TEST REPORT

of

FCC Part 15 Subpart C AND CANADA RSS-210

Full Modular Approval

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product :	**915MHz radio module**
Brand:	**Datalogic ADC**
Model:	**MIZAR RADIO MODULE 915MHz**
Model Difference:	**N/A**
FCC ID:	**U4F0022**
IC:	**3862D-006**
FCC Rule Part:	**§15.247, Cat: DSS**
IC Rule Part:	**RSS-210 issue 8:2010, Annex 8**
Applicant:	**Datalogic ADC S.r.l.**
Address:	**Via San Vitalino 13 – 40012 Lippo di Calderara di Reno (BO) - Italy**

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-13LR276FCB**

Issue Date : **2014/02/06**

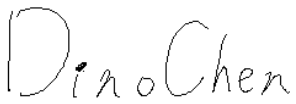
VERIFICATION OF COMPLIANCE

Applicant:	Datalogic ADC S.r.l.
Product Description:	915MHz radio module
Brand Name:	Datalogic ADC
Model No.:	MIZAR RADIO MODULE 915MHz
Model Difference:	N/A
FCC ID:	U4F0022
IC:	3862D-006
FCC Rule Part:	§15.247
IC Rule Part:	RSS-210 issue 8:2010, Annex 8
Date of test:	2013/12/19 ~ 2014/01/29
Date of EUT Received:	2013/12/18

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:		***Date:***	2014/02/06
	Dion Chang / Engineer		
Prepared By:		***Date:***	2014/02/06
	Gigi Yeh / Specialist		
Approved By:		***Date:***	2014/02/06
	Vincent Su / Technical Manager		

Version

Version No.	Date	Description
00	2014/02/06	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name	915MHz radio module
Brand Name	Datalogic ADC
Model Name	MIZAR RADIO MODULE 915MHz
Model Difference	N/A
Power Supply	3.3Vdc
Antenna Designation:	Printing Antenna: 1. 1 dBi,P/N: 663316020 with I-PEX type connector Rubber Antenna(Dipole): 1. 1dBi, P/N: G-RA0K14155047-BON with revised SMA connector 2. 3dBi, P/N: ANT-916-CW-QW with revised SMA connector

High Speed mode (DTS):

Frequency Range:	903.64900 MHz ~ 926.93600 MHz
Channel number:	12 channels
Transmit Power:	14.64 dBm Peak
Modulation type:	NRZ
Transition Rate:	500000 bit/s
Type of Emission:	1M1G1D

Low Speed High Power mode (DSS) : Frequency Hopping

Frequency Range:	902.80050 MHz ~ 927.48450 MHz
Channel number:	25 channels
Modulation type:	RZ Manchester
Data rate:	36864 bit/s
Transmit Power:	16.60 dBm Peak
Dwell Time:	<= 0.4s
Type of Emission:	388KF1D

Low Speed low Power mode (DXX) :

Frequency Range:	902.80050 MHz ~ 927.48450 MHz
Channel number:	25 channels
Modulation type:	RZ Manchester
Data rate:	36864 bit/s
Transmit Power:	93.35 dBuV/m
Type of Emission:	388KF1D

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

The test report is for Low Speed High Power mode.

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

This submittal(s) (test report) is intended for **FCC ID: U4F0022** filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules. And I**C: 3862D-006** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2009 and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4-2009. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7, 13 of ANSI C63.4-2009 and RSS-Gen:2010. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 of ANSI C63.4-2009 and DA 00-705..

2.4. Configuration of Tested System

Fig. 2-1 Configuration

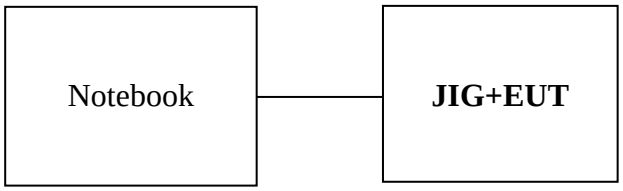


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mrf/Brand	Model name	Series No	Data Cable	Power Cable
1	Notebook	Lenovo	X220i	N/A	Shield	Non-shield

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)/ RSS-Gen §7.2.2	AC Power line Conducted Emission	Compliant
§15.247(b)(2)/ RSS-210 issue 8,§A8.4(1)	Peak Output Power	Compliant
§15.247(d) RSS-210 issue 8,§A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d) RSS-Gen §7.2.3 RSS-210 issue 8,§A8.5	Out-of-band Emissions	Compliant
§15.247(a)(1)/ RSS-210 issue 8,§A8.1(c)	Frequency Separation	Compliant
§15.247(a)(1)(i)/ RSS-210 issue 8,§A8.1(c)	Number of hopping frequency	Compliant
§15.247(a)(1)(i)/ RSS-210 issue 8,§A8.1(c)	Time of Occupancy	Compliant
§15.247(a)(1) RSS210 issue ,§A8.1(c) RSS-GEN 4.6.1	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.203, §15.247(c)/ RSS-GEN 7.1.4, RSS-210 issue 8,§A8.4	Antenna Requirement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Low Speed High Power mode: Channel lowest (902.8005MHz)、mid (915.1425MHz) and highest (927.4845MHz). For Radiated emission, both dipole and printing antenna were tested.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.2, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.2. Measurement Equipment Used:

AC Power Line Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Conduction 04-1 Cable	WOKEN	CFD 300-NL	Conduction 04 -1	09/24/2013	09/23/2014
EMI Receiver 16	Rohde & Schwarz	ESCI	101221	06/13/2013	06/12/2014
LISN 18	ROHDE & SCHWARZ	ENV216	101424	03/13/2013	03/12/2014
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/13/2013	03/12/2014

5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

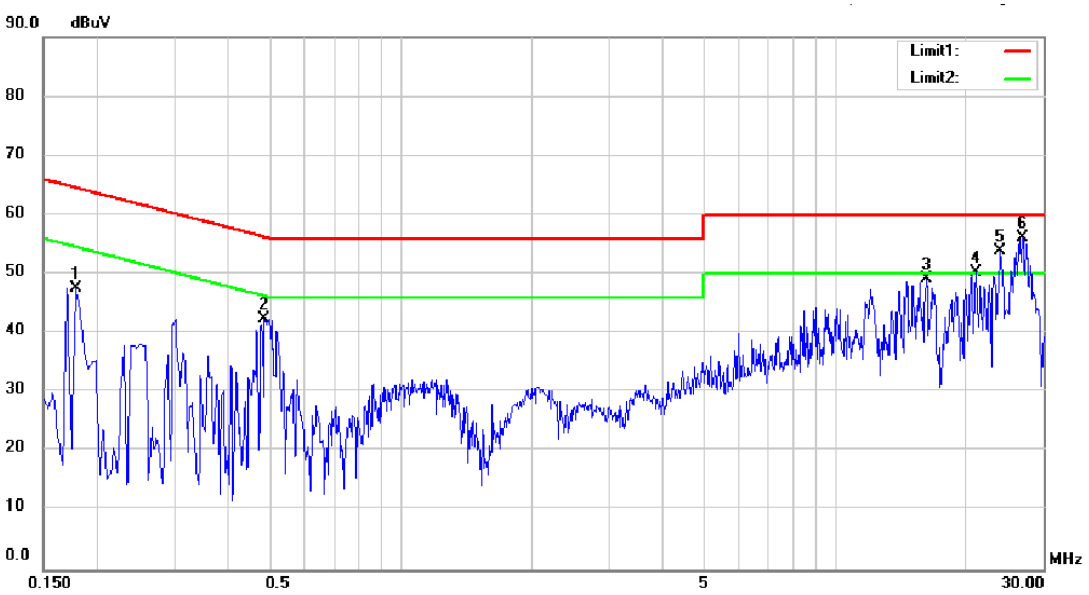
5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

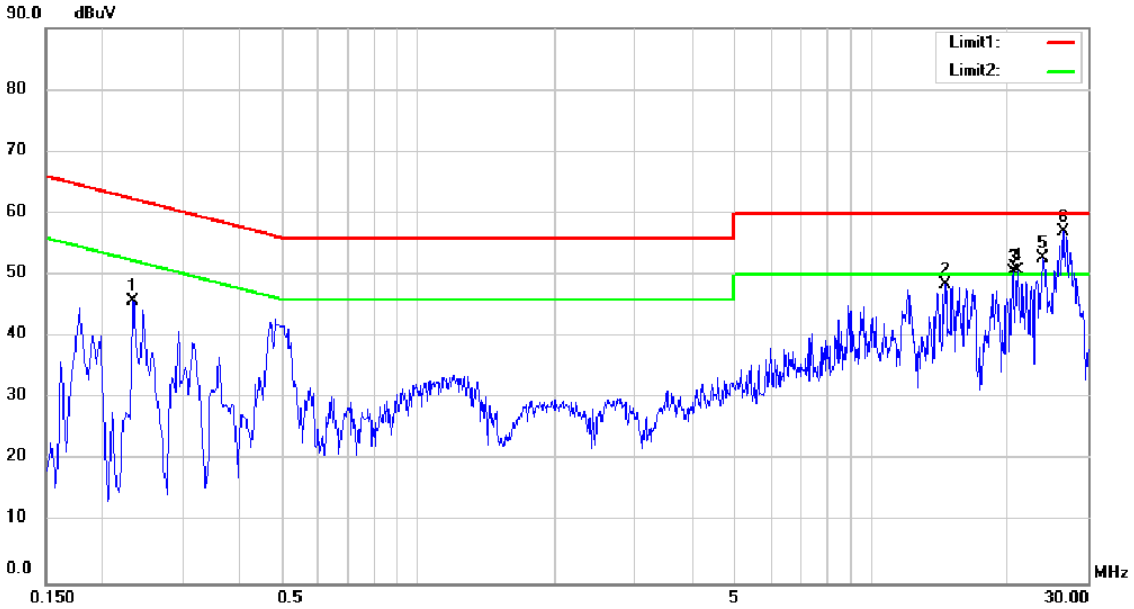
Operation Mode:	Operation Mode	Test Date:	2014/01/27
Test By:	Dino		
Antenna type:	Dipole Antenna		



Site Conduction 04 Phase: L1 Temperature: 26 °C

Condition : Conduction Humidity: 54 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		
	MHz	Peak	QP	AVG	(dB)	peak	QP	AVG	P/Q	AVG	P/Q	AVG	P/F Comment
1	0.1780	38.07	36.27	20.33	9.62	47.69	45.89	29.95	64.58	54.58	-18.69	-24.63	
2	0.4860	32.70	31.23	19.19	9.63	42.33	40.86	28.82	56.24	46.24	-15.38	-17.42	
3	16.1740	39.25	37.56	32.82	9.81	49.06	47.37	42.63	60.00	50.00	-12.63	-7.37	
4	20.9780	40.57	39.28	34.05	9.81	50.38	49.09	43.86	60.00	50.00	-10.91	-6.14	
5	24.0100	44.02	39.76	32.51	9.81	53.83	49.57	42.32	60.00	50.00	-10.43	-7.68	
6 *	26.9540	46.29	44.34	37.58	9.81	56.10	54.15	47.39	60.00	50.00	-5.85	-2.61	



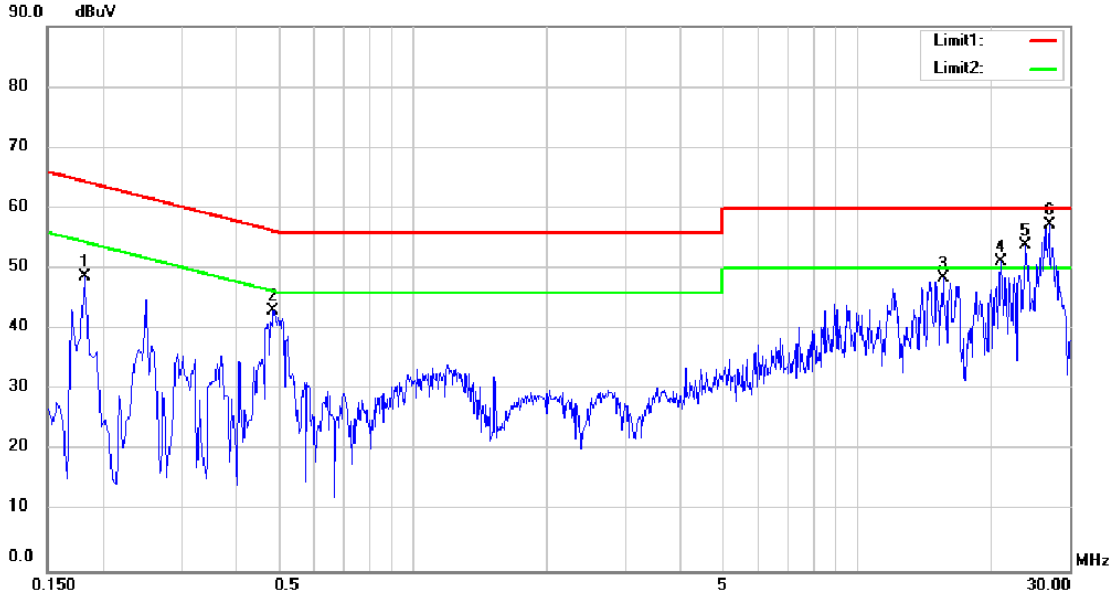
Site Conduction 04 Phase: N Temperature: 26 ℃

Condition : Conduction Humidity: 54 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		
	MHz	Peak	QP	AVG	(dB)	peak	QP	AVG	P/Q	AVG	P/Q	AVG	P/F Comment
1	0.2340	36.30	30.87	14.15	9.59	45.89	40.46	23.74	62.31	52.31	-21.85	-28.57	
2	14.5340	38.55	37.40	32.80	9.86	48.41	47.26	42.66	60.00	50.00	-12.74	-7.34	
3	20.5060	40.66	39.12	33.58	9.92	50.58	49.04	43.50	60.00	50.00	-10.96	-6.50	
4	20.9740	40.80	40.17	34.73	9.92	50.72	50.09	44.65	60.00	50.00	-9.91	-5.35	
5	23.9060	42.79	38.22	31.92	9.93	52.72	48.15	41.85	60.00	50.00	-11.85	-8.15	
6 *	26.4860	47.20	40.33	34.96	9.94	57.14	50.27	44.90	60.00	50.00	-9.73	-5.10	

AC POWER LINE CONDUCTED EMISSION TEST DATA

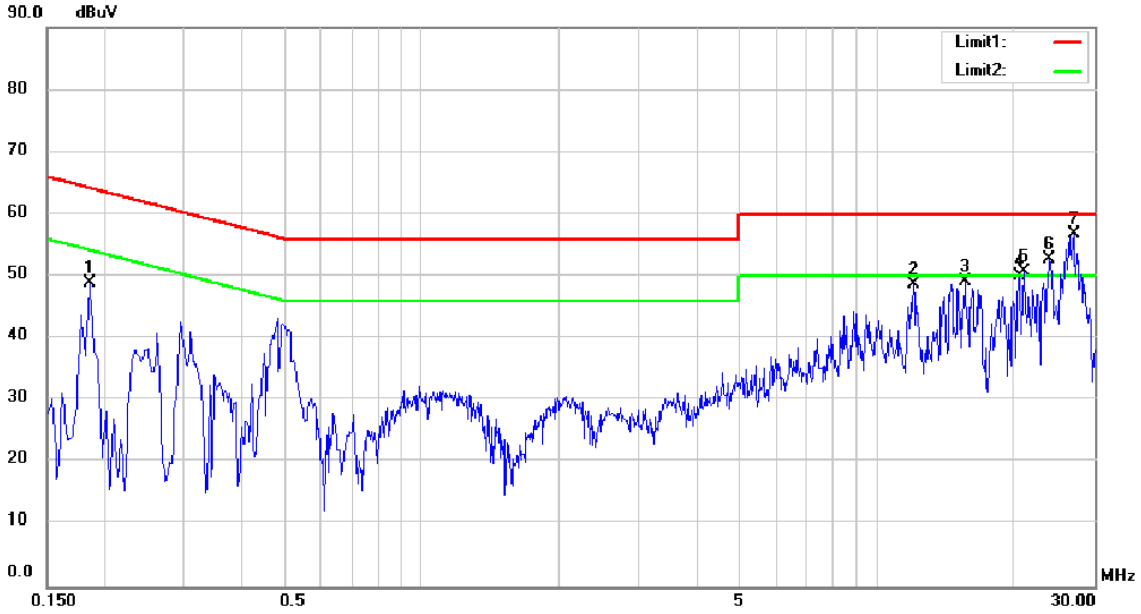
Operation Mode:	Operation Mode	Test Date:	2014/01/27
Test By:	Dino		
Antenna type:	Printing Antenna		



Site Conduction 04 Phase: L1 Temperature: 26 ℃

Condition : Conduction Humidity: 54 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		
	MHz	Peak	QP	AVG	(dB)	peak	QP	AVG	P/Q	AVG	P/Q	AVG	P/F Comment
1	0.1820	39.03	35.73	19.32	9.62	48.65	45.35	28.94	64.39	54.39	-19.04	-25.45	
2	0.4860	33.47	31.20	18.58	9.63	43.10	40.83	28.21	56.24	46.24	-15.41	-18.03	
3	15.5860	38.67	36.10	27.39	9.81	48.48	45.91	37.20	60.00	50.00	-14.09	-12.80	
4	20.9820	41.35	39.07	31.57	9.81	51.16	48.88	41.38	60.00	50.00	-11.12	-8.62	
5	23.8900	44.11	39.75	34.49	9.81	53.92	49.56	44.30	60.00	50.00	-10.44	-5.70	
6 *	27.0700	47.54	42.82	35.19	9.81	57.35	52.63	45.00	60.00	50.00	-7.37	-5.00	



Site Conduction 04 Phase: N Temperature: 26 ℃

Condition : Conduction Humidity: 54 %

No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		
	MHz	Peak	QP	AVG	(dB)	peak	QP	AVG	P/Q	AVG	P/Q	AVG	P/F Comment
1	0.1860	39.33	35.33	19.97	9.59	48.92	44.92	29.56	64.21	54.21	-19.29	-24.65	
2	12.0060	38.81	36.68	33.96	9.80	48.61	46.48	43.76	60.00	50.00	-13.52	-6.24	
3	15.5860	39.18	33.42	28.21	9.88	49.06	43.30	38.09	60.00	50.00	-16.70	-11.91	
4	20.5100	40.07	35.94	30.85	9.92	49.99	45.86	40.77	60.00	50.00	-14.14	-9.23	
5	20.9780	40.77	38.60	32.57	9.92	50.69	48.52	42.49	60.00	50.00	-11.48	-7.51	
6	23.9060	42.86	38.97	32.87	9.93	52.79	48.90	42.80	60.00	50.00	-11.10	-7.20	
7 *	27.0700	46.91	41.87	34.18	9.94	56.85	51.81	44.12	60.00	50.00	-8.19	-5.88	

6. PEAK OUTPUT POWER MEASUREMENT

6.1. Standard Applicable:

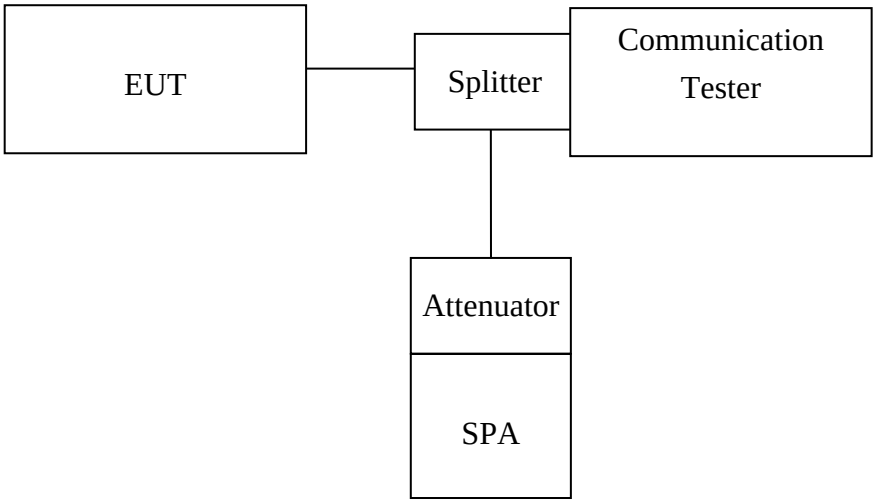
According to §15.247(b)(2 For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

According to RSS-210 issue 8,§A8.4(1), For frequency hopping systems operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W, and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

6.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Meter 05	Anritsu	ML2495A	1116010	04/19/2013	04/18/2014
Power Sensor 05	Anritsu	MA2411B	34NKF50	04/19/2013	04/18/2014
Power Sensor 06	DARE	RPR3006W	13I00030SNO33	10/18/2013	10/17/2014
Power Meter 07	DARE	RPR3006W	13I00030SNO34	10/18/2013	10/17/2014
Temperature Chamber	KSON	THS-B4H100	2287	03/15/2013	03/14/2014
DC Power supply	ABM	51850	N/A	08/16/2013	08/15/2014
AC Power supply	EXTECH	CFC105W	NA	12/19/2013	12/18/2014
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/27/2013	12/26/2014
Spectrum analyzer	Agilent	N9030A	MY51360021	03/29/2013	03/28/2014

6.3. .Test Set-up:



6.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel power function, RBW, VBW = 1MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.5. Measurement Result:

Low Speed

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
902.80	16.60	0.00	16.60	0.04571	1
915.14	15.90	0.00	15.90	0.03890	1
927.48	16.20	0.00	16.20	0.04169	1

offset: 0.5dB

7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

7.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

According to RSS-210 issue 8,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

7.2. Measurement Equipment Used:

7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

7.2.2. Radiated emission:

Chamber 14(966)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/18/2013	07/17/2014
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/26/2013	05/25/2014
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	05/03/2013	05/02/2014
Dipole antenna	SCHWARZBECK	VHAP,30-300	919	12/03/2013	12/02/2014
Dipole antenna	SCHWARZBECK	UHAP,300-1000	1195	12/03/2013	12/02/2014
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	03/07/2013	03/06/2015
Bilog Antenna30-1G	Schaffner	CBL 6112B	2756	01/15/2014	01/14/2015
Horn antenna1-18G(06)	EMCO	3117	0006665	11/04/2013	11/03/2014
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/09/2013	01/08/2015
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/15/2013	05/14/2015
Preamplifier9-1000M	HP	8447D	NA	02/19/2013	02/18/2014
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/18/2013	07/17/2014
Preamplifier1-26G	EM	EM01M26G	NA	02/26/2013	02/25/2014
Preamplifier26-40G	MITEQ	JS-26004000-27-5A	818471	05/08/2013	05/07/2015
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	02/06/2013	02/05/2014
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/08/2013	10/07/2014
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	10/03/2013	10/02/2015
Signal Generator	R&S	SMU200A	102330	02/19/2013	02/18/2014
Signal Generator	Anritsu	MG3692A	20311	10/30/2013	10/29/2014
2.4G Filter	Micro-Tronics	Brm50702	76	12/27/2013	12/26/2014

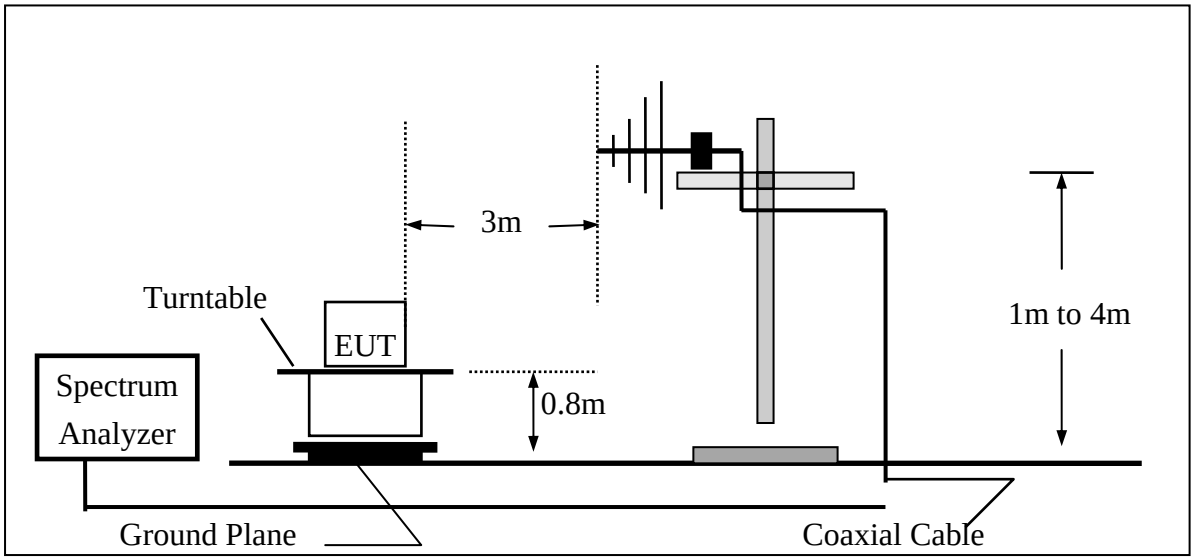
7.3. Test SET-UP:

7.3.1. Conducted Emission at antenna port:

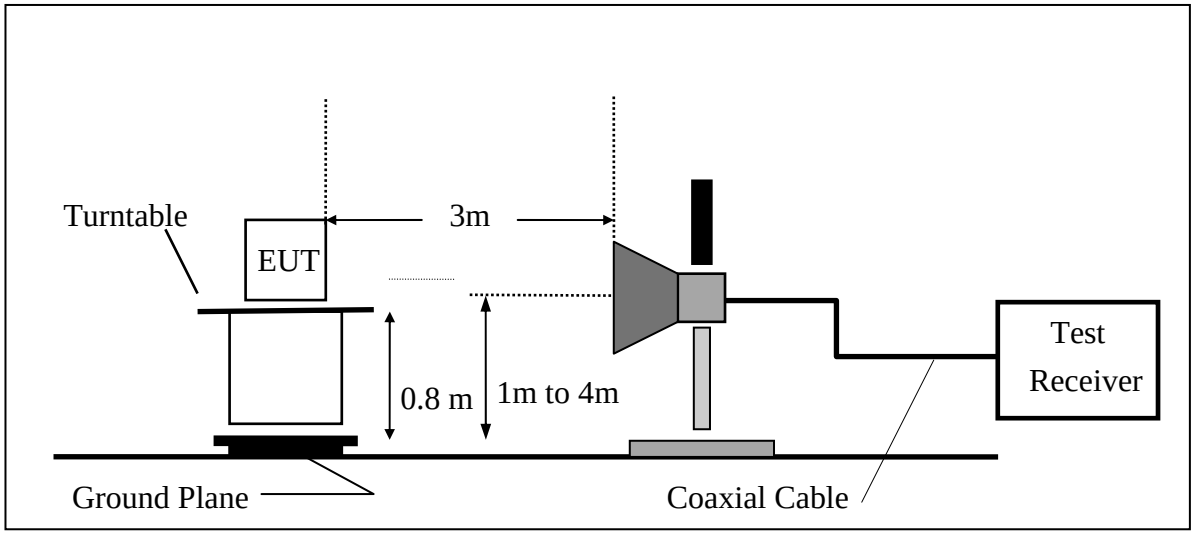
Refer to section 6.3 for details.

7.3.2. Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



7.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 902MHz and 928MHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

7.5. 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

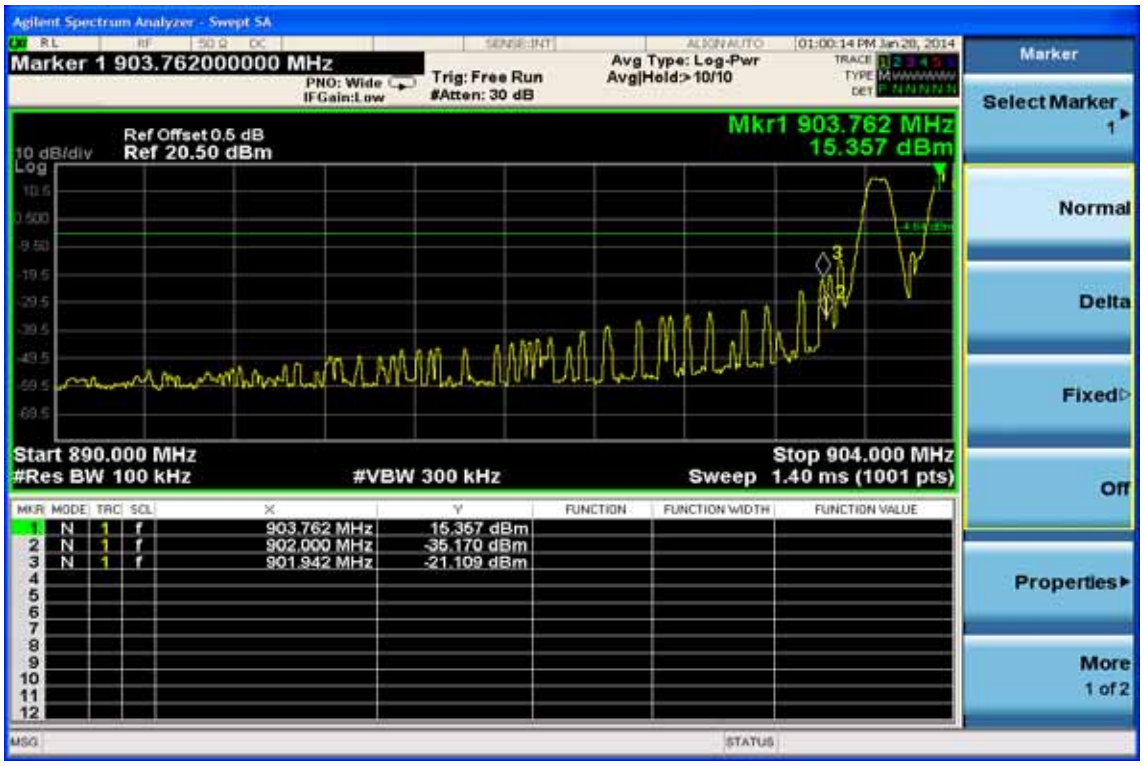
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

7.6. Measurement Result:

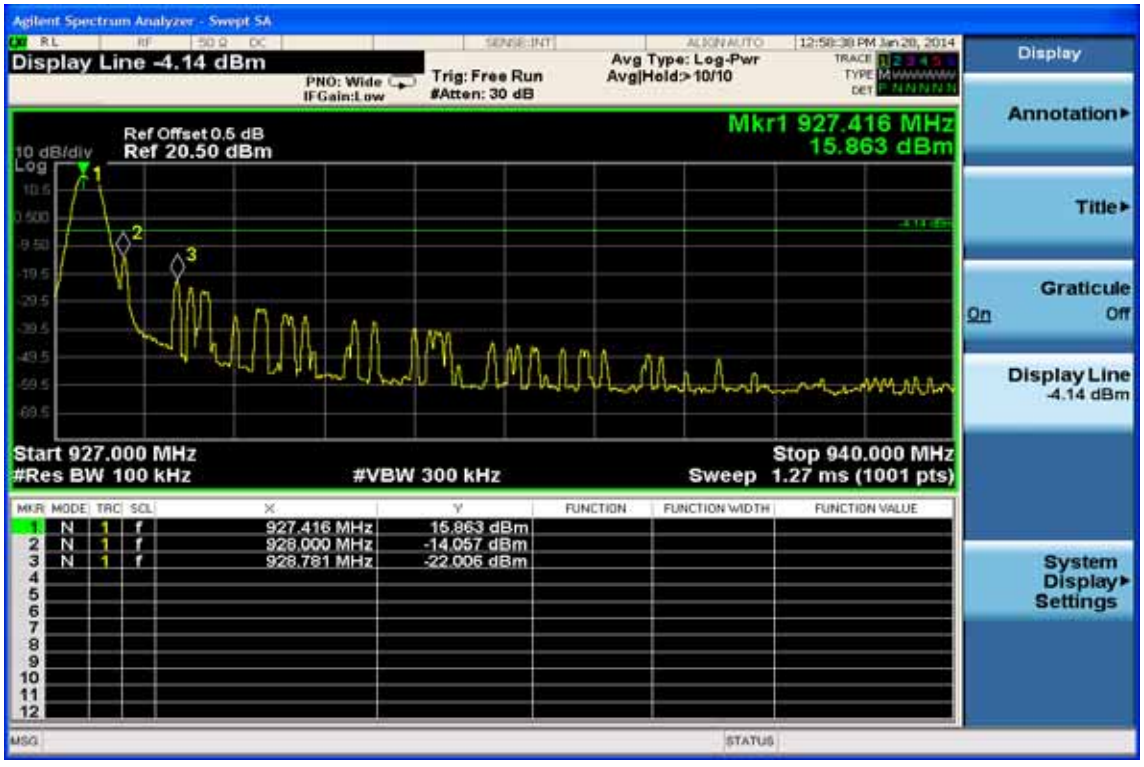
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

915MHz Low Speed

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission (Dipole Antenna):

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.8005 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	901.97	73.29	-0.74	72.55	93.3	-20.75	Peak	VERTICAL
2	902.00	70.19	-0.74	69.45	93.3	-23.85	Peak	VERTICAL
1	901.97	65.81	-0.74	65.07	87.95	-22.88	Peak	HORIZONTAL
2	902.00	61.65	-0.74	60.91	87.95	-27.04	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.4845 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	928.00	70.05	-0.24	69.81	93.76	-23.95	Peak	VERTICAL
2	928.13	83.51	-0.24	83.27	93.76	-10.49	Peak	VERTICAL
1	928.00	63.22	-0.24	62.98	87.92	-24.94	Peak	HORIZONTAL
2	928.21	75.82	-0.24	75.58	87.92	-12.34	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

7 Limit = Measured Peak field strength – 20dB

Radiated Emission (Printing Antenna):

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.8005 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	901.90	67.25	-0.74	66.51	85.98	-19.47	Peak	VERTICAL
2	902.00	64.05	-0.74	63.31	85.98	-22.67	Peak	VERTICAL
1	901.01	55.56	-0.77	54.79	79.3	-24.51	Peak	HORIZONTAL
2	902.00	40.74	-0.74	40.00	79.3	-39.30	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.4845 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	928.00	63.22	-0.24	62.98	88.42	-25.44	Peak	VERTICAL
2	928.31	72.37	-0.23	72.14	88.42	-16.28	Peak	VERTICAL
1	928.00	55.80	-0.24	55.56	81.1	-25.54	Peak	HORIZONTAL
2	928.34	66.14	-0.23	65.91	81.1	-15.19	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

7 Limit = Measured Peak field strength – 20dB

8. SPURIOUS EMISSION TEST

8.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

According to RSS-Gen §7.2.3 and RSS-210 issue 8,§8.5 In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2. Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

8.2.2. Radiated emission:

Refer to section 7.2 for details.

8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

8.3.2. Radiated emission:

Refer to section 7.3 for details.

8.4. Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

8.5. 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

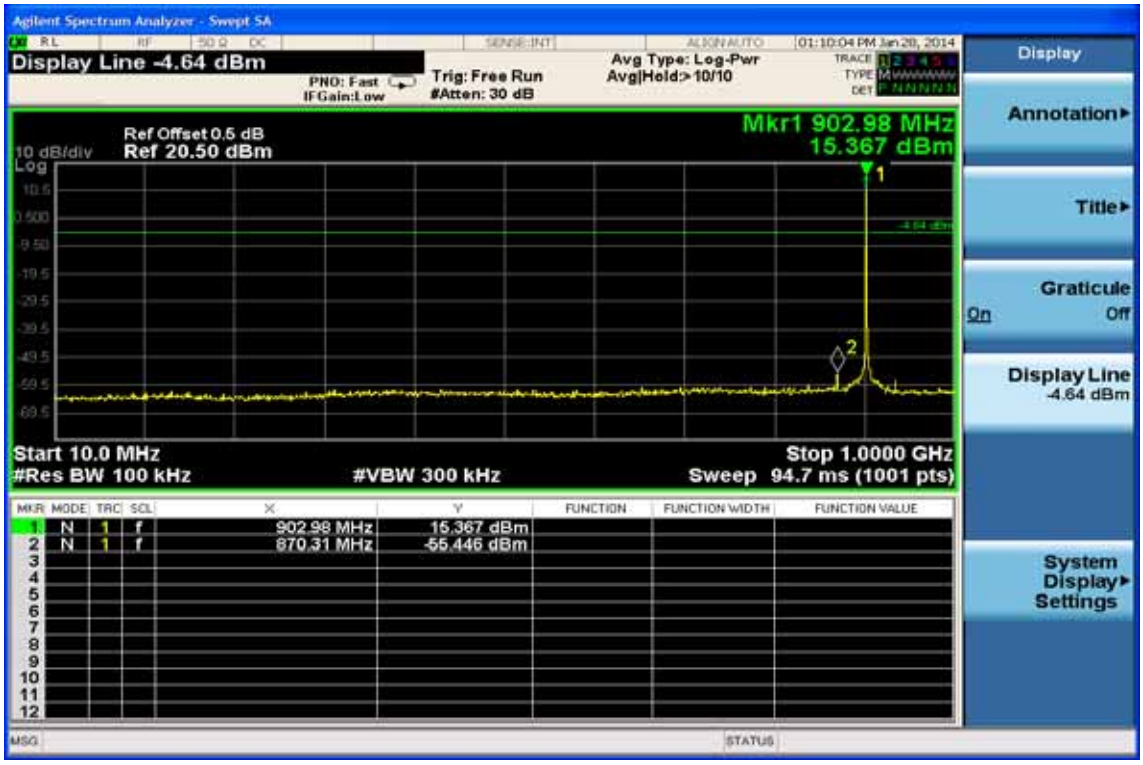
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6. Measurement Result:

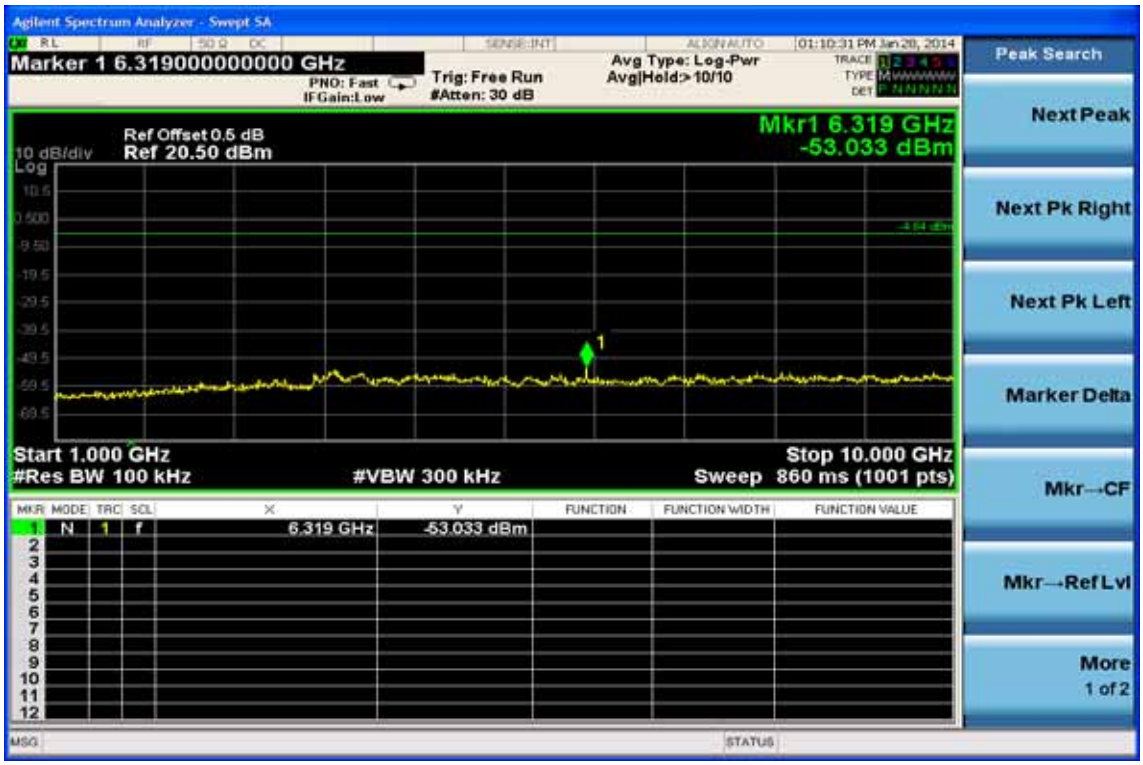
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Conducted Spurious Emission Measurement Result (Low Speed)

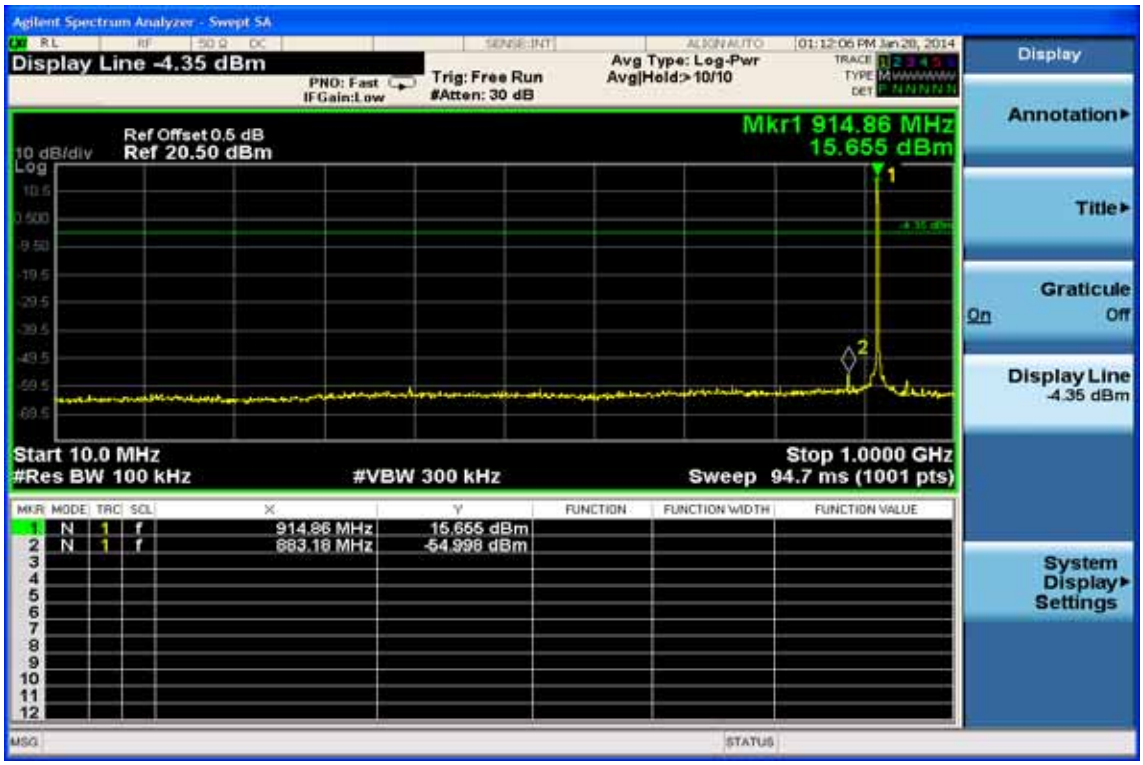
Ch Low 30MHz – 3GHz



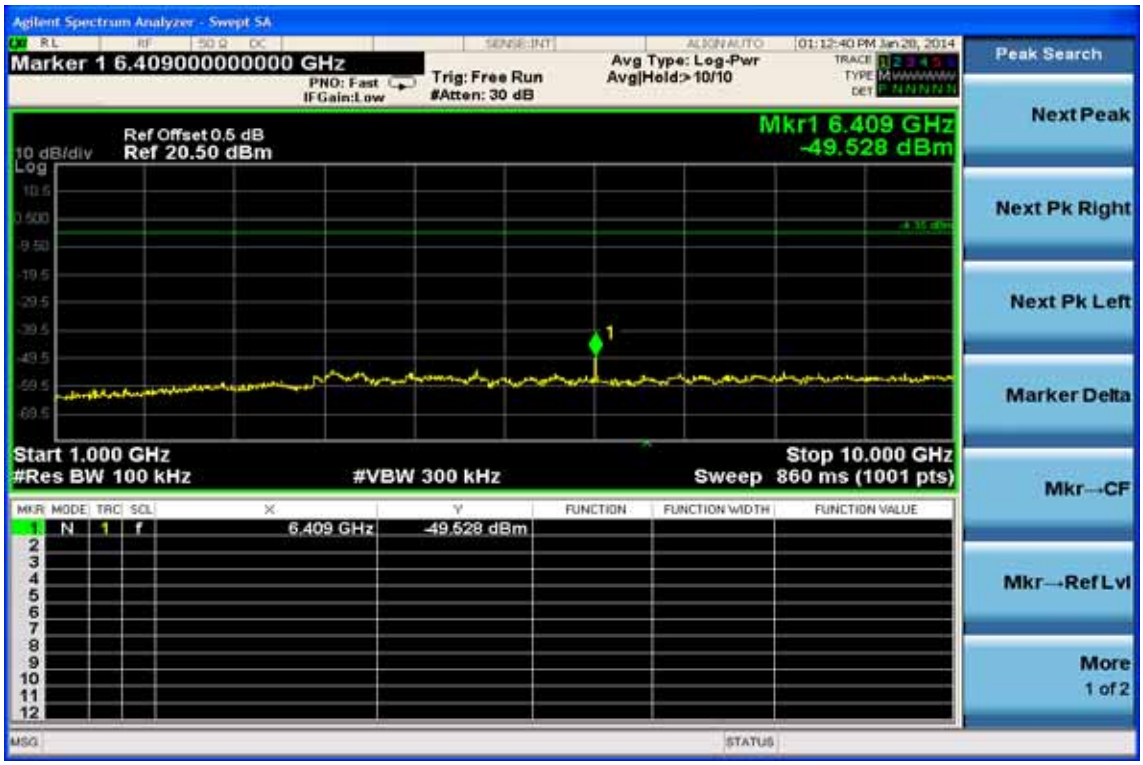
Ch Low 3GHz – 26.5GHz



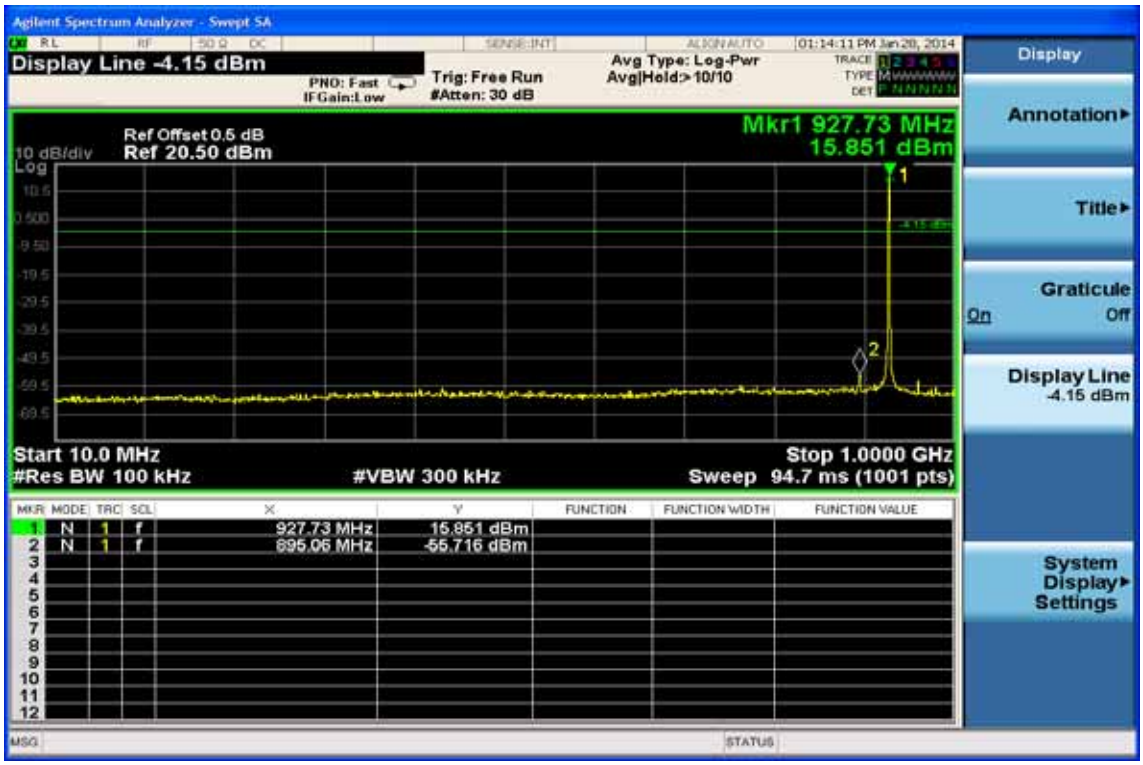
Ch Mid 30MHz – 3GHz



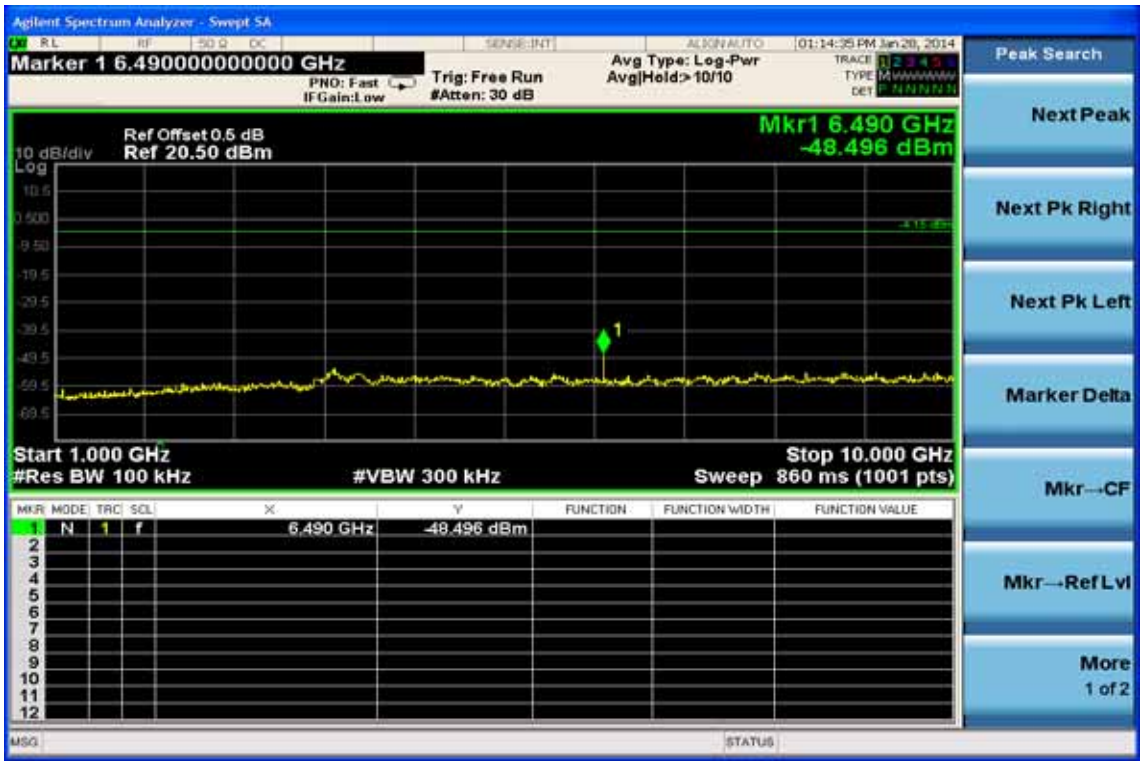
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Dipole Antenna

Radiated Spurious Emission Measurement Result: (below 1GHz)

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.80 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	120.21	40.53	-14.51	26.02	43.50	-17.48	Peak	VERTICAL
2	159.01	38.86	-12.08	26.78	43.50	-16.72	Peak	VERTICAL
3	312.27	41.01	-10.85	30.16	46.00	-15.84	Peak	VERTICAL
4	384.05	37.51	-9.52	27.99	46.00	-18.01	Peak	VERTICAL
5	445.16	35.86	-8.28	27.58	46.00	-18.42	Peak	VERTICAL
6	455.83	35.96	-8.12	27.84	46.00	-18.16	Peak	VERTICAL
1	105.66	43.83	-16.33	27.50	43.50	-16.00	Peak	HORIZONTAL
2	153.19	48.13	-12.05	36.08	43.50	-7.42	Peak	HORIZONTAL
3	288.02	42.24	-11.45	30.79	46.00	-15.21	Peak	HORIZONTAL
4	384.05	45.74	-9.52	36.22	46.00	-9.78	Peak	HORIZONTAL
5	531.49	40.46	-7.15	33.31	46.00	-12.69	Peak	HORIZONTAL
6	776.90	40.38	-2.67	37.71	46.00	-8.29	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2014/01/24
Fundamental Frequency	915.14MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	159.01	42.04	-12.08	29.96	43.50	-13.54	Peak	VERTICAL
2	295.78	42.18	-11.21	30.97	46.00	-15.03	Peak	VERTICAL
3	312.27	43.14	-10.85	32.29	46.00	-13.71	Peak	VERTICAL
4	384.05	40.12	-9.52	30.60	46.00	-15.40	Peak	VERTICAL
5	546.04	39.63	-6.94	32.69	46.00	-13.31	Peak	VERTICAL
6	795.33	40.88	-2.52	38.36	46.00	-7.64	Peak	VERTICAL
1	102.75	43.72	-16.88	26.84	43.50	-16.66	Peak	HORIZONTAL
2	154.16	48.32	-12.06	36.26	43.50	-7.24	Peak	HORIZONTAL
3	288.02	43.38	-11.45	31.93	46.00	-14.07	Peak	HORIZONTAL
4	384.05	45.21	-9.52	35.69	46.00	-10.31	Peak	HORIZONTAL
5	589.69	39.83	-5.90	33.93	46.00	-12.07	Peak	HORIZONTAL
6	762.35	39.69	-2.79	36.90	46.00	-9.10	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.48MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	66.86	40.00	-14.08	25.92	40.00	-14.08	Peak	VERTICAL
2	133.79	40.87	-13.22	27.65	43.50	-15.85	Peak	VERTICAL
3	157.07	41.38	-12.07	29.31	43.50	-14.19	Peak	VERTICAL
4	296.75	43.11	-11.17	31.94	46.00	-14.06	Peak	VERTICAL
5	489.78	40.47	-7.74	32.73	46.00	-13.27	Peak	VERTICAL
6	667.29	38.91	-4.70	34.21	46.00	-11.79	Peak	VERTICAL
1	105.66	43.84	-16.33	27.51	43.50	-15.99	Peak	HORIZONTAL
2	151.25	48.10	-12.04	36.06	43.50	-7.44	Peak	HORIZONTAL
3	288.02	40.70	-11.45	29.25	46.00	-16.75	Peak	HORIZONTAL
4	384.05	46.40	-9.52	36.88	46.00	-9.12	Peak	HORIZONTAL
5	448.07	40.59	-8.22	32.37	46.00	-13.63	Peak	HORIZONTAL
6	580.96	39.51	-6.12	33.39	46.00	-12.61	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.80 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1805.60	55.30	-9.04	46.26	74.00	-27.74	Peak	VERTICAL
2	6319.60	46.93	5.74	52.67	74.00	-21.33	Peak	VERTICAL
3	7222.40	44.34	8.24	52.58	74.00	-21.42	Peak	VERTICAL
4	8125.20	40.49	9.73	50.22	54.00	-3.78	Average	VERTICAL
5	8125.20	49.29	9.73	59.02	74.00	-14.98	Peak	VERTICAL
1	1805.60	54.91	-9.06	45.85	74.00	-28.15	Peak	HORIZONTAL
2	8125.20	35.37	9.73	45.10	54.00	-8.90	Average	HORIZONTAL
3	8125.20	43.49	9.73	53.22	74.00	-20.78	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	2014/01/24
Fundamental Frequency	915.14 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1854.97	56.99	-8.77	48.22	74.00	-25.78	Peak	VERTICAL
2	6492.38	42.70	6.38	49.08	54.00	-4.92	Average	VERTICAL
3	6492.38	48.91	6.38	55.29	74.00	-18.71	Peak	VERTICAL
4	7417.00	44.38	8.35	52.73	74.00	-21.27	Peak	VERTICAL
1	1854.97	54.05	-8.77	45.28	74.00	-28.72	Peak	HORIZONTAL
2	2242.00	54.79	-7.39	47.40	74.00	-26.60	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.48 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1830.28	57.64	-8.91	48.73	74.00	-25.27	Peak	VERTICAL
2	6405.99	44.11	6.07	50.18	54.00	-3.82	Average	VERTICAL
3	6405.99	50.23	6.07	56.30	74.00	-17.70	Peak	VERTICAL
4	7321.14	44.66	8.30	52.96	74.00	-21.04	Peak	VERTICAL
5	8236.28	37.53	10.11	47.64	54.00	-6.36	Average	VERTICAL
6	8236.28	46.62	10.11	56.73	74.00	-17.27	Peak	VERTICAL
1	1830.28	54.76	-8.91	45.85	74.00	-28.15	Peak	HORIZONTAL
2	8236.28	42.00	10.11	52.11	74.00	-21.89	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Printing Antenna

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.80 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	62.01	41.07	-13.10	27.97	40.00	-12.03	Peak	VERTICAL
2	120.21	43.50	-14.51	28.99	43.50	-14.51	Peak	VERTICAL
3	159.98	42.83	-12.08	30.75	43.50	-12.75	Peak	VERTICAL
4	296.75	45.03	-11.17	33.86	46.00	-12.14	Peak	VERTICAL
5	312.27	44.08	-10.85	33.23	46.00	-12.77	Peak	VERTICAL
6	384.05	43.04	-9.52	33.52	46.00	-12.48	Peak	VERTICAL
1	154.16	47.97	-12.06	35.91	43.50	-7.59	Peak	HORIZONTAL
2	288.02	43.10	-11.45	31.65	46.00	-14.35	Peak	HORIZONTAL
3	296.75	42.16	-11.17	30.99	46.00	-15.01	Peak	HORIZONTAL
4	384.05	45.87	-9.52	36.35	46.00	-9.65	Peak	HORIZONTAL
5	518.88	39.93	-7.35	32.58	46.00	-13.42	Peak	HORIZONTAL
6	610.06	40.46	-5.50	34.96	46.00	-11.04	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2014/01/24
Fundamental Frequency	915.14MHz	Test By	Dino
Temperature	25℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	65.89	40.55	-13.88	26.67	40.00	-13.33	Peak	VERTICAL
2	156.10	42.76	-12.06	30.70	43.50	-12.80	Peak	VERTICAL
3	296.75	44.50	-11.17	33.33	46.00	-12.67	Peak	VERTICAL
4	370.47	41.06	-9.79	31.27	46.00	-14.73	Peak	VERTICAL
5	474.26	40.11	-7.91	32.20	46.00	-13.80	Peak	VERTICAL
6	622.67	40.08	-5.33	34.75	46.00	-11.25	Peak	VERTICAL
1	105.66	43.52	-16.33	27.19	43.50	-16.31	Peak	HORIZONTAL
2	151.25	48.66	-12.04	36.62	43.50	-6.88	Peak	HORIZONTAL
3	288.02	42.94	-11.45	31.49	46.00	-14.51	Peak	HORIZONTAL
4	384.05	46.34	-9.52	36.82	46.00	-9.18	Peak	HORIZONTAL
5	604.24	39.86	-5.59	34.27	46.00	-11.73	Peak	HORIZONTAL
6	765.26	40.30	-2.76	37.54	46.00	-8.46	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.48MHz	Test By	Dino
Temperature	25 ℃	Humidity	65%

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	51.34	38.48	-12.19	26.29	40.00	-13.71	Peak	VERTICAL
2	115.36	41.49	-14.99	26.50	43.50	-17.00	Peak	VERTICAL
3	151.25	45.73	-12.04	33.69	43.50	-9.81	Peak	VERTICAL
4	384.05	42.73	-9.52	33.21	46.00	-12.79	Peak	VERTICAL
5	490.75	40.40	-7.72	32.68	46.00	-13.32	Peak	VERTICAL
6	604.24	40.91	-5.59	35.32	46.00	-10.68	Peak	VERTICAL
1	153.19	48.31	-12.05	36.26	43.50	-7.24	Peak	HORIZONTAL
2	288.02	43.28	-11.45	31.83	46.00	-14.17	Peak	HORIZONTAL
3	296.75	42.73	-11.17	31.56	46.00	-14.44	Peak	HORIZONTAL
4	384.05	46.71	-9.52	37.19	46.00	-8.81	Peak	HORIZONTAL
5	480.08	41.12	-7.84	33.28	46.00	-12.72	Peak	HORIZONTAL
6	603.27	40.33	-5.60	34.73	46.00	-11.27	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
2 Measuring frequencies from the lowest internal frequency to the 1GHz.
3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	2014/01/24
Fundamental Frequency	902.80 MHz	Test By	Dino
Temperature	25℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1805.60	49.54	-9.06	40.48	74.00	-33.52	Peak	VERTICAL
2	6319.60	46.17	5.74	51.91	54.00	-2.09	Average	VERTICAL
3	6319.60	52.32	5.74	58.06	74.00	-15.94	Peak	VERTICAL
4	7222.40	41.16	8.24	49.40	54.00	-4.60	Average	VERTICAL
5	7222.40	47.24	8.24	55.48	74.00	-18.52	Peak	VERTICAL
6	8125.20	41.89	9.73	51.62	54.00	-2.38	Average	VERTICAL
7	8125.20	51.54	9.73	61.27	74.00	-12.73	Peak	VERTICAL
1	1810.00	46.79	-9.04	37.75	74.00	-36.25	Peak	HORIZONTAL
2	6319.60	44.64	5.74	50.38	74.00	-23.62	Peak	HORIZONTAL
3	8125.20	36.86	9.73	46.59	54.00	-7.41	Average	HORIZONTAL
4	8125.20	46.10	9.73	55.83	74.00	-18.17	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	2014/01/24
Fundamental Frequency	915.14 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1830.28	49.21	-8.91	40.30	74.00	-33.70	Peak	VERTICAL
2	6405.98	46.12	6.07	52.19	54.00	-1.81	Average	VERTICAL
3	6405.98	56.23	6.07	62.30	74.00	-11.70	Peak	VERTICAL
4	7321.12	40.23	8.30	48.53	54.00	-5.47	Average	VERTICAL
5	7321.12	47.34	8.30	55.64	74.00	-18.36	Peak	VERTICAL
6	8236.26	38.42	10.11	48.53	54.00	-5.47	Average	VERTICAL
7	8236.26	47.14	10.11	57.25	74.00	-16.75	Peak	VERTICAL
1	1828.00	46.25	-8.93	37.32	74.00	-36.68	Peak	HORIZONTAL
2	6405.98	40.12	6.07	46.19	54.00	-7.81	Average	HORIZONTAL
3	6405.98	48.62	6.07	54.69	74.00	-19.31	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2014/01/24
Fundamental Frequency	927.48 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1854.97	48.42	-8.77	39.65	74.00	-34.35	Peak	VERTICAL
2	6492.39	45.40	6.38	51.78	54.00	-2.22	Average	VERTICAL
3	6492.39	53.80	6.38	60.18	74.00	-13.82	Peak	VERTICAL
4	7419.84	47.09	8.35	55.44	74.00	-18.56	Peak	VERTICAL
5	7419.84	39.39	8.36	47.75	54.00	-6.25	Average	VERTICAL
1	1854.97	51.79	-8.77	43.02	74.00	-30.98	Peak	HORIZONTAL
2	6492.39	45.47	6.38	51.85	74.00	-22.15	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.

4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

9. FREQUENCY SEPARATION

9.1. Standard Applicable:

According to §15.247(a)(1), 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to RSS 210 issue 8, A8.1(c), For frequency hopping systems in the band 902-928 MHz: if the -20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel 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 system shall use at least 25 hopping channels and the average time of occupancy on any channel 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.

9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

9.3. Test Set-up:

Refer to section 6.3 for details.

9.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

9.5. Measurement Result:

Channel separation (MHz)	Limit	Result
1.023	>=25KHz or 2/3 times 20dB bandwidth	PASS
1.035	>=25KHz or 2/3 times 20dB bandwidth	PASS
1.017	>=25KHz or 2/3 times 20dB bandwidth	PASS

Note: Refer to next page for plots.

Frequency Separation Test Data

Low

Mid

High


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 1.017000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
01:04:06 PM Jan 20, 2014
Ref Offset 0.5 dB
10 dB/div
Log
Ref 20.50 dBm
ΔMkr1 1.017 MHz
0.209 dB
1Δ2
Center 926.461 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.53 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

10. NUMBER OF HOPPING FREQUENCY

10.1. Standard Applicable:

According to §15.247(a)(1)(i), (i) For frequency hopping systems operating 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 system shall use at least 25 hopping frequencies and the average time of occupancy 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.

According to RSS 210 issue 8, A8.1(c), For frequency hopping systems in the band 902-928 MHz: if the -20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel 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 system shall use at least 25 hopping channels and the average time of occupancy on any channel 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.

10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

10.3. Test Set-up:

Refer to section 6.3 for details.

10.4. Measurement Procedure:

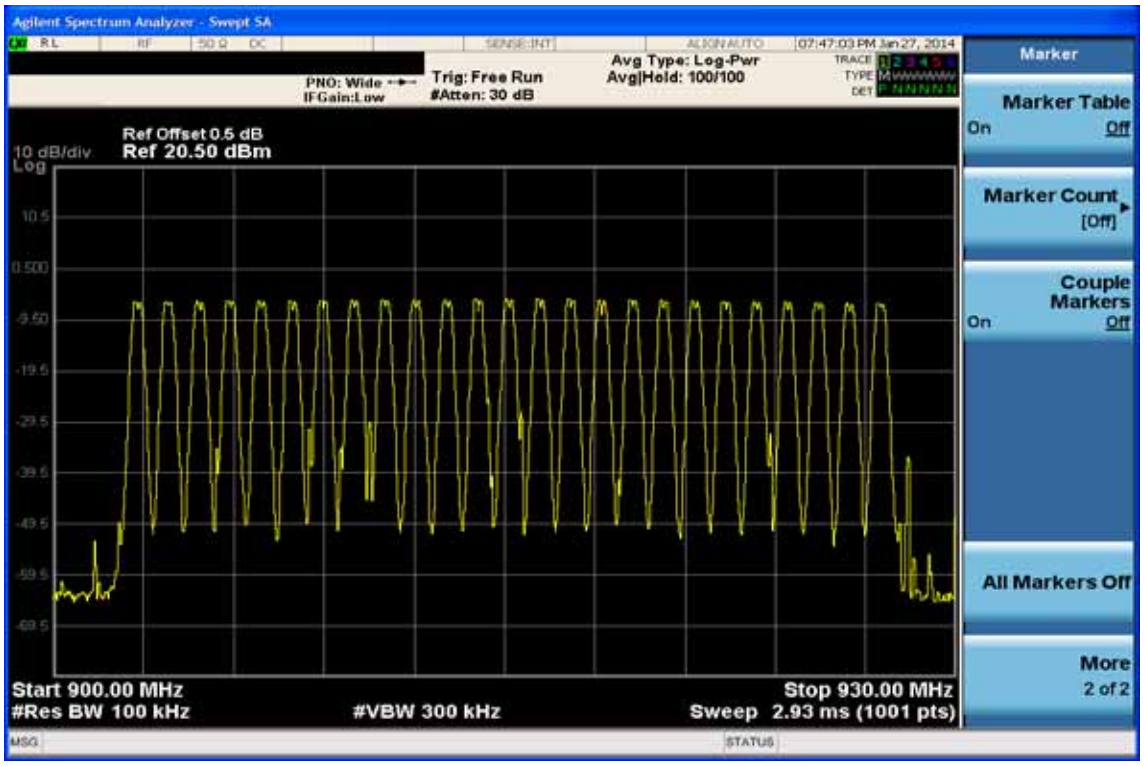
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start 900MHz, Stop = 930MHz Sweep = auto.
4. Set the spectrum analyzer as RBW=100KHz, VBW=300KHz
5. Max hold, view and count how many channel in the band.

10.5. Measurement Result:

25Channels was measured.

Note: Refer to next page for plots.

Channel Number



11. TIME OF OCCUPANCY (DWELL TIME)

11.1. Standard Applicable:

According to §15.247(a)(1)(i),For frequency hopping systems operating 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 system shall use at least 25 hopping frequencies and the average time of occupancy 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.

According to RSS-210 issue 8,§A8.1(c) For frequency hopping systems in the band 902-928 MHz: if the -20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel 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 system shall use at least 25 hopping channels and the average time of occupancy on any channel 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.

11.2. Measurement Equipment Used:

Refer to section 6.2 for details.

11.3. Test Set-up:

Refer to section 6.3 for details.

11.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW / VBW =100kHz, Span = 0Hz , Adjust Sweep = 300ms/10s.
5. Repeat above procedures until all frequency measured were complete.

11.5. Measurement Result:

CH Low	time slot	=	69.6 (us)	*	10	=	0.2784	(ms)
CH Mid	time slot	=	72.0 (us)	*	10	=	0.288	(ms)
CH High	time slot	=	69.6 (us)	*	10	=	0.2784	(ms)

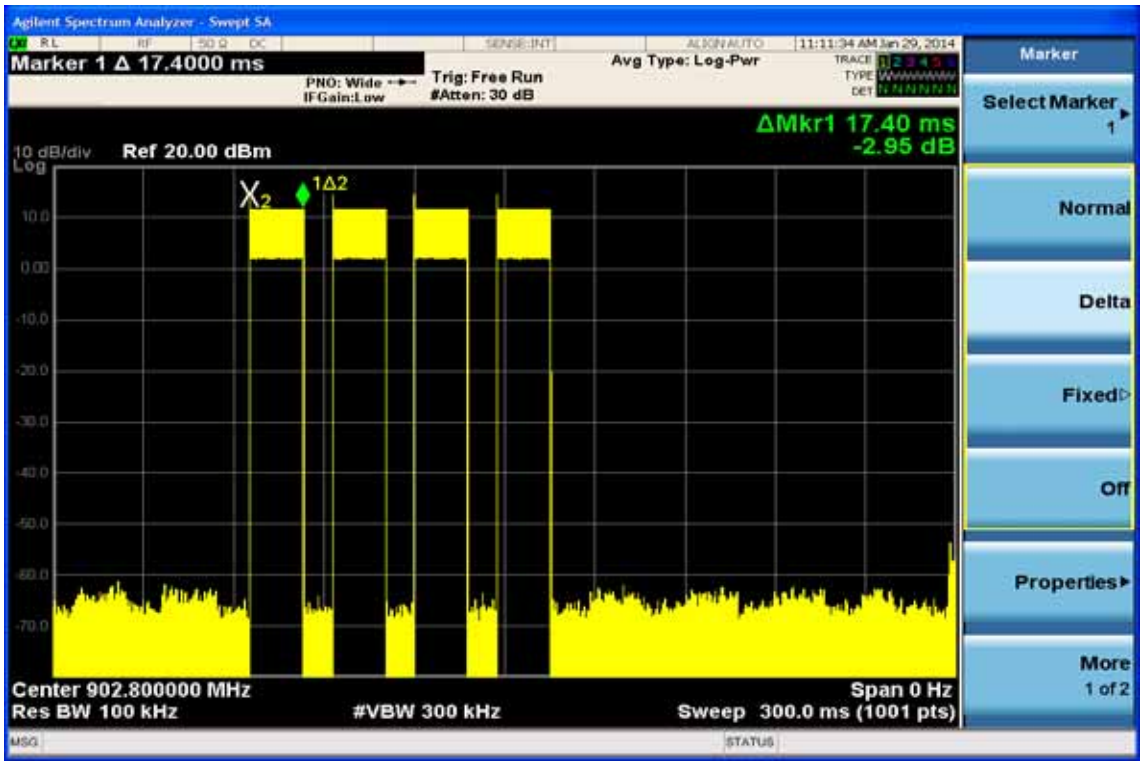
CH Low : 69.6 us = 17.4 us *4

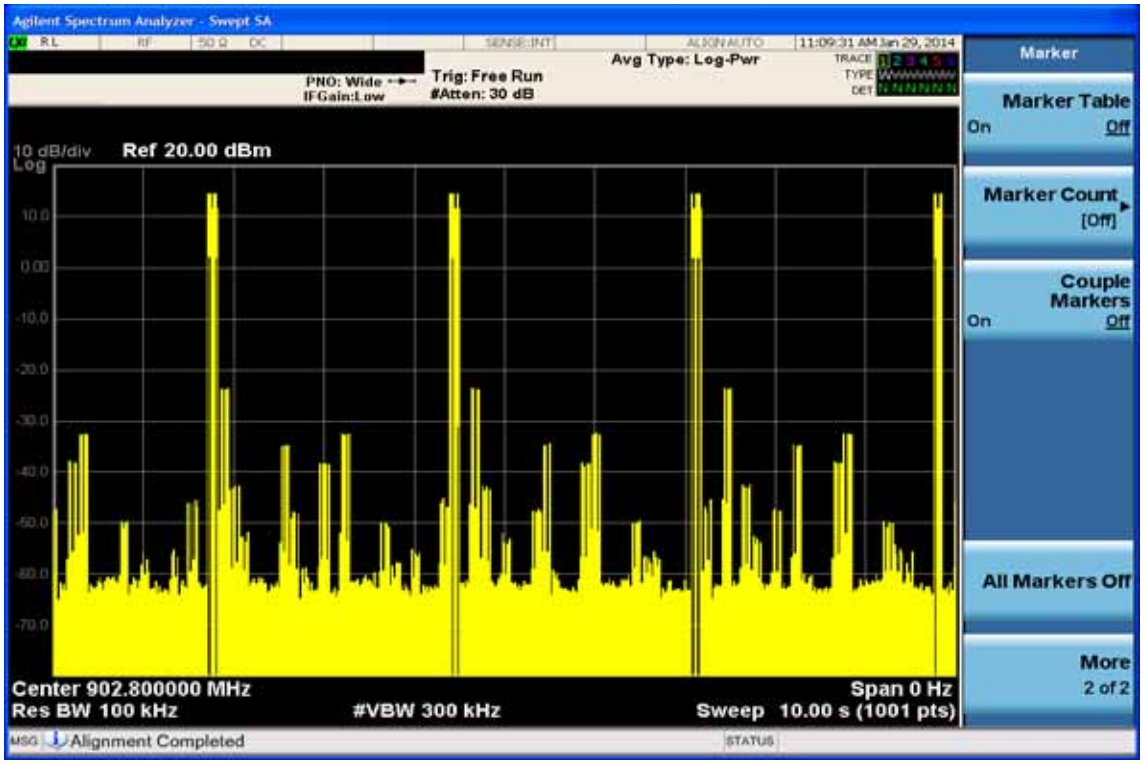
CH Mid : 72.0 us = 18.0 us *4

CH High : 69.6 us = 17.4 us *4

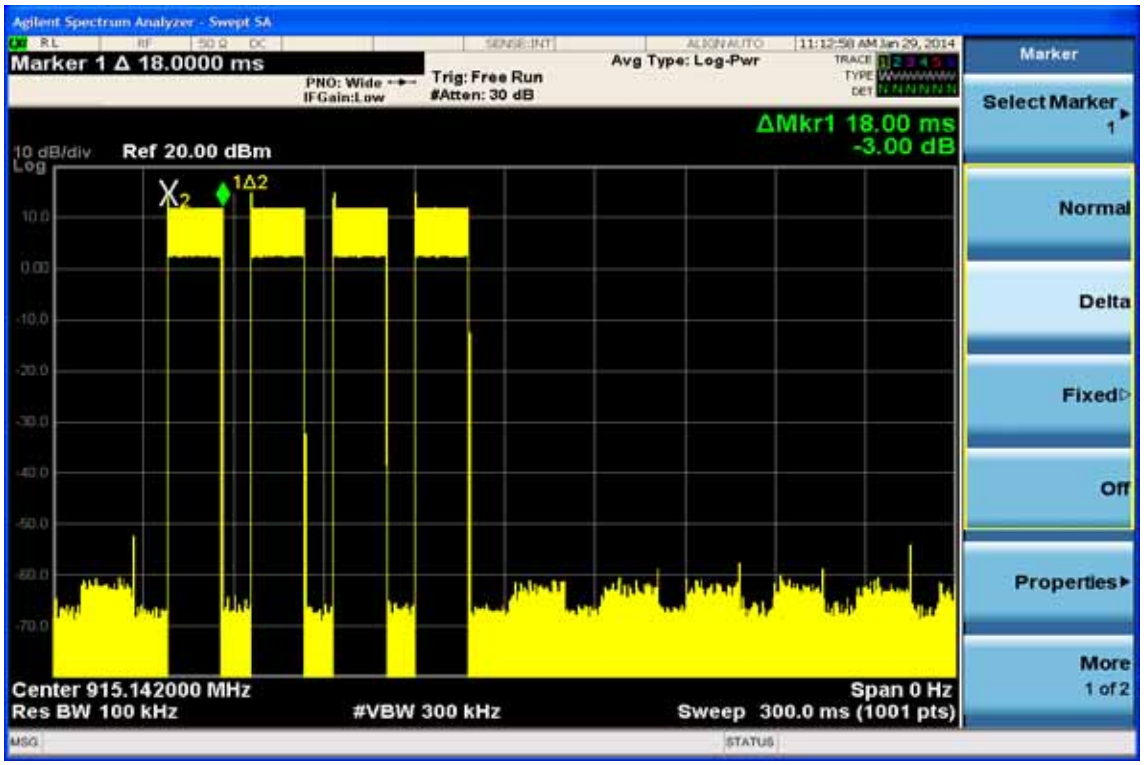
Note: Refer to next page for plots.

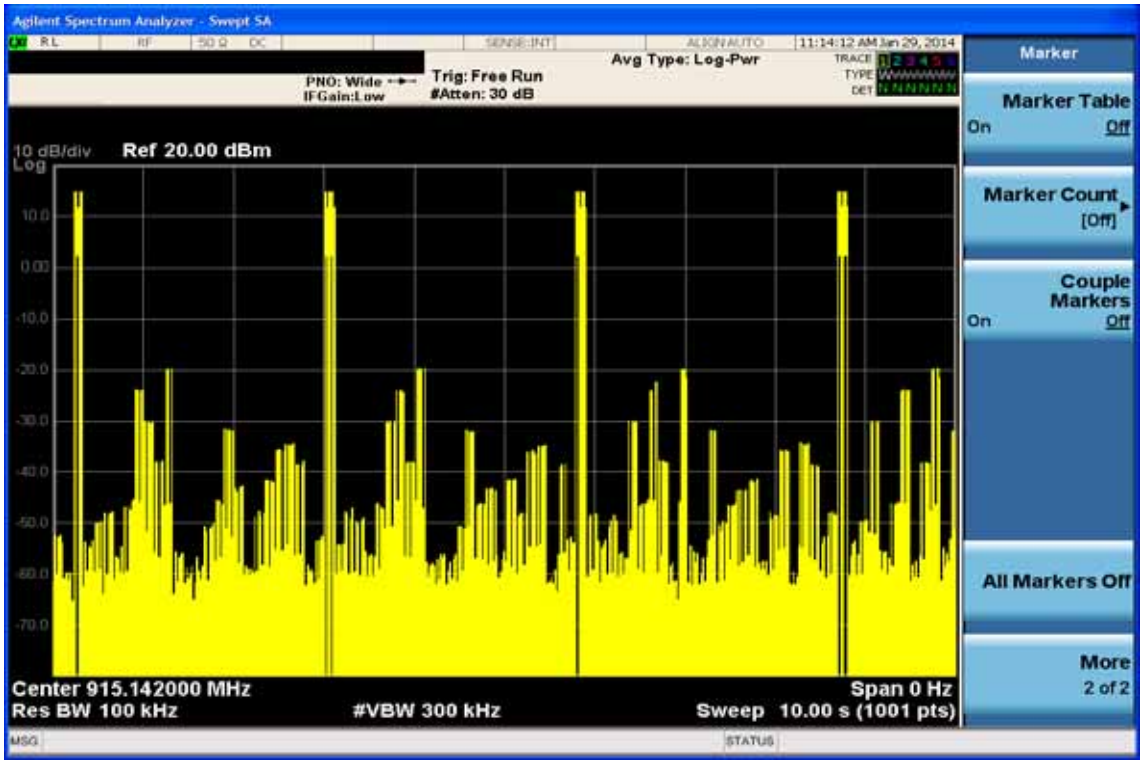
CH-Low


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 17.4000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:11:34 AM Jan 29, 2014
ΔMkr1 17.40 ms
-2.95 dB
10 dB/div
Log
Ref 20.00 dBm
Center 902.800000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 300.0 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

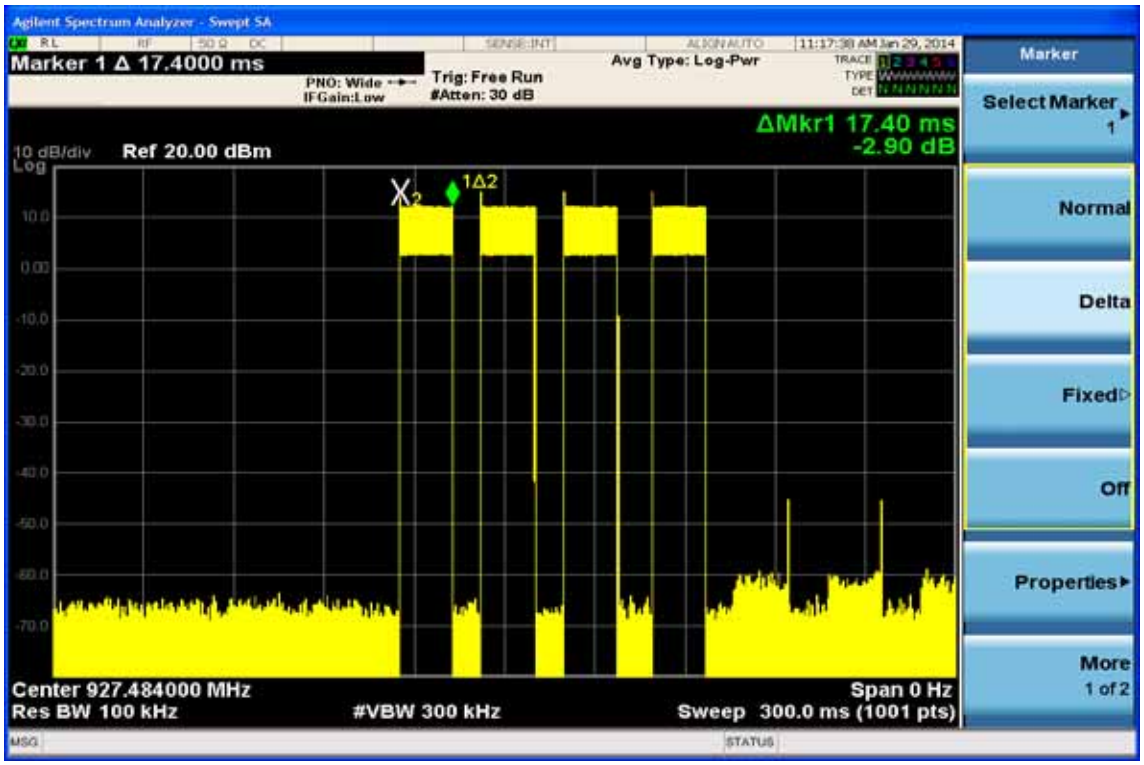

Agilent Spectrum Analyzer - Swept SA
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:09:31 AM Jan 29, 2014
10 dB/div
Log
Ref 20.00 dBm
Center 902.800000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 10.00 s (1001 pts)
Alignment Completed
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2

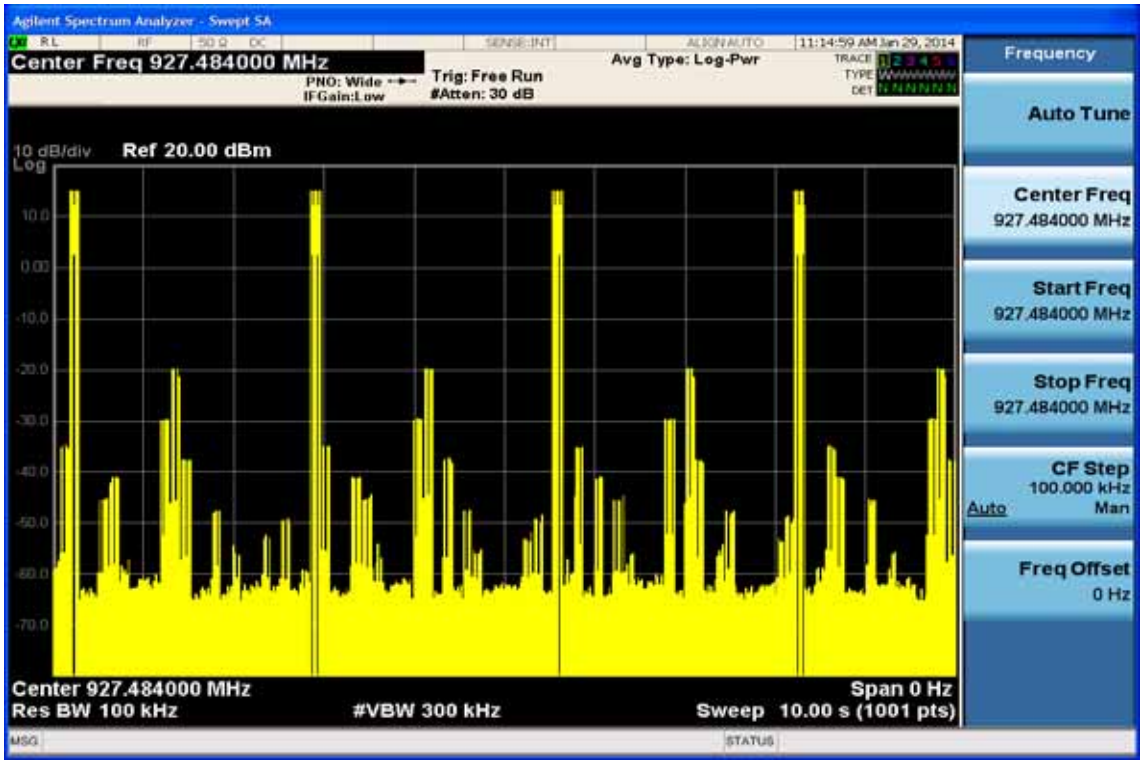
CH-Mid


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 18.0000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:12:58 AM Jan 29, 2014
ΔMkr1 18.00 ms
-3.00 dB
10 dB/div
Log
Ref 20.00 dBm
Center 915.142000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 300.0 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:14:12 AM Jan 29, 2014
10 dB/div
Log
Ref 20.00 dBm
Center 915.142000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 10.00 s (1001 pts)
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2

CH-High


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 17.4000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:17:38 AM Jan 29, 2014
ΔMkr1 17.40 ms
-2.90 dB
10 dB/div
Log
Ref 20.00 dBm
Center 927.484000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 300.0 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Center Freq 927.484000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
11:14:59 AM Jan 29, 2014
10 dB/div
Log
Ref 20.00 dBm
Center 927.484000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 10.00 s (1001 pts)
Frequency
Auto Tune
Center Freq
927.484000 MHz
Start Freq
927.484000 MHz
Stop Freq
927.484000 MHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz

12. 20dB Bandwidth & 99% Bandwidth

12.1. Standard Applicable:

According to §15.247(a)(1)

(1) 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to RSS-210 issue 8,§A8.1(c) For frequency hopping systems in the band 902-928 MHz: if the -20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel 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 system shall use at least 25 hopping channels and the average time of occupancy on any channel 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.

12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

12.3. Test Set-up:

Refer to section 6.3 for details.

12.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 1.5MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

12.5. Measurement Result:

For FCC

CH	20dB Bandwidth
	(MHz)
Lower	0.3894
Mid	0.3786
Higher	0.3813

For IC

CH	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Lower	0.37620	0.3861
Mid	0.37565	0.3883
Higher	0.36794	0.3818

Note: Refer to next page for plots.

915MHz Low Speed

20dB Bandwidth Test Data CH-Low

20dB Bandwidth Test Data CH-Mid

20dB Bandwidth Test Data CH-High

915MHz Low Speed

99% Bandwidth Test Data CH-Low

99% Bandwidth Test Data CH-Mid

99% Bandwidth Test Data CH-High

13. ANTENNA REQUIREMENT

13.1. Standard Applicable:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.246(1), 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 6 dBi.

According to RSS-GEN 7.1.4, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

13.2. Antenna Connected Construction:

The directional gins of antenna used for transmitting is Printing antenna: 1dBi, Dipole antenna : 3dBi and the antenna connector is designed with unique type RF connector. Please see EUT photo and antenna spec. for details.