Prüfbericht - Nr.: *Test Report No.:*	**ULR-TC568819300000007F**		**Seite 1 von 21** *Page 1 of 21*
Auftraggeber: *Client:*	**OTIS Elevator Company,** **5 Farm Springs RD, Farmington,** **CT 06032**		
Gegenstand der Prüfung: *Test item:*	**Floor ID sensor**		
Bezeichnung: *Identification:*	**AAA27800AA**	**Serien-Nr.:** *Serial No.*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**1803357730**	**Eingangsdatum:** *Date of receipt:*	**03-12-2018**
Prüfort: *Testing location:*	**Refer Page 5 of 21 for Test site details**		
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C - 15.225 &** **ANSI C63.10-2013**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test items passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	TÜV Rheinland (India) Pvt. Ltd. 27/B, 2nd Cross, Electronic City , Phase 1 Bangalore – 560 100, **FCC Test Site Registration no.: 496599**		

geprüft / *tested by:*			**kontrolliert** / *reviewed by:*		
20.12.2019	Srinivasa B R Engineer	Srinivas	23.12.2019	Raghavendra Katti Assistant Manager	Raghu.k
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges /*Other Aspects:* **FCC ID:2ASTI-27800AA**

Abkürzungen:	***P(ass)*** = ***entspricht Prüfgrundlage***		***Abbreviations:***	***P(ass)*** = ***passed***	
	F(ail) = ***entspricht nicht Prüfgrundlage***			***F(ail)*** = ***failed***	
	N/A = ***nicht anwendbar***			***N/A*** = ***not applicable***	
	N/T = ***nicht getestet***			***N/T*** = ***not tested***	

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

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TEST SUMMARY

Test Item	FCC Clause	Result
Frequency tolerance	FCC part 15 Subpart C Section 15.225 (e)	Pass
Radiated Spurious Emission & Field Strength Measurement within the band 13.110-14.010 MHz	FCC part 15 Subpart C Section 15.225 (a,b,c,d) / (15.209)	Pass
Conducted Emissions on A.C. Power Lines	15.207	Pass

Product Category: Electronics Testing
Test Discipline: EMC Test Facility

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1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report. This applies especially to the following items.

1. **Test Setup Photo**
2. **EUT External Photo**
3. **EUT Internal Photo**
4. **FCC Label and Label Location**
5. **Block Diagram**
6. **Specification of EUT**
7. **Schematic Diagrams**
8. **Bill of Material**
9. **User Manual**
10. **Maximum permissible exposure**

2 TEST SITES

2.1 Testing Facilities

TÜV Rheinland (India) Pvt.Ltd.,
27/B, 2nd Cross,
Electronic City , Phase 1
Bangalore – 560 100,

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment Name	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Used for Test Items
Environmental Chamber	Envisys	EM80-40H	ET/022/14-15	-	21-05-2020	Yearly	Antenna – Port Measurements
Signal Analyser	Rohde & Schwarz	FSV7	101644	FW 3.40	29-12-2019	Yearly	Antenna - Port Measurements
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	4.43 SP3	11-10-2020	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	15-01-2020	Yearly	
Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	9124-656	-	16-01-2020	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	-	16-01-2020	Yearly	
10m Semi Anechoic Chamber	Frankonia	-	-	-	-	-	

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

The floor ID sensor is used to identify the floor number as the elevator car is stopped at a landing. The floor ID sensor consists of an RFID reader that reads unique RFID tags that are installed at each landing. Floor Id sensor get connected to data acquisition device and collect data periodically.

3.2 Ratings and System Details

Table 2: Ratings and System Details as declared by the client.

Operating Frequency	13.56 MHz
No. of Channel	Single Channel
Radio Protocol	Short-range devices
Transmitted power (declared)	17 dBm
Supporting data rates	26.48 Kbit/s (fc/512)
Modulation	Amplitude shift keying(ASK)
Number of antennas	1 per module
Antenna Gain & Type	-64.31dBi & PCB printed antenna
Supply Voltage to Product	5V
Environmental conditions	-10°C to +70°C
Dimensions	131 x 100 x18.5 mm

Disclaimer:

The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results

3.3 Measurement Uncertainty:

Table 3: Measurement Uncertainty

Parameter	Uncertainty
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 ℃
Supply Voltages	±3 %
RF Frequency	$\pm 1 \times 10^{-7}$Hz
Frequency deviation limitation	±5 %

Note: The test results reported in this test report are exclusive of maximum uncertainity value, and are not used to determine pass fail criteria. Above table gives maximum uncertainity value with 95% confidence level.

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

- Continuous transmission was enabled upon power up of EUT.

4.2 Test Operation and Test Software

- No software involved in the Floor ID sensor, Data Acquisition system controls the Floor ID sensor

4.3 Special Accessories and Auxiliary Equipment

- Data acquisition system and laptop is used as accessories.

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Test modes – data rates and modulations

- For Radiated spurious emissions, tests were performed for the data rate (26.48 Kbit/s) and results are reported in this report.

5 TEST METHODOLOGY

5.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360˚ for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

5.1.1 Test Setup Configuration

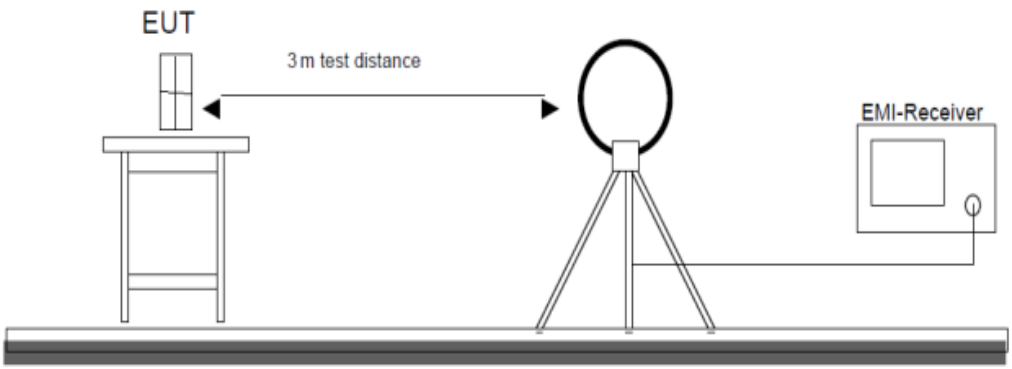


Figure 1: Frequency Range 9 kHz- 30 MHz

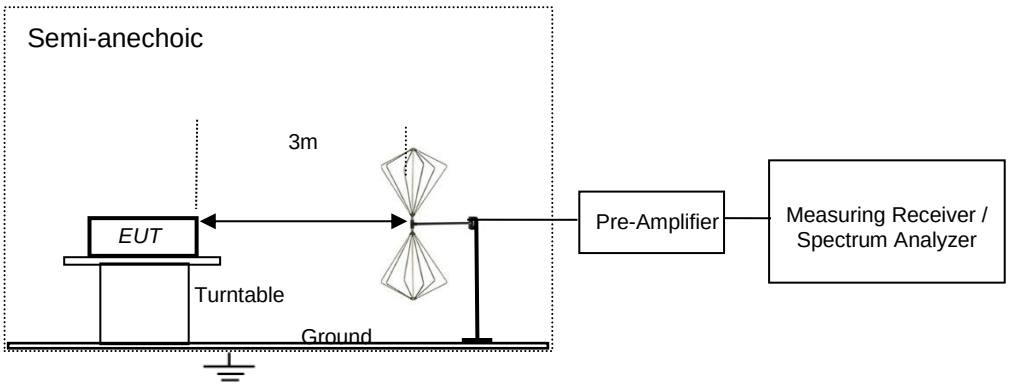


Figure 2: Frequency Range 30 MHz – 200 MHz

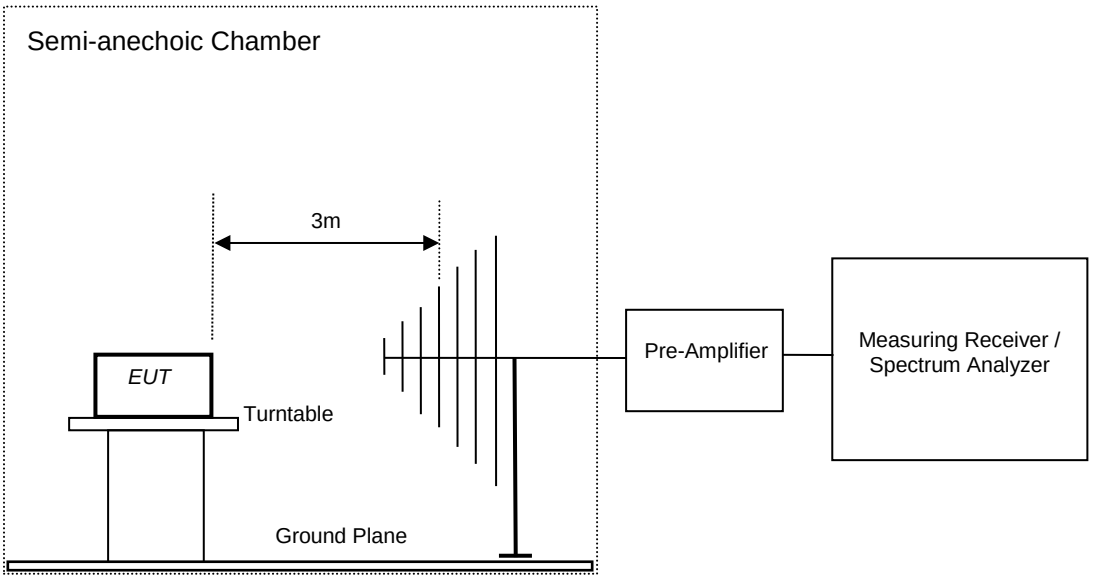


Figure 3: Frequency Range 200 MHz - 1GHz

6 TEST RESULTS

6.1 Frequency tolerance

Result ***Pass***

Test Specification	FCC part 15 Subpart C 15.225 (e)
Measurement Bandwidth	30Hz
Detector	Peak
Requirement	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

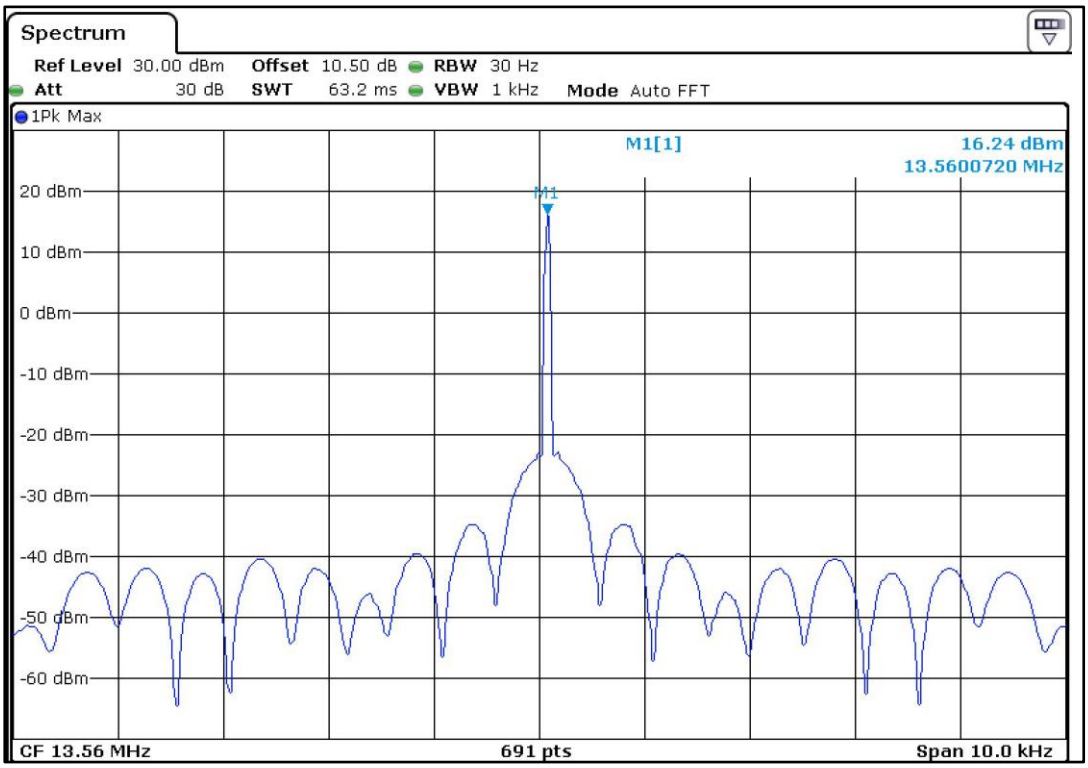
Test Conditions:

Note: EUT was powered up by data acquisition unit and there was no provision for voltage variation to the EUT. hence testing was done at constant 5VDC from data acquisition unit.

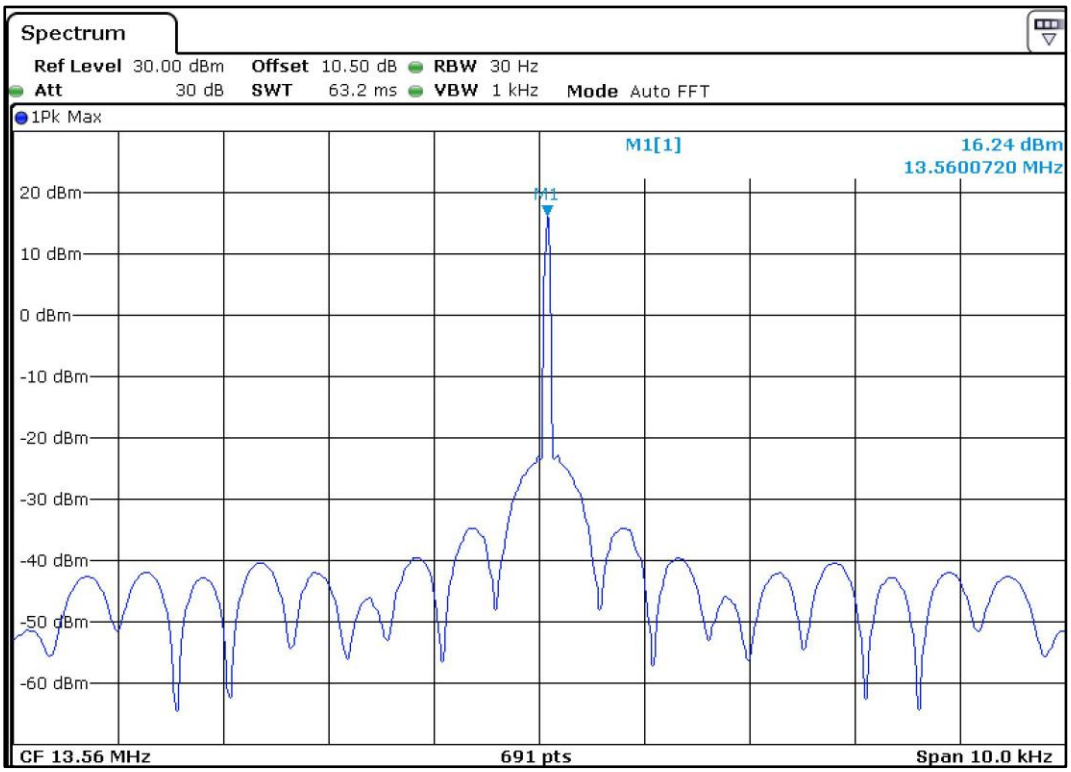
Test results:

Table 4: Frequency tolerance test results

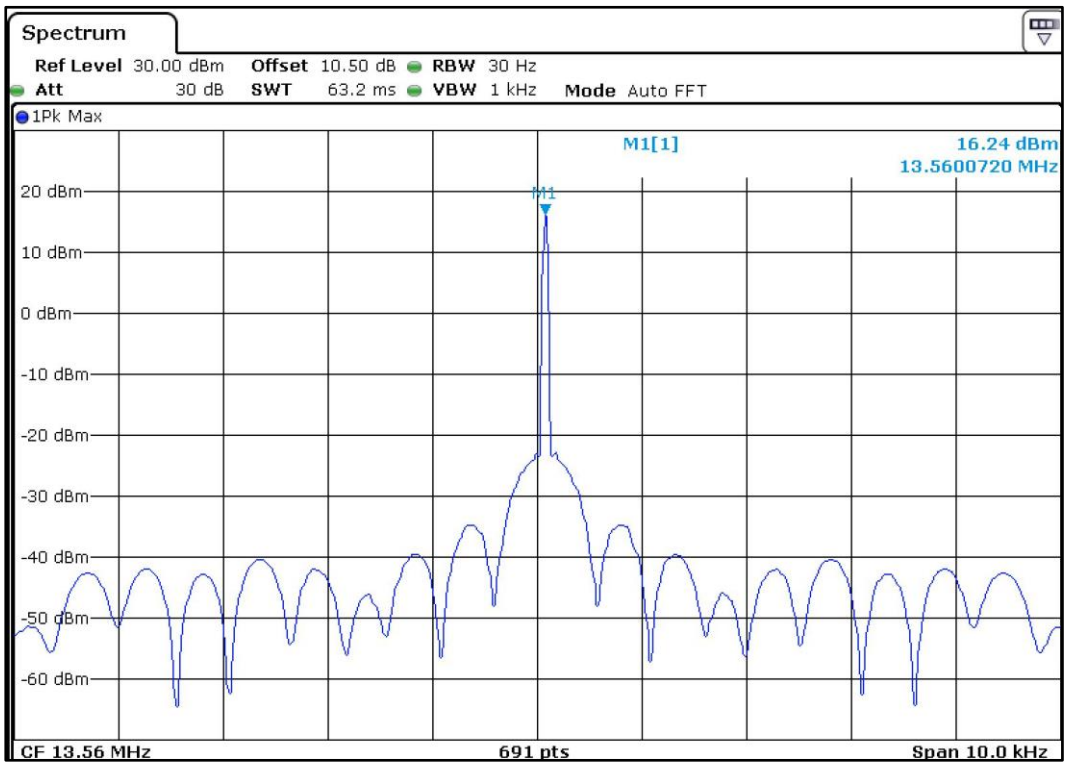
Temperature (ºC)	Centre frequency (Hz)	Measured frequency (Hz)	Deviation (Hz)	Result
-20	13560000	13560072	-72	Pass
-10	13560000	13560072	-72	Pass
0	13560000	13560072	-72	Pass
10	13560000	13560043	-43	Pass
20	13560000	13560029	-29	Pass
30	13560000	13559971	29	Pass
40	13560000	13559986	14	Pass
50	13560000	13559971	29	Pass



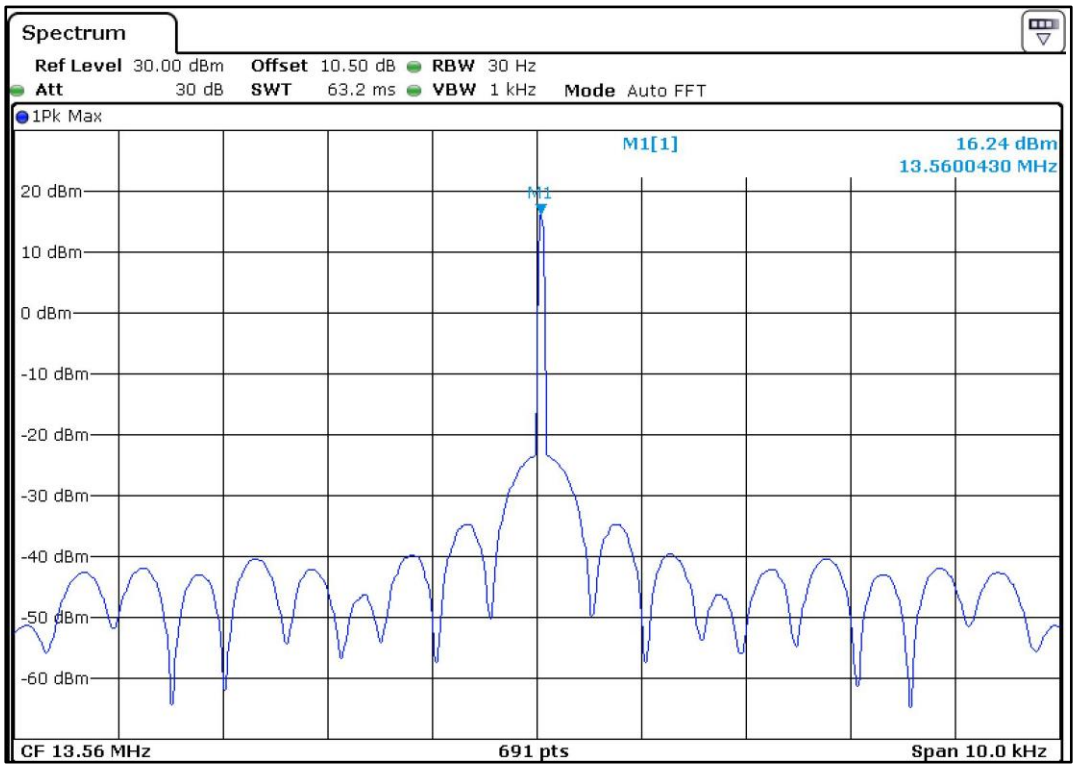
Test plot 1: Frequency tolerance **Temperature:-20° C**



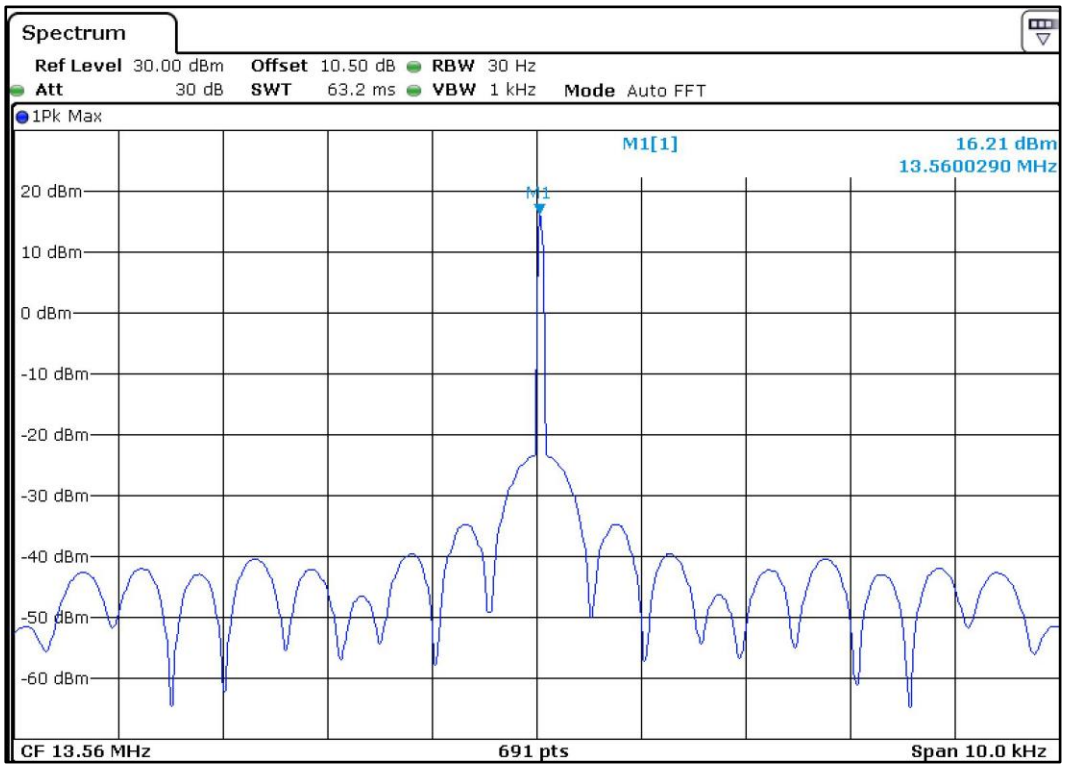
Test plot 2: Frequency tolerance **Temperature:-10°C**



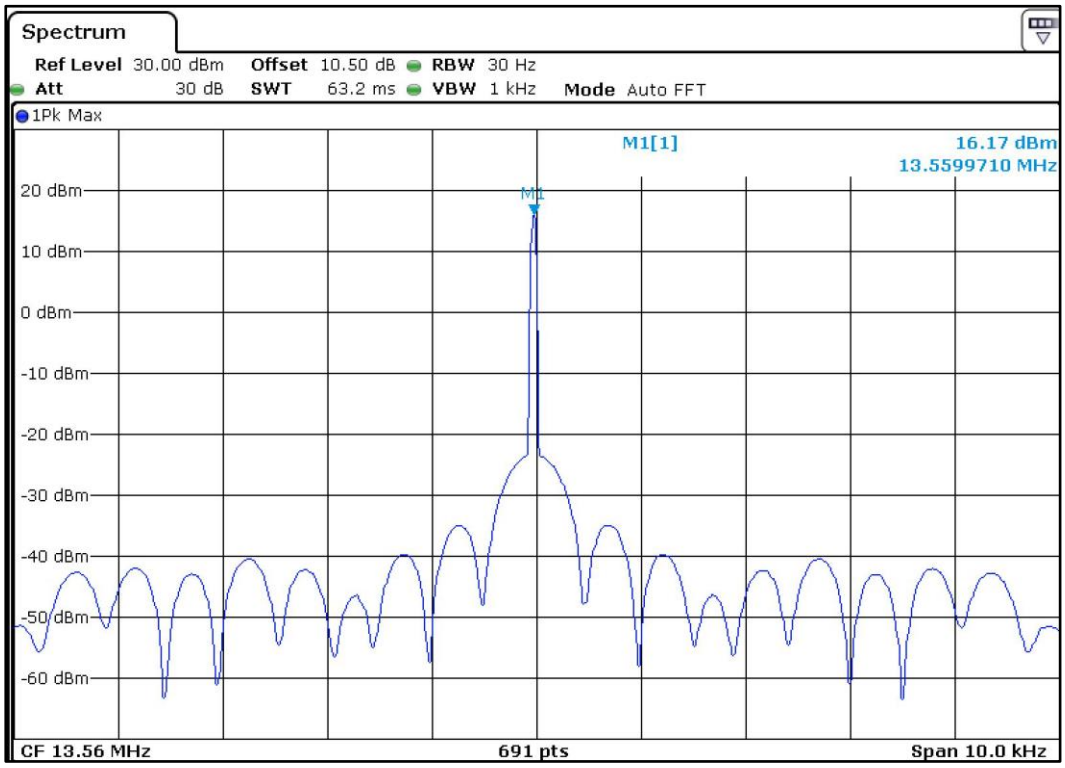
Test plot 3:Frequency tolerance **Temperature:0°C**



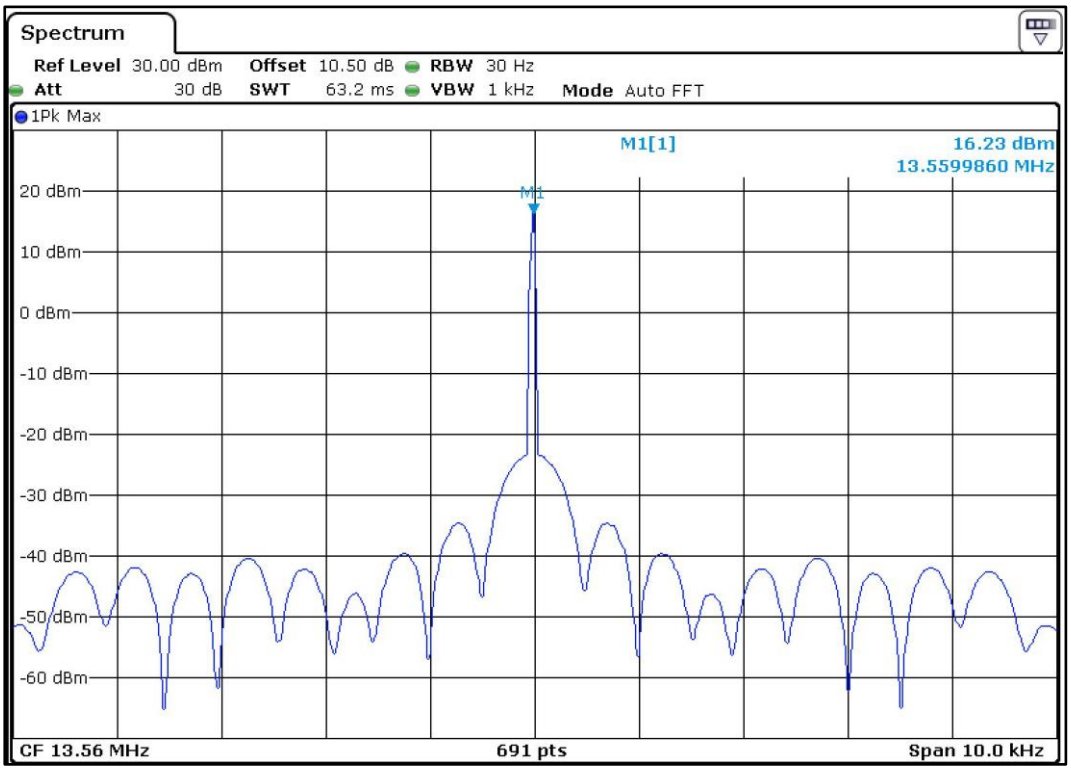
Test plot 4: Frequency tolerance **Temperature:+10°** C



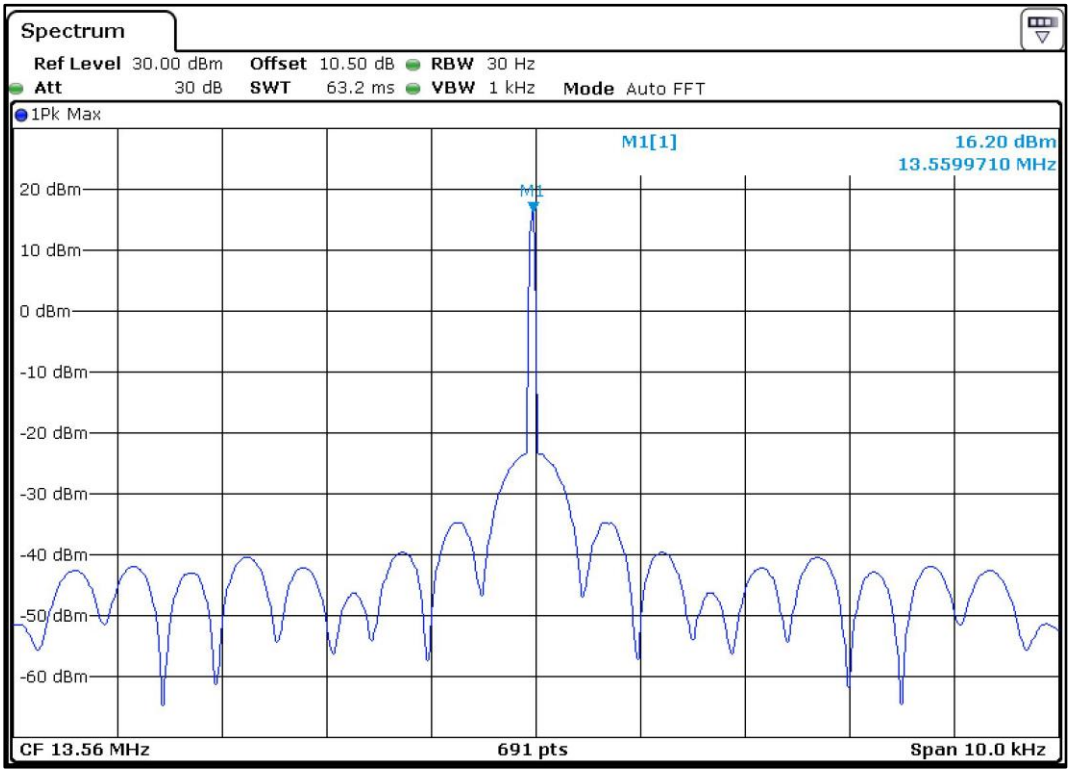
Test plot 5:Frequency tolerance **Temperature:+20° C**



Test plot 6:Frequency tolerance **Temperature:+30° C**



Test plot 7:Frequency tolerance **Temperature:+40° C**



Test plot 8:Frequency tolerance **Temperature:+50° C**

6.2 Radiated Spurious Emission & Field Strength Measurement within the band 13.110-14.010 MHz

Result ***Pass***

Test Specification	FCC part 15 Subpart C Section 15.225 (a,b,c,d) / (15.209)
Test Method	ANSI C 63.10 - 2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3 m
Detector	QP for frequency below 1 GHz, average for frequency above 1 GHz
Requirement	As per the limits mentioned in the below table

Table 5: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dBµV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Conditions:

Supply Voltage: 110 VAC, 60 Hz to the data acquisition unit

Environmental conditions:

Temperature: +24.8 °C RH: 61.76 %

Test results:

Table 6:Tranmitter test results for frequency 9kHz to 30MHz

Antenna Polarization	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV//m)	Margin (dB)
Parallel	0.066	29.62	111.095	-81.475
	0.071	22.93	110.570	-87.640
	0.330	32.35	97.230	-64.880
	0.790	27.95	69.650	-41.700
Perpendicular	0.066	24.21	111.095	-86.885
	0.071	13.13	110.570	-97.440
	0.130	16.08	105.320	-89.240
	0.330	31.64	97.230	-65.590
	9.635	30.94	70.000	-39.060
	11.280	31.022	70.000	-38.978
	27.120	33.21	70.000	-36.790

Table 7: Transmitter test results in the frequency band of 13.11MHz to 14.01MHz

Antenna Polarization	Frequency range (MHz)	Measured frequency (MHz)	Field Strength (dBµV//m)	Limit (dBµV//m)	Margin (dB)
Parallel	13.11-13.41	13.310	33.75	80.50	-46.75
	13.41-13.553	13.445	34.11	90.47	-56.36
	13.553-13.567	13.560	70.53	123.98	-53.45
	13.567-13.71	13.570	43.30	90.47	-47.17
	13.71-14.01	13.725	25.16	80.57	-55.41
Perpendicular	13.11-13.41	13.325	24.51	80.50	-55.99
	13.41-13.553	13.550	49.05	90.47	-41.42
	13.553-13.567	13.560	68.14	123.98	-55.84
	13.567-13.71	13.570	40.08	90.47	-50.39
	13.71-14.01	13.710	33.62	80.57	-46.95

Table 8:Transmitter test results for the frequency 30 MHz – 200 MHz

Antenna Polarization	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV//m)	Margin (dB)
Vertical	40.670	32.18	40	-7.82
	54.265	25.25	40	-14.75
	67.790	22.75	40	-17.25
	81.350	20.66	40	-19.34
Horizontal	40.670	23.7	40	-16.30

Table 9: Transmitter test results for the frequency 200 MHz – 1 GHz

Antenna Polarization	Measured Frequency (MHz)	Field Strength (dBµV/m)	Limit (dBµV//m)	Margin (dB)
Vertical	216.960	29.2	46	-16.80
	325.440	32.59	46	-13.41
	542.400	32.12	46	-13.88
Horizontal	325.440	26.37	46	-19.63
	542.4	35.65	46	-10.35
	899.899	40.72	46	-5.28

Note: Measured Emissions (dBµV/m) = Received Emissions(dBµV) + Antenna Factor(dB/m)+ Cable Loss(dB) – Pre-amplifier Gain(dBi)

6.3 Conducted Spurious Emission Test on AC Power Line

Result ***Pass***

Test Specification	:	FCC Part 15 Section 15.207
Test Method	:	ANSI C 63.10-2014
Testing Location	:	Screened room
Measurement Bandwidth	:	9kHz
Frequency Range	:	150kHz – 30MHz
Supply Voltage	:	110VAC,60Hz

Test setup

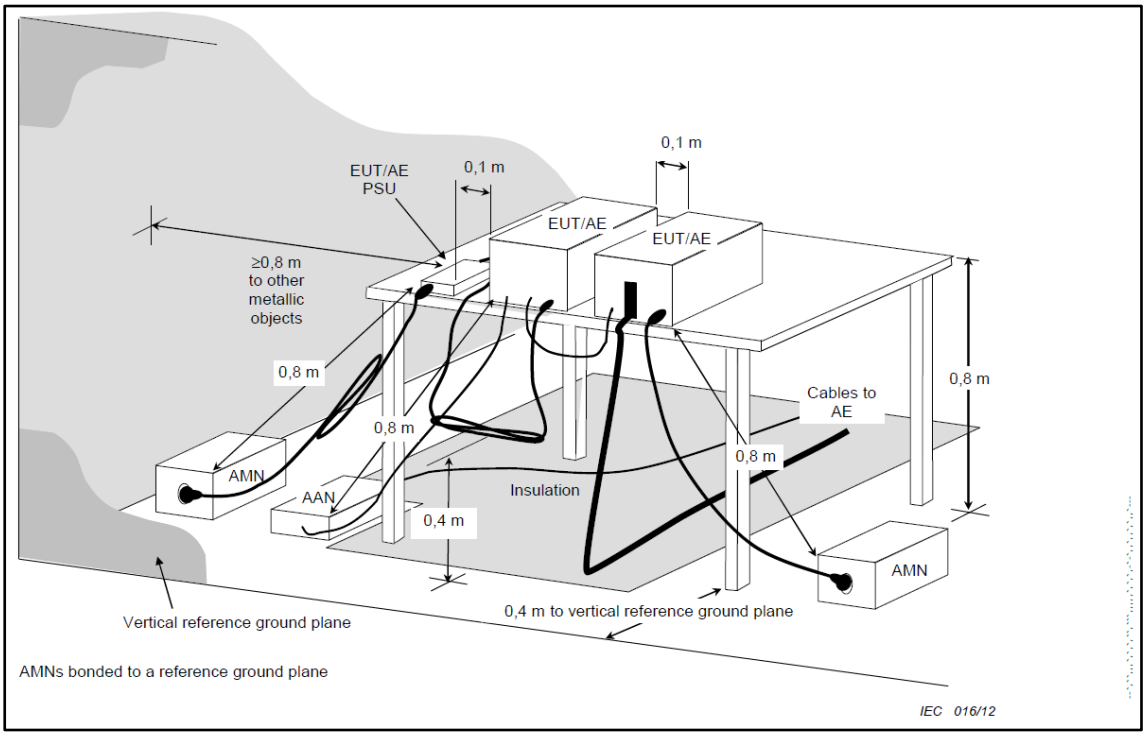
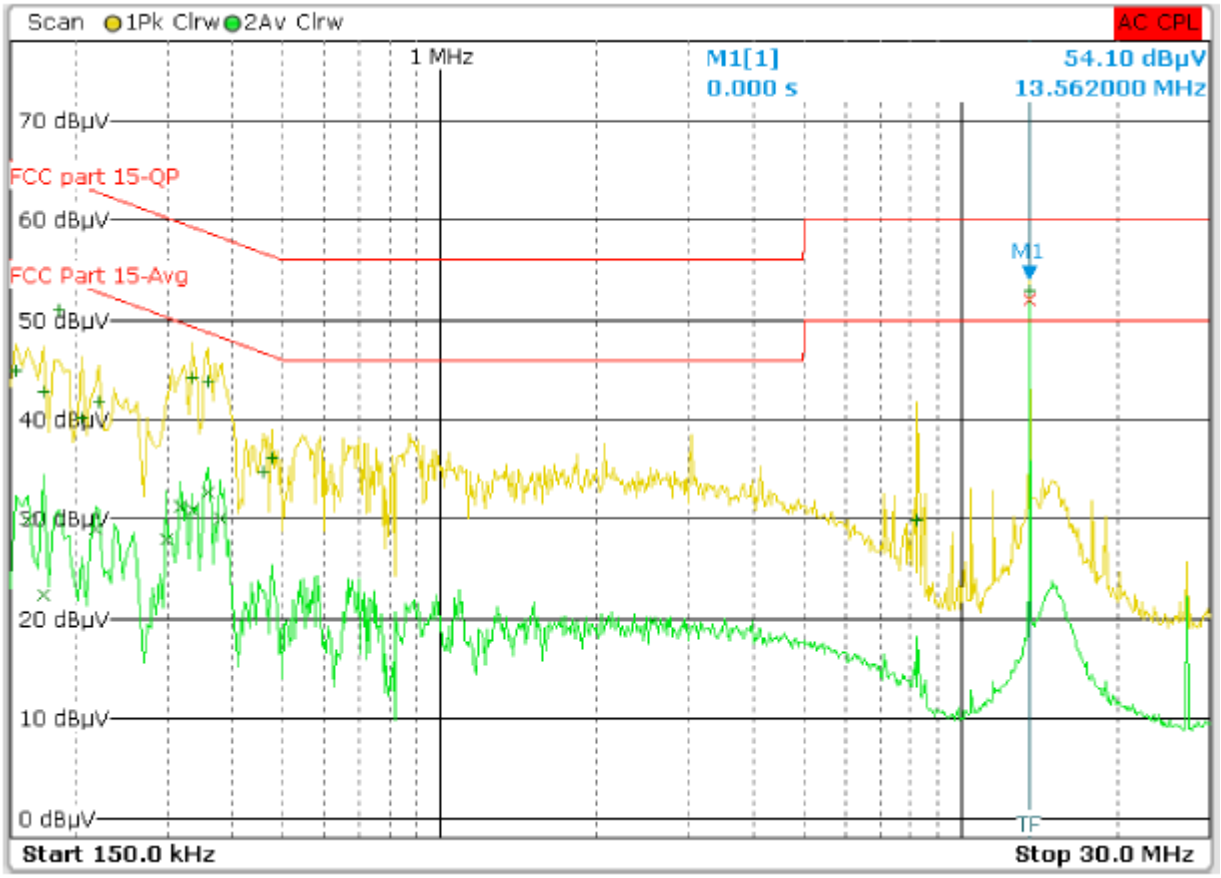


Table 10:Conducted emission test on AC line limits

	Conducted limit (dBµV)	
Frequency of emission (MHz)	**Quasi-peak**	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

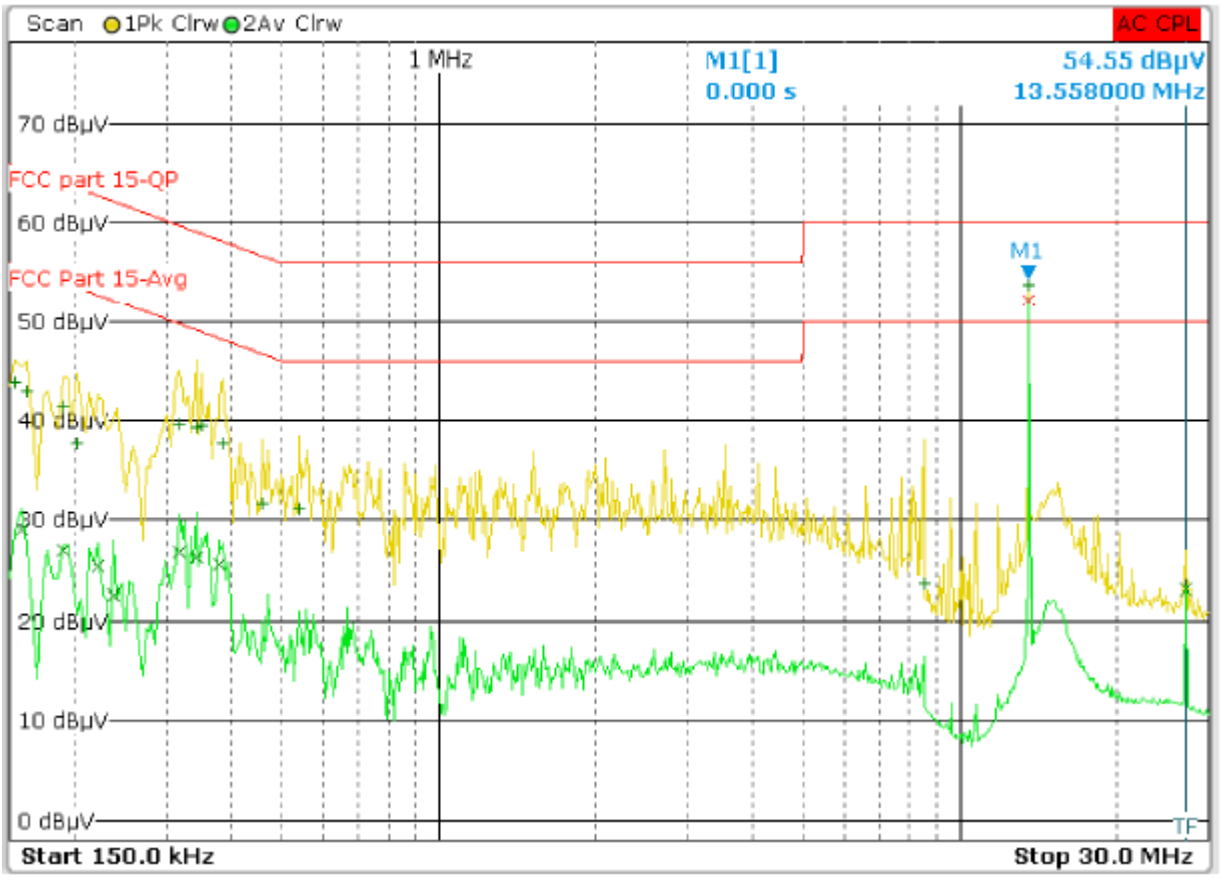
* Decreases with the logarithm of the frequency

Test results:
Line



Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.558000000 MHz	52.04		Average	2.04
1	13.562000000 MHz	52.91		Quasi Peak	-7.09
1	186.000000000 kHz	50.91		Quasi Peak	-13.30
1	358.000000000 kHz	43.81		Quasi Peak	-14.96
1	334.000000000 kHz	44.24		Quasi Peak	-15.11
2	358.000000000 kHz	32.70		Average	-16.07
2	378.000000000 kHz	30.14		Average	-18.18
2	318.000000000 kHz	31.30		Average	-18.46
2	334.000000000 kHz	30.86		Average	-18.49
1	478.000000000 kHz	36.24		Quasi Peak	-20.13
1	154.000000000 kHz	44.93		Quasi Peak	-20.85
1	222.000000000 kHz	41.67		Quasi Peak	-21.07
1	174.000000000 kHz	42.85		Quasi Peak	-21.92
1	458.000000000 kHz	34.71		Quasi Peak	-22.02
2	298.000000000 kHz	27.96		Average	-22.34
1	206.000000000 kHz	40.26		Quasi Peak	-23.11
2	218.000000000 kHz	29.00		Average	-23.89
2	162.000000000 kHz	29.90		Average	-25.46
1	8.246000000 MHz	29.83		Quasi Peak	-30.17
2	174.000000000 kHz	22.39		Average	-32.38

Test results:
Neutral



Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.558000000 MHz	52.14		Average	2.14
1	13.558000000 MHz	53.82		Quasi Peak	-6.18
1	350.000000000 kHz	39.47		Quasi Peak	-19.49
1	342.000000000 kHz	39.26		Quasi Peak	-19.89
1	318.000000000 kHz	39.59		Quasi Peak	-20.17
1	386.000000000 kHz	37.74		Quasi Peak	-20.41
1	154.000000000 kHz	43.92		Quasi Peak	-21.86
1	162.000000000 kHz	42.89		Quasi Peak	-22.47
1	190.000000000 kHz	41.39		Quasi Peak	-22.65
2	378.000000000 kHz	25.48		Average	-22.84
2	318.000000000 kHz	26.83		Average	-22.93
2	342.000000000 kHz	26.19		Average	-22.96
1	538.000000000 kHz	31.17		Quasi Peak	-24.83
1	458.000000000 kHz	31.68		Quasi Peak	-25.05
1	202.000000000 kHz	37.78		Quasi Peak	-25.75
2	158.000000000 kHz	29.00		Average	-26.57
2	27.122000000 MHz	23.07		Average	-26.93
2	190.000000000 kHz	26.95		Average	-27.09
2	222.000000000 kHz	25.38		Average	-27.36
2	238.000000000 kHz	22.53		Average	-29.64
1	8.522000000 MHz	23.62		Quasi Peak	-36.38

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*****END OF TEST REPORT*****