



RADIO TEST REPORT

Applicant : Partner Tech Corp.

Address : 10FL, 233-2, Baoqiao Road, Xindian,
New Taipei City, Taiwan

Equipment : Mobile POS Terminal

Model No. : EM-300

Trade Name : PARTNER

FCC ID : NDPEM-300

I HEREBY CERTIFY THAT :

The sample was received on Jan. 24, 2017 and the testing was carried out on Feb. 08, 2017 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Tested by:

Mark Liao / Assistant Manager

Spree Yei / Engineer

Laboratory Accreditation:

☒ CerpPASS Technology Corporation Test Laboratory





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History of this test report

Report No.	Issue Date	Description
TEFO1611252	Feb. 15, 2017	Original



1. Summary of Test Procedure and Test Results

1.1. Applicable Standards

ANSI C63.4:2014

FCC Rules and Regulations Part 15 Subpart C §15.249

FCC Rule	Description of Test	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.209 15.225	Radiated Emission	Pass
15.225(e)	Frequency Stability	Pass



2. Test Configuration of Equipment under Test

2.1. Feature of Equipment under Test

Frequency Range	2402-2480 MHz
Modulation Type	ASK
Antenna Type / gain	Printed Antenna / 1.0 dBi

2.2. Carrier Frequency of Channels

Channel	Frequency(MHz)
*1	13.56

Note: Channel remarked “*” is selected to perform test.

2.3. Test Mode and Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- The complete test system included EUT for RF test.
- An executive program, "RFDemo V2.03" was executed to transmit and receive data via NFC.
- The test mode of RF test as follow:
Test Mode 1. 13.56MHz

2.4. Description of Test System

The EUT was tested alone. No support devices are needed for testing.



2.5. General Information of Test

☒ Test Site	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582	
	FCC	TW1079, TW1061,390316, 228391, 641184
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz
☐ Test Site	Cerpass Technology (Suzhou) Co., Ltd Address: No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China Tel: +86-512-6917-5888 Fax: +86-512-6917-5666	
	FCC	916572, 331395
	IC	7290A-1, 7290A-2
	VCCI	T-1945 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test G-227 for radiated disturbance above 1GHz
Frequency Range Investigated:		Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 10,000MHz
Test Distance:		The test distance of radiated emission from antenna to EUT is 3 M.



3. Test Equipment and Ancillaries Used for Tests

Instrument	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI3	100443	2016/03/28	2017/03/27
LISN	Schwarzbeck	NSLK 8127	8127-740	2016/08/30	2017/08/29
LISN	Schwarzbeck	NSLK 8127	8127-516	2016/09/06	2017/09/05
Pulse Limiter	R&S	ESH3-Z2	101934	2016/03/09	2017/03/08
Bilog Antenna	Schwarzbeck	VULB9168	369	2016/03/22	2017/03/21
Active Loop Antenna	EMCO	6507	40855	2016/05/11	2017/05/10
Horn Antenna	EMCO	3115	31601	2016/09/05	2017/09/04
Horn Antenna	EMCO	3116	31970	2016/03/18	2017/03/17
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200207	2016/03/16	2017/03/15
Preamplifier	EM	EM330	60660	2016/03/16	2017/03/15
Preamplifier	EMC INSTRUMENTS	EMC051845S E	980333	2016/09/13	2017/09/12
Preamplifier	Agilent	8449B	3008A01954	2016/03/04	2017/03/03
Preamplifier	MITEQ	AMF-7D-0010 100-30-10P	1860212	2016/03/16	2017/03/15
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2016/11/04	2017/11/03
MXG MW Analog Signal Generator	KEYSIGHT	N5183A	MY50142931	2016/03/18	2017/03/17
Spectrum Analyzer	R&S	FSP40	100219	2016/09/01	2017/08/31
BLUETOOTH TESTER	R&S	CBT	101133	2016/03/18	2017/03/17
Attenuator	KEYSIGHT	8491B	MY39250703	2016/03/07	2017/03/06
Rotary Attenuator	Agilent	8494B	MY42154466	2016/03/08	2017/03/07
Rotary Attenuator	Agilent	8495B	MY42146680	2016/03/08	2017/03/07
Temp & Humi chamber	T-MACHINE	TMJ-9712	T-12-040111	2016/09/05	2017/09/04
Series Power Meter	Anritsu	ML2495A	1224005	2016/03/03	2017/03/02
Power Sensor	Anritsu	MA2411B	1207295	2016/03/03	2017/03/02
Cable	HUBER SUHNER	SUCOFLEX 102	28422/2	2016/03/15	2017/03/14
Cable	HUBER SUHNER	SUCOFLEX 102	28418/2	2016/03/16	2017/03/15
Cable	HUBER SUHNER	SUCOFLEX 102	28417/2	2016/03/04	2017/03/03



4. Antenna Requirements

4.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2. Antenna Construction and Directional Gain

Antenna Type	Antenna Gain
Printed Antenna	1.0 dBi



5. Test of AC Power Line Conducted Emission

5.1. Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

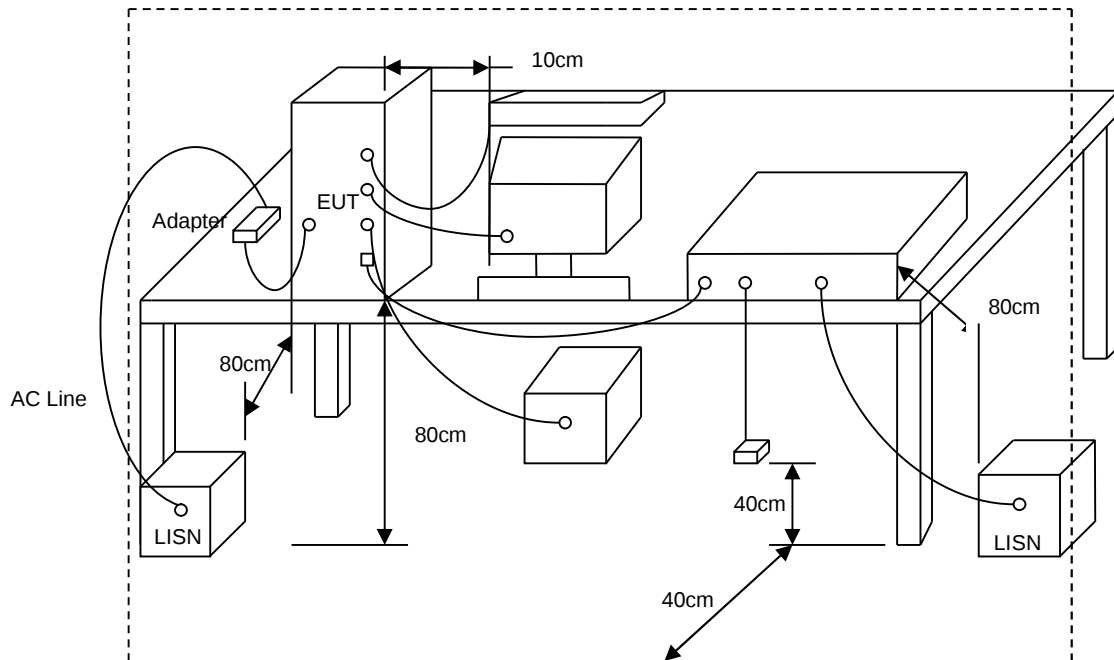
*Decreases with the logarithm of the frequency.

5.2. Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



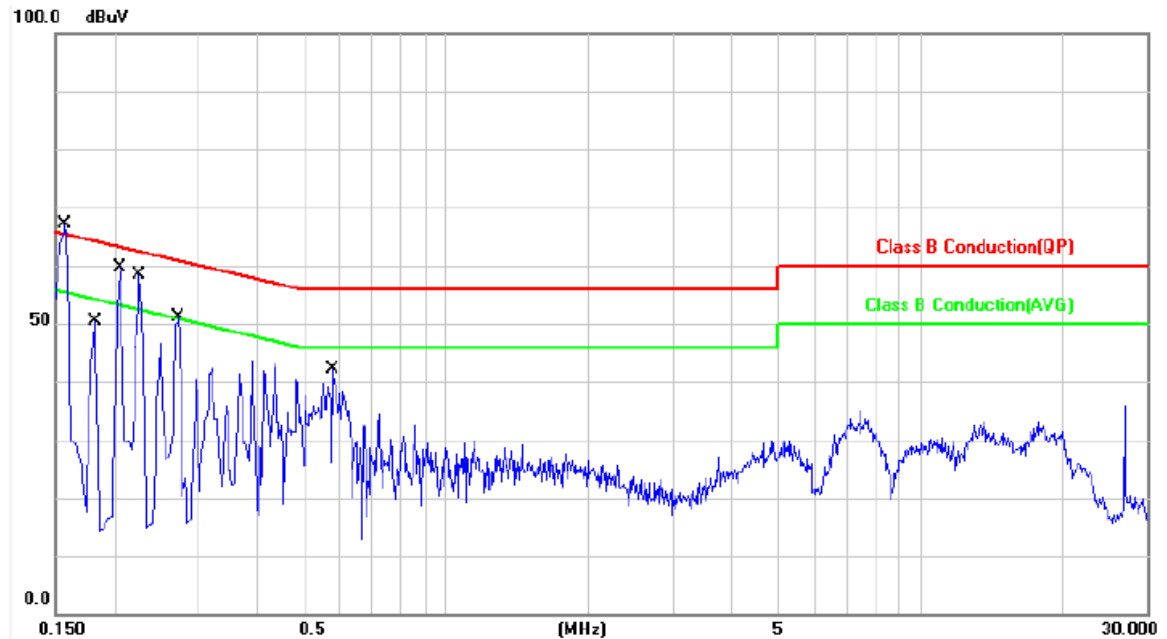
5.3. Typical Test Setup





5.4. Test Result and Data

Power	: AC 120V	Pol/Phase	: LINE
Test Mode	: Mode 1	Temperature	: 19 °C
Test Date	: Feb. 08, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1580	9.98	55.45	65.43	65.56	-0.13	QP	P
2	0.1580	9.98	39.74	49.72	55.56	-5.84	AVG	P
3	0.1819	9.97	34.59	44.56	64.39	-19.83	QP	P
4	0.1819	9.97	9.61	19.58	54.39	-34.81	AVG	P
5	0.2060	9.97	44.56	54.53	63.36	-8.83	QP	P
6	0.2060	9.97	23.52	33.49	53.36	-19.87	AVG	P
7	0.2260	9.97	37.19	47.16	62.59	-15.43	QP	P
8	0.2260	9.97	13.61	23.58	52.59	-29.01	AVG	P
9	0.2740	9.97	36.84	46.81	60.99	-14.18	QP	P
10	0.2740	9.97	18.12	28.09	50.99	-22.90	AVG	P
11	0.5780	9.98	28.75	38.73	56.00	-17.27	QP	P
12	0.5780	9.98	13.73	23.71	46.00	-22.29	AVG	P

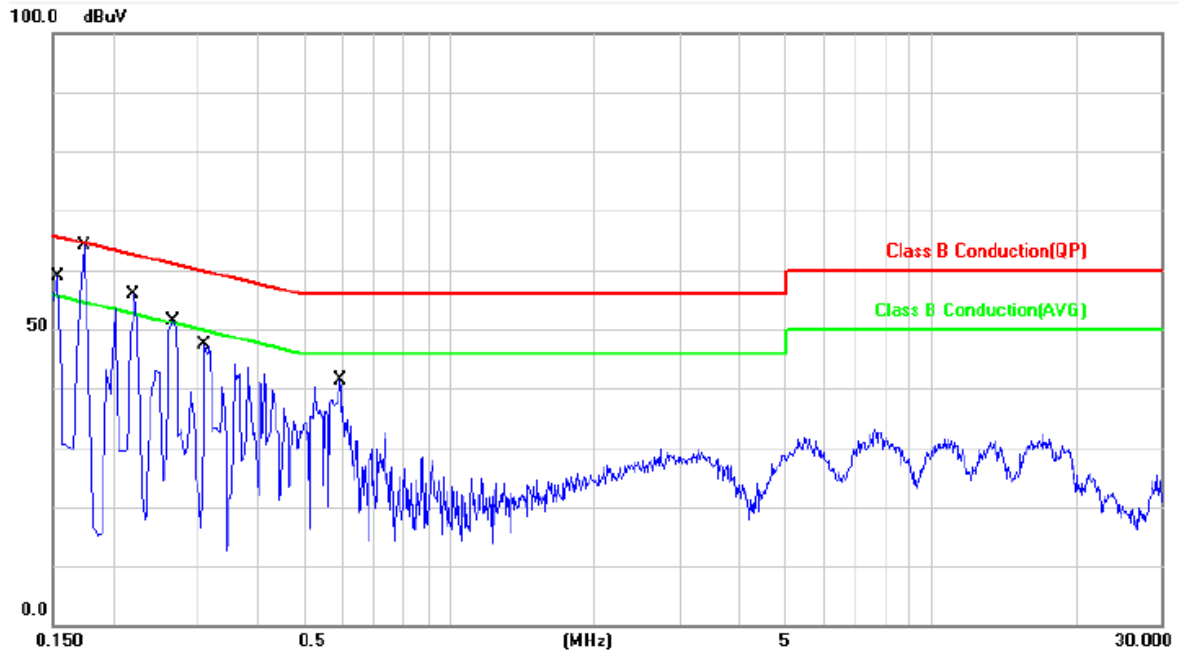
Note: Level = Reading + Factor

Margin = Level – Limit

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



Power	: AC 120V	Pol/Phase	: NEUTRAL
Test Mode	: Mode 1	Temperature	: 19 °C
Test Date	: Feb. 08, 2017	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1539	9.98	55.39	65.37	65.78	-0.41	QP	P
2	0.1539	9.98	38.31	48.29	55.78	-7.49	AVG	P
3	0.1740	9.98	39.13	49.11	64.76	-15.65	QP	P
4	0.1740	9.98	13.46	23.44	54.76	-31.32	AVG	P
5	0.2220	9.97	44.69	54.66	62.74	-8.08	QP	P
6	0.2220	9.97	27.27	37.24	52.74	-15.50	AVG	P
7	0.2660	9.96	38.70	48.66	61.24	-12.58	QP	P
8	0.2660	9.96	22.32	32.28	51.24	-18.96	AVG	P
9	0.3100	9.95	33.89	43.84	59.97	-16.13	QP	P
10	0.3100	9.95	19.81	29.76	49.97	-20.21	AVG	P
11	0.5940	9.95	27.66	37.61	56.00	-18.39	QP	P
12	0.5940	9.95	15.75	25.70	46.00	-20.30	AVG	P

Note: Level = Reading + Factor

Margin = Level – Limit

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



6. Test of Radiated Emission

6.1. Test Limit

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Frequency (MHz)	Distance	Limit (μV/ m)
0.09 ~ 0.490	300m	2400/F(kHz)
0.490 ~ 1.705	30m	24000/ F(kHz)
1.705 ~ 30	30m	30
30 ~ 88	3m	100
88 ~ 216	3m	150
216 ~ 960	3m	200
Above 960	3m	500

15.215 Additional provisions to the general radiated emission limitations.:

- (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.



6.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- h. "Cone of radiation" has been considered to be 3dB beamwidth of the measurement antenna.

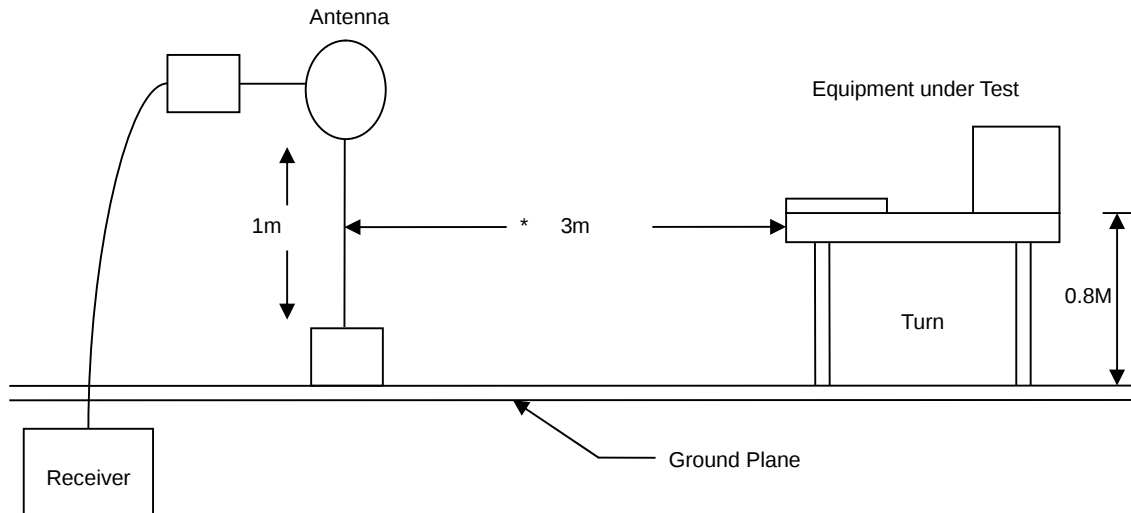
NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 300Hz or CISPS 200Hz(QP detector) at frequency Below 150 kHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 10KHz or CISPS 9KHz(QP detector) at frequency 150 kHz to 30 MHz.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

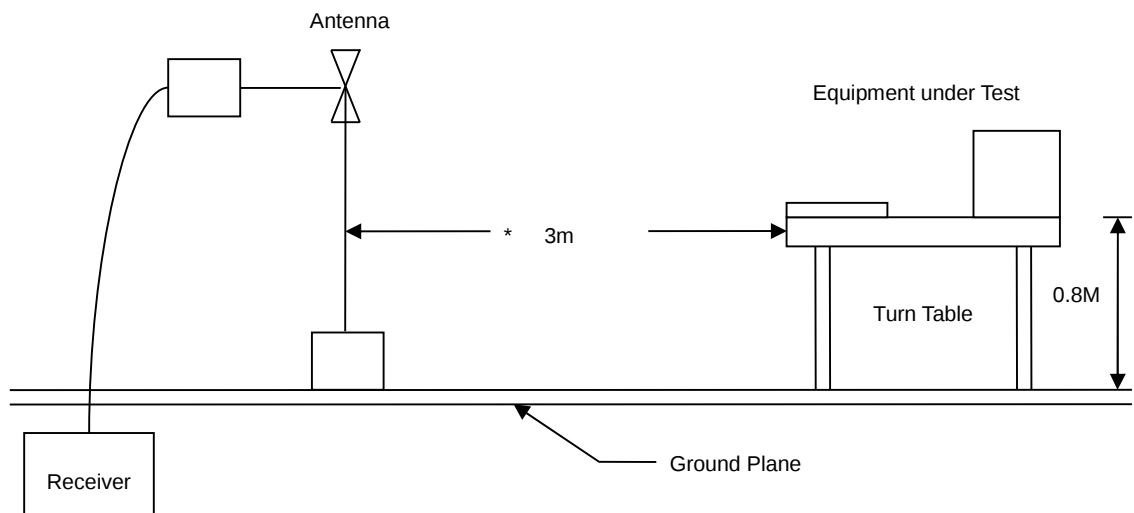


6.3. Typical Test Setup Layout of Radiated Emission

Below 30MHz test setup



Below 1GHz Test Setup



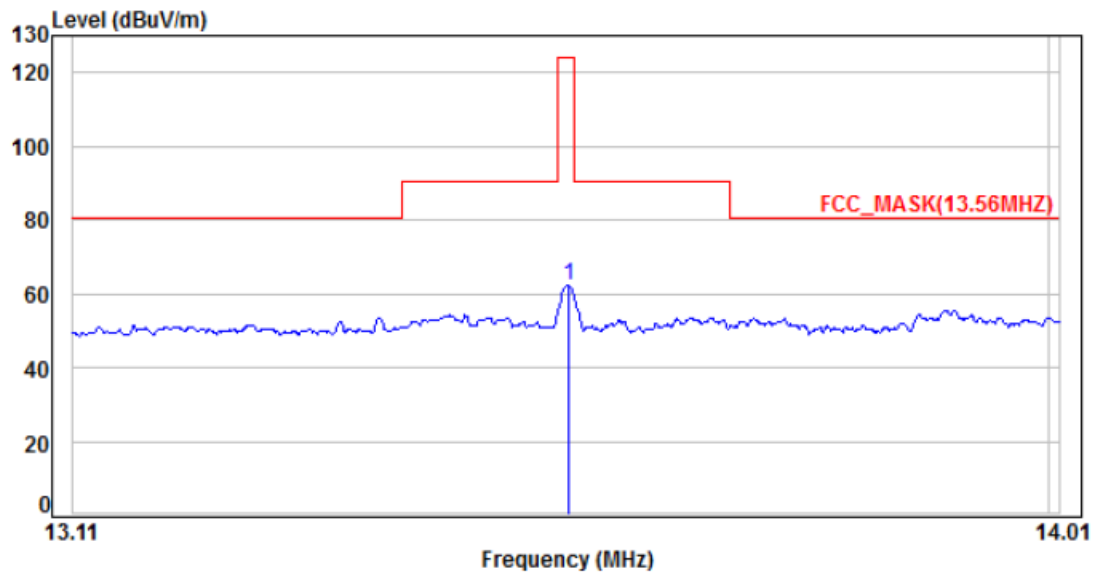
1.5M



6.4. Test Result and Data

6.4.1. Test Result of Fundamental Emission

Power	: AC 120V	Pol/Phase	: OPEN
Test Mode	: Mode 1	Temperature	: 23°C
Test Date	: Feb. 02, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV)	Limit (dBUV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	13.56	17.35	44.79	62.14	124.00	-61.86		100		P

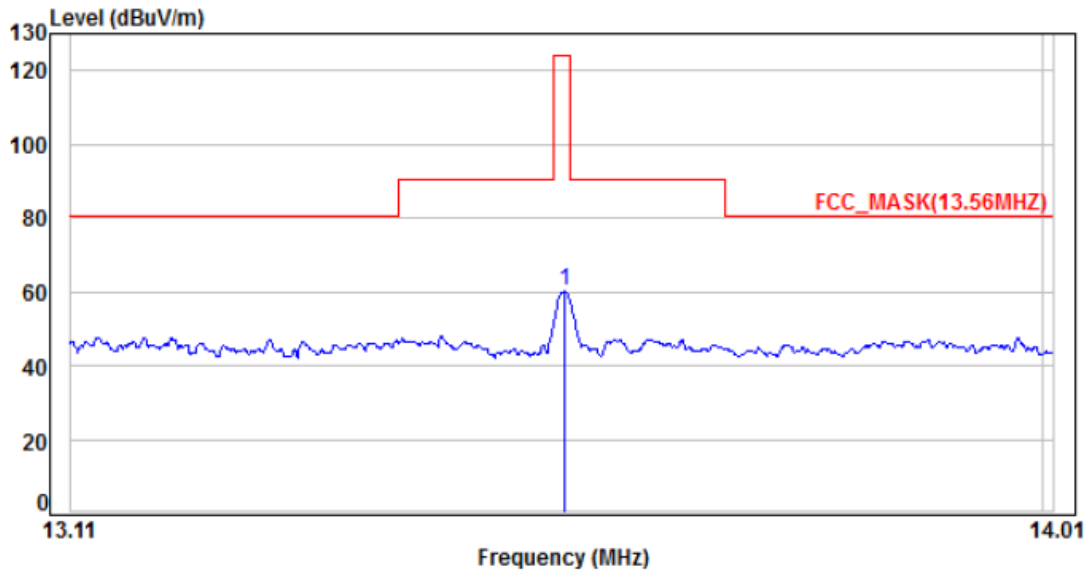
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V	Pol/Phase	: CLOSE
Test Mode	: Mode 1	Temperature	: 23°C
Test Date	: Feb. 02, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV)	Limit (dBUV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	13.56	17.35	42.78	60.13	124.00	-63.87		100		P

Note: Level=Reading+Factor

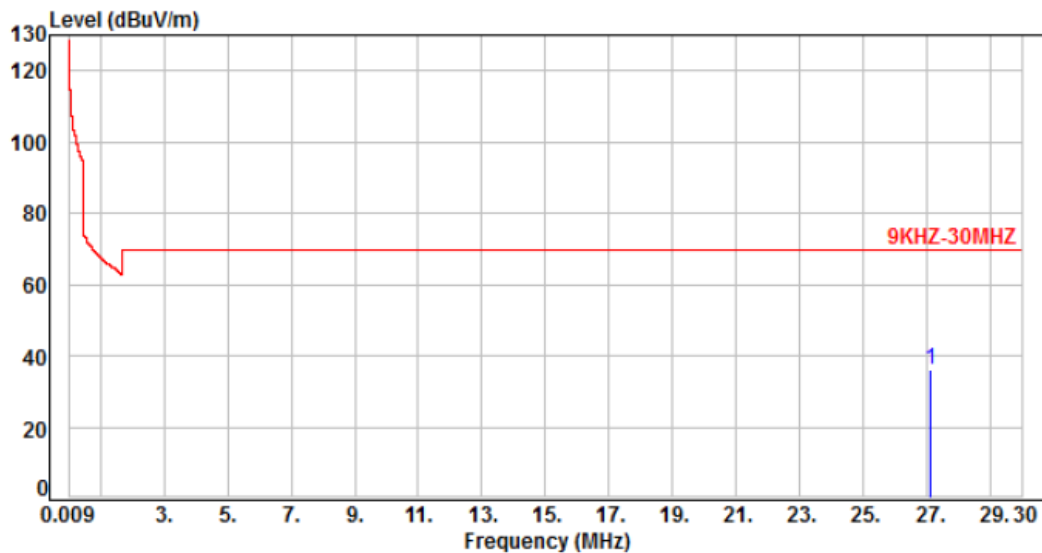
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



6.4.2. Test Result of Unwanted Spurious emission (9KHz ~ 30MHz)

Power	: AC 120V	Pol/Phase	: OPEN
Test Mode	: Mode 1	Temperature	: 23°C
Test Date	: Feb. 02, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	27.12	16.98	18.97	35.95	69.54	-33.59		100	0	P

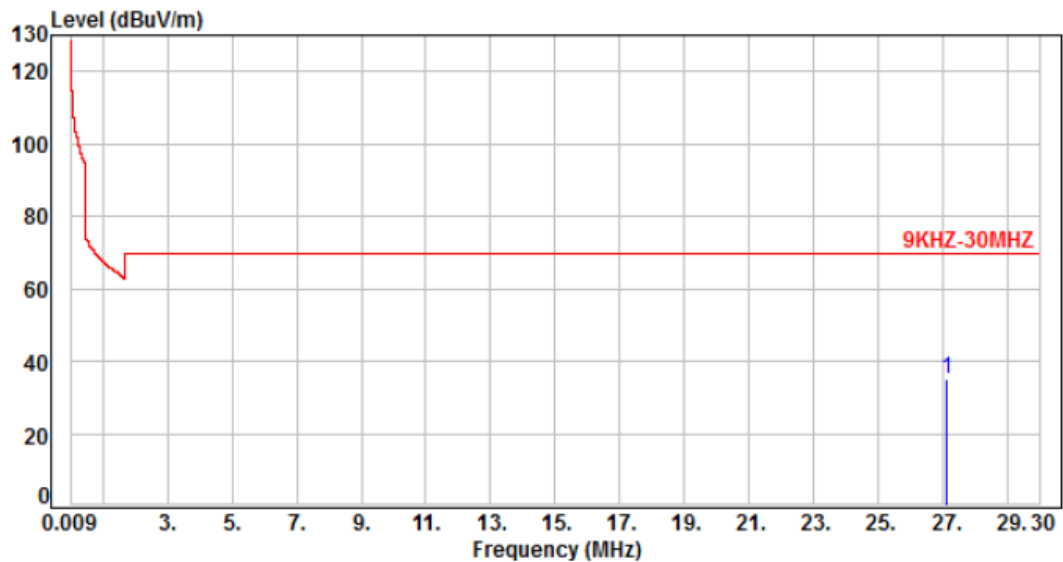
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V	Pol/Phase	: CLOSE
Test Mode	: Mode 1	Temperature	: 23 °C
Test Date	: Feb. 02, 2017	Humidity	: 65 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	27.12	16.98	18.35	35.33	69.54	-34.21		0	0	P

Note: Level=Reading+Factor

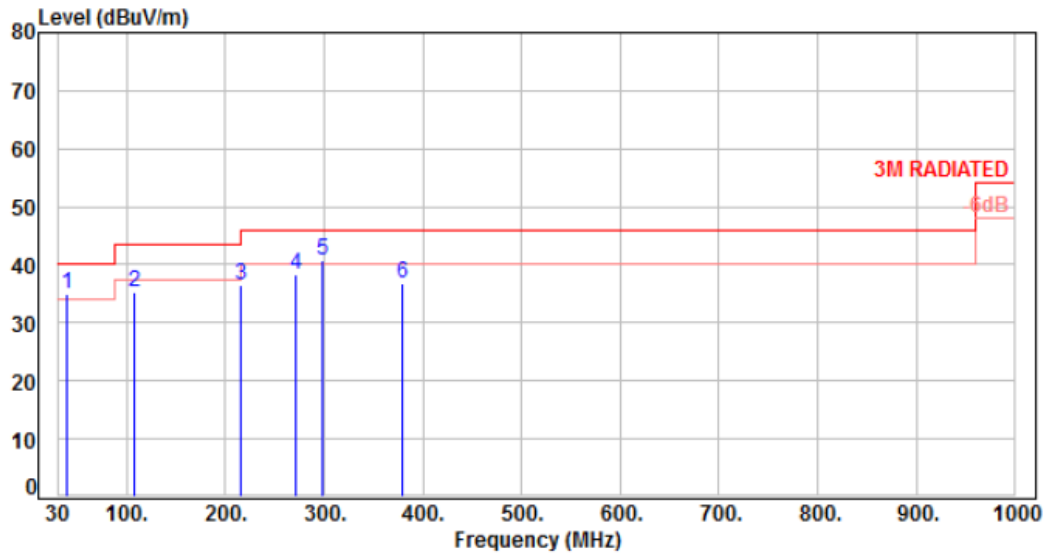
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



6.4.3. Test Result of Unwanted Spurious emission (30GHz ~ 1GHz)

Power	: AC 120V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1	Temperature	: 24 °C
Test Date	: Jan. 24, 2017	Humidity	: 68 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	39.70	-10.15	45.04	34.89	40.00	-5.11	Peak	202		P
2	107.60	-13.42	48.78	35.36	43.50	-8.14	Peak	202		P
3	216.24	-12.67	49.15	36.48	46.00	-9.52	Peak	202		P
4	270.56	-10.09	48.37	38.28	46.00	-7.72	Peak	202		P
5	297.72	-9.12	49.91	40.79	46.00	-5.21	Peak	202		P
6	379.20	-6.96	43.78	36.82	46.00	-9.18	Peak	202		P

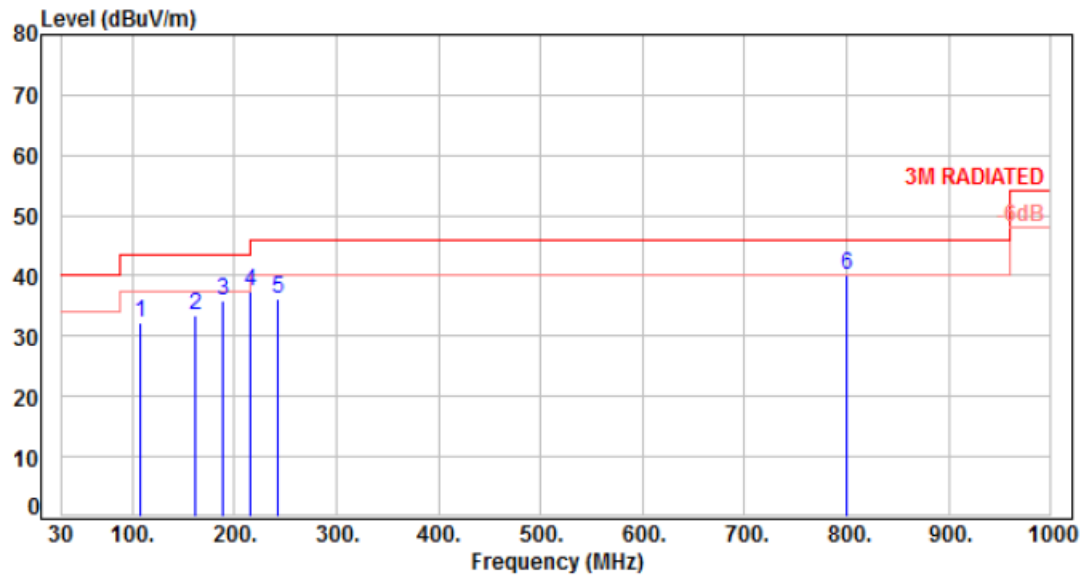
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1	Temperature	: 24 °C
Test Date	: Jan. 24, 2017	Humidity	: 68 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	107.60	-13.42	45.67	32.25	43.50	-11.25	Peak	100		P
2	161.92	-9.96	43.49	33.53	43.50	-9.97	Peak	100		P
3	189.08	-12.13	48.01	35.88	43.50	-7.62	Peak	100		P
4	216.24	-12.67	50.16	37.49	46.00	-8.51	Peak	100		P
5	243.40	-11.21	47.52	36.31	46.00	-9.69	Peak	100		P
6	800.18	0.80	39.39	40.19	46.00	-5.81	Peak	100		P

Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor

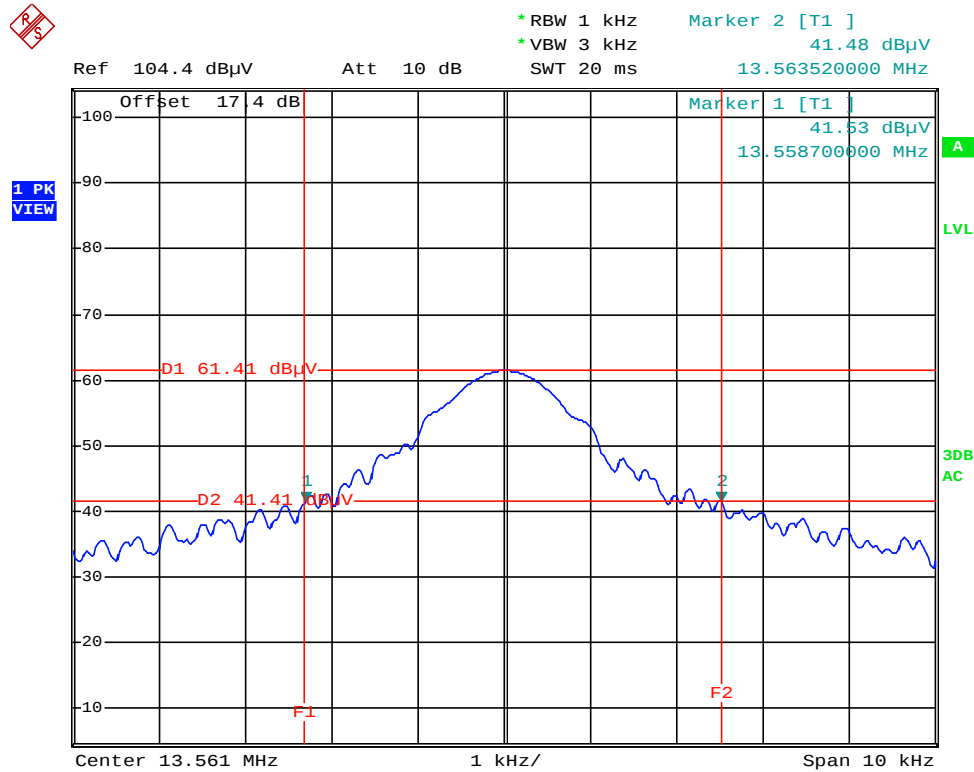


6.4.4. 20dB Bandwidth BW

Frequency (MHz)	20dB Bandwidth (KHz)	Frequency range MHz (20dB Down) fL > 13.553 MHz	Frequency range MHz (20dB Down) fH < 13.567 MHz
13.56	4.82	13.5587	13.56352

20dB Bandwidth

13.56 MHz



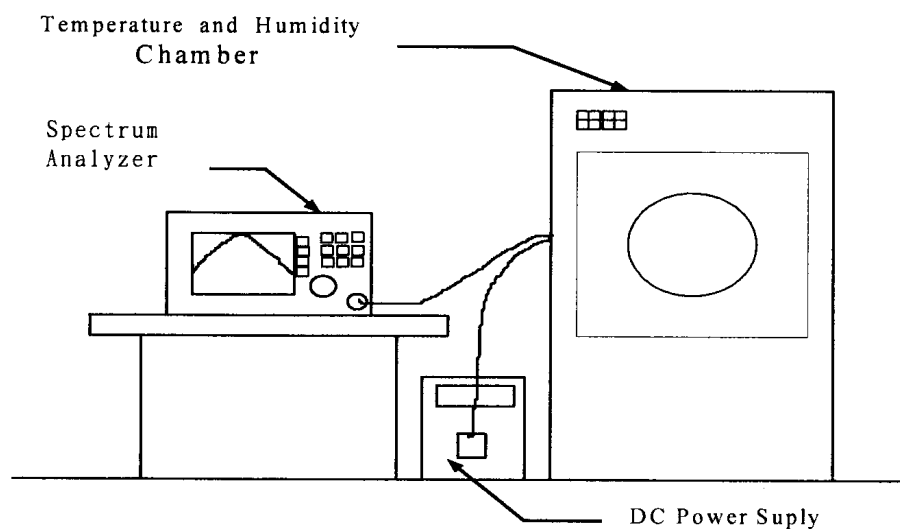


7. Frequency Stability

7.1. Test Procedure

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

7.2. Test Setup Layout





7.3. Test Result and Data

Operating frequency: 13.56 MHz							
Temperature (°C)	Power supply (V)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	102	13.5609	0.006973	13.5609	0.006965	13.5609	0.068475
	120	13.5610	0.007670	13.5610	0.007375	13.5610	0.072271
	138	13.5610	0.007286	13.5612	0.008660	13.5609	0.065384
40	102	13.5609	0.006974	13.5608	0.006128	13.5608	0.062123
	120	13.5609	0.006758	13.5609	0.006763	13.5608	0.062116
	138	13.5609	0.006795	13.5608	0.006195	13.5609	0.064700
30	102	13.5610	0.007193	13.5608	0.006042	13.5610	0.073413
	120	13.5610	0.007548	13.5609	0.006726	13.5610	0.074601
	138	13.5608	0.006202	13.5610	0.007414	13.5608	0.059959
20	102	13.5608	0.005959	13.5610	0.007048	13.5610	0.072957
	120	13.5610	0.007227	13.5610	0.007080	13.5610	0.073746
	138	13.5609	0.006944	13.5609	0.006444	13.5608	0.059052
10	102	13.5608	0.006174	13.5608	0.005949	13.5610	0.073820
	120	13.5609	0.006765	13.5608	0.006076	13.5610	0.071149
	138	13.5610	0.007162	13.5609	0.006377	13.5609	0.068439
0	102	13.5610	0.007537	13.5610	0.007190	13.5608	0.060271
	120	13.5609	0.006617	13.5610	0.007303	13.5610	0.074512
	138	13.5610	0.007595	13.5609	0.006985	13.5608	0.061518
-10	102	13.5609	0.006534	13.5610	0.007567	13.5610	0.071803
	120	13.5608	0.006258	13.5609	0.006960	13.5609	0.070014
	138	13.5610	0.007480	13.5610	0.007150	13.5609	0.062865
-20	102	13.5609	0.006748	13.5609	0.006304	13.5610	0.074932
	120	13.5609	0.006520	13.5608	0.006100	13.5609	0.064712
	138	13.5610	0.007614	13.5608	0.006114	13.5609	0.069847
-30	102	13.5610	0.007093	13.5609	0.006753	13.5609	0.065990
	120	13.5610	0.007375	13.5610	0.007670	13.5610	0.075221
	138	13.5609	0.006717	13.5609	0.006495	13.5609	0.067021