

INT'L STANDARD CERTIFICATION TEAM

SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA

TEL : +82 31 639 8518 FAX : +82 31 639 8525

**CERTIFICATE OF COMPLIANCE (ERM EVALUATION)****Manufacture: GS Instruments Co., Ltd.**

1385-14, Juan-Dong, Nam-Ku, Incheon,,402-200 Korea

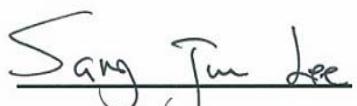
**Date of Issue : August 27, 2008****Test Report No.: HCT-R08-162****Test Site: HCT CO., LTD.****FCC ID : U88-GSR-2624D-SPR****APPLICANT : GS Instruments Co., Ltd.****EUT Type: Single Band RF Repeater****MODEL : GSR-2624D-SPR****Frequency Ranges: Uplink : 2502 – 2690 MHz****Downlink : 2502 – 2690 MHz****RF Output Power: Downlink : 24.0 dBm****Uplink : 24.0 dBm****FCC Rules Part(s): CFR 47, Part 27****Engineering Statement:**

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 24 Subpart E of the FCC Rules under normal use and maintenance.



Report prepared by : Chang-Seok Choi

Engineer of RF Tech. Part



Report prepared by : Sang-Jun Lee

Manager of RF Tech. Part

&gt;&gt;&gt;

**HCT CO., LTD.**

&lt;&lt;&lt;

---

## CONTENTS

1. CLIENT INFORMATION .....	2
2. TEST SPECIFICATIONS .....	3
2.1 Standards .....	3
3. STANDARDS ENVIRONMENTAL TEST CONDITIONS .....	4
4. TEST EQUIPMENT.....	5
5. RF OUTPUT POWER.....	6
6. OCCUPIED BANDWIDTH .....	12
7. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL .....	19
8. FIELD STRENGTH OF SPURIOUS RADIATION.....	33
9 Conducted Emissions.....	35
10. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS.....	41
11. RF Exposure Statement.....	43

## 1. CLIENT INFORMATION

The EUT has been tested by request of

Company	<b>GS Instruments Co., Ltd</b>
Contact Point	1385-14, Juan-Dong, Nam-Ku, Incheon,,402-200 Korea

- **EUT Type:** Single Band RF Repeater
- **FCC ID:** U88-GSR-2624D-SPR
- **Frequency Ranges:** Uplink : 2502 - 2690 MHz  
Downlink : 2502 - 2690 MHz
- **RF Output Power:** Downlink : 24.0 dBm  
Uplink : 24.0 dBm
- **FCC Rules Part(s):** CFR Title 47 Part 27 Sub Part C
- **Emission Designators:** 9M08G7W

## 2. TEST SPECIFICATIONS

### 2.1 Standards

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance With Part 27 Subpart C.

Reference	Description	Results
§2.1051, §27.53	Conducted Emissions	Compliant
§2.1053, §27.53	Radiated Emissions	Compliant
§2.1046; §27.50	RF Power Output	Compliant
§2.1049	Occupied Bandwidth	Compliant
§2.1051, §27.53	Band Edge Measurement	Compliant
§2.1053, §27.53	Spurious Emissions at Antenna Terminals	Compliant
§2.1055; §24.135	Frequency Stability	Compliant

### 3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 °C to + 35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1060 mbar

## 4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Agilent	E4438C /Signal Generator	Annual	01/22/2009	MY42082646
Agilent	E4416A /Power Meter	Annual	01/22/2009	GB41291412
WEINSCHEL	67-30-33/ATTENUATOR	Annual	05/02/2009	BR0530
Korea Eng	KR-1005L/ Temperature and Humidity Chamber	Annual	03/30/2009	KRAC05063-3CH
Agilent	E7405A /EMC Analyzer	Annual	12/29/2008	US40240290
Schwarzbeck	VULB 9160/ TRILOG Antenna	Annual	01/24/2009	9160-3150
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
MITEQ	AMF-60-0010 1800-35-20P	Annual	01/24/2009	1200937
MITEQ	AMF-6D-01180-35-20P	Annual	02/24/2009	990893
Schwarzbeck	BBHA 9120D/ Horn Antenna	Annual	03/30/2009	147
Schwarzbeck	BBHA 9120D/ Horn Antenna	Annual	03/30/2009	296
Schwarzbeck	BBHA9170/SHF-EHF Horn Antenna	Annual	03/20/2009	BBHA9170342
Rohde & Schwarz	HFH2-Z2/Loop Antenna	Annual	01/10/2009	881056/070
ADVANTEST	R3671/Spectrum Analyzer	Annual	05/02/2009	J004821

## 5. RF OUTPUT POWER

### 5.1 Test Procedure

#### Test Requirements:

**§ 2.1046 Measurements required: RF power output:**

**§ 2.1046 (a)** For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

**§ 2.1046 (b)** For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

**§ 2.1046 (c)** For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

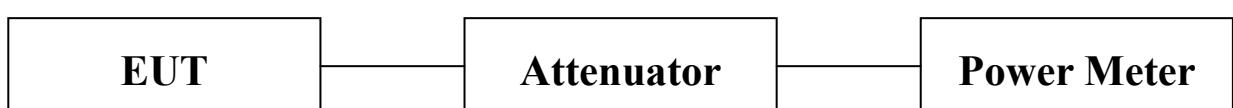
**§ 27.50 Power and antenna height limits.**

**§ 24.50 (h):** (2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP.

All user stations are limited to 2.0 watts transmitter output power.

#### Test Procedures:

As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.



**Block Diagram 1. RF Power Output Test Setup**

**5.2 Test Results****(Downlink)**

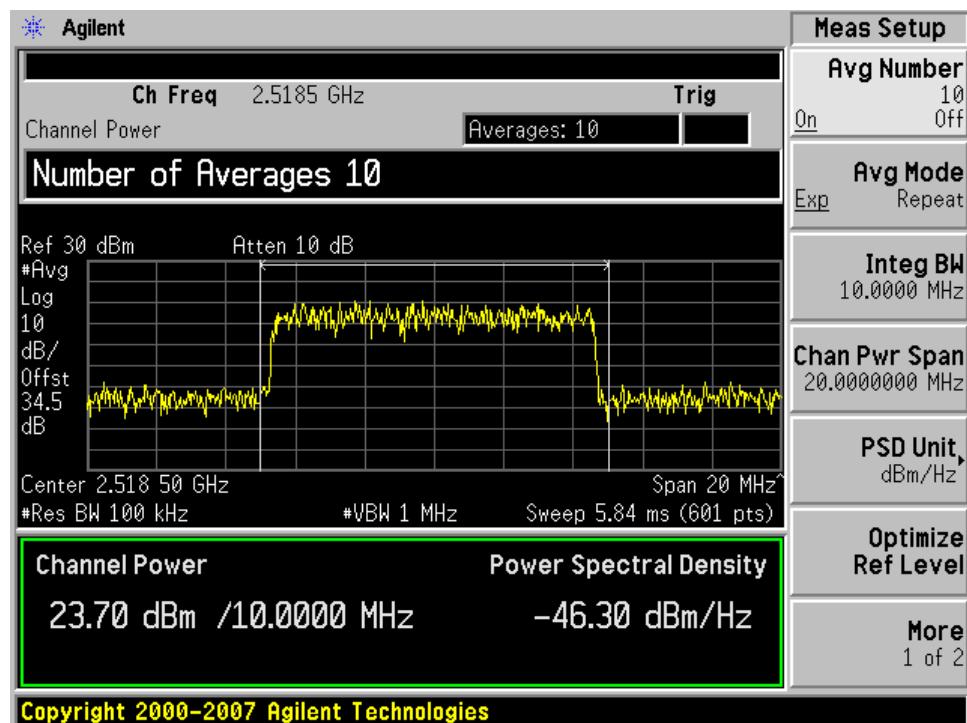
<b>DownLink</b>		
<b>Carrier Channel</b>	<b>Frequency (MHz)</b>	<b>Measured Average Output Power dBm (mW)</b>
Low	2518.5	23.70(234.4)
Mid	2640.5	24.26(266.6)
High	2673.5	24.12(258.2)

**5.3 Test Results****(Uplink)**

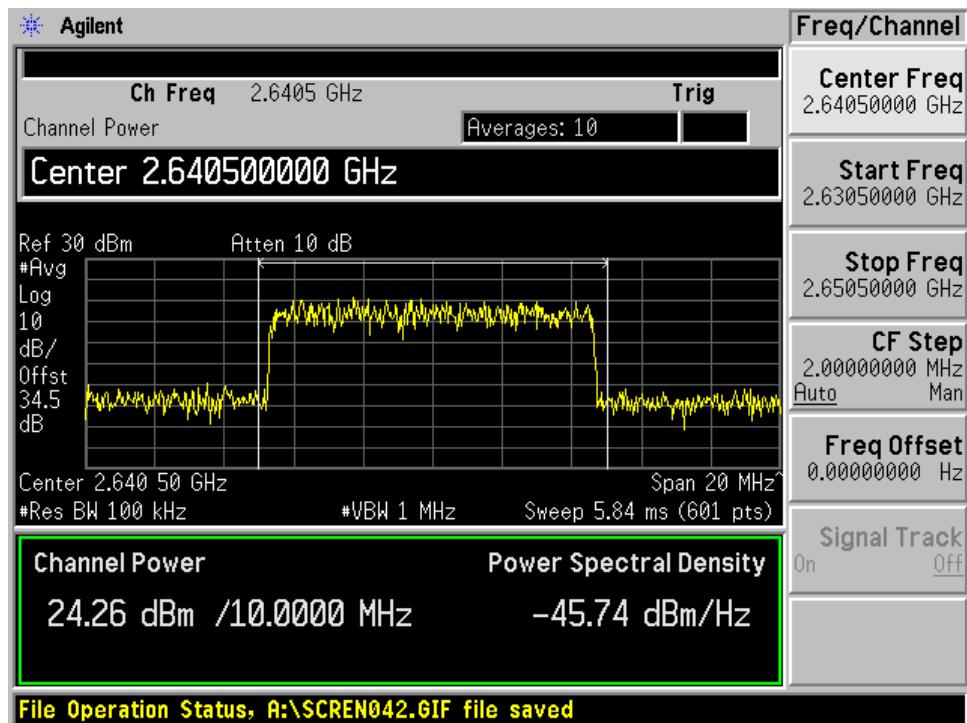
<b>UpLink</b>		
<b>Carrier Channel</b>	<b>Frequency (MHz)</b>	<b>Measured Average Output Power dBm (mW)</b>
Low	2518.5	24.09(256.4)
Mid	2640.5	24.02(252.3)
High	2673.5	23.58(228.0)

## Plots of RF Output Power

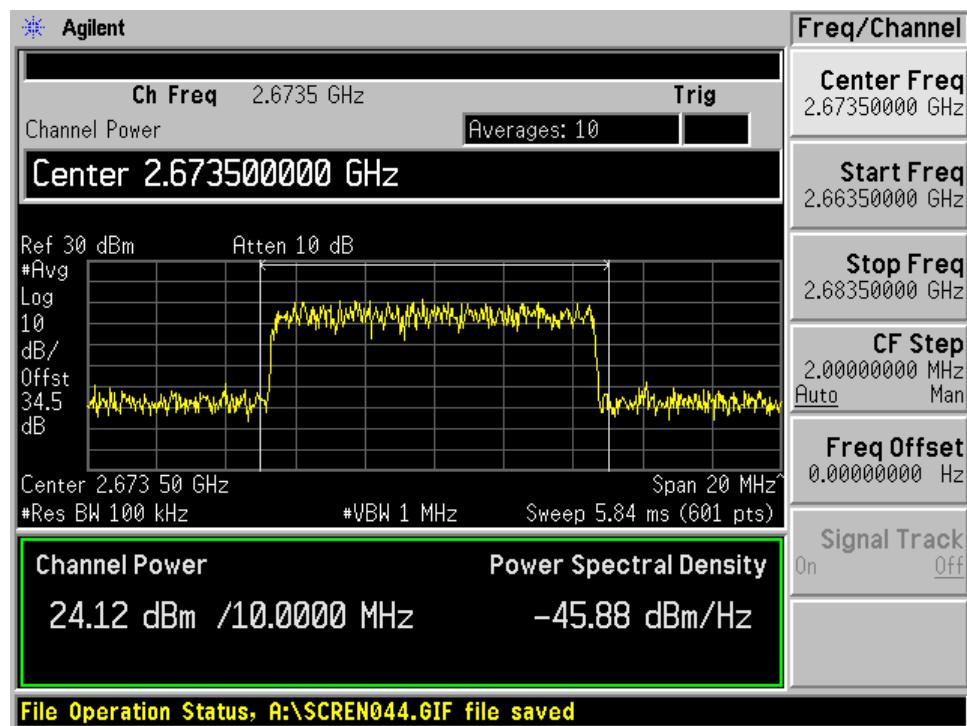
### Downlink Low CH



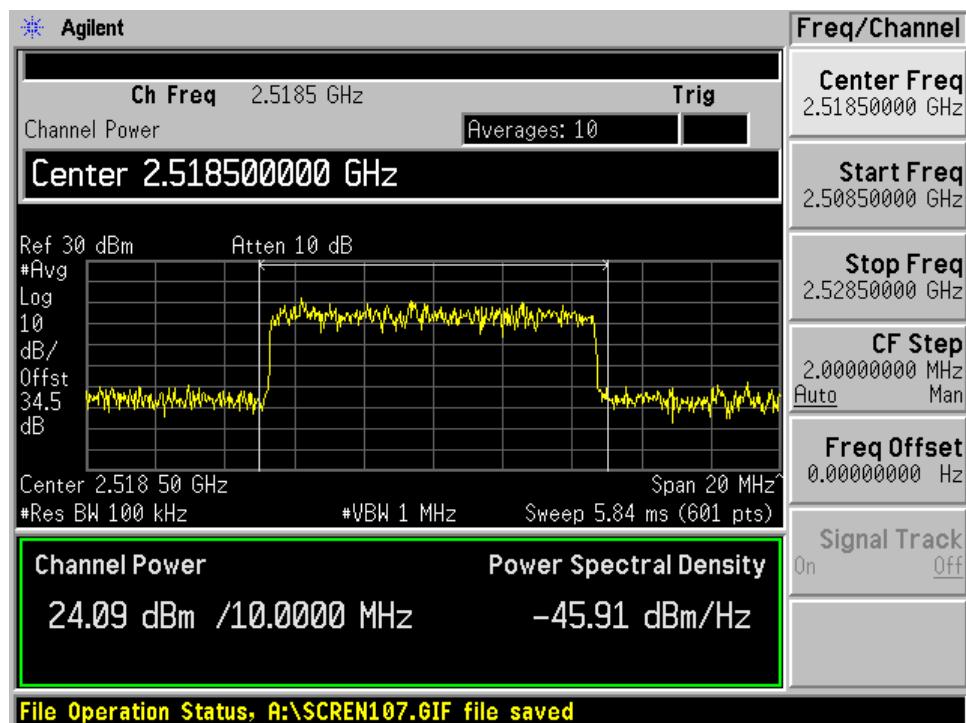
### Downlink Middle CH



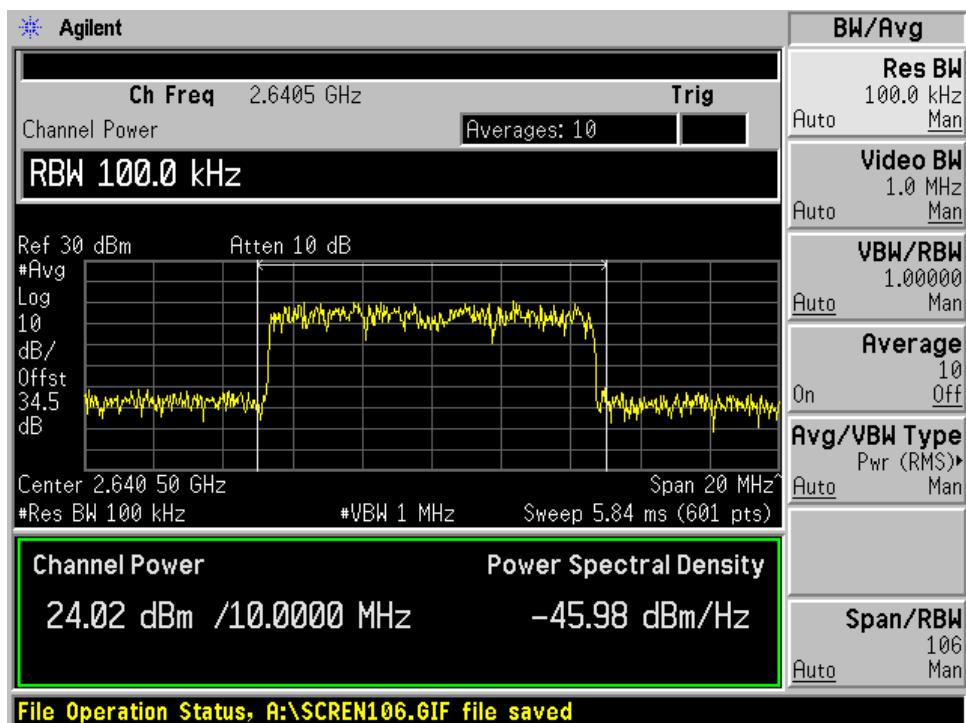
**Downlink High CH**



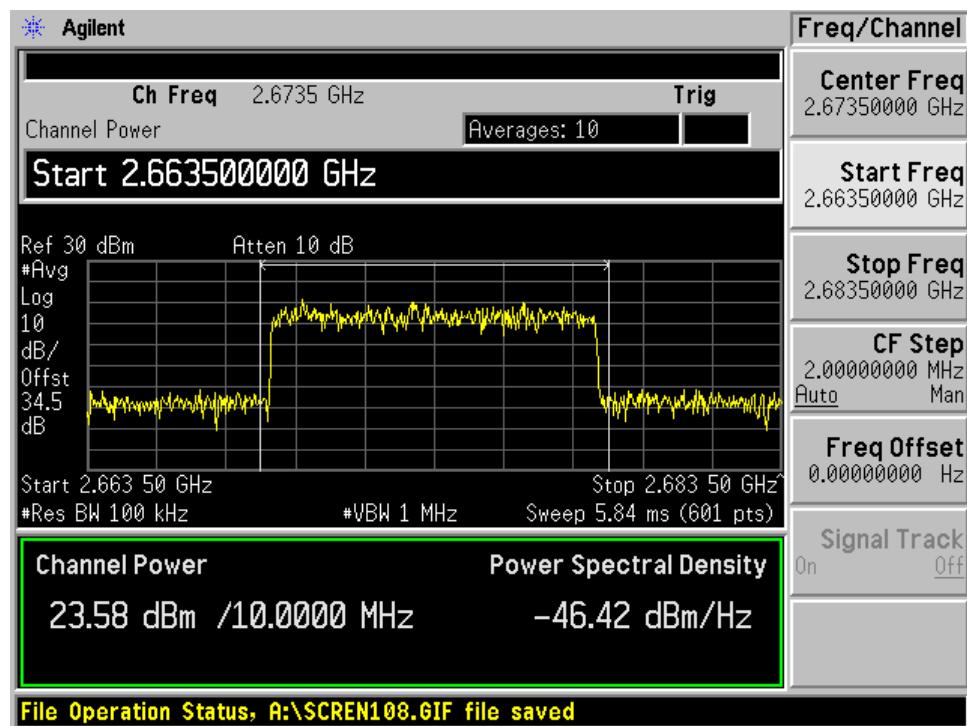
**Uplink Low CH**



### Uplink Middle CH



**Uplink High CH**



## 6. OCCUPIED BANDWIDTH

### 6.1 Test Procedure

#### Test Requirement(s): § 2.1049 Measurements required: Occupied bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

**Test Procedures:** As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink

The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

**Test Results:** The EUT complies with the requirements of this section.

**NOTE:** The EUT is a band selective repeater. The test was performed using all selective bands and there was not much difference between them. The test result is reported using the widest bands.

#### (Downlink)

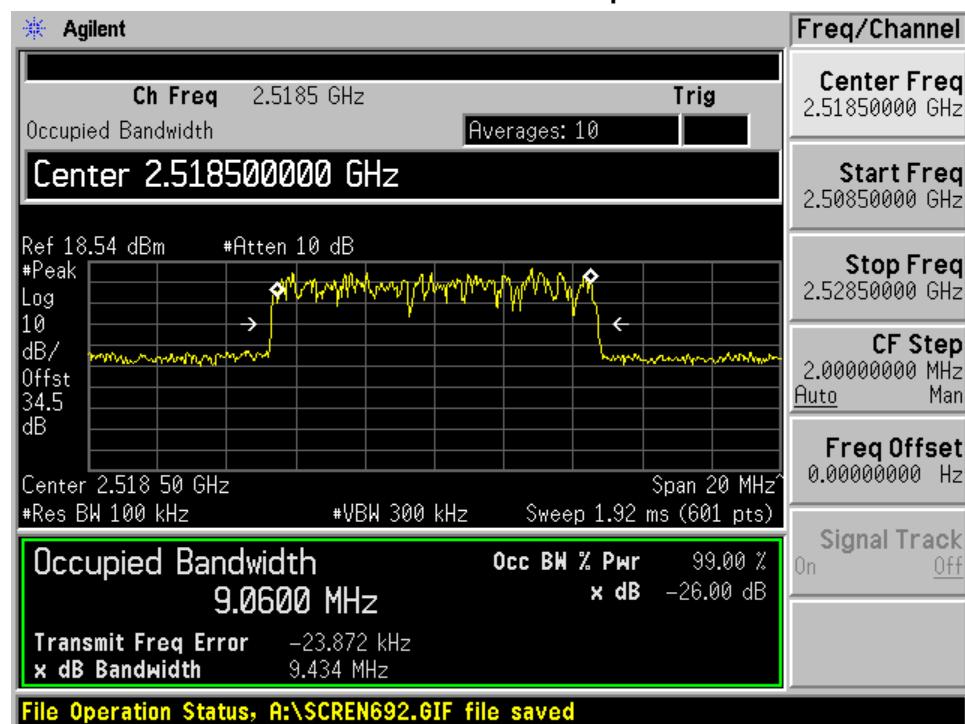
DownLink		
Carrier Channel	Frequency (MHz)	Bandwidth(MHz)
Low	2518.5	9.0600
Mid	2640.5	9.0637
High	2673.5	9.0442

#### (Uplink)

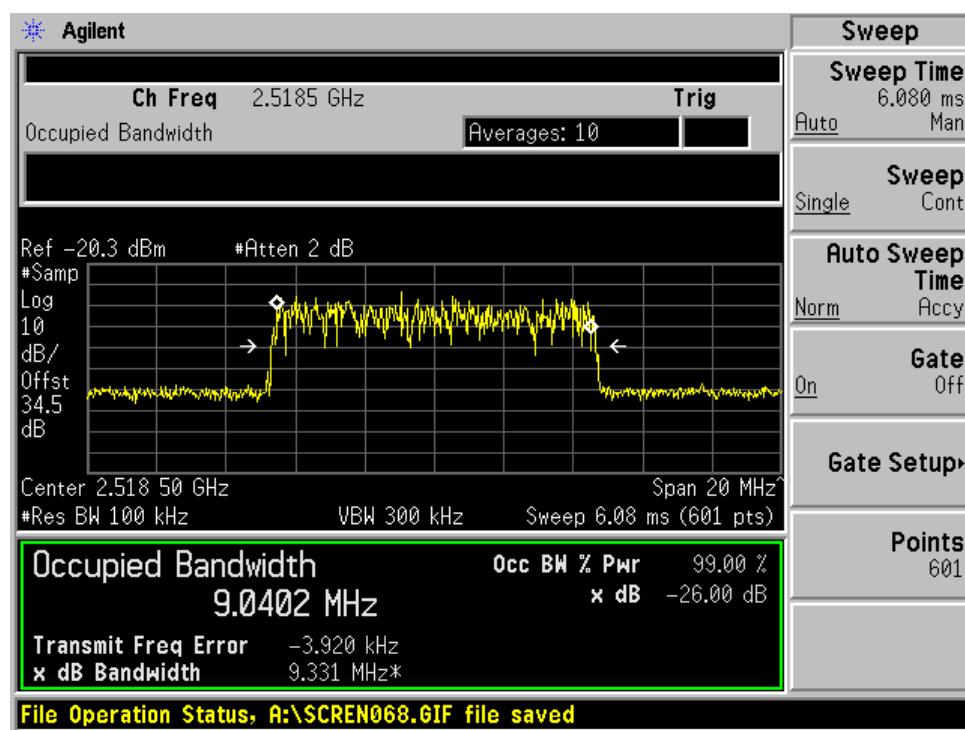
UpLink		
Carrier Channel	Frequency (MHz)	Bandwidth(MHz)
Low	2518.5	9.0766
Mid	2640.5	9.0883
High	2673.5	9.0774

## Plots of Occupied Bandwidth

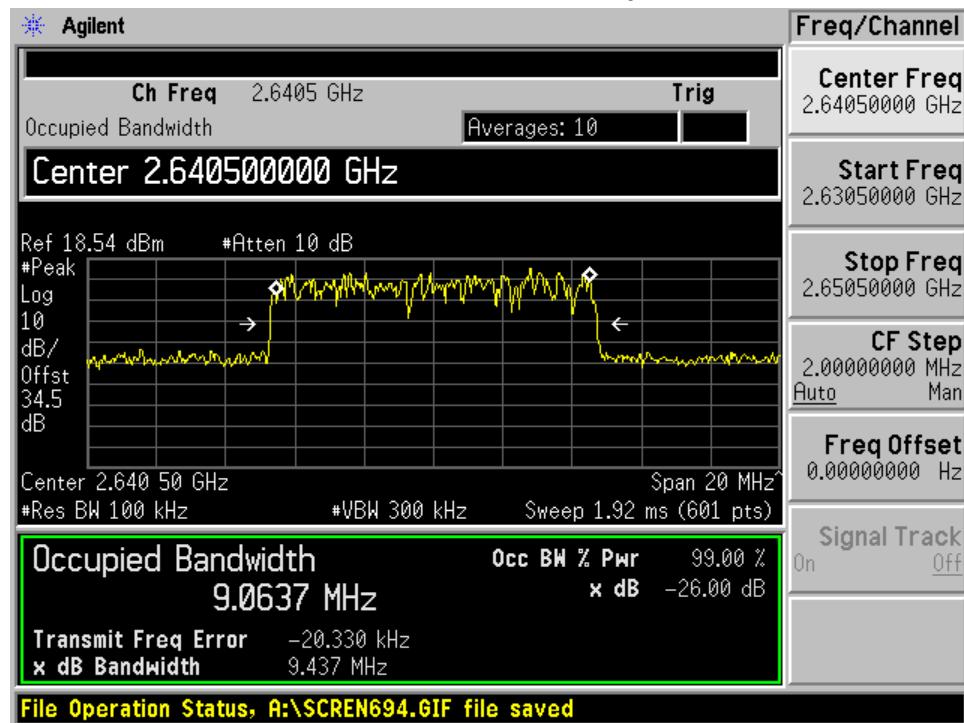
### Downlink Low CH Output



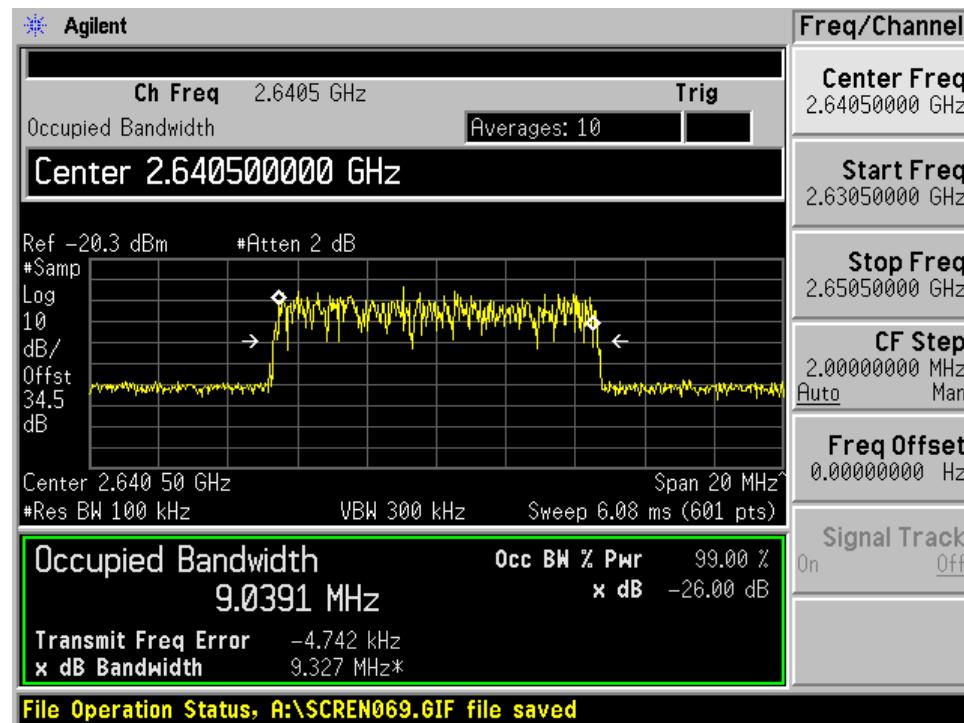
### Downlink Low CH Input



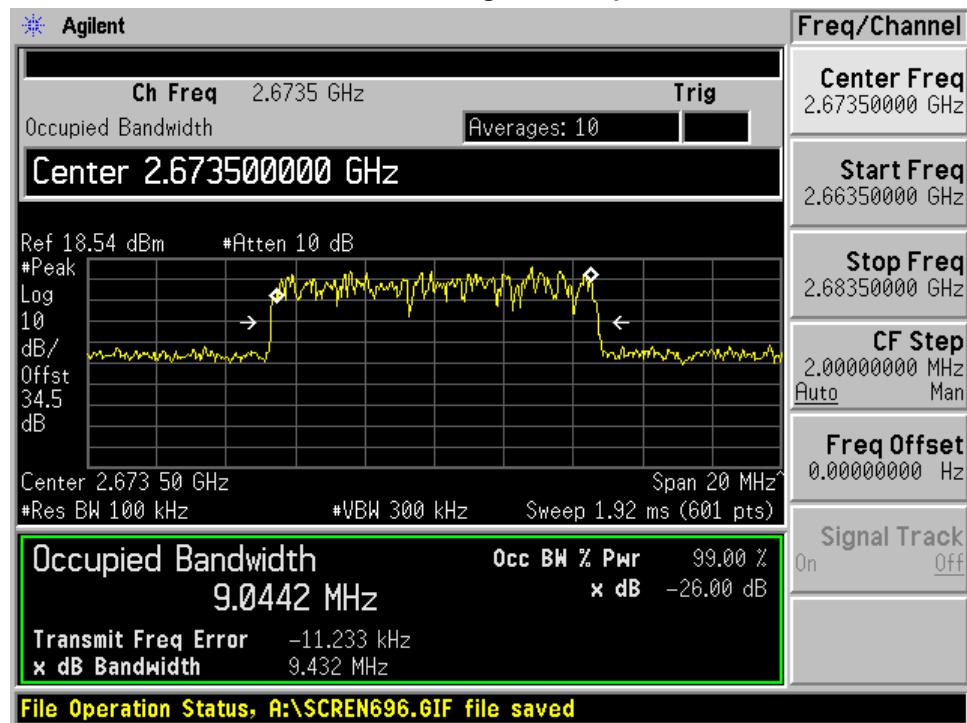
**Downlink Middle CH Output**



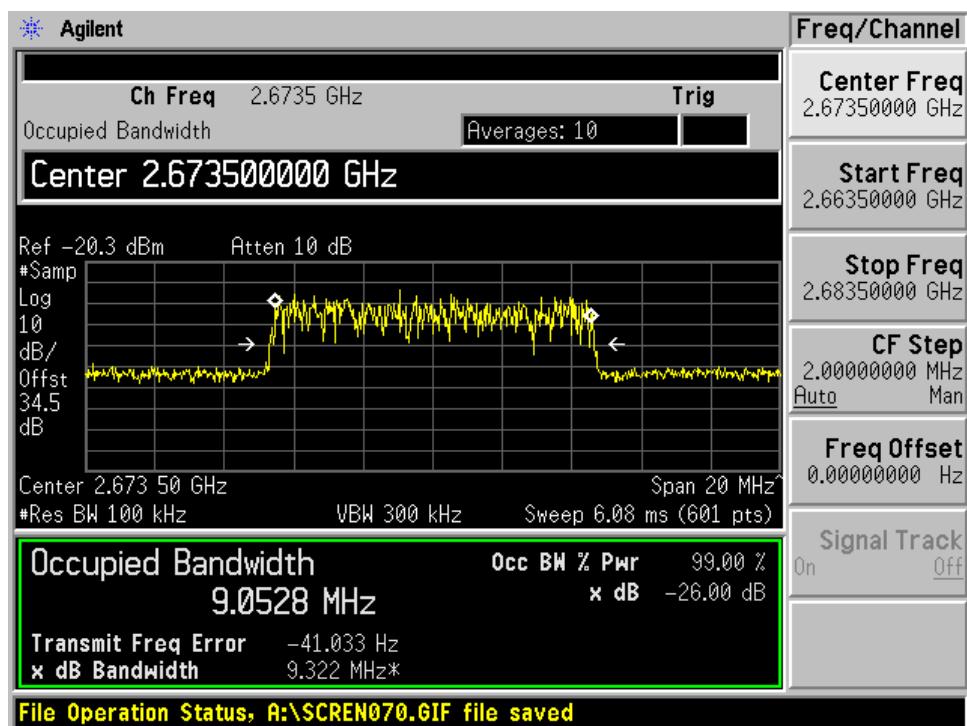
**Downlink Middle CH Input**



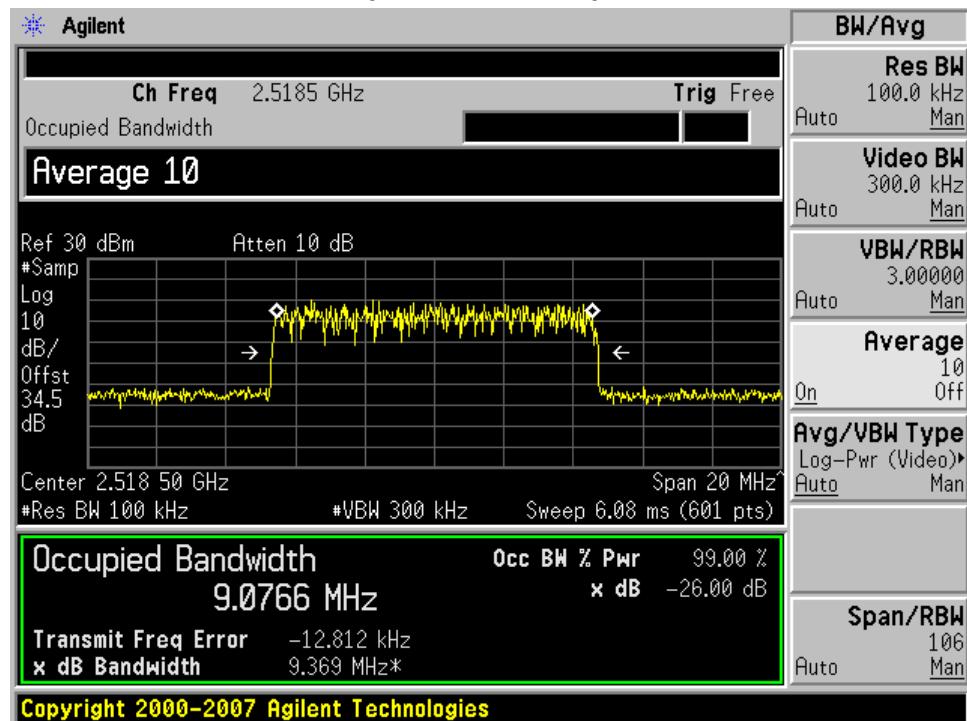
**Downlink High CH Output**



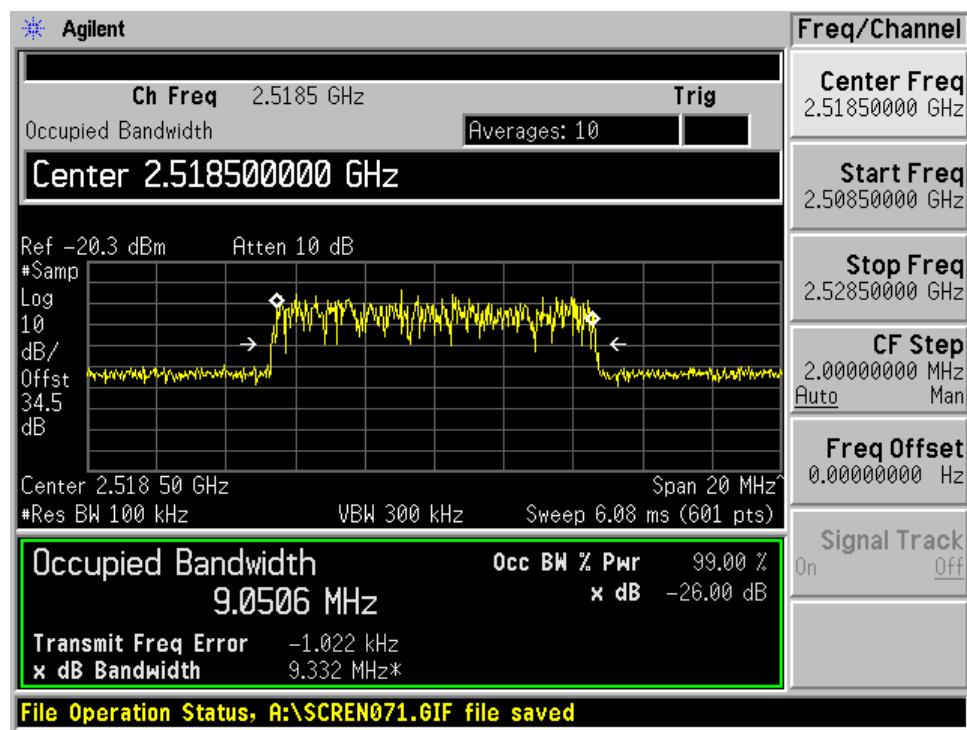
**Downlink High CH Input**



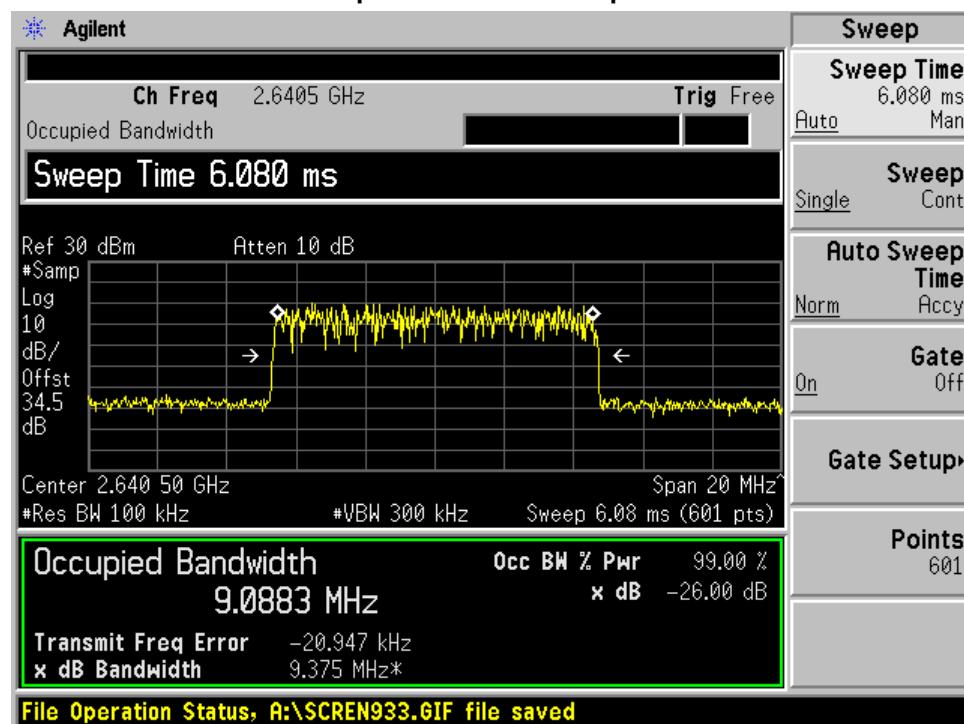
**Uplink Low CH Output**



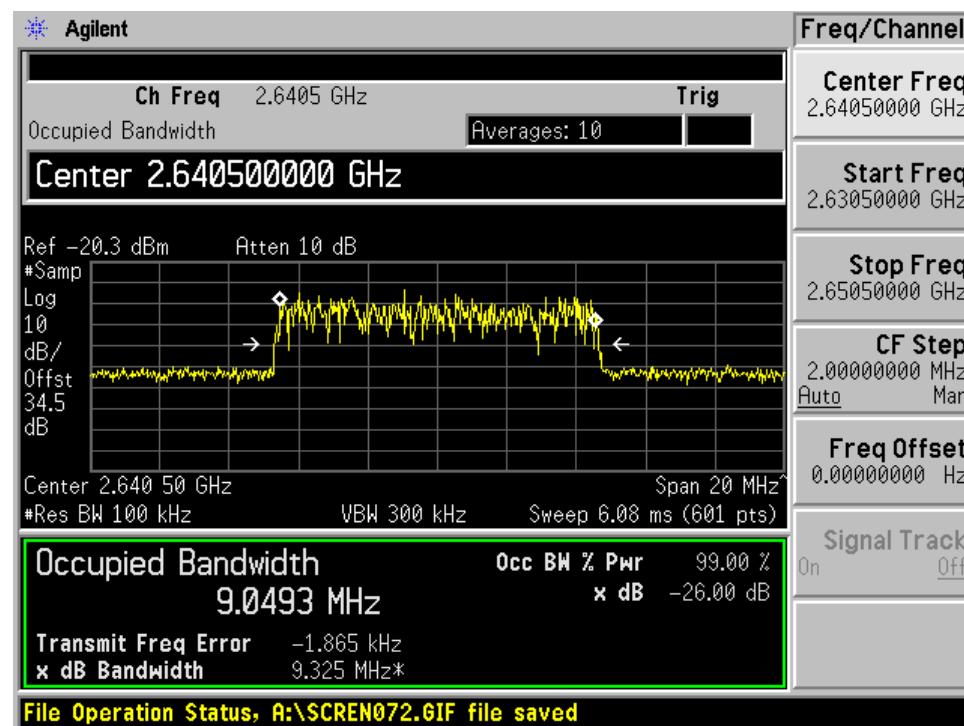
**Uplink Low CH Input**



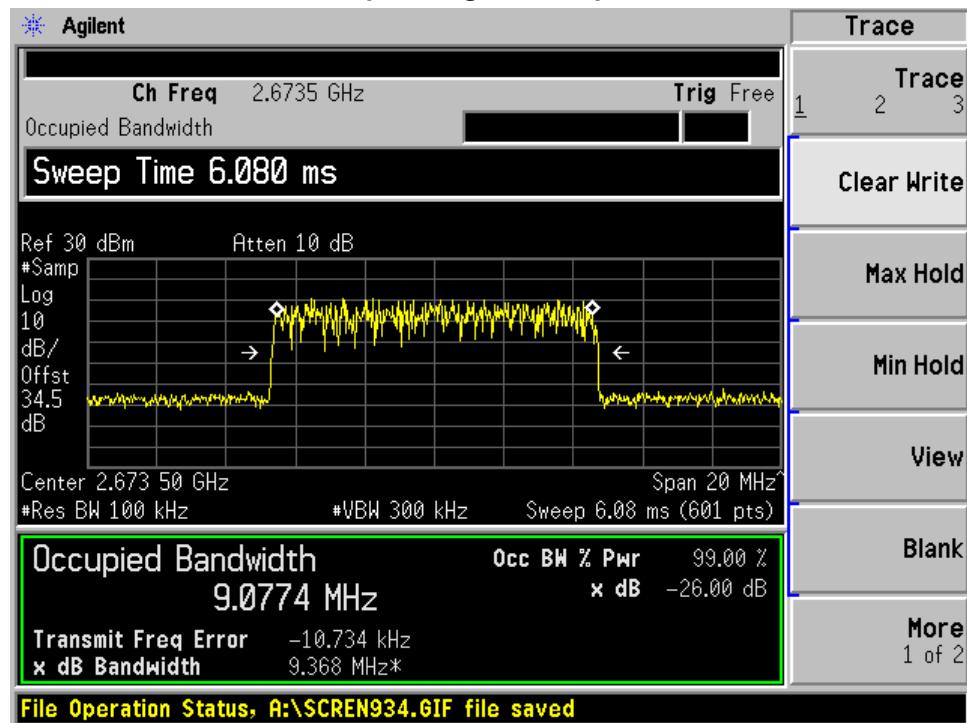
**Uplink Middle CH Output**



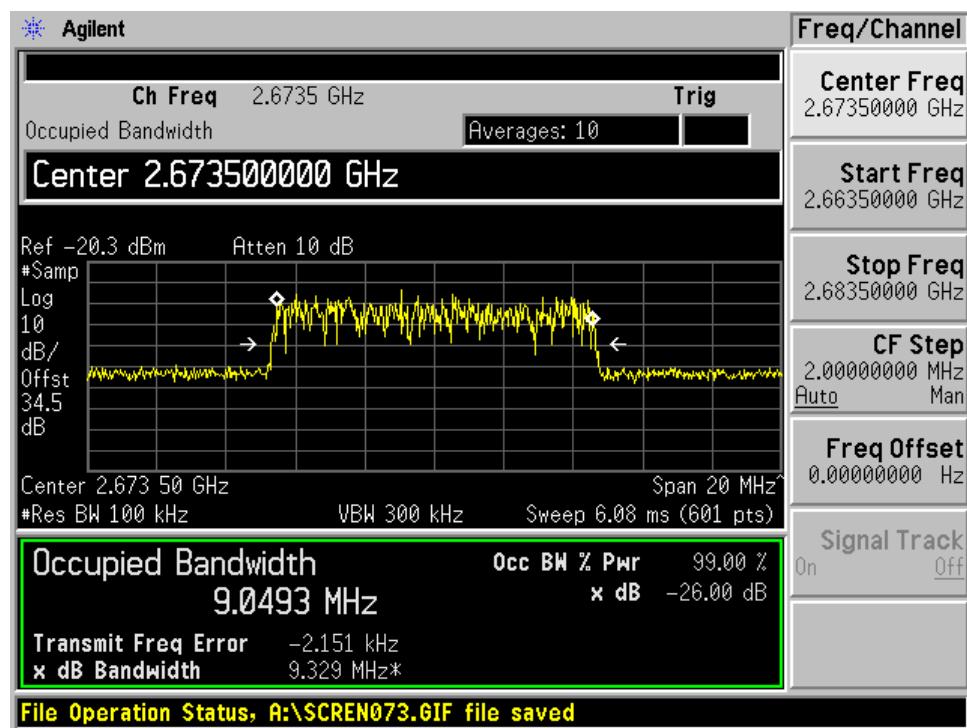
**Uplink Middle CH Input**



**Uplink High CH Output**



**Uplink High CH Input**



## 7. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

**Test Requirement(s): § 2.1051 Measurements required: Spurious emissions at antenna terminals:**

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

**§ 247.53 Emission limits**

(2) For fixed and temporary fixed digital stations, the attenuation shall be not less than  $43 + 10 \log (P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee.

**Test Procedures:** A modulated carrier generated by the signal generator carrier was connected to either the Uplink

or Downlink RF port at a maximum level as determined by the OEM A spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured.

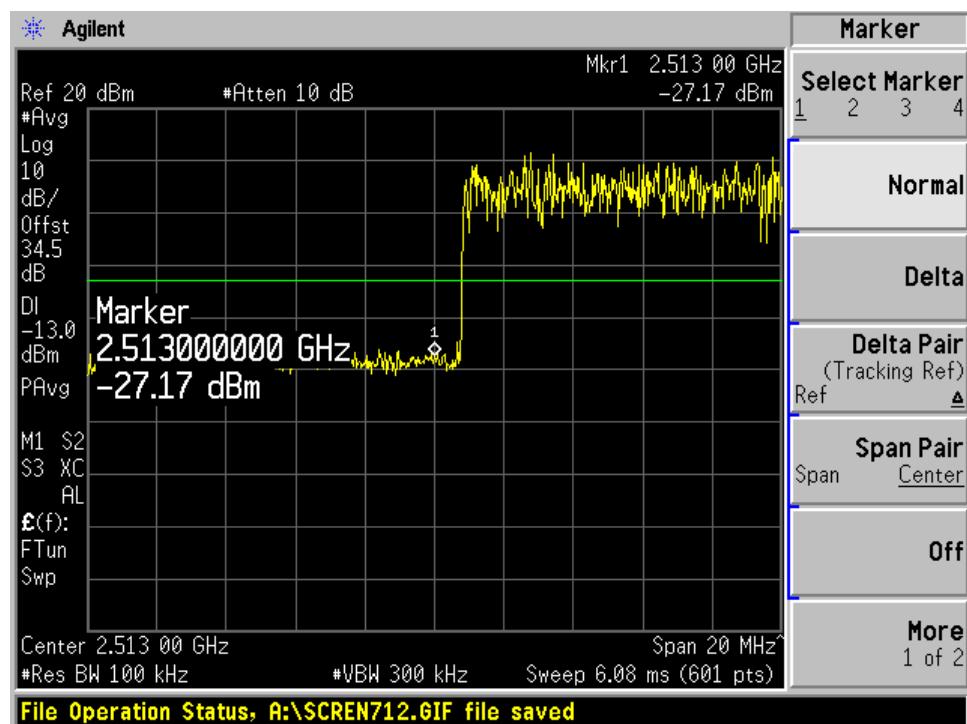
The spectrum was investigated from 30 MHz to the 26.5 GHz of the carrier.

**Test Results:** The EUT complies with the requirements of this section. There were no detectable spurious emissions for this EUT.

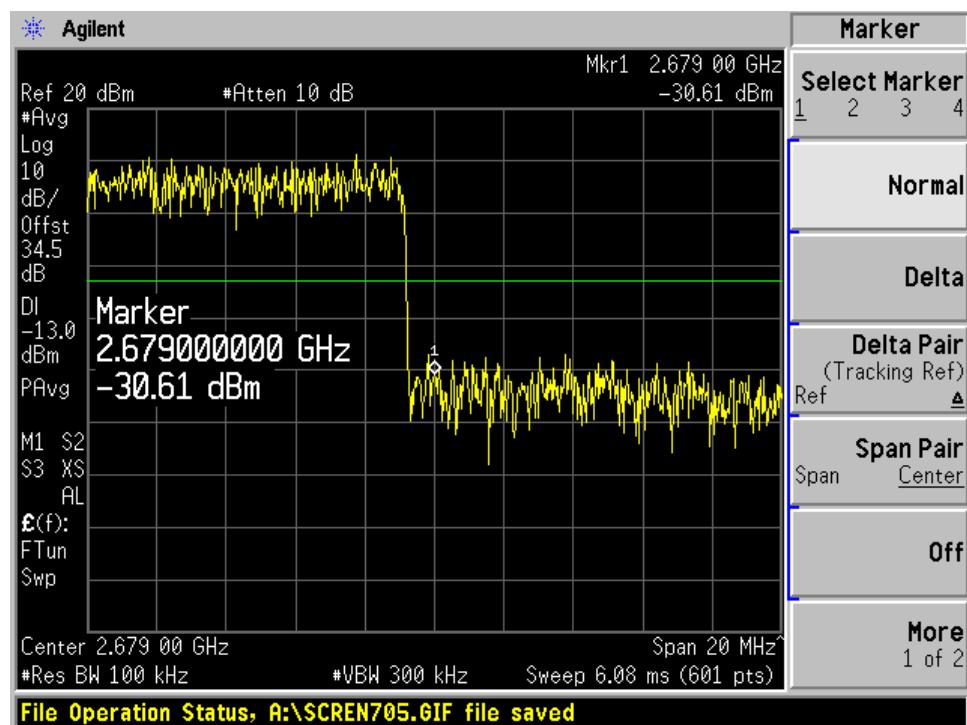
**Test Results:** The EUT complies with the requirements of this section. There were no detectable spurious emissions for this EUT.

**NOTE:** The EUT is a band selective repeater. The test was performed using all selective bands and there was not much difference between them. The test result is reported using the widest bands.

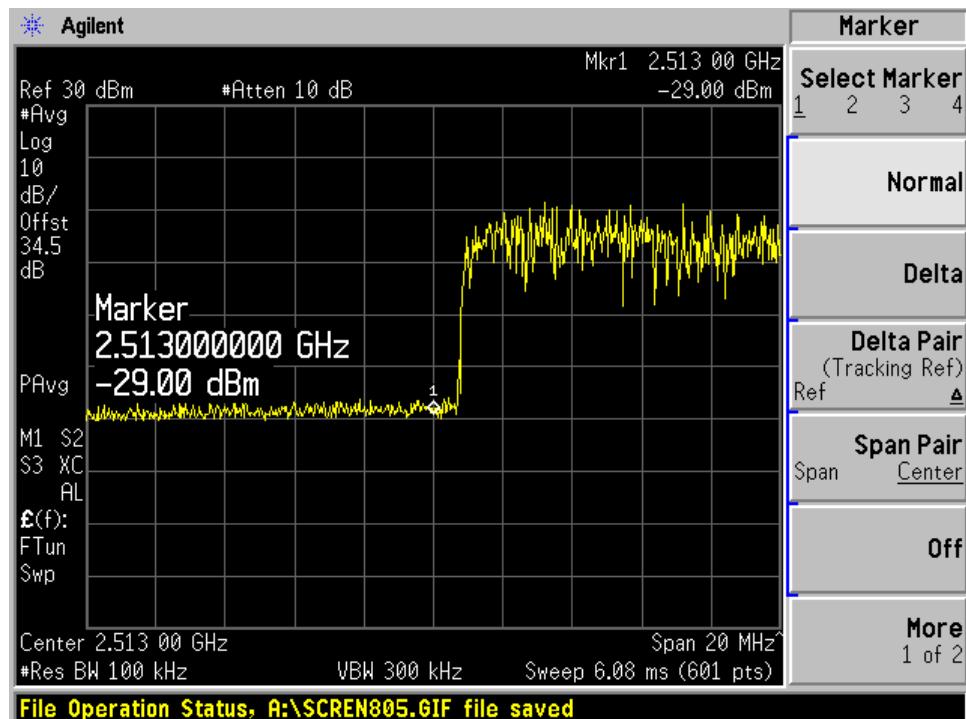
**Plots of BAND EDGE**



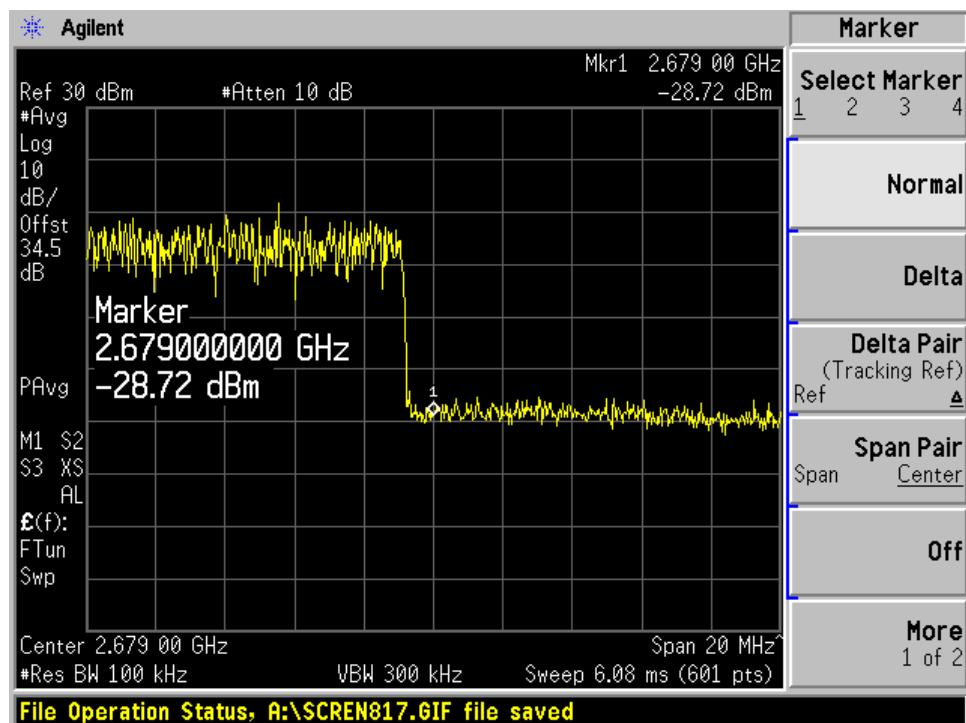
(Downlink Low CH)



(Downlink High CH)

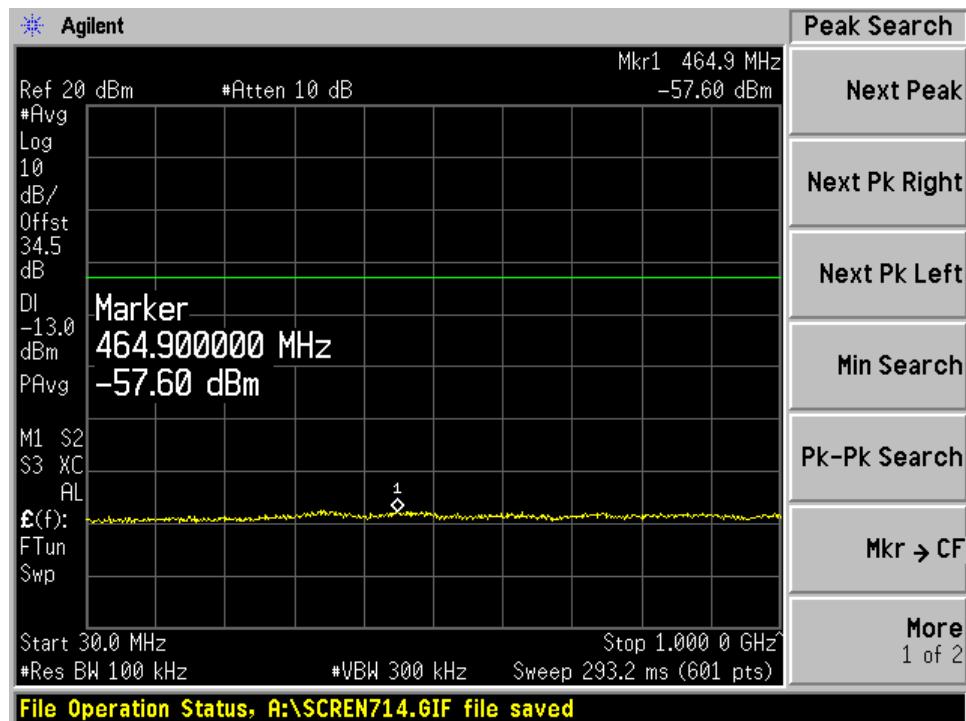


(Uplink Low CH)

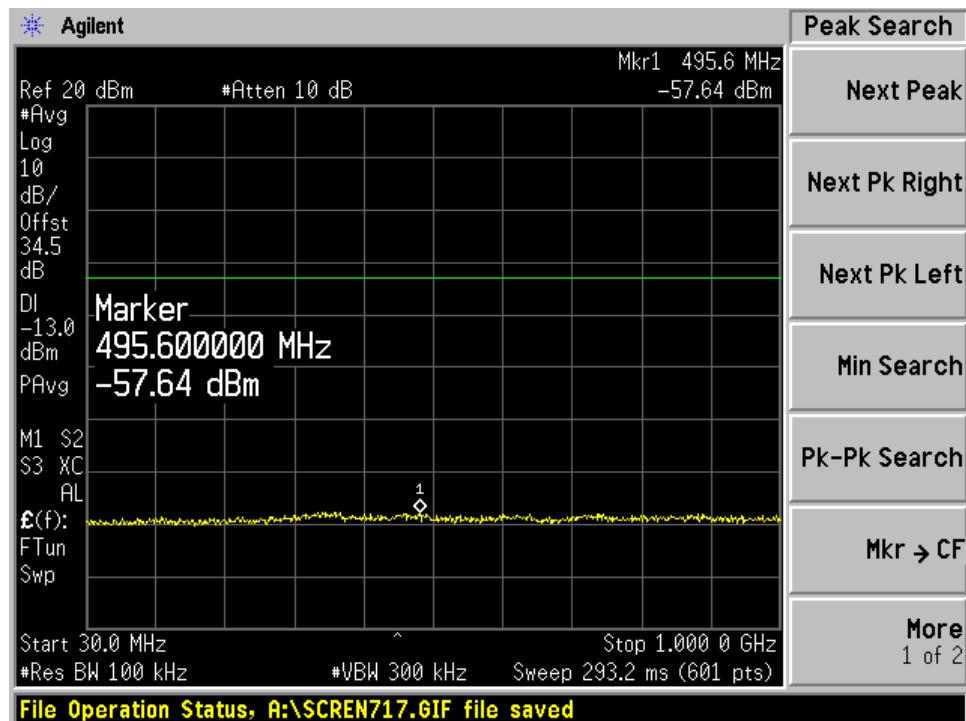


(Uplink High CH)

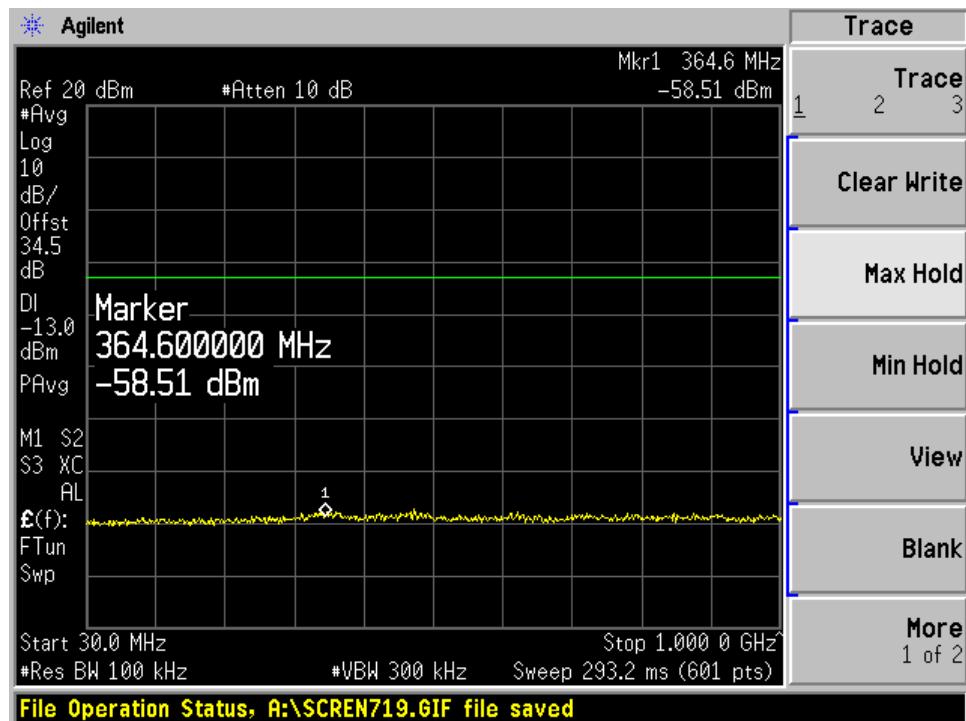
**Plots of Spurious Emission**



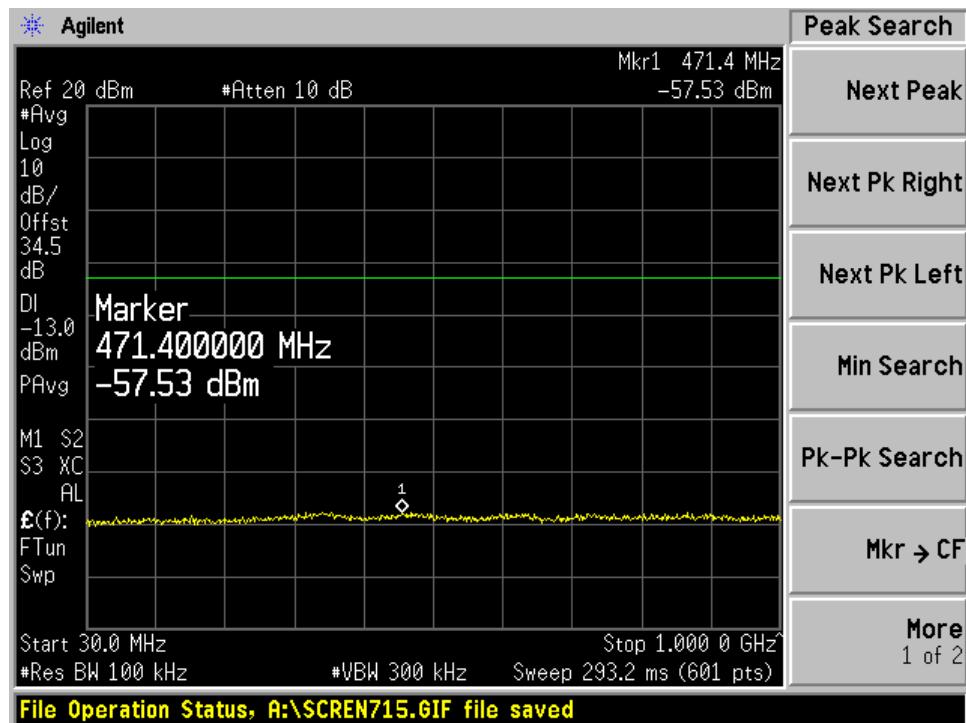
Conducted Spurious Emissions Downlink Low CH (30 MHz – 1 GHz)



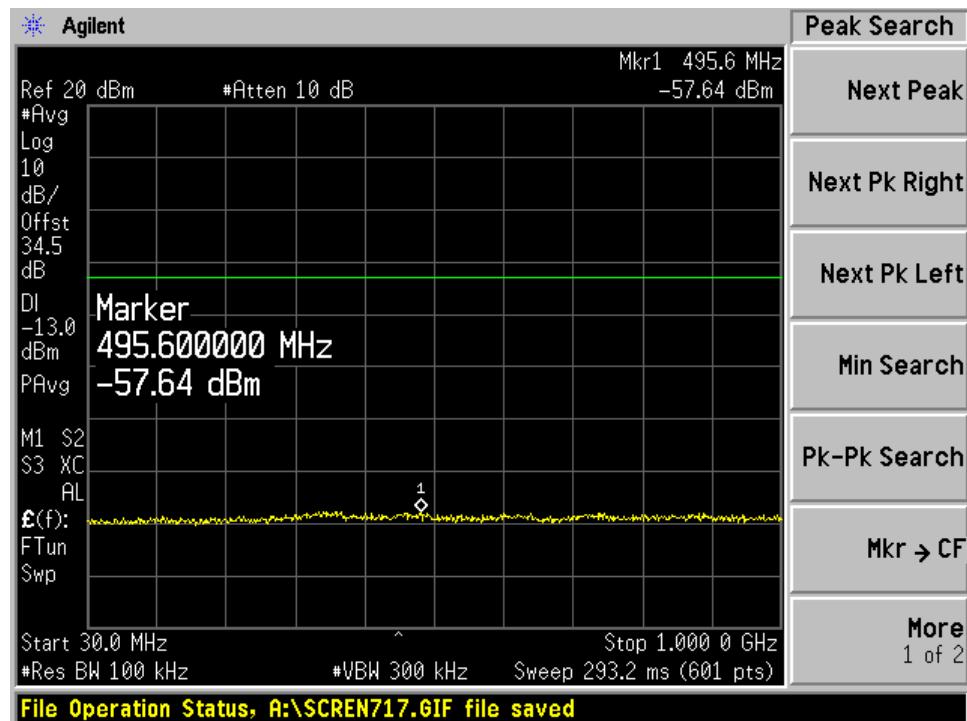
Conducted Spurious Emissions Downlink Mid CH (30 MHz – 1 GHz)



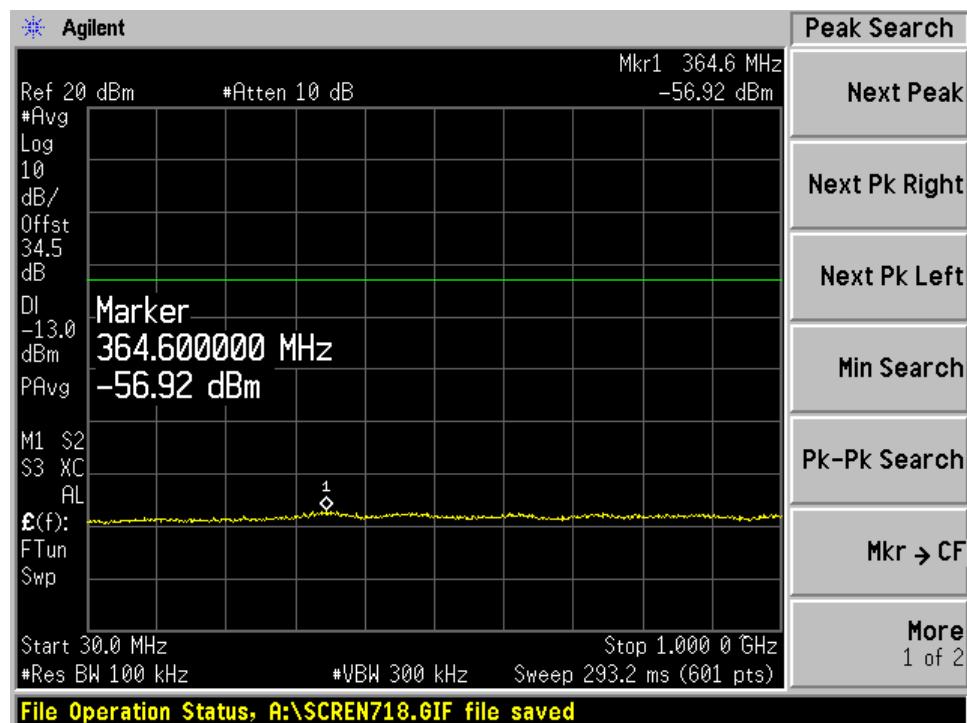
Conducted Spurious Emissions Downlink High CH (30 MHz – 1 GHz)



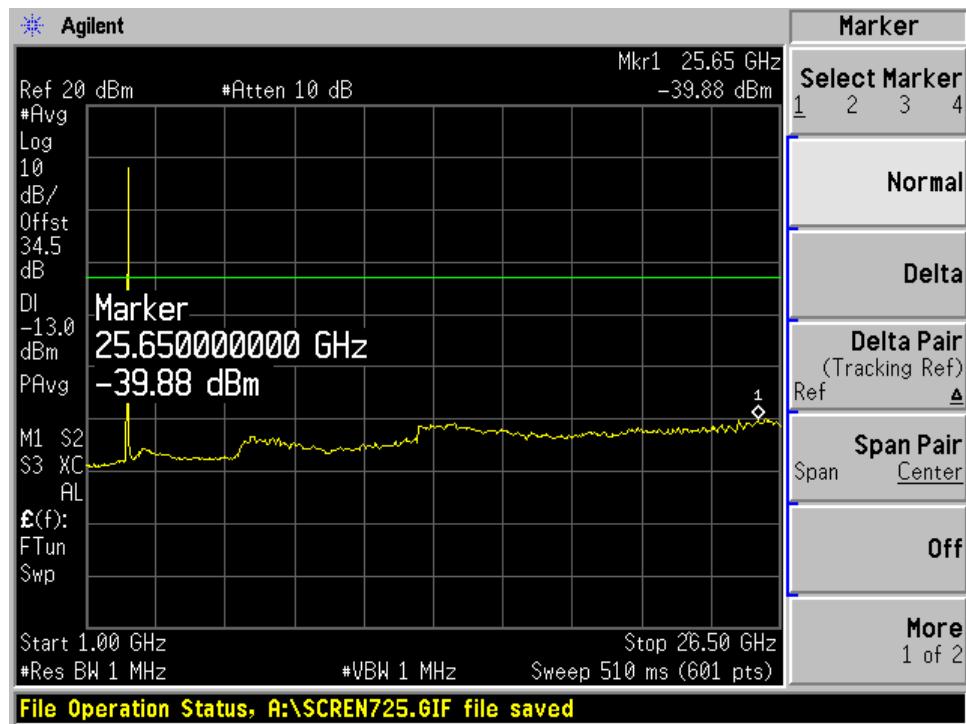
Conducted Spurious Emissions Uplink Low CH (30 MHz – 1 GHz)



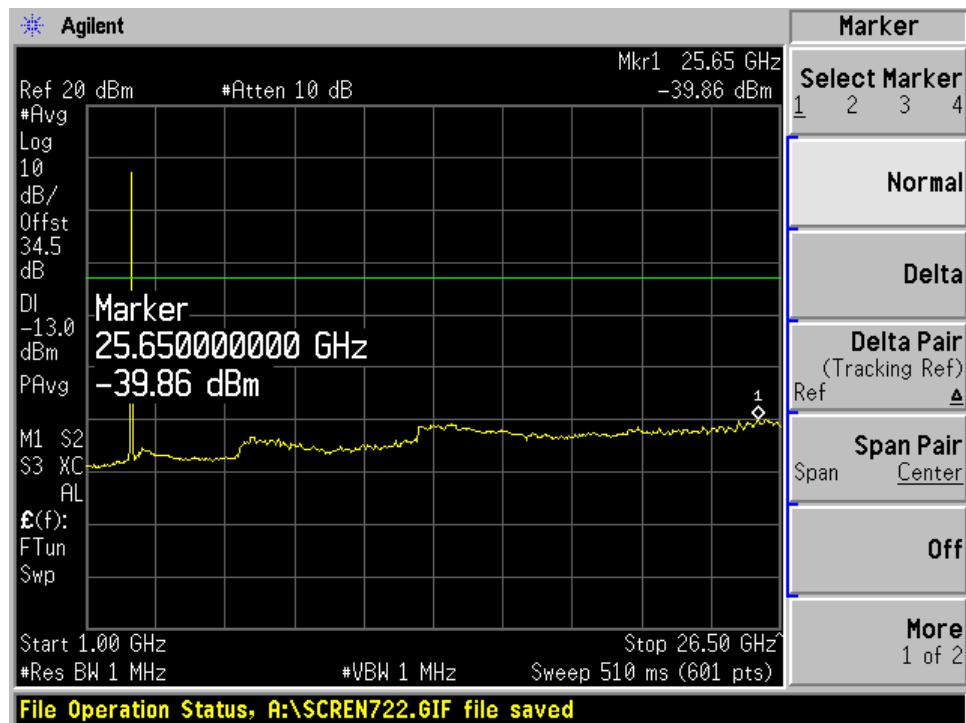
Conducted Spurious Emissions Uplink Mid CH (10 MHz – 1 GHz)



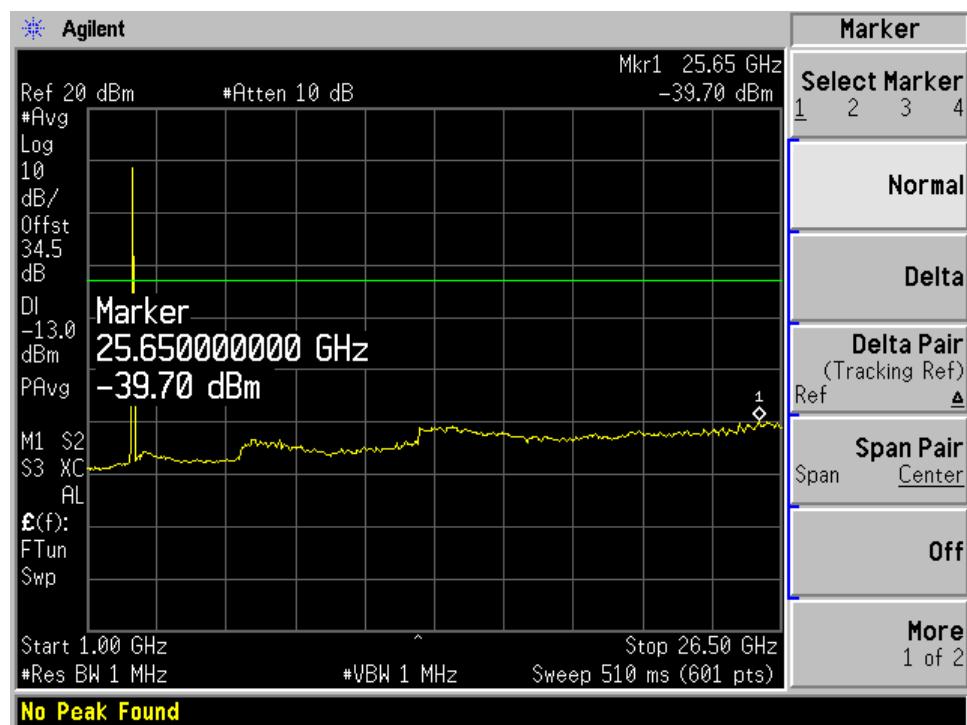
Conducted Spurious Emissions Uplink High CH (30 MHz – 1 GHz)



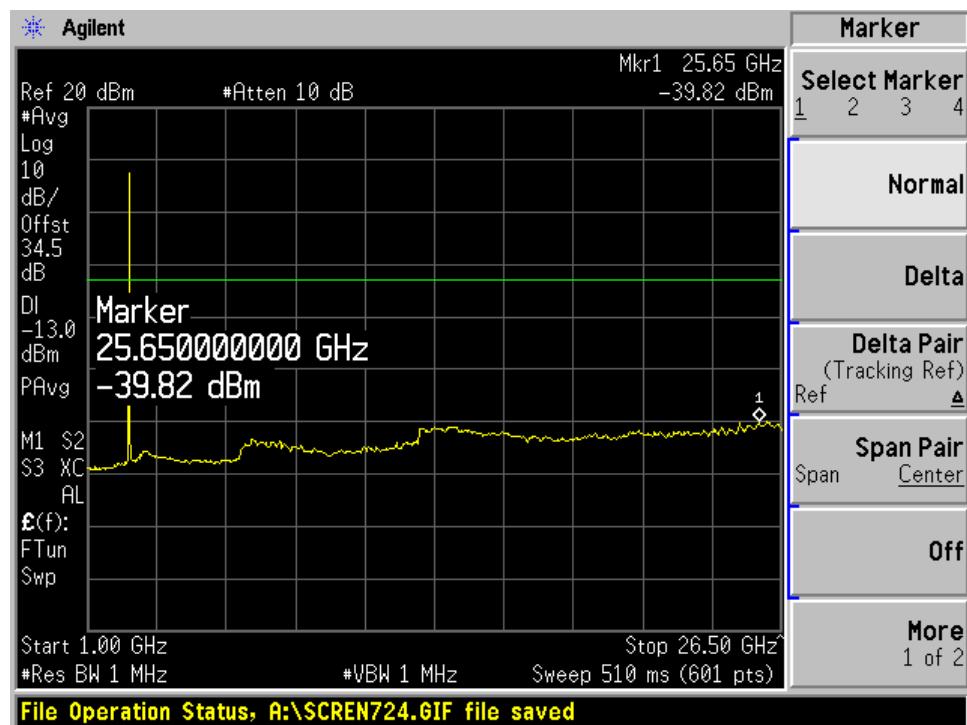
Conducted Spurious Emissions Downlink Low CH (1 GHz – 26.5 GHz)



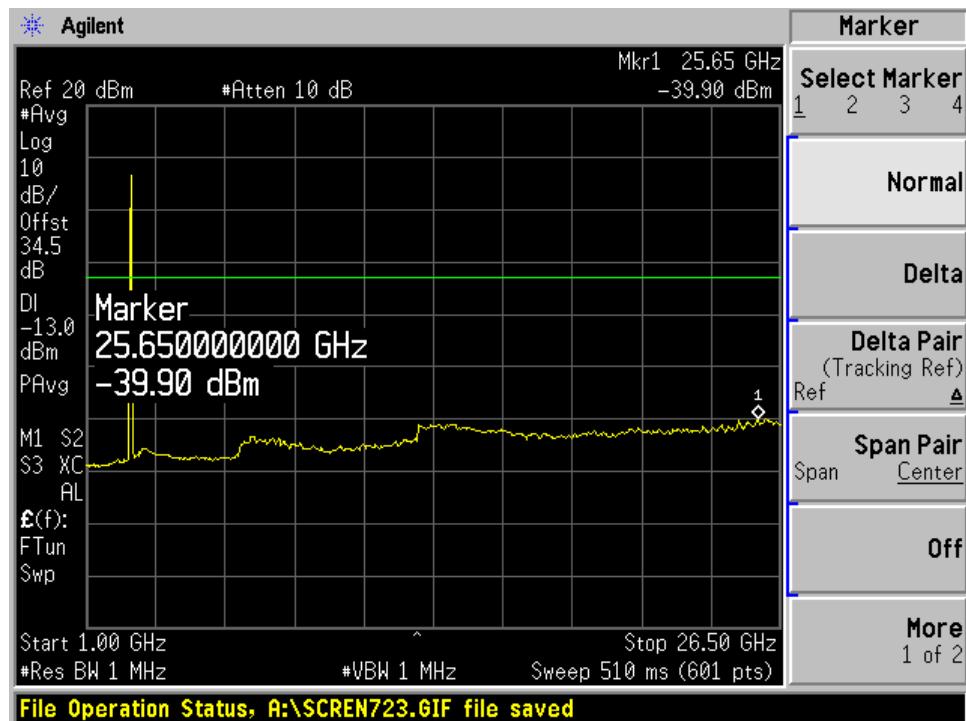
Conducted Spurious Emissions Downlink Mid CH (1 GHz – 26.5 GHz)



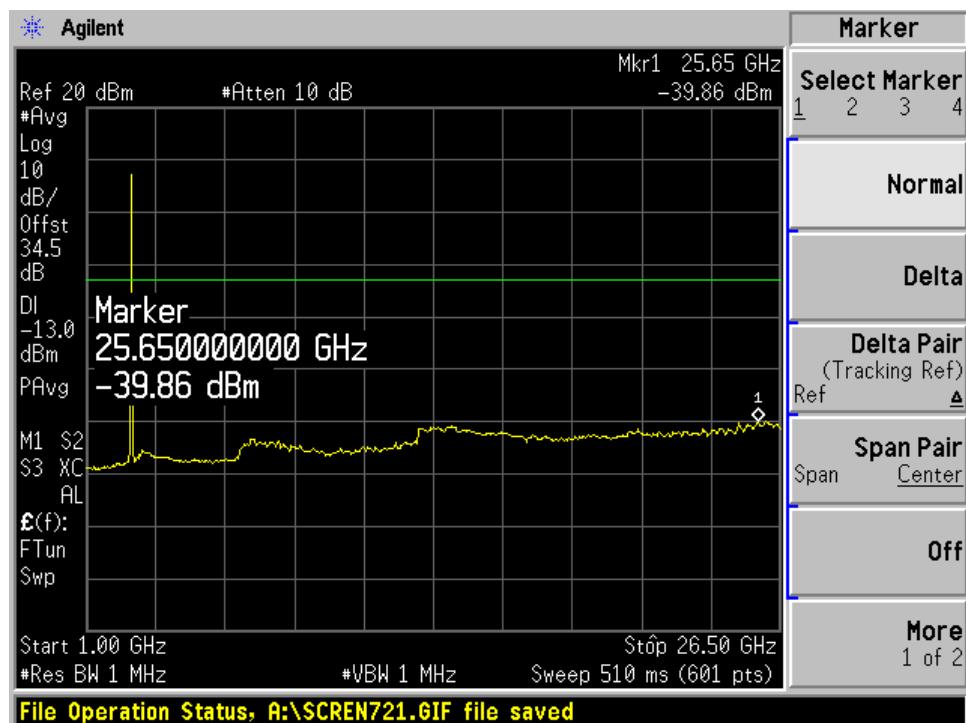
**Conducted Spurious Emissions Downlink High CH (1 GHz – 26.5 GHz)**



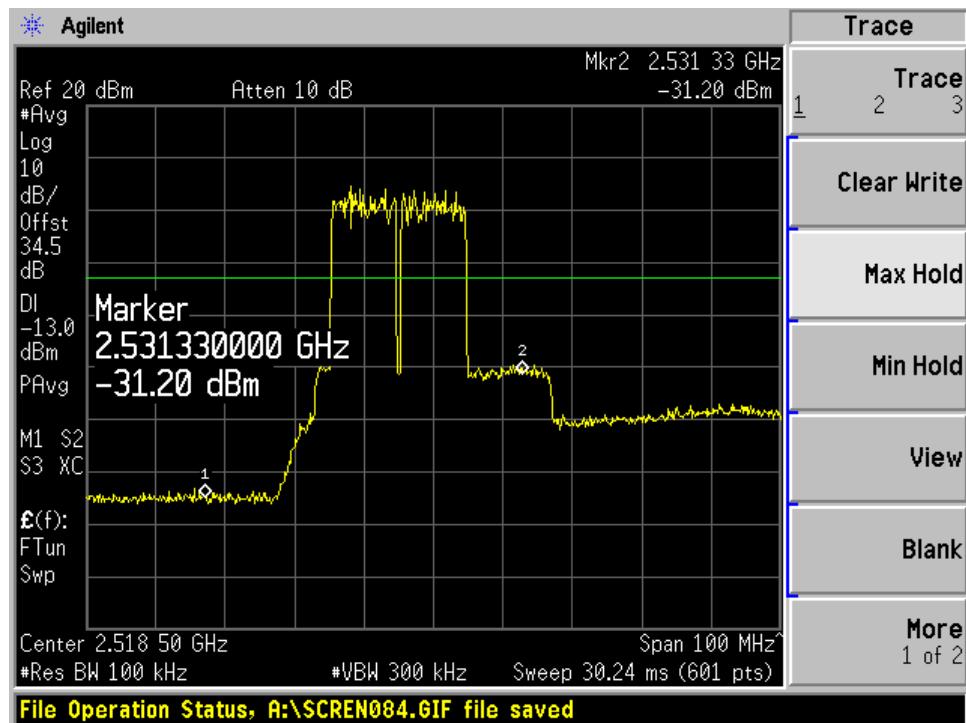
**Conducted Spurious Emissions Uplink Low CH (1 GHz – 26.5 GHz)**



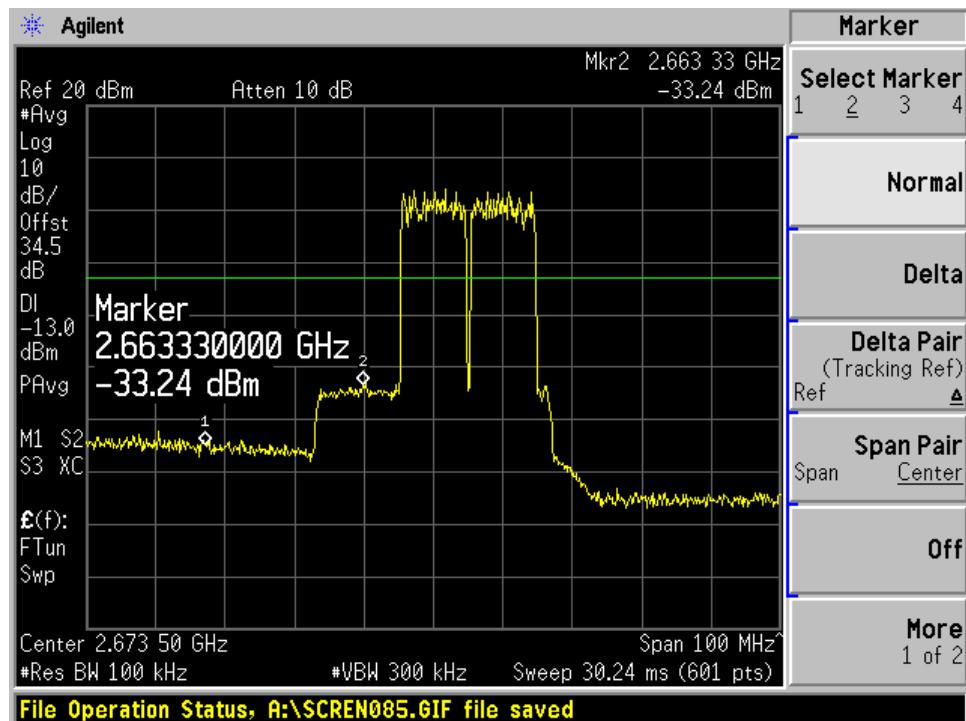
Conducted Spurious Emissions Uplink Mid CH (1 GHz – 26.5 GHz)



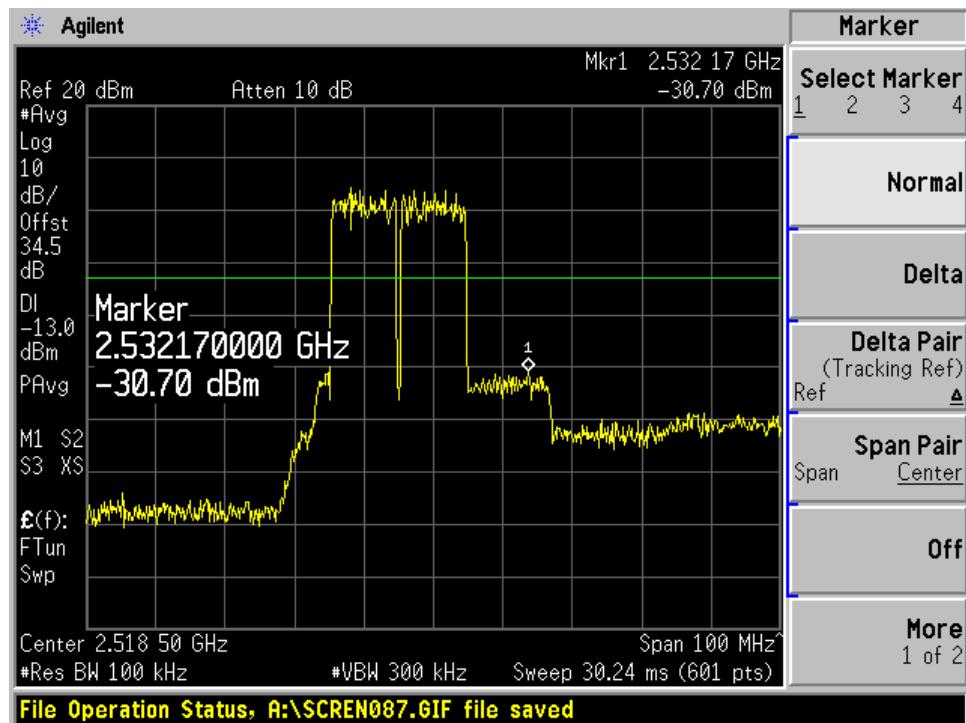
Conducted Spurious Emissions Uplink High CH (1 GHz – 26.5 GHz)



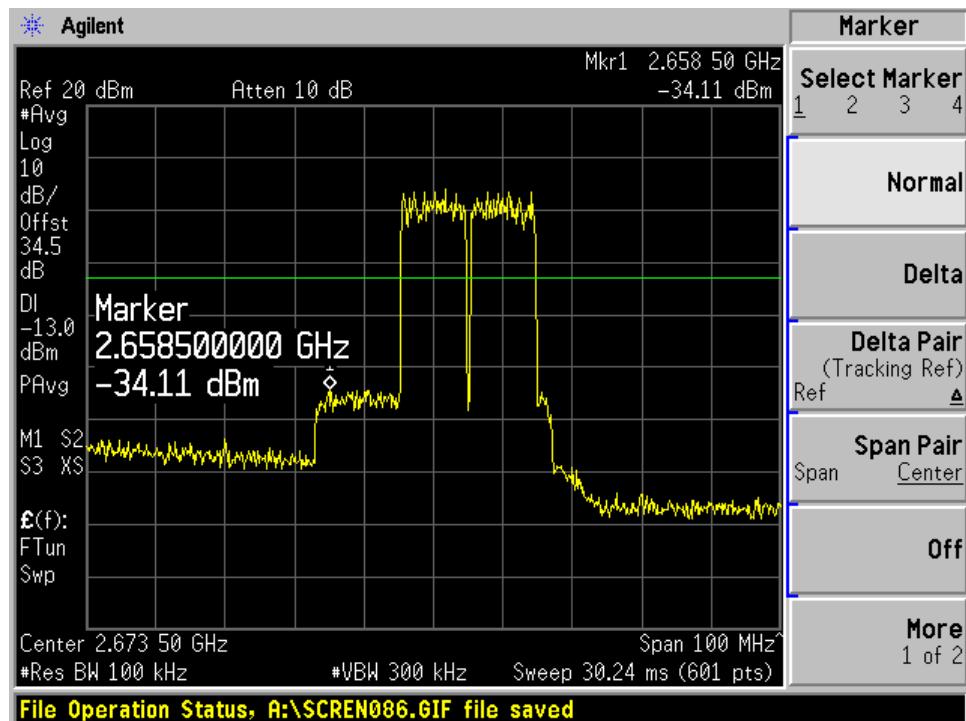
### Intermodulation Spurious Emissions Downlink Low CH



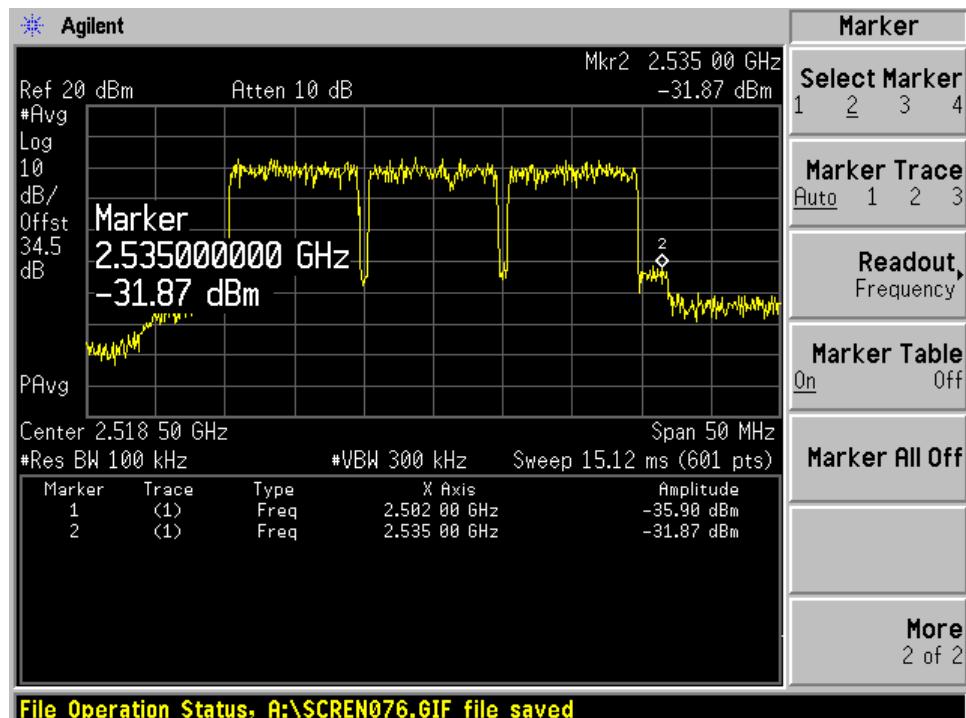
### Intermodulation Spurious Emissions Downlink Low CH



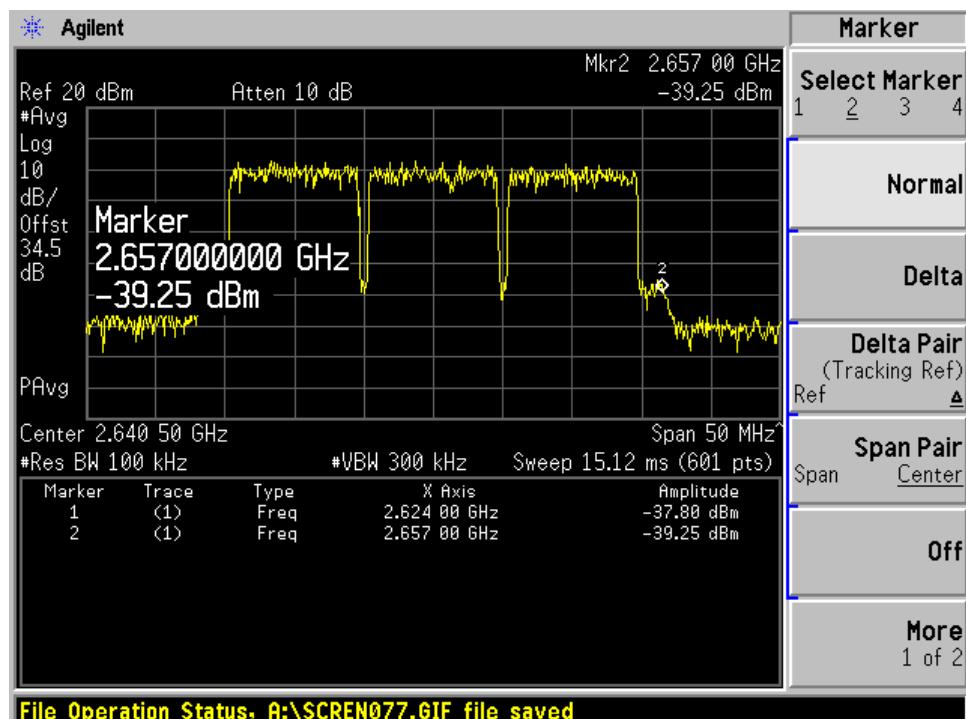
### Intermodulation Spurious Emissions Uplink Low CH



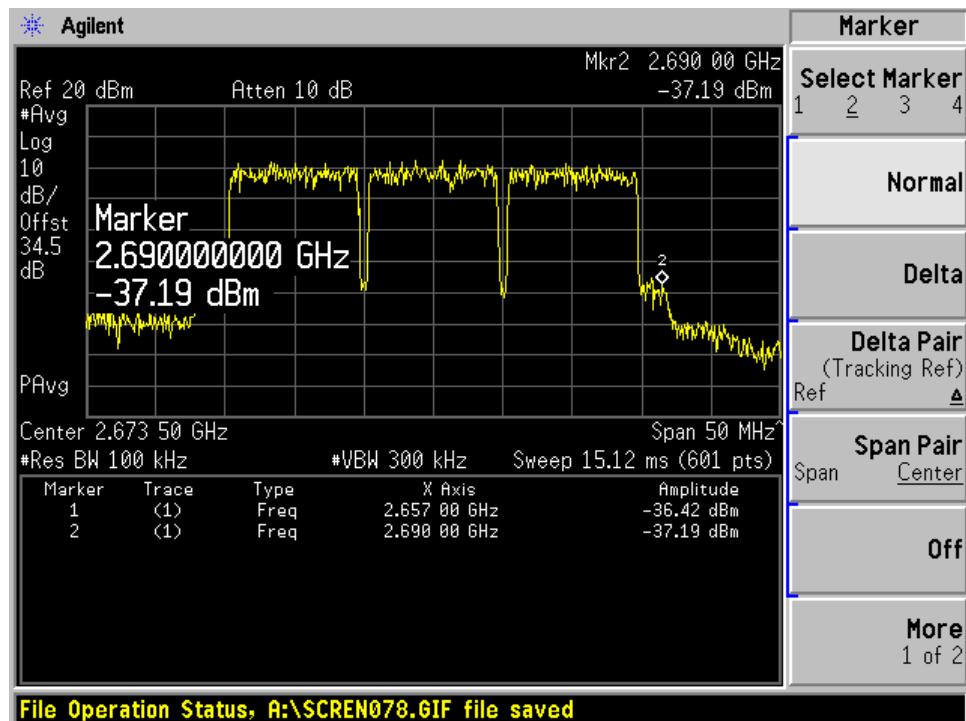
### Intermodulation Spurious Emissions Uplink High CH



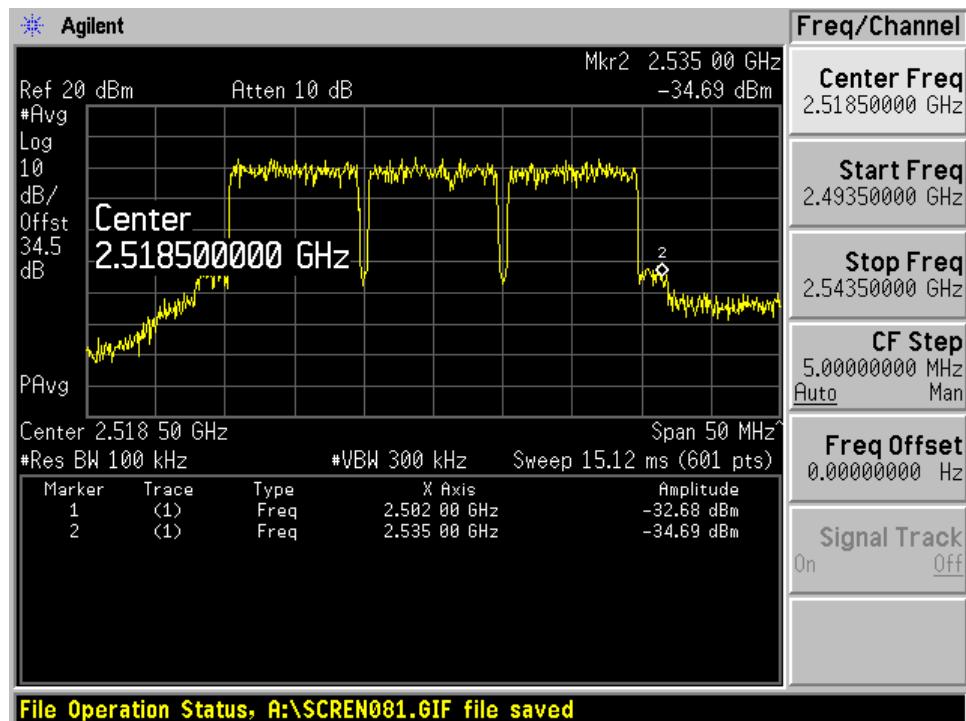
Out of Band Rejection Downlink Low CH



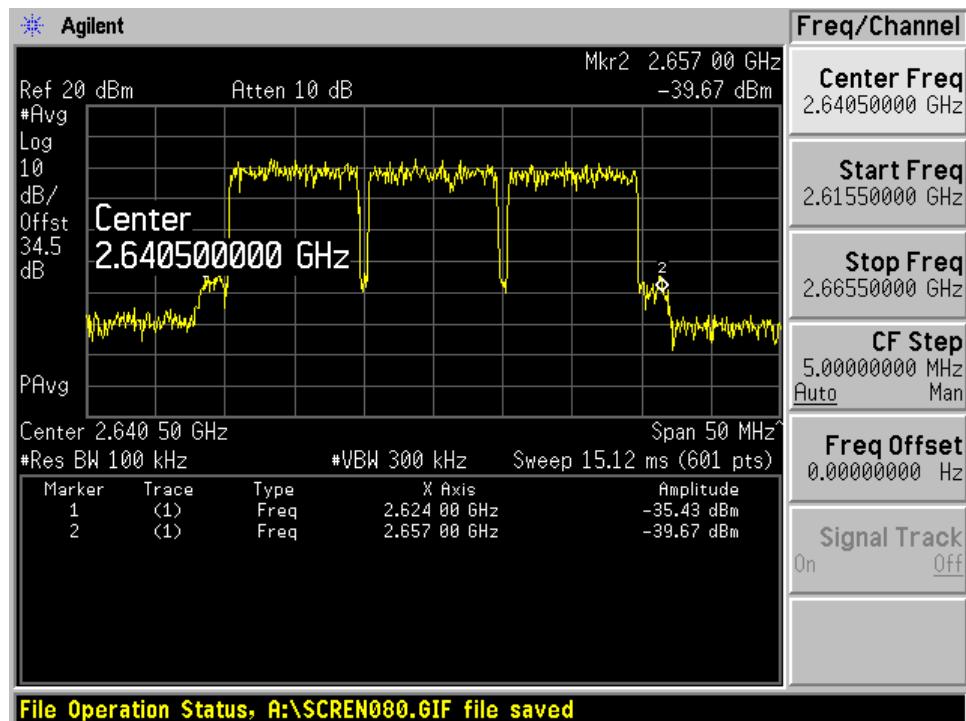
Out of Band Rejection Downlink Middle CH



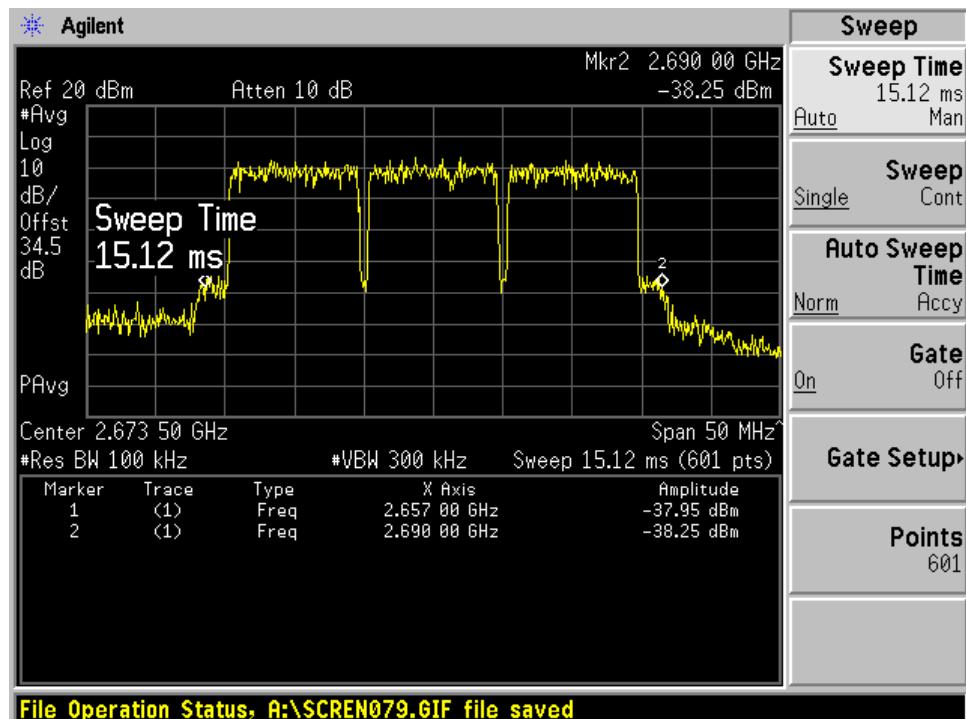
Out of Band Rejection Downlink High CH



Out of Band Rejection Uplink Low CH



Out of Band Rejection Uplink Middle CH



Out of Band Rejection Uplink High CH

## 8. FIELD STRENGTH OF SPURIOUS RADIATION

**Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.**

**§ 2.1053 (a)** Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

**§ 2.1053 (b):** The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

**§ 27.53 Emission limit**

For fixed and temporary fixed digital stations, the attenuation shall be not less than  $43 + 10 \log (P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee.

**Test Procedures:** As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic

chamber.

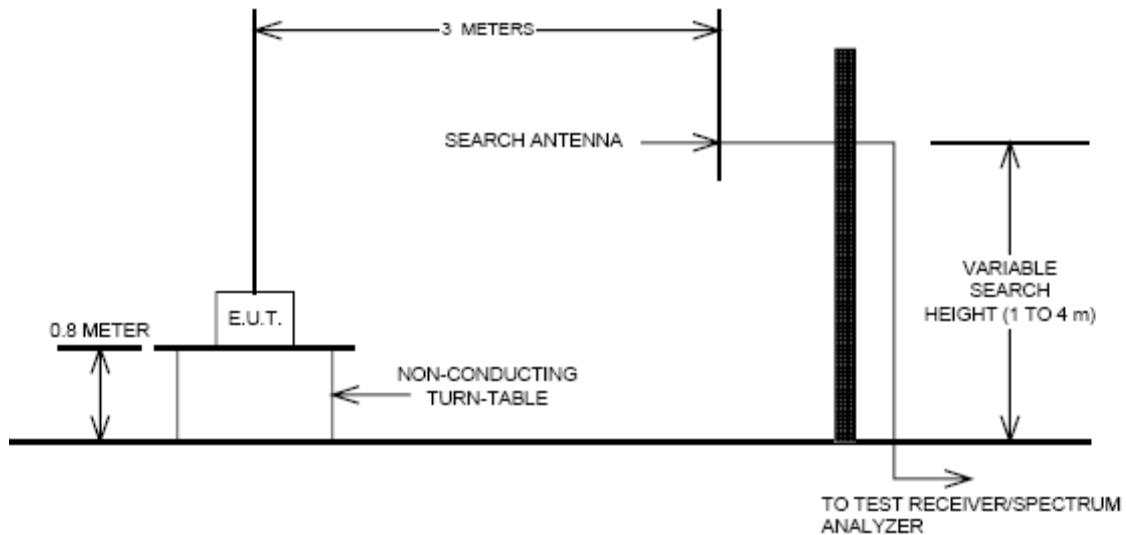
The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360

and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

**Test Results:** There were no emissions detected above the noise floor which was at least 20 dB below the limit.

**NOTE:** The EUT is a band selective repeater. The test was performed using all selective bands and there was not much difference between them. The test result is reported using the widest bands.

## Radiated Spurious Emissions Test Setup



## 9 Conducted Emissions.

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt

The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

### Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

---

**HCT Co., Ltd.**

San 136-1, Ami-ri , Bubal-eup, Icheon-si, Kyounki-do, 467-701,Korea  
TEL : +82 31 639 8518    FAX : +82 31 639 8525    [www.hct.co.kr](http://www.hct.co.kr)

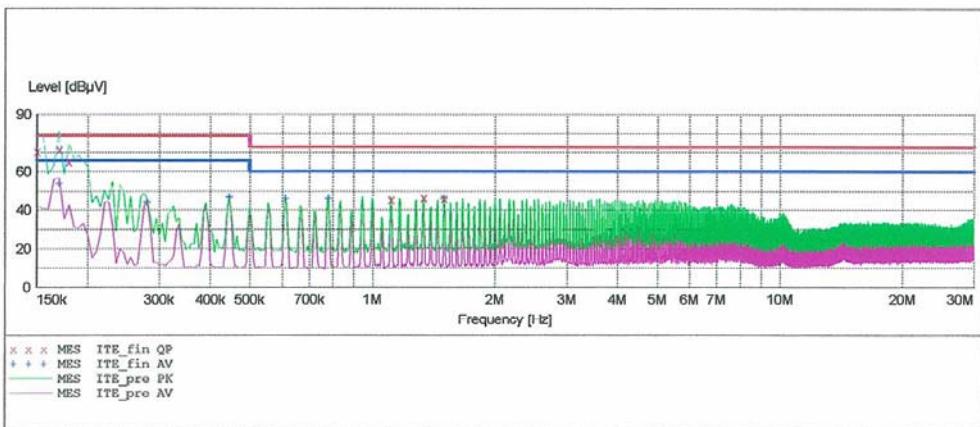
- 36 /45-

**HCT**
**EMC TEST LAB**

EUT: GRS-2624D-SPR  
 Manufacturer: GSInstruments Co.,Ltd  
 Operating Condition: NORMAL  
 Test Site: SHIELD ROOM  
 Operator: KH-SEO  
 Test Specification: CISPR 22 CLASS A  
 Comment: H

**SCAN TABLE: "CISPR22 CLASS A"**

Short Description: EN 55022 Voltage  
 Start Frequency: 150.0 kHz Stop Frequency: 500.0 kHz Step Width: 5.0 kHz  
 Detector: MaxPeak Meas. Time: 10.0 ms IF: 9 kHz Transducer: None  
 Average  
 Start Frequency: 500.0 kHz Stop Frequency: 30.0 MHz Step Width: 5.0 kHz  
 Detector: MaxPeak Meas. Time: 10.0 ms IF: 9 kHz Transducer: None  
 Average


**MEASUREMENT RESULT: "ITE\_fin QP"**

8/24/2008 4:31PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.150000	70.70	10.0	79	8.3	---	---
0.170000	71.60	10.0	79	7.4	---	---
0.180000	65.50	10.0	79	13.5	---	---
1.110000	45.50	10.2	73	27.5	---	---
1.335000	46.40	10.2	73	26.6	---	---
1.500000	46.10	10.2	73	26.9	---	---

**MEASUREMENT RESULT: "ITE\_fin AV"**

8/24/2008 4:31PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.170000	54.20	10.0	66	11.8	---	---
0.280000	44.40	10.0	66	21.6	---	---
0.445000	46.90	10.0	66	19.1	---	---
0.610000	46.20	10.1	60	13.8	---	---

***MEASUREMENT RESULT: "ITE\_fin AV"***

(continued)

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.780000	46.20	10.1	60	13.8	---	---
1.500000	46.10	10.2	60	13.9	---	---

**MEASUREMENT RESULT: "ITE fin AV"**

(continued)

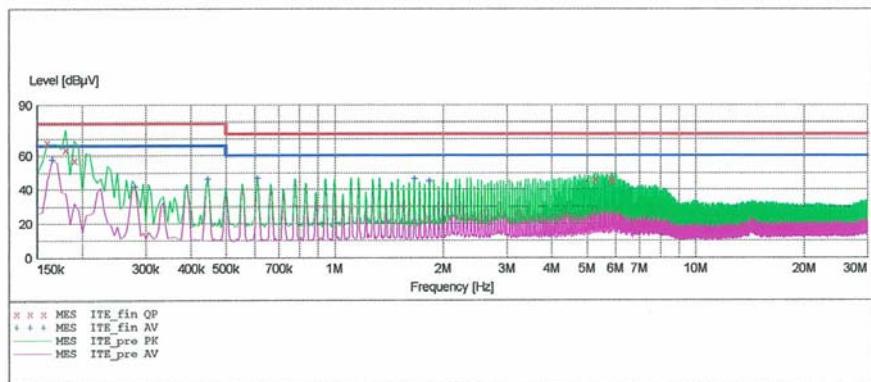
Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line dB	PE
1.665000	46.50	10.2	60	13.5	---	---
1.830000	45.20	10.3	60	14.8	---	---

**HCT****EMC TEST LAB**

EUT: GRS-2624D-SPR  
 Manufacturer: GSInstruments Co.,Ltd  
 Operating Condition: NORMAL  
 Test Site: SHIELD ROOM  
 Operator: KH-SEO  
 Test Specification: CISPR 22 CLASS A  
 Comment: N

**SCAN TABLE: "CISPR22 CLASS A"**

Short Description: EN 55022 Voltage  
 Start Stop Step Detector Meas. IF Transducer  
 Frequency Width Time Bandw.  
 150.0 kHz 500.0 kHz 5.0 kHz MaxPeak 10.0 ms 9 kHz None  
 Average  
 500.0 kHz 30.0 MHz 5.0 kHz MaxPeak 10.0 ms 9 kHz None  
 Average

**MEASUREMENT RESULT: "ITE\_fin QP"**

8/24/2008 4:29PM						
Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.160000	67.80	10.0	79	11.2	---	---
0.180000	63.80	10.0	79	15.2	---	---
0.190000	57.50	10.0	79	21.5	---	---
0.270000	46.10	10.7	73	26.9	---	---
0.5825000	46.40	10.7	73	26.6	---	---
0.5880000	45.10	10.7	73	27.9	---	---

**MEASUREMENT RESULT: "ITE\_fin AV"**

8/24/2008 4:29PM						
Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.165000	57.80	10.0	66	8.2	---	---
0.280000	42.10	10.0	66	23.9	---	---
0.445000	46.10	10.0	66	19.9	---	---
0.610000	46.60	10.1	60	13.4	---	---

## 10. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

**Test Requirement(s):**

§2.1055(a)(1) §90.213

**Test Procedures:**

As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber.

A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option

on the Spectrum Analyzer was used to measure frequency deviations.

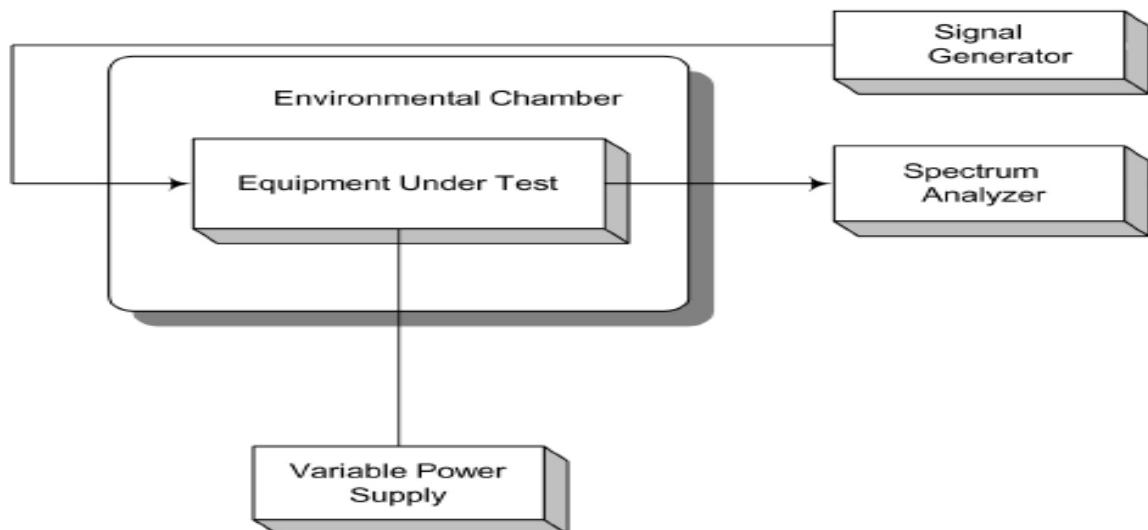
The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50 °C.

Voltage supplied to EUT is 120 Vac reference temperature was done at 20°C. The voltage was varied by  $\pm 15\%$  of nominal

**Test Results:**

**The E.U.T was found in compliance for Frequency Stability and Voltage Test**

**NOTE:** The EUT is a band selective repeater. The test was performed using all selective bands and there was not much difference between them. The test result is reported using the widest bands.

**Test Setup:**

## Frequency Stability and Voltage Test Results

**Reference:** 120 Vac at 20°C **Freq.** = 2640.50008 MHz

Temperature	Measured	Drift
(Celsius)	Freq (MHz)	ppm
50	2640.50013	0.000008
40	2640.50011	0.000006
30	2640.50009	0.000004
20	Reference	
10	2640.50004	- 0.000001
0	2640.50007	0.000002
-10	2640.50015	0.000010
-20	2640.50023	0.000017
-30	2640.50021	0.000016

**Reference:** 120 Vac at 20°C **Freq.** = 2640.50005 MHz

Voltage(dc)	Measured	Drift
+/-15% Ref	Freq (MHz)	(Hz)
102	2640.5004	-0.00001
138	2640.5011	0.00006

**Uplink Mid CH**

**Reference:** 120 Vac at 20°C **Freq.** = 2640.50003 MHz

Temperature	Measured	Drift
(Celsius)	Freq (MHz)	Ppm
50	2640.49992	-0.000003
40	2640.49987	-0.000008
30	2640.49985	-0.000010
20	Reference	
10	2640.49998	0.000003
0	2640.50003	0.000008
-10	2640.50010	0.000010
-20	2640.50013	0.000018
-30	2640.50021	0.000026

**Reference:** 120 Vac at 20°C **Freq.** = 2640.49995 MHz

Voltage(dc)	Measured	Drift
+/-15% Ref	Freq (MHz)	(Hz)
102	2640.50011	0.000016
138	2640.50009	0.000014

**Downlink Mid CH**

## 11. RF Exposure Statement

### 1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

---

#### (B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f <sup>2</sup> )	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....	.....	.....	f/1500	30
1500 - 100.000.....	.....	.....	1.0	30

F = frequency in MHz

\* = Plane-wave equivalent power density

### 2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Max Peak output Power at antenna input terminal	24.70000	dBm
Max Peak output Power at antenna input terminal	295.12092	mW
Prediction distance	20.00000	cm
Prediction frequency	2518.50000	MHz
Antenna Gain(typical)	12.00000	dBi
Antenna Gain(numeric)	15.84893	-
Power density at prediction frequency (S)	0.93053	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm <sup>2</sup>

### 3. RESULTS

The power density level at 20 cm is 0.93053 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0 mW/cm<sup>2</sup> at 2518.5 MHz for BRS band.