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-P408 |
| FCC ID (Requested): | A3LSGHP408 |
| Report No: | FA-006-R1 |
| Date issued: | May 12,2003 |

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

**Prepared By** _____ **Date** May 12, 2003
JH NAM – Test Engineer

**Checked By** _____ **Date** May 14. 2003
CW PARK - Manager

**Authorized By** _____ **Date** May 14, 2003
JK CHOI – Senior Manager

# 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 : A3LSGHP408

## 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 | -12.83 | -12.78 | 8.26 | **-21.04** |
| | | V | -12.74 | -12.72 | 8.26 | **-20.98** |

■ Result

| Frequency (MHz) | From EUT Tested level (dBm) | POL (H/V) | Azimuth (angle) | EIRP (dBm) | EIRP (W) | Battery |
|---|---|---|---|---|---|---|
| 1850.20 | -16.43 | H1 | 111 | 31.61 | 1.449 | Standard |
| 1880.00 | -19.22 | H1 | 113 | 28.82 | 0.762 | Standard |
| 1909.80 | -20.48 | H1 | 116 | 27.56 | 0.570 | Standard |

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 : A3LSGHP408

### Field Stength of SPURIOUS Radiation

Operating Frequency : 1850.2 MHz

Measured Output Power : 31.61 dBm = 1.449 W

Modulation Signal : PCS GSM

Limit : $43+10\log_{10}(W)$ = 44.61 dBc

■ Result

| Channel | Harmonic | Frequency (MHz) | From EUT Tested level (dBm) | POL (H/V) | Result (dBc) |
|---|---|---|---|---|---|
| 512 | 2 | 3700.40 | -51.93 | H2 | 61.28 |
| | 3 | 5550.60 | -53.85 | H1 | 57.41 |
| | 4 | 7400.80 | -56.48 | V | 58.05 |
| | 5 | 9251.00 | -56.81 | V | 53.58 |
| | 6 | 11101.20 | -57.33 | H2 | 49.92 |
| 661 | 2 | 3760.00 | -49.66 | H2 | 57.18 |
| | 3 | 5640.00 | -55.96 | V | 59.81 |
| | 4 | 7520.00 | -56.02 | H2 | 56.50 |
| | 5 | 9400.00 | -62.45 | H1 | 58.91 |
| | 6 | 11280.00 | -57.26 | H1 | 49.80 |
| 810 | 2 | 3819.60 | -47.56 | H2 | 54.76 |
| | 3 | 5729.40 | -58.15 | V | 61.84 |
| | 4 | 7639.20 | -56.20 | V | 58.12 |
| | 5 | 9549.00 | -63.41 | H1 | 58.89 |
| | 6 | 11458.80 | -60.02 | H1 | 51.21 |

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 Conversion Table

Date : 2003 . 04 . 30 .

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

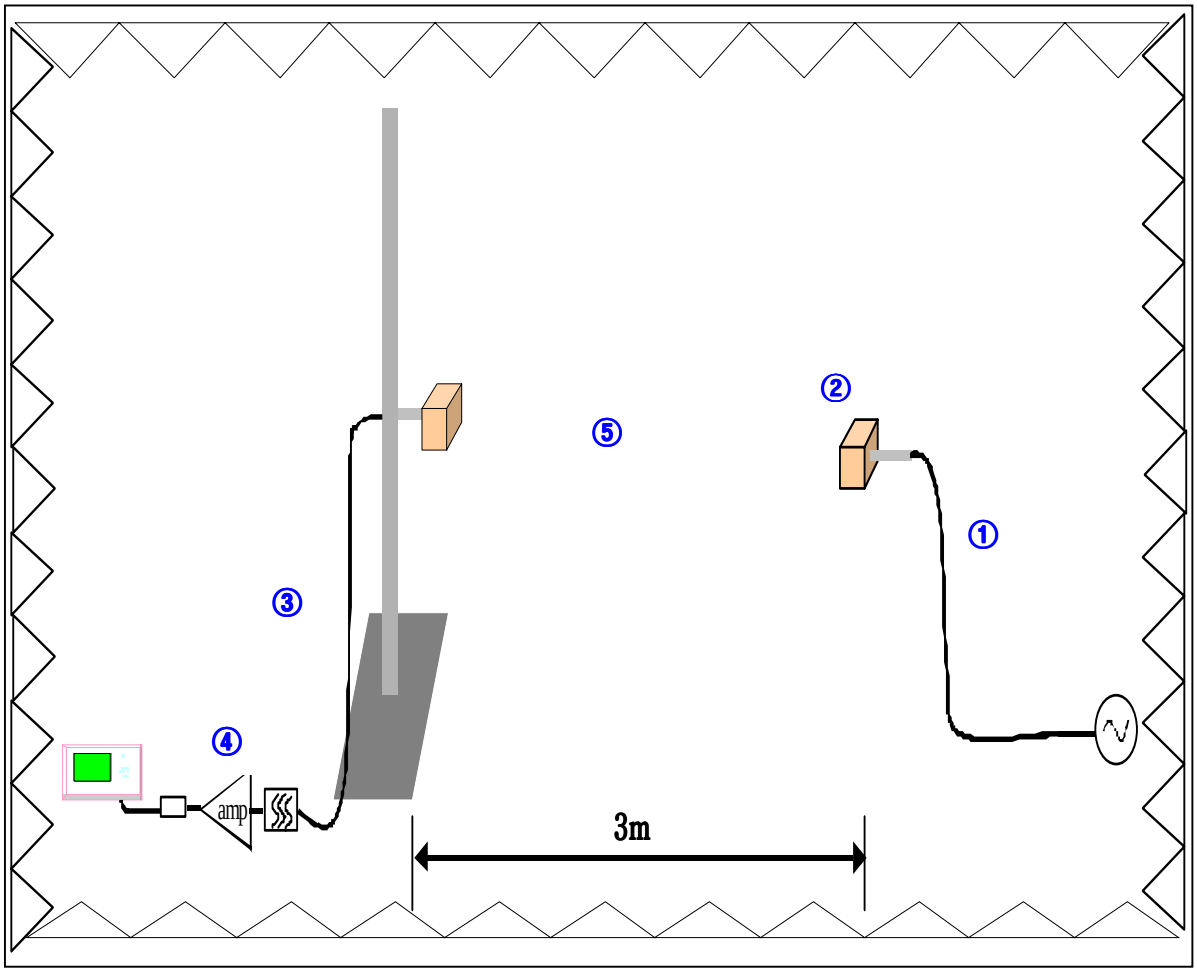
FCC ID : A3LSGHP408 Mode : GSM1900

EIRP : 31.61 dBm

Test Engineer : JH Nam

| CH | 차수 | Frequency (MHz) | ① Tx CL (dB) | ② Horn Gain (dB) | Tx Level (Horn 끝단) S/G 10dBm | 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 | 15.61 | 9.98 | 4.37 | -51.93 | -54.84 | -29.67 | -31.91 | 61.28 | 63.52 |
| | 3 | 5550.60 | 18.44 | 11.18 | 2.74 | -53.85 | -56.11 | -25.80 | -28.23 | 57.41 | 59.84 |
| | 4 | 7400.80 | 22.46 | 11.48 | -0.98 | -57.75 | -56.48 | -26.48 | -26.44 | 58.09 | 58.05 |
| | 5 | 9251.00 | 25.71 | 12.34 | -3.37 | -61.34 | -56.81 | -25.96 | -21.97 | 57.57 | 53.58 |
| | 6 | 11101.20 | 30.50 | 13.76 | -6.74 | -57.33 | -61.55 | -18.31 | -23.79 | 49.92 | 55.40 |
| 661 | 2 | 3760.00 | 14.24 | 10.02 | 5.78 | -49.66 | -50.23 | -25.57 | -26.36 | 57.18 | 57.97 |
| | 3 | 5640.00 | 18.60 | 11.18 | 2.58 | -57.25 | -55.96 | -29.83 | -28.20 | 61.44 | 59.81 |
| | 4 | 7520.00 | 22.56 | 11.50 | -1.06 | -56.02 | -56.75 | -24.89 | -26.45 | 56.50 | 58.06 |
| | 5 | 9400.00 | 25.90 | 12.32 | -3.58 | -62.45 | -62.36 | -27.30 | -27.74 | 58.91 | 59.35 |
| | 6 | 11280.00 | 30.58 | 13.68 | -6.90 | -57.26 | -58.30 | -18.19 | -19.58 | 49.80 | 51.19 |
| 810 | 2 | 3819.60 | 14.22 | 10.02 | 5.80 | -47.56 | -49.06 | -23.15 | -25.10 | 54.76 | 56.71 |
| | 3 | 5729.40 | 19.27 | 11.26 | 1.99 | -60.04 | -58.15 | -32.60 | -30.23 | 64.21 | 61.84 |
| | 4 | 7639.20 | 23.79 | 11.52 | -2.27 | -59.85 | -56.20 | -29.42 | -26.51 | 61.03 | 58.12 |
| | 5 | 9549.00 | 26.01 | 12.30 | -3.71 | -63.41 | -63.02 | -27.28 | -28.03 | 58.89 | 59.64 |
| | 6 | 11458.80 | 30.14 | 13.60 | -6.54 | -60.02 | -60.09 | -19.60 | -20.46 | 51.21 | 52.07 |

**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

## FCC ID : A3LSGHP408

## Frequency Stability (PCS GSM)

Operating Frequency : 1,880,000,000 Hz

Channel : 661

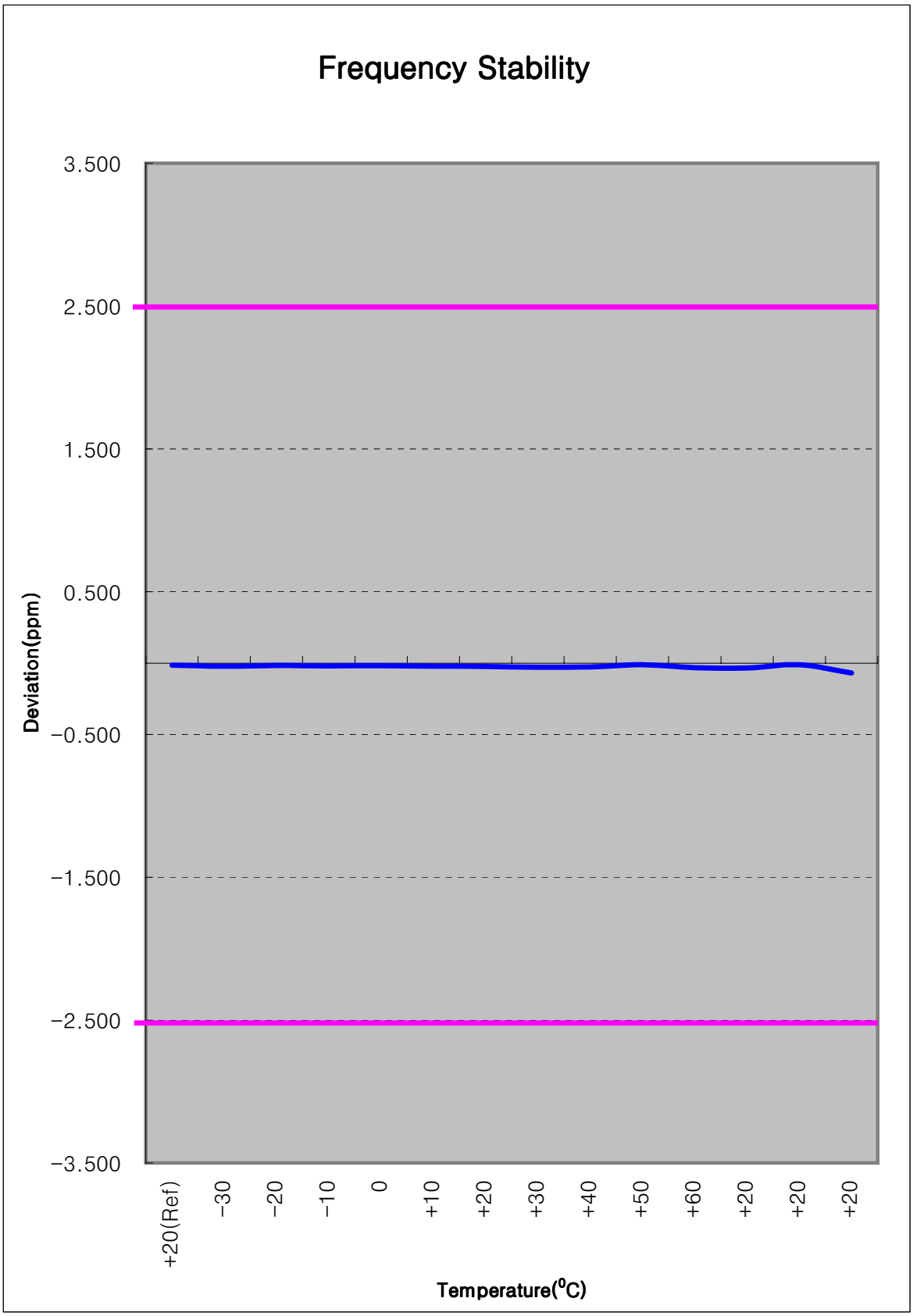
Reference voltage : 3.7VDC

**Deviation Limit : ± 0.00025 % or 2.5ppm**

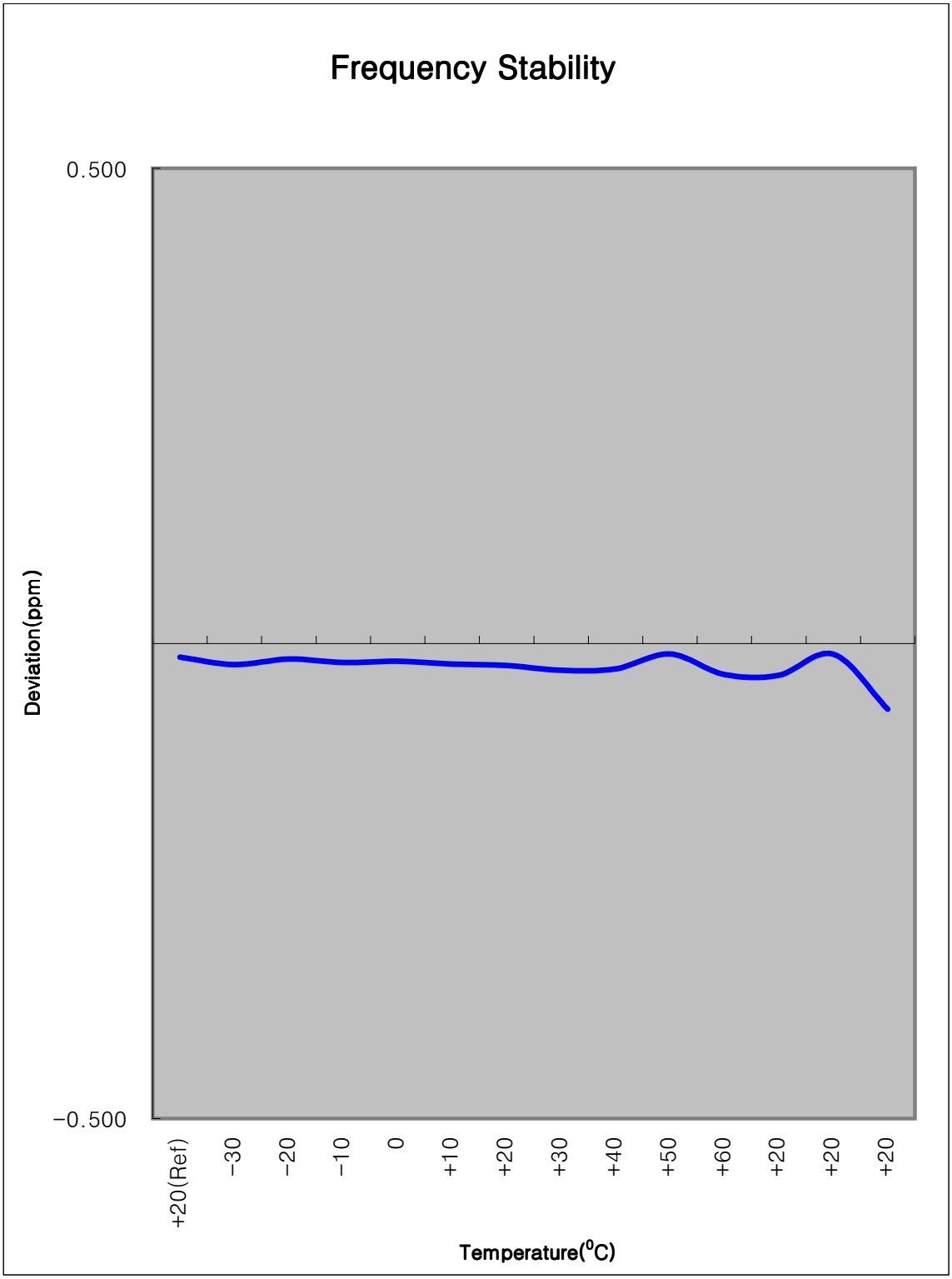
| Voltage (%) | Power (V dc) | TEMP (OC) | Frequency error (Hz) | Frequency (Hz) | Deviation (%) | ppm |
|---|---|---|---|---|---|---|
| 100% | 3.70 | +20(Ref) | -26.94 | 1,879,999,973 | -0.000001 | -0.014 |
| 100% | | -30 | -42.17 | 1,879,999,958 | -0.000002 | -0.022 |
| 100% | | -20 | -30.68 | 1,879,999,969 | -0.000002 | -0.016 |
| 100% | | -10 | -37.49 | 1,879,999,963 | -0.000002 | -0.020 |
| 100% | | 0 | -34.96 | 1,879,999,965 | -0.000002 | -0.019 |
| 100% | | +10 | -41.00 | 1,879,999,959 | -0.000002 | -0.022 |
| 100% | | +20 | -43.37 | 1,879,999,957 | -0.000002 | -0.023 |
| 100% | | +30 | -52.79 | 1,879,999,947 | -0.000003 | -0.028 |
| 100% | | +40 | -50.14 | 1,879,999,950 | -0.000003 | -0.027 |
| 100% | | +50 | -20.78 | 1,879,999,979 | -0.000001 | -0.011 |
| 100% | | +60 | -61.47 | 1,879,999,939 | -0.000003 | -0.033 |
| 85% | 3.15 | +20 | -63.12 | 1,879,999,937 | -0.000003 | -0.034 |
| 115% | 4.26 | +20 | -21.47 | 1,879,999,979 | -0.000001 | -0.011 |
| Batt. Endpoint | 3.12 | +20 | -130.32 | 1,879,999,870 | -0.000007 | -0.069 |

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

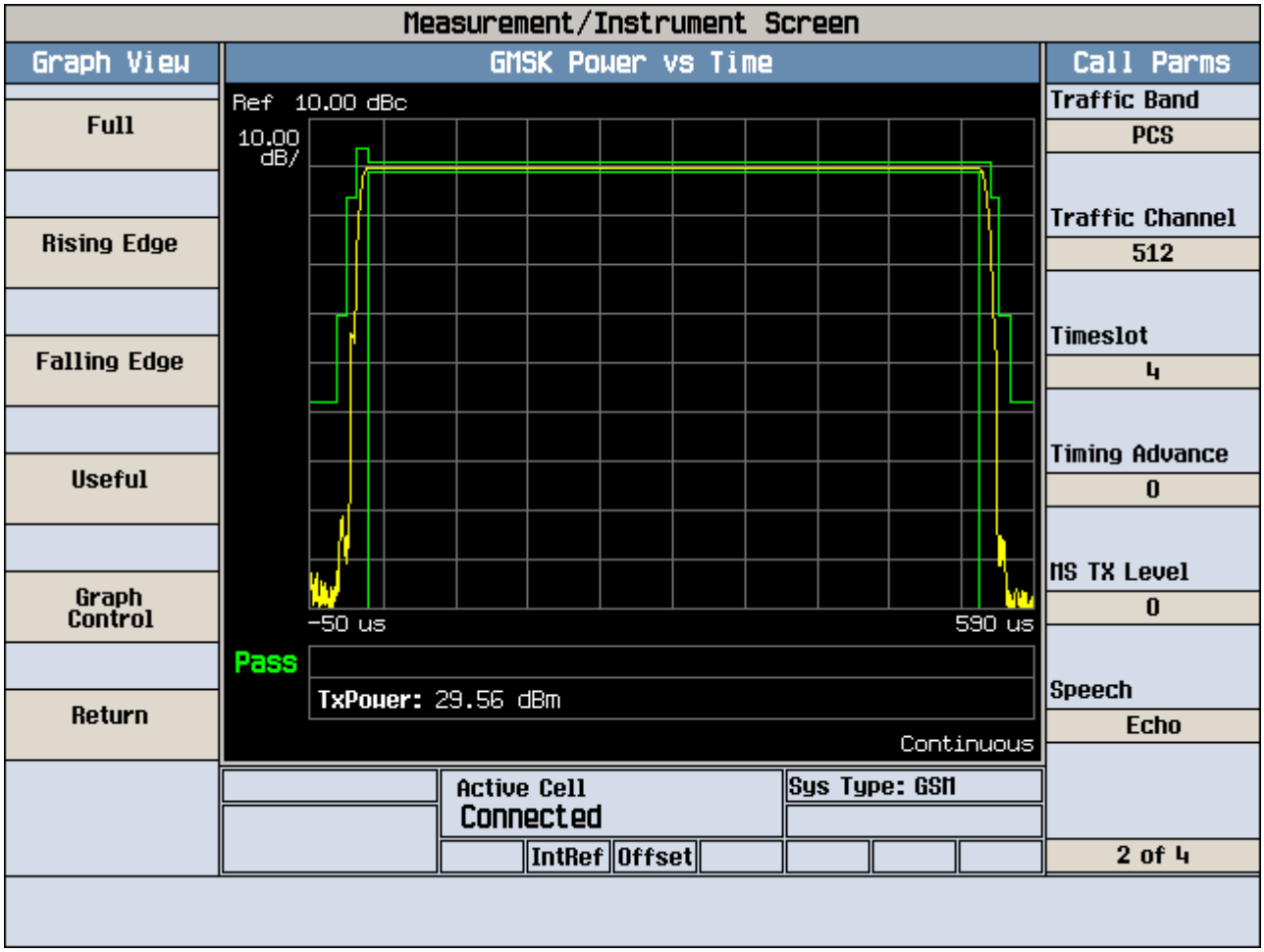
The EUT is tested down to the battery end point.


Frequency Stability
3.500
2.500
1.500
0.500
−0.500
−1.500
−2.500
−3.500
Deviation(ppm)
+20(Ref)
−30
−20
−10
0
+10
+20
+30
+40
+50
+60
+20
+20
+20
Temperature(⁰C)

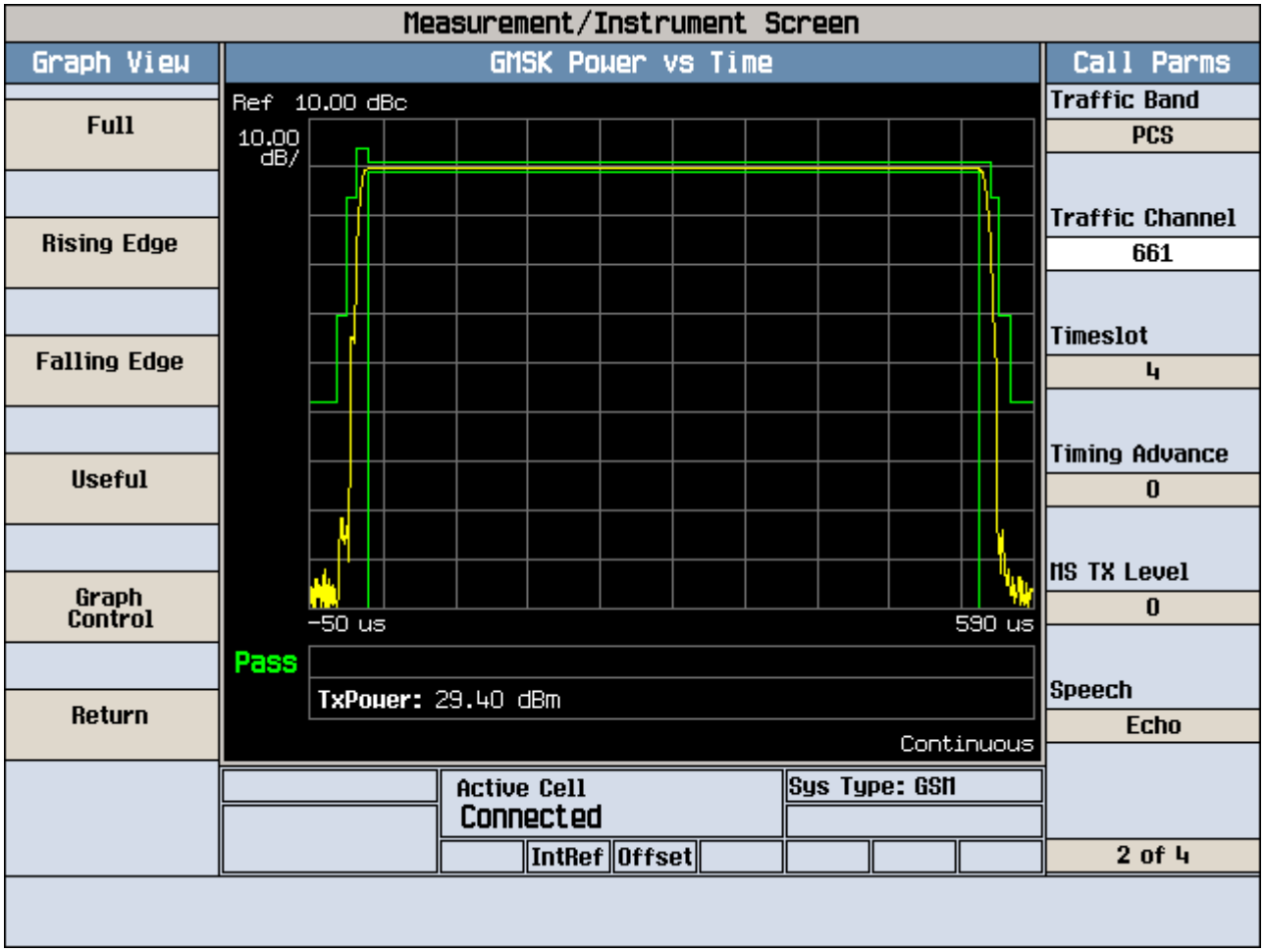
Zoom In


Frequency Stability
0.500
-0.500
Deviation(ppm)
+20(Ref)
-30
-20
-10
0
+10
+20
+30
+40
+50
+60
+20
+20
+20
Temperature(°C)

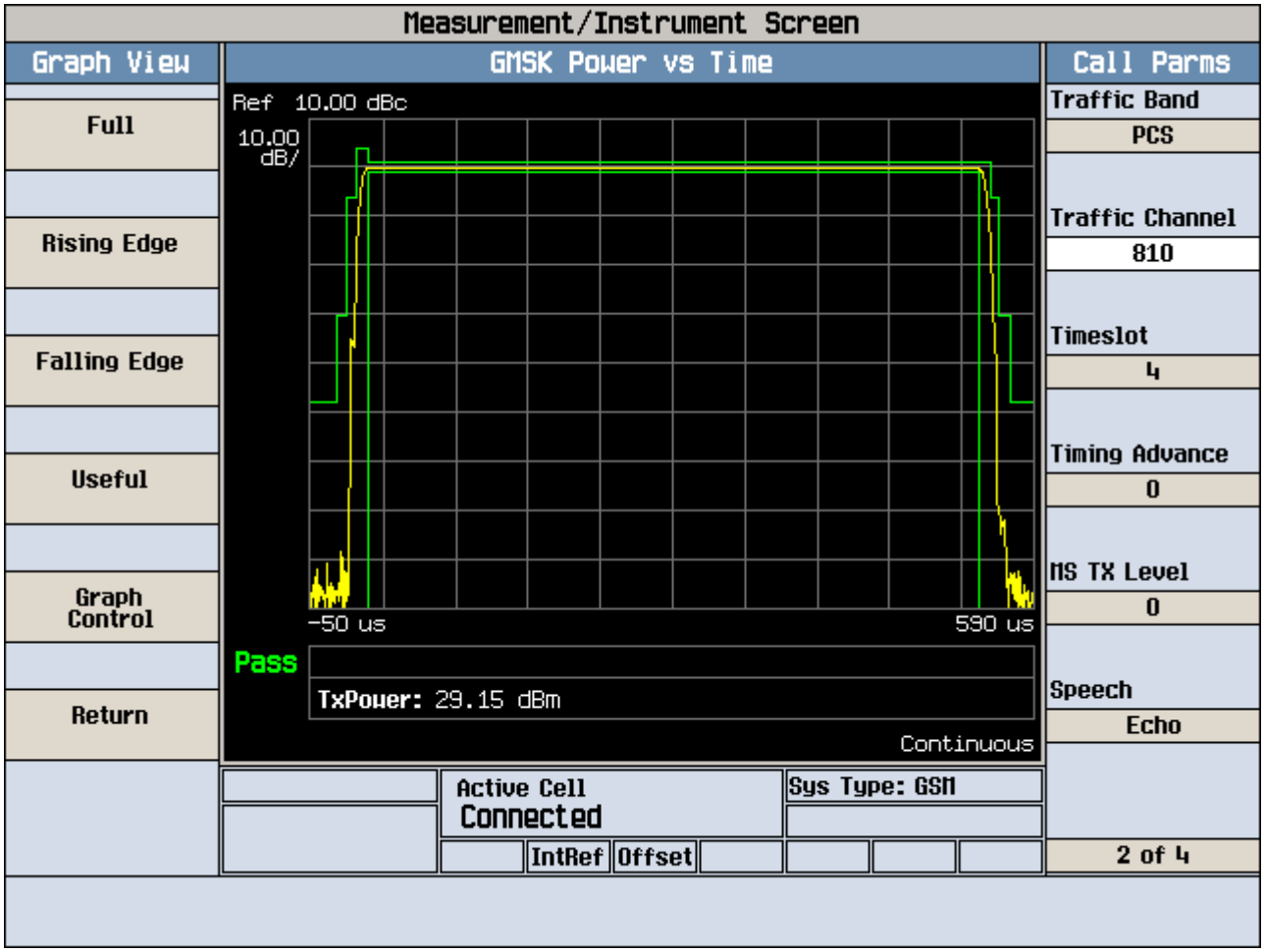
FCC ID:A3LSGHP408  GMSK Power VS Time 512CH



FCC ID:A3LSGHP408  GMSK Power VS Time 661CH



FCC ID:A3LSGHP408  GMSK Power VS Time 810CH



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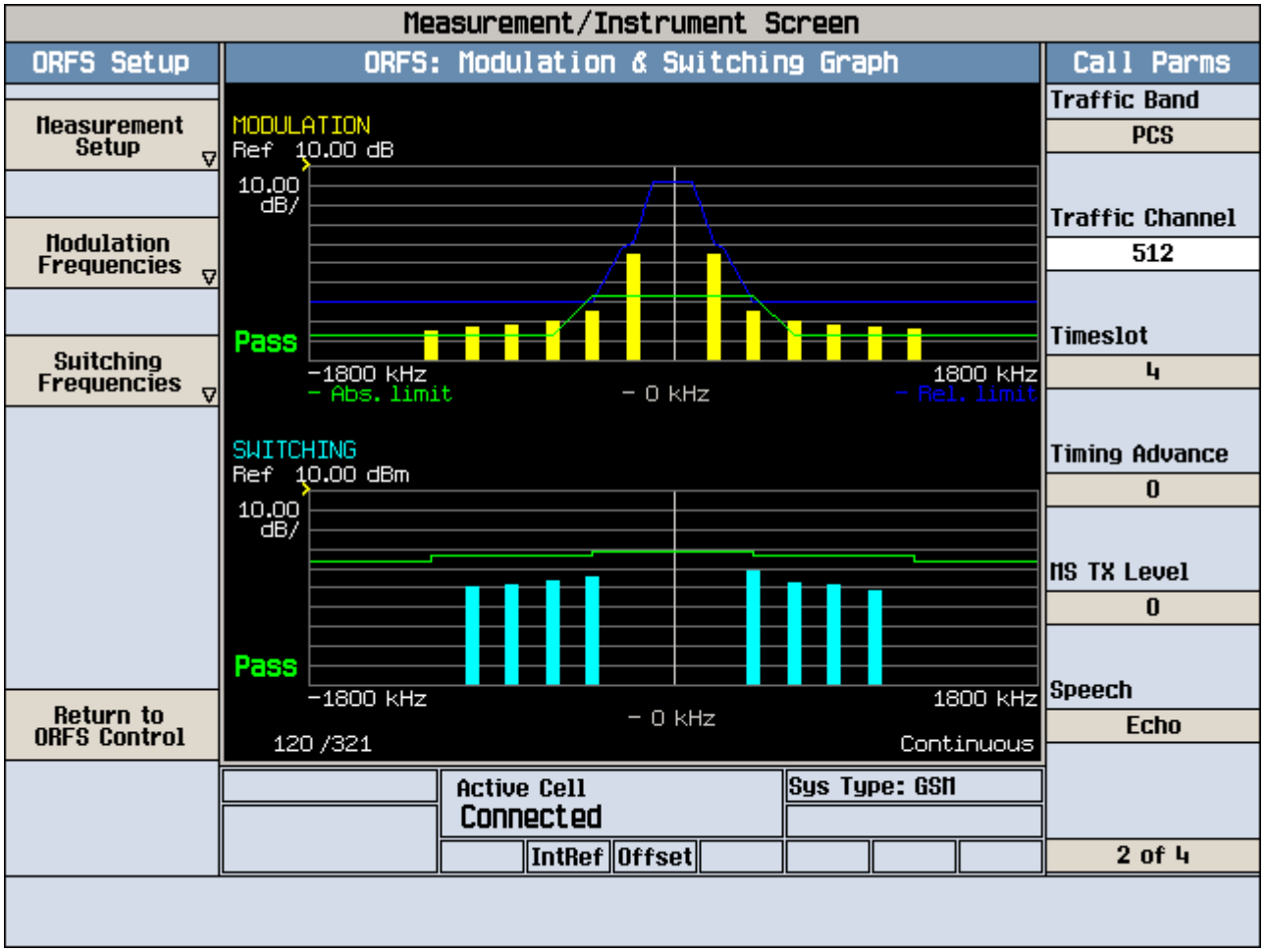

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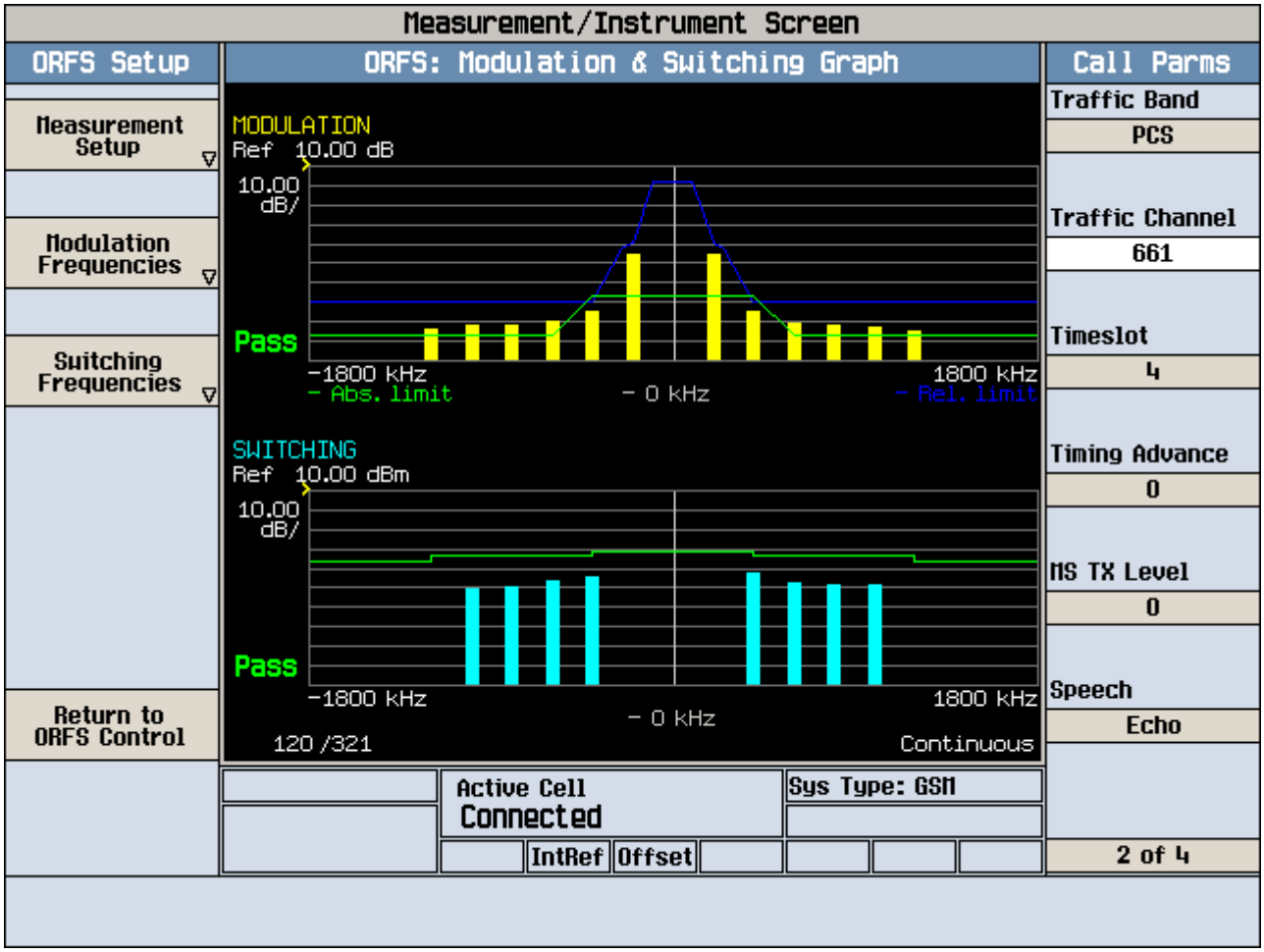

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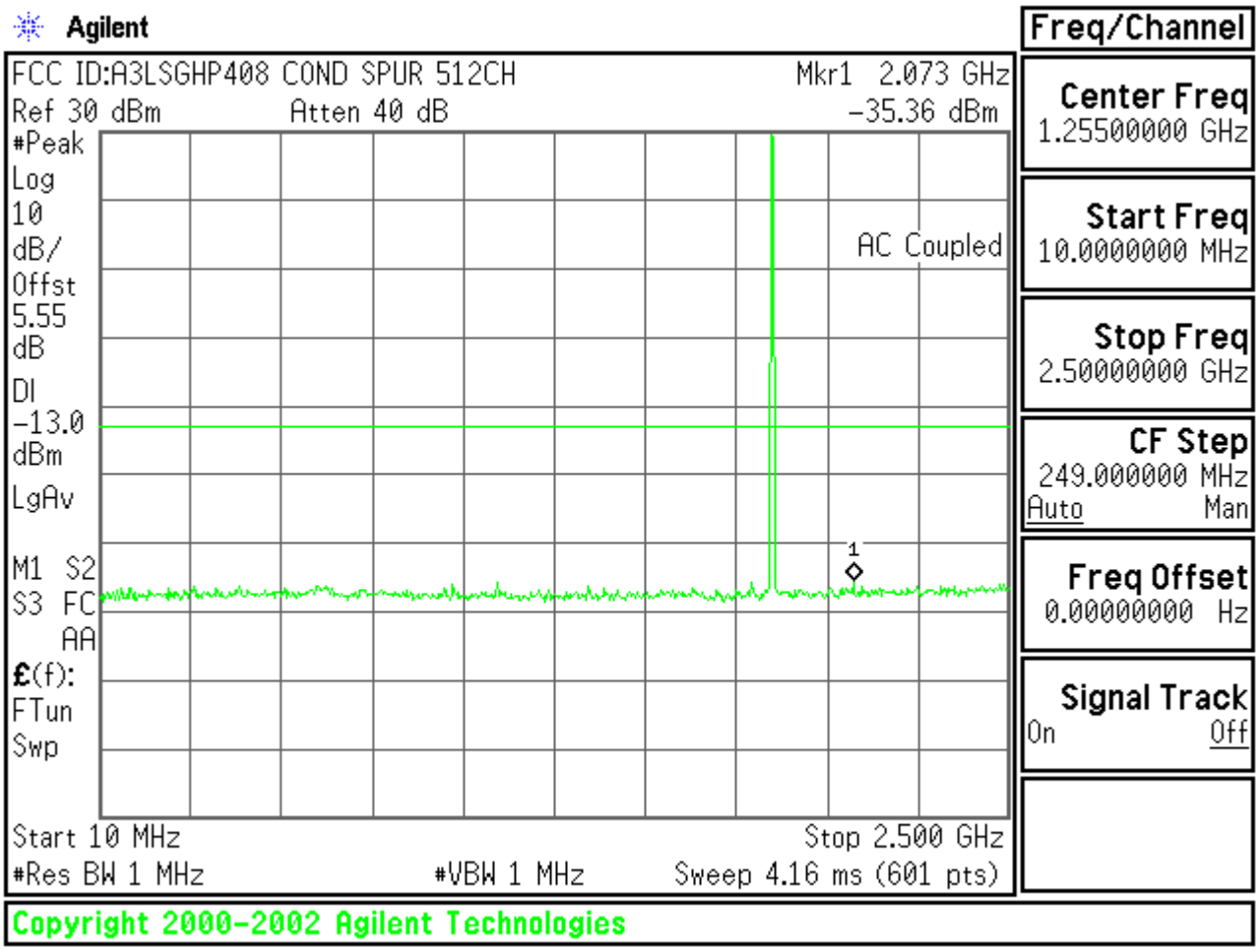
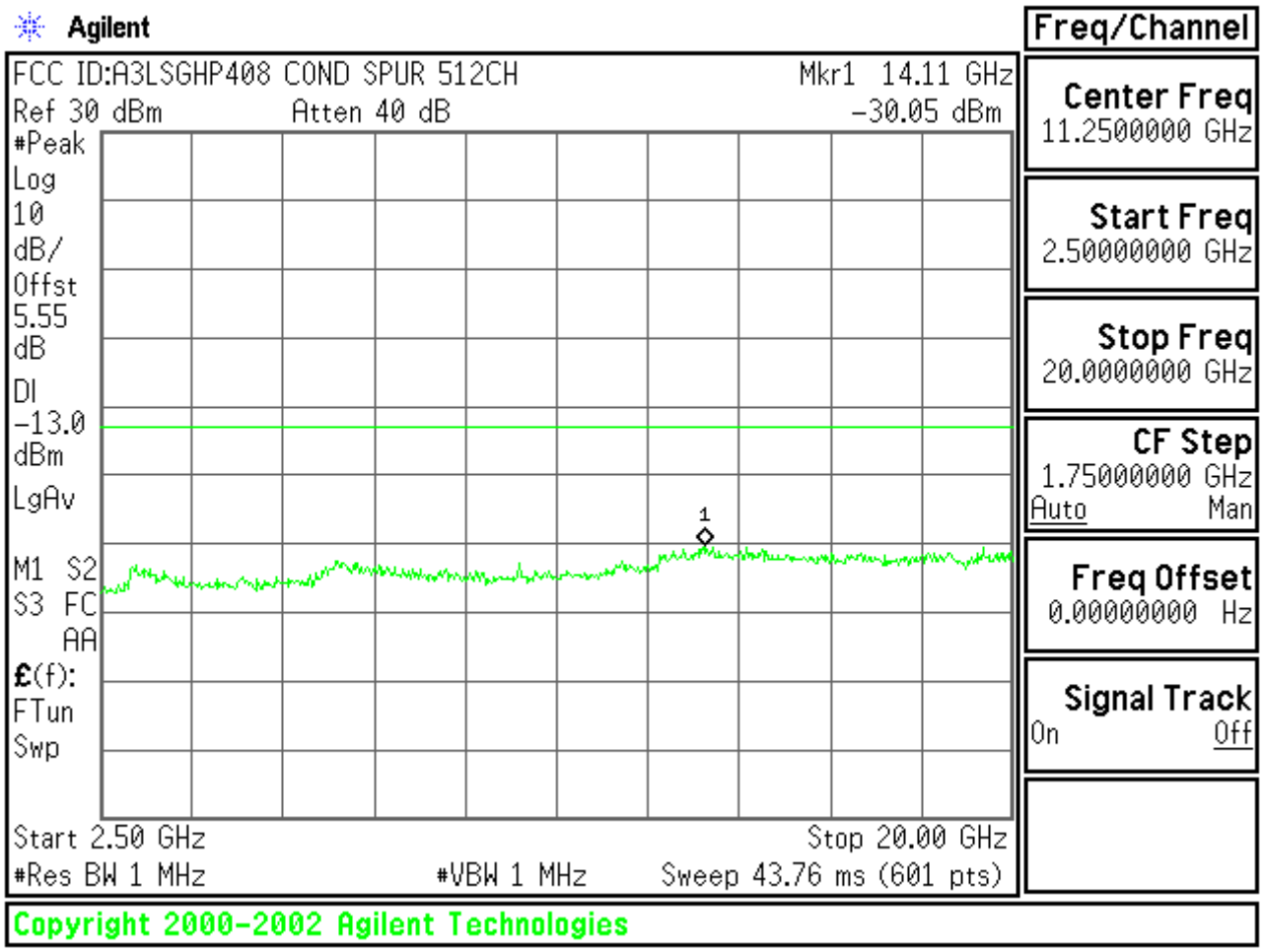
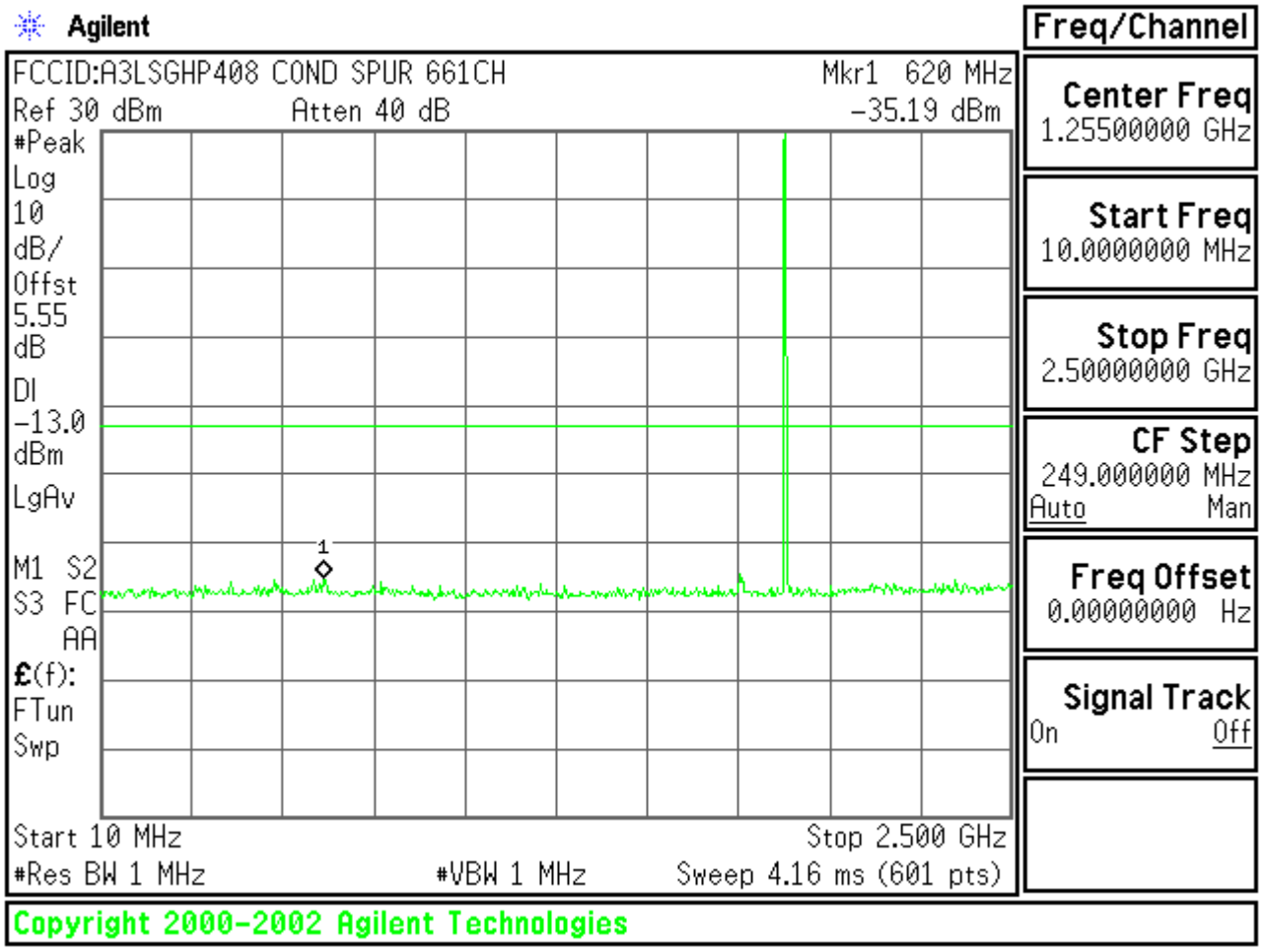
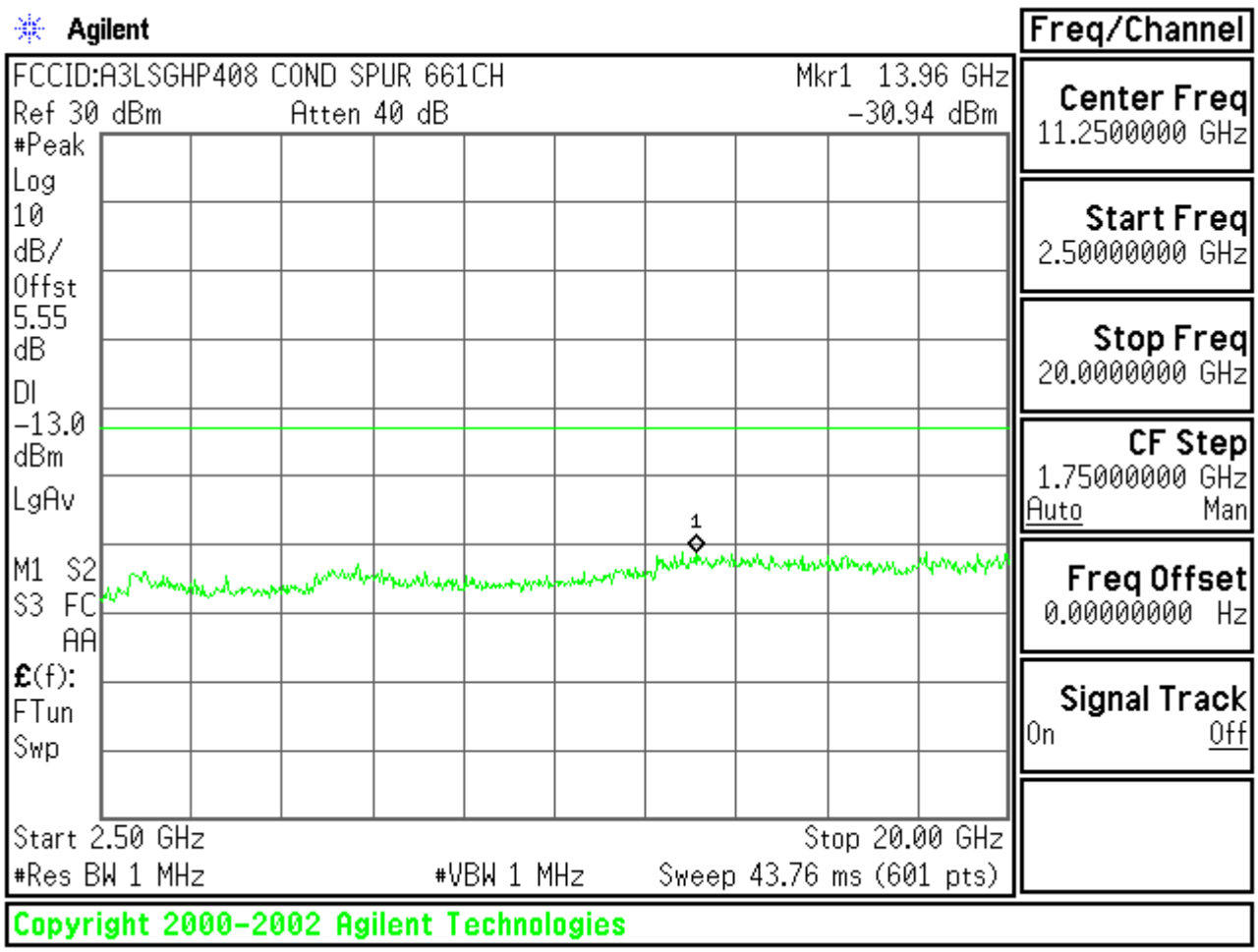
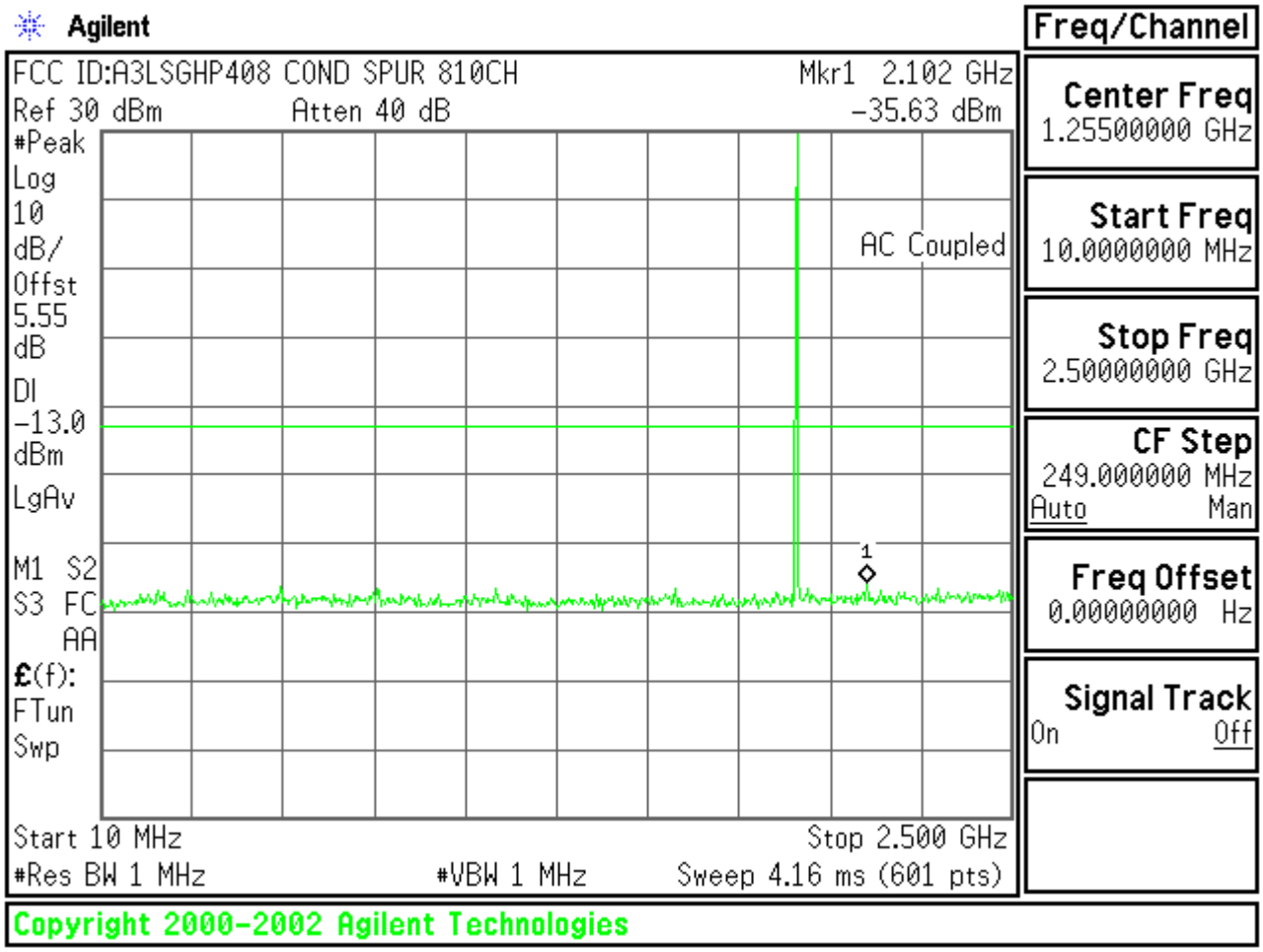
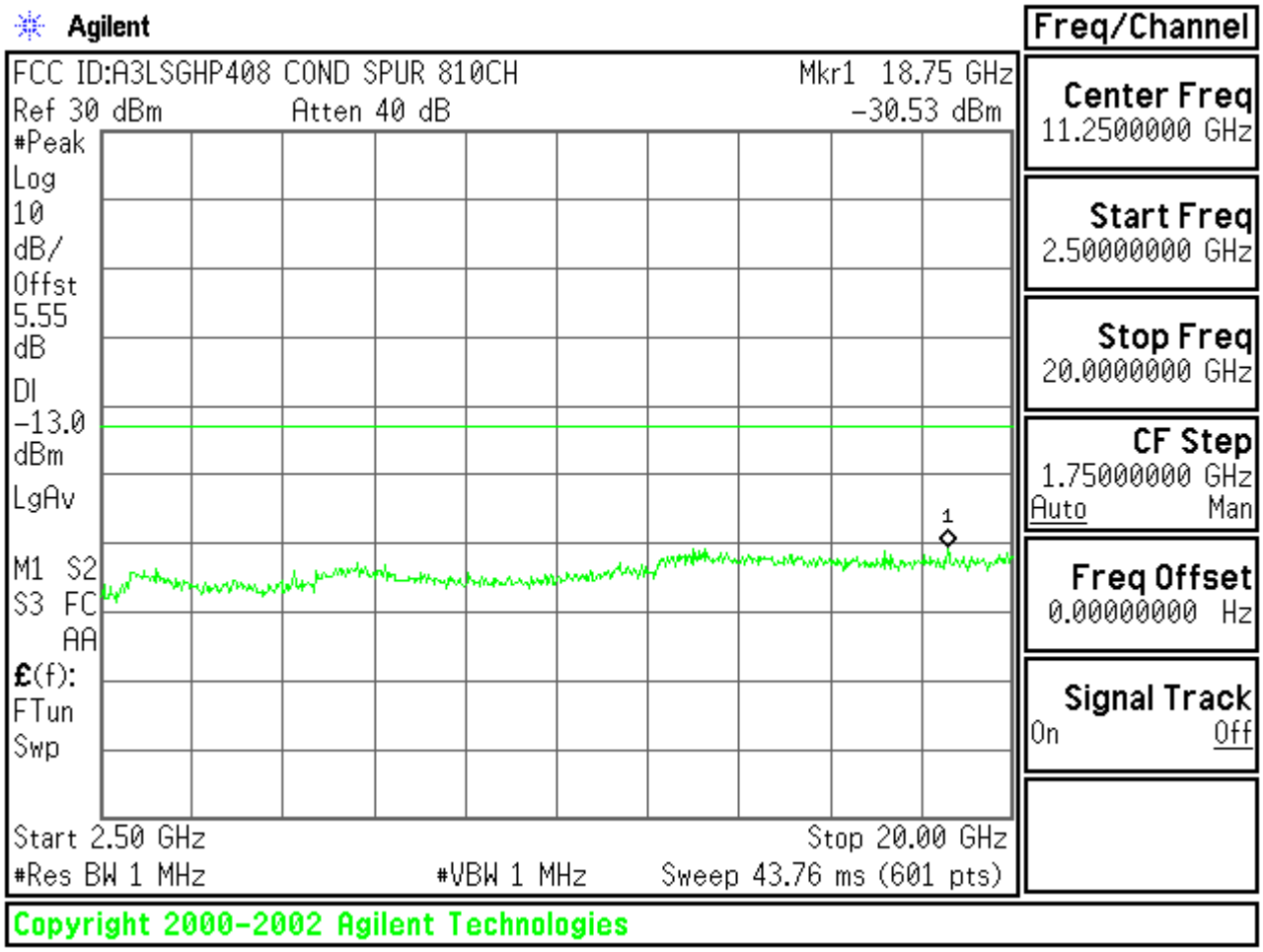

Agilent
FCC ID:A3LSGHP408 COND SPUR 512CH
Mkr1 2.073 GHz
Ref 30 dBm
Atten 40 dB
-35.36 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
AC Coupled
1
Start 10 MHz
Stop 2.500 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 4.16 ms (601 pts)
Freq/Channel
Center Freq
1.25500000 GHz
Start 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

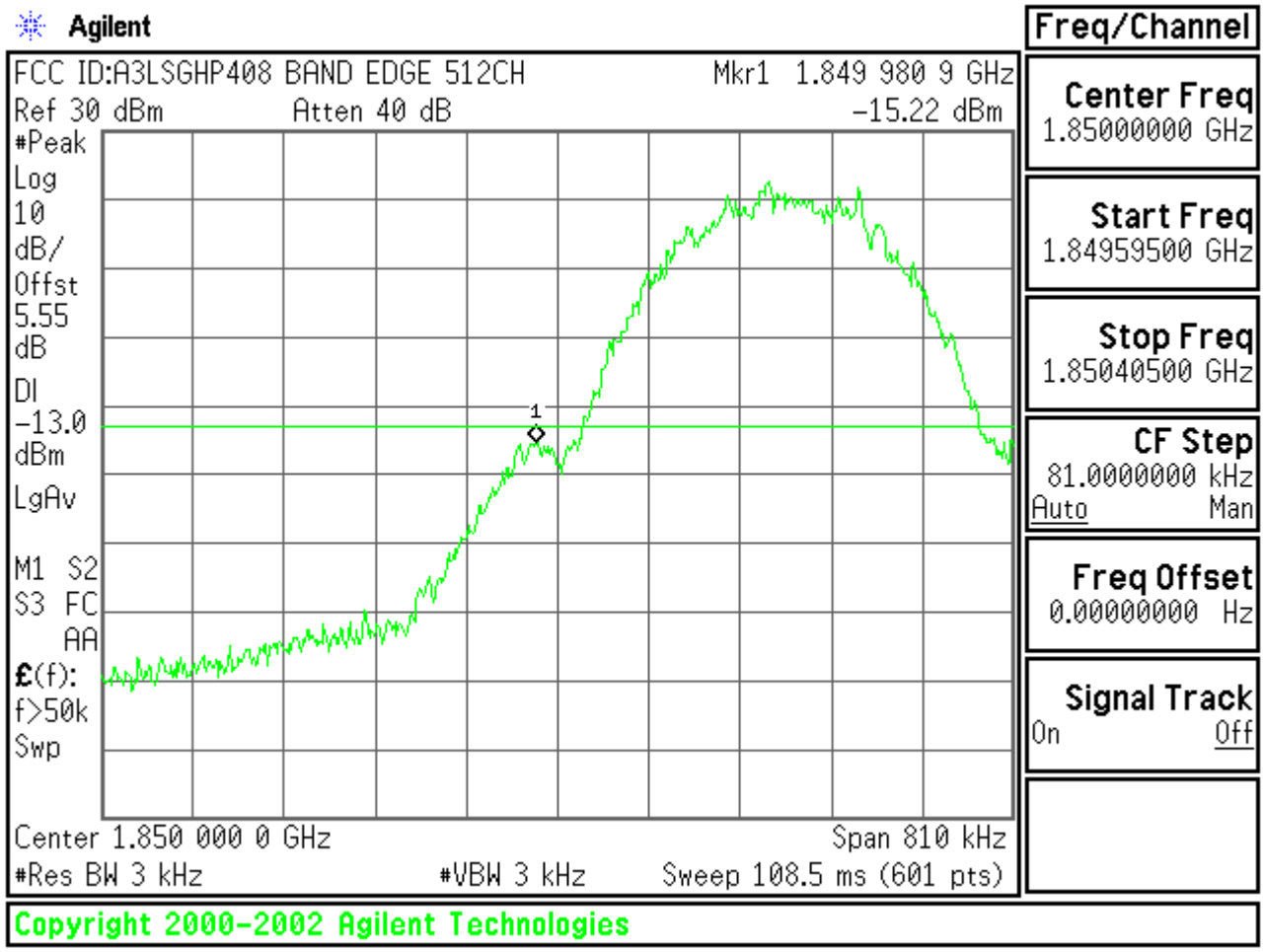

Agilent
FCC ID:A3LSGHP408 COND SPUR 512CH
Mkr1 14.11 GHz
Ref 30 dBm
Atten 40 dB
-30.05 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
Start 2.50 GHz
Stop 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 43.76 ms (601 pts)
Freq/Channel
Center Freq
11.2500000 GHz
Start Freq
2.50000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.75000000 GHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2002 Agilent Technologies


Agilent
FCCID:A3LSGHP408 COND SPUR 661CH
Mkr1 620 MHz
Ref 30 dBm
Atten 40 dB
-35.19 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
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


Agilent
FCCID:A3LSGHP408 COND SPUR 661CH
Mkr1 13.96 GHz
Ref 30 dBm
Atten 40 dB
-30.94 dBm
#Peak
Log
10
dB/
Offst
5.55
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
Copyright 2000-2002 Agilent Technologies


Agilent
FCC ID:A3LSGHP408 COND SPUR 810CH
Mkr1 2.102 GHz
Ref 30 dBm
Atten 40 dB
-35.63 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
AC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
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


Agilent
FCC ID:A3LSGHP408 COND SPUR 810CH
Mkr1 18.75 GHz
Ref 30 dBm
Atten 40 dB
-30.53 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
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
Copyright 2000-2002 Agilent Technologies


Agilent
FCC ID:A3LSGHP408 BAND EDGE 512CH
Mkr1 1.849 980 9 GHz
Ref 30 dBm
Atten 40 dB
-15.22 dBm
#Peak
Log
10
dB/
Offst
5.55
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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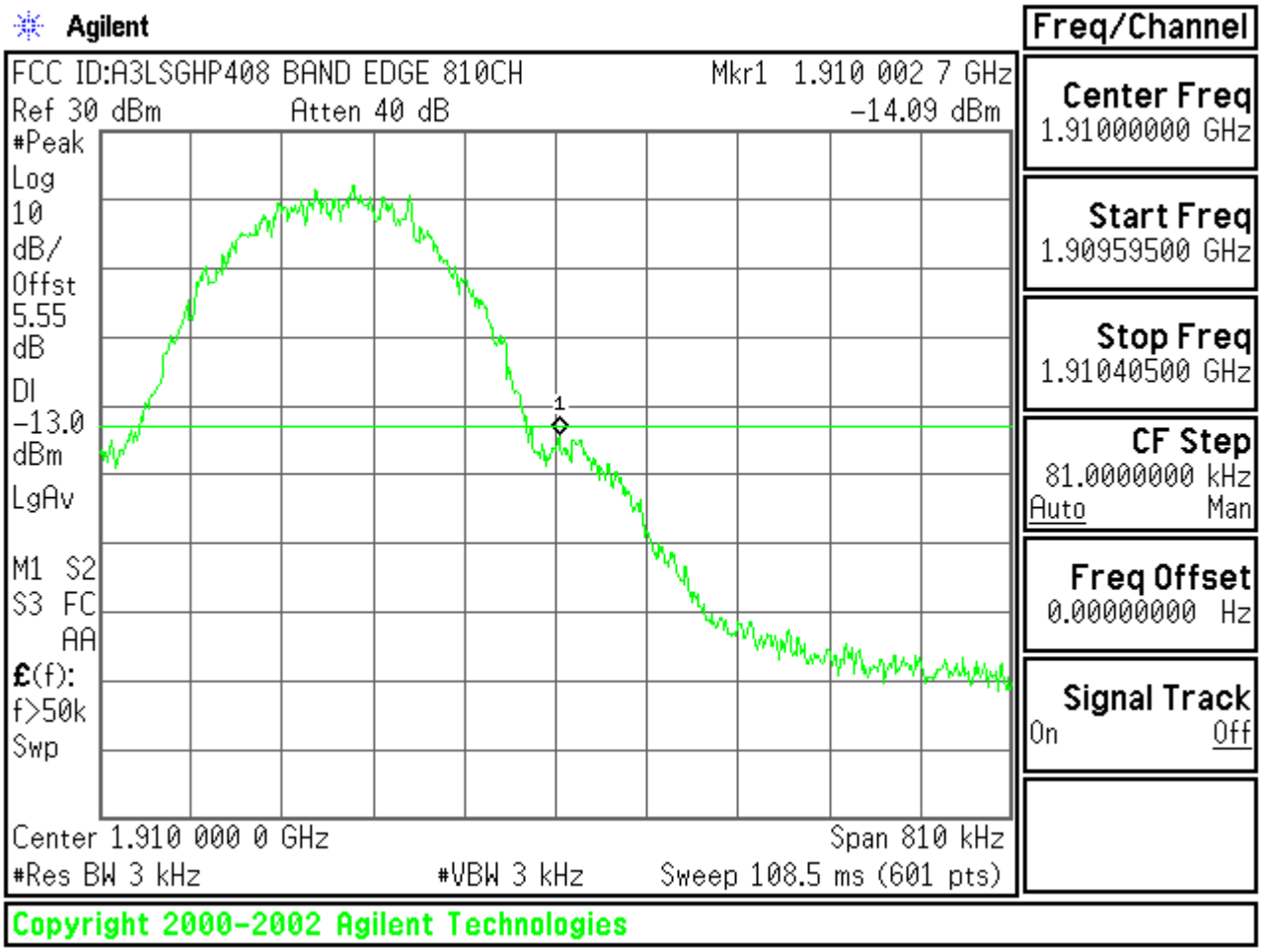
Agilent
FCC ID:A3LSGHP408 BAND EDGE 810CH
Mkr1 1.910 002 7 GHz
Ref 30 dBm
Atten 40 dB
-14.09 dBm
#Peak
Log
10
dB/
Offst
5.55
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 1.910 000 0 GHz
Span 810 kHz
#Res BW 3 kHz
#VBW 3 kHz
Sweep 108.5 ms (601 pts)
Freq/Channel
Center Freq
1.91000000 GHz
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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