SAMSUNG ELECTRONICS Co., Ltd.,
Regulatory Compliance Team
IT R&D Center
416, Maetan-3dong,
Paldal-gu, Suwon-si,
Gyeonggi-do, Korea 442-742

FCC CFR47 PART 22 SUBPART CERTIFICATION REPORT

Model Tested:	**SCH-N393**
FCC ID (Requested):	**A3LSCHN393**
Report No:	**FA-030-R1**
Date issued:	**October 23, 2003**

- Abstract –
All measurement reported herein accordance with FCC Rules, 47CFR Part2, Part22.

Prepared By	JH NAM– Test Engineer	**Date**	2003.10.23
Checked By	CW PARK - Manager	**Date**	2003.10.23
Authorized By	JK CHOI – Senior Manager	**Date**	2003.10.23

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MEASUREMENT REPORT

1. FCC Certification Information

The following information is in accordance with FCC Rules, 47CFR Rart2, Subpart J, Sections 2.1033 – 2.1055.

1.1 §2.1033 General Information

· Applicant Name:	SAMSUNG ELECRONICS CO., LTD.
· Address:	416 Maetan-3Dong, Paldal-ku Suwon City Kyungki-Do 441-742, KOREA
· Attention:	Wallace Oh, Engineering Manager (QA Lab)
· FCC ID:	A3LSCHN393
· Quantity:	Quantity production is planned
· Emission Designators:	1M25F9W, 40K0F8W, 40K0F1D
· Tx Freq. Range:	824.70-848.31MHz(CDMA) 824.04-848.97MHz(AMPS)
· Rx Freq. Range:	869.70-893.31 MHz(CDMA) 869.04-893.97 MHz(AMPS)
· Max. Power Rating:	0.370W ERP AMPS (25.685dBm) 0.327W ERP CDMA (25.140dBm)
· FCC Classification(s):	Non-Broadcast Transmitter Held to Ear (TNE)
· Equipment (EUT) Type:	Dual-Mode AMPS/CDMA Phone
· Modulation(s):	AMPS, CDMA
· Frequency Tolerance:	±0.00025% (2.5ppm)
· FCC Rule Part(s):	Rule Part2 §22(H)
· Dates of Test:	Oct.13-15, 2003
· Place of Test:	SAMSUNG Lab,
· Test Report S/N:	A3LSCHN393

2. INTRODUCTION

2.1 General

These measurement tests were conducted at **SAMSUNG ELECTRONICS CO., LTD(SUWON)**.
The site address is 416Maetan-3Dong, Paldal-ku Suwon City Kyungki-Do 441-742, KOREA
The site has 1 Fully-anechoic chamber and measurement facility.

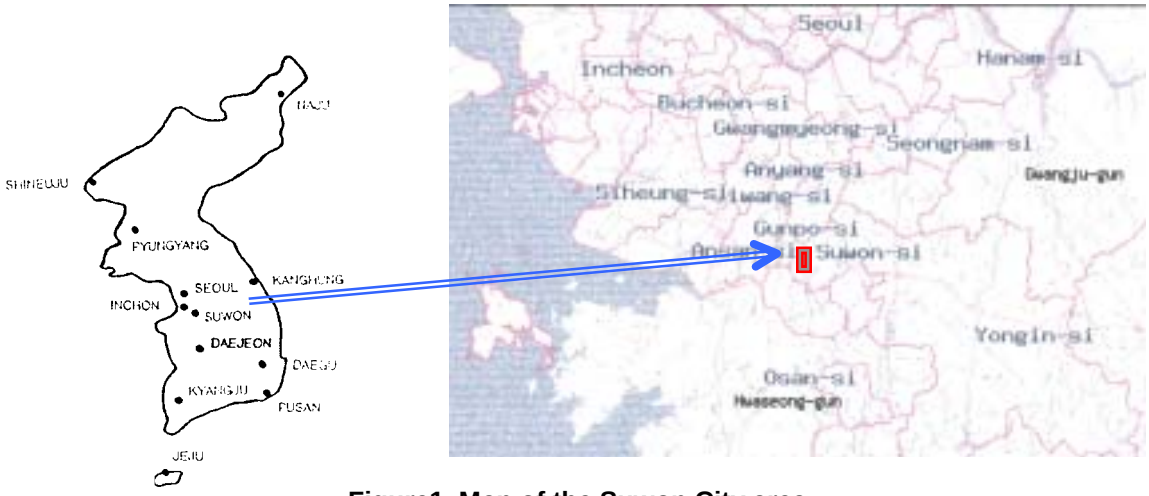

Figure1. Map of the Suwon City area.

Measurement Procedure
The radiated and spurious measurements were made Fully-anechoic chamber at a 3-meter test range (see Figure2). The equipment under testing was placed on a wooden turntable. 3-meters from the receive antenna. The receive antenna height and turntable rotations was adjusted for the highest reading on the receive spectrum analyzer. The substitution antenna will replace the EUT antenna it the same position and in vertical polarization. The frequency of the signal generator shall be set to the frequencies that were measured on the EUT. The test antenna shall be raised and lowered, if necessary, to ensure that the maximum signal is still being received. The signal generator, output level, shall be adjusted until an equal or a known related level to what was measured from the EUT is obtained in the spectrum analyzer. This level was recorded.
For readings above 1 GHz, the above procedure would be repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

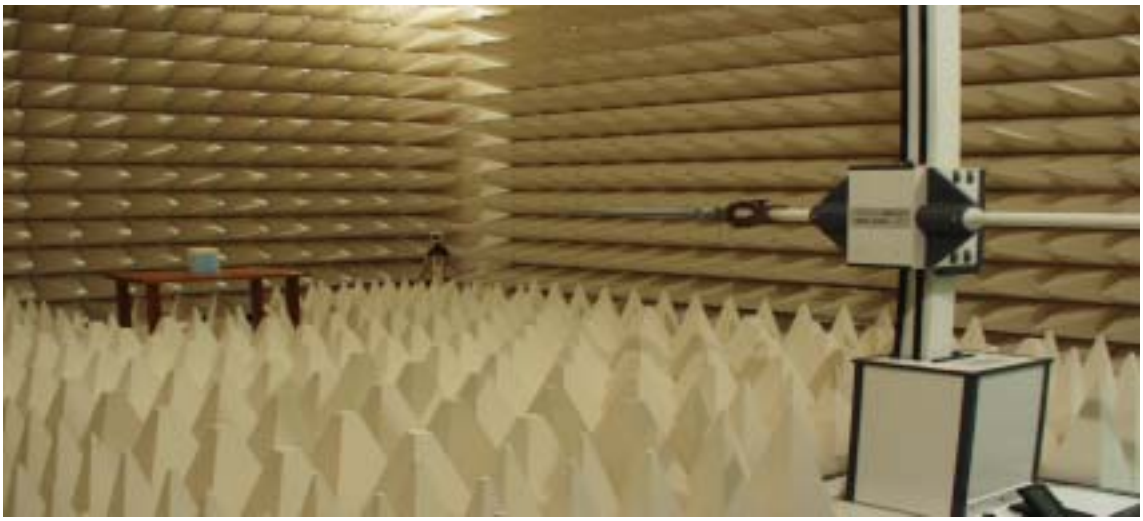

Figure2. Photograph of 3m Fully-Anechoic Chamber

3. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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4. TEST EQUIPMENT LIST

Name of Equipment	Model	Serial No.	Due Date
Spectrum Analyzer	FSIQ26	100153	2004-08-19
	FSU	MY41000236	2004-04-03
	E4440A(3Hz~26.5GHz)	MY41000233	2003-11-25
Signal Generator	SMIQ03B	83824/021	2004-01-20
	SMR20	835197/030	2004-01-20
Power Meter	E4419B	GB41293846	2004-10-02
Power Sensor	8481B	3318A10325	2004-10-06
	8485A	3318A19924	2004-10-04
Amplifier	5S1G4	304866	2003-11-26
Pre-Amplifier	8449B	3008A00691	2004-01-21
Communication test set	8960	GB42230535	2004-01-09
	8960	GB42360886	2004-01-09
Antenna Master	MA0001	ANT0967	Not Required
Controller	HD100	100/756	Not Required
Environmental Chamber	PL-4S	13005454	2004-08-22
	SH-241	92000548	2003-12-12
	SH-241	92000549	2003-12-12
Horn Antenna	HF906	360306/011	2004-02-10
	HF906	100134	2004-02-10
Dipole Antenna	3121C-DB4	9007-587	2004-03-21
	3121C-DB4	9007-588	2004-03-21
Receive Antenna	HO040	353255/020	2004-04-08
Attenuator	8494A	3308A31997	2004-01-20
	8496A	3308A14426	2004-01-20
Directional Coupler	4278-311-2	B3679637	2004-01-22
	4278-111-2	B103DC8722	2004-01-22
High Pass Filter	WHK1.0/15G-10SS	1	Not Required
	WHK1.0/15G-10SS	1	Not Required
	WHK/3.5/18G-10SS	3	Not Required
	WHK/3.5/18G-10SS	4	Not Required
Shielded Semi-Anechoic Chamber	RF0002	ANT0001	2004-01-21

5. DESCRIPTION OF TESTS

5.1 Effective Radiated Power

Test Set-up for the ERP/EIRP TEST

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

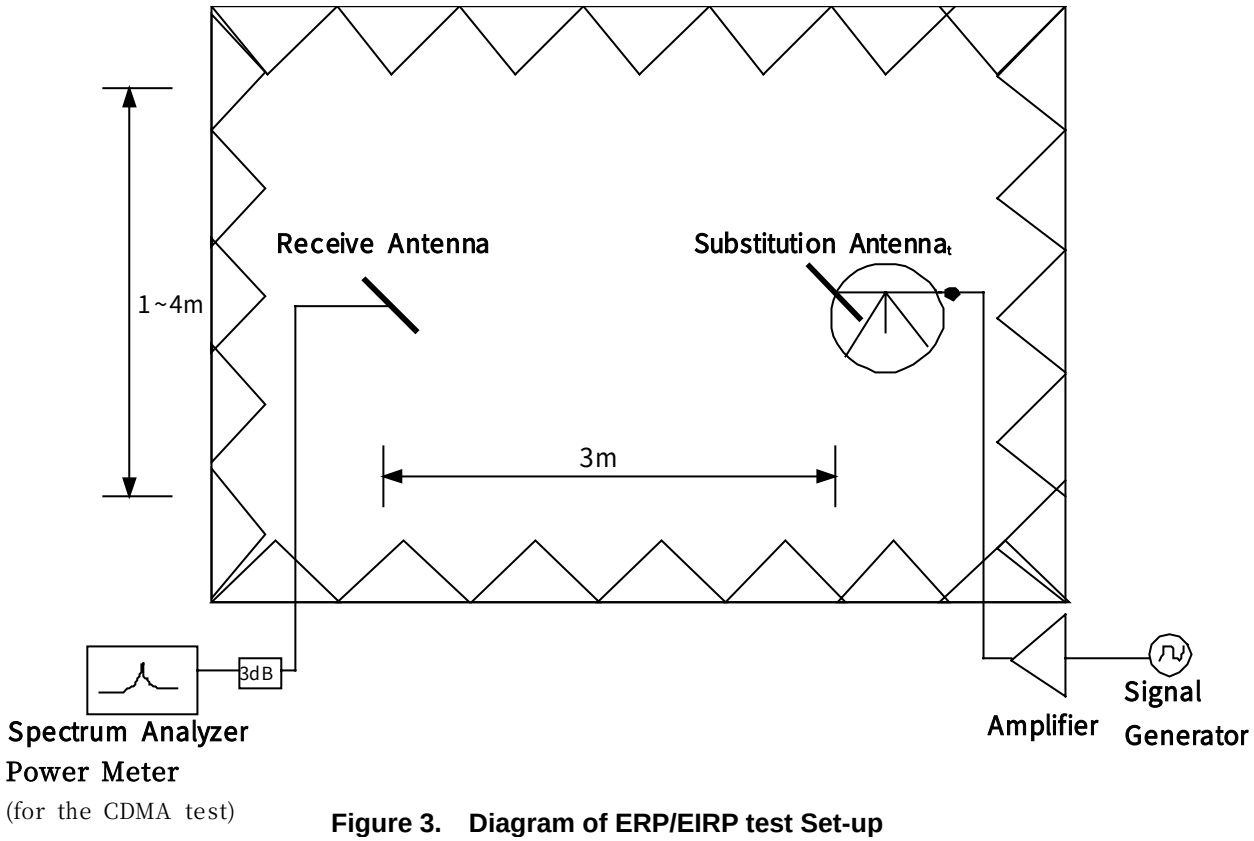


Figure 3. Diagram of ERP/EIRP test Set-up

The EUT was placed on a Non-conducted turntable 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of dipole is measured. The ERP is recorded. For readings above 1GHz, the above procedure is repeated using horn antenna and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.2 Radiated Spurious & Harmonic Emission

Test Set-up for the Radiated Emission TEST

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001

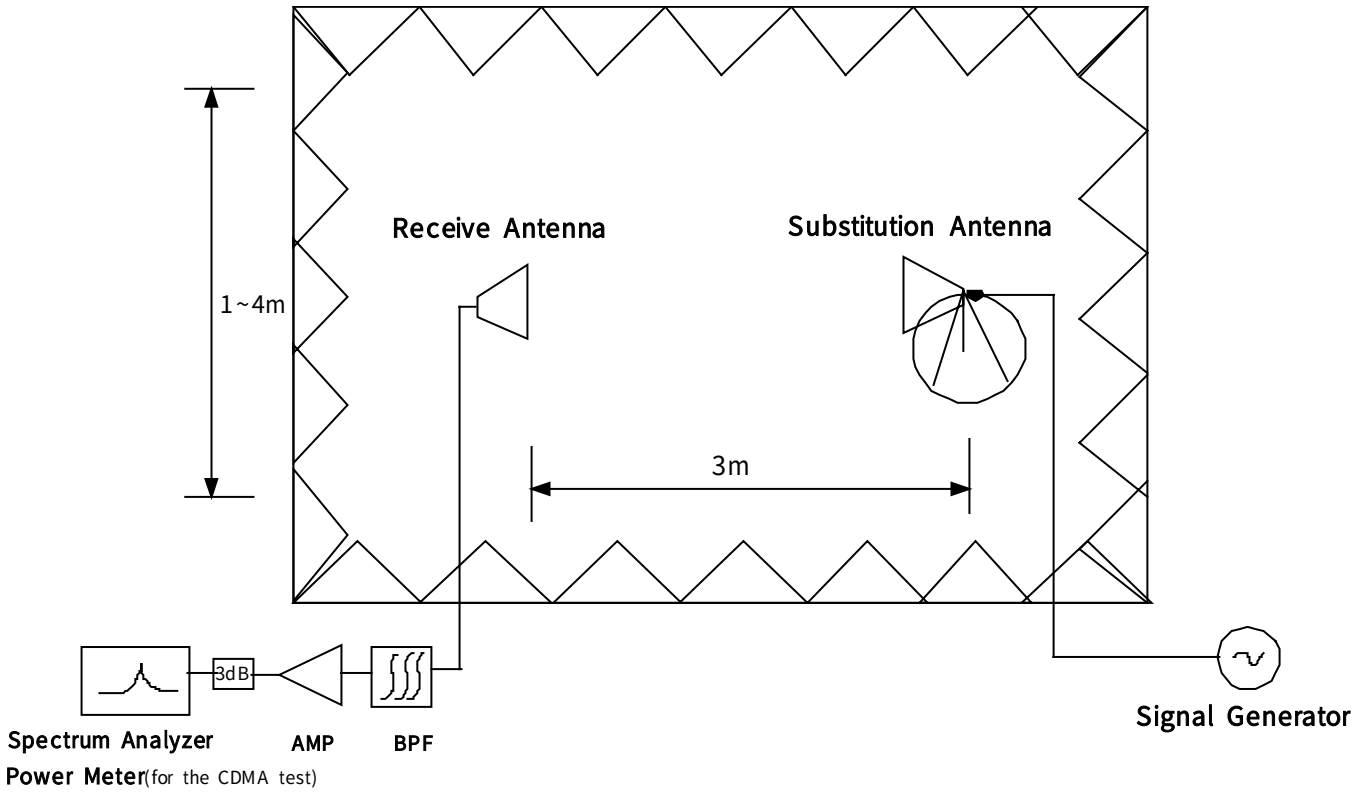


Figure 4. Diagram of Radiated Spurious & Harmonic test Set-up

The EUT was placed on a Non-conducted turntable 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

SAMPLE CALCULATION

Example: Channel 25 PCS Mode 2nd Harmonic (3702.50MHz)

The receive analyzer reading at 3meters with the EUT on the turntable was –81.0dBm. The gain of the substituted antenna is 8.1dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0dBm of the receive analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0dB at 3702.50MHz. So 6.1dB is added to the signal generator reading of –30.9dBm yielding –24.80dBm. The fundamental EIRP was 25.501dBm so this harmonic was 25.501dBm –(-24.80)= 50.3dBc .

5.3 Occupied Bandwidth

Test Procedure

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

Plots of the EUT's occupied bandwidth are shown herein.

5.4 Spurious and Harmonic Emissions at Antenna Terminal

5.4.1 Occupied Bandwidth Emission Limits

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

BLOCK	Freq. Range (MHz) Transmitter (Tx)	Freq. Range (MHz) Receiver (Rx)
A	1850 – 1865	1930 – 1945
B	1870 – 1885	1950 – 1965
C	1895 – 1910	1975 – 1990
D	1865 – 1870	1945 – 1950
E	1885 – 1890	1965 – 1970
F	1890 – 1895	1970 – 1975

Table 1. Broadband PCS Service Frequency Blocks.

5.4.2 Conducted Spurious Emission

Minimum standard:
On any frequency outside a license frequency block, the power of any emission shall be attenuated below the transmitter power(P) by at least 43+10log (P)dB. Limit equivalent to –13dBm, calculation shown below.

43 + 10log (0.327W) = 38.15dB
25dBm – 38.15dB = -13.15dBm

Test Procedure:

The EUT was setup to maximum output power at its lowest channel. The Resolution BW of the analyzer is set to 1% of the emission bandwidth to show compliance with the –13dBm limit, in the 1MHz bands immediately outside and adjacent to the edge of the frequency block. The measurements are repeated for the EUT's highest channel. For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 10GHz. (PCS Mode : 10MHz to 20GHz). A display line was placed at –13dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

Plots are shown herein.

5.5 Frequency Stability / Temperature Variation

The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is carried from -30°C to +60°C using an environmental chamber.
b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification- The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.0001 (±1ppm) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature(25°C to 27°C to provide a reference).
2. The equipment is subjected to an overnight "soak" at -30°C without any power applied.
1. After the overnight "soak" at 30°C (Usually 14~16 hours), the equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying to the transmitter.
2. Frequency measurements are made at 10°C interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
3. Again the transmitter carrier frequency and the individual oscillators are measured at room temperature to begin measurement of the upper temperature levels.
4. Frequency measurements are at 10 intervals starting at 30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
5. The artificial load is mounted external to the temperature chamber.

NOTE: The EUT is tested down to the battery endpoint.

6. TEST DATA

6.1 Effective Radiated Power (E.R.P.)

Supply Voltage : 3.7VDC

Modulation : CDMA

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	S/A (dBm)	P/M (dBm)	Ant gain (dBi)	Ref level (dBm)
835.89	25.00	H	-13.74	-13.92	0.00	-13.92
		V	-12.30	-12.46	0.00	-12.46

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	ERP (dBm)	ERP (W)	Battery
824.70	-14.93	H2	0	23.99	0.251	Standard
835.89	-14.72	H2	2	24.20	0.263	Standard
848.31	-13.78	H2	179	25.14	0.327	Standard

NOTE : Standard batteries are the only battery options for this phone

Radiated measurements at 3 meters by Substitution Method

6.2 Radiated Spurious & Harmonic measurement
Field Strength of SPURIOUS Radiation

Operating Frequency : 824.70 MHz(Low), 835.89MHz(Middle), 848.31MHz(High)

Measured Output Power : 25.14 dBm = 0.327 W

Modulation Signal : CDMA

Limit : 43 + 10log$_{10}$(w) = 38.15 dBc

■ **Result**

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
1013	2	1649.40	-43.51	H1	60.10
	3	2474.10	-50.35	H2	60.25
	4	3298.80	-54.71	H2	61.21
	5	4123.50	-	-	-
	6	4948.20	-	-	-
	7	5772.90	-	-	-
363	2	1671.78	-39.60	H1	55.32
	3	2507.67	-49.33	H2	58.23
	4	3343.56	-50.39	H2	56.65
	5	4179.45	-66.53	H2	68.12
	6	5015.34	-	-	-
	7	5851.23	-	-	-
777	2	1696.62	-42.68	H2	56.89
	3	2544.93	-53.22	H2	62.68
	4	3393.24	-48.63	H2	55.18
	5	4241.55	-61.18	H2	62.58
	6	5089.86	-62.19	V	62.21
	7	5938.17	-	-	-

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.3 Radiated Spurious & Harmonic Conversion Table

Date : 03. 10. 13 ~ 10. 15

Test Engineer : J.H. Nam

① Tx Cable loss
② Tx Horn Ant Gain
③ Rx Cable loss + HPF Insertion loss + Attenuator
④ Pre-Amp gain
⑤ Air loss
⑥ Tested Level from EUT
⑦ = ⑥ + ⑤ + ③ - ④
⑧ = ERP +2.14- ⑦

CH	Har	Frequency (MHz)	① Tx CL (dB)	② Horn Gain (dB)	Tx Level @ (S/G 0dBm)	⑥ Tested Level EUT : H (dBm)	⑥ Tested Level EUT : V (dBm)	⑦ Amplitude of Emission EUT : H (dBm)	⑦ Amplitude of Emission EUT : V (dBm)	⑧ Result EUT : H (dBc)	⑧ Result EUT : V (dBc)
1013	2	1649.40	6.59	7.21	0.62	-43.51	-46.16	-32.82	-34.36	60.10	61.64
	3	2474.10	8.53	8.87	0.34	-50.35	-59.48	-32.97	-41.91	60.25	69.19
	4	3298.80	9.64	8.43	-1.21	-54.71	-59.89	-33.93	-39.01	61.21	66.29
	5	4123.50	10.20	9.89	-0.31	-	-	-	-	-	-
	6	4948.20	12.23	10.33	-1.90	-	-	-	-	-	-
	7	5772.90	13.29	10.86	-2.43	-	-	-	-	-	-
363	2	1671.78	6.58	7.21	0.63	-39.60	-41.81	-28.04	-28.87	55.32	56.15
	3	2507.67	8.44	8.87	0.43	-49.33	-54.10	-30.95	-35.67	58.23	62.95
	4	3343.56	9.64	8.43	-1.21	-50.39	-55.89	-29.37	-34.84	56.65	62.12
	5	4179.45	10.39	10.20	-0.19	-66.53	-67.10	-40.84	-40.88	68.12	68.16
	6	5015.34	12.34	10.34	-2.00	-	-	-	-	-	-
	7	5851.23	13.63	10.86	-2.77	-	-	-	-	-	-
777	2	1696.62	6.59	7.21	0.62	-42.68	-44.56	-29.61	-30.29	56.89	57.57
	3	2544.93	8.35	8.87	0.52	-53.22	-57.52	-35.40	-39.41	62.68	66.69
	4	3393.24	9.59	8.54	-1.05	-48.63	-55.36	-27.90	-34.63	55.18	61.91
	5	4241.55	10.54	10.20	-0.34	-61.18	-63.33	-35.30	-36.29	62.58	63.57
	6	5089.86	12.47	10.39	-2.08	-63.03	-62.19	-35.54	-34.93	62.82	62.21
	7	5938.17	14.12	10.86	-3.26	-	-	-	-	-	-

6.4 Frequency Stability

6.4.1 Frequency Stability Table

Operating Frequency : 835,890,000 Hz

Channel : 363

Reference Voltage : 3.7VDC

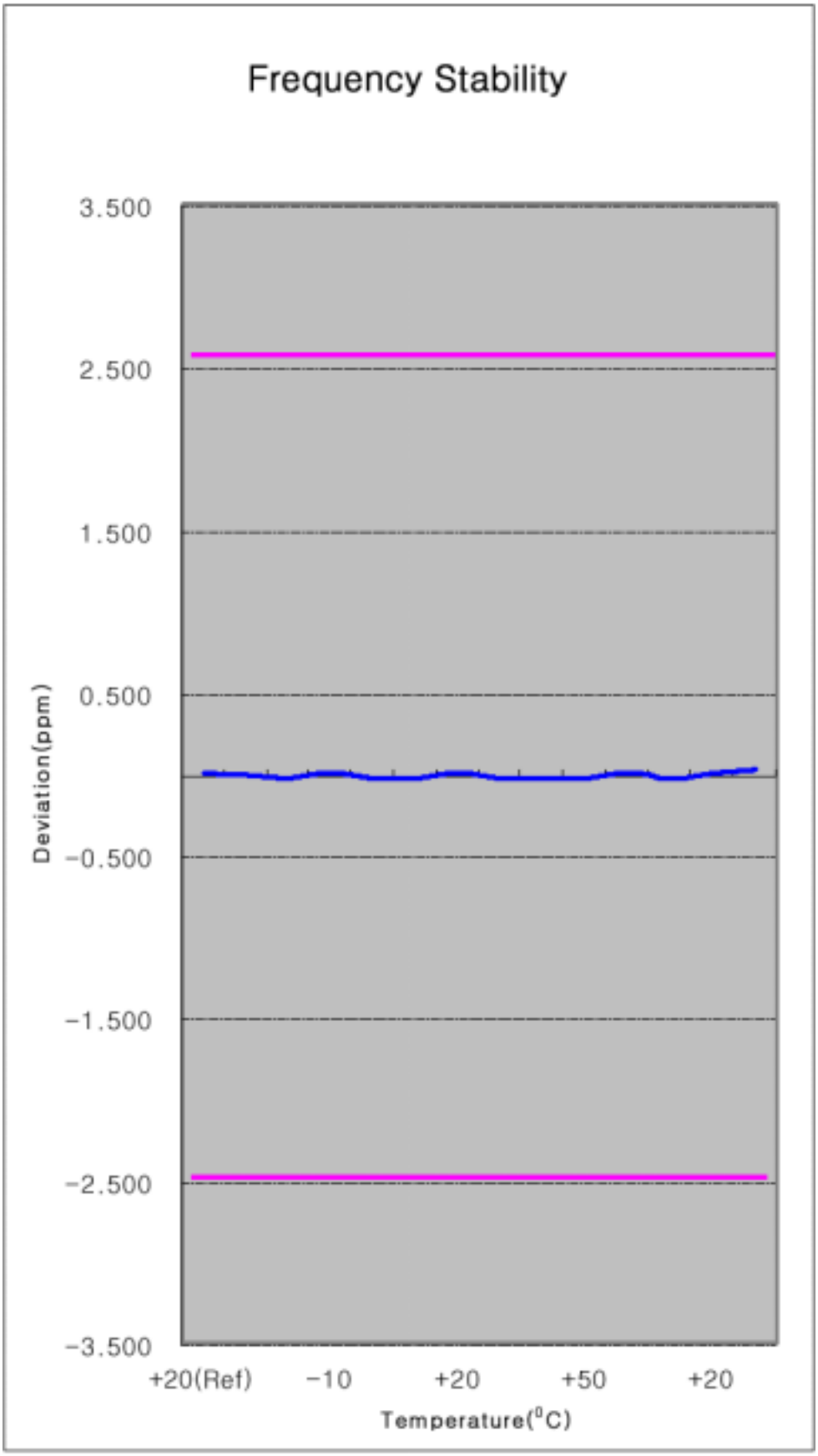
Deviation Limit : ±0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	13.20	835,890,013	0.000002	0.016
100%		-30	8.40	835,890,008	0.000001	0.010
100%		-20	-10.70	835,889,989	-0.000001	-0.013
100%		-10	11.30	835,890,011	0.000001	0.014
100%		0	-12.50	835,889,988	-0.000001	-0.015
100%		+10	-11.40	835,889,989	-0.000001	-0.014
100%		+20	11.90	835,890,012	0.000001	0.014
100%		+30	-13.80	835,889,986	-0.000002	-0.017
100%		+40	-12.20	835,889,988	-0.000001	-0.015
100%		+50	-12.80	835,889,987	-0.000002	-0.015
100%		+60	17.80	835,890,018	0.000002	0.021
85%	3.15	+20	-11.76	835,889,988	-0.000001	-0.014
115%	4.26	+20	14.01	835,890,014	0.000002	0.017
Batt.Endpoint	2.61	+20	27.53	835,890,028	0.000003	0.033

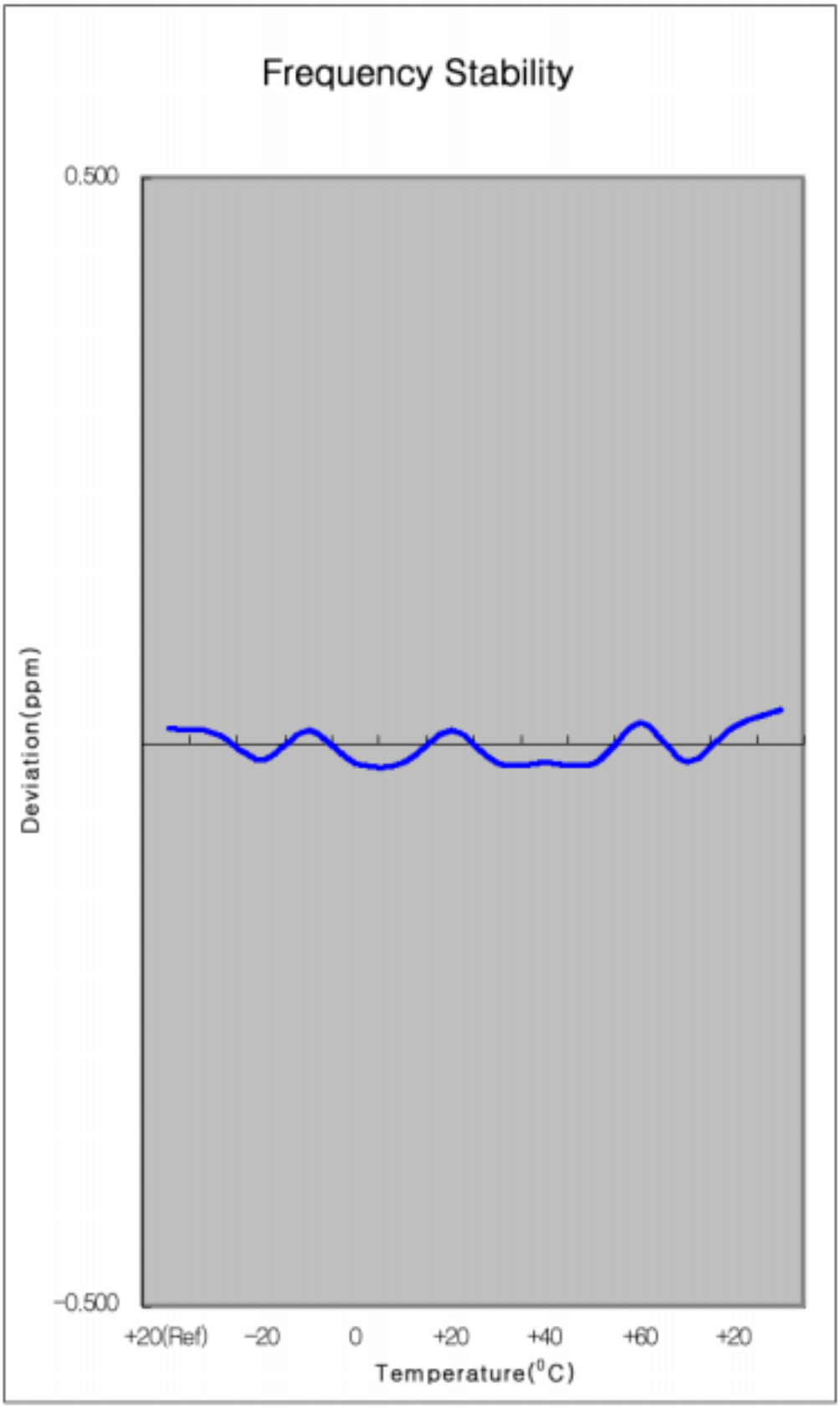
Note : The temperature is varied from -30 °C to +60 °C using an environmental chamber.

The EUT is tested down to the battery end point

6.4.2 Frequency Stability Graph



Zoom In


Frequency Stability
0.500
-0.500
Deviation(ppm)
+20(Ref)
-20
0
+20
+40
+60
+20
Temperature(°C)

7. SAMPLE CALCULATION

7.1 Emission Designator

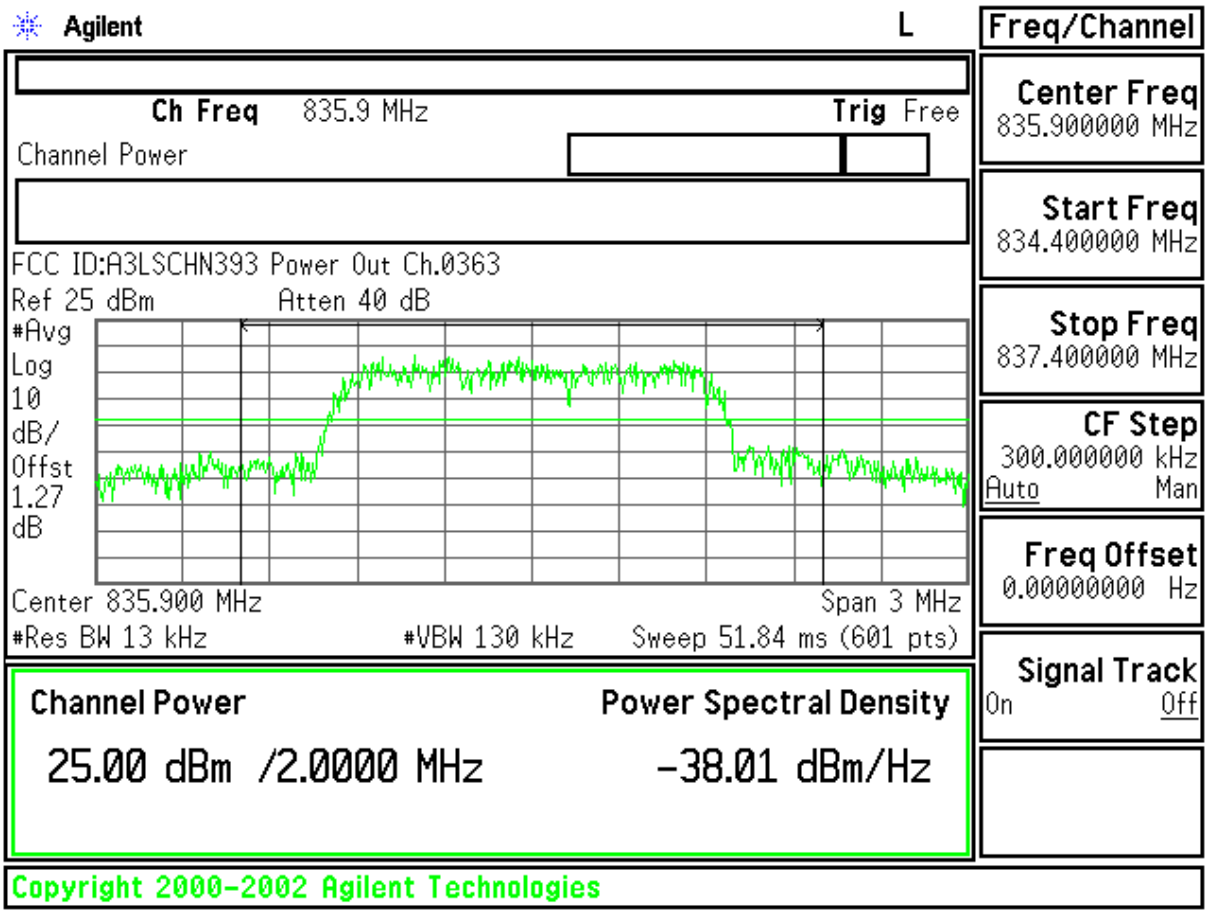
Emission Designator = 1M25F9W

CDMA BW = 1.25MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)
(Measured at the 99.75% power bandwidth)

8. CONCLUSION

The data collected shows that the SAMSUNG Dual-Mode AMPS/CDMA Phone FCC ID : A3LSCHN393 complies with all the requirements of Parts 2,22 of the FCC Rules.

9. TEST PLOTS


Agilent
L
Freq/Channel
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Trig Free
Channel Power
FCC ID:A3LSCHN393 Power Out Ch.0363
Ref 25 dBm
Atten 40 dB
#Avg
Log
10
dB/
Offst
1.27
dB
Center 835.900 MHz
Span 3 MHz
#Res BW 13 kHz
#VBW 130 kHz
Sweep 51.84 ms (601 pts)
Channel Power
25.00 dBm /2.0000 MHz
Power Spectral Density
-38.01 dBm/Hz
Center Freq
835.900000 MHz
Start Freq
834.400000 MHz
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Signal Track
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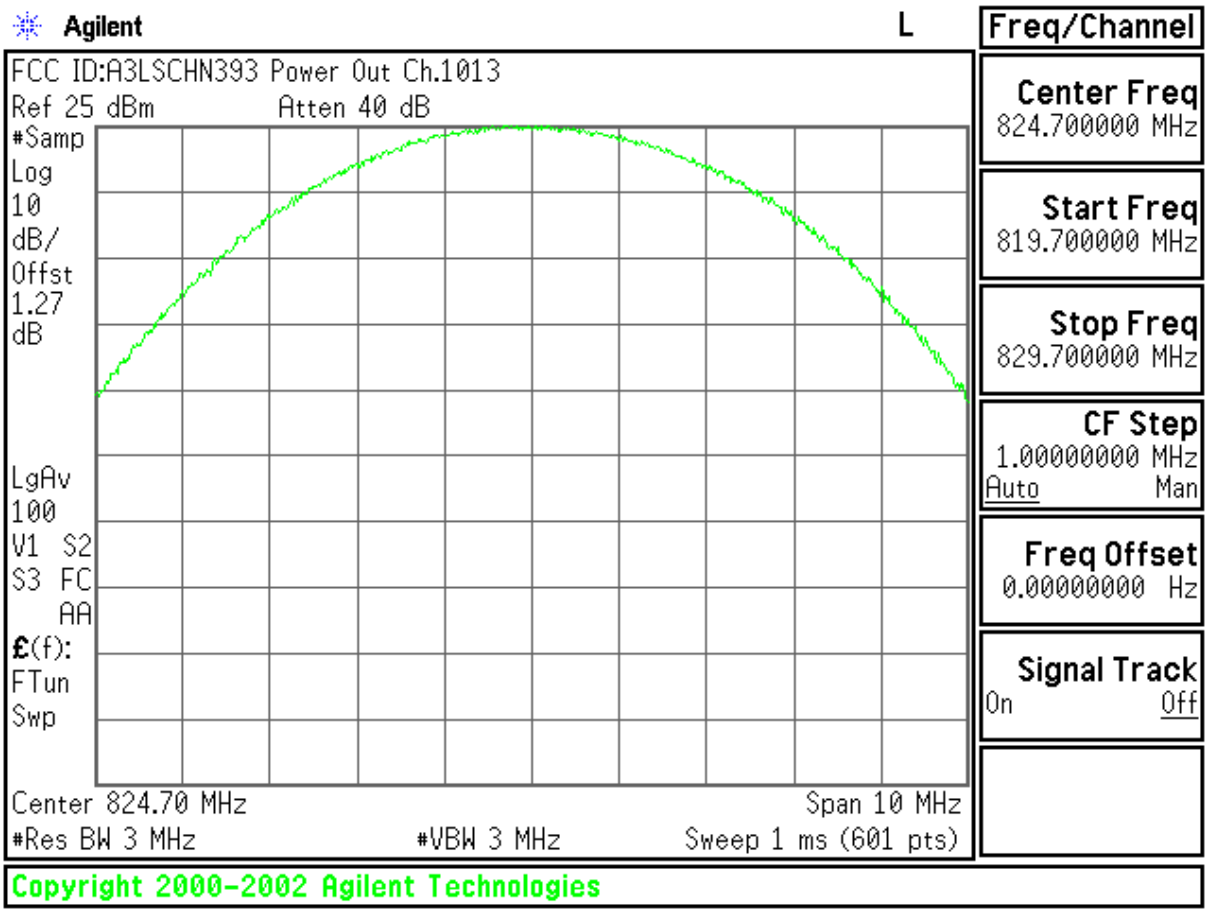
Off
Copyright 2000-2002 Agilent Technologies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L
Freq/Channel
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Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
LgAv
100
V1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 824.70 MHz
Span 10 MHz
#Res BW 3 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Center Freq
824.700000 MHz
Start Freq
819.700000 MHz
Stop Freq
829.700000 MHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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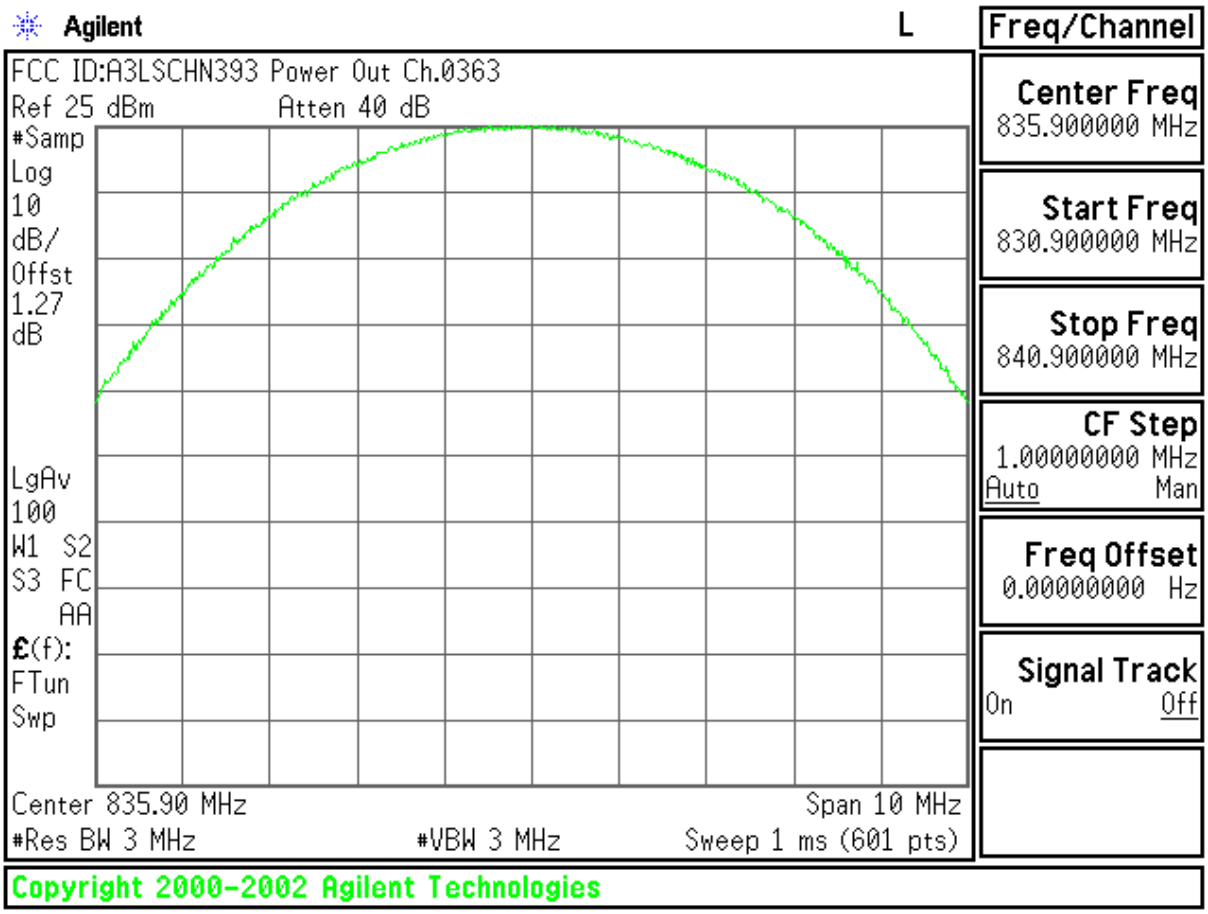
Agilent
L
FCC ID:A3LSCHN393 Power Out Ch.0363
Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
LgAv
100
W1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 835.90 MHz
Span 10 MHz
#Res BW 3 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Freq/Channel
Center Freq
835.900000 MHz
Start Freq
830.900000 MHz
Stop Freq
840.900000 MHz
CF Step
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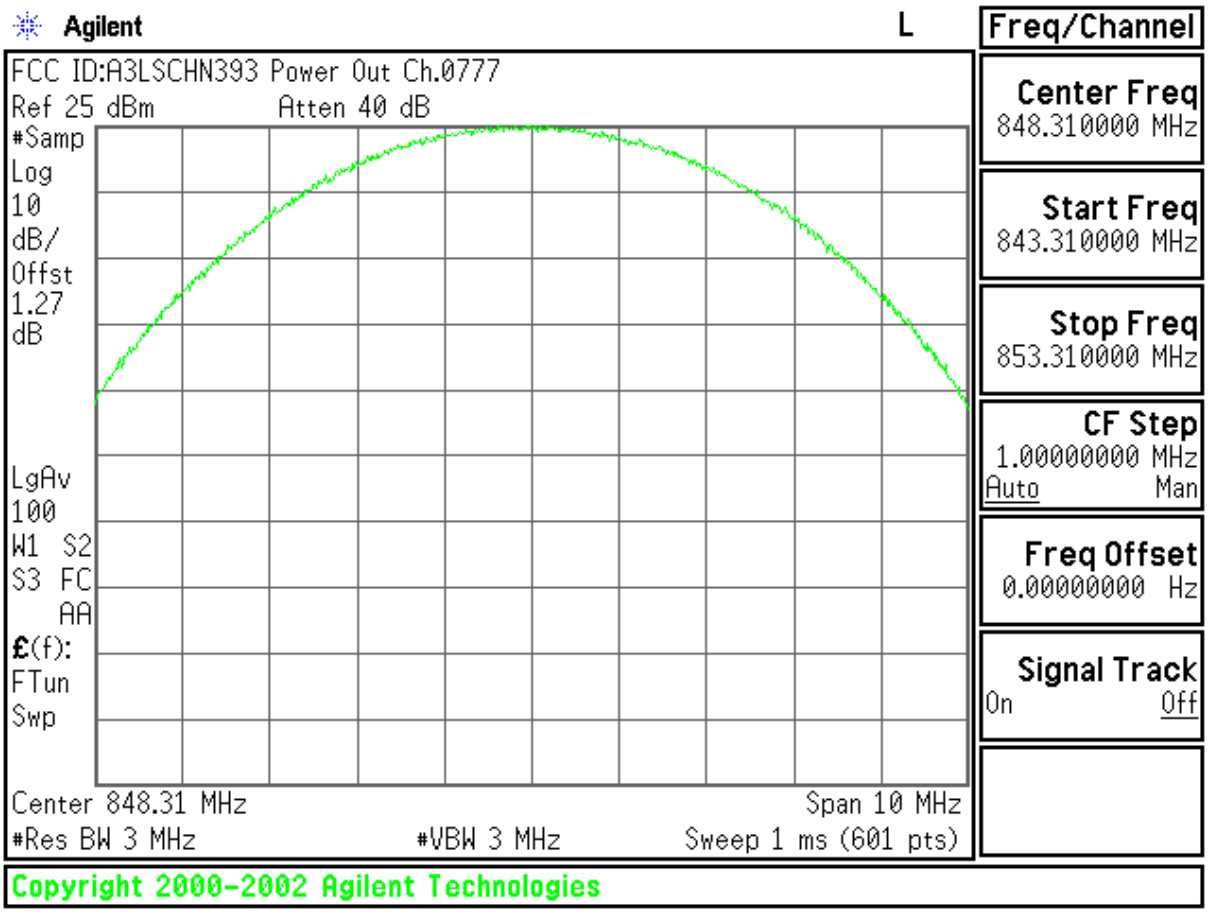
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
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Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
LgAv
100
W1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 848.31 MHz
Span 10 MHz
#Res BW 3 MHz
#VBW 3 MHz
Sweep 1 ms (601 pts)
Freq/Channel
Center Freq
848.310000 MHz
Start Freq
843.310000 MHz
Stop Freq
853.310000 MHz
CF Step
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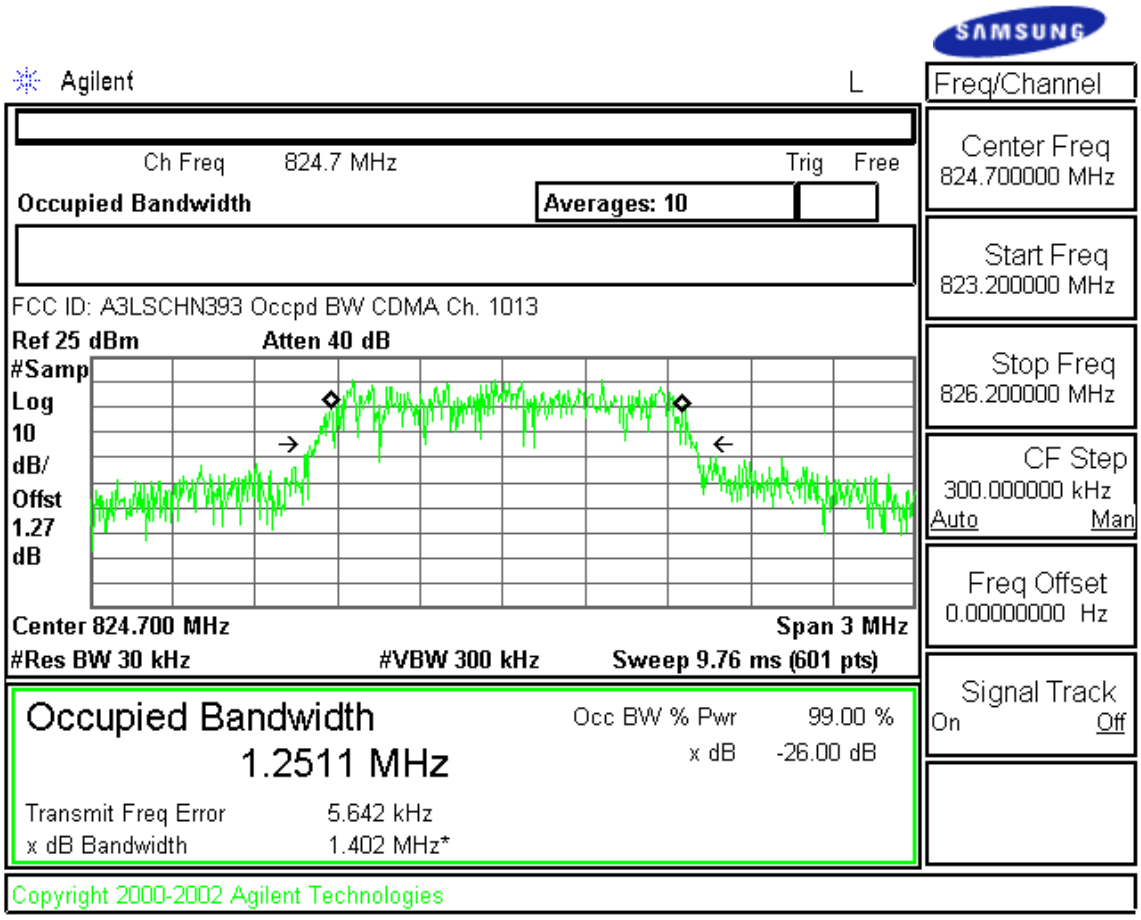
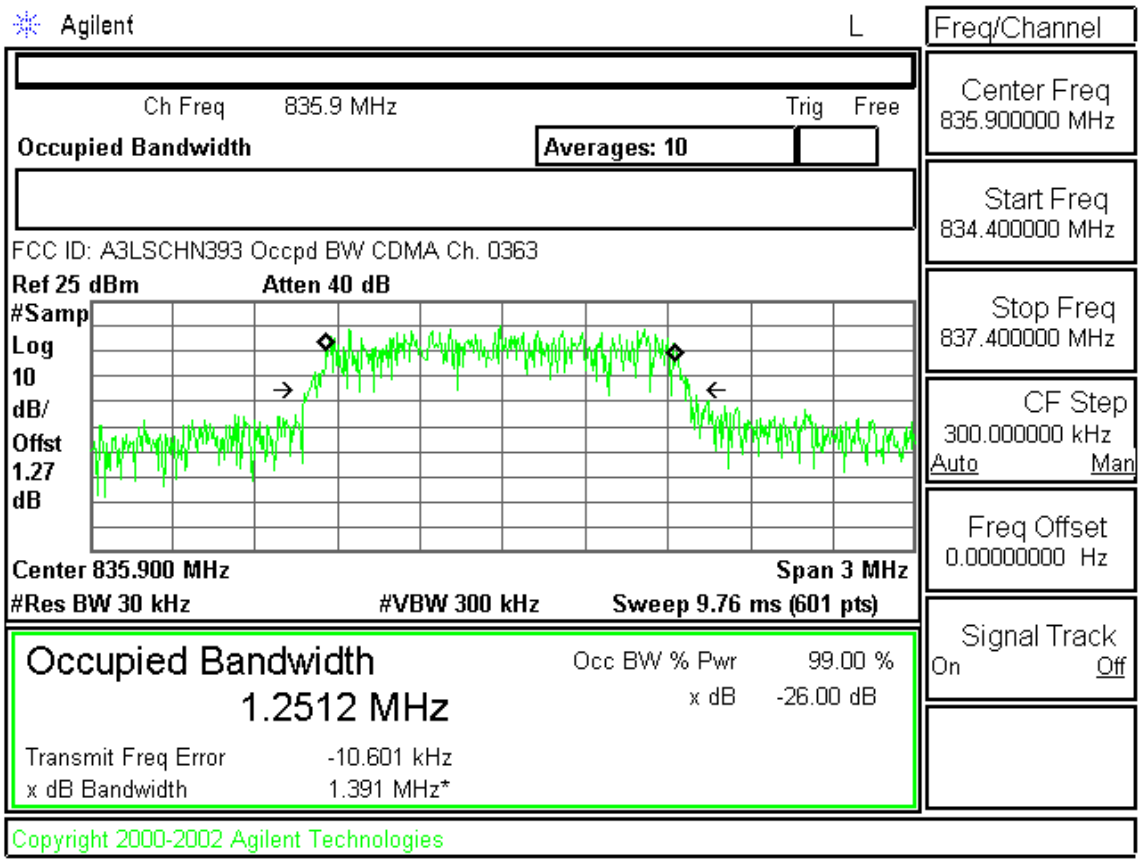
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
Ch Freq 824.7 MHz
Trig Free
Occupied Bandwidth
Averages: 10
Center Freq
824.700000 MHz
Start Freq
823.200000 MHz
FCC ID: A3LSCHN393 Occpd BW CDMA Ch. 1013
Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
Stop Freq
826.200000 MHz
CF Step
300.000000 kHz
Auto
Man
Center 824.700 MHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 9.76 ms (601 pts)
Freq Offset
0.00000000 Hz
Occupied Bandwidth
1.2511 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Signal Track
On
Off
Transmit Freq Error 5.642 kHz
x dB Bandwidth 1.402 MHz*
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
Ch Freq 835.9 MHz
Trig Free
Occupied Bandwidth
Averages: 10
Center Freq
835.900000 MHz
Start Freq
834.400000 MHz
FCC ID: A3LSCHN393 Occpd BW CDMA Ch. 0363
Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
Stop Freq
837.400000 MHz
CF Step
300.000000 kHz
Auto
Man
Center 835.900 MHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 9.76 ms (601 pts)
Freq Offset
0.00000000 Hz
Occupied Bandwidth
1.2512 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Signal Track
On
Off
Transmit Freq Error -10.601 kHz
x dB Bandwidth 1.391 MHz*
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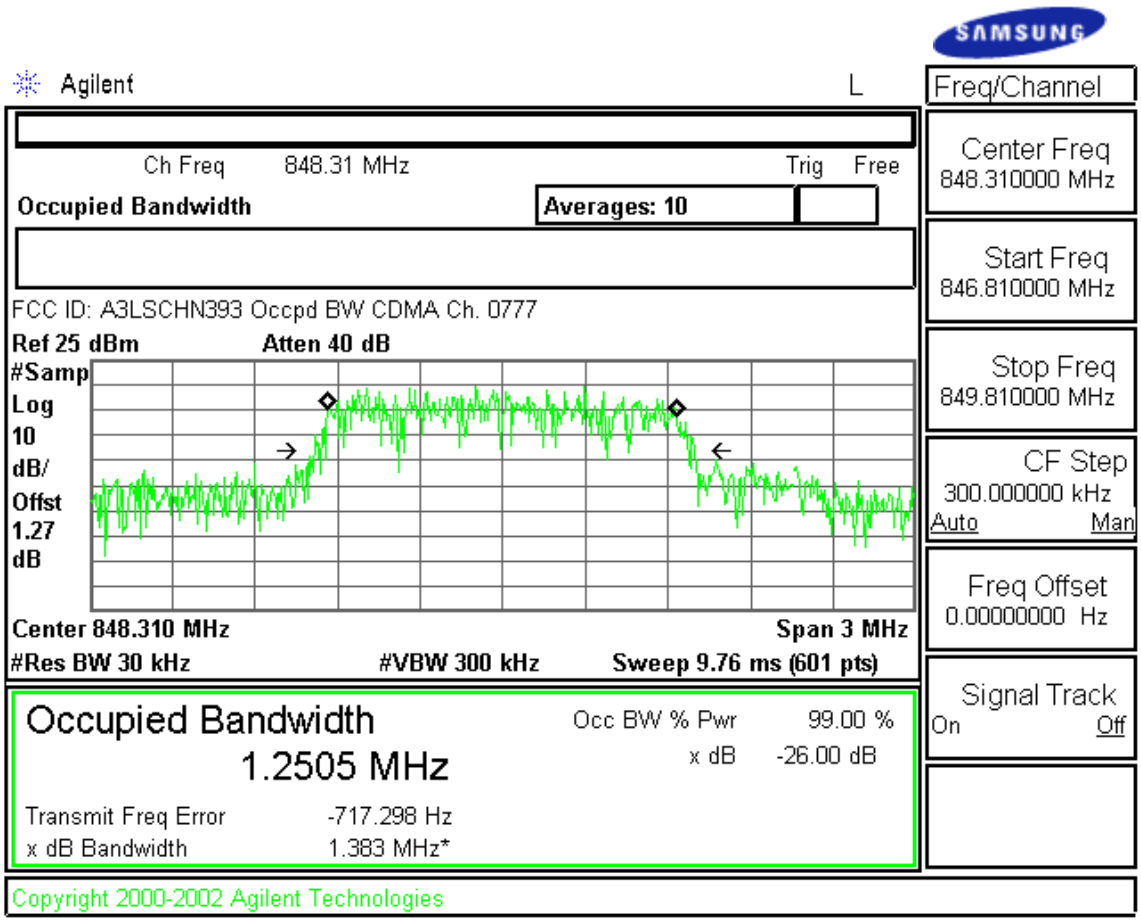
SAMSUNG
Agilent
L
Freq/Channel
Ch Freq 848.31 MHz
Trig Free
Occupied Bandwidth
Averages: 10
Center Freq
848.310000 MHz
Start Freq
846.810000 MHz
FCC ID: A3LSCHN393 Occpd BW CDMA Ch. 0777
Ref 25 dBm
Atten 40 dB
#Samp
Log
10
dB/
Offst
1.27
dB
Stop Freq
849.810000 MHz
CF Step
300.000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Center 848.310 MHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 9.76 ms (601 pts)
Signal Track
On
Off
Occupied Bandwidth
1.2505 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -717.298 Hz
x dB Bandwidth 1.383 MHz*
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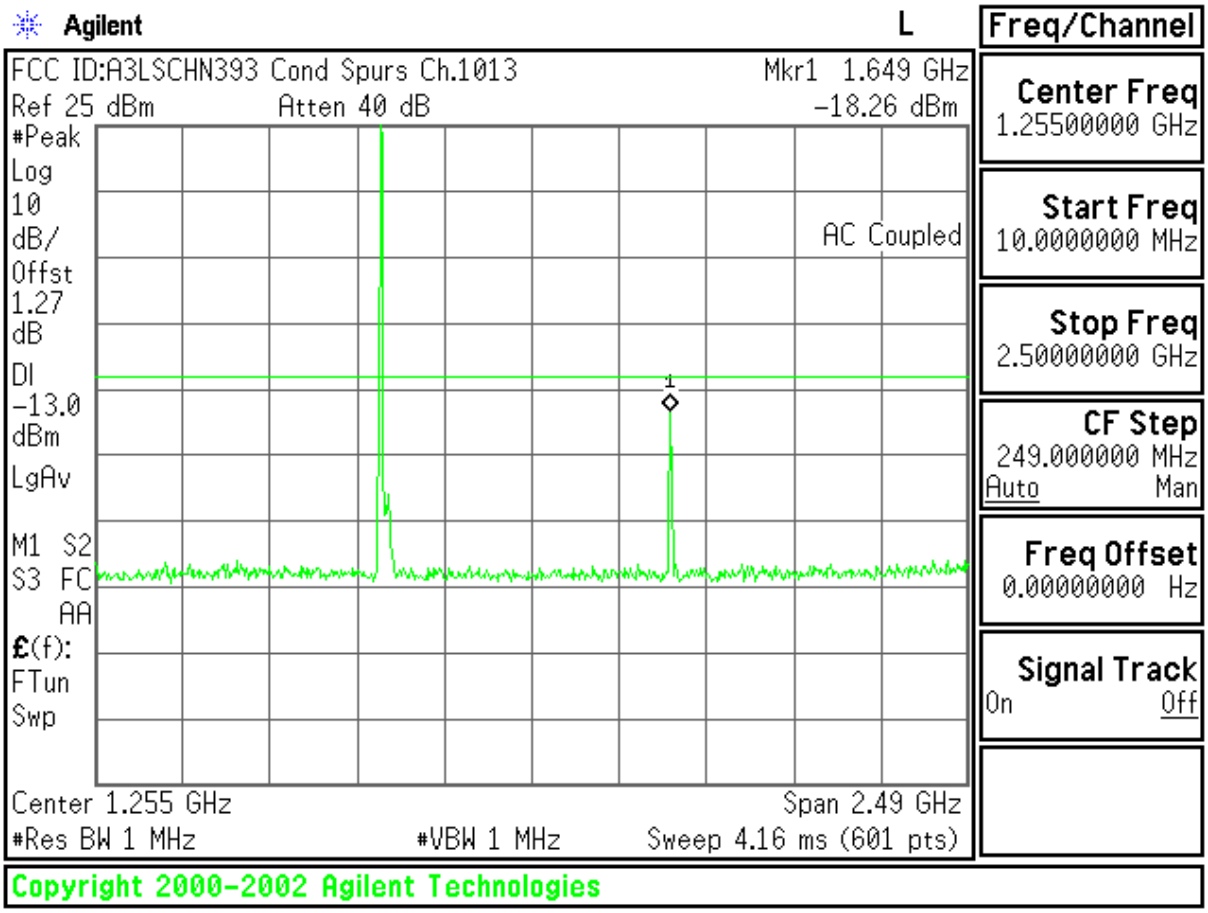
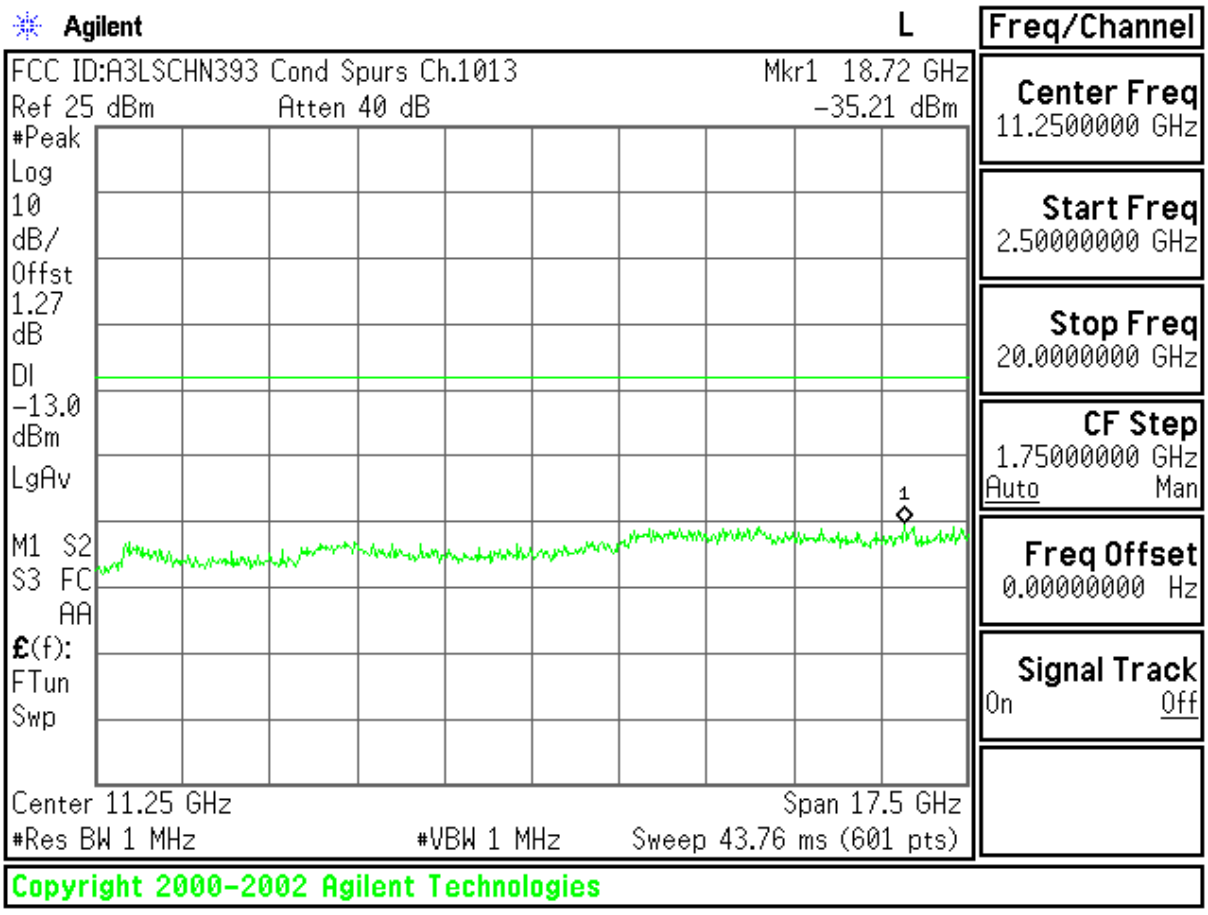
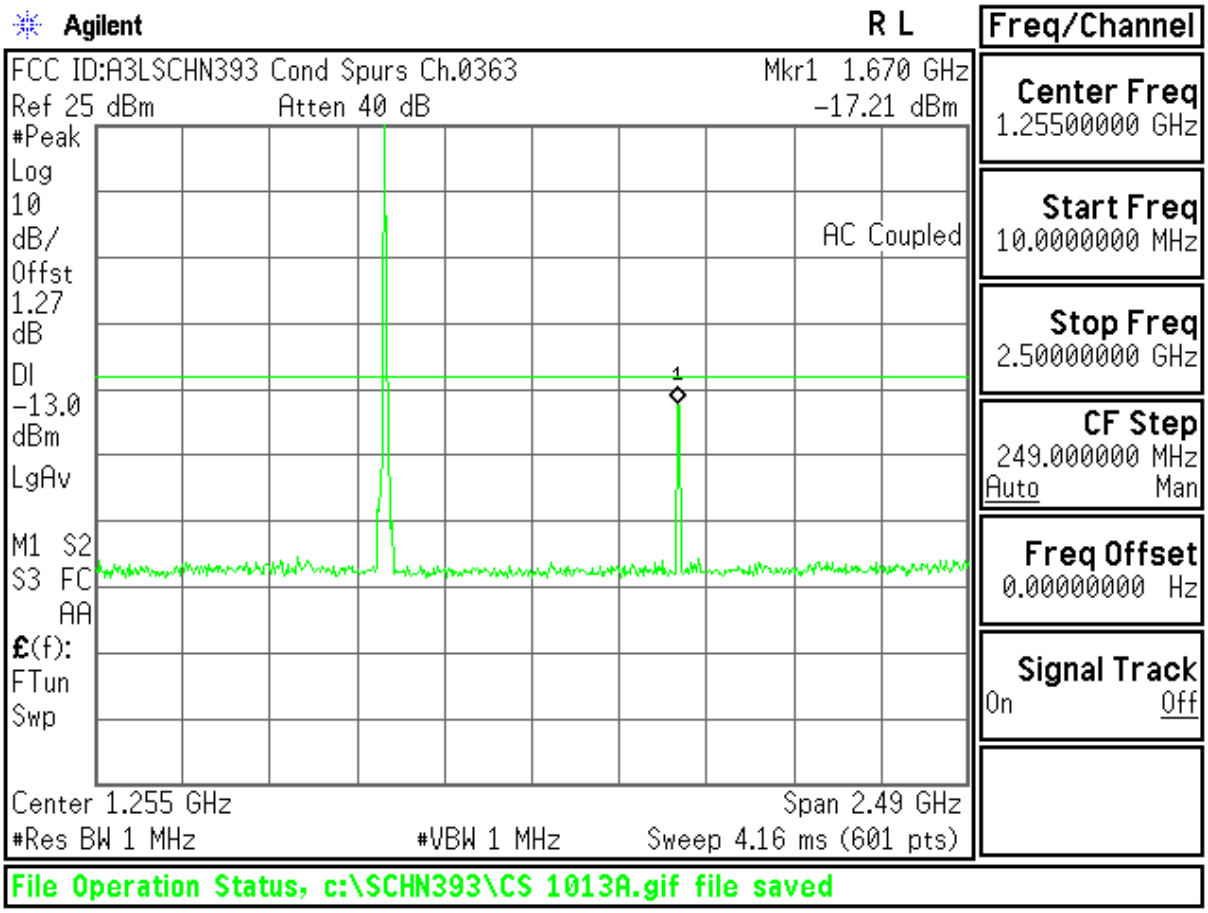

Agilent
L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.1013
Mkr1 1.649 GHz
Ref 25 dBm
Atten 40 dB
-18.26 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.255 GHz
Span 2.49 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.1013
Mkr1 18.72 GHz
Ref 25 dBm
Atten 40 dB
-35.21 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Center Freq
11.2500000 GHz
Start Freq
2.50000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.75000000 GHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
R L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.0363
Mkr1 1.670 GHz
Ref 25 dBm
Atten 40 dB
-17.21 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.255 GHz
Span 2.49 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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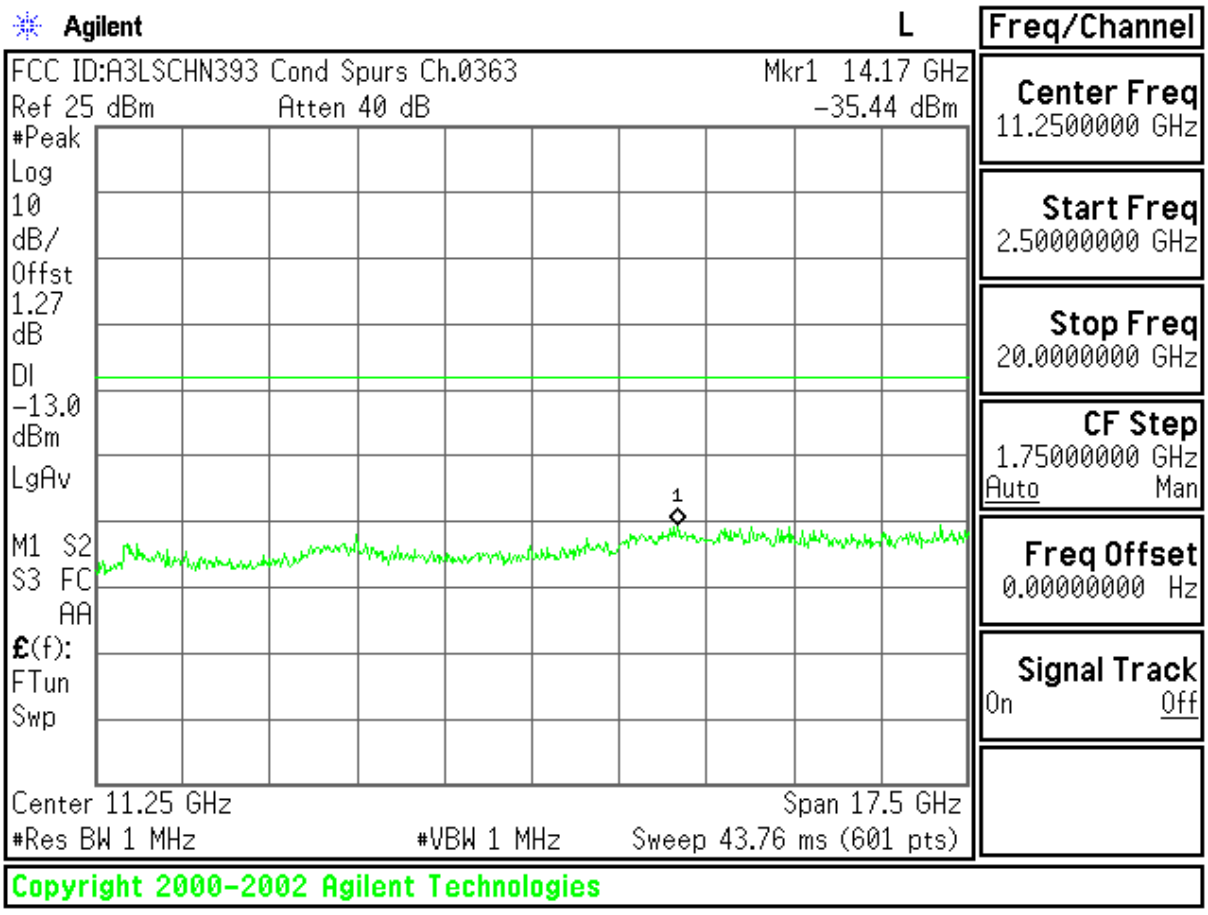
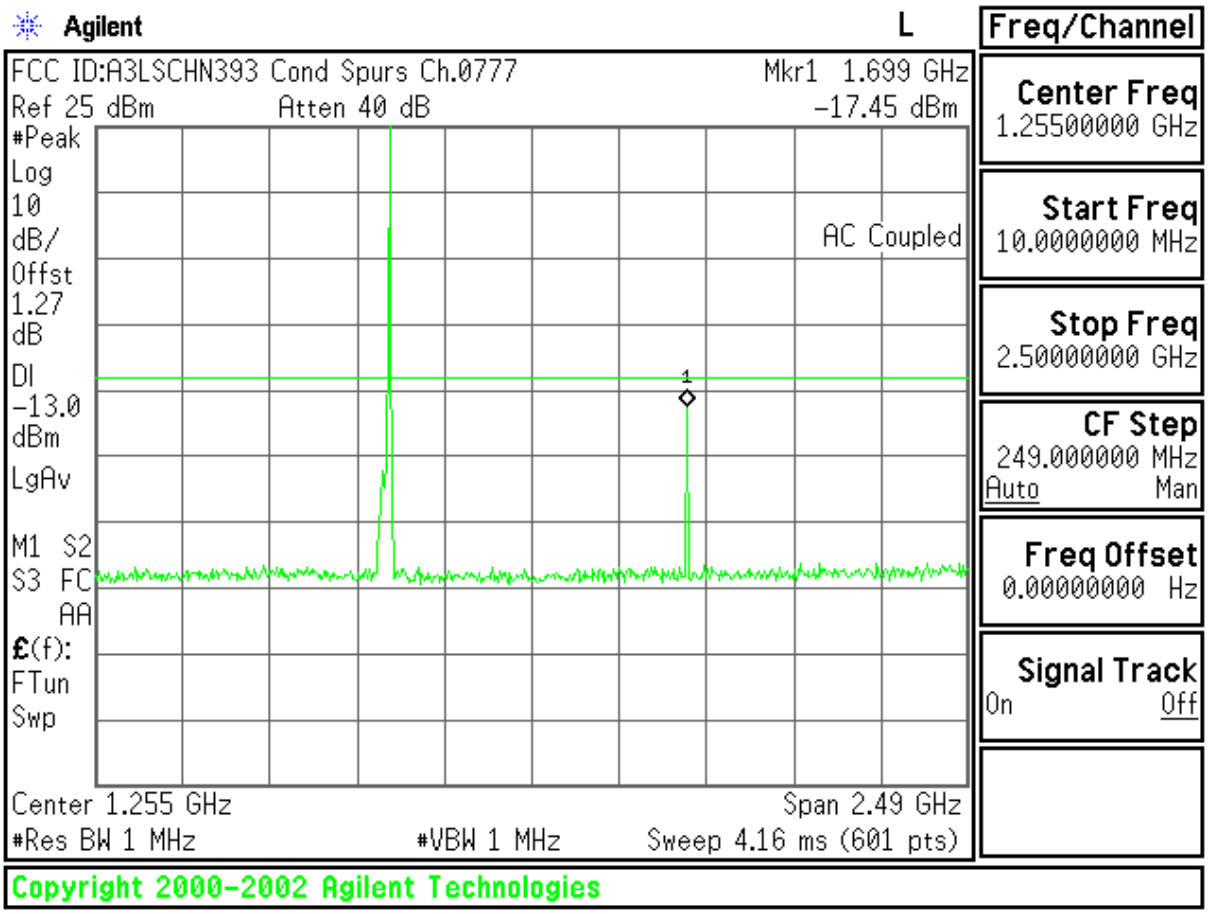

Agilent
L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.0363
Mkr1 14.17 GHz
Ref 25 dBm
Atten 40 dB
-35.44 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Center Freq
11.2500000 GHz
Start Freq
2.50000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.75000000 GHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies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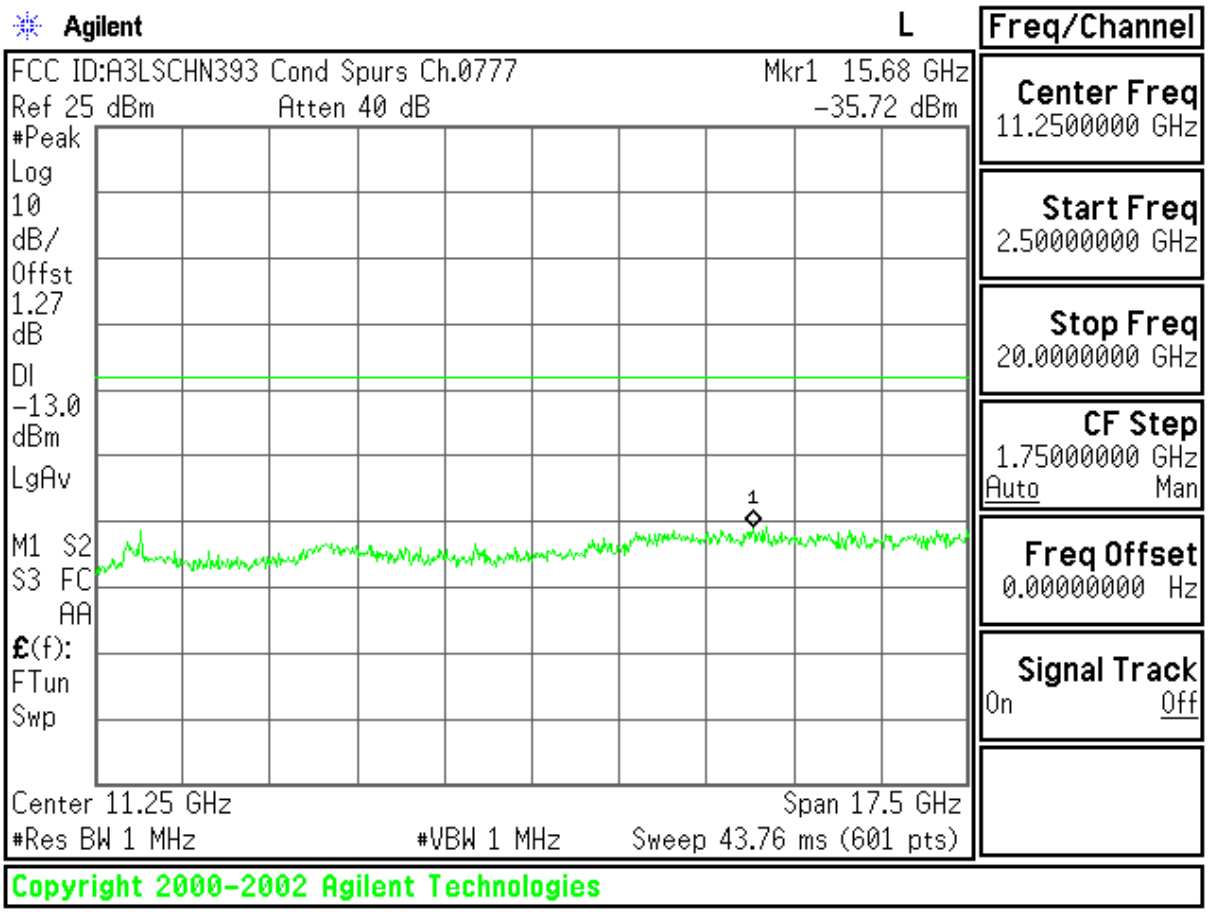
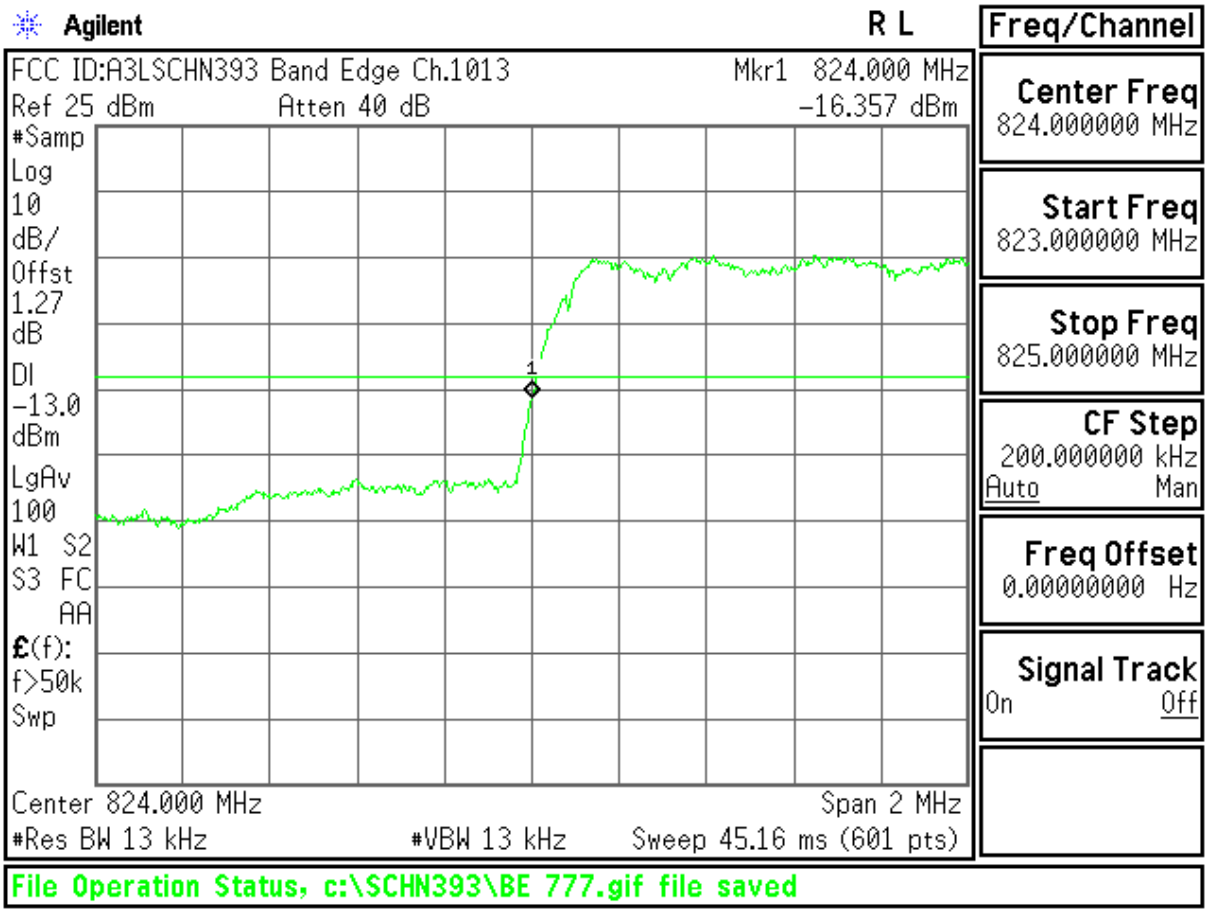
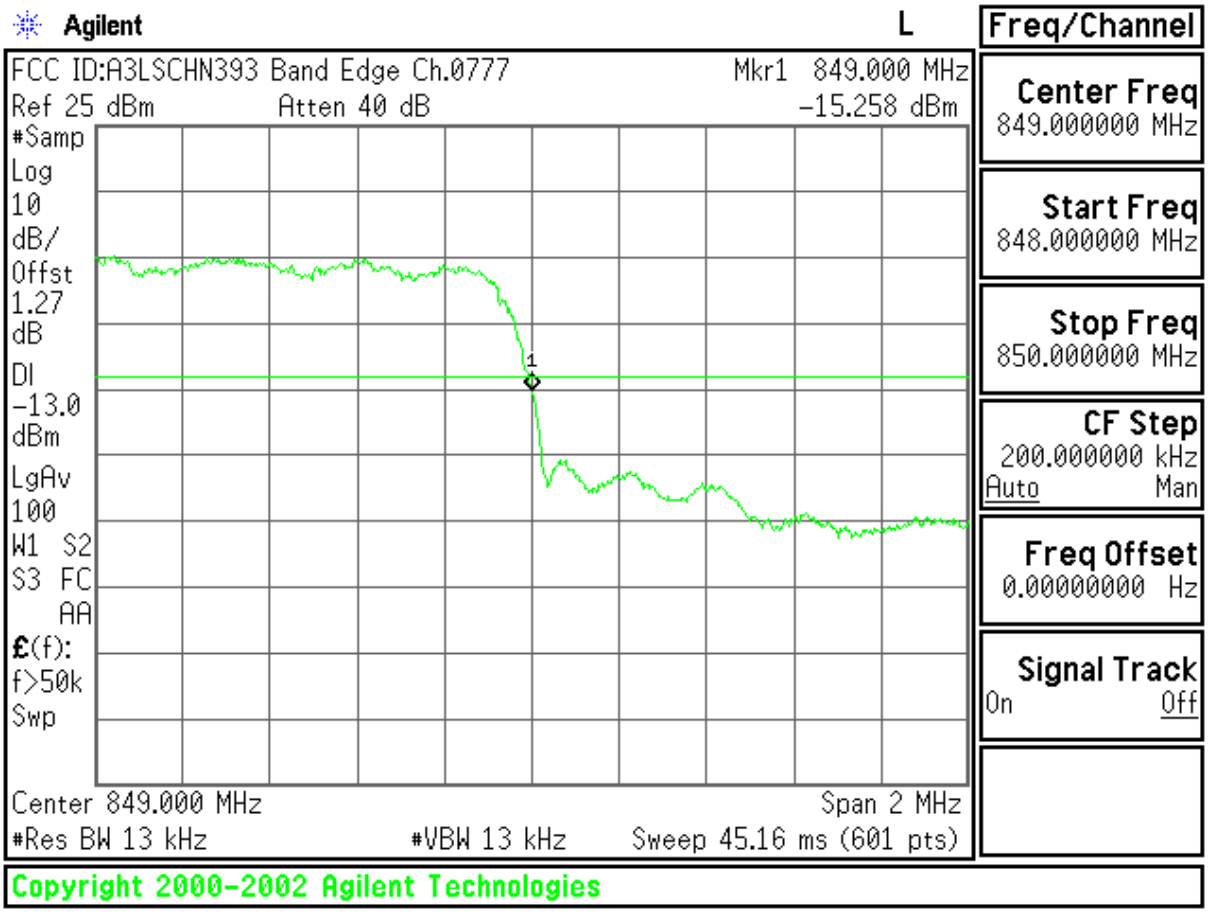
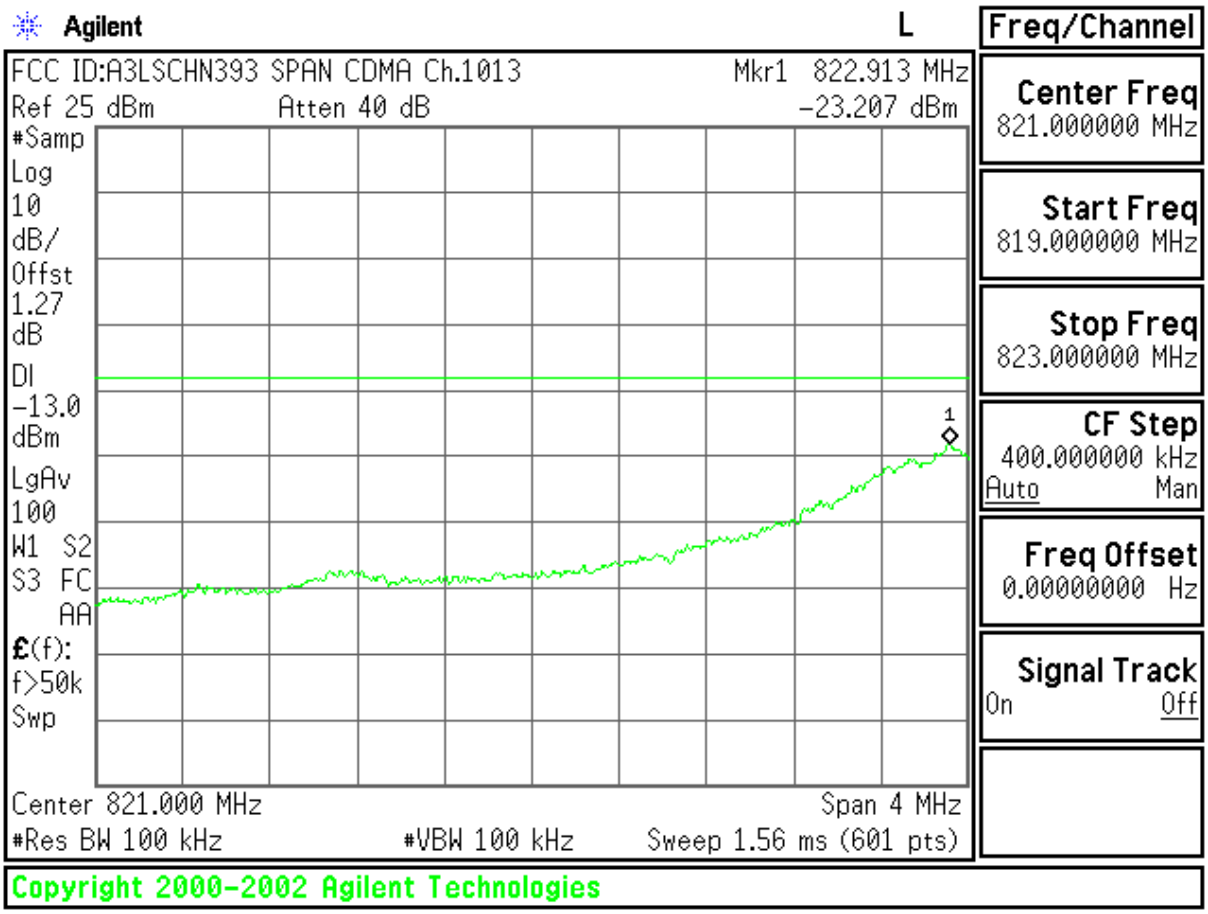
L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.0777
Mkr1 1.699 GHz
Ref 25 dBm
Atten 40 dB
-17.45 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 1.255 GHz
Span 2.49 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSCHN393 Cond Spurs Ch.0777
Mkr1 15.68 GHz
Ref 25 dBm
Atten 40 dB
-35.72 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Center Freq
11.2500000 GHz
Start Freq
2.50000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.75000000 GHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
R L
Freq/Channel
FCC ID:A3LSCHN393 Band Edge Ch.1013
Mkr1 824.000 MHz
Ref 25 dBm
Atten 40 dB
-16.357 dBm
#Samp
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
100
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center Freq
824.000000 MHz
Start Freq
823.000000 MHz
Stop Freq
825.000000 MHz
CF Step
200.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 824.000 MHz
Span 2 MHz
#Res BW 13 kHz
#VBW 13 kHz
Sweep 45.16 ms (601 pts)
File Operation Status, c:\SCHN393\BE 777.gif file saved


Agilent
L
Freq/Channel
FCC ID:A3LSCHN393 Band Edge Ch.0777
Mkr1 849.000 MHz
Ref 25 dBm
Atten 40 dB
-15.258 dBm
#Samp
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
100
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center Freq
849.000000 MHz
Start Freq
848.000000 MHz
Stop Freq
850.000000 MHz
CF Step
200.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 849.000 MHz
Span 2 MHz
#Res BW 13 kHz
#VBW 13 kHz
Sweep 45.16 ms (601 pts)
Copyright 2000-2002 Agilent Technologies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Freq/Channel
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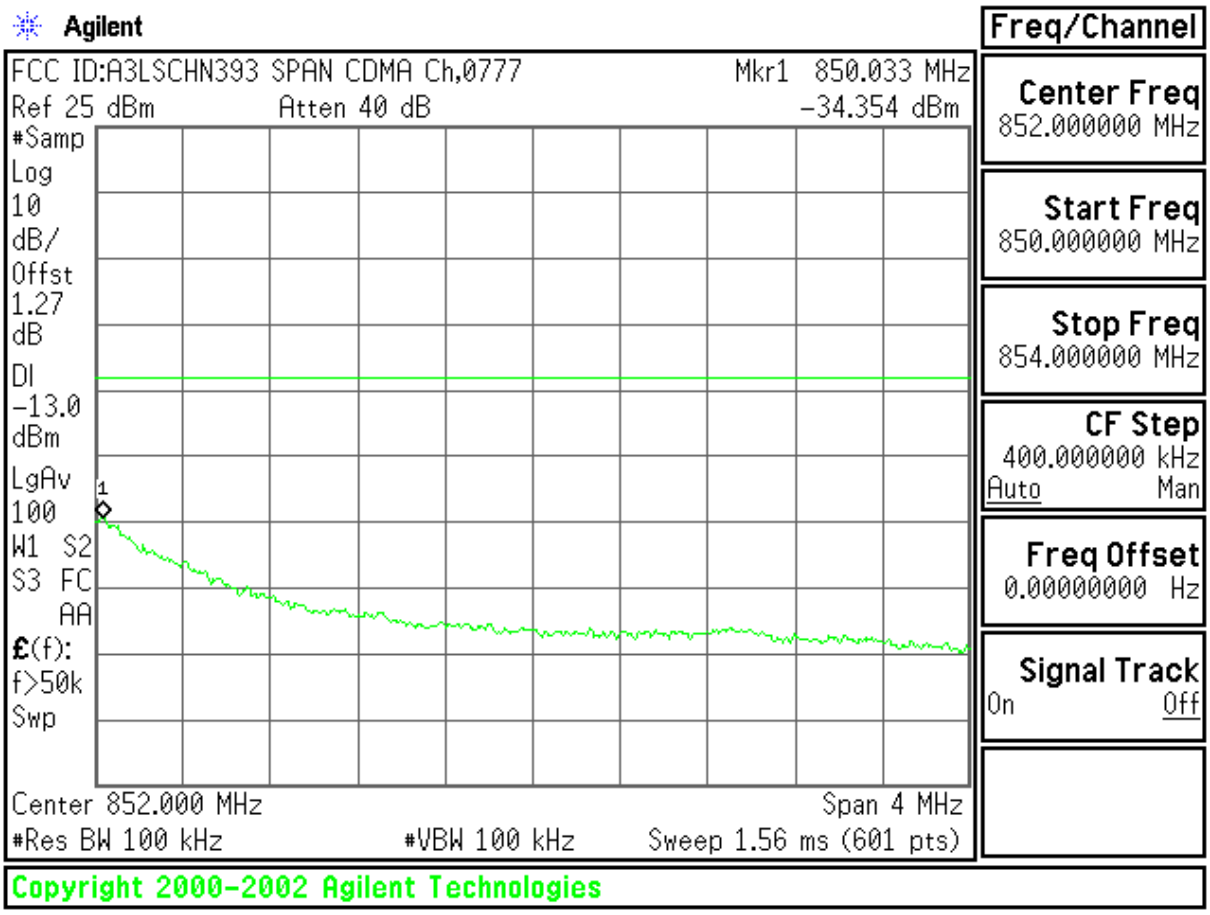
Mkr1 822.913 MHz
Ref 25 dBm
Atten 40 dB
-23.207 dBm
#Samp
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
100
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 821.000 MHz
Span 4 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.56 ms (601 pts)
Center Freq
821.000000 MHz
Start Freq
819.000000 MHz
Stop Freq
823.000000 MHz
CF Step
400.000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
Freq/Channel
FCC ID:A3LSCHN393 SPAN CDMA Ch,0777
Mkr1 850.033 MHz
Ref 25 dBm
Atten 40 dB
-34.354 dBm
#Samp
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
100
W1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 852.000 MHz
Span 4 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.56 ms (601 pts)
Center Freq
852.000000 MHz
Start Freq
850.000000 MHz
Stop Freq
854.000000 MHz
CF Step
400.000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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PCTEST Engineering Laboratory, Inc.

6660-B Dobbin Road · Columbia, MD 21045 · U.S.A.
TEL (410) 290-6652 · FAX (410) 290-6654
http://www.pctestlab.com

FCC Part 22 EMC Supplement & Full Data Summary

Samsung Electronics Co., Ltd.
3351 Michelson Drive, Suite 290
Irvine, CA 92612

Dates of Tests: November 13-14, 2003
Test Report S/N: 22.231028577.A3L
Test Site: PCTEST Lab, Columbia MD

FCC ID	**A3LSCHN393**
APPLICANT	**SAMSUNG ELECTRONICS CO., LTD.**

Classification:	**Non-Broadcast Transmitter Held to Ear (TNE)**
FCC Rule Part(s):	**§22(H); §2**
EUT Type:	**Dual-Mode Cellular Phone (AMPS/CDMA)**
Model:	***SCH-N393***
Tx Frequency Range:	**824.04MHz – 848.97MHz (AMPS) / 824.70 – 848.31MHz (CDMA)**
Rx Frequency Range:	**869.04MHz – 893.97MHz (AMPS) / 869.70 – 893.31MHz (CDMA)**
Max. RF Output Power:	**0.370 W ERP AMPS (25.685 dBm) / 0.327 W ERP CDMA (25.140 dBm)**
Max. SAR Measurement:	**1.370 W/kg AMPS Head SAR; 0.610 W/kg AMPS Body SAR; 1.420 W/kg CDMA Head SAR; 0.610 W/kg CDMA Body SAR**
Emission Designator(s):	**40K0F8W / 40K0F1D (AMPS), 1M25F9W (CDMA)**
Test Device Serial No.	**Identical Prototype [S/N: #FA-030-A]**

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

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant conditions: Power output listed is ERP. SAR compliance for body- worn operating configuration is based on a separation distance of 1.5 cm between the back of the unit and the body of the user. End-users must be informed of the body-worn operating requirements for satisfying RF exposure compliance. Belt clips or holsters may not contain metallic components.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Alfred Cirwithian
Vice President Engineering

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9.1 SAMPLE CALCULATIONS	17
10.1 CONCLUSION	18

APPENDIX A: TEST PLOTS

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MEASUREMENT REPORT

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

§2.1033 General Information

Applicant Name:	**SAMSUNG ELECTRONICS CO., LTD.**
Address:	**3351 Michelson Drive, Suite 290** **Irvine, CA 92612**

- FCC ID: **A3LSCHN393**
- Quantity: Quantity production is planned
- Emission Designators: 40K0F8W / 40K0F1D (AMPS), 1M25F9W (CDMA)
- Tx Freq. Range: 824.04 – 848.97 MHz (AMPS)
824.70 – 848.31 MHz (CDMA)
- Rx Freq. Range: 869.04 – 893.97 MHz (AMPS)
869.70 – 893.31 MHz (CDMA)
- Max. Power Rating: 0.370 W ERP AMPS (25.685 dBm) / 0.327 W ERP CDMA (25.140 dBm)
- FCC Classification(s): Non-Broadcast Transmitter Held to Ear (TNE)
- Equipment (EUT) Type: Dual-Mode Cellular Phone (AMPS/CDMA)
- Modulation(s): AMPS / CDMA
- Frequency Tolerance: ± 0.00025% (2.5 ppm)
- FCC Rule Part(s): §22(H)
- Dates of Tests: November 13-14, 2003
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 22.231028577.A3L

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2.1 INTRODUCTION

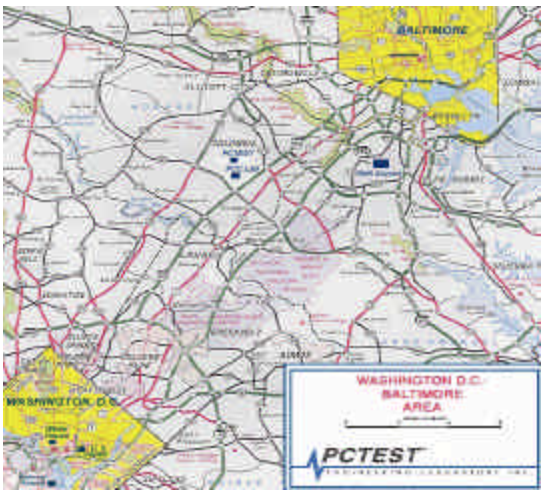

Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

These measurement tests were conducted at ***PCTEST Engineering Laboratory, Inc.*** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

Measurement Procedure

The radiated and spurious measurements were made outdoors at a 3-meter test range (see Figure2). The equipment under test is placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

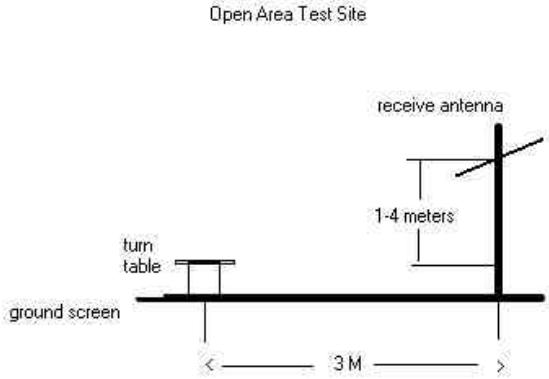

Figure 2. Diagram of 3-meter outdoor test range

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3.1 DESCRIPTION OF TESTS

3.2 Transmitter Audio Frequency Response

The frequency response of the audio modulating circuit over the frequency range 100 – 5000 Hz is measured. The audio signal generator is connected to the audio input circuit/microphone of the EUT. The audio signal input is adjusted to obtain 50% modulation at 1kHz and this point is taken as the 0dB reference. With the input held constant and below the limit at all frequencies, the audio signal generator is varied from 100 to 50 kHz.

3.3 Audio Low Pass Filter Frequency Response

The response in dB relative to 1kHz is measured using the HP8901 a Modulation Analyzer. For the frequency response of the audio low-pass filter, the audio input is connected at the input to the modulation limiter and the modulated stage. The audio output is connected at the output of the modulated stage. The corresponding plots are shown herein.

3.4 Modulation Limiting

The audio signal generator is connected to the audio input circuit/microphone of the EUT. The modulation response is measured for each of the three modulating frequencies (300Hz, 1000 Hz, and 3000Hz), and the input voltage is varied from 30% modulation (±3.6kHz deviation) to at least 20dB higher than the saturation point. Measurements of modulation and the plots are attached herein. Measurements were performed for ST, SAT, and wide-band data modulations. The corresponding results are shown herein.

Note: ST, SAT, & Wide-Band data were internally generated by the EUT.

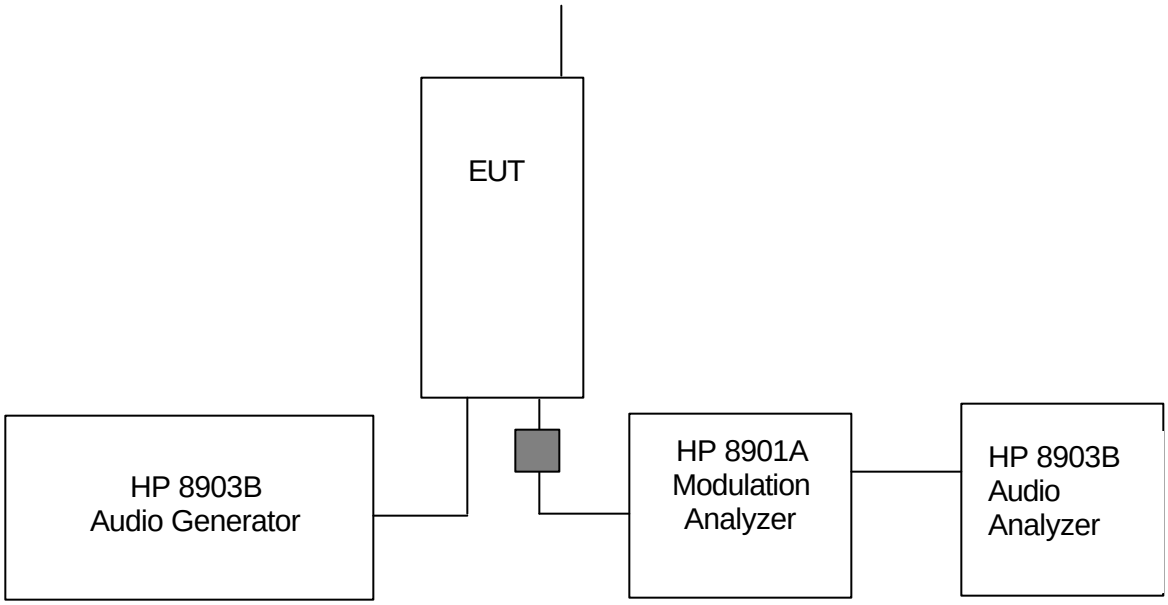

Fig. 3. Transmitter Audio Frequency & Tone Modulation Test Setup.

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3.5 Occupied Bandwidth Emission Limits

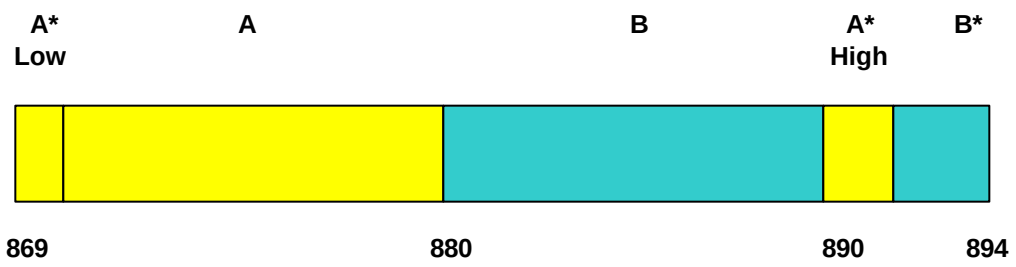
(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

3.6 Cellular - Base Frequency Blocks



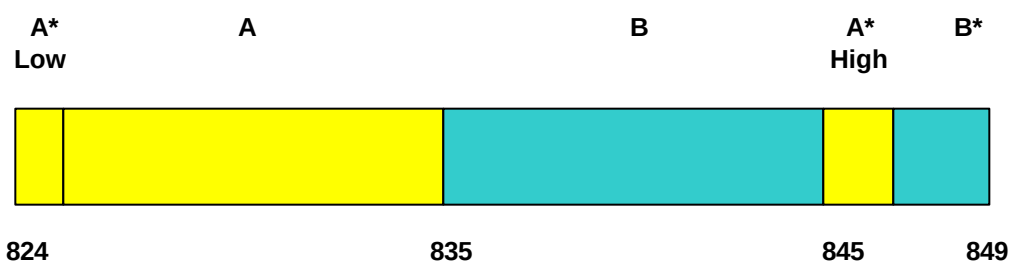
BLOCK 1: 869 – 880 MHz (A* Low + A)

BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 4: 891.5 – 894 MHz (B*)

3.7 Cellular - Mobile Frequency Blocks



BLOCK 1: 824 – 835 MHz (A* Low + A)

BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)

BLOCK 4: 846.5 – 849 MHz (B*)

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3.8 Occupied Bandwidth

The audio signal generator is adjusted to 1kHz. The output level is set to ±6kHz deviation. With the level constant, the frequency is set to 2500Hz. Then the audio signal level is increased by 16dB. The occupied bandwidth data is obtained for the SAT (Supervisory Audio Tone), ST (Signaling Tone), WBD (Wideband data), and DTMF (Dual Tone Multi Frequencies). The results are shown on the attached graphs.

Specified Limits:

a. On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45kHz, the sideband is at least 26dB below the carrier.

b. On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to and including 90kHz, the sideband is at least 45dB below the carrier.

c. On any frequency removed from the assigned carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 40 + $\log_{10}$ (mean power output in Watts) dB, whichever is the smaller attenuation.

3.9 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10 GHz. The transmitter is modulated with a 2500Hz tone at a level of 16dB greater than that required to provided 50% modulation.

At the input terminals of the spectrum analyzer, an isolator (RF circulator with on port terminated with 50 ohms) and an 870 MHz to 890 MHz bandpass filter is connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests) and the analyzer. The rejection of the bandpass filter to signals in the 825 – 845 MHz range is adequate to limit the transmit energy from the test transceiver which appears to a level which will allow the analyzer to measure signals less than –90dBm. Calibration of the test receiver is performed in the 870 – 890 MHz range to insure accuracy to allow variation in the bandpass filter insertion loss to be calibrated.

3.10 Frequencies

At the input terminals of the spectrum analyzer, an isolator (RF pad) and an high-pass filter are connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests) and the analyzer. The high-pass filter (signals below 1.6 GHz) is to limit the fundamental frequency from interfering with the measurement of low-level spurious and harmonic emissions and to ensure that the preamplifier is not saturated.

3.11 Radiation Spurious and Harmonic Emissions

Radiation and harmonic emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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4.0 Frequency Stability/Temperature Variation.

The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +60°C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025 (±2.5 ppm) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (22°C to 25°C to provide a reference).
2. The equipment is subjected to an overnight "soak" at -30°C without any power applied.
3. After the overnight "soak" at -30°C (usually 14-16 hours), the equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements are made at 10°C interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency measurements are at 10 intervals starting at -30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

NOTE: The EUT is tested down to the battery endpoint.

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4.1 Test Data

4.2 Effective Radiated Power Output

A. POWER: **Low (Analog Mode)**

Freq. Tuned (MHz)	REF. LEVEL (dBm)	POL (H/V)	ERP (W)	ERP (dBm)
824.04	-35.900	H	0.003	5.373
836.49	-35.950	H	0.004	5.479
848.97	-35.900	H	0.004	5.685

B. POWER: **High (Analog Mode)**

Freq. Tuned (MHz)	REF. LEVEL (dBm)	POL (H/V)	ERP (W)	ERP (dBm)	BATTERY
824.04	-15.900	H	0.345	25.373	Standard
836.49	-15.950	H	0.353	25.479	Standard
848.97	-15.900	H	0.370	25.685	Standard

Note: Standard batteries are the only options for this phone.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

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5.1 Test Data

5.2 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 824.04 MHz
CHANNEL: 0991 (Low)
MEASURED OUTPUT POWER: 25.685 dBm = 0.370 W
MODULATION SIGNAL: FM (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 38.68 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1648.08	-37.68	6.10	-31.58	H	57.3
2472.12	-52.28	6.70	-45.58	H	71.3
3296.16	-43.68	6.80	-36.88	H	62.6
4120.20	-57.28	6.50	-50.78	H	76.5
4944.24	-54.08	7.00	-47.08	H	72.8

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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5.1 Test Data (Continued)

5.3 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 836.49 MHz
CHANNEL: 0383 (Mid)
MEASURED OUTPUT POWER: 25.685 dBm = 0.370 W
MODULATION SIGNAL: FM (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 38.68 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1672.98	-44.58	6.10	-38.48	H	64.2
2509.47	-50.98	6.70	-44.28	H	70.0
3345.96	-62.18	6.80	-55.38	H	81.1
4182.45	-57.08	6.50	-50.58	H	76.3
5018.94	-62.88	7.00	-55.88	H	81.6

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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5.1 Test Data (Continued)

5.4 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 848.97 MHz
CHANNEL: 0799 (High)
MEASURED OUTPUT POWER: 25.685 dBm = 0.370 W
MODULATION SIGNAL: FM (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 38.68 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1697.94	-34.88	6.10	-28.78	V	54.5
2546.91	-44.28	6.70	-37.58	V	63.3
3395.88	-40.18	6.80	-33.38	V	59.1
4244.85	-58.48	6.50	-51.98	V	77.7
5093.82	-51.58	7.00	-44.58	V	70.3

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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6.1 Test Data

6.2 FREQUENCY STABILITY (AMPS)

OPERATING FREQUENCY: 836,490,001 Hz

CHANNEL: 383

REFERENCE VOLTAGE: 3.7 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (ºC)	FREQ. (Hz)	Deviation (%)
100 %	3.70	+ 20 (Ref)	836,490,001	0.000000
100 %		- 30	836,489,850	0.000018
100 %		- 20	836,489,792	0.000025
100 %		- 10	836,489,758	0.000029
100 %		0	836,489,733	0.000032
100 %		+ 10	836,489,717	0.000034
100 %		+ 20	836,490,001	0.000000
100 %		+ 25	836,489,248	0.000090
100 %		+ 30	836,489,901	0.000012
100 %		+ 40	836,489,850	0.000018
100 %		+ 50	836,489,809	0.000023
100 %		+ 60	836,489,758	0.000029
85 %	3.15	+ 20	836,490,001	0.000000
115 %	4.26	+ 20	836,490,001	0.000000
BATT. ENDPOINT	2.97	+ 20	836,490,001	0.000000

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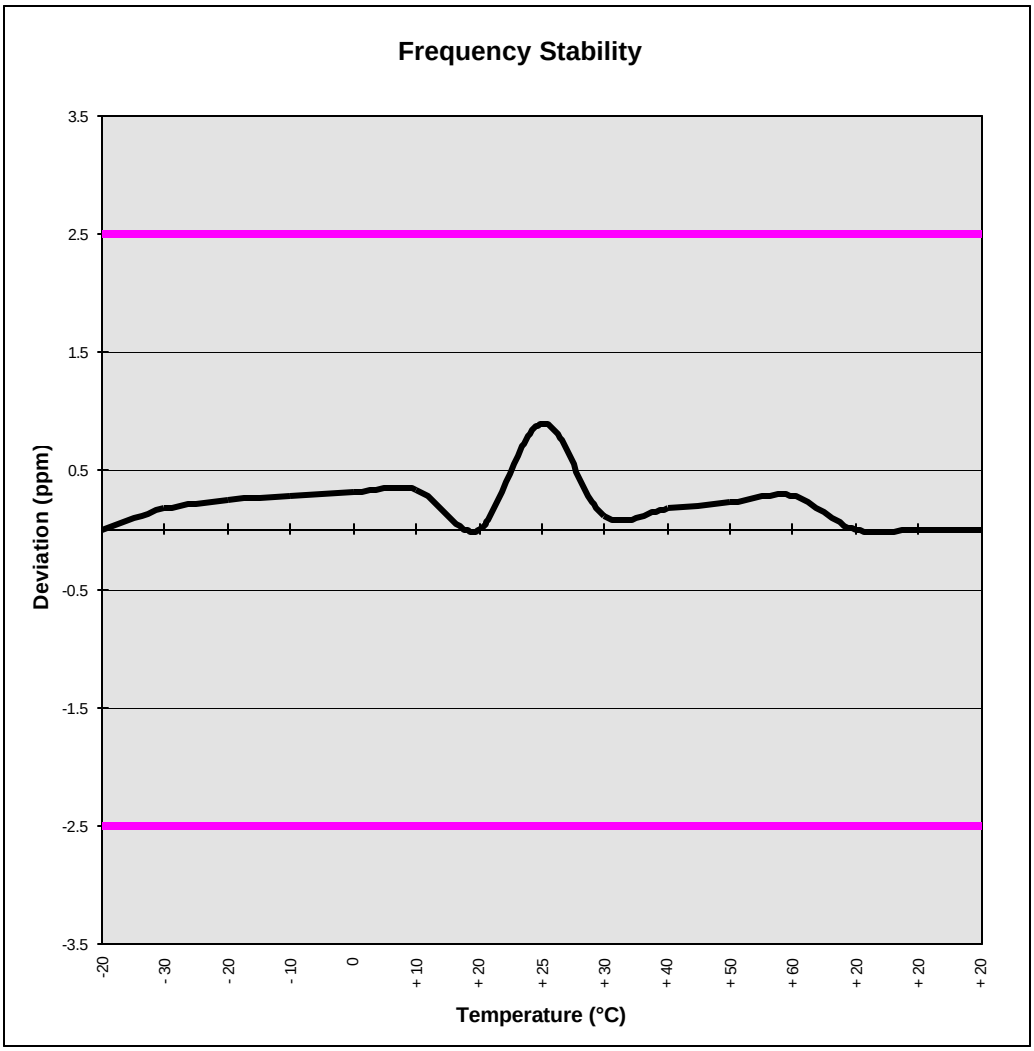
6.1 Test Data (Continued)

6.3 FREQUENCY STABILITY (AMPS)



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7.1 PLOT(S) OF EMISSIONS

(SEE ATTACHED)

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8.1 TEST EQUIPMENT

Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	8566B (100Hz-22GHz) HP	08/15/04	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	04/17/04	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (100Hz-1.8GHz)	08/10/04	3144A02458
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/04	2232A19558
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/04	1851A09816
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	09/11/04	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	04/12/04	0792-032
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	03/11/04	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	09/17/04	0608-03241
Quasi-Peak Adapter	HP 85650A	08/15/04	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/04	0194-04082
Gigatronics Universal Power Meter	8657A		1835256
Gigatronics Power Sensor	80701A (0.05-18GHz)		1833460
Signal Generator	HP 8648D (9kHz-4GHz)		3613A00315
Amplifier Research	5S1G4 (5W, 800MHz-4.2GHz)		22322
Network Analyzer	HP 8753E (30kHz-3GHz)		JP38020182
Audio Analyzer	HP 8903B		3011A09025
Modulation Analyzer	HP 8901A		2432A03467
Power Meter	HP 437B		3125U24437
Power Sensor	HP 8482H (30µW-3W)		2237A02084
Harmonic/Flicker	Test System HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design		1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set)		
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN (6)	3816/2		1079
Microwave Preamplifier 40dB	Gain HP 83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP 8594A		3051A00187
Spectrum Analyzer (2)	HP 8591A		3034A01395, 3108A02053
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Shielded Screen Room	RF Lindgren Model 26-2/2-0		6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81		R2437 (PCT278)
Enviromental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

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9.1 SAMPLE CALCULATIONS

A. Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)
(Measured at the 99.75% power bandwidth)

Emission Designator = 40K0F8W

Calculation: Voice + SAT
Modulation: Voice is 2.5 kHz and SAT is 6 kHz – Maximum modulation is M = 6 kHz
Deviation: Voice is 12 kHz and SAT is 2 kHz – Maximum deviation is D = 12 + 2 = 14 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

Calculation: Signaling Tone (ST) + SAT
Modulation: ST is 10 kHz and SAT is 6 kHz – Maximum modulation is M = 10 kHz
Deviation: ST is 8 kHz and SAT is 2 kHz – Maximum deviation is D = 8 + 2 = 10 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

Emission Designator = 40K0F1D

Calculation: Voice + SAT
Modulation: Wideband Data is 10 kHz and SAT is 6 kHz – Maximum modulation is M = 10 kHz
Deviation: Wideband Data is 8 kHz and SAT is 2 kHz – Maximum deviation is D = 8 + 2 = 10 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

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10.1 CONCLUSION

The data collected shows that the **SAMSUNG ELECTRONICS CO., LTD. Dual-Mode Cellular Phone (AMPS/CDMA) FCC ID: A3LSCHN393** complies with all the requirements of Parts 2 and 22 of the FCC rules.

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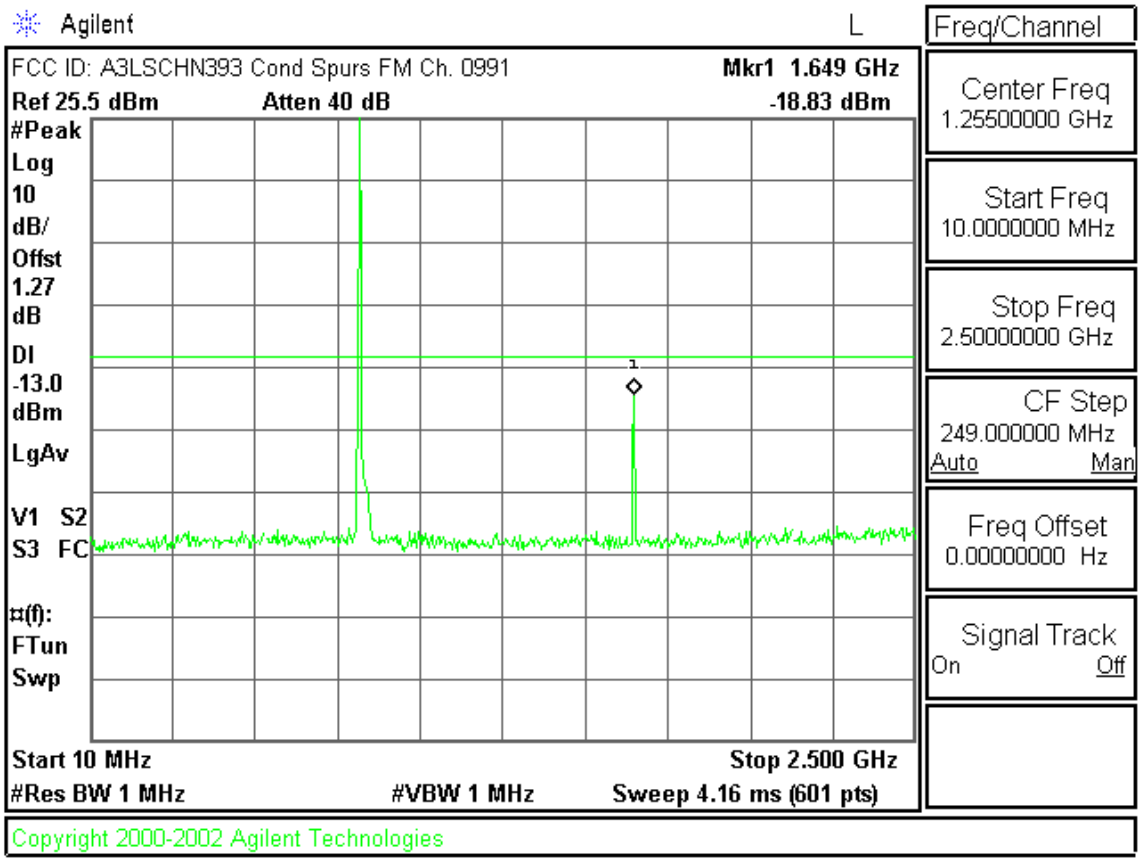
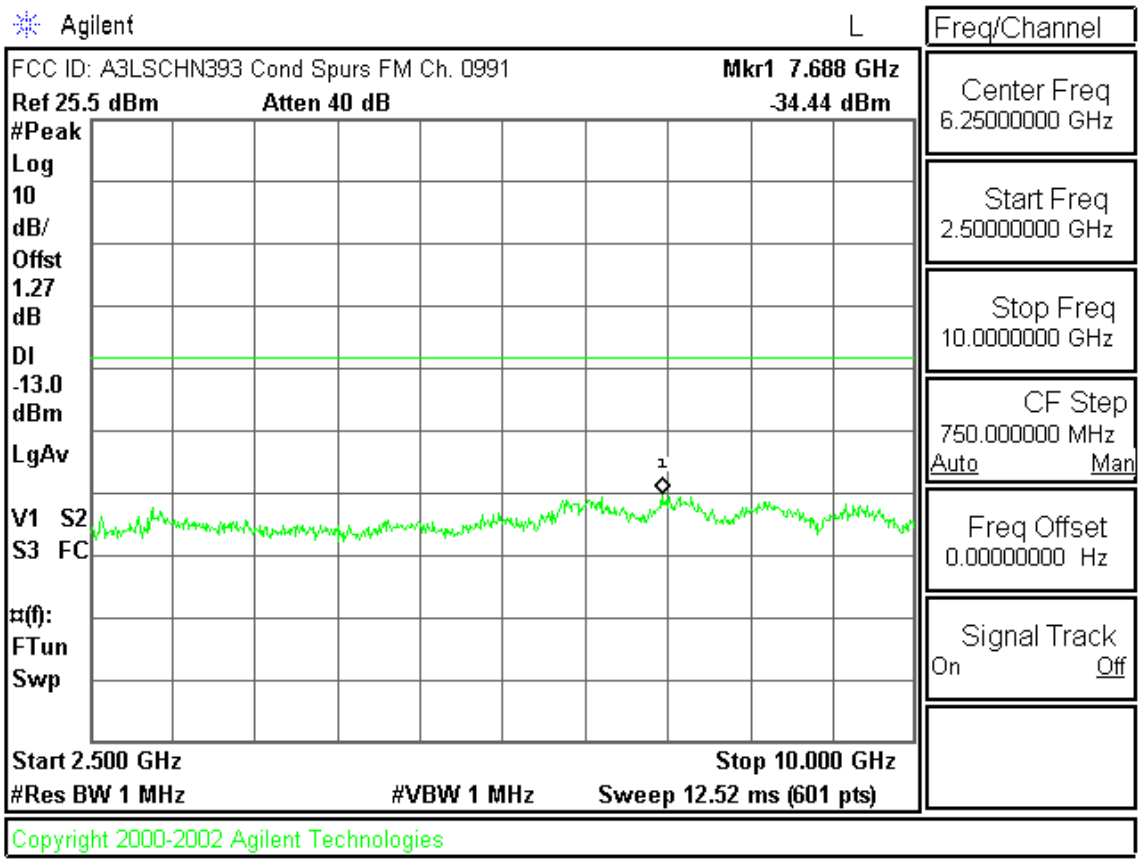
APPENDIX A: TEST PLOTS


Agilent
L
Freq/Channel
FCC ID: A3LSCHN393 Cond Spurs FM Ch. 0991
Mkr1 1.649 GHz
Ref 25.5 dBm
Atten 40 dB
-18.83 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies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L
Freq/Channel
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Mkr1 7.688 GHz
Ref 25.5 dBm
Atten 40 dB
-34.44 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Start 2.500 GHz
Stop 10.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
Center Freq
6.25000000 GHz
Start Freq
2.50000000 GHz
Stop Freq
10.0000000 GHz
CF Step
750.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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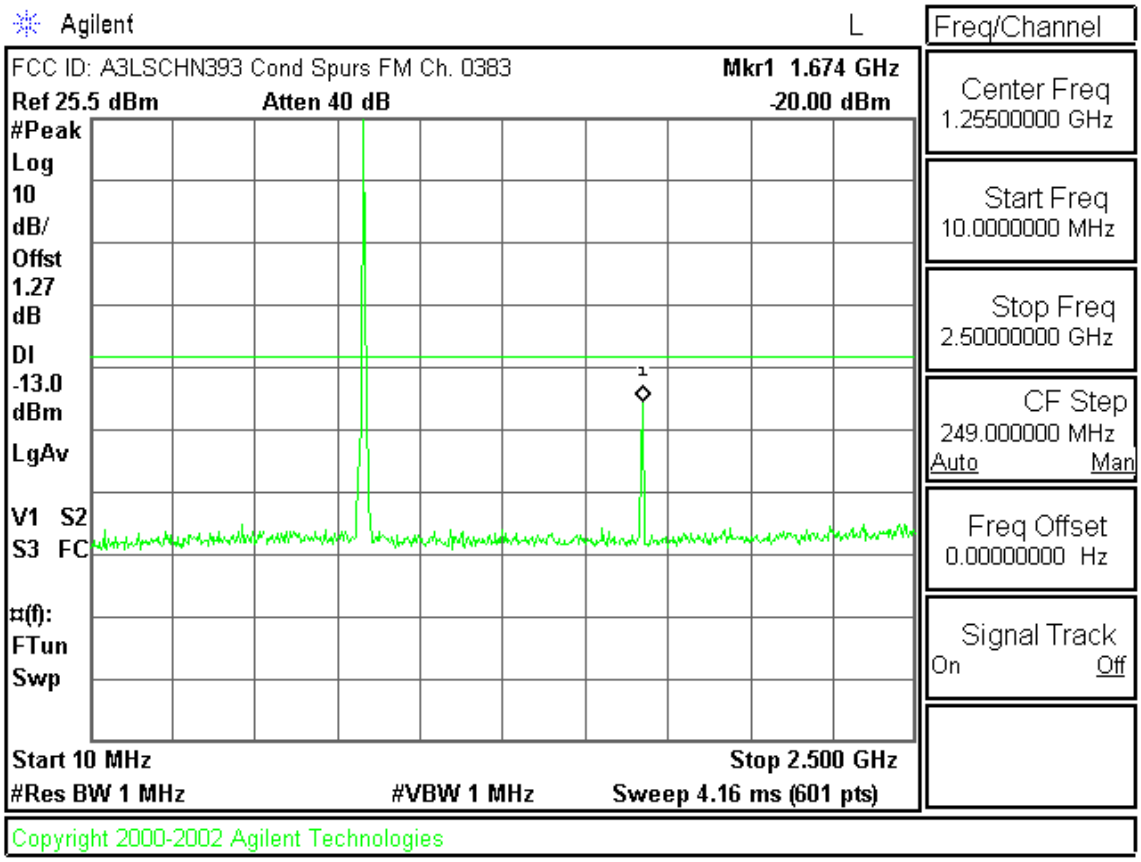
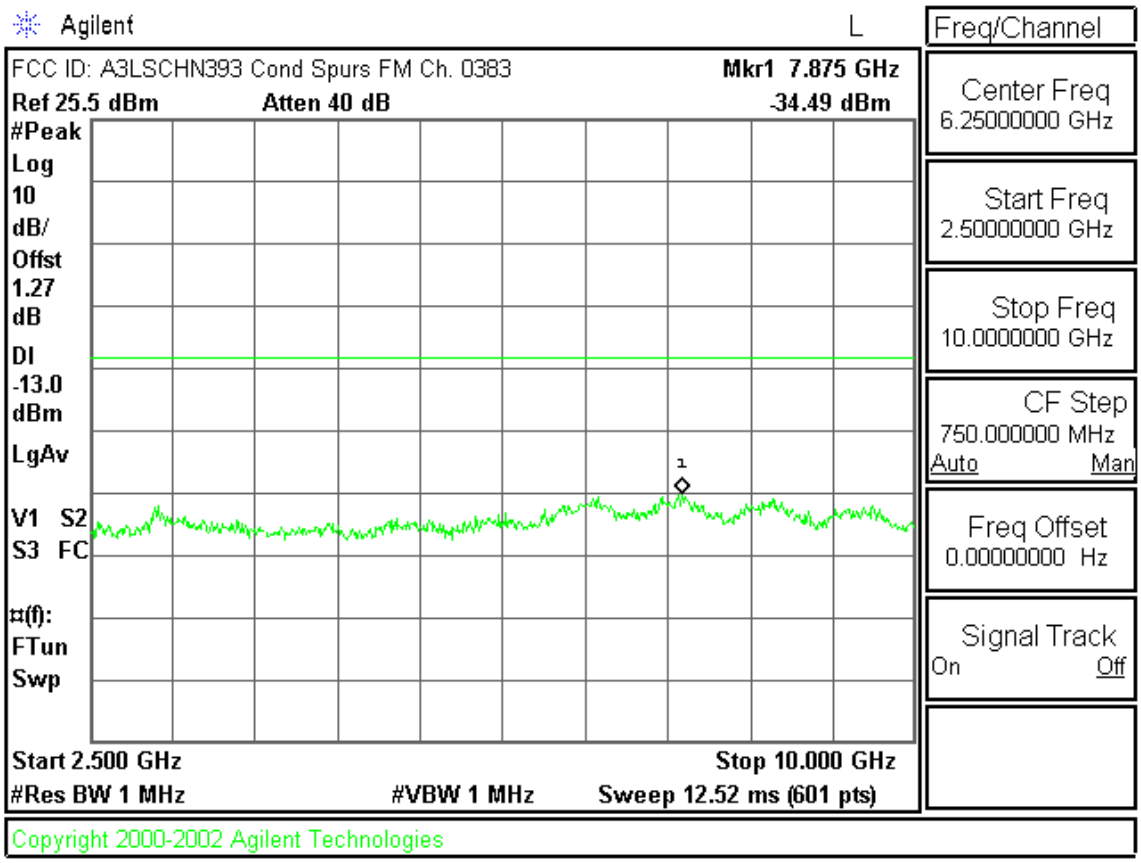

Agilent
L
Freq/Channel
FCC ID: A3LSCHN393 Cond Spurs FM Ch. 0383
Mkr1 1.674 GHz
Ref 25.5 dBm
Atten 40 dB
-20.00 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID: A3LSCHN393 Cond Spurs FM Ch. 0383
Mkr1 7.875 GHz
Ref 25.5 dBm
Atten 40 dB
-34.49 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center Freq
6.25000000 GHz
Start Freq
2.50000000 GHz
Stop Freq
10.0000000 GHz
CF Step
750.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 2.500 GHz
Stop 10.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
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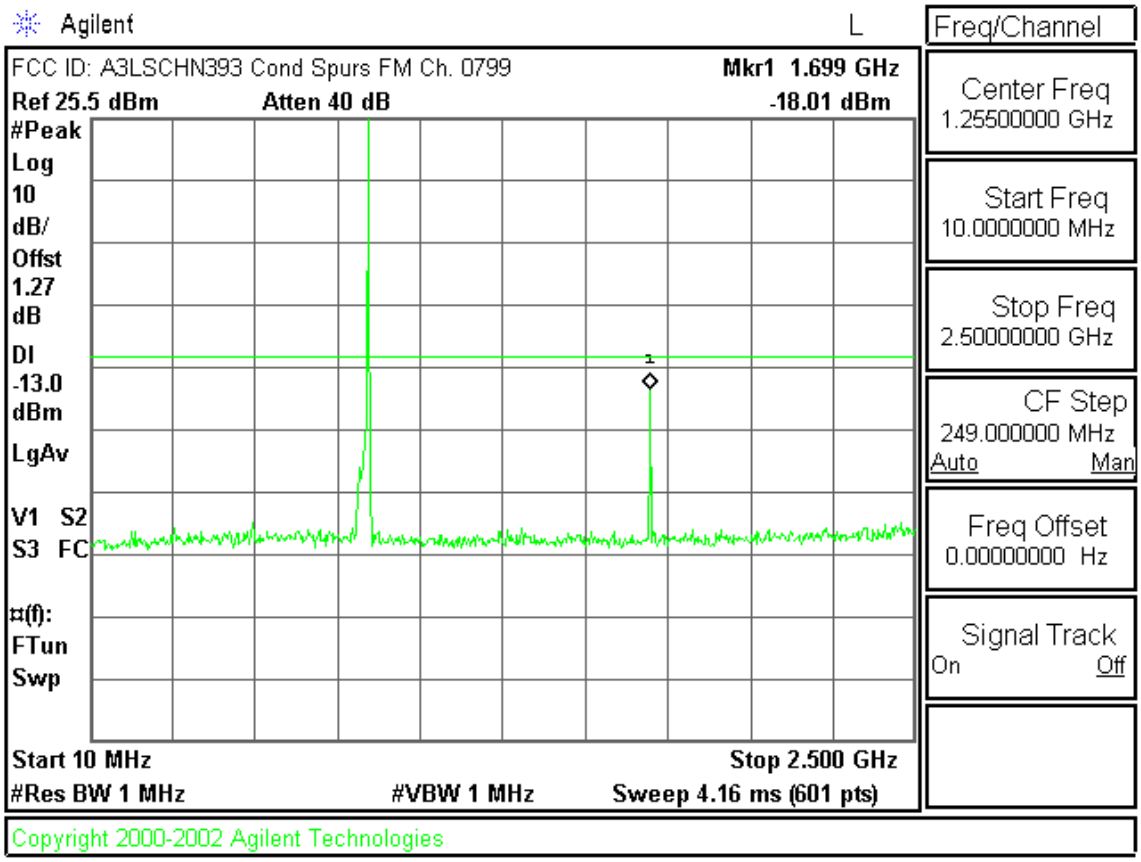
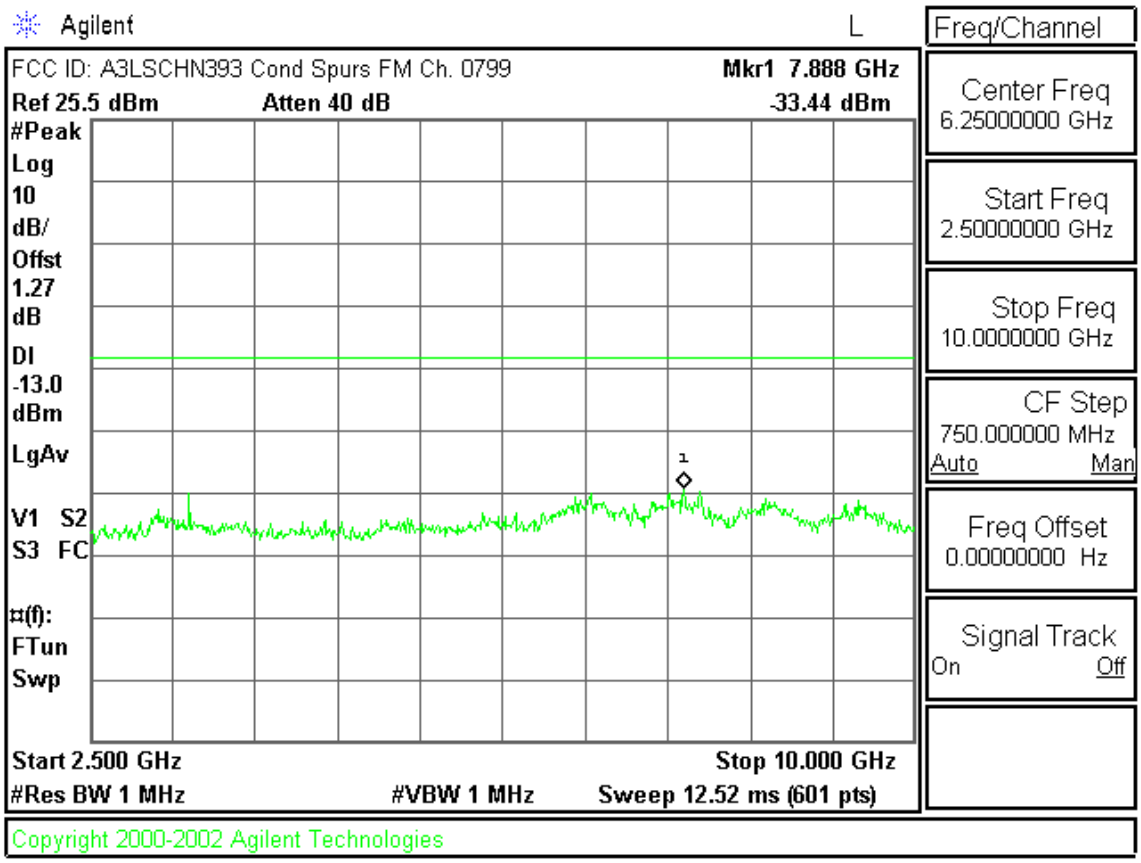
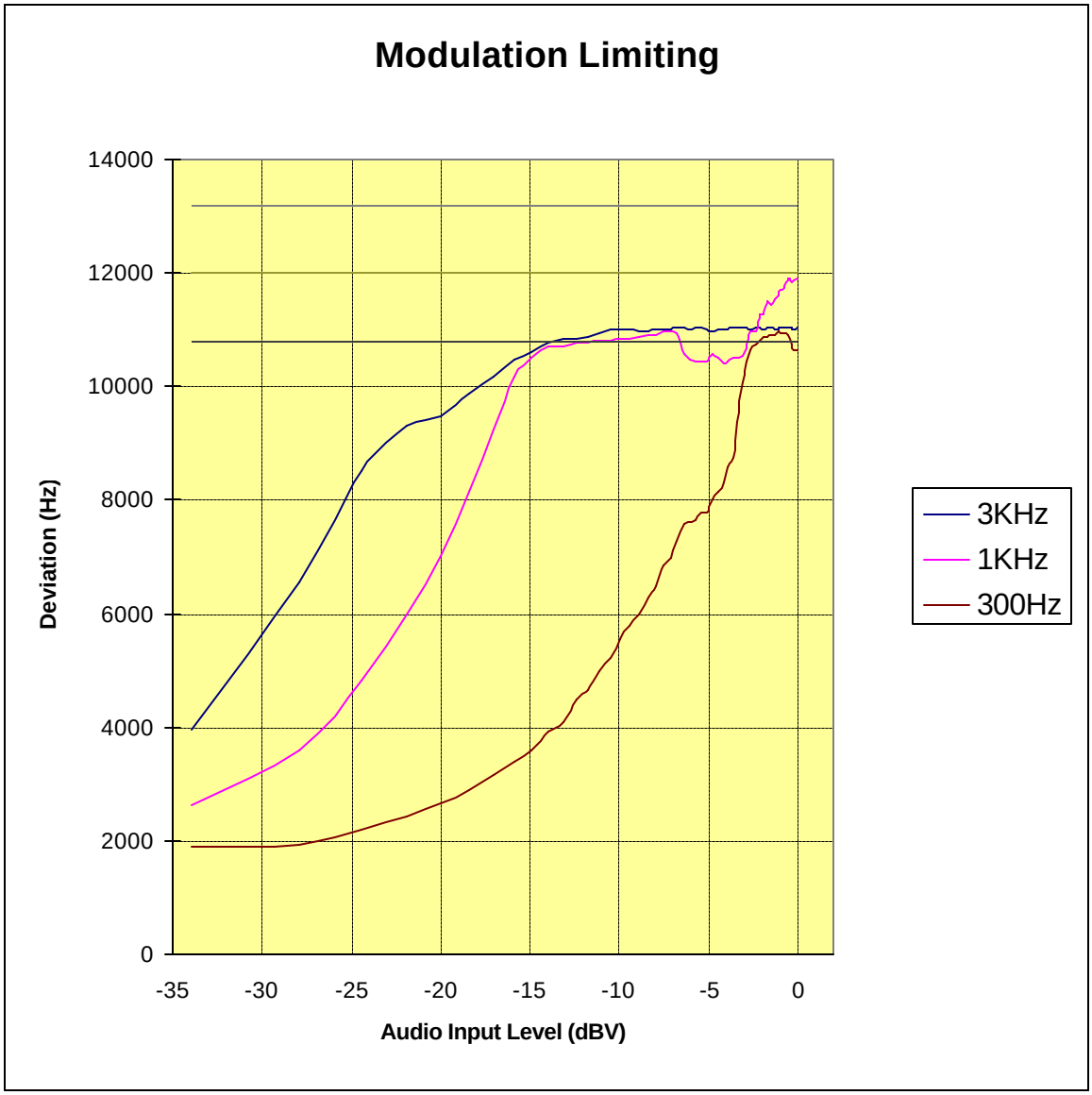

Agilent
L
Freq/Channel
FCC ID: A3LSCHN393 Cond Spurs FM Ch. 0799
Mkr1 1.699 GHz
Ref 25.5 dBm
Atten 40 dB
-18.01 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID: A3LSCHN393 Cond Spurs FM Ch. 0799
Mkr1 7.888 GHz
Ref 25.5 dBm
Atten 40 dB
-33.44 dBm
#Peak
Log
10
dB/
Offst
1.27
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center Freq
6.25000000 GHz
Start Freq
2.50000000 GHz
Stop Freq
10.0000000 GHz
CF Step
750.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 2.500 GHz
Stop 10.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
Copyright 2000-2002 Agilent Technologies

SUBJECT:	Modulation Characteristics	Test Report No.:	22.231028577.A3L
	FCC Part 22	Test Date:	11.13.2003

EUT: Dual-Mode Cellular Phone (AMPS/CDMA)
Model: *SCH-N393*
FCC ID: **A3LSCHN393**

REFERENCE: 1 kHz = 0 dB

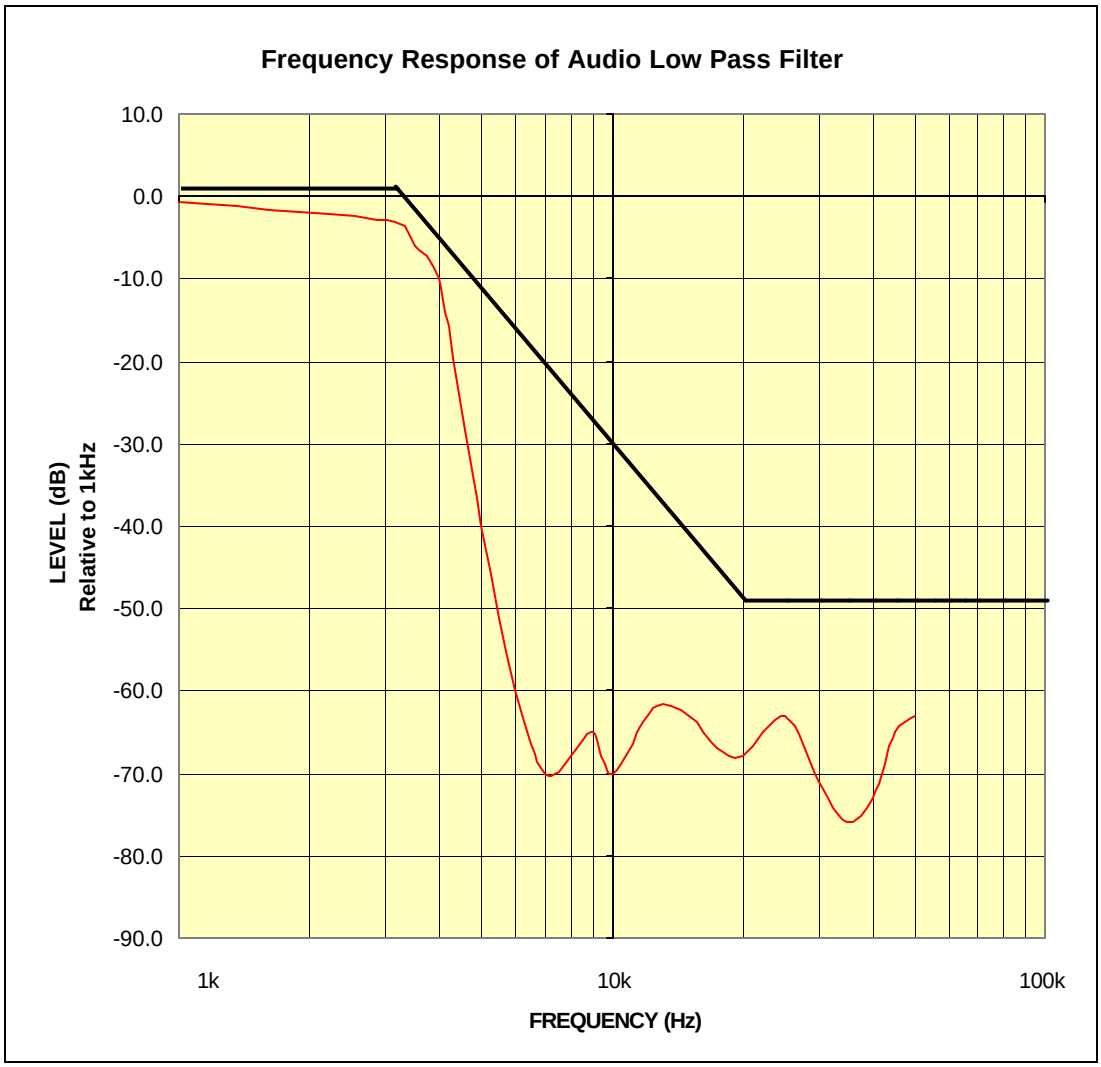


SUBJECT: Modulation Characteristics
FCC Part 22

Test Report No.: 22.231028577.A3L
Test Date: 11.13.2003

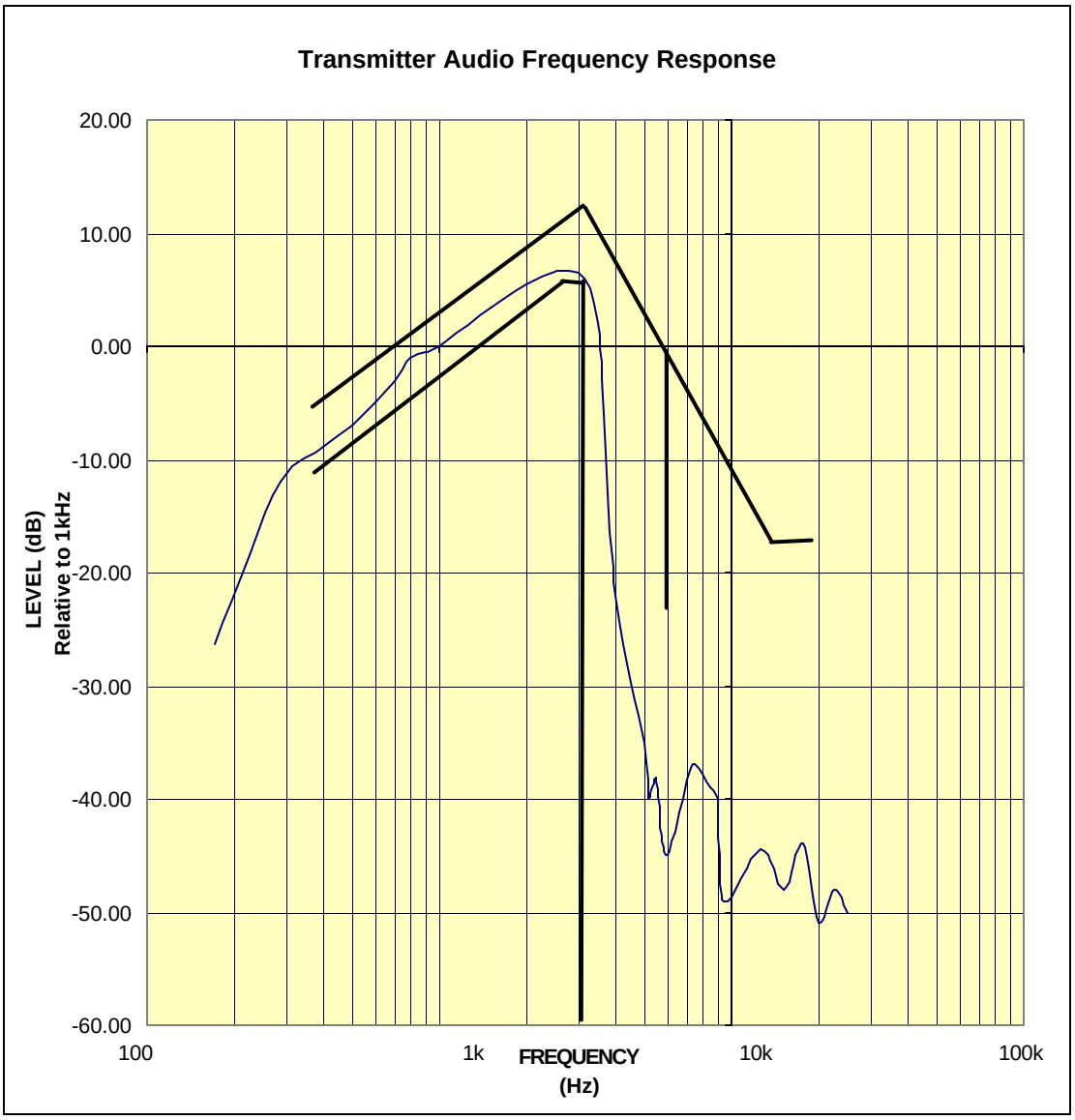
EUT: Dual-Mode Cellular Phone (AMPS/CDMA)
Model: *SCH-N393*
FCC ID: **A3LSCHN393**

REFERENCE: 1 kHz = 0 dB



SUBJECT: Modulation Characteristics
FCC Part 22

Test Report No.: 22.231028577.A3L
Test Date: 11.13.2003

EUT: Dual-Mode Cellular Phone (AMPS/CDMA)
Model: *SCH-N393*
FCC ID: **A3LSCHN393**

REFERENCE: 1 kHz = 0 dB