

FCC Test Report

Product Name : Private land mobile radio

Model No. : ST-3118D

FCC ID. : M38-ST-3118D

Applicant : RANGER COMMUNICATIONS (M) SDN, BHD.

Address : NO.8716, BATU BERENDAM FTZ III, 75350 BATU
BERENDAM, MELAKA, MALAYSIA

Date of Receipt : 2014/09/16

Issued Date : 2016/01/19

Report No. : 1490406R-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

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Manufacturer : RANGER COMMUNICATIONS (M) SDN, BHD.

Model No. : ST-3118D

FCC ID. : M38-ST-3118D

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 :

(Demi Chang / Engineering Adm. Specialist)

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: 181665 / IC Registration Number: 4075C-4

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/english/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

E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	Private land mobile radio
Trade Name	SMAR TRUNK
Model No.	ST-3118D
Frequency Range	450-512MHz
Channel Spacing	12.5kHz, 6.25kHz
Type of Modulation	FM, FDMA, TDMA
Antenna Gain	N/A
Antenna Type	N/A (by Terminator)

Component	
Microphone	Non-shielded, 1.5m
Power Line	Cable Out: Non-shielded, 2m

Note:

1. This device is a Private land mobile radio, 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 1490406R-RFUSP01V00 under Declaration of Conformity.

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
----	------------------

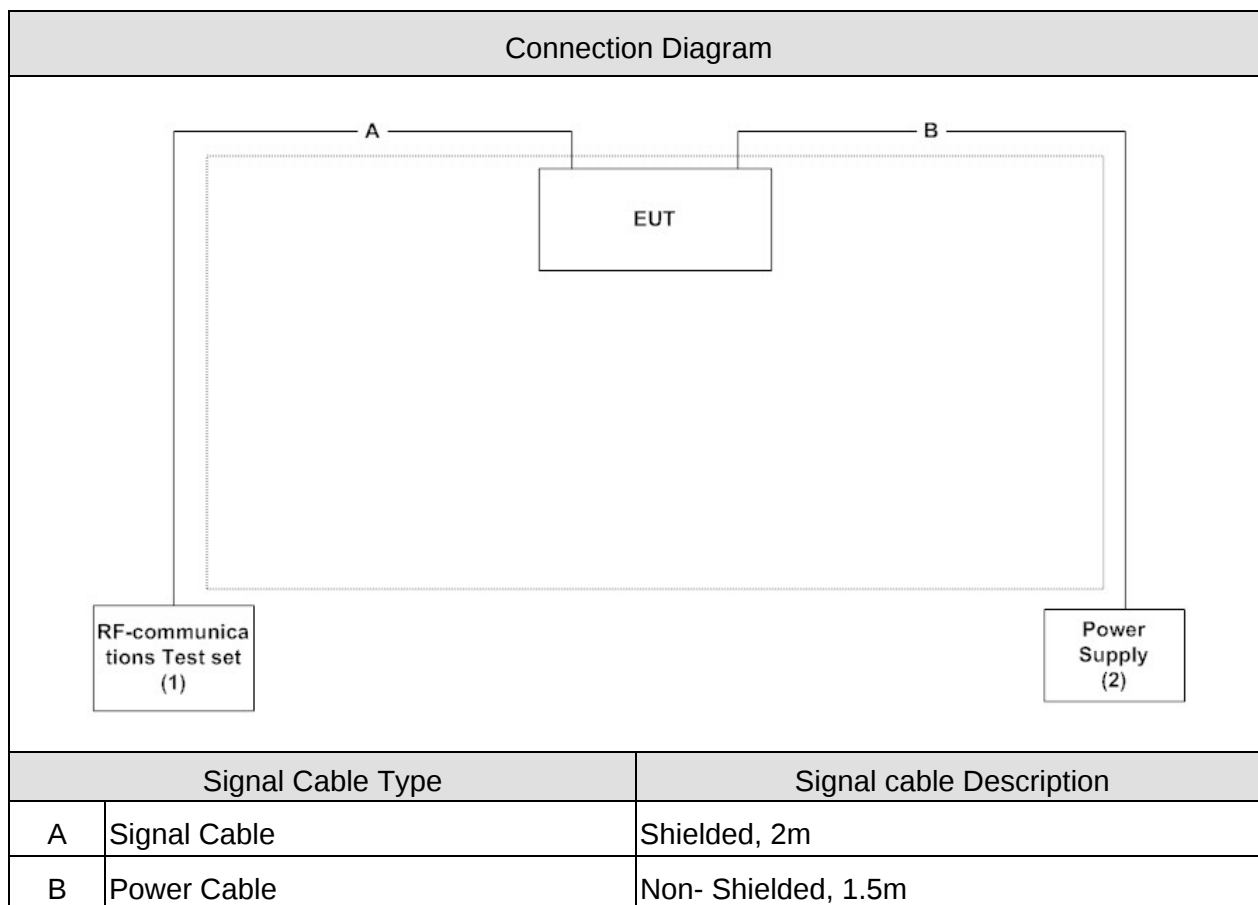
Test Items	Section	Frequency (MHz)	Mode	Result
RF Power Output	90.205	450.1/481.1/511.9	1	Complies
Modulation Characteristics	90.242(b)	450.1/481.1/511.9	1	Complies
Modulation Limiting	90.210	450.1/481.1/511.9	1	Complies
Occupied Bandwidth	90.209 & 90.210	450.1/481.1/511.9	1	Complies
Spurious Emissions 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.	FCC ID	Power Cord
1 RF-communications Test set	HP	8920A	3614A08091	DoC	Non-Shielded, 1m
2 Power Supply	Chroma	62024P-8060	A01034	DoC	--

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

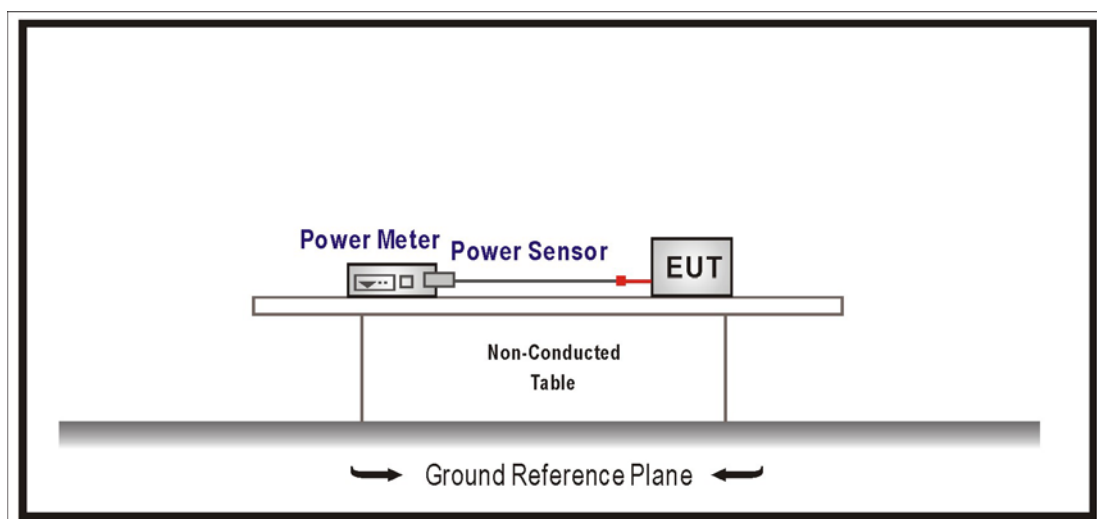
The following test equipments are used during the test:

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	Private land mobile radio		
Test Item	RF Power Output		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz

Channel No.	Frequency (MHz)	Measure Level (dBm)	Measure Level (W)	Limit (dBm)	Result
Low	450.1	46.140	41.115	Reference 90.205	Pass
Mid	481.1	46.170	41.400	Reference 90.205	Pass
High	511.9	46.030	40.087	Reference 90.205	Pass

6.25KHz

Channel No.	Frequency (MHz)	Measure Level (dBm)	Measure Level (W)	Limit (dBm)	Result
Low	450.1	42.13	16.331	Reference 90.205	Pass
Mid	481.1	42.45	17.595	Reference 90.205	Pass
High	511.9	41.67	14.678	Reference 90.205	Pass

3. Modulation Characteristics

3.1. Test Equipment

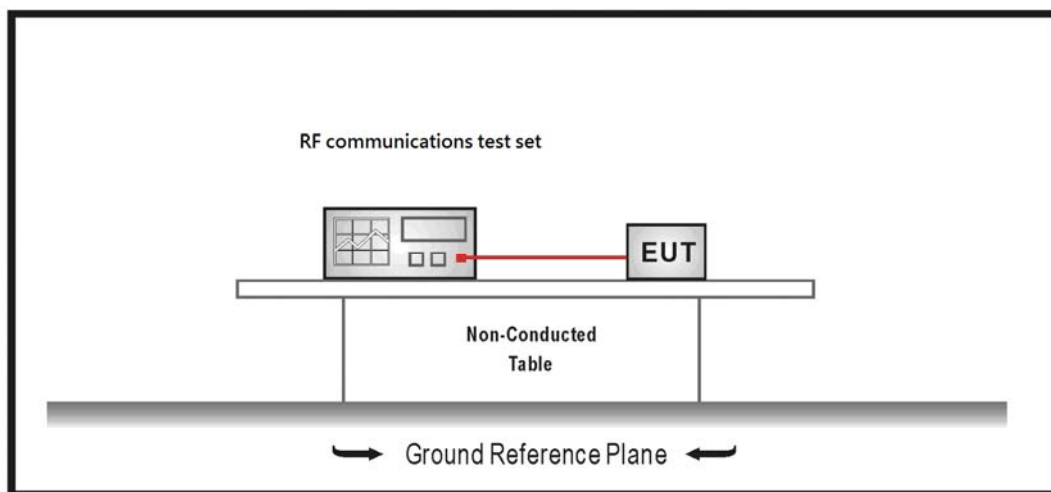
The following test equipments are used during the radiated emission tests:

Modulation Charac Teristics / 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

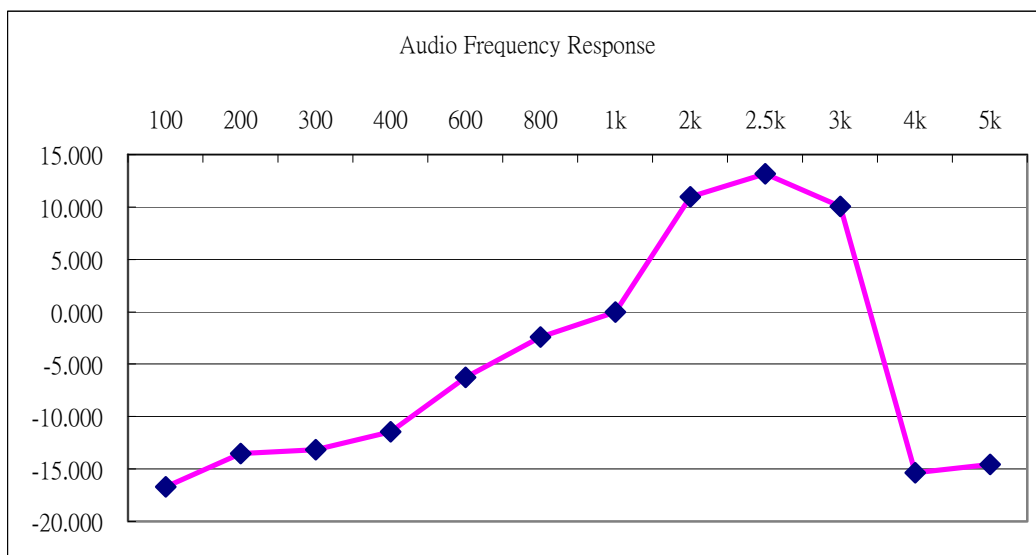
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004.

3.5. Test Result

Product	Private land mobile radio		
Test Item	Audio Frequency Response		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz

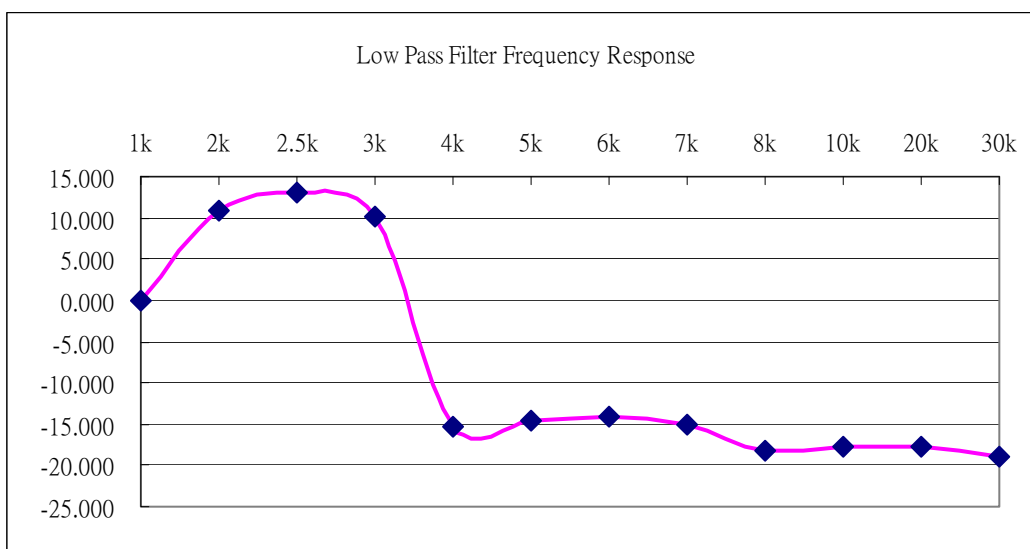
Audio Frequency (Hz)	Deviation	dB
100	0.018	-16.693
200	0.026	-13.499
300	0.027	-13.171
400	0.033	-11.428
600	0.06	-6.235
800	0.093	-2.428
1k	0.123	0.000
2k	0.436	10.992
2.5k	0.561	13.181
3k	0.391	10.045
4k	0.021	-15.354
5k	0.023	-14.564



Product	Private land mobile radio		
Test Item	Low Pass Filter Frequency Response		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz

Audio Frequency (Hz)	Deviation	dB
1k	0.123	0.000
2k	0.436	10.992
2.5k	0.561	13.181
3k	0.391	10.045
4k	0.021	-15.354
5k	0.023	-14.564
6k	0.024	-14.194
7k	0.022	-14.950
8k	0.015	-18.276
10k	0.016	-17.716
20k	0.016	-17.716
30k	0.014	-18.876



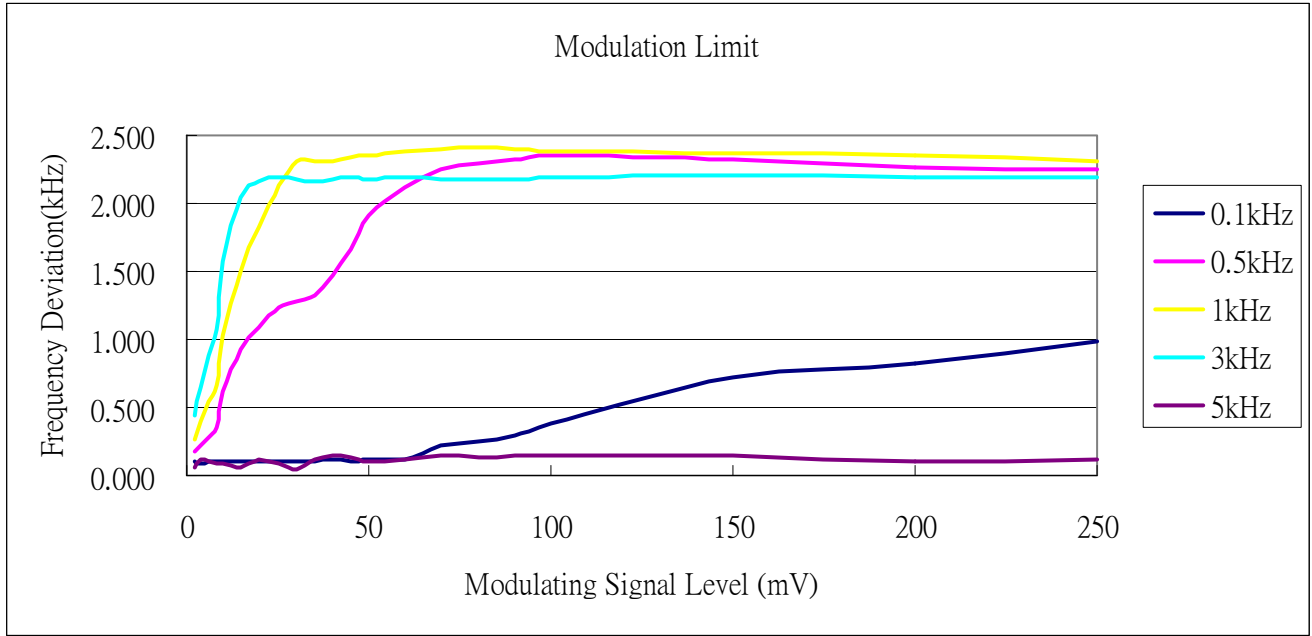
Product	Private land mobile radio		
Test Item	Voice Modulation Limiting for 12.5KHz Channel Spacing		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz

Modulating Signal Level	Peak Frequency Deviation (kHz) at the following modulating frequency:					Maximum Limit
mV	0.1kHz	0.5kHz	1kHz	3kHz	5kHz	kHz
2	0.095	0.175	0.277	0.433	0.051	2.5
4	0.096	0.230	0.393	0.662	0.102	2.5
6	0.103	0.288	0.532	0.870	0.079	2.5
8	0.098	0.360	0.663	1.063	0.108	2.5
10	0.101	0.613	1.029	1.541	0.093	2.5
15	0.105	0.920	1.501	2.042	0.067	2.5
20	0.103	1.081	1.818	2.147	0.129	2.5
25	0.100	1.235	2.144	2.174	0.110	2.5
30	0.106	1.275	2.303	2.188	0.067	2.5
35	0.108	1.321	2.300	2.167	0.119	2.5
40	0.104	1.473	2.324	2.180	0.117	2.5
45	0.106	1.664	2.336	2.172	0.131	2.5
50	0.117	1.915	2.366	2.192	0.129	2.5
60	0.109	2.125	2.381	2.172	0.108	2.5
70	0.214	2.242	2.402	2.174	0.118	2.5
80	0.250	2.296	2.402	2.191	0.162	2.5
90	0.299	2.327	2.394	2.183	0.104	2.5
100	0.376	2.356	2.374	2.184	0.122	2.5
150	0.721	2.310	2.383	2.193	0.140	2.5
200	0.819	2.262	2.351	2.204	0.106	2.5
250	0.982	2.248	2.319	2.176	0.105	2.5

Product	Private land mobile radio		
Test Item	Voice Modulation Limiting for 12.5KHz Channel Spacing		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz



Product	Private land mobile radio		
Test Item	Voice Modulation Limiting for 12.5KHz Channel Spacing		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

12.5KHz

Modulation Frequency (kHz)	Peak Deviation (kHz)	Maximum Limit (kHz)
100	0.018	2.5
200	0.026	2.5
300	0.027	2.5
400	0.033	2.5
600	0.06	2.5
800	0.093	2.5
1k	0.123	2.5
2k	0.436	2.5
2.5k	0.561	2.5
3k	0.391	2.5
4k	0.021	2.5
5k	0.023	2.5
6k	0.024	2.5
7k	0.022	2.5
8k	0.015	2.5
10k	0.016	2.5
20k	0.016	2.5
30k	0.014	2.5

3.6. Digital Modulation

Max Deviation measured for 6.25KHz Channel Spacing F1E&F1D = 844 Hz

4. Occupied Bandwidth

4.1. Test Equipment

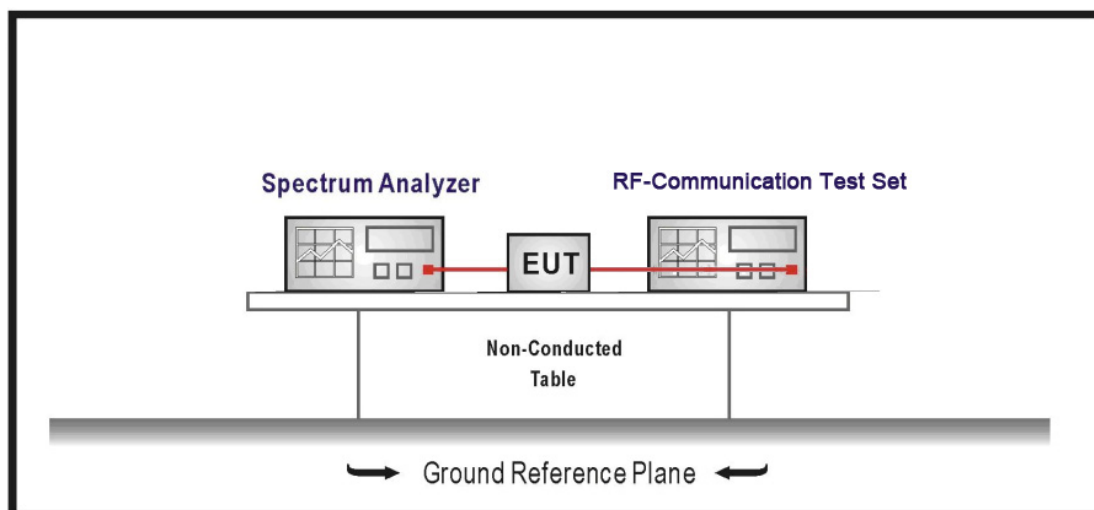
The following test equipments are used during the radiated emission tests:

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.

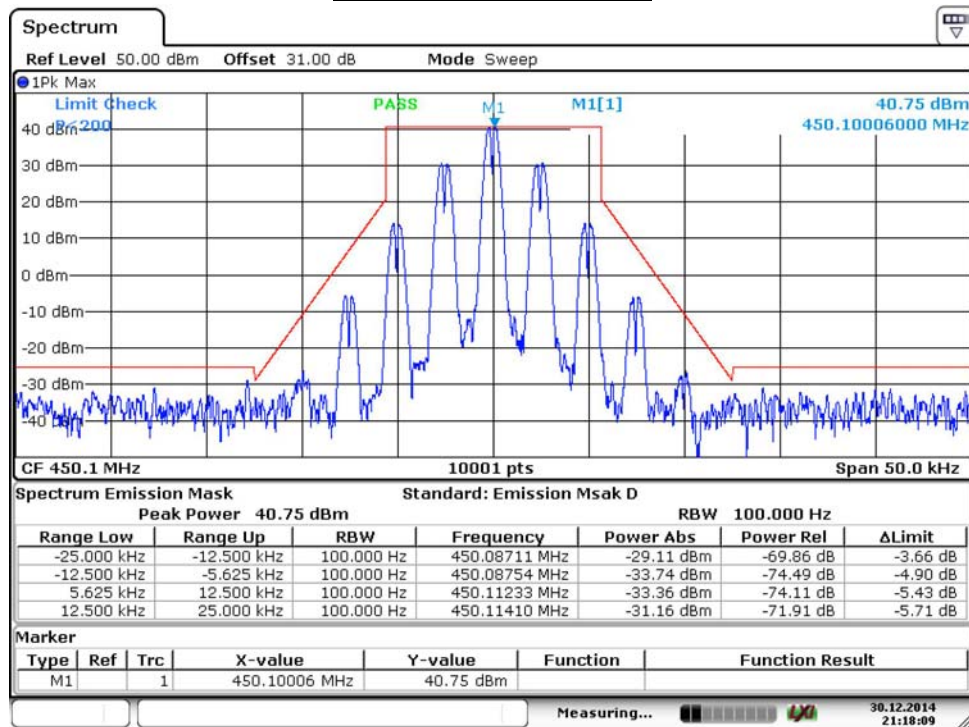
4.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

4.6. Test Result

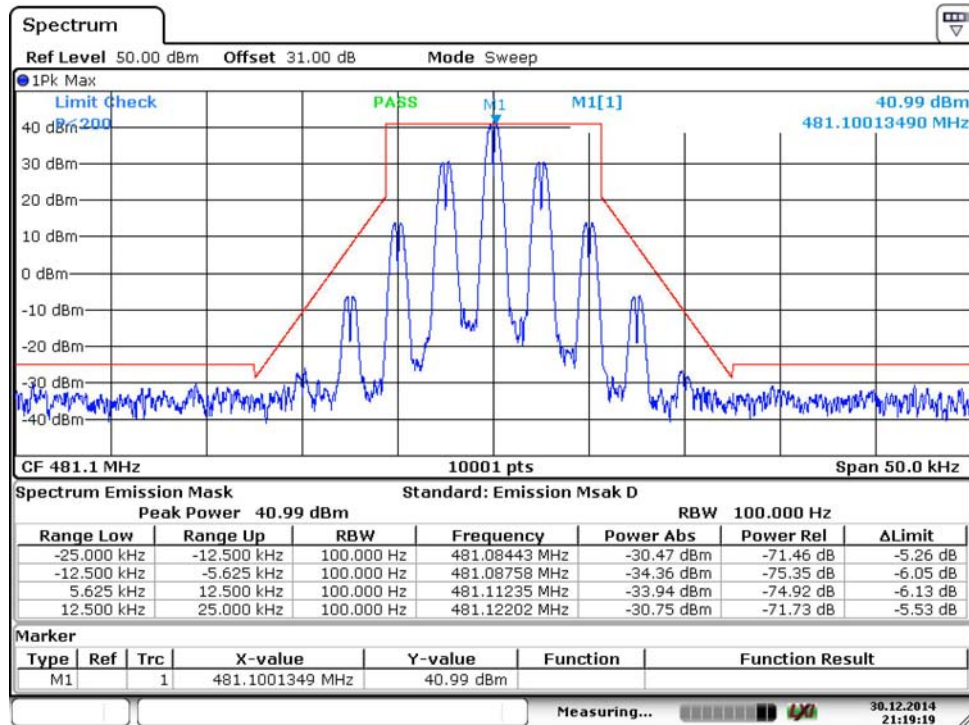
Product	Private land mobile radio		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

450.1MHz (Modulation)



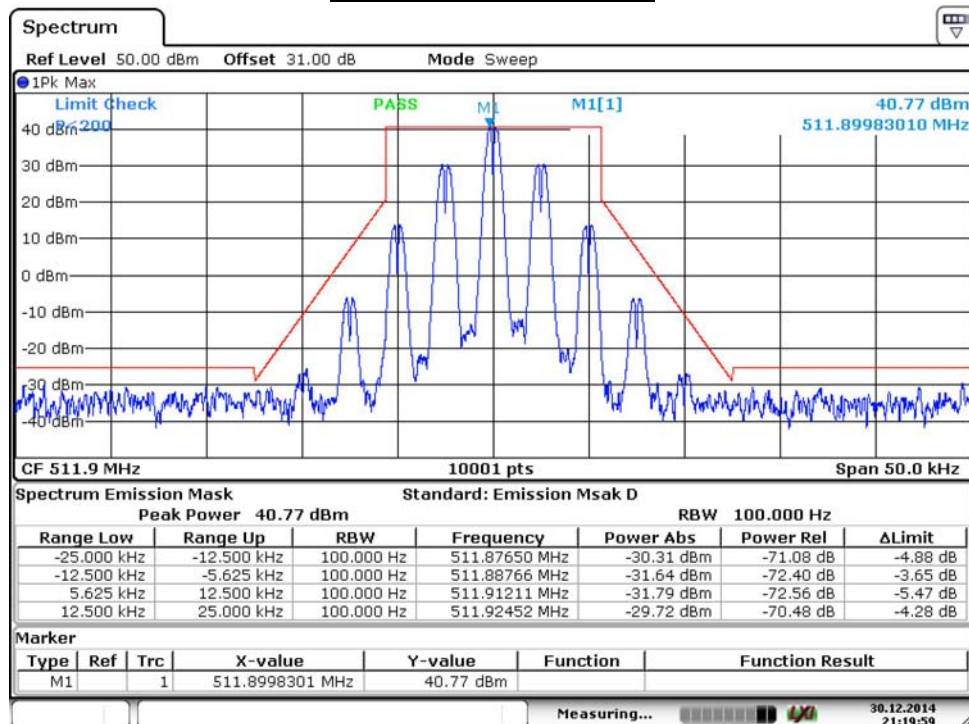
Date: 30.DEC.2014 21:18:09

481.1 MHz (Modulation)



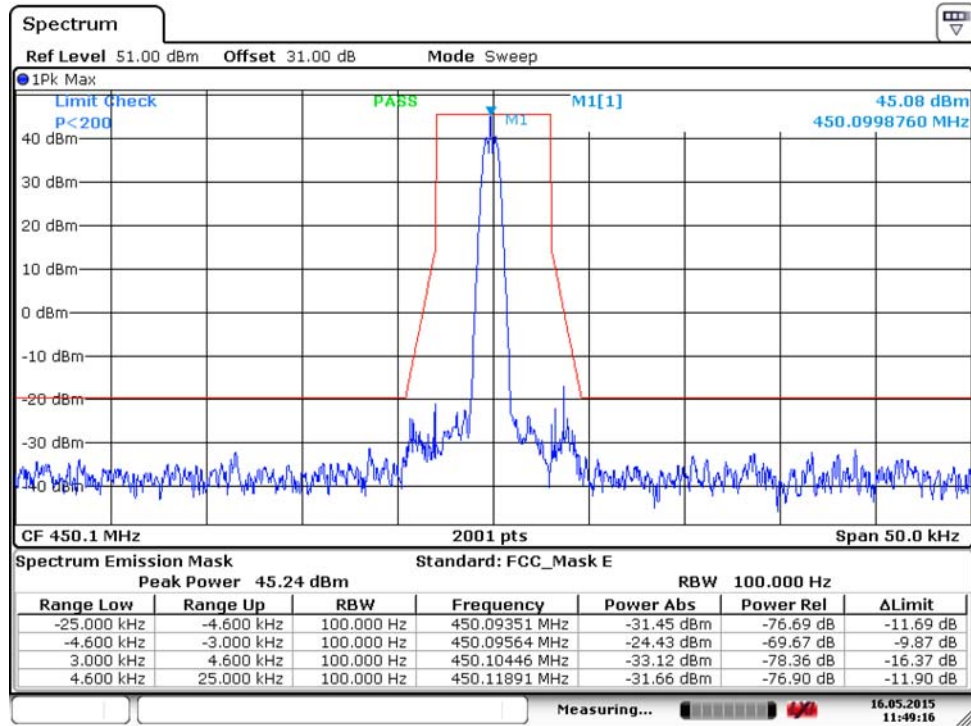
Date: 30.DEC.2014 21:19:20

511.9 MHz (Modulation)



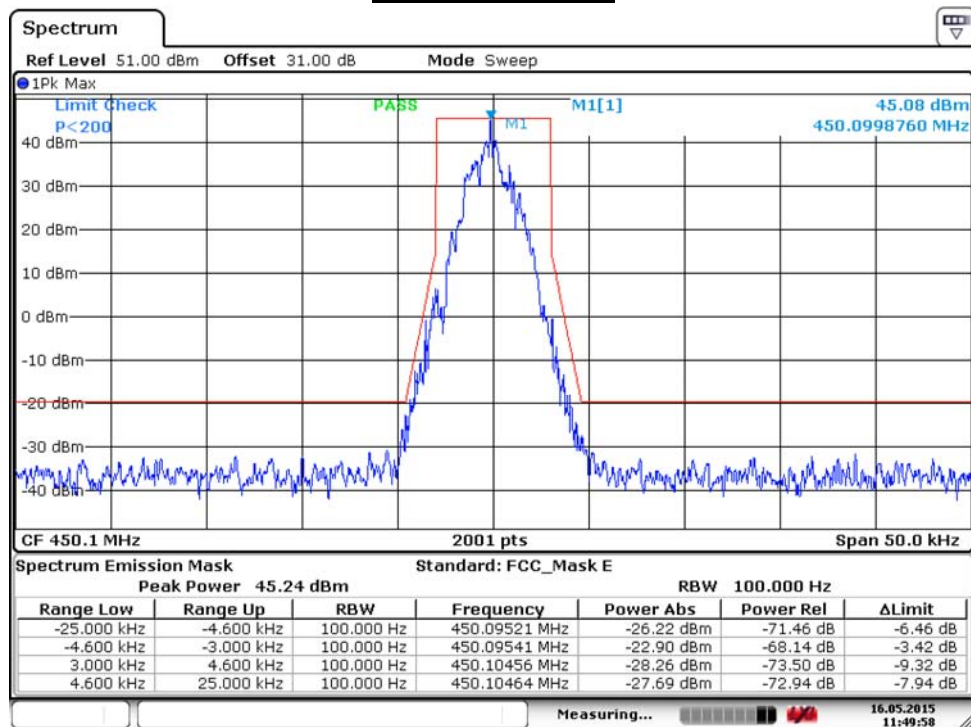
Date: 30.DEC.2014 21:19:59

450.1 MHz (Carr Mask)



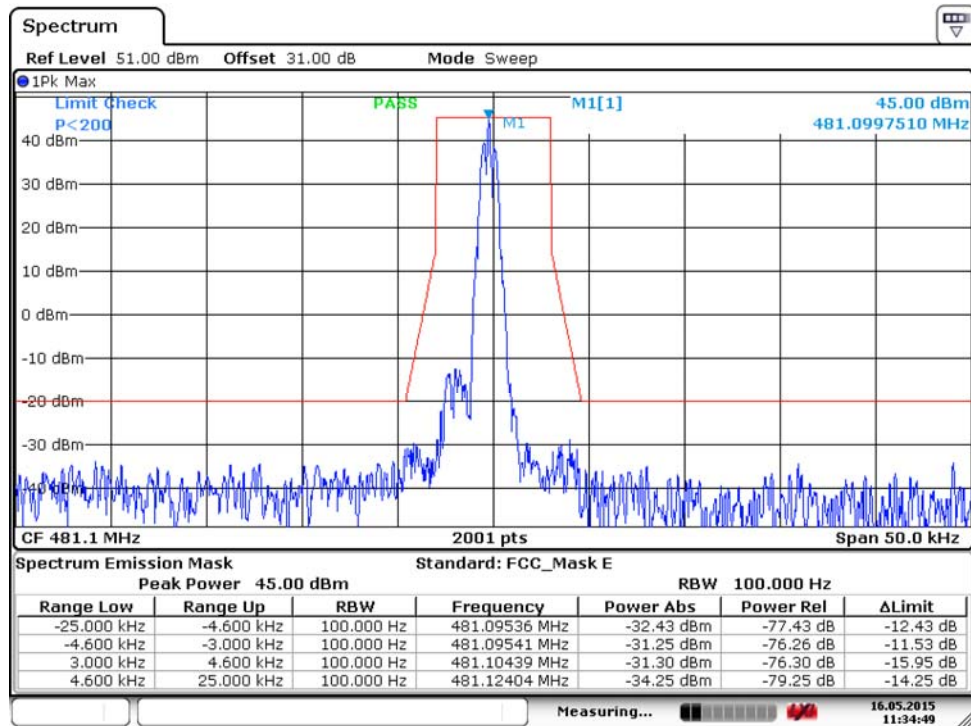
Date: 16.MAY.2015 11:49:16

450.1 MHz (Mask)



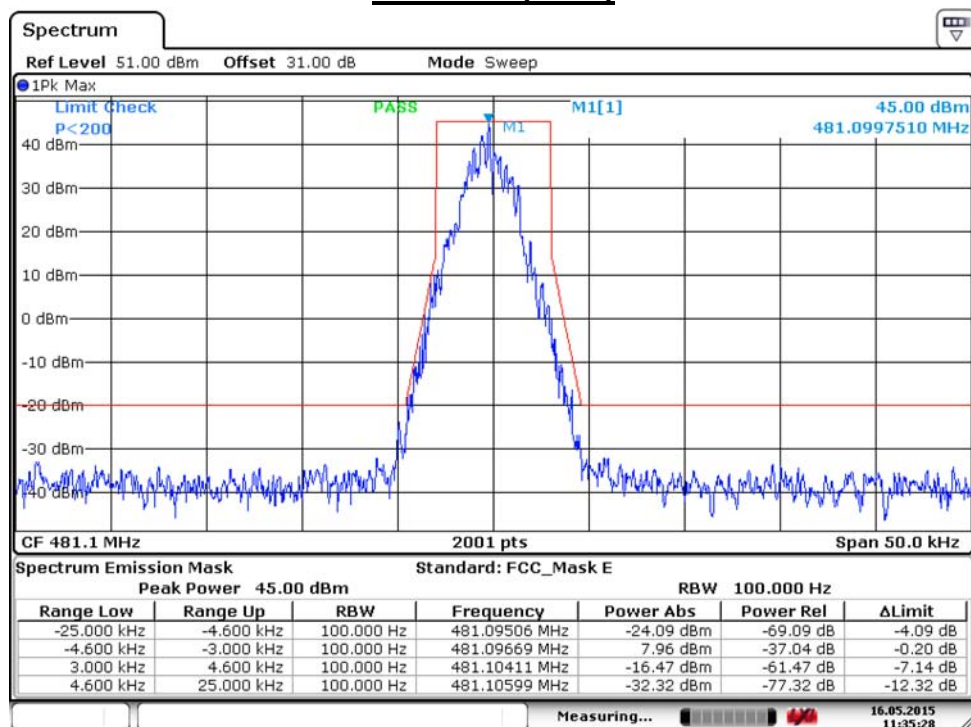
Date: 16.MAY.2015 11:49:58

481.1 MHz (Carr Mask)



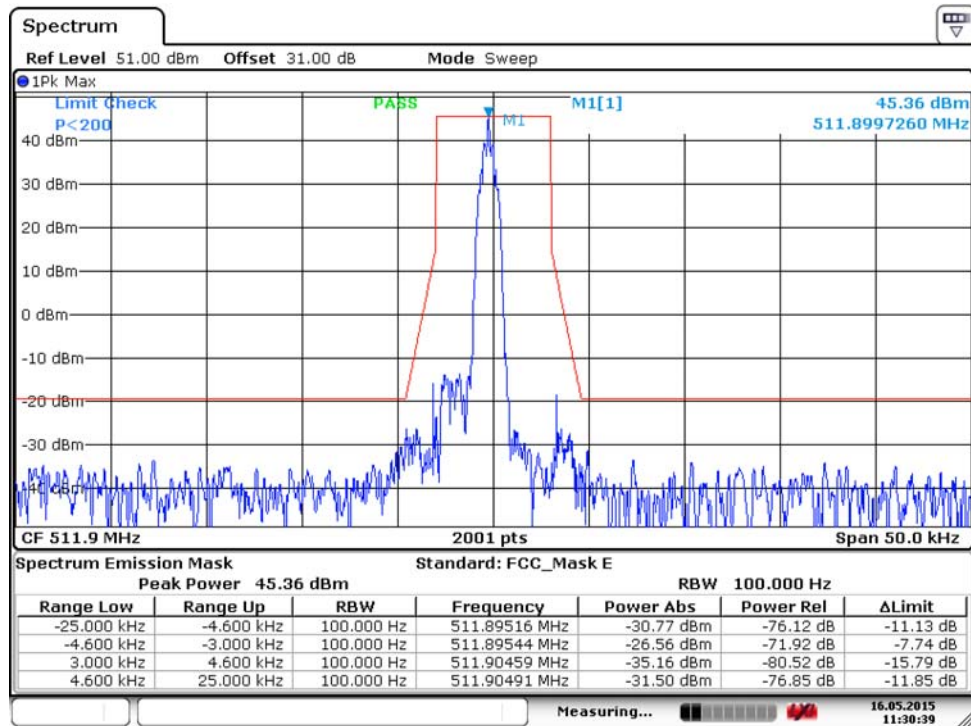
Date: 16.MAY.2015 11:34:49

481.1 MHz (Mask)



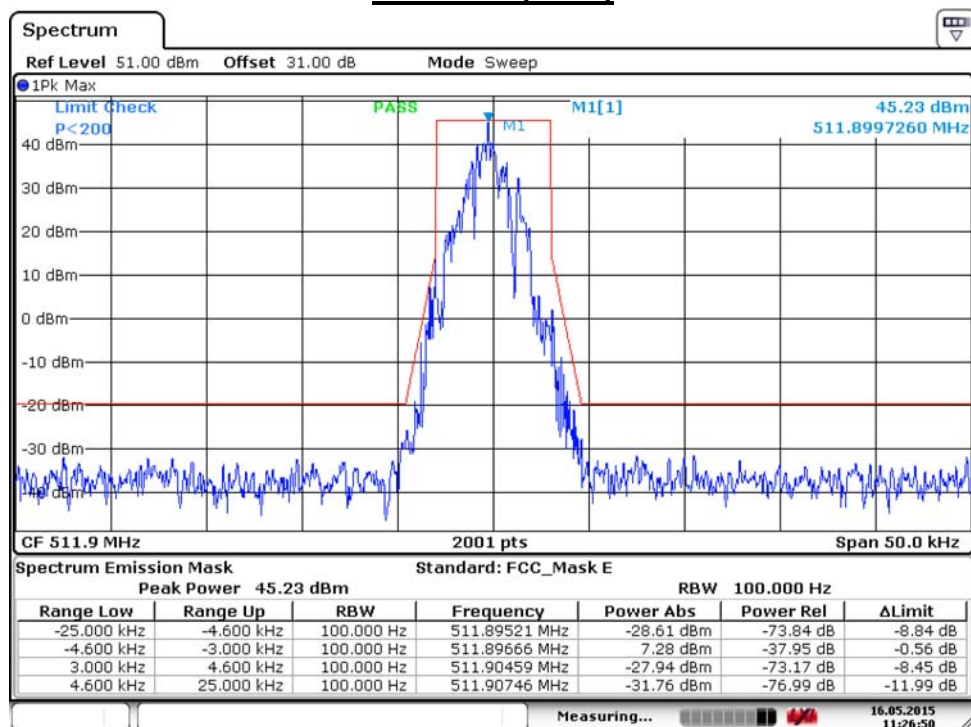
Date: 16.MAY.2015 11:35:28

511.9 MHz (Carr Mask)



Date: 16.MAY.2015 11:30:39

511.9 MHz (Mask)



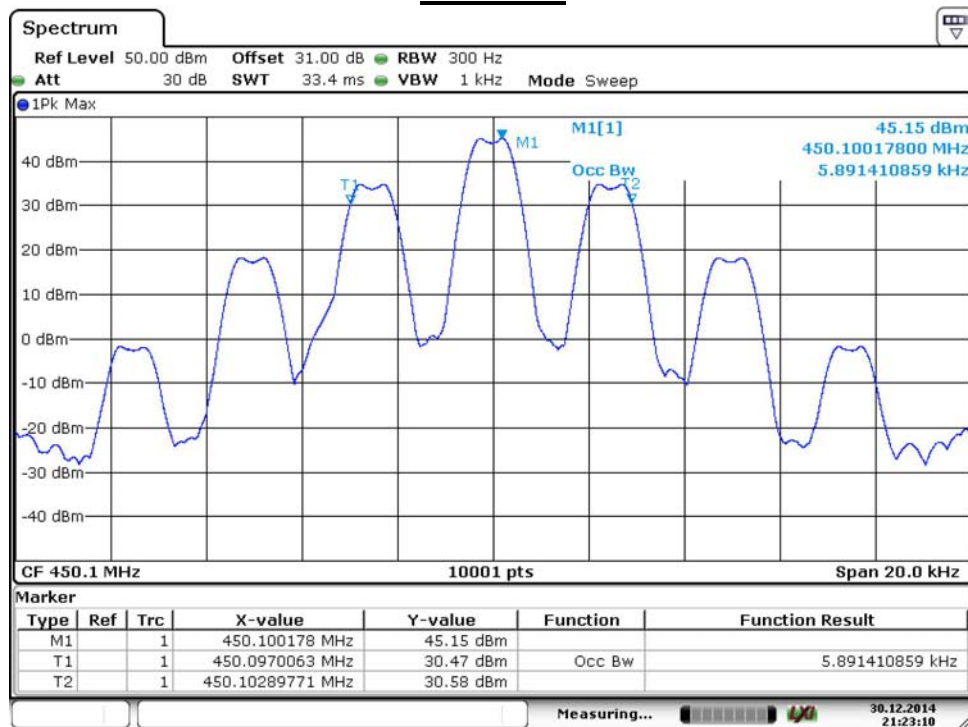
Date: 16.MAY.2015 11:26:50

Product	Private land mobile radio		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

Analog

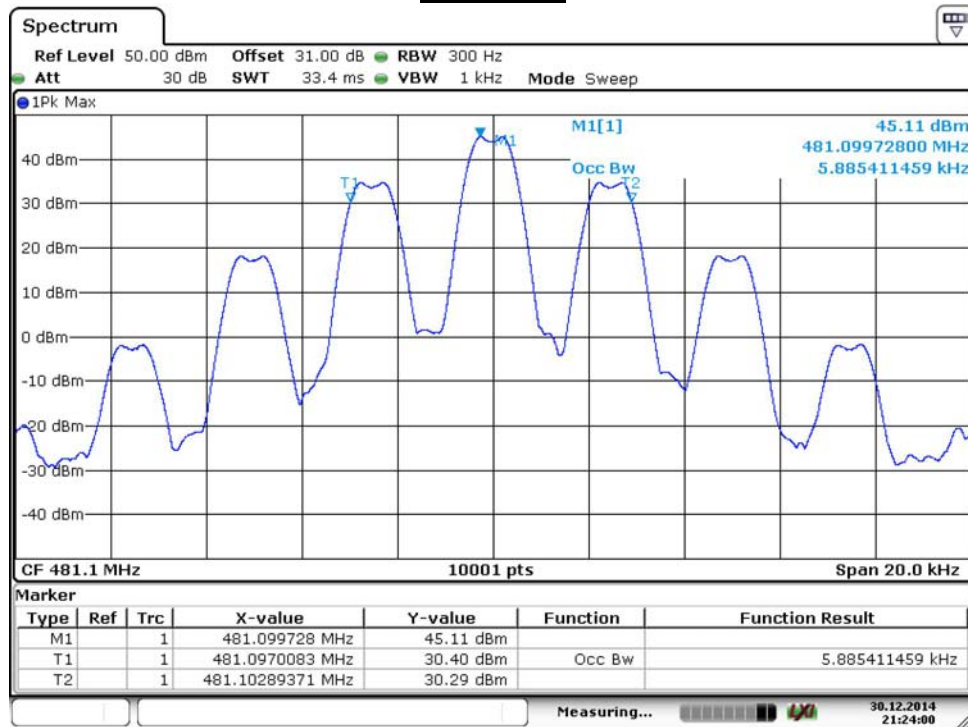
Channel	Frequency (MHz)	Measure Level(kHz)	Limit (kHz)	Result
Low	450.1	5.891	--	Pass
Mid	481.1	5.885	--	Pass
High	511.9	5.885	--	Pass

450.1MHz



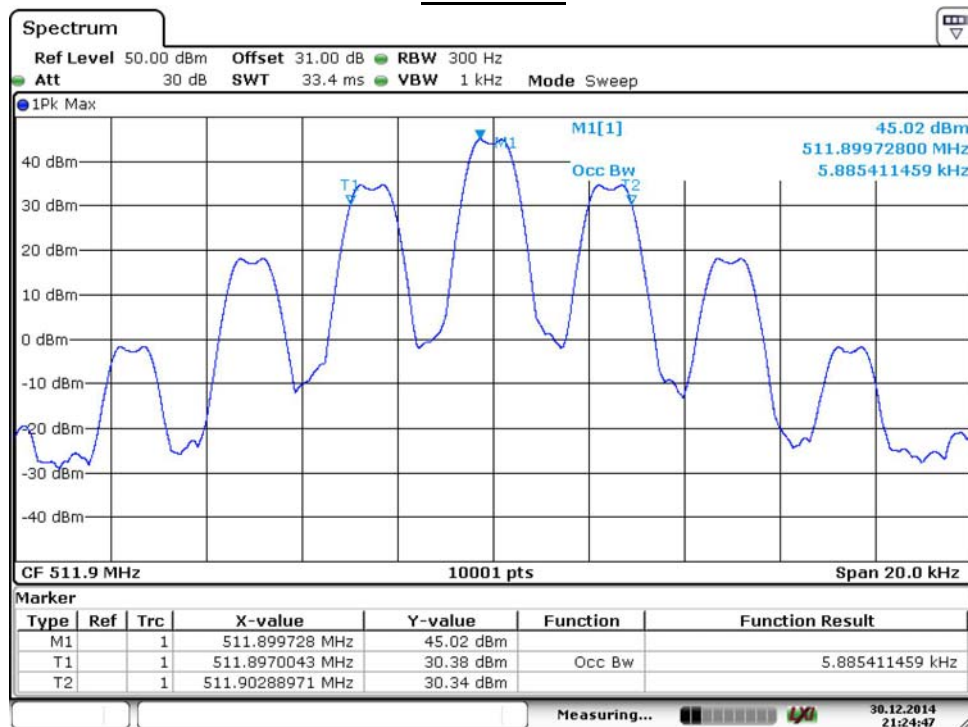
Date: 30.DEC.2014 21:23:10

481.1MHz



Date: 30.DEC.2014 21:24:01

511.9MHz



Date: 30.DEC.2014 21:24:47

Product	Private land mobile radio		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

Analog

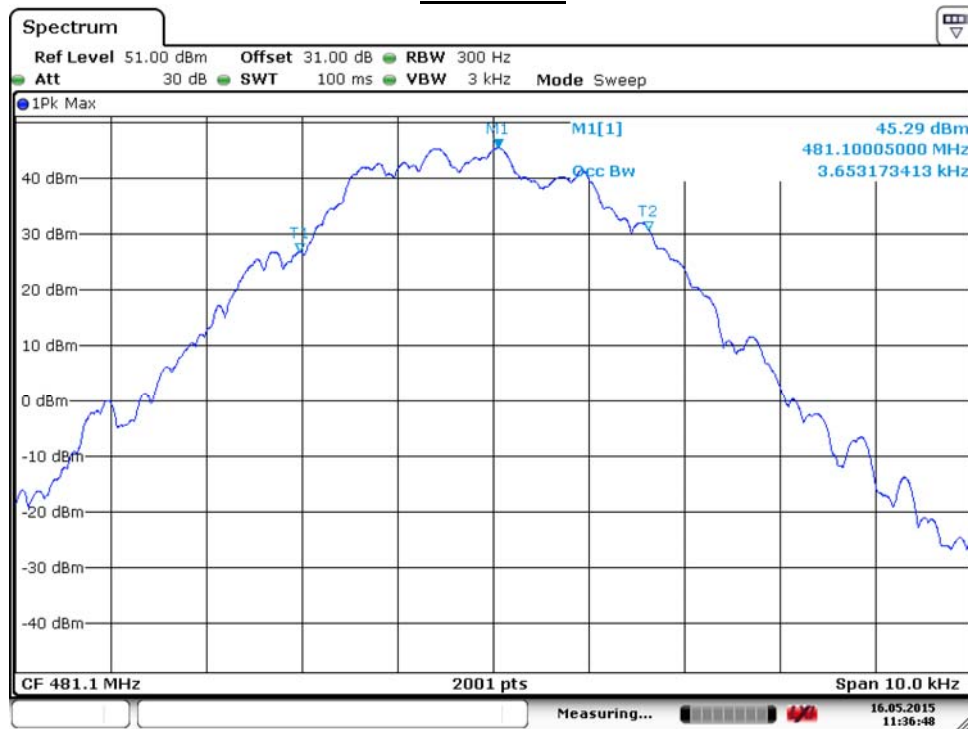
Channel	Frequency (MHz)	Measure Level(kHz)	Limit (kHz)	Result
Low	450.1	3.383	--	Pass
Mid	481.1	3.653	--	Pass
High	511.9	3.698	--	Pass

450.1MHz



Date: 16.MAY.2015 11:40:40

481.1MHz



Date: 16.MAY.2015 11:36:49

511.9MHz



Date: 16.MAY.2015 11:27:28

5. Spurious Emissions at Antenna Terminals (Conducted)

5.1. Test Equipment

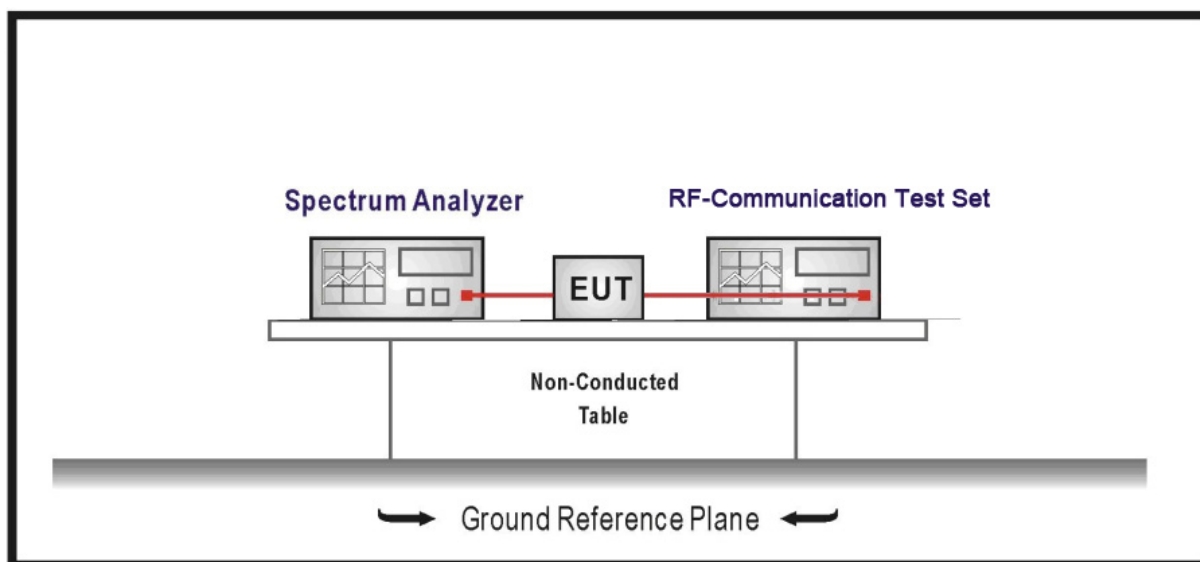
The following test equipments are used during the radiated emission test:

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

High power 12.5 kHz Spacing = $50 + 10 \log(P)$

P= RF Power Output

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

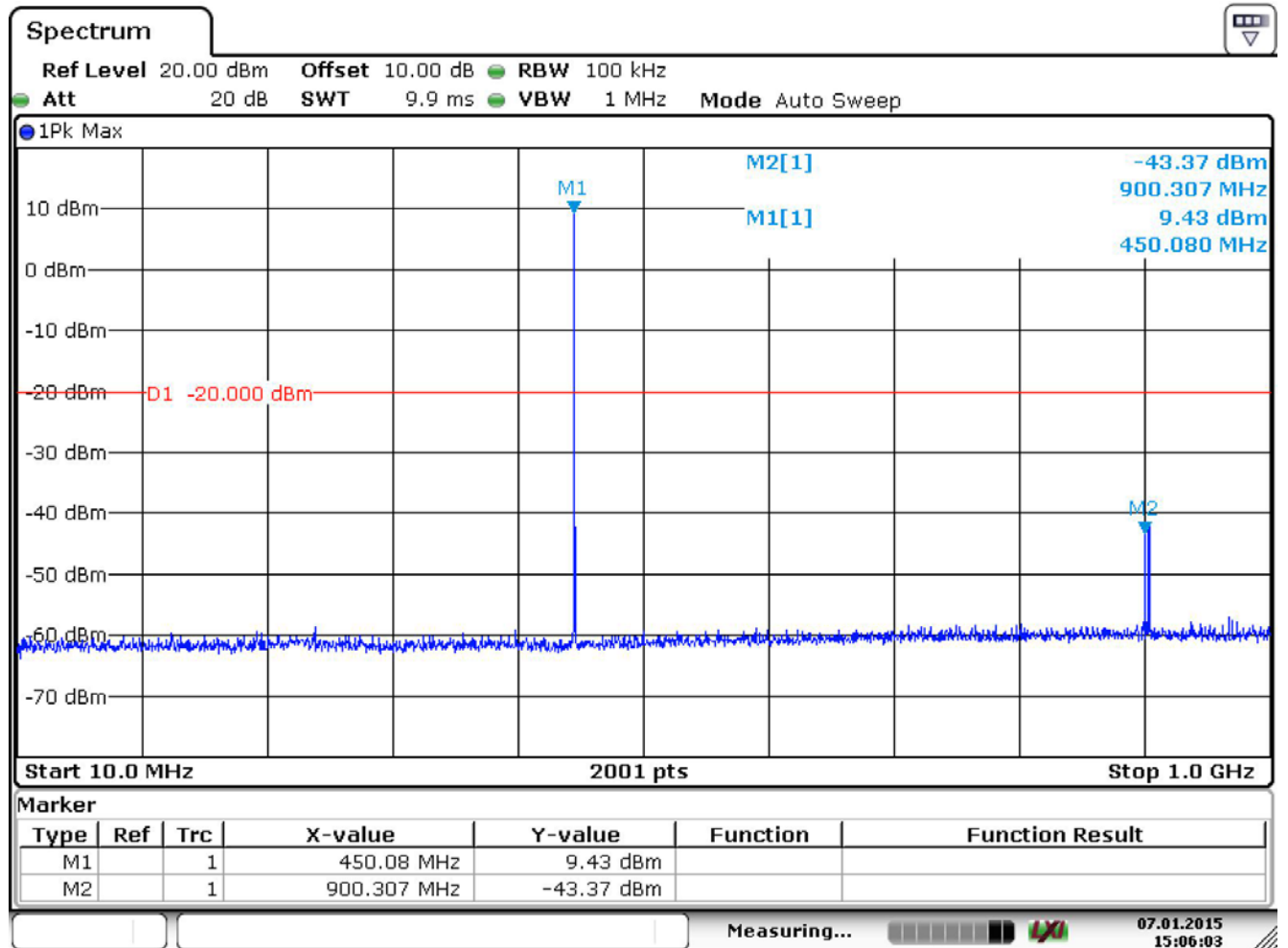
5.5. Uncertainty

The measurement uncertainty is defined as $\pm 1.27\text{dB}$

5.6. Test Result

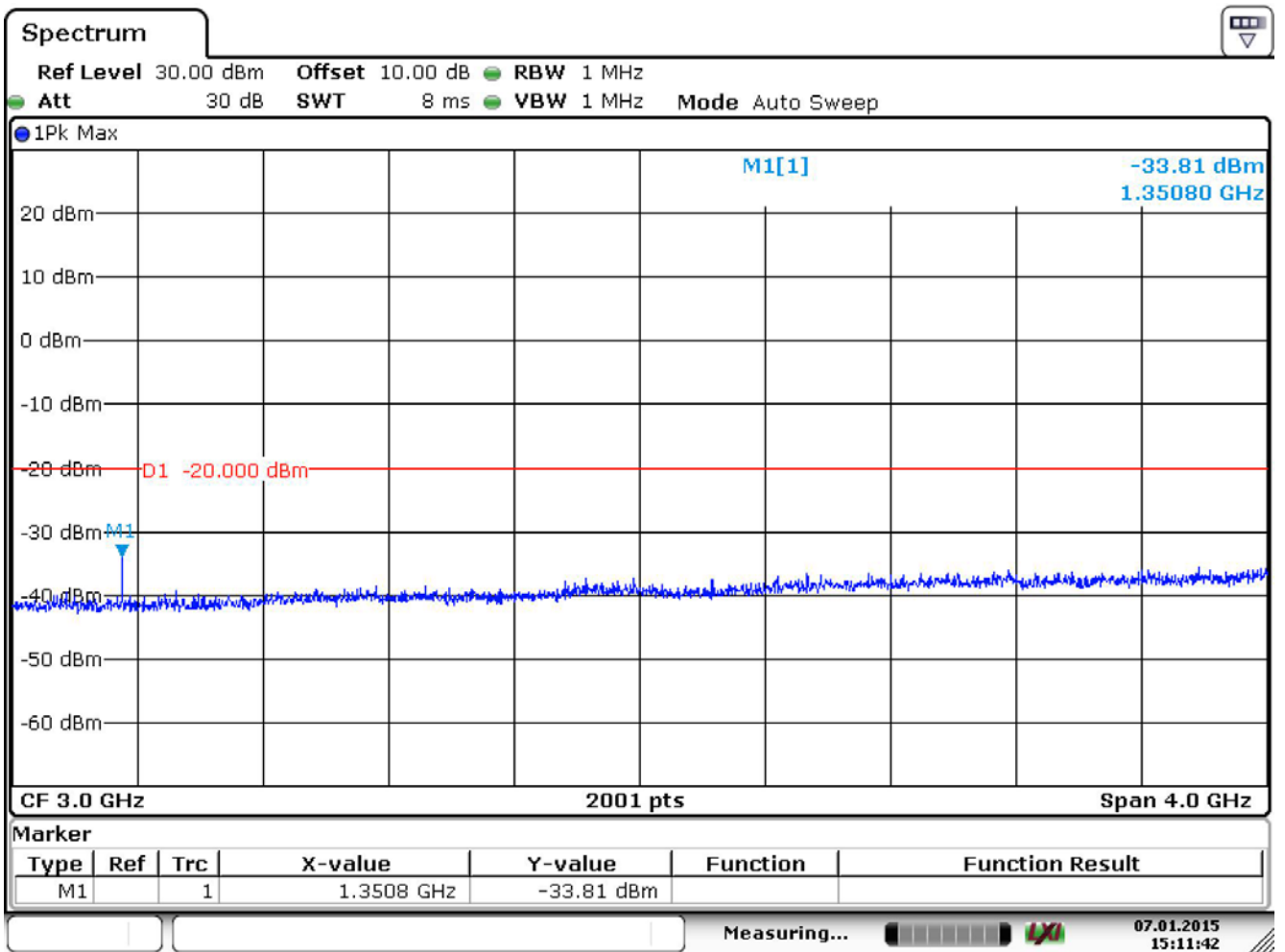
Product	Private land mobile radio		
Test Item	Spurious Emissions at Antenna Terminals (Conducted)		
Test Mode	Mode 1: Transmit(12.5KHz)		
Date of Test	2015/01/07	Test Site	SR7

450.1MHz(10MHz-1GHz)(12.5KHz)



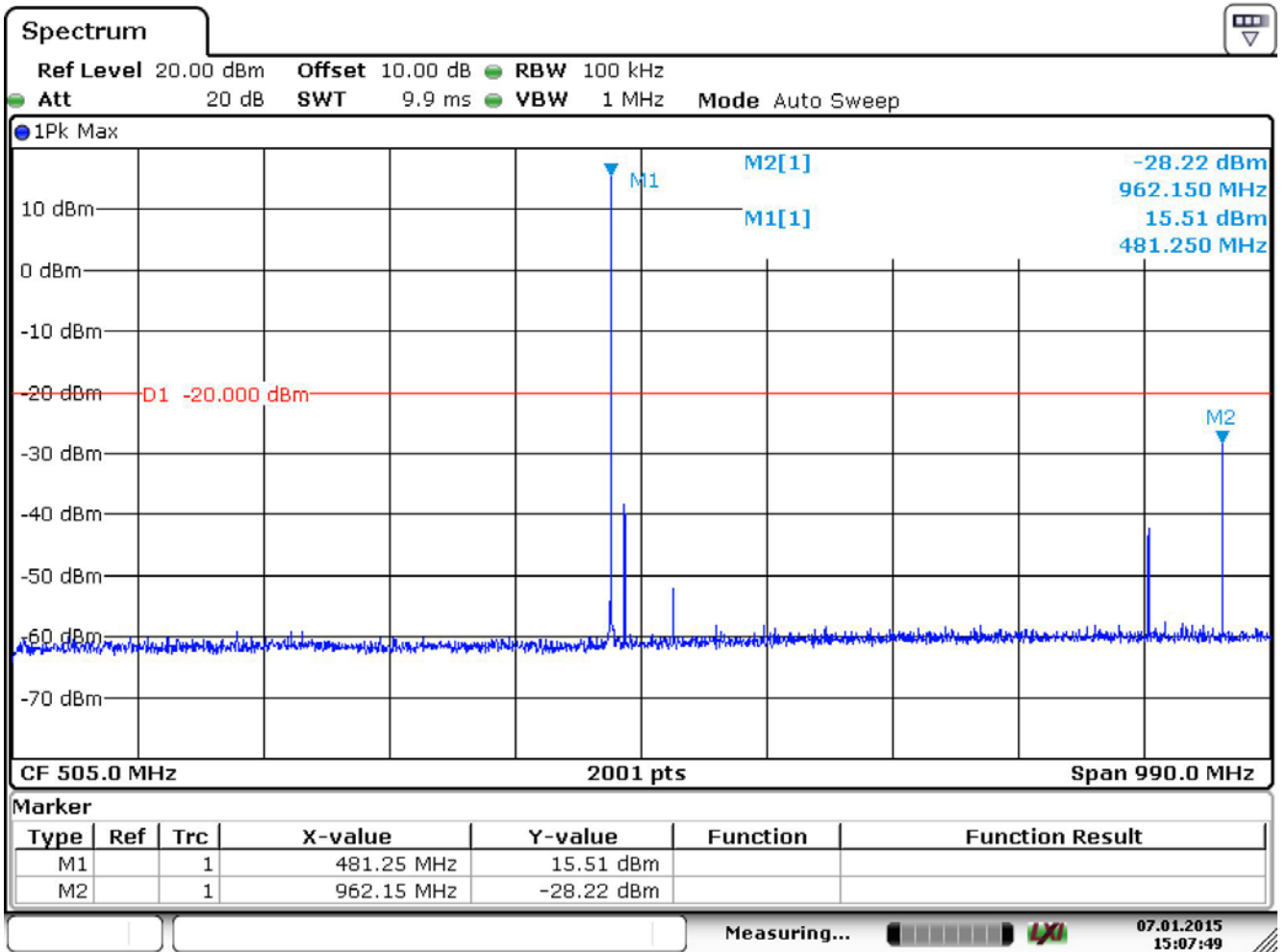
Date: 7.JAN.2015 15:06:03

450.1MHz(1GHz-5GHz)(12.5KHz)



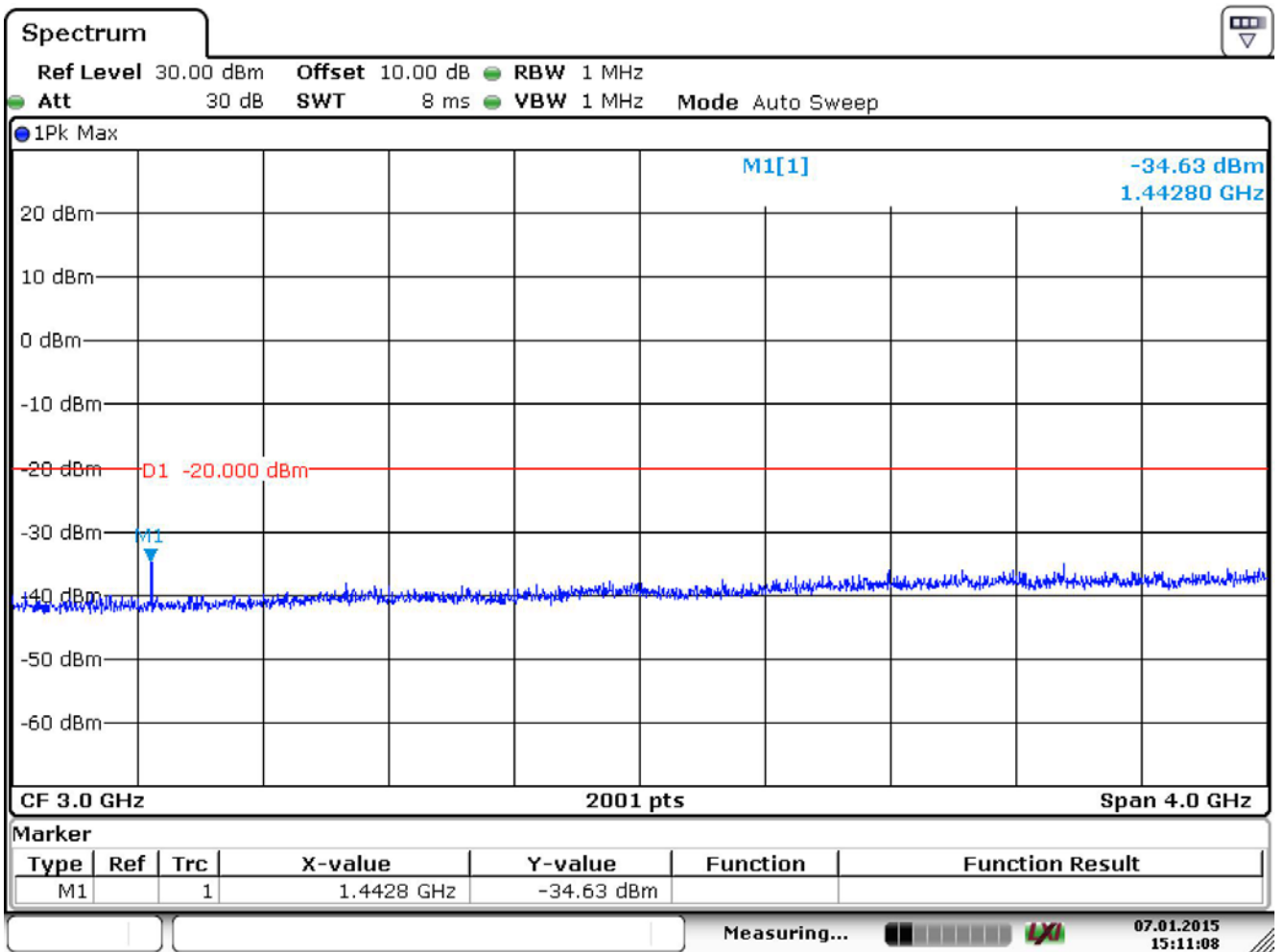
Date: 7.JAN.2015 15:11:42

481.1MHz(10MHz-1GHz)(12.5KHz)



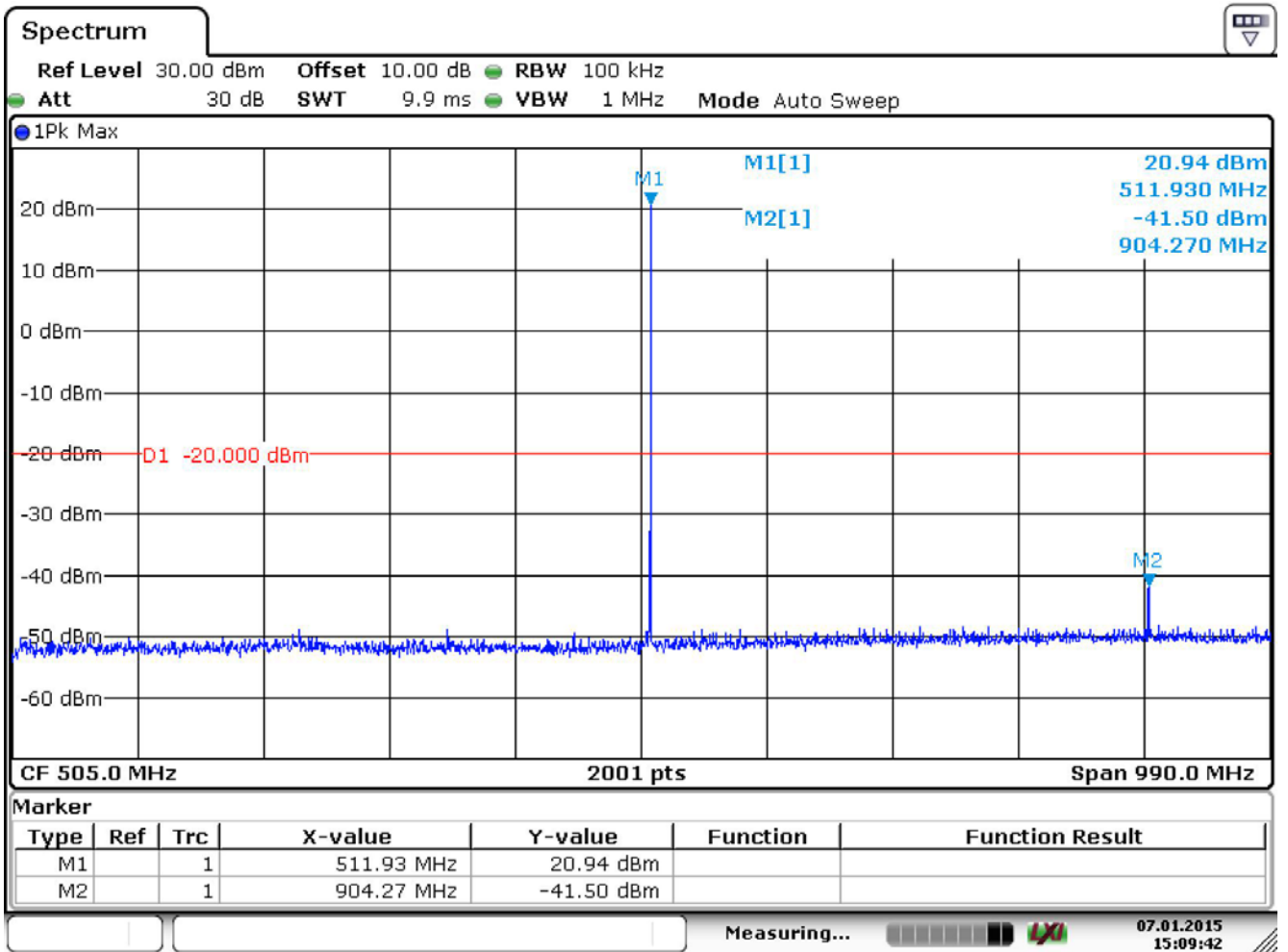
Date: 7.JAN.2015 15:07:49

481.1MHz(1GHz-5GHz)(12.5KHz)



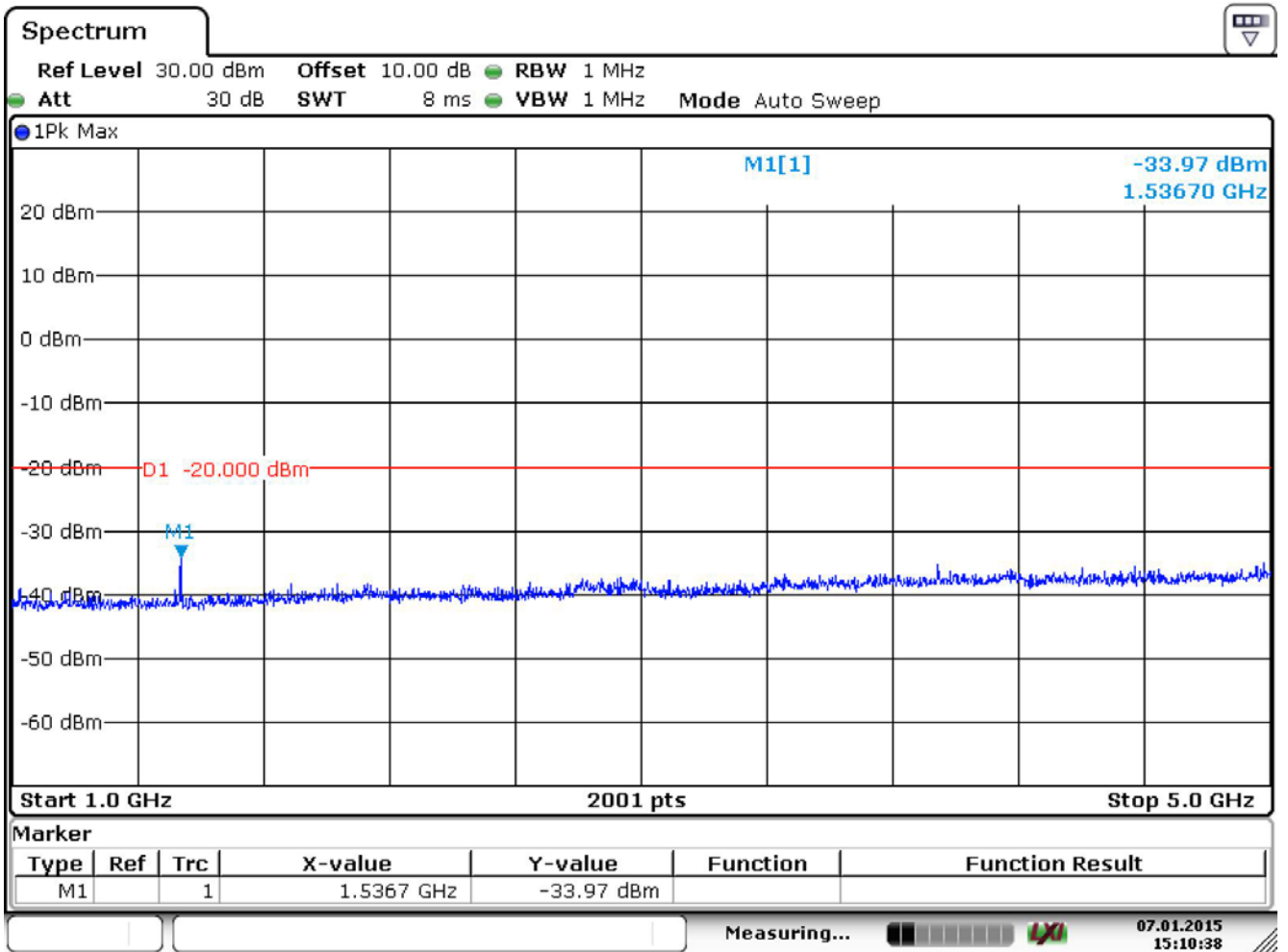
Date: 7.JAN.2015 15:11:08

511.9MHz(10MHz-1GHz)(12.5KHz)



Date: 7.JAN.2015 15:09:42

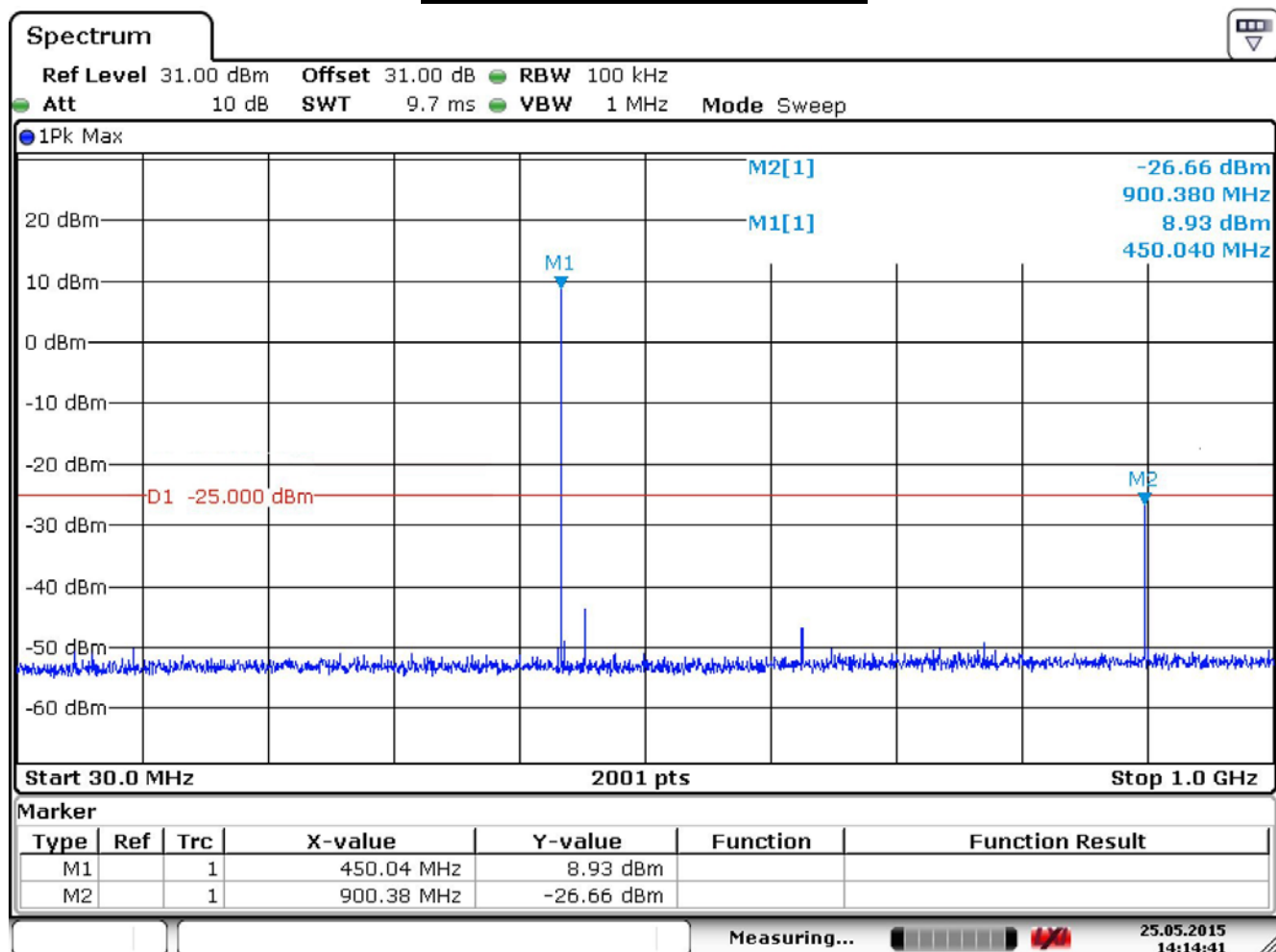
511.9MHz(1GHz-5GHz)(12.5KHz)



Date: 7.JAN.2015 15:10:37

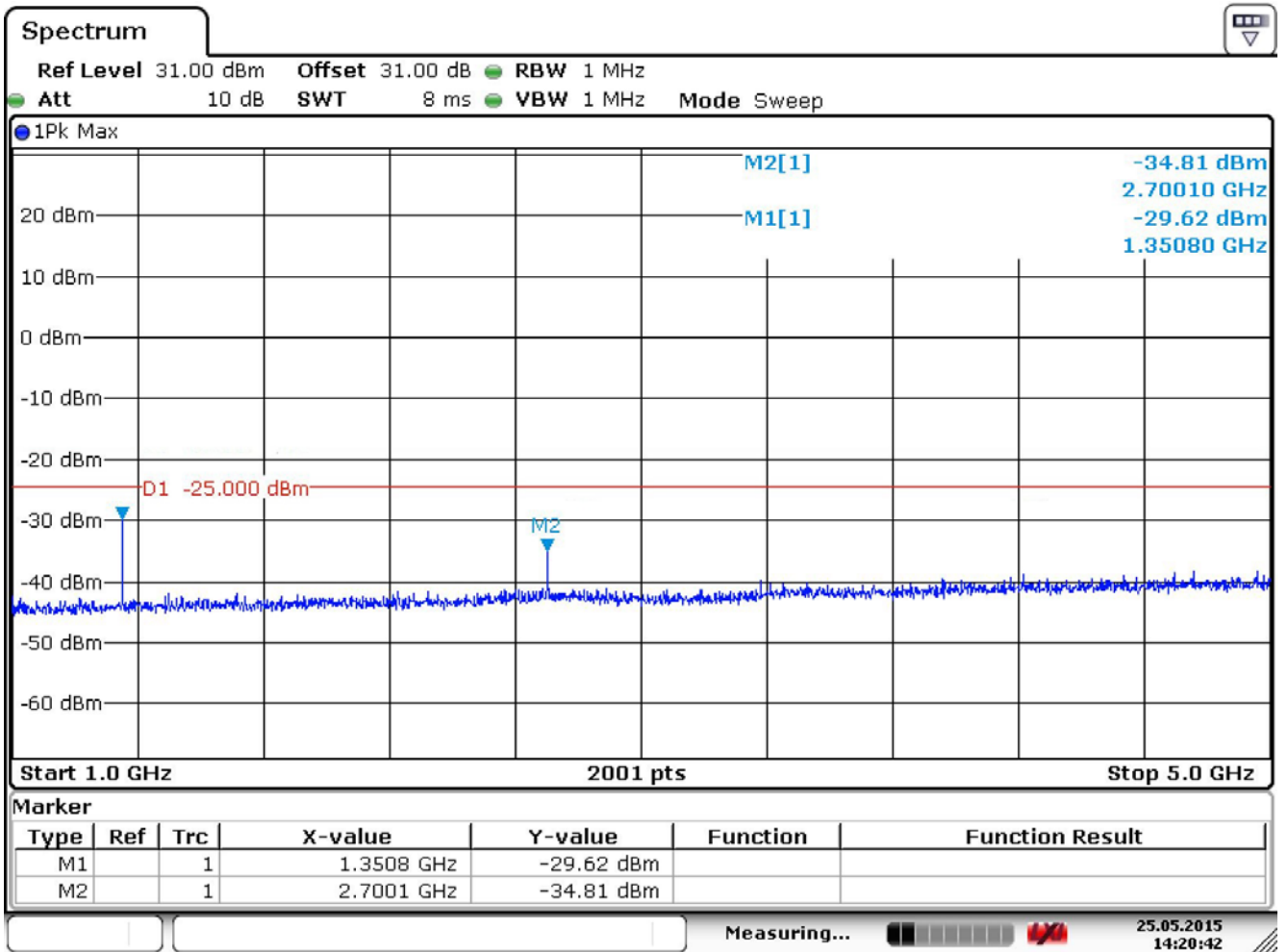
Product	Private land mobile radio		
Test Item	Spurious Emissions at Antenna Terminals (Conducted)		
Test Mode	Mode 1: Transmit(6.25KHz)		
Date of Test	2015/05/25	Test Site	SR7

450.1MHz(10MHz-1GHz)(6.25KHz)



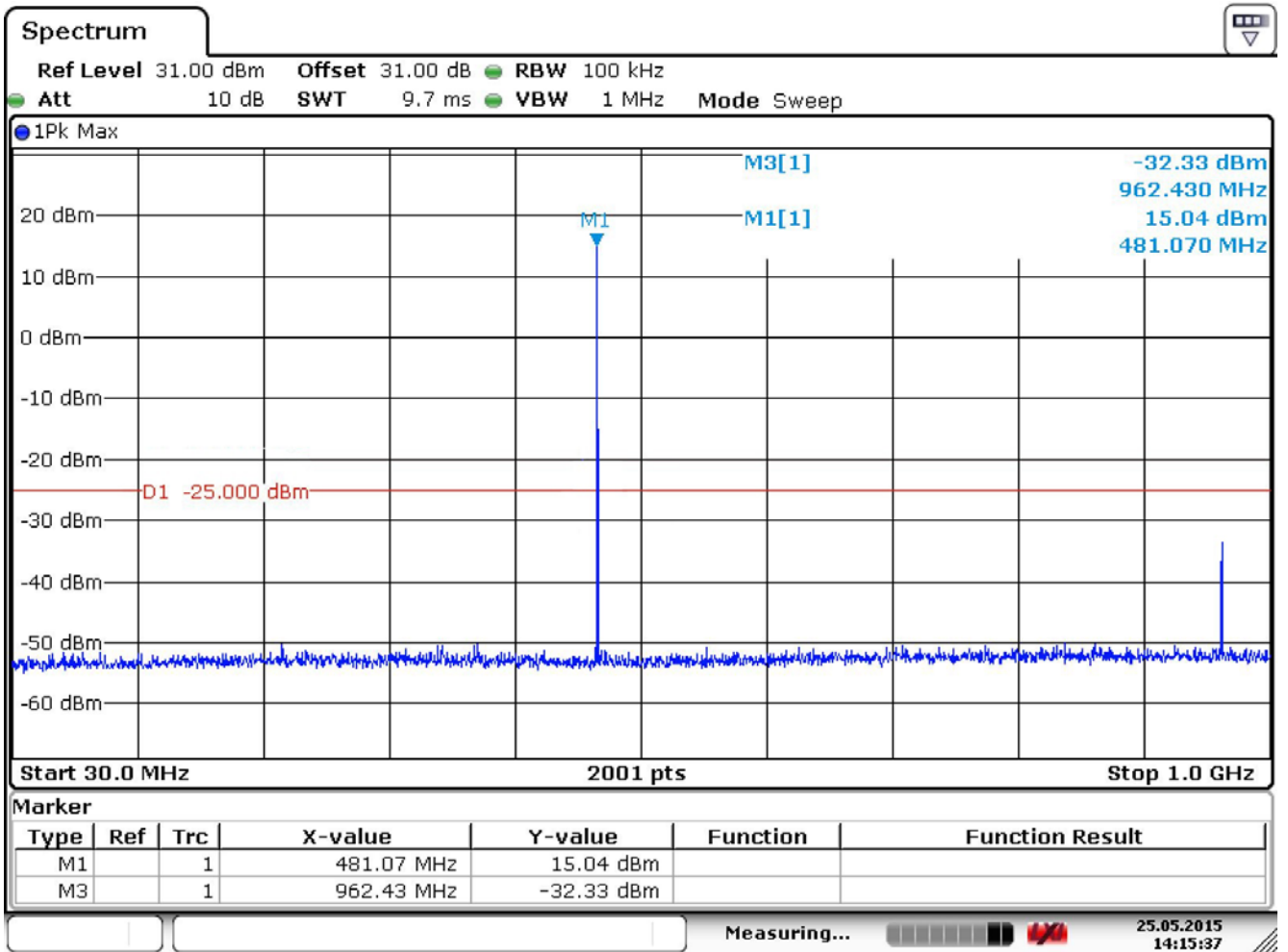
Date: 25.MAY.2015 14:14:41

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



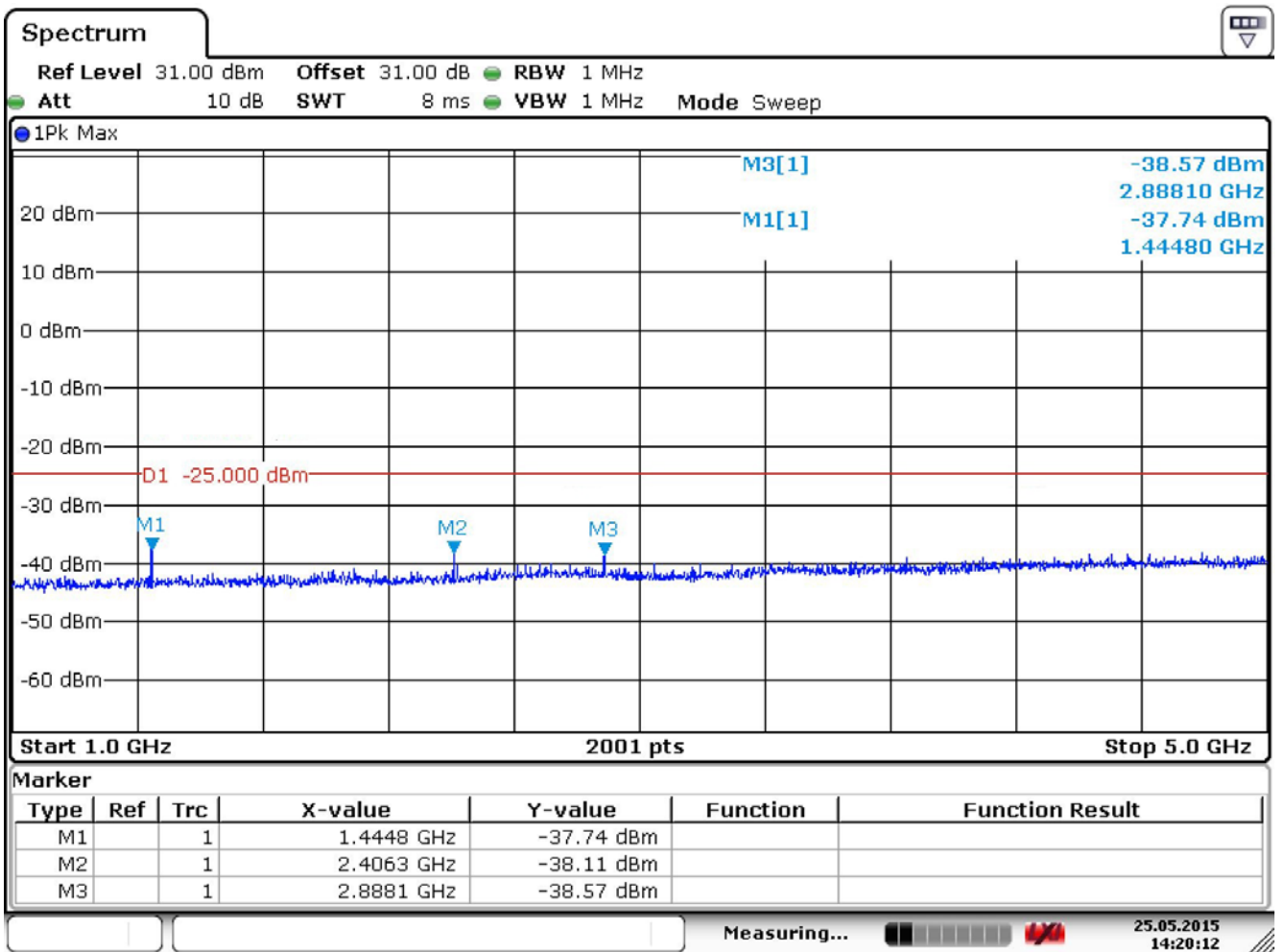
Date: 25.MAY.2015 14:20:43

481.1MHz(10MHz-1GHz)(6.25KHz)



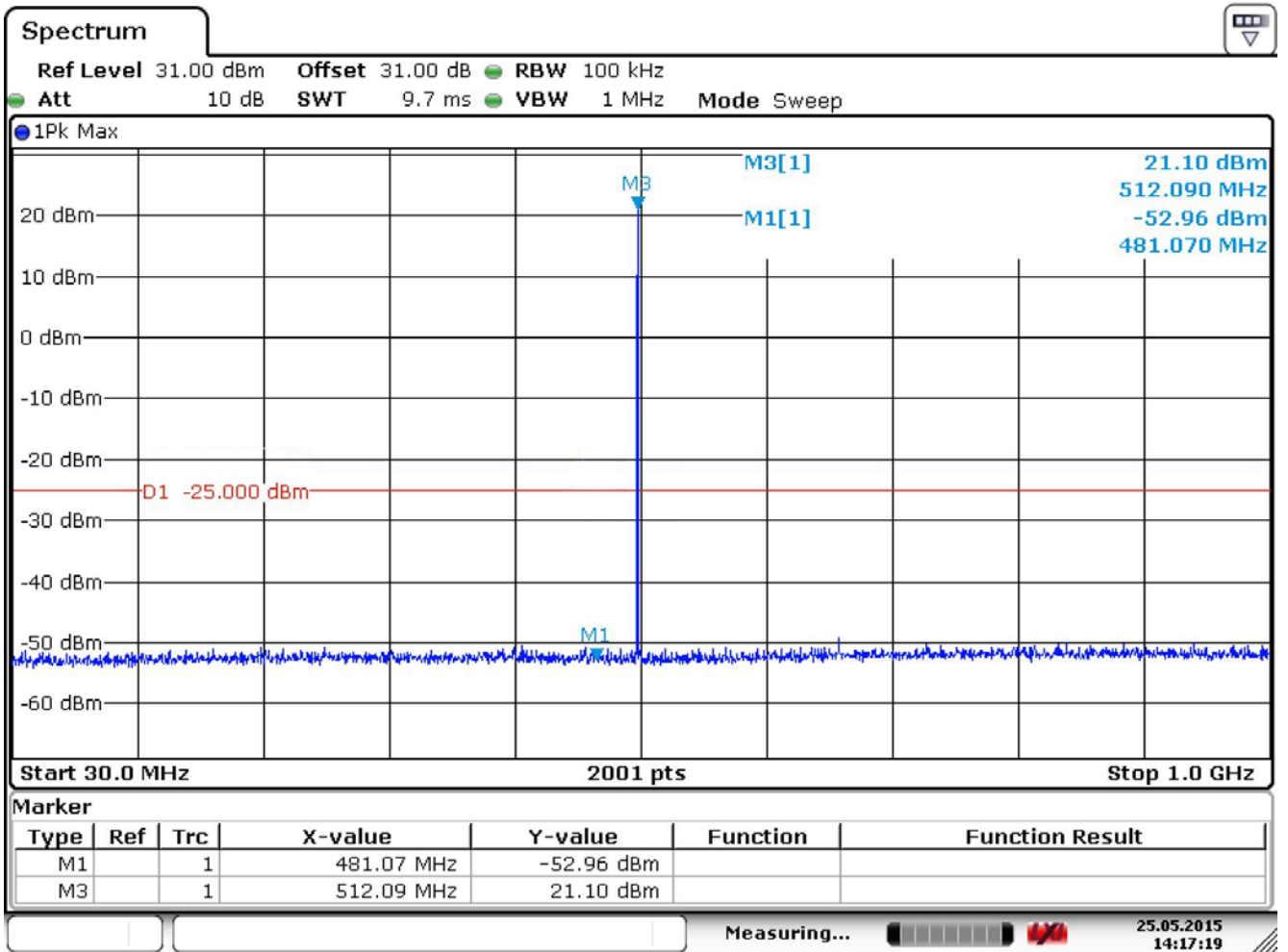
Date: 25.MAY.2015 14:15:38

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



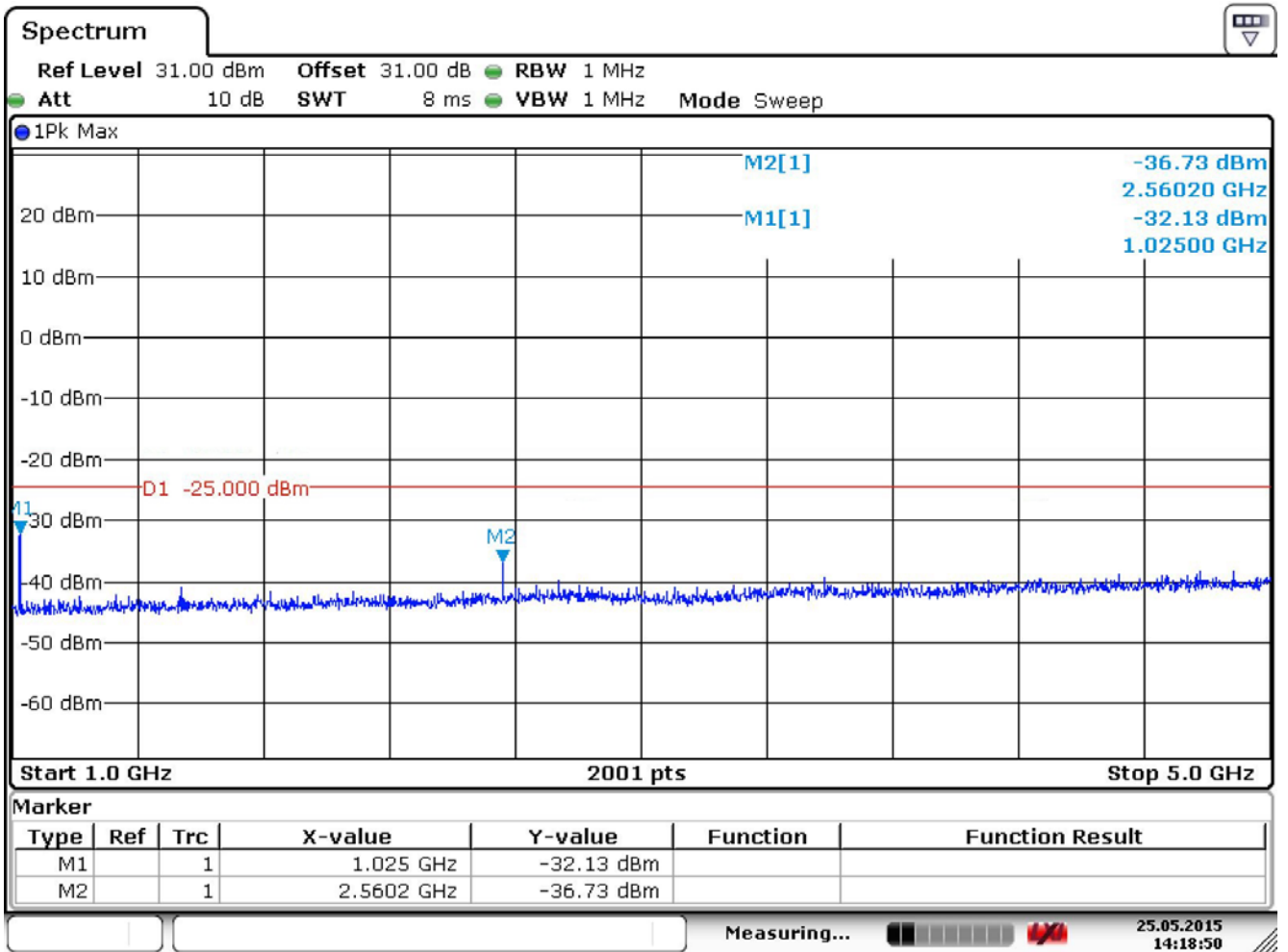
Date: 25.MAY.2015 14:20:12

511.9MHz(10MHz-1GHz)(6.25KHz)



Date: 25.MAY.2015 14:17:18

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



Date: 25.MAY.2015 14:18:50

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

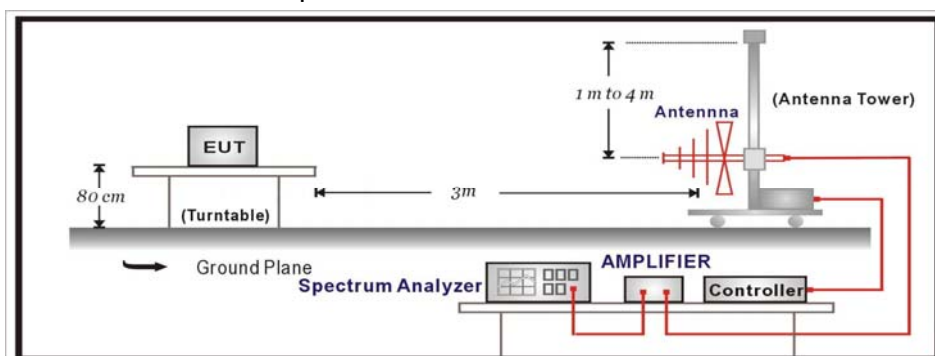
Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895	2015/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120	D743	2015/02/12
Pre-Amplifier	Quietek	AMF-4D.	888003	2015/06/02
Pre-Amplifier	Quietek	AP-025C	CHM-0706049	2015/02/06
k Type Cable	Huber Suhner	Sucoflex 102	25623/2	2015/02/10
Spectrum Analyzer	R&S	FSV 40	101049	2015/07/14
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.

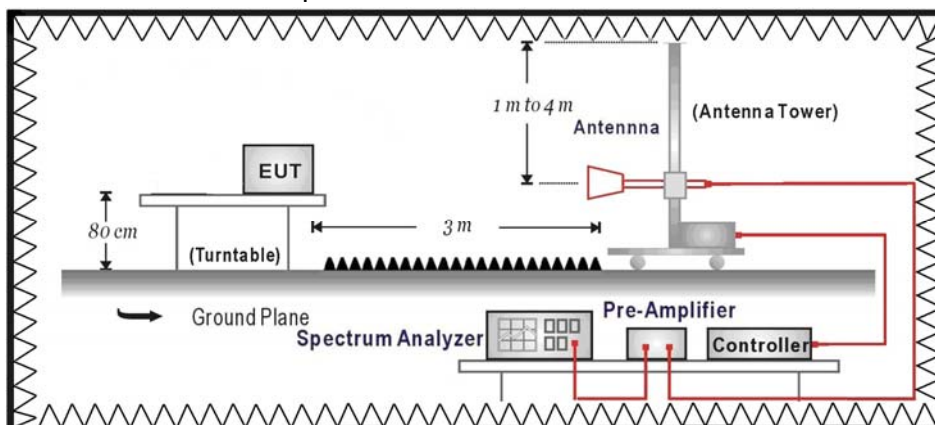
6.2. Test Setup

RF Radiated Measurement:

Under 1GHz Test Setup:



Above 1GHz Test Setup:



6.3. Limits

$12.5 \text{ kHz Spacing} = 50 + 10 \log [P(\text{Watt})]$

$P = \text{Max power output (Watt) at } 0\text{m}$

$\text{Limit (dBm) at } 0\text{m} = (12.5 \text{ kHz Spacing}) - P(\text{dBm})$

$\text{Limit (dBuV/m) at } 3\text{m} = \text{Limit (dBm) at } 0\text{m} + 95.2$

6.4. Test Procedure

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

12.5kHz is the worst case yielding the measurement results closet to the limit.

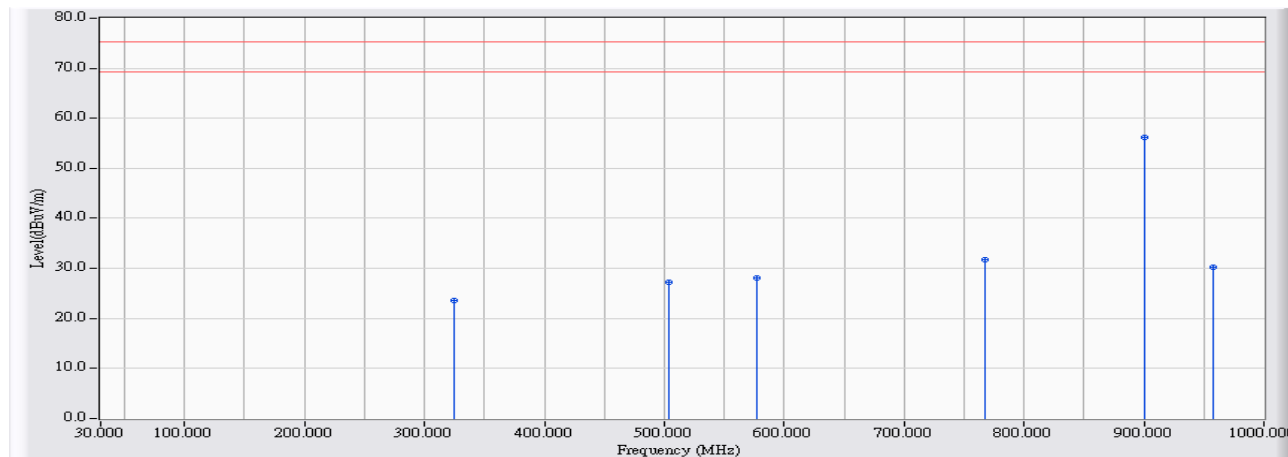
6.5. Uncertainty

The measurement uncertainty is defined as $\pm 3.65\text{dB}$

6.6. Test Result

30MHz-1GHz Spurious

Site : CB1	Time : 2015/01/07 - 22:07
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 450.1MHz

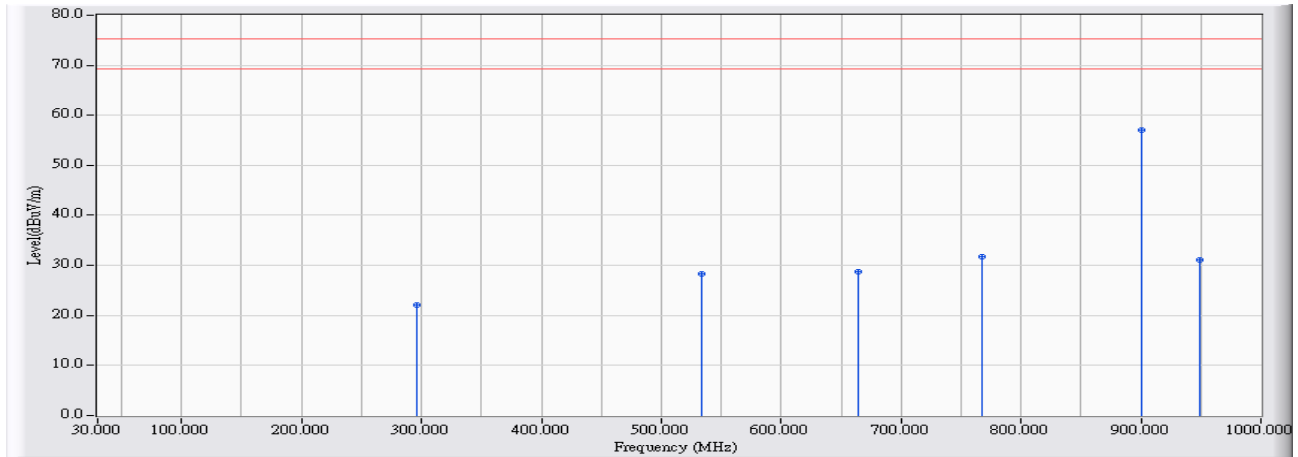


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		324.248	13.180	10.394	23.574	-51.626	75.200	PEAK
2		504.093	17.013	10.265	27.278	-47.922	75.200	PEAK
3		576.807	17.718	10.473	28.191	-47.009	75.200	PEAK
4		767.801	18.999	12.693	31.692	-43.508	75.200	PEAK
5	*	900.140	19.803	36.492	56.295	-18.905	75.200	PEAK
6		958.311	20.313	9.874	30.187	-45.013	75.200	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 : 2015/01/07 - 22:10
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 450.1MHz

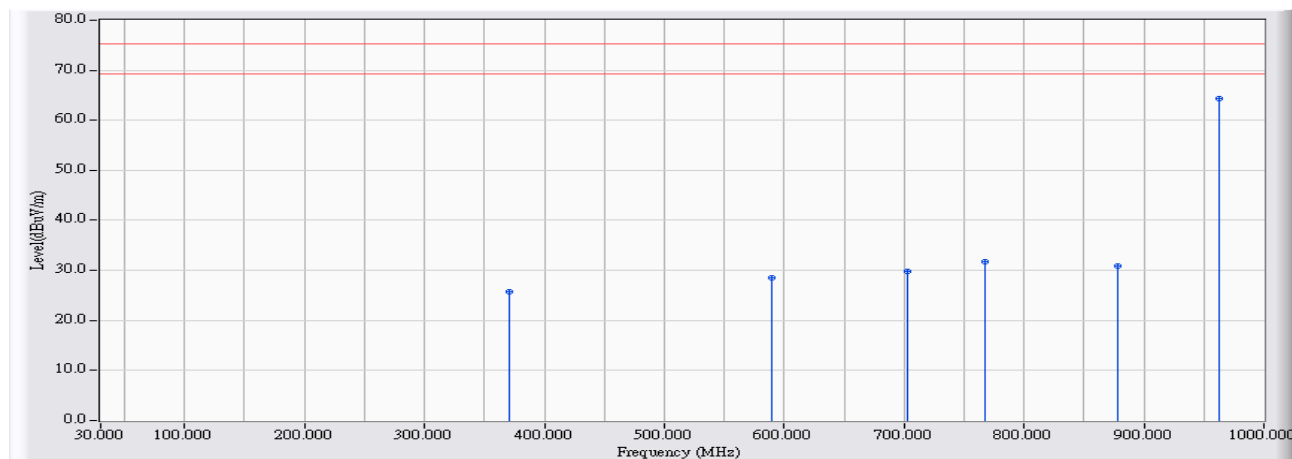


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		295.647	12.457	9.741	22.198	-53.002	75.200	PEAK
2		533.663	17.300	11.060	28.359	-46.841	75.200	PEAK
3		664.548	18.143	10.656	28.799	-46.401	75.200	PEAK
4		767.801	18.999	12.734	31.733	-43.467	75.200	PEAK
5	*	900.140	19.803	37.290	57.093	-18.107	75.200	PEAK
6		948.616	20.229	10.821	31.049	-44.151	75.200	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 : 2015/01/07 - 22:18
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 481.1MHz

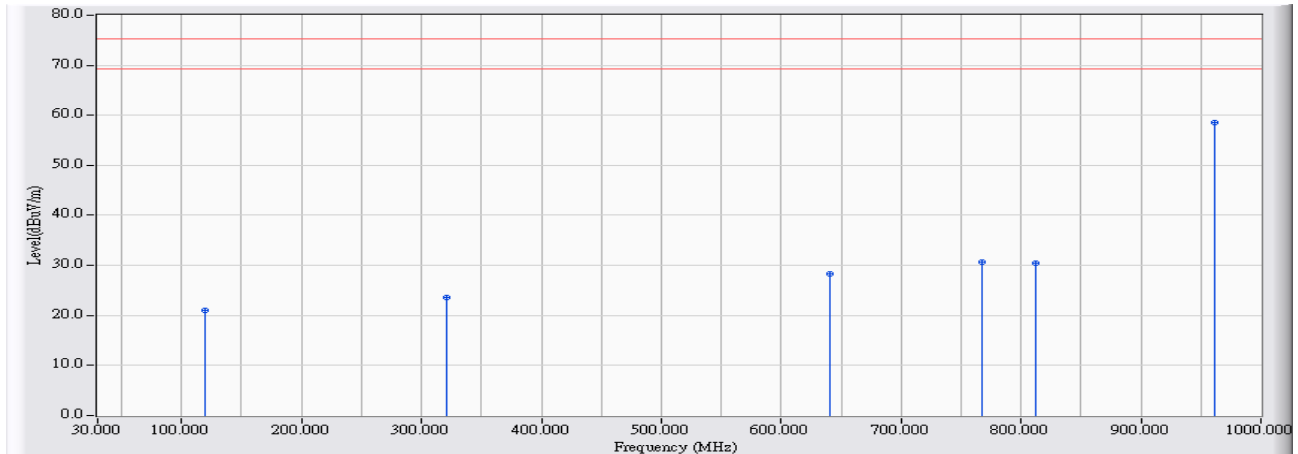


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		371.269	14.455	11.345	25.800	-49.400	75.200	PEAK
2		589.895	17.845	10.703	28.548	-46.652	75.200	PEAK
3		702.844	18.283	11.427	29.711	-45.489	75.200	PEAK
4		767.801	18.999	12.850	31.849	-43.351	75.200	PEAK
5		878.326	19.705	11.099	30.804	-44.396	75.200	PEAK
6	*	962.189	20.348	43.934	64.281	-10.919	75.200	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 : 2015/01/07 - 22:20
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 481.1MHz

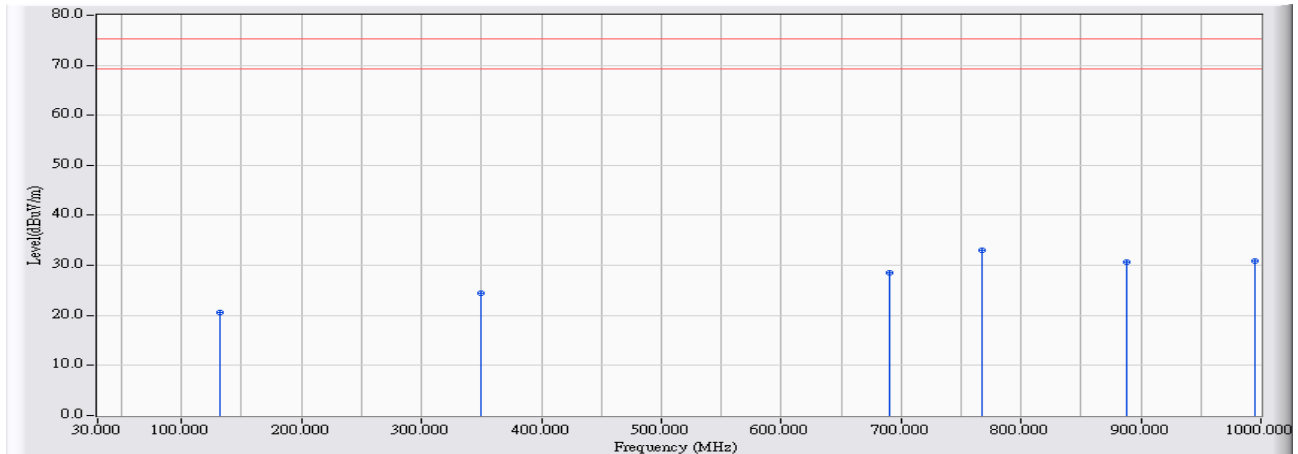


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		119.195	11.118	9.820	20.938	-54.262	75.200	PEAK
2		320.855	13.088	10.589	23.677	-51.523	75.200	PEAK
3		640.310	18.068	10.214	28.282	-46.918	75.200	PEAK
4		767.801	18.999	11.594	30.593	-44.607	75.200	PEAK
5		811.914	19.407	11.046	30.453	-44.747	75.200	PEAK
6	*	961.704	20.343	38.171	58.514	-16.686	75.200	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 : 2015/01/07 - 22:24
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 511.9MHz

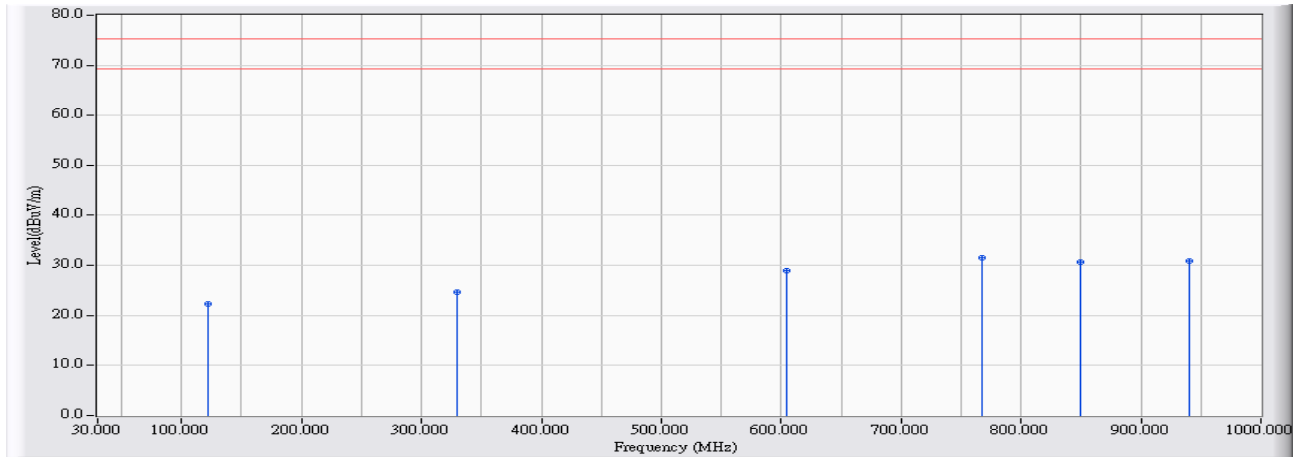


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		131.799	10.500	10.130	20.630	-54.570	75.200	PEAK
2		349.940	13.876	10.638	24.515	-50.685	75.200	PEAK
3		690.240	18.223	10.376	28.598	-46.602	75.200	PEAK
4	*	767.801	18.999	14.117	33.116	-42.084	75.200	PEAK
5		887.536	19.746	10.860	30.606	-44.594	75.200	PEAK
6		995.637	20.641	10.233	30.874	-44.326	75.200	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 : 2015/01/07 - 22:33
Limit : FCC_PART90_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 511.9MHz



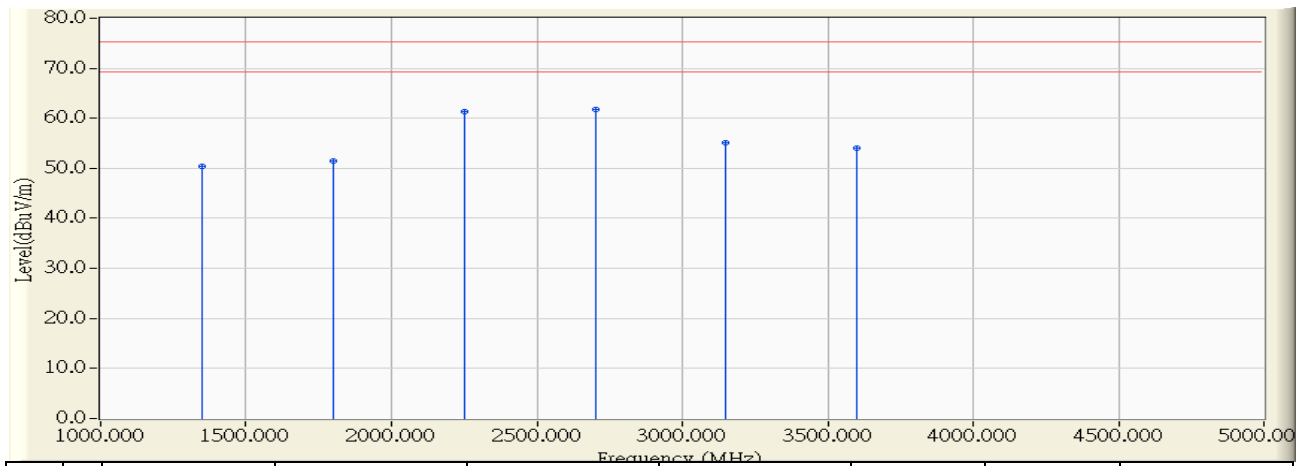
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		121.619	11.093	11.312	22.405	-52.795	75.200	PEAK
2		330.065	13.338	11.322	24.660	-50.540	75.200	PEAK
3		603.953	17.955	10.906	28.862	-46.338	75.200	PEAK
4	*	767.801	18.999	12.490	31.489	-43.711	75.200	PEAK
5		849.725	19.577	11.128	30.705	-44.495	75.200	PEAK
6		939.890	20.152	10.632	30.784	-44.416	75.200	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 : 2015/01/06 - 21:59
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 450.1MHz

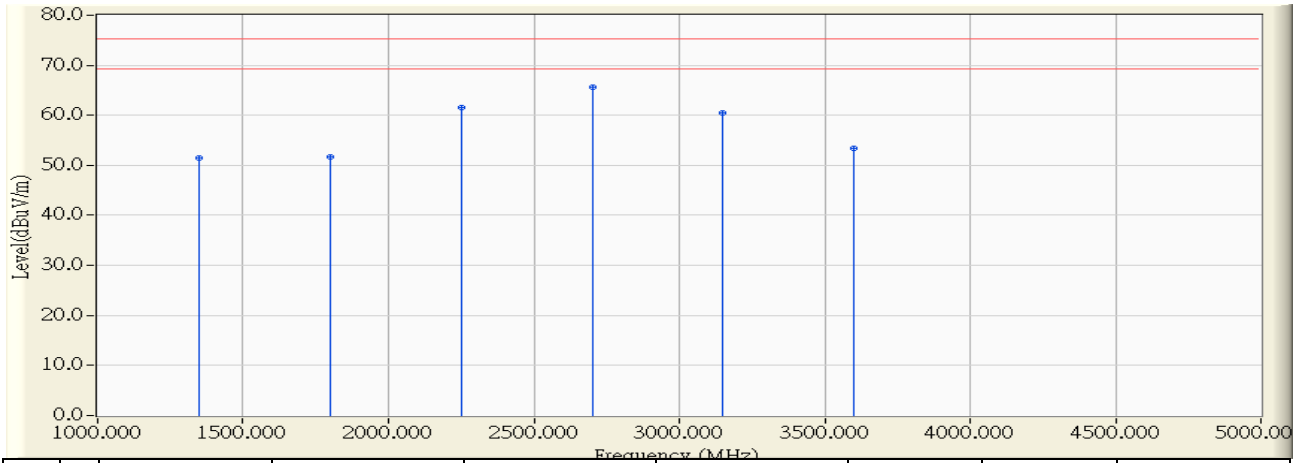


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1350.000	-22.882	73.322	50.440	-24.760	75.200	PEAK
2		1800.000	-21.334	72.803	51.469	-23.731	75.200	PEAK
3		2250.000	-17.455	78.711	61.256	-13.944	75.200	PEAK
4	*	2700.000	-15.508	77.278	61.770	-13.430	75.200	PEAK
5		3150.000	-15.961	71.038	55.077	-20.123	75.200	PEAK
6		3600.000	-15.325	69.364	54.039	-21.161	75.200	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 : 2015/01/06 - 22:03
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 450.1MHz

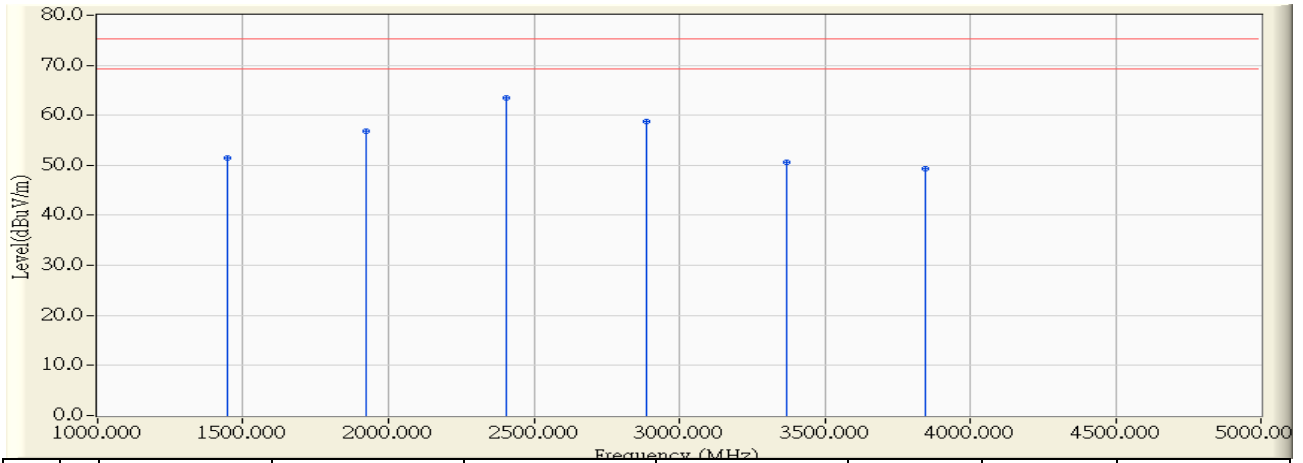


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1350.000	-22.882	74.296	51.414	-23.786	75.200	PEAK
2		1800.000	-21.334	72.933	51.599	-23.601	75.200	PEAK
3		2250.000	-17.455	78.966	61.511	-13.689	75.200	PEAK
4	*	2700.000	-15.508	81.072	65.564	-9.636	75.200	PEAK
5		3150.000	-15.961	76.439	60.478	-14.722	75.200	PEAK
6		3600.000	-15.325	68.812	53.487	-21.713	75.200	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 : 2015/01/06 - 22:06
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 481.1MHz

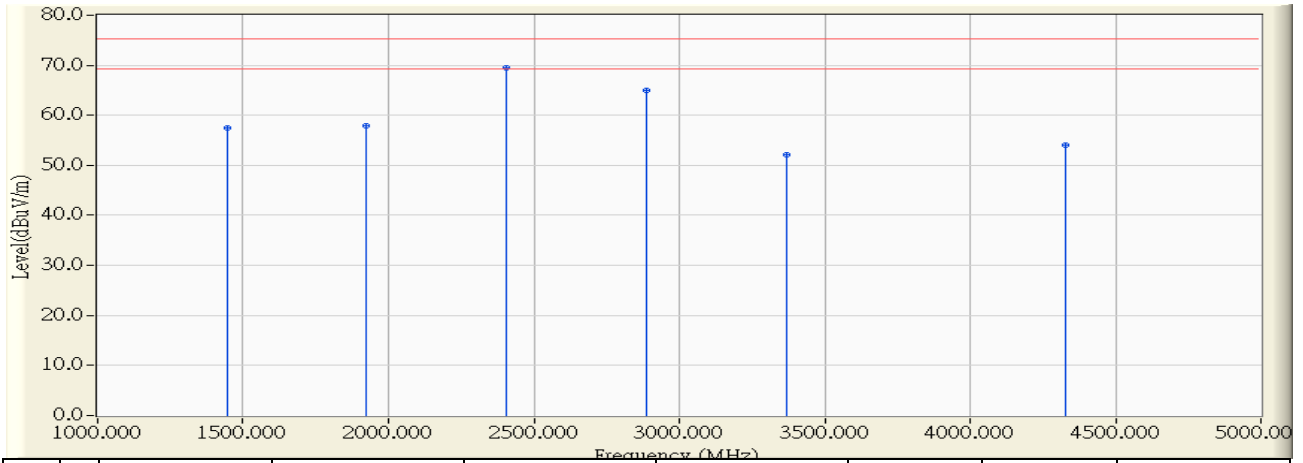


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	1444.000	-22.521	73.991	51.470	-23.730	75.200	PEAK
2	1924.000	-20.925	77.741	56.816	-18.384	75.200	PEAK
3	* 2406.000	-15.625	79.043	63.418	-11.782	75.200	PEAK
4	2886.000	-15.973	74.790	58.817	-16.383	75.200	PEAK
5	3368.000	-15.709	66.328	50.618	-24.582	75.200	PEAK
6	3848.000	-14.822	64.218	49.396	-25.804	75.200	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 : 2015/01/06 - 22:07
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 481.1MHz

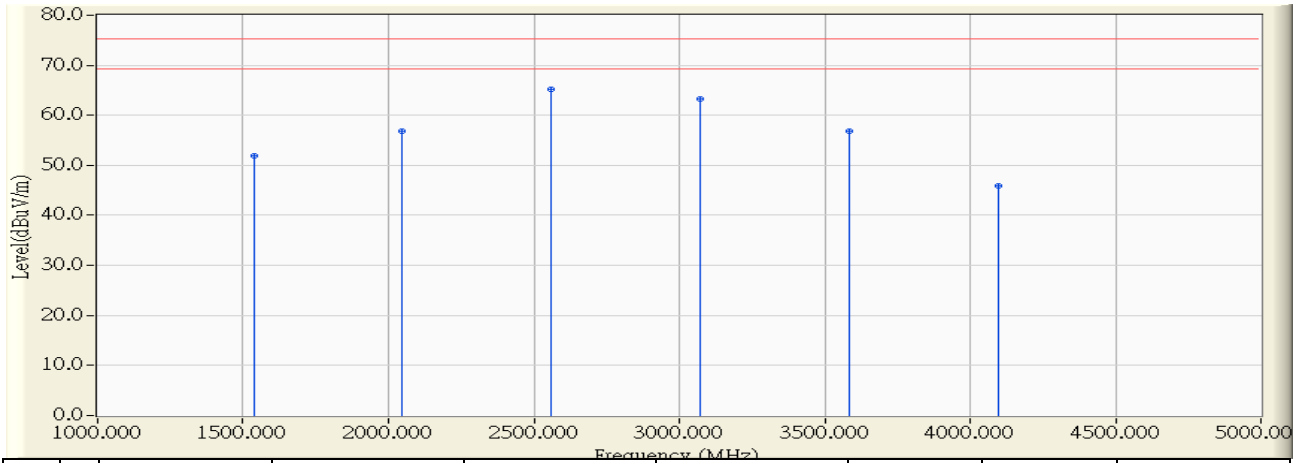


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	1444.000	-22.521	80.043	57.522	-17.678	75.200	PEAK
2	1924.000	-20.925	78.853	57.928	-17.272	75.200	PEAK
3	* 2406.000	-15.625	85.200	69.575	-5.625	75.200	PEAK
4	2886.000	-15.973	80.971	64.998	-10.202	75.200	PEAK
5	3368.000	-15.709	67.893	52.183	-23.017	75.200	PEAK
6	4330.000	-13.530	67.477	53.947	-21.253	75.200	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 : 2015/01/06 - 22:10
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - HORIZONTAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 511.9MHz

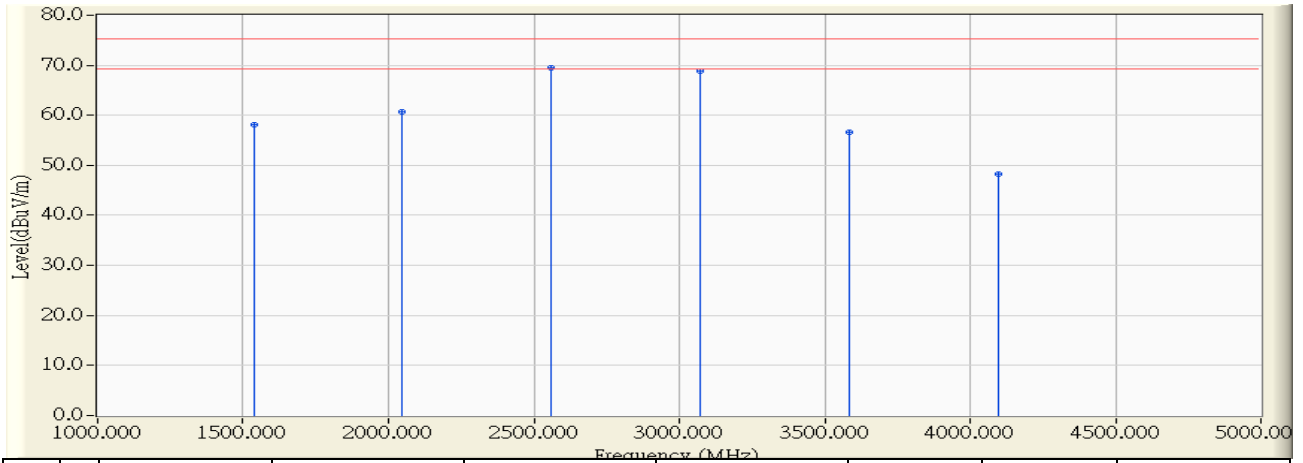


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	1536.000	-22.205	74.045	51.840	-23.360	75.200	PEAK
2	2048.000	-19.824	76.614	56.790	-18.410	75.200	PEAK
3	* 2560.000	-15.158	80.259	65.101	-10.099	75.200	PEAK
4	3072.000	-16.051	79.340	63.289	-11.911	75.200	PEAK
5	3584.000	-15.357	72.141	56.783	-18.417	75.200	PEAK
6	4096.000	-14.206	60.117	45.910	-29.290	75.200	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 : 2015/01/06 - 22:11
Limit : FCC_Part90_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - VERTICAL	Power : DC 13.8V
EUT : Private land mobile radio	Note : 511.9MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	1536.000	-22.205	80.293	58.088	-17.112	75.200	PEAK
2	2048.000	-19.824	80.440	60.616	-14.584	75.200	PEAK
3	* 2560.000	-15.158	84.635	69.477	-5.723	75.200	PEAK
4	3072.000	-16.051	84.889	68.838	-6.362	75.200	PEAK
5	3584.000	-15.357	72.066	56.708	-18.492	75.200	PEAK
6	4096.000	-14.206	62.375	48.168	-27.032	75.200	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

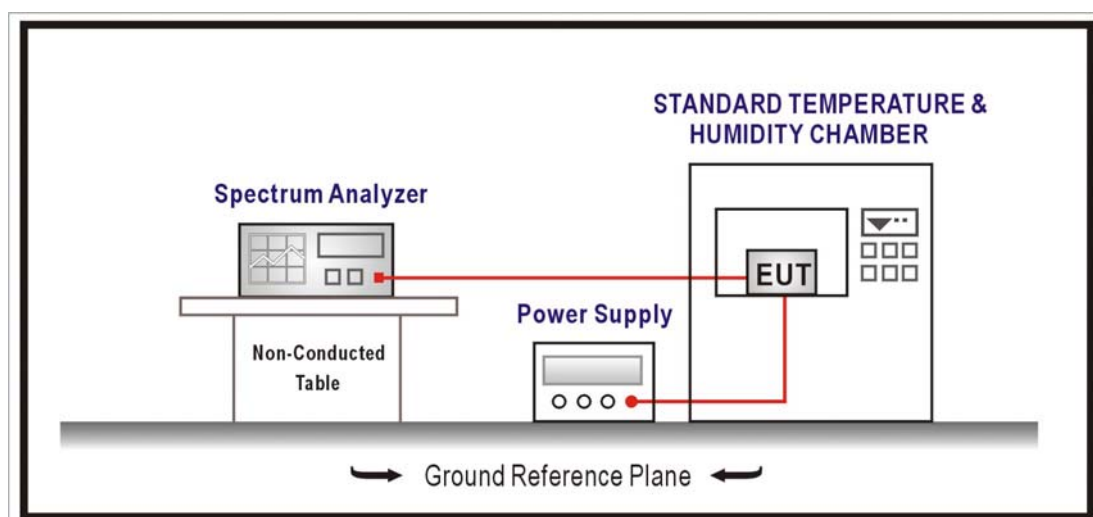
The following test equipments are used during the radiated emission tests:

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

Temperature range requirements: -30 to +50° C.

Voltage Variation +, -15%

±5 PPM

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	Private land mobile radio		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-450.1MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	450.100022	0.0489	PASS
-20		450.100003	0.0067	PASS
-10		450.100010	0.0222	PASS
0		450.099994	-0.0133	PASS
10		450.099989	-0.0244	PASS
20		450.099976	-0.0533	PASS
30		450.099959	-0.0911	PASS
40		450.099980	-0.0444	PASS
50		450.099904	-0.2133	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	450.099999	-0.0022	PASS
	12.80	450.099998	-0.0044	PASS
	10.88	450.100000	0.0000	PASS

Product	Private land mobile radio		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-481.1MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	481.100041	0.0852	PASS
-20		481.100026	0.0540	PASS
-10		481.100009	0.0187	PASS
0		481.099990	-0.0208	PASS
10		481.099996	-0.0083	PASS
20		481.099964	-0.0748	PASS
30		481.099963	-0.0769	PASS
40		481.099967	-0.0686	PASS
50		481.099903	-0.2016	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	481.099998	-0.0042	PASS
	12.80	481.099999	-0.0021	PASS
	10.88	481.099997	-0.0062	PASS

Product	Private land mobile radio		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-511.9MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	511.900014	0.0273	PASS
-20		511.900025	0.0488	PASS
-10		511.900004	0.0078	PASS
0		511.899992	-0.0156	PASS
10		511.900000	0.0000	PASS
20		511.899967	-0.0645	PASS
30		511.899988	-0.0234	PASS
40		511.899994	-0.0117	PASS
50		511.899885	-0.2274	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	511.899997	-0.0059	PASS
	12.80	511.899998	-0.0039	PASS
	10.88	511.899999	-0.0020	PASS

8. Transient Frequency Behavior

8.1. Test Equipment

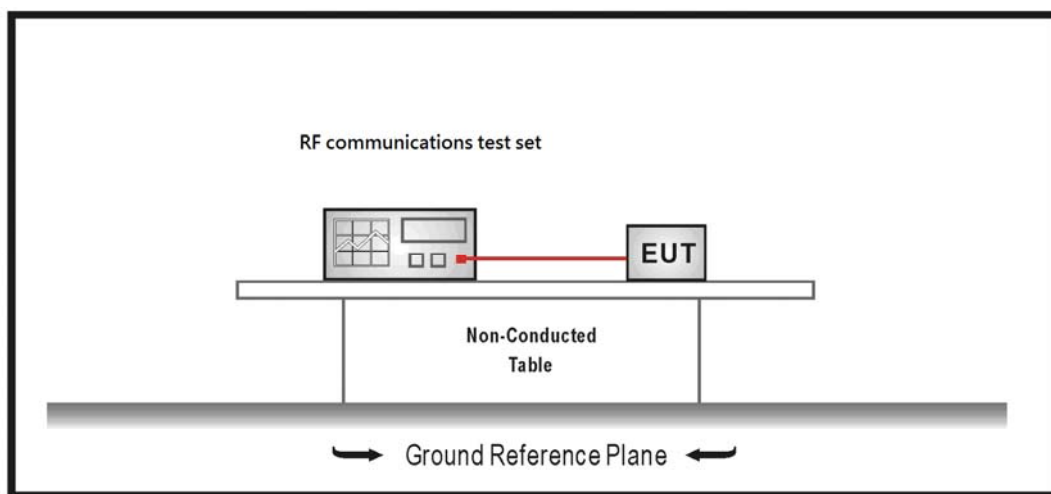
The following test equipments are used during the radiated emission tests:

Transient Frequency Behavior / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
RF-communications Test set	HP	8920A	3614A08091	2015/04/27

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

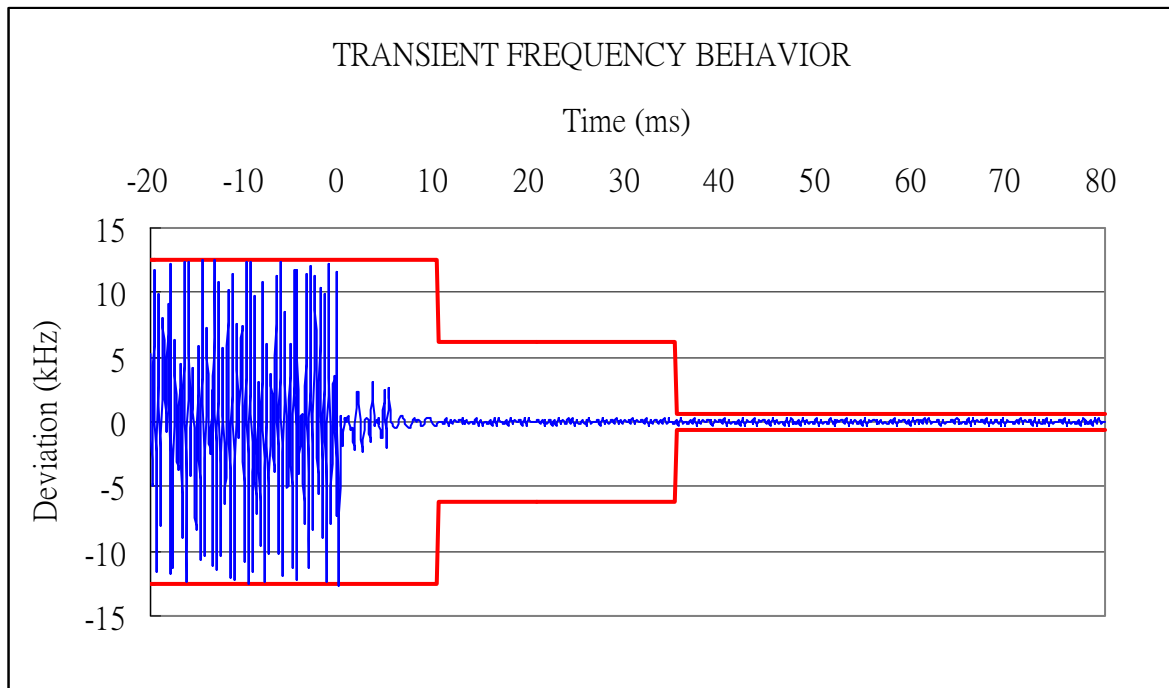
8.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

8.6. Test Result

Product	Private land mobile radio		
Test Item	Transient Frequency Behavior		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

Channel on



Channel off

