

Test Report On
Tri-mode Dual-band AMPS/CDMA Cellular Phone

FCC Part 22 & 24 Certification

FCC ID: **OVFKWC-KX21**

Models: **KX21**

Date: **December 2, 2005**

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.

Date of Test:	November 18, 2005 – November 29, 2005
Test performed by:	Kyocera Wireless Corp. 10300 Campus Point Drive San Diego, Ca 92121
Report Prepared by:	Don Ouk, Regulatory Engineer
Report Reviewed by:	Lin Lu, Principal Engineer
Nemko USA, Inc. performed the tests that required an OATS site.	

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1 General Information

Applicant:	Kyocera Wireless Corp 10300 Campus Point Drive San Diego CA 92121		
FCC ID:	OVFKWC-KX21		
Product:	Tri-Band Quad-mode Cellular Phone with Bluetooth		
Model Numbers:	KX21		
EUT Serial Number:	AP-XDX----1CYY62F, AP-X----1CY640		
Type:	☐ Prototype, ☒ Pre-Production, ☐ Production		
Device Category:	Portable		
RF Exposure Environment:	General Population / Uncontrolled		
Antenna:	External		
Detachable Antenna:	No		
External Input:	Audio/Digital Data		
Quantity:	Quantity production is planned		
FCC Rule Parts:	§22H	§22H	§24E
Modes:	800 AMPS	800 CDMA	1900 CDMA
Multiple Access Scheme:	FDMA	CDMA	CDMA
TX Frequency (MHz):	824 – 849	824 – 849	1850 - 1910
Emission Designators:	40K0F1D 40K0F8W	1M25F9W	1M25F9W
Max. Output Power (W):	0.215 ERP	0.217 ERP	0.553 EIRP

2 Product Description

The OVFKWC-KX21 phones are Tri-mode Dual-Band 1XRTT products. The phones have assisted GPS software feature enabled 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 is designed in compliance with the technical specifications for compatibility of mobile and base stations in the Cellular Radio telephone service contained in "Cellular System Mobile Station -Land Station Compatibility Specification" as specified in OET Bulletin 53 and TIA Standards

As described in Exhibit 1 (operation description), OVFKWC-KX21 can operate in the CDMA mode specified in IS-2000.2 standard, release 0. It can only invoke a Spreading Rate 1 (SR1) operational mode. SR1 is defined as a 1.2288 Mcps chip rate-based system using a direct-spread single carrier, which limits the bandwidth to the same 1.25MHz bandwidth occupied by the legacy IS-95/8-A/B system. Thus, for SR1 in IS-2000, the frequency response is identical to the legacy IS-95 B system standard.

For Part 22 and 24, all of CDMA measurements were conducted with Agilent 8960 as a base station simulator. The base station simulator establishes a CDMA link with the test device. The CDMA link was configured via 8960 for all of measurements as follows:

Radio Configuration: RC1

Service Options: SO2

Code domain channels: R-FCH + R-PICH

Cell Power: -100 dBm/1.23MHz to -103 dBm/1.23MHz

Data Rate: full rate



3 Electronic Serial Numbers (ESN) Protection

The Tri-mode Phone, FCC ID: OVFKWC-KX21 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 models that contain the letter "L" have Global Positioning System (GPS) support.

5 TTY compliance

FCC § 255 of the Telecom Act
The OVFKWC-KX21 phone models 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. Terminated to a resistive coaxial load of 50 ohms.	

Mode	Frequency (MHz)	Channel	Power (dBm)
AMPS	824.04	991	24.96
	836.49	383	25.05
	848.97	799	24.99
CDMA 800	824.70	1013	24.97
	836.52	384	24.97
	848.31	777	25.03
CDMA 1900	1851.25	25	23.43
	1880.00	600	23.50
	1908.75	1175	23.50

6.2 Radiated Power

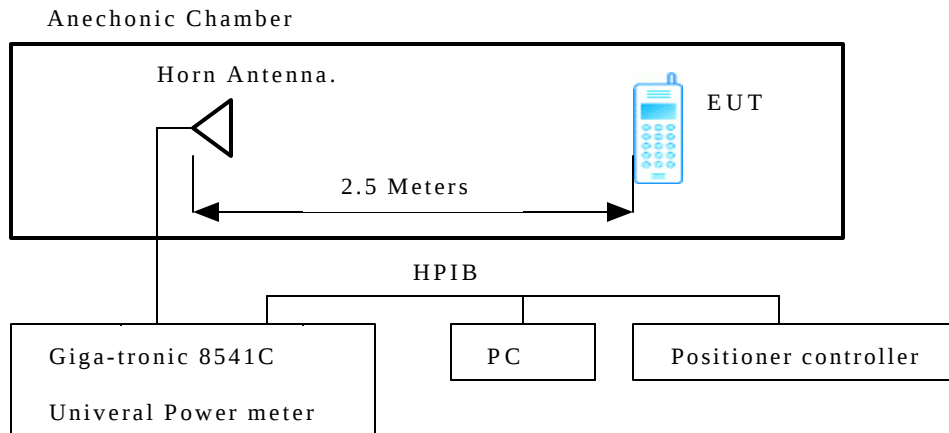
FCC: § 22.913, § 24.232

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

Measurement Procedures:

The EUT (SN: AP-X---1CY63V) was positioned on a 2-axis non-conductive positioner inside an anechoic chamber.

The phone control software set the EUT conducted power. 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.
AMPS	824.04	991	21.66	ERP
	836.49	383	23.32	
	848.97	799	23.31	
CDMA 800	824.70	1013	21.88	ERP
	836.52	384	23.17	
	848.31	777	23.37	
CDMA 1900	1851.25	25	25.85	EIRP
	1880.00	600	25.46	
	1908.75	1175	27.43	

7 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. <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. <u>For Digital:</u> Modulate with full rate.			

List of Figures

Figure	Mode	Description
7-1	AMPS	Un-modulated signal
7-2		SAT
7-3		Voice + SAT
7-4		ST
7-5		SAT+ST
7-6		SAT + DTMF_9
7-7		10kb Wideband Data
7-8	CDMA 800	CDMA @ Ch383
7-9	CDMA 1900	CDMA @ CH600
7-10		Lower Band Edge @ CH 25
7-11		Upper Band Edge @ CH 1175

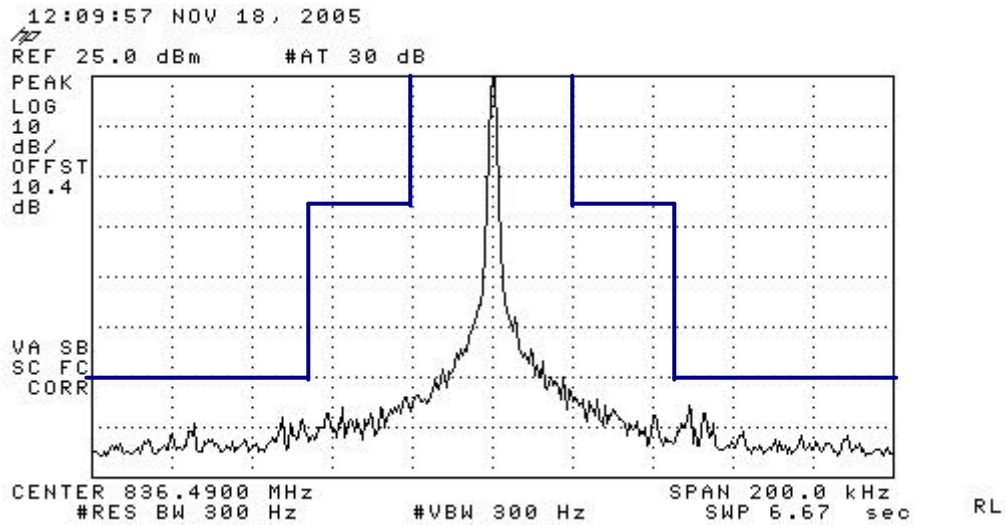


Figure 7-1 AMPS Unmodulated Signal

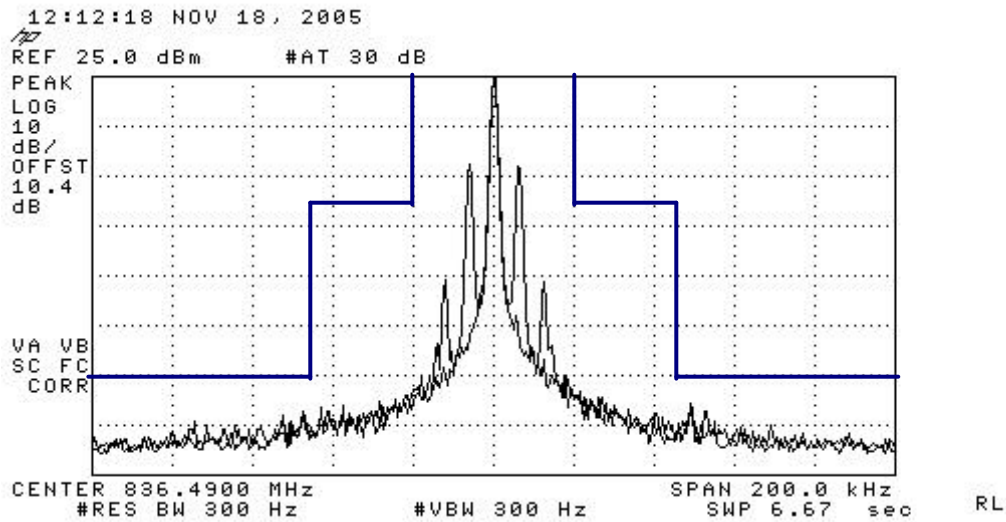


Figure 7-2 AMPS SAT

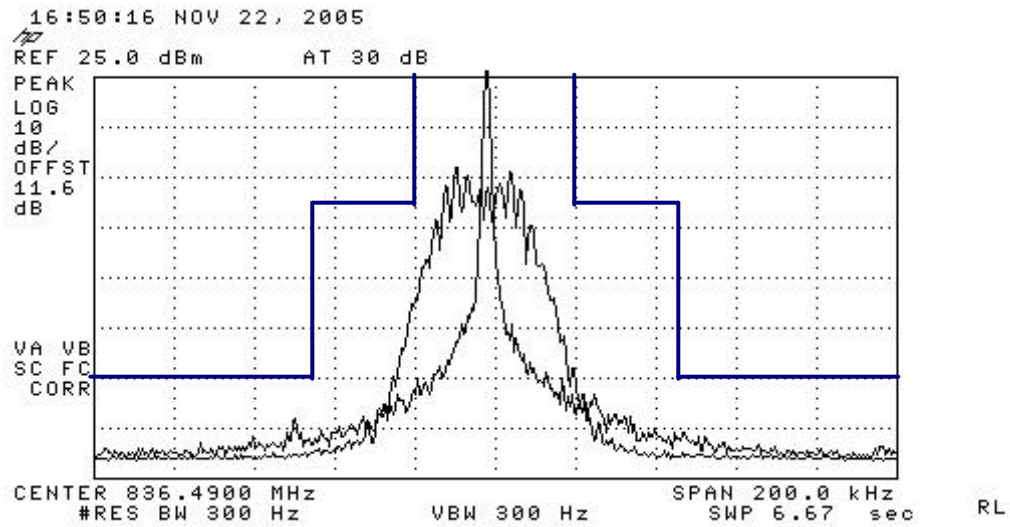


Figure 7-3 AMPS Voice + SAT

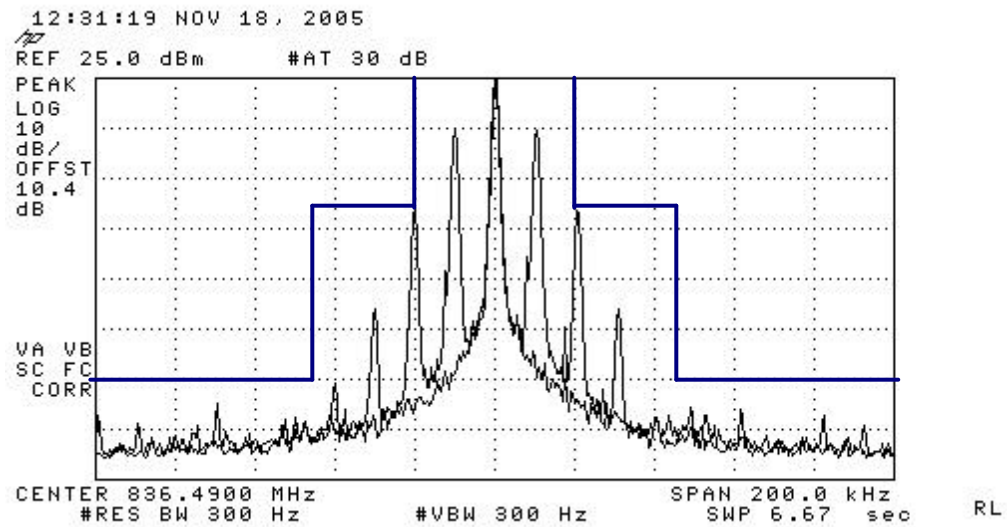


Figure 7-4 AMPS ST

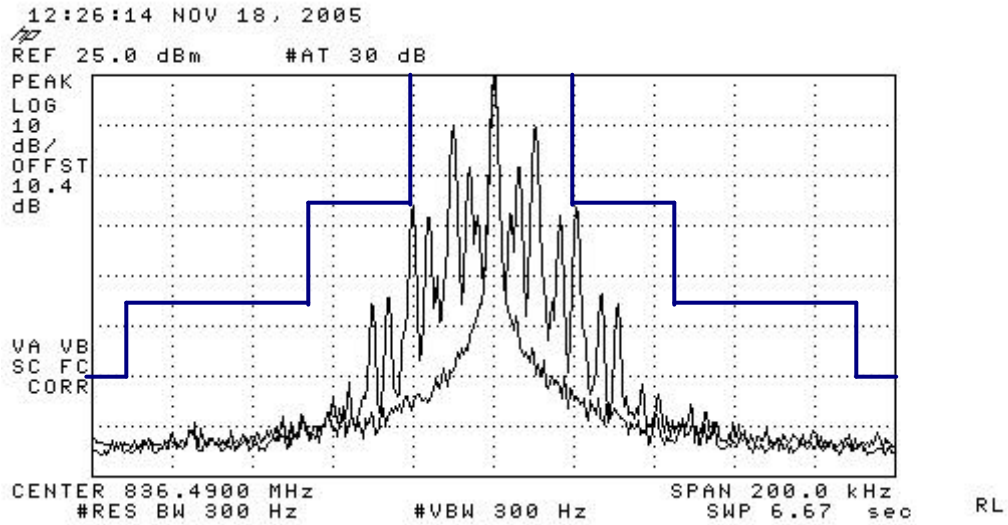


Figure 7-5 AMPS ST + SAT

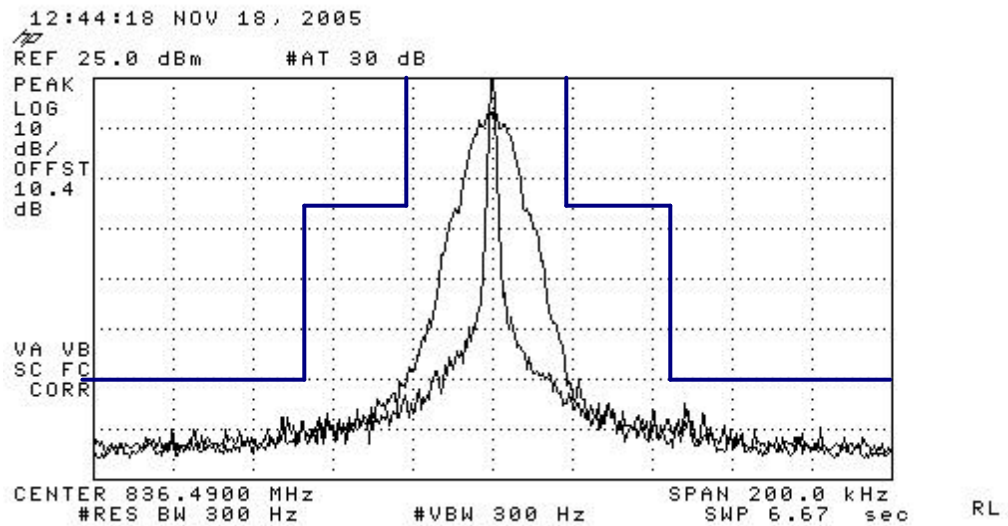


Figure 7-6 SAT + DTMF_9

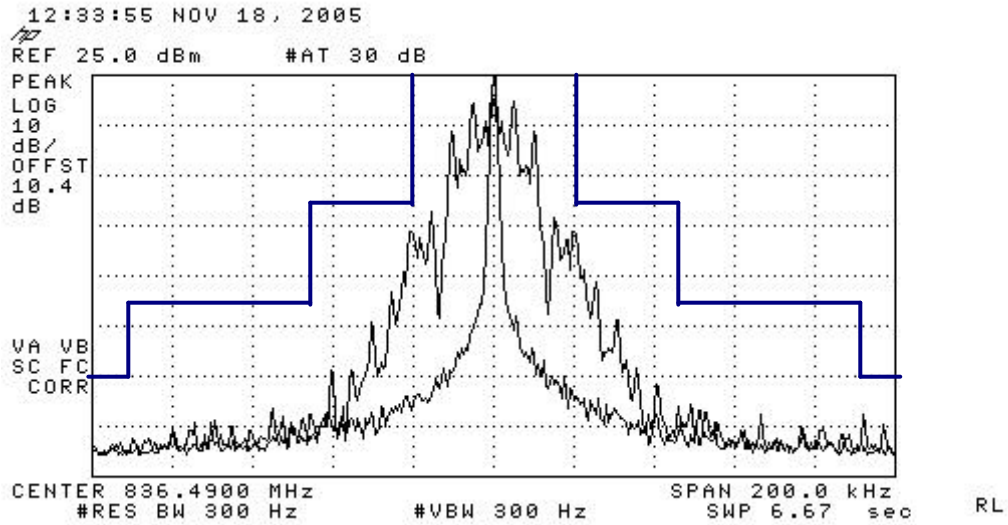


Figure 7-7 AMPS WIDEBAND

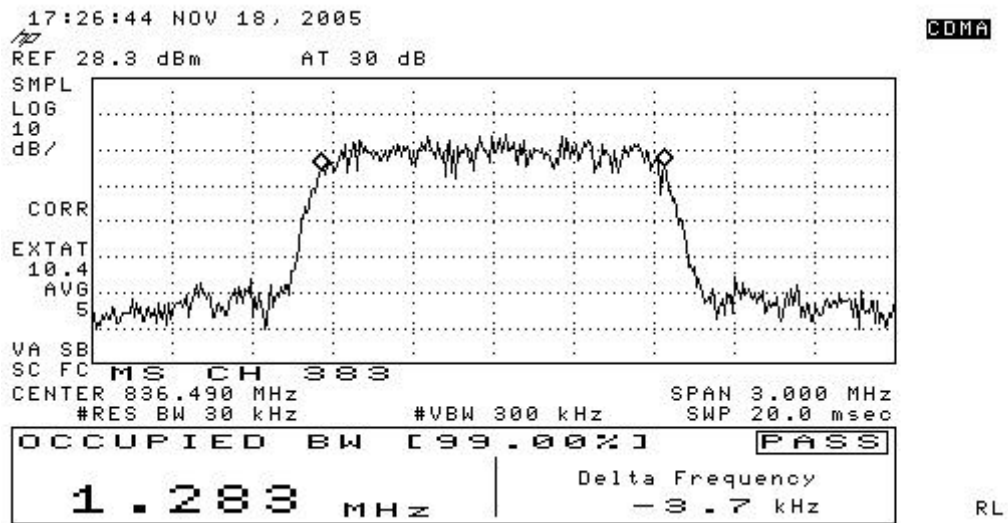


Figure 7-8 CDMA 800 @ CH 383

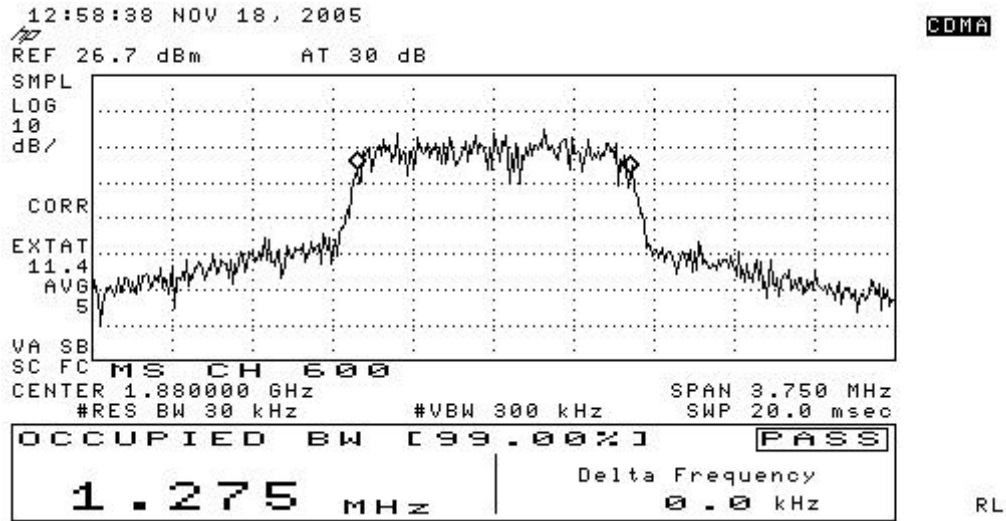


Figure 7-9 CDMA 1900 @ CH 600

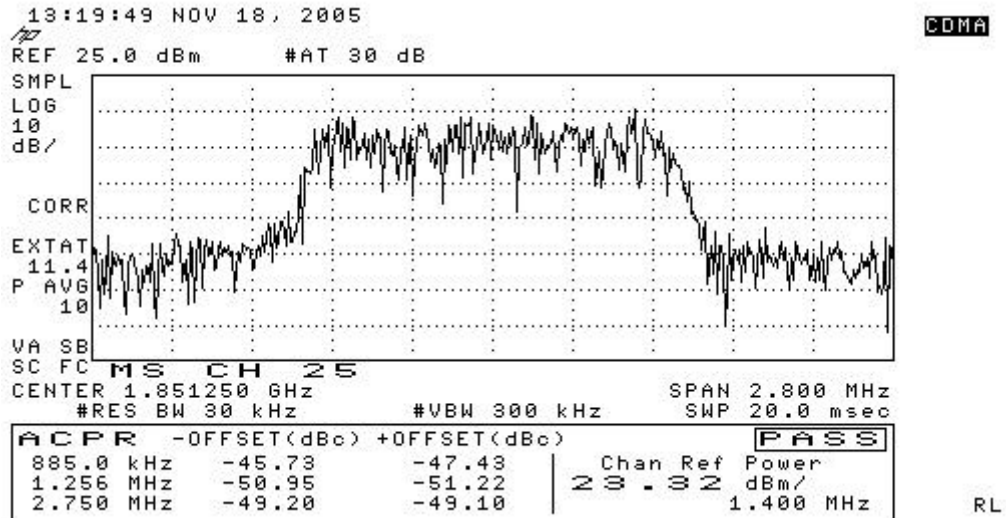


Figure 7-10 CDMA 1900 Lower Band Edge

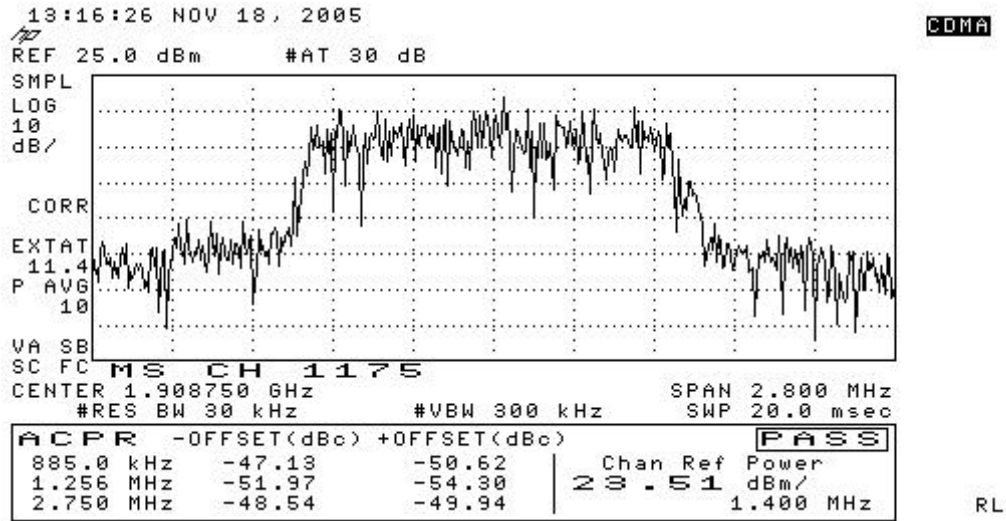


Figure 7-11 CDMA 1900 Upper Band Edge

8 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: <u>Out of Band:</u> The RF output of the EUT was connected to the input of the spectrum analyzer with sufficient attenuation. The modulating signal was applied accordingly. The frequency spectrum was investigated from the lowest frequency signal generated up to at least the tenth harmonic of the fundamental. <u>Base Band:</u> Spectrum was investigated from 869-894 MHz for Cellular.			

List of Figures:

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

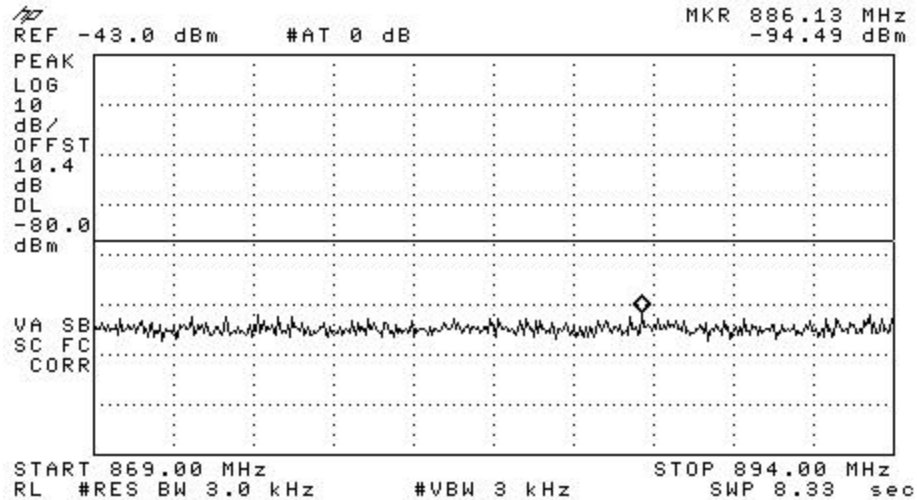


Figure 8-1 AMPS - Emissions in base station frequency range (CH 991)

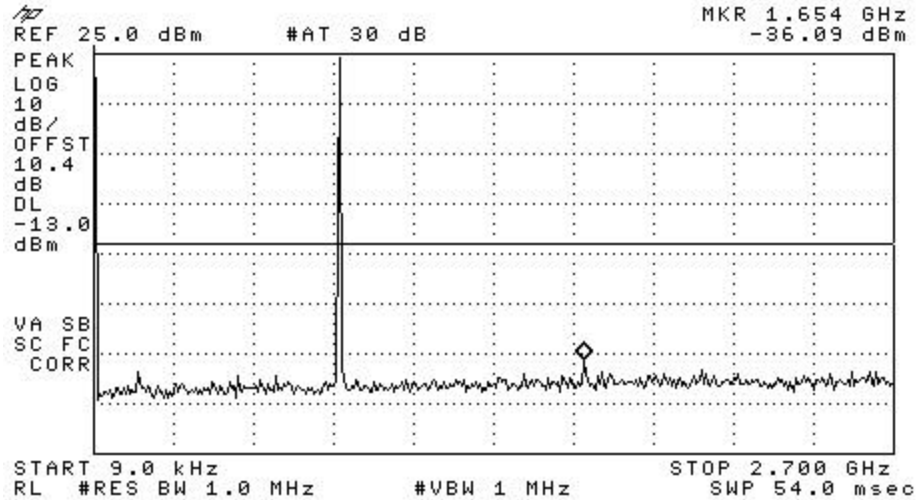


Figure 8-2a AMPS – Conducted Spurious Emission (CH 991)

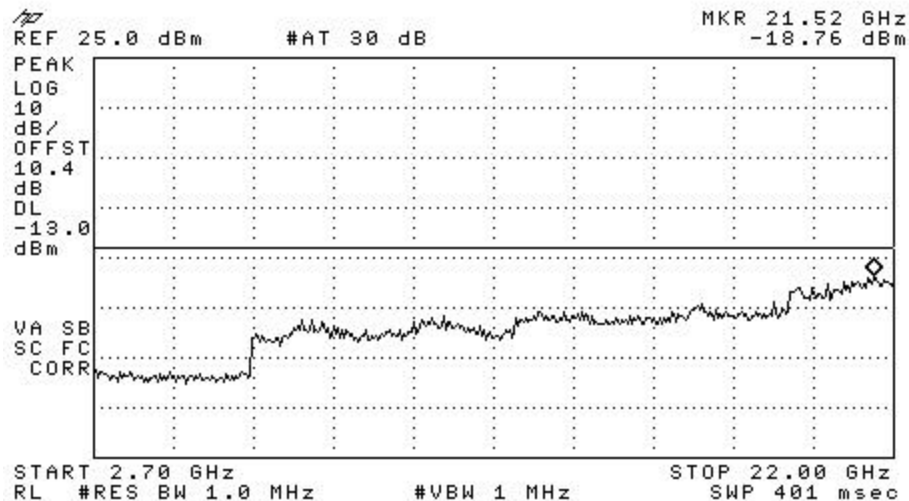


Figure 8-2b AMPS – Conducted Spurious Emission (CH 991)

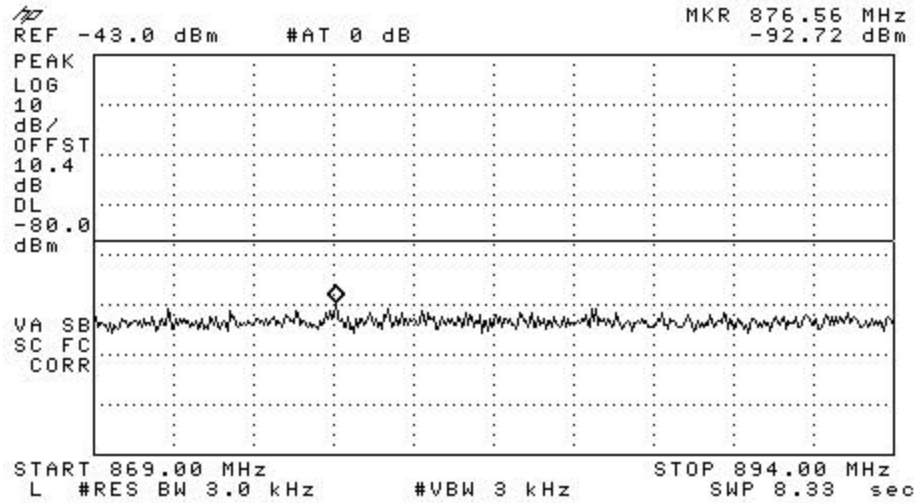


Figure 8-3 AMPS - Emissions in base station frequency range (CH 383)

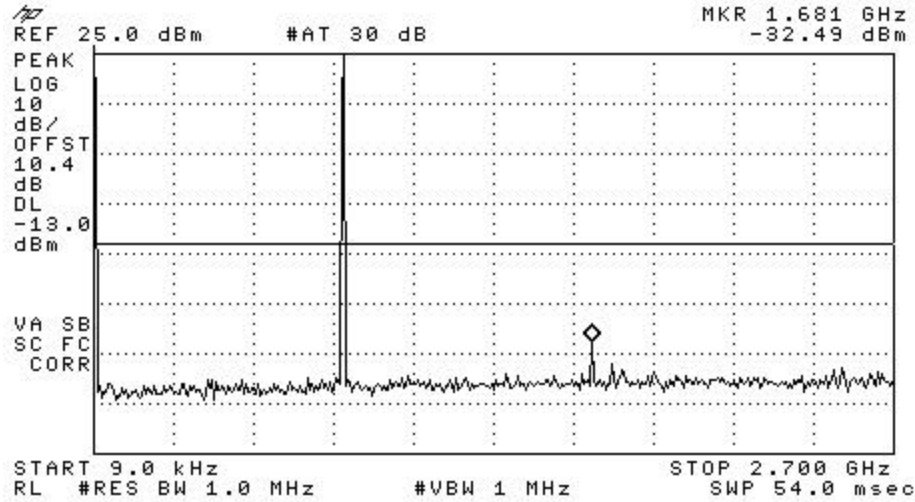


Figure 8-4a AMPS – Conducted Spurious Emission (CH 383)

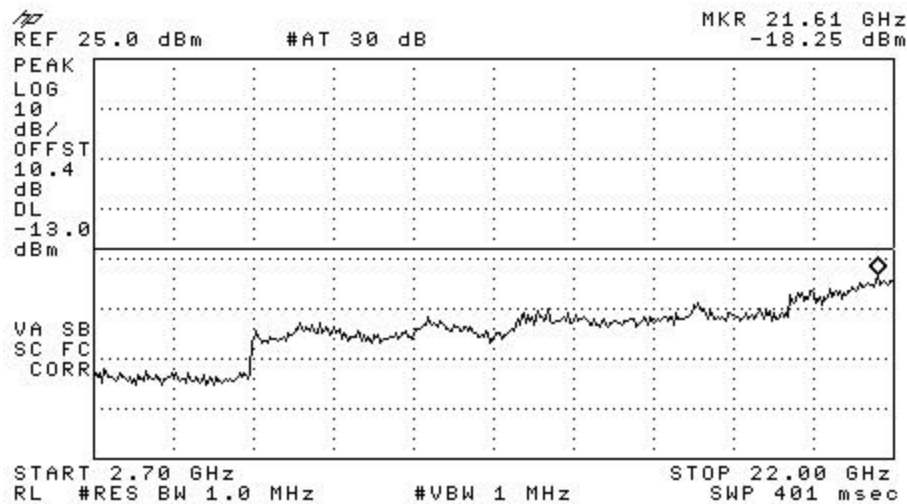


Figure 8-4b AMPS – Conducted Spurious Emission (CH 383)

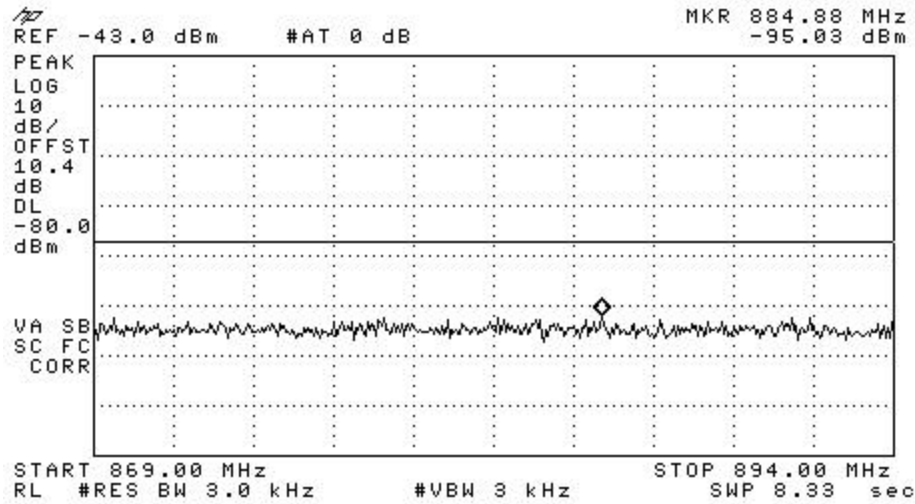


Figure 8-5 AMPS - Emissions in base station frequency range (CH 799)

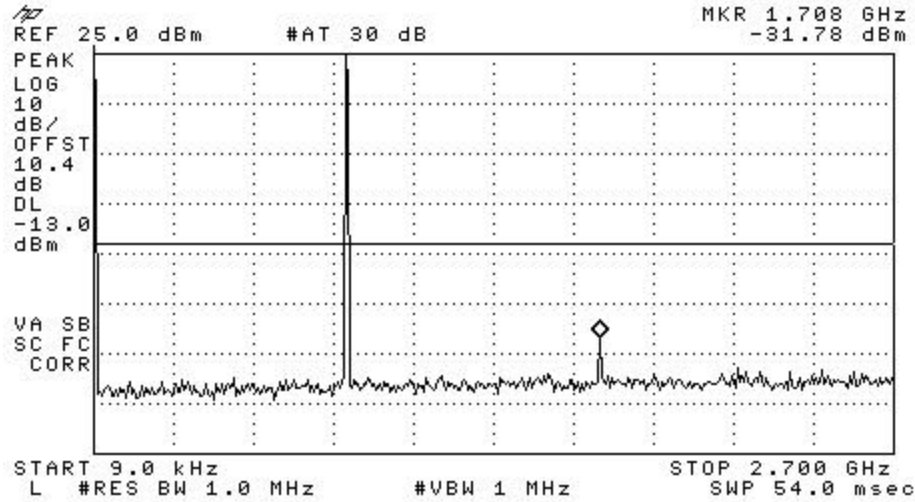


Figure 8-6a AMPS – Conducted Spurious Emission (CH 799)

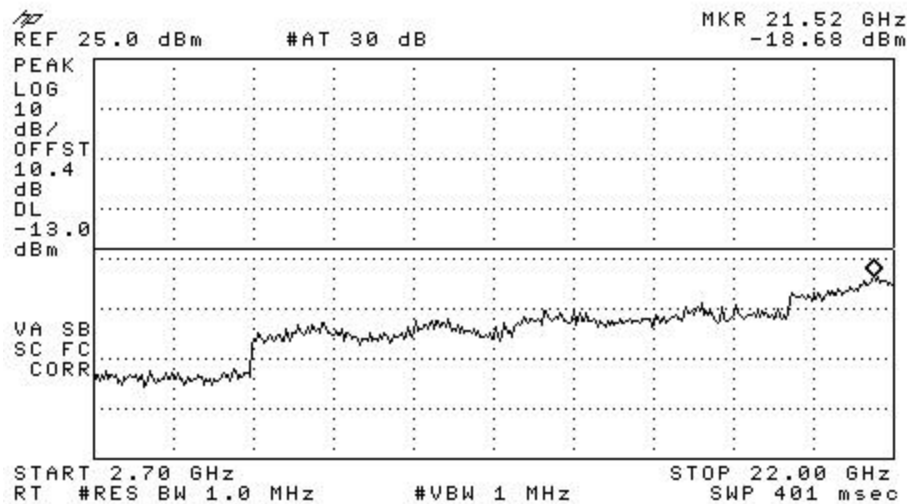


Figure 8-6b AMPS – Conducted Spurious Emission (CH 799)

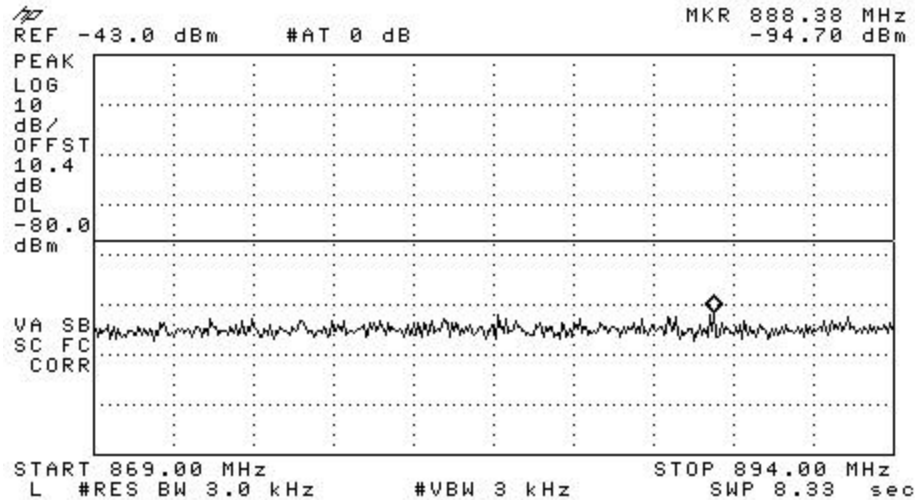


Figure 8-7 CDMA 800 - Emissions in base station frequency range (CH 1013)

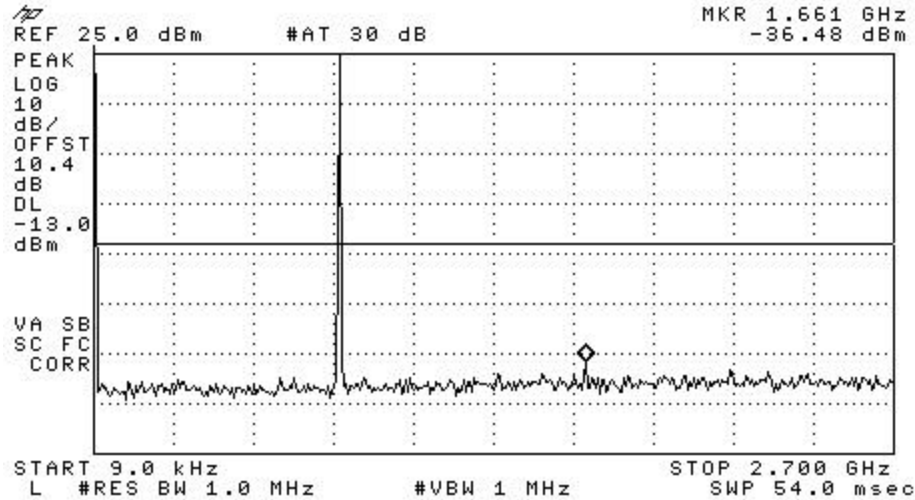


Figure 8-8a CDMA 800 – Conducted Spurious Emission (CH 1013)

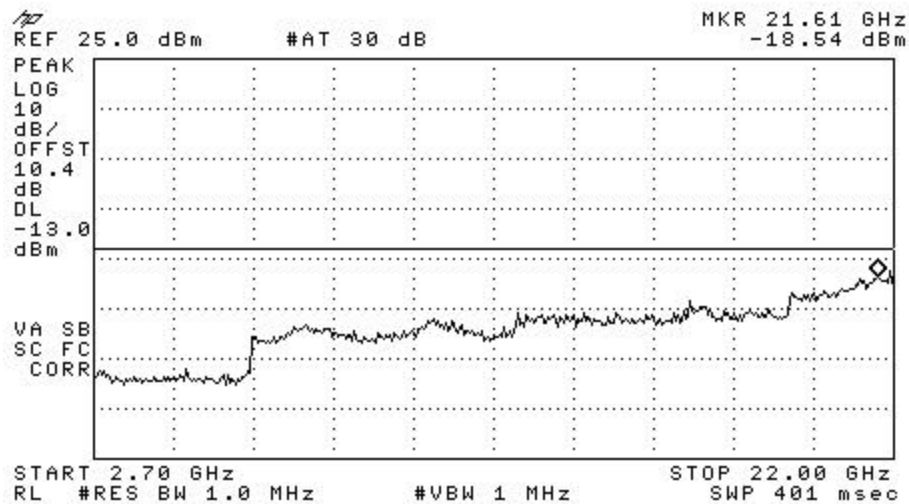


Figure 8-8b CDMA 800 – Conducted Spurious Emission (CH 1013)

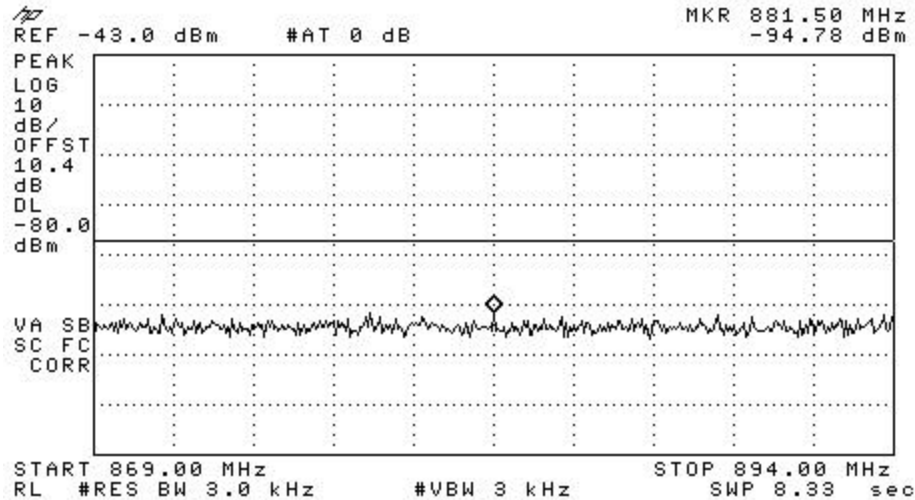


Figure 8-9 CDMA 800 - Emissions in base station frequency range (CH 383)

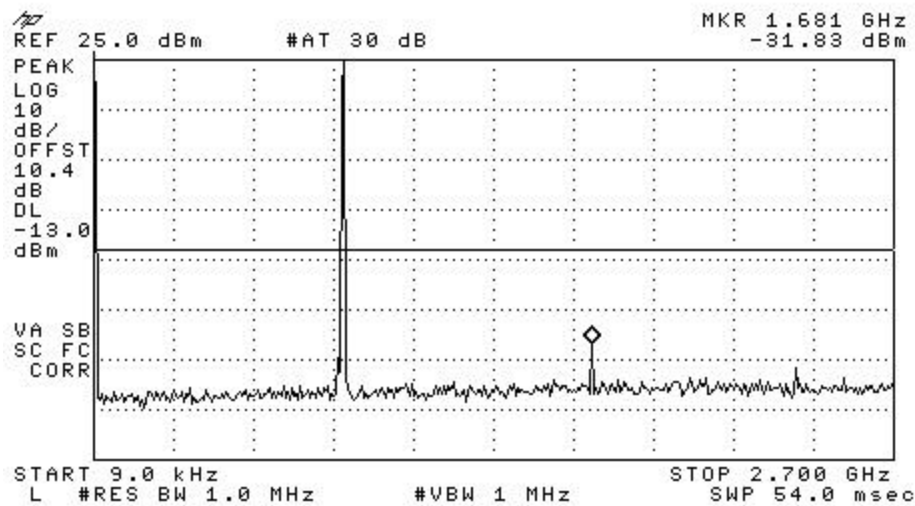


Figure 8-10a CDMA 800 – Conducted Spurious Emission (CH 383)

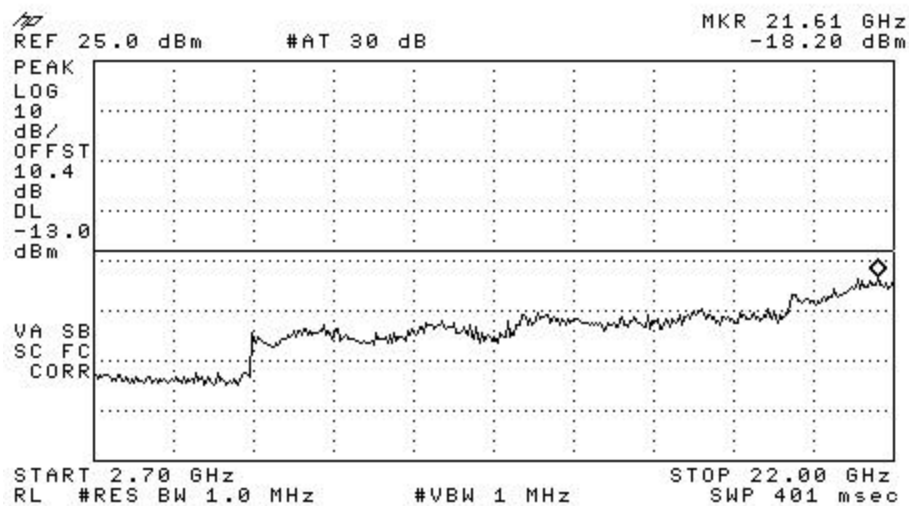


Figure 8-10b CDMA 800 – Conducted Spurious Emission (CH 383)

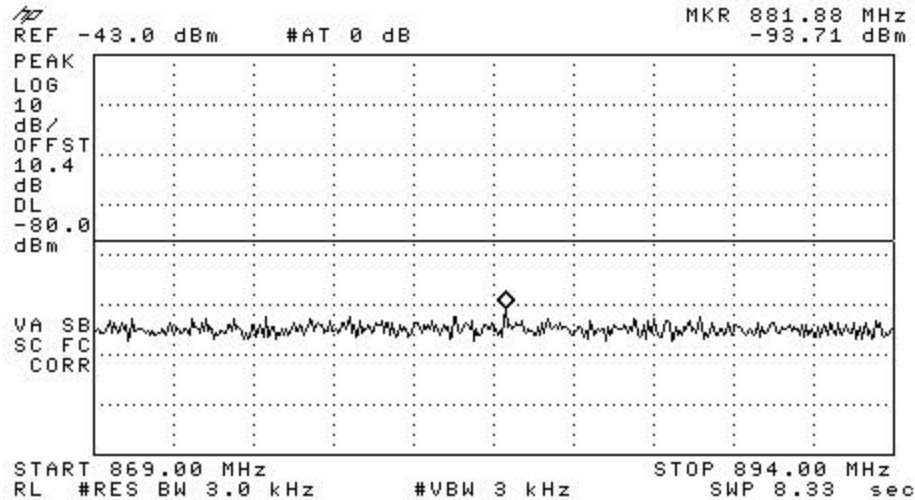


Figure 8-11 CDMA 800 - Emissions in base station frequency range (CH 777)

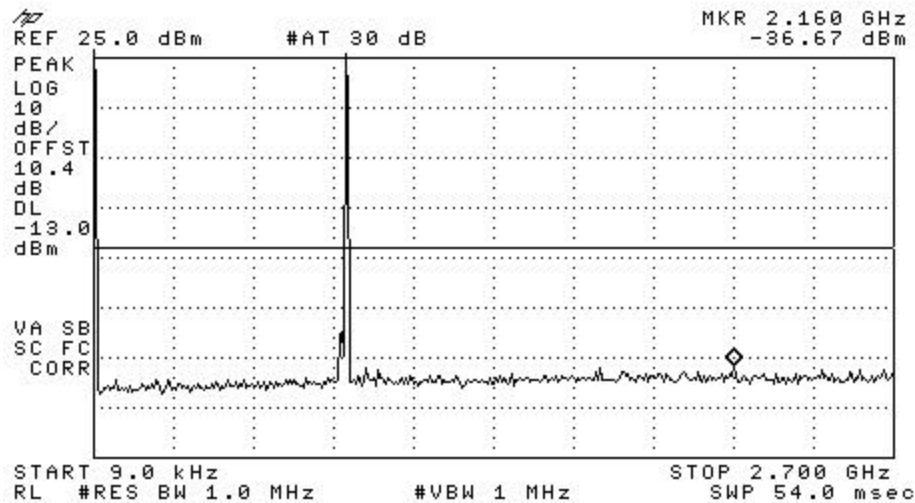


Figure 8-12a CDMA 800 – Conducted Spurious Emission (CH 777)

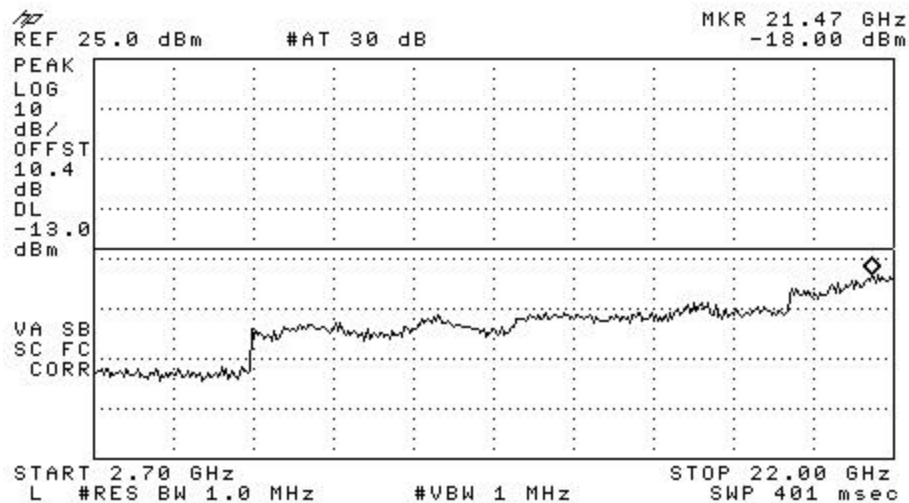


Figure 8-12b CDMA 800 – Conducted Spurious Emission (CH 777)

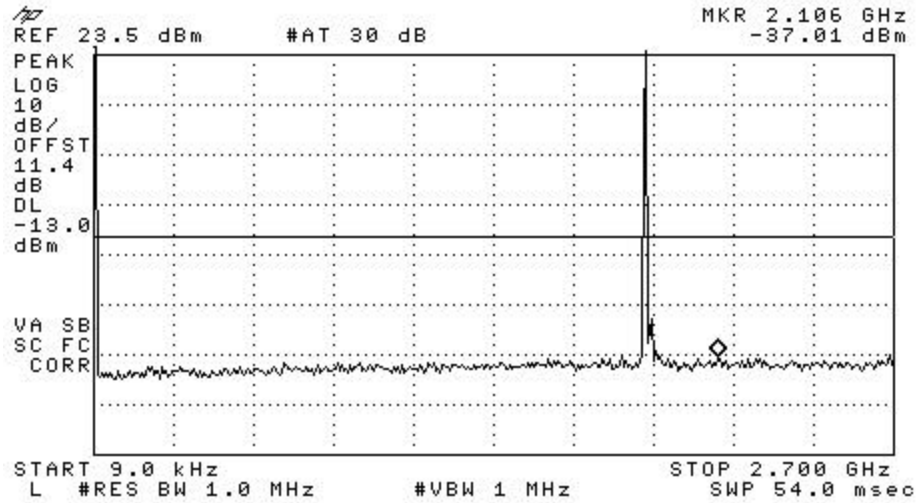


Figure 8-13a CDMA 1900 - Conducted Spurious Emission (CH 25)

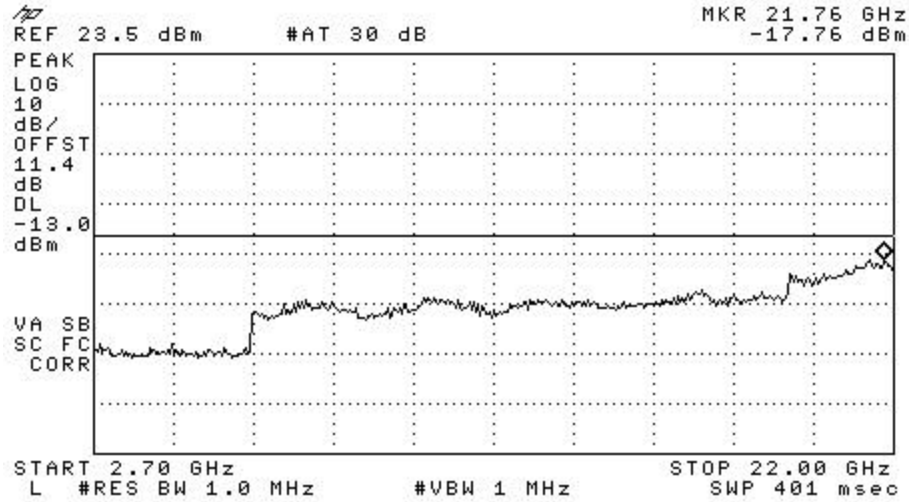


Figure 8-13b CDMA 1900 - Conducted Spurious Emission (CH 25)

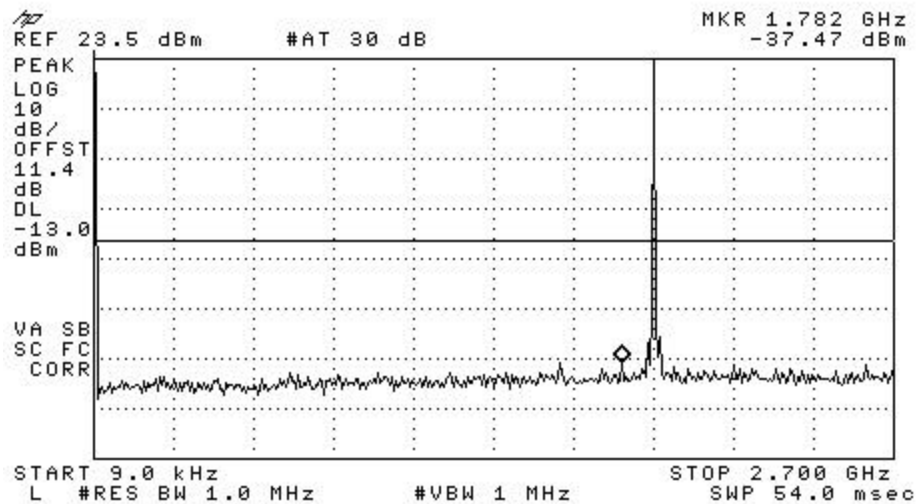


Figure 8-14a CDMA 1900 - Conducted Spurious Emission (CH 600)

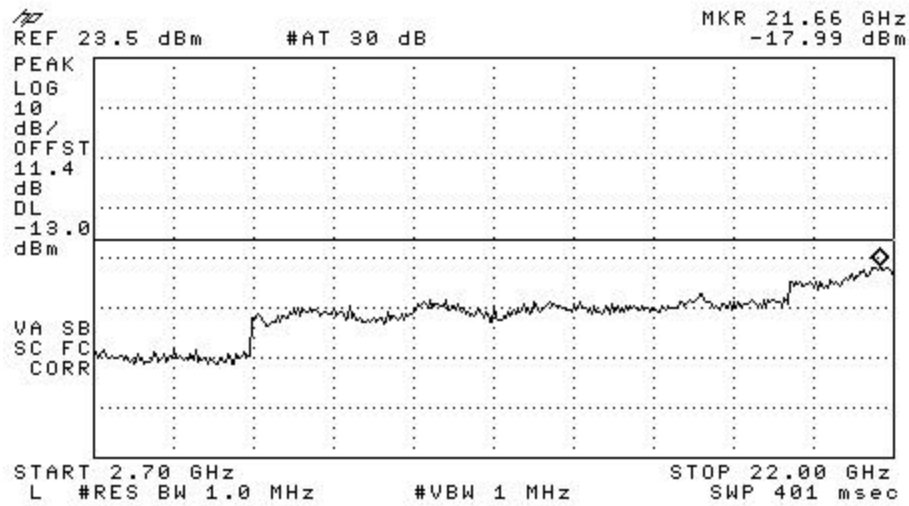


Figure 8-14b CDMA 1900 - Conducted Spurious Emission (CH 600)

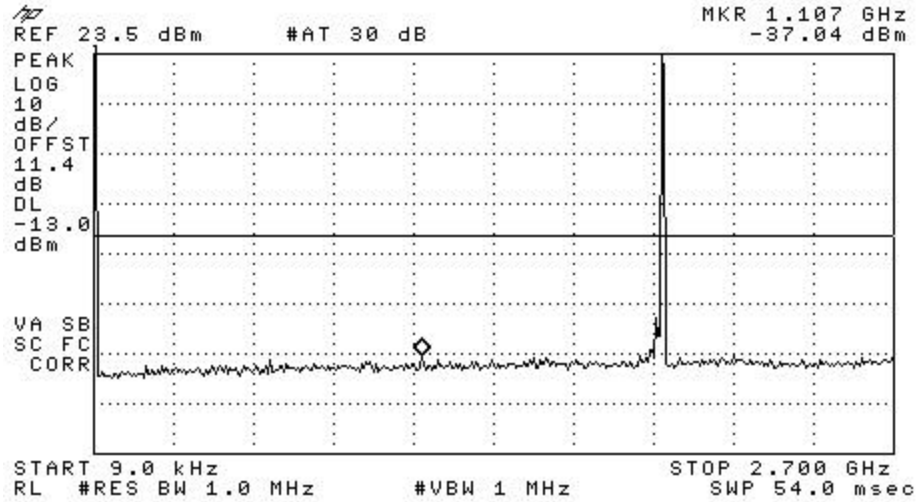


Figure 8-15a CDMA 1900 - Conducted Spurious Emission (CH 1175)

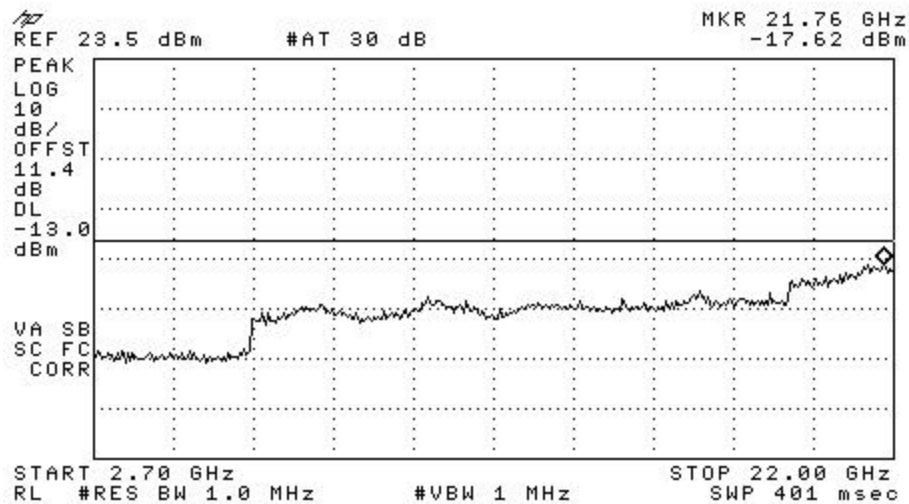


Figure 8-15b CDMA 1900 - Conducted Spurious Emission (CH 1175)

9 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 Nemko in San Diego, California. The test report is attached in a separate attachment.			

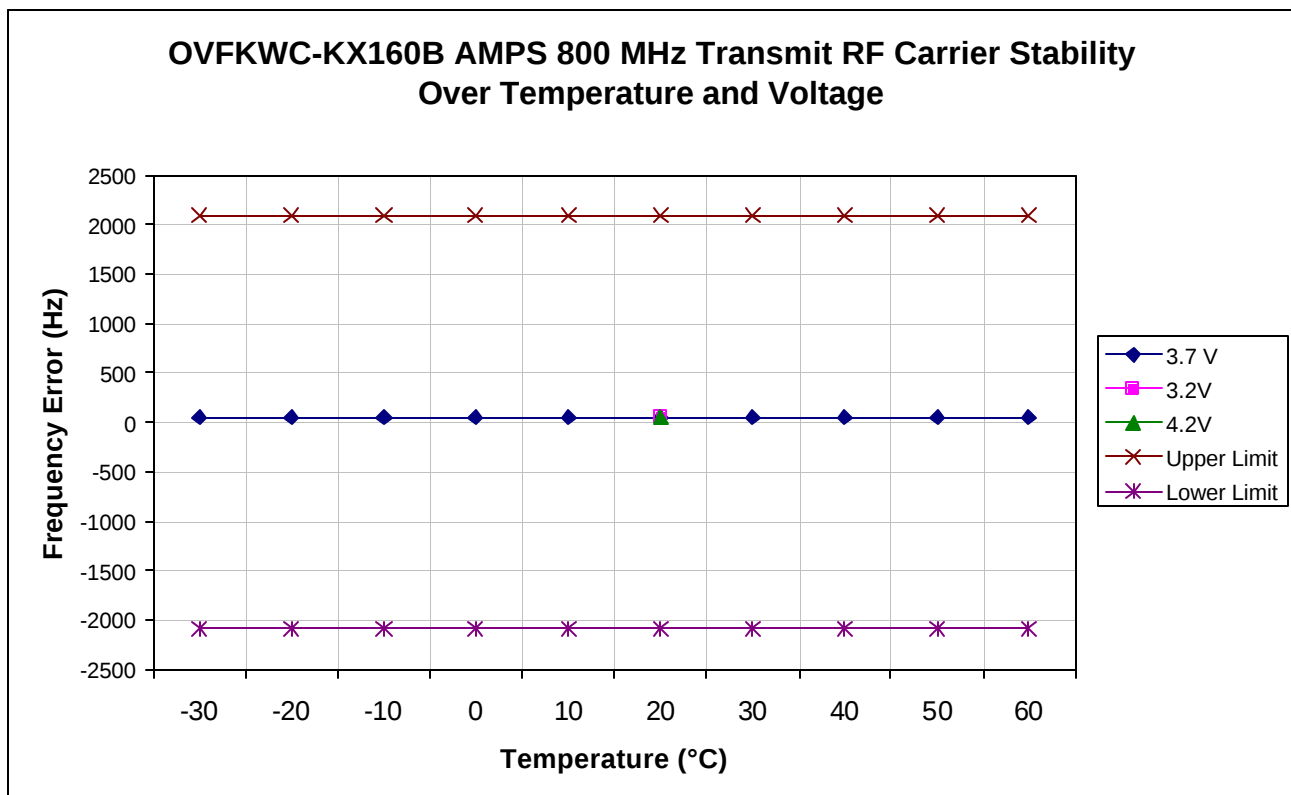
10 Transmitter RF Carrier Frequency Stability

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 Agilent 8960 Series 10 E5515C. A power supplier was connected as primary voltage supply.			

10.1 AMPS Mode

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

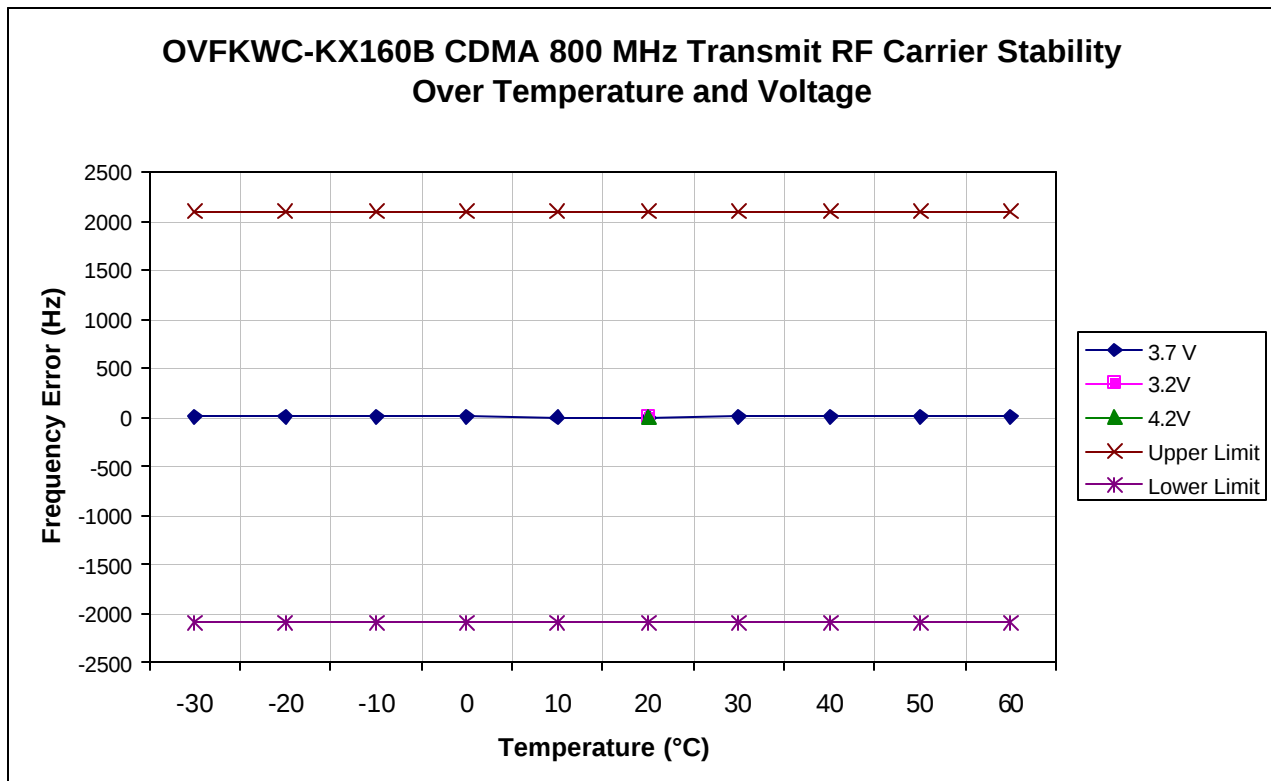
Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.2V (Battery endpoint)	3.7V	4.26V (115%)	Lower limit	Upper limit
-30		51		-2091	2091
-20		51		-2091	2091
-10		51		-2091	2091
0		50		-2091	2091
10		50		-2091	2091
20	67	59	51.00	-2091	2091
30		52		-2091	2091
40		49		-2091	2091
50		51		-2091	2091
60		51		-2091	2091



10.2 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		0.41		-2091	2091
-20		.19		-2091	2091
-10		0.09		-2091	2091
0		0.42		-2091	2091
10		0.46		-2091	2091
20	39.4	0.38	0.81	-2091	2091
30		0.60		-2091	2091
40		0.17		-2091	2091
50		1.82		-2091	2091
60		0.34		-2091	2091



10.3 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		0.06		-4700	4700
-20		0.46		-4700	4700
-10		1.08		-4700	4700
0		0.99		-4700	4700
10		0.76		-4700	4700
20	155.00	0.08	0.35	-4700	4700
30		-.39		-4700	4700
40		.64		-4700	4700
50		.36		-4700	4700
60		1.54		-4700	4700

11 Exposure of Humans to RF Fields (SAR)

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

12 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Cal Due Date
Power Meter	Giga-tronics	8541C	1835203	12/20/05
Power Meter Sensor	Giga-tronics	80601A	1830321	12/20/05
Spectrum Analyzer	Hewlett Packard	8593EM	3710A00203	03/14/06
Spectrum Analyzer	Hewlett Packard	8594E	3810A04238	04/16/06
Spectrum Analyzer	Rohde & Schwarz	FSEA	001854	03/04/06
Wireless Communications Test Set	Agilent	8960	US41140252	09/16/06
CDMA Mobile Station Test Set	Hewlett Packard	8924C	US37482647	09/16/06
Temperature Chamber	CSZ	Z2033	Z9343034	03/11/06