TEST REPORT

of

FCC Part 15 Subpart C AND CANADA RSS-210

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

Product :	**Outdoor Navigation Device**
Brand:	**Magellan, Mio, Navman, Mitac**
Model:	**N429**
Model Difference:	**N/A**
FCC ID:	**P4Q-N429**
IC:	**2420C-N429**
FCC Rule Part:	**§15.247, Cat: DSS**
IC Rule Part:	**RSS-210 issue 8:2010, Annex 8**
Applicant:	**Mitac International Corporation**
Address:	**Building B, No. 209, Sec. 1, Nan Gang Rd., Nan Gan, Taipei, Taiwan**

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
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Report No.: **ISL-14LR081FCDSS**
Issue Date : **2014/04/17**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.
This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.
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VERIFICATION OF COMPLIANCE

Applicant:	Mitac International Corporation
Product Description:	Outdoor Navigation Device
Brand Name:	Magellan, Mio, Navman, Mitac
Model No.:	N429
Model Difference:	N/A
FCC ID:	P4Q-N429
IC:	2420C-N429
Date of test:	2014/04/01 ~ 2014/04/16
Date of EUT Received:	2014/04/01

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:	Dino Chen	***Date:***	2014/04/17
	Dion Chang / Engineer		
Prepared By:	Eva Kao	***Date:***	2014/04/17
	Eva Kao / Technical Supervisor		
Approved By:	Vincent Su	***Date:***	2014/04/17
	Vincent Su / Technical Manager		

Version

Version No.	Date	Description
00	2014/04/17	Initial creation of document

Table of Contents

1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name	Outdoor Navigation Device	
Brand Name	Magellan, Mio, Navman, Mitac	
Model Name	N429	
Model Difference	N/A	
USB port	One provided for Data link and battery charger	
Power Supply	5Vdc from AC/DC adapter or 3.7Vdc, 1500mAh Li-ion Battery	
	Adapter:	Model: MII050100; Supplier: TPT
GPS Receiver	1575MHz Receiver	
VOIP	N/A	

Bluetooth:

Bluetooth Version	V2.1 + EDR (GFSK + π /4 DQPSK + 8DPSK)	V4.0(GFSK)
Frequency Range	2402 – 2480MHz	2402 – 2480MHz
Channel number	79 channels	40 channels
Modulation type	Frequency Hopping Spread Spectrum	Wide band Modulation
Rated power	4 dBm(Peak)	8 dBm(Peak)
Max Measured Transmit Power	3.72 (Peak)	7.05 dBm (Peak)
Dwell Time	<= 0.4s	N/A
Antenna Designation	PIFA Antenna 1.6dBi , share the same antenna with Wifi	

The EUT is compliance with Bluetooth EDR V2.1 +V4.0 Standard.

WLAN: 1Tx / 1Rx

Frequency Range:	802.11b/g/n HT20: 2412 – 2462MHz			
Channel number:	802.11b/g/n HT20: 11 channels			
Transmit Power:		Measured Peak Power at each Chain	Rated AV Power at each Chain	Tolerance
	802.11b:	16.296dBm	15.0 dBm	+/- 1dB
	802.11g:	22.78dBm	13.0 dBm	+/- 1dB
	802.11n HT20 :	22.78dBm	13.0 dBm	+/- 1dB
Modulation Technology	11b/g: DSSS, OFDM 11n: OFDM			
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM			
Transition Rate:	802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n HT20MHz: 6.5 – 65Mbps			
Antenna Designation:	PIFA Antenna 1.6dBi			

The EUT is compliance with IEEE 802.11 b/g/n Standard.

ANT: 1Tx / 1Rx

Frequency Range:	2403 – 2481MHz
Modulation type:	GFSK
Transition Rate:	1M bps
Antenna Designation:	Fixed PIFA Antenna, 1.0dBi

The report applies for BT 2.1 EDR mode.

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

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

This submittal(s) (test report) is intended for **FCC ID: P4Q-N429** filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules. And **IC: 2420C-N429** 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 of Tested System (Fixed channel)

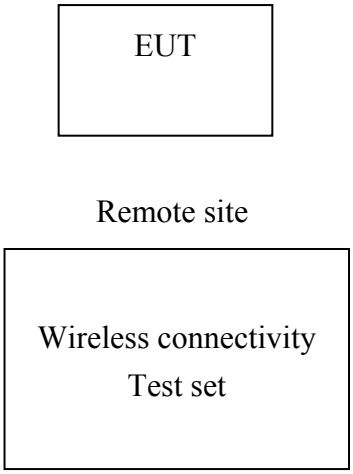


Table 1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Wireless connec-tivity Test set (BT Tester)	Agilent	N4010A	N/A	N/A	No- Shielding

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)(1)/ RSS-210 issue 8,§A8.4(2)	Peak Output Power	Compliant
§15.247(d) RSS-210 issue 8,§A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(c) RSS-Gen §7.2.3 RSS-210 issue 8,§A2.9	Spurious Emission	Compliant
§15.247(a)(1)/ RSS-210 issue 8,§A8.1(b)	Frequency Separation	Compliant
§15.247(a)(1)(iii)/ RSS-210 issue 8,§A8.1(d)	Number of hopping frequency	Compliant
§15.247(a)(1)(ii)/ RSS-210 issue 8,§A8.1(d)	Time of Occupancy	Compliant
§15.247/ RSS-210 issue 8,§A8.2(b)	Peak Power Density	Compliant
§15.247(a)(1) RSS-Gen §4.6.1, RSS210 issue ,§A8.1(b)	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

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

Channel low (2402MHz)、mid (2441MHz) and high (2480MHz) with each modulation were chosen for full testing.

The worst case BDR mode was reported for Radiated Emission.

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 MHz	Limits dB(uV)	
	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:

Conducted Emission 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	03/13/2014	03/12/2015
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/13/2014	03/12/2015

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:

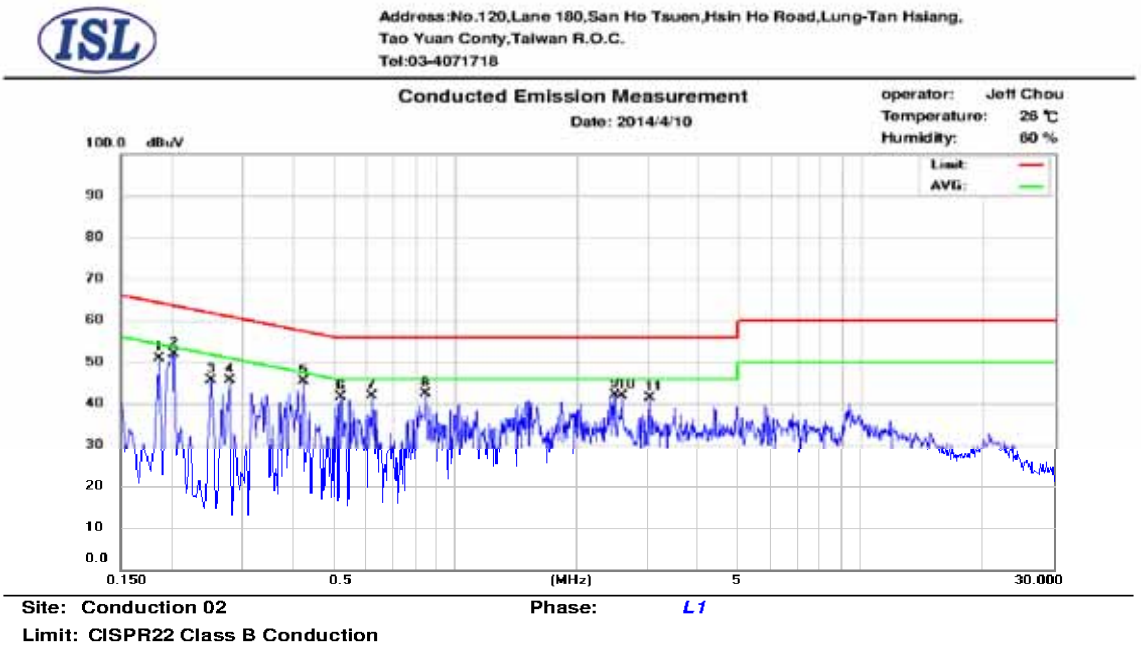
1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.5. Measurement Result:

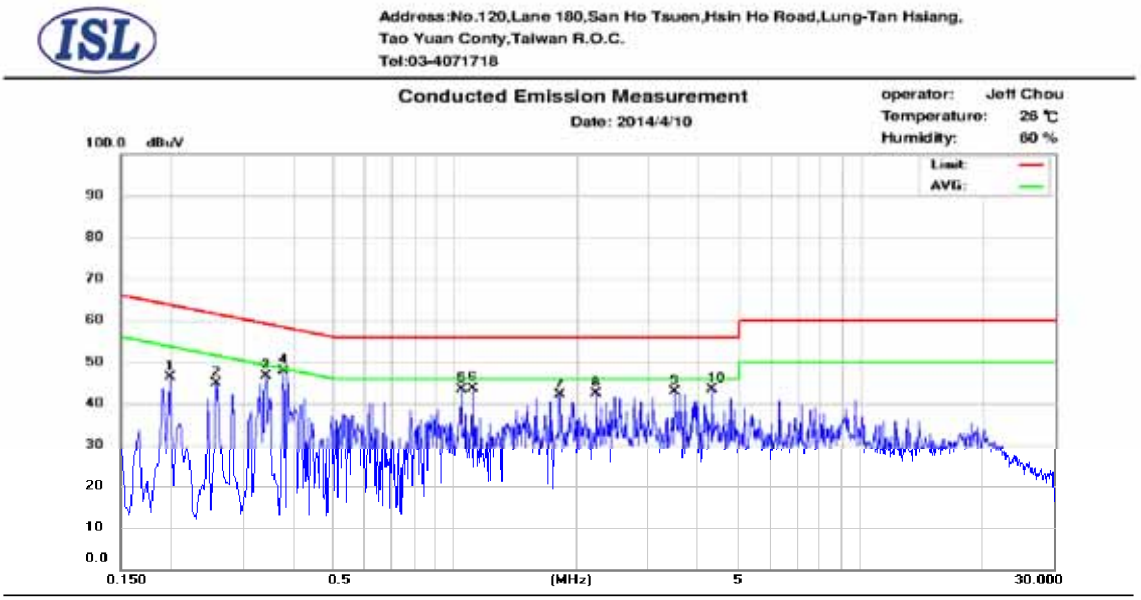
The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2014/04/10
Test By:	Dino		



No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.186	9.68	48.70	64.21	-15.51	26.81	54.21	-27.40	
2	0.202	9.67	47.49	63.53	-16.04	28.62	53.53	-24.91	
3	0.250	9.68	41.35	61.76	-20.41	19.26	51.76	-32.50	
4	0.278	9.68	39.60	60.88	-21.28	19.08	50.88	-31.80	
5	0.422	9.69	39.48	57.41	-17.93	22.34	47.41	-25.07	
6	0.522	9.69	37.82	56.00	-18.18	20.42	46.00	-25.58	
7	0.626	9.70	34.94	56.00	-21.06	19.26	46.00	-26.74	
8	0.846	9.71	36.59	56.00	-19.41	21.22	46.00	-24.78	
9	2.462	9.77	32.59	56.00	-23.41	19.02	46.00	-26.98	
10	2.578	9.77	30.81	56.00	-25.19	17.92	46.00	-28.08	
11	3.010	9.79	32.50	56.00	-23.50	19.03	46.00	-26.97	



Site: Conduction 02 Phase: *N*

Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.198	9.66	47.49	63.69	-16.20	27.83	53.69	-25.86	
2	0.258	9.67	40.43	61.50	-21.07	19.73	51.50	-31.77	
3	0.342	9.68	39.06	59.15	-20.09	20.56	49.15	-28.59	
4	0.378	9.68	38.68	58.32	-19.64	20.36	48.32	-27.96	
5	1.034	9.71	31.49	56.00	-24.51	13.92	46.00	-32.08	
6	1.106	9.71	31.47	56.00	-24.53	14.20	46.00	-31.80	
7	1.818	9.75	31.03	56.00	-24.97	15.07	46.00	-30.93	
8	2.234	9.76	28.85	56.00	-27.15	13.33	46.00	-32.67	
9	3.458	9.79	31.22	56.00	-24.78	15.67	46.00	-30.33	
10	4.310	9.80	30.06	56.00	-25.94	14.38	46.00	-31.62	

6. PEAK OUTPUT POWER MEASUREMENT

6.1. Standard Applicable:

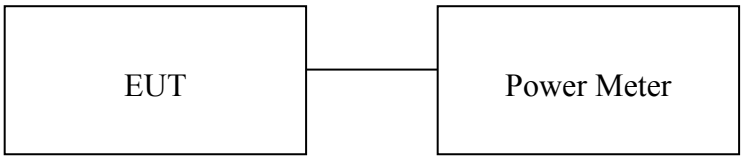
According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

According to RSS-210 issue 8,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

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 Sensor 07	DARE	RPR3006W	13I00030SNO34	10/18/2013	10/17/2014
Temperature Chamber	KSON	THS-B4H100	2287	03/17/2014	03/16/2015
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	03/29/2014	03/28/2015

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:

BDR Mode

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	3.72	0.00	3.72	0.00236	1
2441.00	3.67	0.00	3.67	0.00233	1
2480.00	3.39	0.00	3.39	0.00218	1

EDR 2M Mode

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	2.89	0.00	2.89	0.00195	1
2441.00	2.85	0.00	2.85	0.00193	1
2480.00	2.83	0.00	2.83	0.00192	1

EDR 3M Mode

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	3.37	0.00	3.37	0.00217	1
2441.00	3.31	0.00	3.31	0.00214	1
2480.00	3.27	0.00	3.27	0.00212	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 field strength limits specified in RSS-Gen is not required.

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	12/02/2015
Dipole antenna	SCHWARZBECK	UHAP,300-1000	1195	12/03/2013	12/02/2015
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	03/07/2013	03/06/2015
Bilog Antenna30-1G	Schaffner	CBL 6112B	2756	01/08/2014	01/07/2015
Horn antenna1-18G(06)	EMCO	3117	0006665	11/04/2013	11/03/2014
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/15/2013	05/14/2015
Preamplifier9-1000M	HP	8447D	NA	02/20/2014	02/19/2015
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/18/2013	07/17/2014
Preamplifier1-26G	EM	EM01M26G	NA	02/20/2014	02/19/2015
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	02/17/2014	02/16/2015
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/14/2013	10/13/2014
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	10/03/2013	10/02/2015
Signal Generator	R&S	SMU200A	102330	02/19/2014	02/18/2015
Signal Generator	Anritsu	MG3692A	20311	10/30/2013	10/29/2014
2.4G Filter	Micro-Tronics	Brm50702	76	12/27/2013	12/26/2014

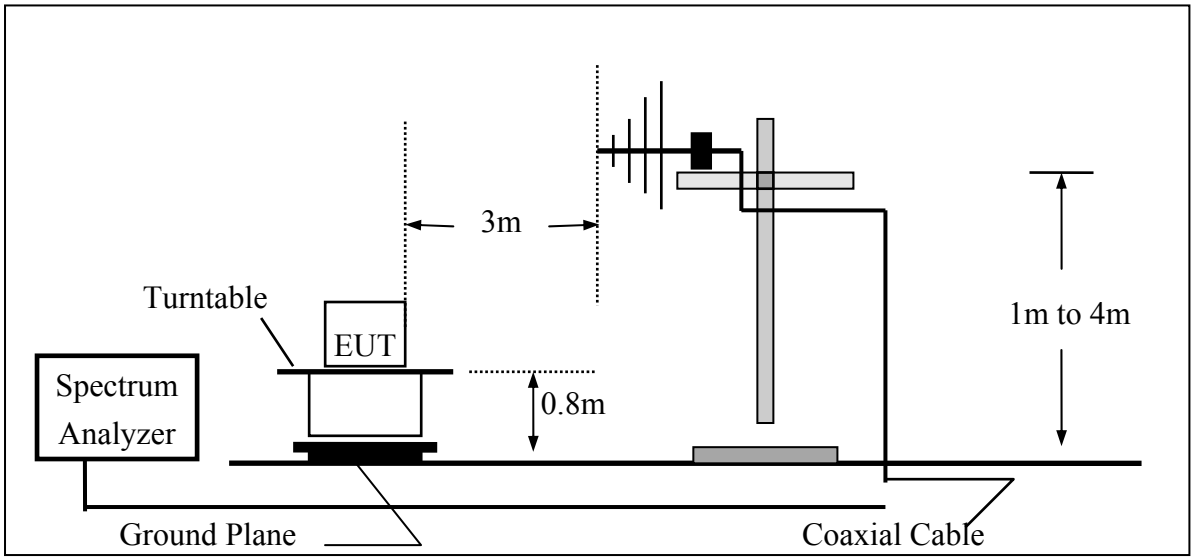
7.3. Test SET-UP:

7.3.1. Conducted Emission at antenna port:

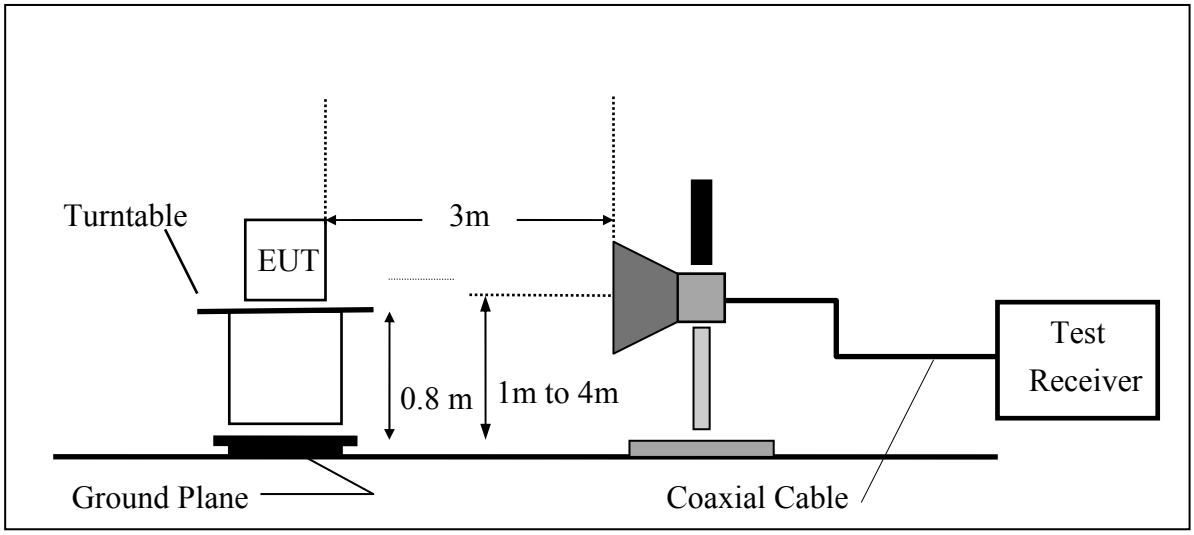
Refer to section 6.3 for details.

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, 2.390GHz and 2.4835GHz 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

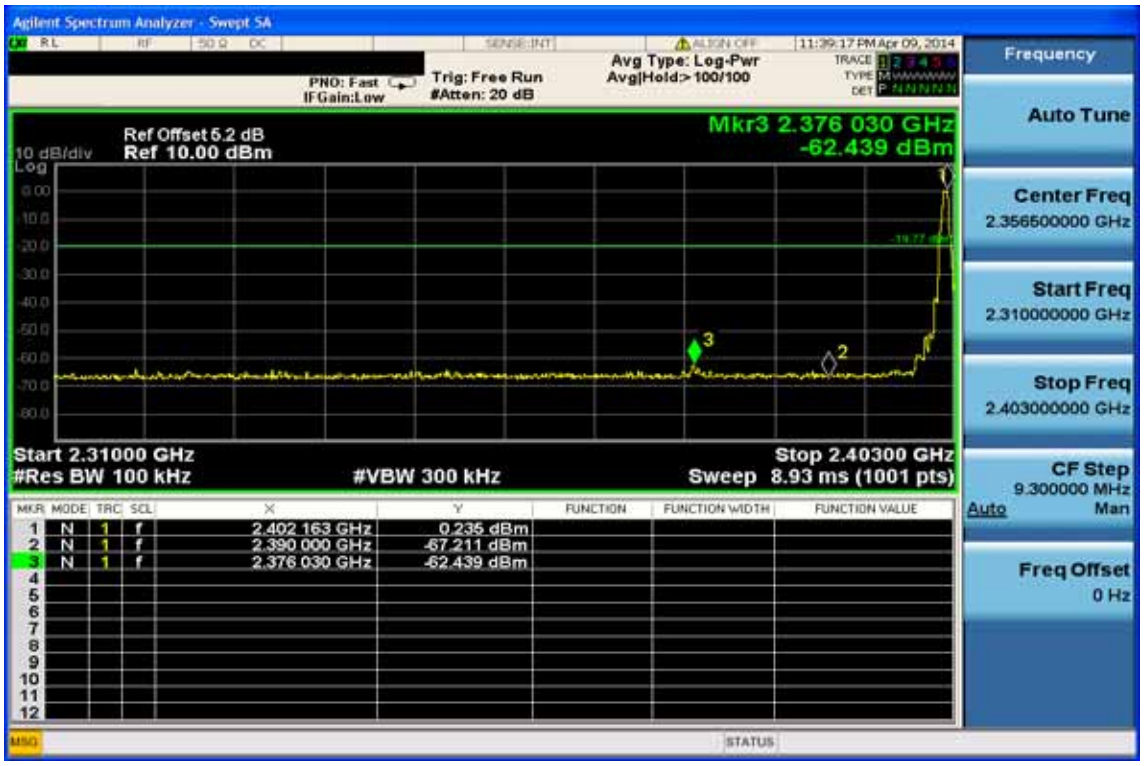
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

7.6. Measurement Result:

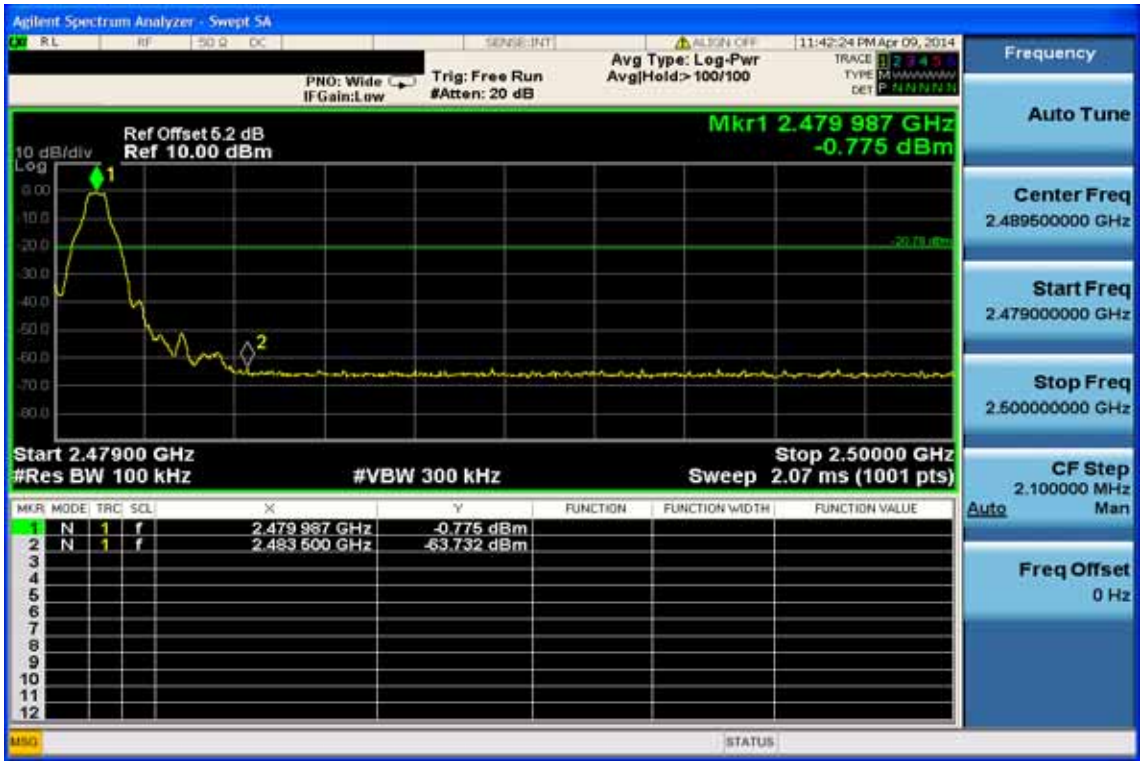
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

BDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: (BDR mode)

Operation Mode	TX CH Low	Test Date	2014/04/14
Fundamental Frequency	2402 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	2389.49	57.82	-7.10	50.72	74.00	-23.28	Peak	VERTICAL
2	2390.00	54.69	-7.09	47.60	74.00	-26.40	Peak	VERTICAL
1	2390.00	51.96	-7.09	44.87	74.00	-29.13	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2014/04/14
Fundamental Frequency	2480 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	2483.50	51.44	-6.90	44.54	74.00	-29.46	Peak	VERTICAL
1	2483.50	51.74	-6.90	44.84	74.00	-29.16	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.

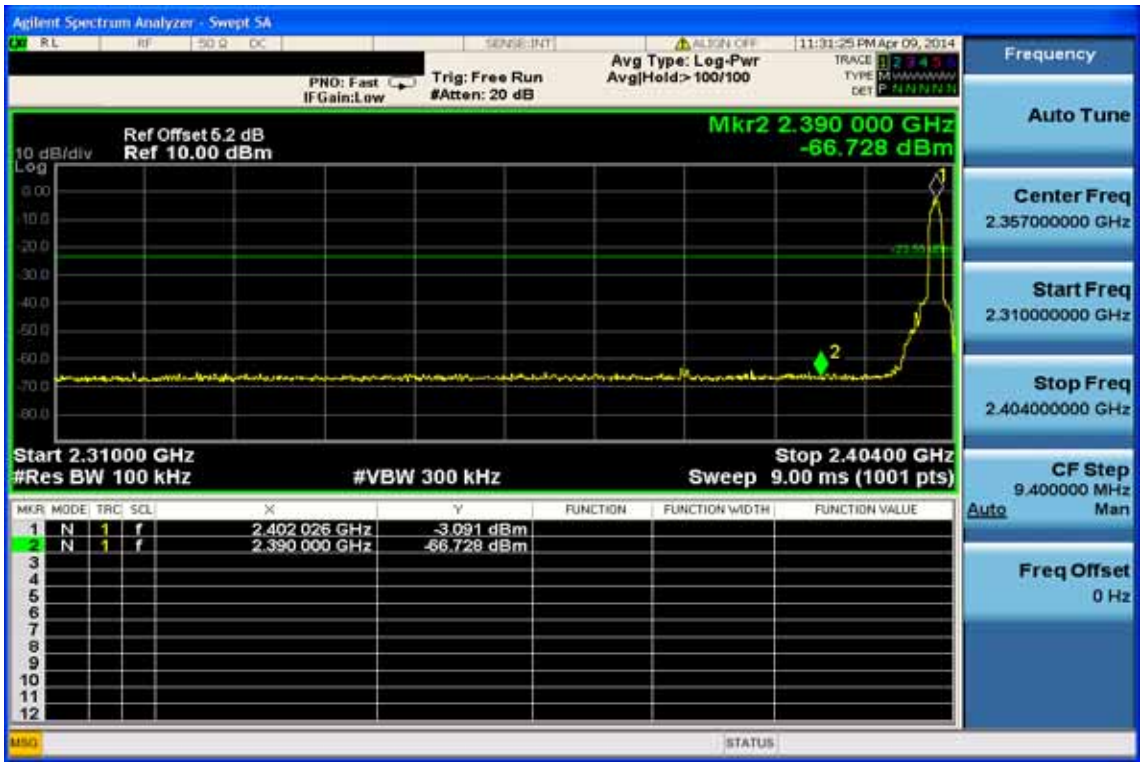
4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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

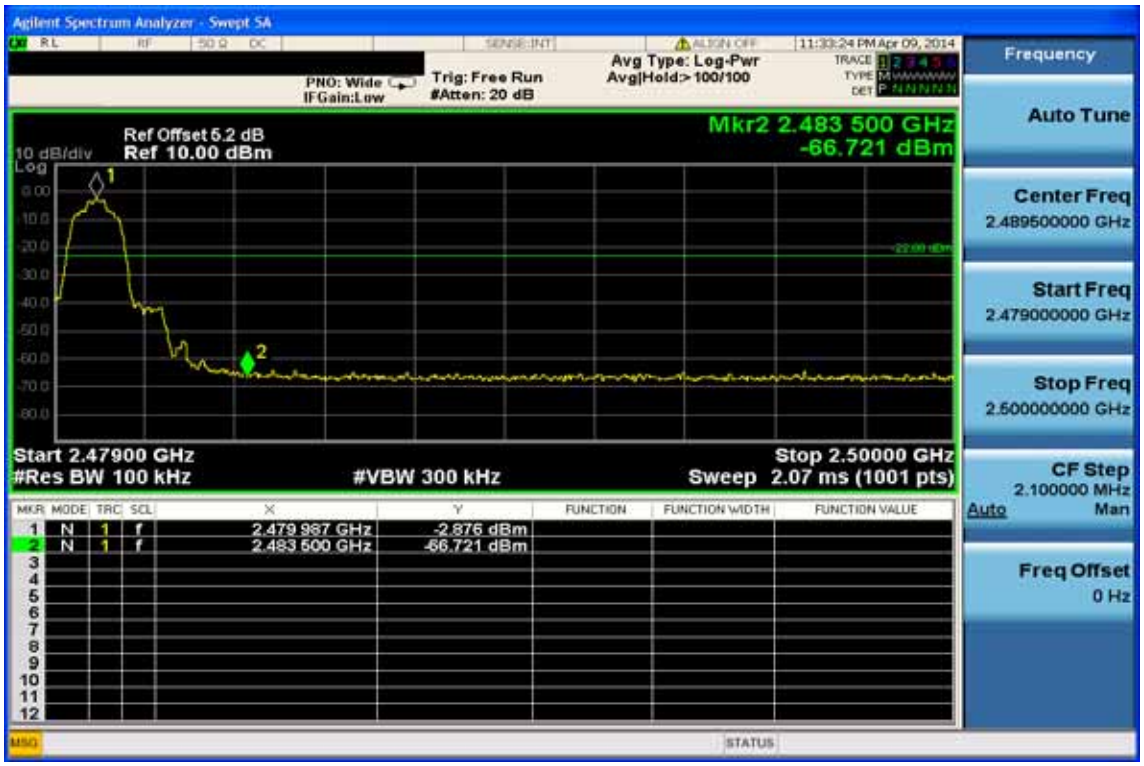
6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

EDR 2M Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission (EDR 2M mode):

Operation Mode	TX CH Low	Test Date	2014/04/14
Fundamental Frequency	2402 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	2389.49	55.74	-7.10	48.64	74.00	-25.36	Peak	VERTICAL
2	2390.00	54.88	-7.09	47.79	74.00	-26.21	Peak	VERTICAL
1	2349.94	53.93	-7.17	46.76	74.00	-27.24	Peak	HORIZONTAL
2	2390.00	51.44	-7.09	44.35	74.00	-29.65	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2014/04/14
Fundamental Frequency	2480 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	2483.50	51.84	-6.90	44.94	74.00	-29.06	Peak	VERTICAL
2	2484.32	53.86	-6.90	46.96	74.00	-27.04	Peak	VERTICAL
1	2483.50	51.60	-6.90	44.70	74.00	-29.30	Peak	HORIZONTAL
2	2483.62	54.43	-6.90	47.53	74.00	-26.47	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.

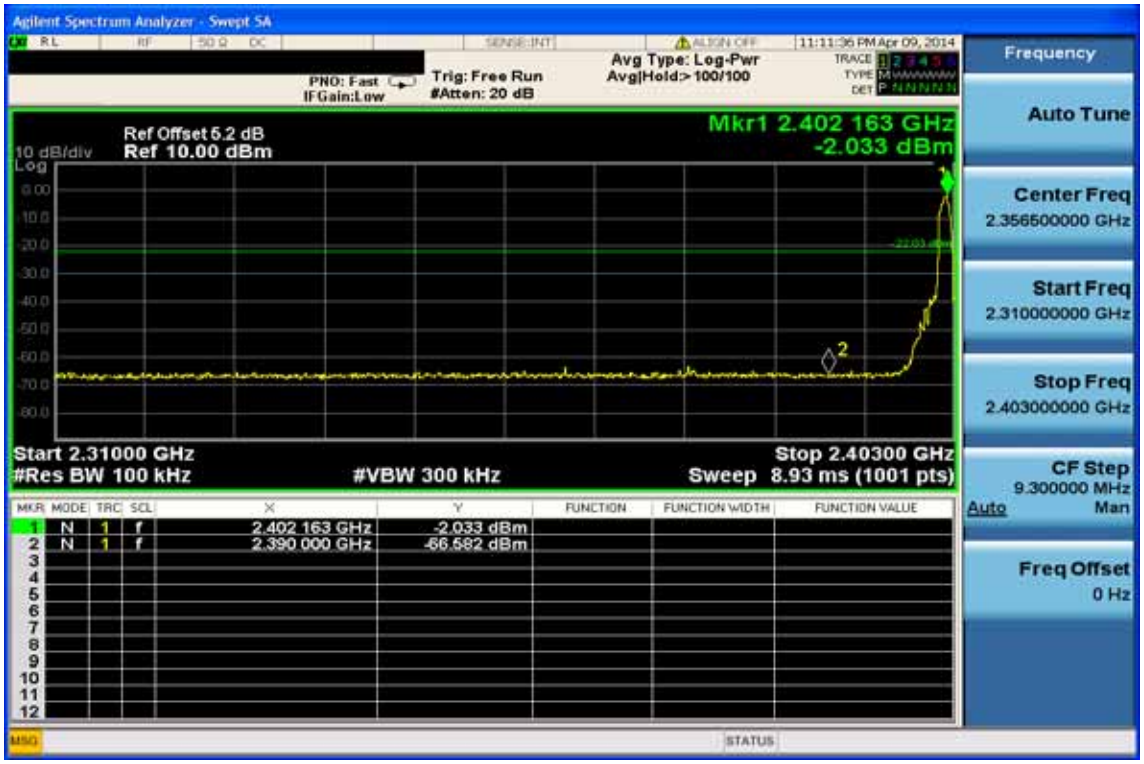
4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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

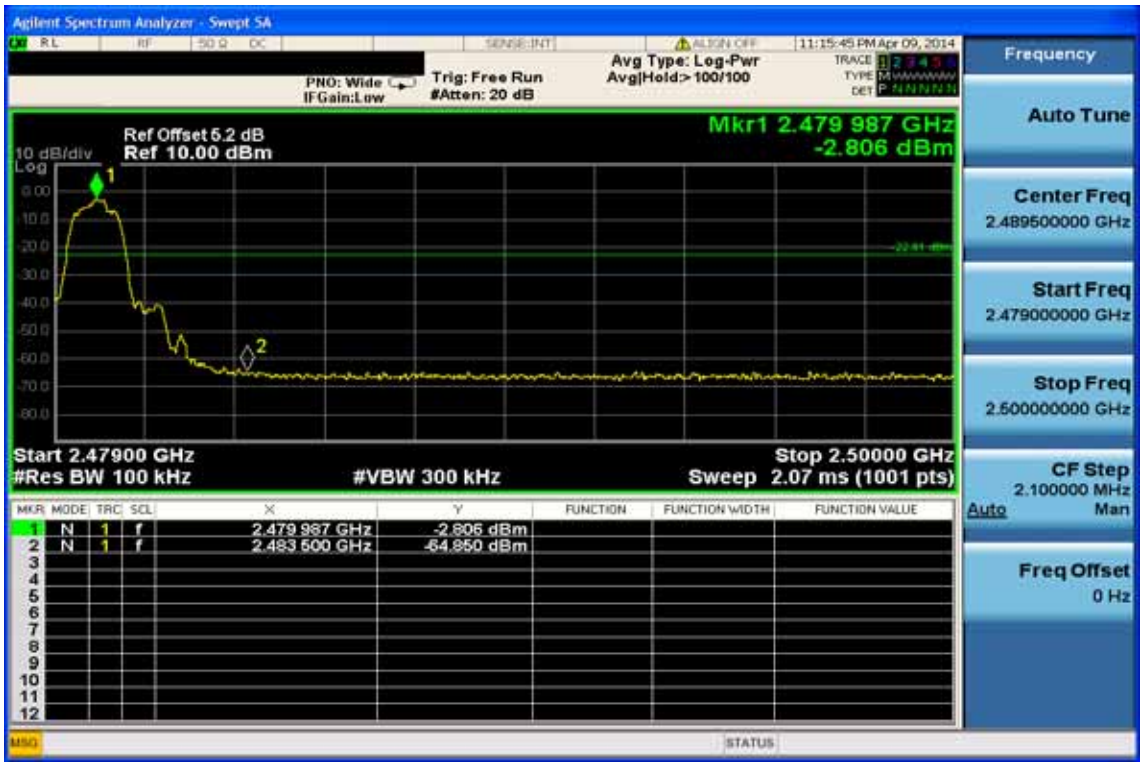
6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

EDR 3M Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission (EDR 3M mode):

Operation Mode	TX CH Low	Test Date	2014/04/14
Fundamental Frequency	2402 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	2362.51	55.89	-7.14	48.75	74.00	-25.25	Peak	VERTICAL
2	2390.00	56.82	-7.09	49.73	74.00	-24.27	Peak	VERTICAL
1	2388.82	54.01	-7.10	46.91	74.00	-27.09	Peak	HORIZONTAL
2	2389.97	52.41	-7.09	45.32	74.00	-28.68	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2014/04/14
Fundamental Frequency	2480 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	2483.50	52.39	-6.90	45.49	74.00	-28.51	Peak	VERTICAL
2	2489.29	53.56	-6.89	46.67	74.00	-27.33	Peak	VERTICAL
1	2483.50	51.80	-6.90	44.90	74.00	-29.10	Peak	HORIZONTAL
2	2484.50	53.35	-6.89	46.46	74.00	-27.54	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.

8. SPURIOUS EMISSION TEST

8.1. Standard Applicable:

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-Gen §7.2.5 and 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 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

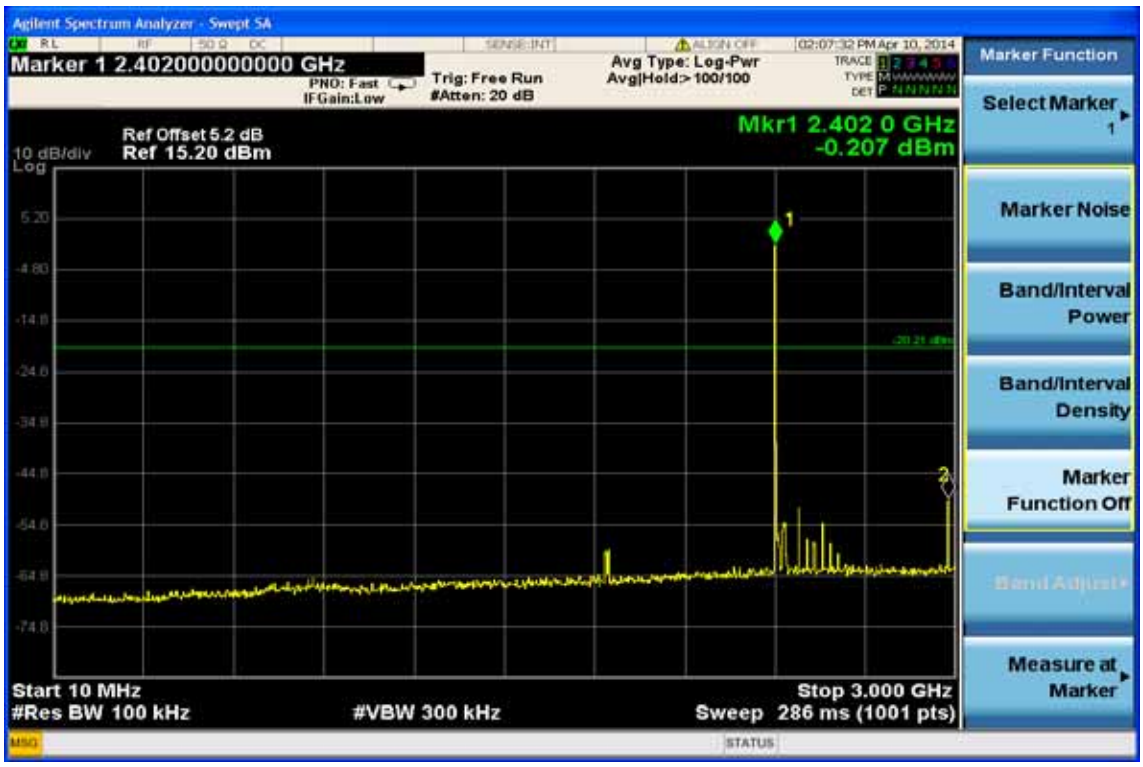
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6. Measurement Result:

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

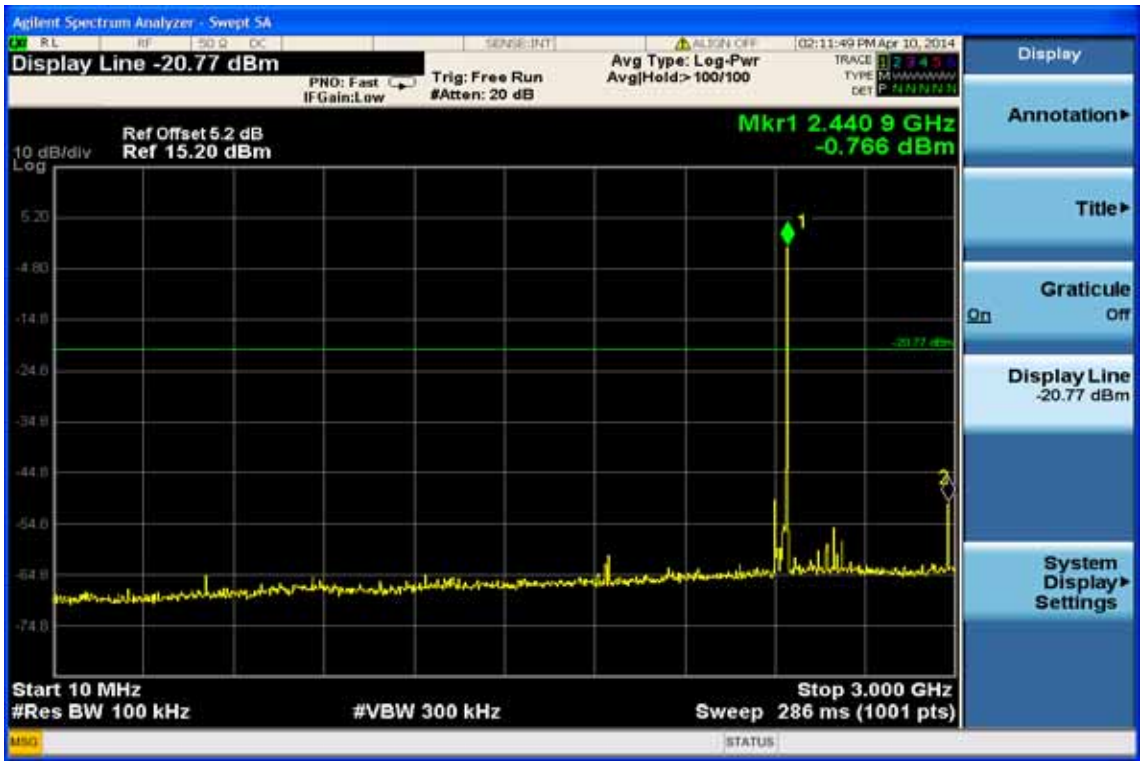
Conducted Spurious Emission Measurement Result (Worst case: BDR Mode)

Ch Low 30MHz – 3GHz



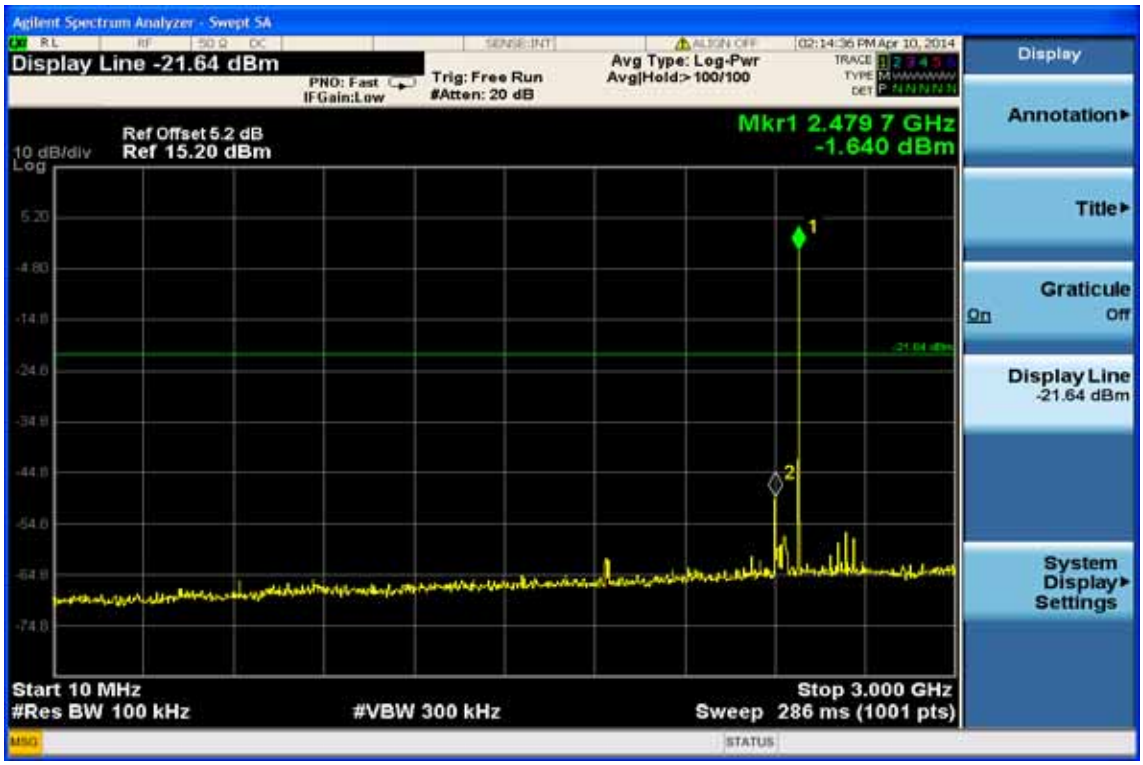
Ch Low 3GHz – 26.5GHz

Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz

Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz

Radiated Spurious Emission Measurement Result: (below 1GHz) (Worst case: BDR Mode)

Operation Mode	TX CH Low	Test Date	2014/04/14
Fundamental Frequency	2402MHz	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	52.31	35.07	-12.24	22.83	40.00	-17.17	Peak	VERTICAL
2	63.95	36.51	-13.49	23.02	40.00	-16.98	Peak	VERTICAL
3	279.29	31.56	-11.61	19.95	46.00	-26.05	Peak	VERTICAL
4	284.14	32.02	-11.50	20.52	46.00	-25.48	Peak	VERTICAL
5	631.40	27.09	-5.22	21.87	46.00	-24.13	Peak	VERTICAL
6	747.80	27.11	-2.95	24.16	46.00	-21.84	Peak	VERTICAL
1	50.37	28.49	-12.14	16.35	40.00	-23.65	Peak	HORIZONTAL
2	283.17	31.81	-11.53	20.28	46.00	-25.72	Peak	HORIZONTAL
3	661.47	25.25	-4.79	20.46	46.00	-25.54	Peak	HORIZONTAL
4	727.43	25.88	-3.49	22.39	46.00	-23.61	Peak	HORIZONTAL
5	779.81	25.47	-2.64	22.83	46.00	-23.17	Peak	HORIZONTAL
6	859.35	26.02	-1.55	24.47	46.00	-21.53	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	2014/04/14
Fundamental Frequency	2441MHz	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	52.31	35.22	-12.24	22.98	40.00	-17.02	Peak	VERTICAL
2	62.98	35.89	-13.30	22.59	40.00	-17.41	Peak	VERTICAL
3	279.29	32.40	-11.61	20.79	46.00	-25.21	Peak	VERTICAL
4	284.14	33.30	-11.50	21.80	46.00	-24.20	Peak	VERTICAL
5	738.10	25.54	-3.20	22.34	46.00	-23.66	Peak	VERTICAL
6	841.89	26.06	-1.84	24.22	46.00	-21.78	Peak	VERTICAL
1	47.46	28.50	-12.22	16.28	40.00	-23.72	Peak	HORIZONTAL
2	283.17	31.90	-11.53	20.37	46.00	-25.63	Peak	HORIZONTAL
3	639.16	25.77	-5.12	20.65	46.00	-25.35	Peak	HORIZONTAL
4	797.27	24.89	-2.51	22.38	46.00	-23.62	Peak	HORIZONTAL
5	840.92	26.28	-1.86	24.42	46.00	-21.58	Peak	HORIZONTAL
6	920.46	26.17	-0.38	25.79	46.00	-20.21	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	2014/04/14
Fundamental Frequency	2480MHz	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	53.28	35.15	-12.30	22.85	40.00	-17.15	Peak	VERTICAL
2	62.01	35.99	-13.10	22.89	40.00	-17.11	Peak	VERTICAL
3	279.29	32.21	-11.61	20.60	46.00	-25.40	Peak	VERTICAL
4	283.17	30.71	-11.53	19.18	46.00	-26.82	Peak	VERTICAL
5	799.21	26.18	-2.48	23.70	46.00	-22.30	Peak	VERTICAL
6	867.11	26.33	-1.40	24.93	46.00	-21.07	Peak	VERTICAL
1	49.40	28.64	-12.13	16.51	40.00	-23.49	Peak	HORIZONTAL
2	283.17	31.96	-11.53	20.43	46.00	-25.57	Peak	HORIZONTAL
3	631.40	25.74	-5.22	20.52	46.00	-25.48	Peak	HORIZONTAL
4	739.07	26.27	-3.17	23.10	46.00	-22.90	Peak	HORIZONTAL
5	822.49	25.36	-2.15	23.21	46.00	-22.79	Peak	HORIZONTAL
6	921.43	25.56	-0.36	25.20	46.00	-20.80	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	2014/04/14
Fundamental Frequency	2402 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	2001.00	56.52	-7.90	48.62	74.00	-25.38	Peak	VERTICAL
2	2974.00	51.56	-5.46	46.10	74.00	-27.90	Peak	VERTICAL
3	4804.00	44.13	1.27	45.40	74.00	-28.60	Peak	VERTICAL
1	2001.00	53.36	-7.90	45.46	74.00	-28.54	Peak	HORIZONTAL
2	2974.00	52.66	-5.46	47.20	74.00	-26.80	Peak	HORIZONTAL
3	4804.00	45.06	1.27	46.33	74.00	-27.67	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	2014/04/14
Fundamental Frequency	2441 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	2001.00	56.36	-7.90	48.46	74.00	-25.54	Peak	VERTICAL
2	2974.00	50.72	-5.46	45.26	74.00	-28.74	Peak	VERTICAL
3	4882.00	42.56	1.53	44.09	74.00	-29.91	Peak	VERTICAL
1	2001.00	53.50	-7.90	45.60	74.00	-28.40	Peak	HORIZONTAL
2	2974.00	52.15	-5.46	46.69	74.00	-27.31	Peak	HORIZONTAL
3	4882.00	44.28	1.53	45.81	74.00	-28.19	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.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2014/04/14
Fundamental Frequency	2480 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	2001.00	56.38	-7.90	48.48	74.00	-25.52	Peak	VERTICAL
2	2974.00	51.43	-5.46	45.97	74.00	-28.03	Peak	VERTICAL
3	4960.00	42.87	1.81	44.68	74.00	-29.32	Peak	VERTICAL
1	2001.00	53.64	-7.90	45.74	74.00	-28.26	Peak	HORIZONTAL
2	2974.00	53.92	-5.46	48.46	74.00	-25.54	Peak	HORIZONTAL
3	4960.00	42.82	1.81	44.63	74.00	-29.37	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 minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

According to RSS 210 issue 8, A8.1(b), 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.

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	>=25KHz or 2/3 times 20dB bandwidth	PASS

Note: Refer to next page for plots.

Frequency Separation Test Data

10. NUMBER OF HOPPING FREQUENCY

10.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

According to RSS-210 issue 8,§A8.1(d), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

10.3. Test Set-up:

Refer to section 6.3 for details.

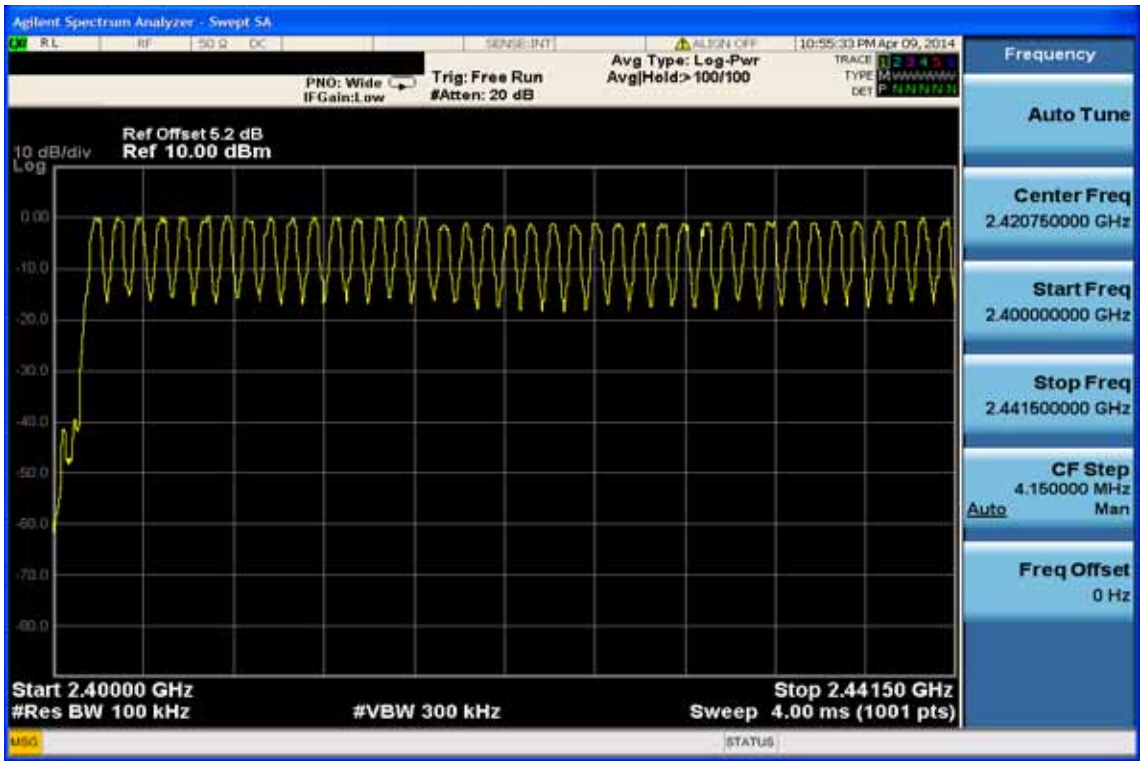
10.4. Measurement Procedure:

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=2400MHz, Stop = 2441MHz and Start=2441MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=300KHz, VBW=1MHz
5. Max hold, view and count how many channel in the band.

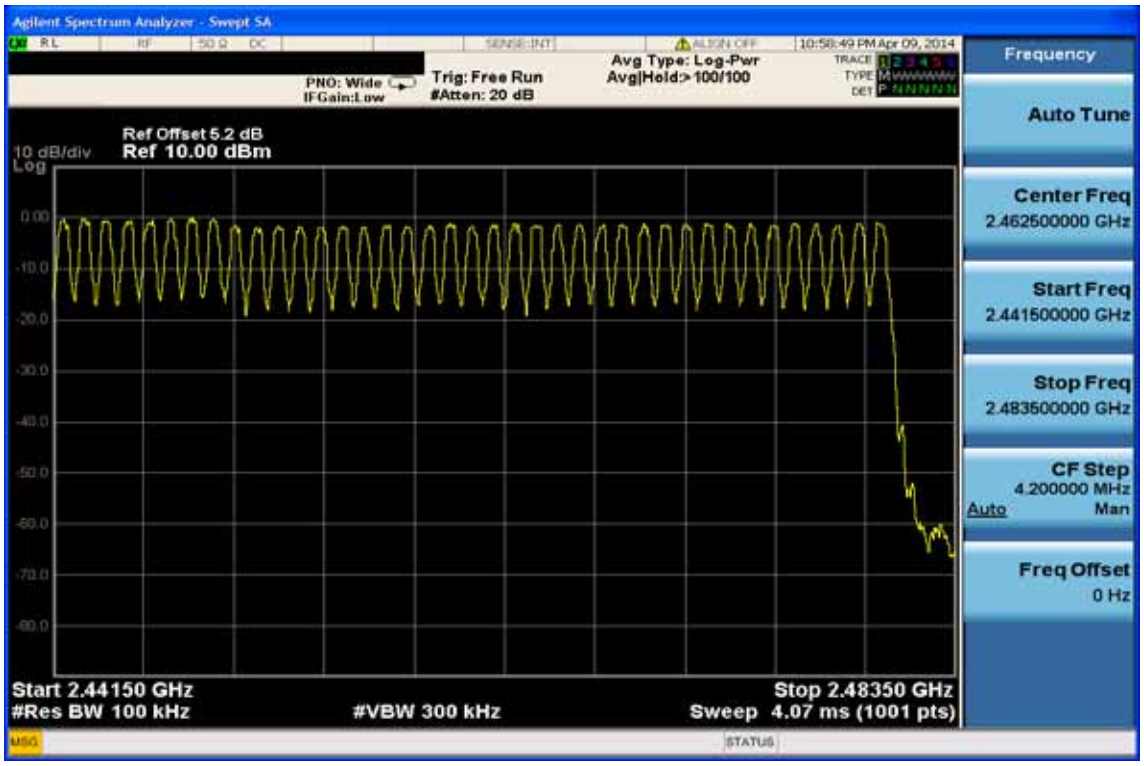
10.5. Measurement Result:

Note: Refer to next page for plots.

Channel Number
2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



11. TIME OF OCCUPANCY (DWELL TIME)

11.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

According to RSS-210 issue 8,§A8.1(d), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

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 =1MHz, Span = 0Hz , Adjust Sweep = 2.5ms.
5. Repeat above procedures until all frequency measured were complete.

11.5. Measurement Result:

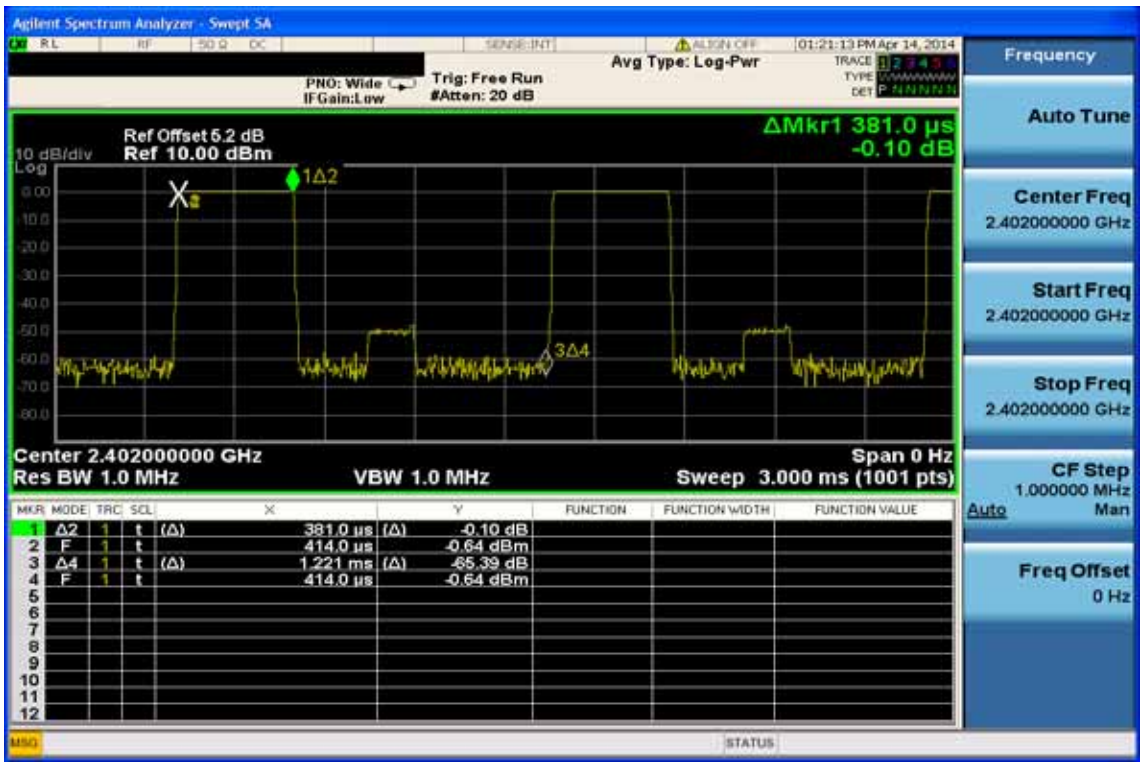
A period time = 0.4 (ms) * 79 = 31.6 (s)

CH Low	DH1 time slot	=	0.381 (ms)	*	(1600/2/79) * 31.6 =	121.92	(ms)
	DH3 time slot	=	1.635 (ms)	*	(1600/4/79) * 31.6 =	261.60	(ms)
	DH5 time slot	=	2.880 (ms)	*	(1600/6/79) * 31.6 =	307.20	(ms)
CH Mid	DH1 time slot	=	0.381 (ms)	*	(1600/2/79) * 31.6 =	121.92	(ms)
	DH3 time slot	=	1.635 (ms)	*	(1600/4/79) * 31.6 =	261.60	(ms)
	DH5 time slot	=	2.880 (ms)	*	(1600/6/79) * 31.6 =	307.20	(ms)
CH High	DH1 time slot	=	0.381 (ms)	*	(1600/2/79) * 31.6 =	121.92	(ms)
	DH3 time slot	=	1.635 (ms)	*	(1600/4/79) * 31.6 =	261.60	(ms)
	DH5 time slot	=	2.880 (ms)	*	(1600/6/79) * 31.6 =	307.20	(ms)

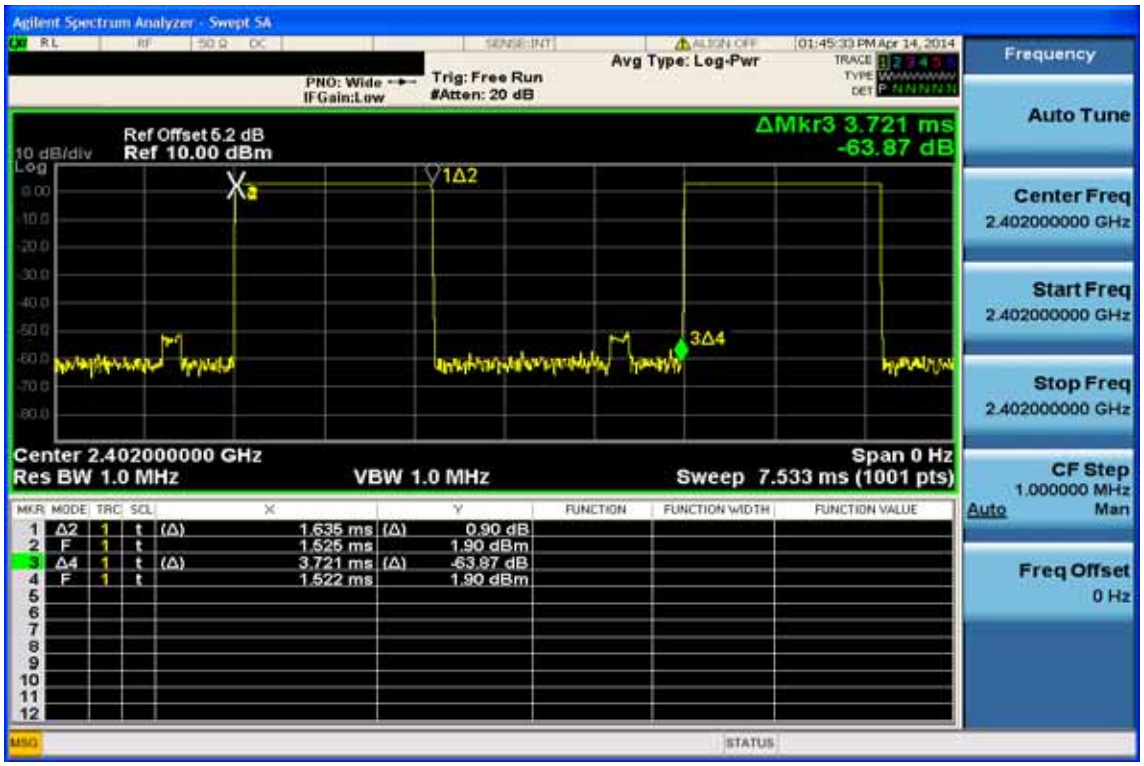
Note: Refer to next page for plots.

Low Channel

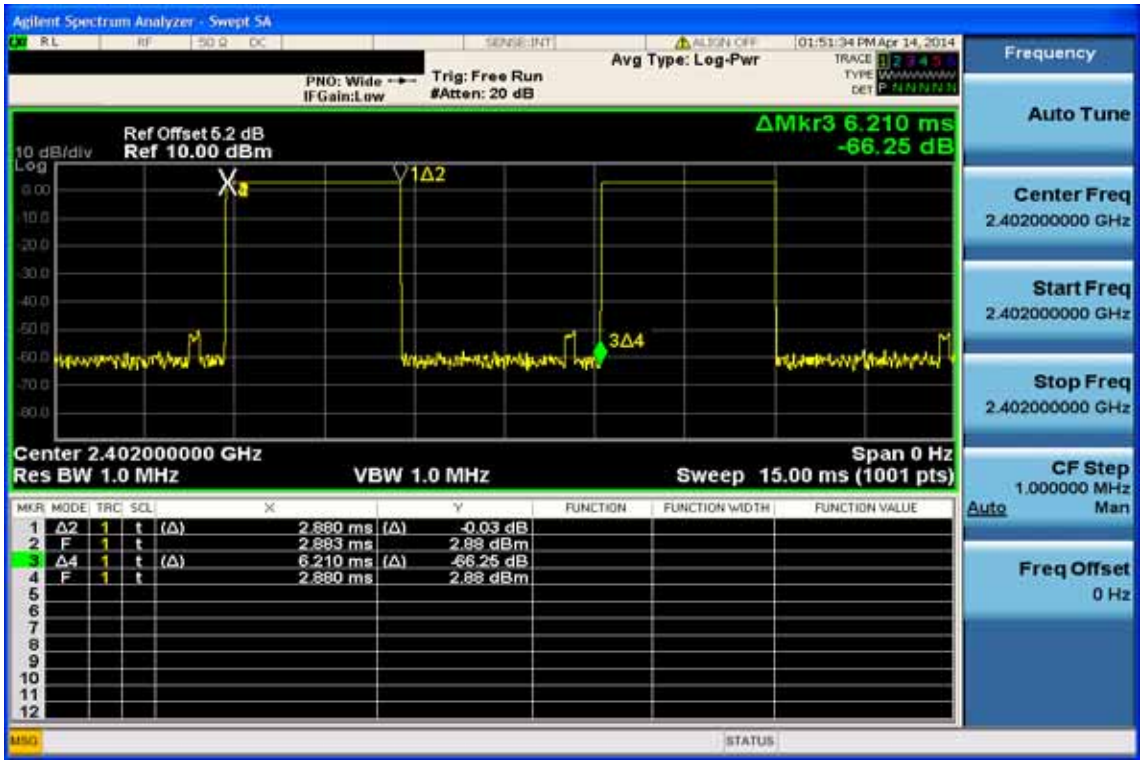
DH1



DH3

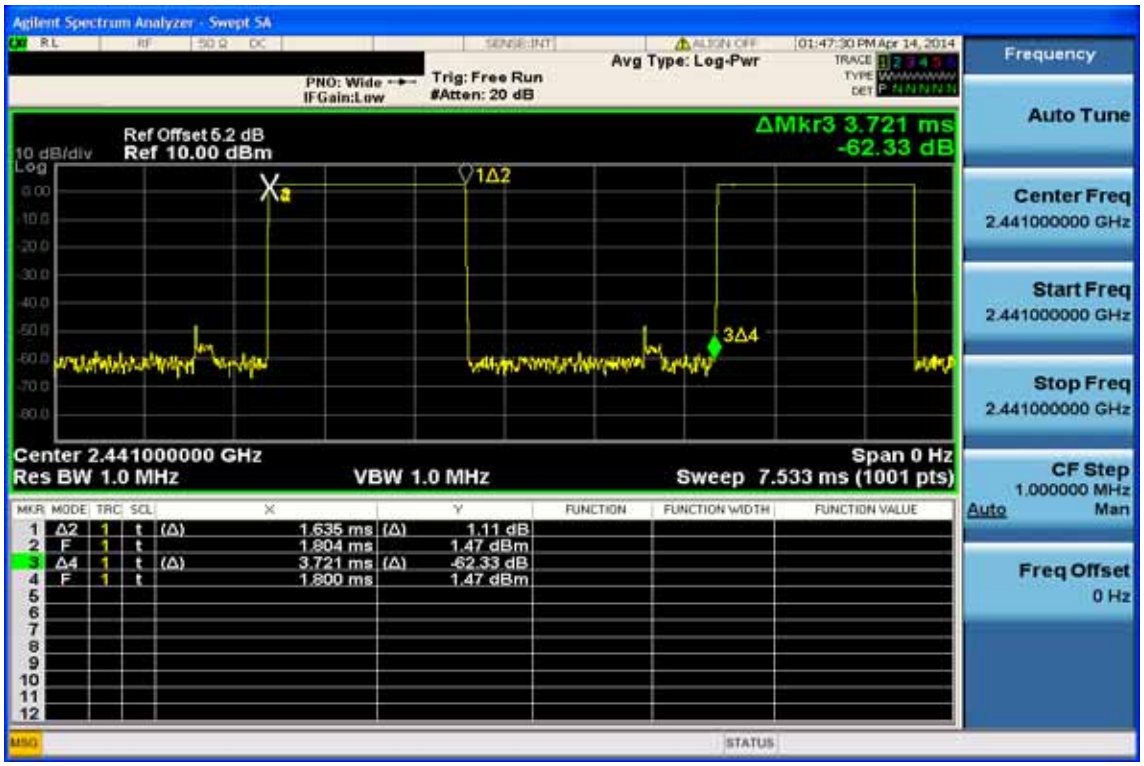


DH5

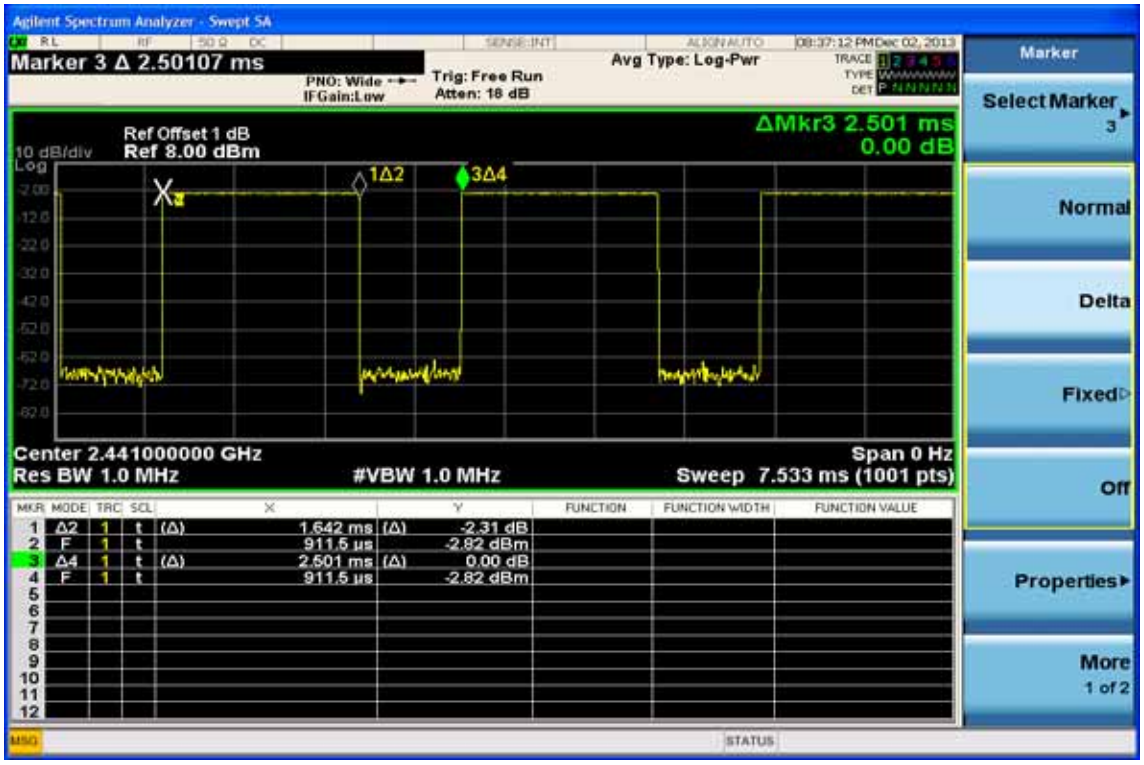


Mid Channel

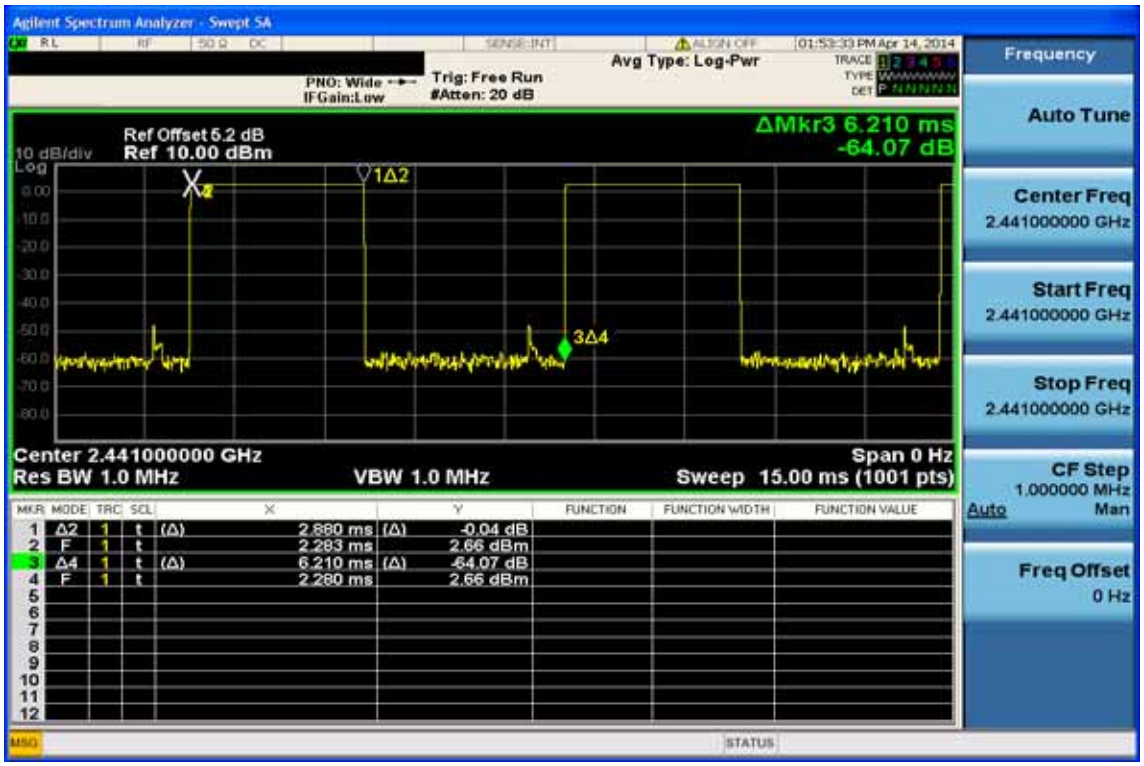
DH1



DH3

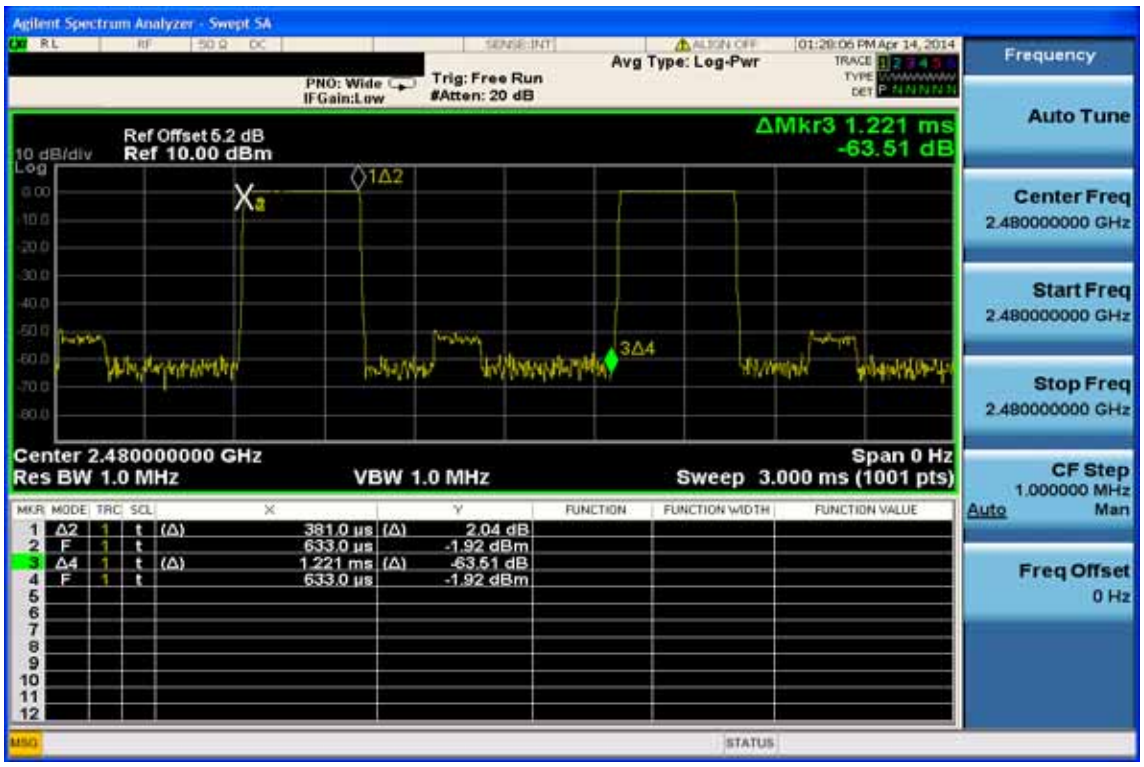

Agilent Spectrum Analyzer - Swept SA
Marker 3 Δ 2.50107 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
08:37:12 PM Dec 02, 2013
Ref Offset 1 dB
10 dB/div
Ref 8.00 dBm
ΔMkr3 2.501 ms
0.00 dB
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 7.533 ms (1001 pts)
1 Δ2 1.642 ms -2.31 dB
2 F 911.5 µs -2.82 dBm
3 Δ4 2.501 ms 0.00 dB
4 F 911.5 µs -2.82 dBm
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

DH5

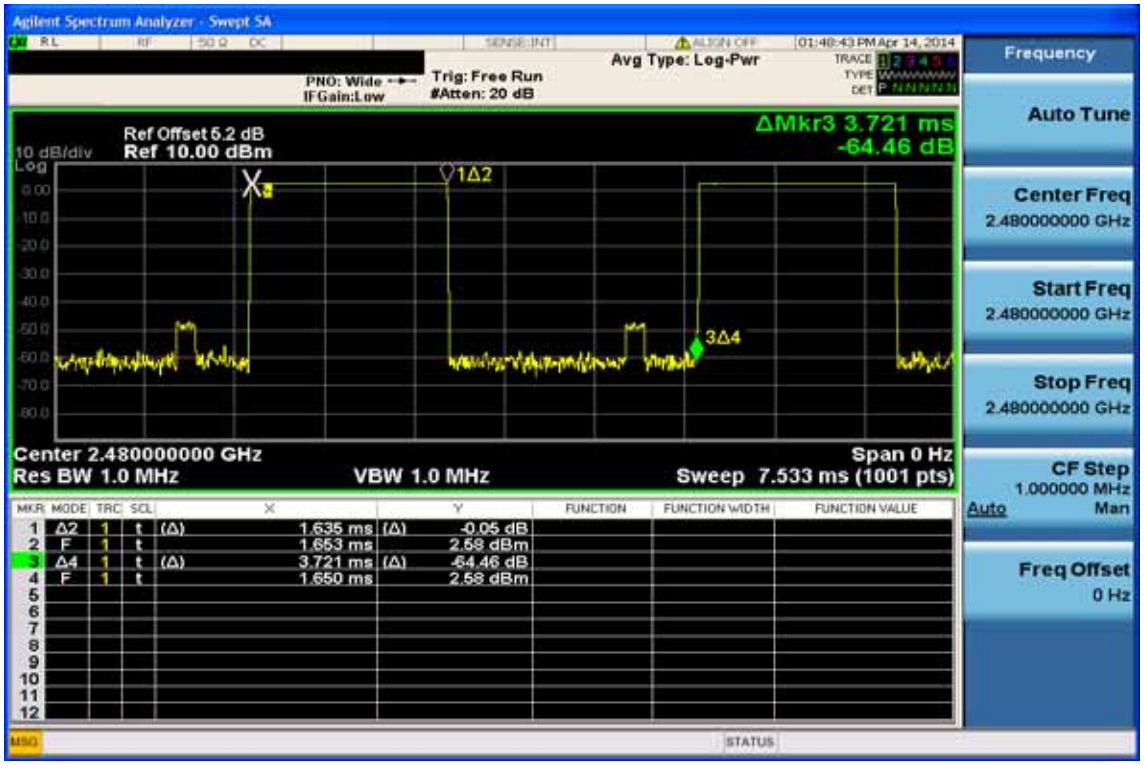

Agilent Spectrum Analyzer - Swept SA
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
01:53:33 PM Apr 14, 2014
Ref Offset 5.2 dB
10 dB/div
Ref 10.00 dBm
ΔMkr3 6.210 ms
-64.07 dB
Center 2.441000000 GHz
Res BW 1.0 MHz
VBW 1.0 MHz
Span 0 Hz
Sweep 15.00 ms (1001 pts)
1 Δ2 2.880 ms -0.04 dB
2 F 2.283 ms 2.66 dBm
3 Δ4 6.210 ms -64.07 dB
4 F 2.280 ms 2.66 dBm
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

High Channel

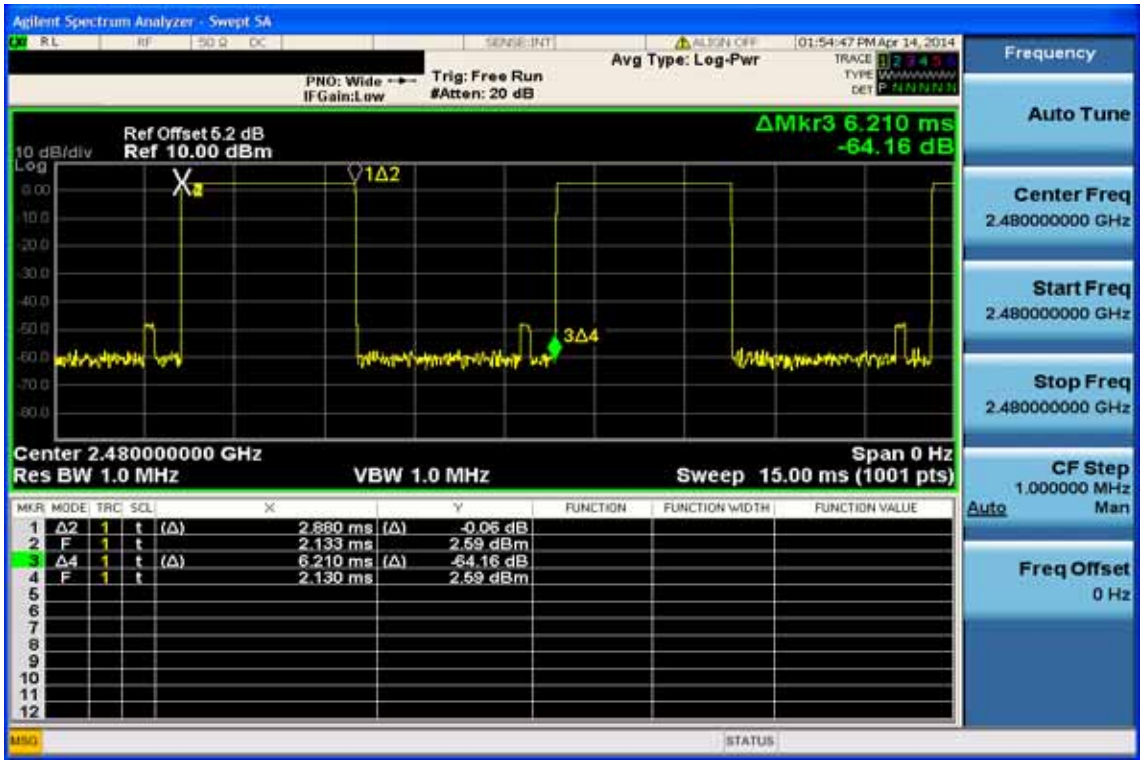
DH1



DH3



DH5


Agilent Spectrum Analyzer - Swept SA
Avg Type: Log-Pwr
01:54:47 PM Apr 14, 2014
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Ref Offset 5.2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr3 6.210 ms
-64.16 dB
1Δ2
3Δ4
Center 2.480000000 GHz
Res BW 1.0 MHz
VBW 1.0 MHz
Span 0 Hz
Sweep 15.00 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 2.880 ms (Δ) -0.06 dB
2 F 1 t 2.133 ms 2.59 dBm
3 Δ4 1 t (Δ) 6.210 ms (Δ) -64.16 dB
4 F 1 t 2.130 ms 2.59 dBm
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

12. 20dB Bandwidth & 99% Bandwidth

12.1. Standard Applicable:

According to §15.247(a)(1),and RSS210 A8.1(b) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

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= 3MHz, 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:

BDR Mode

CH	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Lower	0.924	0.865
Mid	0.934	0.857
Higher	0.926	0.860

EDR 2M Mode

CH	20dB Bandwidth (MHz)	2/3* 20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Lower	1.302	0.868	1.157
Mid	1.280	0.853	1.158
Higher	1.302	0.868	1.158

EDR 3M Mode

CH	20dB Bandwidth (MHz)	2/3* 20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Lower	1.278	0.852	1.164
Mid	1.296	0.864	1.165
Higher	1.291	0.861	1.168

Note: Refer to next page for plots.

BDR Mode

20dB Bandwidth Test Data CH-Low

20dB Bandwidth Test Data CH-Mid

20dB Bandwidth Test Data CH-High

BDR Mode

99% Bandwidth Test Data CH-Low

99% Bandwidth Test Data CH-Mid

99% Bandwidth Test Data CH-High

EDR 2M Mode

20dB Bandwidth Test Data CH-Low

20dB Bandwidth Test Data CH-Mid

20dB Bandwidth Test Data CH-High

EDR 3M Mode

20dB Bandwidth Test Data CH-Low

20dB Bandwidth Test Data CH-Mid

20dB 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 §15.247(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 6 dBi.

According to RSS-GEN 7.1.2, 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 gains of antenna used for transmitting is 1.57dBi, and the antenna type is printed antenna which is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.