MSUNG 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 24 SUBPART CERTIFICATION TEST DATA

Model Tested:	SGH-X400
FCC ID (Requested):	A3LSGHX400
Report No:	FA-003-R1
Date issued:	March 18,2003

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

Prepared By	JH CHOI – Test Engineer	**Date**	March 18. 2003
Checked By	CW PARK - Manager	**Date**	Mar 19, 2003
Authorized By	JK CHOI – Senior Manager	**Date**	Mar 21. 2003

Test Equipment

Name of Equipment	Model	Serial No.	Due Date
Spectrum Analyzer	ESI26(20Hz~26.5GHz)	836119/010	2004-02-04
	E4440B(3Hz~26.5GHz)	MY41000236	2003-11-25
	E4440B(3Hz~26.5GHz)	MY41000233	2003-11-25
Signal Generator	SMIQ03B(300KHz~3.3GHz)	83824/021	2004-01-20
	SMR20(1GHz~20GHz)	835197/030	2004-01-20
Power Meter	E4419B	GB41293846	2003-11-26
Power Sensor	8481B(1mW~25W)	3318A10325	2003-09-26
	8485A(1uW~100mW)	3318A19924	2003-09-26
Amplifier	5S1G4(0.8~4.2GHz, 5W)	304866	2003-11-26
Pre-Amplifier	8449B(1~26.5GHz, 30dB)	3008A00691	2004-01-21
Communication test set	8960	GB42230535	2003-12-02
	8960	GB42360886	2004-01-09
Antenna Master	MA0001	ANT0967	Not Required
Controller	HD100	100/756	Not Required
Environmental Chamber	PL-4S(Temperature/Humidity)	13005454	2003-08-20
	SH-241	92000548	2003-12-12
	SH-241	92000549	2003-12-12
Horn Antenna	HF906(1GHz~18GHz)	360306/011	2004-02-10
	HF906(1GHz~18GHz)	100134	2003-09-07
Dipole Antenna	3121C-DB4	9007-587	2003-11-08
	3121C-DB4	1454	2003-05-19
	3121C-DB4	1455	2003-05-19
Attenuator	8494A(0~11dB)	3308A31997	2004-01-20
	8496A(0~110dB)	3308A14426	2004-01-20
Directional Coupler	4278-311-2(0.1~1GHz)	B3679637	2004-01-22
	4278-111-2(1~2GHz)	B103DC8722	2004-01-22
High Pass Filter	WHK1.0/15G-10SS(1~15GHz)	1	Not Required
	WHV1.0/15G-10SS(1~15GHz)	1	Not Required
	WHK/3.5/18G-10SS(3.5~18GHz)	3	Not Required
	WHK/3.5/18G-10SS(3.5~18GHz)	4	Not Required
Shielded Semi-Anechoic Chamber	RF0002	ANT0001	2004-01-21

FCC ID : A3LSGHX400

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

Supply Voltage: 3.7 VDC

Modulation: PCS GSM

■ Reference level

Frequency (MHz)	Output (dBm)	Polarization	S/A (dBm)	P/M (dBm)	Ant gain (dBi)	Ref level (dBm)
1880.00	27.00	H	−13.16	−13.15	8.26	−21.41
		V	−13.32	−13.20	8.26	−21.46

■ Result

Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
1850.20	−18.75	H2	29	29.66	0.925	Standard
1880.00	−18.95	H1	125	29.46	0.883	Standard
1909.80	−22.19	H2	27	26.22	0.419	Standard
1850.20	−19.13	H2	18	29.28	0.925	Slim
1880.00	−19.06	H1	126	29.35	0.883	Slim
1909.80	−22.32	H1	124	26.09	0.419	Slim

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. 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.

FCC ID : A3LSGHX400

Field Stength of SPURIOUS Radiation

Operating Frequency : 1850.2 MHz

Measured Output Power : 29.66 dBm = 0.925 W

Modulation Signal : PCS GSM

Limit : $43+10\log_{10}(W)$ = 42.66 dBc

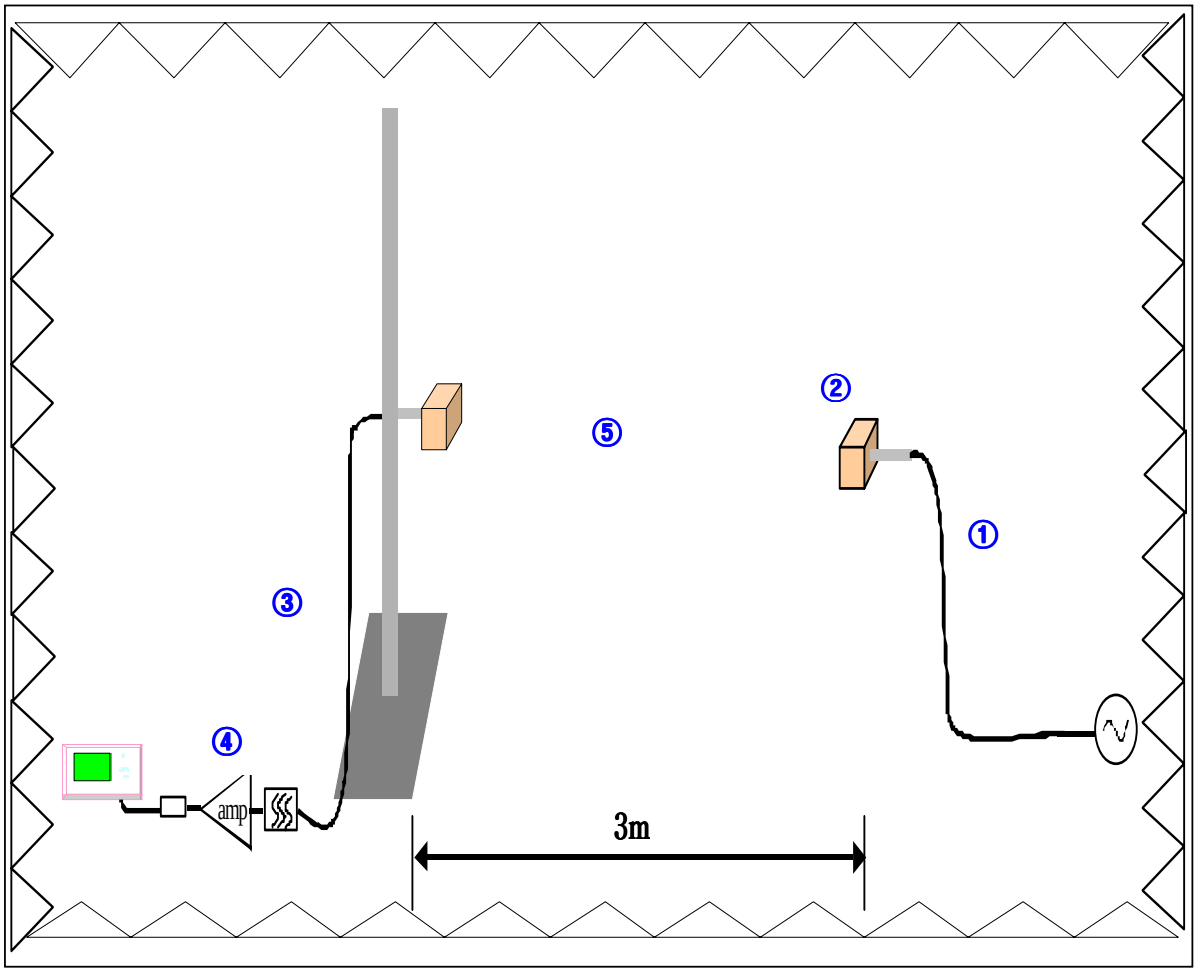
■ Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
512	2	3700.40	-70.40	H2	75.89
	3	5550.60	-66.14	H1	68.17
	4	7400.80	-68.05	H2	66.71
	5	9251.00	-72.09	H2	67.96
	6	11101.20	-67.74	H2	61.10
661	2	3760.00	-69.64	H2	74.87
	3	5640.00	-70.25	H2	72.83
	4	7520.00	-68.32	H2	66.91
	5	9400.00	-73.02	H2	68.57
	6	11280.00	-74.73	H1	67.25
810	2	3819.60	-70.56	H2	76.66
	3	5729.40	-73.46	H2	75.73
	4	7639.20	-72.41	H2	71.30
	5	9549.00	-72.22	H2	67.87
	6	11458.80	-70.99	H2	62.24

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. 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.

Radiated Spurious & Harmonic Configuration for Calibration



① Tx Cable loss
② Horn Ant Gain
③ Rx Cable loss + HPF Insertion loss + Attenuator
④ Pre-Amp gain
⑤ Air loss

Radiated Spurious & Harmonic Conversion Table

FCC ID : A3LSGHX400 Mode : GSM1900

EIRP : 29.66 dBm

Date : 2003 . 03 . 11 .

Test Engineer : JH Choi

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 = ① + ② + ③ − ④
⑧ = EIRP − ⑦

CH	차수	Frequency (MHz)	① Tx CL (dB)	② Horn Gain (dB)	Tx Level (Horn 출력) S/G 15dBm	⑥ Tested Level Ant : H (dBm)	⑥ Tested Level Ant : V (dBm)	⑦ Actual Value Ant : H (dBm)	⑦ Actual Value Ant : V (dBm)	⑧ Result Ant : H (dBc)	⑧ Result Ant : V (dBc)
512	2	3700.40	13.99	9.96	10.97	−70.40	−72.91	−46.23	−49.36	75.89	79.02
	3	5550.60	18.96	11.06	7.10	−66.14	−70.43	−38.51	−42.78	68.17	72.44
	4	7400.80	22.73	11.08	3.35	−68.05	−72.39	−37.05	−42.60	66.71	72.26
	5	9251.00	26.54	12.20	0.66	−72.09	−72.64	−38.30	−39.08	67.96	68.74
	6	11101.20	30.50	13.34	−2.16	−67.74	−71.38	−31.44	−34.94	61.10	64.60
661	2	3760.00	14.40	9.95	10.55	−69.64	−70.54	−45.21	−47.07	74.87	76.73
	3	5640.00	19.02	11.12	7.10	−70.25	−72.37	−43.17	−45.19	72.83	74.85
	4	7520.00	22.74	11.10	3.36	−68.32	−69.33	−37.25	−39.11	66.91	68.77
	5	9400.00	26.52	12.14	0.62	−73.02	−75.66	−38.91	−42.41	68.57	72.07
	6	11280.00	30.53	13.40	−2.13	−74.73	−74.72	−37.59	−37.97	67.25	67.63
810	2	3819.60	14.37	9.94	10.57	−70.56	−72.73	−47.00	−48.69	76.66	78.35
	3	5729.40	19.54	11.14	6.60	−73.46	−76.23	−46.07	−48.70	75.73	78.36
	4	7639.20	23.37	11.15	2.78	−72.41	−72.02	−41.64	−41.96	71.30	71.62
	5	9549.00	27.03	12.16	0.13	−72.22	−74.75	−38.21	−41.47	67.87	71.13
	6	11458.80	30.23	13.50	−1.73	−70.99	−70.93	−32.58	−32.90	62.24	62.56

FCC ID : A3LSGHX400

Frequency Stability (PCS GSM)

Operating Frequency : 1,880,000,000 Hz

Channel : 661

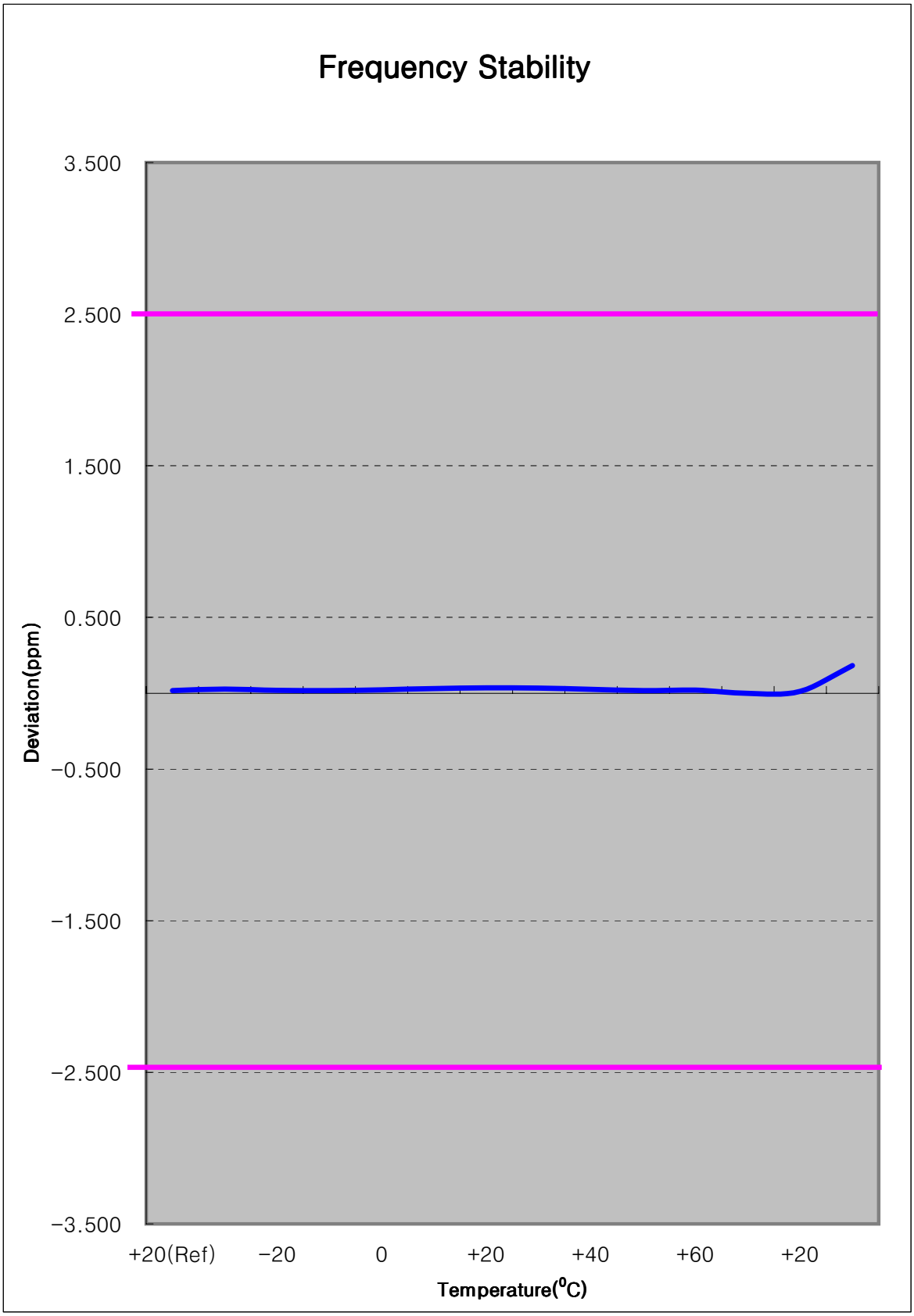
Reference voltage : 3.7VDC

Deviation Limit : ± 0.00025 % or 2.5ppm

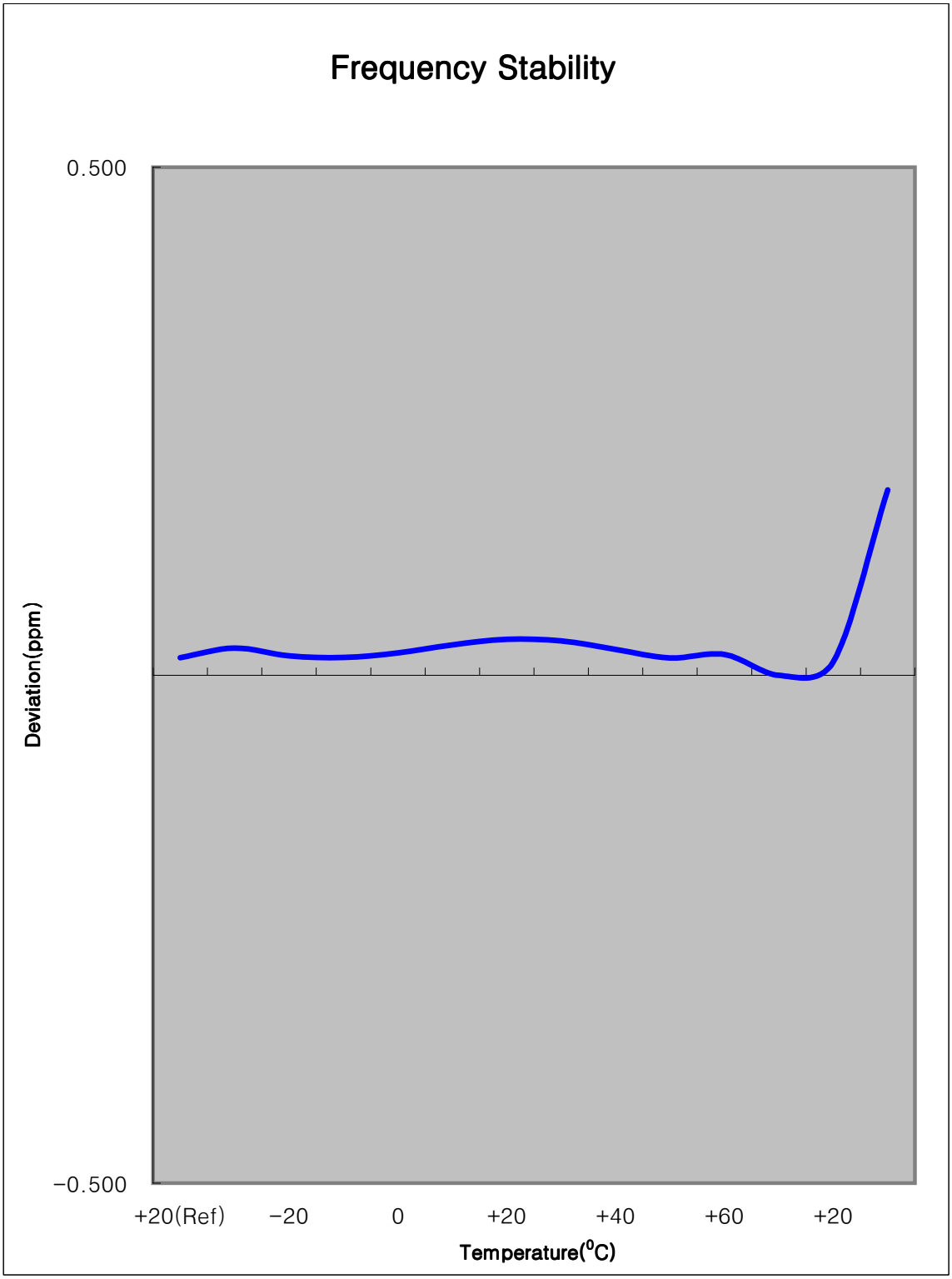
Voltage (%)	Power (V dc)	TEMP (OC)	Frequency error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	-32.43	1,879,999,968	0.000002	0.017
100%		-30	-50.23	1,879,999,950	0.000003	0.027
100%		-20	-35.63	1,879,999,964	0.000002	0.019
100%		-10	-32.72	1,879,999,967	0.000002	0.017
100%		0	41.14	1,880,000,041	0.000002	0.022
100%		+10	-55.92	1,879,999,944	0.000003	0.030
100%		+20	-66.35	1,879,999,934	0.000004	0.035
100%		+30	-63.27	1,879,999,937	0.000003	0.034
100%		+40	-47.42	1,879,999,953	0.000003	0.025
100%		+50	-31.97	1,879,999,968	0.000002	0.017
100%		+60	-38.49	1,879,999,962	0.000002	0.020
85%	3.15	+20	-	-	-	-
115%	4.26	+20	24.77	1,880,000,025	0.000001	0.013
Batt. Endpoint		+20	-342.89	1,879,999,657	0.000018	0.182

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.


Frequency Stability
3.500
2.500
1.500
0.500
−0.500
−1.500
−2.500
−3.500
Deviation(ppm)
+20(Ref)
−20
0
+20
+40
+60
+20
Temperature(⁰C)

Zoom In


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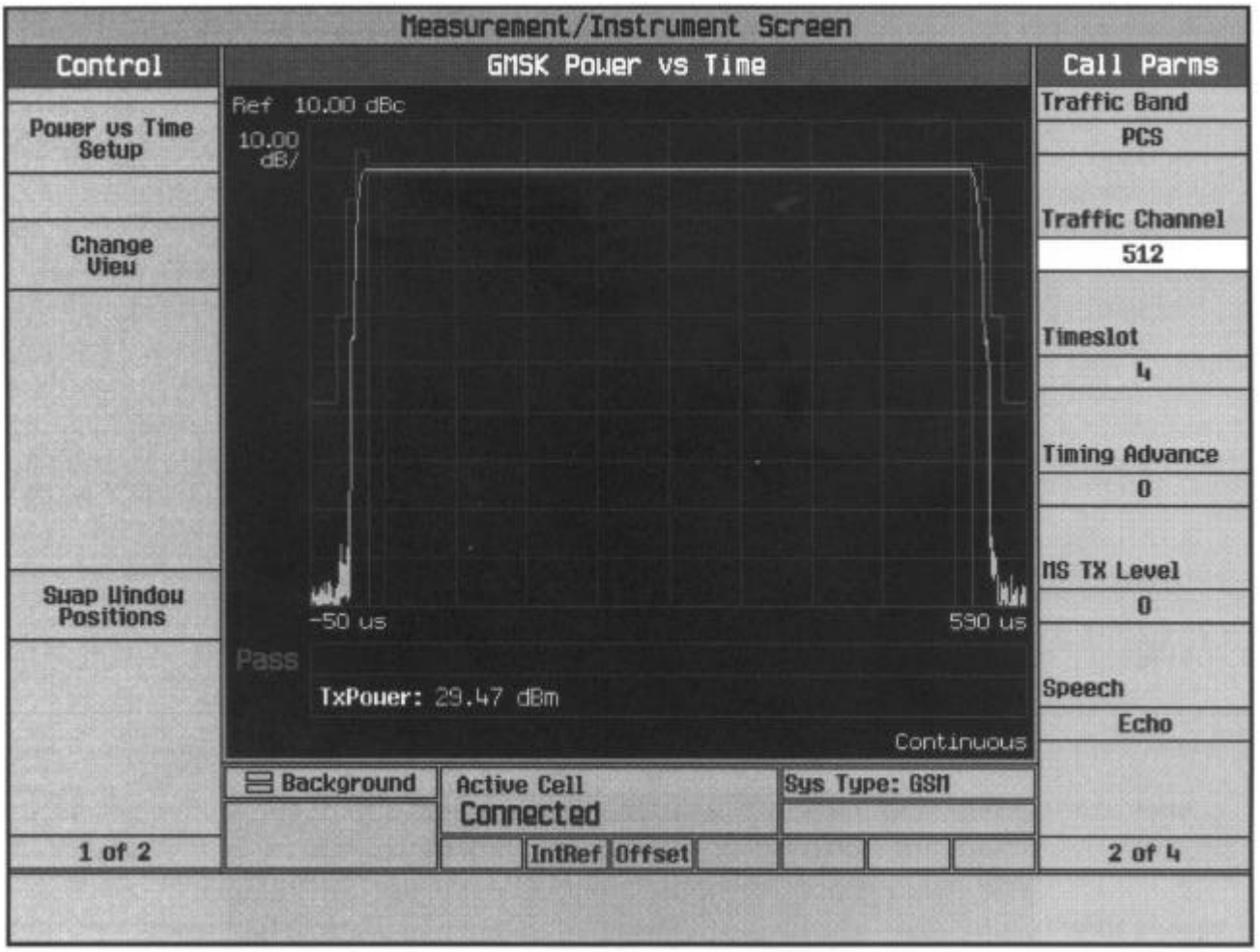
0
+20
+40
+60
+20
Temperature(⁰C)

FCC ID : A3LSGHX400 GMSK Power vs Time 512CH



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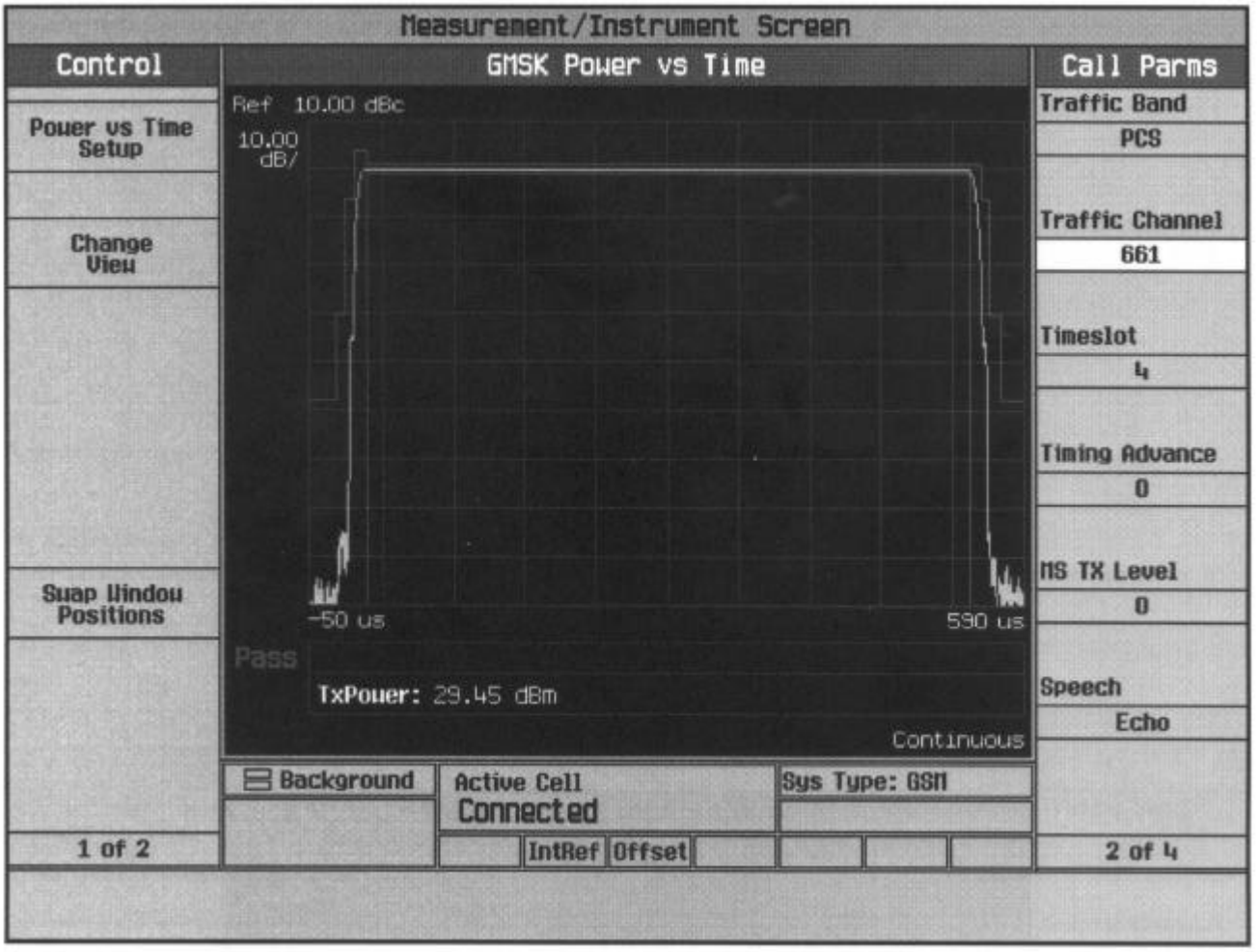

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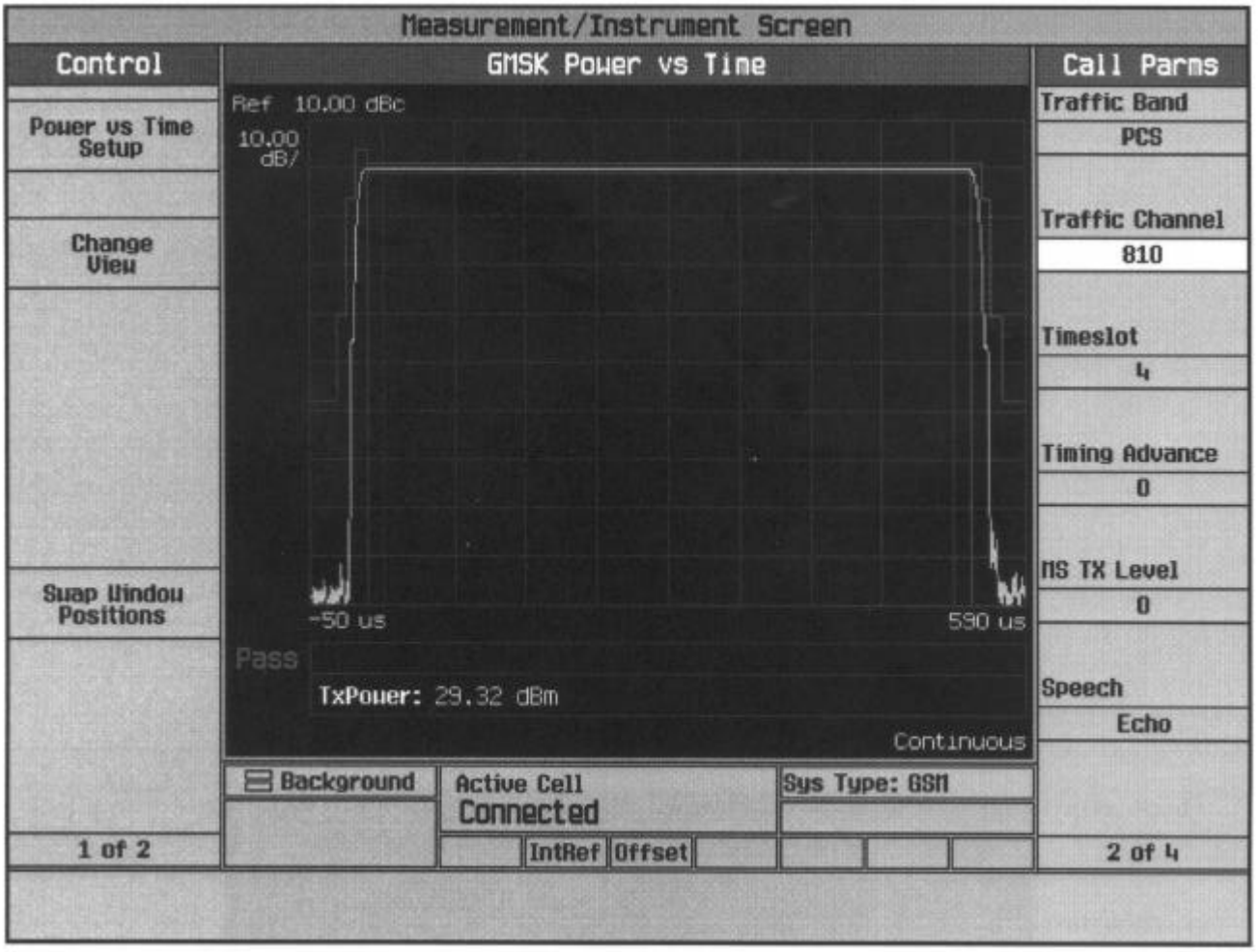

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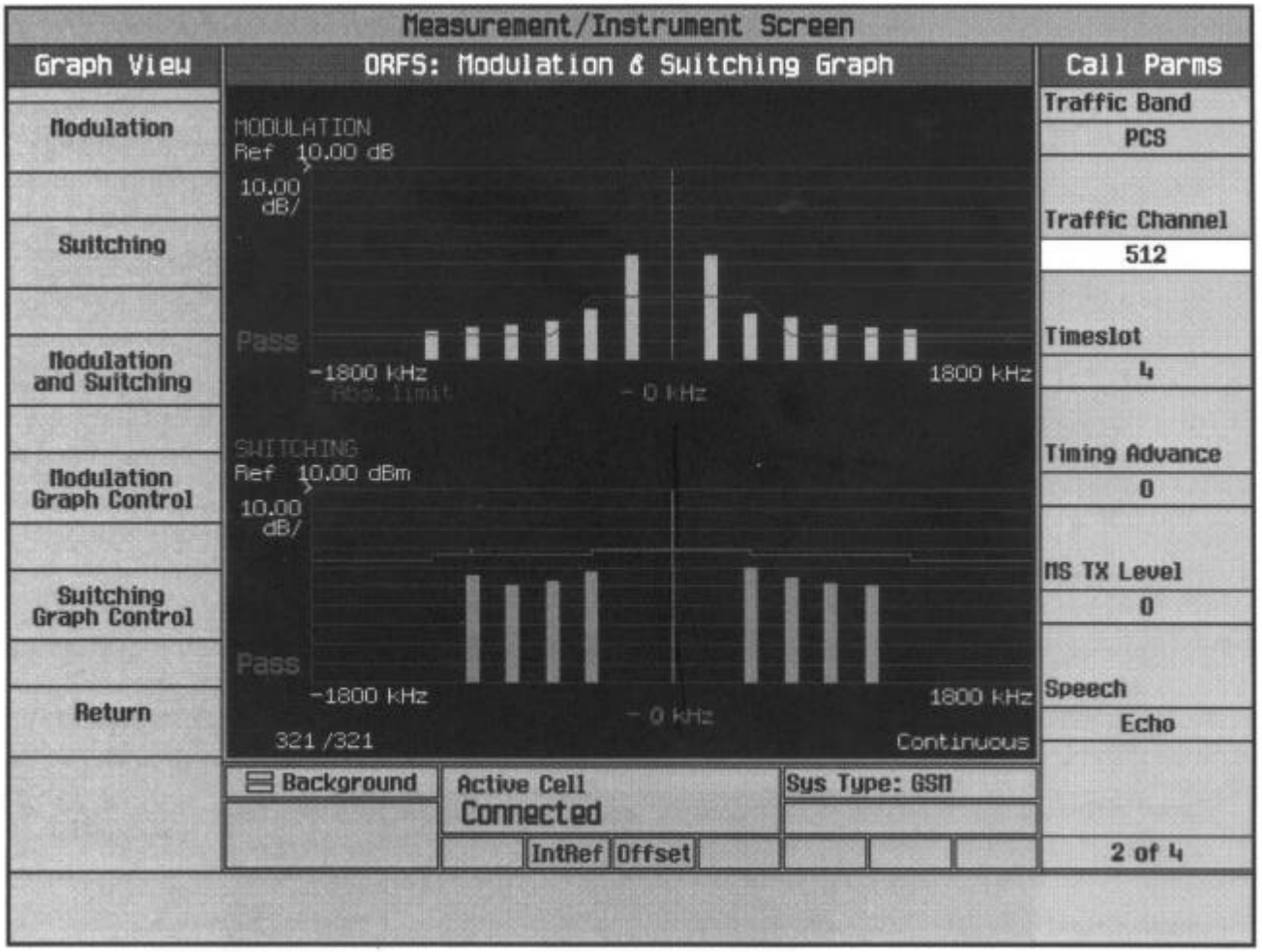

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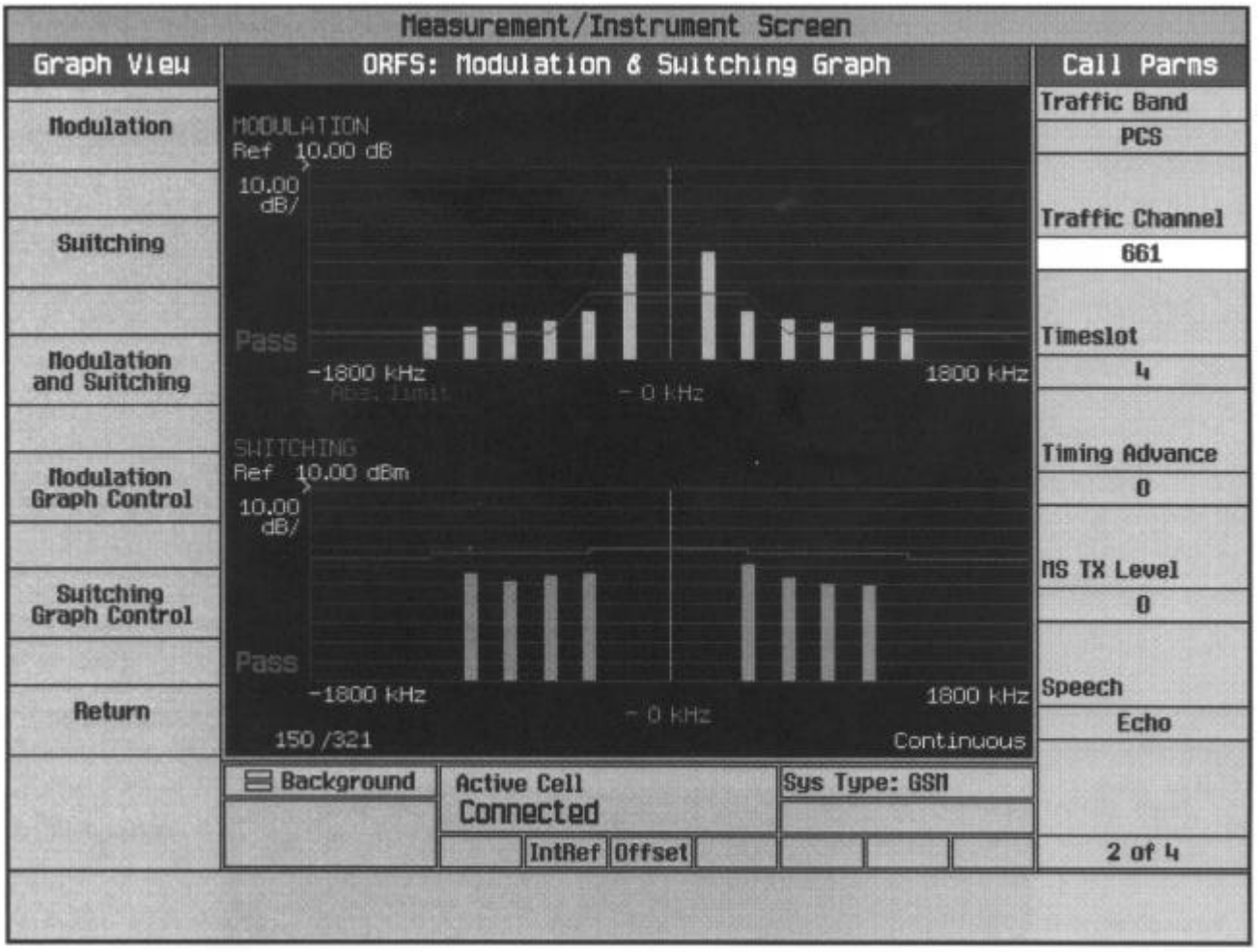

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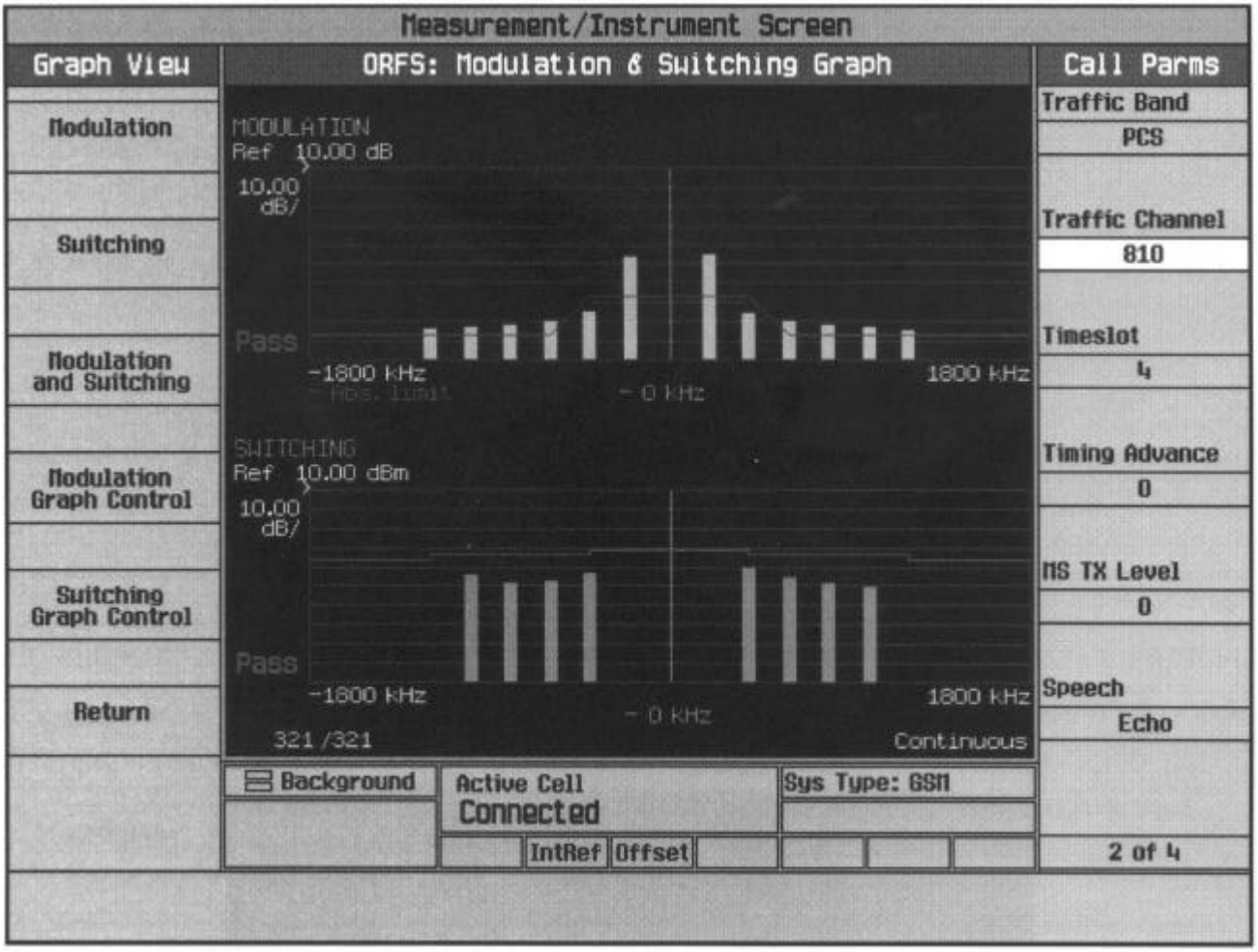

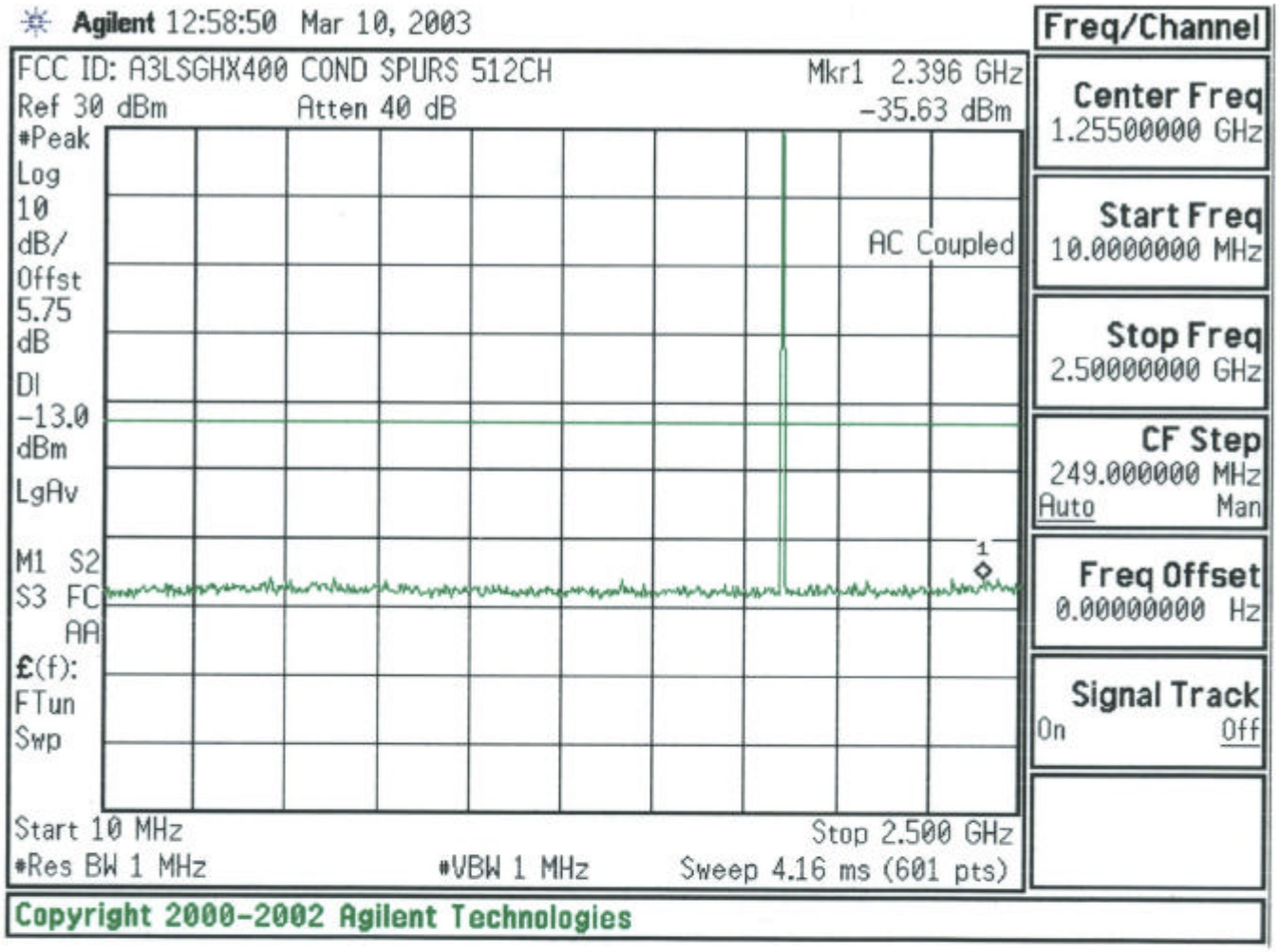
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FCC ID: A3LSGHX400 COND SPURS 512CH
Mkr1 2.396 GHz
Ref 30 dBm
Atten 40 dB
-35.63 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
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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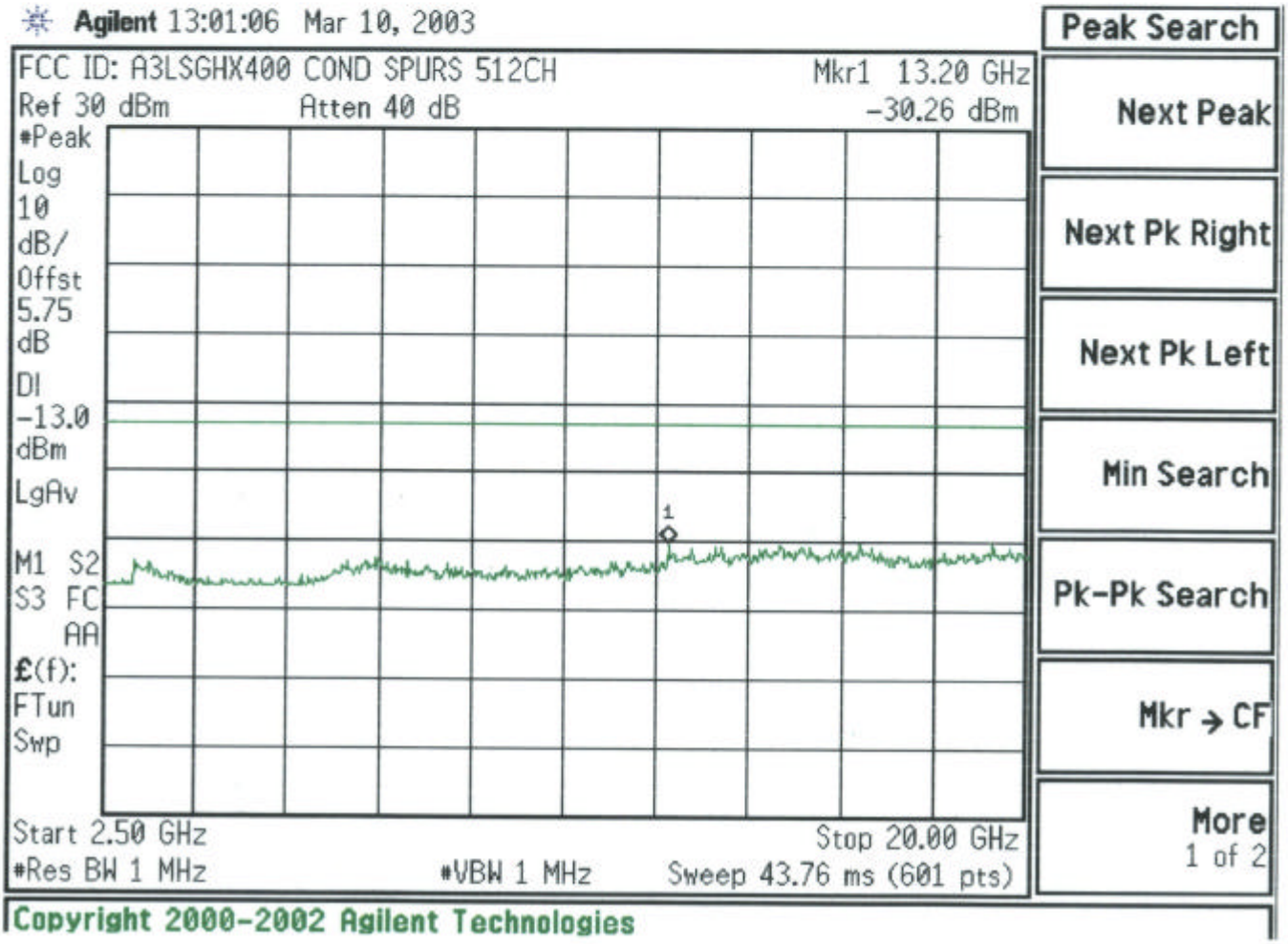
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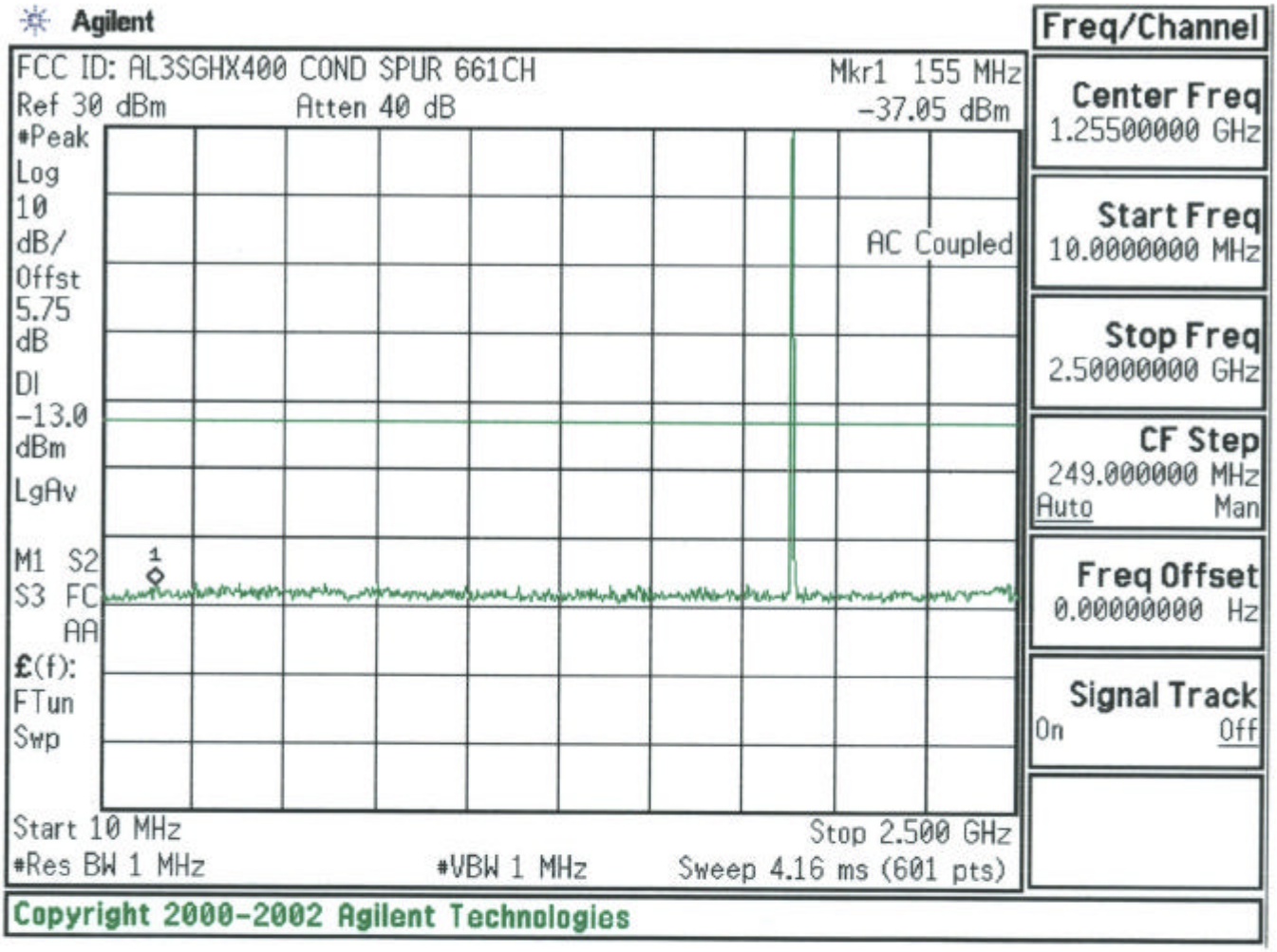
FCC ID: A3LSGHX400 COND SPURS 512CH
Mkr1 13.20 GHz
Ref 30 dBm
Atten 40 dB
-30.26 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.50 GHz
Stop 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2002 Agilent Technologies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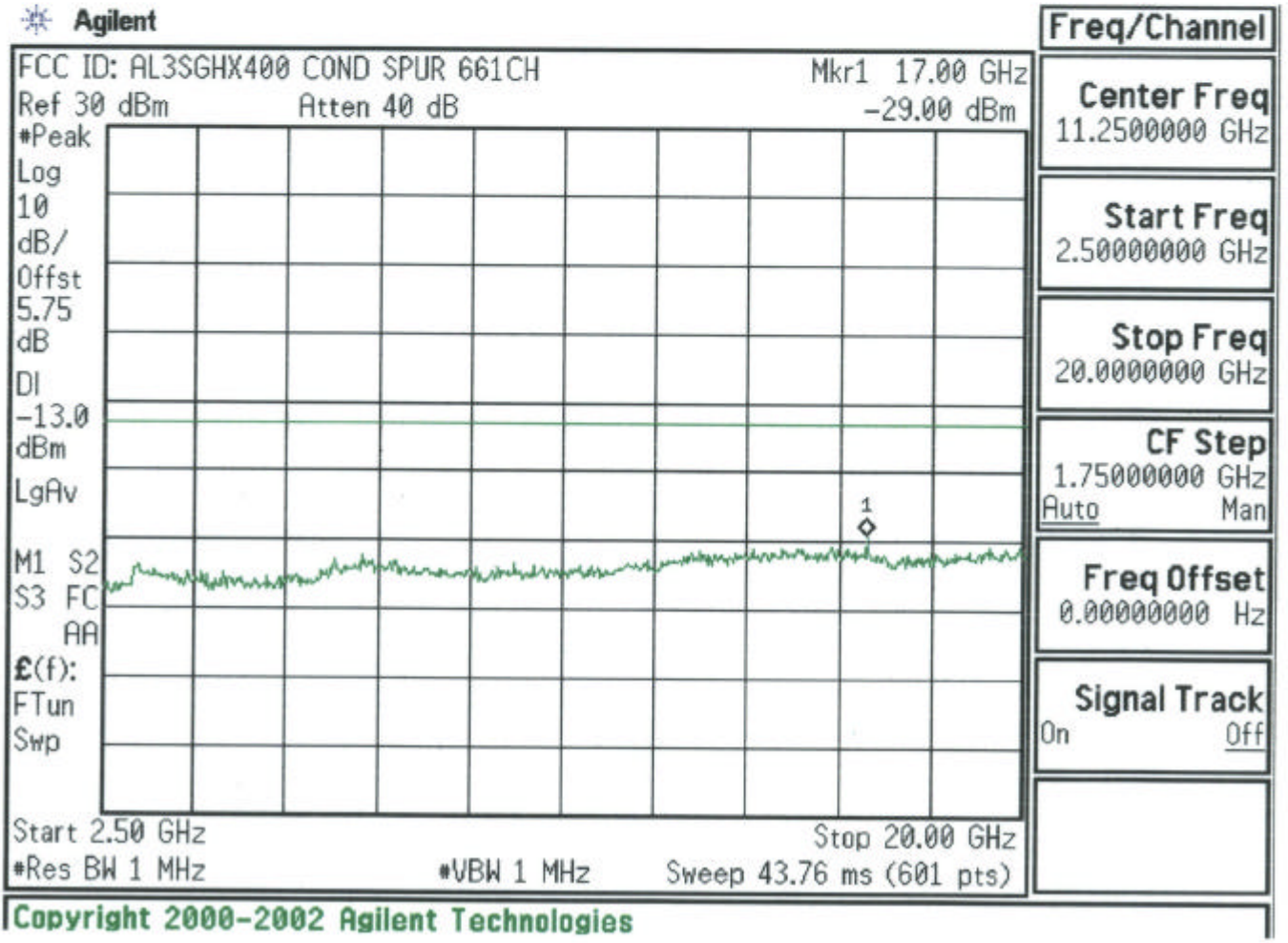
Mkr1 155 MHz
Ref 30 dBm
Atten 40 dB
-37.05 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Freq/Channel
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
2.50000000 GHz
CF Step
249.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies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FCC ID: AL3SGHX400 COND SPUR 661CH
Mkr1 17.00 GHz
Ref 30 dBm
Atten 40 dB
-29.00 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.50 GHz
Stop 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
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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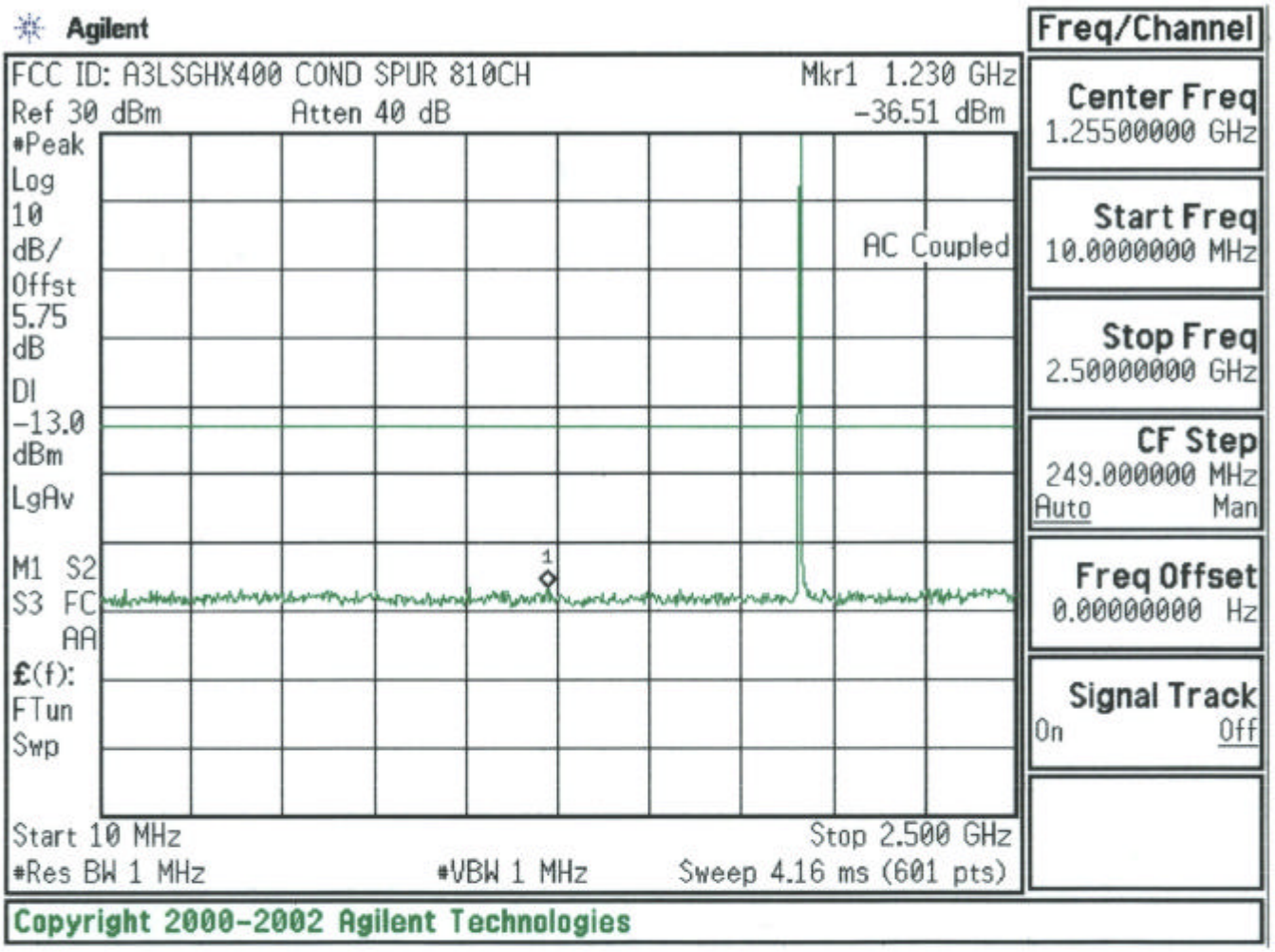
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FCC ID: A3LSGHX400 COND SPUR 810CH
Mkr1 1.230 GHz
Ref 30 dBm
Atten 40 dB
-36.51 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Freq/Channel
Center Freq
1.25500000 GHz
Start Freq
10.0000000 MHz
Stop Freq
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CF Step
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Auto
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Freq Offset
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Signal Track
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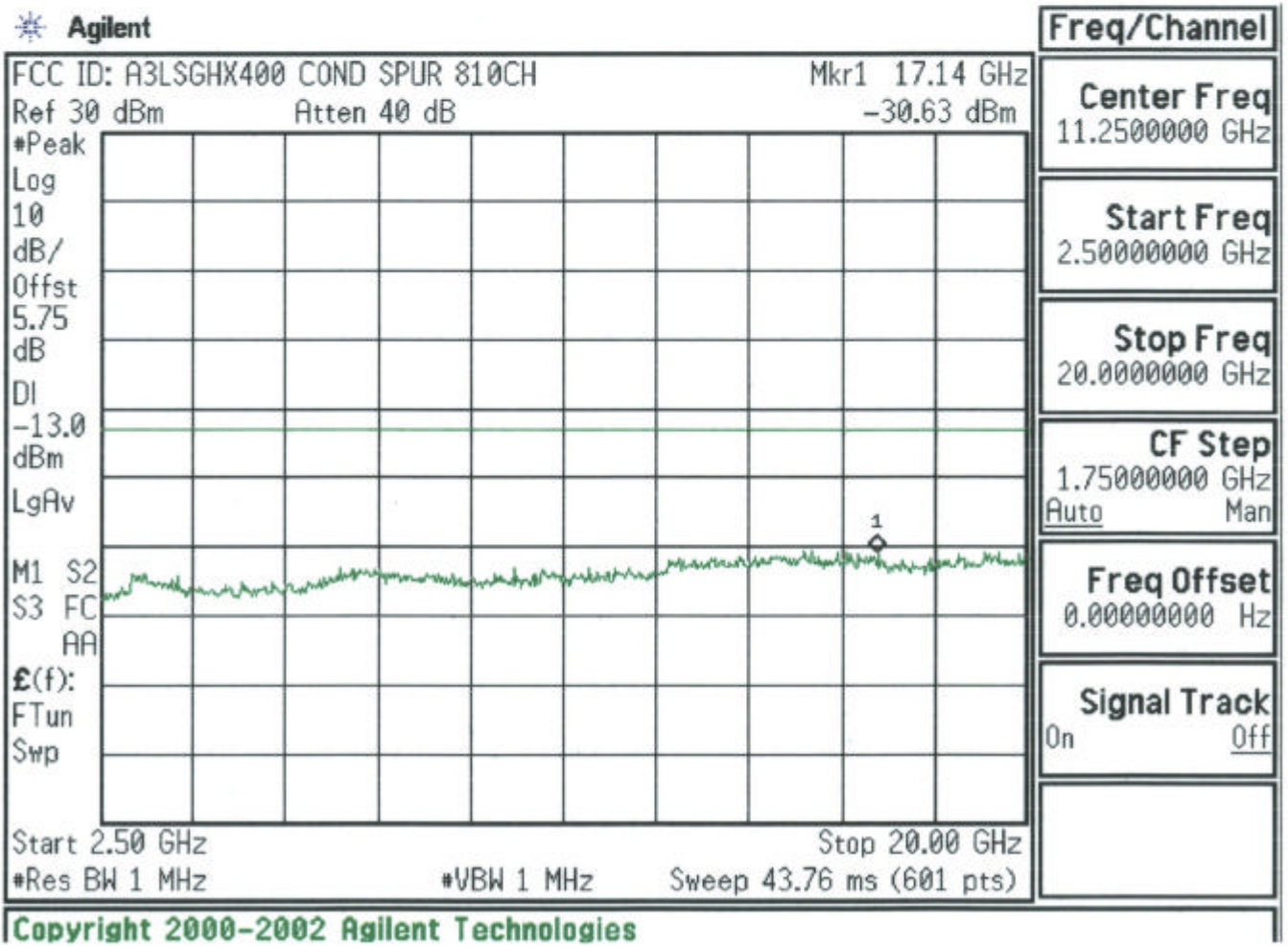
Copyright 2000-2002 Agilent Technologies


Agilent
FCC ID: A3LSGHX400 COND SPUR 810CH
Mkr1 17.14 GHz
Ref 30 dBm
Atten 40 dB
-30.63 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.50 GHz
Stop 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
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
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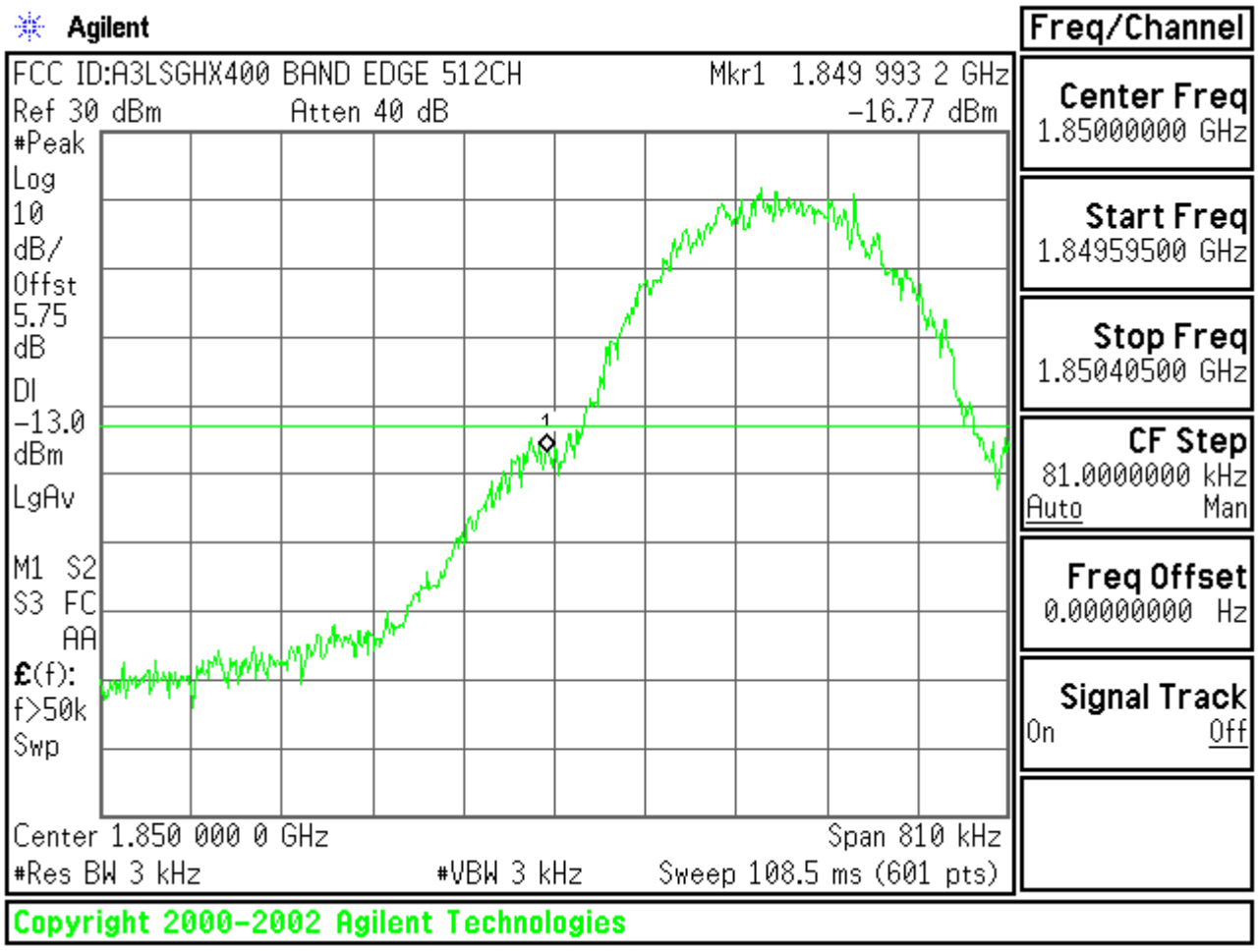
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
FCC ID:A3LSGHX400 BAND EDGE 512CH
Mkr1 1.849 993 2 GHz
Ref 30 dBm
Atten 40 dB
-16.77 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(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)
Freq/Channel
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
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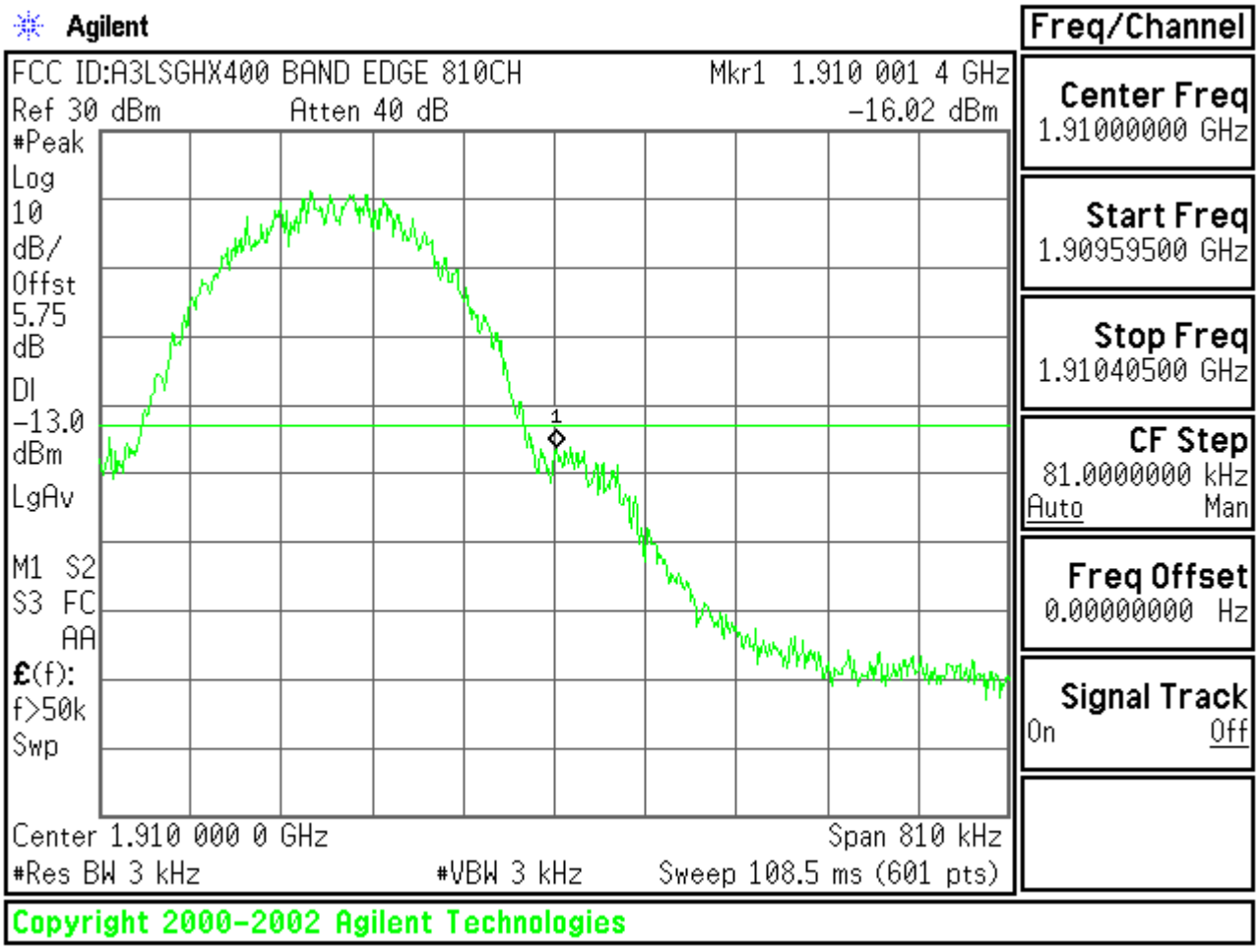
Agilent
FCC ID:A3LSGHX400 BAND EDGE 810CH
Mkr1 1.910 001 4 GHz
Ref 30 dBm
Atten 40 dB
-16.02 dBm
#Peak
Log
10
dB/
Offst
5.75
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 1.910 000 0 GHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 108.5 ms (601 pts)
Freq/Channel
Center Freq
1.91000000 GHz
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
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