TEST REPORT

FCC Applicant:	PowerFleet Inc.
Address of Applicant:	123 Tice Boulevard Suite 101, Woodcliff Lake, NJ New Jersey 07677, United States
IC Applicant:	PowerFleet, Inc.
Address of Applicant:	123 Tice Blvd., Suite 101 Woodcliff Lake NJ 07677 United States
Manufacturer/ Factory:	PowerFleet, Inc.
Address of Manufacturer/ Factory:	123 Tice Blvd., Suite 101 Woodcliff Lake NJ 07677 United States

Equipment Under Test (EUT)

Product Name:	CR400
Model No.:	CR 400
HVIN:	76
FCC ID:	2AG69CR400
IC:	9975A-CR400
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 RSS-247 Issue 2 RSS-Gen Issue 5
Date of sample receipt:	March 02, 2021
Date of Test:	March 03-22, 2021
Date of report issued:	March 23, 2021
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

Testing Cert #381383

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*March 23, 2021*	*Original*

Prepared By: *Tiger Chen* ***Date:*** *March 23, 2021*

Project Engineer

Check By: *Robinson Liu* ***Date:*** *March 23, 2021*

Reviewer

3 Contents

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c) RSS-Gen Section 6.8	Pass
AC Power Line Conducted Emission	15.207 RSS-Gen Section 8.8	Pass
Conducted Output Power	15.247 (b)(3) RSS-247 Section 5.4(d)	Pass
Channel Bandwidth	15.247 (a)(2) RSS-247 Section 5.2(a)	Pass
99% Occupy Bandwidth	RSS-Gen Section 6.7	
Power Spectral Density	15.247 (e) RSS-247 Section 5.2(b)	Pass
Band Edge	15.247(d) RSS-247 Section 5.5	Pass
Spurious Emission	15.205/15.209 RSS-247 Section 5.5	Pass
Frequency stability	RSS-Gen Section 6.11& Section 8.11	Pass

Remarks:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013 and RSS-Gen.*

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	CR400
Model No.:	CR 400
Test sample(s) ID:	GTS202103000020-1
Sample(s) Status:	Engineer sample
Serial No.:	1812899
Hardware Version:	B
Software Version:	54
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	Integral Antenna
Antenna Gain:	1.72dBi(declare by applicant)
Power Supply:	DC 9-32V or DC 3.7V Lithium Ion Polymer Battery Pack

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402 MHz	11	2422 MHz	21	2442 MHz	31	2462 MHz
2	2404 MHz	12	2424 MHz	22	2444 MHz	32	2464 MHz
3	2406 MHz	13	2426 MHz	23	2446 MHz	33	2466 MHz
4	2408 MHz	14	2428 MHz	24	2448 MHz	34	2468 MHz
5	2410 MHz	15	2430 MHz	25	2450 MHz	35	2470 MHz
6	2412 MHz	16	2432 MHz	26	2452 MHz	36	2472 MHz
7	2414 MHz	17	2434 MHz	27	2454 MHz	37	2474 MHz
8	2416 MHz	18	2436 MHz	28	2456 MHz	38	2476 MHz
9	2418 MHz	19	2438 MHz	29	2458 MHz	39	2478 MHz
10	2420 MHz	20	2440 MHz	30	2460 MHz	40	2480 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
MEILI	DC POWER SUPPLY	MCH-305A	011121168

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.8 Additional instructions

Test Software	Test command provide by manufacturer.
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

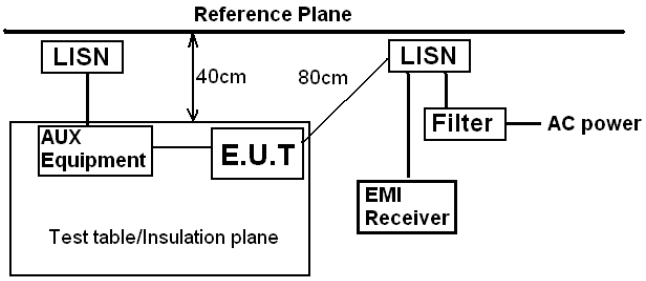
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

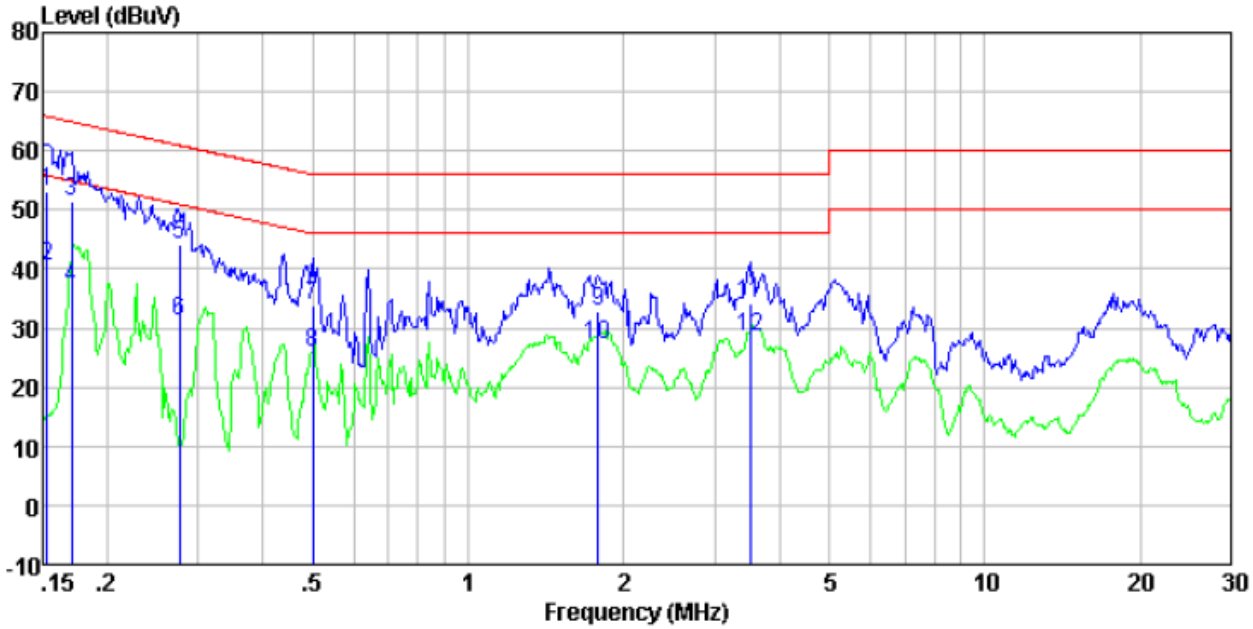
7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
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. **15.247(c) (1)(i) requirement:** (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi 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 6dBi.	
Standard requirement:	RSS-Gen Section 6.8
A transmitter can only be sold or operated with antennas with which it was approved. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. For transmitters of RF output power of 10 milliwatts or less, only the portion of the antenna gain that is in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power to demonstrate compliance with the radiated power limits specified in the applicable standard. For transmitters of output power greater than 10 milliwatts, the total antenna gain shall be added to the measured RF output power to demonstrate compliance to the specified radiated power	
E.U.T Antenna:	
The antenna is Integral antenna, the best case gain of the is 0dBi, reference to the appendix II for details	

7.2 Conducted Emissions

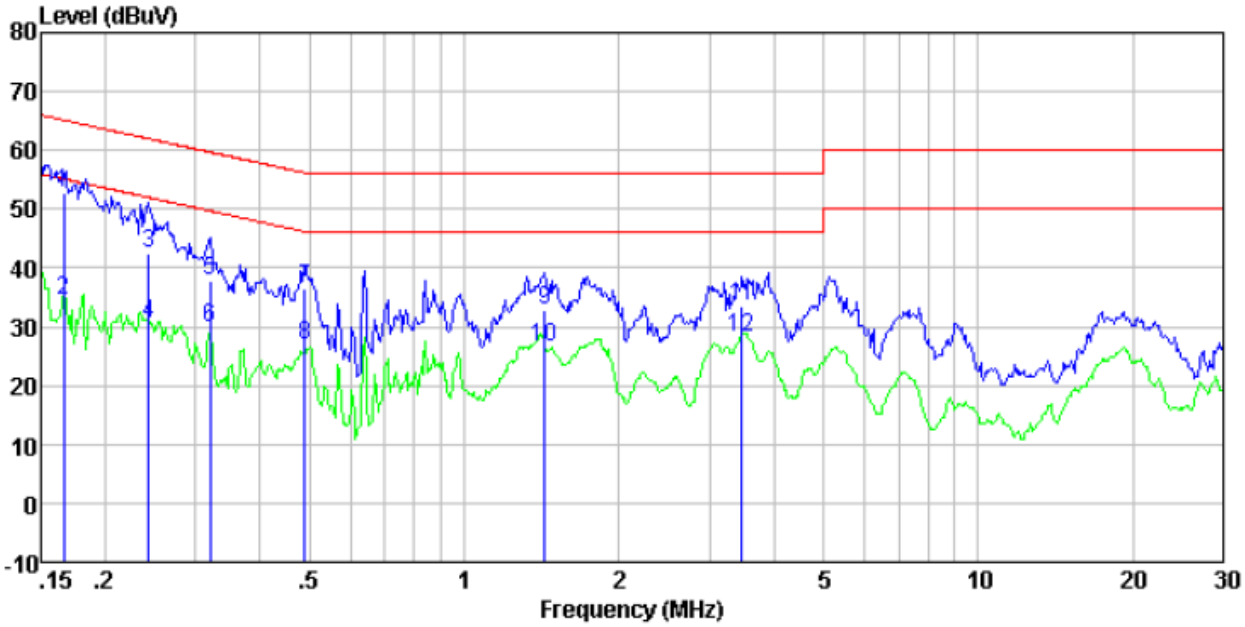
Test Requirement:	FCC Part15 C Section 15.207 RSS-Gen Section 8.8
Test Method:	ANSI C63.10:2013 and RSS-Gen
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2009 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C / Humid.: 52% / Press.: 1012mbar
Test results:	Pass

Measurement data
Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	32.50	20.40	0.07	52.97	65.82	-12.85	QP
0.15	19.90	20.40	0.07	40.37	55.82	-15.45	Average
0.17	30.96	20.40	0.09	51.45	64.94	-13.49	QP
0.17	16.30	20.40	0.09	36.79	54.94	-18.15	Average
0.28	23.47	20.40	0.10	43.97	60.94	-16.97	QP
0.28	10.55	20.40	0.10	31.05	50.94	-19.89	Average
0.50	13.48	20.32	0.11	33.91	56.01	-22.10	QP
0.50	5.47	20.32	0.11	25.90	46.01	-20.11	Average
1.78	12.46	20.20	0.17	32.83	56.00	-23.17	QP
1.78	6.91	20.20	0.17	27.28	46.00	-18.72	Average
3.51	13.67	20.20	0.18	34.05	56.00	-21.95	QP
3.51	7.99	20.20	0.18	28.37	46.00	-17.63	Average

Neutral:

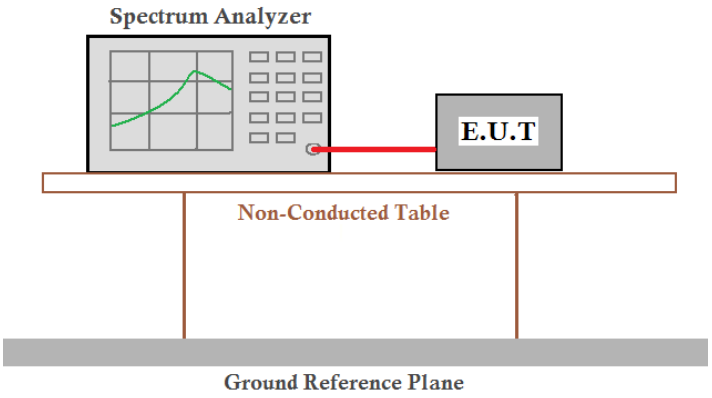


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.17	32.34	20.40	0.08	52.82	65.16	-12.34	QP
0.17	13.87	20.40	0.08	34.35	55.16	-20.81	Average
0.24	21.96	20.40	0.11	42.47	62.00	-19.53	QP
0.24	10.00	20.40	0.11	30.51	52.00	-21.49	Average
0.32	17.23	20.39	0.10	37.72	59.71	-21.99	QP
0.32	9.48	20.39	0.10	29.97	49.71	-19.74	Average
0.49	16.01	20.32	0.11	36.44	56.19	-19.75	QP
0.49	6.55	20.32	0.11	26.98	46.19	-19.21	Average
1.43	12.41	20.20	0.16	32.77	56.00	-23.23	QP
1.43	6.30	20.20	0.16	26.66	46.00	-19.34	Average
3.47	13.15	20.20	0.18	33.53	56.00	-22.47	QP
3.47	7.80	20.20	0.18	28.18	46.00	-17.82	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.3 Conducted Output Power

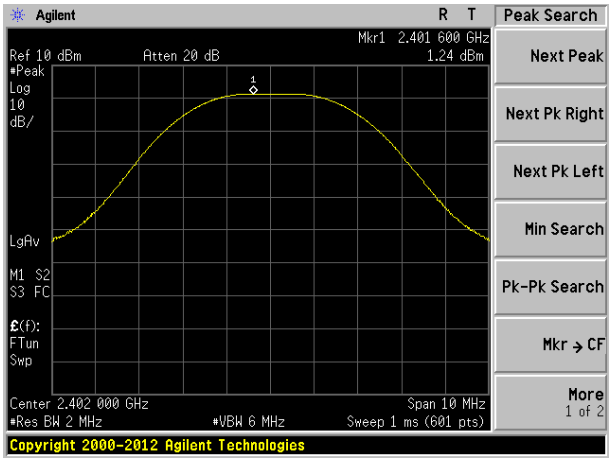
Test Requirement:	FCC Part15 C Section 15.247 (b)(3) RSS-247 Section 5.4(d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02 and RSS-Gen
Limit:	30dBm 36dBm(4W for e.i.r.p)
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

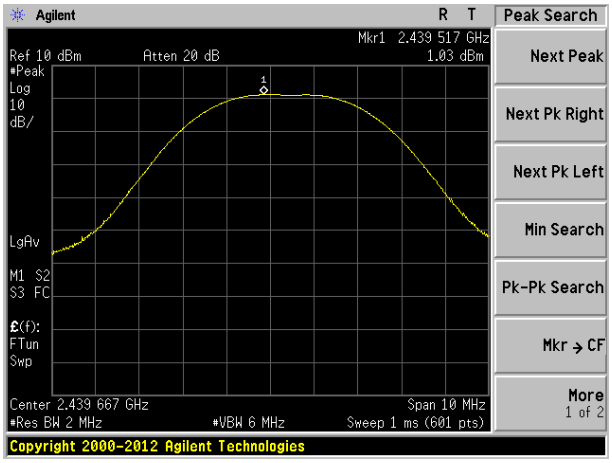
Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	1.24	30.00	Pass
Middle	1.03		
Highest	-0.39		

Test channel	e.i.r.p. (dBm)	Limit(dBm)	Result
Lowest	2.96	36.00	Pass
Middle	2.75		
Highest	1.33		

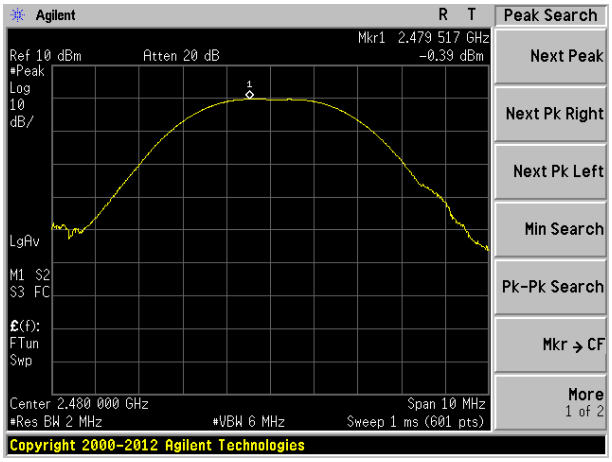
Test plot as follows:



Lowest channel

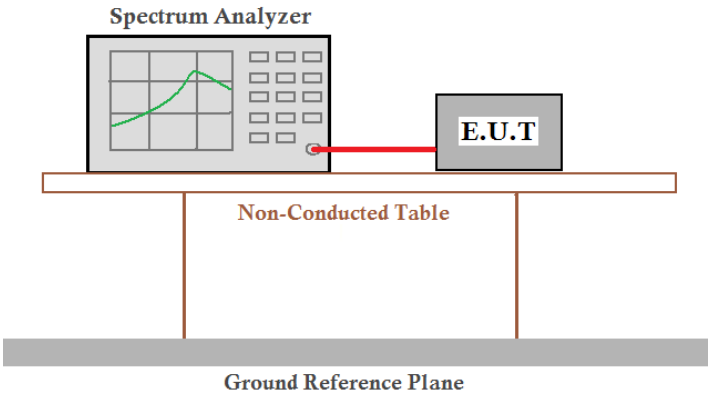


Middle channel



Highest channel

7.4 Channel Bandwidth & 99% Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2) & RSS-247 Section 5.2(a)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02 and RSS-Gen
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

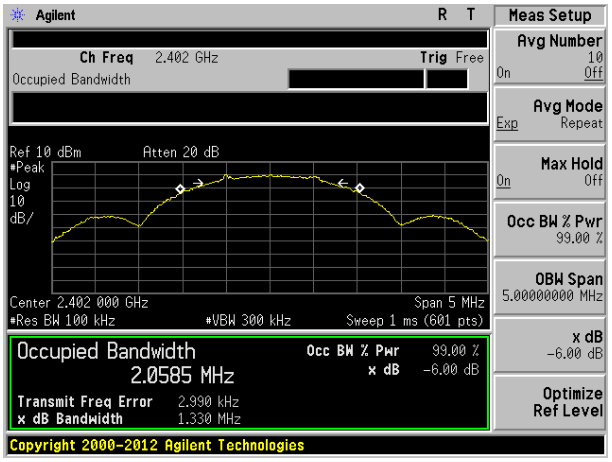
Measurement Data

Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
Lowest	1.330	>500	Pass
Middle	1.439		
Highest	1.339		

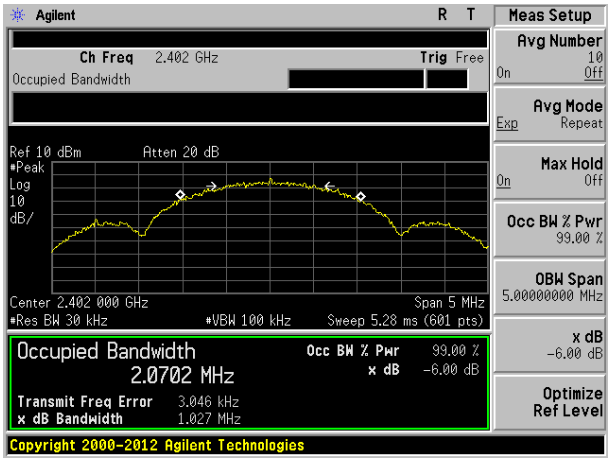
Test channel	99% Bandwidth (MHz)	Result
Lowest	2.0702	Pass
Middle	2.0679	
Highest	2.0678	

Test plot as follows:

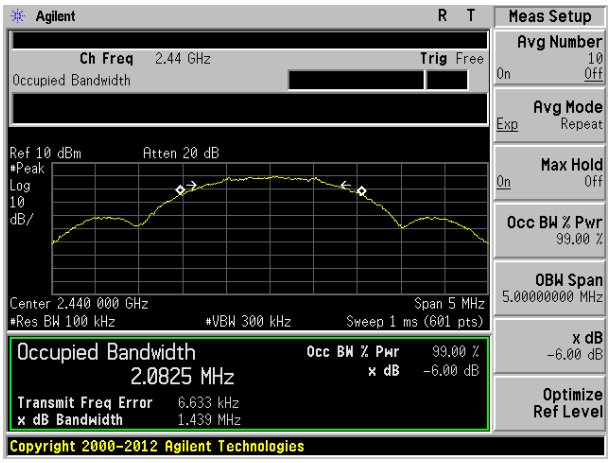
-6dB BW

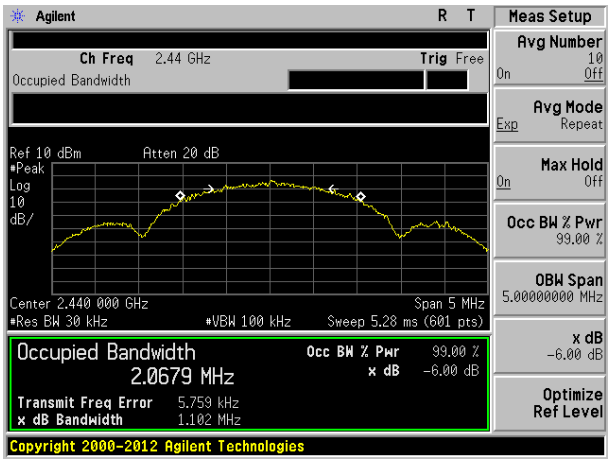


99% BW

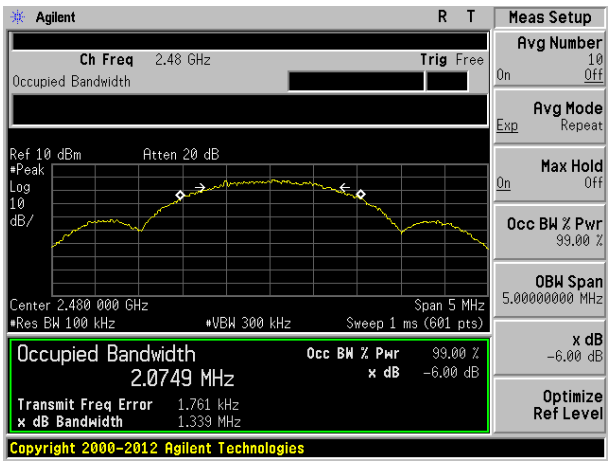


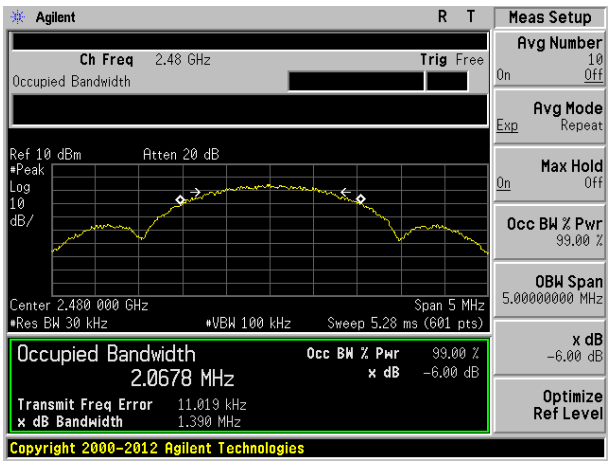
Lowest channel





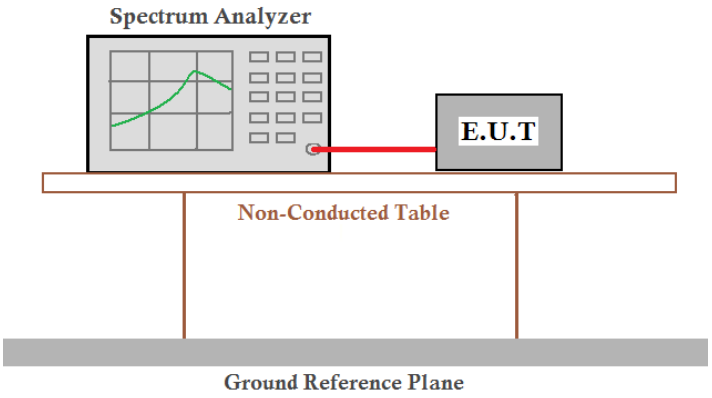
Middle channel





Highest channel

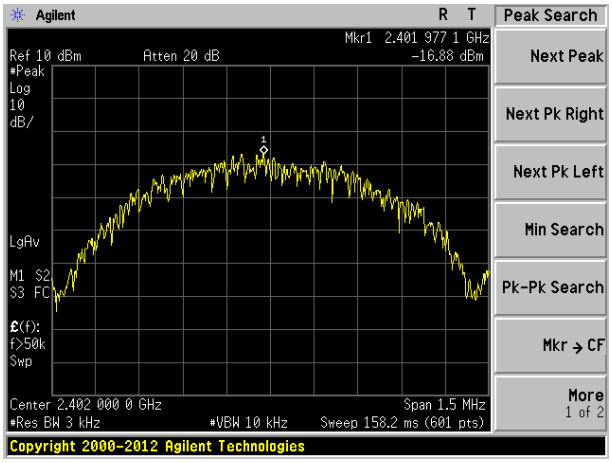
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e) RSS-247 Section 5.2(b)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02 and RSS-Gen
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

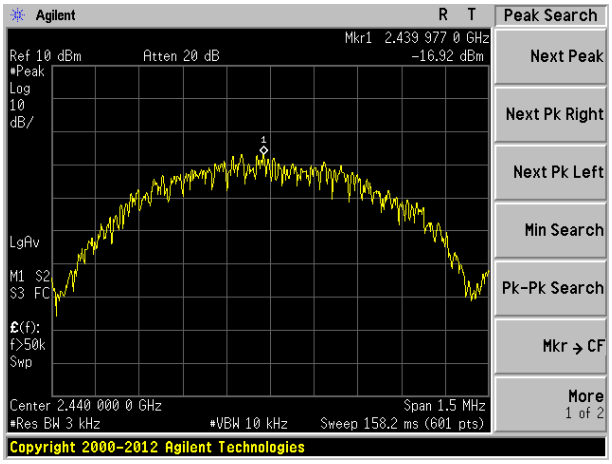
Measurement Data

Test channel	Power Spectral Density (dBm/3kHz)	Limit(dBm/3kHz)	Result
Lowest	-16.88	8.00	Pass
Middle	-16.92		
Highest	-17.98		

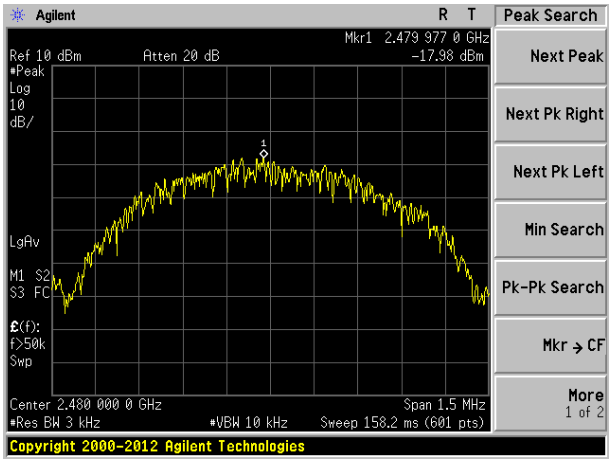
Test plot as follows:



Lowest channel



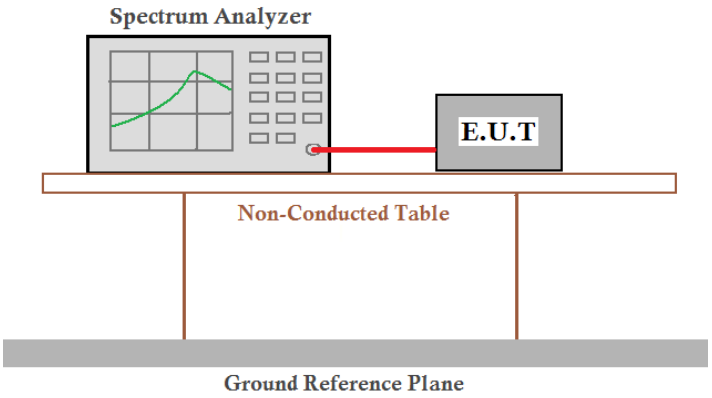
Middle channel



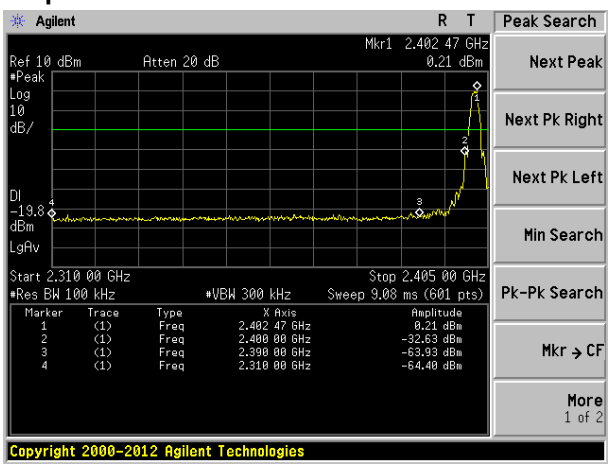
Highest channel

7.6 Band edges

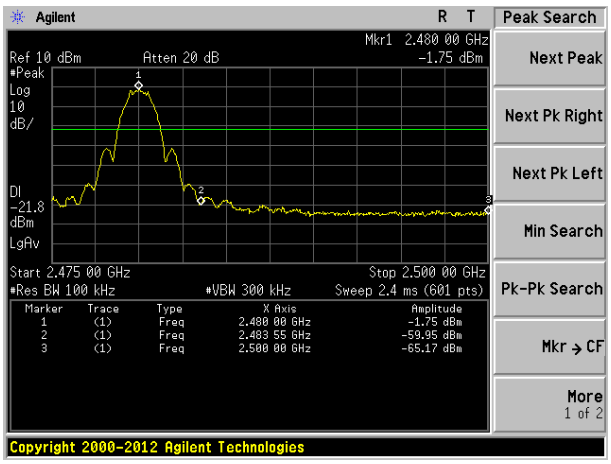
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d) RSS-247 Section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02 & RSS-Gen
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:



Lowest channel



Highest channel

7.6.2 Radiated Emission Method

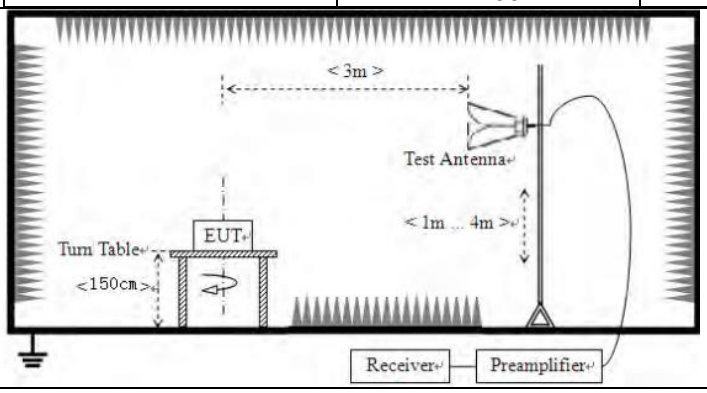
Test Requirement:	FCC Part15 C Section 15.209 and 15.205 RSS-247 Section 3.3 & RSS-Gen Section 8.10
Test Method:	ANSI C63.10:2013 & RSS-Gen
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	RMS	1MHz	3MHz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

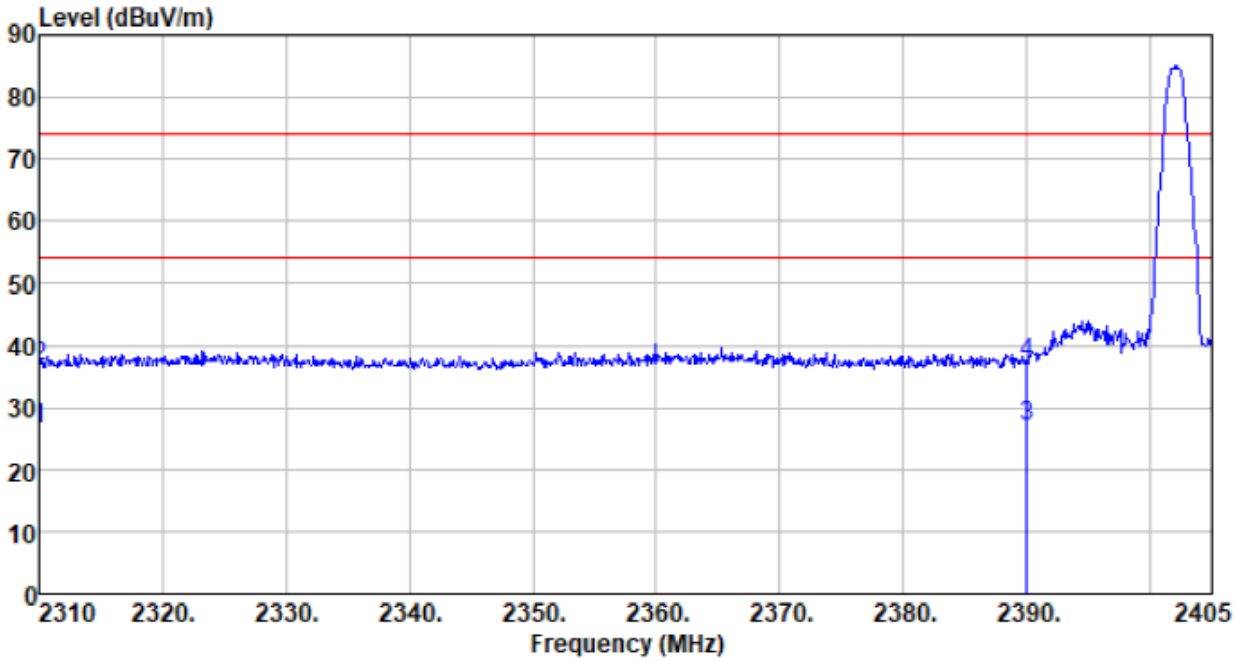
1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height 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 and the rota 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 X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

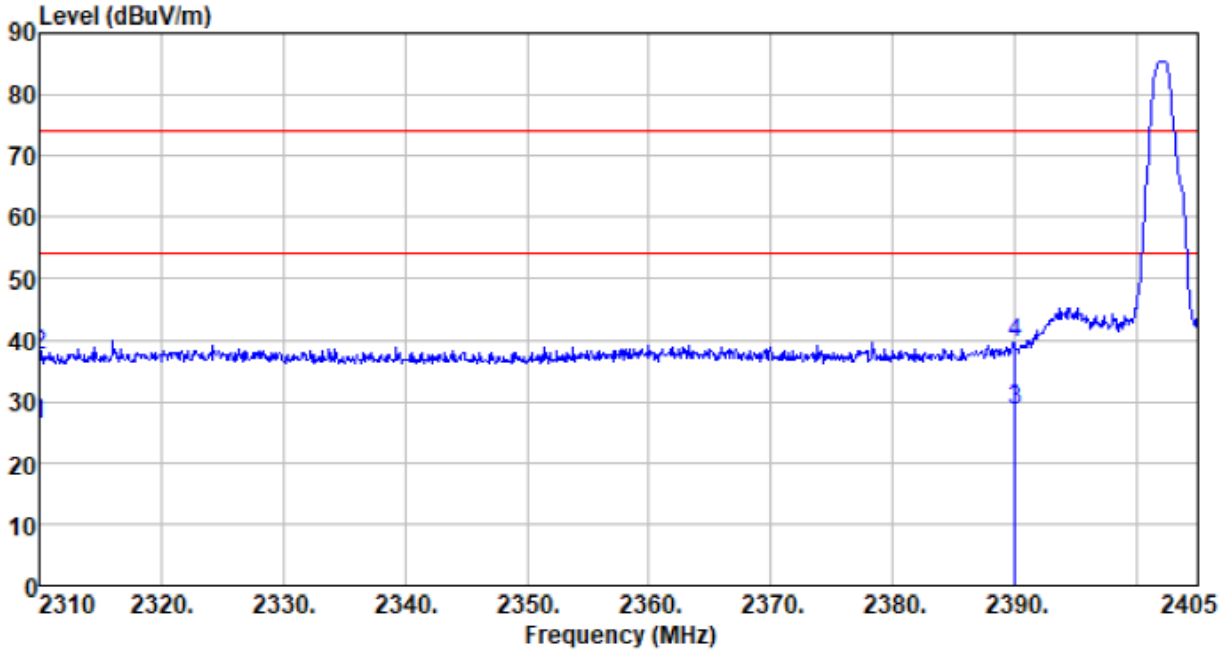
Test channel:	Lowest

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2310.000	33.52	27.14	2.81	36.79	26.68	54.00	-27.32	Average
2310.000	43.41	27.14	2.81	36.79	36.57	74.00	-37.43	Peak
2390.000	33.51	27.37	2.91	36.85	26.94	54.00	-27.06	Average
2390.000	43.66	27.37	2.91	36.85	37.09	74.00	-36.91	Peak

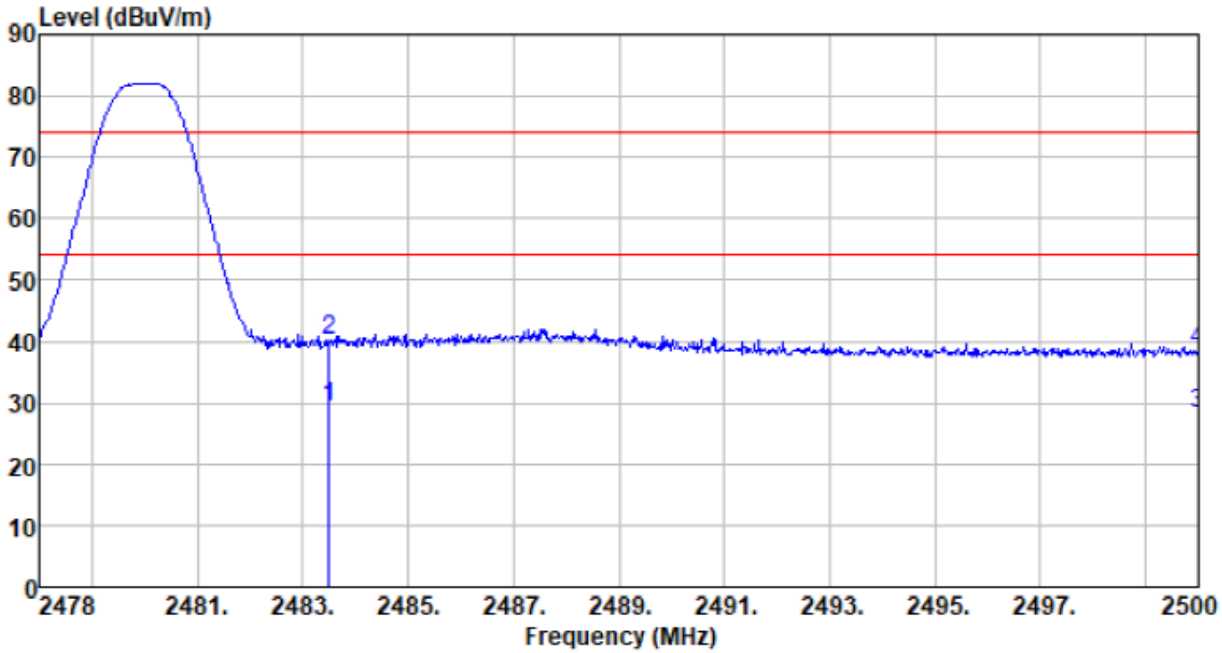
Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	33.14	27.14	2.81	36.79	26.30	54.00	-27.70	Average
2310.000	44.34	27.14	2.81	36.79	37.50	74.00	-36.50	Peak
2390.000	35.16	27.37	2.91	36.85	28.59	54.00	-25.41	Average
2390.000	45.97	27.37	2.91	36.85	39.40	74.00	-34.60	Peak

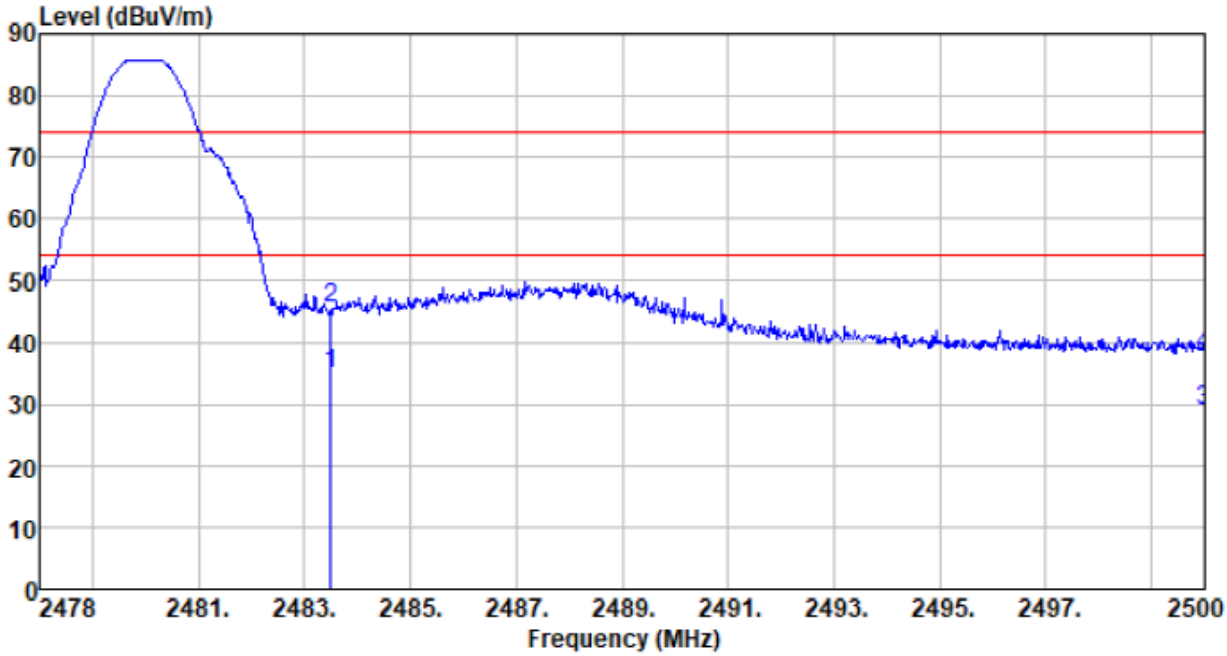
Test channel:	Highest

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2483.500	35.57	27.66	2.99	36.93	29.29	54.00	-24.71	Average
2483.500	46.54	27.66	2.99	36.93	40.26	74.00	-33.74	Peak
2500.000	34.32	27.70	3.01	36.94	28.09	54.00	-25.91	Average
2500.000	44.77	27.70	3.01	36.94	38.54	74.00	-35.46	Peak

Vertical::



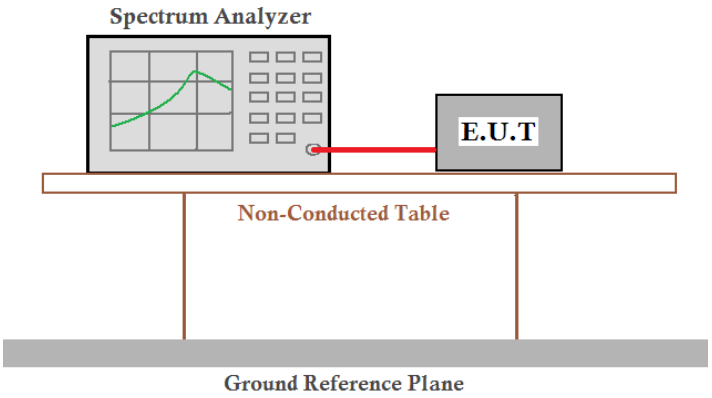
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	41.15	27.66	2.99	36.93	34.87	54.00	-19.13	Average
2483.500	51.86	27.66	2.99	36.93	45.58	74.00	-28.42	Peak
2500.000	34.97	27.70	3.01	36.94	28.74	54.00	-25.26	Average
2500.000	44.14	27.70	3.01	36.94	37.91	74.00	-36.09	Peak

Remarks:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*

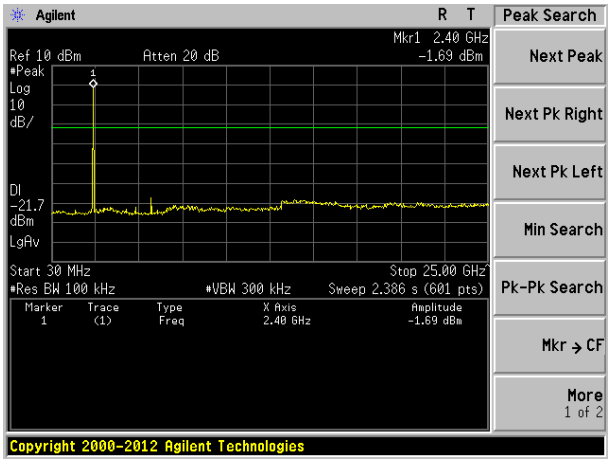
7.7 Spurious Emission

7.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d) RSS-247 Section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02 & RSS-Gen
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

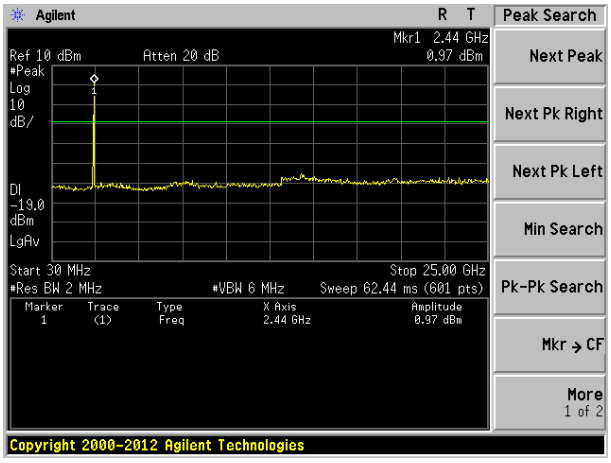
Test plot as follows:

Lowest channel



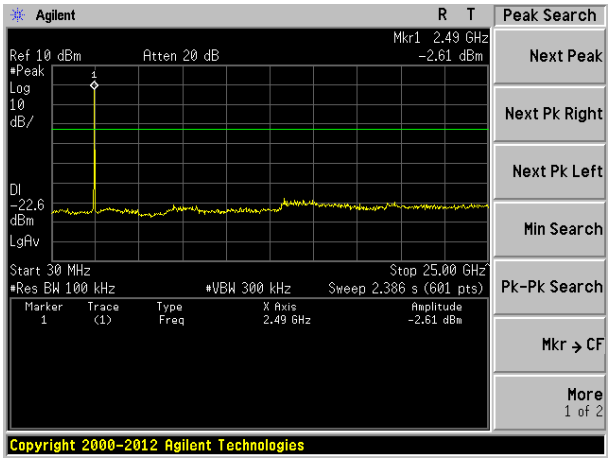
30MHz~25GHz

Middle channel



30MHz~25GHz

Highest channel



30MHz~25GHz

7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 RSS-247 Section 3.3 & RSS-Gen Section 8.9
Test Method:	ANSI C63.10:2013 & RSS-Gen
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

FCC Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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.

IC Limit:

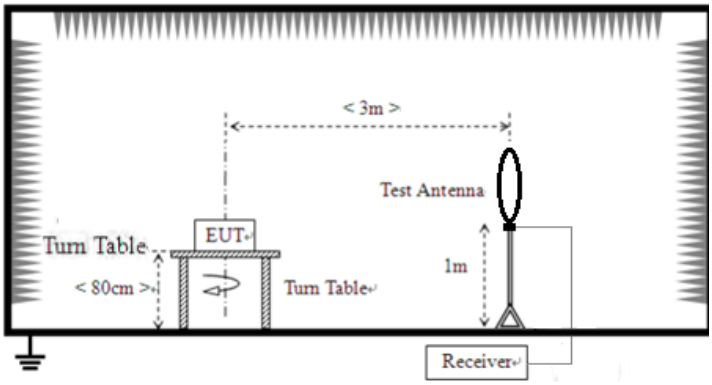
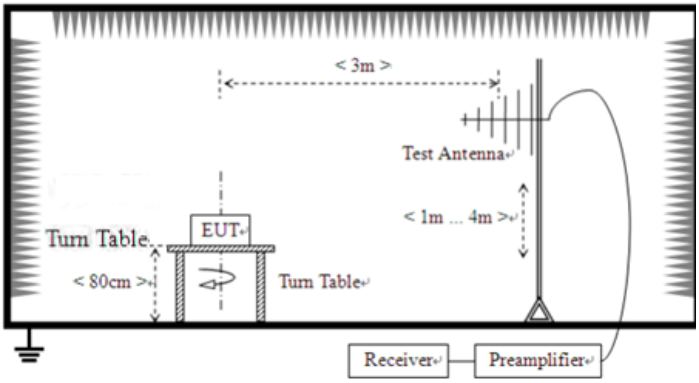
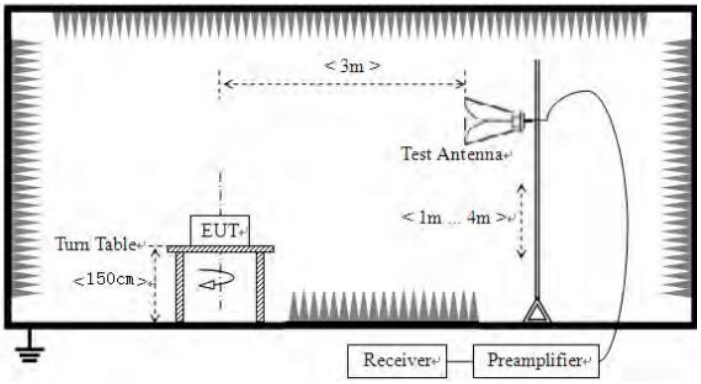
Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (µV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement distance (m)
9 - 490 kHz [1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Test setup:	For radiated emissions from 9kHz to 30MHz  For radiated emissions from 30MHz to1GHz  For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter 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 and the rota 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.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test results:	Pass					

Measurement data:

Remark:
Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

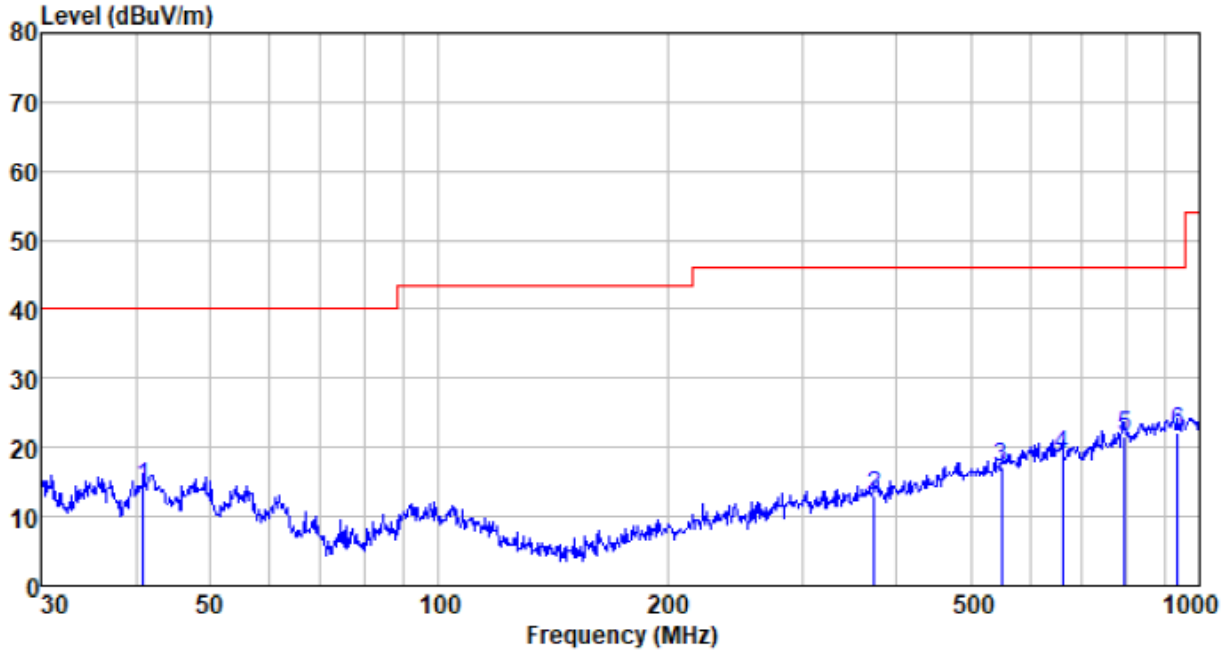
■ **9kHz~30MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

■ **Below 1GHz**

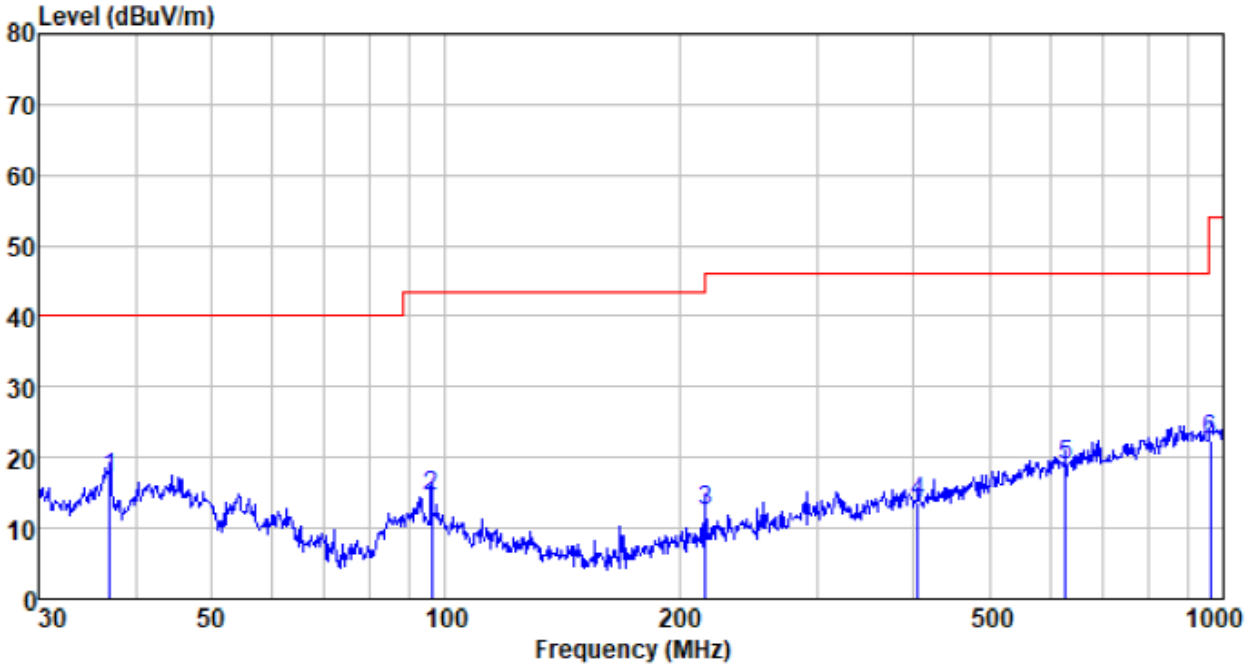
Pre-scan all test modes, found worst case at 2480MHz, and so only show the test result of 2480MHz

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
40.845	37.12	12.21	0.67	35.71	14.29	40.00	-25.71	QP
373.311	32.91	14.89	2.73	37.50	13.03	46.00	-32.97	QP
549.020	32.59	18.40	3.52	37.53	16.98	46.00	-29.02	QP
661.151	33.01	19.56	3.95	37.60	18.92	46.00	-27.08	QP
796.183	33.51	21.34	4.45	37.62	21.68	46.00	-24.32	QP
935.546	32.27	22.45	4.99	37.57	22.14	46.00	-23.86	QP

Vertical:

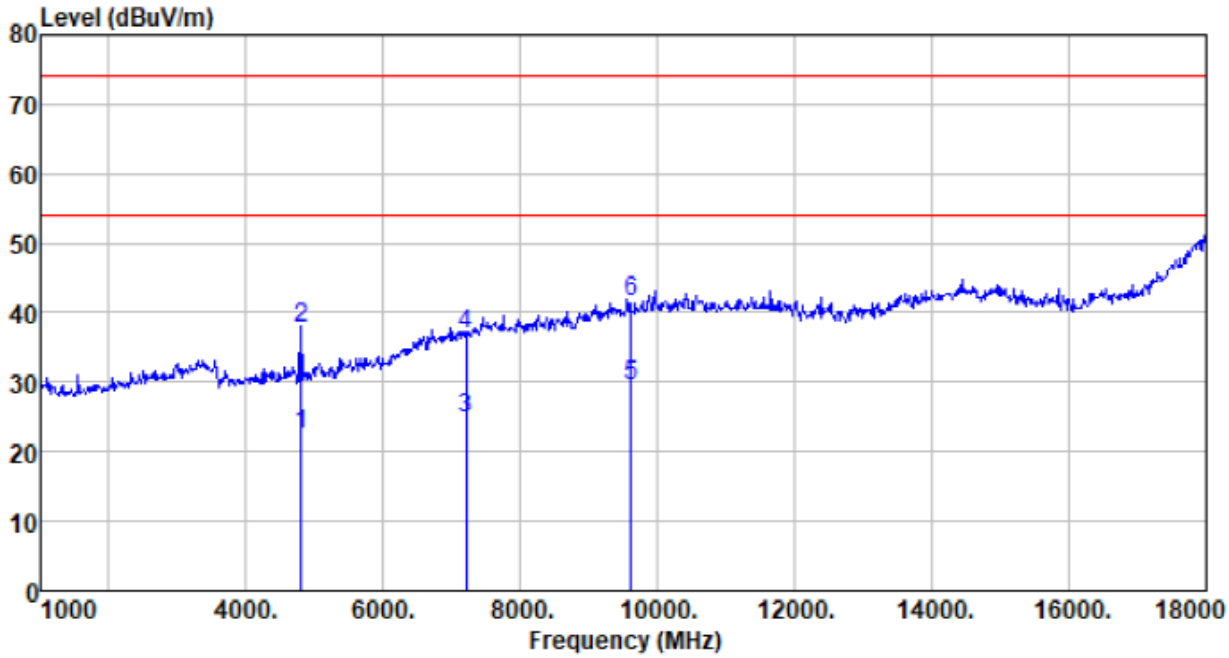


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
37.025	40.34	11.70	0.63	35.49	17.18	40.00	-22.82	QP
96.099	38.34	11.65	1.16	36.69	14.46	43.50	-29.04	QP
216.024	36.86	11.02	1.93	37.35	12.46	46.00	-33.54	QP
404.667	32.91	15.42	2.88	37.52	13.69	46.00	-32.31	QP
627.274	33.05	19.53	3.83	37.57	18.84	46.00	-27.16	QP
962.162	32.41	22.55	5.09	37.54	22.51	54.00	-31.49	QP

■ **Above 1GHz**

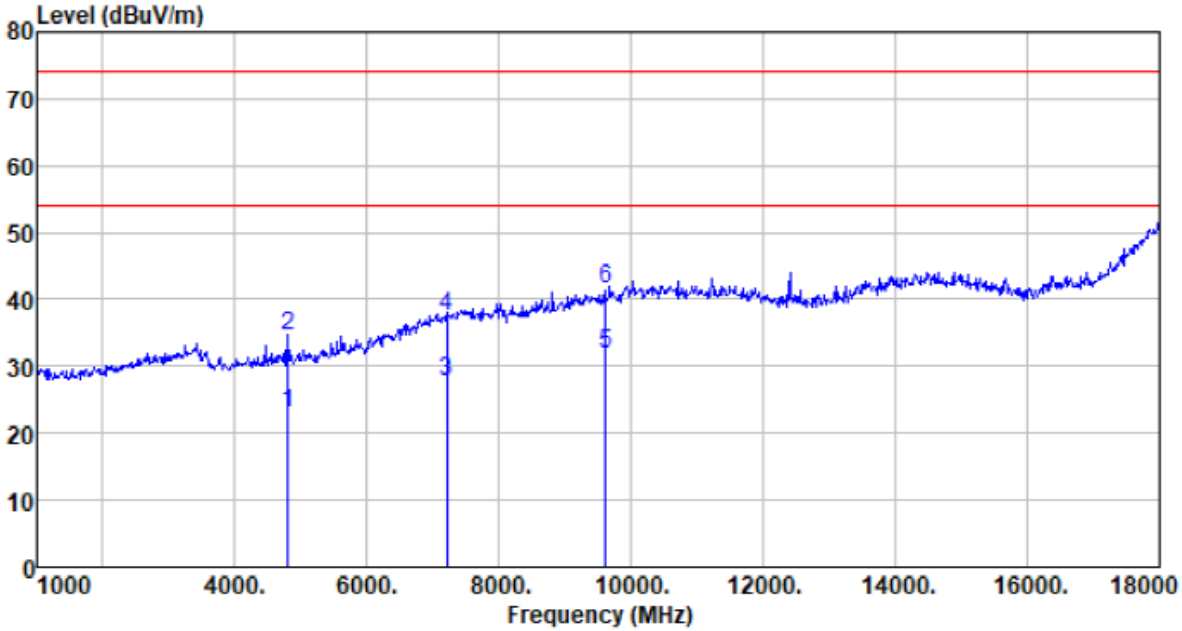
Test channel:	Lowest

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4804.000	24.32	31.20	4.61	37.73	22.40	54.00	-31.60	Average
4804.000	39.68	31.20	4.61	37.73	37.76	74.00	-36.24	Peak
7206.000	17.85	36.16	6.48	35.63	24.86	54.00	-29.14	Average
7206.000	29.96	36.16	6.48	35.63	36.97	74.00	-37.03	Peak
9608.000	18.66	37.93	7.97	34.94	29.62	54.00	-24.38	Average
9608.000	30.69	37.93	7.97	34.94	41.65	74.00	-32.35	Peak

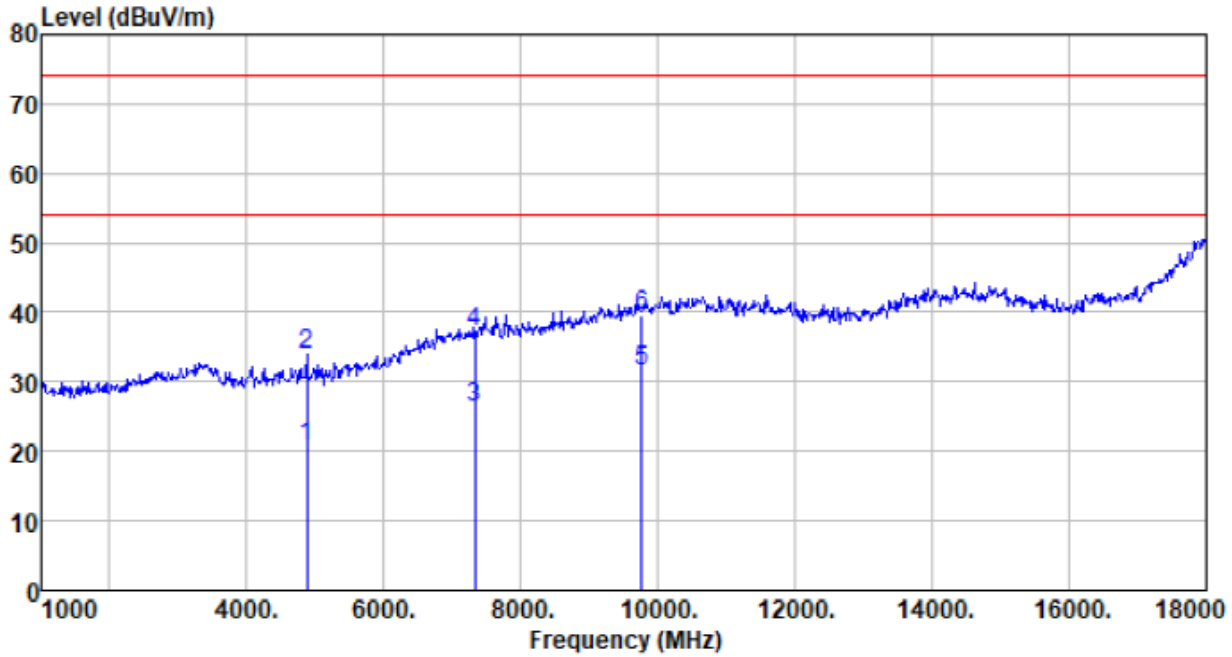
Vertical:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4804.000	24.97	31.20	4.61	37.73	23.05	54.00	-30.95	Average
4804.000	36.52	31.20	4.61	37.73	34.60	74.00	-39.40	Peak
7206.000	20.75	36.16	6.48	35.63	27.76	54.00	-26.24	Average
7206.000	30.36	36.16	6.48	35.63	37.37	74.00	-36.63	Peak
9608.000	20.85	37.93	7.97	34.94	31.81	54.00	-22.19	Average
9608.000	30.57	37.93	7.97	34.94	41.53	74.00	-32.47	Peak

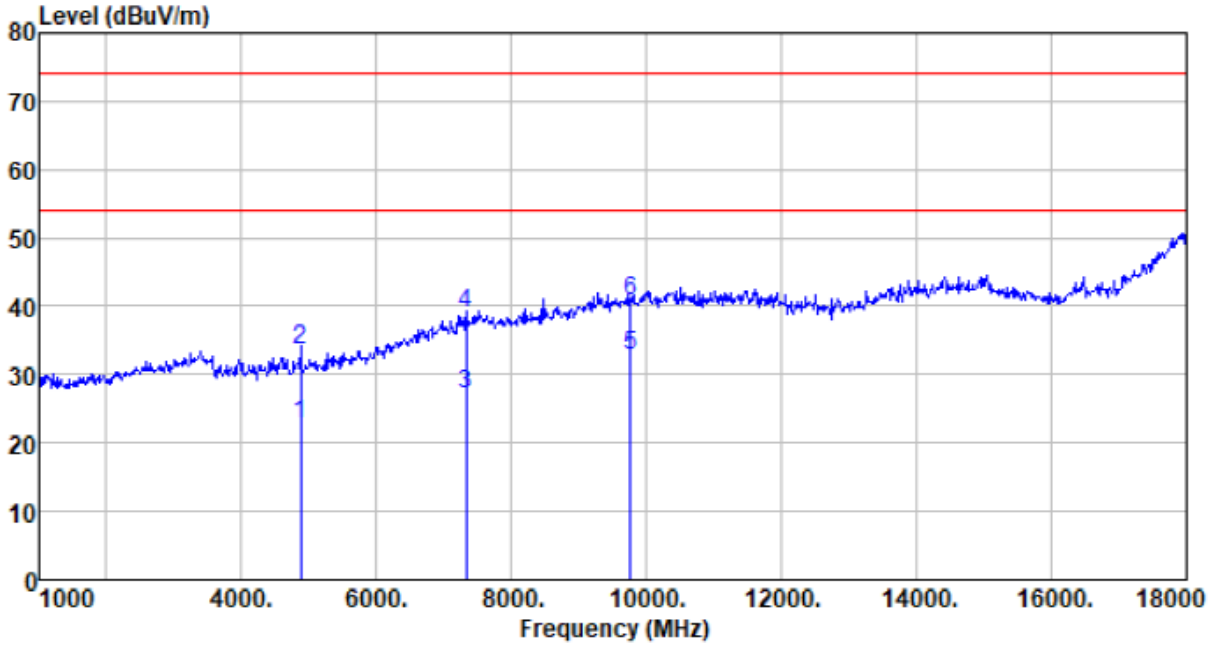
Test channel:	Middle

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4880.000	22.54	31.31	4.69	37.75	20.79	54.00	-33.21	Average
4880.000	35.55	31.31	4.69	37.75	33.80	74.00	-40.20	Peak
7320.000	18.84	36.43	6.63	35.60	26.30	54.00	-27.70	Average
7320.000	29.83	36.43	6.63	35.60	37.29	74.00	-36.71	Peak
9760.000	20.44	38.10	8.03	35.03	31.54	54.00	-22.46	Average
9760.000	28.46	38.10	8.03	35.03	39.56	74.00	-34.44	Peak

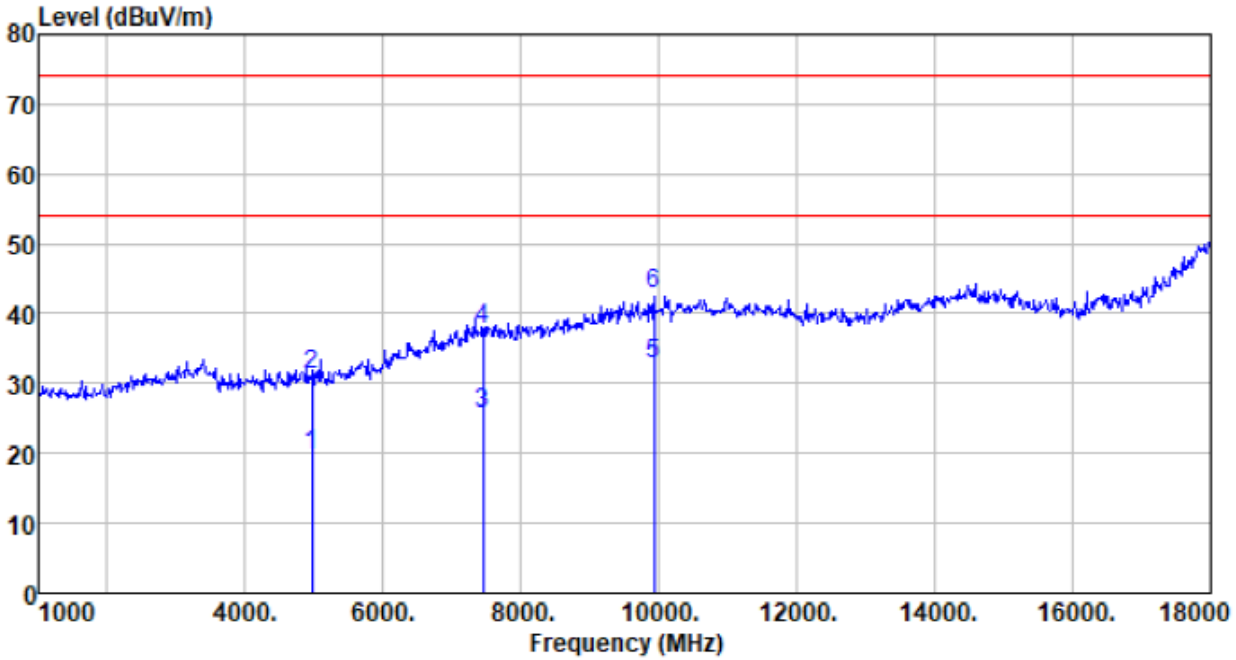
Vertical:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4880.000	24.54	31.31	4.69	37.75	22.79	54.00	-31.21	Average
4880.000	35.47	31.31	4.69	37.75	33.72	74.00	-40.28	Peak
7320.000	19.55	36.43	6.63	35.60	27.01	54.00	-26.99	Average
7320.000	31.44	36.43	6.63	35.60	38.90	74.00	-35.10	Peak
9760.000	21.53	38.10	8.03	35.03	32.63	54.00	-21.37	Average
9760.000	29.74	38.10	8.03	35.03	40.84	74.00	-33.16	Peak

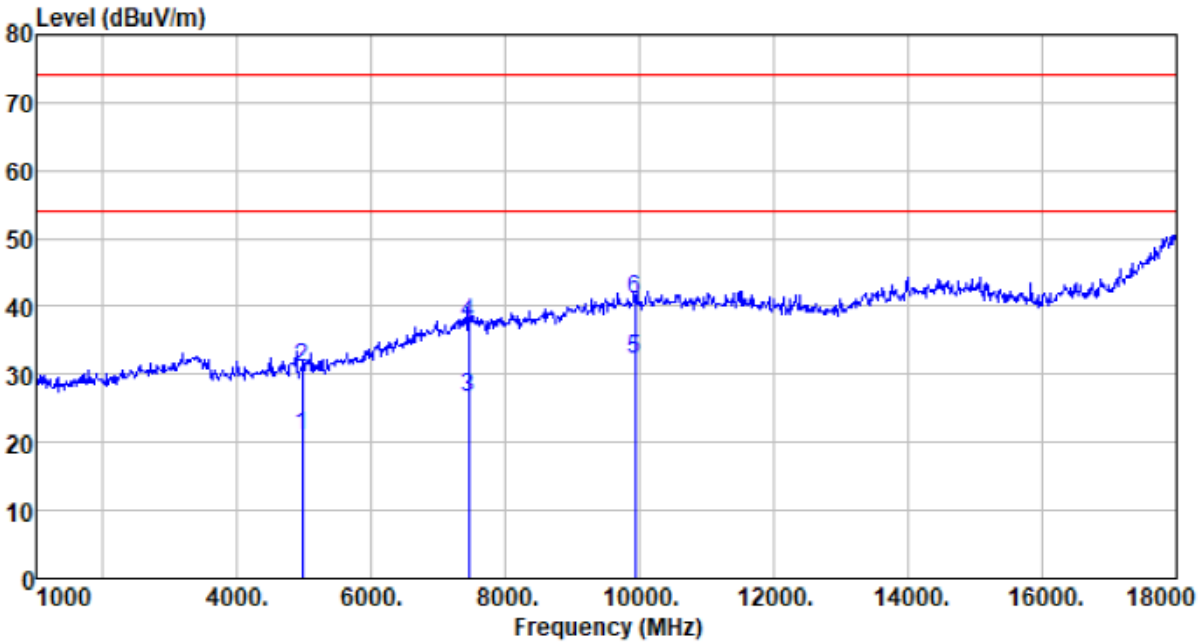
Test channel:	Highest

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4960.000	21.40	31.44	4.79	37.78	19.85	54.00	-34.15	Average
4960.000	32.85	31.44	4.79	37.78	31.30	74.00	-42.70	Peak
7440.000	17.81	36.66	6.77	35.56	25.68	54.00	-28.32	Average
7440.000	29.79	36.66	6.77	35.56	37.66	74.00	-36.34	Peak
9920.000	21.48	38.30	8.09	35.14	32.73	54.00	-21.27	Average
9920.000	31.45	38.30	8.09	35.14	42.70	74.00	-31.30	Peak

Vertical::

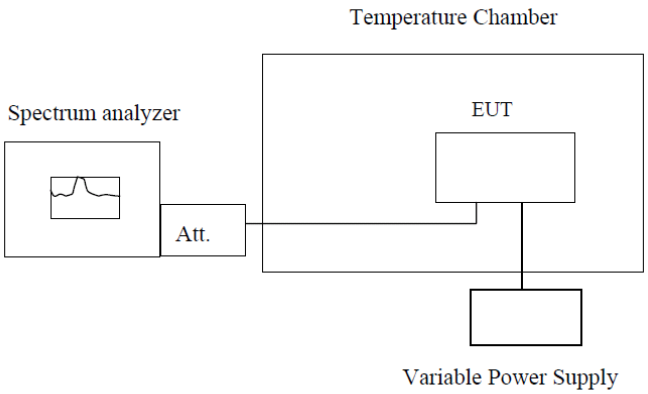


Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4960.000	22.44	31.44	4.79	37.78	20.89	54.00	-33.11	Average
4960.000	32.54	31.44	4.79	37.78	30.99	74.00	-43.01	Peak
7440.000	18.79	36.66	6.77	35.56	26.66	54.00	-27.34	Average
7440.000	29.68	36.66	6.77	35.56	37.55	74.00	-36.45	Peak
9920.000	20.82	38.30	8.09	35.14	32.07	54.00	-21.93	Average
9920.000	29.83	38.30	8.09	35.14	41.08	74.00	-32.92	Peak

Remarks:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7.8 Frequency Stability

Test Requirement:	RSS-Gen Section 6.11& Section 8.11
Test Method:	ANSI C63.10: 2013 & RSS-Gen
Limit:	Manufactures of devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.10, 2013; tested to 2.1055 for compliance to RSS-Gen requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Measurement data:

Frequency stability versus Temp.						
Power Supply: DC 12V						
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)	Pass /Fail
-30	2402	2402.99	2402.38	2402.55	2402.5	Pass
	2440	2440.38	2440.98	2440.15	2440.15	Pass
	2480	2480.63	2480.65	2480.57	2480.02	Pass
-20	2402	2402.52	2402.44	2402.86	2402.44	Pass
	2440	2440.57	2440.83	2440.39	2440.89	Pass
	2480	2480	2480.9	2480.44	2480.1	Pass
-10	2402	2402.94	2402.44	2402.46	2402.23	Pass
	2440	2440.78	2440.95	2440.1	2440.18	Pass
	2480	2480.57	2480.25	2480.94	2480.49	Pass
0	2402	2402.06	2402.6	2402.68	2402.86	Pass
	2440	2440.32	2440.92	2440.45	2440.7	Pass
	2480	2480.76	2480.94	2480.97	2480.65	Pass
10	2402	2402.38	2402.83	2402.52	2402.99	Pass
	2440	2440.8	2440.36	2440.23	2440.98	Pass
	2480	2480.87	2480.1	2480.05	2480.16	Pass
20	2402	2402.86	2402.31	2402.59	2402.85	Pass
	2440	2440.95	2440.89	2440.77	2440.98	Pass
	2480	2480.03	2480.72	2480.53	2480.76	Pass
30	2402	2402.87	2402.92	2402.3	2402.67	Pass
	2440	2440.49	2440.25	2440.73	2440.49	Pass
	2480	2480.63	2480.78	2480.81	2480.51	Pass
40	2402	2402.09	2402.58	2402.69	2402.15	Pass
	2440	2440.74	2440.84	2440.62	2440.7	Pass
	2480	2480.72	2480.31	2480.22	2480.75	Pass
50	2402	2402.48	2402.47	2402.09	2402.01	Pass
	2440	2440.29	2440.54	2440.22	2440.64	Pass
	2480	2480.58	2480.82	2480.53	2480.55	Pass
Frequency stability versus Voltage						
Temperature: 25°C						
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)	Pass /Fail
9	2402	2402.94	2402.06	2402.42	2402.6	Pass
	2440	2440.6	2440.52	2440.76	2440.8	Pass
	2480	2480.85	2480.04	2480.35	2480.08	Pass
32	2402	2402.03	2402.24	2402.86	2402.24	Pass
	2440	2440.36	2440.83	2440.22	2440.1	Pass
	2480	2480.88	2480.85	2480.98	2480.46	Pass

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------End------