



FCC TEST REPORT

Product Name	Wireless Repeater
Model Name	RSN-iDEN-25
Applicant	R-tron Inc.
FCC ID	STESNIDEN25

ESTECH CO., LTD

Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204



FCC Test Report

Report Number	ESTR0705-001			
Applicant	Company Name	R-tron Inc.		
	Address	Jisan IT Venture Center 3F, 1004-9 Doksna-Dong, Gumcheon-Gu, Seoul, Korea		
Product	Product Name	Wireless Repeater		
	Model No.	RSN-iDEN-25	Manufacturer	R-tron Inc.
	Serial No.	NONE	Country of origin	KOREA
Other	Issued Date	2007-05-02	Tested Date	2007-02-12 ~ 2007-5-02
	Test Result			
Pass				
Standard	FCC PART 90 Subpart I			
Tested by	S.R. Kim/ Engineer (Signature)			
Approved by	Jay Kim/ Engineering Manager (Signature)			
ESTECH CO., LTD Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204				
o This is certified that the above mentioned products have been tested for the sample provided by client. o No part of this document may not be duplicated or reproduced by any means without the express written permission of Estech Co., Ltd.				



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1. General Information

1.1 EUT Description

FCC ID	STESNIDEN25
Product Name	Wireless Repeater
Model Name	RSN-iDEN-25
Frequency	Tx :806MHz – 824MHz, 896MHz – 901MHz
	Rx :850.6MHz - 869MHz, 934.6MHz - 940MHz
Modulation Type	iDen(QAM)
Power Rating	AC110V



2. Laboratory Information

2.1 Laboratory Name Estech Co., Ltd.

2.2 Location

Head Office Rm. 1015, World Venture Center II, 426-5 Gasan-dong
 Geumcheon-gu, Seoul, 153-803. Korea.

EMC Lab(Ichon) 58-1, Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea

EMC Lab(Yanggi) 97-1, Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

2.3 Quality System Accredited by KOLAS(ISO/IEC 17025)

2.4 Major Accredited Mark



Industry Canada **Industrie Canada**



3. Summary of Test Results

Test Item	Standard	Result
RF Output Power	Part 90	PASS
Occupied Bandwidth		PASS
Spurious and Harmonic Emission at Antenna Terminal		PASS
Field Strength of Spurious Radiation		PASS
Frequency stability		PASS



4. RF Output Power

4.1 Test Procedure

The EUT was placed on a wooden turn table 3 meters from the receive antenna. The receive antenna height and turn table rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For reading 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

4.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	2008-03-02
Signal Generator	HP	E4432B	2008-03-02
Attenuator	HP	8498A	2008-03-02

4.3.1 Test Results (800MHz Uplink)

Freq (MHz)	Measured Output power(dBm)	Rated Output power(dBm)
806.00	21.45	22.00
815.00	22.08	22.00
824.00	21.62	22.00



4.3.2 Test Results (800MHz Downlink)

Freq (MHz)	Measured Output power(dBm)	Rated Output power(dBm)
851.00	24.96	25.00
860.00	25.00	25.00
869.00	24.89	25.00

4.3.3 Test Results (900MHz Uplink)

Freq (MHz)	Measured Output power(dBm)	Rated Output power(dBm)
896.00	21.61	22.00
899.00	21.42	22.00
901.00	21.61	22.00

4.3.4 Test Results (900MHz Downlink)

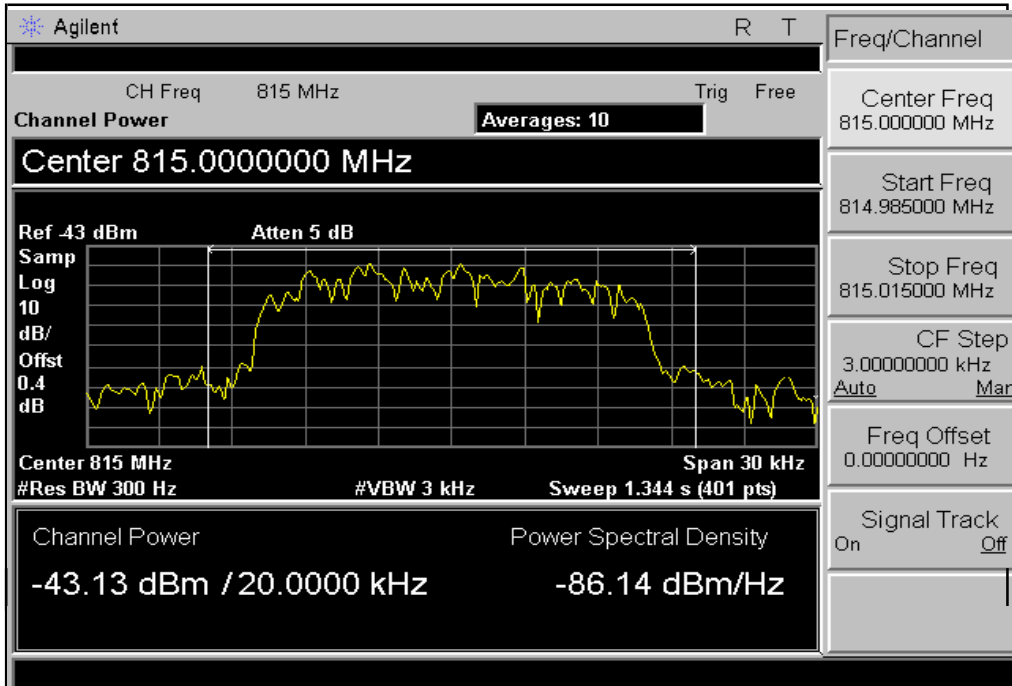
Freq (MHz)	Measured Output power(dBm)	Rated Output power(dBm)
935.00	24.91	25.00
938.00	25.06	25.00
940.00	24.70	25.00



4.4 Test Plot

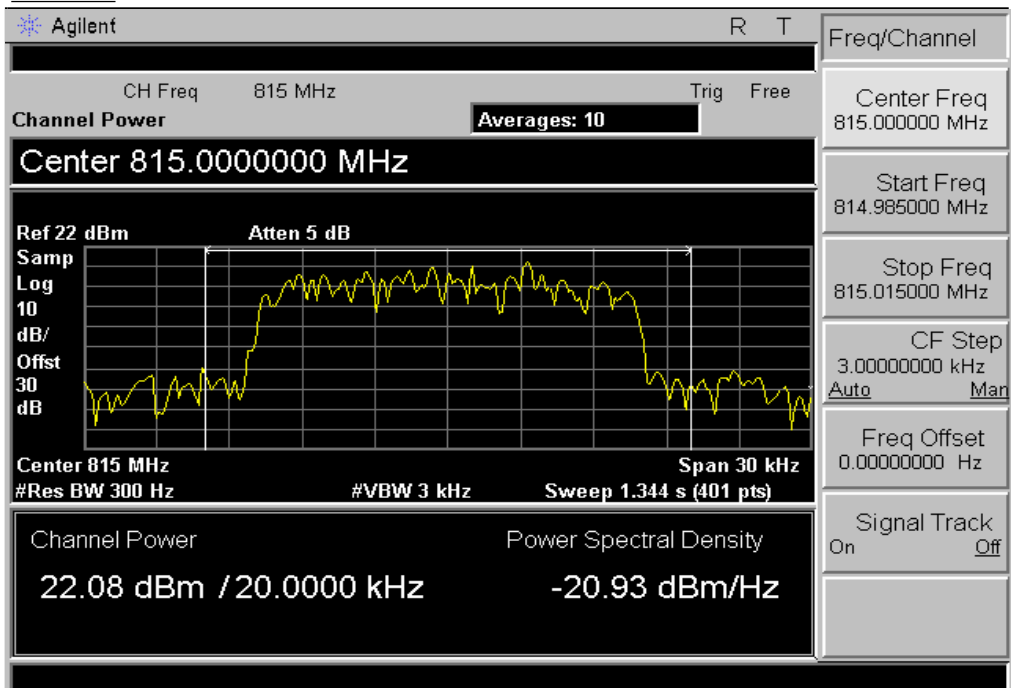
Input power (800MHz Uplink)

815MHz



Output power (800MHz Uplink)

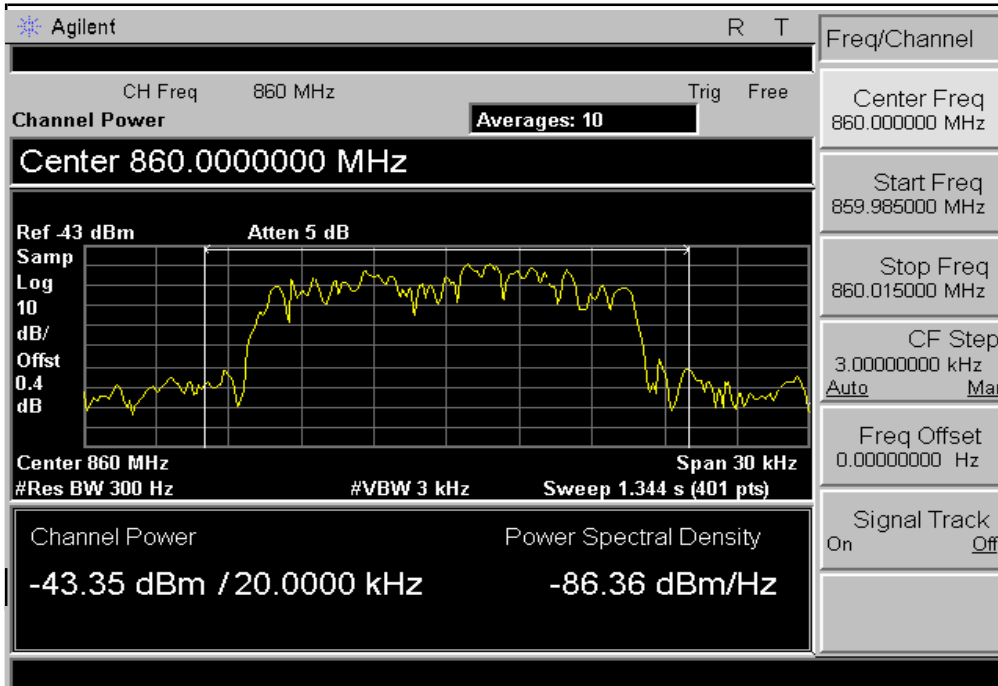
815MHz





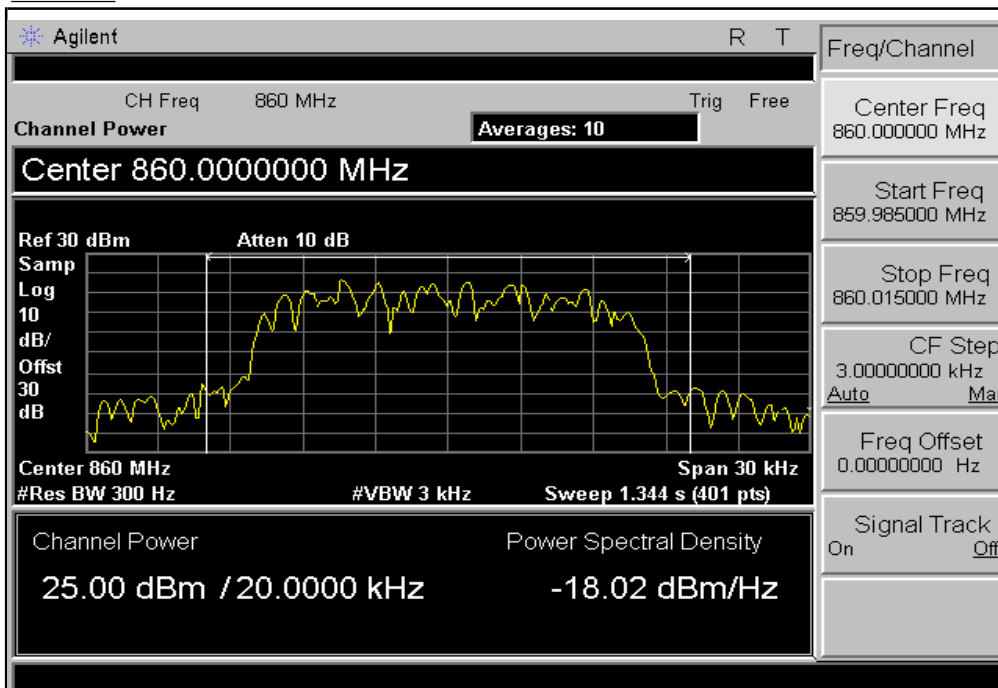
Input power (800MHz Downlink)

860MHz



Output power (800MHz Downlink)

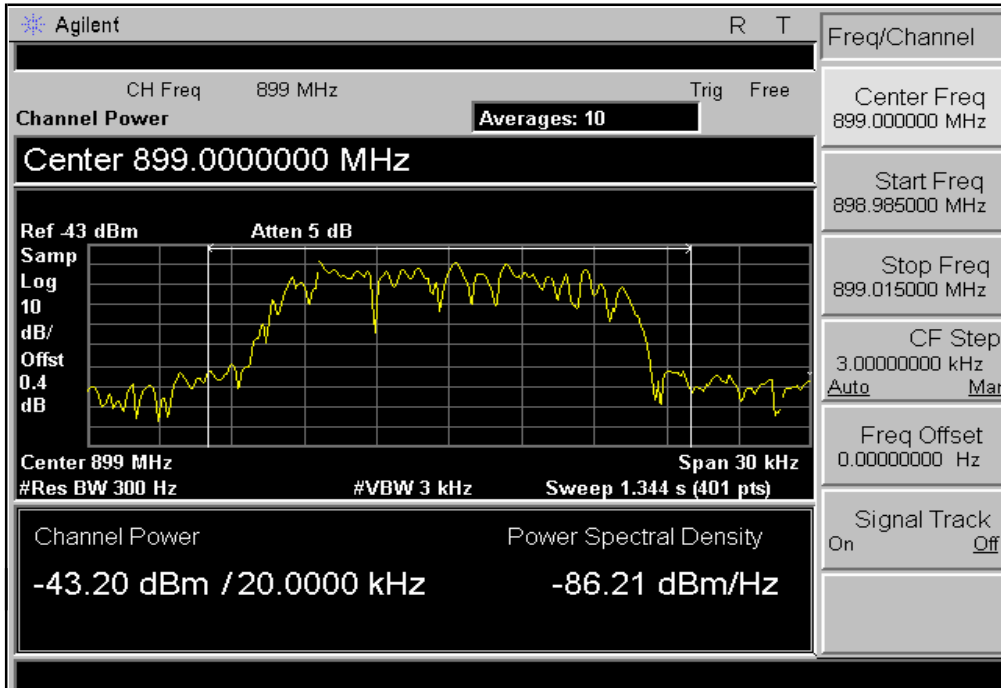
860MHz





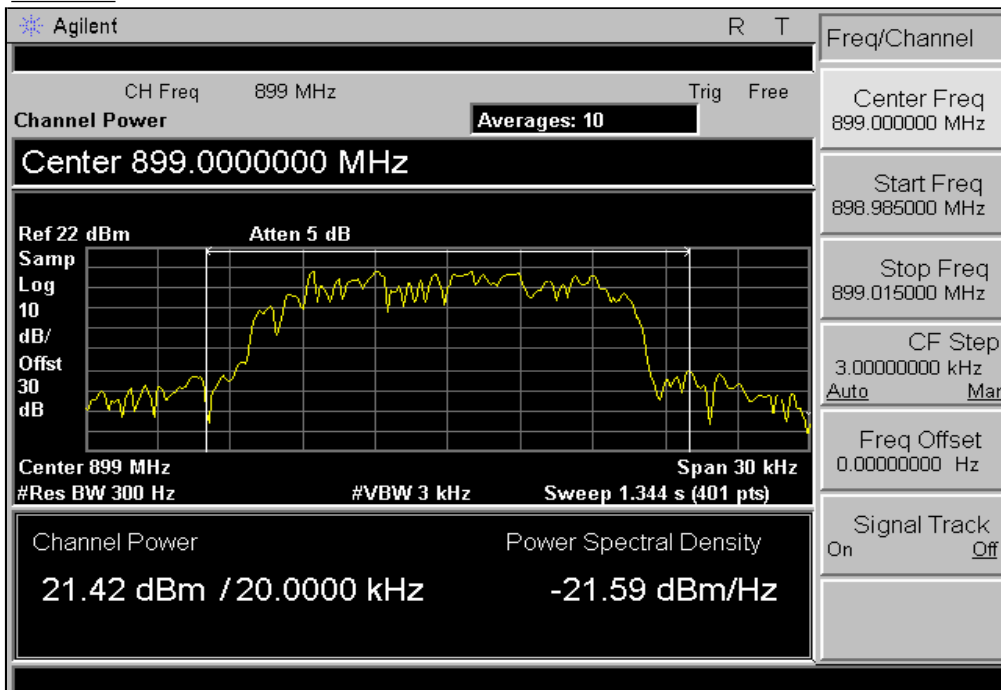
Input power (900MHz Uplink)

899MHz



Output power (800MHz Uplink)

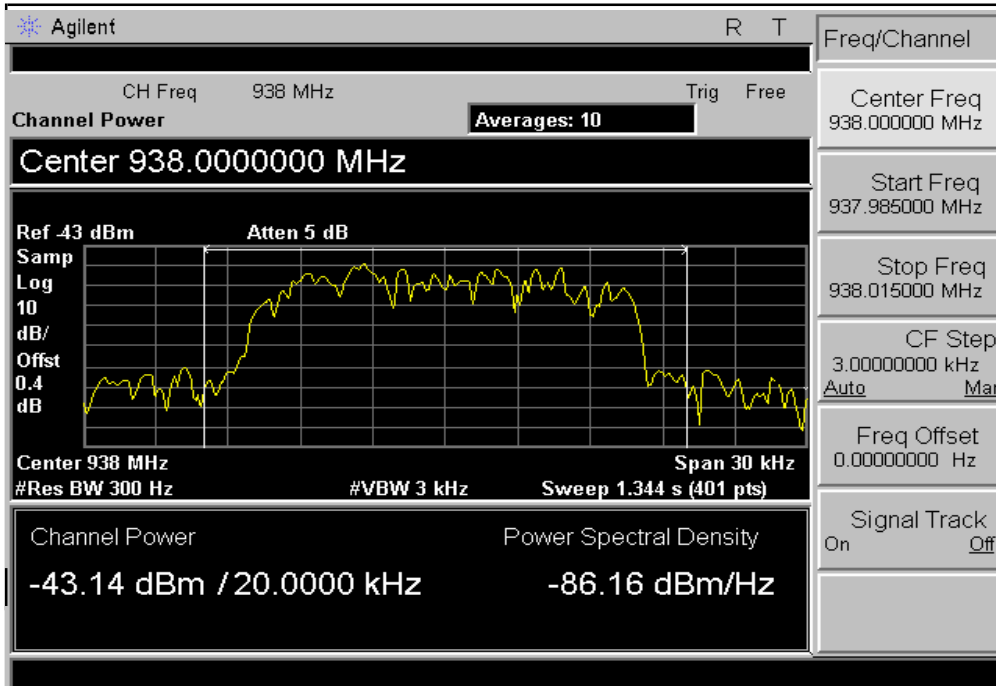
899MHz





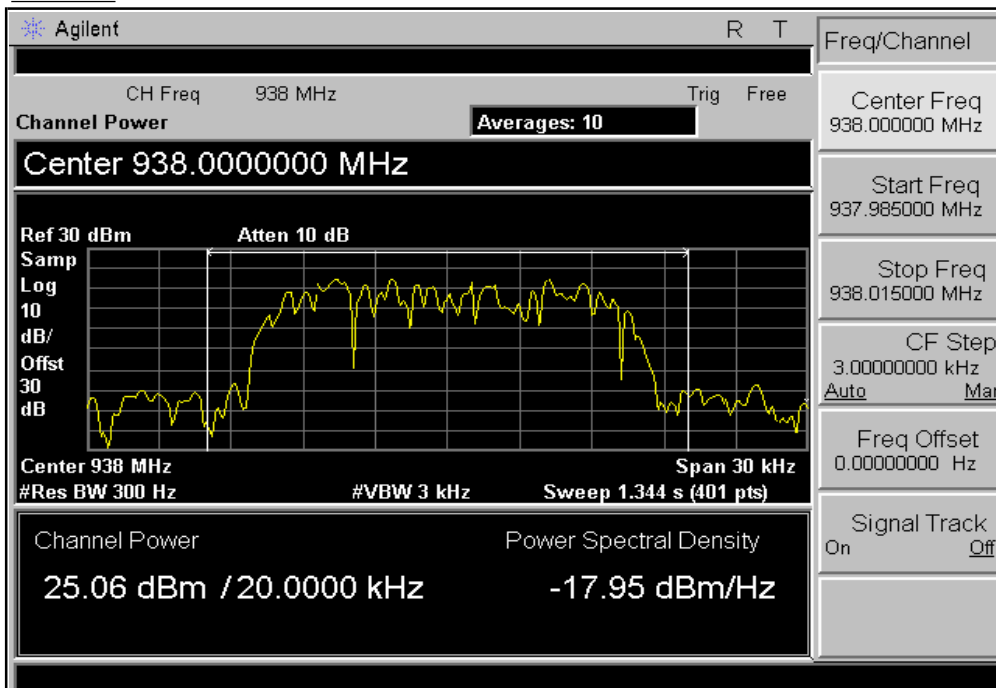
Input power (900MHz Downlink)

938MHz



Output power (800MHz Downlink)

938MHz





5. Occupied Bandwidth

5.1 Test Procedure

Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following Table.

Standard Channel Spacing/Bandwidth

Frequency Band (MHz)	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
Below 25	--	--
25-50	20	20
72-76	20	20
150-174	7.5	20/11.25/6
216-220	6.25	20/11.25/6
220-222	5	4
406-512	6.25	20/11.25/6
806-809/851-854	12.5	20
809-824/854-869	25	20
896-901/935-940	12.5	13.6
902-928	--	--
929-930	25	20
1427-1432	12.5	12.5
2450-2483.5	--	--
Above 2500	--	--

5.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	2008-03-02
Signal Generator	HP	E4432B	2008-03-02
Attenuator	HP	8498A	2008-03-02

5.3 Test Results

(800MHz&900MHz Uplink)

Frequency(MHz)	26dB Bandwidth(kHz)
806.00	15.558
815.00	15.529
824.00	15.447



Frequency(MHz)	26dB Bandwidth(kHz)
896.00	15.459
899.00	15.493
901.00	15.549

(800MHz&900MHz Downlink)

Frequency(MHz)	26dB Bandwidth(kHz)
851.00	15.448
860.00	15.541
869.00	15.675

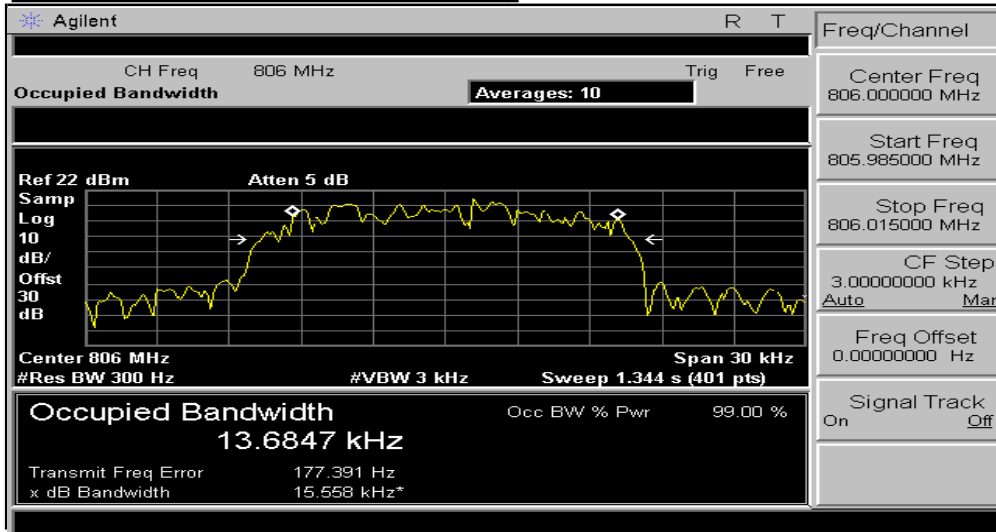
Frequency(MHz)	26dB Bandwidth(kHz)
935.00	15.374
938.00	15.545
940.00	15.378



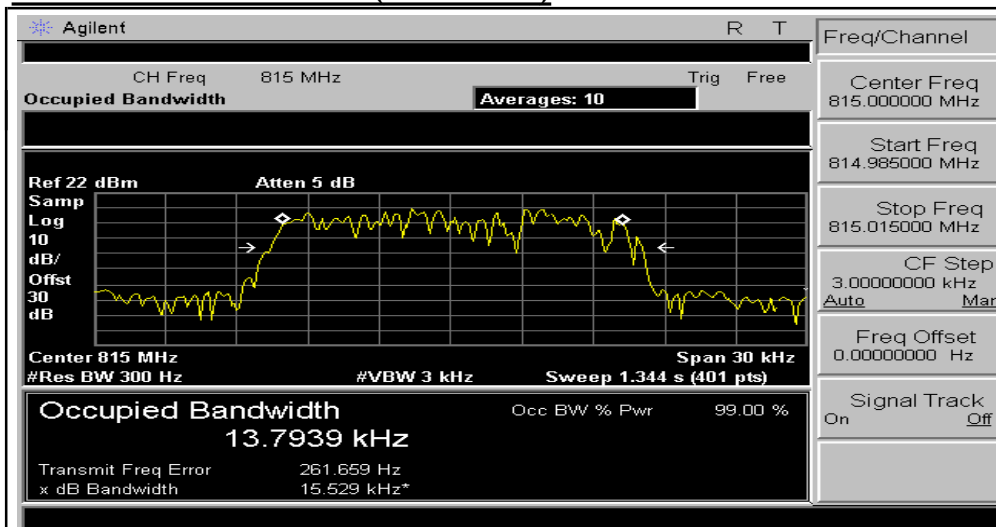
5.4 Test Plot

(800MHz Uplink)

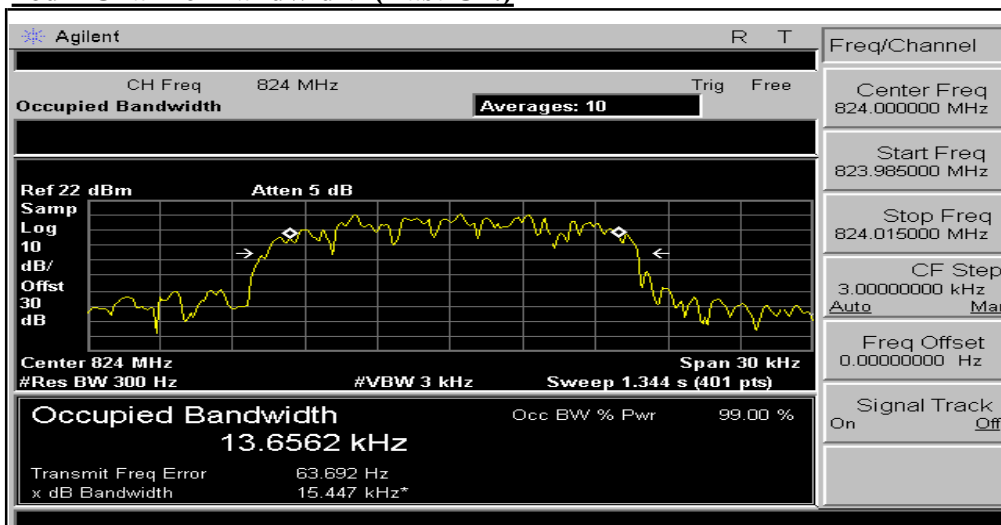
26dB Channel Bandwidth(First Ch.)



26dB Channel Bandwidth(Middle Ch.)



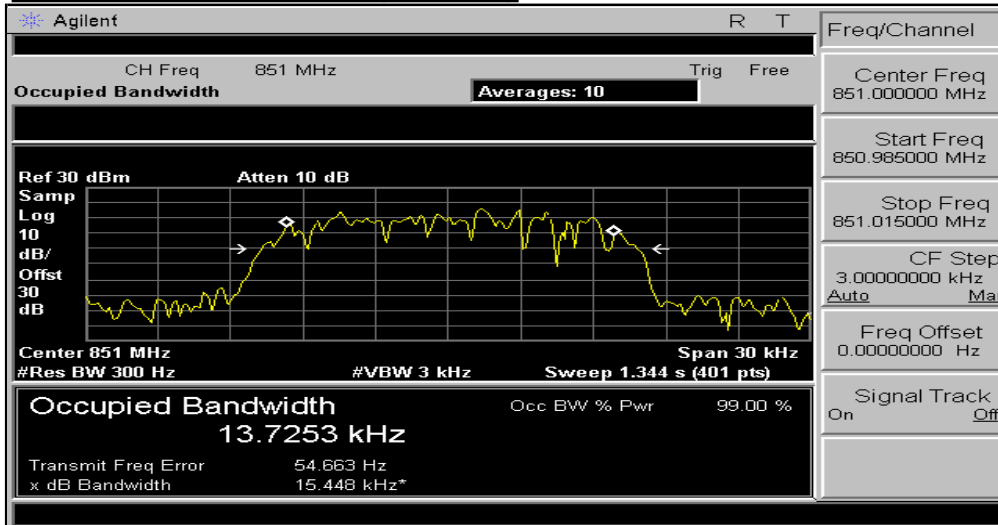
26dB Channel Bandwidth(Last Ch.)



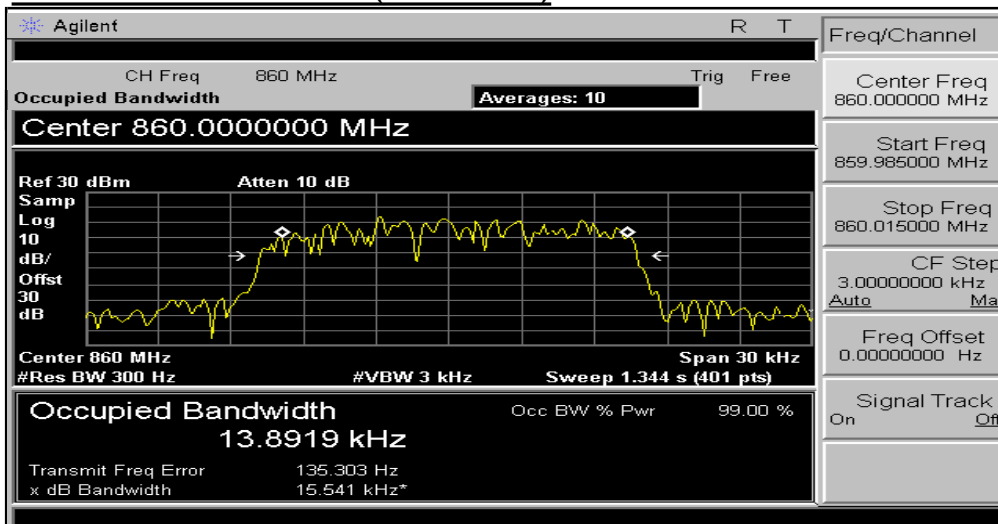


(800MHz Downlink)

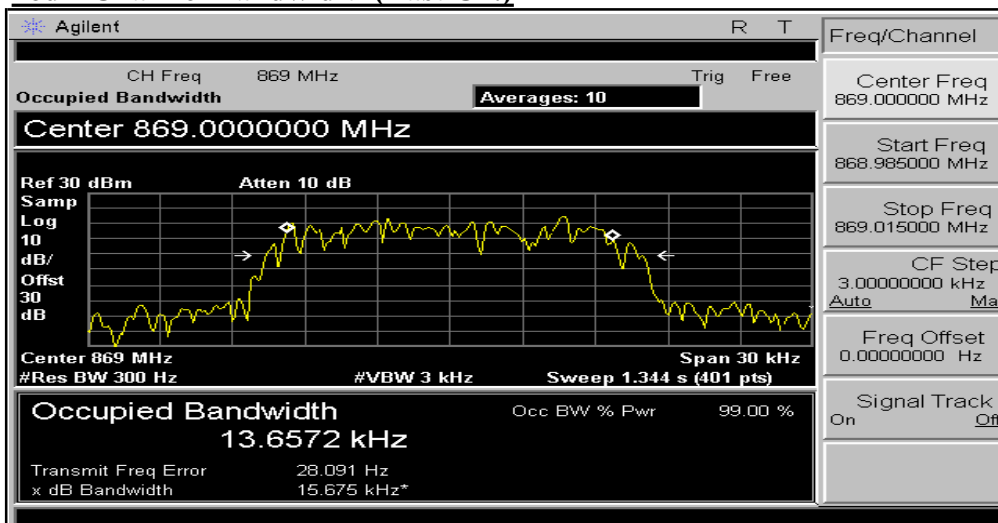
26dB Channel Bandwidth(First Ch.)



26dB Channel Bandwidth(Middle Ch.)



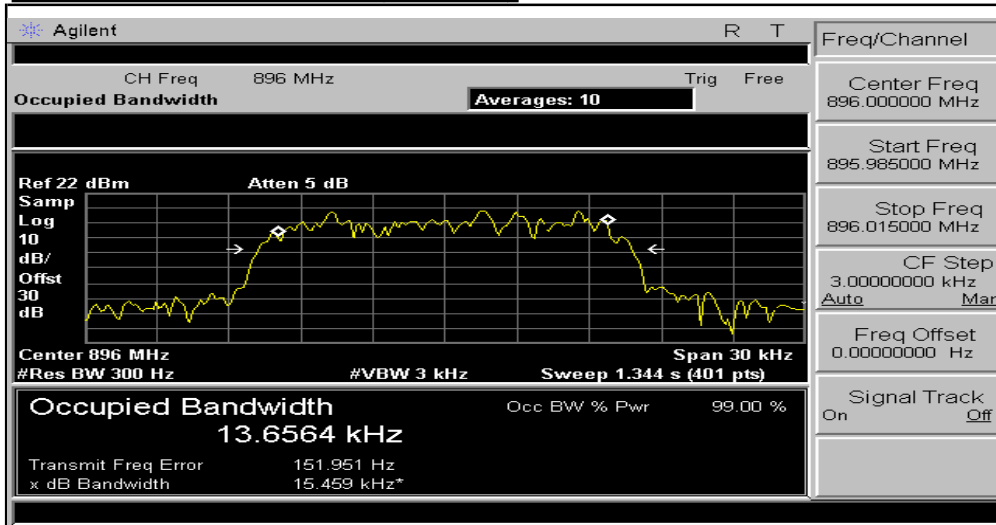
26dB Channel Bandwidth(Last Ch.)



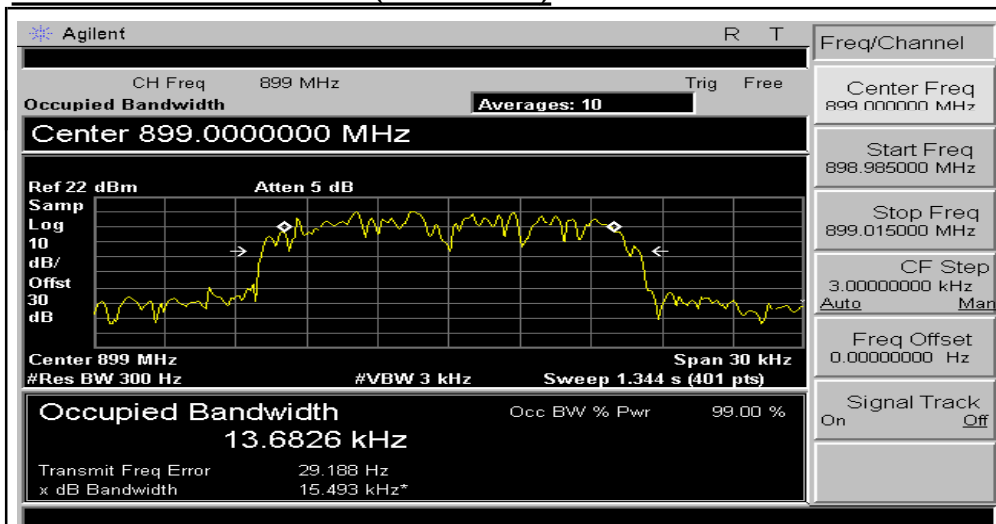


(900MHz Uplink)

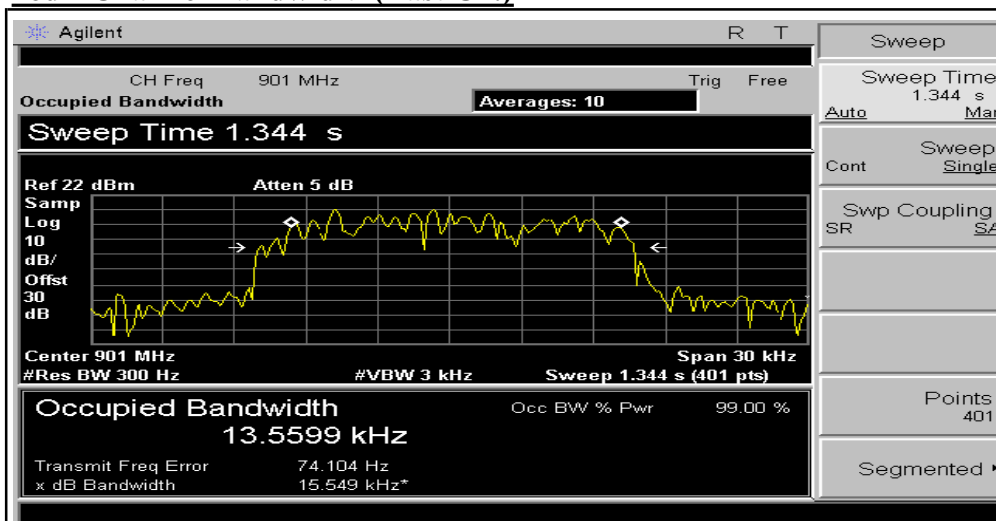
26dB Channel Bandwidth(First Ch.)



26dB Channel Bandwidth(Middle Ch.)



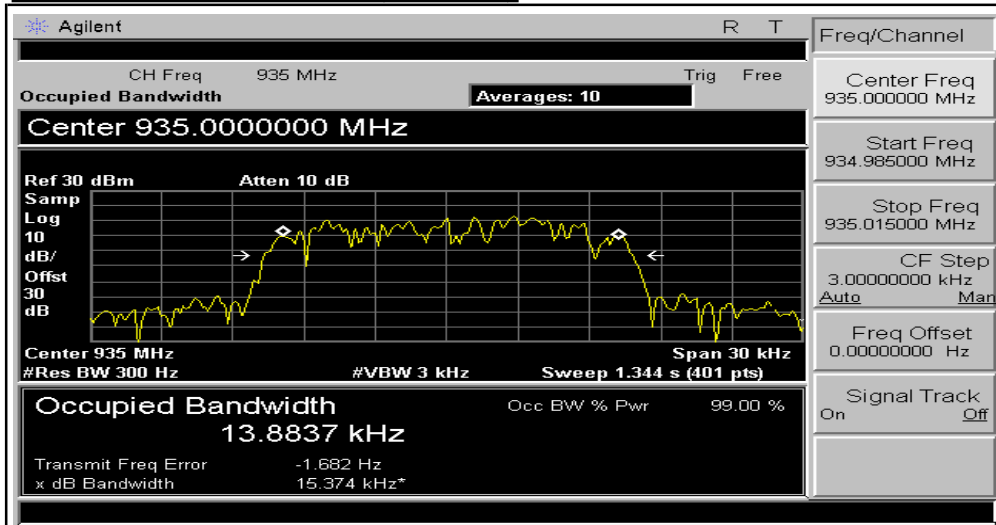
26dB Channel Bandwidth(Last Ch.)



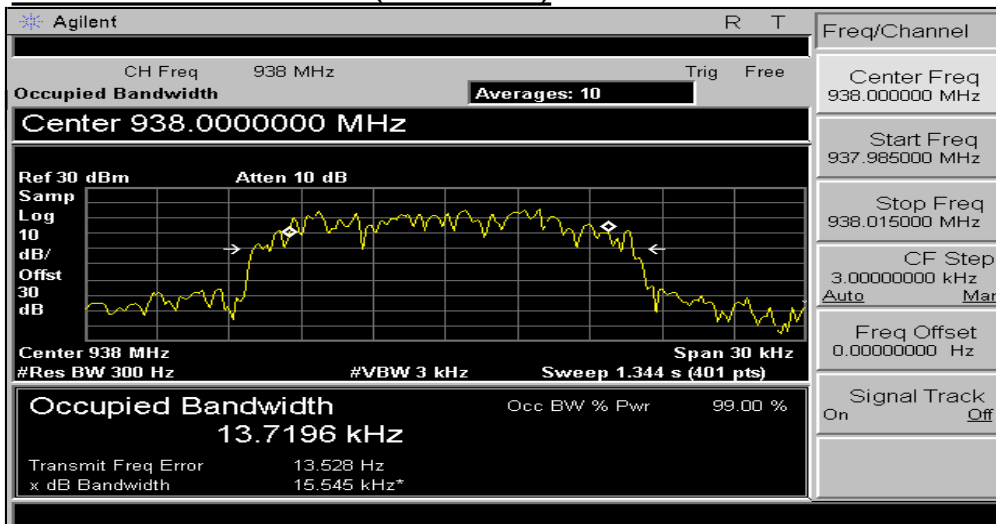


(900MHz Downlink)

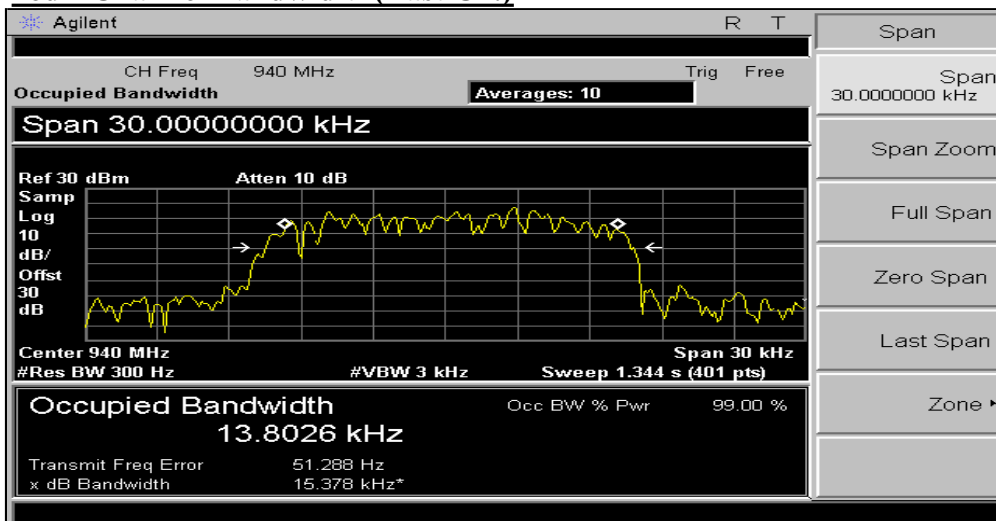
26dB Channel Bandwidth(First Ch.)



26dB Channel Bandwidth(Middle Ch.)



26dB Channel Bandwidth(Last Ch.)





6. Spurious and Harmonic Emission at Antenna Terminal

6.1 Test Procedure

Spurious emissions were searched at low, medium and high ends of the bands for both uplink and downlink directions. Worst case plots have been included for the uplink and downlink.

6.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	2008-03-02
Signal Generator	HP	E4432B	2008-03-02
Attenuator	HP	8498A	2008-03-02

6.3 Test Results

(800MHz Uplink)

Channel	Frequency	Result	Limit	Margin
First Ch.	806.00	-31.65	-20.00	11.65
Middle Ch.	815.00	-32.69	-20.00	12.69
Last Ch.	824.00	-31.68	-20.00	11.68

(800MHz Downlink)

Channel	Frequency	Result	Limit	Margin
First Ch.	851.00	-23.78	-20.00	3.78
Middle Ch.	860.00	-23.82	-20.00	3.82
Last Ch.	869.00	-24.52	-20.00	4.52



(900MHz Uplink)

Channel	Frequency	Result	Limit	Margin
First Ch.	896.00	-32.78	-20.00	12.78
Middle Ch.	899.00	-31.39	-20.00	11.39
Last Ch.	901.00	-31.19	-20.00	11.19

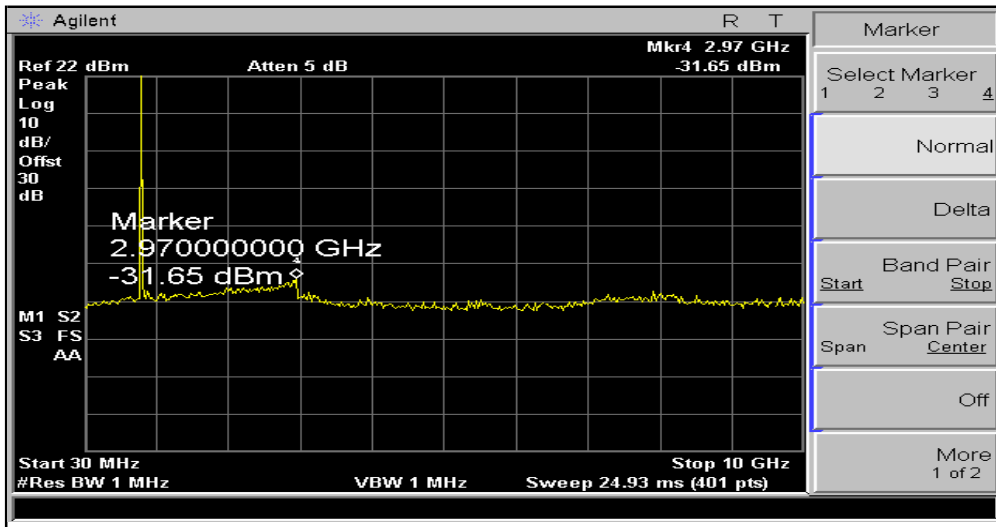
(900MHz Downlink)

Channel	Frequency	Result	Limit	Margin
First Ch.	935.00	-24.03	-20.00	4.03
Middle Ch.	938.00	-25.20	-20.00	5.20
Last Ch.	940.00	-24.83	-20.00	4.83

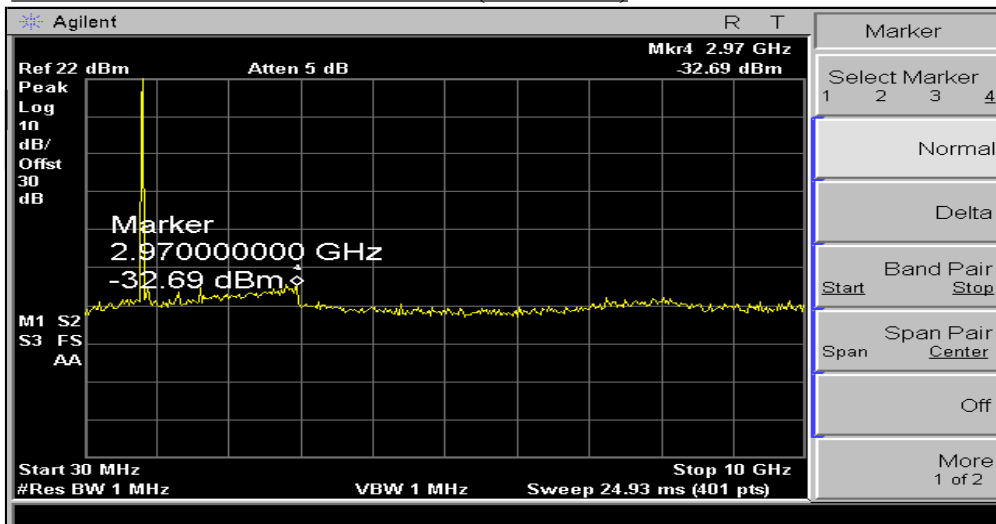


(800MHz Uplink)

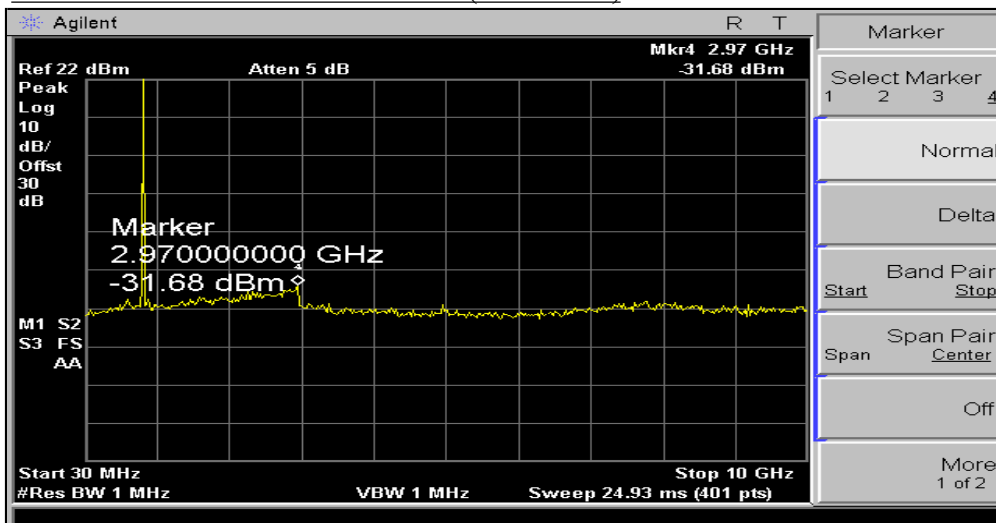
PLOTS OF EMISSION : Out of Band (First Ch.)



PLOTS OF EMISSION : Out of Band (Middle Ch.)



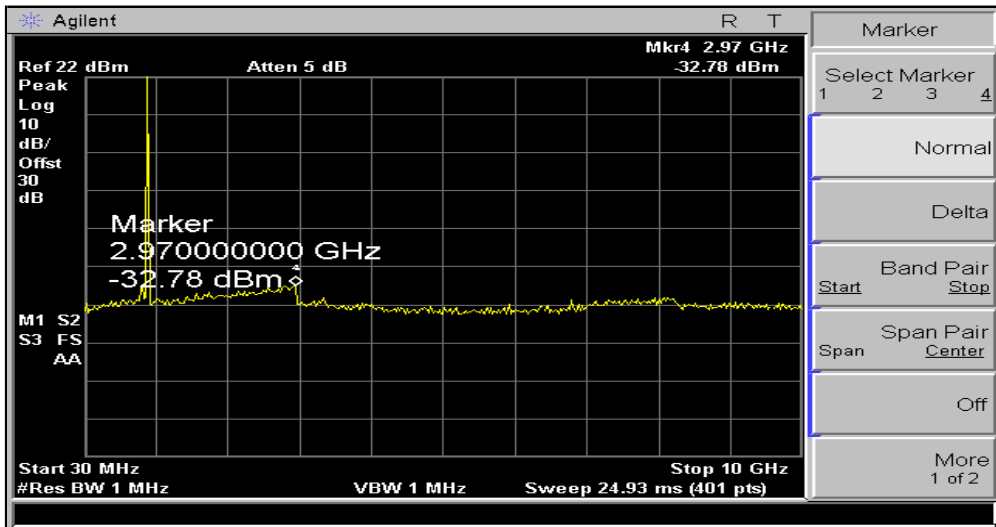
PLOTS OF EMISSION : Out of Band (Middle Ch.)



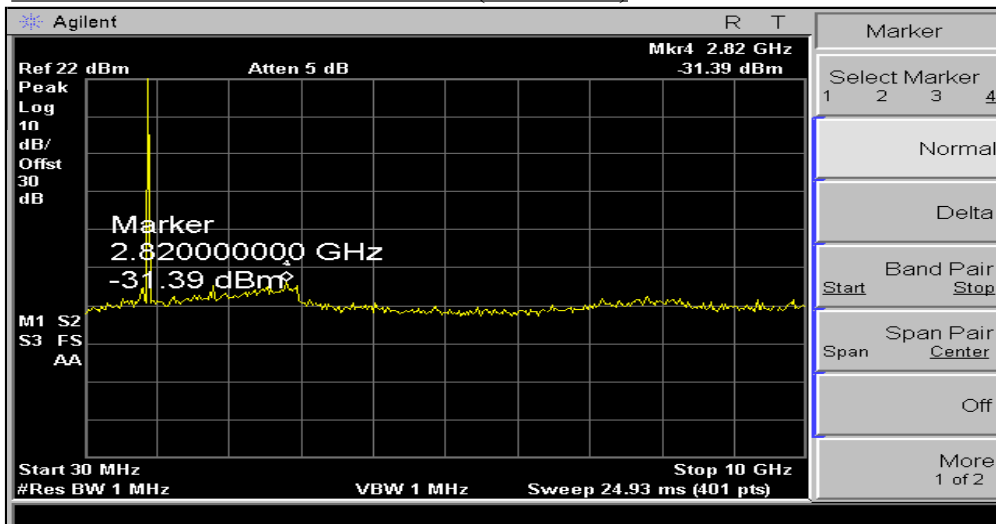


(900MHz Uplink)

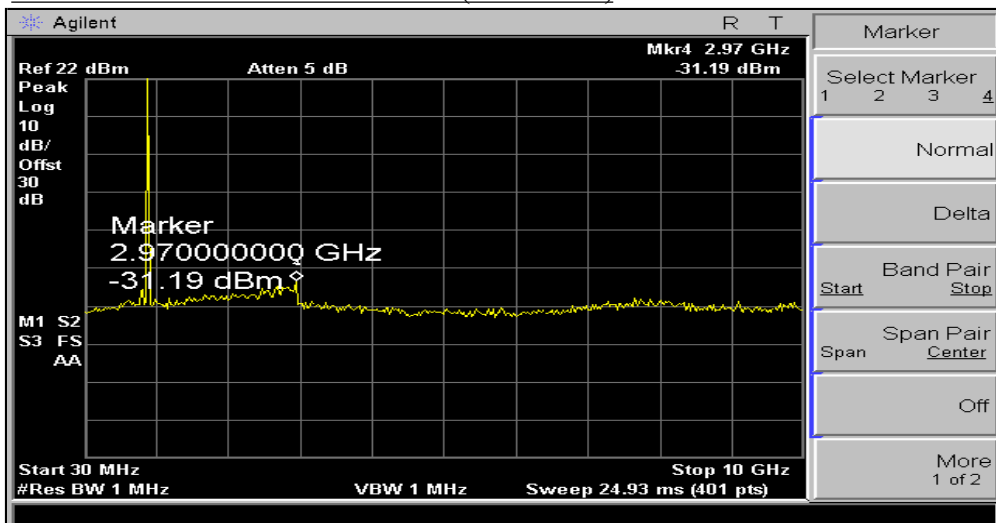
PLOTS OF EMISSION : Out of Band (First Ch.)



PLOTS OF EMISSION : Out of Band (Middle Ch.)



PLOTS OF EMISSION : Out of Band(Middle Ch.)





7. Field Strength of Spurious Radiation

7.1 Test Procedure

Radiation and harmonic emission are measured outdoors at our 3 meters test range. The equipment under test is placed on a wooden turntable 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer (or receiver). A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

7.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model	Cal. Due Date
Receiver	Rohde & Schwarz	ESPI7	2007-08-24
Signal Generator	HP	83620B	2007-09-07
Pre Amplifier	SONOMA INSTRUMENT	310N	2007-09-26
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2008-03-31

Note: The spurious emission wasn't detected from 2rd harmonics.



7.3 Test Results

Uplink(800MHz&900MHz)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		ERP(dBm)		Limit (dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
1612(806MHz)	46.67	9.51	2.00	-65.30	-57.79	-20.00	V
1630(815MHz)	42.17	9.65	2.00	-80.15	-72.50	-20.00	V
1648(824MHz)	41.00	9.78	2.00	-81.88	-74.10	-20.00	V
1792(896MHz)	37.17	10.33	3.50	-84.03	-77.20	-20.00	V
1798(896MHz)	37.17	10.34	3.50	-84.74	-77.90	-20.00	V
1802(896MHz)	37.17	10.35	3.50	-83.65	-76.80	-20.00	V

Downlink(800MHz&900MHz)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		ERP(dBm)		Limit (dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
1702(851MHz)	46.50	10.13	3.50	-64.00	-57.37	-20.00	V
1720(860MHz)	40.17	10.17	3.50	-69.90	-63.23	-20.00	V
1738(869MHz)	39.00	10.22	3.50	-71.30	-64.58	-20.00	V
1870(935MHz)	37.50	10.42	4.00	-70.80	-64.38	-20.00	V
1876(938MHz)	37.00	10.42	4.00	-73.50	-67.08	-20.00	V
1880(940MHz)	37.00	10.43	4.00	-74.80	-68.37	-20.00	V



8. Frequency stability

8.1 Test Procedure

a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following Table.

Minimum Frequency Stability
 parts per million (ppm)

Frequency range (MHz)	Fixed and base stations 2 watts output power	Mobile stations Over power	2 watts or less output
Below 25	100	100	200
25-50	20	20	50
72-76	5	---	50
150-174	50	5	50
216-220	1.0	---	1.0
220-222	0.1	1.5	1.5
421-512	2.5	5	5
806-809	1.0	1.5	1.5
809-824	1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	0.1	1.5	1.5
902-928	2.5	2.5	2.5

Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency stability restrictions.

929-930	1.5	---	---
935-940	0.1	1.5	1.5
1427-1435	300	300	300
Above 2450	---	---	---

8.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	2008-03-02
Signal Generator	HP	E4432B	2008-03-02
Attenuator	HP	8498A	2008-03-02
Slidacs	Digitek Power	-	-
Tem/Hum Chamber	Baek Do	BDS1000	2008-02-08



8.3 Test Results

800MHz Uplink

Operating Frequency : 815,000,000
Reference Voltage : 110.00 VAC
Deviation Limit : 0.00025

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	815,000,003	0.000000
100		-30	814,999,981	0.000003
100		-20	814,999,981	0.000003
100		-10	814,999,984	0.000002
100		0	814,999,983	0.000002
100		10	814,999,977	0.000003
100		20	815,000,003	0.000000
100		25	814,999,985	0.000002
100		30	814,999,985	0.000002
100		40	814,999,987	0.000002
100		50	814,999,981	0.000003
100		60	814,999,977	0.000003
85	93.5	20	814,999,974	0.000004
115	126.5	20	814,999,981	0.000003
EndPoint	85.0	20	814,999,978	0.000003



800MHz Downlink

Operating Frequency :	860,000,000	
Reference Voltage :	110.00	VAC
Deviation Limit :	0.00025	

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	860,000,002	0.000000
100		-30	859,999,986	0.000002
100		-20	859,999,982	0.000002
100		-10	859,999,980	0.000003
100		0	859,999,978	0.000003
100		10	859,999,978	0.000003
100		20	860,000,002	0.000000
100		25	859,999,982	0.000002
100		30	859,999,980	0.000003
100		40	859,999,980	0.000003
100		50	859,999,976	0.000003
100		60	859,999,972	0.000003
85	93.5	20	859,999,978	0.000003
115	126.5	20	859,999,988	0.000002
EndPoint	85.0	20	859,999,976	0.000003



8.3 Test Results

900MHz Uplink

Operating Frequency :	899,000,000	
Reference Voltage :	110.00	VAC
Deviation Limit :	0.00015	

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	899,000,002	0.000000
100		-30	898,999,973	0.000003
100		-20	898,999,977	0.000003
100		-10	898,999,979	0.000003
100		0	898,999,981	0.000002
100		10	898,999,982	0.000002
100		20	899,000,002	0.000000
100		25	898,999,976	0.000003
100		30	898,999,982	0.000002
100		40	898,999,980	0.000002
100		50	898,999,974	0.000003
100		60	898,999,978	0.000003
85	93.5	20	898,999,981	0.000002
115	126.5	20	898,999,980	0.000002
EndPoint	85.0	20	898,999,976	0.000003



900MHz Downlink

Operating Frequency :	938,000,000	
Reference Voltage :	110.00	VAC
Deviation Limit :	0.00015	

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	938,000,003	0.000000
100		-30	937,999,975	0.000003
100		-20	937,999,981	0.000002
100		-10	937,999,980	0.000002
100		0	937,999,977	0.000003
100		10	937,999,975	0.000003
100		20	938,000,003	0.000000
100		25	937,999,972	0.000003
100		30	937,999,975	0.000003
100		40	937,999,979	0.000003
100		50	937,999,982	0.000002
100		60	937,999,982	0.000002
85	93.5	20	937,999,978	0.000003
115	126.5	20	937,999,981	0.000002
EndPoint	85.0	20	937,999,977	0.000003