

Test Report No. 7191131678-EEC16/02
dated 01 Mar 2016



PSB Singapore

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
47 CFR FCC Parts 2, 15, and 25
OF A
SATELLITE TERMINAL, iSavi-E
[Model : SH-100E]
[FCC ID : QO4-SMTISAVIEWE]

TEST FACILITY

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
No. 1 Science Park Drive, Singapore 118221

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
13 International Business Park #01-01, Singapore 609932

FCC REG. NO.

99142 (3m and 10m Semi-Anechoic Chamber, Science Park)

IND. CANADA REG. NO.

29321-1 (3m and 10m Semi-Anechoic Chamber, Science Park)

PREPARED FOR

Addvalue Innovation Pte Ltd
8 Tai Seng Link, Level 5 (WING 2),
Singapore 534158

Tel : (65) 6509 5700

Fax : (65) 6509 5701

QUOTATION NUMBER

219192247 & 2191035097

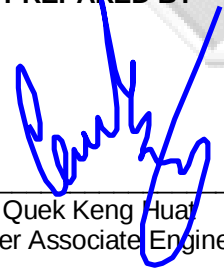
JOB NUMBER

7191086396 & 7191131678

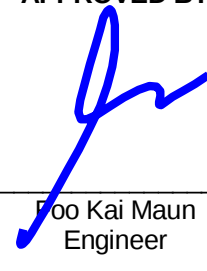
TEST PERIOD

06 May 2014 – 30 Jun 2014

PREPARED BY


Quek Keng Huat
Higher Associate Engineer

APPROVED BY


Foo Kai Maun
Engineer



LA-2007-0380-A
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G

LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C
LA-2010-0464-D

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Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: enquiries@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
1 Science Park Drive, #02-01
Singapore 118221
TUV®

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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

Test Standard	Description	Pass / Fail
47 CFR FCC Parts 2, 15 and 25: 2012		
15.107(a), 15.207	Conducted Emissions	Pass
15.109	Radiated Emissions (Class B)	Pass
2.1046(a), 25.204	RF Output Power	Pass
2.1051, 25.202(f)	Unwanted Emissions at Antenna Terminal	Pass
2.1053, 25.202(f)	Radiated Spurious Emissions	Pass
25.216(h)(i)(j)	Protection of Aeronautical Radio Navigation Satellite Service	Pass
2.1055, 25.202(d)	Frequency Stability (Temperature Variation)	Pass
2.1055, 25.202(d)	Frequency Stability (Voltage Variation)	Pass
1.1310	Maximum Permissible Exposure	Refer to page 98 for details

Notes

- Three channels as listed below, which respectively represent the lower, middle and upper channels (transmit and receive) of the Equipment Under Test (EUT) when it was configured to operate under test mode condition.

Transmit Channel	Frequency (GHz)	Receive Channel	Frequency (GHz)
Lower Channel	1.6266	Lower Channel	1.5251
Middle Channel	1.6435	Middle Channel	1.5420
Upper Channel	1.6604	Upper Channel	1.5589

- The following tests were based on conducted measurement method:
 - RF Output Power
 - Unwanted Emissions at Antenna Terminal
 - Frequency Stability (Temperature Variation)
 - Frequency Stability (Voltage Variation)
- All test measurement procedures are according to ANSI/TIA-603-B-2002.
- The EUT is a Class B device when in non-transmitting state and meets the FCC Part15B Class B requirements.
- This report 7191031678-EEC16/02 was reproduced from TÜV SÜD PSB's issued test report 7191086396-EEC14/05 dated 03 Jul 2014 as per Addvalue Innovation Pte Ltd's declaration that Satellite Terminal, iSavi Model SH-100 and Satellite Terminal, iSavi-E Model SH-100E are similar in terms of components, circuitry design, PCB layouts and mechanical structures. The full EMC tests were applied to Model SH-100. The declared model SH-100E is deemed to have fulfilled the EMC requirement.



TEST SUMMARY

Modifications

No modifications were made.



PRODUCT DESCRIPTION

Description	: The Equipment Under Test (EUT) is a Satellite Terminal, iSavi-E.
Applicant	: Addvalue Innovation Pte Ltd 8 Tai Seng Link, Level 5 (Wing 2) Singapore 534158
Manufacturer	: Addvalue Innovation Pte Ltd 8 Tai Seng Link, Level 5 (Wing 2) Singapore 534158
Factory (ies)	: Beyonics Technology (Senai) Sdn Bhd No. 96 (Plot 128), Jalani-Park 1/10, Kawasan Perindustriani-Park, 81000 Bandar Indahpura, Kulaijaya, Johor, Malaysia
Brand	: WIDEYE
Model Number	: SH-100E
FCC ID	: QO4-SMTISAVIEWE
Serial Number	: Nil
Microprocessor	: OMAPL138
Operating / Transmitting Frequency	: <u>Satellite Transmitting</u> 1626.5 MHz – 1660.5 MHz <u>Satellite Receiving</u> 1518.0 MHz – 1559.0 MHz <u>GPS Receiving</u> 1575.42MHz
Clock / Oscillator Frequency	: <u>Baseband Board</u> 32.768KHz, 4.9152MHz, 24.192MHz, 25.0MHz <u>RF Board</u> 18.0MHz & 24.192MHz
Modulation / Emissions Designator	: pi/4QPSK and 16QAM (Satellite Transmit) pi/4QPSK and 16QAM (Satellite Receive) QPSK (GPS)
Antenna Gain	: 8.5dBi
Port / Connectors	: 1xRJ45 LAN Port
Rated Input Power	: DC 18V

PRODUCT DESCRIPTION

Accessories : Battery Model SH-100BP3 (3INR19/66)
10.8Vdc 3100mAh 33.4Wh

AC Adapter Model PA1065—180IB360
Input 100V-240V 50Hz-60Hz 1.5A
Output 18Vdc 3.6A64.8W Max.





SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Acer Travelmate 4750	M/N: MS2335 S/N: LXV420302411500B3B2000 FCC ID: DoC	1.8 m unshielded power cable
Delta Electronics AC/DC Adapter	M/N: ADP-65JH DB S/N: 67DW28P00YC FCC ID: DoC	1.80m unshielded power cable



EUT OPERATING CONDITIONS

47 CFR FCC Parts 2, 15 and 25

- 1. RF Output Power**
- 2. Unwanted Emissions at Antenna Terminal**
- 3. Radiated Spurious Emissions**
- 4. Protection of Aeronautical Radio Navigation Satellite Service**
- 5. Frequency Stability (Temperature Variation)**
- 6. Frequency Stability (Voltage Variation)**
- 7. Maximum Permissible Exposure**

The EUT was exercised by operating in following modes with the EUT simulating the transmission and reception using the client's provided test programs, "RFCalib_Start"

Satellite Transmission Mode

- Continuous RF transmission at lower channel at maximum RF power
- Continuous maximum RF transmission at middle channel at maximum RF power
- Continuous maximum RF transmission at upper channel at maximum RF power

Satellite Reception (Receive) Mode

- Continuous RF reception at lower channel
- Continuous RF reception at middle channel
- Continuous RF reception at upper channel

GPS Reception (Receive) Mode

- Continuous GPS signal reception

CONDUCTED EMISSION TEST

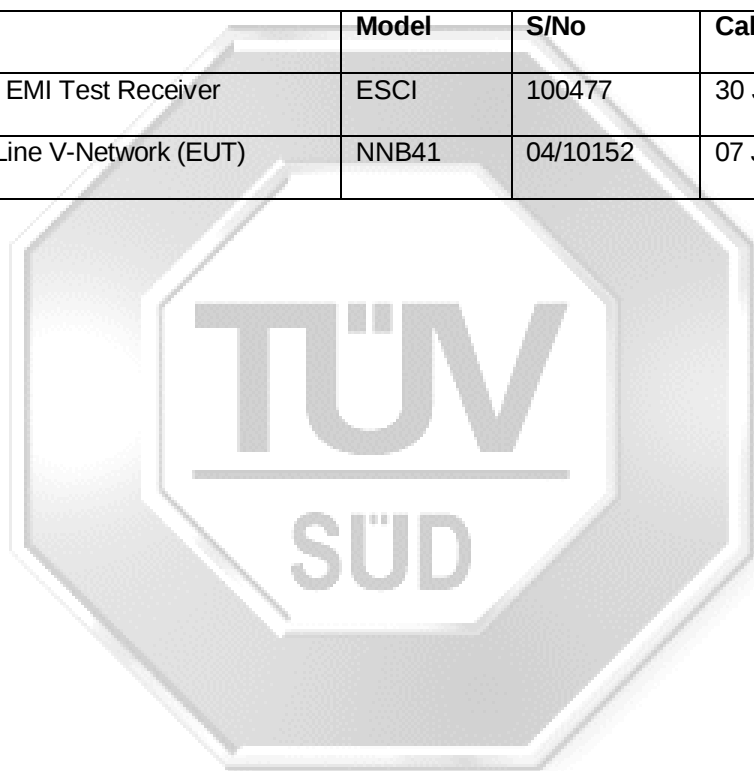
47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Limits

Frequency Range (MHz)	Limit Values (dBμV)	
	Quasi-peak (Q-P)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreasing linearly with the logarithm of the frequency

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date	Cal Interval
Rohde & Schwarz EMI Test Receiver (9kHz-3GHz)	ESCI	100477	30 Jul 2014	1 year
Schaffner LISN 2-Line V-Network (EUT) (9kHz-30MHz)	NNB41	04/10152	07 Jan 2015	1 year



CONDUCTED EMISSION TEST

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50 Ω /50 μ H EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another LISN.

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
3. High peaks, relative to the limit line, were then selected.
4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.
5. Steps 2 to 4 were then repeated for the LIVE line.

Sample Calculation Example

At 20 MHz

Q-P limit = 60.0 dB μ V

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB

Q-P reading obtained directly from EMI Receiver = 40.0 dB μ V
(Calibrated for system losses)

Therefore, Q-P margin = 60.0 - 40.0 = 20.0 i.e. 20.0 dB below Q-P limit

CONDUCTED EMISSION TEST

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Results

Test Input Power	120V 60Hz	Temperature	24°C
Line Under Test Mains	AC Mains	Relative Humidity	54%
		Atmospheric Pressure	1035 mbar
		Tested By	Nazrulhizat

Frequency (MHz)	Q-P Value (dBμV)	Q-P Limit (dBμV)	Q-P Margin (dB)	AV Value (dBμV)	AV Limit (dBμV)	AV Margin (dB)	Line
0.1858	44.3	64.2	19.9	34.8	54.2	19.4	Live
0.7518	33.6	56.0	22.4	25.6	46.0	20.4	Live
1.1618	33.0	56.0	23.0	24.9	46.0	21.1	Neutral
1.3139	34.4	56.0	21.6	25.5	46.0	20.5	Live
2.6630	38.8	56.0	17.2	24.0	46.0	22.0	Live
3.4885	35.1	56.0	20.9	21.7	46.0	24.3	Neutral

Notes

- All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "positive" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative" margin indicates a FAIL.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
9kHz - 30MHz
RBW: 9kHz VBW: 30kHz
- Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 9kHz – 30MHz is ± 2.2 dB.

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Limits (Class B)

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

47 CFR FCC Part 15.109 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date	Cal Interval
R&S Test Receiver – ESI1	ESI40	100010	09 Jul 2014	1 year
Schaffner Bilog Antenna –(30MHz-2GHz) BL3 (Ref)	CBL6112B	2549	23 Jan 2015	1 year
Com-Power Preamplifier (1MHz-1GHz)	PAM-103	441056	16 Aug 2014	1 year
R&S Preamplifier (1GHz -18GHz)	SCU18	102191	14 Mar 2015	1 year
EMCO Horn Antenna(1GHz-18GHz)	3115	9901-5671	13 Mar 2015	1 year
K&L Microwave Bandreject Filter	3TNF-1000/2000-N/N	436	Output Monitor	Output Monitor

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

47 CFR FCC Part 15.109 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 10th harmonic of the highest frequency used or generated by the EUT, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz

Q-P limit = 37.0 dB μ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dB μ V/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 37.0 - 31.0 = 6.0

i.e. 6.0 dB below Q-P limit

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Results

Operating Mode	Continuous Satellite Transmission	Temperature	22°C
Test Input Power	120V 60Hz	Relative Humidity	54%
Test Distance	3m	Atmospheric Pressure	1030mbar
		Tested By	Lim Kay Tak

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Limit (dBμV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
30.8040	26.4	40.0	13.6	118	12	V
64.5520	15.1	40.0	24.9	136	47	V
94.2230	11.2	43.5	32.3	164	180	V
215.9570	25.2	43.5	18.3	134	333	H
229.3920	36.7	46.0	9.3	100	337	H
952.8620	14.8	46.0	31.2	213	20	V

Spurious Emissions above 1GHz - 18GHz

Freq (GHz)	Peak Value (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	AV Value (dBμV/m)	AV Limit (dBμV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
4.7161	45.1	74.0	28.9	39.6	54.0	14.4	100	139	V
5.1556	51.2	74.0	22.8	48.6	54.0	5.4	109	145	V
7.0927	52.1	74.0	21.9	42.7	54.0	11.3	100	137	V
7.5887	57.7	74.0	16.3	30.6	54.0	23.4	100	78	H
9.0222	48.1	74.0	25.9	40.6	54.0	13.4	100	45	V
9.4417	53.2	74.0	20.8	42.5	54.0	11.5	100	130	V

Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "positive" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative" margin indicates a FAIL.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
RBW: 120kHz VBW: 1MHz
>1GHz
RBW: 1MHz VBW: 1MHz
- Radiated Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25.0GHz is ±4.0dB.

RF OUTPUT POWER TEST

47 CFR FCC Parts 2.1046 and 25.204 RF Output Power Test Limits

1. 25.204 Power Limits
 - (a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1GHz and 5GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:
 $+40\text{dBW}$ in any 4kHz band for $\theta: 0^\circ$
 $+40\text{dBW} + 3.0\text{dBW}$ in any 4kHz band for $0^\circ < \theta \leq 5^\circ$
where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.
 - (c) For angles of evaluation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.
 - (d) Notwithstanding the e.i.r.p and e.i.r.p density limits specified in the station authorization, each earth station transmission shall be conducted at the lowest power level that will provide the required signal quality as indicated in the application and further amended by coordination agreements.
2. 2.1046 Measurements Required: RF Power Output
 - (a) For transmission 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 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.
 - (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.

47 CFR FCC Parts 2.1046 and 25.204 RF Output Power Test Instrumentation

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4404B	US39440632	3 Apr 2015	1 year
Microwave Communications Laboratories, Inc. (MCLI) 20dB RF Attenuator	FAS-8-20	Nil	Output Monitor	Output Monitor

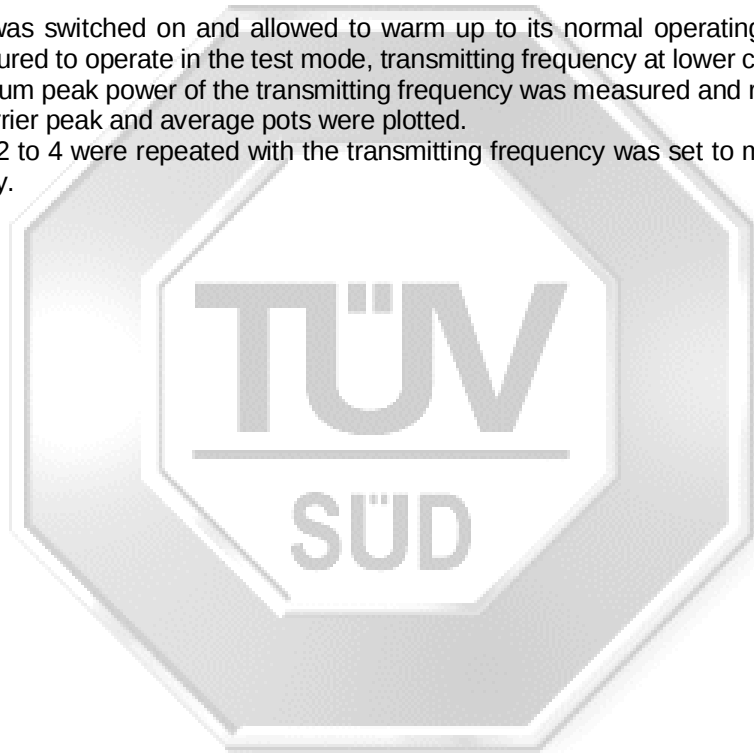
RF OUTPUT POWER TEST

47 CFR FCC Parts 2.1046 and 25.204 RF Output Power Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the Universal Radio Communication Tester, which set into power analyser mode via a RF attenuator and a low-loss coaxial cable.
4. The spectrum analyser was then calibrated to the power meter level as shown by the Universal Radio Communicator Tester with a calibrated RF signal source.
5. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Parts 2.1046 and 25.204 RF Output Power Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, transmitting frequency at lower channel.
2. The maximum peak power of the transmitting frequency was measured and recorded.
3. The RF carrier peak and average pots were plotted.
4. The steps 2 to 4 were repeated with the transmitting frequency was set to middle and upper channels respectively.



RF OUTPUT POWER TEST

47 CFR FCC Parts 2.1046 and 25.204 RF Output Power Results

Operating Mode	Continuous Satellite Transmission	Temperature	22°C
Test Input Power	120V 60Hz	Relative Humidity	53%
Antenna Gain	8.5dBi	Atmospheric Pressure	1030mbar
Attached Plots	1 – 34	Tested By	Kyaw Soe Hein

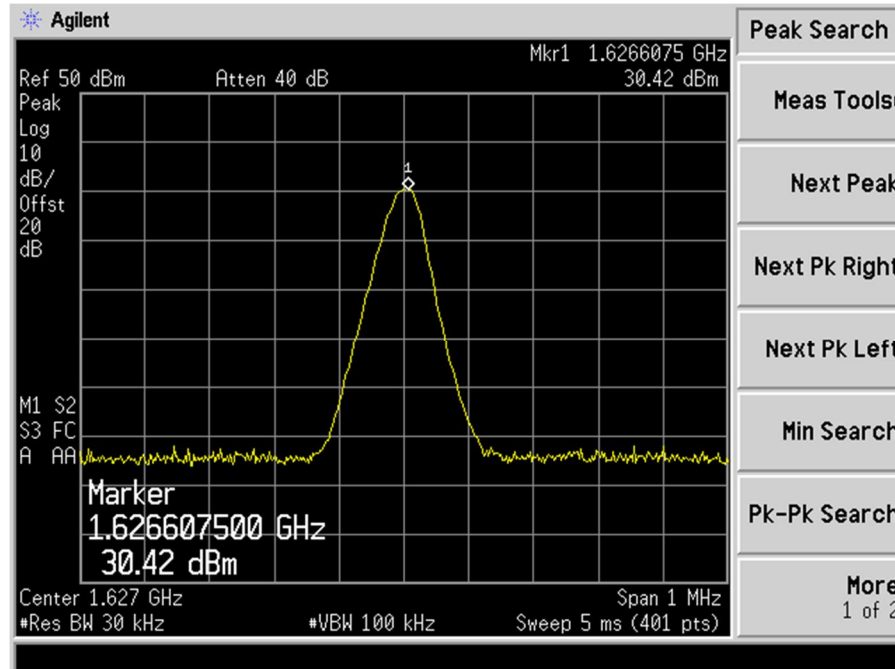
Frequency (GHz)	Channel	Peak Output Power (dBm)		Average Output Power (dBm)		Bearer Type
		EIRP	ERP	EIRP	ERP	
1.6266	Lower	39.2	37.1	38.6	36.5	0
1.6435	Middle	40.7	38.6	40.0	37.9	
1.6604	Upper	40.9	38.8	40.7	38.6	
1.6266	Lower	38.4	36.3	38.1	36.0	1
1.6435	Middle	39.2	37.1	38.8	36.7	
1.6604	Upper	40.1	38.0	40.1	38.0	
1.6266	Lower	36.8	34.7	36.7	34.6	2
1.6435	Middle	38.1	36.0	38.0	35.9	
1.6604	Upper	39.0	36.9	38.9	36.8	
1.6266	Lower	36.6	34.5	36.5	34.4	3
1.6435	Middle	38.1	36.0	37.8	35.7	
1.6604	Upper	38.6	36.5	38.6	36.5	
1.6266	Lower	37.0	34.9	36.9	34.8	7
1.6435	Middle	38.1	36.0	37.9	35.8	
1.6604	Upper	39.1	37.0	39.0	36.9	
1.6266	Lower	36.5	34.4	36.4	34.3	8
1.6435	Middle	37.8	35.7	37.7	35.6	
1.6604	Upper	39.8	37.7	39.4	37.3	

Notes

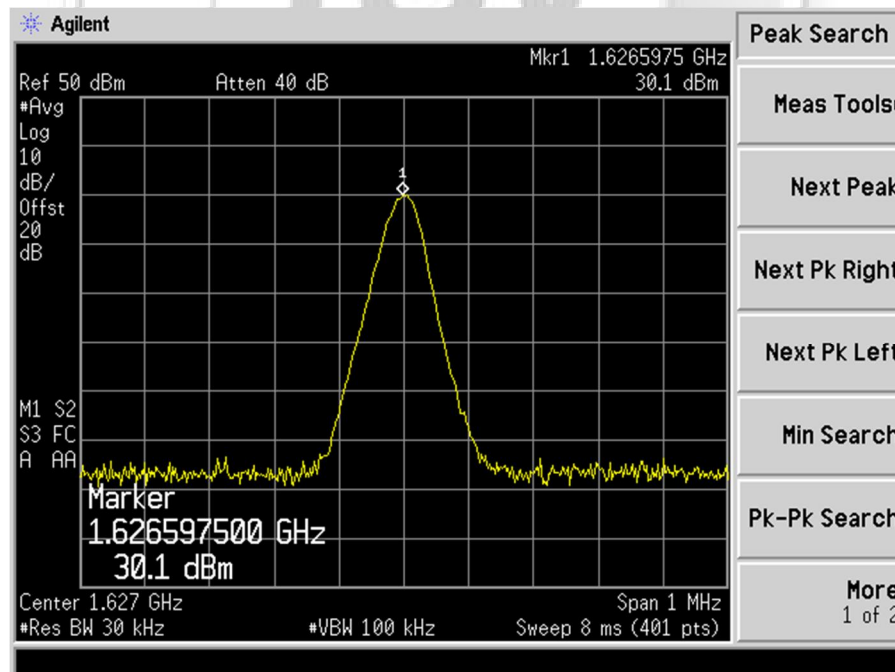
1. RF Output Power Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of 95%, with a coverage factor of 2 is $\pm 1.0\text{dB}$.

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 0)



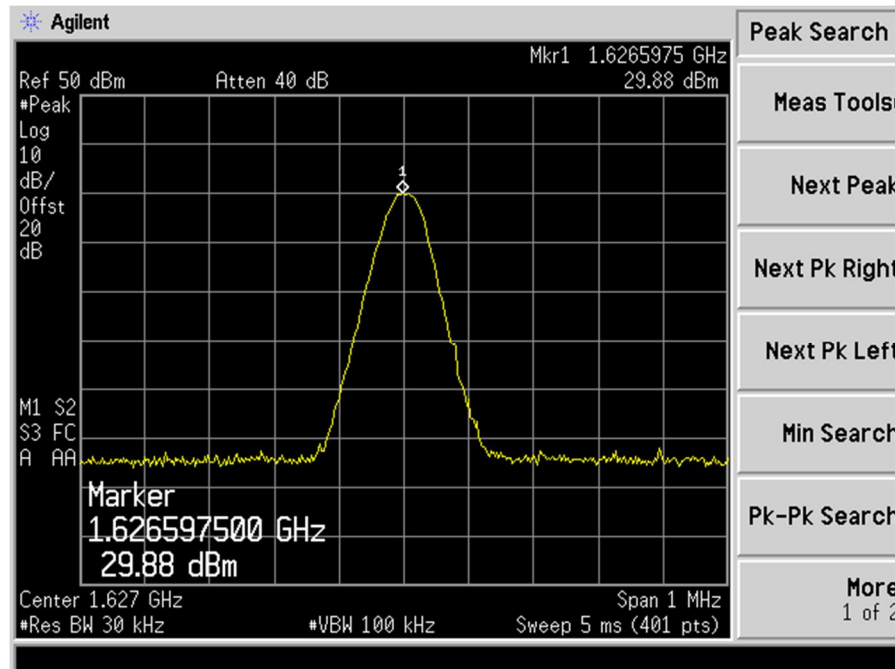
Plot 1 - Lower Channel (Peak)



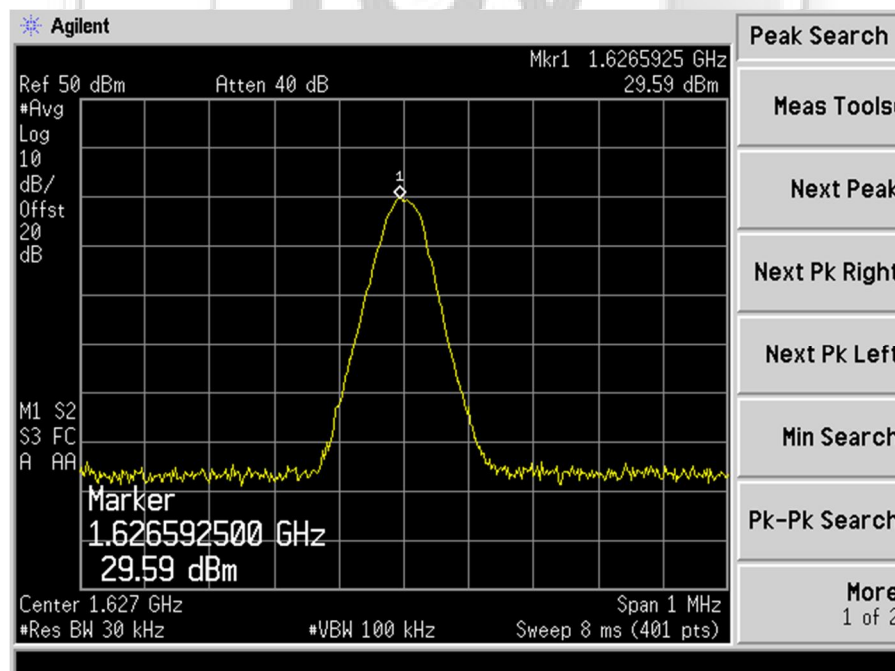
Plot 2 - Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 1)



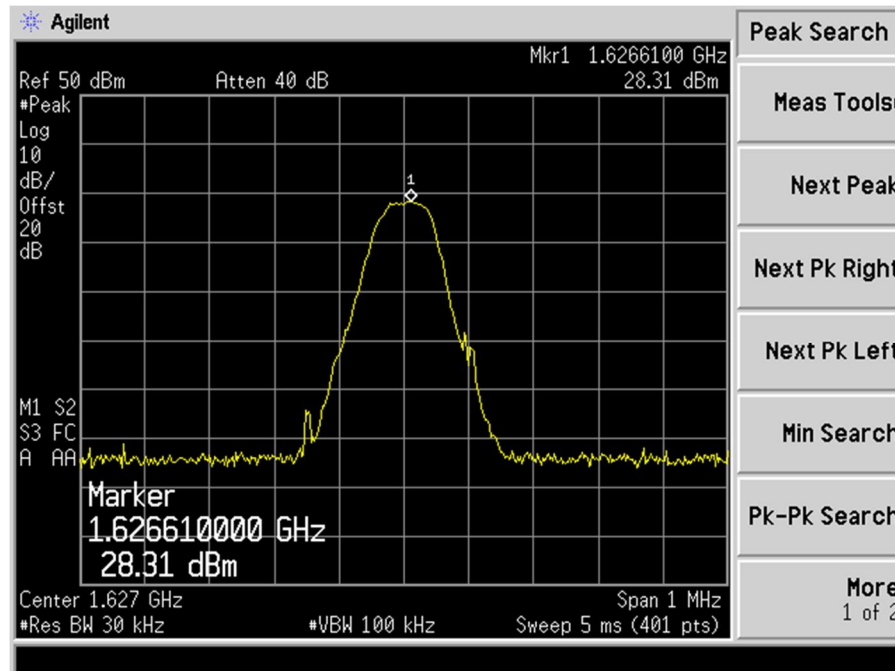
Plot 3 – Lower Channel (Peak)



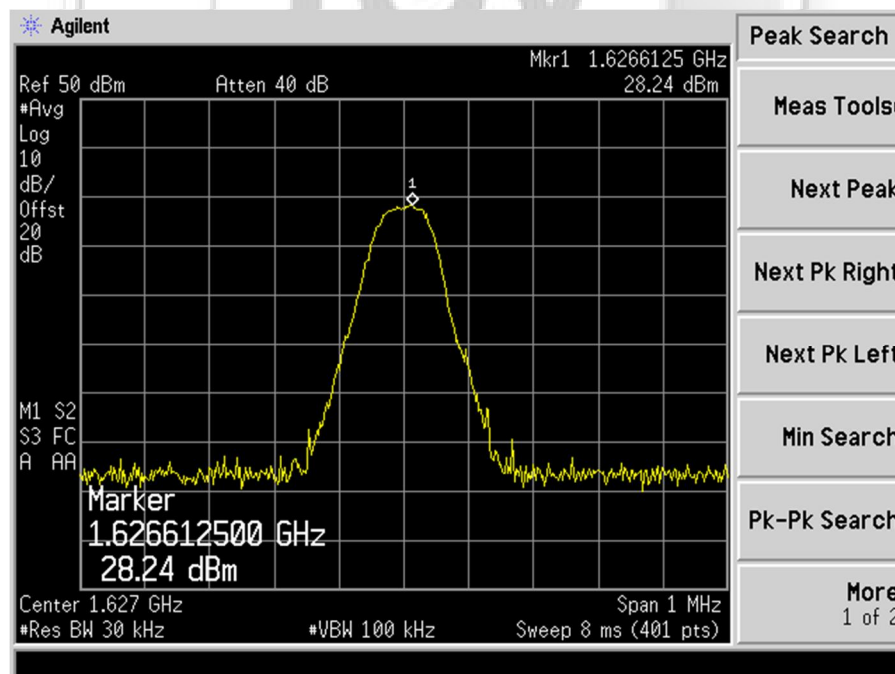
Plot 4 – Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 2)



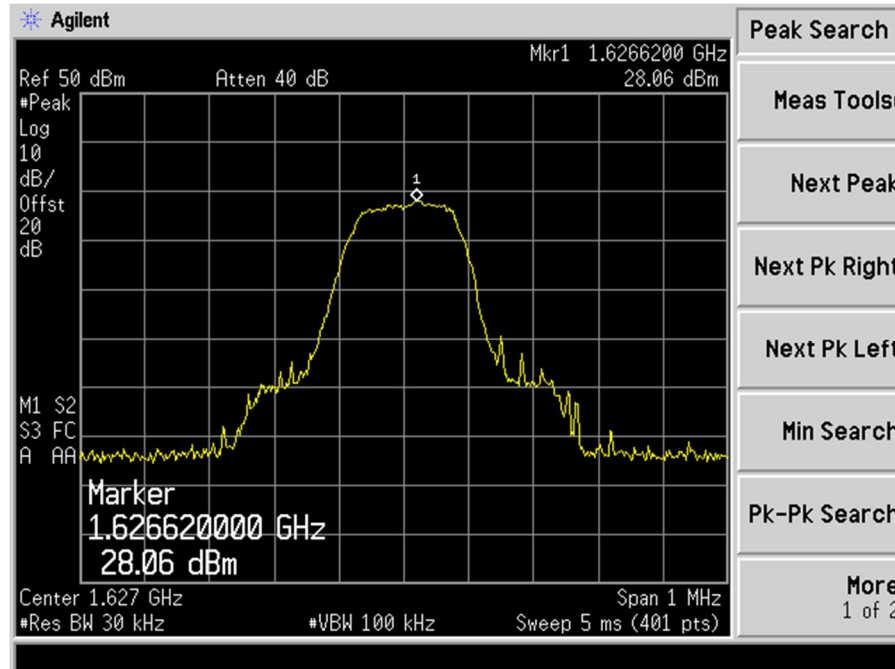
Plot 5 – Lower Channel (Peak)



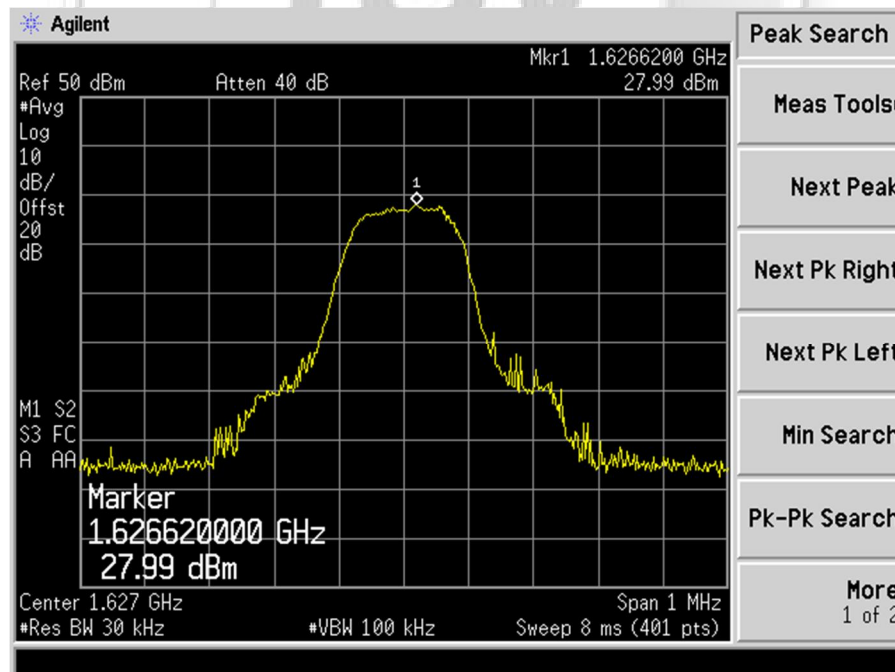
Plot 6 – Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 3)



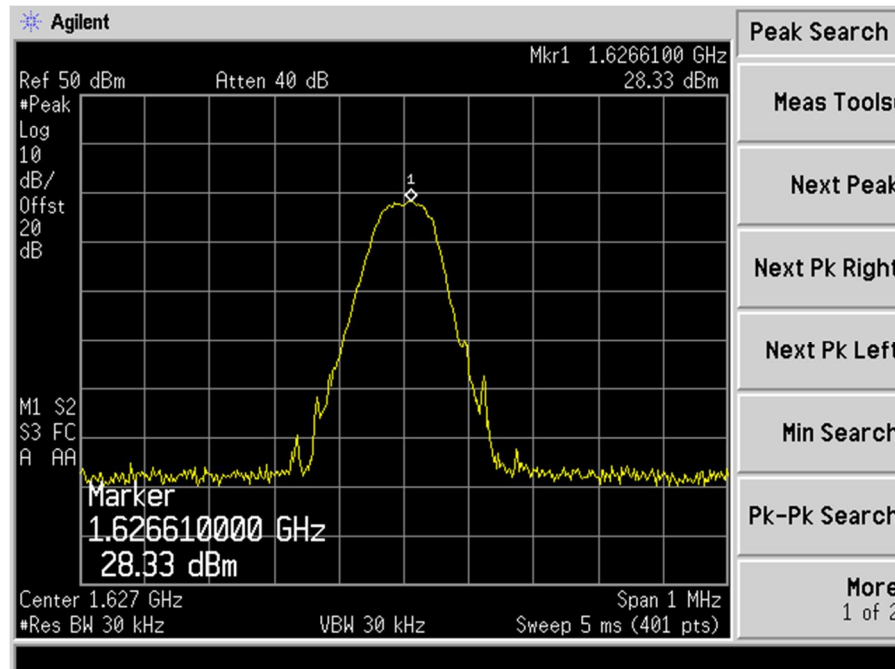
Plot 7 – Lower Channel (Peak)



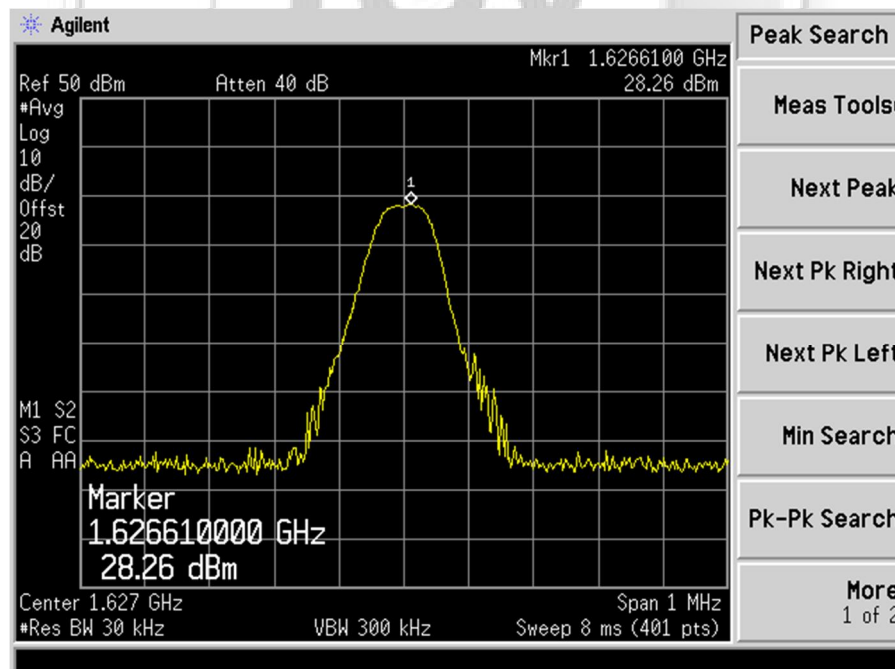
Plot 8 – Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 7)



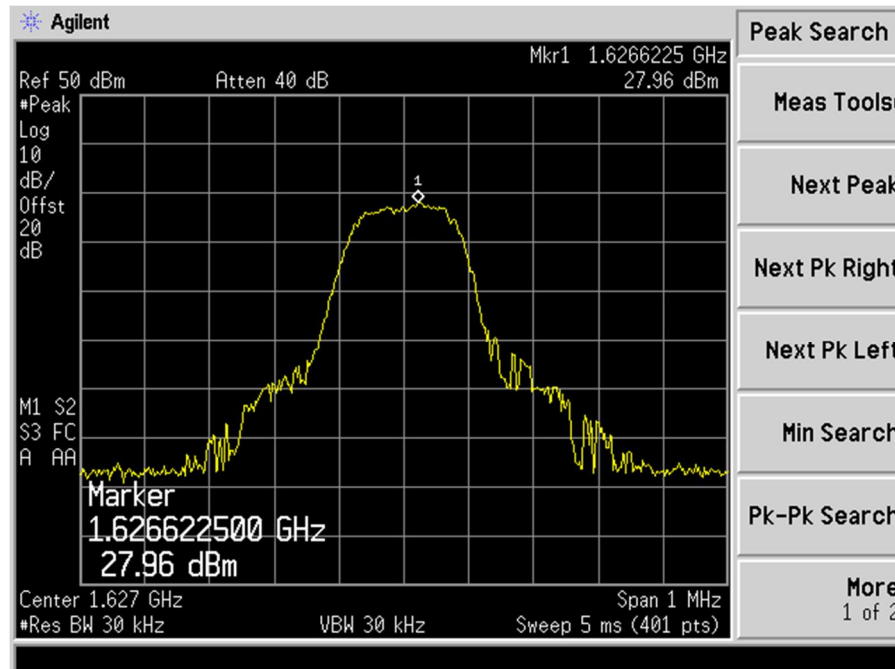
Plot 9 – Lower Channel (Peak)



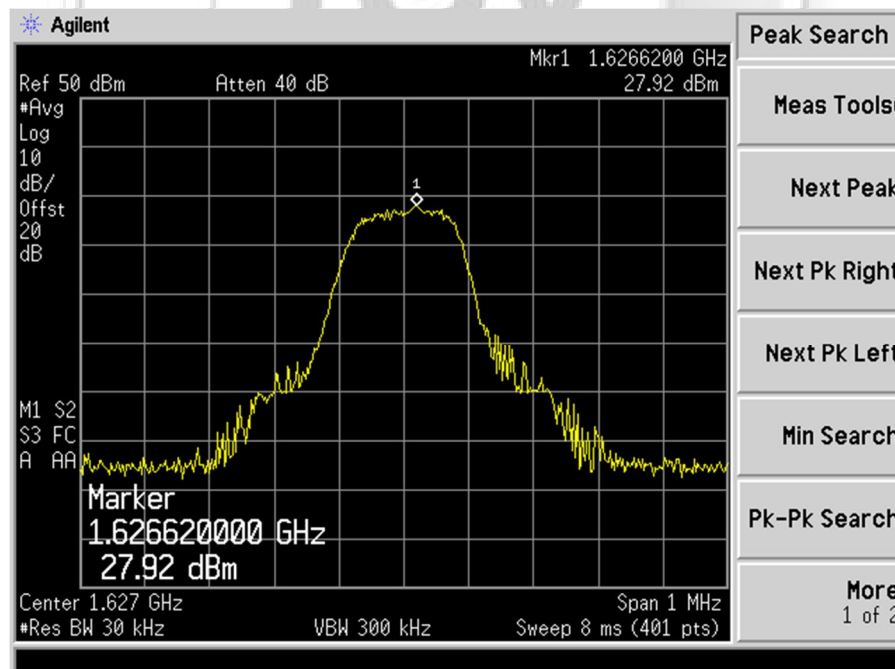
Plot 10 – Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 8)



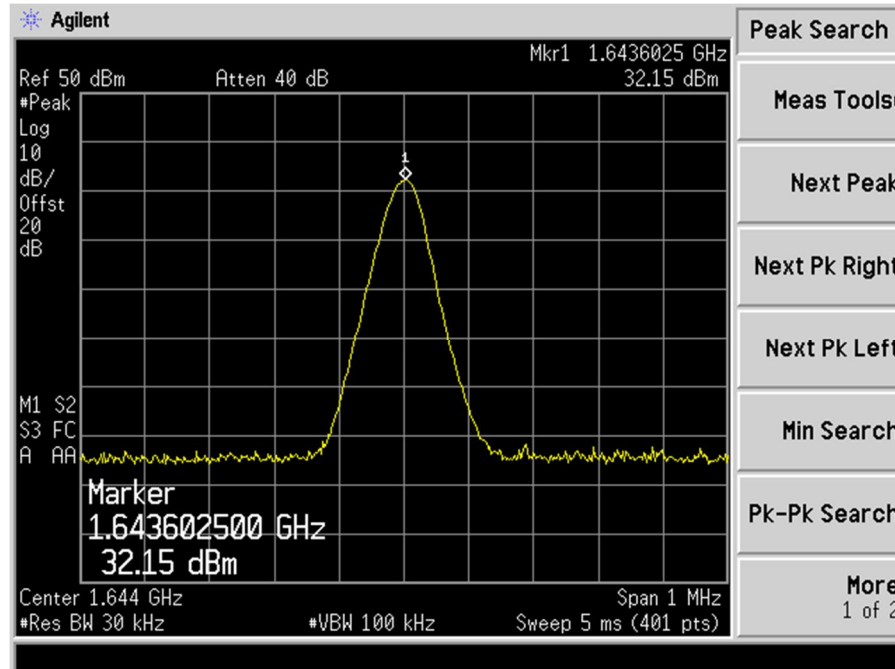
Plot 11 – Lower Channel (Peak)



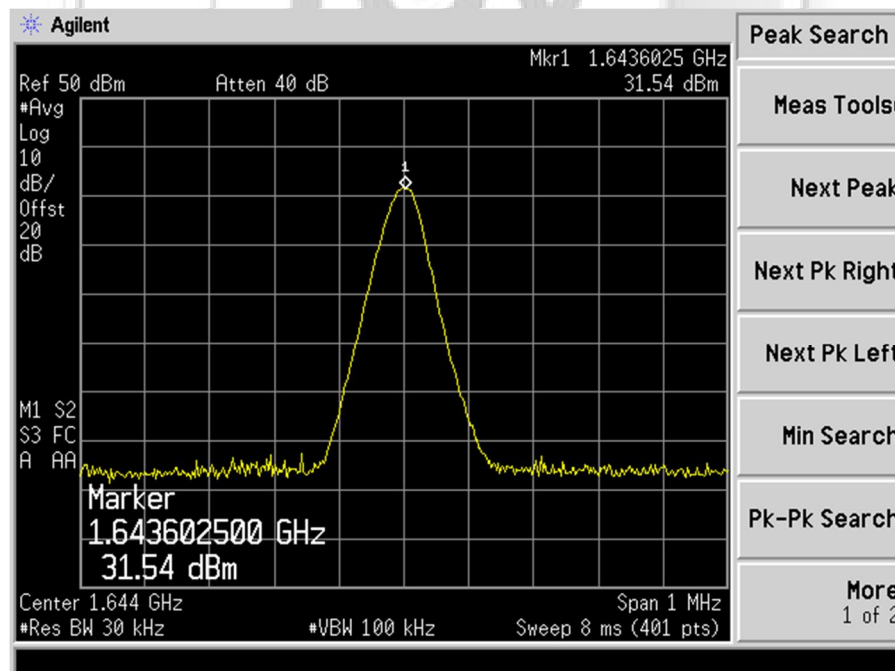
Plot 12 – Lower Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 1)



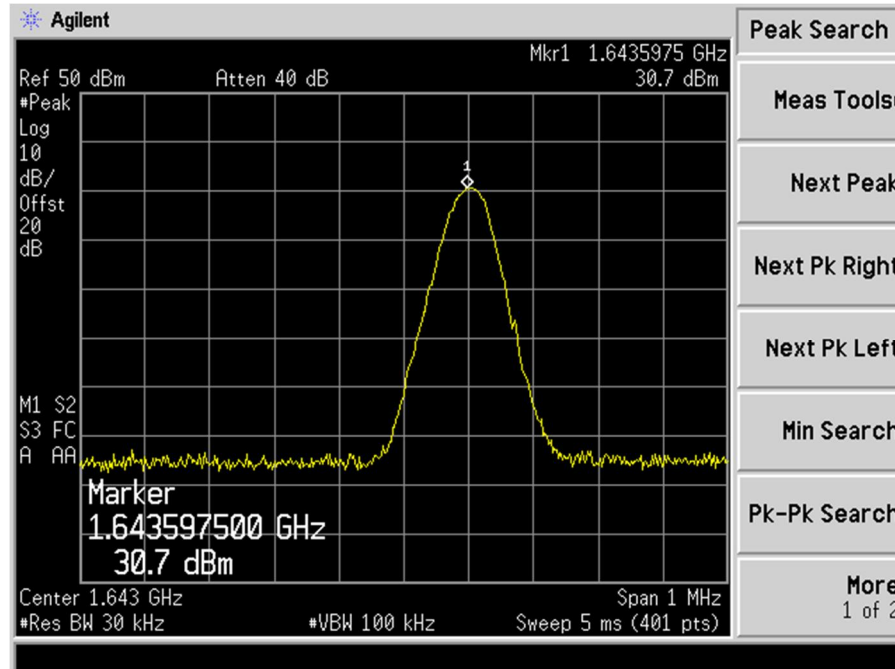
Plot 13 – Middle Channel (Peak)



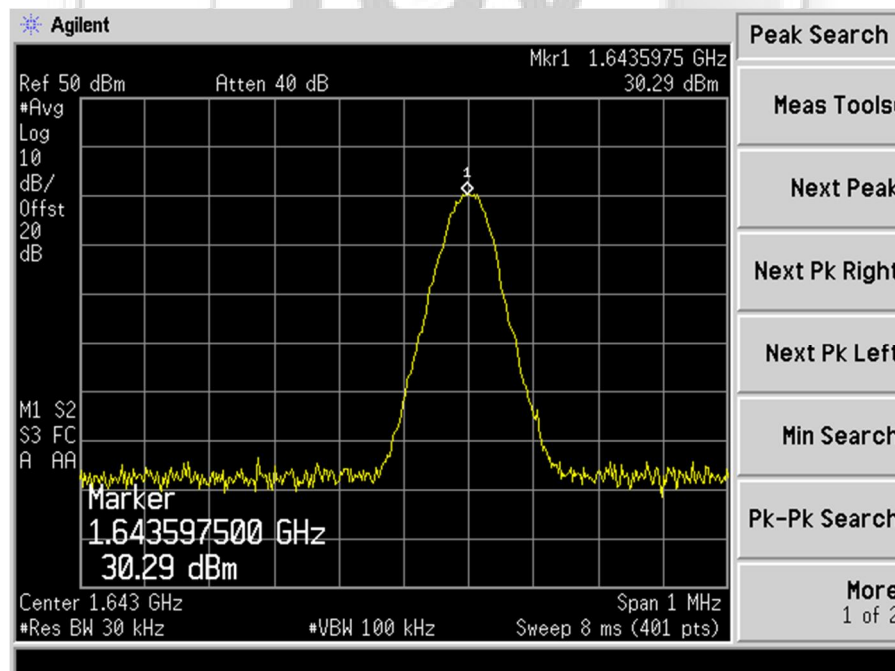
Plot 14 – Middle Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 2)



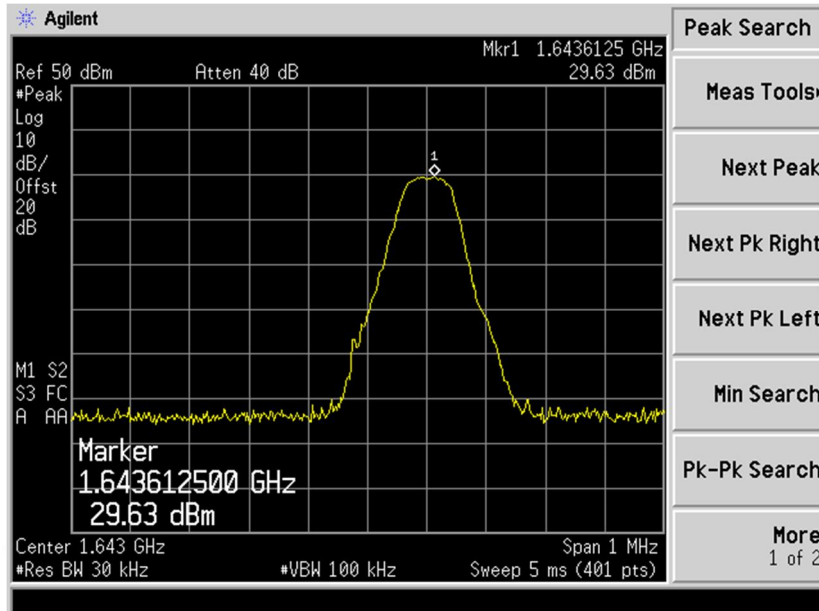
Plot 15 – Middle Channel (Peak)



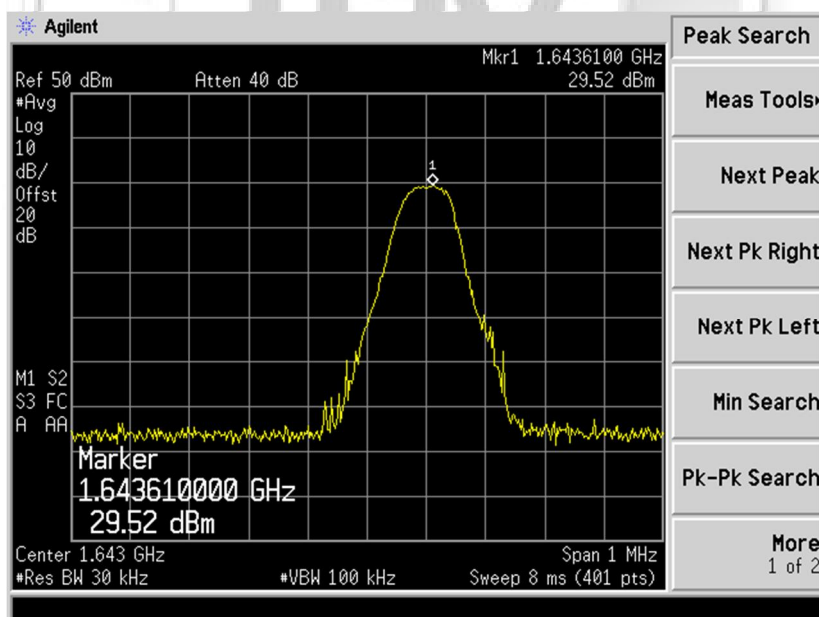
Plot 16 – Middle Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 3)



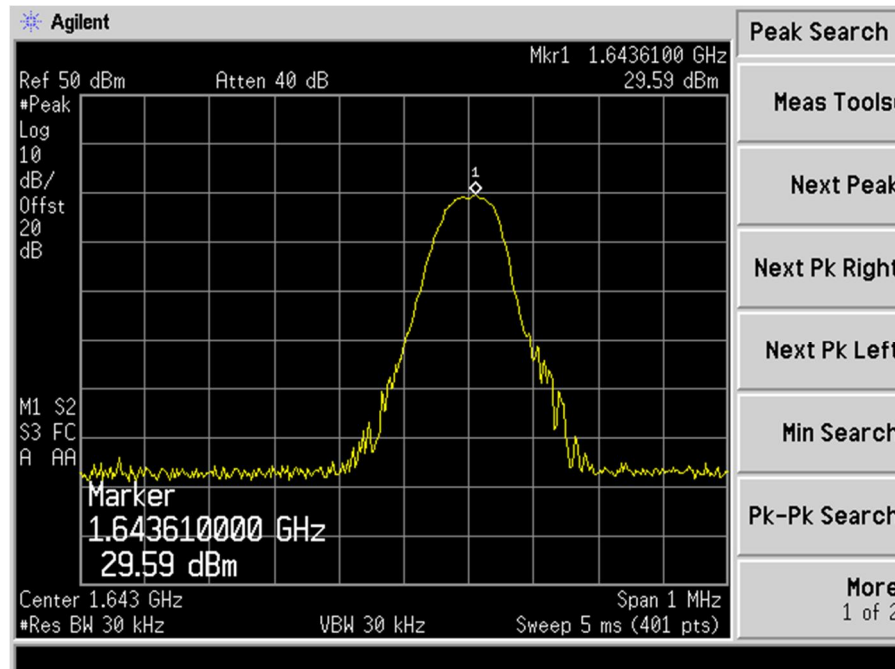
Plot 17 – Middle Channel (Peak)



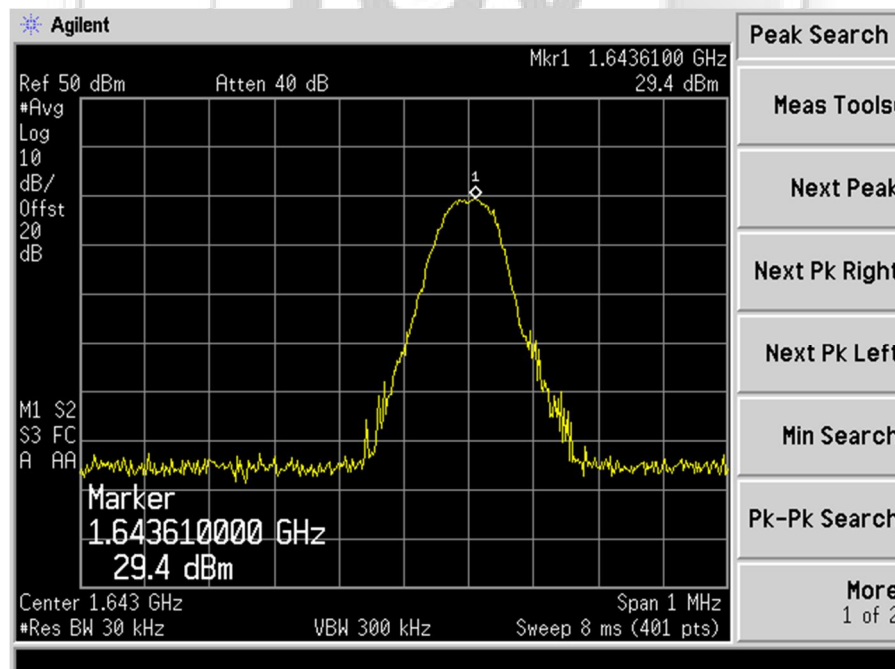
Plot 18 – Middle Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 7)



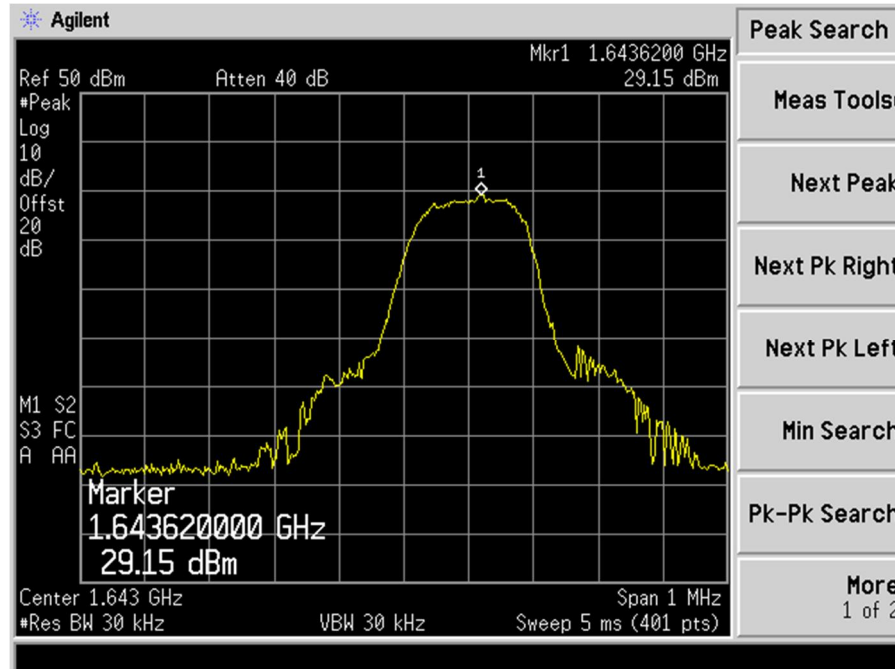
Plot 19 – Middle Channel (Peak)



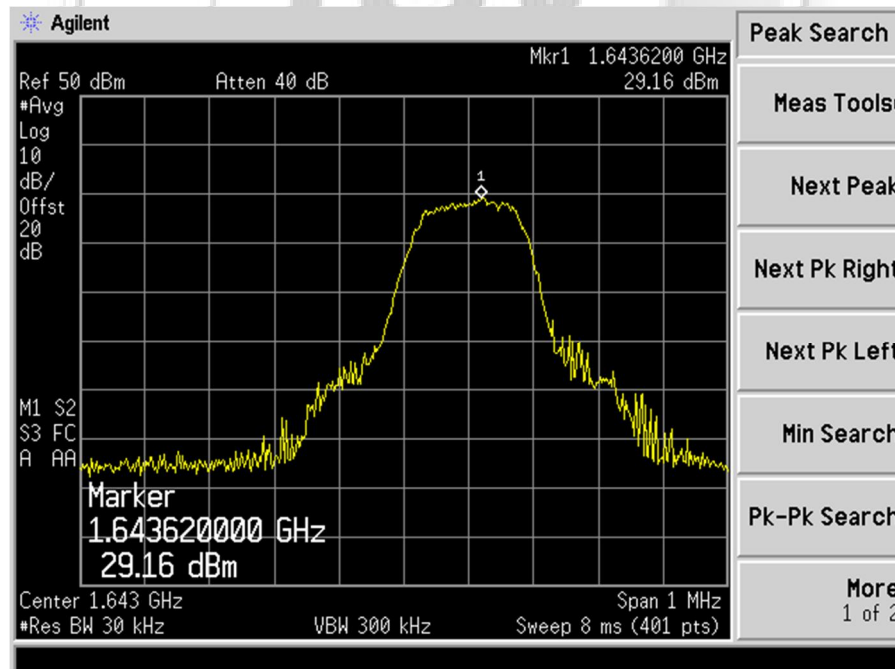
Plot 20 – Middle Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 8)



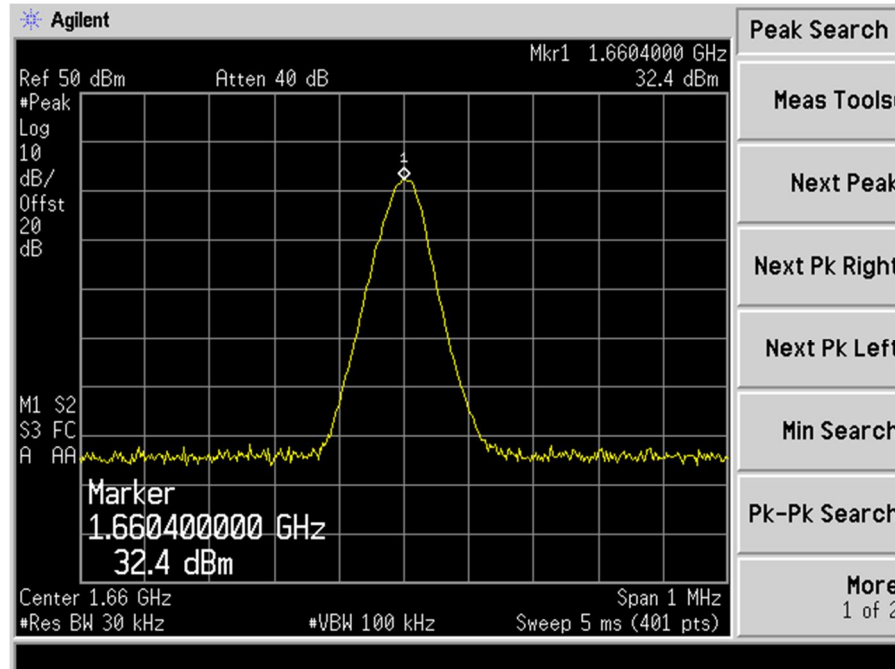
Plot 21 – Middle Channel (Peak)



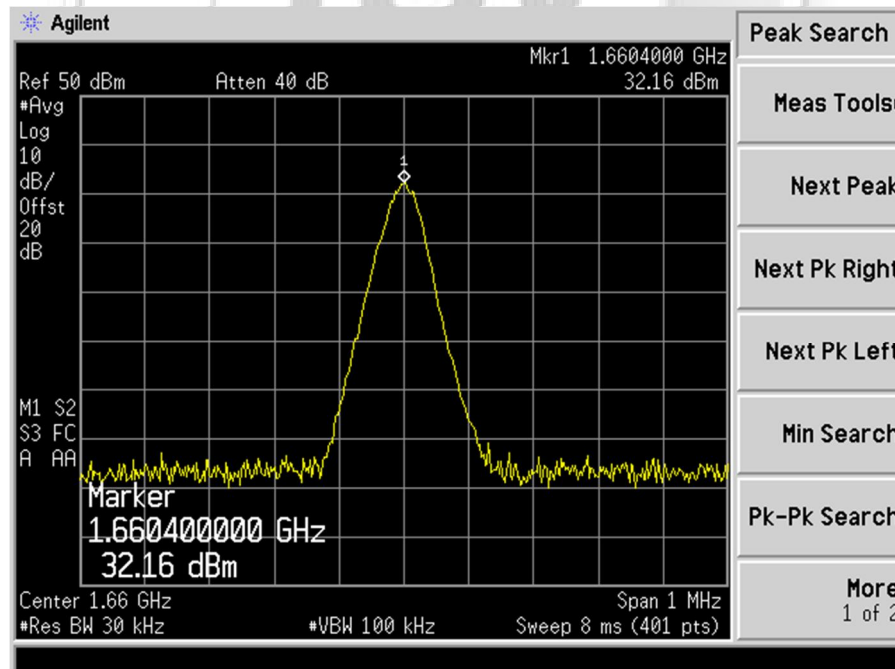
Plot 22 – Middle Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 0)



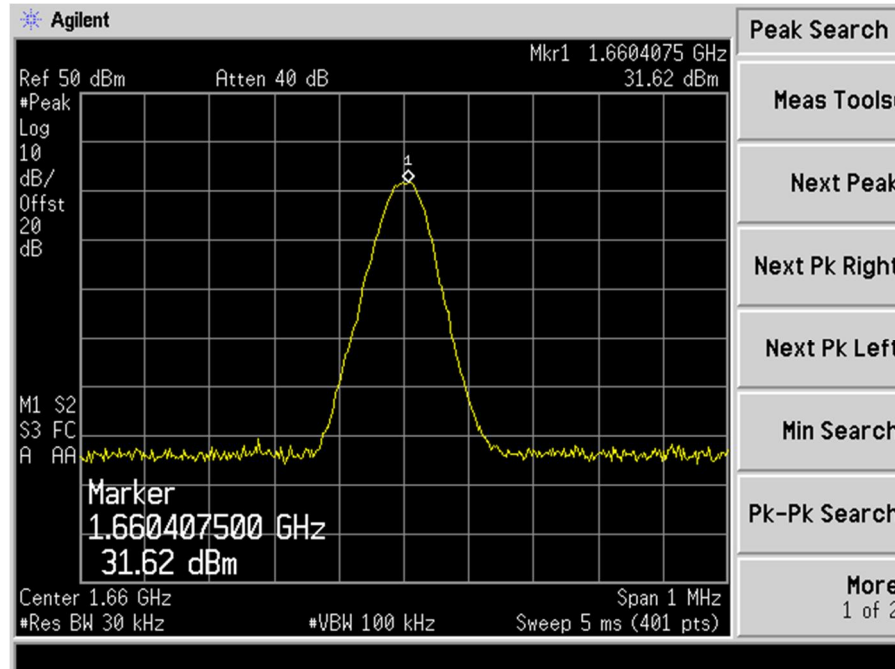
Plot 23 - Upper Channel (Peak)



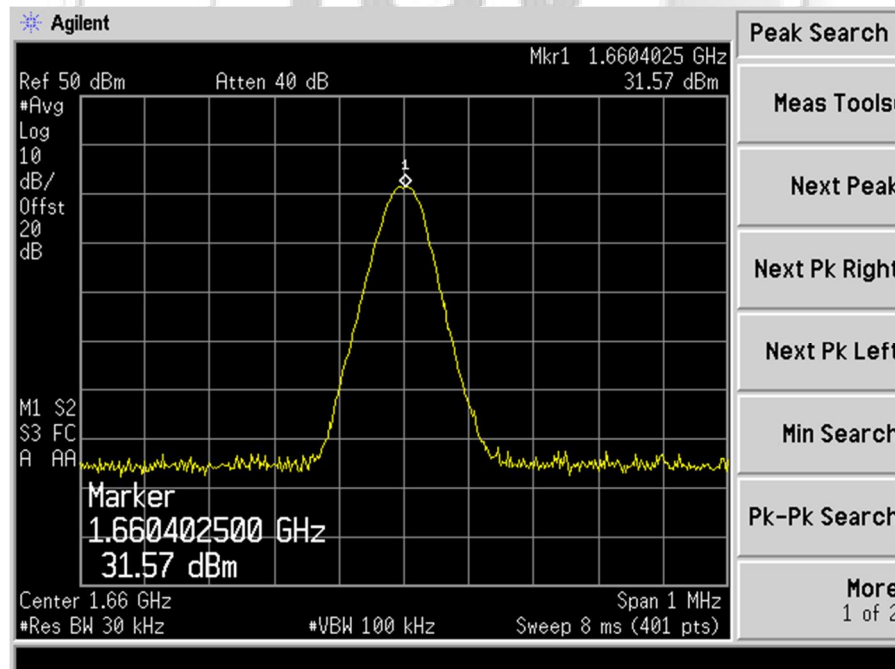
Plot 24 - Upper Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 1)



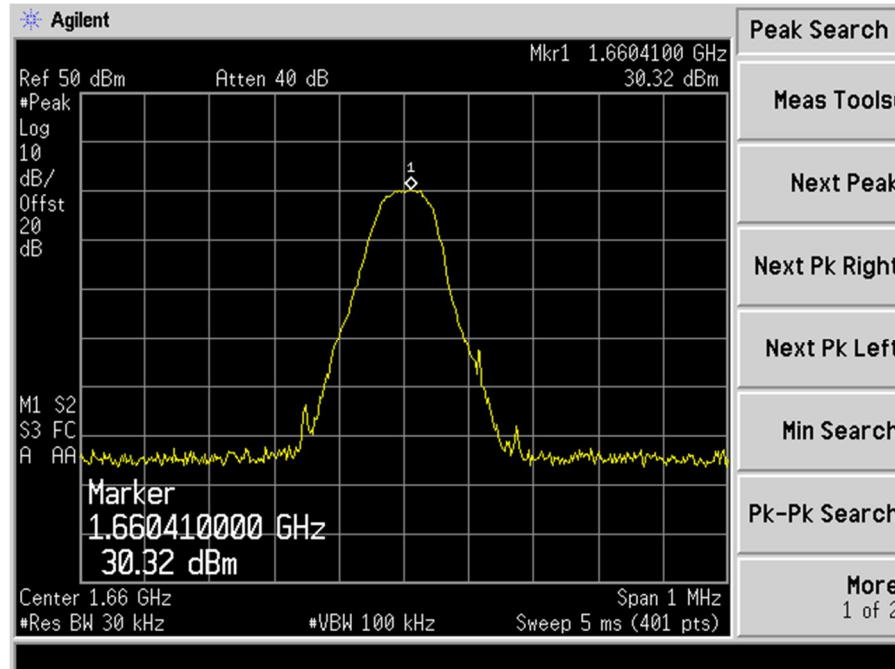
Plot 25 – Upper Channel (Peak)



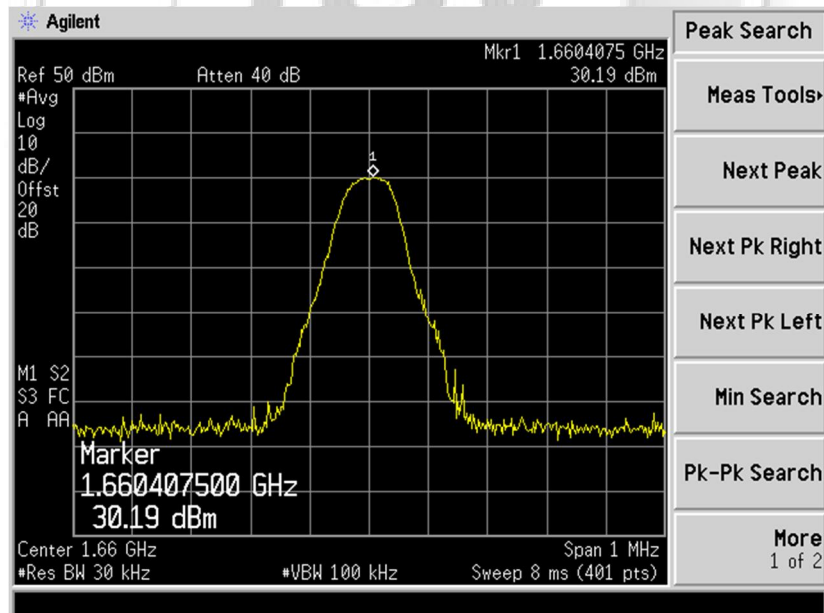
Plot 26 – Upper Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 2)



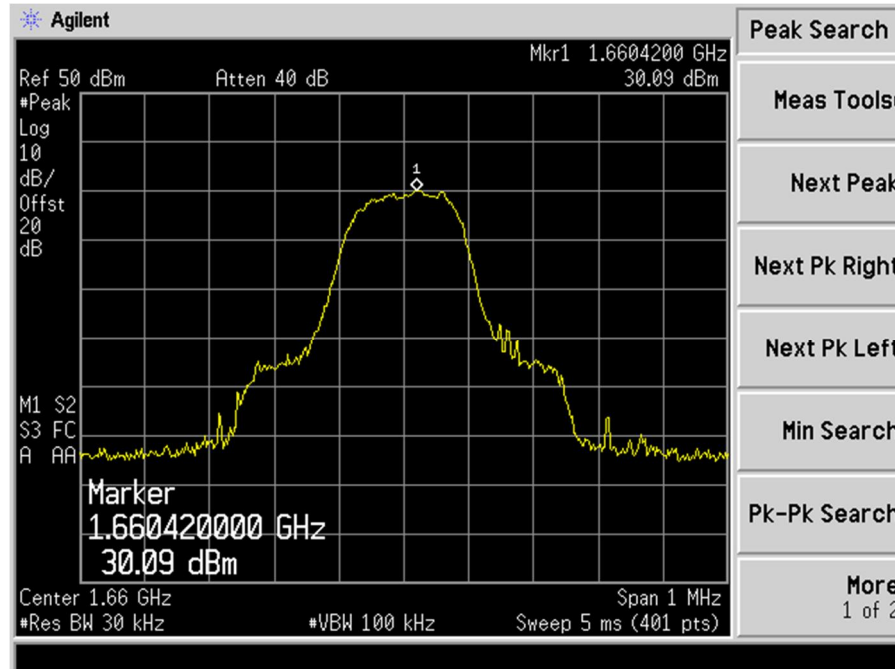
Plot 27 – Upper Channel (Peak)



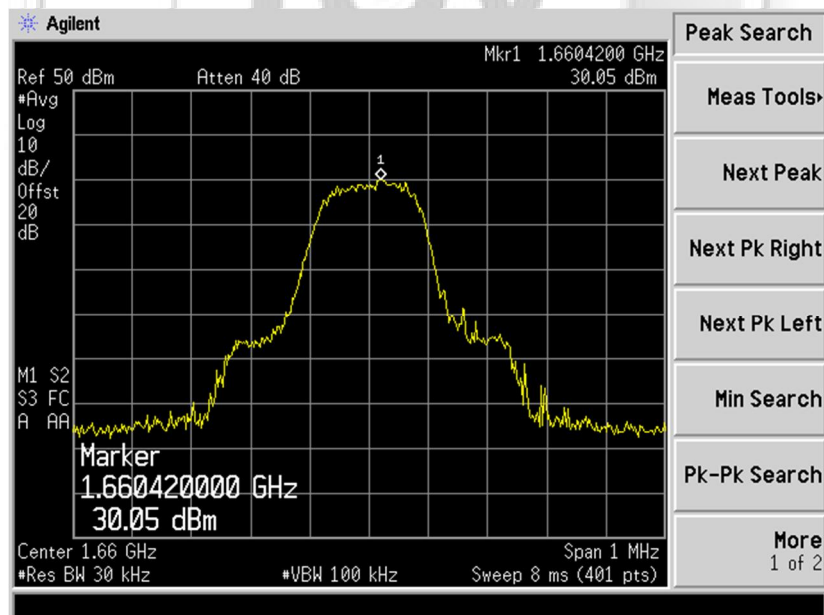
Plot 28 – Upper Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 3)



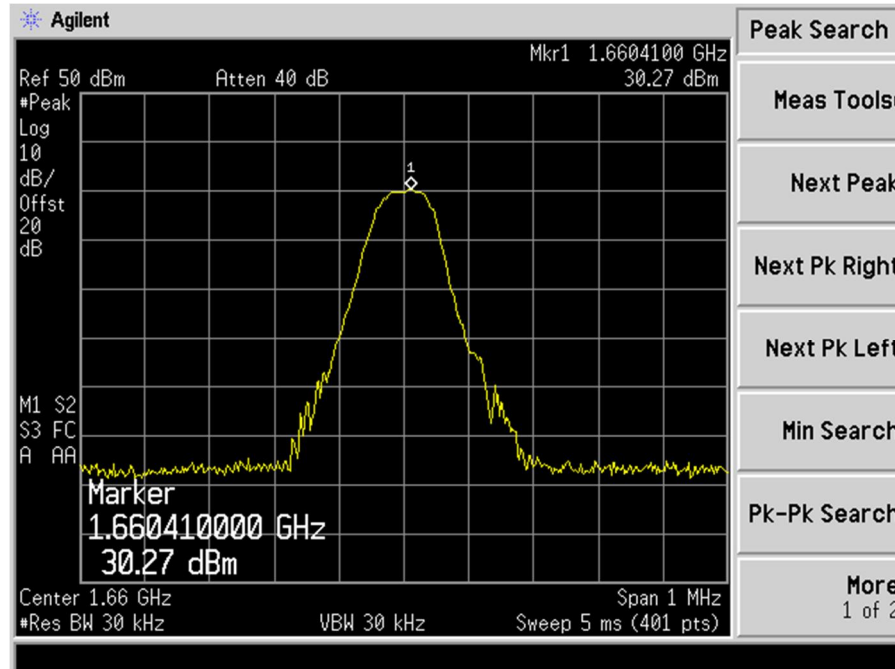
Plot 29 – Upper Channel (Peak)



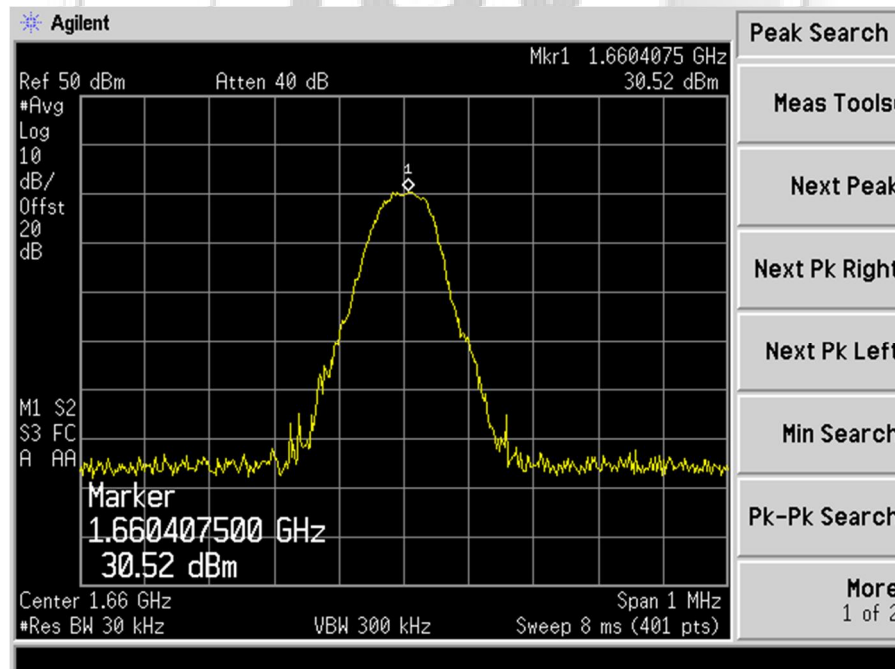
Plot 30 – Upper Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 7)



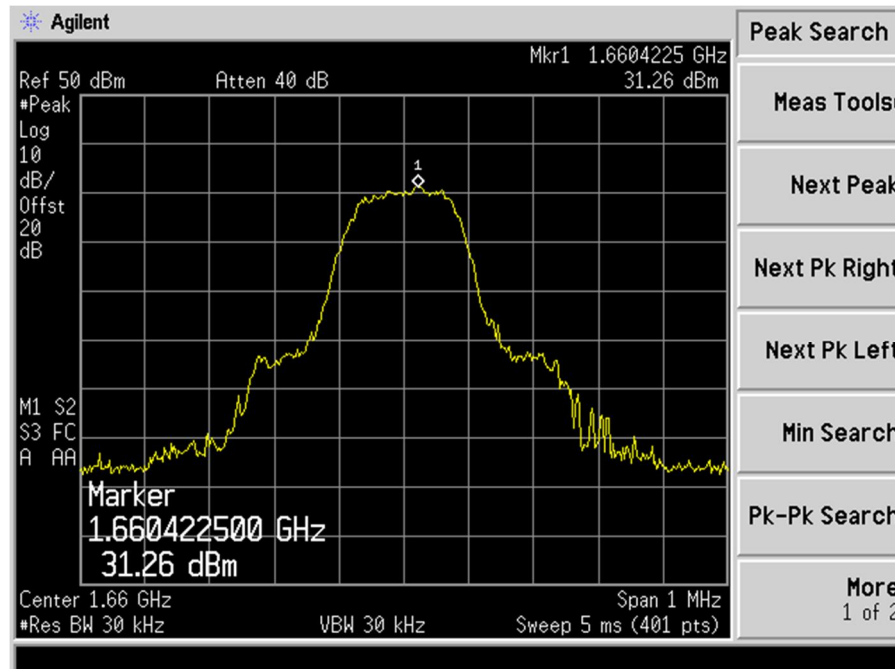
Plot 31 - Upper Channel (Peak)



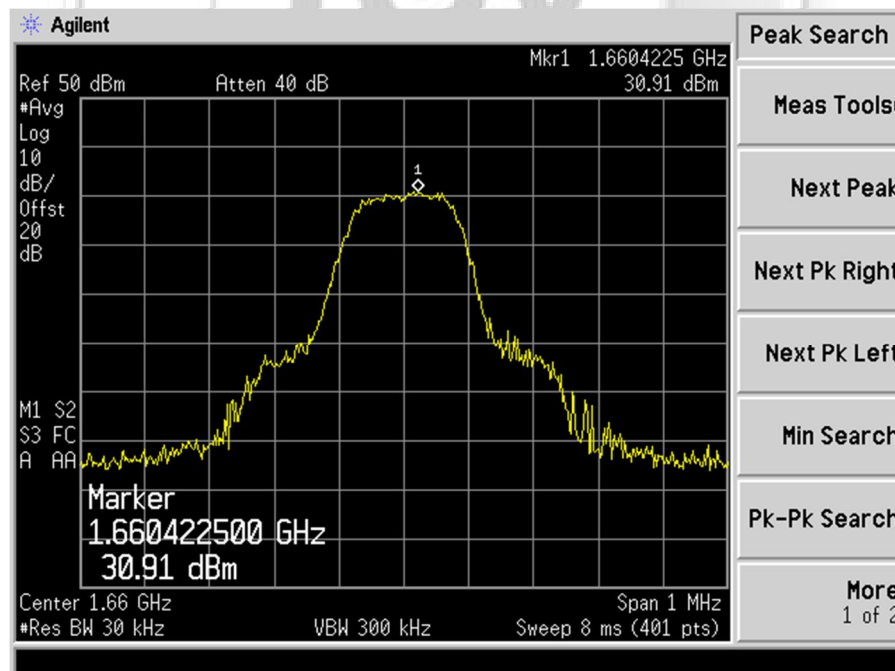
Plot 32 - Upper Channel (Average)

RF OUTPUT POWER TEST

Output Power Plots (Bearer Type: 8)



Plot 33 – Upper Channel (Peak)



Plot 34 – Upper Channel (Average)

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

FCC Parts 2.1051 and 25.202(f) Unwanted Emissions at Antenna Terminal Test Limits

1. 25.202 Emissions Limitations
 - (f) The mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:
 - (1) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 50% up to and including 100% of the authorized bandwidth: 25 decibels;
 - (2) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 100% up to and including 250% of the authorized bandwidth: 35 decibels;
 - (3) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 250% of the authorized bandwidth: an amount equal to 43 decibels plus 10 times logarithm (to the base 10) of the transmitter power in watts.
2. 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 20dB below the permissible value needed not be specified.

FCC Parts 2.1051 and 25.202(f) Unwanted Emissions at Antenna Terminal Test Instrumentation

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4404A	MY45304764	03 Apr 2015	1 year
Microwave Communications Laboratories, Inc. (MCLI) 20dB RF Attenuator	FAS-8-20	Nil	Output Monitor	Output Monitor

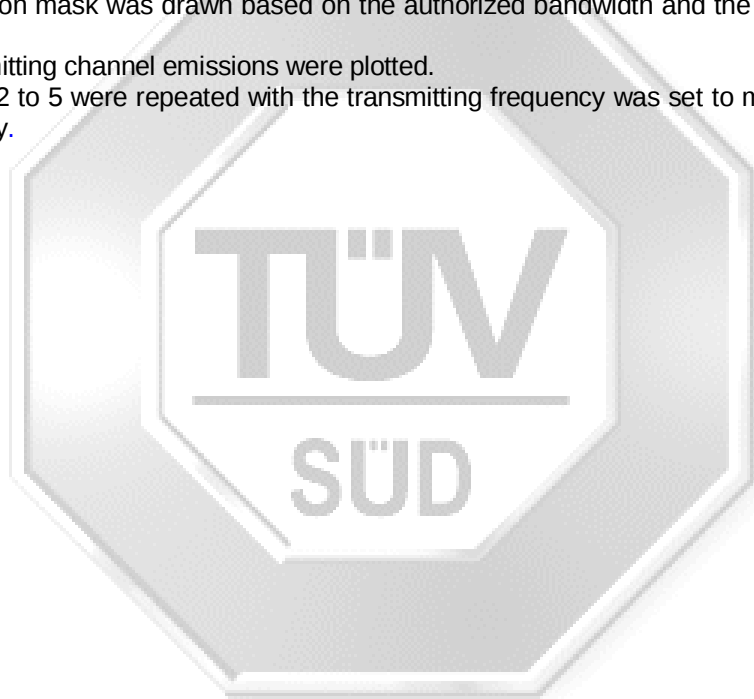
UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

47 CFR FCC Parts 2.1051 and 25.202(f) Unwanted Emissions at Antenna Terminal Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a RF attenuator and a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Parts 2.1051 and 25.202(f) Unwanted Emissions at Antenna Terminal Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, transmitting frequency at lower channel.
2. The 26dB bandwidth of the transmitting channel was measured.
3. The emission mask was drawn based on the authorized bandwidth and the measured average output power.
4. The transmitting channel emissions were plotted.
5. The steps 2 to 5 were repeated with the transmitting frequency was set to middle and upper channels respectively.



UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

47 CFR FCC Parts 25.254(d)(6) and 2.1049 Occupied Bandwidth Results

Operating Mode	Continuous Satellite Transmission	Temperature	21°C
Test Input Power	120V 60Hz	Relative Humidity	52%
Antenna Gain	8.5dBi	Atmospheric Pressure	1030mbar
Attached Plots	35 – 52 (26dB Bandwidth) 53 – 70 (In Band Emissions) 71 – 106 (Out of Band Spurious)	Tested By	Kyaw Soe Hein

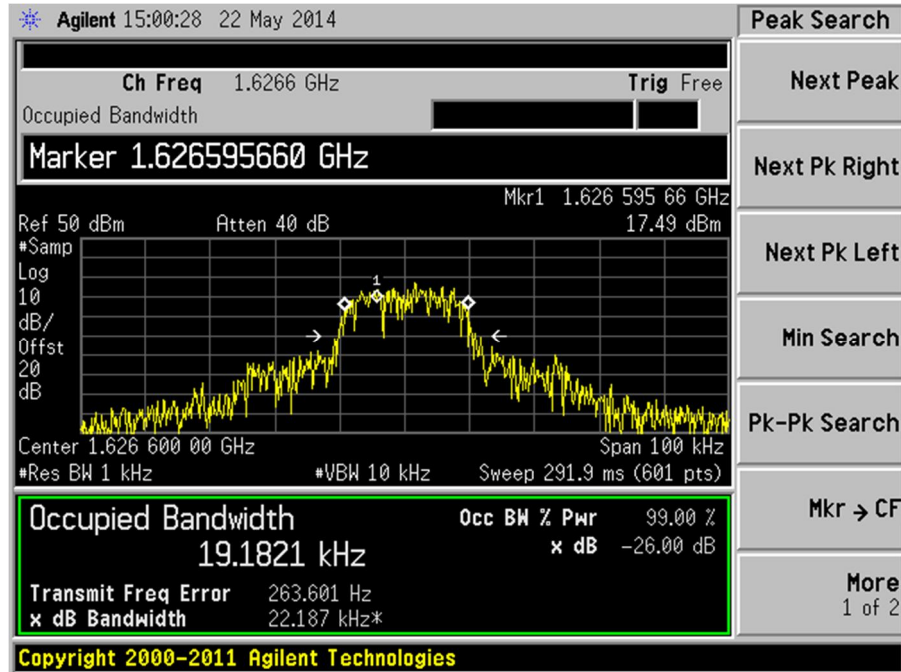
All emissions are within the emission mask. Please refer to the attached plots.

Notes

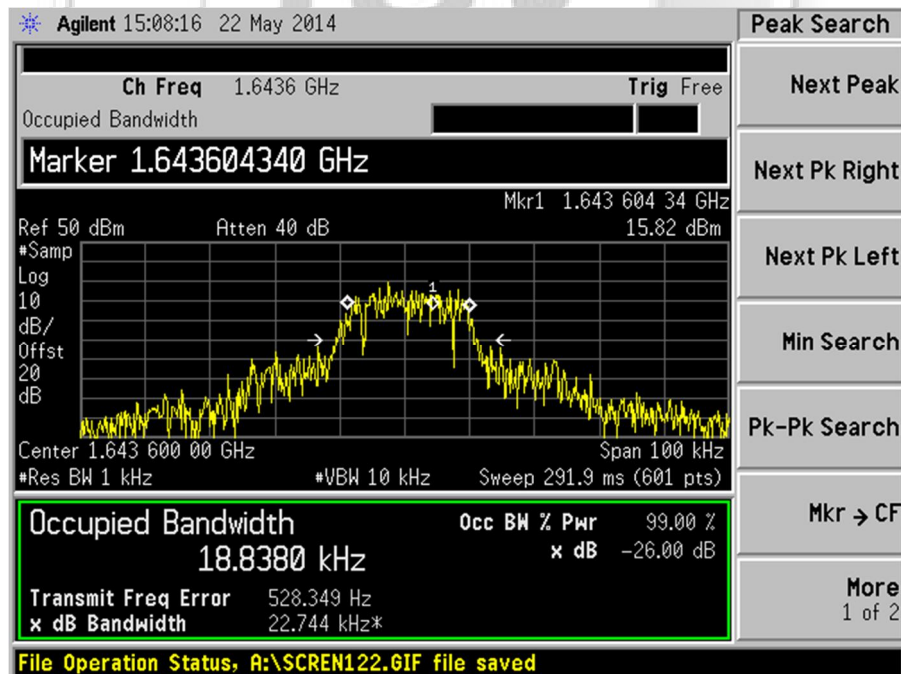
1. The Resolution Bandwidth (RBW) was corrected from 4kHz by $10\log_{10} [(used\ RBW) / 4kHz]$.
2. Emission limits are computed based on following:
 - a. Emissions Limits (dBm) (50% - 100% authorised bandwidth) = $P - 25 + CF$
 - b. Emissions Limits (dBm) (100% - 250% authorised bandwidth) = $P - 35 + CF$
 - c. Emissions Limits (dBm) (> 250% authorised bandwidth) = $P - [43 + 10 \log_{10} P_w] + 30 + CF$where
 - P = Measured mean power in dBm
 - P_w = Measured mean power in W
 - CF = RBW correction factor (see Note 1)

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 0)



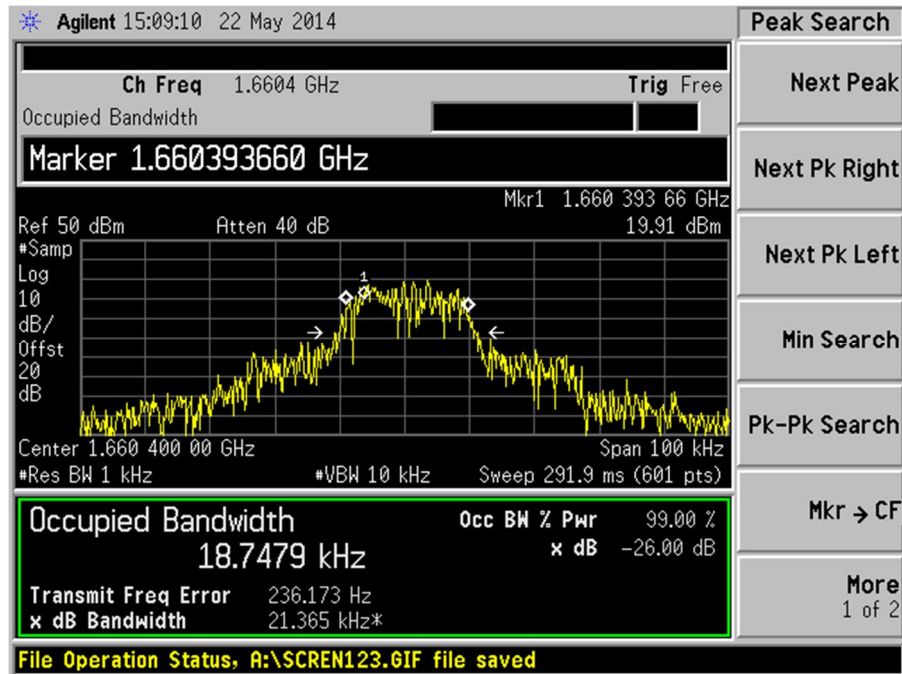
Plot 35 – Lower Channel



Plot 36 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

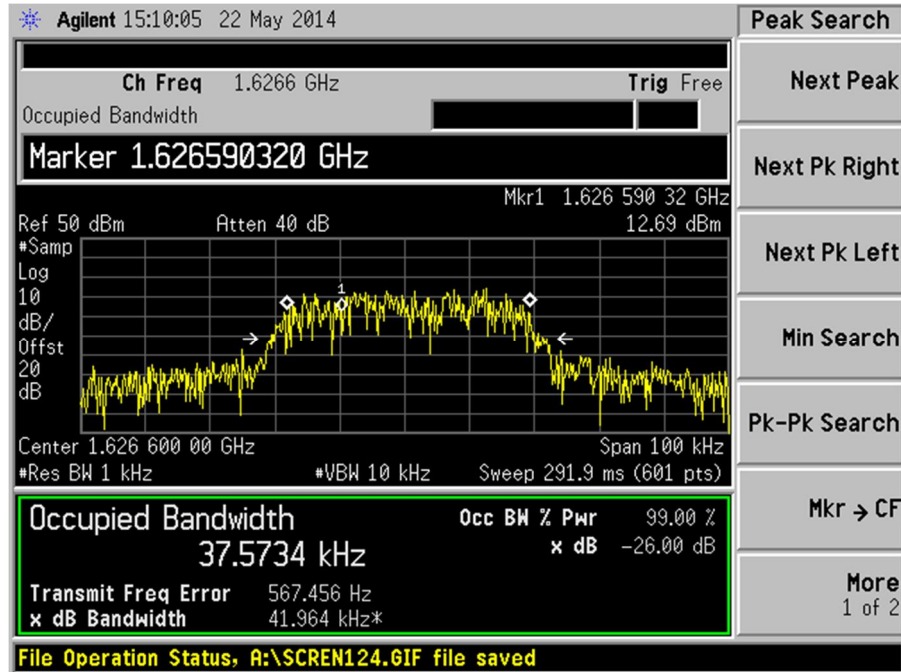
26dB Bandwidth Plots (Bearer Type: 0)



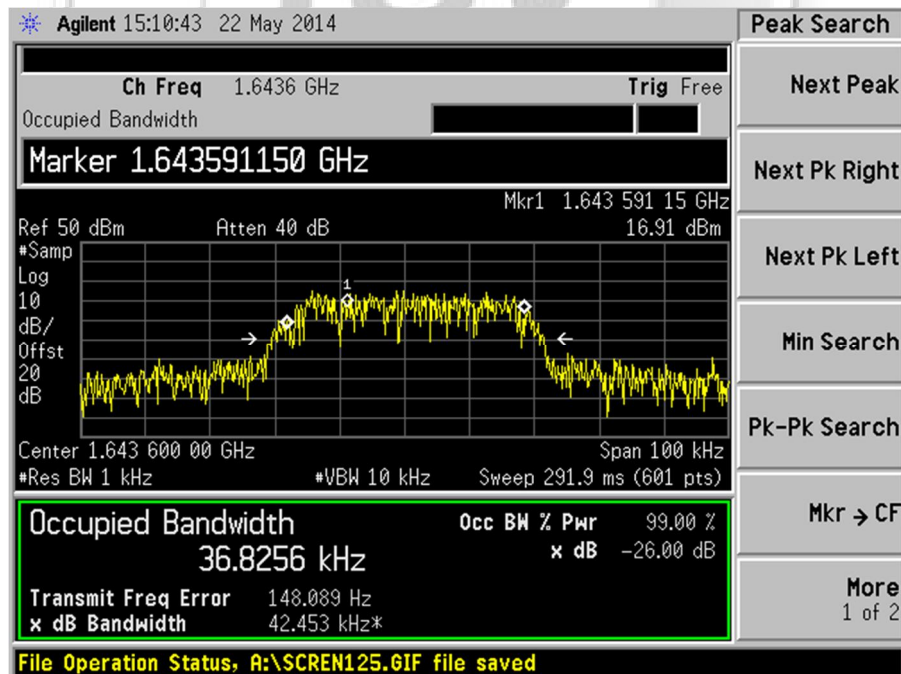
Plot 37 – Upper Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 1)



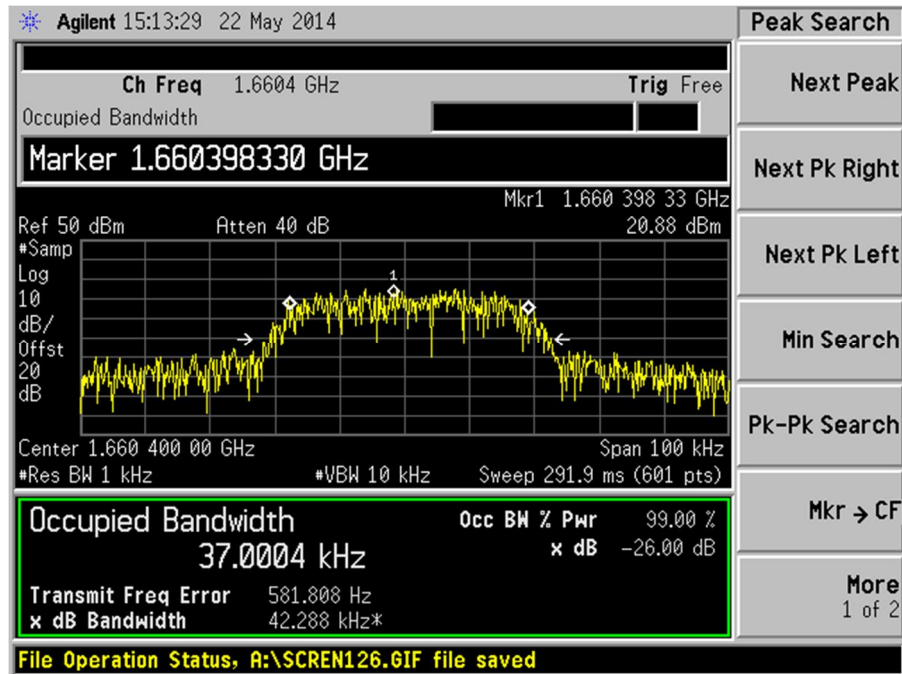
Plot 38 – Lower Channel



Plot 39 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

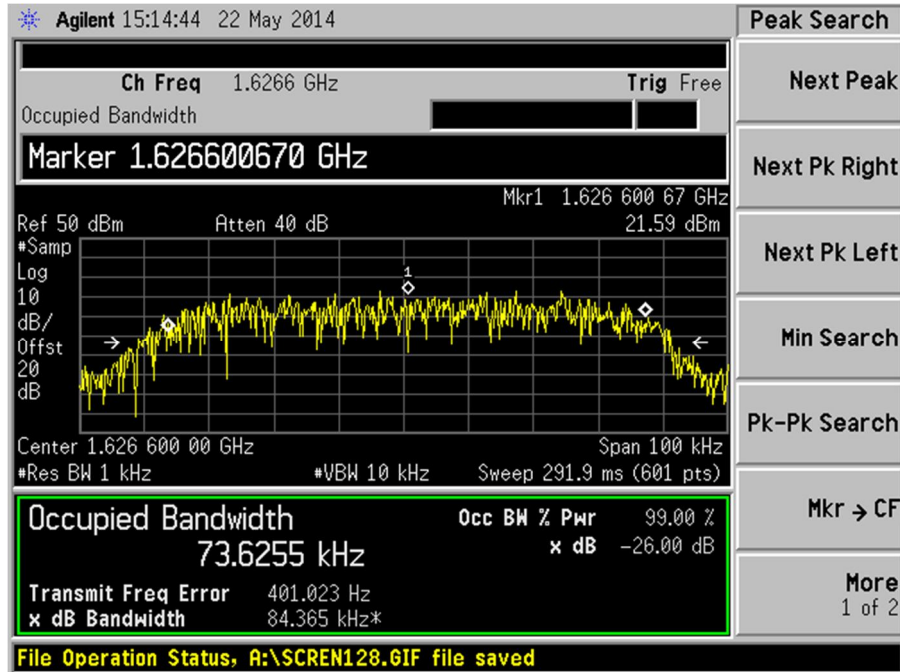
26dB Bandwidth Plots (Bearer Type: 1)



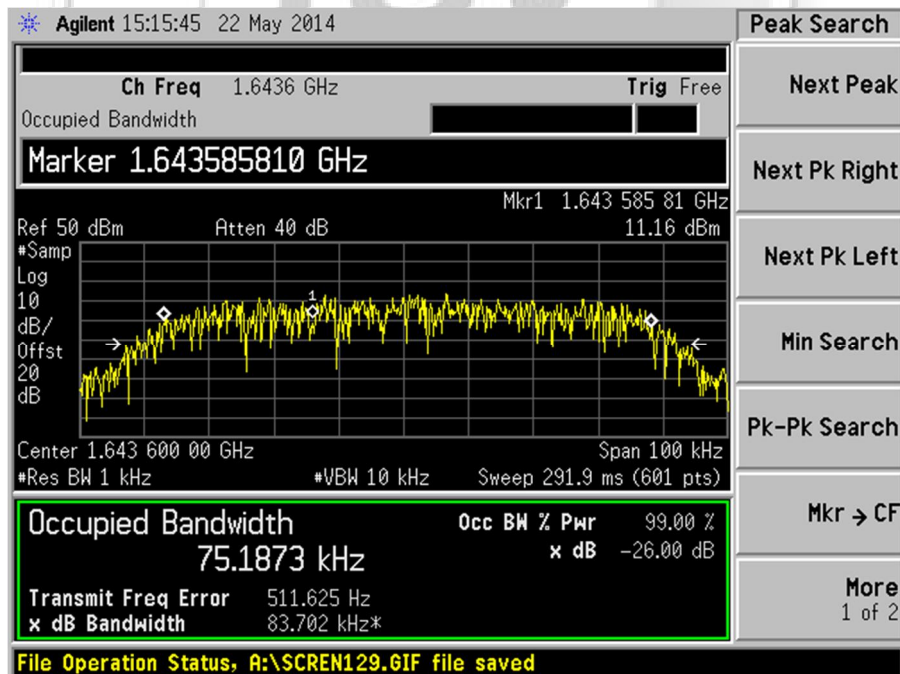
Plot 40 – Upper Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 2)



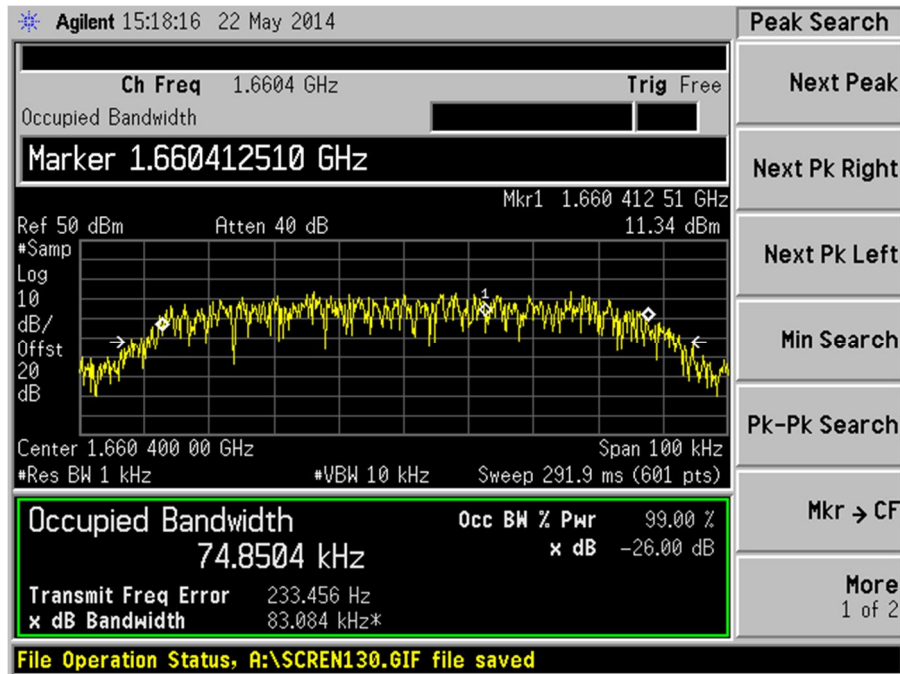
Plot 41 – Lower Channel



Plot 42 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

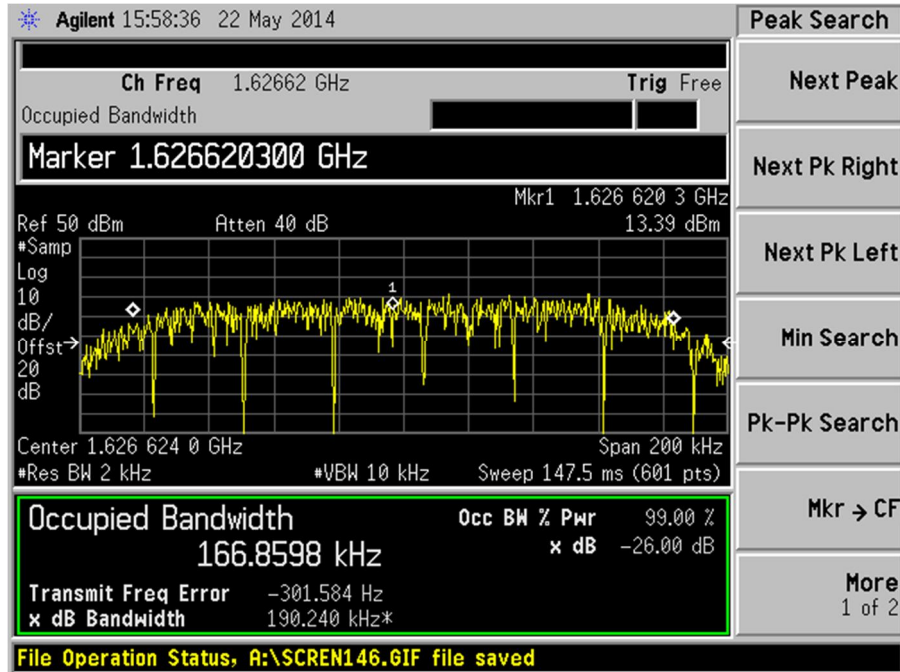
26dB Bandwidth Plots (Bearer Type: 2)



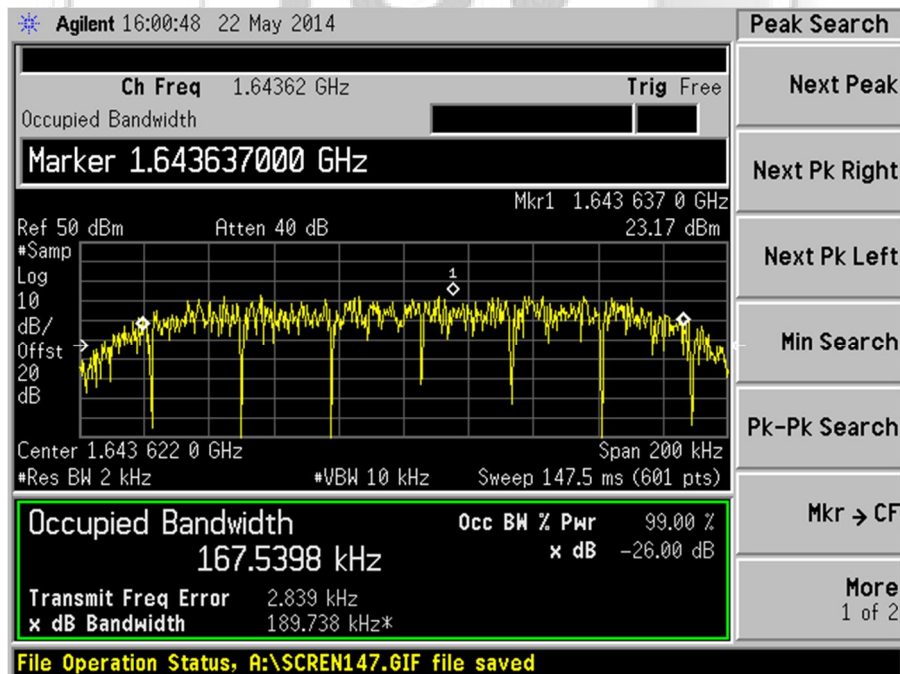
Plot 43 – Upper Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 3)



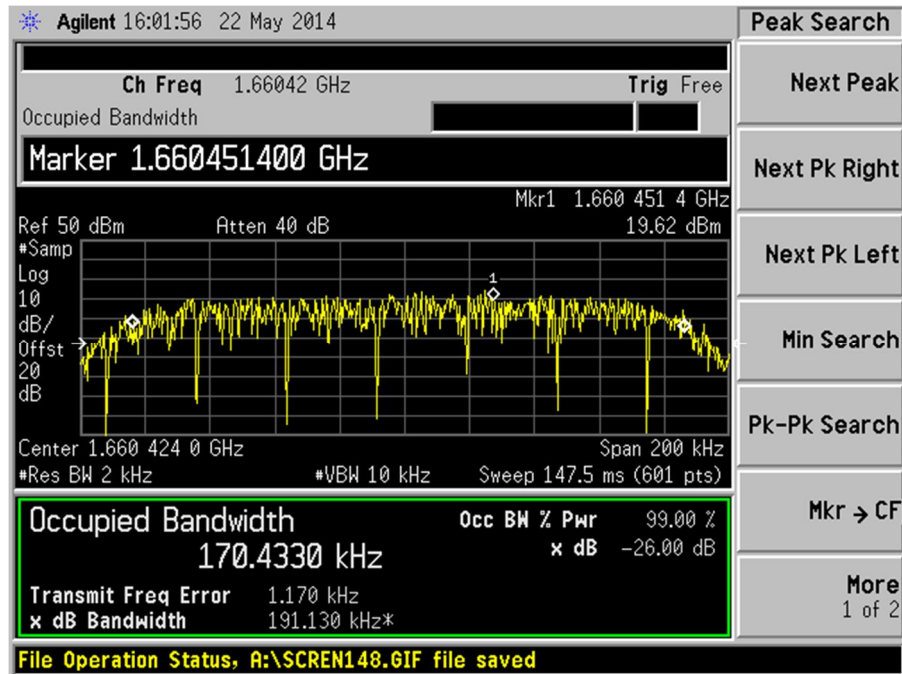
Plot 44 – Lower Channel



Plot 45 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

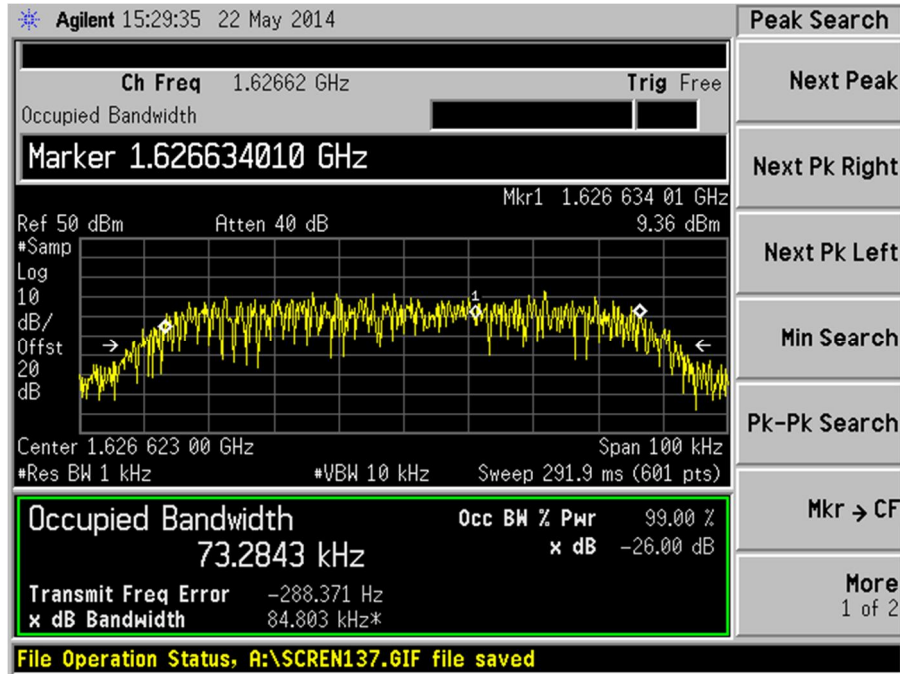
26dB Bandwidth Plots (Bearer Type: 3)



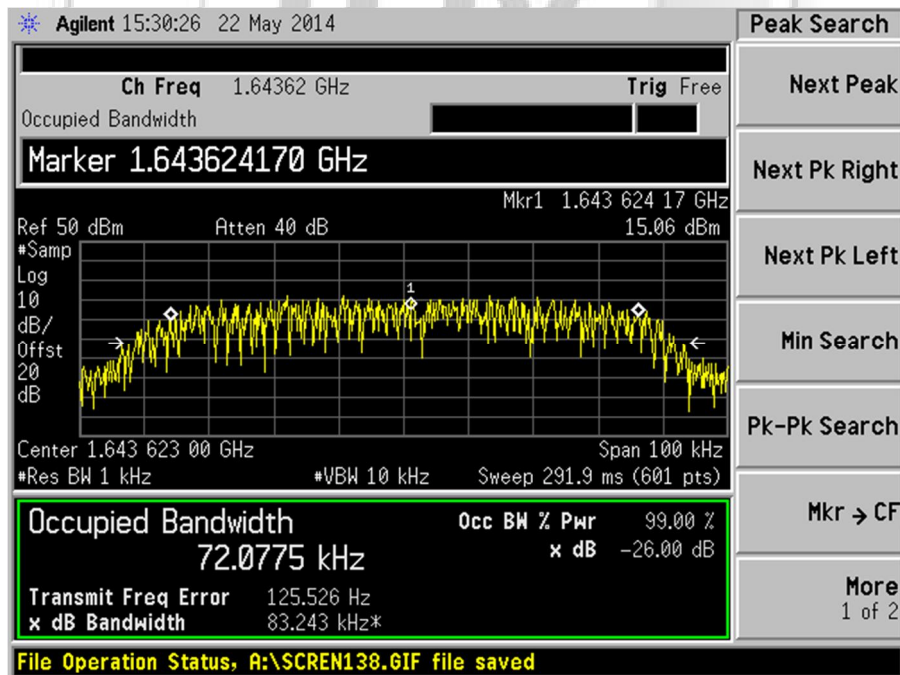
Plot 46 - Upper Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 7)



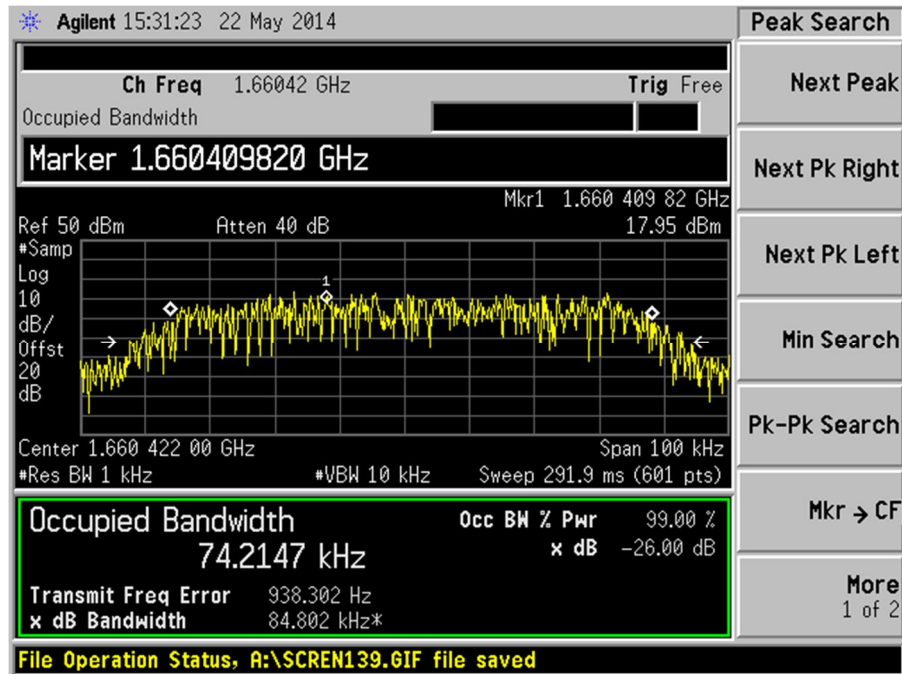
Plot 47 – Lower Channel



Plot 48 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

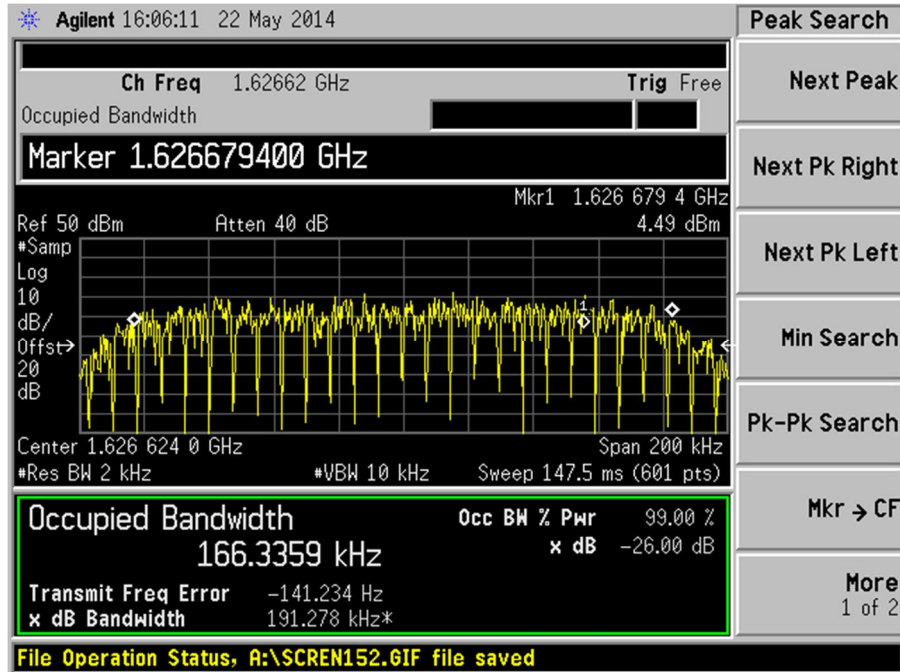
26dB Bandwidth Plots (Bearer Type: 7)



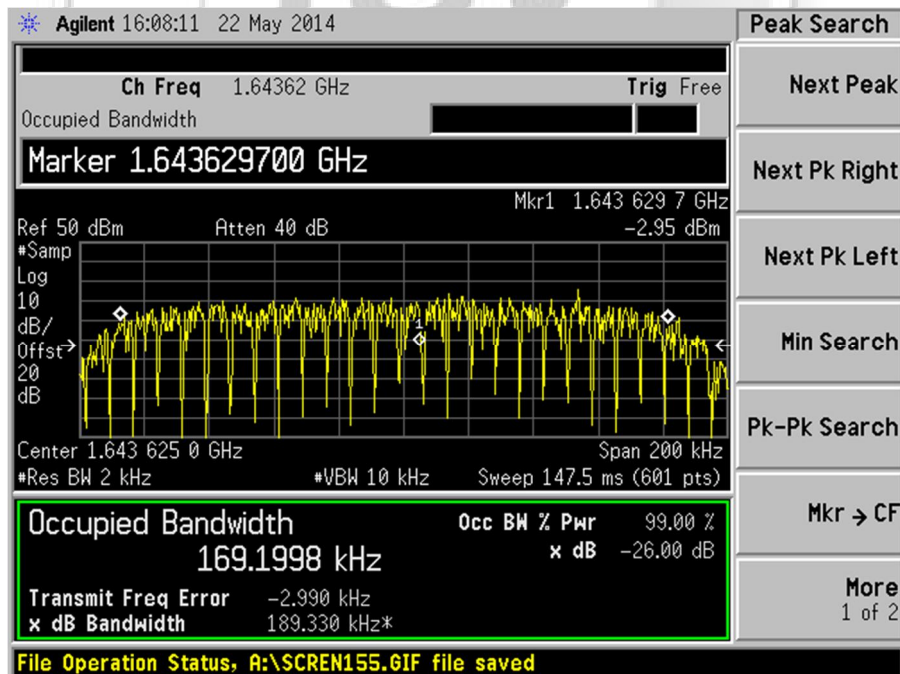
Plot 49 – Upper Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 8)



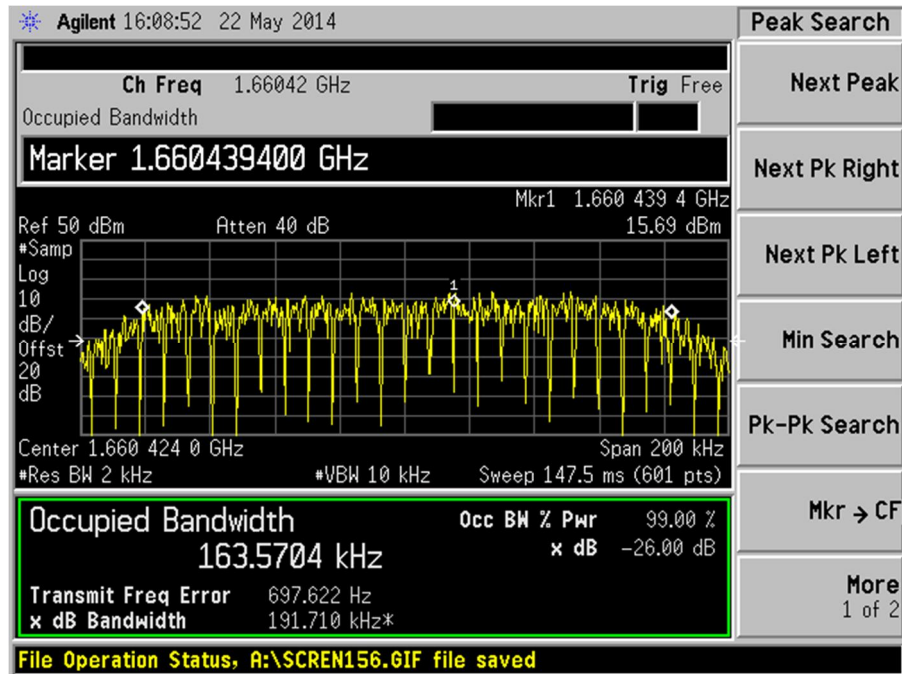
Plot 50 – Lower Channel



Plot 51 – Middle Channel

UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

26dB Bandwidth Plots (Bearer Type: 8)

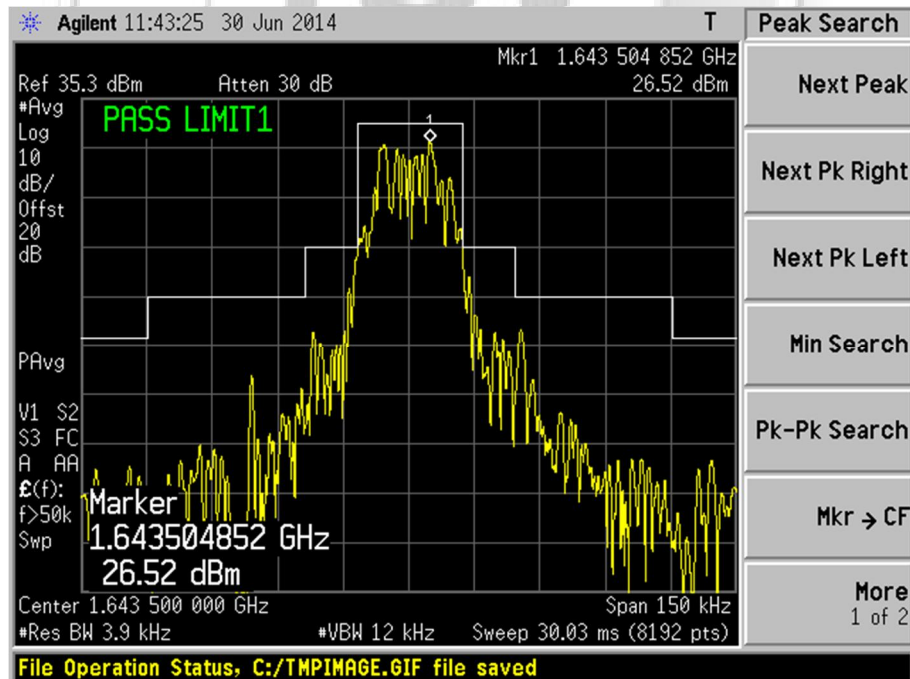


UNWANTED EMISSIONS AT ANTENNA TERMINAL TEST

In Band Emissions Plots (Bearer Type: 0)



Plot 53 - Lower Channel



Plot 54 - Middle Channel