

FCC Test Report

Product Name : Repeater
Model No. : ST-9116D
FCC ID. : M38-ST-9116D

Applicant : RANGER COMMUNICATIONS (M) SDN , BHD.
Address : NO.8716, BATU BERENDAM FTZⅢ, 75350 BATU
BERENDAM, MELAKA, MALAYSIA

Date of Receipt : 2014/09/26
Issued Date : 2015/06/10
Report No. : 14A0006R-RFUSP22V00
Report Version : V1.0

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of Corporation.

Test Report Certification

Issued Date : 2015/06/10

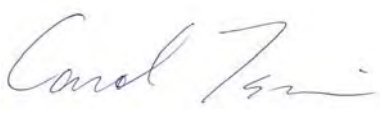
Report No. : 14A0006R-RFUSP22V00



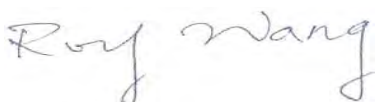
Product Name : Repeater
Applicant : RANGER COMMUNICATIONS (M) SDN , BHD.
Address : NO.8716, BATU BERENDAM FTZ III, 75350 BATU
BERENDAM, MELAKA, MALAYSIA
Manufacturer : RANGER COMMUNICATIONS (M) SDN , BHD.
Model No. : ST-9116D
FCC ID. : M38-ST-9116D
EUT Voltage : DC 13.8V
Trade Name : SMAR TRUNK
Applicable Standard : ANSI/TIA 603-C: 2004, FCC CFR 47 Part 90, ANSI C63.4:
2009
Test Result : Complied

The test results relate only to the samples tested.

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Documented By : 
(Carol Tsai / Engineering Adm. Assistant)

Reviewed By : 
(Bruno Tsai / Engineer)

Approved By : 
(Roy Wang / Director)

Laboratory Information

We, **Quietek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	:	TAF, Accreditation Number: 3024
USA	:	FCC, Registration Number: 365520
Canada	:	IC, Submission No: 150981

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site:<http://www.quietek.com/chinese/about/certificates.aspx?bval=5>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :

http://www.quietek.com/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789

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No. 99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou,China.

TEL : +86-512-6251-5088 / FAX : +86-512-6251-5098

E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	Repeater
Trade Name	SMAR TRUNK
Model No.	ST-9116D
Frequency Range	450-470MHz, 470MHz~512MHz
Channel Spacing	12.5kHz, 6.25kHz
Type of Modulation	FM, FDMA, TDMA
Antenna Gain	NA
Antenna Type	N/A (by Terminator)

Note:

1. This device is a Repeater, which including 450-512MHz transmitting and receiving function.
2. Regards to the frequency band operation; the lowest 、middle and highest frequency of channel were selected to perform the test, and then shown on this report.
3. This device is a composite device in accordance with Part 15 regulations. The receiving function receiving was tested and its test report number is 14A0006R-RFUSP01V00 under verification

1.2. Test Mode

Has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

TX	Mode 1: Transmit
----	------------------

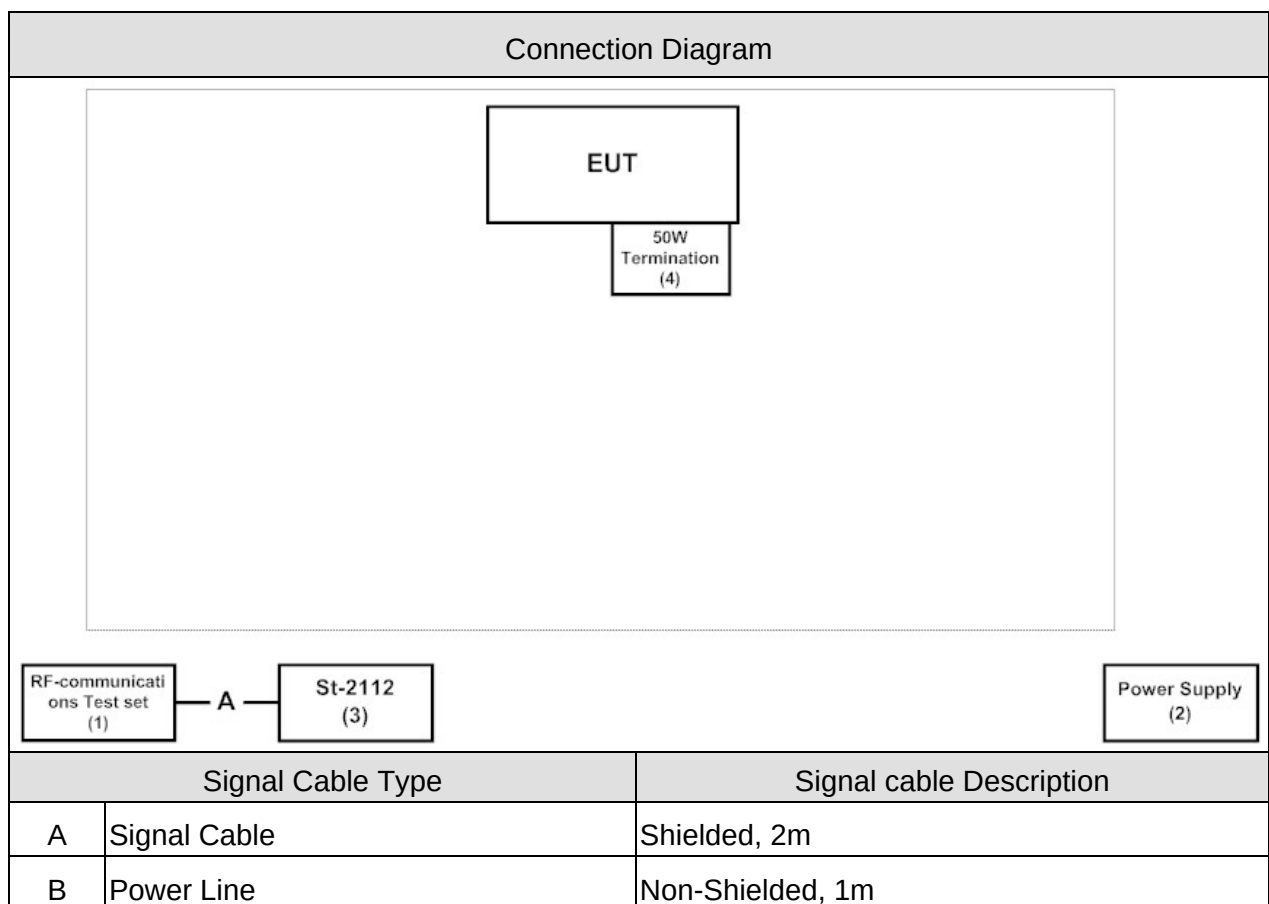
Test Items	Section	Frequency (MHz)	Mode	Result
RF Power Output	90.205	450.1/481.1/511.9	1	Complies
Modulation Characteristics	90.242(b)	450.1/481.1/511.9	1	Complies
Modulation Limiting	90.210	450.1/481.1/511.9	1	Complies
Occupied Bandwidth	90.209 & 90.210	450.1/481.1/511.9	1	Complies
Spurious Emissions at Antenna Terminals (Conducted)	90.210	450.1/481.1/511.9	1	Complies
Field Strength of Spurious Emissions	90.210	450.1/481.1/511.9	1	Complies
Frequency Stability	90.213	450.1/481.1/511.9	1	Complies
Transient Frequency Behavior	90.214	450.1/481.1/511.9	1	Complies

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 RF-communications Test set	HP	8920A	3614A08091	Non-Shielded, 1m
2 Power Supply	Chroma	62024P-80-60	A01034	--
3 St-2112	RANGER	2112	N/A	--
4 50Ω Termination	N/A	Mini-Circuits	N/A	--

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Use the Audio Generator input modulation tone
3	Configure the test channel
4	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	RF Power Output	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Modulation Characteristics	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Occupied Bandwidth	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Spurious Emissions at Antenna Terminals (Conducted)	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Field Strength of Spurious Emissions	15 - 35	25
Humidity (%RH)		25 - 75	65
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Frequency Stability	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Transient Frequency Behavior	15 - 35	25
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000

2. RF Power Output

2.1. Test Equipment

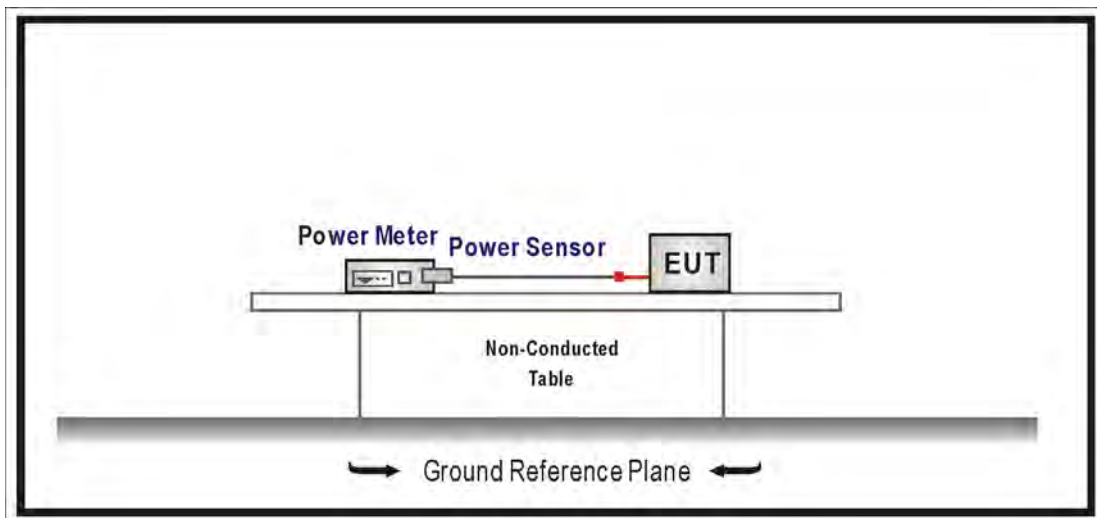
The following test equipments are used during the test:

RF Power Output / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Power Meter	Agilent	N1911A	MY45101353	2015/10/31
Power Sensor	Agilent	N1921A	MY45241670	2015/10/31

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

Please refer to FCC 47 CFR 90.205 for specification details.

2.4. Test Procedure

The RF power output was measured at the antenna feed point using a peak power meter. A 50-ohm, resistive wattmeter was connected to the RF output connector.

2.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB.

2.6. Test Result

Product	Repeater		
Test Item	RF Power Output		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

Channel No.	Frequency (MHz)	Measure Level (dBm)	Measure Level (W)	Limit (dBm)	Result
Low	450.1	46.150	41.210	Reference 90.205	Pass
Mid	481.1	46.140	41.115	Reference 90.205	Pass
High	511.9	46.070	40.458	Reference 90.205	Pass

3. Modulation Characteristics

3.1. Test Equipment

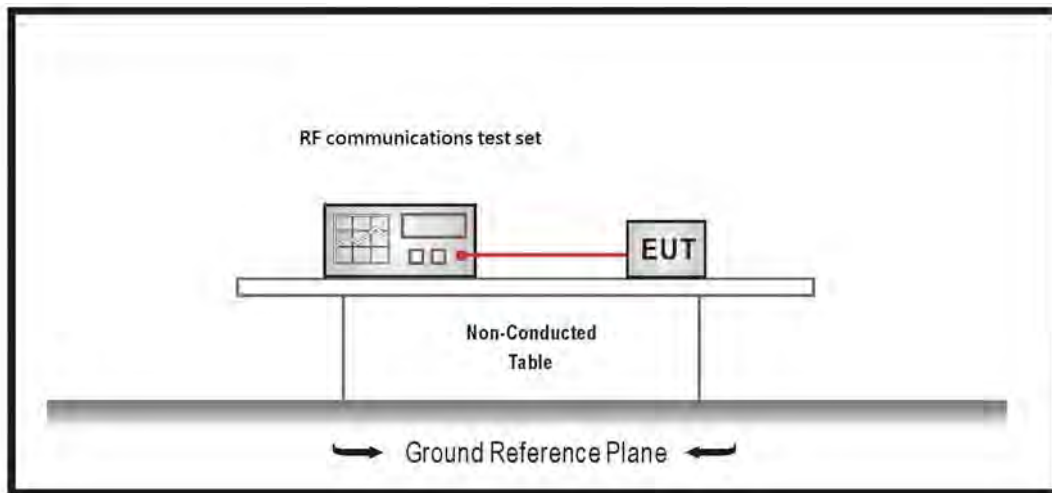
The following test equipments are used during the radiated emission tests:

Modulation Characteristics / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
RF-communications Test set	HP	8920A	3614A08091	2015/04/27
Receiver	Agilent	N9038A	MY53220121	2015/07/26

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

§ **90.242(b)**: Recommended audio filter attenuation characteristics are given below:

Audio band	Minimum Attenuation Rel. to 1 kHz Attenuation
3 – 20 KHz 20 – 30 KHz	$60 \log_{10}(f/3)$ dB where f is in kHz 50dB

Note: Audit Freq Response and Modulation limiting tests were performed only for 12.5 & 25 kHz channel spacing.

These tests were not performed for 6.25 kHz ch spacing as there is no FM voice capability for this device.

3.4. Test Procedure

Audio frequency response

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004.

Audio Low Pass Filter

The audio low pass filter for voice-modulated equipment was measured in accordance with ANSI/TIA 603-C: 2004.

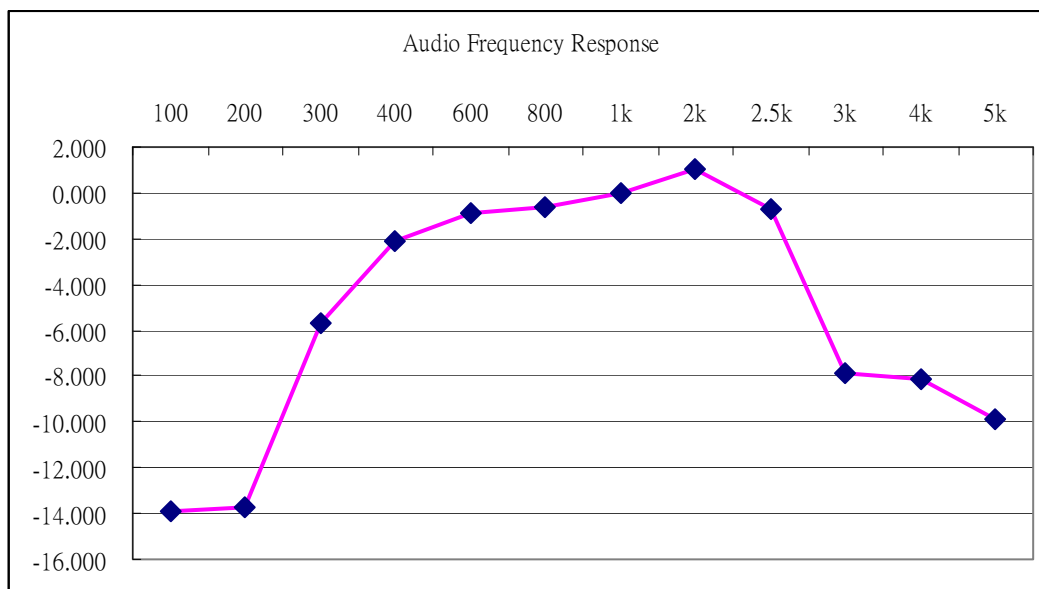
Audio Input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004.

3.5. Test Result

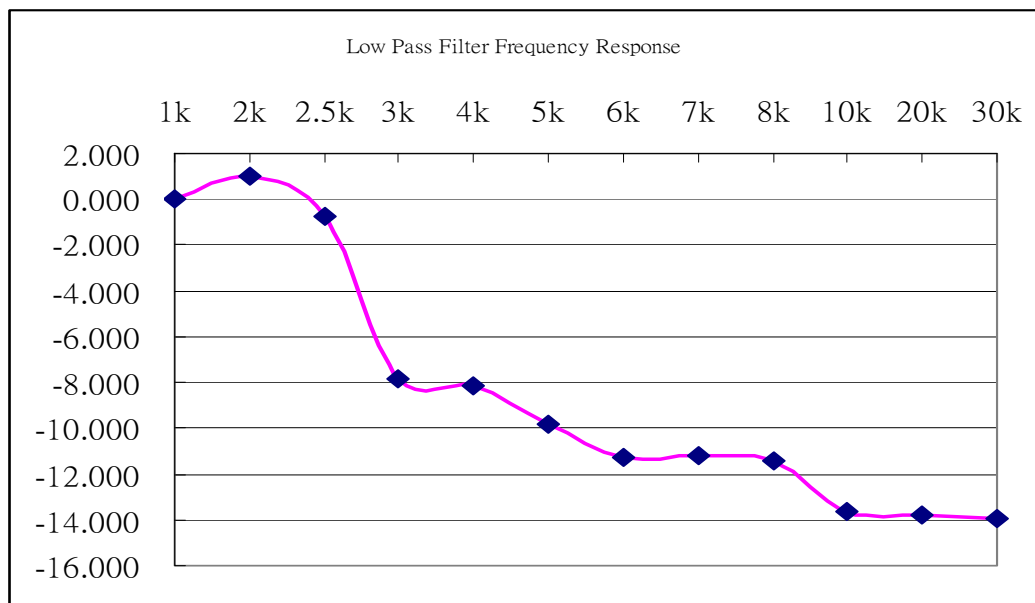
Product	Repeater		
Test Item	Audio Frequency Response		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7

Audio Frequency (Hz)	Deviation	dB
100	0.404	-13.915
200	0.411	-13.765
300	1.037	-5.727
400	1.566	-2.146
600	1.803	-0.922
800	1.867	-0.619
1k	2.005	0.000
2k	2.256	1.024
2.5k	1.846	-0.718
3k	0.813	-7.840
4k	0.782	-8.178
5k	0.645	-9.851



Product	Repeater		
Test Item	Low Pass Filter Frequency Response		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7

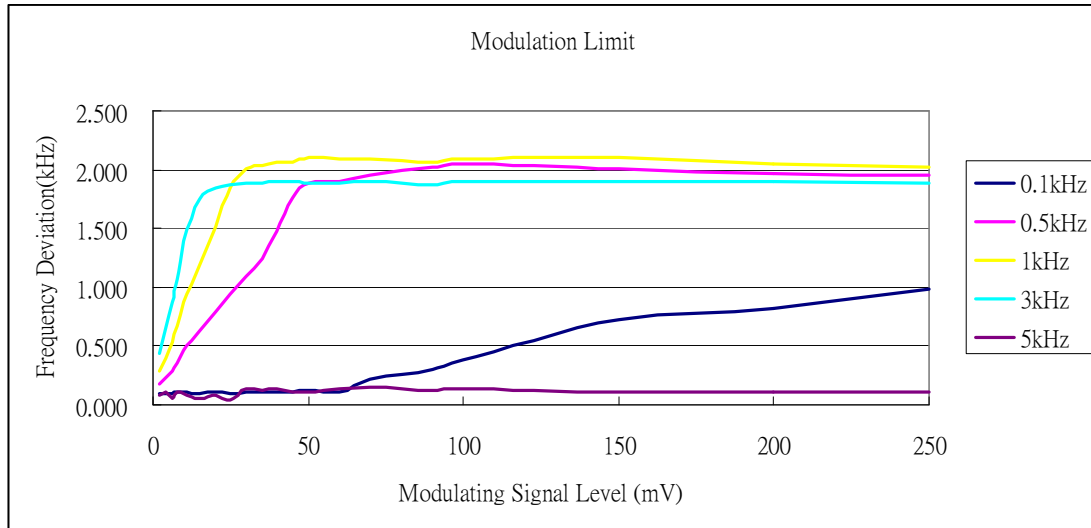
Audio Frequency (Hz)	Deviation	dB
1k	2.005	0.000
2k	2.256	1.024
2.5k	1.846	-0.718
3k	0.813	-7.840
4k	0.782	-8.178
5k	0.645	-9.851
6k	0.548	-11.267
7k	0.552	-11.204
8k	0.537	-11.443
10k	0.416	-13.660
20k	0.411	-13.765
30k	0.404	-13.915



Product	Repeater		
Test Item	Voice Modulation Limiting for 12.5 KHz Channel Spacing		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7

Modulating Signal Level	Peak Frequency Deviation (kHz) at the following modulating frequency:					Maximum Limit
mV	0.1kHz	0.5kHz	1kHz	3kHz	5kHz	kHz
2	0.102	0.176	0.285	0.439	0.080	2.5
4	0.101	0.233	0.401	0.650	0.109	2.5
6	0.097	0.287	0.538	0.874	0.055	2.5
8	0.103	0.356	0.665	1.070	0.109	2.5
10	0.105	0.465	0.871	1.399	0.095	2.5
15	0.100	0.625	1.195	1.755	0.051	2.5
20	0.107	0.789	1.518	1.849	0.076	2.5
25	0.101	0.942	1.838	1.876	0.041	2.5
30	0.106	1.092	2.007	1.879	0.134	2.5
35	0.107	1.248	2.032	1.885	0.121	2.5
40	0.112	1.474	2.058	1.895	0.138	2.5
45	0.109	1.758	2.061	1.899	0.103	2.5
50	0.117	1.891	2.099	1.888	0.116	2.5
60	0.116	1.900	2.095	1.881	0.133	2.5
70	0.215	1.953	2.091	1.895	0.149	2.5
80	0.258	1.995	2.081	1.888	0.131	2.5
90	0.301	2.025	2.066	1.873	0.123	2.5
100	0.376	2.053	2.089	1.895	0.137	2.5
150	0.720	2.015	2.099	1.902	0.116	2.5
200	0.820	1.964	2.047	1.901	0.106	2.5
250	0.978	1.952	2.020	1.889	0.113	2.5

Product	Repeater		
Test Item	Voice Modulation Limiting for 12.5 KHz Channel Spacing		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7



Product	Repeater		
Test Item	Voice Modulation Limiting for 12.5 KHz Channel Spacing		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7

Modulation Frequency (kHz)	Peak Deviation (kHz)	Maximum Limit (kHz)
100	0.404	2.5
200	0.411	2.5
300	1.037	2.5
400	1.566	2.5
600	1.803	2.5
800	1.867	2.5
1k	2.005	2.5
2k	2.256	2.5
2.5k	1.846	2.5
3k	0.813	2.5
4k	0.782	2.5
5k	0.645	2.5
6k	0.548	2.5
7k	0.552	2.5
8k	0.537	2.5
10k	0.416	2.5
20k	0.411	2.5
30k	0.404	2.5

3.6. Digital Modulation

Max Deviation measured for 6.25KHz Channel Spacing F1E &F1D = 869Hz

4. Occupied Bandwidth

4.1. Test Equipment

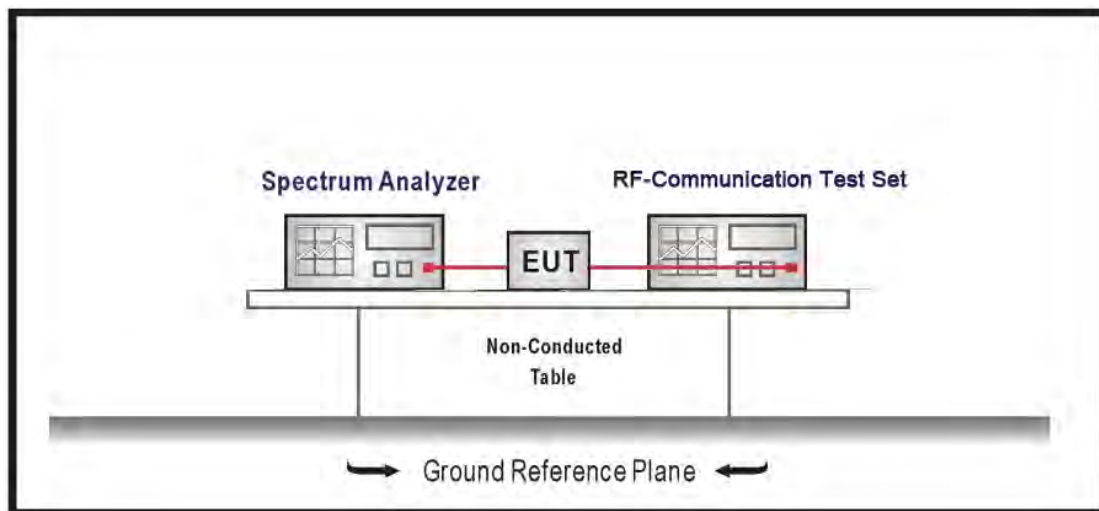
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSV 40	101049	2015/07/14
RF-communications Test set	HP	8920A	3614A08091	2015/04/27
Receiver	Agilent	N9038A	MY53220121	2015/07/26

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

Frequency Range (MHz)	Maximum Authorized BW (KHz)	Channel Spacing (KHz)	Recommended Frequency Deviation (KHz)	FCC Applicable Mask
156-174, 421-512	11.25	12.5	2.5	Mask D – Voice & Data
150-174, 421-512	6	6.25	1.25	Mask E – Voice & Data

4.4. Test Procedure

The test procedure used was ANSI/TIA 603-C: 2004

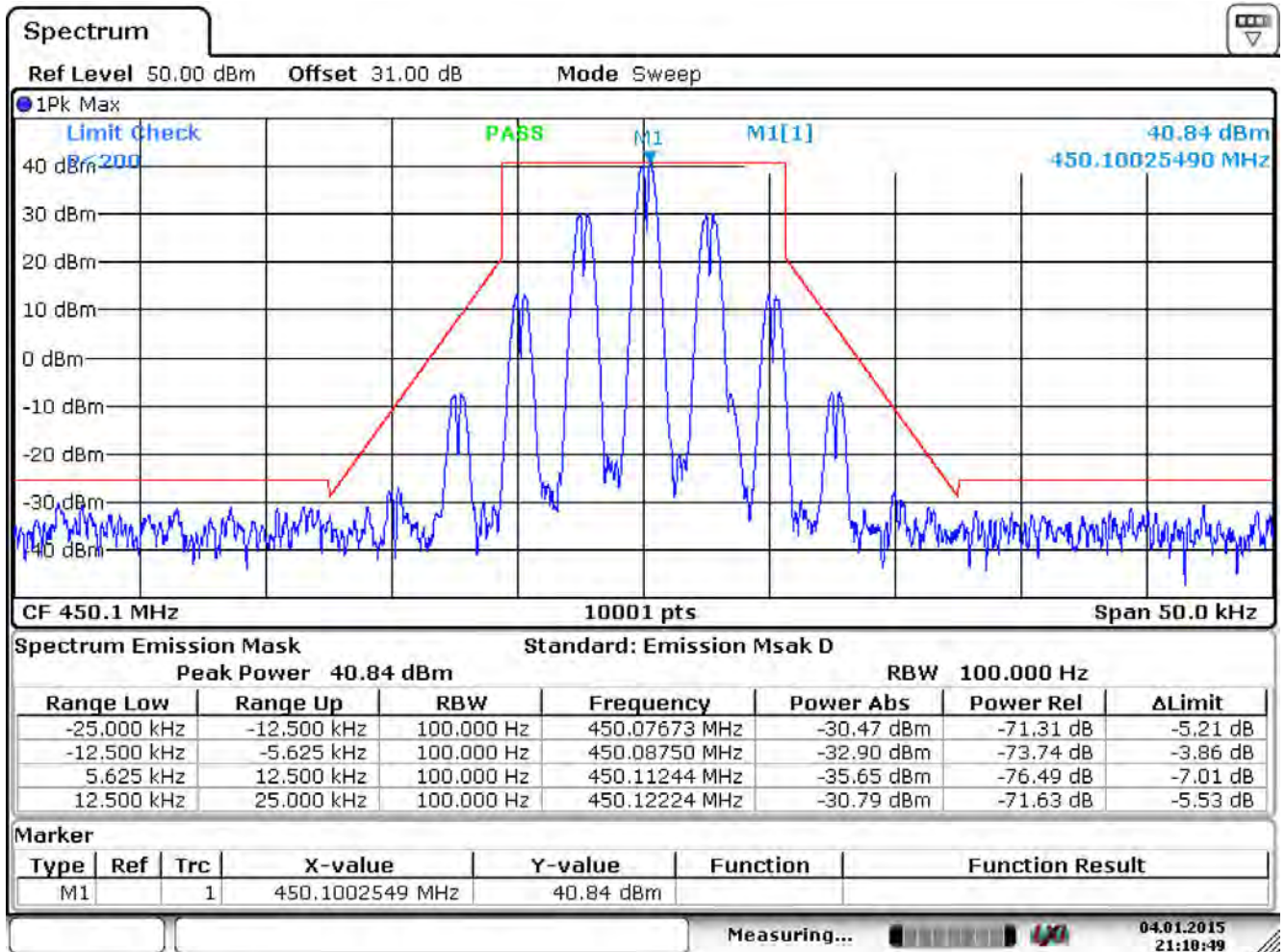
4.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

4.6. Test Result

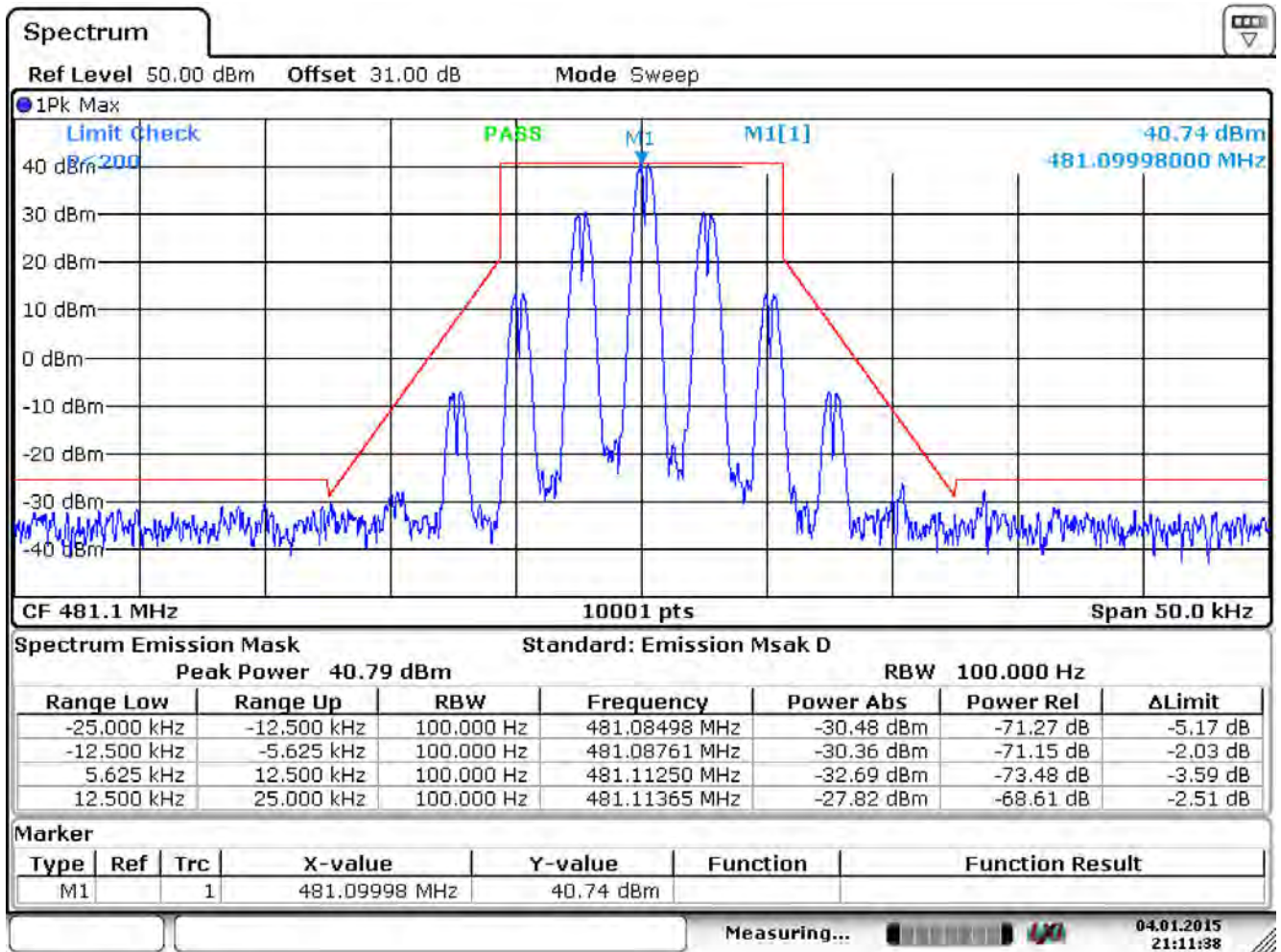
Product	Repeater		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit—12.5KHz		
Date of Test	2015/01/04	Test Site	SR7

450.1MHz (Modulation)



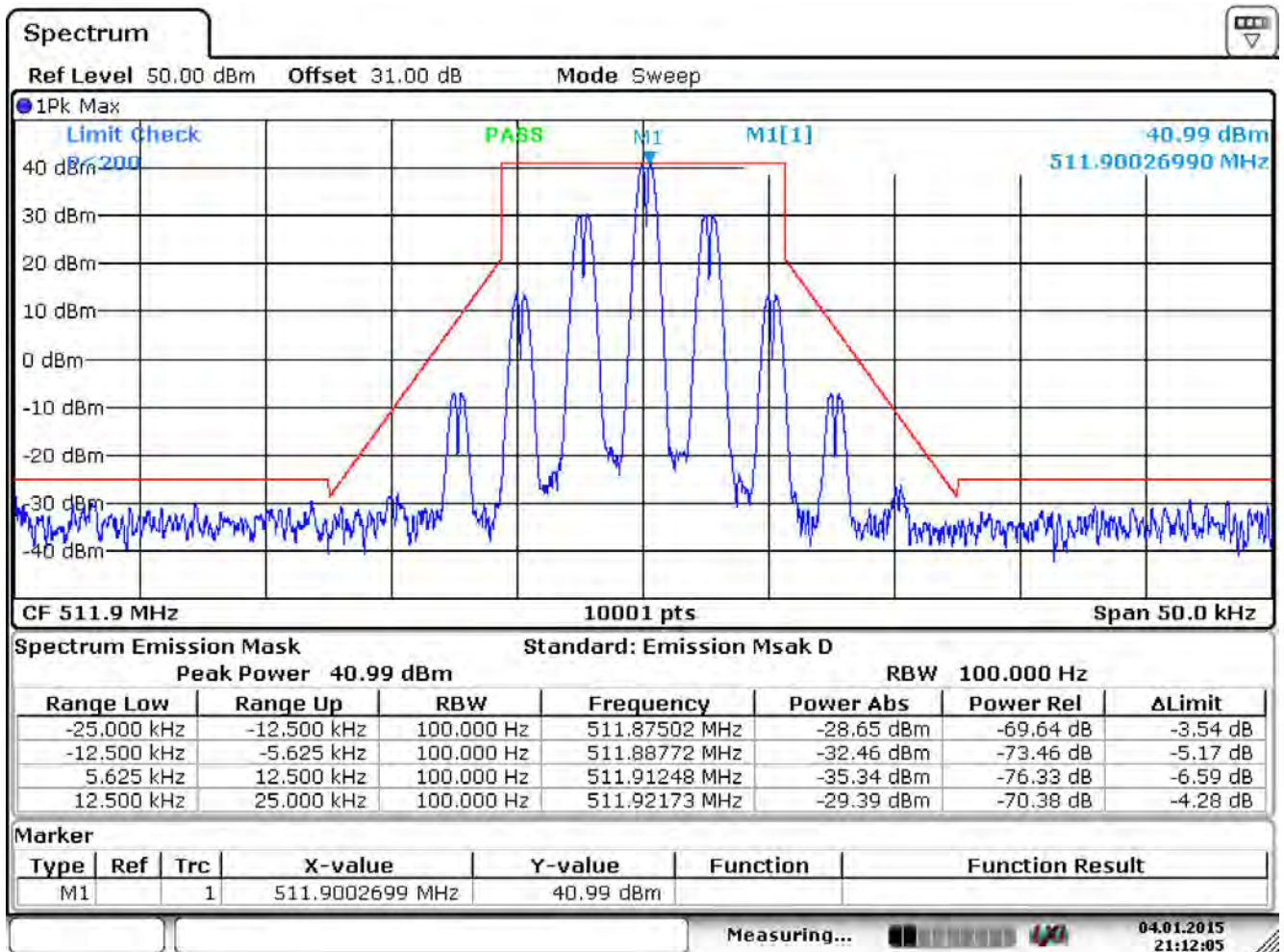
Date: 4.JAN.2015 21:10:49

481.1 MHz (Modulation)



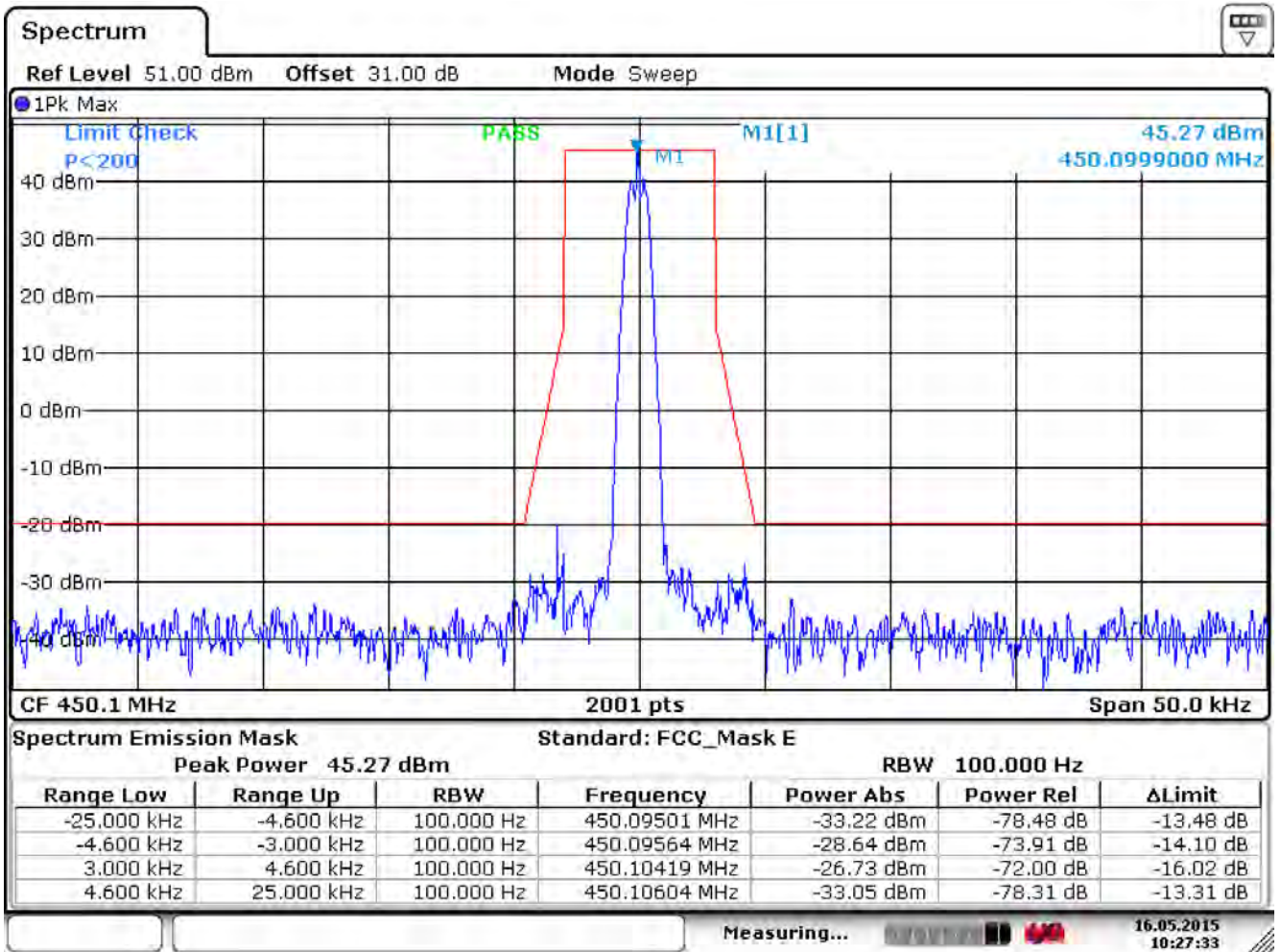
Date: 4.JAN.2015 21:11:38

511.9 MHz (Modulation)

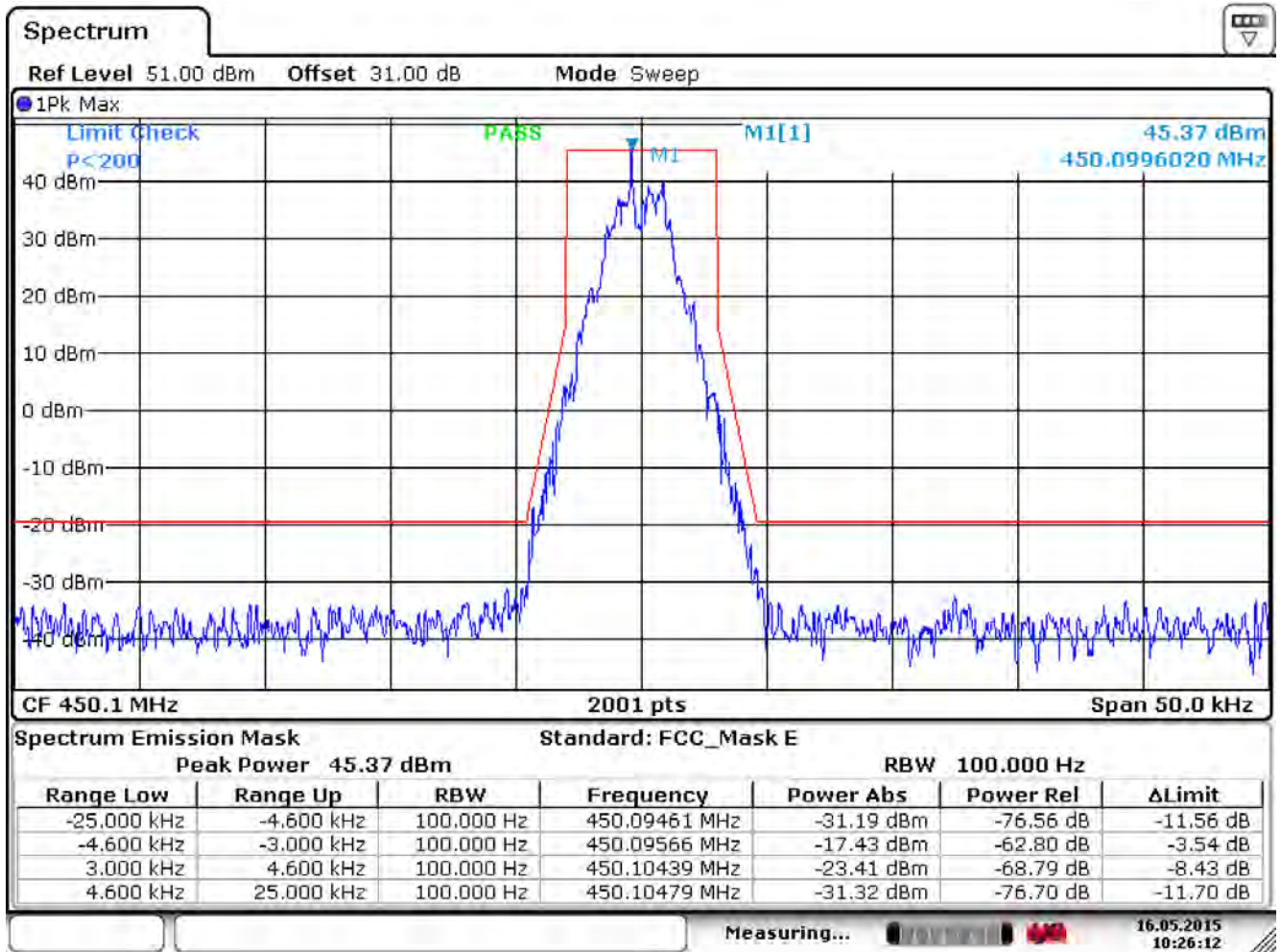


Date: 4.JAN.2015 21:12:04

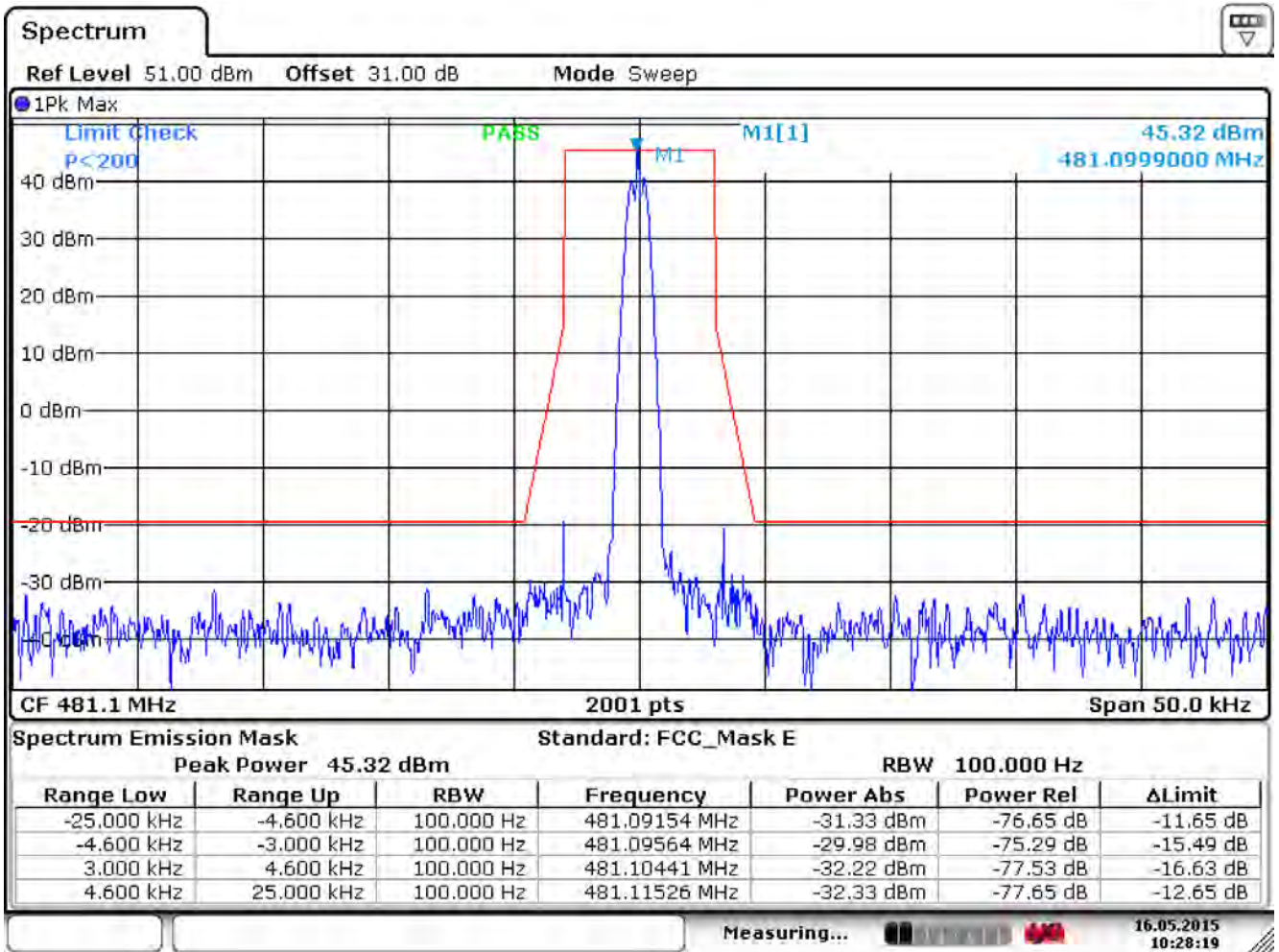
450.1MHz (Carr Mask)



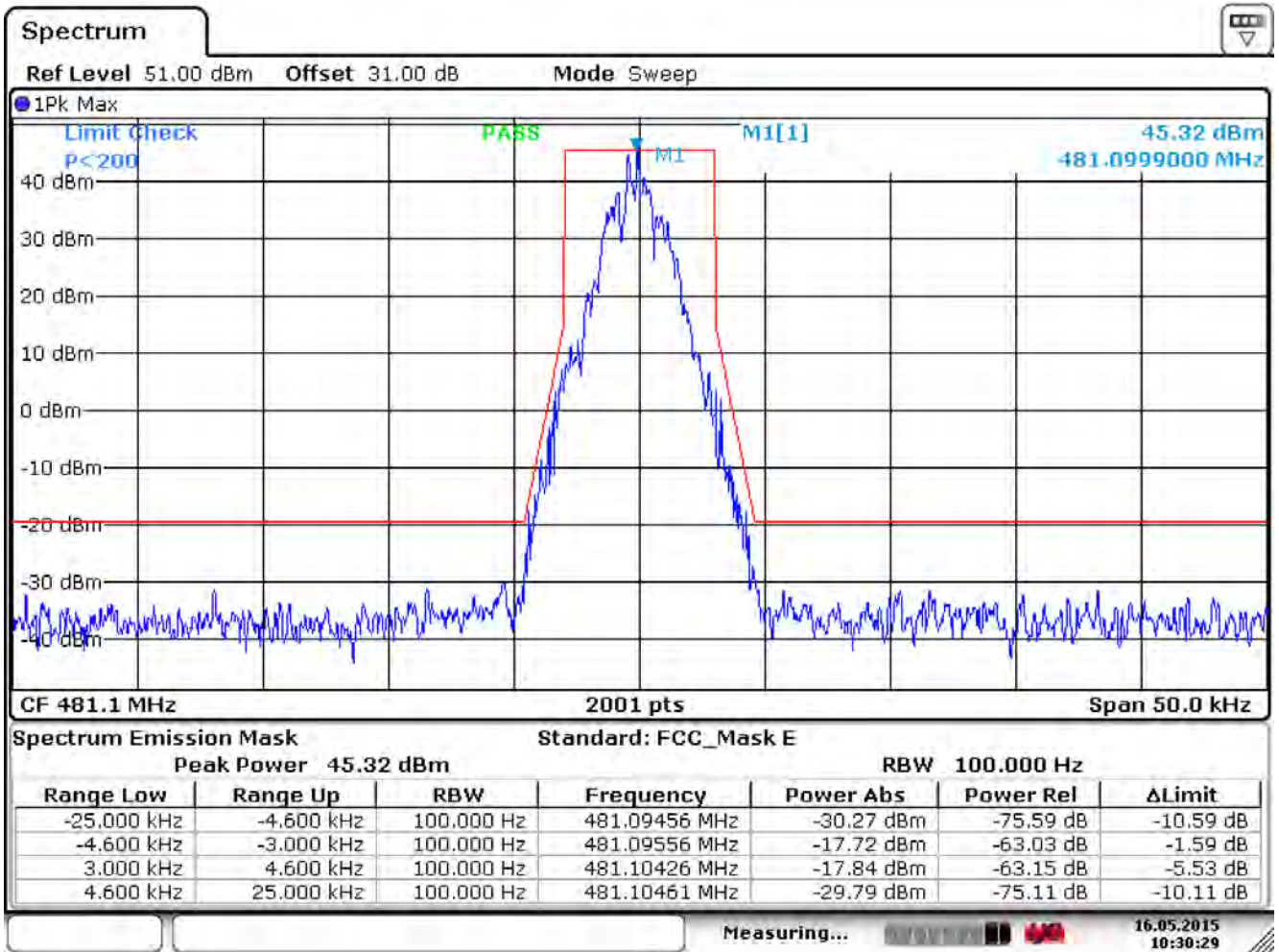
450.1MHz (Mask)



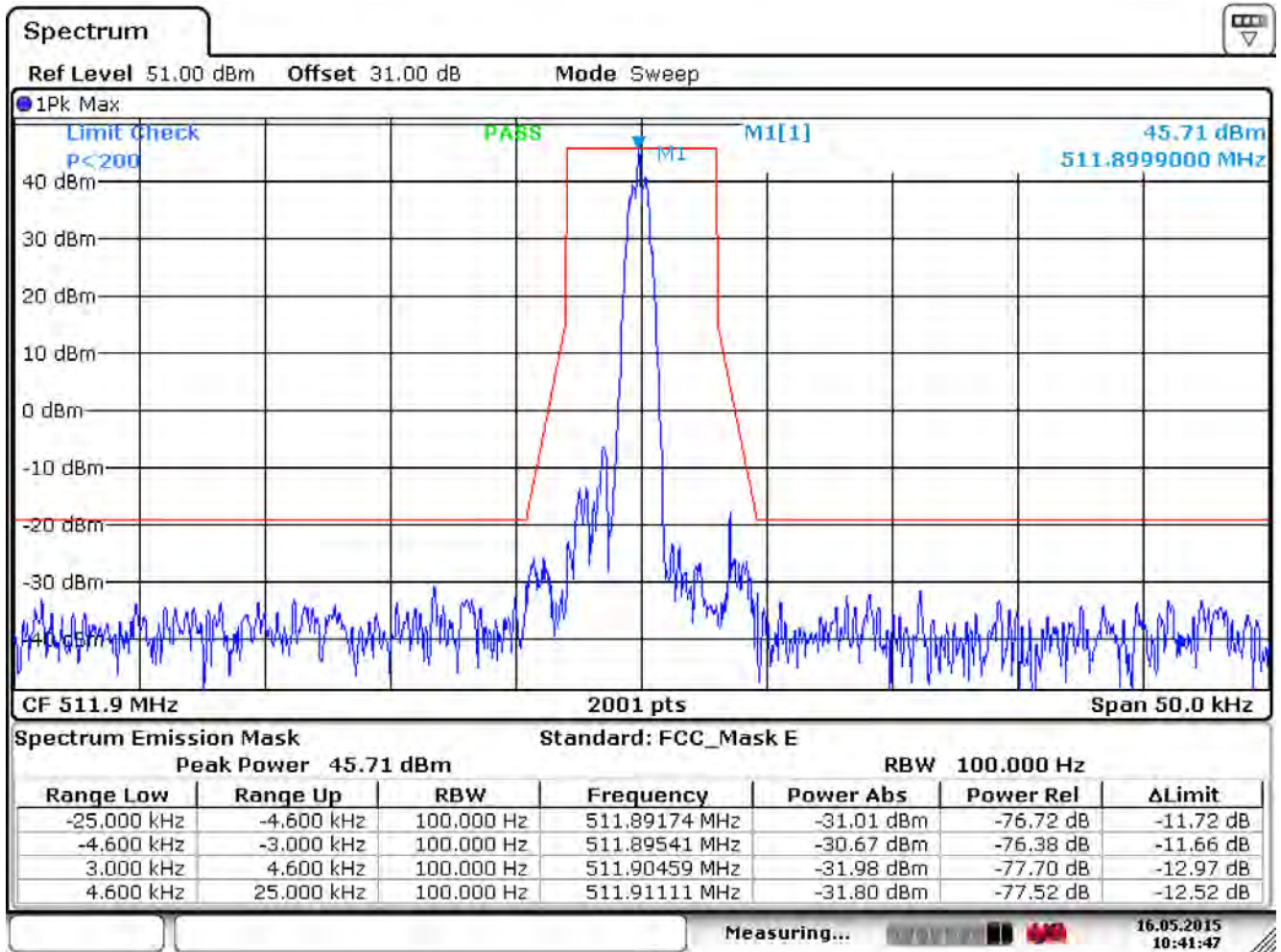
481.1MHz (Carr Mask)



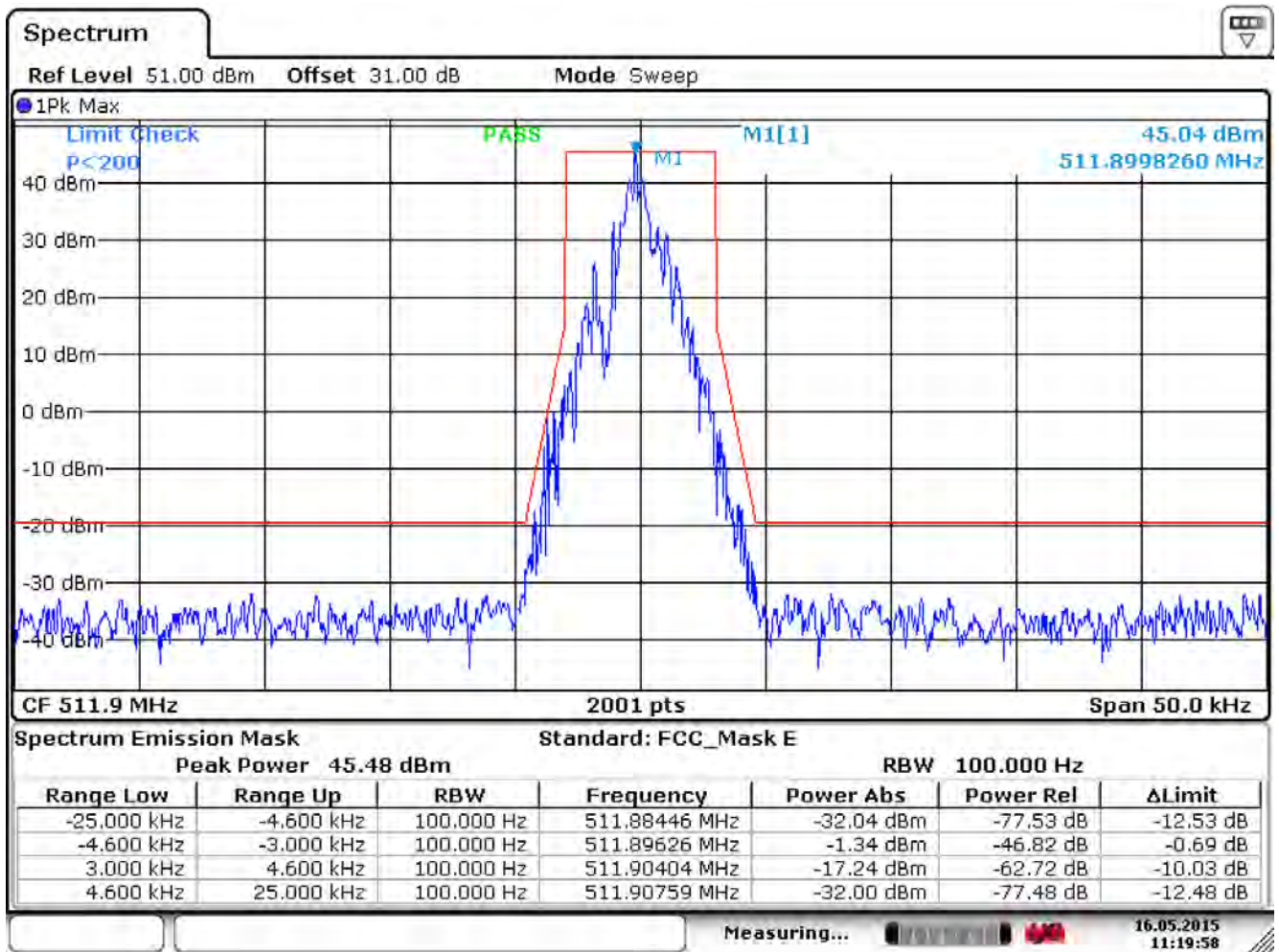
481.1MHz (Mask)



511.9MHz (Carr Mask)



511.9MHz (Mask)

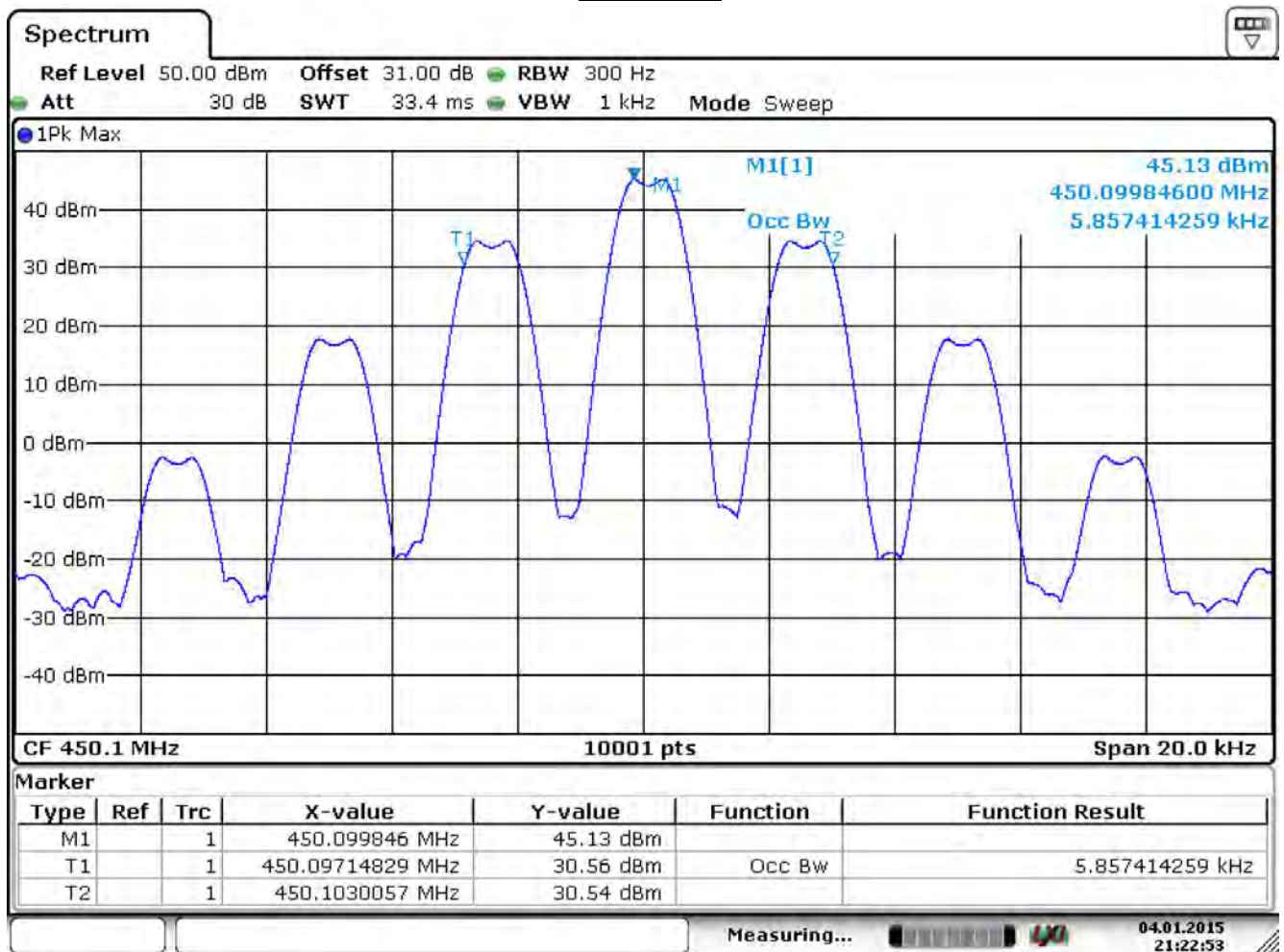


Product	Repeater		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/25	Test Site	SR7

Analog

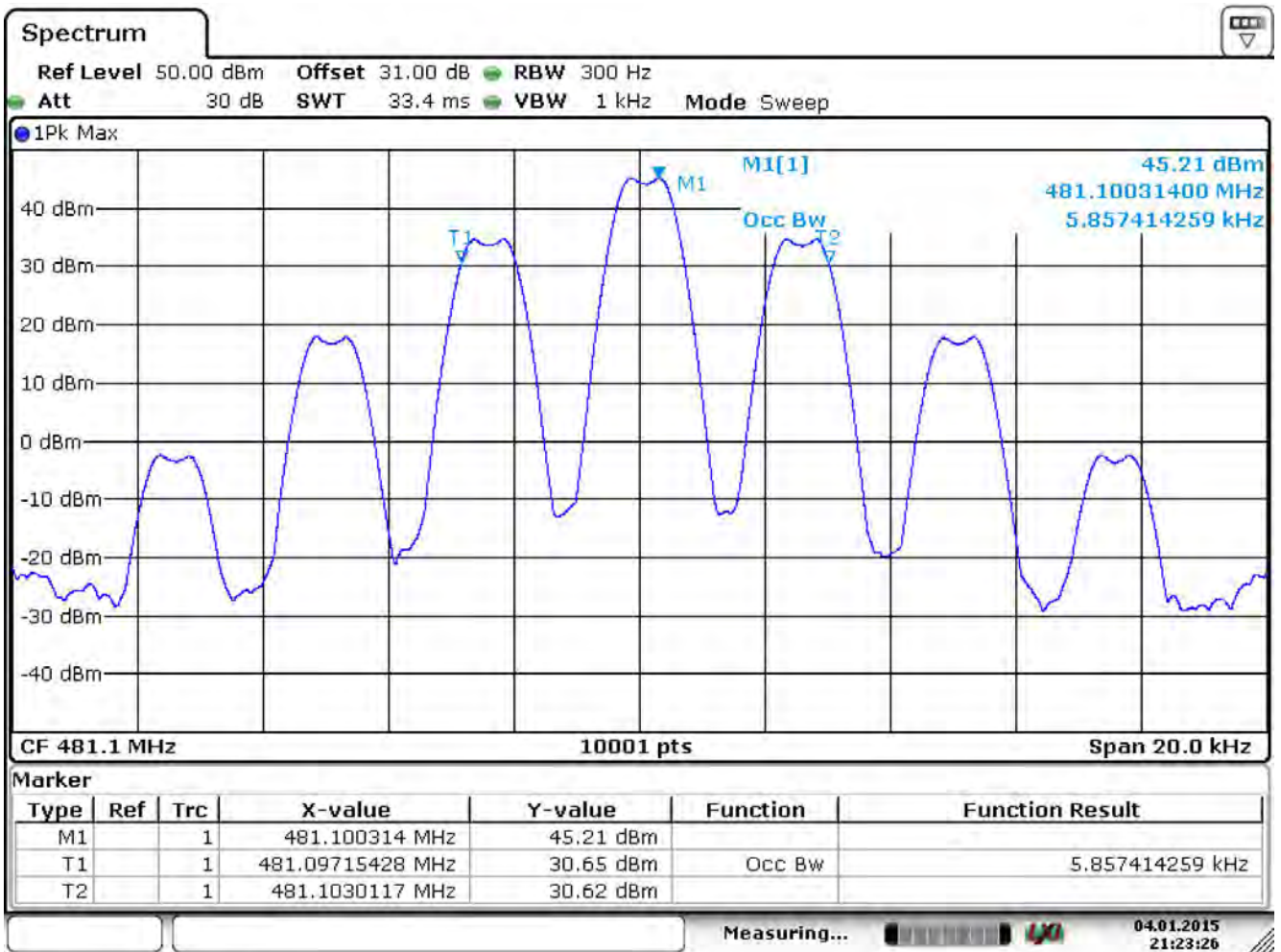
Channel	Frequency (MHz)	Measure Level (kHz)	Limit (kHz)	Result
Low	450.1	5.857	--	Pass
Mid	481.1	5.857	--	Pass
High	511.9	5.863	--	Pass

450.1MHz



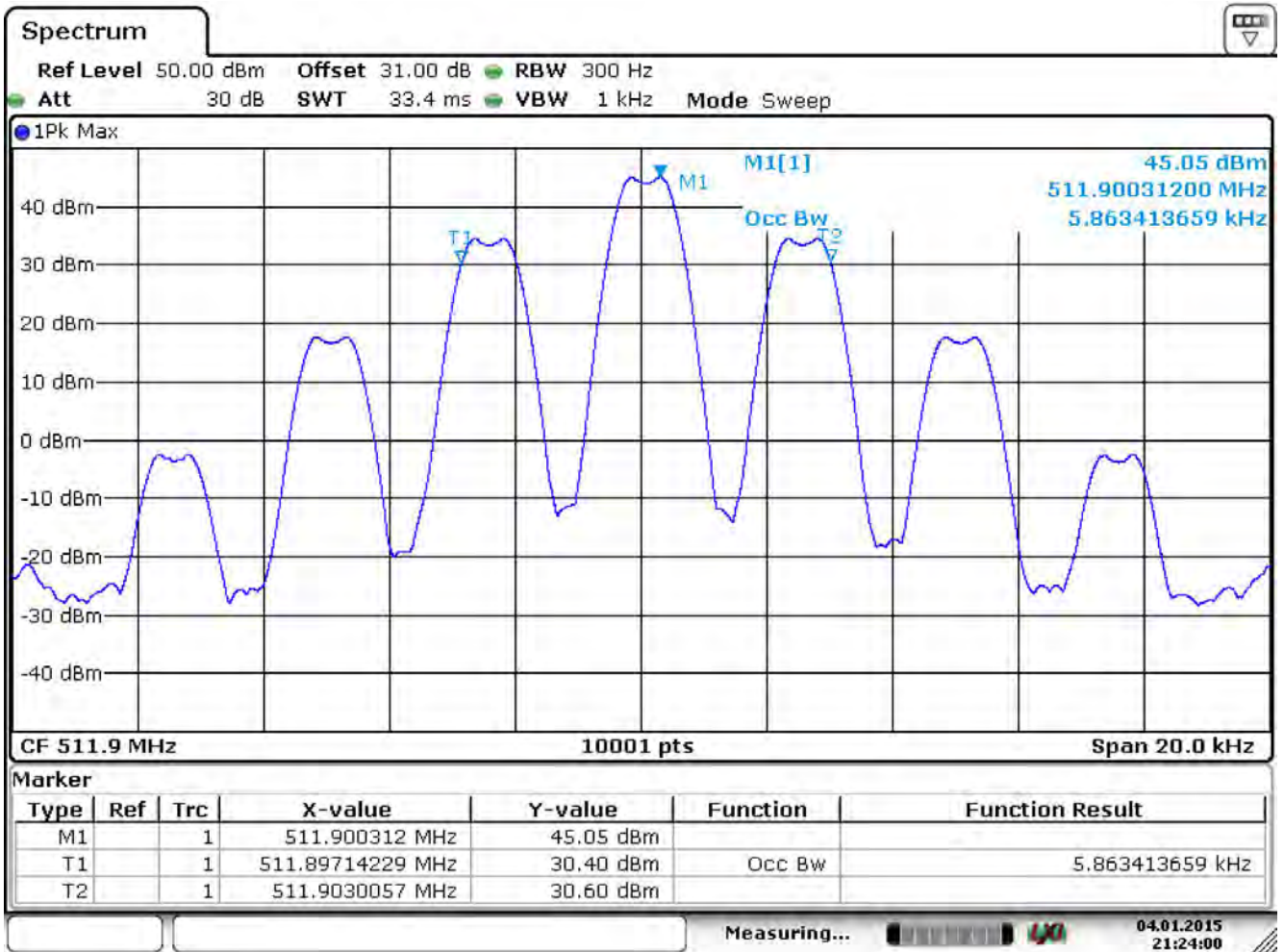
Date: 4 JAN.2015 21:22:53

481.1 MHz



Date: 4.JAN.2015 21:23:26

511.9 MHz



Date: 4.JAN.2015 21:24:00

Product	Repeater		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/25	Test Site	SR7

Digital 6.25kHz

Channel	Frequency (MHz)	Measure Level (kHz)	Limit (kHz)	Result
Low	450.1	3.398	--	Pass
Mid	481.1	3.688	--	Pass
High	511.9	3.728	--	Pass

450.1MHz



Date: 16.MAY.2015 10:23:44

481.1 MHz



Date: 16.MAY.2015 10:35:58

511.9 MHz



Date: 16.MAY.2015 10:40:52

5. Spurious Emissions at Antenna Terminals (Conducted)

5.1. Test Equipment

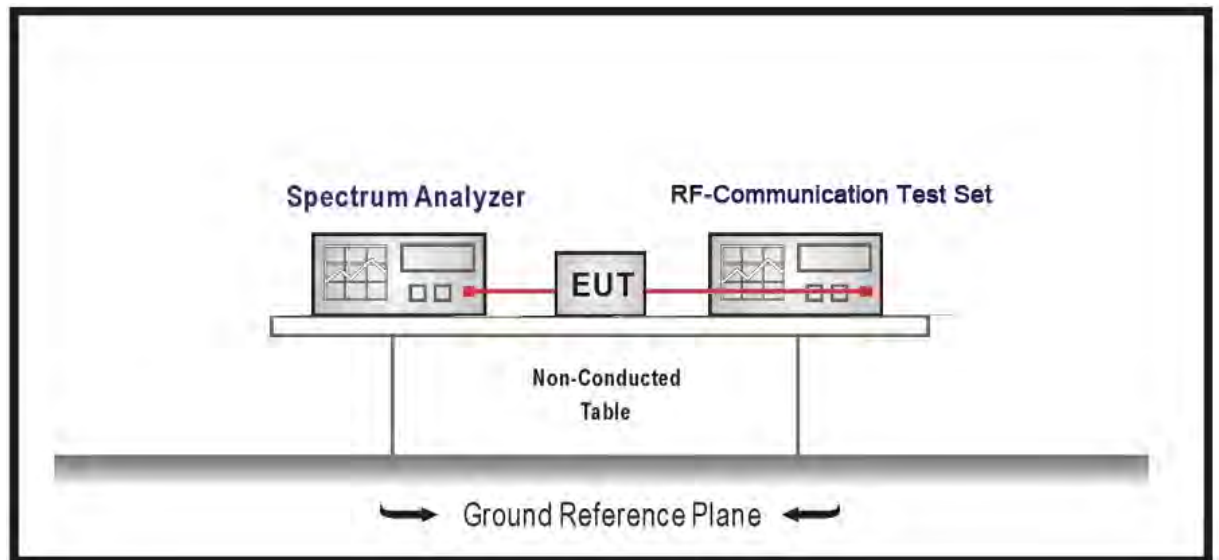
The following test equipments are used during the radiated emission test:

Spurious Emissions at Antenna Terminals (Conducted) / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSV 40	101049	2015/07/14
RF-communications Test set	HP	8920A	3614A08091	2015/04/27
Receiver	Agilent	N9038A	MY53220121	2015/07/26

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 90.210(b)	At least $43 + 10 \log (P)$ dB
§ 90.210(d)	At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least $55 + 10 \log (P)$ or 65 dB, whichever is the lesser attenuation.

5.4. Test Procedure

The carrier was modulated 100%. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 1MHz. The measurements were made in accordance with standard ANSI/TIA-603-C: 2004

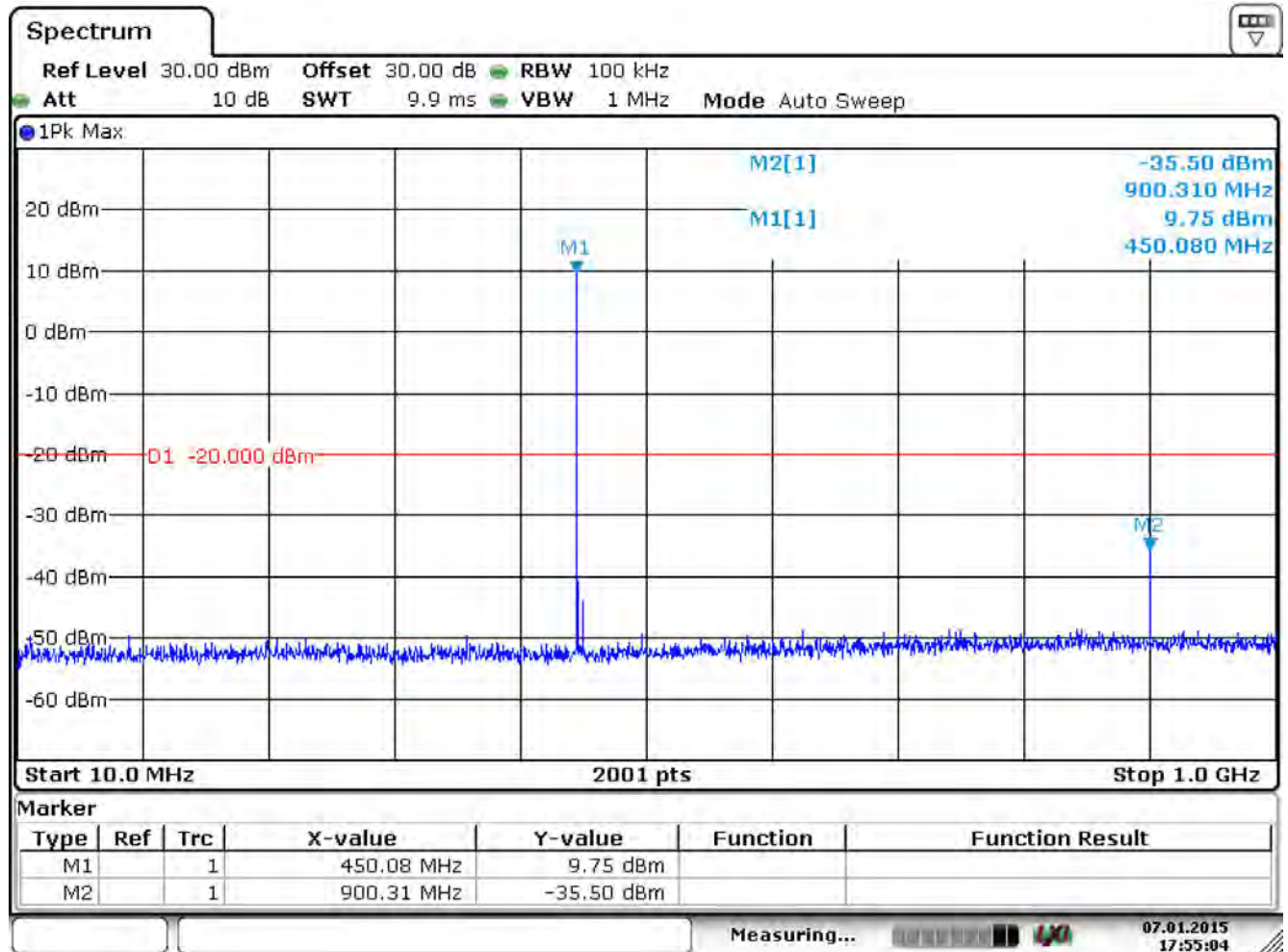
5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

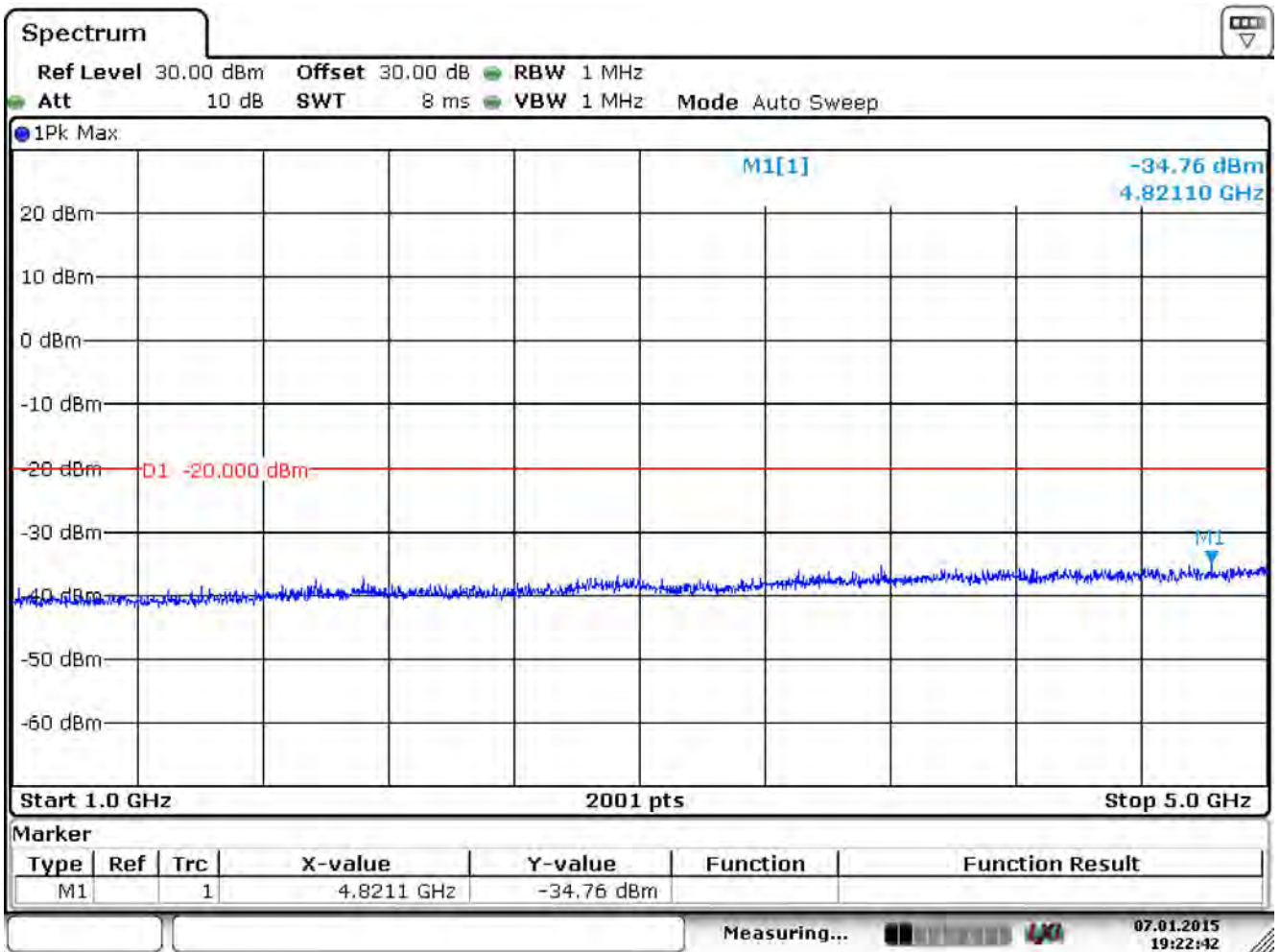
Product	Repeater		
Test Item	Spurious Emissions at Antenna Terminals (Conducted)		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/07	Test Site	SR7

450.1MHz(10MHz-1GHz)



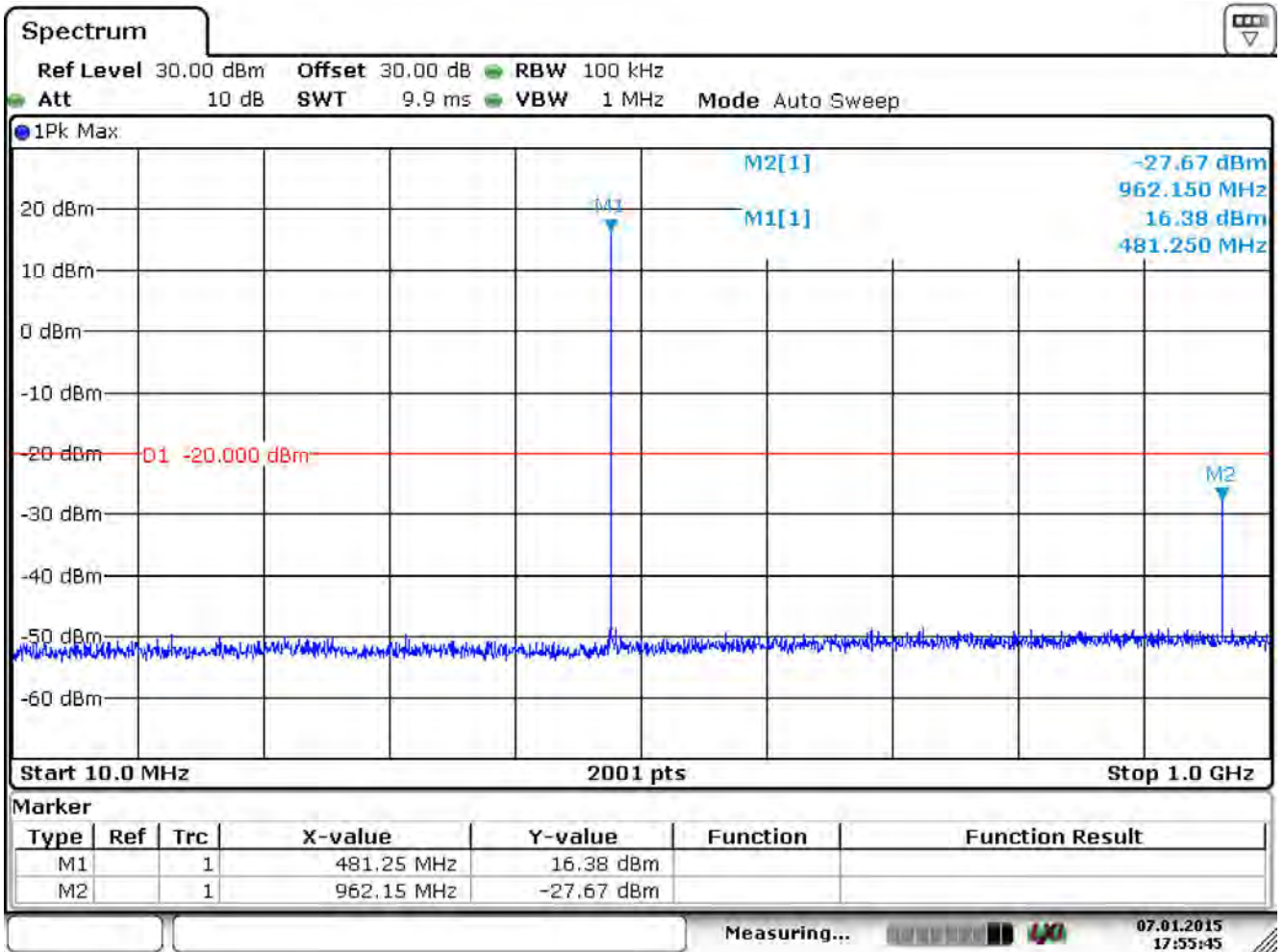
Date: 7.JAN.2015 17:55:04

450.1MHz(1GHz-5GHz)



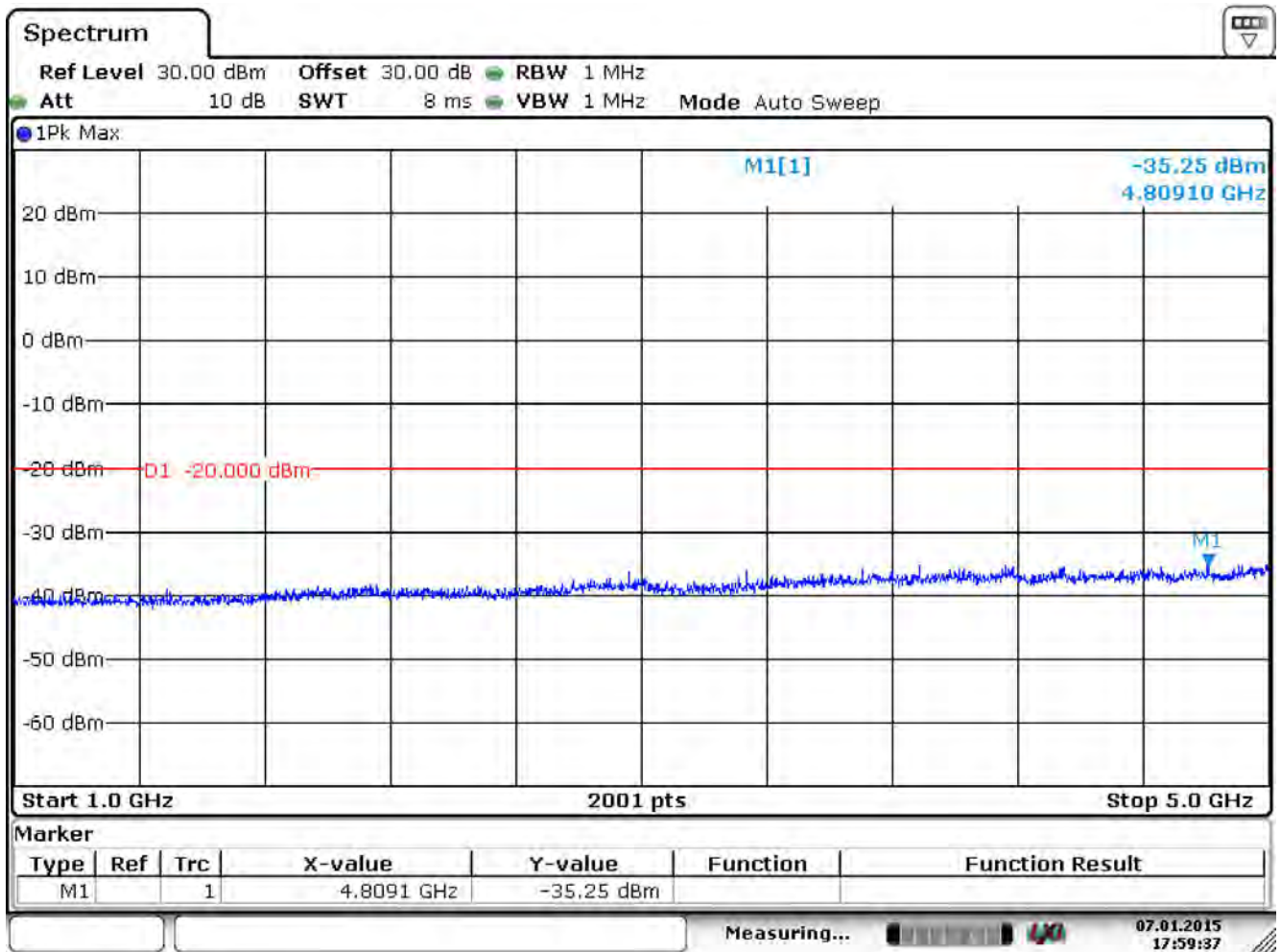
Date: 7.JAN.2015 19:22:42

481.1MHz(10MHz-1GHz)



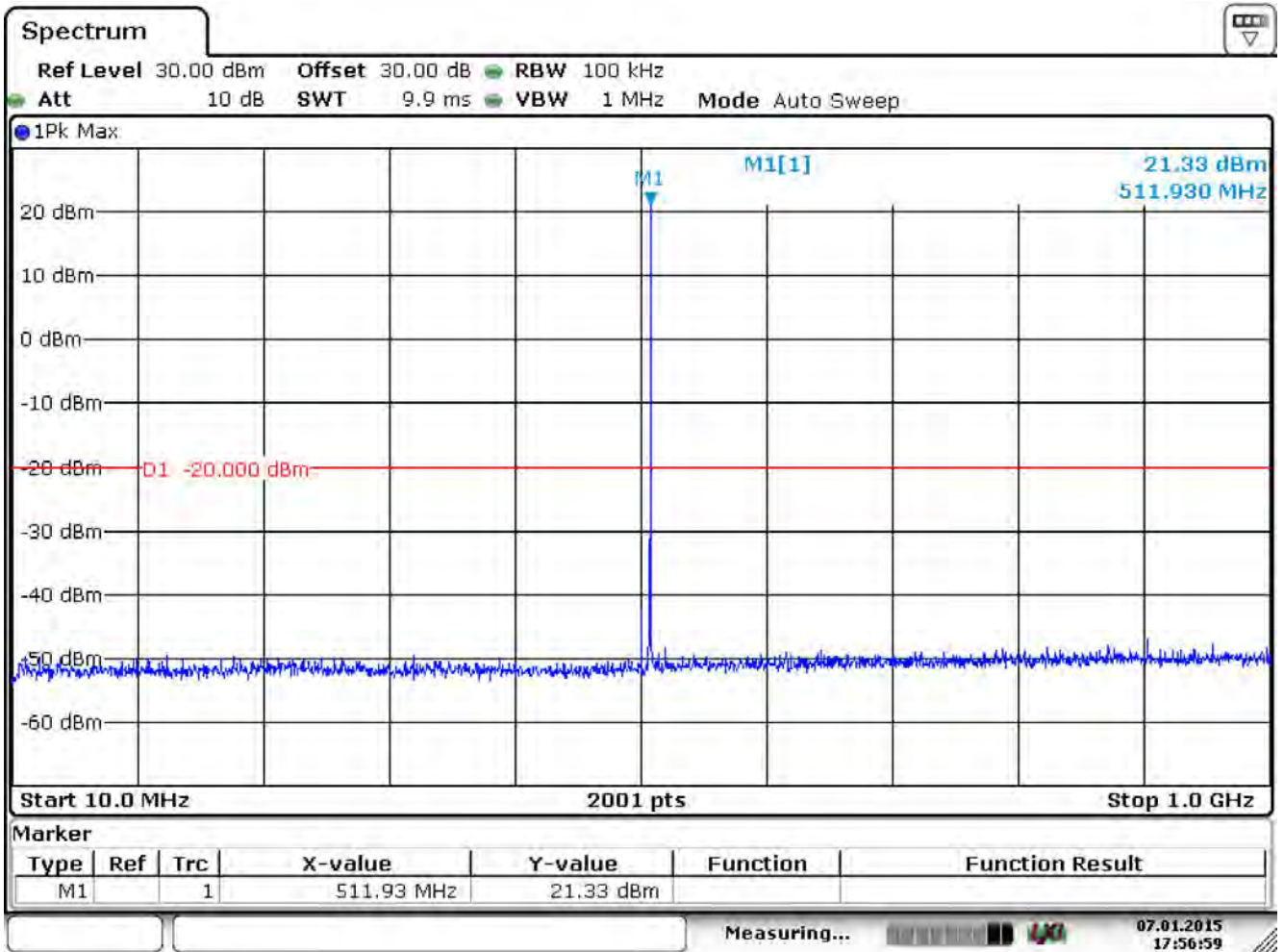
Date: 7.JAN.2015 17:55:44

481.1MHz(1GHz-5GHz)



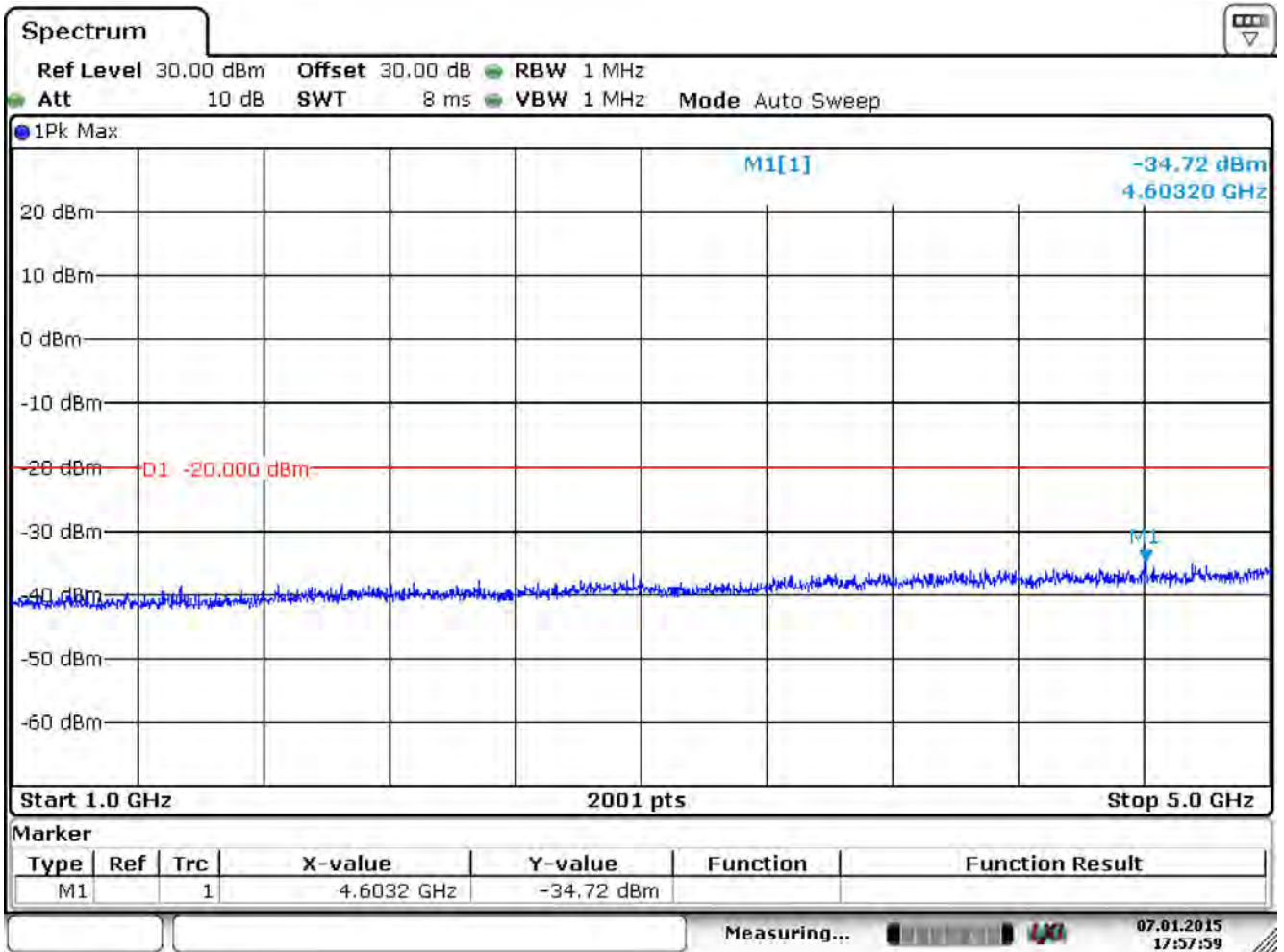
Date: 7.JAN.2015 17:59:37

511.9MHz(10MHz-1GHz)



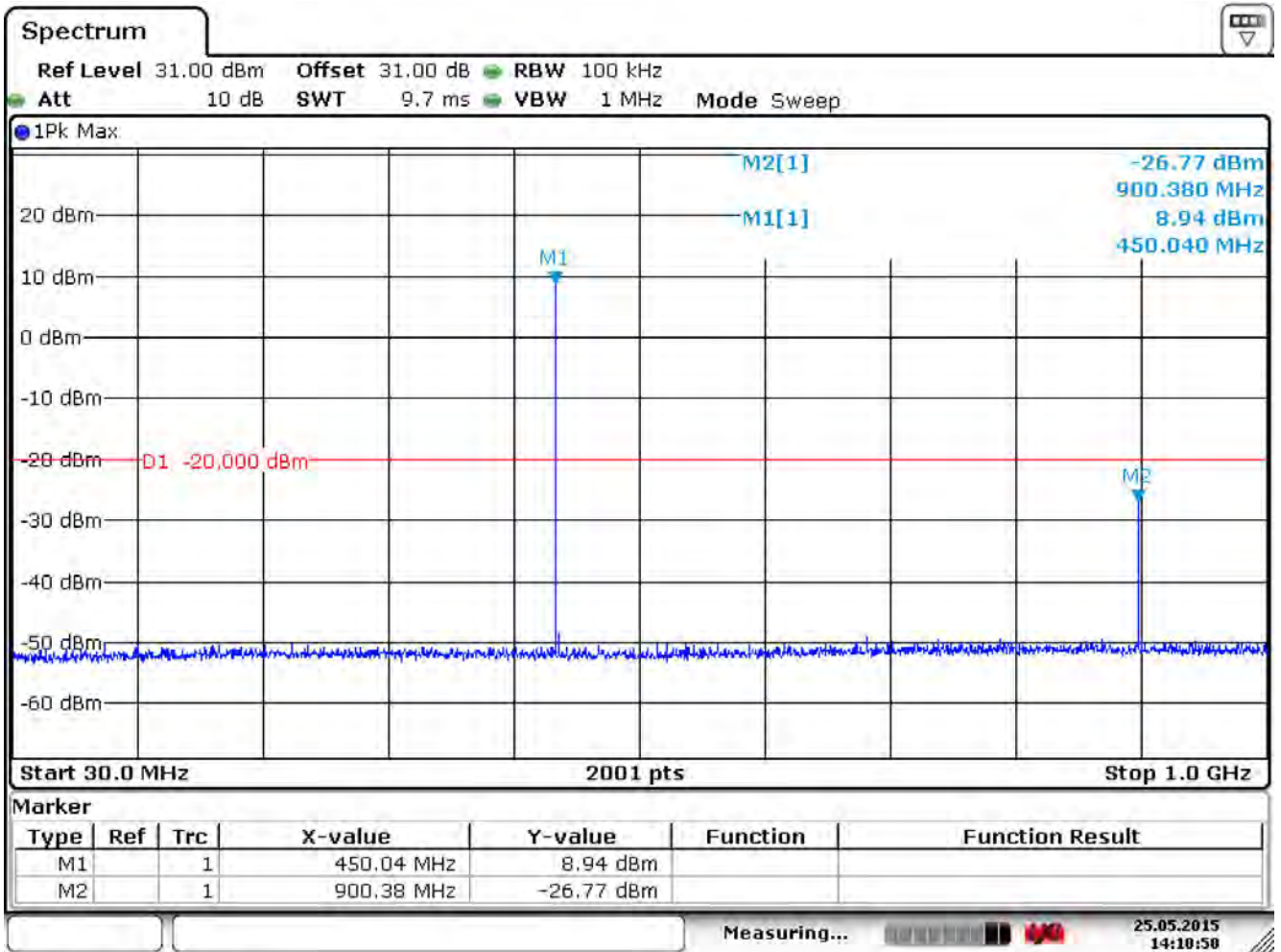
Date: 7.JAN.2015 17:56:59

511.9MHz(1GHz-5GHz)

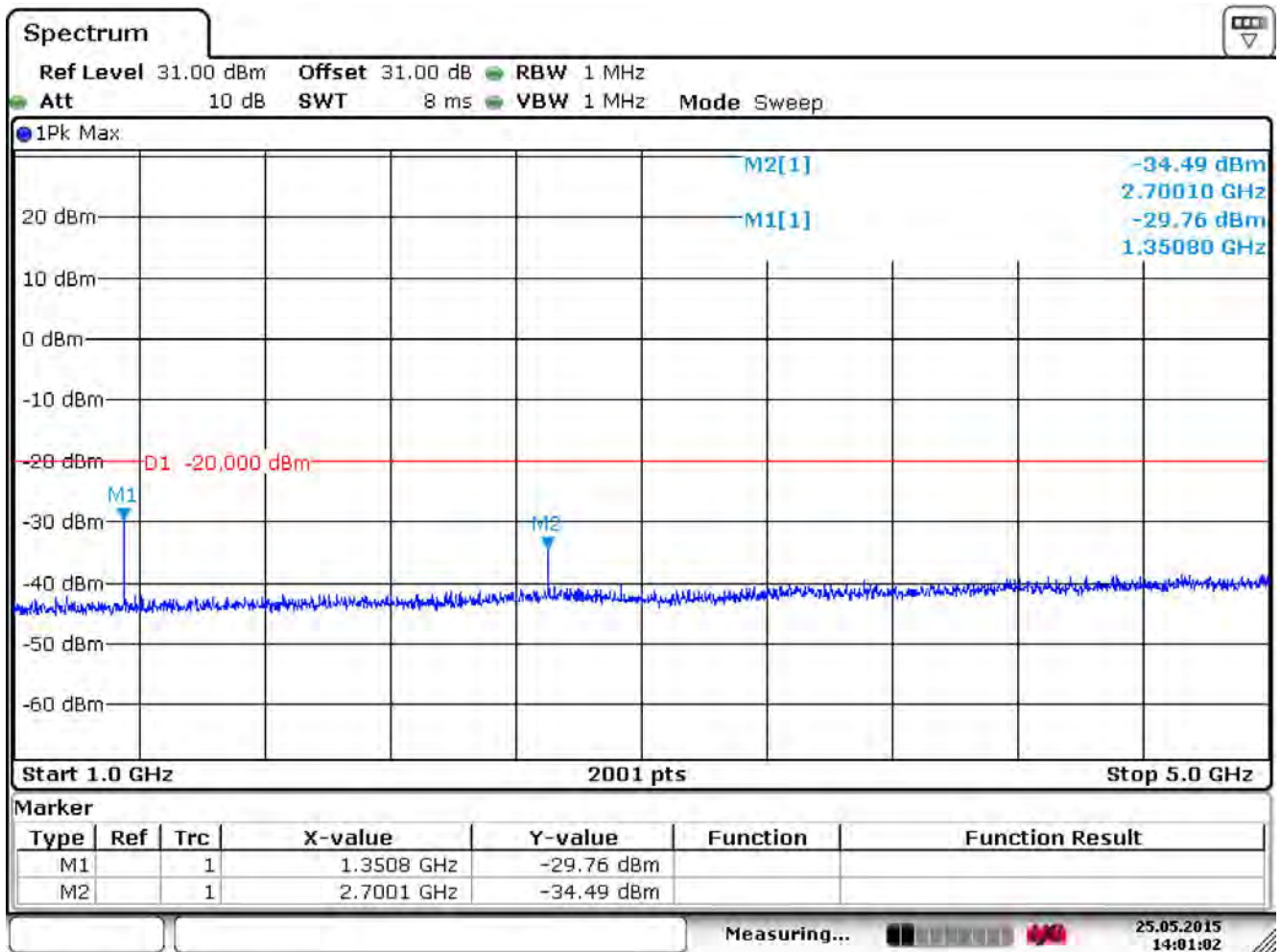


Date: 7.JAN.2015 17:57:59

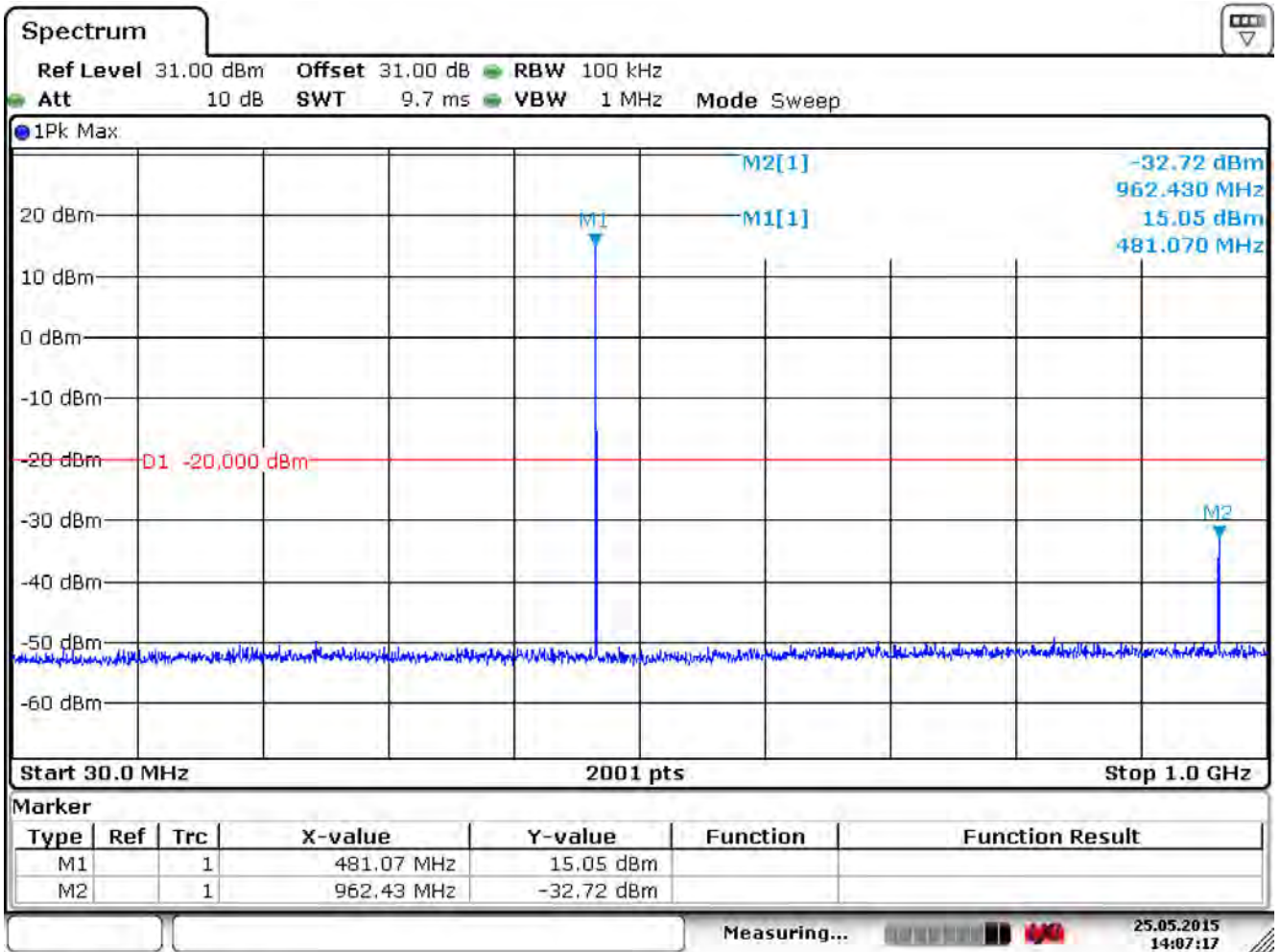
450.1MHz(30MHz-1GHz)- 6.25kHz



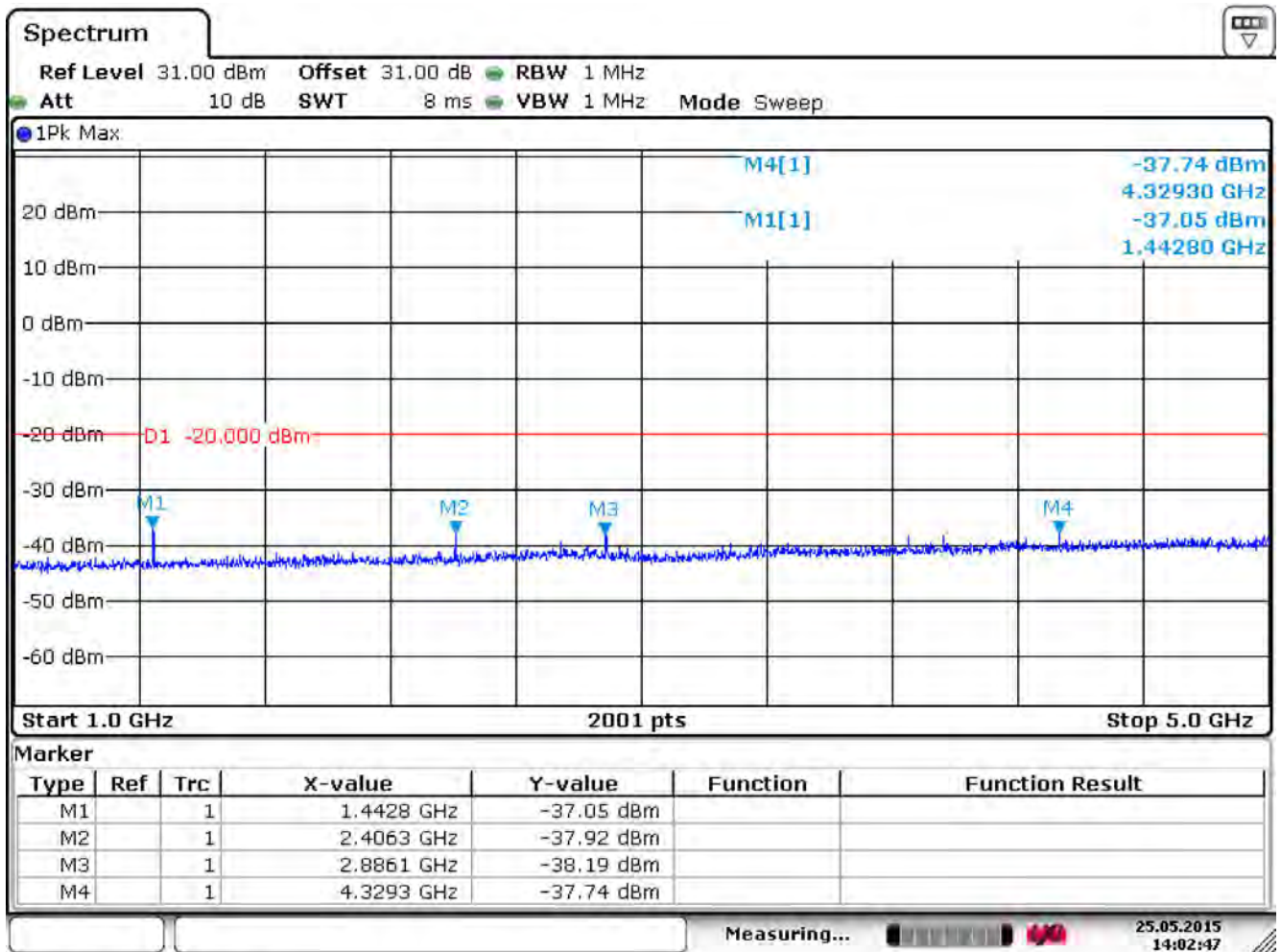
450.1MHz(1GHz-5GHz)- 6.25kHz



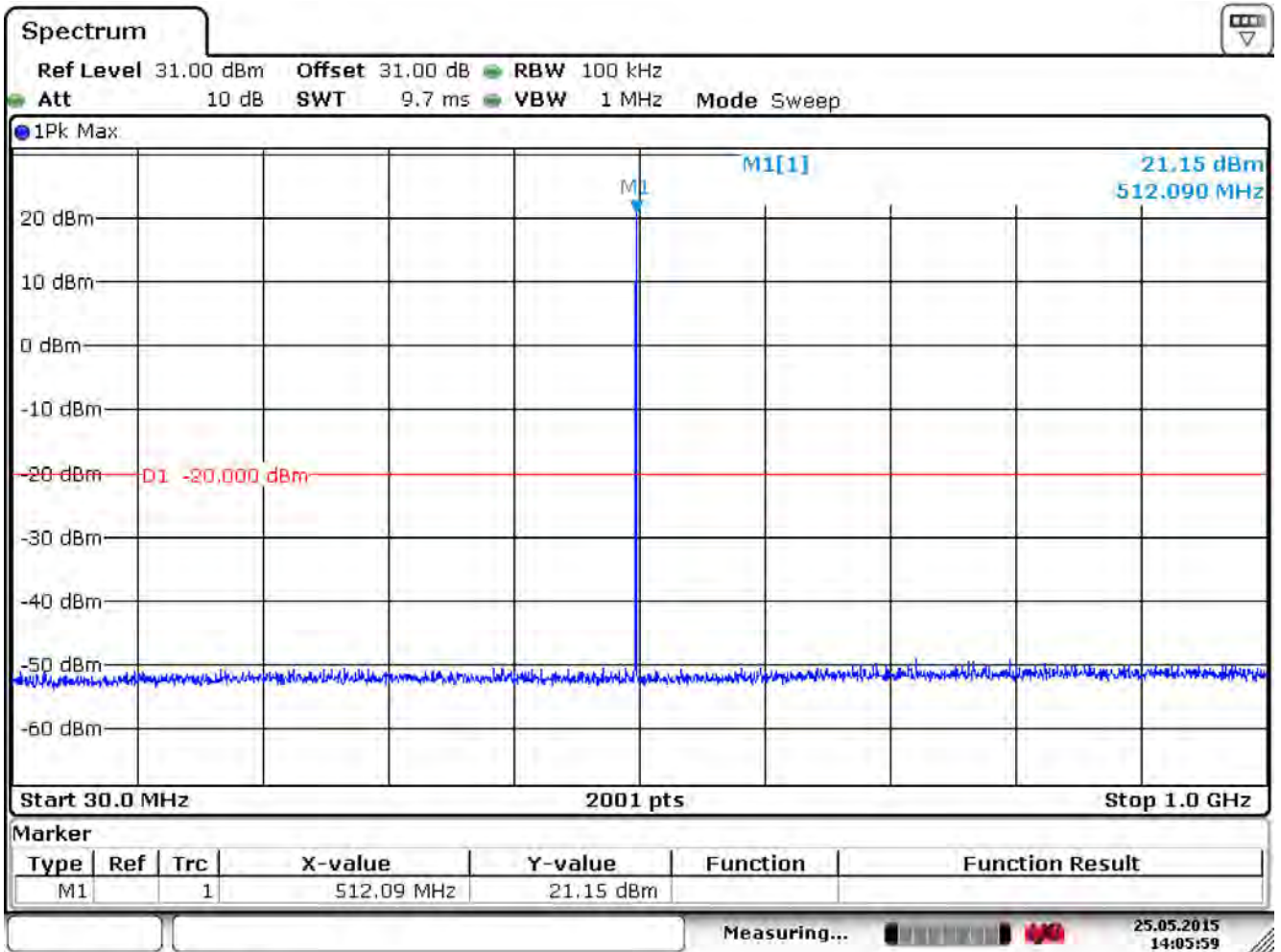
481.1MHz(30MHz-1GHz)- 6.25kHz



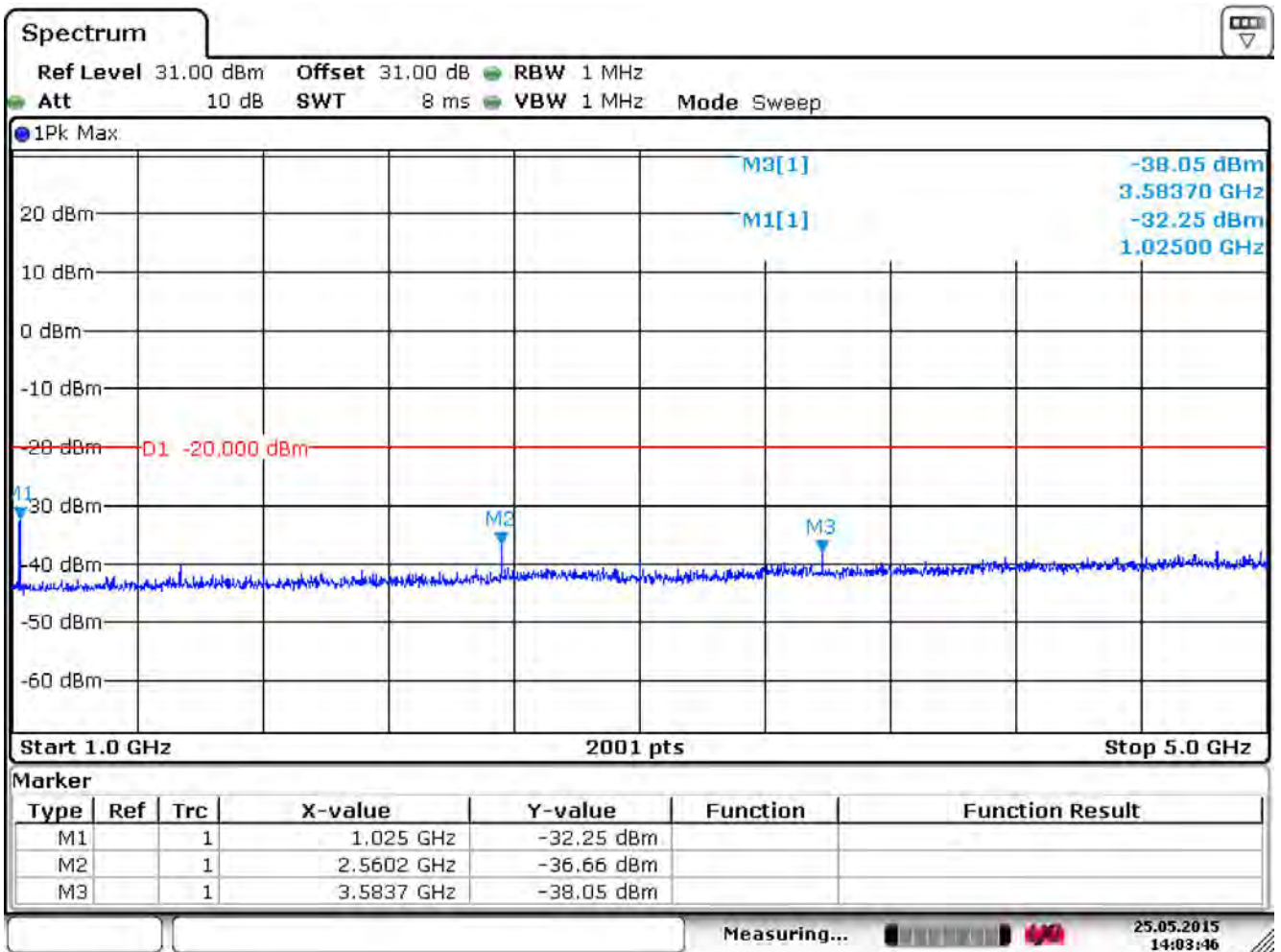
481.1MHz(1GHz-5GHz)- 6.25kHz



511.9MHz(30MHz-1GHz)- 6.25kHz



511.9MHz(1GHz-5GHz)- 6.25kHz



6. Field Strength of Spurious Emissions

6.1. Test Equipment

The following test equipments are used during the band edge tests:

Field Strength of Spurious Emissions / CB1

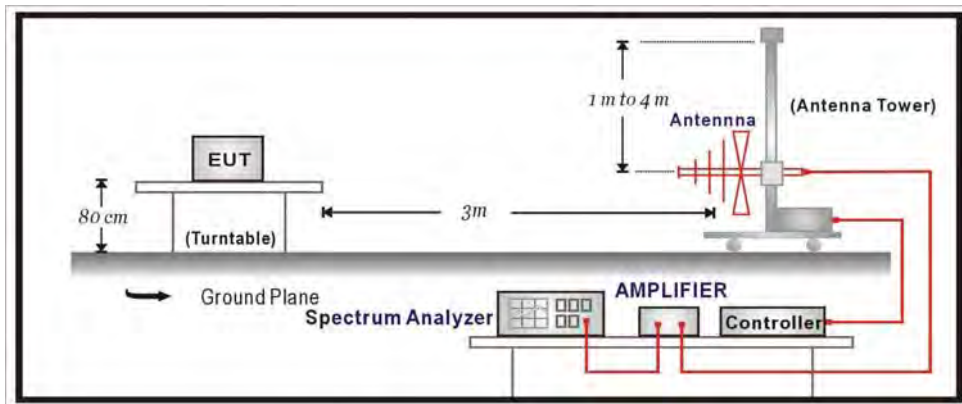
Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895(CB1)	2015/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120	D743	2016/01/26
Pre-Amplifier	Quietek	AMF-4D.	888003	2015/06/02
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2016/01/18
k Type Cable	Huber Suhner	Sucoflex 102	25623/2	2016/01/26
Signal & Spectrum Analyzer	R&S	FSV40	101049	2015/10/30
RF-communications Test set	HP	8920A	3614A08091	2015/04/27

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

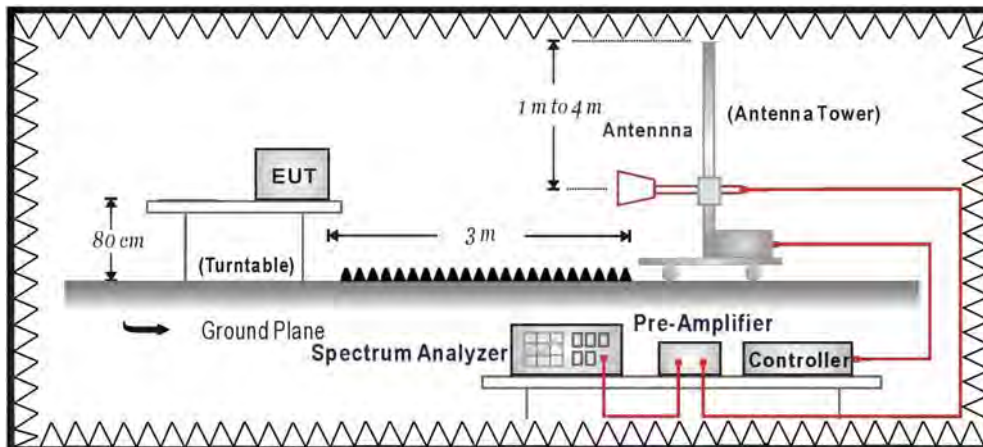
6.2. Test Setup

RF Radiated Measurement:

Under 1GHz Test Setup:



Above 1GHz Test Setup:



6.3. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 90.210(b)	At least $43 + 10 \log (P)$ dB
§ 90.210(d)	At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least $55 + 10 \log (P)$ or 65 dB, whichever is the lesser attenuation.

6.4. Test Procedure

The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental.

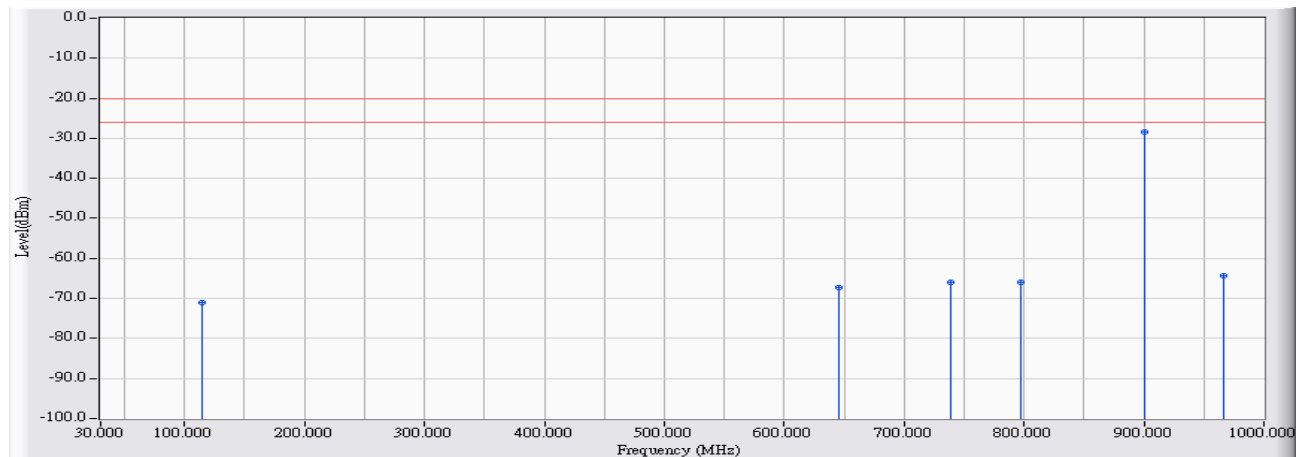
6.5. Uncertainty

The measurement uncertainty is defined as ± 3.65 dB

6.6. Test Result

30MHz-1GHz Spurious

Site : CB1	Time : 2015/4/20 - 16:03
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

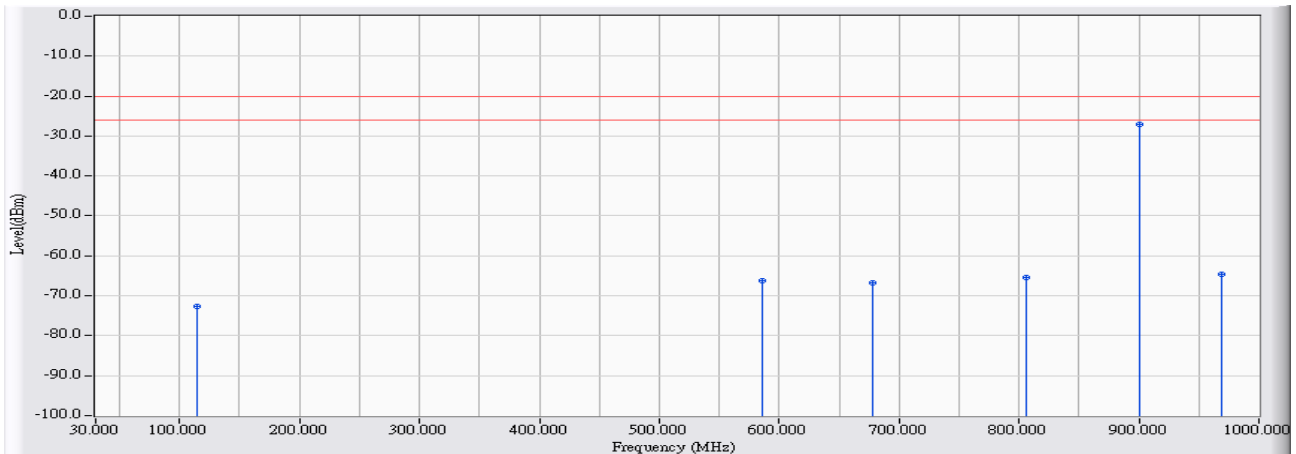


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		114.833	21.362	-92.355	-70.994	-50.994	-20.000	PEAK
2		645.642	29.357	-96.608	-67.251	-47.251	-20.000	PEAK
3		739.200	30.051	-96.077	-66.026	-46.026	-20.000	PEAK
4		797.856	30.334	-96.245	-65.911	-45.911	-20.000	PEAK
5	*	900.140	30.011	-58.306	-28.295	-8.295	-20.000	PEAK
6		966.067	31.028	-95.308	-64.280	-44.280	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:04
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

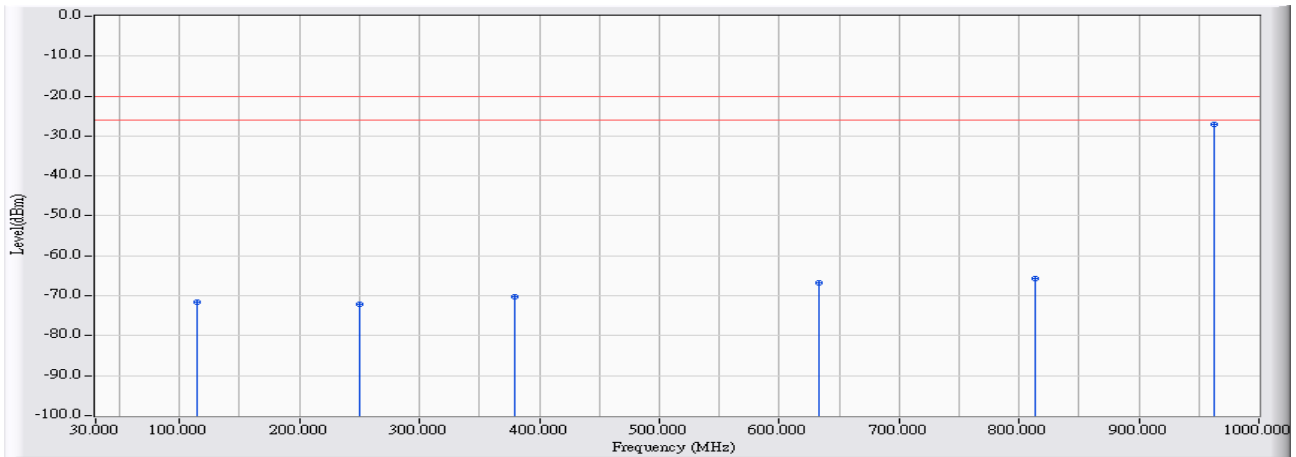


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		114.833	23.008	-95.707	-72.700	-52.700	-20.000	PEAK
2		586.017	29.317	-95.592	-66.274	-46.274	-20.000	PEAK
3		677.636	29.884	-96.524	-66.639	-46.639	-20.000	PEAK
4		806.097	31.927	-97.227	-65.300	-45.300	-20.000	PEAK
5	*	900.140	31.129	-58.123	-26.994	-6.994	-20.000	PEAK
6		969.460	31.785	-96.266	-64.481	-44.481	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:06
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

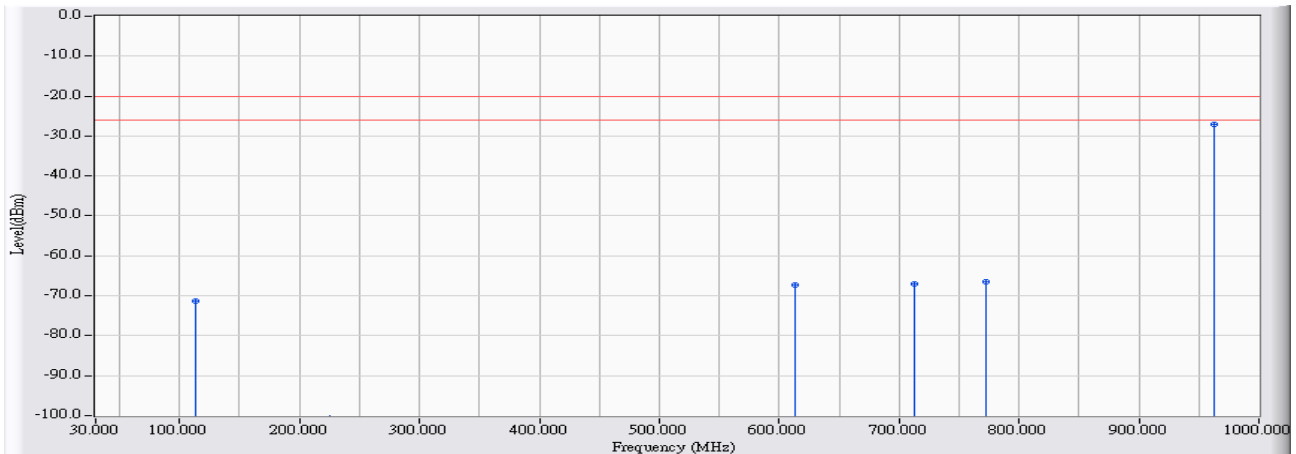


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		114.348	21.399	-92.941	-71.542	-51.542	-20.000	PEAK
2		249.595	19.984	-92.090	-72.106	-52.106	-20.000	PEAK
3		379.025	24.113	-94.392	-70.280	-50.280	-20.000	PEAK
4		632.554	29.484	-96.198	-66.714	-46.714	-20.000	PEAK
5		812.884	30.337	-95.938	-65.600	-45.600	-20.000	PEAK
6	*	962.189	30.937	-57.914	-26.977	-6.977	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:07
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

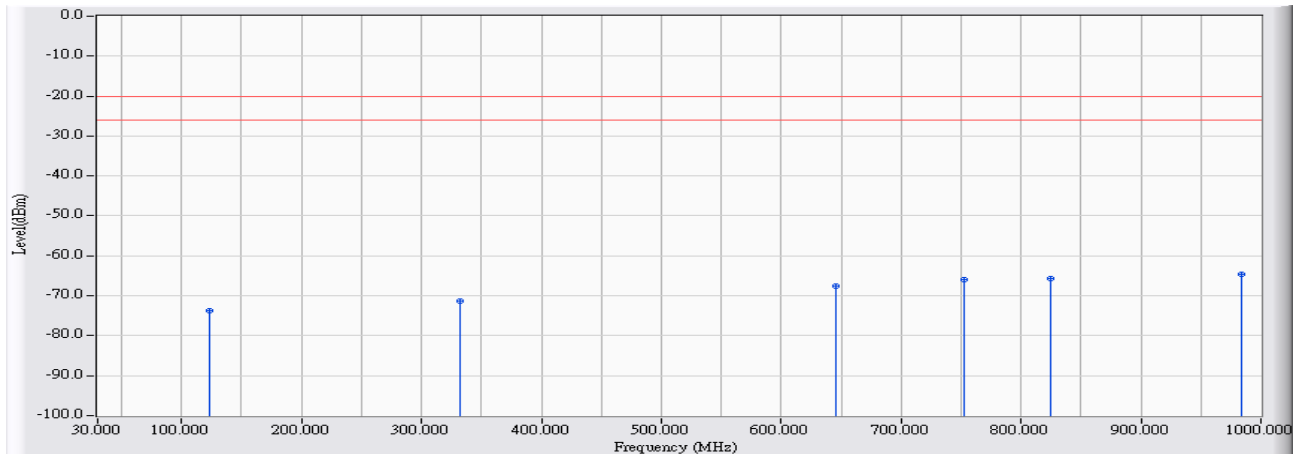


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		113.348	23.040	-94.261	-71.221	-51.221	-20.000	PEAK
2		224.873	23.708	-760.030	-736.322	-716.322	-20.000	PEAK
3		612.679	30.180	-97.600	-67.420	-47.420	-20.000	PEAK
4		713.023	30.064	-97.086	-67.022	-47.022	-20.000	PEAK
5		772.164	31.872	-98.230	-66.359	-46.359	-20.000	PEAK
6	*	962.189	31.709	-58.723	-27.015	-7.015	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:08
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

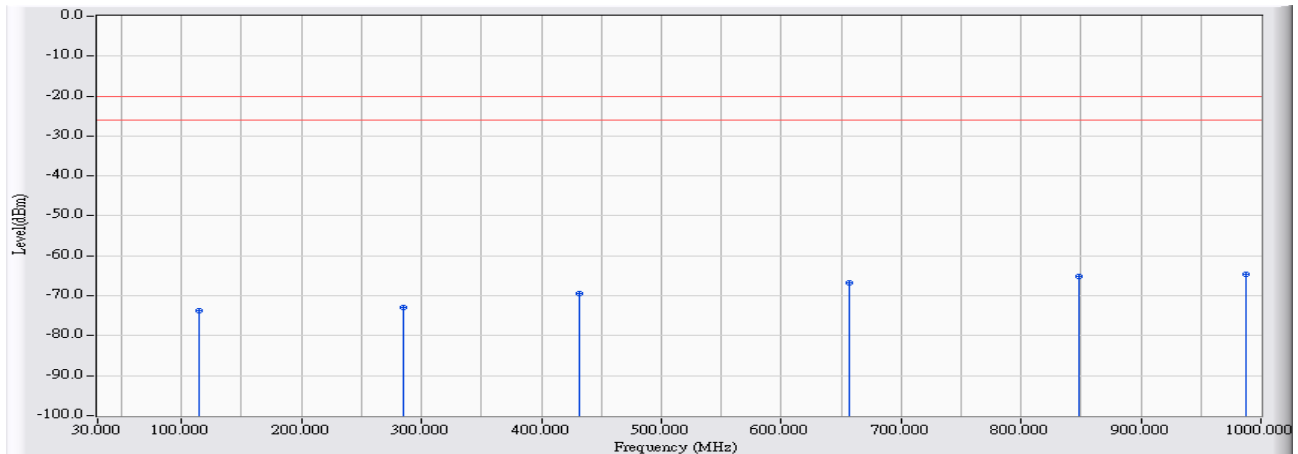


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		123.073	21.192	-94.789	-73.597	-53.597	-20.000	PEAK
2		332.004	23.085	-94.386	-71.300	-51.300	-20.000	PEAK
3		646.127	29.352	-96.992	-67.640	-47.640	-20.000	PEAK
4		752.289	30.089	-96.096	-66.007	-46.007	-20.000	PEAK
5		824.518	30.325	-96.112	-65.788	-45.788	-20.000	PEAK
6	*	983.518	31.356	-95.970	-64.614	-44.614	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:09
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

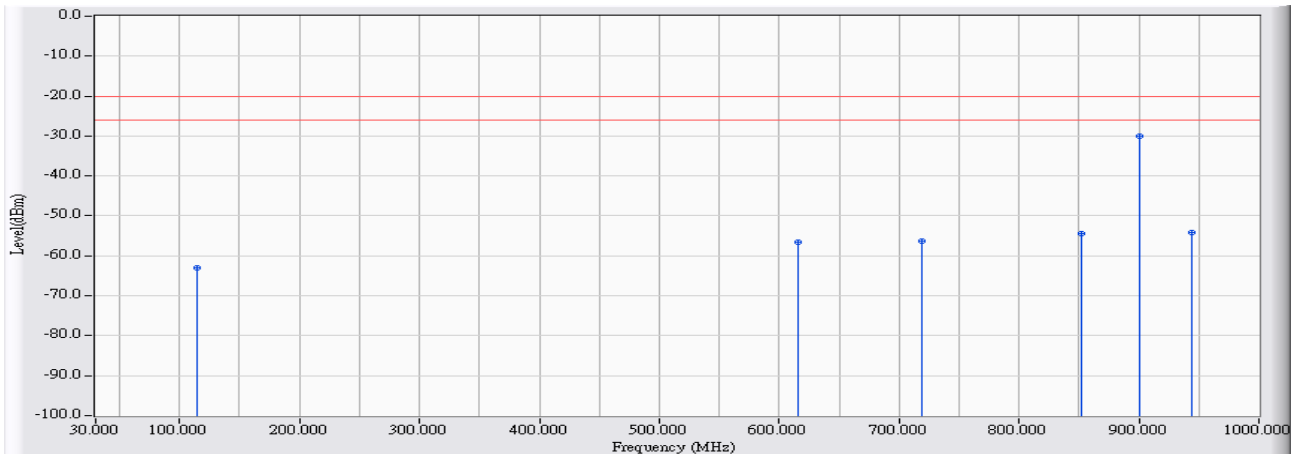


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		114.833	23.008	-96.632	-73.625	-53.625	-20.000	PEAK
2		284.983	22.792	-95.690	-72.899	-52.899	-20.000	PEAK
3		431.864	27.125	-96.438	-69.313	-49.313	-20.000	PEAK
4		656.307	30.244	-96.877	-66.633	-46.633	-20.000	PEAK
5		848.756	31.400	-96.540	-65.140	-45.140	-20.000	PEAK
6	*	987.396	31.881	-96.566	-64.685	-44.685	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:53
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

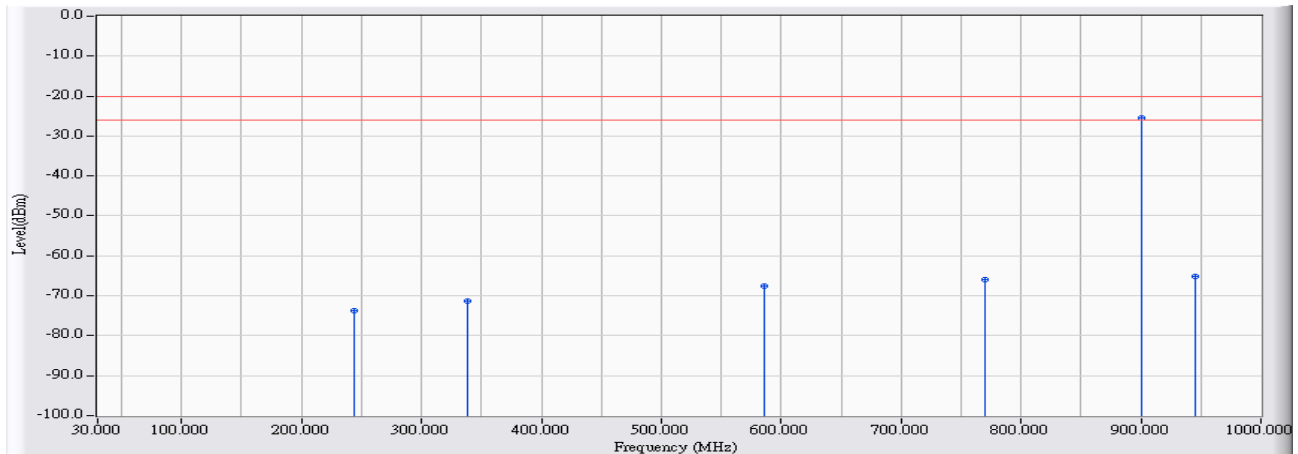


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		114.348	21.399	-84.470	-63.071	-43.071	-20.000	PEAK
2		616.072	29.446	-86.101	-56.656	-36.656	-20.000	PEAK
3		718.841	29.811	-86.136	-56.325	-36.325	-20.000	PEAK
4		852.149	30.245	-84.605	-54.360	-34.360	-20.000	PEAK
5	*	900.233	30.011	-59.915	-29.903	-9.903	-20.000	PEAK
6		943.768	30.504	-84.677	-54.173	-34.173	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:54
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

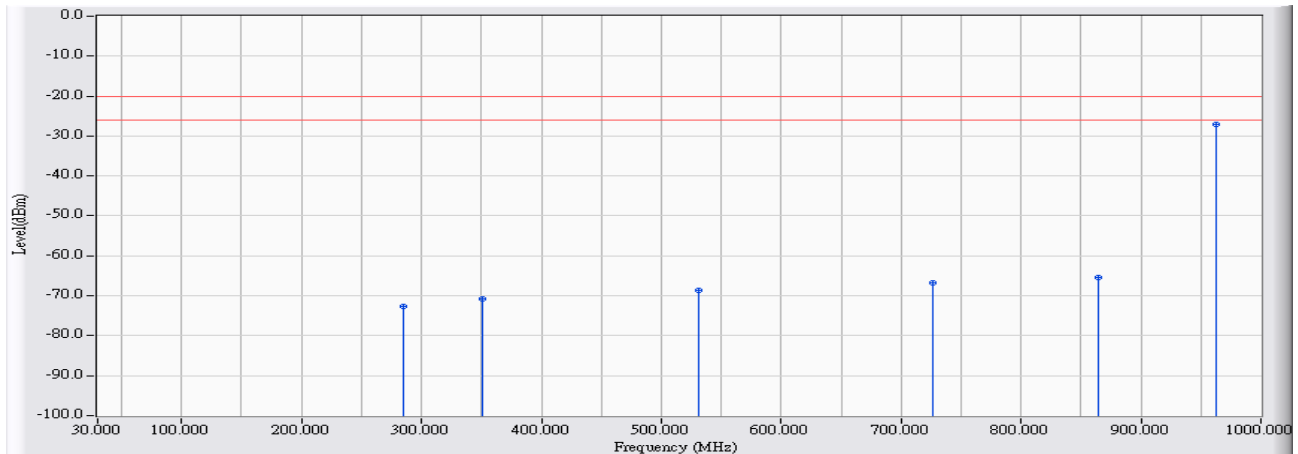


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		243.293	23.258	-97.100	-73.842	-53.842	-20.000	PEAK
2		338.306	24.694	-95.944	-71.250	-51.250	-20.000	PEAK
3		586.017	29.317	-96.792	-67.474	-47.474	-20.000	PEAK
4		770.225	31.792	-97.800	-66.008	-46.008	-20.000	PEAK
5	*	900.140	31.129	-56.640	-25.511	-5.511	-20.000	PEAK
6		945.222	31.530	-96.706	-65.176	-45.176	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:55
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

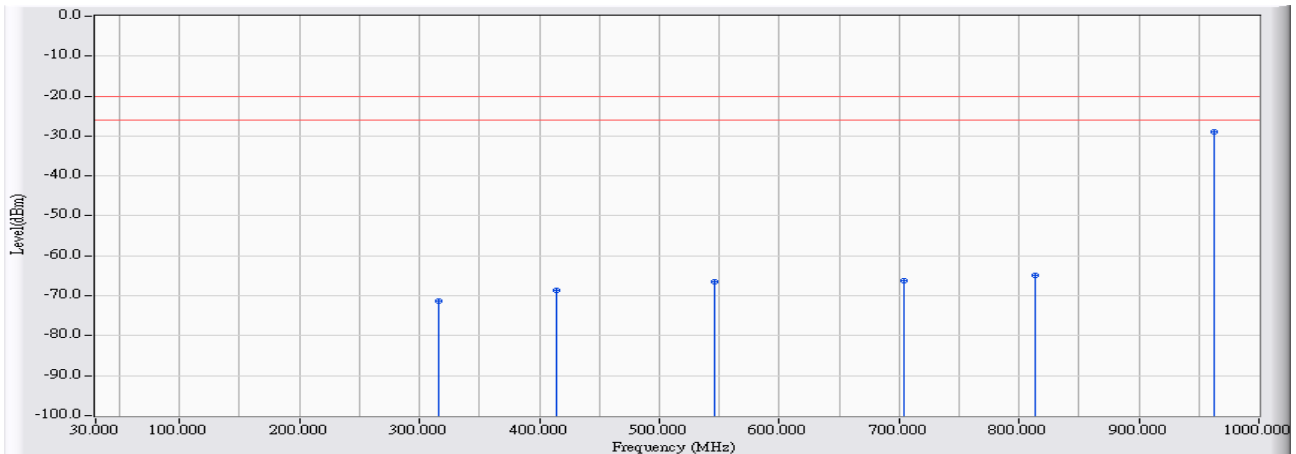


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		284.983	22.512	-95.164	-72.652	-52.652	-20.000	PEAK
2		351.394	23.522	-94.380	-70.858	-50.858	-20.000	PEAK
3		530.755	27.055	-95.565	-68.511	-48.511	-20.000	PEAK
4		726.112	29.950	-96.735	-66.785	-46.785	-20.000	PEAK
5		864.268	30.207	-95.673	-65.466	-45.466	-20.000	PEAK
6	*	962.674	30.948	-57.939	-26.991	-6.991	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:56
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

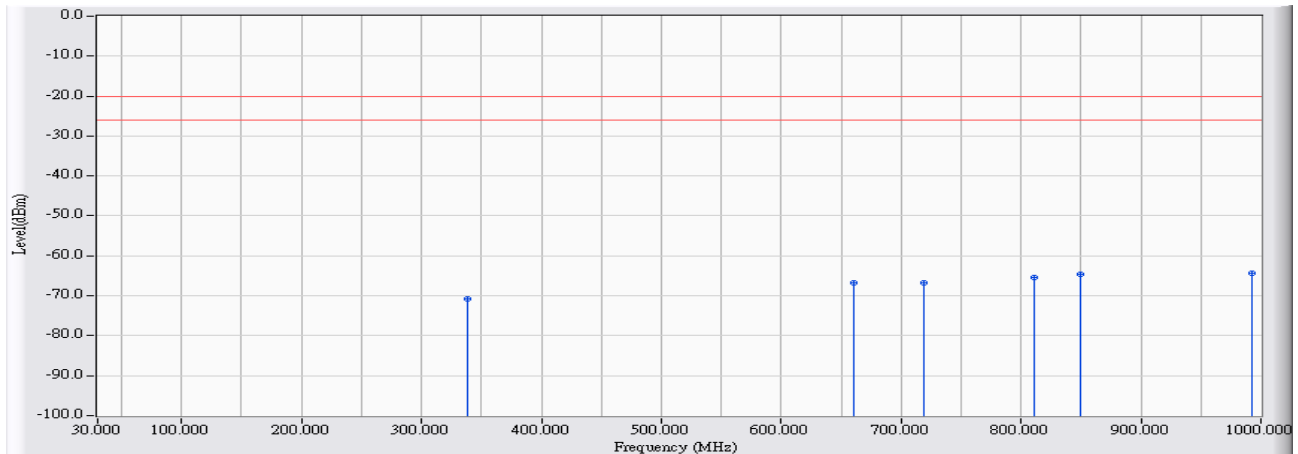


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		315.522	23.779	-95.004	-71.225	-51.225	-20.000	PEAK
2		413.928	27.087	-95.631	-68.544	-48.544	-20.000	PEAK
3		545.782	29.377	-95.962	-66.586	-46.586	-20.000	PEAK
4		704.298	30.018	-96.304	-66.287	-46.287	-20.000	PEAK
5		812.884	31.808	-96.807	-64.999	-44.999	-20.000	PEAK
6	*	962.189	31.709	-60.586	-28.878	-8.878	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:57
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

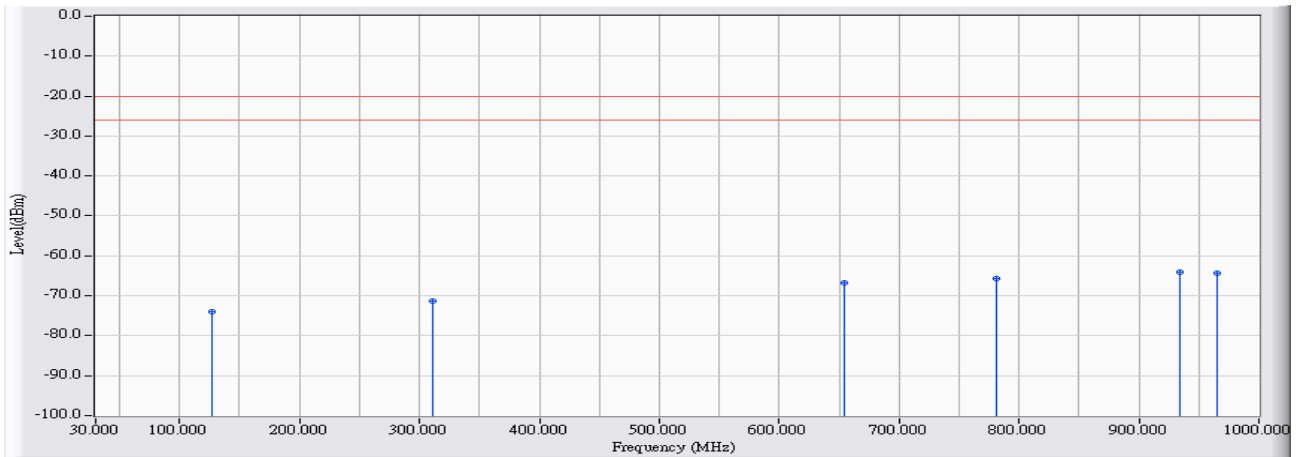


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		337.821	23.217	-93.881	-70.664	-50.664	-20.000	PEAK
2		660.670	29.211	-95.979	-66.767	-46.767	-20.000	PEAK
3		718.841	29.811	-96.441	-66.630	-46.630	-20.000	PEAK
4		810.460	30.340	-95.688	-65.348	-45.348	-20.000	PEAK
5		849.725	30.252	-94.858	-64.606	-44.606	-20.000	PEAK
6	*	992.244	31.356	-95.688	-64.332	-44.332	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 15:58
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz



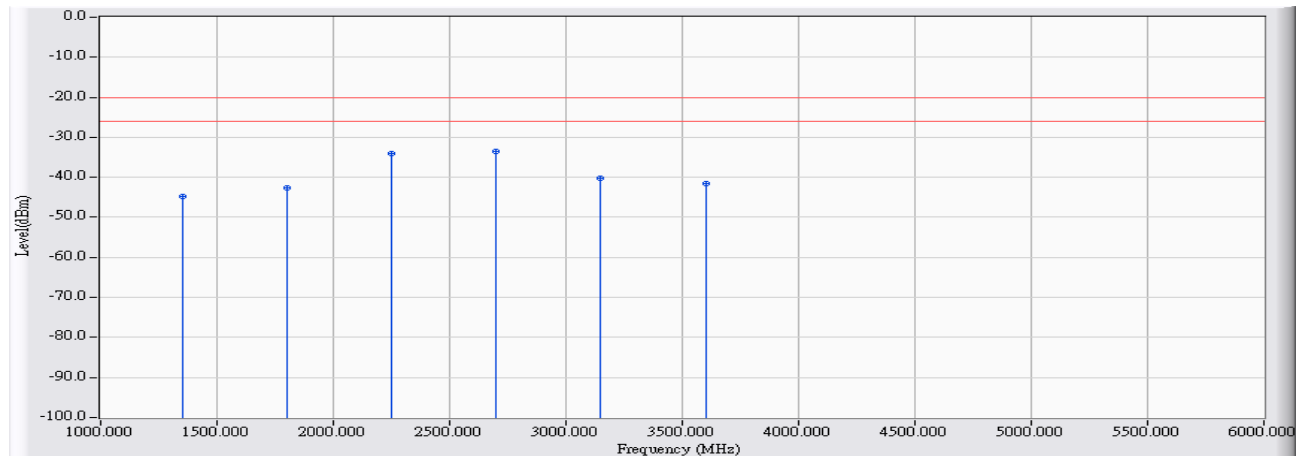
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		127.436	23.854	-97.969	-74.115	-54.115	-20.000	PEAK
2		311.644	23.660	-94.931	-71.270	-51.270	-20.000	PEAK
3		654.368	30.277	-96.959	-66.682	-46.682	-20.000	PEAK
4		781.374	32.183	-97.928	-65.745	-45.745	-20.000	PEAK
5	*	933.588	31.408	-95.378	-63.970	-43.970	-20.000	PEAK
6		965.582	31.744	-96.018	-64.274	-44.274	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Harmonic & Spurious:

Site : CB1	Time : 2015/4/20 - 16:12
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

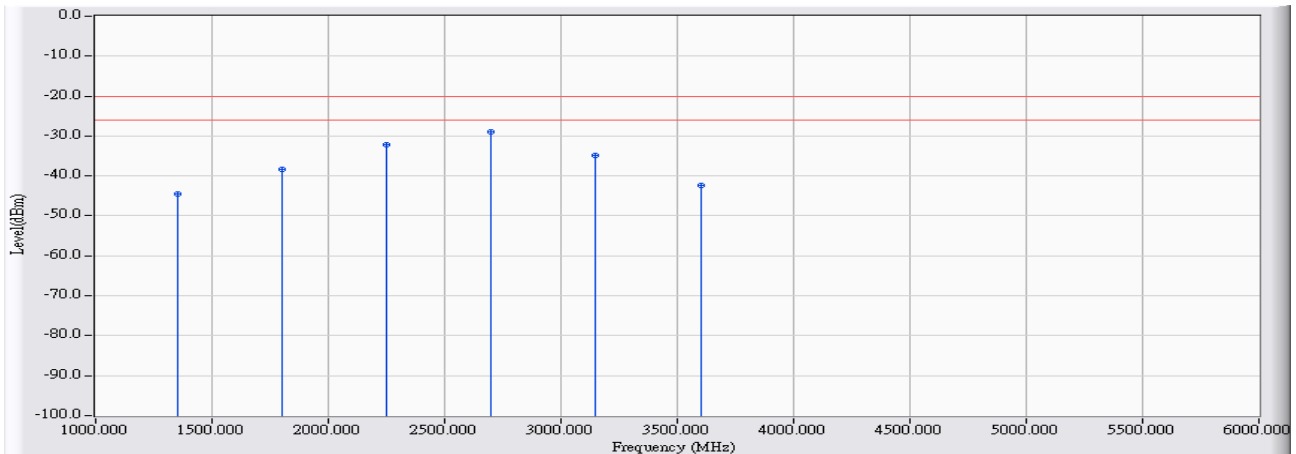


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1350.004	31.356	-76.142	-44.786	-24.786	-20.000	PEAK
2	1800.006	31.356	-73.884	-42.528	-22.528	-20.000	PEAK
3	2250.014	31.356	-65.420	-34.064	-14.064	-20.000	PEAK
4	* 2700.005	31.356	-64.859	-33.503	-13.503	-20.000	PEAK
5	3150.013	31.356	-71.670	-40.314	-20.314	-20.000	PEAK
6	3599.965	31.356	-72.902	-41.546	-21.546	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:13
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

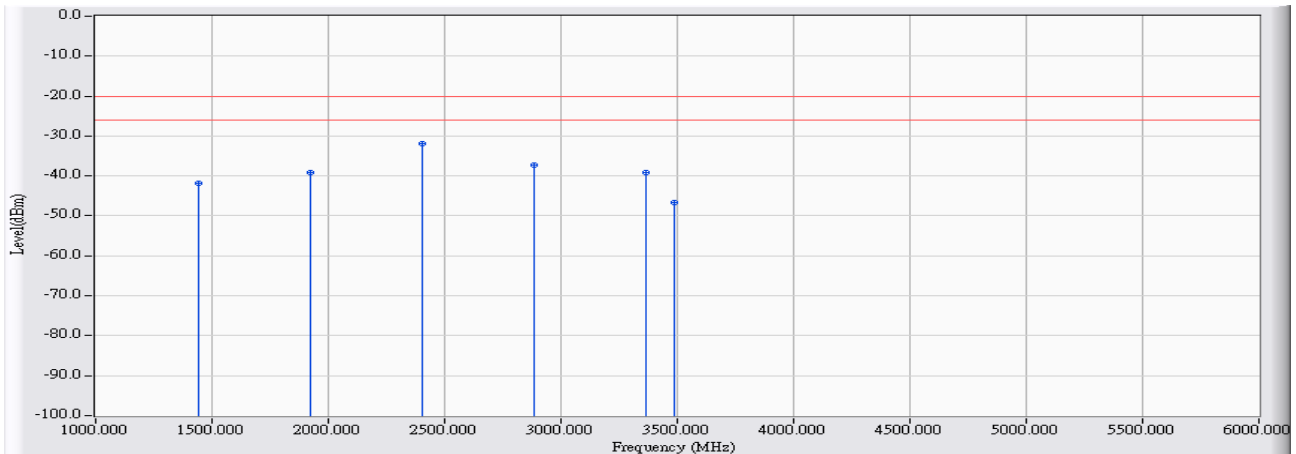


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1350.009	31.856	-76.412	-44.556	-24.556	-20.000	PEAK
2	1800.015	31.856	-70.146	-38.290	-18.290	-20.000	PEAK
3	2250.009	31.856	-63.922	-32.066	-12.066	-20.000	PEAK
4	* 2700.015	31.856	-60.878	-29.022	-9.022	-20.000	PEAK
5	3150.018	31.856	-66.796	-34.940	-14.940	-20.000	PEAK
6	3599.980	31.856	-74.109	-42.253	-22.253	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:14
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

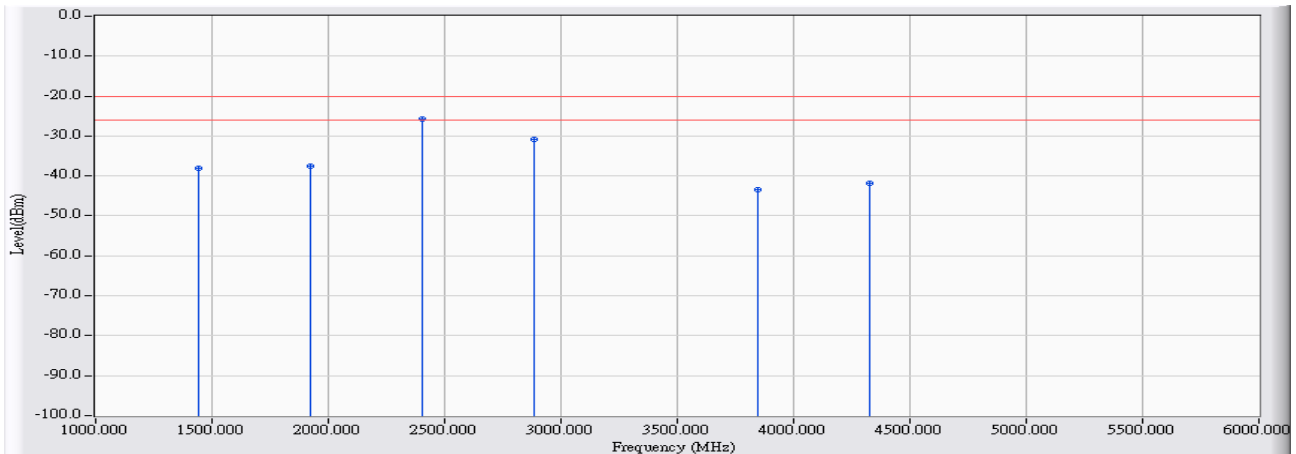


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1444.003	31.356	-73.248	-41.892	-21.892	-20.000	PEAK
2	1924.008	31.356	-70.429	-39.073	-19.073	-20.000	PEAK
3	* 2405.968	31.356	-63.254	-31.898	-11.898	-20.000	PEAK
4	2885.972	31.356	-68.678	-37.322	-17.322	-20.000	PEAK
5	3368.007	31.356	-70.419	-39.063	-19.063	-20.000	PEAK
6	3484.003	31.356	-78.010	-46.654	-26.654	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:15
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

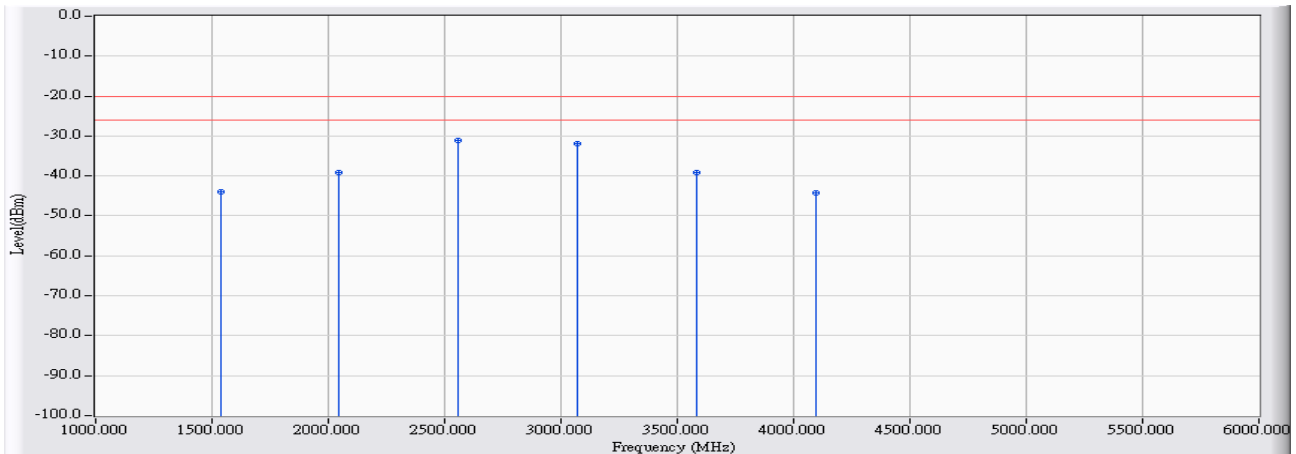


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1443.961	31.856	-69.844	-37.988	-17.988	-20.000	PEAK
2	1923.970	31.856	-69.401	-37.545	-17.545	-20.000	PEAK
3	* 2406.018	31.856	-57.617	-25.761	-5.761	-20.000	PEAK
4	2886.006	31.856	-62.791	-30.935	-10.935	-20.000	PEAK
5	3848.900	31.856	-75.283	-43.427	-23.427	-20.000	PEAK
6	4329.972	31.856	-73.557	-41.701	-21.701	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:16
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

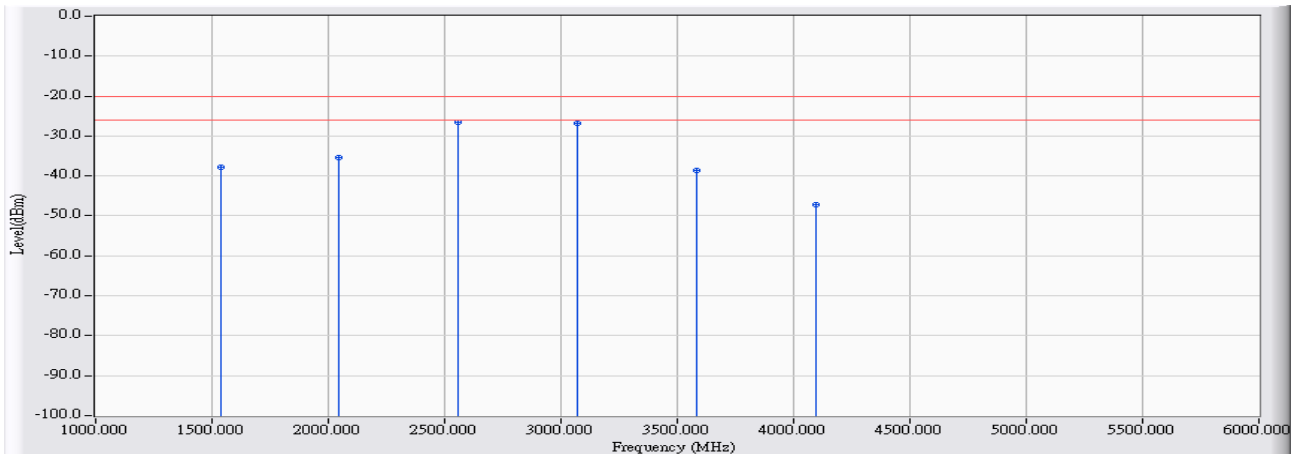


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1535.969	31.356	-75.324	-43.968	-23.968	-20.000	PEAK
2	2047.969	31.356	-70.510	-39.154	-19.154	-20.000	PEAK
3	* 2560.012	31.356	-62.334	-30.978	-10.978	-20.000	PEAK
4	3071.974	31.356	-63.382	-32.026	-12.026	-20.000	PEAK
5	3584.010	31.356	-70.555	-39.199	-19.199	-20.000	PEAK
6	4095.965	31.356	-75.668	-44.312	-24.312	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:16
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

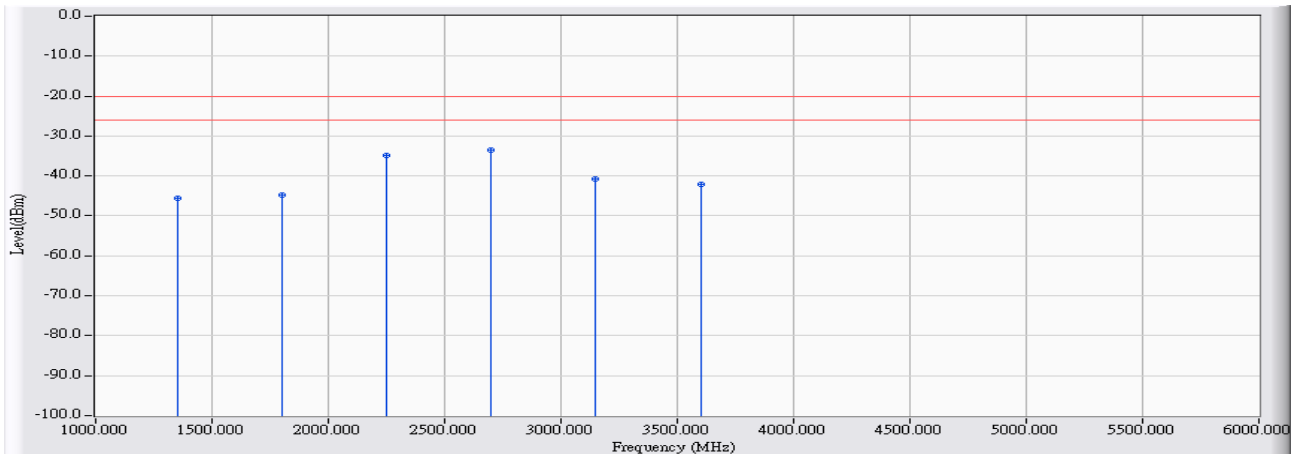


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1536.006	31.856	-69.746	-37.890	-17.890	-20.000	PEAK
2	2048.004	31.856	-67.375	-35.519	-15.519	-20.000	PEAK
3	* 2559.963	31.856	-58.307	-26.451	-6.451	-20.000	PEAK
4	3071.977	31.856	-58.739	-26.883	-6.883	-20.000	PEAK
5	3583.974	31.856	-70.479	-38.623	-18.623	-20.000	PEAK
6	4096.004	31.856	-78.930	-47.074	-27.074	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:18
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

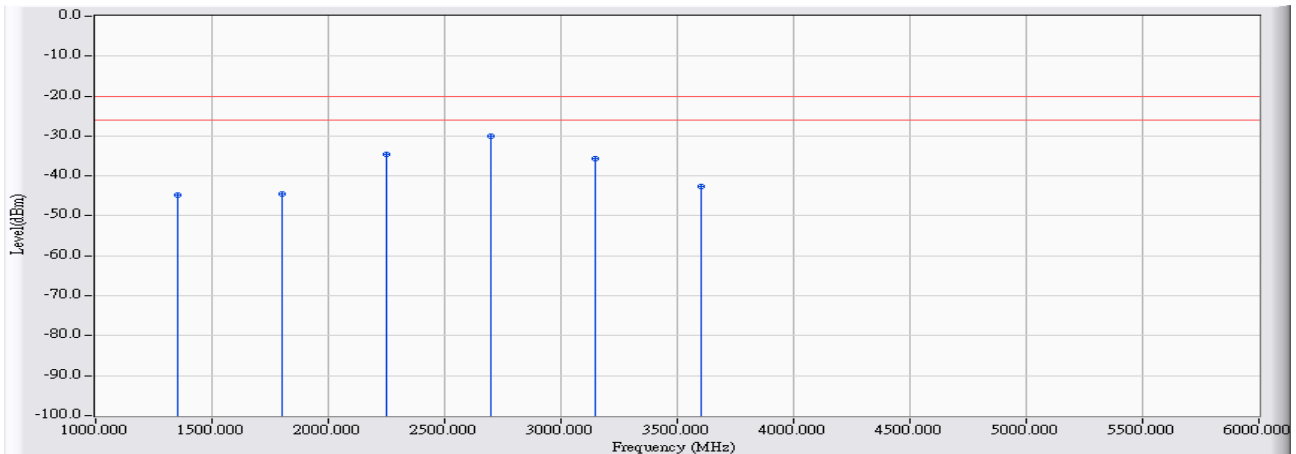


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1349.967	31.356	-76.848	-45.492	-25.492	-20.000	PEAK
2	1799.964	31.356	-75.997	-44.641	-24.641	-20.000	PEAK
3	2249.968	31.356	-66.109	-34.753	-14.753	-20.000	PEAK
4	* 2700.007	31.356	-64.815	-33.459	-13.459	-20.000	PEAK
5	3149.975	31.356	-72.018	-40.662	-20.662	-20.000	PEAK
6	3600.005	31.356	-73.441	-42.085	-22.085	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:19
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 450.1MHz

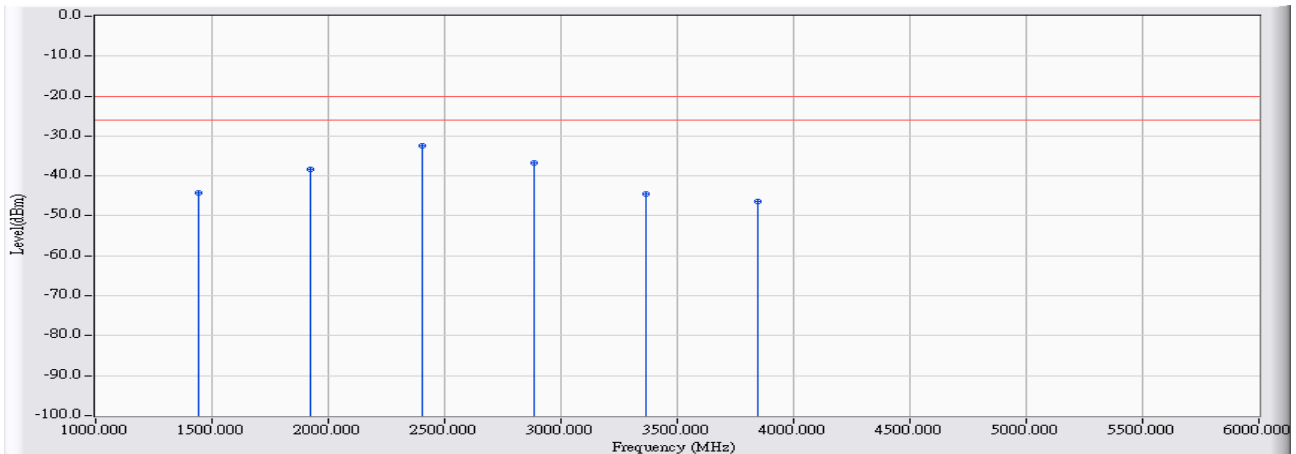


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		1350.007	31.856	-76.538	-44.682	-24.682	-20.000	PEAK
2		1800.017	31.856	-76.377	-44.521	-24.521	-20.000	PEAK
3		2249.974	31.856	-66.468	-34.612	-14.612	-20.000	PEAK
4	*	2699.964	31.856	-61.941	-30.085	-10.085	-20.000	PEAK
5		3150.007	31.856	-67.556	-35.700	-15.700	-20.000	PEAK
6		3600.005	31.856	-74.559	-42.703	-22.703	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:20
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

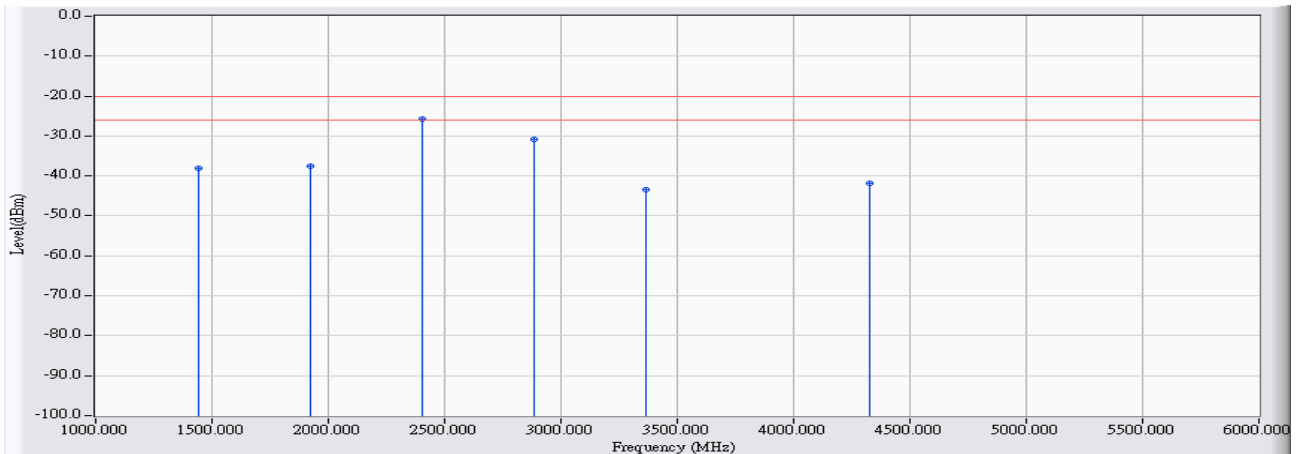


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1443.962	31.356	-75.632	-44.276	-24.276	-20.000	PEAK
2	1924.015	31.356	-69.771	-38.415	-18.415	-20.000	PEAK
3	* 2406.009	31.356	-63.845	-32.489	-12.489	-20.000	PEAK
4	2886.011	31.356	-68.149	-36.793	-16.793	-20.000	PEAK
5	3368.013	31.356	-75.956	-44.600	-24.600	-20.000	PEAK
6	3848.010	31.356	-77.617	-46.261	-26.261	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:20
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 481.1MHz

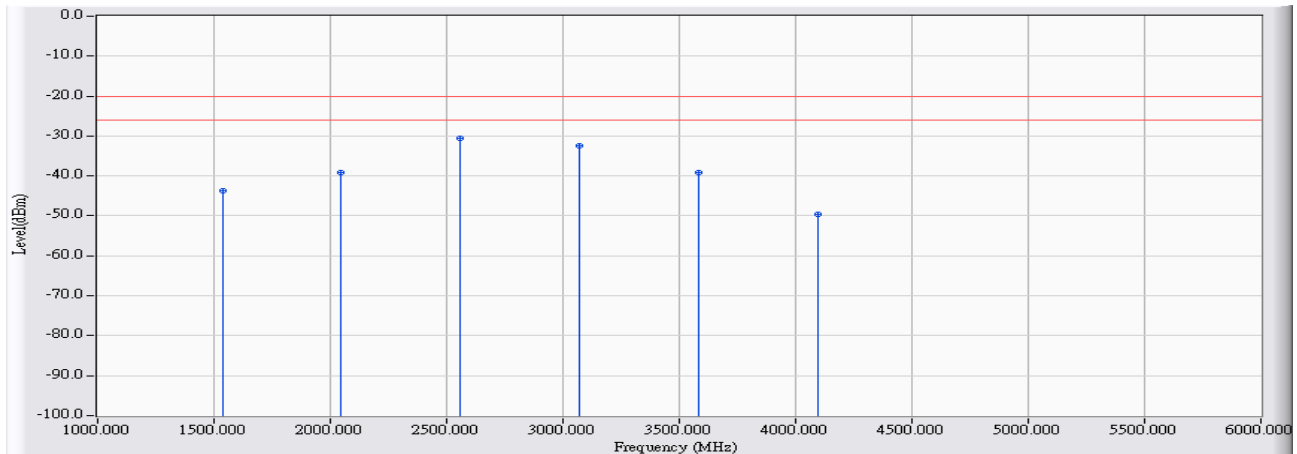


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1444.013	31.856	-69.942	-38.086	-18.086	-20.000	PEAK
2	1924.003	31.856	-69.378	-37.522	-17.522	-20.000	PEAK
3	* 2406.002	31.856	-57.606	-25.750	-5.750	-20.000	PEAK
4	2886.008	31.856	-62.818	-30.962	-10.962	-20.000	PEAK
5	3367.976	31.856	-75.304	-43.448	-23.448	-20.000	PEAK
6	4330.005	31.856	-73.772	-41.916	-21.916	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:22
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - HORIZONTAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz

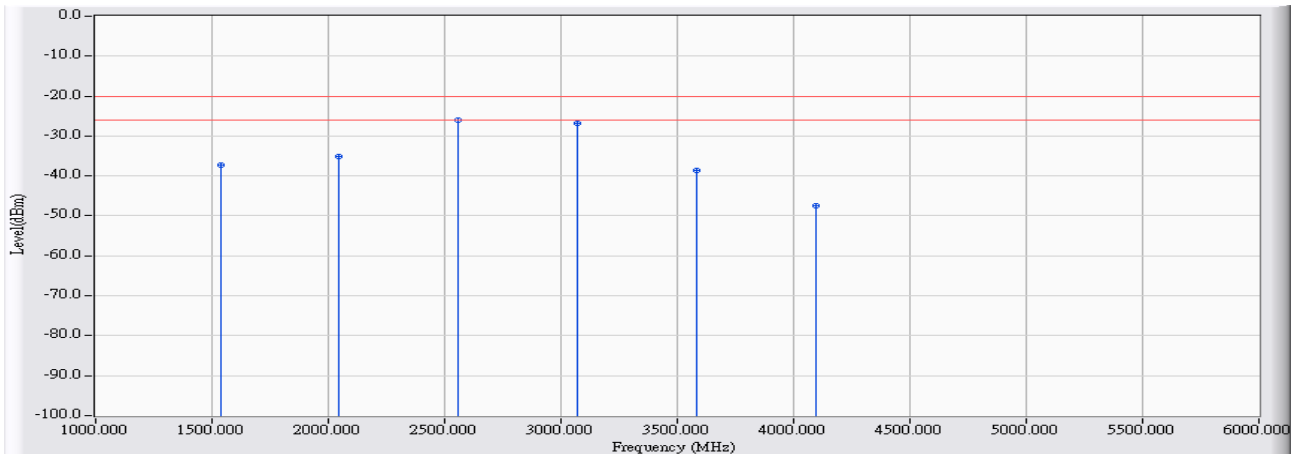


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1536.014	31.356	-75.152	-43.796	-23.796	-20.000	PEAK
2	2047.968	31.356	-70.438	-39.082	-19.082	-20.000	PEAK
3	* 2559.976	31.356	-61.915	-30.559	-10.559	-20.000	PEAK
4	3072.001	31.356	-63.826	-32.470	-12.470	-20.000	PEAK
5	3584.007	31.356	-70.440	-39.084	-19.084	-20.000	PEAK
6	4095.973	31.356	-80.894	-49.538	-29.538	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2015/4/20 - 16:22
Limit : FCC_Part90_dBm_00M_PK	Margin : 6
Probe : CB1_CE_Sub_30-1G-2_1009 - VERTICAL	Power : DC 13.8V
EUT : Repeater	Note : 511.9MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	1535.975	31.856	-69.049	-37.193	-17.193	-20.000	PEAK
2	2048.003	31.856	-67.032	-35.176	-15.176	-20.000	PEAK
3	* 2559.968	31.856	-57.767	-25.911	-5.911	-20.000	PEAK
4	3072.015	31.856	-58.656	-26.800	-6.800	-20.000	PEAK
5	3583.969	31.856	-70.495	-38.639	-18.639	-20.000	PEAK
6	4096.018	31.856	-79.373	-47.517	-27.517	-20.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

7. Frequency Stability

7.1. Test Equipment

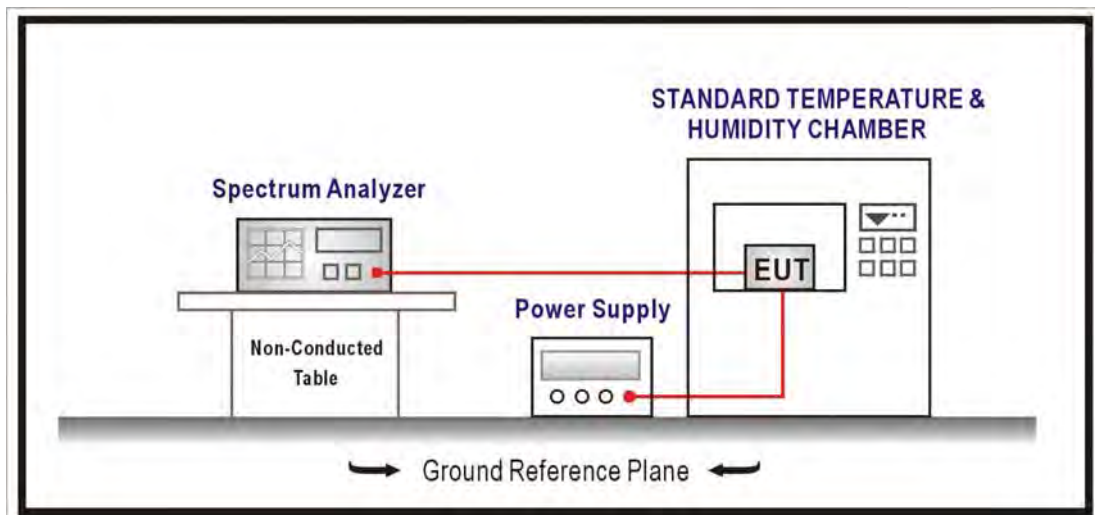
The following test equipments are used during the radiated emission tests:

Frequency Stability / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2015/07/14
Temperature & Humidity Chamber	WIT	TH-1S-B	1082101	2016/01/22

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Limits

§Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Range (MHz)	Channel Bandwidth (KHz)	Frequency Tolerance (ppm)		
		Fixed and Base Stations	Mobile Stations	
			> 2 W	≤ 2 W
150-174 MHz	6.25	1.0	2.0	2.0
	12.5	2.5	5.0	5.0
	25	5.0	5.0	50.0*
421-512 MHz	6.25	0.5	1.0	1.0
	12.5	1.5	2.5	2.5
	25	2.5	5.0	5.0

- Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.
- Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

7.4. Test Procedure

The frequency stability was measured per ANSI/TIA 603-C: 2004

7.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

7.6. Test Result

Product	Repeater		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-450.1MHz		
Date of Test	2015/04/06	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	13.80	450.100003	0.0067	PASS
-20		450.100017	0.0378	PASS
-10		450.100005	0.0111	PASS
0		450.099999	-0.0022	PASS
10		450.099993	-0.0156	PASS
20		450.099960	-0.0889	PASS
30		450.099956	-0.0978	PASS
40		450.099951	-0.1089	PASS
50		450.099887	-0.2511	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	15.87	450.099998	-0.0044	PASS
	13.80	450.099998	-0.0044	PASS
	11.73	450.099997	-0.0067	PASS

Product	Repeater		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-481.1MHz		
Date of Test	2015/01/06	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	13.80	481.100018	0.0374	PASS
-20		481.100001	0.0021	PASS
-10		481.100002	0.0042	PASS
0		481.099994	-0.0125	PASS
10		481.099988	-0.0249	PASS
20		481.099963	-0.0769	PASS
30		481.099960	-0.0831	PASS
40		481.099977	-0.0478	PASS
50		481.099918	-0.1704	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	15.87	481.099999	-0.0021	PASS
	13.80	481.099998	-0.0042	PASS
	11.73	481.099995	-0.0104	PASS

Product	Repeater		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-511.9MHz		
Date of Test	2015/01/06	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	13.80	511.900017	0.0332	PASS
-20		511.900008	0.0156	PASS
-10		511.900006	0.0117	PASS
0		511.899994	-0.0117	PASS
10		511.899990	-0.0195	PASS
20		511.899993	-0.0137	PASS
30		511.899958	-0.0820	PASS
40		511.899945	-0.1074	PASS
50		511.899933	-0.1309	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	15.87	511.899998	-0.0039	PASS
	13.80	511.899999	-0.0020	PASS
	11.73	511.899995	-0.0098	PASS

8. Transient Frequency Behavior

8.1. Test Equipment

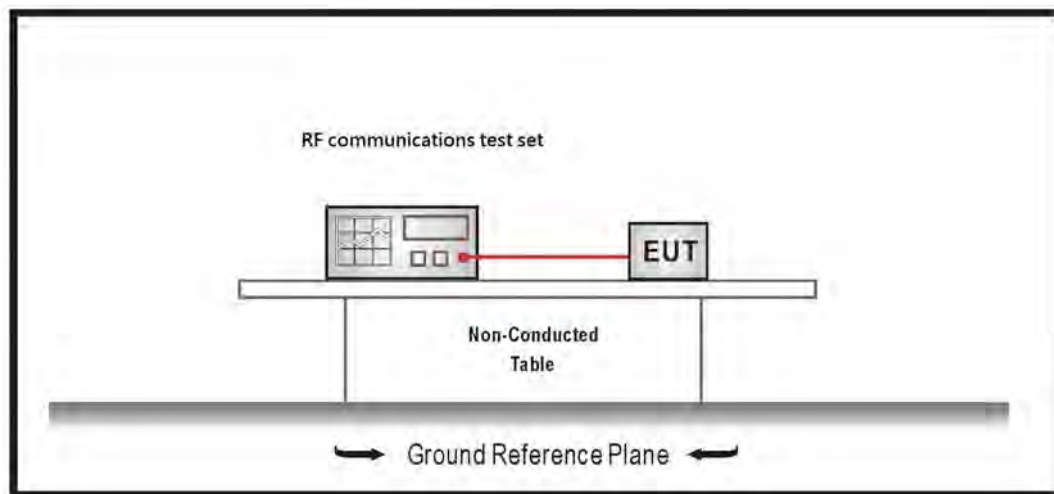
The following test equipments are used during the radiated emission tests:

Transient Frequency Behavior / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
RF-communications Test set	HP	8920A	3614A08091	2015/04/27
Receiver	Agilent	N9038A	MY53220121	2015/07/26

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies difference limits in the time intervals indicated:

Time Intervals	Maximum frequency difference	All Equipment	
		150-174 MHz	421-512 MHz

Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels

t_1^4	± 25.0 kHz	5.0 ms	10.0 ms
t_2	± 12.5 kHz	20.0 ms	25.0 ms
t_3^4	± 25.0 kHz	5.0 ms	10.0 ms

Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels

t_1^4	± 12.5 kHz	5.0 ms	10.0 ms
t_2	± 6.25 kHz	20.0 ms	25.0 ms
t_3^4	± 12.5 kHz	5.0 ms	10.0 ms

Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels

t_1^4	± 6.25 kHz	5.0 ms	10.0 ms
t_2	± 3.125 kHz	20.0 ms	25.0 ms
t_3^4	± 6.25 kHz	5.0 ms	10.0 ms

- (1) t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
 t_1 is the time period immediately following t_{on} .
 t_2 is the time period immediately following t_1 .
 t_3 is the time period from the instant when the transmitter is turned off until t_{off} .
 t_{off} is the instant when the 1kHz test signal starts to rise.
- (2) During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in §90.213.
- (3) Difference between the actual transmitter frequency and the assigned transmitter frequency.
- (4) If the transmitter carrier output power rating is 6watts or less, the frequency difference during this time may exceed the maximum frequency difference for this period.

8.4. Test Procedure

The test procedure was ANSI/TIA 603-C: 2004. Using the variable attenuator. The transmitter level was set to 40 dB below the test receivers maximum input level. Then the transmitter was turned off. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.

Reduce the attenuation between the transmitter and the RF detector by 30 dB.

With the levels set as above the transient frequency behavior was observed

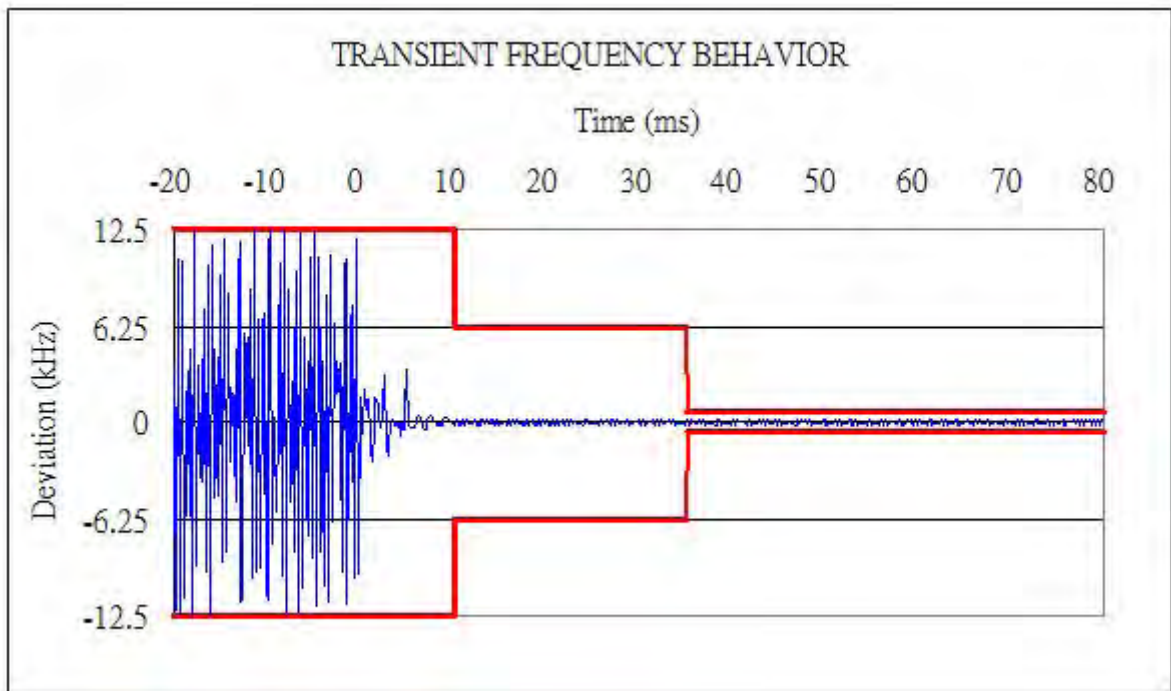
8.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

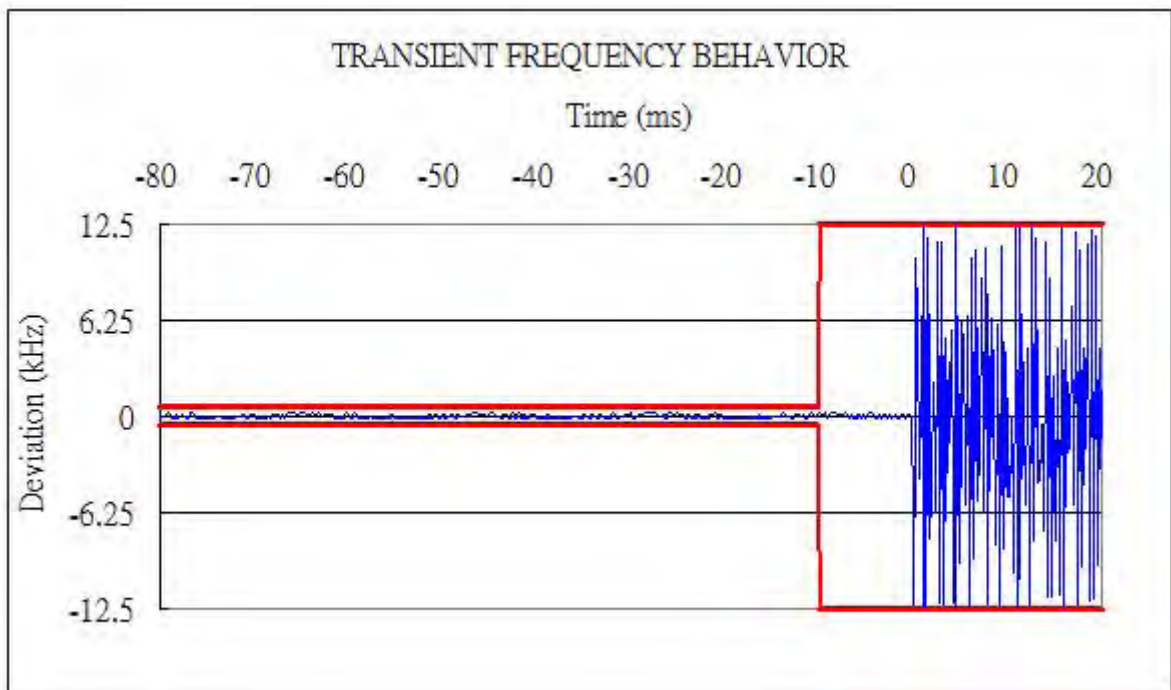
8.6. Test Result

Product	Repeater		
Test Item	Transient Frequency Behavior		
Test Mode	Mode 1: Transmit		
Date of Test	2015/04/21	Test Site	SR7

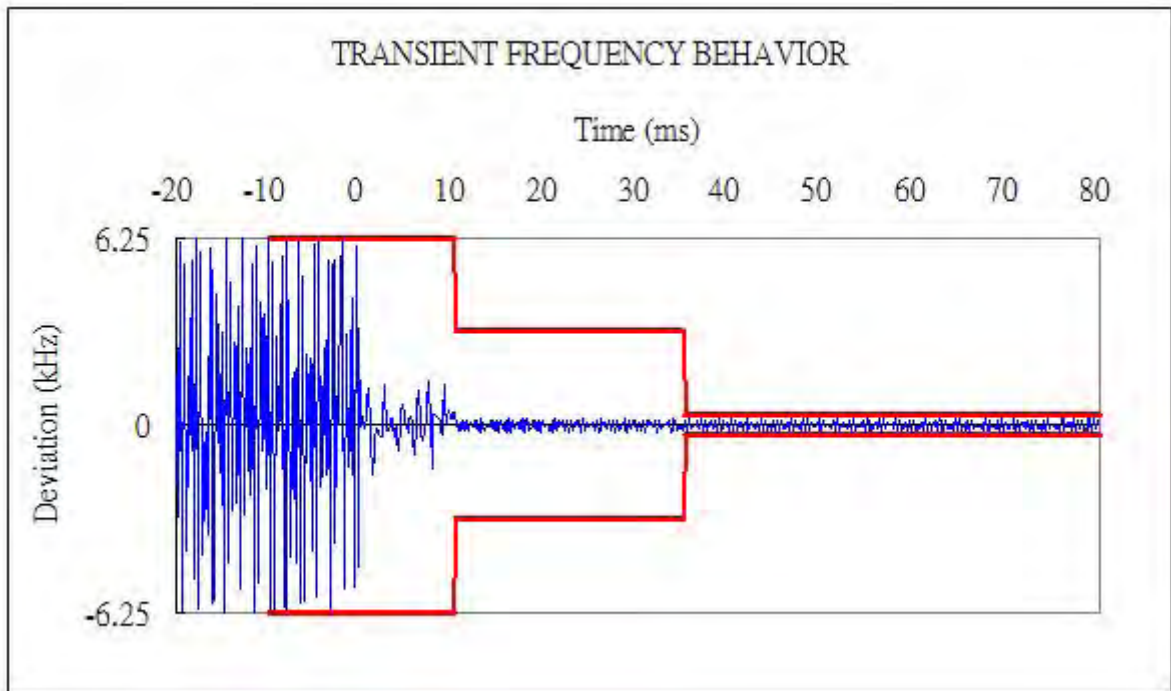
Channel On (12.5kHz)



Channel off (12.5kHz)



Channel On (6.25kHz)



Channel off (6.25kHz)

