SAMSUNG ELECTRONICS Co., Ltd.,
Regulatory Compliance Team
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:	SGH-E316
FCC ID (Requested):	A3LSGHE316
Report No:	FB-004-R1/2
Job No:	FB-004
Date issued:	February 2,2004

Supplement to Test Report FB-004-R1, dated Feb 2, 2004.
The test results contained in this Report supersede those.

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

Prepared By	JH NAM – Test Engineer	**Date**	**2004.03.22**
Checked By	JH CHOI - Engineer	**Date**	**2004.03.22**
Authorized By	JK CHOI – Senior Manager	**Date**	**2004.03.22**

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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, Youngtong-Gu, Suwon City Gyeonggi-Do, KOREA 442-600
· Attention:	Wallace Oh, Engineering Manager (QA Lab)
· FCC ID:	A3LSGHE316
· Quantity:	Quantity production is planned
· Emission Designators:	300KGX7W
· Tx Freq. Range:	824.2 - 848.8MHz (GSM 850) 1850.2 -1909.8MHz (GSM 1900)
· Rx Freq. Range:	869.2 - 893.8 MHz (GSM 850) 1930.2 -1989.8 MHz (GSM 1900)
· Max. Power Rating:	3.475W ERP GSM850(35.41dBm) 1.600W EIRP GSM1900(32.04dBm)
· FCC Classification(s):	Licensed Portable Tx Held to Ear (PCE)
· Equipment (EUT) Type:	Dual-Mode GSM850/GSM1900 Phone
· Modulation(s):	GSM850/PCS GSM
· Frequency Tolerance:	±0.00025% (2.5ppm)
· FCC Rule Part(s):	§24(E), §22(H), §2
· Dates of Test:	JAN. 19, 29-30, 2004
· Place of Test:	SAMSUNG Lab,
· Test Report S/N:	FB-004-R1/2

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.

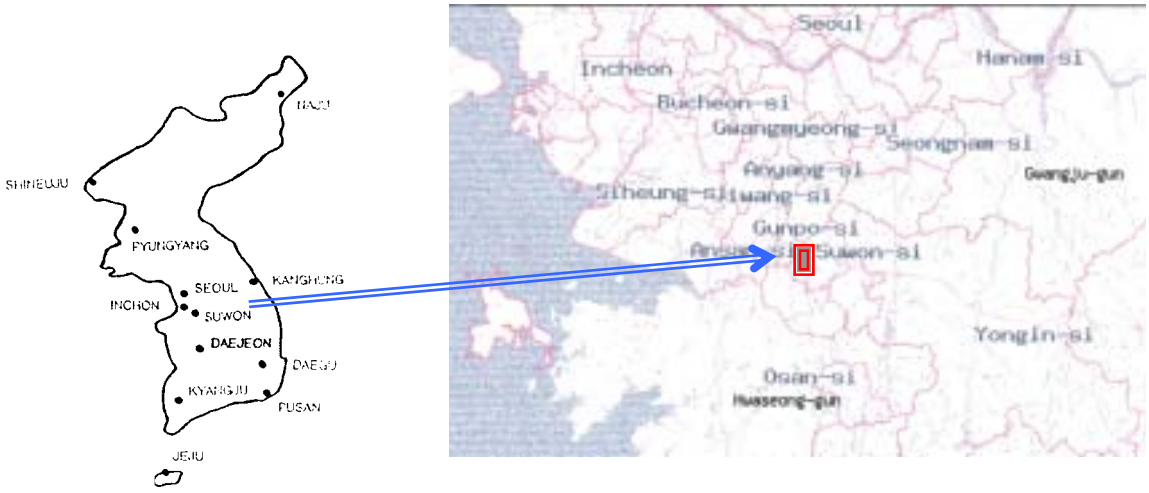

Figure1. Map of the Suwon City area.

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.

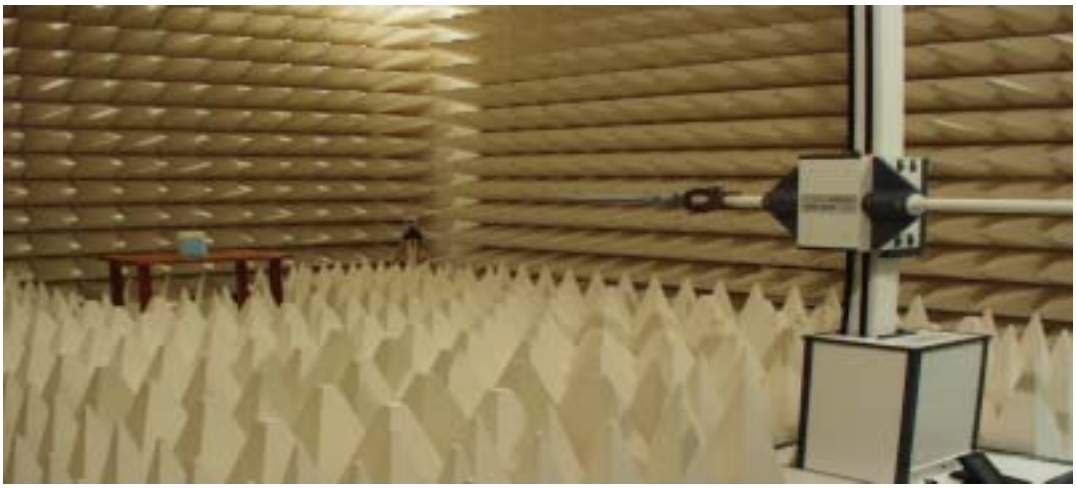

Figure2. Photograph of 3m Fully-Anechoic Chamber

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.

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3. 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	100134	2004-03-31
Dipole Antenna	3121C-DB4	9007-587	2004-03-21
	3121C-DB4	9007-588	2004-03-21
Receive Antenna	HO040	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:

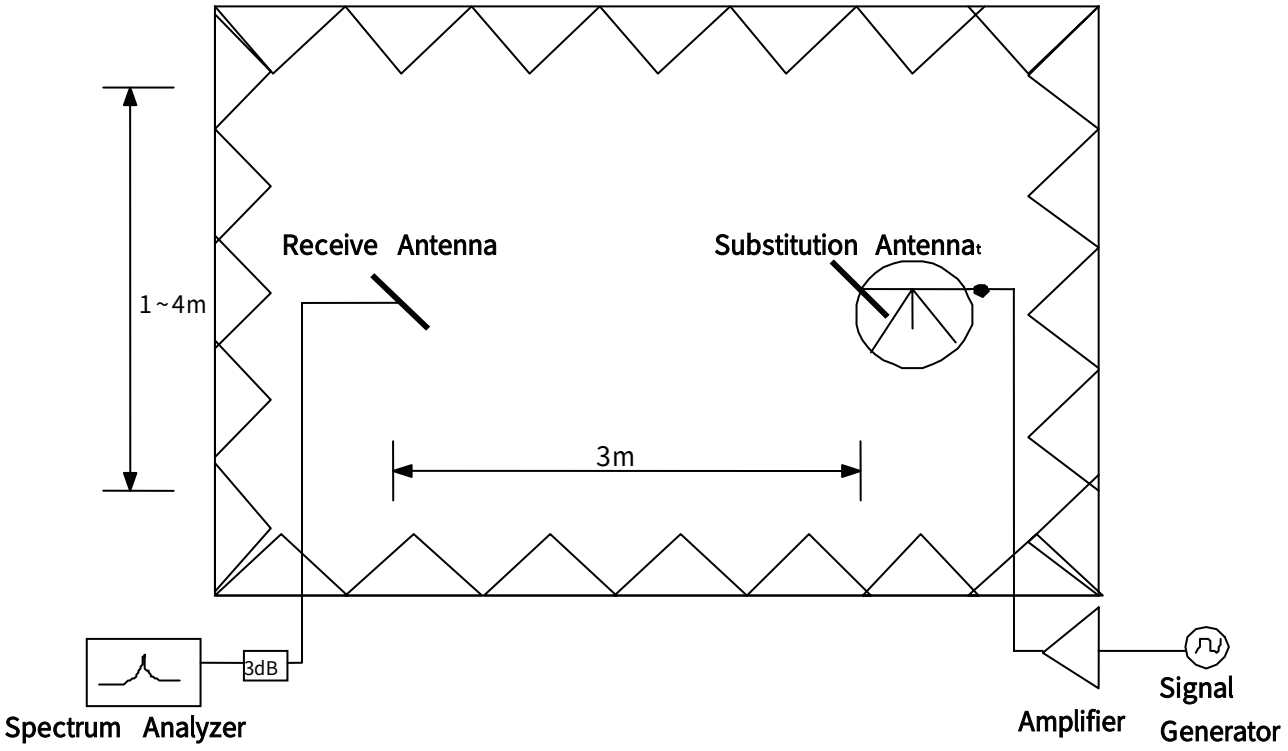

Figure 3. Diagram of ERP/EIRP test Set-up

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. For GSM signals, a peak 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 and EIRP are 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

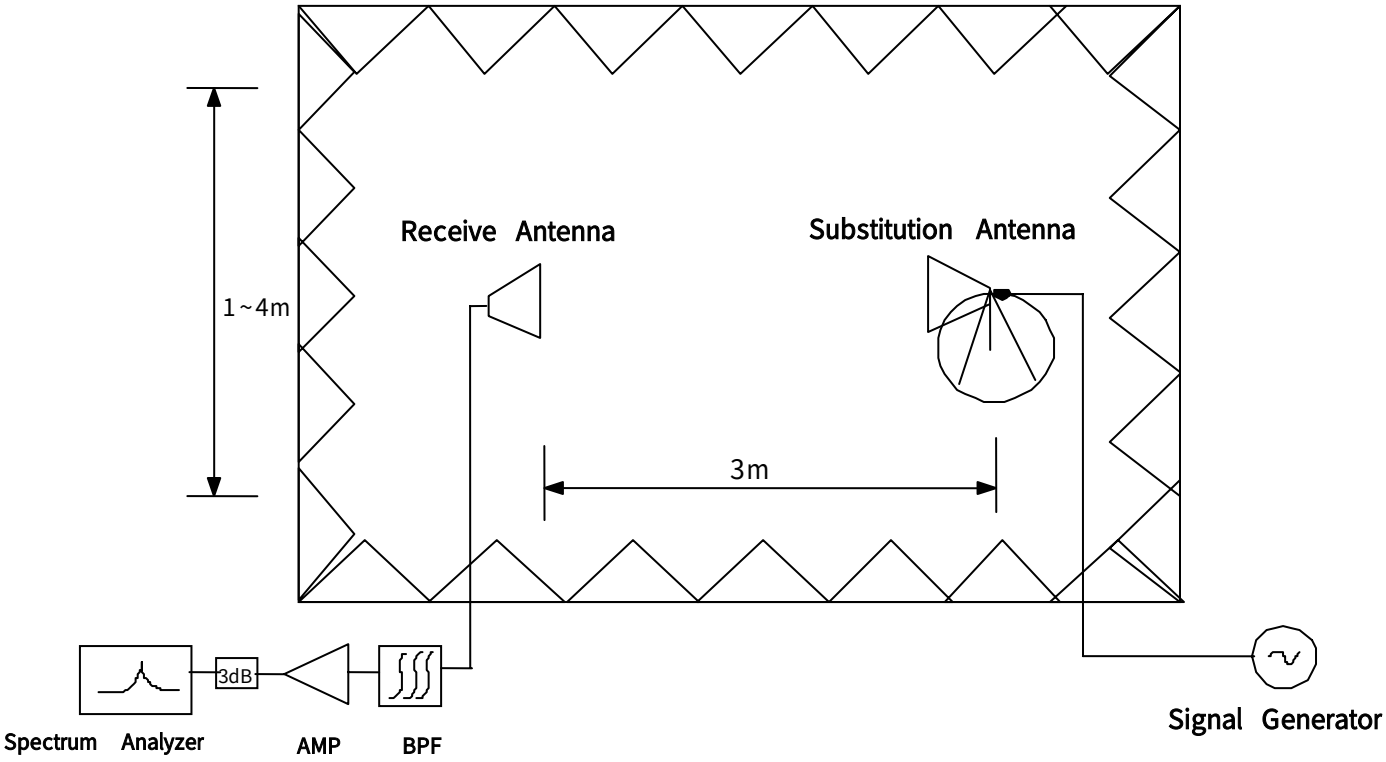

Figure 4. Diagram of Radiated Spurious & Harmonic test Set-up

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 661 PCS Mode 2nd Harmonic(1880MHz)

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 25.5dBm –(-24.8)= 50.3dBc .

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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+10log (P)dB. Limit equivalent to –13dBm, calculation shown below.

43 + 10log (1.600W) = 45.04dB
32.04dBm – 45.04dB = -13dBm

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.
4. 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.
5. 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.
6. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
7. 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.
8. The artificial load is mounted external to the temperature chamber.

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

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6. TEST DATA

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

Supply Voltage : 3.7VDC

Modulation : GSM850

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	S/A (dBm)	Ant gain (dBi)	Ref level (dBm)
836.60	33.00	H	-5.43	0	-5.43
		V	-5.90	0	-5.90

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
824.2	-3.89	H2	181	34.54	2.844	Standard
836.6	-3.02	H2	183	35.41	3.475	Standard
848.8	-3.04	H2	179	35.39	3.459	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 : GSM1900

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	S/A (dBm)	Ant gain (dBi)	Ref level (dBm)
1880.00	30.00	H	-10.02	8.18	-18.20
		V	-10.18	8.18	-18.36

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
1850.20	-16.16	H1	127	32.04	1.600	Standard
1880.00	-17.15	H1	123	31.05	1.274	Standard
1909.80	-19.18	H2	2	29.02	0.798	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 : 824.20 MHz(Low), 836.60MHz(Middle), 848.80MHz(High)

Measured Output Power : 35.41 dBm = 3.475 W

Modulation Signal : GSM850

Limit : 43 + 10log$_{10}$(w) = 48.41 dBc

■ **Result**

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
128	2	1648.40	-42.89	H2	70.24
	3	2472.60	-54.97	H2	75.70
	4	3296.80	-61.66	H2	79.97
	5	4121.00	-73.20	H2	86.82
	6	4945.20	-69.76	H2	80.72
	7	5769.40	-	-	-
190	2	1673.20	-43.61	H2	69.90
	3	2509.80	-54.11	H2	73.51
	4	3346.40	-63.74	H2	81.45
	5	4183.00	-71.51	H2	84.35
	6	5019.60	-65.63	H2	77.30
	7	5856.20	-	-	-
251	2	1697.60	-45.16	H2	70.35
	3	2546.40	-53.17	H2	73.54
	4	3395.20	-65.00	H1	83.10
	5	4244.00	-72.32	H2	85.05
	6	5092.80	-66.13	H2	77.00
	7	5941.60	-	-	-

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 : 32.04 dBm = 1.600 W

Modulation Signal : PCS GSM

Limit : 43 + 10log$_{10}$(w) = 45.04 dBc

■ Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
512	2	3700.40	-44.26	H2	52.32
	3	5550.60	-53.13	H2	56.37
	4	7400.80	-	-	-
	5	9251.00	-69.70	H1	65.53
	6	11101.20	-	-	-
	7	12951.40	-	-	-
	8	14801.60	-	-	-
661	2	3760.00	-44.13	H2	52.18
	3	5640.00	-53.30	H2	56.94
	4	7520.00	-75.40	H1	74.98
	5	9400.00	-69.15	H1	65.24
	6	11280.00	-	-	-
	7	13160.00	-	-	-
	8	15040.00	-	-	-
810	2	3819.60	-47.83	H2	55.72
	3	5729.40	-59.78	H2	63.36
	4	7639.20	-	-	-
	5	9549.00	-	-	-
	6	11458.80	-	-	-
	7	13368.60	-	-	-
	8	15278.40	-	-	-

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.5 CDMA Radiated Spurious & Harmonic Conversion Table

Date : 2004 . 01 . 29 .

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)
128	2	1648.40	6.95	7.21	0.26	-42.89	-49.15	-32.69	-37.61	70.24	75.160
	3	2472.60	8.77	8.87	0.10	-54.97	-62.66	-38.15	-44.85	75.70	82.400
	4	3296.80	11.07	8.43	-2.64	-61.66	-66.08	-42.42	-46.50	79.97	84.050
	5	4121.00	11.57	9.89	-1.68	-73.20	-	-49.27	-	86.82	-
	6	4945.20	12.78	10.33	-2.45	-69.76	-69.88	-43.17	-43.52	80.72	81.070
	7	5769.40	13.78	10.86	-2.92	-	-	-	-	-	-
190	2	1673.20	7.02	7.21	0.19	-43.61	-48.08	-32.35	-35.63	69.90	73.180
	3	2509.80	8.91	8.87	-0.04	-54.11	-62.45	-35.96	-44.17	73.51	81.720
	4	3346.40	11.08	8.43	-2.65	-63.74	-65.92	-43.90	-46.04	81.45	83.590
	5	4183.00	11.59	10.20	-1.39	-71.51	-	-46.80	-	84.35	-
	6	5019.60	13.13	10.34	-2.79	-65.63	-70.30	-39.75	-43.99	77.30	81.540
	7	5856.20	14.23	10.86	-3.37	-	-	-	-	-	-
251	2	1697.60	7.04	7.21	0.17	-45.16	-48.53	-32.80	-35.04	70.35	72.590
	3	2546.40	8.95	8.87	-0.08	-53.17	-60.60	-35.99	-42.72	73.54	80.270
	4	3395.20	11.03	8.54	-2.49	-65.00	-65.38	-45.55	-46.16	83.10	83.710
	5	4244.00	11.68	10.20	-1.48	-72.32	-	-47.50	-	85.05	-
	6	5092.80	13.22	10.39	-2.83	-66.13	-67.58	-39.45	-41.42	77.00	78.970
	7	5941.60	14.27	10.86	-3.41	-	-	-	-	-	-

6.6 PCS Radiated Spurious & Harmonic Conversion Table

Date : 2004 . 1 . 30 .

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 = EIRP - ⑦

CH	Har	Frequency (MHz)	① Tx CL (dB)	② Horn Gain (dB)	Tx Level @ (S/G 10dBm)	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)
512	2	3700.40	10.76	8.87	8.11	-44.26	-50.16	-20.28	-36.43	52.32	57.75
	3	5550.60	13.67	10.60	6.93	-53.13	-56.25	-24.33	-27.49	56.37	59.53
	4	7400.80	16.56	10.83	4.27	-	-	-	-	-	-
	5	9251.00	18.86	11.56	2.70	-69.70	-70.59	-33.49	-34.61	65.53	66.65
	6	11101.20	21.50	12.79	1.29	-	-	-	-	-	-
	7	12951.40	23.76	12.66	-1.10	-	-	-	-	-	-
	8	14801.60	26.18	12.69	-3.49	-	-	-	-	-	-
661	2	3760.00	10.91	8.98	8.07	-44.13	-49.91	-20.14	-25.79	52.18	57.83
	3	5640.00	13.78	10.60	6.82	-53.30	-55.97	-24.90	-27.35	56.94	59.39
	4	7520.00	16.85	10.83	3.98	-75.40	-	-42.94	-	74.98	-
	5	9400.00	19.04	11.60	2.56	-69.15	-70.64	-33.20	-35.22	65.24	67.26
	6	11280.00	21.29	12.93	1.64	-	-	-	-	-	-
	7	13160.00	23.78	12.64	-1.14	-	-	-	-	-	-
	8	15040.00	26.74	12.70	-4.04	-	-	-	-	-	-
810	2	3819.60	10.90	8.98	8.08	-47.83	-51.78	-23.68	-27.08	55.72	59.12
	3	5729.40	14.03	10.73	6.70	-59.78	-60.79	-31.32	-31.88	63.36	63.92
	4	7639.20	17.12	10.87	3.75	-	-	-	-	-	-
	5	9549.00	19.29	11.67	2.38	-	-	-	-	-	-
	6	11458.80	21.55	12.90	1.35	-	-	-	-	-	-
	7	13368.60	25.38	12.65	-2.73	-	-	-	-	-	-
	8	15278.40	27.28	12.73	-4.55	-	-	-	-	-	-

6.7 Frequency Stability

6.7.1 GSM850 Frequency Stability Table

Operating Frequency : 836,600,000 Hz

Channel : 190

Reference Voltage : 3.7VDC

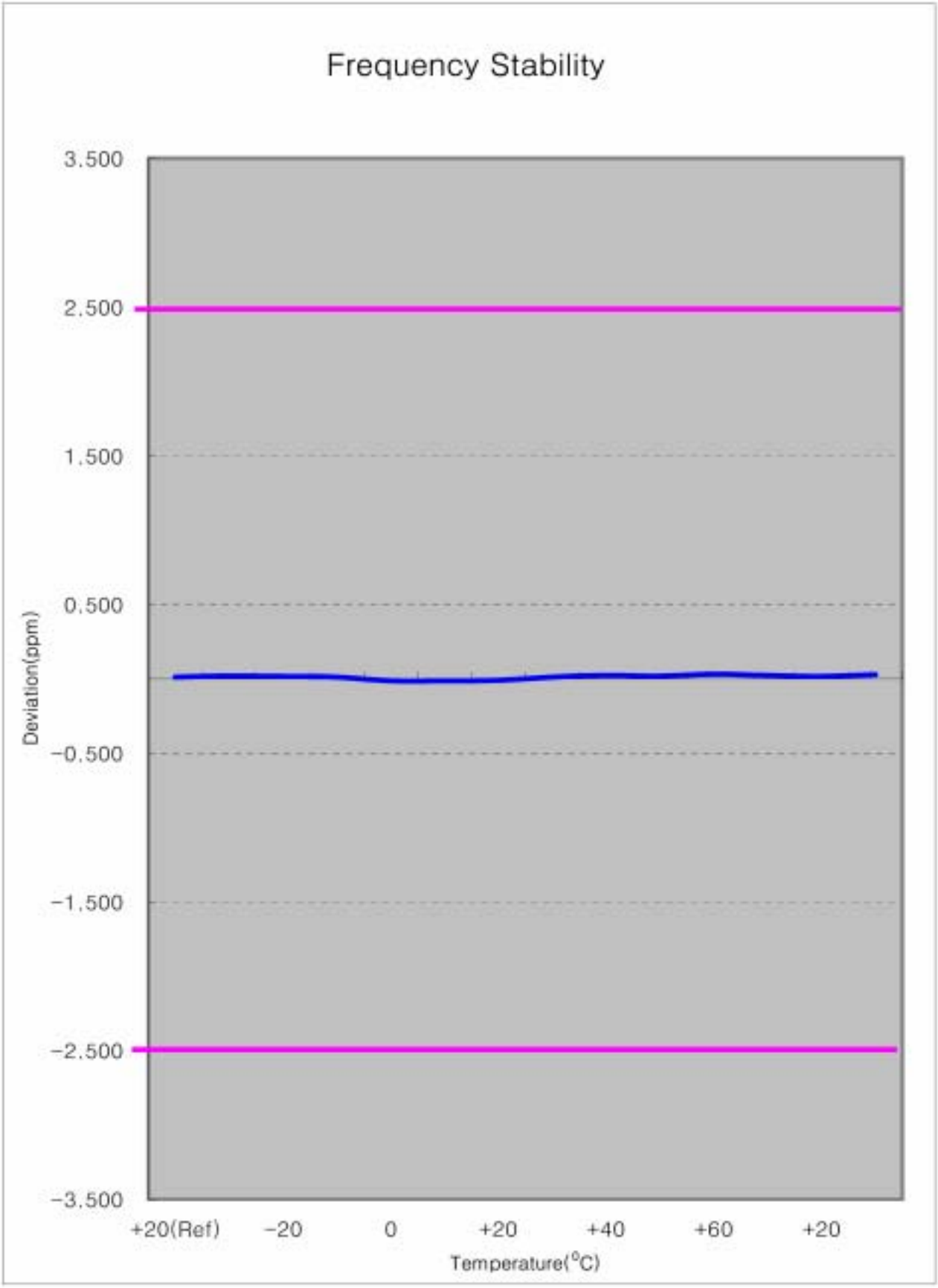
Deviation Limit : ±0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	18.65	1,880,000,019	0.000001	0.010
100%		-30	35.21	1,880,000,035	0.000002	0.019
100%		-20	30.24	1,880,000,030	0.000002	0.016
100%		-10	21.23	1,880,000,021	0.000001	0.011
100%		0	-26.07	1,879,999,974	-0.000001	-0.014
100%		+10	-25.54	1,879,999,974	-0.000001	-0.014
100%		+20	-18.96	1,879,999,981	-0.000001	-0.010
100%		+30	21.05	1,880,000,021	0.000001	0.011
100%		+40	42.42	1,880,000,042	0.000002	0.023
100%		+50	33.45	1,880,000,033	0.000002	0.018
100%		+60	56.20	1,880,000,056	0.000003	0.030
85%	3.15	+20	42.39	1,880,000,042	0.000002	0.023
115%	4.26	+20	30.33	1,880,000,030	0.000002	0.016
Batt.Endpoint	3.10	+20	51.87	1,880,000,052	0.000003	0.028

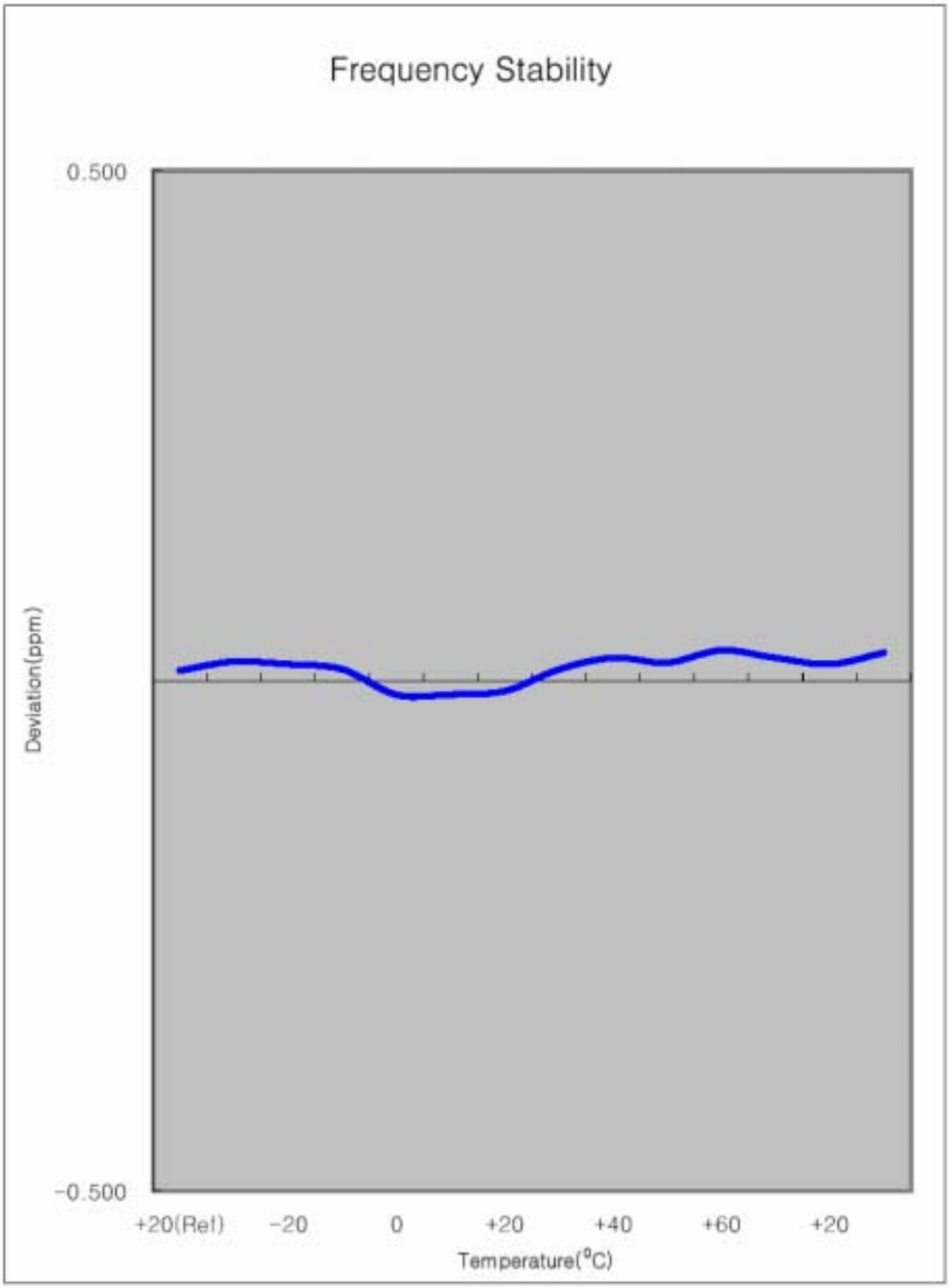
Note : The temperature is varied from -30 °C to +60 °C using an environmental chamber.

The EUT is tested down to the battery end point

6.7.3 GSM850 Frequency Stability Grap



Zoom In


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

6.7.2 PCS GSM Frequency Stability Table

Operating Frequency : 1,880,000,000 Hz

Channel : 661

Reference Voltage : 3.7VDC

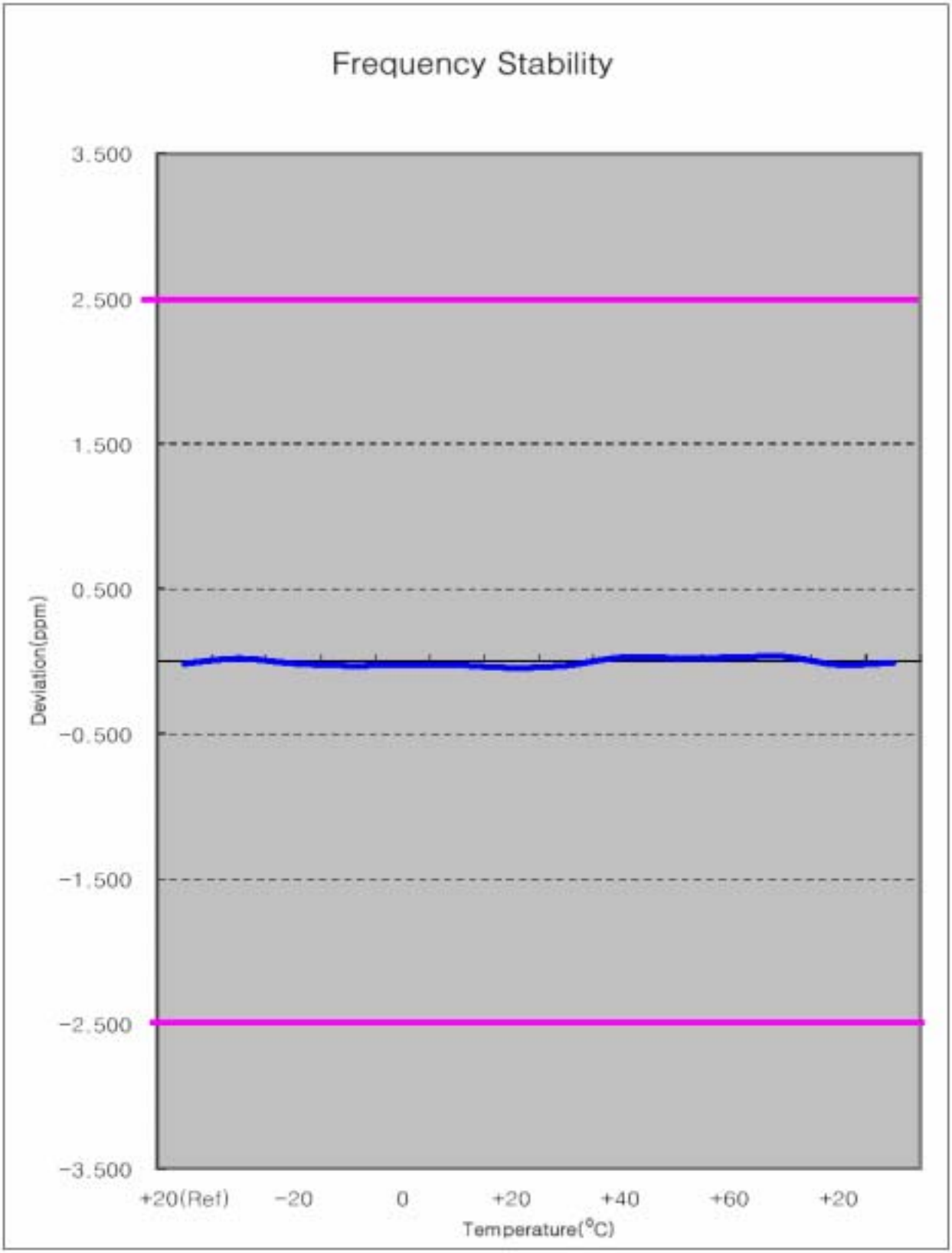
Deviation Limit : ±0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	-34.58	1,879,999,965	-0.000002	-0.018
100%		-30	33.94	1,880,000,034	0.000002	0.018
100%		-20	-29.90	1,879,999,970	-0.000002	-0.016
100%		-10	-58.14	1,879,999,942	-0.000003	-0.031
100%		0	-49.51	1,879,999,950	-0.000003	-0.026
100%		+10	-50.61	1,879,999,949	-0.000003	-0.027
100%		+20	-85.93	1,879,999,914	-0.000005	-0.046
100%		+30	-57.48	1,879,999,943	-0.000003	-0.031
100%		+40	46.68	1,880,000,047	0.000002	0.025
100%		+50	44.42	1,880,000,044	0.000002	0.024
100%		+60	46.10	1,880,000,046	0.000002	0.025
85%	3.15	+20	59.08	1,880,000,059	0.000003	0.031
115%	4.26	+20	-47.44	1,879,999,953	-0.000003	-0.025
Batt.Endpoint	3.00	+20	-20.29	1,879,999,980	-0.000001	-0.011

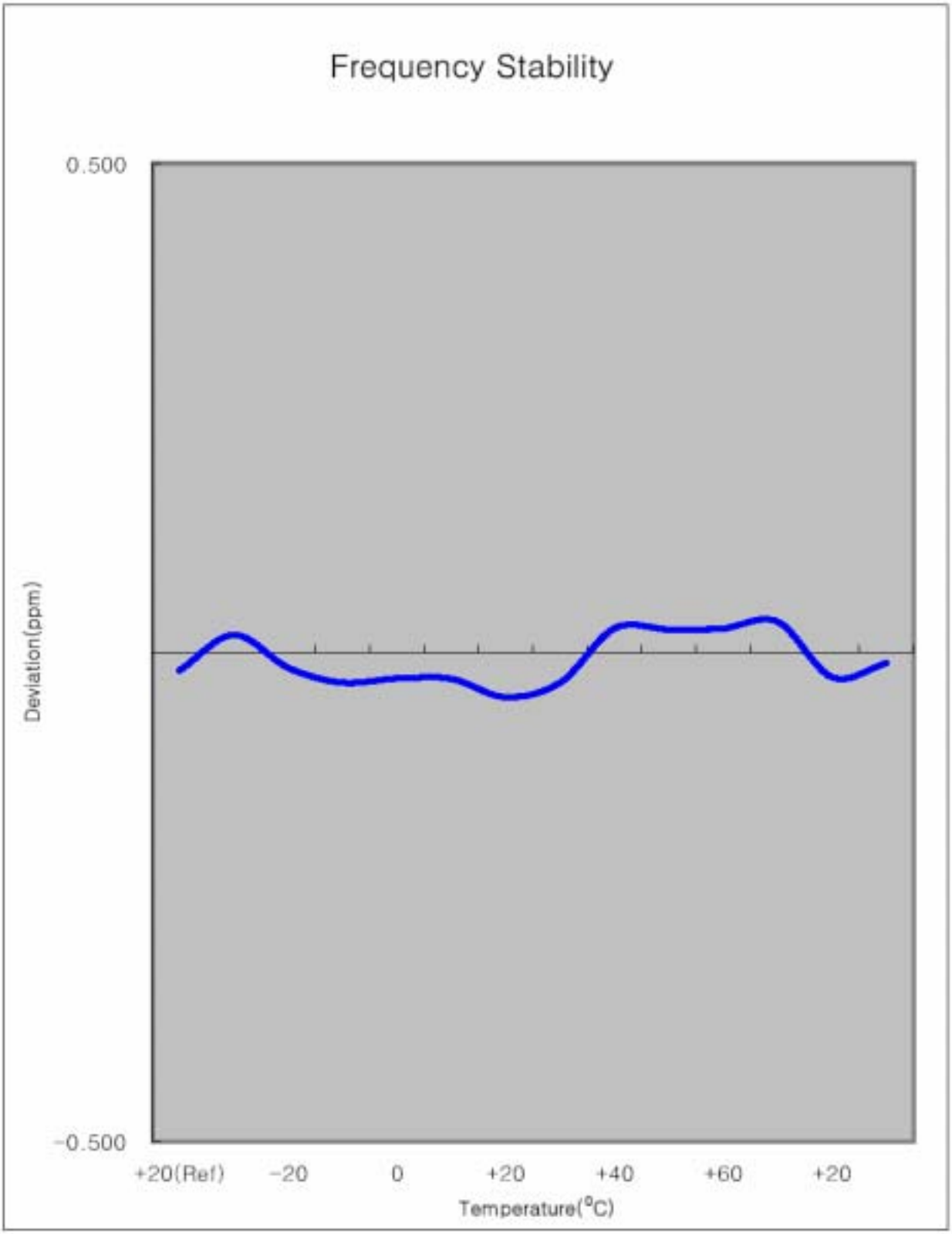
Note : The temperature is varied from -30 °C to +60 °C using an environmental chamber.

The EUT is tested down to the battery end point

6.7.4 PCS GSM 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 = 300KG7W

GSM Bandwidth = 300KHz
G = Phase Modulation
7 = Two or more channels containing quantized or digital inforamtion
W = Combination(Audio/Data)

- End of page -

8. CONCLUSION

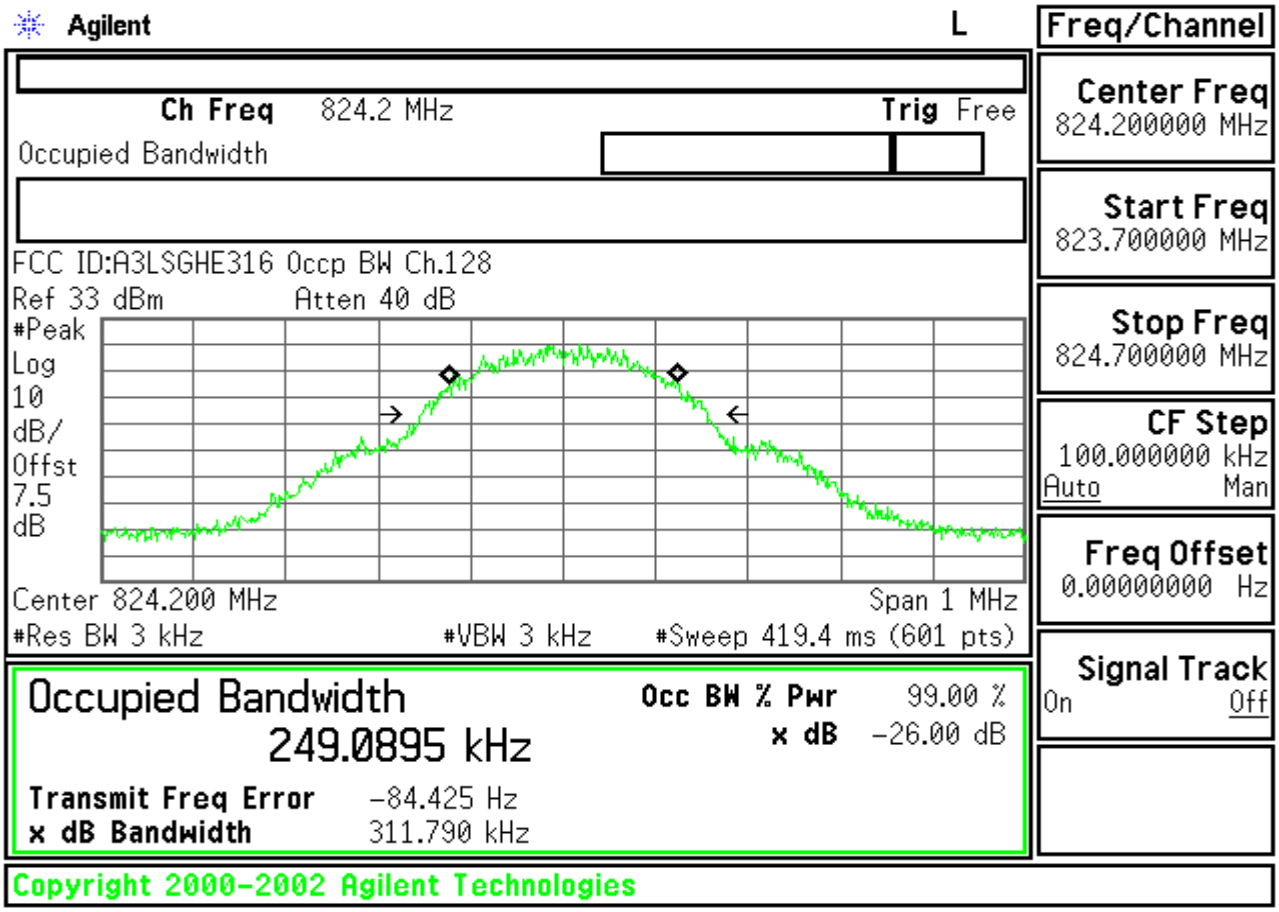
The data collected shows that the SAMSUNG Dual-Mode GSM850/PCS GSM Phone FCC ID : A3LSGHE316 complies with all the requirements of Parts 2,22,24 of the FCC Rules.

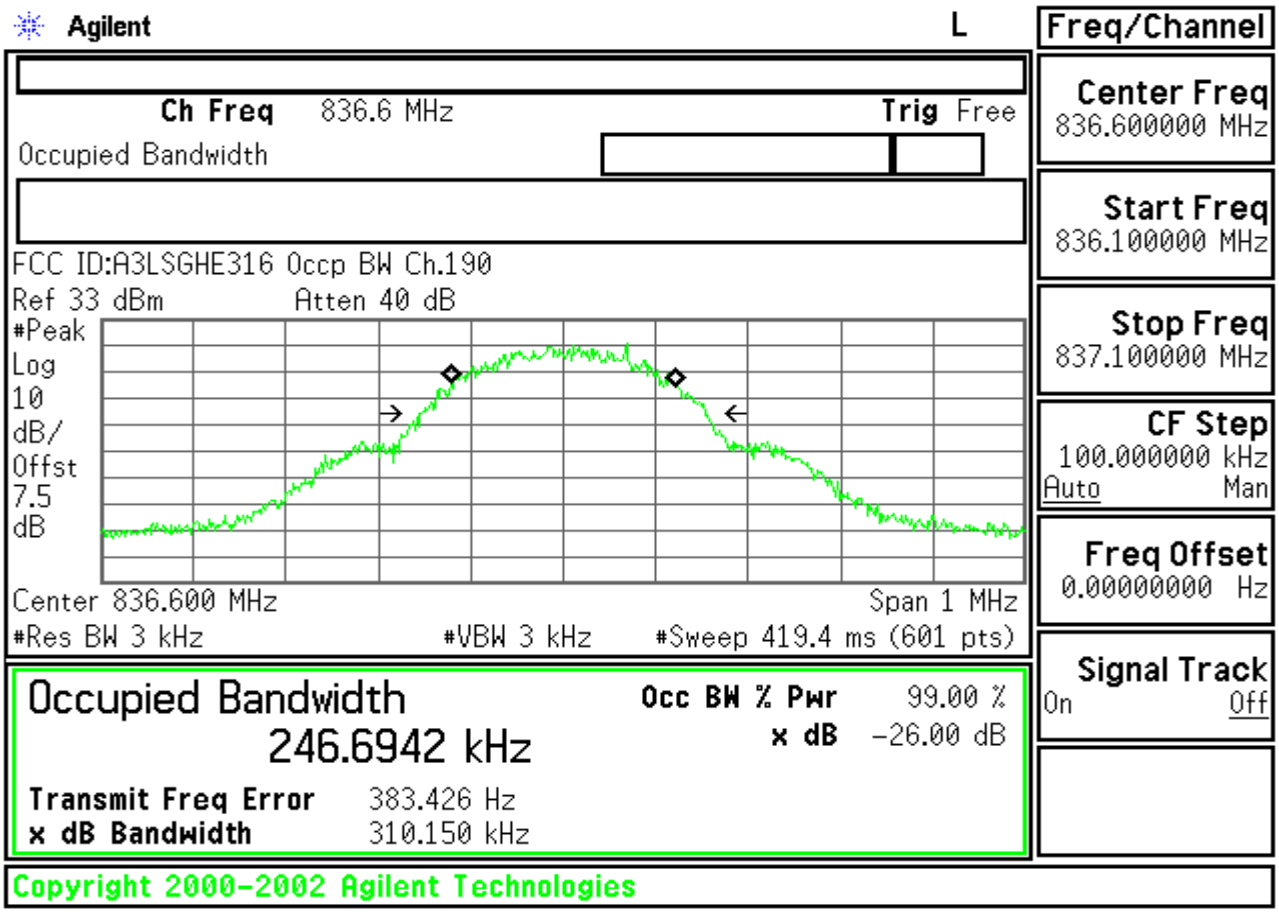
- End of page -

9. TEST PLOTS

- End of page -

GSM850


Agilent
L
Freq/Channel
Ch Freq 824.2 MHz
Trig Free
Occupied Bandwidth
FCC ID:A3LSGHE316 Occp BW Ch.128
Ref 33 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
7.5
dB
Center 824.200 MHz
Span 1 MHz
#Res BW 3 kHz
#VBW 3 kHz
#Sweep 419.4 ms (601 pts)
Occupied Bandwidth
249.0895 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -84.425 Hz
x dB Bandwidth 311.790 kHz
Center Freq
824.200000 MHz
Start Freq
823.700000 MHz
Stop Freq
824.700000 MHz
CF Step
100.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
Ch Freq 836.6 MHz
Trig Free
Occupied Bandwidth
FCC ID:A3LSGHE316 Occp BW Ch.190
Ref 33 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
7.5
dB
Center 836.600 MHz
Span 1 MHz
#Res BW 3 kHz
#VBW 3 kHz
#Sweep 419.4 ms (601 pts)
Occupied Bandwidth
246.6942 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 383.426 Hz
x dB Bandwidth 310.150 kHz
Center Freq
836.600000 MHz
Start Freq
836.100000 MHz
Stop Freq
837.100000 MHz
CF Step
100.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2002 Agilent Technologies

Agilent L

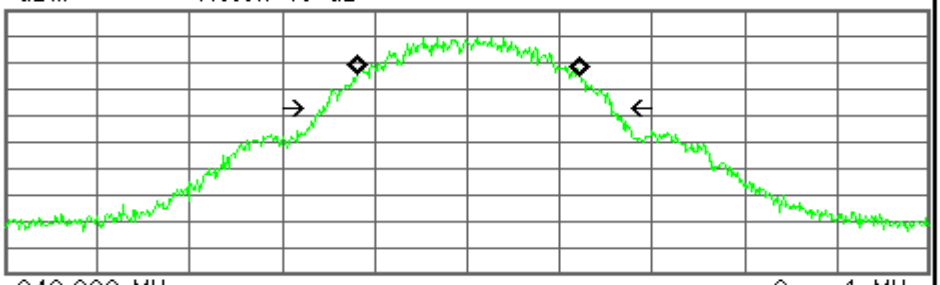
Ch Freq 848.8 MHz Trig Free

Occupied Bandwidth

FCC ID:A3LSGHE316 Occp BW Ch.251

Ref 33 dBm Atten 40 dB

#Peak
Log
10
dB/
Offst
7.5
dB



Center 848.800 MHz Span 1 MHz

#Res BW 3 kHz #VBW 3 kHz #Sweep 419.4 ms (601 pts)

Occupied Bandwidth
246.0099 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 857.789 Hz
x dB Bandwidth 315.745 kHz

Freq/Channel

Center Freq
848.800000 MHz

Start Freq
848.300000 MHz

Stop Freq
849.300000 MHz

CF Step
100.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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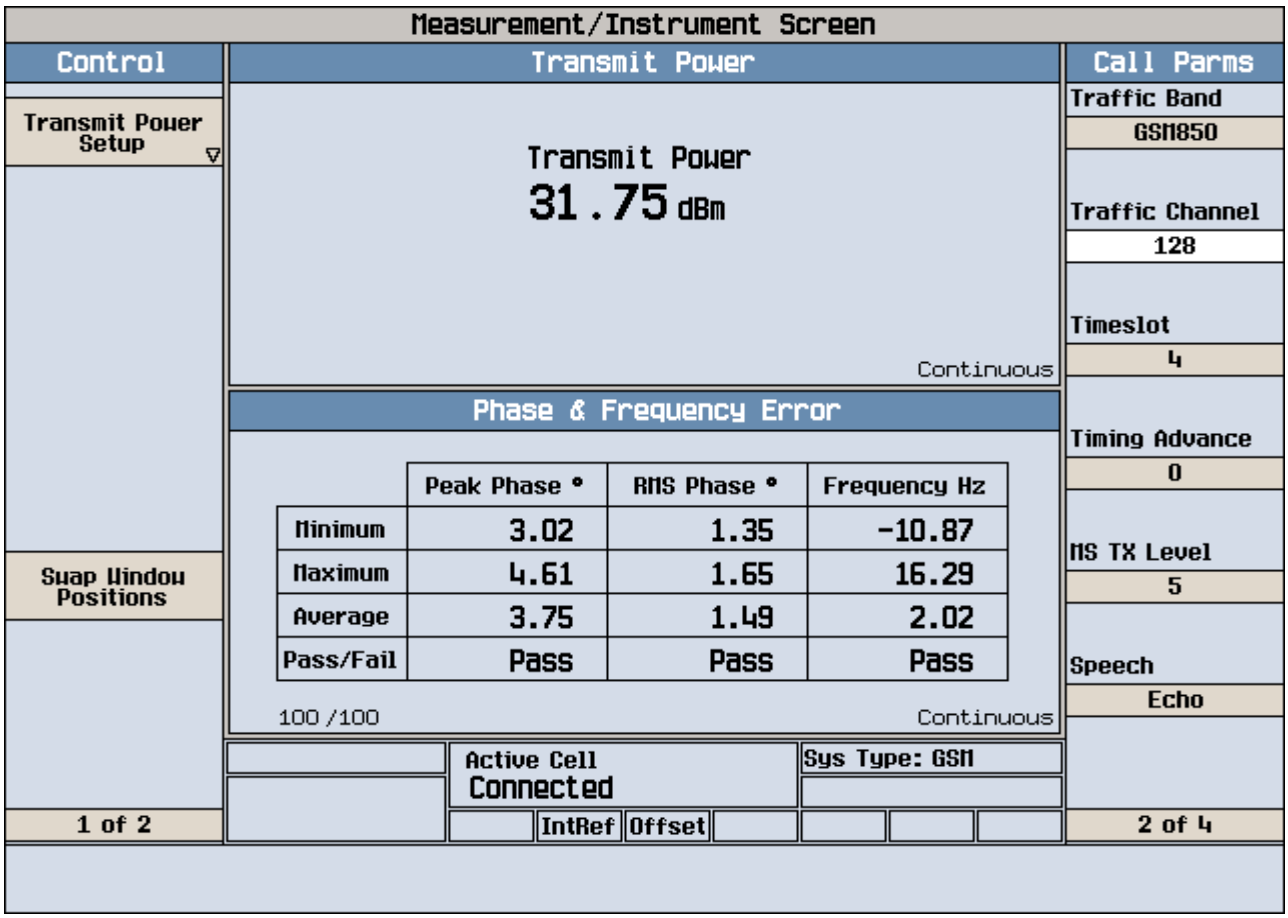
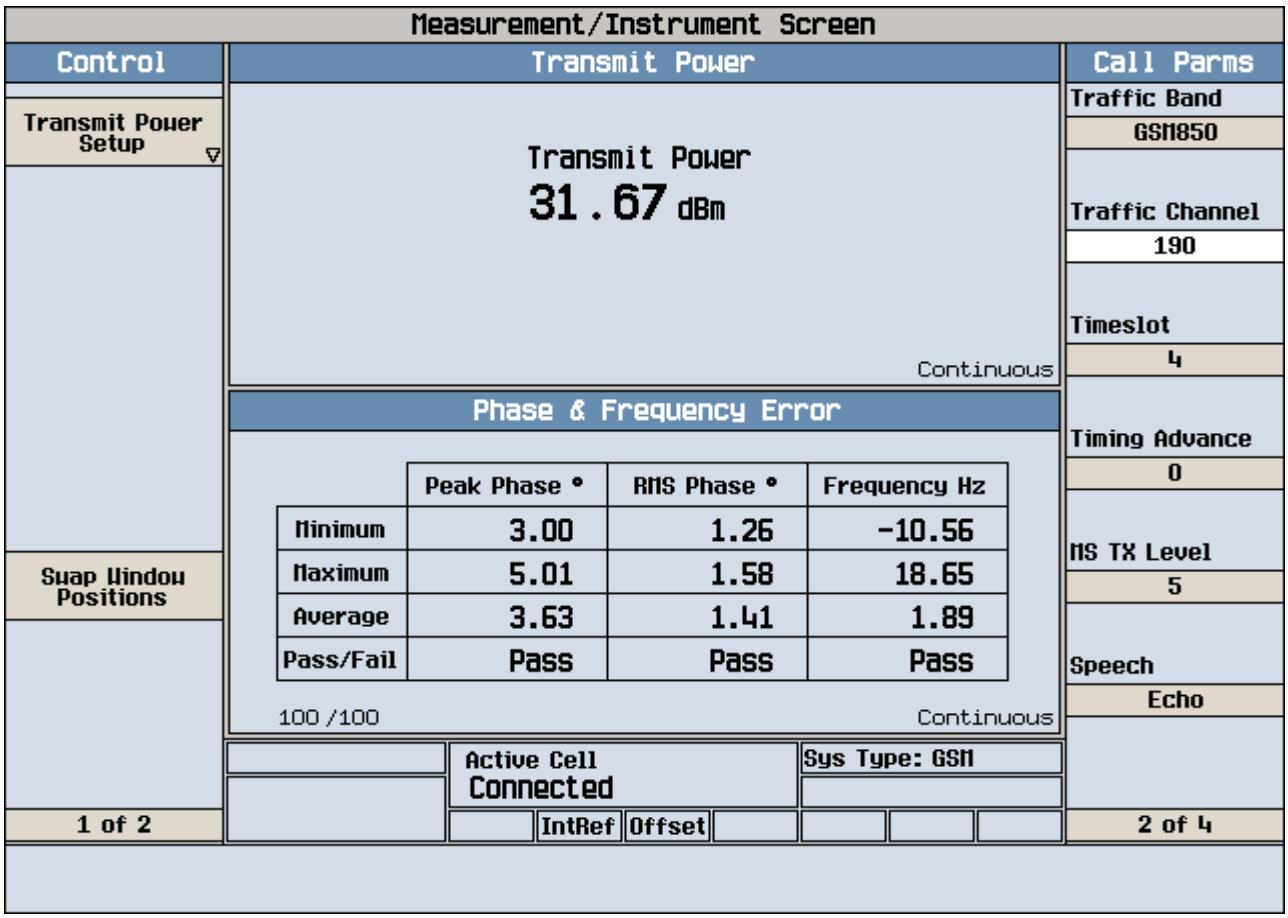
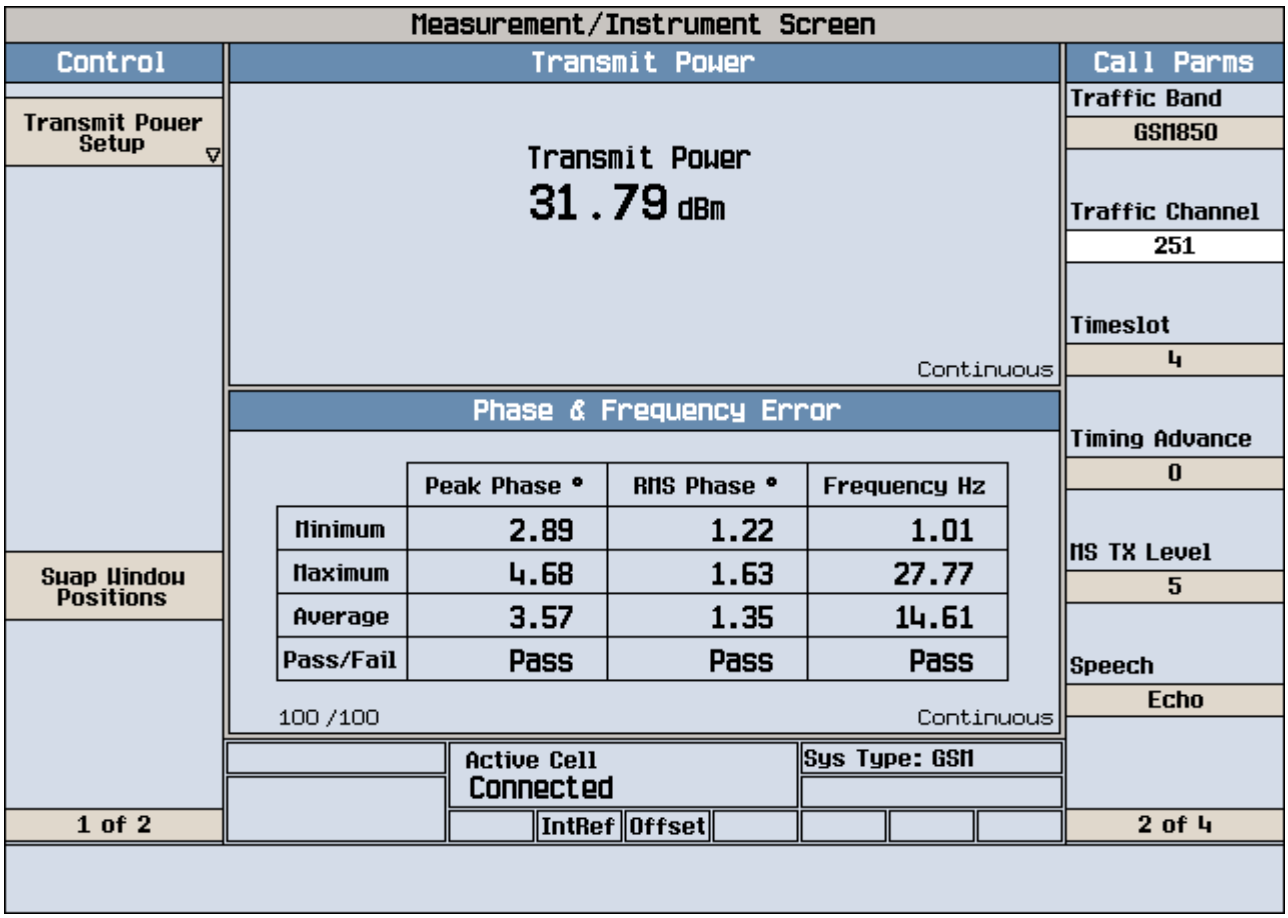
FCC ID : A3LSGHE316 Transmit Power 128CH



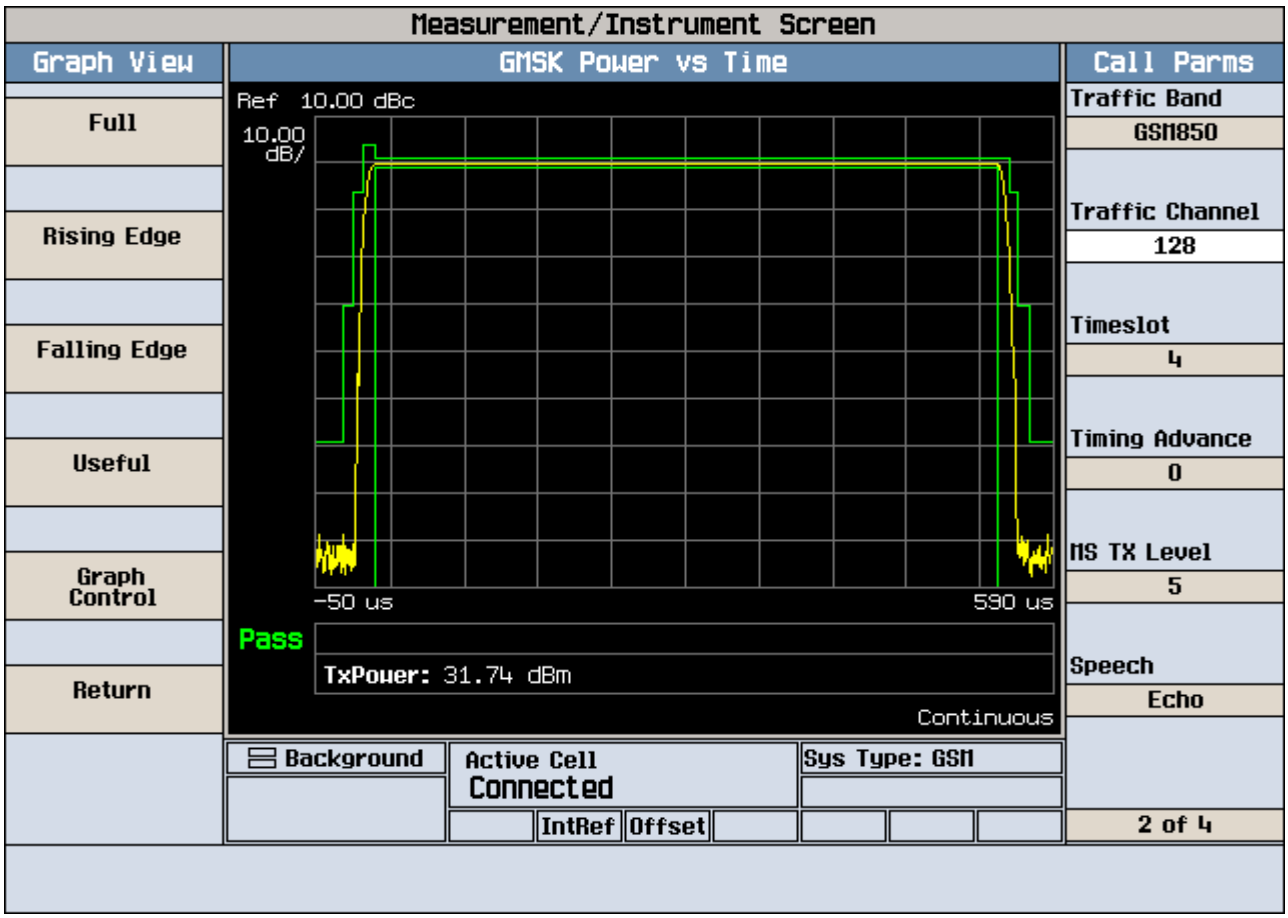
FCC ID : A3LSGHE316 Transmit Power 190CH



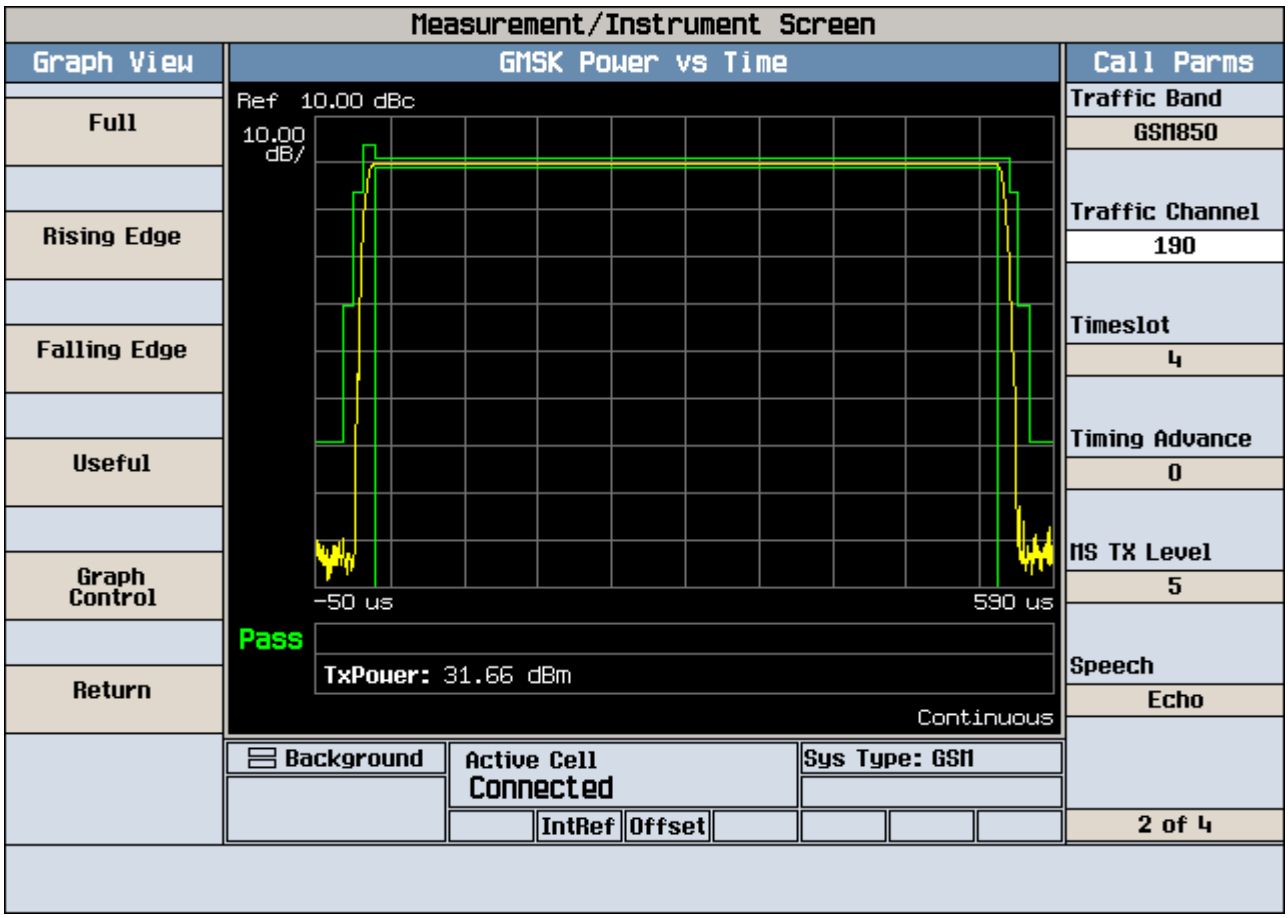
FCC ID : A3LSGHE316 Transmit Power 251CH



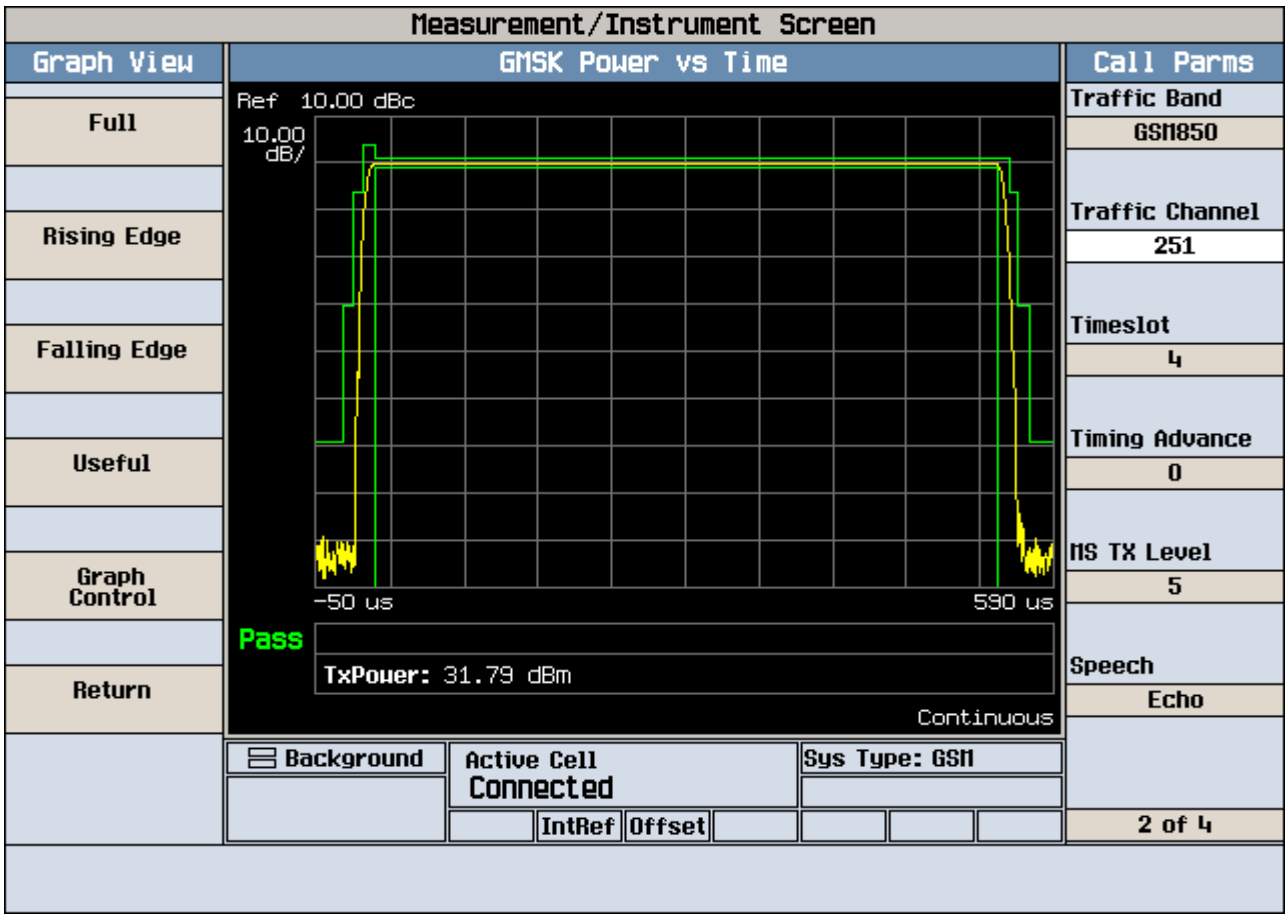
FCC ID : A3LSGHE316 GMSK Power vs Time 128CH



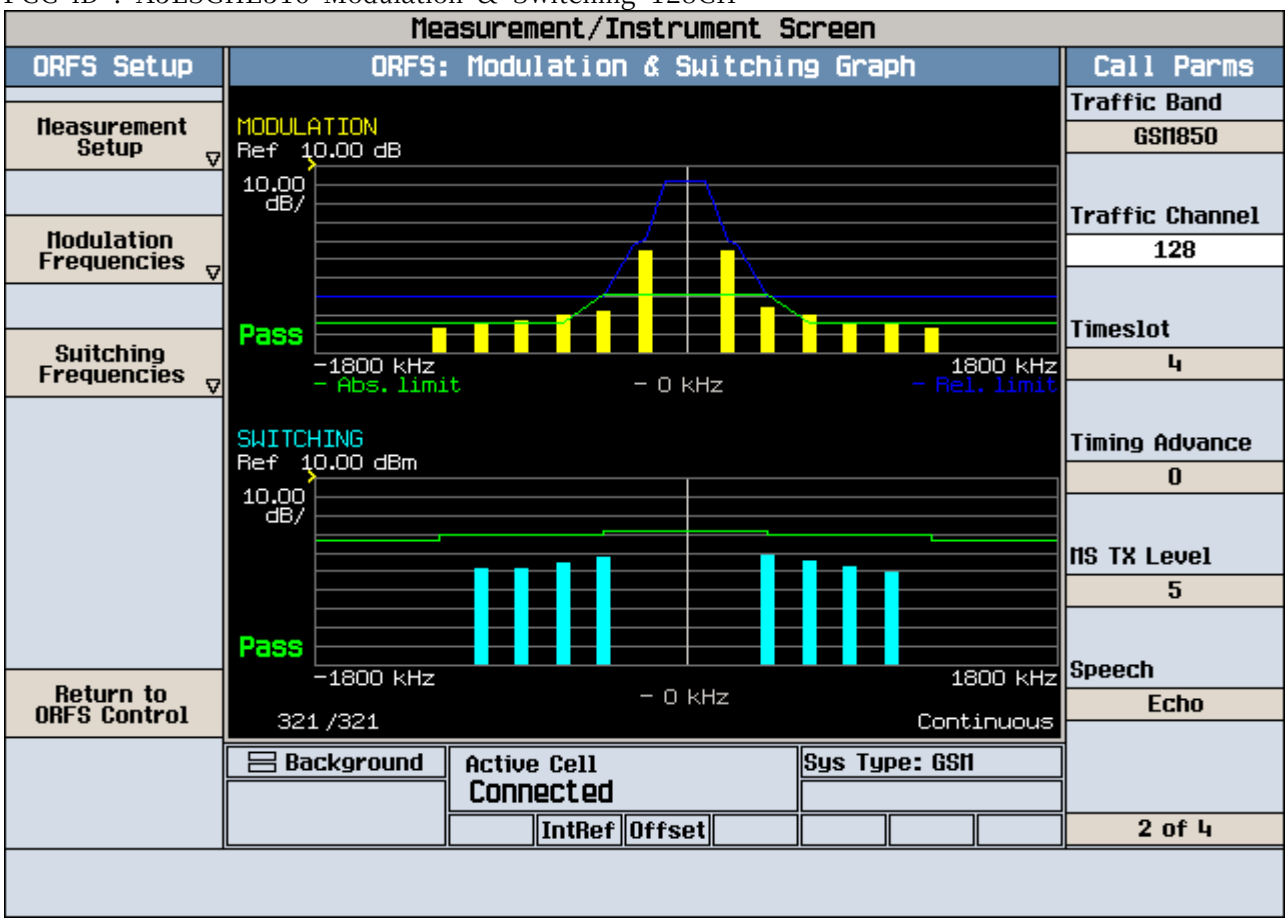
FCC ID : A3LSGHE316 GMSK Power vs Time 190CH



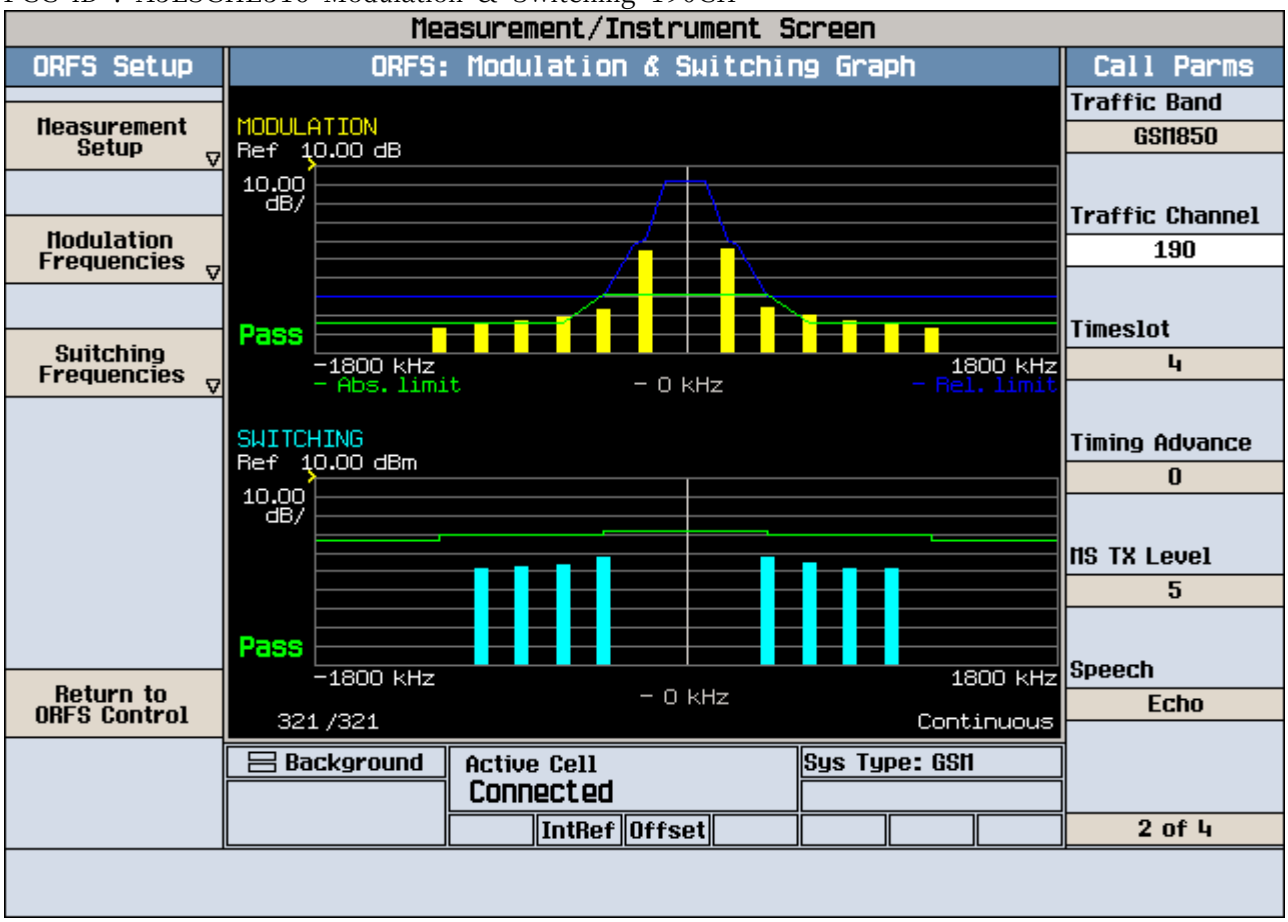
FCC ID : A3LSGHE316 GMSK Power vs Time 251CH



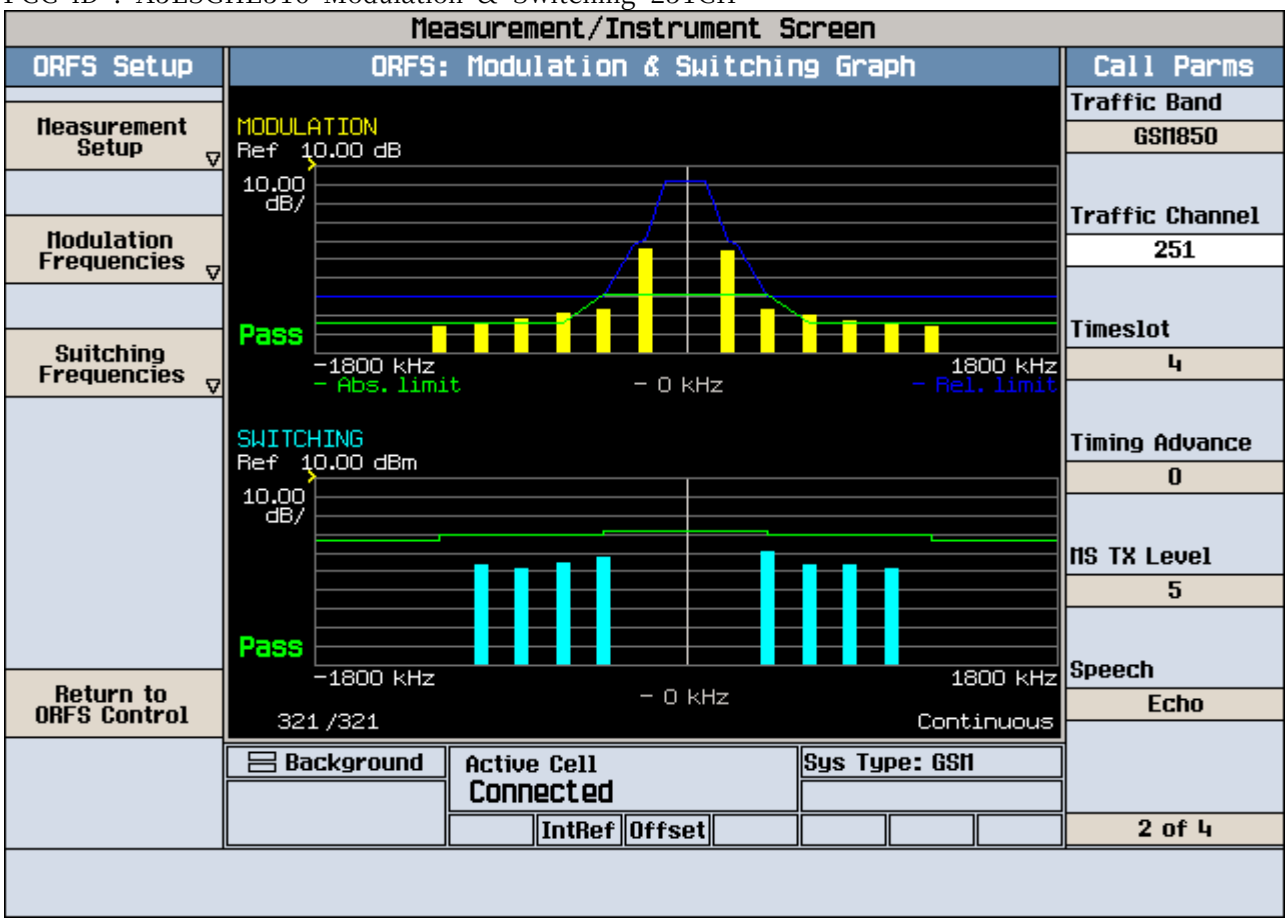
FCC ID : A3LSGHE316 Modulation & Switching 128CH

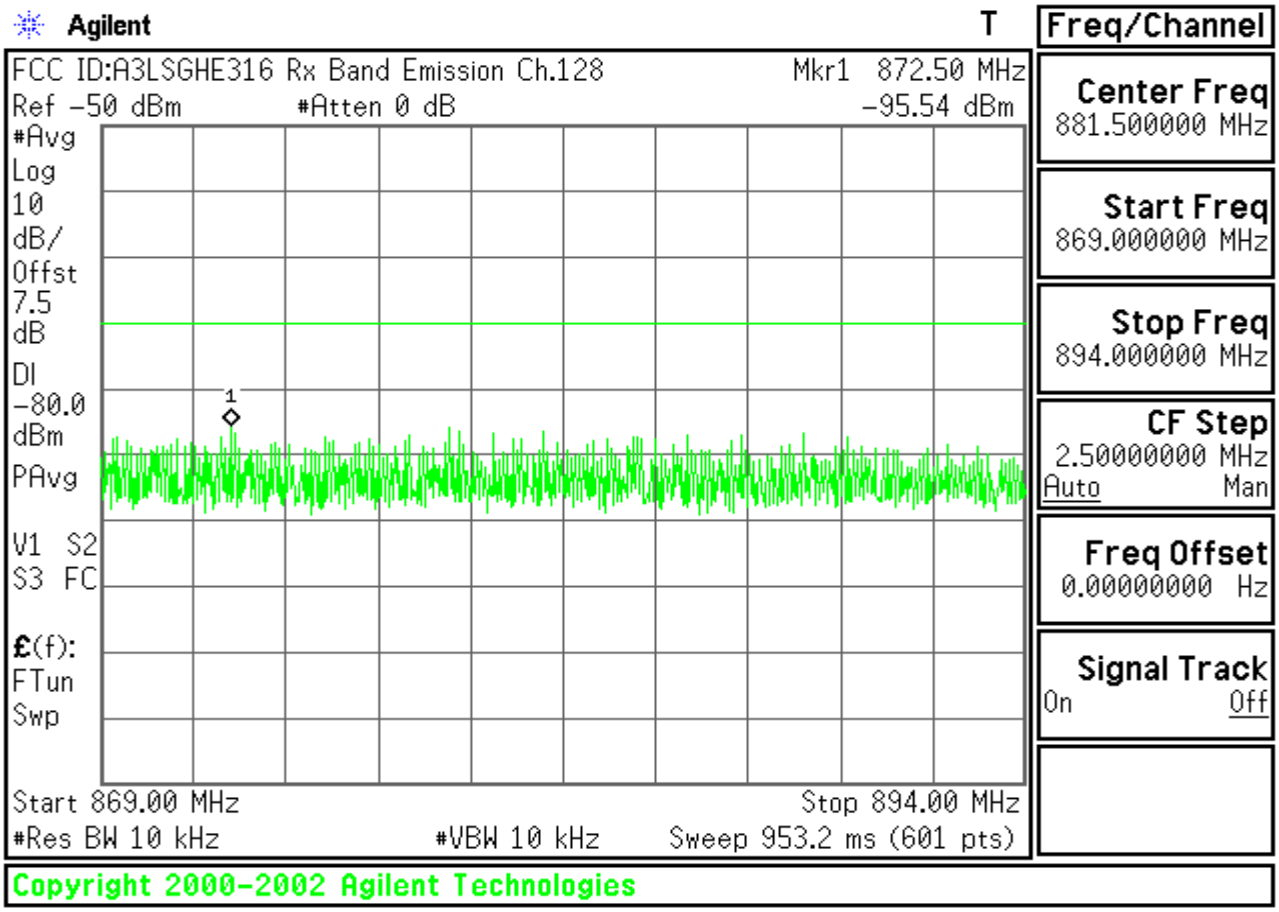


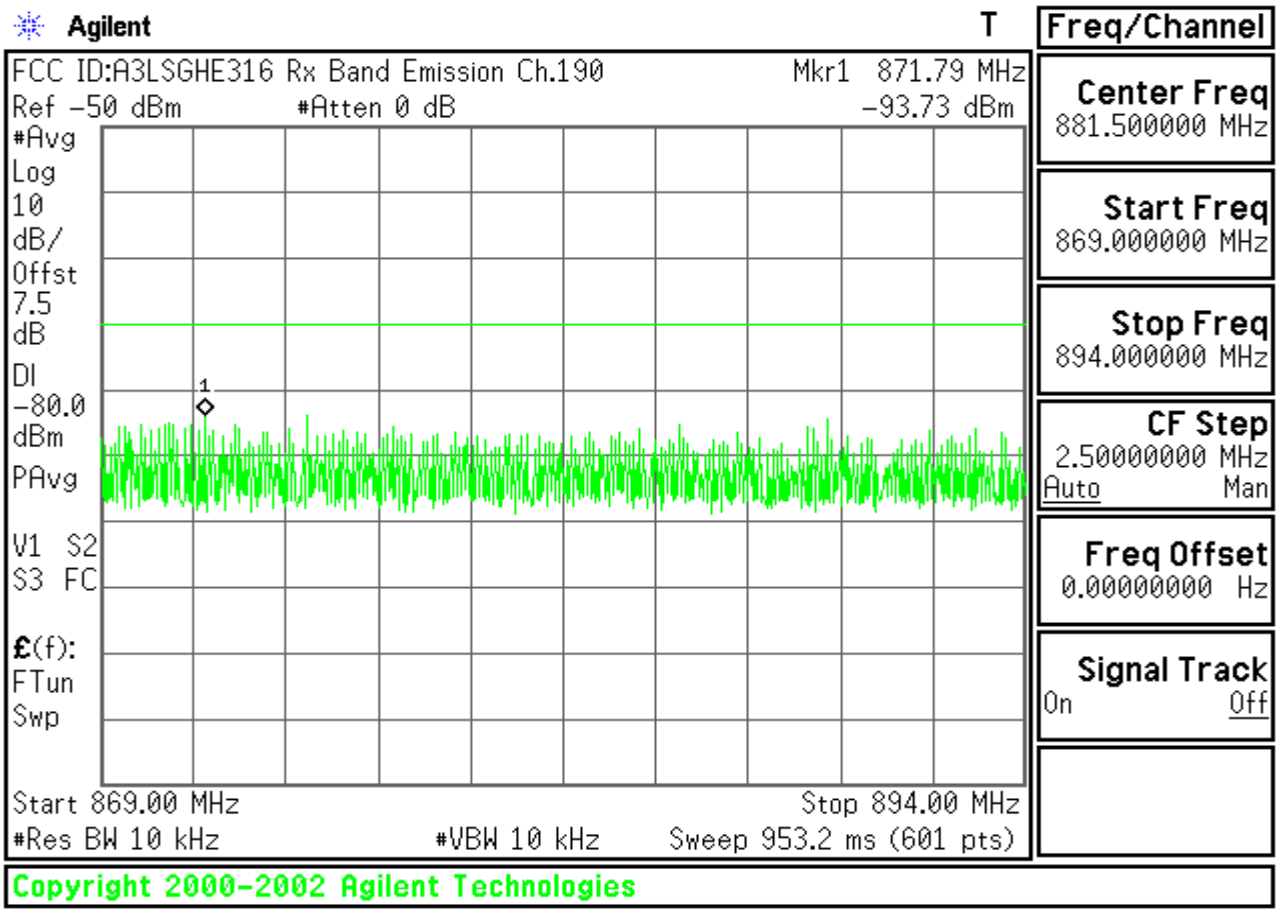
FCC ID : A3LSGHE316 Modulation & Switching 190CH

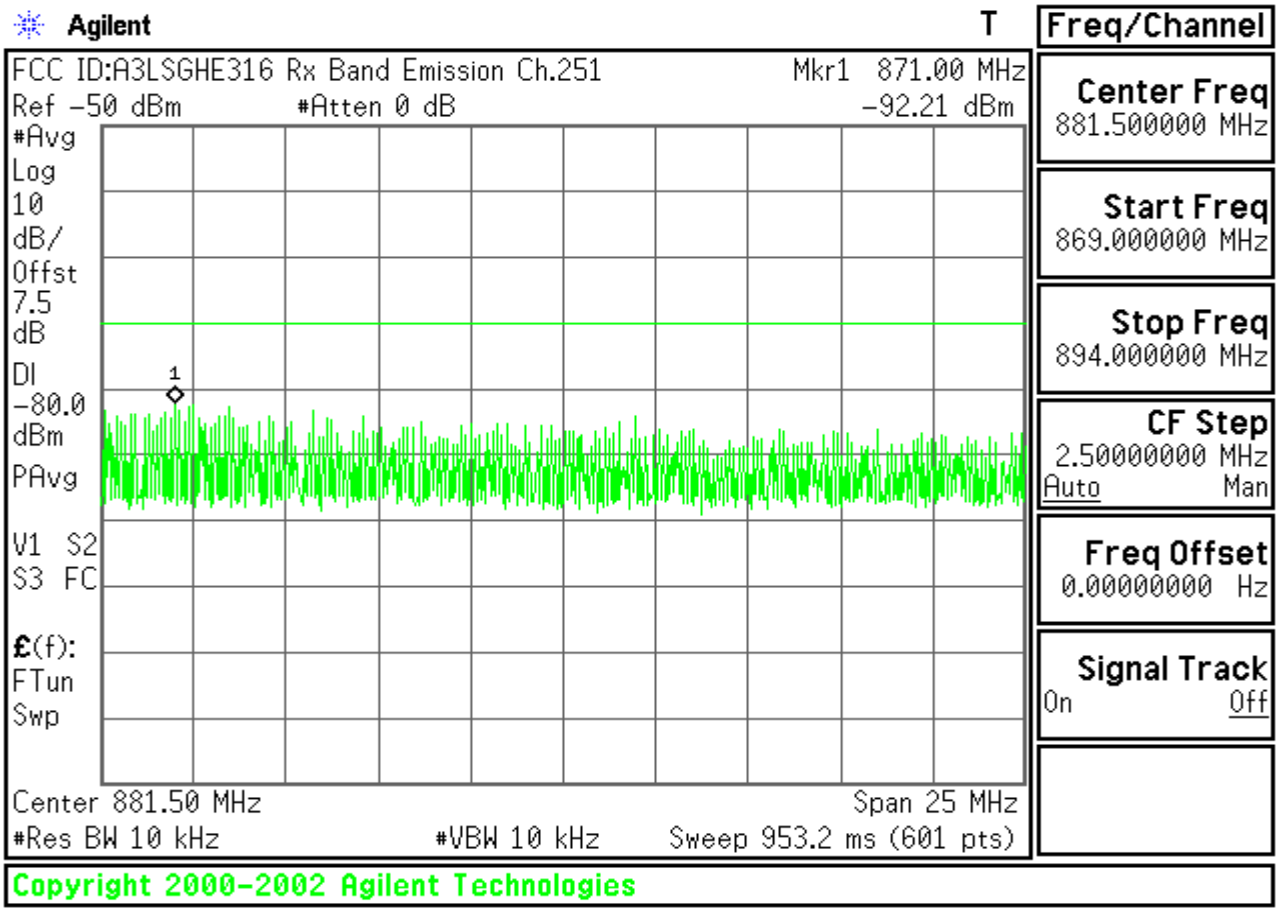


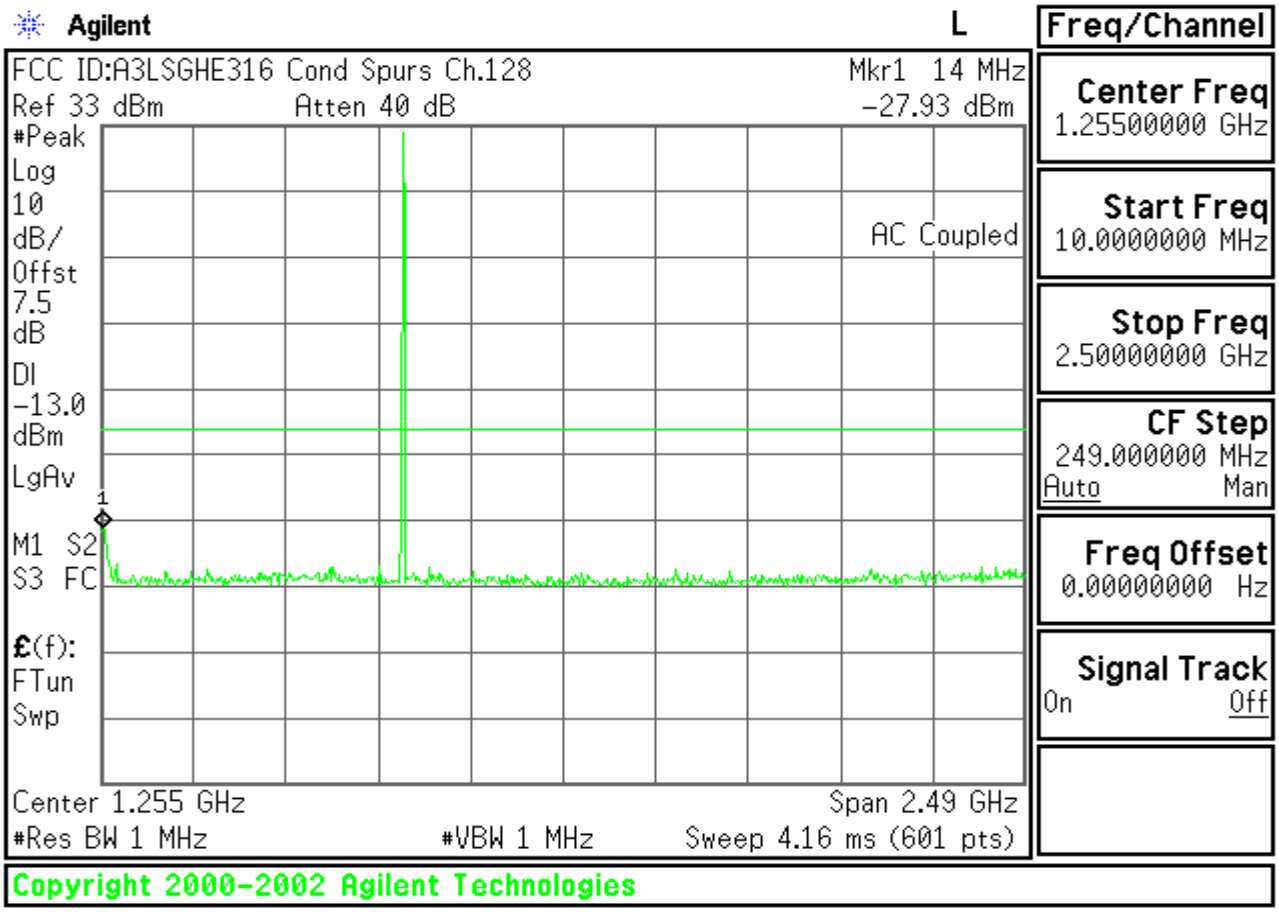
FCC ID : A3LSGHE316 Modulation & Switching 251CH

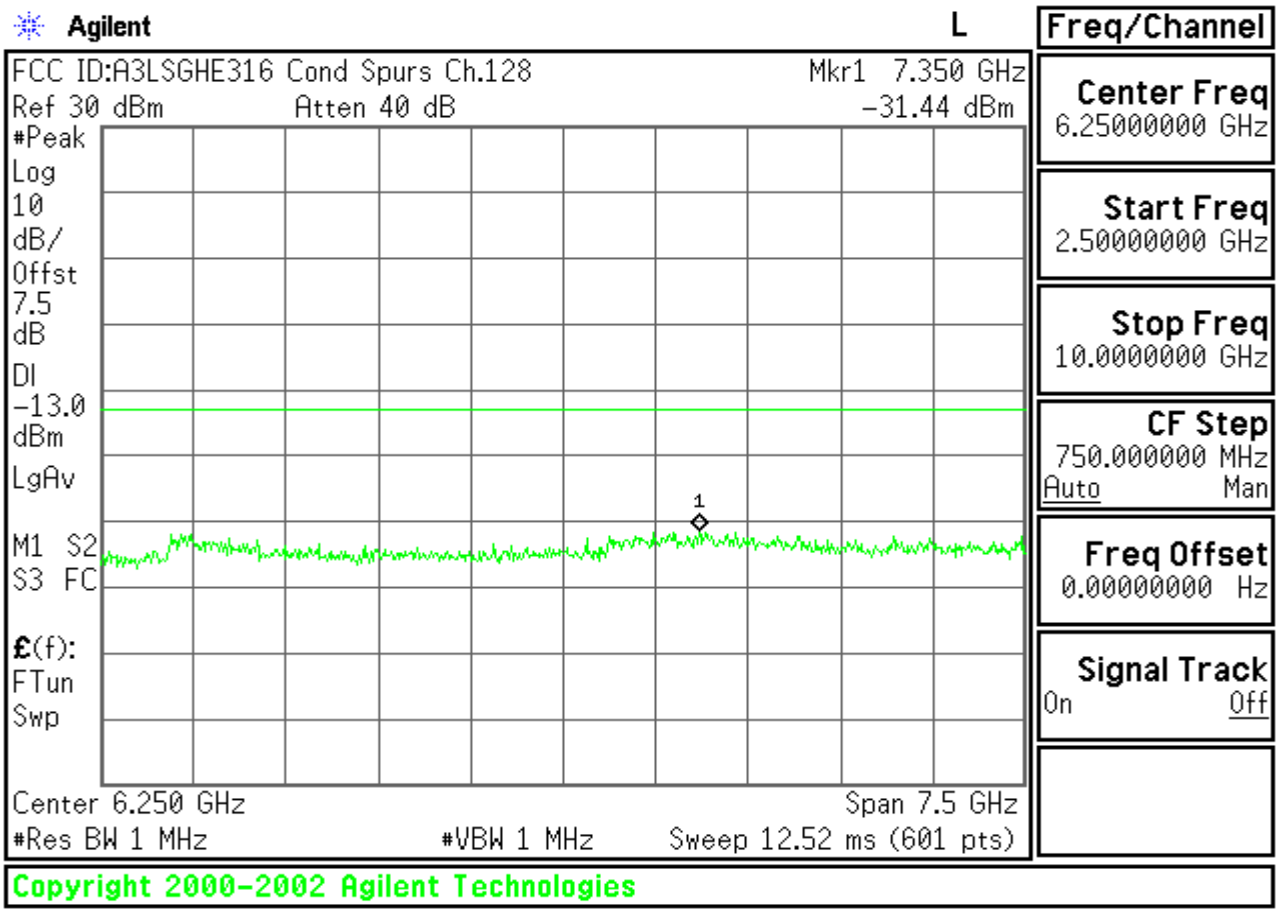


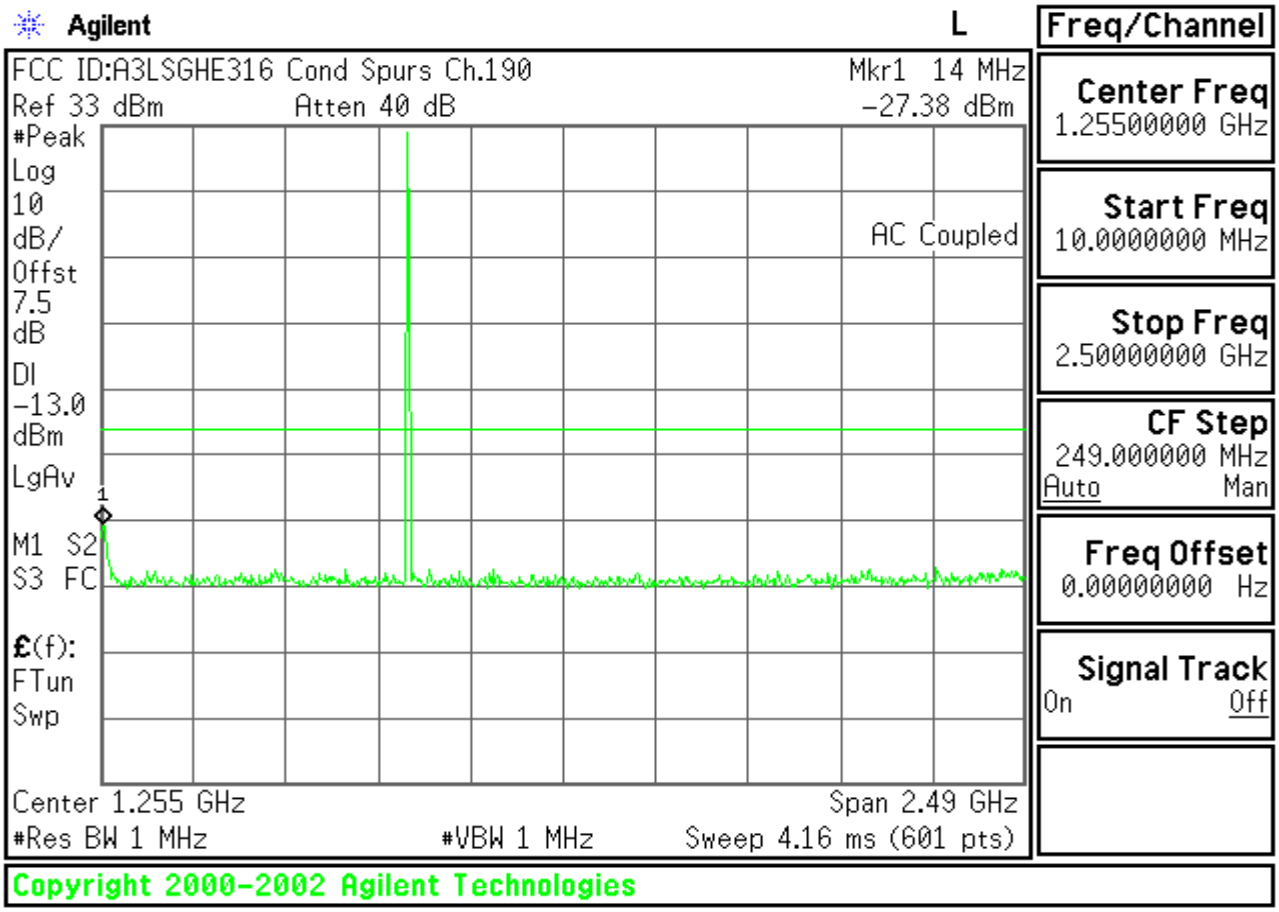

Agilent
T
Freq/Channel
FCC ID:A3LSGHE316 Rx Band Emission Ch.128
Mkr1 872.50 MHz
Ref -50 dBm
#Atten 0 dB
-95.54 dBm
#Avg
Log
10
dB/
Offst
7.5
dB
Dl
-80.0
dBm
PAvg
1
V1 S2
S3 FC
£(f):
FTun
Swp
Start 869.00 MHz
Stop 894.00 MHz
#Res BW 10 kHz
#VBW 10 kHz
Sweep 953.2 ms (601 pts)
Center Freq
881.500000 MHz
Start Freq
869.000000 MHz
Stop Freq
894.000000 MHz
CF Step
2.50000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies

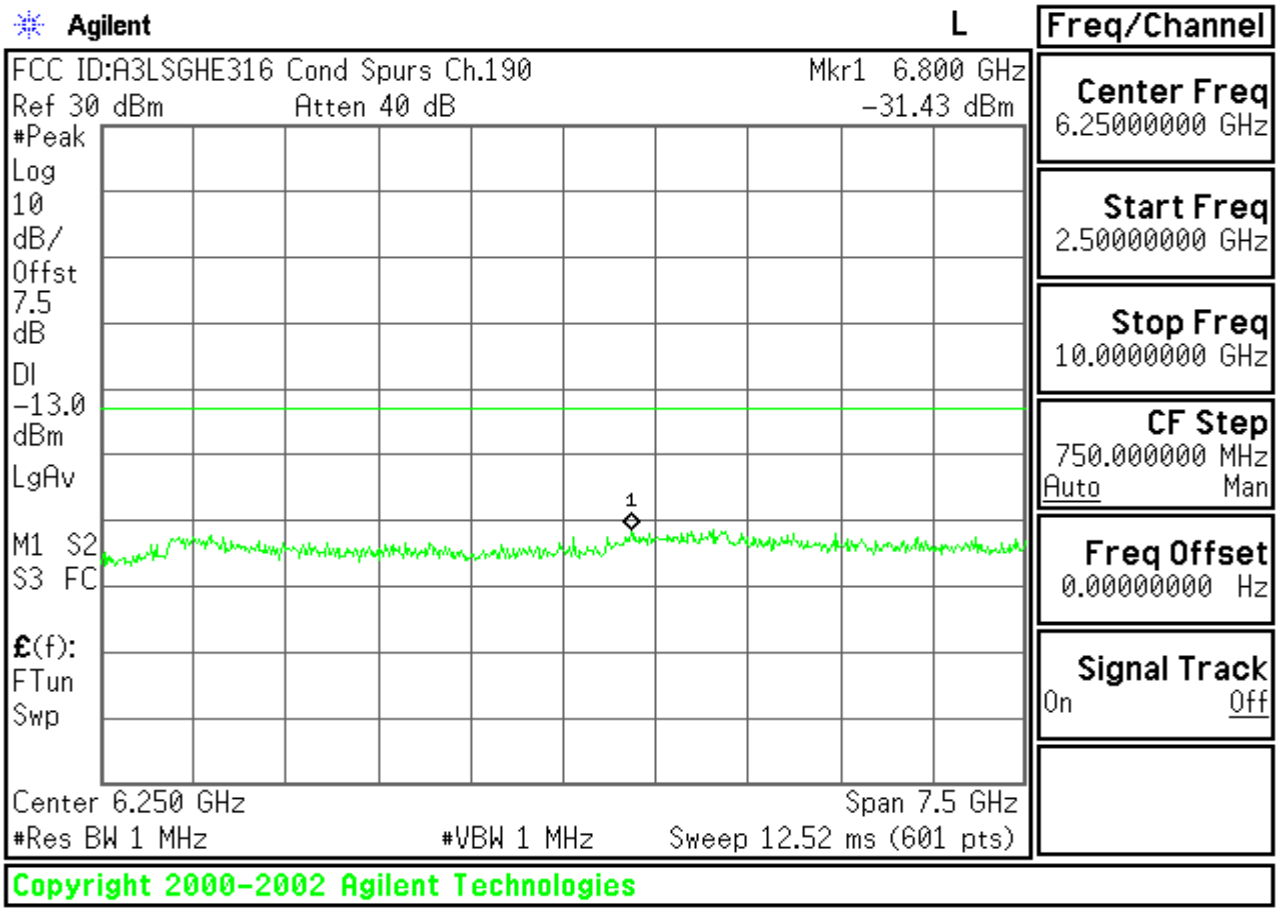

Agilent
T
Freq/Channel
FCC ID:A3LSGHE316 Rx Band Emission Ch.190
Mkr1 871.79 MHz
Ref -50 dBm
#Atten 0 dB
-93.73 dBm
#Avg
Log
10
dB/
Offst
7.5
dB
Dl
-80.0
dBm
PAvg
1
V1 S2
S3 FC
£(f):
FTun
Swp
Start 869.00 MHz
Stop 894.00 MHz
#Res BW 10 kHz
#VBW 10 kHz
Sweep 953.2 ms (601 pts)
Center Freq
881.500000 MHz
Start Freq
869.000000 MHz
Stop Freq
894.000000 MHz
CF Step
2.50000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies

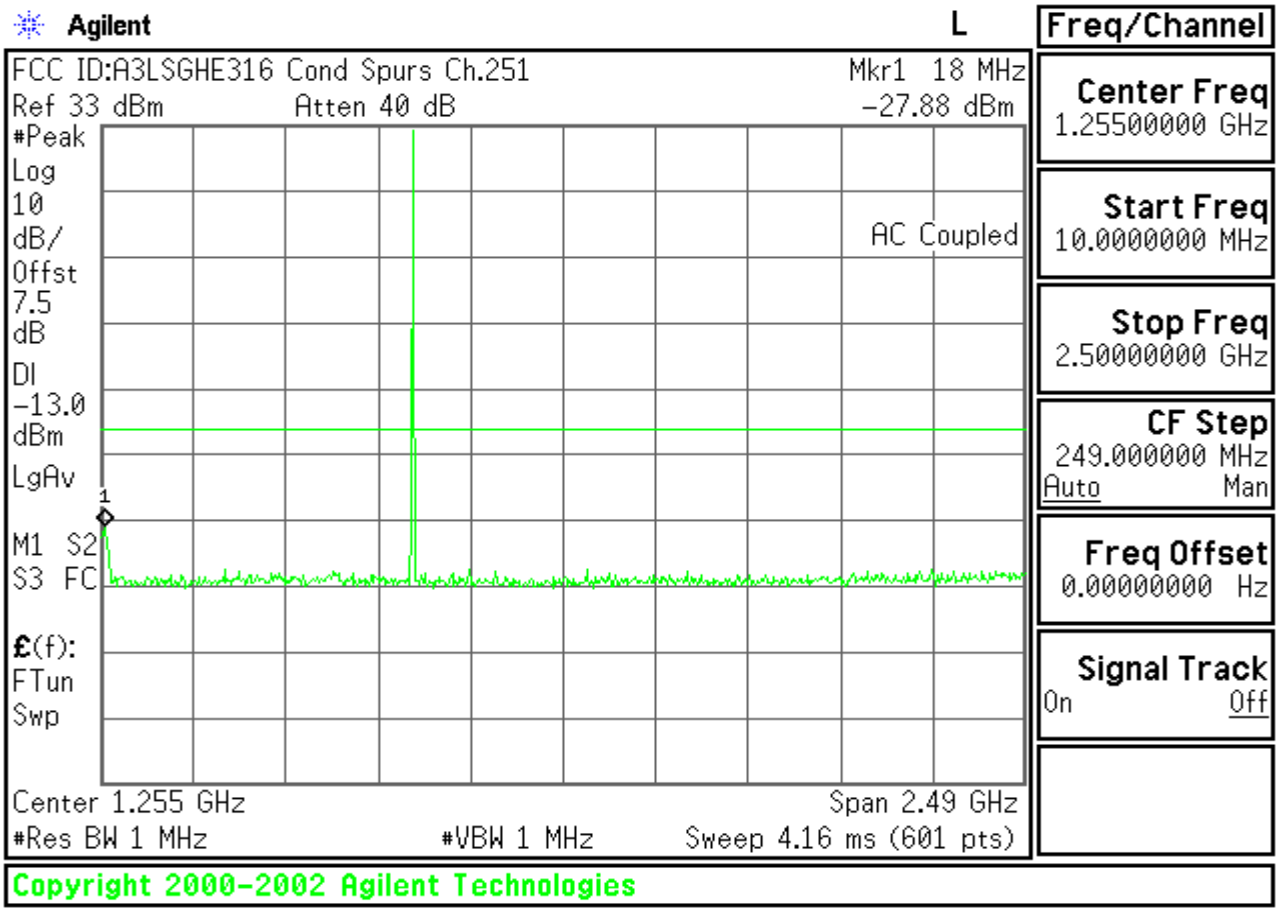

Agilent
T
FCC ID:A3LSGHE316 Rx Band Emission Ch.251
Mkr1 871.00 MHz
Ref -50 dBm
#Atten 0 dB
-92.21 dBm
#Avg
Log
10
dB/
Offst
7.5
dB
Dl
-80.0
dBm
PAvg
1
V1 S2
S3 FC
£(f):
FTun
Swp
Center 881.50 MHz
Span 25 MHz
#Res BW 10 kHz
#VBW 10 kHz
Sweep 953.2 ms (601 pts)
Freq/Channel
Center Freq
881.500000 MHz
Start Freq
869.000000 MHz
Stop Freq
894.000000 MHz
CF Step
2.50000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.128
Mkr1 14 MHz
Ref 33 dBm
Atten 40 dB
-27.93 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 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
Center 1.255 GHz
Span 2.49 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:A3LSGHE316 Cond Spurs Ch.128
Mkr1 7.350 GHz
Ref 30 dBm
Atten 40 dB
-31.44 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
M1 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
Center 6.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.190
Mkr1 14 MHz
Ref 33 dBm
Atten 40 dB
-27.38 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 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
Center 1.255 GHz
Span 2.49 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:A3LSGHE316 Cond Spurs Ch.190
Mkr1 6.800 GHz
Ref 30 dBm
Atten 40 dB
-31.43 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
M1 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
Center 6.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.251
Mkr1 18 MHz
Ref 33 dBm
Atten 40 dB
-27.88 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
£(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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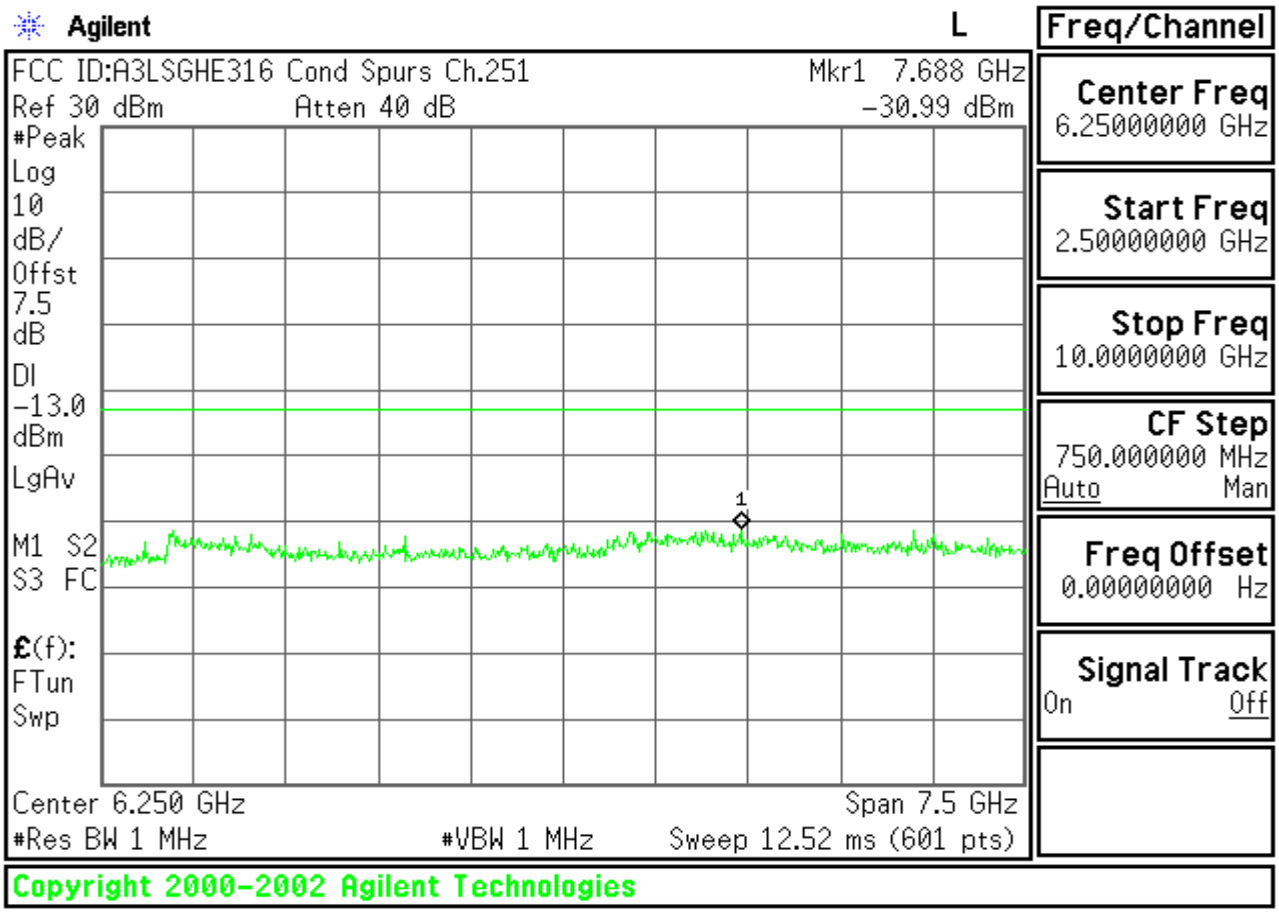
Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.251
Mkr1 7.688 GHz
Ref 30 dBm
Atten 40 dB
-30.99 dBm
#Peak
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Center 6.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 12.52 ms (601 pts)
Center Freq
6.25000000 GHz
Start Freq
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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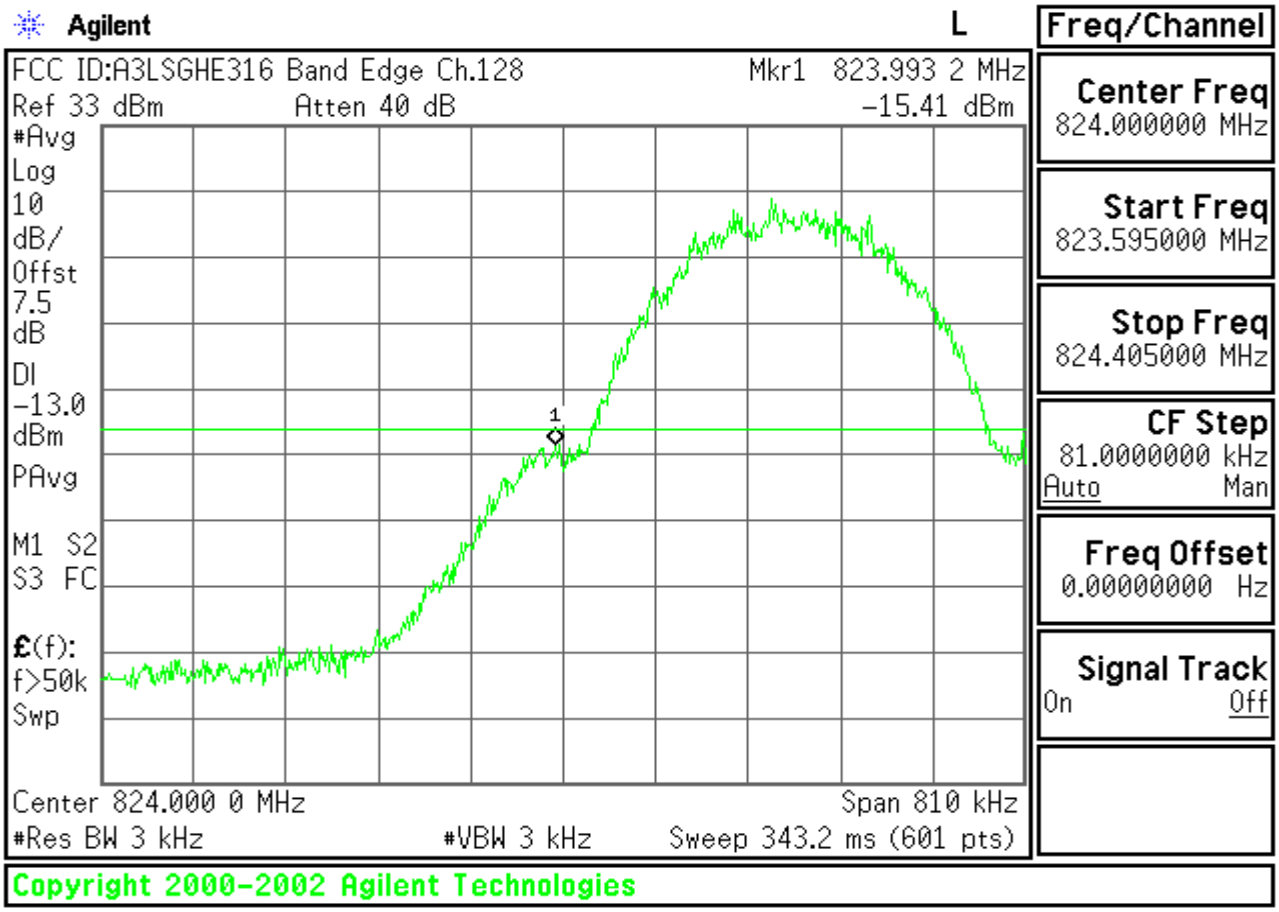
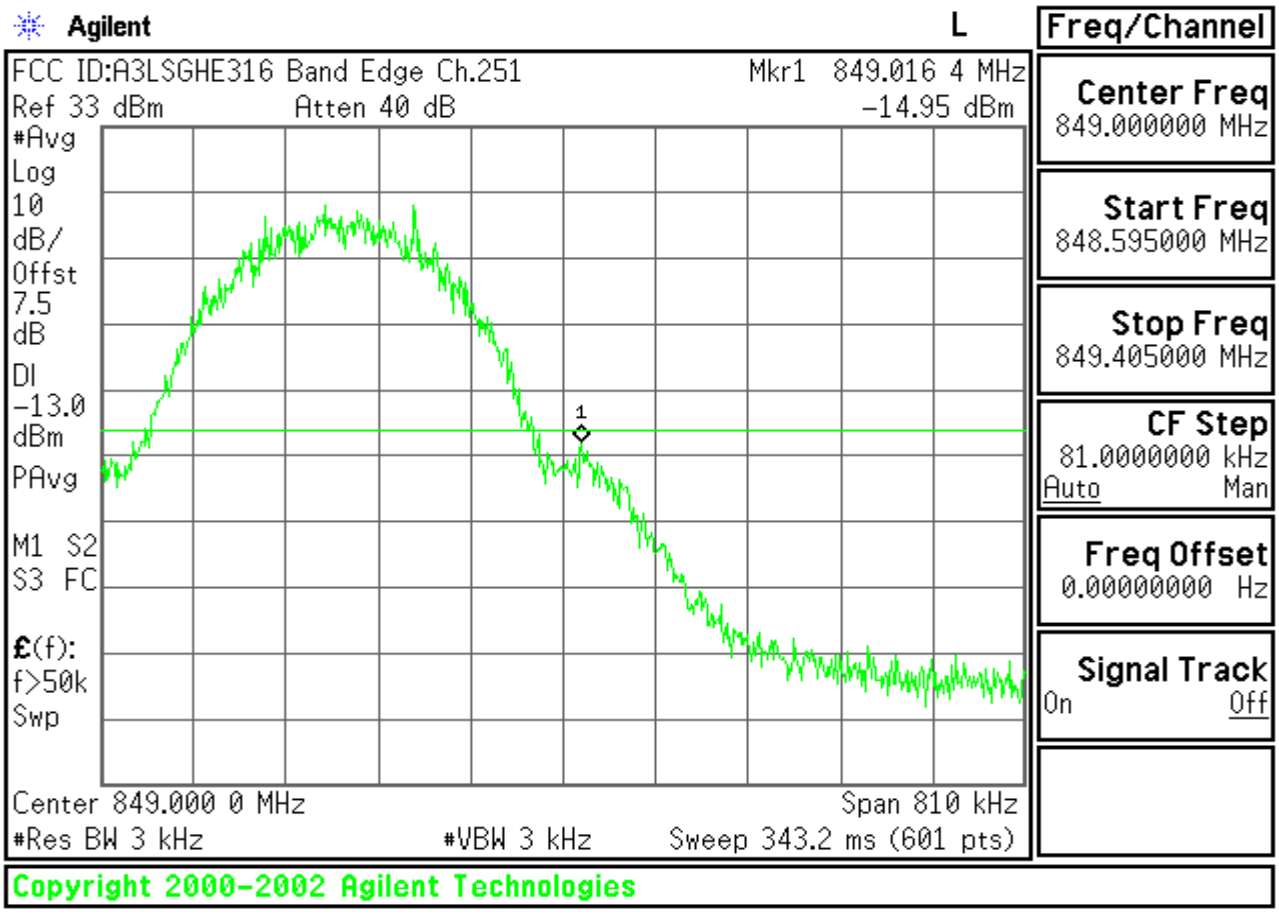
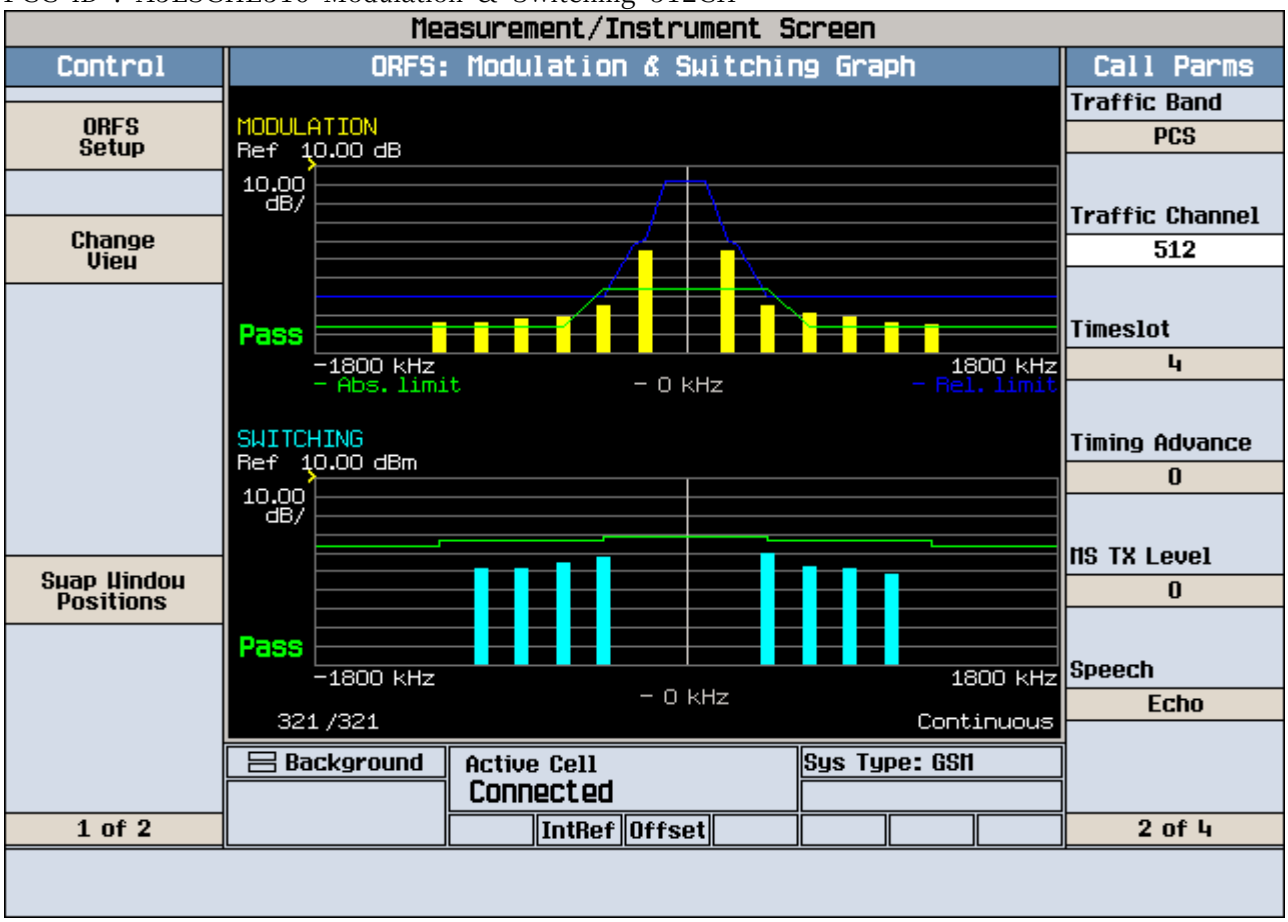
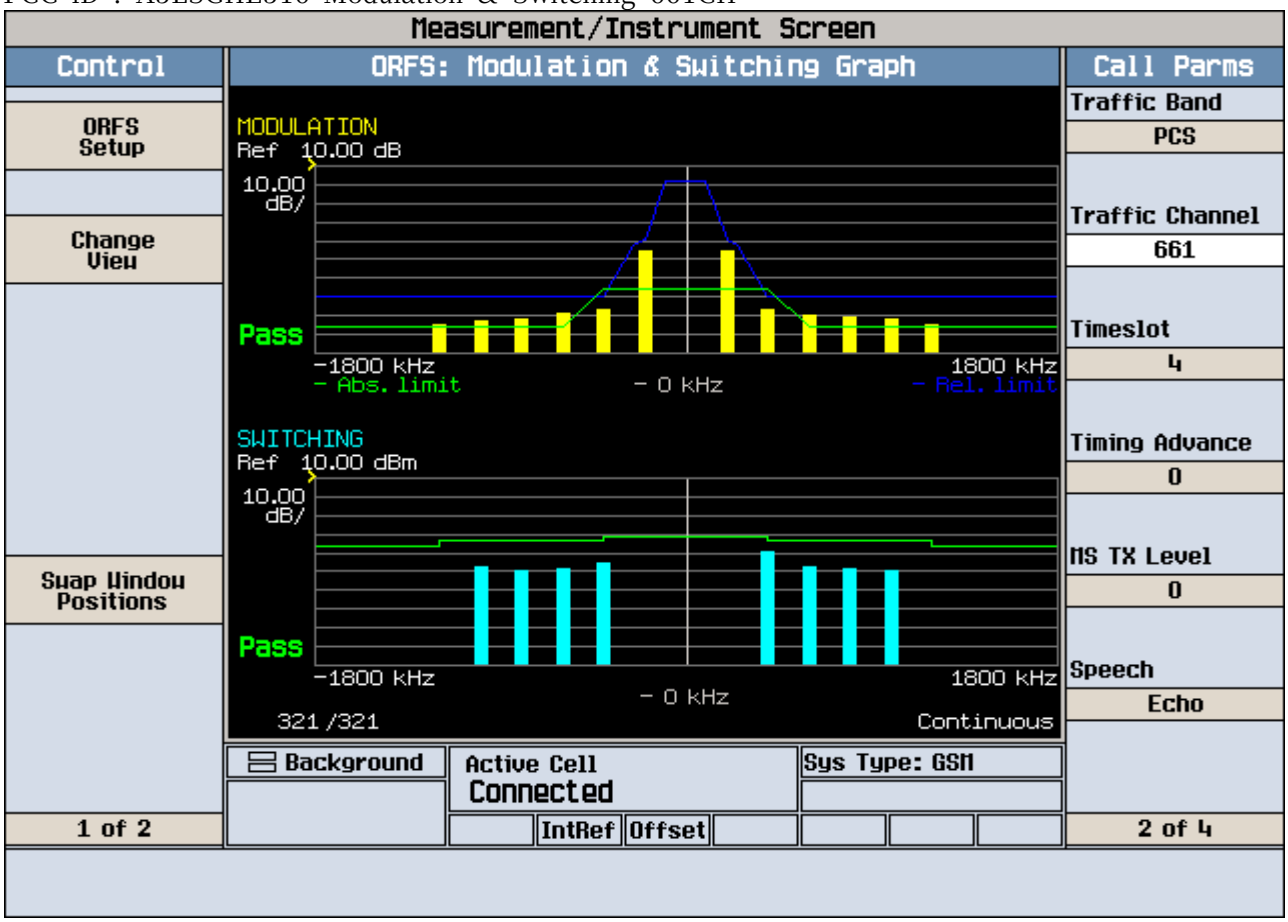

Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Band Edge Ch.128
Mkr1 823.993 2 MHz
Ref 33 dBm
Atten 40 dB
-15.41 dBm
#Avg
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
PAvg
M1 S2
S3 FC
£(f):
f>50k
Swp
1
Center 824.000 0 MHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 343.2 ms (601 pts)
Center Freq
824.000000 MHz
Start Freq
823.595000 MHz
Stop Freq
824.405000 MHz
CF Step
81.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Band Edge Ch.251
Mkr1 849.016 4 MHz
Ref 33 dBm
Atten 40 dB
-14.95 dBm
#Avg
Log
10
dB/
Offst
7.5
dB
Dl
-13.0
dBm
PAvg
M1 S2
S3 FC
£(f):
f>50k
Swp
1
Center 849.000 0 MHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 343.2 ms (601 pts)
Center Freq
849.000000 MHz
Start Freq
848.595000 MHz
Stop Freq
849.405000 MHz
CF Step
81.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies

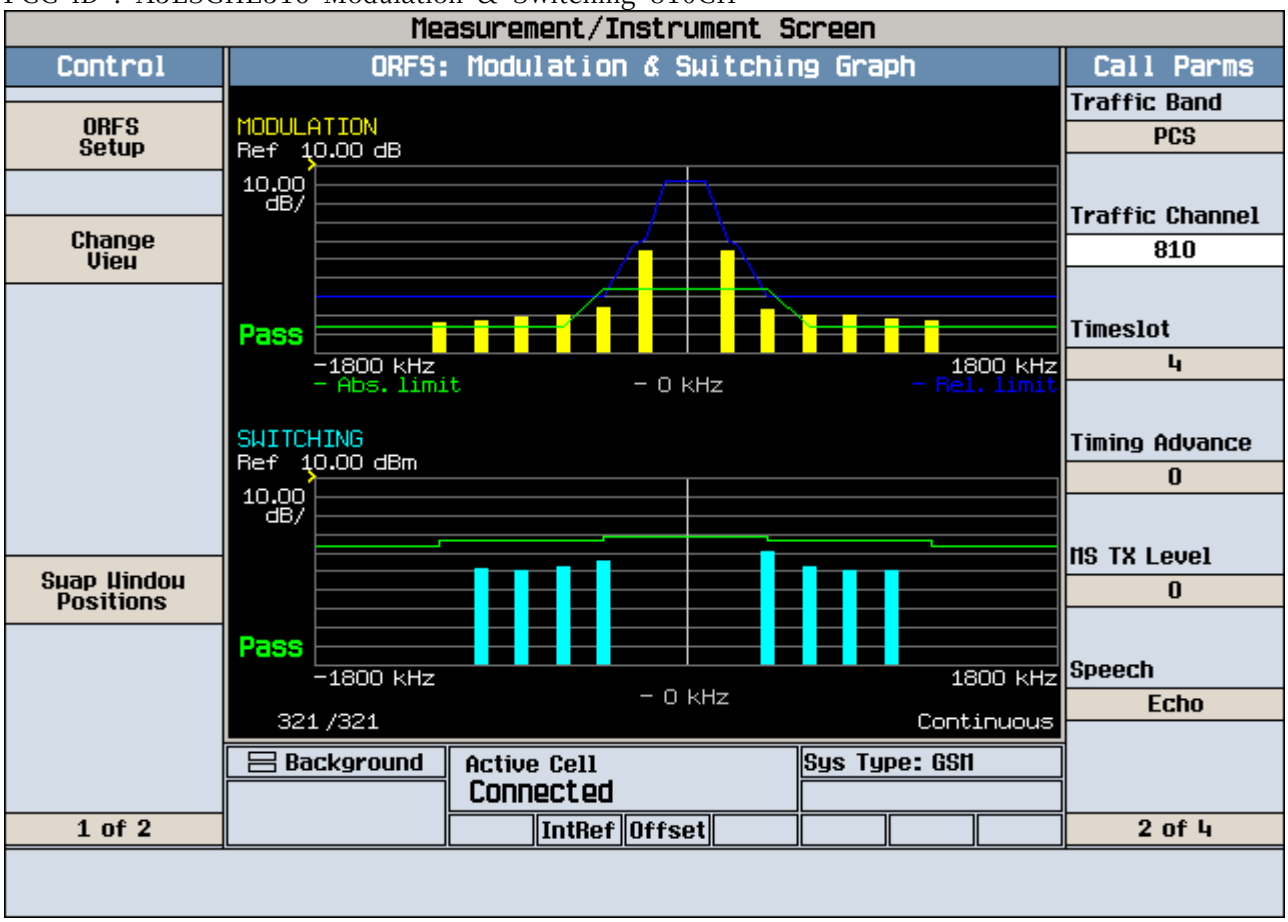
FCC ID : A3LSGHE316 Modulation & Switching 512CH

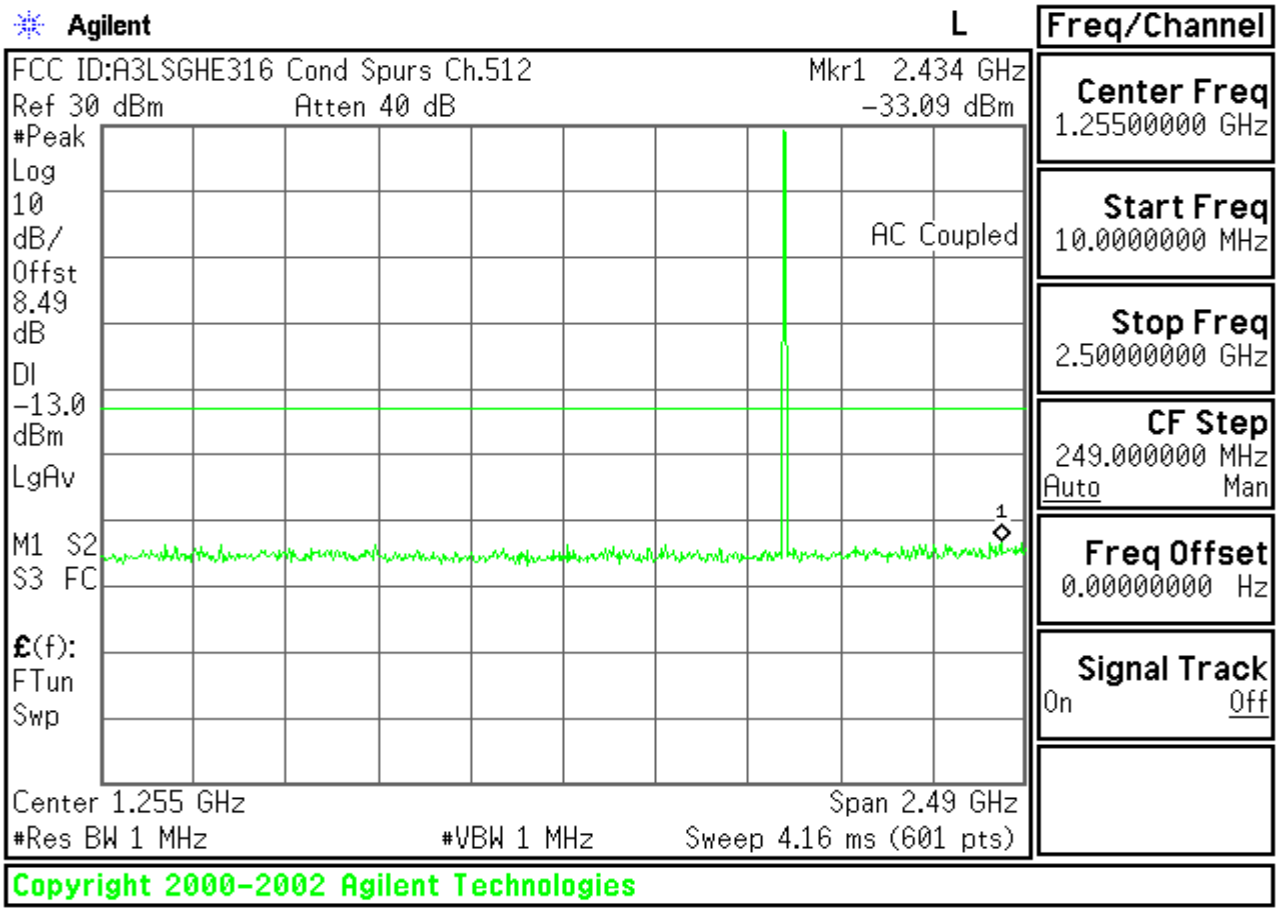


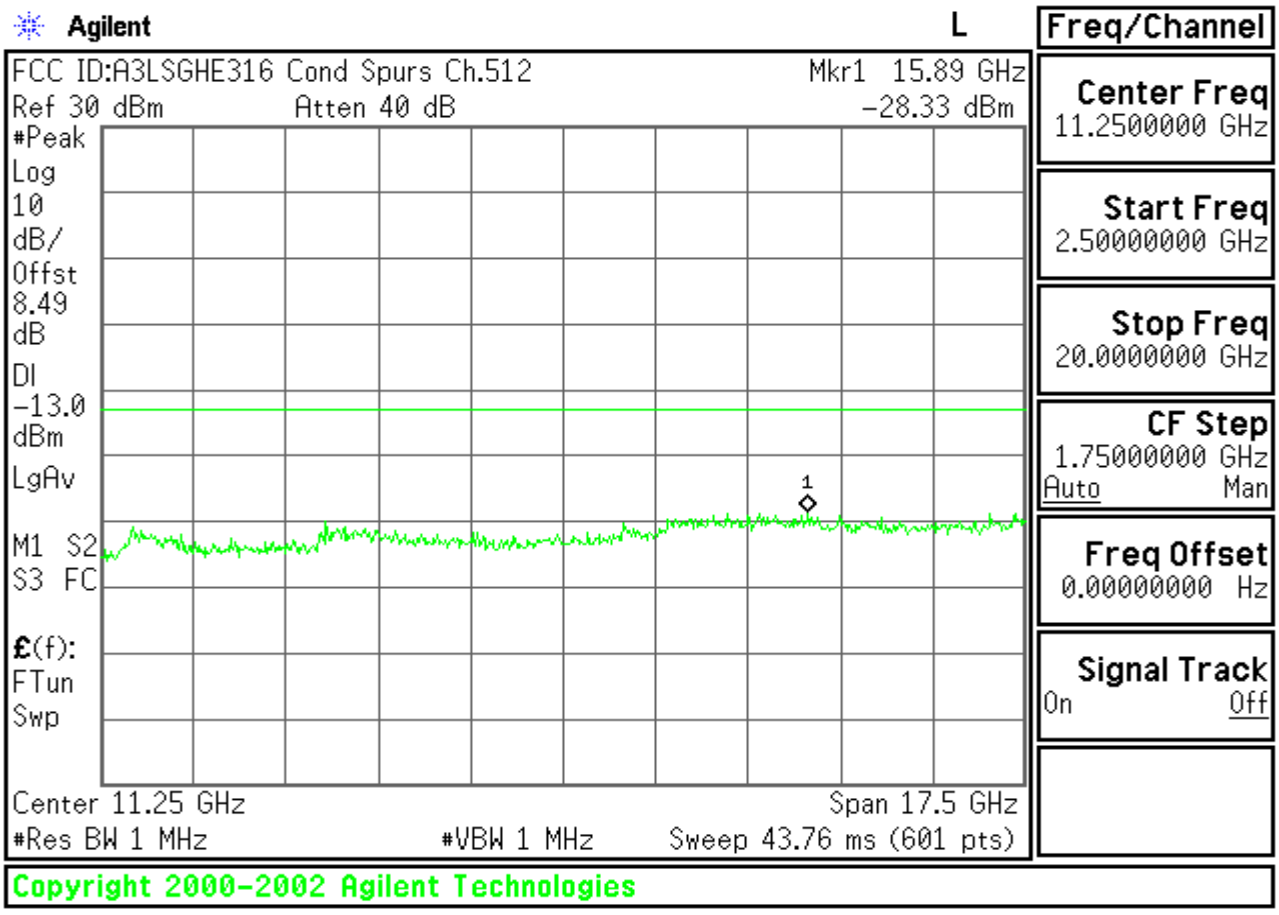
FCC ID : A3LSGHE316 Modulation & Switching 661CH

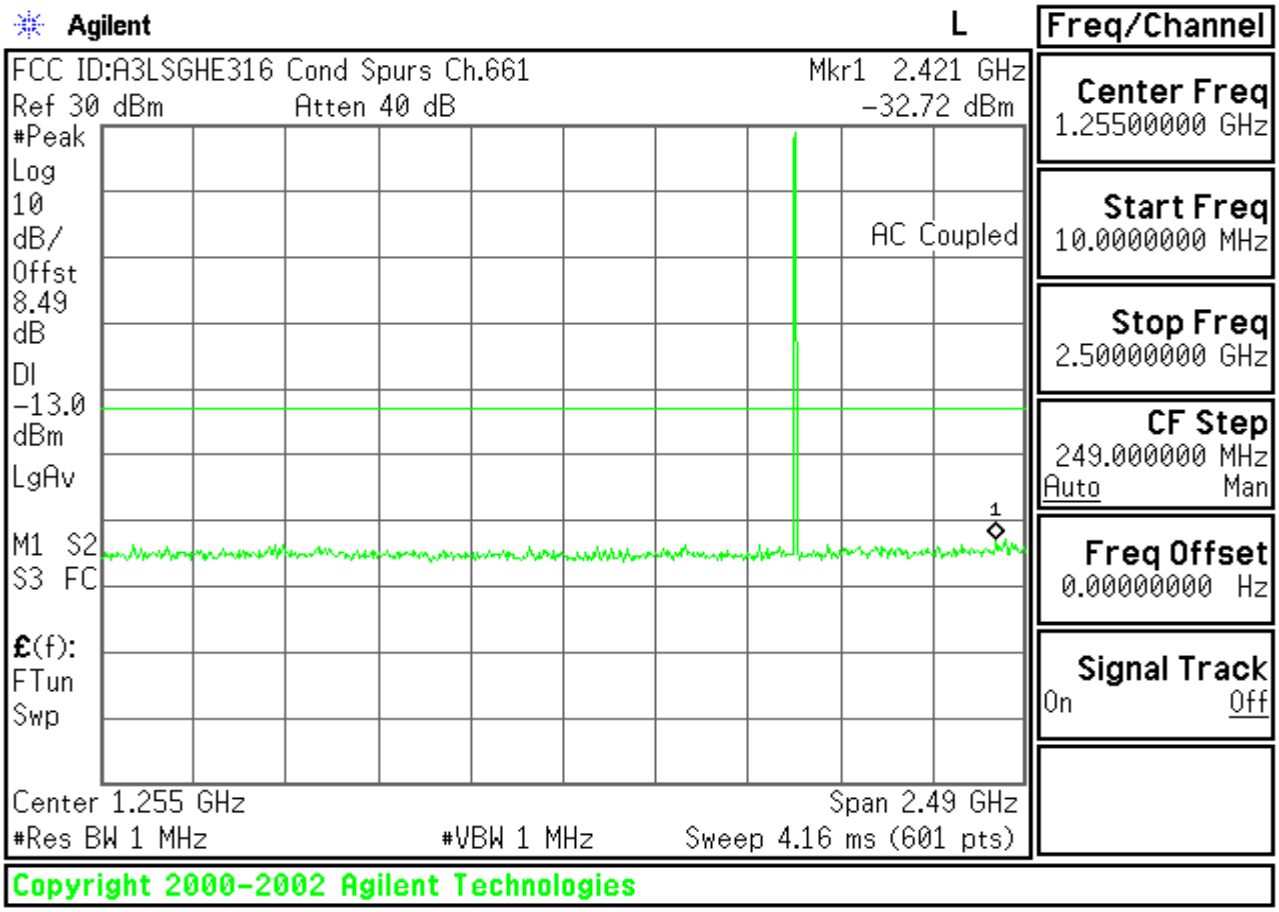


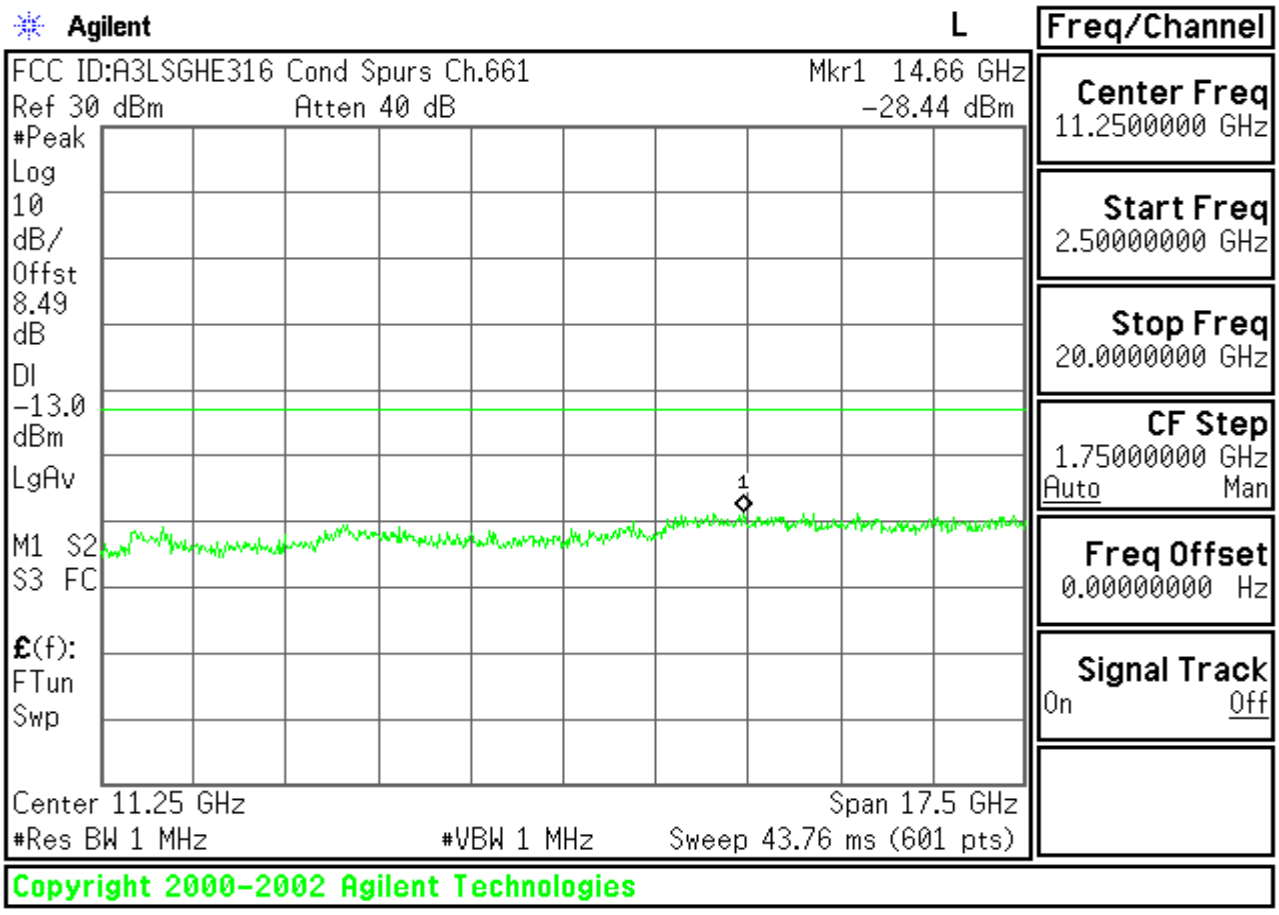
FCC ID : A3LSGHE316 Modulation & Switching 810CH

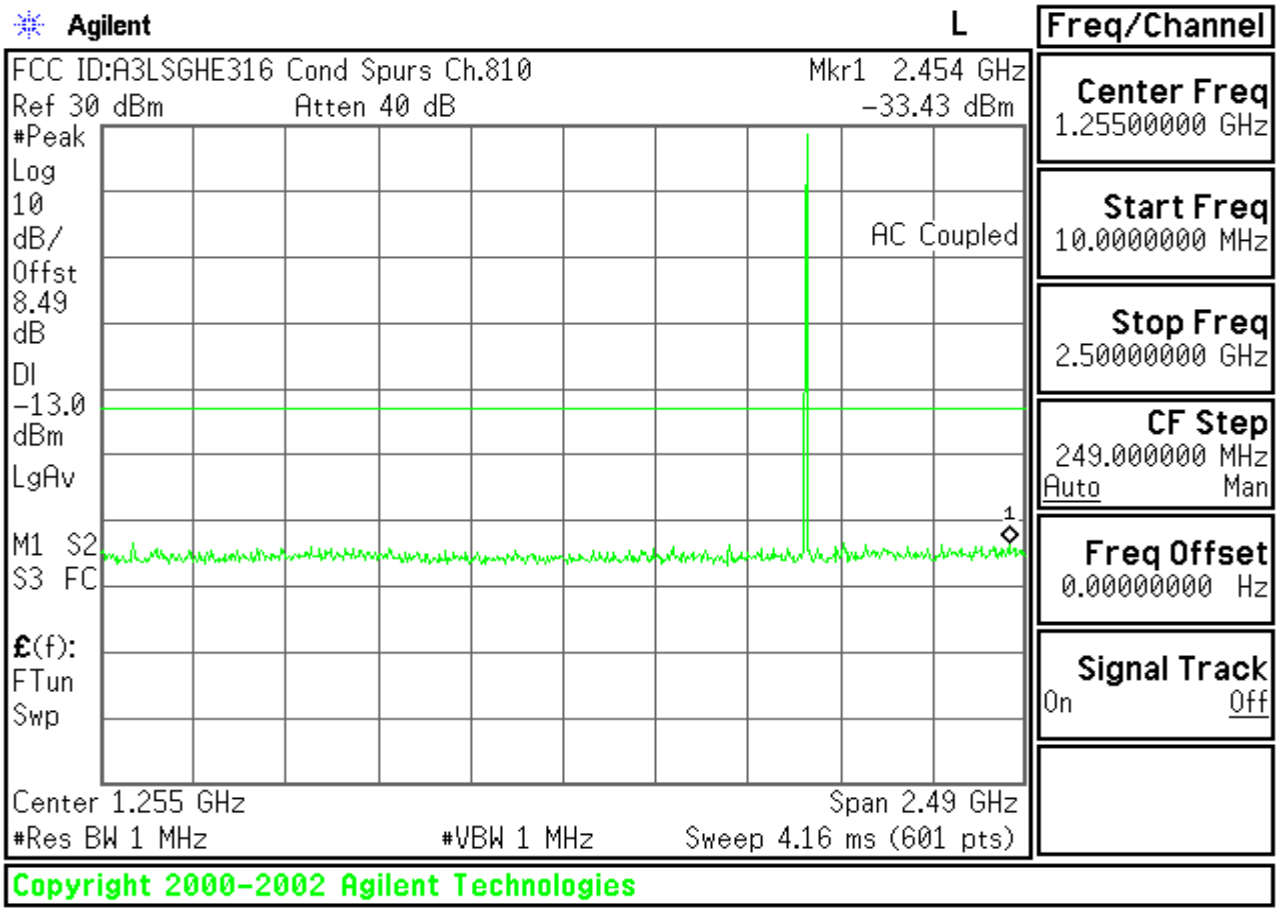



Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.512
Mkr1 2.434 GHz
Ref 30 dBm
Atten 40 dB
-33.09 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
£(f):
FTun
Swp
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 1.255 GHz
Span 2.49 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:A3LSGHE316 Cond Spurs Ch.512
Mkr1 15.89 GHz
Ref 30 dBm
Atten 40 dB
-28.33 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
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
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.661
Mkr1 2.421 GHz
Ref 30 dBm
Atten 40 dB
-32.72 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 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
Center 1.255 GHz
Span 2.49 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:A3LSGHE316 Cond Spurs Ch.661
Mkr1 14.66 GHz
Ref 30 dBm
Atten 40 dB
-28.44 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
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
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.810
Mkr1 2.454 GHz
Ref 30 dBm
Atten 40 dB
-33.43 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 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
Center 1.255 GHz
Span 2.49 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
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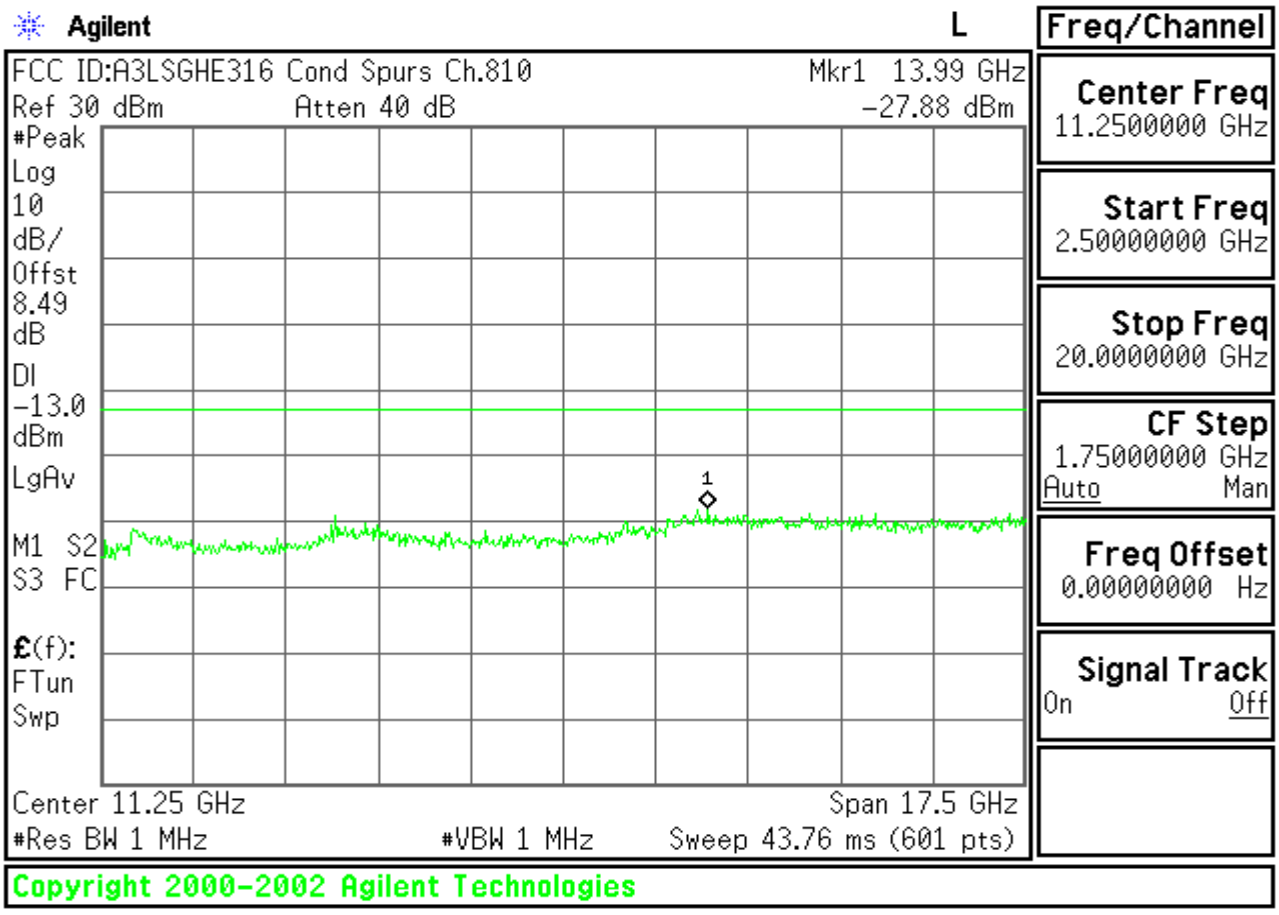
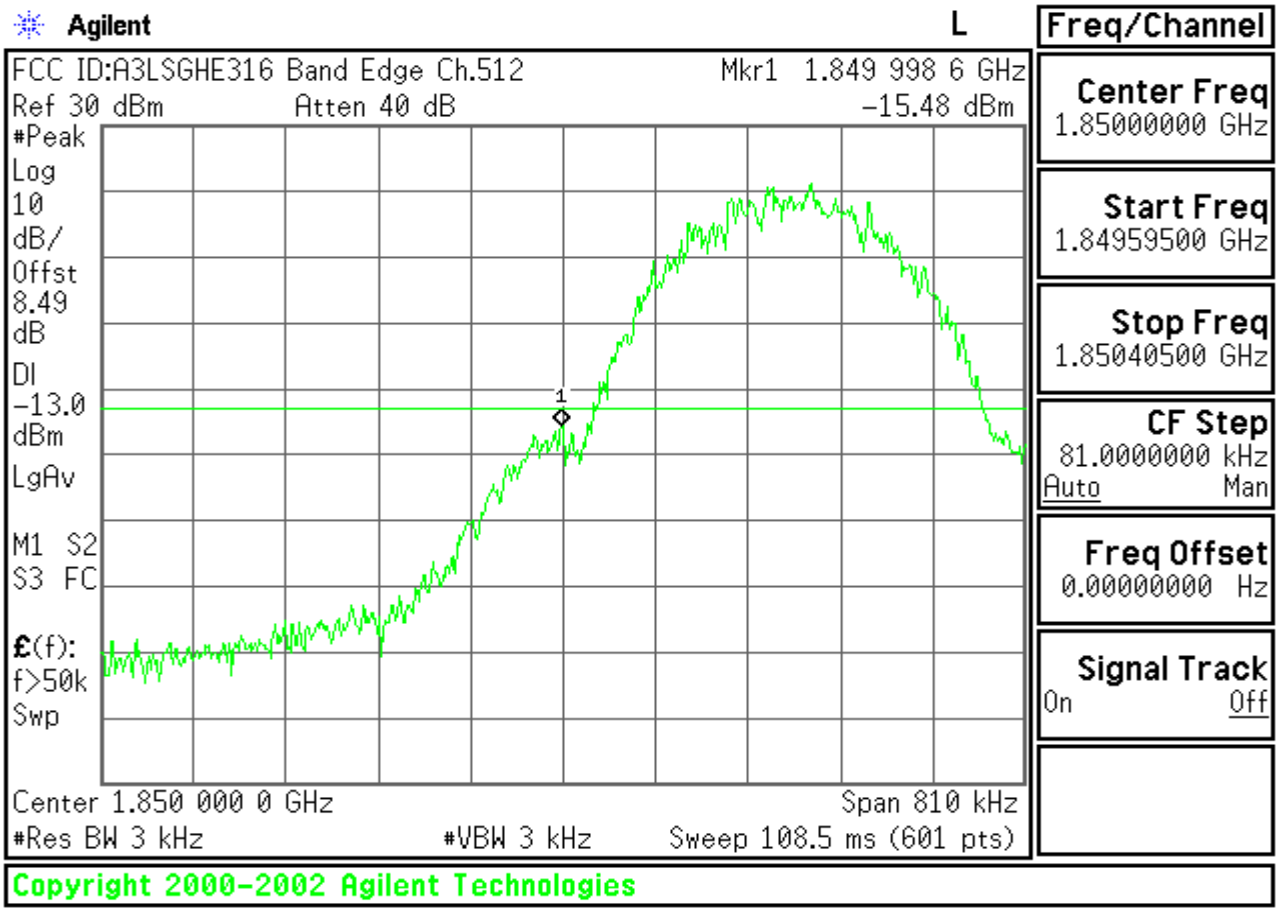
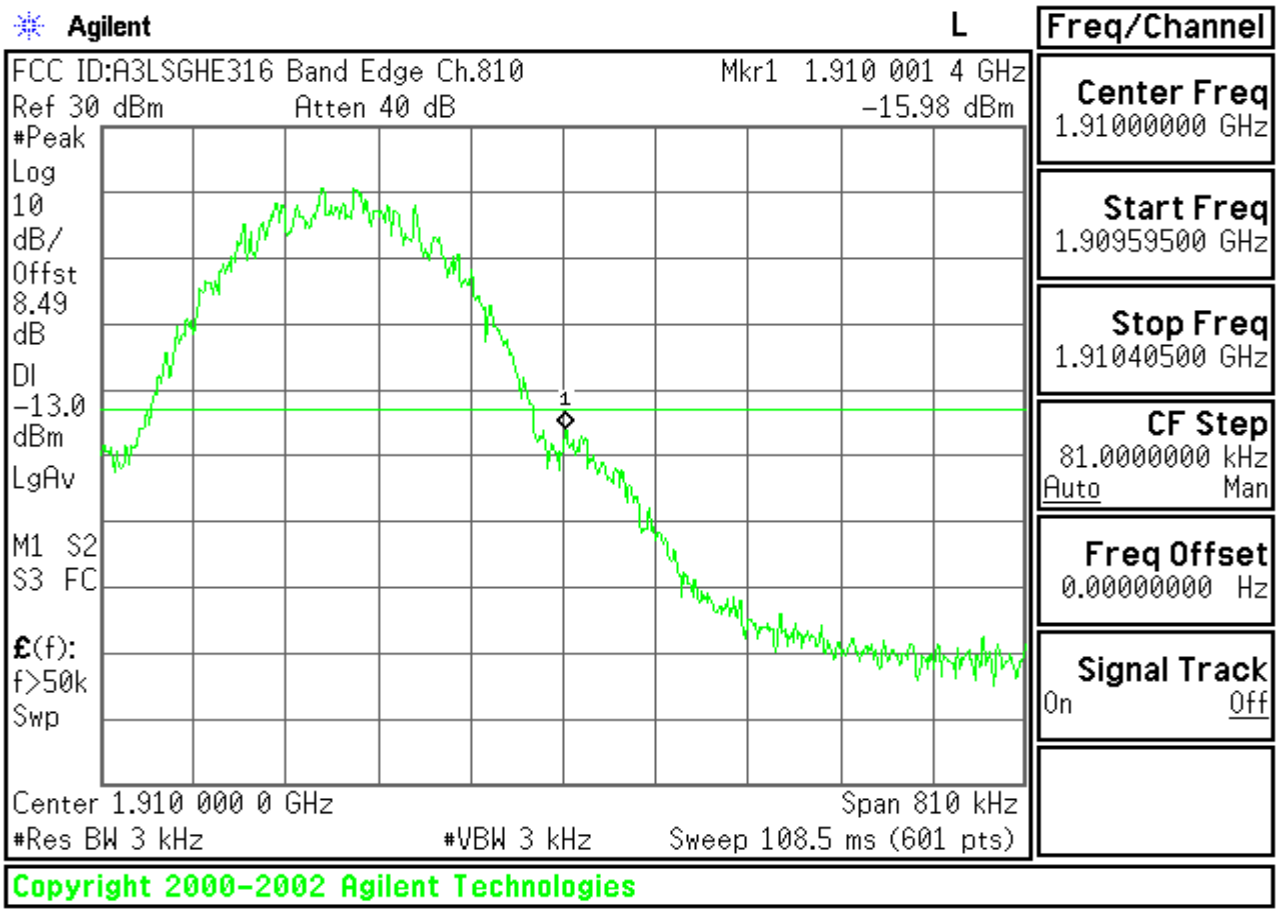

Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Cond Spurs Ch.810
Mkr1 13.99 GHz
Ref 30 dBm
Atten 40 dB
-27.88 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Center Freq
11.2500000 GHz
Start Freq
2.50000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.75000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 11.25 GHz
Span 17.5 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Band Edge Ch.512
Mkr1 1.849 998 6 GHz
Ref 30 dBm
Atten 40 dB
-15.48 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
f>50k
Swp
Center 1.850 000 0 GHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 108.5 ms (601 pts)
Center Freq
1.85000000 GHz
Start Freq
1.84959500 GHz
Stop Freq
1.85040500 GHz
CF Step
81.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
L
Freq/Channel
FCC ID:A3LSGHE316 Band Edge Ch.810
Mkr1 1.910 001 4 GHz
Ref 30 dBm
Atten 40 dB
-15.98 dBm
#Peak
Log
10
dB/
Offst
8.49
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
f>50k
Swp
Center 1.910 000 0 GHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 108.5 ms (601 pts)
Center Freq
1.91000000 GHz
Start Freq
1.90959500 GHz
Stop Freq
1.91040500 GHz
CF Step
81.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies