



Test Report Issued Under the Responsibility of:
ITC ENGINEERING SERVICES, INC.

FCC CFR Title 47 Part 101 , Part 2, and FCC KDB 935210 D05 v01r01	
Report Reference No. :	20160629-05- RF11000E-FCC
Date of Issue :	2/2/2017
Total Number of Pages..... :	29
Testing Laboratory..... :	ITC Engineering Services, Inc.
Address :	9959 Calaveras Road, Box 543, Sunol CA 94586
Applicant's Name :	Peninsula Engineering Solutions , Inc
Address :	POB 1095 , Danville , CA 94526
Contact..... :	Mr. Frank Martens
Phone :	925-837-2243
Fax :	925-837-2298
Test Specification Standard :	FCC CFR Title 47 Part 101 ; FCC KDB 935210 D05 v01r01;
Test Procedure :	ANSI C63.4:2014, ANSI C63.10:2009 and 2013, FCC KDB 935210 D05 v01r01
Judgment :	Complies as tested
Test Item Description :	11GHz microwave RF repeater
Manufacturer Logo :	
Manufacturer :	Peninsula Engineering Solutions , Inc.
Model/Type Reference :	RF-11000E
RF Operating Frequency Bands :	10.7 - 11.7 GHz



ISO/IEC 17025 : 2005 Accredited Laboratory

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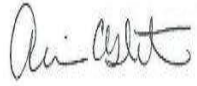
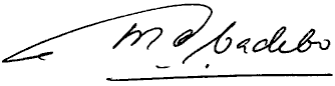
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documentation

1.1 Testing Location

☒	ITC Testing Laboratory:	:	ITC Engineering Services, Inc.
	Testing Location/Address	:	9959 Calaveras Road, PO Box 543, Sunol, CA 94586, USA
	Tested By (Name + Signature)	:	Benjamin Jing 
	Reviewed By (Name + Signature)	:	Amir Ashtiani 
	Approved By (Name + Signature)	:	Michael Gbadebo, PE 
☐	Manufacturer Facility	:	
	Testing Location/Address	:	
	Tested By (Name + Signature)	:	
	Approved By (+ Signature)	:	
☐	3 rd Party Test Facility	:	
	Testing Location/Address	:	
	Tested By (Name + Signature)	:	
	Approved By (+ Signature)	:	

1.2 Declaration/Disclaimer

It is the manufacturer's responsibility to assure that additional production units of these models are manufactured with identical electrical and mechanical characteristics. This report is the confidential property of the applicant. As a mutual protection to our applicants, the public, and ourselves, extracts from the test report shall not be reproduced except in full without ITC Engineering Service's written approval. The applicant/manufacturer shall not use this report to claim product endorsement by any US Government agency.

1.3 Revision History

#	Revision Date	Revision
1	8/3/2016	01

1.4 Condition of EUT

Equipment Under Test (EUT) was tested as it was received. The radiated emissions are tested by substitution method. For the RF conducted tests, a suitable patch cable is used for the connection from the RF output port to the spectrum analyzer .

1.5 Description of EUT

The RF-11000E Microwave Repeater is an active communications repeater that does not change frequencies but linearly amplifies signals in its pass-bands. It is a bi-direction repeater.

EUT Technical Specification and Description

Manufacturer	Peninsula Engineering Solutions, Inc.
EUT Name	Microwave RF Repeater
Model No.	RF-11000E
FCC ID	QFTA1102
Serial Number of EUT	16080201
Internal Power	N/A
AC/DC Power Adaptor	N/A
EUT Rated Voltage	24 Vdc
Cables	Power cable 3 ft , unshielded .
I/O Ports	N/A
Operation Freq. Range	10.7 – 11.7 GHz
Dimensions	37.31" x 23.25" x 22.82"
Weight	125 lb
Linear Gain	63 dB typical
AGC/ALC	15 dB down fade ; 5dB up fade ;
Maximum Output Power	32 dBm .

1.6 List of Applicant Peripherals/ Supporting Equipments Used During Test

Description	Manufacturer	Model Name	Serial Number
DC Power Supply	HP	HP6675A	3502A-00674

*N/A- Not Applicable

1.7 General Test Remarks

The EUT was operated under the following conditions during the testing:

☐	Standby	☐	Test Program (H – Pattern)
☐	Test Program (Color Bar)	☐	Test Program (Applicant Specific)
☐	TV/VCR Signal Input	☐	Signal Generator Input
☐	Continuous Audio Tone (1kHz)	☐	Cycled Audio Tone (1kHz)
☐	Printer/Parallel Function	☐	Modem/Serial Function
☐	Serpentine Program with I/O	☐	Serpentine Program without I/O
☐	Practice Operation	☐	Normal Operating Mode
☐	Essential Operation (Functional Safety)	☐	Continuous Unmonitored Operation
☒	Continuous Monitored Operation	☐	Non-Continuous Operation

The requirements according to the technical regulations are:

☒	Met	☐	Not Met
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The Equipment Under Test does:

☒	Fulfill the general approval requirements	☐	Not fulfill the general approval requirements
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1.8 Summary of Tests

ITC Engineering Services, Inc. as an independent testing laboratory, declares that the equipment specified above was tested to the requirements of:

FCC Title 47 CFR & KDB	Test Description	Result
101.113 / 2.1046	RF TX Power	Passed
101.109 / 2.1049	Occupied Bandwidth	Passed
101.111 / 2.1051	Conducted Out of Band Emissions	Passed
101.107 / 2.1055	Frequency Stability	Passed
101.111 / 2.1053	Radiated Out of Band Emissions	Passed
101.111	Spectrum Emission Mask	Passed
FCC KDB935210	Two Tone Intermodulation	Passed

1.9 Measurement Uncertainty

The measurement of uncertainty levels were estimated based on calculation in accordance with TR 100-028-1. Using the value $k = 2$ for expanded uncertainty, this provides a 95% level of confidence.

	Measurement Method	Calculated Uncertainty (dB)
1	RF Power, Conducted	± 1.5
2	Radiated emission of transmitter (30MHz - 1 GHz) @ 3m	± 3.2
3	Radiated emission of transmitter (1 - 25 GHz) @ 3m	± 2.5

1.10 TEST SET UP PHOTOS

(See test set-up photo file).

2 RF Output Power Per FCC Part 101.113 & 2.1046

2.1 Administrative and Environmental Details

Site Used:	EMC Lab 2B
Test Date:	8/17/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

2.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Vector Signal Generator	Agilent	E8267C	US43320669	8/10/2017	1 yr
Spectrum Analyzer	Agilent	E7405A	US40240257	7/28/2017	1 yr
Power Metter	Gigatronics	8651A	8650061	7/27/2017	1 yr

2.3 TEST SET UP PHOTO(S) REFER TO SET-UP PHOTO FILE .

2.4 Limits/Requirements

According to FCC §101.113, (a) On any authorized frequency, the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below.

Frequency Band	Maximum allowable EIRP	
	Fixed (dBW)	Mobile (dBW)
10,700–11,700	+55	

2.5 Test Description and Procedure

The EUT is connected to the spectrum analyzer by attaching suitable attenuator and patch cable from the RF port of the EUT. QAM and BPSK signals are used for this test, the level of the input signals is set at -24dBm for maximum output power. Test is performed at bi-direction.

2.6 Test Data

F1F3 Direction :

Channel	Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (dBW)	Max Ant. Gain (dBi)	EIRP (dBW)	EIRP Limit (dBW)
Low	16QAM	11265	23.7	- 6.3	50	43.7	< 55
	32QAM	11265	21.7	- 8.3	50	41.7	< 55
	64QAM	11265	19.7	- 10.3	50	39.7	< 55
	128QAM	11265	17.8	- 12.2	50	37.8	< 55
	256QAM	11265	16.7	- 13.3	50	36.7	< 55
	BPSK	11265	29.8	- 0.2	50	49.8	< 55

High	16QAM	11345	23.1	- 6.9	50	43.1	< 55
	32QAM	11345	21.2	- 8.8	50	41.2	< 55
	64QAM	11345	19.1	- 10.9	50	39.1	< 55
	128QAM	11345	17.1	- 12.9	50	37.1	< 55
	256QAM	11345	16.1	- 13.9	50	36.2	< 55
	BPSK	11345	29.1	- 0.9	50	49.1	< 55

F2F4 Direction :

Channel	Modulation	Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (dBW)	Max Ant. Gain (dBi)	EIRP (dBW)	Limit (dBW)
Low	16QAM	10775	23.9	- 6.1	50	43.8	< 55
	32QAM	10775	22.0	- 8.0	50	42.0	< 55
	64QAM	10775	20.0	- 10.0	50	40.0	< 55
	128QAM	10775	17.8	- 12.2	50	37.8	< 55
	256QAM	10775	17.5	- 12.5	50	37.5	< 55
	BPSK	10775	30.0	0.0	50	50.0	< 55
High	16QAM	10855	23.2	- 6.8	50	43.2	< 55
	32QAM	10855	21.2	- 8.8	50	41.2	< 55
	64QAM	10855	19.3	- 10.7	50	39.3	< 55
	128QAM	10855	17.1	- 12.9	50	37.1	< 55
	256QAM	10855	16.2	- 13.8	50	36.2	< 55
	BPSK	10855	29.3	- 0.7	50	49.3	< 55

3 Conducted Out of Band Emissions Per FCC Part 101.111 and 2.1051

3.1 Administrative and Environmental Details

Site Used:	EMC Lab 2B
Test Date:	8/8/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

3.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Vector Signal Generator	Agilent	E8267C	US43320669	8/10/2017	1 yr
Spectrum Analyzer	Agilent	E7405A	US40240257	7/28/2017	1 yr
Spectrum Analyzer	HP	8565E	3943A01328	6/14/2018	2 yr

3.3 TEST SET UP PHOTO(S) REFER TO SET-UP PHOTO FILE.

3.4 Limits/Requirements

Per FCC Part 101.111,

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(2) When using transmissions employing digital modulation techniques (see §101.141(b)) in situations not covered in this section:

(i) For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$A = 35 + 0.8(P - 50) + 10 \log_{10} B$. (Attenuation greater than 80 decibels or to an absolute power of less than -13 dBm/1MHz is not required.) where:

A = Attenuation (in decibels) below the mean output power level.

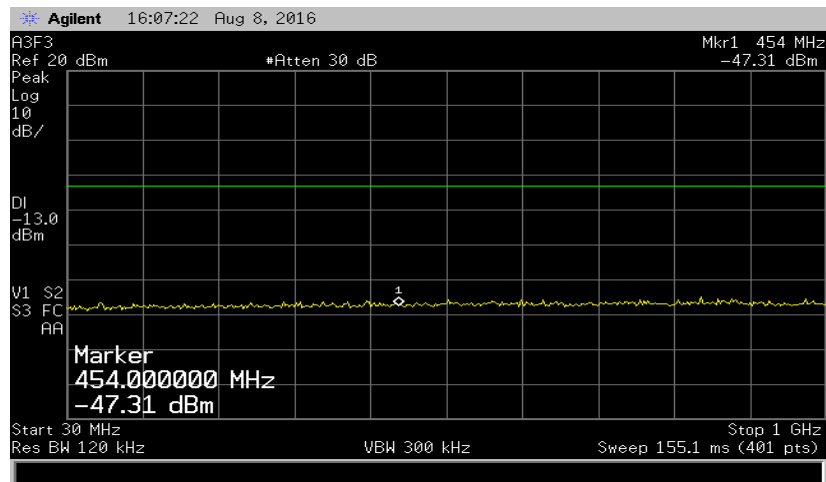
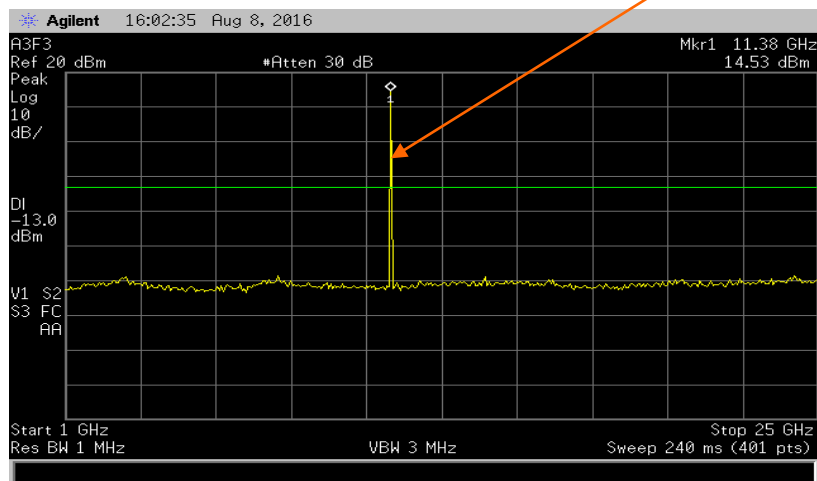
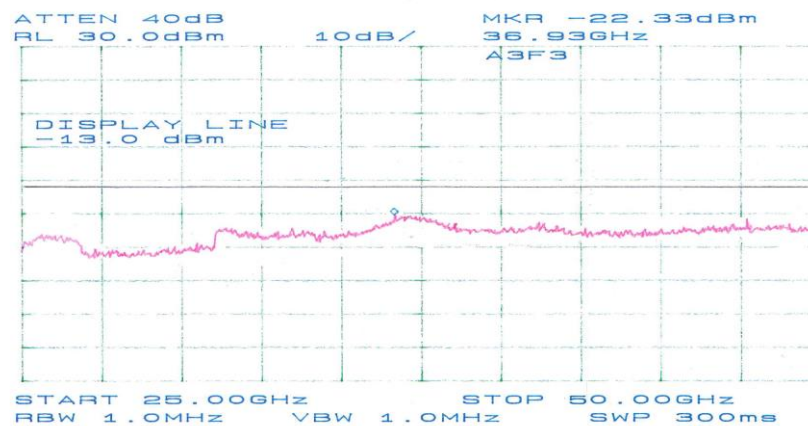
P = Percent removed from the center frequency of the transmitter bandwidth.

B = Authorized bandwidth in MHz..

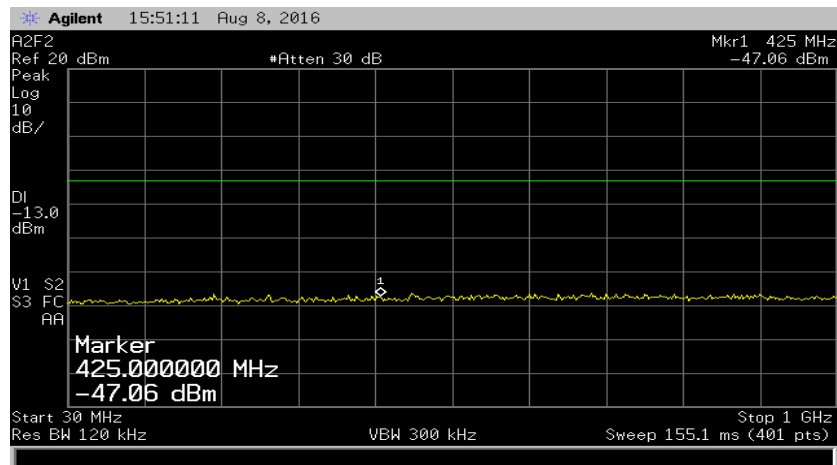
3.5 Test Description and Procedure

The EUT antenna port is connected to the spectrum analyzer. Sufficient scans are taken to show any out of band emissions up to 5th harmonic.

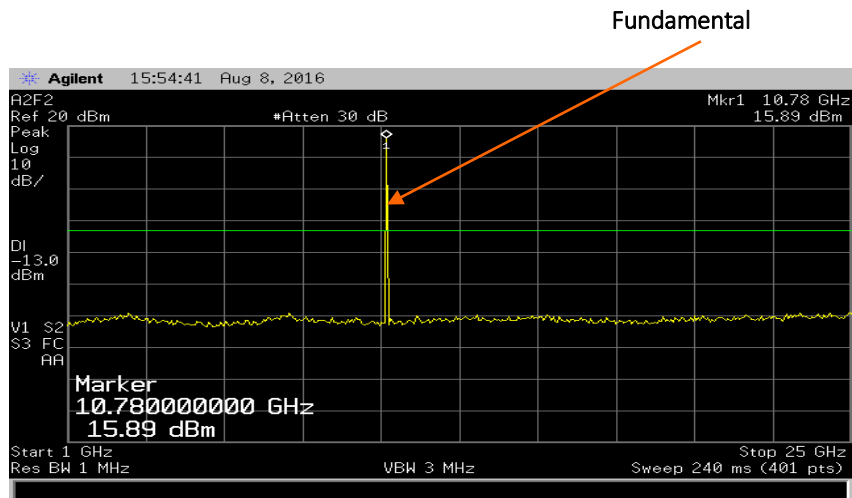
3.6 Test Plots

F1F3 Direction**30 – 1000 MHz****Fundamental****1 – 25 GHz****25 – 50 GHz**

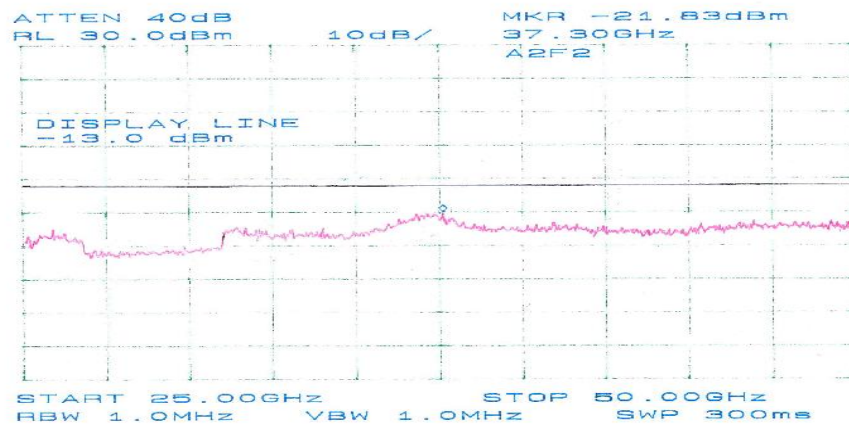
F2F4 Direction



30 – 1000 MHz



1 – 25 GHz



25 – 50 GHz

4 Occupied Bandwidth Per FCC Part 101.109 & 2.1049

4.1 Administrative and Environmental Details

Site Used:	EMC Lab 2B
Test Date:	8/17/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

4.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Vector Signal Generator	Agilent	E8267C	US43320669	8/10/2017	1 yr
Spectrum Analyzer	Agilent	E7405A	US40240257	7/28/2017	1 yr
Spectrum Analyzer	HP	8565E	3943A01328	6/14/2018	2 yr

4.3 Test Set up Photo(s)

REFER TO SET-UP PHOTO FILE .

4.4 Limits/Requirements

Per FCC Part 101.109 ,

(c) The maximum bandwidth which will be authorized per frequency assigned is set out in the table that follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency Band (MHz)	Maximum Authorized Bandwidth
10700 to 11700	80 MHz

4.5 Test Description and Procedure

The EUT antenna port is connected to the spectrum analyzer. Sufficient scans are taken to show the occupied bandwidths.

4.6 Test Data

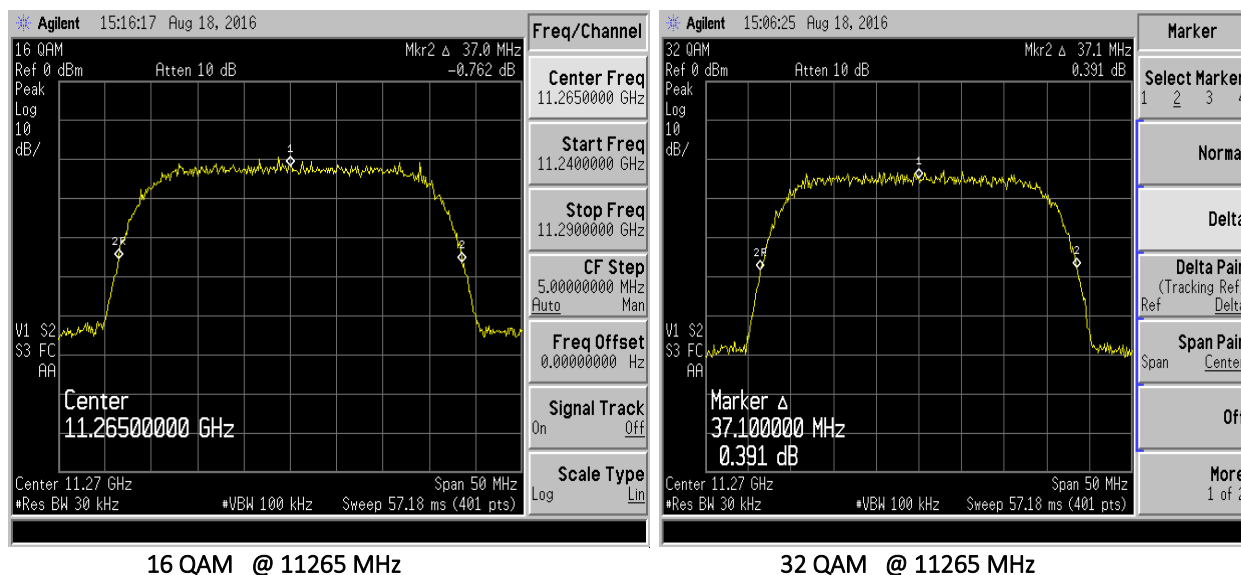
F1F3 Direction :

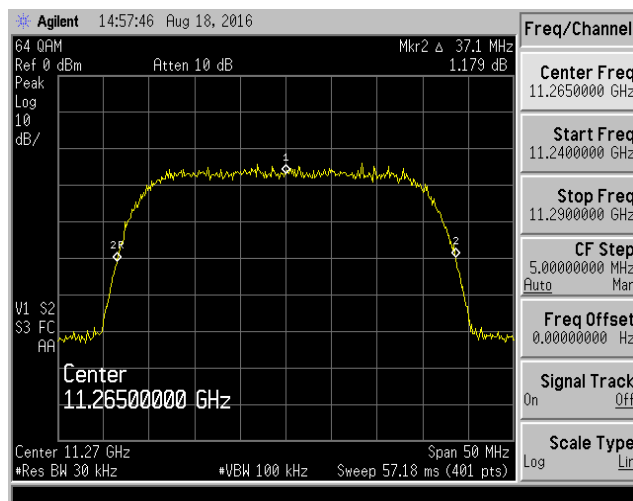
Channel	Modulation	Frequency (MHz)	26 dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
Low	16QAM	11265	37.0	32.4	< 80	Pass
	32QAM	11265	37.1	32.4	< 80	Pass
	64QAM	11265	37.1	32.4	< 80	Pass
	128QAM	11265	37.5	32.4	< 80	Pass
	256QAM	11265	37.3	32.3	< 80	Pass
	BPSK	11265	38.1	34.4	< 80	Pass

High	16QAM	11345	37.6	32.1	< 80	Pass
	32QAM	11345	37.3	31.9	< 80	Pass
	64QAM	11345	37.5	32.1	< 80	Pass
	128QAM	11345	35.3	32.0	< 80	Pass
	256QAM	11345	37.1	32.1	< 80	Pass
	BPSK	11345	37.8	33.5	< 80	Pass

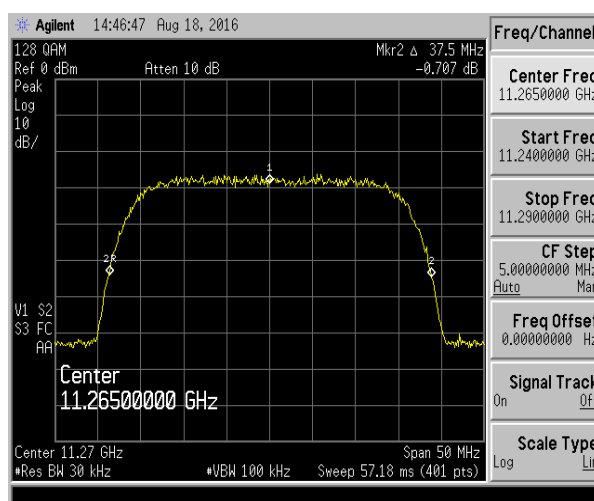
F2F4 Direction :

Channel	Modulation	Frequency (MHz)	26 dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
Low	16QAM	10775	37.0	31.9	< 80	Pass
	32QAM	10775	37.6	32.4	< 80	Pass
	64QAM	10775	37.4	32.5	< 80	Pass
	128QAM	10775	37.1	32.1	< 80	Pass
	256QAM	10775	36.5	31.1	< 80	Pass
	BPSK	10775	39.9	34.0	< 80	Pass
High	16QAM	10855	37.0	32.1	< 80	Pass
	32QAM	10855	37.3	32.0	< 80	Pass
	64QAM	10855	37.0	32.3	< 80	Pass
	128QAM	10855	37.1	31.7	< 80	Pass
	256QAM	10855	37.0	32.4	< 80	Pass
	BPSK	10855	37.5	33.5	< 80	Pass

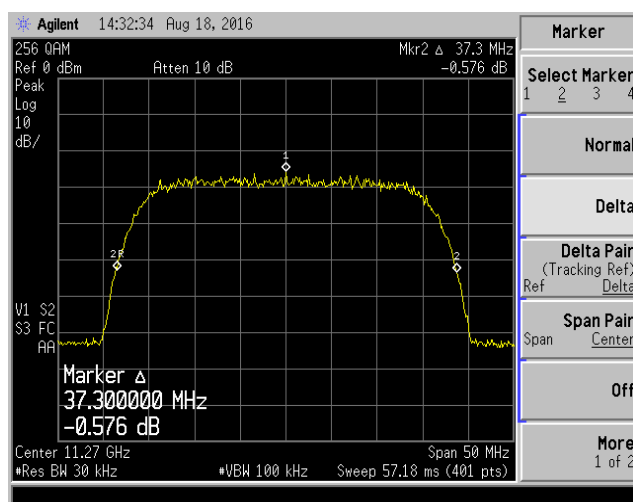
Plot F1F3 Direction :



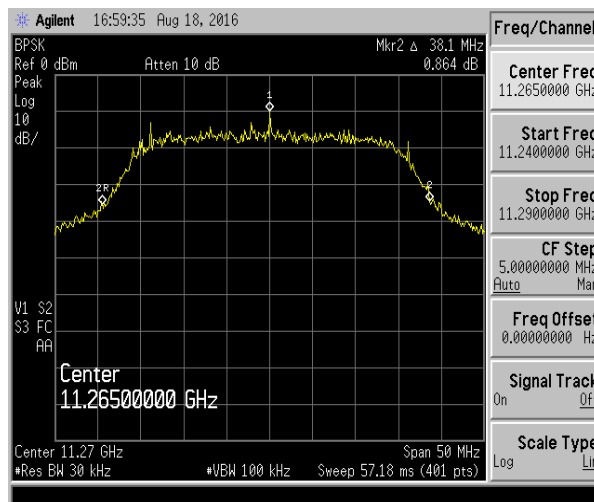
64 QAM @ 11265 MHz



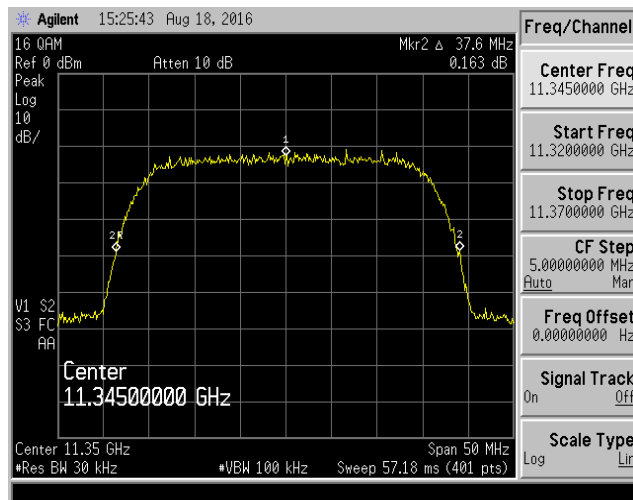
128 QAM @ 11265 MHz



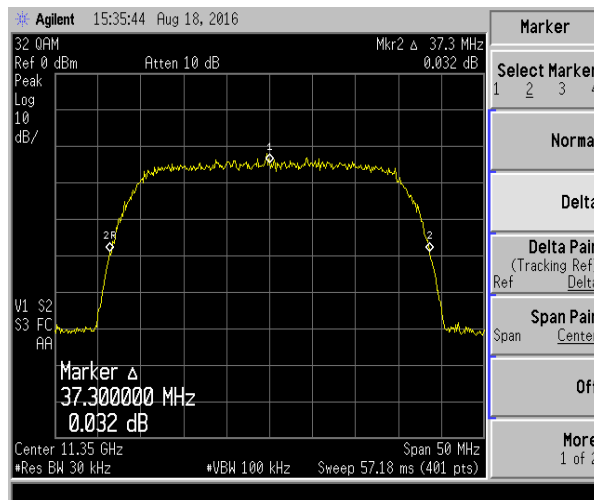
256 QAM @ 11265 MHz



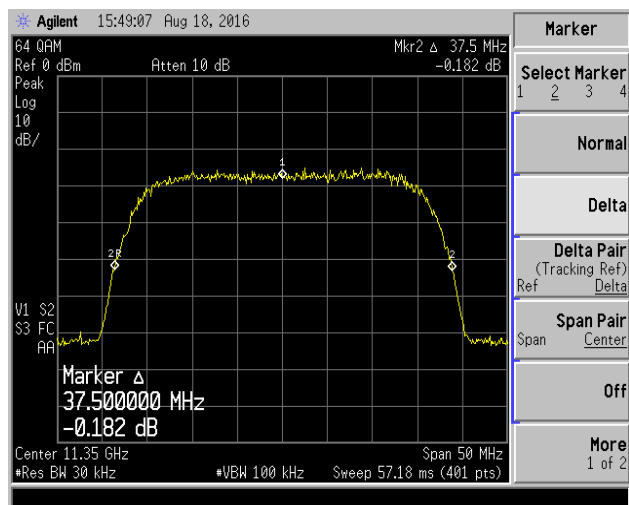
BPSK @ 11265 MHz



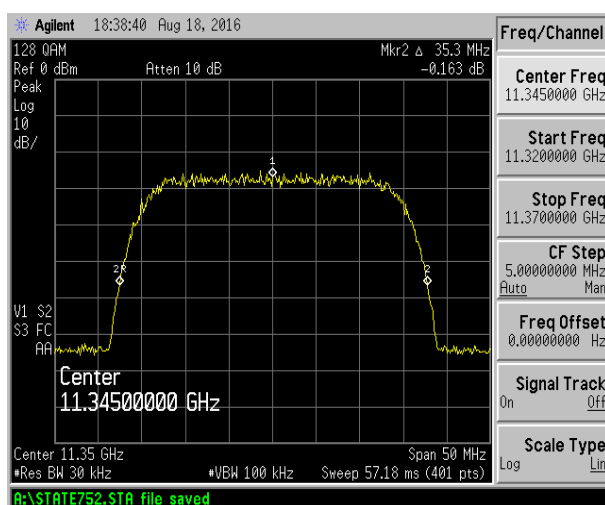
16 QAM @ 11345 MHz



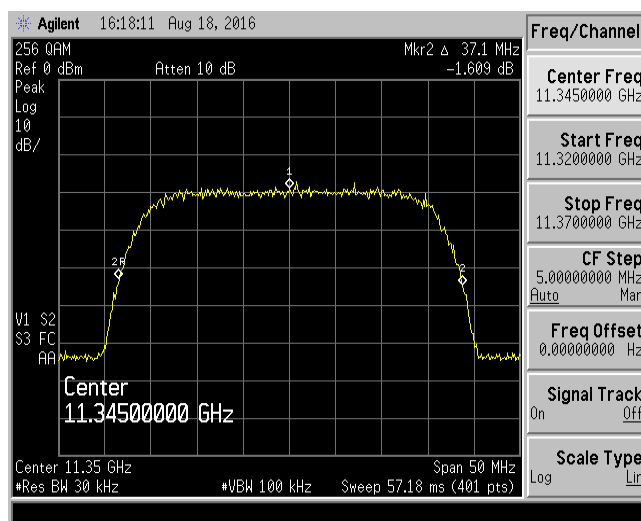
32 QAM @ 11345 MHz



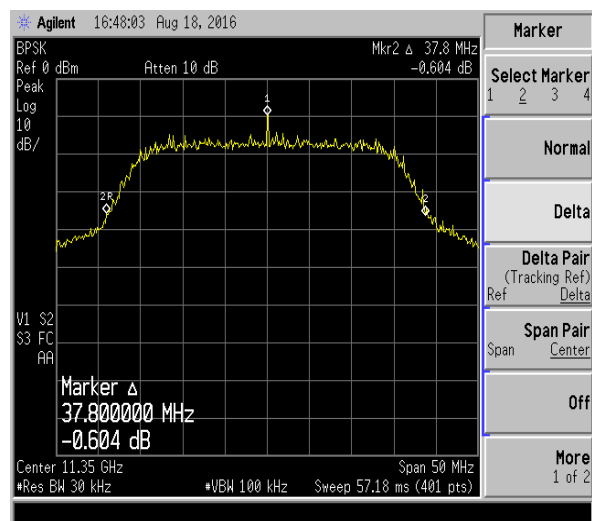
64 QAM @ 11345 MHz



128 QAM @ 11345 MHz

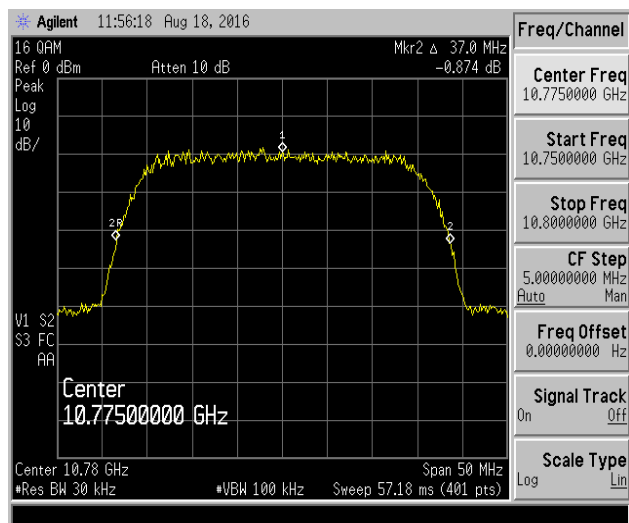


256 QAM @ 11345 MHz

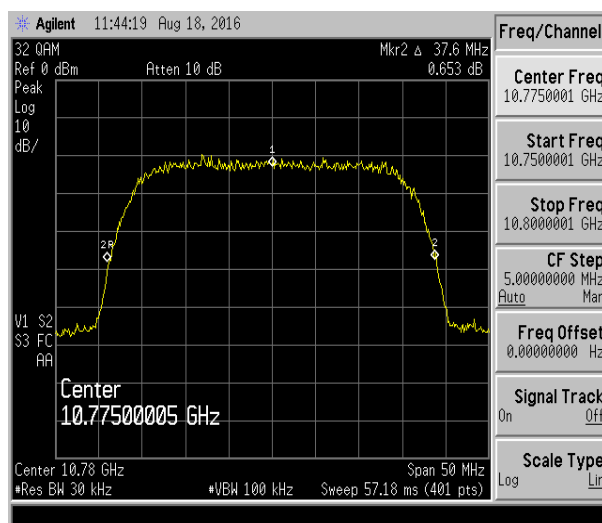


BPSK @ 11345 MHz

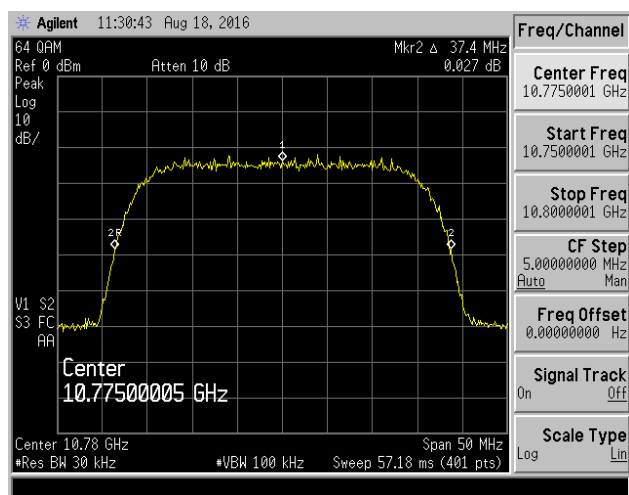
Plot F2F4 Direction :



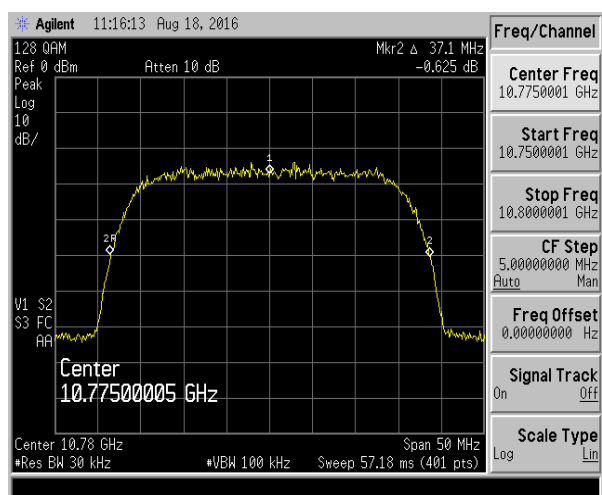
16 QAM @ 10775 MHz



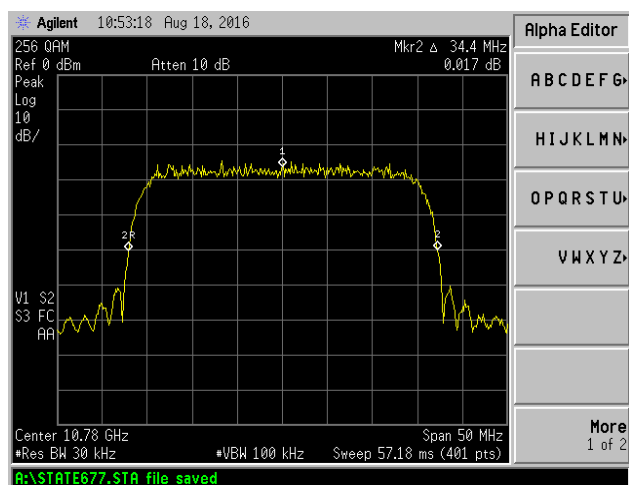
32 QAM @ 10775 MHz



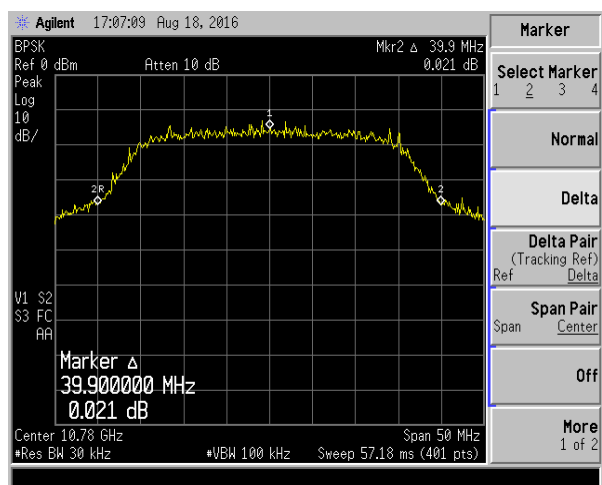
64 QAM @ 10775 MHz



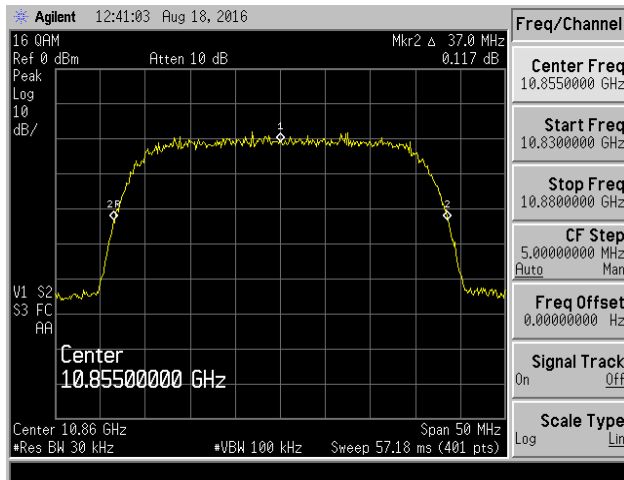
128 QAM @ 10775 MHz



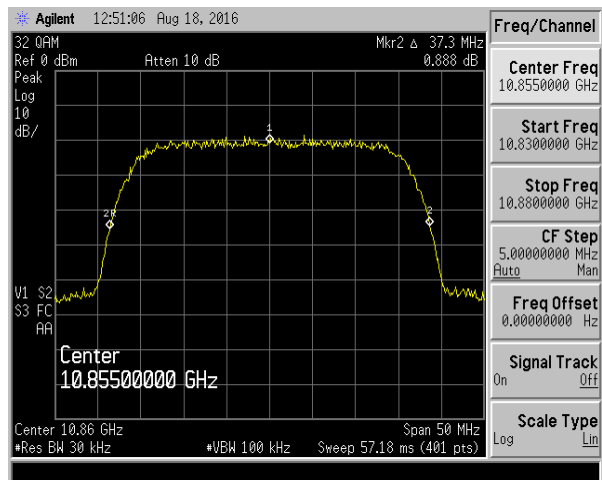
256 QAM @ 10775 MHz



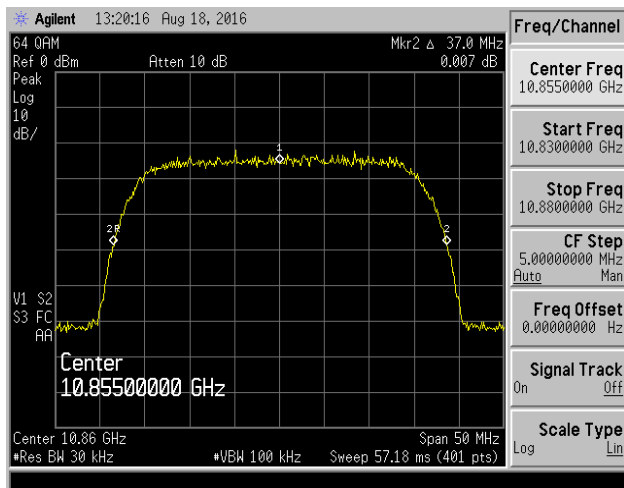
BPSK @ 10775 MHz



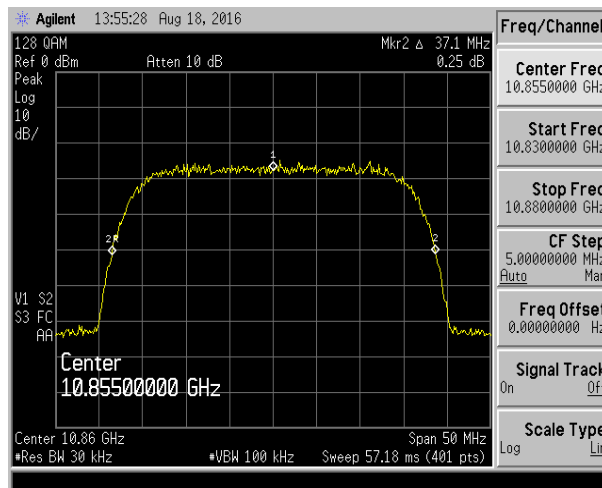
16 QAM @ 10855 MHz



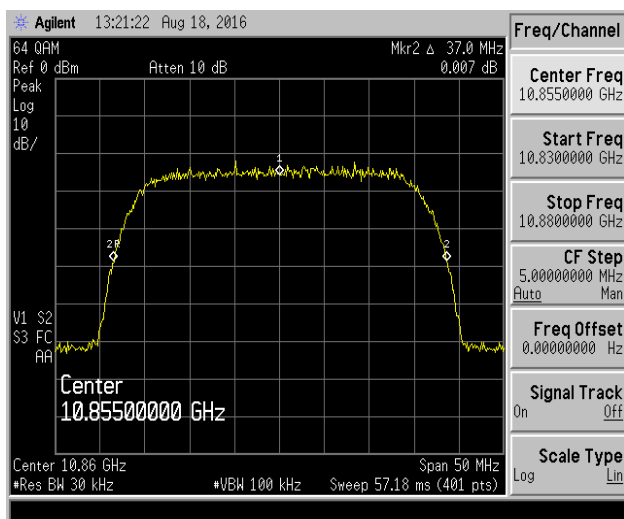
32 QAM @ 10855 MHz



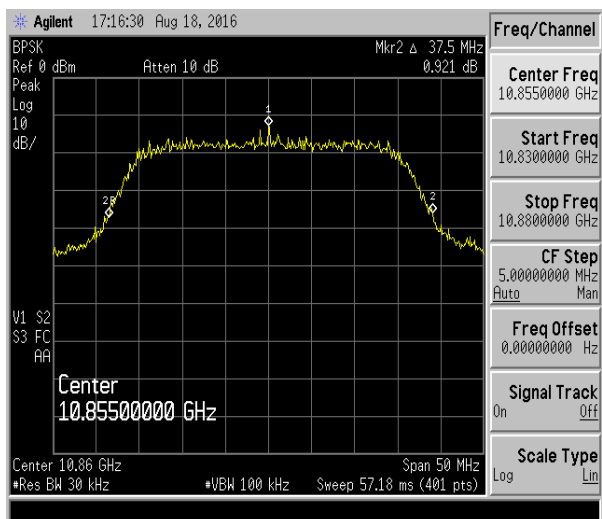
64 QAM @ 10855 MHz



128 QAM @ 10855 MHz



256 QAM @ 10855 MHz



BPSK @ 10855 MHz

5 Frequency Tolerance Per FCC Part 101.107 & 2.1055

5.1 Administrative and environmental details

Site Used:	EMC Lab 2B
Test Date:	8/8/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

5.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Environmental Chamber	3M	8	0008	7/28/2017	1 yr
Signal Generator	Gigatronics	2550B	919003	Verified	N/A
Spectrum Analyzer	HP	8565E	3943A01328	6/14/2018	2 yr

5.3 Test Set up Photo(s)

REFER TO SET-UP PHOTO FILE.

5.4 Limits/Requirements

Per FCC Part 101.107 and 2.1055, the carrier frequency of each transmitter authorized in these services must be maintained within the following percentage of the reference frequency except as otherwise provided in paragraph (b) of this section or in the applicable subpart of this part (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency (MHz)	Frequency Tolerance (percent)
10550 to 11700	0.005

5.5 Test Description and Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The frequency stability of the transmitter is measured by:

The temperature is varied from - 20 °C to + 60 °C using an environmental chamber.

The DC supply voltage is varied from the lowest point (19Vdc) of the EUT voltage range to the highest point (30Vdc) of the EUT voltage range at the DC input of the EUT or at the DC power supply terminals if cables are not normally supplied.

5.6 Test Data

Test Environment		Channel Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (percent)	Limit (percent)
Supply Voltage (Vdc)	Temperature (°C)					
Frequency Tolerance with Temperature						
24	-20	10775	10775.000057	+57	0.00000053	0.005
	-10	10775	10775.000055	+55	0.00000051	0.005
	0	10775	10775.000053	+53	0.00000051	0.005
	10	10775	10775.000052	+52	0.00000051	0.005
	20	10775	10775.000051	+51	0.00000049	0.005
	30	10775	10775.000051	+51	0.00000049	0.005
	40	10775	10775.000051	+51	0.00000049	0.005
	50	10775	10775.000051	+51	0.00000049	0.005
	60	10775	10775.000051	+51	0.00000049	0.005
Frequency Tolerance with Supply Voltage						
30	20	10775	10775.000051	+51	0.00000049	0.005
19		10775	10775.000051	+51	0.00000049	0.005

6 Radiated Out of Band Emissions Per FCC Part 101.111 and 2.1053

6.1 Administrative and Environmental Details

Site Used:	Semi Anechoic Chamber
Test Date:	8/8/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

6.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
EMC Analyzer	Agilent	E7405A	US40240257	7/16/17	2 yr
Spectrum Analyzer	HP	8565E	3943A01328	6/14/18	2 yr
Signal Generator	Gigatronics	2550B	919003	Verified	N/A
Bi-Conical Antenna	EMCO	3104	8901-3855	3/22/18	2 yr
Bi-Conical Antenna	EMCO	3104	3459	10/14/18	2 yr
Log Periodic Antenna	EMCO	3146	1596-1001	10/13/18	2 yr
Log Periodic Antenna	EMCO	3146	2261	3/23/18	2 yr
Pre-Amplifier	Agilent	83051A	0000009025	Verified	N/A
Amplifier	Giga-tronics	GT-1040A	1112003	Verified	N/A
Horn Antenna	A.H. Systems	SAS-571	887	10/14/18	2 yr
Horn Antenna	EMCO	3115	8812-3050	3/21/18	2 yr
Horn Antenna	Schwarzbeck	15633	BBHA9170267	10/16/18	2yr

6.3 TEST SET UP PHOTO(S)

REFER TO SET-UP PHOTO FILE .

6.4 Limits/Requirements

Per FCC Part 101.111,

- (a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:
- (2) When using transmissions employing digital modulation techniques (see §101.141(b)) in situations not covered in this section:
- (i) For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$A = 35 + 0.8(P - 50) + 10 \log_{10} B$. (Attenuation greater than 80 decibels or to an absolute power of less than -13 dBm/1MHz is not required.) where:

A = Attenuation (in decibels) below the mean output power level.

P = Percent removed from the center frequency of the transmitter bandwidth.

B = Authorized bandwidth in MHz..

6.5 Test Description and Procedure

The EUT is placed on the turntable, and it is normal transmitting with a 50 ohm termination .

The measurement antenna is placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to 5th harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with a substitution antenna. A signal generator as a substitution source is connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions are measured by the substitution method.

6.6 Test Data

F1F3 Direction (Fundamental Frequency 11345 MHz)

Indicated		Turntable Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (cm)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
5425	48.3	170	187	V	5425	-40.9	9.7	2.1	-33.3	-13	-20.3
5425	51.2	140	146	H	5425	-39.5	9.7	2.1	-31.9	-13	-18.9

Note : All other spurious emissions are too low to be detected .

F2F34 Direction (Fundamental Frequency 10775 MHz)

Indicated		Turntable Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (cm)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Antenna Cord. (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
5430	48.1	160	185	V	5430	-41.3	9.7	2.1	-33.7	-13	-20.7
5430	50.9	130	143	H	5430	-39.8	9.7	2.1	-32.2	-13	-19.2

Note : All other spurious emissions are too low to be detected

Sample Calculation of Radiated Spurious Emissions Level :

$$\text{Absolute Level (dBm)} = \text{Substitution Reading (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

7 Spectrum Emission Mask Per FCC Part 101.111

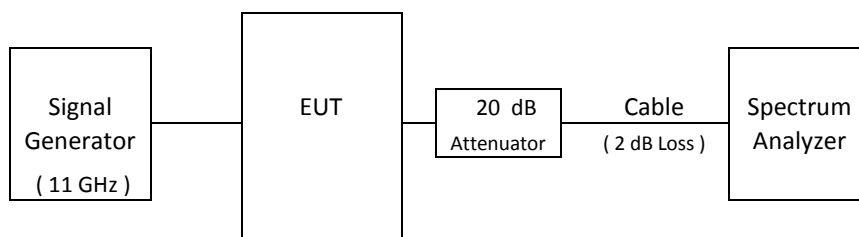
7.1 Administrative and Environmental Details

Site Used:	Semi Anechoic Chamber
Test Date:	8/17/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

7.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Vector Signal Generator	Agilent	E8267C	US43320669	8/10/2017	1 yr
Spectrum Analyzer	HP	8565E	3943A01328	6/14/18	2 yr

7.3 Test Set up



Emission Mask Measurement Set-up

7.4 Limits/Requirements

Per FCC Part 101.111,

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(2)When using transmissions employing digital modulation techniques (see §101.141(b)) in situations not covered in this section:

(i)For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$A = 35 + 0.8(P - 50) + 10 \log_{10} B$. (Attenuation greater than 80 decibels or to an absolute power of less than -13 dBm/1MHz is not required.) where:

A = Attenuation (in decibels) below the mean output power level.

P = Percent removed from the center frequency of the transmitter bandwidth.

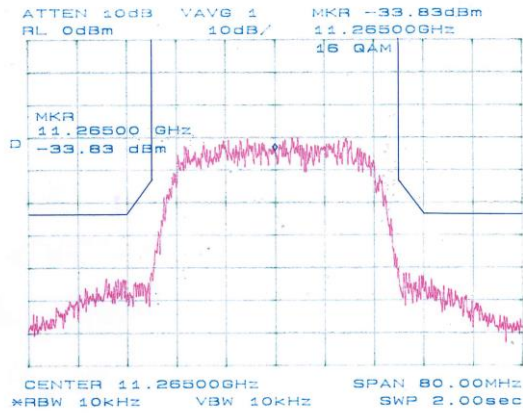
B = Authorized bandwidth in MHz..

7.5 Test Description and Procedure

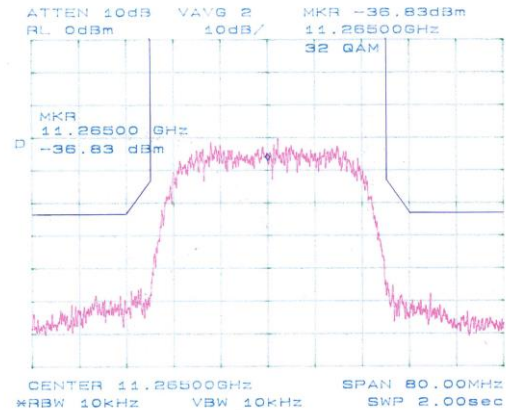
The RF output of the EUT is connected to the input of the spectrum analyzer through sufficient attenuation. Using the conducted test method, the spectrum is recorded in the band.

7.6 Test Plots

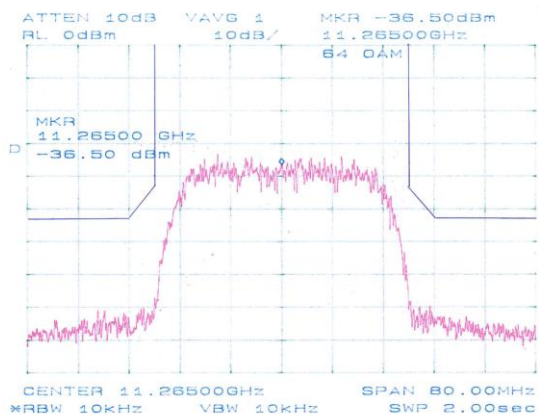
F1F3 Direction :



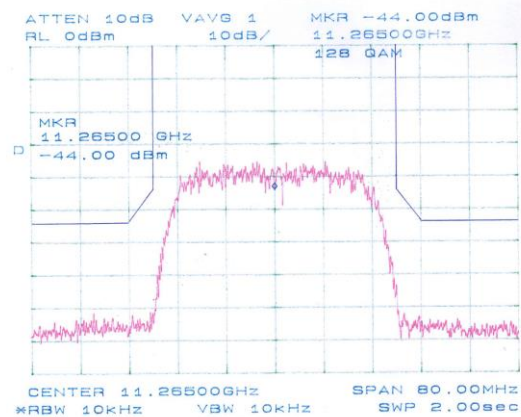
16 QAM @ 11265 MHz



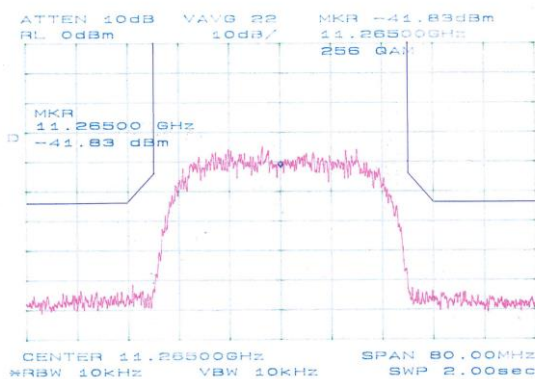
32 QAM @ 11265 MHz



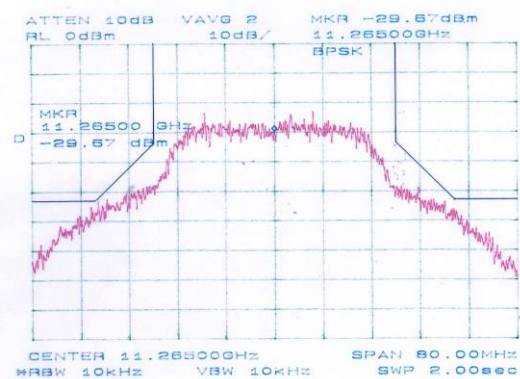
64 QAM @ 11265 MHz



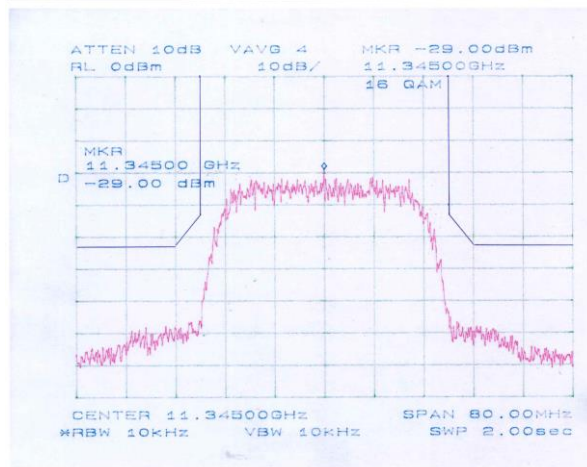
128 QAM @ 11265 MHz



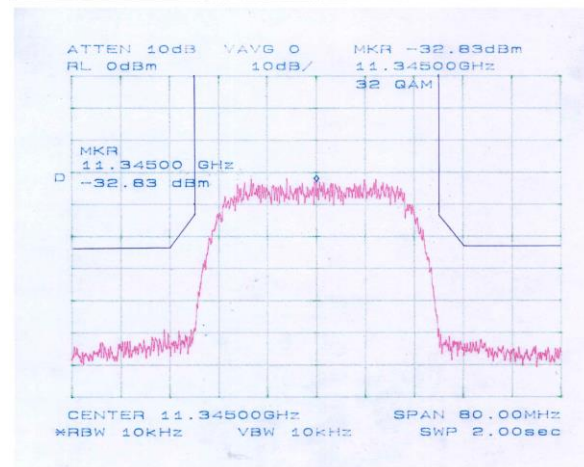
256 QAM @ 11265 MHz



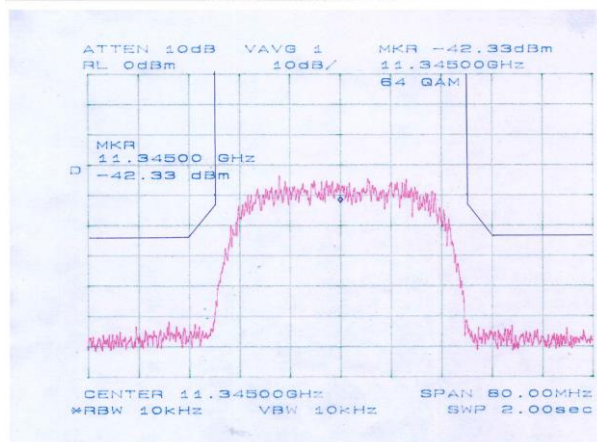
BPSK @ 11265 MHz



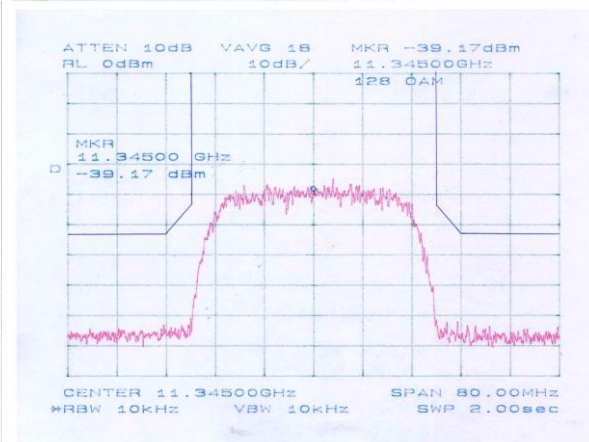
16 QAM @ 11345 MHz



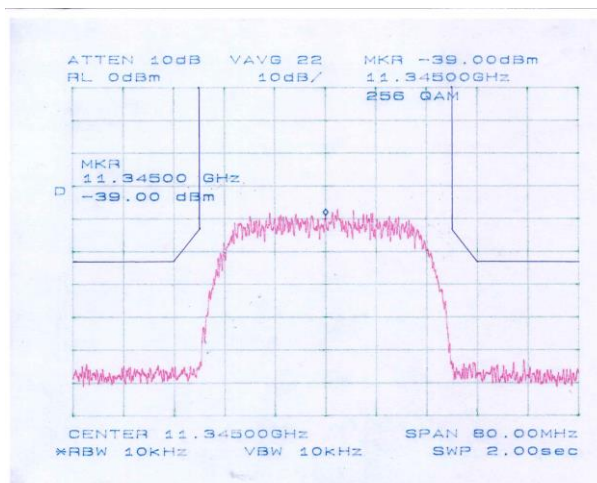
32 QAM @ 11345 MHz



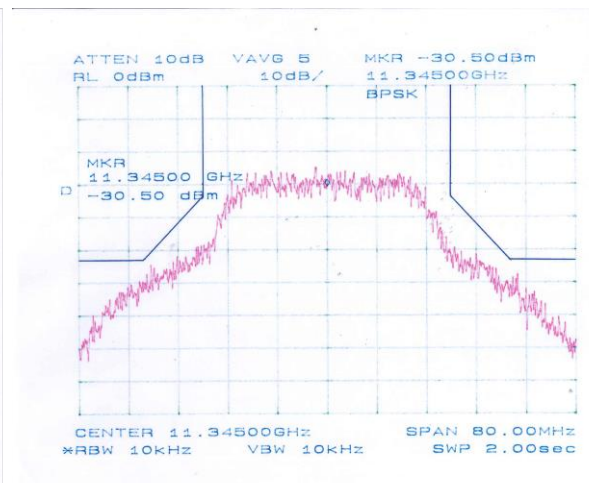
64 QAM @ 11345 MHz



128 QAM @ 11345 MHz

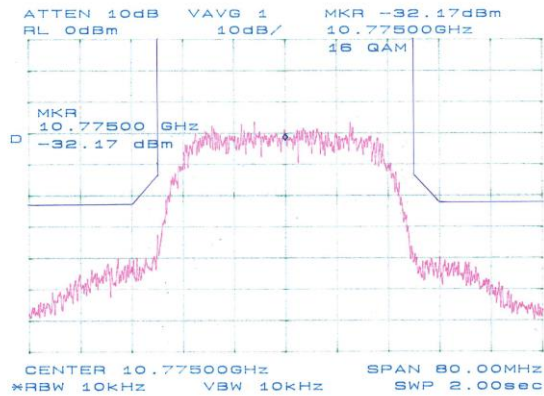


256 QAM @ 11345 MHz

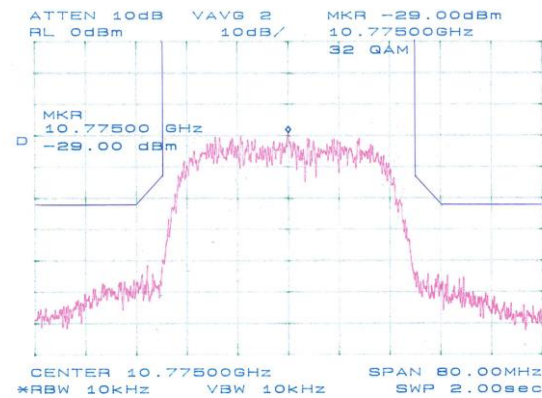


BPSK @ 11345 MHz

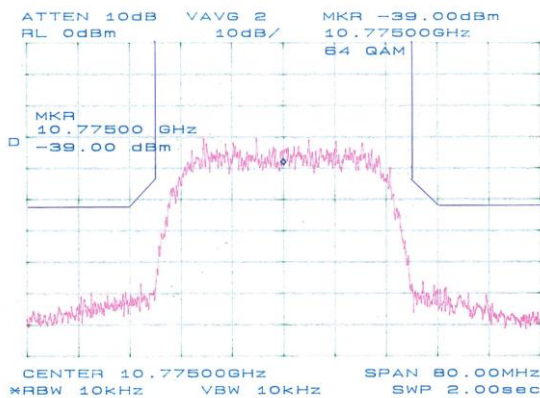
F2F4 Direction :



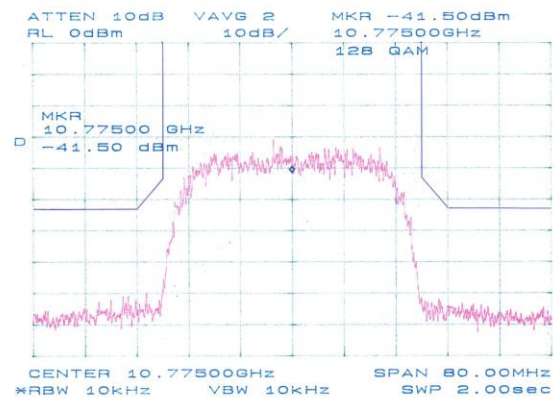
16 QAM @ 10775 MHz



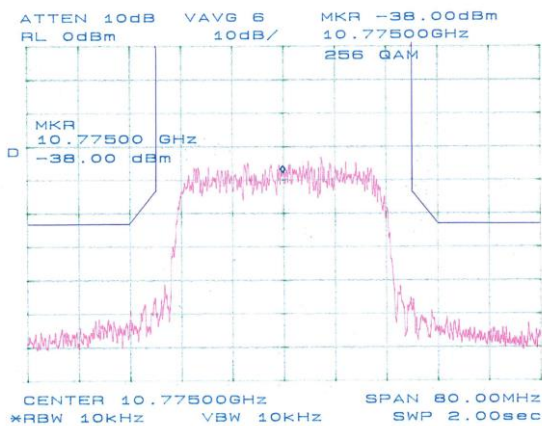
32 QAM @ 10775 MHz



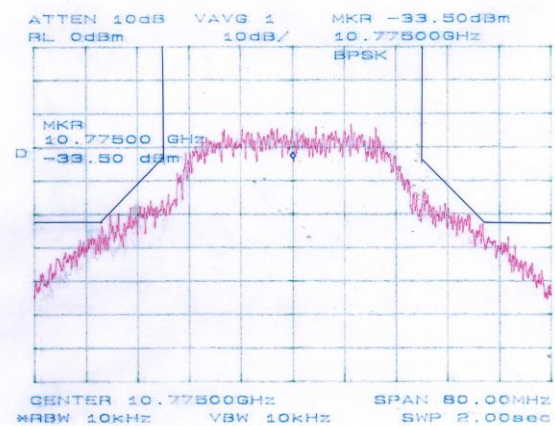
64 QAM @ 10775 MHz



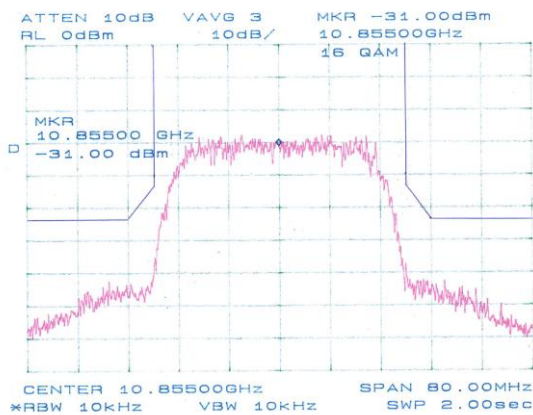
128 QAM @ 10775 MHz



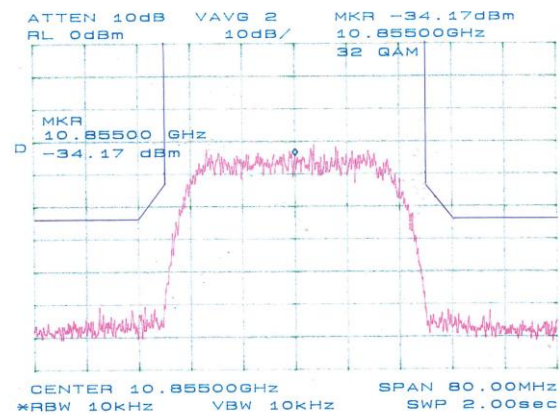
256 QAM @ 10775 MHz



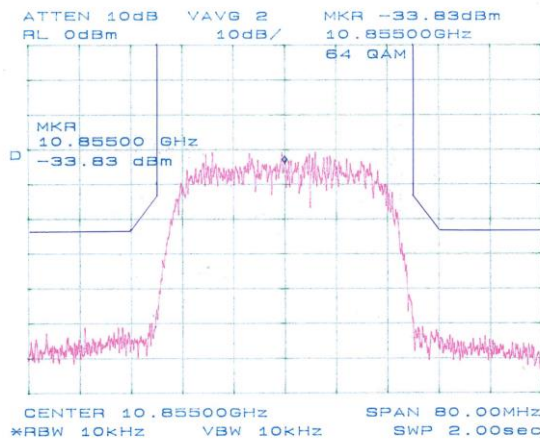
BPSK @ 10775 MHz



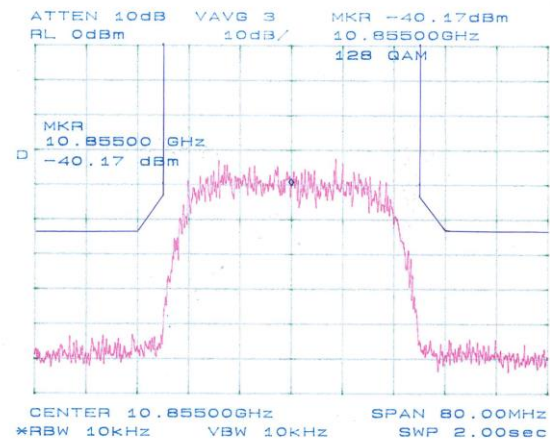
16 QAM @ 10855 MHz



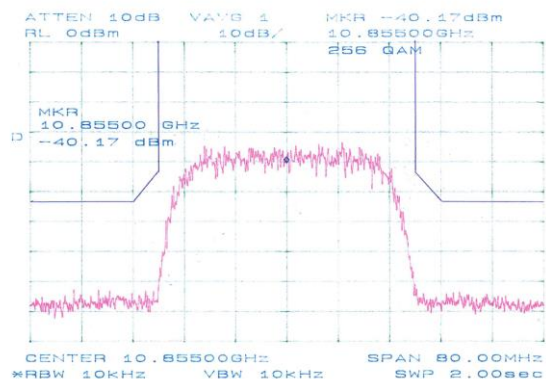
32 QAM @ 10855 MHz



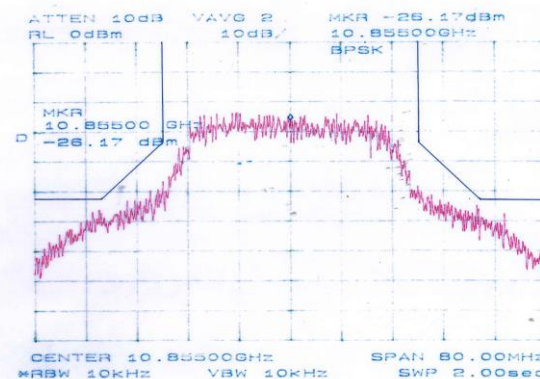
64 QAM @ 10855 MHz



128 QAM @ 10855 MHz



256 QAM @ 10855 MHz



BPSK @ 10855 MHz

8 Two Tones Inter-modulation Per FCC Part 2.1047(d) , 2.1051 , and FCC KDB 935210 D05 v01r01

8.1 Administrative and Environmental Details

Site Used:	Semi Anechoic Chamber
Test Date:	8/12/2016
Test Engineer:	Benjamin Jing
Temperature	23°C avg
Humidity:	48% avg

8.2 Test Equipment

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date	Calibration Interval
Signal Generator	Gigatronics	2550B	919003	Verified	N/A
Signal Generator	HP	8350B	2933A13036	Verified	N/A
Spectrum Analyzer	Agilent	E7405A	US40240257	7/28/2017	1 yr

8.3 TEST SET UP PHOTO(S) REFER TO SET-UP PHOTO FILE.

8.4 Limits/Requirements

Per FCC Part 2.1047 (d), a curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed

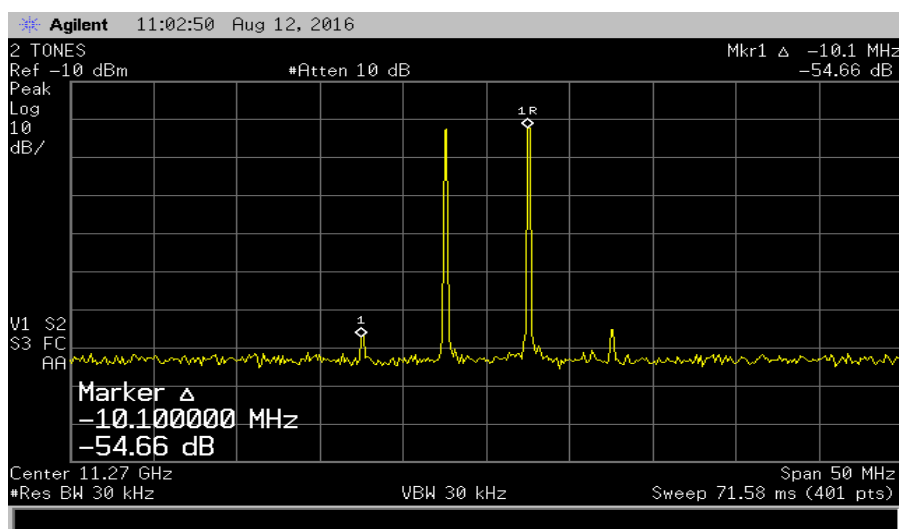
Per FCC 2.1051, the radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and 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.

8.5 Test Description and Procedure

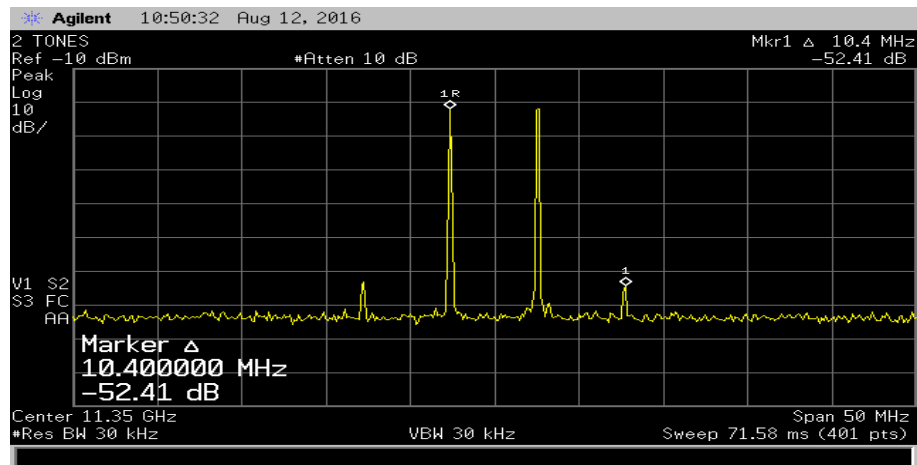
Two RF signals are injected into the input of the EUT. The RF output of the EUT is connected to the spectrum analyzer . The two tones inter-modulation products are recorded by the plots.

8.6 Test Plots

F1F3 Direction :

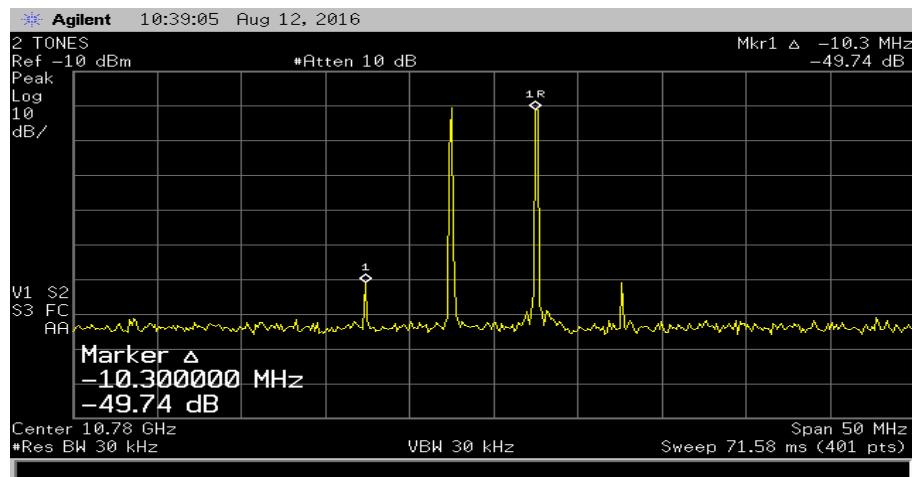


Two Tones at Low Channel

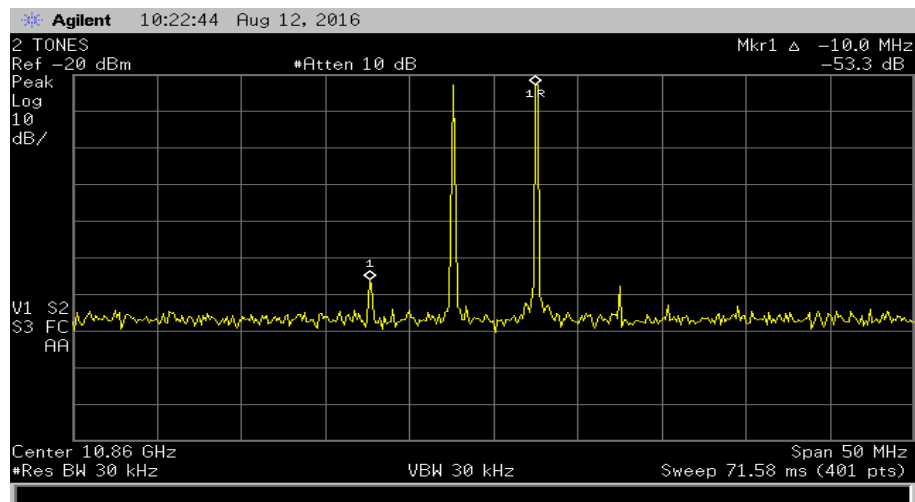


Two Tones at High Channel

F2F4 Direction :



Two Tones at Low Channel



Two Tones at High Channel