

FCC Test Report

Product Name : Private land mobile radio

Model No. : ST-3118V

FCC ID. : M38-ST-3118V

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-B

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 : 2016/01/19

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Manufacturer : RANGER COMMUNICATIONS (M) SDN, BHD.

Model No. : ST-3118V

FCC ID. : M38-ST-3118V

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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1. General Information

1.1. EUT Description

Product Name	Private land mobile radio
Trade Name	SMAR TRUNK
Model No.	ST-3118V
Frequency Range	150-174MHz
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 150-174MHz 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
----	------------------

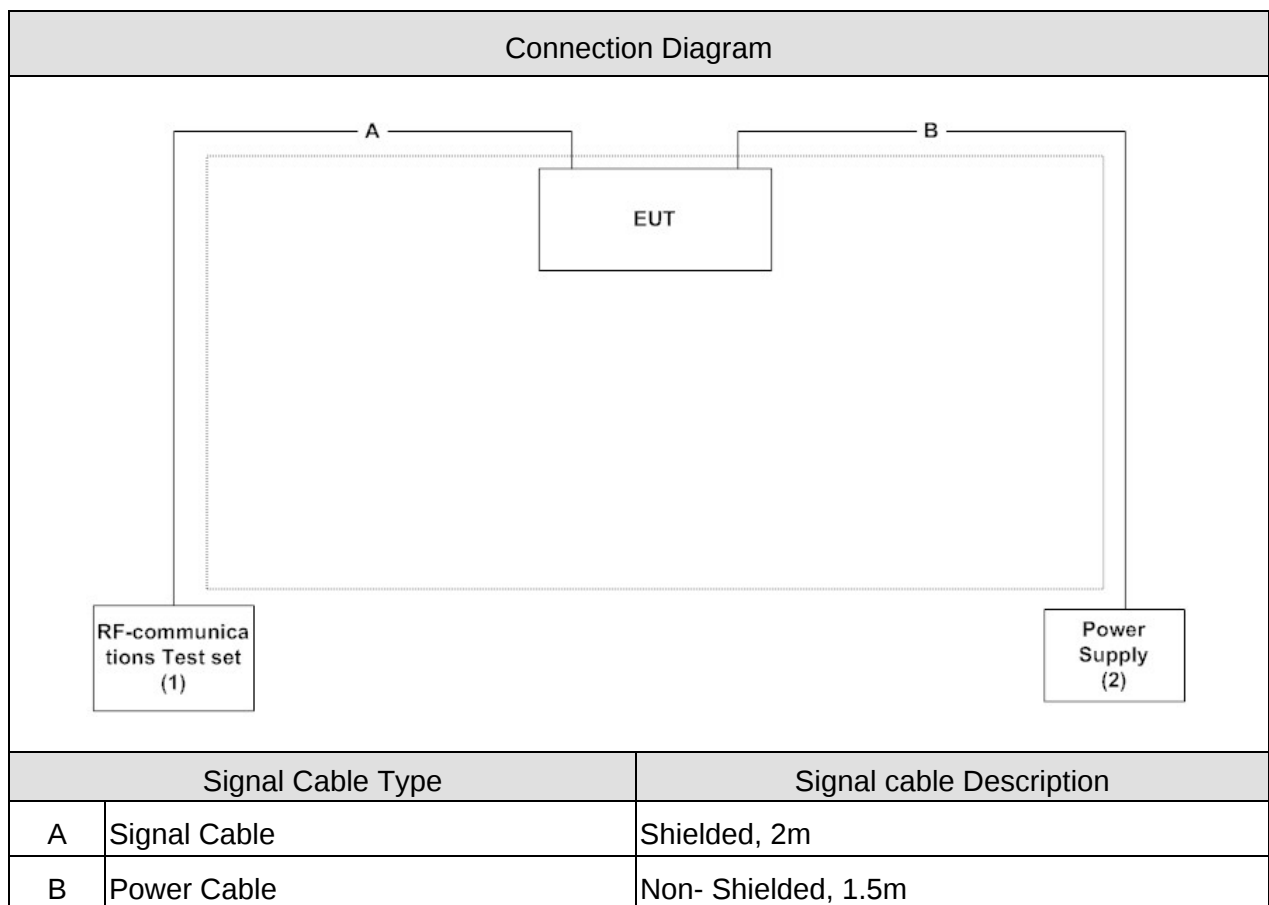
Test Items	Section	Frequency (MHz)	Mode	Result
RF Power Output	90.205	150/162/174	1	Complies
Modulation Characteristics	90.242(b)	150/162/174	1	Complies
Modulation Limiting	90.210	150/162/174	1	Complies
Occupied Bandwidth	90.209 & 90.210	150/162/174	1	Complies
Spurious Emissions at Antenna Terminals (Conducted)	90.210	150/162/174	1	Complies
Field Strength of Spurious Emissions	90.210	150/162/174	1	Complies
Frequency Stability	90.213	150/162/174	1	Complies
Transient Frequency Behavior	90.214	150/162/174	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

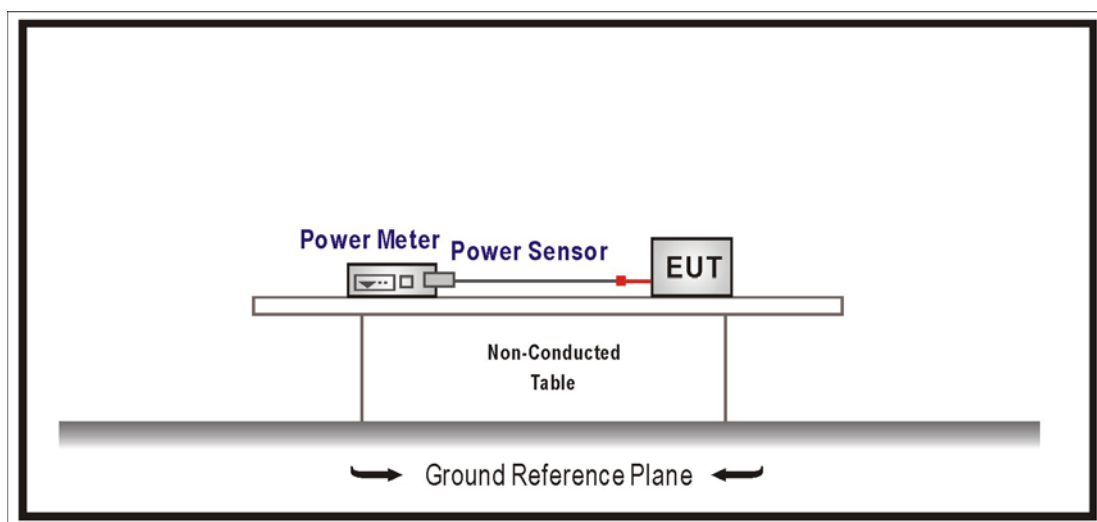
The following test equipments are used during the test:

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	150	47.000	50.119	Reference 90.205	Pass
Mid	162	47.070	50.933	Reference 90.205	Pass
High	174	47.030	50.466	Reference 90.205	Pass

6.25KHz

Channel No.	Frequency (MHz)	Measure Level (dBm)	Measure Level (W)	Limit (dBm)	Result
Low	150	42.13	16.331	Reference 90.205	Pass
Mid	162	42.41	17.436	Reference 90.205	Pass
High	174	41.91	15.509	Reference 90.205	Pass

3. Modulation Characteristics

3.1. Test Equipment

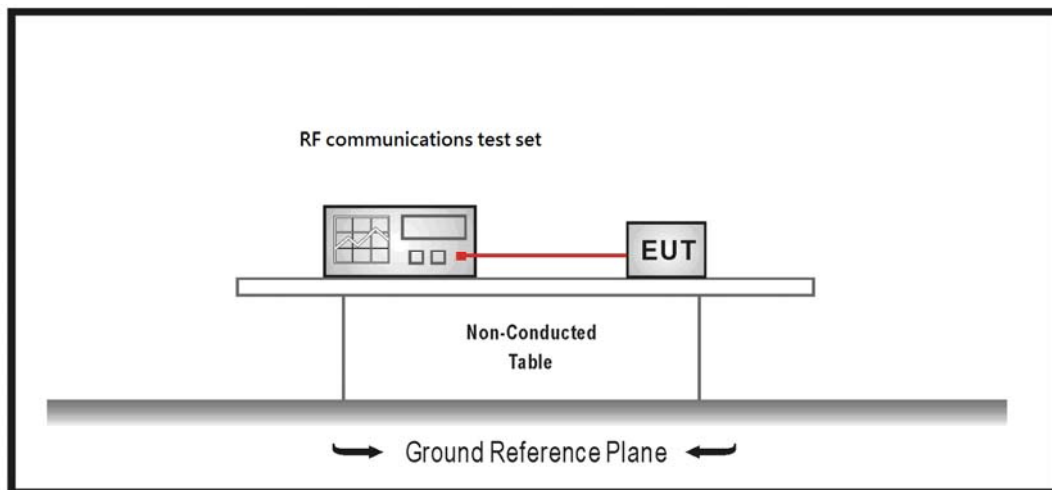
The following test equipments are used during the radiated emission tests:

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

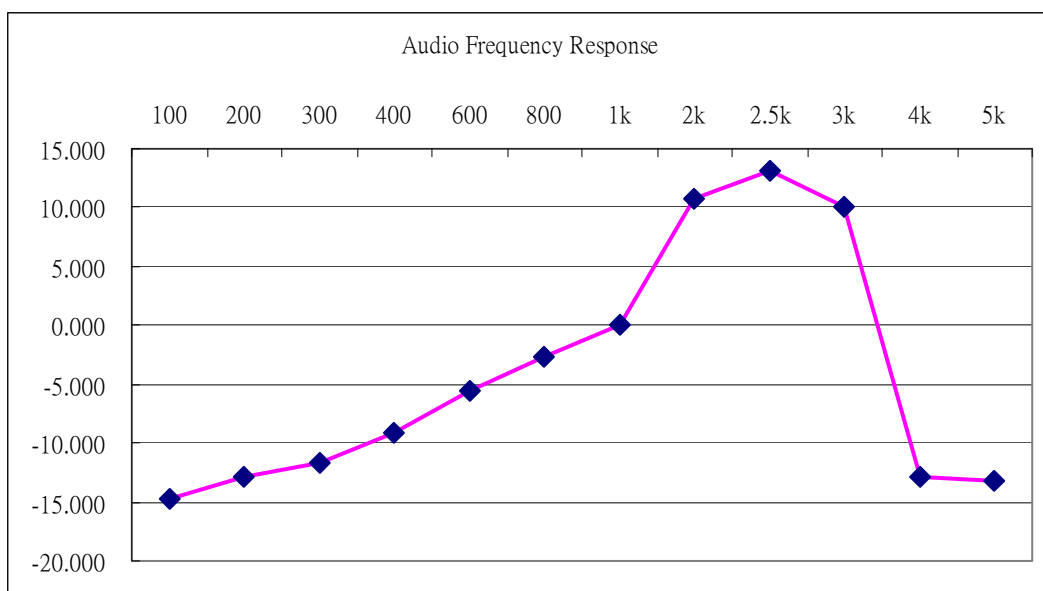
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004.

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

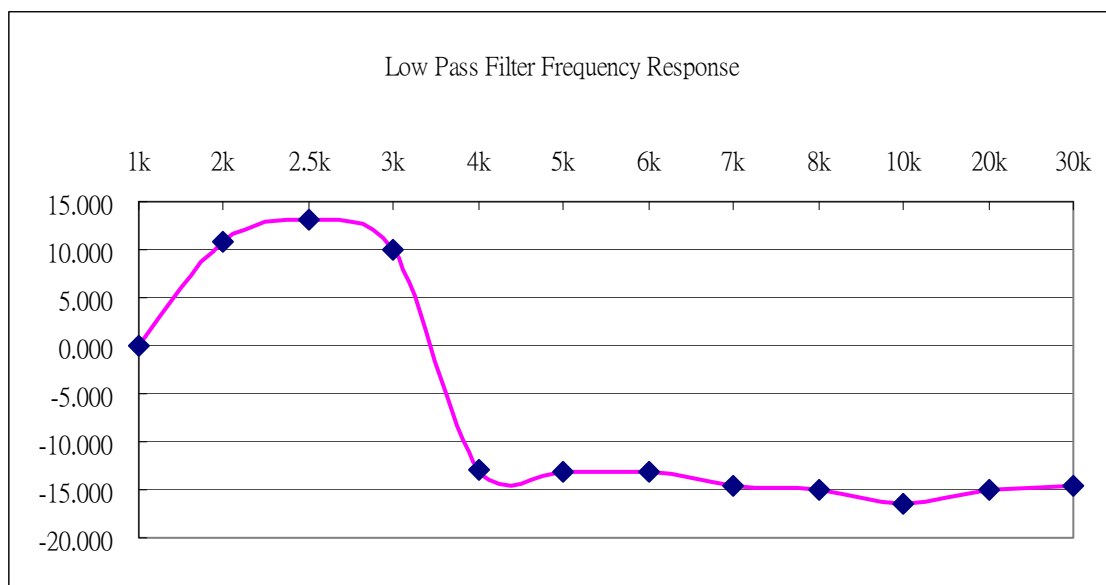
12.5KHz

Audio Frequency (Hz)	Deviation	dB
100	0.022	-14.662
200	0.027	-12.884
300	0.031	-11.684
400	0.042	-9.046
600	0.063	-5.524
800	0.087	-2.721
1k	0.119	0.000
2k	0.412	10.787
2.5k	0.539	13.121
3k	0.376	9.993
4k	0.027	-12.884
5k	0.026	-13.211



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

Audio Frequency (Hz)	Deviation	dB
1k	0.119	0.000
2k	0.412	10.787
2.5k	0.539	13.121
3k	0.376	9.993
4k	0.027	-12.884
5k	0.026	-13.211
6k	0.026	-13.211
7k	0.022	-14.662
8k	0.021	-15.067
10k	0.018	-16.405
20k	0.021	-15.067
30k	0.022	-14.662



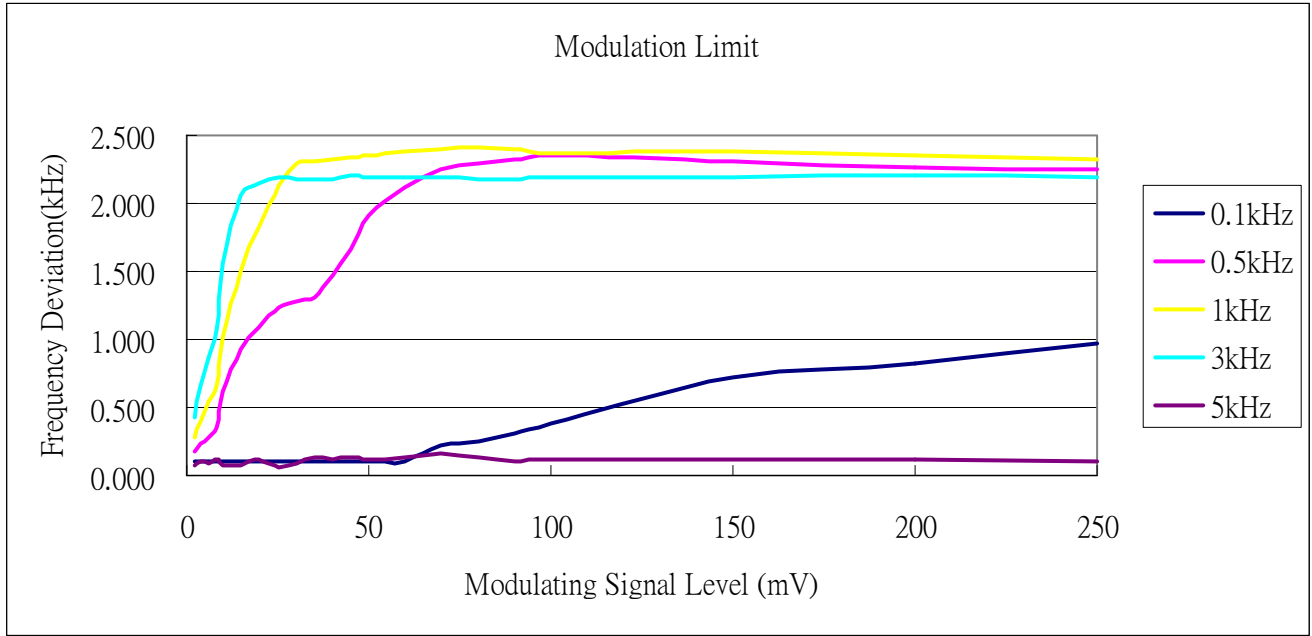
Product	Private land mobile radio		
Test Item	Voice Modulation Limiting for 12.5KHz Channel Spacing		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

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	0.097	0.175	0.271	0.426	0.055	2.5
4	0.095	0.232	0.395	0.648	0.056	2.5
6	0.104	0.282	0.531	0.874	0.132	2.5
8	0.102	0.358	0.667	1.061	0.072	2.5
10	0.106	0.620	1.019	1.549	0.047	2.5
15	0.097	0.922	1.495	2.040	0.047	2.5
20	0.103	1.083	1.828	2.161	0.036	2.5
25	0.098	1.237	2.131	2.171	0.122	2.5
30	0.108	1.279	2.310	2.180	0.090	2.5
35	0.107	1.318	2.301	2.176	0.104	2.5
40	0.109	1.471	2.312	2.187	0.149	2.5
45	0.105	1.663	2.339	2.184	0.124	2.5
50	0.113	1.919	2.365	2.185	0.150	2.5
60	0.116	2.120	2.386	2.178	0.144	2.5
70	0.212	2.246	2.401	2.198	0.143	2.5
80	0.249	2.296	2.405	2.185	0.121	2.5
90	0.302	2.321	2.401	2.180	0.129	2.5
100	0.383	2.349	2.372	2.180	0.103	2.5
150	0.715	2.313	2.375	2.206	0.144	2.5
200	0.819	2.263	2.367	2.194	0.135	2.5
250	0.981	2.248	2.314	2.179	0.133	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	0.022	2.5
200	0.027	2.5
300	0.031	2.5
400	0.042	2.5
600	0.063	2.5
800	0.087	2.5
1k	0.119	2.5
2k	0.412	2.5
2.5k	0.539	2.5
3k	0.376	2.5
4k	0.027	2.5
5k	0.026	2.5
6k	0.026	2.5
7k	0.022	2.5
8k	0.021	2.5
10k	0.018	2.5
20k	0.021	2.5
30k	0.022	2.5

3.6. Digital Modulation

Max Deviation measured for 6.25KHz Channel Spacing F1E&F1D = 837 Hz

4. Occupied Bandwidth

4.1. Test Equipment

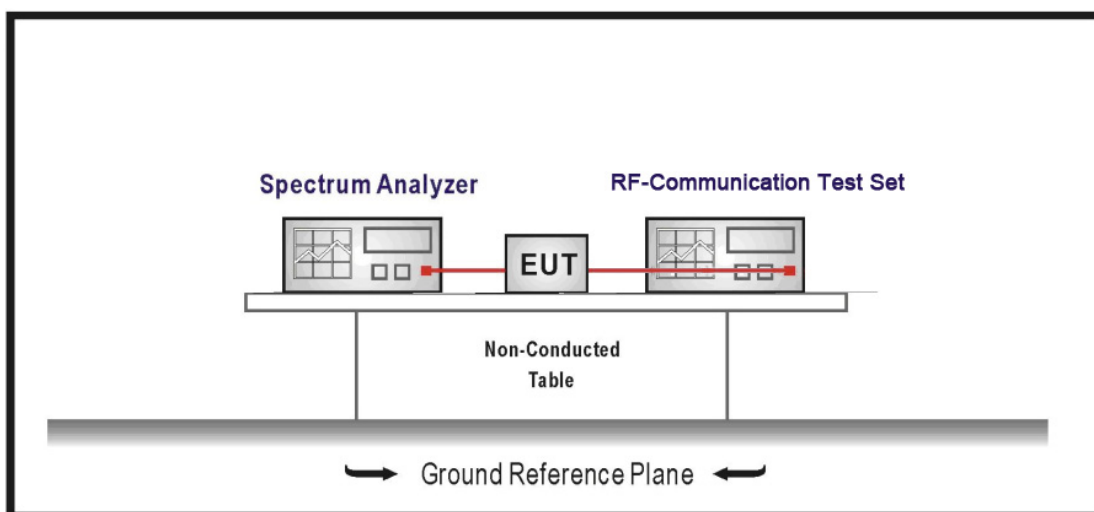
The following test equipments are used during the radiated emission tests:

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

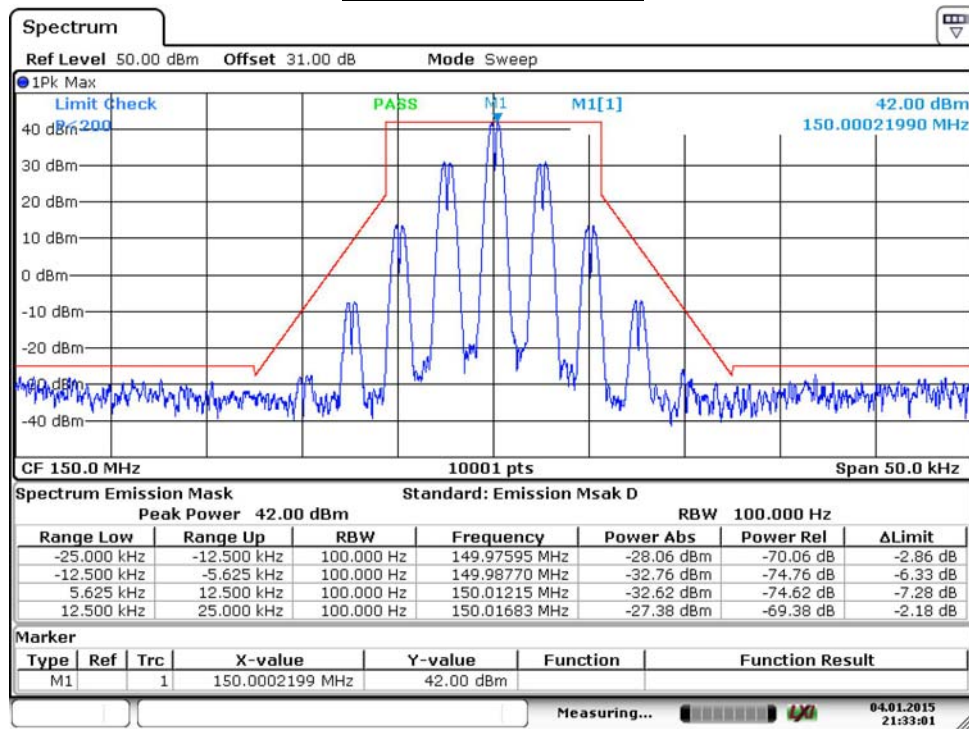
4.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

4.6. Test Result

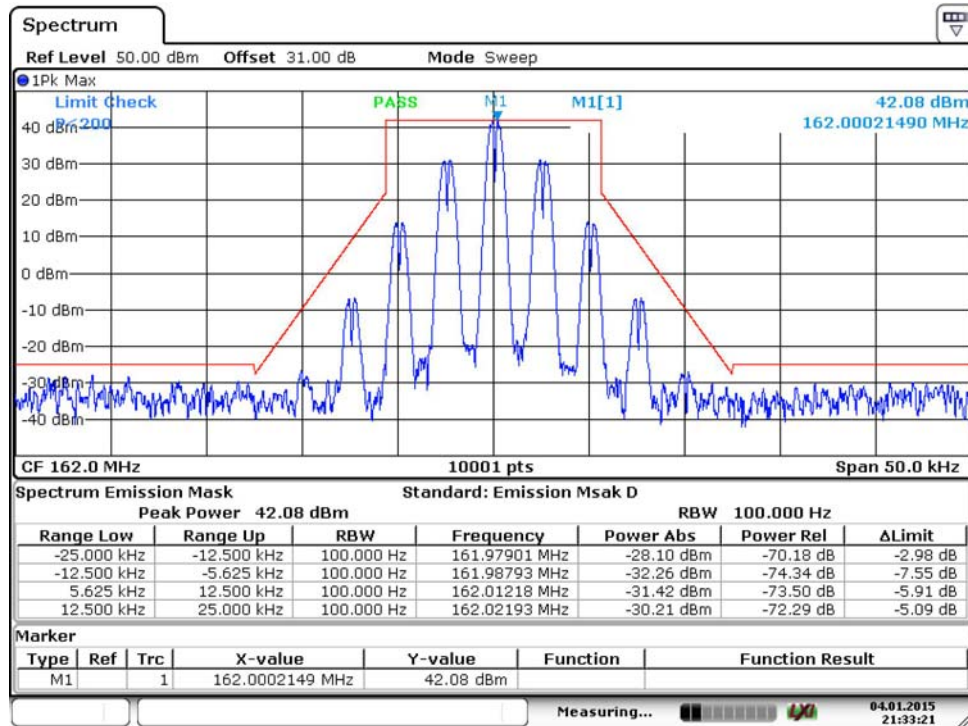
Product	Private land mobile radio		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/01/04	Test Site	SR7

150 MHz (Modulation)



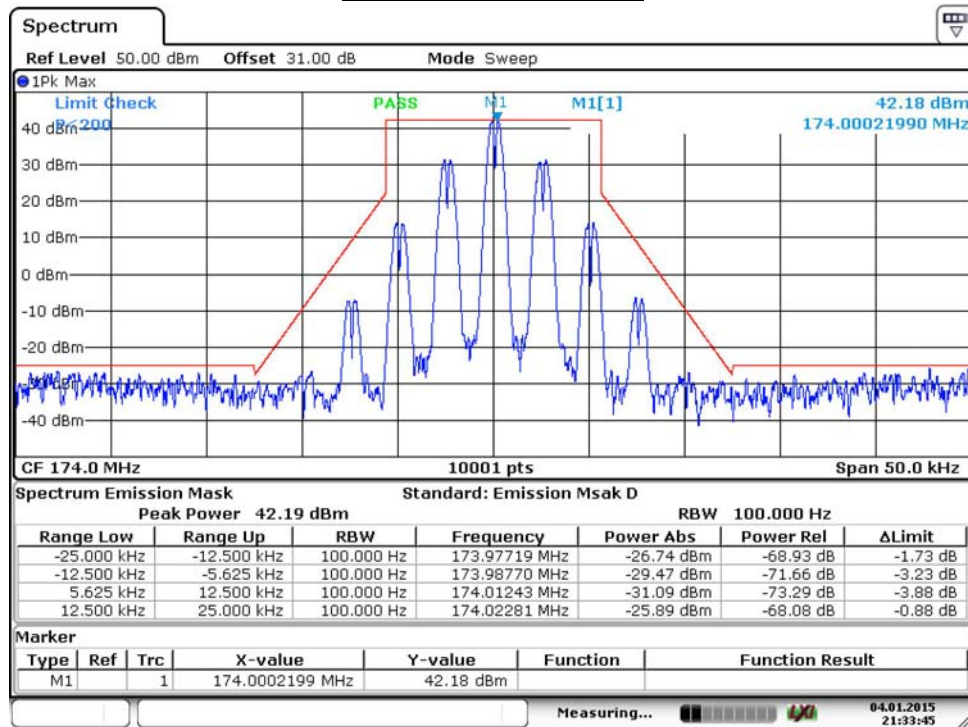
Date: 4.JAN.2015 21:33:01

162 MHz (Modulation)



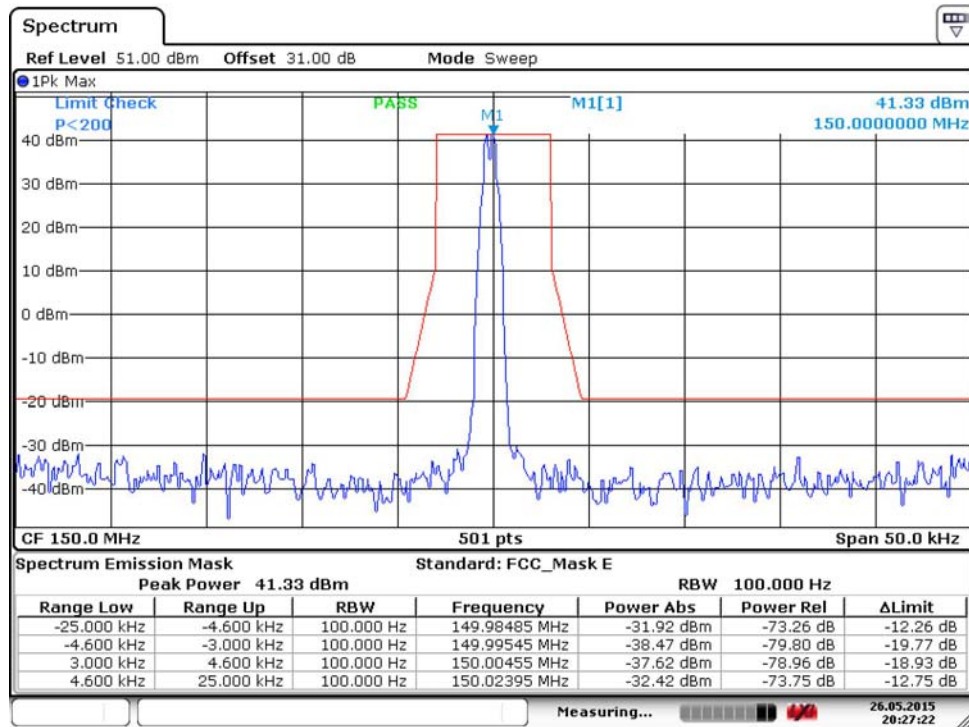
Date: 4.JAN.2015 21:33:22

174 MHz (Modulation)



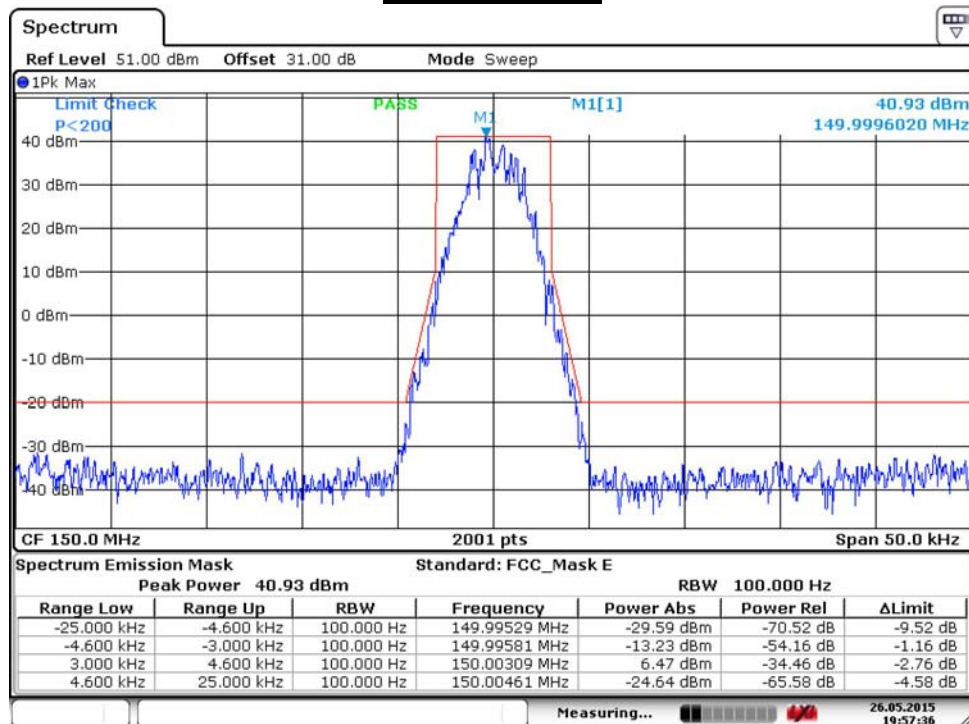
Date: 4.JAN.2015 21:33:45

150 MHz (Carr Mask)



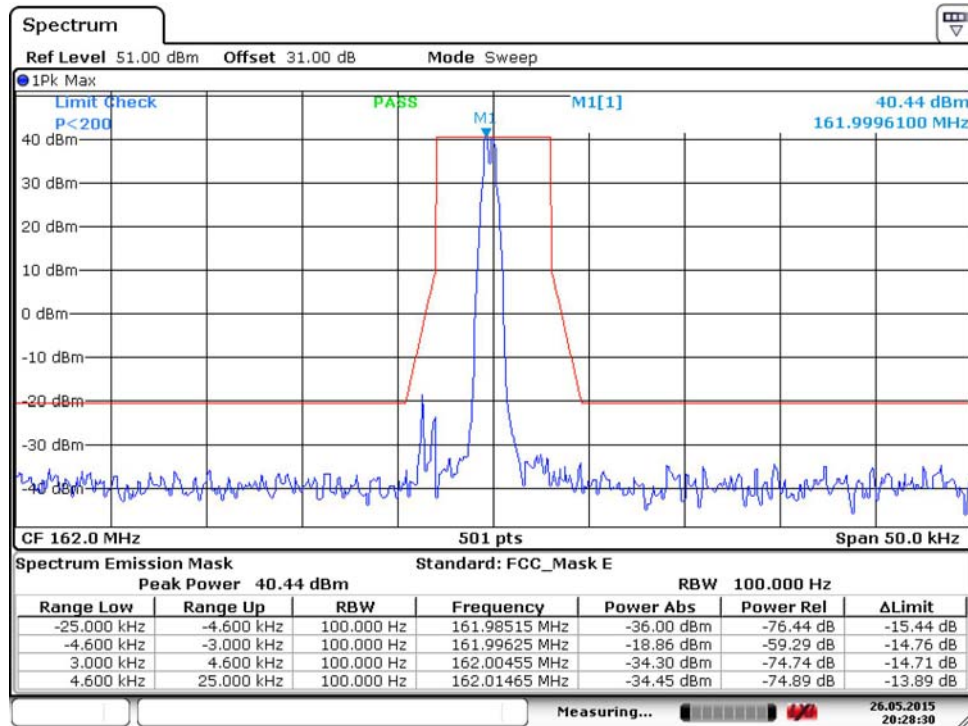
Date: 26.MAY.2015 20:27:22

150 MHz (Mask)



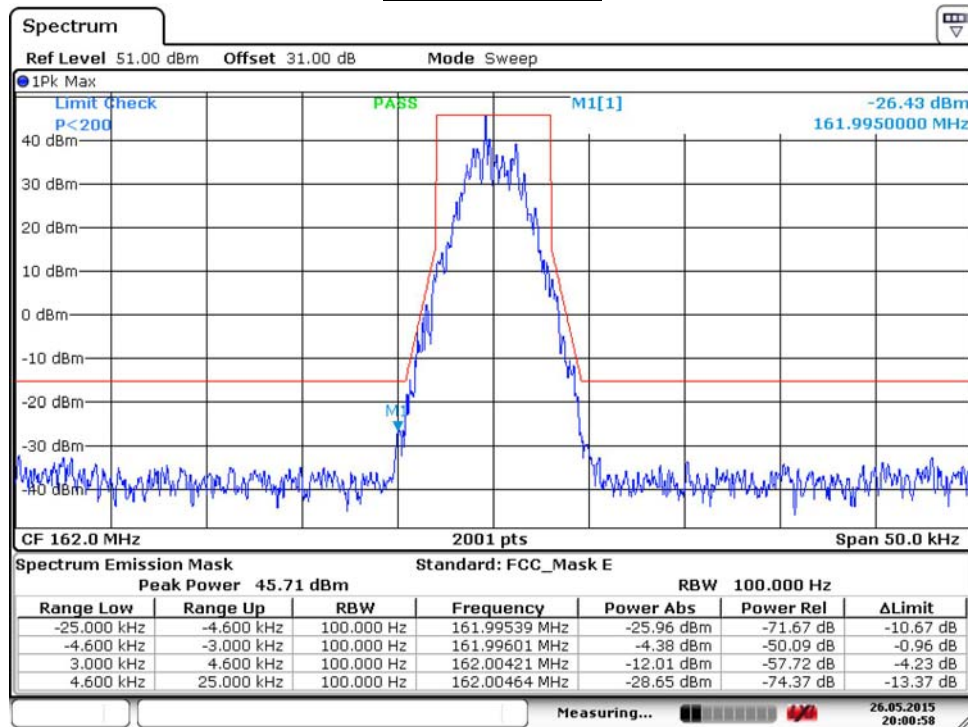
Date: 26.MAY.2015 19:57:36

162 MHz (Carr Mask)



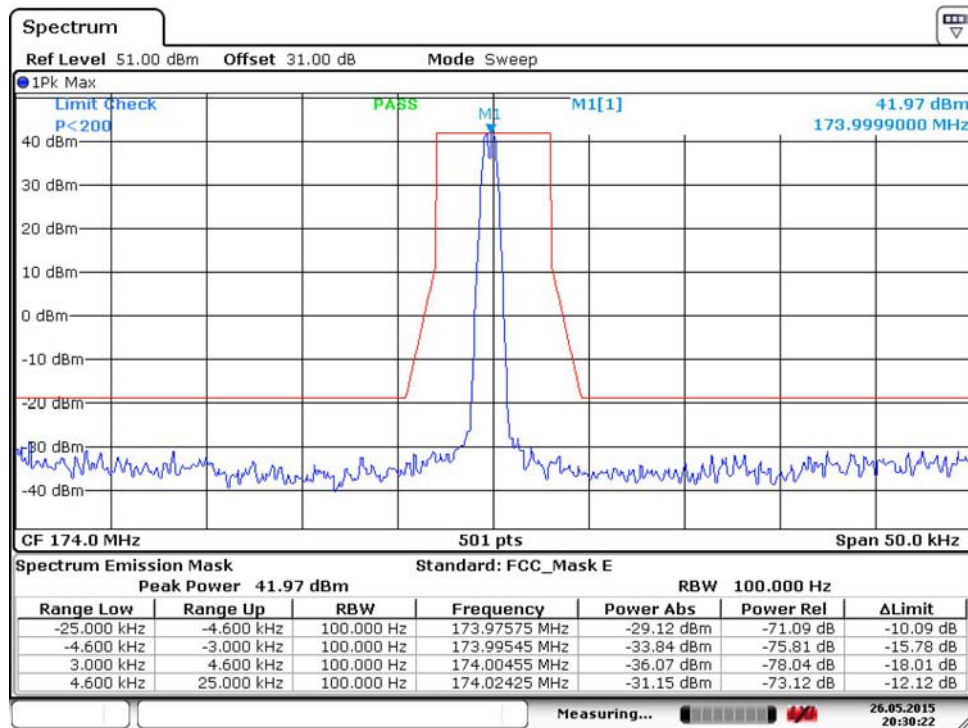
Date: 26.MAY.2015 20:28:29

162 MHz (Mask)



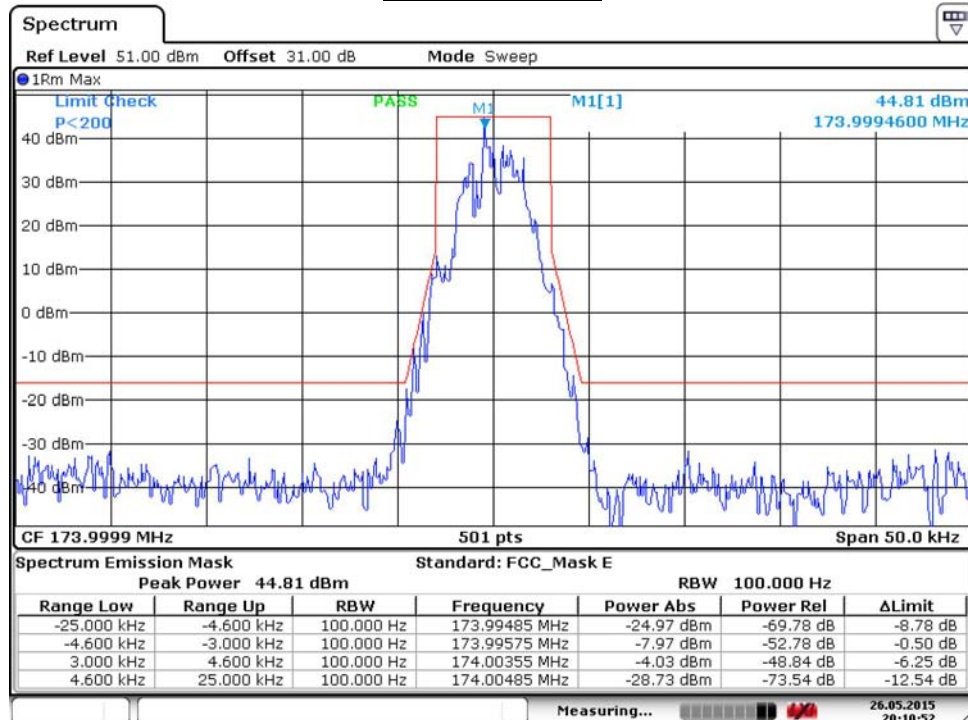
Date: 26.MAY.2015 20:00:58

174 MHz (Carr Mask)



Date: 26.MAY.2015 20:30:23

174 MHz (Mask)



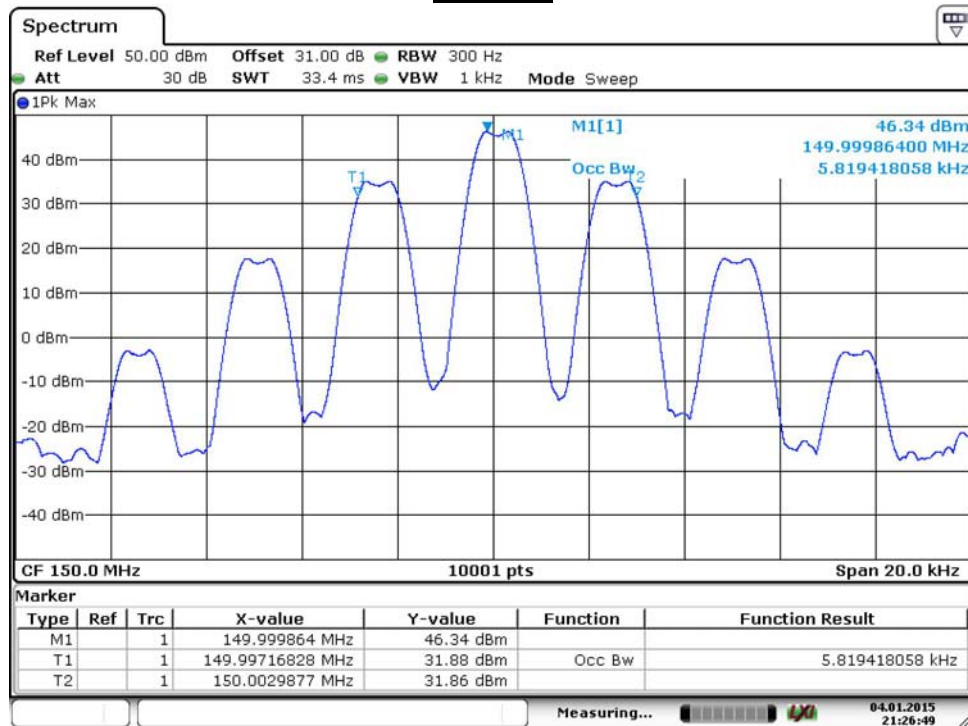
Date: 26.MAY.2015 20:10:53

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

Analog

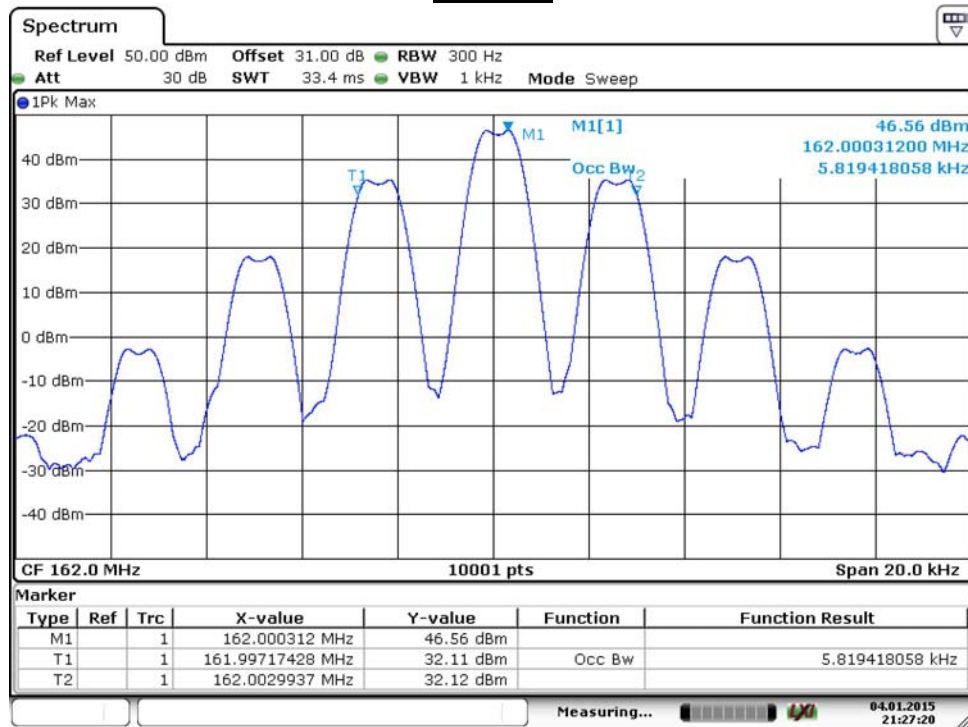
Channel	Frequency (MHz)	Measure Level(kHz)	Limit (kHz)	Result
Low	150	5.819	--	Pass
Mid	162	5.819	--	Pass
High	174	5.823	--	Pass

150MHz



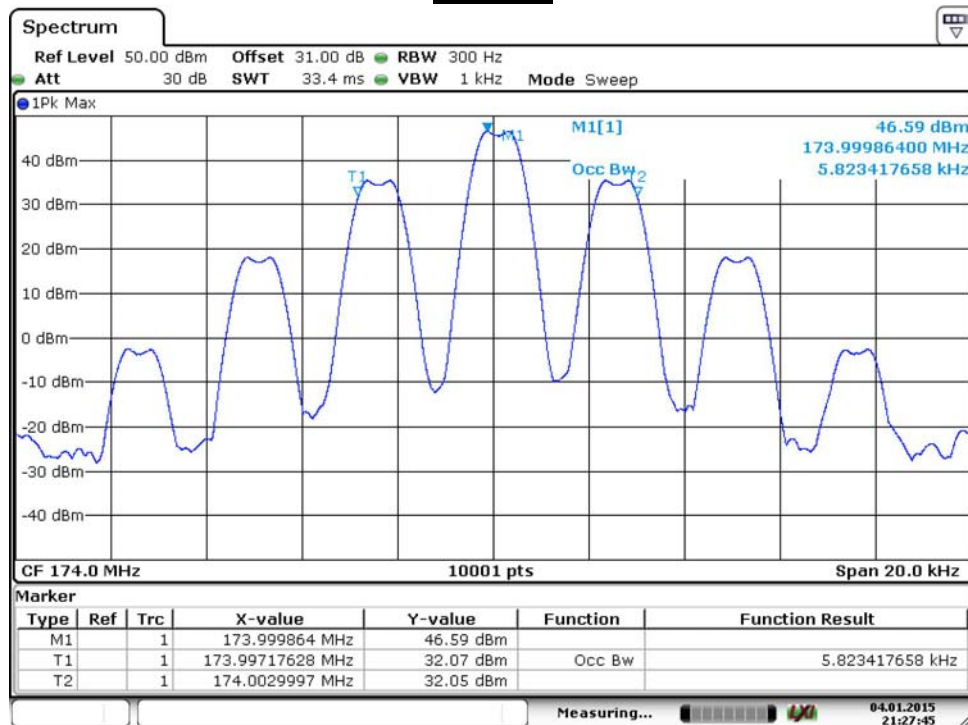
Date: 4.JAN.2015 21:26:49

162MHz



Date: 4.JAN.2015 21:27:21

174MHz



Date: 4.JAN.2015 21:27:45

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	150	3.980	--	Pass
Mid	162	4.110	--	Pass
High	174	4.168	--	Pass

150MHz



Date: 26.MAY.2015 19:58:44

162MHz



Date: 26.MAY.2015 19:59:36

174MHz



Date: 26.MAY.2015 20:18:53

5. Spurious Emissions at Antenna Terminals (Conducted)

5.1. Test Equipment

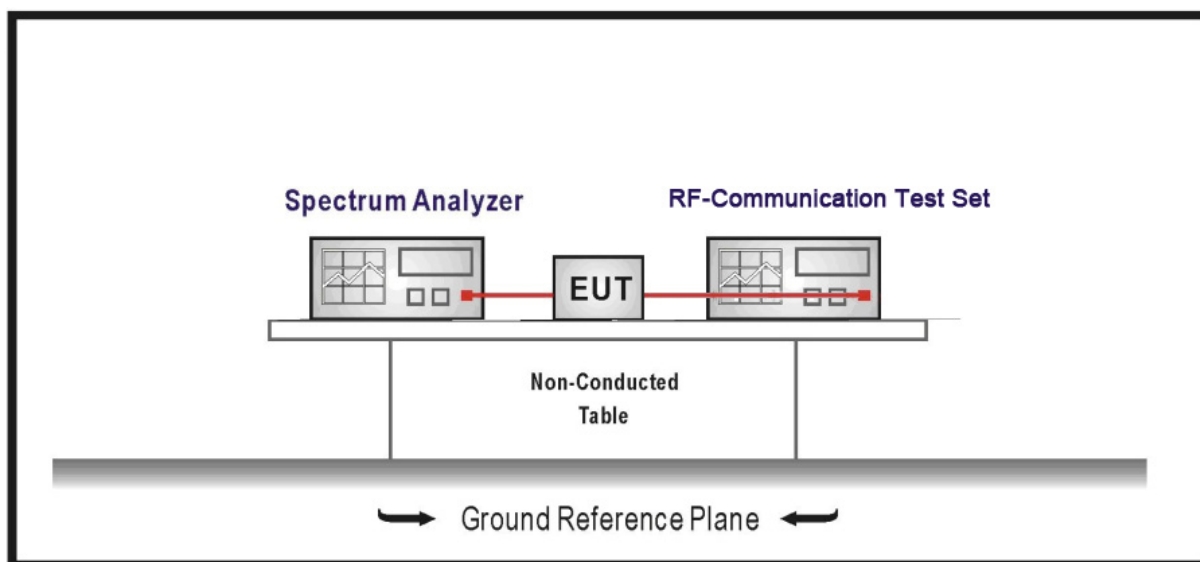
The following test equipments are used during the radiated emission test:

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

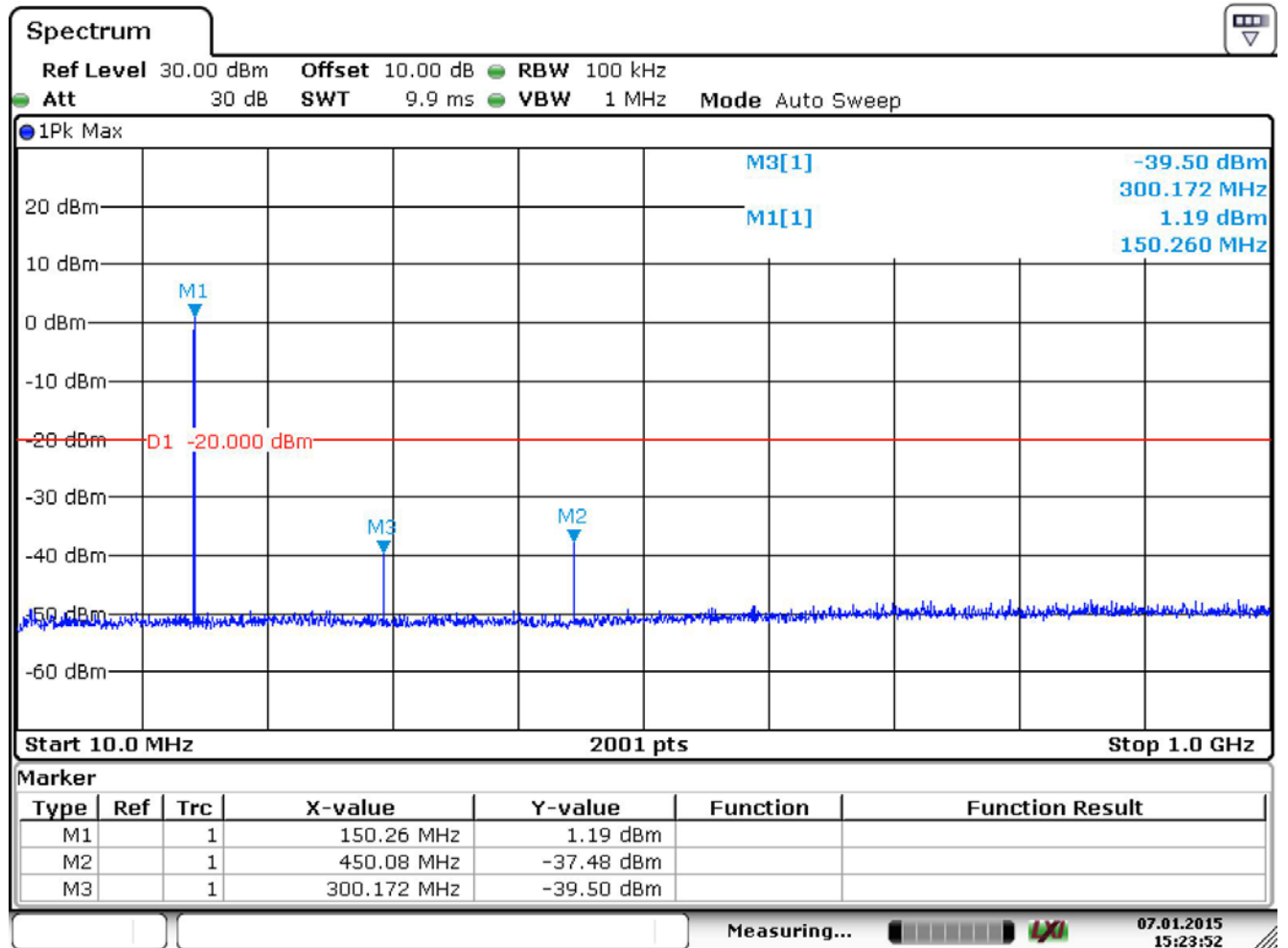
5.5. Uncertainty

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

5.6. Test Result

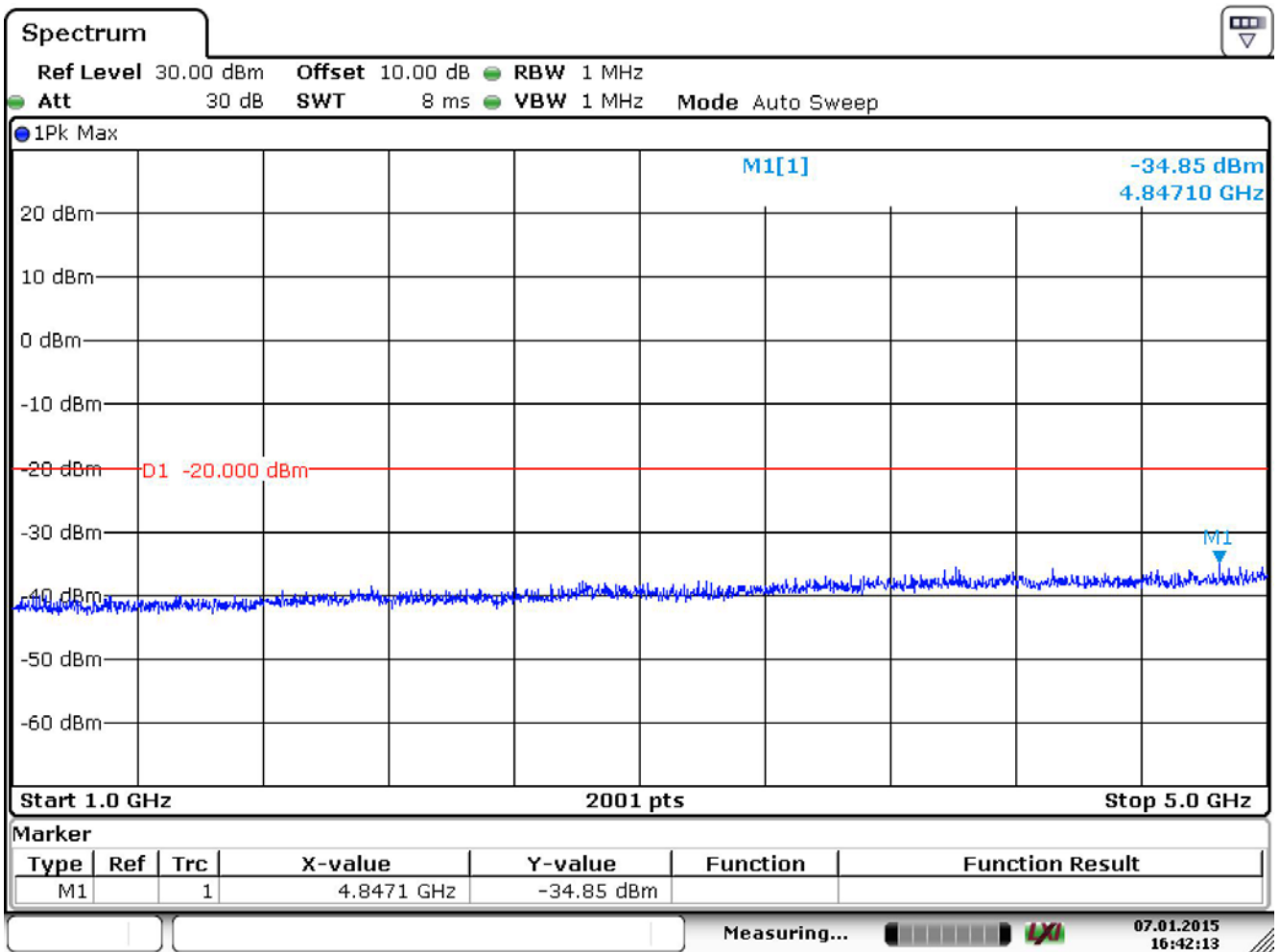
Product	Private land mobile radio		
Test Item	Spurious Emissions at Antenna Terminals (Conducted)		
Test Mode	Mode 1: Transmit (12.5KHz)		
Date of Test	2015/01/07	Test Site	SR7

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



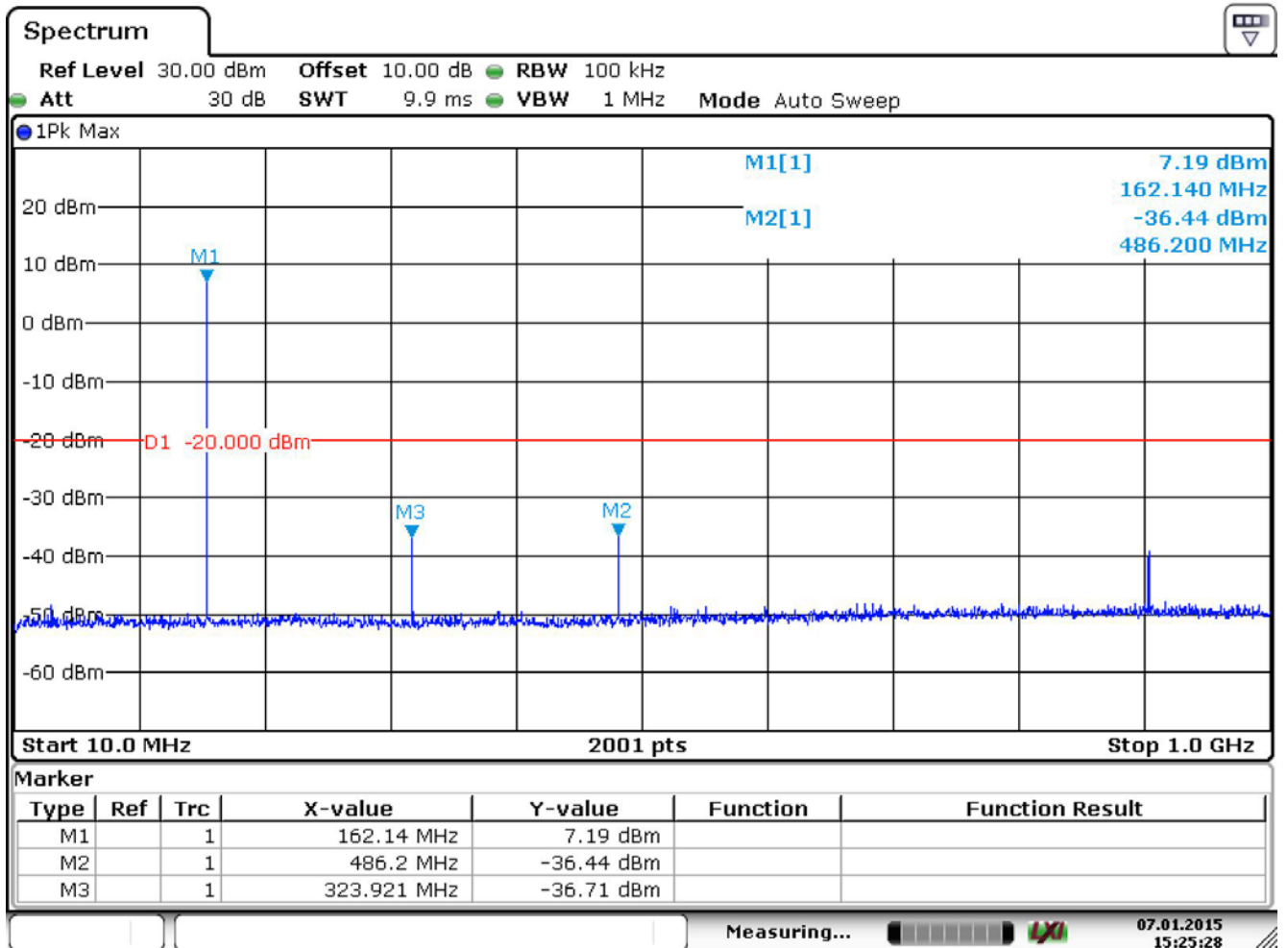
Date: 7.JAN.2015 15:23:52

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



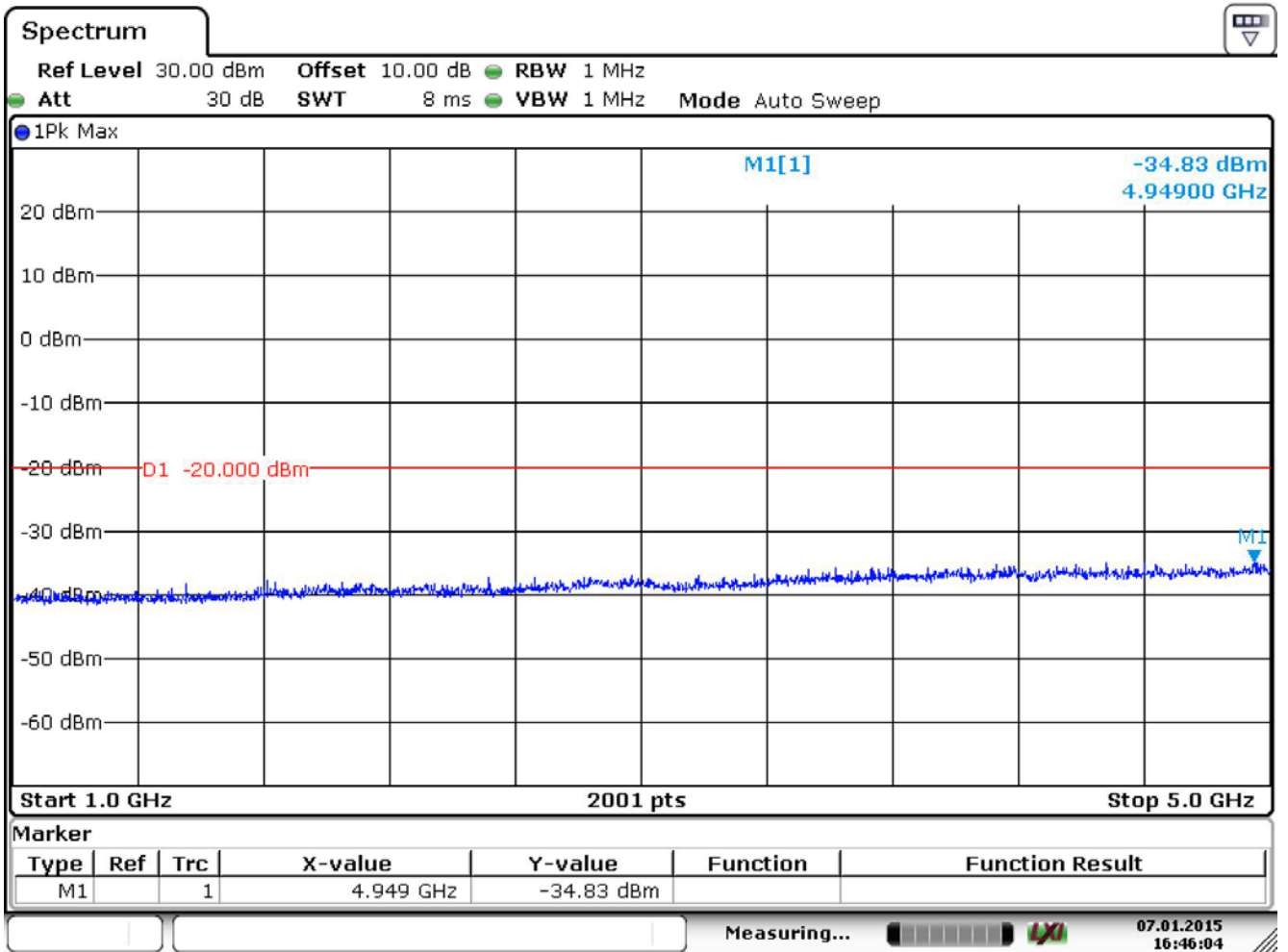
Date: 7.JAN.2015 16:42:12

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



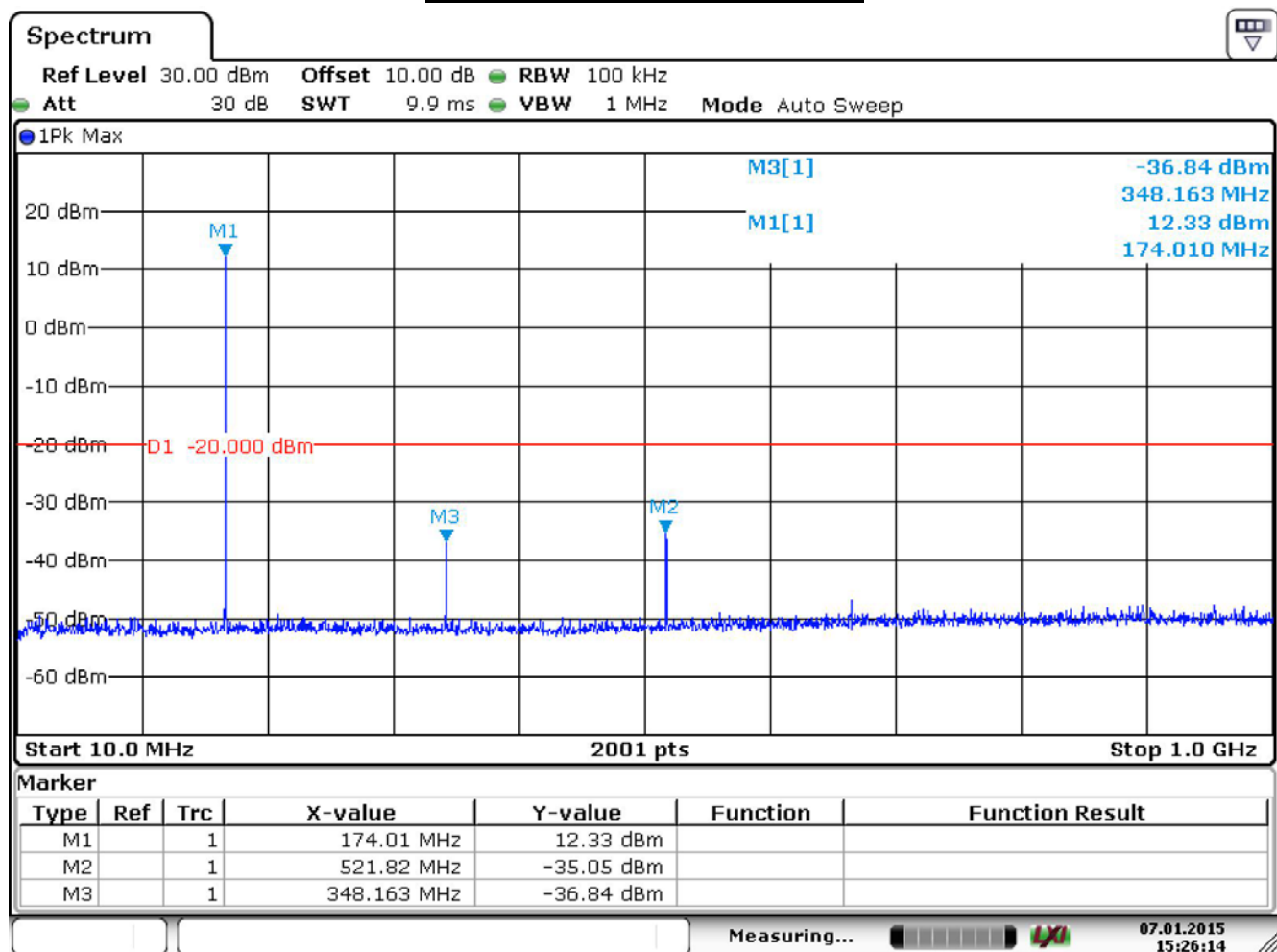
Date: 7.JAN.2015 15:25:28

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



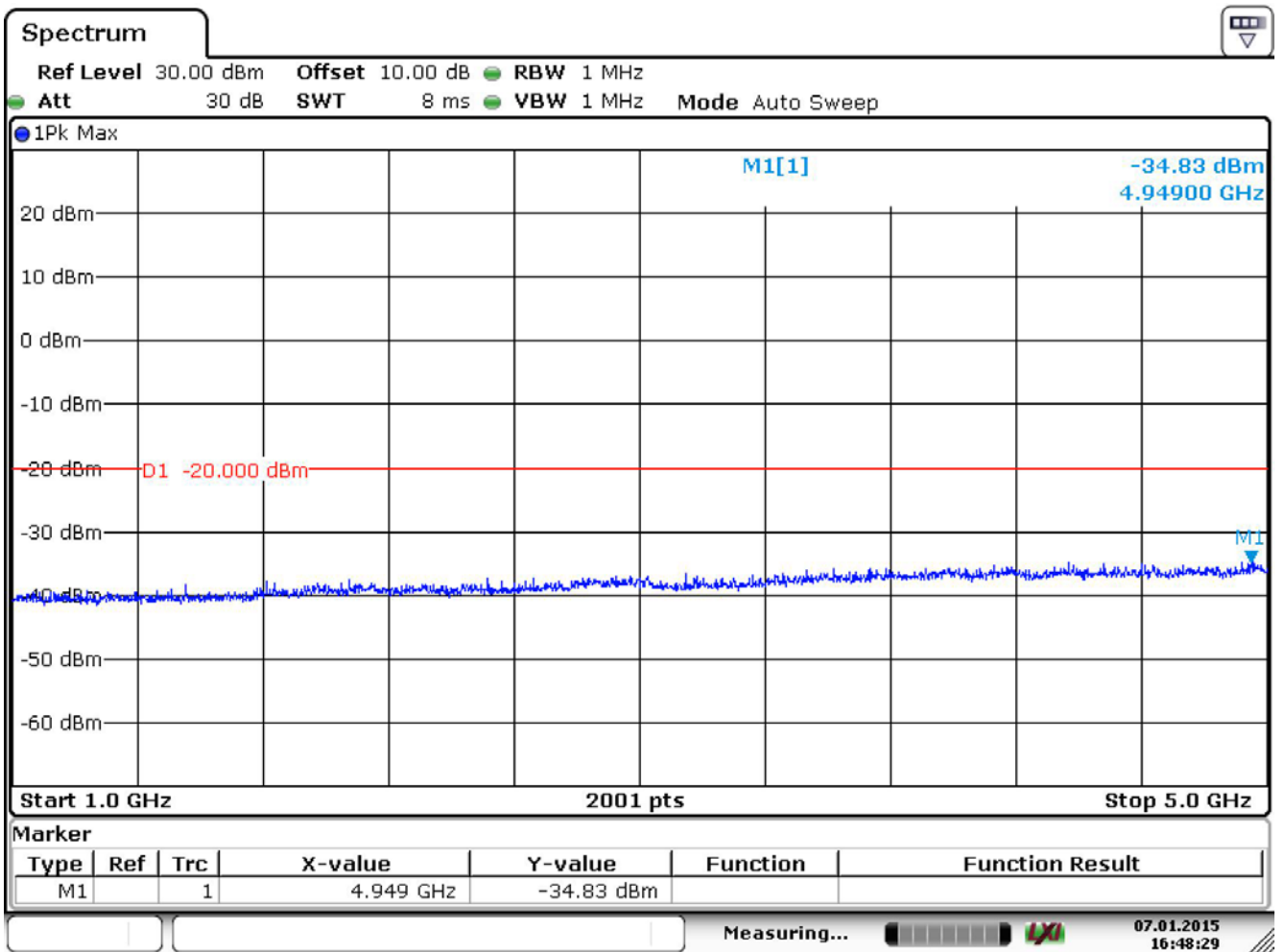
Date: 7.JAN.2015 16:46:04

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



Date: 7.JAN.2015 15:26:14

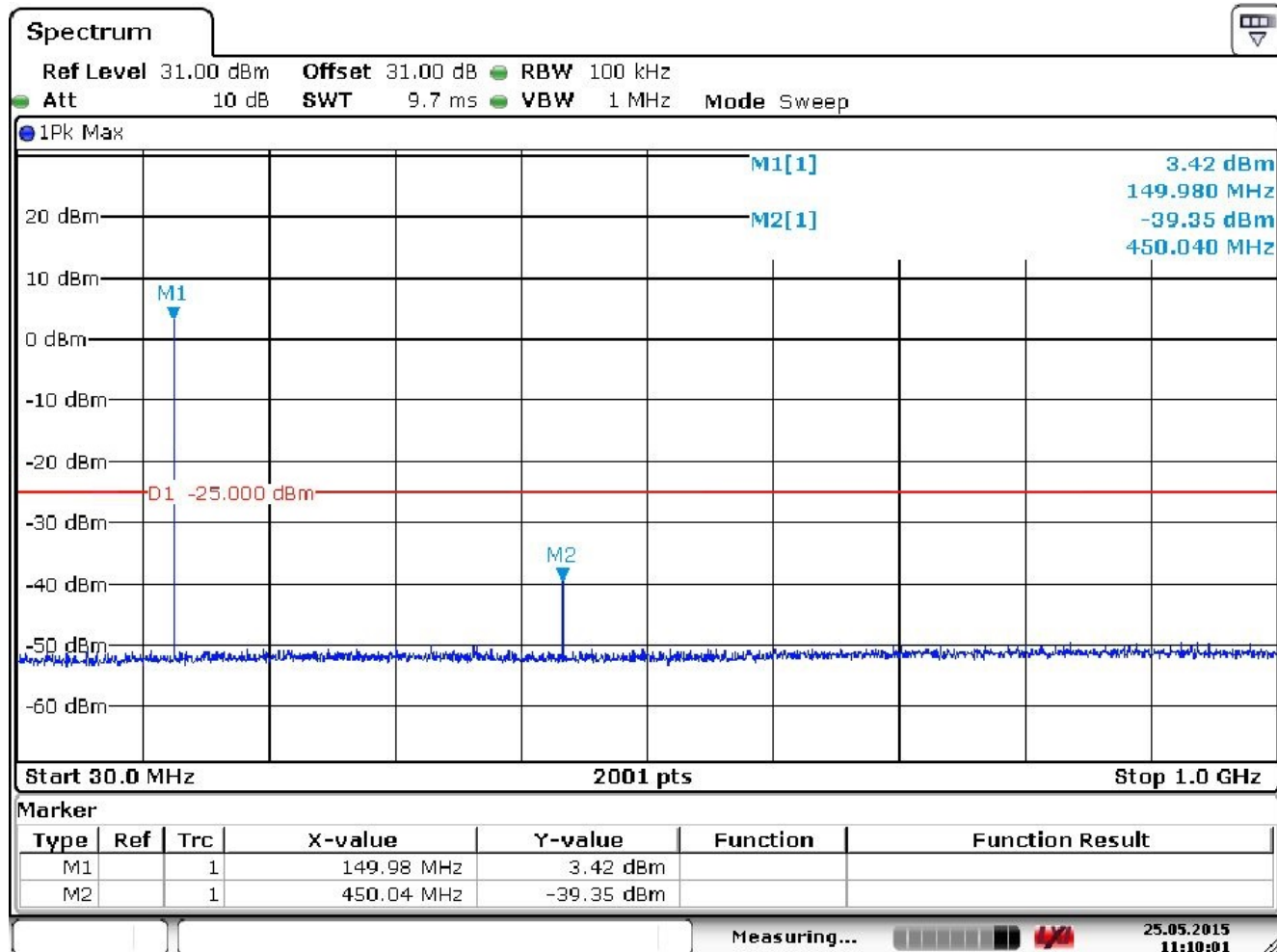
174 MHz (1GHz-5GHz)(12.5KHz)



Date: 7.JAN.2015 16:48:29

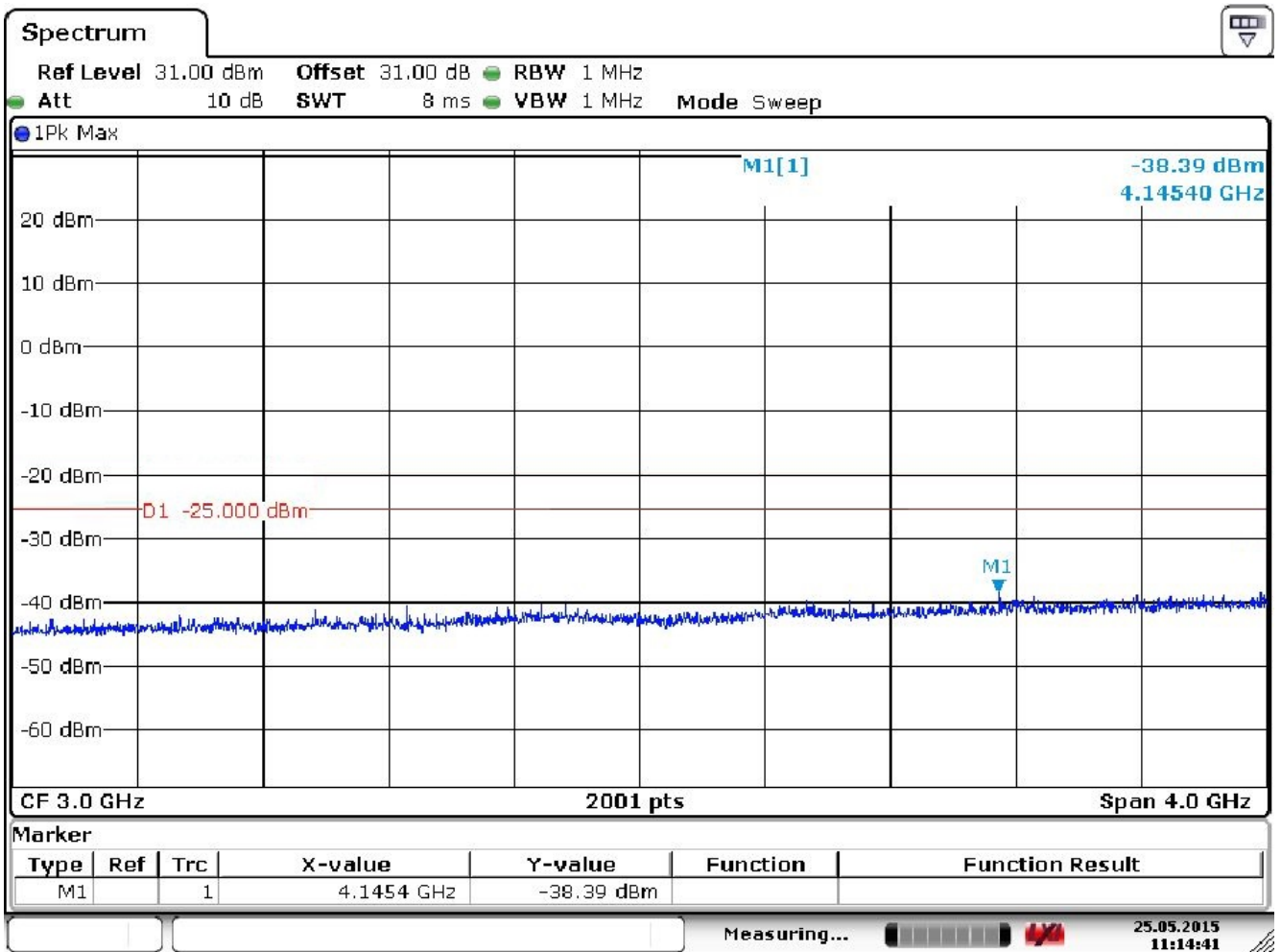
Product	Private land mobile radio		
Test Item	Spurious Emissions at Antenna Terminals (Conducted)		
Test Mode	Mode 1: Transmit (12.5KHz)		
Date of Test	2015/05/25	Test Site	SR7

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



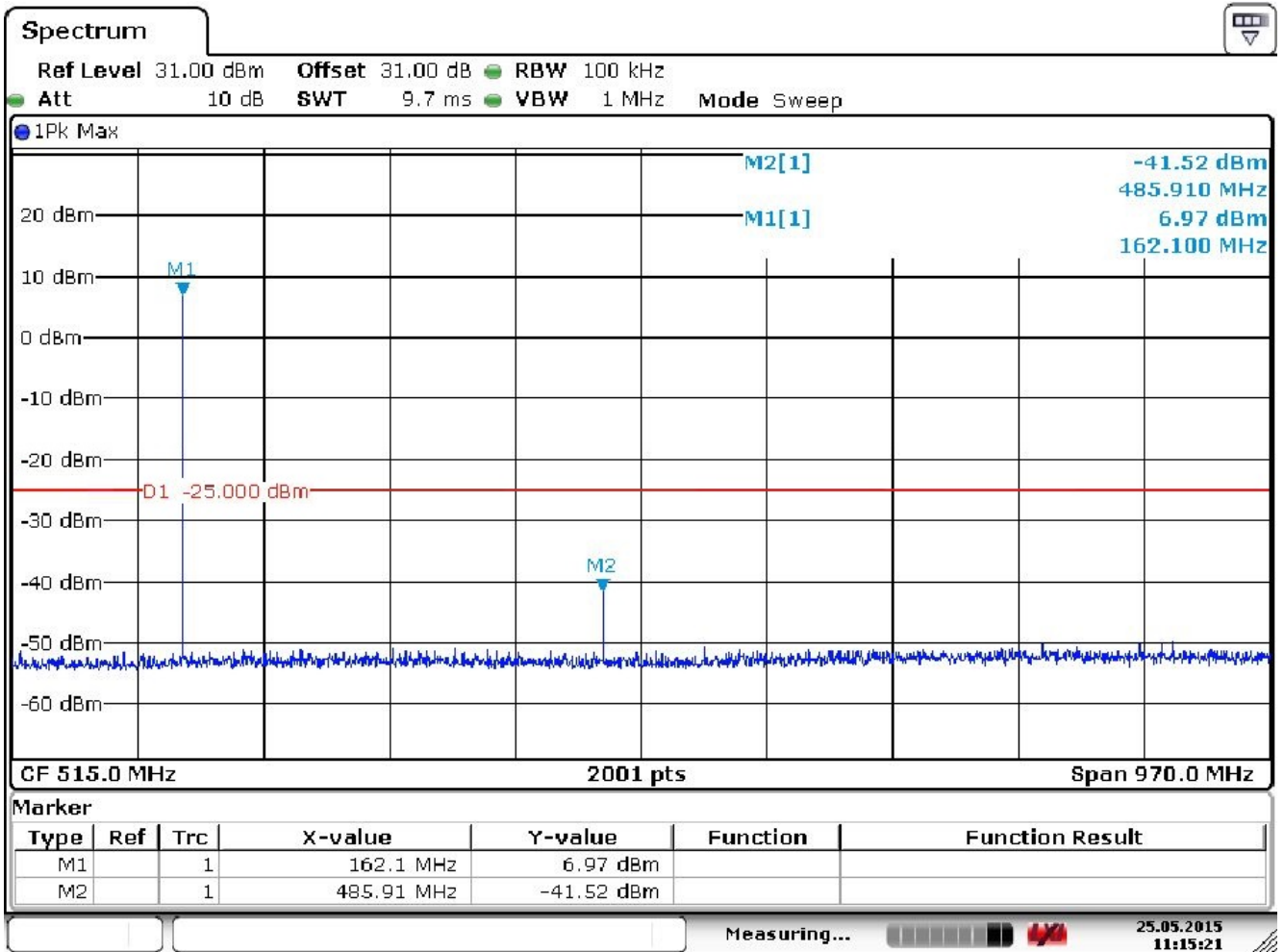
Date: 25 MAY 2015 11:10:02

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



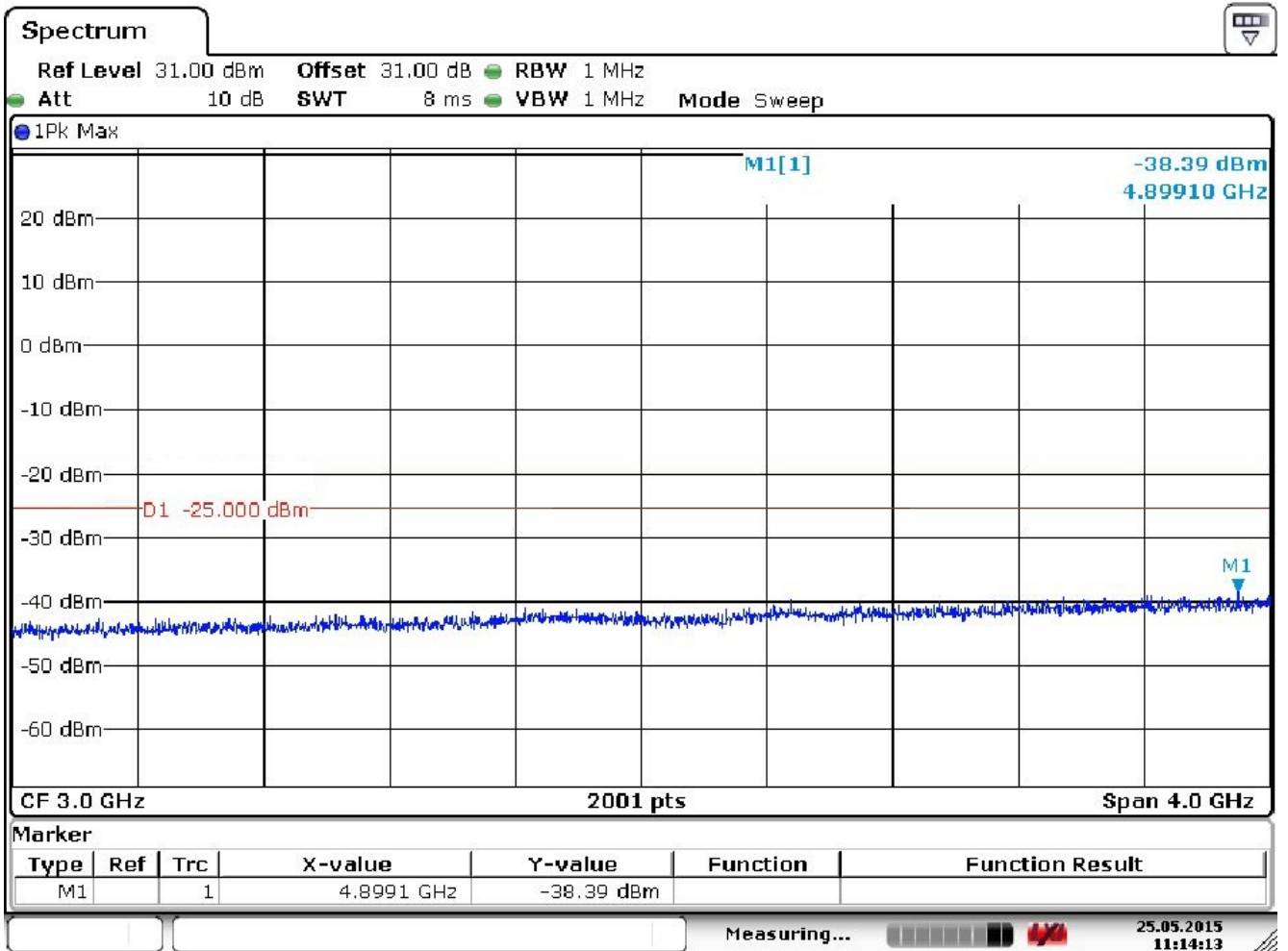
Date: 25 MAY 2015 11:14:41

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



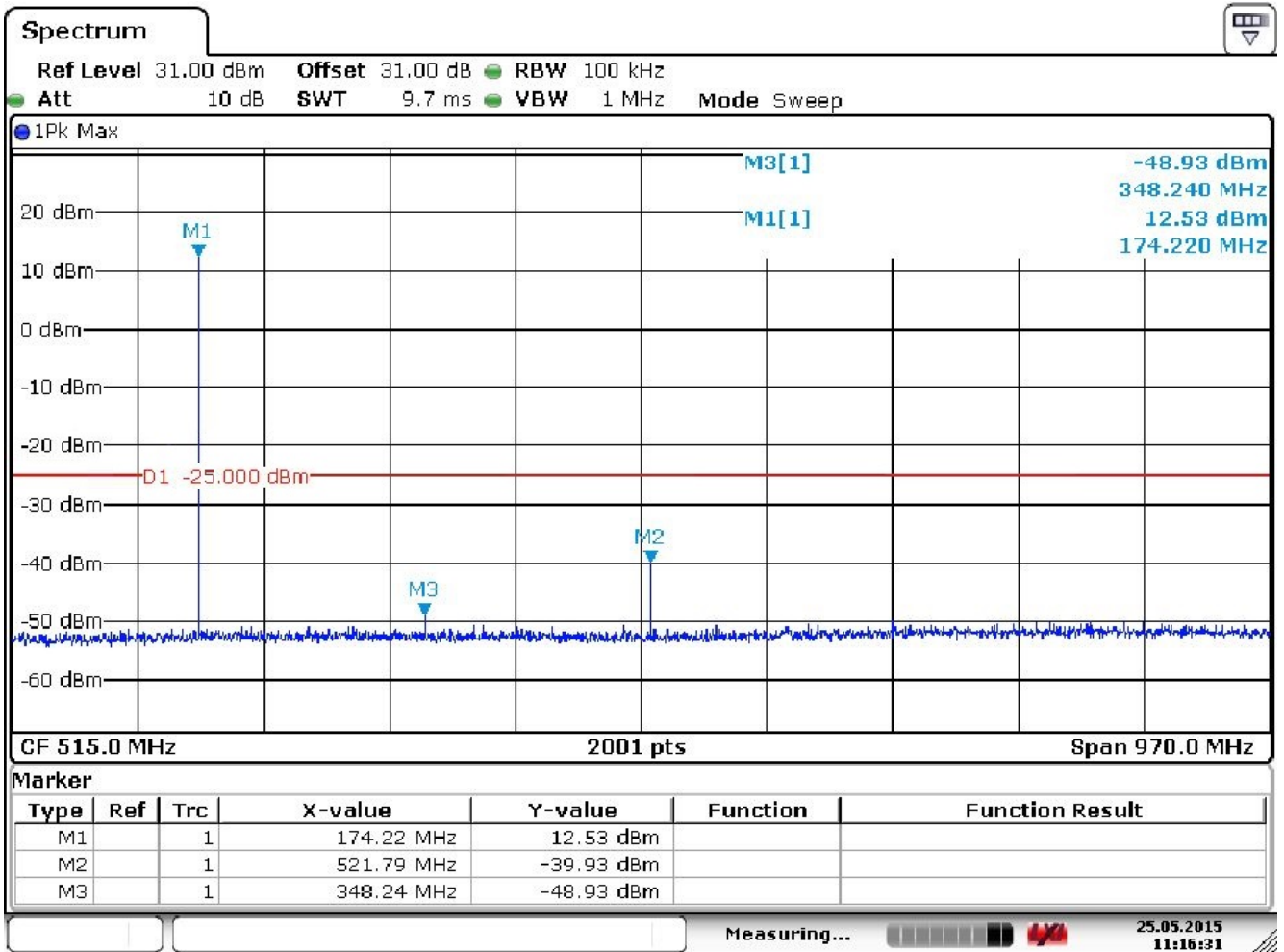
Date: 25 MAY 2015 11:15:21

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



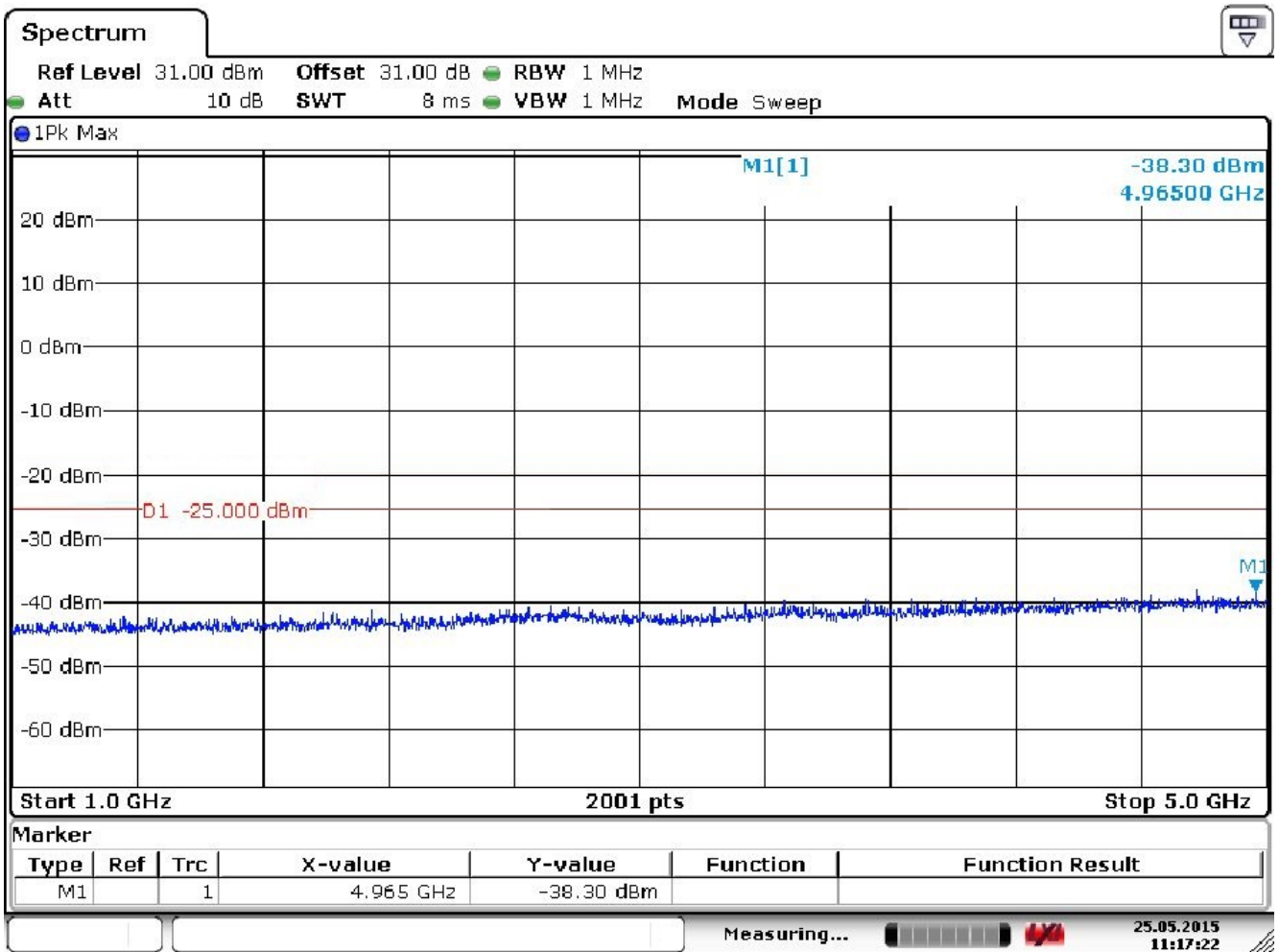
Date: 25 MAY 2015 11:14:12

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



Date: 25 MAY 2015 11:16:30

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



Date: 25 MAY 2015 11:17:22

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

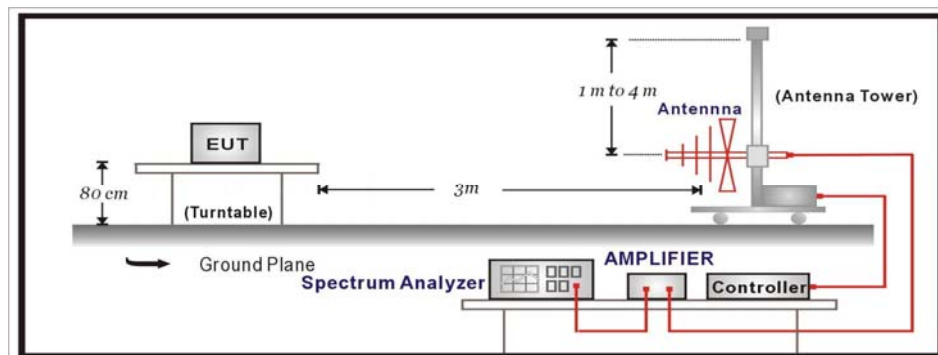
Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895	2015/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120	D743	2015/02/12
Pre-Amplifier	Quietek	AMF-4D.	888003	2015/06/02
Pre-Amplifier	Quietek	AP-025C	CHM-0706049	2015/02/06
k Type Cable	Huber Suhner	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.

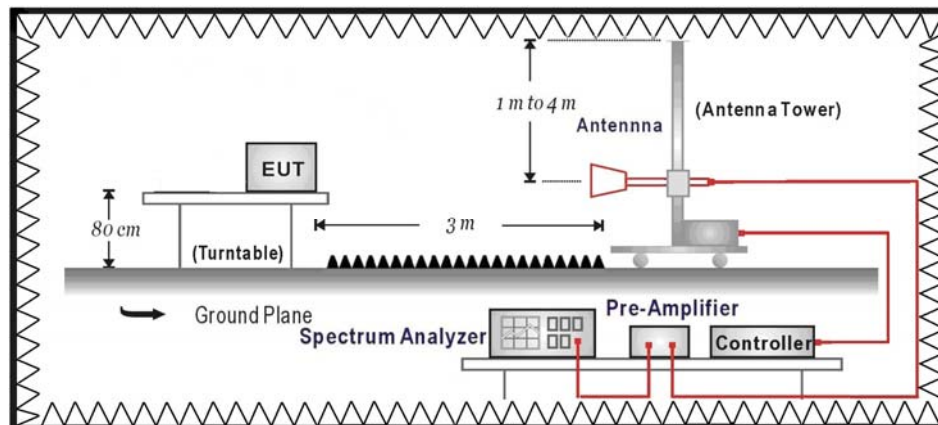
6.2. Test Setup

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=Max power output (Watt) at 0m

Limit (dBm) at 0m = (12.5 kHz Spacing) - P(dBm)

Limit (dBuV/m) at 3m = Limit(dBm) at 0m + 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

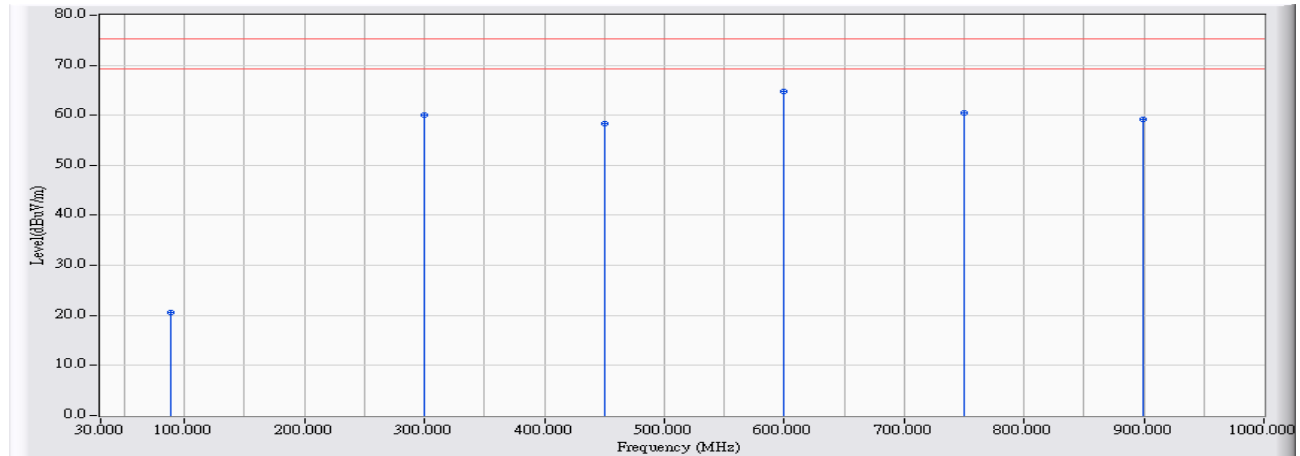
6.5. Uncertainty

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

6.6. Test Result

30MHz-1GHz Spurious

Site : CB1	Time : 2015/01/07 - 23:16
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 : 150MHz

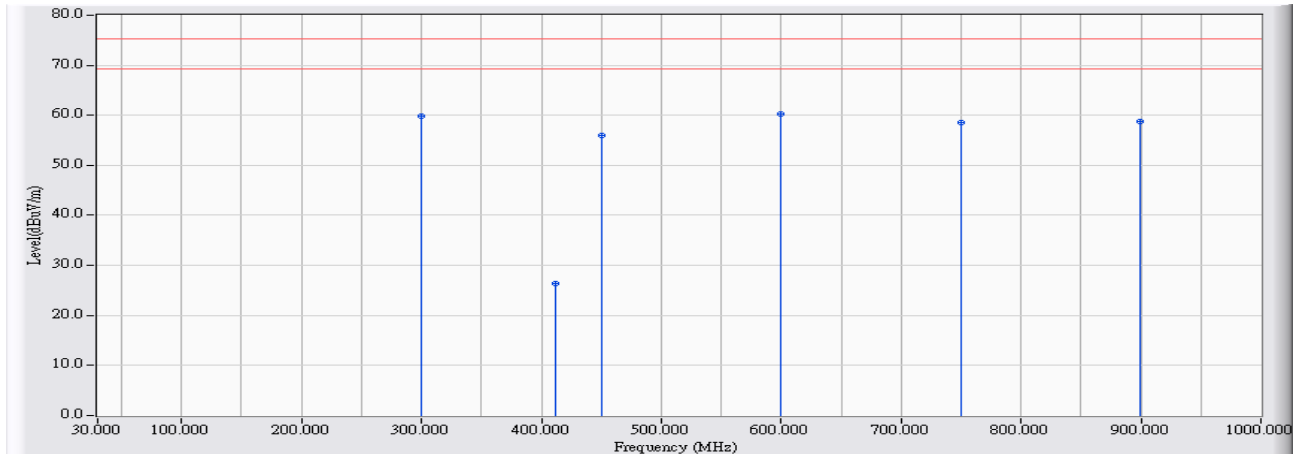


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		88.656	7.138	13.408	20.546	-54.654	75.200	PEAK
2		299.525	12.515	47.438	59.953	-15.247	75.200	PEAK
3		449.800	16.100	42.316	58.416	-16.784	75.200	PEAK
4	*	599.590	17.939	46.803	64.742	-10.458	75.200	PEAK
5		749.865	18.802	41.641	60.443	-14.757	75.200	PEAK
6		899.655	19.801	39.387	59.188	-16.012	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 - 23:18
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 : 150MHz

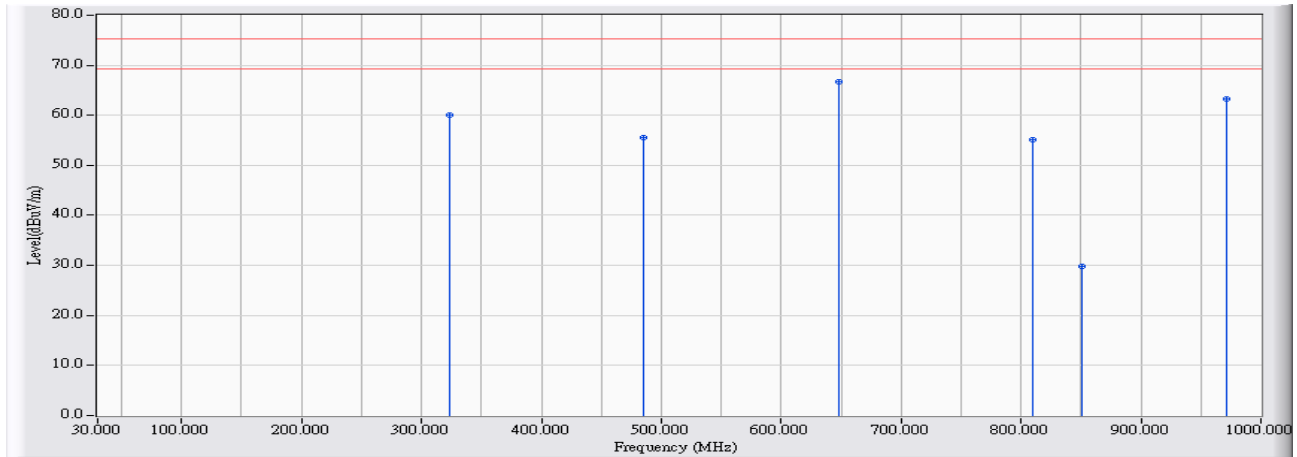


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		299.525	12.515	47.328	59.843	-15.357	75.200	PEAK
2		411.989	15.443	11.041	26.484	-48.716	75.200	PEAK
3		449.800	16.100	39.929	56.029	-19.171	75.200	PEAK
4	*	599.590	17.939	42.261	60.200	-15.000	75.200	PEAK
5		749.865	18.802	39.831	58.633	-16.567	75.200	PEAK
6		899.655	19.801	38.920	58.721	-16.479	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 - 23:22
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 : 162MHz

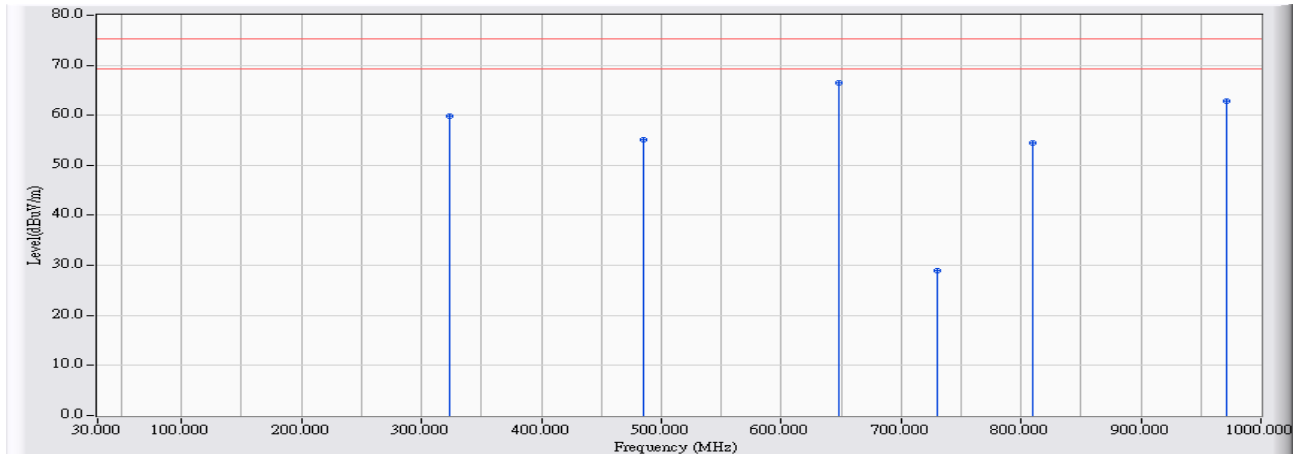


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	323.763	13.167	46.982	60.149	-15.051	75.200	PEAK
2	485.672	16.724	38.878	55.602	-19.598	75.200	PEAK
3	* 647.581	18.090	48.603	66.693	-8.507	75.200	PEAK
4	809.975	19.399	35.744	55.143	-20.057	75.200	PEAK
5	850.210	19.579	10.266	29.845	-45.355	75.200	PEAK
6	971.884	20.432	42.833	63.265	-11.935	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 - 23:23
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 : 162MHz

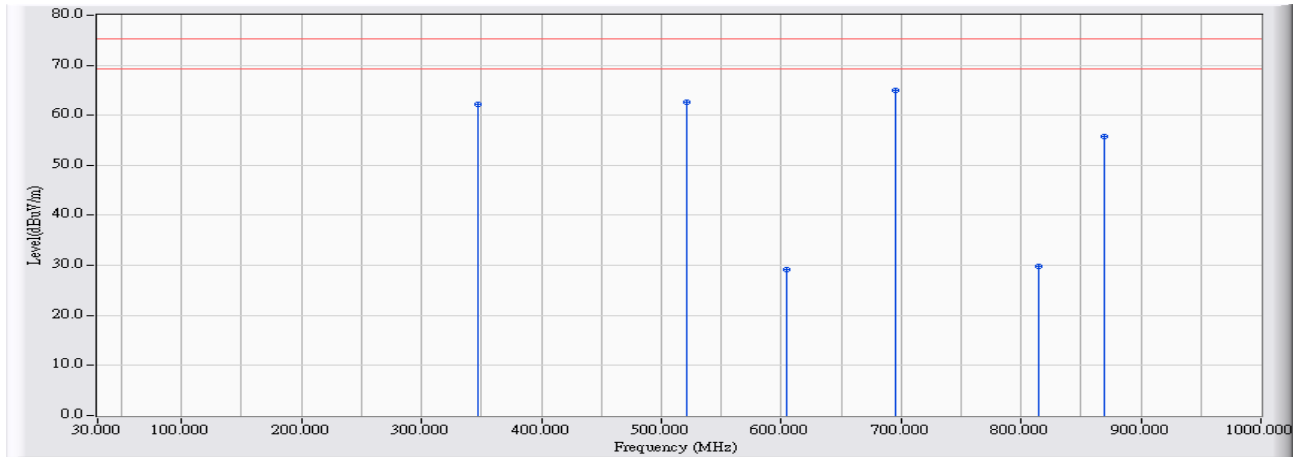


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	323.763	13.167	46.720	59.887	-15.313	75.200	PEAK
2	485.672	16.724	38.494	55.218	-19.982	75.200	PEAK
3	* 647.581	18.090	48.355	66.445	-8.755	75.200	PEAK
4	729.990	18.583	10.337	28.920	-46.280	75.200	PEAK
5	809.975	19.399	35.086	54.485	-20.715	75.200	PEAK
6	971.884	20.432	42.325	62.757	-12.443	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 - 23:28
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 : 174MHz

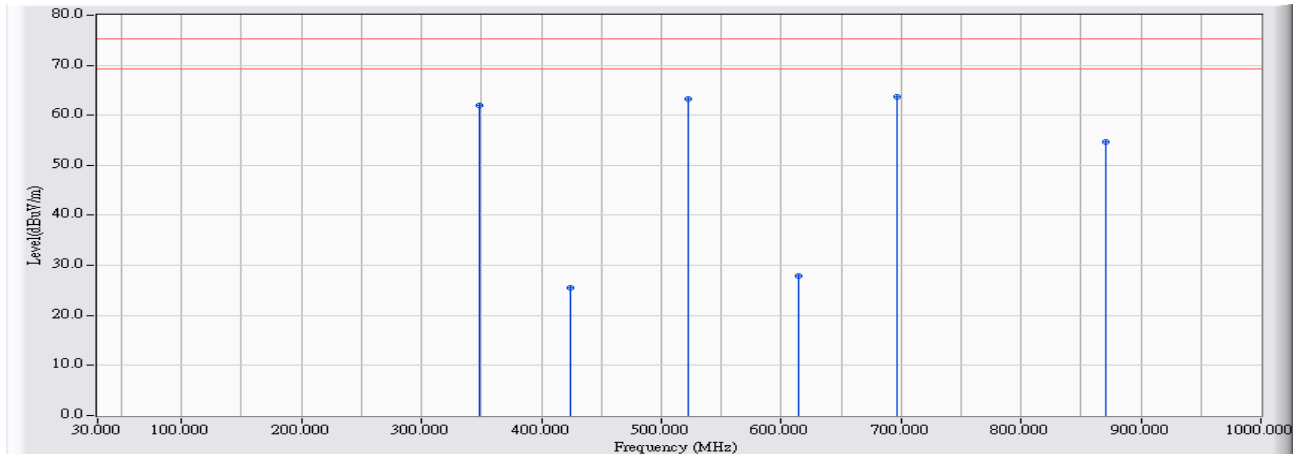


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		347.516	13.811	48.485	62.296	-12.904	75.200	PEAK
2		521.544	17.181	45.406	62.588	-12.612	75.200	PEAK
3		604.438	17.957	11.254	29.211	-45.989	75.200	PEAK
4	*	695.572	18.238	46.749	64.988	-10.212	75.200	PEAK
5		814.823	19.420	10.326	29.746	-45.454	75.200	PEAK
6		869.600	19.666	36.028	55.694	-19.506	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 - 23:30
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 : 174MHz



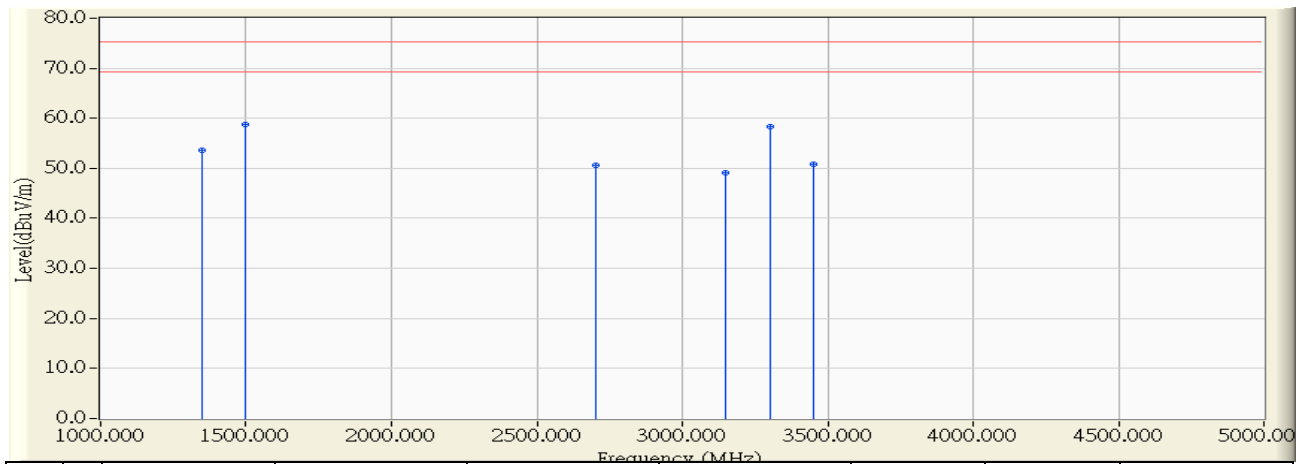
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		348.001	13.824	48.136	61.960	-13.240	75.200	PEAK
2		424.108	15.654	9.922	25.576	-49.624	75.200	PEAK
3		522.029	17.187	46.091	63.278	-11.922	75.200	PEAK
4		615.102	17.990	9.984	27.974	-47.226	75.200	PEAK
5	*	696.057	18.241	45.457	63.697	-11.503	75.200	PEAK
6		870.085	19.668	35.074	54.742	-20.458	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 - 22:55
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 : 150MHz

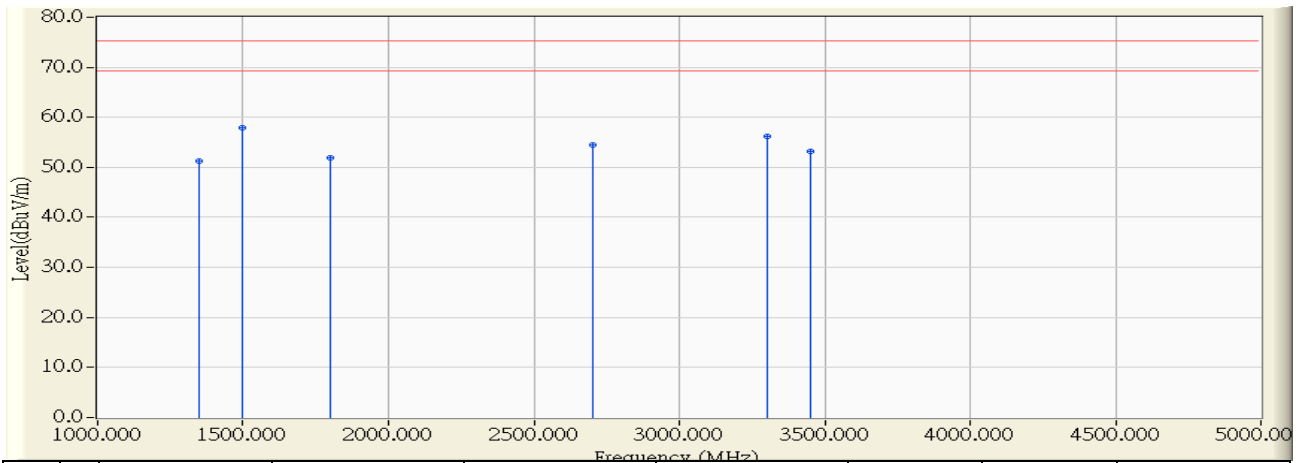


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1350.000	-22.882	76.481	53.599	-21.601	75.200	PEAK
2	*	1500.000	-22.323	81.142	58.818	-16.382	75.200	PEAK
3		2700.000	-15.508	66.079	50.571	-24.629	75.200	PEAK
4		3150.000	-15.961	65.138	49.177	-26.023	75.200	PEAK
5		3300.000	-15.788	74.093	58.305	-16.895	75.200	PEAK
6		3450.000	-15.616	66.416	50.801	-24.399	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 - 22:56
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 : 150MHz

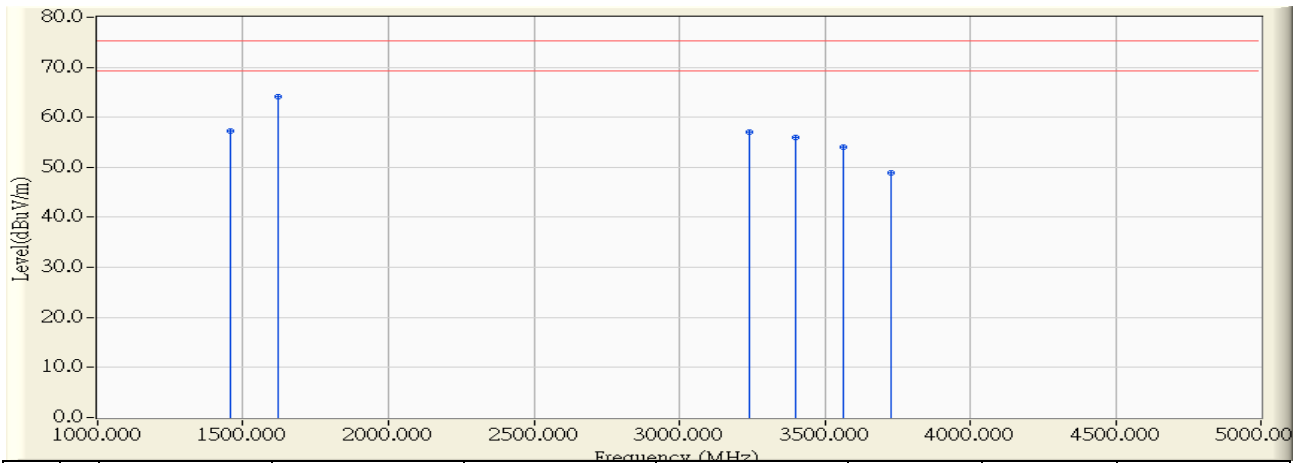


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1350.000	-22.882	74.152	51.270	-23.930	75.200	PEAK
2	*	1500.000	-22.323	80.127	57.803	-17.397	75.200	PEAK
3		1800.000	-21.334	73.310	51.976	-23.224	75.200	PEAK
4		2700.000	-15.508	69.963	54.455	-20.745	75.200	PEAK
5		3300.000	-15.788	71.903	56.115	-19.085	75.200	PEAK
6		3450.000	-15.616	68.762	53.147	-22.053	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 - 22:59
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 : 162MHz

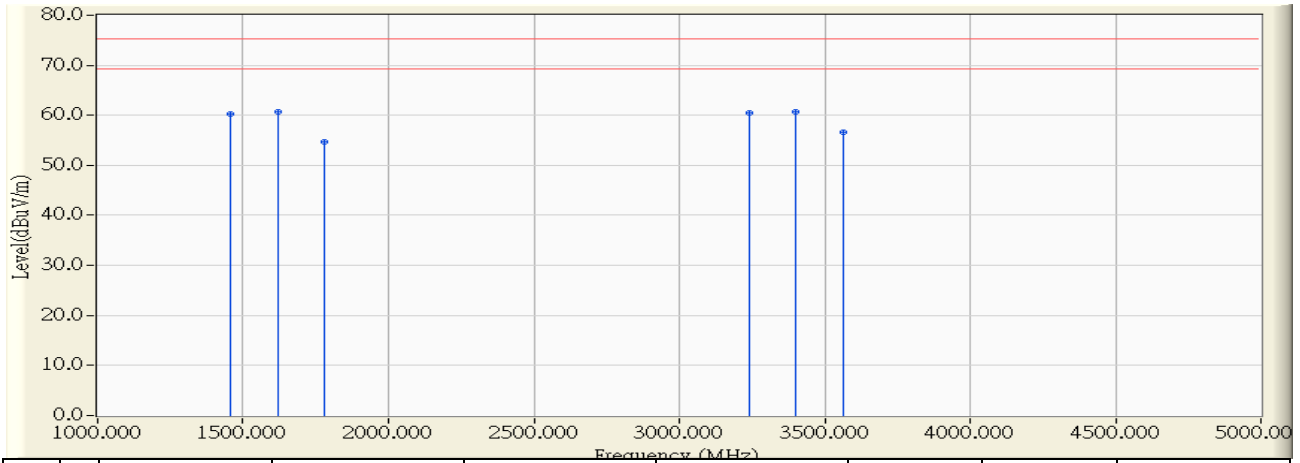


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1458.000	-22.467	79.774	57.307	-17.893	75.200	PEAK
2	*	1620.000	-21.927	86.163	64.235	-10.965	75.200	PEAK
3		3240.000	-15.857	72.949	57.092	-18.108	75.200	PEAK
4		3402.000	-15.670	71.611	55.941	-19.259	75.200	PEAK
5		3564.000	-15.398	69.353	53.955	-21.245	75.200	PEAK
6		3726.000	-15.069	64.036	48.967	-26.233	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 - 23:00
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 : 162MHz

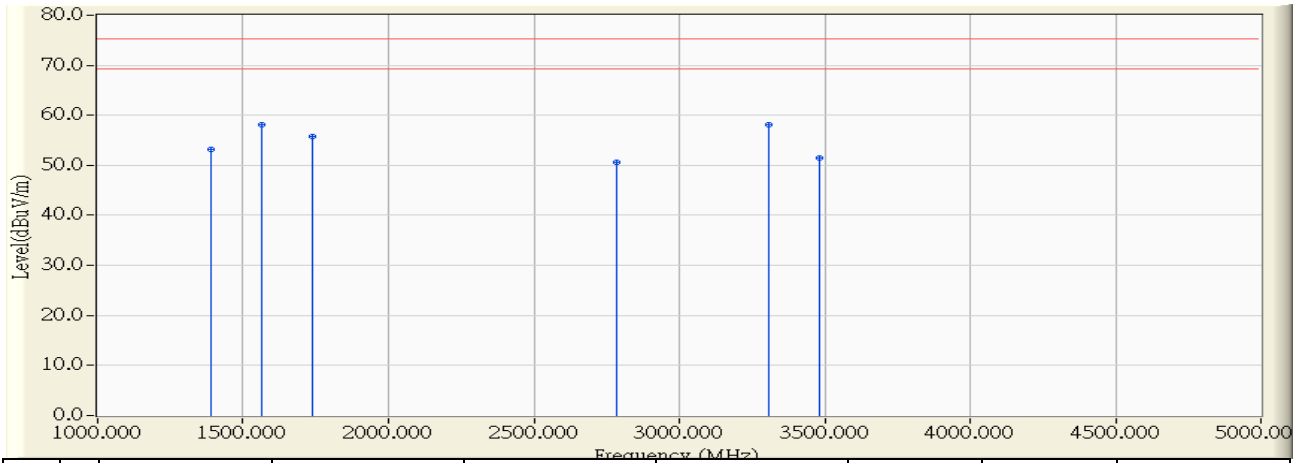


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1458.000	-22.467	82.743	60.276	-14.924	75.200	PEAK
2	*	1620.000	-21.927	82.617	60.689	-14.511	75.200	PEAK
3		1782.000	-21.393	76.180	54.787	-20.413	75.200	PEAK
4		3240.000	-15.857	76.428	60.571	-14.629	75.200	PEAK
5		3402.000	-15.670	76.356	60.686	-14.514	75.200	PEAK
6		3564.000	-15.398	71.980	56.582	-18.618	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 - 23:05
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 : 174MHz

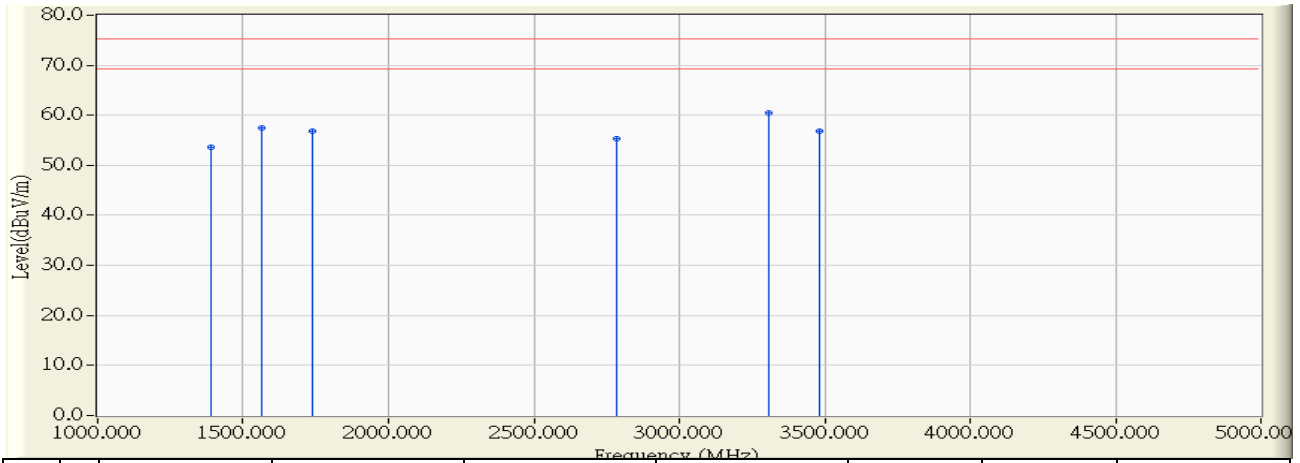


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1392.000	-22.720	76.014	53.293	-21.907	75.200	PEAK
2	*	1566.000	-22.106	80.332	58.226	-16.974	75.200	PEAK
3		1740.000	-21.531	77.192	55.660	-19.540	75.200	PEAK
4		2784.000	-15.718	66.402	50.684	-24.516	75.200	PEAK
5		3306.000	-15.781	73.859	58.078	-17.122	75.200	PEAK
6		3480.000	-15.568	67.090	51.521	-23.679	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 - 23:08
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 : 174MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1392.000	-22.720	76.243	53.522	-21.678	75.200	PEAK
2		1566.000	-22.106	79.679	57.573	-17.627	75.200	PEAK
3		1740.000	-21.531	78.443	56.911	-18.289	75.200	PEAK
4		2784.000	-15.718	71.005	55.287	-19.913	75.200	PEAK
5	*	3306.000	-15.781	76.210	60.429	-14.771	75.200	PEAK
6		3480.000	-15.568	72.422	56.853	-18.347	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

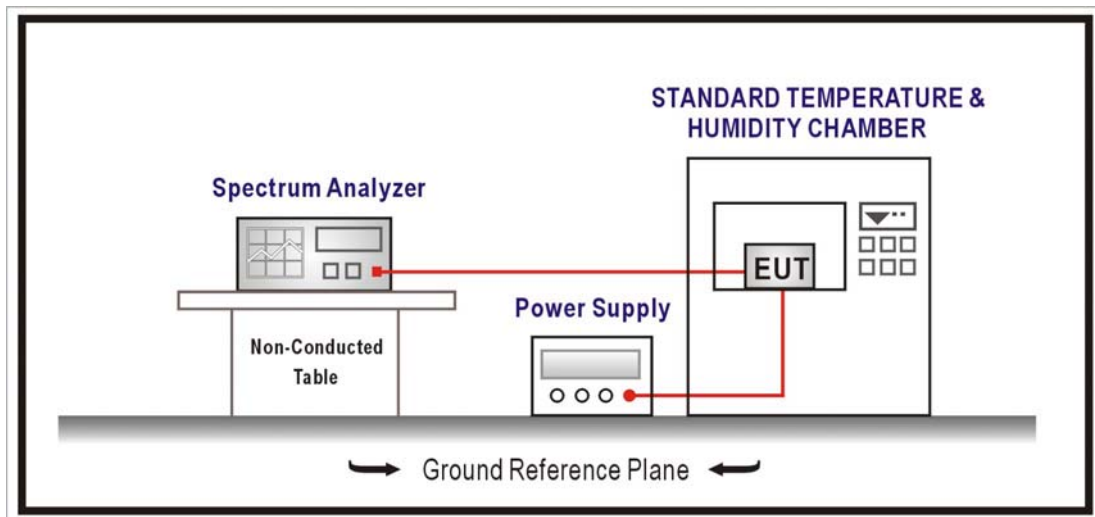
The following test equipments are used during the radiated emission tests:

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-150MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	150.000014	0.0933	PASS
-20		150.000033	0.2200	PASS
-10		150.000001	0.0067	PASS
0		149.999988	-0.0800	PASS
10		149.999995	-0.0333	PASS
20		149.999964	-0.2400	PASS
30		149.999982	-0.1200	PASS
40		149.999955	-0.3000	PASS
50		149.999936	-0.4267	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	149.999996	-0.0267	PASS
	12.80	149.999999	-0.0067	PASS
	10.88	149.999998	-0.0133	PASS

Product	Private land mobile radio		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-162MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	162.000004	0.0247	PASS
-20		162.000012	0.0741	PASS
-10		162.000011	0.0679	PASS
0		161.999997	-0.0185	PASS
10		161.999989	-0.0679	PASS
20		161.999990	-0.0617	PASS
30		161.999978	-0.1358	PASS
40		161.999976	-0.1481	PASS
50		161.999965	-0.2160	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	161.999995	-0.0309	PASS
	12.80	161.999999	-0.0062	PASS
	10.88	161.999998	-0.0123	PASS

Product	Private land mobile radio		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit-174MHz		
Date of Test	2015/05/27	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-30	12.80	174.000004	0.0230	PASS
-20		174.000037	0.2126	PASS
-10		174.000006	0.0345	PASS
0		173.999999	-0.0057	PASS
10		173.999993	-0.0402	PASS
20		173.999999	-0.0057	PASS
30		173.999997	-0.0172	PASS
40		173.999955	-0.2586	PASS
50		173.999954	-0.2644	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	14.72	173.999997	-0.0172	PASS
	12.80	174.000000	0.0000	PASS
	10.88	173.999995	-0.0287	PASS

8. Transient Frequency Behavior

8.1. Test Equipment

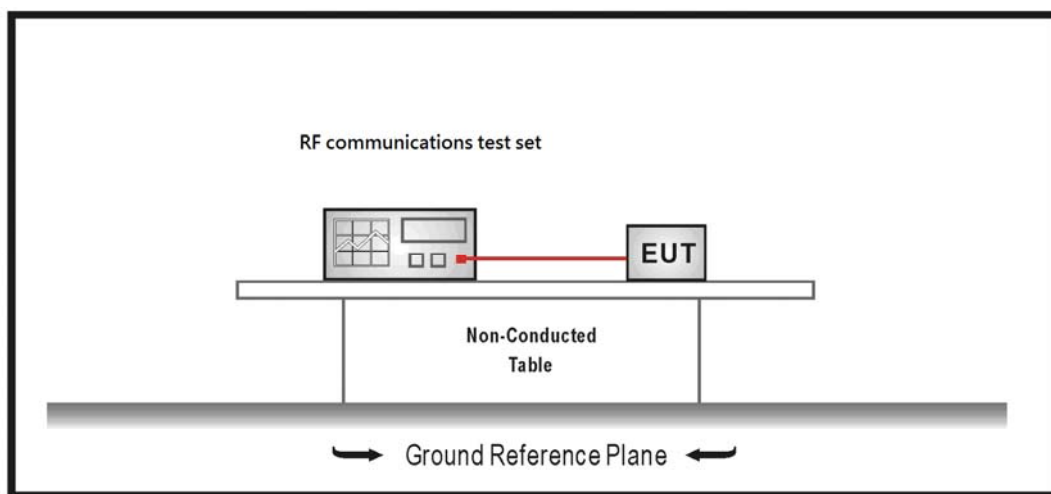
The following test equipments are used during the radiated emission tests:

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

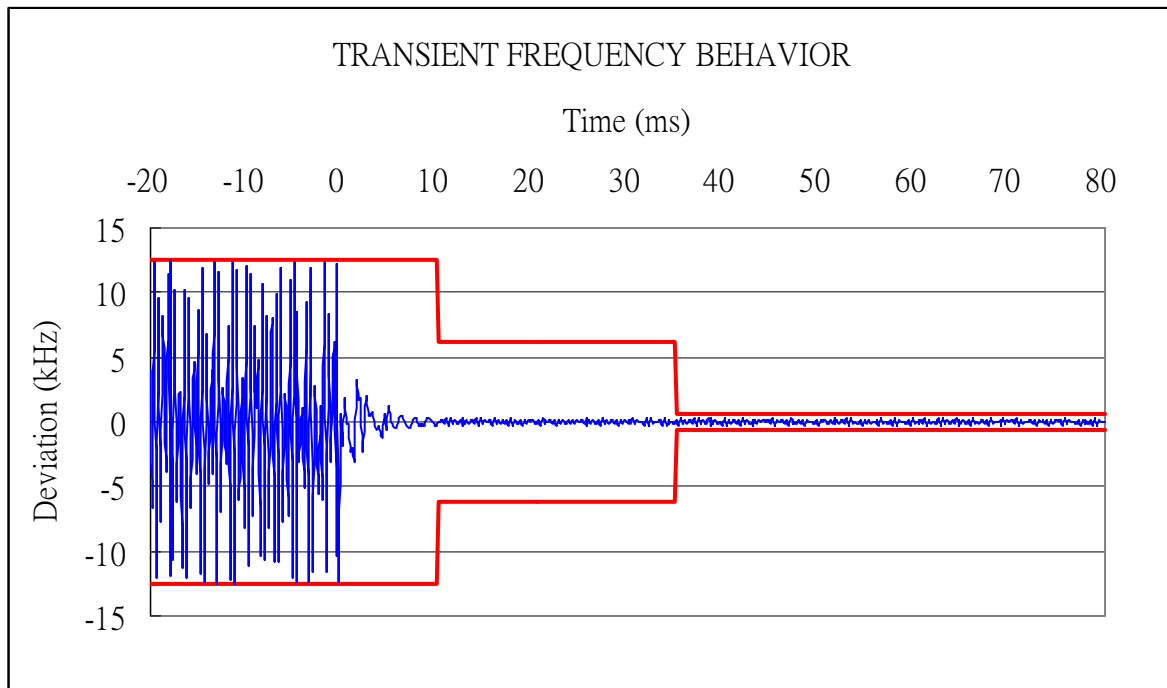
8.5. Uncertainty

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

