Certificate #4312.01

TEST REPORT

Product Name:	Smart Door Station
Trade Mark:	GRANDSTREAM
Model No.:	GDS3727
Report Number:	25040917185RFC-4
Test Standards:	FCC 47 CFR Part 15 Subpart C
FCC ID:	YZZGDS3727
Test Result:	PASS
Date of Issue:	July 22, 2025

Prepared for:

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

Prepared by:

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Date: July 22, 2025

UnionTrust Laboratories

Version

Version No.	Date	Description
V1.0	July 22, 2025	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Smart Door Station		
Model No.:	GDS3727		
Trade Mark:	GRANDSTREAM		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n/ax	
		Bluetooth V5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac/ax
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac/ax
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac/ax
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac/ax
	NFC:	13.553 MHz to 13.567 MHz	
	RF ID:	13.553 MHz to 13.567 MHz	
		125 kHz	
Sample Received Date:	April 9, 2025		
Sample Tested Date:	June 4, 2025 to June 20, 2025		

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.2.2 Description of Accessories

Others
Wall Bracket, 13.56MHz RFID Cards

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Range:	13.110 MHz to 14.010 MHz
Nominal Operating Frequency:	13.56 MHz
Work in Modes:	Card Emulation
NFC Type:	☑ NFC A Type
	☑ NFC B Type
	☑ NFC F Type
Max. Data Rates:	212 Kbps
Type of Modulation:	ASK
Number of Channels:	1
Antenna Type:	Coil Antenna
Maximum Field Strength:	54.23 dBµV/m at 3 meter
Normal Test Voltage:	12 Vdc
Extreme Test Voltage:	11.4 to 12.6 Vdc
Extreme Test Temperature:	-30 °C to +60 °C
Nominal Operating Frequency:	125kHz
Type of Modulation:	ASK
Antenna Type:	Coil Antenna

1.4 OTHER INFORMATION

None

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Latitude 3400	16238087894	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust
Power over Ethernet Injector	Cisco	MA-INJ-4	QS-6593-01N A02	UnionTrust
Switching Power Adapter	FSP	FSP025-1AD207A	0213A03K	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	±4.7 dB
4	Radiated emission 30MHz-1GHz	±4.6 dB
5	Radiated emission 1GHz-18GHz	±4.4 dB
6	Radiated emission 18GHz-40GHz	±4.6 dB
7	Occupied Bandwidth	± 1.86 %
8	Radio Frequency	± 7 x 10^{-8}

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203	N/A	PASS
Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
The field strength of any emissions appearing outside band	FCC 47 CFR Part 15 Subpart C Section 15.225(d) /15.209	ANSI C63.10-2013	PASS
Fundamental Field Strength and Emission Mask 13.110 MHz to 14.010 MHz	FCC 47 CFR Part 15 Subpart C Section 15.227(a) (b) (c) /15.205	ANSI C63.10-2013	PASS
20DB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.215(c)	ANSI C63.10-2013	PASS
Frequency Tolerance	FCC 47 CFR Part 15 Subpart C Section 15.225(e)	ANSI C63.10-2013	PASS
Disclaimer and Explanations: The declared of product specification and data (e.g., antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.			

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☑	Receiver	R&S	ESIB26	100114	25-Oct-2024	24-Oct-2025
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	29-Oct-2024	28-Oct-2025
☑	6dB Attenuator	Talent	RA6A5-N-18	18103001	29-Oct-2024	28-Oct-2025
☑	Preamplifier	HP	8447F	2805A02960	25-Oct-2024	24-Oct-2025
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	Receiver	R&S	ESCI3	1166.5950.03	25-Oct-2024	24-Oct-2025
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	25-Oct-2024	24-Oct-2025
☑	LISN	R&S	EVN216	3560.6550.12	26-Sep-2024	25-Sep-2025
☐	LISN	ETS-Lindgren	3816/2SH	00201088	25-Oct-2024	24-Oct-2025
☑	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

RF Conducted Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☑	Spectrum analyzer	R&S	FSV40-N	101653	28-Mar-2025	27-Mar-2026
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025
☑	DC Source	KIKUSUI	PWR400L	LK003024	19-Jul-2024	18-Jul-2025
☑	Temp & Humidity chamber	Votisch	VT4002	58566133290020	28-Mar-2025	27-Mar-2026

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	12	20 to 75
TL/VL	-30	11.4	20 to 75
TH/VL	+60	11.4	20 to 75
TL/VH	-30	12.6	20 to 75
TH/VH	+60	12.6	20 to 75

Remark:

1) The EUT just work in such extreme temperature of -30 °C to +60 °C and the extreme voltage of 11.4 V to 12.6 V, so here the EUT is tested in the temperature of -30 °C to +60 °C and the voltage of 11.4 V to 12.6 V.
2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Conducted Emission	23.8	46.4	100.1	S202504095710-ZJA03/4	Linson Xie
The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	26.4	55.8	100.0	S202504095710-ZJA02/4	Leo Li
Fundamental Field Strength and Emission Mask 13.110 MHz to 14.010 MHz					
20DB Bandwidth					
Radiated Spurious Emissions	26.4	55.8	100.0	S202504095710-ZJA02/4	Leo Li

4.2 TEST CHANNELS

Frequency	Test RF Channel
13.553 MHz to 13.567 MHz	Channel 1
	13.56 MHz
119 kHz to 140 kHz	Channel 1
	125 kHz

4.3 EUT TEST STATUS

Frequency	Tx Function	Description
13.56 MHz 125 kHz	1Tx	1. Keep the EUT in continuously transmitting during the test.

4.4 TEST SETUP

4.4.1 For Radiated Emissions test setup

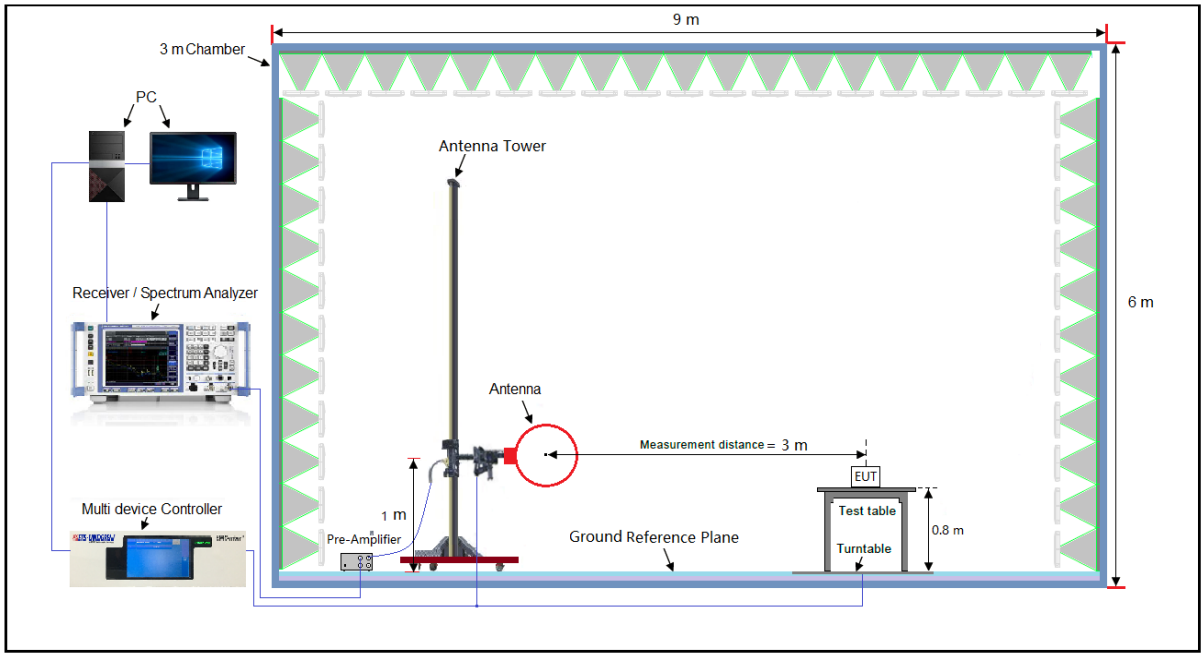


Figure 1. Below 30MHz

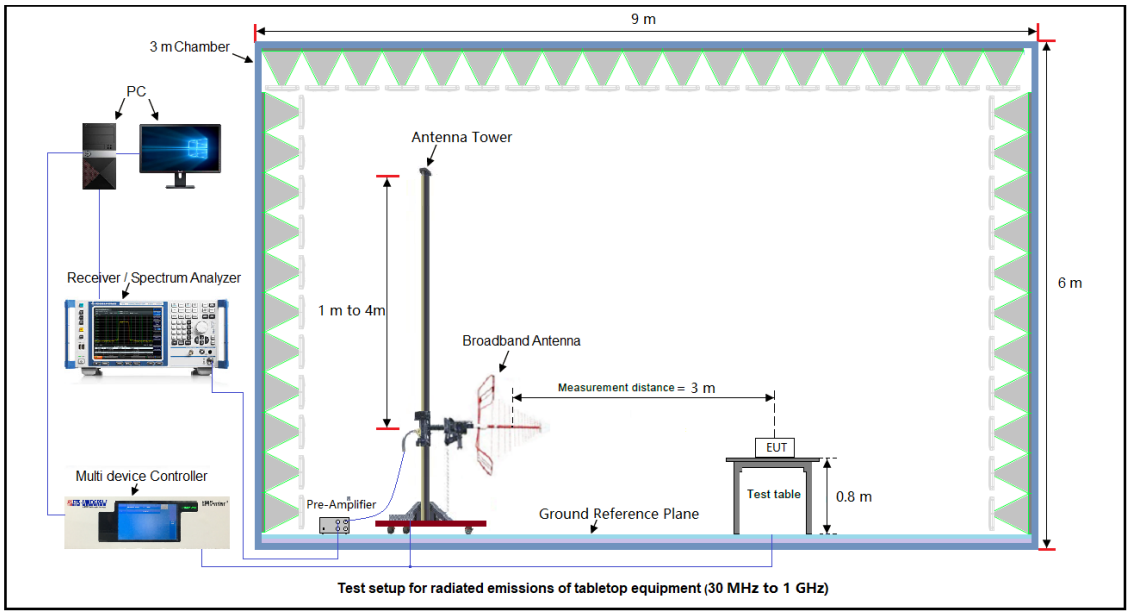
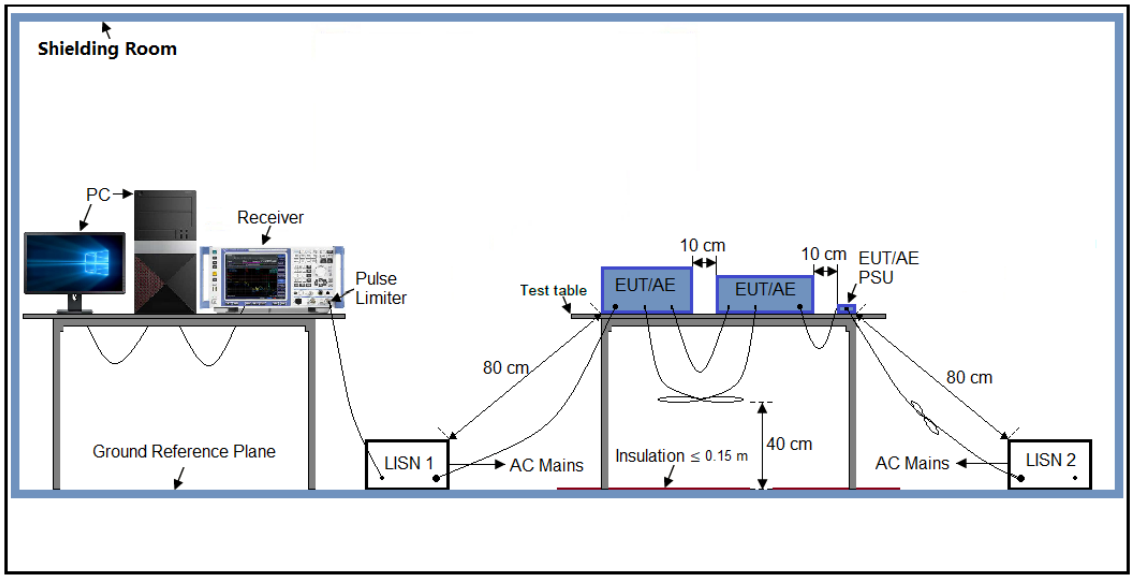
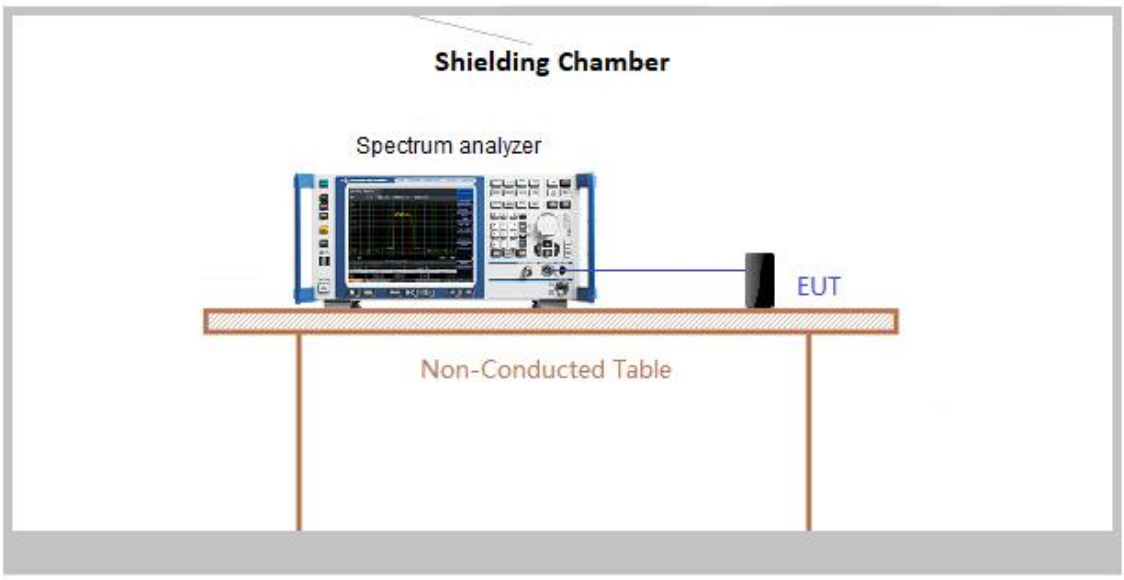


Figure 2. 30MHz to 1GHz

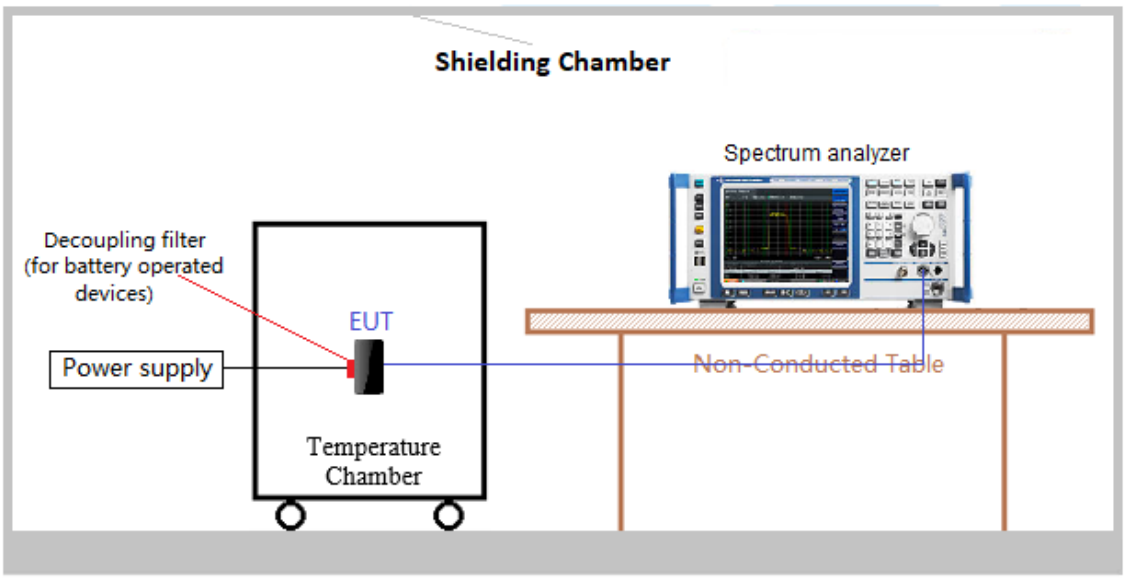
4.4.2 For Conducted Emissions test setup



4.4.3 For Conducted RF test setup



Normal Environment



Extreme Environment

4.5 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 15	Radio Frequency Devices
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: 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, 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.
EUT Antenna:
This product has a permanent antenna, fulfill the requirement of this section.

5.3 20DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.215 (c)

Test Method: ANSI C63.10

Limit: Operation within the band 13.110 MHz to 14.010 MHz

Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be. Demonstrated by measuring the radiated emissions.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency
b) Span = approximately 2 to 5 times the OBW
c) RBW = 1% to 5%of the OBW
d) VBW ≥ 3*RBW
e) Sweep = auto;
f) Detector function = peak
g) Trace = max hold
h) All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

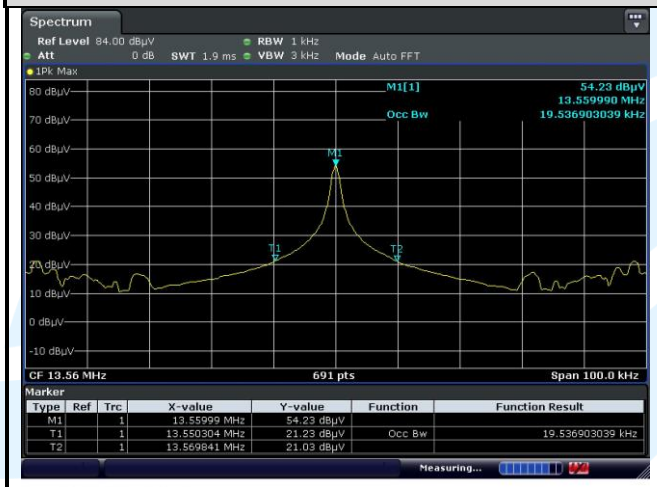
Test Mode: Transmitter mode

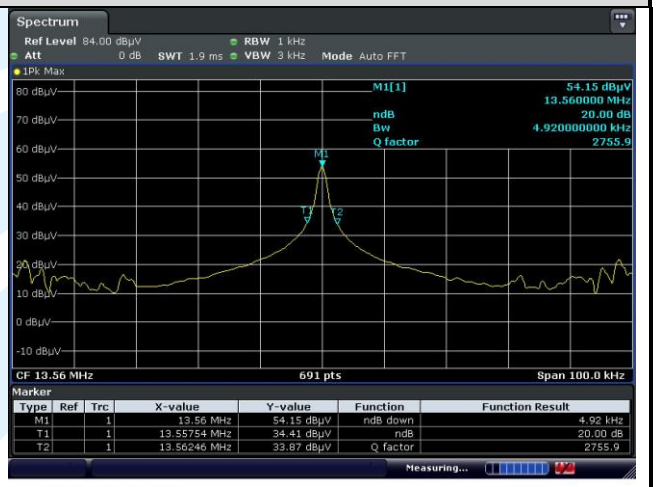
Test Results: Pass

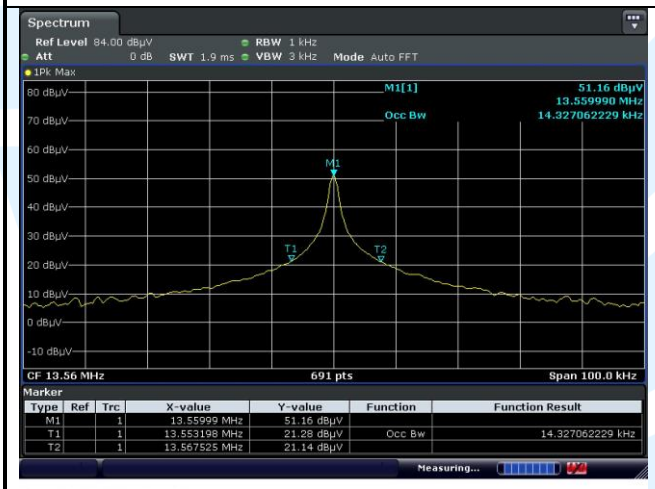
Test Frequency	OBW (kHz)	20 dB BW (kHz)	Limit
13.56 MHz A Type	19.54	4.92	Operation within the band 13.110 MHz to 14.010 MHz
13.56 MHz F Type	14.33	5.07	
125 kHz	2.01	0.7542	N/A

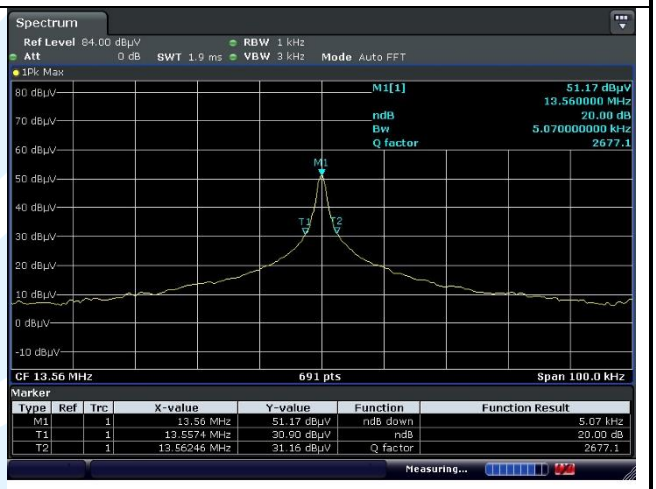
The test plot as follows:

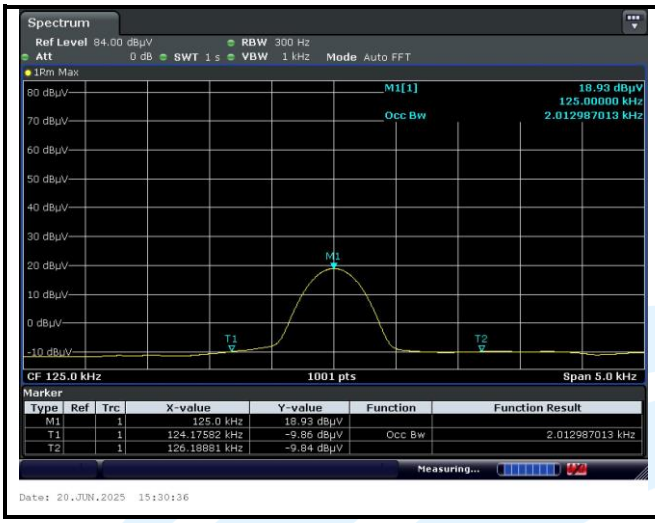
OBW	20 dB BW

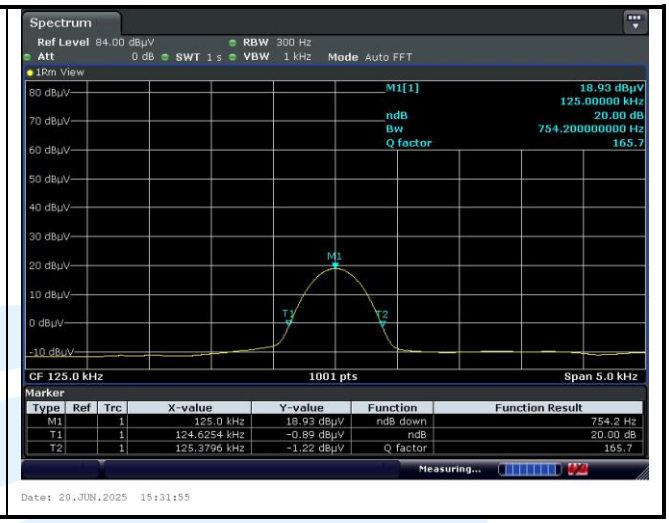









Spectrum
Ref Level 84.00 dBµV
RBW 300 Hz
Att 0 dB
SWT 1 s
VBW 1 kHz
Mode Auto FFT
1Rm Max
M1[1] 18.93 dBµV
125.00000 kHz
Occ Bw 2.012987013 kHz
CF 125.0 kHz
1001 pts
Span 5.0 kHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 125.0 kHz 18.93 dBµV
T1 1 124.17582 kHz -9.86 dBµV Occ Bw 2.012987013 kHz
T2 1 126.18881 kHz -9.84 dBµV
Measuring...
Date: 20.JUN.2025 15:30:36


Spectrum
Ref Level 84.00 dBµV
RBW 300 Hz
Att 0 dB
SWT 1 s
VBW 1 kHz
Mode Auto FFT
1Rm View
M1[1] 18.93 dBµV
125.00000 kHz
ndB 20.00 dB
Bw 754.200000000 Hz
Q factor 165.7
CF 125.0 kHz
1001 pts
Span 5.0 kHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 125.0 kHz 18.93 dBµV ndB down 754.2 Hz
T1 1 124.6254 kHz -0.89 dBµV ndB 20.00 dB
T2 1 125.3796 kHz -1.22 dBµV Q factor 165.7
Measuring...
Date: 20.JUN.2025 15:31:55

5.4 THE FIELD STRENGTH OF ANY EMISSIONS APPEARING OUTSIDE BAND

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.225(d) /15.209

Test Method: ANSI C63.10-2013 Section 6.6.4.3

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.
4. For Below 30MHz, the measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

   Example:

   Field strength limit for 13.56MHz = 15848 μV/m at 30m
   = 84 dBμV/m at 30m
   = 84 dBμV/m + 40log(30/3) dB at 3m
   = 124 dBμV/m at 3m

Test Setup: Refer to section 4.5.1 for details.

Test Procedures:

1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

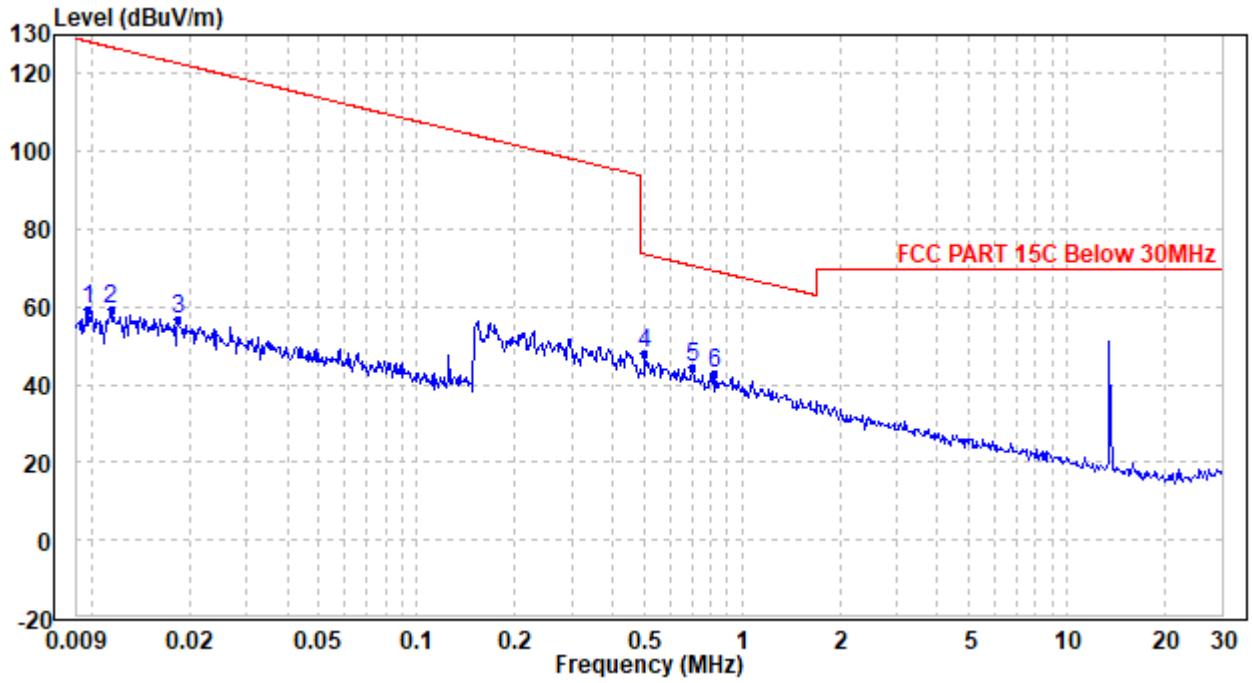
5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7) The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.(for portable and mobile devices)

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Radiated Emission Test Data (9 kHz ~ 30 MHz):

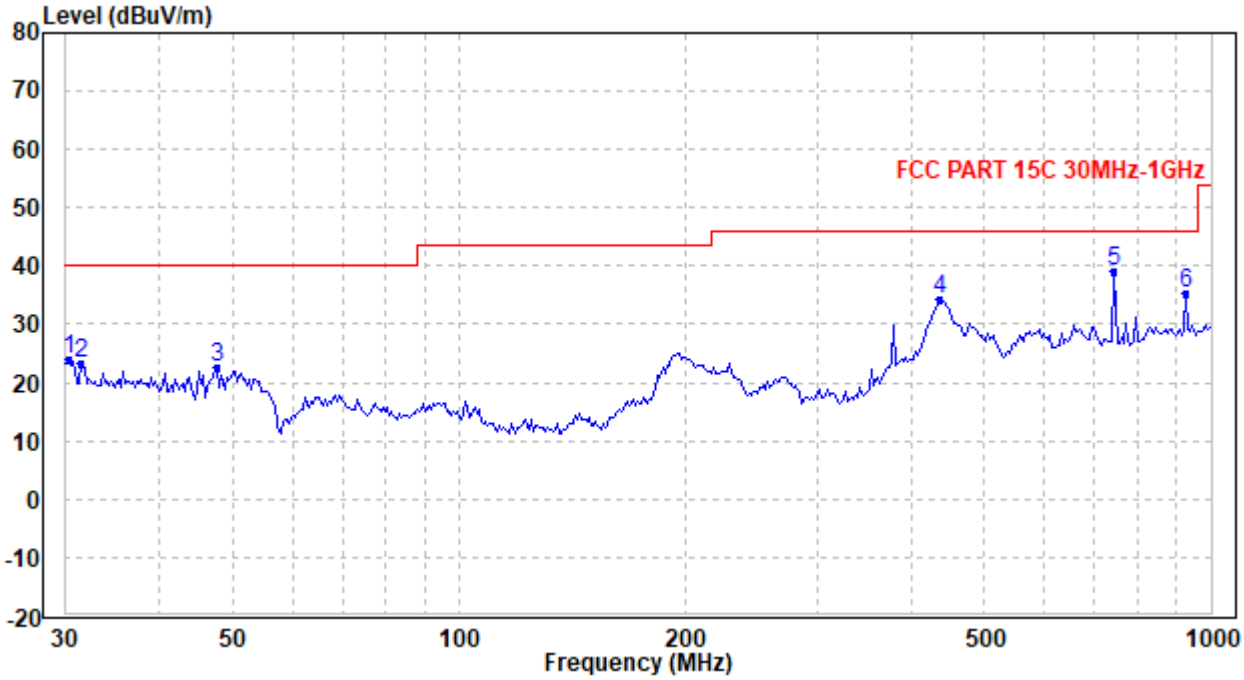
Fundamental 13.56MHz A Type



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.010	70.62	-11.31	59.31	128.35	-69.04	Peak
2	0.011	71.06	-11.71	59.35	126.87	-67.52	Peak
3	0.018	70.41	-13.62	56.79	122.74	-65.95	Peak
4	0.503	66.18	-18.39	47.79	73.57	-25.78	Peak
5	0.707	62.58	-18.39	44.19	70.63	-26.44	Peak
6	0.820	61.30	-18.38	42.92	69.34	-26.42	Peak
7	0.010	70.62	-11.31	59.31	128.35	-69.04	Peak

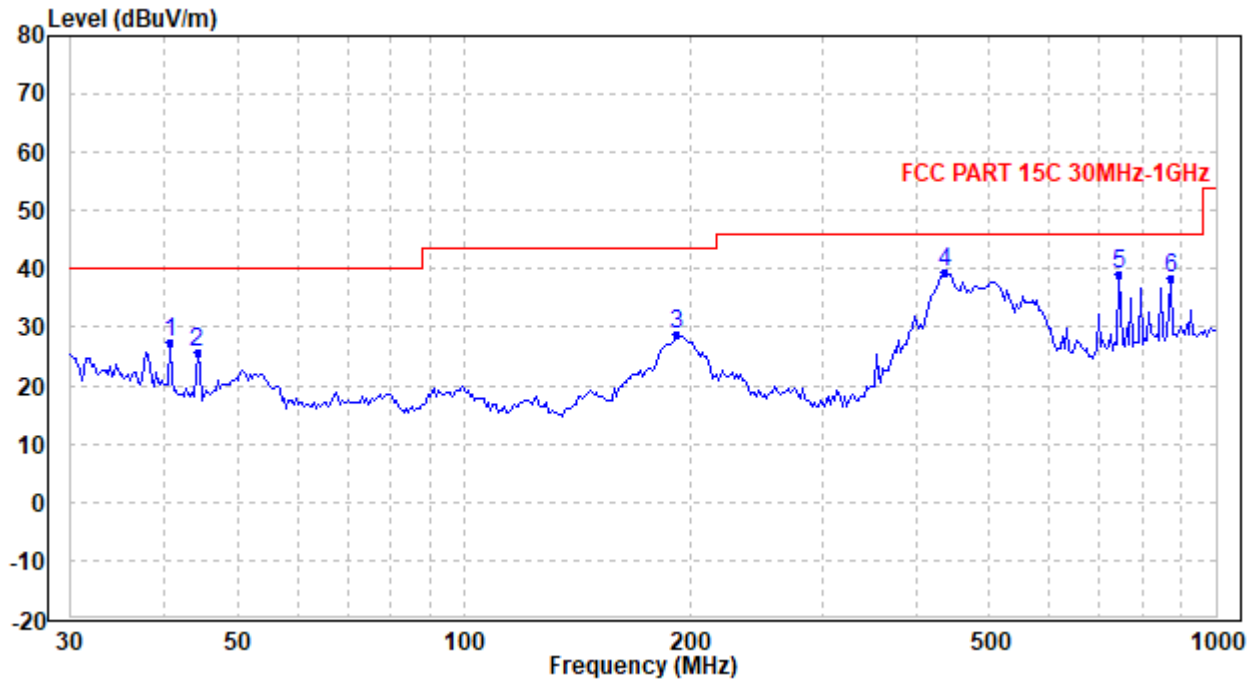
Radiated Emission Test Data (30 MHz ~ 1 GHz):

Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	30.212	28.59	-4.69	23.90	40.00	-16.10	Peak
2	31.513	29.66	-6.29	23.37	40.00	-16.63	Peak
3	47.703	35.94	-13.37	22.57	40.00	-17.43	Peak
4	436.396	38.19	-4.05	34.14	46.00	-11.86	Peak
5	744.427	37.14	1.87	39.01	46.00	-6.99	Peak
6	925.613	30.80	4.67	35.47	46.00	-10.53	Peak

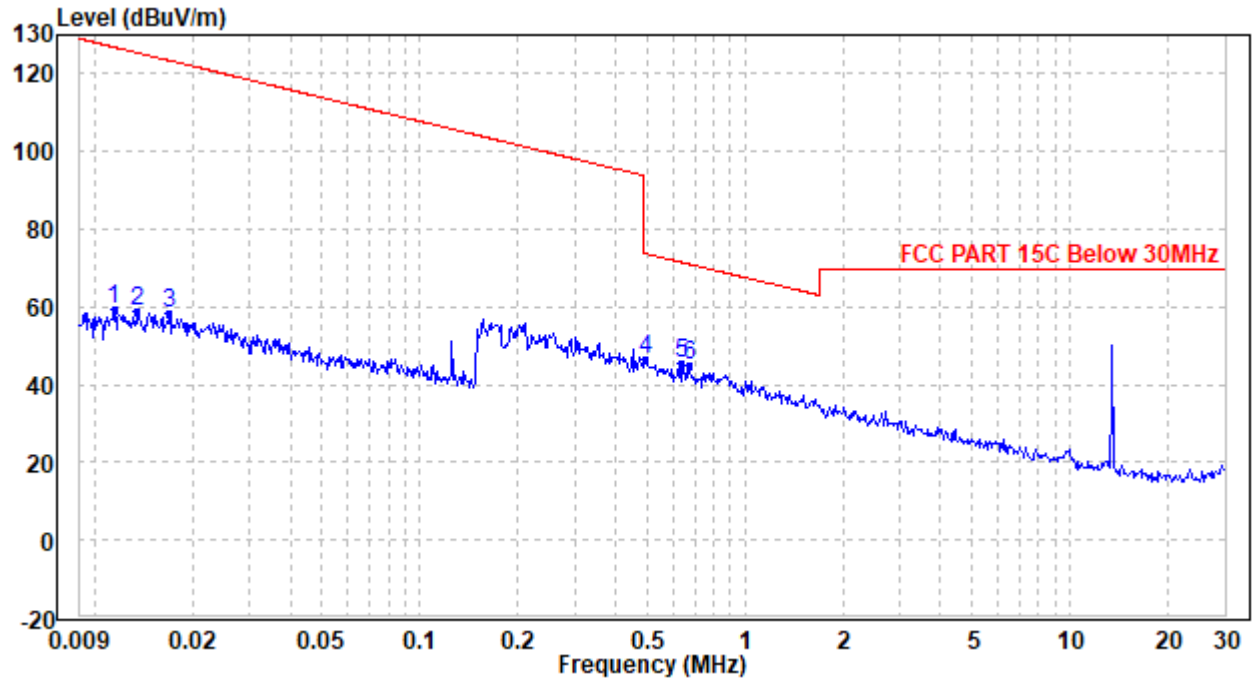
Vertical



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	40.584	36.97	-9.41	27.56	40.00	-12.44	Peak
2	44.154	38.38	-12.63	25.75	40.00	-14.25	Peak
3	191.784	40.46	-11.81	28.65	43.50	-14.85	Peak
4	436.396	43.35	-4.05	39.30	46.00	-6.70	Peak
5	744.427	37.32	1.87	39.19	46.00	-6.81	Peak
6	868.886	34.36	4.07	38.43	46.00	-7.57	Peak

Radiated Emission Test Data (9 kHz ~ 30 MHz):

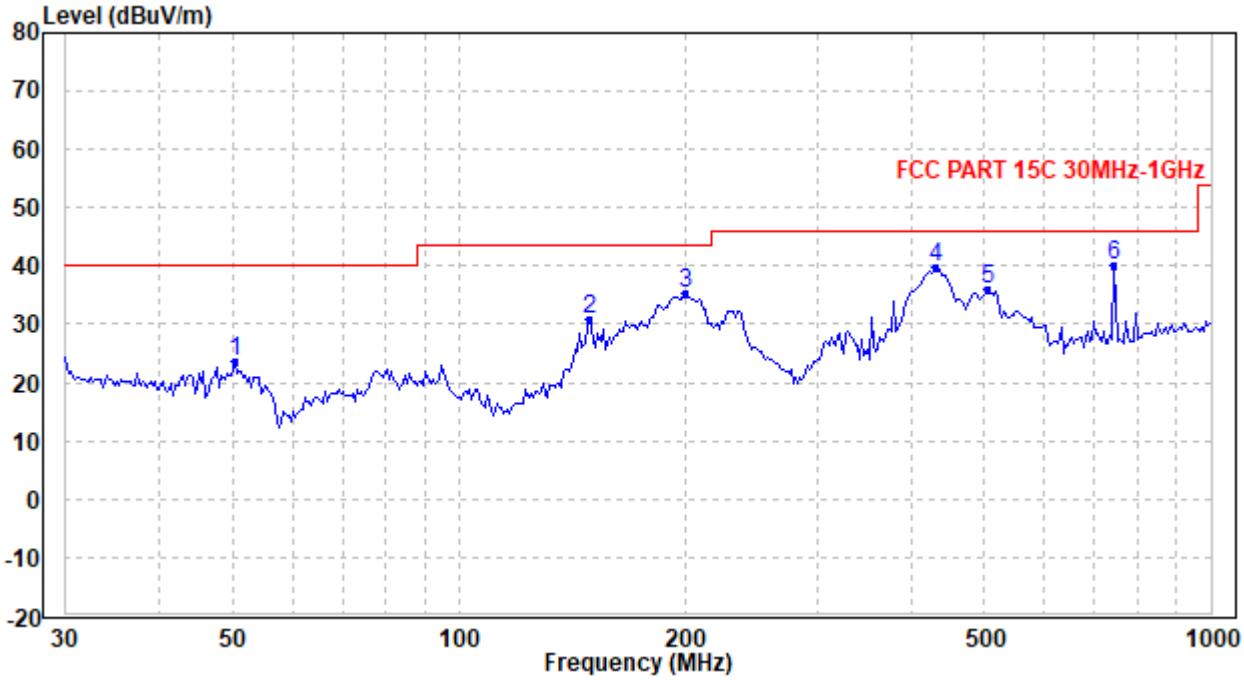
Fundamental 13.56MHz F Type



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.011	71.03	-11.71	59.32	126.87	-67.55	Peak
2	0.014	70.97	-12.31	58.66	125.38	-66.72	Peak
3	0.017	71.48	-13.26	58.22	123.39	-65.17	Peak
4	0.498	64.74	-18.39	46.35	73.66	-27.31	Peak
5	0.642	63.68	-18.39	45.29	71.45	-26.16	Peak
6	0.677	63.37	-18.39	44.98	70.99	-26.01	Peak
7	0.011	71.03	-11.71	59.32	126.87	-67.55	Peak

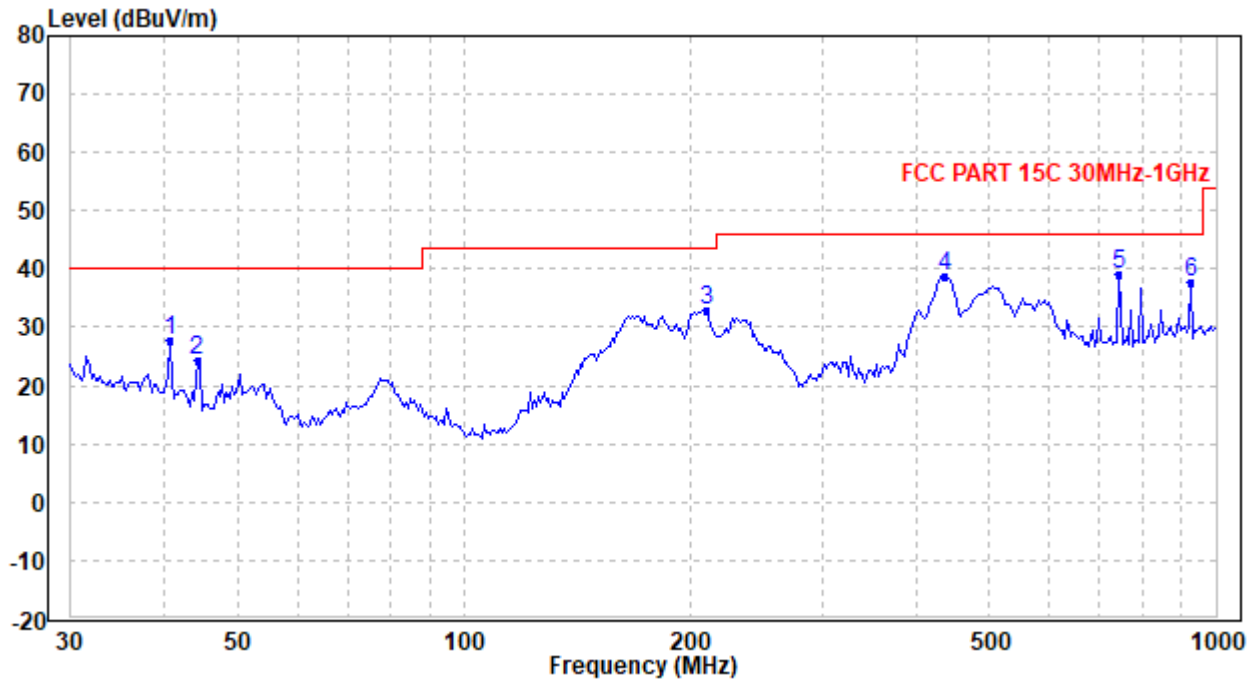
Radiated Emission Test Data (30 MHz ~ 1 GHz):

Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	50.461	37.48	-13.99	23.49	40.00	-16.51	Peak
2	148.917	45.58	-14.71	30.87	43.50	-12.63	Peak
3	200.043	46.52	-11.17	35.35	43.50	-8.15	Peak
4	430.305	43.74	-4.00	39.74	46.00	-6.26	Peak
5	505.789	38.53	-2.47	36.06	46.00	-9.94	Peak
6	744.427	38.23	1.87	40.10	46.00	-5.90	Peak

Vertical

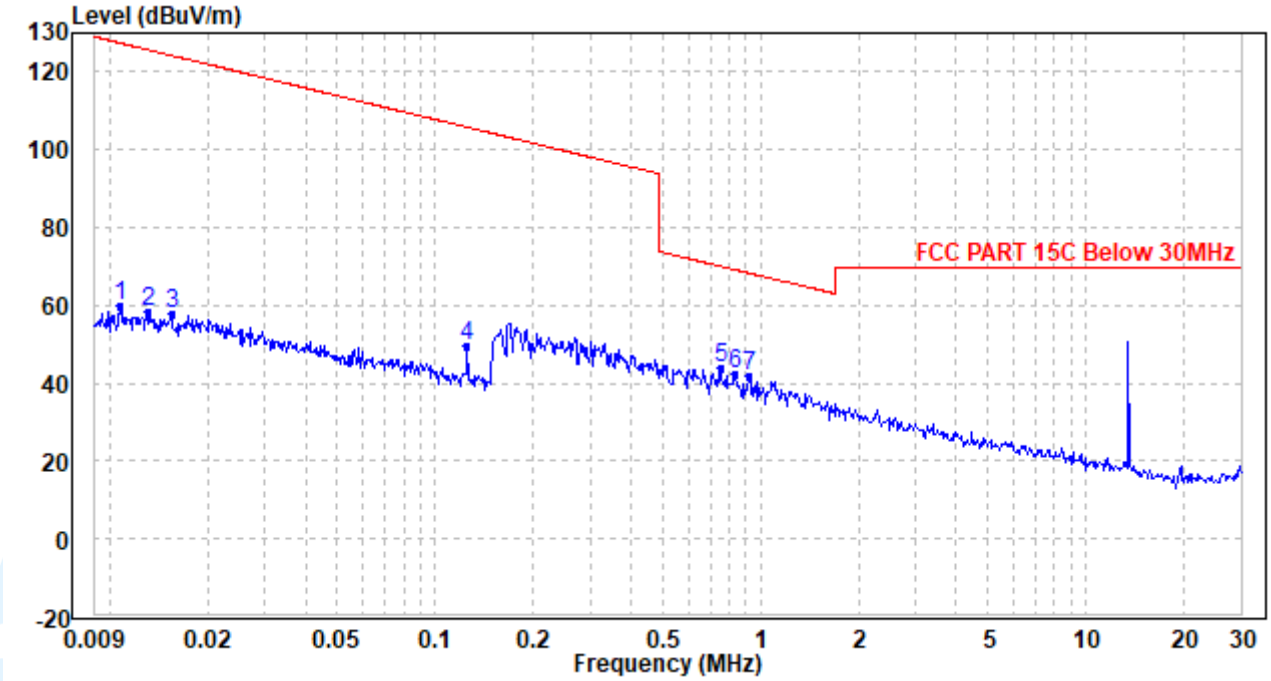


No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	40.584	37.30	-9.41	27.89	40.00	-12.11	Peak
2	44.154	36.95	-12.63	24.32	40.00	-15.68	Peak
3	210.129	43.85	-11.06	32.79	43.50	-10.71	Peak
4	436.396	42.94	-4.05	38.89	46.00	-7.11	Peak
5	744.427	37.40	1.87	39.27	46.00	-6.73	Peak
6	925.613	33.11	4.67	37.78	46.00	-8.22	Peak

Radiated Emission Test Data (9 kHz ~ 30 MHz):

Fundamental 125kHz

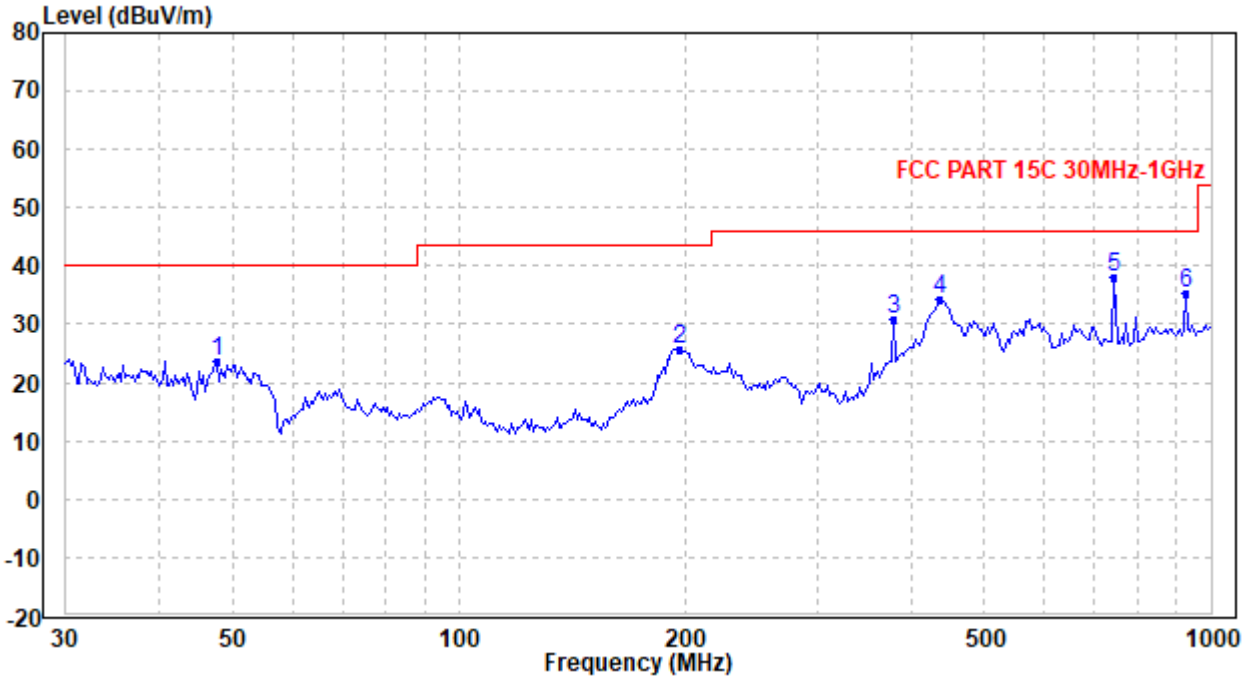
Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.011	71.18	-11.52	59.66	127.41	-67.75	Peak
2	0.013	70.44	-12.18	58.26	125.67	-67.41	Peak
3	0.015	70.61	-12.82	57.79	124.23	-66.44	Peak
4	0.125	67.74	-18.17	49.57	105.81	-56.24	Peak
5	0.753	62.16	-18.39	43.77	70.07	-26.30	Peak
6	0.838	60.72	-18.38	42.34	69.15	-26.81	Peak
7	0.922	60.10	-18.36	41.74	68.33	-26.59	Peak

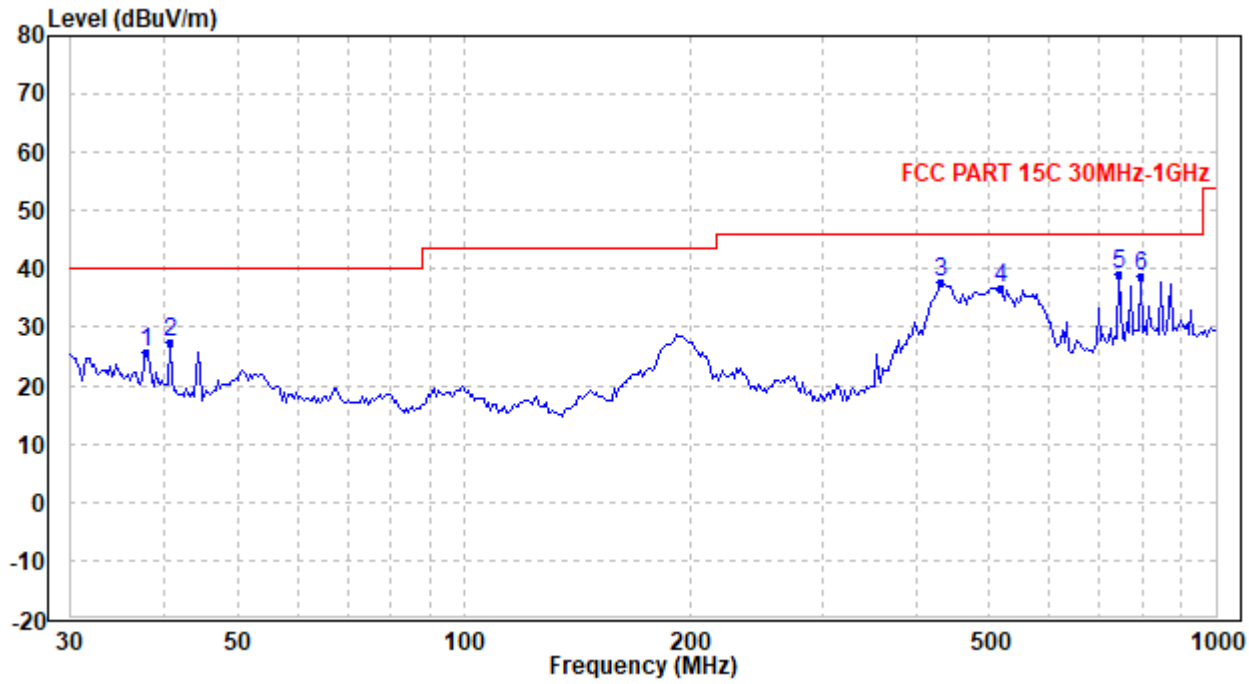
Radiated Emission Test Data (30 MHz ~ 1 GHz):

Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	47.703	36.94	-13.37	23.57	40.00	-16.43	Peak
2	195.870	37.32	-11.46	25.86	43.50	-17.64	Peak
3	379.178	36.60	-5.83	30.77	46.00	-15.23	Peak
4	436.396	38.19	-4.05	34.14	46.00	-11.86	Peak
5	744.427	36.14	1.87	38.01	46.00	-7.99	Peak
6	925.613	30.80	4.67	35.47	46.00	-10.53	Peak

Vertical



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	37.830	33.04	-7.43	25.61	40.00	-14.39	Peak
2	40.584	36.97	-9.41	27.56	40.00	-12.44	Peak
3	430.305	41.69	-4.00	37.69	46.00	-8.31	Peak
4	516.565	39.03	-2.22	36.81	46.00	-9.19	Peak
5	744.427	37.32	1.87	39.19	46.00	-6.81	Peak
6	793.028	36.19	2.65	38.84	46.00	-7.16	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

5.5 FUNDAMENTAL FIELD STRENGTH AND EMISSION MASK 13.110 MHZ TO 14.010 MHZ

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.227(a) (b) (c) /15.205

Test Method: ANSI C63.10

Limits:

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For Below 30MHz, the measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

Field strength limit for 13.56MHz	=	15848 μV/m	at 30m
	=	84 dBμV/m	at 30m
	=	84 dBμV/m + 40log(30/3) dB	at 3m
	=	124 dBμV/m	at 3m

Test Setup: Refer to section 4.5.1 for details.

Test Procedures:

As the radiation test, set the RBW=10kHz VBW=30kHz, observed the outside band of 13.110 MHz to 14.010 MHz, than mark the higher-level emission for comparing with the FCC rules.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

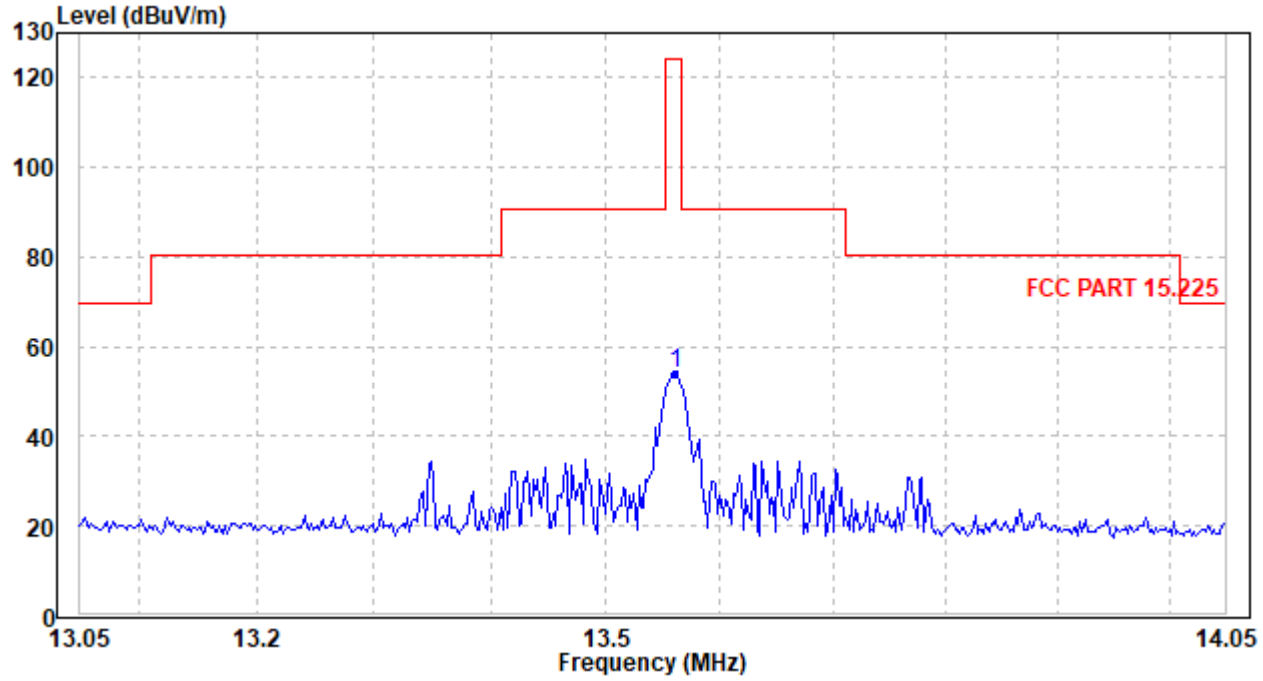
Maximum Field Strength:

Fundamental frequency (MHz)	Detector	Result at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
13.56 A Type	Peak	54.23	124	69.77
13.56 F Type	Peak	51.43	124	72.57

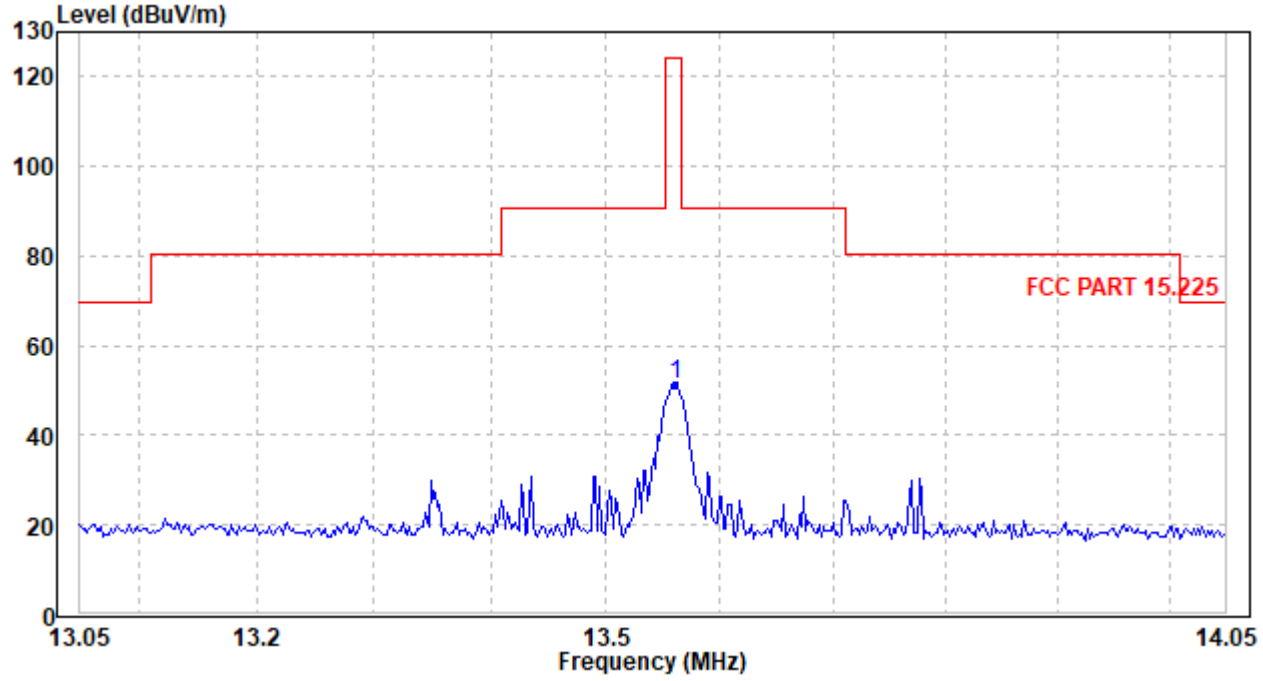
Emission Mask:

The worst-case test plots as below.

A Type



F Type



5.6 FREQUENCY TOLERANCE

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.225(e)

Test Method: ANSI C63.10-2013

Limits:

The frequency tolerance of the carrier signal shall be maintained within ±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.

Test Setup: Refer to section 4.5.3 for details.

Test Procedures:

1) The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2) Turn the EUT on and couple its output to a spectrum analyzer.
3) Turn the EUT off and set the chamber to the highest temperature specified.
4) Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5) Repeat step c) and d) with the temperature chamber set to the lowest temperature.
6) The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

Frequency Tolerance VS Temperature and Voltage Fundamental 13.56MHz A Type									
Temp.(°C)	**Voltage**	**Test time (minutes)**							
		0	**2**	**5**	**10**	**0**	**2**	**5**	**10**
		Measured Frequency (MHz)				**Frequency Drift (%)**			
50	VN	13.55934	13.55971	13.55968	13.55954	-0.0049	-0.0021	-0.0024	-0.0034
40	VN	13.55956	13.55969	13.55965	13.55969	-0.0032	-0.0023	-0.0026	-0.0023
30	VN	13.55911	13.55973	13.55974	13.55975	-0.0066	-0.0020	-0.0019	-0.0018
20	VN	13.55969	13.55963	13.55969	13.55966	-0.0023	-0.0027	-0.0023	-0.0025
	VL	13.55973	13.55966	13.55966	13.55969	-0.0020	-0.0025	-0.0025	-0.0023
	VH	13.55968	13.55964	13.55968	13.55971	-0.0024	-0.0027	-0.0024	-0.0021
10	VN	13.55968	13.55973	13.55968	13.55969	-0.0024	-0.0020	-0.0024	-0.0023
0	VN	13.55972	13.55975	13.55934	13.55968	-0.0021	-0.0018	-0.0049	-0.0024
-10	VN	13.55969	13.55969	13.55969	13.55977	-0.0023	-0.0023	-0.0023	-0.0017
-20	VN	13.55973	13.55971	13.55973	13.55972	-0.0020	-0.0021	-0.0020	-0.0021
Limit: ±0.01 %									

Frequency Tolerance VS Temperature and Voltage Fundamental 13.56MHz F Type									
Temp.(°C)	Voltage	Test time (minutes)							
		0	2	5	10	0	2	5	10
		Measured Frequency (MHz)				Frequency Drift (%)			
50	VN	13.55965	13.55971	13.55932	13.55986	-0.0026	-0.0021	-0.0050	-0.0010
40	VN	13.55956	13.55959	13.55965	13.55965	-0.0032	-0.0030	-0.0026	-0.0026
30	VN	13.55969	13.55942	13.55956	13.55974	-0.0023	-0.0043	-0.0032	-0.0019
20	VN	13.55945	13.55975	13.55943	13.55989	-0.0041	-0.0018	-0.0042	-0.0008
	VL	13.55973	13.55956	13.55966	13.55969	-0.0020	-0.0032	-0.0025	-0.0023
	VH	13.55956	13.55956	13.55969	13.55971	-0.0032	-0.0032	-0.0023	-0.0021
10	VN	13.55974	13.55988	13.55971	13.55969	-0.0019	-0.0009	-0.0021	-0.0023
0	VN	13.55969	13.55975	13.55986	13.55896	-0.0023	-0.0018	-0.0010	-0.0077
-10	VN	13.55969	13.55969	13.55969	13.55977	-0.0023	-0.0023	-0.0023	-0.0017
-20	VN	13.55973	13.55971	13.55973	13.55972	-0.0020	-0.0021	-0.0020	-0.0021
Limit: ±0.01 %									

5.7 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.207

Test Method: ANSI C63.10-2013 Section 6.2

Limits:

Frequency range (MHz)	Limits (dB(μV)	
	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

Remark:

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 to 0.50 MHz.

Test Setup: Refer to section 4.5.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

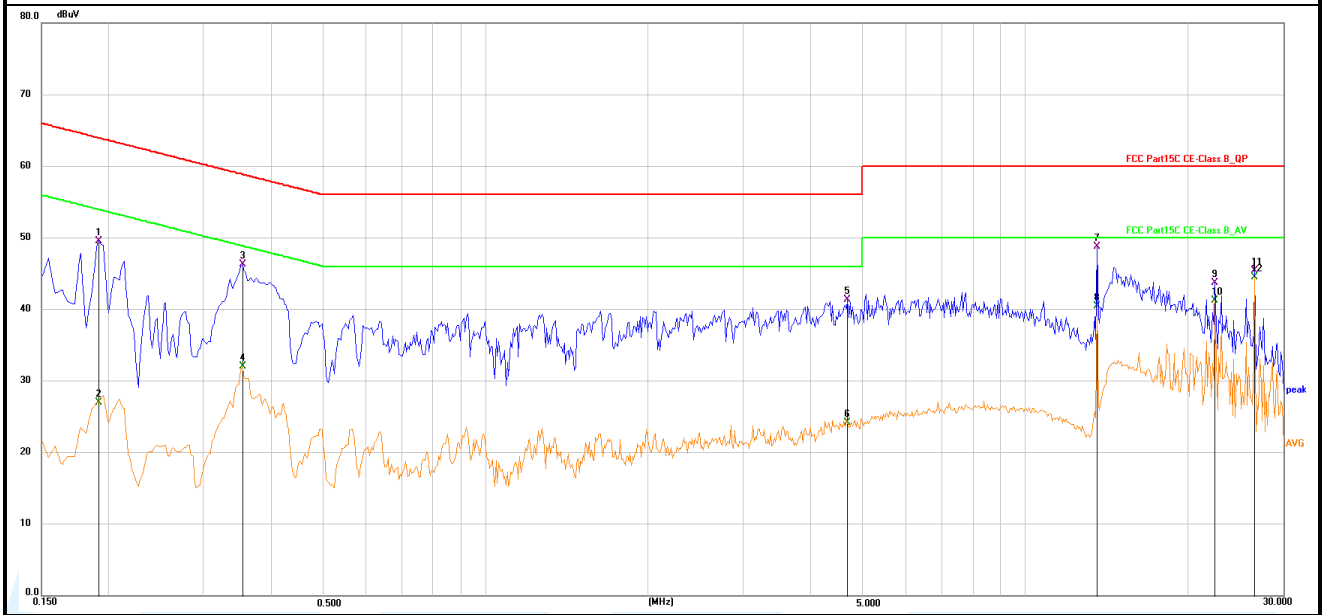
7) The mains terminal disturbance voltage test was conducted in a shielded room.
8) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
9) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
10) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
11) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

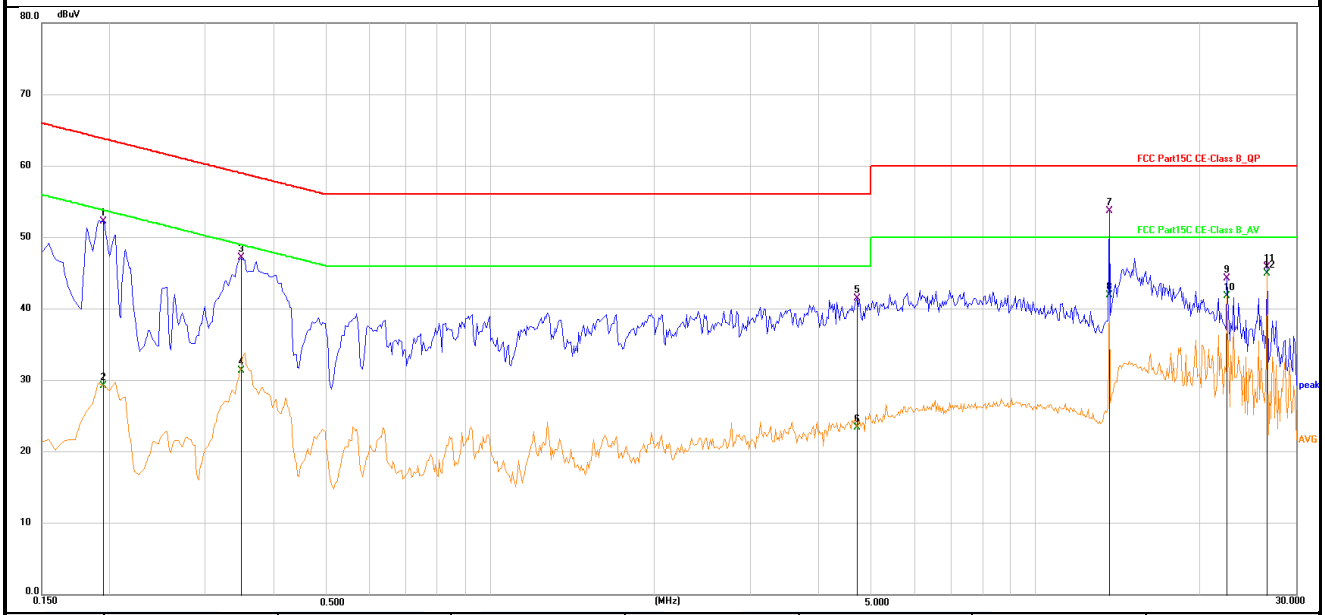
The worst measurement data as follows:
Quasi Peak and Average:
Mode: Fundamental 13.56MHz A Type

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor(dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1905	39.69	9.80	49.49	64.01	-14.52	QP
2	0.1905	17.24	9.80	27.04	54.01	-26.97	AVG
3	0.3524	36.46	9.77	46.23	58.91	-12.68	QP
4	0.3524	22.29	9.77	32.06	48.91	-16.85	AVG
5	4.6860	31.62	9.75	41.37	56.00	-14.63	QP
6	4.6860	14.41	9.75	24.16	46.00	-21.84	AVG
7	13.5600	39.01	9.77	48.78	60.00	-11.22	QP
8	13.5600	30.69	9.77	40.46	50.00	-9.54	AVG
9	22.5285	33.80	9.91	43.71	60.00	-16.29	QP
10	22.5285	31.29	9.91	41.20	50.00	-8.80	AVG
11	26.6234	35.49	9.89	45.38	60.00	-14.62	QP
12	26.6234	34.59	9.89	44.48	50.00	-5.52	AVG

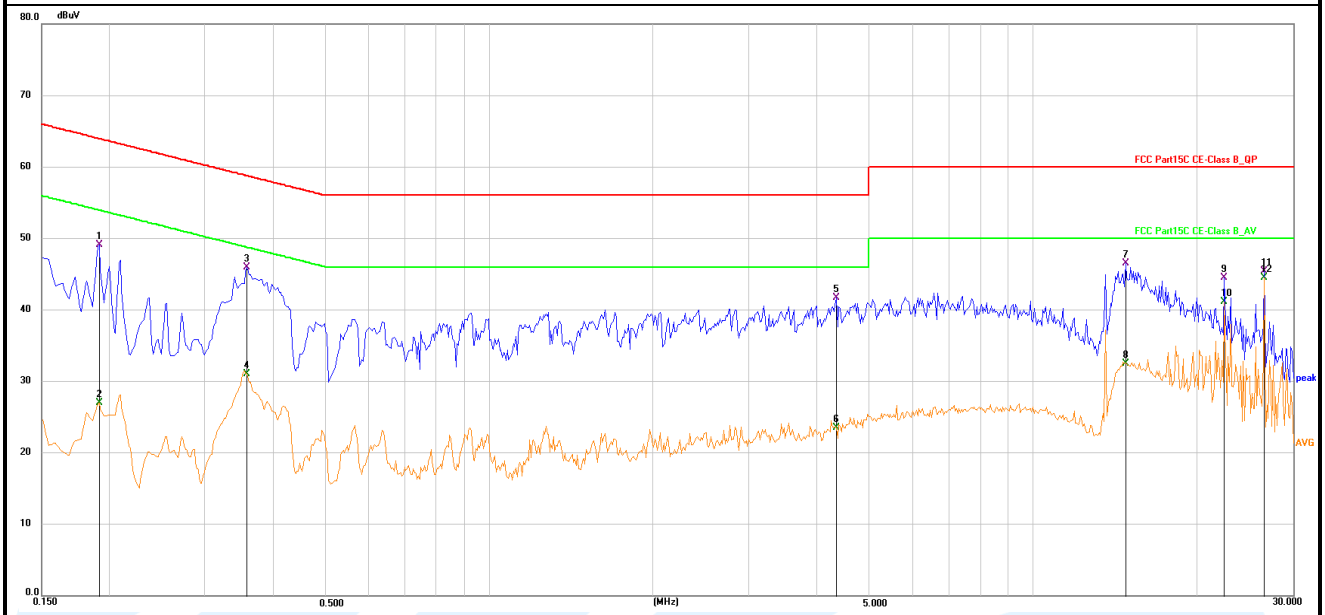
Neutral Line



No.	Frequency (MHz)	Reading (dBµV)	Correction factor(dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1949	42.43	9.77	52.20	63.83	-11.63	QP
2	0.1949	19.48	9.77	29.25	53.83	-24.58	AVG
3	0.3480	37.39	9.75	47.14	59.01	-11.87	QP
4	0.3480	21.62	9.75	31.37	49.01	-17.64	AVG
5	4.6994	31.74	9.76	41.50	56.00	-14.50	QP
6	4.6994	13.64	9.76	23.40	46.00	-22.60	AVG
7	13.5600	44.00	9.74	53.74	60.00	-6.26	QP
8	13.5600	32.17	9.74	41.91	50.00	-8.09	AVG
9	22.5285	34.42	9.88	44.30	60.00	-15.70	QP
10	22.5285	31.88	9.88	41.76	50.00	-8.24	AVG
11	26.6235	35.96	9.90	45.86	60.00	-14.14	QP
12	26.6235	35.09	9.90	44.99	50.00	-5.01	AVG

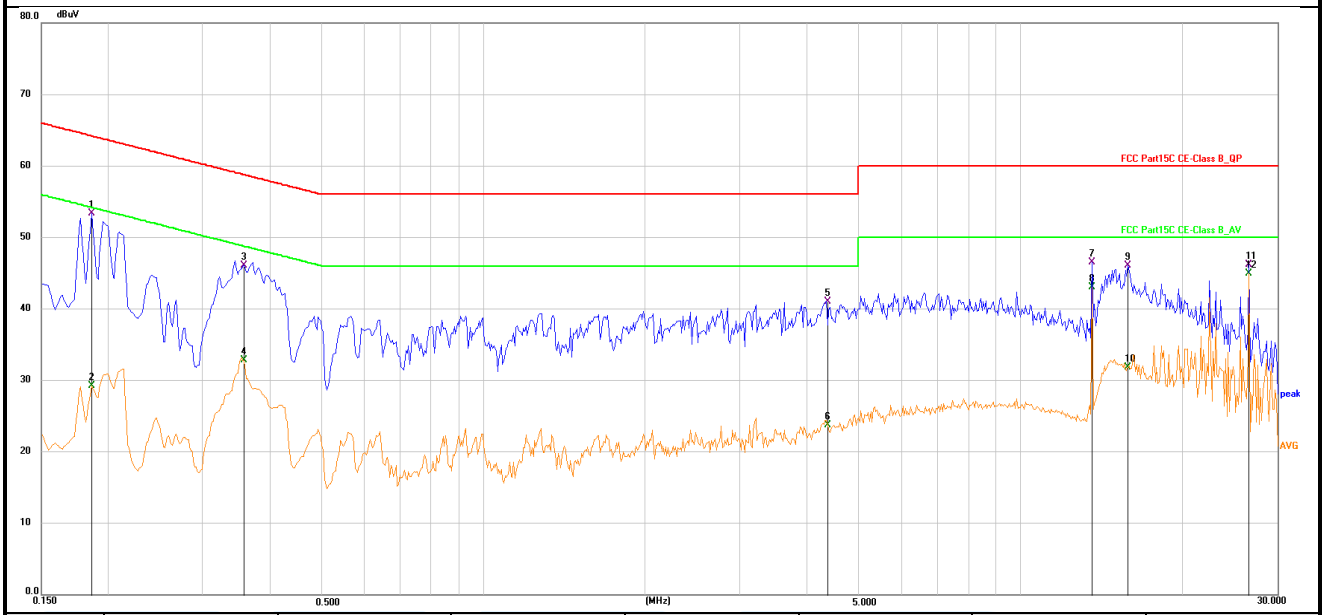
Quasi Peak and Average:
Mode: Fundamental 13.56MHz F Type

Live Line



No.	Frequency (MHz)	Reading (dBµV)	Correction factor(dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1905	39.32	9.80	49.12	64.01	-14.89	QP
2	0.1905	17.17	9.80	26.97	54.01	-27.04	AVG
3	0.3570	36.22	9.77	45.99	58.80	-12.81	QP
4	0.3570	21.29	9.77	31.06	48.80	-17.74	AVG
5	4.3395	31.91	9.75	41.66	56.00	-14.34	QP
6	4.3395	13.74	9.75	23.49	46.00	-22.51	AVG
7	14.8245	36.74	9.81	46.55	60.00	-13.45	QP
8	14.8245	22.62	9.81	32.43	50.00	-17.57	AVG
9	22.5285	34.58	9.91	44.49	60.00	-15.51	QP
10	22.5285	31.26	9.91	41.17	50.00	-8.83	AVG
11	26.6235	35.45	9.89	45.34	60.00	-14.66	QP
12	26.6235	34.58	9.89	44.47	50.00	-5.53	AVG

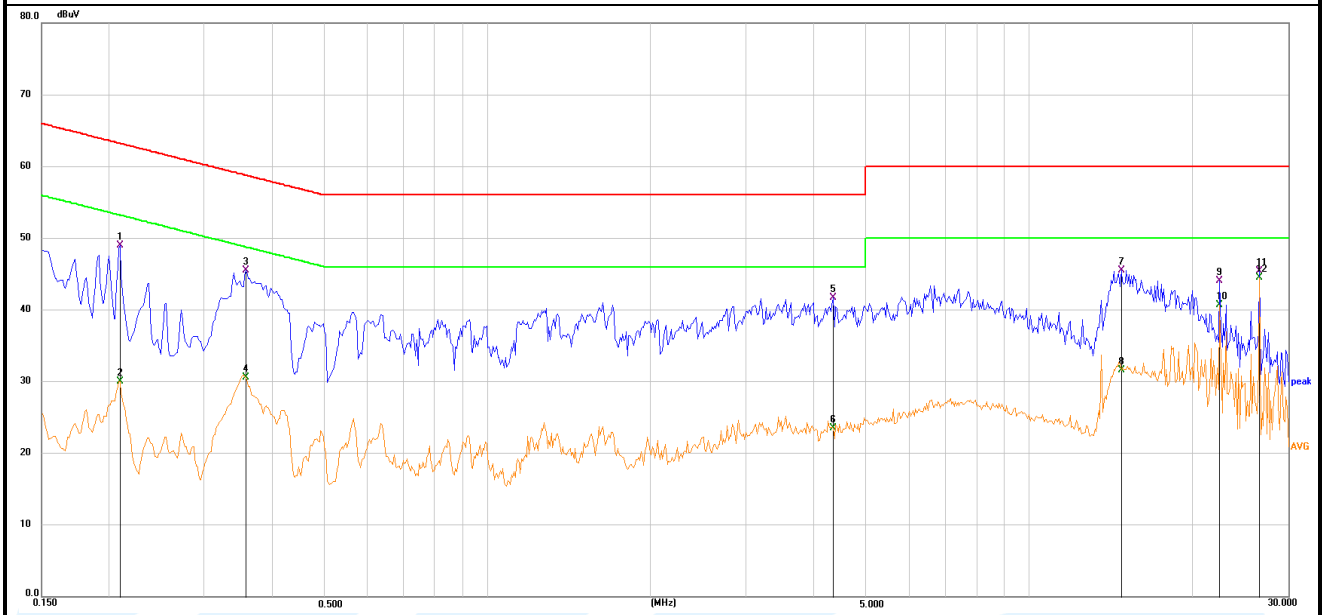
Neutral Line



No.	Frequency (MHz)	Reading (dBµV)	Correction factor(dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1860	43.57	9.77	53.34	64.21	-10.87	QP
2	0.1860	19.45	9.77	29.22	54.21	-24.99	AVG
3	0.3570	36.30	9.76	46.06	58.80	-12.74	QP
4	0.3570	23.08	9.76	32.84	48.80	-15.96	AVG
5	4.3439	31.23	9.76	40.99	56.00	-15.01	QP
6	4.3439	13.92	9.76	23.68	46.00	-22.32	AVG
7	13.5600	36.82	9.74	46.56	60.00	-13.44	QP
8	13.5600	33.26	9.74	43.00	50.00	-7.00	AVG
9	15.8280	36.23	9.78	46.01	60.00	-13.99	QP
10	15.8280	22.03	9.78	31.81	50.00	-18.19	AVG
11	26.6234	36.30	9.90	46.20	60.00	-13.80	QP
12	26.6234	35.01	9.90	44.91	50.00	-5.09	AVG

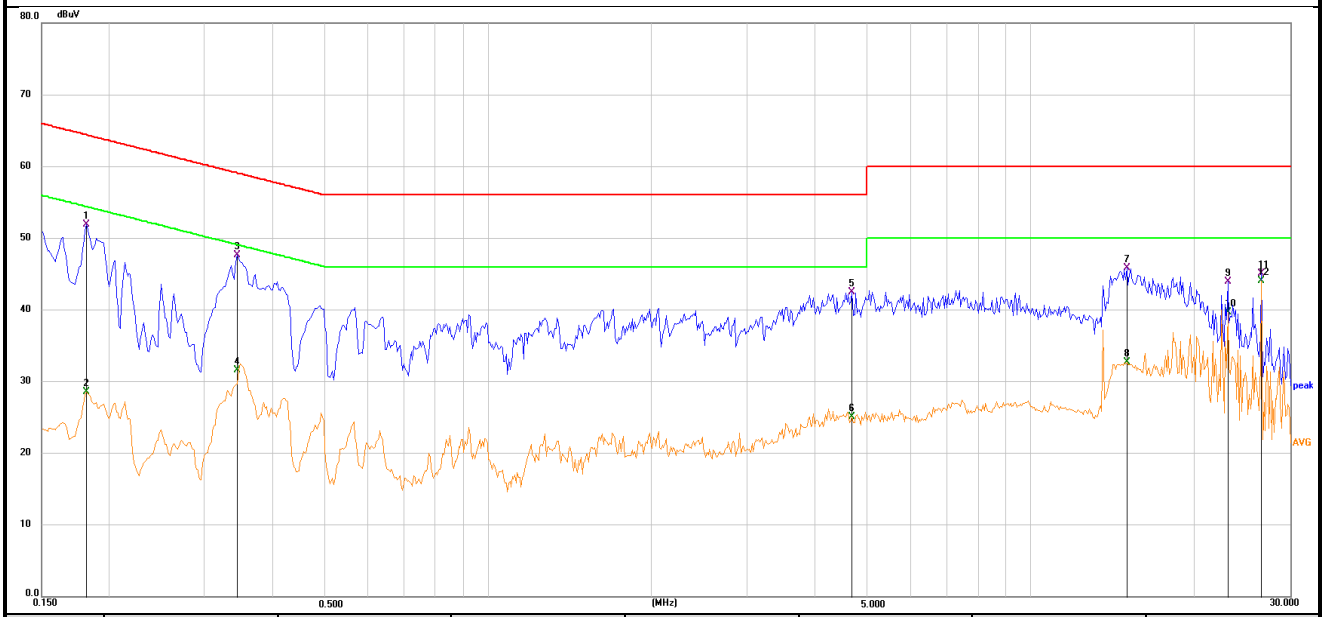
Quasi Peak and Average:
Fundamental 125kHz

Live Line



No.	Frequency (MHz)	Reading (dBµV)	Correction factor(dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.2084	39.19	9.80	48.99	63.27	-14.28	QP
2	0.2084	20.27	9.80	30.07	53.27	-23.20	AVG
3	0.3570	35.72	9.77	45.49	58.80	-13.31	QP
4	0.3570	20.79	9.77	30.56	48.80	-18.24	AVG
5	4.3395	31.91	9.75	41.66	56.00	-14.34	QP
6	4.3395	13.74	9.75	23.49	46.00	-22.51	AVG
7	14.8245	35.74	9.81	45.55	60.00	-14.45	QP
8	14.8245	21.78	9.81	31.59	50.00	-18.41	AVG
9	22.5285	34.08	9.91	43.99	60.00	-16.01	QP
10	22.5285	30.76	9.91	40.67	50.00	-9.33	AVG
11	26.6234	35.45	9.89	45.34	60.00	-14.66	QP
12	26.6234	34.58	9.89	44.47	50.00	-5.53	AVG

Neutral Line



No.	Frequency (MHz)	Reading (dBµV)	Correction factor(dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.1814	42.11	9.78	51.89	64.42	-12.53	QP
2	0.1814	18.79	9.78	28.57	54.42	-25.85	AVG
3	0.3435	37.93	9.75	47.68	59.12	-11.44	QP
4	0.3435	21.80	9.75	31.55	49.12	-17.57	AVG
5	4.6770	32.76	9.76	42.52	56.00	-13.48	QP
6	4.6770	15.28	9.76	25.04	46.00	-20.96	AVG
7	14.9910	36.05	9.77	45.82	60.00	-14.18	QP
8	14.9910	22.93	9.77	32.70	50.00	-17.30	AVG
9	23.1270	34.01	9.88	43.89	60.00	-16.11	QP
10	23.1270	29.74	9.88	39.62	50.00	-10.38	AVG
11	26.6234	35.16	9.90	45.06	60.00	-14.94	QP
12	26.6234	34.10	9.90	44.00	50.00	-6.00	AVG

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.