Test Report

From

Kyocera Wireless Corp

Dual-Band Tri-mode Cellular Phone

FCC Part 22 & 24 Certification	
FCC ID:	**OVFKWC-SE44**
Model:	**SE44**

STATEMENT OF CERTIFICATION

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

STATEMENT OF COMPLIANCE

This product has been shown to be capable of compliance with the applicable technical standards as indicted in the measurement report and was tested in accordance with the measurement procedures specified in §2.947.

Test performed by:	PatrickBowen Senior Engineer	Date of Test:	11/10/03 – 12/08/03
Report Prepared by:	Patrick Bowen Senior Engineer	Date of Report:	12/09/03
Report Reviewed by:	C. K. Li Engineer, Senior Staff/Manager	Date of Review:	12/09/03
Tests that required an OATS site were performed by TUV Product Services.			

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1 General Information

Applicant:	Kyocera Wireless Corp 10300 Campus Point Drive San Diego CA 92121			
FCC ID:	OVFKWC-SE44			
Product:	Tri-mode Dual-Band Analog/PCS Phone			
Trade Name:	Kyocera Wireless Corp			
Model Number:	SE44			
EUT S/N:	QJOT			
Type:	[ ] Prototype, [X] Pre-Production, [ ] Production			
Device Category:	Portable			
RF Exposure Environment:	General Population / Uncontrolled			
Antenna:	Top loaded Helix Whip			
Detachable Antenna:	Yes			
External Input:	Audio/Digital Data			
Quantity:	Quantity production is planned			
FCC Rule Parts:	§22H	§22H	§22.901(d)	§24E
Modes:	800 AMPS	800 CDMA	800 CDMA1X	1900 CDMA
Multiple Access Scheme:	FDMA	CDMA	CDMA	CDMA
Duty Cycle:	1:1	1:1	1:1	1:1
TX Frequency (MHz):	824 – 849	824 – 849	824 – 849	1850 - 1910
Emission Designators:	40K0F1D	40K0F8W	1M25F9W	1M25F9W
Max. Output Power (W)	0.406 ERP	0.392 ERP		0.607 EIRP

2 Product Description

The phone is a Dual-band tri-mode 1XRTT product that integrates Assisted GPS capability to meet the emergency location requirements of the FCC's E911 Phase II mandate. The tri-mode architecture is defined as 1900MHz (PCS CDMA) and 800MHz (cellular CDMA and AMPS). The phone will support certain CDMA2000 radio-configurations (RC) as describes in Exhibit 1 (operation description).

Model SE44 consists of a Color LCD display.

Note: The OVFKWC-SE44 transmitter is disabled by software while operating in the head position with the slide is in the closed position.

3 Electronic Serial Numbers (ESN) Protection

The Dual-band Tri-mode Phone, FCC ID: OVFKWC-SE44 uses ESN. The ESN is a unique identification number to each phone which is contained in the Numeric Assignment Module and is automatically transmitted to the base station whenever a call is placed. The ESN is stored in an EPROM and is isolated from fraudulent contact and tampering. Any attempt to change the ESN will render the portable phone inoperative.

The phone complies with all requirements for ESN under Part 22.919.

4 FCC Compliance Emergency 911

FCC § 22.921
When an emergency 911 call is originated by the user, the mobile will attempt to acquire any available system and originate the emergency call on that system, disregarding restrictions set by the roaming list. The FCC NPRM WT99-13, CC94-102 automatic analog A/B roaming option has been implemented for 911 emergency calls. Note that the SE44 have Global Positioning System (GPS) support.

5 TTY compliance

FCC § 255 of the Telecom Act
SE44 have been designed for TTY Compliance with Cellular Compatibility Standard.

6 Transmitter RF Power Output

6.1 Conducted Power

FCC: § 2.1046	IC: RSS-129 §7.1, RSS-133 §6.2

Measurement Procedures:

The RF output power was measured using a Giga-tronics 8541C Universal Power Meter and HP 8594E Spectrum Analyzer that has the CDMA personality option. Terminated to a resistive coaxial load of 50 ohms.

Mode	Frequency (MHz)	Channel	Power (dBm)
AMPS	824.04	991	25.02
	936.49	383	25.03
	848.97	799	25.01
CDMA 800	824.70	1013	24.52
	836.52	384	24.51
	848.31	777	25.54
CDMA 1900	1851.25	25	23.29
	1880.00	600	23.28
	1908.75	1175	23.23

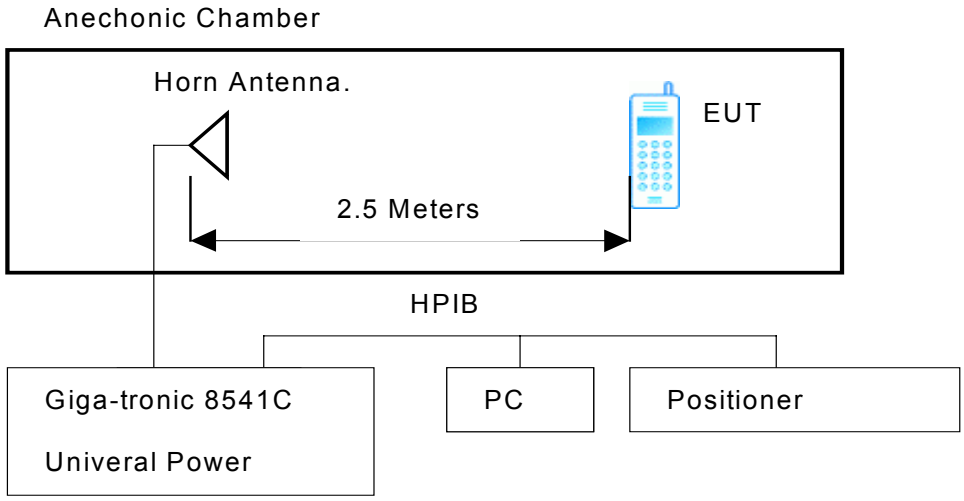
6.2 Radiated Power

FCC: § 22.913, § 24.232	IC: RSS-129 §7.1 and §9.1, RSS-133 §6.2

Measurement Procedures:

The EUT was positioned on a 2-axis non-conductive positioner inside a 10-meter anechoic chamber.

The EUT conducted power was set by the phone control software. During tests, the phone was rotated 360 degree in azimuth and elevation by an automated antenna measurement workstation. Maximum radiated power was recorded using a Giga-tronics 8541C Universal Power Meter. All measurement results are EIRP in dBm. For ERP, subtract 2.1 dB from the EIRP data.



Mode	Frequency (MHz)	Channel	Measured Max. Power (dBm)	Ref.
AMPS	824.04	991	24.53	ERP
	936.49	383	25.63	
	848.97	799	26.09	
CDMA 800	824.70	1013	25.53	ERP
	836.52	384	25.87	
	848.31	777	25.93	
CDMA 1900	1851.25	25	27.79	EIRP
	1880.00	600	27.83	
	1908.75	1175	27.76	

7 Transmit Modulation Requirement

7.1 Transmitter Audio Frequency Response

FCC: § 2.1047	IC: RSS-129 §6.2

Measurement Procedures:

Measured with HP8920 RF communication test set & HP 3588A spectrum analyzer.

- Operate the transmitter with the compressor disabled, and monitor the output with HP8920 test receiver without de-emphasis. Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 100 to 3000 Hz, and observe the input levels necessary to maintain a constant ± 2.9 kHz system deviation.

- Adjust the audio input level to 20 dB greater than that required to produce ± 8 kHz deviation with 1 kHz tone. Vary the modulation frequency from 3 kHz to 30 kHz and observe the deviation while maintaining a constant audio input level. Use the audio spectrum analyzer to measure the output deviation at the same frequency as the input signal.

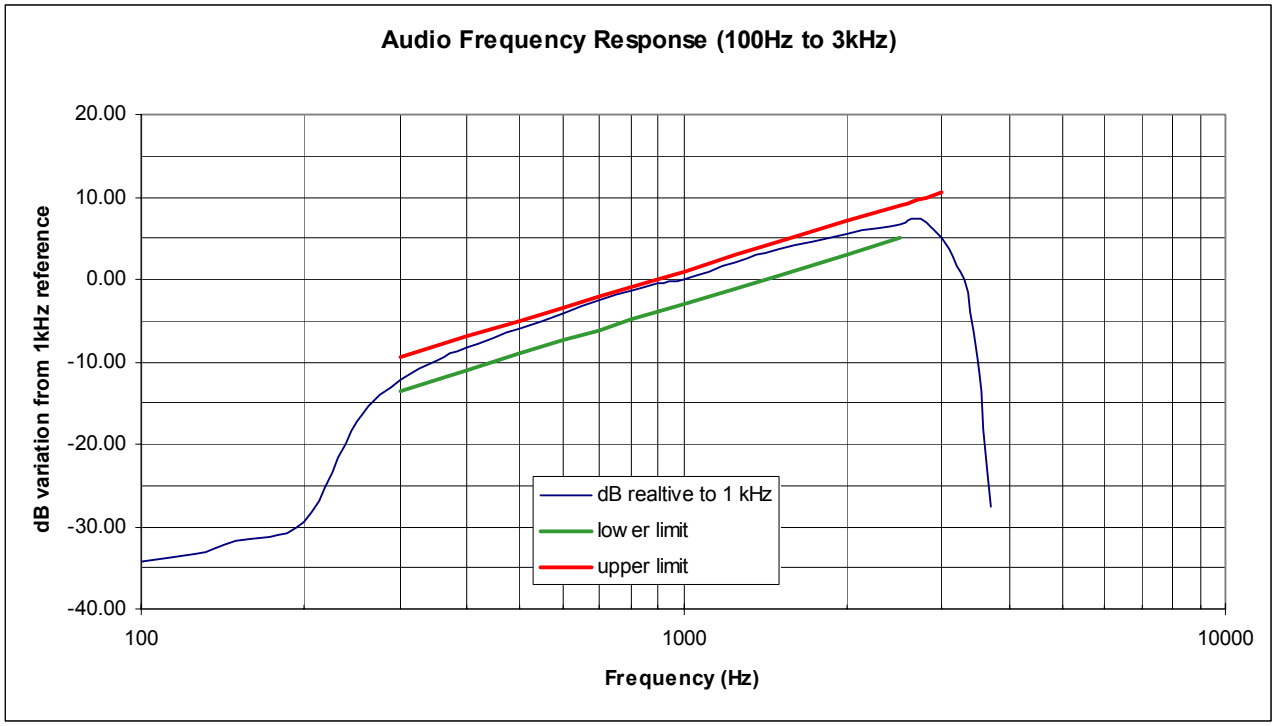


Figure 7.1 Audio Filter Characteristics (100 Hz - 3000Hz)

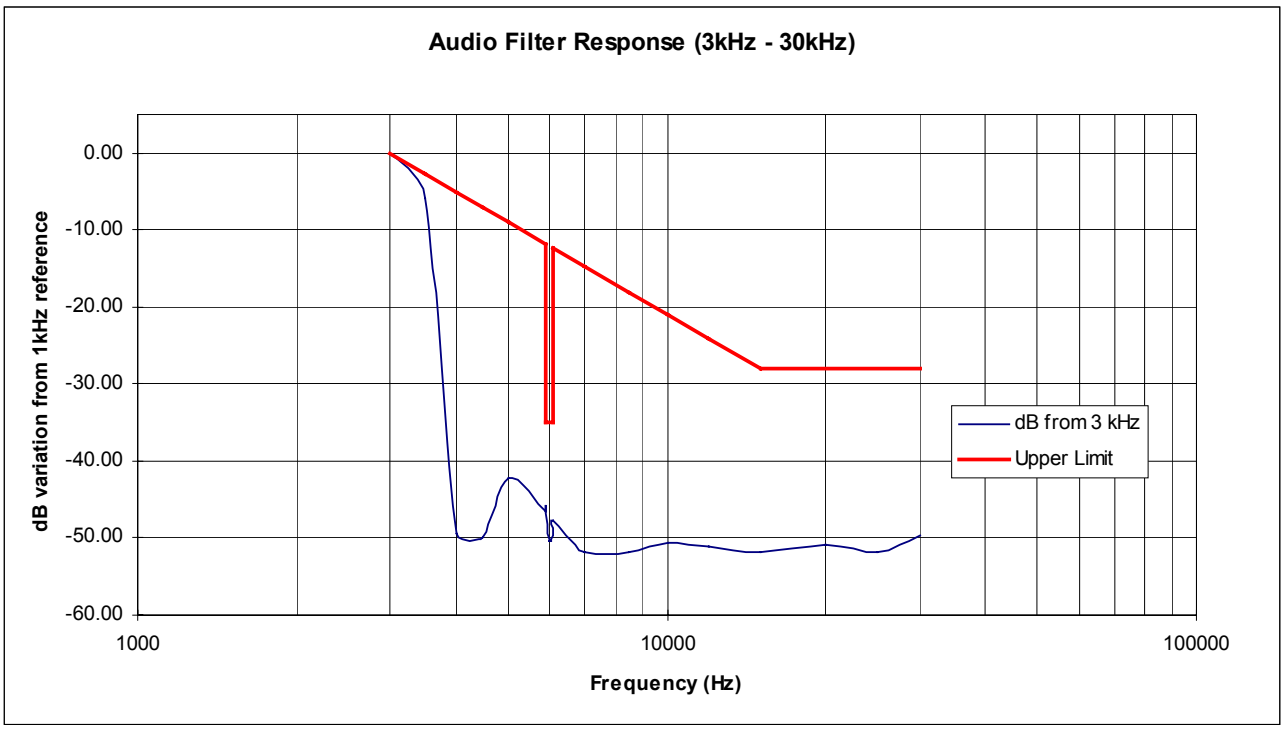


Figure 7.2 Post Limiter Filter Attenuation (3 kHz - 30 kHz)

7.2 Transmitter Modulation Deviation Limiting

FCC: § 2.1047(b)	IC: RSS-129 §6.1

Measurement Procedures:

Measured with HP8920 RF communication test set as an audio signal generator.

With the compressor enabled and the SAT disabled, and at three different modulating frequencies (300Hz, 1kHz and 3kHz), adjust the audio input level from -20 dB to +20 dB in reference to the level required to generate 8kHz deviation at 1KHz.

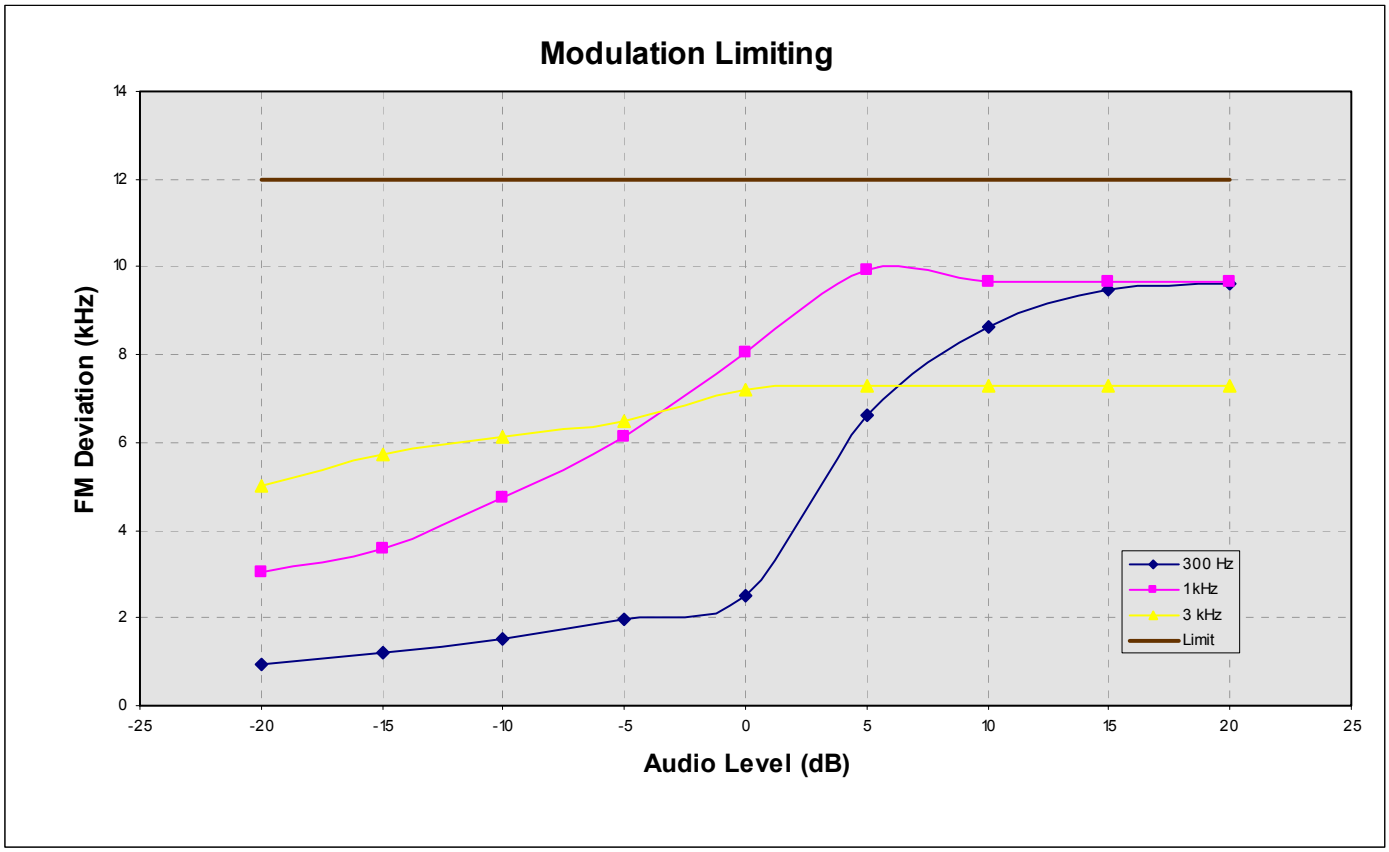


Figure 7.3 Modulation Deviation Limiting

8 Occupied Bandwidth

FCC: § 2.1049, § 22.917(b)(d), § 24.238	IC: RSS-129 §6.3, §8.1

Measurement Procedures:

The RF output of the EUT was connected to the input of the spectrum analyzer with sufficient attenuation. The spectrum with no modulation was recorded.

For Analog: The audio input signal was adjusted to as followings: (1) For combined voice and SAT, disable the compressor, modulate with a 2500 Hz sine wave 13.5 dB greater than that required to produce ± 8 kHz peak deviation at 1000 Hz and a 6000 Hz SAT with ± 2.0 kHz peak deviation. (2) For combined Signaling Tone and SAT, modulate with a 10 kHz ST with ± 8 kHz peak deviation and a 6000 Hz SAT with ± 2.0 kHz peak deviation. (3) For wideband data, modulate with a quasi-random 10 kbps data pattern with ± 8 kHz peak deviation. (4) For voice only, disable the compressor, modulate with a 2500 Hz sine wave 13.5 dB greater than that required to produce ± 8 kHz peak deviation at 1000 Hz. (5) For SAT only, modulate with a 6000 Hz SAT with ± 2.0 kHz peak deviation. (6) For ST only, modulate with a 10 kHz ST with ± 8 kHz peak deviation. (7) For combined SAT and DTMF, modulate with a 6000 Hz SAT with ± 2.0 kHz peak deviation and one of the DTMF tones. All measurements were performed on middle channel.

For Digital: Modulate with full rate.

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Figure	Mode	Description
8-1	AMPS	Voice
8-2		SAT
8-3		Voice + SAT
8-4		ST
8-5		SAT + ST
8-6		SAT + DTMF_9
8-7		10kb Wideband Data
8-8		Lower Band Edge @ CH991
8-9		Upper Band Edge @ CH799
8-10	CDMA 800	CDMA at RC1
8-11		CDMA 1X, F/R-FCH at RC3
8-12		CDMA 1X, F/R-FCH + F/R-SCH at RC3
8-13		Lower Band Edge @ CH1013
8-14		Upper Band Edge @ CH777
8-15	CDMA 1900	CDMA at RC1
8-16		CDMA 1X, F/R-FCH at RC3
8-17		CDMA 1X, F/R-FCH + F/R-SCH at RC3
8-18		Lower Band Edge @ CH25
8-19		Upper Band Edge @ CH1175

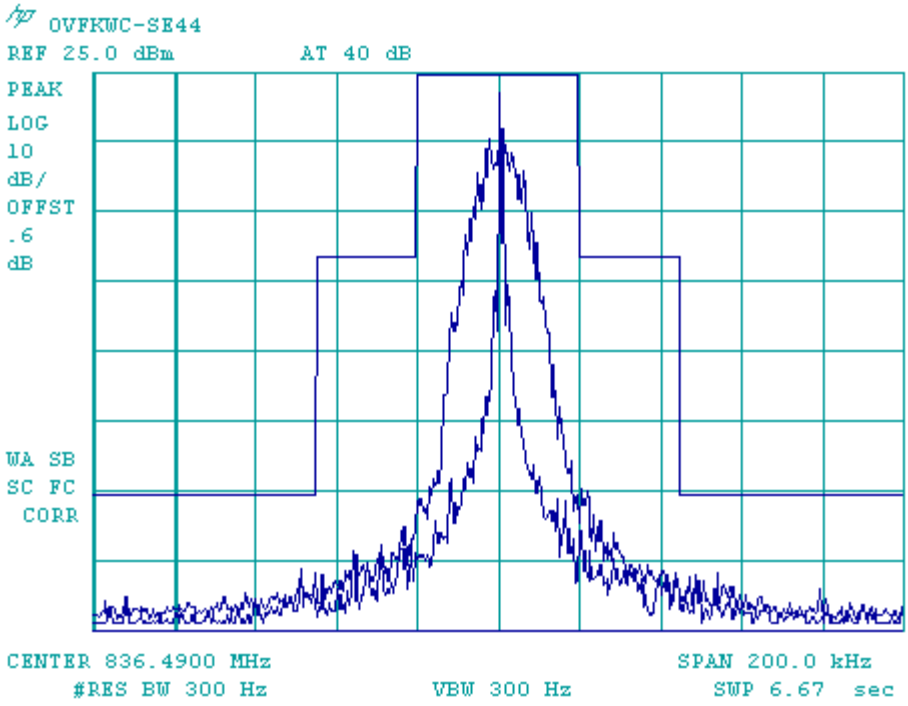

Figure 8-1 AMPS Voice

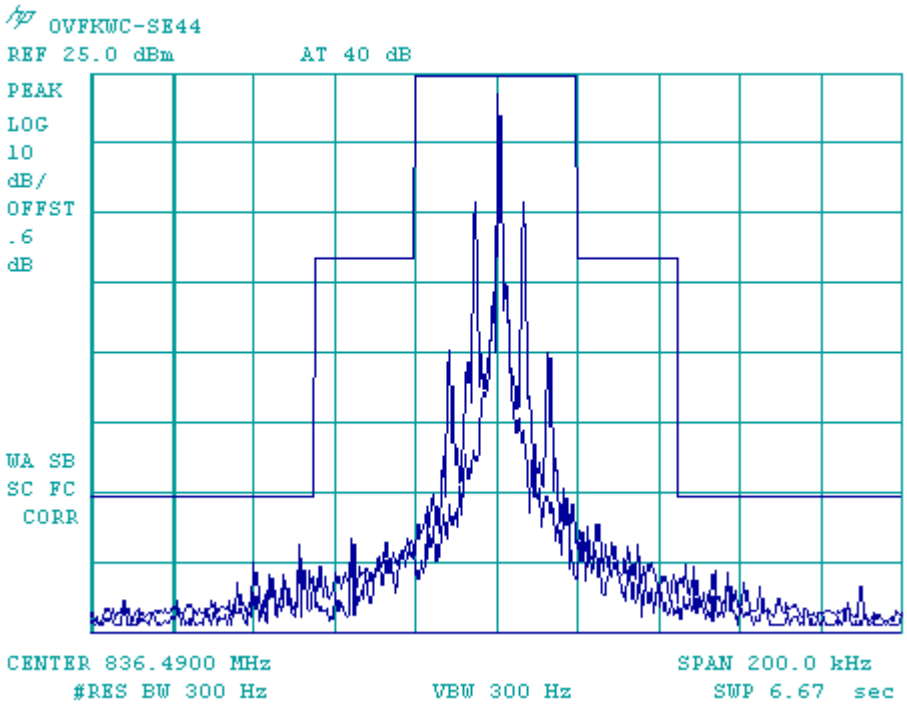

Figure 8-2 AMPS SAT

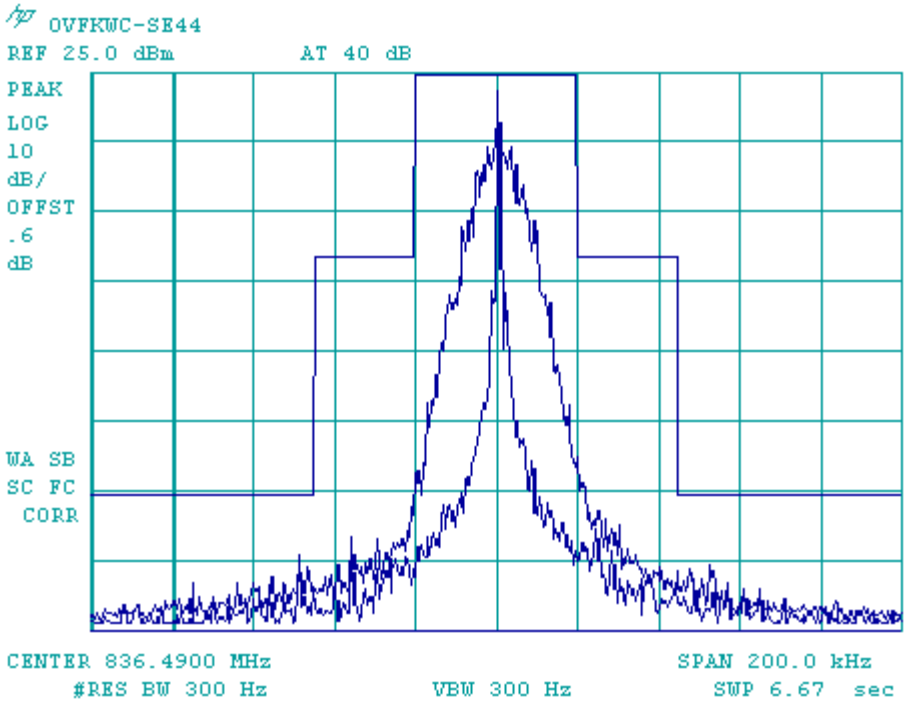

Figure 8-3 AMPS Voice + SAT

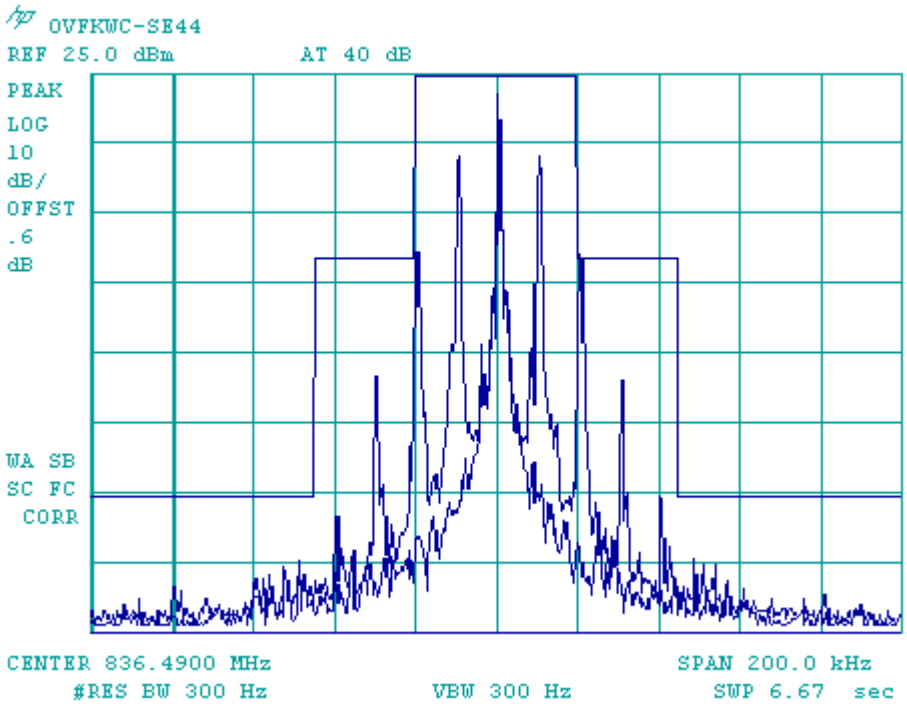

Figure 8-4 AMPS ST

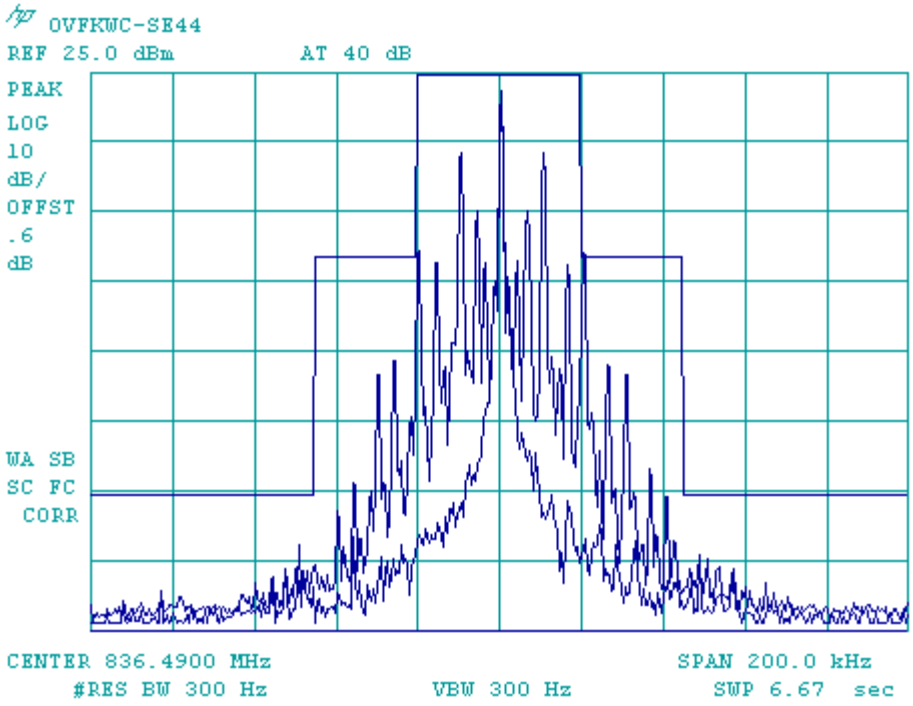

Figure 8-5 AMPS SAT + ST

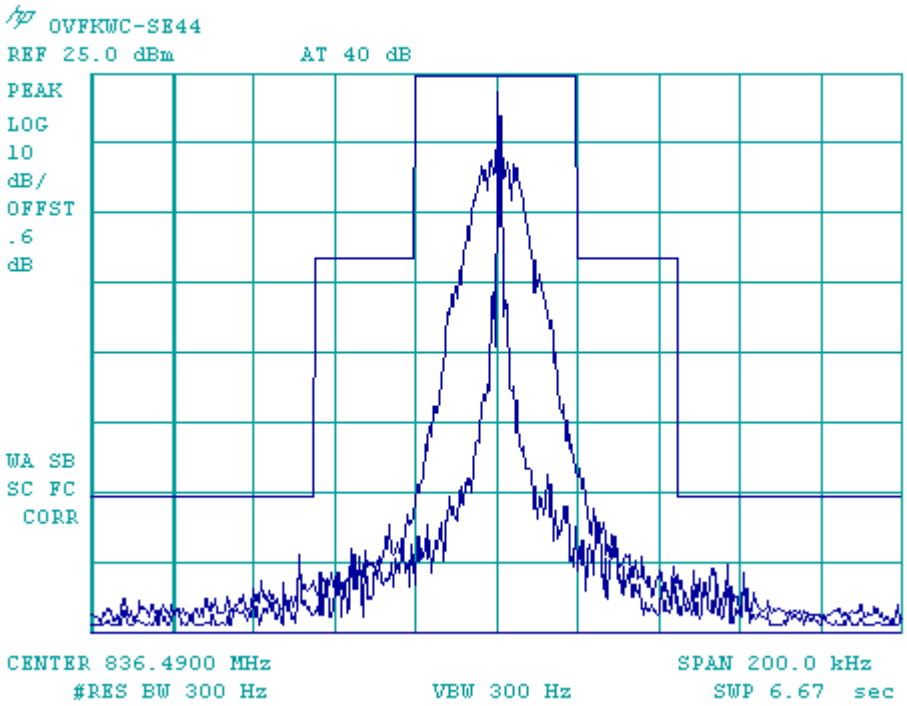

Figure 8-6 AMPS SAT + DTMF_9

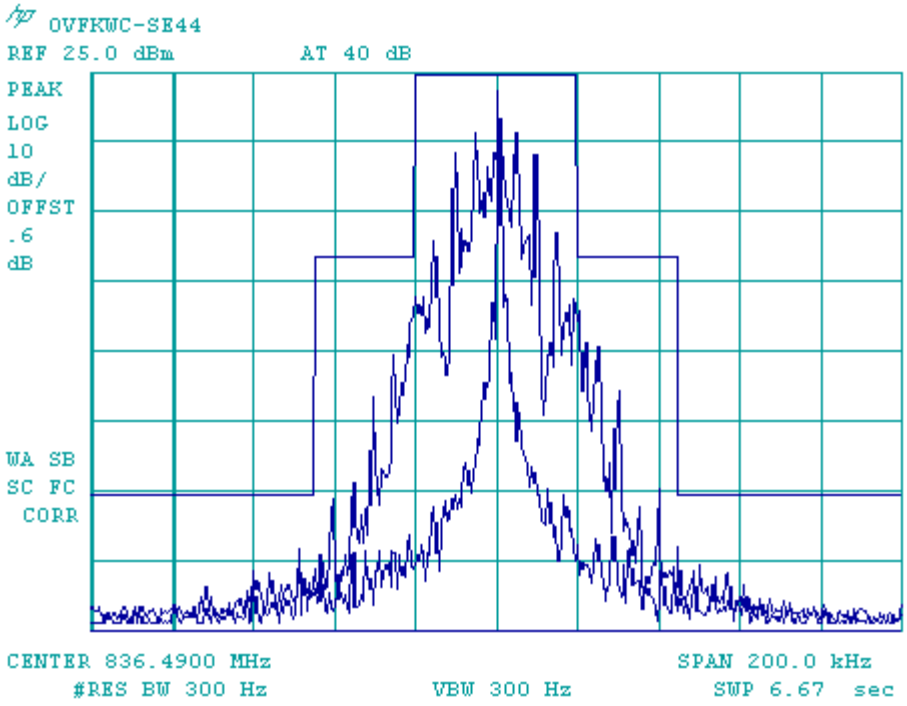

Figure 8-7 10kb Wideband Data

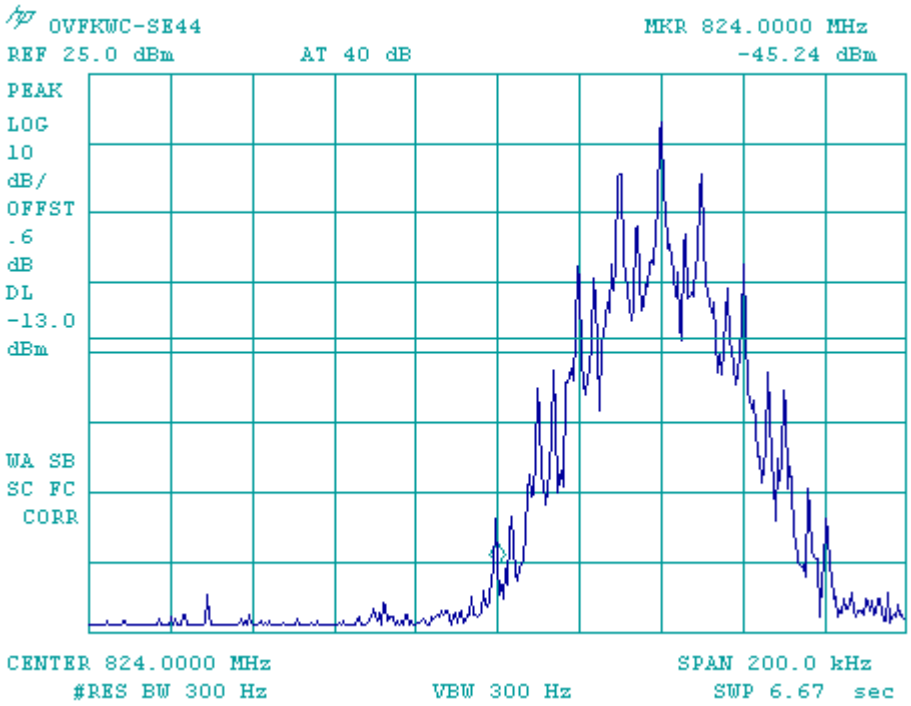

Figure 8-8 Lower Band Edge @ CH991

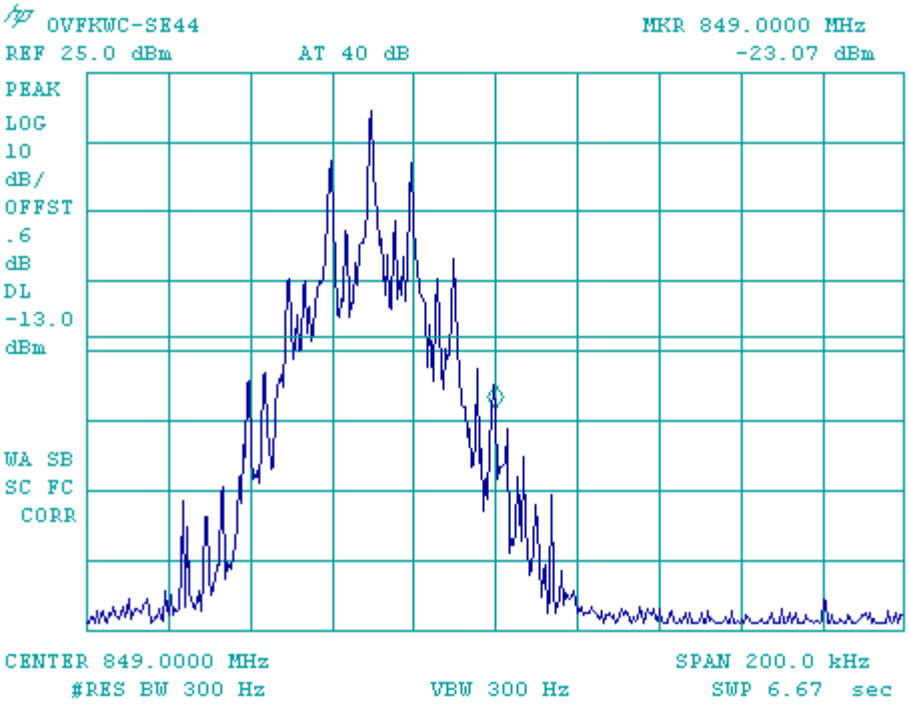

Figure 8-9 Upper Band Edge @ CH799

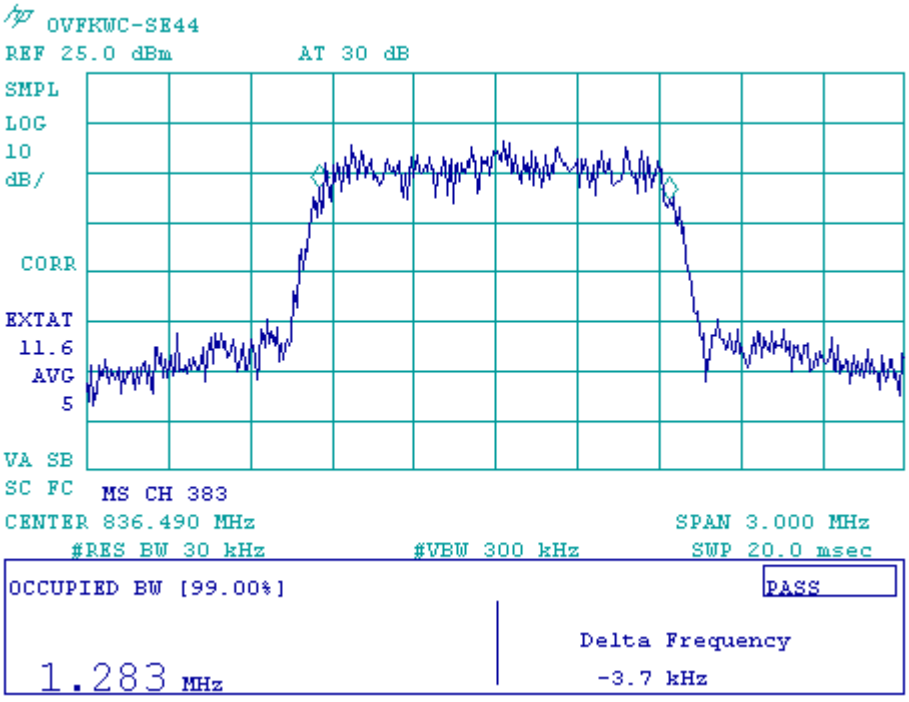

Figure 8-10 CDMA 800 at RC1

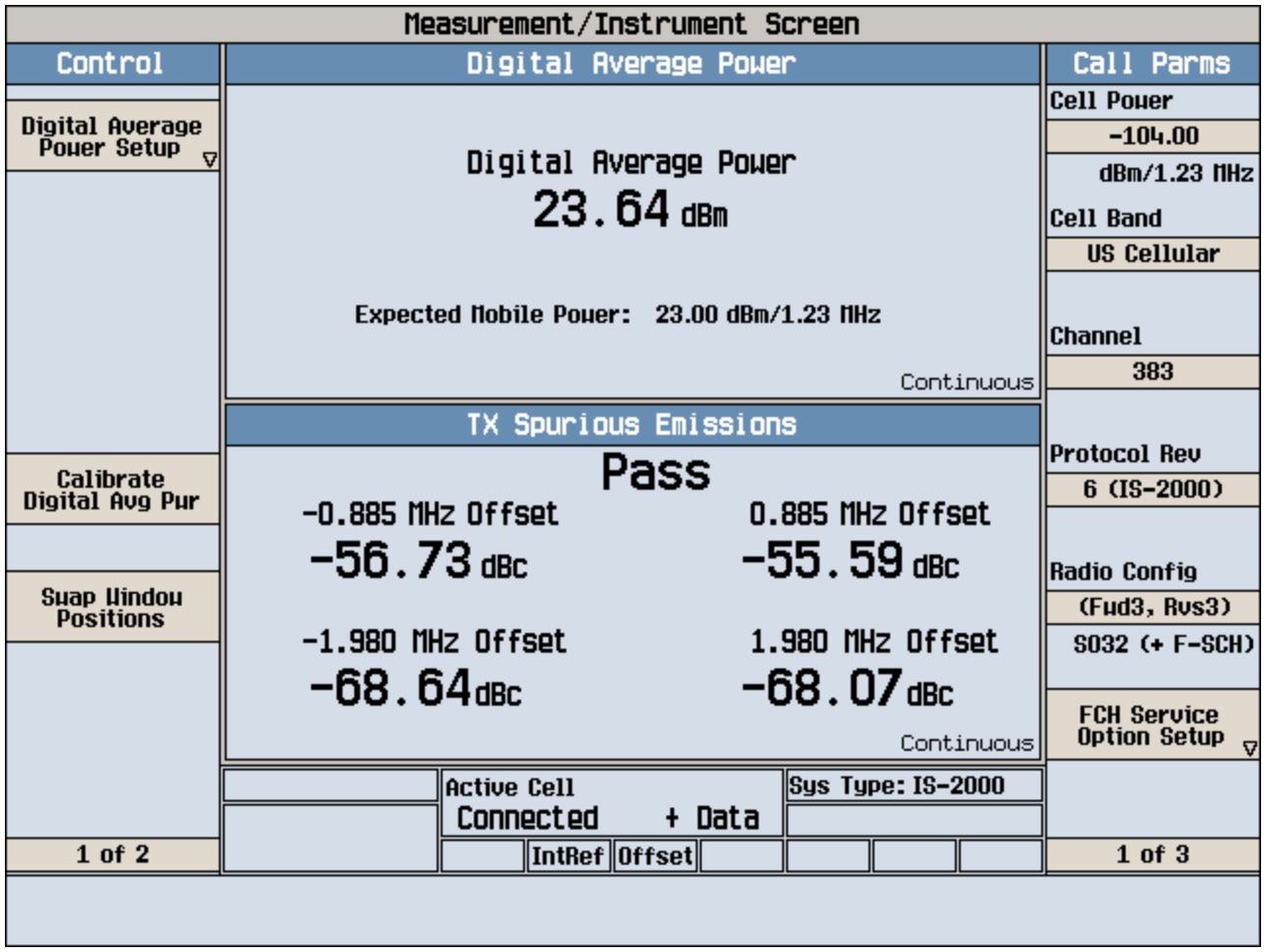

Figure 8-11a CDMA 800 1X, F/R-FCH at RC3

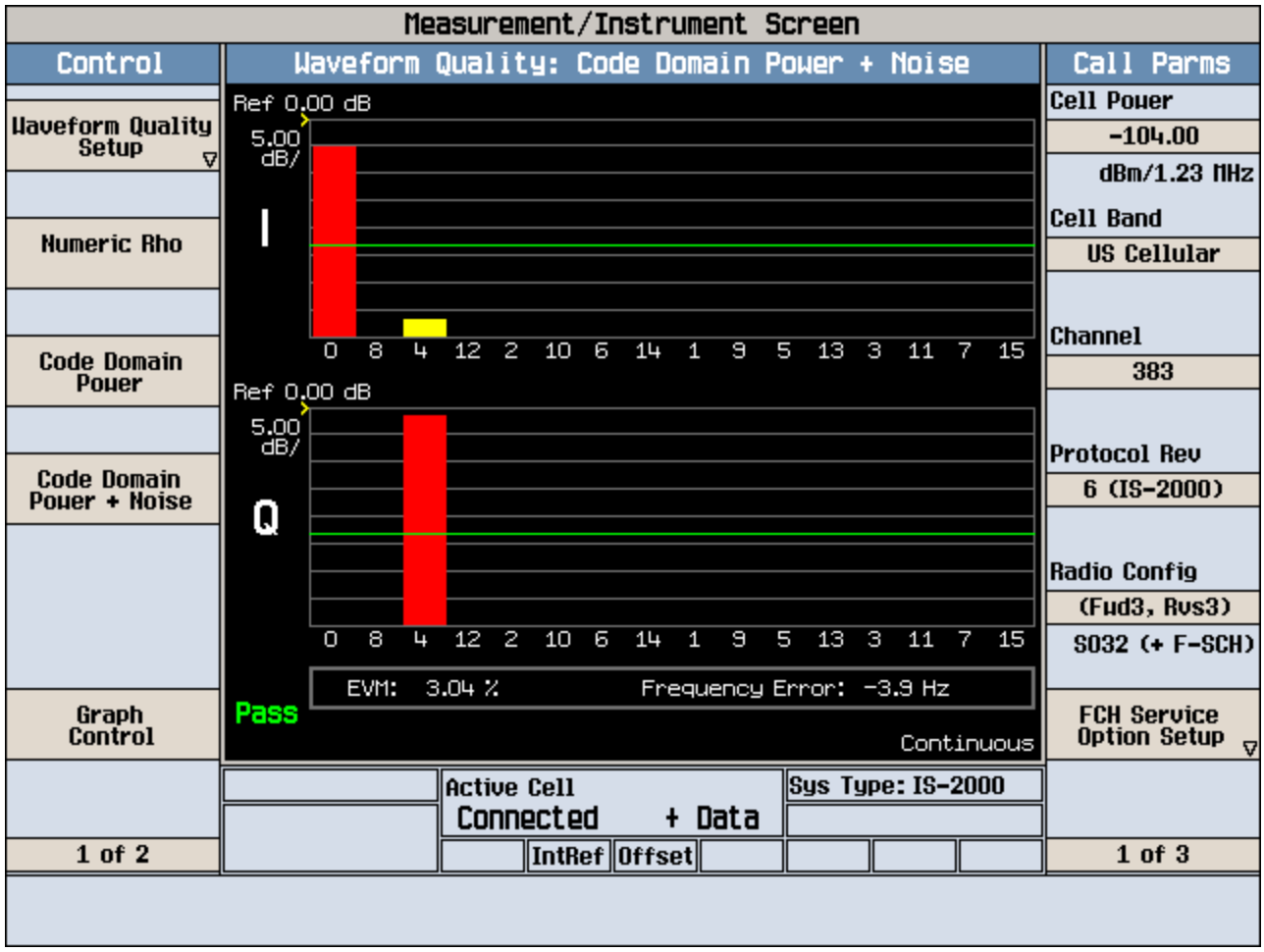

Figure 8-11b CDMA 800 1X, F/R-FCH at RC3

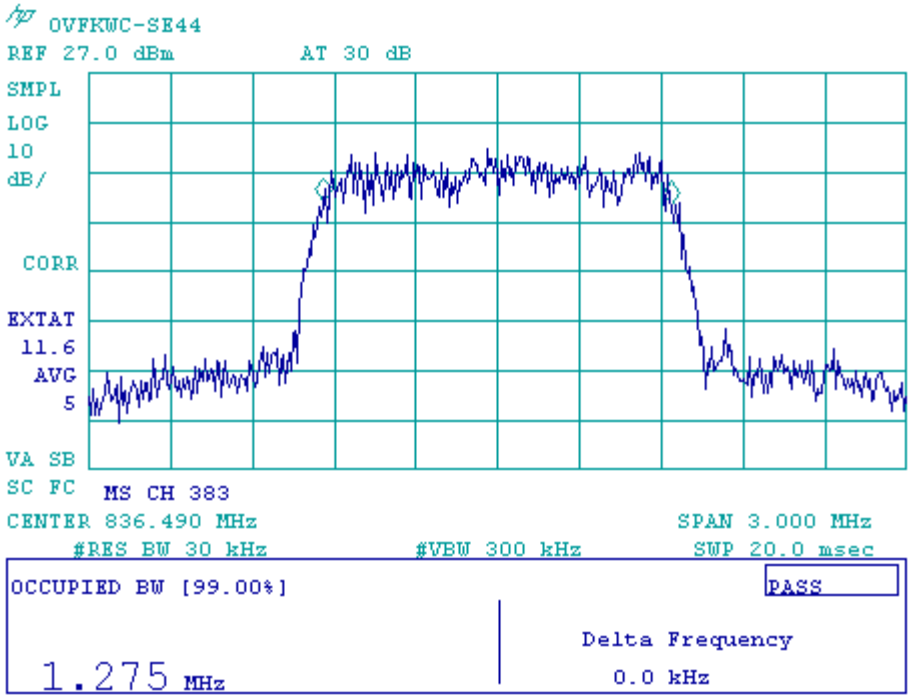

Figure 8-11c CDMA 800 1X, F/R-FCH at RC3

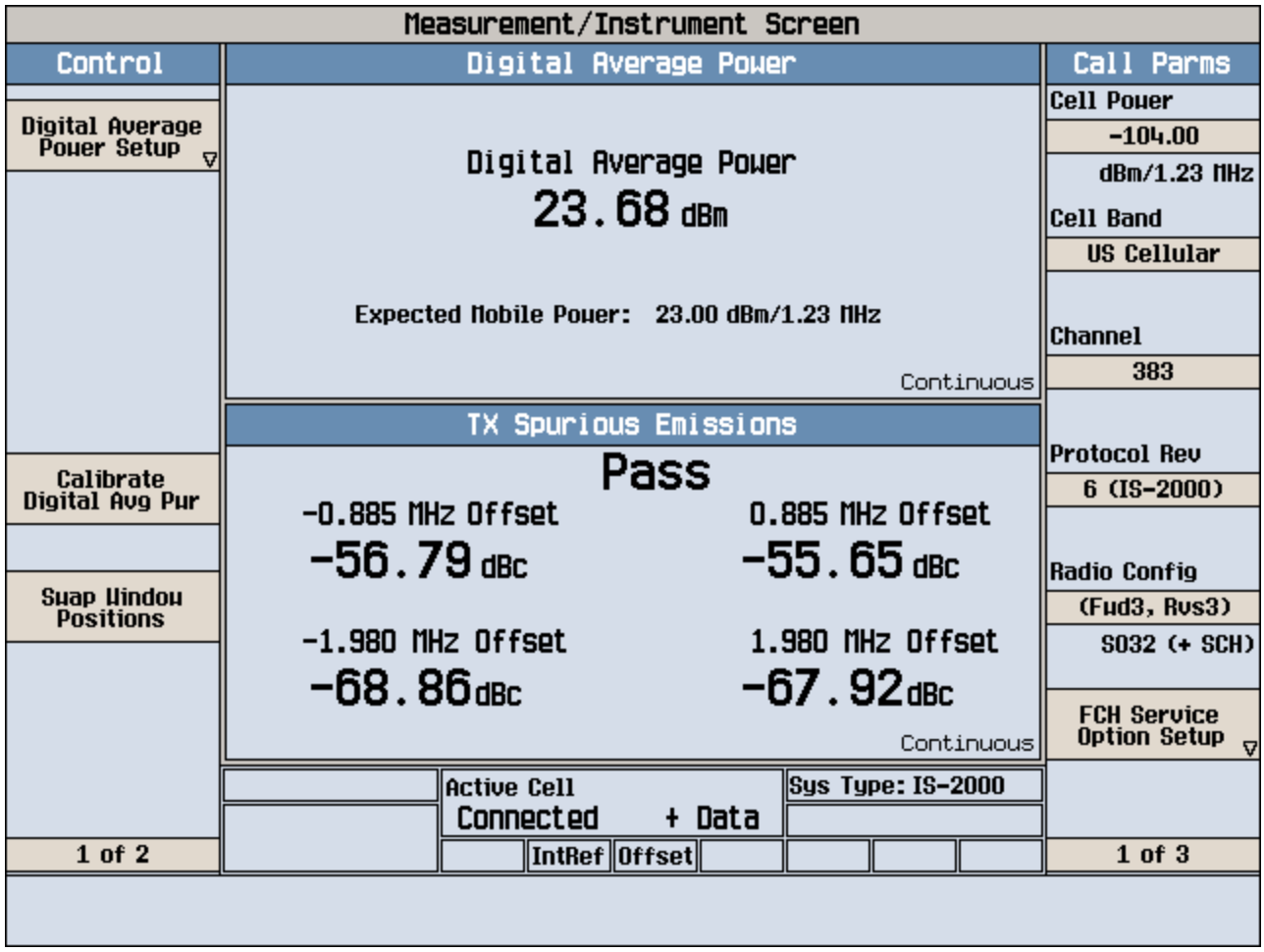

Figure 8-12a CDMA 800 1X, F/R-FCH + F/R-SCH at RC3

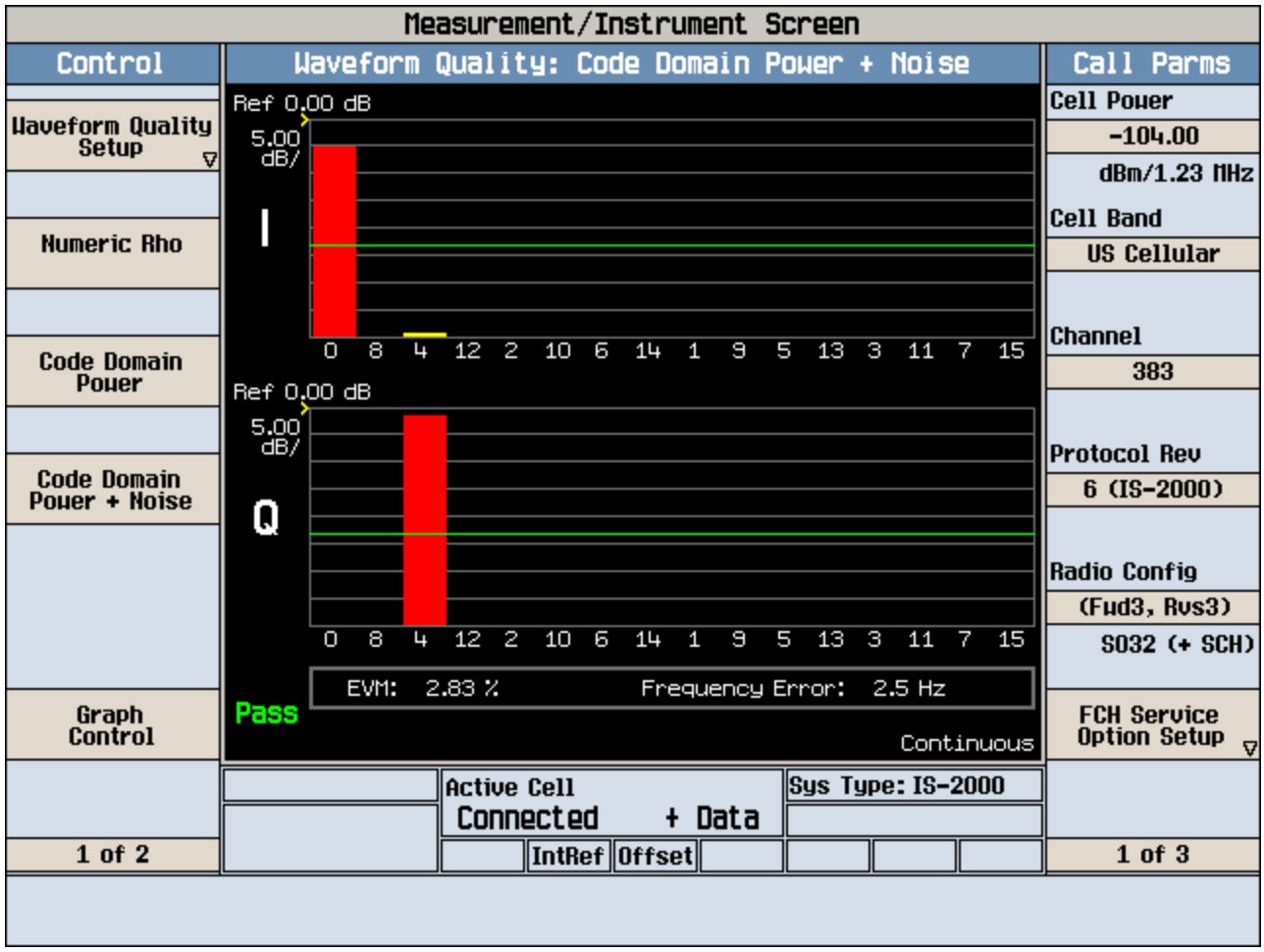

Figure 8-12b CDMA 800 1X, F/R-FCH + F/R-SCH at RC3

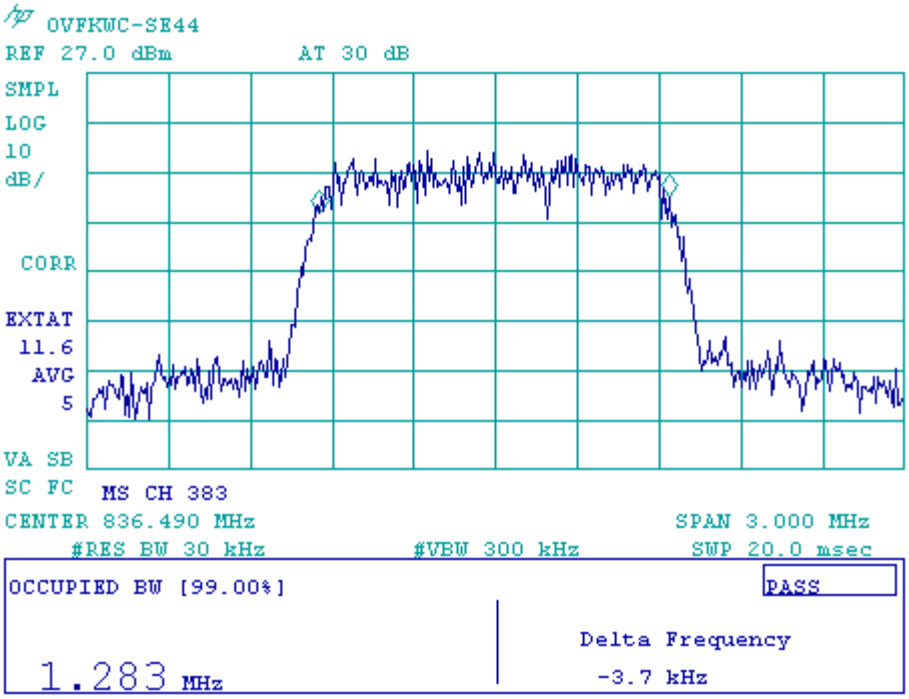

Figure 8-12c CDMA 800 1X, F/R-FCH + F/R-SCH at RC3

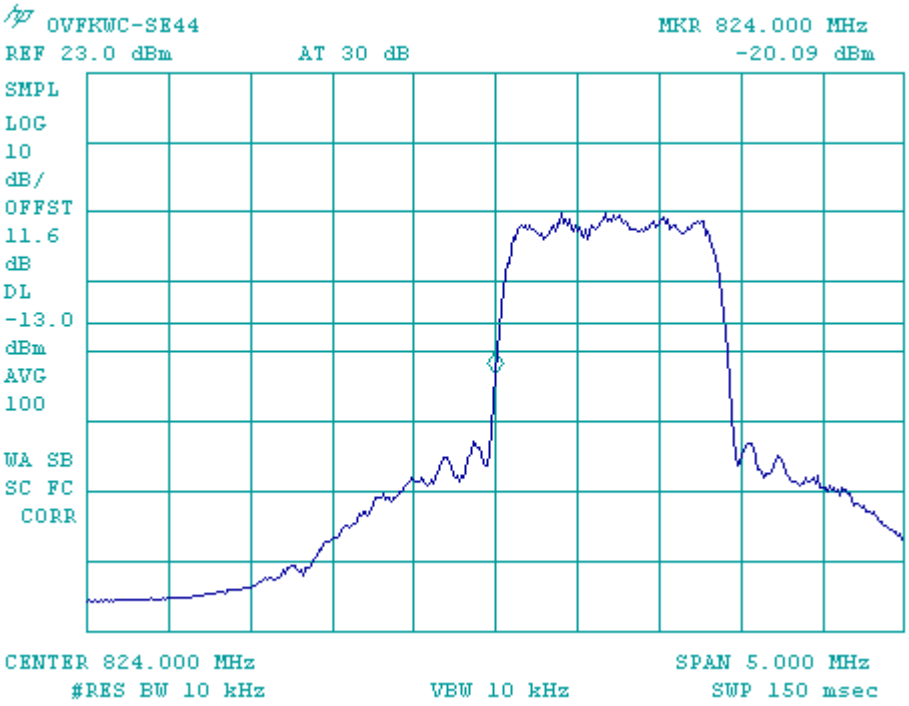

Figure 8-13 Lower Band Edge @ CH1013

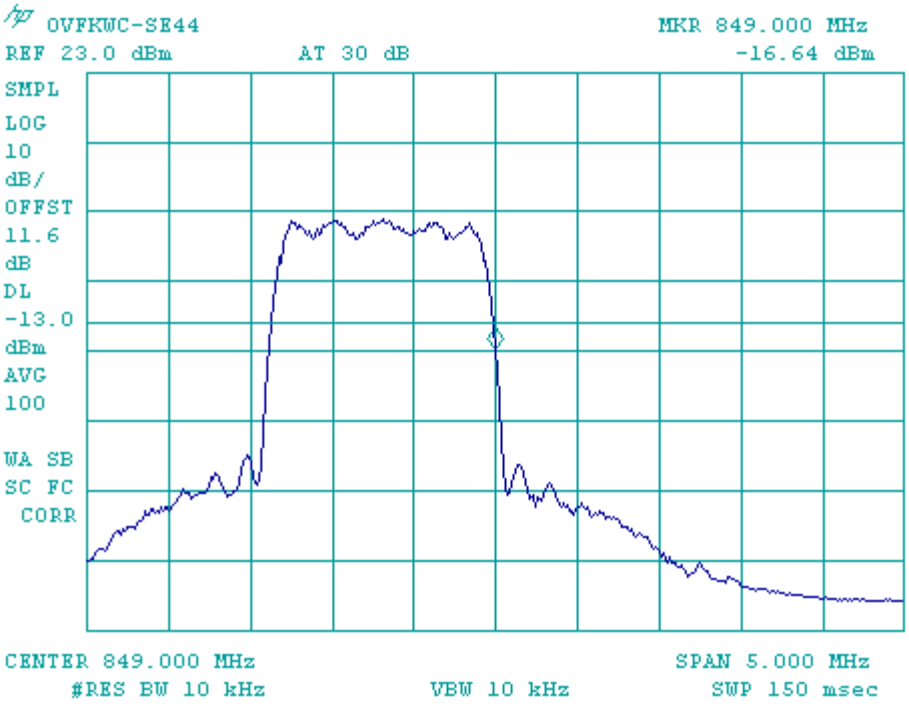

Figure 8-14 Upper Band Edge @ CH777

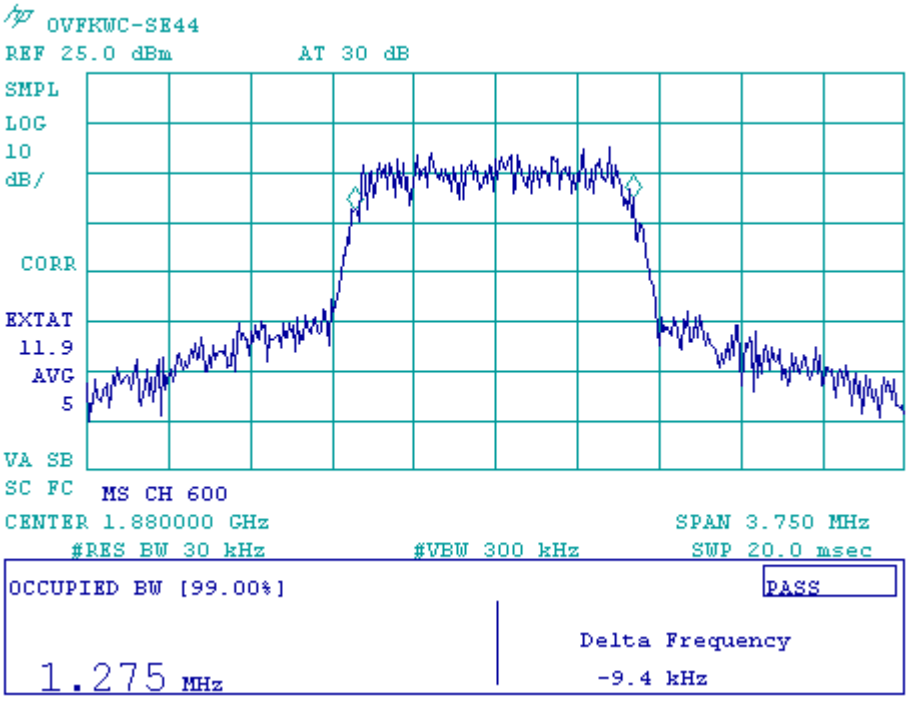

Figure 8-15 CDMA 1900 at RC1

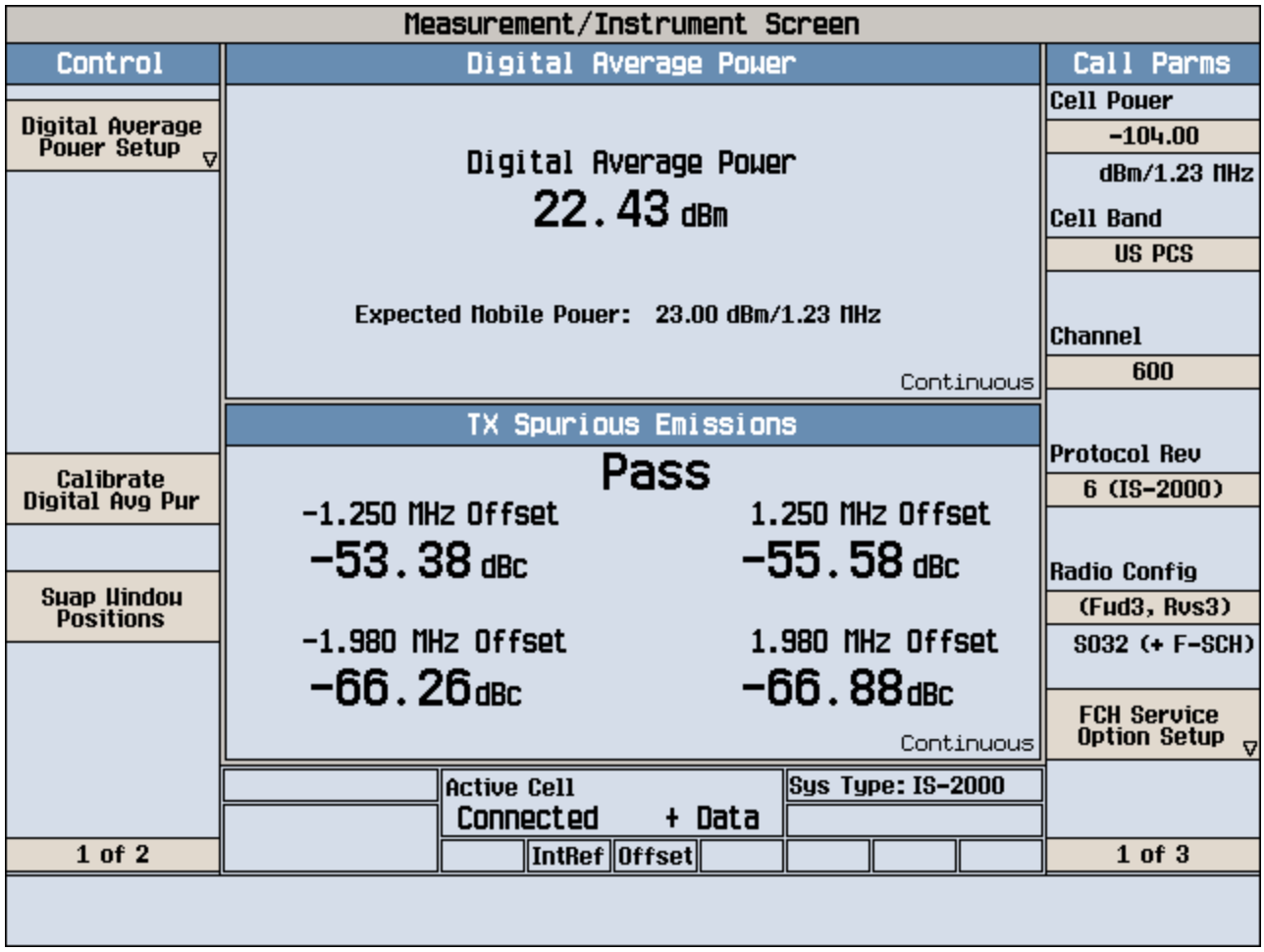

Figure 8-16a CDMA 1900 1X, F/R-FCH at RC3

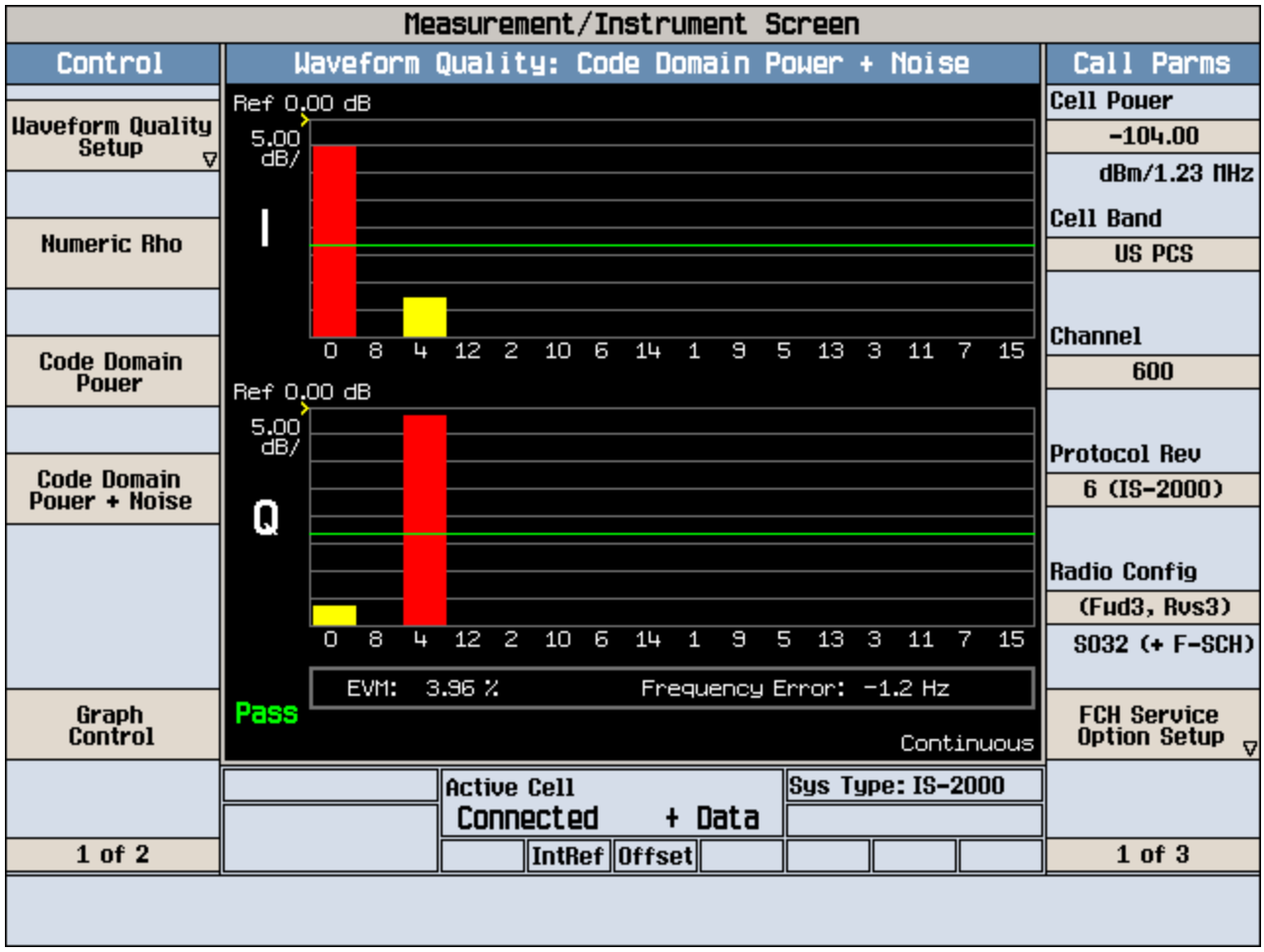

Figure 8-16b CDMA 1900 1X, F/R-FCH at RC3

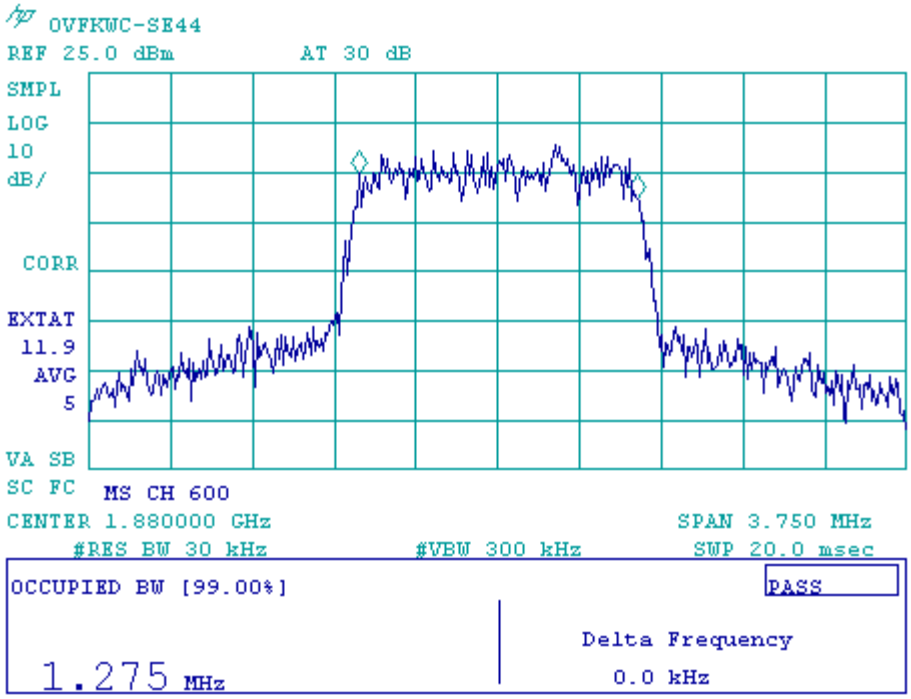

Figure 8-16c CDMA 1900 1X, F/R-FCH at RC3

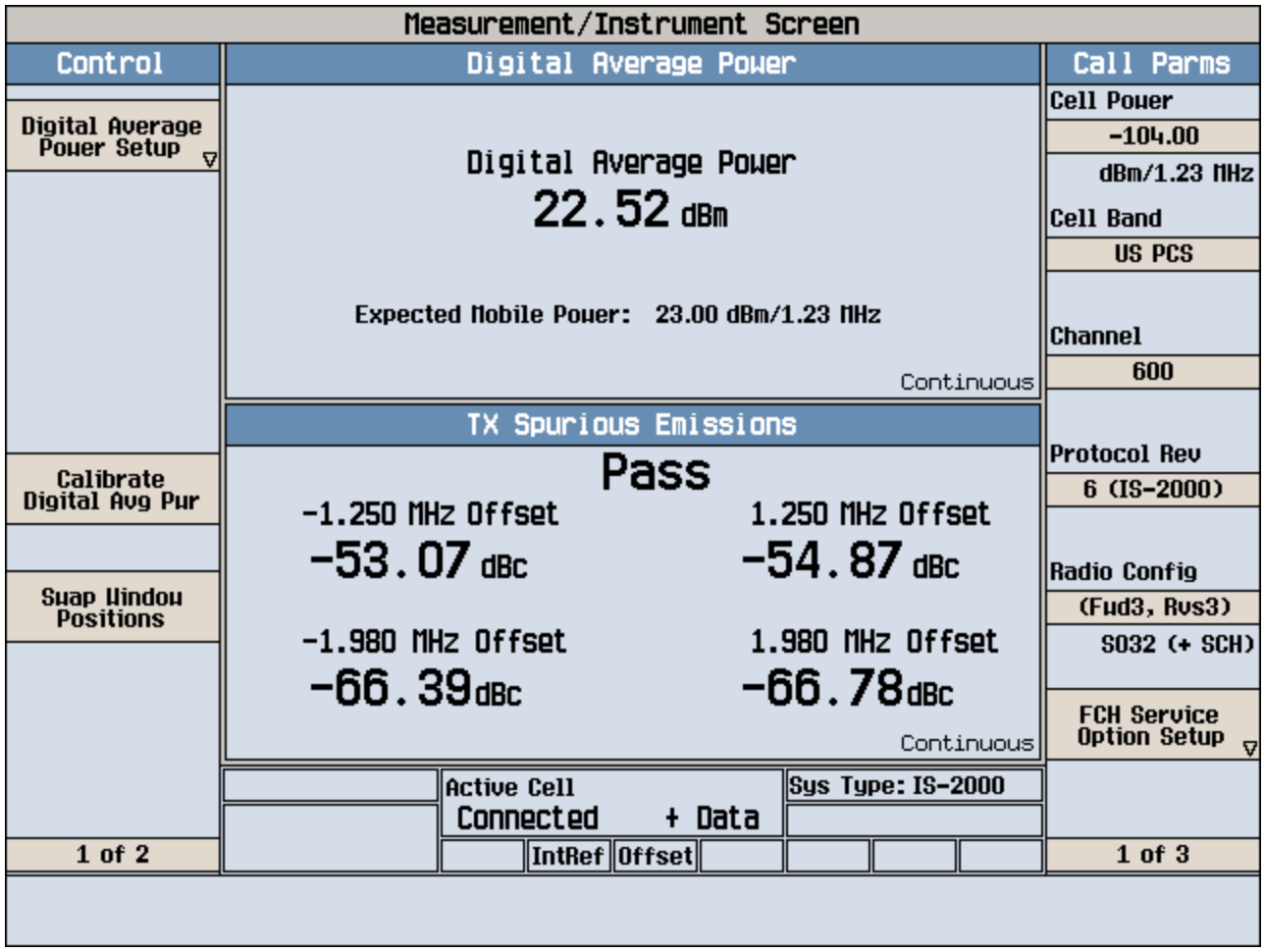

Figure 8-17a CDMA 1900 1X, F/R-FCH + F/R-SCH at RC3

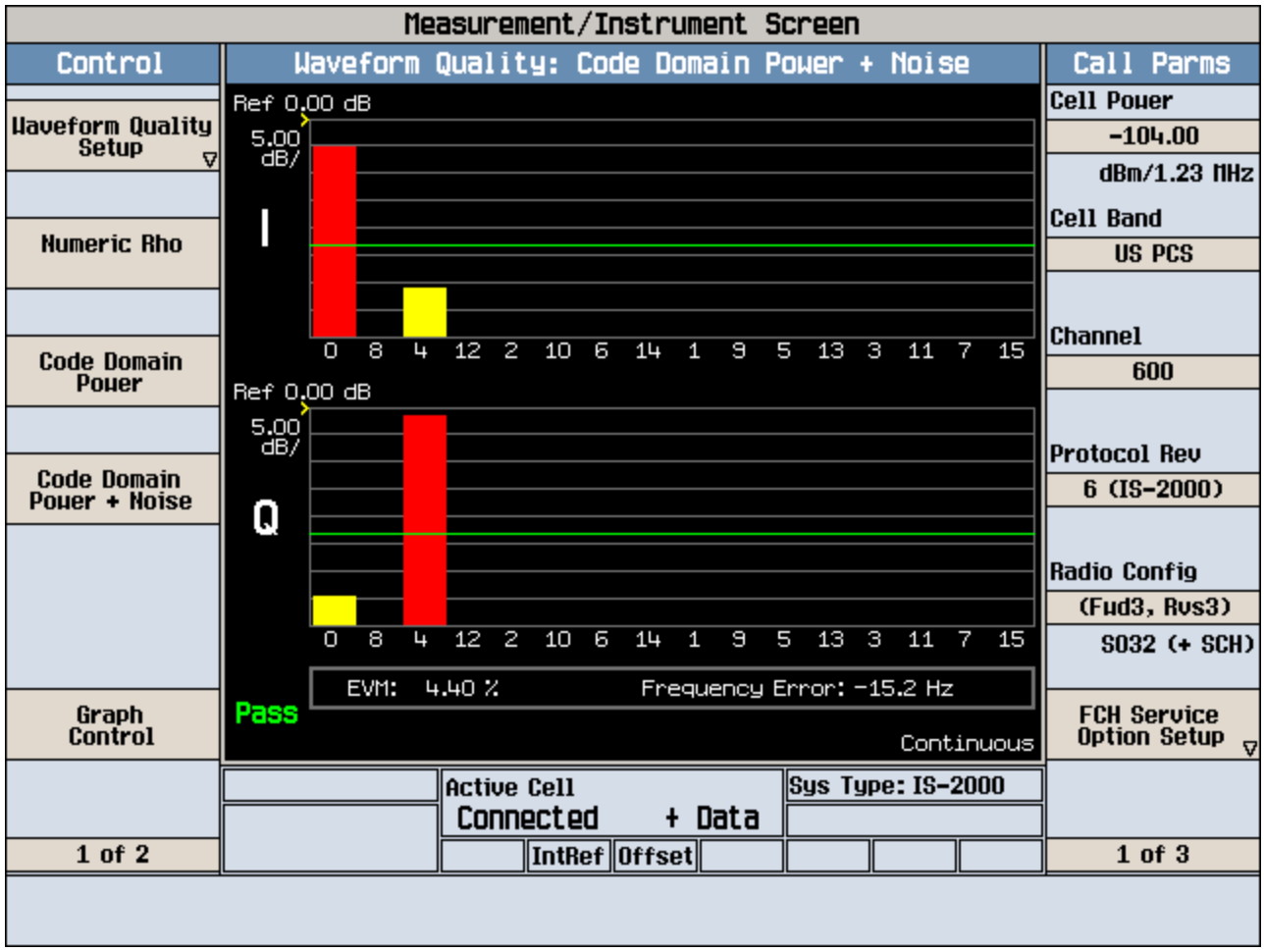

Figure 8-17b CDMA 1900 1X, F/R-FCH + F/R-SCH at RC3

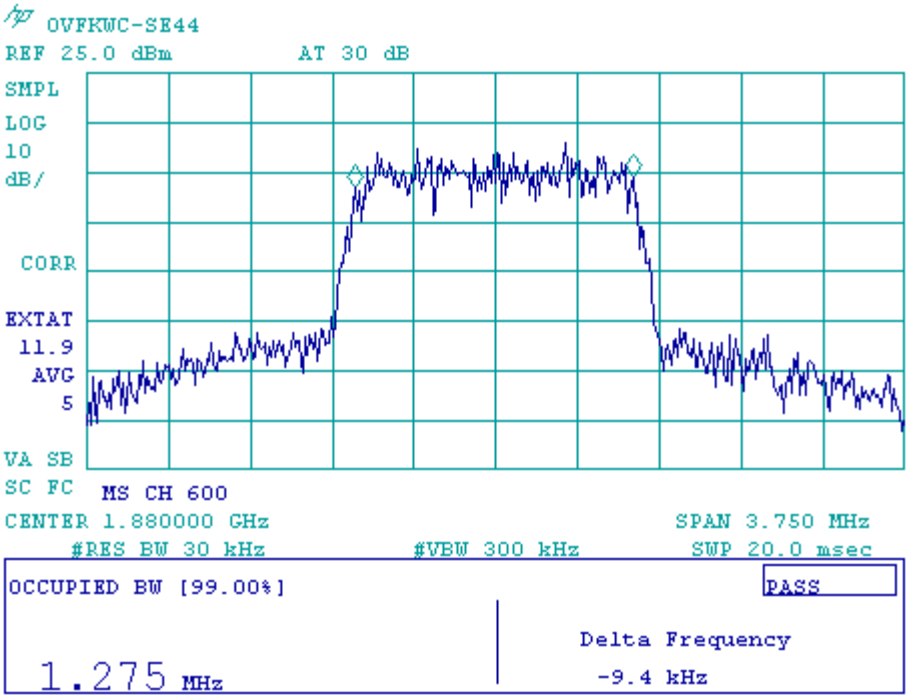

Figure 8-17c CDMA 1900 1X, F/R-FCH + F/R-SCH at RC3

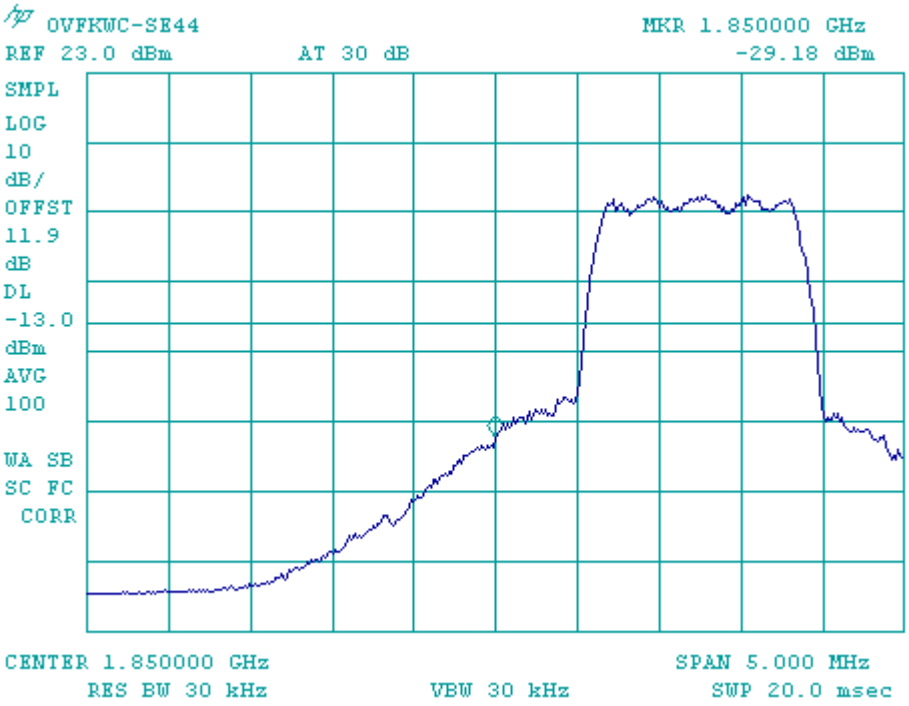

Figure 8-18 CDMA 1900 Lower Band Edge @ CH25

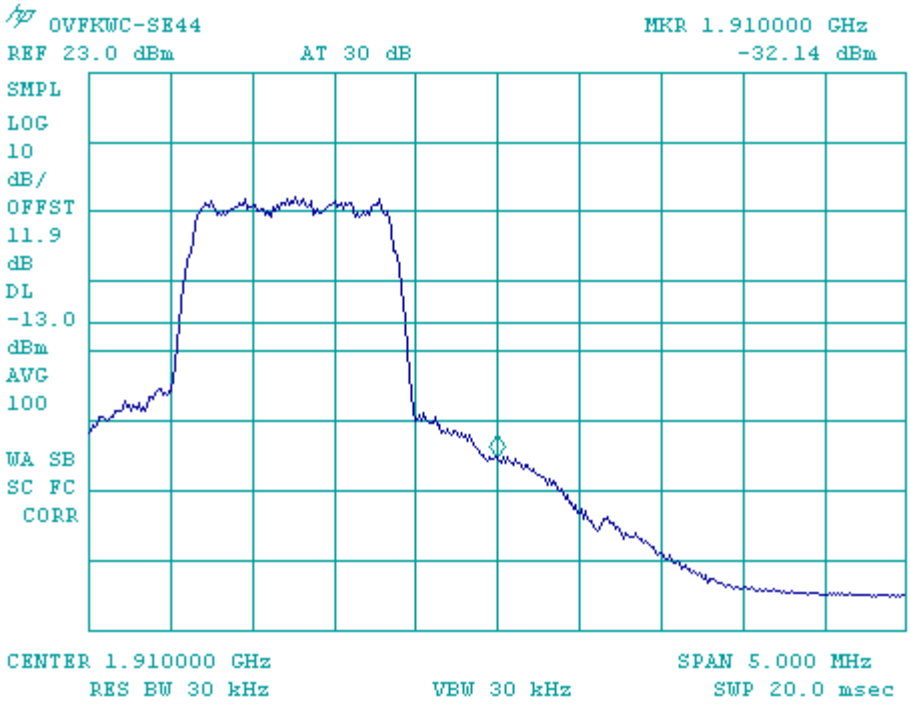

Figure 8-19 CDMA 1900 Upper Band Edge @ CH1175

9 Spurious Emissions At Antenna Terminals

FCC: § 2.1051, § 22.917(e)(f), § 24.238	IC: RSS-129 §6.3, §8.1, RSS-133 §6.3

Measurement Procedures:

Out of Band: The RF output of the EUT was connected to the input of the spectrum analyzer with sufficient attenuation. The audio modulating signal was applied as in Section 5.0. The frequency spectrum was investigated from the lowest frequency signal generated up to at least the tenth harmonic of the fundamental.

Base Band: Spectrum was investigated from 869-894 MHz for Cellular.

List of Figures:

Mode	Figure	Channel	Plot Description
AMPS 800	9-1	991	Emissions in base station frequency range, 869 - 894 MHz
	9-2		Conducted spurious emissions, 9kHz to 20GHz
	9-3	383	Emissions in base station frequency range, 869 - 894 MHz
	9-4		Conducted spurious emissions, 9kHz to 20GHz
	9-5	799	Emissions in base station frequency range, 869 - 894 MHz
	9-6		Conducted spurious emissions, 9kHz to 20GHz
CDMA 800	9-7	1013	Emissions in base station frequency range, 869 - 894 MHz
	9-8		Conducted spurious emissions, 9kHz to 20GHz
	9-9	383	Emissions in base station frequency range, 869 - 894 MHz
	9-10		Conducted spurious emissions, 9kHz to 20GHz
	9-11	777	Emissions in base station frequency range, 869 - 894 MHz
	9-12		Conducted spurious emissions, 9kHz to 20GHz
CDMA 1900	9-13	25	Conducted spurious emissions, 9kHz to 20GHz
	9-14	600	Conducted spurious emissions, 9kHz to 20GHz
	9-15	1175	Conducted spurious emissions, 9kHz to 20GHz

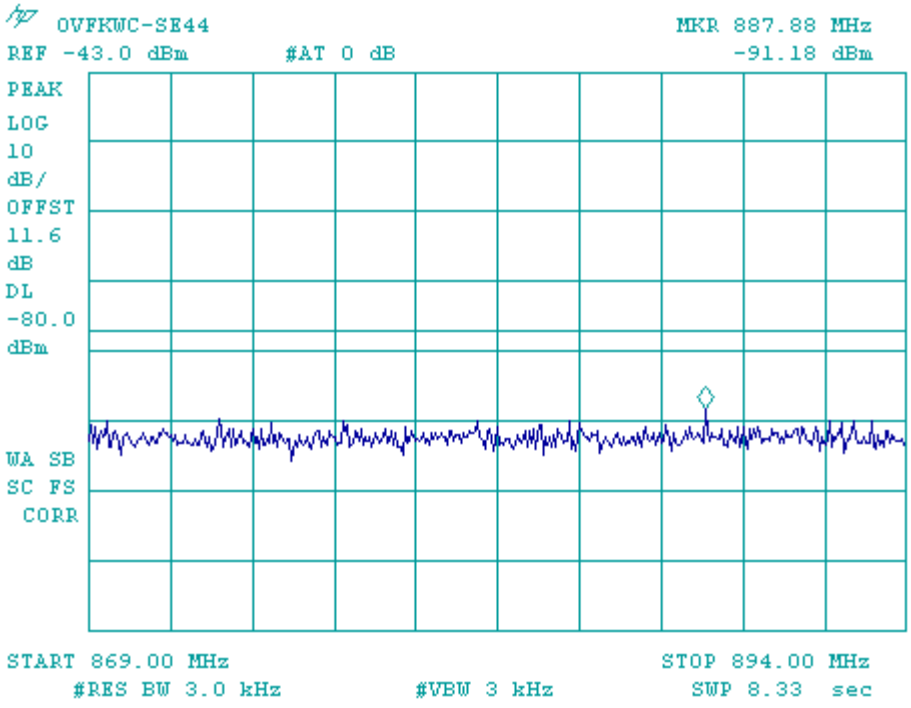

Figure 9-1 AMPS 800 - Emissions in base station frequency range (CH 991)

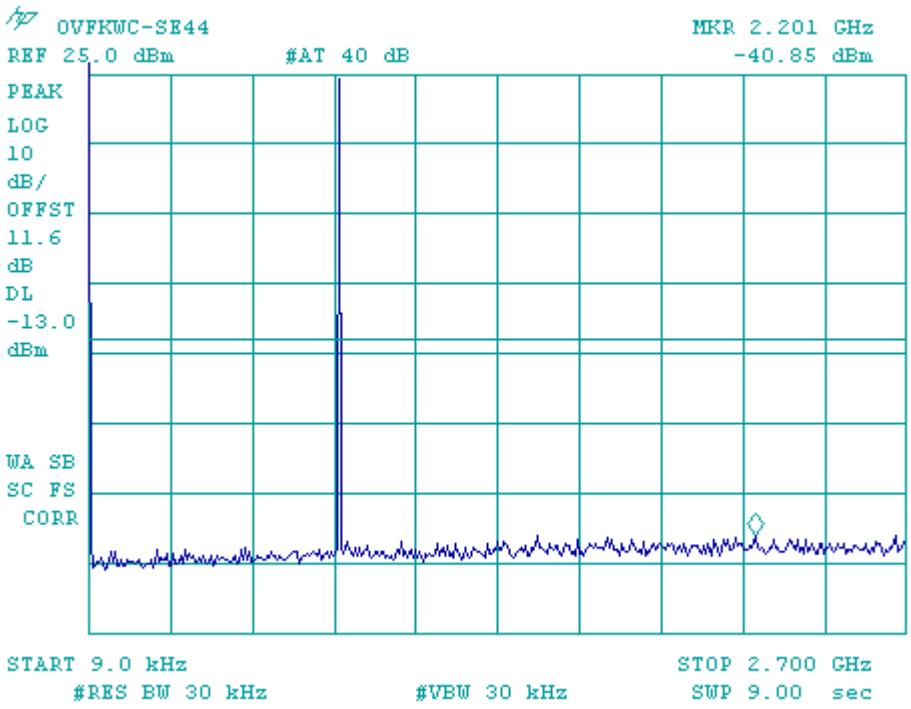

Figure 9-2a AMPS 800 – Conducted Spurious Emission (CH 991)

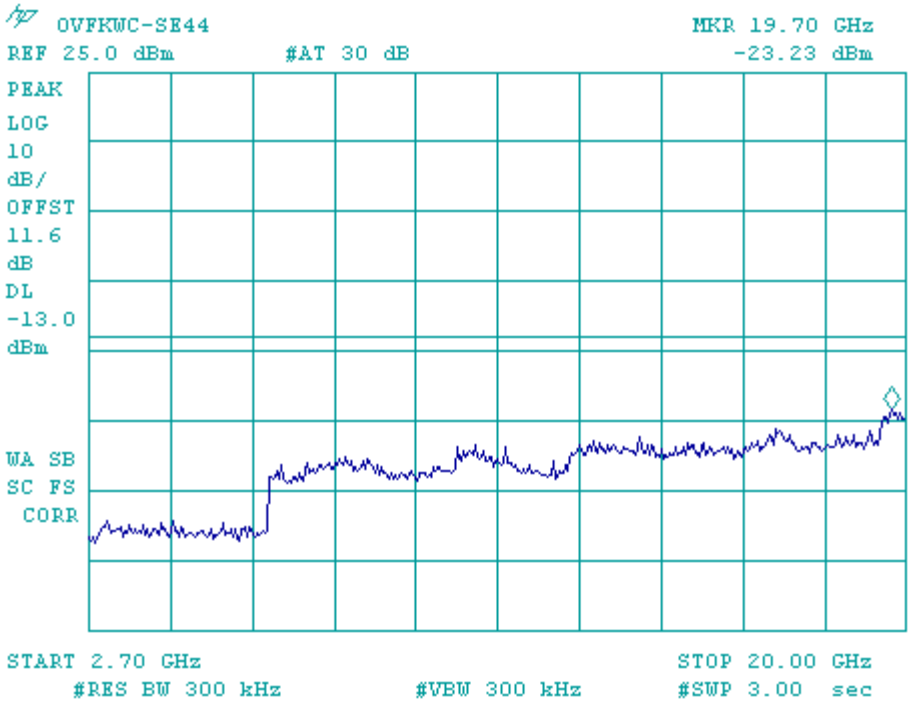

Figure 9-2b AMPS 800 – Conducted Spurious Emission (CH 991)

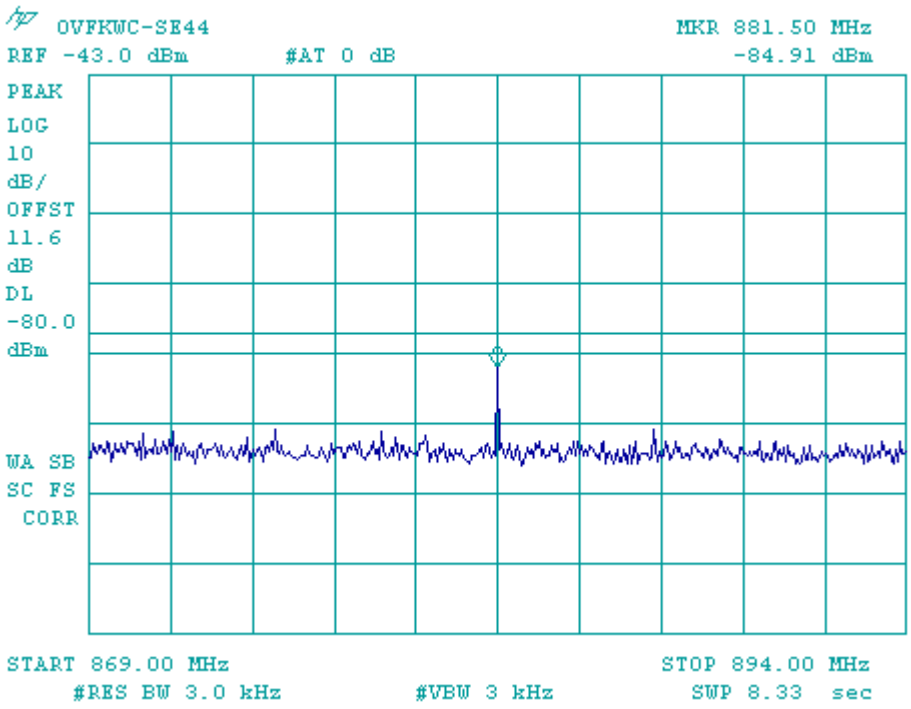

Figure 9-3 AMPS 800 - Emissions in base station frequency range (CH 383)

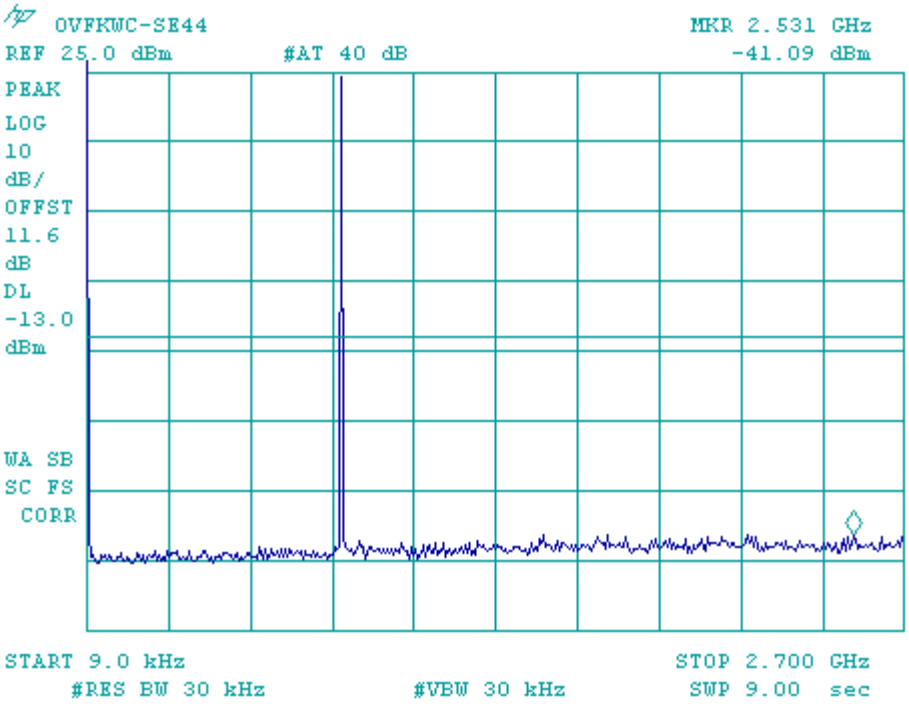

Figure 9-4aAMPS 800 – Conducted Spurious Emission (CH 383)

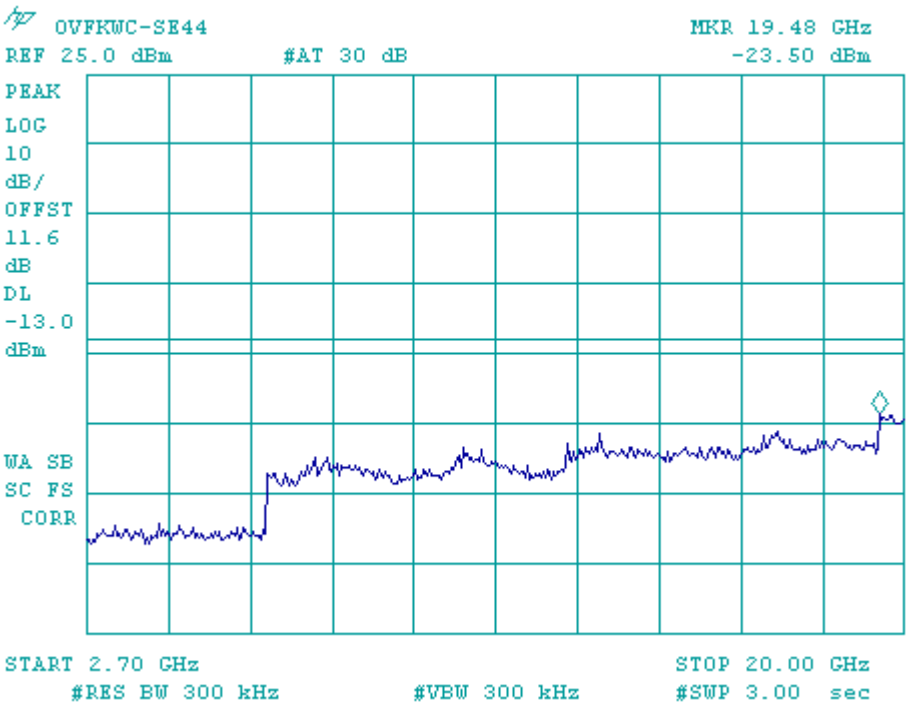

Figure 9-4b AMPS 800 – Conducted Spurious Emission (CH 383)

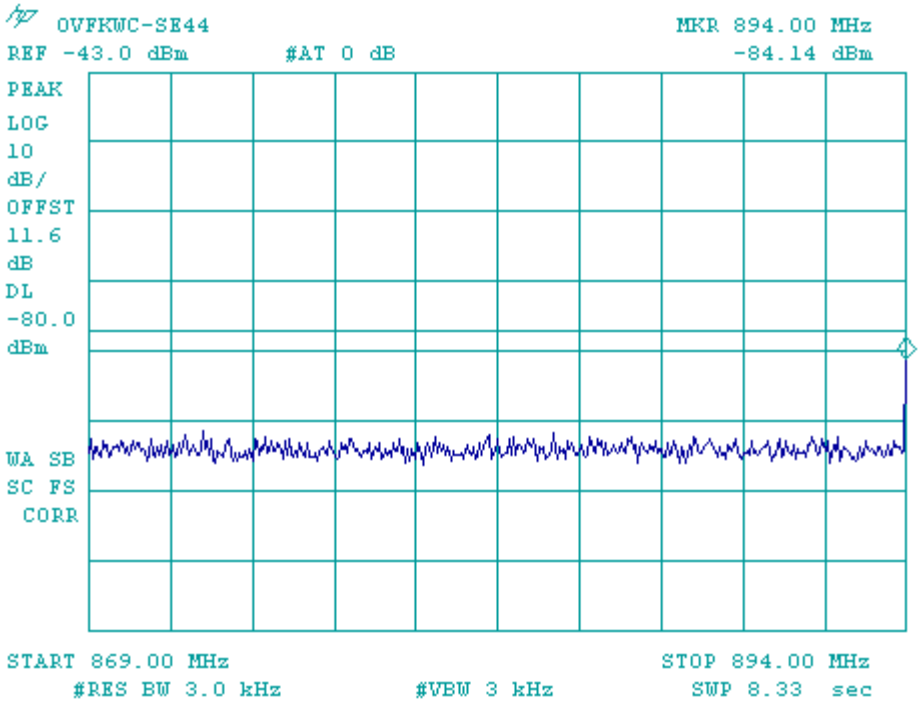

Figure 9-5 AMPS 800 - Emissions in base station frequency range (CH 799)

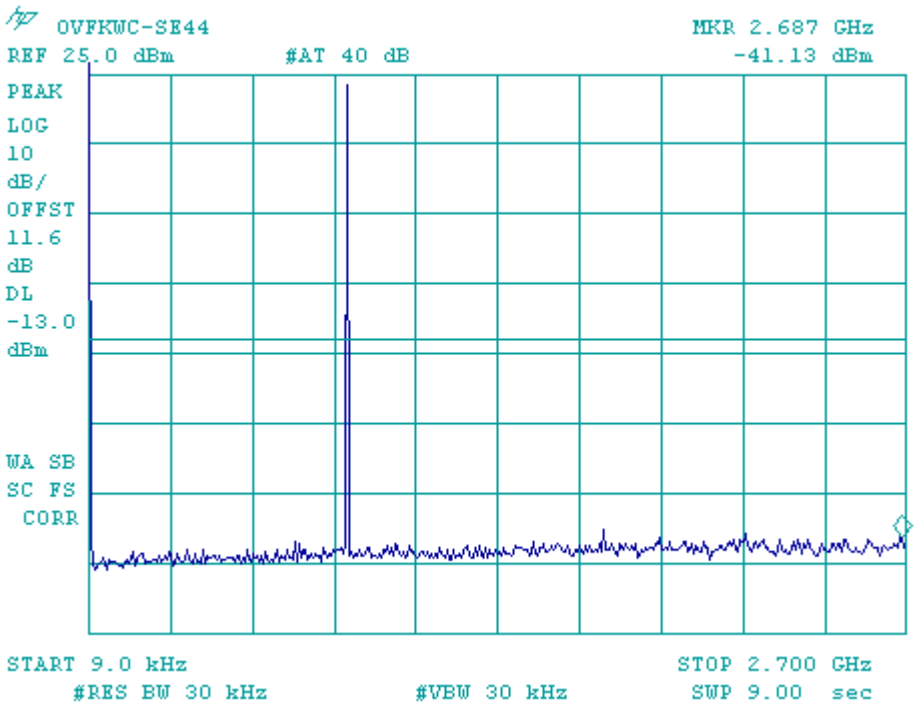

Figure 9-6a AMPS 800 – Conducted Spurious Emission (CH 799)

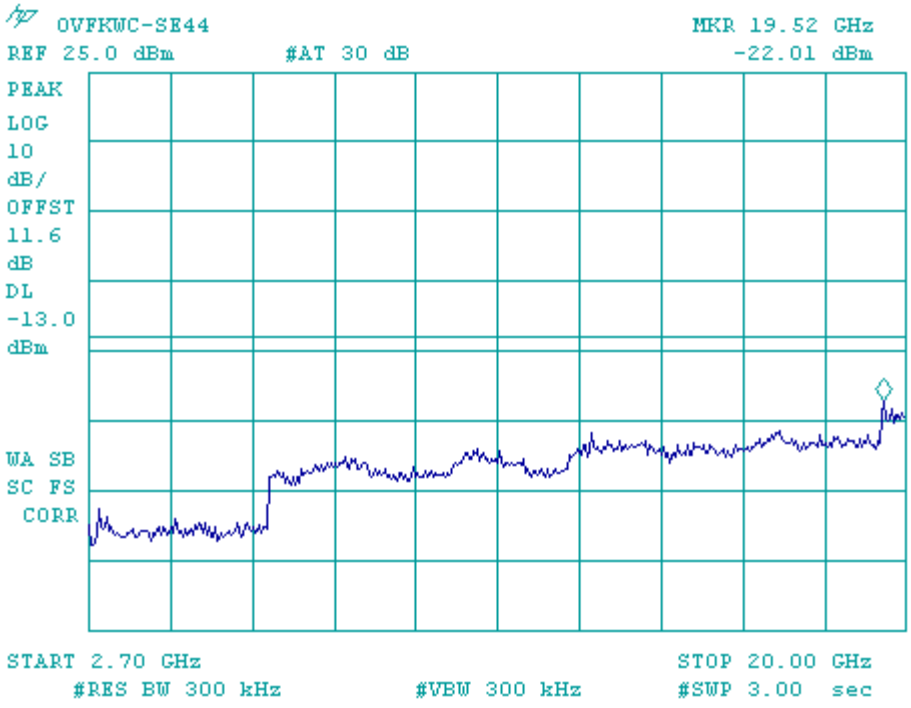

Figure 9-6b AMPS 800 – Conducted Spurious Emission (CH 799)

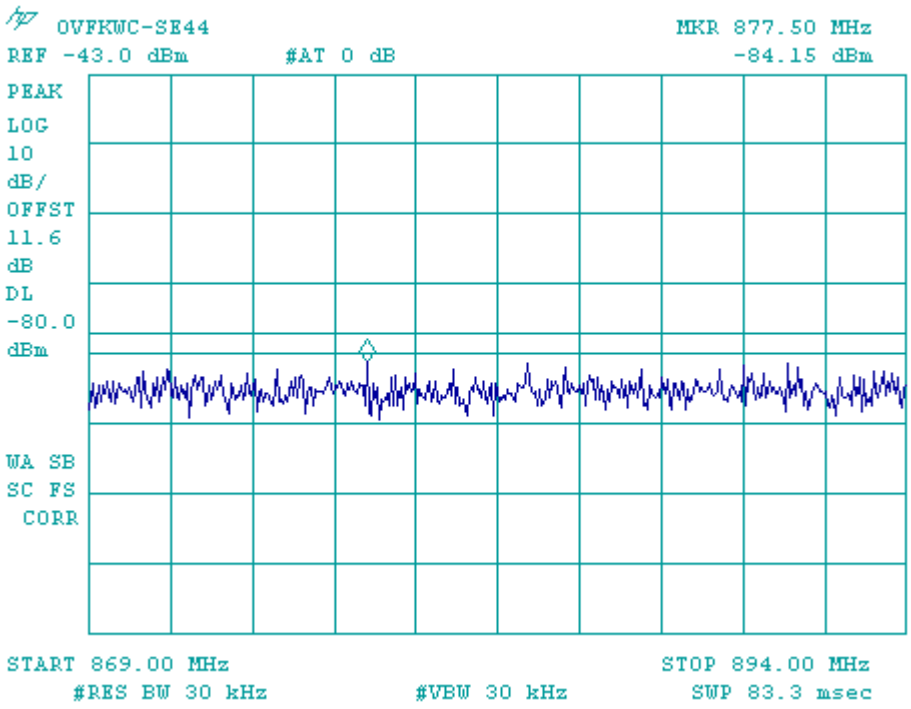

Figure 9-7 CDMA 800 - Emissions in base station frequency range (CH 1013)

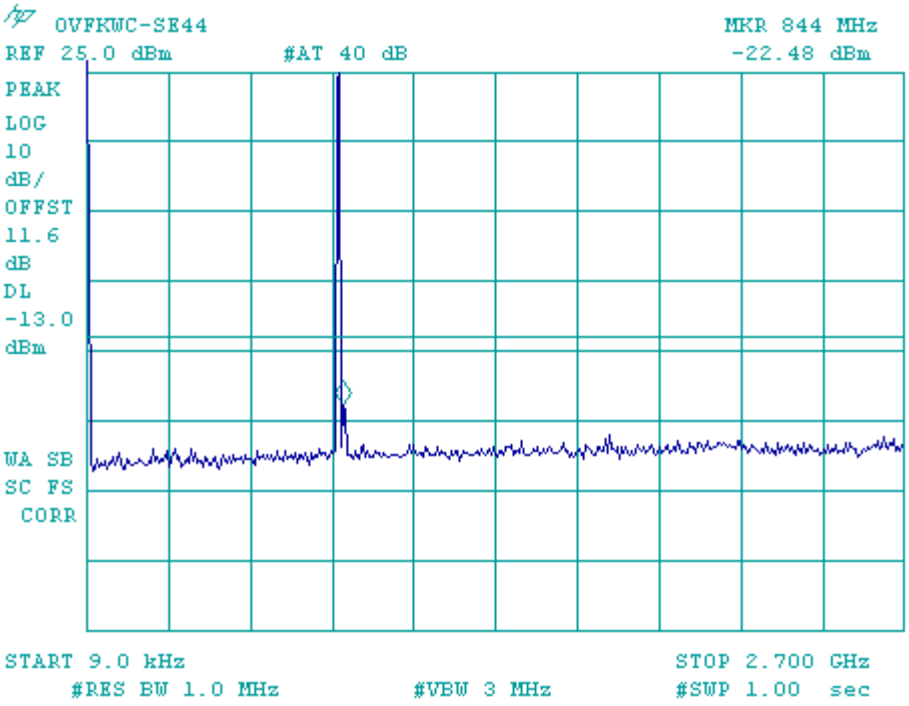

Figure 9-8a CDMA 800 – Conducted Spurious Emission (CH 1013)

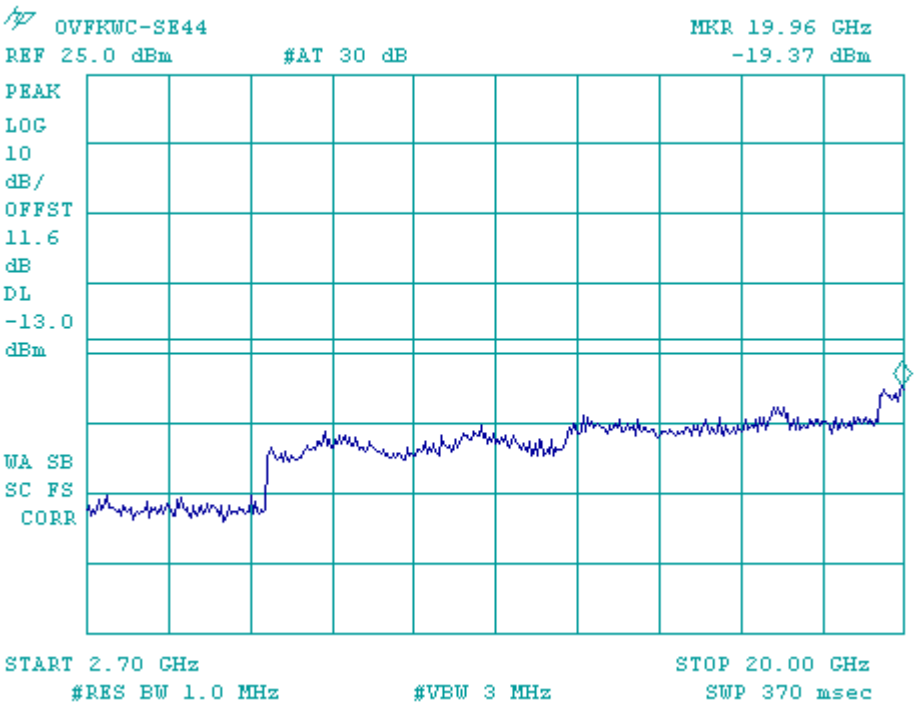

Figure 9-8b CDMA 800 – Conducted Spurious Emission (CH 1013)

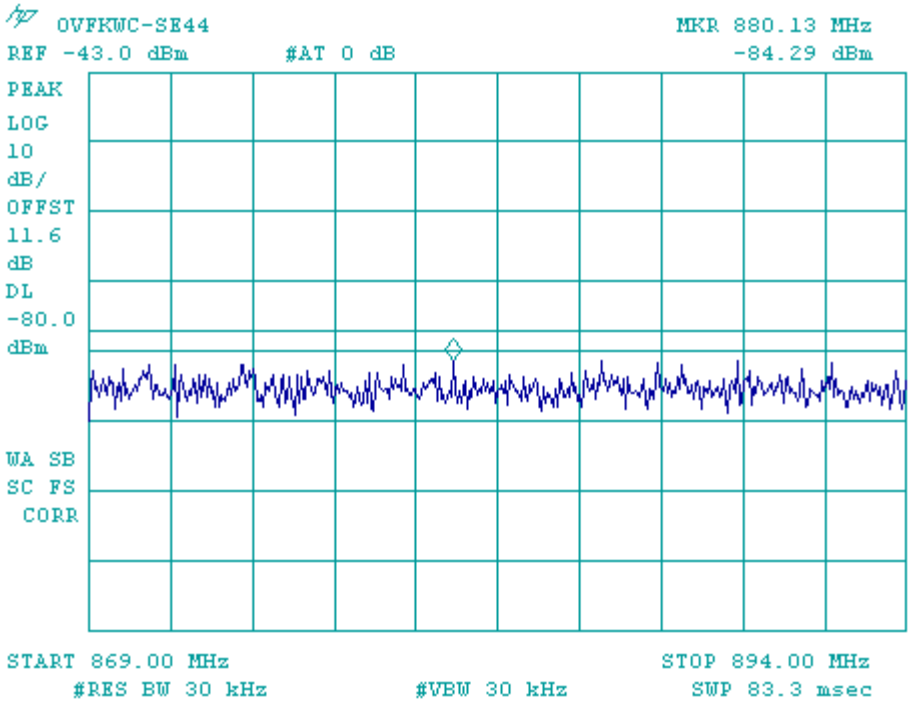

Figure 9-9 CDMA 800 - Emissions in base station frequency range (CH 383)

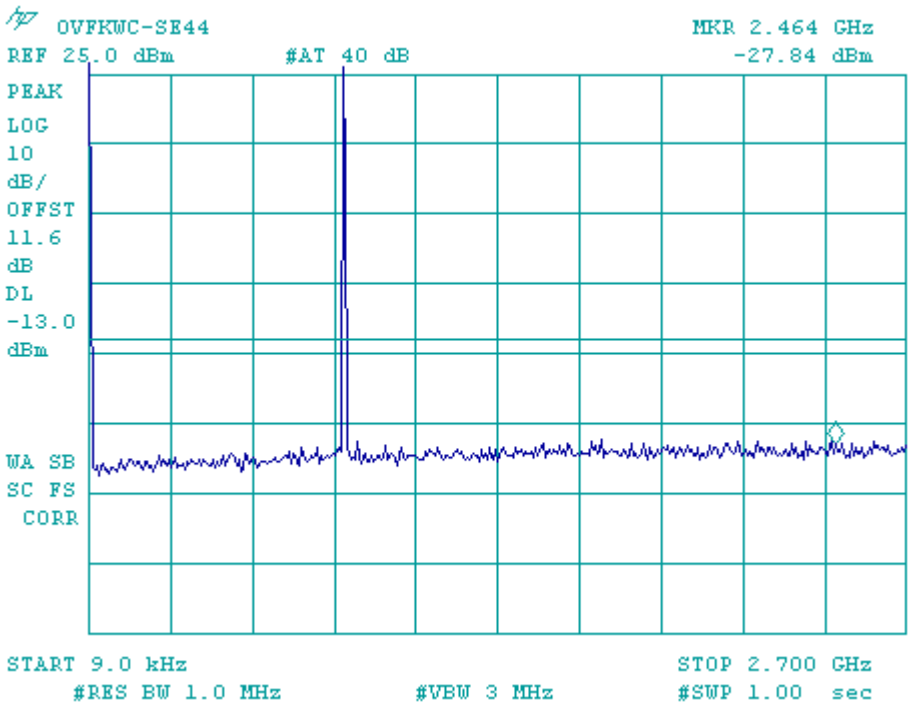

Figure 9-10a CDMA 800 – Conducted Spurious Emission (CH 383)

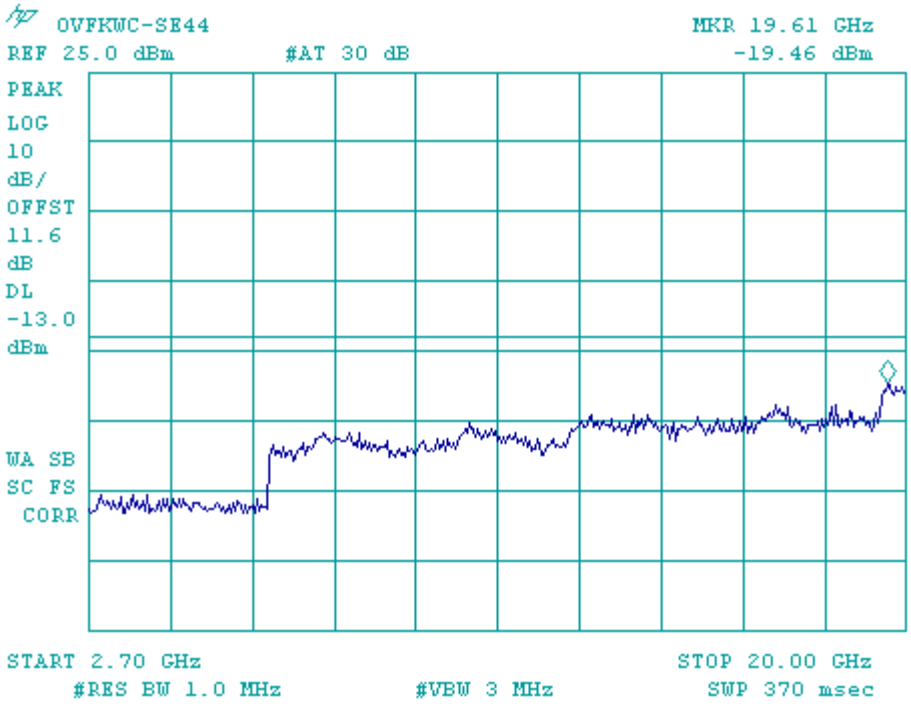

Figure 9-10b CDMA 800 – Conducted Spurious Emission (CH 383)

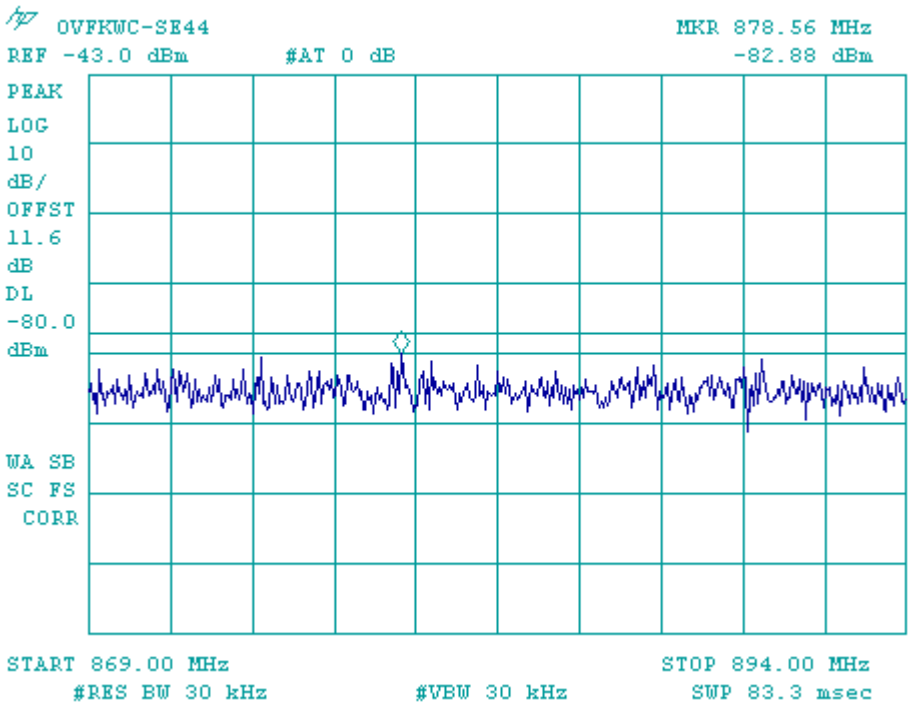

Figure 9-11 CDMA 800 - Emissions in base station frequency range (CH 777)

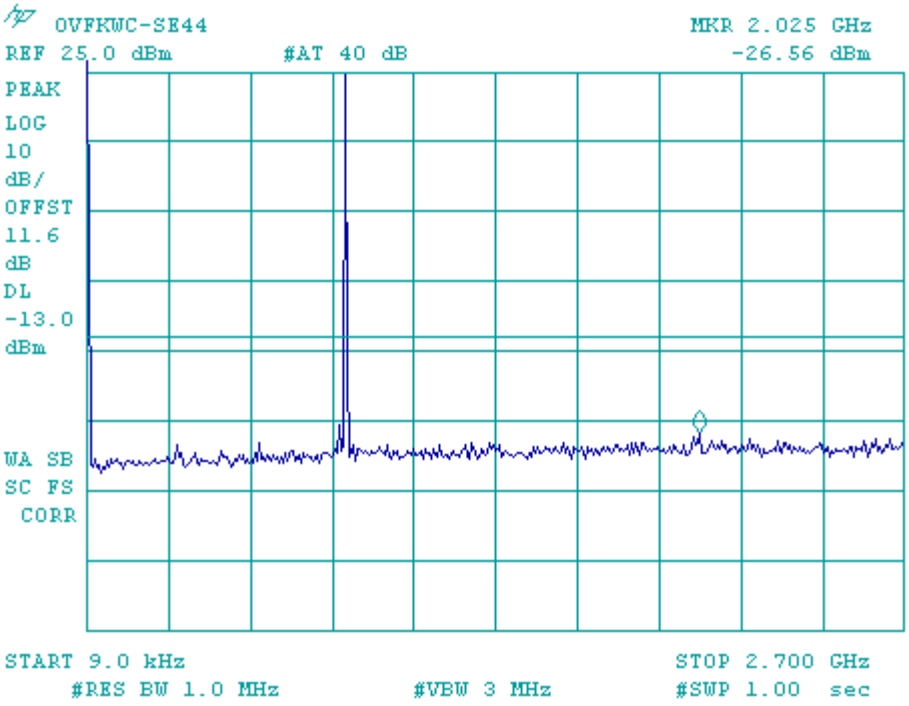

Figure 9-12a CDMA 800 – Conducted Spurious Emission (CH 777)

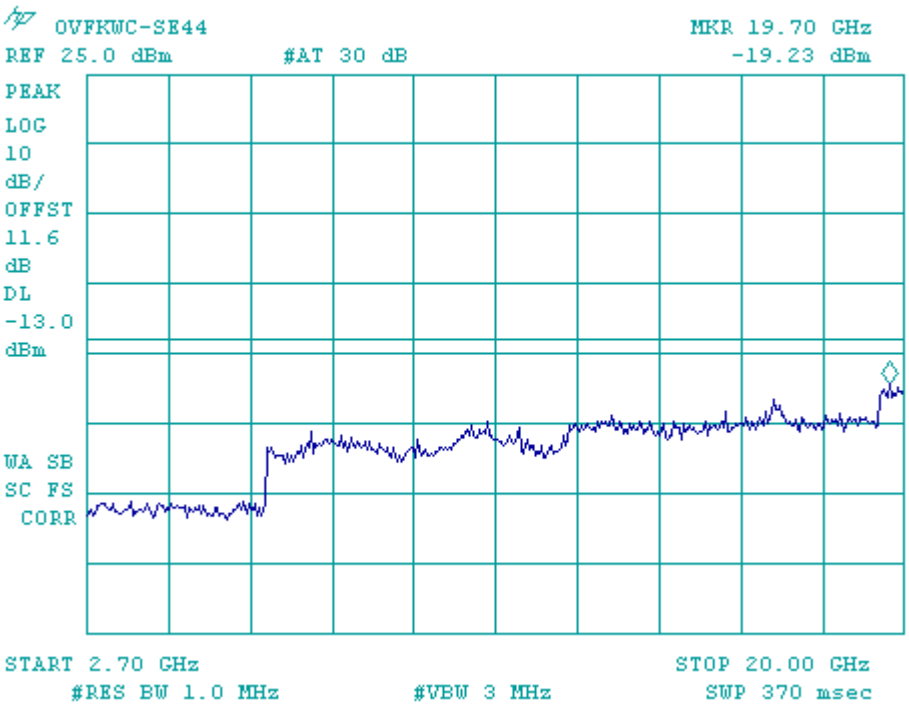

Figure 9-12b CDMA 800 – Conducted Spurious Emission (CH 777)

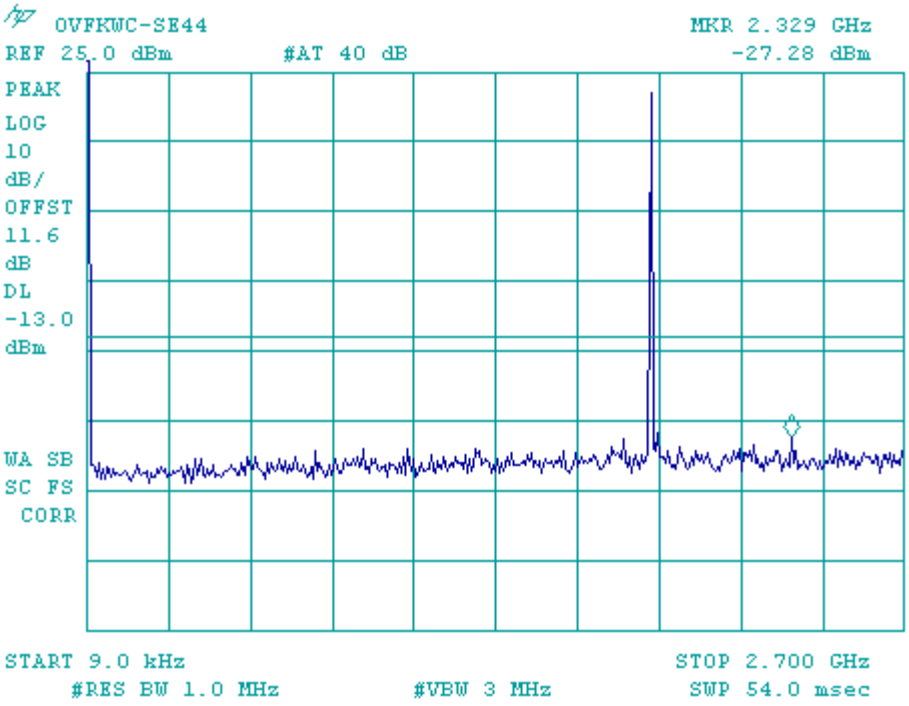

Figure 9-13a CDMA 1900 - Conducted Spurious Emission (CH 25)

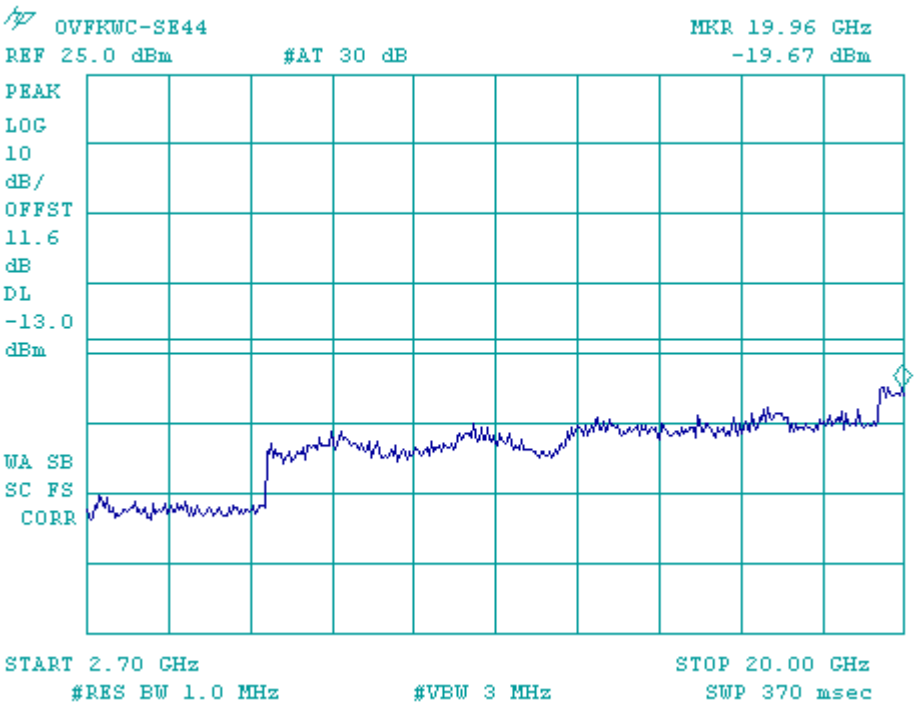

Figure 9-13b CDMA 1900 - Conducted Spurious Emission (CH 25)

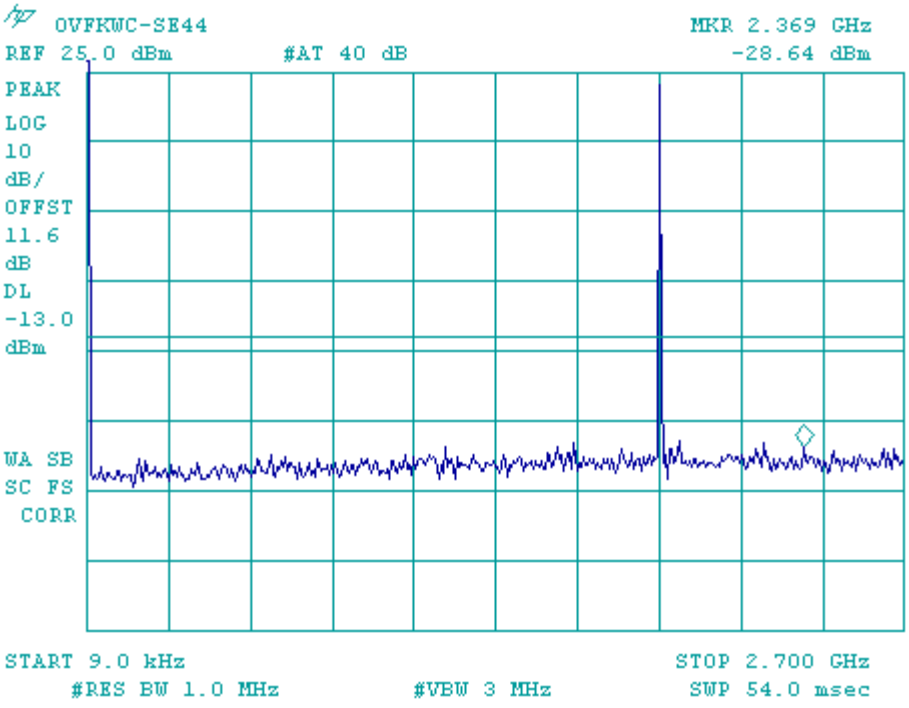

Figure 9-14a CDMA 1900 - Conducted Spurious Emission (CH 600)

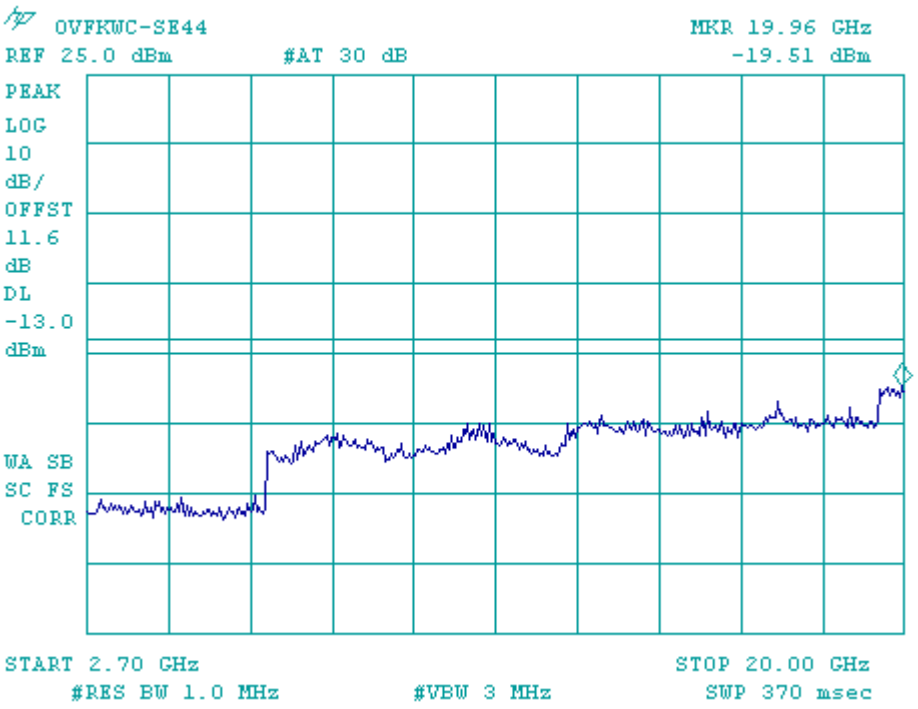

Figure 9-14b CDMA 1900 - Conducted Spurious Emission (CH 600)

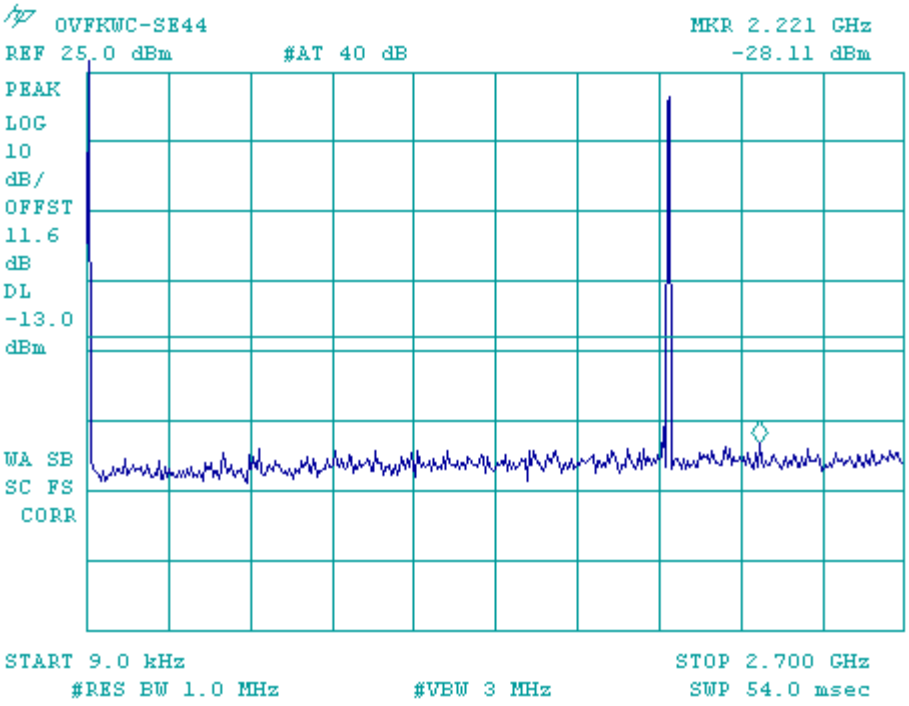

Figure 9-15a CDMA 1900 - Conducted Spurious Emission (CH 1175)

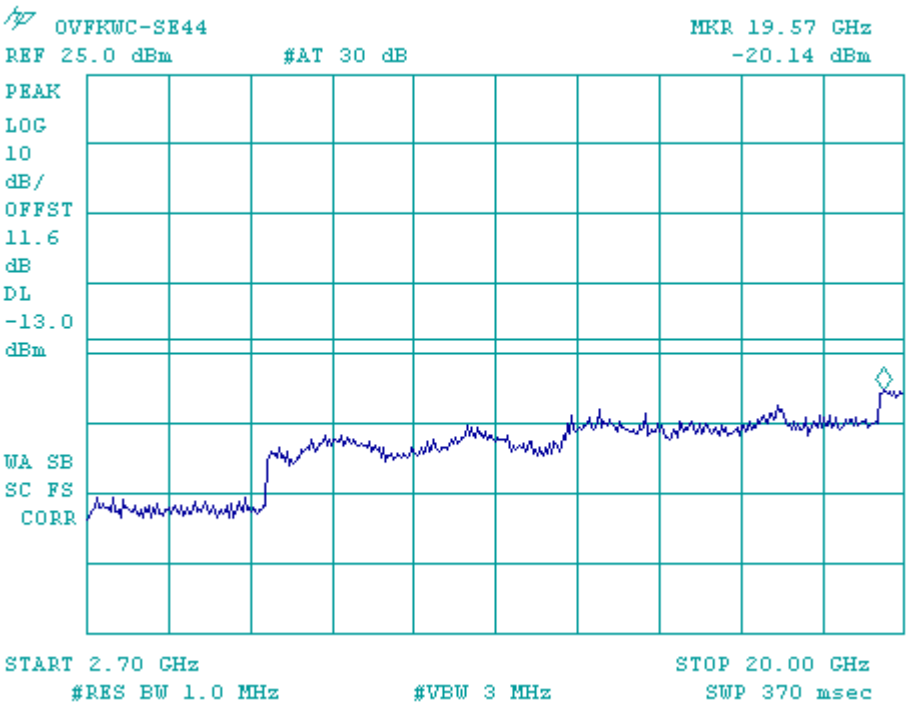

Figure 9-15b CDMA 1900 - Conducted Spurious Emission (CH 1175)

10 Transmitter Radiated Spurious Emissions Measured Data

FCC: § 2.1053, § 22.91, § 24.238	IC: RSS-129 §8.1, RSS-133 §6.3
Measurement Procedures: The radiated spurious emission test was performed at TUV in San Diego, California. The test report is attached in a separate attachment.	

11 Receiver Spurious Emissions

FCC: § 15.109	IC: RSS-129 §10, RSS-133 §9
Measurement Procedures: The receiver radiated spurious emission test was performed at TUV in San Diego, California. The test report is attached in a separate attachment.	

12 Transmitter RF Carrier Frequency Stability

FCC: § 2.1055, § 22.355, § 24.235	IC: RSS-129 §7.2 and §9.2, RSS-133 §7

Measurement Procedures:

The EUT was placed in an environmental chamber. The RF output of the EUT was connected to a frequency counter via attenuator. A power supplier was connected as primary voltage supply.

12.1 AMPS 800 Mode

Tx Frequency:	836.49 MHz	**Voltage :**	3.7V
Tolerance:	+/- 2.5 ppm (+/- 2091 Hz)	**Ch:**	383

Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		265		-2091	2091
-20		232		-2091	2091
-10		227		-2091	2091
0		229		-2091	2091
10		232		-2091	2091
20	932	223	870	-2091	2091
30		227		-2091	2091
40		-773		-2091	2091
50		-425		-2091	2091
60		-87		-2091	2091

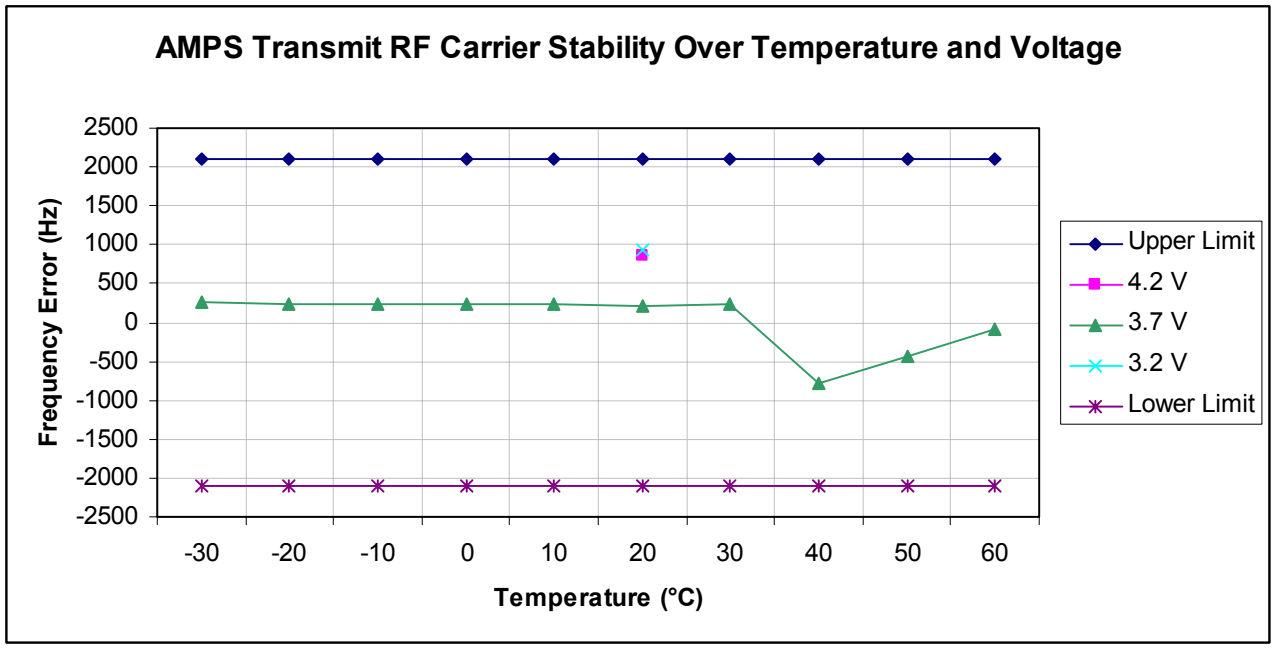

Figure 12.1 AMPS 800 Transmitter RF Carrier Stability Over Temperature and Voltage

12.2 CDMA 800 Mode

Tx Frequency:	836.49 MHz	**Voltage :**	3.7V
Tolerance:	+/- 2.5 Ppm (+/- 2091 Hz)	**Ch:**	383

Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		785		-2091	2091
-20		792		-2091	2091
-10		720		-2091	2091
0		479		-2091	2091
10		537		-2091	2091
20	244	650	217	-2091	2091
30		770		-2091	2091
40		739		-2091	2091
50		500		-2091	2091
60		-12		-2091	2091

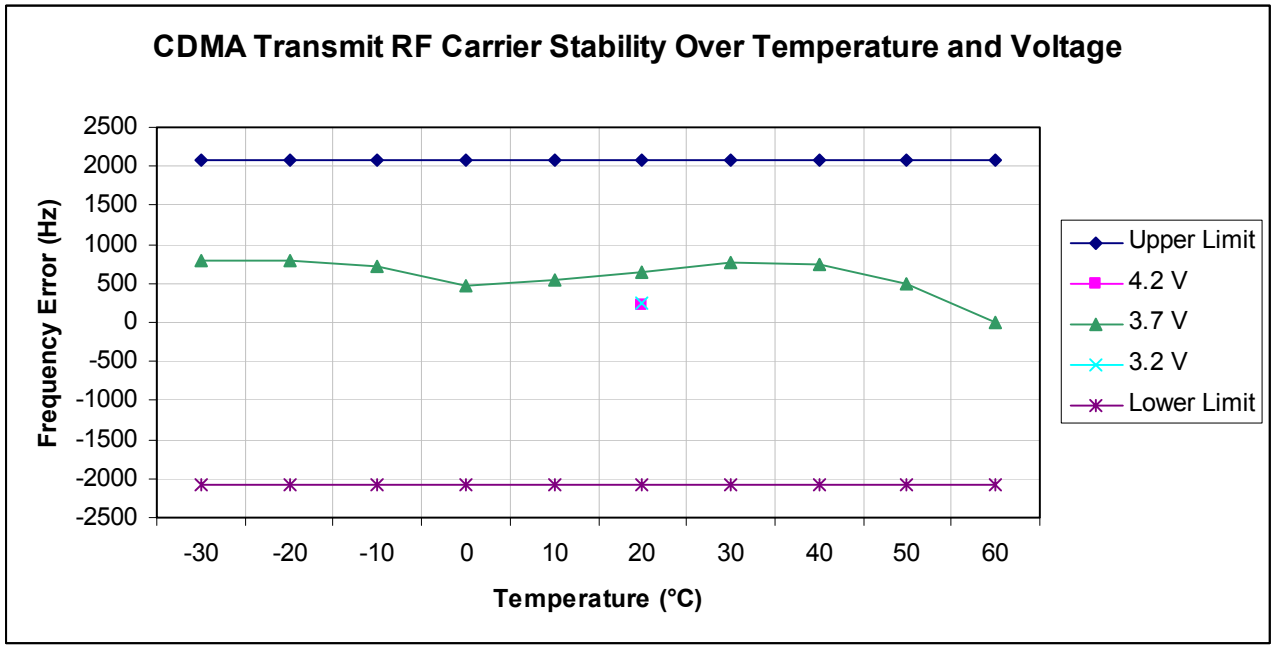

Figure 12.2 CDMA 800 Transmitter RF Carrier Stability Over Temperature and Voltage

12.3 CDMA 1900 Mode

Tx Frequency:	1880.00 MHz	**Voltage :**	3.7V
Tolerance:	+/- 2.5 Ppm (+/-4700 Hz)	**Ch:**	600

Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		1092		-4700	4700
-20		-180		-4700	4700
-10		848		-4700	4700
0		428		-4700	4700
10		627		-4700	4700
20	258	1110	280	-4700	4700
30		899		-4700	4700
40		1155		-4700	4700
50		1250		-4700	4700
60		-337		-4700	4700

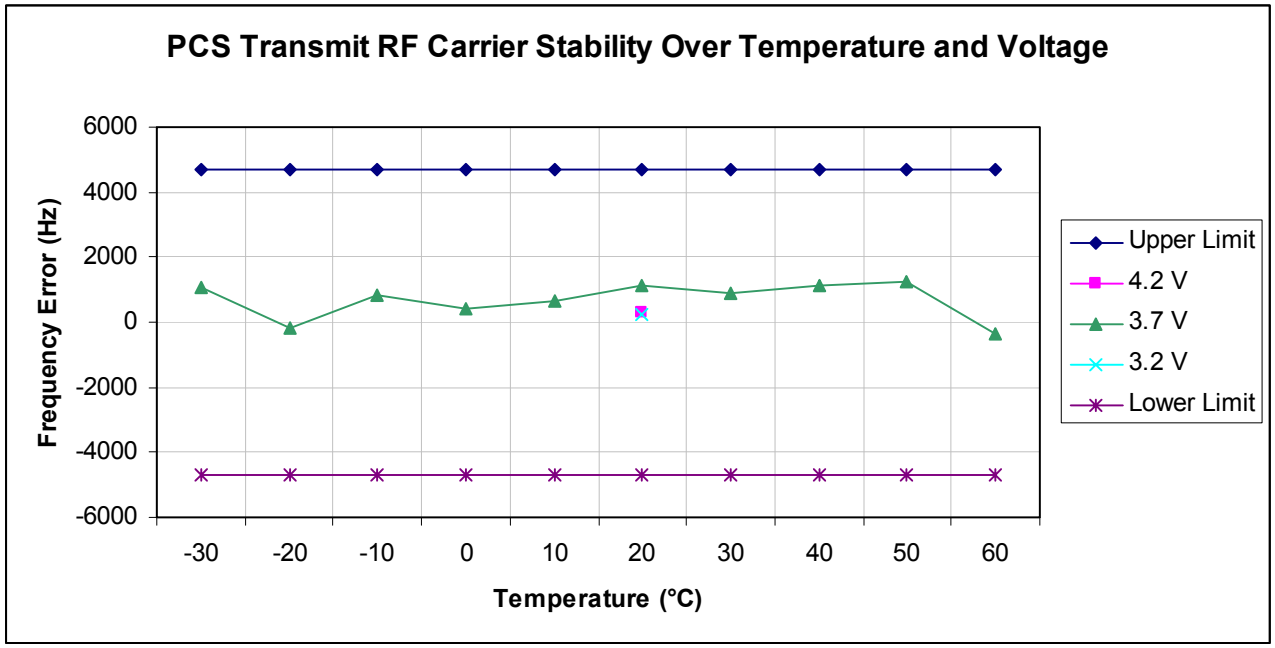

Figure 12.3 CDMA 1900 Transmitter RF Carrier Stability Over Temperature and Voltage

13 Exposure of Humans to RF Fields (SAR)

The SAR Test Report is showed in a separate attachment as Exhibit 9.

14 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Cal Due Date
Power Meter	Giga-tronics	8541C	1835203	02/23/04
Power Meter	Hewlett Packard	473B	3125U19179	03/23/04
Spectrum Analyzer	Hewlett Packard	8593EM	3710A00203	04/15/04
Spectrum Analyzer	Hewlett Packard	8594E	3520A01882	01/14/04
Wireless Communications Test Set	Agilent	8960	US41070147	05/10/04
RF communication test set	Hewlett Packard	8920B	US35320824	12/21/03
Temperature Chamber	CSZ	Z2033	Z9343034	02/14/04