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Report No.: GZEM140800422801
Page: 1 of 46
FCC ID: OU9AW8001-LS

TEST REPORT

Application No.:	GZEM1408004228RF
Applicant:	Guangdong Transtek Medical Electronics Co.,Ltd
Manufacturer:	The same as applicant
Factory:	The same as applicant
FCC ID:	OU9AW8001-LS
Product Name:	Bluetooth Module
Product Description:	Wireless control Body Fat Analyzer with 2.4 GHz as carrier.
Model No.:	AW8001
Product Name of Host:	Body Pressure Monitor
Product Description of Host:	Body Pressure Monitor with 2.4 GHz as carrier
Model No. of Host:	LS808-B
Standards:	CFR 47 FCC PART 15 Subpart C: 2013 section 15.247
Date of Receipt:	2014-10-10
Date of Test:	2014-08-21 to 2014-10-21
Date of Issue:	2014-12-15
Test Result :	Pass*

* In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further detail.

Authorized Signature:

Jerry Chan
Manager



The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2014-12-15		Original

Authorized for issue by:			
Tested By			2014-08-21 to 2014-10-21
	(Sangdi Huang) /Project Engineer		Date
Prepared By			2014-10-31
	(June Chen) /Clerk		Date
Checked By			2014-10-31
	(Jerry Chan)/Reviewer		Date



3 Test Summary

TEST	TEST REQUIREMENT	TEST METHOD	RESULT
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
6 dB Bandwidth	FCC PART 15 C section 15.247 (a)(2)	ANSI C63.10: Clause 6.9.1	N/A
Maximum Peak Output Power	FCC PART 15 C section 15.247(b)(3)	FCC/KDB-558074 D01 v03r01 Clause 9.1.1	PASS
Peak Power Spectral Density	FCC PART 15 C section 15.247(e)	ANSI C63.10: Clause 6.11.2.3	N/A
Conducted Spurious Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.7	PASS
Radiated Spurious Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.4, 6.5 and 6.6	PASS
Band Edges Measurement	FCC PART 15 C section 15.247 (d) &15.205	FCC/KDB-558074 D01 v03r01 Clause 13.3.1	N/A
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS

Remark1:

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

N/A: It means that it has been tested. The result refers to report GZEM130500178601 of FCC ID:OU9AW8001-LS



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5 General Information

5.1 Client Information

Applicant: Guangdong Transtek Medical Electronics Co.,Ltd
Address of Applicant: Zone A, 5/F., Investment Building, No. 12 Huizhan East Rd., Torch Development District, Zhongshan, Guangdong, China 528437
Manufacturer: The same as applicant
Address of Manufacturer: The same as address of applicant
Factory: The same as applicant
Address of Factory: Jin'an Road, Minzhong, Zhongshan 528441 China

5.2 General Description of E.U.T.

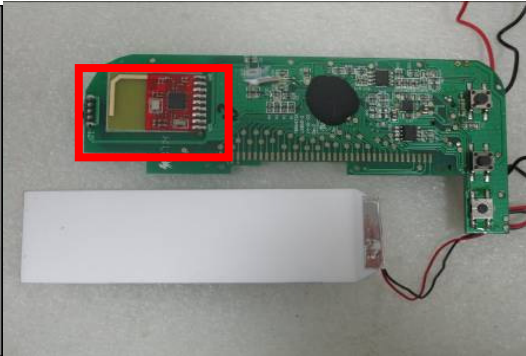
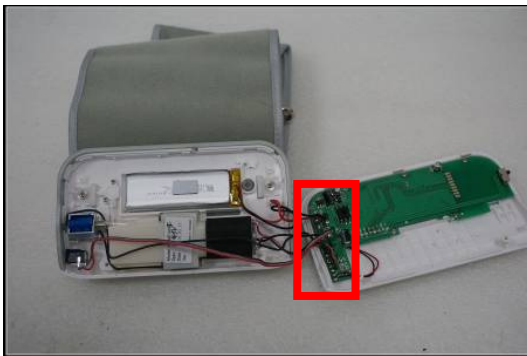
Product Name: Bluetooth Module
Product Description: Wireless control Body Fat Analyzer with 2.4 GHz as carrier.
Product Name of Host:: Body Pressure Monitor
Model No. of Host: LS808-B

5.3 Details of E.U.T.

Operating Frequency 2402 MHz to 2480 MHz
Type of Modulation: GFSK
DSSS with Adaptive (LBT based DAA)
Equipment types: Only one adaptive mode is implemented and could not operate in a non-adaptive mode.
Number of Channels 40 Channels
Channel Separation: 2 MHz
Duty Cycle: Continuous operation possible for testing purposes
Antenna Type Integral antenna
Antenna gain: 1.0 dBi
Speciality: Bluetooth 4.0 Smart (Single mode)
Function: Body Pressure Monitor with BT function to transmit and receive radio signal.
Power Supply: Working voltage: DC 3.7V 1000mA rechargeable battery
Charging voltage: AC 100-240V 50/60Hz 0.3A Max
Adapter: Model: KH0601000UW
Input: AC 100-240V 50/60Hz 0.3A Max
Output: DC 6V 1000mA
Normal Test Voltage: DC 3.7V or AC 230V 50Hz for adapter
Power cord: 1.2m x 2 wires unscreened DC cable

5.4 Description of Support Units

The EUT should be put inside the host. During test the transferred board was used for finding the fixed frequency. The information of the support units is shown as below:



5.5 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

5.8 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2013-12-5	2014-12-5
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2014-04-19	2015-04-19
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2014-03-03	2015-03-03
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2014-05-09	2015-05-09
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2014-07-14	2017-07-14
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2013-08-31	2016-08-31
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-05-04	2017-05-04
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2013-08-31	2016-08-31
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2012-07-01	2015-07-01
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2014-03-03	2015-03-03
EMC2065	Amplifier	HP	8447F	N/A	2014-08-25	2015-08-25
EMC0075	310N Amplifier	Sonoma	310N	272683	2014-03-03	2015-03-03
EMC0523	Active Loop Antenna	EMCO	6502	42963	2014-03-03	2016-03-03
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9170	9170-375	2014-05-26	2017-05-26
EMC2069	2.4GHz filter	Micro-Tronics	BRM 50702	149	2014-04-19	2015-04-19
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-05-03	2016-05-03

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal. Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2014-09-15	2015-09-15
EMC0007	DMM	Fluke	73	70671122	2014-09-15	2015-09-15

7 Test Results

7.1 E.U.T. test conditions

Test Voltage:	DC 6V
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar

Requirements: **15.31(e):** For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

15.32: Power supplies and CPU boards used with personal computers and for which separate authorizations are required to be obtained shall be tested as follows: Testing shall be in accordance with the procedures specified in Section 15.31 of this part.

Test frequencies and frequency range: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2456
1	2404	28	2458
2	2406	29	2460
3	2408	30	2462
4	2410	31	2464
5	2412	32	2466
6	2414	33	2468
7	2416	34	2470
8	2418	35	2472
9	2420	36	2474
10	2422	37	2476
11	2424	38	2478
12	2426	39	2480
13	2428	40	/
14	2430	41	/
15	2432	42	/
16	2434	43	/
17	2436	44	/
18	2438	45	/
19	2440	46	/
20	2442	47	/
21	2444	48	/
22	2446	49	/
23	2448	50	/
24	2450	51	/
25	2452	52	/
26	2454	53	/

Test frequencies are the lowest channel: 0 channel(2402MHz), middle channel: 20 channel(2442 MHz) and highest channel: 39 channel(2480 MHz)

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

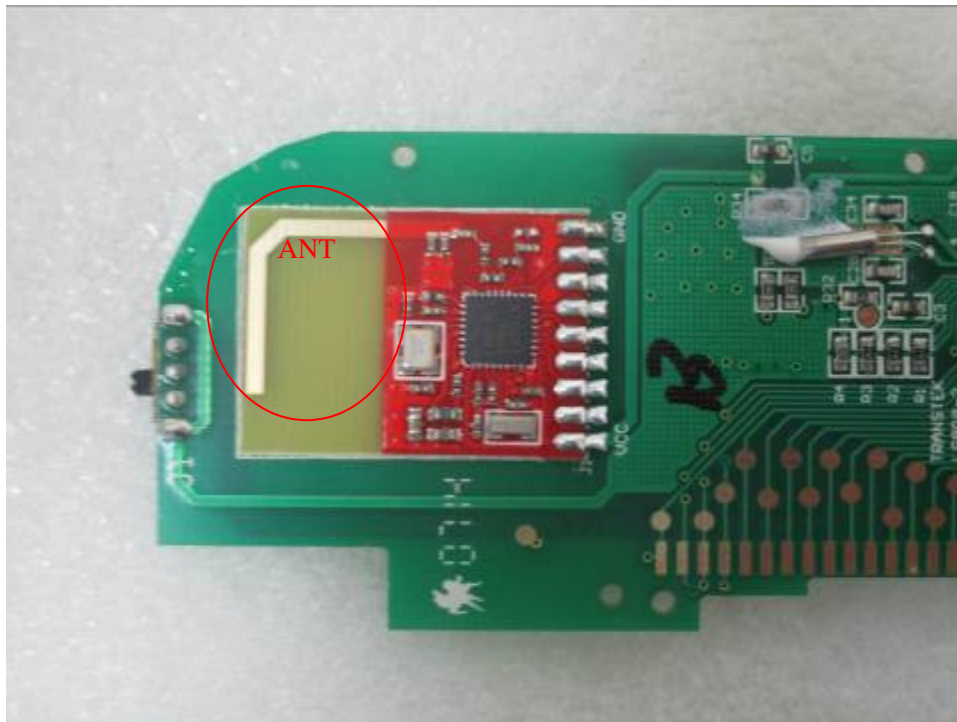
For intentional device. According to 15.203, an intentional radiator shall be designed to Ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

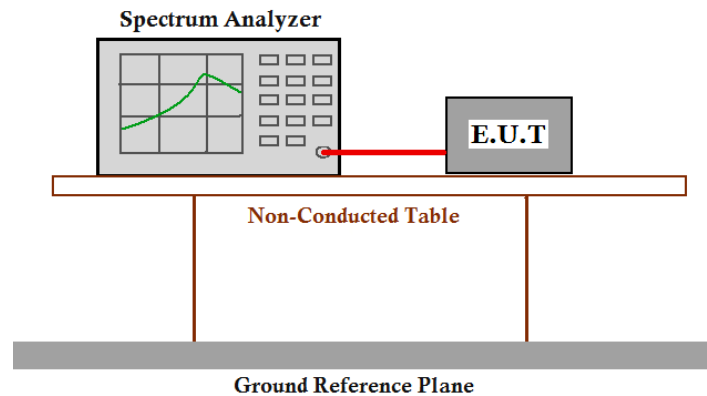
The antenna is Integral antenna and no consideration of replacement. The best case gain of the antenna is 1.0 dBi.



Test result: The unit does meet the FCC requirements.

7.3 Maximum Peak Output Power

- Test Requirement:** FCC Part 15 C section 15.247
 (b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.
 Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- Test Method:** FCC/KDB-558074 D01 v03r01 9.1.1 RBW \geq DTS bandwidth
- Test Status:** Enter test mode for the product. Test in Channel lowest (2402MHz), middle (2442MHz) and highest (2480MHz), keep in continuously transmitting status.
 Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.
- Test Configuration:**





Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (Cable loss =1.5dB) from the antenna port to the spectrum.
2. Set the RBW≥DTS bandwidth
3. Set the VBW ≥ 3 x RBW
4. Set the span ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Use peak marker function to determine the peak amplitude level.
9. Report the worse case.

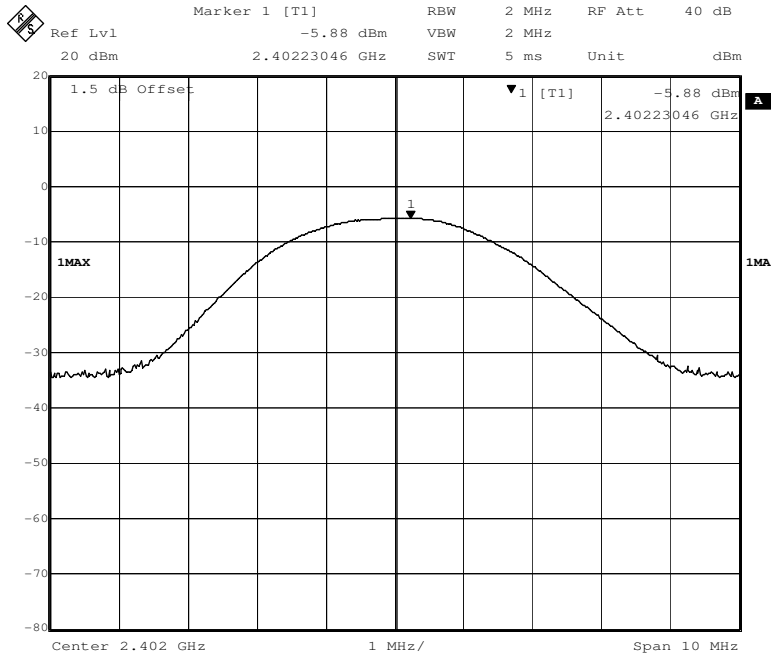
Test result:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
0	2402	GFSK	1Mbps	-5.88	1W(30dBm)	Pass
20	2442		1Mbps	-3.62		Pass
39	2480		1Mbps	-2.27		Pass

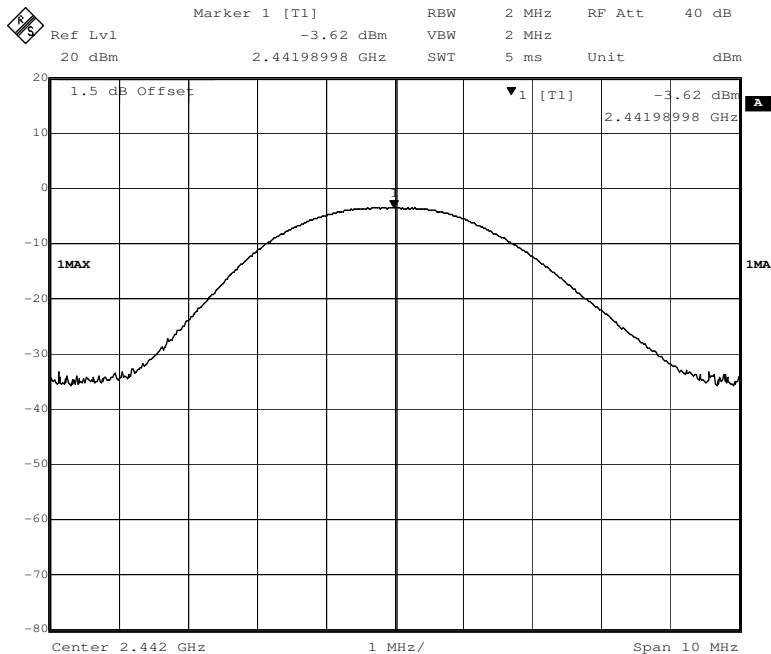
Remark: Level = Read Level + Cable Loss.
The unit does meet the FCC requirements.

Result plot as follows:

Channel 0:2.402GHz:

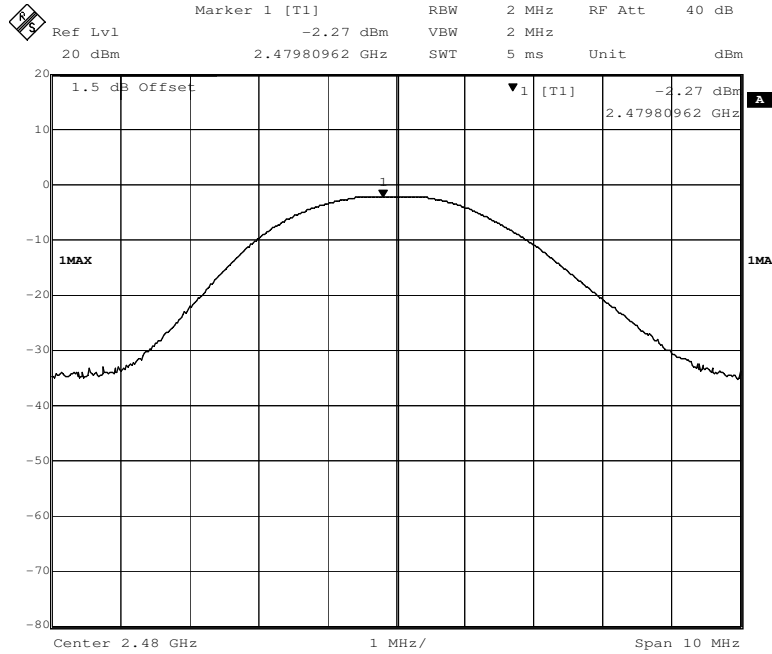


Channel 20:2.442GHz:



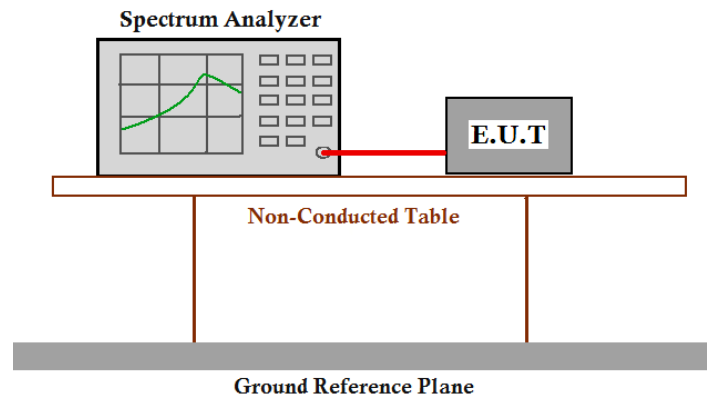


Channel 39:2.480GHz:



7.4 Conducted Spurious Emissions

Test Requirement:	FCC Part 15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.
Test Method:	ANSI C63.10: Clause 6.7
Test Status:	Enter test mode for the product. Test in lowest Channel 0, middle Channel 20 and highest Channel 39, keep in continuously transmitting status. find worse case in Channel 20. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.
Test Configuration:	



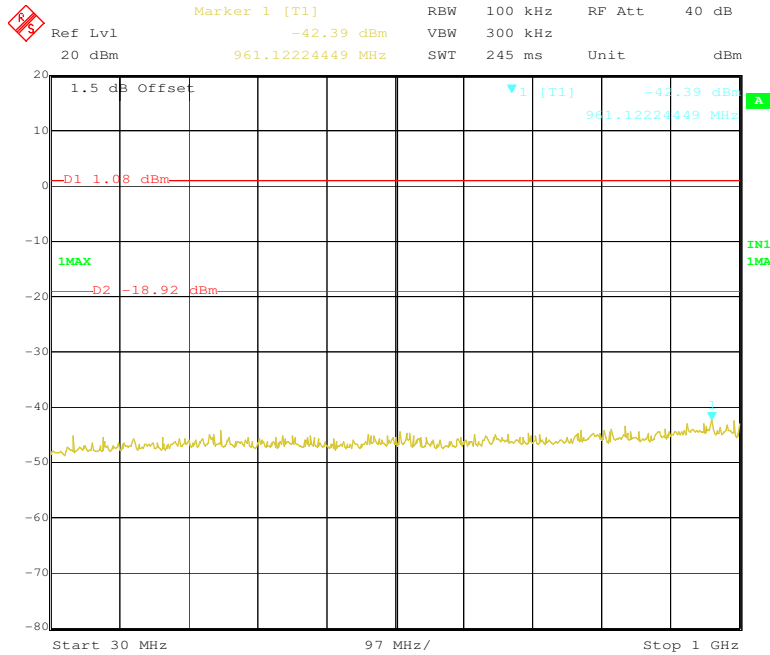
Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer: RBW=100 KHz, VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max Hold, Scan up through 10th harmonic.
3. Measure the Conducted Spurious Emissions of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worse case.

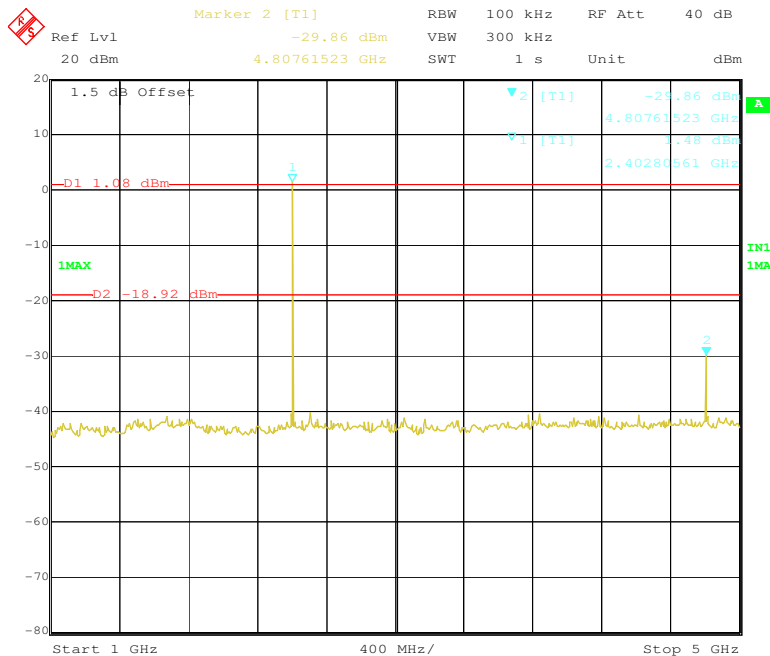
Result plot as follows:

Channel 0: 2.402 GHz

30 MHz to 1GHz

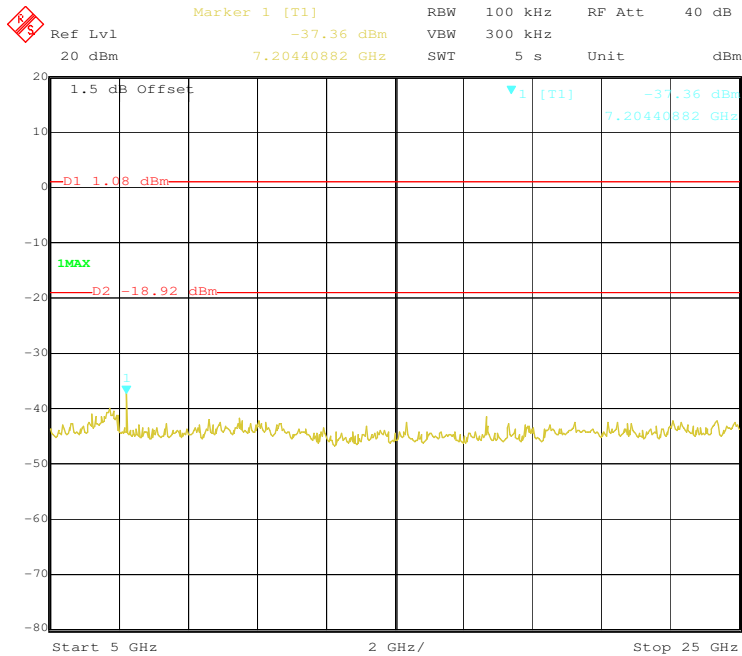


1GHz to 5GHz



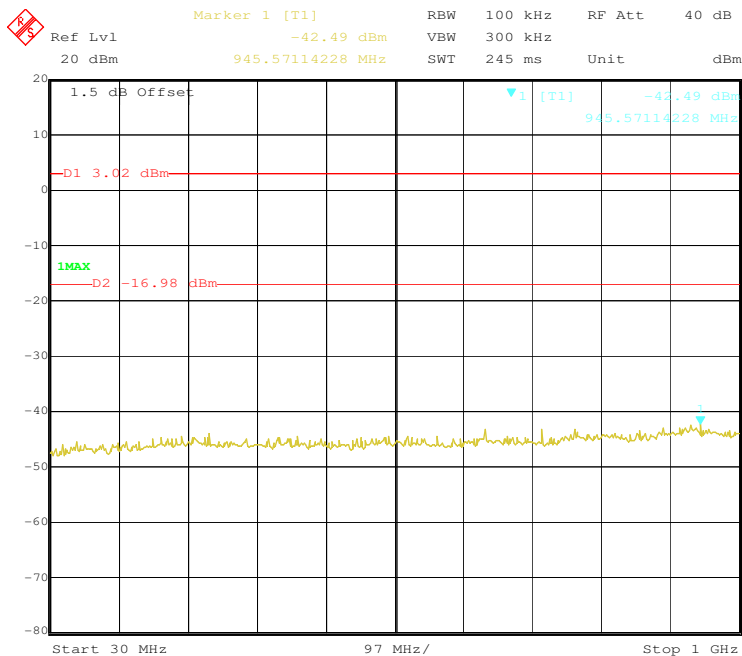


5GHz to 25GHz

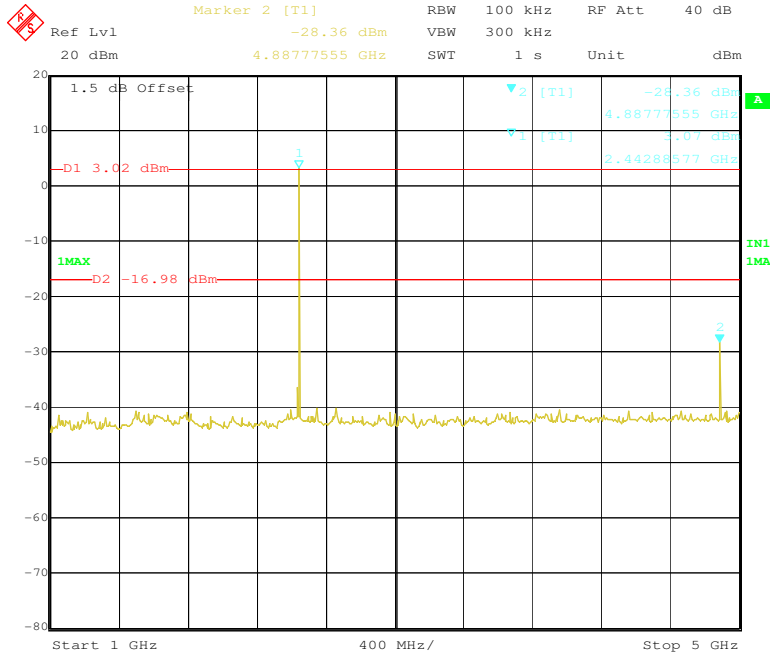


Channel 20:2.442GHz

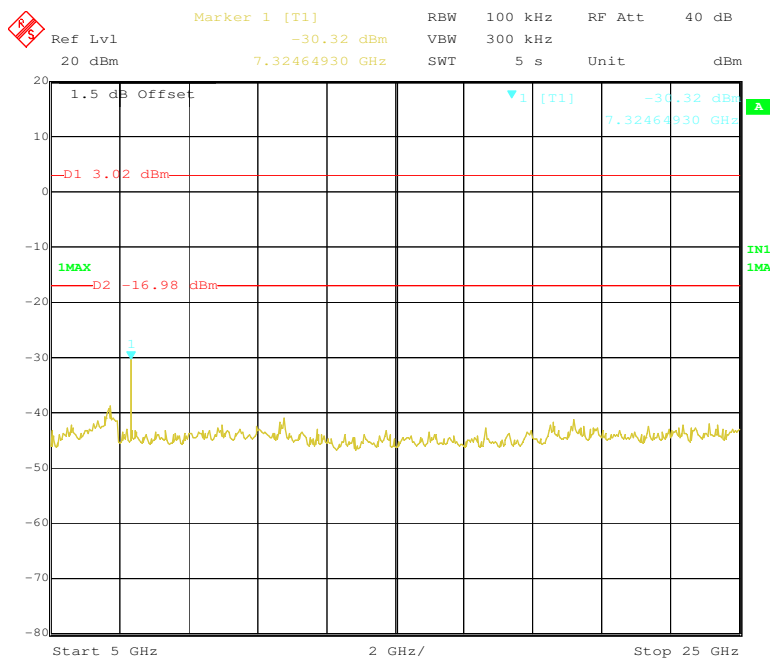
30 MHz to 1GHz



1GHz to 5GHz



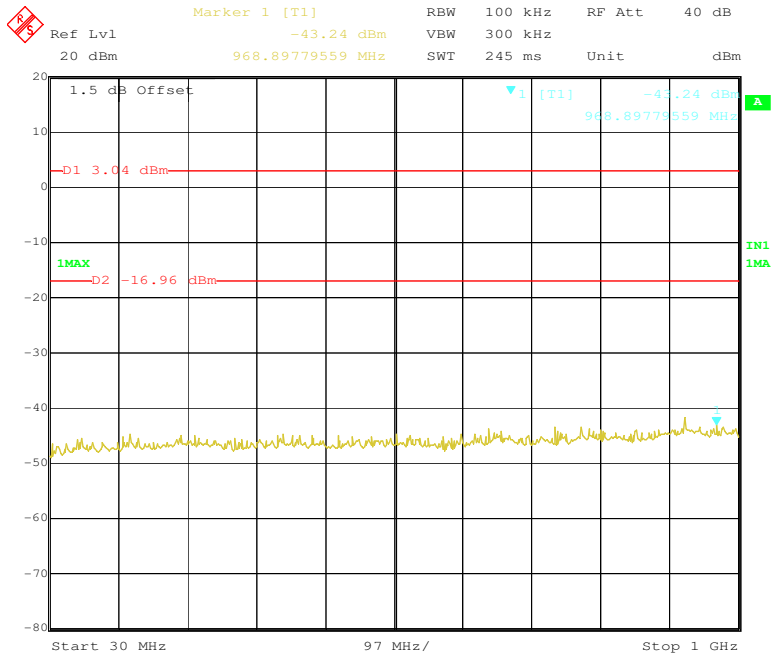
5GHz to 25GHz



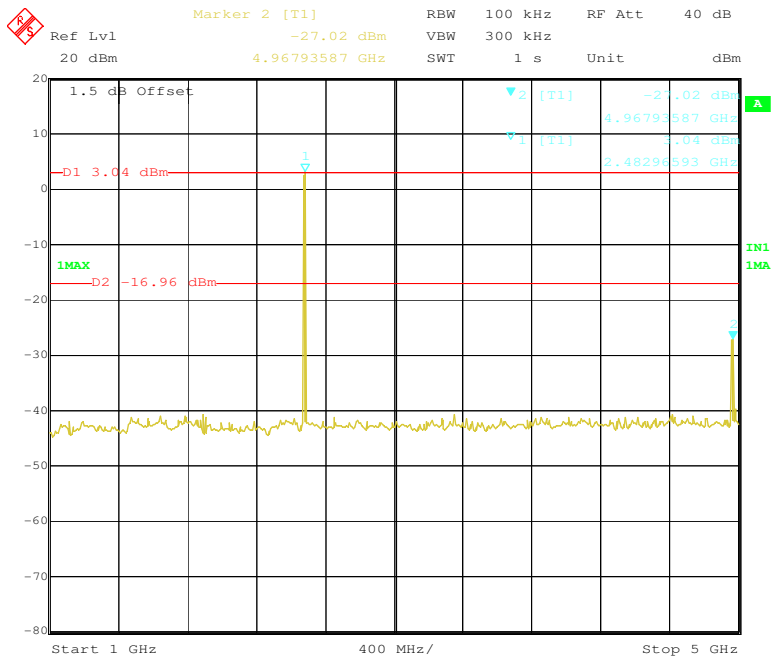


Channel 39:2.480GHz

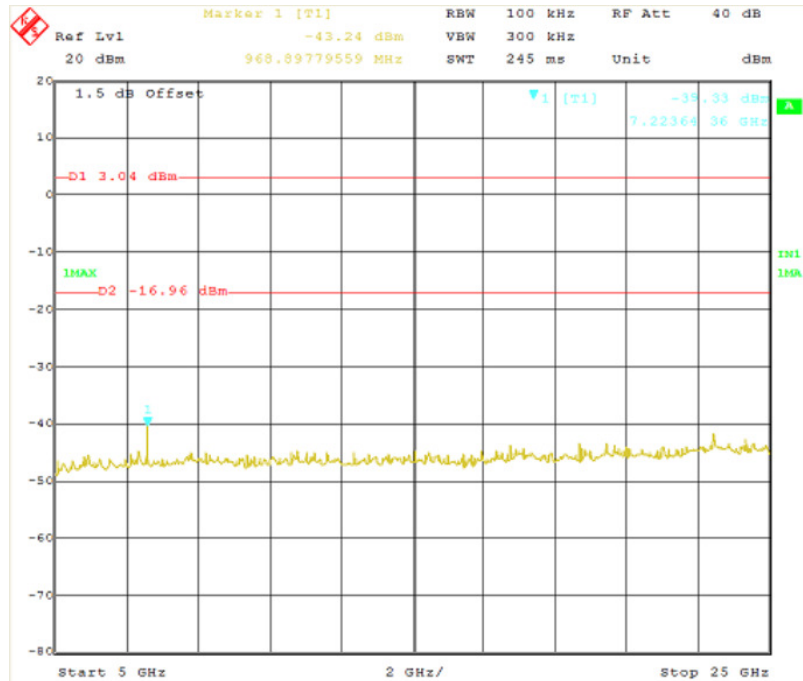
30 MHz to 1GHz



1GHz to 5GHz



5GHz to 25GHz

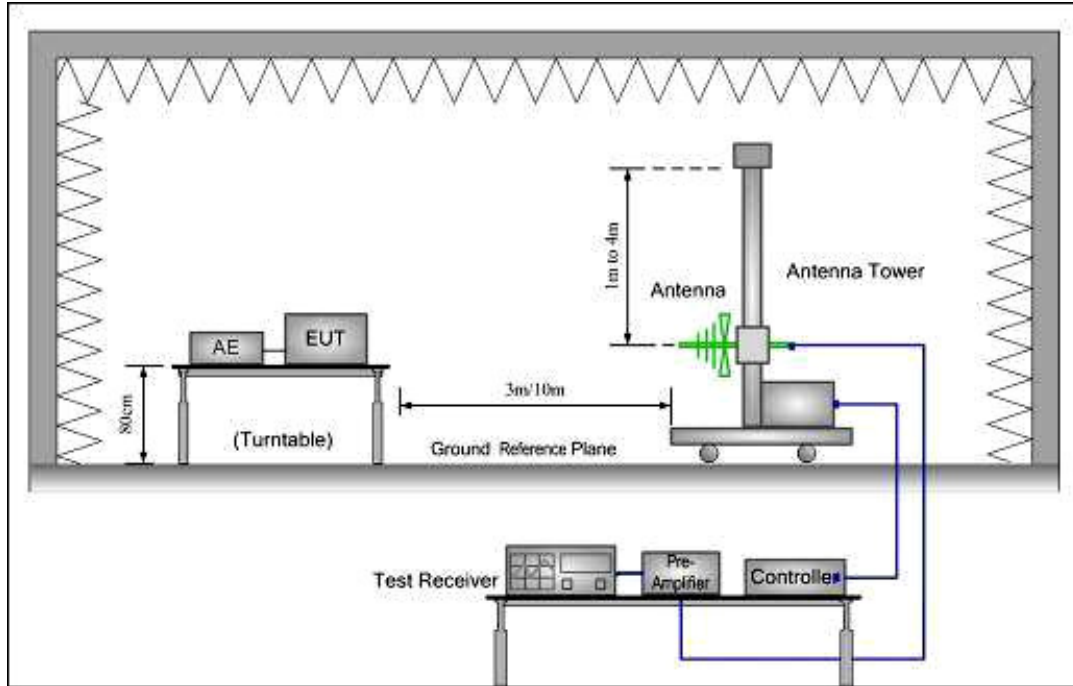


7.5 Radiated Spurious Emissions

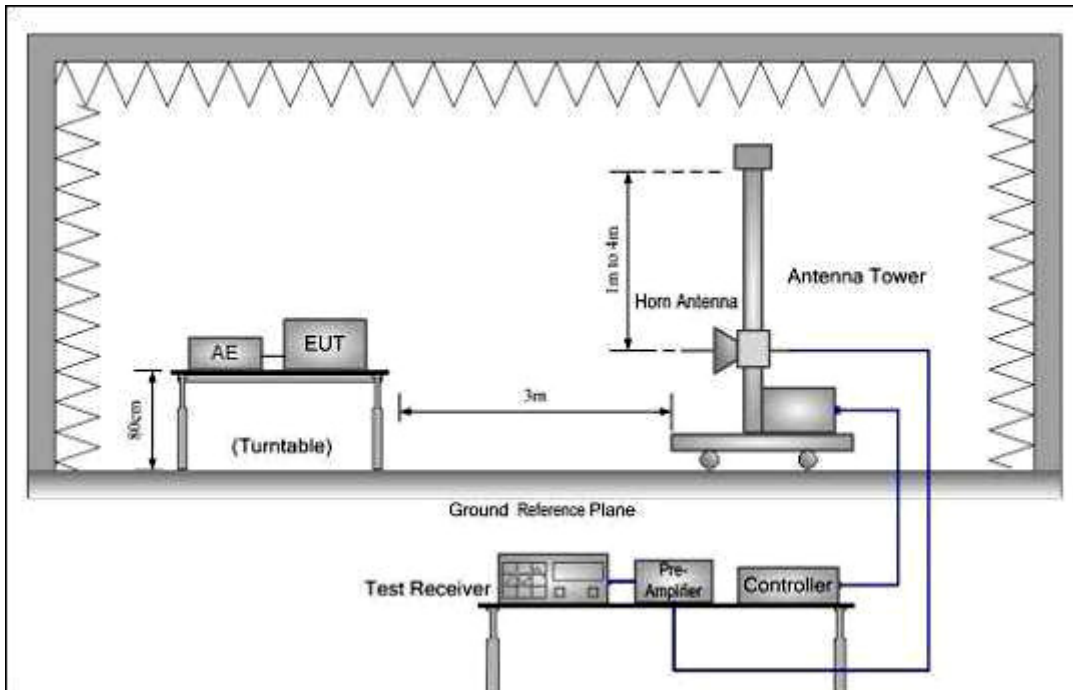
Test Requirement:	FCC Part 15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, and provided the transmitter demonstrates compliance with the peak conducted power limits.
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Enter test mode for the product. Test in lowest channel 2402 MHz and highest channel 2480 MHz, keep in continuously transmitting status with GFSK modulation. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.
Detector:	For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW = 10Hz Sweep = auto Detector function = peak Trace = max hold
15.209 Limit:	40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz 54.0 dB μ V/m above 960MHz

Test Configuration:

- 1) 30 MHz to 1 GHz emissions:



- 2) 1 GHz to 40 GHz emissions:



Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

The receiver scanned from the lowest frequency generated within the EUT to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

From 30MHz to 1GHz, read the Quasi-Peak field strength of the emissions with receiver QP detector RBW=120KHz.

Above 1GHz, read the Peak field strength and Average field strength.

Read the Peak field strength through RBW=1MHz,VBW=3MHz in spectrum analyzer setting;

Read the Average field strength through RBW=1MHz,VBW=10Hz in spectrum analyzer setting;

While maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the average field strength reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit.

7.5.1 Harmonic and other spurious emissions

Test at Channel 0 (2.402 GHz) in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

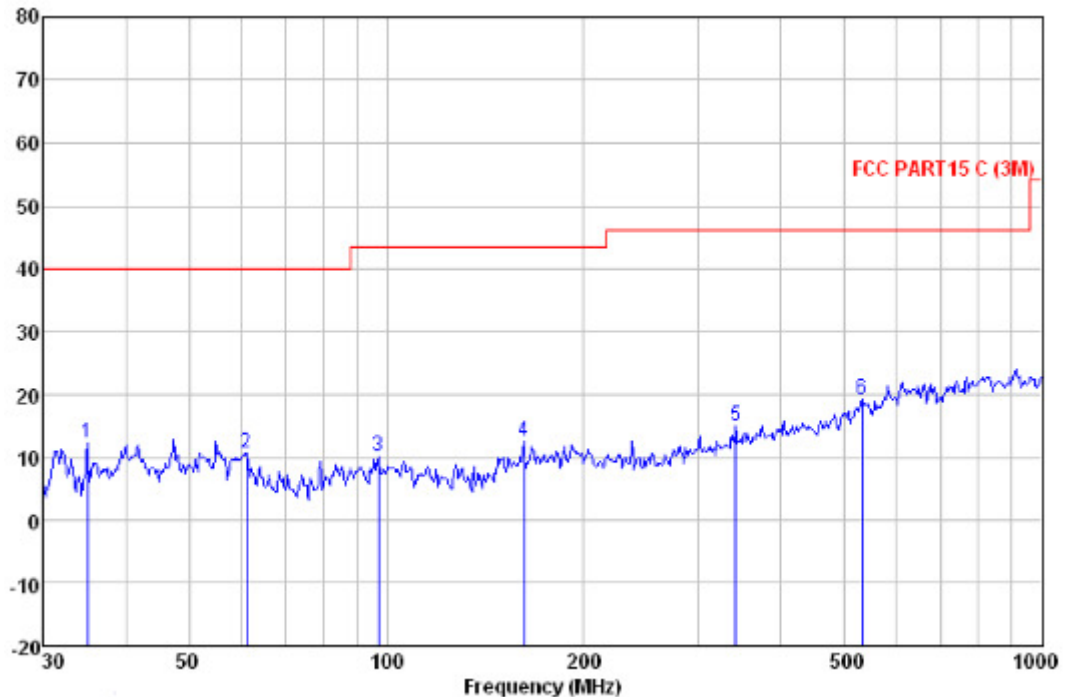
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dB μ V/m)



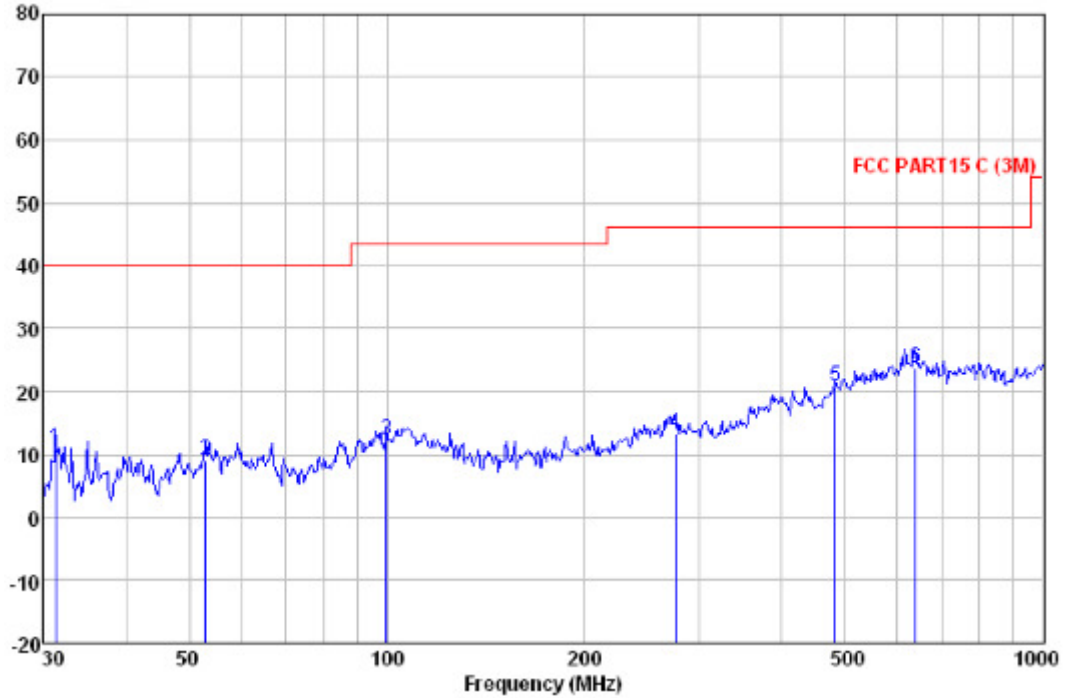
Quasi-peak measurement

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Remark		
MHz	Level	Factor	Loss	Line	Limit			
	dB μ V	dB/m	dB	dB	dB μ V/m	dB μ V/m	dB	
35.005	30.81	12.30	0.88	31.60	12.39	40.00	-27.61	QP
61.132	28.79	12.29	1.13	31.60	10.61	40.00	-29.39	QP
97.115	27.42	12.97	1.40	31.60	10.19	43.50	-33.31	QP
162.041	33.51	8.72	1.76	31.37	12.62	43.50	-30.88	QP
340.782	29.35	14.15	2.52	31.21	14.81	46.00	-31.19	QP
531.964	30.10	17.20	3.09	31.23	19.16	46.00	-26.84	QP

Horizontal:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Remark
MHz	Level	Factor	Loss	Line	Limit	
	dBuV	dB/m	dB	dB	dBuV/m	dB
31.289	29.49	12.32	0.84	31.60	11.05	40.00 -28.95 QP
52.945	26.53	13.11	1.04	31.60	9.08	40.00 -30.92 QP
99.878	29.20	13.16	1.43	31.60	12.19	43.50 -31.31 QP
275.157	29.72	12.55	2.25	31.30	13.22	46.00 -32.78 QP
482.216	32.94	16.13	3.04	31.19	20.92	46.00 -25.08 QP
638.369	32.99	18.59	3.41	31.26	23.73	46.00 -22.27 QP



1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
4804.00	31.53	11.11	38.57	48.17	52.24	74.00	V
7206.00	36.47	12.96	38.85	42.45	53.03	74.00	V
9608.00	38.08	15.16	39.71	42.08	55.61	74.00	V
4804.00	31.53	11.11	38.57	50.13	54.20	74.00	H
7206.00	36.47	12.96	38.85	43.03	53.61	74.00	H
9608.00	38.08	15.16	39.71	44.88	58.41	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
4804.00	31.53	11.11	38.57	43.67	47.74	54.00	V
7206.00	36.47	12.96	38.85	37.06	47.64	54.00	V
9608.00	38.08	15.16	39.71	36.30	49.83	54.00	V
4804.00	31.53	11.11	38.57	43.66	47.73	54.00	H
7206.00	36.47	12.96	38.85	39.64	50.22	54.00	H
9608.00	38.08	15.16	39.71	35.84	49.37	54.00	H

Test at Channel20 (2.442 GHz) in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

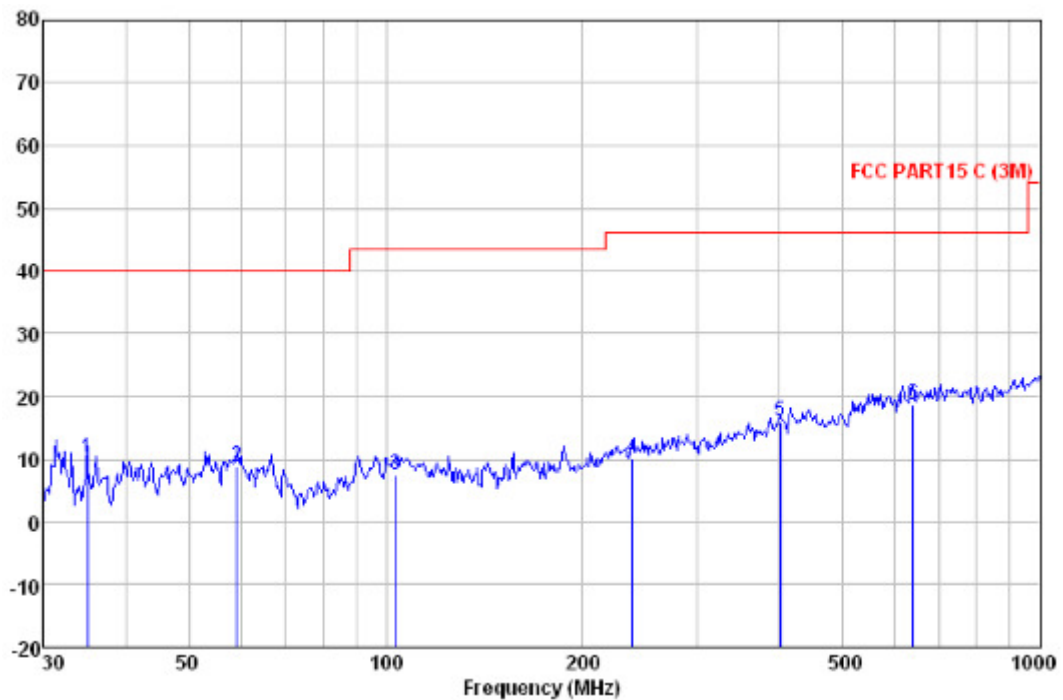
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



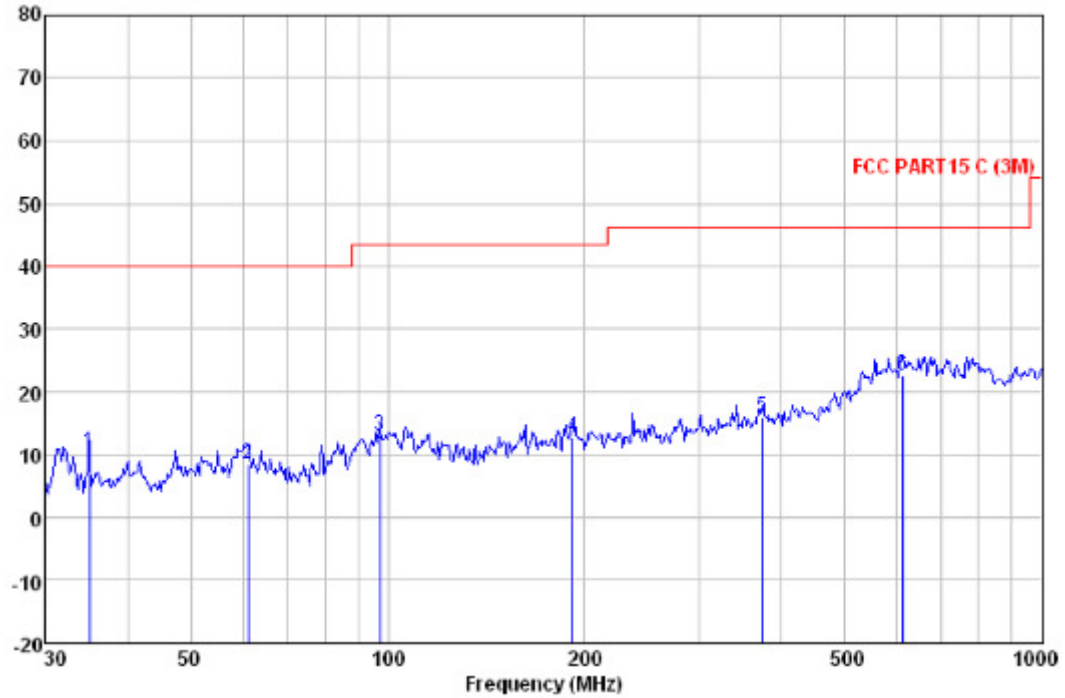
Quasi-peak measurement

Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
35.005	28.51	12.30	0.88	31.60	10.09	40.00	-29.91	QP
59.232	26.59	12.74	1.11	31.60	8.84	40.00	-31.16	QP
103.442	24.92	12.82	1.45	31.59	7.60	43.50	-35.90	QP
238.310	27.31	11.99	2.09	31.30	10.09	46.00	-35.91	QP
400.432	29.32	15.10	2.71	31.10	16.03	46.00	-29.97	QP
638.369	27.99	18.59	3.41	31.26	18.73	46.00	-27.27	QP

Horizontal:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Remark	
MHz	Level	Factor	Loss	Line	Limit		
	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	
35.005	28.81	12.30	0.88	31.60	10.39	40.00	-29.61 QP
61.132	26.79	12.29	1.13	31.60	8.61	40.00	-31.39 QP
97.115	30.42	12.97	1.40	31.60	13.19	43.50	-30.31 QP
191.745	31.80	10.56	1.86	31.31	12.91	43.50	-30.59 QP
373.311	29.88	14.54	2.63	31.14	15.91	46.00	-30.09 QP
612.064	32.25	18.50	3.32	31.29	22.78	46.00	-23.22 QP



1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
4884.000	31.57	11.24	38.56	44.89	49.14	74.00	V
7326.000	36.50	13.28	38.88	42.75	53.65	74.00	V
9768.000	38.46	15.05	39.74	43.99	53.76	74.00	V
4884.000	31.57	11.24	38.56	45.86	50.11	74.00	H
7326.000	36.50	13.28	38.88	44.03	54.93	74.00	H
9768.000	38.46	15.05	39.74	45.40	59.17	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
4884.000	31.57	11.24	38.56	40.60	44.85	54.00	V
7326.000	36.50	13.28	38.88	37.65	48.55	54.00	V
9768.000	38.46	15.05	39.74	35.99	49.76	54.00	V
4884.000	31.57	11.24	38.56	42.63	46.88	54.00	H
7326.000	36.50	13.28	38.88	39.89	50.79	54.00	H
9768.000	38.46	15.05	39.74	35.63	49.40	54.00	H

Test at Channel39 (2.480 GHz) in transmitting status

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

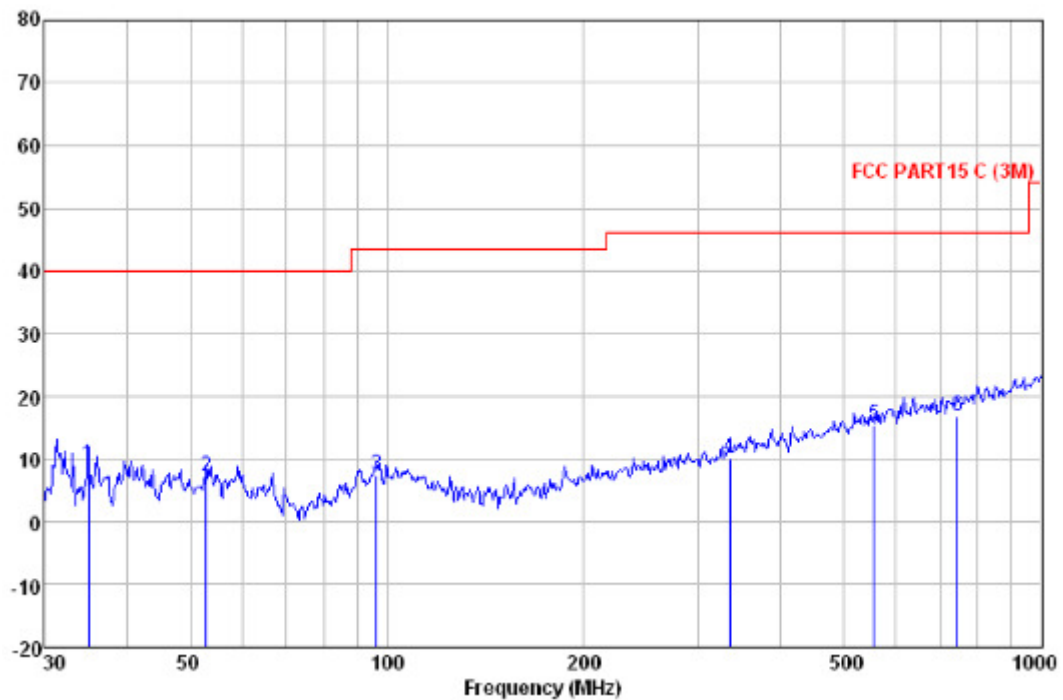
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



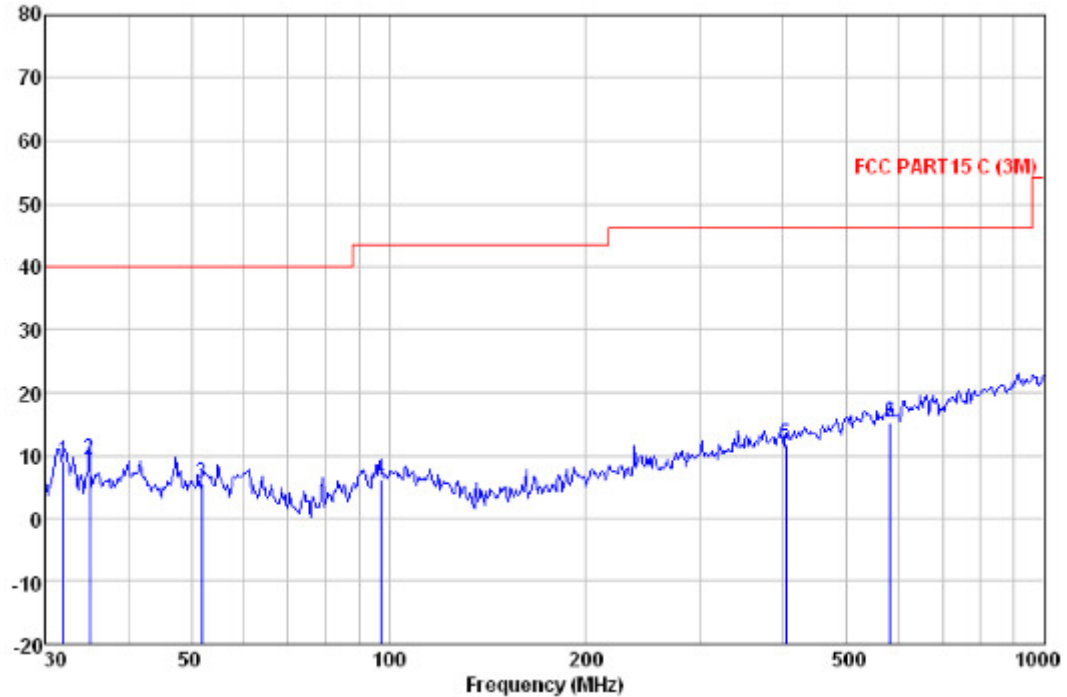
Quasi-peak measurement

Freq	ReadAntenna Level	ReadAntenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
35.005	27.51	12.30	0.88	31.60	9.09	40.00	-30.91	QP
52.945	24.53	13.11	1.04	31.60	7.08	40.00	-32.92	QP
96.436	24.77	12.94	1.40	31.60	7.51	43.50	-35.99	QP
333.687	24.98	13.92	2.49	31.22	10.17	46.00	-35.83	QP
554.825	25.82	17.67	3.11	31.26	15.34	46.00	-30.66	QP
744.866	24.98	19.39	3.69	31.20	16.86	46.00	-29.14	QP

Horizontal:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Remark
MHz	Level	Factor	Loss	Line	Limit	
	dB μ V	dB/m	dB	dB	dB μ V/m	dB
31.955	27.56	12.32	0.85	31.60	9.13	40.00 -30.87 QP
35.005	27.81	12.30	0.88	31.60	9.39	40.00 -30.61 QP
51.843	23.10	13.16	1.02	31.60	5.68	40.00 -34.32 QP
97.115	23.42	12.97	1.40	31.60	6.19	43.50 -37.31 QP
403.250	24.94	15.14	2.72	31.10	11.70	46.00 -34.30 QP
582.743	25.22	18.14	3.22	31.29	15.29	46.00 -30.71 QP



1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4960.00	31.68	11.37	38.56	48.90	53.39	74.00	V
7440.00	36.60	13.60	38.90	43.31	54.61	74.00	V
9920.00	38.68	14.94	39.78	43.56	47.40	74.00	V
4960.00	31.68	11.37	38.56	47.53	52.02	74.00	H
7440.00	36.60	13.60	38.90	43.79	55.09	74.00	H
9920.00	38.68	14.94	39.78	44.26	58.10	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4960.00	31.68	11.37	38.56	42.04	46.53	54.00	V
7440.00	36.60	13.60	38.90	37.72	49.02	54.00	V
9920.00	38.68	14.94	39.78	35.61	49.45	54.00	V
4960.00	31.68	11.37	38.56	41.35	45.84	54.00	H
7440.00	36.60	13.60	38.90	36.09	47.39	54.00	H
9920.00	38.68	14.94	39.78	36.44	50.28	54.00	H

Remark:

- 1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.
- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. 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.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the FCC requirements.

7.5.2 Radiated Emissions which fall in the restricted bands

Test Requirement:	FCC Part 15 C section 15.247 (d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Enter test mode for the product. Test in lowest channel 2402 MHz and highest channel 2480 MHz, keep in continuously transmitting status with GFSK modulation.
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	40.0 dB μ V/m between 30MHz & 88MHz; 43.5 dB μ V/m between 88MHz & 216MHz; 46.0 dB μ V/m between 216MHz & 960MHz; 54.0 dB μ V/m above 960MHz.
Detector:	For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW = 10Hz Sweep = auto Detector function = peak Trace = max hold



Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

Test Result:

Test at lowest Channel (2.402 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2310.000	27.93	8.02	38.23	43.87	41.59	74.00	Vertical
2390.000	27.63	8.17	38.25	42.58	40.13	74.00	V
2483.500	27.55	6.99	49.42	48.39	33.51	74.00	V
2500.000	27.55	7.02	49.42	51.23	36.38	74.00	V
2310.000	27.93	8.02	38.23	44.15	41.87	74.00	Horizontal
2390.000	27.63	8.17	38.25	43.78	41.33	74.00	H
2483.500	27.55	6.99	49.42	49.34	34.46	74.00	H
2500.000	27.55	7.02	49.42	51.43	36.58	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2310.000	27.93	8.02	38.23	39.33	37.05	54.00	Vertical
2390.000	27.63	8.17	38.25	41.26	38.81	54.00	V
2483.500	27.55	6.99	49.42	48.73	33.85	54.00	V
2500.000	27.55	7.02	49.42	47.26	32.41	54.00	V
2310.000	27.93	8.02	38.23	38.34	36.06	54.00	Horizontal
2390.000	27.63	8.17	38.25	39.13	36.68	54.00	H
2483.500	27.55	6.99	49.42	46.33	31.45	54.00	H
2500.000	27.55	7.02	49.42	45.21	30.36	54.00	H



Test at middle Channel(2.442 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2310.000	27.93	8.02	38.23	48.25	45.97	74.00	Vertical
2390.000	27.63	8.17	38.25	47.31	44.86	74.00	V
2483.500	27.55	6.99	49.42	50.25	35.37	74.00	V
2500.000	27.55	7.02	49.42	51.09	36.24	74.00	V
2310.000	27.93	8.02	38.23	47.48	45.20	74.00	Horizontal
2390.000	27.63	8.17	38.25	49.64	47.19	74.00	H
2483.500	27.55	6.99	49.42	51.24	36.36	74.00	H
2500.000	27.55	7.02	49.42	52.87	38.02	74.00	H

Average Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Antenna polarization
2310.000	27.93	8.02	38.23	38.35	36.07	54.00	Vertical
2390.000	27.63	8.17	38.25	37.21	34.76	54.00	V
2483.500	27.55	6.99	49.42	47.38	32.50	54.00	V
2500.000	27.55	7.02	49.42	48.76	33.91	54.00	V
2310.000	27.93	8.02	38.23	38.51	36.23	54.00	Horizontal
2390.000	27.63	8.17	38.25	39.42	36.97	54.00	H
2483.500	27.55	6.99	49.42	48.37	33.49	54.00	H
2500.000	27.55	7.02	49.42	49.16	34.31	54.00	H



Test at highest Channel (2.480 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	27.93	8.02	38.23	48.14	45.86	74.00	Vertical
2390.000	27.63	8.17	38.25	47.23	44.78	74.00	V
2483.500	27.55	6.99	49.42	51.65	36.77	74.00	V
2500.000	27.55	7.02	49.42	52.79	37.94	74.00	V
2310.000	27.93	8.02	38.23	48.68	46.40	74.00	Horizontal
2390.000	27.63	8.17	38.25	47.93	45.48	74.00	H
2483.500	27.55	6.99	49.42	51.76	36.88	74.00	H
2500.000	27.55	7.02	49.42	52.85	38.00	74.00	H

Average Measurement:

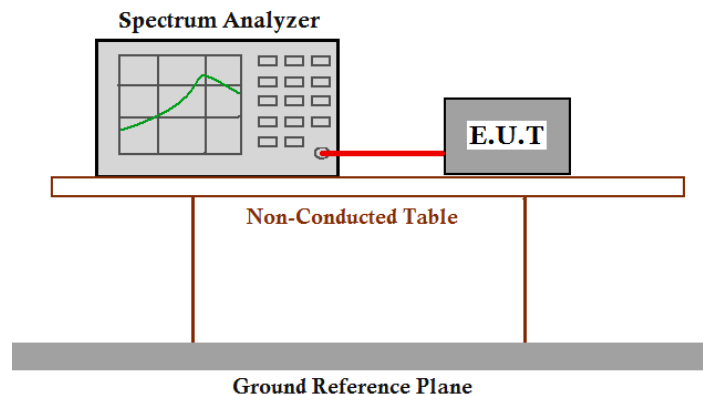
Frequency (MHz)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	27.93	8.02	38.23	38.52	36.24	54.00	Vertical
2390.000	27.63	8.17	38.25	39.41	36.96	54.00	V
2483.500	27.55	6.99	49.42	49.87	34.99	54.00	V
2500.000	27.55	7.02	49.42	50.12	35.27	54.00	V
2310.000	27.93	8.02	38.23	39.30	37.02	54.00	Horizontal
2390.000	27.63	8.17	38.25	38.33	35.88	54.00	H
2483.500	27.55	6.99	49.42	47.12	32.24	54.00	H
2500.000	27.55	7.02	49.42	46.35	31.50	54.00	H

Remark: above table only record the worse data of emissions in restricted frequency bands.

Test result: The unit does meet the FCC requirements.

7.6 Band Edges Requirement

Test Requirement:	FCC Part 15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.
Frequency Band:	2400 MHz to 2483.5 MHz
Test Method:	FCC/KDB-558074 D01 v03r01 Clause 13.3.1
Test Status:	Enter test mode for the product. Test in lowest channel 2402 MHz and highest channel 2480 MHz, keep in continuously transmitting status with GFSK modulation. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.
Test Configuration:	



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set instrument center frequency to the frequency of the emission to be measured (must be within 2MHz of the authorized band edge).
3. Set span to 2MHz,
4. RBW=100kHz,
5. VBW \geq 3 \times RBW
6. Detector=peak
7. Sweep time =auto,
8. Trace mode=max hold.
9. Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)
10. Compute the power by integrating the spectrum over 1MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency ($f_{\text{emission}} \pm 0.5\text{MHz}$). If the instrument does not have a band power function, the sum the amplitude levels (in power units) at 100kHz intervals extending across the 1MHz spectrum defined by $f_{\text{emission}} \pm 0.5\text{MHz}$.

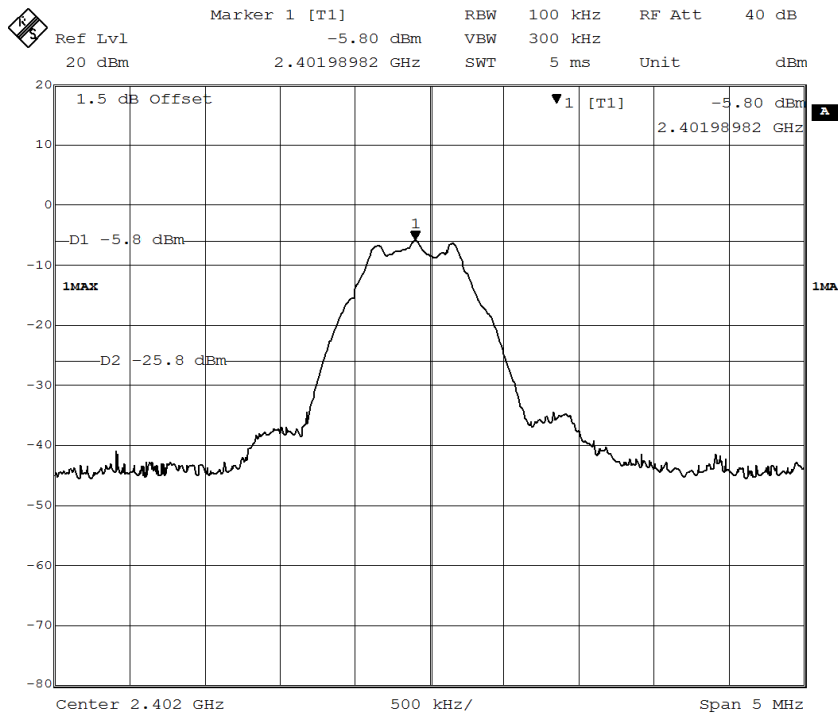
Test result with plots as follows:

Compare with the output power of the lowest frequency, the Lower Edges attenuated more than 20dB
 Compare with the output power of the highest frequency, the Upper Edges attenuated more than 20dB.

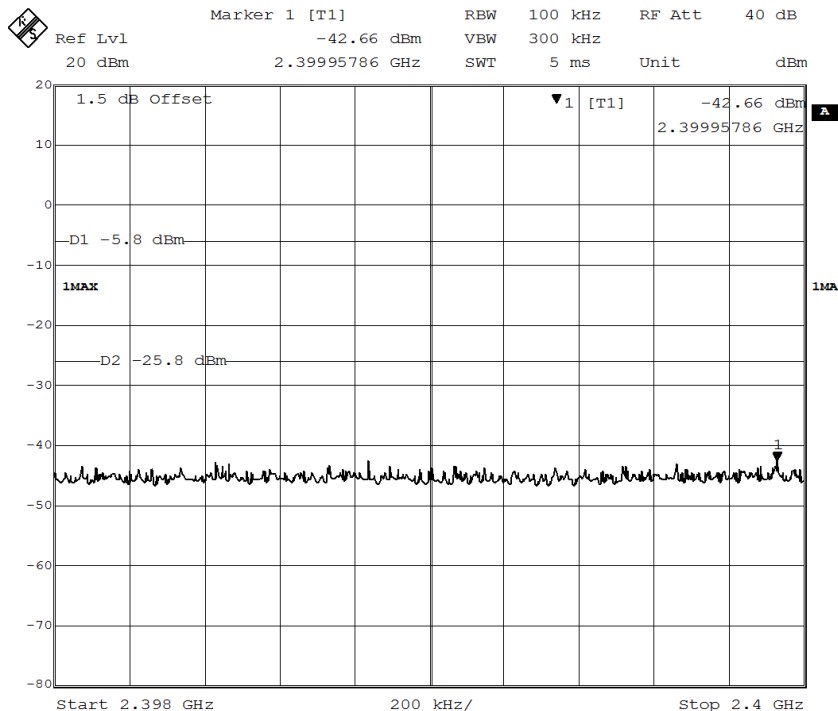
Result plot as follows:

Channel 0: 2.402 GHz

Step 1

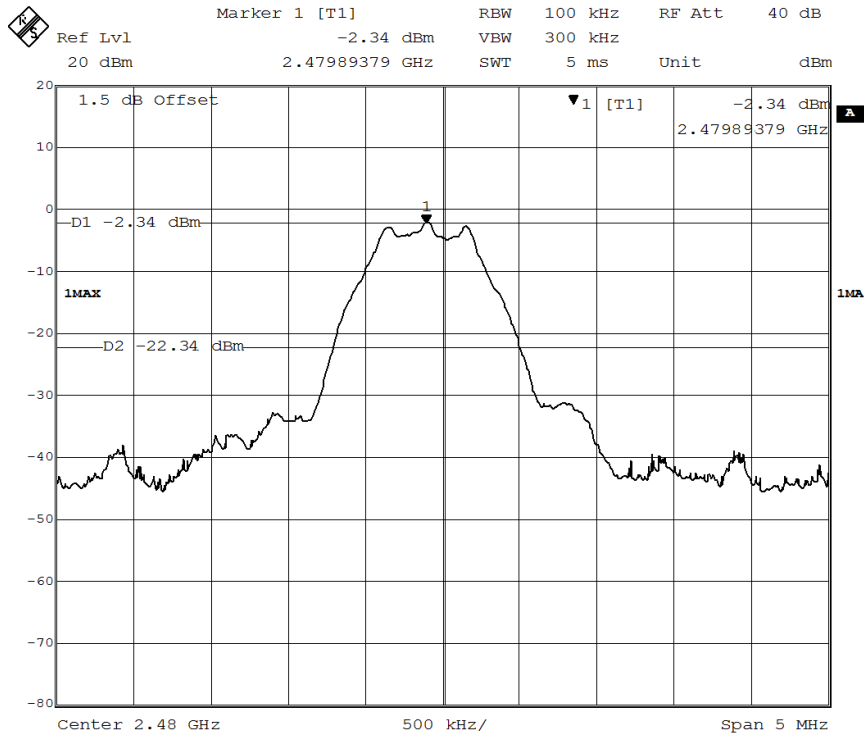


Step 2

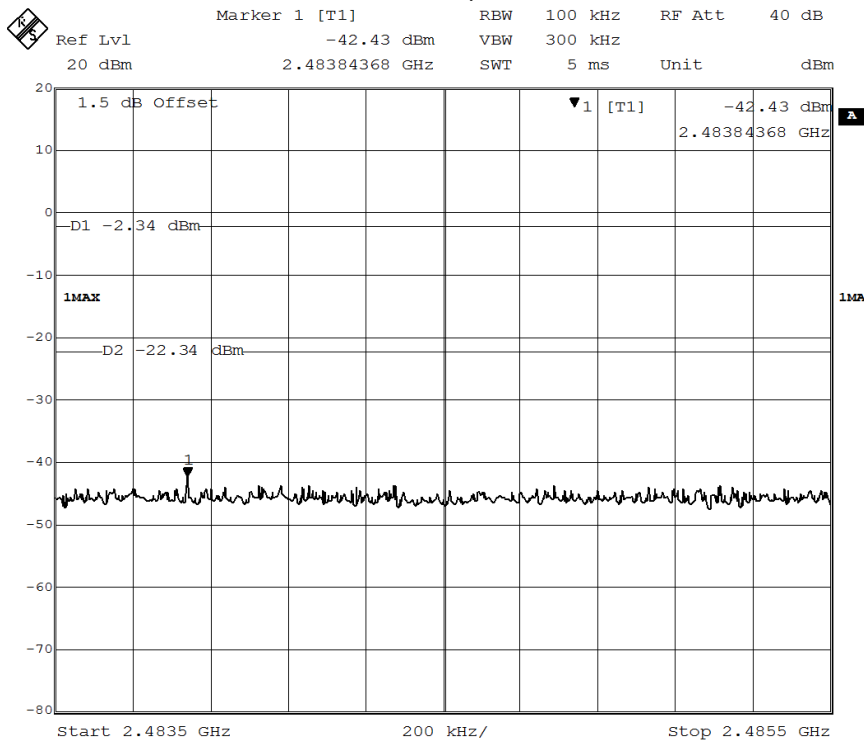


Channel 39: 2.480GHz

Step 1



Step 2



7.7 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207
Test Method: ANSI C63.10: Clause 6.2
Test Status: Enter test mode for the product. Test in lowest Channel 0, middle Channel 20 and highest Channel 39, keep in continuously transmitting status. find worse case in Channel 20.
Frequency Range: 150 kHz to 30 MHz
Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)
Test Limit

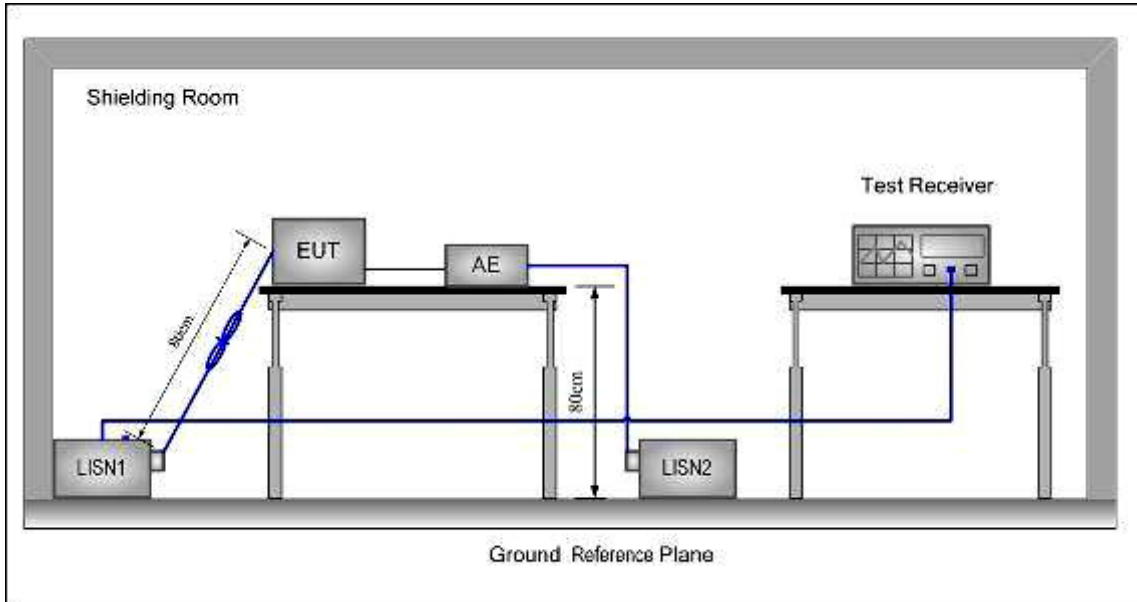
Limits for conducted disturbance at the mains ports of class B

Frequency Range (MHz)	Class B Limit 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

NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.
 Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:



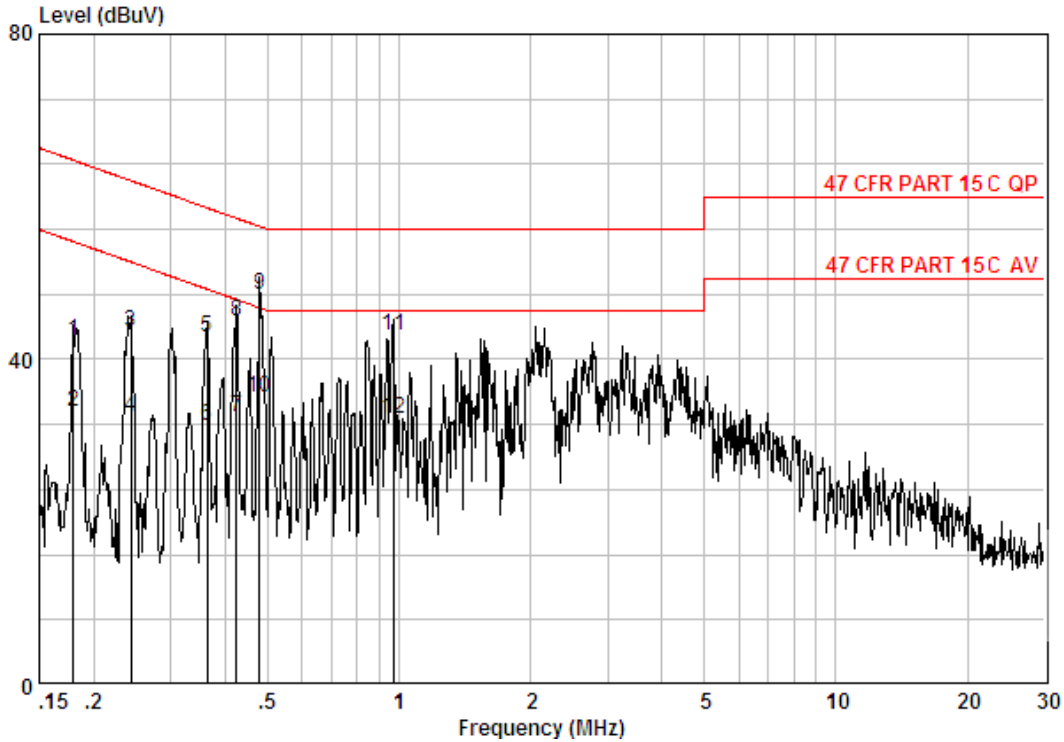
Test procedure:

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables + 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.
3. 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, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. 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.

7.7.1 Measurement Data

The following Quasi-Peak and Average measurements were performed on the EUT:

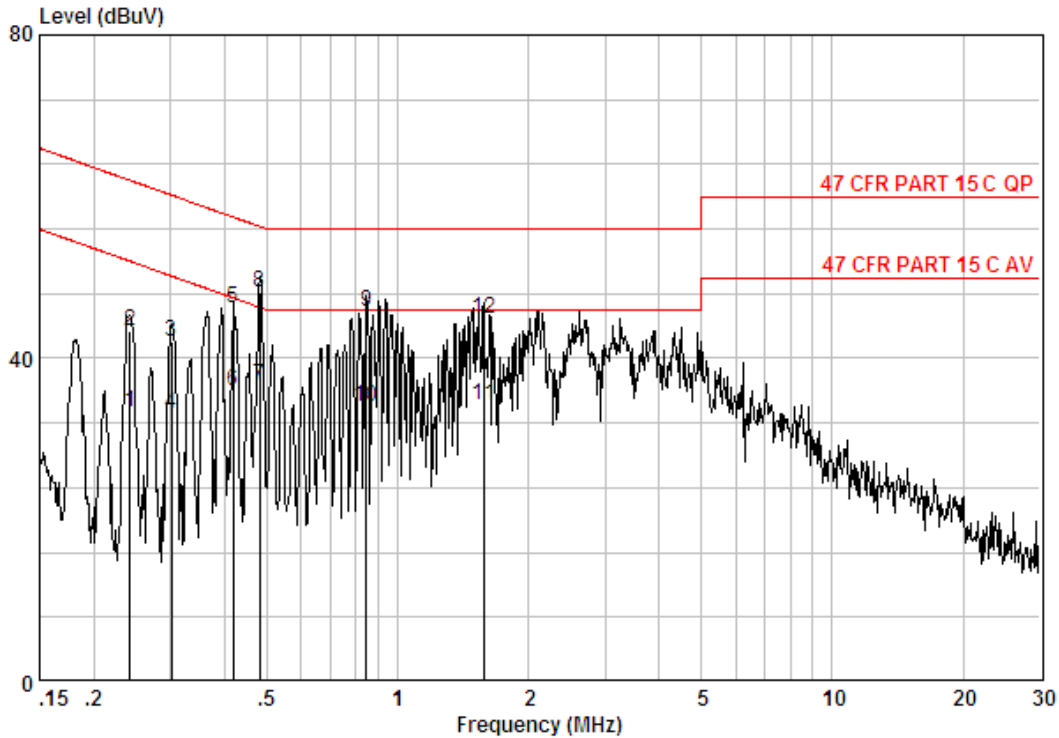
Neutral Line



Measure data:

Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB	dB	dBuV	dBuV	dBuV	dB	
0.17961	0.02	9.70	32.61	42.33	64.50	-22.18	QP
0.17961	0.02	9.70	23.95	33.67	54.50	-20.83	Average
0.24293	0.02	9.70	33.67	43.39	62.00	-18.61	QP
0.24293	0.02	9.70	23.13	32.85	52.00	-19.15	Average
0.36338	0.01	9.77	32.93	42.71	58.65	-15.94	QP
0.36338	0.01	9.77	22.05	31.83	48.65	-16.82	Average
0.42373	0.01	9.80	23.18	32.99	47.37	-14.38	Average
0.42373	0.01	9.80	34.87	44.68	57.37	-12.69	QP
0.47865	0.01	9.80	38.22	48.03	56.36	-8.33	QP
0.47865	0.01	9.80	25.42	35.23	46.36	-11.13	Average
0.97354	0.02	9.80	33.05	42.87	56.00	-13.13	QP
0.97354	0.02	9.80	22.86	32.68	46.00	-13.32	Average

Live Line



Measure result:

Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB	dB	dBuV	dBuV	dBuV	dB	
0.24165	0.02	9.70	23.58	33.30	52.04	-18.74	Average
0.24165	0.02	9.70	33.71	43.42	62.04	-18.62	QP
0.30188	0.01	9.70	32.43	42.14	60.19	-18.05	QP
0.30188	0.01	9.70	23.47	33.18	50.19	-17.01	Average
0.41927	0.01	9.80	36.36	46.17	57.46	-11.29	QP
0.41927	0.01	9.80	26.25	36.06	47.46	-11.40	Average
0.48119	0.01	9.80	26.77	36.58	46.32	-9.73	Average
0.48119	0.01	9.80	38.34	48.15	56.32	-8.17	QP
0.84826	0.02	9.80	35.88	45.70	56.00	-10.30	QP
0.84826	0.02	9.80	24.29	34.11	46.00	-11.89	Average
1.577	0.02	9.80	24.33	34.15	46.00	-11.86	Average
1.577	0.02	9.80	35.06	44.88	56.00	-11.12	QP

--End of Report--