

Test Report

From

Kyocera Wireless Corp

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|--|
| FCC Part 22 & 24 Certification IC RSS-129 & 133 |
| FCC ID: OVFKWC-KE4X4 Model: KE414, KE424c |

| | |
|---|---|
| STATEMENT OF CERTIFICATION | |
| <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

| | | | | |
|---------------------------------|---|-----------|------------|-------------|
| Applicant: | Kyocera Wireless Corp 10300 Campus Point Drive San Diego CA 92121 | | | |
| FCC ID: | OVFKWC-KE4X4 | | | |
| Product: | Dual-Band Tri-mode Cellular Phone | | | |
| Model Number: | KE414 | KE424c | | |
| EUT Serial Number: | MXXZ | PVGW | | |
| Type: | [] Prototype, [X] Pre-Production, [] Production | | | |
| Device Category: | Portable | | | |
| RF Exposure Environment: | General Population / Uncontrolled | | | |
| Antenna: | Fixed Helix | | | |
| 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 |
| TX Frequency (MHz): | 824 - 849 | 824 – 849 | 824 - 849 | 1850 - 1910 |
| Emission Designators: | 40K0F8W, 40K0F1D, 1M25F9W | | | |
| Max. Output Power (W) | 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 |

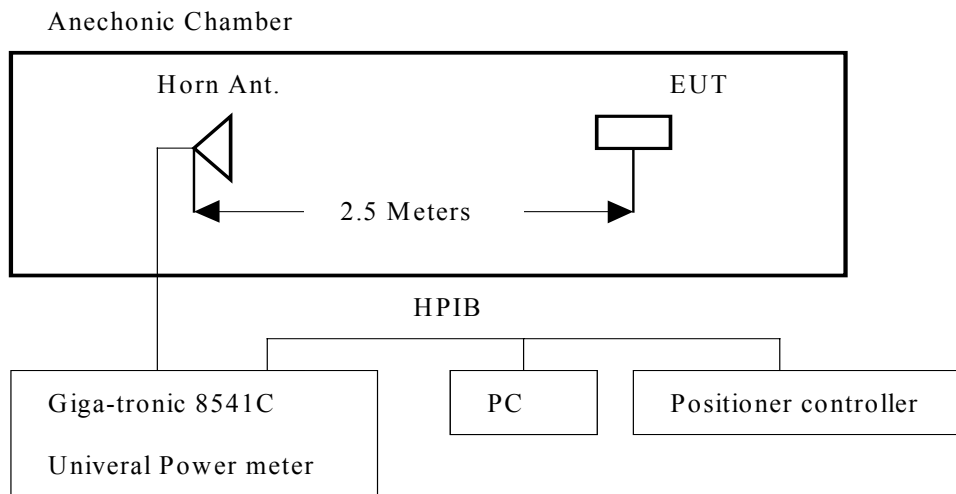
6.2 Radiated Power

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

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

| | |
|--|-------------------------|
| FCC: § 2.1047, § 22.915 | IC: RSS-129 §6.2 |
| Measurement Procedures: | |
| Measured with HP8920 RF communication test set & HP 3588A spectrum analyzer. | |
| <ul style="list-style-type: none"> 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. | |

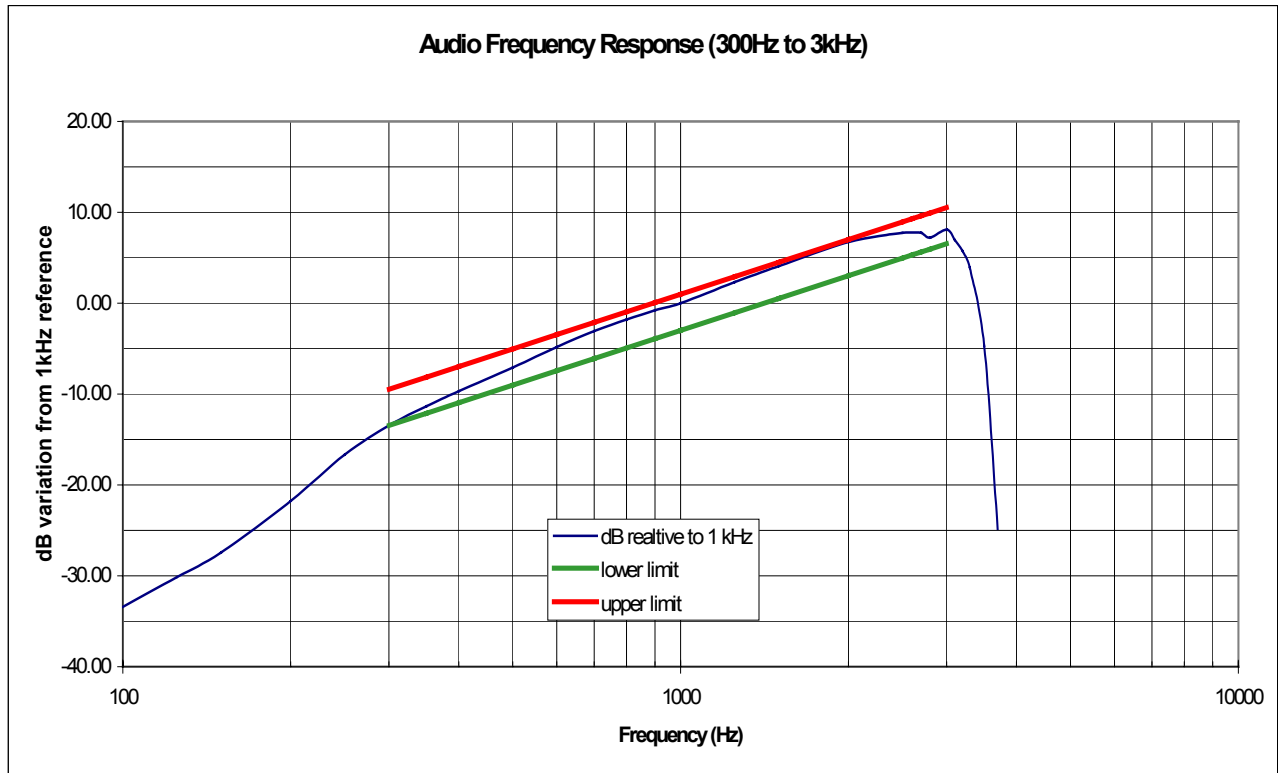
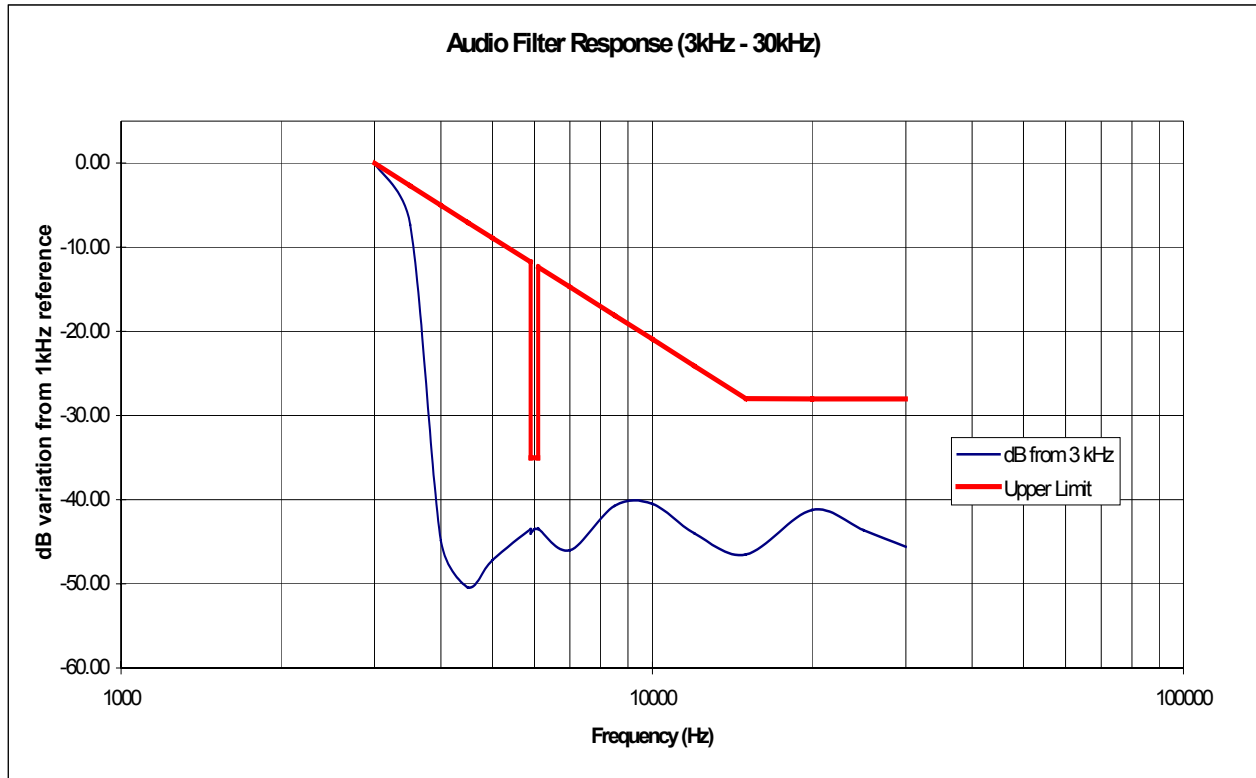


Figure 7.1 Audio Filter Characteristics (300-3000Hz)

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. | |

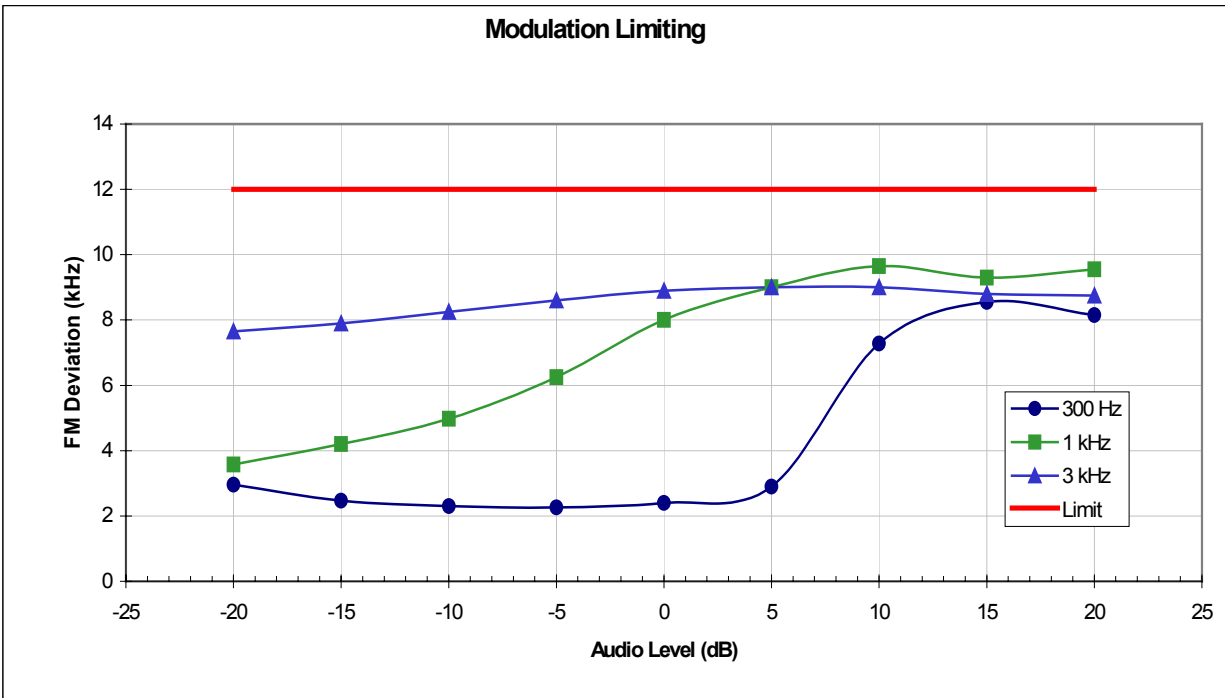


Figure 7.3 Modulation Deviation Limiting

8 Occupied Bandwidth

| | |
|--|-------------------------------|
| FCC: § 2.1049, § 22.917(b)(d), § 24.238 | IC: RSS-129 §6.3, §8.1 |
| <p>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.</p> <p><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 ± 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.</p> <p><u>For Digital:</u> Modulate with full rate.</p> | |

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| 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

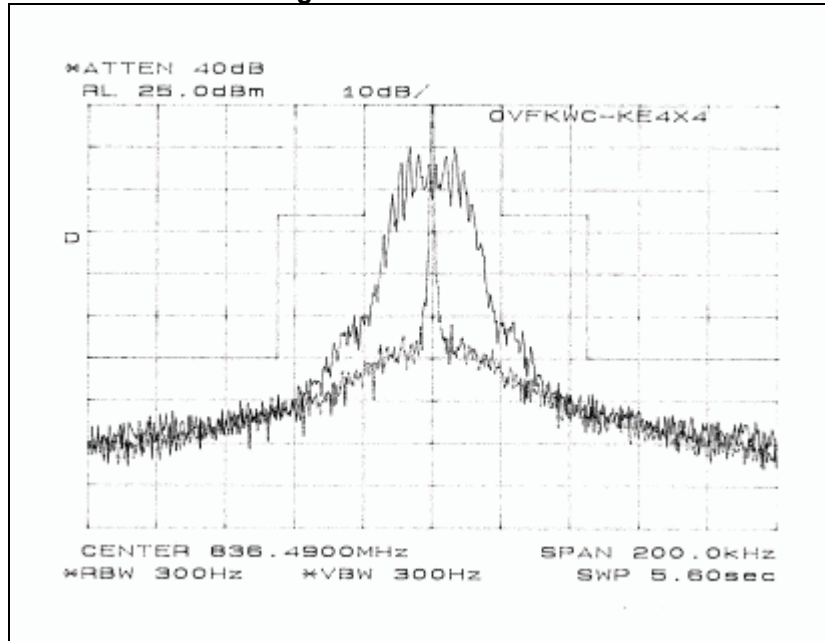


Figure 8-2 AMPS SAT

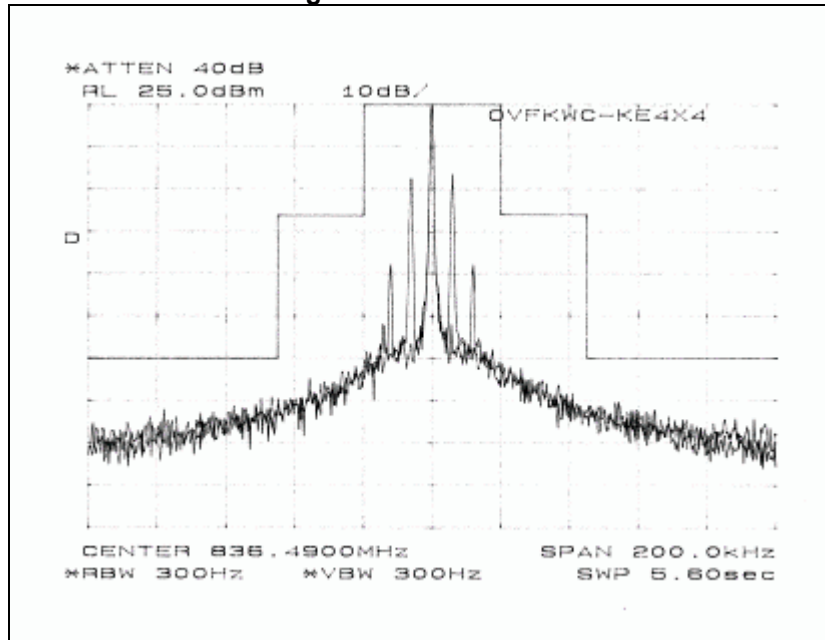


Figure 8-3 AMPS Voice + SAT

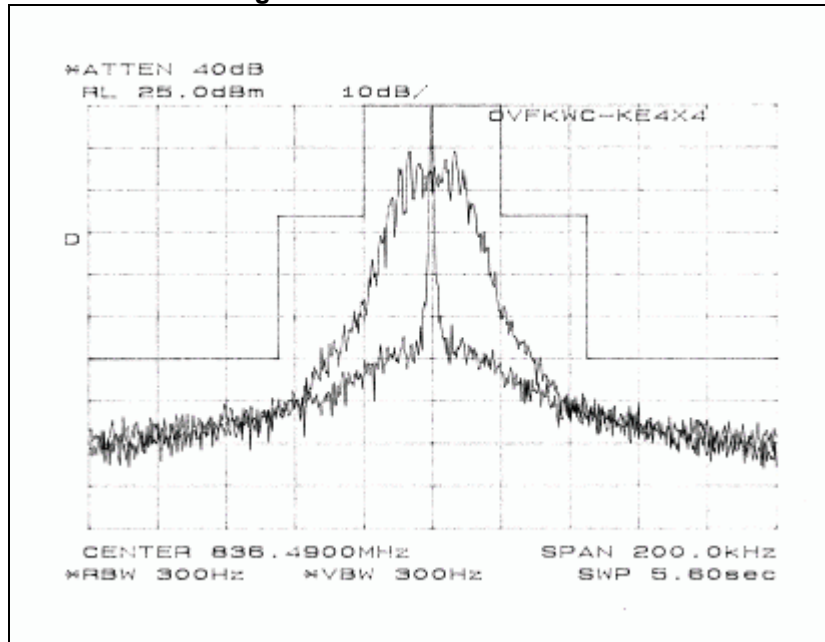


Figure 8-4 AMPS ST

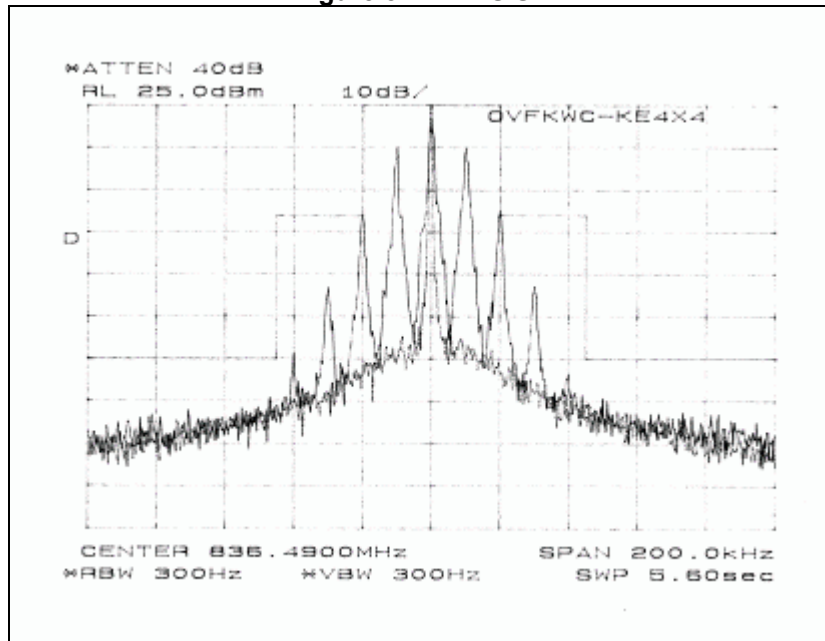


Figure 8-5 AMPS ST + SAT

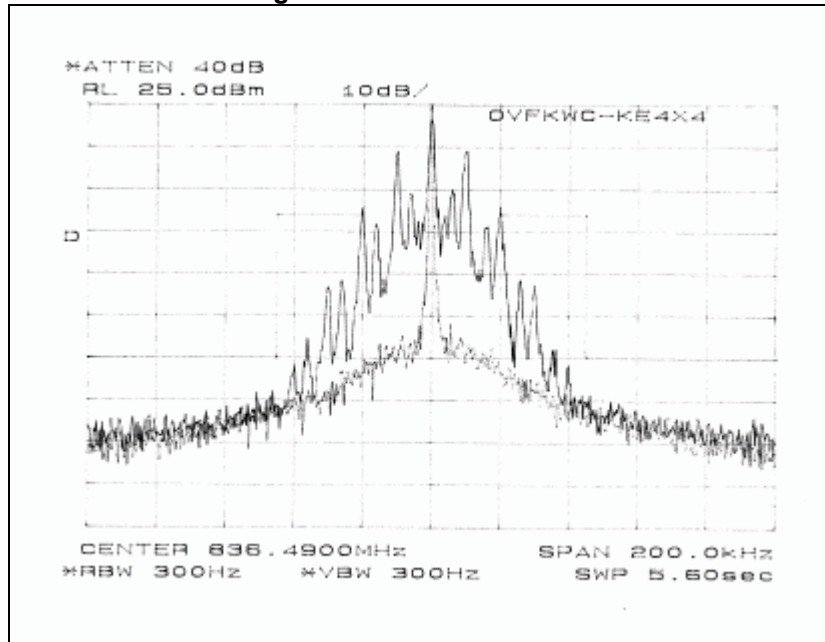


Figure 8-6 SAT + DTMF_9

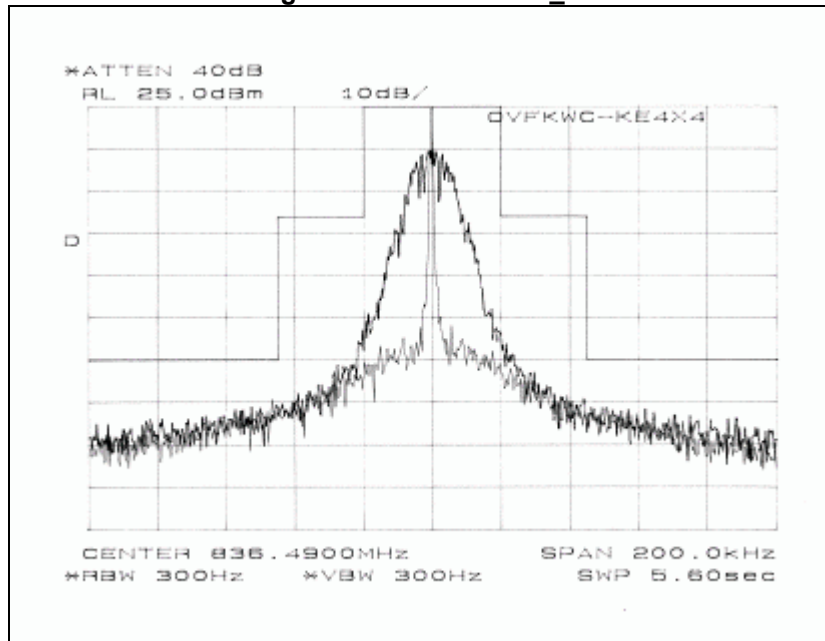


Figure 8-7 AMPS WIDEBAND

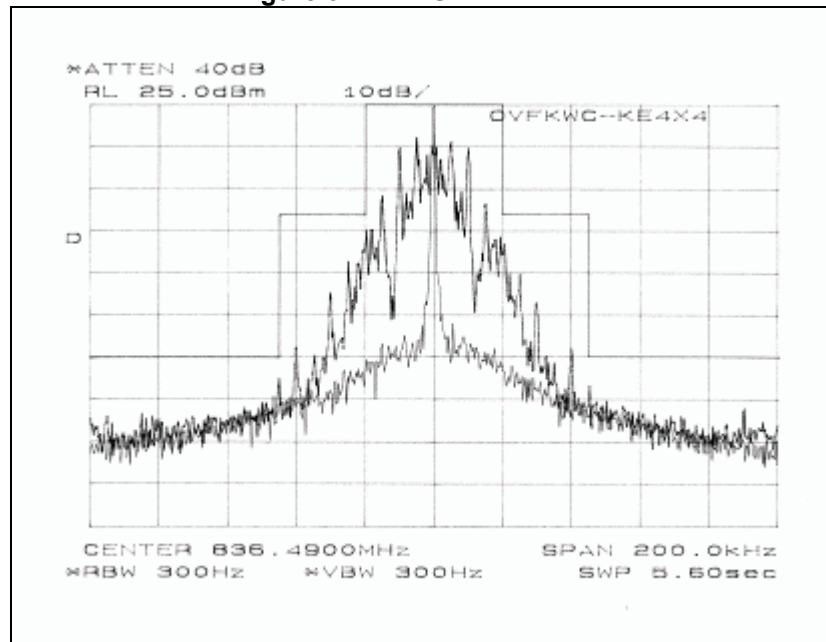
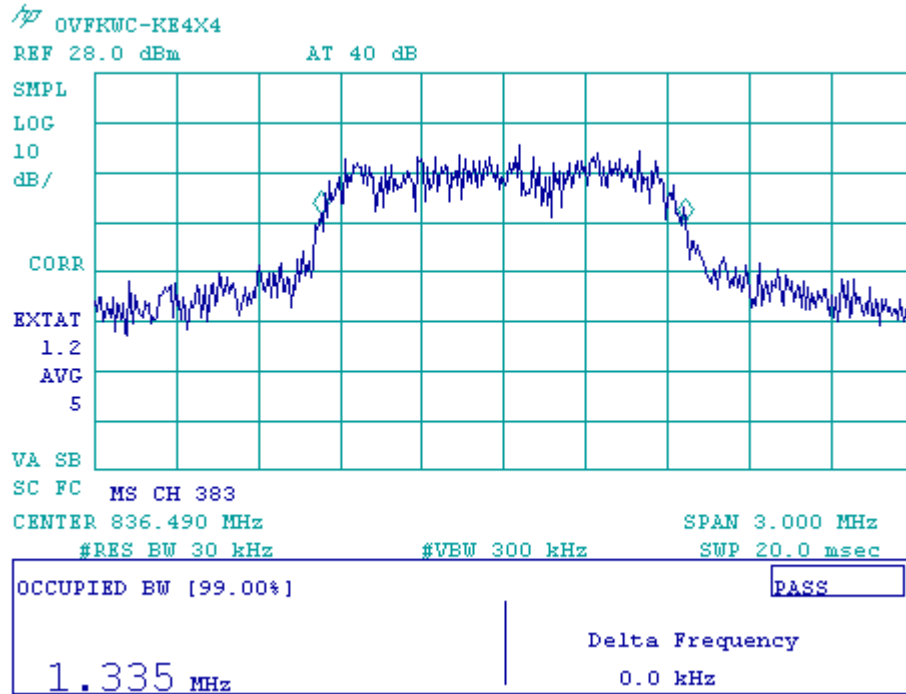


Figure 8-8 CDMA 800 at RC1



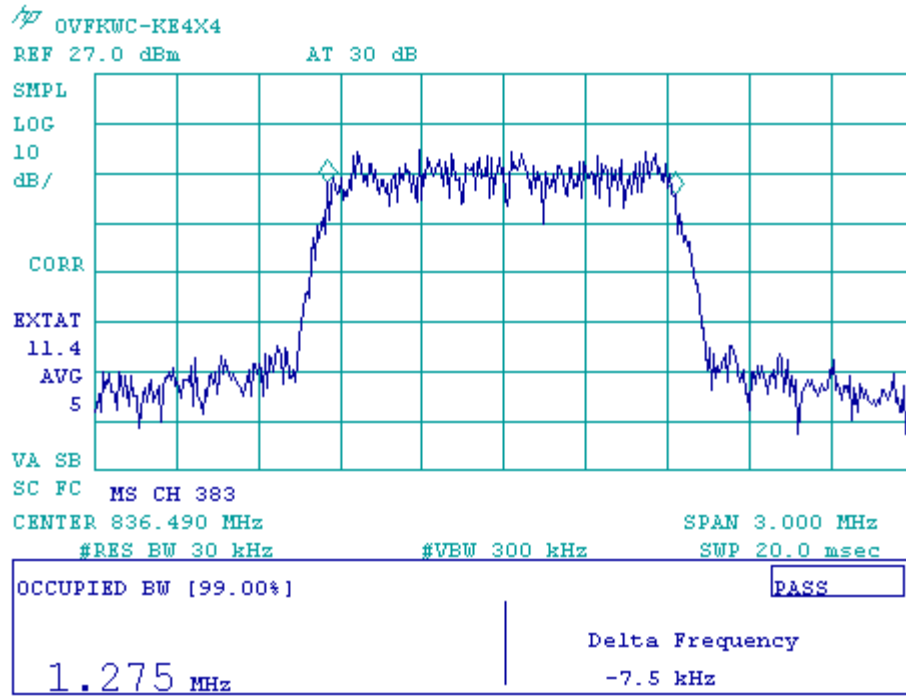


Figure 8-10a CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

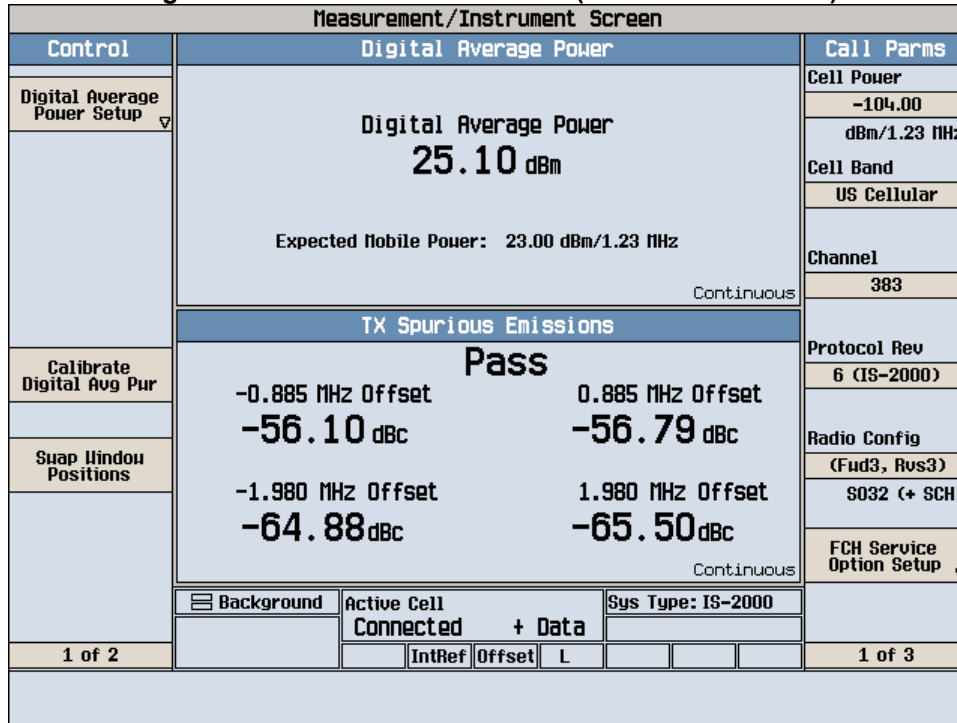


Figure 8-10b CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

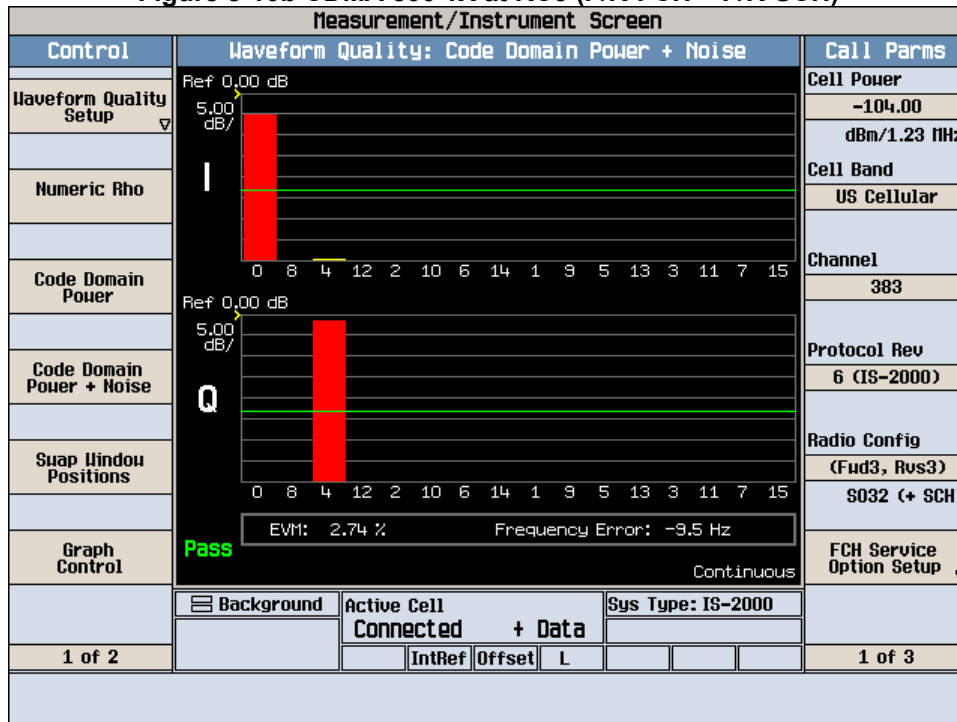


Figure 8-10c CDMA 800 1X at RC3 (F/R-FCH + F/R-SCH)

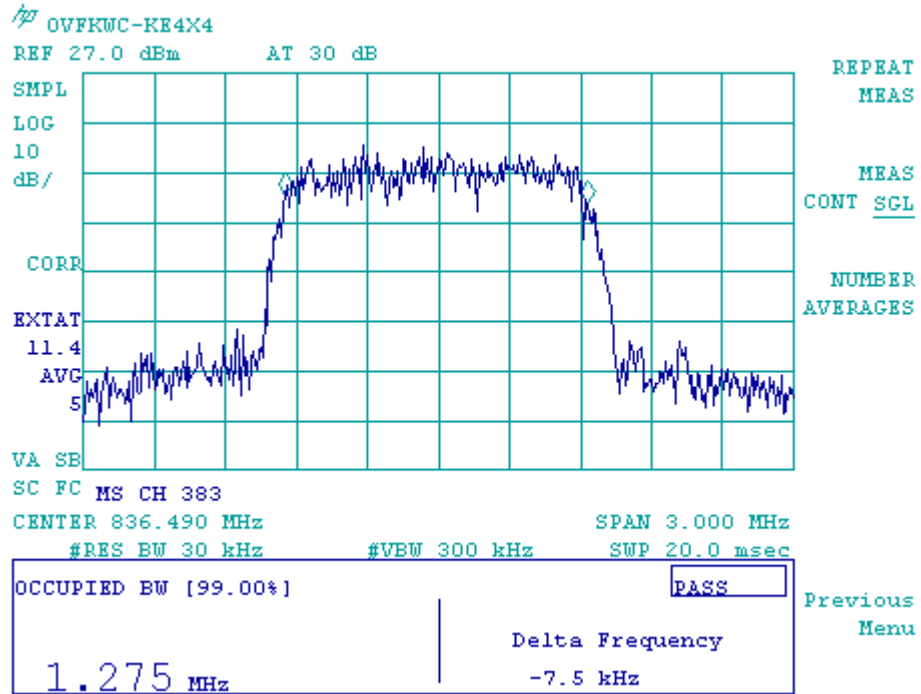


Figure 8-11 CDMA 1900 at RC1

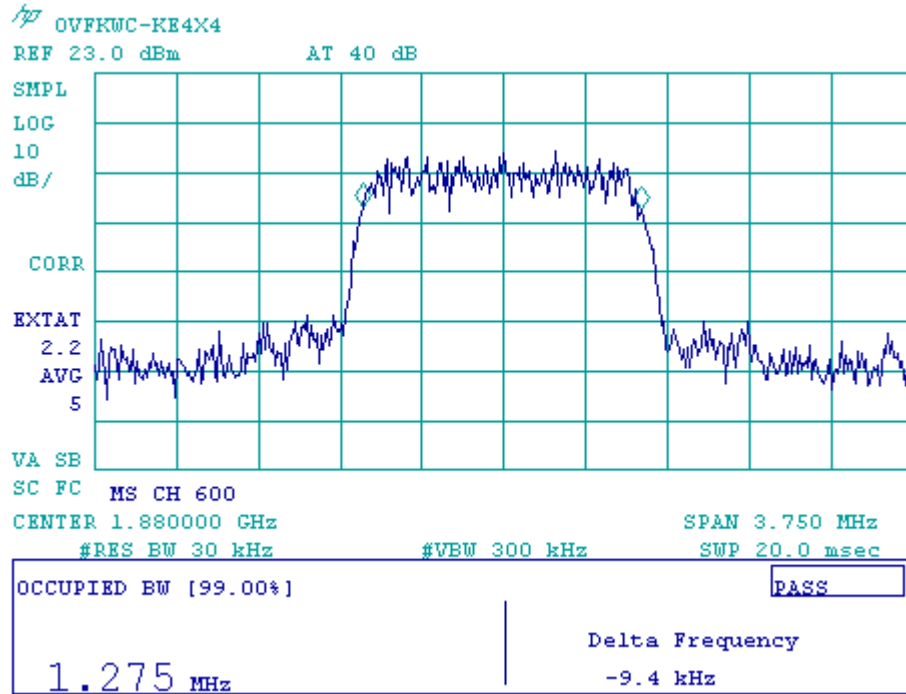


Figure 8-12a CDMA 1900 1X at RC3 (F/R-FCH)

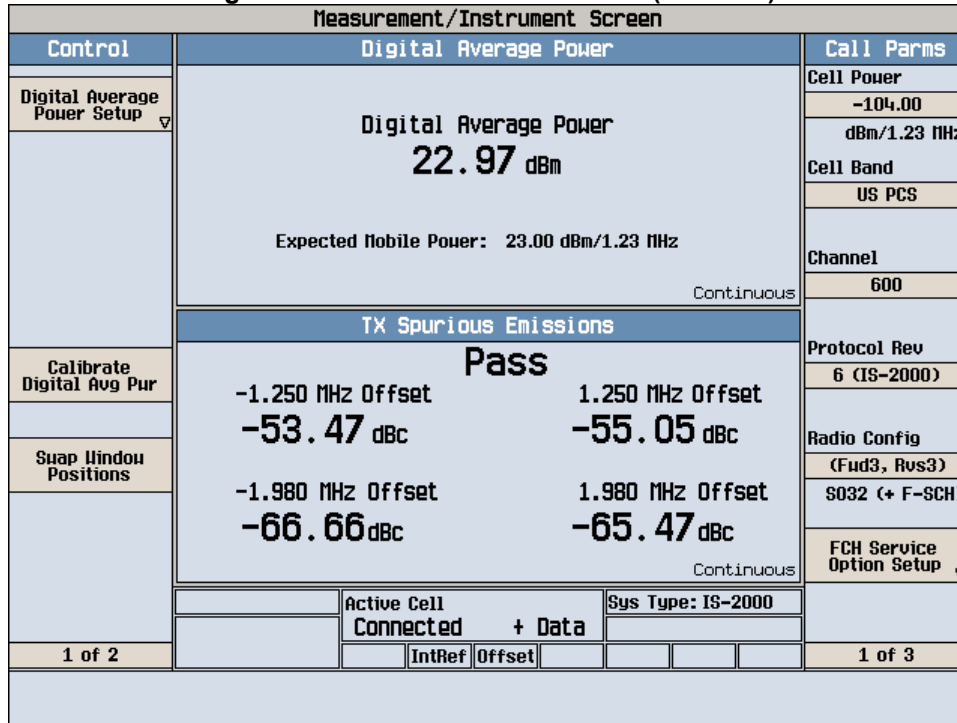


Figure 8-12b CDMA 1900 1X at RC3 (F/R-FCH)

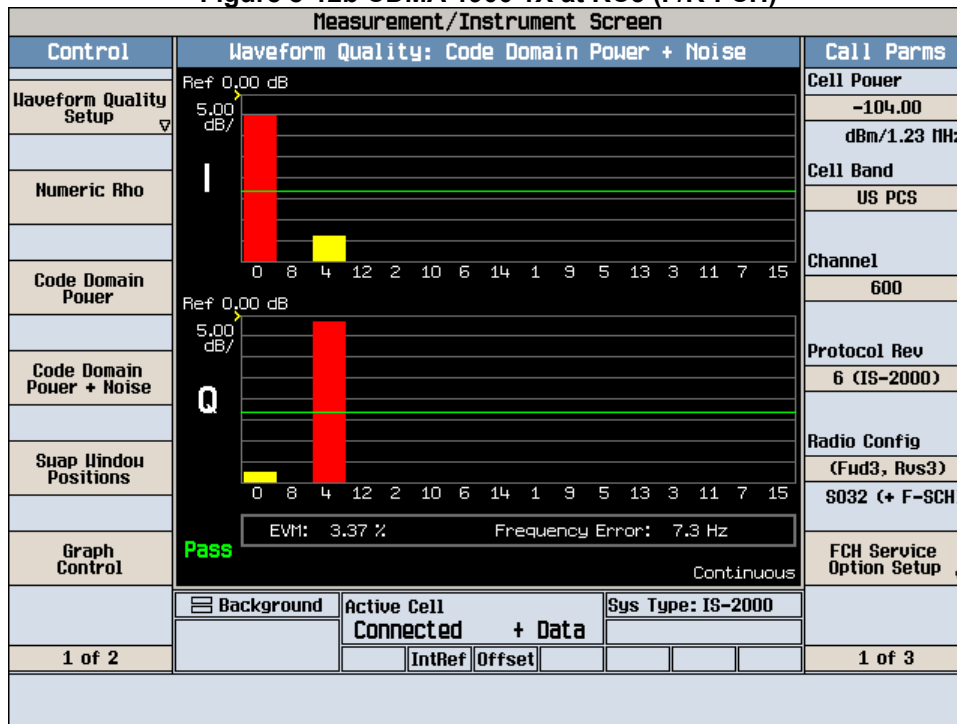


Figure 8-12c CDMA 1900 1X at RC3 (F/R-FCH)

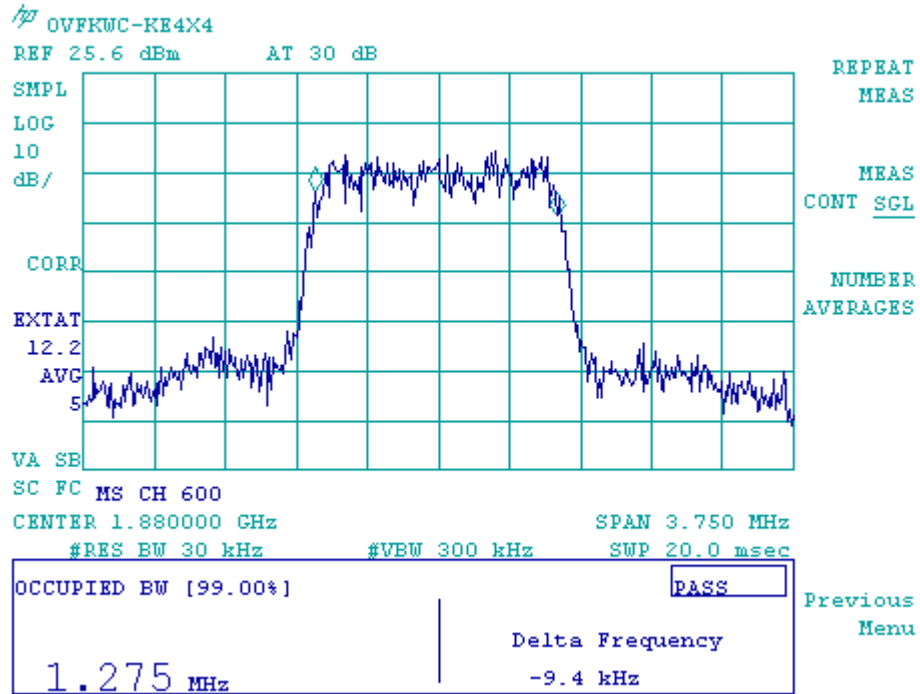


Figure 8-13a CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

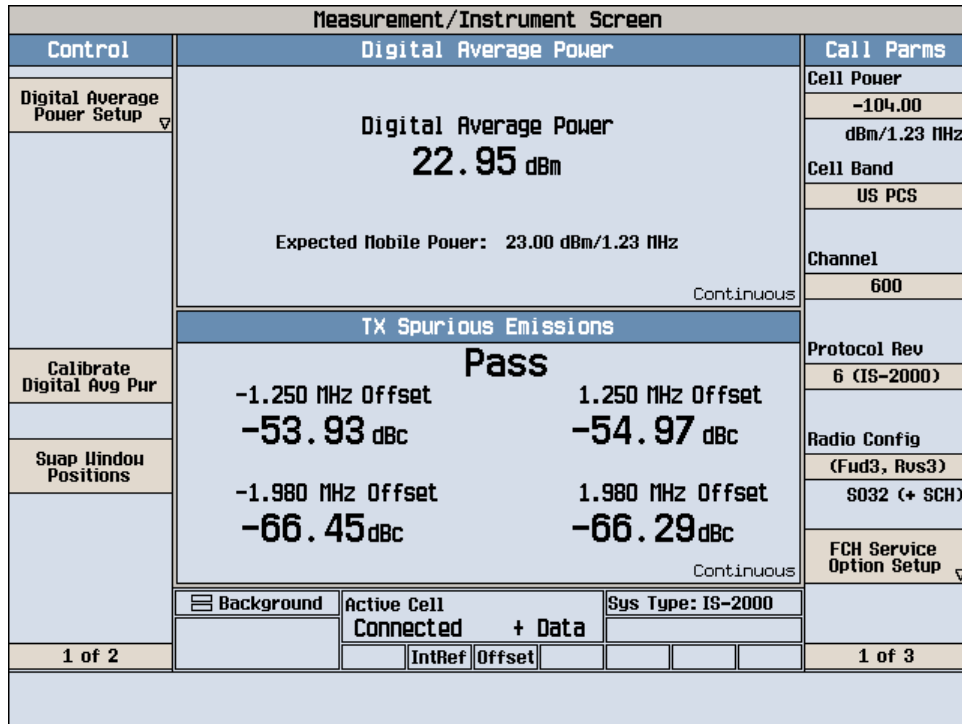


Figure 8-13b CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

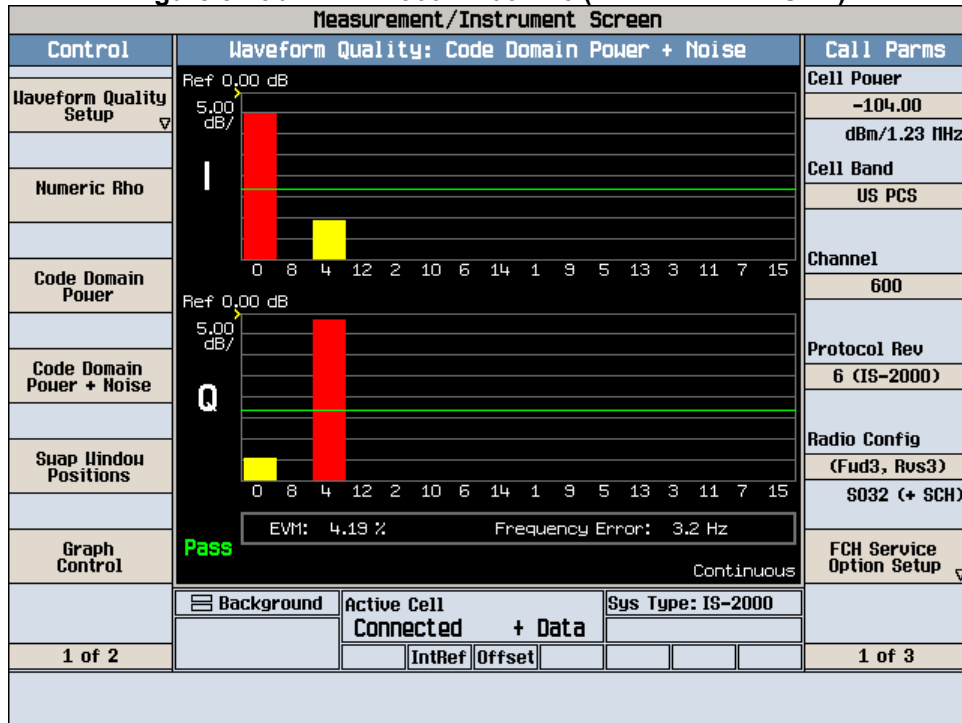


Figure 8-13c CDMA 1900 1X at RC3 (F/R-FCH + F/R-SCH)

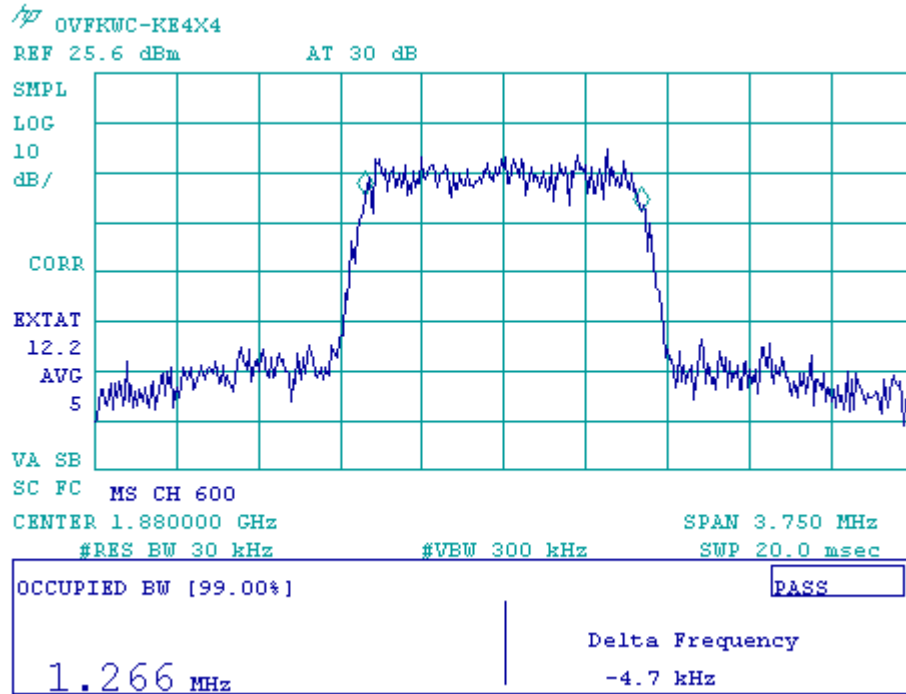


Figure 8-14 CDMA 1900 Lower Band Edge

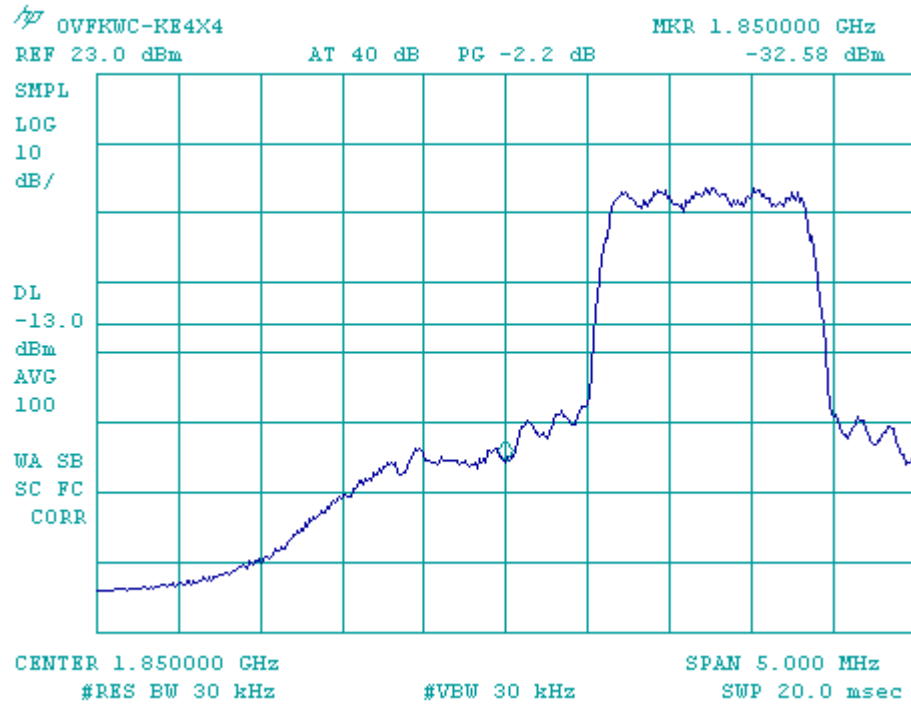
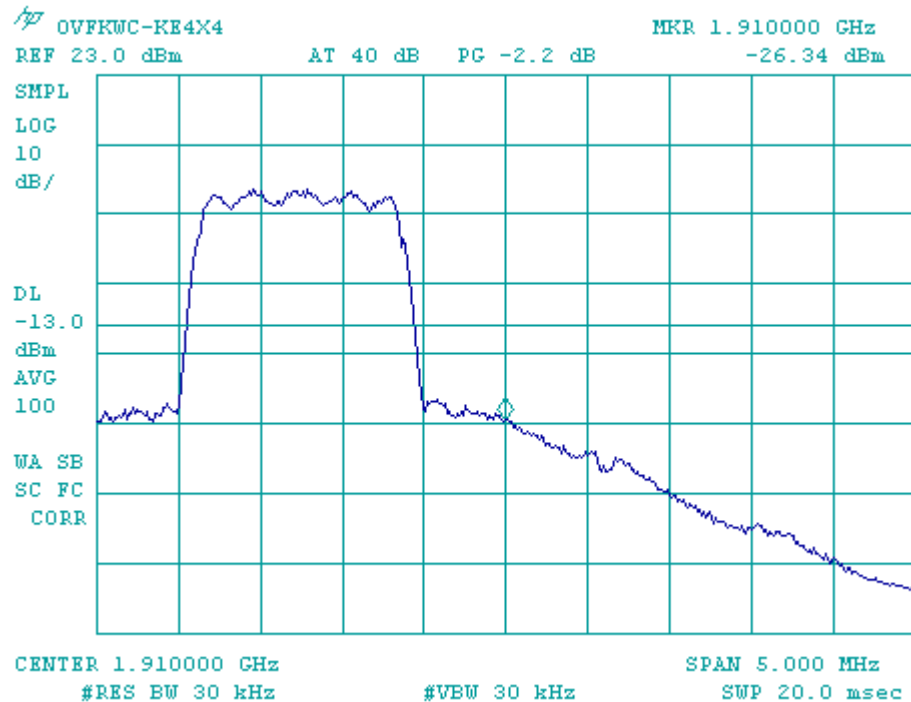


Figure 8-15 CDMA 1900 Upper Band Edge



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: | |
| <p><u>Out of Band:</u> 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.</p> | |
| <p><u>Base Band:</u> Spectrum was investigated from 869-894 MHz for Cellular.</p> | |

List of Figures:

| Figure | Mode | Channel | Plot Description |
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| 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)

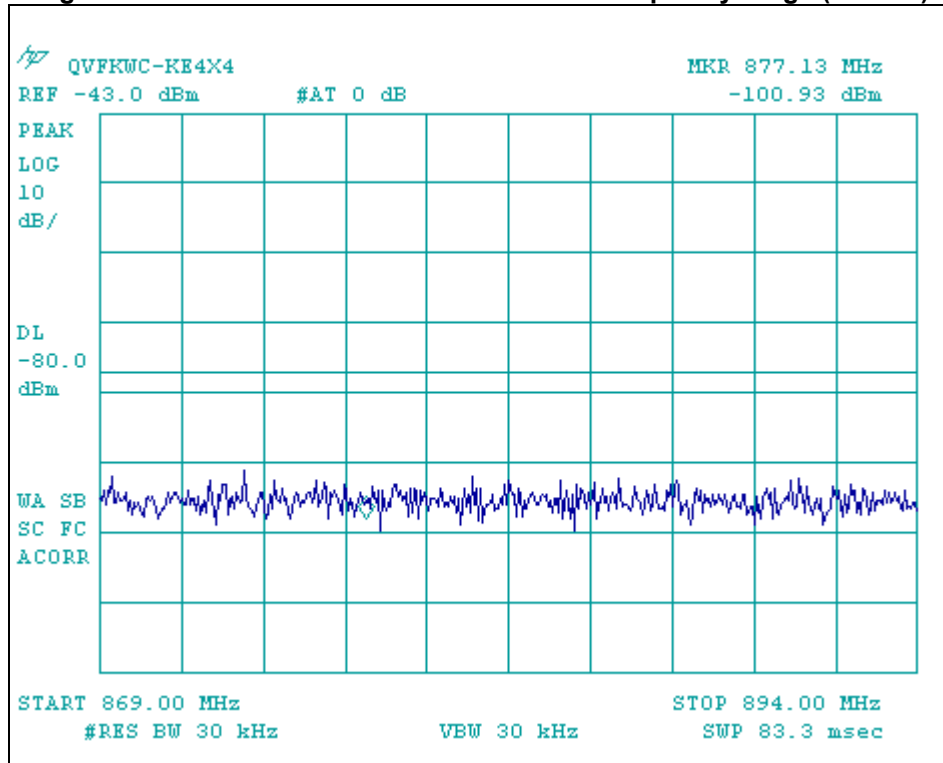


Figure 9-2a AMPS – Conducted Spurious Emission (CH 991)

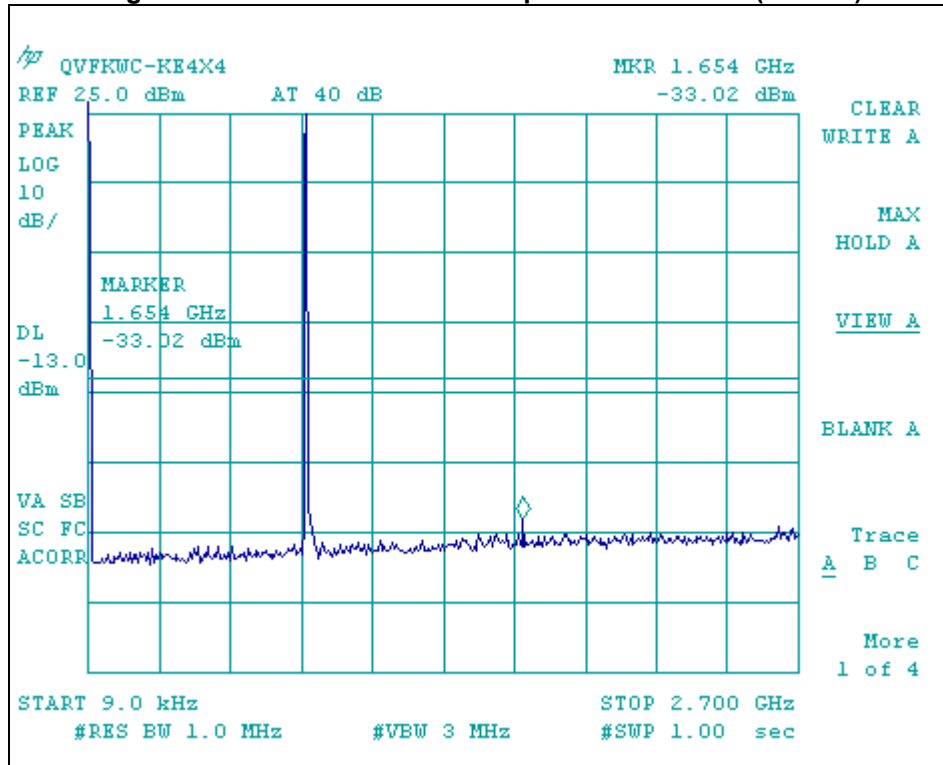


Figure 9-2b AMPS – Conducted Spurious Emission (CH 991)

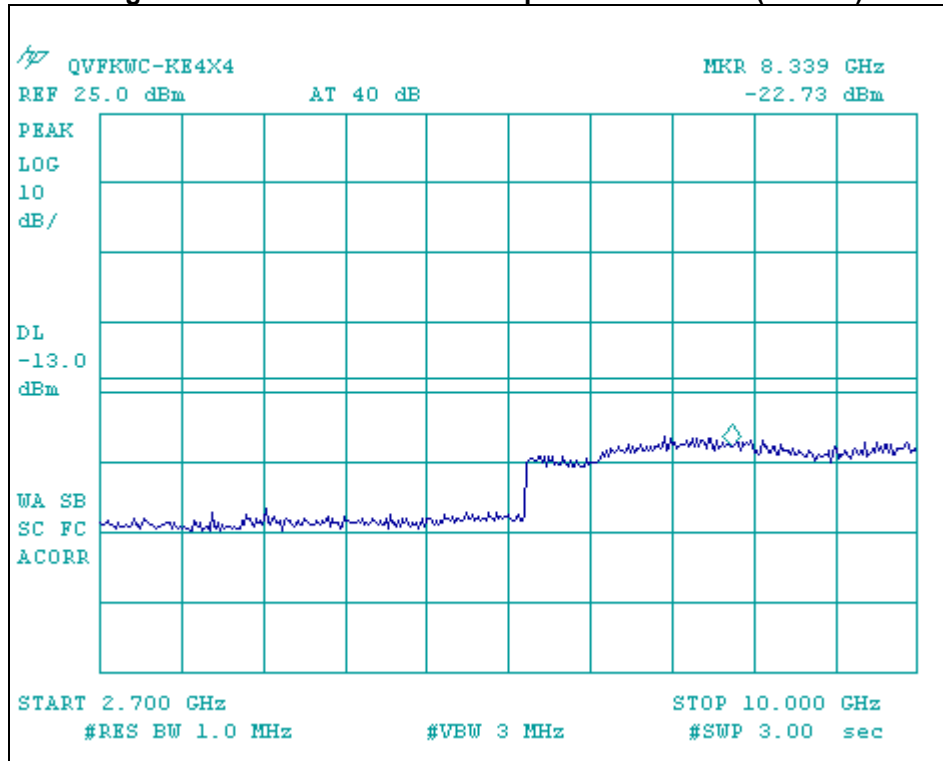


Figure 9-3 AMPS - Emissions in base station frequency range (CH 383)

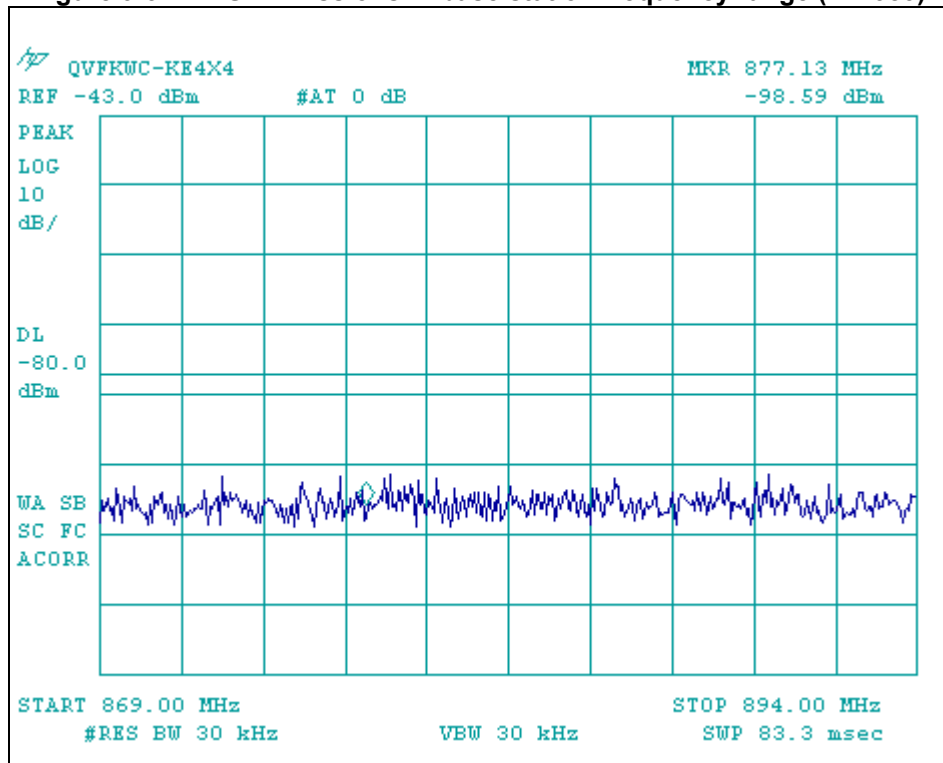


Figure 9-4a AMPS – Conducted Spurious Emission (CH 383)

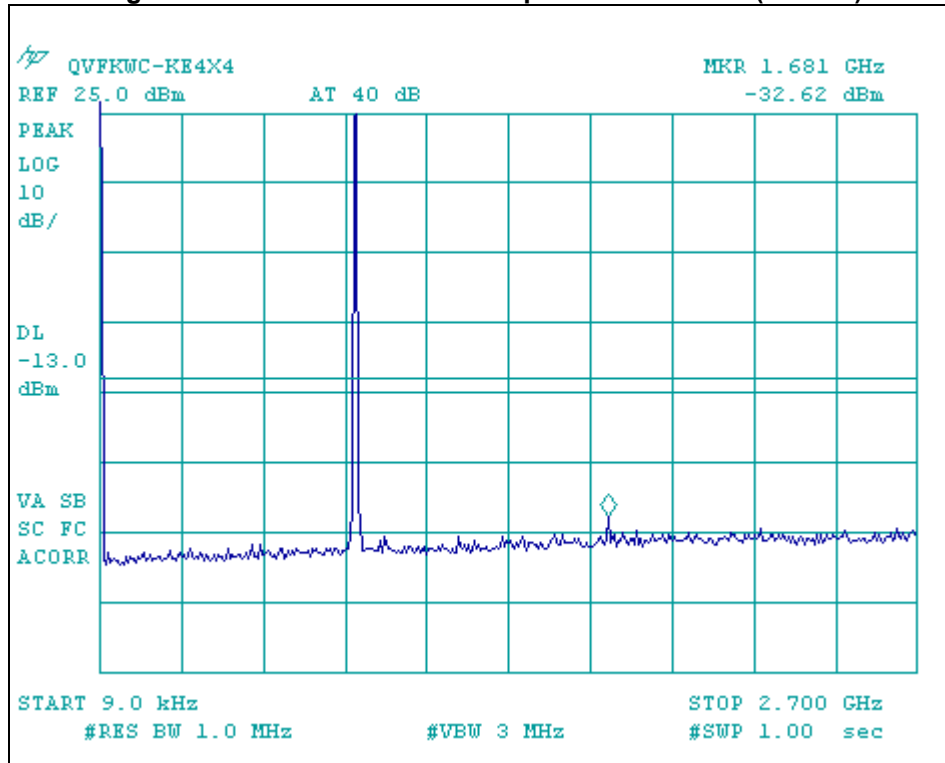


Figure 9-4b AMPS – Conducted Spurious Emission (CH 383)

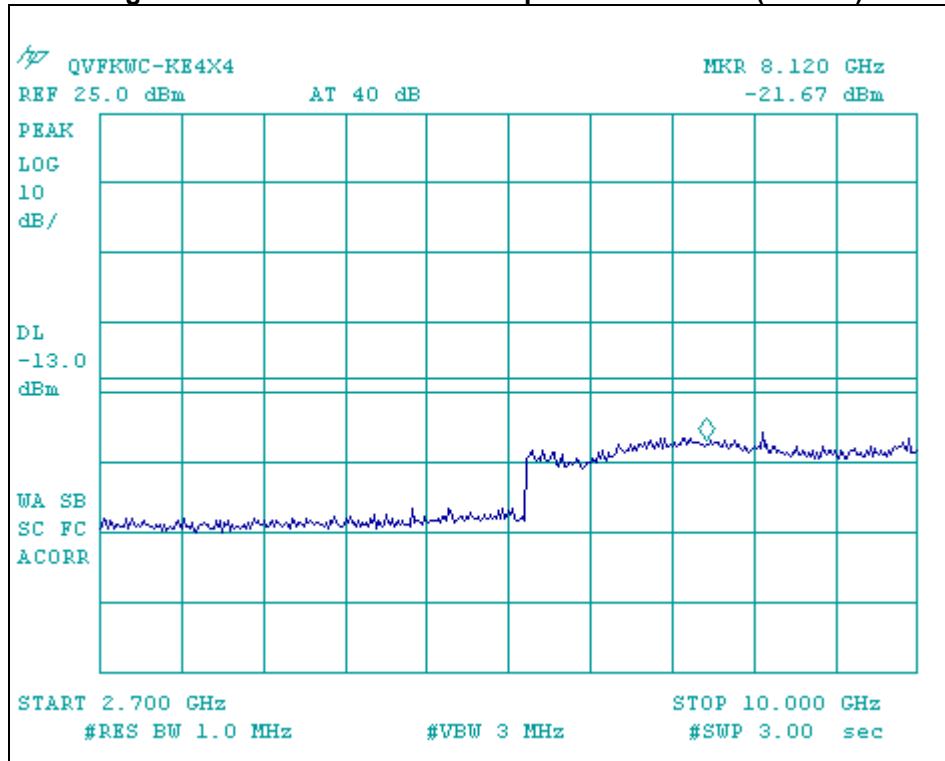


Figure 9-5 AMPS - Emissions in base station frequency range (CH 799)

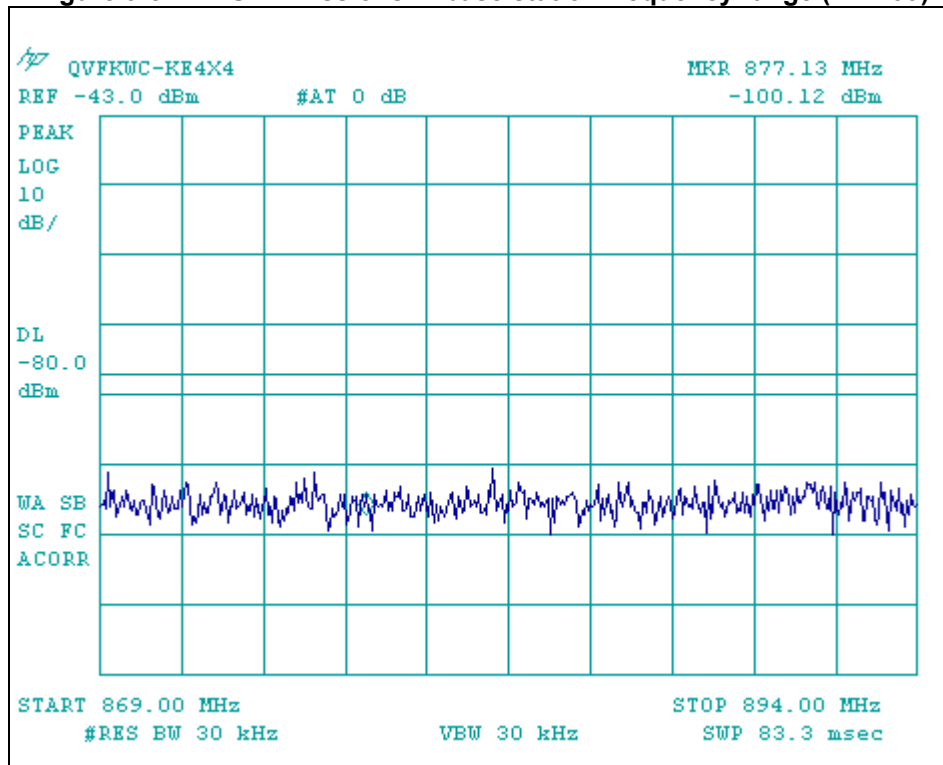


Figure 9-6a AMPS – Conducted Spurious Emission (CH 799)

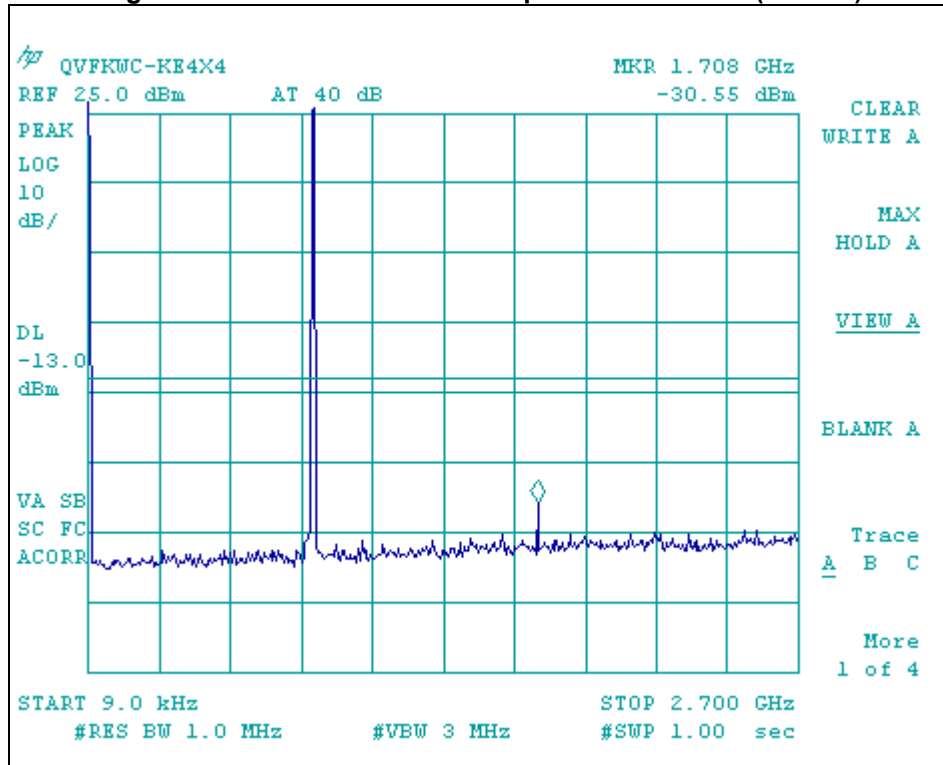


Figure 9-6b AMPS – Conducted Spurious Emission (CH 799)

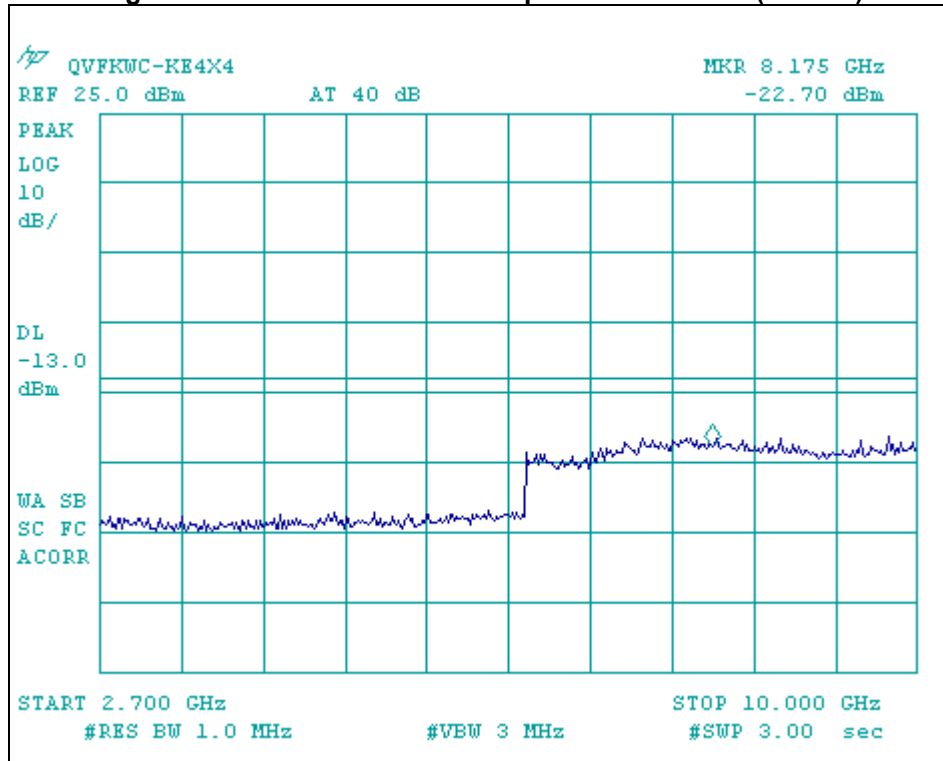


Figure 9-7 CDMA 800 - Emissions in base station frequency range (CH 1013)

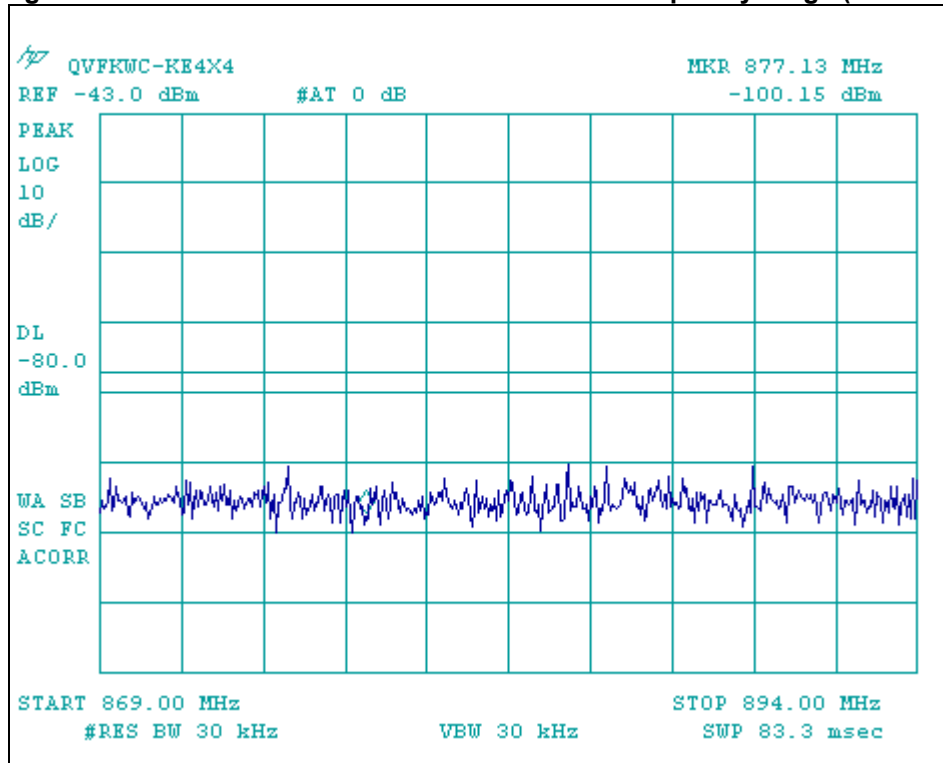


Figure 9-8a CDMA 800 – Conducted Spurious Emission (CH 1013)

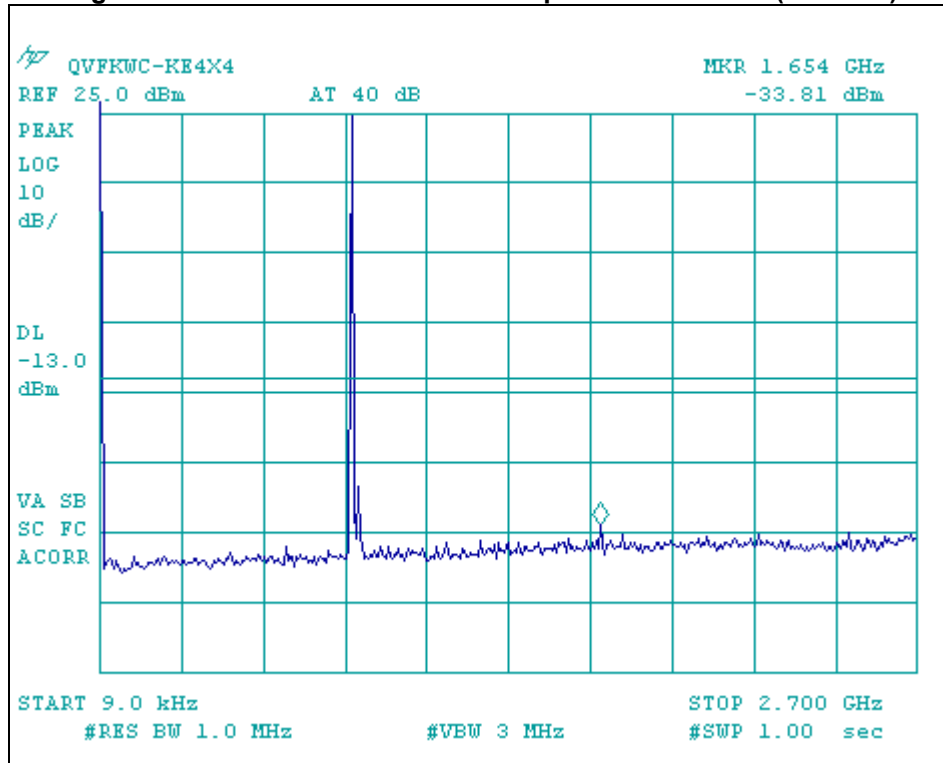


Figure 9-8b CDMA 800 – Conducted Spurious Emission (CH 1013)

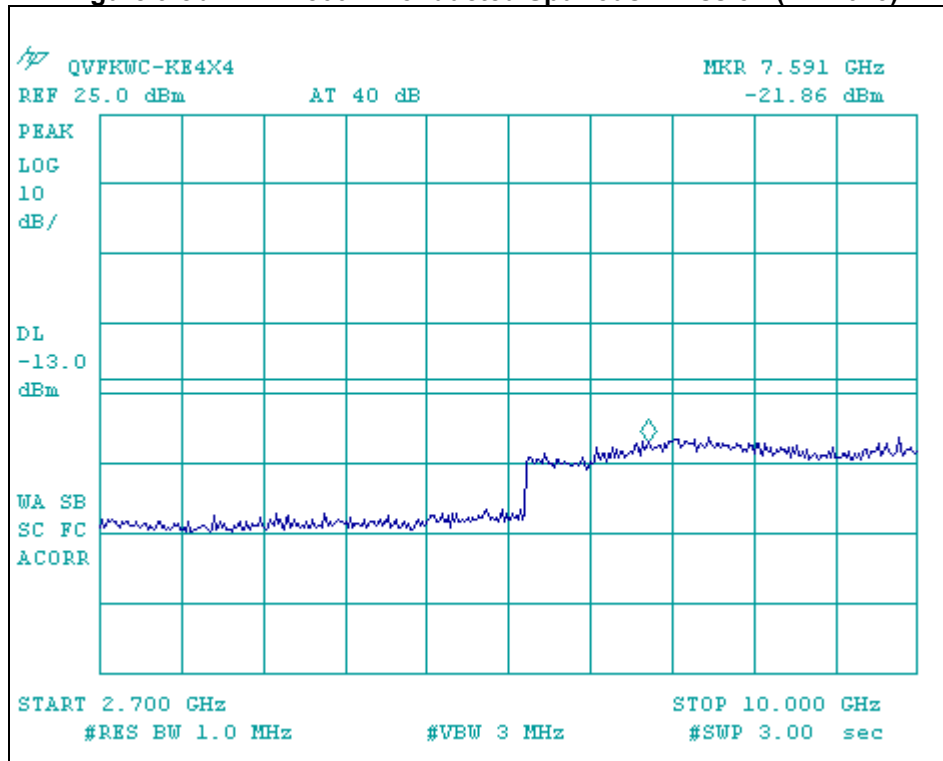


Figure 9-9 CDMA 800 - Emissions in base station frequency range (CH 383)

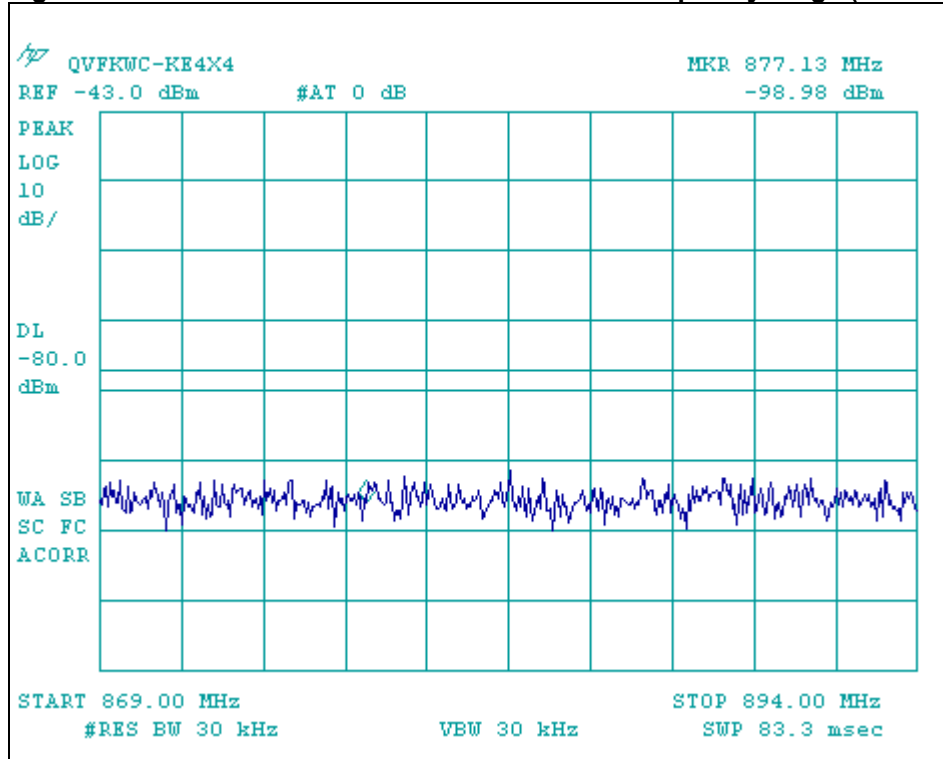


Figure 9-10a CDMA 800 – Conducted Spurious Emission (CH 383)

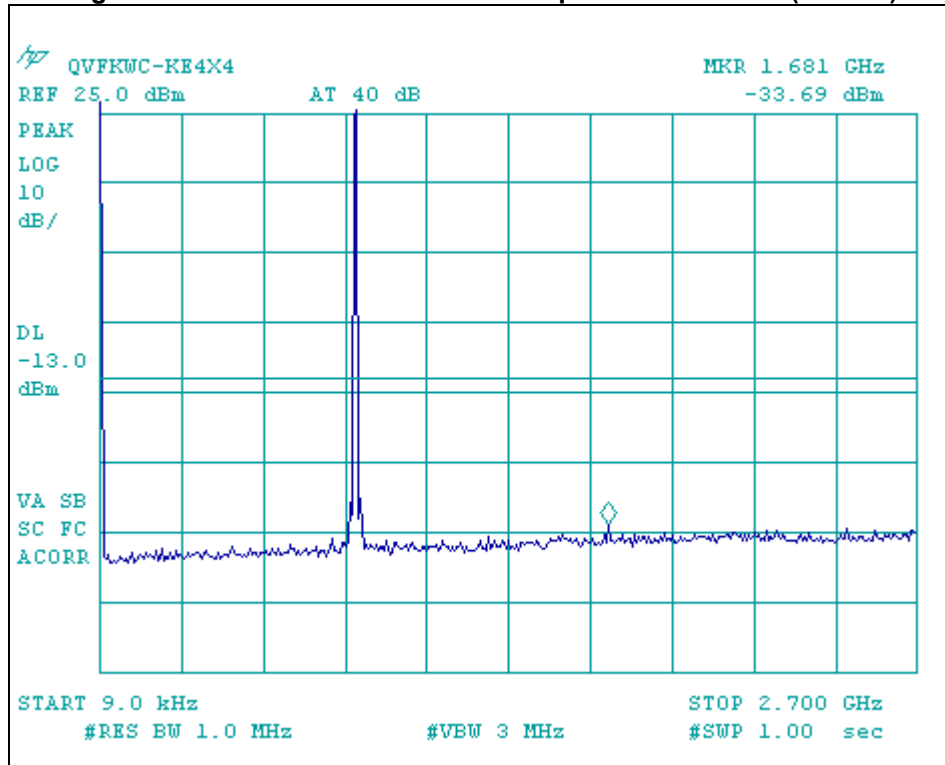


Figure 9-10b CDMA 800 – Conducted Spurious Emission (CH 383)

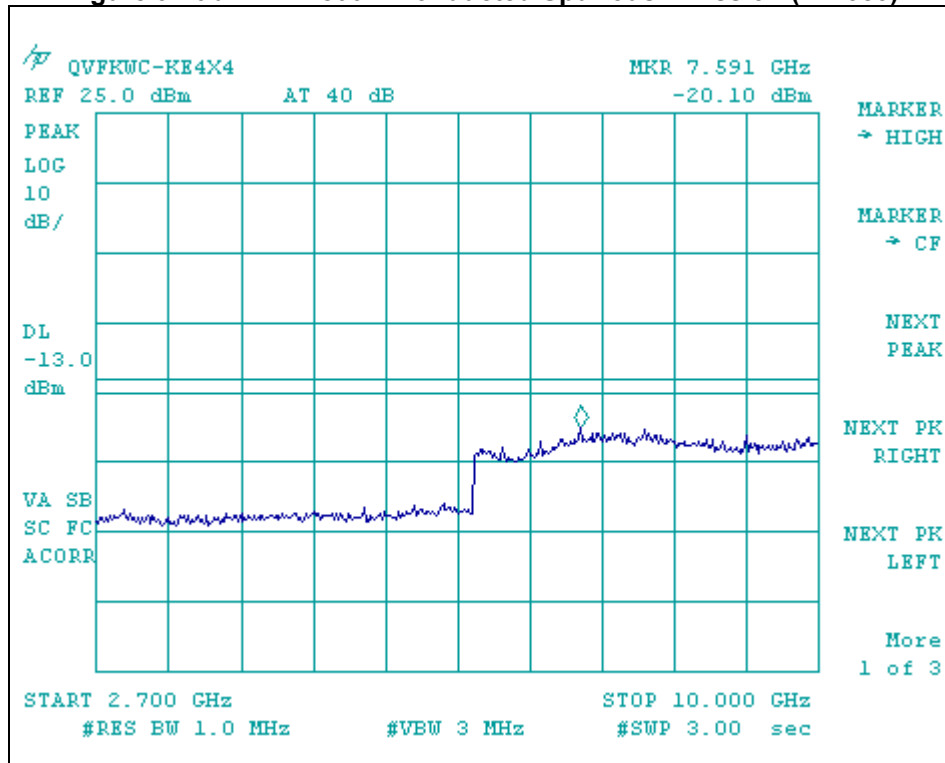


Figure 9-11 CDMA 800 - Emissions in base station frequency range (CH 777)

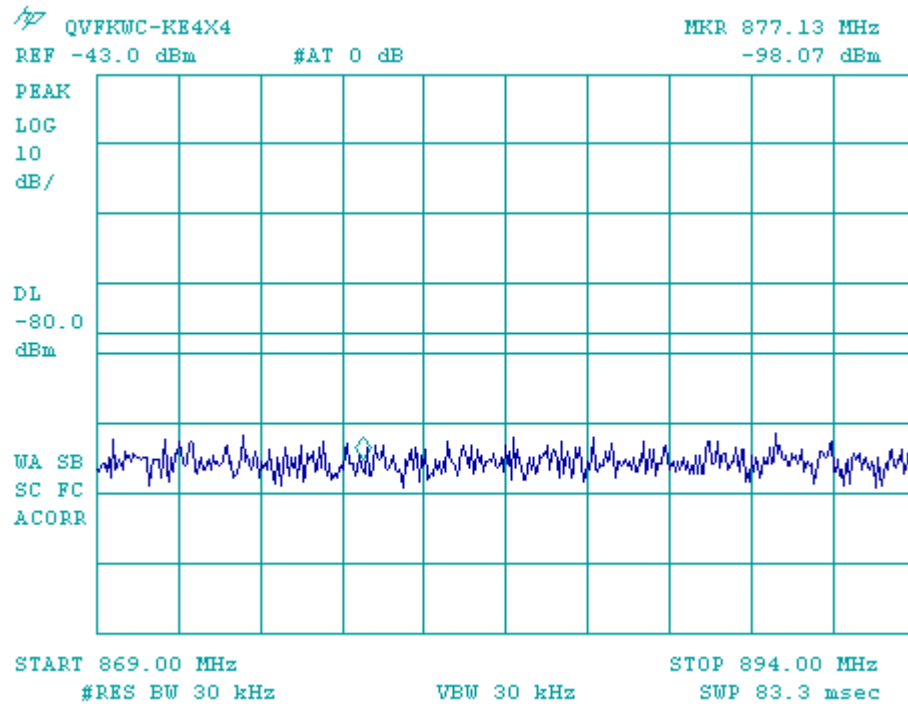


Figure 9-12a CDMA 800 – Conducted Spurious Emission (CH 777)

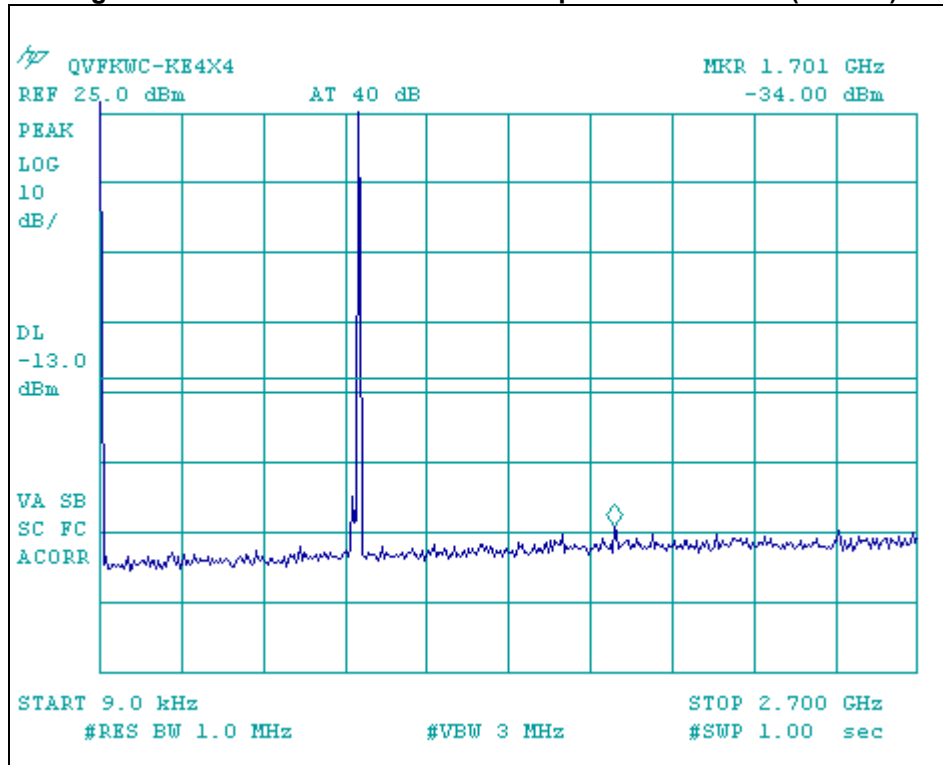


Figure 9-12b CDMA 800 – Conducted Spurious Emission (CH 777)

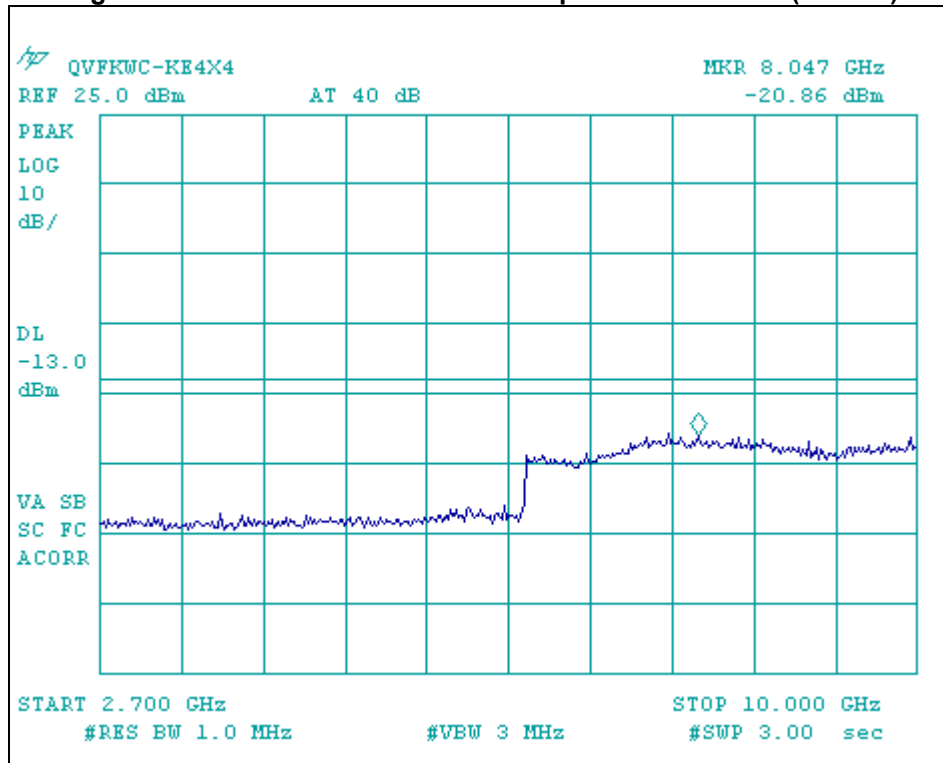


Figure 9-13a CDMA 1900 - Conducted Spurious Emission (CH 25)

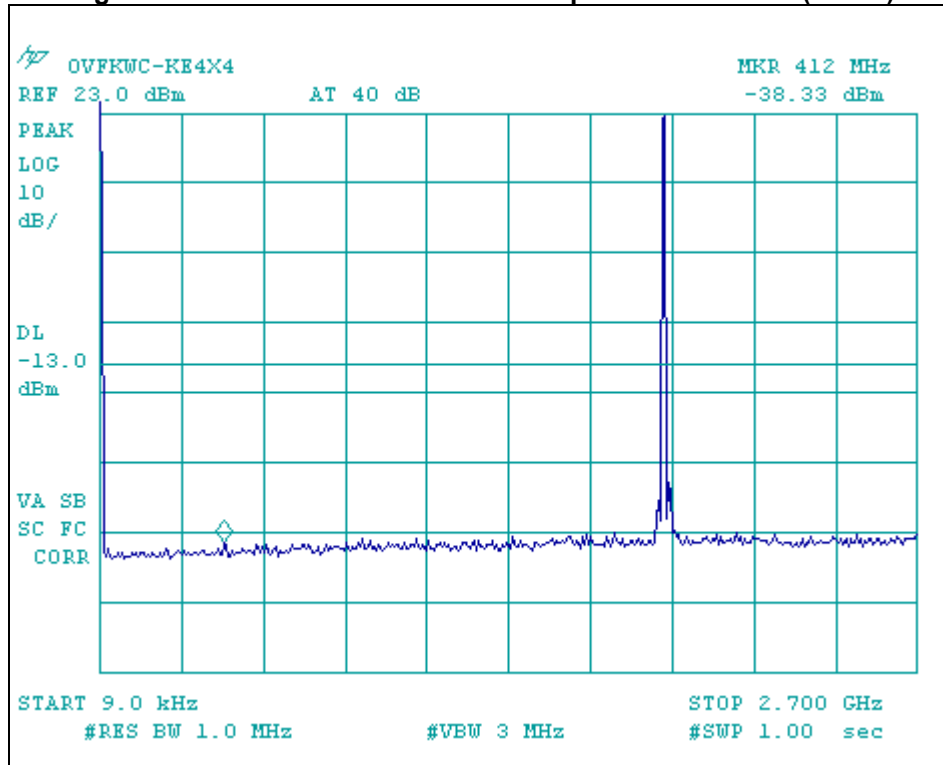


Figure 9-13b CDMA 1900 - Conducted Spurious Emission (CH 25)

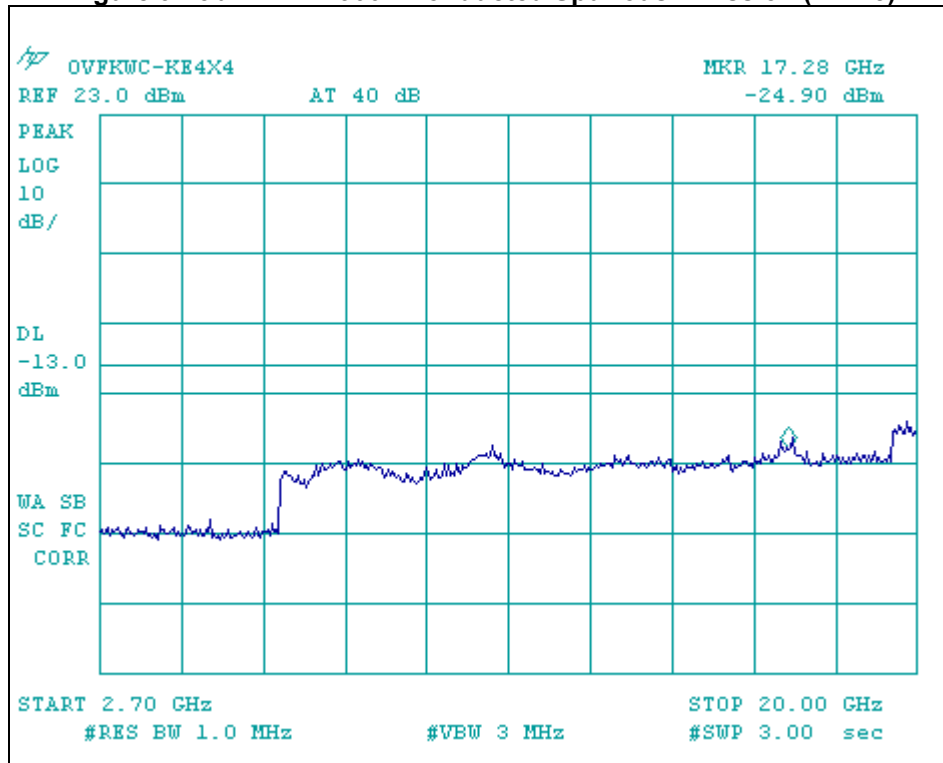


Figure 9-14a CDMA 1900 - Conducted Spurious Emission (CH 600)

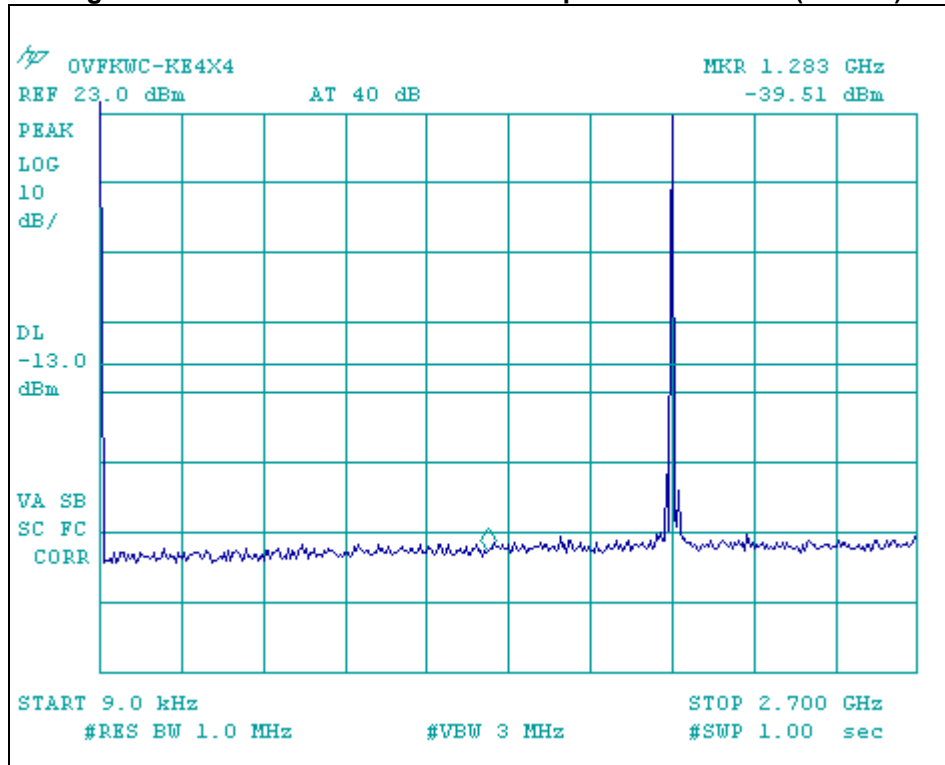


Figure 9-14b CDMA 1900 - Conducted Spurious Emission (CH 600)

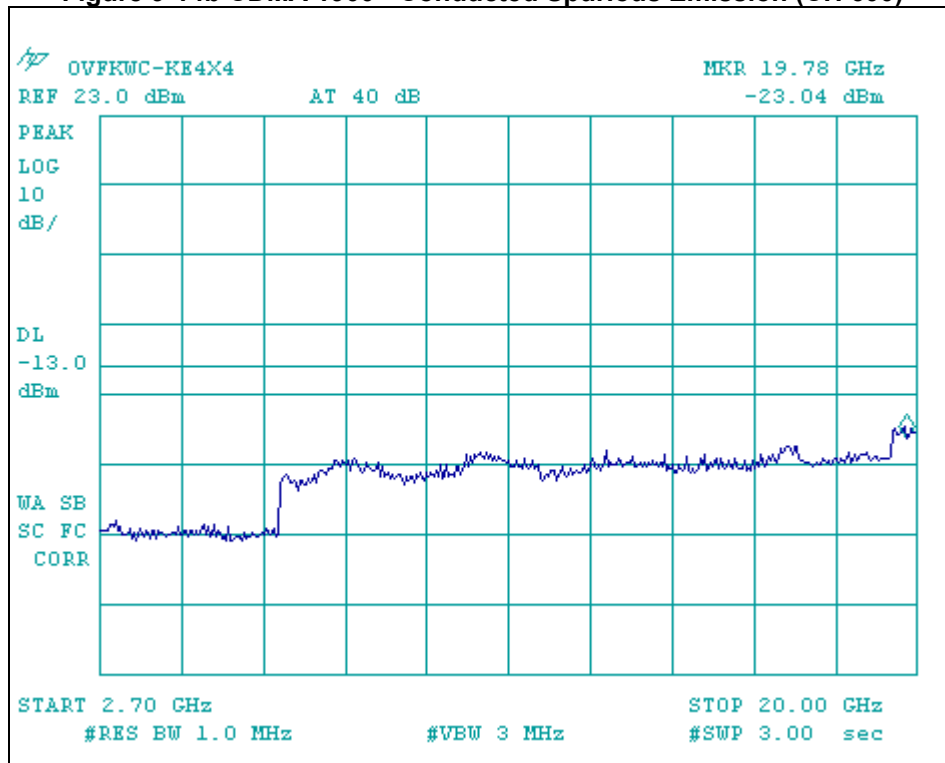


Figure 9-15a CDMA 1900 - Conducted Spurious Emission (CH 1175)

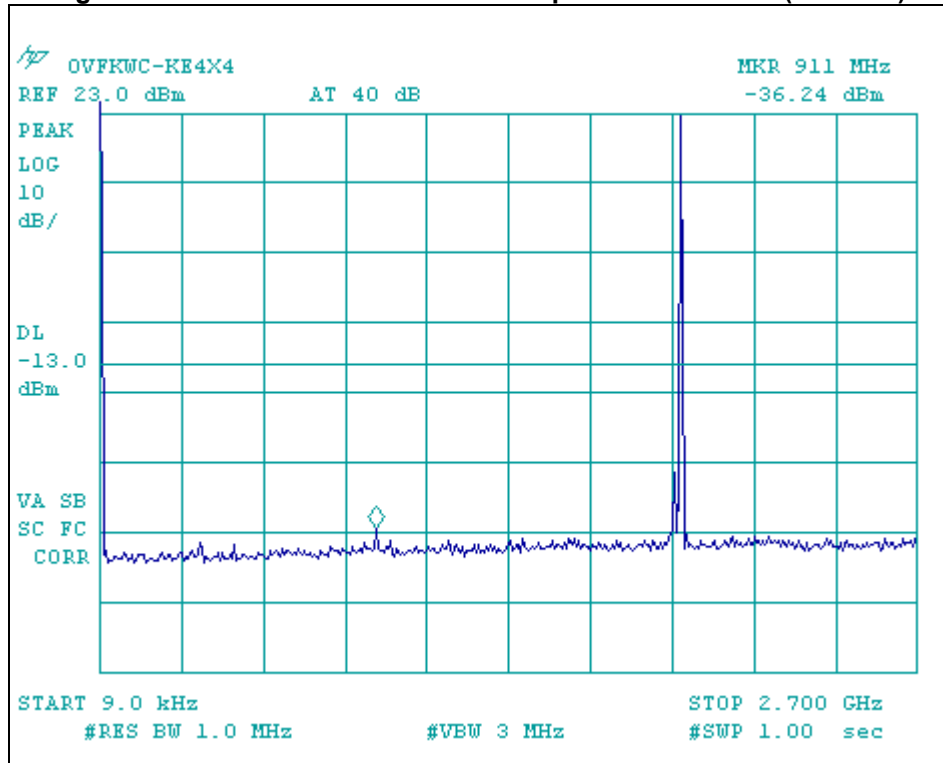
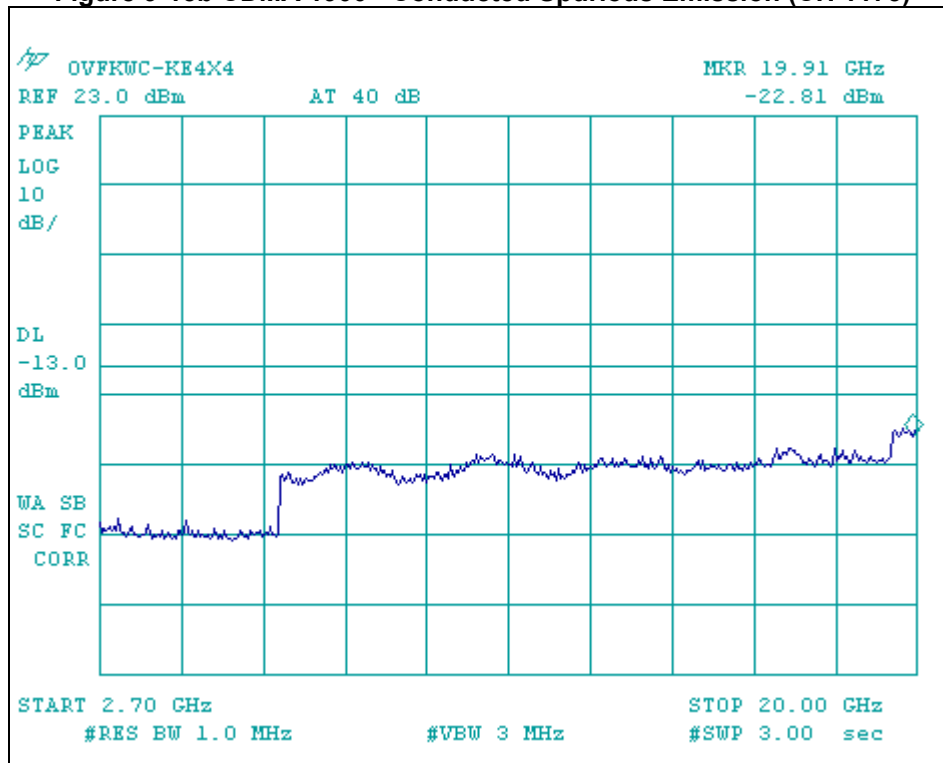


Figure 9-15b CDMA 1900 - Conducted Spurious Emission (CH 1175)



10 Transmitter Radiated Spurious Emissions Measured Data

| | |
|--|---------------------------------------|
| 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. | |

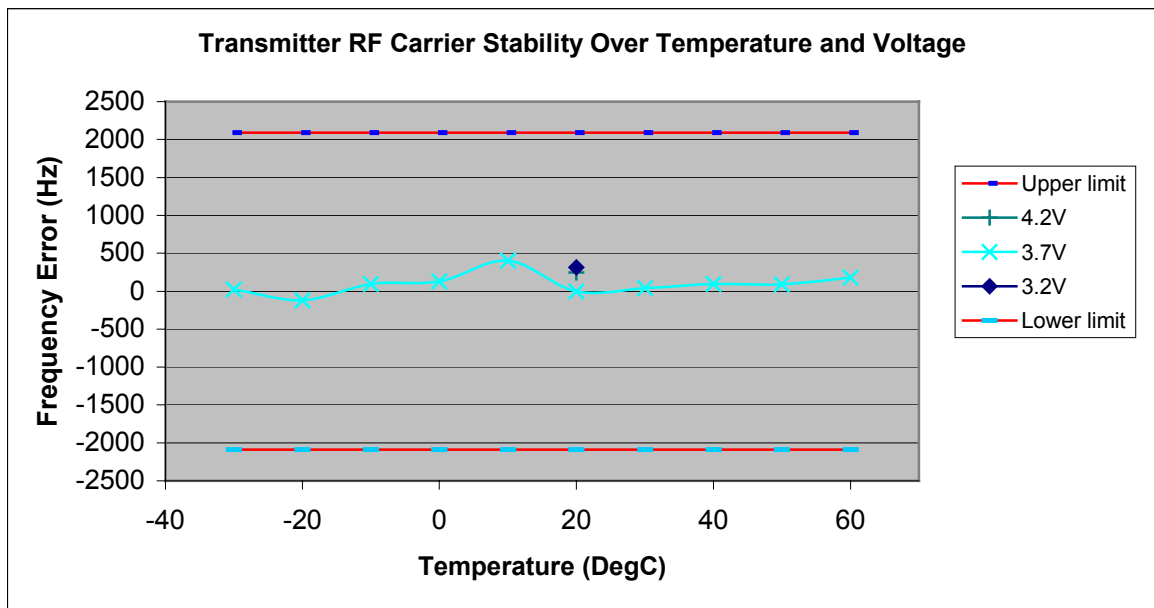
12 Transmitter RF Carrier Frequency Stability

| | |
|---|--|
| 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 Mode

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

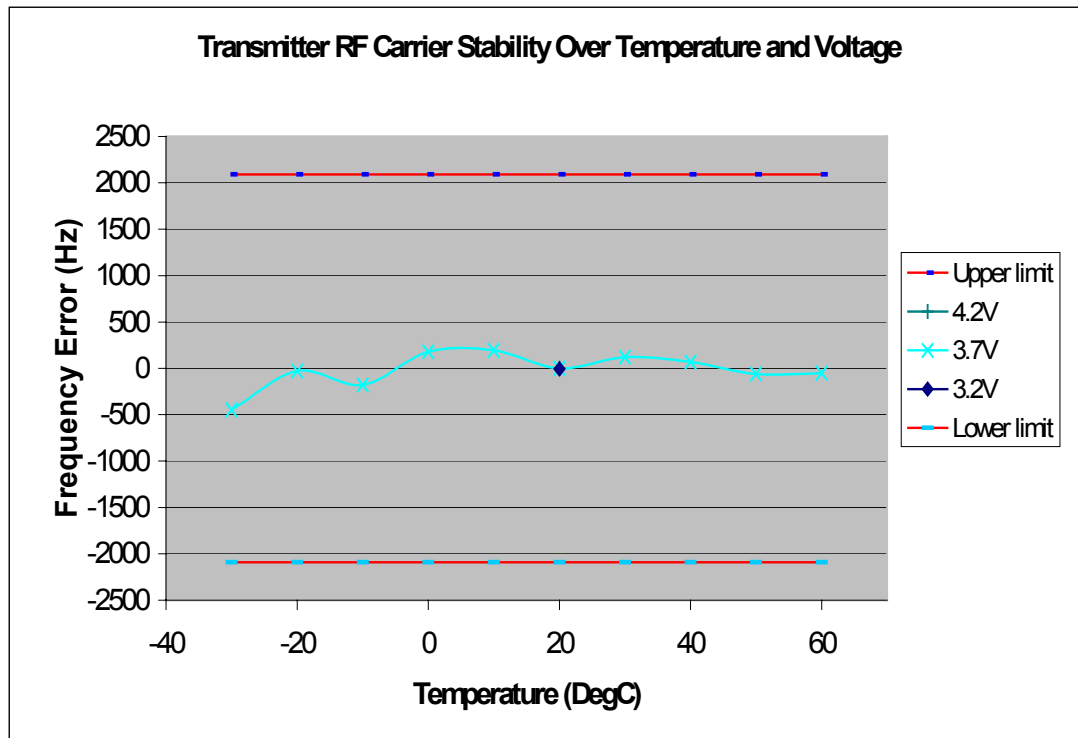
| Temperature (°C) | Deviation of Carrier (Hz) | | | Specification (Hz) | |
|------------------|---------------------------|------|--------------|--------------------|-------------|
| | 3.2V (Battery endpoint) | 3.7V | 4.26V (115%) | Lower limit | Upper limit |
| -30 | 314 | 22 | 247 | -2091 | 2091 |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



12.2 CDMA 800 Mode

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

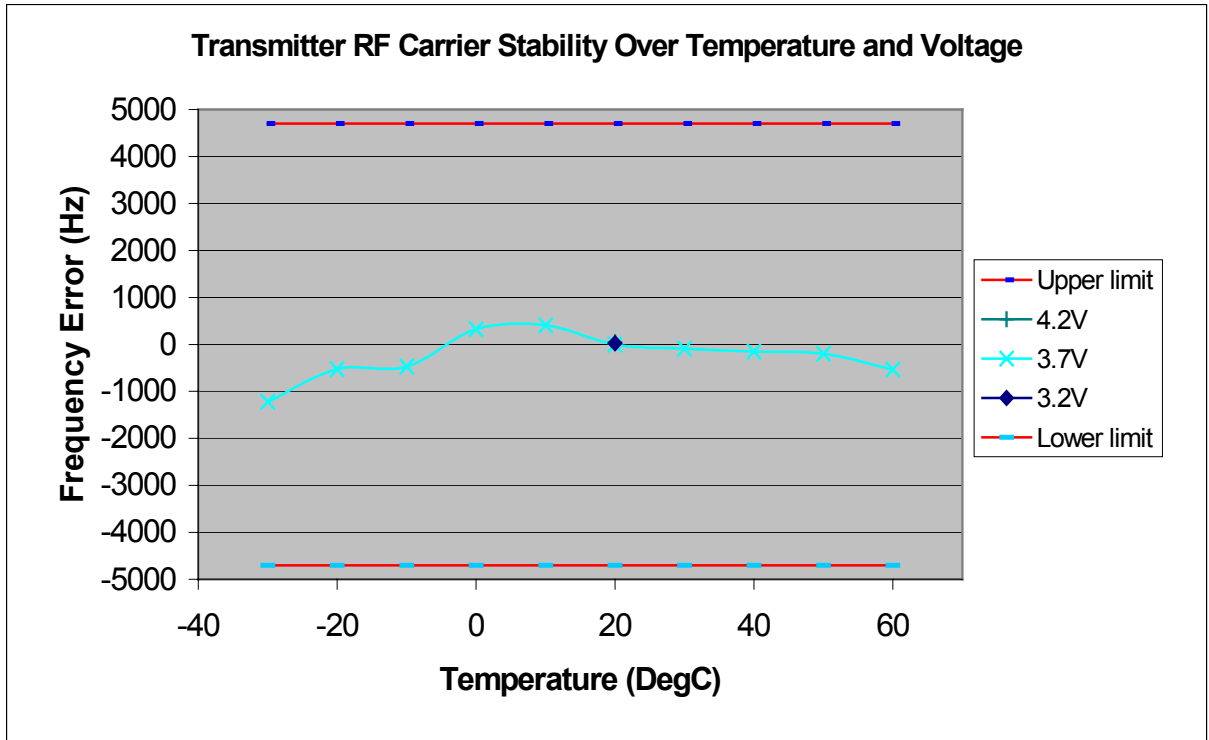
| Temperature (°C) | Deviation of Carrier (Hz) | | | Specification (Hz) | |
|------------------|---------------------------|------|--------------|--------------------|-------------|
| | 3.2V (Battery endpoint) | 3.7V | 4.26V (115%) | Lower limit | Upper limit |
| -30 | | -448 | | -2091 | 2091 |
| -20 | | -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

| | |
|--|-----------------------|
| 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 | | -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 |