

## Test Report

From

**Kyocera Wireless Corp**

<b>FCC Part 22 &amp; 24 Certification IC RSS-129 &amp; 133</b>
FCC ID: <b>OVFKWC-KE4X4</b> Model: <b>KE414, KE424c</b>

<b>STATEMENT OF CERTIFICATION</b>	
<i>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.</i>	
Test performed by:	Kyocera Wireless Corp 10300 Campus Point Drive CA 92121
Report Prepared by:	C. K. Li Engineer, Staff
Tests that required an OATS site were performed by TUV Product Services.	

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## 1 General Information

<b>Applicant:</b>	Kyocera Wireless Corp 10300 Campus Point Drive San Diego CA 92121			
<b>FCC ID:</b>	OVFKWC-KE4X4			
<b>Product:</b>	Dual-Band Tri-mode Cellular Phone			
<b>Model Number:</b>	KE414	KE424c		
<b>EUT Serial Number:</b>	MXXZ	PVGW		
<b>Type:</b>	[ ] Prototype, [X] Pre-Production, [ ] Production			
<b>Device Category:</b>	Portable			
<b>RF Exposure Environment:</b>	General Population / Uncontrolled			
<b>Antenna:</b>	Fixed Helix			
<b>Detachable Antenna:</b>	Yes			
<b>External Input:</b>	Audio/Digital Data			
<b>Quantity:</b>	Quantity production is planned			
<b>FCC Rule Parts:</b>	§22H	§22H	§22.901(d)	§24E
<b>Modes:</b>	800 AMPS	800 CDMA	800 CDMA1X	1900 CDMA
<b>Multiple Access Scheme:</b>	FDMA	CDMA	CDMA	CDMA
<b>TX Frequency (MHz):</b>	824 - 849	824 – 849	824 - 849	1850 - 1910
<b>Emission Designators:</b>	40K0F8W, 40K0F1D, 1M25F9W			
<b>Max. Output Power (W)</b>	0.326 ERP	0.338 ERP		0.427 EIRP

## 2 Product Description

The phone is a single board 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), 800MHz (cellular CDMA and AMPS). The phone will support certain CDMA2000 radio-configurations (RC) as describes in Exhibit 2 (operation description).

Model KE414 and KE424C belong to the same equipment family. Both models are identical in term of RF, PCB design and construction. The only differences between them are the front housing cosmetic design, front housing metal bracket and the LCD display. KE414 and KE424C consist of a gray-scale LCD display and Color LCD display respectively.

## 3 Electronic Serial Numbers (ESN) Protection

The Trimode Phones,FCC ID: OVFKWC-KE4X4 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 KE414 and KE424C have Global Positioning System (GPS) support.

#### 5 TTY compliance

##### FCC § 255 of the Telecom Act

KE414 and KE424C 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)	
			KE414	KE424C
AMPS	824.04	911	25.04	25.10
	936.49	383	25.10	25.13
	848.97	799	25.05	25.08
CDMA 800	824.70	1013	25.02	25.07
	836.52	384	25.01	25.03
	848.31	777	25.05	25.09
CDMA 1900	1851.25	25	23.10	23.02
	1880.00	600	23.05	23.05
	1908.75	1175	23.11	23.04

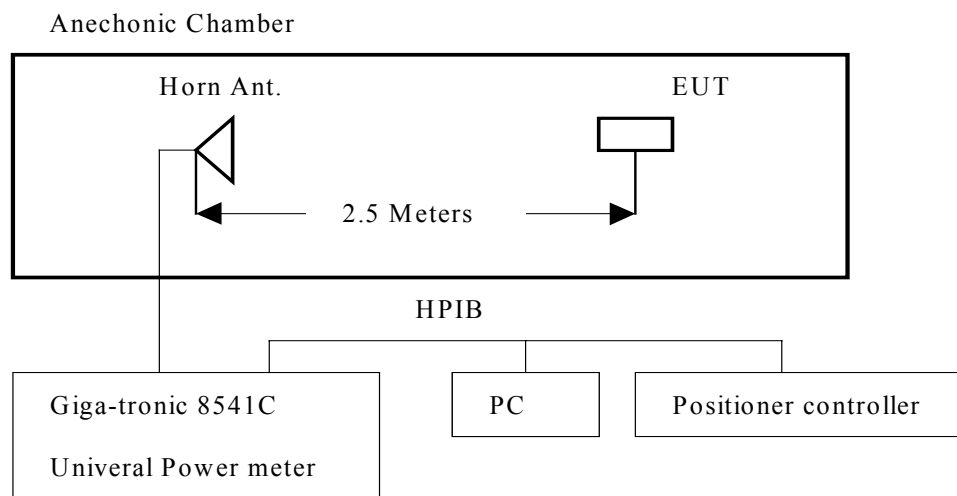
## 6.2 Radiated Power

FCC: § 22.913, § 24.232	IC: RSS-129 §7.1 and §9.1, RSS-133 §6.2
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### 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	Max. Power (dBm)		Ref.
			KE414	KE424C	
AMPS	824.04	911	23.6	24.1	ERP
	936.49	383	24.2	24.4	
	848.97	799	25.0	24.8	
CDMA 800	824.70	1013	23.7	24.1	ERP
	836.52	384	24.2	24.5	
	848.31	777	25.1	25.3	
CDMA 1900	1851.25	25	25.2	26.3	EIRP
	1880.00	600	25.4	25.7	
	1908.75	1175	25.7	26.1	

## 7 Transmitter Modulation Requirement

### 7.1 Transmitter Audio Frequency Response

<b>FCC:</b> § 2.1047, § 22.915	<b>IC:</b> RSS-129 §6.2
<b>Measurement Procedures:</b>  Measured with HP8920 RF communication test set & HP 3588A spectrum analyzer. <ul style="list-style-type: none"> <li>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 <math>\pm 2.9</math> kHz system deviation.</li> <li>Adjust the audio input level to 20 dB greater than that required to produce <math>\pm 8</math> 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.</li> </ul>	

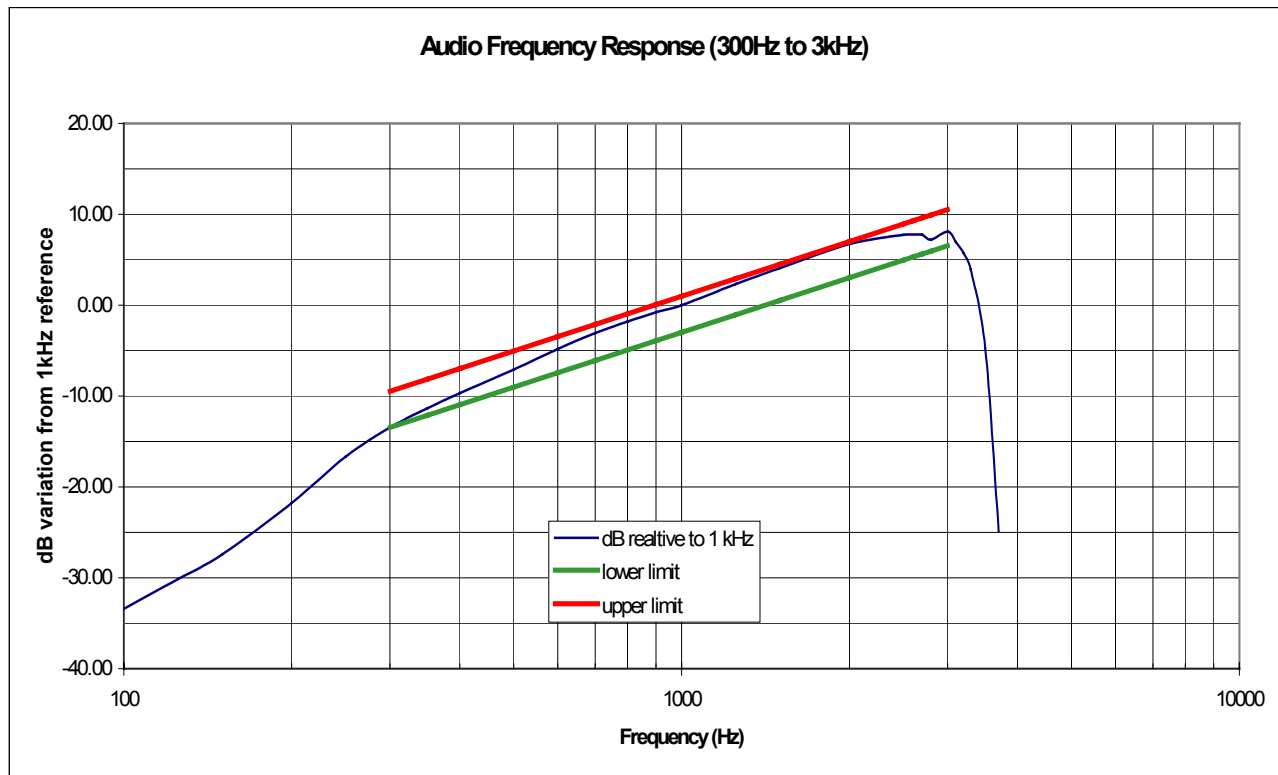
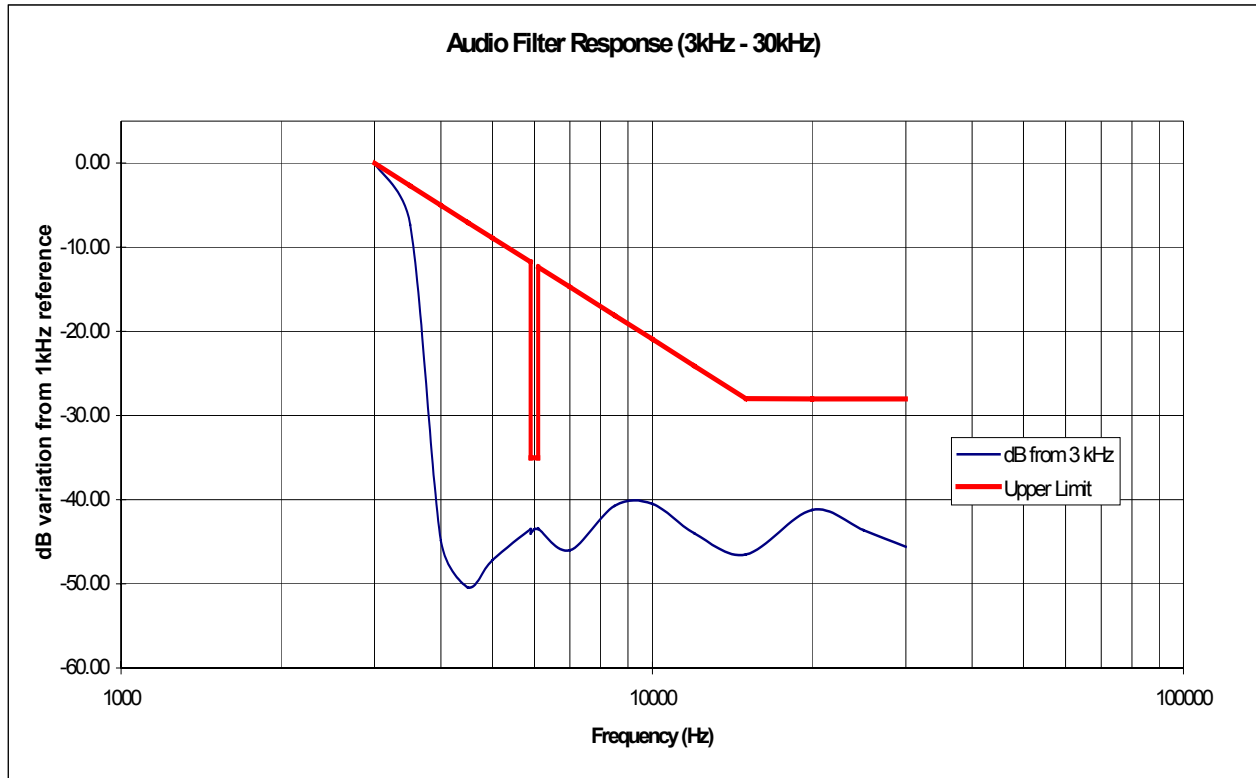


Figure 7.1 Audio Filter Characteristics (300-3000Hz)



Figure 7.2 Post Limiter Filter Attenuation



## 7.2 Transmitter Modulation Deviation Limiting

**FCC:** § 2.1047(b), § 22.915(b)(c) **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.

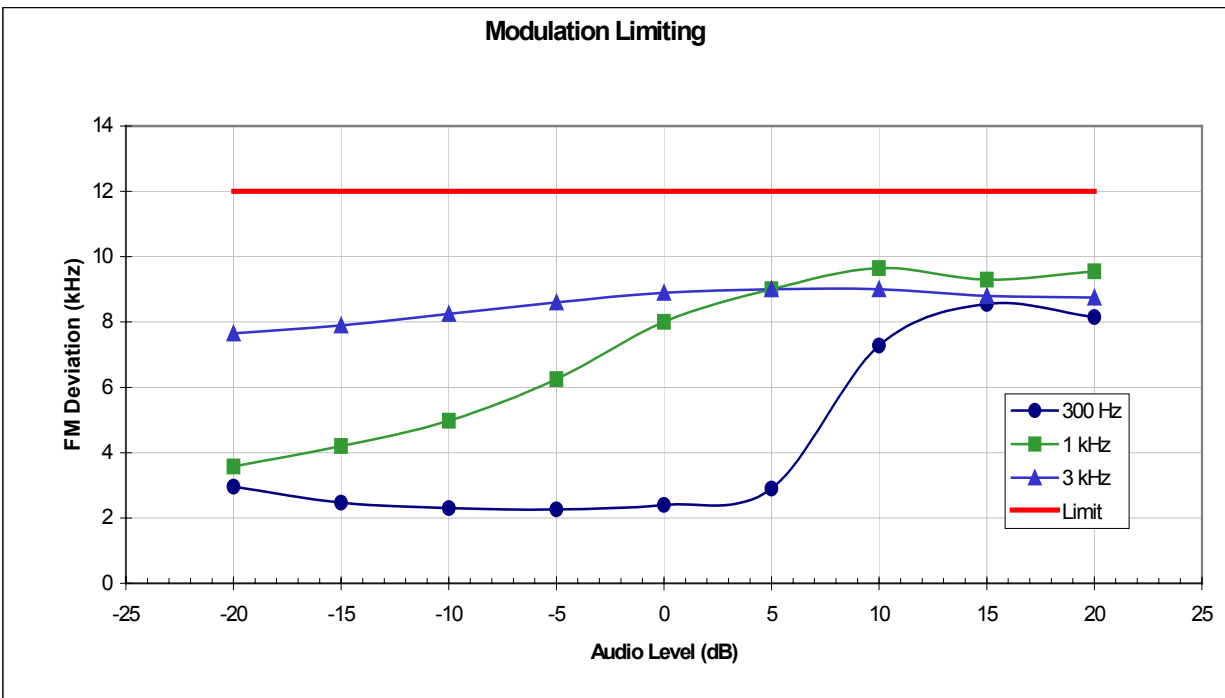


Figure 7.3 Modulation Deviation Limiting

## 8 Occupied Bandwidth

<b>FCC:</b> § 2.1049, § 22.917(b)(d), § 24.238	<b>IC:</b> RSS-129 §6.3, §8.1
<b>Measurement Procedures:</b> 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.  <u>For Analog:</u> 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 $\pm 8$ kHz peak deviation at 1000 Hz and a 6000 Hz SAT with $\pm 2.0$ kHz peak deviation. (2) For combined Signaling Tone and SAT, modulate with a 10 kHz ST with $\pm 8$ kHz peak deviation and a 6000 Hz SAT with $\pm 2.0$ kHz peak deviation. (3) For wideband data, modulate with a quasi-random 10 kbps data pattern with $\pm 8$ 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 $\pm 8$ kHz peak deviation at 1000 Hz. (5) For SAT only, modulate with a 6000 Hz SAT with $\pm 2.0$ kHz peak deviation. (6) For ST only, modulate with a 10 kHz ST with $\pm 8$ kHz peak deviation. (7) For combined SAT and DTMF, modulate with a 6000 Hz SAT with $\pm 2.0$ kHz peak deviation and one of the DTMF tones. All measurements were performed on middle channel.  <u>For Digital:</u> Modulate with full rate.	

### List of Figures

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	CDMA 800	CDMA at RC1
8-9		CDMA 1X, F/R-FCH at RC3
8-10		CDMA 1X, F/R-FCH + F/R-SCH at RC3
8-11	CDMA 1900	CDMA at RC1
8-12		CDMA 1X, F/R-FCH at RC3
8-13		CDMA 1X, F/R-FCH + F/R-SCH at RC3
8-14		Lower Band Edge @ CH25
8-15		Upper Band Edge @ CH1175

Figure 8-1 AMPS Voice

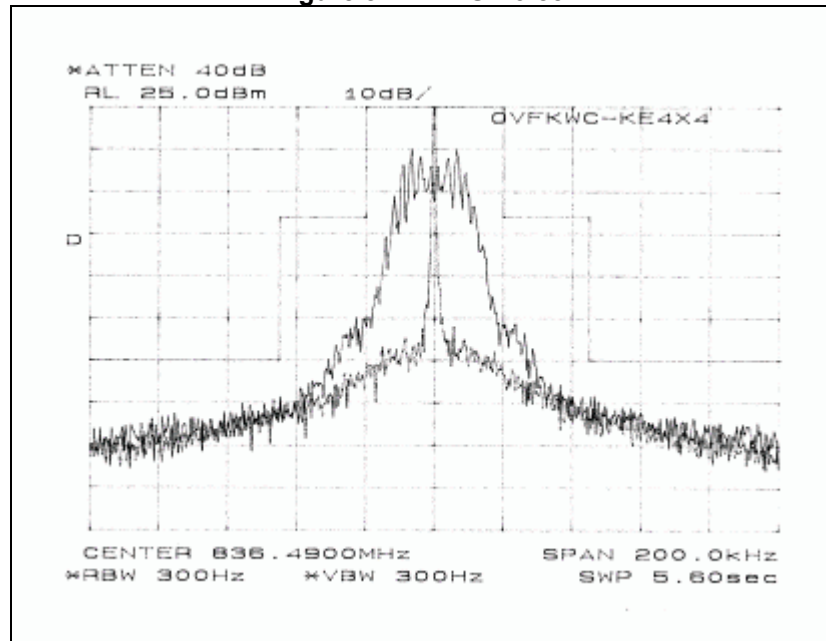


Figure 8-2 AMPS SAT

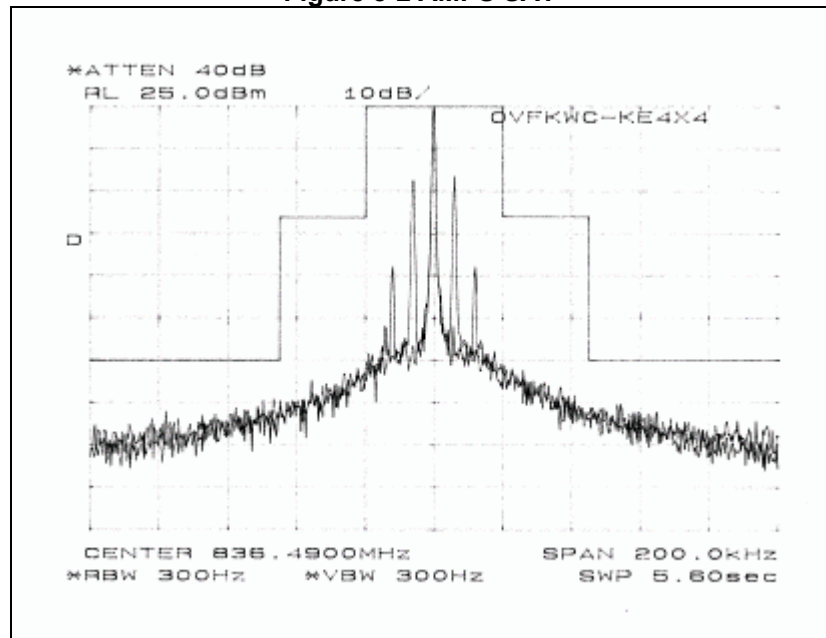


Figure 8-3 AMPS Voice + SAT

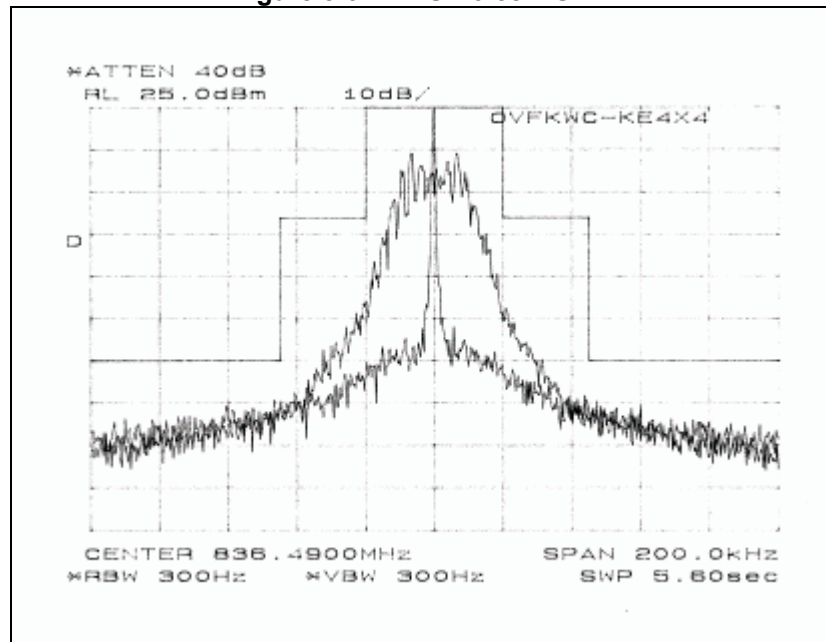


Figure 8-4 AMPS ST

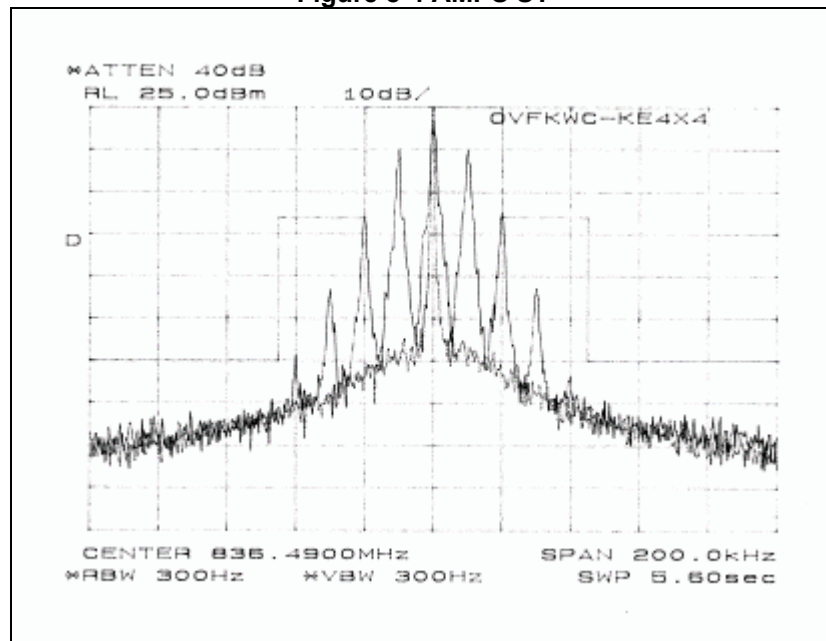


Figure 8-5 AMPS ST + SAT

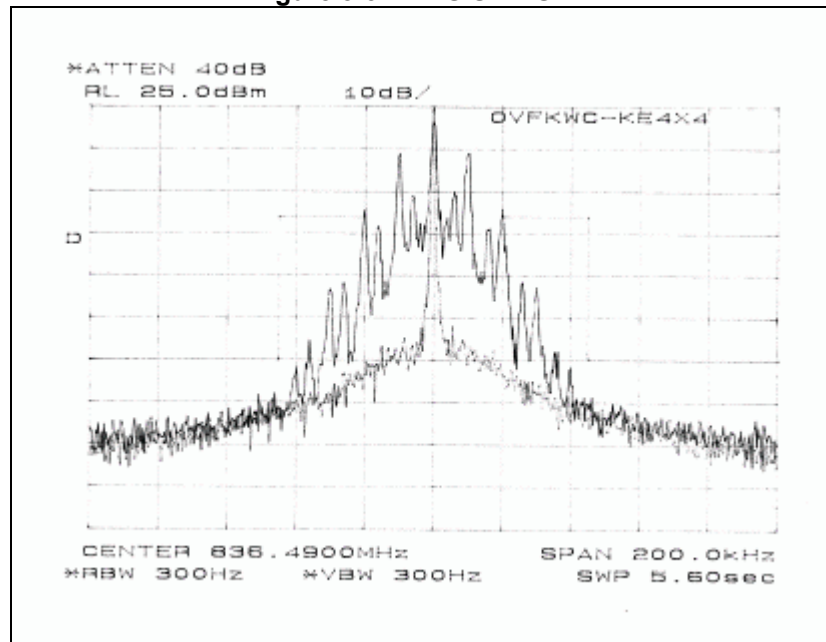


Figure 8-6 SAT + DTMF\_9

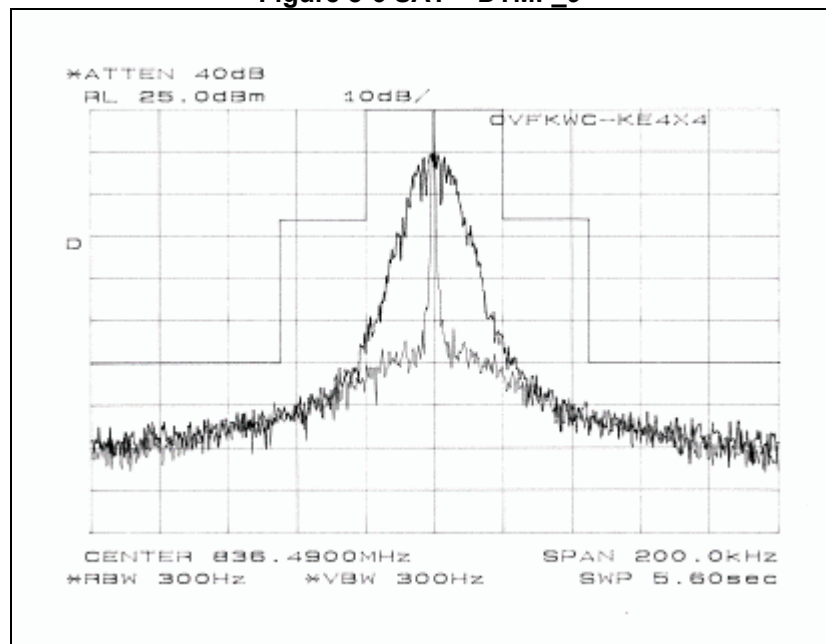


Figure 8-7 AMPS WIDEBAND

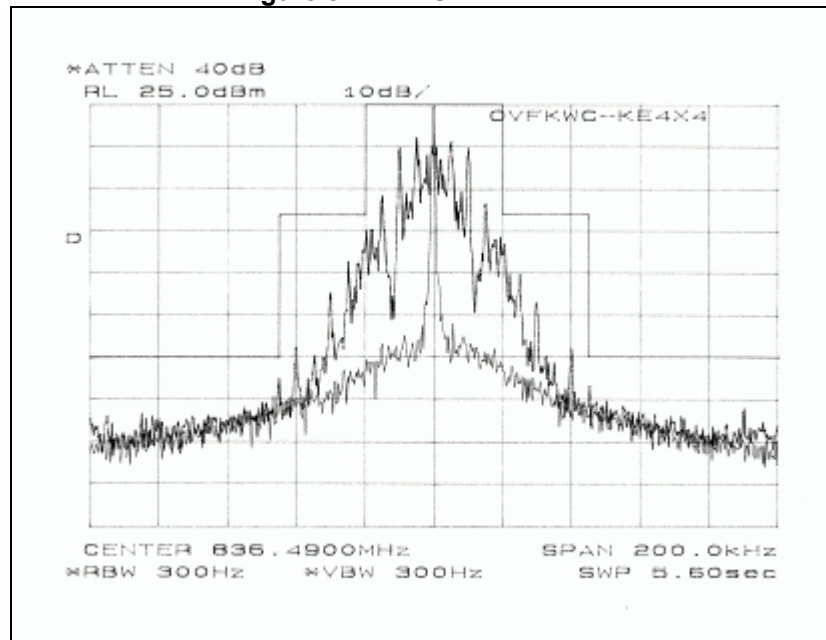


Figure 8-8 CDMA 800 at RC1

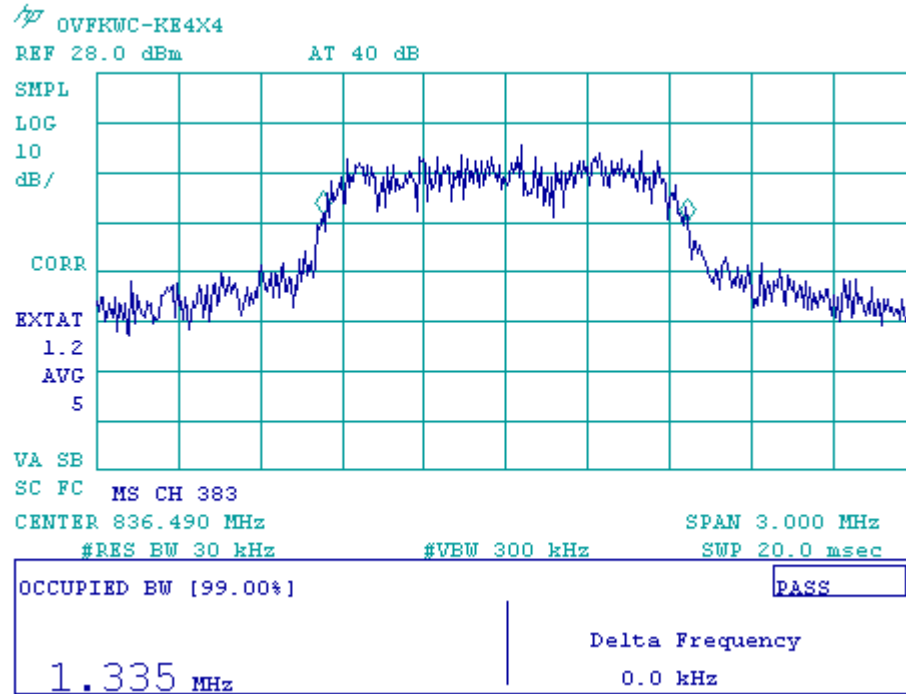




Figure 8-9a CDMA 800 1X at RC3 (F/R-FCH)

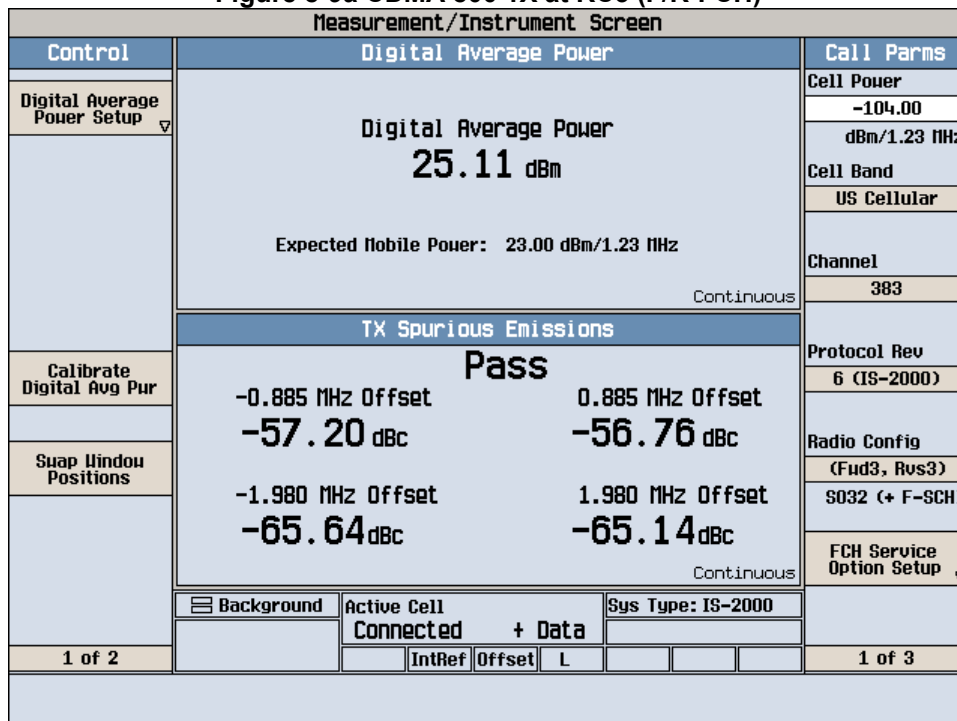


Figure 8-9b CDMA 800 1X at RC3 (F/R-FCH)

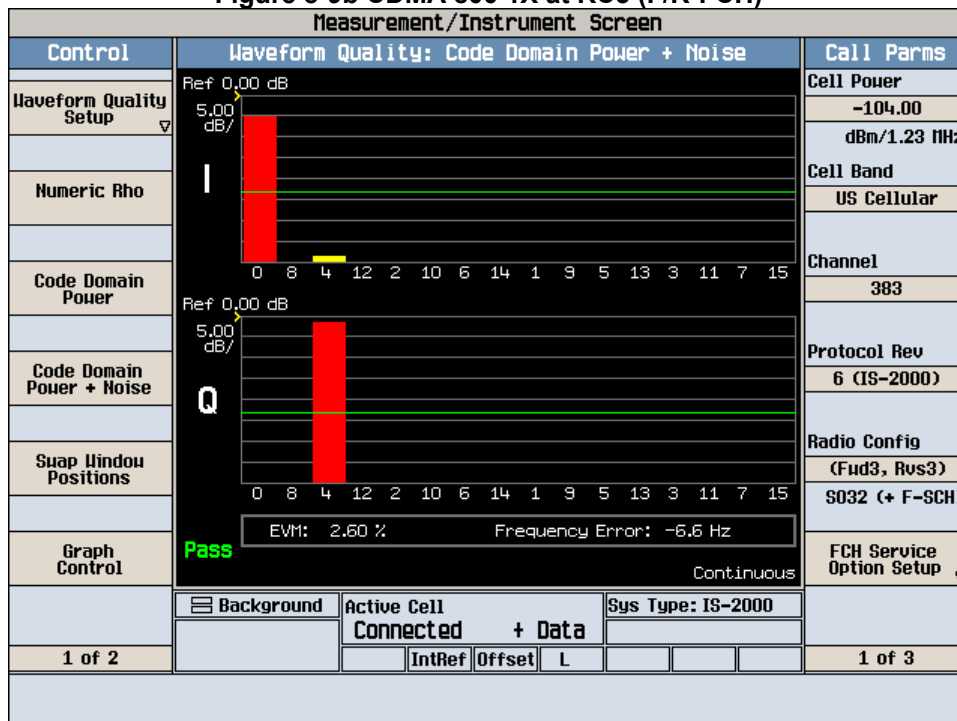


Figure 8-9c CDMA 800 1X at RC3 (F/R-FCH)

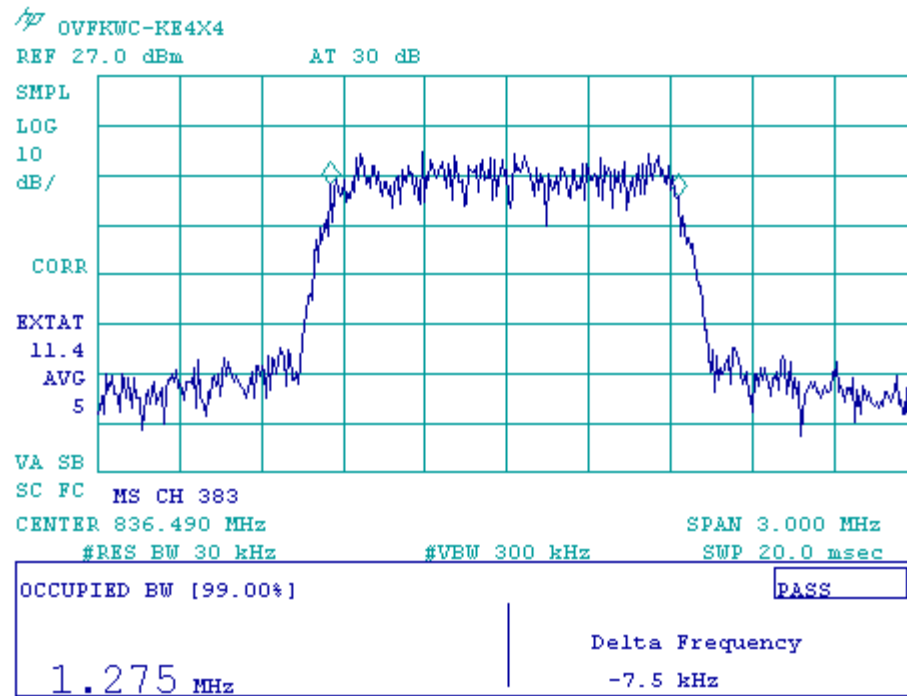


Figure 8-10a CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

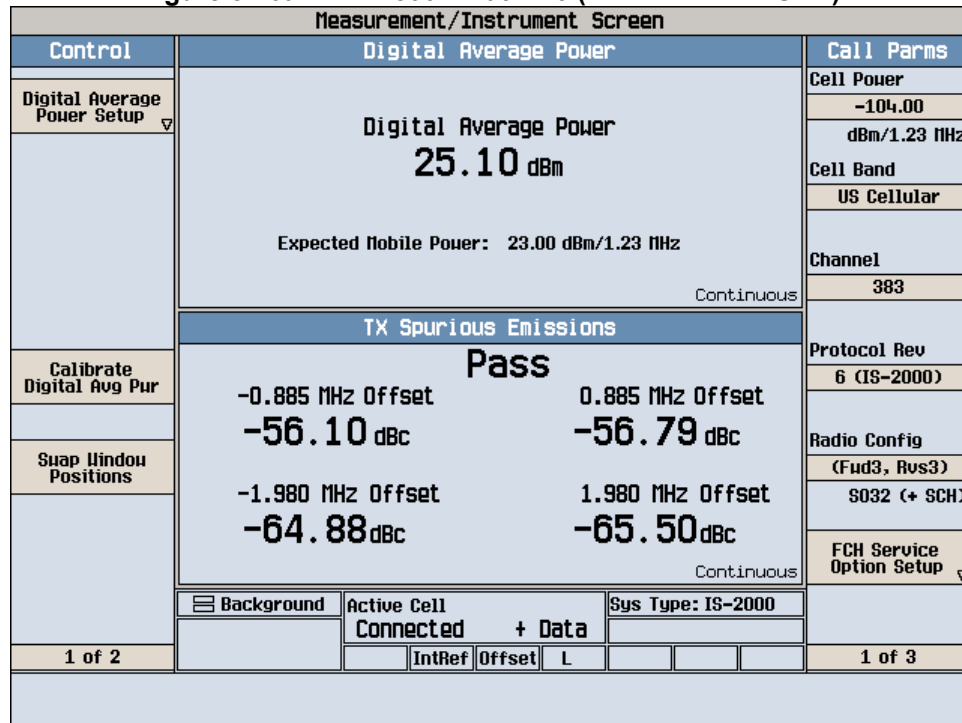


Figure 8-10b CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

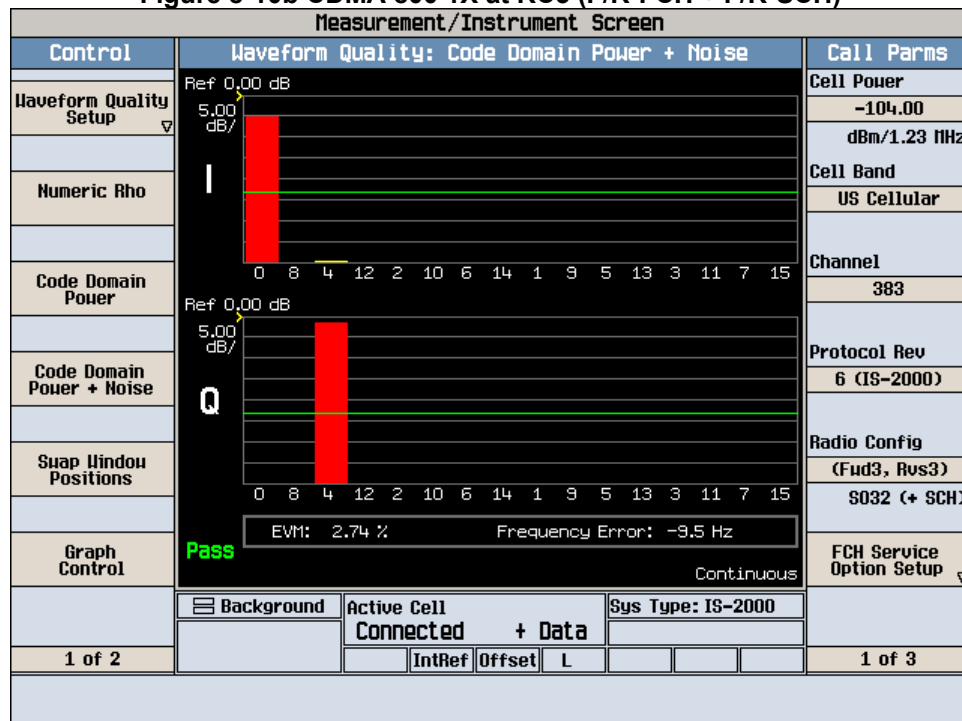


Figure 8-10c CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

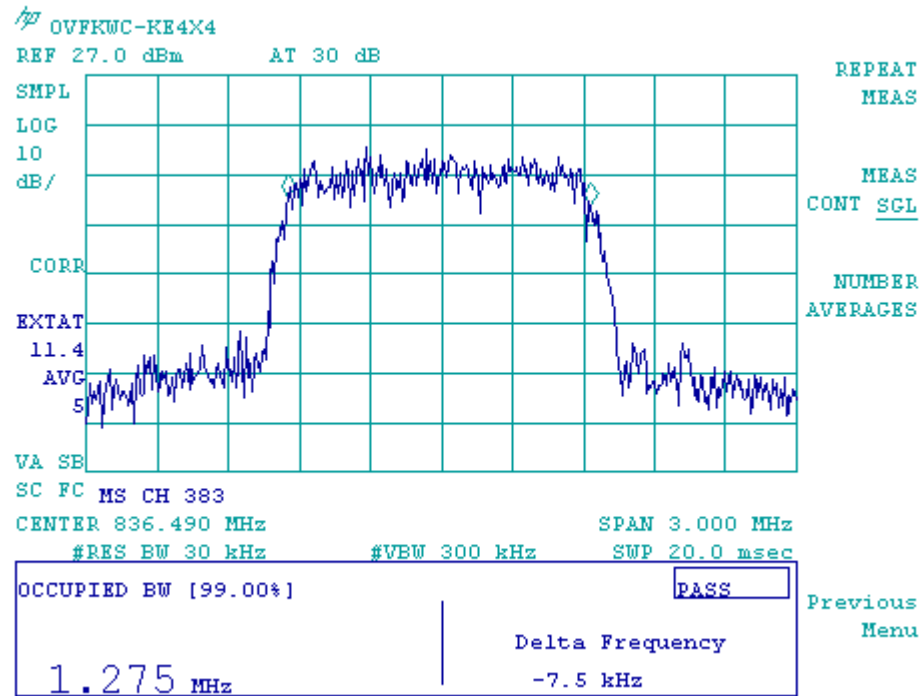


Figure 8-11 CDMA 1900 at RC1

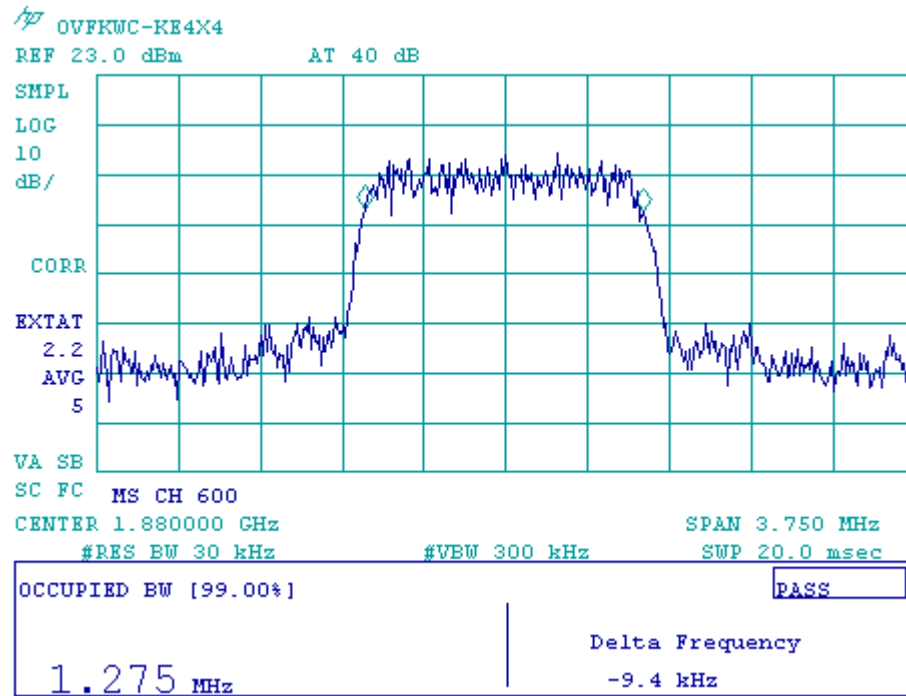


Figure 8-12a CDMA 1900 1X at RC3 (F/R-FCH)

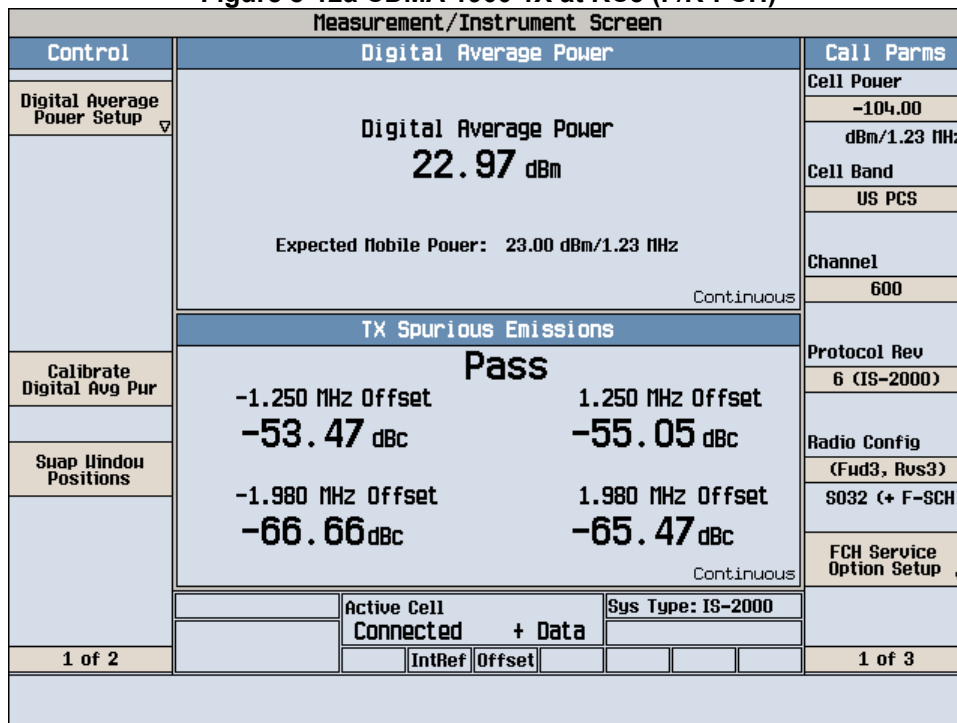


Figure 8-12b CDMA 1900 1X at RC3 (F/R-FCH)

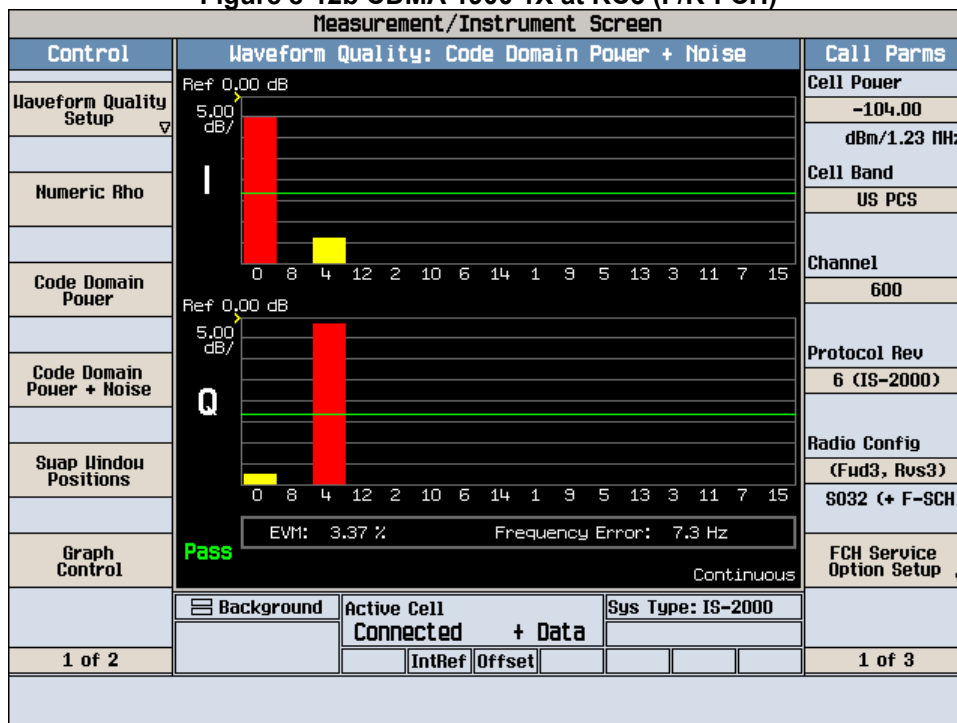


Figure 8-12c CDMA 1900 1X at RC3 (F/R-FCH)

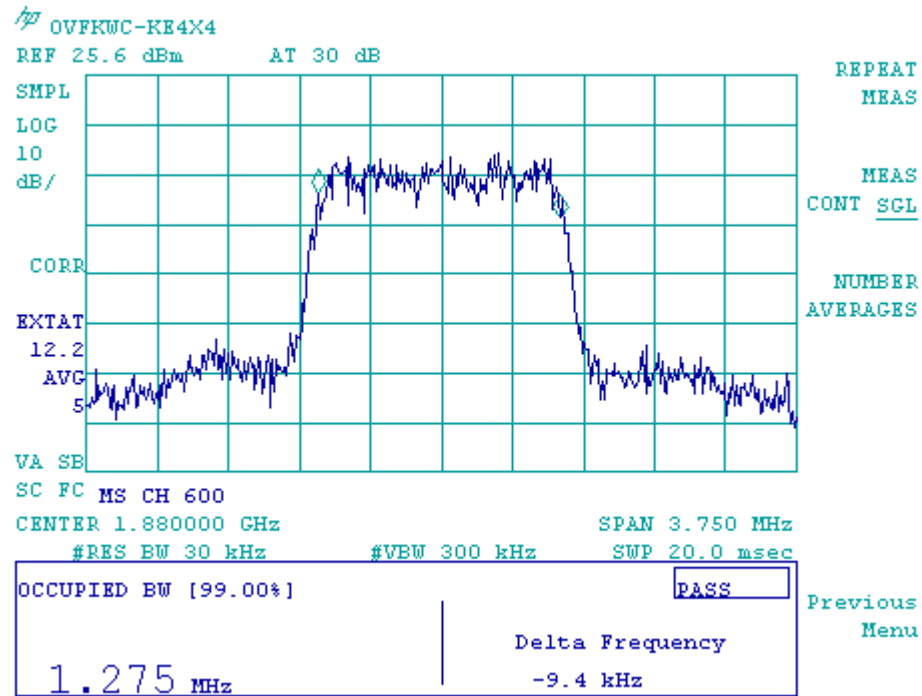


Figure 8-13a CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

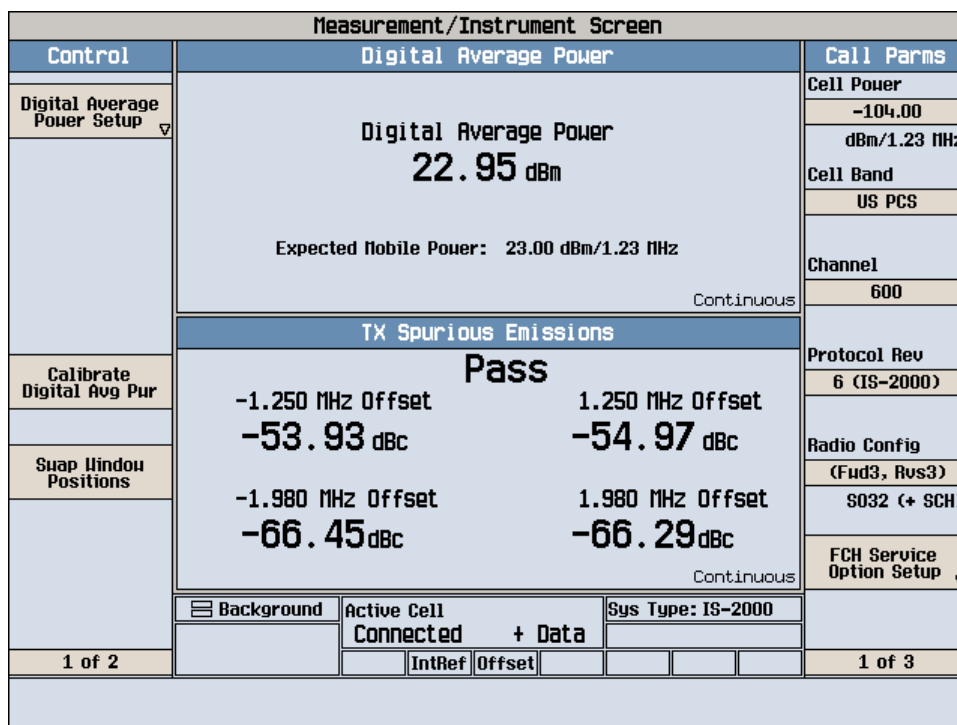


Figure 8-13b CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

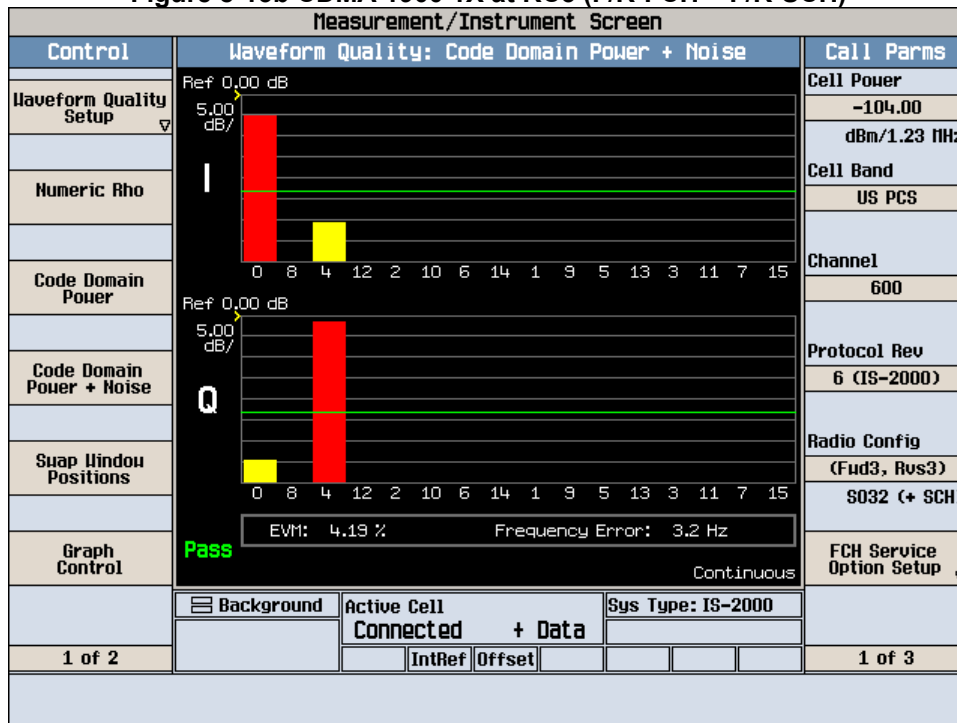




Figure 8-13c CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

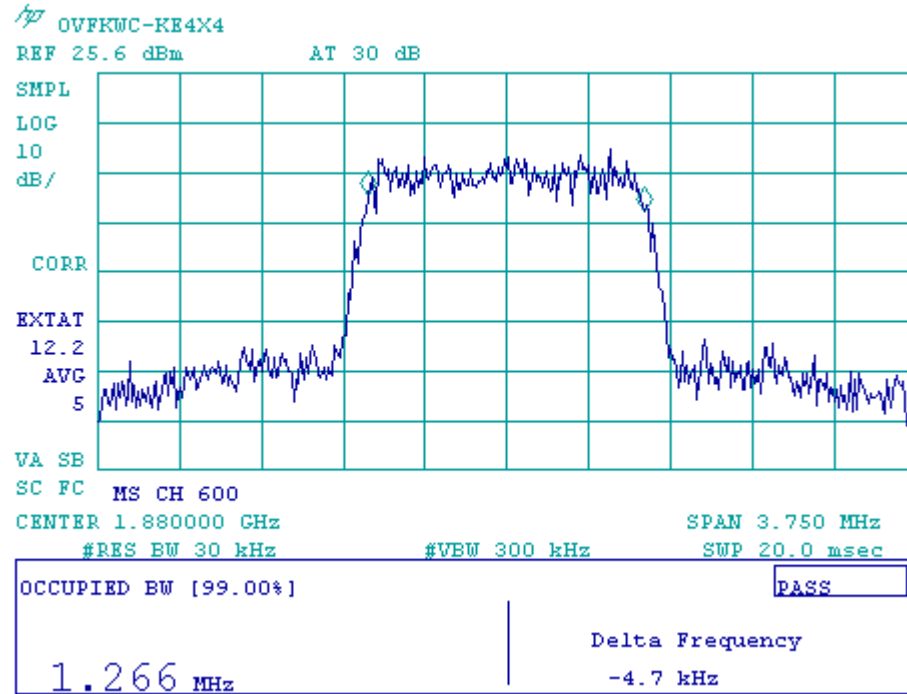


Figure 8-14 CDMA 1900 Lower Band Edge

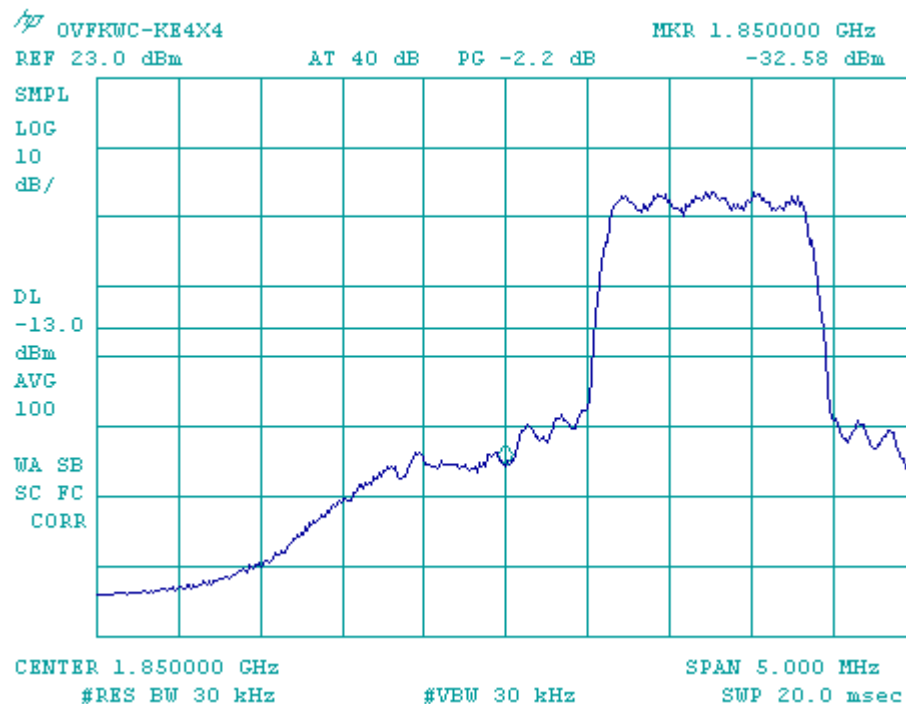
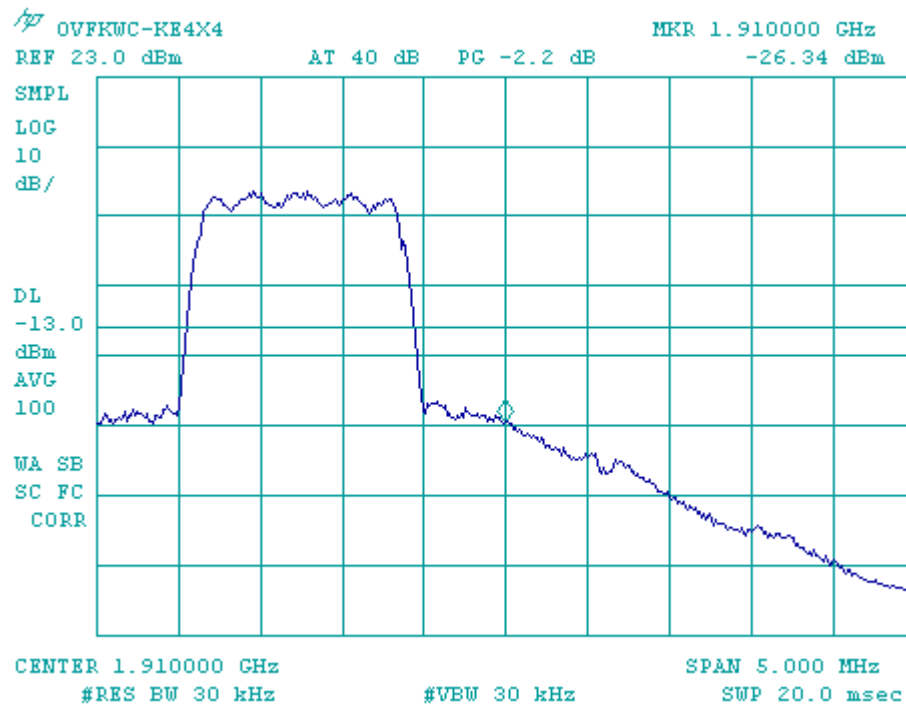


Figure 8-15 CDMA 1900 Upper Band Edge



## 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:**

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

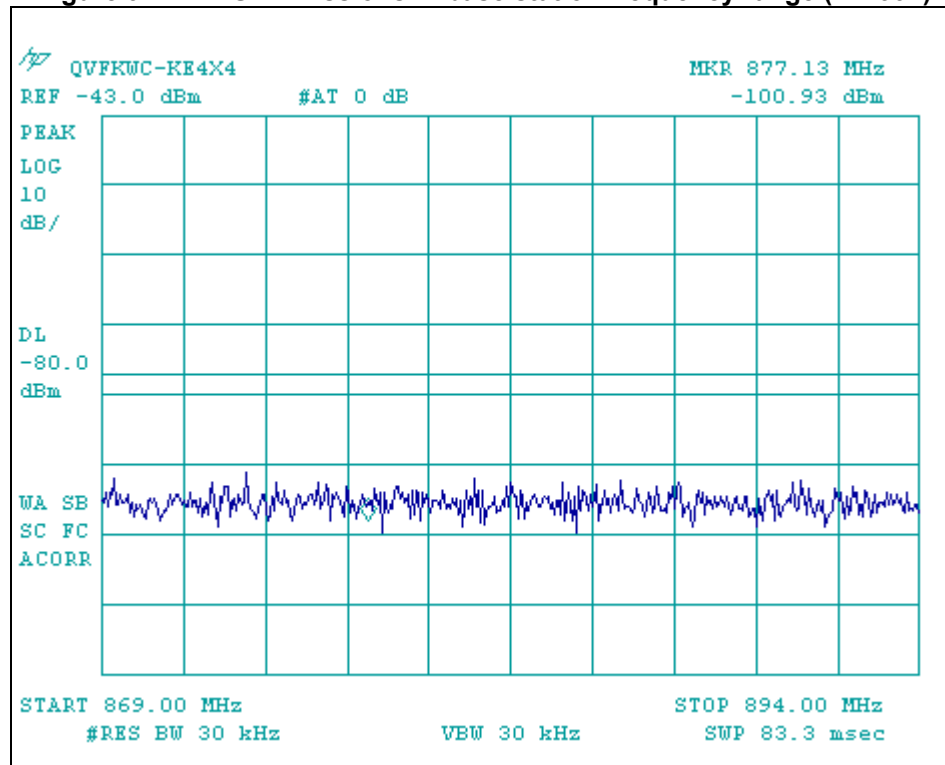


Figure 9-2a AMPS – Conducted Spurious Emission (CH 991)

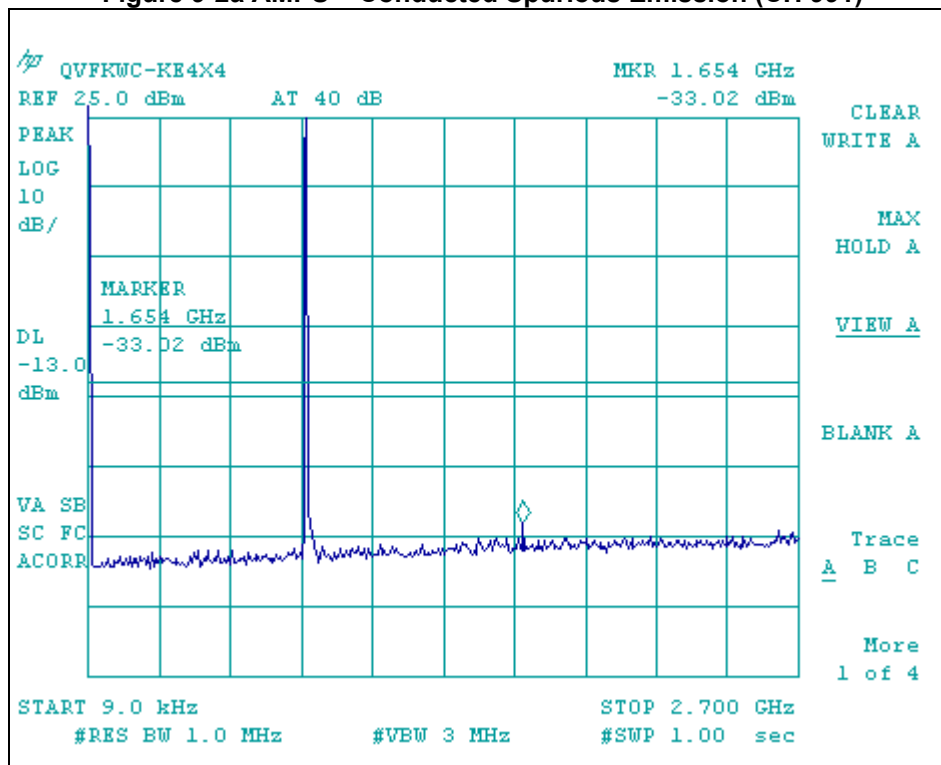
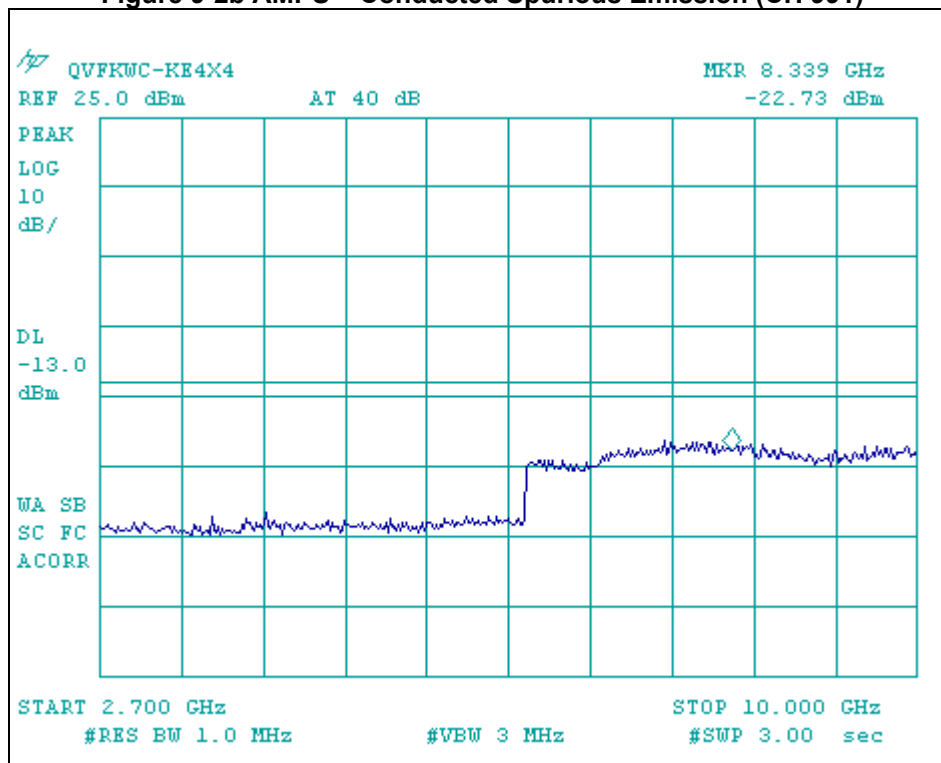


Figure 9-2b AMPS – Conducted Spurious Emission (CH 991)



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

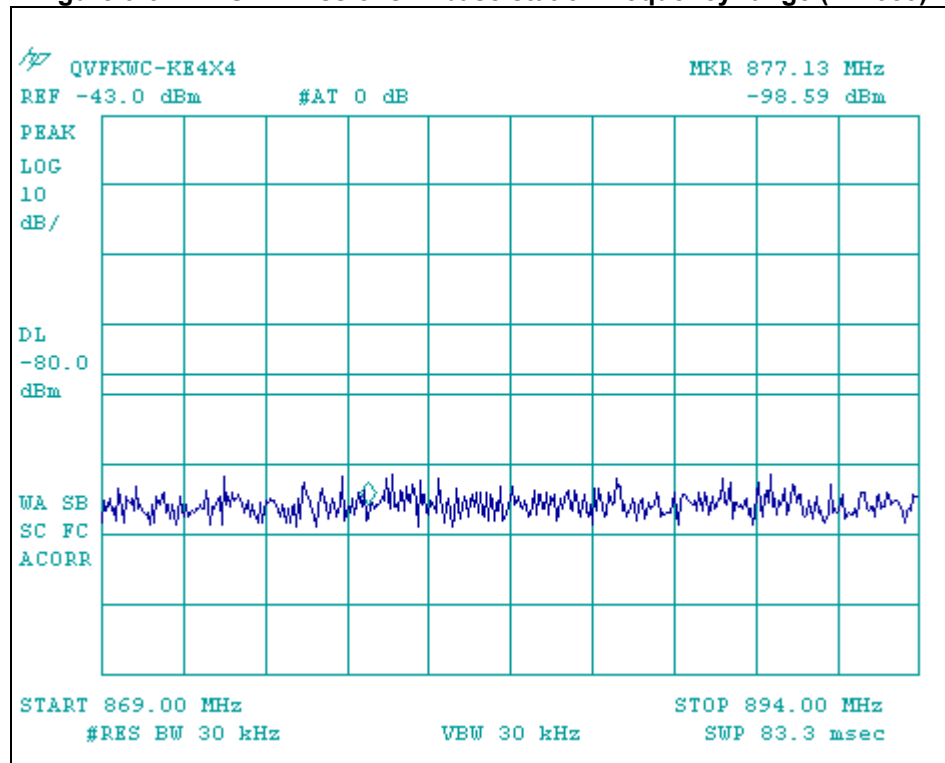


Figure 9-4a AMPS – Conducted Spurious Emission (CH 383)

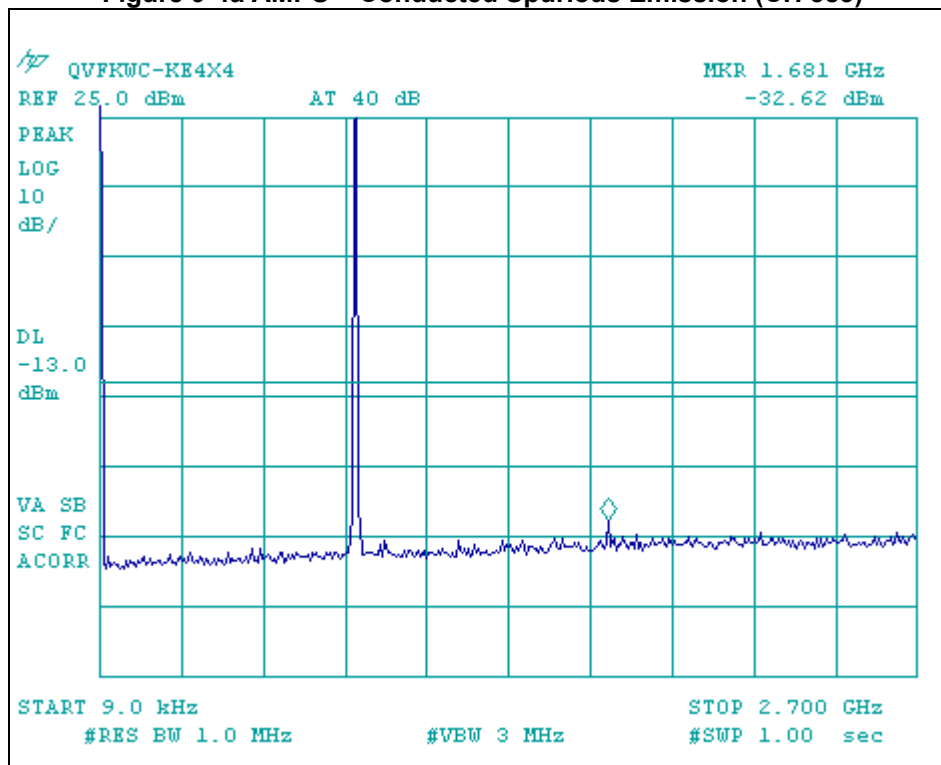


Figure 9-4b AMPS – Conducted Spurious Emission (CH 383)

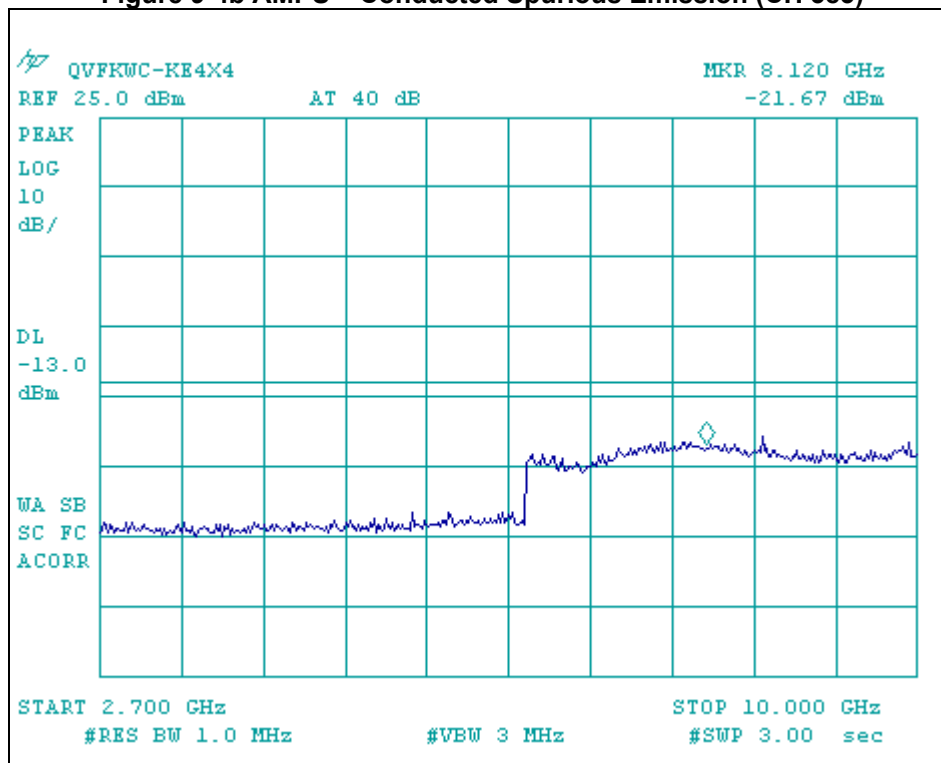


Figure 9-5 AMPS - Emissions in base station frequency range (CH 799)

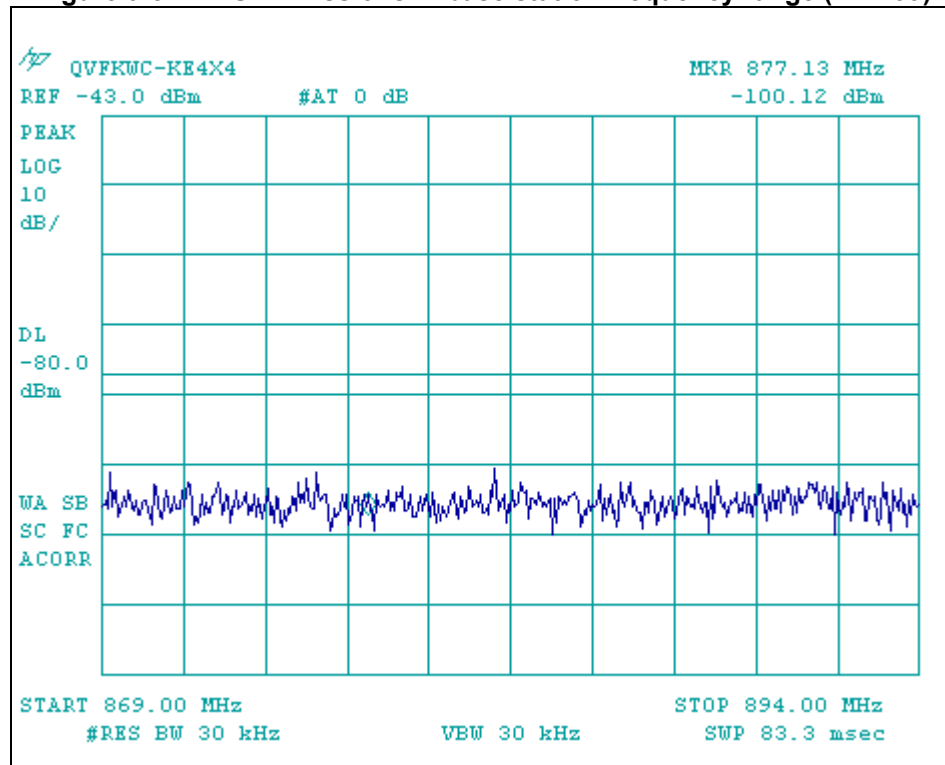




Figure 9-6a AMPS – Conducted Spurious Emission (CH 799)

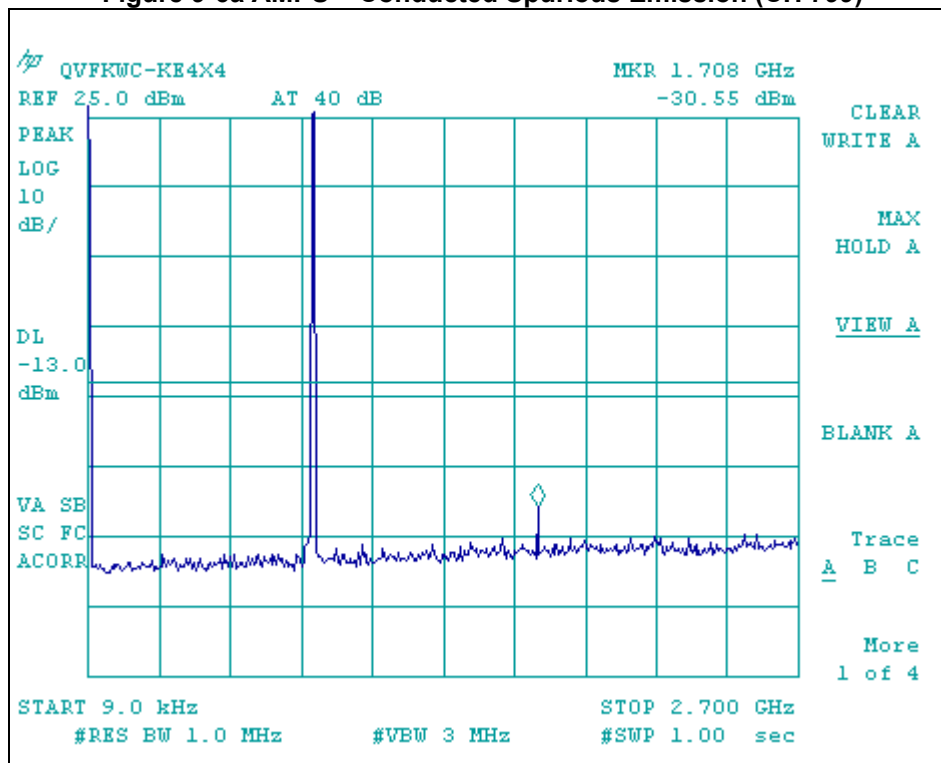


Figure 9-6b AMPS – Conducted Spurious Emission (CH 799)

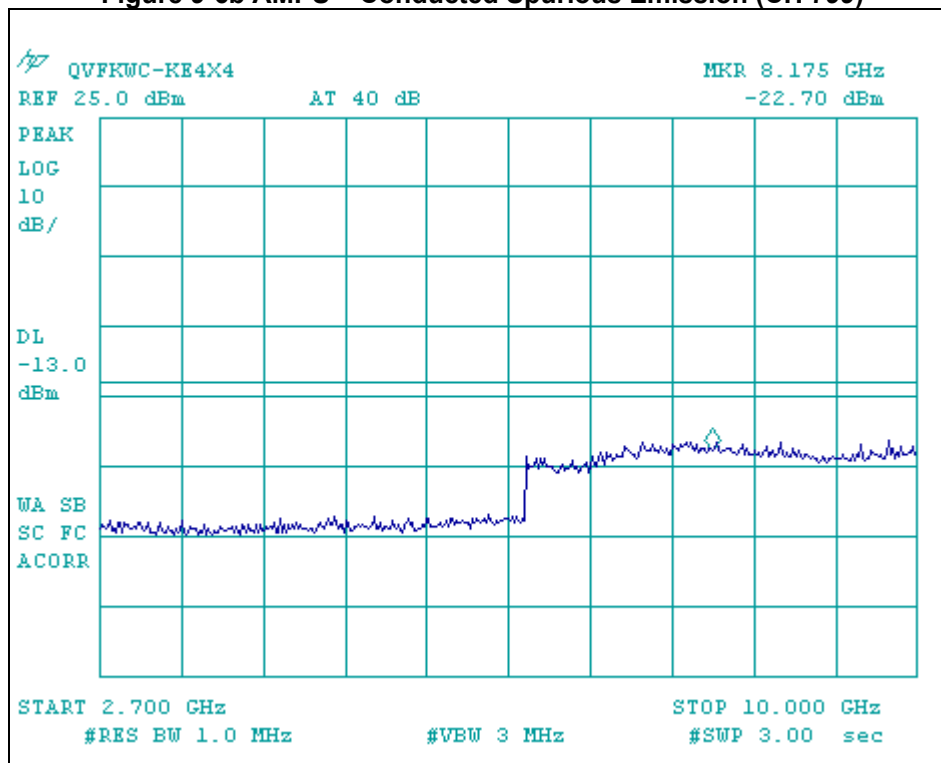


Figure 9-7 CDMA 800 - Emissions in base station frequency range (CH 1013)

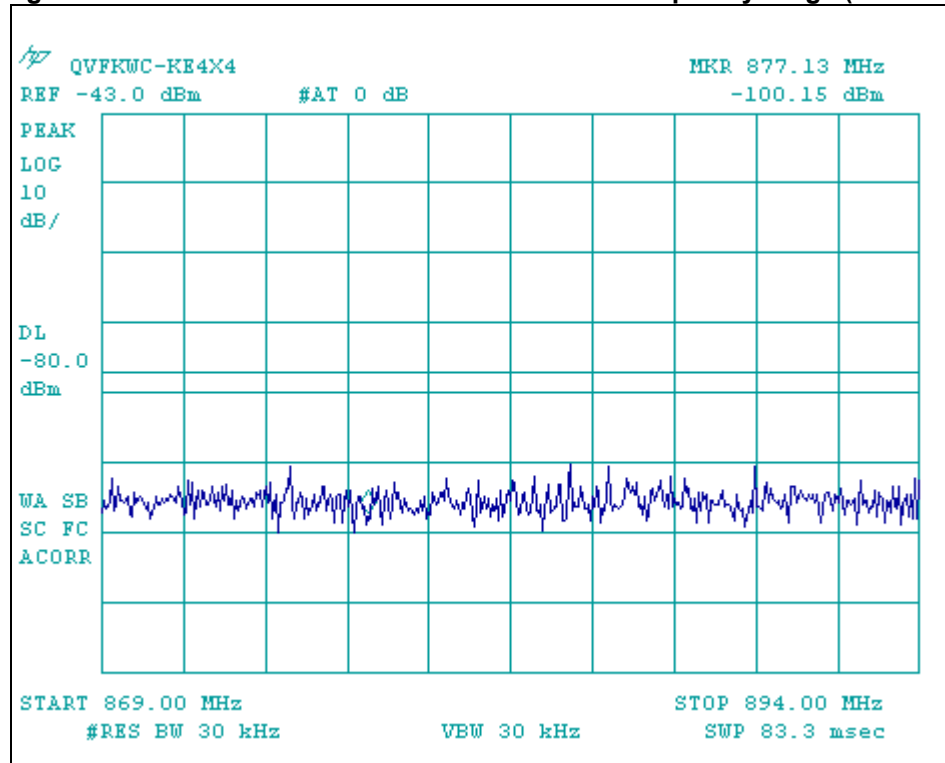


Figure 9-8a CDMA 800 – Conducted Spurious Emission (CH 1013)

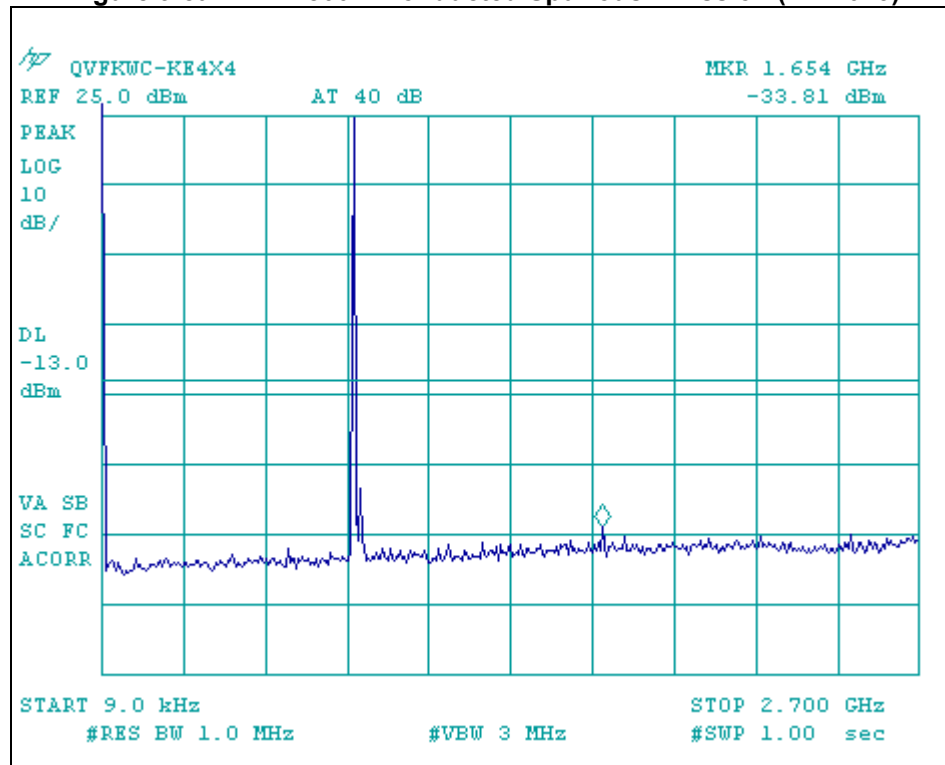


Figure 9-8b CDMA 800 – Conducted Spurious Emission (CH 1013)

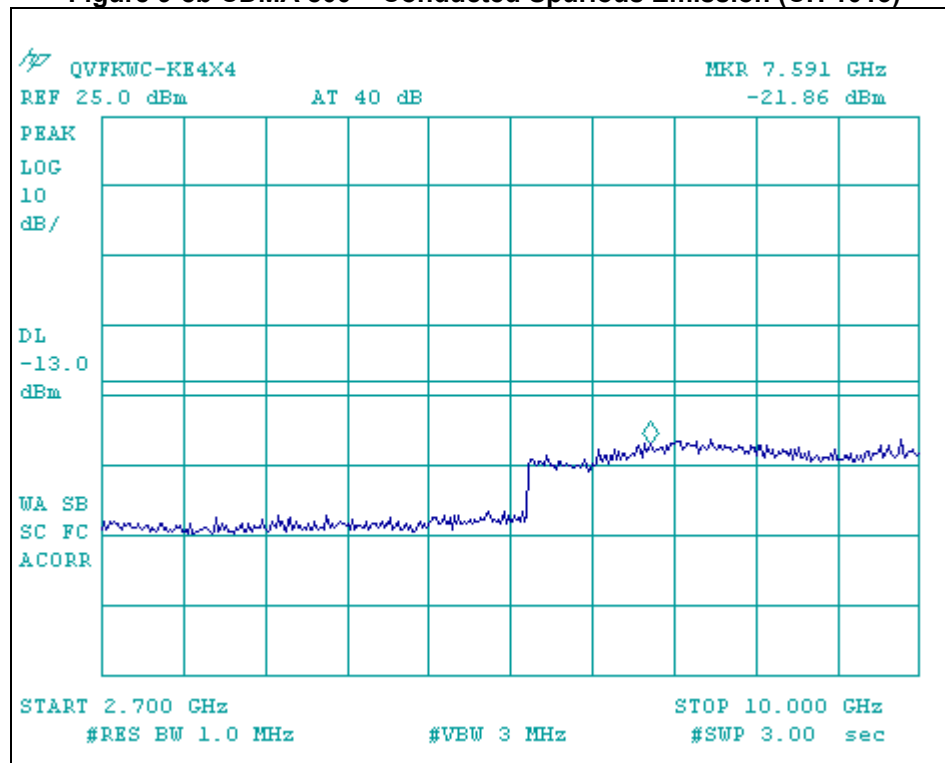


Figure 9-9 CDMA 800 - Emissions in base station frequency range (CH 383)

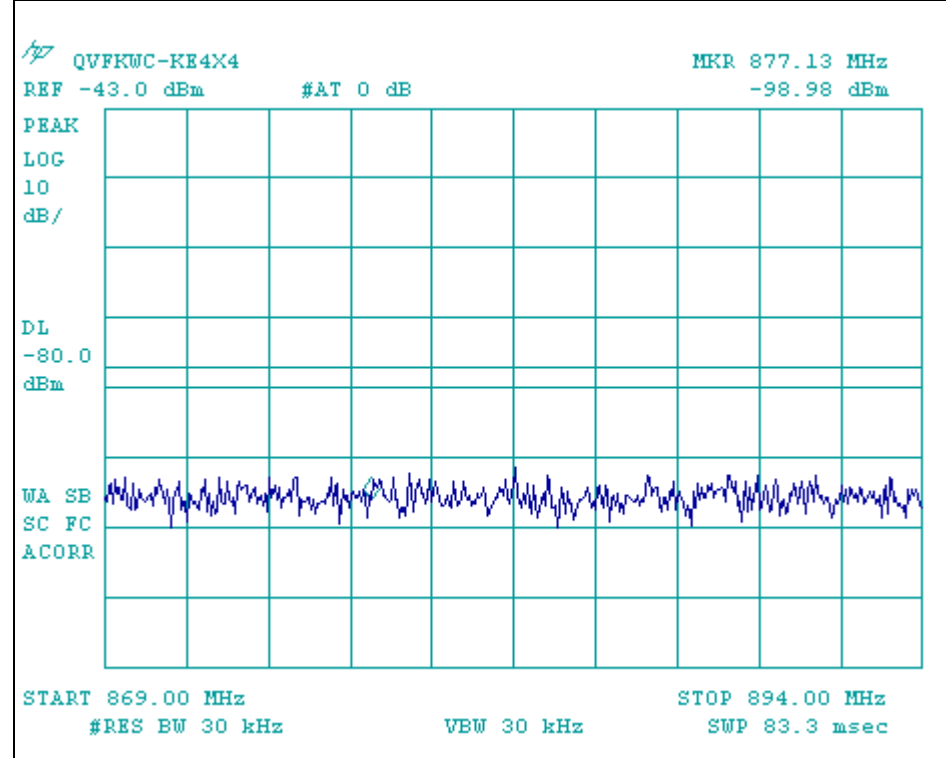


Figure 9-10a CDMA 800 – Conducted Spurious Emission (CH 383)

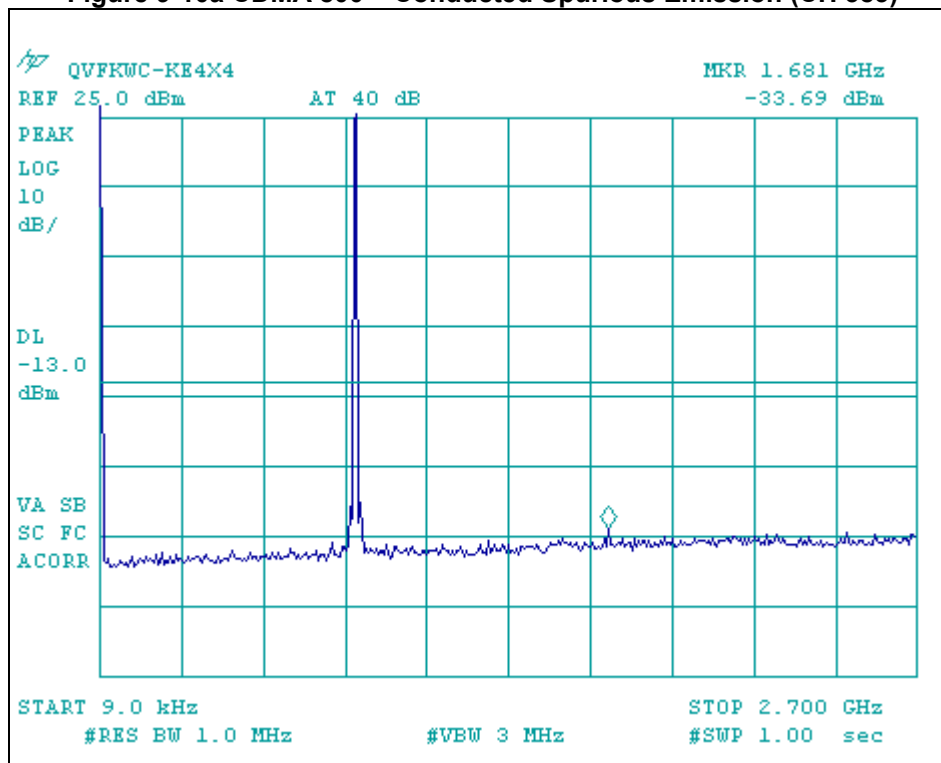


Figure 9-10b CDMA 800 – Conducted Spurious Emission (CH 383)

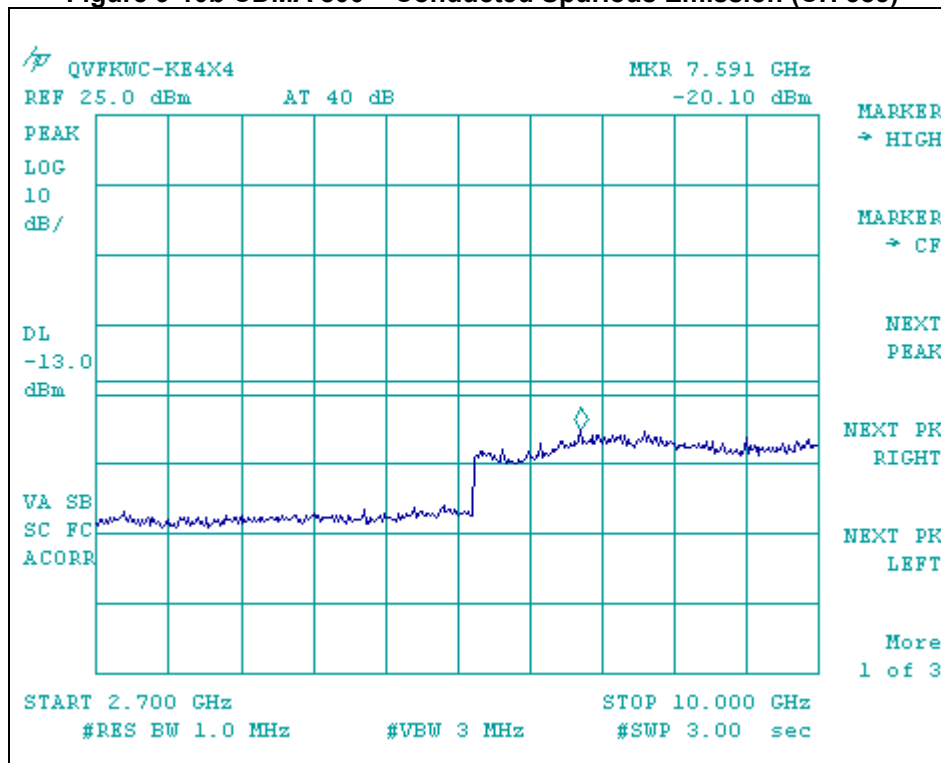


Figure 9-11 CDMA 800 - Emissions in base station frequency range (CH 777)

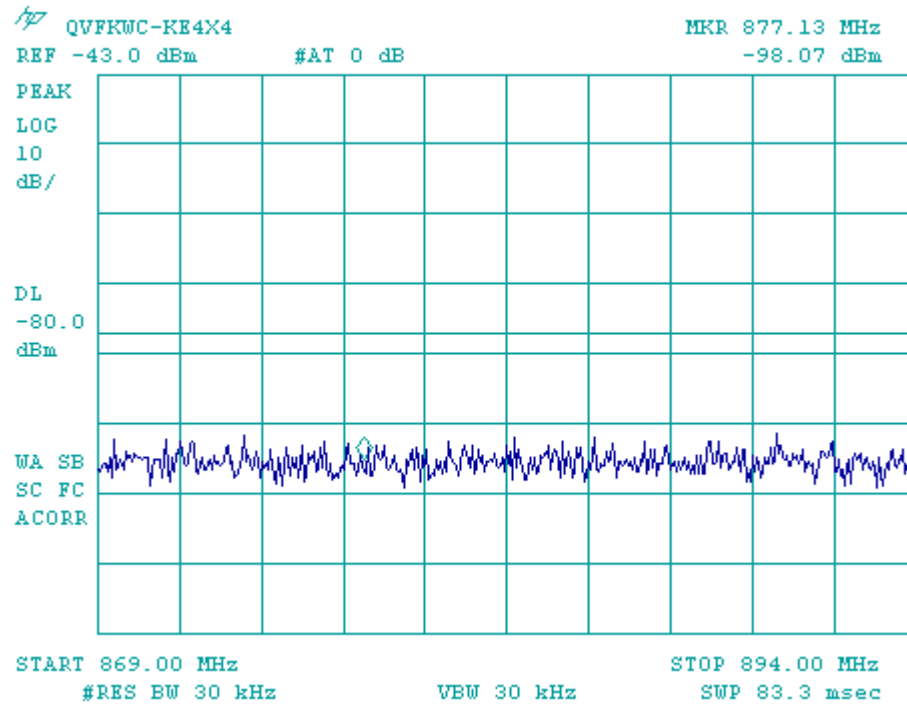


Figure 9-12a CDMA 800 – Conducted Spurious Emission (CH 777)

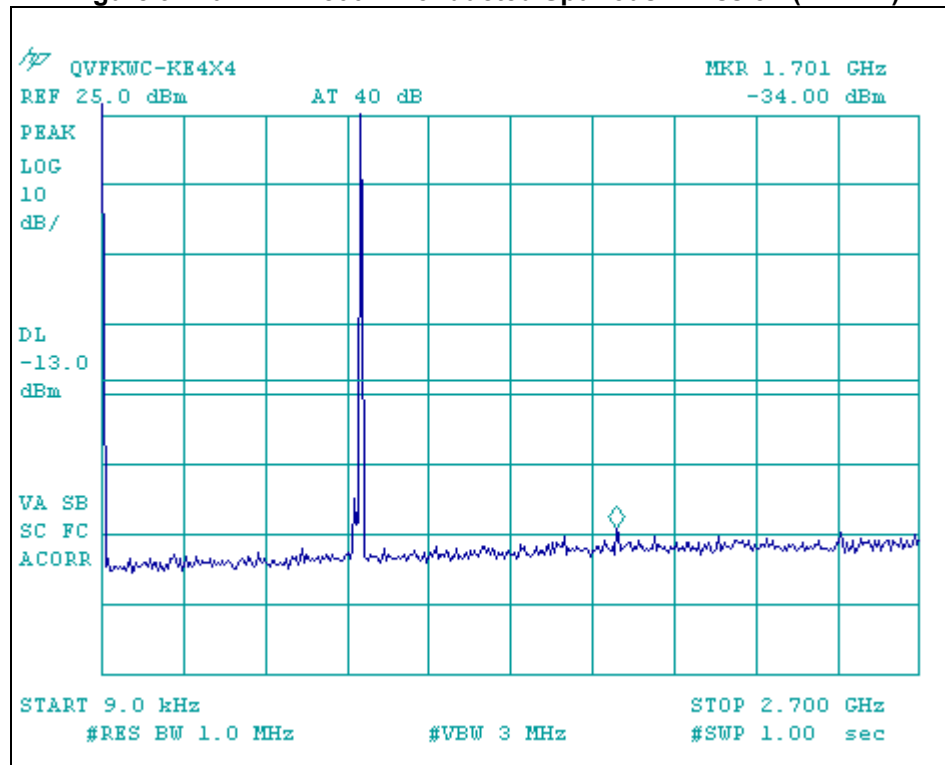


Figure 9-12b CDMA 800 – Conducted Spurious Emission (CH 777)

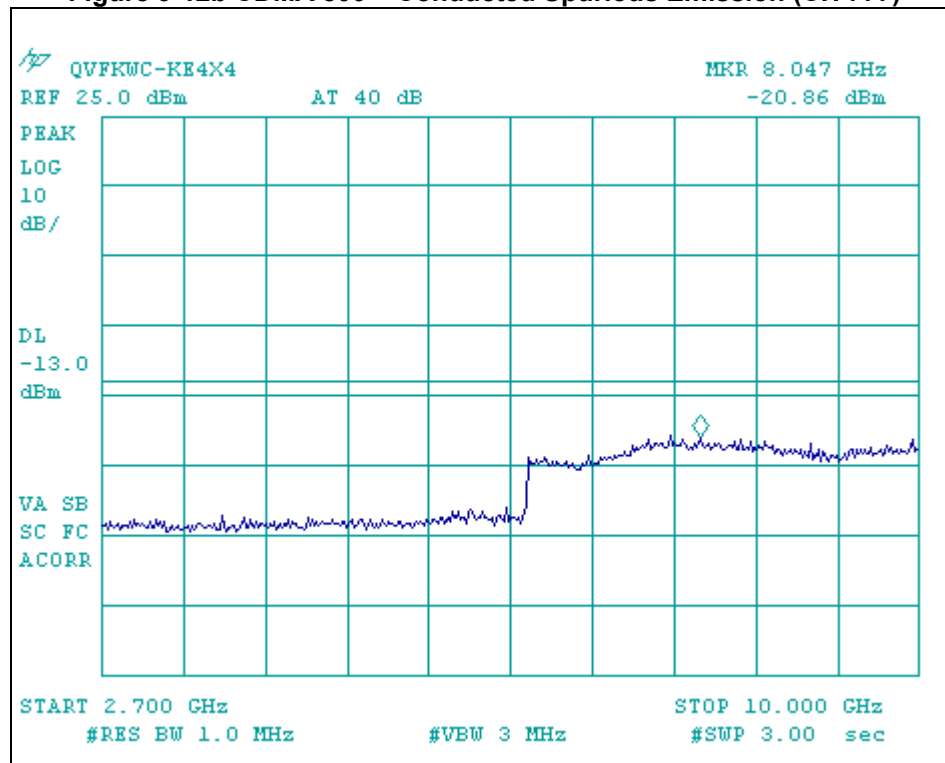


Figure 9-13a CDMA 1900 - Conducted Spurious Emission (CH 25)

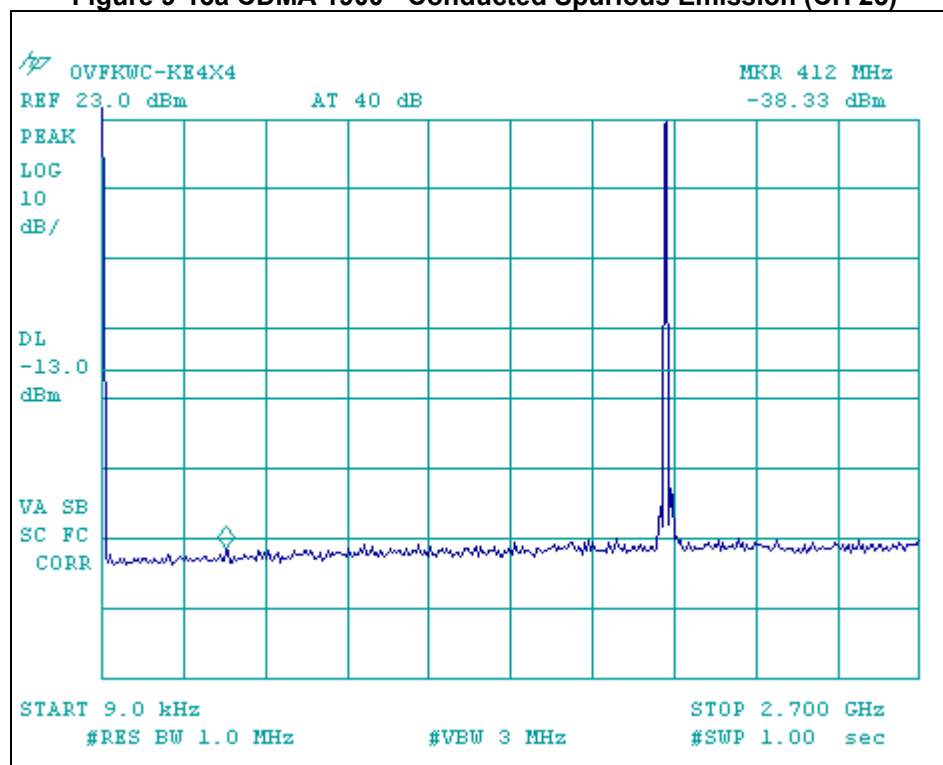


Figure 9-13b CDMA 1900 - Conducted Spurious Emission (CH 25)

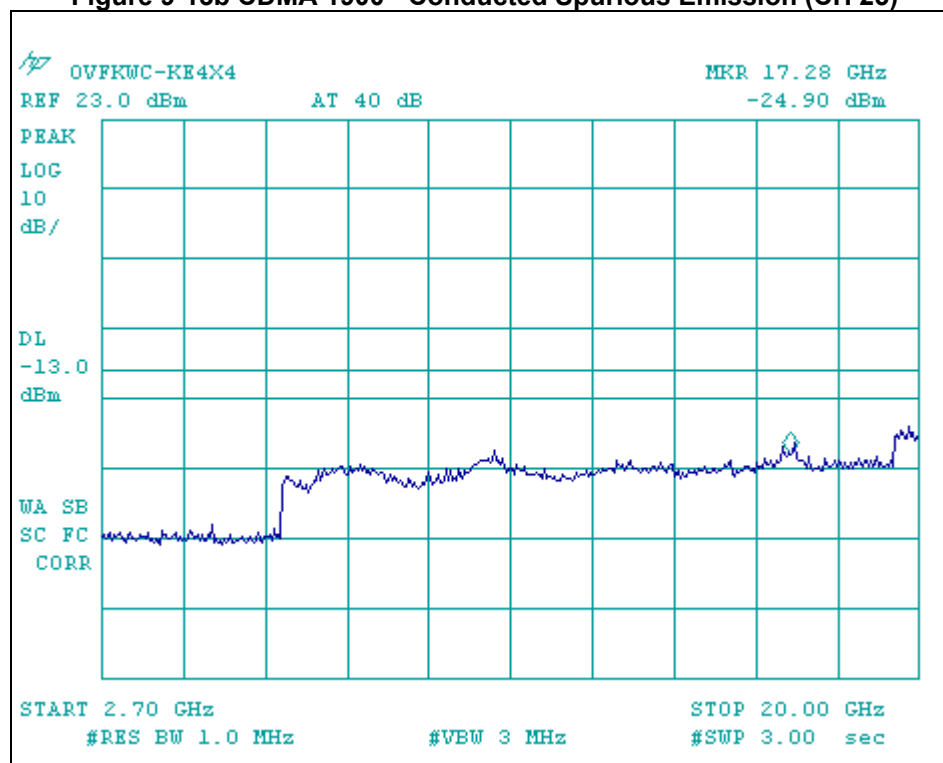




Figure 9-14a CDMA 1900 - Conducted Spurious Emission (CH 600)

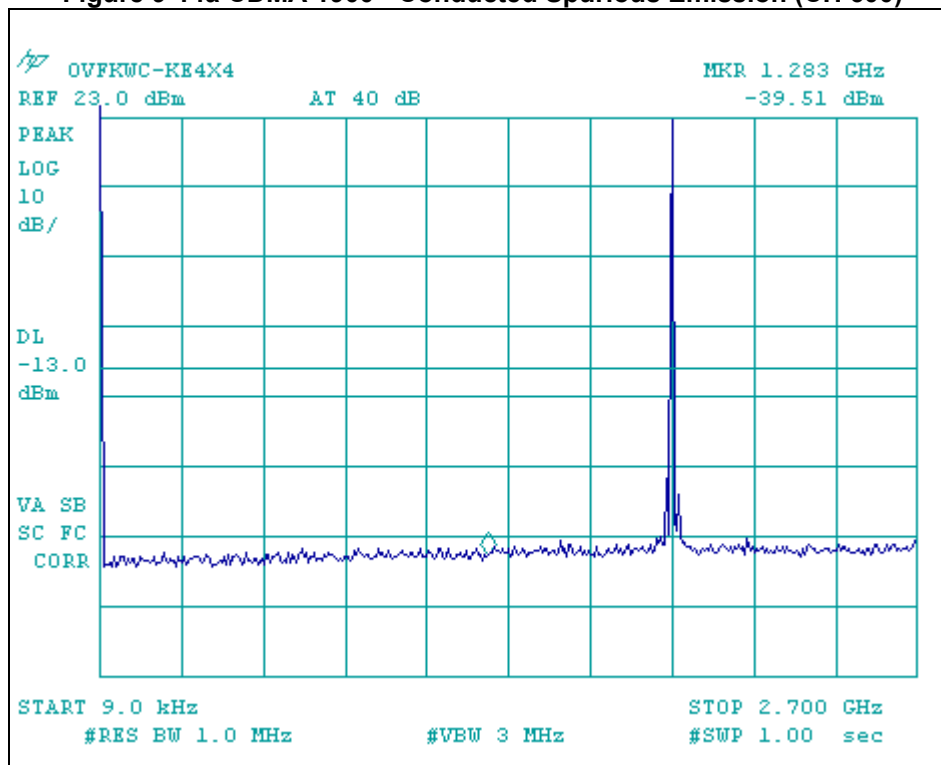


Figure 9-14b CDMA 1900 - Conducted Spurious Emission (CH 600)

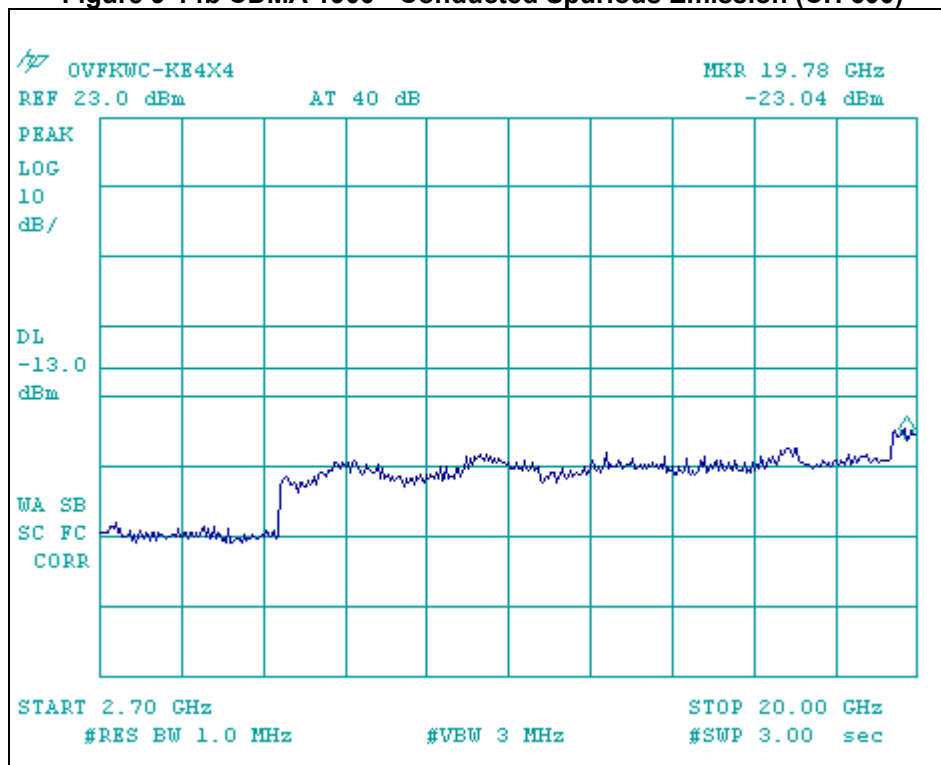


Figure 9-15a CDMA 1900 - Conducted Spurious Emission (CH 1175)

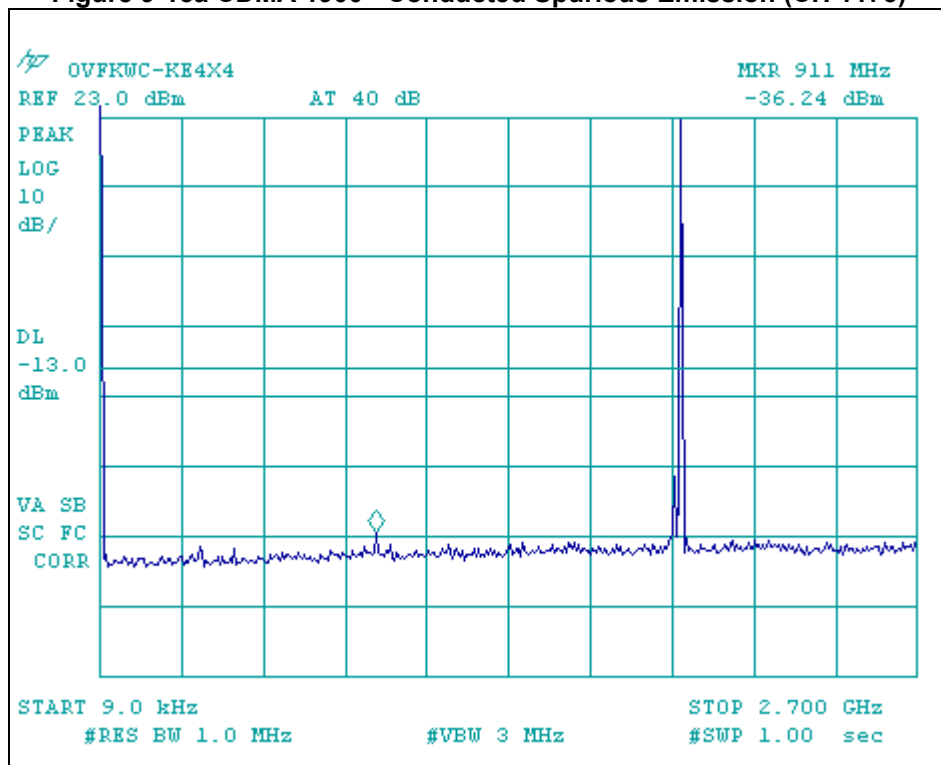
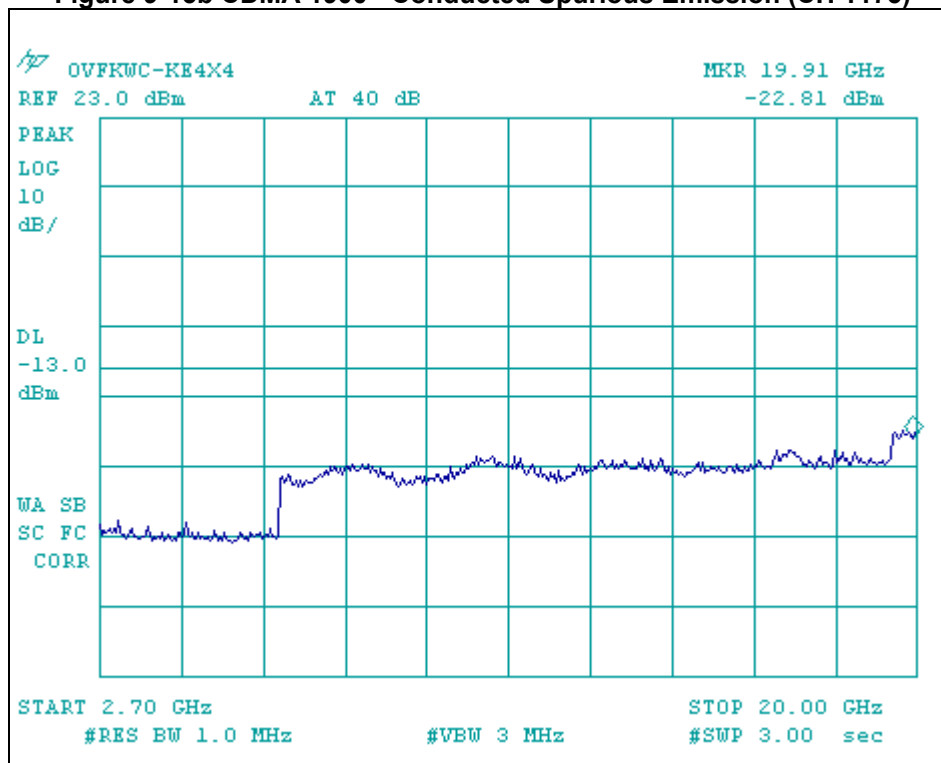


Figure 9-15b CDMA 1900 - Conducted Spurious Emission (CH 1175)



**10 Transmitter Radiated Spurious Emissions Measured Data**

<b>FCC:</b> § 2.1053, § 22.91, § 24.238	<b>IC:</b> RSS-129 §8.1, RSS-133 §6.3
<b>Measurement Procedures:</b>  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**

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

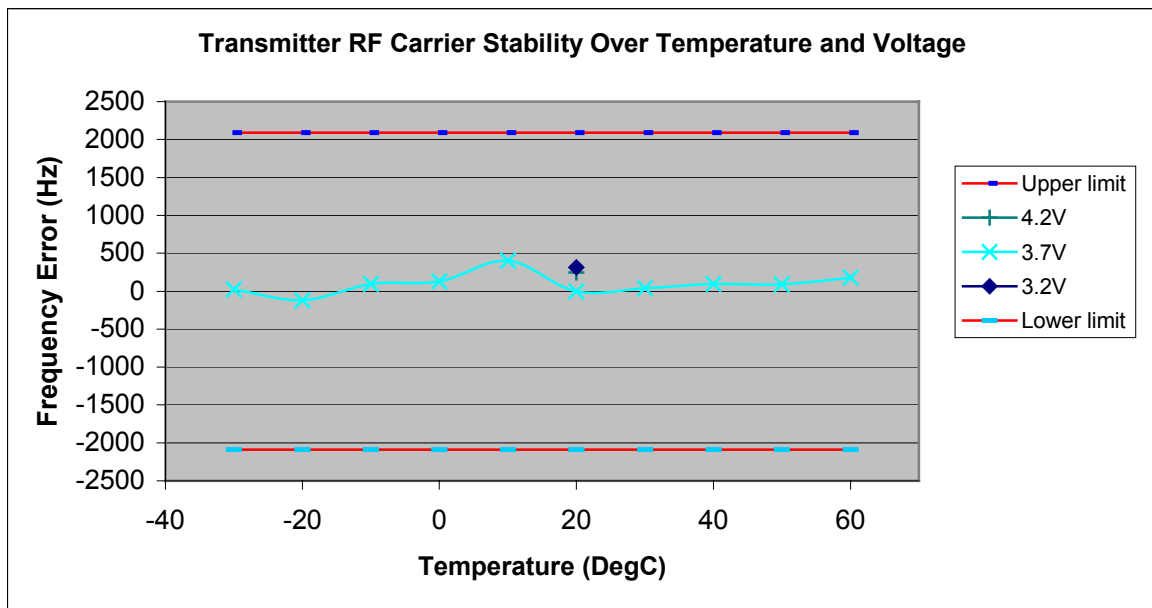
## 12 Transmitter RF Carrier Frequency Stability

<b>FCC:</b>	<b>§ 2.1055, § 22.355, § 24.235</b>	<b>IC:</b>	<b>RSS-129 §7.2 and §9.2, RSS-133 §7</b>
<b>Measurement Procedures:</b>			
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 Mode

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

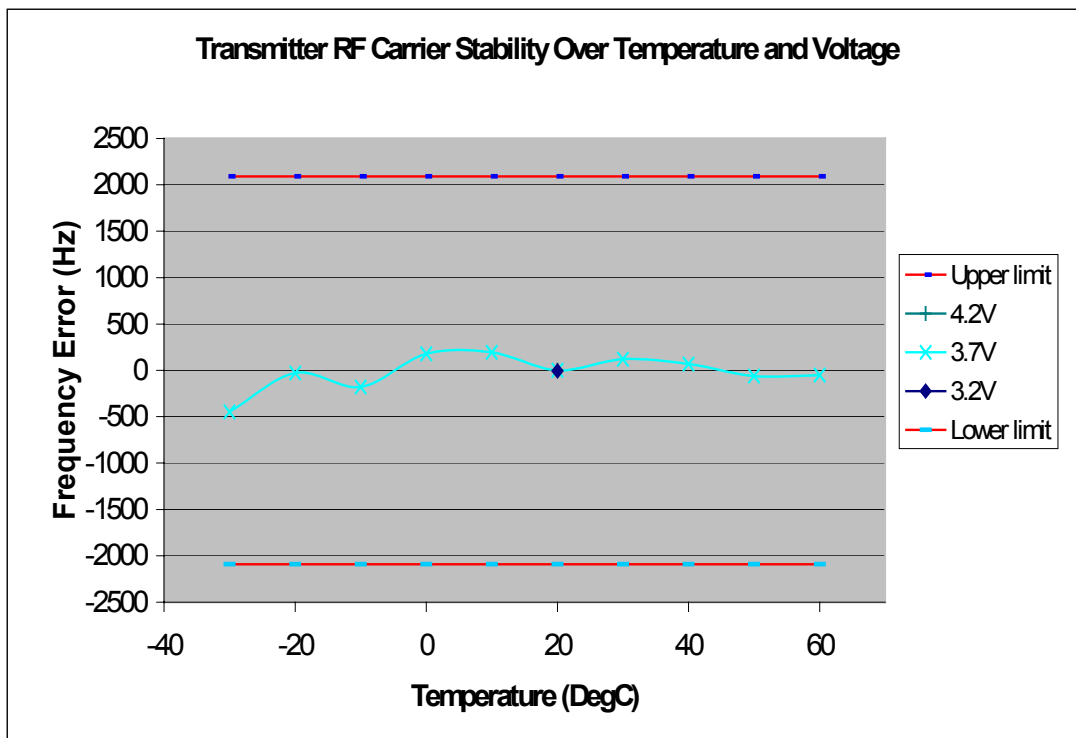
Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		22		-2091	2091
-20		-120		-2091	2091
-10		97		-2091	2091
0		130		-2091	2091
10		405		-2091	2091
20	314	0	247	-2091	2091
30		39		-2091	2091
40		97		-2091	2091
50		89		-2091	2091
60		180		-2091	2091



## 12.2 CDMA 800 Mode

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

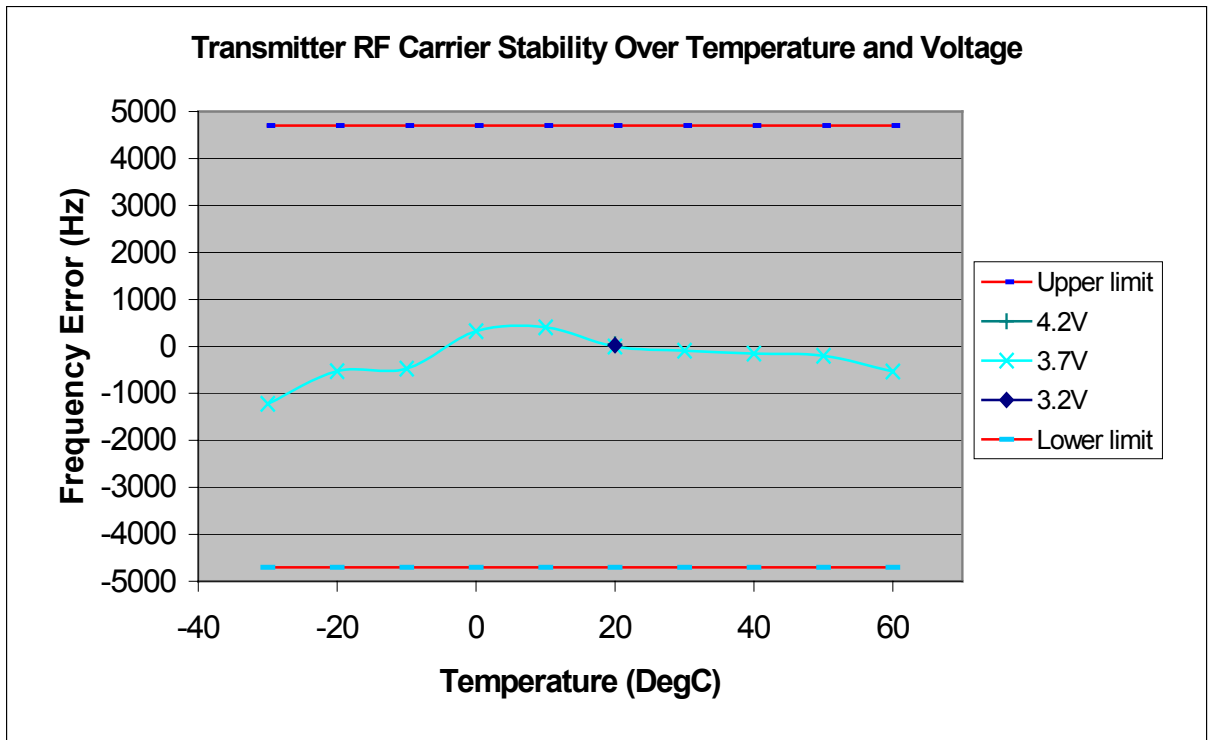
Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		-448		-2091	2091
-20		-28		-2091	2091
-10		-178		-2091	2091
0		179		-2091	2091
10		195		-2091	2091
20	-8	0	0	-2091	2091
30		119		-2091	2091
40		69		-2091	2091
50		-61		-2091	2091
60		-51		-2091	2091



### 12.3 CDMA 1900 Mode

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

Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		-1225		-4700	4700
-20		-525		-4700	4700
-10		-475		-4700	4700
0		325		-4700	4700
10		408		-4700	4700
20	25	0	41	-4700	4700
30		-92		-4700	4700
40		-150		-4700	4700
50		-200		-4700	4700
60		-534		-4700	4700



**13 Exposure of Humans to RF Fields (SAR)**

The SAR Test Report is showed in a separate attachment as Exhibit 7.

**14 Test Equipment**

Description	Manufacturer	Model Number	Serial Number	Cal Due Date
Power Meter	Giga-tronics	8541C	1835203	01/04/04
Spectrum Analyzer	Hewlett Packard	8593EM	3710A00203	04/15/03
Spectrum Analyzer	Hewlett Packard	8594E	3810A06429	11/19/03
Wireless Communications Test Set	Agilent	8960	GB41251014	11/15/03
RF communication test set	Hewlett Packard	8920B	US35320824	12/21/03
Temperature Chamber	CSZ	Z2033	Z9343034	02/14/03