






SAMSUNG ELECTRONICS Co., Ltd.,  
Regulatory Compliance Group  
IT R&D Center  
416 Maetan3-Dong,  
Yeongtong-gu, Suwon city,  
Gyeonggi-Do, Korea 442-742

## FCC CFR47 PART 15 SUBPART CERTIFICATION REPORT

Model Tested: SGH-Z310  
FCC ID (Requested): A3LSGHZ310  
Report No: FC-137-R2  
Job No: FC-137  
Date issued: October 12, 2005

- Abstract -

All measurement reported herein accordance with FCC Rules, 47CFR  
Part2, Part15.

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# TABLE OF CONTENT

<b>MEASUREMENT REPORT</b>	<b>Page</b>
<b>1. FCC CERTIFICATION INFORMATION</b>	<b>4</b>
1.1 §2.1033 GENERAL INFORMATION	4
<b>2. INTRODUCTION</b>	<b>4</b>
2.1 SAMSUNG TEST LOCATION	5
2.2 SCOPE	5
2.2 MEASUREMENT PROCEDURE	5
<b>3. TEST EQUIPMENT LIST</b>	<b>6</b>
<b>4. TECHNICAL CHARACTERISTICS TEST</b>	<b>7</b>
4.1 20dB BANDWIDTH	7
4.1.1 LIMIT	7
4.1.2 TEST SET-UP	7
4.1.3 TEST PROCEDURE	7
4.1.4 TEST RESULT	7
4.2 OUTPUT POWER MEASUREMENT	8
4.2.1 LIMIT	8
4.2.2 TEST SET-UP	8
4.2.3 TEST PROCEDURE	8
4.2.4 TEST RESULT	8
4.3 CONDUCTED SPURIOUS EMISSION TEST	9
4.3.1 LIMIT	9
4.3.2 TEST SET-UP	9
4.3.3 TEST PROCEDURE	9
4.3.4 TEST RESULT	9
4.4 BAND EDGE COMPLIANCE	10
4.4.1 LIMIT	10
4.4.2 TEST SET-UP	10
4.4.3 TEST PROCEDURE	10
4.4.4 TEST RESULT	10
4.5 NUMBER OF HOPPING CHANNELS	11
4.5.1 LIMIT	11
4.5.2 TEST SET-UP	11
4.5.3 TEST PROCEDURE	11
4.5.4 TEST RESULT	11

4.6 CHANNEL SEPARATION TEST	12
4.6.1 LIMIT	12
4.6.2 TEST SET-UP	12
4.6.3 TEST PROCEDURE	12
4.6.4 TEST RESULT	12
4.7 DWELL TIME	13
4.7.1 LIMIT	13
4.7.2 TEST SET-UP	13
4.7.3 TEST PROCEDURE	13
4.7.4 TEST RESULT	13
4.8 RADIATED HARMONIC MEASUREMENTS	14
4.8.1 LIMIT	14
4.8.2 TEST SET-UP	14
4.8.3 TEST PROCEDURE	14
4.8.4 TEST RESULT	15
<b>5. CONCLUSION</b>	<b>16</b>
<b>6. TEST PLOTS</b>	<b>17</b>



# MEASUREMENT REPORT

## 1. FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part15, Subpart C

### 1.1 §2.1033 GENERAL INFORMATION

- Applicant Name: SAMSUNG ELECRONICS CO., LTD.
- Address: 416 Maetan3-Dong, Yeongtong-gu, Suwon City  
Gyeonggi-Do, Korea 442-742
- Attention: SungJoo KIM, Engineering Manager (QA Lab)
- FCC ID: A3LSGHZ310
  
- Quantity: Quantity production is planned.
- Equipment (EUT) Type: Single-Band PCS GSM/EDGE Phone with Bluetooth
- This Bluetooth Module has been tested by Bluetooth Qualification Lab, and we confirm the following:
  - A) The hopping sequence is pseudorandom
  - B) All Channels were used equally on average
  - C) The receiver input bandwidth equals the transmit bandwidth
  - D) the receiver hops in sequence with the transmit signal
- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) stream.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channel selection/hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
  
- FCC Classification(s): FCC Part15 Spread Spectrum Transceiver (DSS)
- Frequency Range: 2402 ~ 2480MHz(Bluetooth)
- Max. Output Power: 0.00062W(-2.09dBm) Conducted
- FCC Rule Part(s): §15.247, §2
- Dates of Test: October 12. 2005
- Place of Test: SAMSUNG Lab,
- Test Report S/N: FC-137-R2

- End of page -

## 2. INTRODUCTION

### 2.1 SAMSUNG TEST LOCATION

These measurement test were conducted at the **SAMSUNG ELECTRONICS CO., LTD(SUWON)**. The site address is 416 Maetan3-Dong, Yeongtong-gu, Suwon City, Gyeonggi-Do, Korea 442-742. The site has 1 Fully-anechoic chamber and measurement facility.

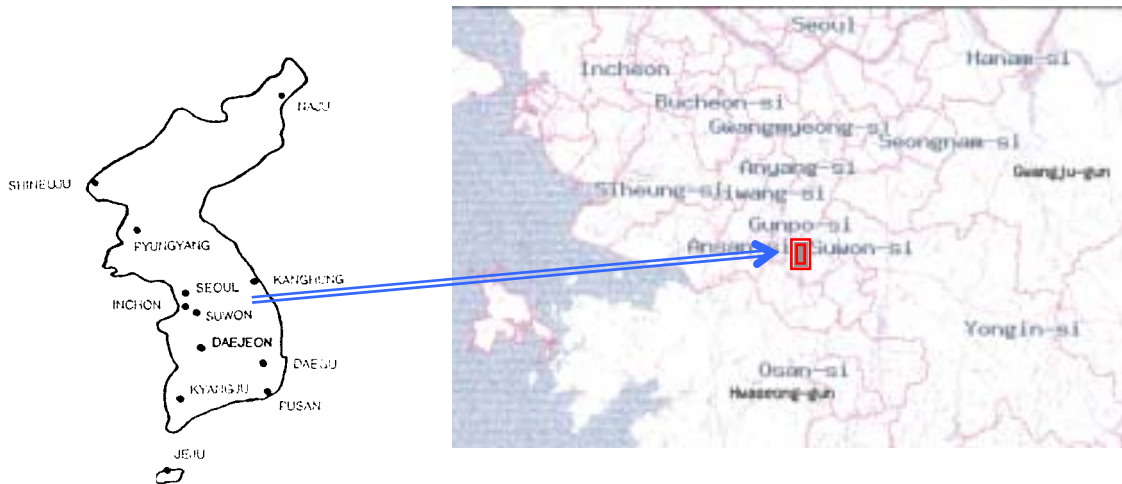


Figure1. Map of the Suwon City area.

### 2.2 SCOPE

All measurement tests were conducted at the SAMSUNG Lab, except Radiated Emission & Conducted Emission test. RE and CE measurement test reports are issued separately.

### 2.3 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.



Figure2. Photograph of 3m Fully Anechoic Chamber

- End of page -



### 3. TEST EQUIPMENT LIST

Name of Equipment	Model	Serial No.	Due Date
Spectrum Analyzer	ESI26	836119/010	2006-09-26
	E4440A(3Hz~26.5GHz)	MY41000236	2005-10-27
	E4440A(3Hz~26.5GHz)	MY41000233	2005-11-04
Signal Generator	SMR20	835197/030	2006-01-18
Pre-Amplifier	8449B	3008A00691	2006-01-11
Antenna Master	MA0001	ANT0967	Not Required
Controller	HD100	100/756	Not Required
Horn Antenna	HF906	100134	2006-04-25
High Pass Filter	WHK/3.5/18G-10SS	3	Not Required
	WHK/3.5/18G-10SS	4	Not Required
Shielded Fully-Anechoic Chamber	RF0002	ANT0001	Not Required
Power Meter	E4419B	GB41293846	2006-09-07
Power sensor	8481B	3318A10325	2006-09-08
Power sensor	8485A	3318A19924	2006-09-08
Network Analyzer	8753E	JP38160590	2006-06-30
Power Supply	E3640A	MY40003595	2006-06-16
Power Supply	E3640A	MY40003594	2006-06-29
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	838115/081	2006-04-08

## 4. TECHNICAL CHARACTERISTICS TEST

### 4.1 20dB BANDWIDTH

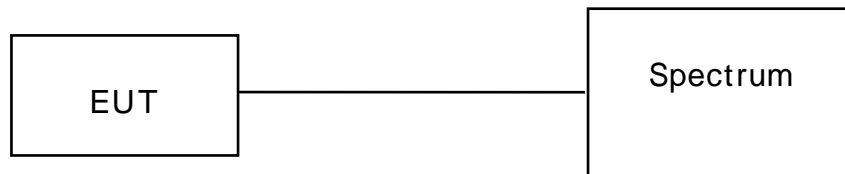
FCC Part15, Subpart C Section 15.247(a)

#### 4.1.1 LIMIT

For frequency hopping system operation in the 2400-2483.5MHz and 5725-5850MHz bands, the maximum 20dB bandwidth of the hopping channels is 1MHz.

Frequency(MHz)	Channel no.	20dB Bandwidth LIMIT(kHz)
2402	0	<1000
2441	39	<1000
2480	78	<1000

#### 4.1.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable.

#### 4.1.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one proper frequency within its operating range.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the highest peak value.
4. Repeat above procedures until all frequencies measured were complete.

#### 4.1.4 TEST RESULT

Frequency(MHz)	Channel no.	20dB Bandwidth(kHz)	20dB Bandwidth LIMIT(kHz)	Pass/Fail
2402	0	874	<1000	Pass
2441	39	885	<1000	Pass
2480	78	868	<1000	Pass

## 4.2 OUTPUT POWER MEASUREMENT

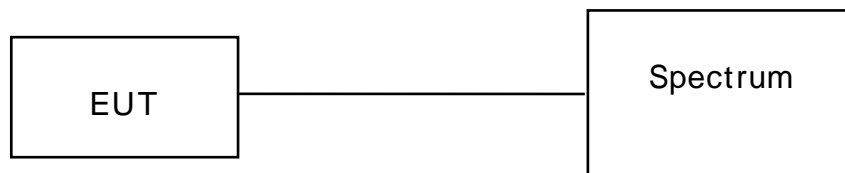
FCC Part15, Subpart C Section 15.247(b)

### 4.2.1 LIMIT

For frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz BAND : 1 Watt (30dBm)

Frequency Range(MHz)	2400~2483.5
Quantity of Hopping Channel	>75
Limit(W)	1

### 4.2.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable

### 4.2.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn the EUT and connect it to measurement instrument. Then set it to any one proper frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 3MHz VBW.

### 4.2.4 TEST RESULT

Frequency(MHz)	Channel no.	Power Output(dBm)	Power Output LIMIT(dBm)	Pass/Fail
2402	0	-4.49	<30	Pass
2441	39	-2.70	<30	Pass
2480	78	-2.09	<30	Pass

### 4.3 CONDUCTED SPURIOUS EMISSION TEST

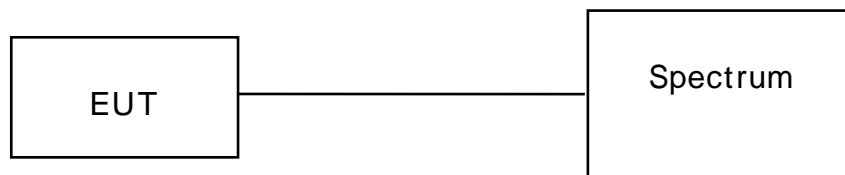
FCC Part15, Subpart C Section 15.247(d)

#### 4.3.1 LIMIT

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Frequency(MHz)	Channel no.	LIMIT (30MHz – 25GHz)
2402	0	>20dBc
2441	39	>20dBc
2480	78	>20dBc

#### 4.3.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable

#### 4.3.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. The transmitter output was connected to the spectrum analyzer via a low loss cable.
3. Turn the EUT and connect it to measurement instrument. Then set it to any one proper frequency within its operating range.

#### 4.3.4 TEST RESULT

Frequency(MHz)	Channel no.	Actual attenuation below frequency of operation(dBc)	LIMIT (30MHz – 25GHz)	Pass/Fail
2402	0	58.35	>20dBc	Pass
2441	39	58.98	>20dBc	Pass
2480	78	54.28	>20dBc	Pass

## 4.4 BAND EDGE COMPLIANCE

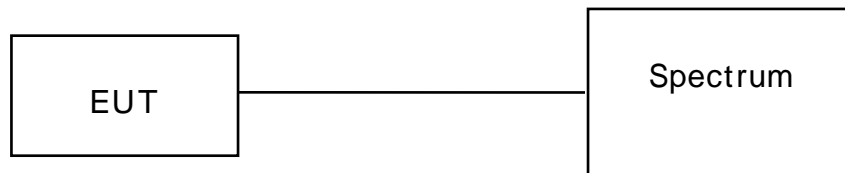
FCC Part15, Subpart C Section 15.247(d)

### 4.4.1 LIMIT

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Frequency Range(MHz)	2400~2483.5
Band edge LIMIT(dBc)	>20

### 4.4.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable

### 4.4.3 TEST PROCEDURE

1. Turn the EUT and connect it to measurement instrument. Then set it to any one proper frequency within its operating range.
2. The transmitter output was connected to the spectrum analyzer via a low loss cable.
3. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100MHz bandwidth from band edge.

### 4.4.4 TEST RESULT

Frequency(MHz)	Result of Band edge(dBc)	Band edge LIMIT(dBc)	Pass/Fail
<2400	61.50	>20	Pass
>2483.5	65.42	>20	Pass

## 4.5 NUMBER OF HOPPING CHANNELS

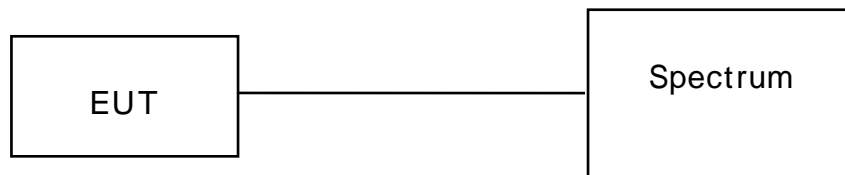
FCC Part15, Subpart C Section 15.247(a)

### 4.5.1 LIMIT

At least 75 hopping frequencies

Frequency Range(MHz)	2400~2483.5
LIMIT(Quantity of Hopping Channel)	>75

### 4.5.2 TEST SET -UP



The EUT was connected to a spectrum through a 50ohm RF cable

### 4.5.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operation range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode.

### 4.5.4 TEST RESULT

HOPPING CHANNEL FREQUENCY RANGE(MHz)	QUANTITY OF HOPPING CHANNEL READ VALUE	QUANTITY OF HOPPING CHANNEL LIMIT	Pass/Fail
2400~2483.5	79	>75	Pass

## 4.6. CHANNEL SEPARATION TEST

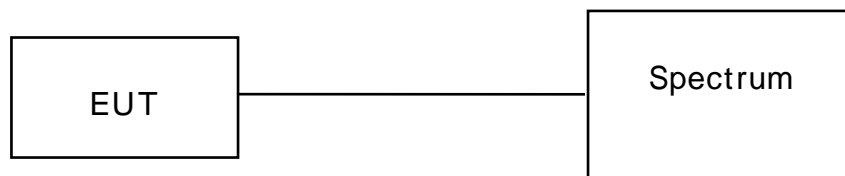
FCC Part15, Subpart C Section 15.247(a)

### 4.6.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Frequency Range(MHz)	2400~2483.5
LIMIT(KHz)	>25

### 4.6.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable

### 4.6.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one proper frequency within its operating range.
3. By using the Max Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARKER function.

### 4.6.4 TEST RESULT

CHANNEL NUMBER	CHANNEL FREQUENCY	SEPARATION READ VALUE(KHz)	SEPARATION LIMIT(KHz)	Pass/Fail
39	2441	1000	>25	Pass

## 4.7. DWELL TIME

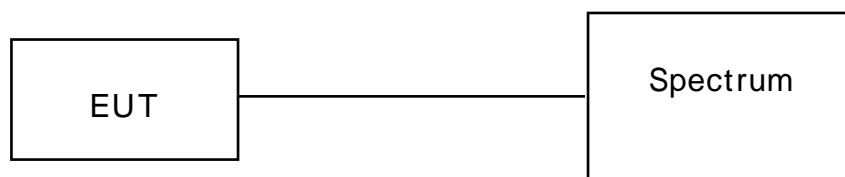
FCC Part15, Subpart C Section 15.247

### 4.7.1 LIMIT

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

Frequency Range(MHz)	2400~2483.5
LIMIT(ms)	<400

### 4.7.2 TEST SET - UP



The EUT was connected to a spectrum through a 50ohm RF cable

### 4.7.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operation range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency.

### 4.7.4 TEST RESULT

CHANNEL NUMBER	CHANNEL FREQUENCY(MHz)	Time of occupancy (Dwell Time) (ms)	Time of occupancy limit(ms)	Pass/Fail
39	2441.00	166.481	<400	Pass

## 4.8 RADIATED HARMONIC MEASUREMENT

FCC Part15, Subpart C Section 15.249, 15.209

### 4.8.1 LIMIT

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

FUNDAMENTAL FREQUENCY(MHz)	FIELD STRENGTH OF HARMONICS(dBuV/m) (at 3m)
2400~2483.5	<54

### 4.8.2 TEST SET - UP

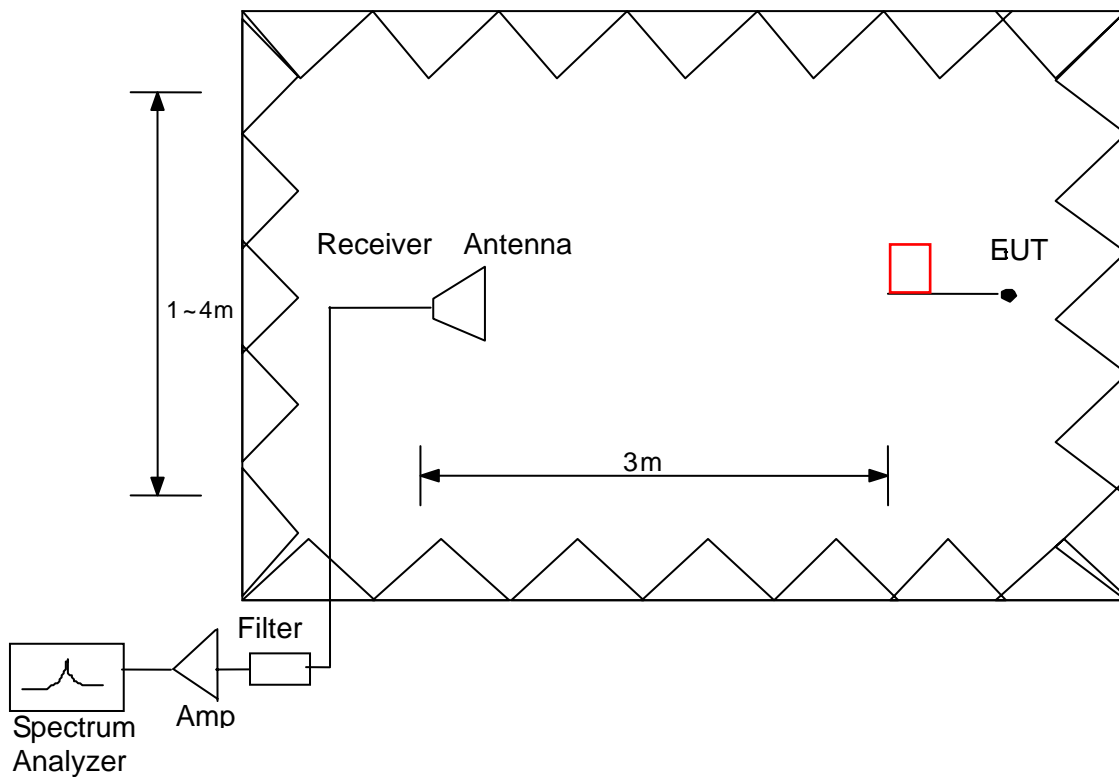


Figure 3. Diagram of Radiated harmonic test Set-up

### 4.8.3 TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 1 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the receiver antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.



5. The test-receiver system was set to Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

#### 4.8.4 TEST RESULT

Test mode : Ch0

FREQ. (MHz)	Reading	Cable loss (dB)	Ant. Fact. (dB)	POL. (H/V)	F/S (dBuV/m)	LIMIT (dBuV/m)	MARGIN	Pass /Fail
4804	-67.24	-18.36	11.05	H	32.45	<54.0	-21.55	Pass
7206	*	-15.45	11.44	*	*	<54.0	*	Pass
9608	*	-12.57	12.17	*	*	<54.0	*	Pass

Test mode : Ch39

FREQ. (MHz)	Reading	Cable loss (dB)	Ant. Fact. (dB)	POL. (H/V)	F/S (dBuV/m)	LIMIT (dBuV/m)	MARGIN	Pass /Fail
4882	-68.44	-17.97	11.05	H	31.64	<54.0	-22.36	Pass
7323	*	-15.14	11.44	*	*	<54.0	*	Pass
9764	*	-11.41	12.17	*	*	<54.0	*	Pass

Test mode : Ch78

FREQ. (MHz)	Reading	Cable loss (dB)	Ant. Fact. (dB)	POL. (H/V)	F/S (dBuV/m)	LIMIT (dBuV/m)	MARGIN	Pass /Fail
4960	-67.89	-17.78	11.05	H	32.38	<54.0	-21.62	Pass
7440	*	-15.49	11.44	*	*	<54.0	*	Pass
9920	*	-9.93	12.17	*	*	<54.0	*	Pass

#### NOTE :

1. "\*" Measurement does not apply for this frequency.
2. The test data reported are the worst-case field strength value of harmonics.
3. All modes of operation were investigated, and the worst-case results are reported.



## 5. CONCLUSION

The data collected shows that the Single modulation Single-Band PCS GSM/EDGE Phone with Bluetooth.

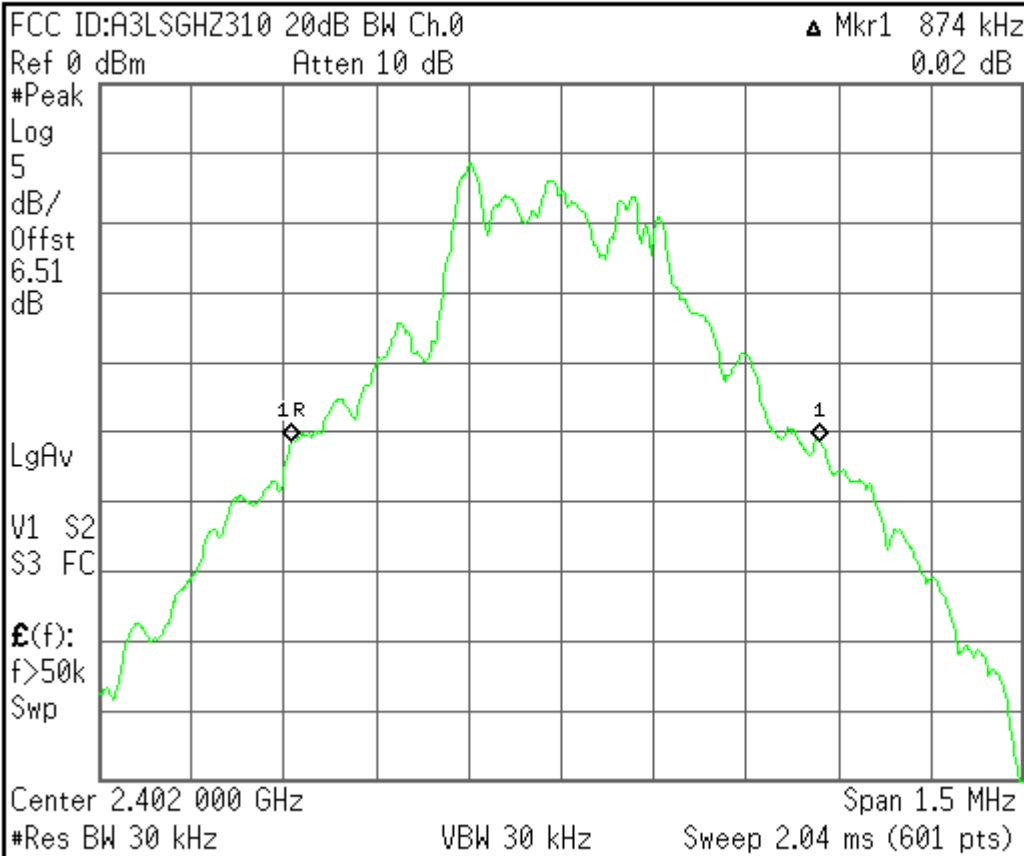
FCC ID : A3LSGHZ310 complies with the requirements of Parts 15 of the FCC Rules.

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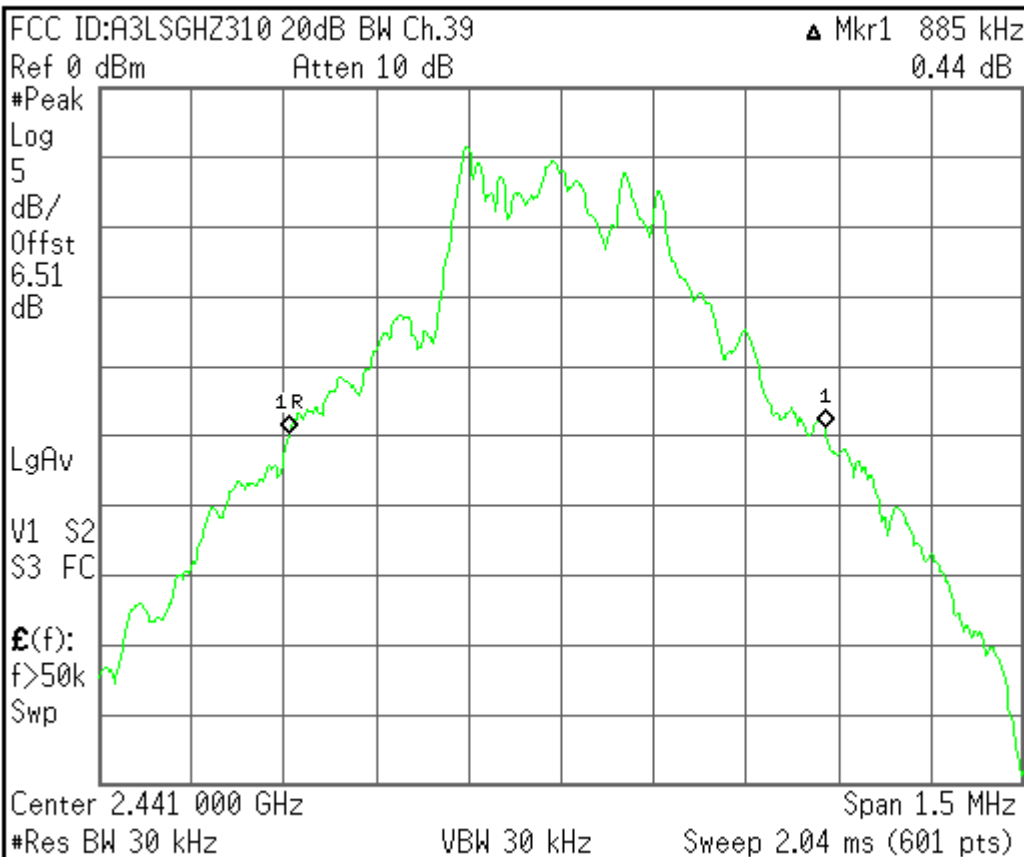
## 6. TEST PLOTS

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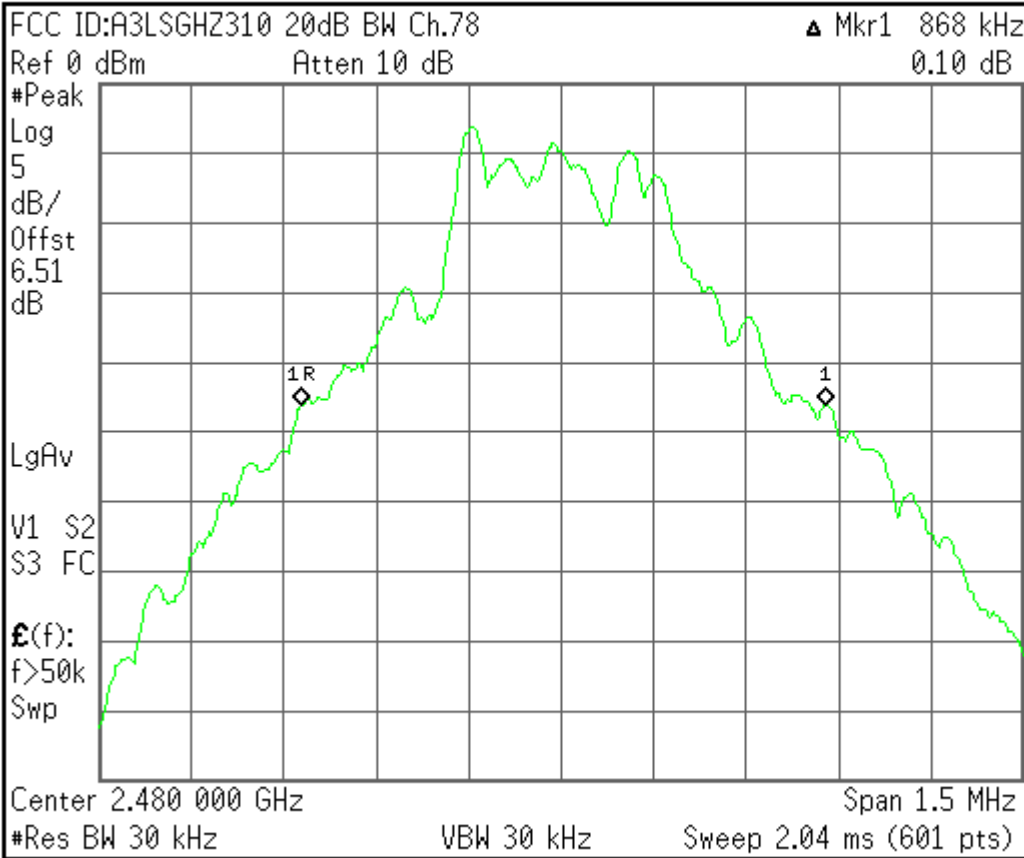
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<b>Start Freq</b> 2.40125000 GHz
<b>Stop Freq</b> 2.40275000 GHz
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<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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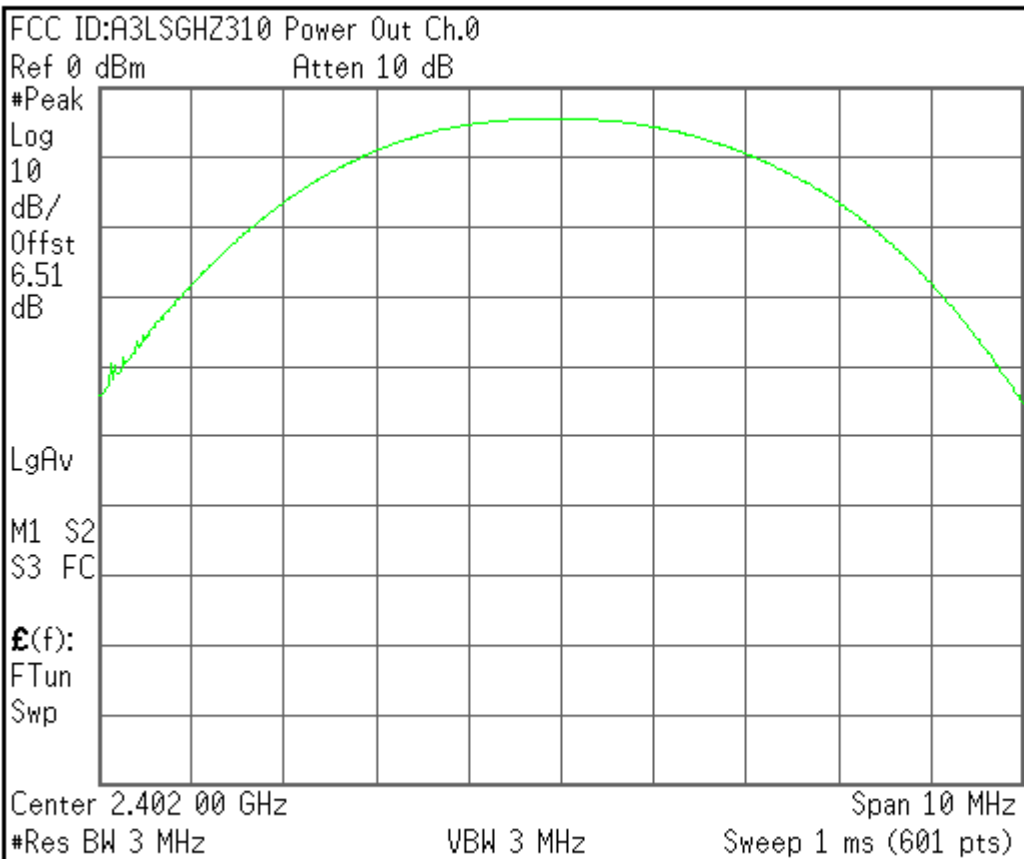
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<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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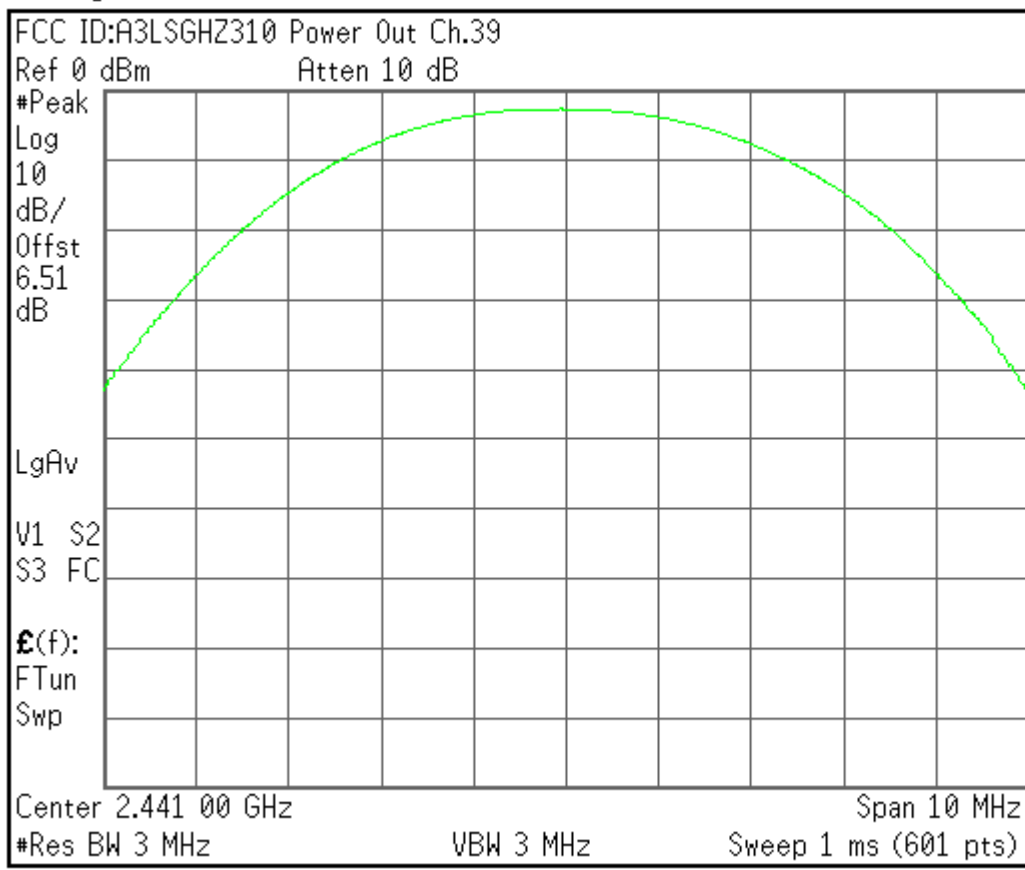
Freq/Channel	
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<b>Freq Offset</b>	0.00000000 Hz
<b>Signal Track</b>	On <u>Off</u>

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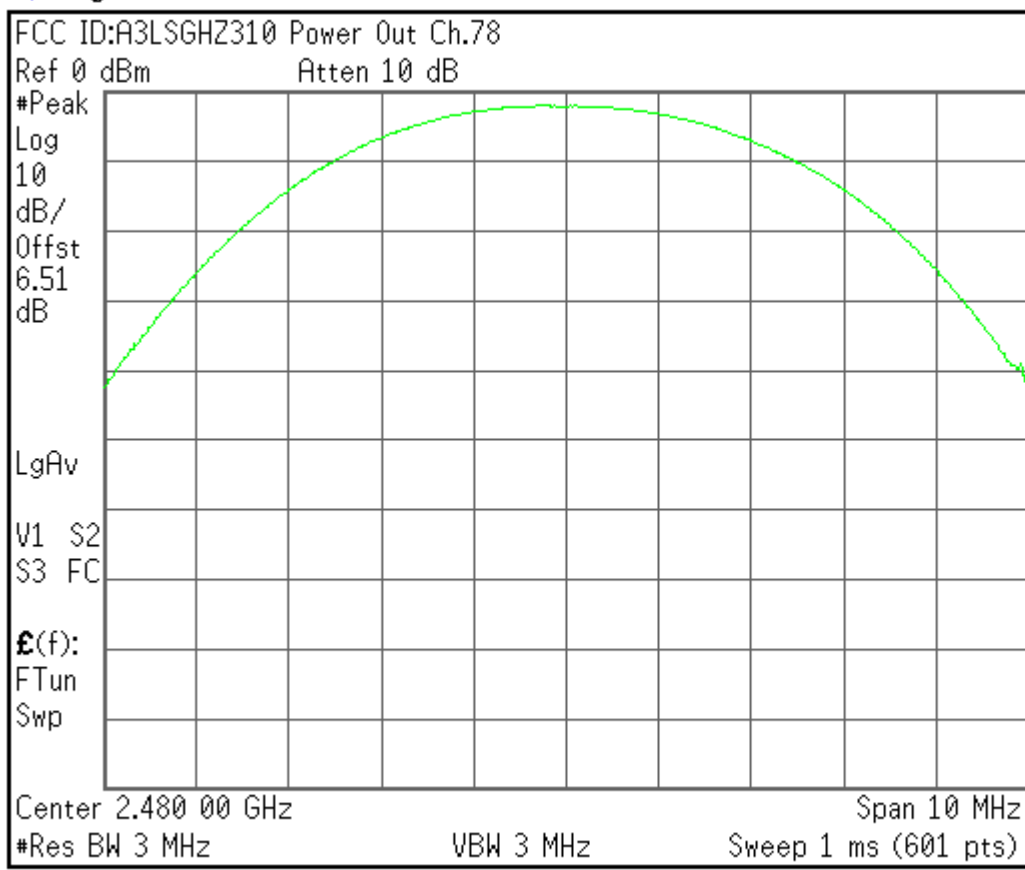
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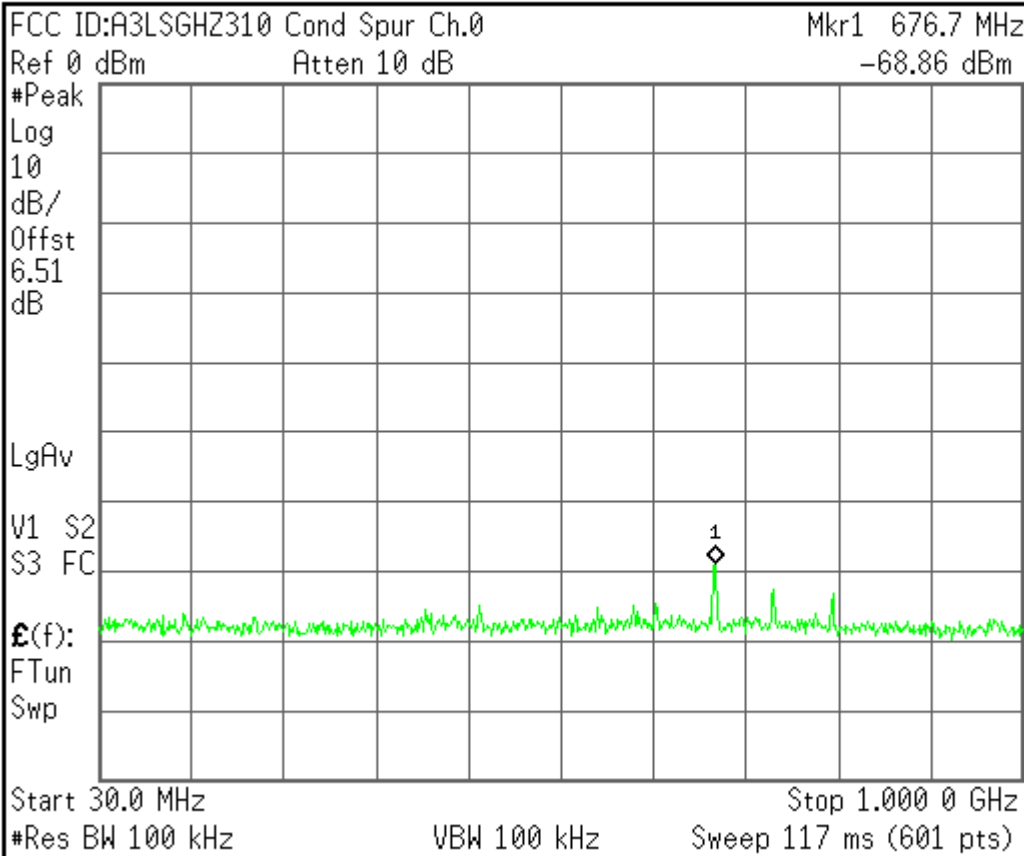
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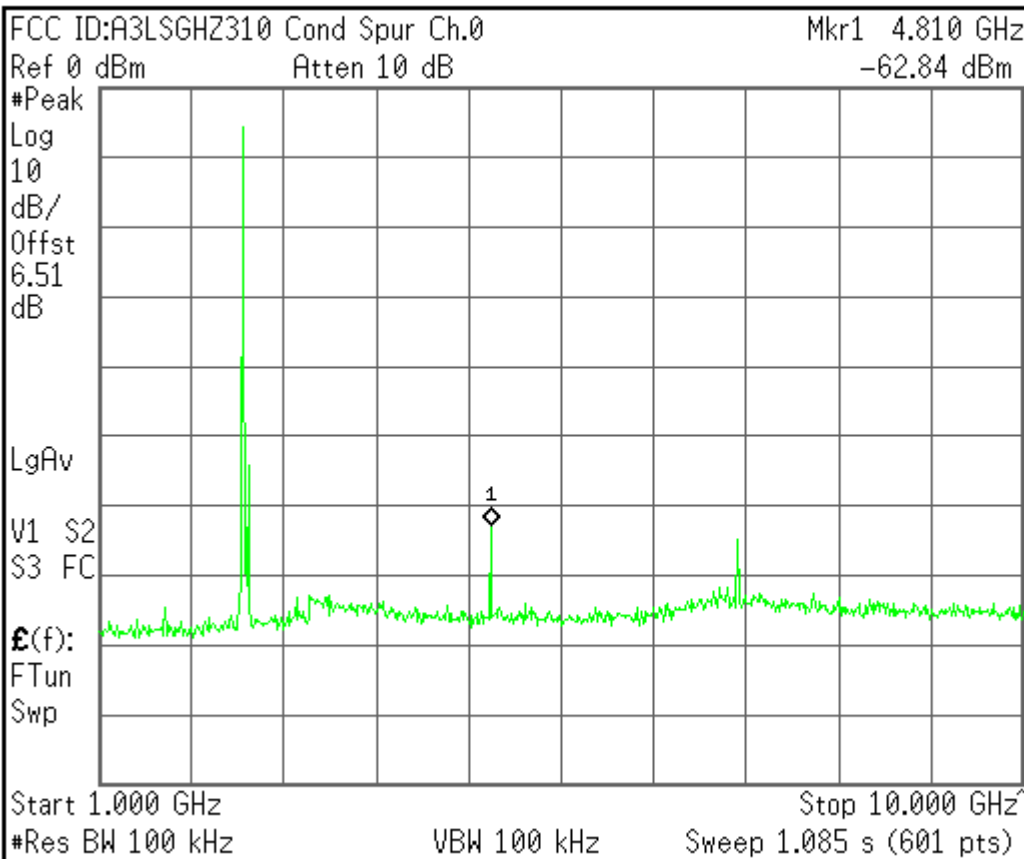
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<b>CF Step</b>	1.00000000 MHz Auto Man
<b>Freq Offset</b>	0.00000000 Hz
<b>Signal Track</b>	On <u>Off</u>

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<b>Center Freq</b> 515.0000000 MHz
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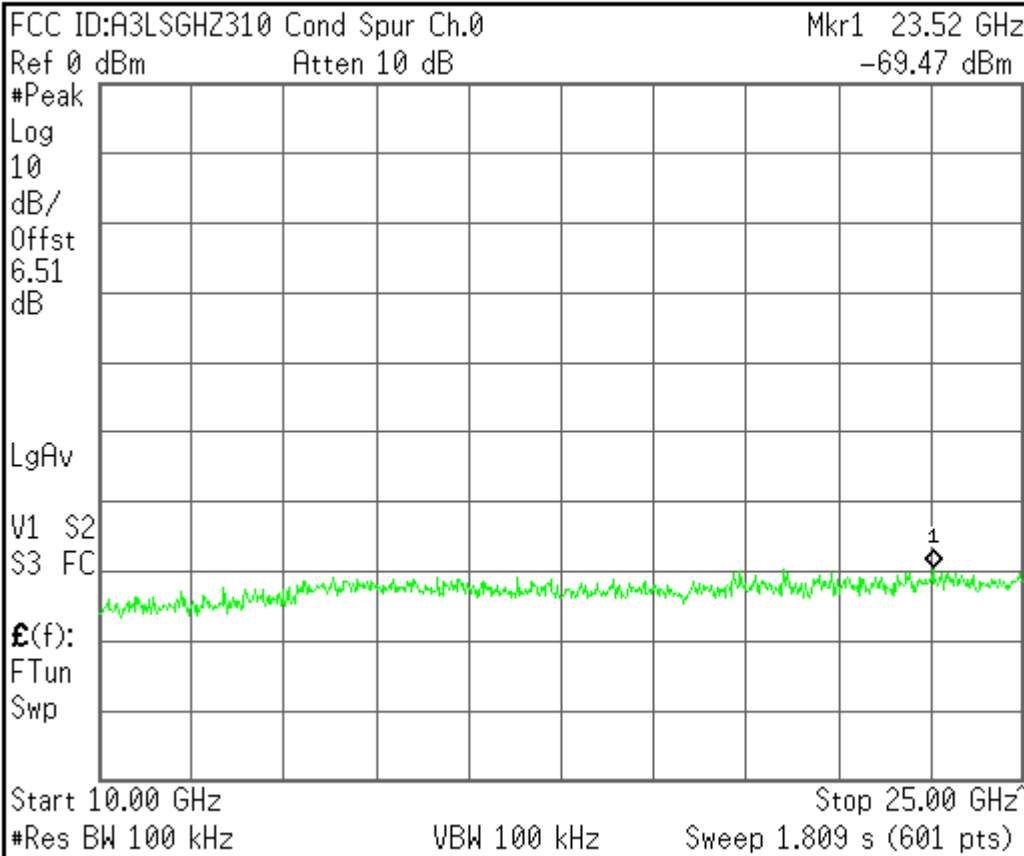
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Freq/Channel



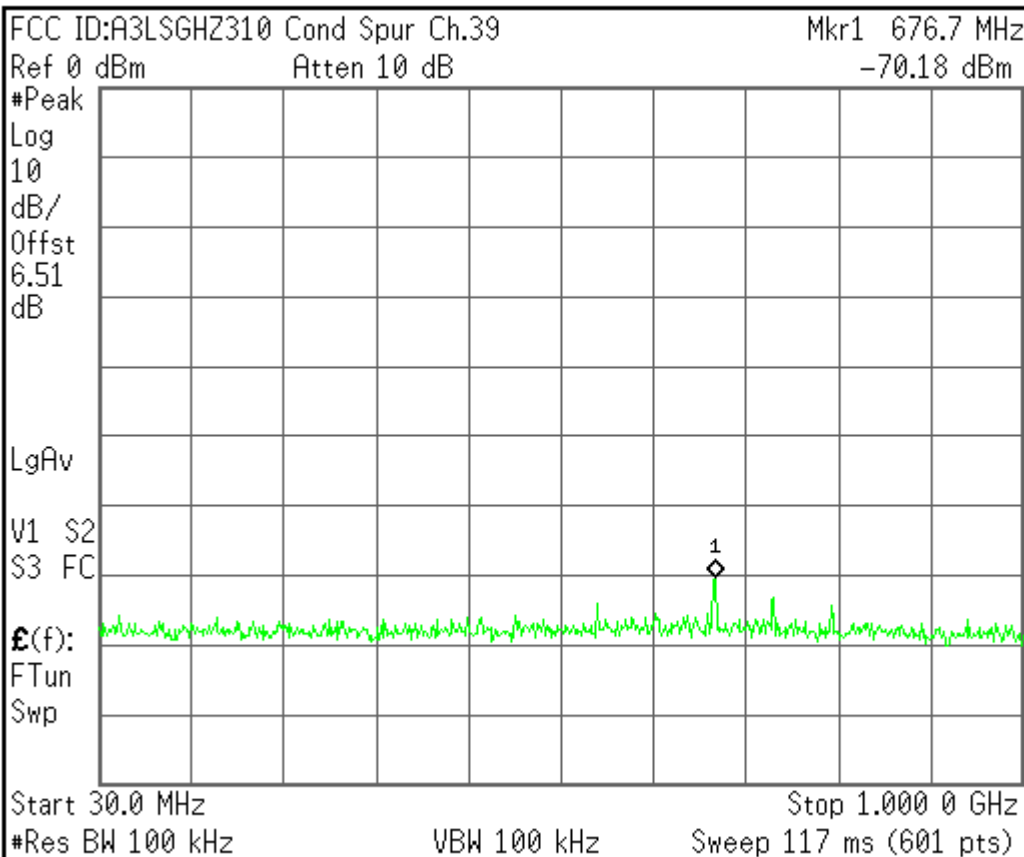
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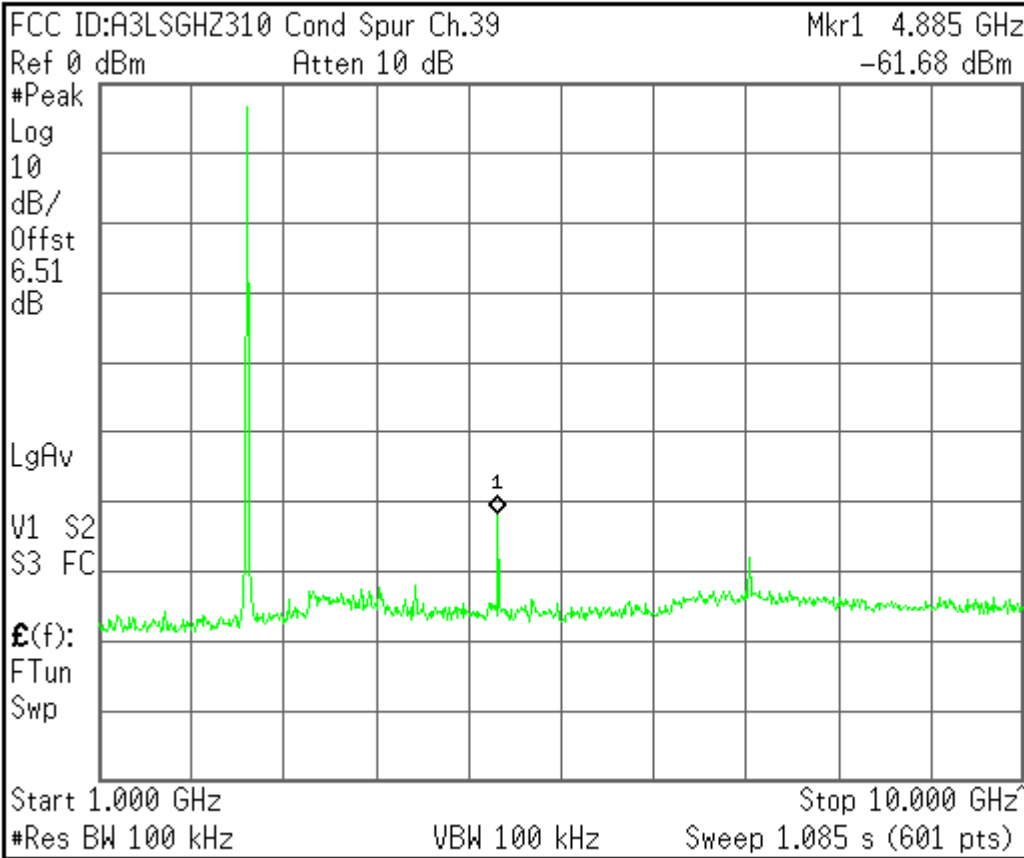
L

Freq/Channel



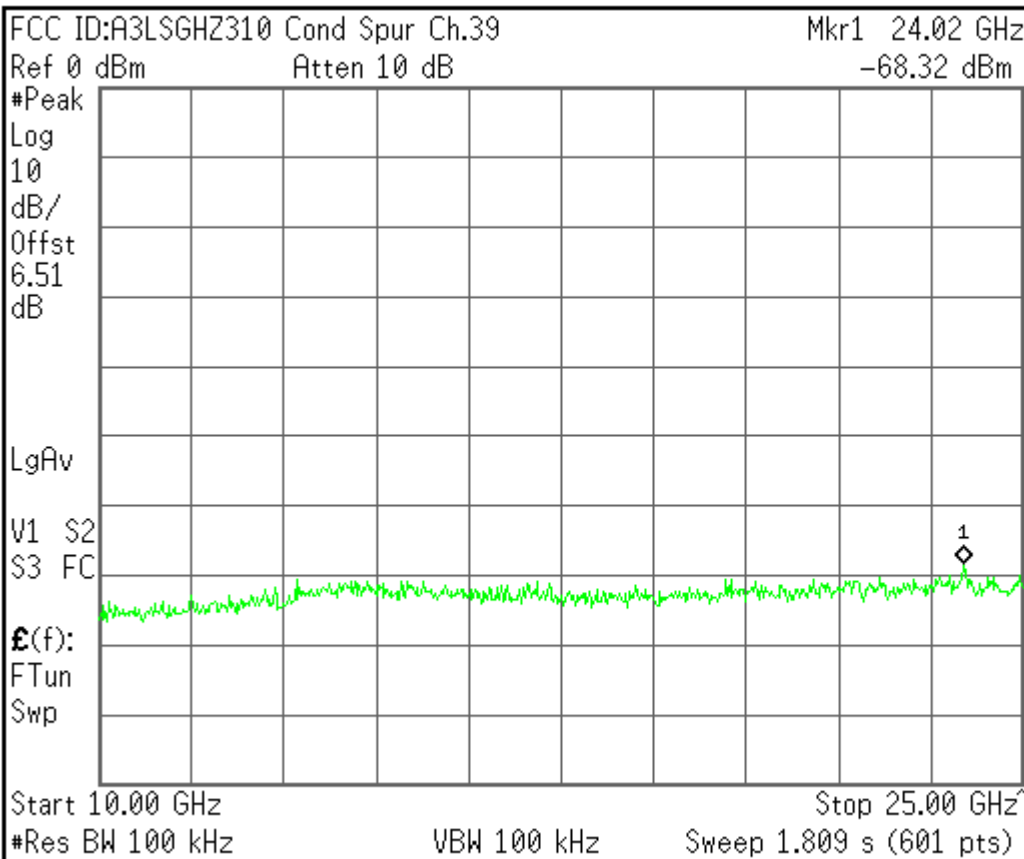
<b>Center Freq</b> 515.000000 MHz
<b>Start Freq</b> 30.0000000 MHz
<b>Stop Freq</b> 1.00000000 GHz
<b>CF Step</b> 97.0000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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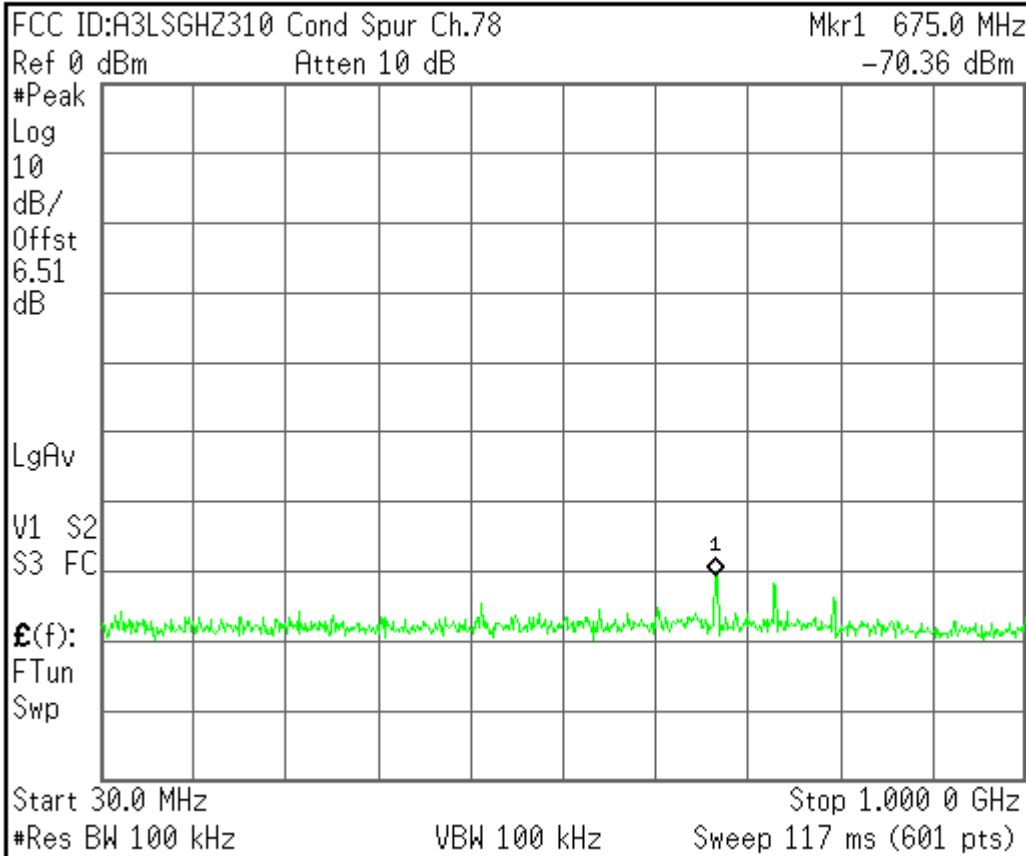
<b>Freq/Channel</b>
<b>Center Freq</b> 5.50000000 GHz
<b>Start Freq</b> 1.00000000 GHz
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<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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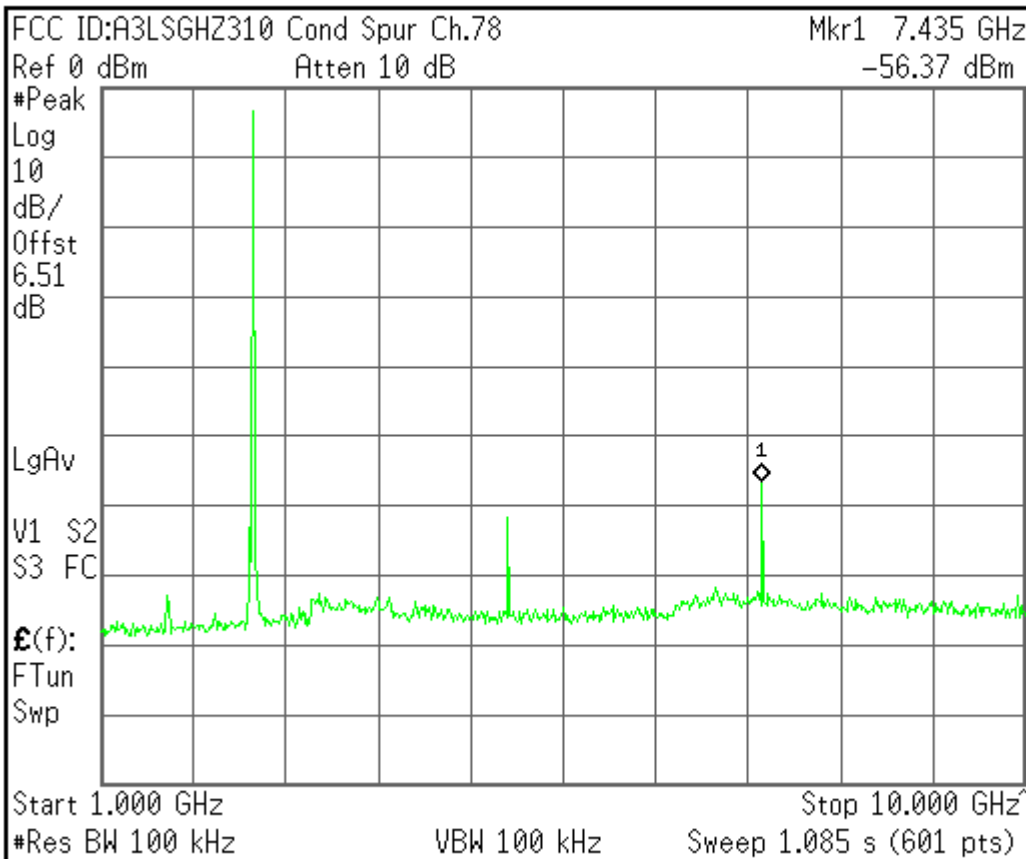
<b>Freq/Channel</b>
<b>Center Freq</b> 17.50000000 GHz
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<b>Stop Freq</b> 25.00000000 GHz
<b>CF Step</b> 1.50000000 GHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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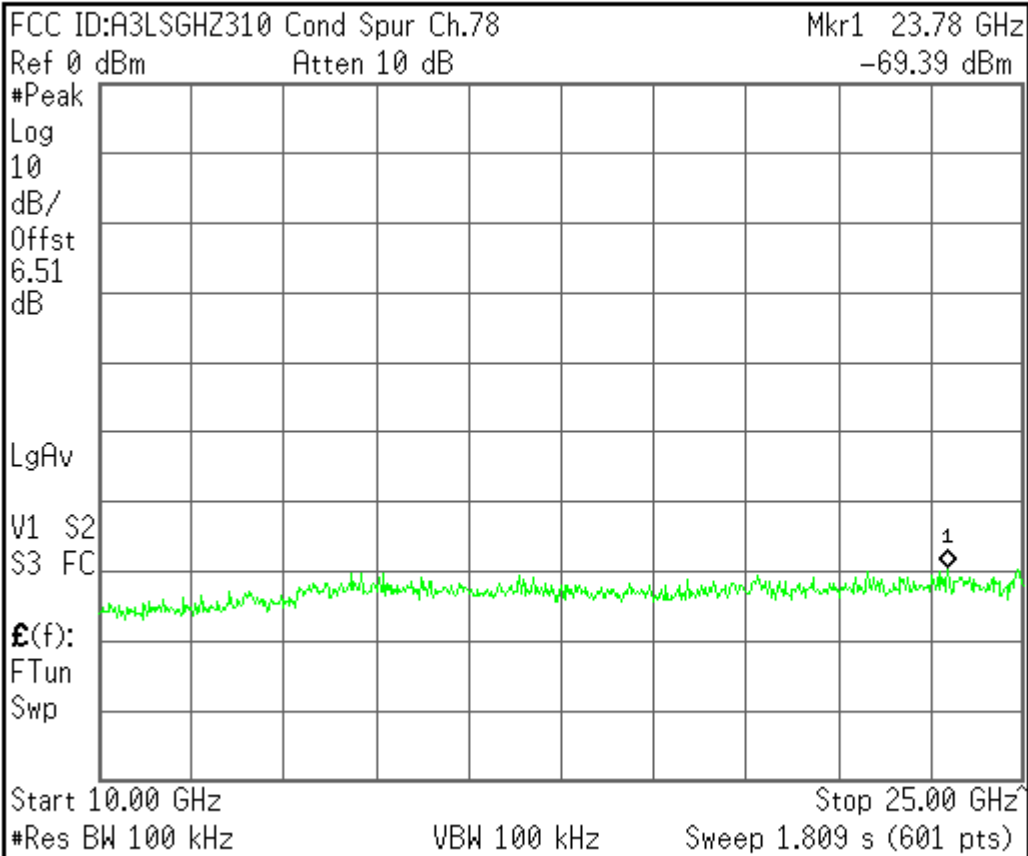
Freq/Channel	
Center Freq	515.0000000 MHz
Start Freq	30.00000000 MHz
Stop Freq	1.000000000 GHz
CF Step	97.00000000 MHz Auto Man
Freq Offset	0.000000000 Hz
Signal Track	On <u>Off</u>

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Freq/Channel	
Center Freq	5.500000000 GHz
Start Freq	1.000000000 GHz
Stop Freq	10.00000000 GHz
CF Step	900.0000000 MHz Auto Man
Freq Offset	0.000000000 Hz
Signal Track	On <u>Off</u>

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**Center Freq**  
 17.5000000 GHz

**Start Freq**  
 10.0000000 GHz

**Stop Freq**  
 25.0000000 GHz

**CF Step**  
 1.50000000 GHz  
 Auto Man

**Freq Offset**  
 0.00000000 Hz

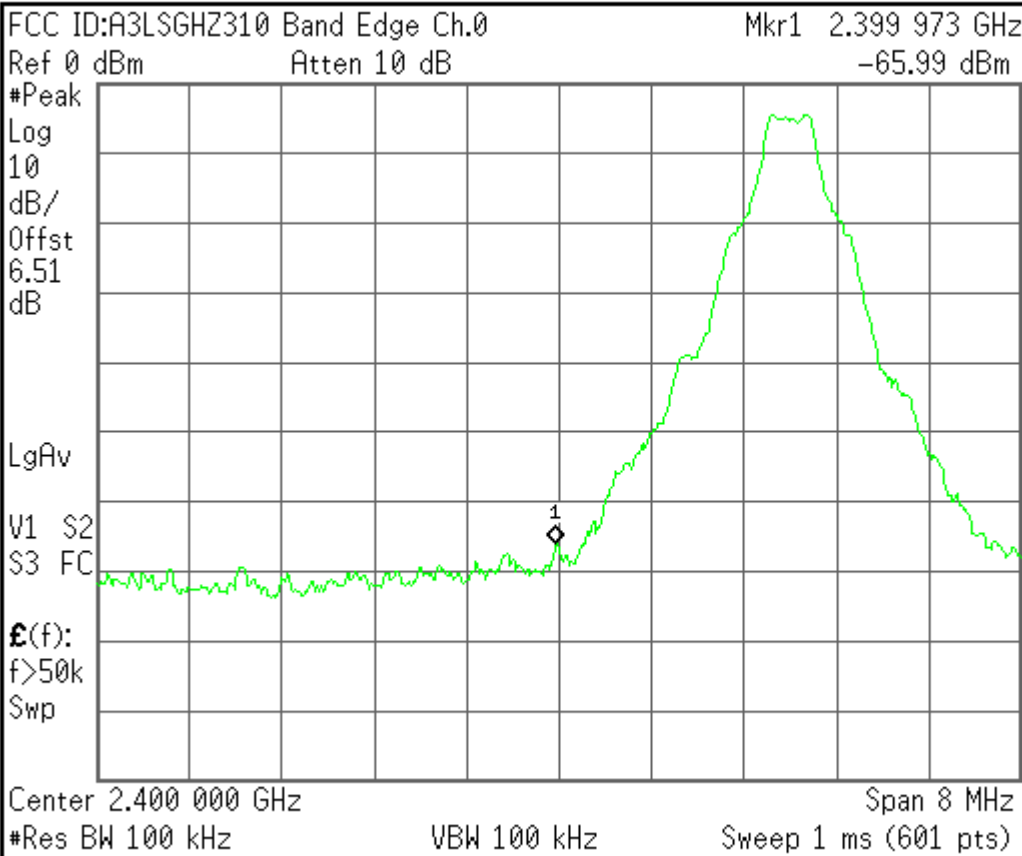
**Signal Track**  
 On Off

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Freq/Channel



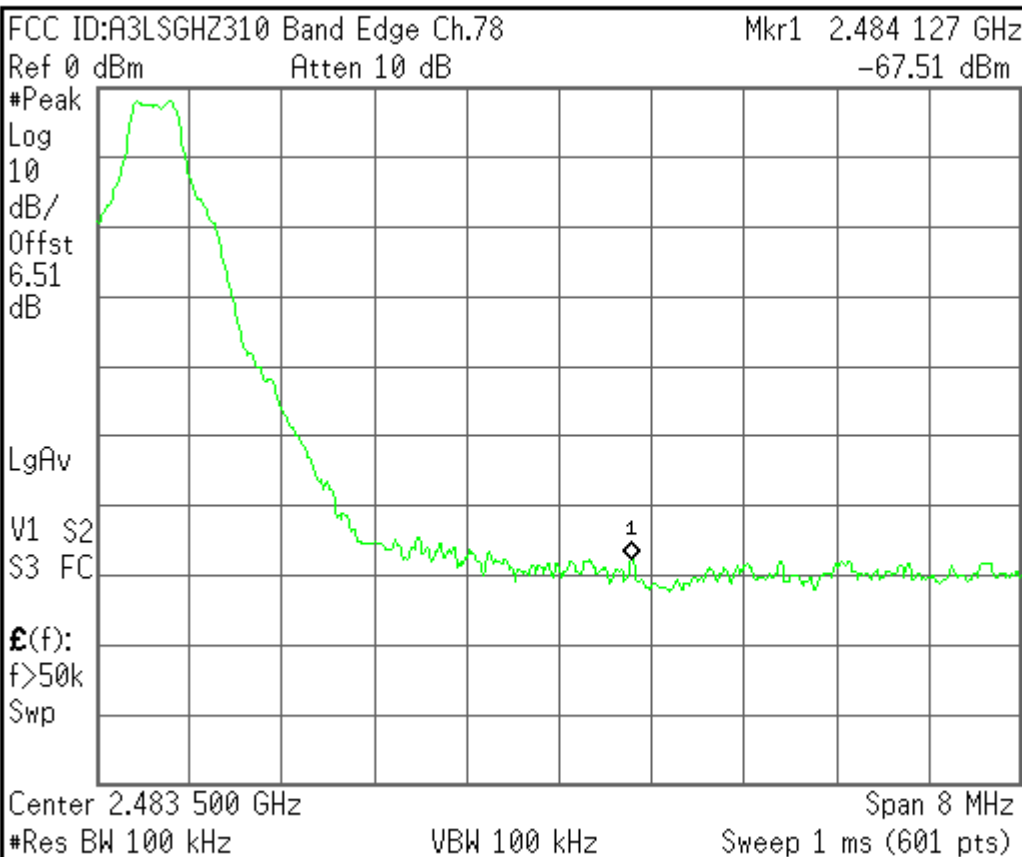
<b>Center Freq</b> 2.40000000 GHz
<b>Start Freq</b> 2.39600000 GHz
<b>Stop Freq</b> 2.40400000 GHz
<b>CF Step</b> 800.000000 kHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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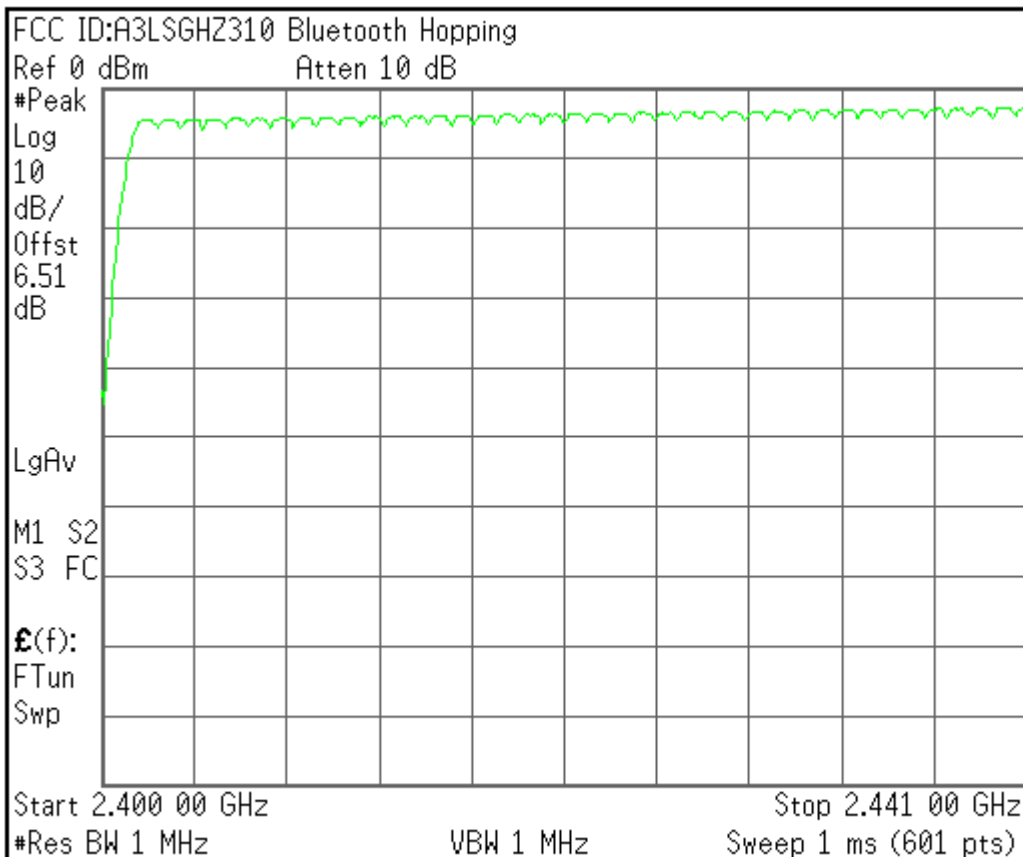
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Freq/Channel



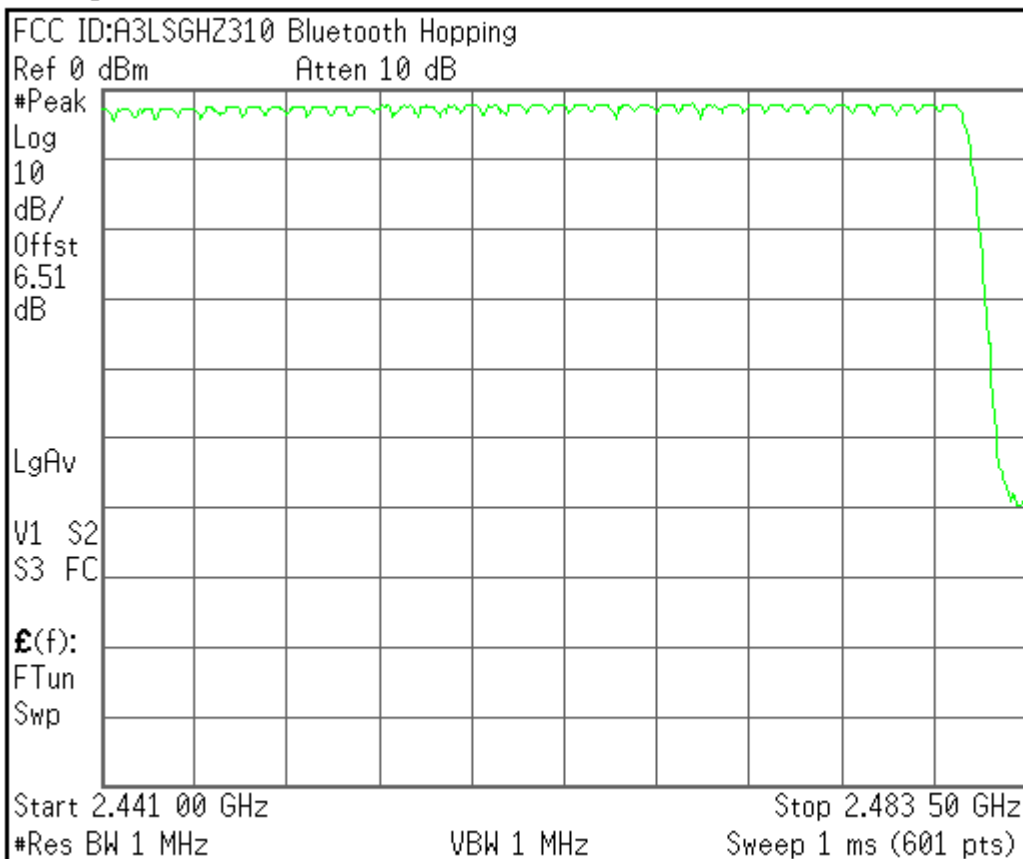
<b>Center Freq</b> 2.48350000 GHz
<b>Start Freq</b> 2.47950000 GHz
<b>Stop Freq</b> 2.48750000 GHz
<b>CF Step</b> 800.000000 kHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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<b>Center Freq</b> 2.42050000 GHz
<b>Start Freq</b> 2.40000000 GHz
<b>Stop Freq</b> 2.44100000 GHz
<b>CF Step</b> 4.10000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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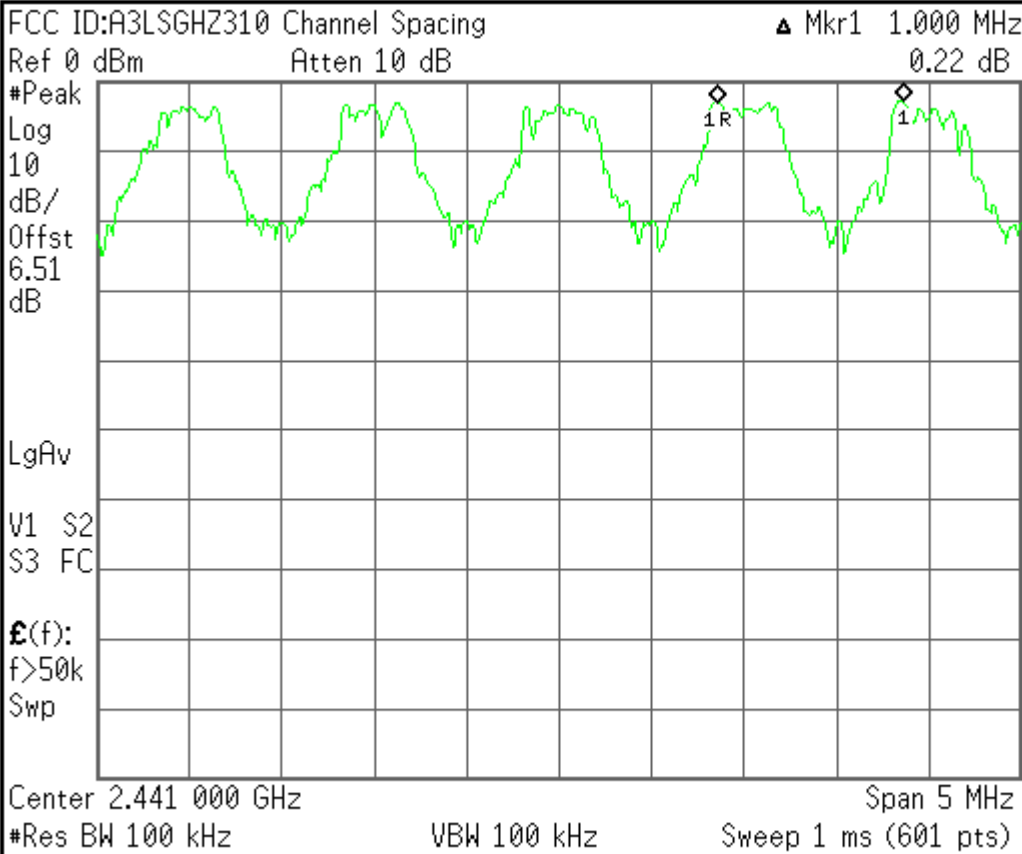
<b>Center Freq</b> 2.46225000 GHz
<b>Start Freq</b> 2.44100000 GHz
<b>Stop Freq</b> 2.48350000 GHz
<b>CF Step</b> 4.25000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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Freq/Channel



**Center Freq**  
2.44100000 GHz

**Start Freq**  
2.43850000 GHz

**Stop Freq**  
2.44350000 GHz

**CF Step**  
500.000000 kHz  
Auto Man

**Freq Offset**  
0.00000000 Hz

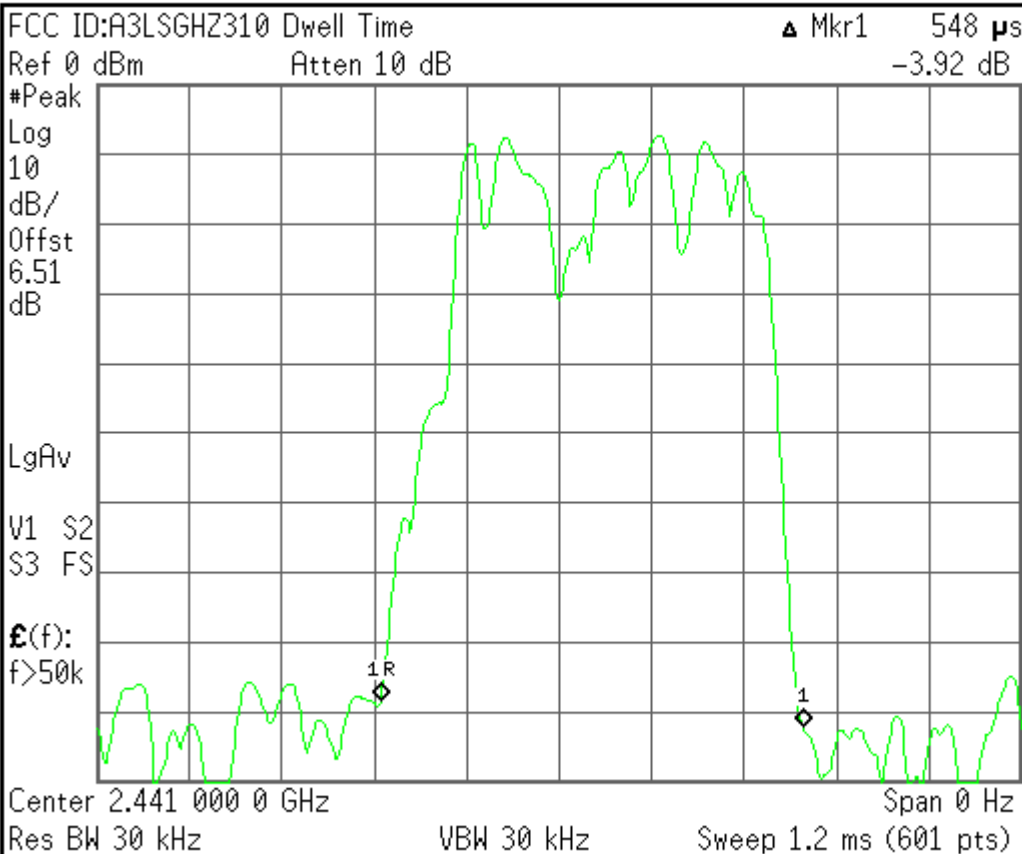
**Signal Track**  
On Off

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L

Freq/Channel



**Center Freq**  
2.44100000 GHz

**Start Freq**  
2.44100000 GHz

**Stop Freq**  
2.44100000 GHz

**CF Step**  
30.0000000 kHz  
Auto Man

**Freq Offset**  
0.00000000 Hz

**Signal Track**  
On Off

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