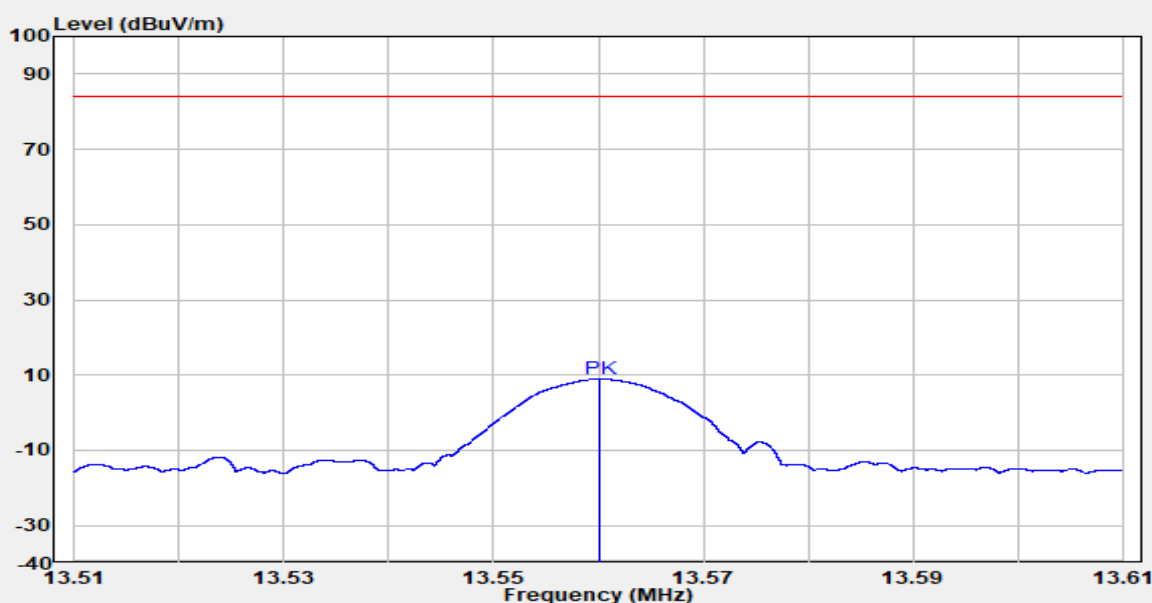
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## 8.4.3 Field Strength of Fundamental Emission Measurement Result

Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
13.560	Peak	33.88	-24.97	8.91	84.00	-75.09

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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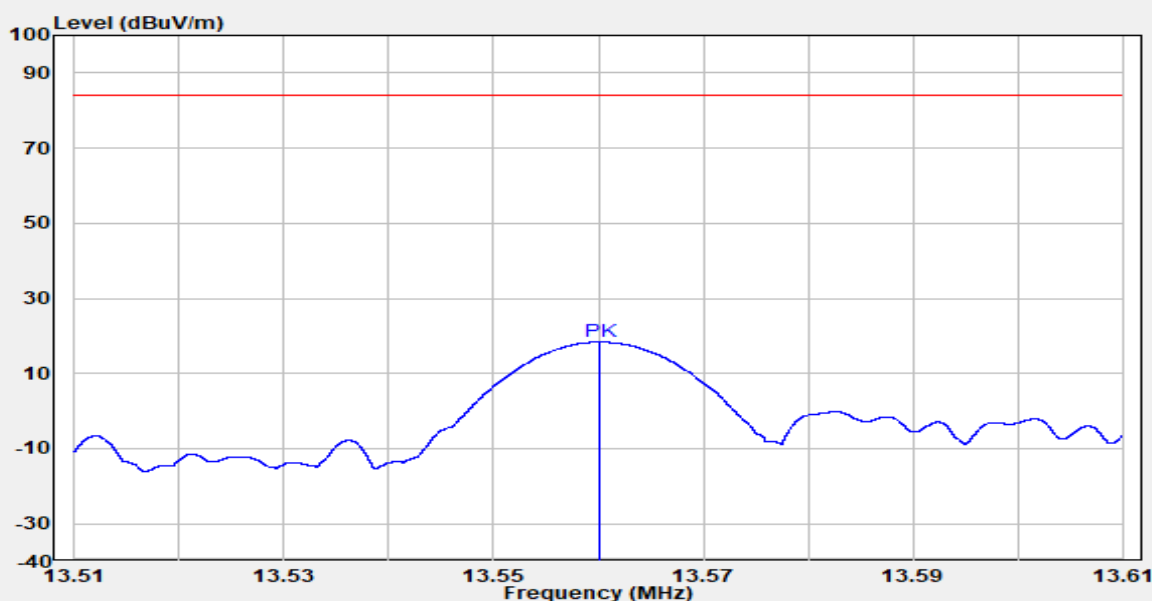
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Report Number :TERF2409002611ER  
Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Main  
EUT Pol :H Plane  
Note. :INPAQ

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Parallel  
Engineer :Nick Lin



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS		
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
13.560	Peak	43.29	-24.97	18.32	84.00	-65.68

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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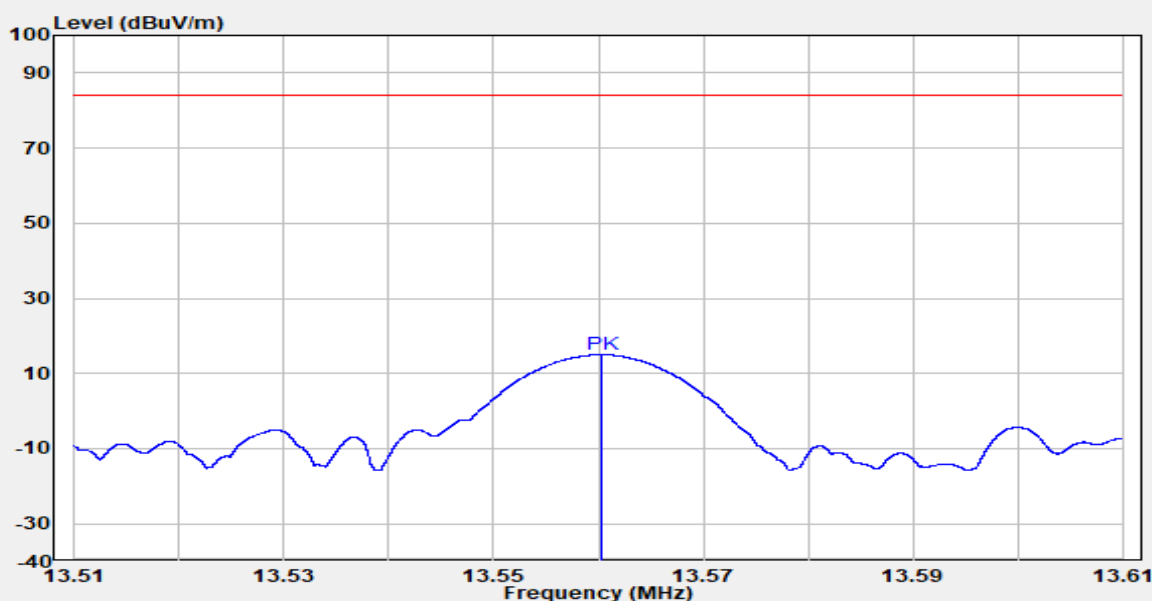
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.560	Peak	39.93	-24.97	14.96	84.00	-69.04

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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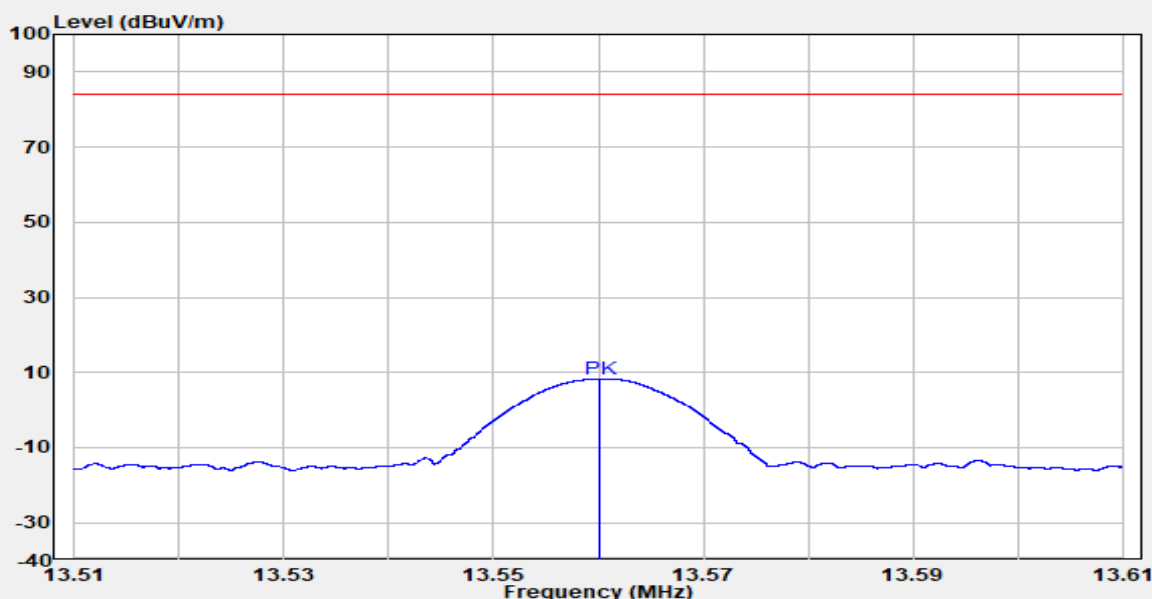
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.560	Peak	33.30	-24.97	8.33	84.00	-75.67

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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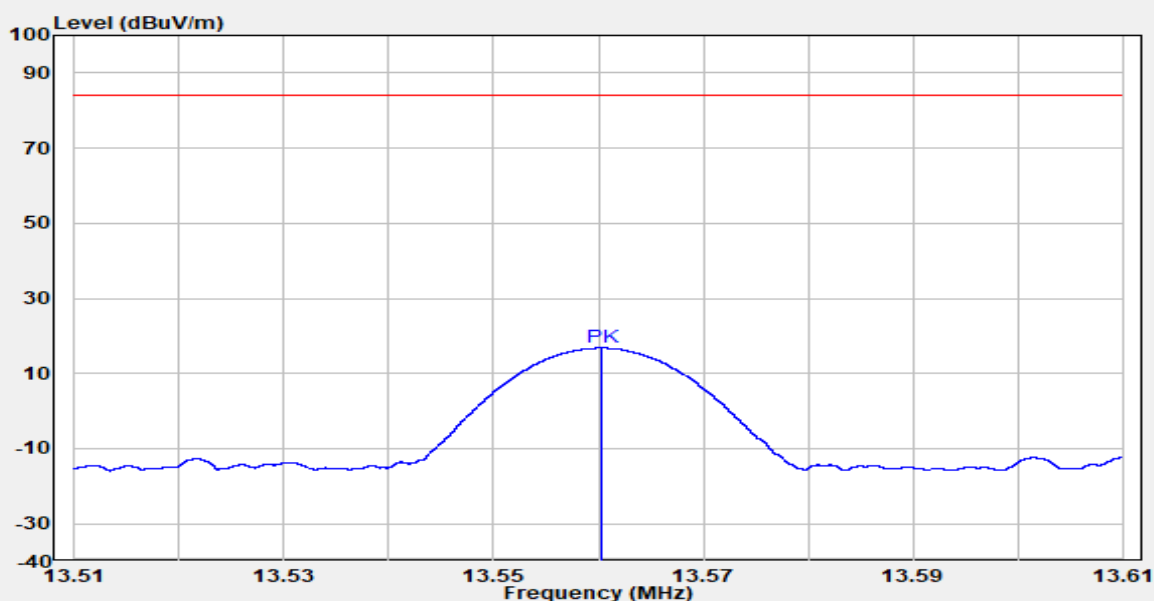
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Report Number :TERF2409002611ER  
Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Main  
EUT Pol :H Plane  
Note. :AWAN

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Parallel  
Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.560	Peak	41.72	-24.97	16.75	84.00	-67.25

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

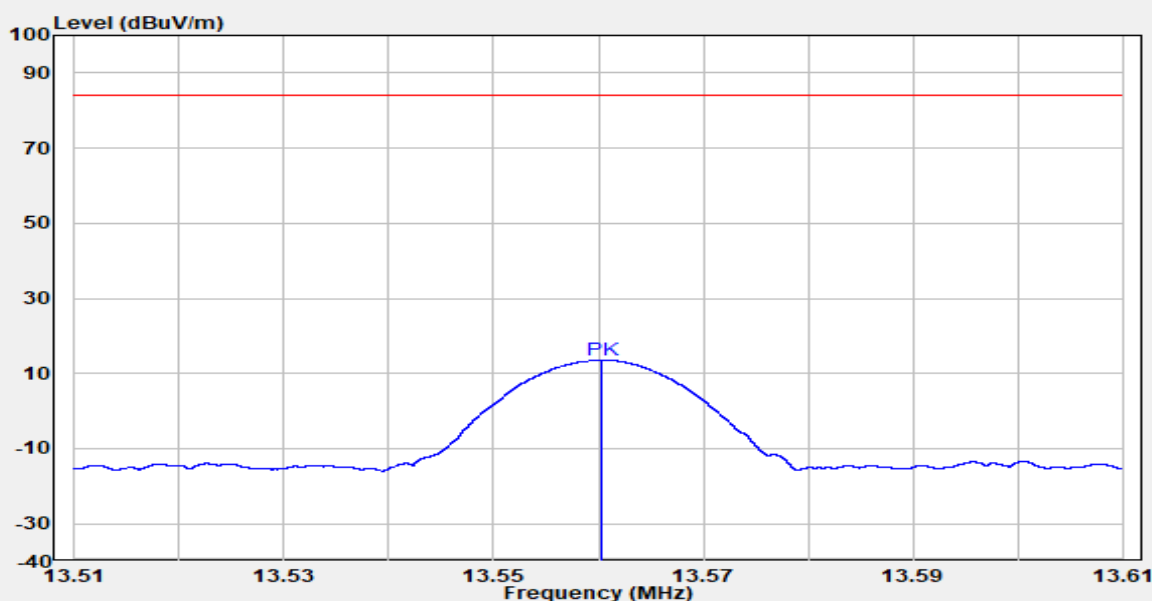
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.560	Peak	38.47	-24.97	13.50	84.00	-70.50

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz

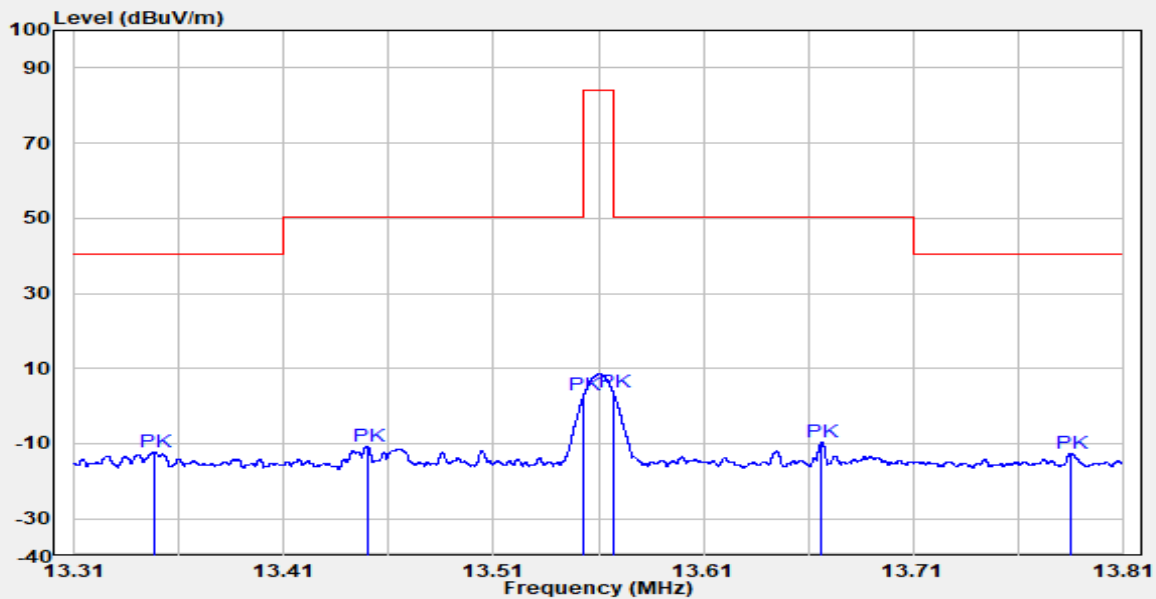
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit d $\mu$ V/m	Margin dB
13.348	Peak	12.58	-24.93	-12.35	40.50	-52.85
13.450	Peak	14.32	-24.95	-10.63	50.47	-61.10
13.553	Peak	27.78	-24.96	2.82	50.47	-47.65
13.567	Peak	28.61	-24.97	3.64	50.47	-46.83
13.667	Peak	15.19	-24.99	-9.79	50.47	-60.26
13.786	Peak	12.40	-25.01	-12.61	40.50	-53.11

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBUV/m) at 300m,within the band 9 kHz - 490 kHz.

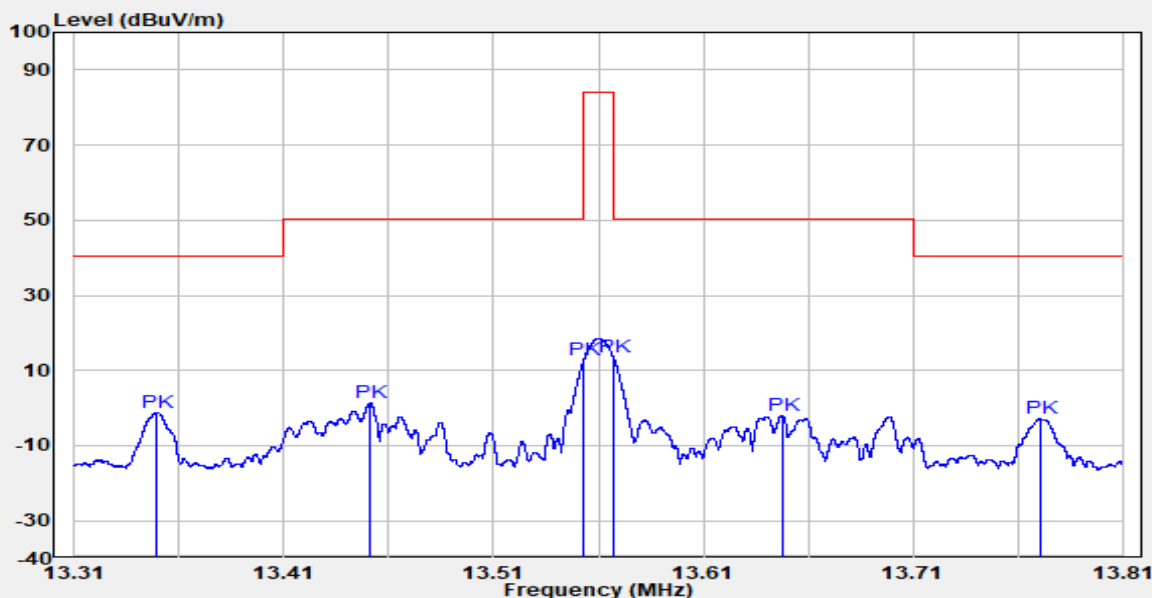
Field strength (dBUV/m) at 30m,within the band 490 kHz - 30 MHz.

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 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.349	Peak	23.64	-24.93	-1.28	40.50	-41.78
13.451	Peak	26.27	-24.95	1.33	50.47	-49.14
13.553	Peak	37.72	-24.96	12.76	50.47	-37.71
13.567	Peak	38.59	-24.97	13.62	50.47	-36.85
13.648	Peak	23.09	-24.98	-1.89	50.47	-52.36
13.771	Peak	22.04	-25.01	-2.97	40.50	-43.47

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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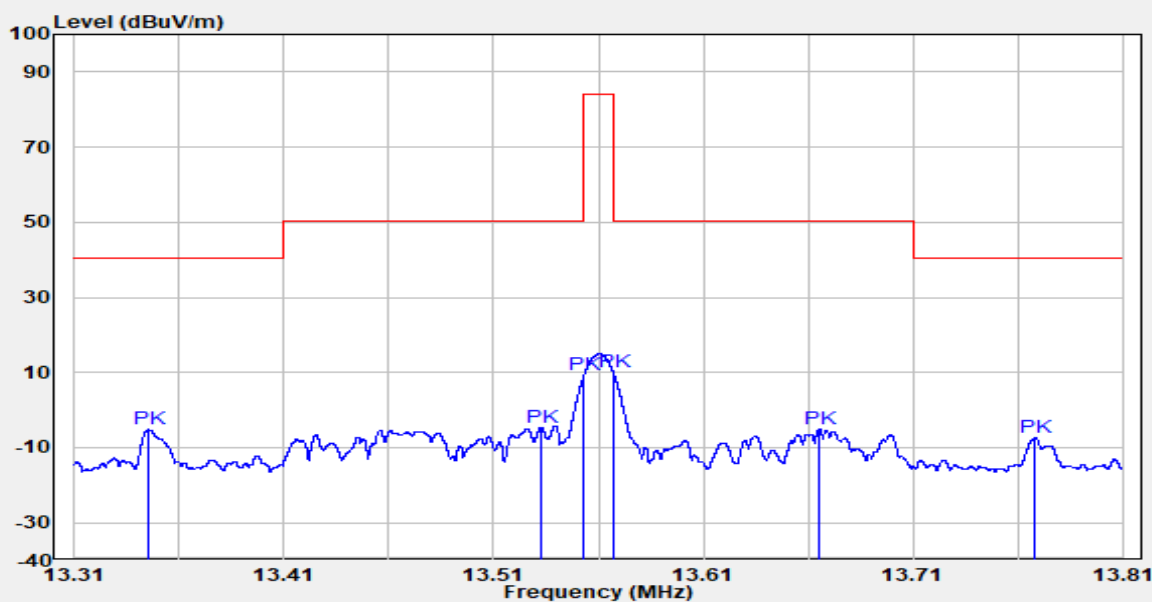
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Member of SGS Group

Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.345	Peak	19.65	-24.93	-5.28	40.50	-45.78
13.533	Peak	20.29	-24.96	-4.68	50.47	-55.15
13.553	Peak	34.11	-24.96	9.14	50.47	-41.33
13.567	Peak	35.00	-24.97	10.04	50.47	-40.43
13.665	Peak	19.75	-24.99	-5.23	50.47	-55.70
13.768	Peak	17.57	-25.01	-7.43	40.50	-47.93

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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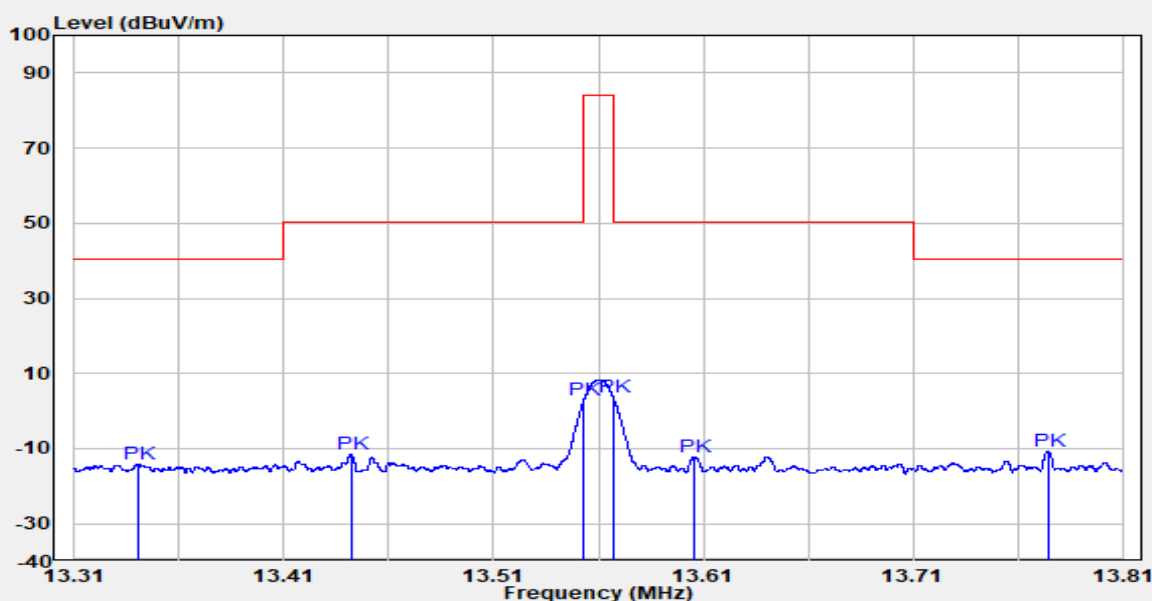
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.340	Peak	10.88	-24.92	-14.05	40.50	-54.55
13.442	Peak	13.31	-24.94	-11.64	50.47	-62.11
13.553	Peak	27.79	-24.96	2.83	50.47	-47.64
13.567	Peak	28.56	-24.97	3.59	50.47	-46.88
13.606	Peak	12.76	-24.97	-12.21	50.47	-62.68
13.775	Peak	14.31	-25.01	-10.69	40.50	-51.19

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m,within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m,within the band 490 kHz - 30 MHz.

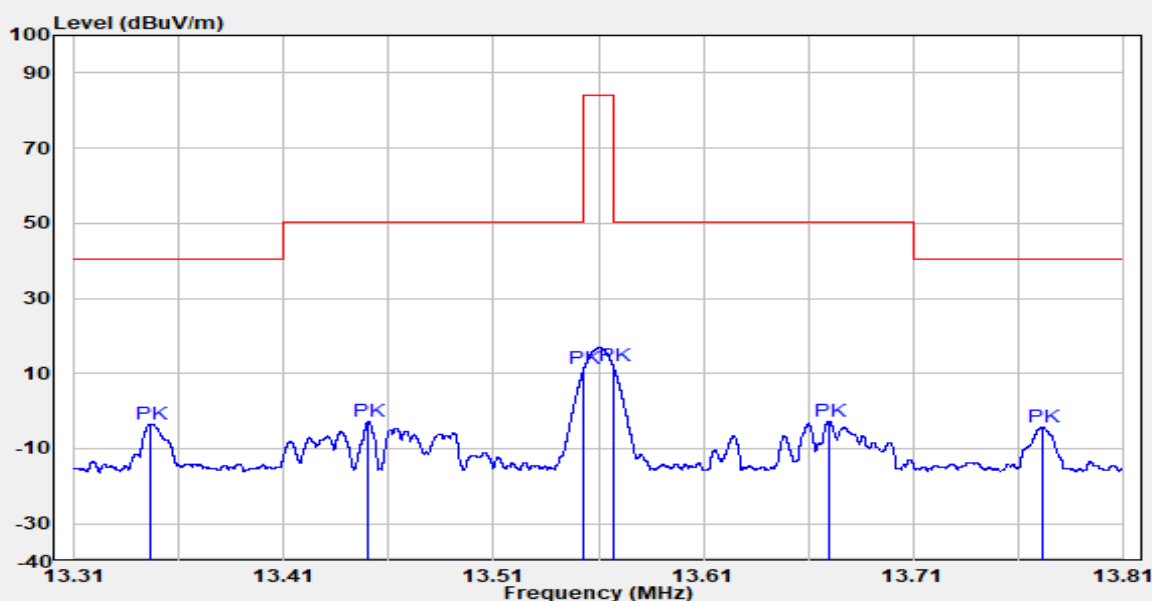
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 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
13.346	Peak	21.51	-24.93	-3.42	40.50	-43.92
13.450	Peak	22.31	-24.95	-2.64	50.47	-53.11
13.553	Peak	36.21	-24.96	11.25	50.47	-39.22
13.567	Peak	36.89	-24.97	11.92	50.47	-38.55
13.670	Peak	22.33	-24.99	-2.66	50.47	-53.13
13.772	Peak	20.65	-25.01	-4.36	40.50	-44.86

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

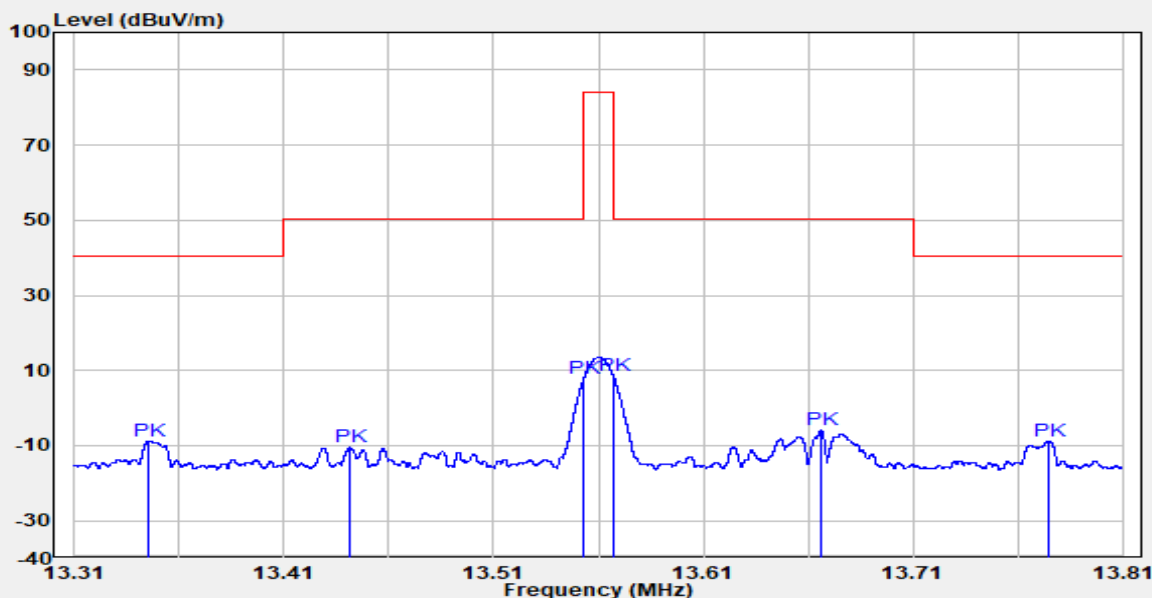
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 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
13.345	Peak	16.11	-24.93	-8.82	40.50	-49.32
13.442	Peak	14.36	-24.94	-10.59	50.47	-61.06
13.553	Peak	32.84	-24.96	7.87	50.47	-42.60
13.567	Peak	33.69	-24.97	8.73	50.47	-41.74
13.666	Peak	18.96	-24.99	-6.03	50.47	-56.50
13.775	Peak	16.25	-25.01	-8.76	40.50	-49.26

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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## 8.5 Radiated Spurious Emission Measurement

### 8.5.1 Standard Applicable

The field strength of any emissions appearing outside of the 13.110-14.010 MHz shall not exceed the general radiated emission limits as below.

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ )	Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**Note:**

1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
2. Distance extrapolation factor =  $40 \log (\text{required distance/ test distance})$  (dB)
3.  $20 * \log(30 \mu\text{V/m}) = 29.54 \text{ dB}\mu\text{V/m}$
4. The lower limit shall apply at the transition frequencies.
5. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.
6. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of §15.205.
7. The general radiated emission limits in §15.209 apply for the spurious emission generate from UE, except for the fundamental emission where the respective section specifies otherwise.

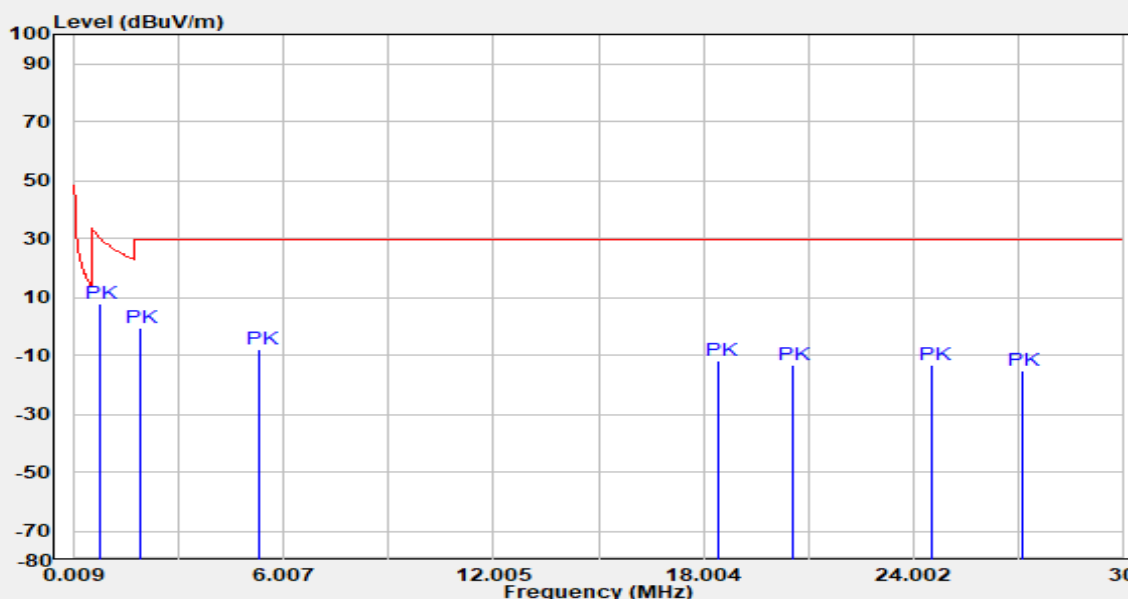
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## 8.5.2 Radiated Spurious Emission Measurement Result

Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
0.744	Peak	34.46	-26.49	7.98	30.17	-22.20
1.914	Peak	25.92	-26.18	-0.26	29.54	-29.80
5.318	Peak	17.11	-25.08	-7.97	29.54	-37.51
18.463	Peak	12.41	-24.35	-11.95	29.54	-41.49
20.567	Peak	11.81	-25.03	-13.22	29.54	-42.76
24.575	Peak	12.49	-25.79	-13.30	29.54	-42.84
27.120	Peak	10.72	-25.96	-15.24	29.54	-44.78

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

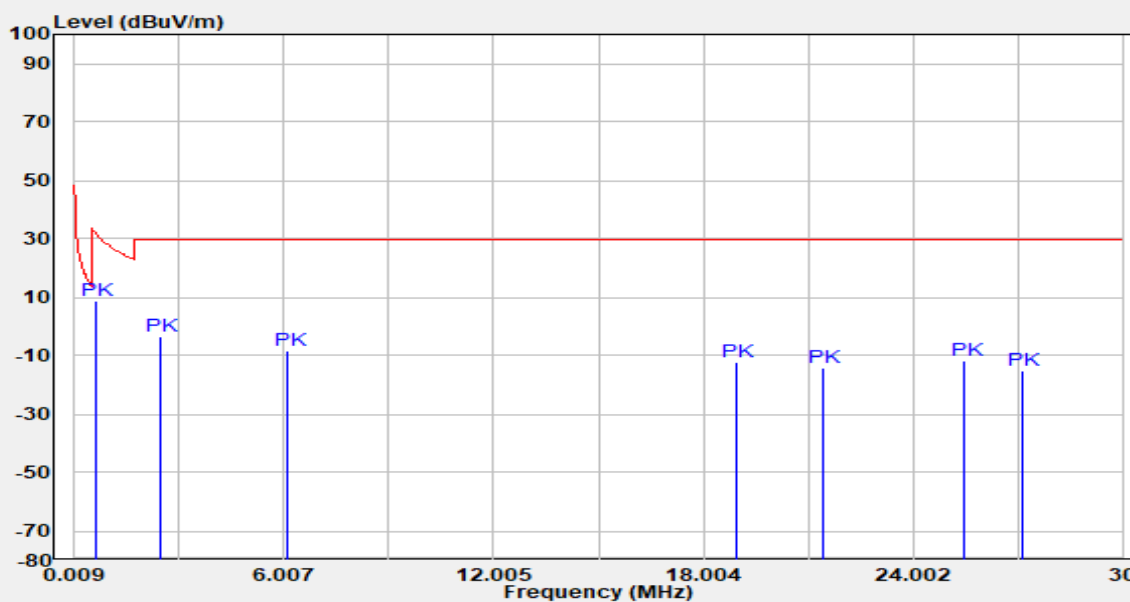
Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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 Test Mode :Tx  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
0.594	Peak	34.94	-26.39	8.55	32.13	-23.59
2.491	Peak	22.69	-26.01	-3.32	29.54	-32.86
6.124	Peak	16.06	-24.56	-8.51	29.54	-38.05
18.936	Peak	12.22	-24.40	-12.18	29.54	-41.72
21.425	Peak	11.50	-25.54	-14.03	29.54	-43.57
25.497	Peak	14.22	-25.74	-11.52	29.54	-41.06
27.121	Peak	10.72	-25.96	-15.24	29.54	-44.78

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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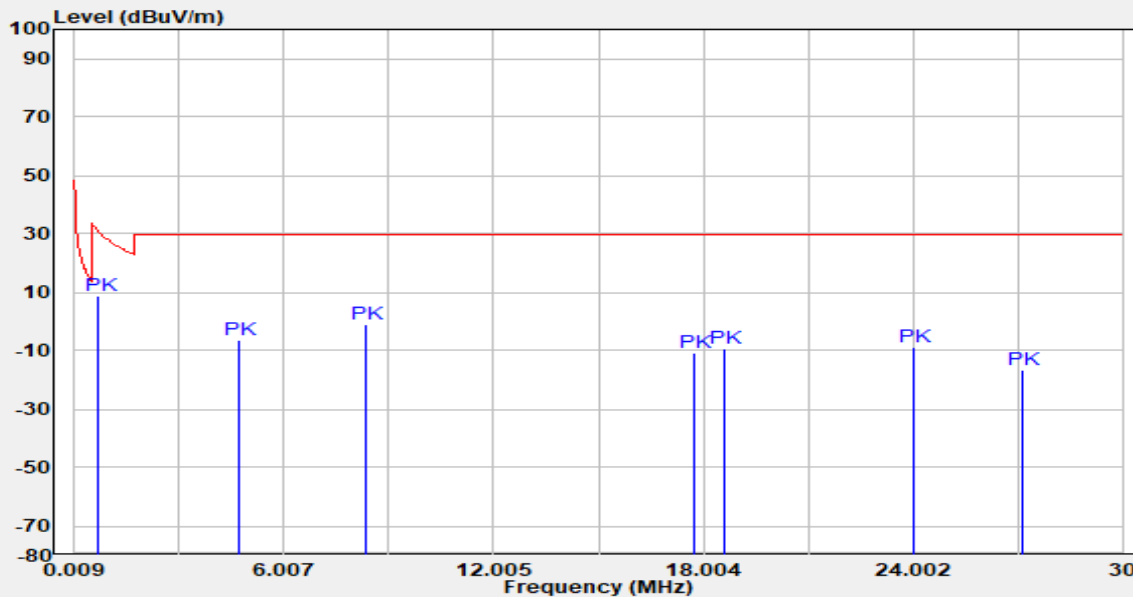
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Member of SGS Group

Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :H Plane  
 Note. :INPAQ

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit d $\mu$ V/m	Margin dB
0.706	Peak	35.39	-26.56	8.83	30.62	-21.80
4.688	Peak	19.23	-25.37	-6.14	29.54	-35.68
8.333	Peak	24.20	-25.14	-0.94	29.54	-30.48
17.751	Peak	13.77	-24.34	-10.57	29.54	-40.11
18.632	Peak	15.14	-24.37	-9.23	29.54	-38.77
24.012	Peak	17.59	-26.25	-8.66	29.54	-38.20
27.121	Peak	9.58	-25.96	-16.38	29.54	-45.92

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBUV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBUV/m) at 30m, within the band 490 kHz - 30 MHz.

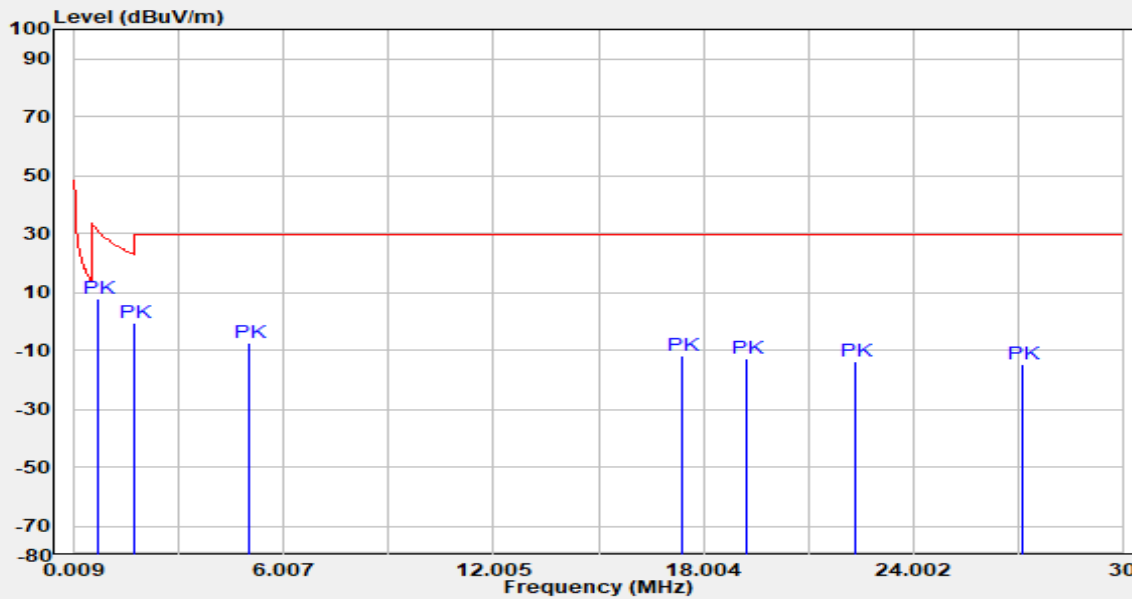
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 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Ground Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
0.695	Peak	34.56	-26.57	7.99	30.76	-22.77
1.715	Peak	25.52	-26.22	-0.70	29.54	-30.24
4.981	Peak	18.19	-25.34	-7.15	29.54	-36.69
17.391	Peak	12.50	-24.38	-11.88	29.54	-41.42
19.243	Peak	11.61	-24.47	-12.86	29.54	-42.40
22.344	Peak	12.39	-26.04	-13.65	29.54	-43.19
27.121	Peak	11.45	-25.96	-14.52	29.54	-44.06

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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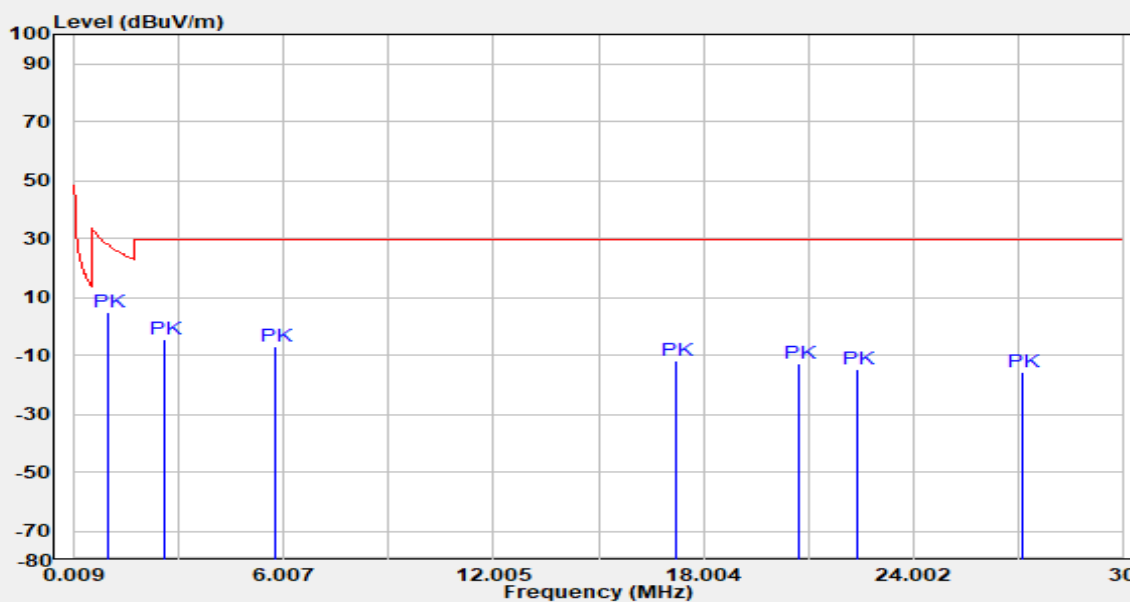
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Parallel  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
0.991	Peak	31.36	-26.37	4.99	29.54	-22.69
2.604	Peak	21.42	-25.98	-4.56	29.54	-34.10
5.730	Peak	17.71	-24.74	-7.03	29.54	-36.57
17.245	Peak	12.61	-24.40	-11.79	29.54	-41.33
20.743	Peak	12.30	-25.13	-12.83	29.54	-42.37
22.404	Peak	11.52	-26.07	-14.55	29.54	-44.09
27.120	Peak	10.38	-25.96	-15.58	29.54	-45.12

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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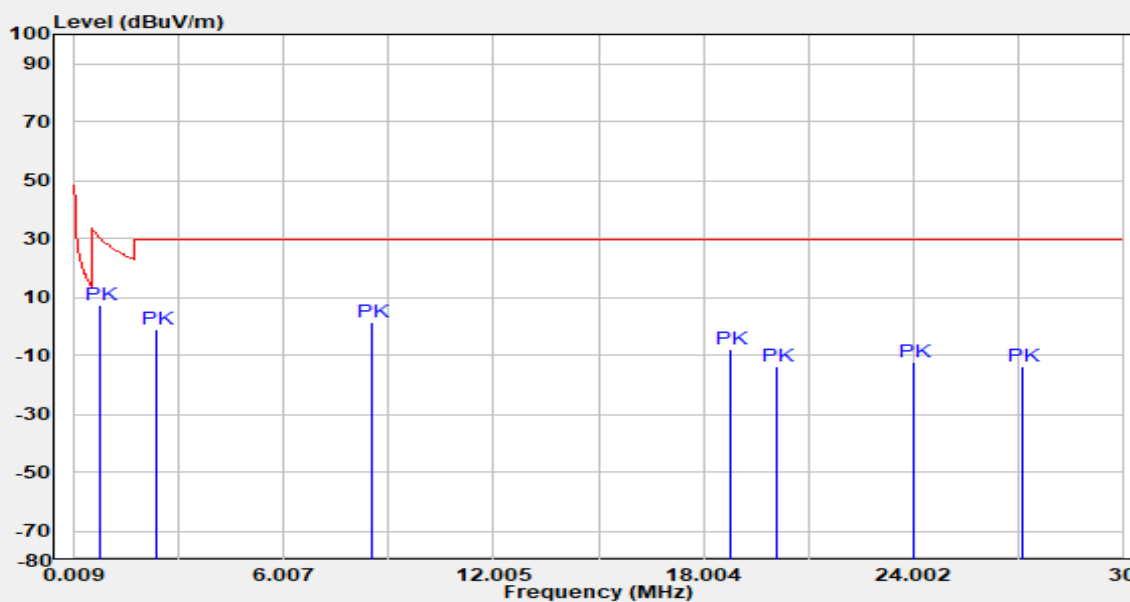
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Report Number :TERF2409002611ER  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :H Plane  
 Note. :AWAN

Test Site :SAC 3  
 Test Date :2024-09-10  
 Temp./Humi. :24.2°C/67%  
 Antenna Pol. :Perpendicular  
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
0.710	Peak	34.08	-26.55	7.53	30.58	-23.05
2.356	Peak	25.31	-26.05	-0.74	29.54	-30.28
8.539	Peak	26.42	-25.16	1.26	29.54	-28.28
18.797	Peak	16.45	-24.38	-7.93	29.54	-37.47
20.094	Peak	11.24	-24.75	-13.51	29.54	-43.05
24.012	Peak	14.24	-26.25	-12.01	29.54	-41.55
27.120	Peak	12.32	-25.96	-13.64	29.54	-43.18

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

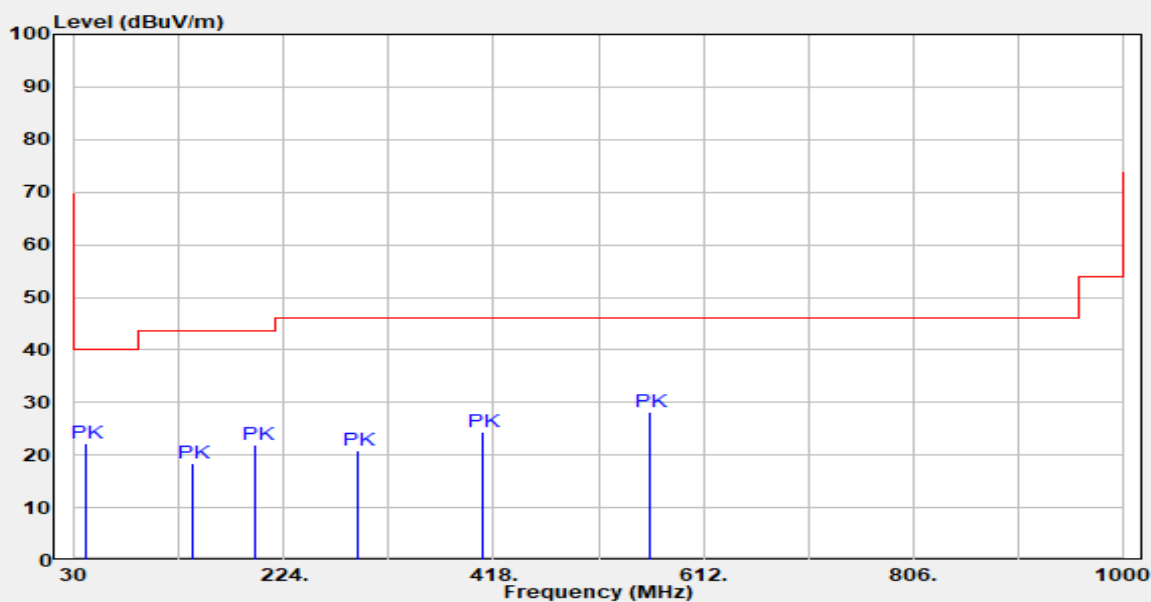
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Report Number :TERF2409002611ER  
Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Tx  
EUT Pol :H Plane  
Note. :INPAQ

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Vertical  
Engineer :Nick Lin



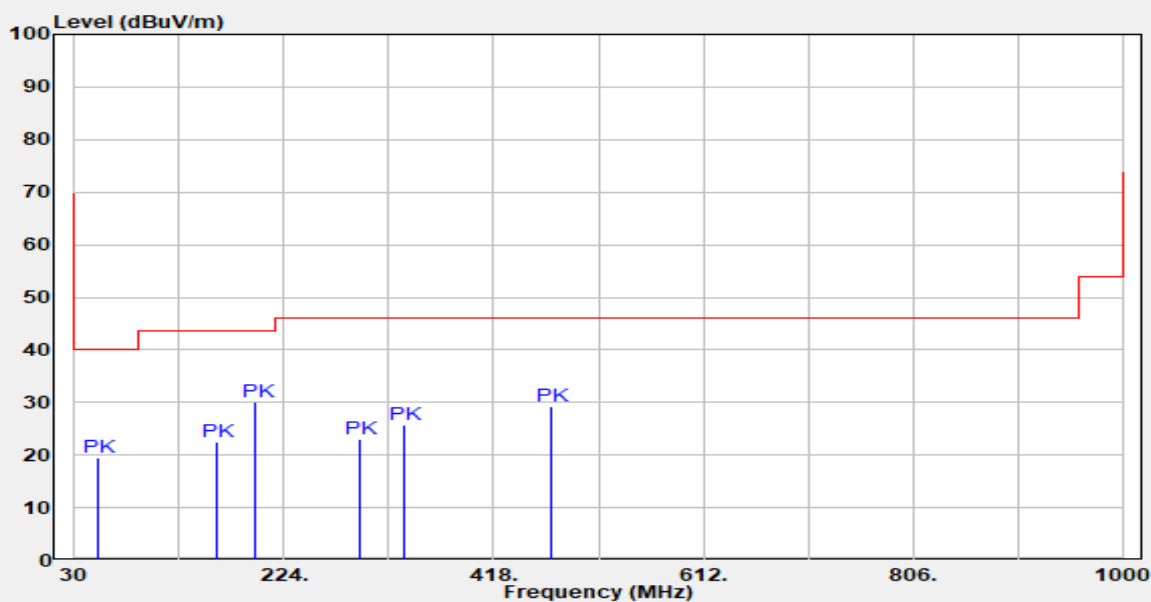
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
40.671	Peak	31.58	-9.40	22.18	40.00	-17.82
139.745	Peak	27.54	-8.99	18.55	43.50	-24.95
197.952	Peak	32.79	-10.92	21.87	43.50	-21.63
292.175	Peak	28.08	-7.15	20.93	46.00	-25.07
407.862	Peak	29.44	-5.02	24.42	46.00	-21.58
563.082	Peak	30.49	-2.22	28.27	46.00	-17.73

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Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Tx  
EUT Pol :H Plane  
Note. :INPAQ

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Horizontal  
Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
51.585	Peak	28.02	-8.61	19.41	40.00	-20.59
161.937	Peak	30.79	-8.32	22.47	43.50	-21.03
197.952	Peak	40.94	-10.92	30.02	43.50	-13.48
294.116	Peak	30.01	-7.09	22.92	46.00	-23.08
335.831	Peak	31.97	-6.33	25.63	46.00	-20.37
470.920	Peak	32.90	-3.68	29.22	46.00	-16.78

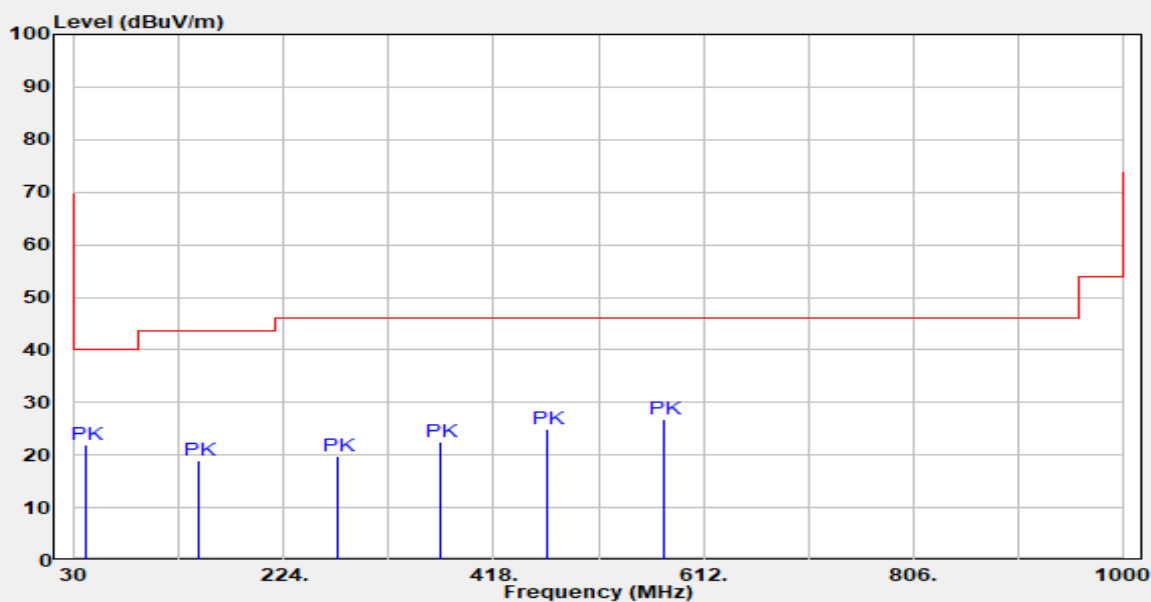
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Report Number :TERF2409002611ER  
Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Tx  
EUT Pol :H Plane  
Note. :AWAN

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Vertical  
Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
40.671	Peak	31.29	-9.40	21.89	40.00	-18.11
144.717	Peak	27.66	-8.61	19.05	43.50	-24.45
272.652	Peak	27.47	-7.81	19.66	46.00	-26.34
368.815	Peak	28.25	-5.79	22.46	46.00	-23.54
467.161	Peak	28.55	-3.73	24.83	46.00	-21.17
575.451	Peak	28.64	-1.88	26.76	46.00	-19.24

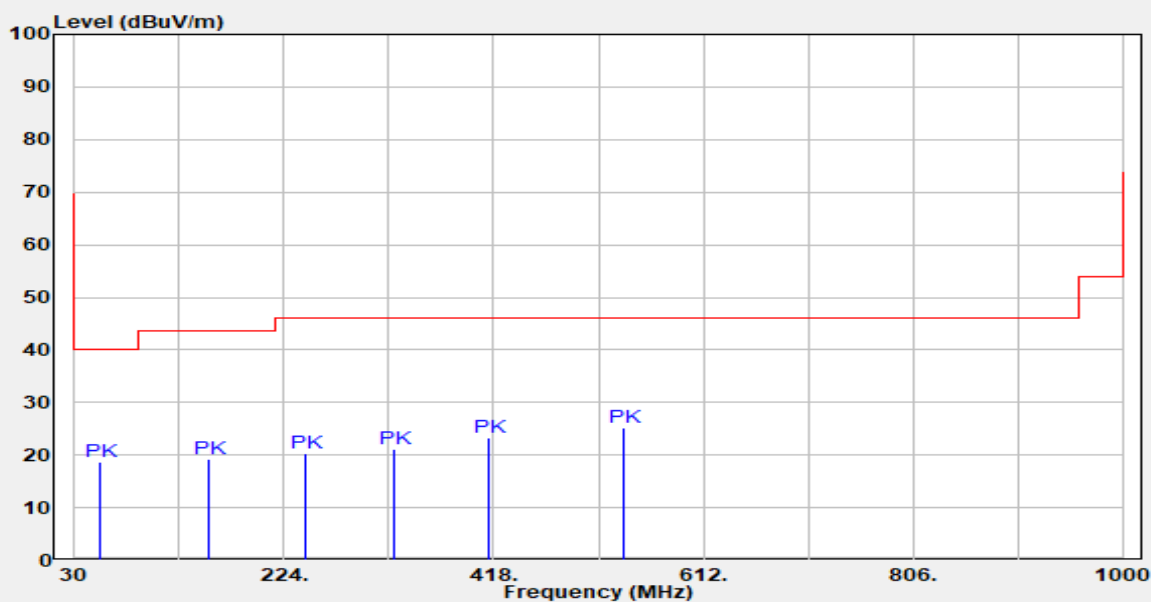
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Operation Mode :NFC  
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Test Mode :Tx  
EUT Pol :H Plane  
Note. :AWAN

Test Site :SAC 3  
Test Date :2024-09-10  
Temp./Humi. :24.2°C/67%  
Antenna Pol. :Horizontal  
Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
54.253	Peak	27.42	-8.73	18.68	40.00	-21.32
154.539	Peak	27.45	-8.21	19.24	43.50	-24.26
244.033	Peak	29.37	-8.94	20.43	46.00	-25.57
325.523	Peak	27.74	-6.47	21.26	46.00	-24.74
412.592	Peak	28.21	-4.89	23.33	46.00	-22.67
539.071	Peak	27.97	-2.75	25.22	46.00	-20.78

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## 9 FREQUENCY STABILITY

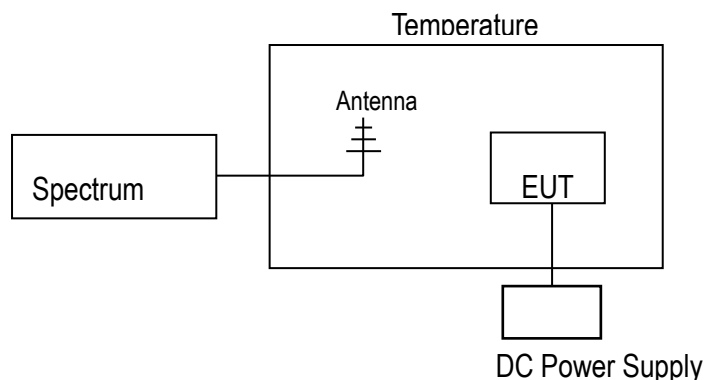
### 9.1 Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 9.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span =100kHz.
4. Set SPA Max hold. Mark peak.

### 9.3 Test SET-UP (Block Diagram of Configuration)



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## 9.4 Measurement Results

Mode: AWAN

### Startup

#### A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5599886	-0.01140	+/- 1.356
120	-10	13.5599891	-0.01090	+/- 1.356
120	0	13.5599972	-0.00280	+/- 1.356
120	10	13.5599847	-0.01530	+/- 1.356
120	20	13.5599922	-0.00780	+/- 1.356
120	30	13.5600004	0.00040	+/- 1.356
120	40	13.5599985	-0.00150	+/- 1.356
120	50	13.5599961	-0.00390	+/- 1.356

#### B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5599961	-0.00390	+/- 1.356
120	20	13.5599922	-0.00780	+/- 1.356
102	20	13.5599823	-0.01770	+/- 1.356

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2 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5599989	-0.00110	+/- 1.356
120	-10	13.560001	0.00100	+/- 1.356
120	0	13.5599905	-0.00950	+/- 1.356
120	10	13.5599936	-0.00640	+/- 1.356
120	20	13.5599953	-0.00470	+/- 1.356
120	30	13.5599983	-0.00170	+/- 1.356
120	40	13.5599886	-0.01140	+/- 1.356
120	50	13.5599825	-0.01750	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5599998	-0.00020	+/- 1.356
120	20	13.5599953	-0.00470	+/- 1.356
102	20	13.559992	-0.00800	+/- 1.356

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5 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5599833	-0.01670	+/- 1.356
120	-10	13.5599863	-0.01370	+/- 1.356
120	0	13.5599838	-0.01620	+/- 1.356
120	10	13.5599937	-0.00630	+/- 1.356
120	20	13.5599861	-0.01390	+/- 1.356
120	30	13.5599959	-0.00410	+/- 1.356
120	40	13.5599941	-0.00590	+/- 1.356
120	50	13.5600008	0.00080	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5600018	0.00180	+/- 1.356
120	20	13.5599861	-0.01390	+/- 1.356
102	20	13.5599895	-0.01050	+/- 1.356

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10 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5599881	-0.01190	+/- 1.356
120	-10	13.5599983	-0.00170	+/- 1.356
120	0	13.5599956	-0.00440	+/- 1.356
120	10	13.5599969	-0.00310	+/- 1.356
120	20	13.5599974	-0.00260	+/- 1.356
120	30	13.5599906	-0.00940	+/- 1.356
120	40	13.5599835	-0.01650	+/- 1.356
120	50	13.5599948	-0.00520	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5600006	0.00060	+/- 1.356
120	20	13.5599974	-0.00260	+/- 1.356
102	20	13.5599825	-0.01750	+/- 1.356

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## Startup

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5600103	0.01030	+/- 1.356
120	-10	13.5600092	0.00920	+/- 1.356
120	0	13.5599987	-0.00130	+/- 1.356
120	10	13.5600053	0.00530	+/- 1.356
120	20	13.5600047	0.00470	+/- 1.356
120	30	13.5600016	0.00160	+/- 1.356
120	40	13.5599985	-0.00150	+/- 1.356
120	50	13.5600071	0.00710	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5599965	-0.00350	+/- 1.356
120	20	13.5600047	0.00470	+/- 1.356
102	20	13.5599965	-0.00350	+/- 1.356

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2 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5600107	0.01070	+/- 1.356
120	-10	13.5600051	0.00510	+/- 1.356
120	0	13.5600071	0.00710	+/- 1.356
120	10	13.5600093	0.00930	+/- 1.356
120	20	13.5600031	0.00310	+/- 1.356
120	30	13.5600099	0.00990	+/- 1.356
120	40	13.5599987	-0.00130	+/- 1.356
120	50	13.5600041	0.00410	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5600133	0.01330	+/- 1.356
120	20	13.5600031	0.00310	+/- 1.356
102	20	13.5599981	-0.00190	+/- 1.356

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5 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5600118	0.01180	+/- 1.356
120	-10	13.5600066	0.00660	+/- 1.356
120	0	13.5599986	-0.00140	+/- 1.356
120	10	13.5600114	0.01140	+/- 1.356
120	20	13.5599952	-0.00480	+/- 1.356
120	30	13.5600009	0.00090	+/- 1.356
120	40	13.5600035	0.00350	+/- 1.356
120	50	13.5599974	-0.00260	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5600008	0.00080	+/- 1.356
120	20	13.5599952	-0.00480	+/- 1.356
102	20	13.5600077	0.00770	+/- 1.356

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10 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
120	-20	13.5600097	0.00970	+/- 1.356
120	-10	13.5599992	-0.00080	+/- 1.356
120	0	13.5599973	-0.00270	+/- 1.356
120	10	13.5599953	-0.00470	+/- 1.356
120	20	13.5599974	-0.00260	+/- 1.356
120	30	13.5599967	-0.00330	+/- 1.356
120	40	13.5600108	0.01080	+/- 1.356
120	50	13.56	0.00000	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
138	20	13.5599951	-0.00490	+/- 1.356
120	20	13.5599974	-0.00260	+/- 1.356
102	20	13.5600074	0.00740	+/- 1.356

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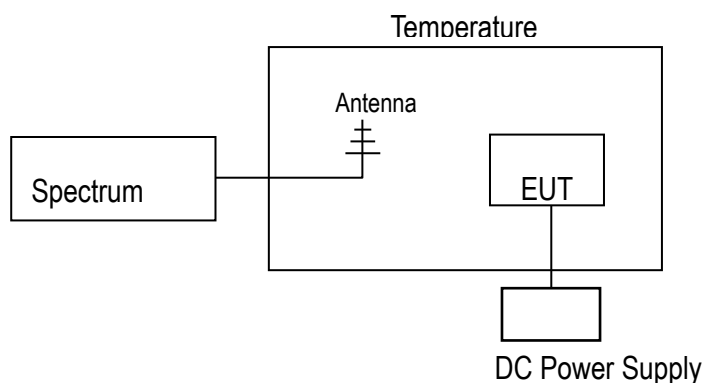
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## 10 EMISSION BANDWIDTH MEASUREMENT

### 10.1 Applicable Standard:

The 20 dB and 99% bandwidth shall be specified in operating frequency band.

### 10.2 Test Set-up



### 10.3 Measurement Procedure

1. Placed the EUT on the testing table.
2. Set the EUT under transmission condition continuously at specific channel frequency.
3. Set SPA Center Frequency = fundamental frequency, RBW=1% to 5% OBW, VBW=3 x RBW, Span = large enough to capture all products of the modulation process.
4. Measured the spectrum width with power higher than 20dB below carrier and turn on the 99% bandwidth function, max reading.

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## 10.4 Measurement Result

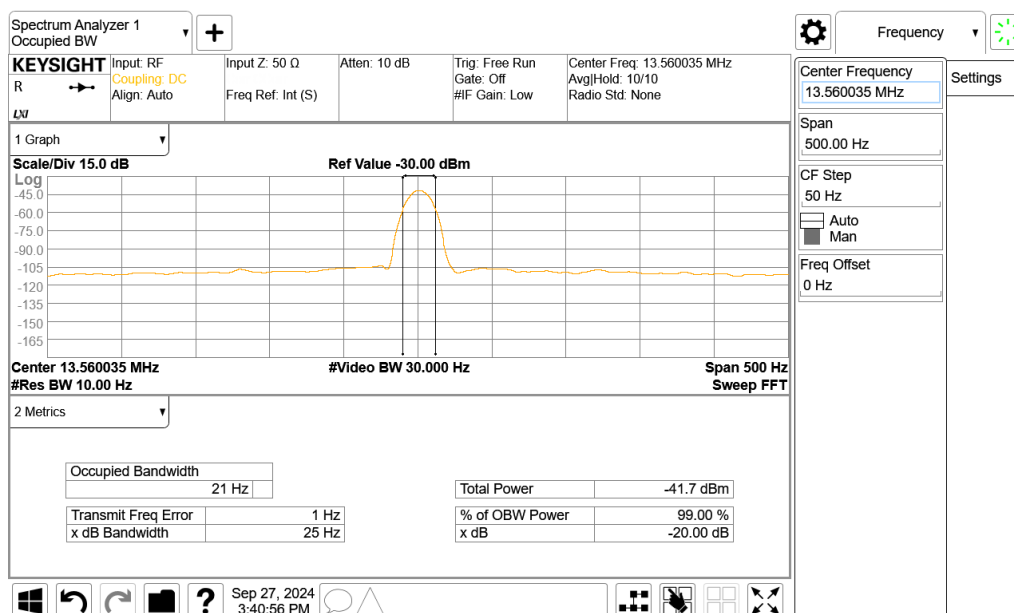
Mode: AWAN

20dB BW (kHz)
0.025

99% BW (kHz)
0.021

Operation range	Frequency (MHz)	Limit (MHz)
Low	13.56003	>13.11
High	13.56005	<14.01

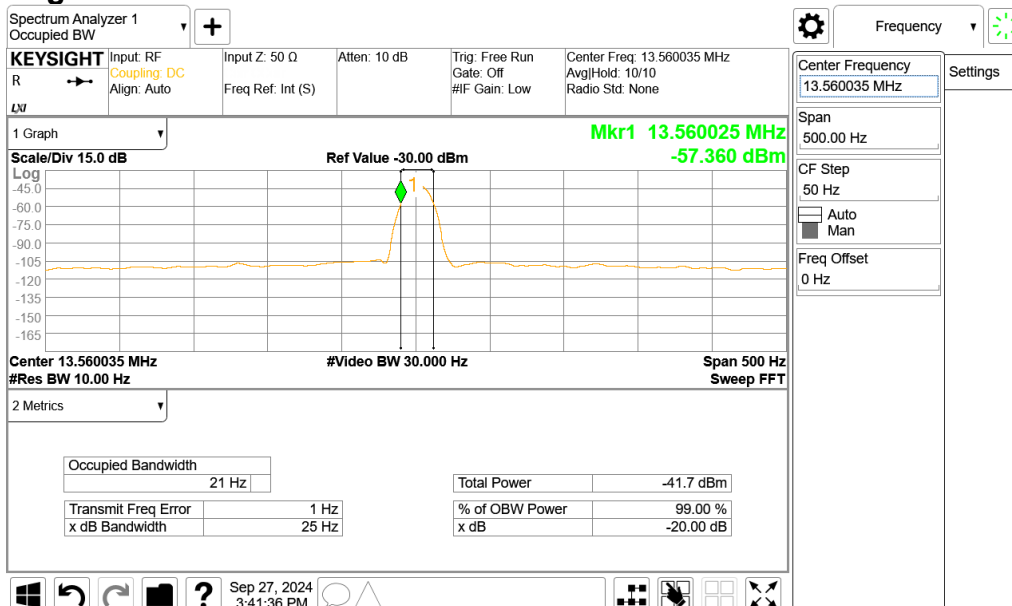
## Bandwidth



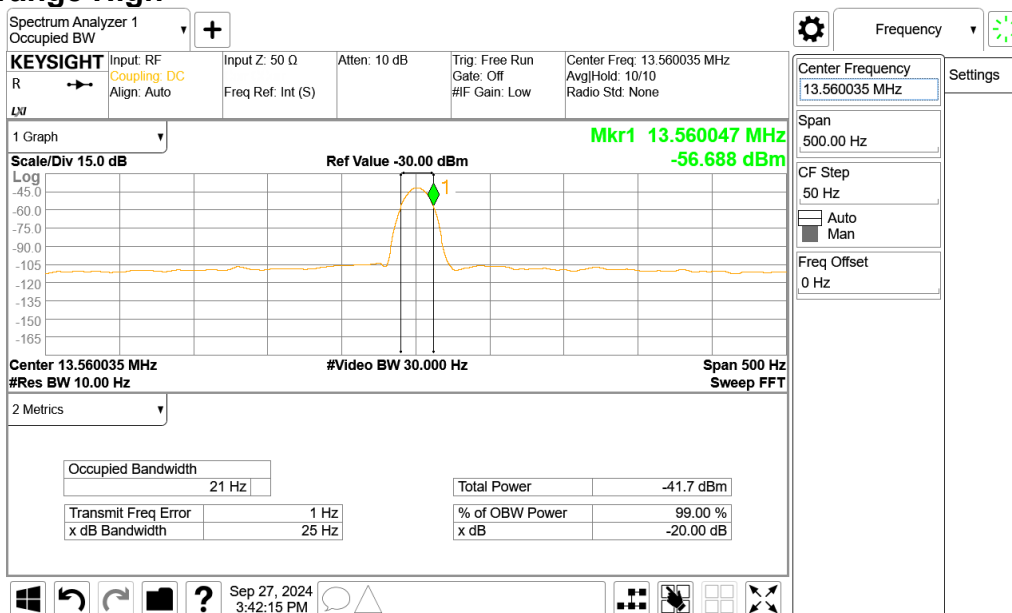
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## Operation range low



## Operation range High



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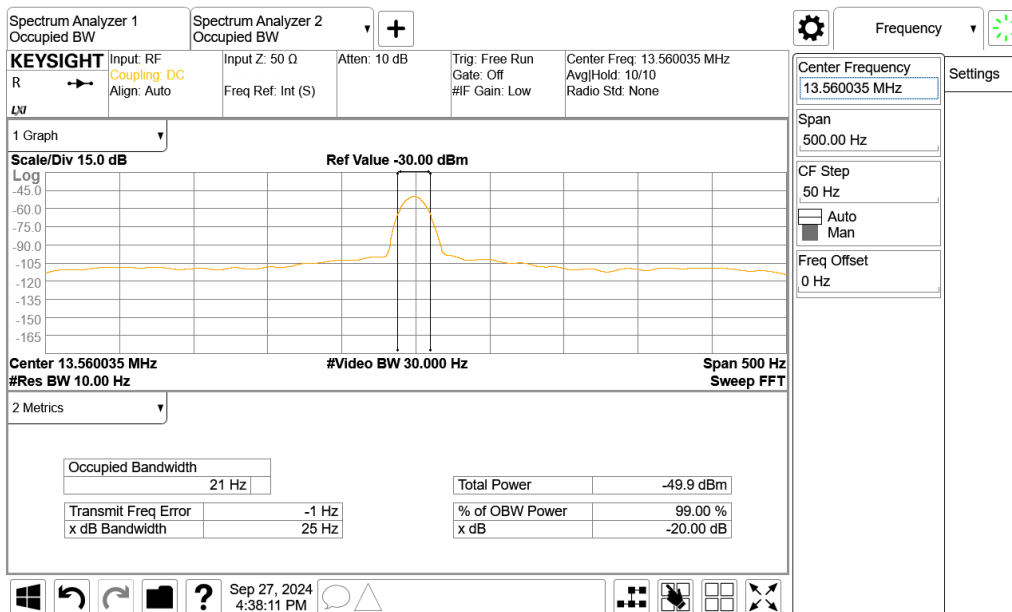
Mode: INPAQ

20dB BW (kHz)
0.025

Operation range	Frequency (MHz)	Limit (MHz)
Low	13.56002	>13.11
High	13.56005	<14.01

99% BW (kHz)
0.021

## Bandwidth



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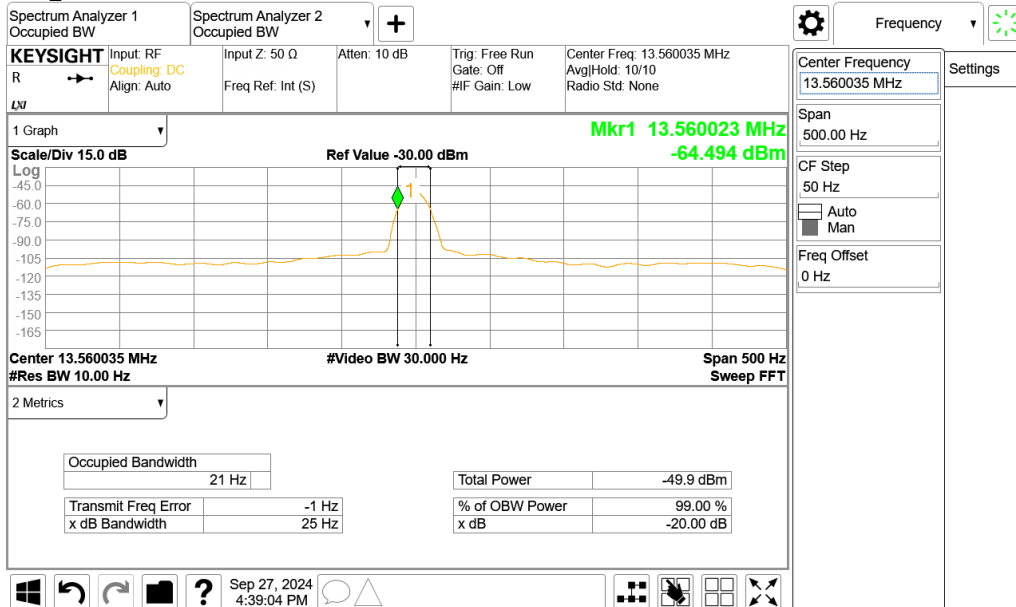
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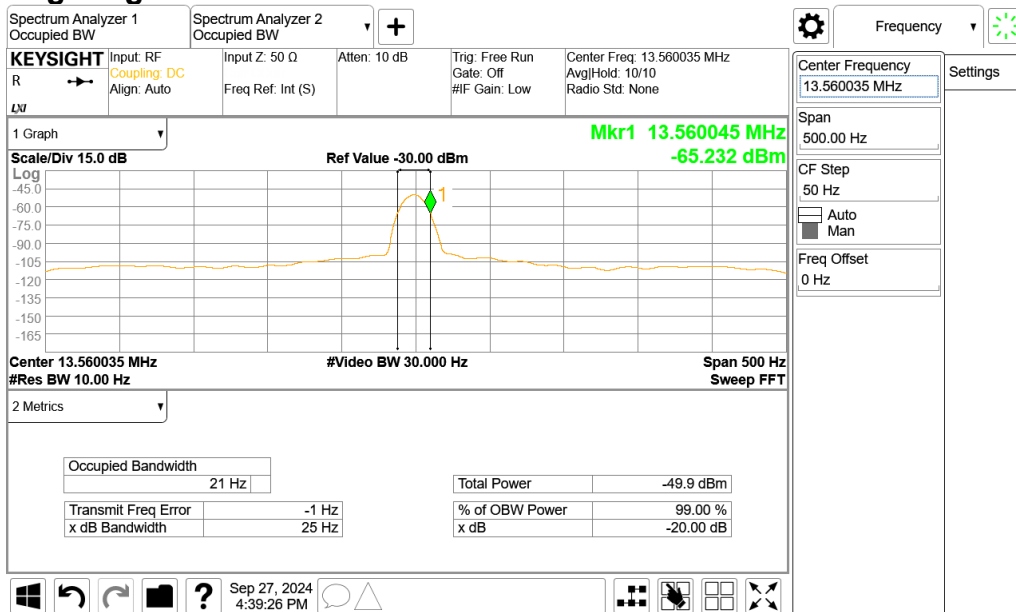
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## Operation range low



## Operation range High



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## 11 ANTENNA REQUIREMENT

### 11.1 Standard Applicable:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### 11.2 Antenna Connected Construction:

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

*~ End of Report ~*

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