

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR PCS LICENSED TRANSMITTER

Test Report No. : E091R-001

AGR No. : A08DA-126

Applicant : Inkel Corp.

Address : 177 Cheongcheon-dong, Bupyeong-gu, Incheon, 403-853, Korea

Manufacturer : Inkel Corp.

Address : 3-8 Cheongcheon-dong, Bupyeong-gu, Incheon, 403-853, Korea

Type of Equipment : Fiber Fed Repeater

FCC ID. : P87JF46C1900CFN01

Model Name : JF-46CP

Serial number : N/A

Total page of Report : 95 pages (including this page)

Date of Incoming : December 22, 2008

Date of issue : January 05, 2009

SUMMARY

The equipment complies with the regulation; **FCC Part 24 Subpart E.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

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ONETECH Corp.

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CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	5
2. TEST SUMMARY.....	6
2.1 TEST ITEMS AND RESULTS.....	6
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	6
2.3 RELATED SUBMITTAL(S)/ GRANT(S)	6
2.4 PURPOSE OF THE TEST	6
2.5 TEST METHODOLOGY	6
2.6 TEST FACILITY	6
3. GENERAL INFORMATION.....	7
3.1 PRODUCT DESCRIPTION.....	7
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.	7
3.3 PERIPHERAL EQUIPMENT.....	8
3.4 MODE OF OPERATION DURING THE TEST.....	8
3.5 MODULATION CHARACTERISTICS.....	8
4. EUT MODIFICATIONS	8
5. RF POWER OUTPUT AT ANTENNA TERMINAL	9
5.1 OPERATING ENVIRONMENT	9
5.2 TEST SET-UP	9
5.3 TEST EQUIPMENT USED	9
5.4 TEST DATA.....	10
5.4.1 Operating Condition: Max. Power Mode.....	10
5.4.2 Operating Condition: Min. Power Mode	10
6. OCCUPIED BANDWIDTH	11
6.1 OPERATING ENVIRONMENT	11
6.2 TEST SET-UP	11
6.3 TEST EQUIPMENT USED	11
6.4 TEST DATA.....	12
6.4.1 Operating Condition: Max. Power Mode.....	12
6.4.2 Operating Condition: Min. Power Mode	25
7. SPURIOUS EMISSION AT ANTENNA TERMINAL	38
7.1 OPERATING ENVIRONMENT	38

7.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	38
7.3 TEST EQUIPMENT USED	38
7.4 TEST DATA.....	39
7.4.1 Operating Condition: Max. Power Mode.....	39
7.4.2 Operating Condition: Min. Power Mode	46
8. SPURIOUS EMISSION AT ANTENNA TERMINAL AT BLOCK EDGES $\pm$ 1 MHZ.....	53
8.1 OPERATING ENVIRONMENT	53
8.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	53
8.3 TEST EQUIPMENT USED	53
8.4 TEST DATA.....	54
8.4.1 Operating Condition: Max. Power Mode.....	54
8.4.2 Operating Condition: Min. Power Mode	57
9. INTERMODULATION TEST	60
9.1 OPERATING ENVIRONMENT	60
9.2 TEST SET-UP	60
9.3 TEST EQUIPMENT USED	60
9.4 TEST DATA.....	60
10. FIELD STRENGTH OF SPURIOUS RADIATION	85
10.1 OPERATING ENVIRONMENT	85
10.2 TEST SET-UP	85
10.3 TEST EQUIPMENT USED	85
10.4 TEST DATA FOR RADIATED EMISSION	86
10.4.1 Operating Condition: Max. Power Mode of IS-95	86
10.4.2 Operating Condition: Max. Power Mode of 1xEVDO	87
10.4.3 Operating Condition: Min. Power Mode of IS-95.....	88
10.4.4 Operating Condition: Min. Power Mode of 1xEVDO.....	89
11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....	90
11.1 OPERATING ENVIRONMENT	90
11.2 TEST SET-UP	90
11.3 TEST EQUIPMENT USED	90
11.4 TEST DATA.....	91
11.4.1 Operating Condition: Max. Power Mode.....	91
11.4.2 Operating Condition: Min. Power Mode	92
12. FREQUENCY STABILITY WITH VOLTAGE VARIATION.....	93

12.1 OPERATING ENVIRONMENT	93
12.2 TEST SET-UP	93
12.3 TEST EQUIPMENT USED	93
12.4 TEST DATA	94
12.4.1 Operating Condition: Max. Power Mode.....	94
12.4.2 Operating Condition: Min. Power Mode	95

1. VERIFICATION OF COMPLIANCE

APPLICANT : Inkel Corp.
ADDRESS : 177 Cheongcheon-dong, Bupyeong-gu, Incheon, 403-853, Korea
CONTACT PERSON : Mr. Yang-Hoon, Lim / Research Engineer
TELEPHONE NO : +82-2-818-8615
FCC ID : P87JF46C1900CFN01
MODEL NAME : JF-46CP
SERIAL NUMBER : N/A
DATE : January 05, 2009

EQUIPMENT CLASS	PCB - PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	Fiber Fed Repeater
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2003, EIA/TAI 603B
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	PART 24 Subpart E
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER(S) OPEN AREA TEST SITE

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1046, 24.232	RF Power Output at Antenna Terminals	Met the Limit / PASS
2.1047	Modulation Characteristics	Met the requirement / PASS
2.1049, 24.238	Occupied Bandwidth, Bandwidth Limitation	Met the Limit / PASS
2.1049	Band Edge	Met the Limit / PASS
2.1051, 24.238 (a)	Spurious Emissions at Antenna Terminals	Met the Limit / PASS
2.1053, 24.238 (a)	Field strength of Spurious Radiation	Met the Limit / PASS
2.1055(a)(1), 24.235	Frequency Stability with Temperature variation	Met the requirement / PASS
2.1055(d), 24.235	Frequency stability with primary voltage variation	Met the requirement / PASS
2.1093	RF Exposure	See Note.

Note: End Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original Grant

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The Electromagnetic compatibility measurement facilities are located on at 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Federal Communications Commission on August 21, 2008 (Registration Number: 340658), accredited by KOLAS (Korea Laboratory Accreditation Scheme, No: 85) and approved by TUV, DNV and KCC (Korea Communications Commission) according to the requirement of ISO 17025.

3. GENERAL INFORMATION

3.1 Product Description

The Inkel Corp., Model JF-46CP (referred to as the EUT in this report) is a Fiber Fed Repeater that provides cell coverage extension and increased call quality in shadow areas. The EUT is a RF signal transport system that provides long range RF coverage where it is impractical to install a Base Transceiver System. The EUT transforms the optic signal from the donor hub unit into RF signal, and then the RF signals are transmitted into antenna. Also the EUT transforms the RF signal into optic signals, and then the optic signals are transmitted to the Donor Hub Unit. The EUT includes Remote Optic Module, control module, LPA, LNA, Cavity BPF, and power supply. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Fiber Fed Repeater
LIST OF EACH OSC. or CRY. FREQ.(FREQ.>=1 MHz)	3.686 4 MHz, 16 MHz, 25 MHz and 14.745 6 MHz
EMISSION DESIGNATOR	1M34F9X
TYPE OF EMISSION CLASS	F9X
OPERATING FREQUENCY	Tx: 1 931.25 MH ~ 1 968.75 MH Rx: 1 851.25 MHz ~ 1 888.75 MHz
RF OUTPUT POWER	46 dBm
CHANNEL SEPARATION	1.25 MHz
DC VOLTAGE & CURRENT INTO FINAL AMPLIFIER	DC 30 V, 23.5 A
NUMBER OF CHANNEL	30 Channels
TEMPERATURE RANGE	-30 °C ~ 55 °C
EXTERNAL CONNECTOR	Optic, DI/UL_0, UL_1, AC_IN, Battery, Fan

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
JF-46CP	Inkel Corp.	P87JF46C1900CFN01	Fiber Fed Repeater (EUT)	-
SMJ100A	Rohde & Schwarz	N/A	Vector Signal Generator	EUT
E4432B	HP	N/A	Signal Generator	EUT
3TNF-1000/2000-N/N	K&L Microwave	N/A	Tunable Band Reject Filter	EUT
HTF-5150-3-NF	N/A	N/A	Resistor	EUT

3.4 Mode of operation during the test

The EUT was received signal form signal generator and then each mode, IS-95 and 1xEVDO was configured for maximum signal gain and bandwidth. The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission. The applicant does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports on the EUT for radiated spurious emission testing. The Output power of the EUT is variable from 33 dBm to 46 dBm, so the measurements are made at low and high power condition.

3.5 Modulation Characteristics

The EUT uses CDMA modulation, so the voice is digitized and coded into a bit stream. Also the EUT does not produce a modulated signal, so the test dose not performed and met the requirement.

4. EUT MODIFICATIONS

-. None

5. RF POWER OUTPUT at ANTENNA TERMINAL

5.1 Operating environment

Temperature : 20.5 °C
Relative humidity : 46.8 %R.H.

5.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer. The software for RF control on the notebook PC was set to transmit maximum signal gain and bandwidth. The test was performed at three frequencies (low, middle, and high channels) using all modulation.

RF output power was measured by channel power measurement function of the spectrum analyzer.



5.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	437B	HP	Power Meter	3125U25121	June 16, 2008
■ -	8481A	HP	Power Sensor	1550A14928	Dec. 04, 2008
■ -	E4432B	HP	Signal Generator	US38440950	June 16, 2008
■ -	SMJ100A	R/S	Vector Signal Generator	100698	June 16, 2008
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ -	3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

5.4 Test data

5.4.1 Operating Condition: Max. Power Mode

-. Test Date : December 23, 2008

-. Test Result : Pass

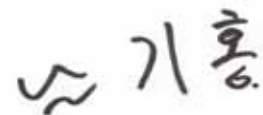
Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
IS-95	Low	1 931.25	-2.00	46.00	39.810 717	100.00
	Middle	1 951.25	-2.05	46.00		
	High	1 968.75	-2.00	46.00		
1xEVDO	Low	1 931.25	-2.10	46.00	39.810 717	
	Middle	1 951.25	-2.07	46.00		
	High	1 968.75	-2.09	46.00		

5.4.2 Operating Condition: Min. Power Mode

-. Test Date : December 23, 2008

-. Test Result : Pass

Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
IS-95	Low	1 931.25	-15.00	33.00	1.995 262	100.00
	Middle	1 951.25	-15.10	33.00		
	High	1 968.75	-15.50	33.00		
1xEVDO	Low	1 931.25	-15.17	33.00	1.995 262	
	Middle	1 951.25	-15.30	33.00		
	High	1 968.75	-15.25	33.00		



Tested by: Ki-Hong, Nam / Project Engineer

6. OCCUPIED BANDWIDTH

6.1 Operating environment

Temperature : 21 °C
Relative humidity : 45.2 %R.H.

6.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer. The software for RF control on the notebook PC was set to transmit maximum signal gain and bandwidth. The test was performed at three frequencies (low, middle, and high channels).

For the testing, the RBW was set to 1 % to 3 % of the -26 dB bandwidth. The VBW is set to 3 times the RBW and sweep time is coupled.



6.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - 8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ - E4432B	HP	Signal Generator	US38440950	June 16, 2008
■ - SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ - FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ - 3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

6.4 Test data

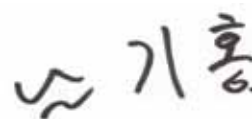
6.4.1 Operating Condition: Max. Power Mode

-. Test Date : December 24, 2008

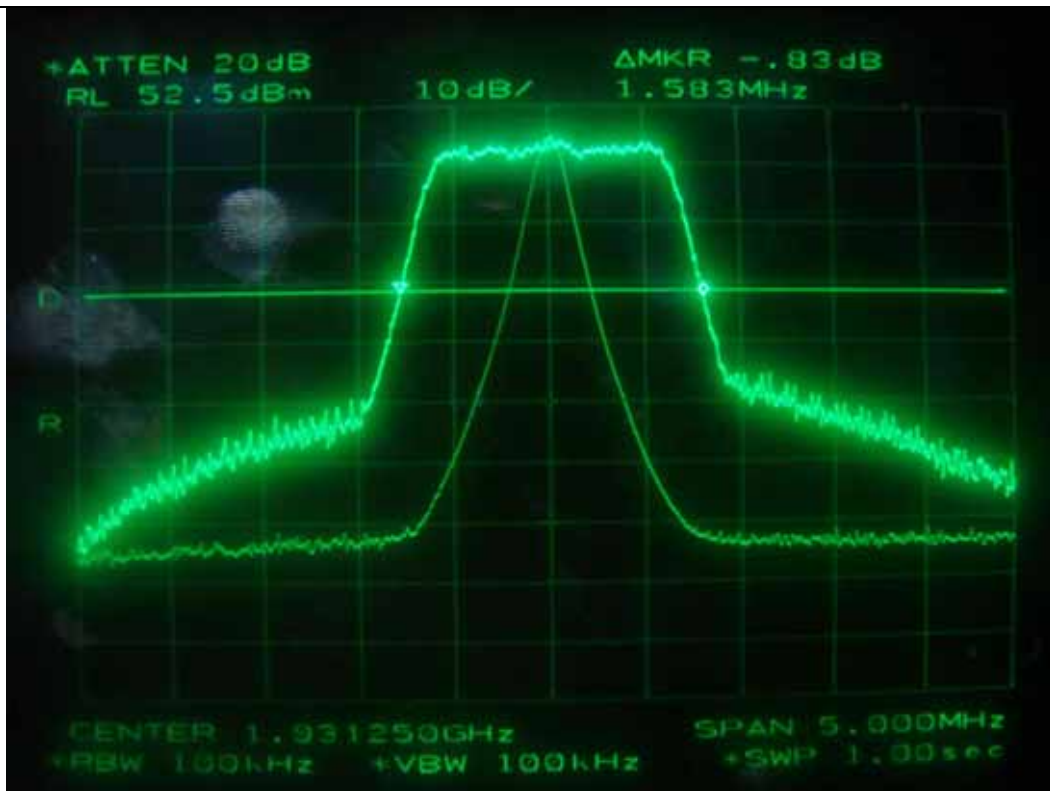
-. Test Result : Pass

Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
IS-95	Low	1 583	1 333
	Middle	1 575	1 333
	High	1 583	1 342
1xEVDO	Low	1 583	1 333
	Middle	1 583	1 342
	High	1 575	1 342

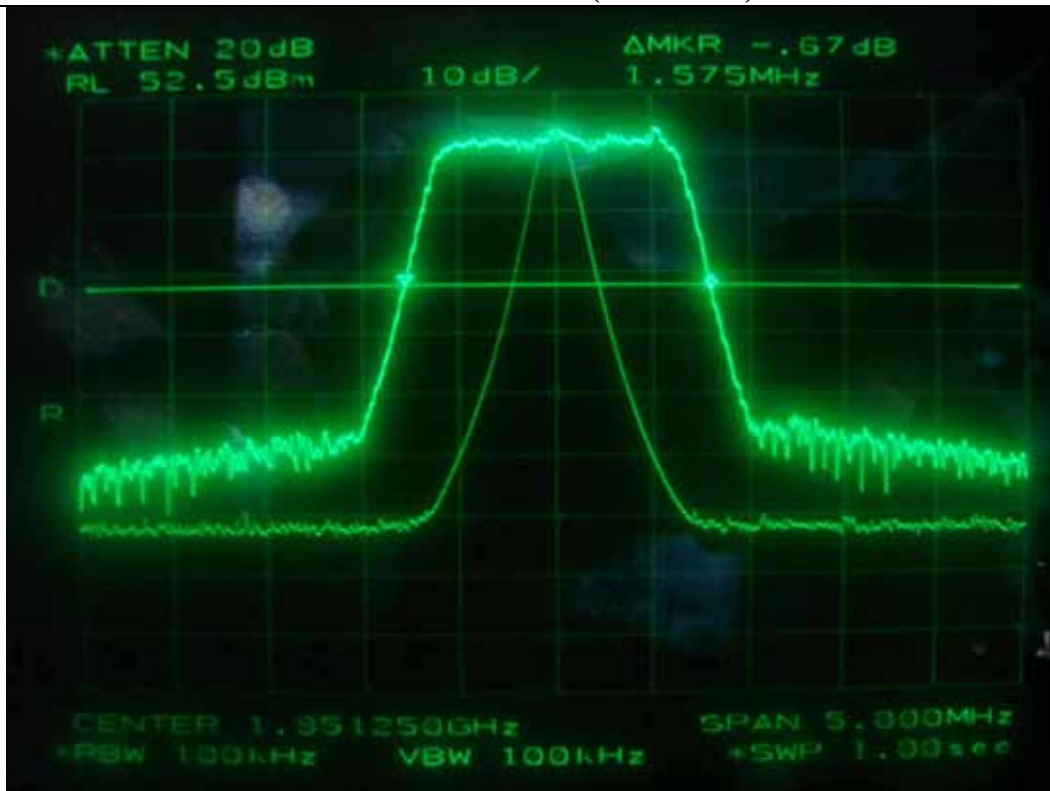
Remark: According to above result, the carrier frequency shall be within the frequency block edges.



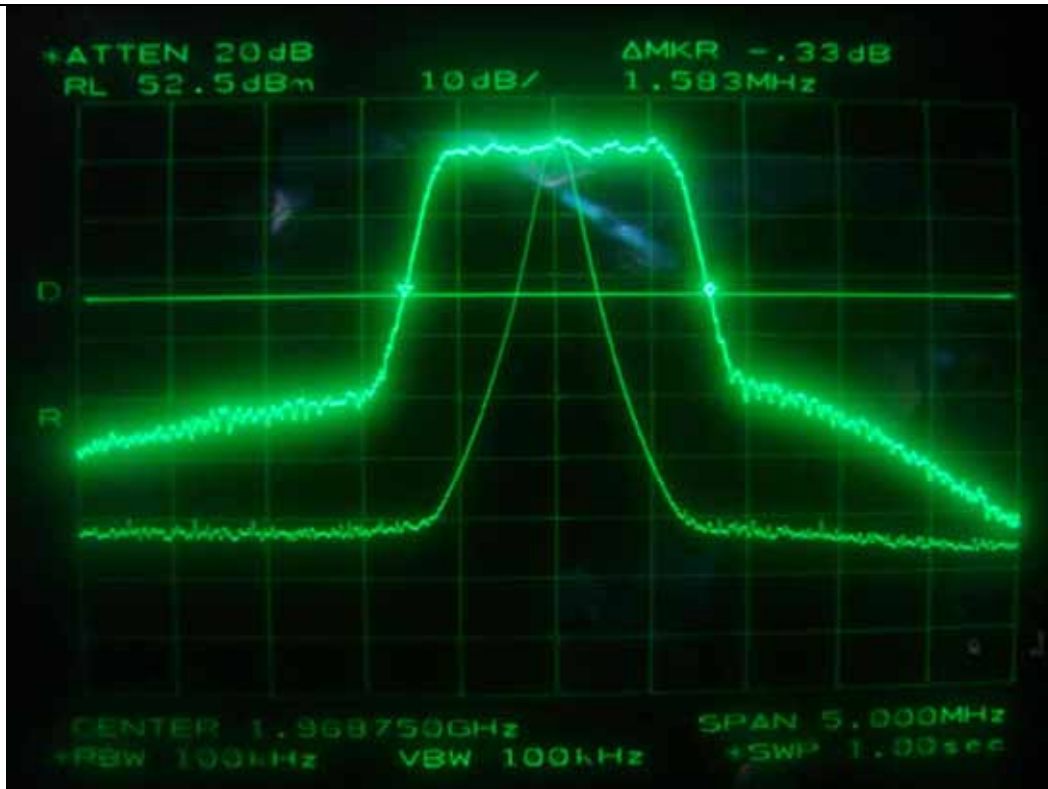
Tested by: Ki-Hong, Nam / Project Engineer



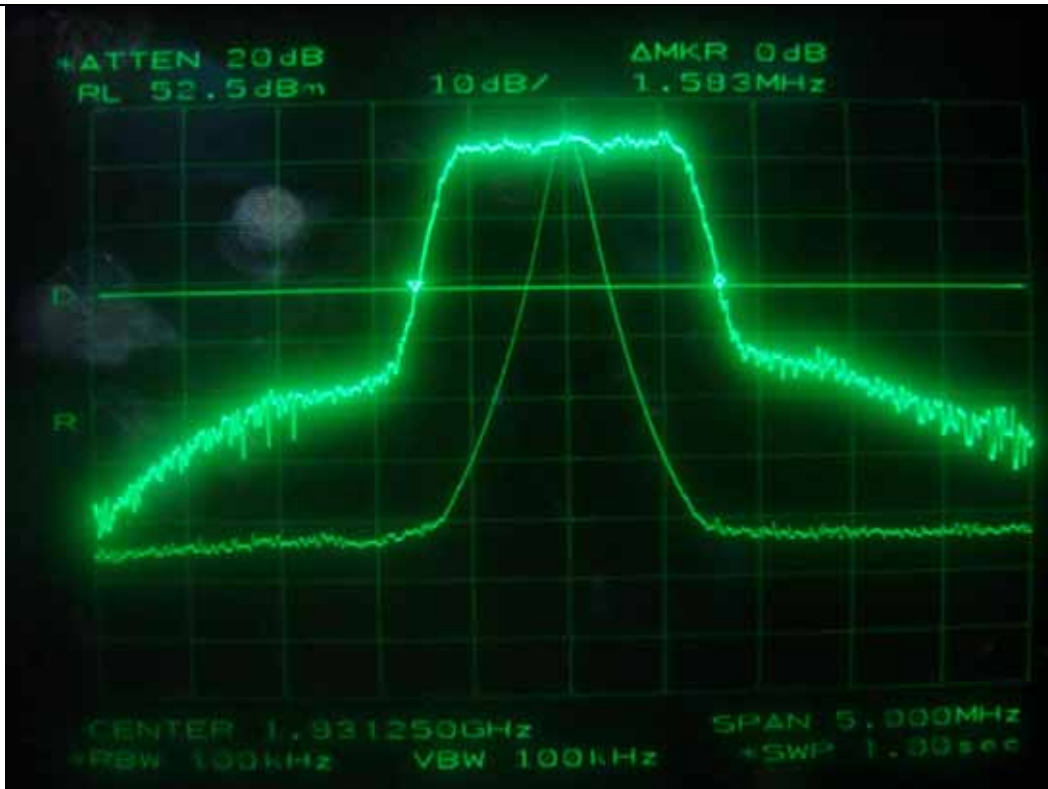
IS-95 – 26 dB Bandwidth (Low Channel)



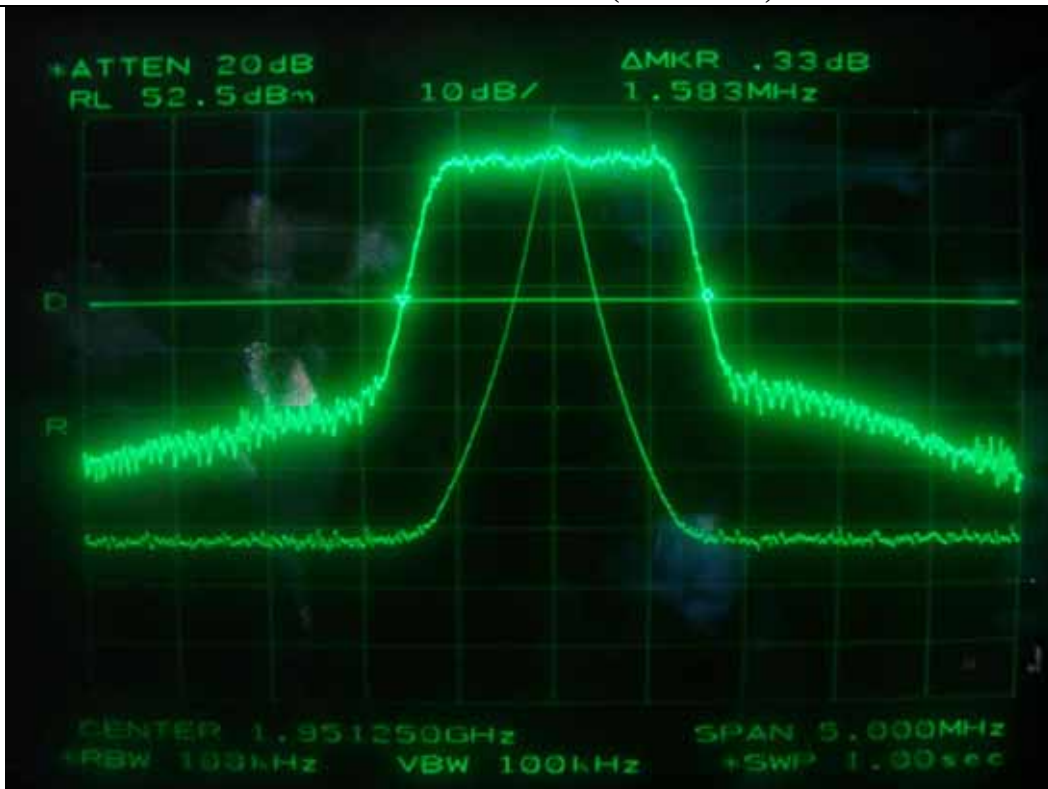
IS-95 – 26 dB Bandwidth (Middle Channel)



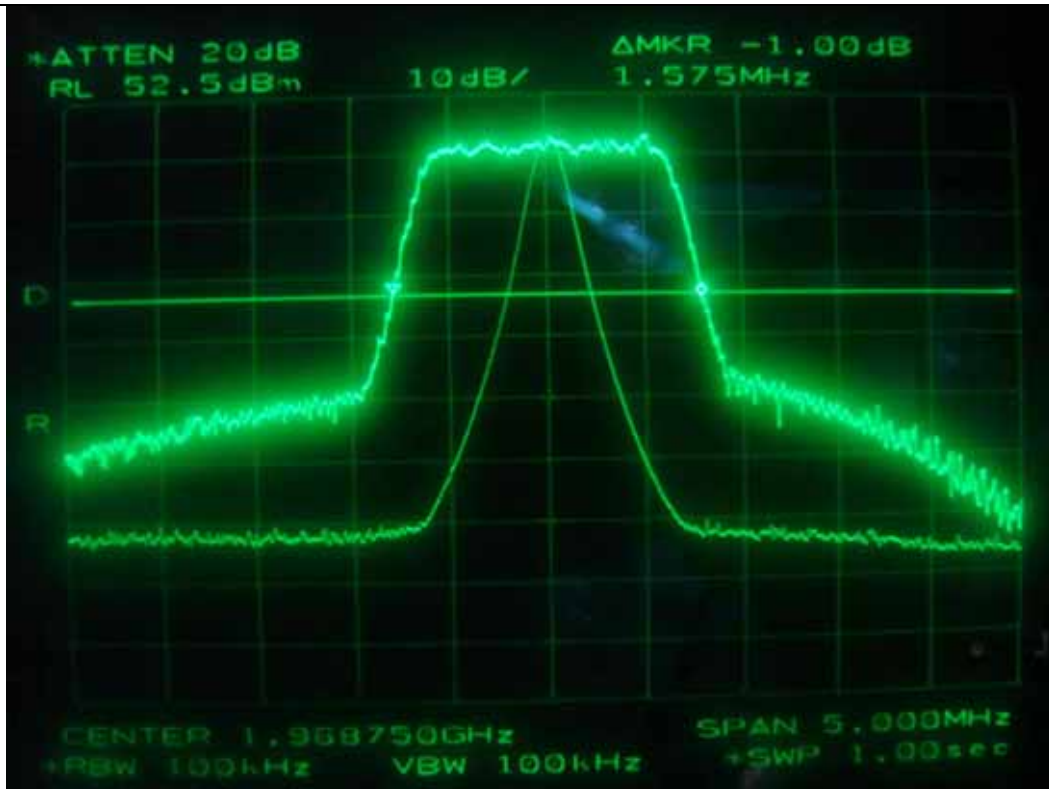
IS-95 – 26 dB Bandwidth (High Channel)



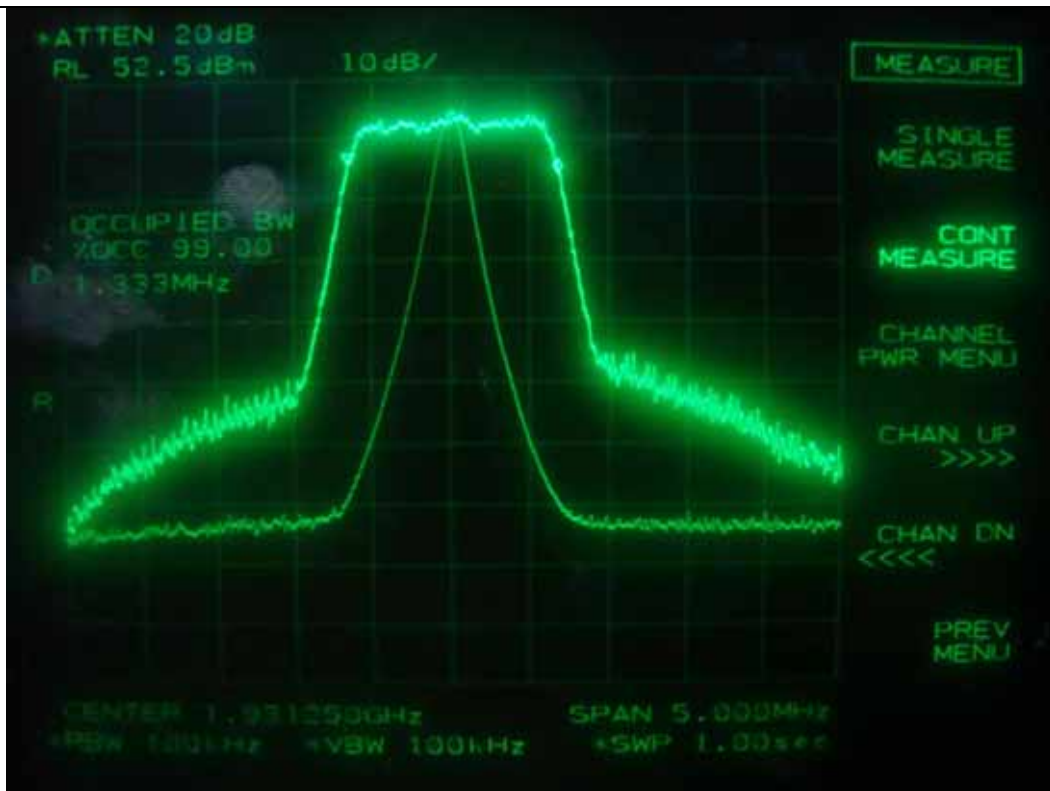
1xEVDO – 26 dB Bandwidth (Low Channel)



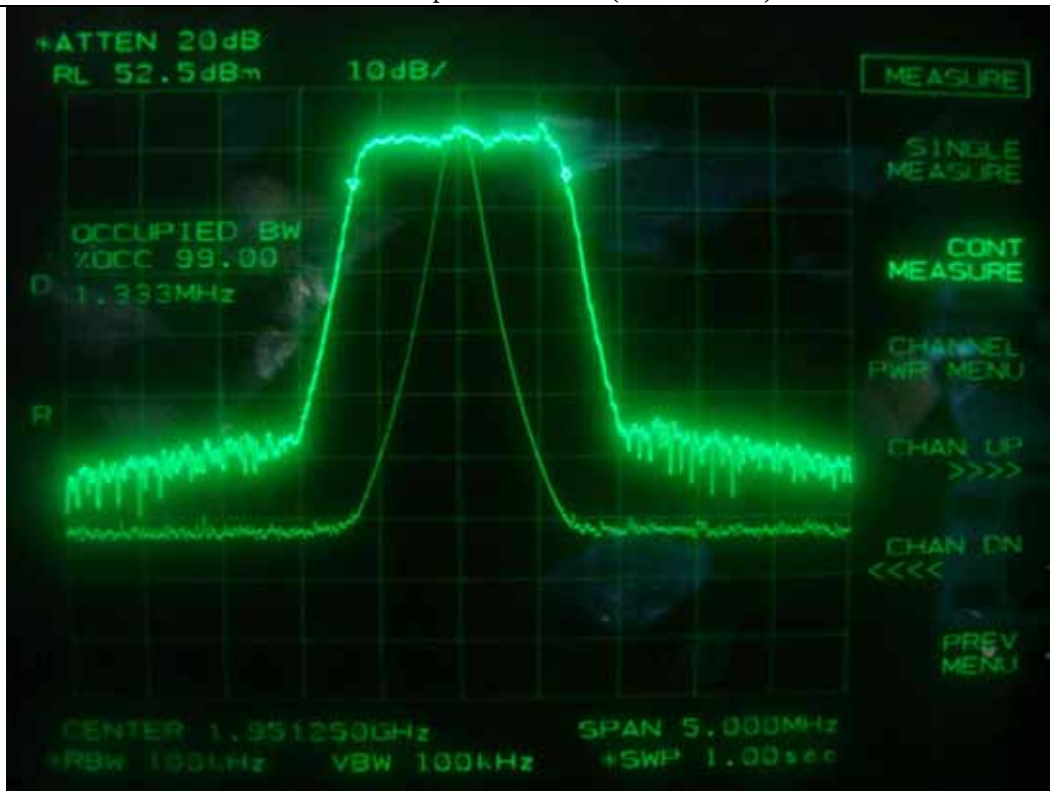
1xEVDO – 26 dB Bandwidth (Middle Channel)



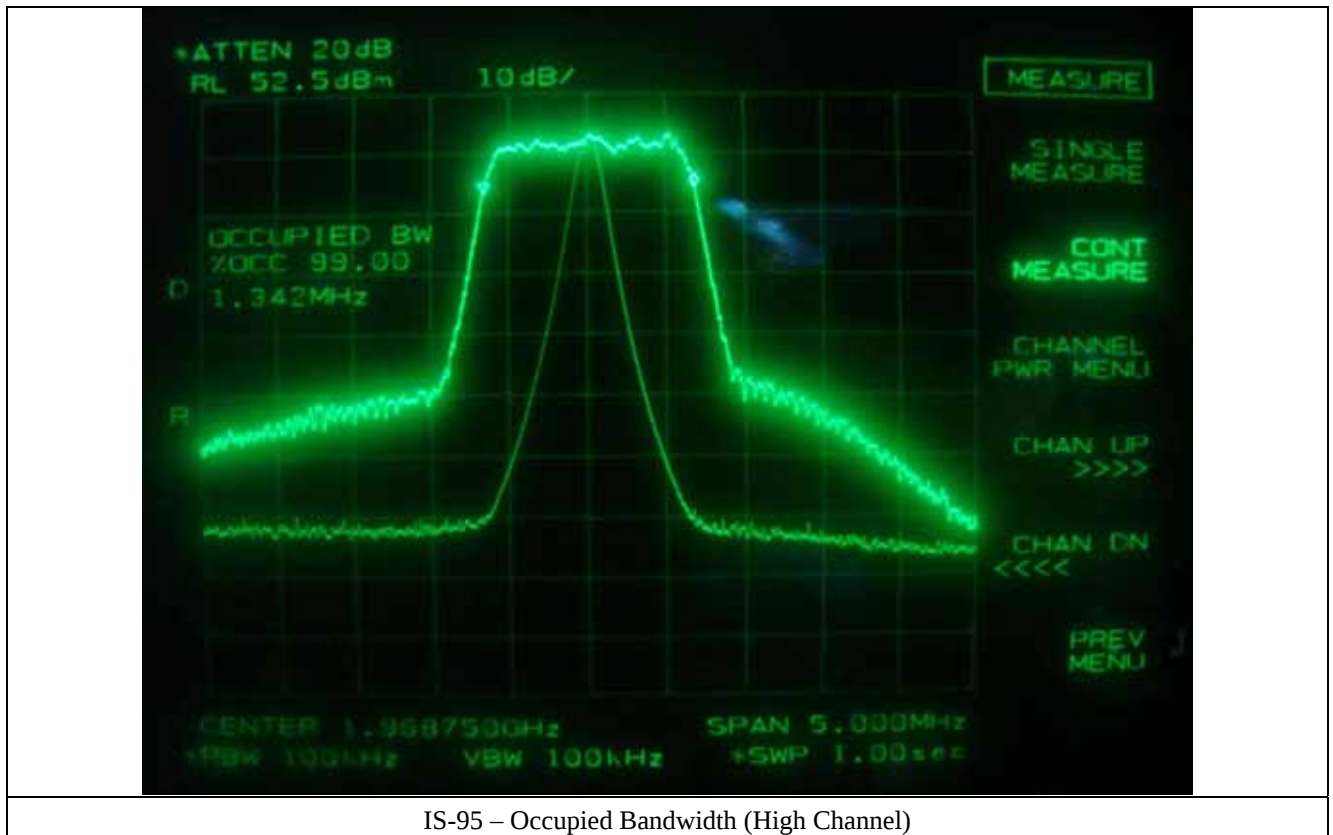
1xEVDO – 26 dB Bandwidth (High Channel)

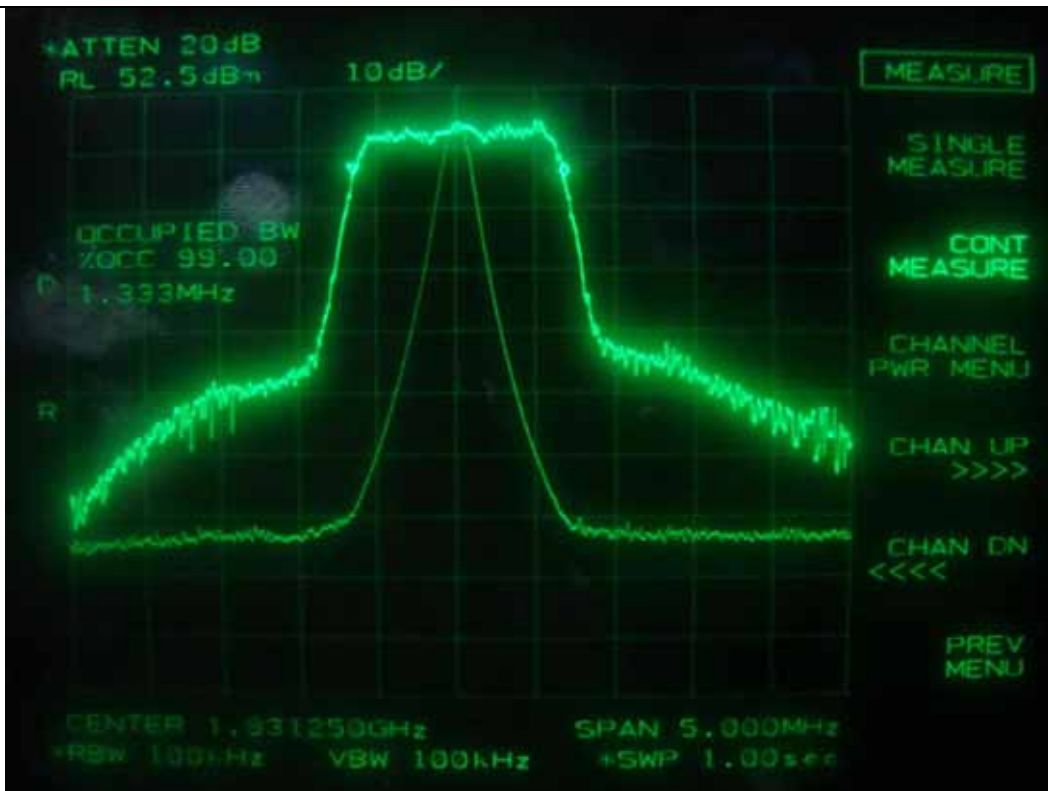


IS-95 – Occupied Bandwidth (Low Channel)

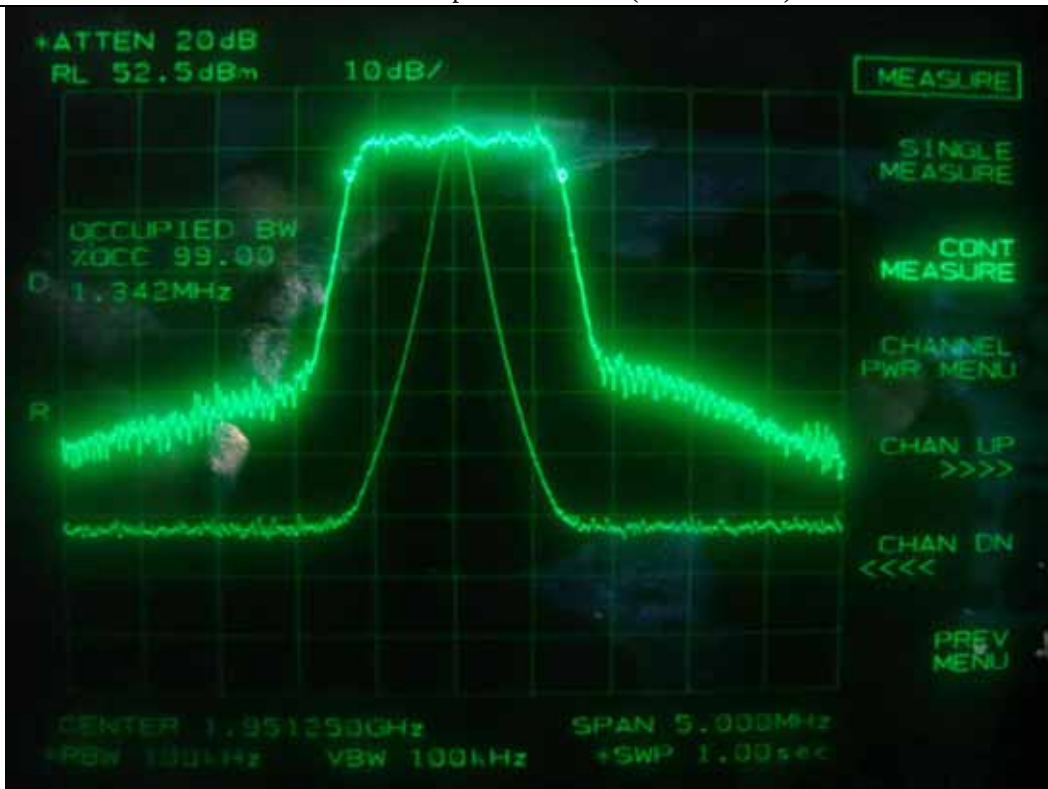


IS-95 – Occupied Bandwidth (Middle Channel)

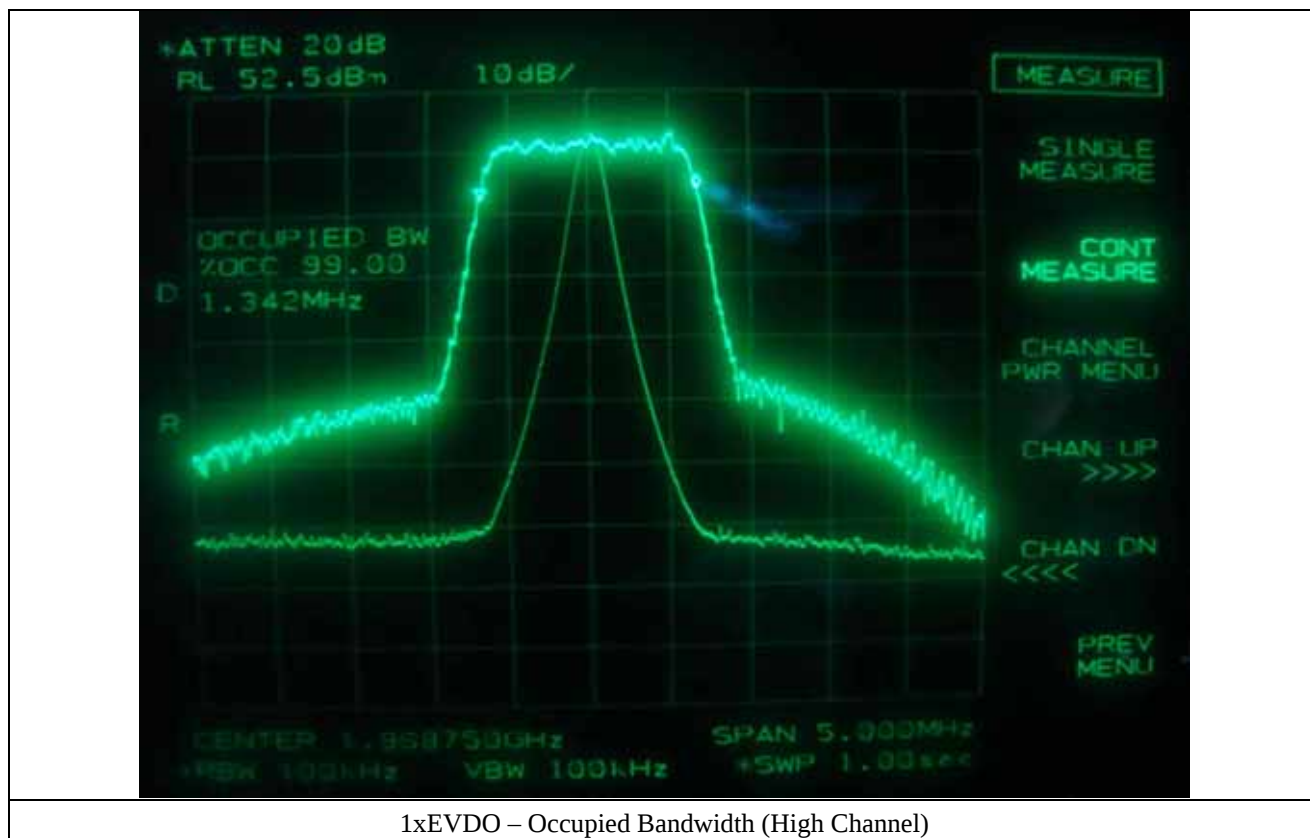


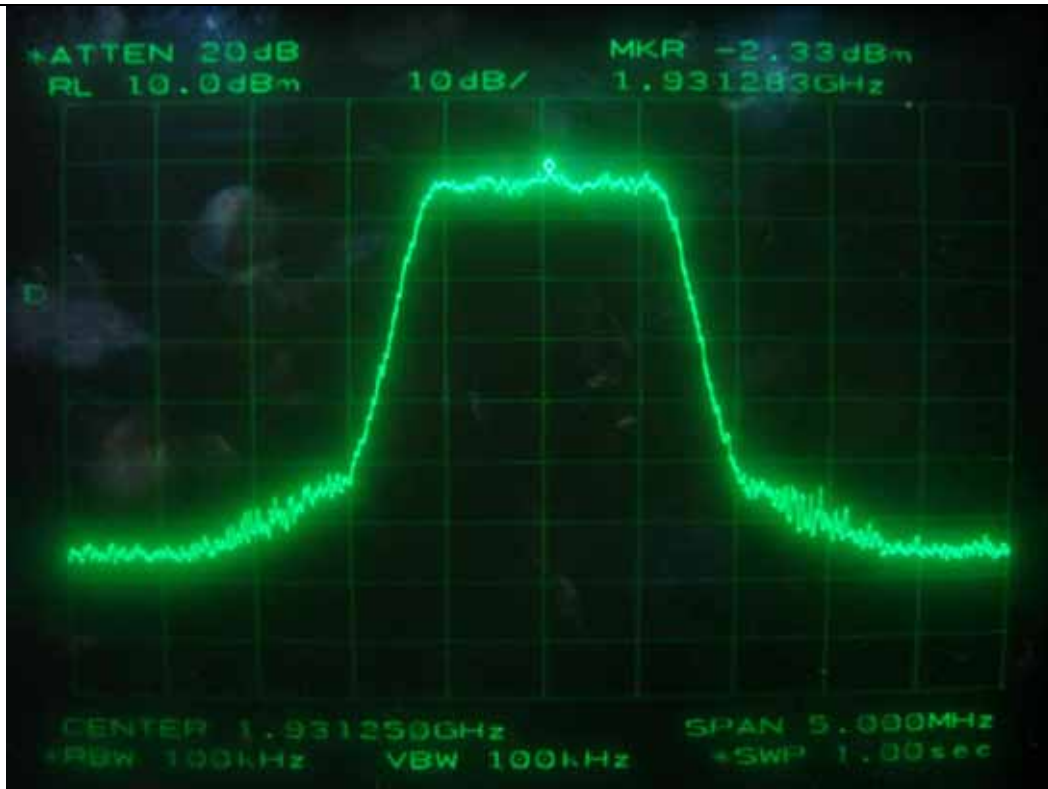


1xEVDO – Occupied Bandwidth (Low Channel)



1xEVDO – Occupied Bandwidth (Middle Channel)





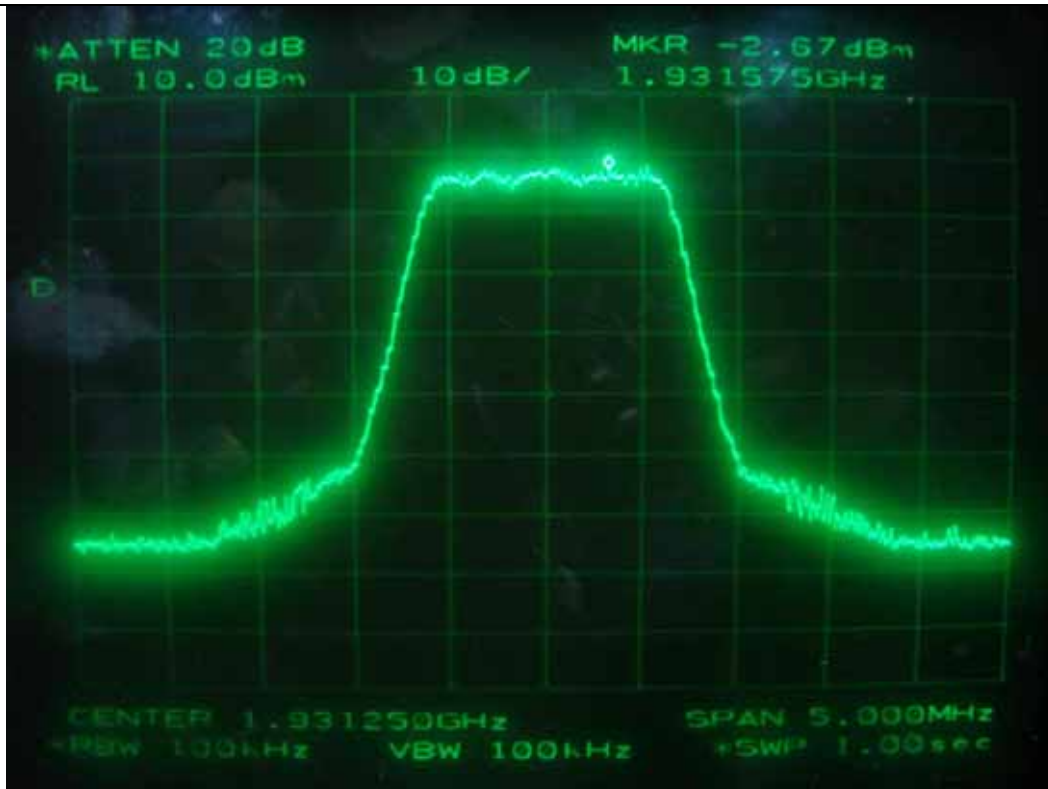
IS-95 – Input (Low Channel)



IS-95 – Input (Middle Channel)



IS-95 – Input (High Channel)



1xEVDO – Input (Low Channel)



1xEVDO – Input (Middle Channel)



1xEVDO – Input (High Channel)

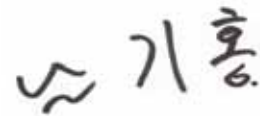
6.4.2 Operating Condition: Min. Power Mode

-. Test Date : December 24, 2008

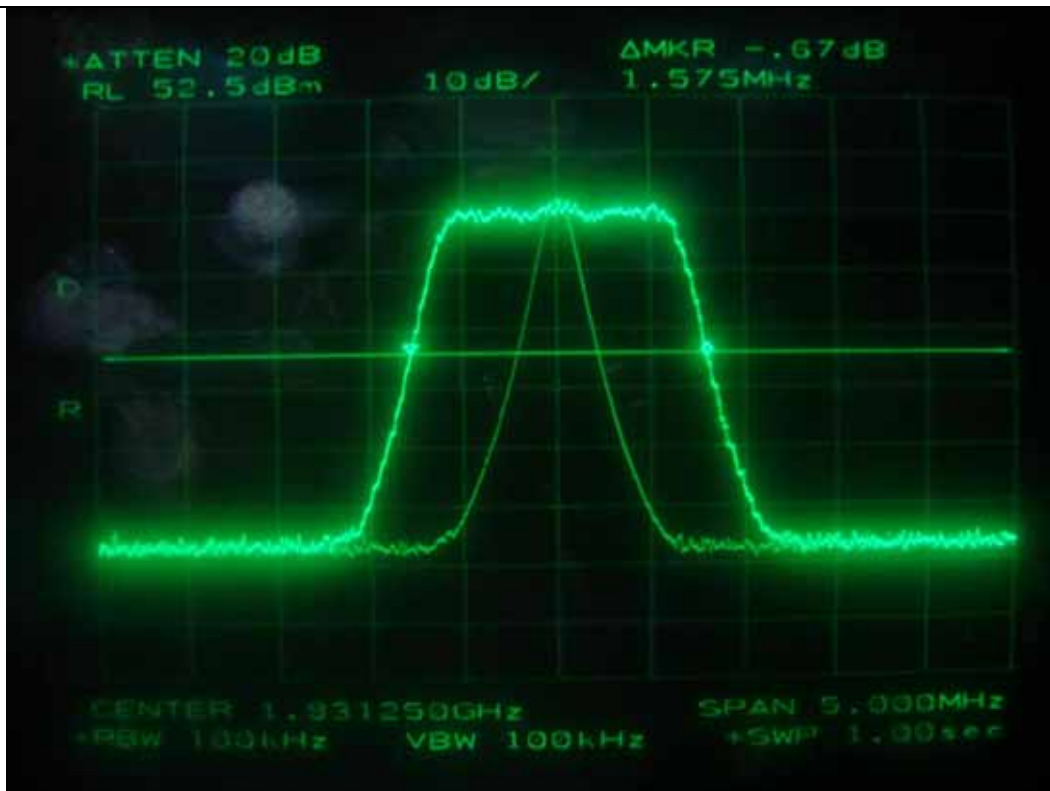
-. Test Result : Pass

Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
IS-95	Low	1 575	1 333
	Middle	1 575	1 333
	High	1 575	1 333
1xEVDO	Low	1 567	1 333
	Middle	1 583	1 342
	High	1 575	1 333

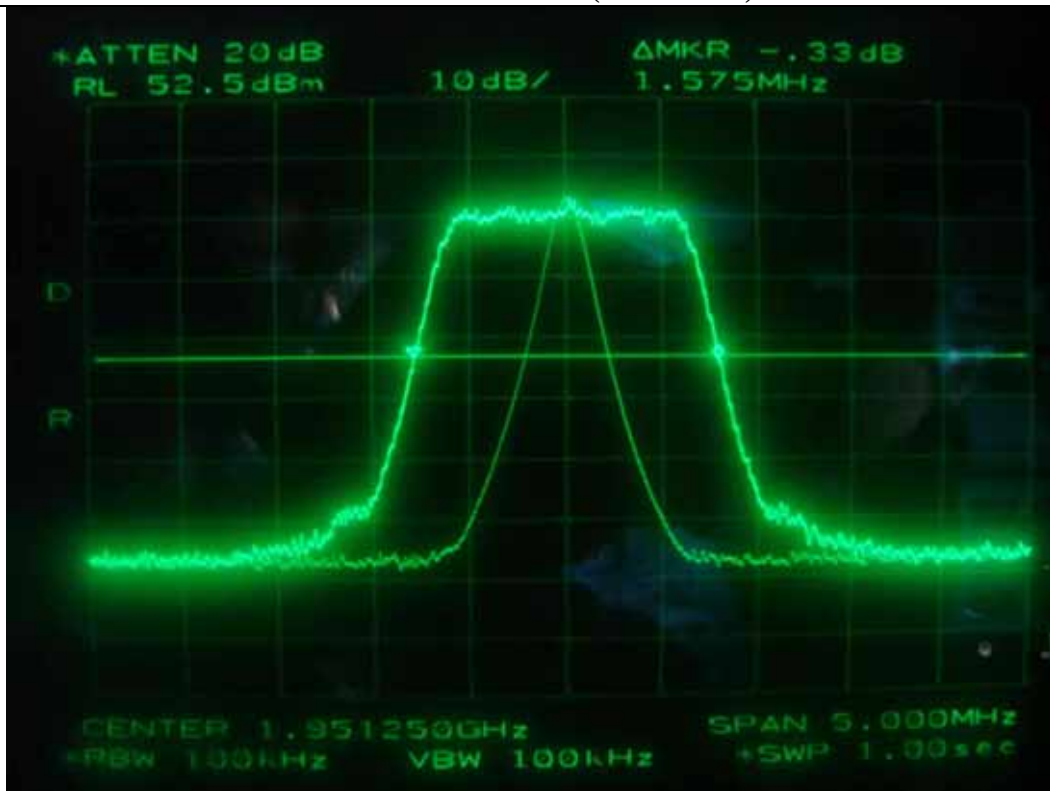
Remark: According to above result, the carrier frequency shall be within the frequency block edges.



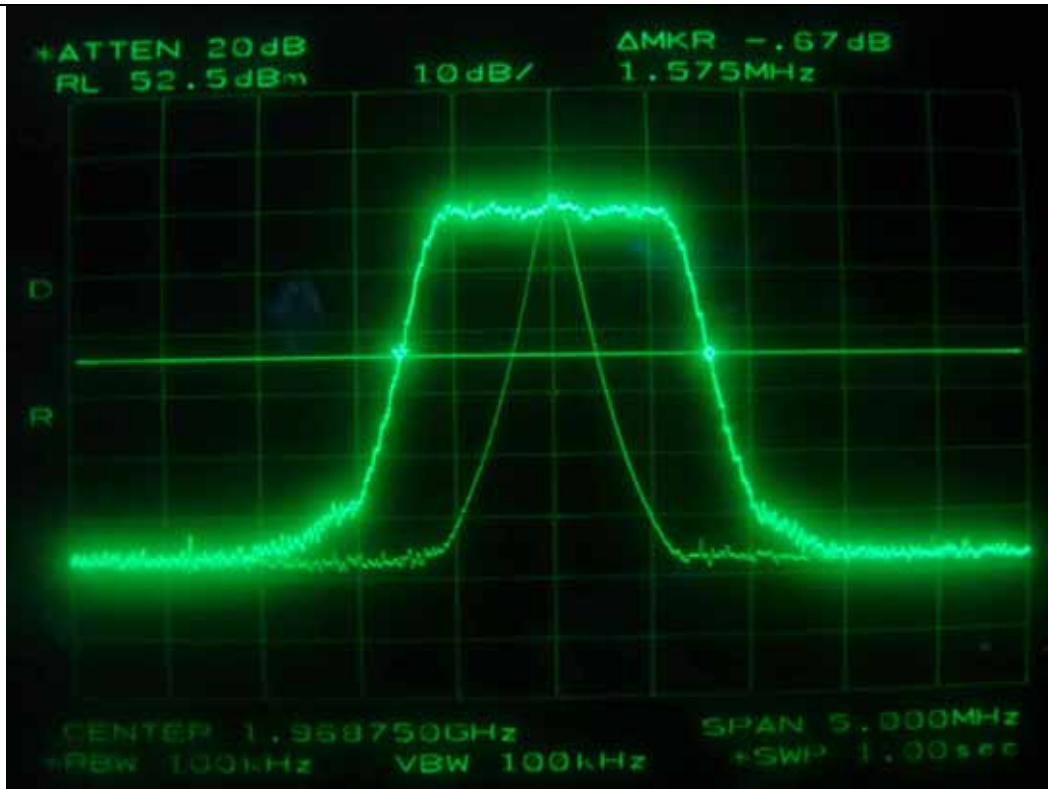
Tested by: Ki-Hong, Nam / Project Engineer



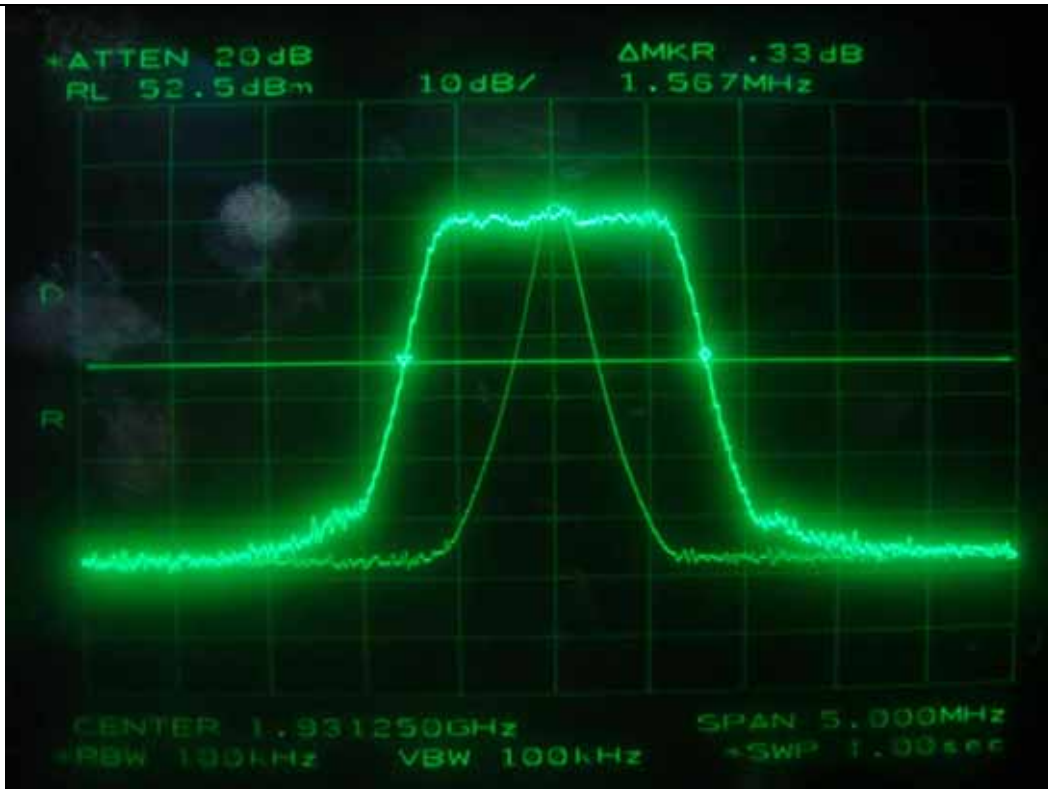
IS-95 – 26 dB Bandwidth (Low Channel)



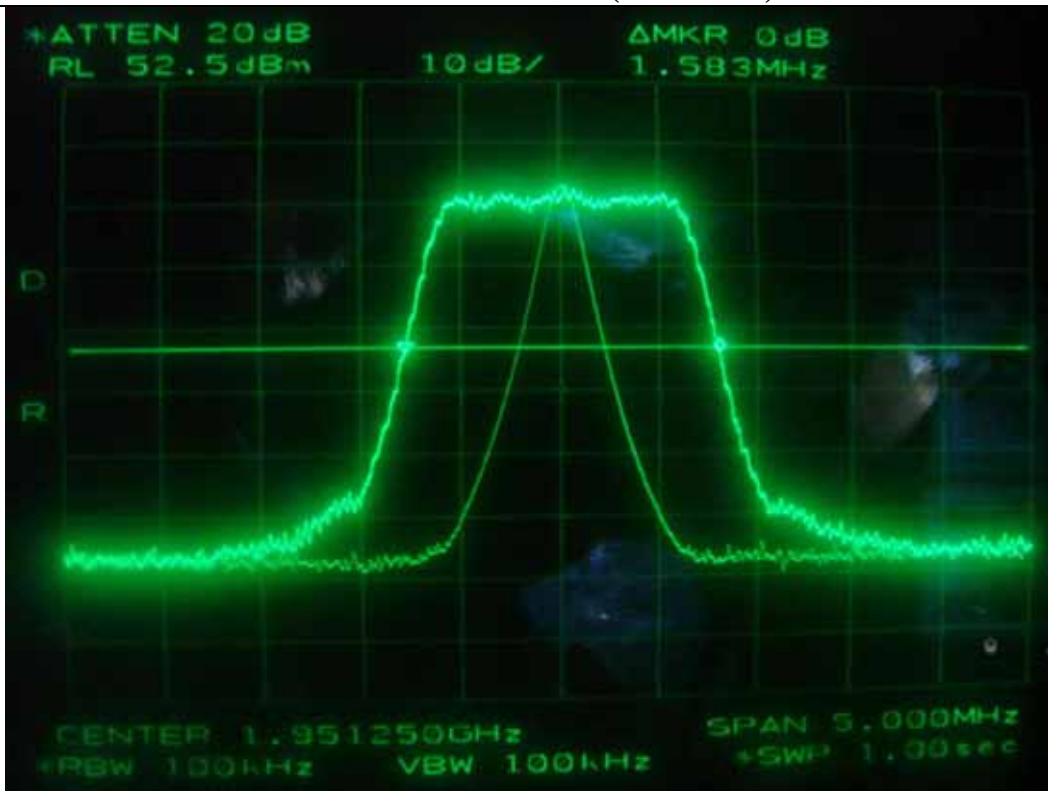
IS-95 – 26 dB Bandwidth (Middle Channel)



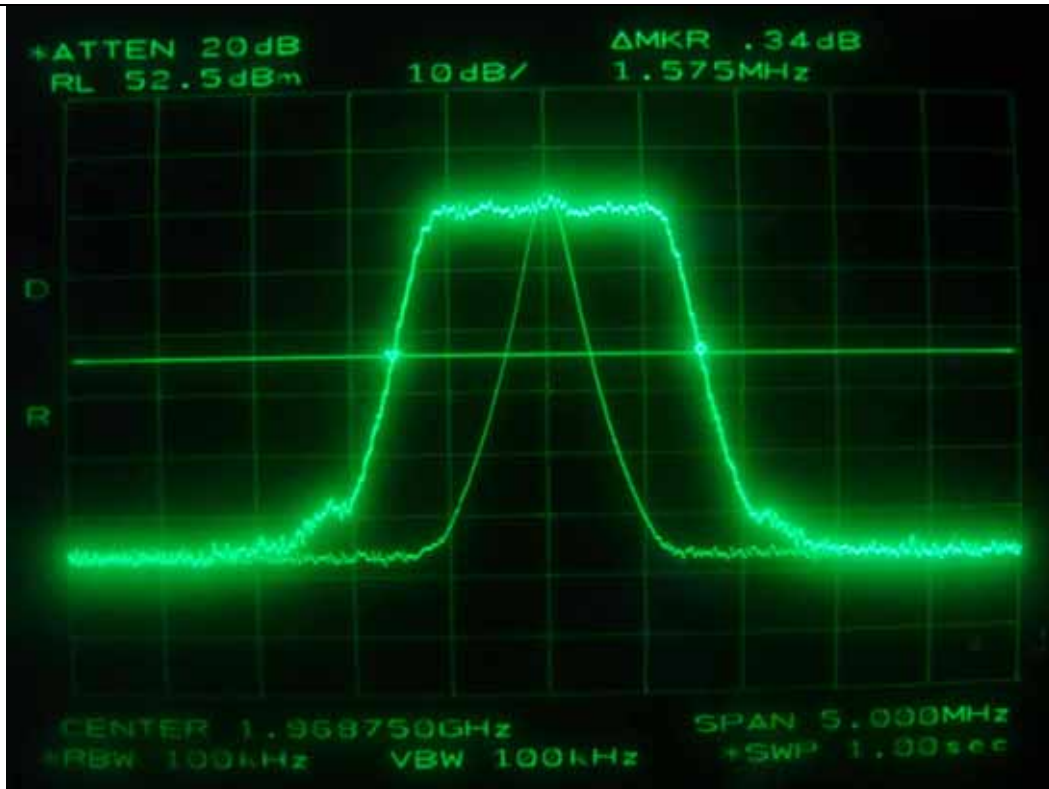
IS-95 – 26 dB Bandwidth (High Channel)



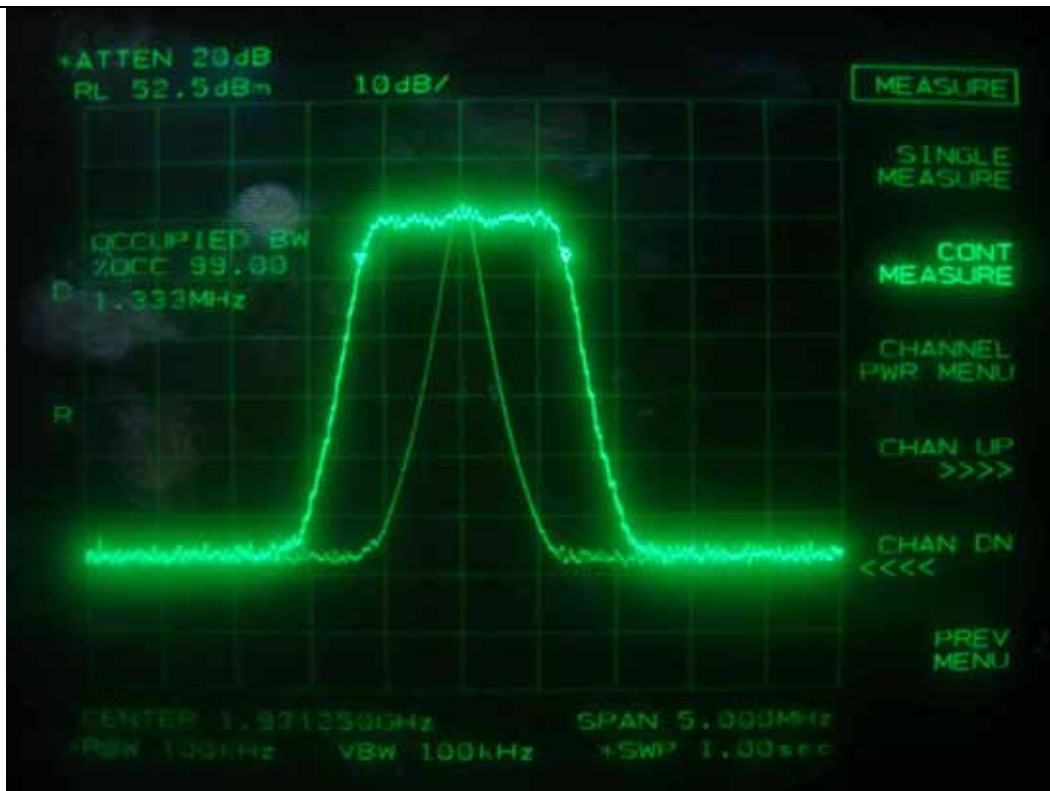
1xEVDO – 26 dB Bandwidth (Low Channel)



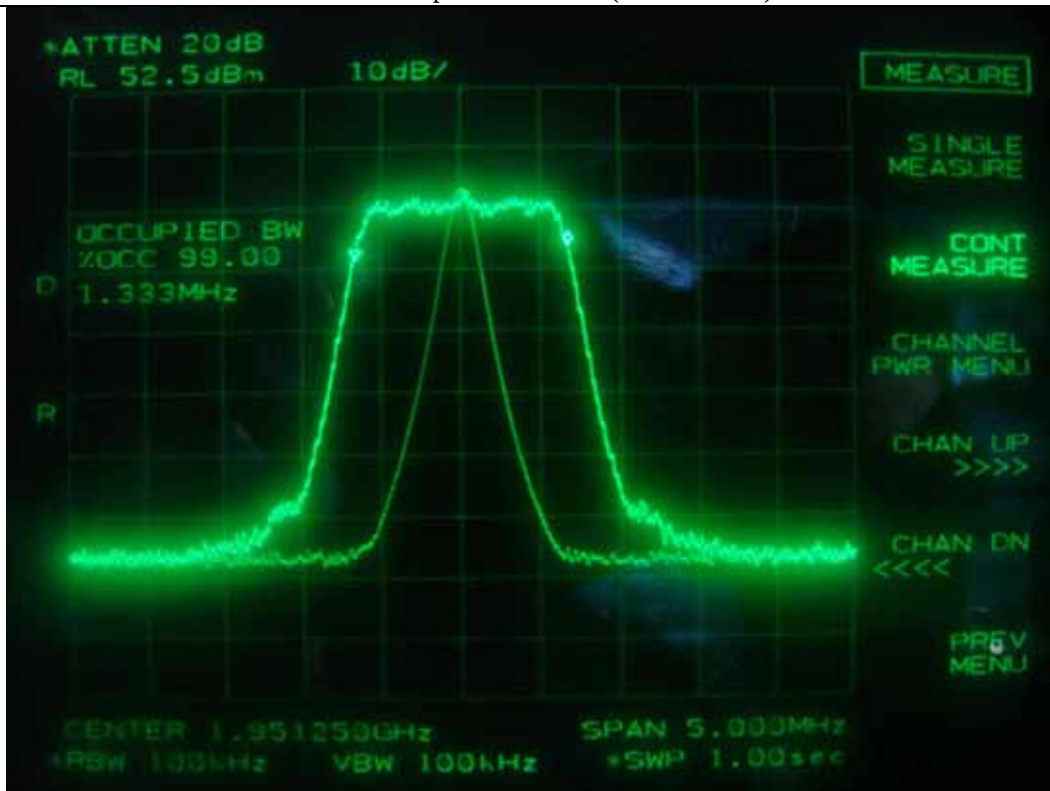
1xEVDO – 26 dB Bandwidth (Middle Channel)



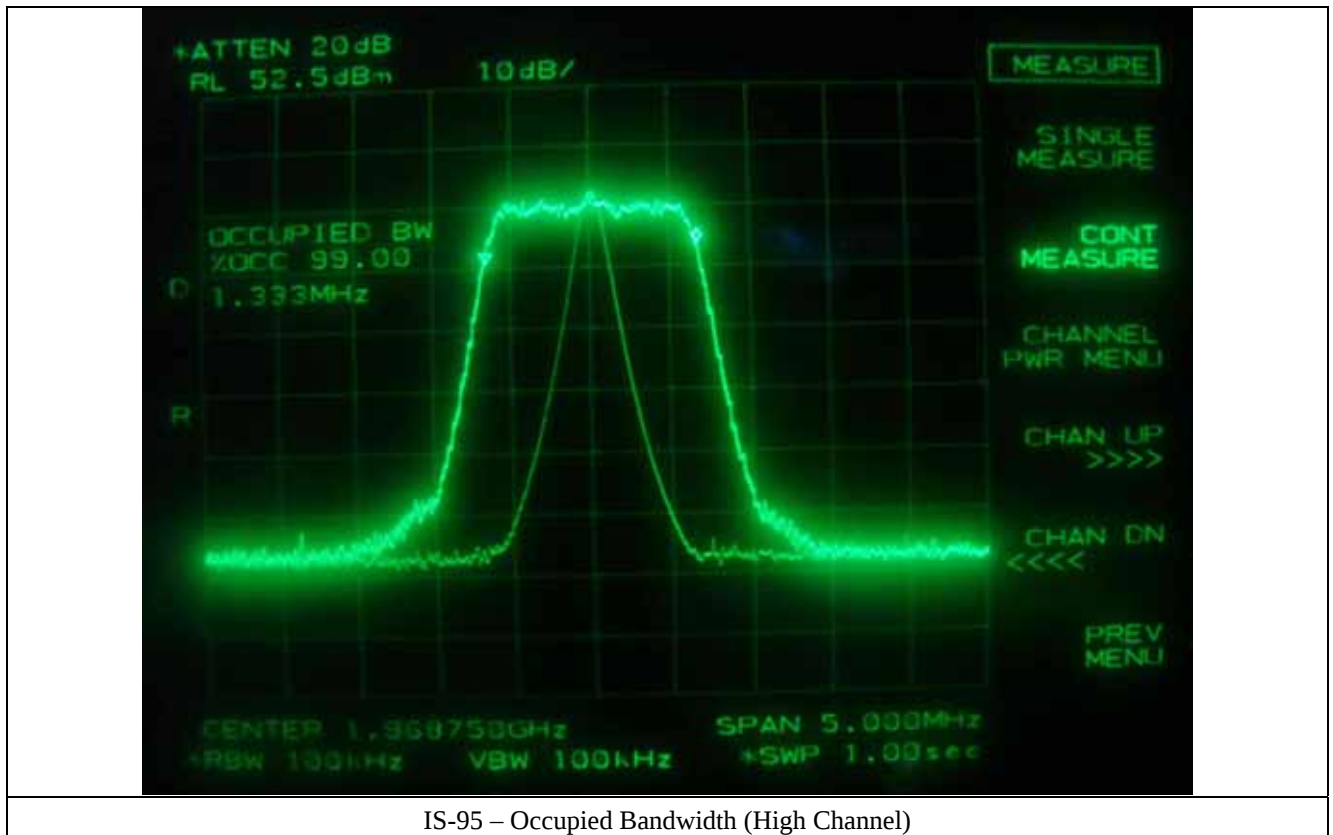
1xEVDO – 26 dB Bandwidth (High Channel)

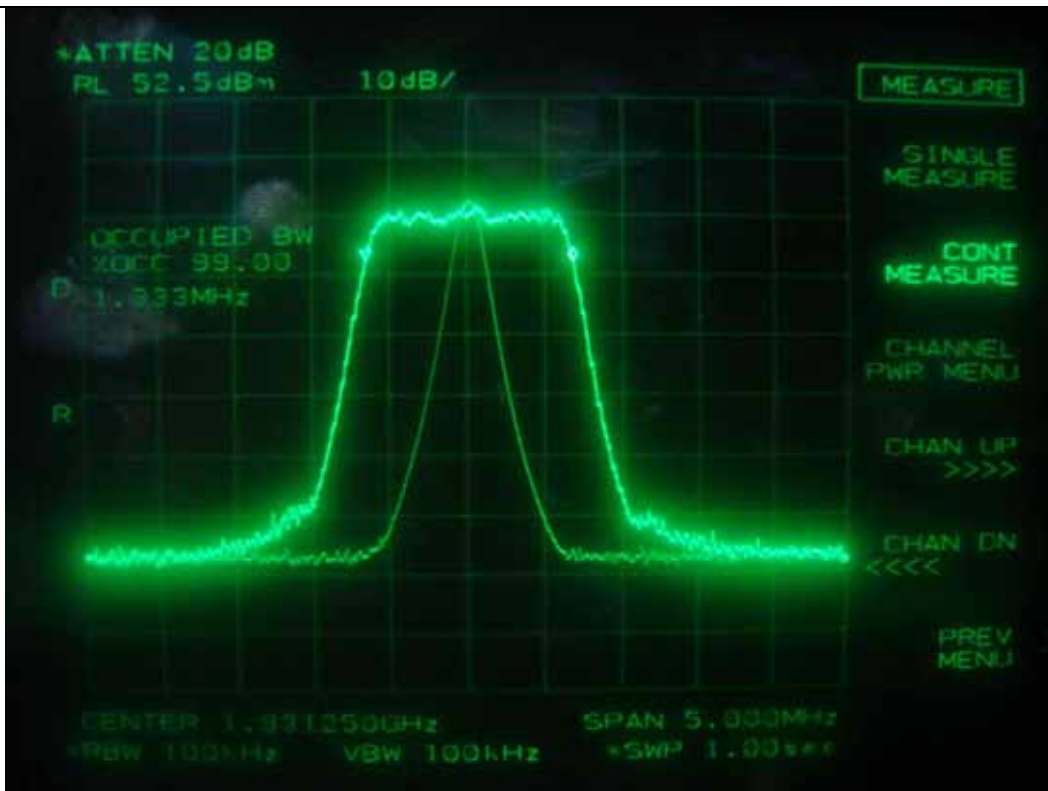


IS-95 – Occupied Bandwidth (Low Channel)

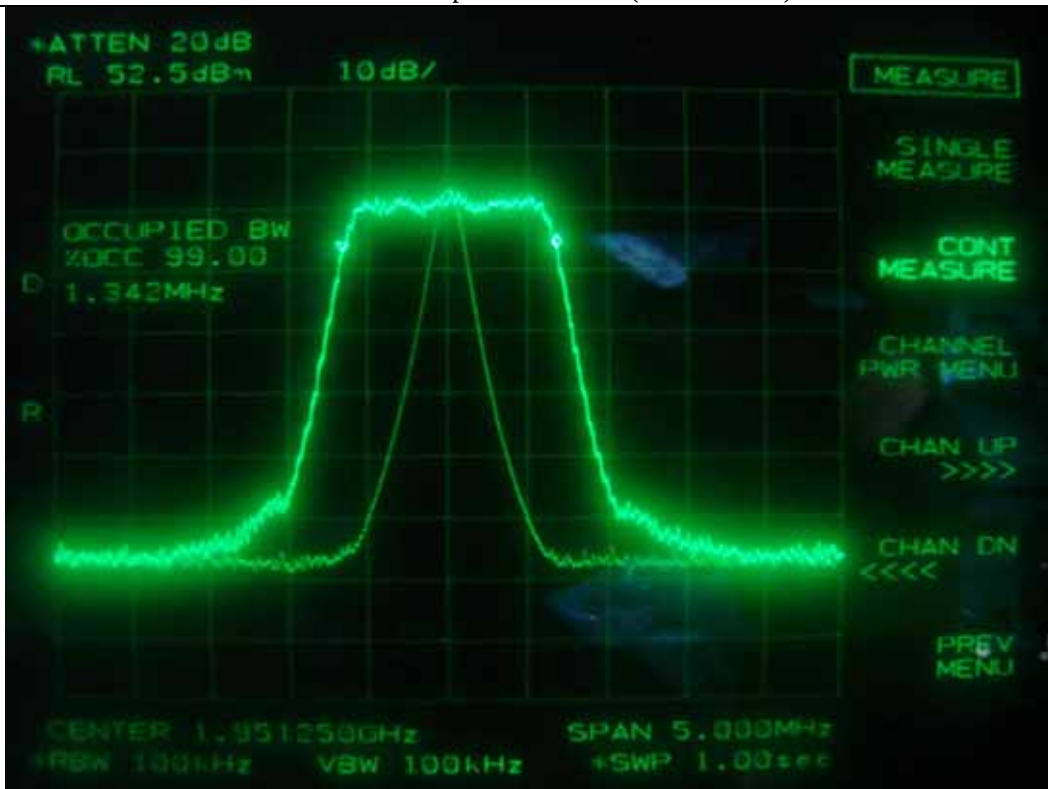


IS-95 – Occupied Bandwidth (Middle Channel)

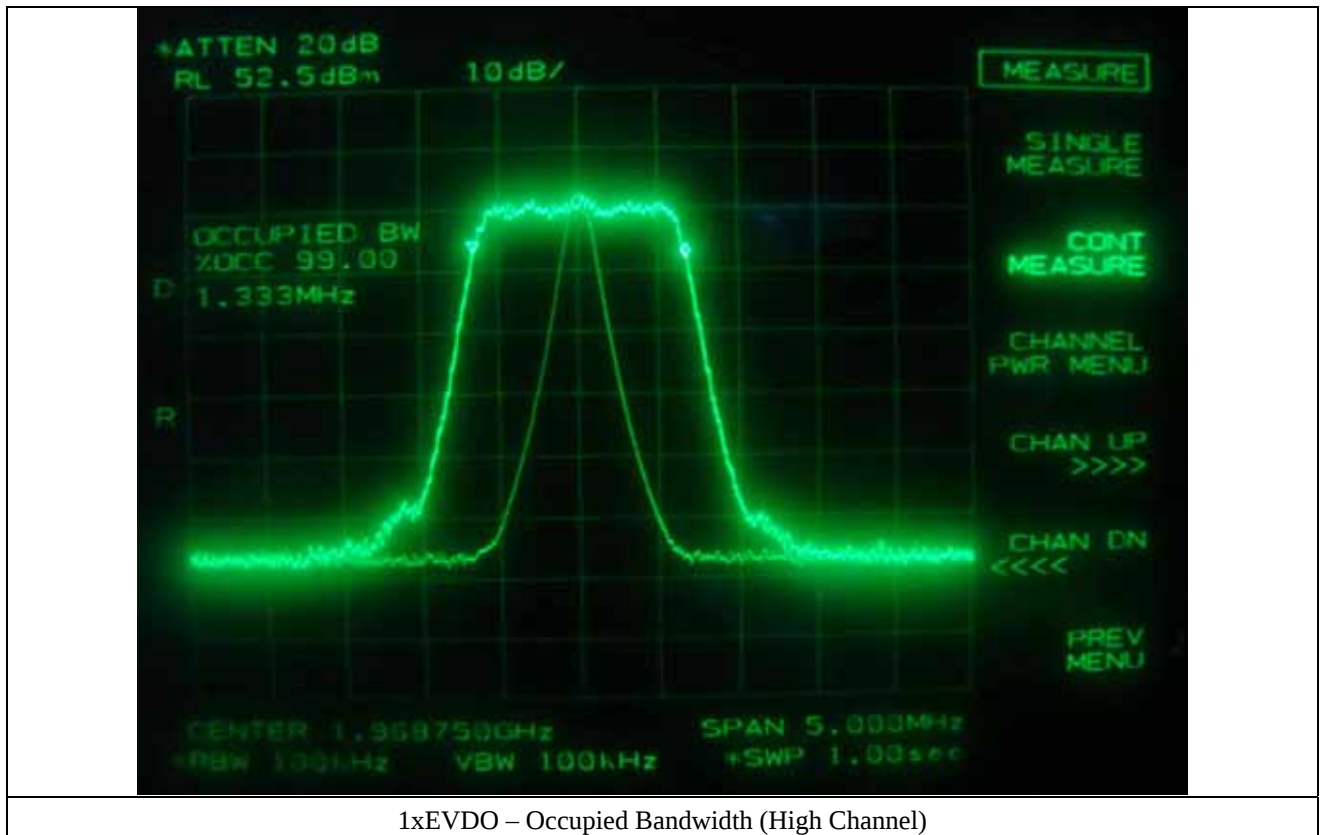


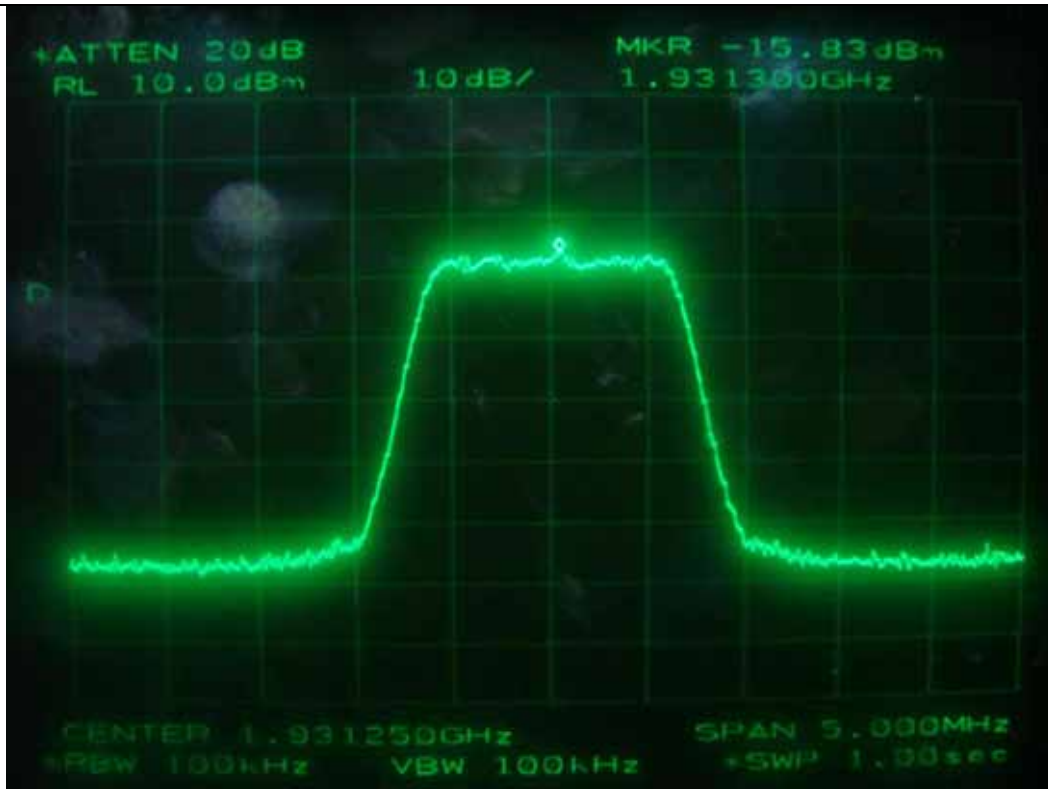


1xEVDO – Occupied Bandwidth (Low Channel)

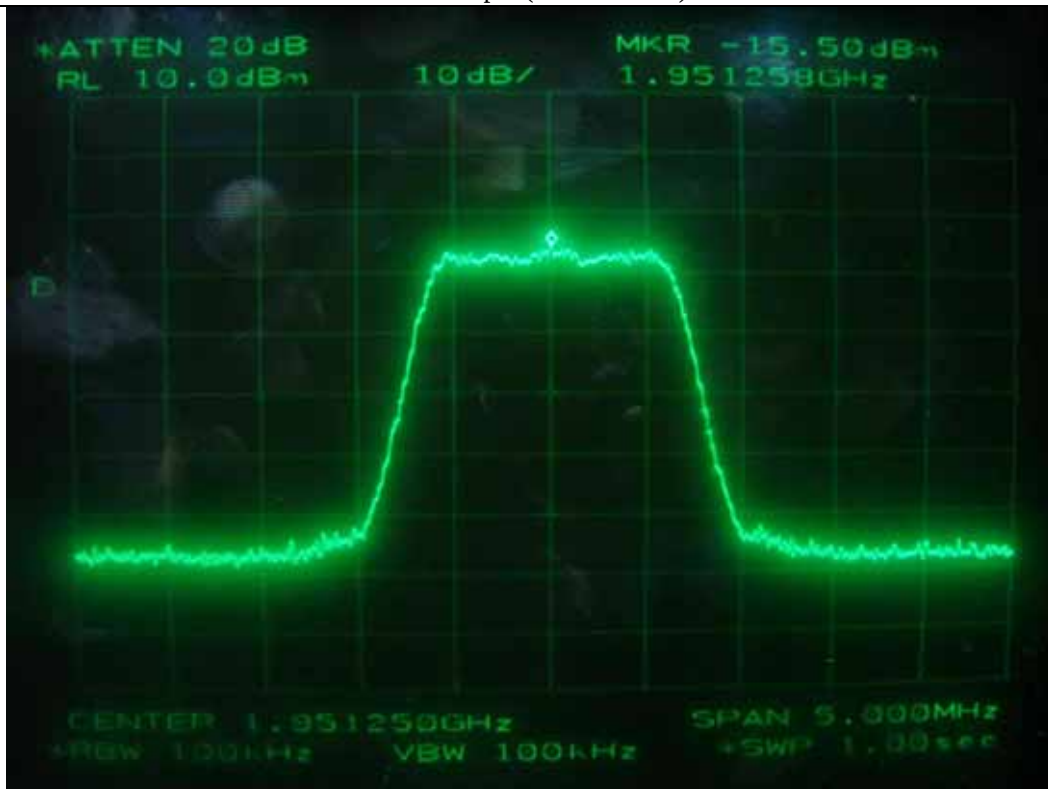


1xEVDO – Occupied Bandwidth (Middle Channel)

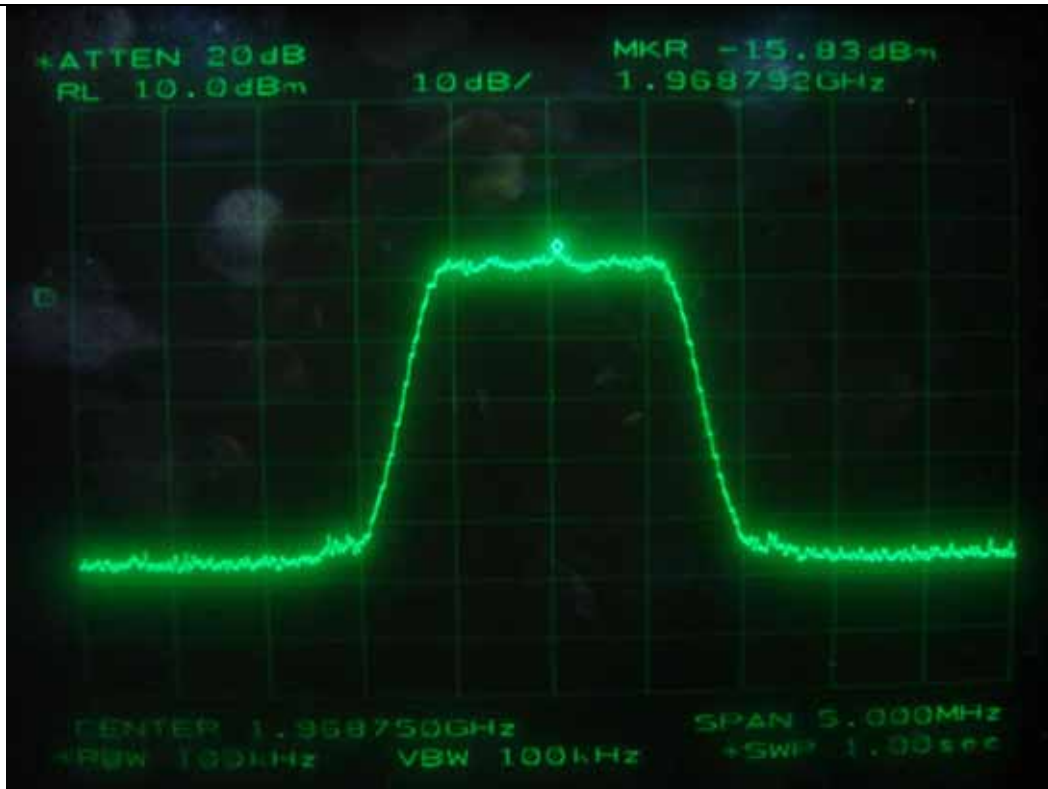




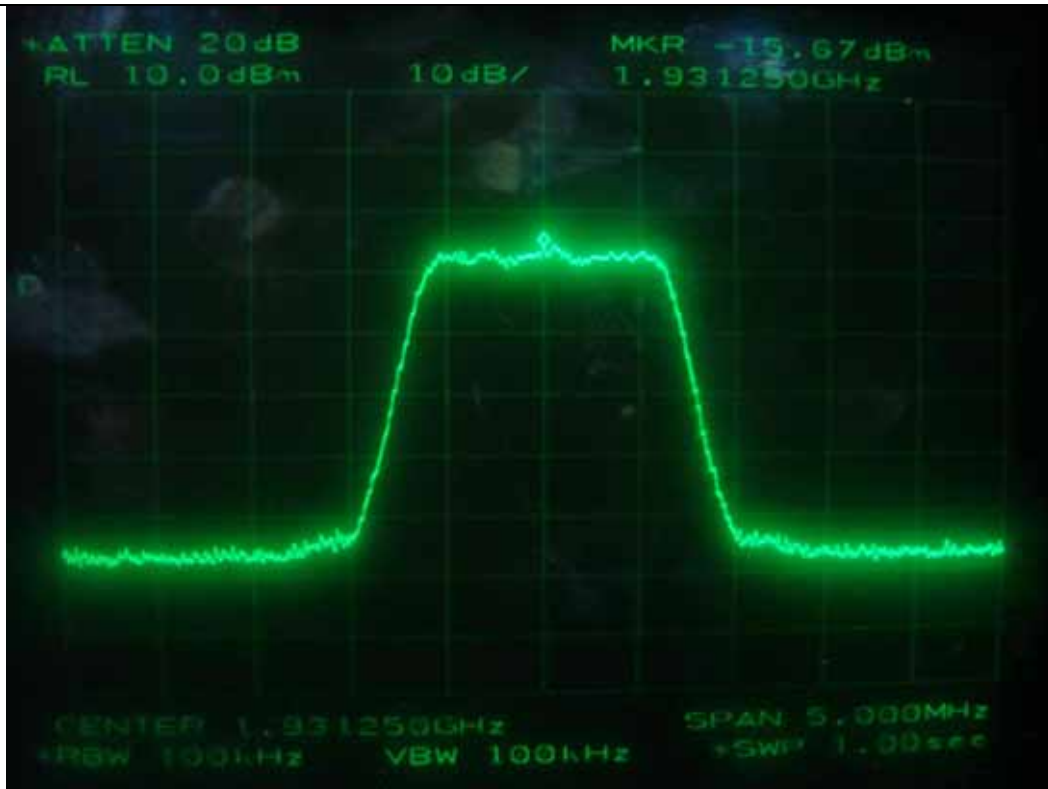
IS-95 – Input (Low Channel)



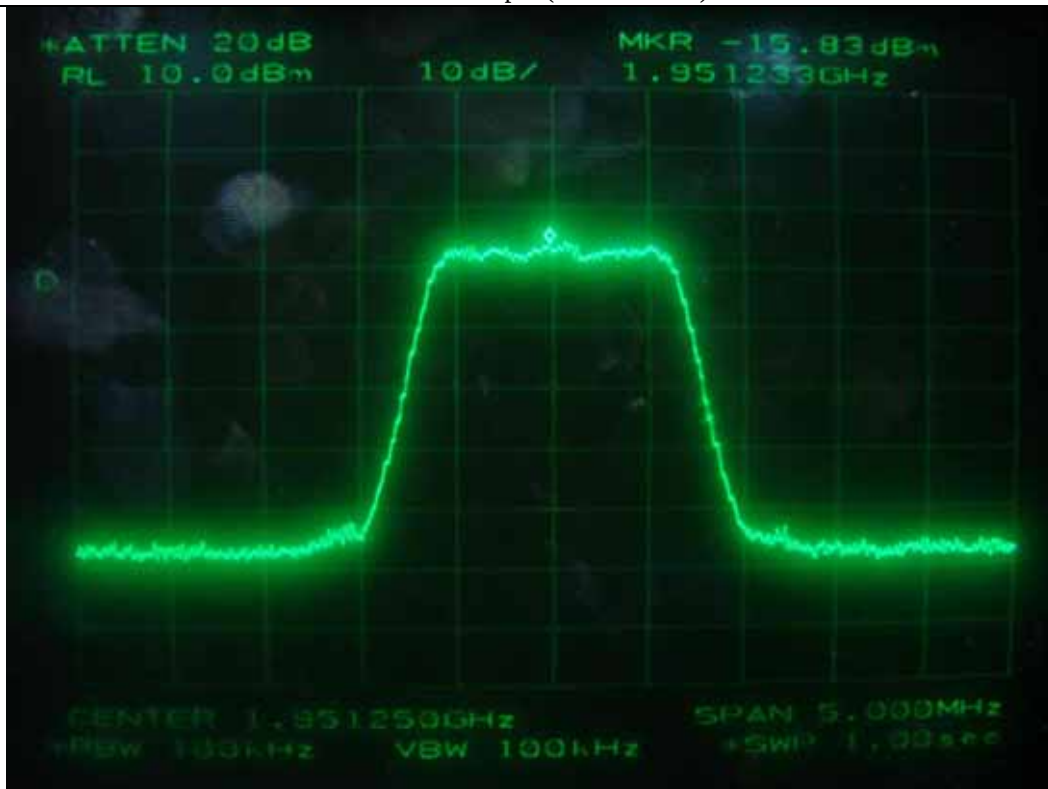
IS-95 – Input (Middle Channel)



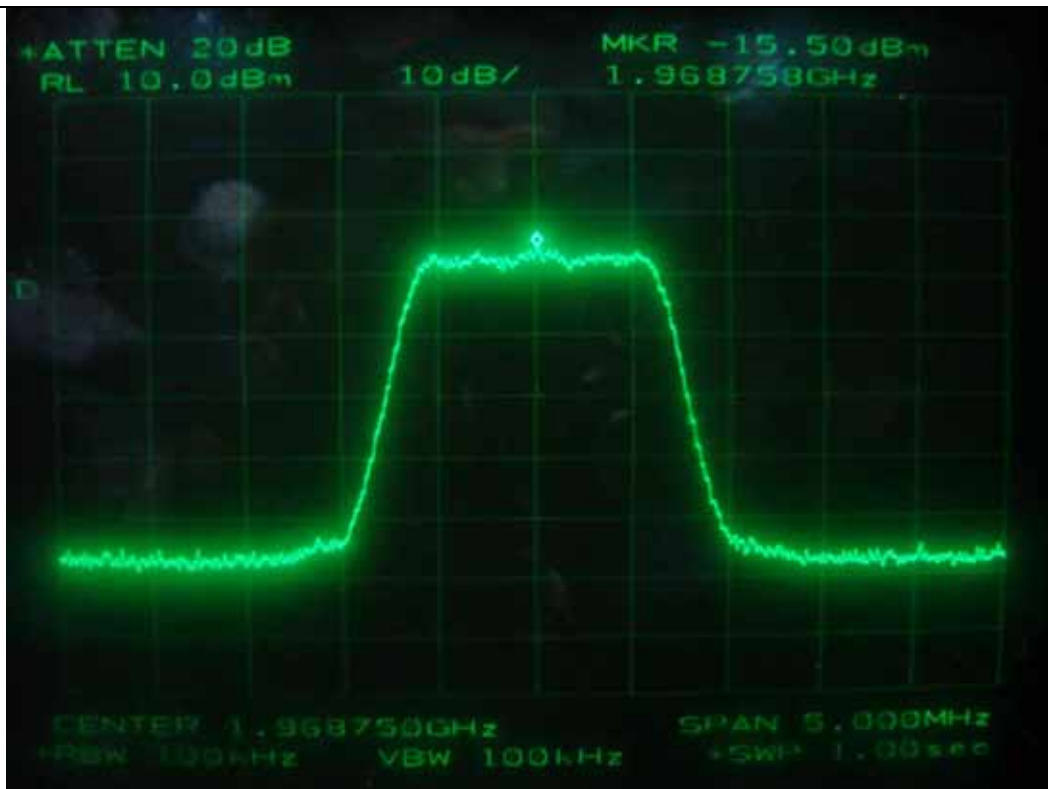
IS-95 – Input (High Channel)



1xEVDO – Input (Low Channel)



1xEVDO – Input (Middle Channel)



1xEVDO – Input (High Channel)

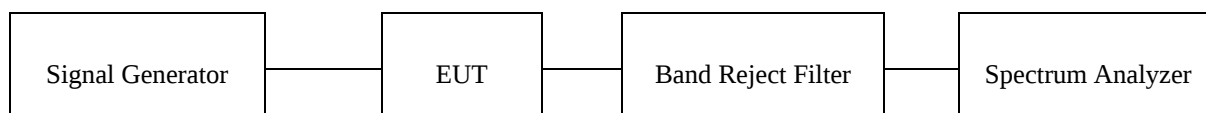
7. SPURIOUS EMISSION AT ANTENNA TERMINAL

7.1 Operating environment

Temperature : 21 °C
Relative humidity : 45.2 %R.H.

7.2 Test set-up for conducted measurement

The RF output port of the EUT was connected to the input of the spectrum analyzer. The resolution bandwidth and video bandwidth of the spectrum analyzer was set at 1 MHz and sufficient scans were taken to show any out of band emissions up to 20 GHz. The software for RF control on the notebook PC was set to zero.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ -	E4432B	HP	Signal Generator	US38440950	June 16, 2008
■ -	SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ -	3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

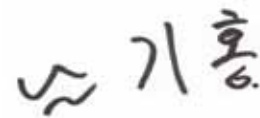
7.4 Test data

7.4.1 Operating Condition: Max. Power Mode

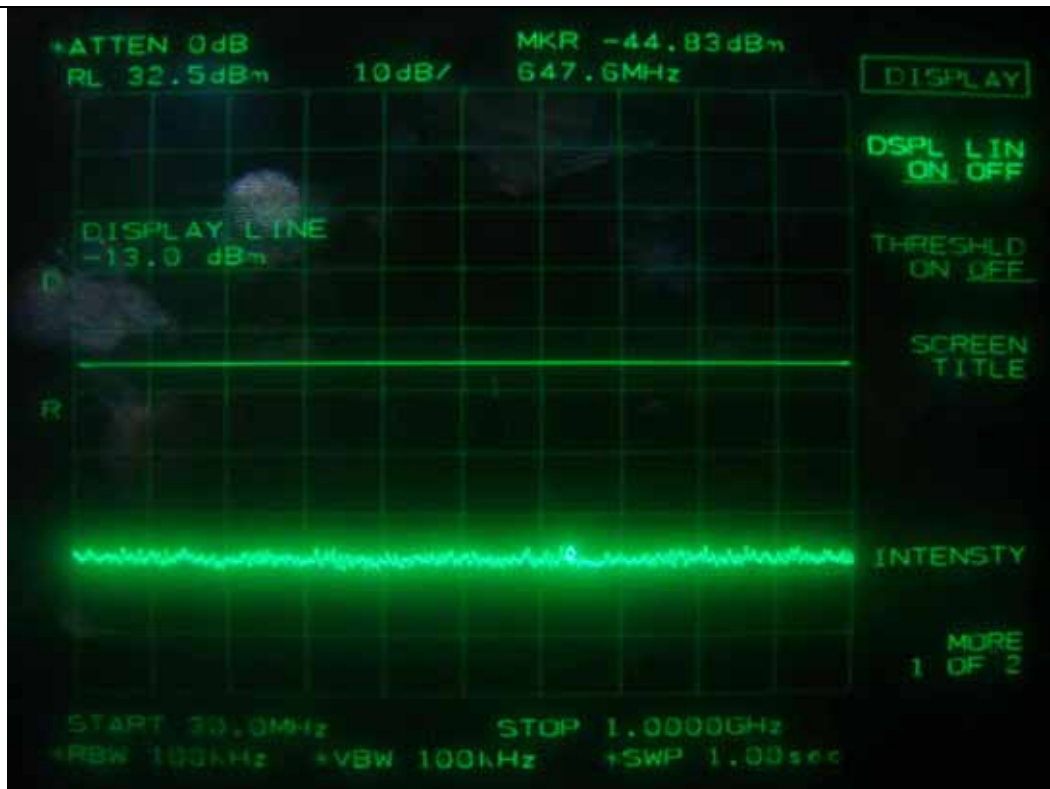
- . Test Date : December 24, 2008
- . Frequency range : 30 MHz ~ 20 GHz
- . Result : PASSED BY -14.00 dB at low channel of IS-95 Mode

Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
IS-95	Low	7 330.00	-28.17	1.17	-27.00	-13.00	-14.00
	Middle	7 420.00	-29.33	1.17	-28.16		-15.16
	High	7 330.00	-29.17	1.17	-28.00		-15.00
1xEVDO	Low	7 460.00	-29.50	1.17	-28.33	-13.00	-15.33
	Middle	7 380.00	-28.83	1.17	-27.66		-14.66
	High	7 250.00	-28.67	1.17	-27.50		-14.50

According to Part 24E, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0 dBm.



Tested by: Ki-Hong, Nam / Project Engineer



IS-95 – Low Channel



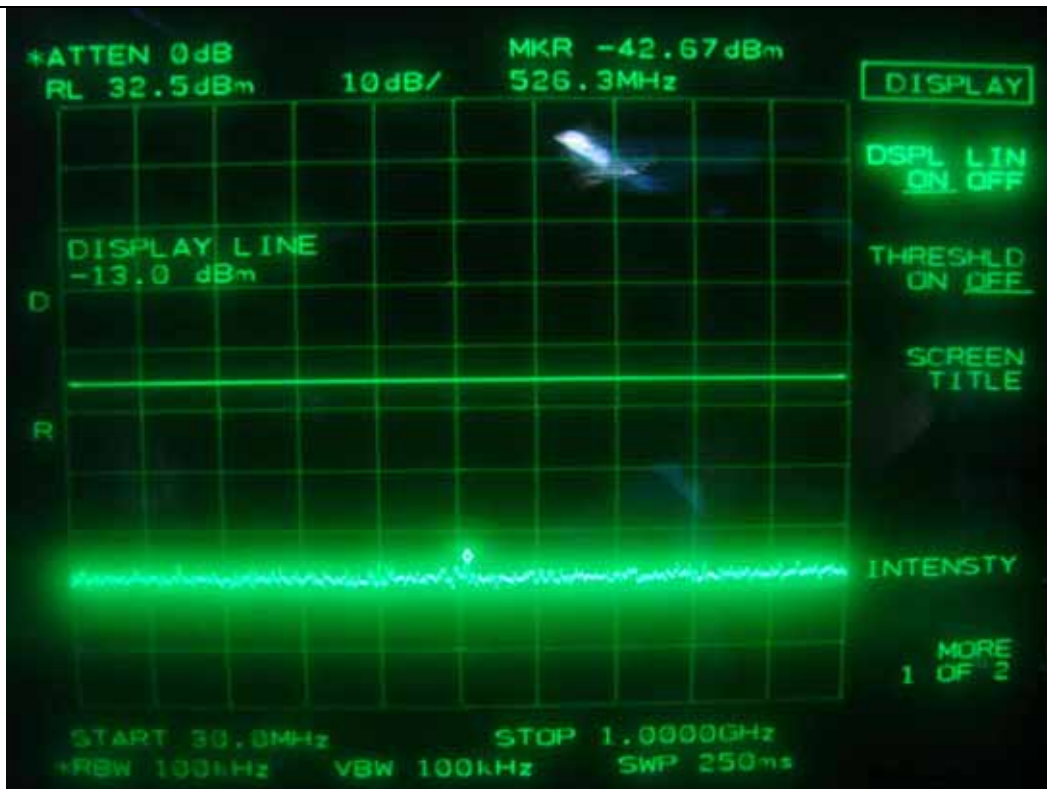
IS-95 – Low Channel



IS-95 – Middle Channel



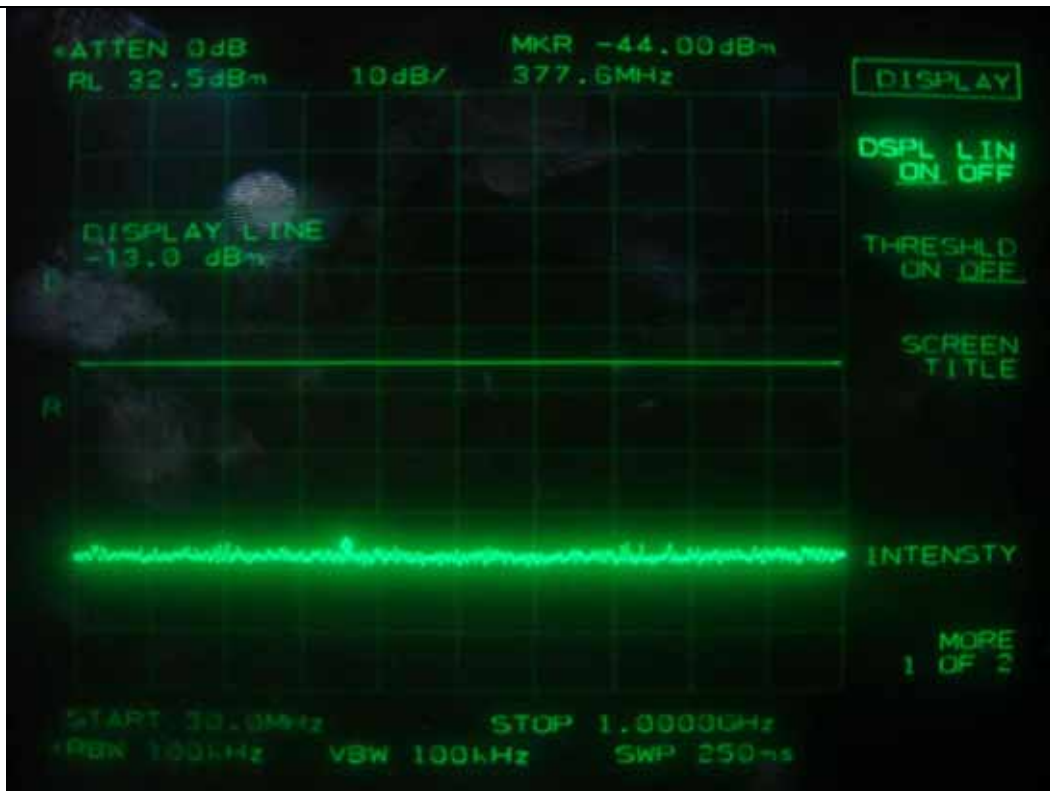
IS-95 – Middle Channel



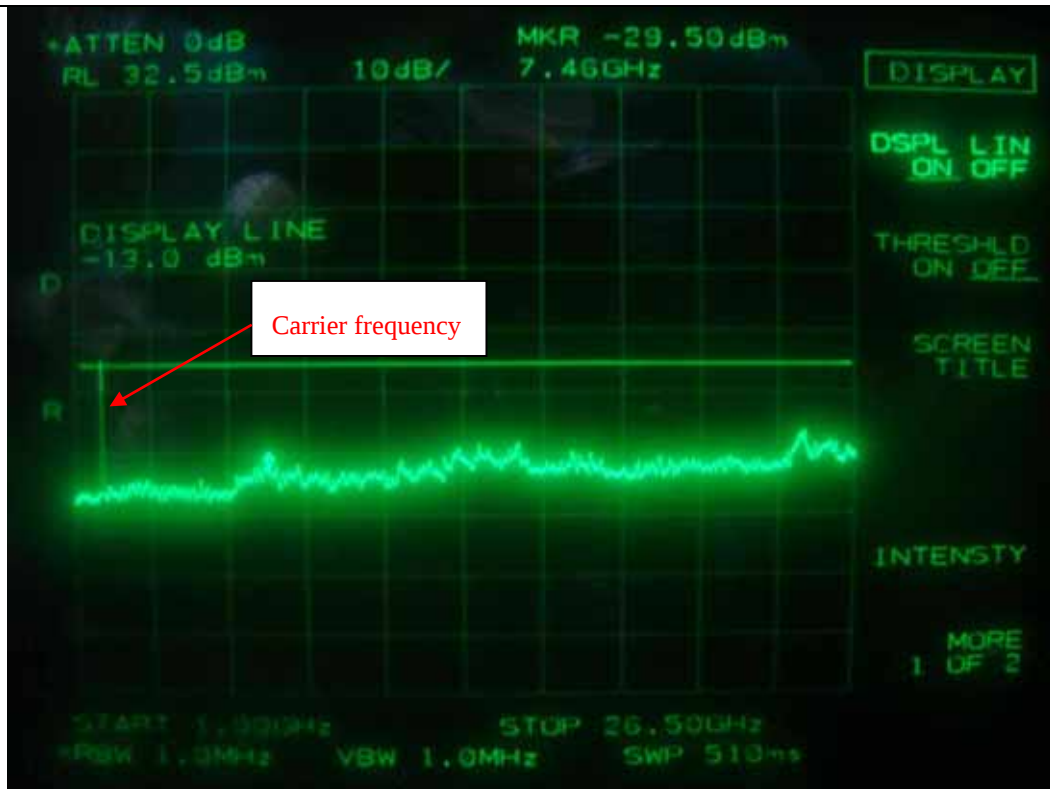
IS-95 – High Channel



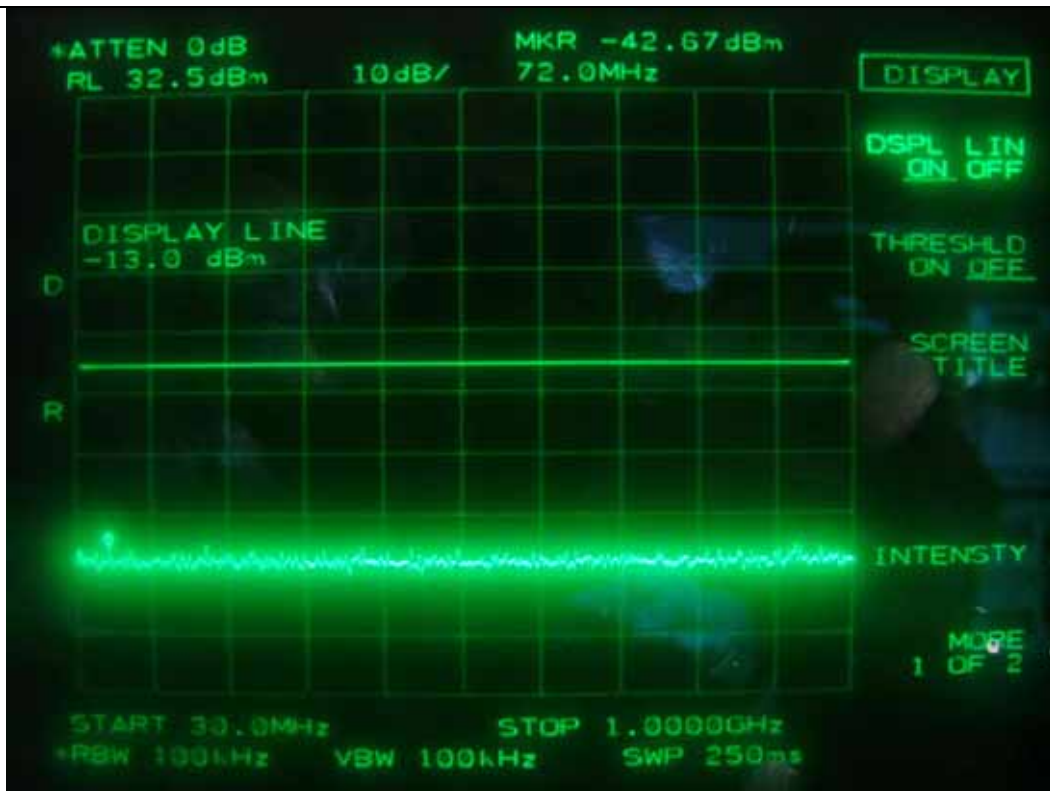
IS-95 – High Channel



1xEVDO – Low Channel



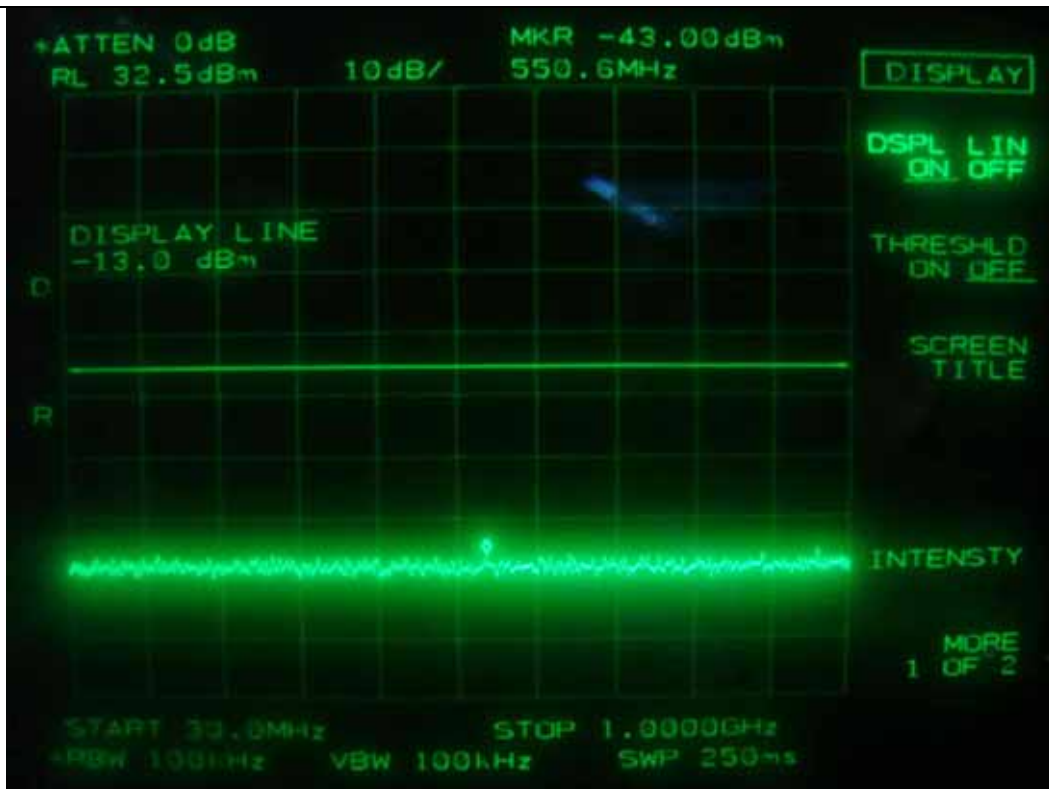
1xEVDO – Low Channel



1xEVDO – Middle Channel



1xEVDO – Middle Channel



1xEVDO – High Channel



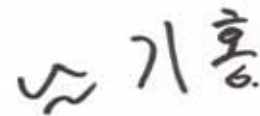
1xEVDO – High Channel

7.4.2 Operating Condition: Min. Power Mode

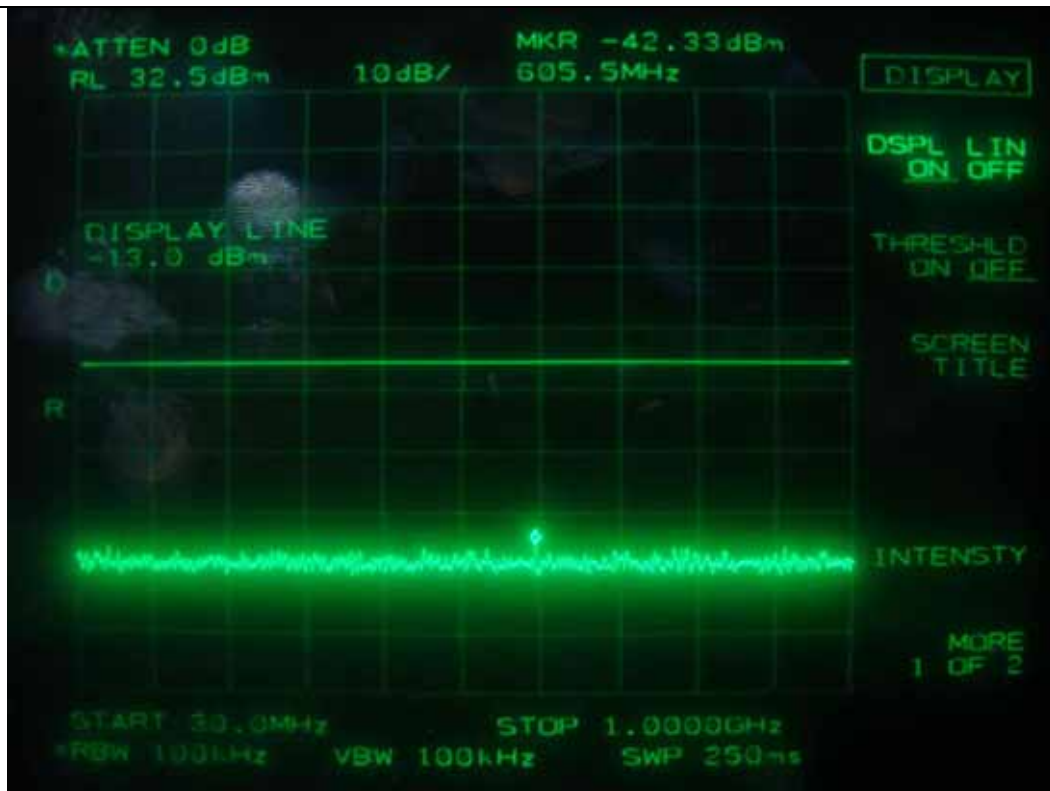
-. Test Date : December 24, 2008
-. Frequency range : 30 MHz ~ 20 GHz
-. Result : PASSED BY -13.83 dB at low channel of IS-95 Mode

Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
IS-95	Low	7 330.00	-28.00	1.17	-26.83	-13.00	-13.83
	Middle	7 290.00	-29.00	1.17	-27.83		-14.83
	High	7 500.00	-28.33	1.17	-27.16		-14.16
1xEVDO	Low	7 500.00	-28.33	1.17	-27.16	-13.00	-14.16
	Middle	7 380.00	-29.83	1.17	-28.66		-15.66
	High	7 330.00	-28.33	1.17	-27.16		-14.16

According to Part 24E, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0 dBm.



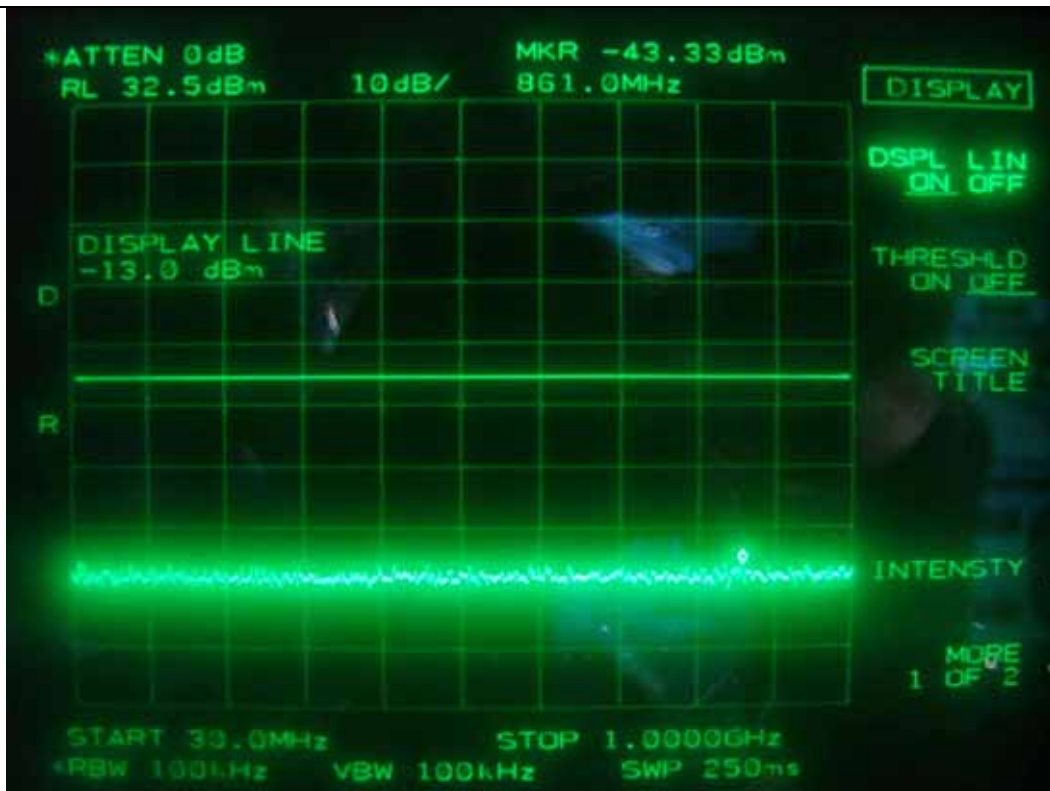
Tested by: Ki-Hong, Nam / Project Engineer



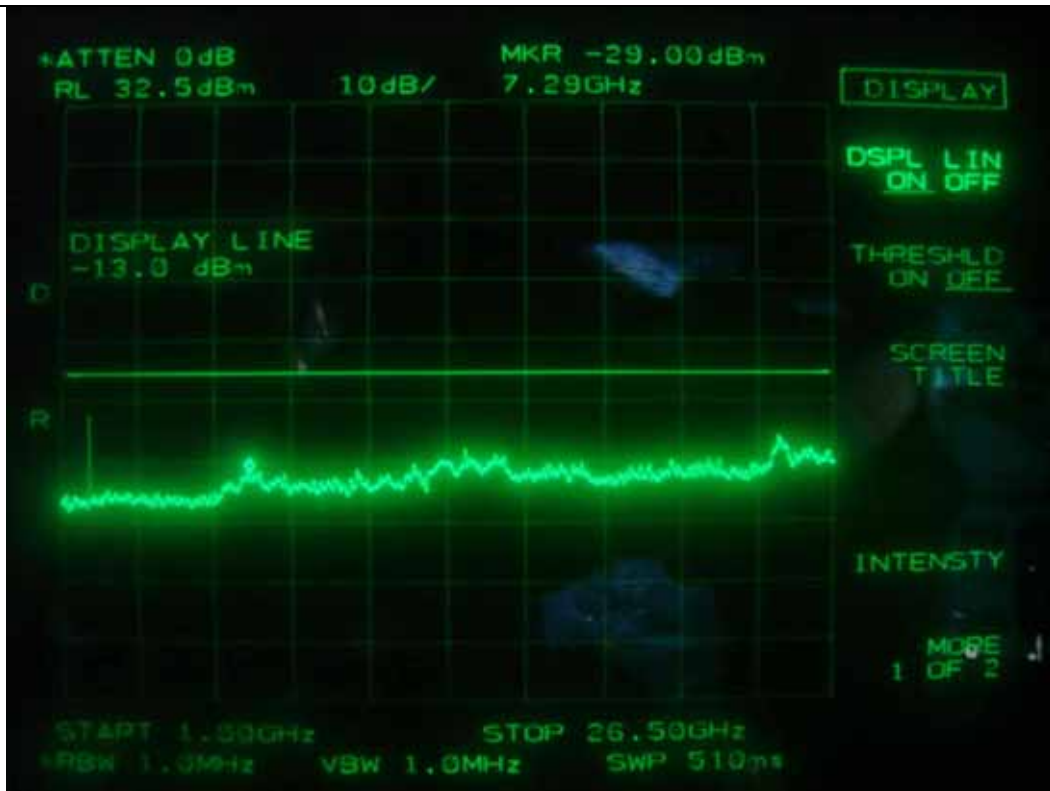
IS-95 - Low Channel



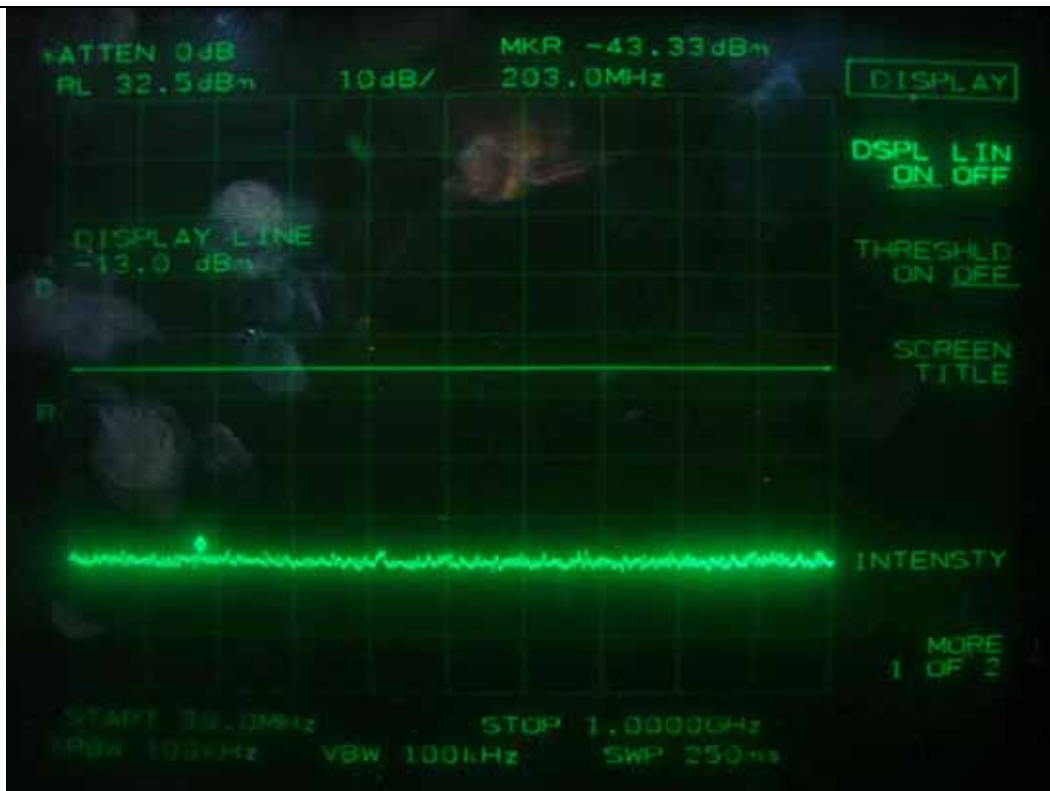
IS-95 - Low Channel



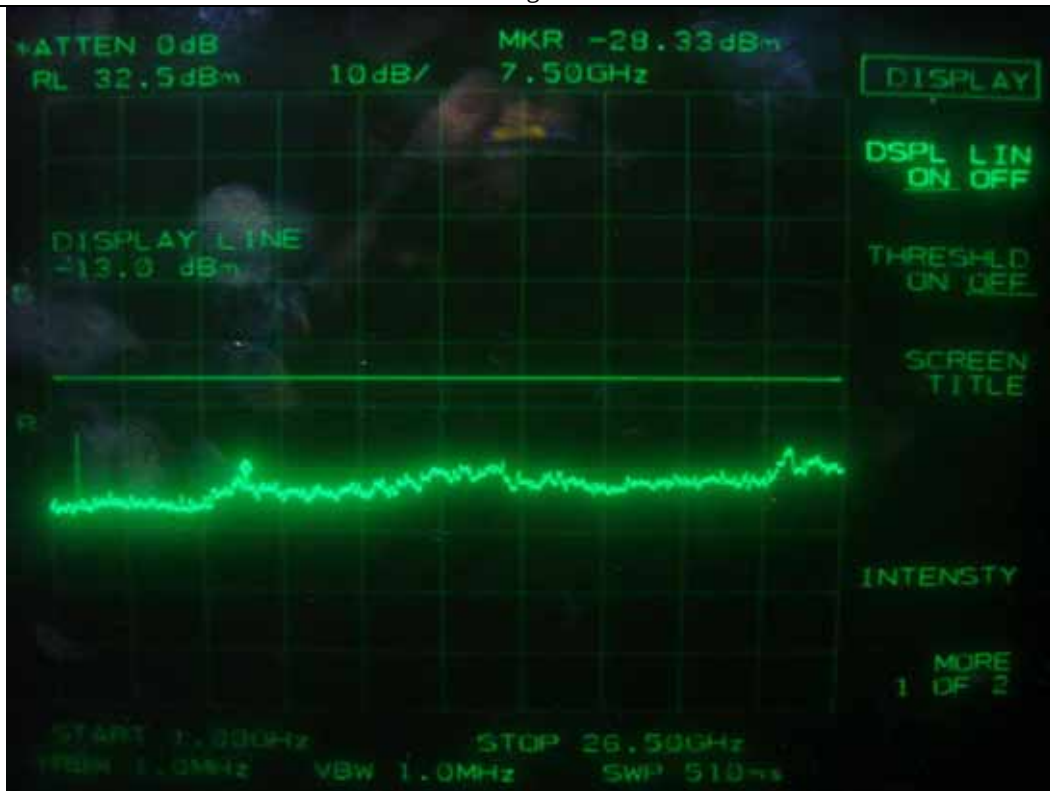
IS-95 – Middle Channel



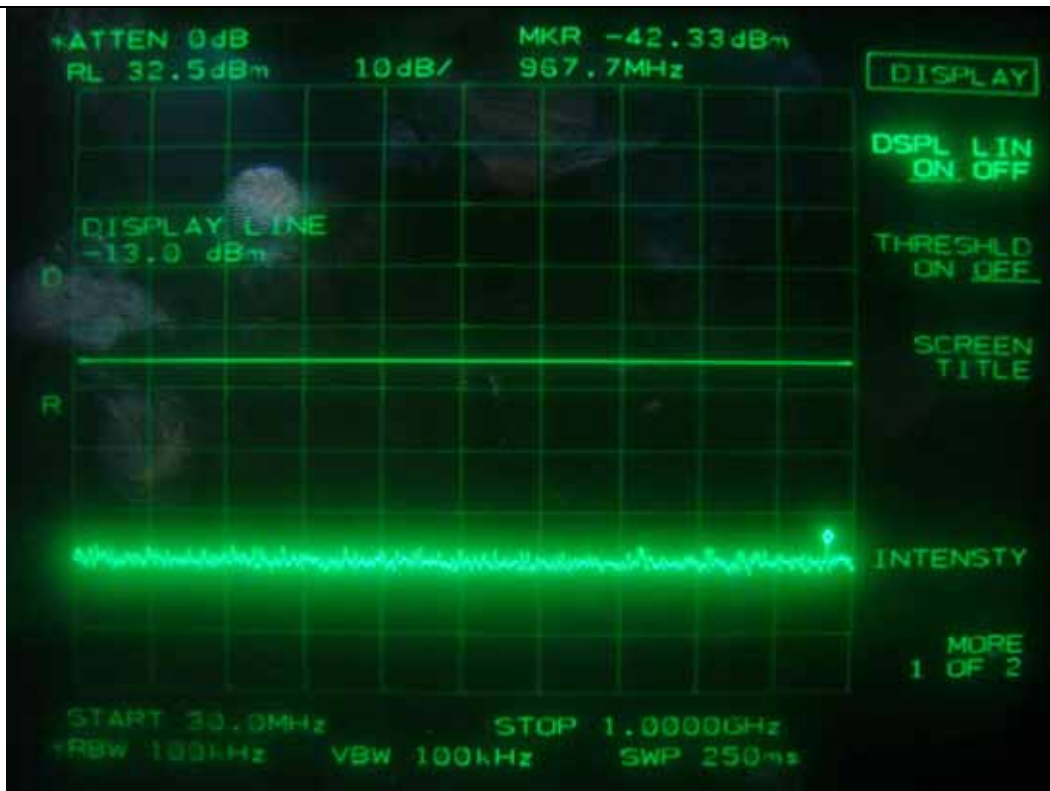
IS-95 – Middle Channel



IS-95 – High Channel



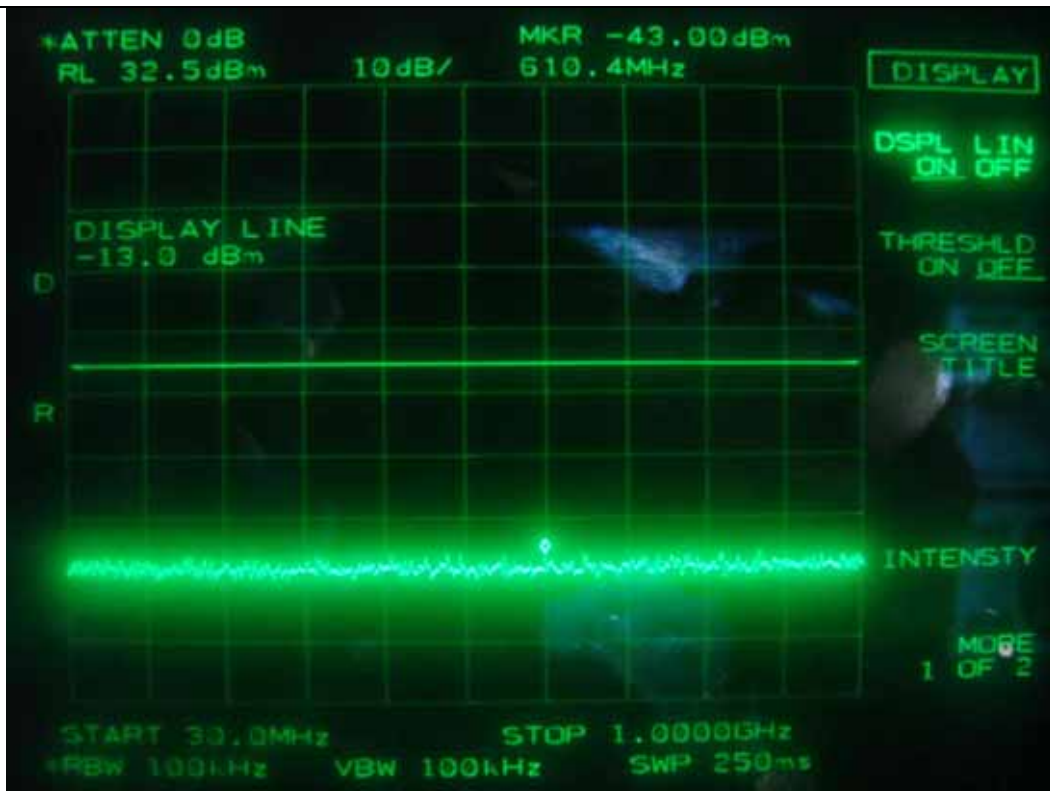
IS-95 – High Channel



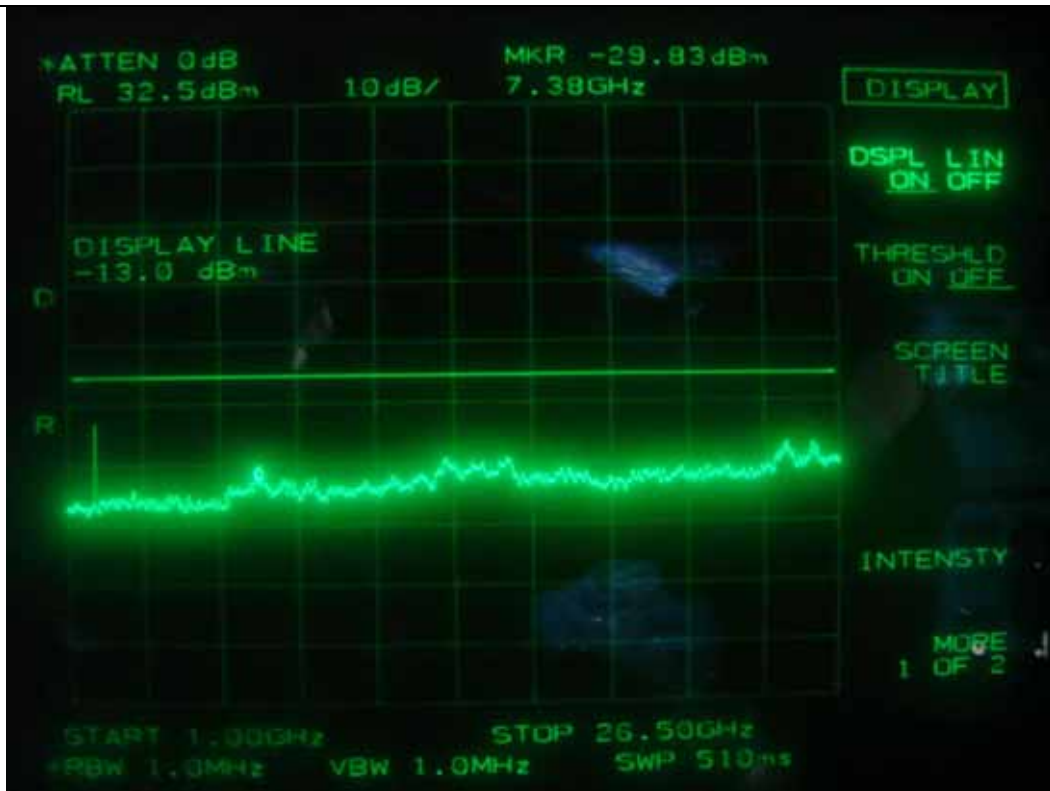
1xEVDO – Low Channel



1xEVDO – Low Channel



1xEVDO – Middle Channel



1xEVDO – Middle Channel



1xEVDO – High Channel



1xEVDO – High Channel

8. SPURIOUS EMISSION AT ANTENNA TERMINAL AT BLOCK EDGES ± 1 MHz

8.1 Operating environment

Temperature : 21 °C
Relative humidity : 41.5 %R.H.

8.2 Test set-up for conducted measurement

The RF output port of the EUT was connected to the input of the spectrum analyzer. The software for RF control on the notebook PC was set to transmit maximum signal gain and bandwidth. The test was performed at three frequencies (low, middle, and high channels).



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2008
■ -	E4432B	HP	Signal Generator	US38440950	June 16, 2008

All test equipment used is calibrated on a regular basis.

8.4 Test data

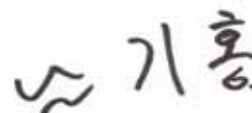
8.4.1 Operating Condition: Max. Power Mode

-. Test Date : January 05, 2009

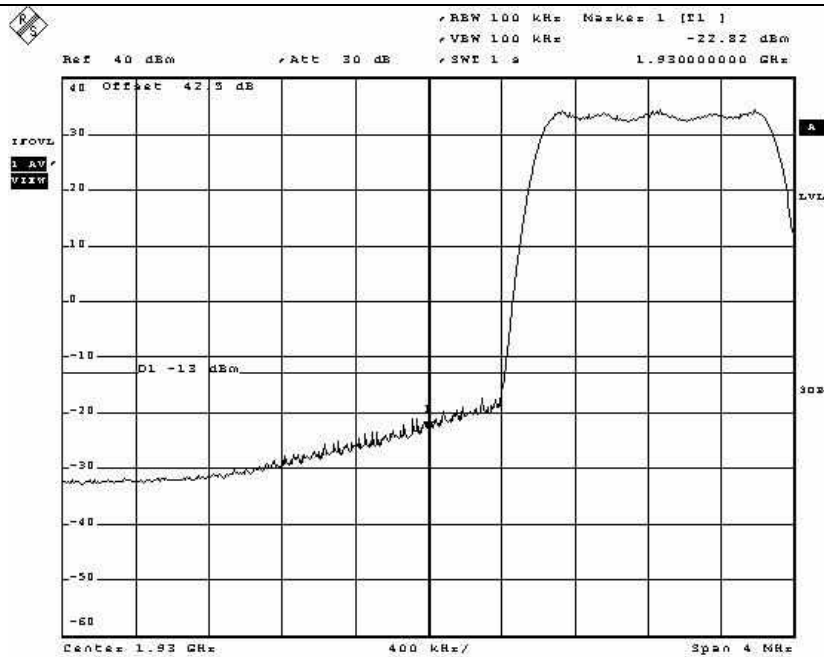
-. Result : PASSED BY -7.86 dB at low channel of 1xEVDO Mode

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
IS-95	Low	1 930.00	-22.82	-13.00
	Middle	1 950.00	-21.99	
	High	1 970.00	-23.59	
1xEVDO	Low	1 930.00	-20.86	
	Middle	1 950.00	-22.04	
	High	1 970.00	-23.89	

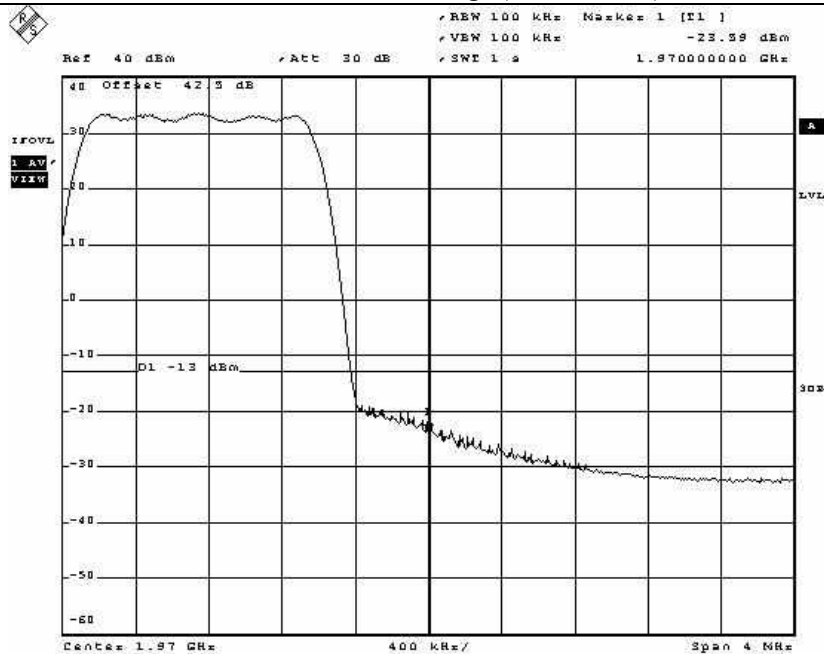
According to Part 24E, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0dBm.



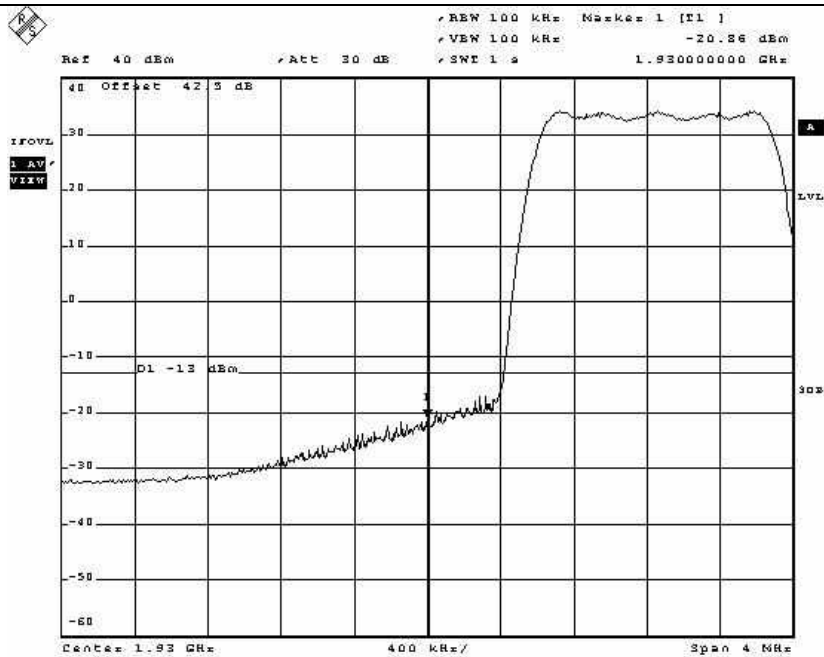
Tested by: Ki-Hong, Nam / Project Engineer



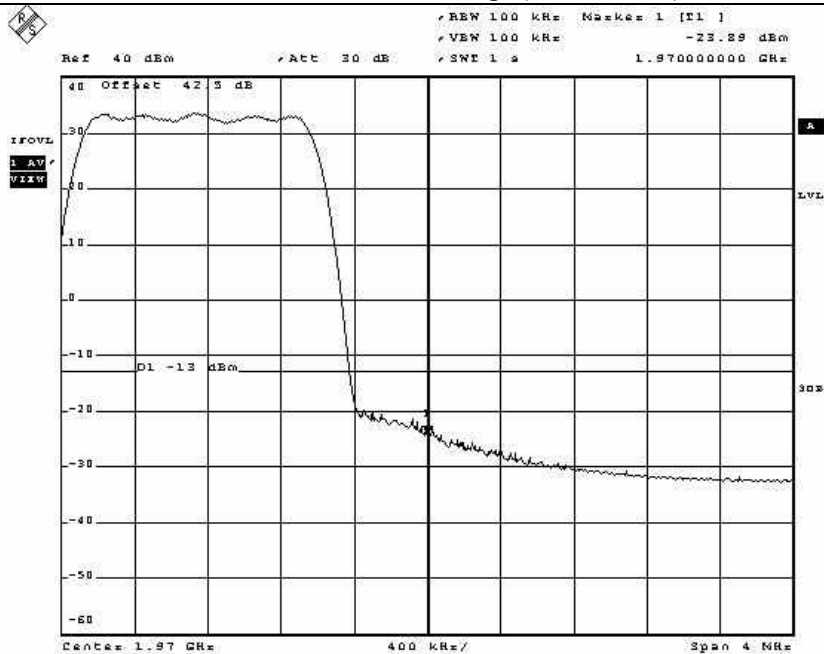
IS-95 – Band Edge (Low Channel)



IS-95 – Band Edge (High Channel)



1xEVDO – Band Edge (Low Channel)



1xEVDO – Band Edge (High Channel)

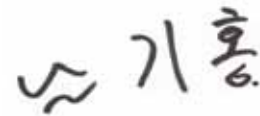
8.4.2 Operating Condition: Min. Power Mode

-. Test Date : January 05, 2009

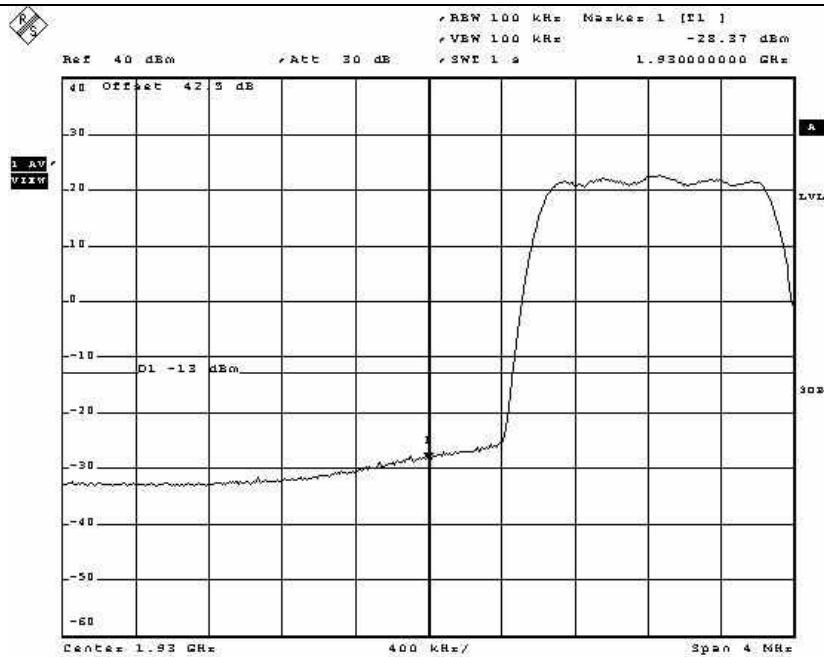
-. Result : PASSED BY -15.11 dB at low channel of 1xEVDO Mode

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
IS-95	Low	1 930.00	-28.37	-13.00
	Middle	1 950.00	-30.65	
	High	1 970.00	-31.31	
1xEVDO	Low	1 930.00	-28.11	
	Middle	1 950.00	-30.12	
	High	1 970.00	-31.13	

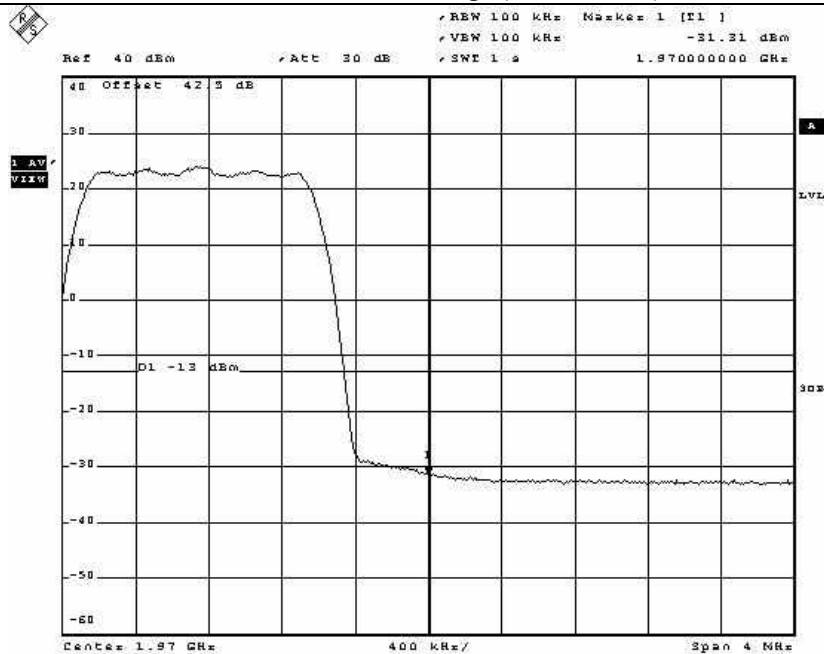
According to Part 24E, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0dBm.



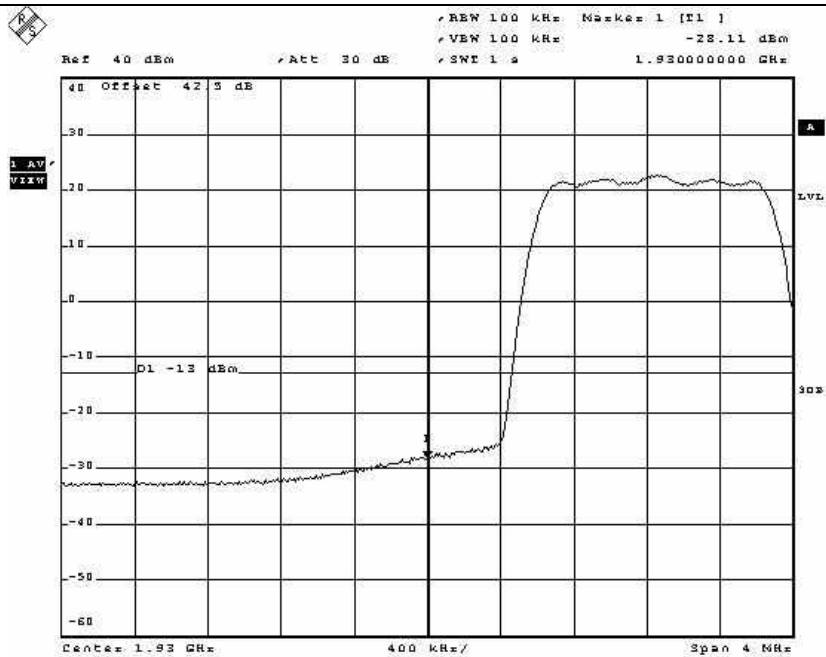
Tested by: Ki-Hong, Nam / Project Engineer



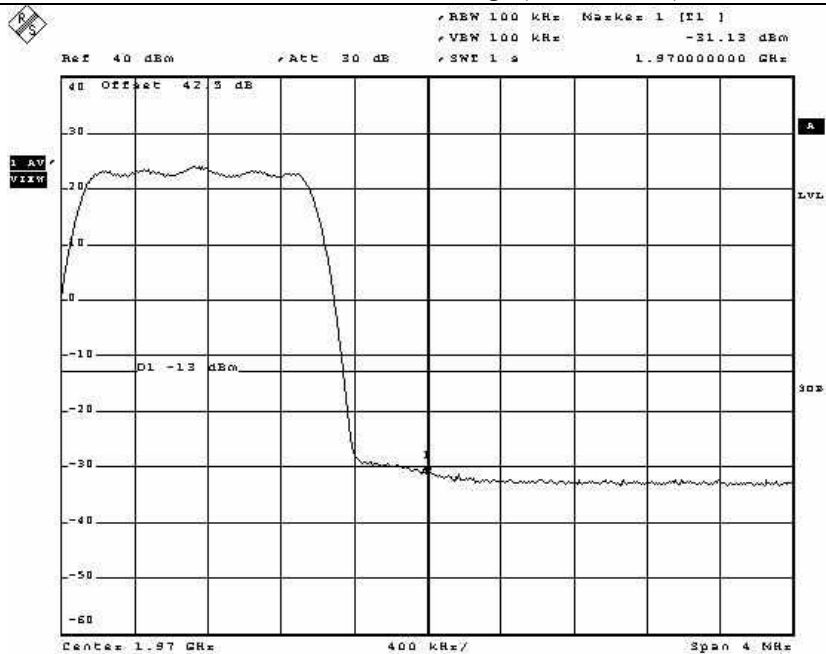
IS-95 – Band Edge (Low Channel)



IS-95 – Band Edge (High Channel)



1xEVDO – Band Edge (Low Channel)



1xEVDO – Band Edge (High Channel)

9. INTERMODULATION TEST

9.1 Operating environment

Temperature : 25.7 °C
Relative humidity : 44.7 %

9.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer. The resolution bandwidth, 100 kHz and video bandwidth, 100 kHz of the spectrum analyzer was set and sufficient scans were taken to show any out of band emissions up to 10th harmonic. The attenuator of the EUT was set to zero by the software for RF control on the notebook PC. Two input signals are equal in level and were sent to the input of the EUT.



9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ -	E4432B	HP	Signal Generator	US38440950	June 16, 2008
■ -	SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ -	3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

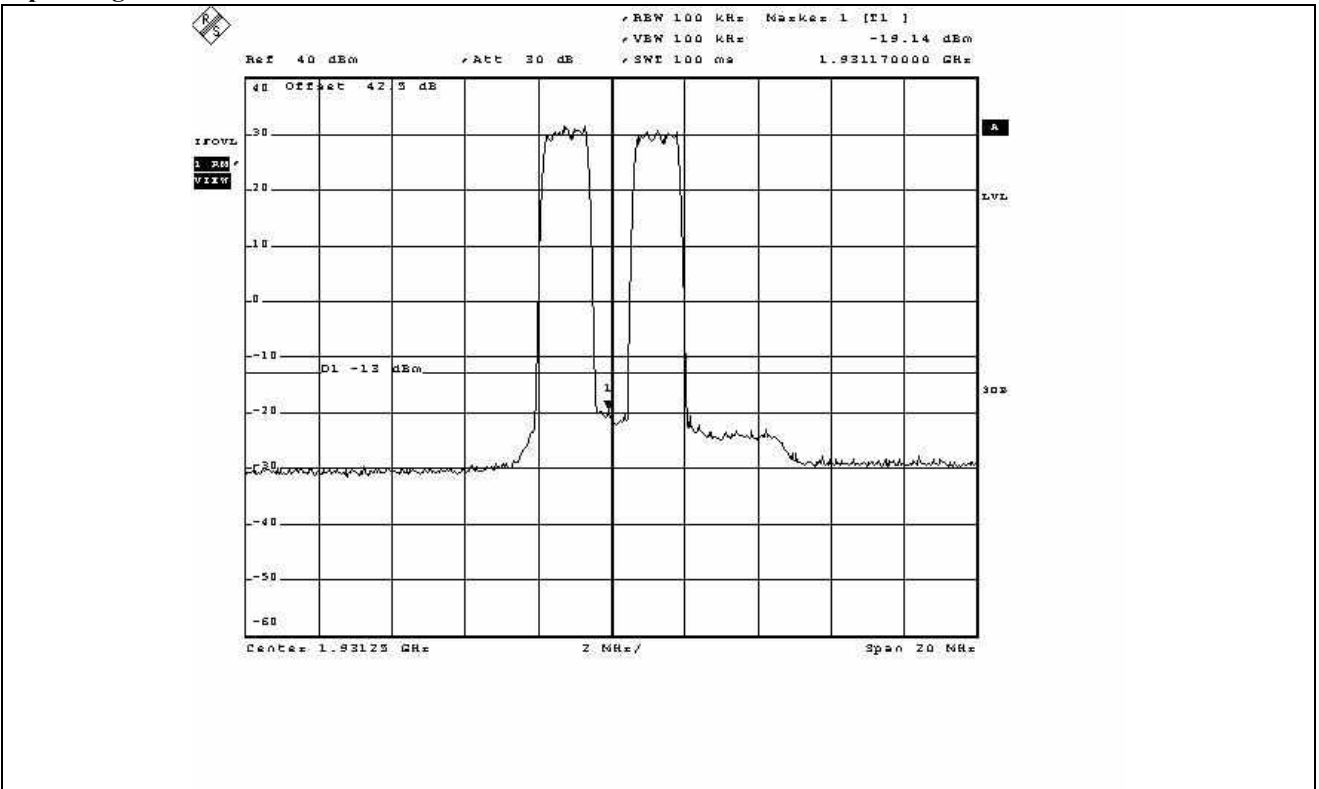
9.4 Test data

-. Test Date : January 05, 2009
-. Test Result : Pass (Max. & Min Power Modes)

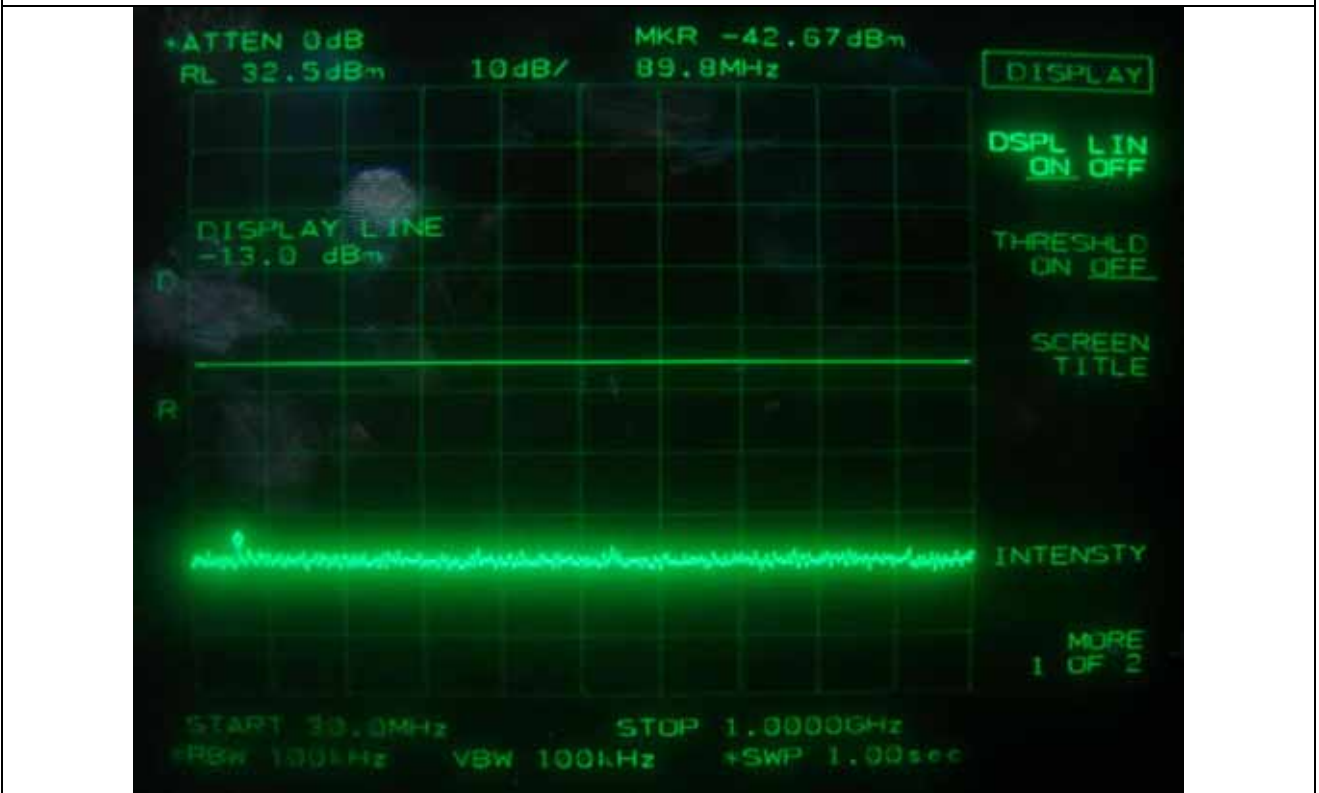
Modulation	Channel	Measured
IS-95	Low	< -13 dBm
	High	< -13 dBm
1xEVDO	Low	< -13 dBm
	High	< -13 dBm

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13dBm. Please refer to test data hereinafter.

Operating Condition: Max. Power Mode

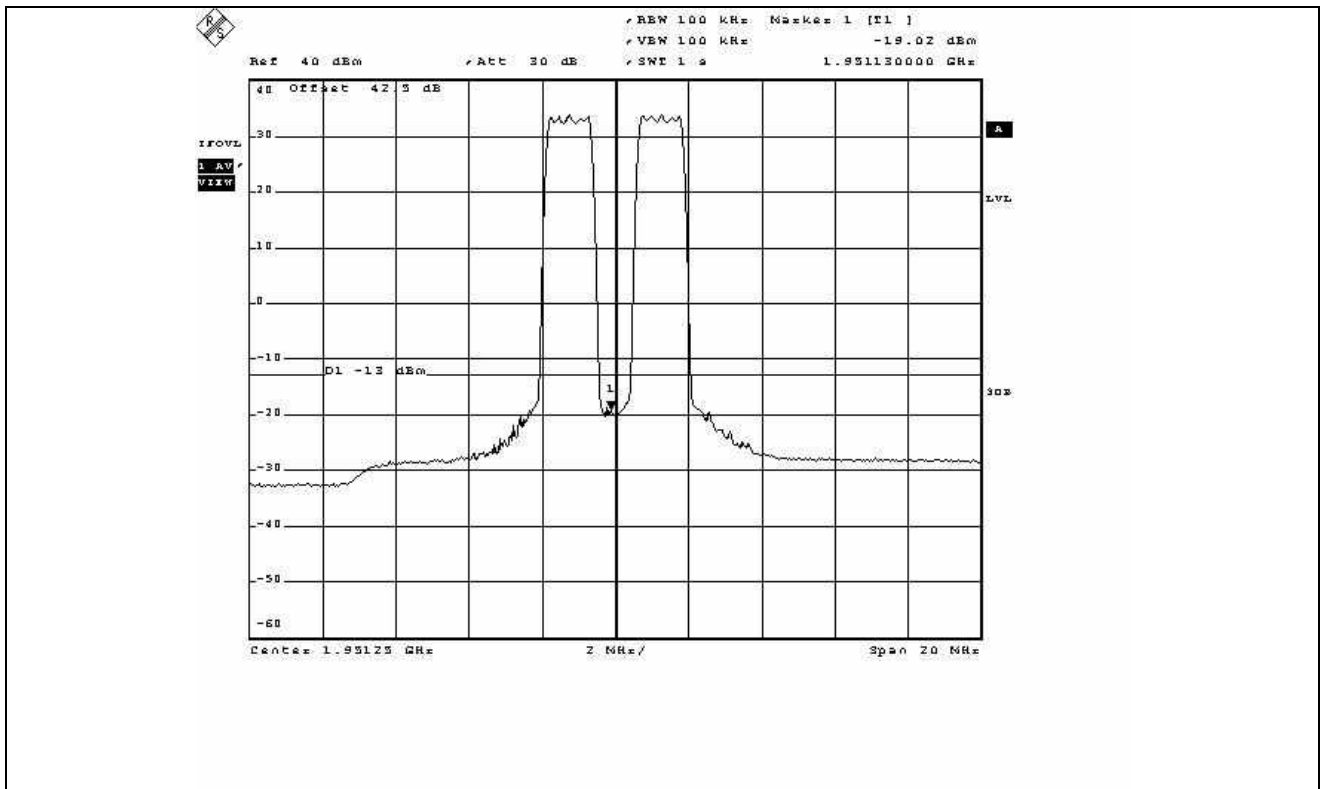


IS-95 – Low Channel

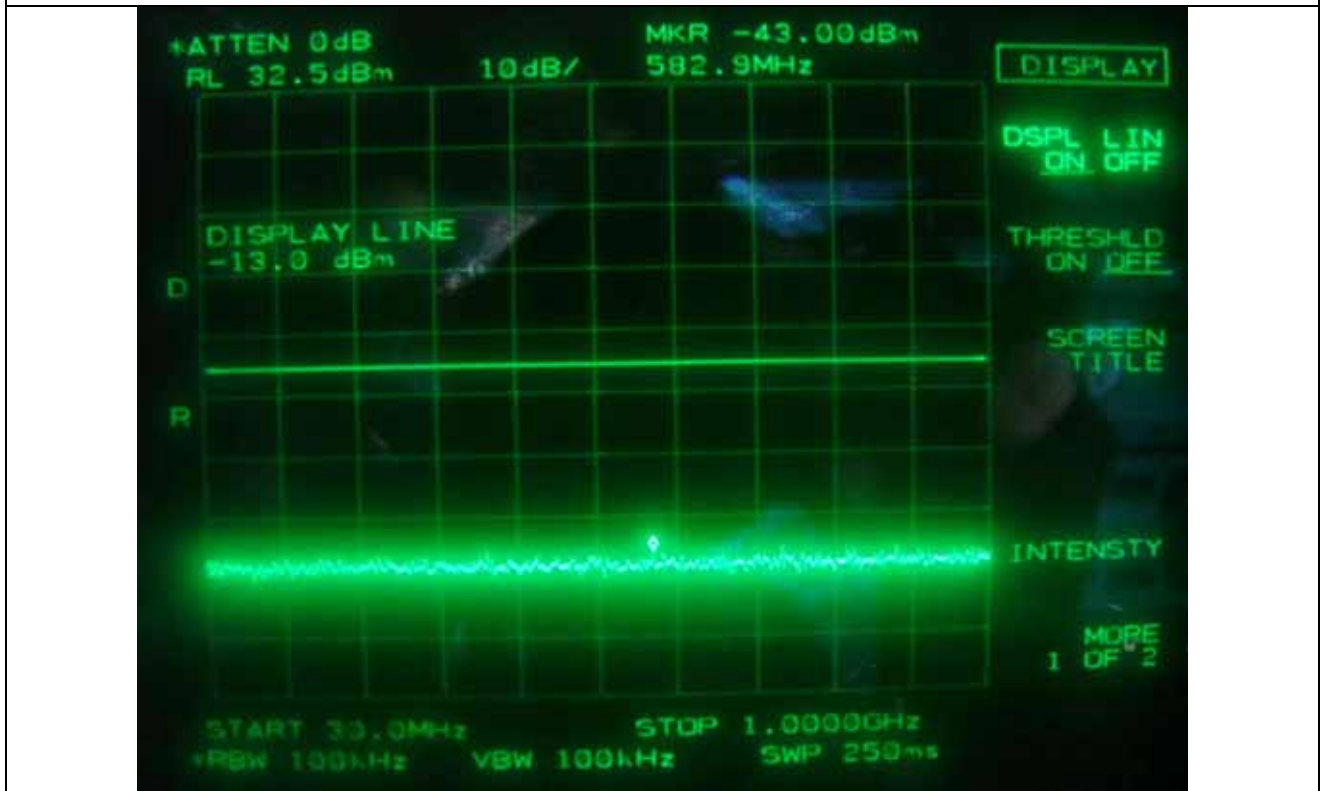


IS-95 – Low Channel





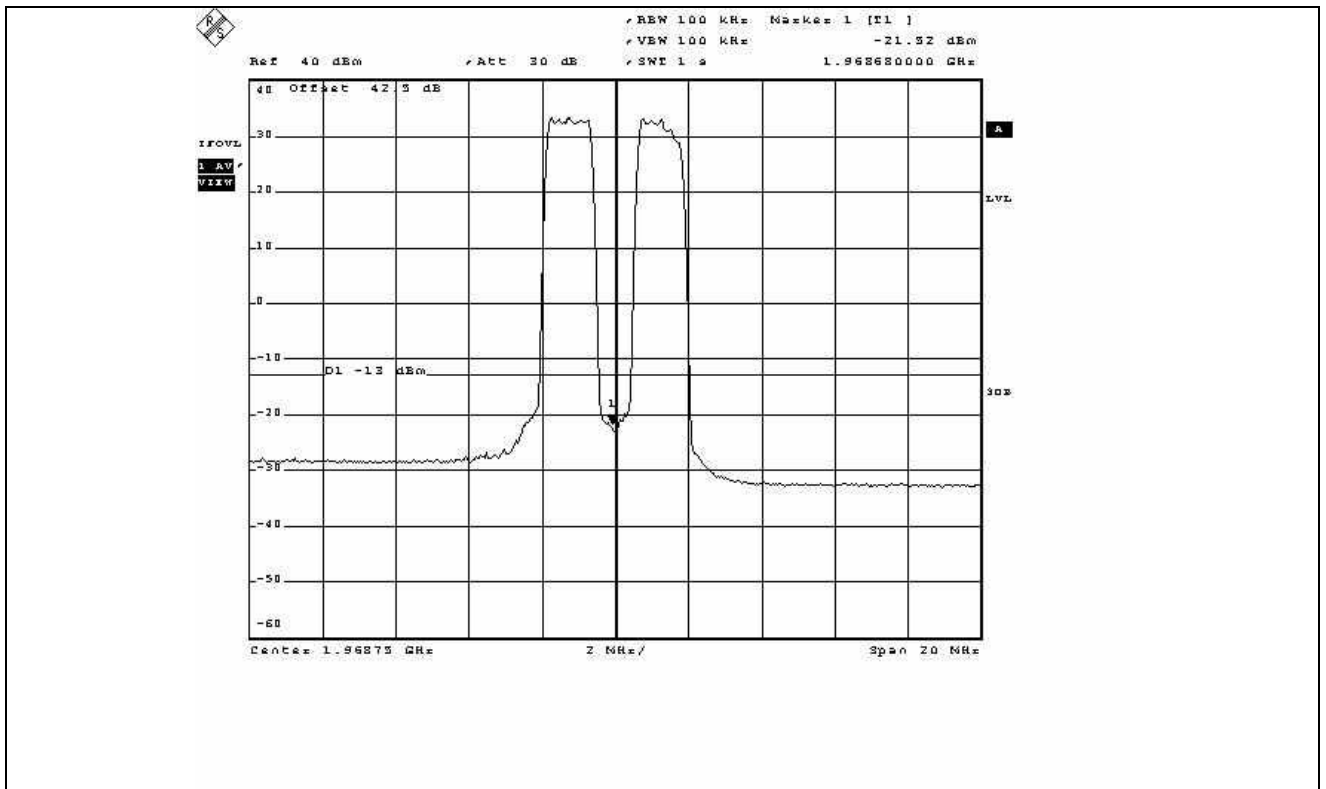
IS-95 – Middle Channel



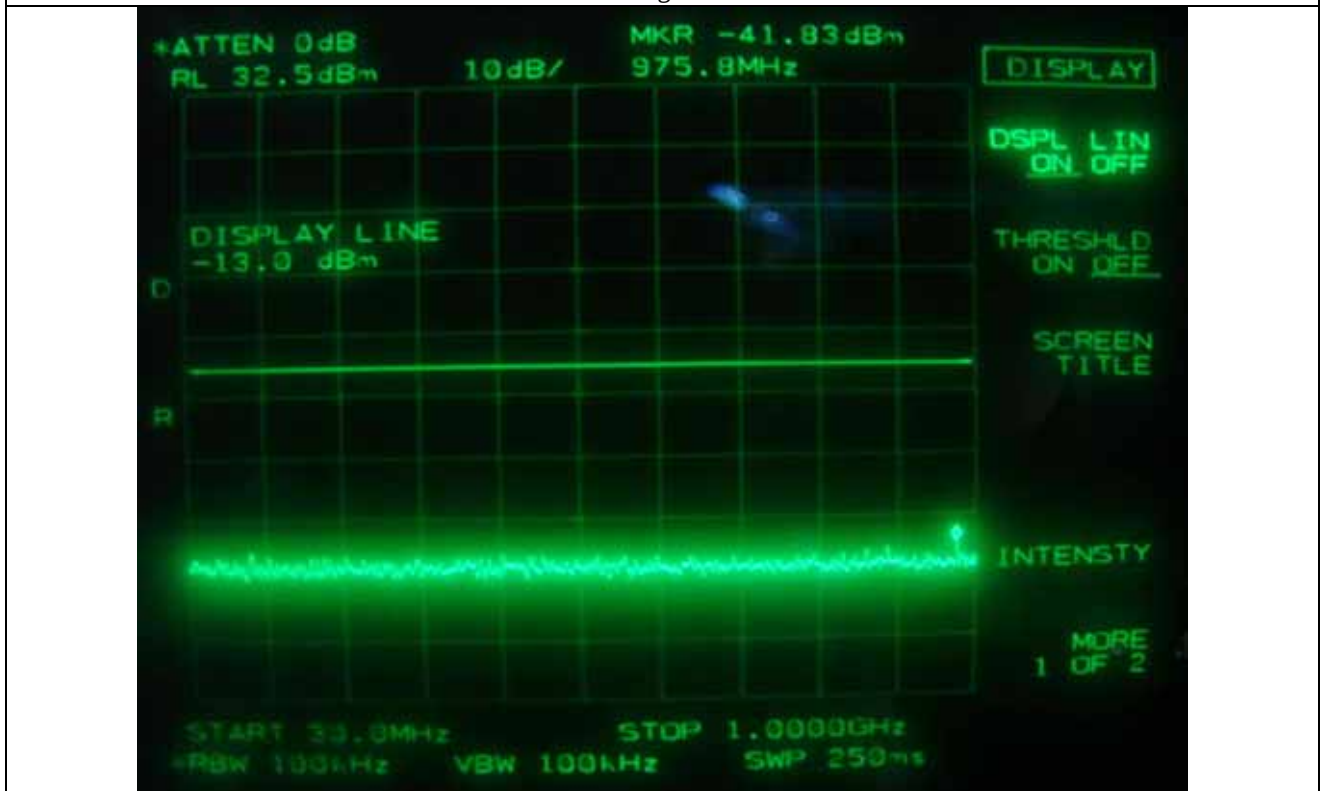
IS-95 – Middle Channel



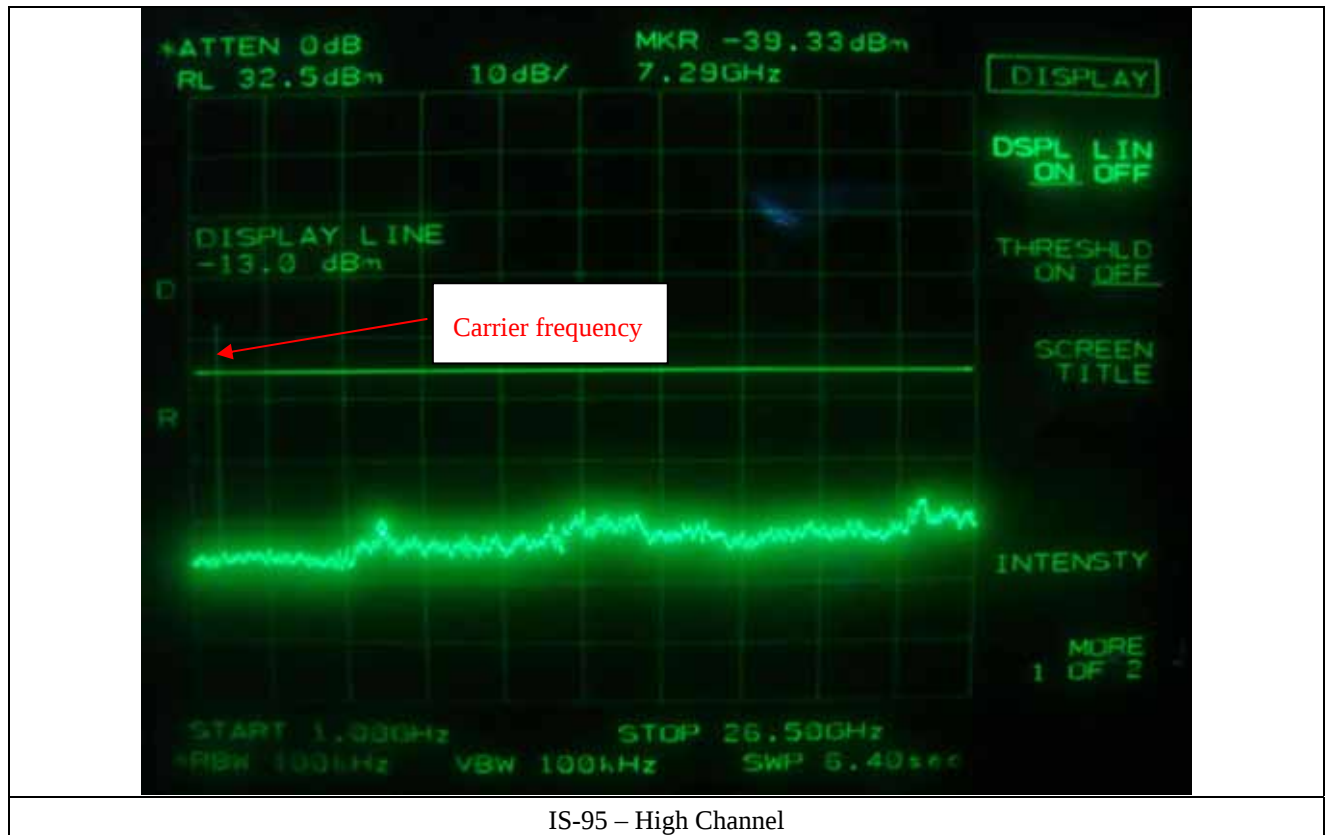
IS-95 – Middle Channel

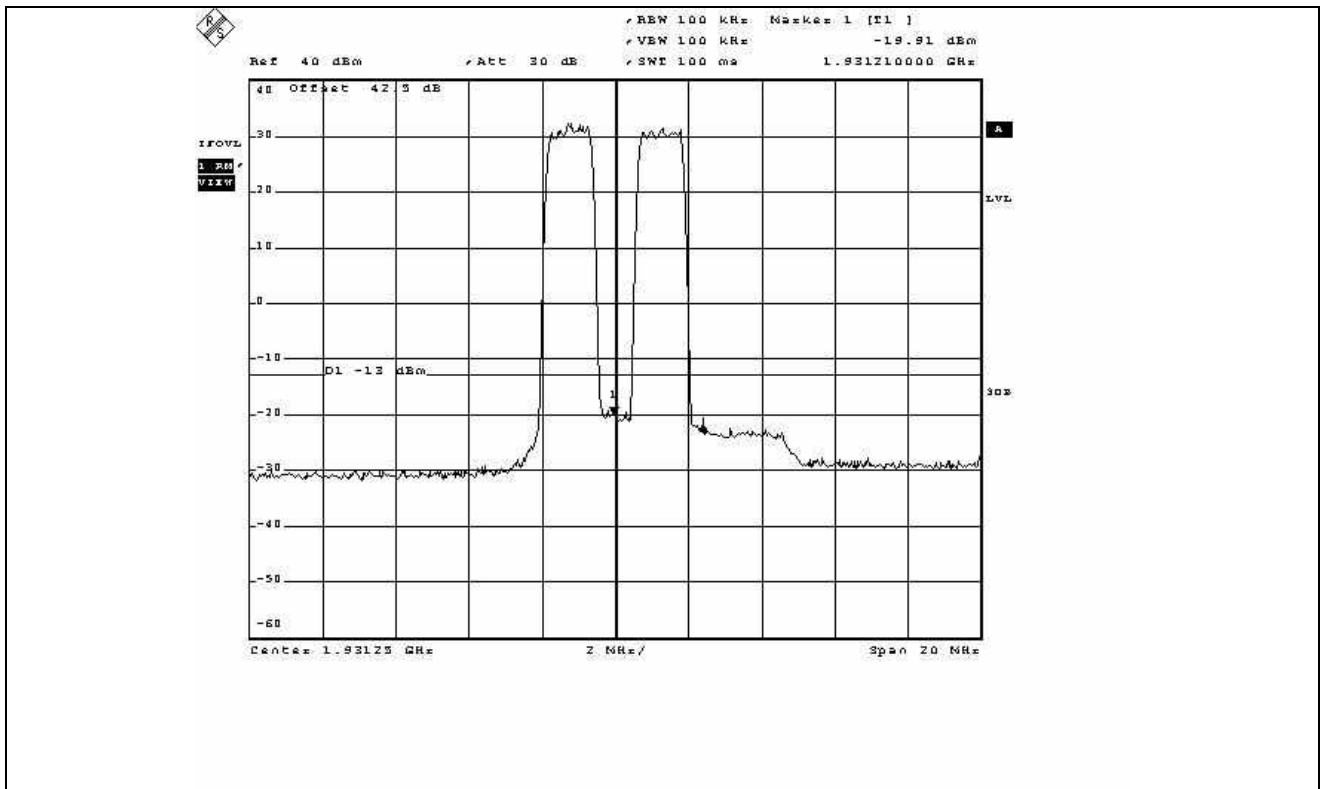


IS-95 – High Channel

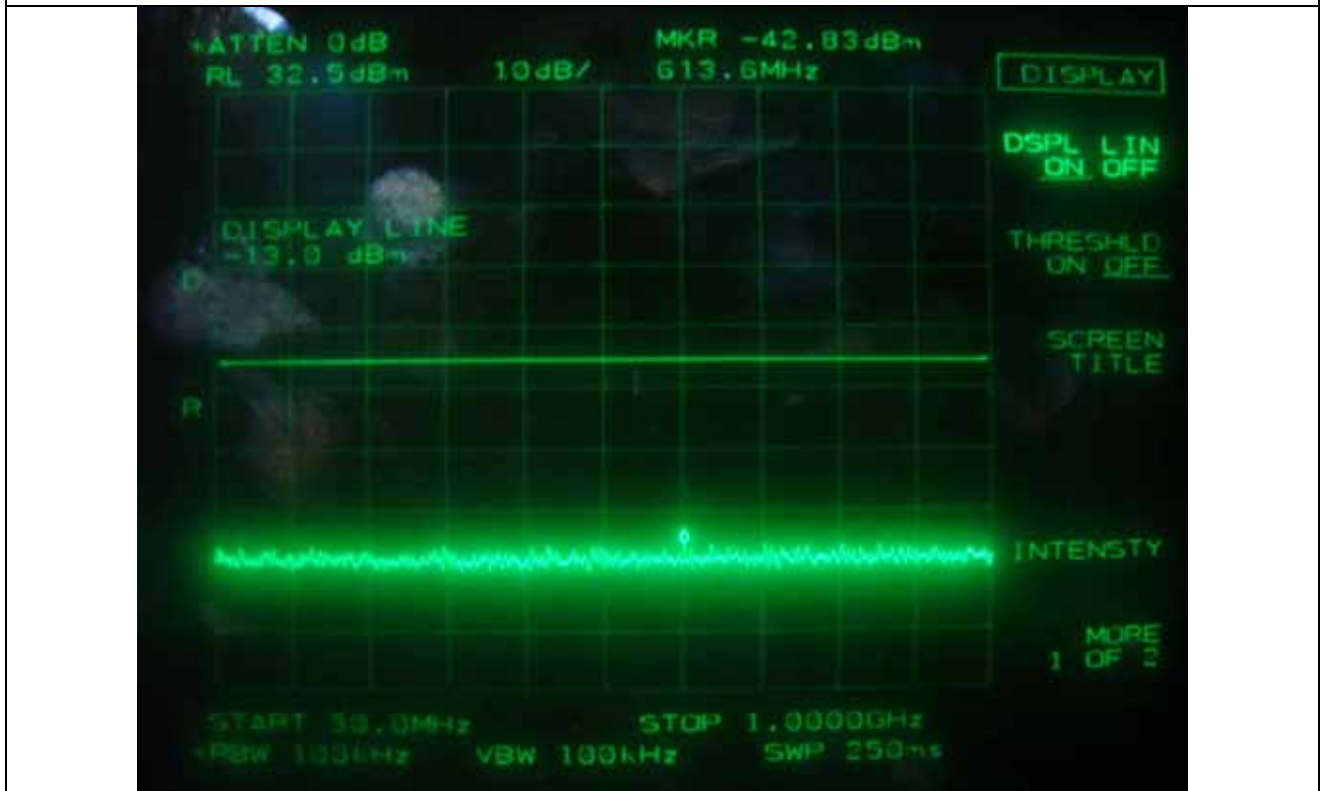


IS-95 – High Channel



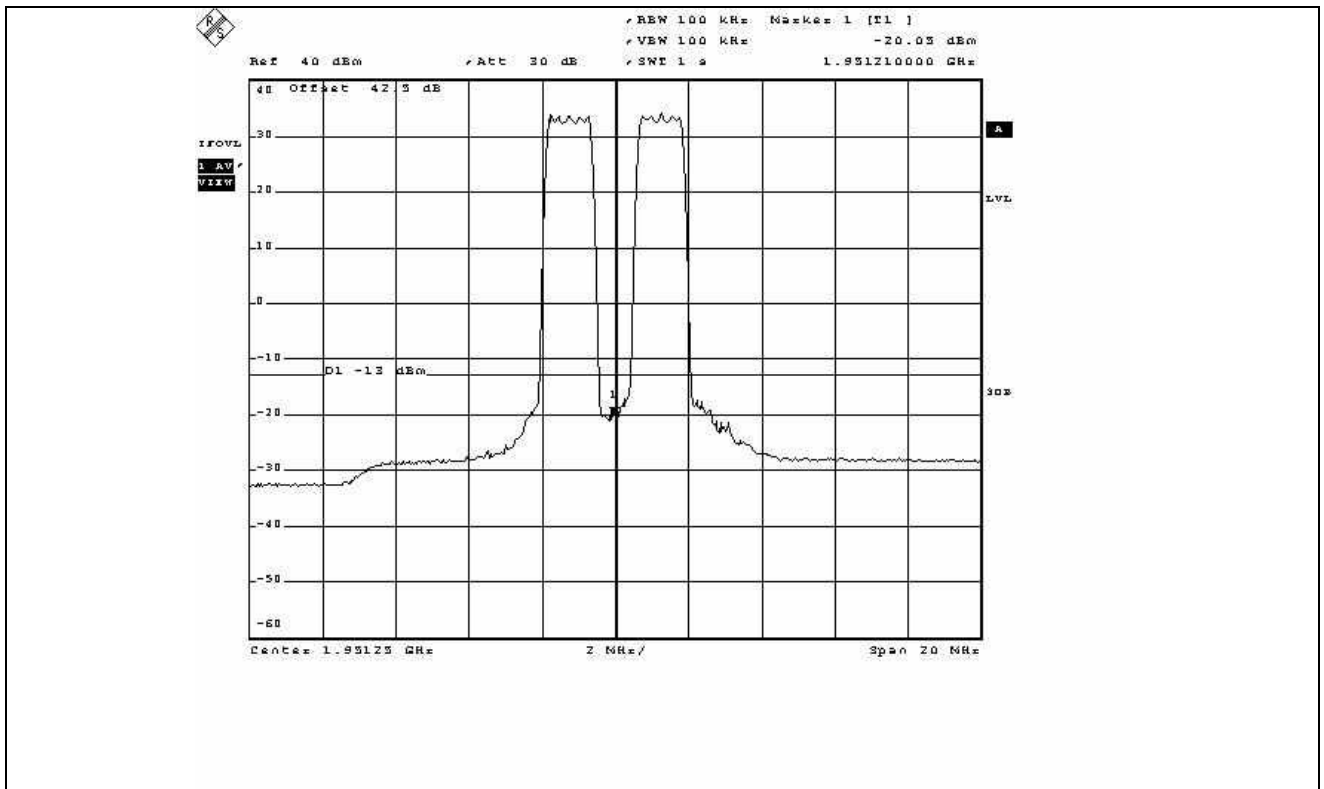


1xEVDO – Low Channel



1xEVDO – Low Channel



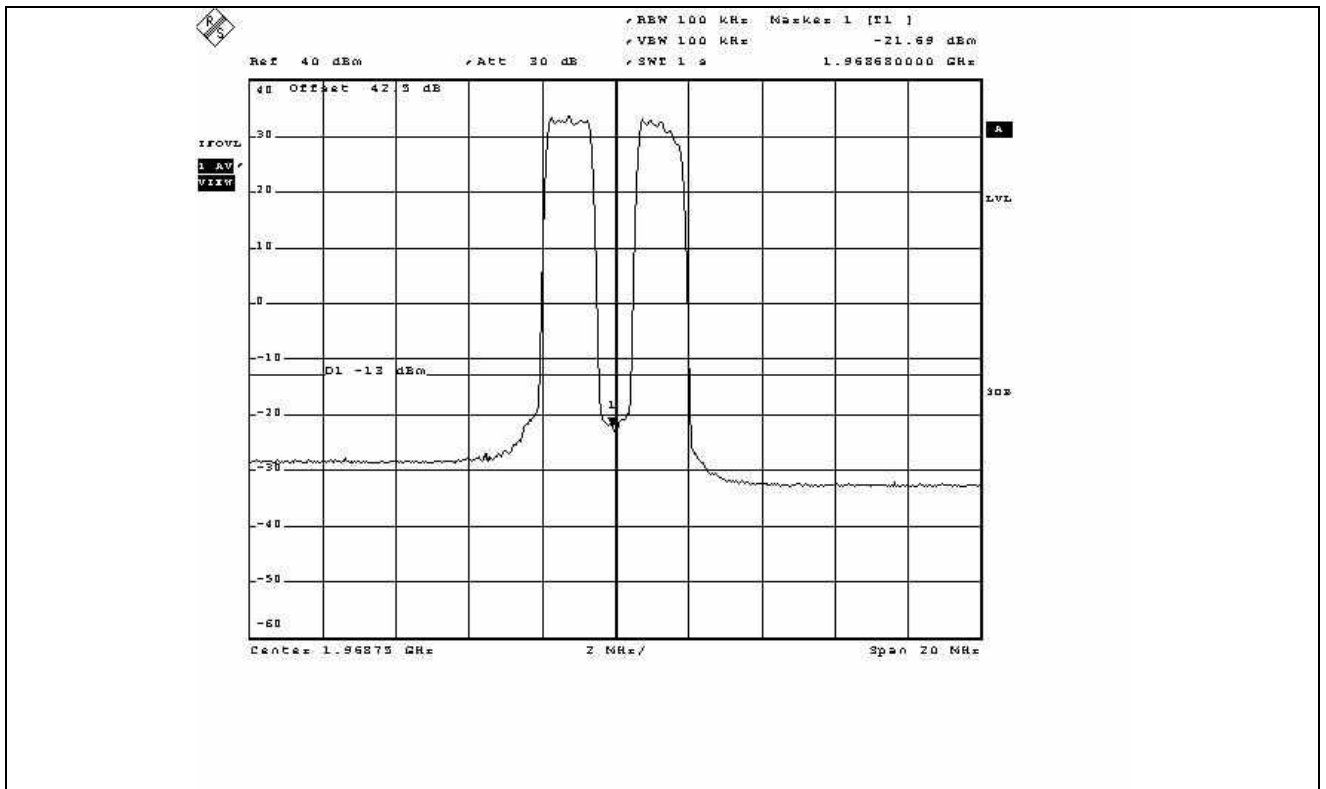


1xEVDO – Middle Channel

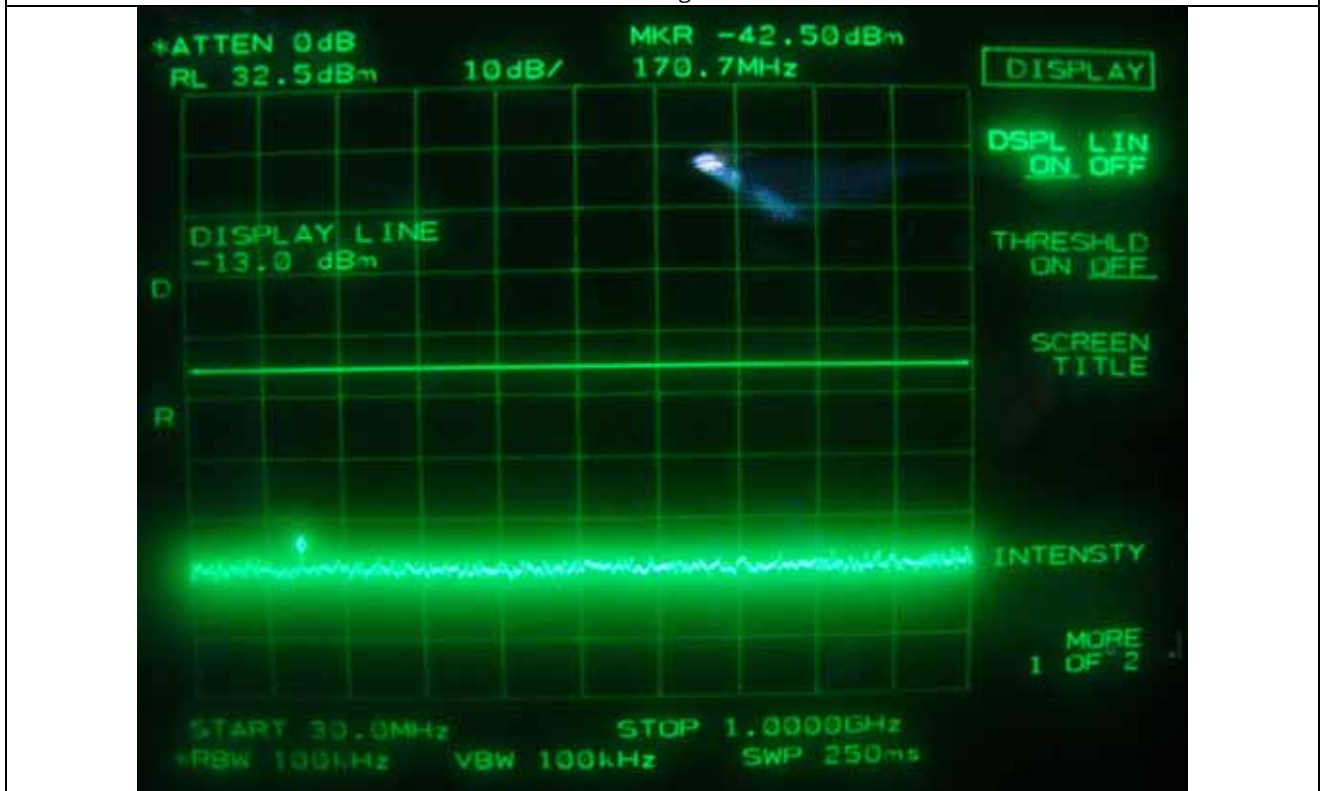


1xEVDO – Middle Channel





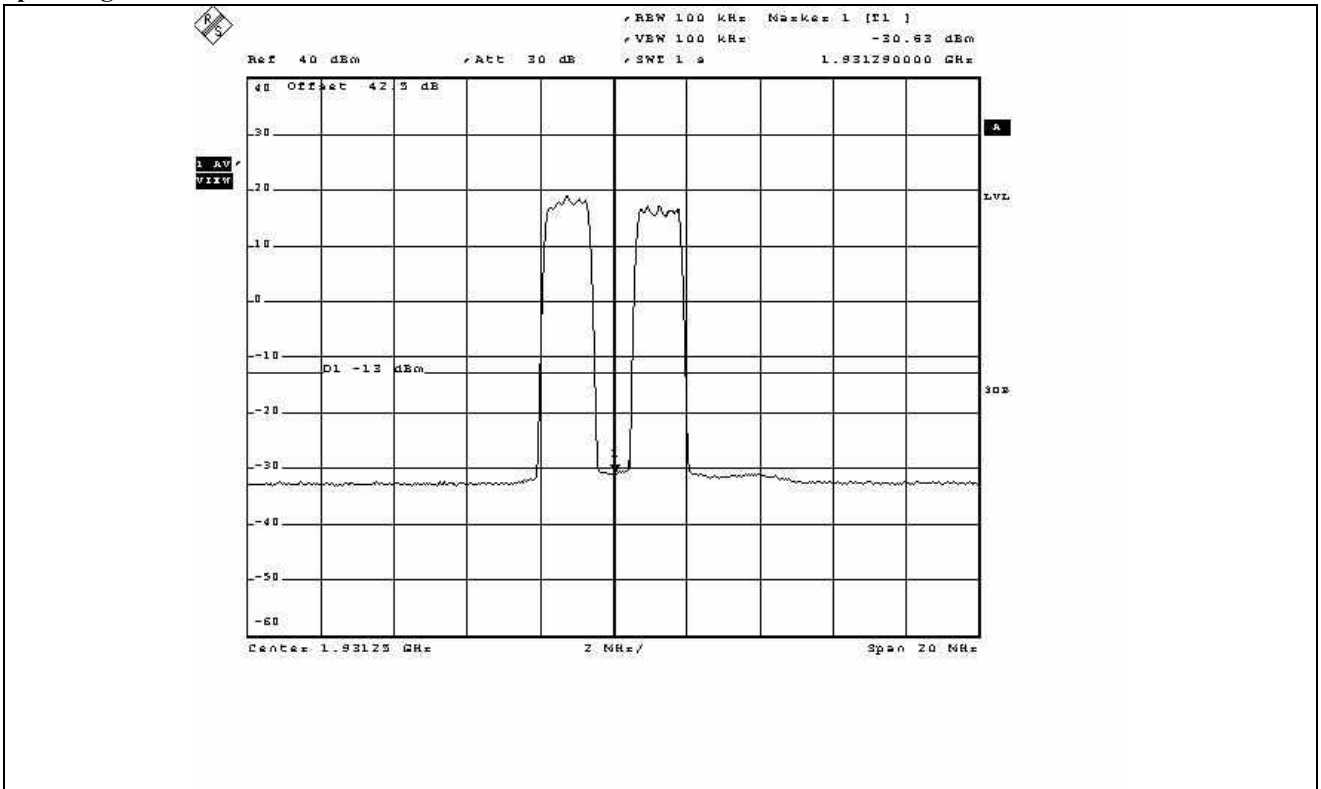
1xEVDO – High Channel



1xEVDO – High Channel



Operating Condition: Min. Power Mode

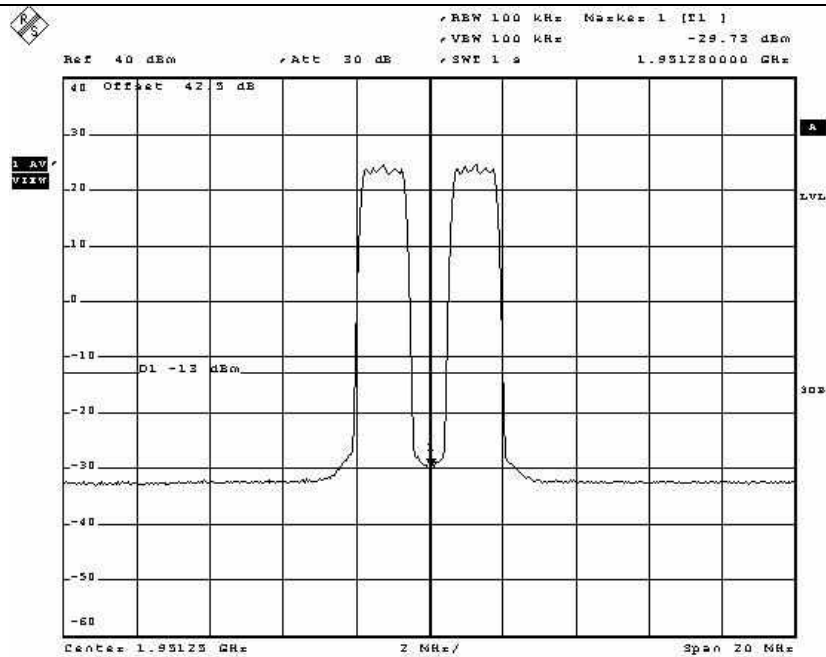


IS-95 – Low Channel

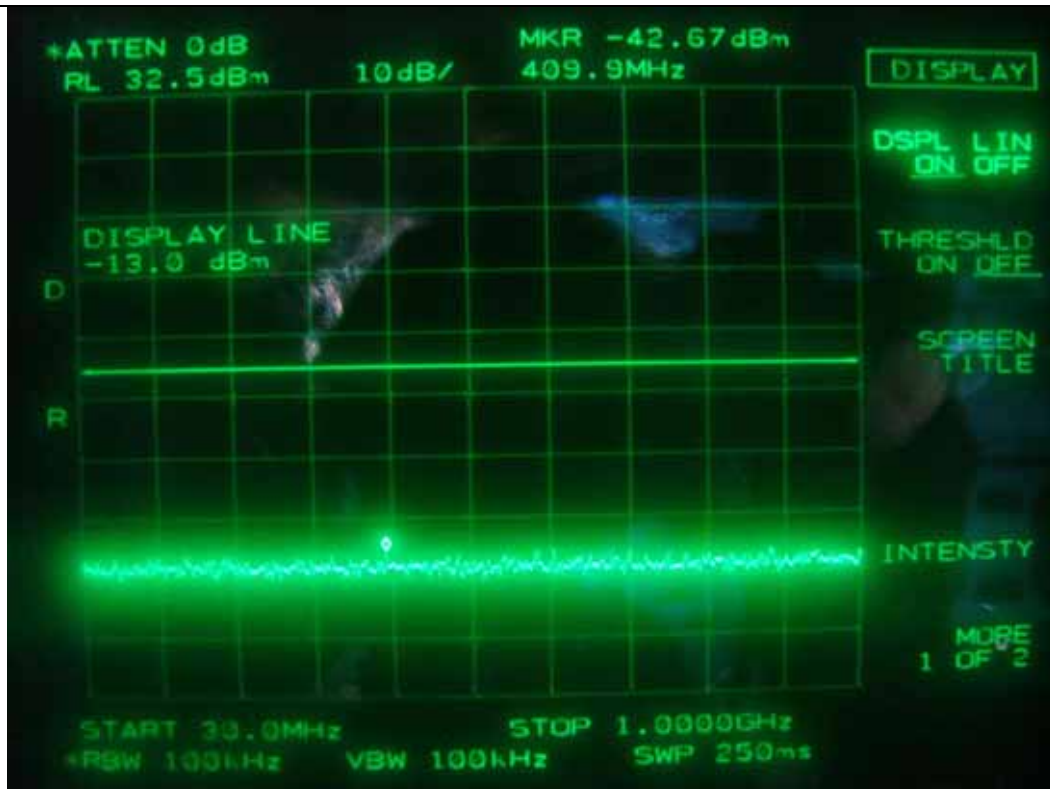


IS-95 – Low Channel



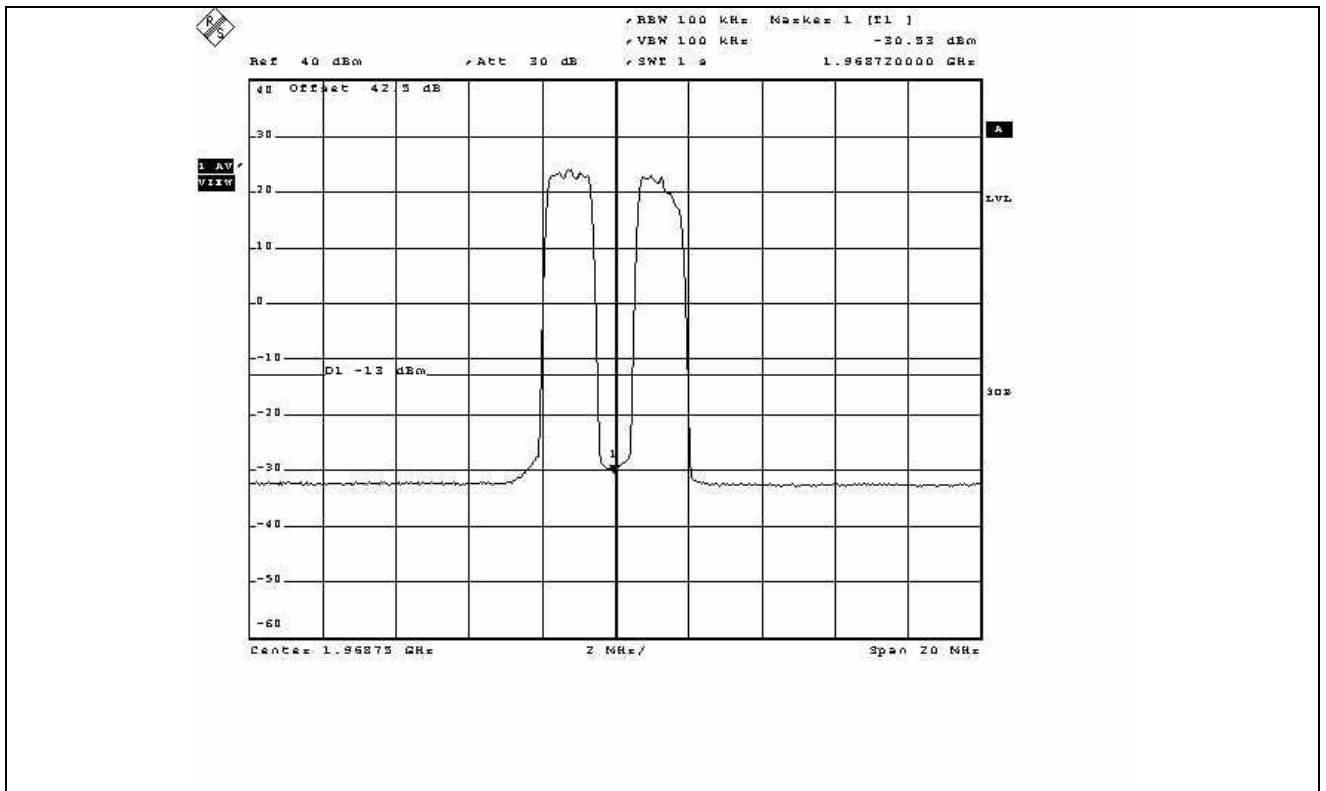


IS-95 – Middle Channel



IS-95 – Middle Channel





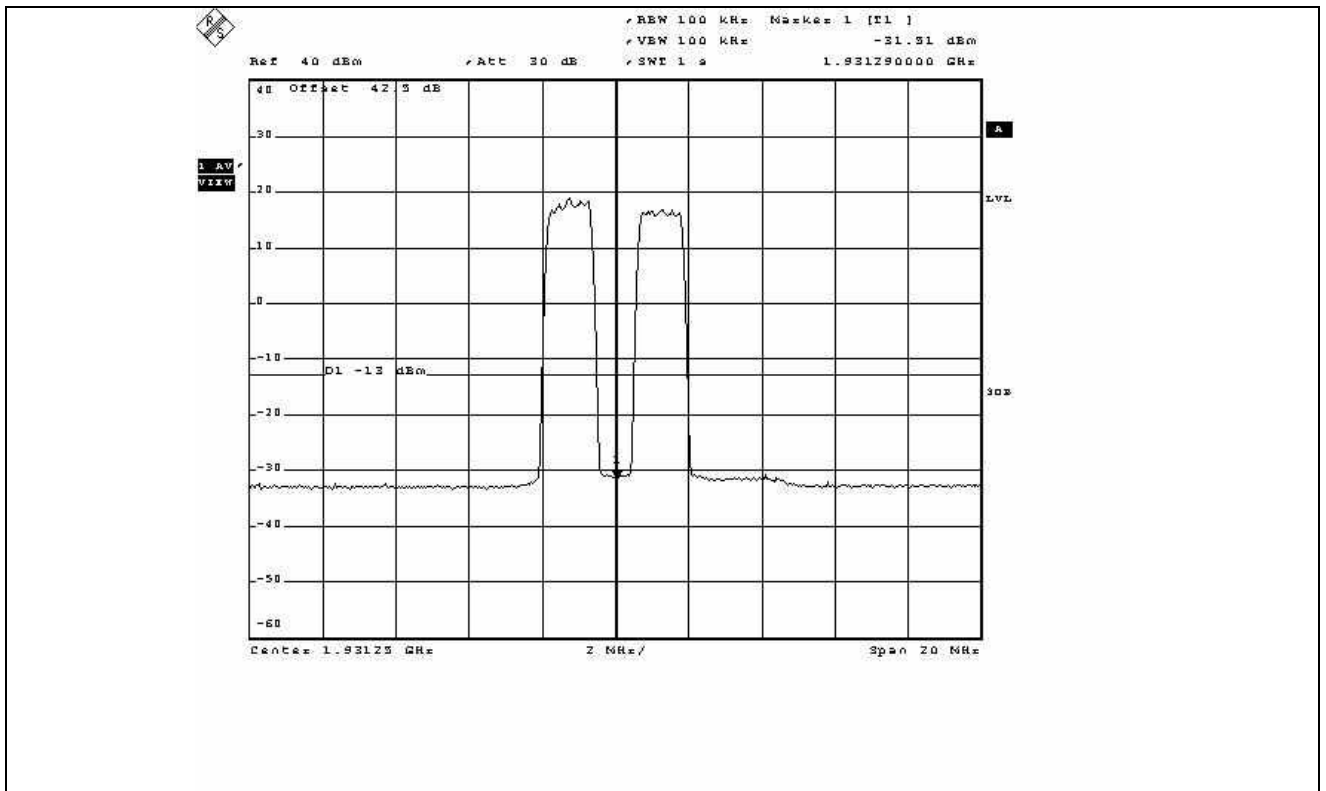
IS-95 – High Channel



IS-95 – High Channel



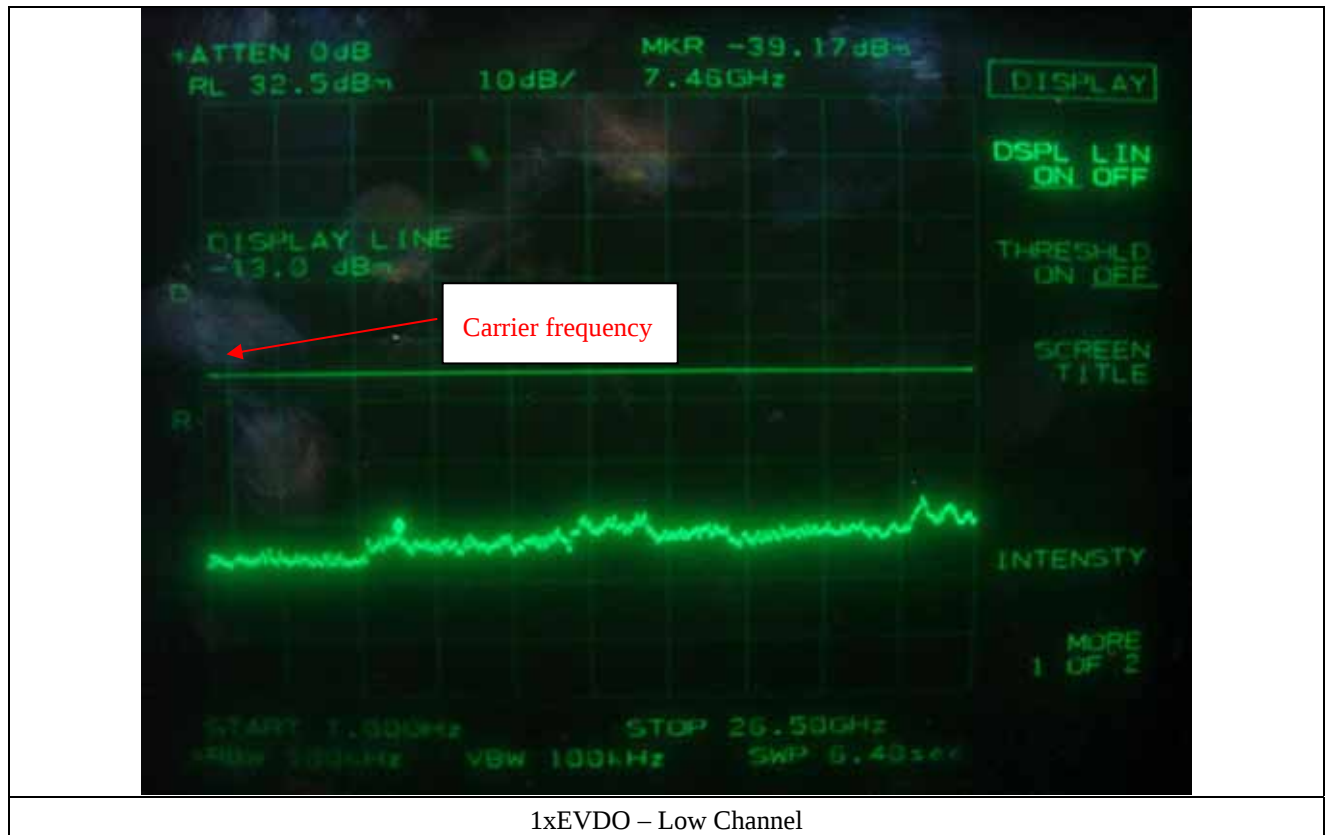
IS-95 – High Channel

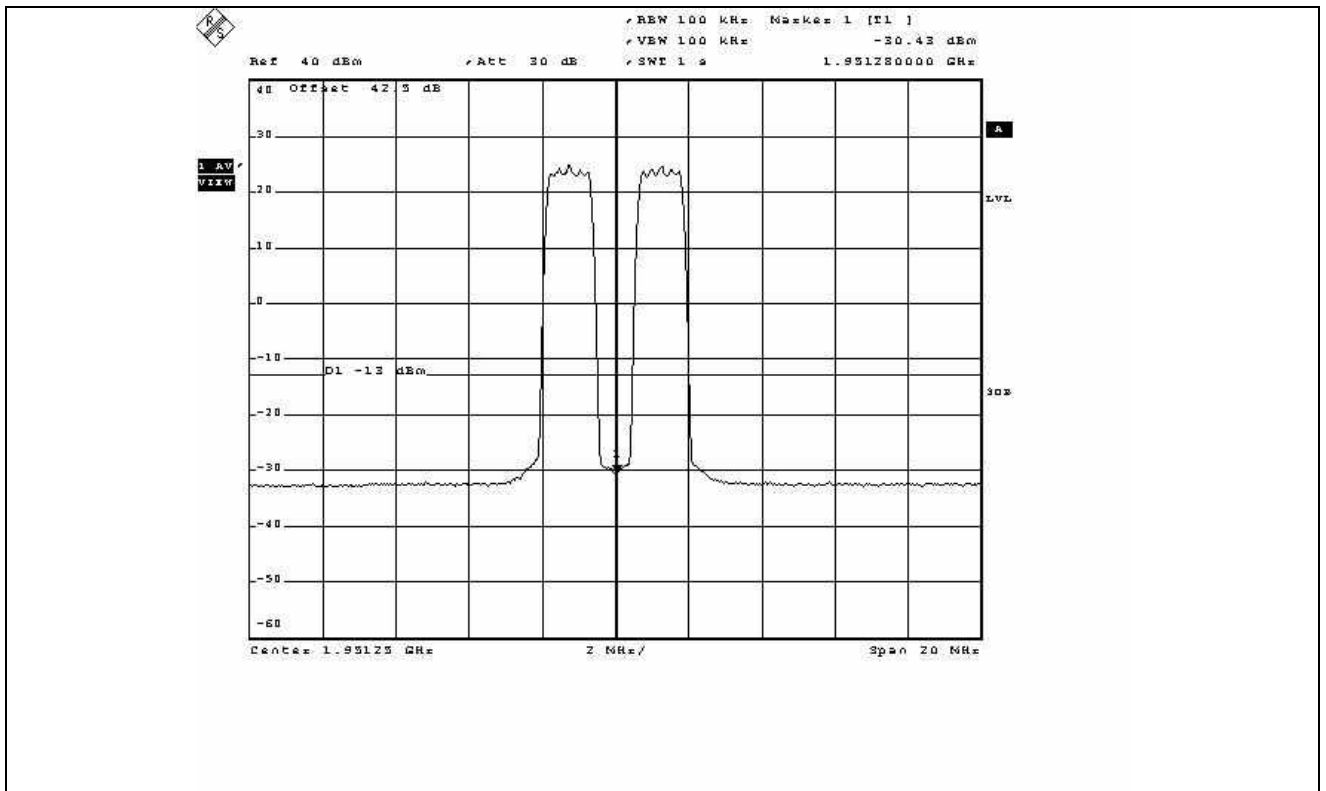


1xEVDO – Low Channel



1xEVDO – Low Channel

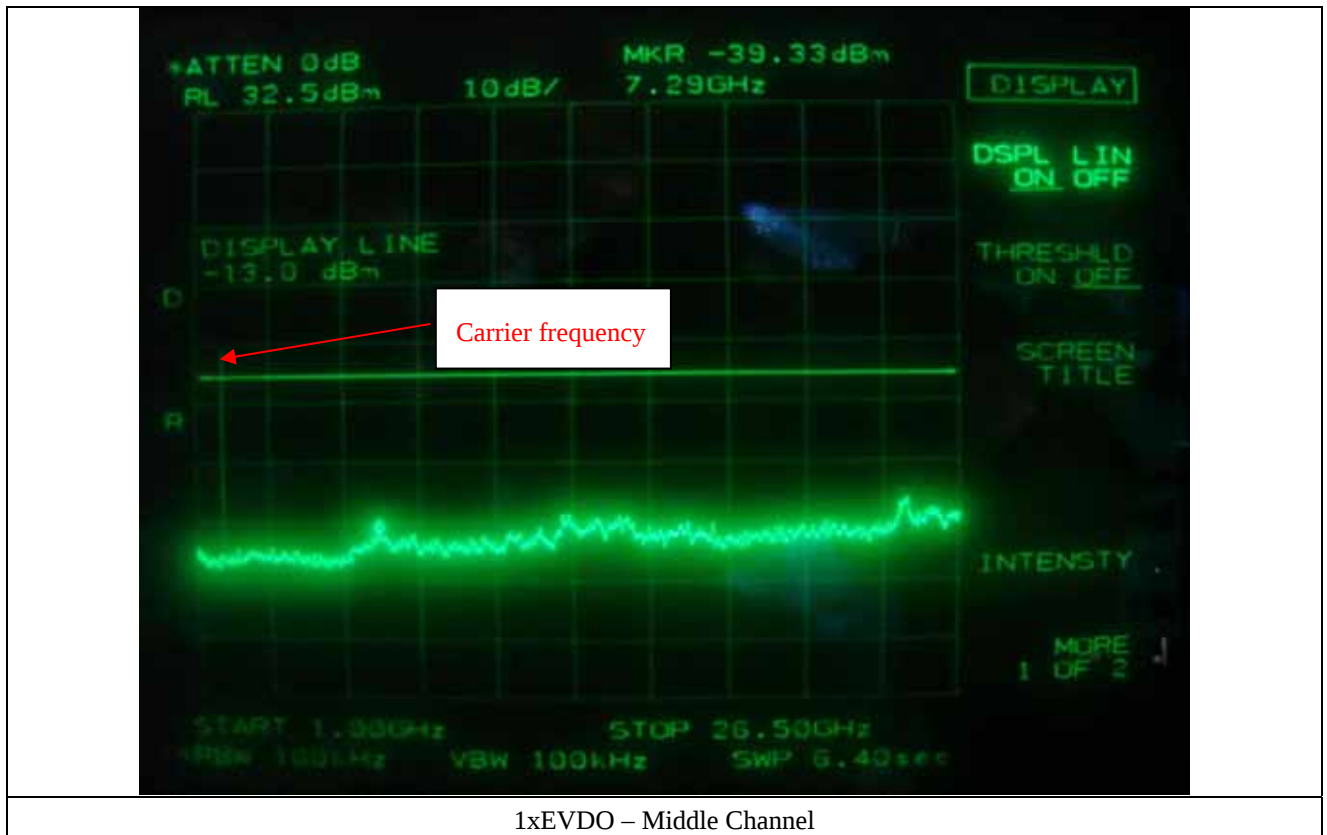


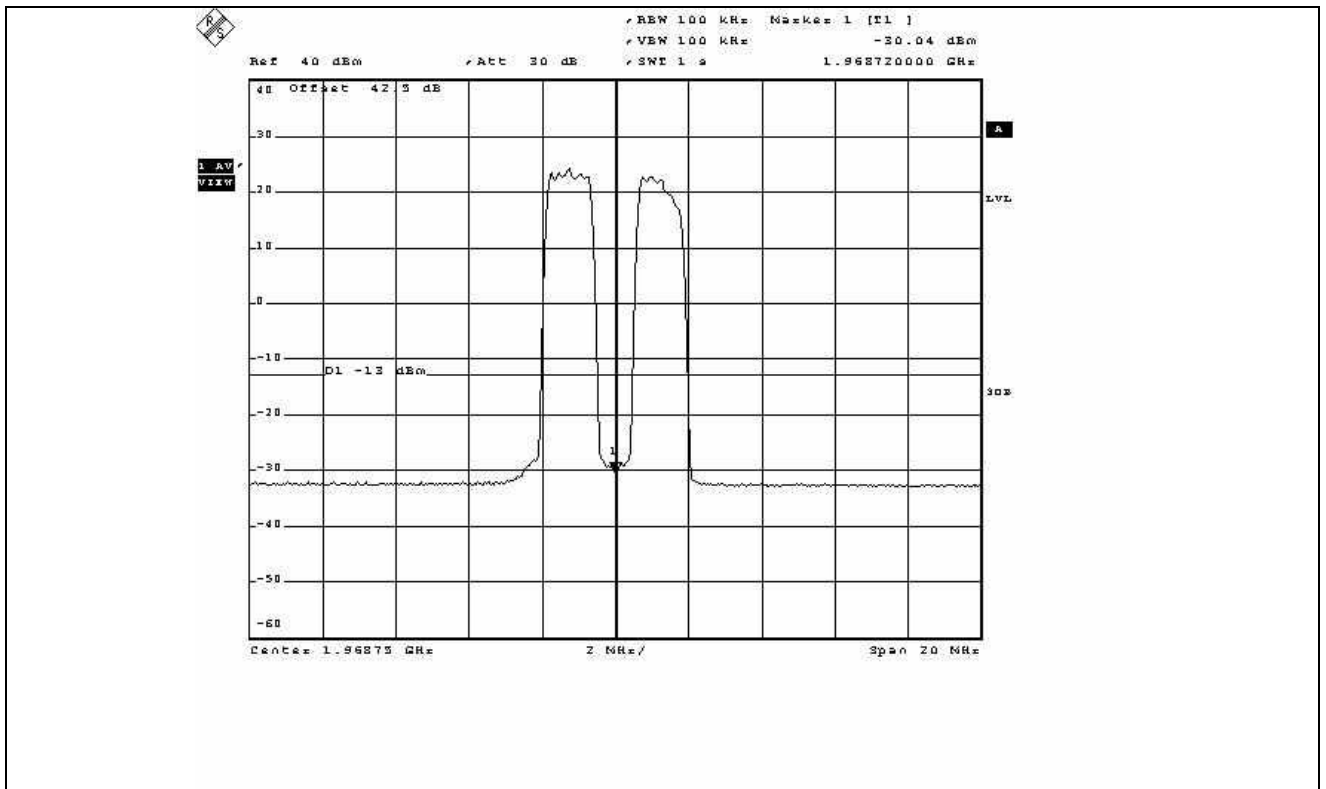


1xEVDO – Middle Channel

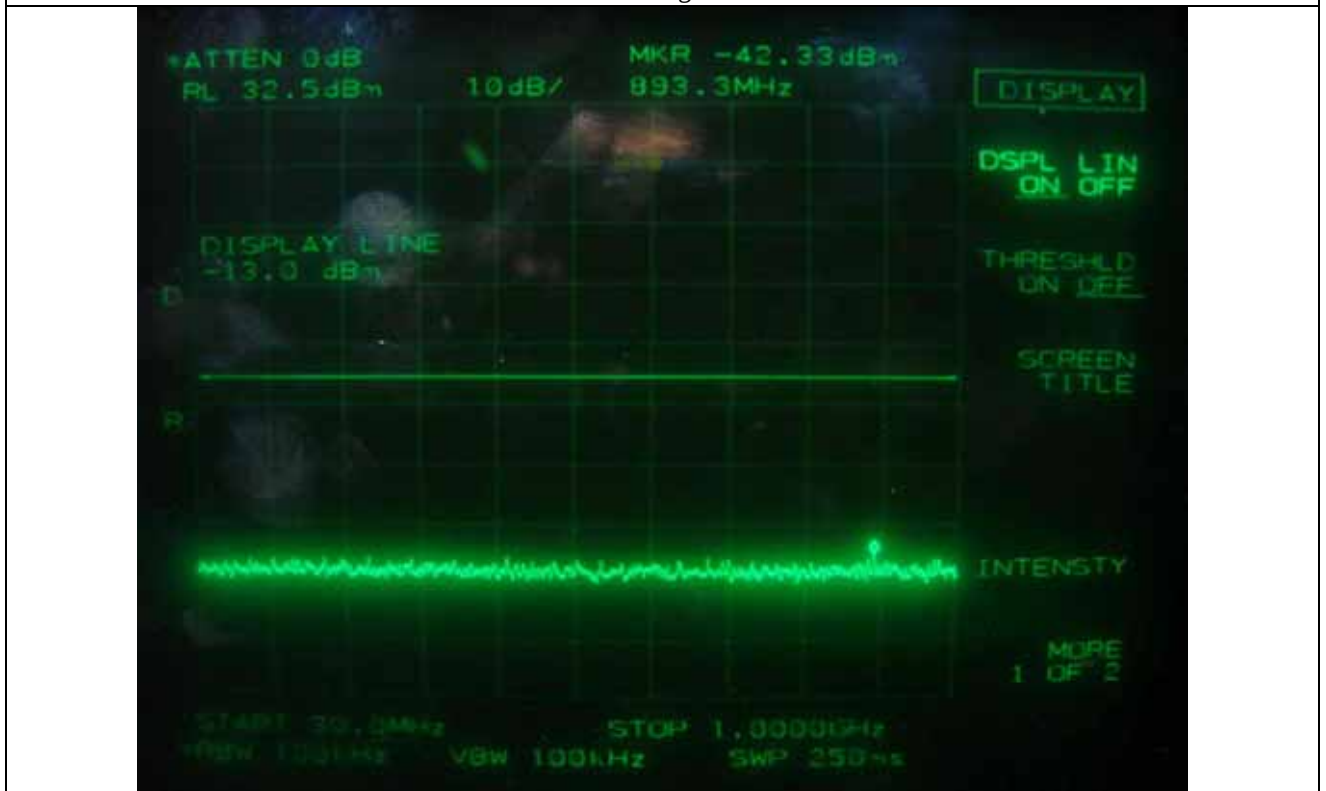


1xEVDO – Middle Channel





1xEVDO – High Channel



1xEVDO – High Channel



10. FIELD STRENGTH OF SPURIOUS RADIATION

10.1 Operating environment

Temperature : 10.5 °C
Relative humidity : 42 %R.H.

10.2 Test set-up

The radiated emissions measurements were on the 3 meters, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The maximum radiated emission was recorded and used as reference for the effective radiated power measurement. The EUT was then replaced by a tuned dipole antenna or Horn antenna and was oriented for vertical polarization and then the length was adjusted to correspond to the frequency of the transmitter. The substitution antenna was connected to a signal generator with a coaxial cable. The receiving antenna height was raised and lowered again through the specified range of height until maximum signal level is detected by the measuring receiver. The signal to the substitution antenna was adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the EUT radiated power measured, corrected for the change of input attenuation setting of the measuring receiver. The signal generator level was recorded and corrected by the power loss in the cable between the signal generator and substitution antenna and further corrected for the gain of the dipole antenna or horn antenna used relative to an ideal tuned dipole antenna. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization. The measure of the effective radiated power is the larger of the two levels recorded.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVD	Rohde & Schwarz	EMI Test Receiver	838453/018	Nov. 06, 2008
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 16, 2008
■ -	83051A	Agilent	Preamplifier	3950M00201	June 16, 2008
■ -	E4432B	Hewlett-Packard	Signal Generator	US38440950	June 16, 2008
■ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	June 16, 2008
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	July 03, 2006(3Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	July 04, 2006(3Y)
■ -	SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ -	3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

10.4 Test data for radiated emission

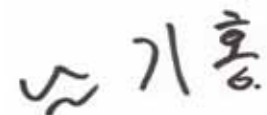
10.4.1 Operating Condition: Max. Power Mode of IS-95

-. Test Date : December 26, 2008
-. Resolution bandwidth : 1 MHz
-. Video bandwidth : 1 MHz
-. Frequency range : 1 GHz ~ 20 GHz
-. Measurement distance : 3 m
-. Result : PASSED BY -15.46 dB at 111.40 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
1 931.25	110.83	35.71	10.03	H	4.12	49.86	-	-
	112.83	41.86		V		56.01	-	-
Test Data for Middle Channel								
1 951.25	110.50	36.85	10.11	H	4.08	51.04	-	-
	112.67	41.70		V		55.89	-	-
Test Data for High Channel								
1 968.75	110.92	38.08	10.19	H	4.05	52.32	-	-
	112.83	41.00		V		55.24	-	-
78.45	55.50	-31.50	1.82	H	0.33	-29.35	-13.00	-16.35
100.74	53.83	-32.67	1.60	H	0.33	-30.74	-13.00	-17.74
111.40	52.50	-30.33	1.54	H	0.33	-28.46	-13.00	-15.46
138.53	48.67	-38.50	1.47	V	0.33	-36.70	-13.00	-23.70
170.50	47.33	-39.83	1.96	H	0.50	-37.37	-13.00	-24.37
205.40	48.10	-38.00	1.81	V	0.50	-35.69	-13.00	-22.69

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Ki-Hong, Nam / Project Engineer

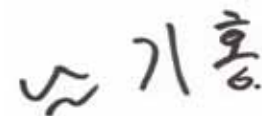
10.4.2 Operating Condition: Max. Power Mode of 1xEVDO

-. Test Date : December 26, 2008
-. Resolution bandwidth : 1 MHz
-. Video bandwidth : 1 MHz
-. Frequency range : 1 GHz ~ 20 GHz
-. Measurement distance : 3 m
-. Result : PASSED BY -16.53 dB at 78.90 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
1 931.25	110.67	35.55	10.03	H	4.12	49.70	-	-
	112.50	41.53		V		55.68	-	-
Test Data for Middle Channel								
1 951.25	110.50	36.83	10.11	H	4.08	51.02	-	-
	112.83	41.86		V		56.05	-	-
Test Data for High Channel								
1 968.75	110.72	37.88	10.19	H	4.05	52.12	-	-
	112.90	41.07		V		55.31	-	-
78.90	55.33	-31.67	1.81	H	0.33	-29.53	-13.00	-16.53
100.50	54.00	-32.50	1.60	H	0.33	-30.57	-13.00	-17.57
111.83	51.00	-31.83	1.54	H	0.33	-29.96	-13.00	-16.96
138.50	48.50	-38.67	1.47	V	0.33	-36.87	-13.00	-23.87
170.33	47.67	-39.49	1.95	H	0.50	-37.04	-13.00	-24.04
206.00	48.50	-37.60	1.80	V	0.50	-35.30	-13.00	-22.30

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Ki-Hong, Nam / Project Engineer

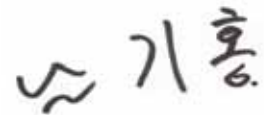
10.4.3 Operating Condition: Min. Power Mode of IS-95

-. Test Date : December 26, 2008
-. Resolution bandwidth : 1 MHz
-. Video bandwidth : 1 MHz
-. Frequency range : 1 GHz ~ 20 GHz
-. Measurement distance : 3 m
-. Result : PASSED BY -15.29 dB at 112.80 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
1 931.25	90.50	15.38	10.03	H	4.12	29.53	-	-
	92.67	21.70		V		35.85	-	-
Test Data for Middle Channel								
1 951.25	90.33	16.66	10.11	H	4.08	30.85	-	-
	92.67	21.70		V		35.89	-	-
Test Data for High Channel								
1 968.75	90.67	17.83	10.19	H	4.05	32.07	-	-
	90.92	19.09		V		33.33	-	-
78.50	54.83	-32.17	1.82	H	0.33	-30.02	-13.00	-17.02
102.50	53.50	-33.00	1.59	H	0.33	-31.08	-13.00	-18.08
112.80	52.67	-30.16	1.54	H	0.33	-28.29	-13.00	-15.29
140.10	48.83	-38.34	1.47	V	0.33	-36.54	-13.00	-23.54
172.50	47.00	-38.82	2.01	H	0.50	-36.31	-13.00	-23.31
208.80	47.50	-38.60	1.79	V	0.50	-36.31	-13.00	-23.31

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Ki-Hong, Nam / Project Engineer

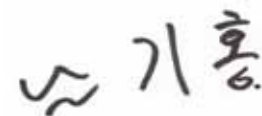
10.4.4 Operating Condition: Min. Power Mode of 1xEVDO

-. Test Date : December 26, 2008
-. Resolution bandwidth : 1 MHz
-. Video bandwidth : 1 MHz
-. Frequency range : 1 GHz ~ 20 GHz
-. Measurement distance : 3 m
-. Result : PASSED BY -15.13 dB at 113.00 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
1 931.25	90.33	15.51	10.03	H	4.12	29.66	-	-
	92.50	21.53		V		35.68	-	-
Test Data for Middle Channel								
1 951.25	90.72	17.05	10.11	H	4.08	31.24	-	-
	92.83	21.86		V		36.05	-	-
Test Data for High Channel								
1 968.75	90.50	17.66	10.19	H	4.05	31.90	-	-
	90.83	19.00		V		33.24	-	-
78.83	54.50	-32.50	1.81	H	0.33	-30.36	-13.00	-17.36
102.00	53.67	-32.83	1.59	H	0.33	-30.91	-13.00	-17.91
113.00	52.50	-30.00	1.54	H	0.33	-28.13	-13.00	-15.13
139.50	48.72	-38.84	1.47	V	0.33	-37.04	-13.00	-24.04
172.33	47.33	-38.50	2.00	H	0.50	-36.00	-13.00	-23.00
209.00	47.72	-38.38	1.80	V	0.50	-36.08	-13.00	-23.08

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical,



Tested by: Ki-Hong, Nam / Project Engineer

11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 Operating environment

Temperature : 20.5 °C
Relative humidity : 45.8 %R.H.

11.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer. The software for RF control on the notebook PC was set to transmit maximum signal gain and bandwidth. The test was performed at center frequency.

Turn EUT off and set chamber temperature to -30 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -30 °C to +50 °C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

11.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - 8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ - 53152A	HP	Frequency Counter	US39270295	Dec. 05, 2008
■ - EY-101	Tabai ESPEC Corp.	Chamber	5104390	N/A
■ - SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ - FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ - 3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

11.4 Test data

11.4.1 Operating Condition: Max. Power Mode

-. Test Date : December 29, 2008

-. Result : PASSED

Temperature (°C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	1 931 250 000	1 931 249 987	-0.006 7	Within the Authorized Frequency block
-20		1 931 249 986	-0.007 2	
-10		1 931 249 987	-0.006 7	
0		1 931 249 985	-0.007 8	
10		1 931 249 988	-0.006 2	
20		1 931 249 987	-0.006 7	
30		1 931 249 986	-0.007 2	
40		1 931 249 987	-0.006 7	
50		1 931 249 988	-0.006 2	

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Tested by: Ki-Hong, Nam / Project Engineer

11.4.2 Operating Condition: Min. Power Mode

-. Test Date : December 29, 2008

-. Result : PASSED

Temperature (°C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	1 931 250 000	1 931 249 986	-0.007 2	Within the Authorized Frequency block
-20		1 931 249 987	-0.006 7	
-10		1 931 249 985	-0.007 8	
0		1 931 249 986	-0.007 2	
10		1 931 249 988	-0.006 2	
20		1 931 249 987	-0.006 7	
30		1 931 249 987	-0.006 7	
40		1 931 249 985	-0.007 8	
50		1 931 249 986	-0.007 2	

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Tested by: Ki-Hong, Nam / Project Engineer

12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 Operating environment

Temperature : 20.5 °C
Relative humidity : 45.8 %R.H.

12.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer. The signal generator was set to 1 931.25 MHz with an un-modulated signal. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85% of nominal voltage. The output frequency was recorded at each step.

12.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - 8564E	HP	Spectrum Analyzer	3650A00756	June 16, 2008
■ - 53152A	HP	Frequency Counter	US39270295	Dec. 05, 2008
■ - 2350A	HP	30 dB Attenuator Assembly	2350A03133	June 16, 2008
■ - 3033B	B&J TMI	DC Power Supply	2056036	N/A
■ - SMJ100A	R/S	Vecter Signal Generator	100698	June 16, 2008
■ - FSP	R/S	Spectrum Analyzer	100017	Mar. 11, 2008
■ - 3TNF-1000/2000-N/N	K&L Microwave	Tunable Band Reject Filter	536	Feb. 27, 2008

All test equipment used is calibrated on a regular basis.

12.4 Test data

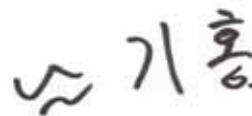
12.4.1 Operating Condition: Max. Power Mode

-. Test Date : December 29, 2008

-. Rated Supply Voltage : 110 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
126.5 (115 %)	1 931 250 000	1 931 249 988	-0.006 2	Within the Authorized Frequency block
110 (100 %)		1 931 249 987	-0.006 7	
93.5 (85 %)		1 931 249 988	-0.006 2	



Tested by: Ki-Hong, Nam / Project Engineer

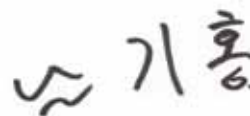
12.4.2 Operating Condition: Min. Power Mode

-. Test Date : December 29, 2008

-. Rated Supply Voltage : 110 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
126.5 (115 %)	1 931 250 000	1 931 249 987	-0.006 7	Within the Authorized Frequency block
110 (100 %)		1 931 249 988	-0.006 2	
93.5 (85 %)		1 931 249 988	-0.006 2	



Tested by: Ki-Hong, Nam / Project Engineer