



FCC TEST REPORT

Product Name	PCS Repeater(CDMA)
Model Name	RSP-APA-002
Applicant	R-TRON, Inc.
FCC ID	STESP-APA-002

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	ESTR0604-004			
Applicant	Company Name	R-TRON, Inc.		
	Address	Jisan IT Venture Bldg., 2/3F, 1004-9/10, Doksan-Dong, Gumcheon-Gu, Seoul, Korea		
Product	Product Name	PCS Repeater(CDMA)		
	Model No.	RSP-APA-002	Manufacturer	R-TRON, Inc.
	Serial No.	NONE	Country of origin	KOREA
Other	Issued Date	2006-04-06	Tested Date	2005-02-13 ~ 2006-04-06
	Test Result			
Pass				
Standard	FCC PART 24 Subpart E			
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.				
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1. General Information

1.1 EUT Description

FCC ID	STESP-APA-002
Product Name	PCS Repeater(CDMA)
Model Name	RSP-APA-002
Frequency	Uplink :1851.25 ~ 1863.75MHz
	Downlink :1931.25 ~ 1943.75MHz
Channel	Uplink&Downlink(25/150/275)
Modulation Type	CDMA
Power Rating	110VAC(85 ~ 145VAC)



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 Industry
Canada Canada



3. Summary of Test Results

Test Item	Standard	Result
RF Output Power	Part 24	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
Spectrum Analyzer	Agilent	E4407B
Signal Generator	HP	E4432B
Attenuator	Bird Electronic Corp.	100-SA-MFN-30

4.3.1 Test Results (Uplink)

	Ch No.	Freq (MHz)	Power Output (dBm)
Low	25	1851.25	22.98
Mid.	150	1857.50	23.01
High	275	1863.75	23.01

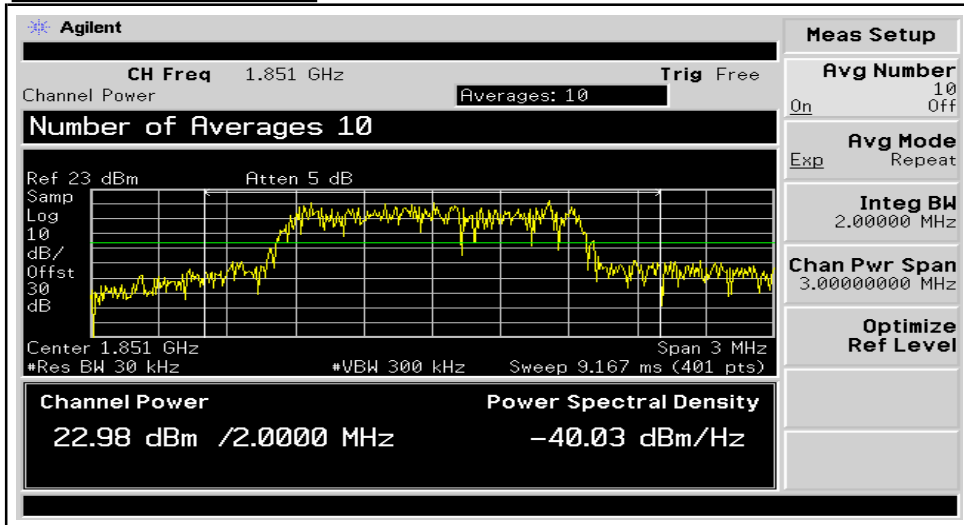
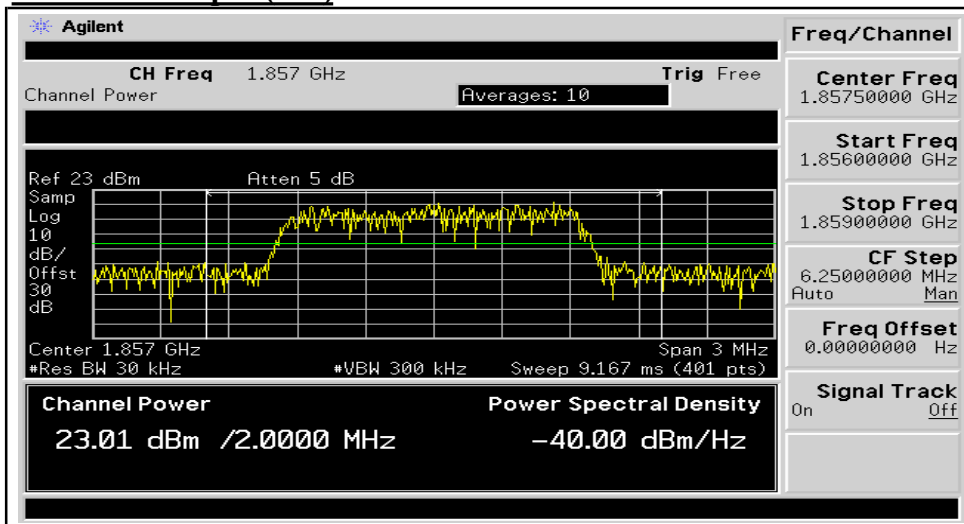
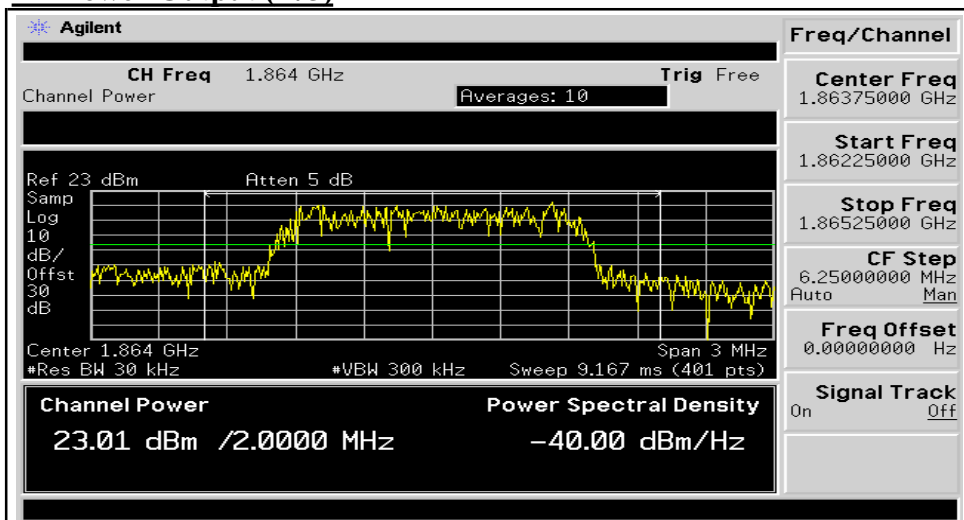


4.3.2 Test Results (Downlink)

	Ch No.	Freq (MHz)	Power Output (dBm)
Low	25	1931.25	33.98
Mid	150	1937.50	33.94
High	275	1943.75	34.04



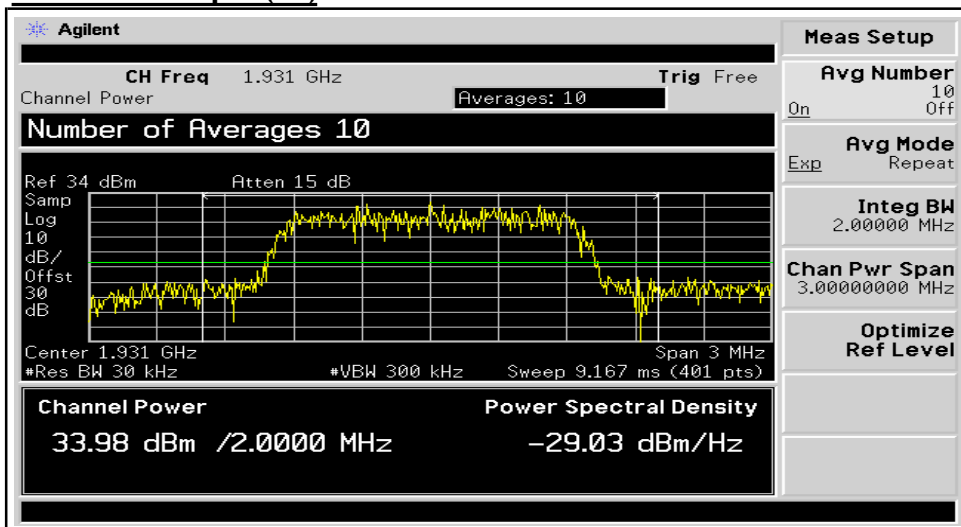
4.4 Test Plot

UplinkRF Power Output (25)RF Power Output (150)RF Power Output (275)

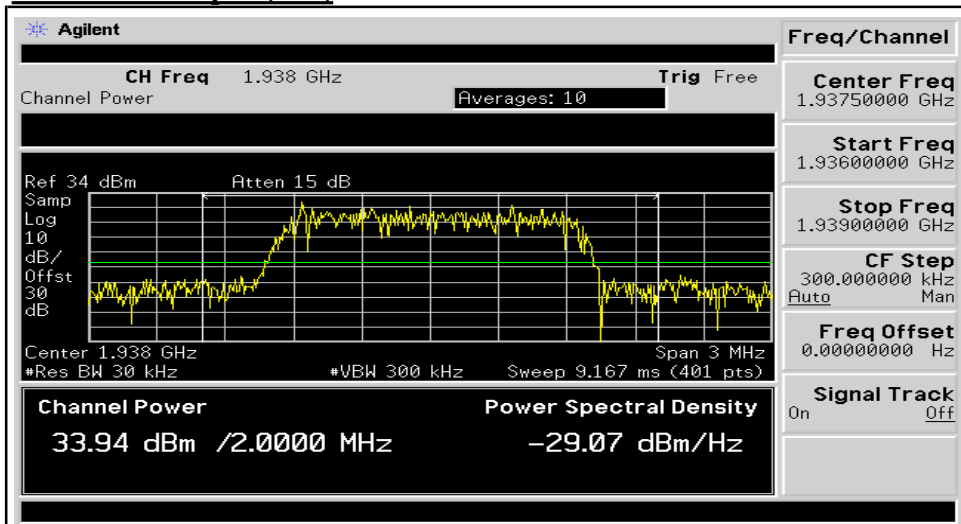


Downlink

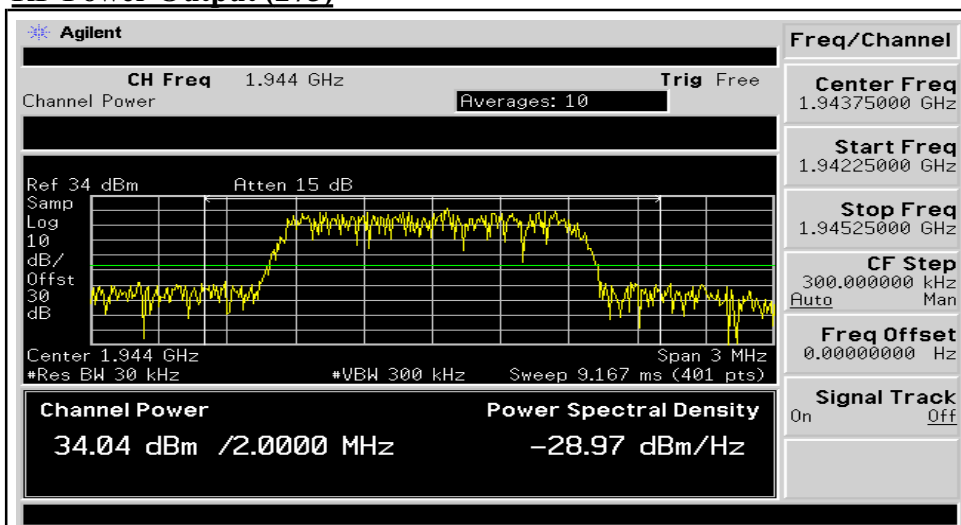
RF Power Output (25)



RF Power Output (150)



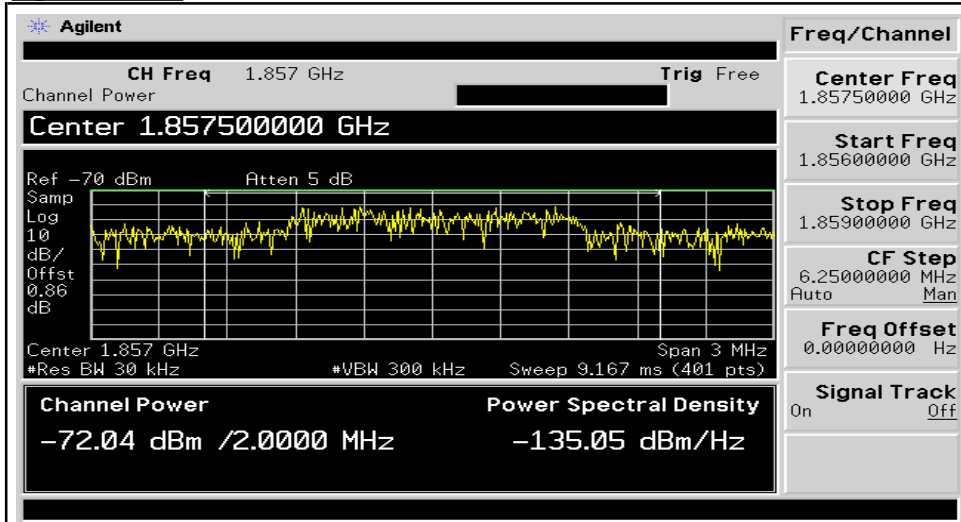
RF Power Output (275)



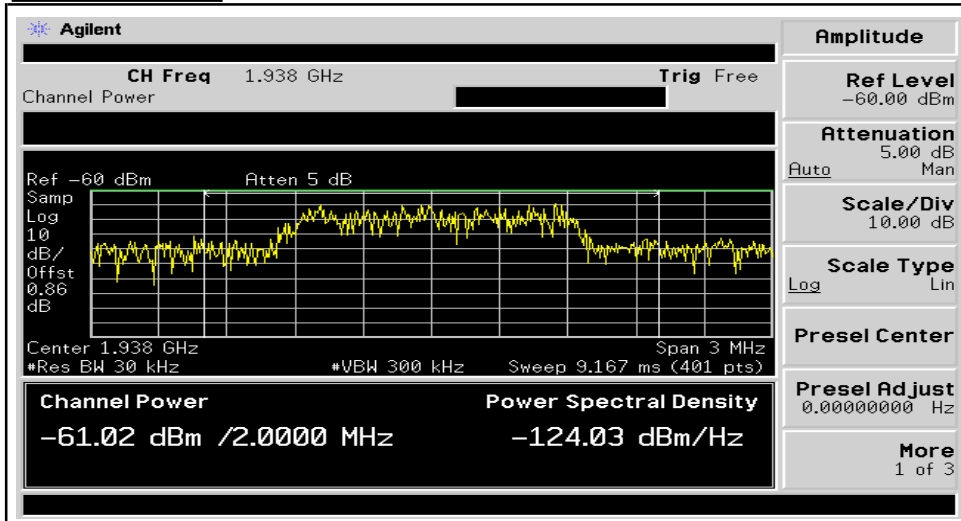


Input Signal Output Power

Uplink (150)



Downlink (150)





5. Occupied Bandwidth

5.1 Test Procedure

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth.

The VBW is set to 3 times the RBW. The sweep time is coupled.

5.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E4407B
Signal Generator	HP	E4432B
Attenuator	Bird Electronic Corp.	100-SA-MFN-30

5.3 Test Results

(Uplink)

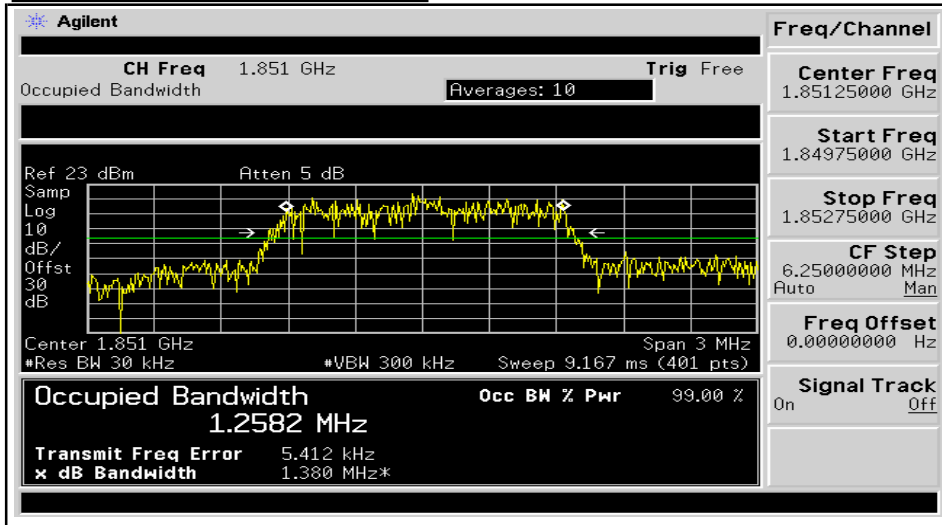
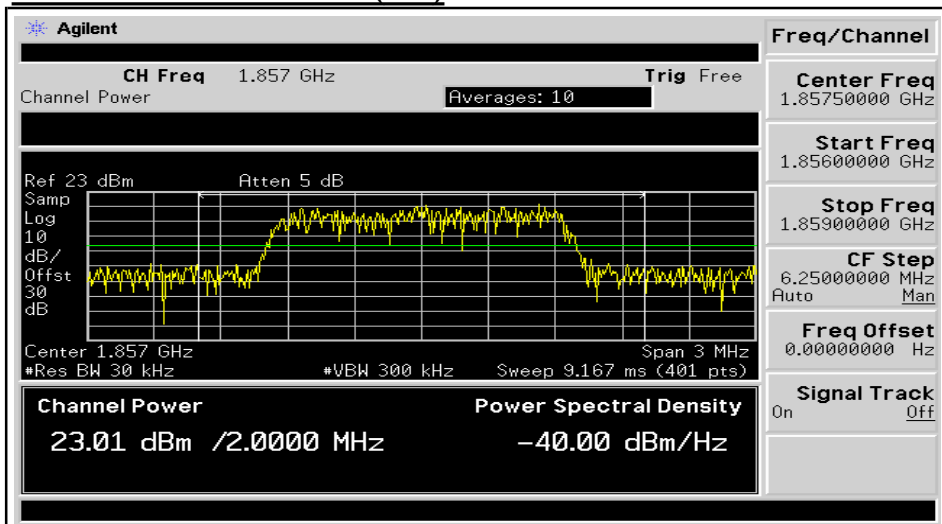
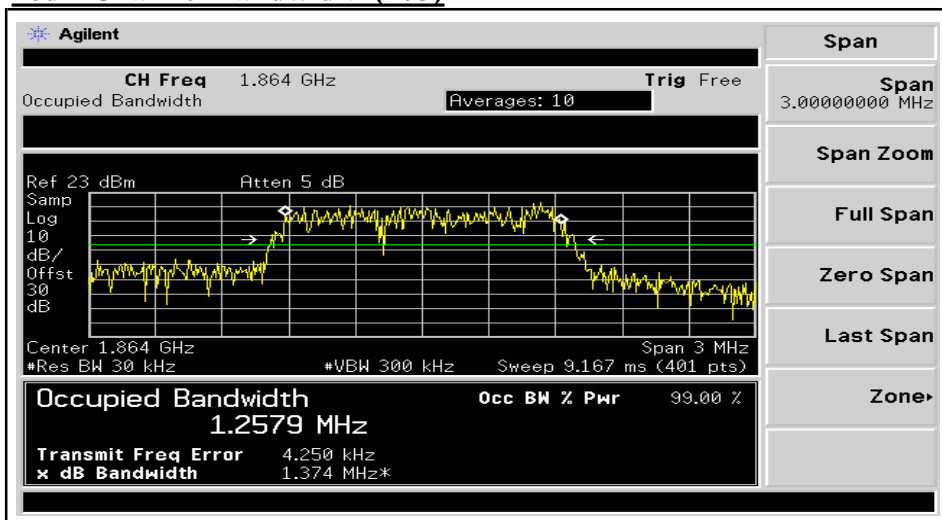
Channel	Frequency(MHz)	26dB Bandwidth(MHz)
25	1851.25	1.38
150	1857.50	1.39
275	1863.75	1.37

(Downlink)

Channel	Frequency(MHz)	26dB Bandwidth(MHz)
25	1931.25	1.38
150	1937.50	1.39
275	1943.75	1.38



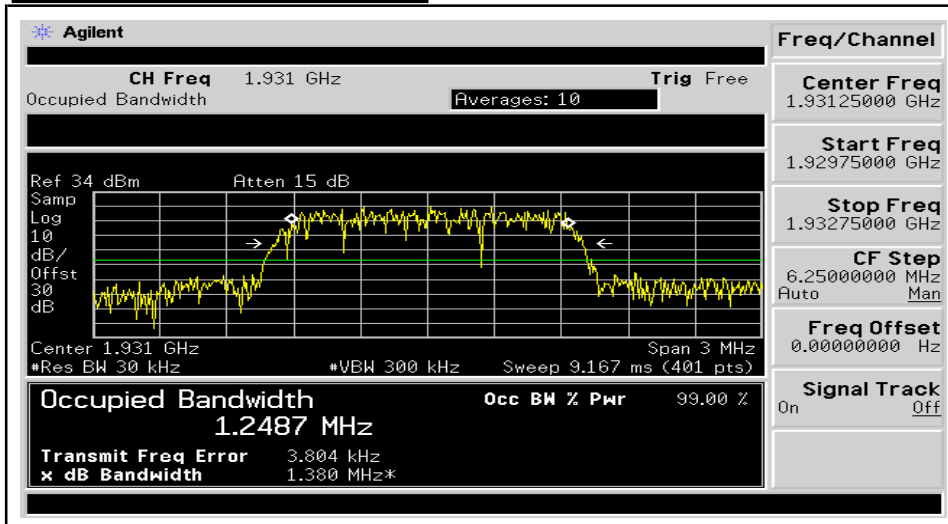
5.4 Test Plot

Uplink26dB Channel Bandwidth(25)26dB Channel Bandwidth(150)26dB Channel Bandwidth(275)

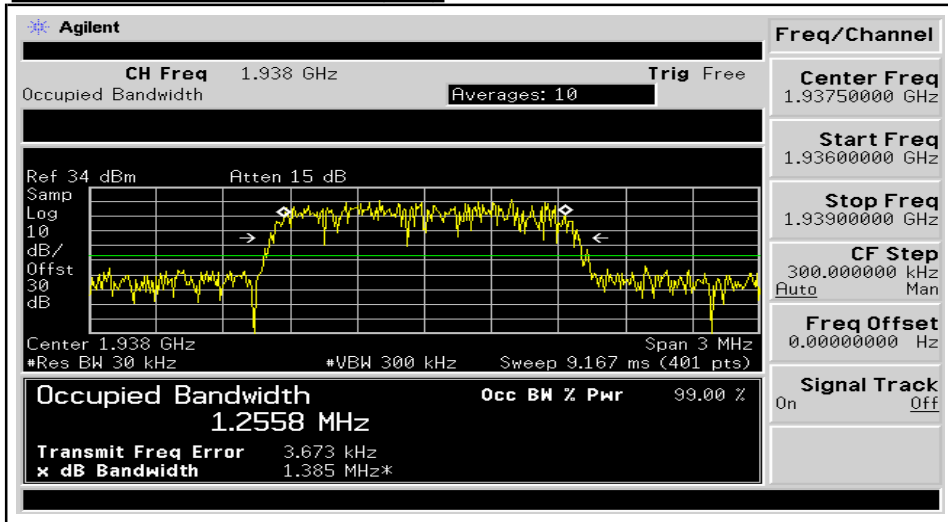


Downlink

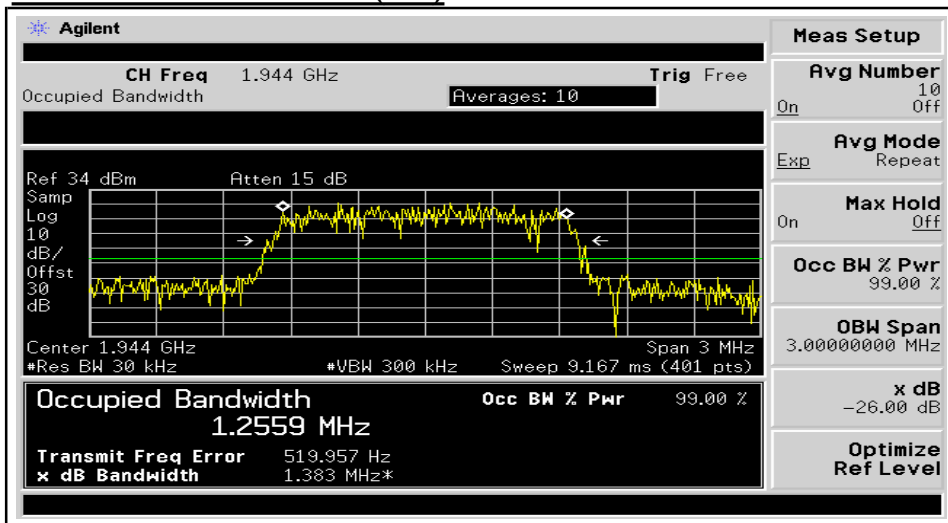
26dB Channel Bandwidth(25)



26dB Channel Bandwidth(150)



26dB Channel Bandwidth(275)





6. Spurious and Harmonic Emission at Antenna Terminal

6.1 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10GHz. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm, limit, in the 1MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 10xfo of the fundamental carrier for all frequency block. A display line was placed at -13dBm to show compliance for spurious, and harmonics.

6.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E4407B
Signal Generator	HP	E4432B
Attenuator	Bird Electronic Corp.	100-SA-MFN-30

6.3 Test Results (Uplink)

CDMA(Spurious Emission: Band Edge)

Channel	Frequency	Result	Limit	Margin
25	1851.25	-38.40	-13.00	25.40
275	1863.75	-39.42	-13.00	26.42

CDMA (Spurious Emission: Out of Band)

Channel	Frequency	Result	Limit	Margin
25	1851.25	-33.12	-13.00	20.12
150	1857.50	-33.52	-13.00	20.52
275	1863.75	-33.03	-13.00	20.03



6.4 Test Results (Downlink)

CDMA(Spurious Emission: Band Edge)

Channel	Frequency	Result	Limit	Margin
25	1931.25	-29.54	-13.00	16.54
275	1943.75	-31.18	-13.00	18.18

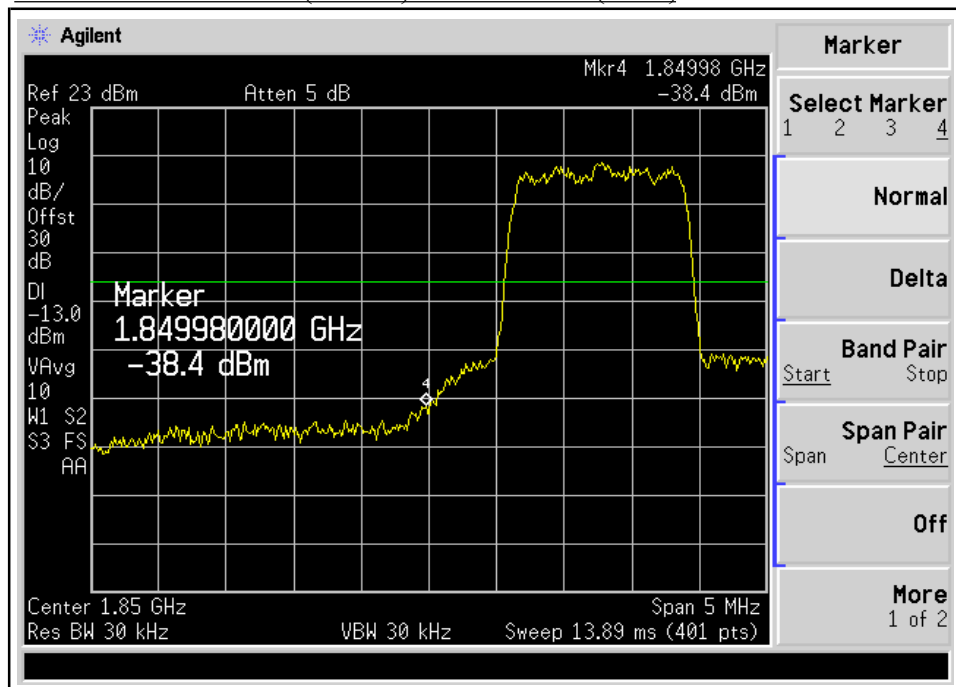
CDMA (Spurious Emission: Out of Band)

Channel	Frequency	Result	Limit	Margin
25	1931.25	-21.18	-13.00	8.18
150	1937.50	-21.54	-13.00	8.54
275	1943.75	-21.37	-13.00	8.37

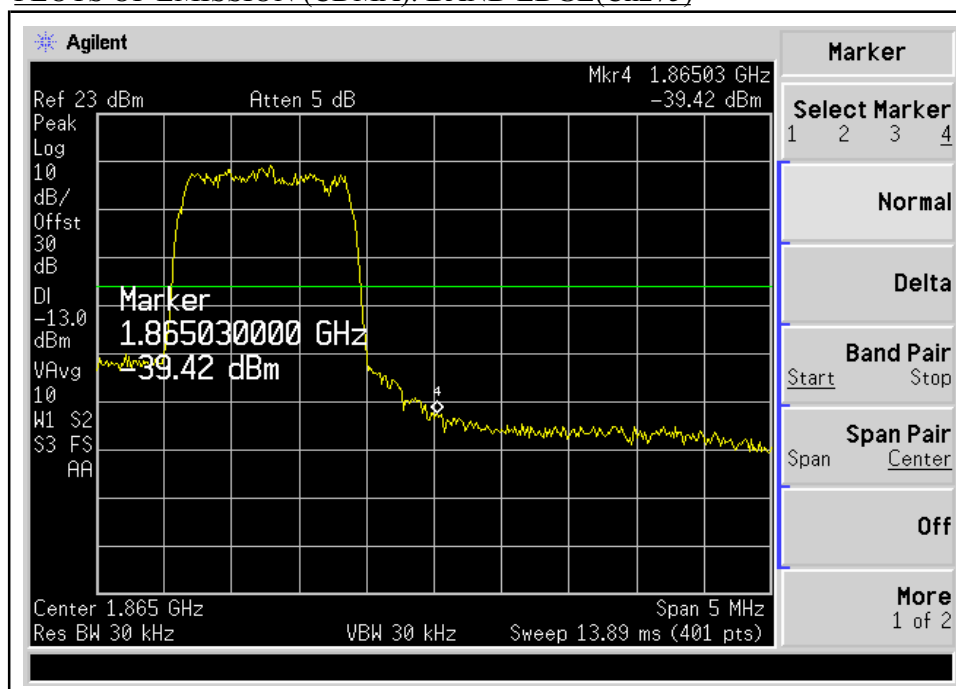
6.5 Test Plot

Uplink

PLOTS OF EMISSION (CDMA): BAND EDGE(Ch25)



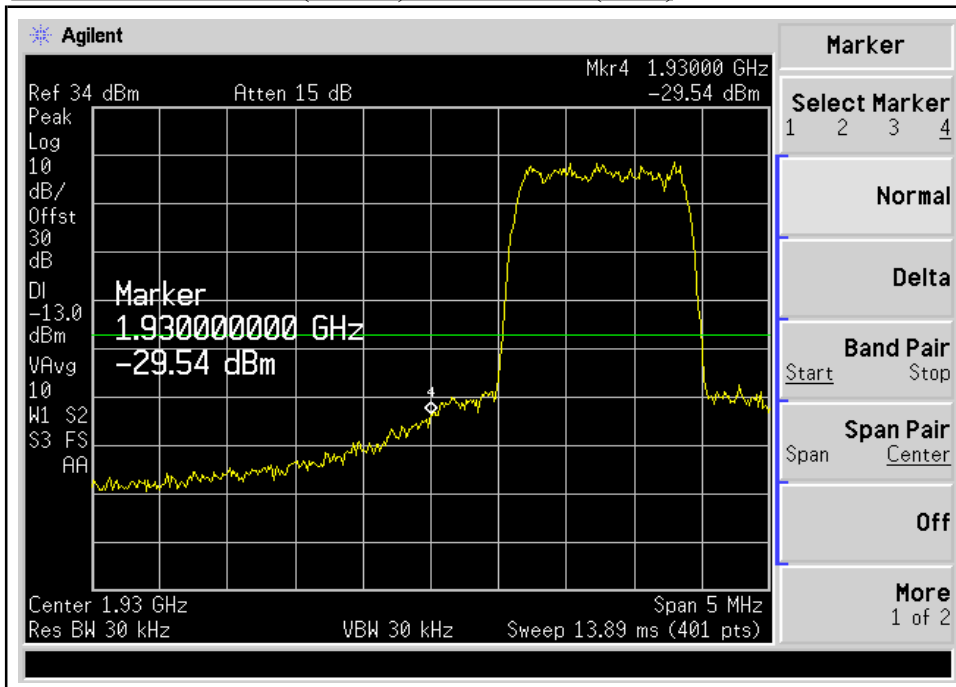
PLOTS OF EMISSION (CDMA): BAND EDGE(Ch275)



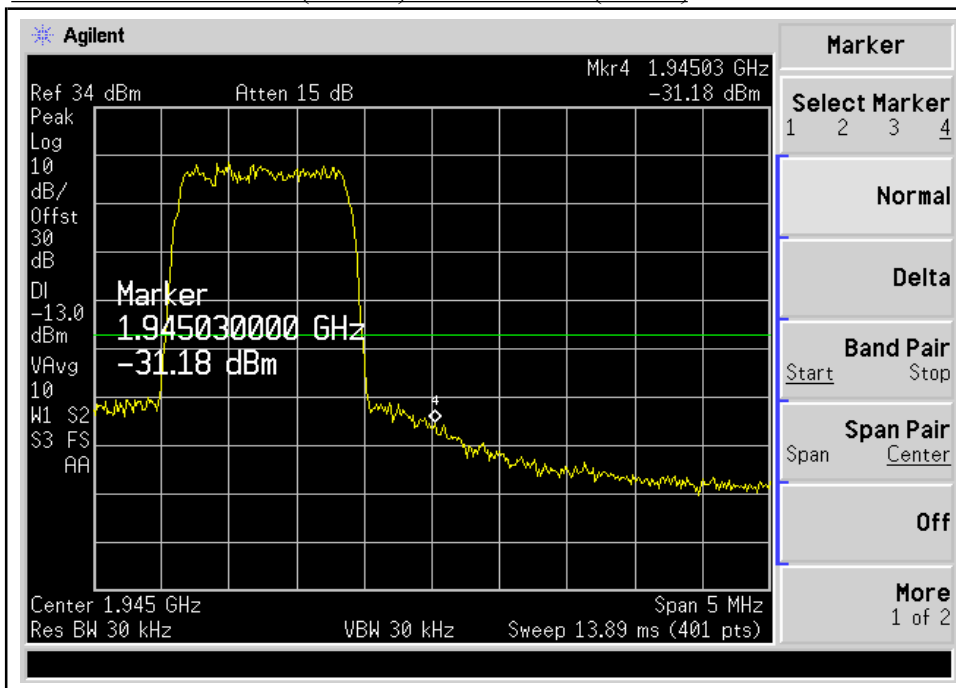


Downlink

PLOTS OF EMISSION (CDMA): BAND EDGE(Ch25)



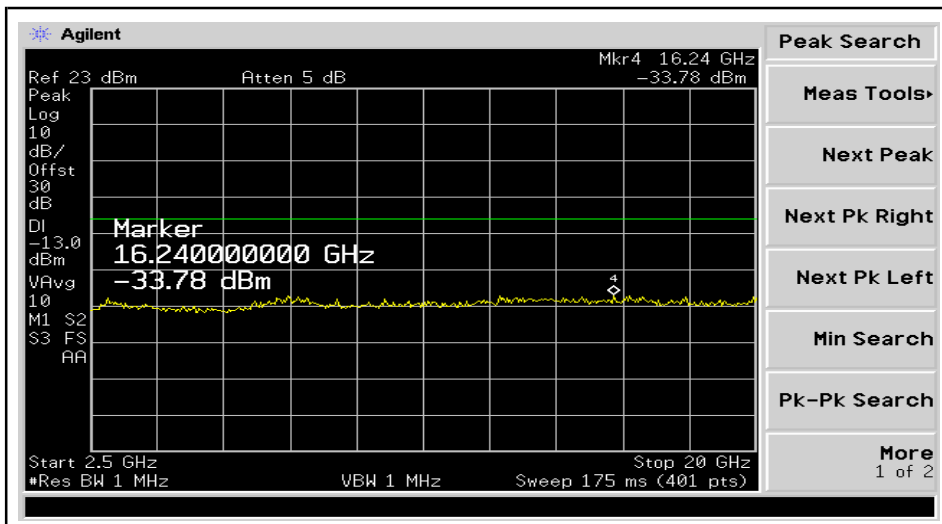
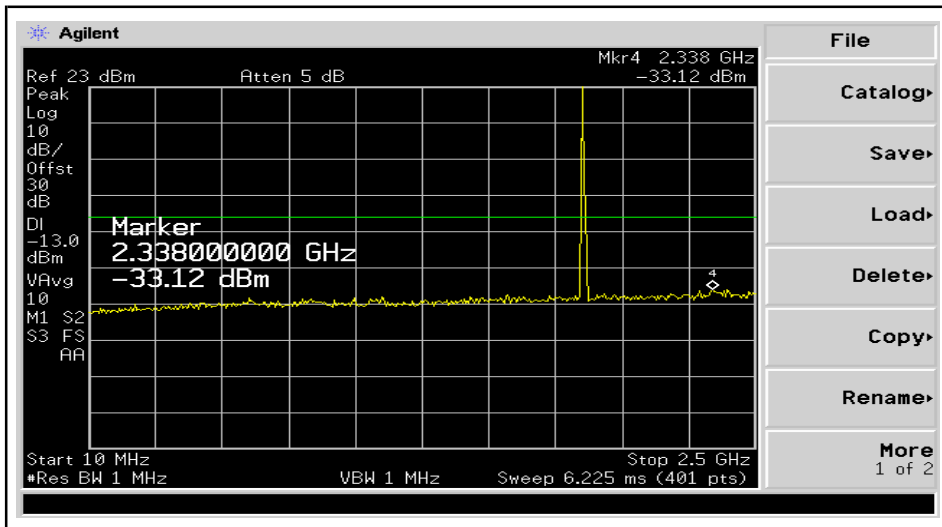
PLOTS OF EMISSION (CDMA): BAND EDGE(Ch275)



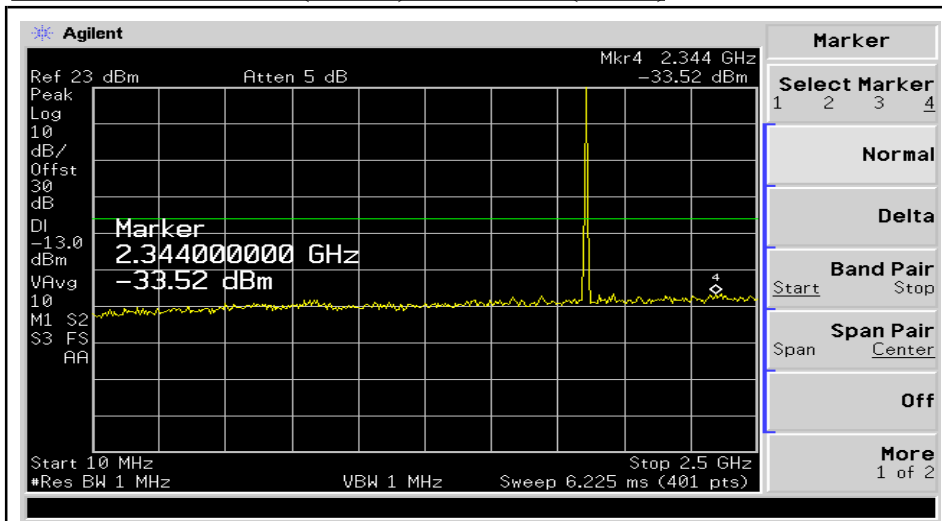


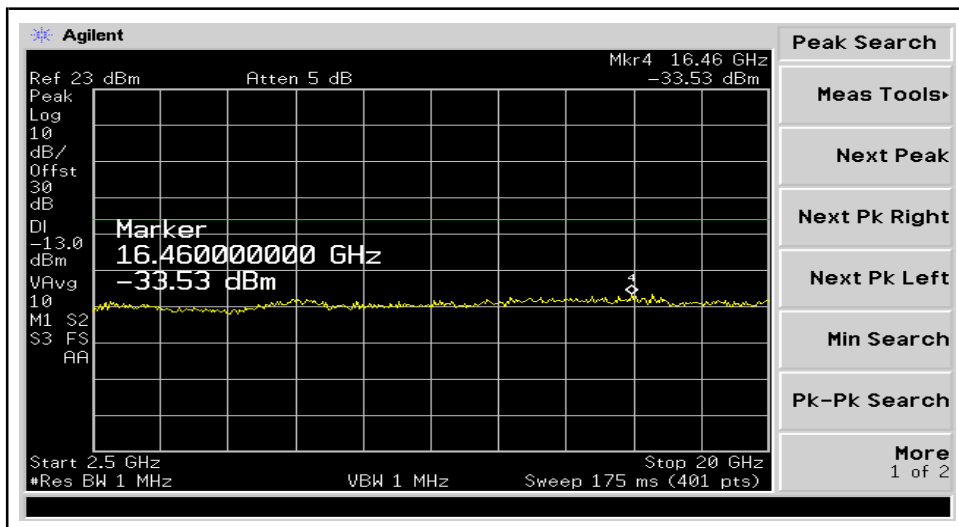
Uplink

PLOTS OF EMISSION (CDMA): Out of Band(Ch25)

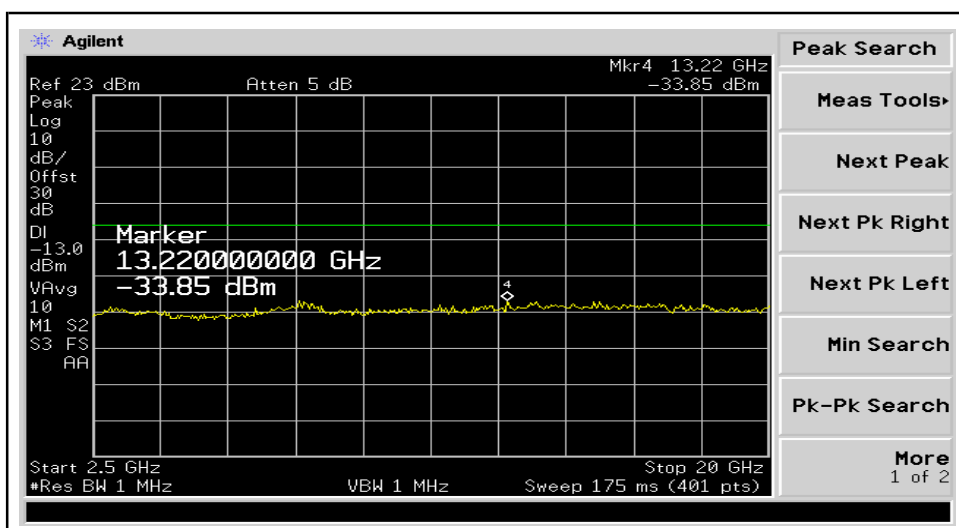
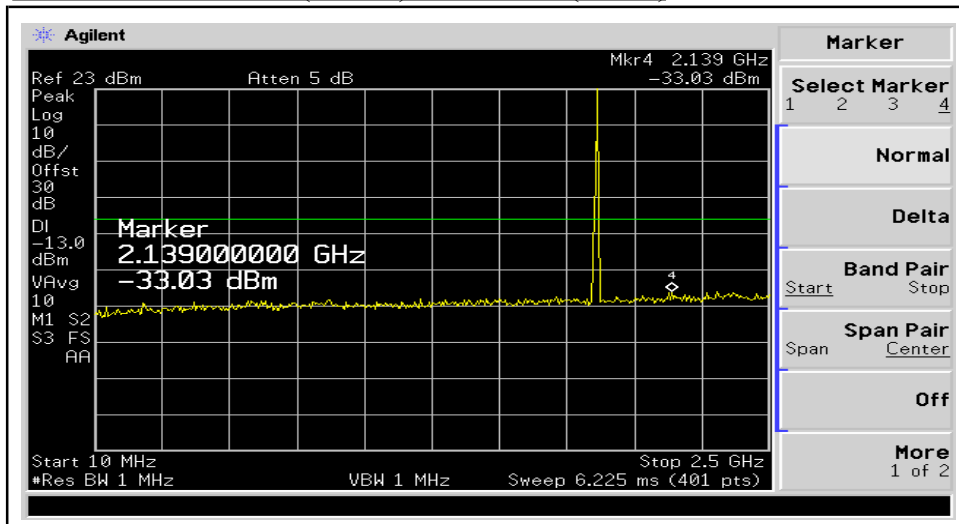


PLOTS OF EMISSION (CDMA): Out of Band(Ch150)





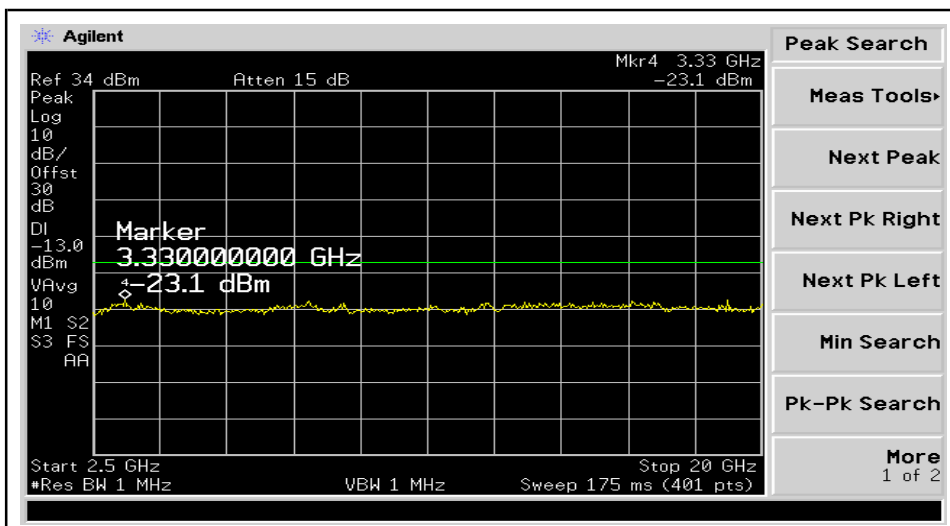
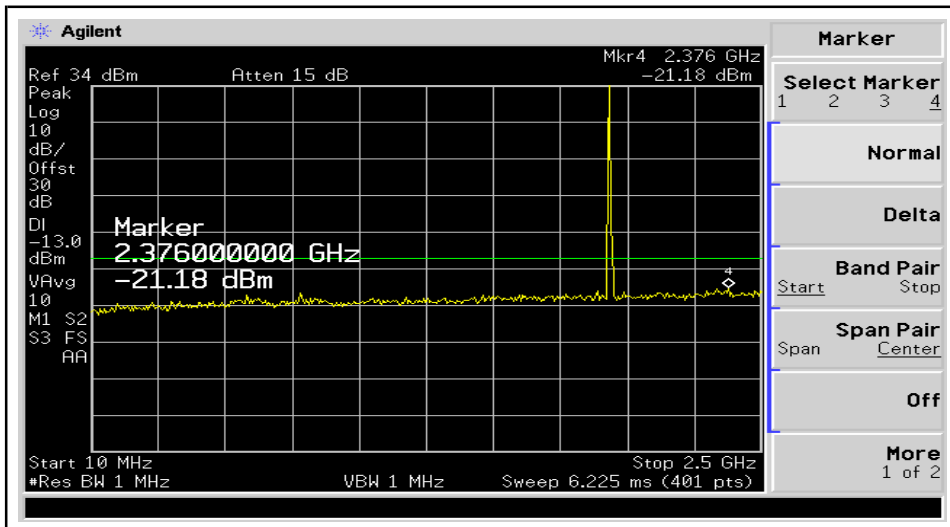
PLOTS OF EMISSION (CDMA): Out of Band(Ch275)



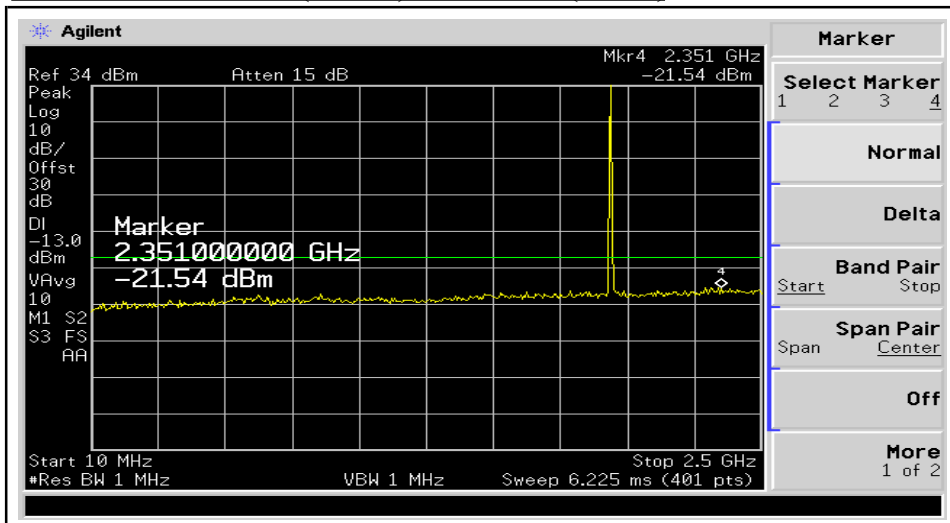


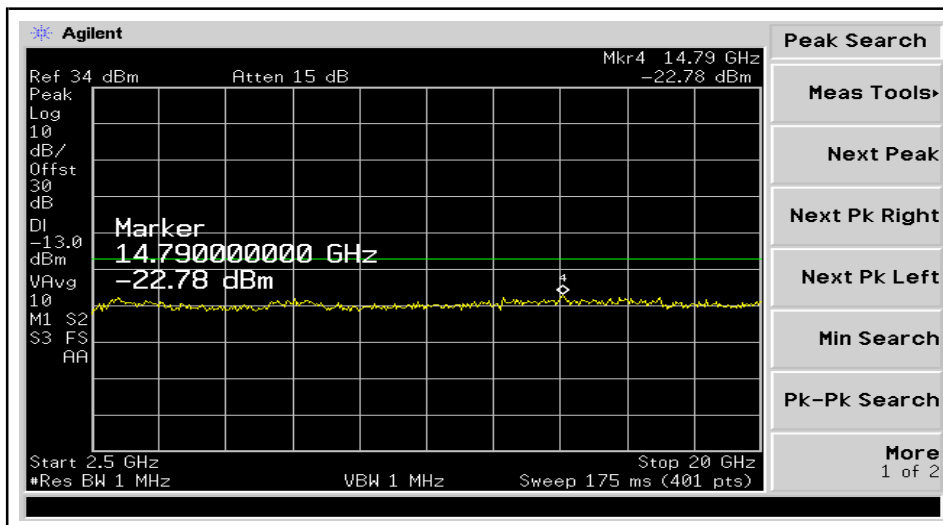
Downlink

PLOTS OF EMISSION (CDMA): Out of Band(Ch25)

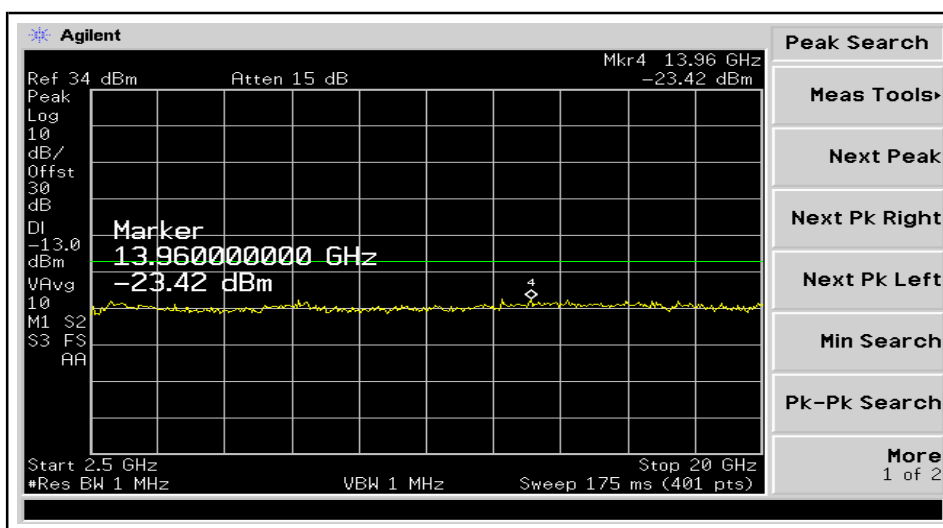
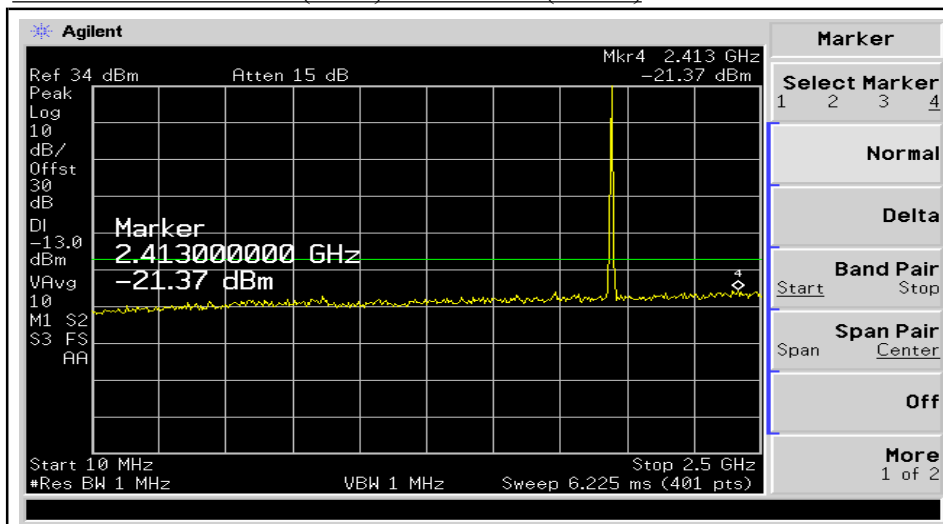


PLOTS OF EMISSION (CDMA): Out of Band(Ch150)





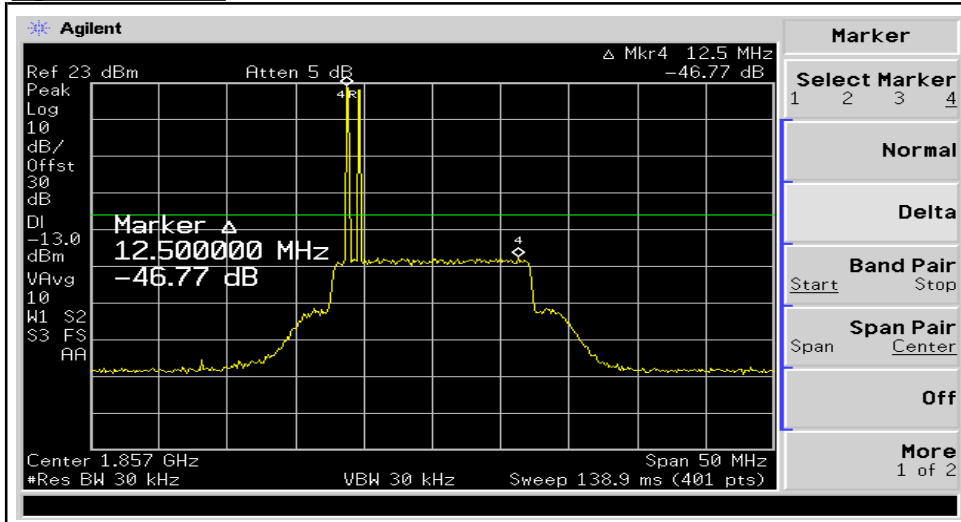
PLOTS OF EMISSION (GSM): Out of Band(Ch275)



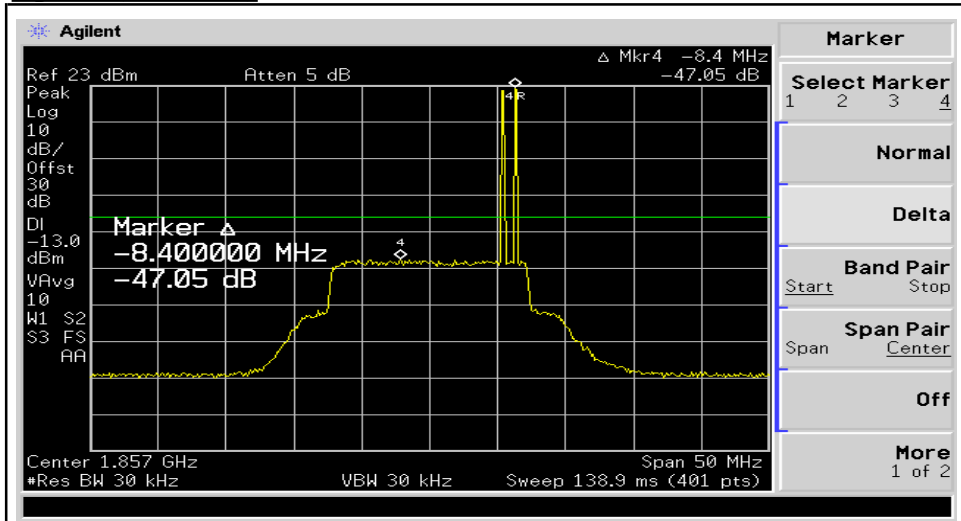


Inter-modulation Signal

Uplink (25&50)

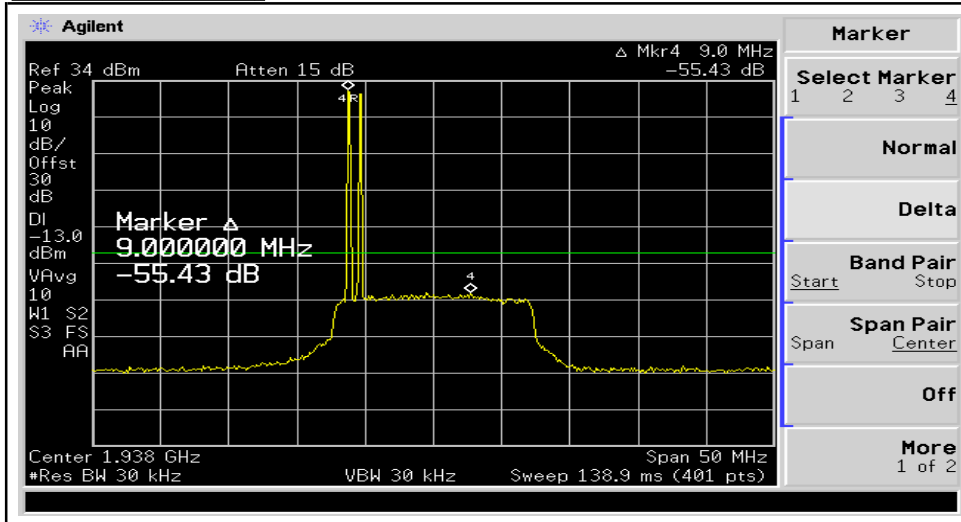


Uplink (250&275)

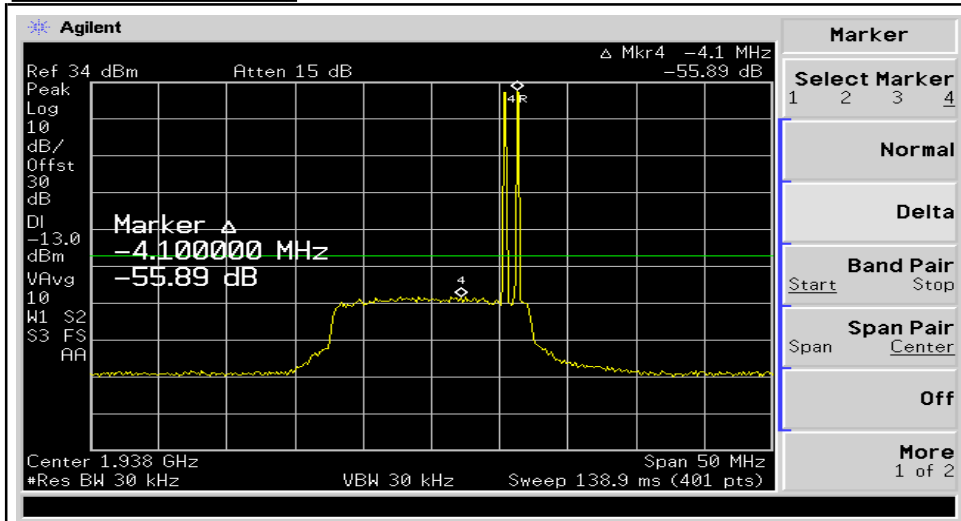




Downlink (25&50)



Downlink (250&275)





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
Spectrum Analyzer	Agilent	E4407B
Signal Generator	HP	83620B
Pre Amplifier	HP	8449B
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9120 D



7.3 Test Results

Uplink

CDMA(Ch 25)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		EIRP(dBm)		Limit(dBm)	Polarity
		AG(dBi)	CL(dB)	SG Reading	Result		
3702.50	58.83	12.60	8.33	-44.94	-40.67	-13.00	V

CDMA(Ch 150)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		EIRP(dBm)		Limit(dBm)	Polarity
		AG(dBi)	CL(dB)	SG Reading	Result		
3715.00	57.50	12.60	8.33	-44.77	-40.50	-13.00	V

CDMA(Ch 275)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		EIRP(dBm)		Limit(dBm)	Polarity
		AG(dBi)	CL(dB)	SG Reading	Result		
3727.50	57.83	12.60	8.33	-45.77	-41.50	-13.00	V

* The TX signal isn't detected from 2nd harmonics.



Downlink

CDMA(Ch 25)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
3862.50	65.33	12.60	8.33	-36.77	-32.50	-13.00	V

CDMA(Ch 150)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
3875.00	65.67	12.60	8.33	-36.47	-32.20	-13.00	V

CDMA(Ch 275)

Frequency (MHz)	Receiver Reading(dBuV)	Correction Factor(dB)		ERP(dBm)		Limit(dBm)	Polarity
		AG(dBd)	CL(dB)	SG Reading	Result		
3887.50	65.00	12.60	8.33	-37.07	-32.80	-13.00	V

* The TX signal isn't detected from 2nd harmonics.



8. Frequency stability

8.1 Test Procedure

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -30 °C to +60 °C using an environmental chamber.

b) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

※ The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ± 1 ppm of the center frequency.

8.2 Test Equipments

The following test equipments are used during tests

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E4407B
DC Power Supply	INTERACT	AK-5007
Tem/Hum Chamber	Myung Technology	SM-150-2
Signal Generator	HP	E4432B



8.3 Test Results

Uplink

Operating Frequency : 1,857,500,000
Channel : 150
Reference Voltage : 110.00 VAC
Deviation Limit : 0.00010

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	1,857,500,002	0.000000
100		-30	1,857,499,984	0.000001
100		-20	1,857,499,988	0.000001
100		-10	1,857,499,988	0.000001
100		0	1,857,499,982	0.000001
100		10	1,857,499,980	0.000001
100		20	1,857,500,002	0.000000
100		25	1,857,499,990	0.000001
100		30	1,857,499,986	0.000001
100		40	1,857,499,982	0.000001
100		50	1,857,499,980	0.000001
100		60	1,857,499,980	0.000001
85	93.5	20	1,857,499,982	0.000001
115	126.5	20	1,857,499,984	0.000001
EndPoint	85.0	20	1,857,499,980	0.000001



Downlink

Operting Frequency : 1,937,500,000
Channel : 150
Reference Voltage : 110.00 VAC
Deviatin Limit : 0.00010

Voltage (%)	Power (VAC)	Temperature (°C)	Frequency (Hz)	Deviation
100	110.0	+20 °C (Ref)	1,937,500,003	0.000000
100		-30	1,937,499,988	0.000001
100		-20	1,937,499,984	0.000001
100		-10	1,937,499,987	0.000001
100		0	1,937,499,982	0.000001
100		10	1,937,499,984	0.000001
100		20	1,937,500,003	0.000000
100		25	1,937,499,990	0.000001
100		30	1,937,499,982	0.000001
100		40	1,937,499,985	0.000001
100		50	1,937,499,985	0.000001
100		60	1,937,499,981	0.000001
85	93.5	20	1,937,499,980	0.000001
115	126.5	20	1,937,499,983	0.000001
EndPoint	85.0	20	1,937,499,985	0.000001