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Regulatory Compliance Group
IT R&D Center
416 Maetan3-Dong,
Yeongtong-gu, Suwon city,
Gyeonggi-Do, Korea 443-742

FCC CFR47 PART 22 & 24 SUBPART CERTIFICATION REPORT

Model Tested : GT-I6230
FCC ID(Requested) : A3LGTI6230
Report No : FH-001-R1
Job No : FH-001
Date issued : January 18, 2010

- Abstract -

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

Prepared By

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Authorized By

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MEASUREMENT REPORT

1. FCC Certification Information

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.1033 – 2.1055.

1.1. §2.1033 General Information

- Applicant Name : SAMSUNG ELECTRONICS CO., LTD.
- Address : 416 Maetan3-Dong, Yeongtong-gu, Suwon City
Gyeonggi-Do, Korea 443-742
- FCC ID : A3LGTI6230
- Model : GT-I6230
- Quantity : Quantity production is planned
- Emission Designators : 246KGXW(GSM850)
248KGXW(GSM1900)
- Tx Freq. Range : 824.2 - 848.8MHz (GSM850)
1850.2MHz - 1909.8MHz (GSM1900)
- Rx Freq. Range : 869.2 - 893.8 MHz (GSM850)
1930.2MHz - 1989.8MHz (GSM1900)
- Max. Power Rating : 0.557 W ERP GSM850 (27.46 dBm)
0.897 W EIRP GSM1900 (29.53 dBm)
- FCC Classification(s) : PCS Licensed Portable Tx Held to Ear (PCE)
- Equipment (EUT) Type : 850/1900 GSM/GPRS Phone with Bluetooth and EDGE Rx
Only
- Frequency Tolerance : $\pm 0.00025\%$ (2.5ppm)
- FCC Rule Part(s) : §24(E), §22(H), §2.
- Dates of Test : January 8-9, 2010
- Place of Test : SAMSUNG Lab,
- Test Report S/N : FH-001-R1

2. INTRODUCTION

2.1. General

These measurement test were conducted at **SAMSUNG ELECTRONICS CO., LTD(SUWON)**.
 The site address is 416 Maetan3-Dong, Yeongtong-gu, Suwon City, Gyeonggi-Do, Korea 443-742
 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 Non-conducted 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.

4. TEST EQUIPMENT LIST

Name Of Equipment	Model	Serial No.	Due Date
Spectrum Analyzer	ESI26	836119/010	2010-10-20
	E4440A(3Hz~26.5GHz)	MY46187454	2010-03-06
	E4440A(3Hz~26.5GHz)	MY41000236	2010-04-14
Network Analyzer	8753E	JP38160590	2010-06-19
Pre-Amplifier	8449B	3008A00691	2010-12-15
Communication test set	8960	MY47510060	2010-03-06
	8960	GB42230535	2010-12-18
Controller	CO2000	CO2000/424	Not Required
Turn Unit	CT0800	CT0800/057	Not Required
Rotating Device	DE3600-RH-PR	DE3600-RH-PR/050	Not Required
Antenna Master	MA4000	MA4000/204	Not Required
Horn Antenna	HF906	360306/011	2010-06-13
Dipole Antenna	UHA 9105	9105-2412	2011-10-06
	UHA 9105	9105-2413	2010-06-13
Power Supply	E3640A	MY40003594	2010-06-19
	E3640A	MY40003595	2010-06-19
	E3632A	MY40022438	2010-03-06
Divider	11636B	51946	Not Required
	11636B	56913	Not Required
	11636B	56918	Not Required
High Pass Filter	WHK/3.0/18G-10SS	492	Not Required
	WHK/3.5/18G-10SS	4	Not Required
Environmental Chamber	SH-241	92000549	2010-11-11
	SH-241	92000548	2010-11-11
Shielded Fully Anechoic Chamber	CHAMBER	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-C-2004

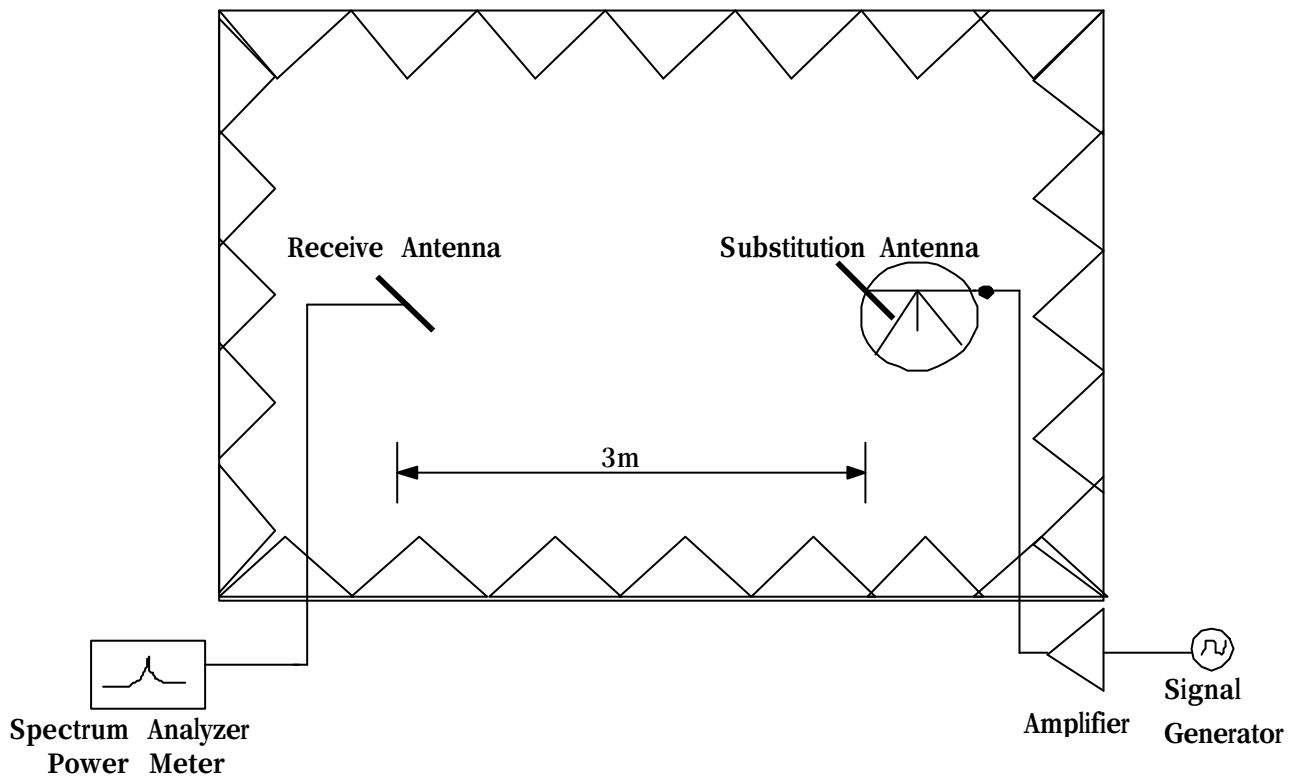


Figure 3. Diagram of ERP/EIRP test Set-up

The EUT was placed on the rotating device at 3-meters from the receive antenna. The turn unit and rotating device was adjusted for the highest reading on the receive spectrum analyzer. For GSM 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 and EIRP are 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.

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-C-2004

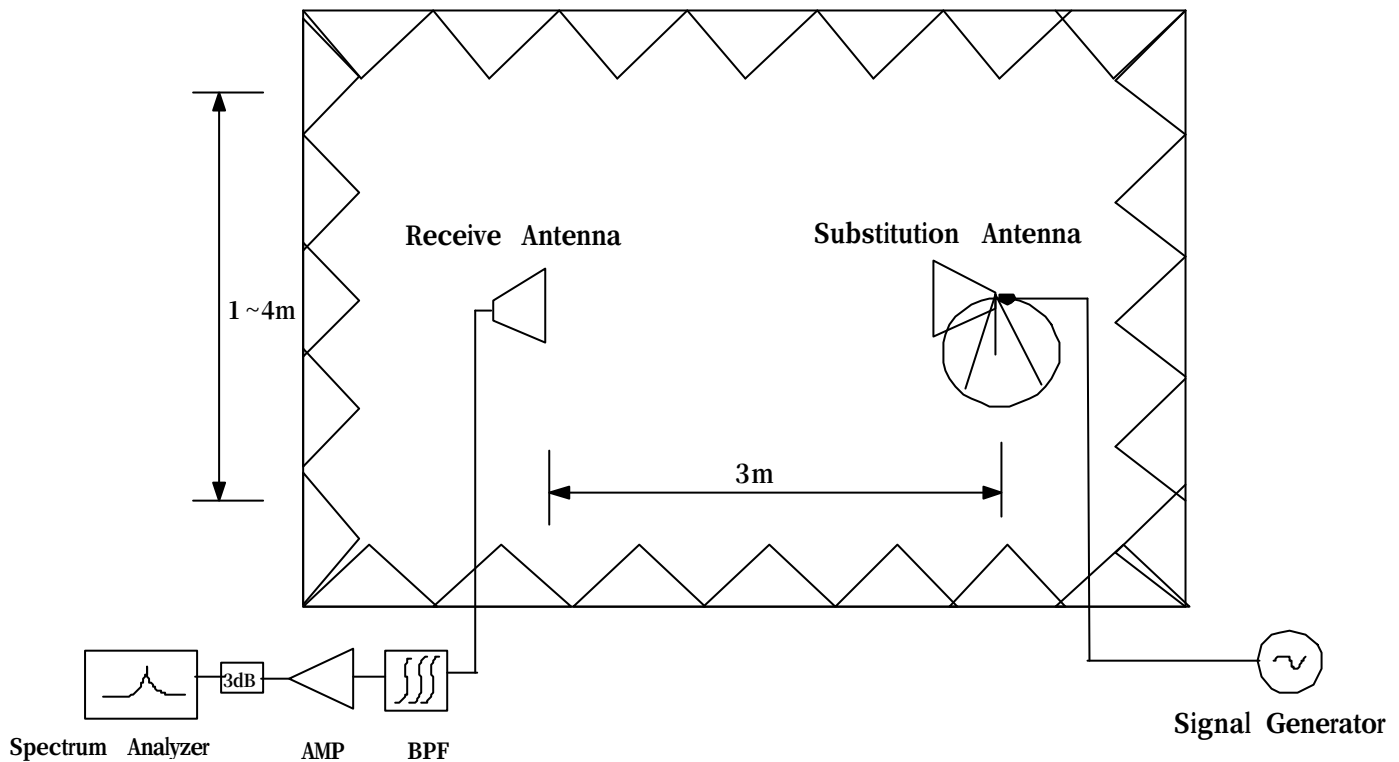


Figure 4. Diagram of Radiated Spurious & Harmonic test Set-up

The EUT was placed on the rotating device at 3-meters from the receive antenna. The turn unit and rotating device 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 , Second Harmonic(3760.00MHz)

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 3760.00MHz. 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 $25.5\text{dBm} - (-24.8) = 50.3\text{dBc}$.

5.3. Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. An average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth.

5.4. 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.

5.5. Spurious and Harmonic Emission at Antenna Terminal

5.5.1. Occupied Bandwidth Emission Limits

- (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.
- (b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.
- (c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
- (d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

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

Table 1. Broadband PCS Service Frequency Blocks

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

5.5.2. 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 -13dBm, calculation shown below.

$$43 + 10\log(0.557 \text{ W}) = 40.46 \text{ dB}$$

$$27.46 \text{ dBm} - 40.46 \text{ dB} = -13 \text{ dBm}$$

Compliance with the out-of-band emissions requirement is based on test being performed with an analyzer resolution bandwidth of 1MHz. However in the 1MHz band immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the fundamental emissions bandwidth may be employed.

In case of GSM : $0.01 * 273\text{KHz} = 2.73\text{KHz}$
A Resolution BW of 3KHz was used for measurement at the band edges.

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. (GSM1900 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.

5.6. 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 ± 0.00025 ($\pm 2.5\text{ppm}$) 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 +60 °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.

6. TEST DATA

6.1. Conducted Output Power

A base station simulator was used to establish communication with the Samsung 850/1900 GSM/GPRS Phone with Bluetooth and EDGE Rx Only FCC ID: A3LGTI6230. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported in GSM mode and using a Power Control Level of “0” in the PCS BAND and “5” in the Cellular Band. The GSM conducted powers are reported below, respectively.

BAND	Channel	RF Conducted Power Table				
		Voice	GPRS Data			
			1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot
PCS	512	29.67	29.73	28.18	26.15	26.13
	661	29.65	29.65	28.17	26.14	26.12
	810	29.94	29.95	28.45	26.43	26.41
Cellular	128	32.45	32.50	30.95	28.96	28.93
	190	32.54	32.59	31.13	29.08	29.06
	251	32.53	32.58	31.15	29.08	29.06

Table 6-1 GSM Conducted Output Powers

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

Supply Voltage : 3.7VDC

Modulation : GSM850

■Reference level

Frequency (MHz)	Output (dBm)	Polarization (H/V)	S/A (dBm)	Ant gain (dBd)	Ref level (dBm)
824.20	26.00	H	-10.46	-0.67	-9.79
		V	-10.68	-0.67	-10.01
836.60	26.00	H	-11.93	-0.73	-11.20
		V	-11.42	-0.73	-10.69
848.80	27.00	H	-13.65	-0.79	-12.86
		V	-12.34	-0.79	-11.55

■Result

Frequency (MHz)	Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	ERP (dBm)	ERP (W)	Battery
824.20	-10.17	H	292/110	25.62	0.365	Standard
836.60	-11.03	H	289/100	26.17	0.414	Standard
848.80	-12.30	H	277/80	27.46	0.557	Standard

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

- All modes of operation were investigated, and the worst-case results are reported.

Radiated measurements at 3 meters by Substitution Method

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

Supply Voltage : 3.7VDC

Modulation : PCS 1900

■Reference level

Frequency (MHz)	Output (dBm)	Polarization (H/V)	S/A (dBm)	Ant gain (dBi)	Ref level (dBm)
1850.20	30.00	H	-8.75	9.70	-18.45
		V	-8.38	9.70	-18.08
1880.00	29.00	H	-10.11	9.70	-19.81
		V	-10.11	9.70	-19.81
1909.80	29.00	H	-10.11	9.70	-19.81
		V	-9.80	9.70	-19.50

■Result

Frequency (MHz)	Tested level (dBm)	Polarization (H/V)	Azimuth (angle)	EIRP (dBm)	EIRP (W)	Battery
1850.20	-18.92	H	253/180	29.53	0.897	Standard
1880.00	-19.92	V	227/90	28.89	0.774	Standard
1909.80	-19.41	H	100/0	29.40	0.871	Standard

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

- All modes of operation were investigated, and the worst-case results are reported.

Radiated measurements at 3 meters by Substitution Method

6.4. GSM850 Radiated Spurious & Harmonic measurement

Operating Frequency : 824.20 MHz(Low), 836.60MHz(Middle), 848.80MHz(High)

Measured Output Power : 27.46 dBm = 0.557 W

Modulation Signal : GSM850

Limit : $43 + 10\log_{10}(P) = 40.46 \text{ dBc}$

■Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
128	2	1648.40	-56.11	H	71.47
	3	2472.60	-50.22	H	61.12
	4	3296.80	-61.16	H	68.79
	5	4121.00	-	-	-
	6	4945.20	-	-	-
	7	5769.40	-	-	-
190	2	1673.20	-54.73	H	69.59
	3	2509.80	-53.18	H	64.09
	4	3346.40	-63.28	H	70.42
	5	4183.00	-	-	-
	6	5019.60	-	-	-
	7	5856.20	-	-	-
251	2	1697.60	-54.33	H	68.98
	3	2546.40	-57.30	H	67.66
	4	3395.20	-64.18	H	71.61
	5	4244.00	-	-	-
	6	5092.80	-	-	-
	7	5941.60	-	-	-

NOTE :

1. "-" Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. The spectrum is measured from 30MHz to the 10th harmonic and All modes of operation were investigated, and the worst-case results are reported..

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.5. GSM1900 Radiated Spurious & Harmonic measurement

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

Measured Output Power : 29.53 dBm = 0.897 W

Modulation Signal : GSM1900

Limit : $43 + 10\log_{10}(P) = 42.53 \text{ dBc}$

■Result

Channel	Harmonic	Frequency (MHz)	From EUT Tested level (dBm)	POL (H/V)	Result (dBc)
512	2	3700.40	-59.14	H	64.73
	3	5550.60	-56.98	V	56.71
	4	7400.80	-62.20	H	57.40
	5	9251.00	-	-	-
	6	11101.20	-	-	-
	7	12951.40	-	-	-
661	2	3760.00	-57.62	V	63.10
	3	5640.00	-57.65	V	57.10
	4	7520.00	-62.50	V	58.08
	5	9400.00	-	-	-
	6	11280.00	-	-	-
	7	13160.00	-	-	-
810	2	3819.60	-56.66	H	61.17
	3	5729.40	-58.05	V	57.09
	4	7639.20	-60.87	H	56.11
	5	9549.00	-	-	-
	6	11458.80	-	-	-
	7	13368.60	-	-	-

NOTE :

1. "-" Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. The spectrum is measured from 30MHz to the 10th harmonic and All modes of operation were investigated, and the worst-case results are reported.

Radiated Spurious Emission measurements at 3 meters by Substitution Method

6.6. GSM850 Radiated Spurious & Harmonic Conversion Table

Date : January 9, 2010

Test Engineer : KJ KWON

- ① Tx Cable loss
- ② Tx Horn Ant Gain
- ③ Tx Level to radiate -13dBm
- ④ ESI Level received from Tx with -13dBm
- ⑤ Tested Level from EUT
- ⑥ = ERP+2.15 - (-13 +⑤ - ④)

CH	Har	Frequency (MHz)	① Tx C/L dB	②Tx Horn Gain dBi	③Tx Level dBm	④ ESI Level : H dBm	④ ESI Level : V dBm	⑤Tested EUT Level : H dBm	⑤Tested EUT Level : V dBm	⑥ Result EUT : H (dBc)	⑥ Result EUT : V (dBc)
128	2	1648.40	-9.02	9.50	-13.50	-27.24	-27.10	-56.11	-65.88	71.47	81.38
	3	2472.60	-11.41	10.70	-12.30	-31.70	-31.45	-50.22	-55.21	61.12	66.36
	4	3296.80	-13.59	12.30	-11.70	-34.96	-35.43	-61.16	-61.62	68.80	68.79
	5	4121.00	-15.15	12.50	-10.30	-38.60	-38.90	-	-	-	-
	6	4945.20	-16.71	12.70	-9.00	-40.65	-40.69	-	-	-	-
	7	5769.40	-18.17	12.90	-7.70	-43.29	-43.30	-	-	-	-
190	2	1673.20	-9.07	9.50	-13.40	-27.74	-28.63	-54.73	-63.11	69.59	77.08
	3	2509.80	-11.43	10.70	-12.30	-31.69	-31.64	-53.18	-56.65	64.09	67.61
	4	3346.40	-13.78	12.30	-11.50	-35.46	-35.60	-63.28	-63.89	70.42	70.89
	5	4183.00	-15.26	12.50	-10.20	-38.67	-39.11	-	-	-	-
	6	5019.60	-16.94	12.70	-8.80	-41.28	-41.32	-	-	-	-
	7	5856.20	-18.23	12.90	-7.70	-43.94	-43.84	-	-	-	-
251	2	1697.60	-9.08	9.50	-13.40	-27.95	-27.75	-54.33	-60.63	68.98	75.48
	3	2546.40	-11.41	10.70	-12.30	-31.58	-32.94	-57.30	-58.00	68.32	67.66
	4	3395.20	-13.82	12.30	-11.50	-35.17	-35.46	-64.18	-65.05	71.61	72.19
	5	4244.00	-15.38	12.50	-10.10	-38.81	-39.07	-	-	-	-
	6	5092.80	-17.06	12.70	-8.60	-41.51	-41.42	-	-	-	-
	7	5941.60	-18.41	12.90	-7.50	-43.83	-43.32	-	-	-	-

6.7. GSM1900 Radiated Spurious & Harmonic Conversion Table

Date : January 9, 2010

Test Engineer : KJ KWON

- ① Tx Cable loss
- ② Tx Horn Ant Gain
- ③ Tx Level to radiate -13dBm
- ④ ESI Level received from Tx with -13dBm
- ⑤ Tested Level from EUT
- ⑥ = EIRP - (-13 + ⑤ - ④)

CH	Har	Frequency (MHz)	① Tx C/L dB	②Tx Horn Gain dBi	③Tx Level dBm	④ ESI Level : H dBm	④ ESI Level : V dBm	⑤Tested EUT Level : H dBm	⑤Tested EUT Level : V dBm	⑥ Result EUT : H (dBc)	⑥ Result EUT : V (dBc)
512	2	3700.40	-14.91	12.40	-10.50	-36.94	-36.57	-59.14	-59.67	64.73	65.63
	3	5550.60	-17.69	12.90	-8.20	-42.68	-42.80	-59.07	-56.98	58.92	56.71
	4	7400.80	-20.43	10.50	-3.10	-47.33	-46.96	-62.20	-63.94	57.40	59.51
	5	9251.00	-23.63	11.20	-0.60	-51.79	-50.45	-	-	-	-
	6	11101.20	-26.86	11.60	2.30	-54.95	-55.26	-	-	-	-
	7	12951.40	-28.80	12.90	2.90	-58.88	-58.56	-	-	-	-
661	2	3760.00	-15.19	12.40	-10.20	-37.08	-37.05	-58.76	-57.62	64.21	63.10
	3	5640.00	-17.78	12.90	-8.10	-42.73	-43.08	-60.61	-57.65	60.41	57.10
	4	7520.00	-20.67	10.60	-2.90	-47.12	-46.95	-65.13	-62.50	60.54	58.08
	5	9400.00	-23.23	11.60	-1.40	-51.75	-52.22	-	-	-	-
	6	11280.00	-26.34	12.10	1.20	-55.98	-56.30	-	-	-	-
	7	13160.00	-28.12	12.80	2.30	-59.32	-58.91	-	-	-	-
810	2	3819.60	-14.23	12.40	-11.20	-38.02	-38.68	-56.66	-59.15	61.17	63.00
	3	5729.40	-18.11	13.00	-7.90	-43.48	-43.49	-59.10	-58.05	58.15	57.09
	4	7639.20	-21.16	11.20	-3.00	-47.29	-47.44	-60.87	-61.38	56.11	56.47
	5	9549.00	-23.54	11.70	-1.20	-52.60	-52.08	-	-	-	-
	6	11458.80	-26.84	11.70	2.10	-56.26	-56.23	-	-	-	-
	7	13368.60	-28.23	12.30	2.90	-60.44	-59.84	-	-	-	-

6.8. Frequency Stability

6.8.1. GSM850 Frequency Stability Table

Operating Frequency : 836,600,000 Hz

Channel : 190

Reference Voltage : 3.7VDC

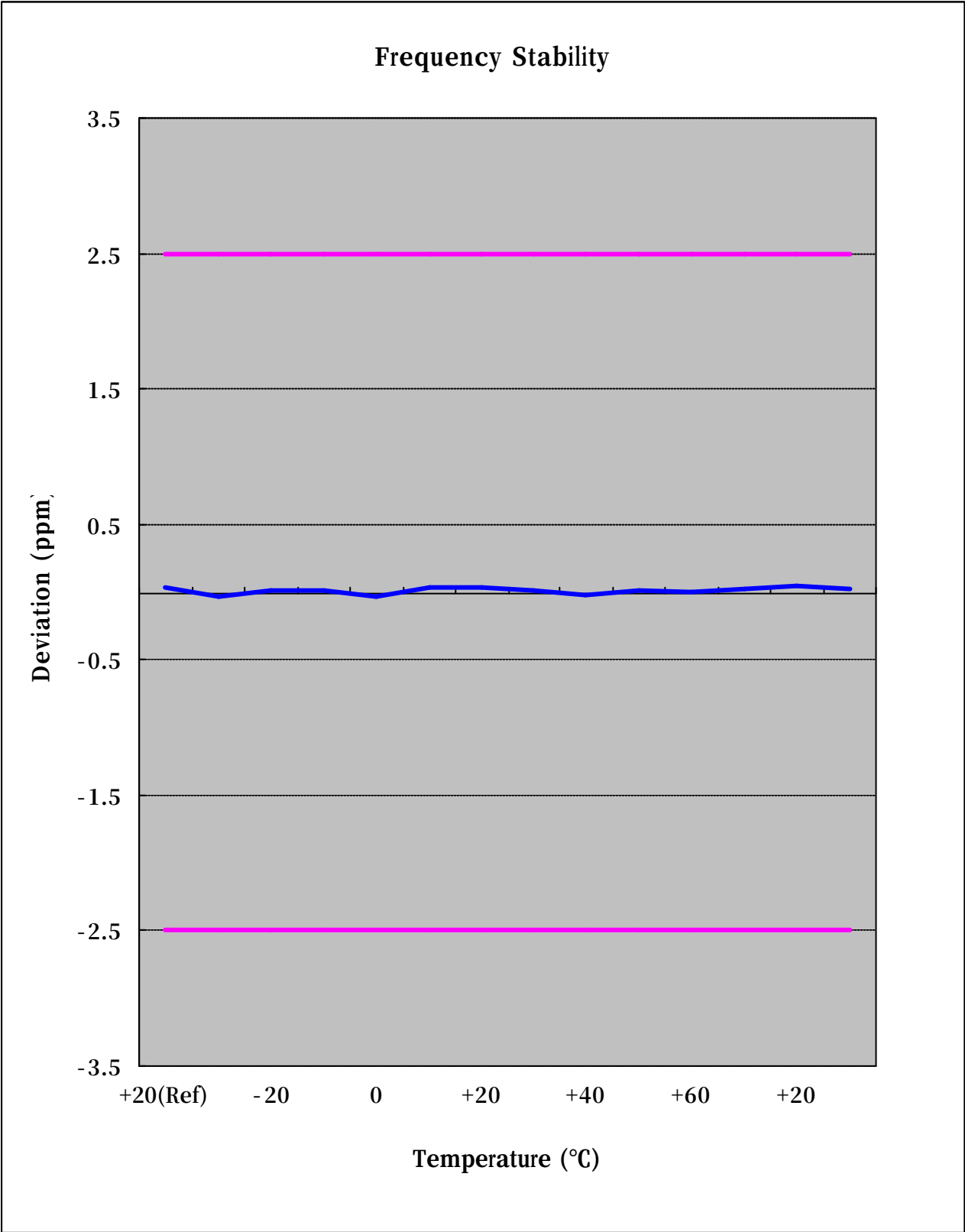
Deviation Limit : ± 0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	12.70	836,600,013	0.000002	0.015
100%		-30	-34.10	836,599,966	-0.000004	-0.041
100%		-20	7.30	836,600,007	0.000001	0.009
100%		-10	-13.40	836,599,987	-0.000002	-0.016
100%		0	15.20	836,600,015	0.000002	0.018
100%		+10	-26.40	836,599,974	-0.000003	-0.032
100%		+20	12.70	836,600,013	0.000002	0.015
100%		+30	26.20	836,600,026	0.000003	0.031
100%		+40	-11.40	836,599,989	-0.000001	-0.014
100%		+50	-31.60	836,599,968	-0.000004	-0.038
100%		+60	-15.50	836,599,985	-0.000002	-0.019
85%	3.35	+20	-24.70	836,599,975	-0.000003	-0.030
115%	4.26	+20	26.50	836,600,027	0.000003	0.032
Batt.Endpoint	3.35	+20	-24.70	836,599,975	-0.000003	-0.030

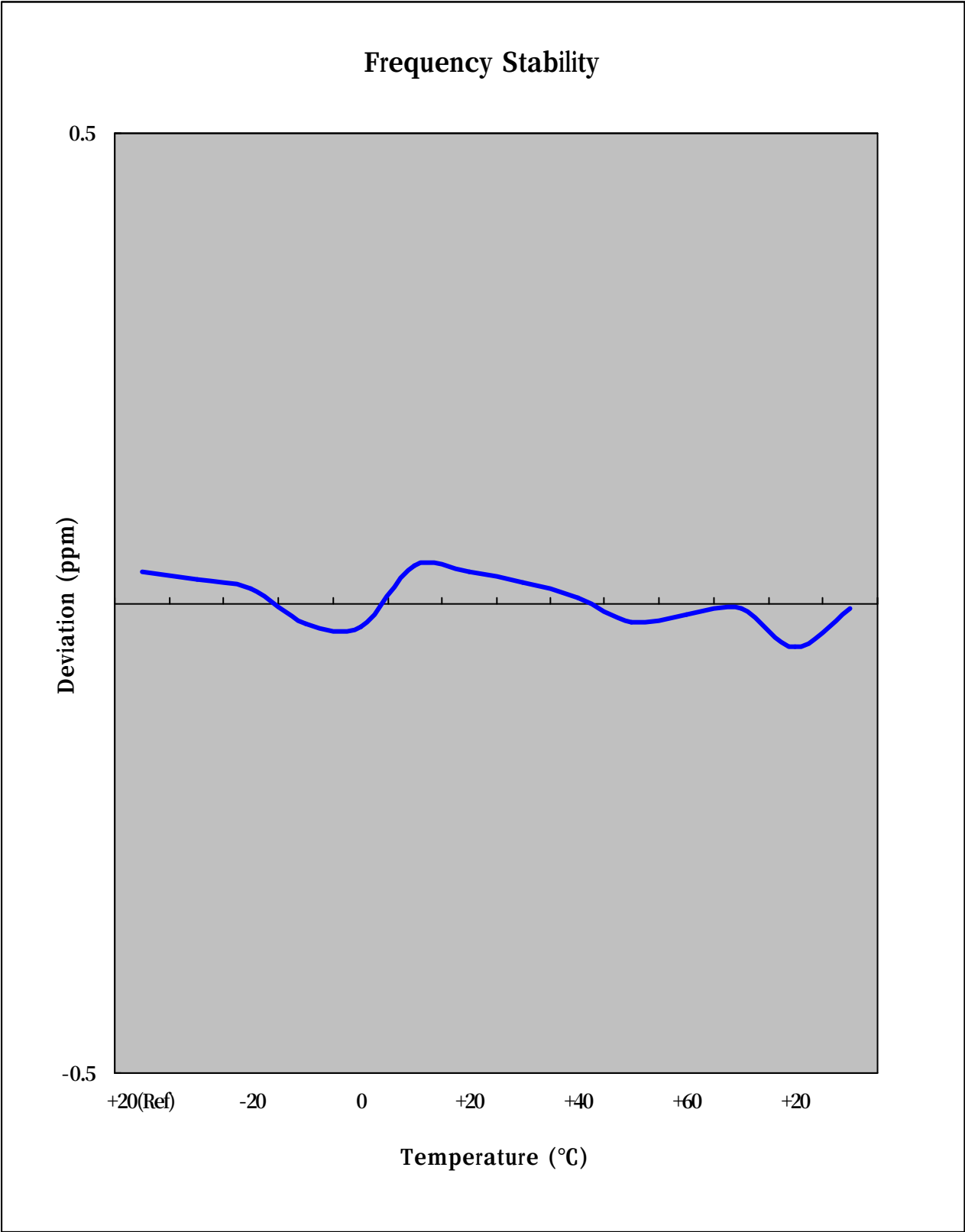
Note : The temperature is varied from -30 °C to +60 °C using an environmental chamber.

The EUT is tested down to the battery end point.

6.8.2. GSM850 Frequency Stability Graph



Zoom IN



6.8.3. GSM1900 Frequency Stability Table

Operating Frequency : 1,880,000,000 Hz

Channel : 661

Reference Voltage : 3.7VDC

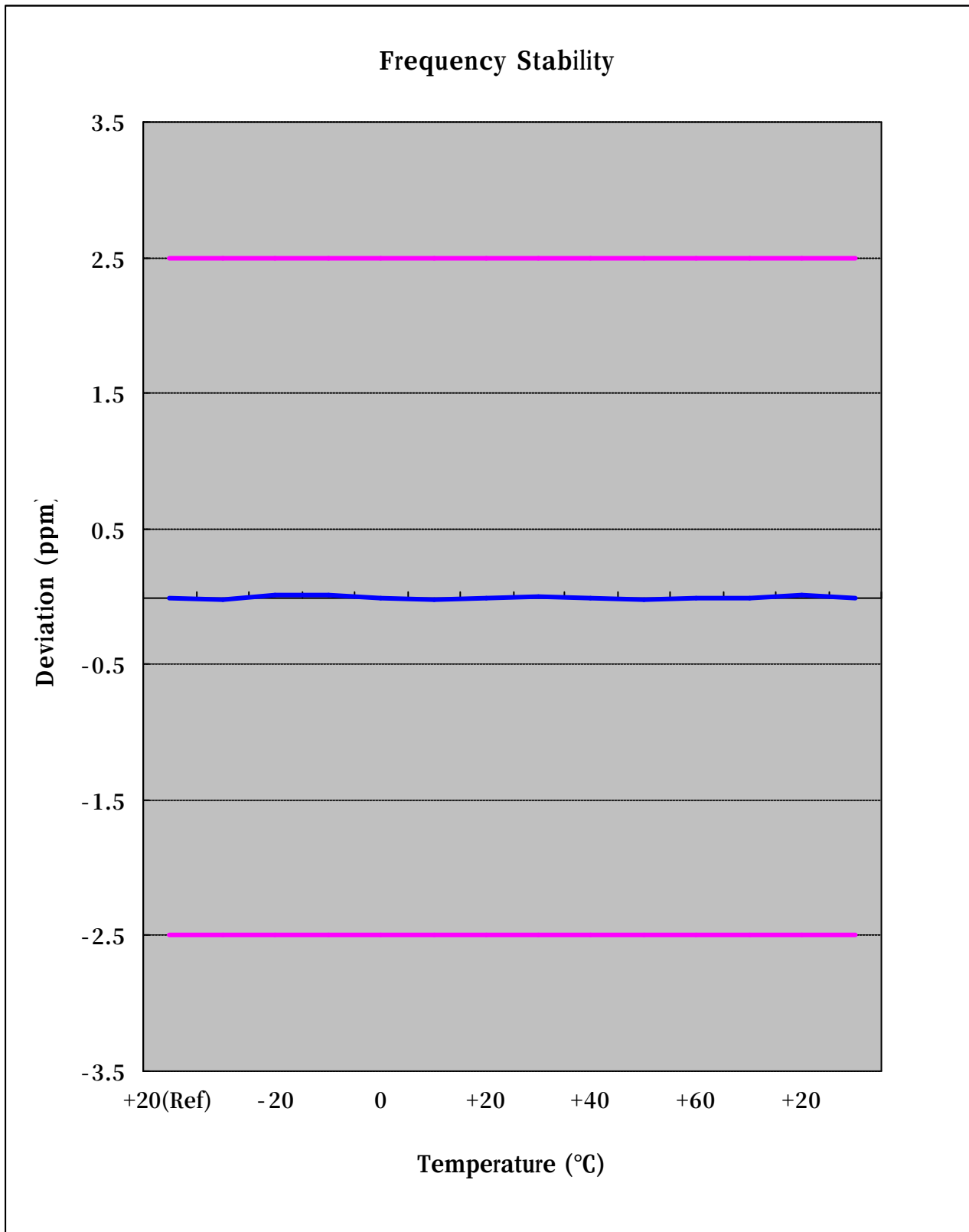
Deviation Limit : ± 0.00025 % or 2.5ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency Error (Hz)	Frequency (Hz)	Deviation (%)	ppm
100%	3.70	+20(Ref)	14.80	1,880,000,015	0.000001	0.008
100%		-30	-23.70	1,879,999,976	-0.000001	-0.013
100%		-20	-4.20	1,879,999,996	0.000000	-0.002
100%		-10	-13.40	1,879,999,987	-0.000001	-0.007
100%		0	-15.30	1,879,999,985	-0.000001	-0.008
100%		+10	-0.30	1,880,000,000	0.000000	0.000
100%		+20	14.80	1,880,000,015	0.000001	0.008
100%		+30	-21.00	1,879,999,979	-0.000001	-0.011
100%		+40	22.10	1,880,000,022	0.000001	0.012
100%		+50	-39.20	1,879,999,961	-0.000002	-0.021
100%		+60	17.70	1,880,000,018	0.000001	0.009
85%	3.35	+20	21.60	1,880,000,022	0.000001	0.011
115%	4.26	+20	-18.20	1,879,999,982	-0.000001	-0.010
Batt.Endpoint	3.35	+20	21.60	1,880,000,022	0.000001	0.011

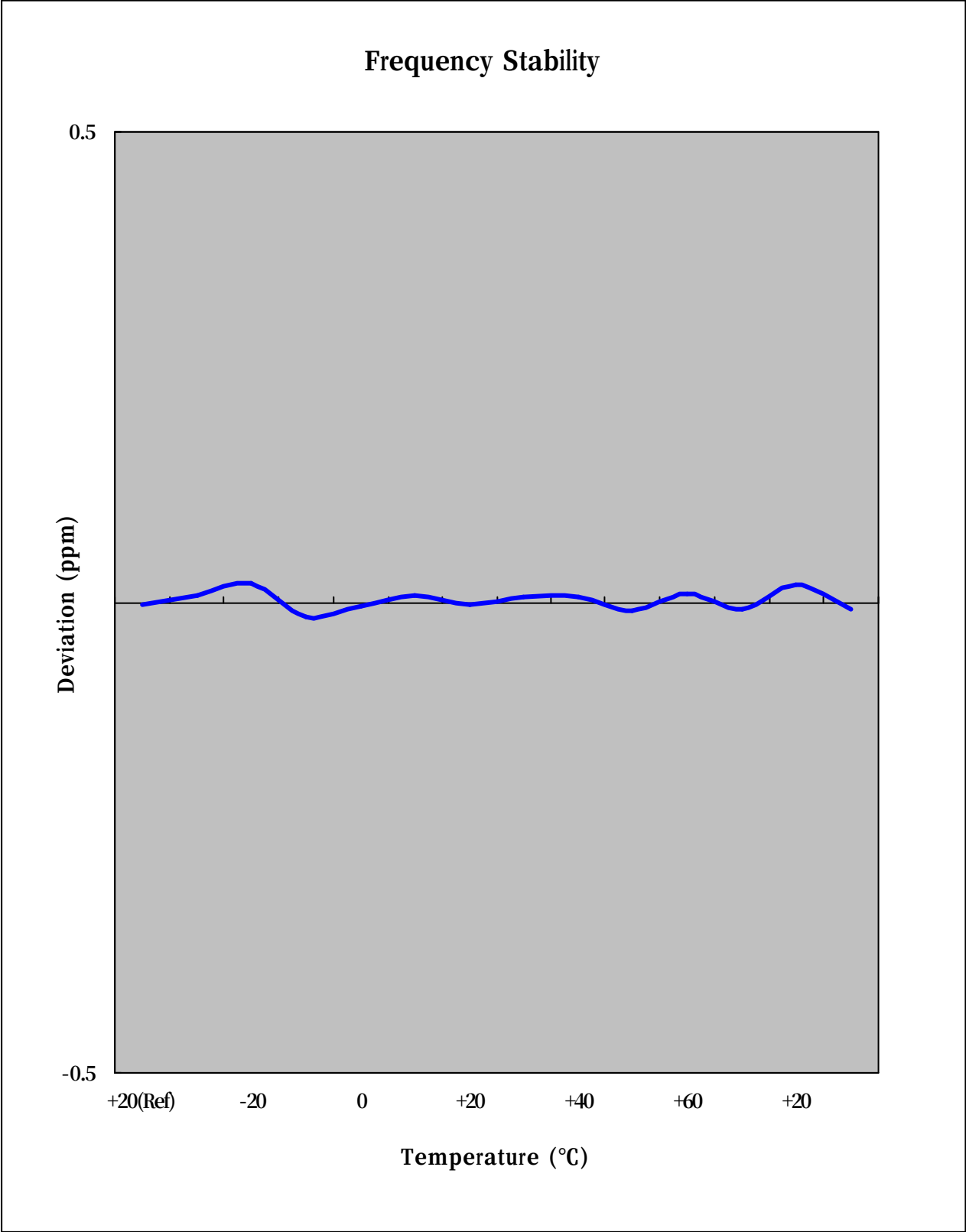
Note : The temperature is varied from -30 °C to +60 °C using an environmental chamber.

The EUT is tested down to the battery end point.

6.8.4. GSM1900 Frequency Stability Graph



Zoom IN





7. CONCLUSION

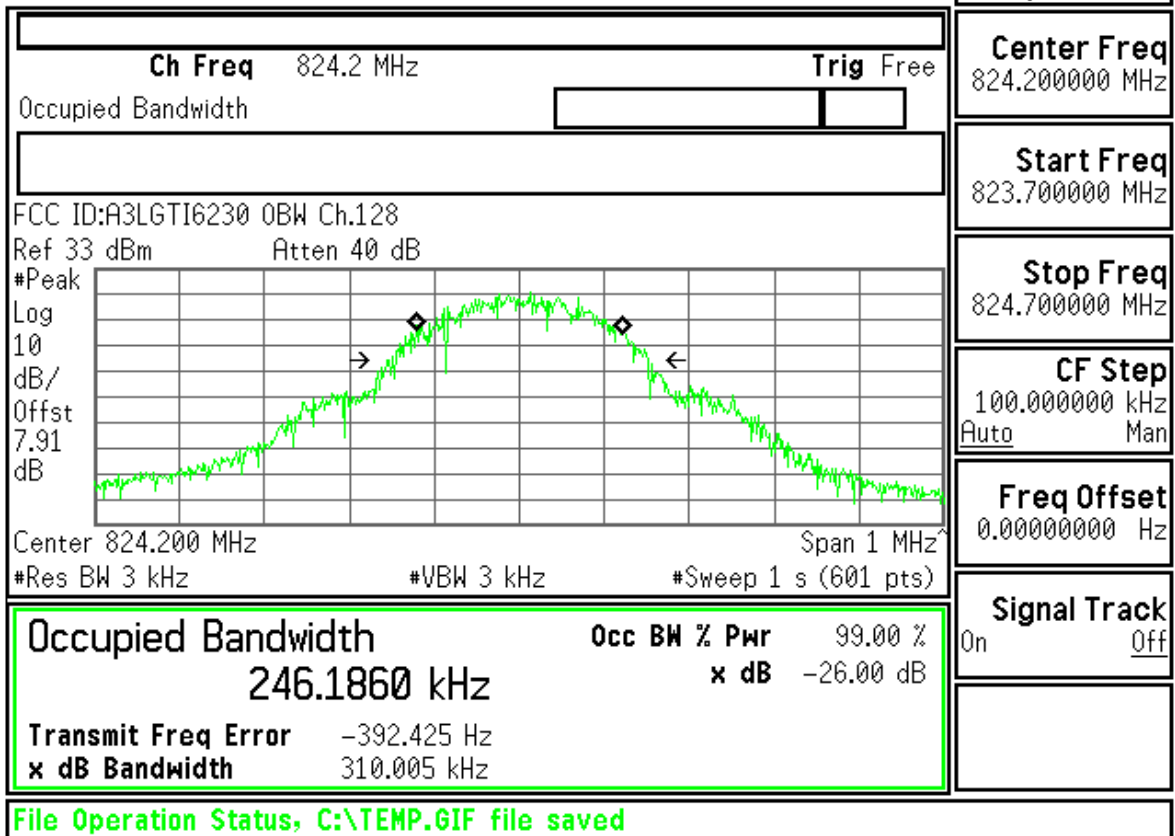
The data collected shows that the SAMSUNG 850/1900 GSM/GPRS Phone with Bluetooth and EDGE Rx Only FCC ID : A3LGT16230 complies with all the requirements of Parts 2,22,24 of the FCC Rules.

8. TEST PLOTS

GSM850

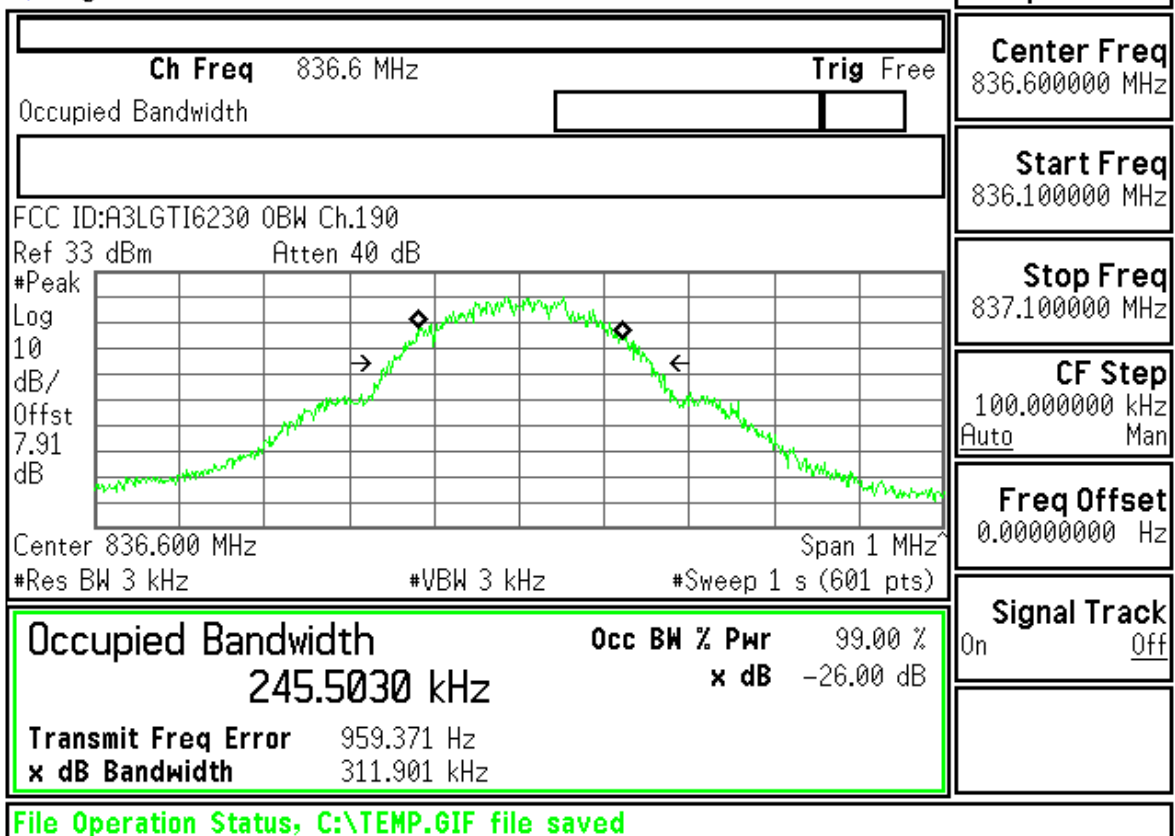
Agilent

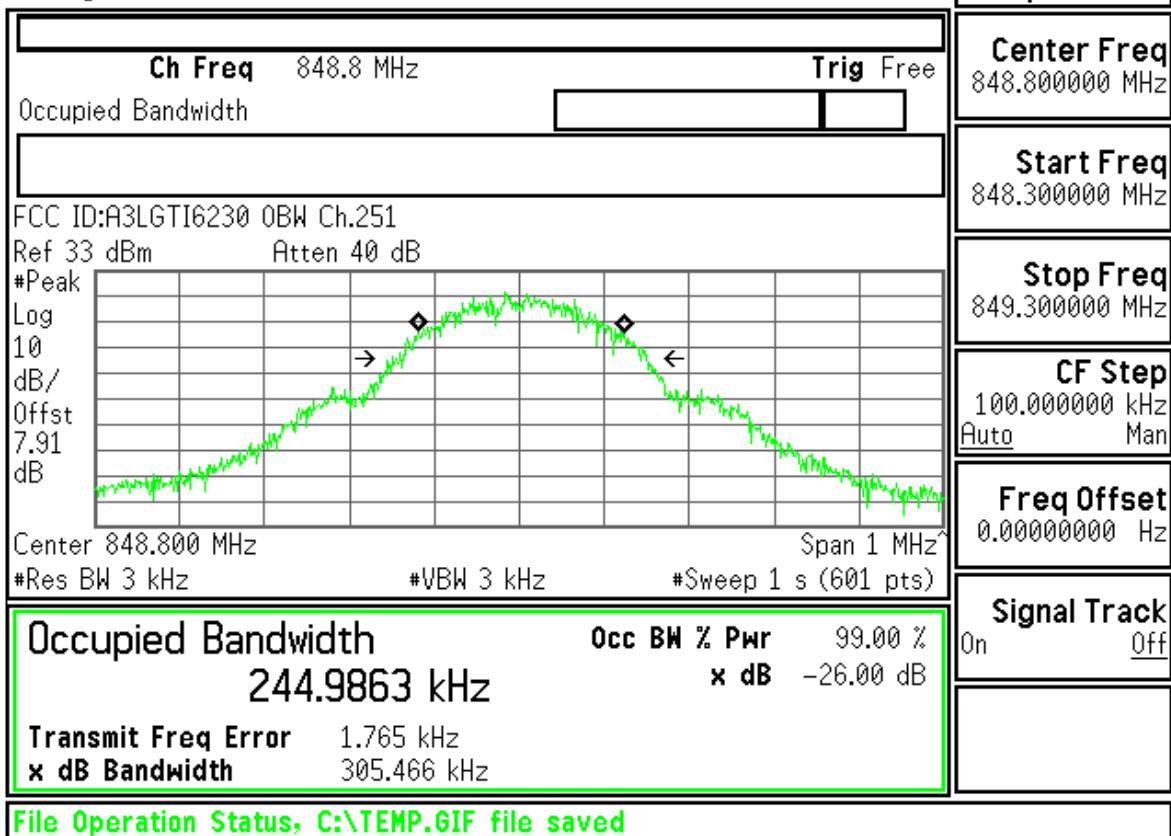
R T



Agilent

R T





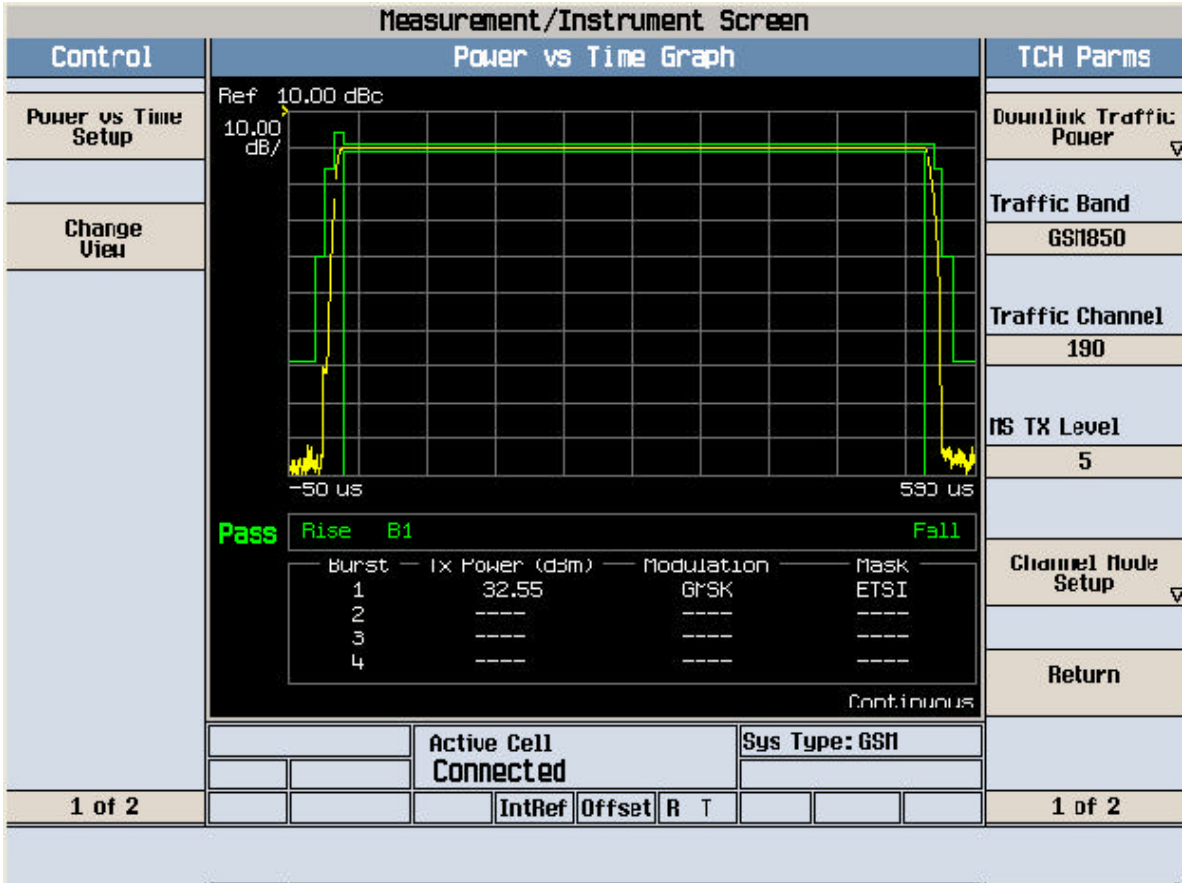
Control	Transmit Power								TCH Parms																						
Transmit Power Setup ▾	<table><tr><td></td><td>Burst 1</td><td>Burst 2</td><td>Burst 3</td><td>Burst 4</td></tr><tr><td>Burst Power</td><td>32.45</td><td>----</td><td>----</td><td>----</td></tr><tr><td>Estimated Carrier Power</td><td>32.45</td><td>----</td><td>----</td><td>----</td></tr></table>									Burst 1	Burst 2	Burst 3	Burst 4	Burst Power	32.45	----	----	----	Estimated Carrier Power	32.45	----	----	----	Downlink Traffic Power ▾							
										Burst 1	Burst 2	Burst 3	Burst 4																		
									Burst Power	32.45	----	----	----																		
									Estimated Carrier Power	32.45	----	----	----																		
Traffic Band																															
									GS1850																						
									Traffic Channel																						
									128																						
									Single																						
	Phase & Frequency Error								MS TX Level																						
	<table><tr><td></td><td>Peak Phase °</td><td>RMS Phase °</td><td>Frequency Hz</td></tr><tr><td>Minimum</td><td>2.24</td><td>0.73</td><td>3.41</td></tr><tr><td>Maximum</td><td>4.37</td><td>0.95</td><td>13.80</td></tr><tr><td>Average</td><td>3.09</td><td>0.84</td><td>9.16</td></tr><tr><td>Pass/Fail</td><td>Pass</td><td>Pass</td><td>Pass</td></tr></table>									Peak Phase °	RMS Phase °	Frequency Hz	Minimum	2.24	0.73	3.41	Maximum	4.37	0.95	13.80	Average	3.09	0.84	9.16	Pass/Fail	Pass	Pass	Pass	5		
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Pass/Fail	Pass	Pass	Pass																												
Swap Window Positions									Channel Mode Setup ▾																						
									Return																						
									Single																						
			Active Cell Connected				Sys Type: GSM																								
1 of 2				IntRef	Offset	R	T				1 of 2																				

Control	Transmit Power										TCH Parms																					
Transmit Power Setup ▾	<table><tr><td></td><td>Burst 1</td><td>Burst 2</td><td>Burst 3</td><td>Burst 4</td></tr><tr><td>Burst Power</td><td>32.54</td><td>----</td><td>----</td><td>----</td></tr><tr><td>Estimated Carrier Power</td><td>32.54</td><td>----</td><td>----</td><td>----</td></tr></table>											Burst 1	Burst 2	Burst 3	Burst 4	Burst Power	32.54	----	----	----	Estimated Carrier Power	32.54	----	----	----	Downlink Traffic Power ▾						
												Burst 1	Burst 2	Burst 3	Burst 4																	
											Burst Power	32.54	----	----	----																	
											Estimated Carrier Power	32.54	----	----	----																	
	Traffic Band																															
GSM850																																
Single										Traffic Channel																						
										190																						
Phase & Frequency Error										MS TX Level																						
Swap Window Positions	<table><tr><td></td><td>Peak Phase °</td><td>RMS Phase °</td><td>Frequency Hz</td></tr><tr><td>Minimum</td><td>1.81</td><td>0.72</td><td>7.64</td></tr><tr><td>Maximum</td><td>3.71</td><td>0.97</td><td>17.36</td></tr><tr><td>Average</td><td>2.59</td><td>0.84</td><td>12.29</td></tr><tr><td>Pass/Fail</td><td>Pass</td><td>Pass</td><td>Pass</td></tr></table>											Peak Phase °	RMS Phase °	Frequency Hz	Minimum	1.81	0.72	7.64	Maximum	3.71	0.97	17.36	Average	2.59	0.84	12.29	Pass/Fail	Pass	Pass	Pass	Channel Mode Setup ▾	
												Peak Phase °	RMS Phase °	Frequency Hz																		
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Pass/Fail	Pass	Pass	Pass																													
50 / 50										Return																						
50 / 50										Single																						
Active Cell Connected										Sys Type: GSM																						
IntRef										Offset																						
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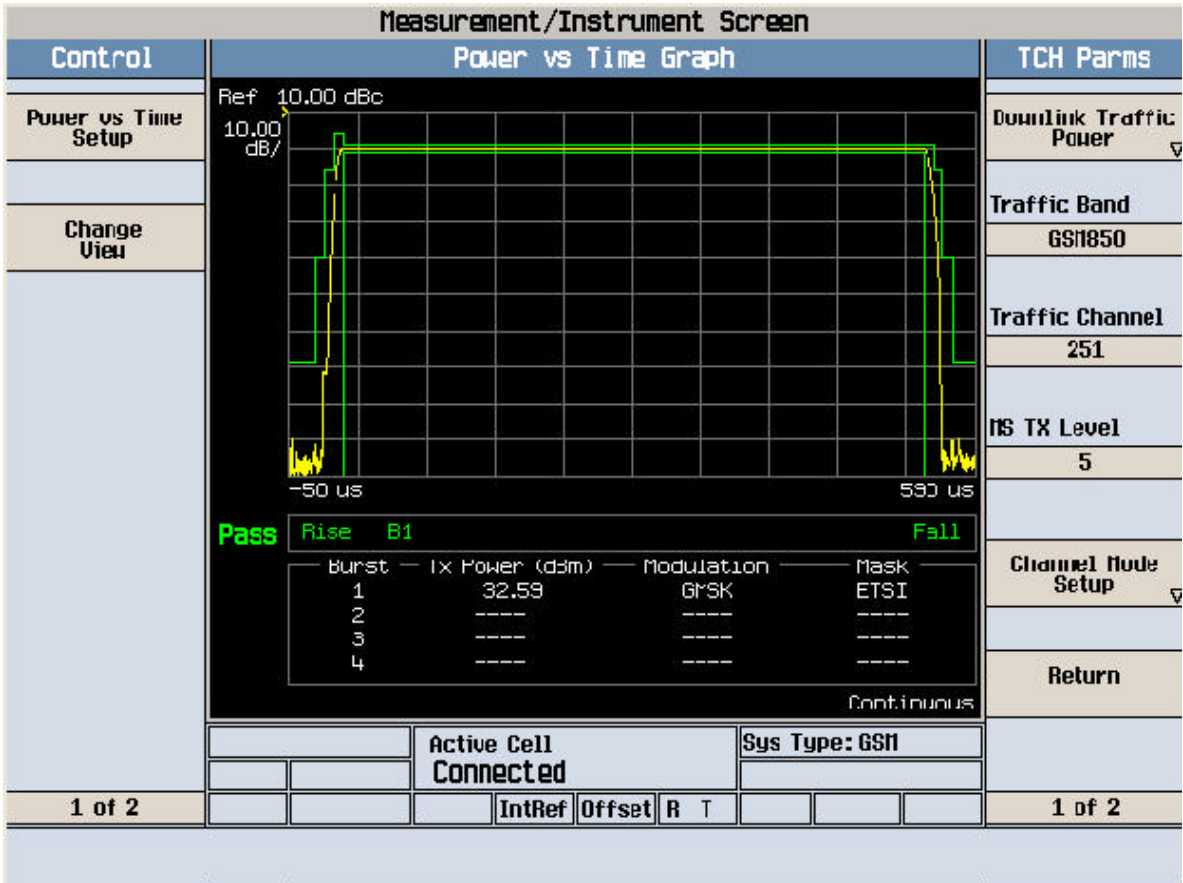
Control	Transmit Power								TCH Parms																									
Transmit Power Setup	<table border="1"> <thead> <tr> <th></th> <th>Burst 1</th> <th>Burst 2</th> <th>Burst 3</th> <th>Burst 4</th> </tr> </thead> <tbody> <tr> <td>Burst Power</td> <td>32.53</td> <td>----</td> <td>----</td> <td>----</td> </tr> <tr> <td>Estimated Carrier Power</td> <td>32.53</td> <td>----</td> <td>----</td> <td>----</td> </tr> </tbody> </table>									Burst 1	Burst 2	Burst 3	Burst 4	Burst Power	32.53	----	----	----	Estimated Carrier Power	32.53	----	----	----	Downlink Traffic Power										
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Estimated Carrier Power									32.53	----	----	----																						
	Traffic Band																																	
	GS1850																																	
	Traffic Channel																																	
	251																																	
	MS TX Level																																	
	5																																	
Swap Window Positions	<table border="1"> <thead> <tr> <th colspan="4">Phase & Frequency Error</th> </tr> <tr> <th></th> <th>Peak Phase °</th> <th>RMS Phase °</th> <th>Frequency Hz</th> </tr> </thead> <tbody> <tr> <td>Minimum</td> <td>2.16</td> <td>0.81</td> <td>-1.33</td> </tr> <tr> <td>Maximum</td> <td>3.67</td> <td>1.11</td> <td>7.45</td> </tr> <tr> <td>Average</td> <td>2.86</td> <td>0.94</td> <td>3.14</td> </tr> <tr> <td>Pass/Fail</td> <td>Pass</td> <td>Pass</td> <td>Pass</td> </tr> </tbody> </table>								Phase & Frequency Error					Peak Phase °	RMS Phase °	Frequency Hz	Minimum	2.16	0.81	-1.33	Maximum	3.67	1.11	7.45	Average	2.86	0.94	3.14	Pass/Fail	Pass	Pass	Pass	Channel Mode Setup	
Phase & Frequency Error																																		
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Pass/Fail	Pass	Pass	Pass																															
	Return																																	
	1 of 2																																	
	<table border="1"> <tr> <td colspan="4">Active Cell Connected</td> <td colspan="4">Sys Type: GSM</td> </tr> <tr> <td colspan="4">IntRef</td> <td colspan="4">Offset</td> </tr> <tr> <td colspan="4">R</td> <td colspan="4">T</td> </tr> </table>								Active Cell Connected				Sys Type: GSM				IntRef				Offset				R				T				1 of 2	
Active Cell Connected				Sys Type: GSM																														
IntRef				Offset																														
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Measurement/Instrument Screen																																		
Control	Power vs Time Graph								TCH Parms																									
Power vs Time Setup									Downlink Traffic Power																									
Change View									Traffic Band																									
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Active Cell Connected				Sys Type: GSM																														
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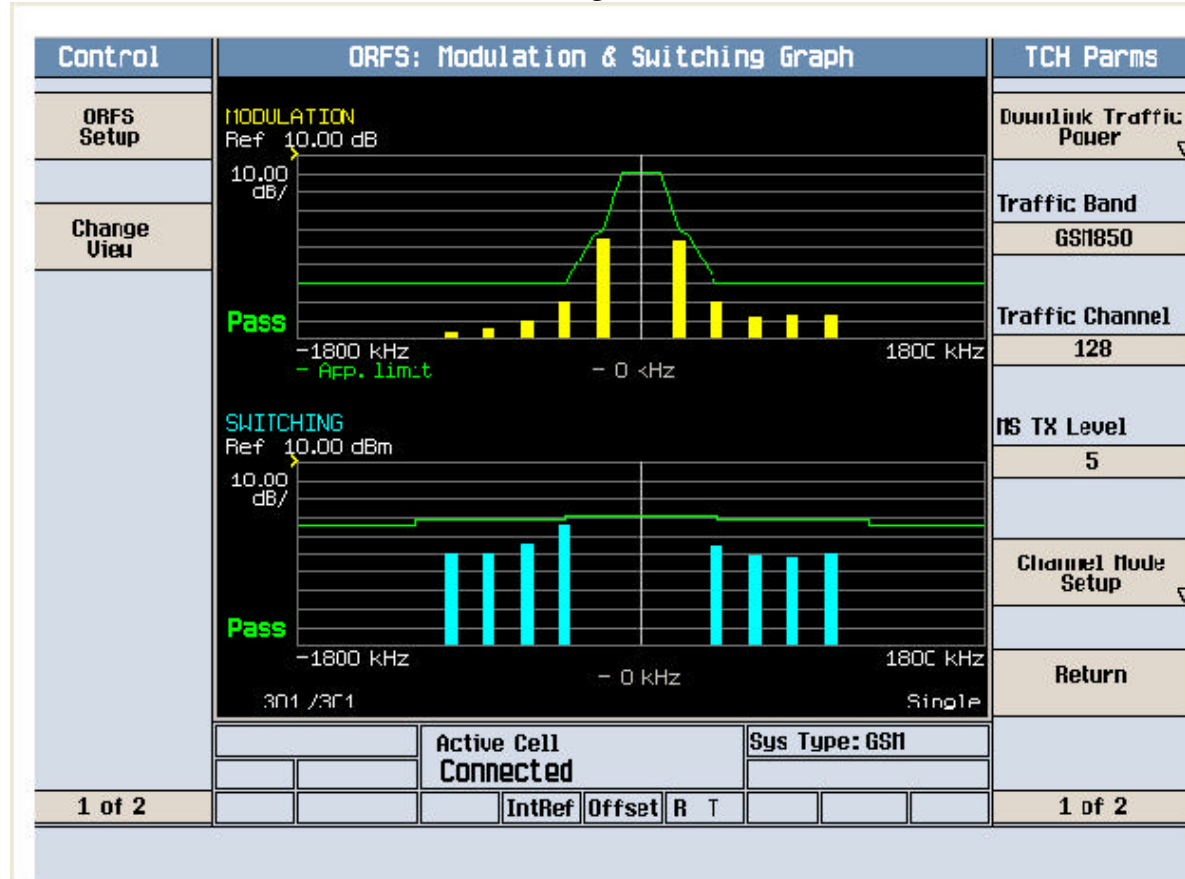
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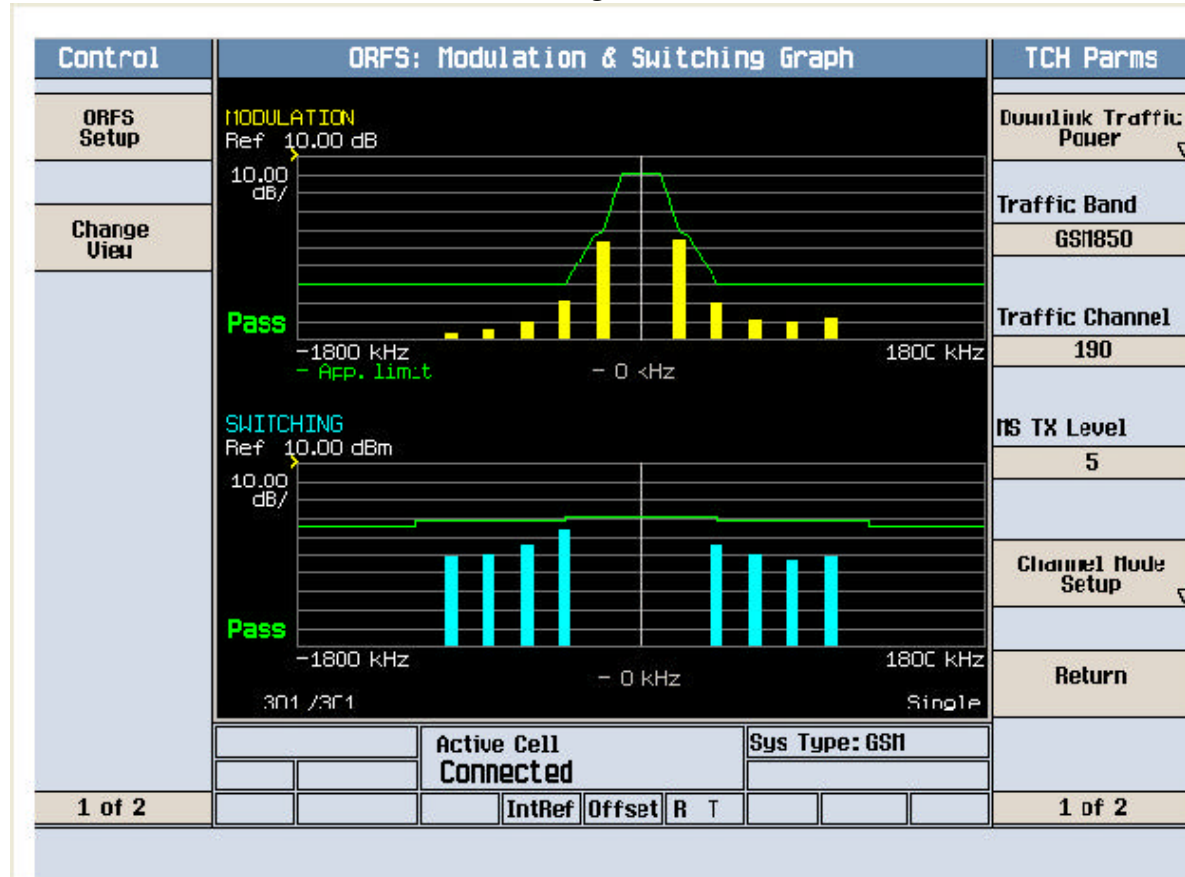
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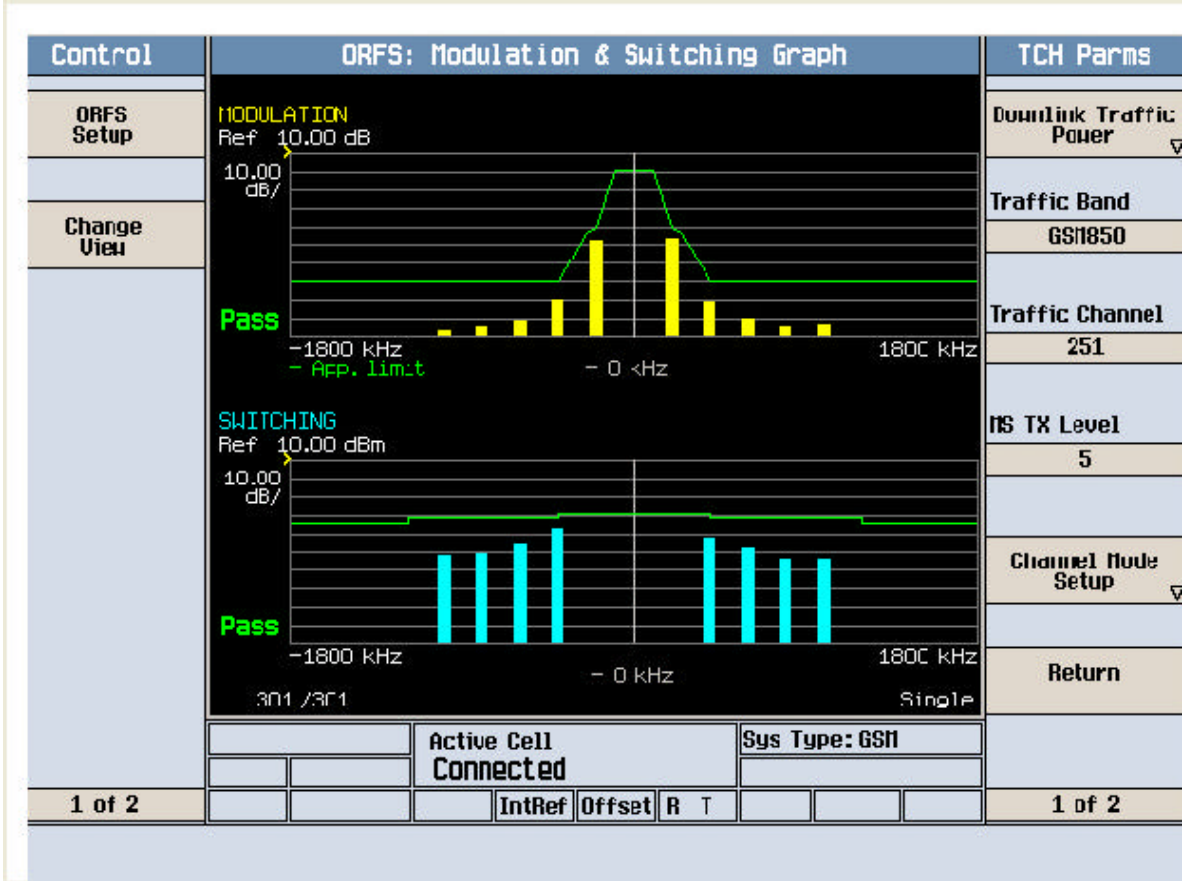


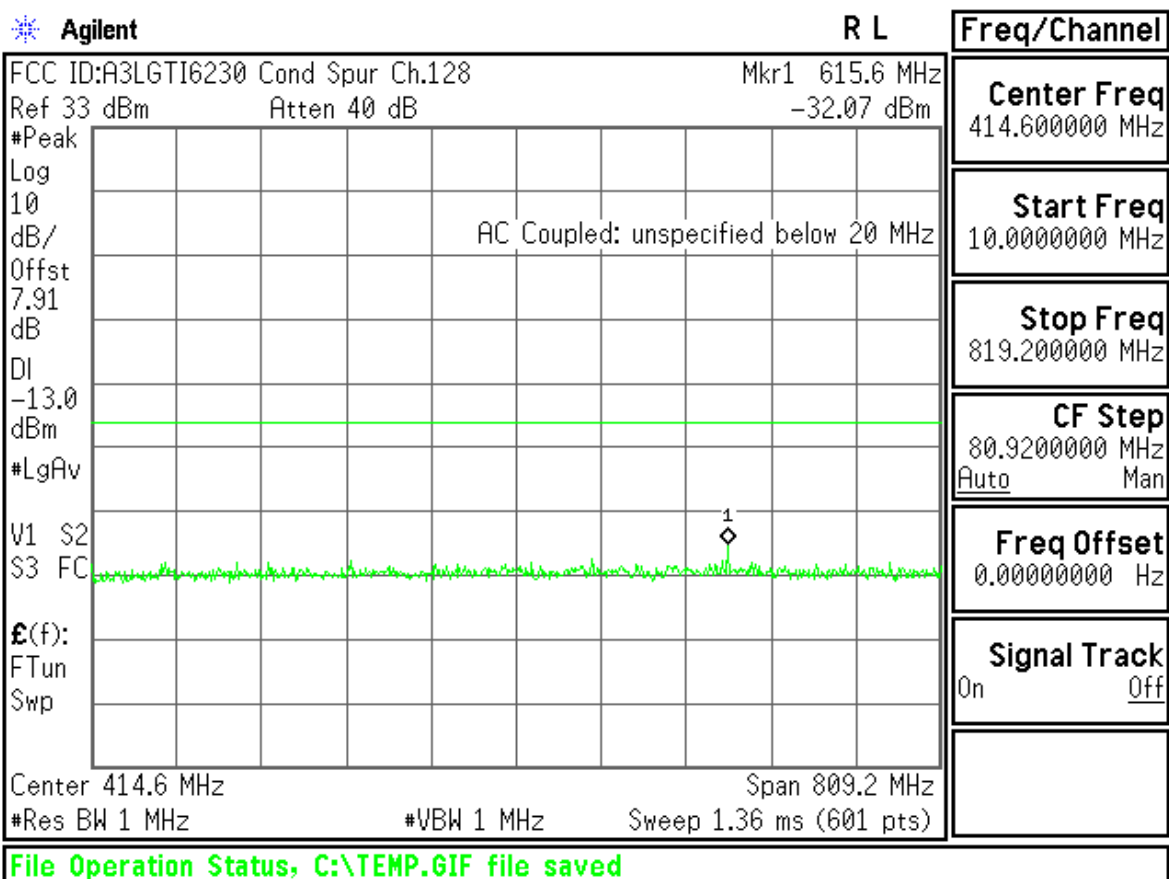
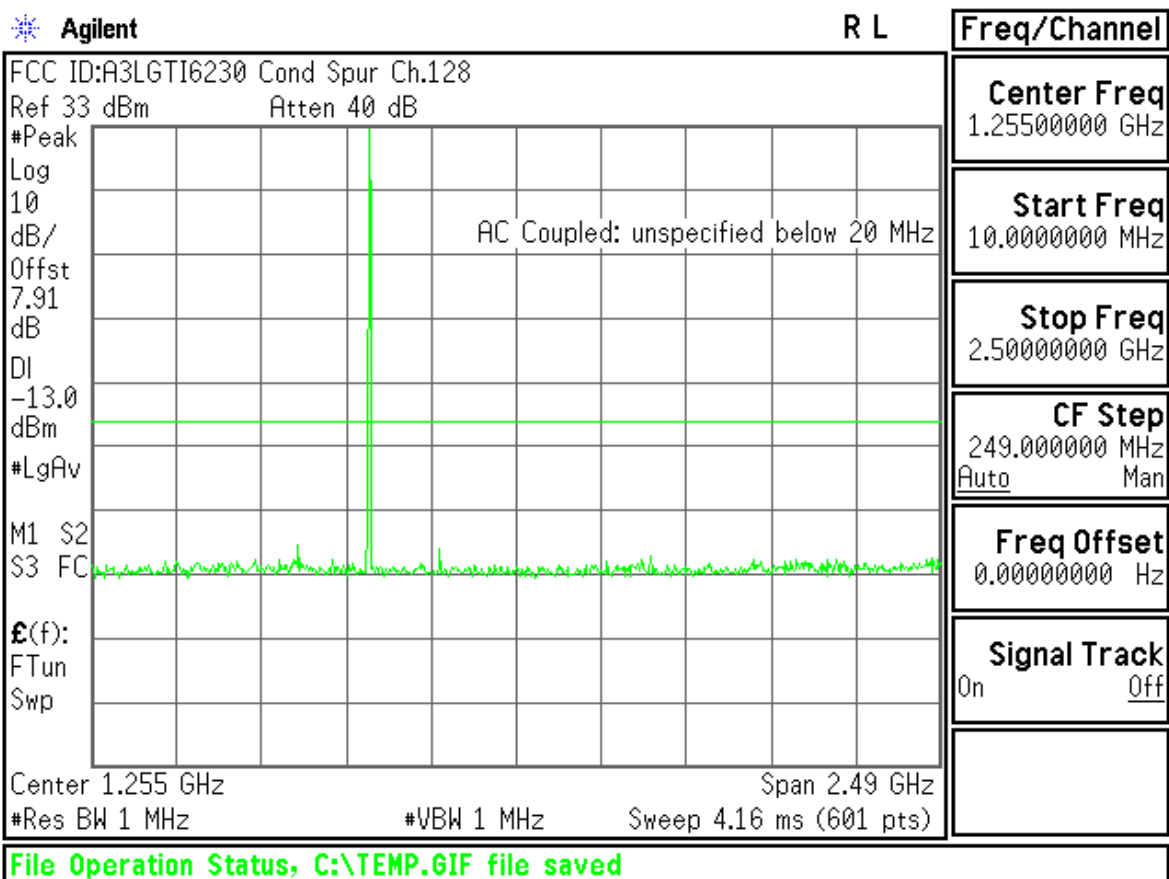
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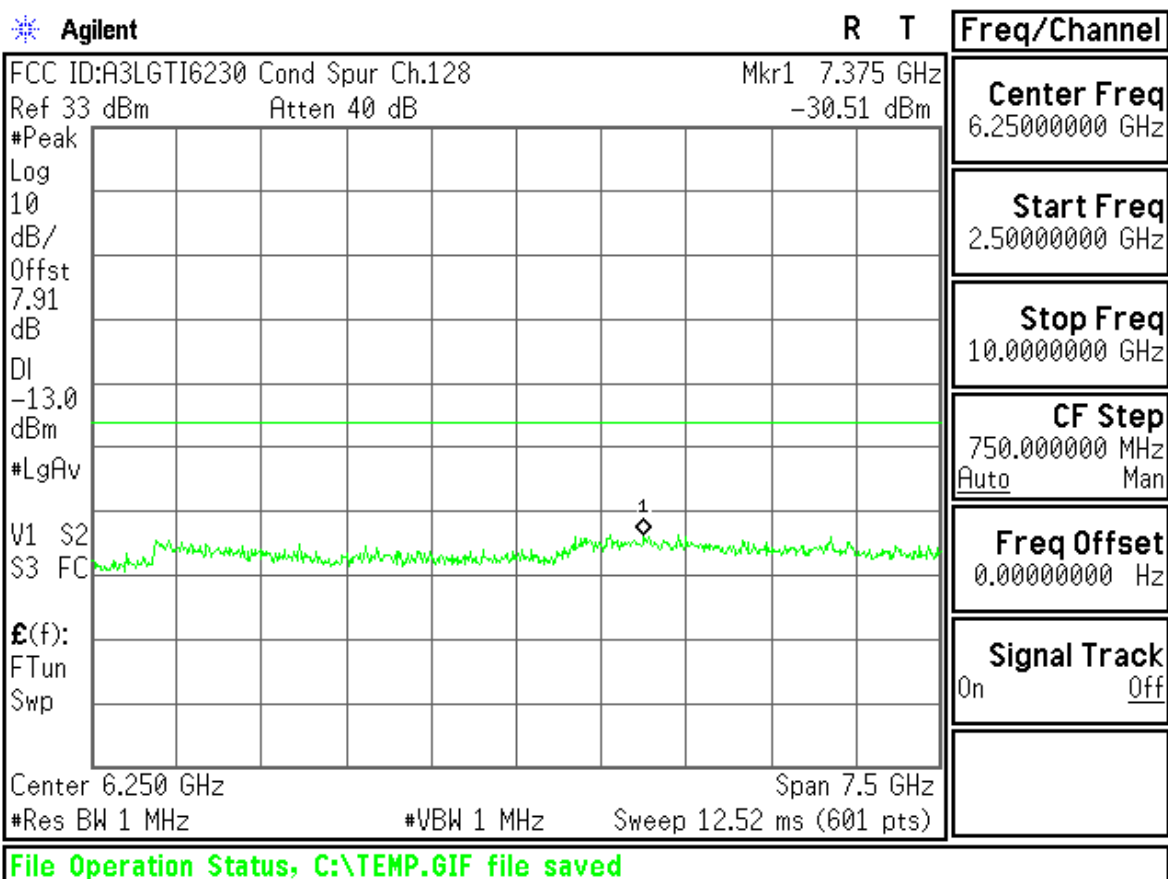
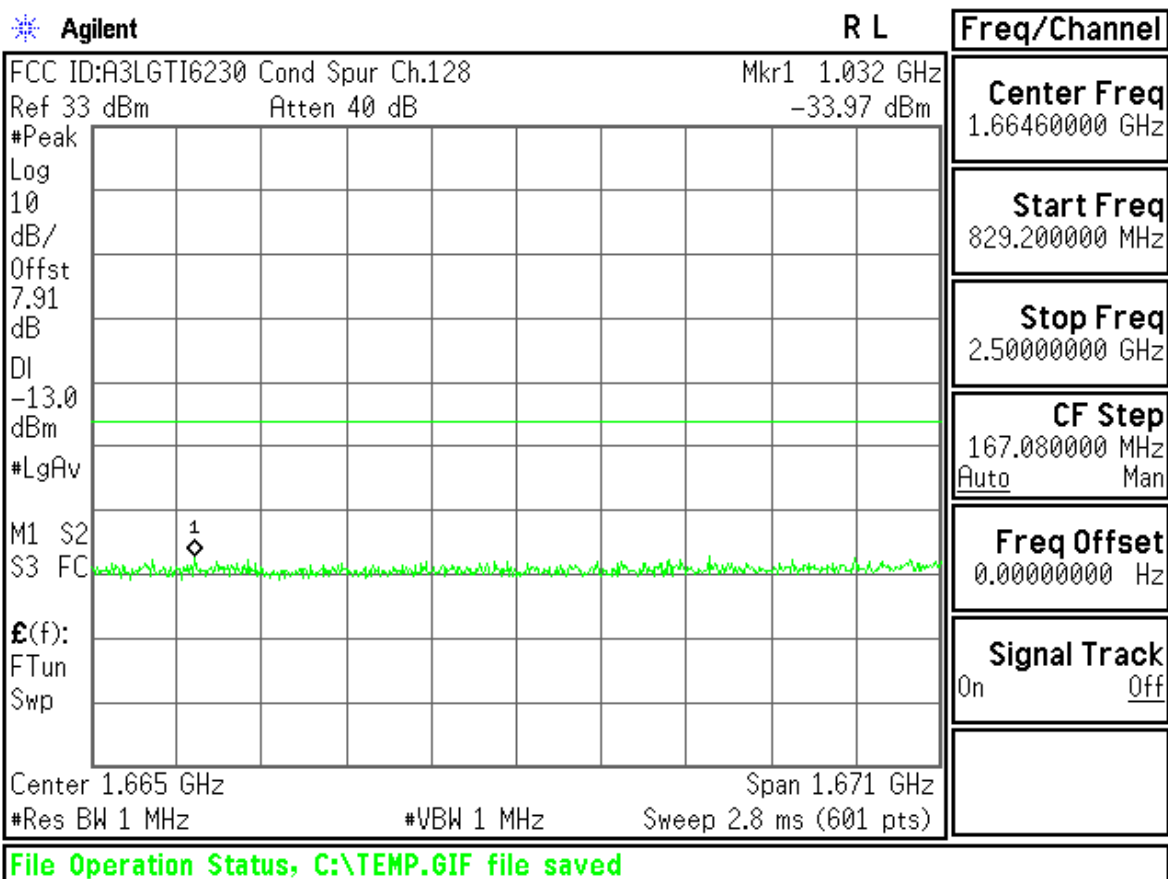


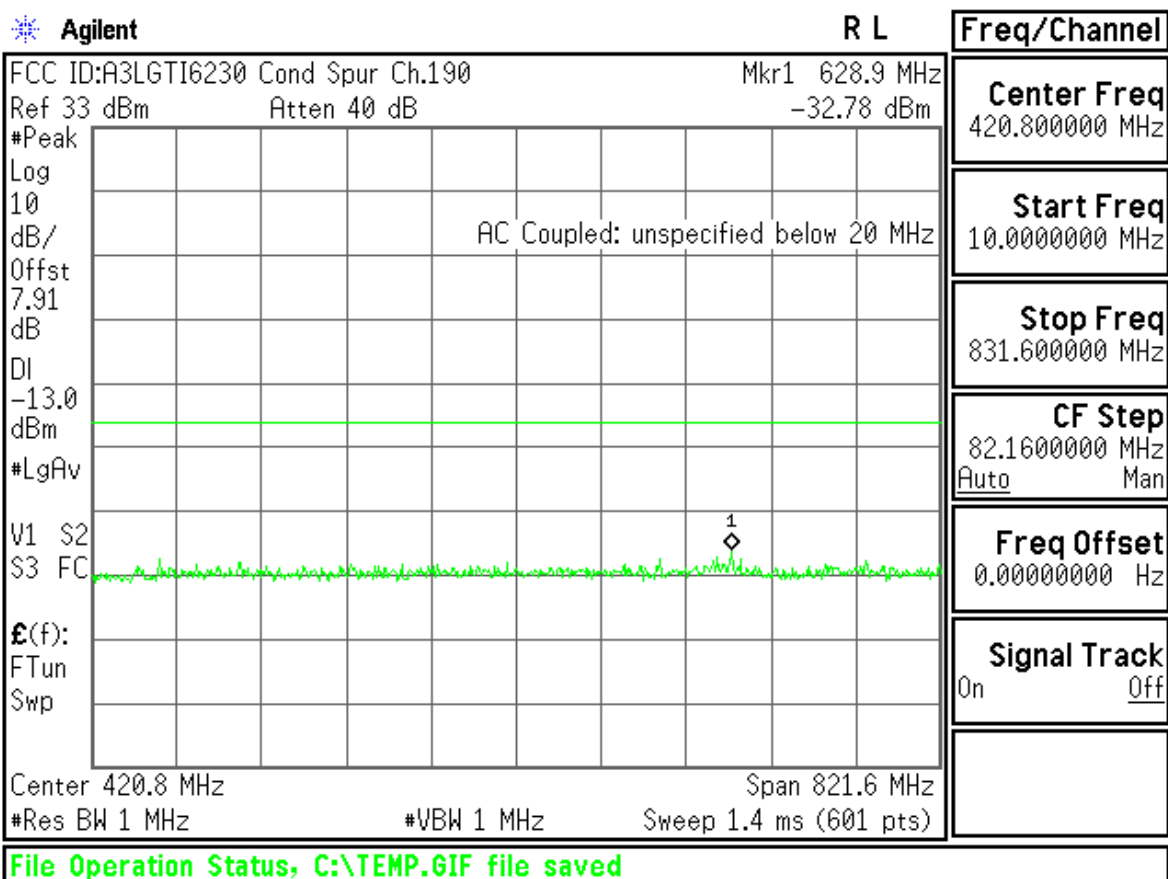
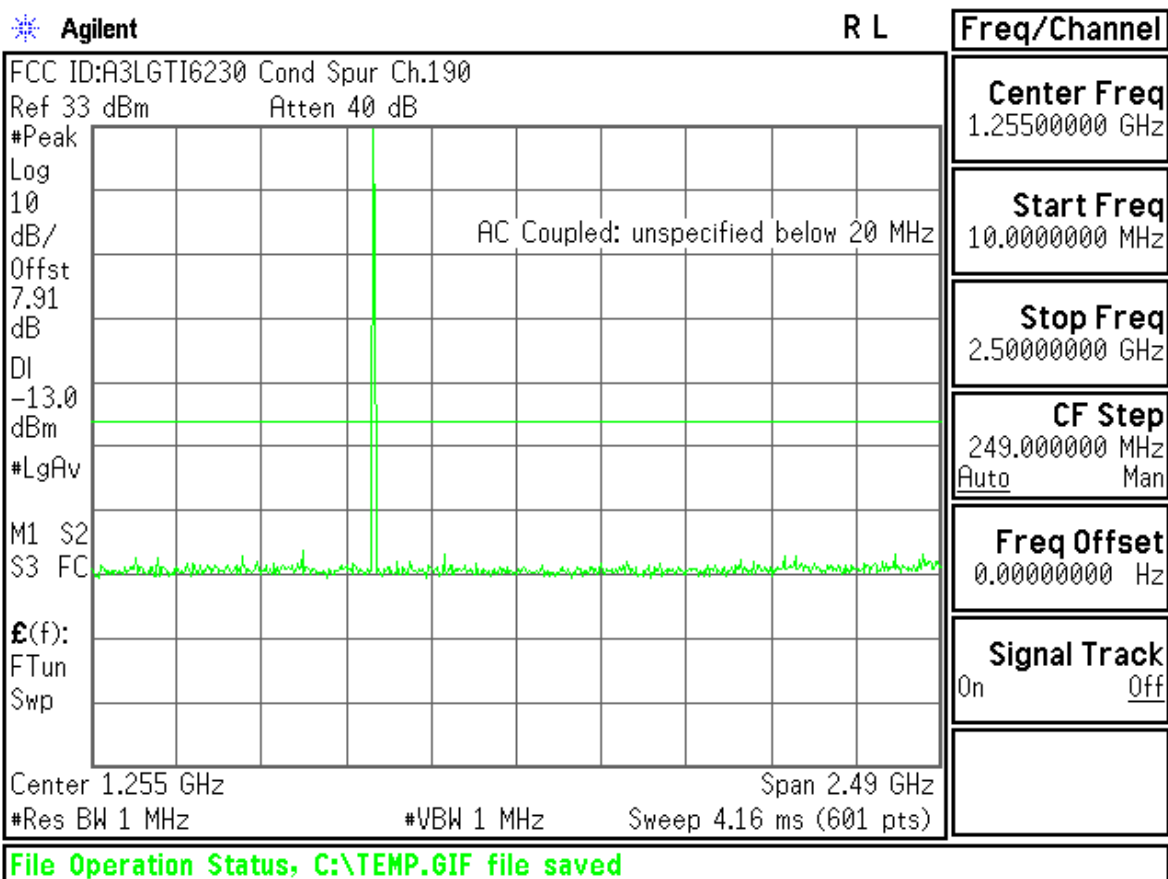
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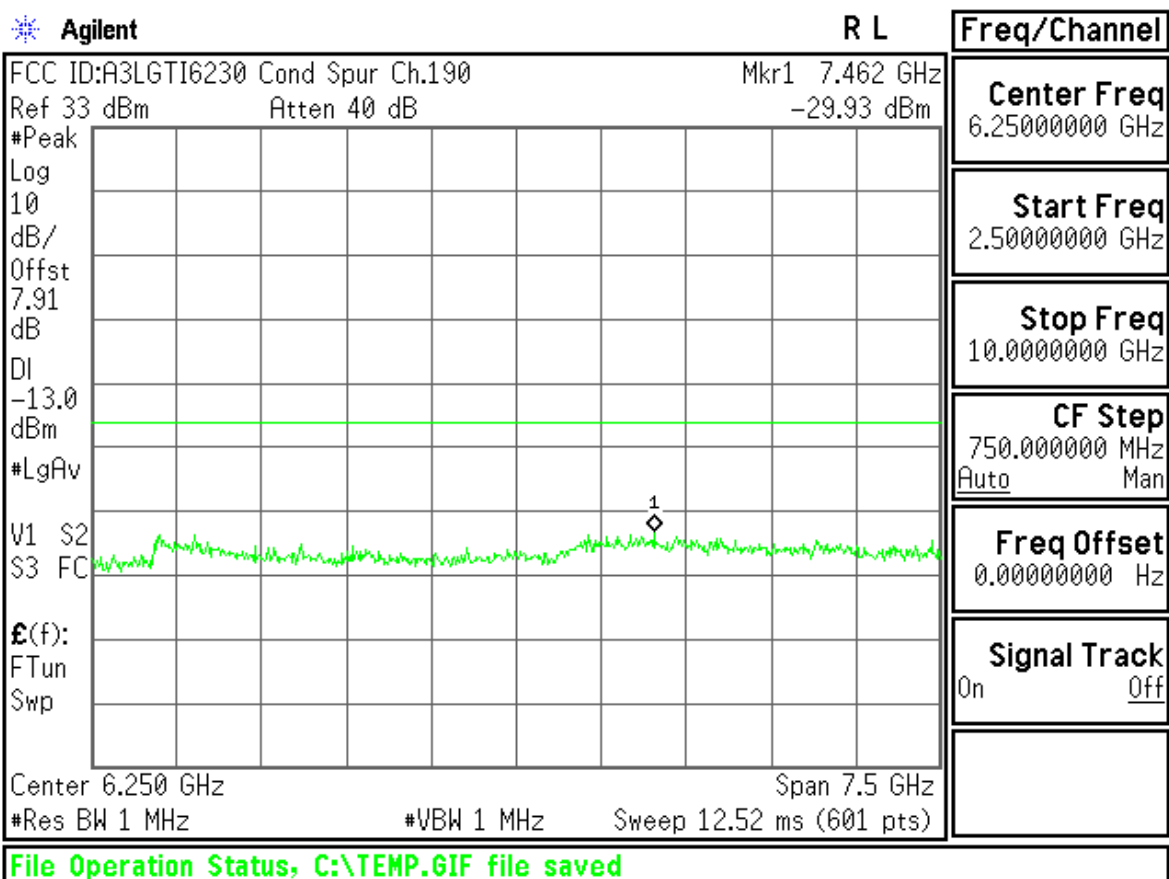
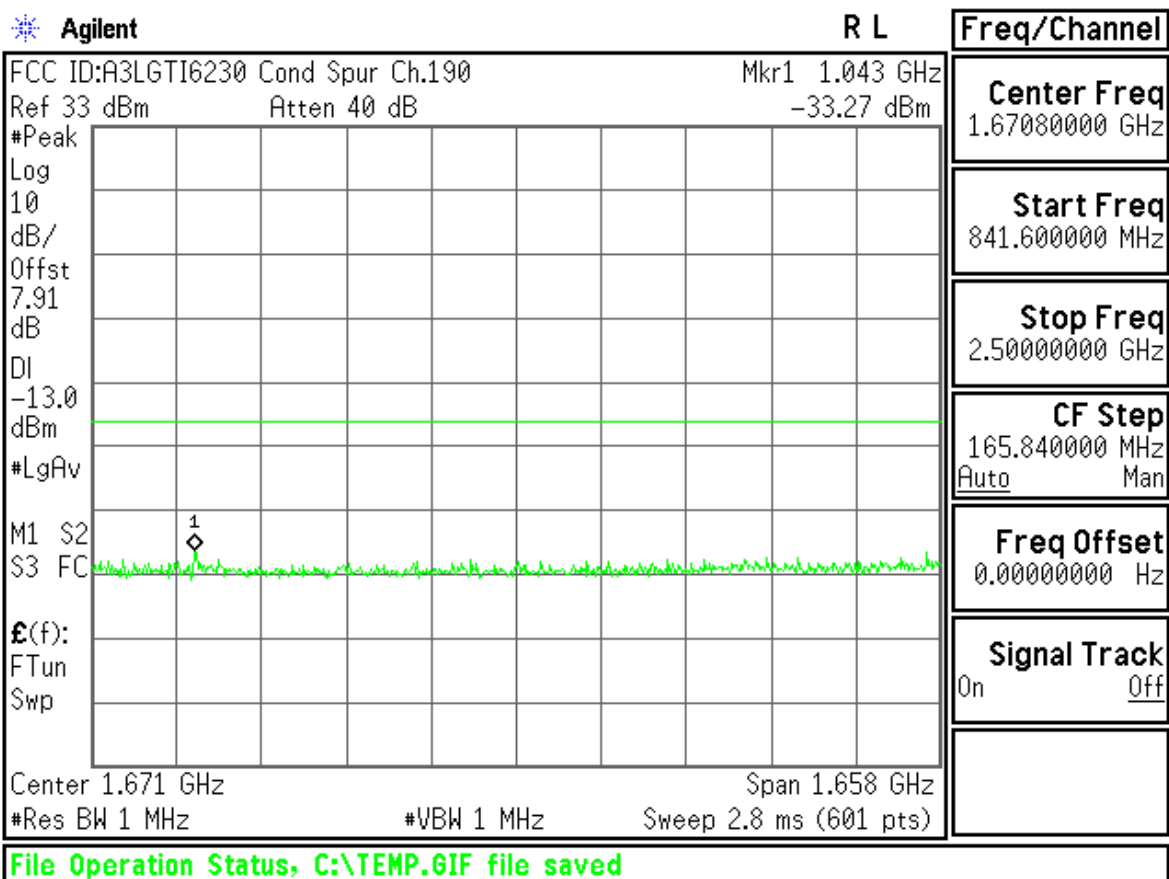


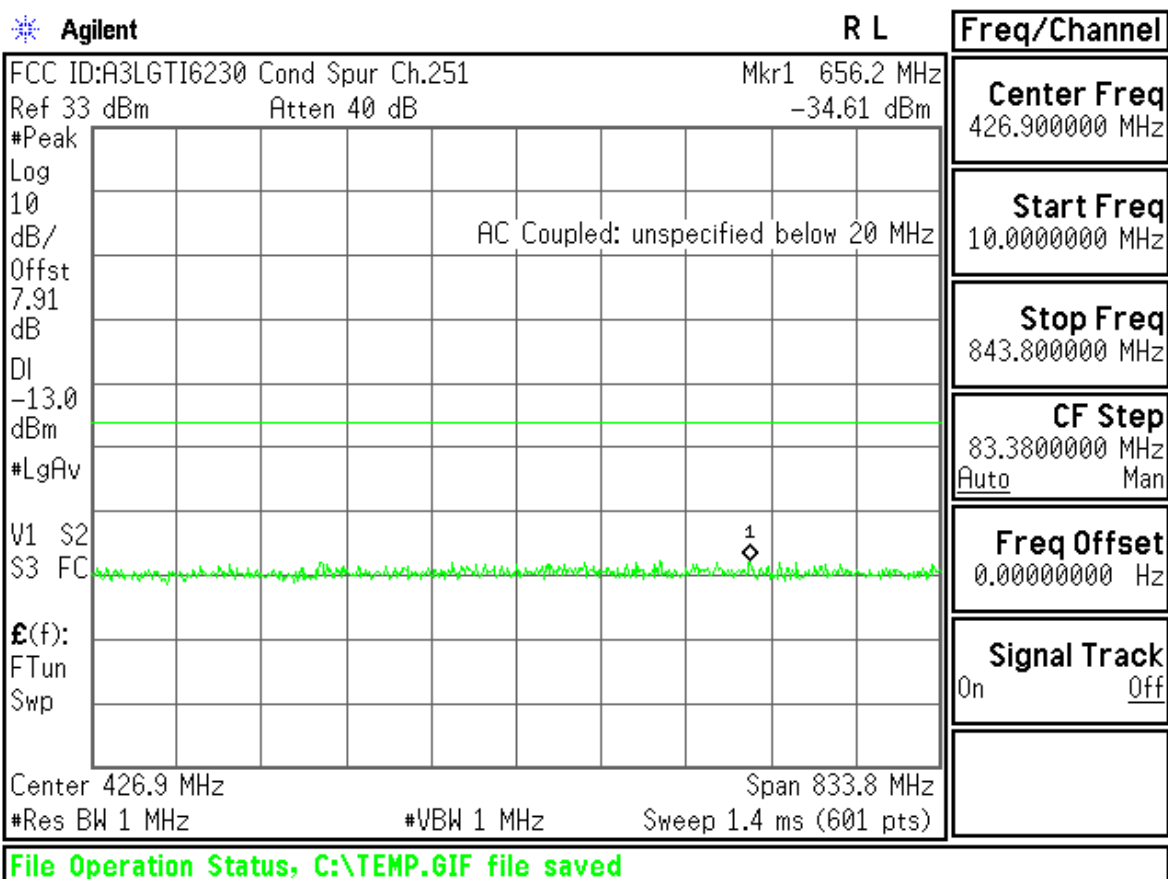
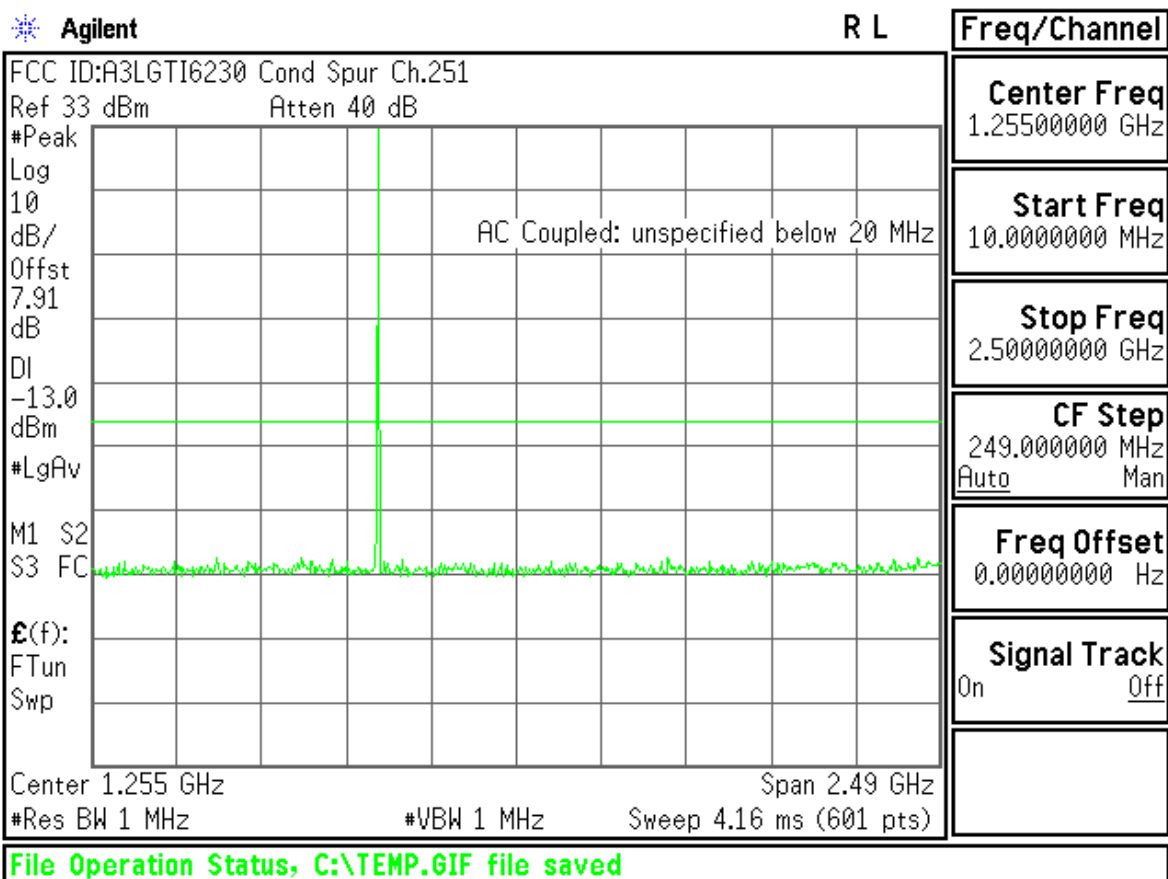








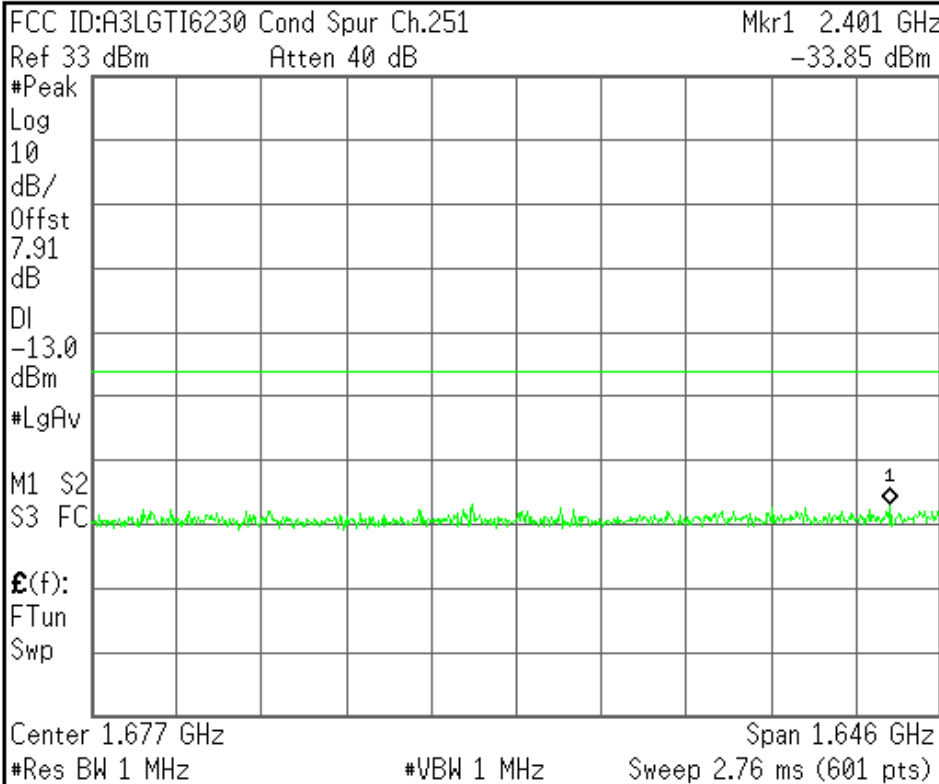




Agilent

R L

Freq/Channel



Center Freq
1.67690000 GHz

Start Freq
853.800000 MHz

Stop Freq
2.50000000 GHz

CF Step
164.620000 MHz
Auto Man

Freq Offset
0.00000000 Hz

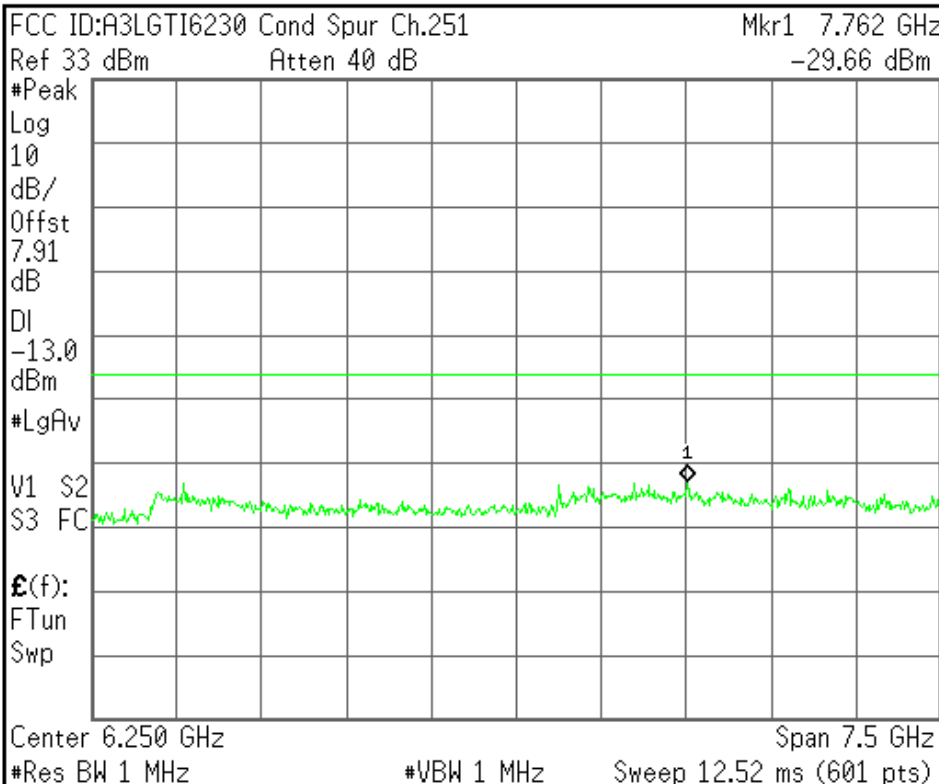
Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R L

Freq/Channel



Center Freq
6.25000000 GHz

Start Freq
2.50000000 GHz

Stop Freq
10.00000000 GHz

CF Step
750.000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R L

Freq/Channel

FCC ID:A3LGTI6230 Band Edge Ch.128

Ref 33 dBm

Atten 40 dB

#Avg

Log

10

dB/

Offset

7.91

dB

DI

-13.0

dBm

#LgAv

M1 S2

S3 FC

£(f):

f>50k

Swp

Center 824.000 0 MHz

#Res BW 3 kHz

#VBW 3 kHz

Sweep 343.2 ms (601 pts)

Span 810 kHz

File Operation Status, C:\TEMP.GIF file saved

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

Agilent

R T

Freq/Channel

FCC ID:A3LGTI6230 Band Edge Ch.128

Ref 33 dBm

Atten 40 dB

Mkr1 823.967 9 MHz

-18.94 dBm

#Avg

Log

10

dB/

Offset

7.91

dB

DI

-13.0

dBm

#LgAv

M1 S2

S3 FC

£(f):

f>50k

Swp

Center 823.595 0 MHz

#Res BW 3 kHz

#VBW 3 kHz

Sweep 343.2 ms (601 pts)

Span 810 kHz

File Operation Status, C:\TEMP.GIF file saved

Center Freq

823.595000 MHz

Start Freq

823.190000 MHz

Stop Freq

824.000000 MHz

CF Step

81.0000000 kHz

Auto

Man

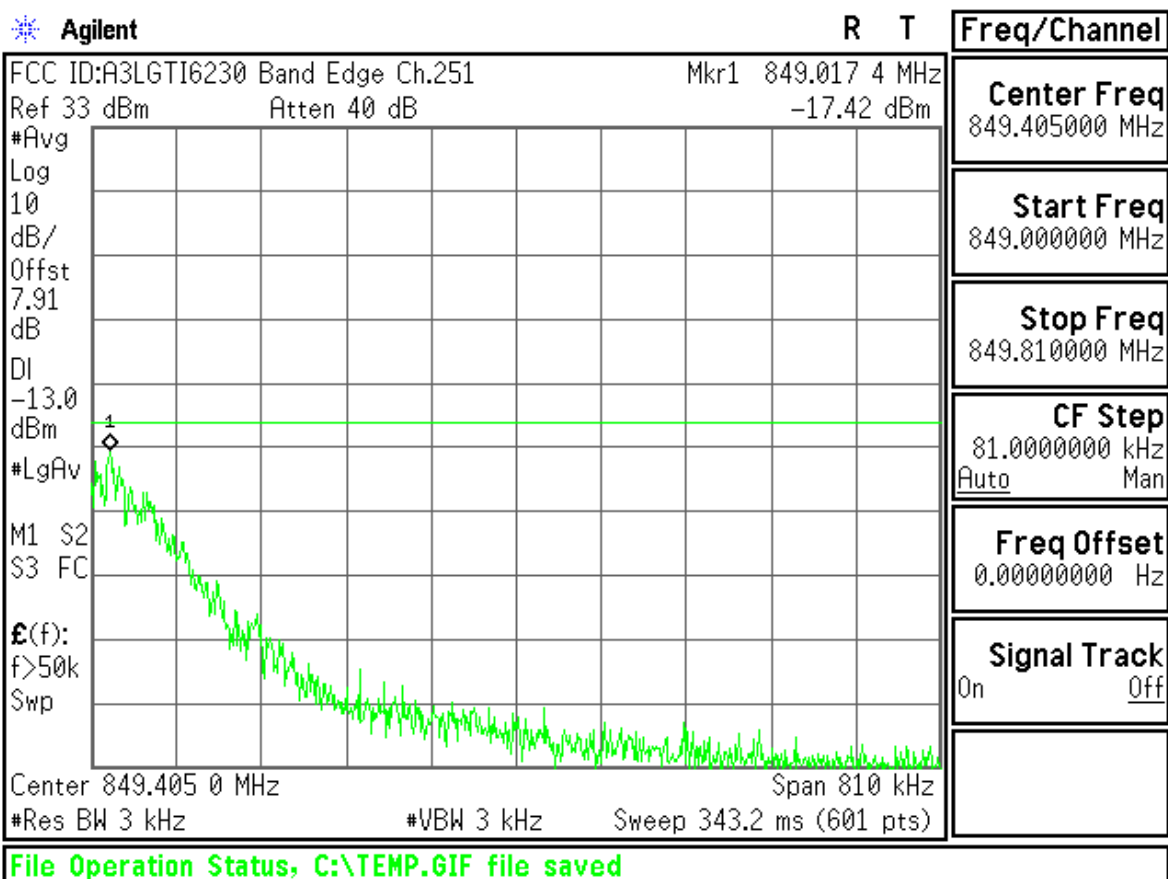
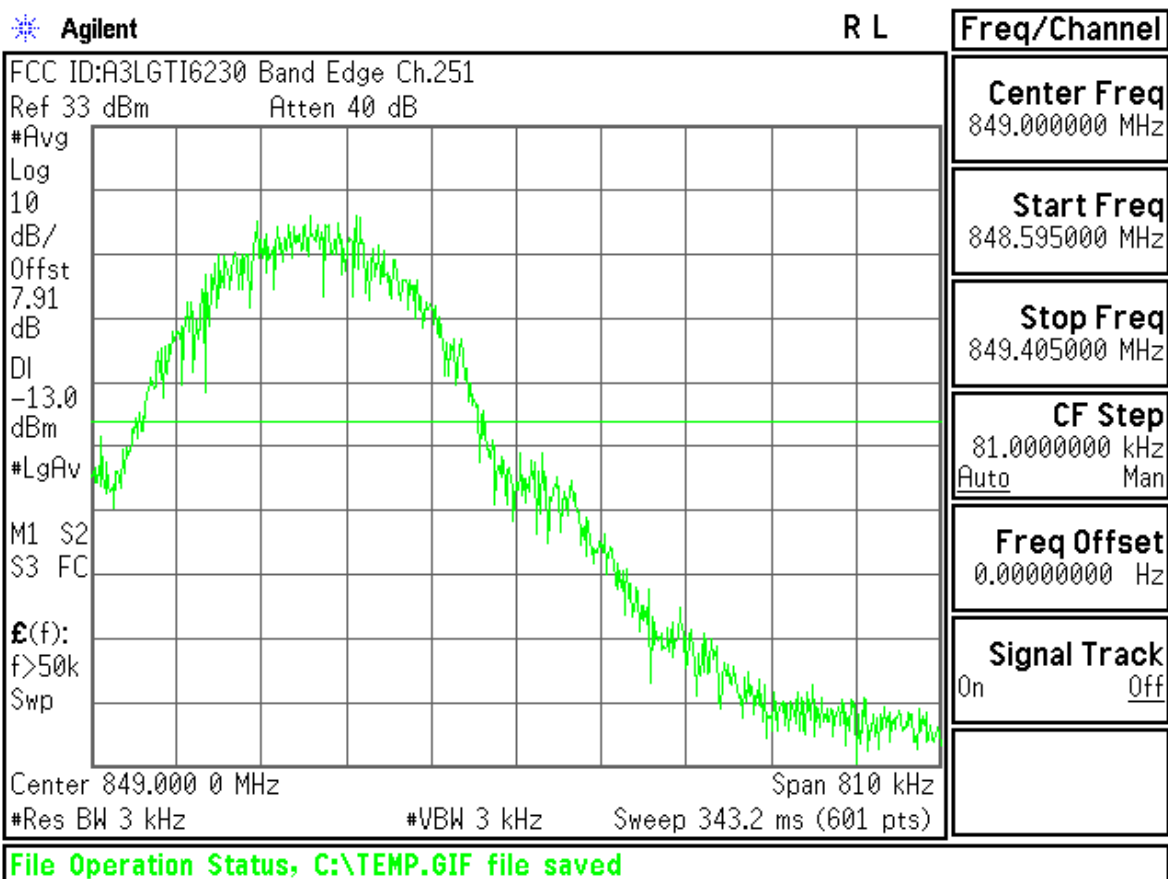
Freq Offset

0.00000000 Hz

Signal Track

On

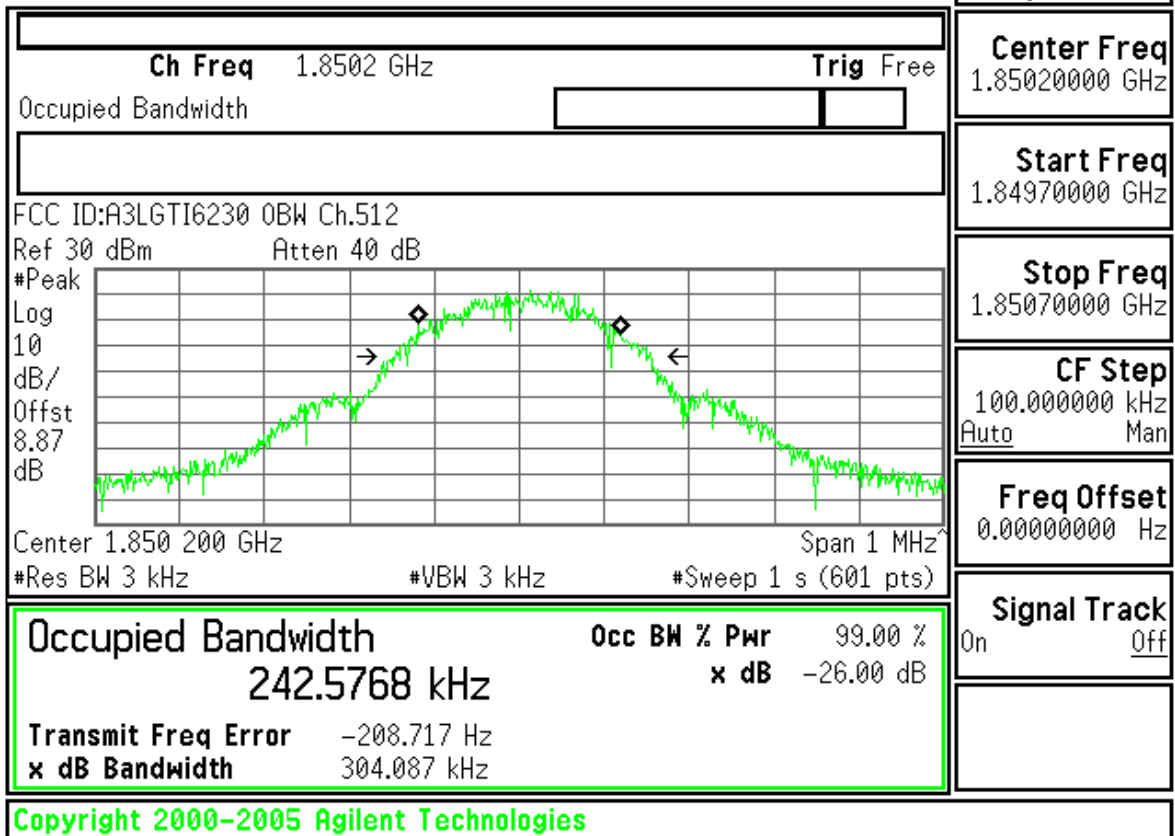
Off



GSM1900

Agilent

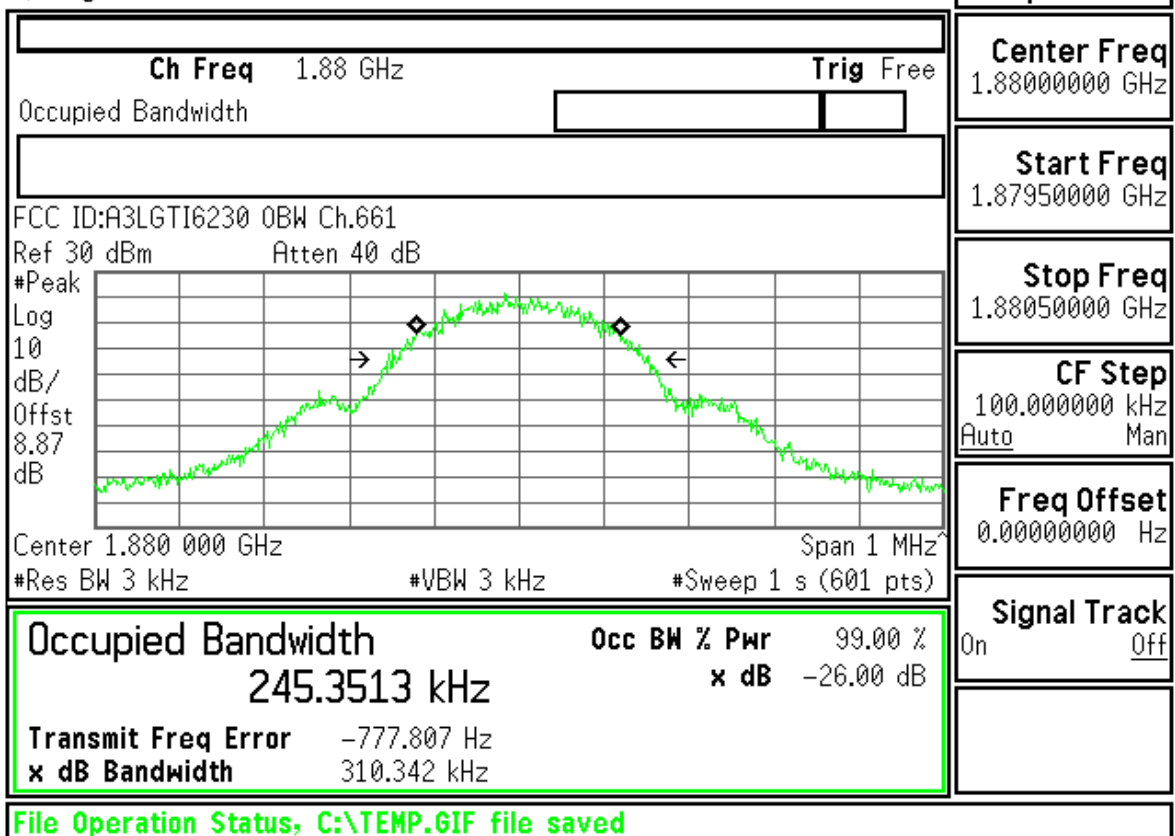
R T



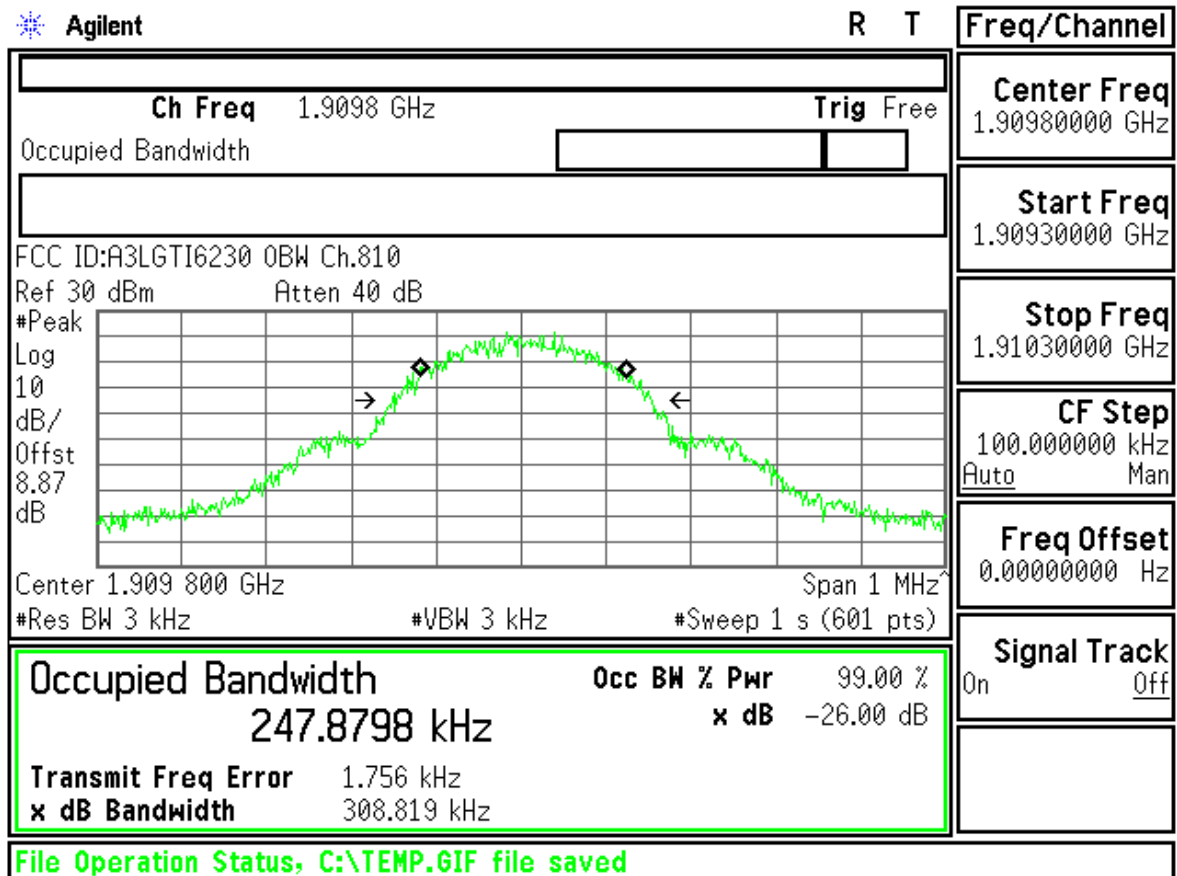
Freq/Channel
Center Freq 1.85020000 GHz
Start Freq 1.84970000 GHz
Stop Freq 1.85070000 GHz
CF Step 100.000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Agilent

R T



Freq/Channel
Center Freq 1.88000000 GHz
Start Freq 1.87950000 GHz
Stop Freq 1.88050000 GHz
CF Step 100.000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off



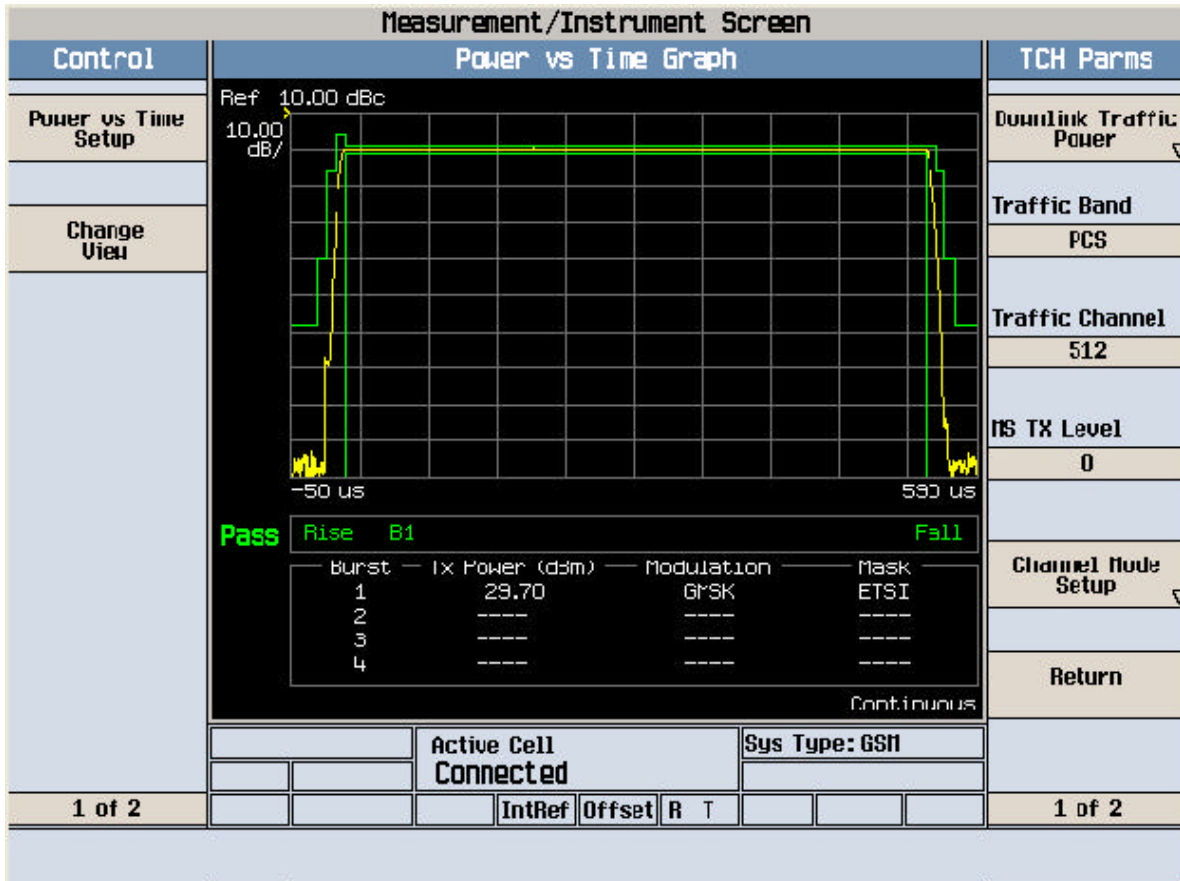
FCC ID : A3LGTI6230 Transmit Power 512CH

Measurement/Instrument Screen												
Control		Transmit Power								TCH Parms		
Transmit Power Setup										Downlink Traffic Power		
										Traffic Band		
										PCS		
										Traffic Channel		
										512		
										MS TX Level		
										0		
										Channel Mode Setup		
										Return		
</												

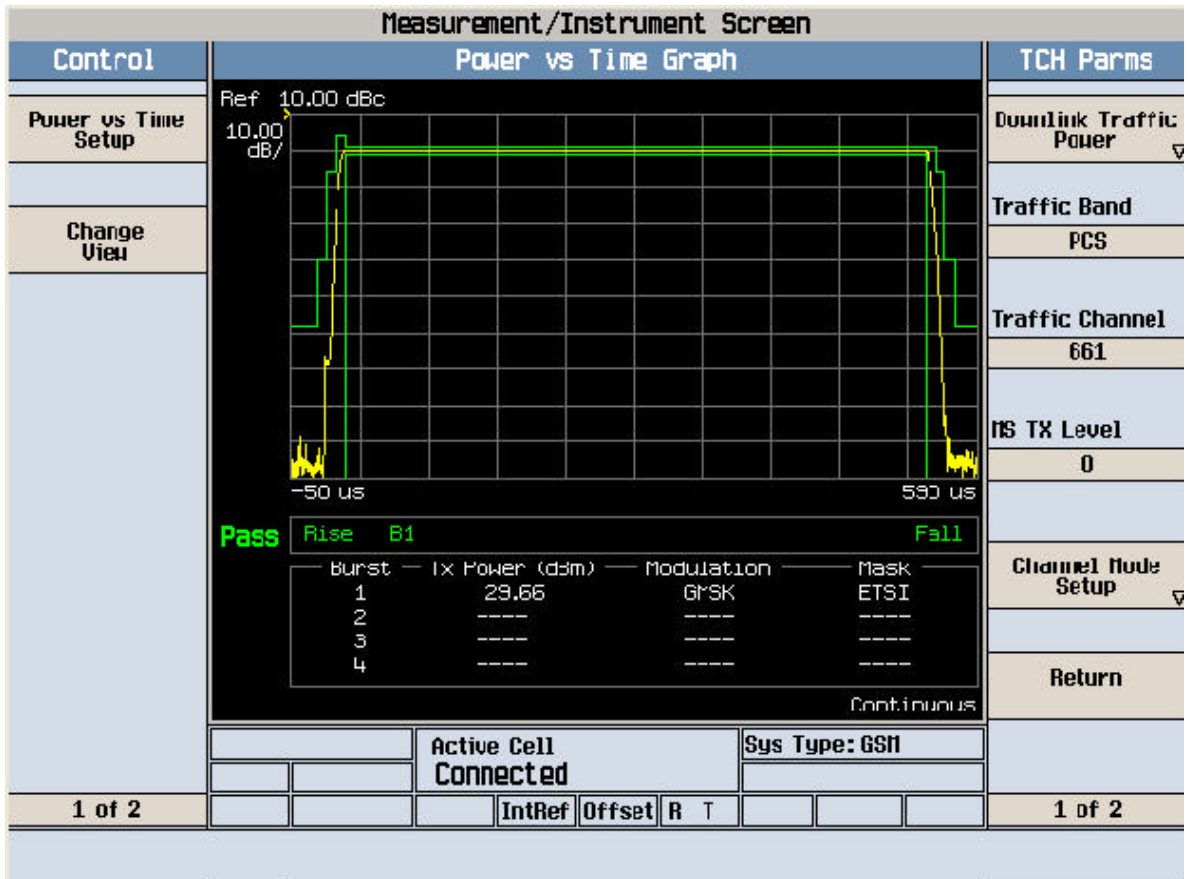
Measurement/Instrument Screen																														
Control		Transmit Power							TCH Parms																					
Transmit Power Setup ▾		<table><tr><td></td><td>Burst 1</td><td>Burst 2</td><td>Burst 3</td><td>Burst 4</td></tr><tr><td>Burst Power</td><td>29.65</td><td>----</td><td>----</td><td>----</td></tr><tr><td>Estimated Carrier Power</td><td>29.65</td><td>----</td><td>----</td><td>----</td></tr></table>								Burst 1	Burst 2	Burst 3	Burst 4	Burst Power	29.65	----	----	----	Estimated Carrier Power	29.65	----	----	----	Downlink Traffic Power ▾						
	Burst 1								Burst 2	Burst 3	Burst 4																			
Burst Power	29.65								----	----	----																			
Estimated Carrier Power	29.65								----	----	----																			
Swap Window Positions		Traffic Band																												
		PCS																												
		Traffic Channel																												
		661																												
		MS TX Level																												
1 of 2		Single							0																					
		<table><tr><td></td><td>Peak Phase °</td><td>RMS Phase °</td><td>Frequency Hz</td></tr><tr><td>Minimum</td><td>4.81</td><td>1.69</td><td>-12.04</td></tr><tr><td>Maximum</td><td>7.53</td><td>2.46</td><td>25.94</td></tr><tr><td>Average</td><td>5.75</td><td>2.11</td><td>7.10</td></tr><tr><td>Pass/Fail</td><td>Pass</td><td>Pass</td><td>Pass</td></tr></table>								Peak Phase °	RMS Phase °	Frequency Hz	Minimum	4.81	1.69	-12.04	Maximum	7.53	2.46	25.94	Average	5.75	2.11	7.10	Pass/Fail	Pass	Pass	Pass	Channel Mode Setup ▾	
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Pass/Fail	Pass	Pass	Pass																											
50 / 50		Single		Return																										
		Active Cell Connected					Sys Type: GSM																							
				IntRef	Offset	R T			1 of 2																					

Measurement/Instrument Screen																															
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										Burst 1	Burst 2	Burst 3	Burst 4																		
									Burst Power	29.94	----	----	----																		
		Estimated Carrier Power	29.94	----	----	----																									
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Pass/Fail	Pass	Pass	Pass																												
810																															
MS TX Level																															
0																															
1 of 2		<table><tr><td colspan="2"></td><td colspan="3">Active Cell Connected</td><td colspan="2">Sys Type: GSM</td></tr><tr><td colspan="2"></td><td colspan="3"></td><td colspan="2"></td></tr><tr><td colspan="2"></td><td>IntRef</td><td>Offset</td><td>R T</td><td colspan="2"></td></tr></table>									Active Cell Connected			Sys Type: GSM											IntRef	Offset	R T			Channel Mode Setup ▾	
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											Active Cell Connected			Sys Type: GSM																	
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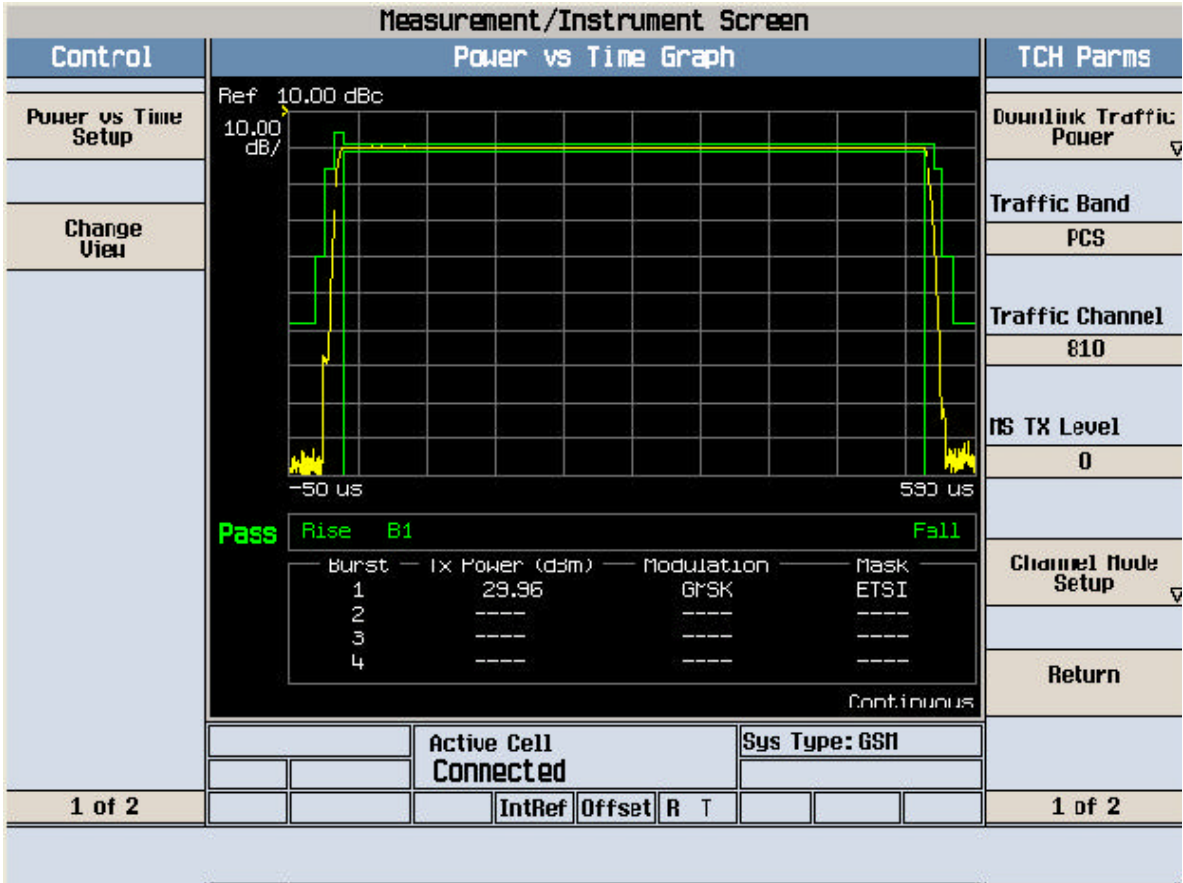
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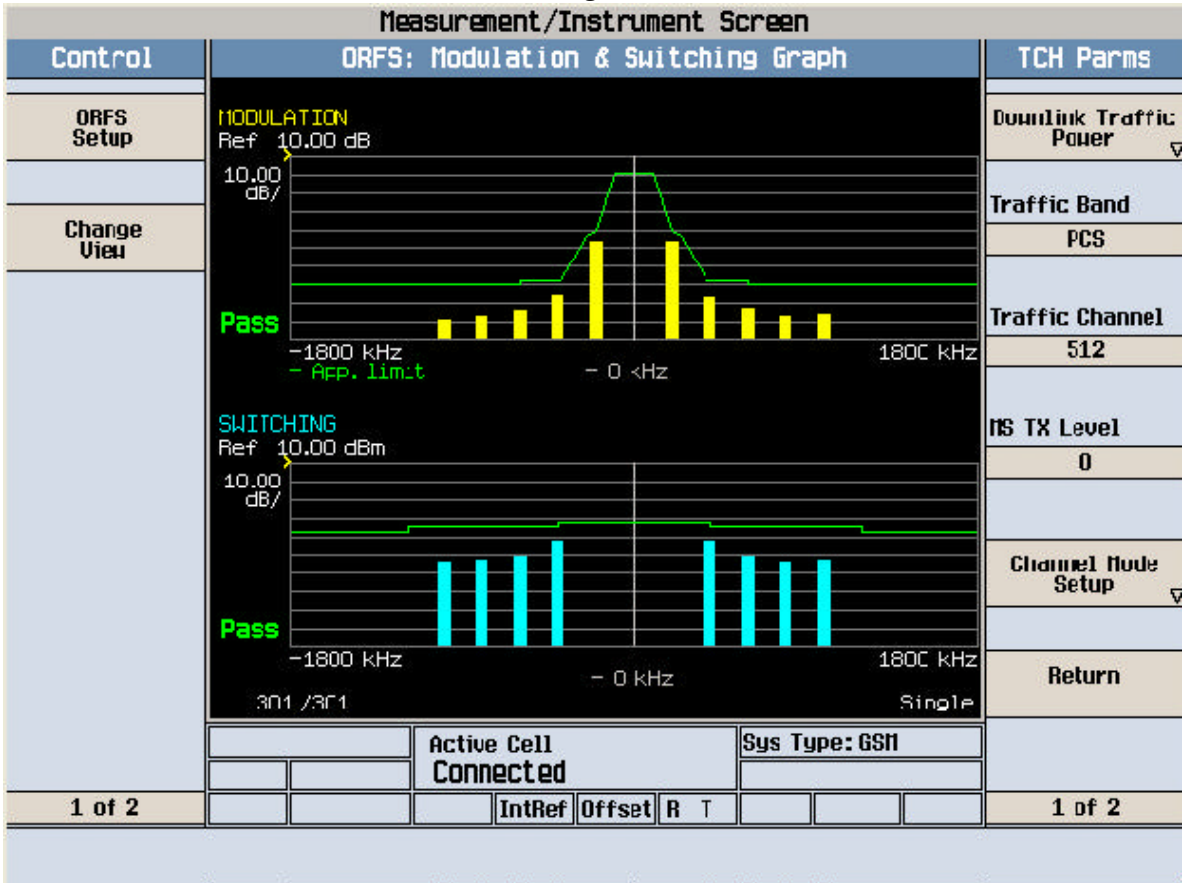
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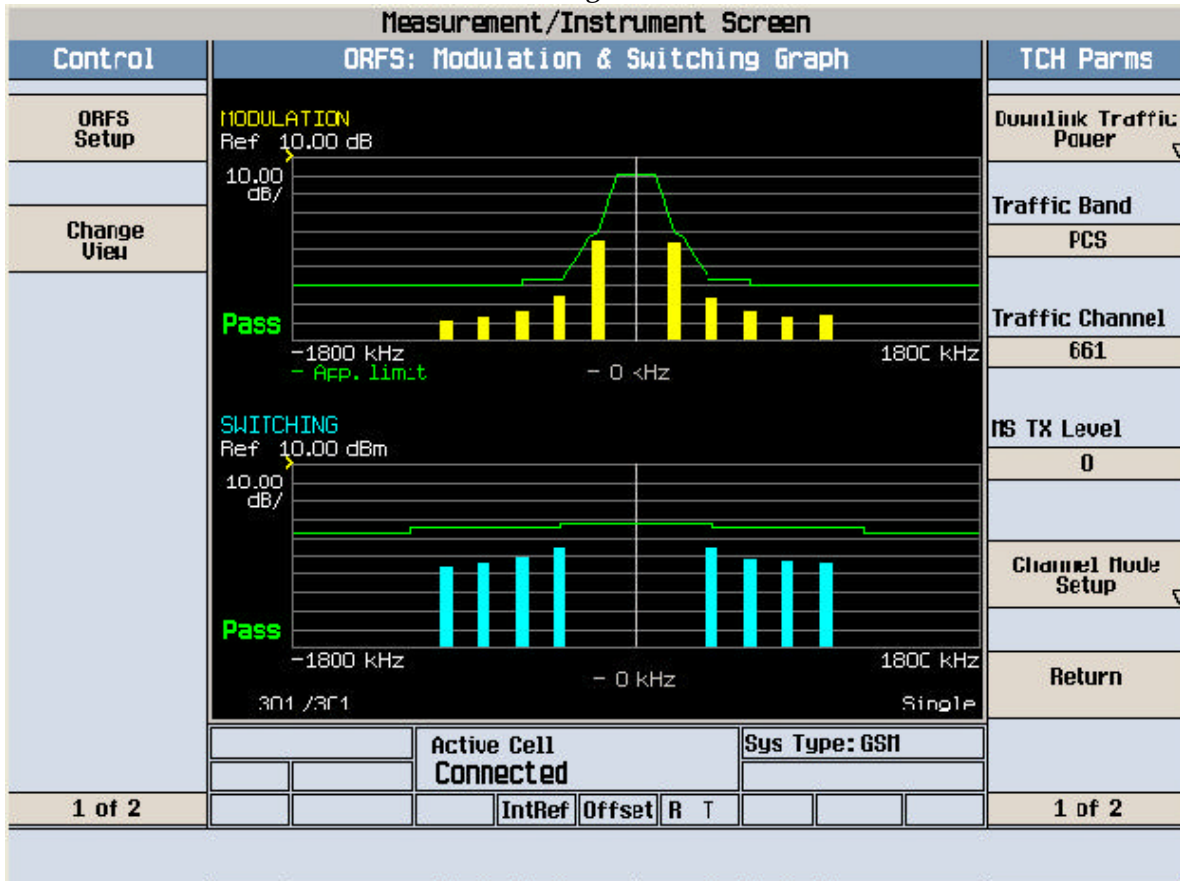
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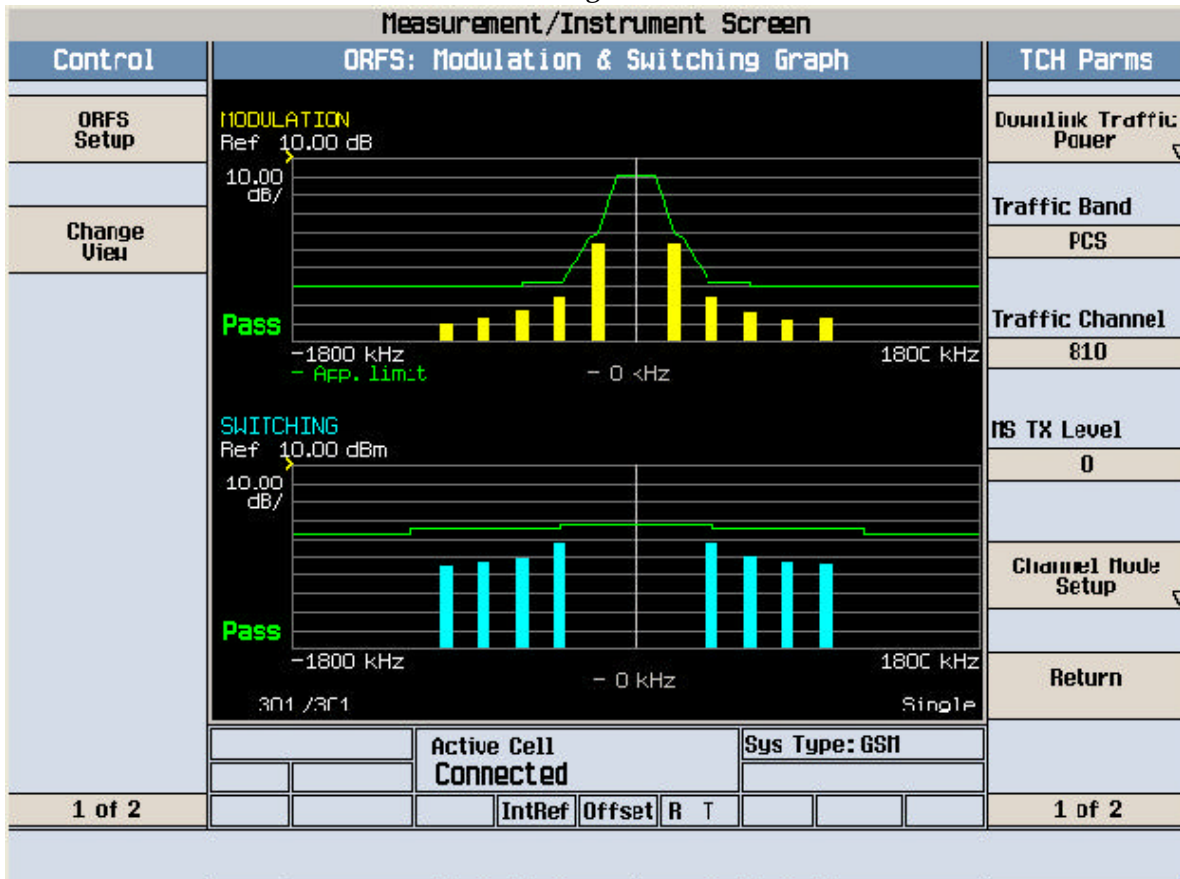
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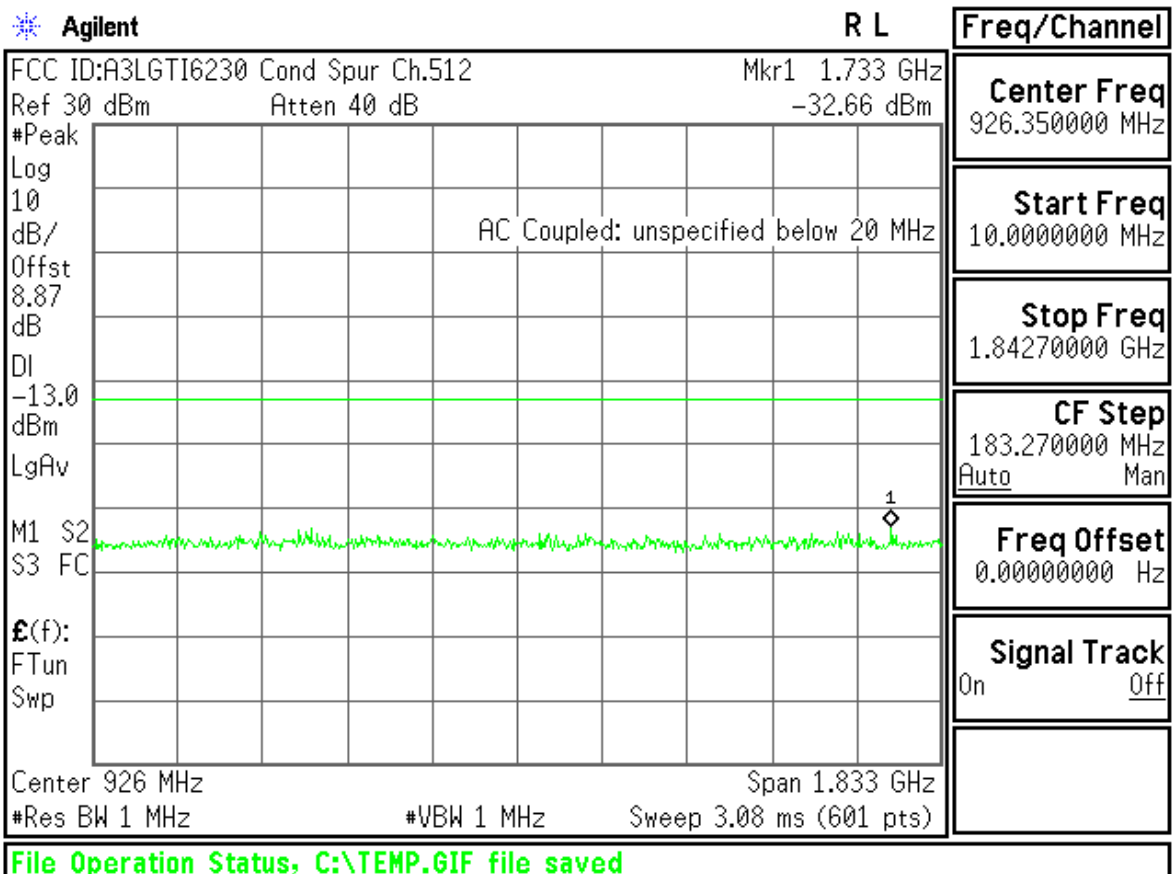
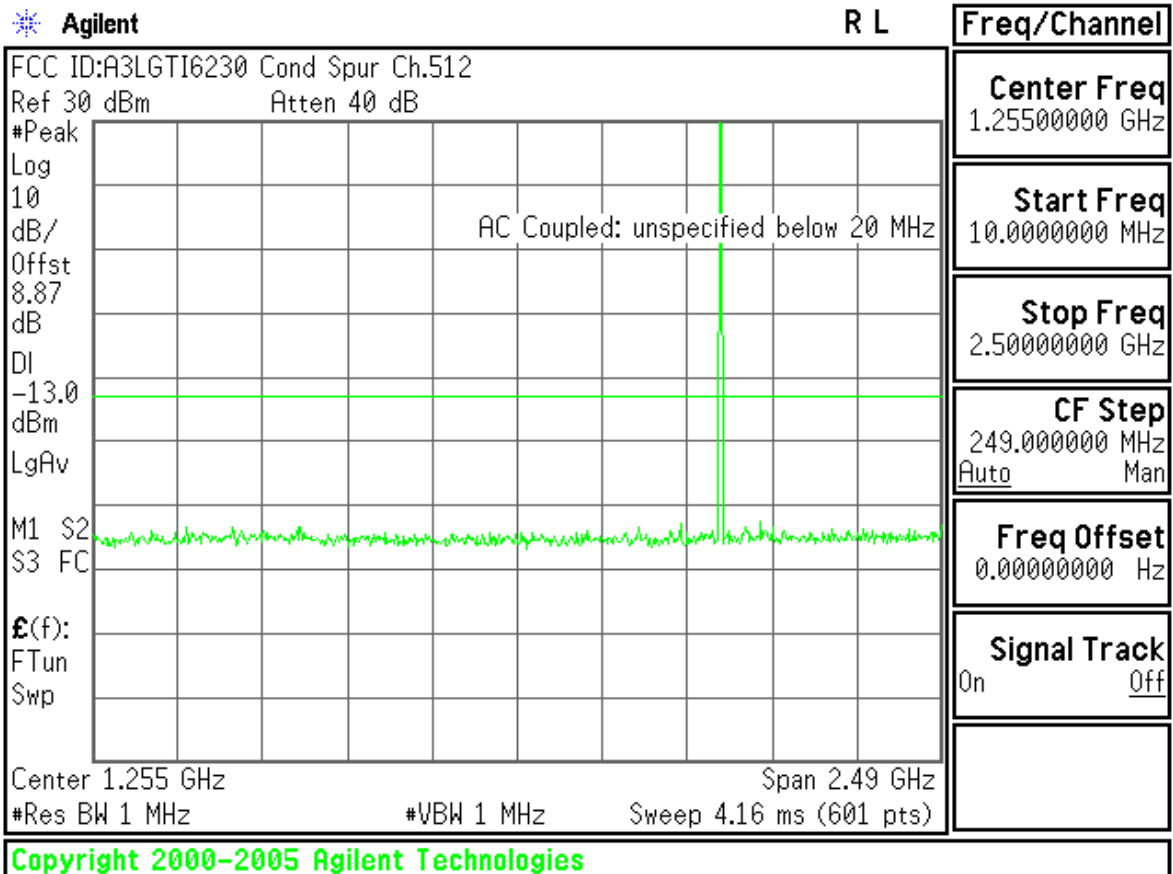


FCC ID : A3LGTI6230 Modulation & Switching 661CH



FCC ID : A3LGTI6230 Modulation & Switching 810CH

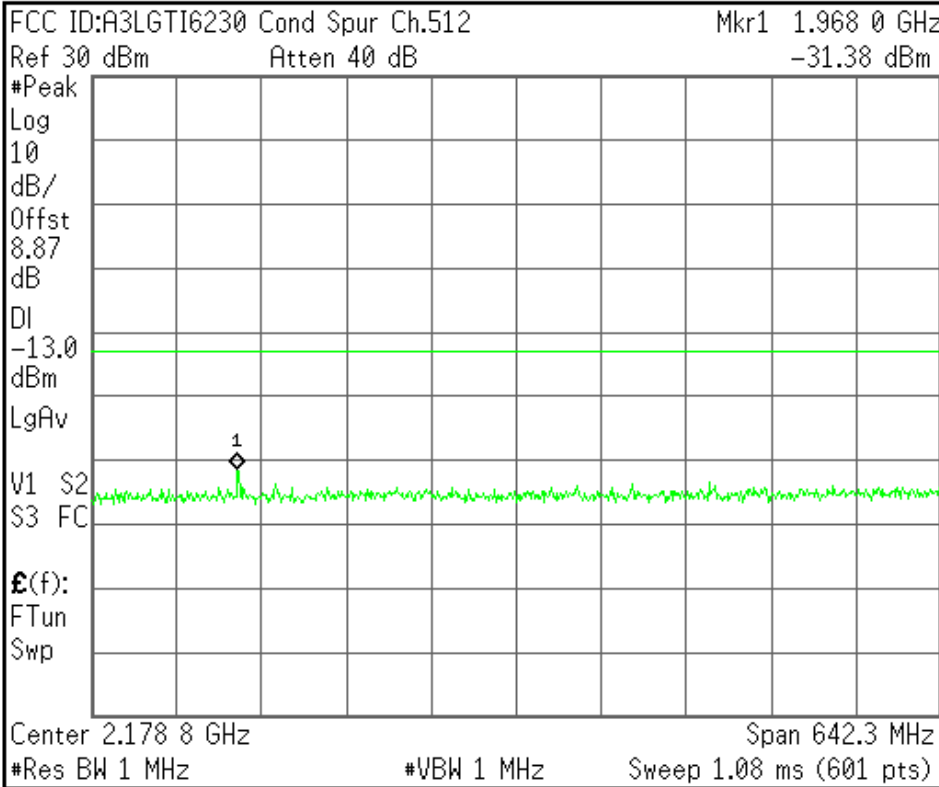




Agilent

R L

Freq/Channel



Center Freq
2.17885000 GHz

Start Freq
1.85770000 GHz

Stop Freq
2.50000000 GHz

CF Step
64.2300000 MHz
Auto Man

Freq Offset
0.00000000 Hz

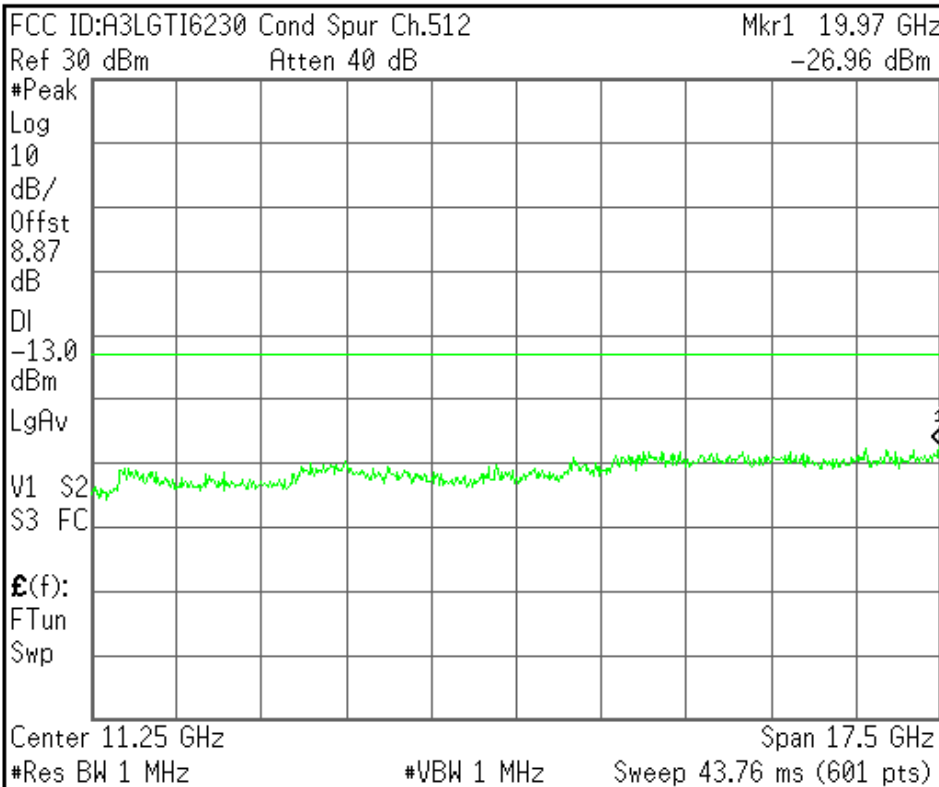
Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



Center Freq
11.2500000 GHz

Start Freq
2.50000000 GHz

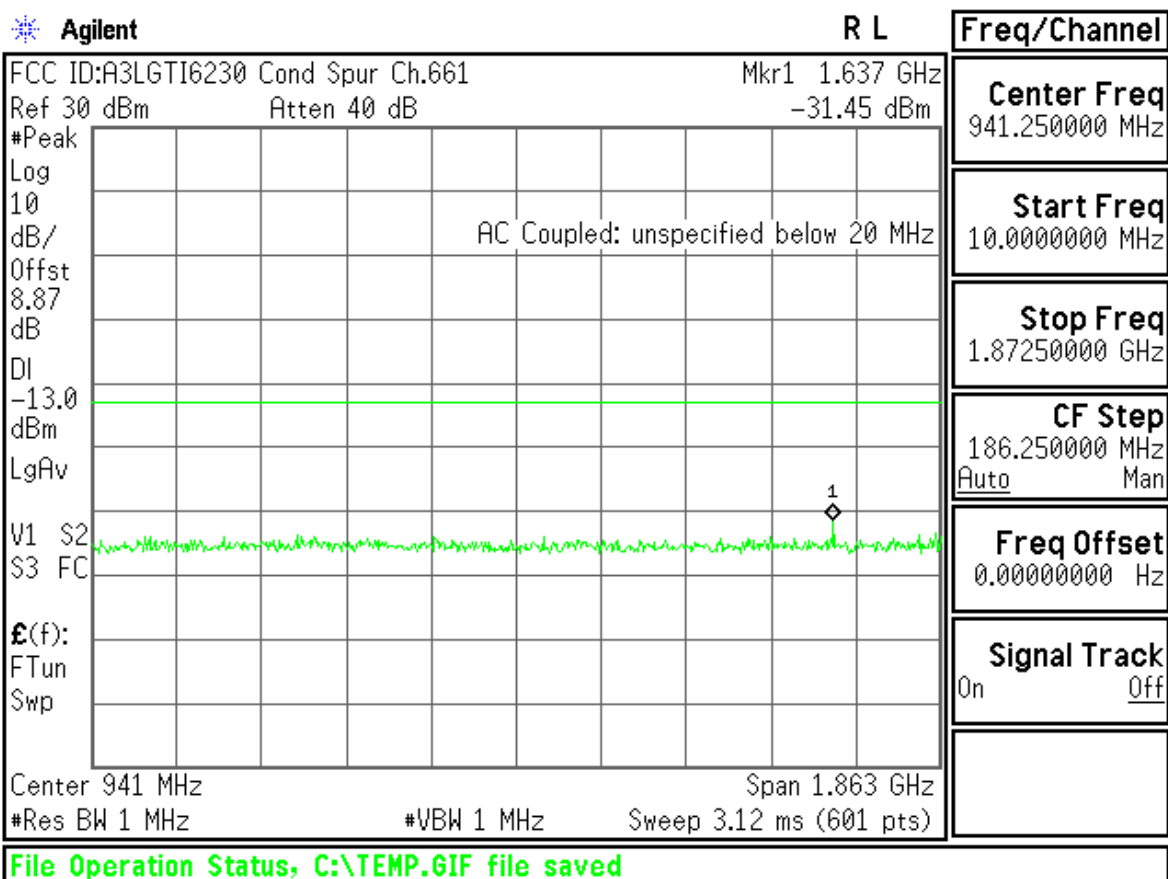
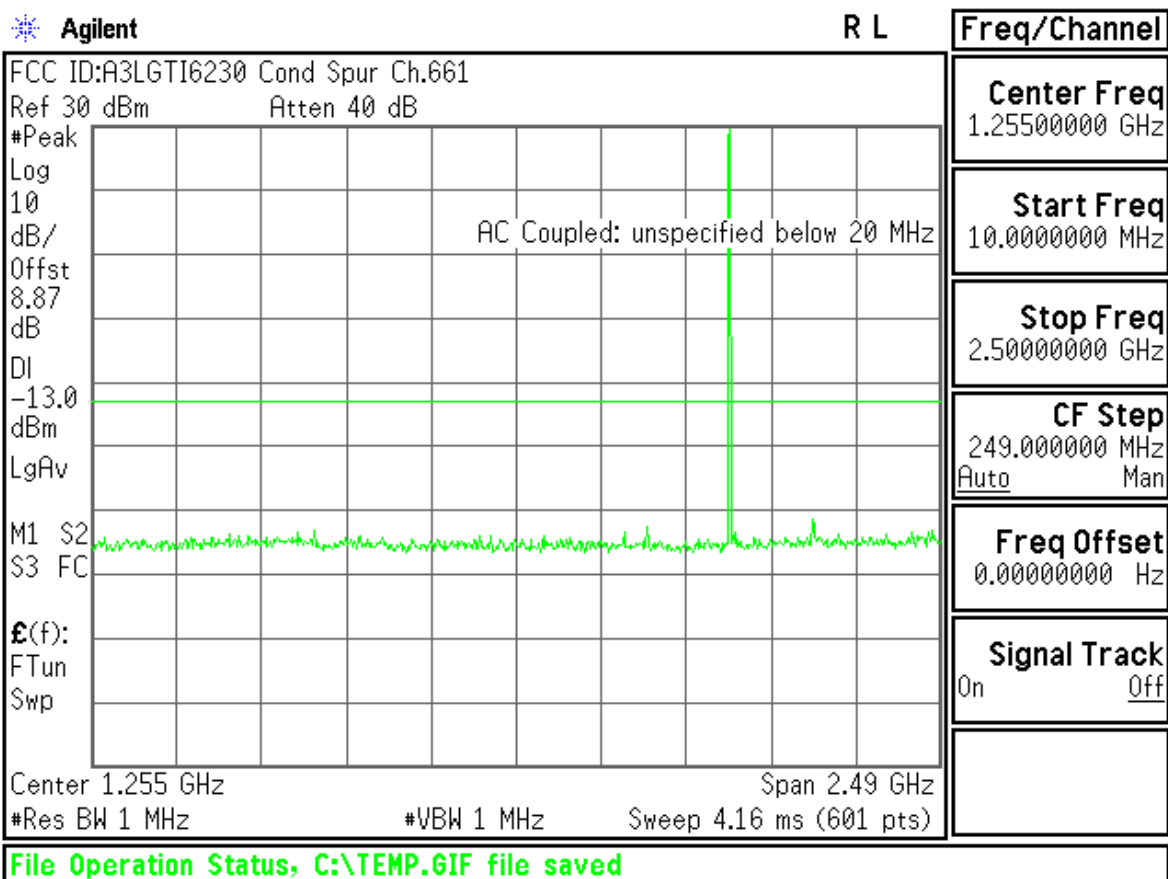
Stop Freq
20.0000000 GHz

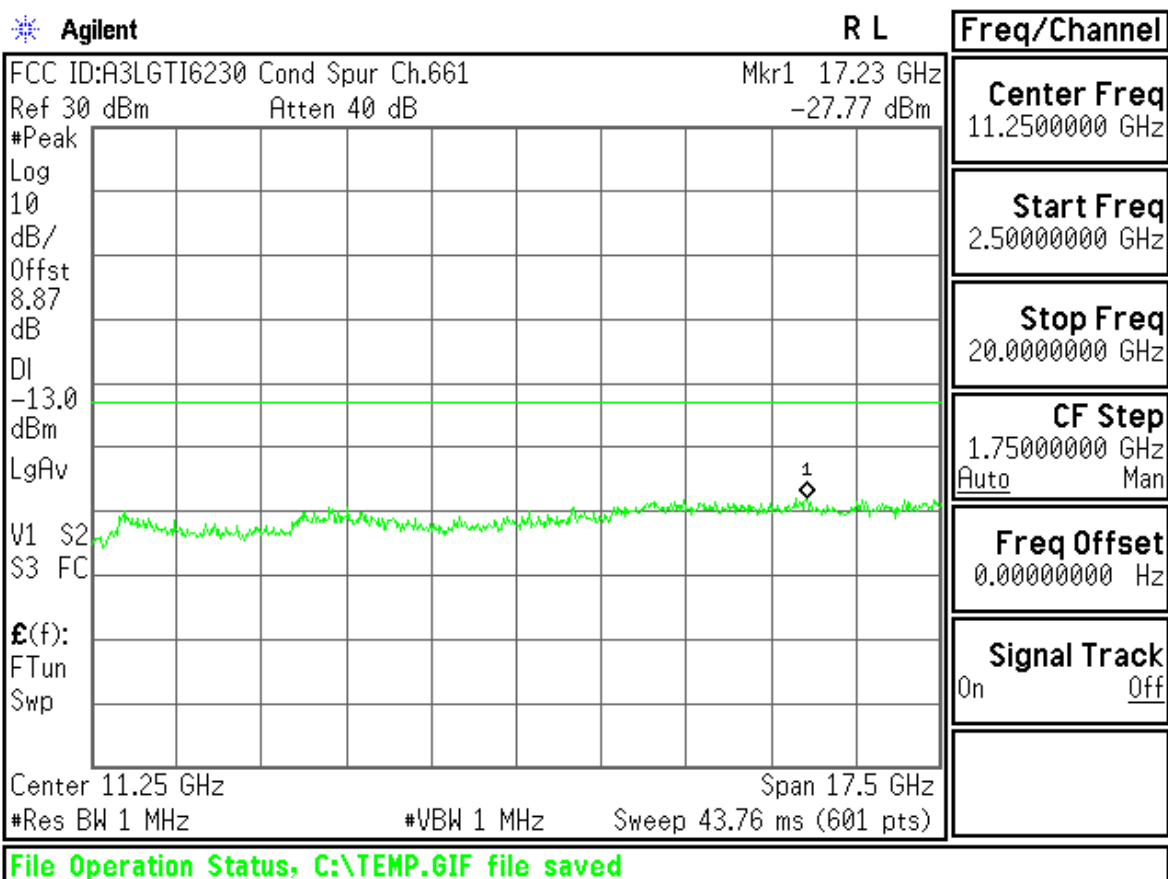
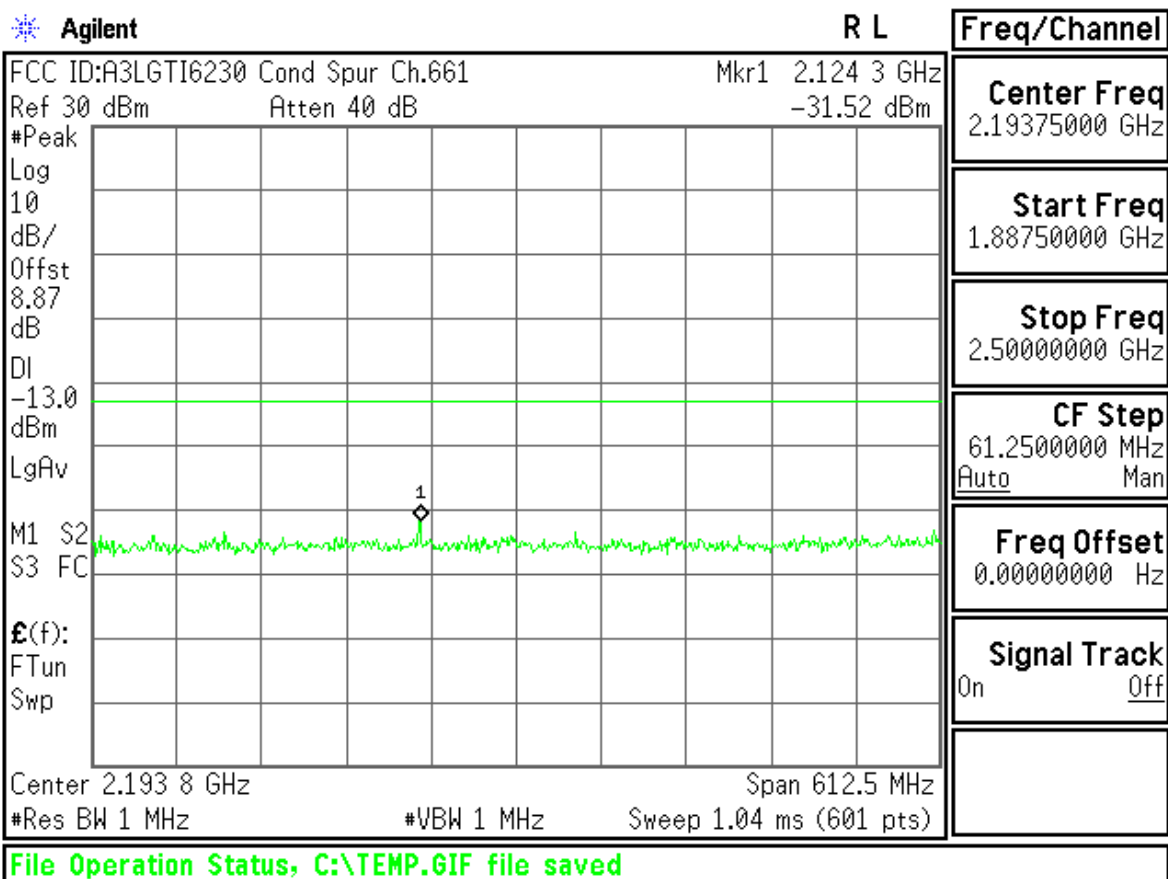
CF Step
1.75000000 GHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved





Agilent

R L

Freq/Channel

FCC ID:A3LGTI6230 Cond Spur Ch.810

Ref 30 dBm

Atten 40 dB

#Peak

Log

10

dB/

Offst

8.87

dB

DI

-13.0

dBm

LgAv

M1 S2

S3 FC

£(f):

FTun

Swp

AC Coupled: unspecified below 20 MHz

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

File Operation Status, C:\TEMP.GIF file saved

Agilent

R L

Freq/Channel

FCC ID:A3LGTI6230 Cond Spur Ch.810

Mkr1 1.789 GHz

Ref 30 dBm

Atten 40 dB

-32.43 dBm

#Peak

Log

10

dB/

Offst

8.87

dB

DI

-13.0

dBm

LgAv

V1 S2

S3 FC

£(f):

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center 956 MHz

Span 1.892 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 3.16 ms (601 pts)

Center Freq
956.150000 MHz

Start Freq
10.0000000 MHz

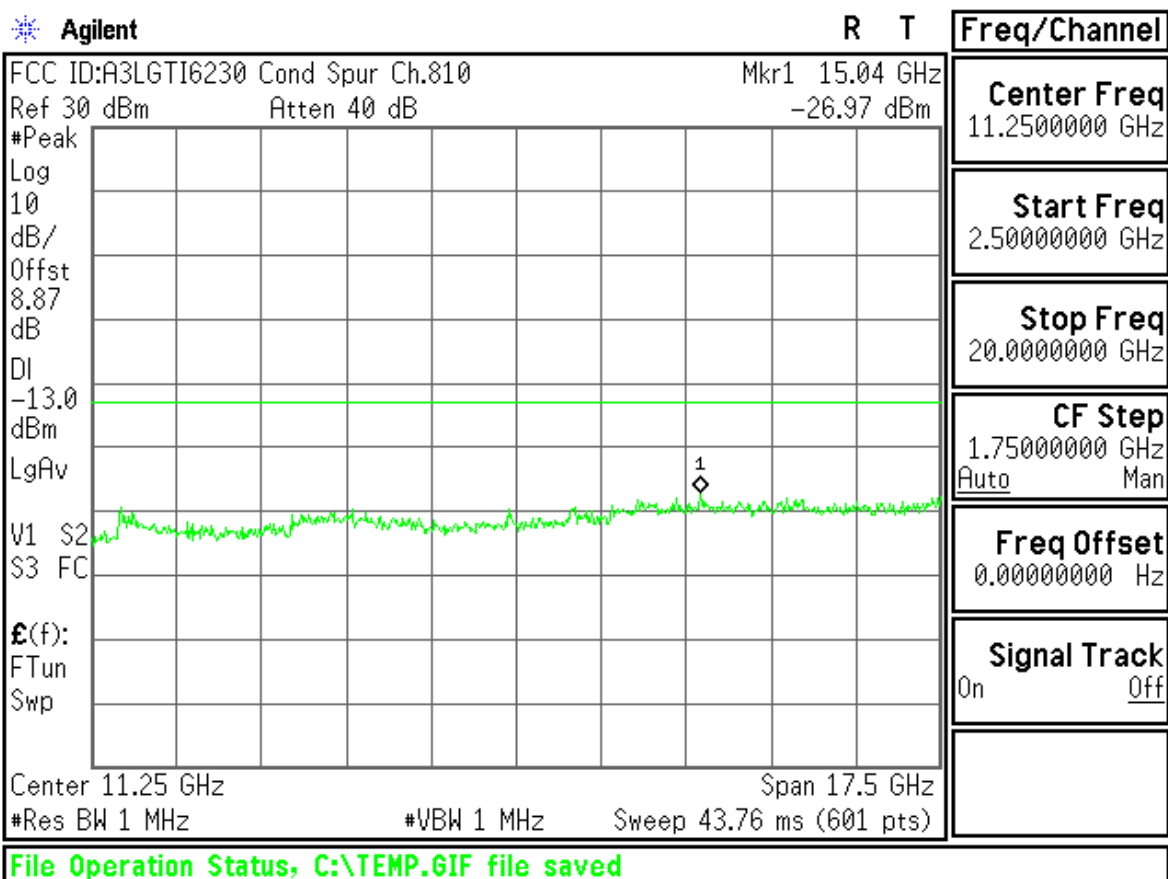
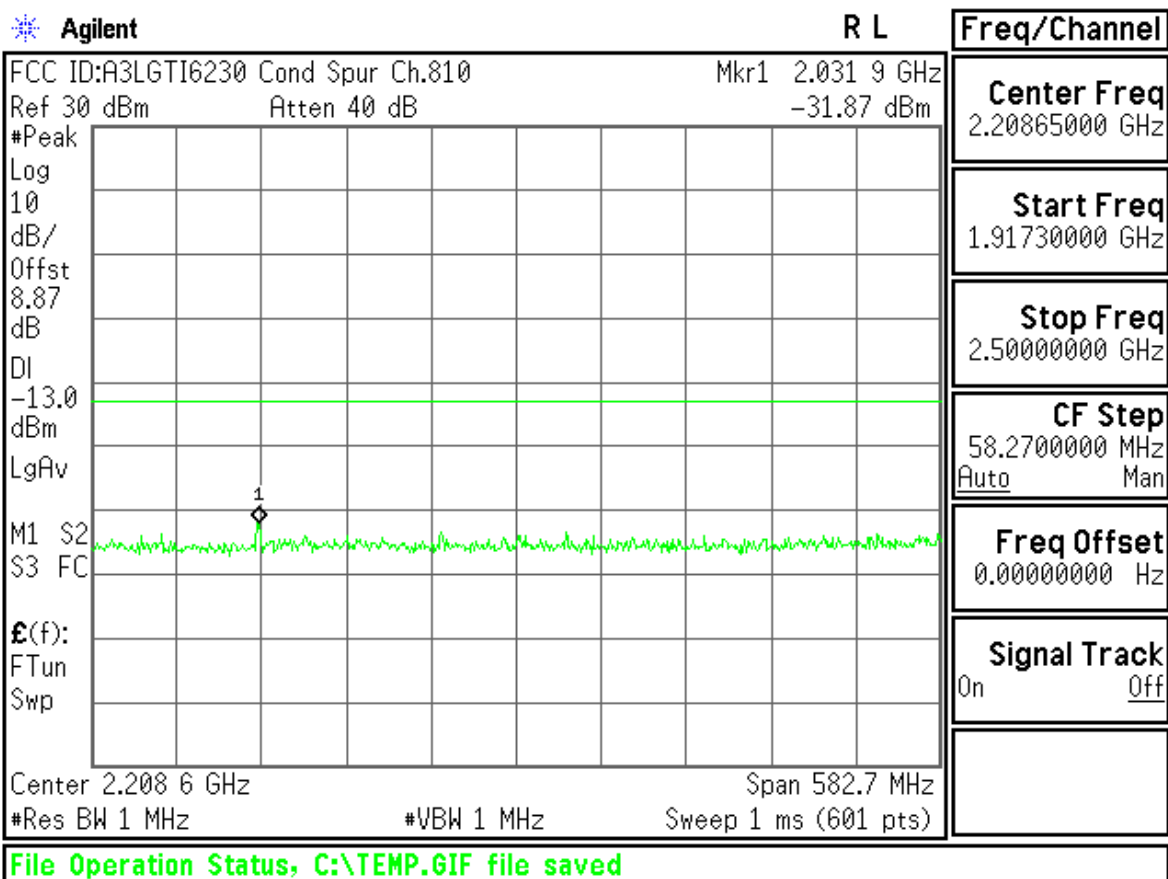
Stop Freq
1.90230000 GHz

CF Step
189.230000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved



Agilent

R L

Freq/Channel

FCC ID:A3LGTI6230 Band Edge Ch.512

Ref 30 dBm

Atten 40 dB

#Avg

Log

10

dB/

Offst

8.87

dB

DI

-13.0

dBm

PAvg

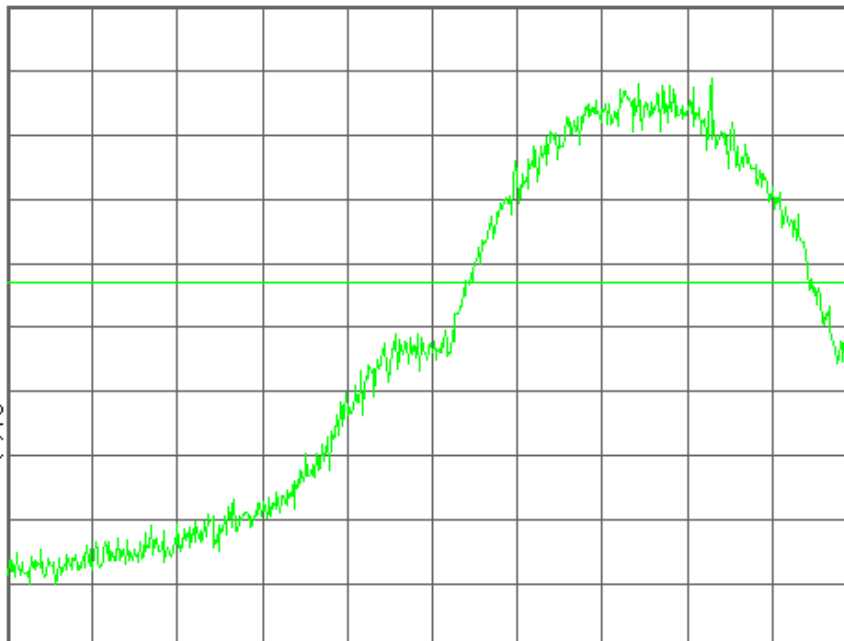
M1 S2

S3 FC

$\mathcal{E}(f)$:

f>50k

Swp



Center 1.850 000 0 GHz

Span 810 kHz

#Res BW 3 kHz

#VBW 3 kHz

Sweep 343.2 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

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LGTI6230 Band Edge Ch.512

Mkr1 1.849 997 3 GHz

Ref 30 dBm

Atten 40 dB

-19.29 dBm

#Avg

Log

10

dB/

Offst

8.87

dB

DI

-13.0

dBm

PAvg

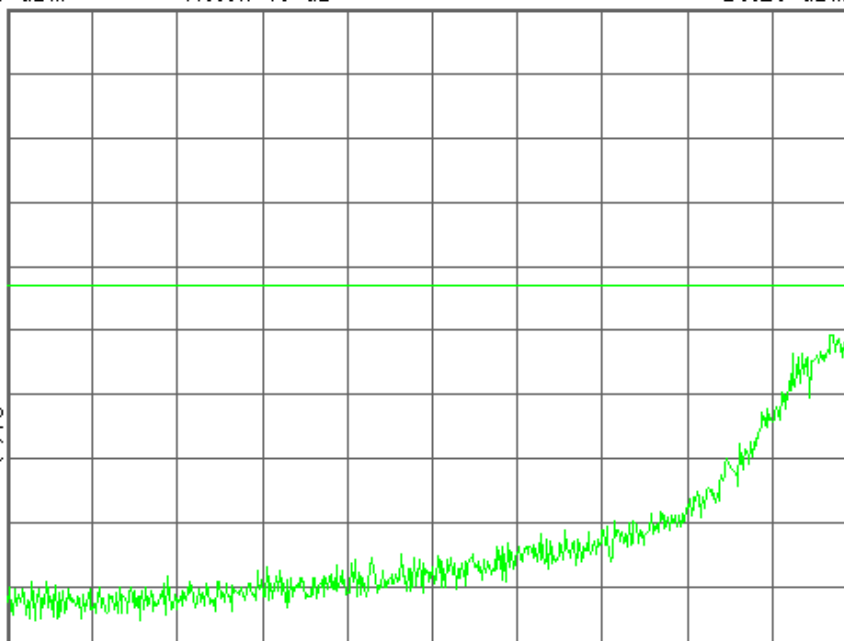
M1 S2

S3 FC

$\mathcal{E}(f)$:

f>50k

Swp



Center 1.849 595 0 GHz

Span 810 kHz

#Res BW 3 kHz

#VBW 3 kHz

Sweep 343.2 ms (601 pts)

Center Freq
1.84959500 GHz

Start Freq
1.84919000 GHz

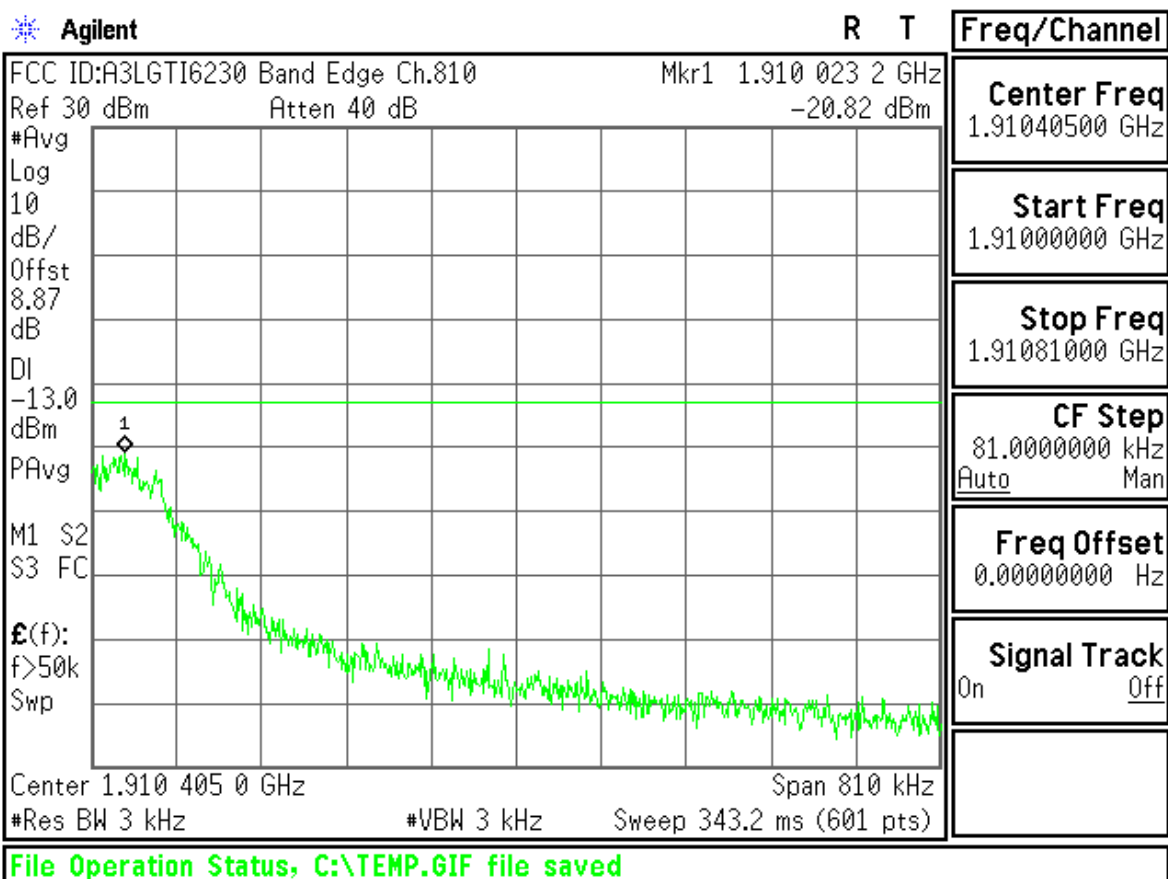
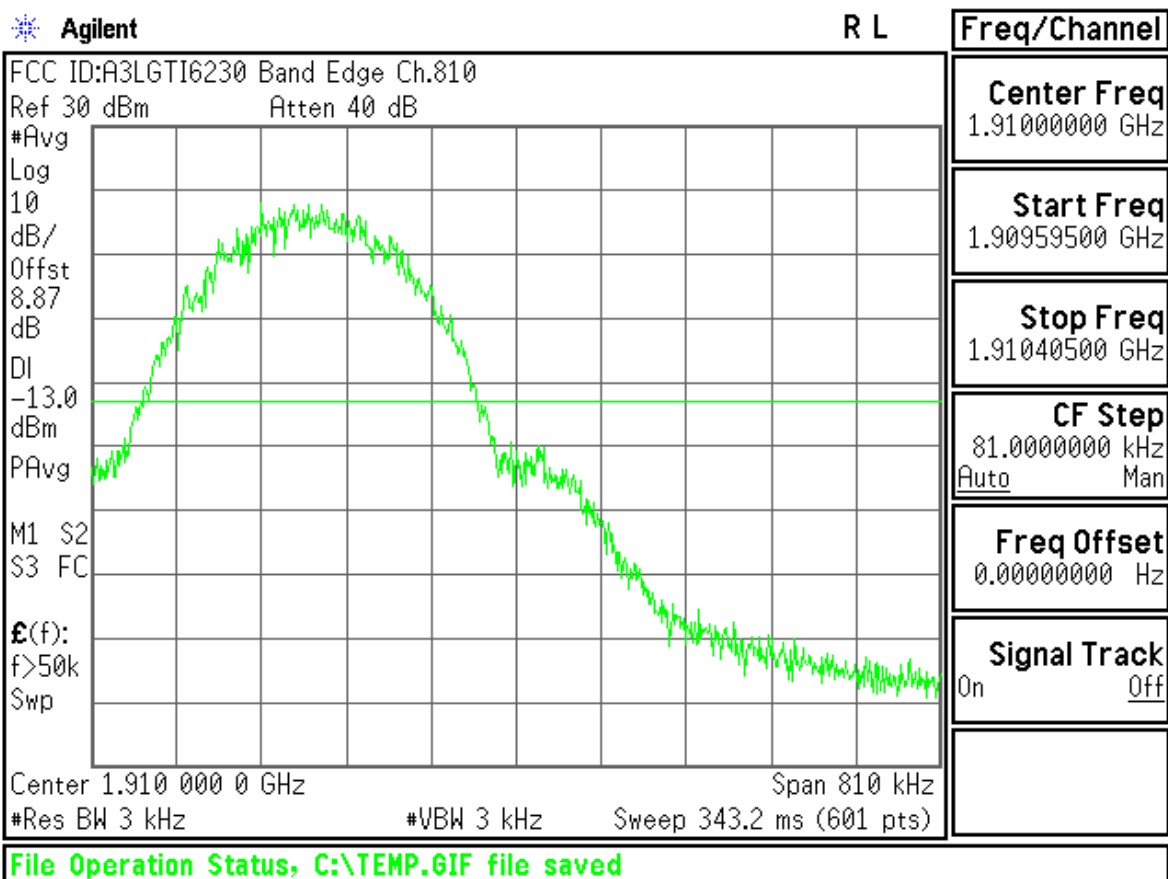
Stop Freq
1.85000000 GHz

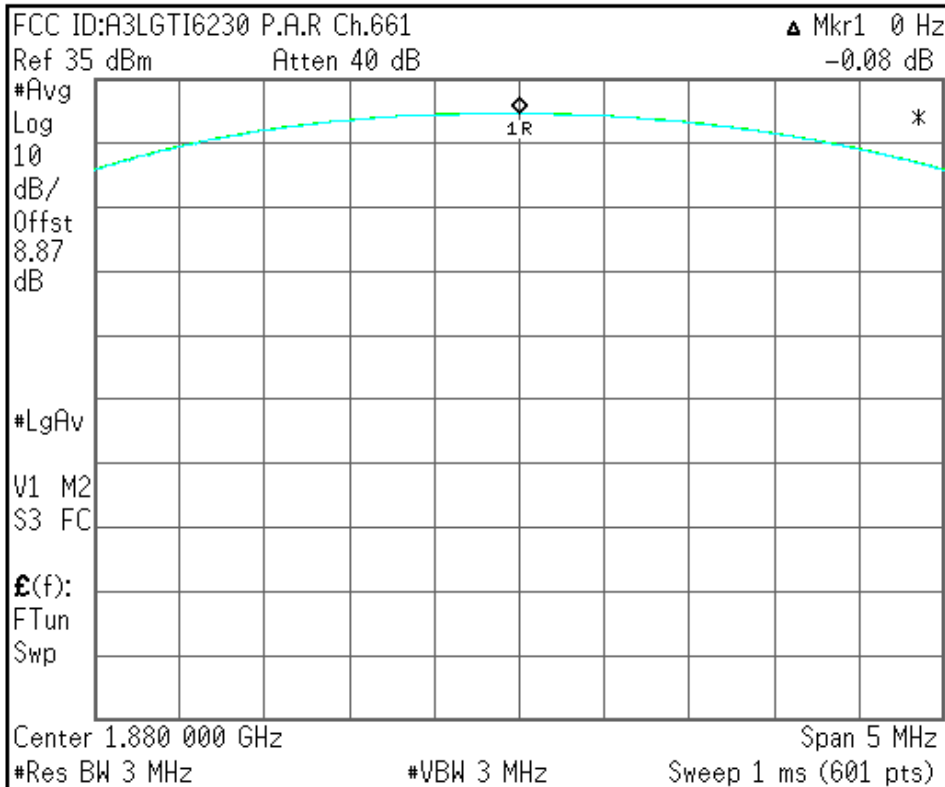
CF Step
81.0000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

File Operation Status, C:\TEMP.GIF file saved





Center Freq
 1.88000000 GHz

Start Freq
 1.87750000 GHz

Stop Freq
 1.88250000 GHz

CF Step
 500.000000 kHz
 Auto Man

Freq Offset
 0.00000000 Hz

Signal Track
 On Off

File Operation Status, C:\TEMP.GIF file saved