

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



**EUT Description** LEDGER STAX  
**Applicant:** LEDGER SAS  
106 Rue du Temple, 75003 Paris, France  
**Manufacturer:** LEDGER SAS  
106 Rue du Temple, 75003 Paris, France  
**Brand Name:** [ L ] or [ LEDGER ]  
**Model No.:** 2103  
**Report Number:** TERF2507002216E2  
**FCC ID** 2ASAL-2103  
**Date of EUT Received:** N/A, the test results are fully leveraged from test report number TERF2507002217E2, for more details please refer to section 3 in this report.  
**Date of Test:** N/A, the test results are fully leveraged from test report number TERF2507002217E2, for more details please refer to section 3 in this report.  
**Issue Date:** August 6, 2025

Approved By

Aken Huang

## 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
TERF2507002216E2	00	Class II permissive change for NFC optimization	August 6, 2025	Karen Huang	

### Note:

- 1、The remark "" indicates modification of the report upon requests from certification body.
- 2、Variant information of trademarks 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).
- 3、This is an addendum test report reference to the test report *TERF2407001902E2*, full testing has been performed to demonstrate compliance.

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## 1 GENERAL INFORMATION

### 1.1 Product Description

EUT Description	LEDGER STAX
Brand Name:	[ L ] or [ LEDGER ]
Model No.:	2103
Hardware Version:	MP
Firmware Version:	MCU 5.28.2 + SE 1.6.2
EUT Series No.:	0UF451Y01D
Power Supply:	3.8Vdc
Test Software (Name/Version)	Termite V3.4

### 1.2 RF specification

Radio Technology:	NFC
Operating Frequency	13.56MHz
Transmit Power	< 7.25dBuV/m at 30m.
Number of Channels	1
Modulation Type	ASK
Antenna Type	Coil antenna

**Note:** The antenna information is provided by the applicant, and the laboratory shall not be held liable for the accuracy, completeness, or reliability of any applicant-supplied data.

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**1.3 Test Methodology**

FCC Part 15, Subpart C §15.225

ANSI C63.10:2020.

**1.4 Test Facility**

Laboratory	Test Site Address	Test Site Name	FCC Designation Number / Registration 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 / 891563	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 / 200037	
		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.

Temperature:	22.7	°C	Relative Humidity:	63	%
Test site	Conducted C		Test Start:	07/24/2025	
Test Engineer:	Joey You		Test Done:	07/24/2025	

**1.5 Special Accessories**

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

**1.6 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

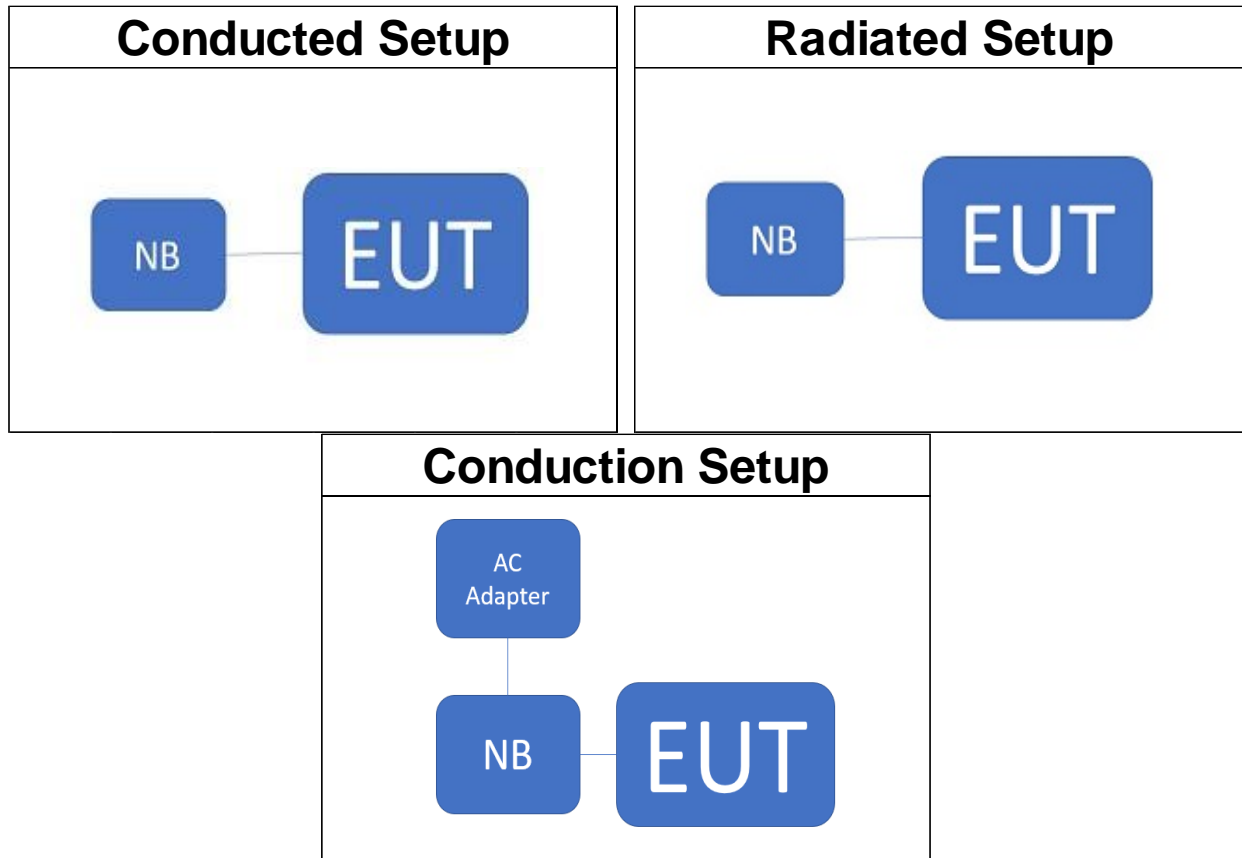
Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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 F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB Cable	MI	SJX10ZM	N/A	N/A	N/A
Notebook	Lenovo	T14	P0003332	N/A	N/A
Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Notebook	HP	HSN-Q35C-4	P0004691	N/A	N/A
USB Cable	I Max	USB-C1200	N/A	N/A	N/A
AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
NB Adapter	Lenovo	ADLX65YLC3A	8SSA10M13945L1C Z88N0F8W	N/A	N/A
USB Cable	MI	SJX10ZM	N/A	N/A	N/A
Notebook	Lenovo	T14	P0003332	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result	Note
§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	

#### Note

1. N/S Indicates whether item(s) being newly tested [N] or spot checked [S].
2. Items other than newly tested [N] are leveraged from test report TERF2507002217E2.

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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
	+/-	4.1 dB	30MHz - 1000MHz
	+/-	3.37 dB	1GHz - 18GHz
	+/-	3.83 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89 dB	9kHz~30MHz
	+/-	4.1 dB	30MHz - 1000MHz
	+/-	3.37 dB	1GHz - 18GHz
	+/-	3.83 dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2 dB	33GHz-50GHz
	+/-	1.59 dB	50GHz-60GHz
	+/-	1.71 dB	60GHz-90GHz
	+/-	1.64 dB	90GHz-140GHz
	+/-	3.84 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 C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2025	03/26/2026
EMI Test Receiver	R&S	ESCI	101342	04/23/2025	04/22/2026
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	974	06/30/2025	06/29/2026
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2025	03/26/2026
Test Software	audix	e3	E3 20923 SGS Ver.9 ( C )	N.C.R	N.C.R

### 6.2 Conducted Measurement

Conducted Emission Test Site: Conducted F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
DC Block	PASTERNAK	PE8210	RF35	11/14/2024	11/13/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	06/03/2025	06/02/2026
H-Loop Near Field Antenna	LANGER EMV- Technik	LF-R 400	02-1597	N.C.R	N.C.R

### 6.3 Radiated Measurement

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
3m Site NSA	SGS	966 chamber D	N/A	04/30/2025	04/29/2026
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/11/2024	12/10/2025
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/17/2024	12/16/2025
Coaxial Cable	EMCI+Huber Suhner	RG 214/U+EMC104- SM-SM- 500+SUCOFLEX 104+16+EMC105- SM-SM- 11000+EMC106- SM-SM-2300	W22.01+W21.01+1 50707+MY969/4+1 6+190825+150702	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/14/2024	11/13/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/26/2025	06/25/2026

**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

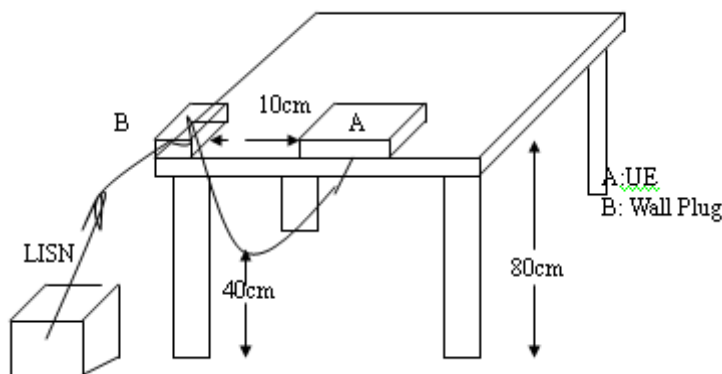
Note

- 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

Level = Read Level + Factor

Factor = (LISN, ISN, or current probe)Factor + Cable Loss +Attenuator

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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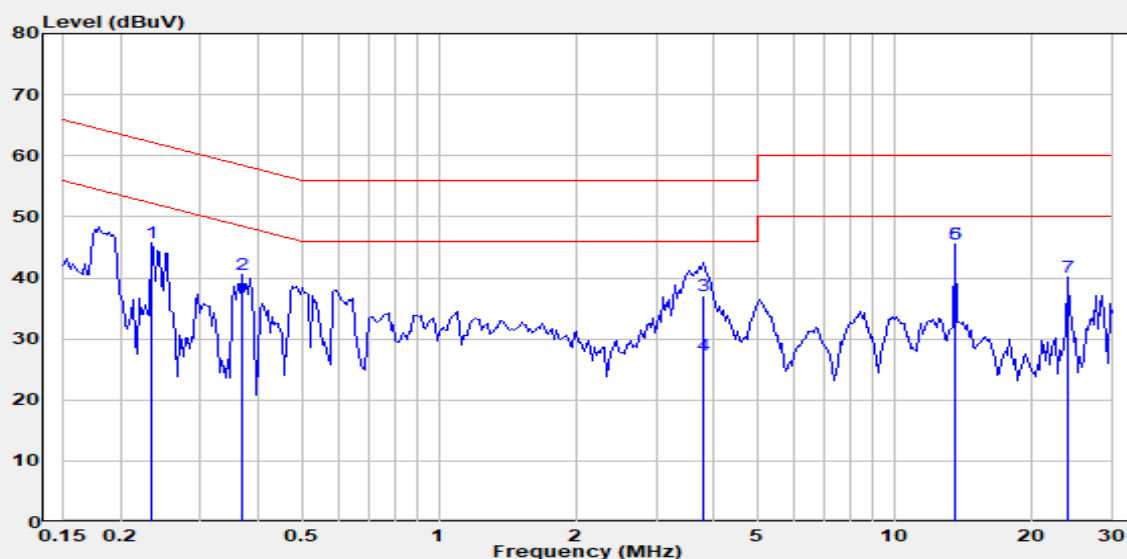
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2507002217E2	Test Site	:Conduction C
Test Mode	:Conduction	Test Date	:2025-07-17
Power	:120V/60Hz	Temp./Humi.	:23.8°C/61%
Probe	:L1	Engineer	:Temo Chen
Note	:NFC On		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.234	Peak	35.01	10.64	45.65	62.30	-16.65
0.369	Peak	29.83	10.63	40.46	58.52	-18.06
3.799	QP	26.20	10.89	37.09	56.00	-18.91
3.799	Average	16.50	10.89	27.39	46.00	-18.61
13.551	Peak	34.49	11.05	45.54	60.00	-14.46
13.560	Peak	34.49	11.05	45.54	-	-
24.015	Peak	28.95	11.25	40.20	60.00	-19.80

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Report Number :TERF2507002217E2

Test Site :Conduction C

Test Mode :Conduction

Test Date :2025-07-17

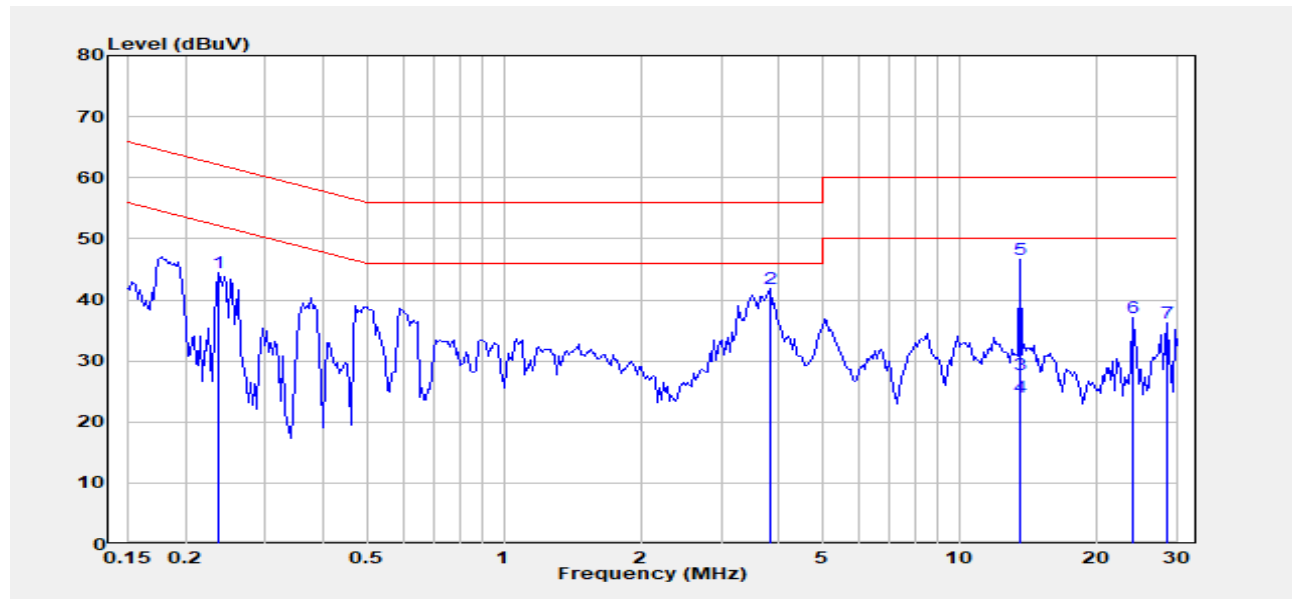
Power :120V/60Hz

Temp./Humi. :23.8°C/61%

Probe :N

Engineer :Temo Chen

Note :NFC On



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.237	Peak	33.72	10.64	44.36	62.22	-17.86
3.840	Peak	31.03	10.87	41.90	56.00	-14.10
13.551	QP	16.80	11.04	27.84	60.00	-32.16
13.551	Average	13.10	11.04	24.14	50.00	-25.86
13.560	Peak	35.51	11.04	46.55	-	-
24.015	Peak	25.73	11.26	36.99	60.00	-23.01
28.755	Peak	24.82	11.37	36.19	60.00	-23.81

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Test Site :Conduction C

Test Mode :Conduction

Test Date :2025-07-17

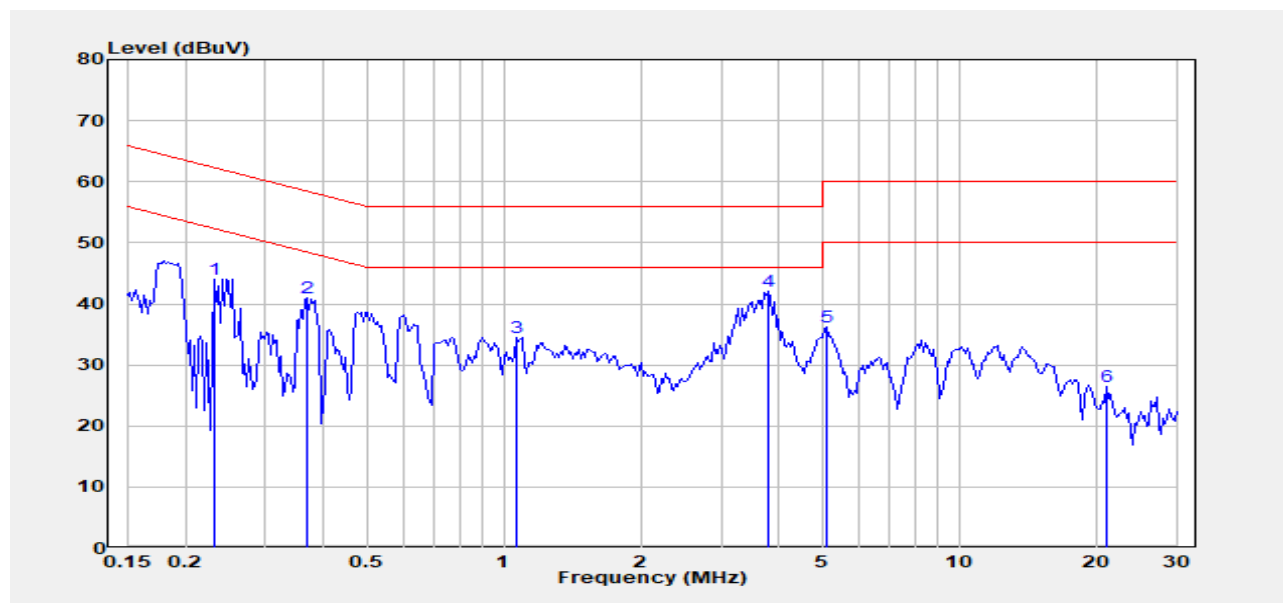
Power :120V/60Hz

Temp./Humi. :23.8°C/61%

Probe :L1

Engineer :Temo Chen

Note :Standby Mode



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.232	Peak	33.44	10.64	44.09	62.39	-18.30
0.369	Peak	30.26	10.63	40.89	58.52	-17.63
1.065	Peak	23.69	10.70	34.38	56.00	-21.62
3.799	Peak	31.11	10.89	42.00	56.00	-14.00
5.112	Peak	25.19	10.95	36.15	60.00	-23.85
21.147	Peak	15.24	11.19	26.42	60.00	-33.58

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Report Number :TERF2507002217E2

Test Site :Conduction C

Test Mode :Conduction

Test Date :2025-07-17

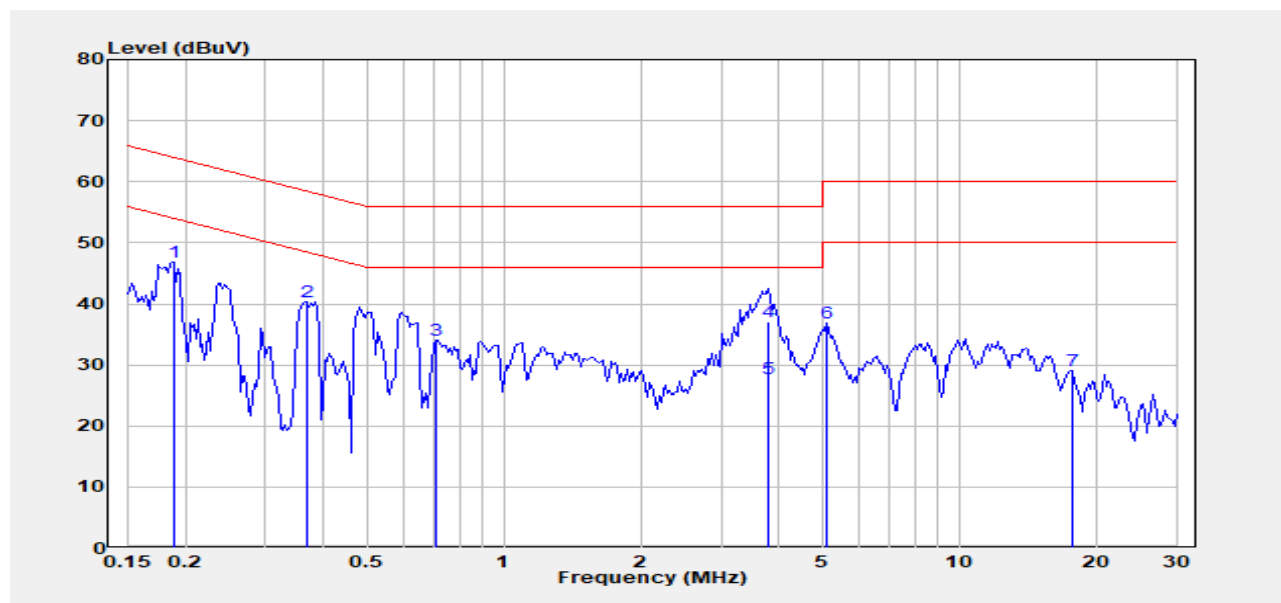
Power :120V/60Hz

Temp./Humi. :23.8°C/61%

Probe :N

Engineer :Temo Chen

Note :Standby Mode



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.189	Peak	36.22	10.65	46.87	64.06	-17.19
0.369	Peak	29.80	10.62	40.42	58.52	-18.10
0.712	Peak	23.35	10.64	33.99	56.00	-22.01
3.799	QP	26.30	10.87	37.17	56.00	-18.83
3.799	Average	16.80	10.87	27.67	46.00	-18.33
5.112	Peak	26.01	10.94	36.95	60.00	-23.05
17.661	Peak	17.94	11.12	29.06	60.00	-30.94

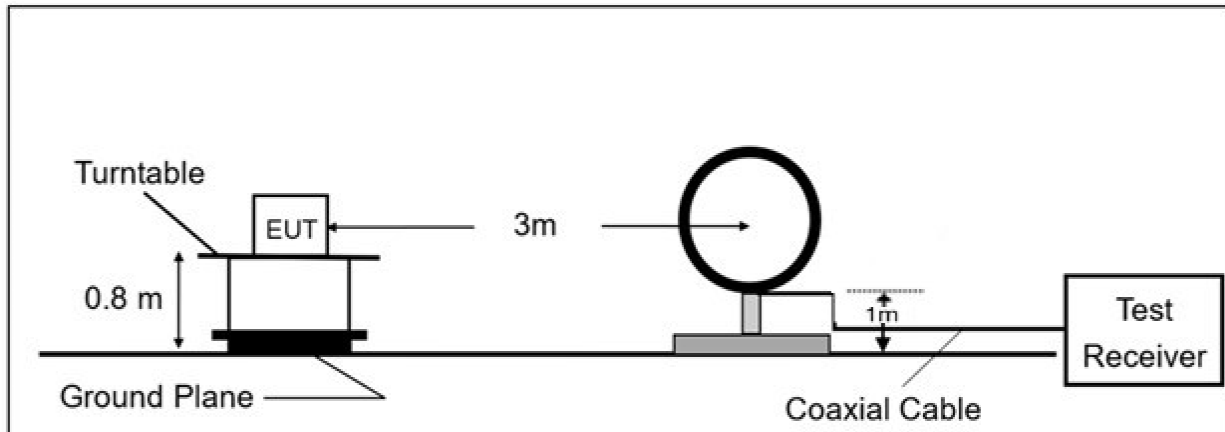
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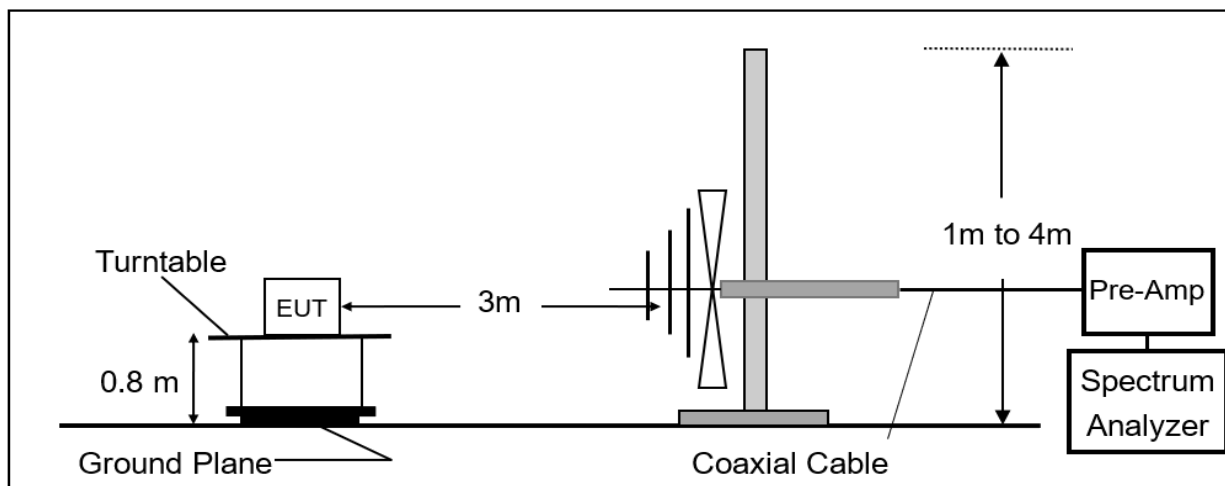
## 8 RADIATED EMISSION TEST

### 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(dB/m) + Cable Loss(dB) – Distance Factor (dB)

Above 30 MHz of Factor(dB) = Antenna Factor(dB/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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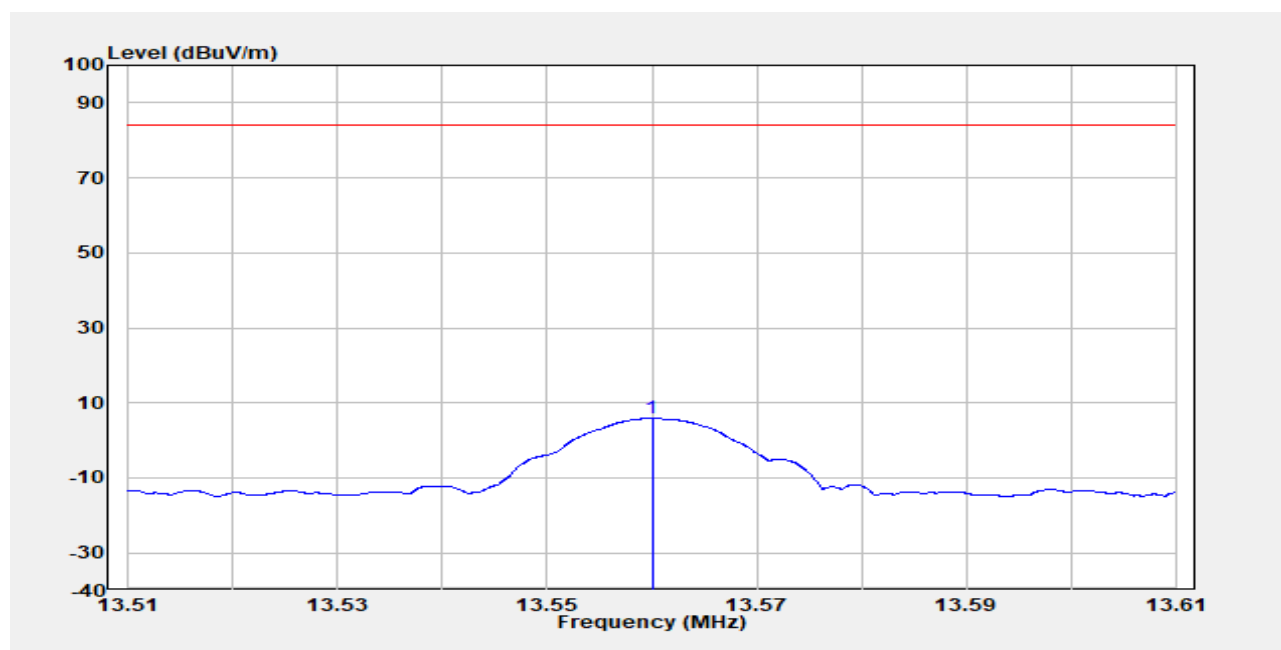
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### 8.4.3 Field Strength of Fundamental Emission Measurement Result

Report Number :TERF2507002217E2  
Operation Mode :NFC  
Test Frequency :13.56 MHz  
Test Mode :Main  
EUT Pol :E1 Plane

Test Site :SAC D  
Test Date :2025-07-15  
Temp./Humi. :23.5°C/58%  
Antenna Pol. :Ground Parallel  
Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
13.560	Peak	30.44	-24.60	5.84	84.00	-78.16

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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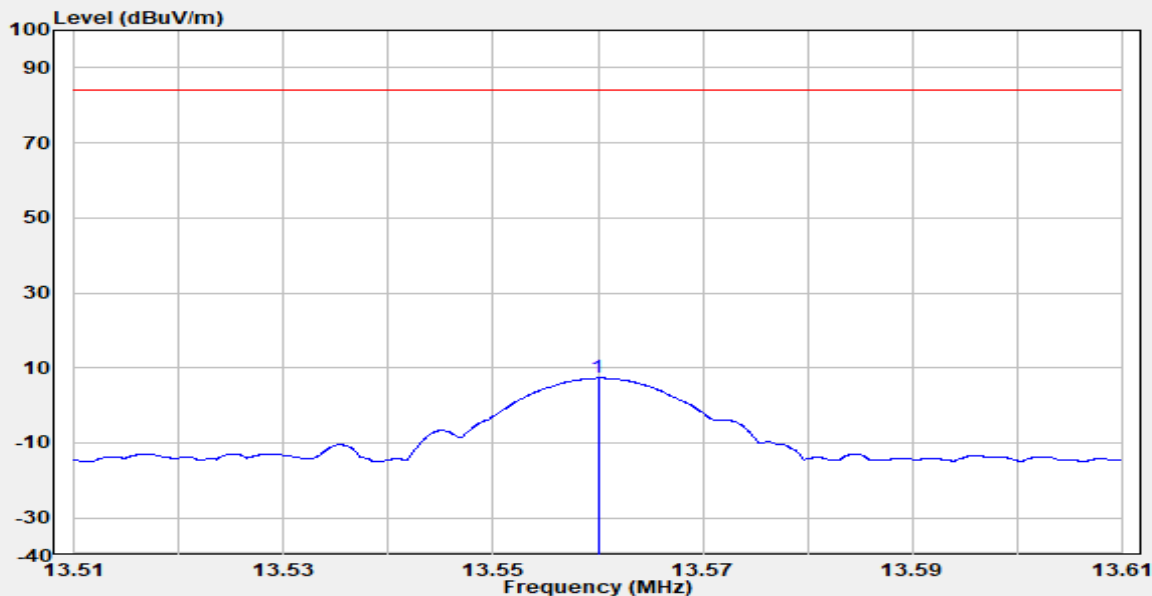
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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Parallel  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
13.560	Peak	31.85	-24.60	7.25	84.00	-76.75

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.

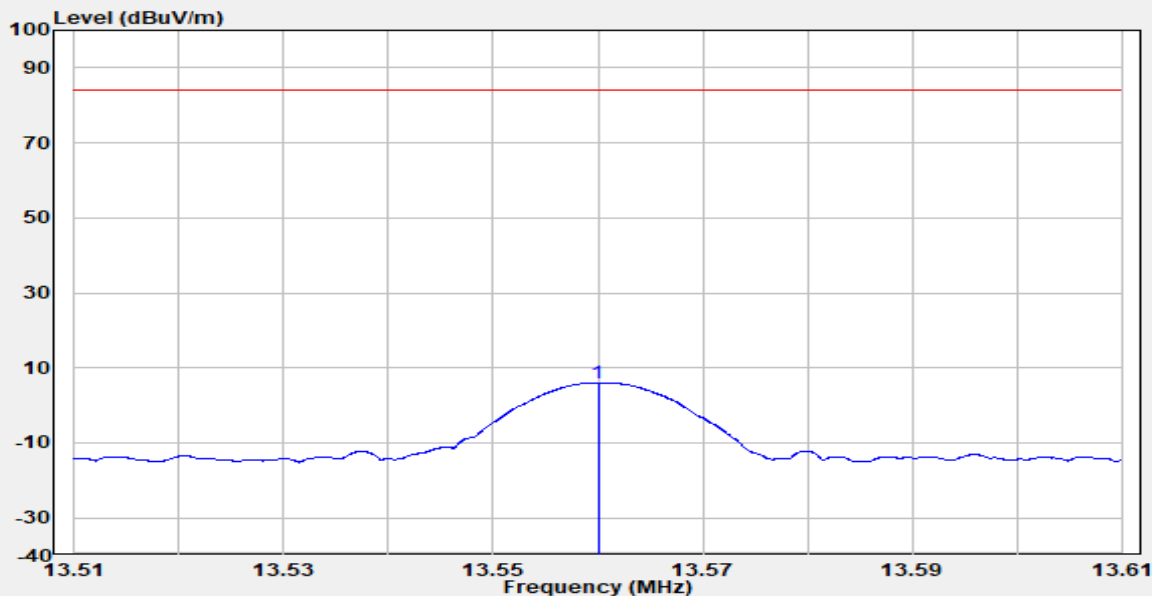
Field strength (dBuV/m) at 30m,within the band 490 kHz - 30 MHz.

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Main  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Perpendicular  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
13.560	Peak	30.67	-24.60	6.07	84.00	-77.93

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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t (886-2) 2299-3279

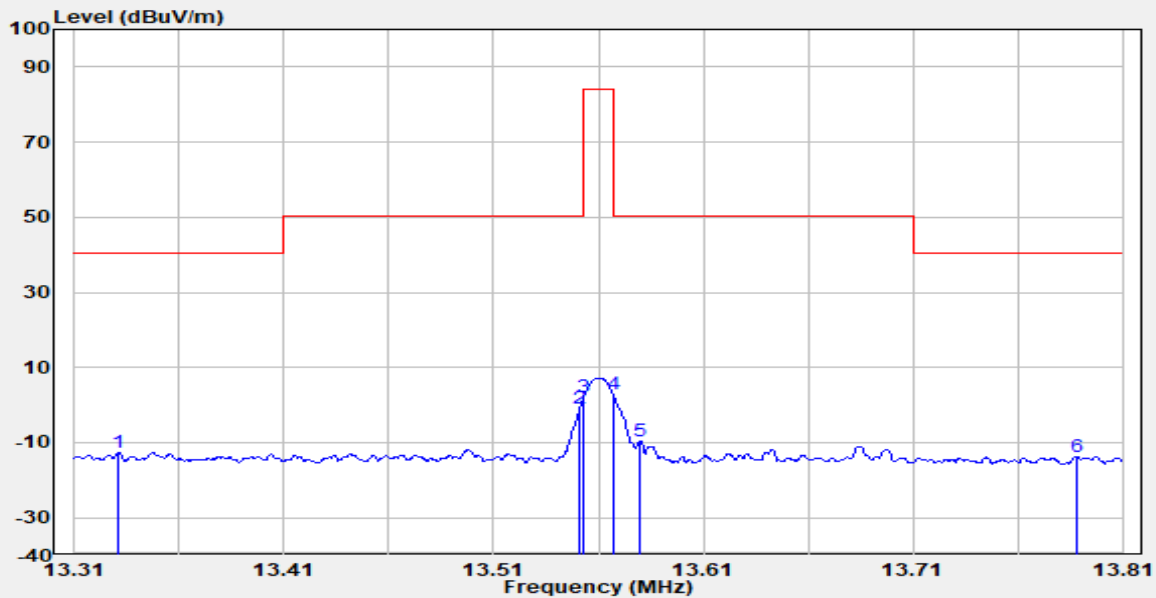
f (886-2) 2298-0488

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Ground Parallel  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level d $\mu$ V	Factor dB	Actual FS d $\mu$ V/m	Limit @3m d $\mu$ V/m	Margin dB
13.331	Peak	11.72	-24.53	-12.81	40.50	-53.31
13.551	Peak	23.56	-24.60	-1.04	50.47	-51.51
13.553	Peak	26.73	-24.60	2.13	50.47	-48.34
13.567	Peak	27.51	-24.60	2.91	50.47	-47.56
13.580	Peak	14.98	-24.60	-9.63	50.47	-60.10
13.788	Peak	10.91	-24.66	-13.75	40.50	-54.25

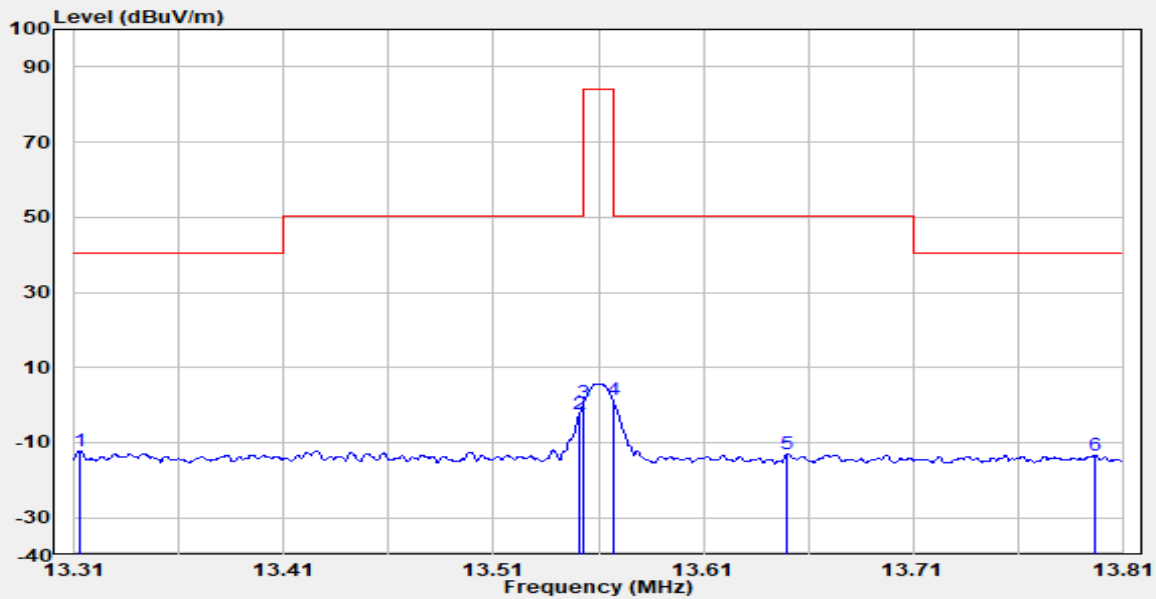
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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Parallel  
 Engineer :Temo Chen



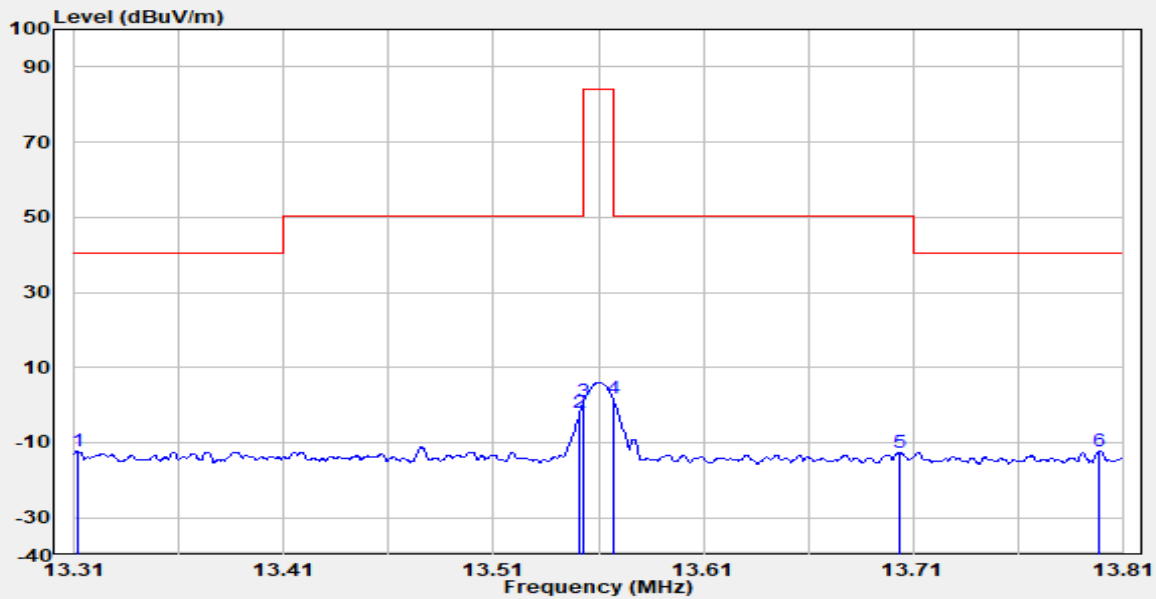
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
13.313	Peak	12.11	-24.53	-12.42	40.50	-52.92
13.551	Peak	22.32	-24.60	-2.28	50.47	-52.75
13.553	Peak	25.19	-24.60	0.59	50.47	-49.88
13.567	Peak	25.96	-24.60	1.36	50.47	-49.11
13.650	Peak	11.69	-24.62	-12.94	50.47	-63.41
13.797	Peak	11.22	-24.67	-13.44	40.50	-53.94

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Mask  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Perpendicular  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
13.312	Peak	12.10	-24.53	-12.43	40.50	-52.93
13.551	Peak	22.37	-24.60	-2.23	50.47	-52.70
13.553	Peak	25.41	-24.60	0.82	50.47	-49.65
13.567	Peak	26.17	-24.60	1.57	50.47	-48.90
13.704	Peak	11.98	-24.64	-12.66	50.47	-63.13
13.799	Peak	12.31	-24.67	-12.35	40.50	-52.85

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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.  $20 \cdot \log(30 \mu\text{V/m}) = 29.54 \text{ dBuV/m}$
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 :TERF2507002217E2

Test Site :SAC D

Operation Mode :NFC

Test Date :2025-07-15

Test Frequency :13.56 MHz

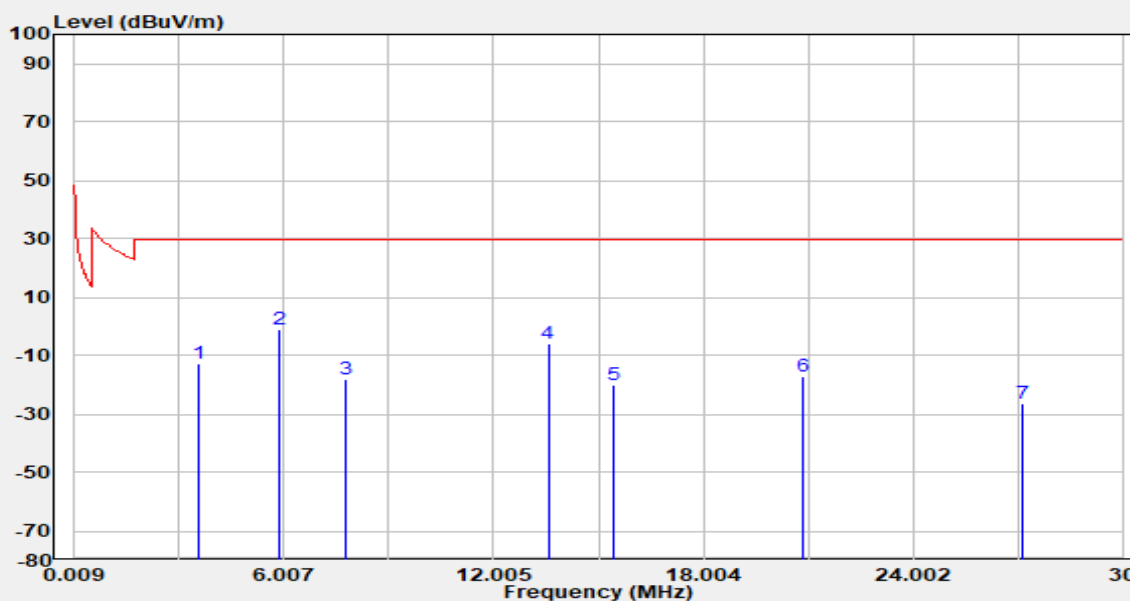
Temp./Humi. :23.5°C/58%

Test Mode :Tx

Antenna Pol. :Ground Parallel

EUT Pol :E1 Plane

Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
3.578	Peak	24.05	-36.70	-12.66	29.54	-42.20
5.857	Peak	34.71	-35.74	-1.03	29.54	-30.57
7.747	Peak	18.16	-36.22	-18.06	29.54	-47.60
13.565	Peak	30.14	-36.10	-5.96	29.54	-35.50
15.454	Peak	15.93	-35.98	-20.05	29.54	-49.59
20.853	Peak	19.04	-36.27	-17.22	29.54	-46.76
27.120	Peak	10.60	-37.03	-26.42	29.54	-55.96

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.

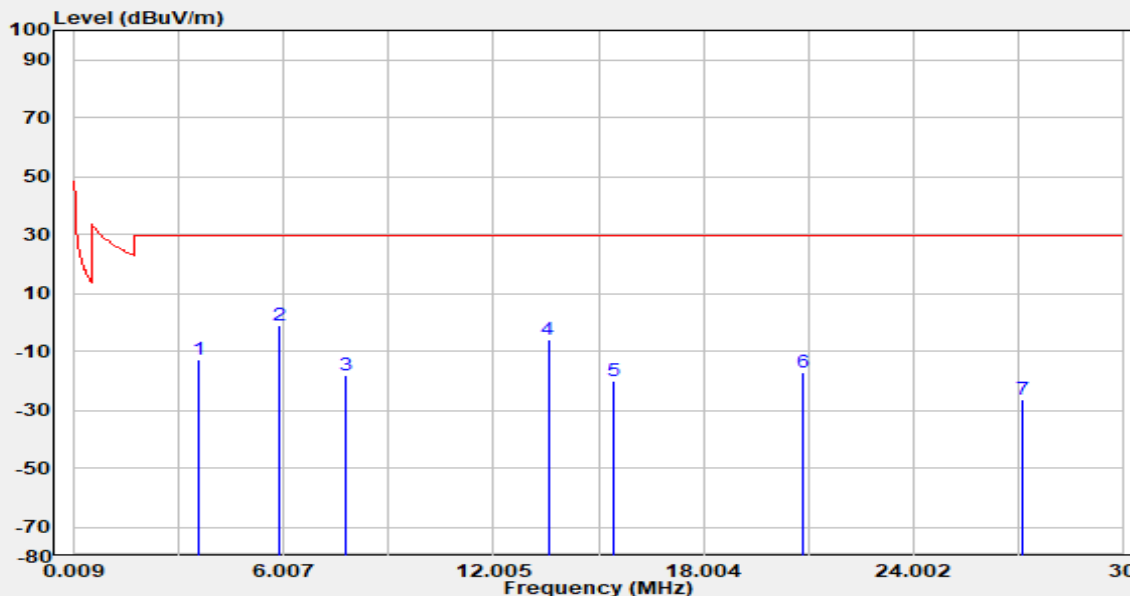
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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Parallel  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
3.578	Peak	24.05	-36.70	-12.66	29.54	-42.20
5.857	Peak	34.71	-35.74	-1.03	29.54	-30.57
7.747	Peak	18.16	-36.22	-18.06	29.54	-47.60
13.565	Peak	30.14	-36.10	-5.96	29.54	-35.50
15.454	Peak	15.93	-35.98	-20.05	29.54	-49.59
20.853	Peak	19.04	-36.27	-17.22	29.54	-46.76
27.120	Peak	10.60	-37.03	-26.42	29.54	-55.96

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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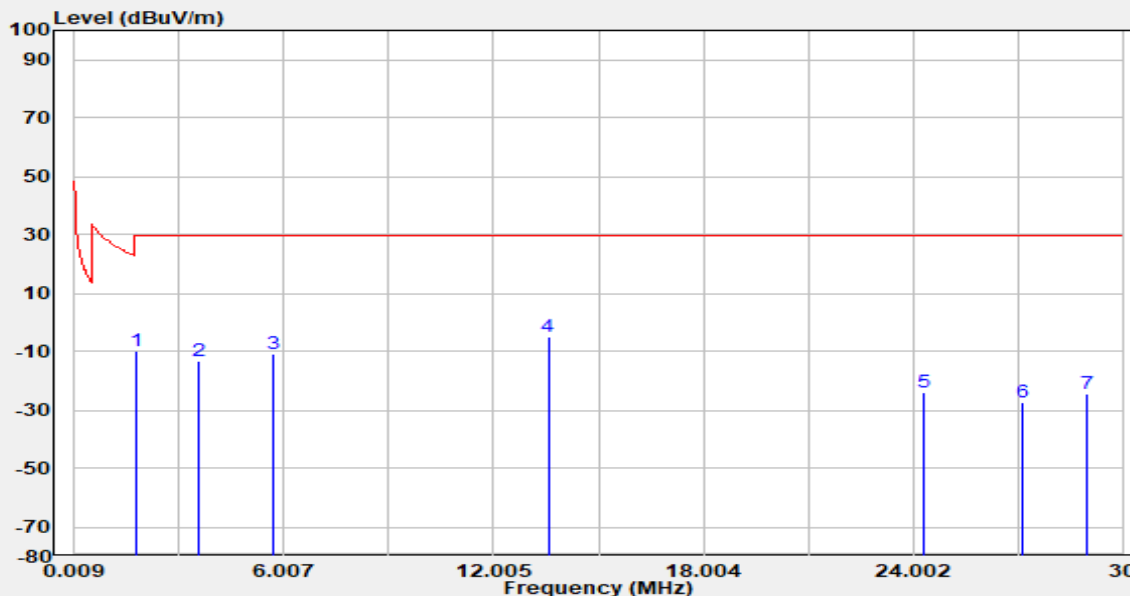
f (886-2) 2298-0488

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Perpendicular  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1.748	Peak	27.36	-37.33	-9.97	29.54	-39.51
3.548	Peak	23.65	-36.72	-13.06	29.54	-42.60
5.707	Peak	25.31	-35.88	-10.56	29.54	-40.10
13.565	Peak	31.24	-36.10	-4.86	29.54	-34.40
24.332	Peak	13.27	-37.02	-23.75	29.54	-53.29
27.120	Peak	9.49	-37.03	-27.54	29.54	-57.08
29.010	Peak	13.37	-37.58	-24.21	29.54	-53.75

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.

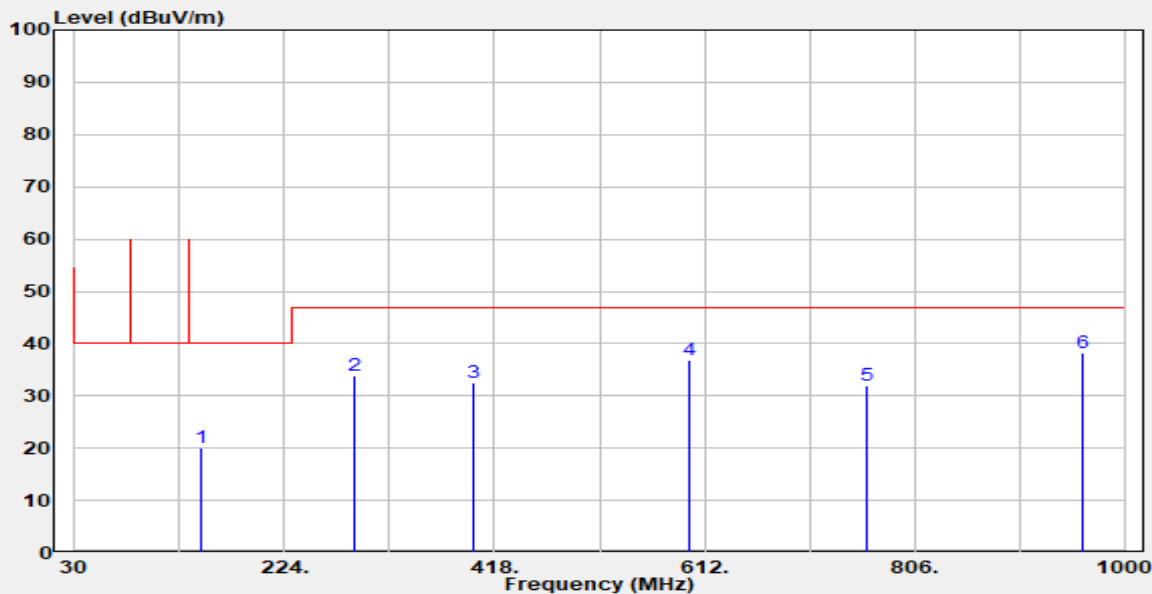
Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Vertical  
 Engineer :Temo Chen



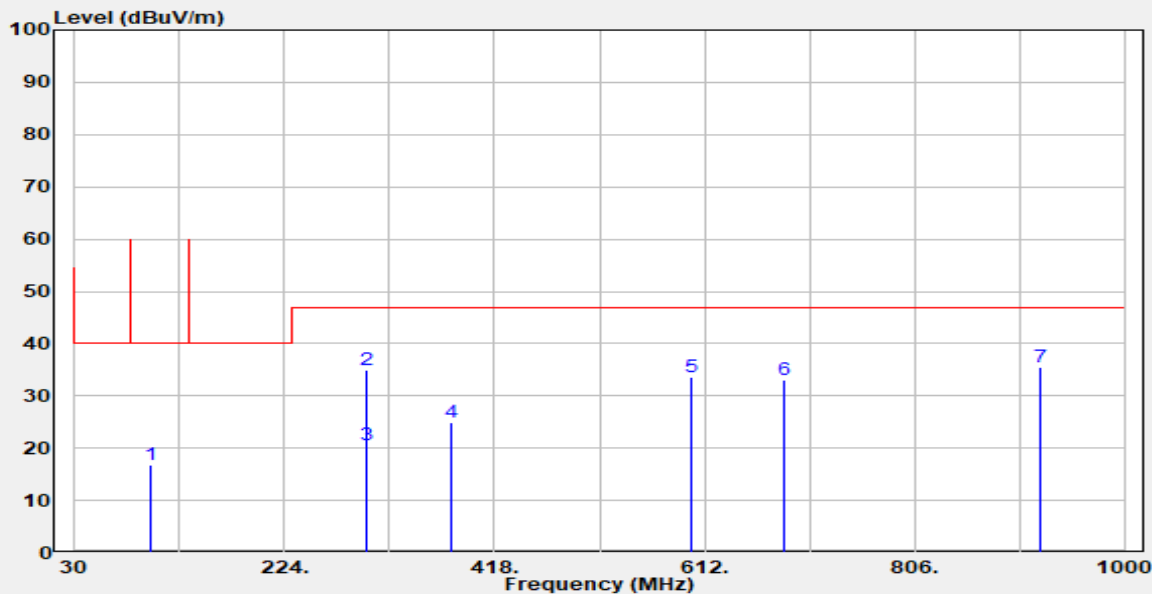
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
147.37	Peak	36.72	-16.70	20.02	40.00	-19.98
288.99	Peak	50.34	-16.33	34.01	47.00	-12.99
398.60	Peak	45.99	-13.57	32.42	47.00	-14.58
598.42	Peak	46.29	-9.40	36.89	47.00	-10.11
762.35	Peak	38.67	-6.69	31.98	47.00	-15.02
961.20	Peak	42.45	-4.25	38.20	47.00	-8.80

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Report Number :TERF2507002217E2  
 Operation Mode :NFC  
 Test Frequency :13.56 MHz  
 Test Mode :Tx  
 EUT Pol :E1 Plane

Test Site :SAC D  
 Test Date :2025-07-15  
 Temp./Humi. :23.5°C/58%  
 Antenna Pol. :Horizontal  
 Engineer :Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
99.84	Peak	38.61	-21.88	16.73	40.00	-23.27
299.66	QP	51.10	-16.11	34.99	47.00	-12.01
299.66	Average	36.70	-16.11	20.59	47.00	-26.41
378.23	Peak	38.93	-14.04	24.89	47.00	-22.11
599.39	Peak	42.88	-9.36	33.52	47.00	-13.48
685.72	Peak	41.27	-8.16	33.11	47.00	-13.89
922.40	Peak	40.27	-4.88	35.39	47.00	-11.61

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## 9 FREQUENCY STABILITY

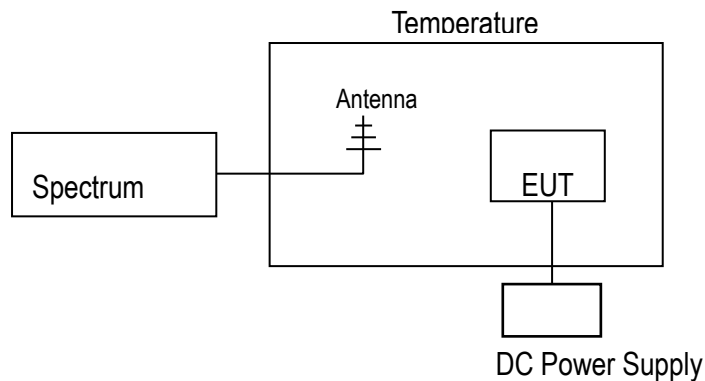
### 9.1 Applicable Standard

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

### Startup

#### A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55929	-0.71000	+/- 1.356

#### B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55929	-0.71000	+/- 1.356

### 2 minutes

#### A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55977	-0.23000	+/- 1.356

#### B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55977	-0.23000	+/- 1.356

### 5 minutes

#### A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55973	-0.27000	+/- 1.356

#### B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55973	-0.27000	+/- 1.356

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10 minutes

## A. Temperature Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55963	-0.37000	+/- 1.356

## B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (kHz)	Limit (kHz)
Vdc	Temperature (°C)	(MHz)		
3.8	25	13.55963	-0.37000	+/- 1.356

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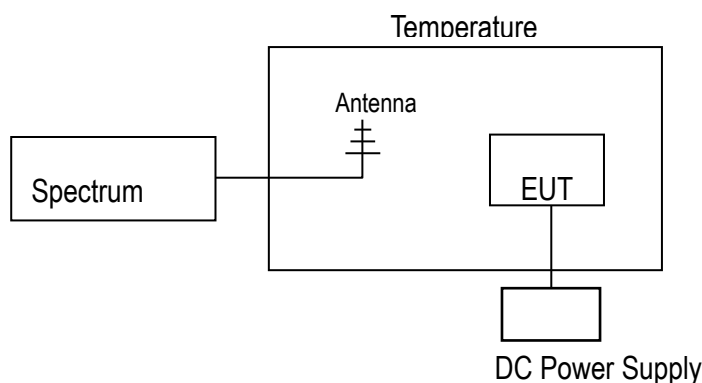
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## 10 EMISSION BANDWIDTH MEASUREMENT

### 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

### FCC

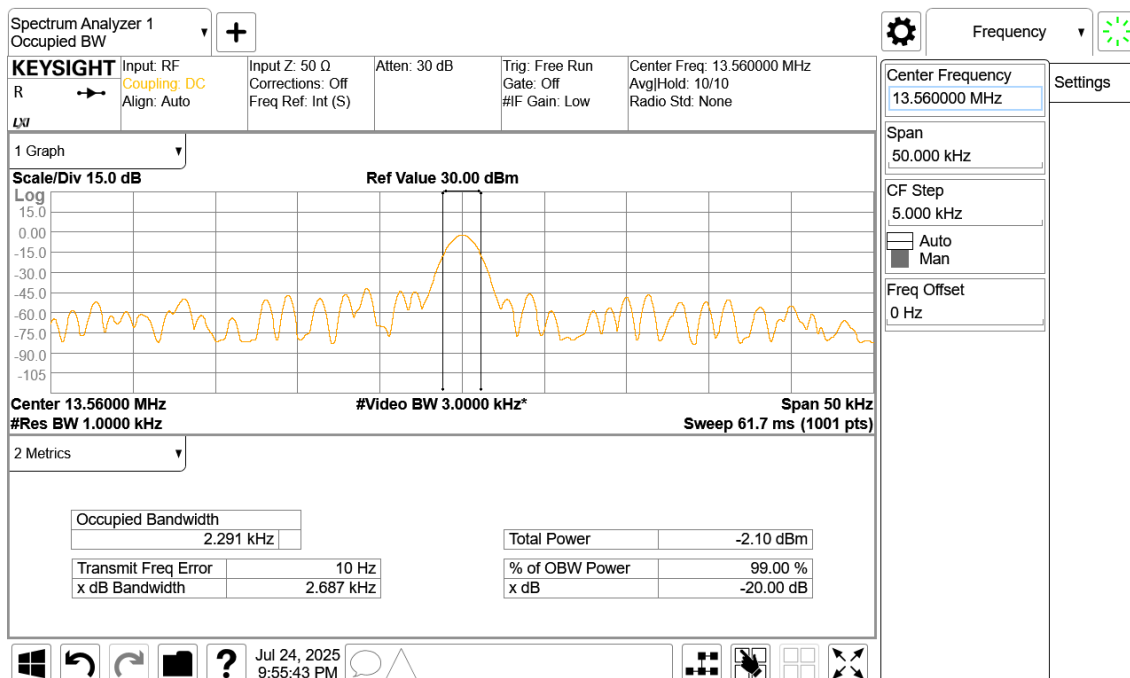
20dB BW (kHz)
2.687

Operation range	Frequency (MHz)	Limit (MHz)
Low	13.55885	>13.11
High	13.56115	<14.01

### IC

99% BW (kHz)
2.291

## Bandwidth



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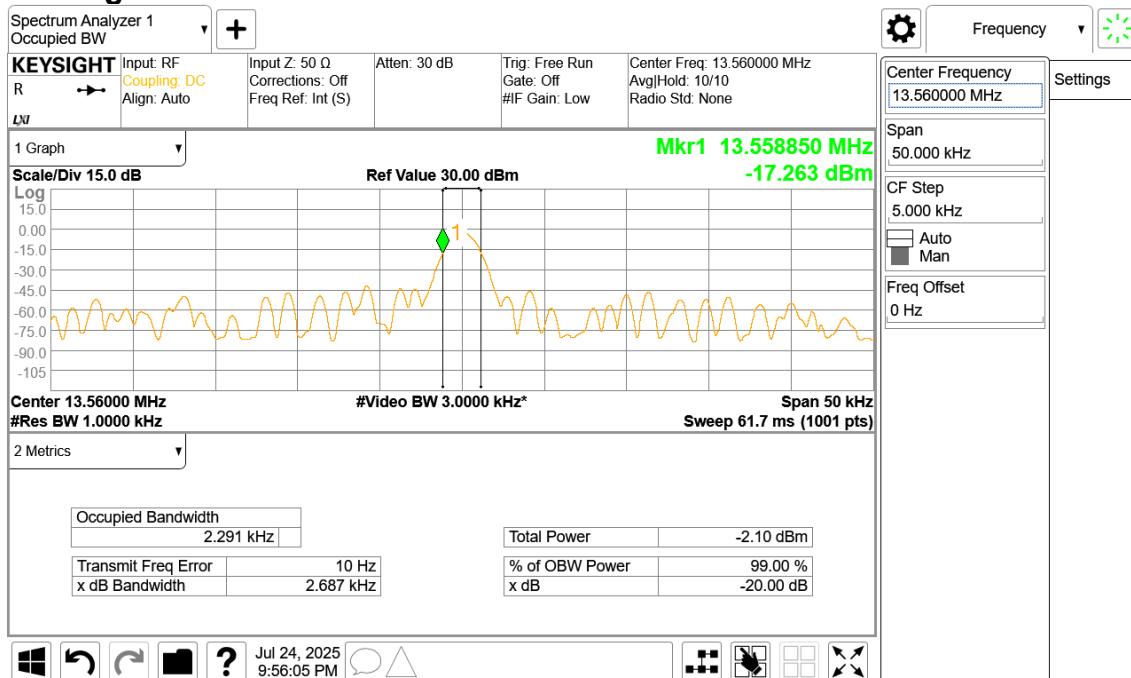
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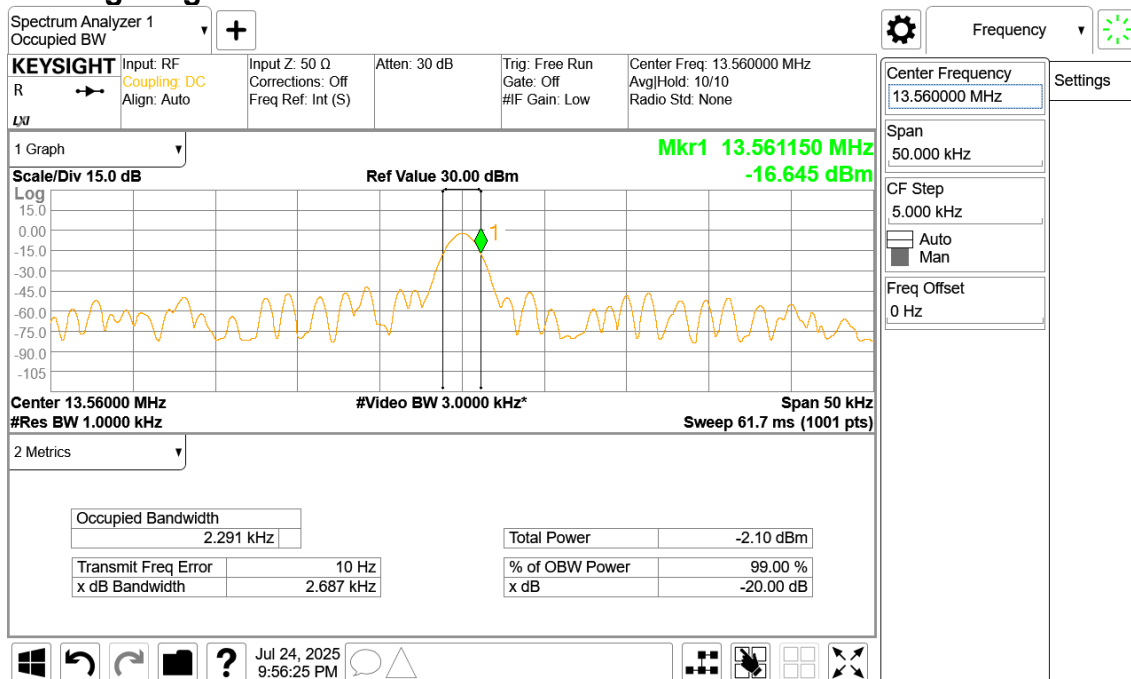
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## Operation range low



## 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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