

TEST REPORT

Report Number		RAPA13-O-855
Type of Equipment		Wireless Transceiver System
Model Name		ARB-HT3G RX
FCC ID		ROY3102PNARE
IC Number		5479A-102RX00
Applicant	Name	Trinus Systems Inc.
	Logo	
	Address	#801, Ilsan-Ro 142, Ilsandong-Gu, Goyang-Si, Gyeonggi-Do, Korea
Manufacturer	Name	Trinus Systems Inc.
	Address	#801, Ilsan-Ro 142, Ilsandong-Gu, Goyang-Si, Gyeonggi-Do, Korea
Test period		December 09, 2013 to December 23, 2013
Issuing date of report		December 27, 2013
Total page		59 pages (including this page)

SUMMARY

The equipment complies with FCC Part 15.247: Operation within the bands 902 MHz to 928 MHz, 2 400 MHz to 2 483.5 MHz, and 5 725 MHz to 5 850 MHz and IC RSS-210 Issue8 Annex 1-2010.

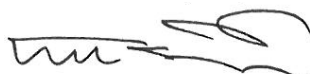
This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Date : December 27, 2013



Prepared and tested by Tae Yang Yoon
Manager / TCL of RAPA

Date : December 27, 2013



Reviewed by Sukil Park
Executive Managing Director / TCL of RAPA

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1. GENERAL DESCRIPTION

1.1 Applicant

- Company name : Trinus Systems Inc.
- Address : #801, Ilsan-Ro 142, Ilsandong-Gu, Goyang-Si, Gyeonggi-Do, Korea
- Contact person : Ahnse Lee
- Phone/Fax : +82-31-904-5588 / +82-31-904-5696

1.2 Manufacturer

- Company name : Trinus Systems Inc.
- Address : #801, Ilsan-Ro 142, Ilsandong-Gu, Goyang-Si, Gyeonggi-Do, Korea
- Contact person : Ahnse Lee
- Phone/Fax : +82-31-904-5588 / +82-31-904-5696

1.3 Basic description of EUT

- Product name : Wireless Transceiver System
- Model name : ARB-HT3G RX
- Serial number : N/A
- Frequency : 902.5 MHz ~ 927.5 MHz
- Number of channel(s) : 51 Channels
- Modulation method : FHSS
- FCC Rule Part(s) : FCC CFR47 Part 15 Subpart C Section 15.247
- IC Rule Part(s) : IC RSS-210 Issue8 Annex 8-2010
- FCC classification : DSS / Part 15 Spread Spectrum Transmitter (FHSS)
- IC classification : Annex 8 / Frequency Hopping and Digital Modulation Systems Operating in the bands 902 - 928 MHz, 2 400 - 2 483.5 MHz and 5 725 - 5 850 MHz
- Test period : December 09, 2013 to December 23, 2013
- Issuing date of report : December 27, 2013
- Place of test : Head office
824 & B104, Anyang Megavalley, 799, Gwanyang-dong,
Dongan-gu, Anyang-si, Gyeonggi-do 431-767, Korea

Open area test site
80, Jeil-ri, Yangji-myun, Cheoin-gu, Yongin-si, Gyeonggi-do
449-825, Korea

(FCC Registration Number : 337229)
(IC Submission Number : 143881)
(KCC Designation Number : KR0027)

1.4 Electrical specification

Item	Specifications
Frequency	900 MHz FHSS with 902.50 ~ 927.50 MHz
Number of Channel	51 Channel
Channel Space	500 kHz
Speech Coder	16 kbps ADPCM with Parity
Type of Modulation	GFSK
Data Rate	250 kbps Time Division Duplex
Power	RX : DC 12 V/24 V
RF Power Levels	RX : 24 dBm
Dimensions(L x W x H)	RX : 94 mm x 43 mm x 73.7 mm(3.7" x 1.69" x 2.9")

2. General information of test

2.1 Standard for measurement methods

Applied Standard : FCC CFR47 Part 15 Subpart C, IC RSS-210 Issue8 Annex 8-2010				
FCC	IC	Description of Test	Limit	Result
15.209	RSS-210_2.2	Spurious Radiated Emission	See 15.209	Pass
15.247(a)(1)	RSS-210_A8.1_B	Frequency Separation	≥ 20 dB Bandwidth	Pass
15.247(a)(1)	RSS-210_A8.1_C	Number of Hopping Channels	≥ 50 CH	Pass
15.247(a)(1)	RSS-210_A8.1_C	Occupied Bandwidth	≤ 500 kHz	Pass
15.247(a)(1)	RSS-210_A8.1_C	Average Time of Occupancy	≤ 0.4 s within 20 s	Pass
15.247(b)(2)	RSS-210_A8.4_1	Maximum Peak Output Power	≤ 1.00 Watt	Pass
15.247(d)	RSS-210_A8.5	Conducted Emission & Band Edge	≥ 20 dBc	Pass

2.2 Description of EUT modification

During the test, there was no mechanical or circuitry modification to improve any RF specification including spurious characteristic, and any RF and spurious suppression device(s) were not added against the device tested.

2.3 Description of test system configuration

• Peripheral equipment used;

Description	Model name	Serial No.	Manufacturer	FCC ID	IC Number
EUT	ARB-HT3G RX	N/A	Trinus Systems Inc.	ROY3102PNARE	5479A-102RX00

• Cables used

Device from	Device to	Type of cable	Type of connector	Length
-	-	-	-	-

3. Measurement data

3.1 Spurious Radiated emission

3.1.1 Definitions

A radiated emission is a emission from the equipment when transmitting into a non-radiating load on frequencies that are restricted band sufficient to ensure transmission of information of required quality for the class of communications desired.

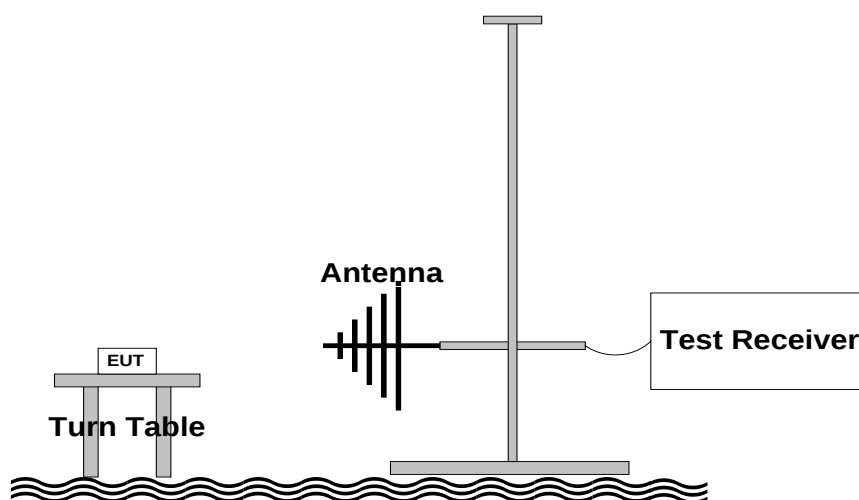
3.1.2 Specification

- FCC Rules Part 15 Subpart C Section 15.209
- IC Rules RSS-210 Section 2.2

3.1.3 Measurement method

- ANSI Standard C63.4-2003 8.3

3.1.4 Set-up



3.1.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Test Receiver	ESCI 7	Rohde & Schwarz
Loop antenna	EMCO 6502	EMCO
Bi-conical antenna	VHA9103	Schwarzbeck
Log periodic antenna	VULP9118A	Schwarzbeck
Horn Antenna	BBHA-9120D	Schwarzbeck

3.1.6 Test procedure

The EUT is placed on a turntable, which is 0.8 meter high above ground.
The turntable rotates 360 degrees to determine the position of the maximum emission level.

EUT is set 3.0 meters away from the receiving antenna, broadband antenna, which is mounted on an antenna mast. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level from the EUT. Both horizontal and vertical polarizations of the antenna are set on measurement.

In order to find out the maximum emission levels, all of the EUT location were manipulated according to ANSI 63.4 during the radiated emission measurement. The EUT was tested to 3 orthogonal planes.

The RBW of test receiver is 120 kHz between 30 to 1 000 MHz, and 1 MHz above 1 GHz.

3.1.7 Test condition

- Test place : Open area test site
- Test environment : 9.8 °C, 41 % R.H.
- Test mode : Operation at single channel

3.1.8 Limit

Frequency [MHz]	Field Strength [μV/m]	Field Strength [dBμV/m]	Measurement Distance [m]
0.009 – 0.490	2 400 / F(kHz)	48.52 to 13.80	300
0.490 – 1.705	2 4000 / F(kHz)	33.80 to 22.97	30
1.705 – 30.0	30	29.54	30
30 – 88	100	40.00	3
88 – 216	150	43.52	3
216 – 960	200	46.02	3
Above 960	500	53.98	3
§15.205 and RSS-210(2.7 Table 1) : Restrict Band of Operation : Only spurious emissions are permitted in any of the frequency bands listed below ;			
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
1) 0.495 - 0.505**	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6

1) Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

3.1.9 Test result

3.1.9.1 DC Power 12.0 V

- Operation frequency: 902.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
902.5	H	Y	Peak	97.5	22.5	4.1	0	124.1	-	-
902.5	V	Y	AVG	85.5	22.5	4.1	0	112.1	-	-
1 805.0	H	Y	Peak	29.9	25.7	2.2	0	57.8	104.1	46.3
1 805.0	H	Y	AVG	17.6	25.7	2.2	0	45.5	92.1	46.6

- Operation frequency: 914.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
914.5	H	Y	Peak	98.6	22.5	4.1	0	125.2	-	-
914.5	H	Y	AVG	88.8	22.5	4.1	0	115.4	-	-
1 825.0	H	Y	Peak	30.5	25.8	2.2	0	58.5	105.2	46.7
1 825.0	H	Y	AVG	18.9	25.8	2.2	0	46.9	95.4	48.5

- Operation frequency: 927.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
927.5	H	Y	Peak	110.4	22.6	4.2	0	127.2	-	-
927.5	H	Y	AVG	89.6	22.6	4.2	0	116.4	-	-
1 855.0	H	Y	Peak	28.3	25.9	2.2	0	56.4	107.2	50.8
1 855.0	H	Y	AVG	14.3	25.9	2.2	0	42.4	96.4	54.0

Here, * is restricted frequency.

Remark: The other emissions were not detected.

3.1.9.2 DC Power 24.0 V

- Operation frequency: 902.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
902.5	H	Y	Peak	100.1	22.5	4.1	0	126.7	-	-
902.5	H	Y	AVG	89.4	22.5	4.1	0	116.0	-	-
1 805.0	H	Y	Peak	31.4	25.7	2.2	0	59.3	106.7	47.4
1 805.0	H	Y	AVG	18.8	25.7	2.2	0	46.7	96.0	49.3

- Operation frequency: 914.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
914.5	H	Y	Peak	98.2	22.5	4.1	0	124.8	-	-
914.5	H	Y	AVG	86.0	22.5	4.1	0	112.6	-	-
1 825.0	H	Y	Peak	31.2	25.8	2.2	0	59.2	104.8	45.6
1 825.0	H	Y	AVG	18.8	25.8	2.2	0	46.8	92.6	45.8

- Operation frequency: 927.50 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBμV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBμV]	Limit [dBμV]	Margin [dB]
927.5	H	Y	Peak	101.3	22.6	4.2	0	128.1	-	-
927.5	H	Y	AVG	90.1	22.6	4.2	0	116.9	-	-
1 855.0	H	Y	Peak	28.6	25.9	2.2	0	56.7	108.1	51.4
1 855.0	H	Y	AVG	14.9	25.9	2.2	0	43.0	96.9	53.9

Here, * is restricted frequency.

Remark: The other emissions were not detected.

3.2 Frequency separation

3.2.1 Definitions

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

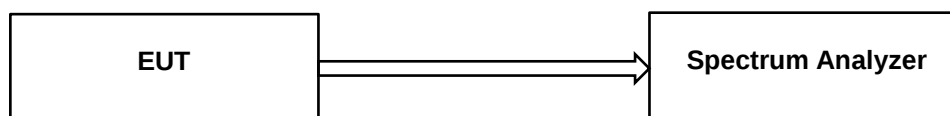
3.2.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(a)(1)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 B

3.2.3 Measurement method

- Public Notice "DA 00-705"

3.2.4 Set-up



3.2.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.2.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- The Hopping channel separation is defined as the channel is separated with next channel.

3.2.7 Test condition

- Test place : Test room
- Test environment : 23.1 °C, 48 % R.H.
- Test mode : Operation at full hopping

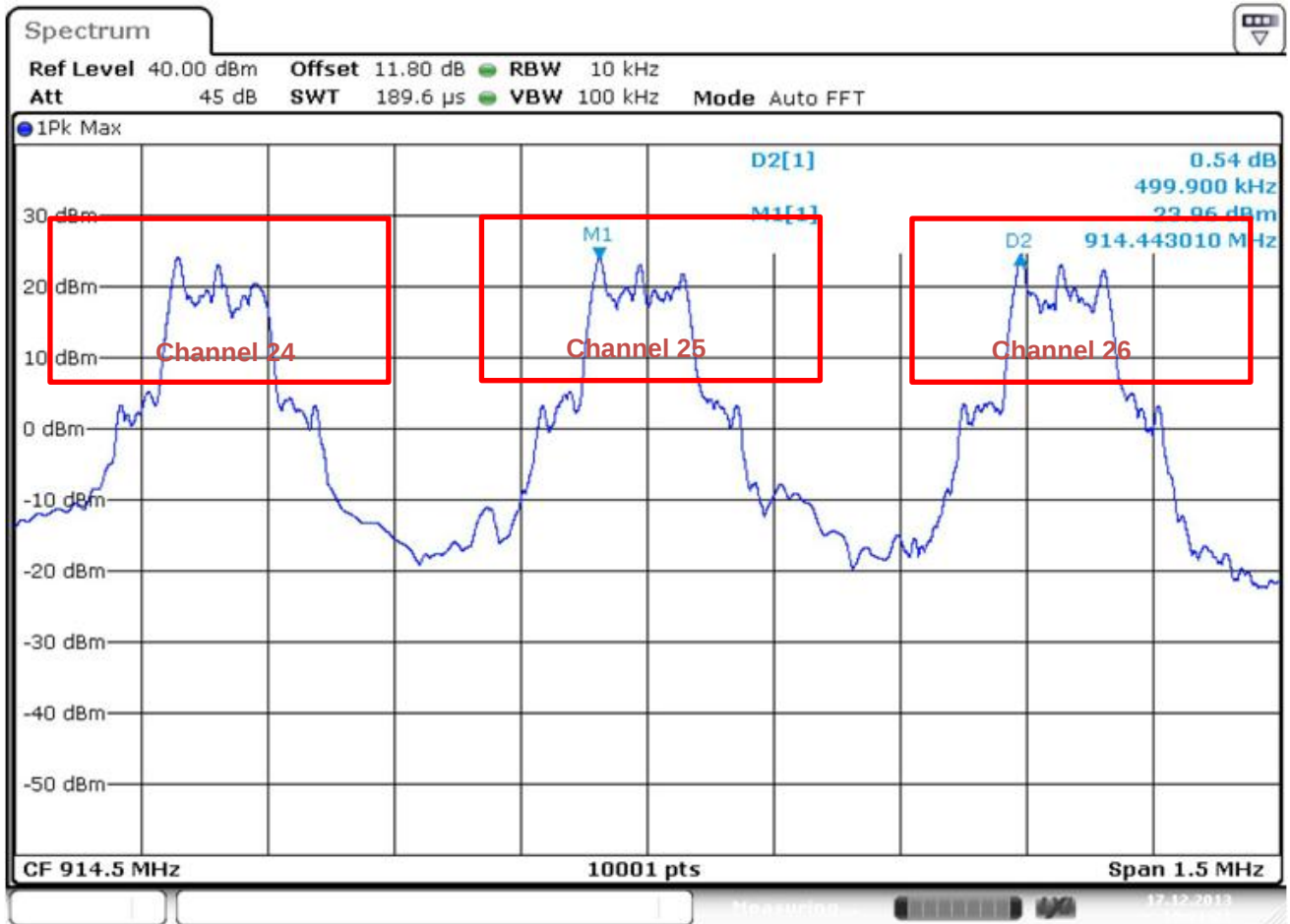
3.2.8 Test result

Channel	Frequency separation [kHz]		Limit [kHz]
	DC Power 12 V	DC Power 24 V	
Full hopping	499.9	500.5	≥ 192.0

Remark: For the limit value, please refer to the maximum 20 dB Bandwidth value of section 3.4.8 in this report.

3.2.9 Plots of frequency separation

3.2.9.1 DC Power 12 V



Operating frequency : Full hopping

RBW : 10 kHz

VBW : 100 kHz

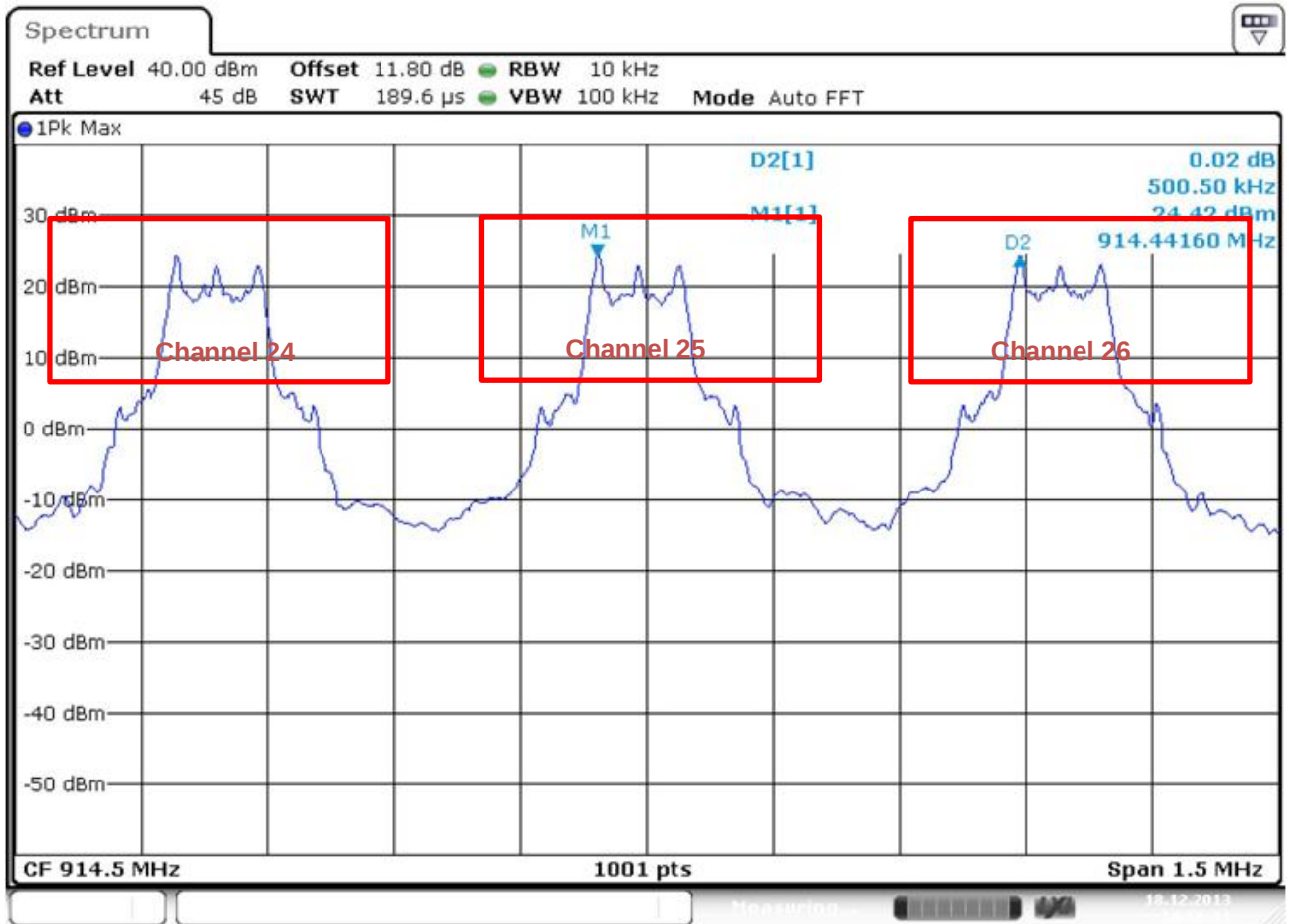
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Frequency separation : 499.9 kHz

3.2.9.2 DC Power 24 V



Operating frequency : Full hopping

RBW : 10 kHz

VBW : 100 kHz

Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Frequency separation : 500.5 kHz

3.3 Number of hopping channels

3.3.1 Definitions

Frequency hopping systems operating in the 902 MHz - 928 MHz should employ at least 50 hopping channels.

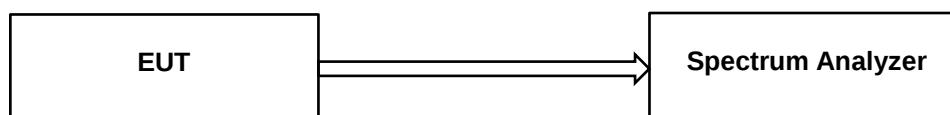
3.3.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(a)(1)(i)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.3.3 Measurement method

- Public Notice "DA 00-705"

3.3.4 Set-up



3.3.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.3.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Measure the hopping channels of EUT using spectrum analyzer.
- With the analyzer set to max hold readings were taken for 1 ~ 2 minutes in each band.

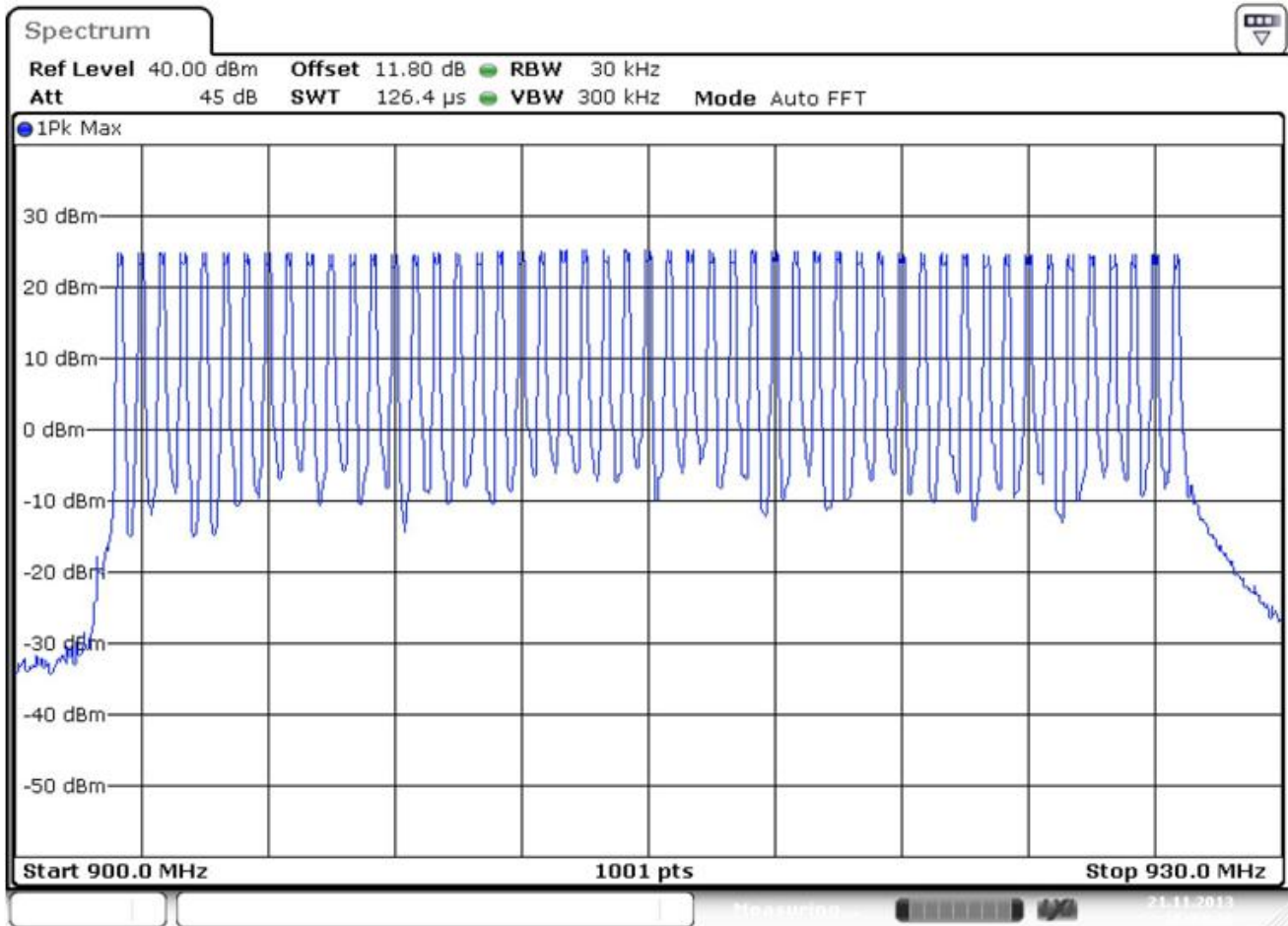
3.3.7 Test condition

- Test place : Test room
- Test environment : 23.2 °C, 49 % R.H.
- Test mode : Operation at full hopping

3.3.8 Test result

Channel	Number of hopping channels	Limit
Full hopping	51	≥ 50 Channels

3.3.9 Plots of number of hopping channels



Operating frequency : Full hopping

RBW : 30 kHz

VBW : 300 kHz

Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Number of hopping channels : 51

3.4 Occupied bandwidth

3.4.1 Definitions

Channel is below 250 kHz 20 dB of the case of least 50 is occupied bandwidth.

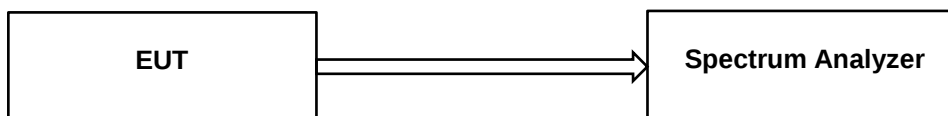
3.4.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(a)(1)(i)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.4.3 Measurement method

- Public Notice "DA 00-705"

3.4.4 Set-up



3.4.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.4.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level.

3.4.7 Test condition

- Test place : Test room
- Test environment : 23.1 °C, 48 % R.H.
- Test mode : Operation at single channel

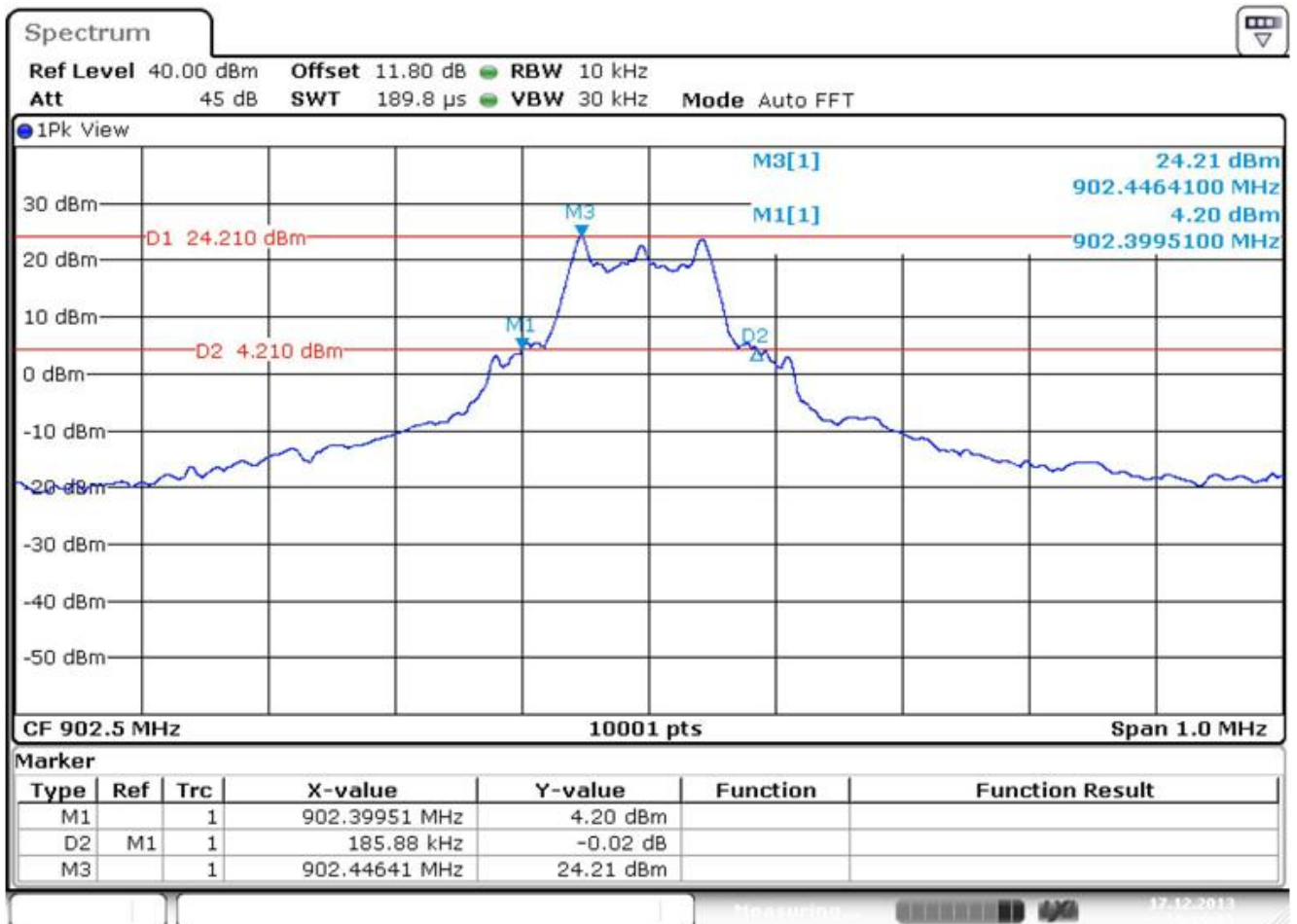
3.4.8 Test result

Frequency [MHz]	20 dB Bandwidth [kHz]		99 % Bandwidth [kHz]	
	DC Power 12 V	DC Power 24 V	DC Power 12 V	DC Power 24 V
902.5	185.88	183.98	191.02	195.36
914.5	191.78	190.68	189.58	192.47
927.5	184.48	189.48	191.02	193.92

3.4.9 Plots of 20 dB bandwidth

3.4.9.1 DC Power 12.0 V

3.4.9.1.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 10 kHz

VBW : 30 kHz

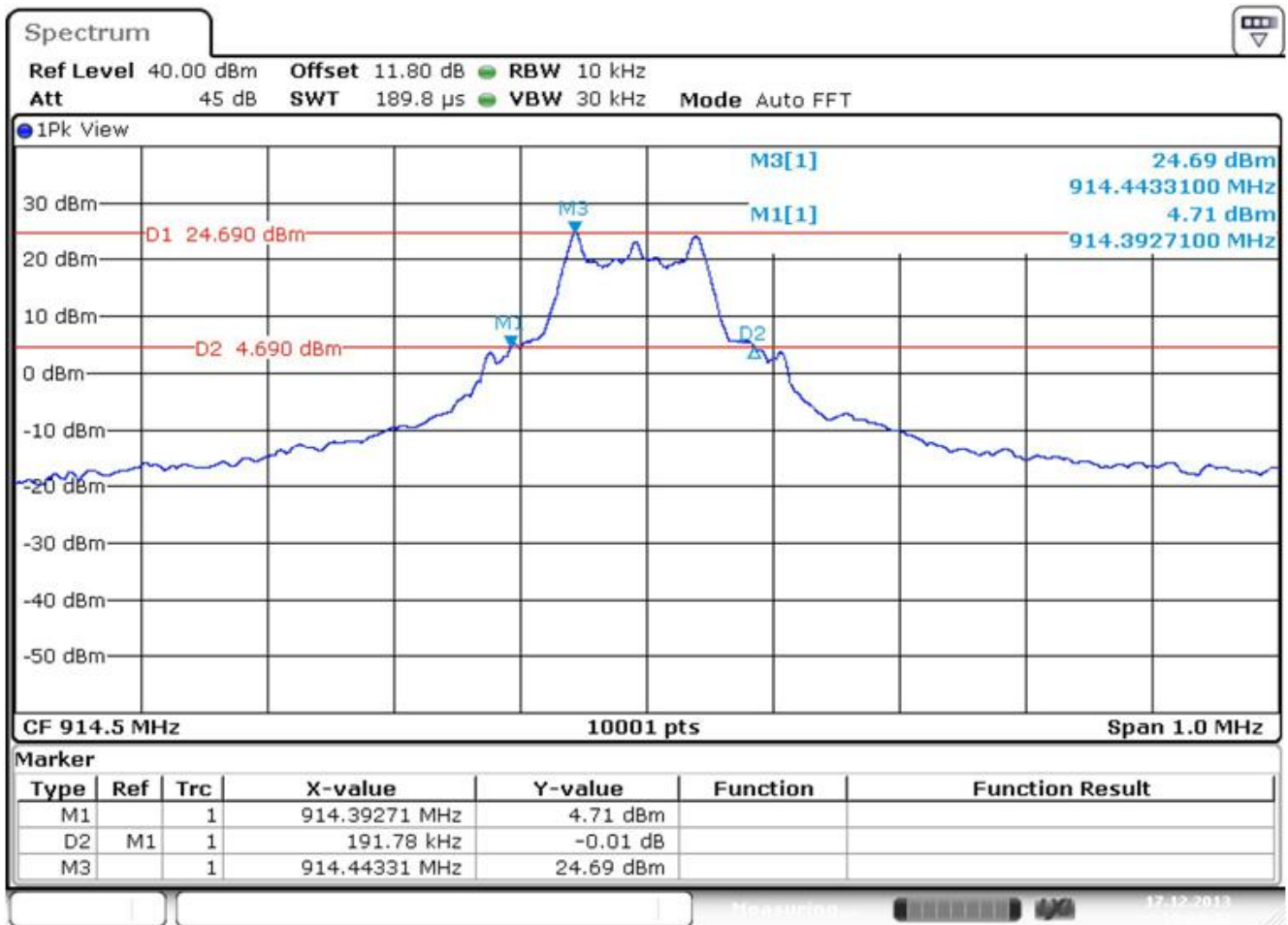
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

20 dB bandwidth : 185.88 kHz

3.4.9.1.2 Channel 25



Operating frequency : 914.5 MHz

RBW : 10 kHz

VBW : 30 kHz

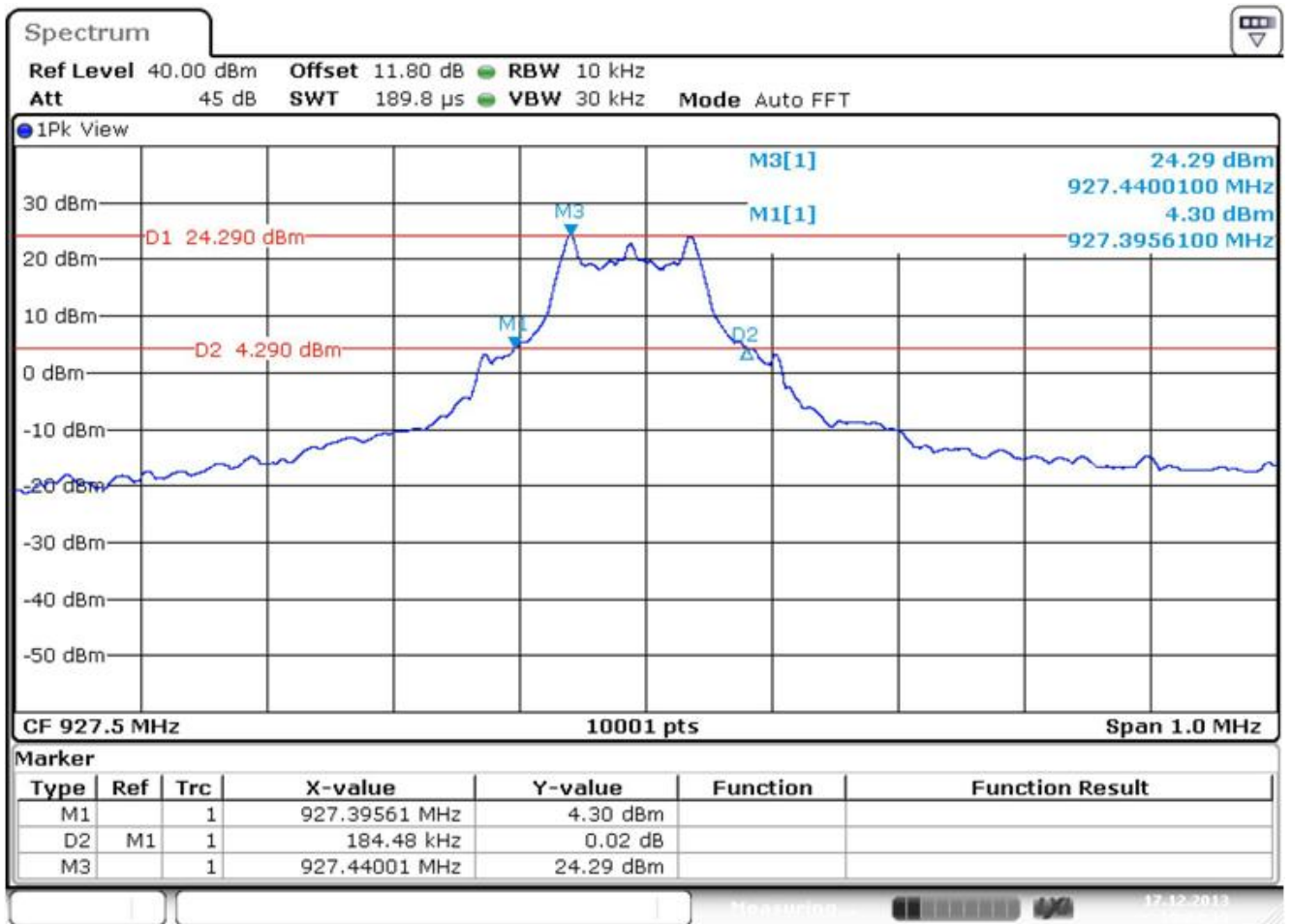
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

20 dB bandwidth : 191.78 kHz

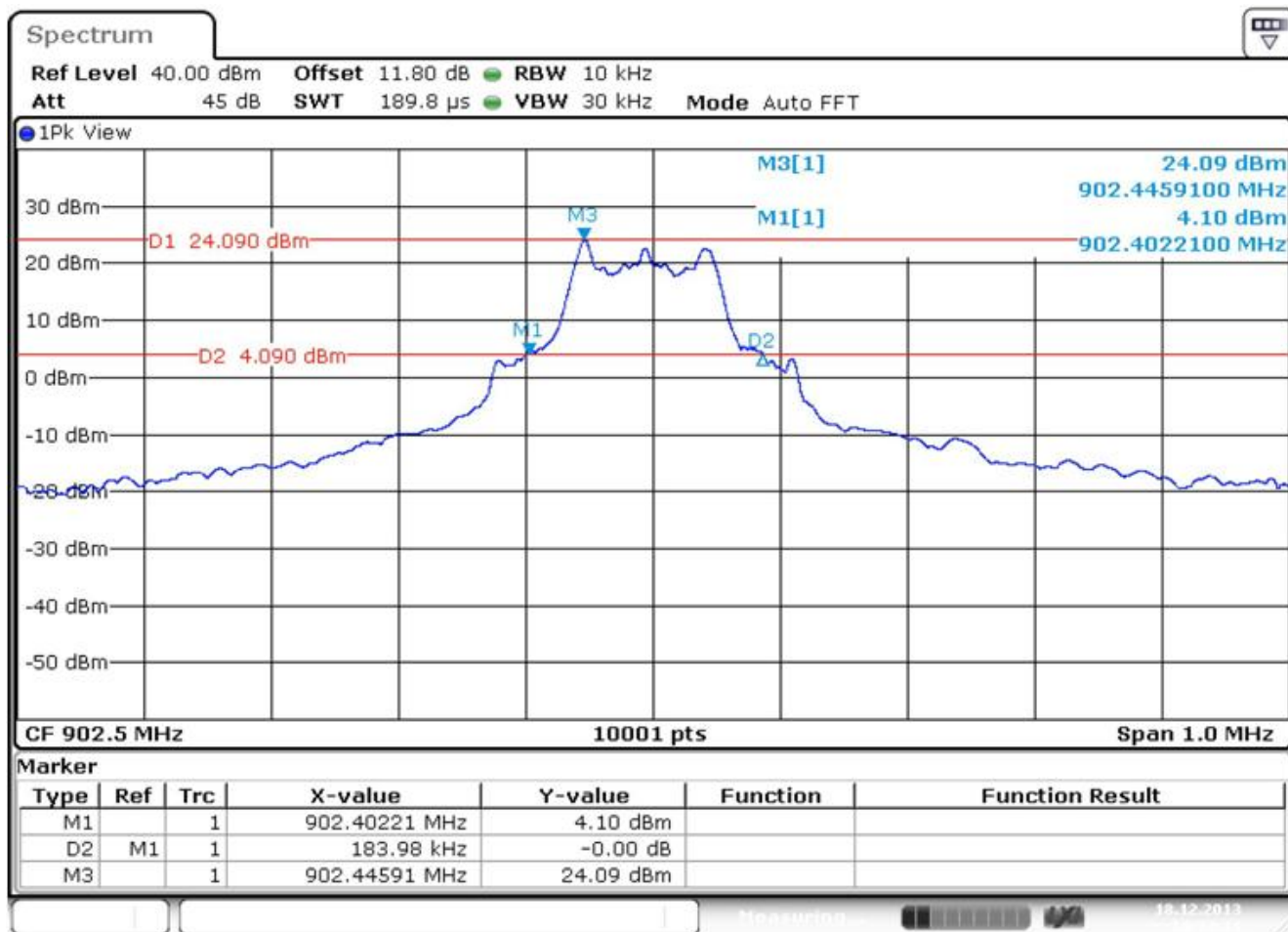
3.4.9.1.3 Channel 51



Operating frequency : 927.5 MHz
RBW : 10 kHz
VBW : 30 kHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto
20 dB bandwidth : 184.48 MHz

3.4.9.2 DC Power 24.0 V

3.4.9.2.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 10 kHz

VBW : 30 kHz

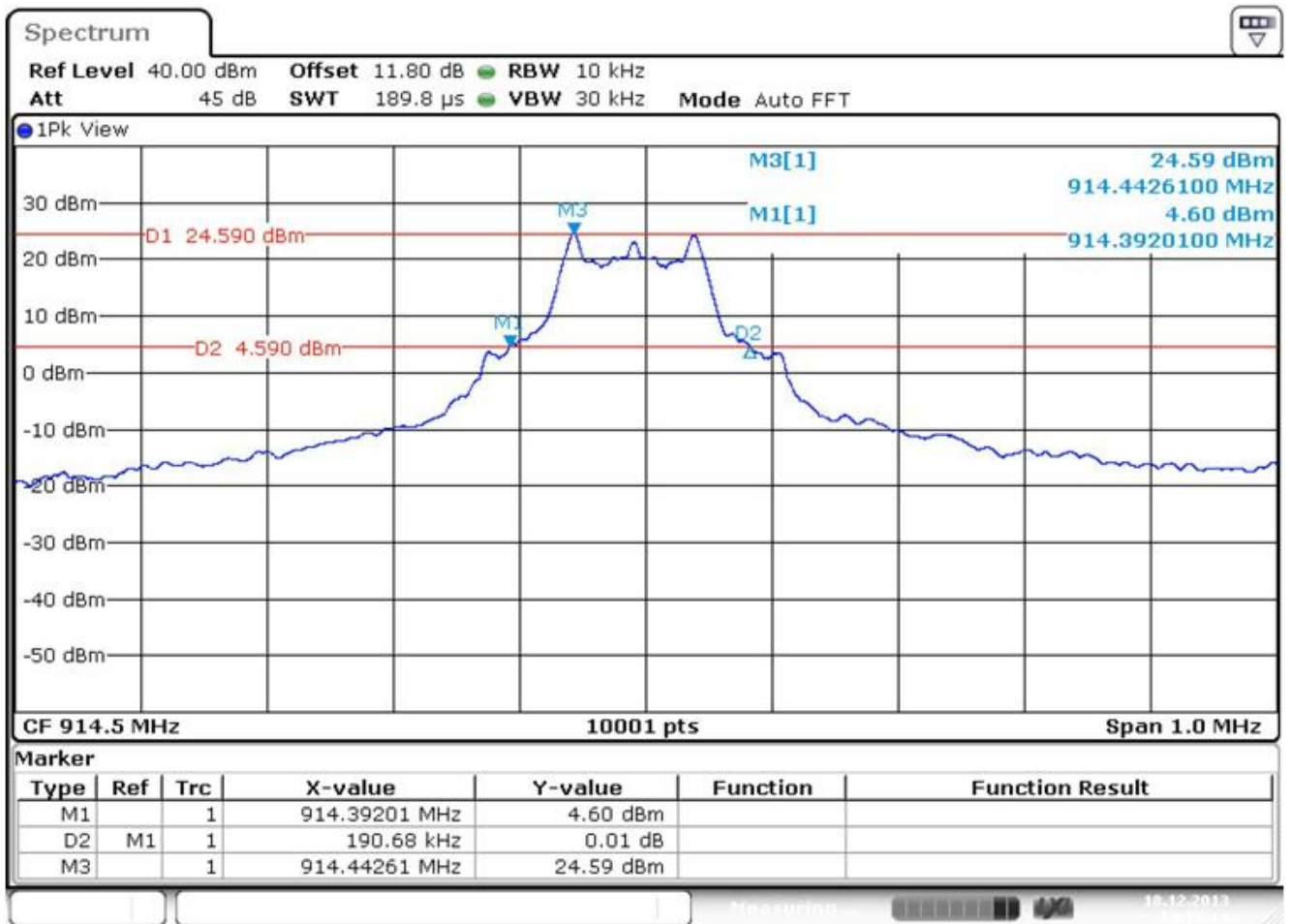
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

20 dB bandwidth : 183.98 kHz

3.4.9.2.2 Channel 25



Operating frequency : 914.5 MHz

RBW : 10 kHz

VBW : 30 kHz

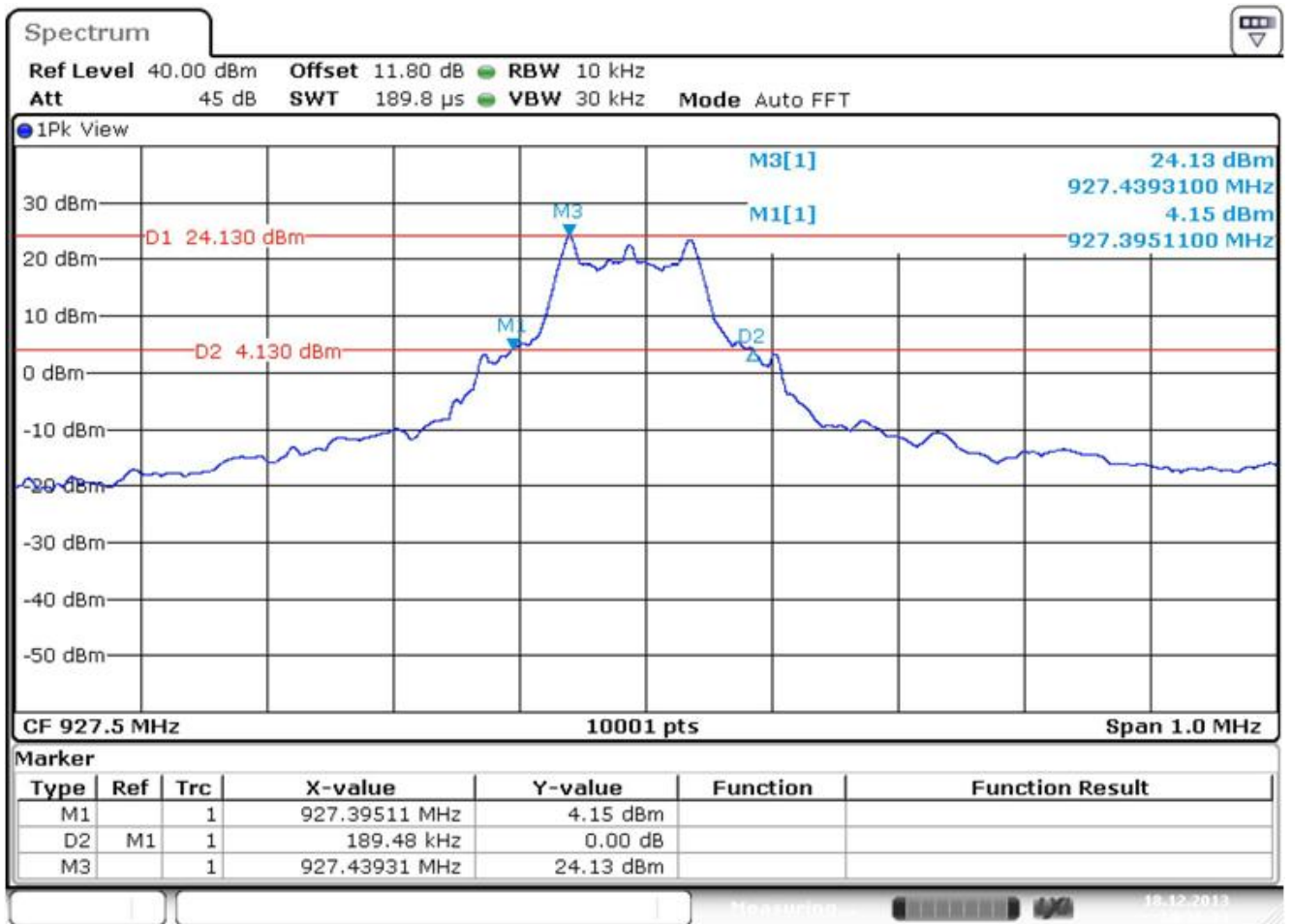
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

20 dB bandwidth : 190.68 kHz

3.4.9.2.3 Channel 51



Operating frequency : 927.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : Peak

Trace mode : Max hold

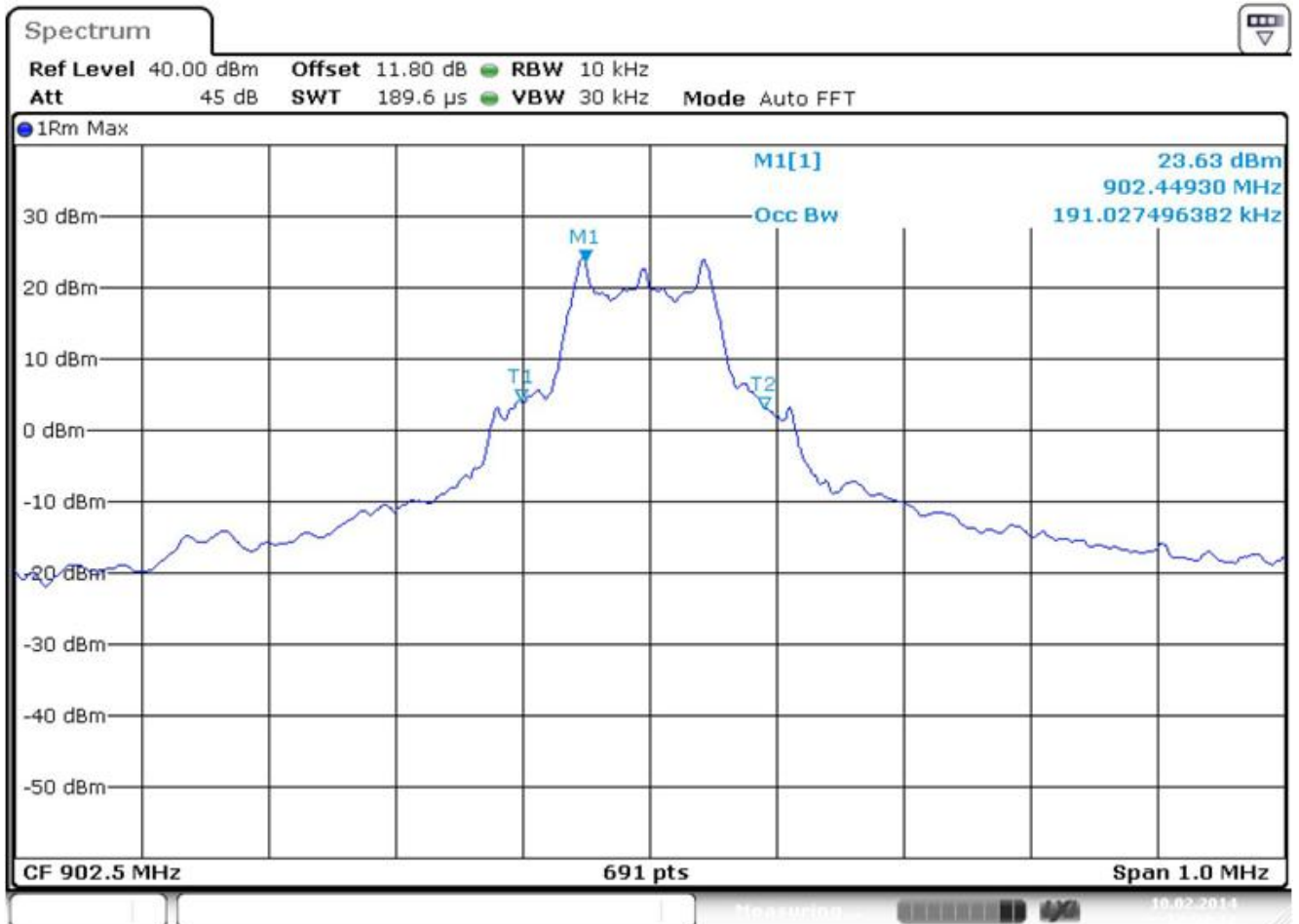
Sweep time : Auto

20 dB bandwidth : 189.48 MHz

3.4.10 Plots of 99 % bandwidth

3.4.10.1 DC Power 12.0 V

3.4.10.1.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : RMS Mode

Trace mode : Max hold

Sweep time : Auto

99 % bandwidth : 191.02 kHz

3.4.10.1.2 Channel 25



Operating frequency : 914.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : RMS Mode

Trace mode : Max hold

Sweep time : Auto

99 % bandwidth : 189.58 kHz

3.4.10.1.3 Channel 51



Operating frequency : 927.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : RMS Mode

Trace mode : Max hold

Sweep time : Auto

99 % bandwidth : 191.02 kHz

3.4.10.2 DC Power 24.0 V

3.4.10.2.1 Channel 1



Operating frequency : 902.5 MHz
RBW : 10 kHz
VBW : 30 kHz
Detector mode : RMS Mode
Trace mode : Max hold
Sweep time : Auto
99 % bandwidth : 195.36 kHz

3.4.10.2.2 Channel 25



Operating frequency : 914.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : RMS Mode

Trace mode : Max hold

Sweep time : Auto

99 % bandwidth : 192.47 kHz

3.4.10.2.3 Channel 51



Operating frequency : 927.5 MHz

RBW : 10 kHz

VBW : 30 kHz

Detector mode : RMS Mode

Trace mode : Max hold

Sweep time : Auto

99 % bandwidth : 193.92 kHz

3.5 Average time of occupancy

3.5.1 Definitions

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20 second period.

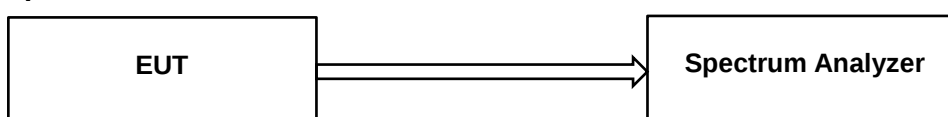
3.5.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(a)(1)(i)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.5.3 Measurement method

- Public Notice "DA 00-705"

3.5.4 Set-up



3.5.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.5.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Sets RBW 1 MHz, VBW 1 MHz, Max hold

3.5.7 Test condition

- Test place : Test room
- Test environment : 23.2 °C, 48 % R.H.
- Test mode : Operation at full hopping.

3.5.8 Test result

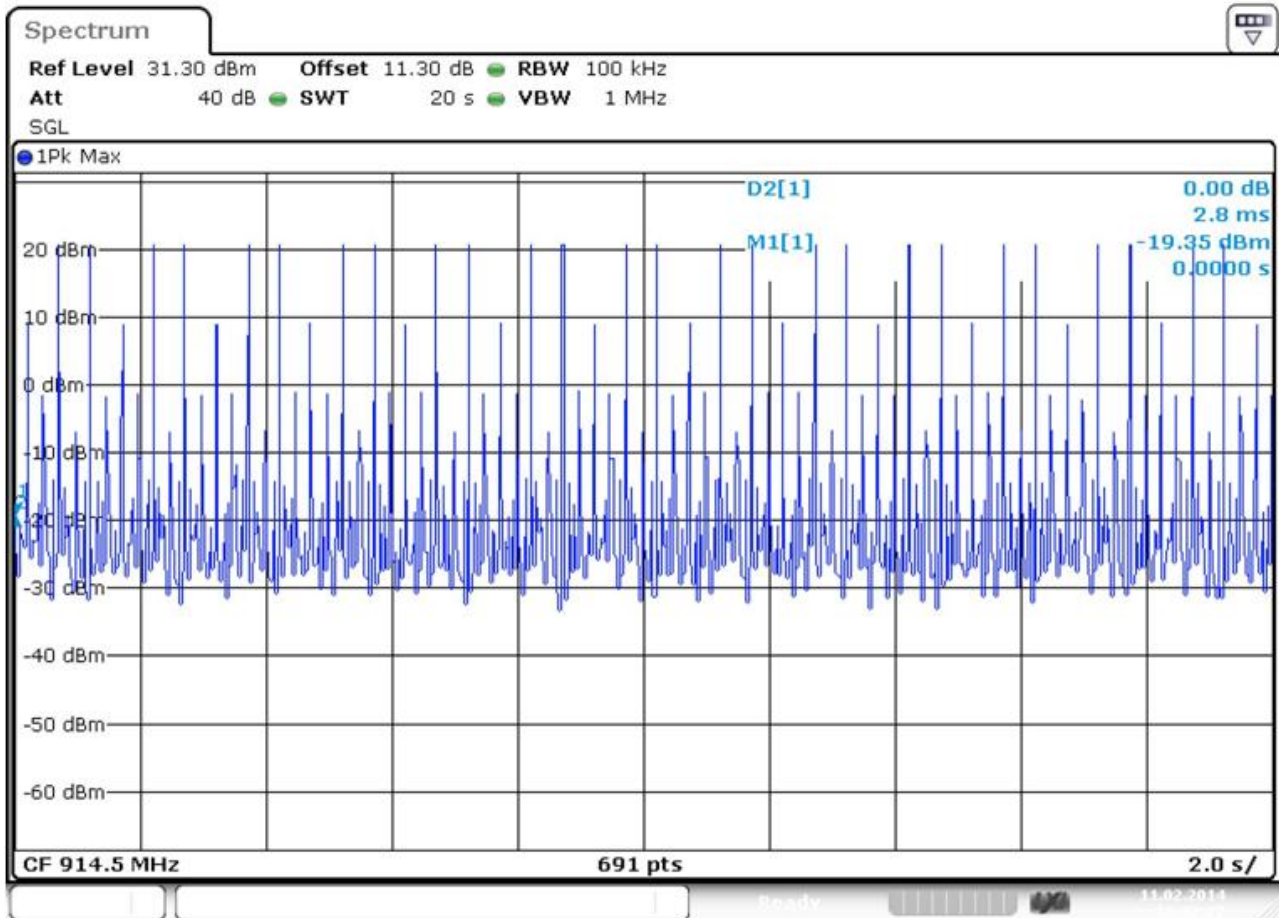
Frequency [MHz]	Dwell time [ms]	Transmission Occurred	Result [ms]	Limit [ms]
914.5	3.46	39	134.94	400

3.5.9 Limit

Less than 0.4 seconds within 20 seconds period.

3.5.10 Plots of channel occupation

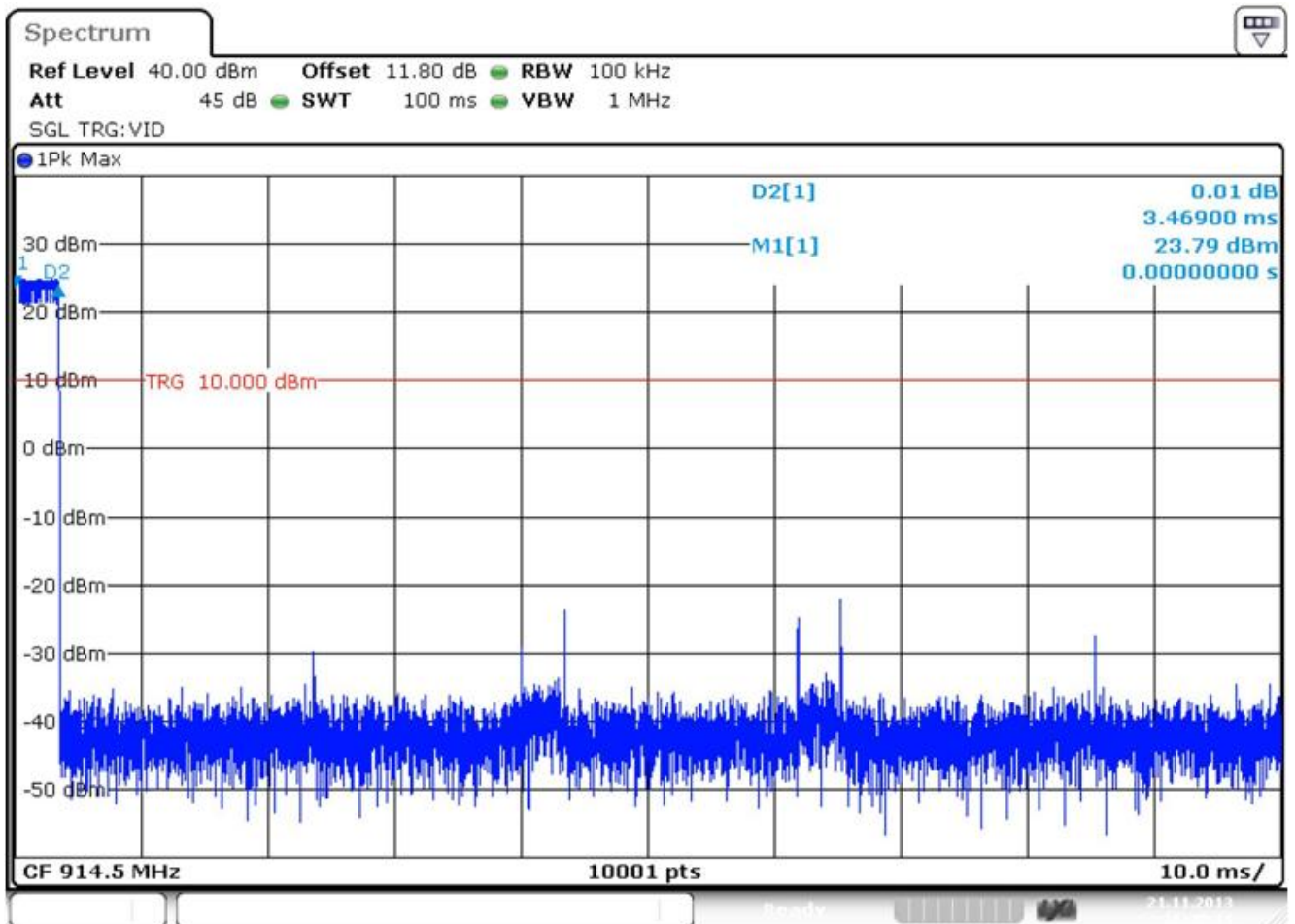
3.5.10.1 Within 20 seconds period



Operating frequency : Full hopping
RBW : 100 kHz
VBW : 1 MHz
Detector mode : Peak
Trace mode : Max Hold
Sweep time : 20 s

Number of channel within 20 s : 39

3.5.10.2 Dwell time



Operating frequency : Full hopping

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

Trace mode : View

Sweep time : 10 ms

Dwell time : 3.46 ms

3.6 Maximum peak output power

3.6.1 Definitions

Maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

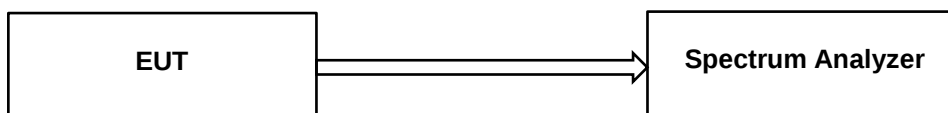
3.6.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(b)(2)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.4

3.6.3 Measurement method

- Public Notice "DA 00-705"

3.6.4 Set-up



3.6.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.6.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Sets RBW 1 MHz, VBW 20 MHz, Max hold

3.6.7 Test condition

- Test place : Test room
- Test environment : 23.3 °C, 48 % R.H.
- Test mode : Operation at full hopping

3.6.8 Test result

Frequency [MHz]	Peak Power				Average Power				Limit [W]
	DC 12V [dBm]	DC 12V [W]	DC 24V [dBm]	DC 24V [W]	DC 12V [dBm]	DC 12V [W]	DC 24V [dBm]	DC 24V [W]	
902.5	24.22	0.2642	24.70	0.2951	23.06	0.2023	22.94	0.1967	1.00
914.5	24.66	0.2924	25.07	0.3213	23.57	0.2275	23.55	0.2264	1.00
927.5	24.29	0.2685	24.44	0.2779	23.23	0.2103	22.94	0.1967	1.00

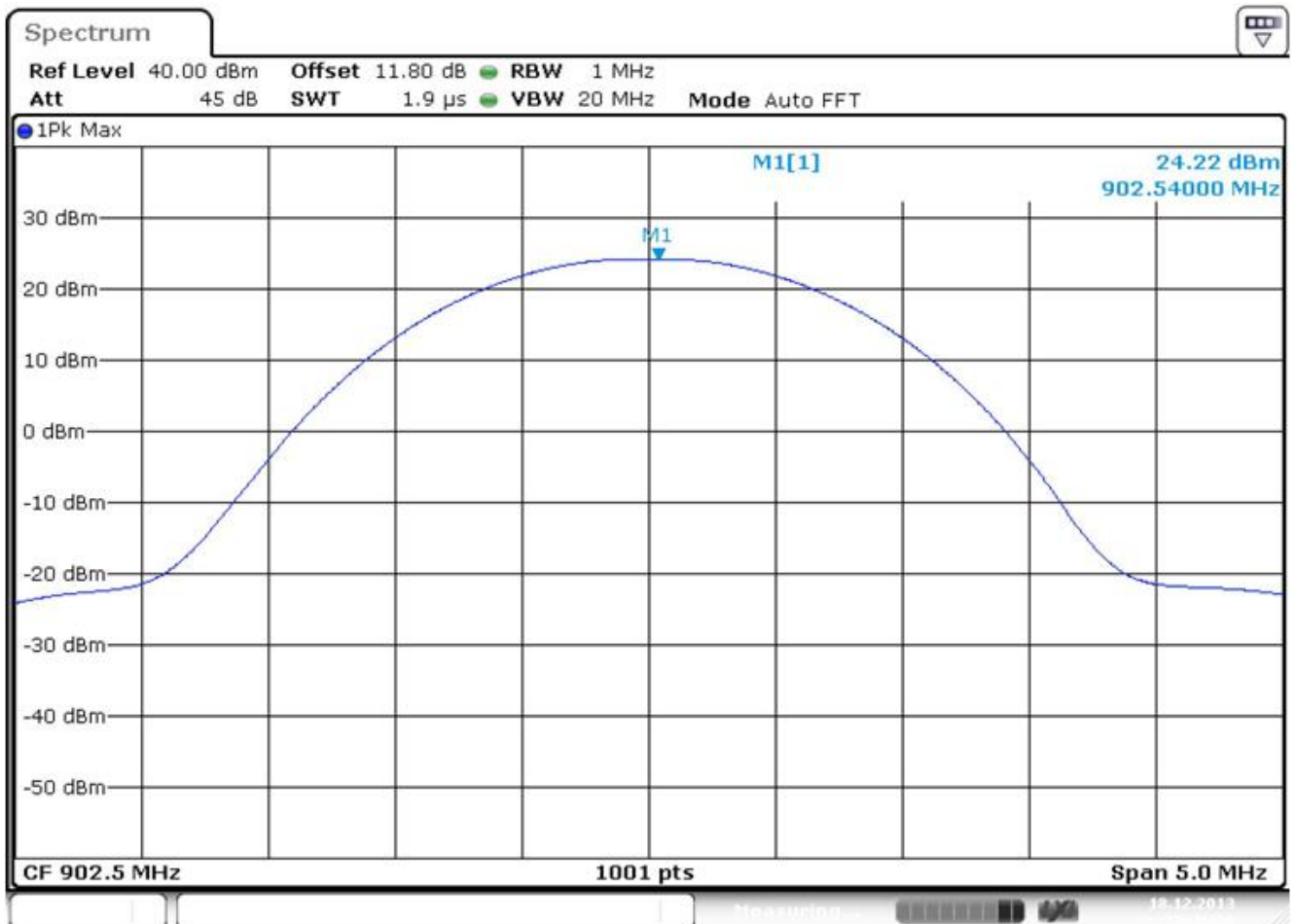
3.6.9 Limit

For frequency hopping systems operating in the 902 ~ 928 MHz band: 1 watt for systems employing at least 50 hopping channels.

3.6.10 Plots of peak output power

3.6.10.1 DC Power 12.0 V

3.6.10.1.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 1 MHz

VBW : 20 MHz

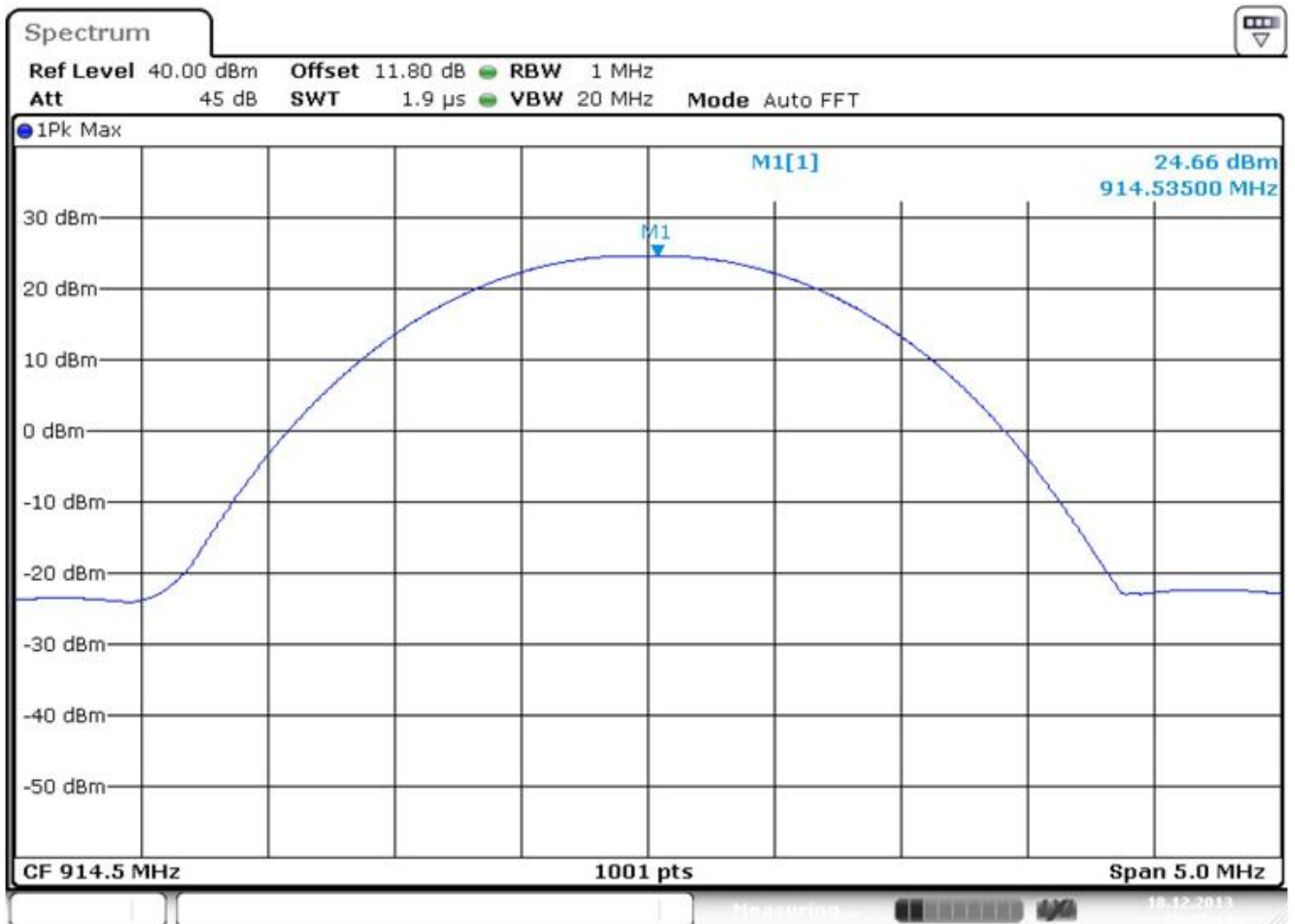
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Output power : 24.22 dBm (=0.2642 W)

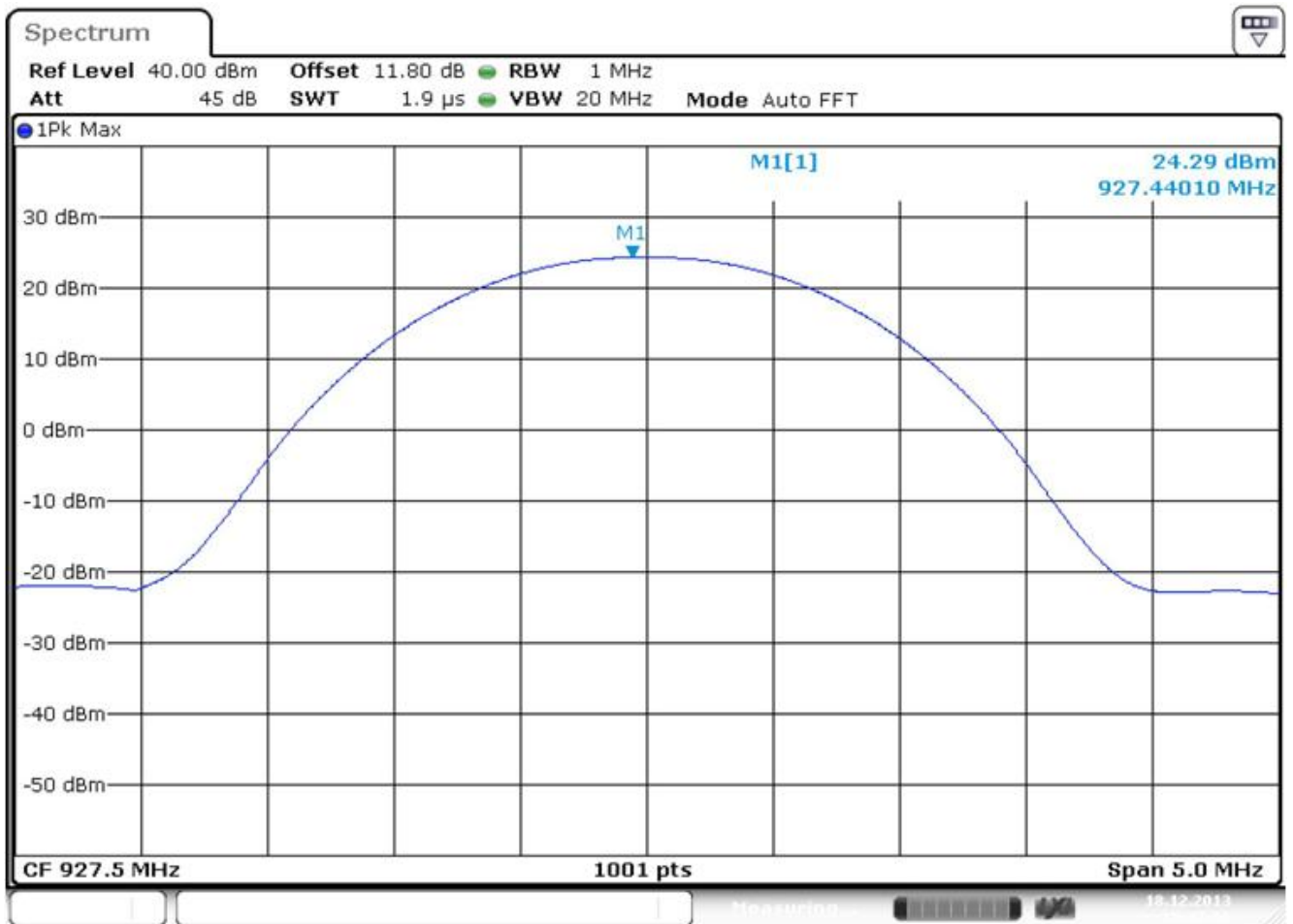
3.6.10.1.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 24.66 dBm (=0.2924 W)

3.6.10.1.3 Channel 51

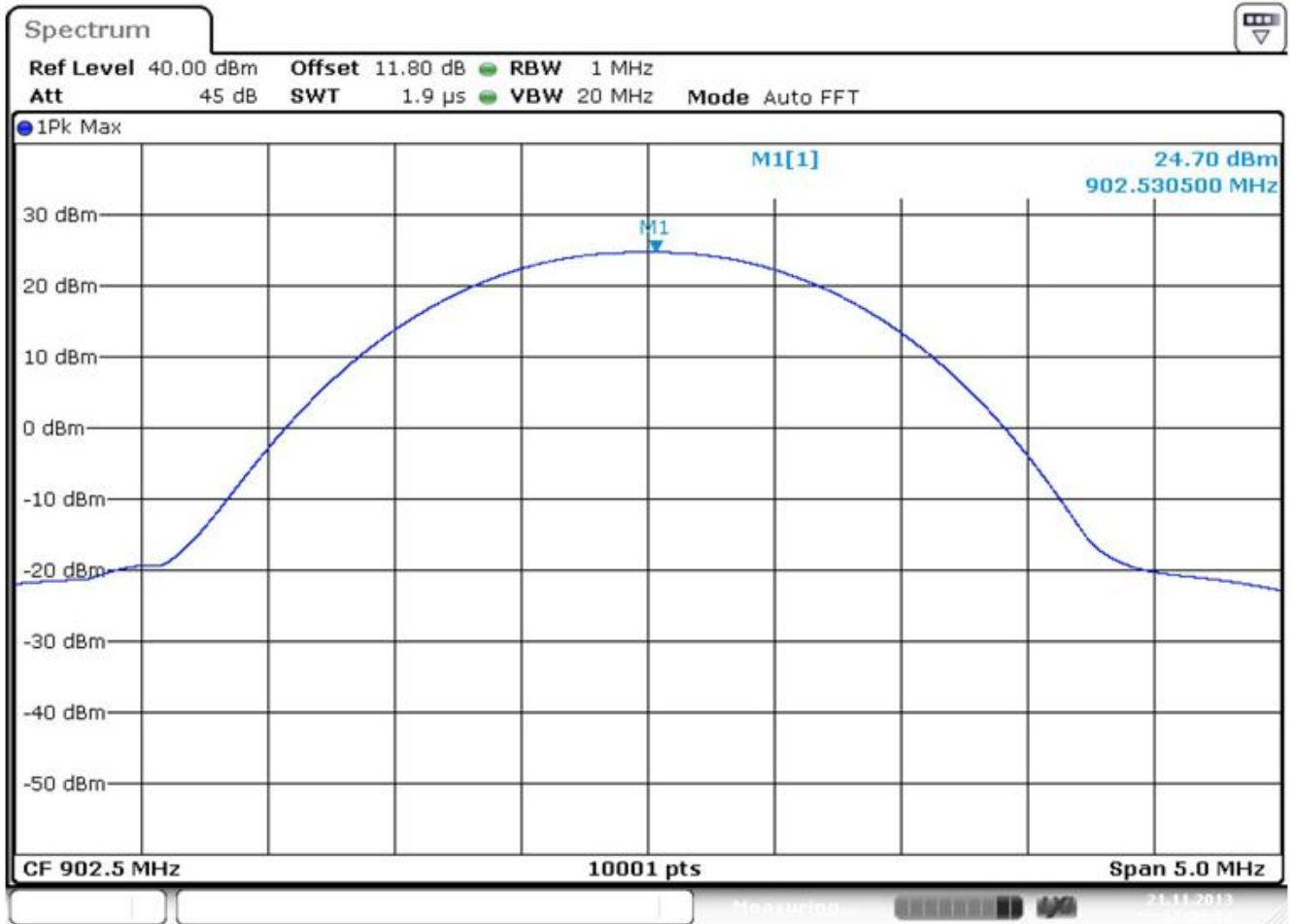


Operating frequency : 927.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 24.29 dBm (=0.2685 W)

3.6.10.2 DC Power 24.0 V

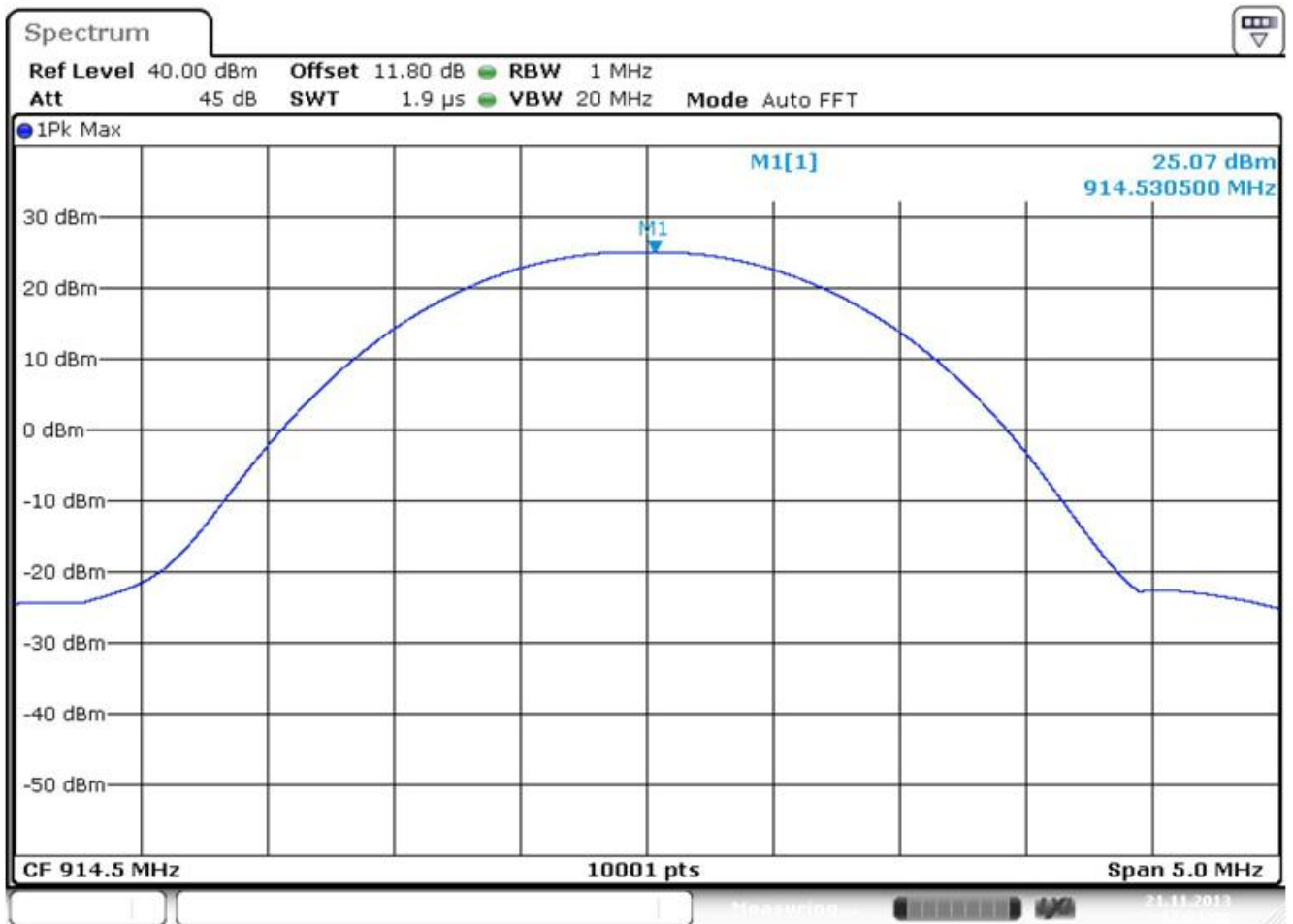
3.6.10.2.1 Channel 1



Operating frequency : 902.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 24.70 dBm (=0.2951 W)

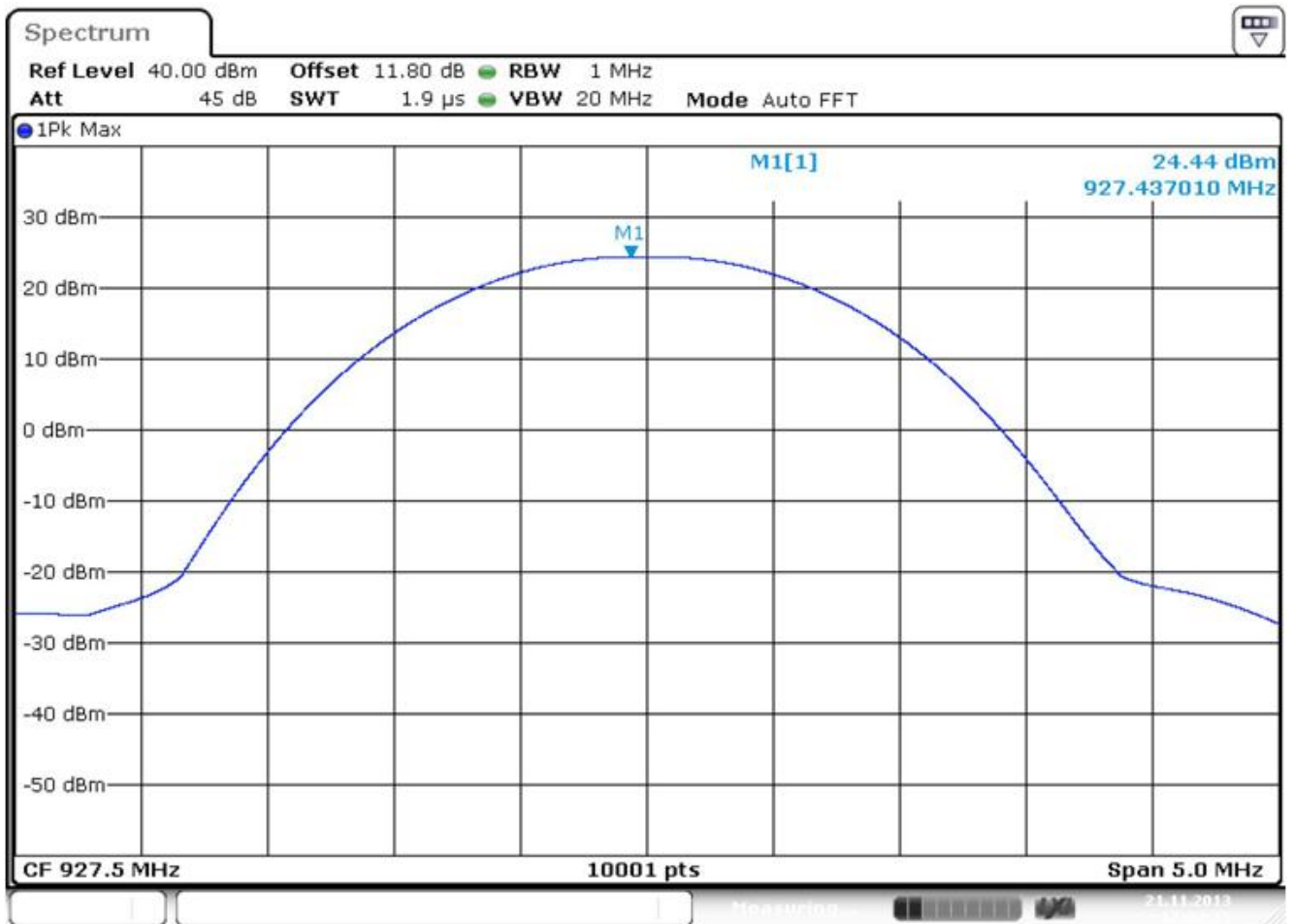
3.6.10.2.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 25.07 dBm (=0.3213 W)

3.6.10.2.3 Channel 51



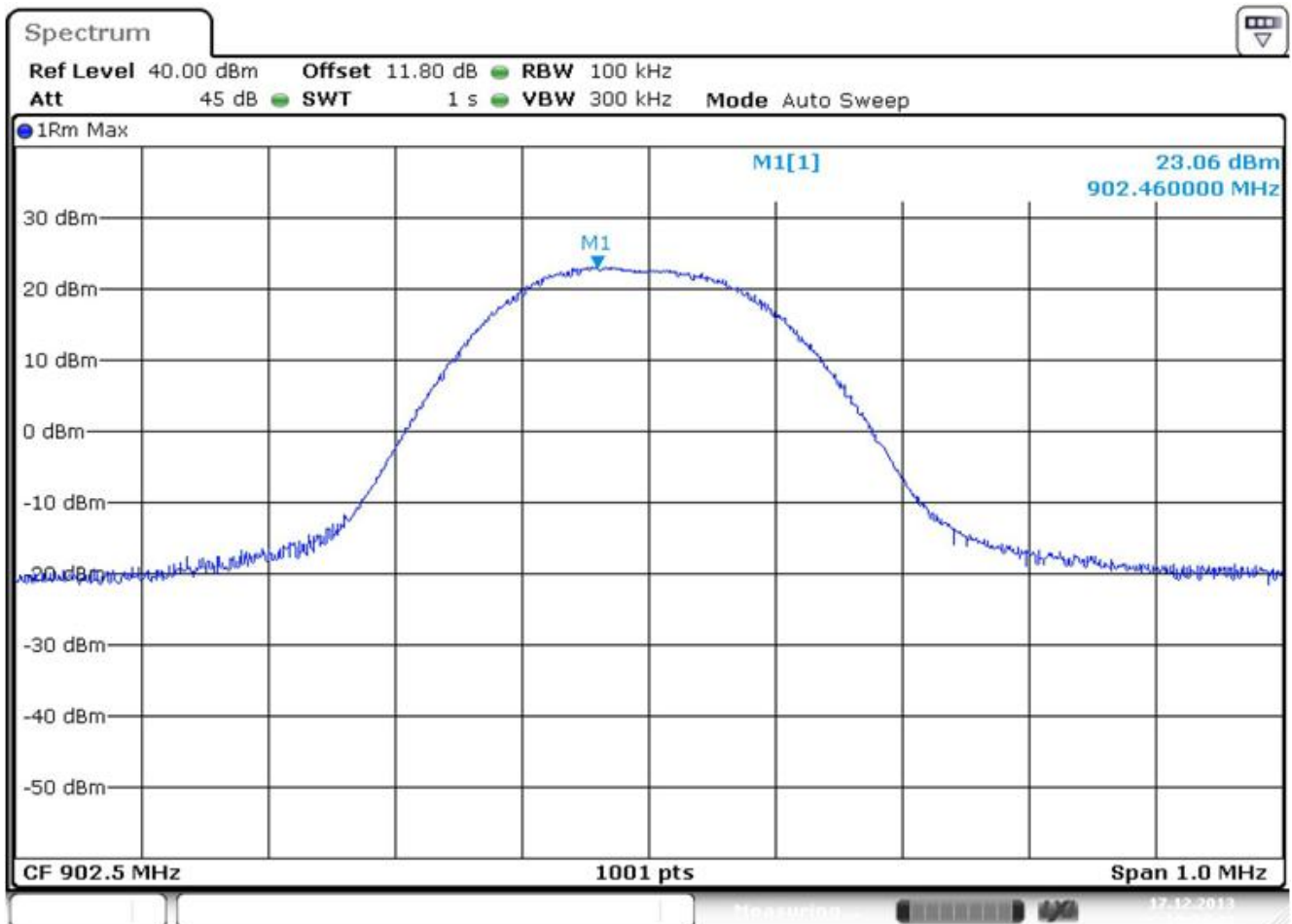
Operating frequency : 927.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 24.44 dBm (=0.2779 W)

3.6.11 Plots of average output power

3.6.11.1 DC Power 12.0 V

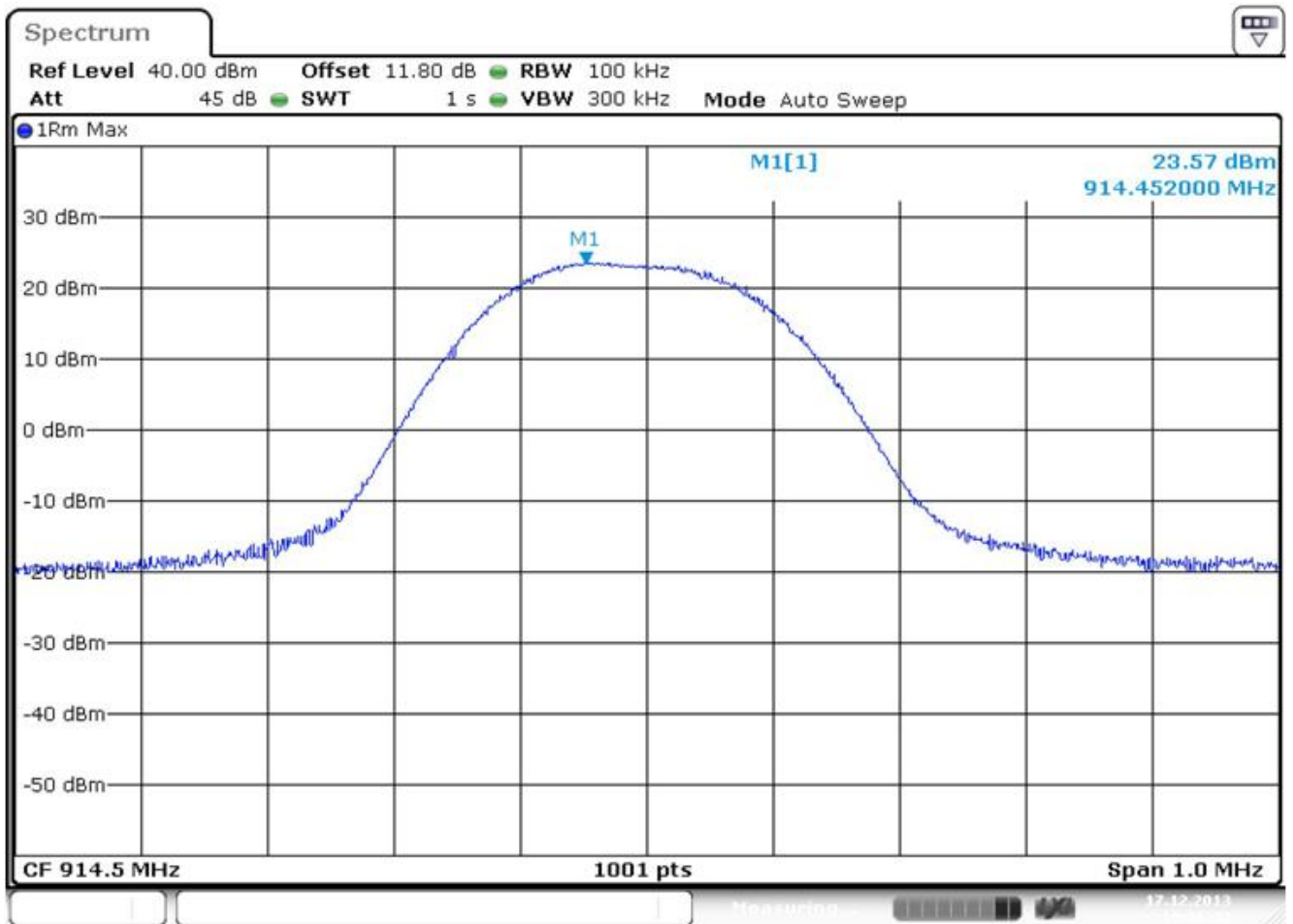
3.6.11.1.1 Channel 1



Operating frequency : 902.5 MHz
RBW : 100 kHz
VBW : 300 kHz
Detector mode : RMS
Trace mode : Max hold
Sweep time : Auto

Output power : 23.06 dBm (=0.2023 W)

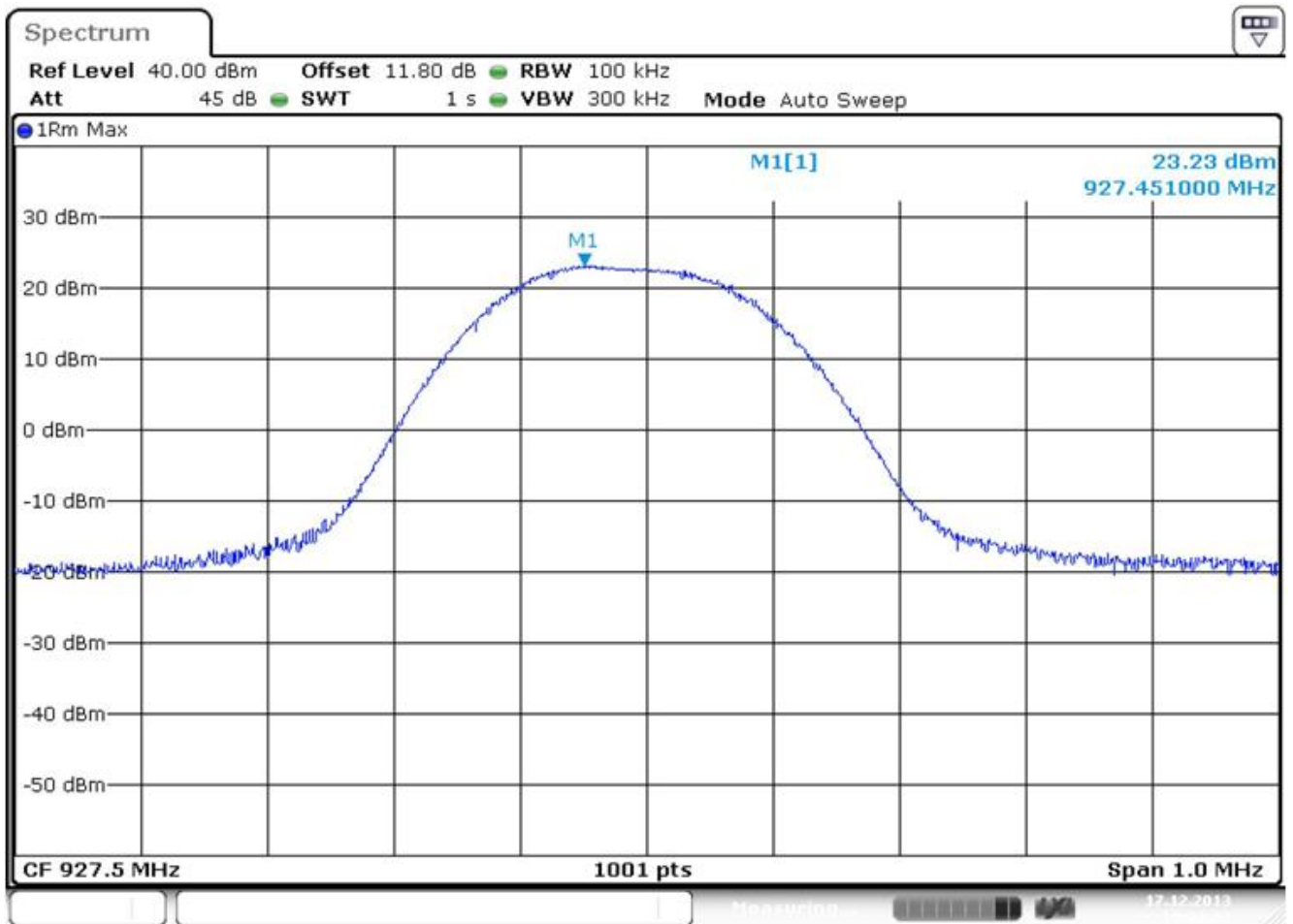
3.6.11.1.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 100 kHz
VBW : 300 kHz
Detector mode : RMS
Trace mode : Max hold
Sweep time : Auto

Output power : 23.57 dBm (=0.2275 W)

3.6.11.1.3 Channel 51

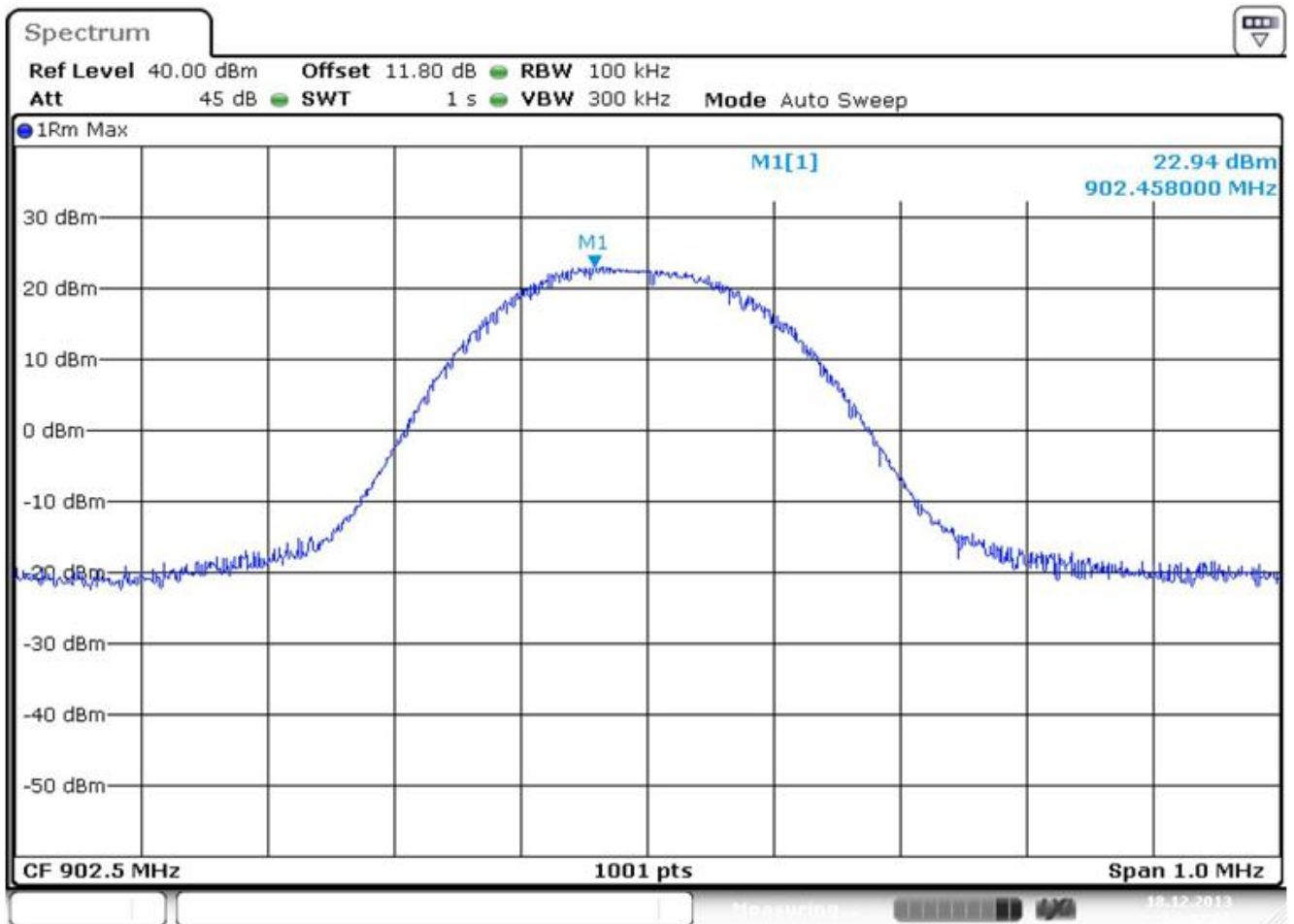


Operating frequency : 927.5 MHz
RBW : 1 MHz
VBW : 20 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Output power : 23.23 dBm (=0.2103 W)

3.6.11.2 DC Power 24.0 V

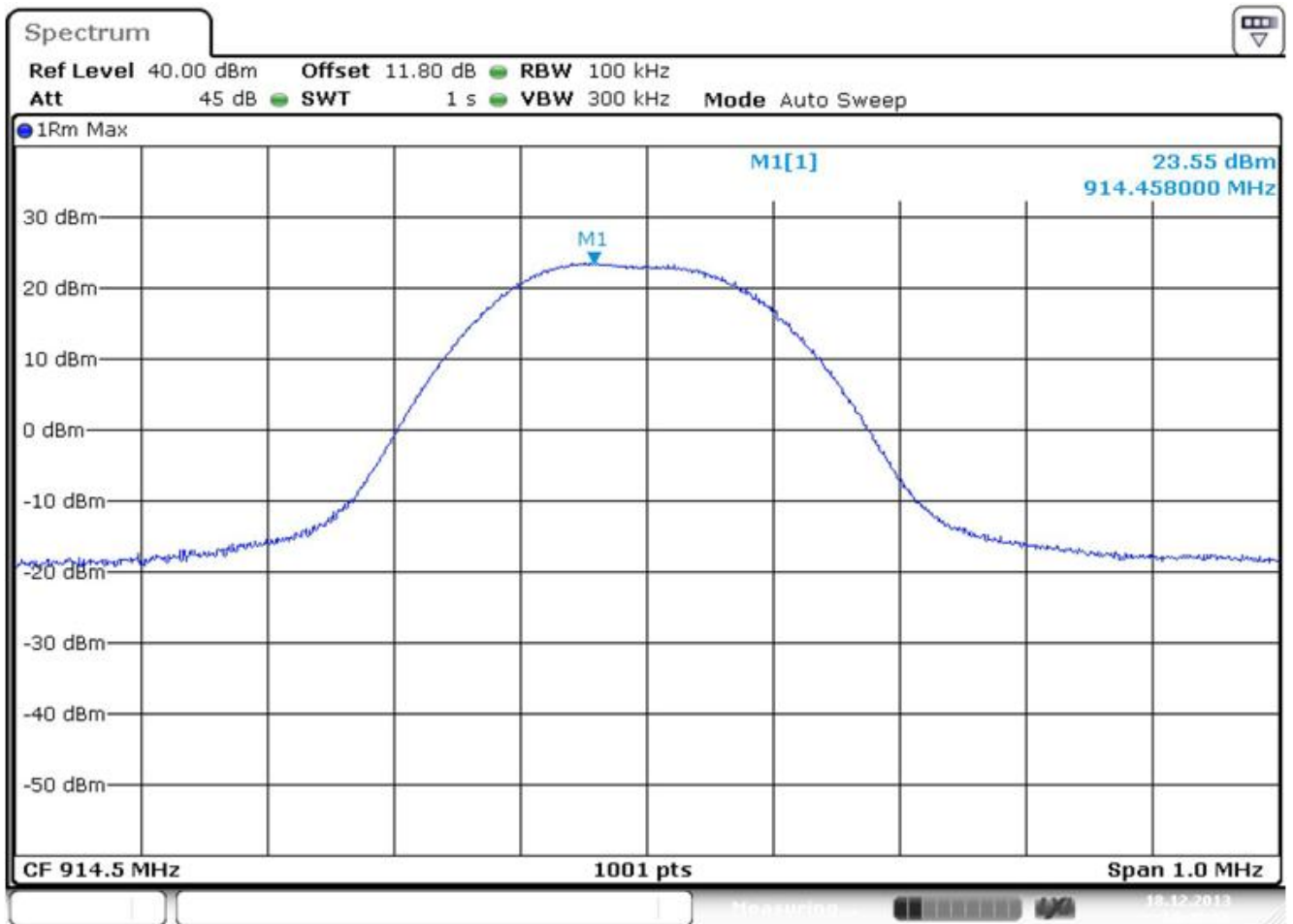
3.6.11.2.1 Channel 1



Operating frequency : 902.5 MHz
RBW : 100 kHz
VBW : 300 kHz
Detector mode : RMS
Trace mode : Max hold
Sweep time : Auto

Output power : 22.94 dBm (=0.1967 W)

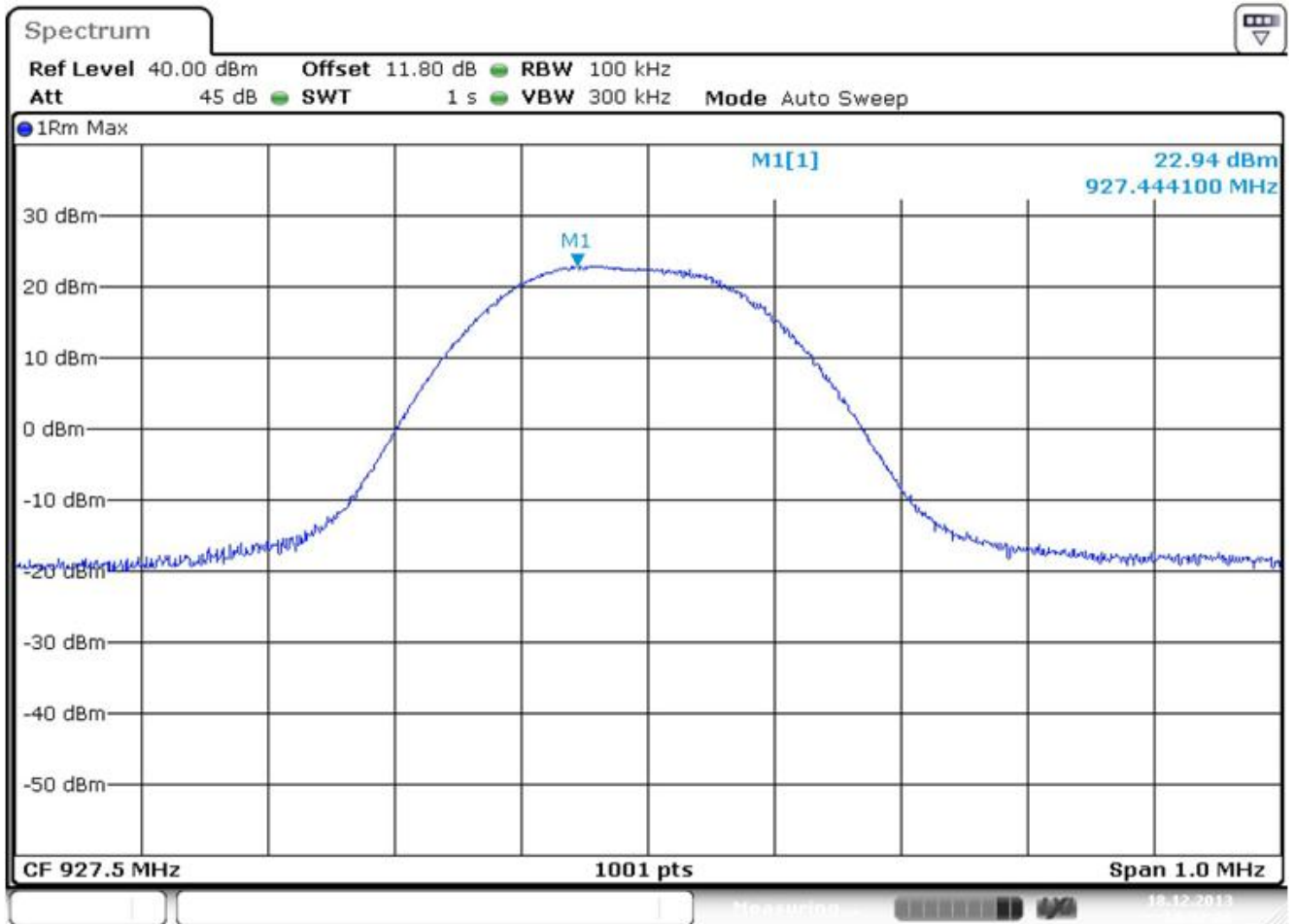
3.6.11.2.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 100 kHz
VBW : 300 kHz
Detector mode : RMS
Trace mode : Max hold
Sweep time : Auto

Output power : 23.55 dBm (=0.2264 W)

3.6.11.2.3 Channel 51



Operating frequency : 927.5 MHz
RBW : 100 kHz
VBW : 300 kHz
Detector mode : RMS
Trace mode : Max hold
Sweep time : Auto

Output power : 22.94 dBm (=0.1967 W)

3.7 Conducted emission and band edge

3.7.1 Definitions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted measurement.

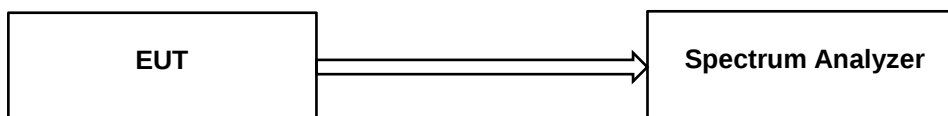
3.7.2 Specification

- FCC Rules Part 15 Subpart C Section 15.247(d)
- IC Rules RSS-210 Issue8 Annex 8-2010 A8.5

3.7.3 Measurement method

- Public Notice "DA 00-705"

3.7.4 Set-up



3.7.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	ARB-HT3G RX	Trinus Systems Inc.
Spectrum analyzer	FSV	Rohde & Schwarz

3.7.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Sets RBW 100 kHz, VBW 1 MHz, Max hold

3.7.7 Test condition

- Test place : Test room
- Test environment : 23.2 °C, 47 % R.H.
- Test mode : Operation at full hopping

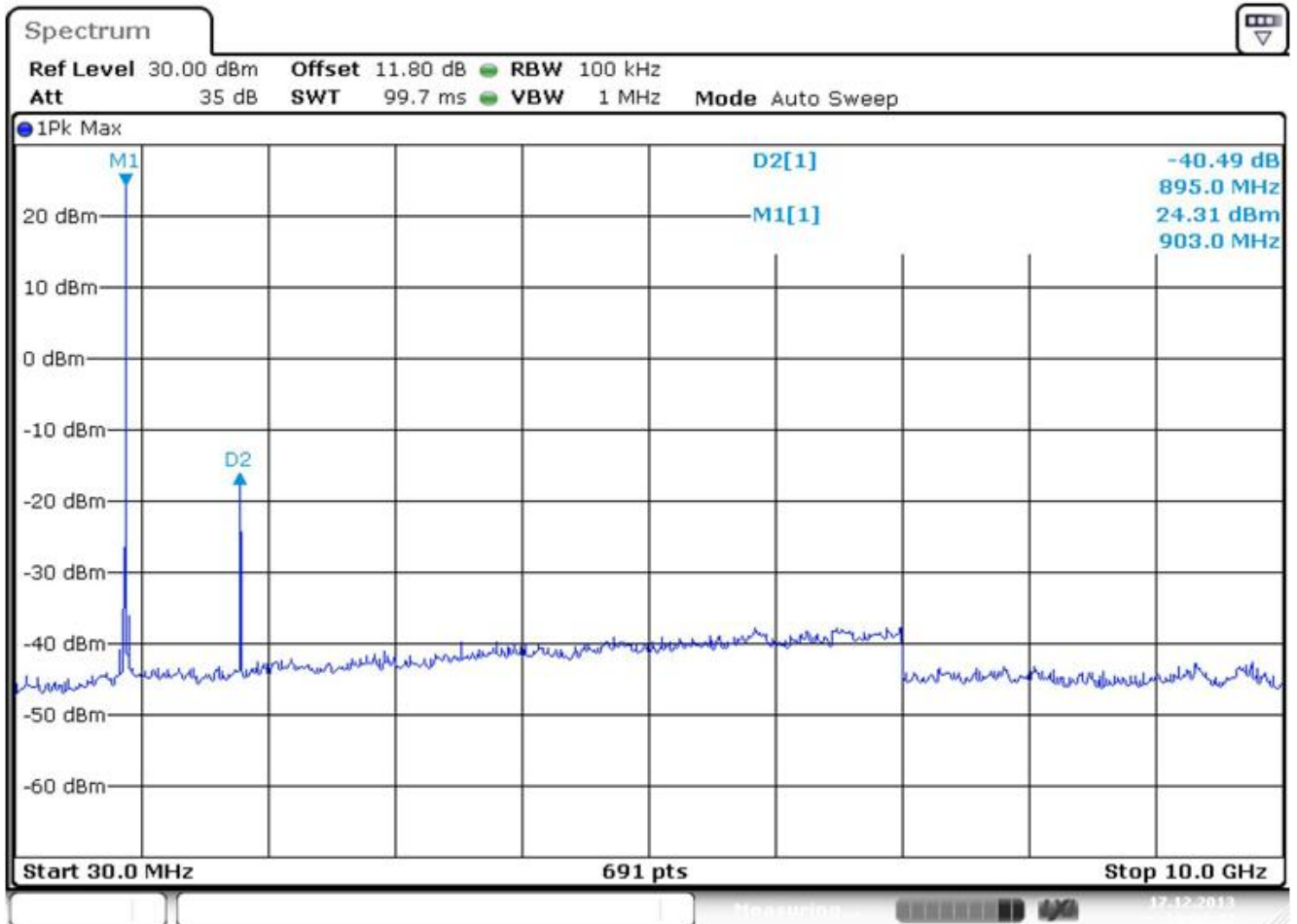
3.7.8 Limit

Less than 20 dBc.

3.7.9 Plots of conducted emission & band edge

3.7.9.1 DC Power 12.0 V

3.7.9.1.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 100 kHz

VBW : 1 MHz

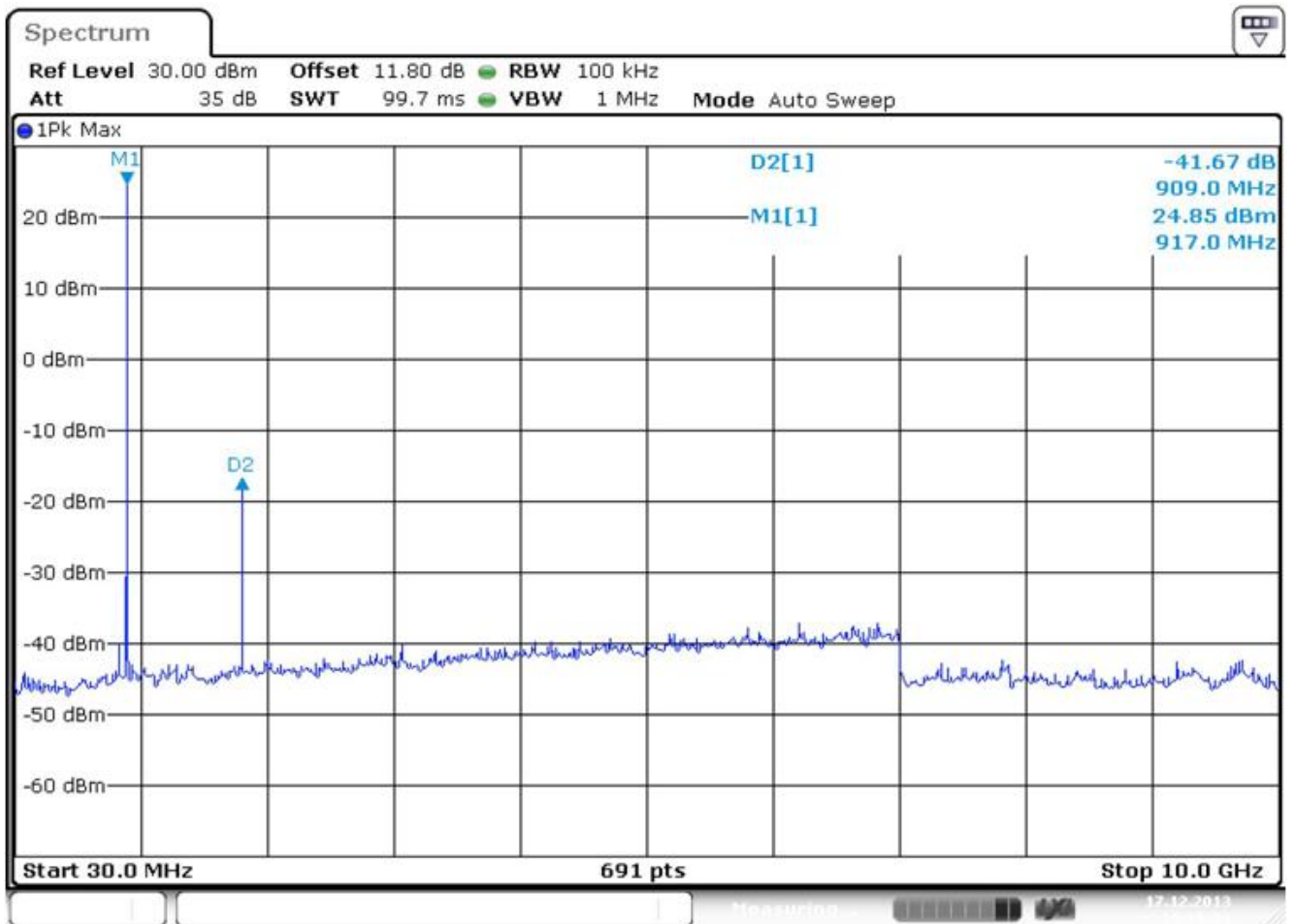
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Spurious emission (2nd harmonic) : 40.4 dBc

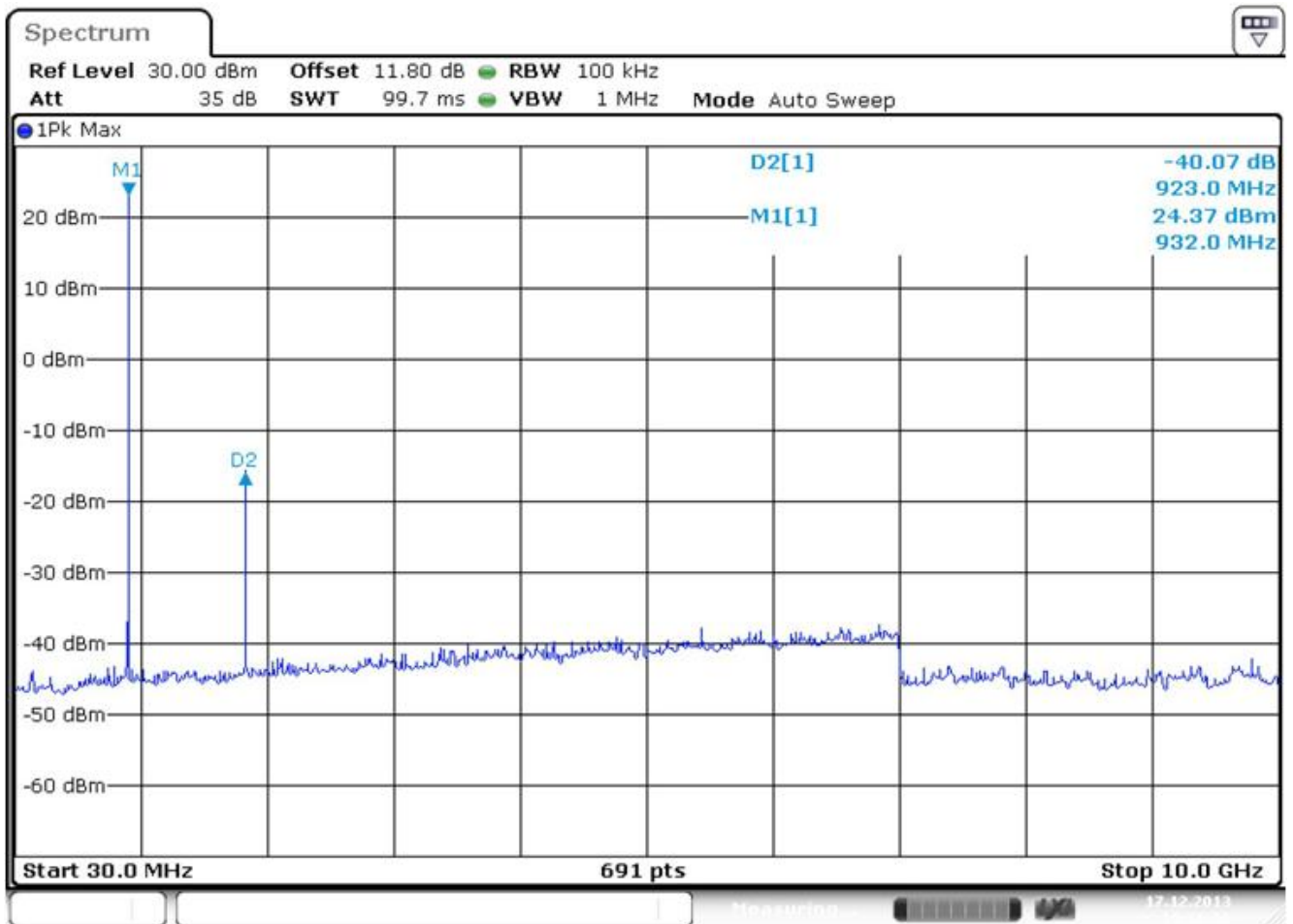
3.7.9.1.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 100 kHz
VBW : 1 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Spurious emission (2nd harmonic) : 41.6 dBc

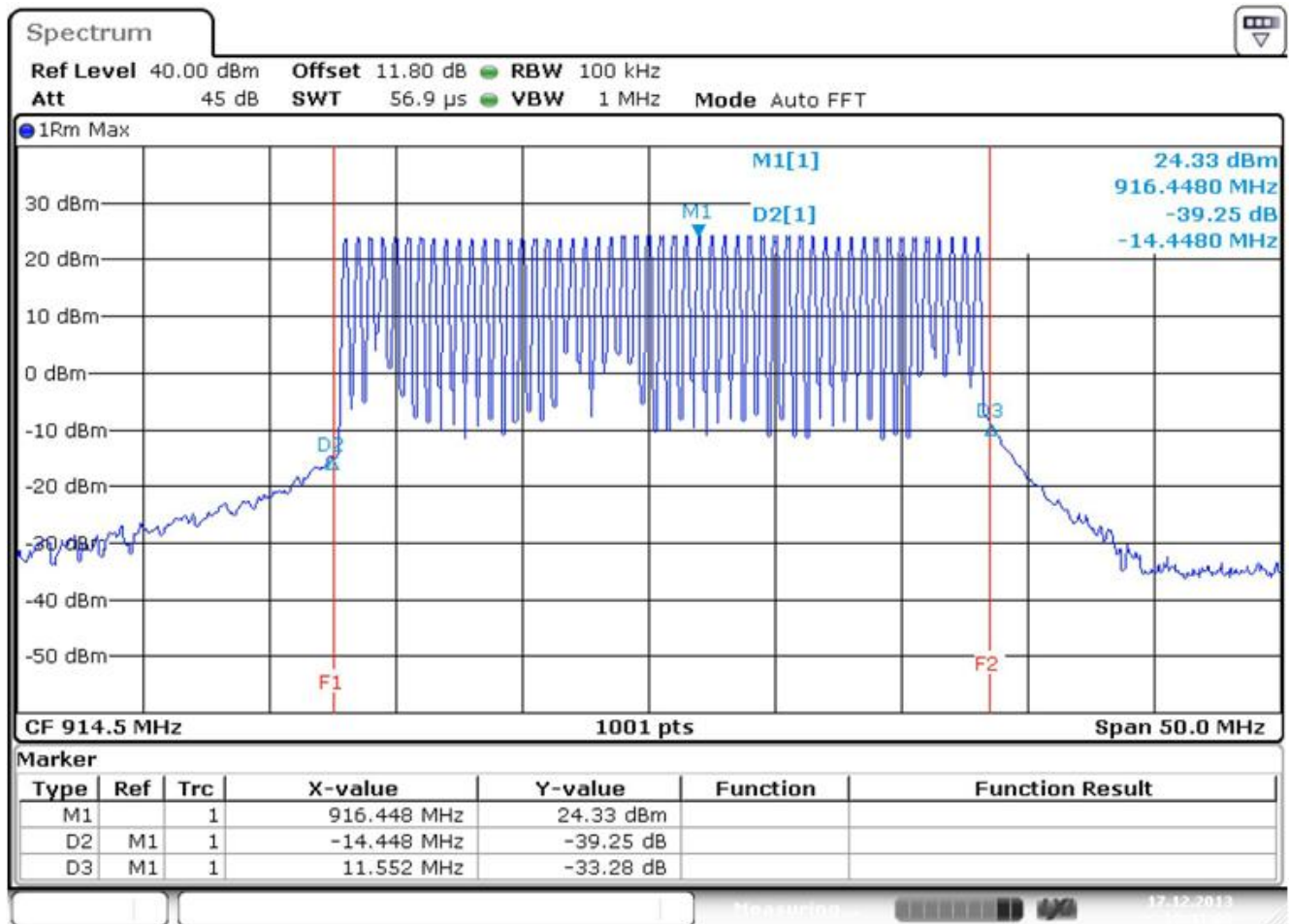
3.7.9.1.3 Channel 51



Operating frequency : 927.5 MHz
RBW : 100 kHz
VBW : 1 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Spurious emission (2nd harmonic) : 40.0 dBc

3.7.9.1.4 Band edge at full hopping mode



Operating frequency : Full hopping

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

Trace mode : Max hold

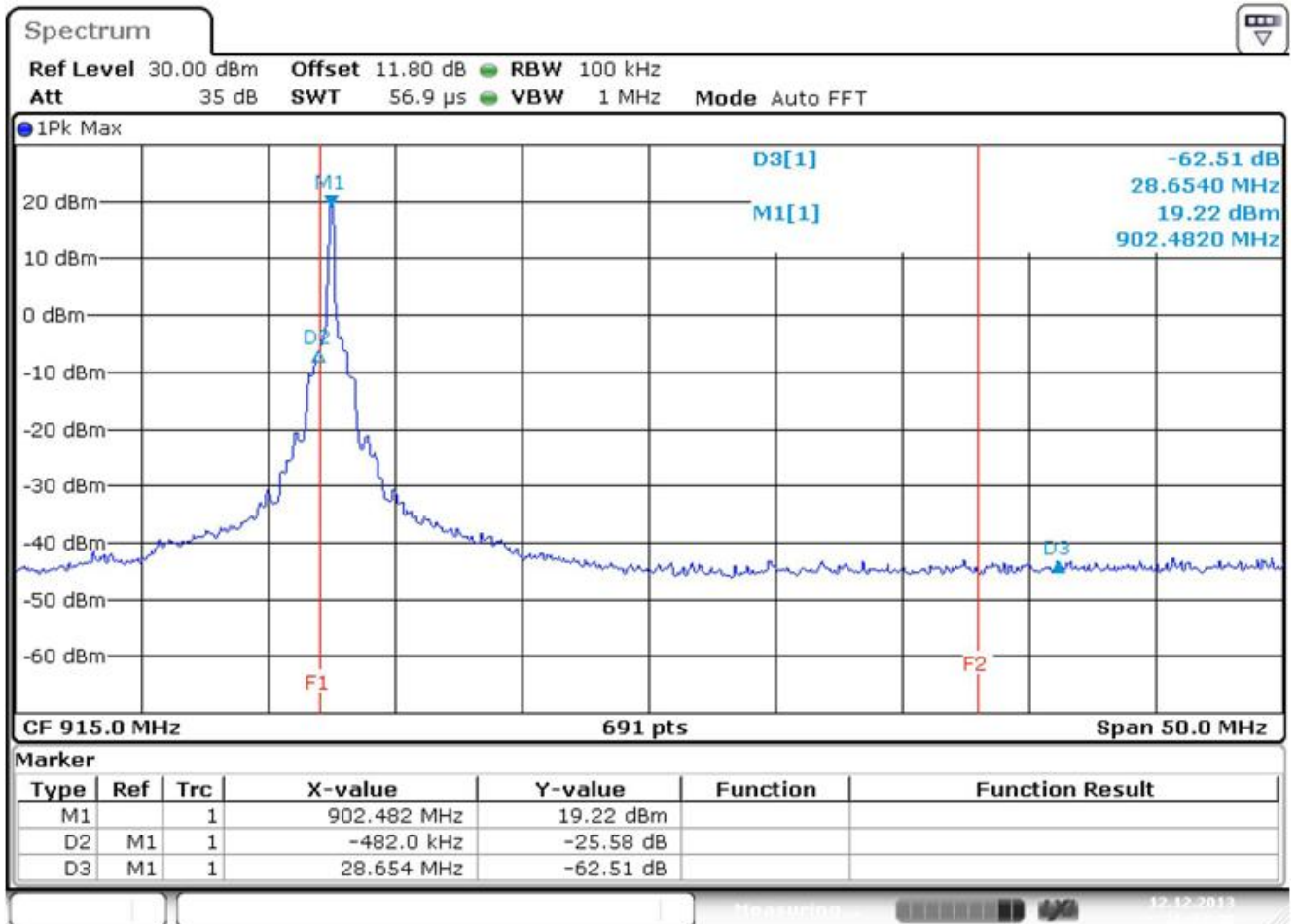
Sweep time : Auto

Lower band edge : 39.2 dBc

Upper band edge : 33.2 dBc

3.7.9.1.5 Band edge at Nomal mode

3.7.9.1.5.1 1 Channel



Operating frequency : 902.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

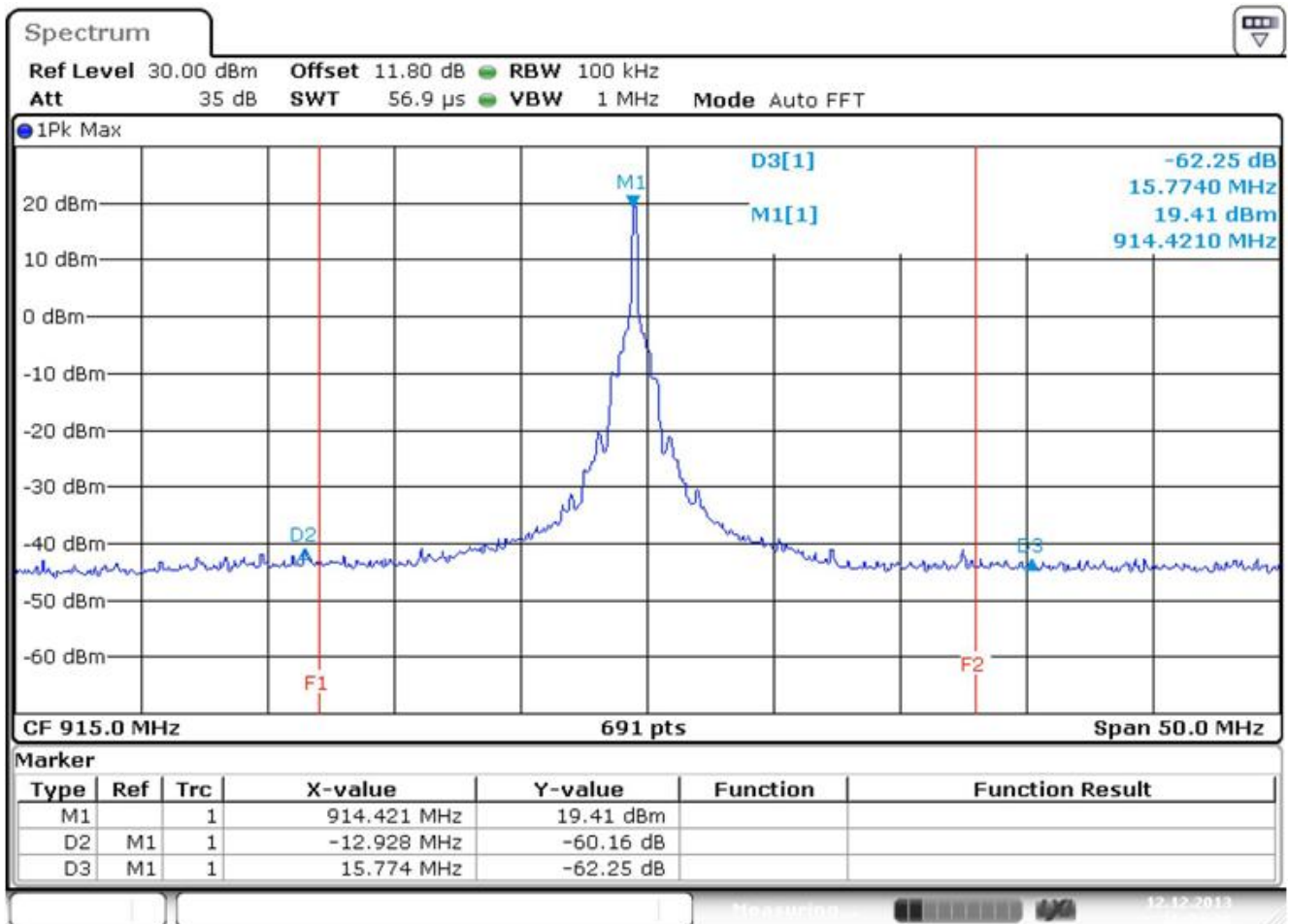
Trace mode : Max hold

Sweep time : Auto

Lower band edge : 25.5 dBc

Upper band edge : 62.5 dBc

3.7.9.5.1.2 25 Channel



Operating frequency : 914.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

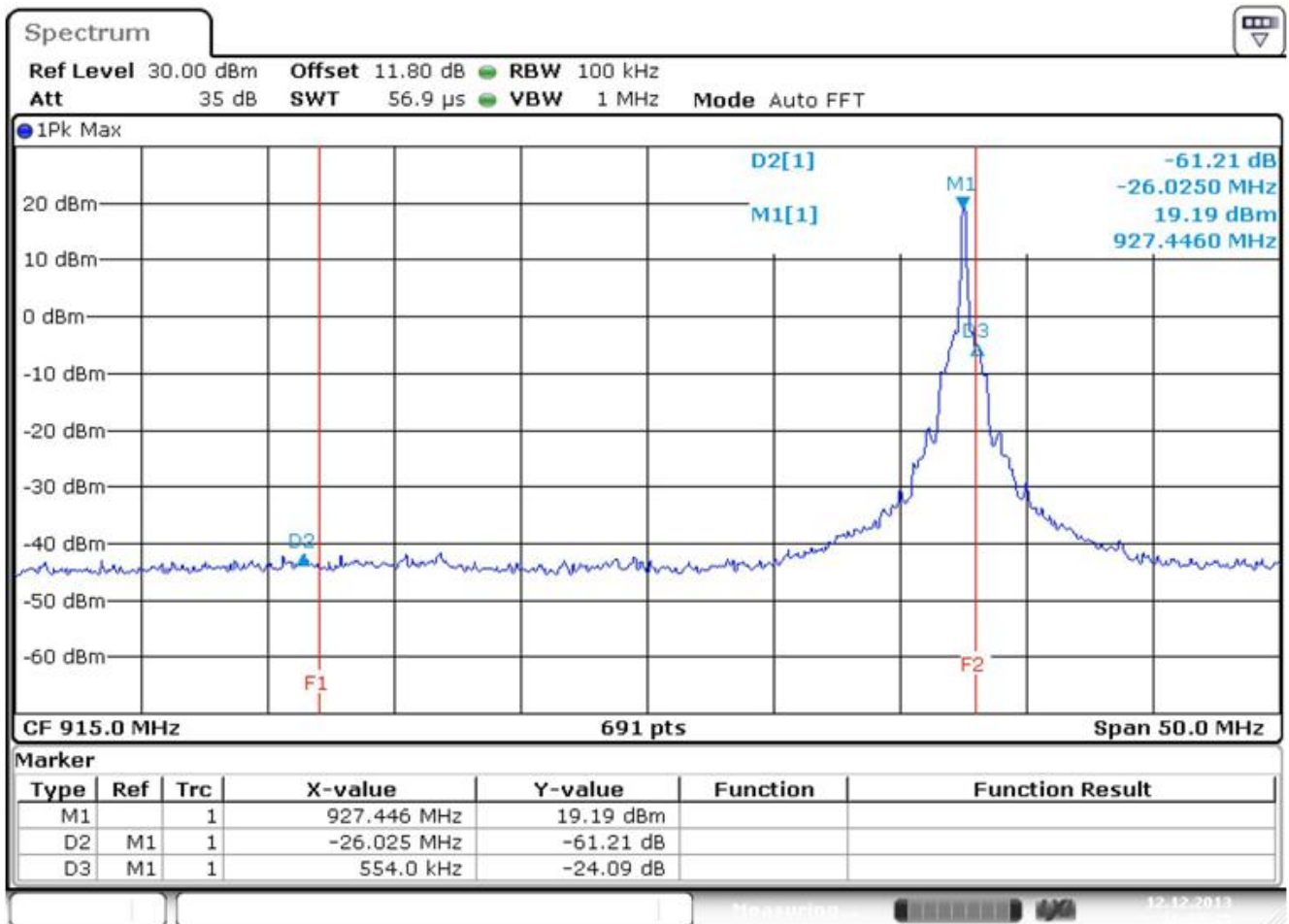
Trace mode : Max hold

Sweep time : Auto

Lower band edge : 60.1 dBc

Upper band edge : 62.2 dBc

3.7.9.1.5.3 51 Channel



Operating frequency : 927.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

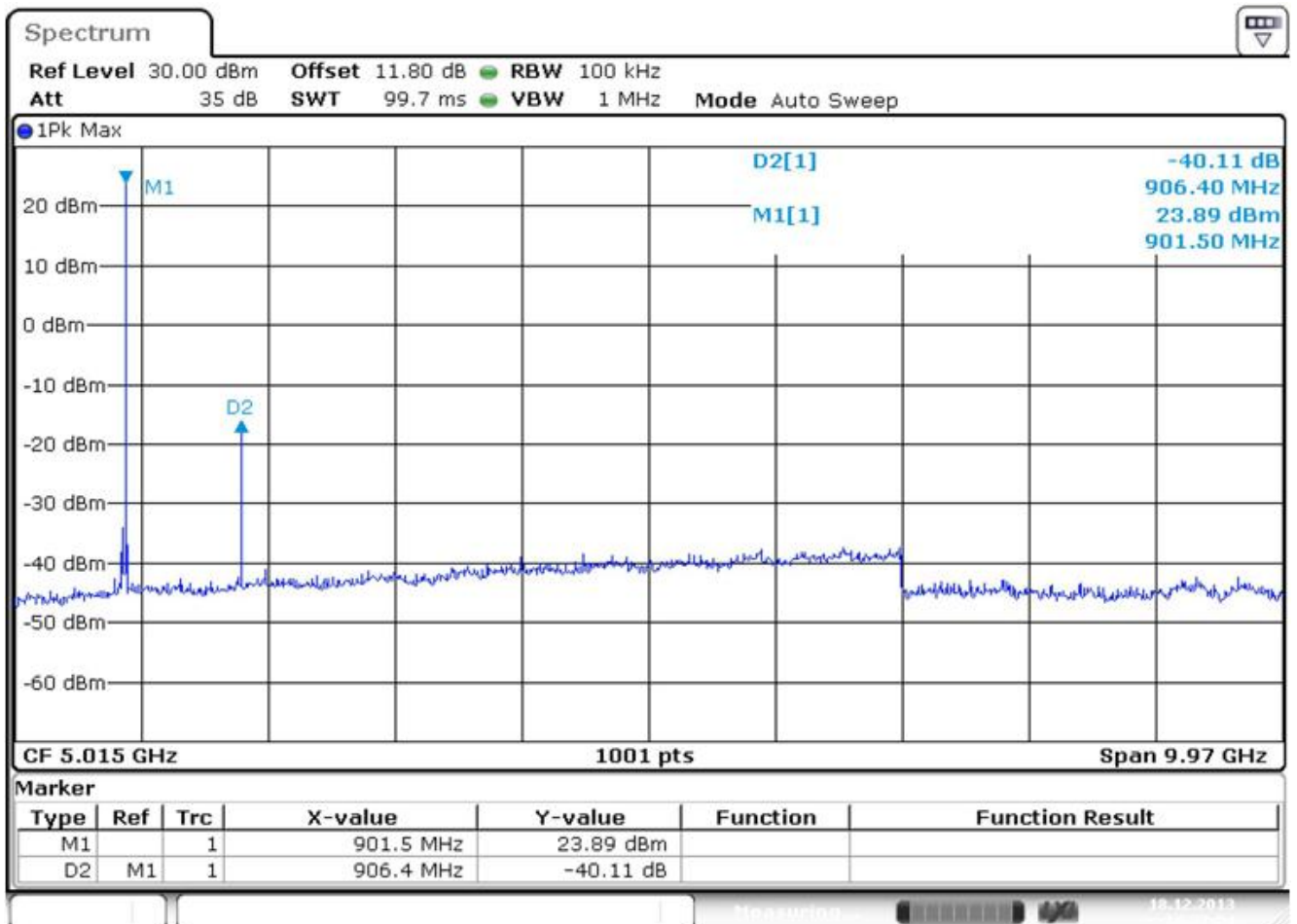
Lower band edge : 61.2 dBc

Upper band edge : 24.0 dBc

3.7.9 Plots of conducted emission & band edge

3.7.9.2 DC Power 24.0 V

3.7.9.2.1 Channel 1



Operating frequency : 902.5 MHz

RBW : 100 kHz

VBW : 1 MHz

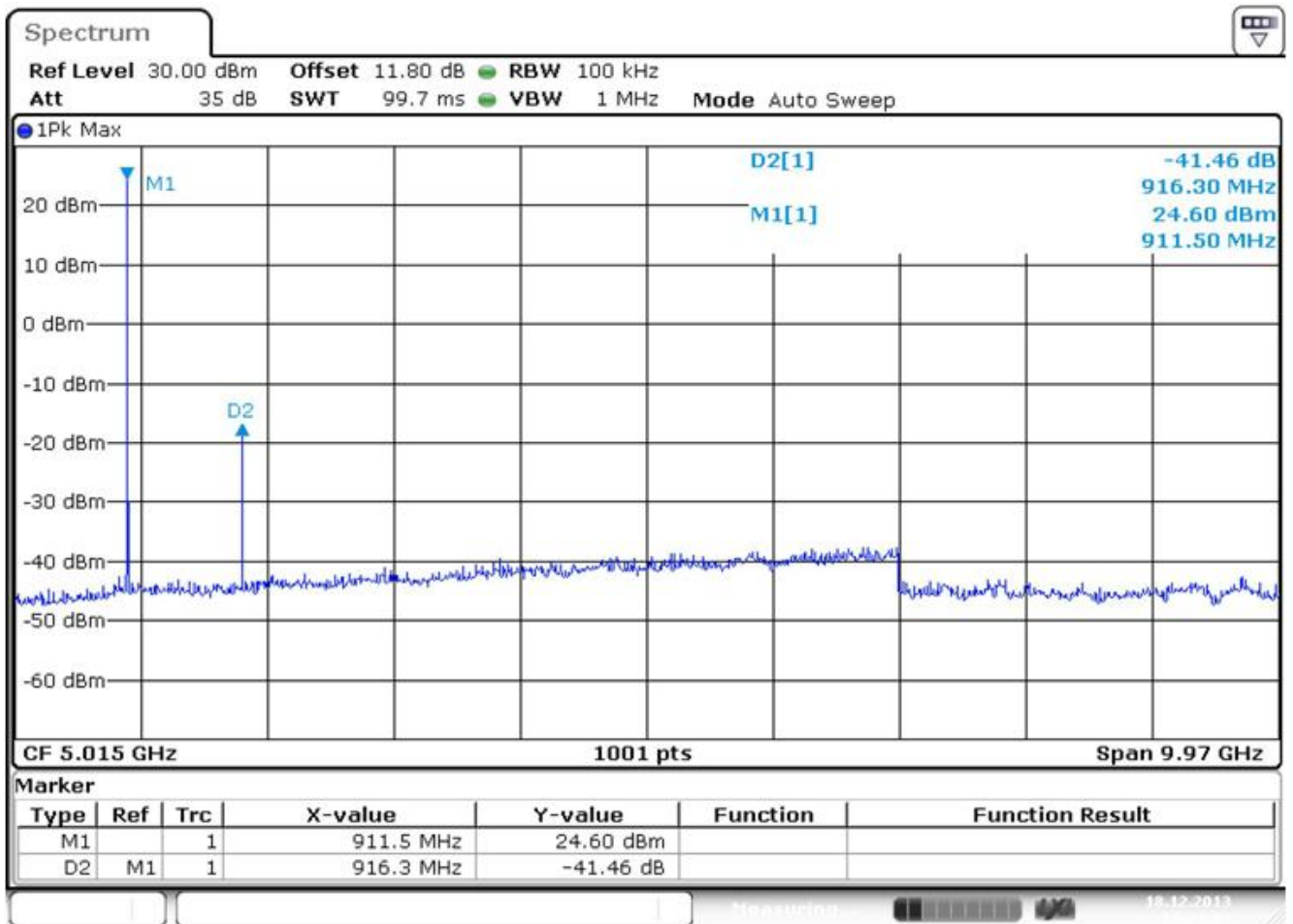
Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Spurious emission (2nd harmonic) : 40.1 dBc

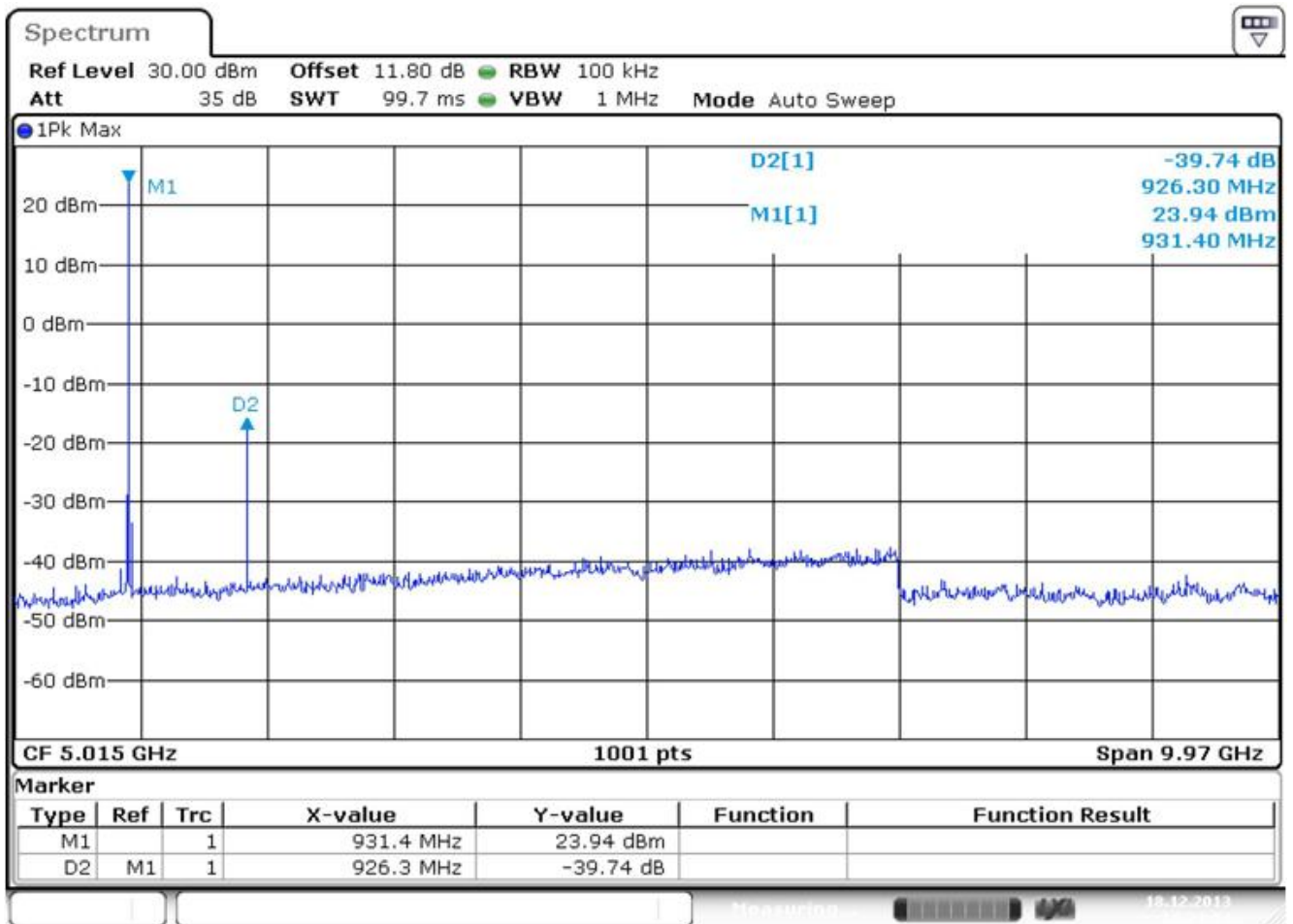
3.7.9.2.2 Channel 25



Operating frequency : 914.5 MHz
RBW : 100 kHz
VBW : 1 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Spurious emission (2nd harmonic) : 41.4 dBc

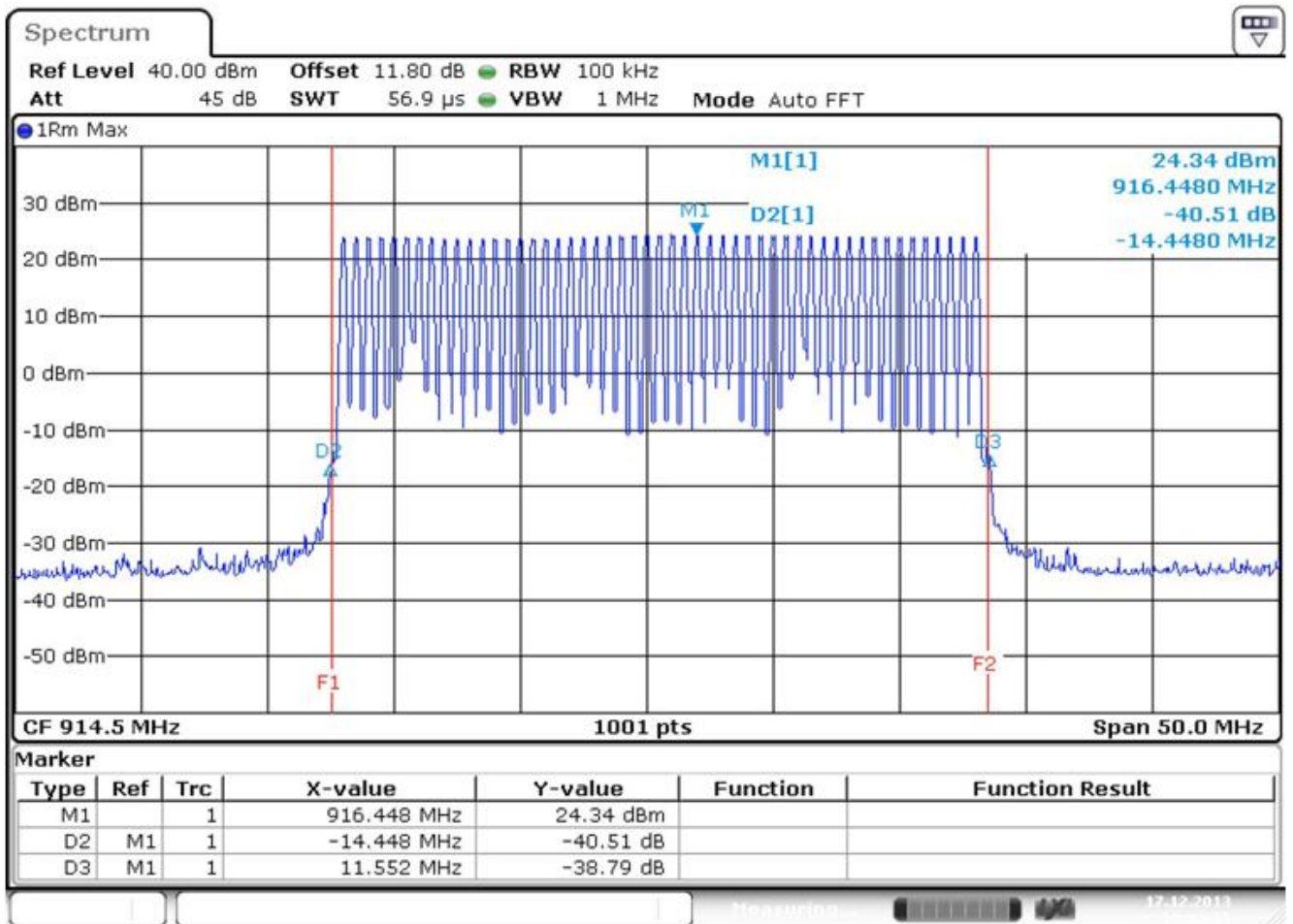
3.7.9.2.3 Channel 51



Operating frequency : 927.5 MHz
RBW : 100 kHz
VBW : 1 MHz
Detector mode : Peak
Trace mode : Max hold
Sweep time : Auto

Spurious emission (2nd harmonic) : 39.7 dBc

3.7.9.2.4 Band edge at full hopping mode



Operating frequency : Full hopping

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

Trace mode : Max hold

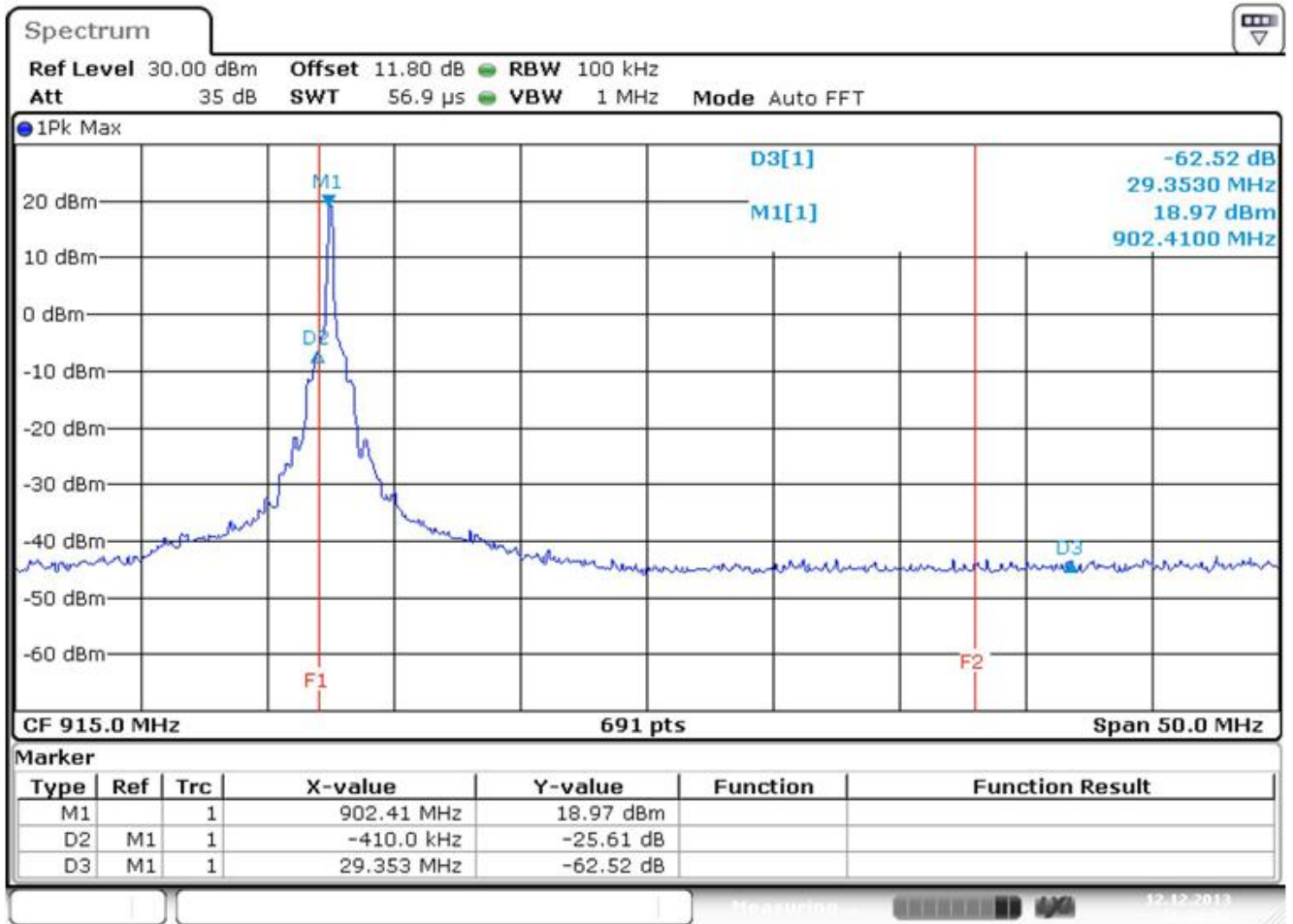
Sweep time : Auto

Lower band edge : 40.5 dBc

Upper band edge : 38.7 dBc

3.7.9.2.5 Band edge at Nomal mode

3.7.9.2.5.1 1 Channel



Operating frequency : 902.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

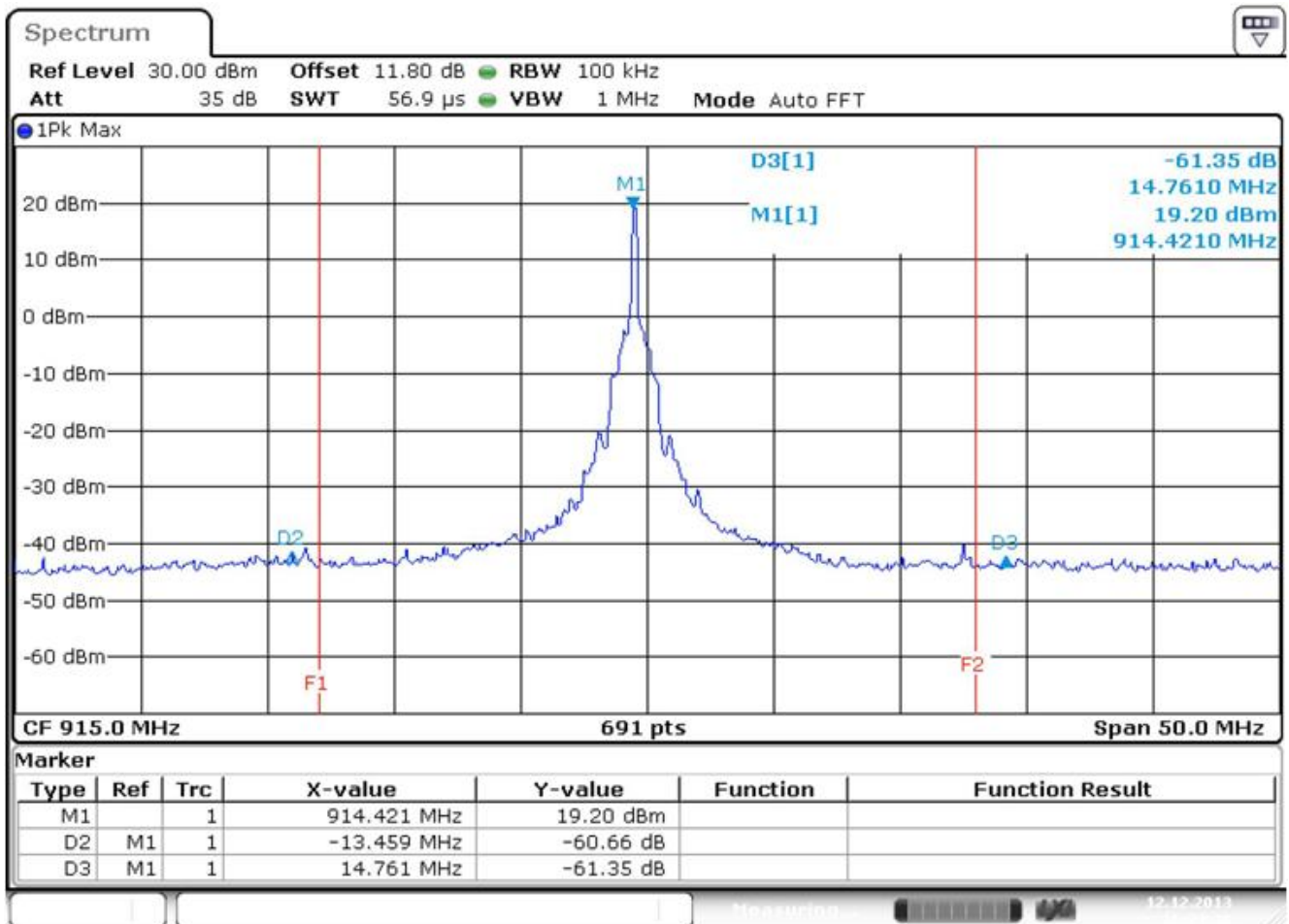
Trace mode : Max hold

Sweep time : Auto

Lower band edge : 25.6 dBc

Upper band edge : 62.5 dBc

3.7.9.2.5.2 25 Channel



Operating frequency : 914.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

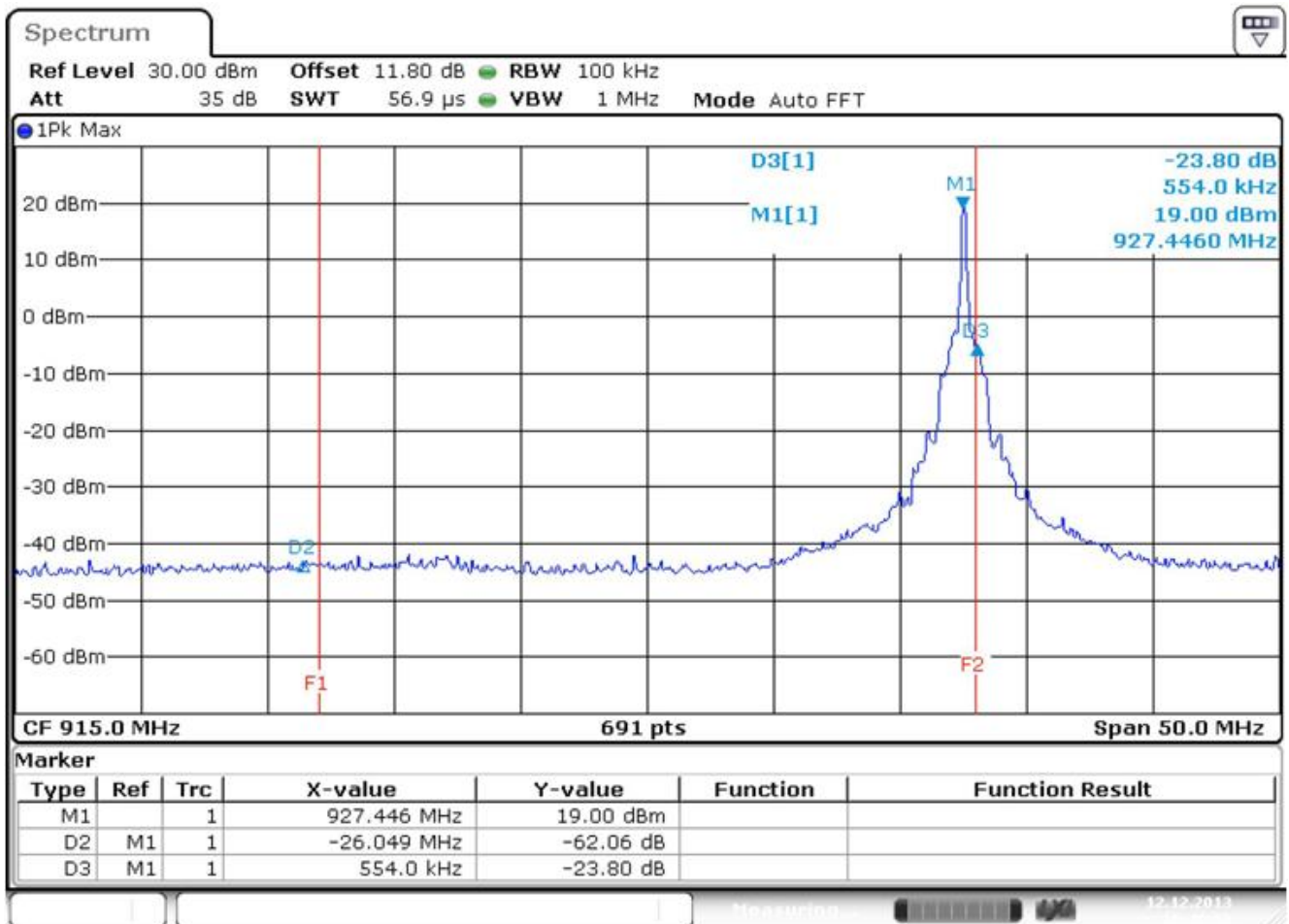
Trace mode : Max hold

Sweep time : Auto

Lower band edge : 60.6 dBc

Upper band edge : 61.3 dBc

3.7.9.2.5.3 51 Channel



Operating frequency : 927.5 MHz

RBW : 100 kHz

VBW : 1 MHz

Detector mode : Peak

Trace mode : Max hold

Sweep time : Auto

Lower band edge : 62.0 dBc

Upper band edge : 23.8 dBc

4. Test equipment list

The listing below denotes the test equipment for the test(s).

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Due date
1	Spectrum analyzer	FSV	Rohde & Schwarz	101673	02/04/14
2	Test receiver	ESCI 7	Rohde & Schwarz	1166.5950.07	01/30/14
3	Power supply	E3633A	Agilent	SG40002272	01/28/14
4	Loop antenna	6502	EMCO	9609-9087	03/03/14
5	Biconical antenna	VHA9103	Schwarzbeck	2217	11/23/15
6	Log-Periodic antenna	VULP9118A	Schwarzbeck	382	11/23/15
7	Horn antenna	BBHA 9120 D	Schwarzbeck	395	08/07/14
8	Turn table	N/A	Daeil EMC	N/A	N/A
9	Antenna mast	EAM4.5	Daeil EMC	N/A	N/A
10	Controller	DE200	Daeil EMC	AAA69813111	N/A