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Regulatory Compliance Group
IT R&D Center
416, Maetan-3Dong,
Youngtong-Gu, Suwon-city,
Gyeonggi-Do, Korea 442-600

FCC CFR47 PART 22 & 24 SUBPART CERTIFICATION REPORT

Model Tested: SPH-A780
FCC ID (Requested): A3LSPHA780
Report No: FB-027-R1
Job No: FB-027
Date issued: May 28, 2004

- Abstract -

All measurement reported herein accordance with FCC Rules, 47CFR
Part2, Part22, Part24.

Prepared By

Date

2004.05.28

SS LEE – Test Engineer

Checked By

Date

2004.05.28

JH CHOI - Engineer

Authorized By

Date

2004.05.28

JK CHOI – Senior Manager

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MEASUREMENT REPORT

1. FCC Certification Information

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, Sections 2.1033 – 2.1055.

1.1 §2.1033 General Information

- Applicant Name: SAMSUNG ELECTRONICS CO., LTD.
- Address: 416, Maetan-3Dong, Youngtong-Gu, Suwon City
Gyeonggi-Do, KOREA 442-600
- Attention: Wallace Oh, Engineering Manager (QA Lab)
- FCC ID: A3LSPHA780
- Quantity: Quantity production is planned
- Emission Designators: 40K0F8W, 40K0F1D (AMPS), 1M25F9W
824.04-848.97MHz (AMPS)
- Tx Freq. Range: 824.70-848.31MHz (CDMA)
1851.25-1908.75MHz (PCS CDMA)
- Rx Freq. Range: 869.04-893.97 MHz (AMPS)
869.70-893.31 MHz (CDMA)
1931.25-1988.75 MHz (PCS CDMA)
- Max. Power Rating: 0.389W ERP AMPS(25.90 dBm)
0.344W ERP CDMA(25.37 dBm)
0.262W EIRP PCS CDMA (24.18 dBm)
- FCC Classification(s): Licensed Portable Tx Held to Ear (PCE)
- Equipment (EUT) Type: Tri-Mode Dual-Band Analog/PCS Phone
- Modulation(s): AMPS/CDMA
- Frequency Tolerance: $\pm 0.00025\%$ (2.5ppm)
- FCC Rule Part(s): §24(E), §22(H), §2.
- Dates of Test: May 21, 27~28, 2004
- Place of Test: SAMSUNG Lab,
- Test Report S/N: FB-027-R1

2. INTRODUCTION

2.1 General

These measurement test were conducted at **SAMSUNG ELECTRONICS CO., LTD(SUWON)**. The site address is 416, Maetan-3Dong, Youngtong-Gu, Suwon City, Gyeonggi-Do, KOREA 442-600 The site have 1 Fully-anechoic chamber and measurement facility.

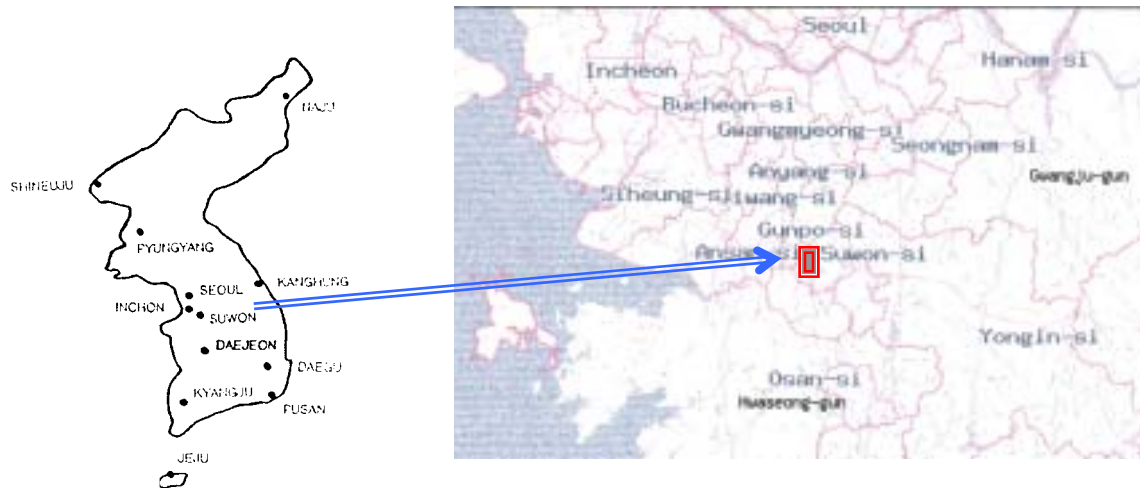


Figure1. Map of the Suwon City area.

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 were 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 is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

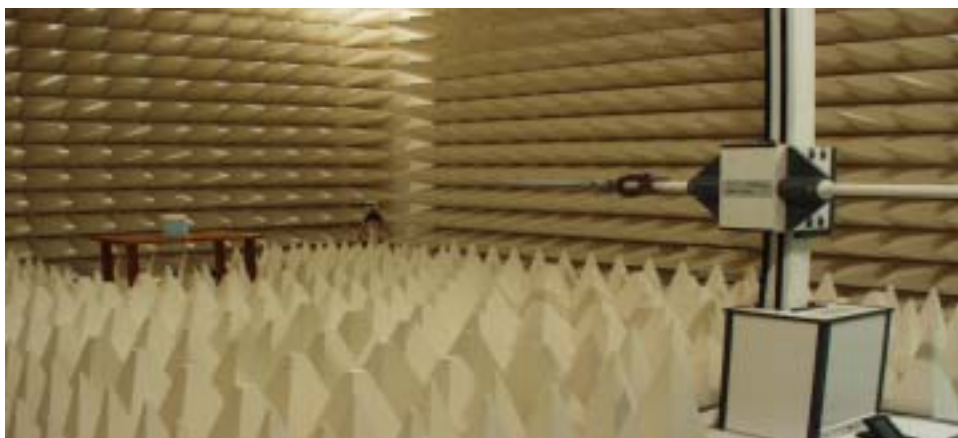


Figure2. Photograph of 3m Fully-Anechoic Chamber

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.

- End of page -

4. TEST EQUIPMENT LIST

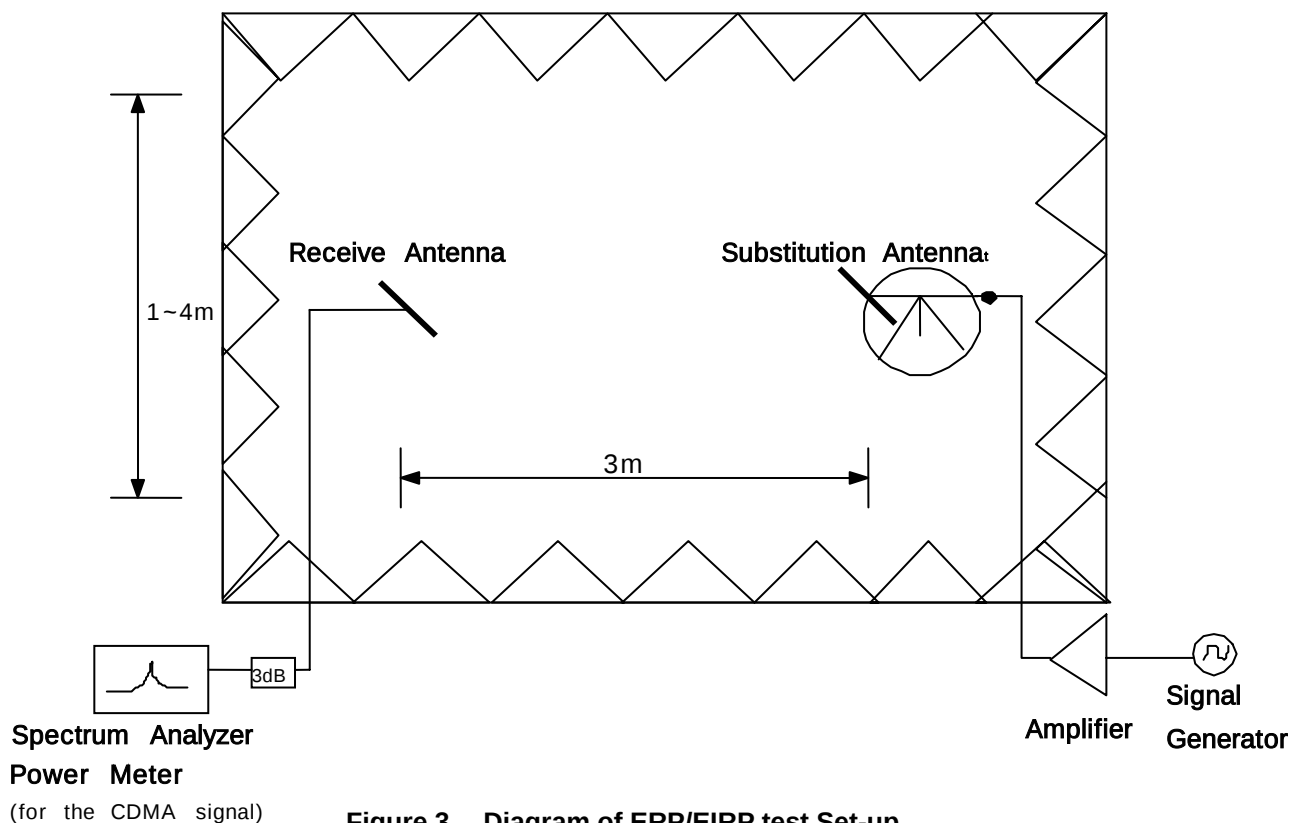
Name of Equipment	Model	Serial No.	Due Date
Spectrum Analyzer	ESI26	836119/010	2004-09-15
	E4440A(3Hz~26.5GHz)	MY41000236	2004-11-07
	E4440A(3Hz~26.5GHz)	MY41000233	2004-11-14
Signal Generator	SMIQ03B	83824/021	2005-01-15
	SMR20	835197/030	2005-01-15
Power Meter	E4419B	GB41293846	2004-10-02
Power Sensor	8481B	3318A10325	2004-10-06
	8485A	3318A19924	2004-10-04
Amplifier	5S1G4	304866	2004-11-17
Pre-Amplifier	8449B	3008A00691	2005-01-16
Communication test set	8960	GB42230535	2004-11-17
	8960	GB42360886	2004-11-10
Antenna Master	MA0001	ANT0967	Not Required
Controller	HD100	100/756	Not Required
Environmental Chamber	PL-4S	13005454	2004-08-22
	SH-241	92000548	2004-12-04
	SH-241	92000549	2004-12-04
Horn Antenna	HF906	360306/011	2005-03-11
Dipole Antenna	3121C-DB4	9007-587	2004-10-21
Receive Antenna	HL040	353255/019	2004-07-14
Attenuator	8494A	3308A31997	2005-01-17
	8496A	3308A14426	2005-01-17
Directional Coupler	4278-311-2	B3679637	2005-01-14
	4278-111-2	B103DC8722	2005-01-14
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	Not Required

5. DESCRIPTION OF TESTS

5.1 Effective Radiated Power / Equivalent Isotropic Radiated Power

Test Set-up for the ERP/EIRP TEST

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



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. For CDMA & PCS signals, an average detector is used, with RBW=VBW=3MHz, SPAN=10MHz. 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.

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

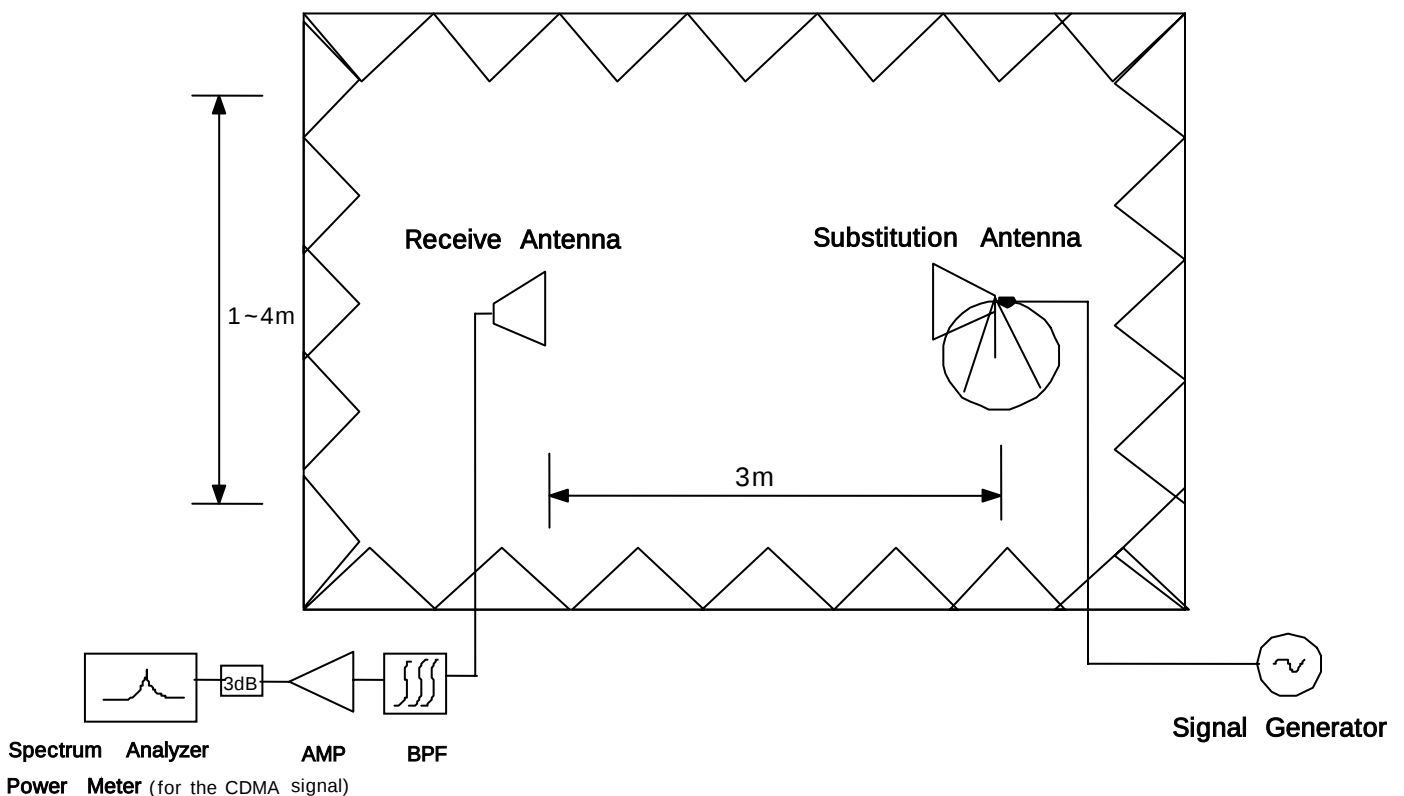


Figure 4. Diagram of Radiated Spurious & Harmonic test Set-up

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. The Spectrum was investigated from 30MHz to the 10th Harmonic of the fundamental. A peak detector is used, with RBW=VBW=1MHz. The value that we could measure was only reported. 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 600 PCS Mode 2nd Harmonic(3760MHz)

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 3760MHz. So 6.1dB is added to the signal generator reading of -30.9dBm yielding -24.8dBm . The fundamental EIRP was 25.5dBm so this harmonic was $25.5\text{dBm} - (-24.8) = 50.3\text{dBc}$.

- End of page -

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.

- End of page -

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

BLOCK	Freq. Range (MHz) Transmitter (Tx)	Freq. Range (MHz) Receiver (Rx)
A* Low + A	824 – 835	869 – 880
B	835 – 845	880 – 890
A* High	845 – 846.5	890 – 891.5
B*	846.5 – 849	891.5 – 894

Table 2. Cellular 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 $43+10\log(P)$ dB. Limit equivalent to -13 dBm, calculation shown below.

$$43 + 10\log(0.344 \text{ W}) = 38.37 \text{ dB}$$

$$25.37\text{dBm} - 38.37 \text{ dB} = -13 \text{ dBm}$$

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 -13 dBm 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 -13 dBm 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 (± 1 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 (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.
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 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.

- End of page -

6. TEST DATA

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

Supply Voltage : 3.7VDC

Modulation : CDMA

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	P/M (dBm)	Ant gain (dBi)	Ref level (dBm)
835.89	25.00	H	-13.64	0.00	-13.64
		V	-13.30	0.00	-13.30

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
824.70	-15.28	H2	173	25.37	0.344	Standard
835.89	-15.51	H2	176	25.18	0.330	Standard
848.31	-16.72	H2	173	25.04	0.319	Standard

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

Radiated measurements at 3 meters by Substitution Method

6.2 Equivalent Isotropic Radiated Power(E.I.R.P.)

Supply Voltage : 3.7VDC

Modulation : PCS

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	S/A (dBm)	Ant gain (dBi)	Ref level (dBm)
1880.00	27.00	H	-12.59	7.99	-20.58
		V	-12.53	7.99	-20.52

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
1851.25	-23.30	H1	10	23.53	0.225	Standard
1880.00	-22.73	H1	9	24.18	0.262	Standard
1908.75	-22.10	H1	9	22.51	0.178	Standard

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

Radiated measurements at 3 meters by Substitution Method

6.3 Cellular CDMA Radiated Spurious & Harmonic measurement

Field Strength of SPURIOUS Radiation

Operating Frequency : 824.70 MHz(Low), 835.89MHz(Middle), 848.37MHz(High)

Measured Output Power : 25.37 dBm = 0.344 W

Modulation Signal : CDMA

$$\text{Limit : } 43 + 10\log_{10}(w) = 38.37 \text{ dBc}$$

■ Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
1013	2	1649.40	-45.74	V	61.78
	3	2474.10	-58.14	H2	68.34
	4	3298.80	-61.63	H2	68.82
	5	4123.50	-56.43	H2	60.19
	6	4948.20	-65.55	H2	66.10
	7	5772.90	-	-	-
363	2	1671.78	-47.12	V	62.27
	3	2507.67	-60.73	H2	70.10
	4	3343.56	-60.94	H2	67.06
	5	4179.45	-58.92	H2	63.01
	6	5015.34	-64.79	H2	65.61
	7	5851.23	-	-	-
777	2	1696.62	-50.70	H2	64.33
	3	2544.93	-59.08	H2	68.79
	4	3393.24	-59.96	H2	67.09
	5	4241.55	-64.75	V	67.53
	6	5089.86	-64.74	V	65.21
	7	5938.17	-	-	-

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.4 PCS CDMA Radiated Spurious & Harmonic measurement

Field Strength of SPURIOUS Radiation

Operating Frequency : 1850.2 MHz(Low), 1880.00 MHz(Middle), 1909.80MHz(High)

Measured Output Power : 24.18 dBm = 0.262 W

Modulation Signal : PCS

$$\text{Limit : } 43 + 10\log_{10}(w) = 37.18 \text{ dBc}$$

■ Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
25	2	3702.50	-43.98	H2	43.91
	3	5553.75	-48.08	H2	43.40
	4	7405.00	-62.49	H2	53.51
	5	9256.25	-61.87	H2	48.94
	6	11107.50	-	-	-
	7	12958.75	-	-	-
600	2	3760.00	-40.73	H2	40.87
	3	5640.00	-49.52	V	45.12
	4	7520.00	-62.46	H2	53.98
	5	9400.00	-61.17	H2	48.84
	6	11280.00	-	-	-
	7	13160.00	-	-	-
1175	2	3817.50	-35.94	H1	36.11
	3	5726.25	-50.08	H2	45.41
	4	7635.00	-63.39	H2	54.21
	5	9543.75	-60.90	H2	47.90
	6	11452.50	-	-	-
	7	13361.25	-	-	-

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.5 CDMA Radiated Spurious & Harmonic Conversion Table

Date : 2004 . 05 . 27 .

Test Engineer : SS LEE

Tx Cable loss
 Tx Horn Ant Gain
 Rx Cable loss + HPF Insertion loss + Attenuator
 Pre-Amp gain
 Air loss
 Tested Level from EUT
 = + + -
 = ERP +2.14-

CH	Har	Frequency (MHz)	Tx CL (dB)	Horn Gain (dB)	Tx Level @ (S/G 0dBm)	Tested Level EUT : H (dBm)	Tested Level EUT : V (dBm)	Amplitude of Emission EUT : H (dBm)	Amplitude of Emission EUT : V (dBm)	Result EUT : H (dBc)	Result EUT : V (dBc)
1013	2	1649.40	6.91	6.09	-0.82	-45.98	-45.74	-34.76	-34.27	62.27	61.78
	3	2474.10	8.74	8.77	0.03	-58.14	-62.25	-40.83	-44.13	68.34	71.64
	4	3298.80	10.75	9.25	-1.50	-61.63	-63.44	-41.31	-41.74	68.82	69.25
	5	4123.50	11.73	9.63	-2.10	-56.43	-59.73	-32.68	-35.76	60.19	63.27
	6	4948.20	12.97	10.80	-2.17	-65.55	-65.69	-38.59	-39.07	66.10	66.58
	7	5772.90	13.86	10.62	-3.24	-	-	-	-	-	-
363	2	1671.78	7.02	6.09	-0.93	-46.66	-47.12	-34.91	-34.76	62.42	62.27
	3	2507.67	8.88	8.77	-0.11	-60.73	-63.50	-42.59	-44.64	70.10	72.15
	4	3343.56	10.76	9.25	-1.51	-60.94	-64.05	-39.55	-41.65	67.06	69.16
	5	4179.45	11.72	9.63	-2.09	-58.92	-60.28	-35.50	-36.24	63.01	63.75
	6	5015.34	13.30	10.80	-2.50	-64.79	-65.31	-38.10	-38.37	65.61	65.88
	7	5851.23	14.26	10.62	-3.64	-	-	-	-	-	-
777	2	1696.62	7.04	6.09	-0.95	-50.70	-53.71	-36.82	-40.29	64.33	67.80
	3	2544.93	8.97	8.77	-0.20	-59.08	-61.54	-41.28	-43.34	68.79	70.85
	4	3393.24	11.03	9.25	-1.78	-59.96	-62.91	-39.58	-41.81	67.09	69.32
	5	4241.55	11.76	9.63	-2.13	-64.20	-64.75	-40.81	-40.02	68.32	67.53
	6	5089.86	13.61	10.80	-2.81	-65.86	-64.74	-38.51	-37.70	66.02	65.21
	7	5938.17	14.33	10.62	-3.71	-	-	-	-	-	-

6.6 PCS Radiated Spurious & Harmonic Conversion Table

Date : 2004 . 05 . 27 .

Test Engineer : SS LEE

Tx Cable loss
 Tx Horn Ant Gain
 Rx Cable loss + HPF Insertion loss + Attenuator
 Pre-Amp gain
 Air loss
 Tested Level from EUT
 = + + -
 = EIRP -

CH	Har	Frequency (MHz)	Tx CL (dB)	Horn Gain (dB)	Tx Level @ (S/G 10dBm)	Tested Level EUT : H (dBm)	Tested Level EUT : V (dBm)	Amplitude of Emission EUT : H (dBm)	Amplitude of Emission EUT : V (dBm)	Result EUT : H (dBc)	Result EUT : V (dBc)
25	2	3702.50	11.72	9.63	7.91	-43.98	-48.16	-19.73	-23.38	43.91	47.56
	3	5553.75	13.88	10.80	6.92	-48.08	-51.07	-19.22	-22.07	43.40	46.25
	4	7405.00	16.53	11.21	4.68	-62.49	-63.28	-29.33	-31.45	53.51	55.63
	5	9256.25	18.83	11.86	3.03	-61.87	-64.81	-24.76	-28.37	48.94	52.55
	6	11107.50	21.55	12.71	1.16	-	-	-	-	-	-
	7	12958.75	23.35	12.66	-0.69	-	-	-	-	-	-
600	2	3760.00	11.68	9.63	7.95	-40.73	-46.54	-16.69	-21.69	40.87	45.87
	3	5640.00	14.01	10.80	6.79	-49.59	-49.52	-21.08	-20.94	45.26	45.12
	4	7520.00	16.88	11.21	4.33	-62.46	-62.93	-29.80	-31.17	53.98	55.35
	5	9400.00	19.25	11.86	2.61	-61.17	-62.98	-24.66	-27.08	48.84	51.26
	6	11280.00	21.61	12.71	1.10	-	-	-	-	-	-
	7	13160.00	23.47	12.66	-0.81	-	-	-	-	-	-
1175	2	3817.50	11.30	9.63	8.33	-35.94	-40.67	-11.93	-15.49	36.11	39.67
	3	5726.25	14.11	10.80	6.69	-50.08	-50.29	-21.23	-21.23	45.41	45.41
	4	7635.00	17.07	11.21	4.14	-63.39	-62.61	-30.03	-30.31	54.21	54.49
	5	9543.75	19.48	11.86	2.38	-60.90	-63.29	-23.72	-26.40	47.90	50.58
	6	11452.50	21.83	12.71	0.88	-	-	-	-	-	-
	7	13361.25	24.44	12.66	-1.78	-	-	-	-	-	-

6.7 Frequency Stability

6.7.1 CDMA 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)	11.66	835,890,012	0.000001	0.014
100%		-30	16.21	835,890,016	0.000002	0.019
100%		-20	-14.35	835,889,986	-0.000002	-0.017
100%		-10	12.59	835,890,013	0.000002	0.015
100%		0	11.36	835,890,011	0.000001	0.014
100%		+10	10.12	835,890,010	0.000001	0.012
100%		+20	-10.93	835,889,989	-0.000001	-0.013
100%		+30	12.42	835,890,012	0.000001	0.015
100%		+40	10.98	835,890,011	0.000001	0.013
100%		+50	13.76	835,890,014	0.000002	0.016
100%		+60	12.63	835,890,013	0.000002	0.015
85%	3.15	+20	8.92	835,890,009	0.000001	0.011
115%	4.26	+20	10.36	835,890,010	0.000001	0.012
Batt.Endpoint	3.39	+20	8.92	835,890,009	0.000001	0.011

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

6.7.2 PCS Frequency Stability Table

Operating Frequency : 1,880,000,000 Hz

Channel : 600

Reference Voltage : 3.7VDC

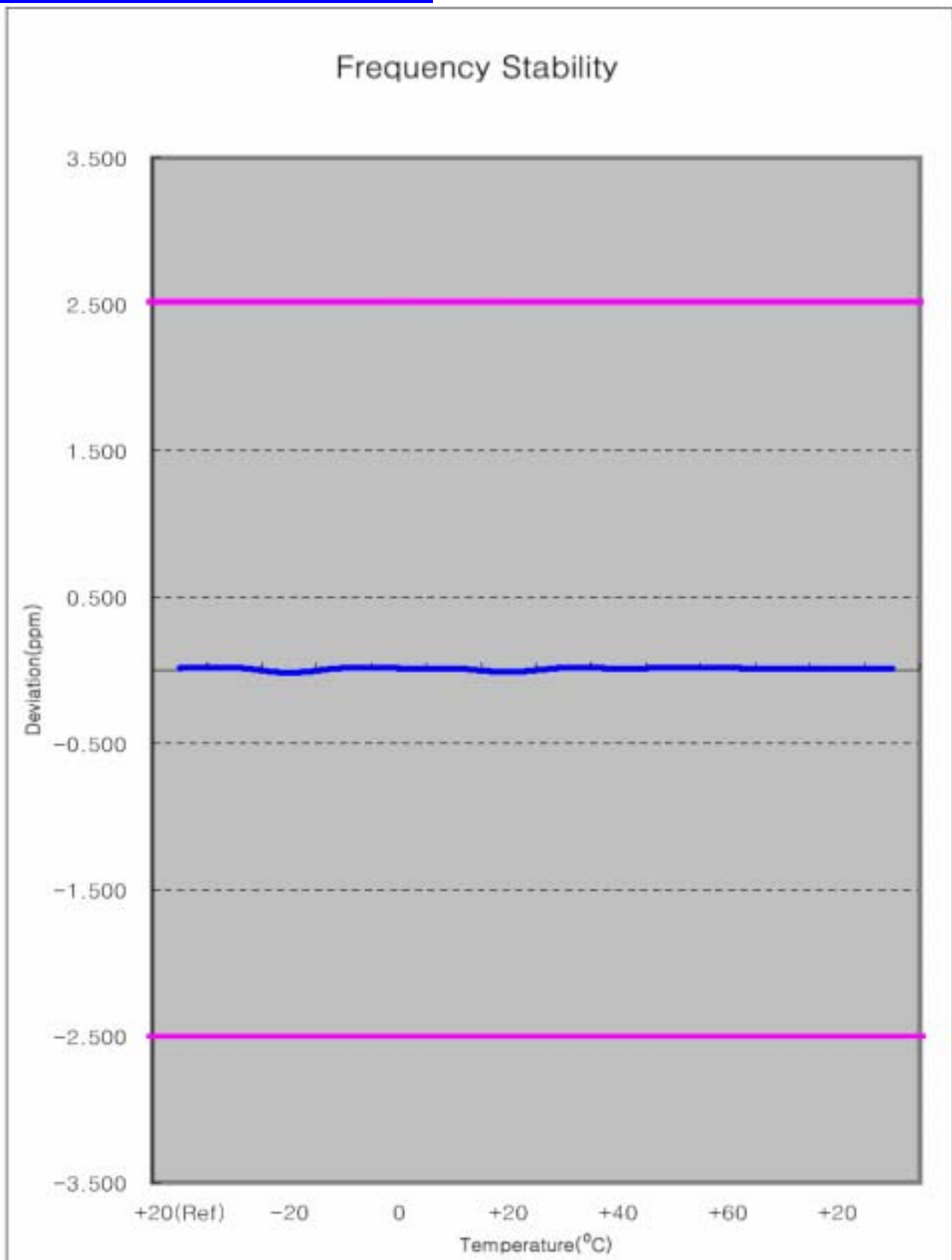
Deviation Limit : ± 0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	28.12	1,880,000,028	0.000001	0.015
100%		-30	28.34	1,880,000,028	0.000002	0.015
100%		-20	-25.02	1,879,999,975	-0.000001	-0.013
100%		-10	26.19	1,880,000,026	0.000001	0.014
100%		0	24.03	1,880,000,024	0.000001	0.013
100%		+10	-20.63	1,879,999,979	-0.000001	-0.011
100%		+20	21.39	1,880,000,021	0.000001	0.011
100%		+30	25.73	1,880,000,026	0.000001	0.014
100%		+40	-20.33	1,879,999,980	-0.000001	-0.011
100%		+50	25.3	1,880,000,025	0.000001	0.013
100%		+60	24.2	1,880,000,024	0.000001	0.013
85%	3.15	+20	41.39	1,880,000,041	0.000002	0.022
115%	4.26	+20	24.36	1,880,000,024	0.000001	0.013
Batt.Endpoint	3.29	+20	41.39	1,880,000,041	0.000002	0.022

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

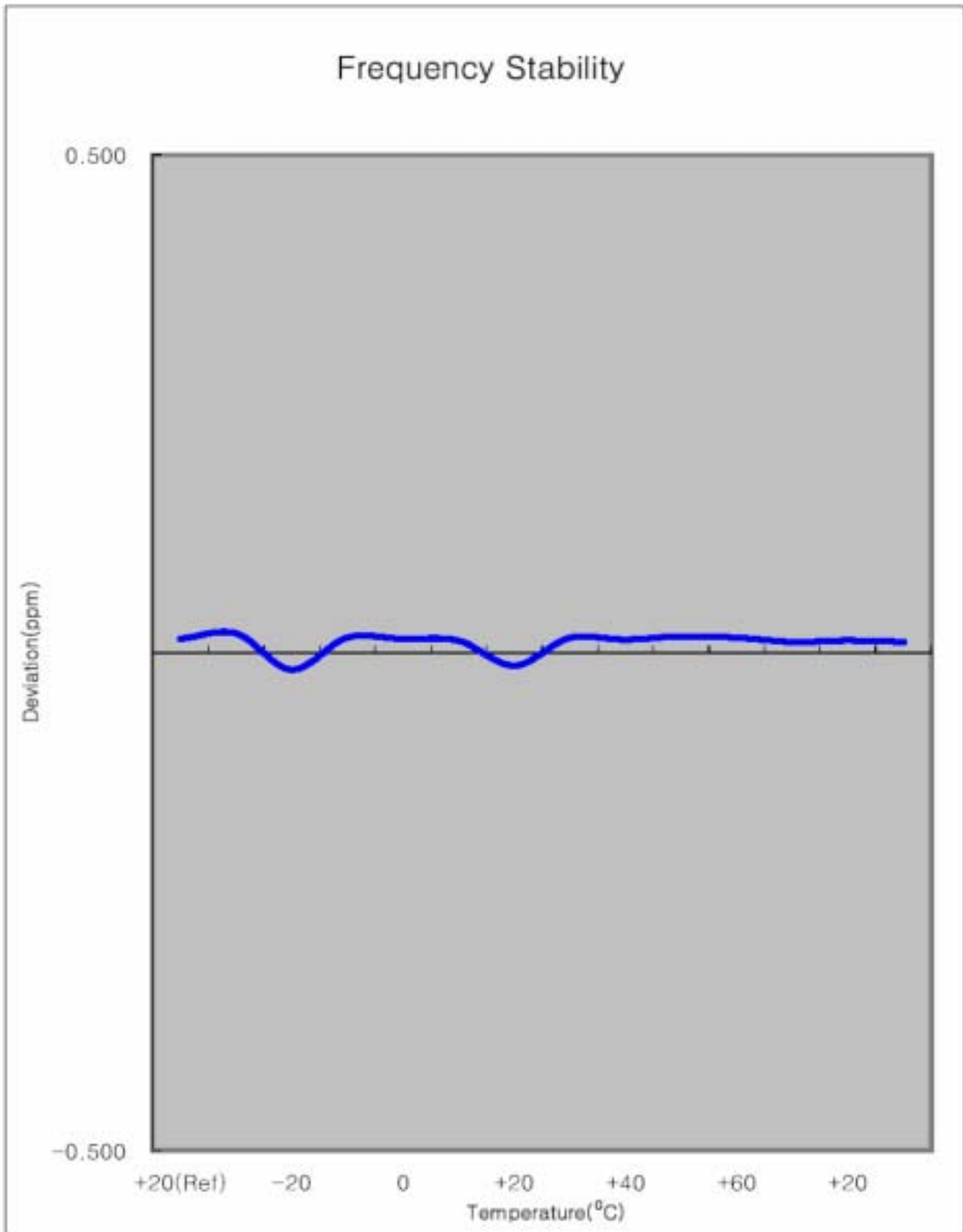
The EUT is tested down to the battery end point_

6.7.3 CDMA Frequency Stability Graph



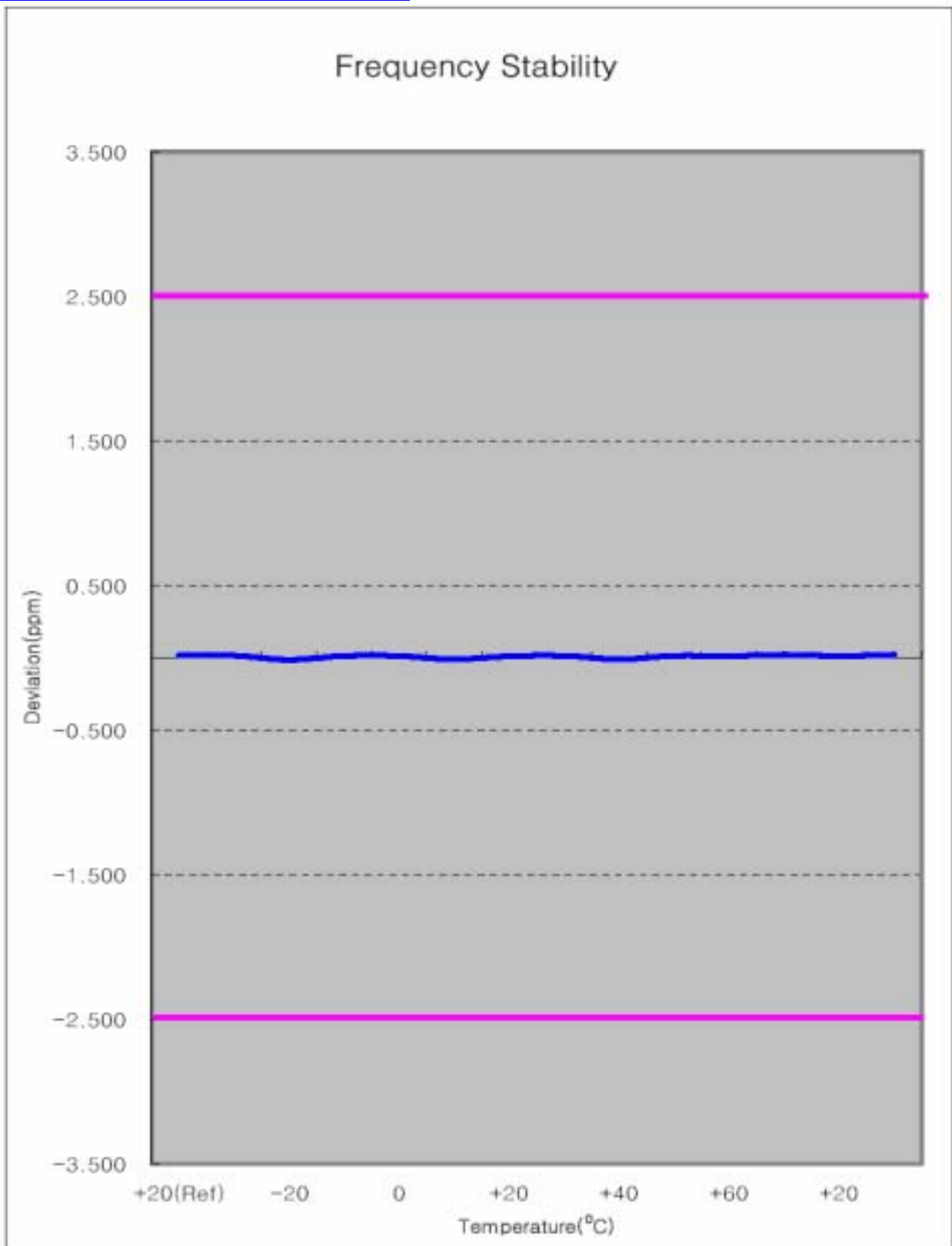
- End of page -

Zoom In



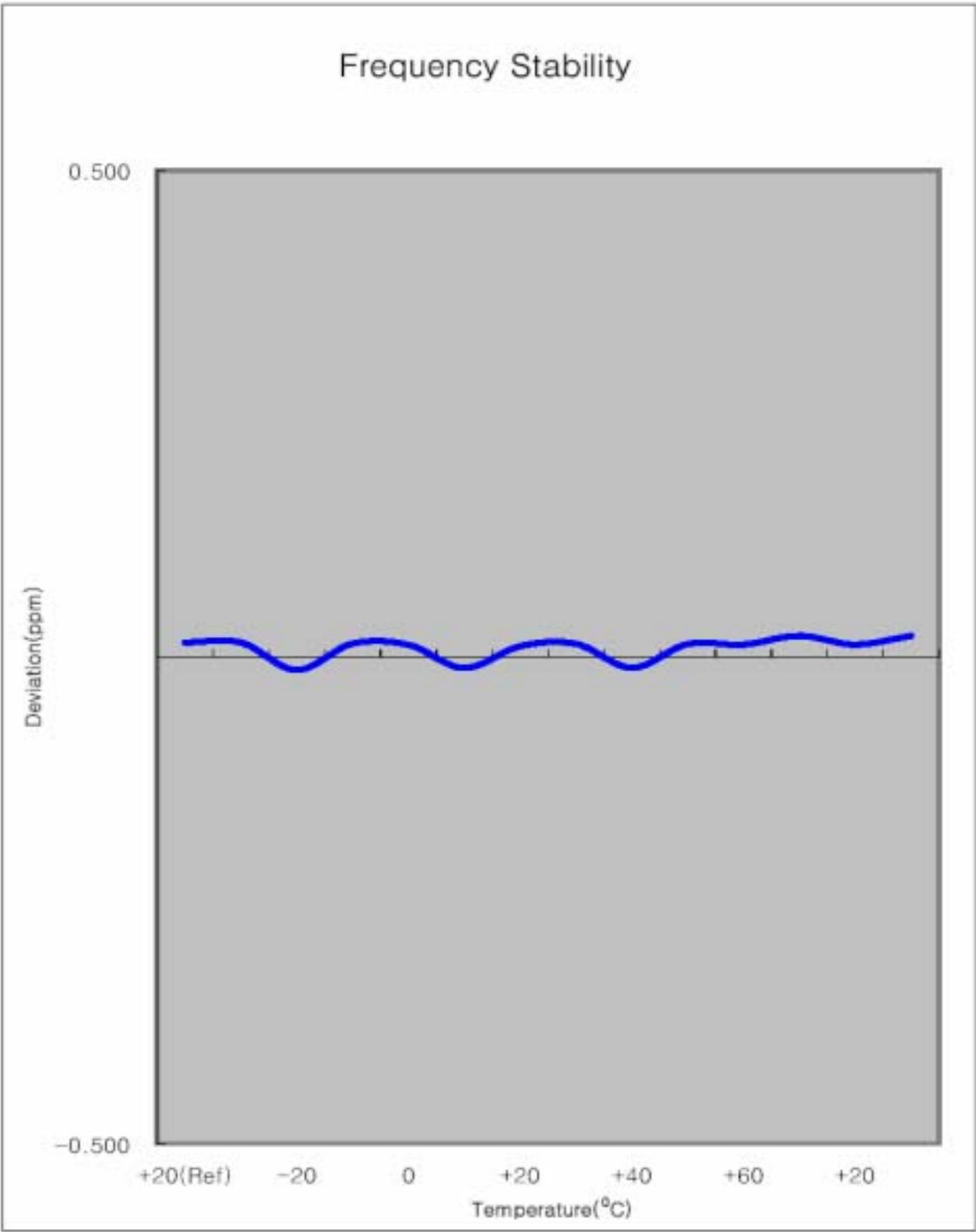
- End of page -

6.7.4 PCS Frequency Stability Graph



- End of page -

Zoom In



7. SAMPLE CALCULATION

7.1 Emission Designator

Emission Designator = 1M25F9W

Calculation : 2M + 2DK

CDMA BW = 1.25MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination(Audio/Data)

(Measured at the 99.75% power bandwidth)

- End of page -



8. CONCLUSION

The data collected shows that the SAMSUNG Tri-Mode Dual-Band Analog/PCS Phone(AMPS/CDMA) FCC ID : A3LSPHA780 complies with all the requirements of Parts 2,22,24 of the FCC Rules.

- End of page -

9. TEST PLOTS

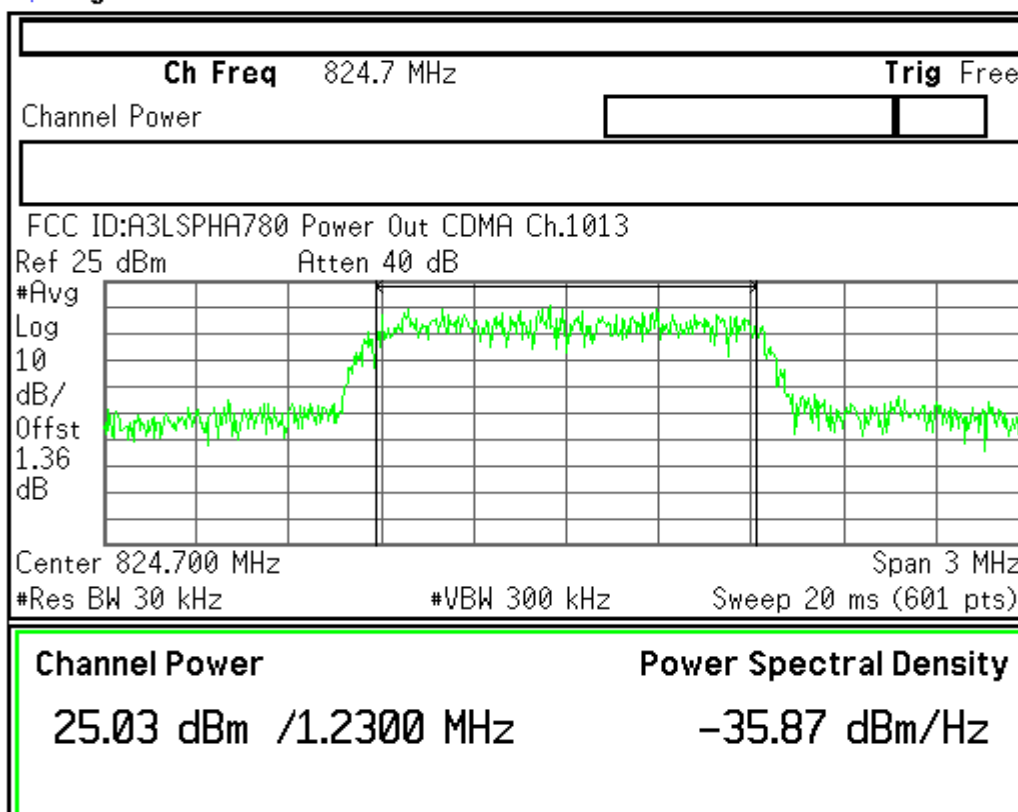
- End of page -



Agilent

R L

Freq/Channel

**Center Freq**
824.700000 MHz**Start Freq**
823.200000 MHz**Stop Freq**
826.200000 MHz**CF Step**
300.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

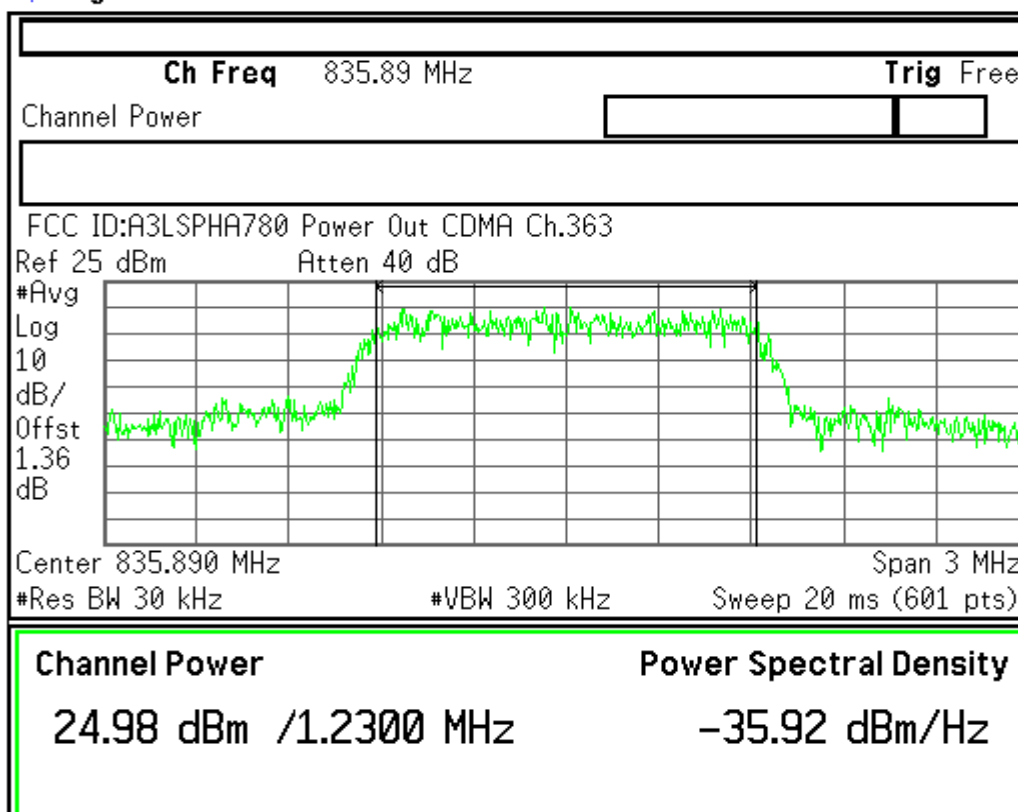
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Agilent

R L

Freq/Channel

**Center Freq**
835.890000 MHz**Start Freq**
834.390000 MHz**Stop Freq**
837.390000 MHz**CF Step**
300.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

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R L

Freq/Channel

Ch Freq 848.31 MHz Trig Free

Channel Power

Center Freq
848.310000 MHz

Start Freq
846.810000 MHz

Stop Freq
849.810000 MHz

CF Step
300.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

FCC ID:A3LSPHA780 Power Out CDMA Ch.777

Ref 25 dBm Atten 40 dB

#Avg

Log

10

dB/

Offst

1.36

dB

Center 848.310 MHz

Span 3 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

25.01 dBm /1.2300 MHz

-35.89 dBm/Hz

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Agilent

R L

Freq/Channel

FCC ID:A3LSPHA780 Power Out CDMA Ch.1013

Ref 25 dBm Atten 40 dB

#Samp

Log

10

dB/

Offst

1.36

dB

LgAv

100

V1 S2

S3 FC

f(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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FCC ID:A3LSPHA780 Power Out CDMA Ch.363

Ref 25 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

1.36

dB

LgAv

100

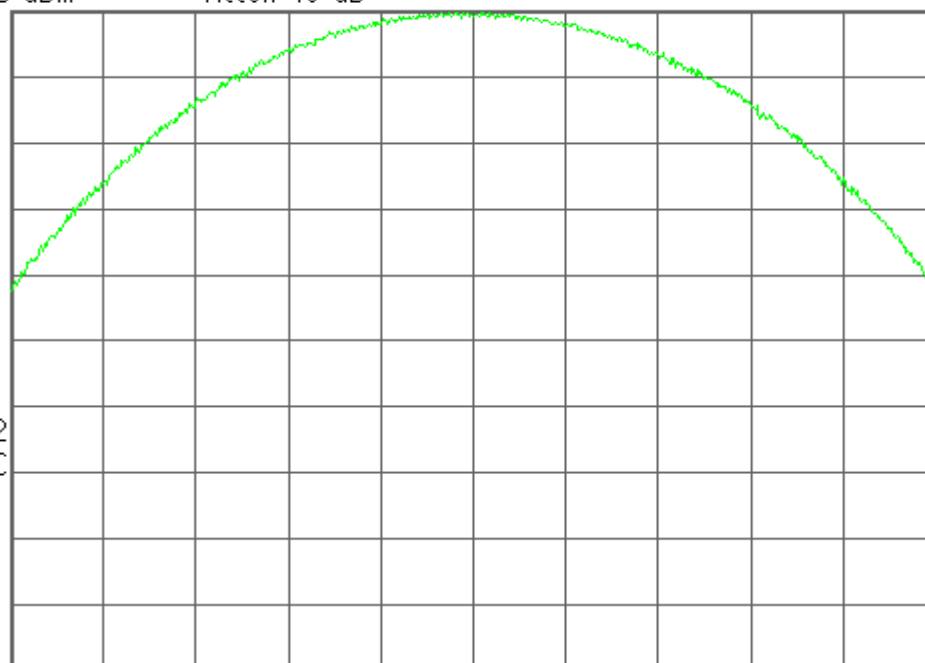
V1 S2

S3 FC

$\mathcal{E}(f)$:

FTun

Swp



Center 835.89 MHz

Span 10 MHz

#Res BW 3 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Center Freq

835.890000 MHz

Start Freq

830.890000 MHz

Stop Freq

840.890000 MHz

CF Step

1.00000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

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FCC ID:A3LSPHA780 Power Out CDMA Ch.777

Ref 25 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

1.36

dB

LgAv

100

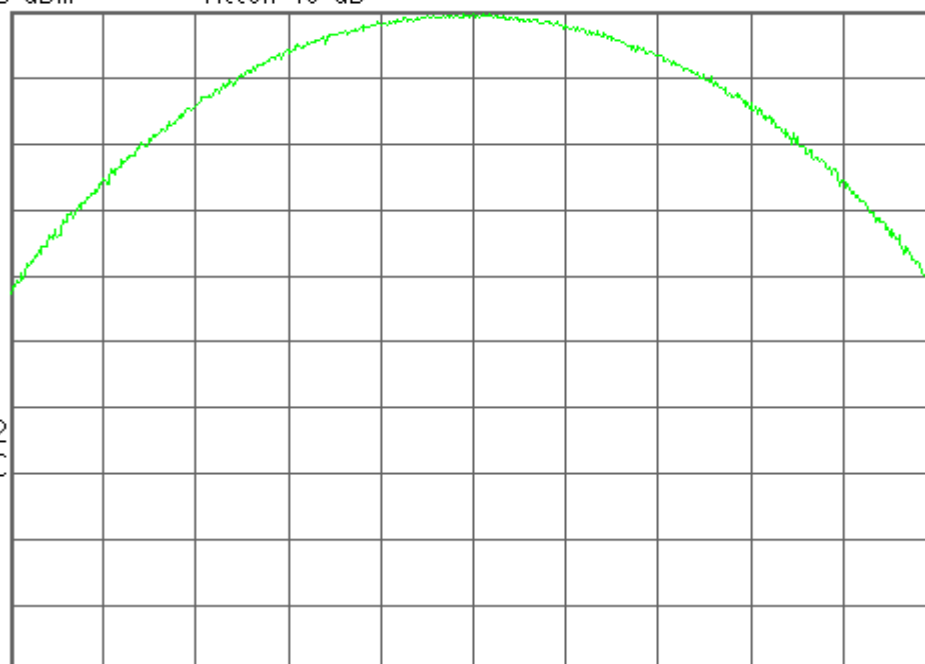
V1 S2

S3 FC

$\mathcal{E}(f)$:

FTun

Swp



Center 848.31 MHz

Span 10 MHz

#Res BW 3 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Center Freq

848.310000 MHz

Start Freq

843.310000 MHz

Stop Freq

853.310000 MHz

CF Step

1.00000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

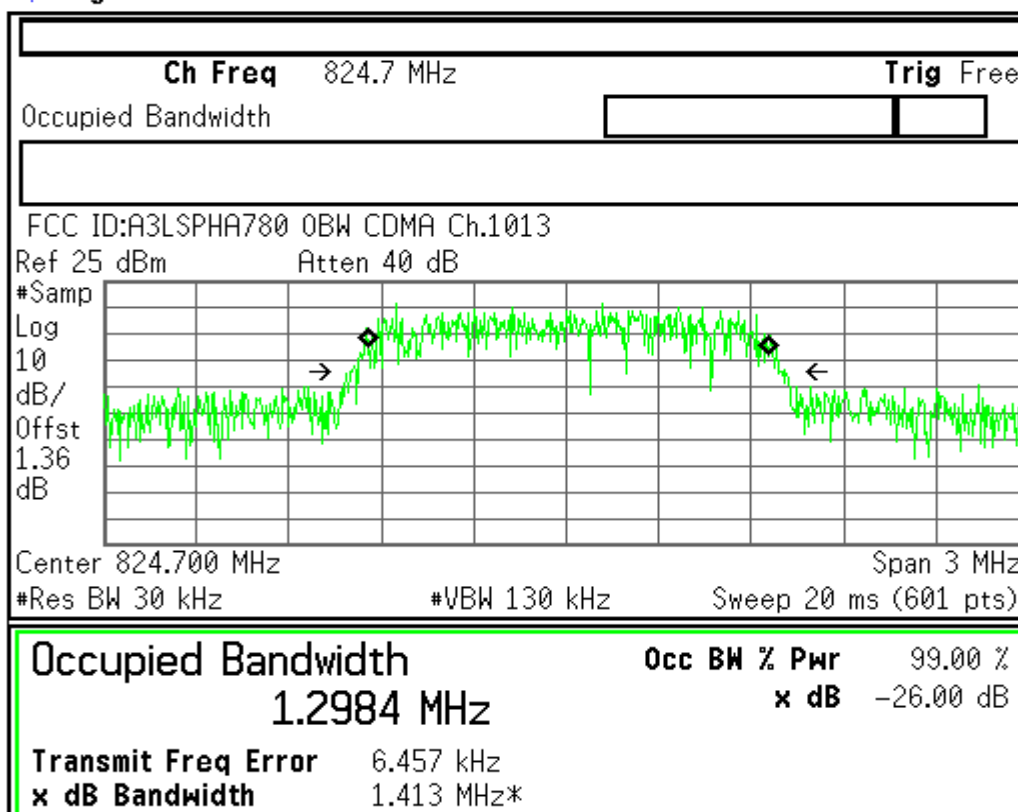
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R T

Freq/Channel

Center Freq
824.700000 MHzStart Freq
823.200000 MHzStop Freq
826.200000 MHzCF Step
300.000000 kHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

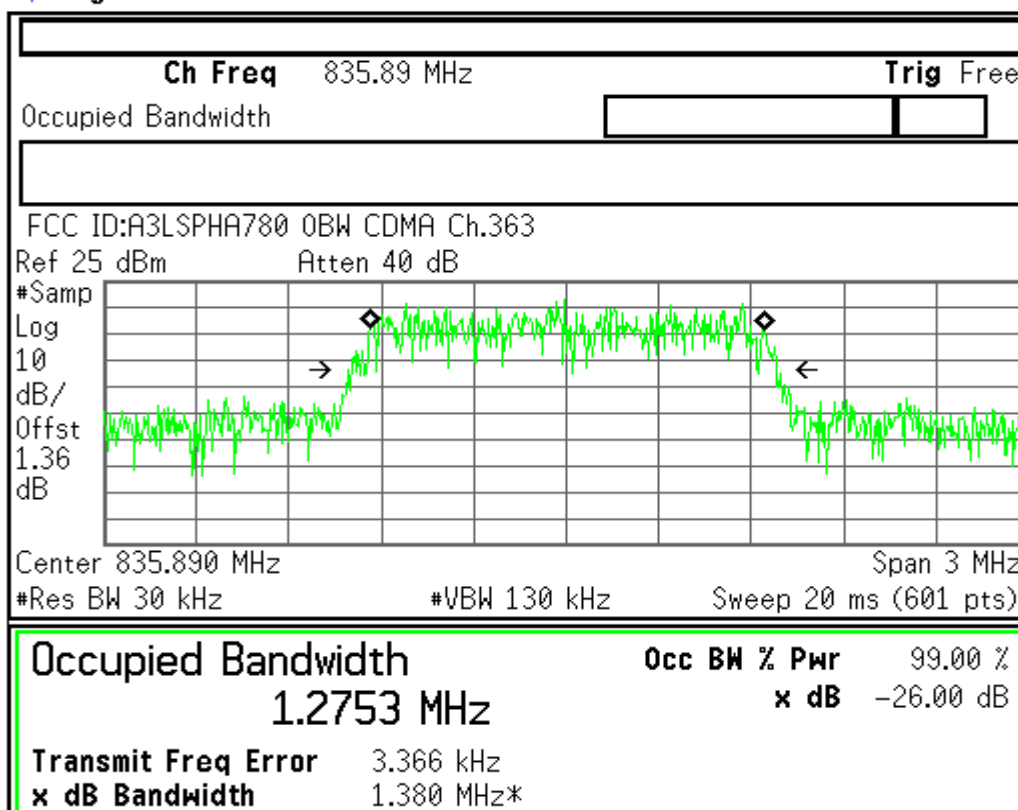
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R T

Freq/Channel

Center Freq
835.890000 MHzStart Freq
834.390000 MHzStop Freq
837.390000 MHzCF Step
300.000000 kHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

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Ch Freq 848.31 MHz Trig Free

Occupied Bandwidth

Center Freq
848.310000 MHz

Start Freq
846.810000 MHz

Stop Freq
849.810000 MHz

CF Step
300.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

FCC ID:A3LSPHA780 0BW CDMA Ch.777

Ref 25 dBm

Atten 40 dB

#Samp

Log

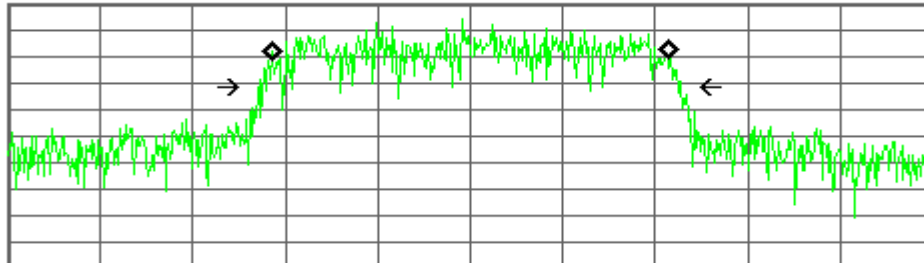
10

dB/

Offst

1.36

dB



Center 848.310 MHz

Span 3 MHz

#Res BW 30 kHz

#VBW 130 kHz

Sweep 20 ms (601 pts)

Occupied Bandwidth

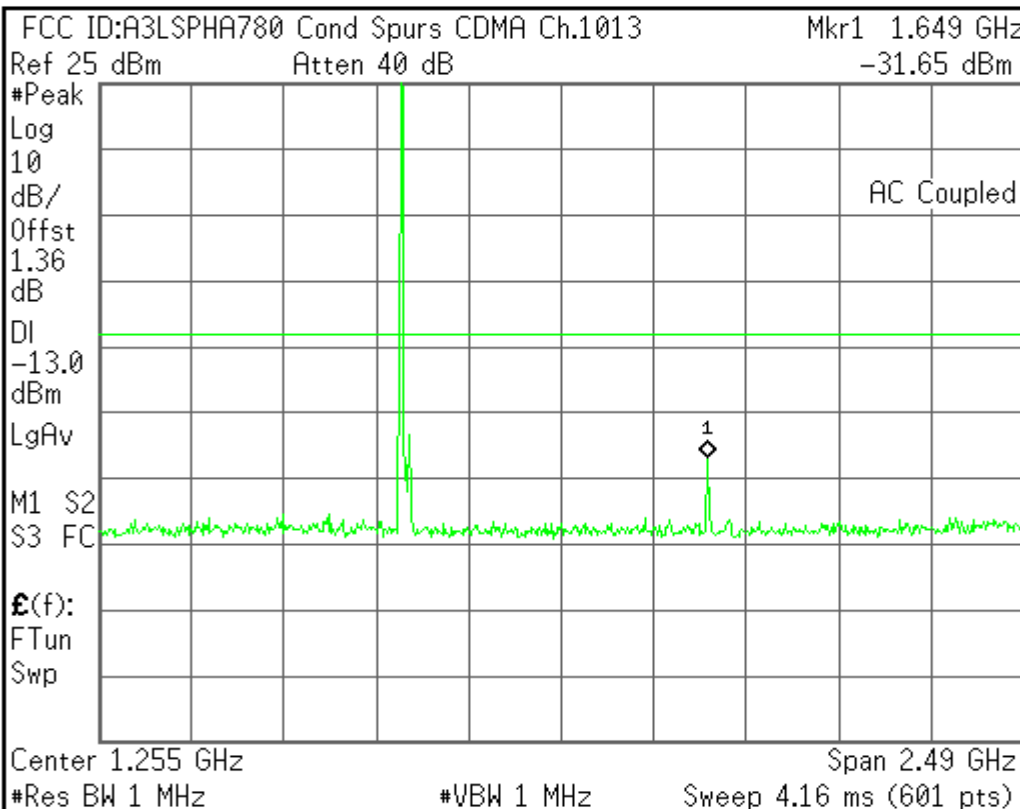
1.2796 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error -1.664 kHz

x dB Bandwidth 1.373 MHz*



Center Freq
 1.25500000 GHz

Start Freq
 10.0000000 MHz

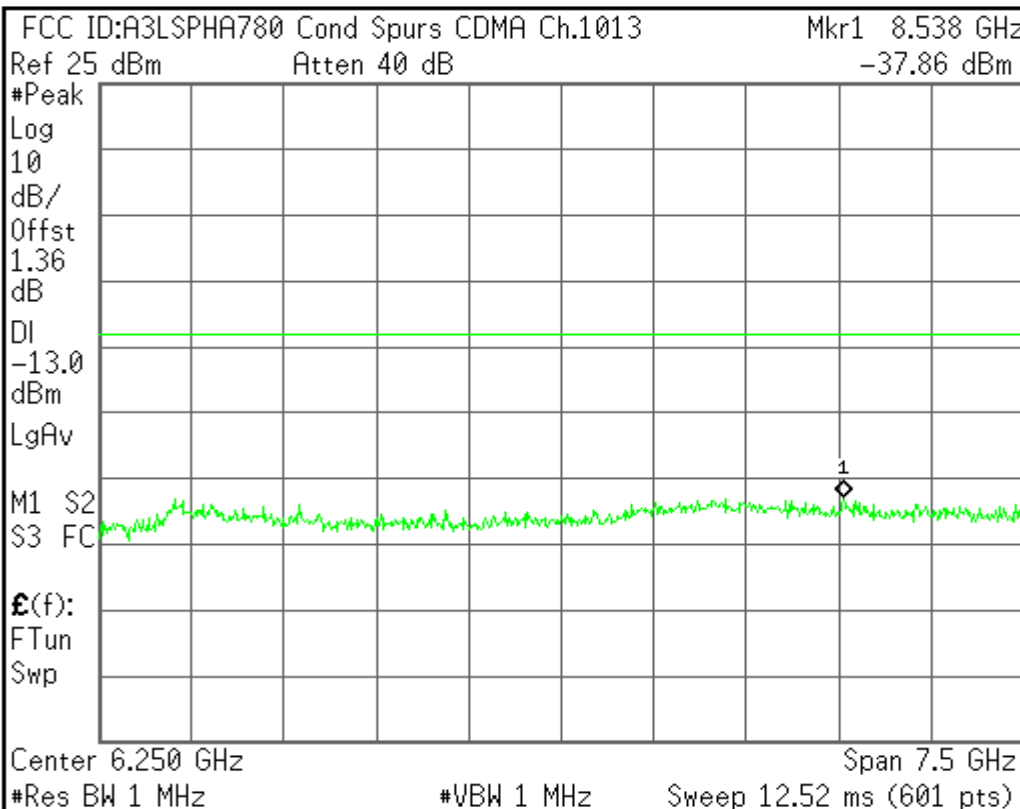
Stop Freq
 2.50000000 GHz

CF Step
 249.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

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Center Freq
 6.25000000 GHz

Start Freq
 2.50000000 GHz

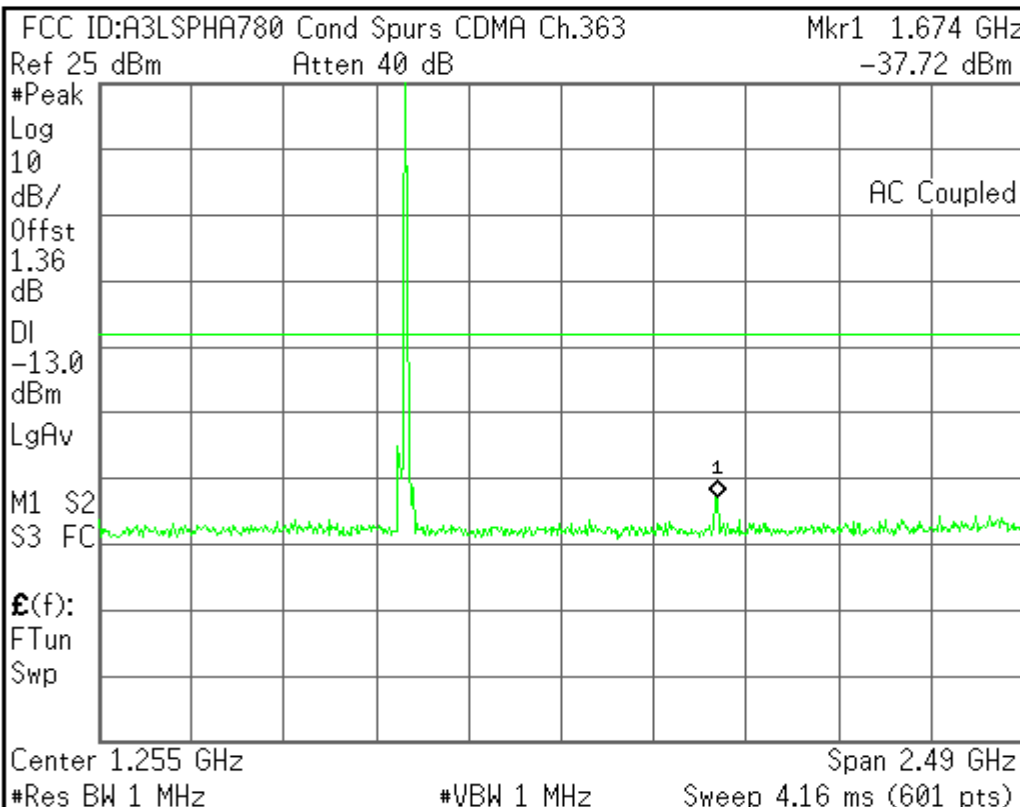
Stop Freq
 10.0000000 GHz

CF Step
 750.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

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Center Freq
 1.25500000 GHz

Start Freq
 10.0000000 MHz

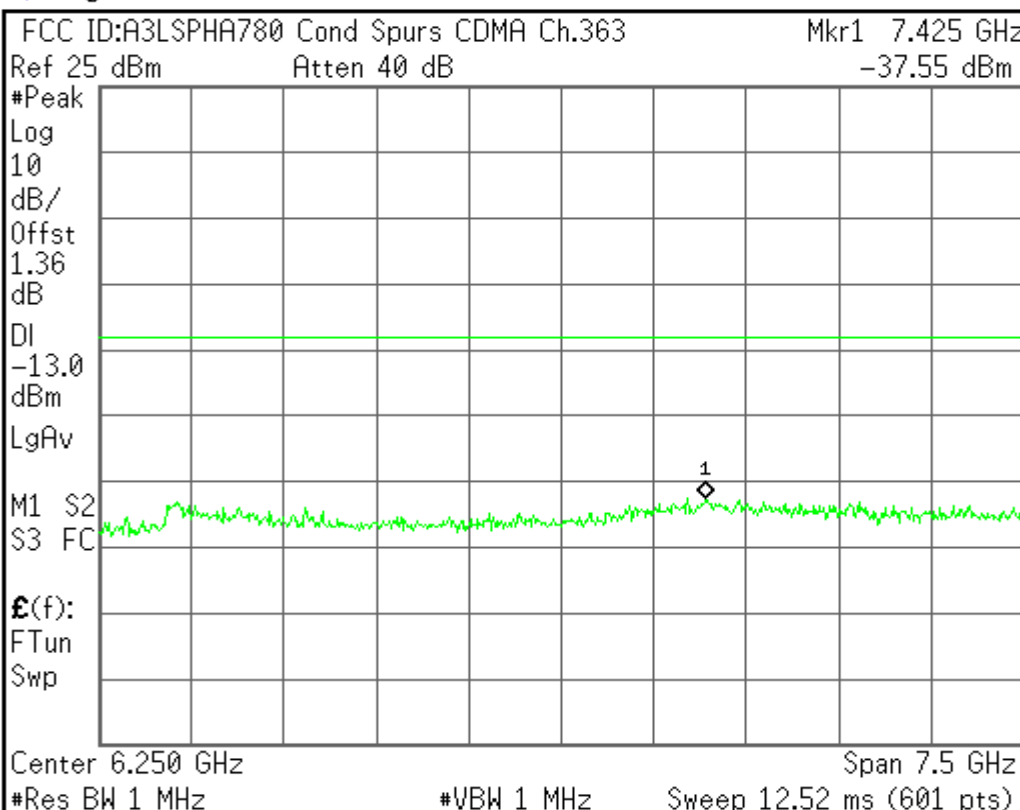
Stop Freq
 2.50000000 GHz

CF Step
 249.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

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Center Freq
 6.25000000 GHz

Start Freq
 2.50000000 GHz

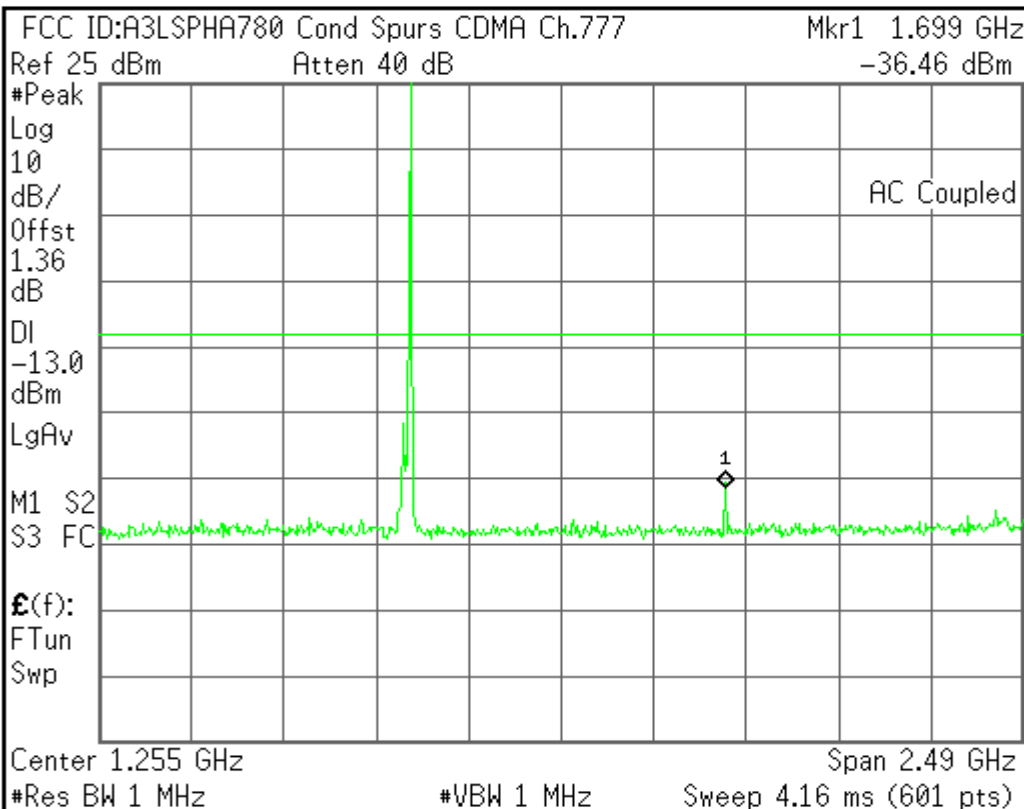
Stop Freq
 10.0000000 GHz

CF Step
 750.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

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Center Freq
 1.25500000 GHz

Start Freq
 10.0000000 MHz

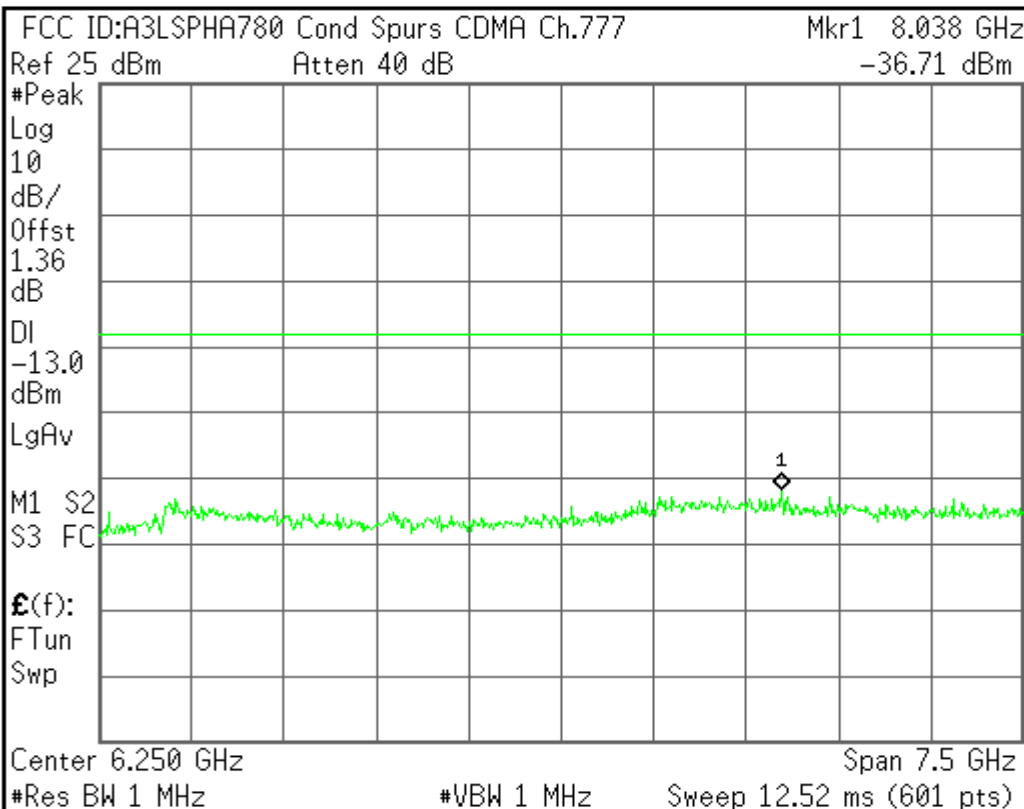
Stop Freq
 2.50000000 GHz

CF Step
 249.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

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Center Freq
 6.25000000 GHz

Start Freq
 2.50000000 GHz

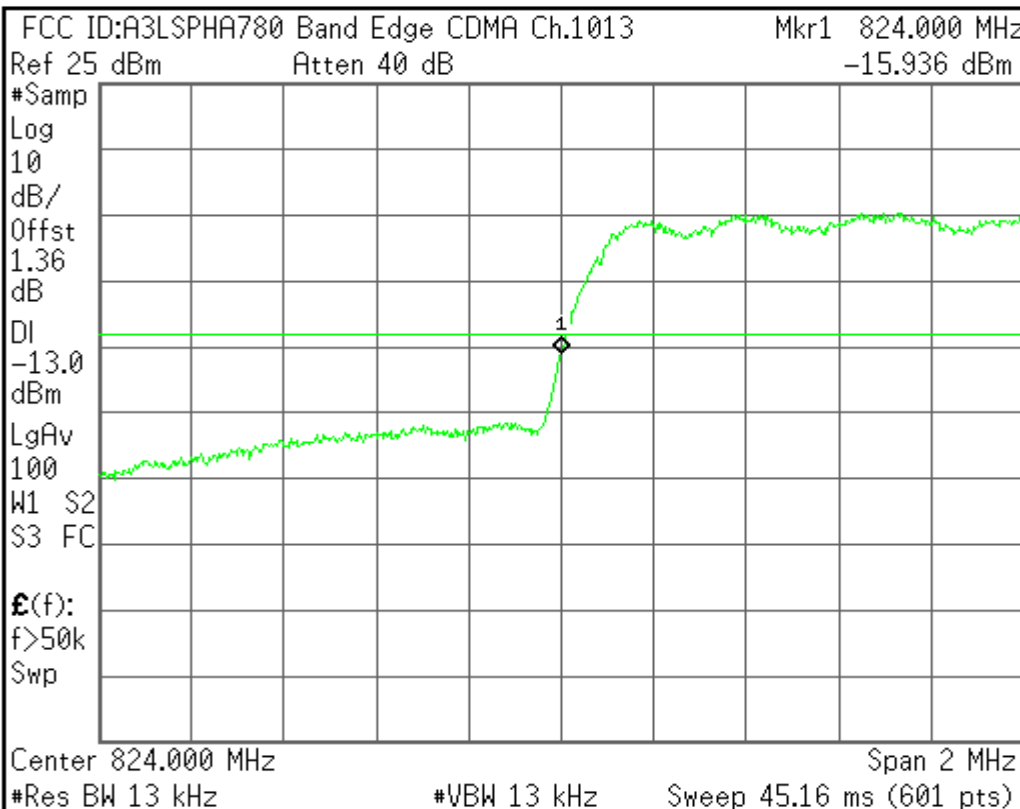
Stop Freq
 10.0000000 GHz

CF Step
 750.000000 MHz
 Auto Man

Freq Offset
 0.00000000 Hz

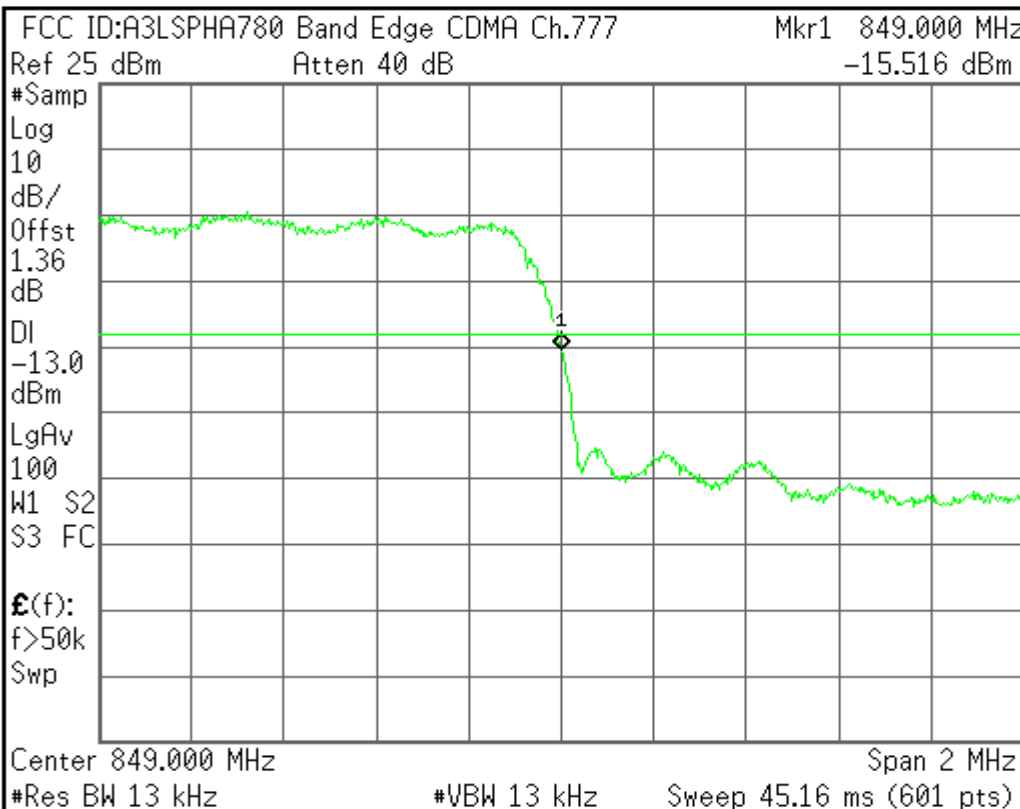
Signal Track
 On Off

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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

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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

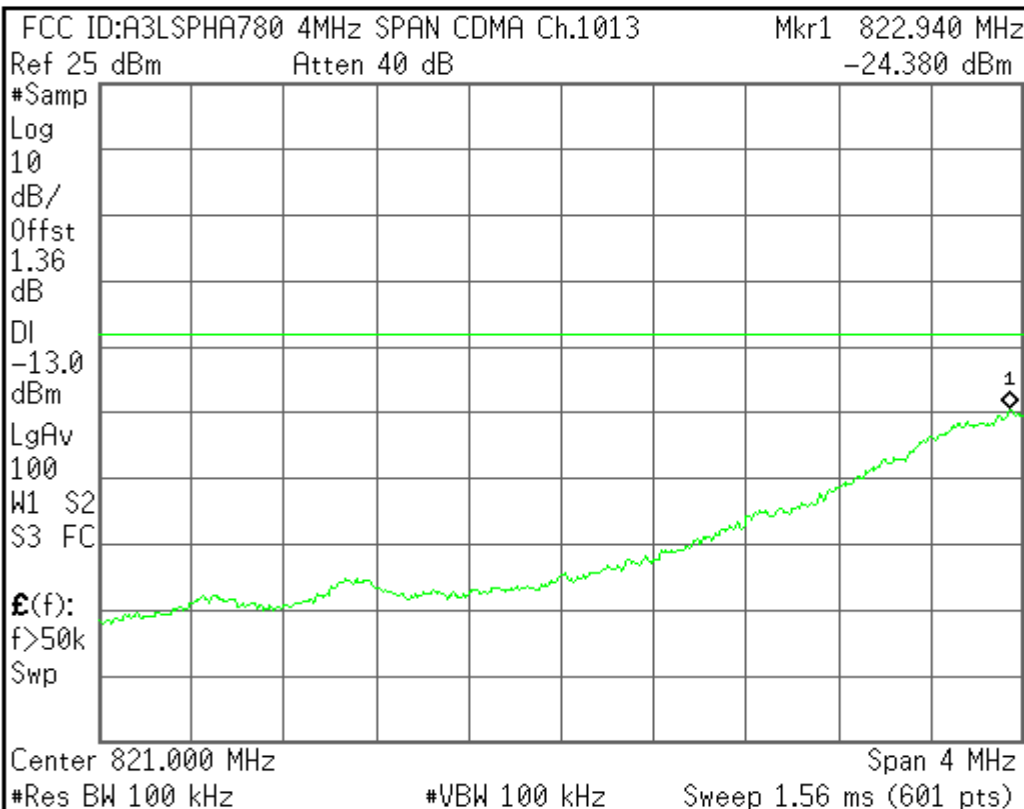
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R L

Freq/Channel

Center Freq
821.000000 MHzStart Freq
819.000000 MHzStop Freq
823.000000 MHzCF Step
400.000000 kHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

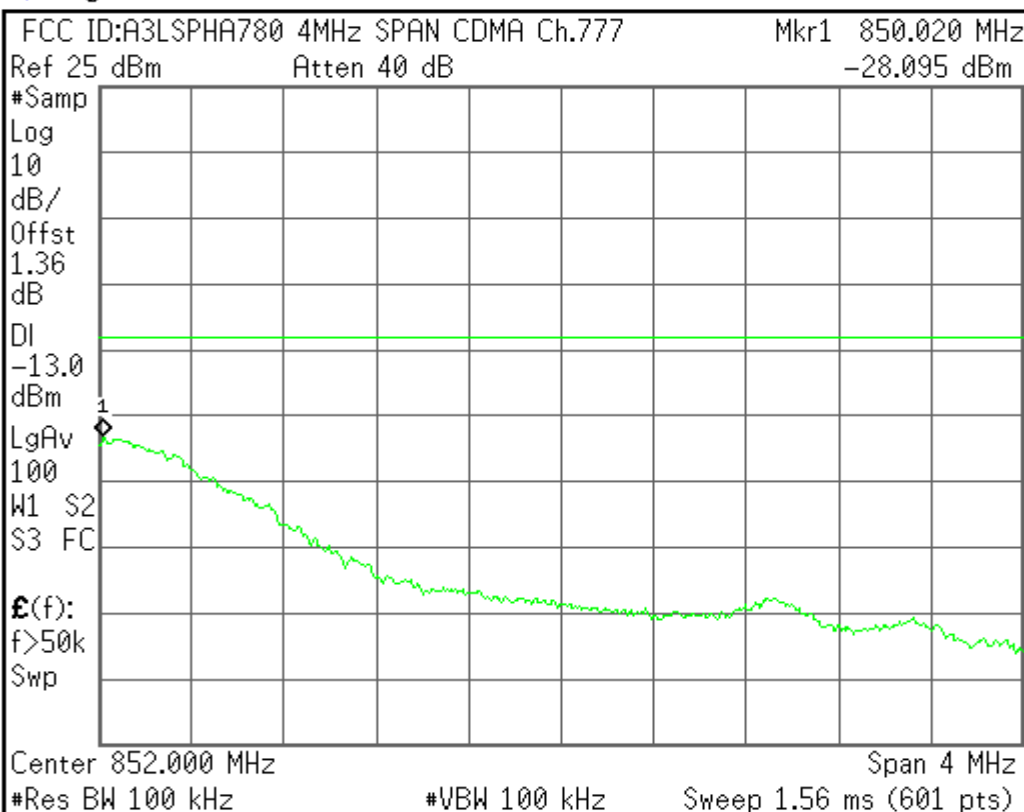
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Agilent

R L

Freq/Channel

Center Freq
852.000000 MHzStart Freq
850.000000 MHzStop Freq
854.000000 MHzCF Step
400.000000 kHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

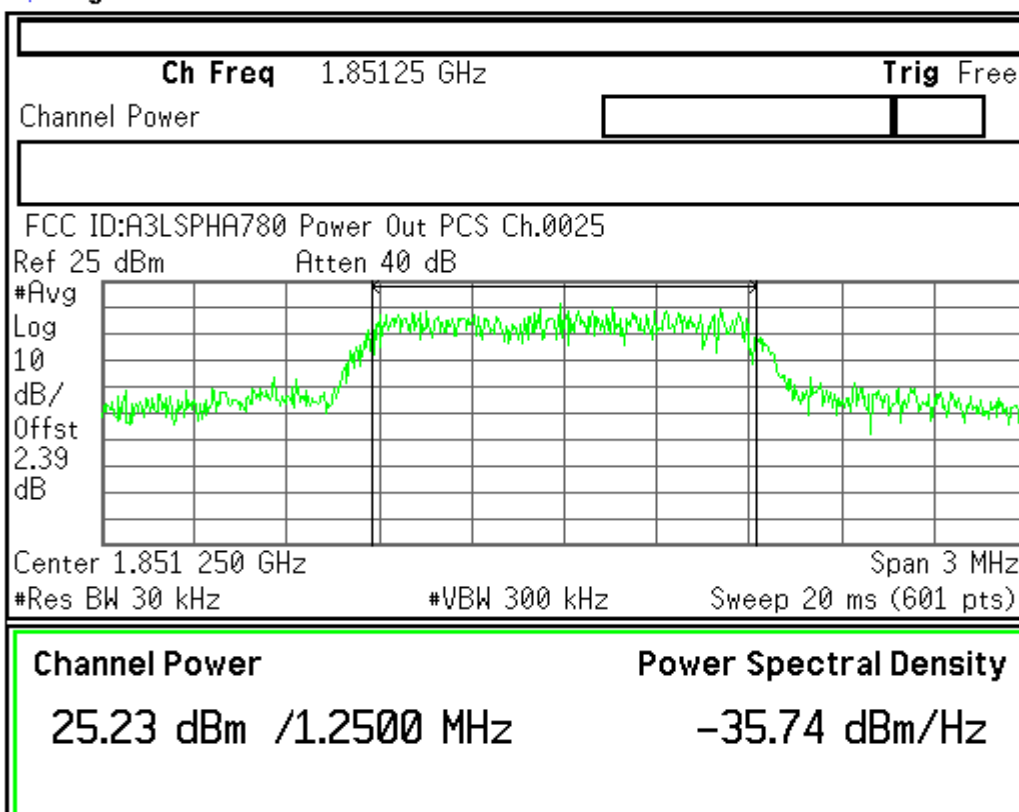
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R T

Freq/Channel

**Center Freq**
1.85125000 GHz**Start Freq**
1.84975000 GHz**Stop Freq**
1.85275000 GHz**CF Step**
300.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

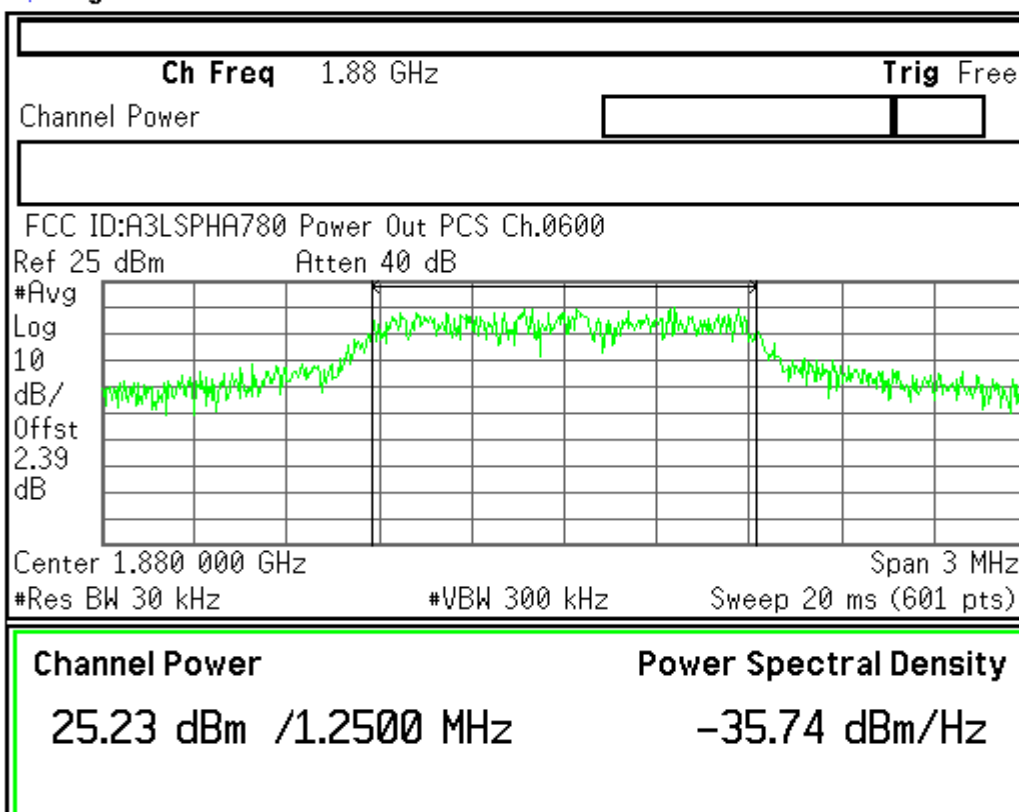
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R T

Freq/Channel

**Center Freq**
1.88000000 GHz**Start Freq**
1.87850000 GHz**Stop Freq**
1.88150000 GHz**CF Step**
300.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

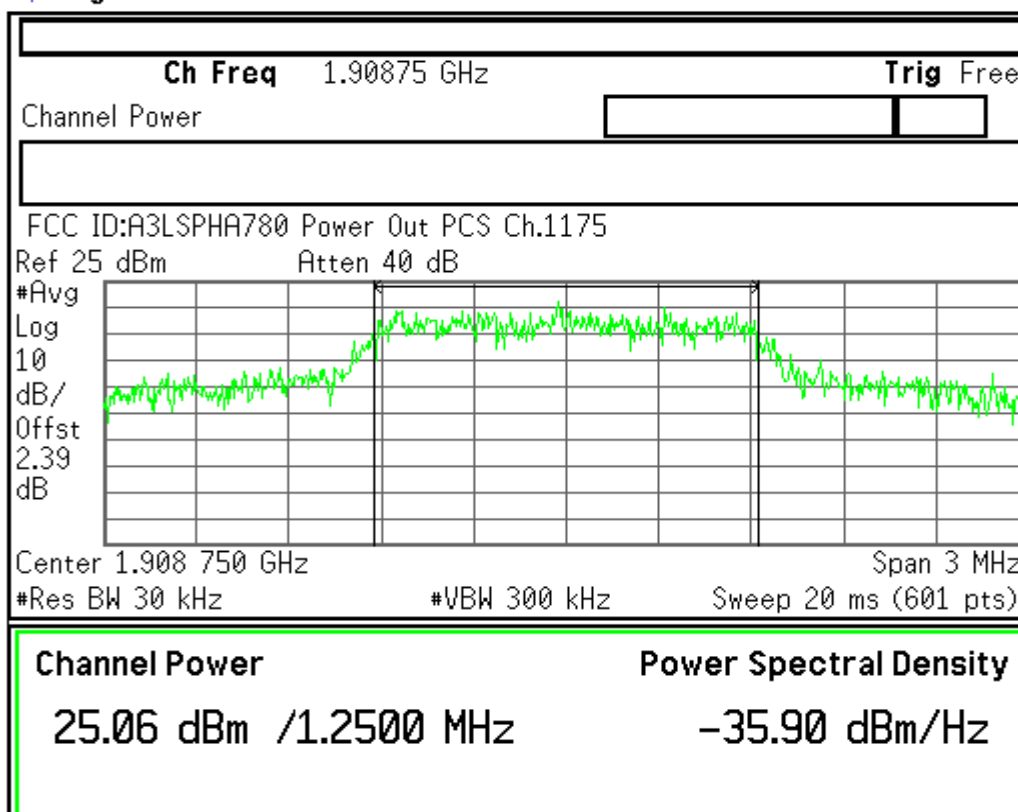
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Agilent

R T

Freq/Channel

Center Freq
1.90875000 GHzStart Freq
1.90725000 GHzStop Freq
1.91025000 GHzCF Step
300.000000 kHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

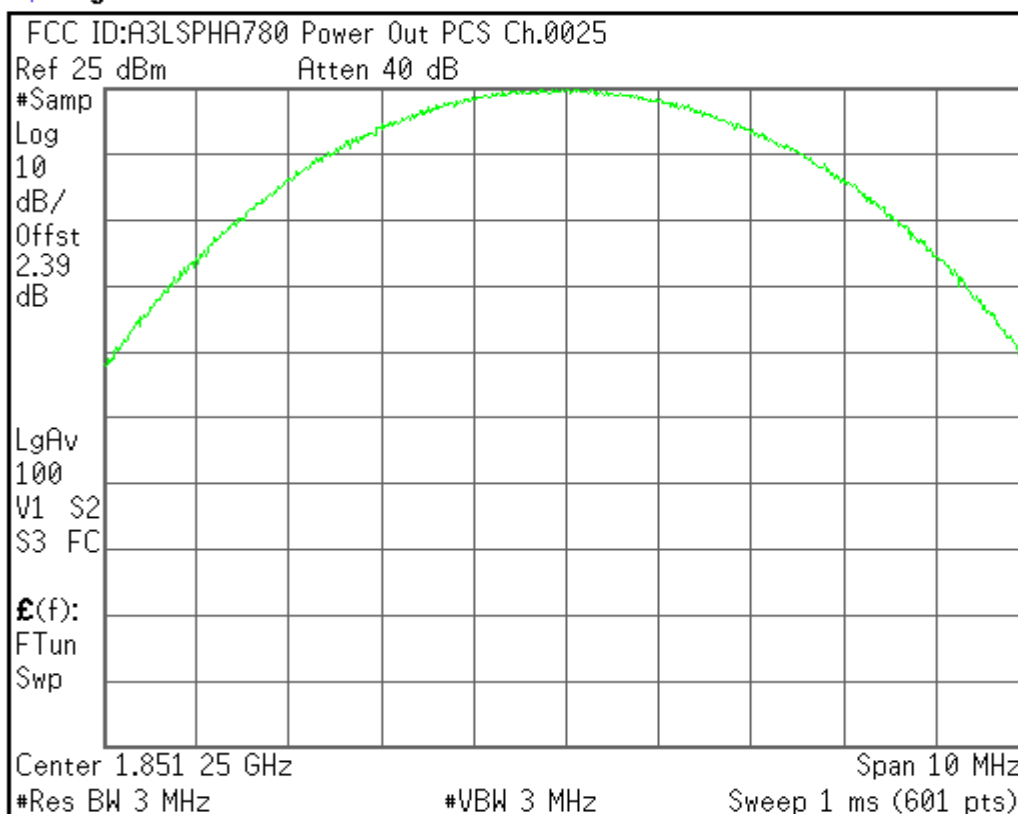
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Agilent

R L

Freq/Channel

Center Freq
1.85125000 GHzStart Freq
1.84625000 GHzStop Freq
1.85625000 GHzCF Step
1.00000000 MHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

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R L

Freq/Channel

FCC ID:A3LSPHA780 Power Out PCS Ch.0600

Ref 25 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

2.39

dB

LgAv

100

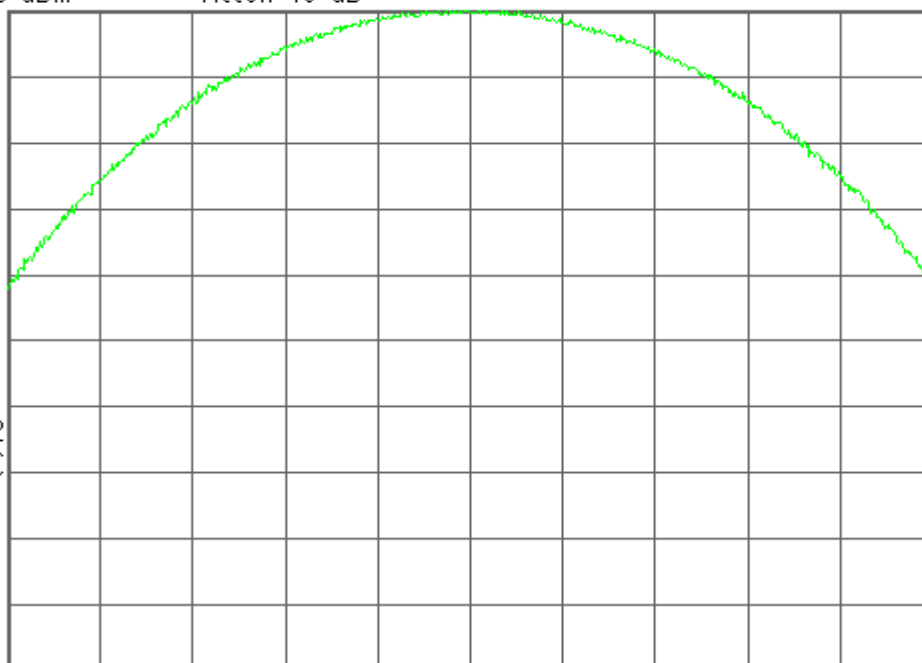
V1 S2

S3 FC

E(f):

FTun

Swp



Center 1.880 00 GHz

Span 10 MHz

#Res BW 3 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Center Freq

1.88000000 GHz

Start Freq

1.87500000 GHz

Stop Freq

1.88500000 GHz

CF Step

1.00000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

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Agilent

R L

Freq/Channel

FCC ID:A3LSPHA780 Power Out PCS Ch.1175

Ref 25 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

2.39

dB

LgAv

100

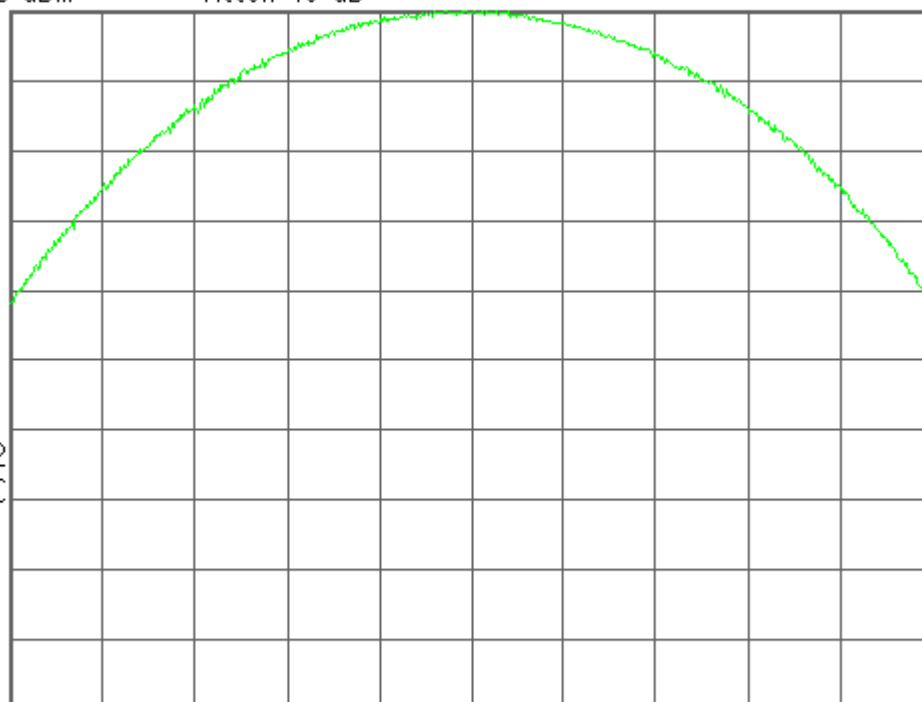
V1 S2

S3 FC

E(f):

FTun

Swp



Center 1.908 75 GHz

Span 10 MHz

#Res BW 3 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Center Freq

1.90875000 GHz

Start Freq

1.90375000 GHz

Stop Freq

1.91375000 GHz

CF Step

1.00000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

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Ch Freq 1.85125 GHz Trig Free
Occupied Bandwidth

Center Freq
1.85125000 GHz

Start Freq
1.84975000 GHz

Stop Freq
1.85275000 GHz

CF Step
300.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

FCC ID:A3LSPHA780 0BW PCS Ch.0025

Ref 25 dBm Atten 40 dB

#Samp

Log

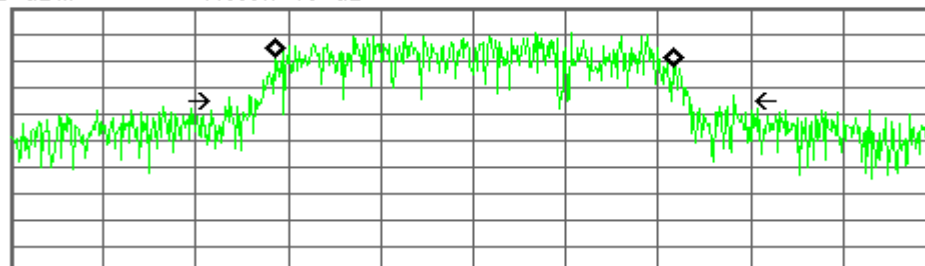
10

dB/

Offst

2.39

dB



Center 1.851 250 GHz

Span 3 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 20 ms (601 pts)

Occupied Bandwidth

1.2944 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 2.775 kHz

x dB Bandwidth 1.639 MHz*

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Ch Freq 1.88 GHz Trig Free
Occupied Bandwidth

Center Freq
1.88000000 GHz

Start Freq
1.87850000 GHz

Stop Freq
1.88150000 GHz

CF Step
300.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

FCC ID:A3LSPHA780 0BW PCS Ch.0600

Ref 25 dBm Atten 40 dB

#Samp

Log

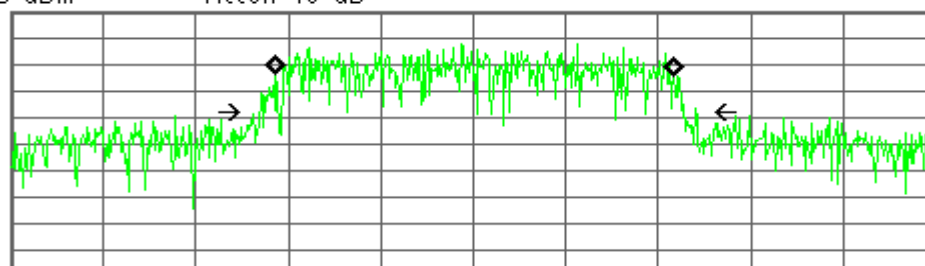
10

dB/

Offst

2.39

dB



Center 1.880 000 GHz

Span 3 MHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 20 ms (601 pts)

Occupied Bandwidth

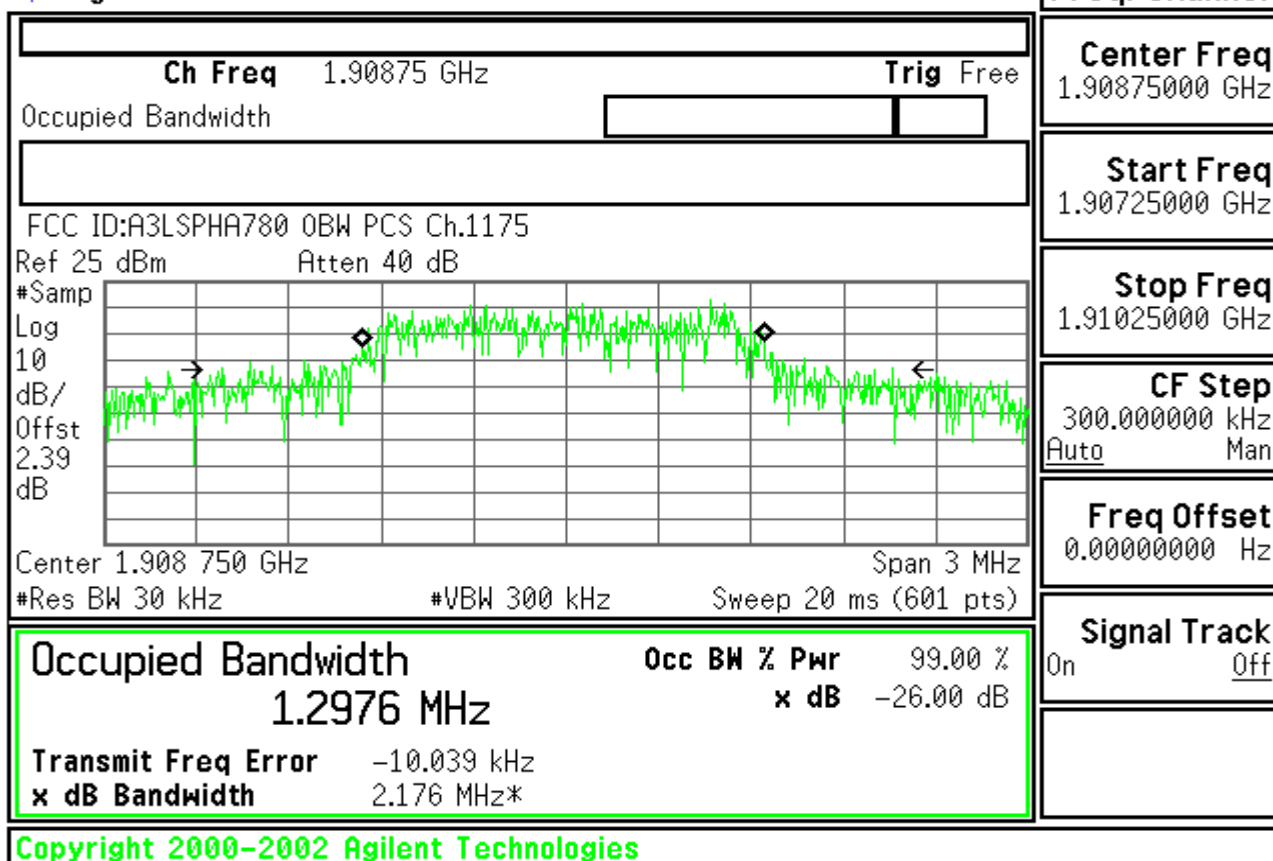
1.2898 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 5.717 kHz

x dB Bandwidth 1.416 MHz*

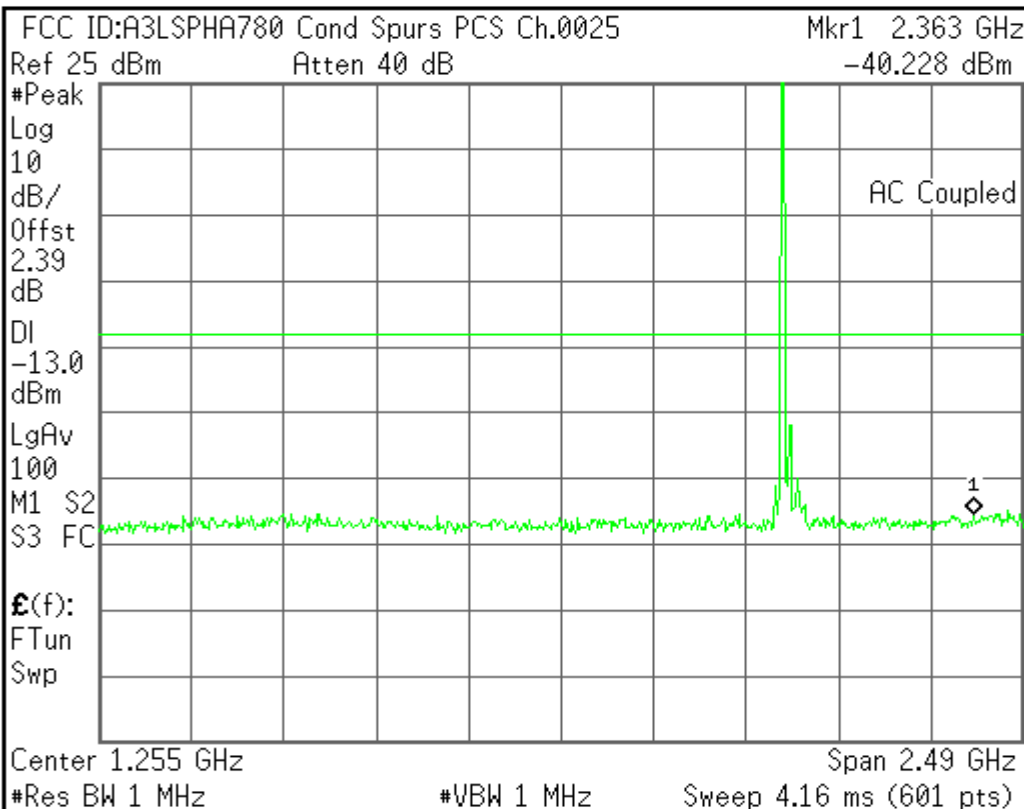
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Agilent

L

Freq/Channel



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

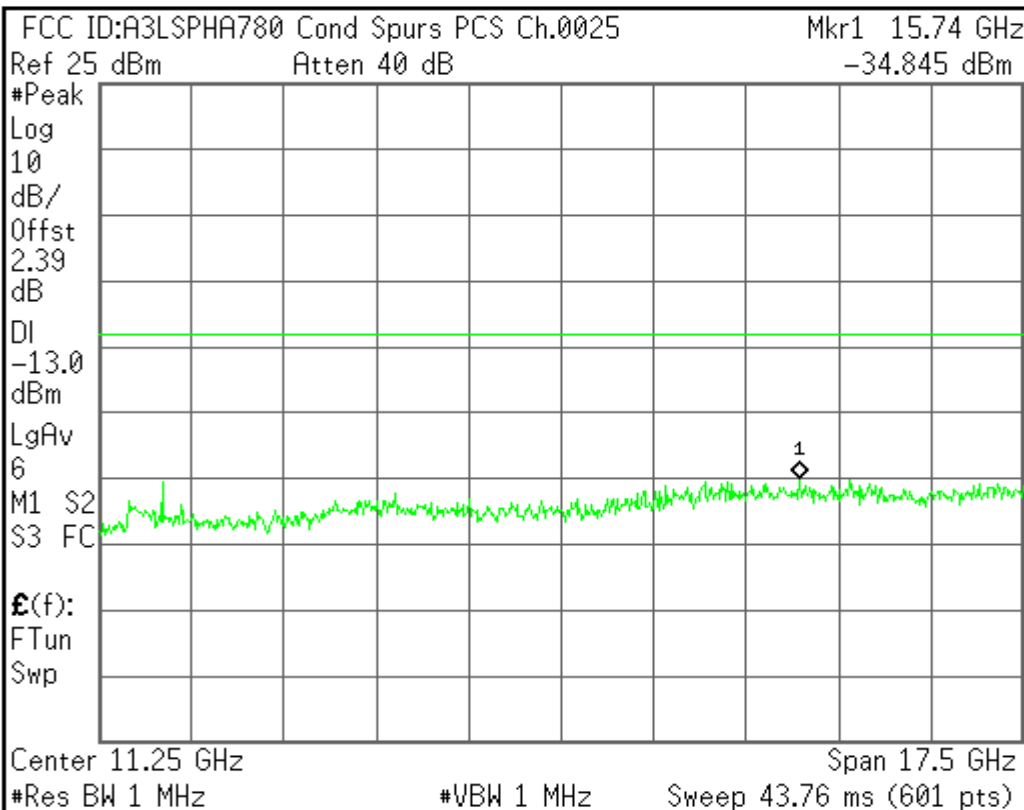
Signal Track
On Off

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Agilent

R L

Freq/Channel



Center Freq
11.2500000 GHz

Start Freq
2.50000000 GHz

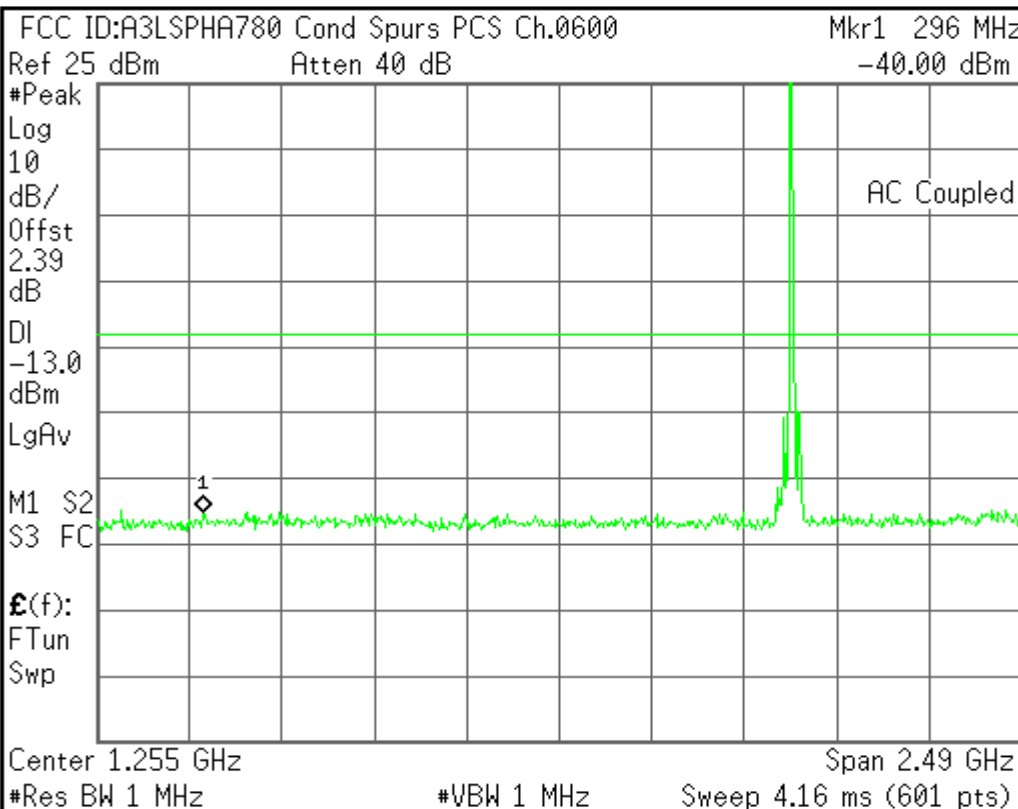
Stop Freq
20.0000000 GHz

CF Step
1.75000000 GHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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Center Freq
1.25500000 GHz

Start Freq
10.0000000 MHz

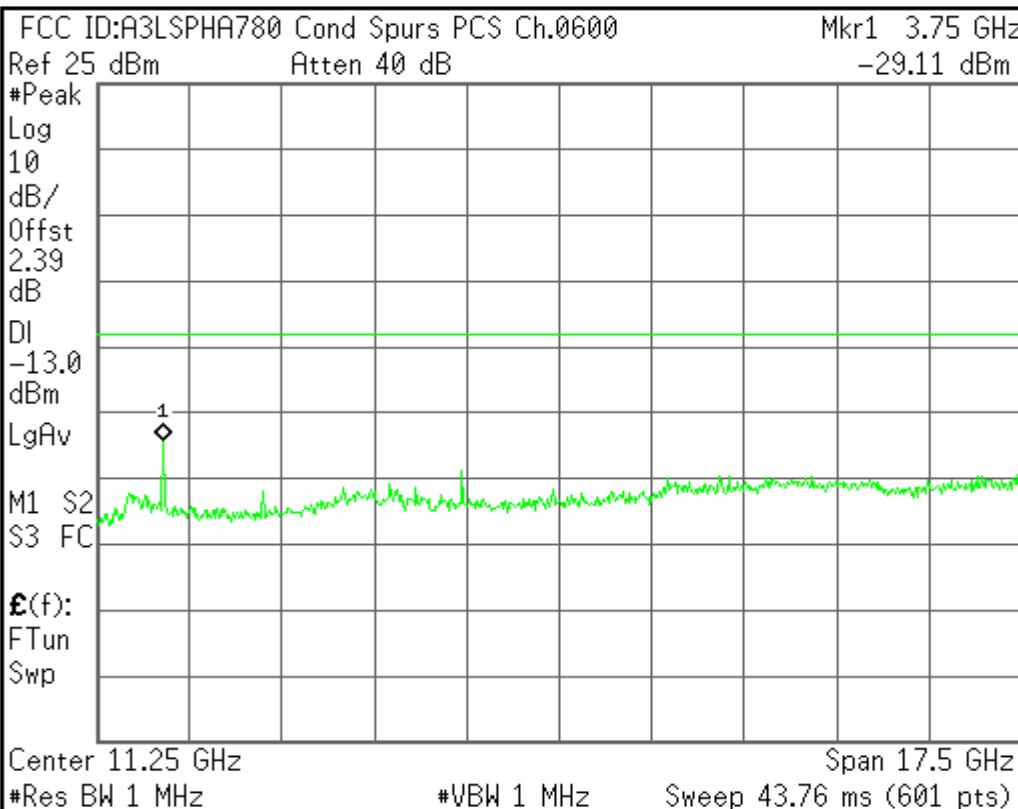
Stop Freq
2.50000000 GHz

CF Step
249.000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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Center Freq
11.2500000 GHz

Start Freq
2.50000000 GHz

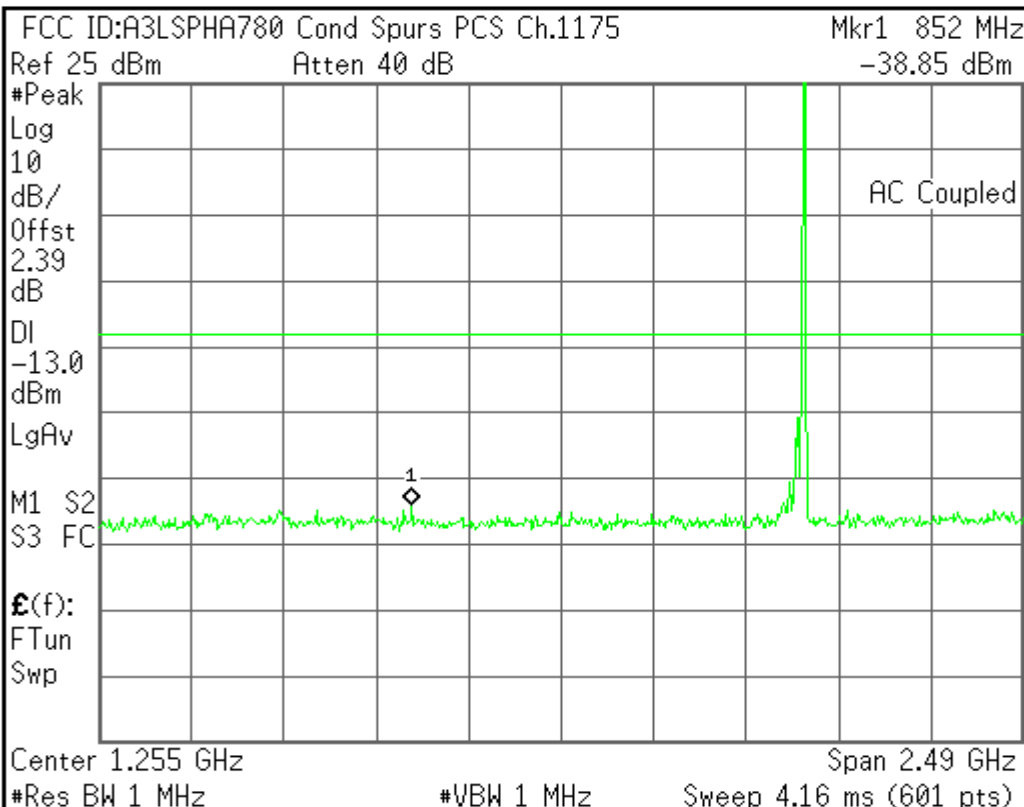
Stop Freq
20.0000000 GHz

CF Step
1.75000000 GHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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Center Freq
1.25500000 GHz

Start Freq
10.0000000 MHz

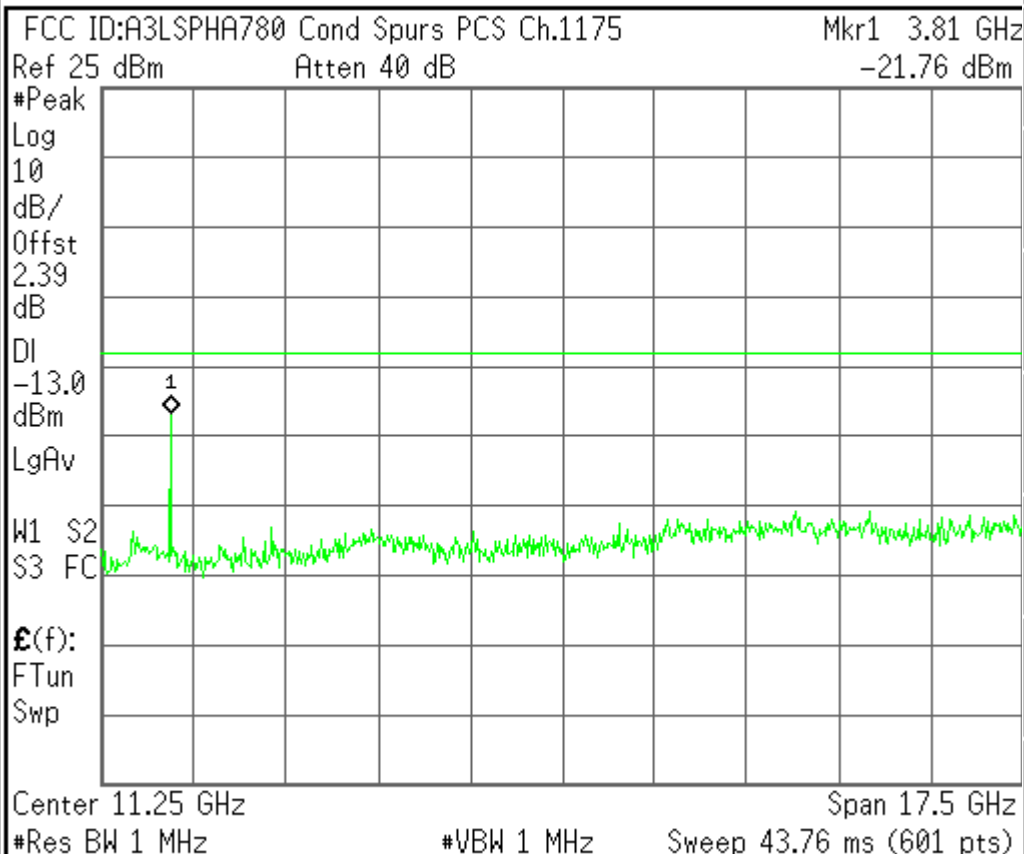
Stop Freq
2.50000000 GHz

CF Step
249.000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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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

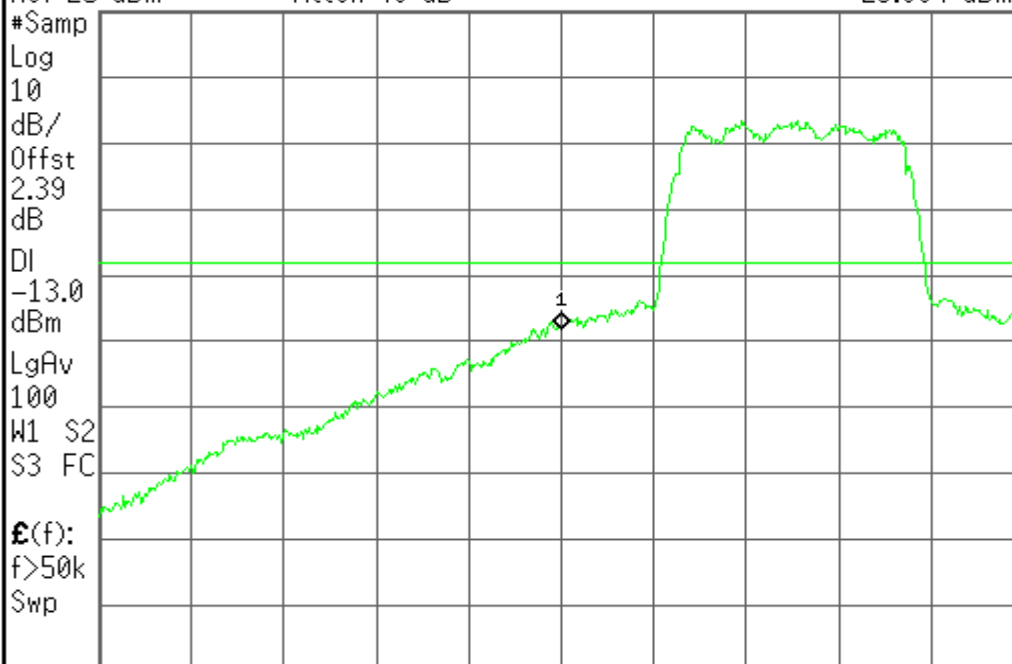
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R L

Freq/Channel

FCC ID:A3LSPHA780 Band Edge PCS Ch.0025 Mkr1 1.850 000 GHz
Ref 25 dBm Atten 40 dB -23.094 dBm



Center Freq
1.85000000 GHz

Start Freq
1.84750000 GHz

Stop Freq
1.85250000 GHz

CF Step
500.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

Center 1.850 000 GHz Span 5 MHz
#Res BW 30 kHz #VBW 30 kHz Sweep 21.2 ms (601 pts)

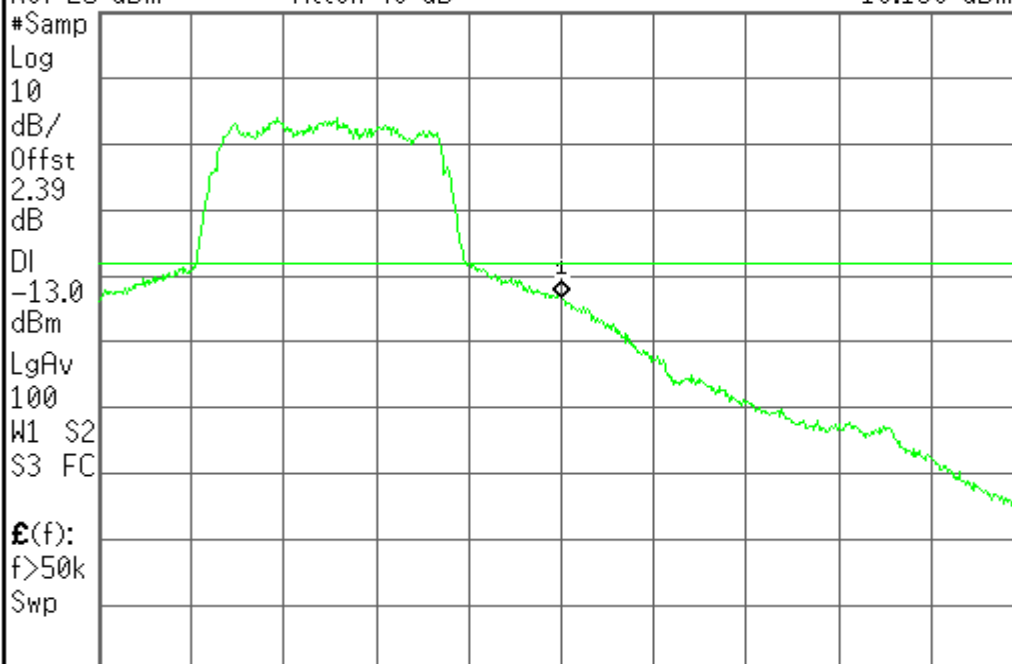
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L

Freq/Channel

FCC ID:A3LSPHA780 Band Edge PCS Ch.1175 Mkr1 1.910 000 GHz
Ref 25 dBm Atten 40 dB -18.136 dBm



Center Freq
1.91000000 GHz

Start Freq
1.90750000 GHz

Stop Freq
1.91250000 GHz

CF Step
500.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

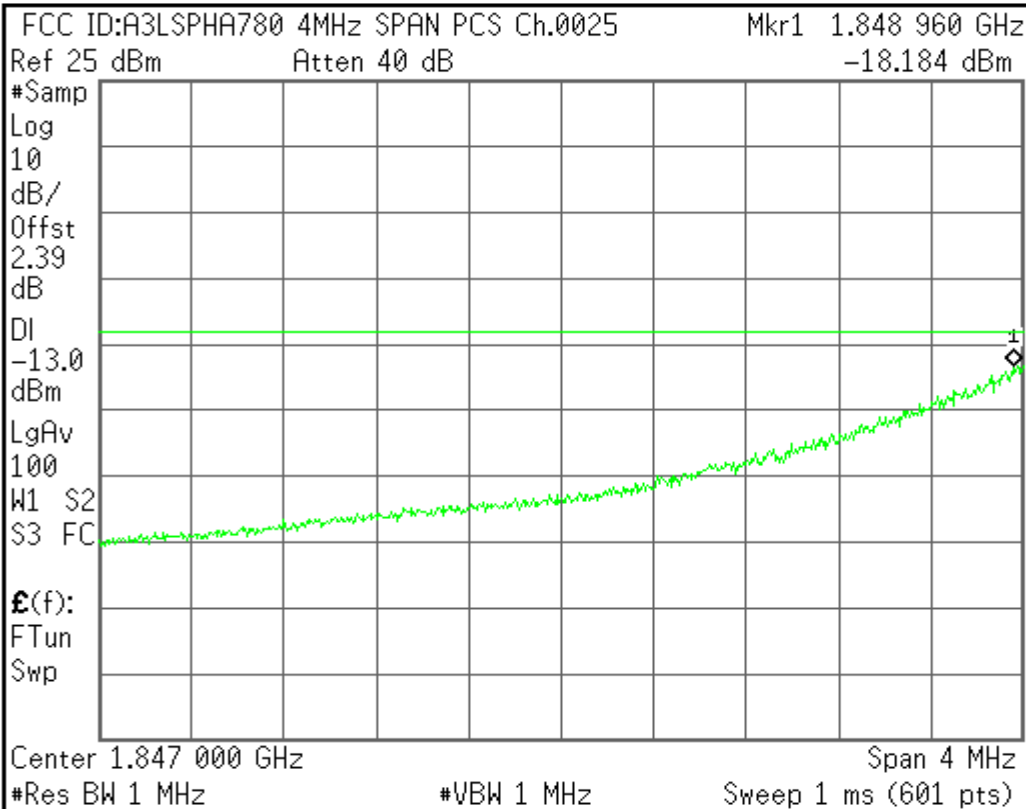
Signal Track
On Off

Center 1.910 000 GHz Span 5 MHz
#Res BW 30 kHz #VBW 30 kHz Sweep 21.2 ms (601 pts)

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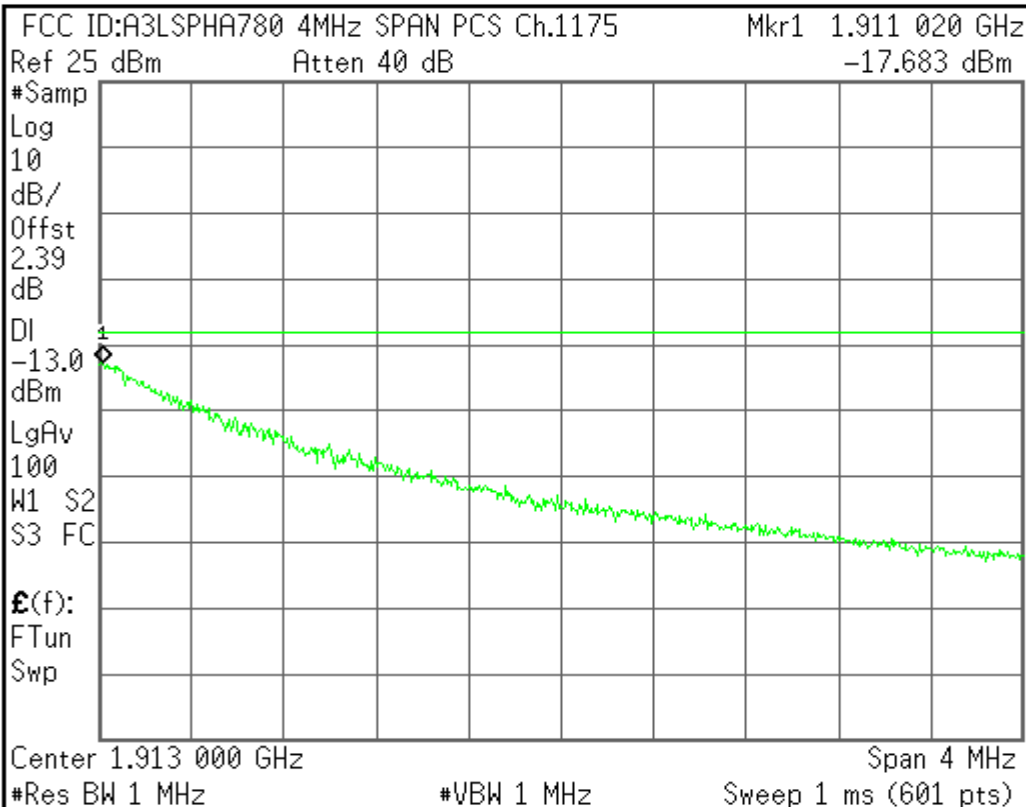
R L

Freq/Channel**Center Freq**
1.84700000 GHz**Start Freq**
1.84500000 GHz**Stop Freq**
1.84900000 GHz**CF Step**
400.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

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**Agilent**

R L

Freq/Channel**Center Freq**
1.91300000 GHz**Start Freq**
1.91100000 GHz**Stop Freq**
1.91500000 GHz**CF Step**
400.000000 kHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

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