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CNASL1225

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**TRE1309009701 R/C:82060**
FCC ID .....:	**RVZHYM730**
Compiled by (position+printed name+signature)..:	File administrators Jerome Luo
Supervised by (position+printed name+signature)..:	Test Engineer Yuchao Wang
Approved by (position+printed name+signature)..:	Manager Wenliang Li
Date of issue.....:	Nov 28, 2013
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address .....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**Winnix Technologies Co., Limited**
Address .....:	4/F R2-B Building,Hi-tech Park,NanShan District,ShenZhen, GuangDong,China
Test specification:	
Standard .....:	**FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

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Test item description .....:	UHF RFID Reader Module
Trade Mark .....:	/
Model/Type reference.....:	HYM730
Modulation .....:	GFSK
Manufacturer.....:	**RealID technology Co.,LTD.**
Listed Models .....:	/
Ratings .....:	DC 5.0 V
Operation Frequency .....:	From 902.75MHz to 927.25MHz
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. :	**TRE1309009701**	Nov 28, 2013 Date of issue

Equipment under Test	:	UHF RFID Reader Module
Model /Type	:	HYM730
Listed Models	:	/
Applicant	:	**Winnix Technologies Co., Limited.**
Address	:	4/F R2-B Building,Hi-tech Park,NanShan District,ShenZhen, GuangDong,China
Manufacturer	:	**RealID technology Co.,LTD.**
Address	:	Unit04,7/F,Bright way tower,NO.33 Mong KOK Road,Kowlood,HK.

Test Result	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Sep 29,2013
Testing commenced on	:	Sep 29,2013
Testing concluded on	:	Nov 28, 2013

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 5.0V

2.3. Short description of the Equipment under Test (EUT)

902-928MHz (UHF RFID Reader Module (HYM730)),

For more details, refer to the user's manual of the EUT.

2.4. EUT operation mode

The EUT has been tested under typical operating condition.The Applicant provides communication tools software to control the EUT for staying in continous transmitting and receiving mode for testing. There are 50 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel .

Frequency Range:	902-928MHz
Channel number:	50 channels
Modulation type:	GFSK
Antenna:	External Antenna

Description of the test mode

There are fifty channels provide to the EUT.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	**902.75**	26	915.25
2	903.25	27	915.75
3	903.75	28	916.25
4	904.25	29	916.75
5	904.75	30	917.25
6	905.25	31	917.75
7	905.75	32	918.25
8	906.25	33	918.75
9	906.75	34	919.25
10	907.25	35	919.75
11	907.75	36	920.25
12	908.25	37	920.75
13	908.75	38	921.25
14	909.25	39	921.75
15	909.75	40	922.25

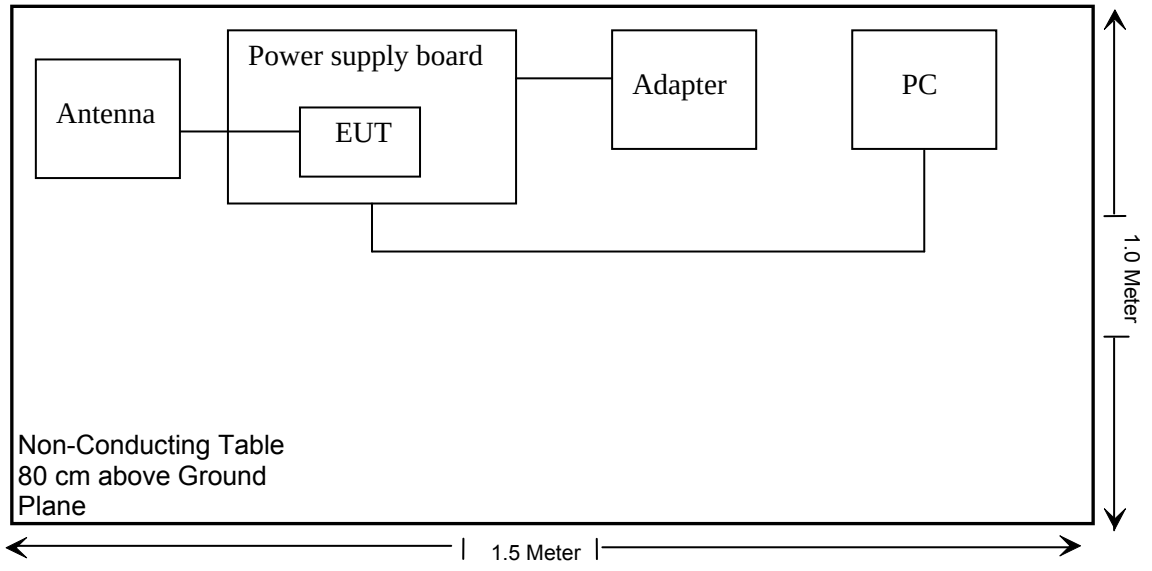
16	910.25	41	922.75
17	910.75	42	923.25
18	911.25	43	923.75
19	911.75	44	924.25
20	912.25	45	924.75
21	912.75	46	925.25
22	913.25	47	925.75
23	913.75	48	926.25
24	914.25	49	926.75
25	**914.75**	**50**	**927.25**

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:RVZHYM730** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Configuration of Test System

Block Diagram of Test Setup



2.7. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

○ - supplied by the manufacturer

● - supplied by the lab

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Notebook PC	ACER	D610	CN-0D4571-48643-51S-0236	N/A

2.8. Modifications

No modifications were implemented to meet testing criteria.

2.9. NOTE

1. The EUT is a UHF RFID Reader Module.The functions of the EUT are listed as below:

	Test Standards	Reference Report
Radio	FCC Part 15 Subpart C (Section15.247)	TRE1309009701
RF Exposure	OET 65	TRE1309009702

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	902-928	2400-2483.5	5470-5725	5725-5850
EUT	√	—	—	—

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar. 01, 2012. Valid time is until Feb 28, 2015.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept. 30, 2015.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date Jun. 01, 2012, valid time is until Jun. 01, 2015.

IC-Registration No.: 5377A

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Jan. 25, 2011, valid time is until Jan. 24, 2014.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2010. Valid time is until Dec. 23, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

3.4. Test Description

FCC Part 15 15.247 Requirement		
FCC Part 15.207	AC Power Conducted Emission	N/A
FCC Part 15.247(a)(2)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS
FCC Part 15.247(b)	Pseudorandom Frequency Hopping Sequence	PASS[1]
FCC Part 15B 15.109	Receiver spurious Emissions	PASS

Remark: 1. Please refer operation description for Pseudorandom Frequency Hopping Sequence of the product

2. The measurement uncertainty is not included in the test result.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.6. Equipments Used during the Test

Maximum Peak Output Power / Frequency Separation / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission/ Number of hopping frequency/ Time of Occupancy					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2013/10/26

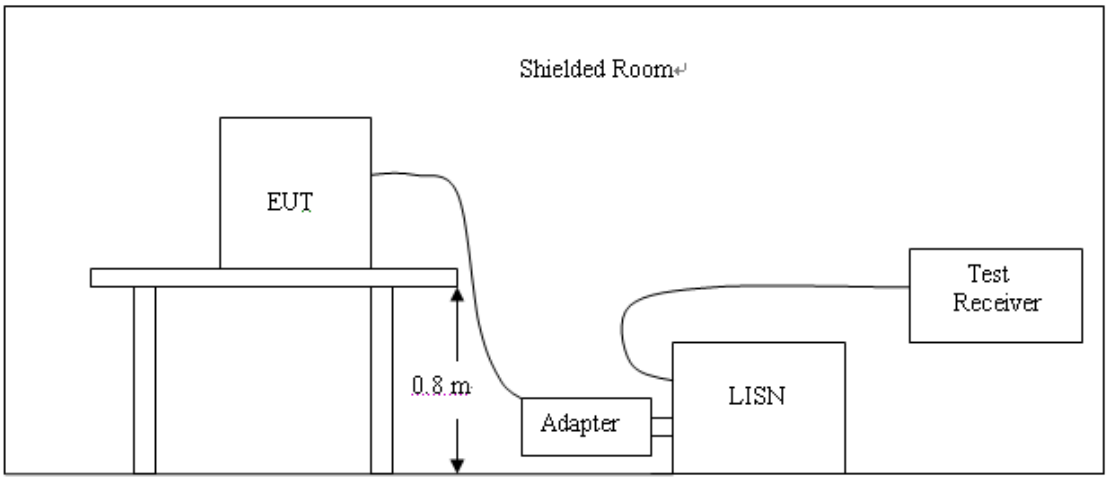
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2013/10/26
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2013/10/26
3	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST OFTWARE	Rohde&Schwarz	ESK1	N/A	N/A
7	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2013/10/26
8	Amplifer	Sonoma	310N	E009-13	2013/10/26
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2013/10/26
10	High pass filter	Compliance Direction systems	BSU-6	34202	2013/10/26
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	470	2013/10/26
12	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2013/10/26
13	HORN ANTENNA	ShwarzBeck	9120D	1011	2013/10/26
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2013/10/26

The Calibration Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission(Not Applicable)

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2 Support equipment, if needed, was placed as per ANSI C63.10-2009
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

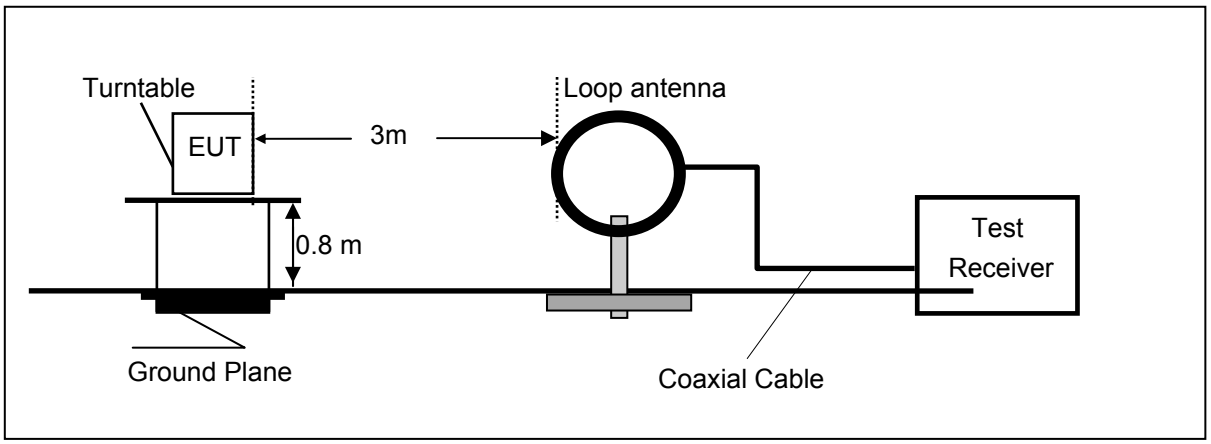
Not applicable to this device.

4.2. Radiated Emission

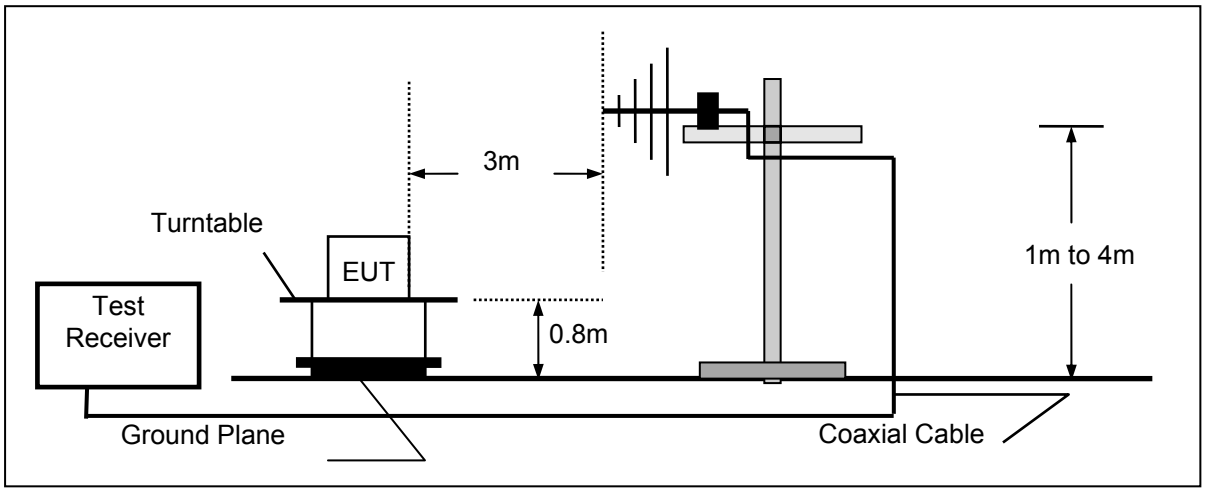
TEST CONFIGURATION

Radiated Emission Test Set-Up

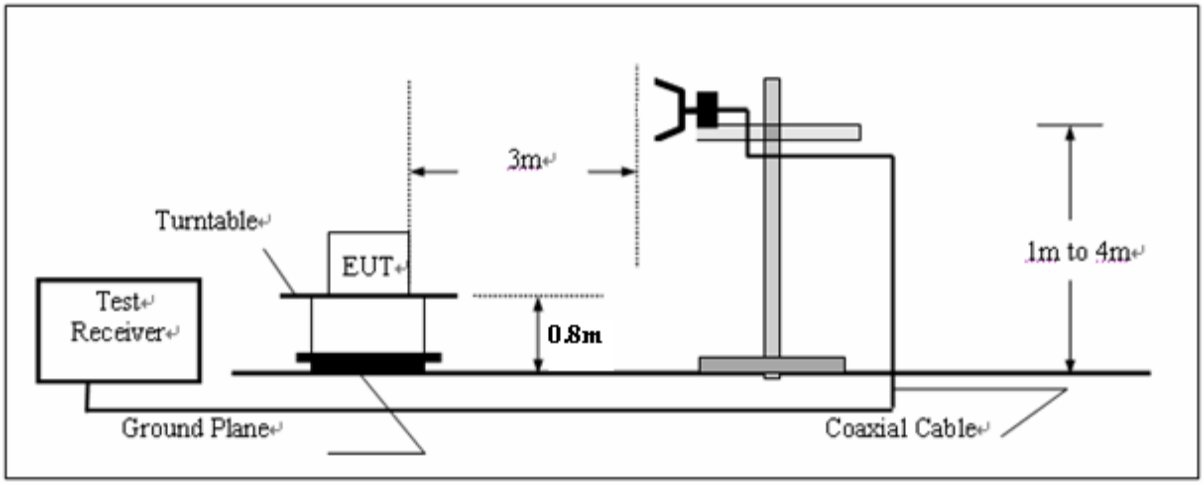
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.

2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The minmum clock frequency was 18.432MHz and fundamental frequency is 902-928MHz, So the radiation emissions frequency range were tested from 9KHz to 10GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

For above 1GHz radiated emission test, All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

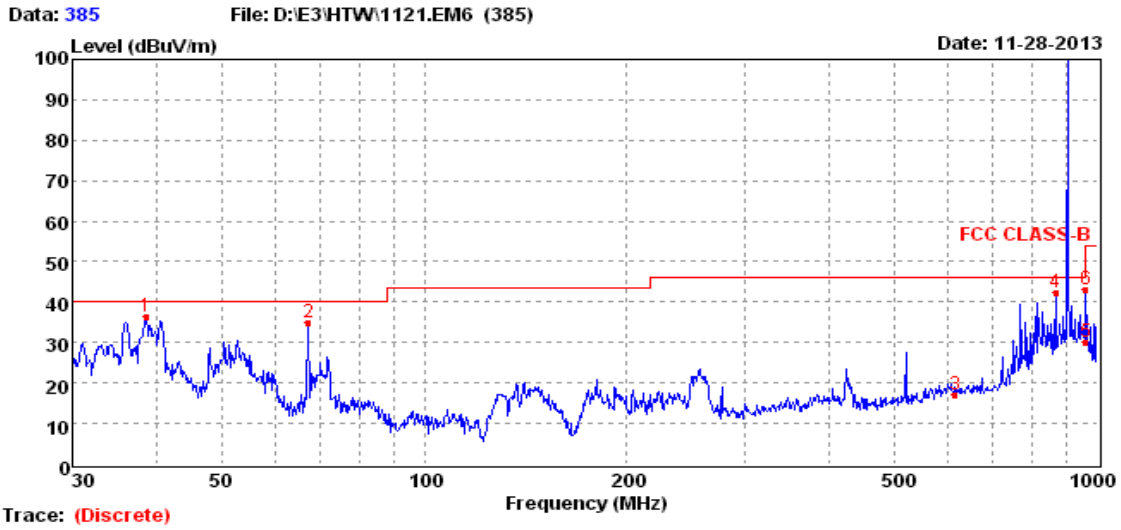
TEST RESULTS

Note: 1. The EUT has four equivalent antenna interface, these antenna interface have the same circuit, we tested four antenna ports and recorded worst case in the report.
2. The minimun clock freqency was 18.432 MHz,I tested three channels(High, Middle, Low) for Radiated Emission form 9KHz to 10000MHz and recored the worst mode data.
3. Test was repeated in three different EUT positions.

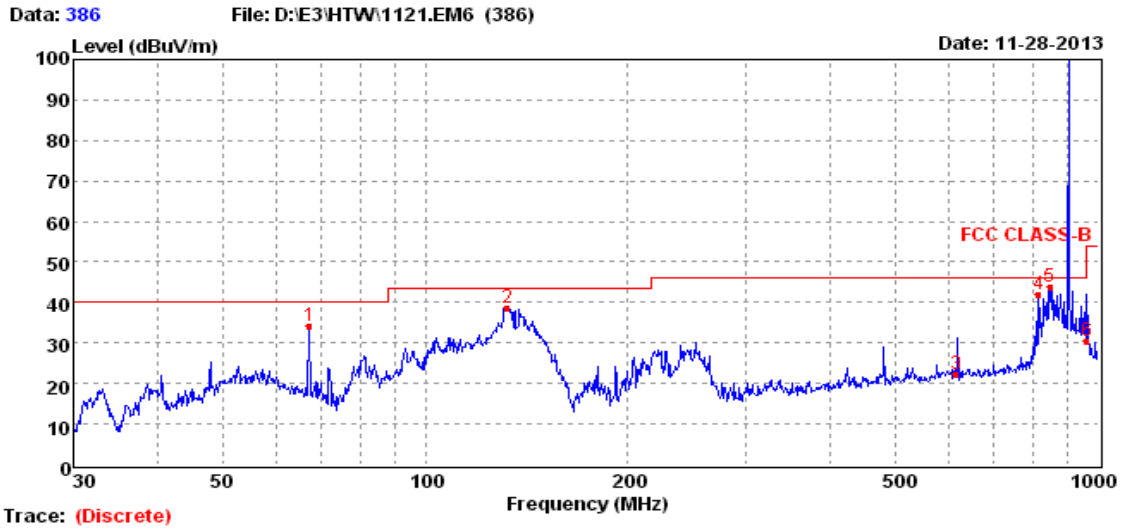
For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
18.52	50.23	69.54	19.31	QP	PASS
29.36	52.39	69.54	17.15	QP	PASS

For 30MHz to 1000MHz



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	38.62	36.55	-0.16	36.71	40.00	3.45	HORIZONTAL	Peak
2	67.20	34.96	-5.91	40.87	40.00	5.04	HORIZONTAL	Peak
3	614.00	17.12	3.04	14.08	46.00	28.88	HORIZONTAL	Peak
4	866.09	42.44	5.70	36.74	46.00	3.56	HORIZONTAL	Peak
5	960.00	30.19	6.92	23.27	46.00	15.81	HORIZONTAL	Peak
6	962.16	42.94	6.95	35.99	54.00	11.06	HORIZONTAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	67.20	34.16	-4.11	38.27	40.00	5.84	VERTICAL	Peak
2	132.22	38.80	-5.36	44.16	43.50	4.70	VERTICAL	Peak
3	614.00	22.30	2.80	19.50	46.00	23.70	VERTICAL	Peak
4	815.97	42.08	5.43	36.65	46.00	3.92	VERTICAL	Peak
5	848.06	43.70	5.95	37.75	46.00	2.30	VERTICAL	Peak
6	960.00	30.42	6.79	23.63	46.00	15.58	VERTICAL	Peak

Above 1G

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M- Low Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1805.50	52.65	PK	74.00	21.35	1.00 H	196	53.25	27.40	4.30	32.30	-0.60
2	2708.25	51.98	PK	74.00	22.02	1.00 H	288	49.38	29.80	5.30	32.50	2.60
3	3611.00	49.36	PK	74.00	24.64	1.00 H	37	44.26	31.90	5.90	32.70	5.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M- Low Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1805.50	53.38	PK	74.00	20.62	1.00 V	9	53.98	27.40	4.30	32.30	-0.60
2	2708.25	52.11	PK	74.00	21.89	1.00 V	197	49.51	29.80	5.30	32.50	2.60
3	3611.00	50.73	PK	74.00	23.27	1.00 V	172	45.63	31.90	5.90	32.70	5.10

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M- Middle Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1829.50	53.05	PK	74.00	20.95	1.00 H	38	53.65	27.40	4.30	32.30	-0.60
2	2744.25	52.49	PK	74.00	21.51	1.00 H	316	49.89	29.80	5.30	32.50	2.60
3	3659.00	50.02	PK	74.00	23.98	1.00 H	29	44.92	31.90	5.90	32.70	5.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M- Middle Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1829.50	53.77	PK	74.00	20.23	1.00 V	46	54.37	27.40	4.30	32.30	-0.60
2	2744.25	53.15	PK	74.00	20.85	1.00 V	177	50.55	29.80	5.30	32.50	2.60
3	3659.00	50.26	PK	74.00	23.74	1.00 V	46	45.16	31.90	5.90	32.70	5.10

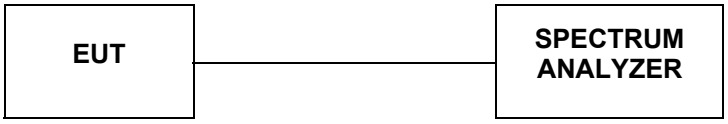
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M- High Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1854.50	52.87	PK	74.00	21.13	1.00 H	299	53.47	27.40	4.30	32.30	-0.60
2	2781.75	51.63	PK	74.00	22.37	1.00 H	108	49.03	29.80	5.30	32.50	2.60
3	3709.00	49.82	PK	74.00	24.18	1.00 H	122	44.72	31.90	5.90	32.70	5.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M- High Channel												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	1854.50	53.29	PK	74.00	20.71	1.00 V	125	53.89	27.40	4.30	32.30	-0.60
2	2781.75	52.46	PK	74.00	21.54	1.00 V	188	49.86	29.80	5.30	32.50	2.60
3	3709.00	50.71	PK	74.00	23.29	1.00 V	153	45.61	31.90	5.90	32.70	5.10

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. The other emission levels were very low against the limit.
4. Margin value = Limit value- Emission level.
5. The limit value is defined as per 15.247
6. The average measurement was not performed when the peak measured data under the limit of average detection.

4.3. Spurious RF Conducted Emissions

TEST CONFIGURATION



TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

LIMIT

The Spurious RF CONDUCTED EMISSIONS Measurement result is lower than the fundamental power 20dBc.

TEST RESULTS

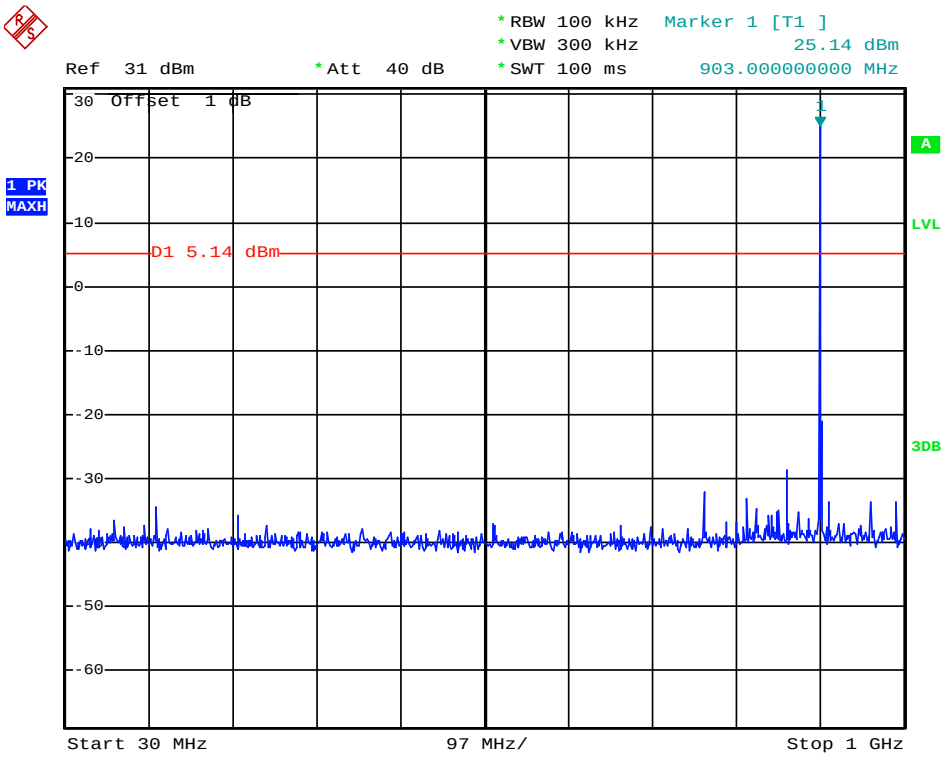
A. Test Verdict

Channel	Frequency (MHz)	Frequency Range (MHz)	Refer to Plot	Limit (dBc)	Verdict
1	902.75	30-1000	Plot 4.3.1 A1	-20	PASS
		1000-5000	Plot 4.3.1 A2	-20	PASS
		5000-10000	Plot 4.3.1 A3	-20	PASS
25	914.75	30-1000	Plot 4.3.1 B1	-20	PASS
		1000-5000	Plot 4.3.1 B2	-20	PASS
		5000-10000	Plot 4.3.1 B3	-20	PASS
50	927.25	30-1000	Plot 4.3.1 C1	-20	PASS
		1000-5000	Plot 4.3.1 C2	-20	PASS
		5000-10000	Plot 4.3.1 C3	-20	PASS

Channel	Frequency (MHz)	Delta Peak to Band emission (dBc)	Hoping Mode	Detector	Limit (dBc)	Refer to Plot	Verdict
1	902.75	-56.14	OFF	Peak	-20	Plot 4.3.1 D1	PASS
1	902.75	-55.85	ON	Peak	-20	Plot 4.3.1 D2	PASS
50	927.25	-63.18	OFF	Peak	-20	Plot 4.3.1 E1	PASS
50	927.25	-61.84	ON	Peak	-20	Plot 4.3.1 E2	PASS

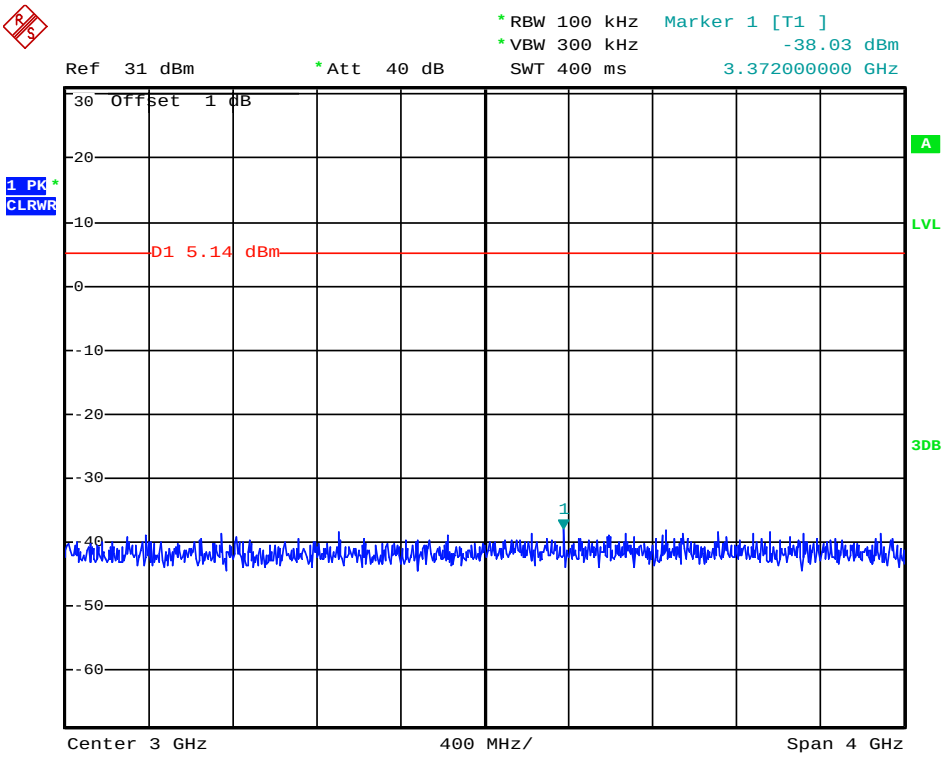
Note: 1. The test results including the cable lose.

B. Test Plots



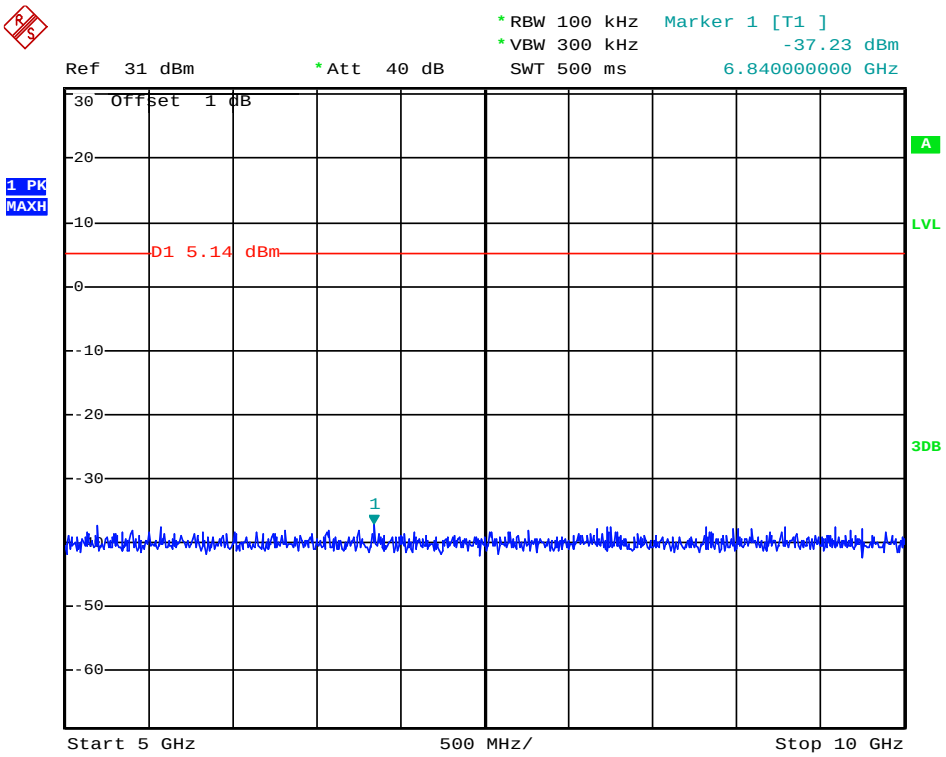
Date: 27.NOV.2013 13:01:49

(Plot 4.3.1.A1: Channel 1: 902.75MHz @ GFSK)



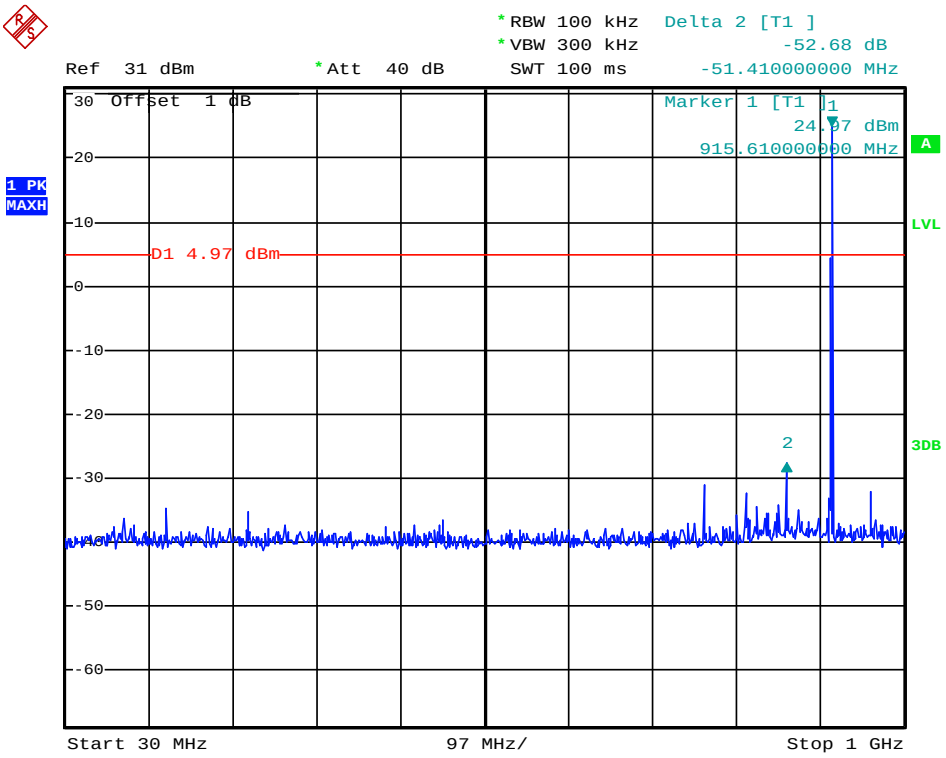
Date: 27.NOV.2013 13:02:39

(Plot 4.3.1.A2: Channel 1: 902.75MHz @ GFSK)



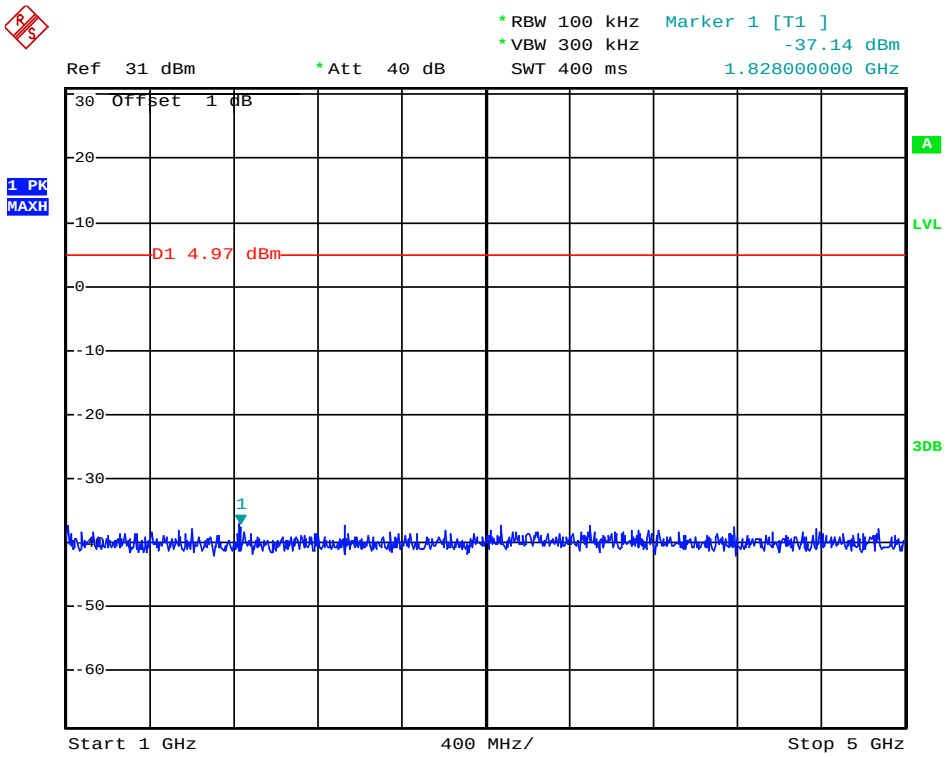
Date: 27.NOV.2013 13:02:54

(Plot 4.3.1.A3: Channel 1: 902.75MHz @ GFSK)



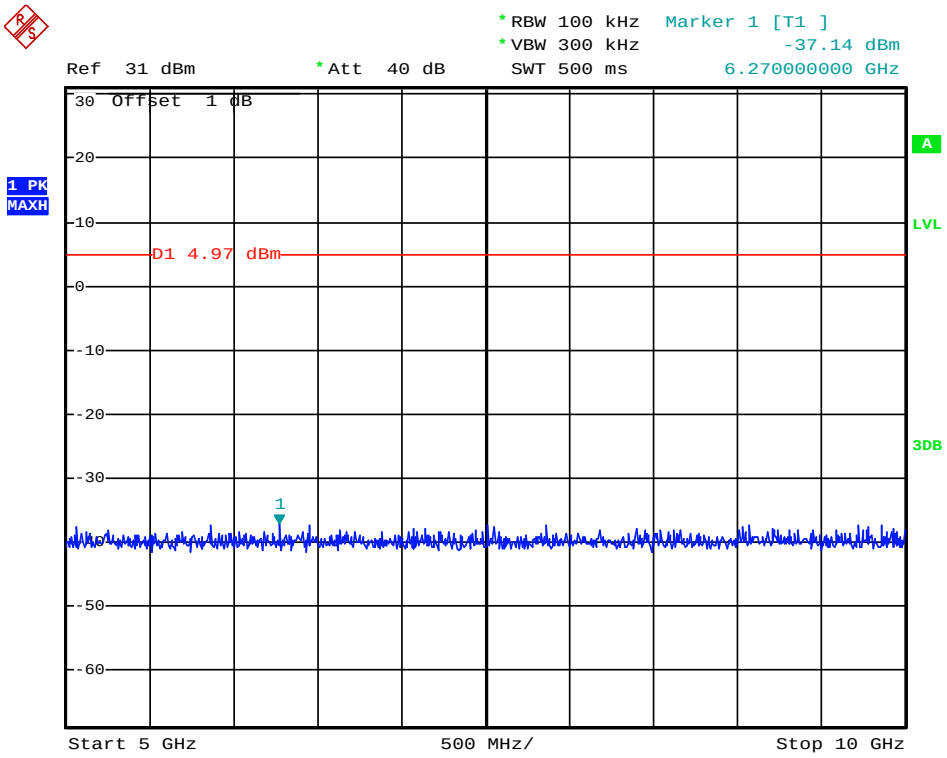
Date: 27.NOV.2013 13:03:34

(Plot 4.3.1.B1: Channel 25: 914.75MHz @ GFSK)



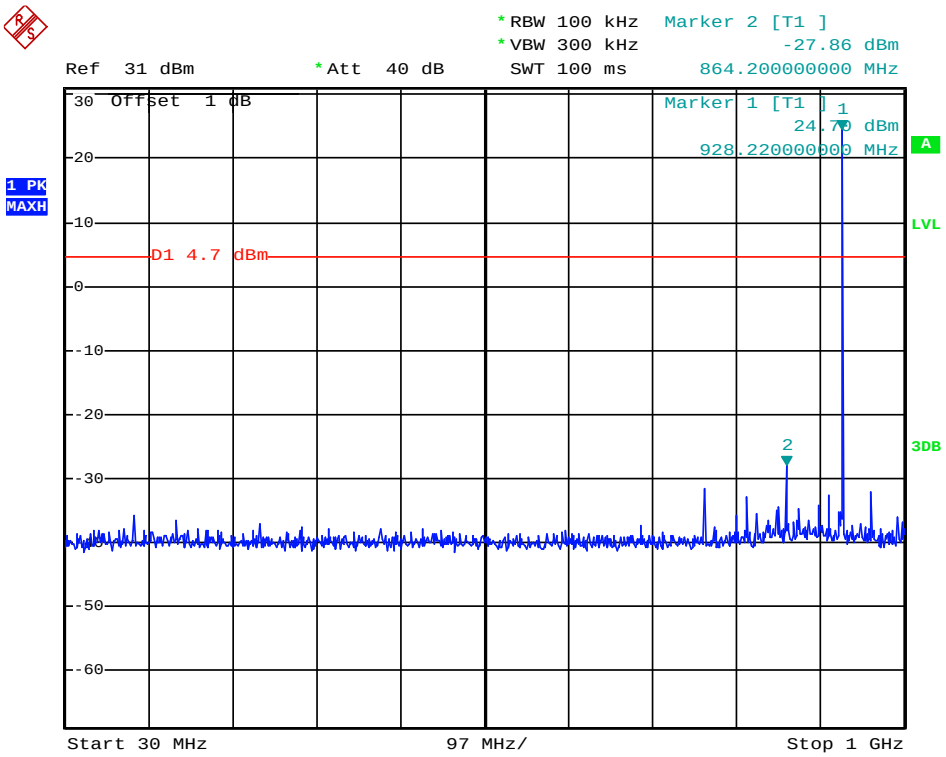
Date: 27.NOV.2013 13:03:51

(Plot 4.3.1.B2: Channel 25: 914.75MHz @ GFSK)



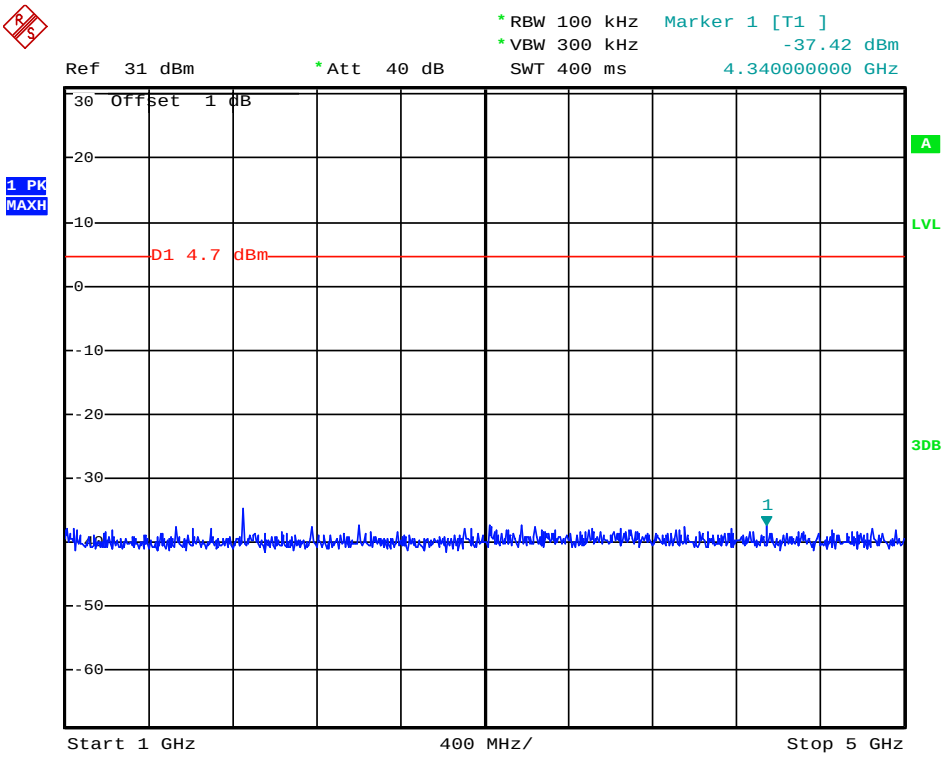
Date: 27.NOV.2013 13:04:08

(Plot 4.3.1.B3: Channel 25: 914.75MHz @ GFSK)



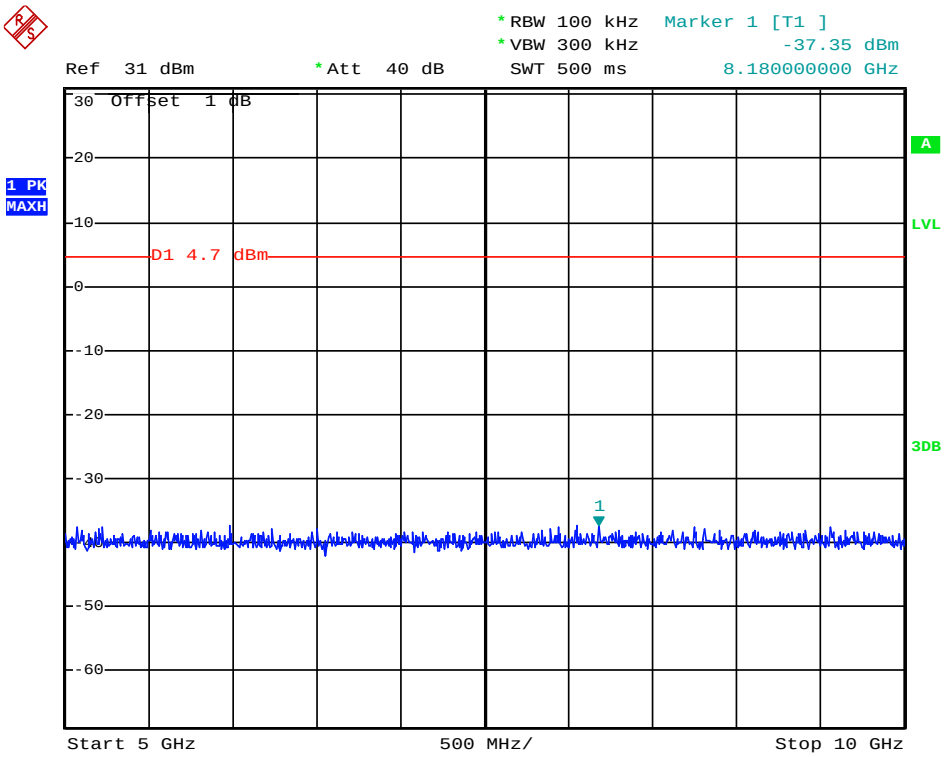
Date: 27.NOV.2013 13:05:00

(Plot 4.3.1.B1: Channel 50: 927.25MHz @ GFSK)



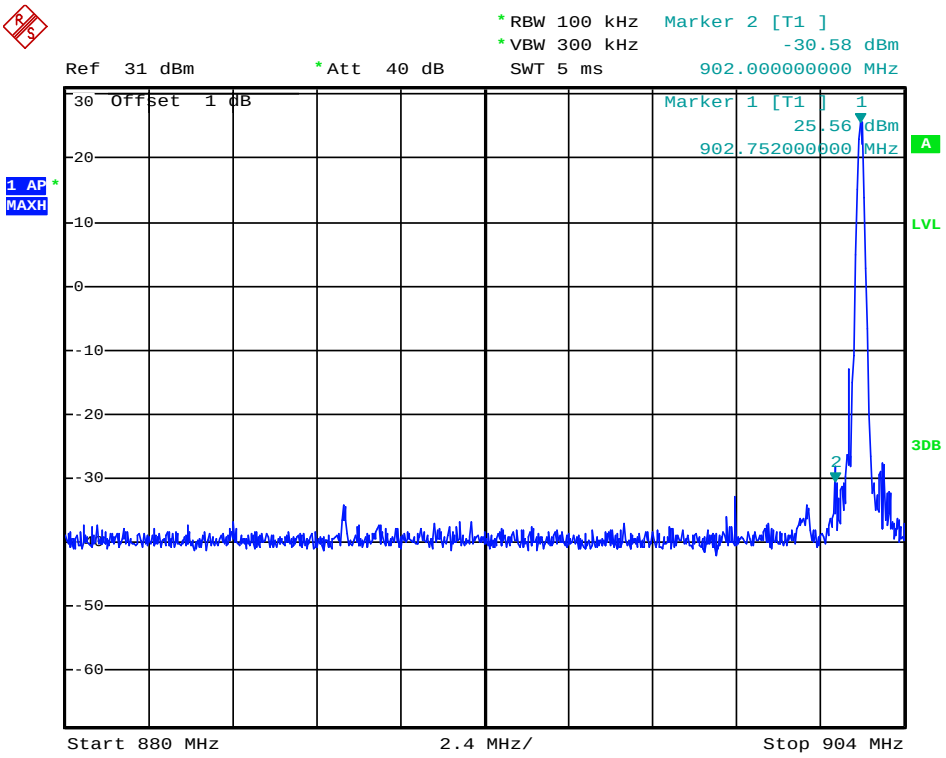
Date: 27.NOV.2013 13:05:35

(Plot 4.3.1.B2: Channel 50: 927.25MHz @ GFSK)



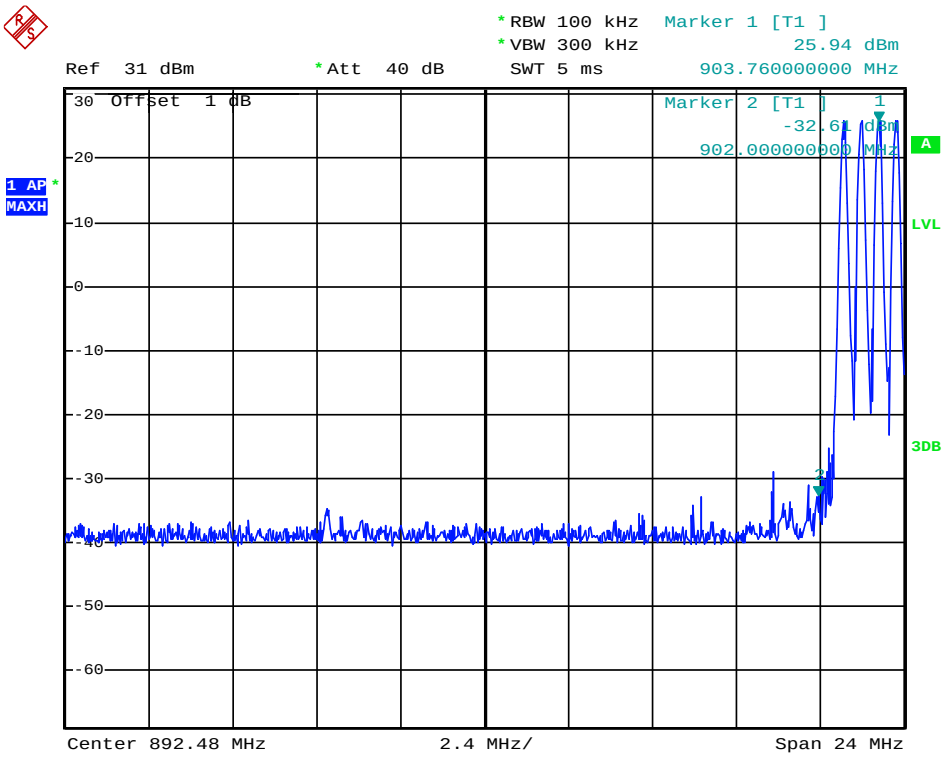
Date: 27.NOV.2013 13:05:48

(Plot 4.3.1.B3: Channel 50: 927.25MHz @ GFSK)



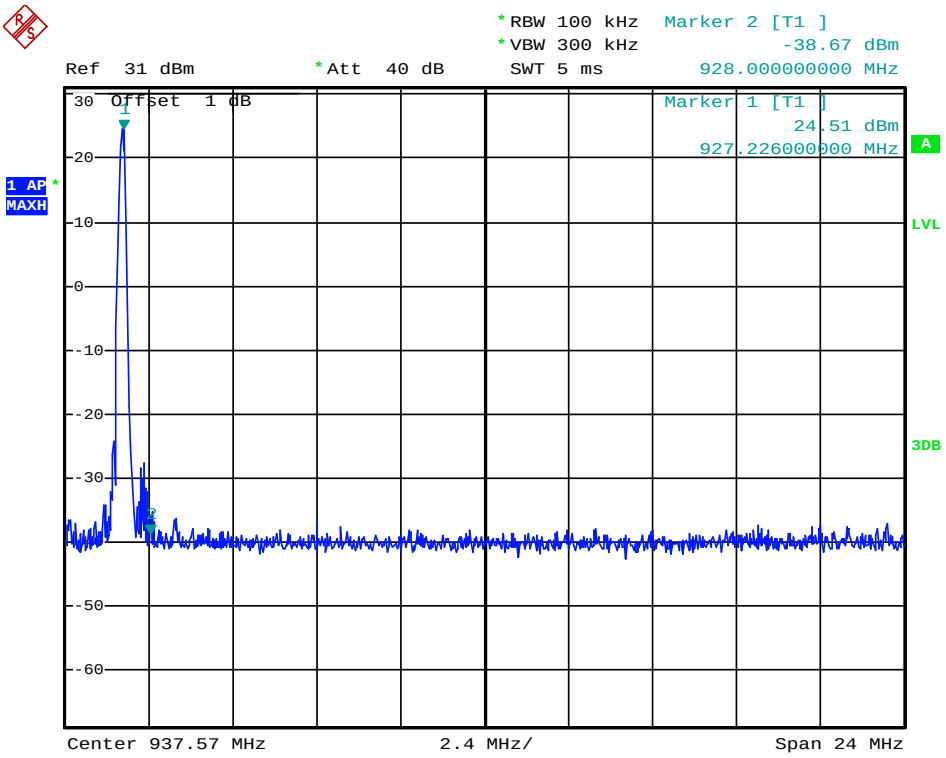
Date: 27.NOV.2013 12:06:41

(Plot 4.3.1.D1: Channel 1: 902.75MHz @ GFSK)



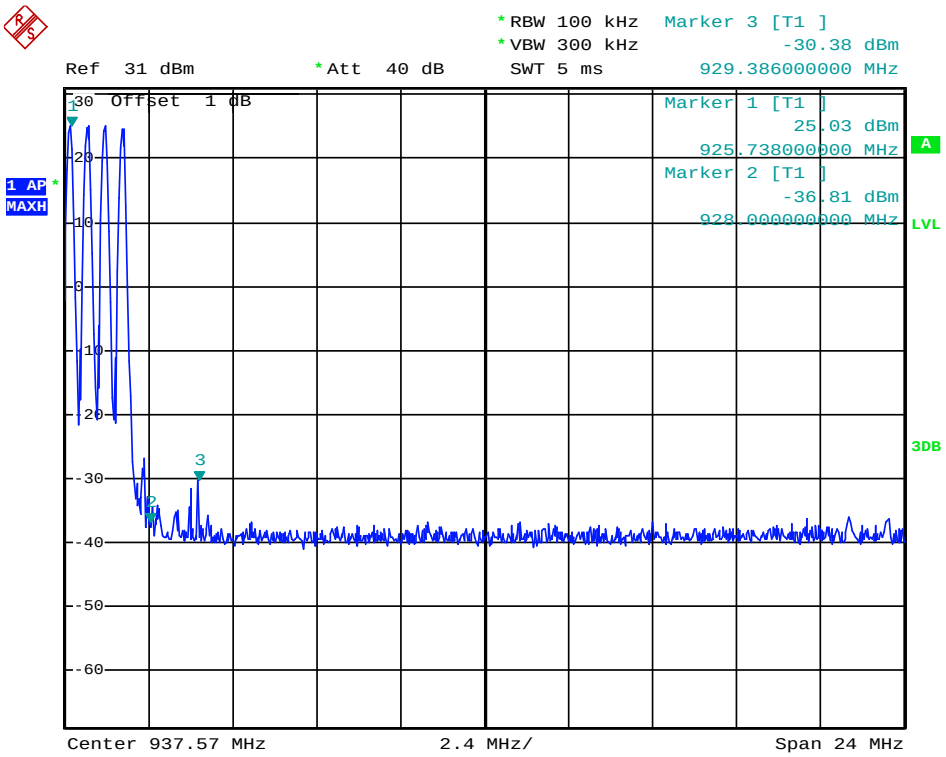
Date: 27.NOV.2013 12:07:58

(Plot 4.3.1.D2: Channel 1: 902.75MHz @ GFSK)



Date: 27.NOV.2013 12:09:27

(Plot 4.3.1.E1: Channel 50: 927.25MHz @ GFSK)

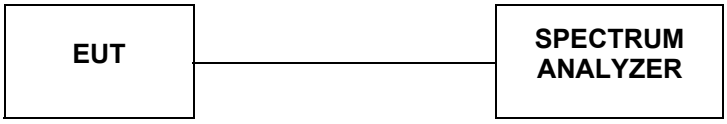


Date: 27.NOV.2013 12:11:17

(Plot 4.3.1.E2: Channel 50: 927.25MHz @ GFSK)

4.4. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

LIMIT

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hop-ping channels, but at least 25 hopping channels, as permitted under para-graph (a)(1)(i) of this section.
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.The product with 50 hopping channel and maximum antenna gain was 9dBi,so the maximum output power should not exceed 27dBm.

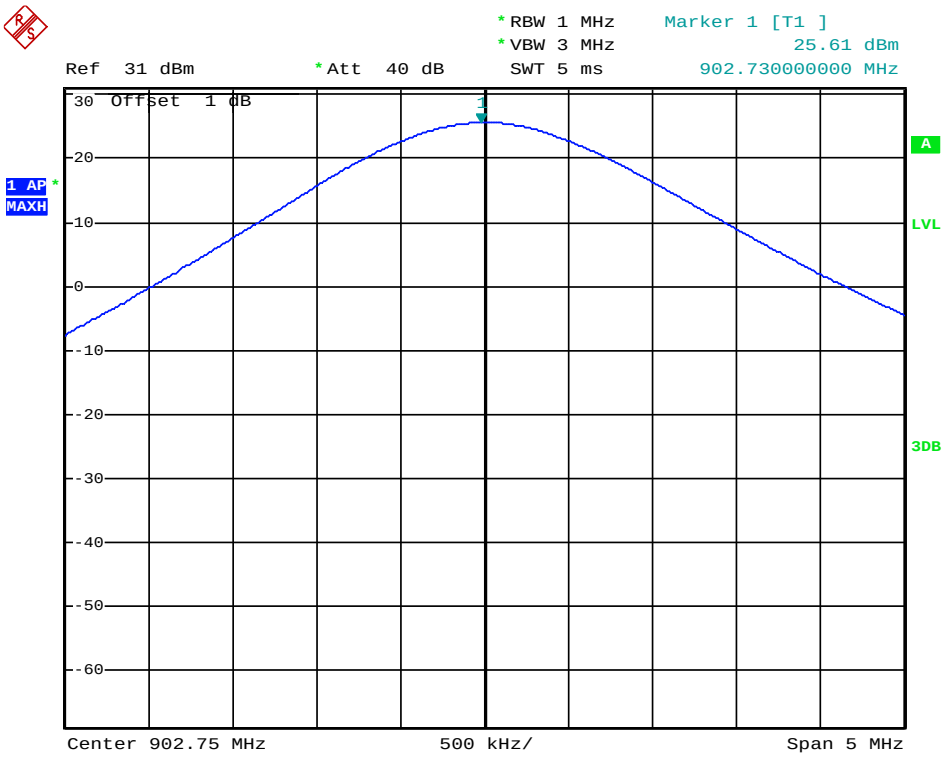
TEST RESULTS

A. Test Verdict

Channel	Frequency (MHz)	Peak Power Output (dBm)	Refer to Plot	Peak Power Limit (dBm)	Verdict
1	902.75	25.61	Plot 4.4.1 A	27.00	PASS
25	914.75	25.37	Plot 4.4.1 B	27.00	PASS
50	927.25	24.96	Plot 4.4.1 C	27.00	PASS

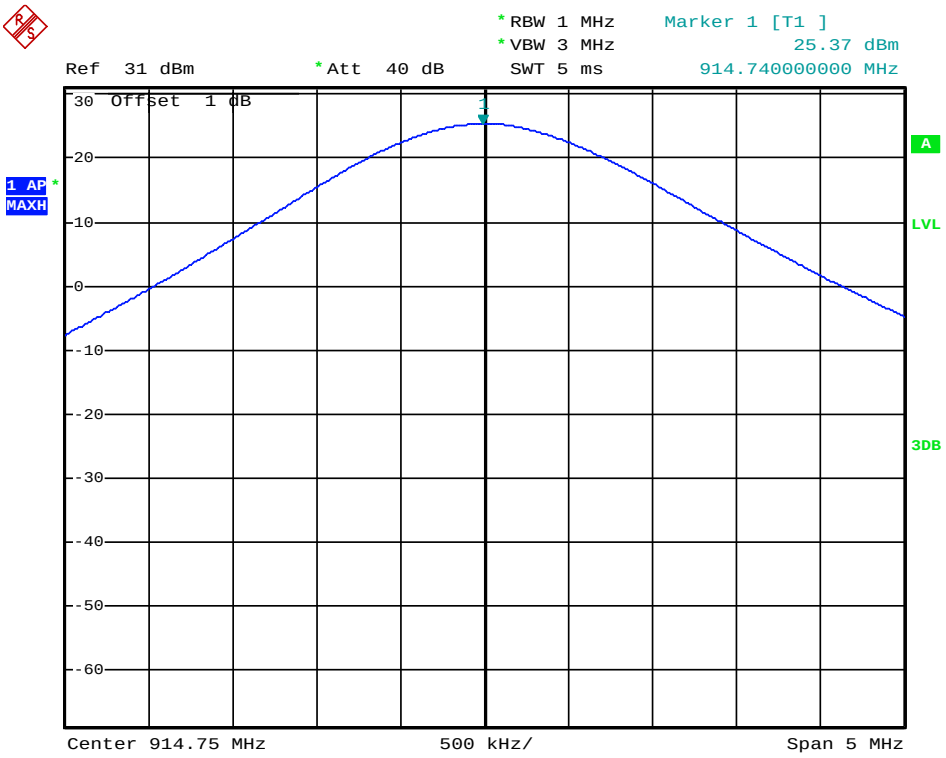
Note: 1.The test results including the cable lose.

B. Test Plots



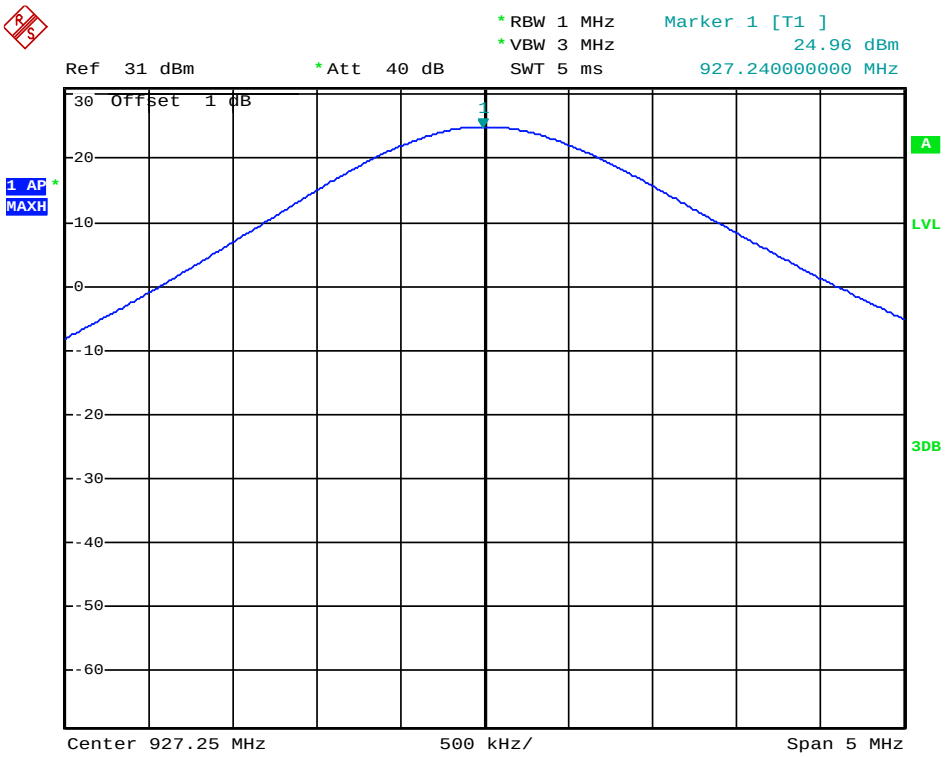
Date: 27.NOV.2013 12:01:22

(Plot 4.4.1 A: Channel 1: 902.75MHz @ GFSK)



Date: 27.NOV.2013 12:02:14

(Plot 4.4.1 B: Channel 25: 914.75MHz @ GFSK)

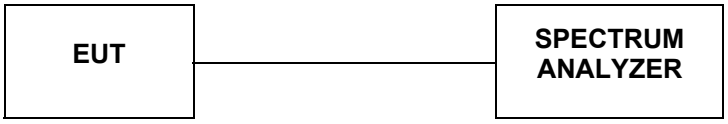


Date: 27.NOV.2013 12:02:56

(Plot 4.4.1 C: Channel 50: 927.25MHz @ GFSK)

4.5. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30 KHz and VBW= 100KHz.
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the sys-tem shall use at least 25 hopping fre-quencies and the average time of occu-pancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

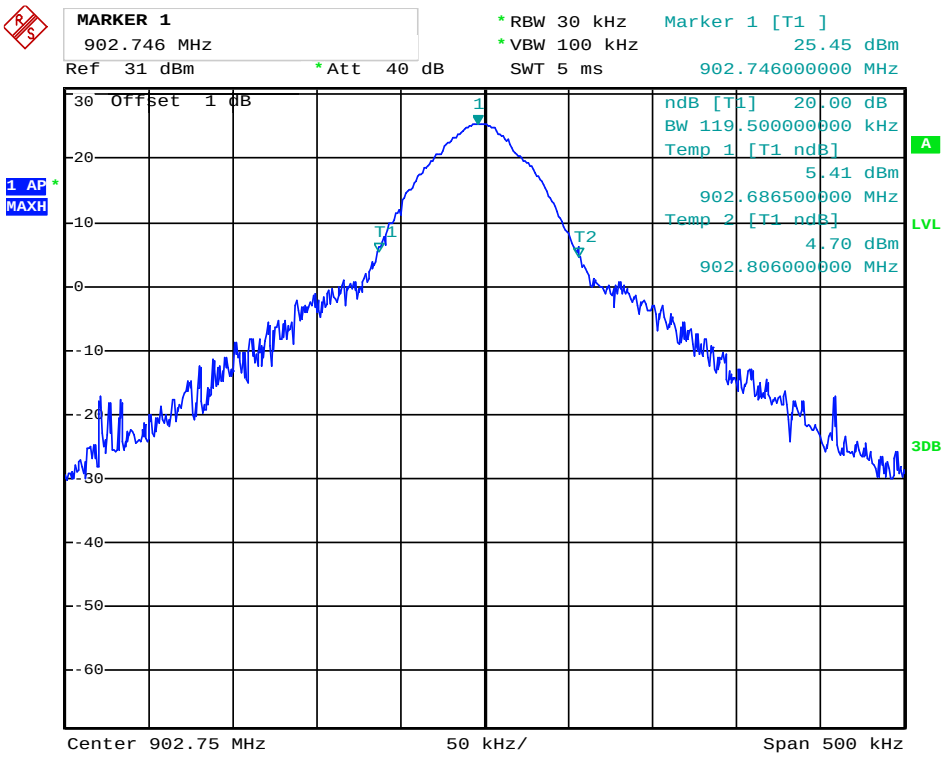
TEST RESULTS

A. Test Verdict

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	Refer to Plot	Limits (KHz)	Verdict
1	902.75	119.50	Plot 4.5.1 A	250.00	PASS
25	914.75	117.00	Plot 4.5.1 B	250.00	PASS
50	927.25	112.50	Plot 4.5.1 C	250.00	PASS

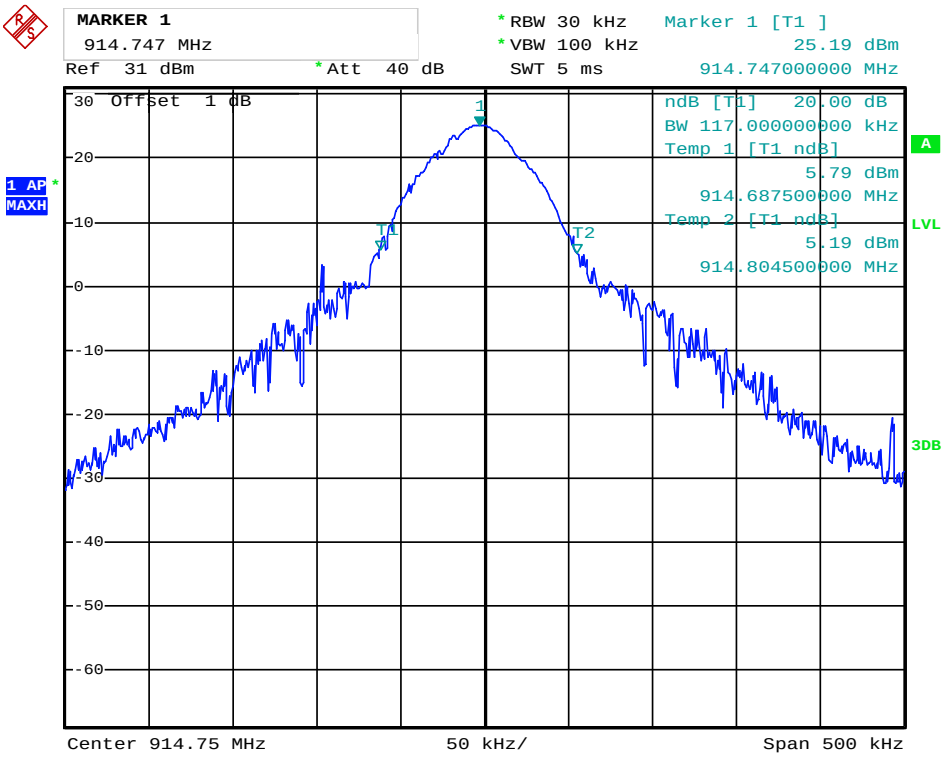
Note: 1.The test results including the cable lose.

B. Test Plots



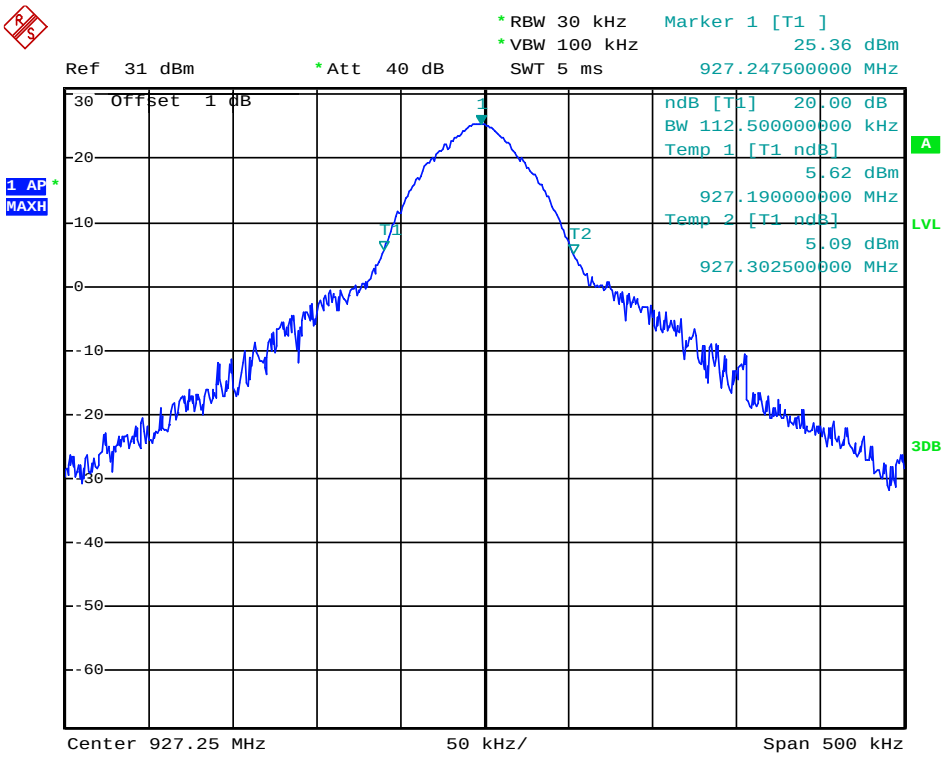
Date: 27.NOV.2013 12:05:31

(Plot 4.5.1 A: Channel 1: 902.75MHz @ GFSK)



Date: 27.NOV.2013 12:04:54

(Plot 4.5.1 B: Channel 25: 914.75MHz @ GFSK)



Date: 27.NOV.2013 12:03:51

(Plot 4.5.1 C: Channel 50: 927.25MHz @ GFSK)

4.6. Band Edge

Applicable Standard

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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. For Radiated emissions restricted band RBW=120KHz, VBW=1MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

TEST RESULTS

Remark: we tested radiated bandedge at both hopping and no-hopping modes,recorded worst case at no-hopping mode

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Polari-zation
Out of left side band					
614.00	20.35	54.00	33.65	QP	Horizontal
902.79*	126.56	---	----	QP	Horizontal
614.00	26.81	54.00	27.19	QP	Vertical
902.79*	131.89	---	----	QP	Vertical
Out of right side band					
927.31*	122.33	---	----	QP	Horizontal
960.00	35.87	54.00	18.13	QP	Horizontal
927.31*	129.61	---	----	QP	Vertical
960.00	40.35	54.00	13.65	QP	Vertical

Note: 1. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

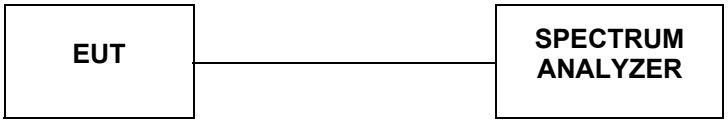
2. The average measurement was not performed when the peak measured data under the limit of average detection.

3. The test data is the worst case data in the restrict band.

4. '*'for fundamental frequency.

4.7. Frequency Separation

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.

LIMIT

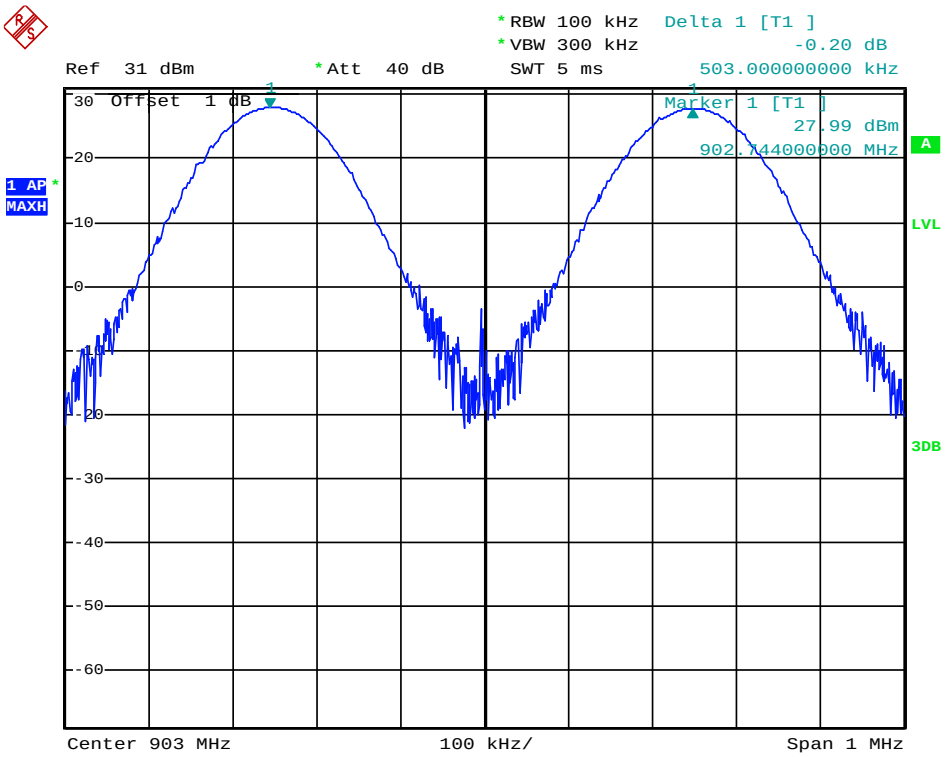
According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

TEST RESULTS

A. Test Verdict

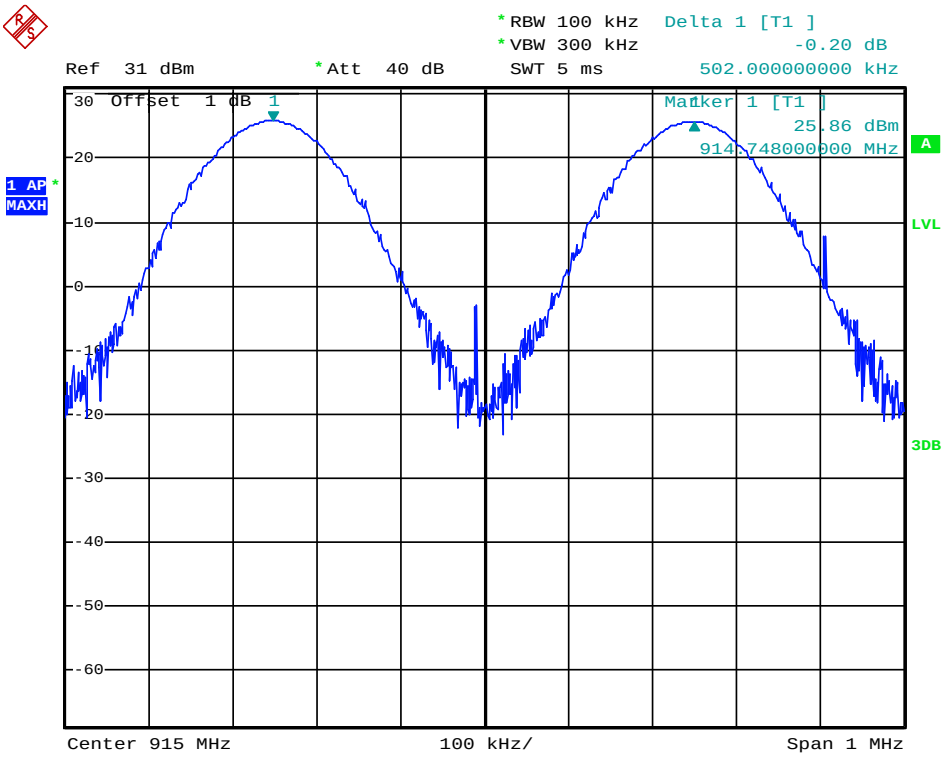
Channel	Frequency (MHz)	Channel Separation (KHz)	Refer to Plot	Limits (KHz)	Verdict
1	902.75	503.00	Plot 4.7.1 A	25	PASS
2	903.25				
25	914.75	502.00	Plot 4.7.1 B	25	PASS
26	915.25				
49	927.25	503.00	Plot 4.7.1 C	25	PASS
50	926.75				

B. Test Plots



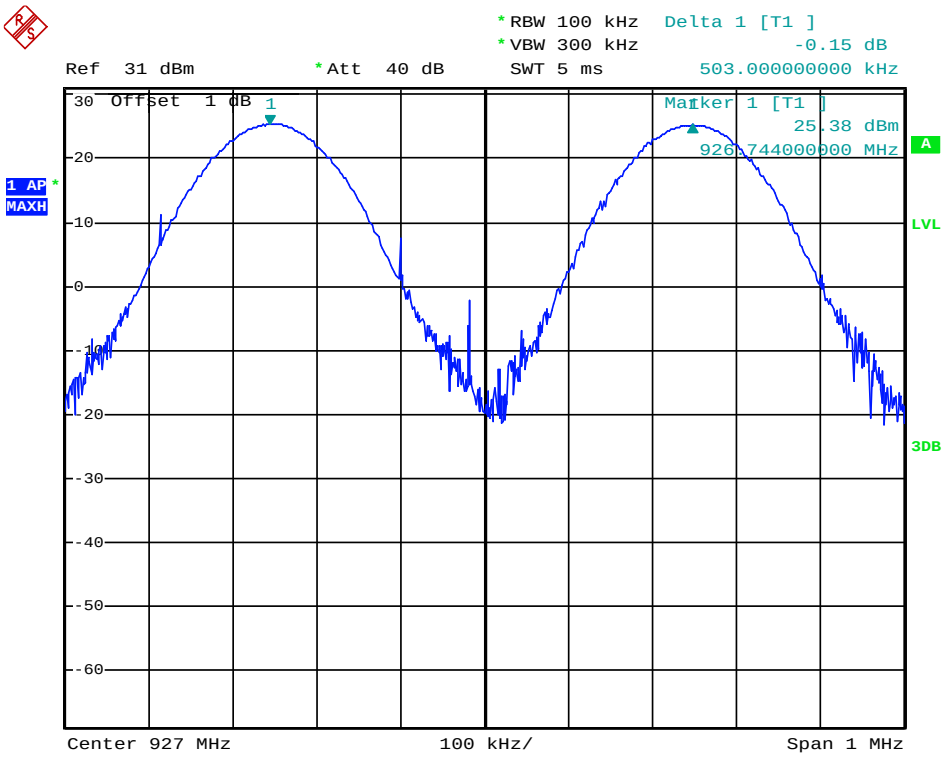
Date: 28.NOV.2013 10:54:54

(Plot 4.7.1 A: Channel 1: 902.75MHz @ GFSK)



Date: 27.NOV.2013 12:14:32

(Plot 4.7.1 B: Channel 25: 914.75MHz @ GFSK)

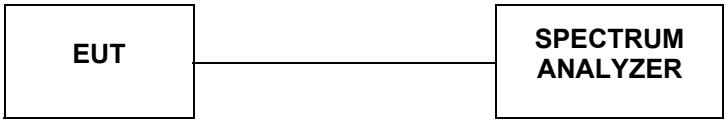


Date: 27.NOV.2013 12:16:05

(Plot 4.7.1 C: Channel 50: 927.25MHz @ GFSK)

4.8. Number of hopping frequency

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator.Set spectrum analyzer start 902MHz to 928MHz with RBW= 100 KHz and VBW=300KHz.

LIMIT

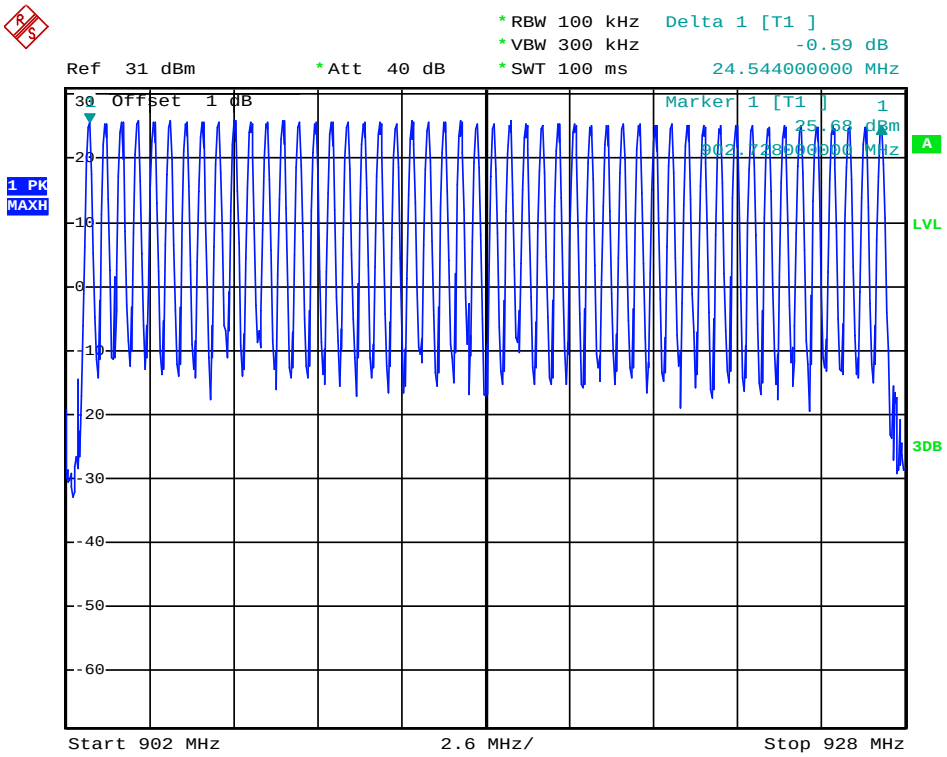
If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the sys-tem shall use at least 25 hopping fre-quencies and the average time of occu-pancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST RESULTS

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
902-928	50	Plot 4.8.1 A	≥15	PASS

B. Test Plots

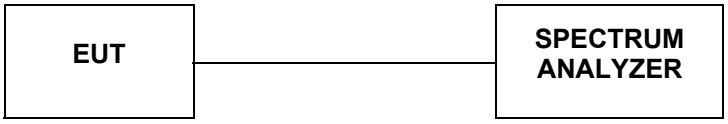


Date: 27.NOV.2013 13:00:42

(Plot 4.8.1 A: @ GFSK)

4.9. Time Of Occupancy(Dwell Time)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with RBW=1MHz and VBW=1MHz,Span=0Hz.

LIMIT

For frequency hopping systems op-erating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the sys-tem shall use at least 25 hopping frequencies and the average time of occu-pancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

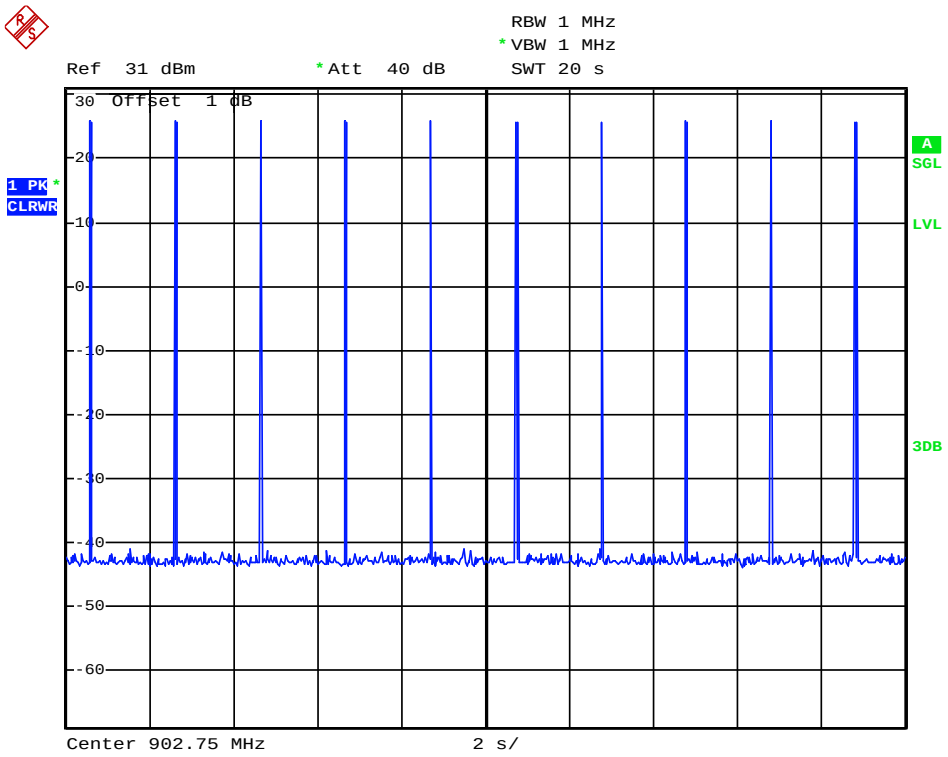
TEST RESULTS

In the connection mode RFID uses 50 channels,As defined in 15.247,a 1 I,the limit for time of occupancy is 0.4s over time of 20s.

A. Test Verdict

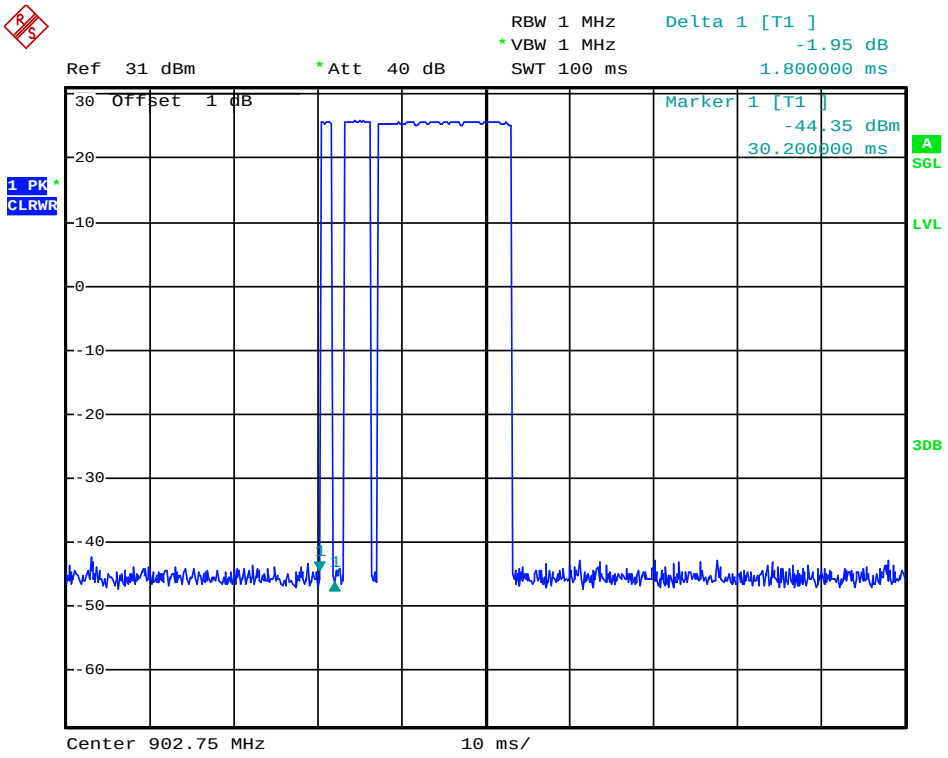
Channel	Frequency (MHz)	Dwell Time (S)	Limit (S)	Refer to Plot	Verdict
1	902.75	0.116	0.4	Plot 4.9.1 A1 Plot 4.9.1 A2 Plot 4.9.1 A3 Plot 4.9.1 A4	PASS
Note: Dwell time=10X(0.0018+0.0036+0.0062)=0.116 Second					
25	914.75	0.114	0.4	Plot 4.9.1 B1 Plot 4.9.1 B2 Plot 4.9.1 B3 Plot 4.9.1 B4	PASS
Note: Dwell time=10X(0.0018+0.0036+0.0060)=0.114 Second					
50	927.25	0.114	0.4	Plot 4.9.1 C1 Plot 4.9.1 C2 Plot 4.9.1 C3 Plot 4.9.1 C4	PASS
Note: Dwell time=10X(0.0018+0.0036+0.0060)=0.114 Second					

B. Test Plots



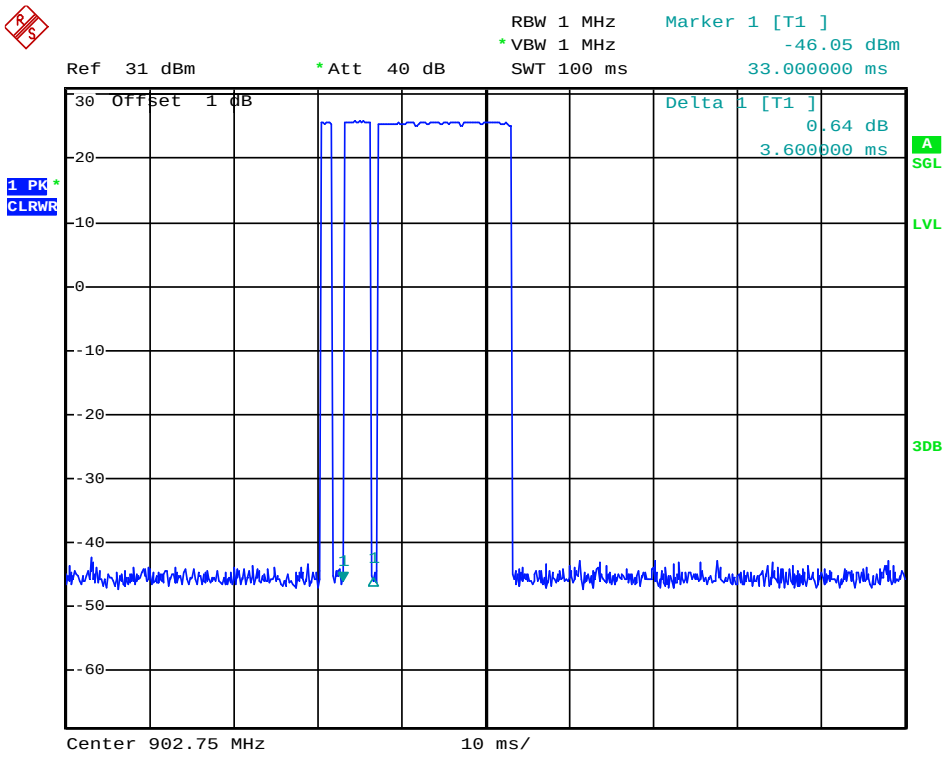
Date: 27.NOV.2013 12:19:39

(Plot 4.9.1 A1: Channel 1: 902.75MHz @ GFSK)



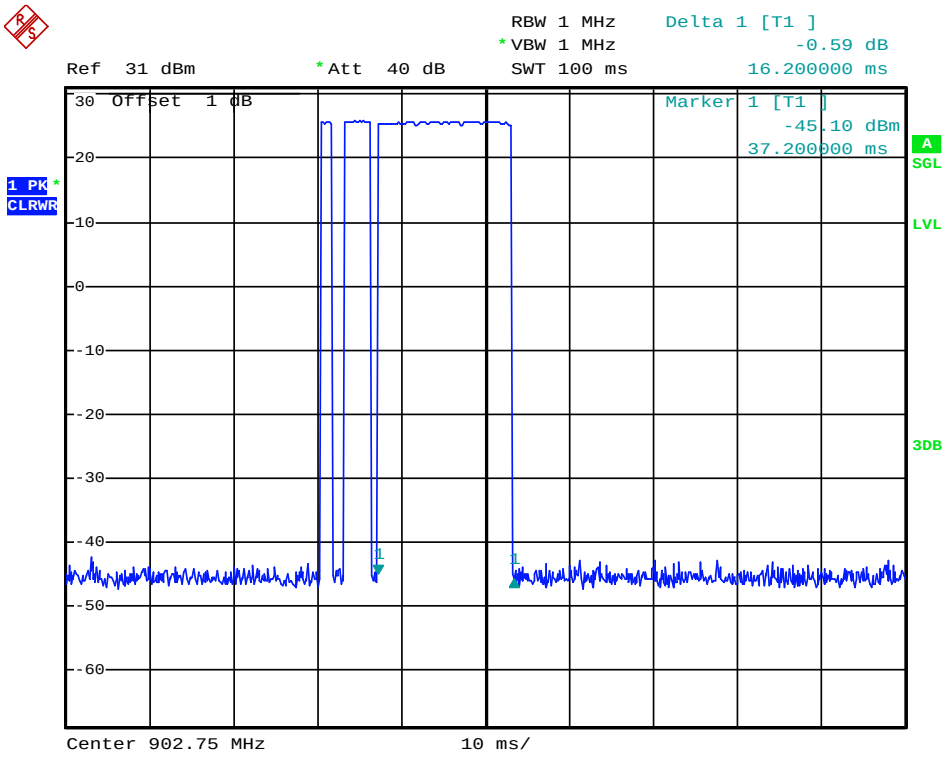
Date: 27.NOV.2013 12:20:55

(Plot 4.9.1 A2: Channel 1: 902.75MHz @ GFSK)



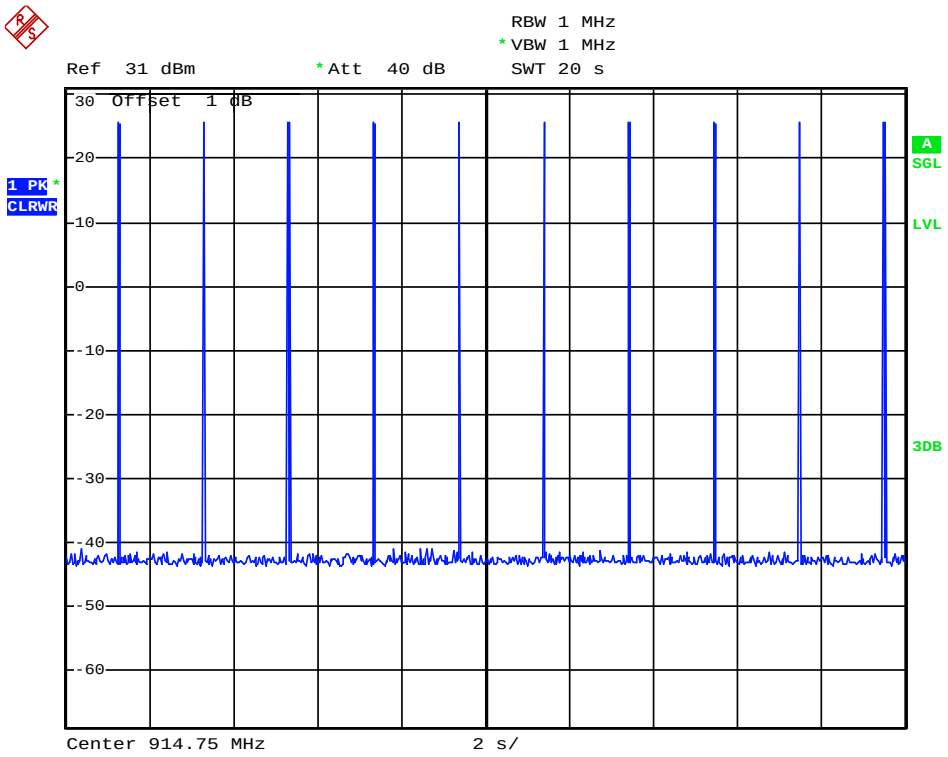
Date: 27.NOV.2013 12:21:15

(Plot 4.9.1 A3: Channel 1: 902.75MHz @ GFSK)



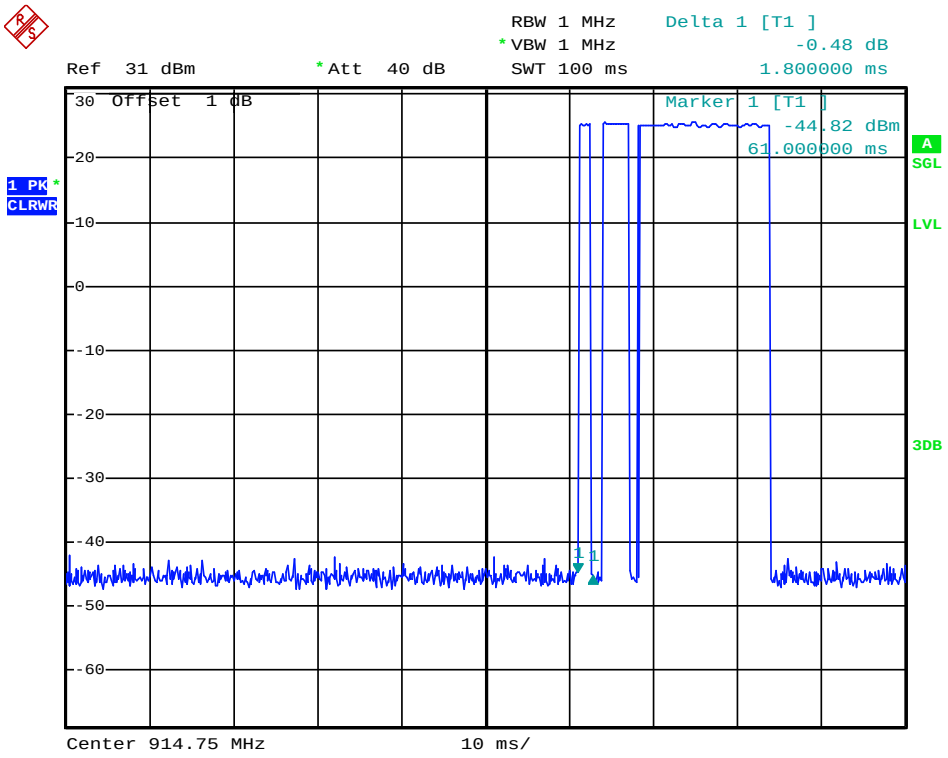
Date: 27.NOV.2013 12:21:32

(Plot 4.9.1 A4: Channel 1: 902.75MHz @ GFSK)



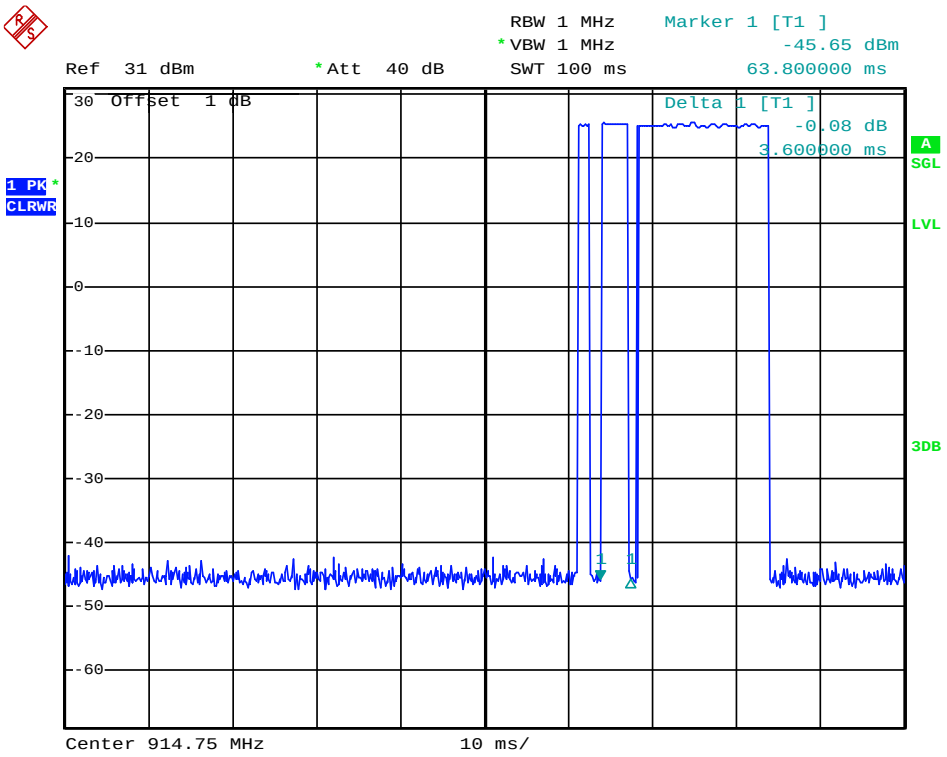
Date: 27.NOV.2013 12:24:56

(Plot 4.9.1 B1: Channel 25: 914.75MHz @ GFSK)



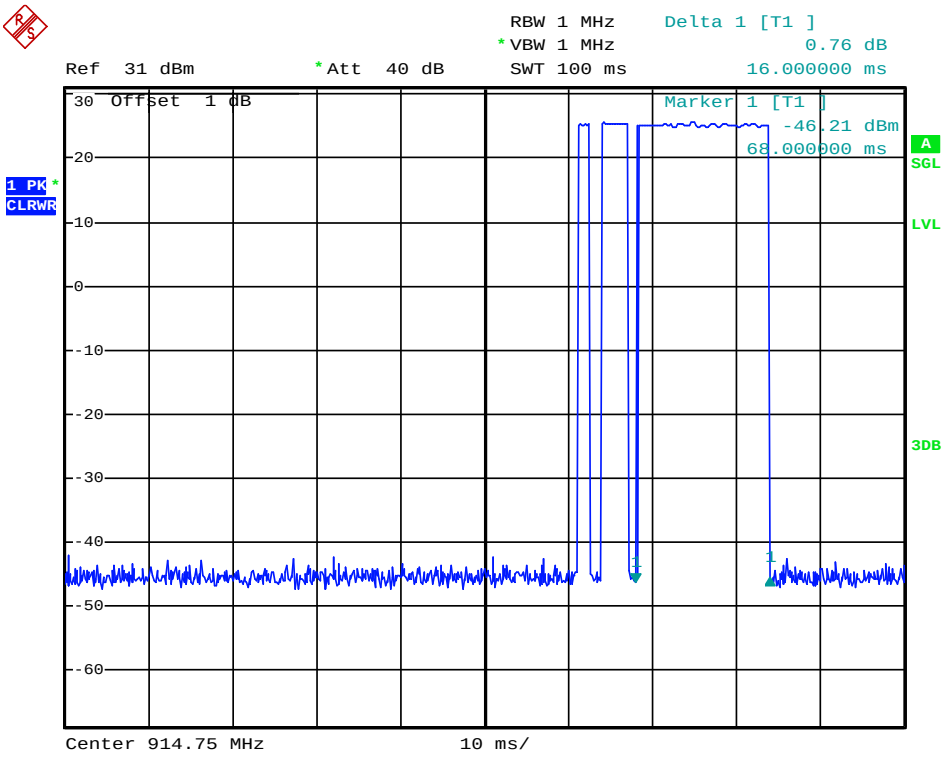
Date: 27.NOV.2013 12:23:20

(Plot 4.9.1 B2: Channel 25: 914.75MHz @ GFSK)



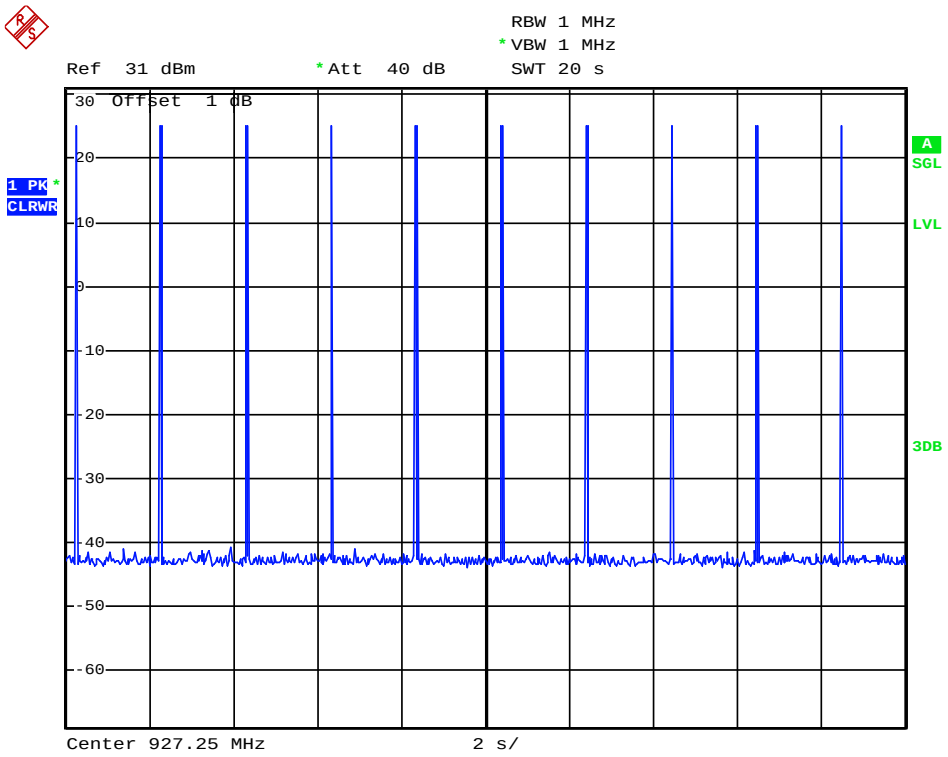
Date: 27.NOV.2013 12:23:37

(Plot 4.9.1 B3: Channel 25: 914.75MHz @ GFSK)



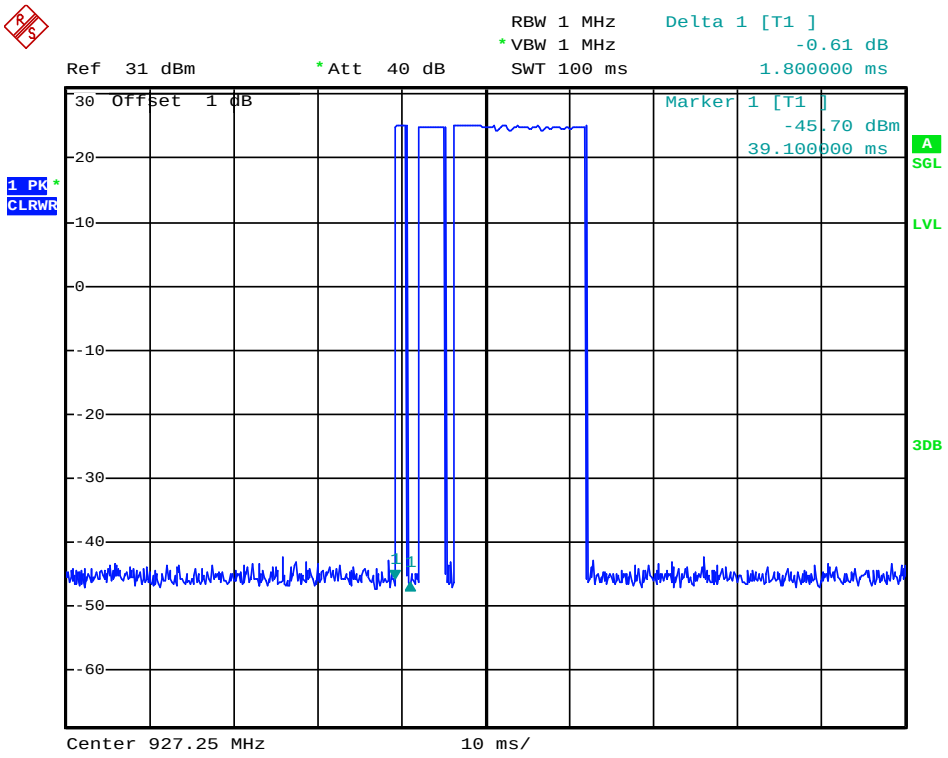
Date: 27.NOV.2013 12:23:53

(Plot 4.9.1 B4: Channel 25: 914.75MHz @ GFSK)



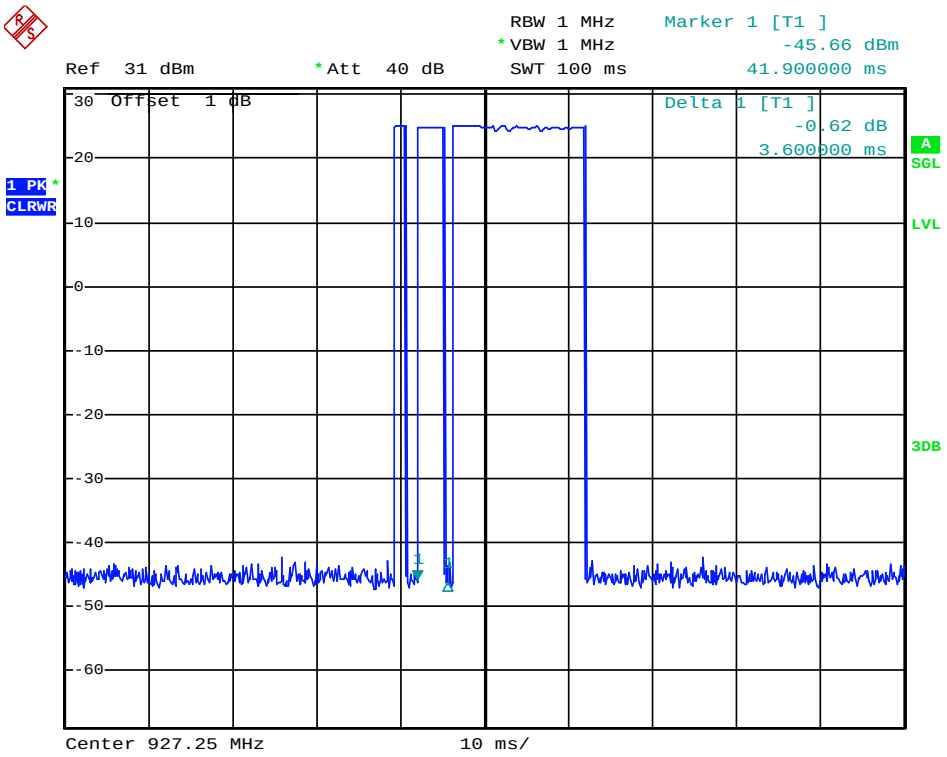
Date: 27.NOV.2013 12:26:13

(Plot 4.9.1 C1: Channel 50: 927.25MHz @ GFSK)



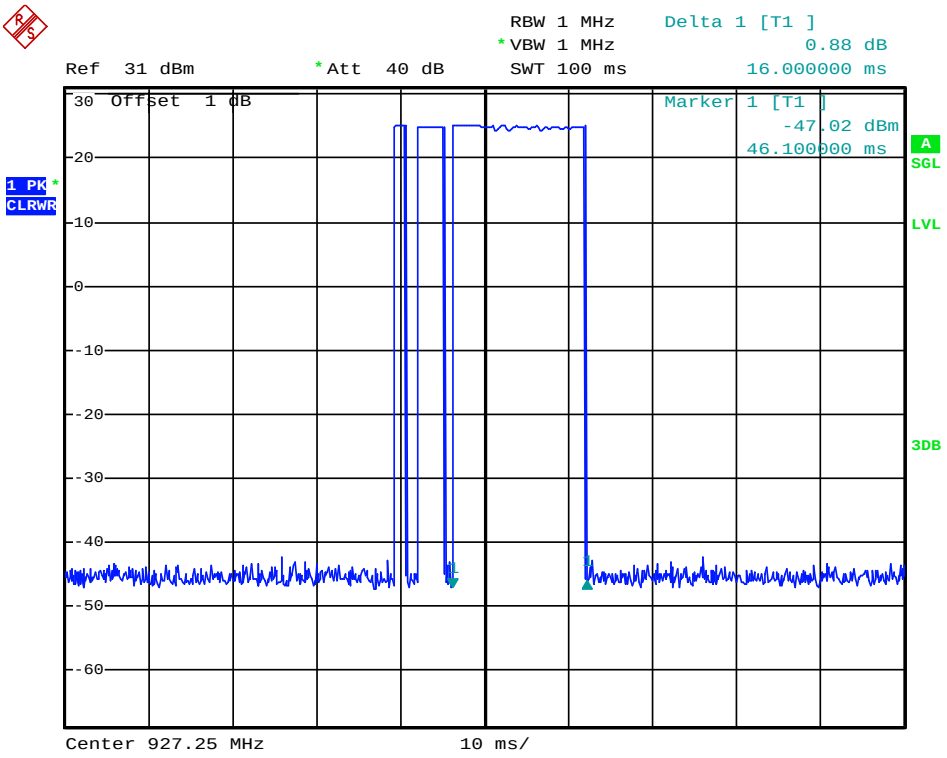
Date: 27.NOV.2013 12:27:12

(Plot 4.9.1 C2: Channel 50: 927.25MHz @ GFSK)



Date: 27.NOV.2013 12:27:30

(Plot 4.9.1 C3: Channel 50: 927.25MHz @ GFSK)



Date: 27.NOV.2013 12:27:53

(Plot 4.9.1 C4: Channel 50: 927.25MHz @ GFSK)

4.10. Receiver spurious Emissions

TEST APPLICABLE

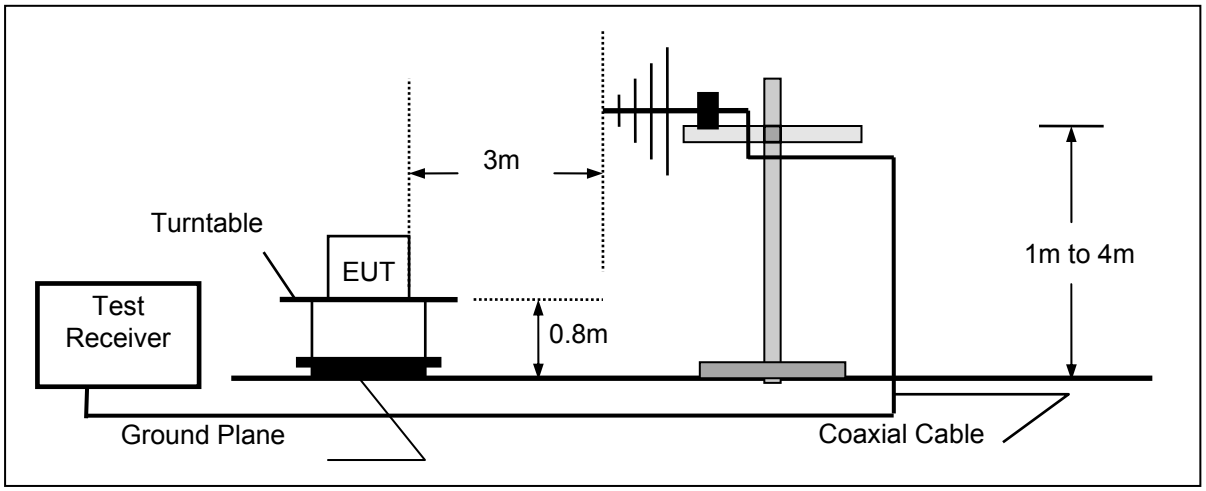
The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

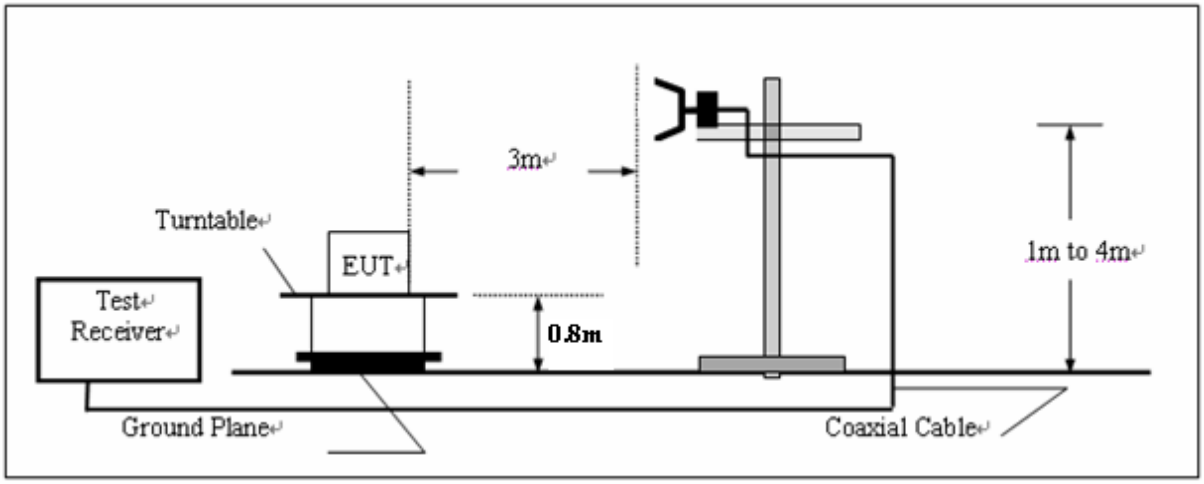
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST CONFIGURATION

Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

RECEIVER RADIATED SPOUIOUS LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

TEST RESULTS

The Radiated Measurement are performed to the three channels (the high channel, the middle channel and the low channel), the datum recorded below is the worst case for each channel separation;and the EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1 GHz whichever is higher.

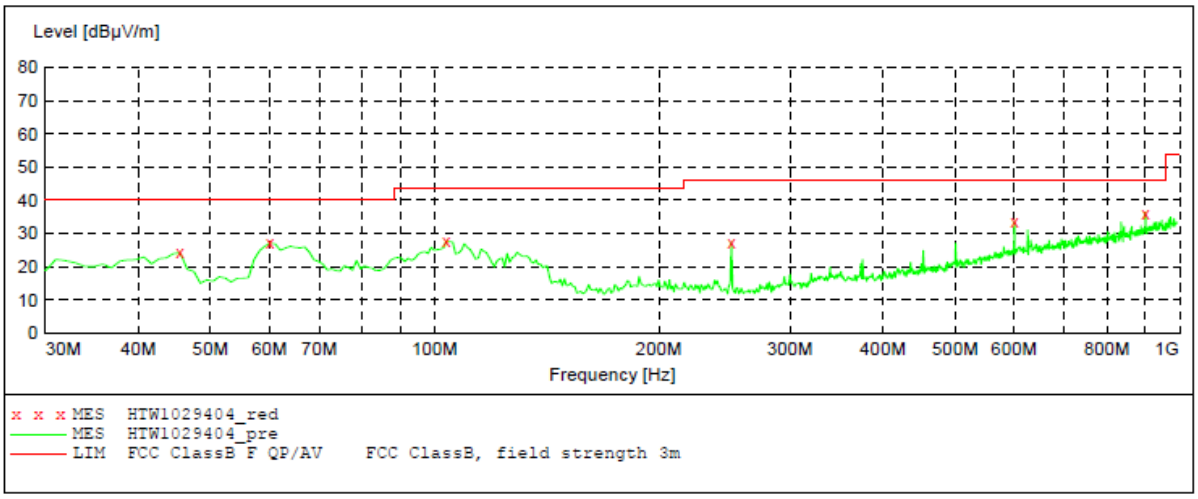
TEST RESULTS

Below 1GHz

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	VULB9163



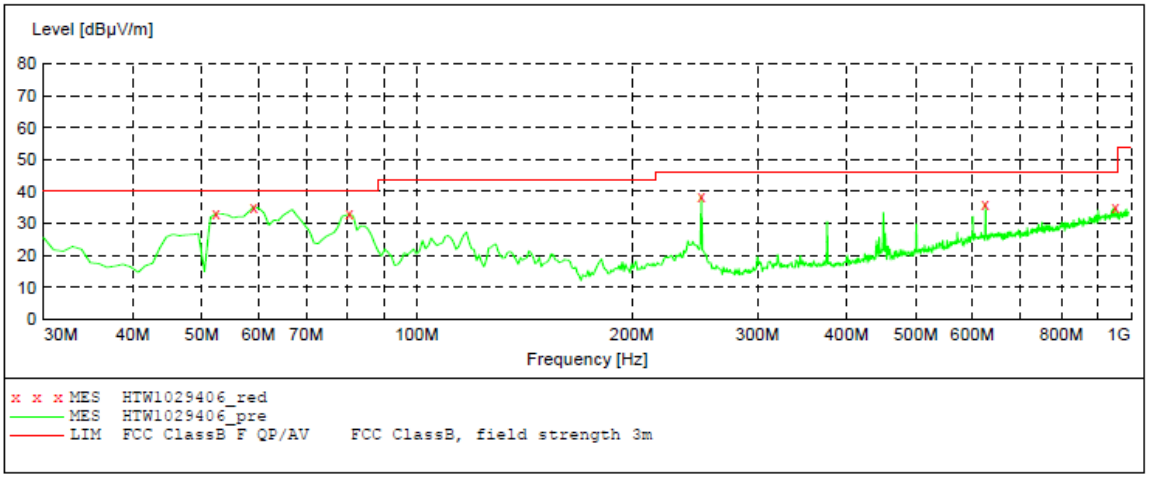
MEASUREMENT RESULT: "HTW1029404_red"

10/29/2013 8:22PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.520000	24.20	-15.0	40.0	15.8	QP	100.0	248.00	VERTICAL
60.070000	27.10	-15.7	40.0	12.9	QP	100.0	174.00	VERTICAL
103.720000	27.60	-14.0	43.5	15.9	QP	100.0	333.00	VERTICAL
250.190000	27.30	-15.7	46.0	18.7	QP	100.0	89.00	VERTICAL
600.360000	33.50	-3.0	46.0	12.5	QP	100.0	114.00	VERTICAL
900.090000	36.20	2.4	46.0	9.8	QP	100.0	67.00	VERTICAL

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	VULB9163

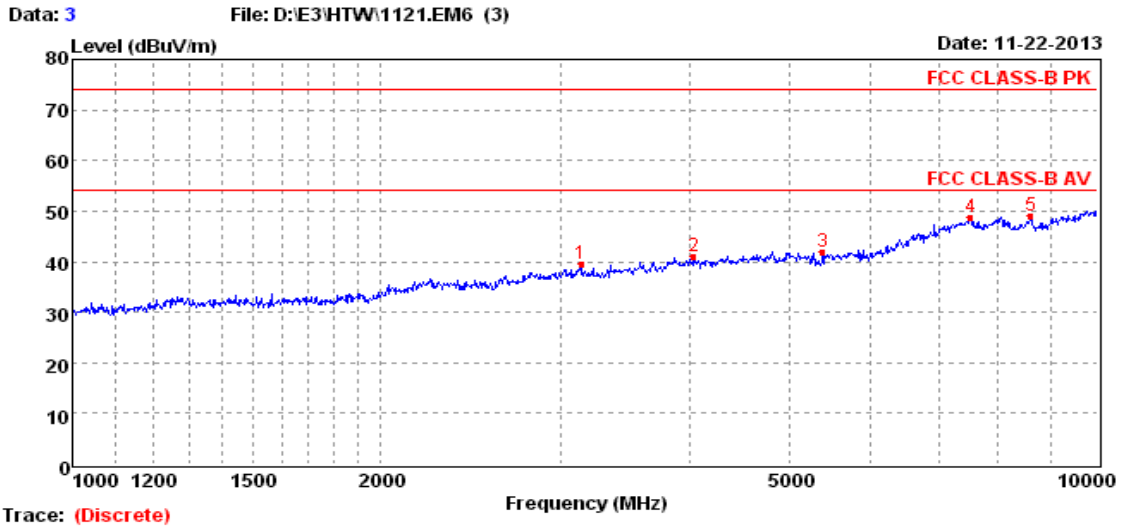


MEASUREMENT RESULT: "HTW1029406_red"

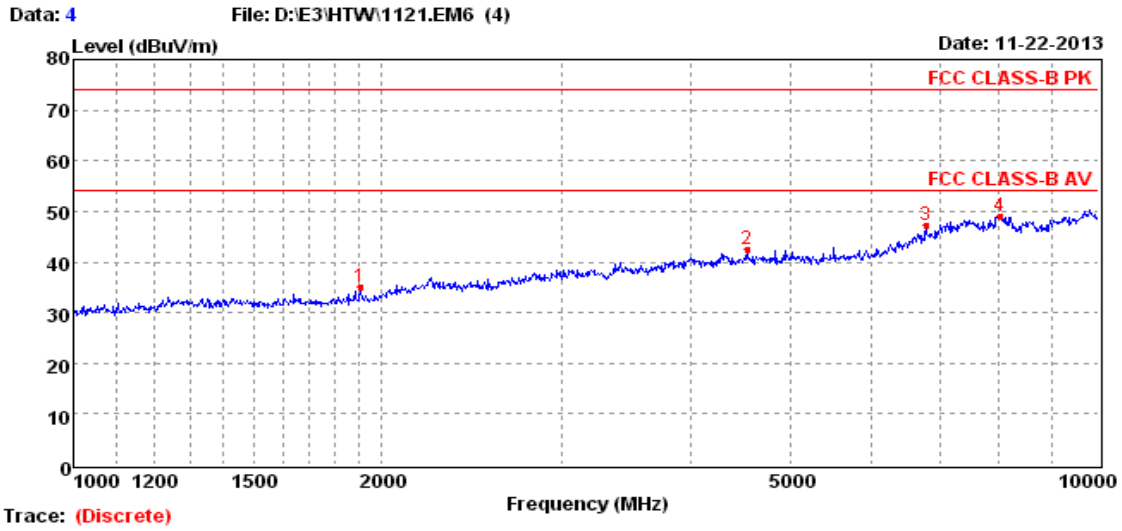
10/29/2013 8:29PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
52.310000	33.00	-15.3	40.0	7.0	QP	100.0	3.00	HORIZONTAL
59.100000	35.20	-15.6	40.0	4.8	QP	100.0	28.00	HORIZONTAL
80.440000	33.00	-19.0	40.0	7.0	QP	300.0	110.00	HORIZONTAL
250.190000	38.60	-15.7	46.0	7.4	QP	100.0	132.00	HORIZONTAL
625.580000	36.20	-2.6	46.0	9.8	QP	100.0	80.00	HORIZONTAL
951.500000	34.90	3.4	46.0	11.1	QP	100.0	360.00	HORIZONTAL

Above 1GHz



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	3133.29	39.60	-2.82	42.42	74.00	34.40	VERTICAL	Peak
2	4036.45	41.01	-0.24	41.25	74.00	32.99	VERTICAL	Peak
3	5395.11	41.97	2.95	39.02	74.00	32.03	VERTICAL	Peak
4	7516.23	48.83	11.58	37.25	74.00	25.17	VERTICAL	Peak
5	8609.94	49.03	11.32	37.71	74.00	24.97	VERTICAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	1905.46	35.03	-7.78	42.81	74.00	38.97	HORIZONTAL	Peak
2	4539.42	42.39	1.20	41.19	74.00	31.61	HORIZONTAL	Peak
3	6792.04	47.15	8.46	38.69	74.00	26.85	HORIZONTAL	Peak
4	8016.78	48.95	12.09	36.86	74.00	25.05	HORIZONTAL	Peak

4.11. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

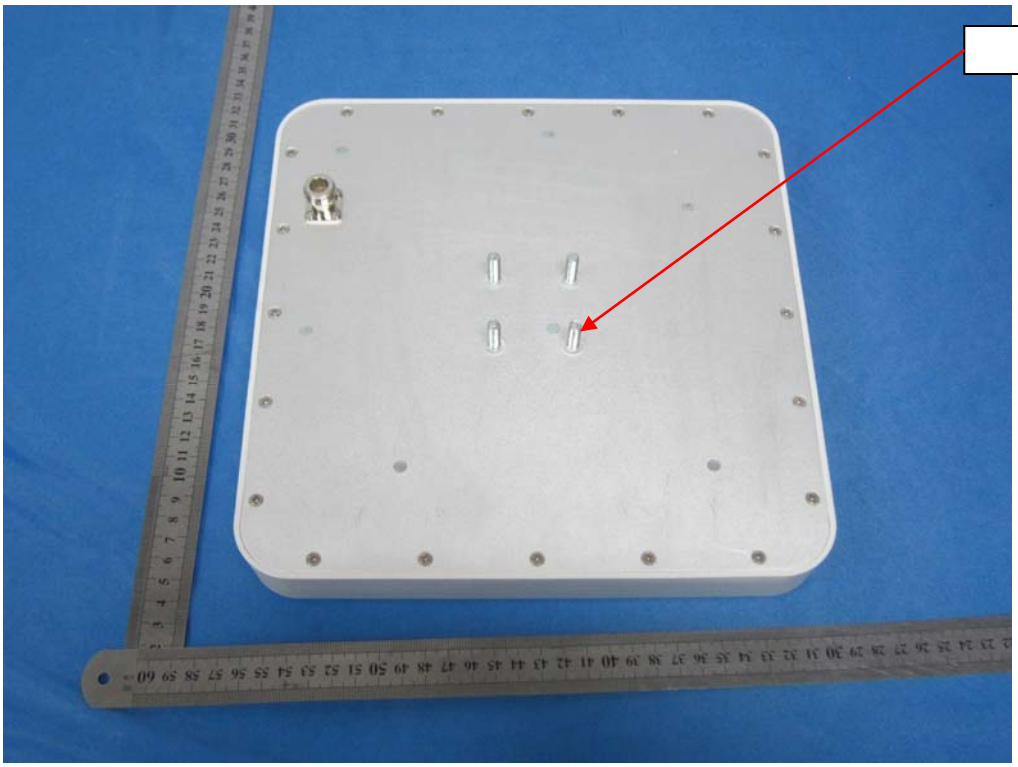
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

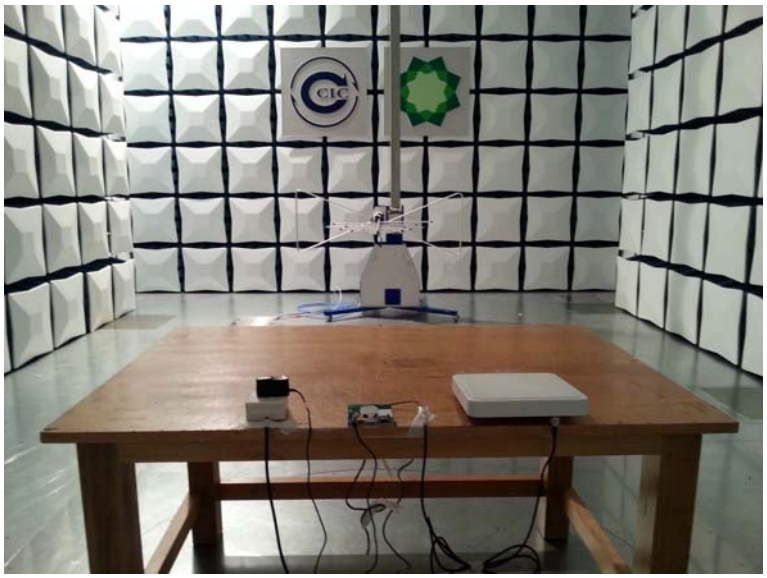
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a External Antenna .The maximum Gain of the antenna was 9.00dBi. Detail please see the photos as following:

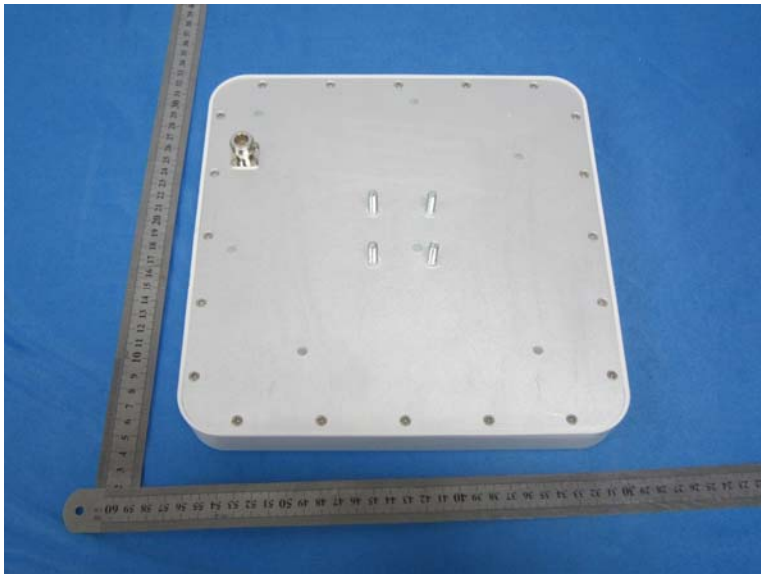


5. Test Setup Photos of the EUT

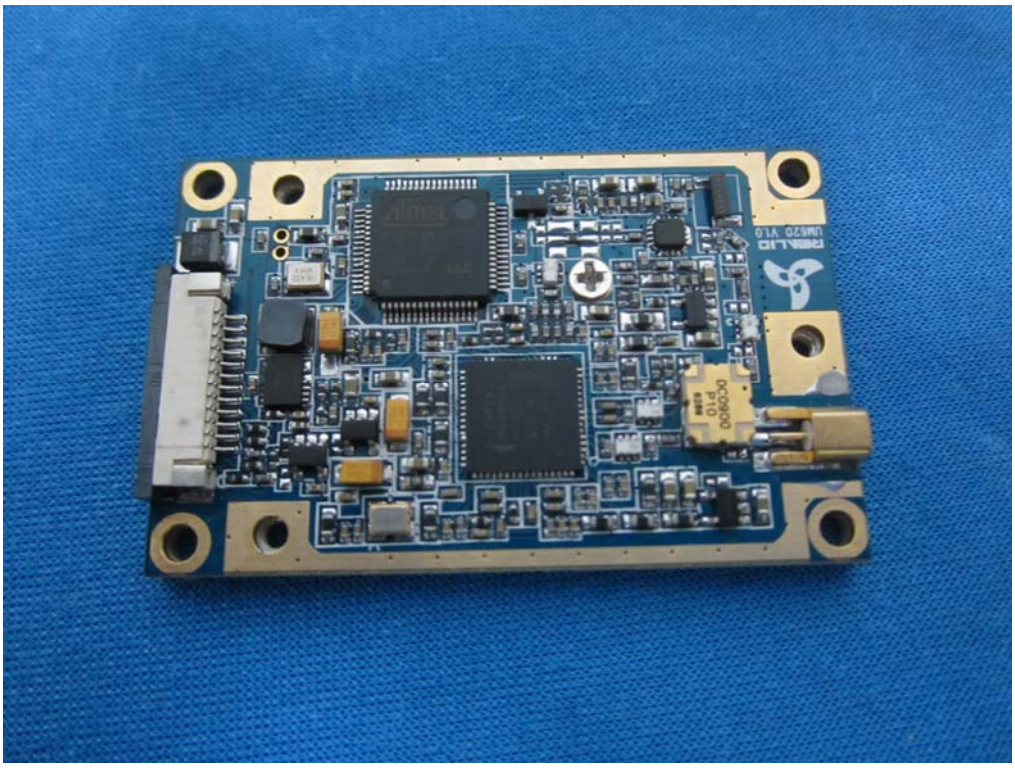


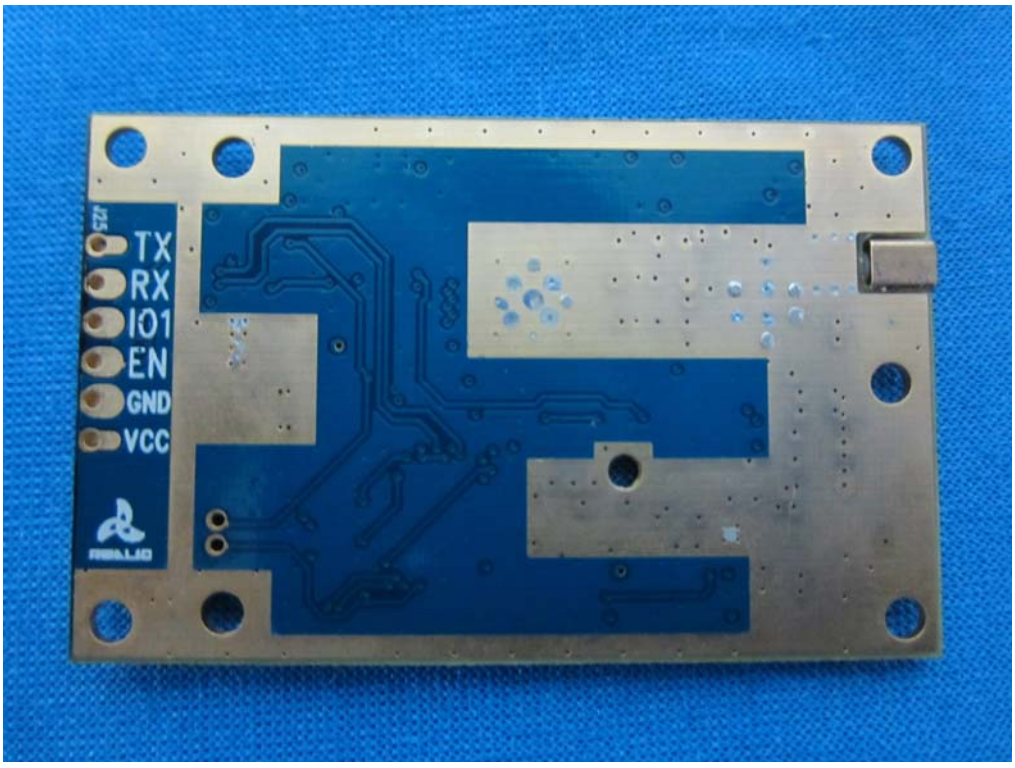
6. External and Internal Photos of the EUT

External Photos



Internal Photos





.....End of Report.....