



FCC TEST REPORT

For

WiMAX 3.5GHz Outdoor CPE

**Model: XS-61X-35X-XXX, XS-615-35S-001, XS-615-35M-001,
XS-618-35S-001, XS-618-35M-001**

Trade Name: MTI

Issued to

MICROELECTRONICS TECHNOLOGY INC.

**No.1,Innovation Road II, Hsinchu Science Park,
Hsinchu 300, Taiwan, R.O.C.**

Issued by

Compliance Certification Services Inc.
**No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,
Taoyuan Hsien, (338) Taiwan, R.O.C.**
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1 TEST RESULT CERTIFICATION

Product:	WiMAX 3.5GHz Outdoor CPE
Model:	XS-61X-35X-XXX, XS-615-35S-001, XS-615-35M-001, XS-618-35S-001, XS-618-35M-001
Applicant:	MICROELECTRONICS TECHNOLOGY INC. No.1, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.
Manufacturer:	MICROELECTRONICS TECHNOLOGY INC. No.1, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.
Brand:	MTI
Tested:	May 11 ~ August 22, 2009

FCC PART 90, SUBPART Z	
Standard	Test Type
2.1049	99% Occupied bandwidth
90.1321(a)	EIRP radiated power
90.1321(a)	Peak EIRP power density
90.1323, 2.1051	Spurious emissions at Antenna Terminals
2.1055(a)(1)	Frequency stability
15.209	Radiated emissions Below 1 GHz
90.1323, 2.1053	Transmitter Radiated Emissions above 1 GHz
15.207	Conducted emissions
90 Subpart C §90.1217	Maximum Permissible Exposure

- Note: 1. The test result judgment is decided by the limit of test standard
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
None

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by

Reviewed by

Rex Lai
Section Manager
Compliance Certification Services Inc.

Gina Lo
Section Manager
Compliance Certification Services Inc.



2 EUT DESCRIPTION

Product	WiMAX 3.5GHz Outdoor CPE
Model Number	XS-61X-35X-XXX, XS-615-35S-001, XS-615-35M-001, XS-618-35S-001, XS-618-35M-001
Trade	MTI
Power Source	Trade name / Model number: PHIHONG / PSA16U-480 I/P: AC 100-240V, 0.4A, 50-60Hz O/P: DC 48V, 0.32A
Modulation Type	QPSK-1/2, -3/4, 16QAM-1/2, -3/4, 64QAM-1/2, -2/3, -3/4, -5/6
Modulation Technology	OFDMA
Channel Bandwidth	5 MHz, 10 MHz
Frequency Range	3650 – 3675 MHz
Maximum Output Power	24.72dBm
Antenna Specification	Patch antenna / Gain: 15dBi Dual-Polarization Patch antenna / Gain: 11dBi
Associated Devices	NA

*Note: 1. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.
2. Model Discrepancy is list as below*

XS-61X-35S-XXX





3 TEST METHODOLOGY

3.1. DESCRIPTION OF TEST TYPE

The EUT (model: XS-618-35X-001) comes with two different antennas (Patch antenna & Dual-Polarization Patch antenna) for sale. After the preliminary test, the Patch antenna was found to emit the worst emissions and therefore had been tested under operating condition. Software used to control the EUT for staying in continuous transmitting mode was programmed.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) mode for powerline conducted emissions, Z mode for radiation emissions and the worst cases were recorded.

Emissions bandwidth 5 MHz

Channel	Frequency (MHz)
Low	3652.5
Middle	3662.5
High	3672.5

Emissions bandwidth 10 MHz

Channel	Frequency (MHz)
Low	3655
Middle	3662.5
High	3670

The following test modes were scanned during the preliminary test:

Pre-Test Mode

Mode 1: 1Tx2Rx with Digital (Model: XS-618-35M-001)

Mode 2: 1Tx1Rx with Digital (Model: XS-618-35S-001)

Mode 3: 1Tx2Rx without Digital (Model: XS-615-35M-001)

Mode 4: 1Tx1Rx without Digital (Model: XS-615-35S-001)

Final Test Mode

After the preliminary scan, the following test mode was found to produce the highest emission level.

Conducted Emission: **Mode 1**

Radiated Emission: **Mode 1**



The scope of the test program was to test the As applicant MICROELECTRONICS TECHNOLOGY INC. WiMAX 3.5GHz Outdoor CPE for compliance against;-

FCC 47 CFR Part 90, Subpart Z regulatory requirements.

The WiMAX 3.5GHz Outdoor CPE has two operational bandwidths 3.5 and 7MHz and employs three modulation schemes QPSK, 16QAM, 64QAM in the frequency range 3650 to 3700MHz. Per Part 90 Subpart Z, 90.1319 the WiMAX 3.5GHz Outdoor CPE "equipment incorporating a restricted contention based protocol may operate in and shall only tune over, the lower 25MHz of this frequency band".

As the WiMAX 3.5GHz Outdoor CPE incorporating a restricted contention based protocol the frequency range is limited to 3650 to 3675MHz.



4 INSTRUMENT CALIBRATION

4.1. MEASURING instrument calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2. MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	03/05/2010

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/30/2009
Switch Controller	TRC	Switch Controller	SC94050010	N.C.R.
4 Port Switch	TRC	4 Port Switch	SC94050020	N.C.R.
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	10/20/2009
Horn-Antenna	TRC	HA-1201A	01	10/15/2009
Horn-Antenna	TRC	HA-1301A	01	10/15/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/27/2010
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: IC 2324G-1/-2	10/17/2010 11/04/2010
Test S/W	LABVIEW (V 6.1)			

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	11/18/2009
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/10/2010
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W	LABVIEW (V 6.1)			



4.3. MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 2.81
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



5 FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2. EQUIPMENT




Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*



6 SETUP OF EQUIPMENT UNDER TEST

6.1. SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2. SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC (Remote)	DELL	PP05L	7T390 A03	E2K5HCKT	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Wimax Test Set (Remote)	Agilent	E6651A	MY41850118	N/A	N/A	N/A

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7 TEST PROCEDURE AND RESULT

7.1. Occupied Bandwidth

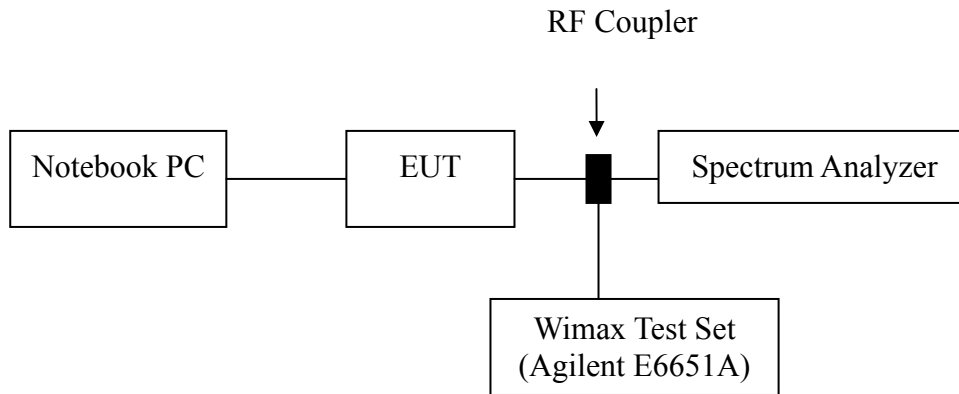
99% Occupied bandwidth according to § 2.1049

Method of measurement ANSI 63.4 §13.1.7

Operating Frequency Range 3.650 – 3.675 GHz

Ambient Temperature 21°C Relative Humidity 52% Air Pressure 1009 hPa

Test Configuration





Test Results:

QPSK Modulation

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	99% Bandwidth (MHz)
QPSK	5	3652.5	4.4989
		3662.5	4.4608
		3672.5	4.4432
	10	3655	9.1351
		3662.5	9.1276
		3670	9.1136

16QAM Modulation

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	99% Bandwidth (MHz)
16QAM	5	3652.5	4.4730
		3662.5	4.4416
		3672.5	4.4361
	10	3655	9.0542
		3662.5	9.1231
		3670	9.0975

64QAM Modulation

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	99% Bandwidth (MHz)
64QAM	5	3652.5	4.4972
		3662.5	4.4595
		3672.5	4.4633
	10	3655	9.1362
		3662.5	9.0893
		3670	9.0819



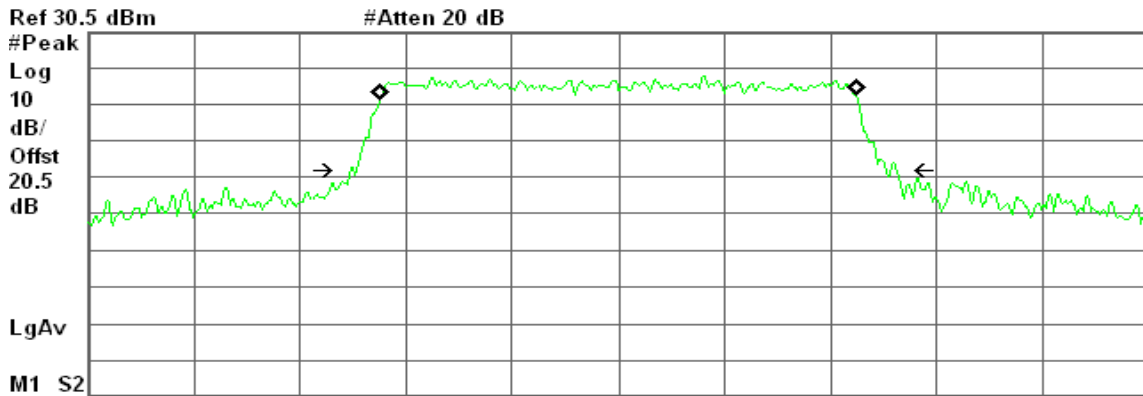
Test Plot

5 MHz QPSK 99% Bandwidth

QPSK Modulation / Carrier frequency: 3652.5 MHz

Agilent 15:14:24 May 7, 2009

R T



Center 3.652 50 GHz Span 10 MHz
 #Res BW 51 kHz #VBW 160 kHz Sweep 1.24 ms (601 pts)

Occupied Bandwidth
4.4989 MHz

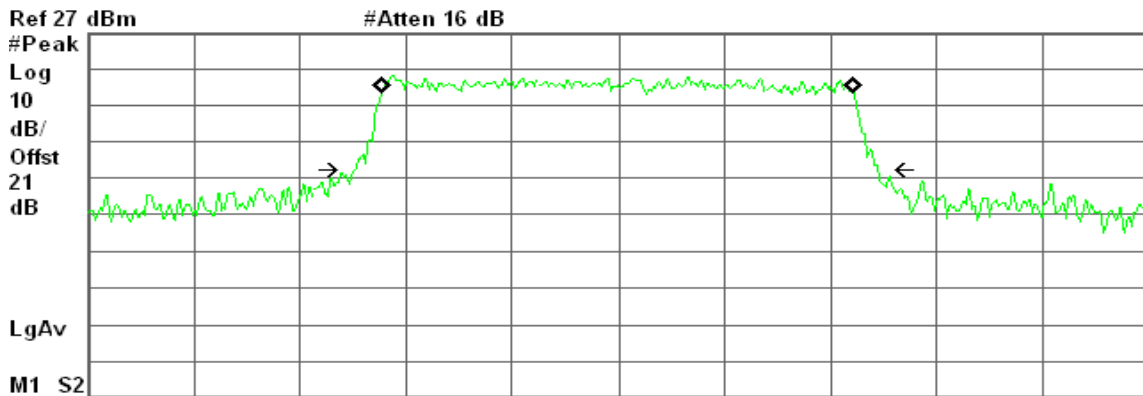
Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 1.869 kHz
 x dB Bandwidth 5.155 MHz

QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:39:13 Aug 22, 2009

R T



Center 3.662 50 GHz Span 10 MHz
 #Res BW 51 kHz #VBW 160 kHz Sweep 3.68 ms (601 pts)

Occupied Bandwidth
4.4608 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

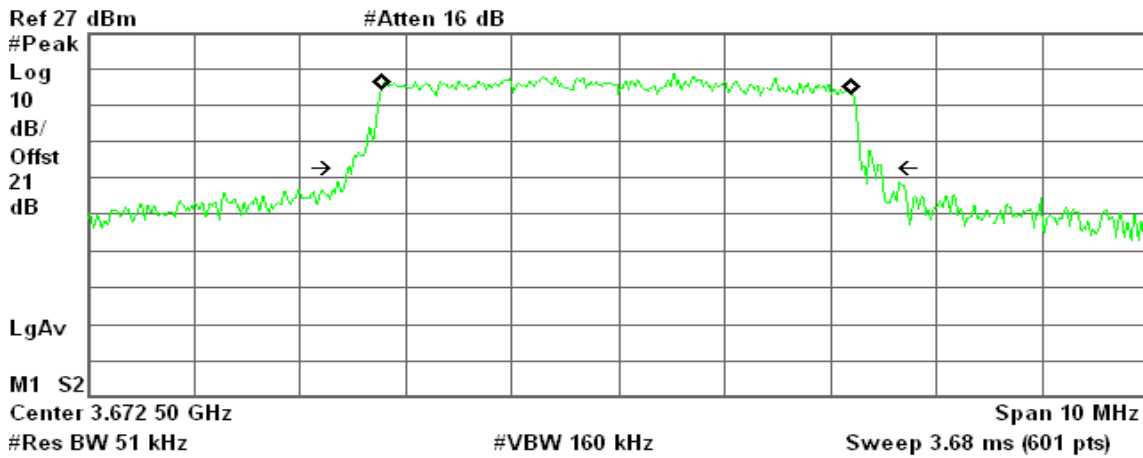
Transmit Freq Error -6.038 kHz
 x dB Bandwidth 4.937 MHz



QPSK Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:39:33 Aug 22, 2009

R T



Occupied Bandwidth
4.4432 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

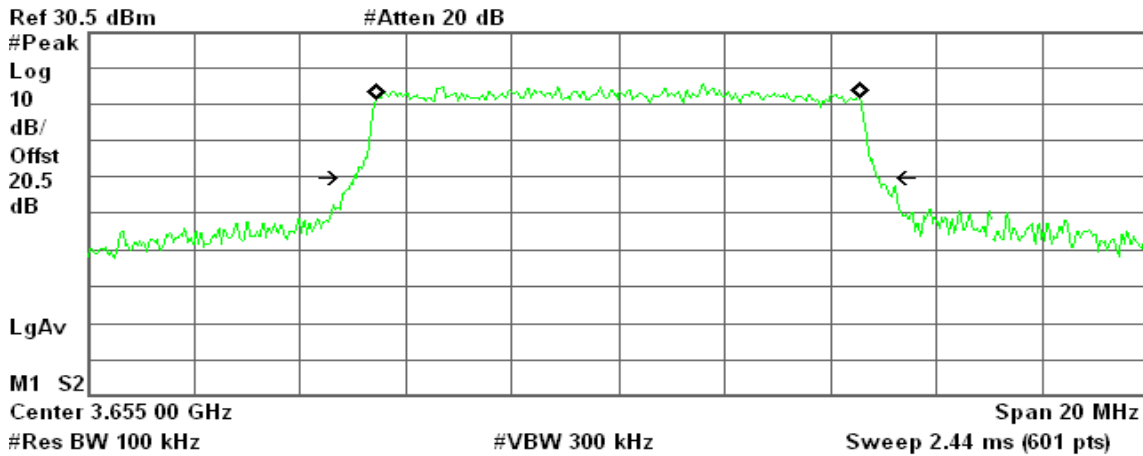
Transmit Freq Error -14.678 kHz
x dB Bandwidth 5.041 MHz

10 MHz QPSK 99% Bandwidth

QPSK Modulation / Carrier frequency: 3655 MHz

Agilent 11:21:44 May 21, 2009

R T



Occupied Bandwidth
9.1351 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

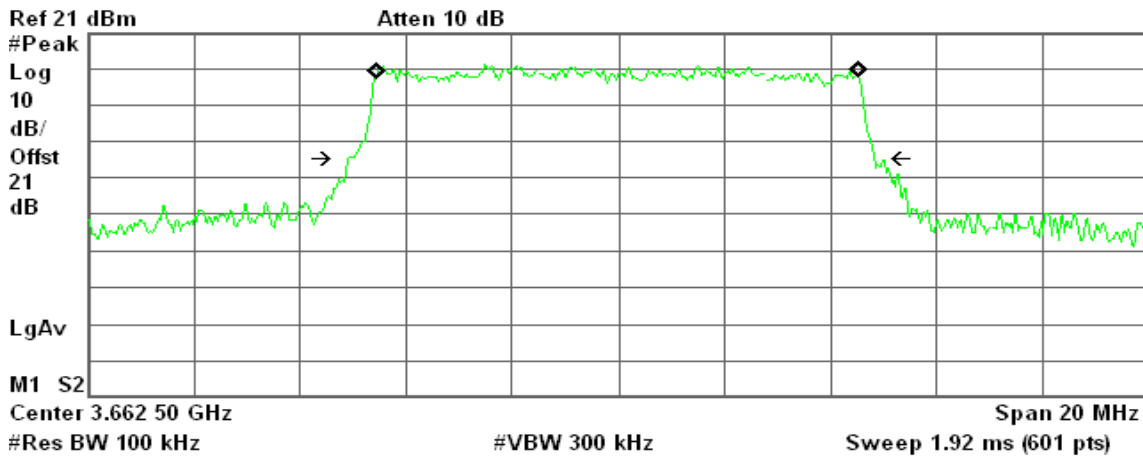
Transmit Freq Error 1.318 kHz
x dB Bandwidth 9.921 MHz



QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 10:47:32 Aug 22, 2009

R T



Occupied Bandwidth
9.1276 MHz

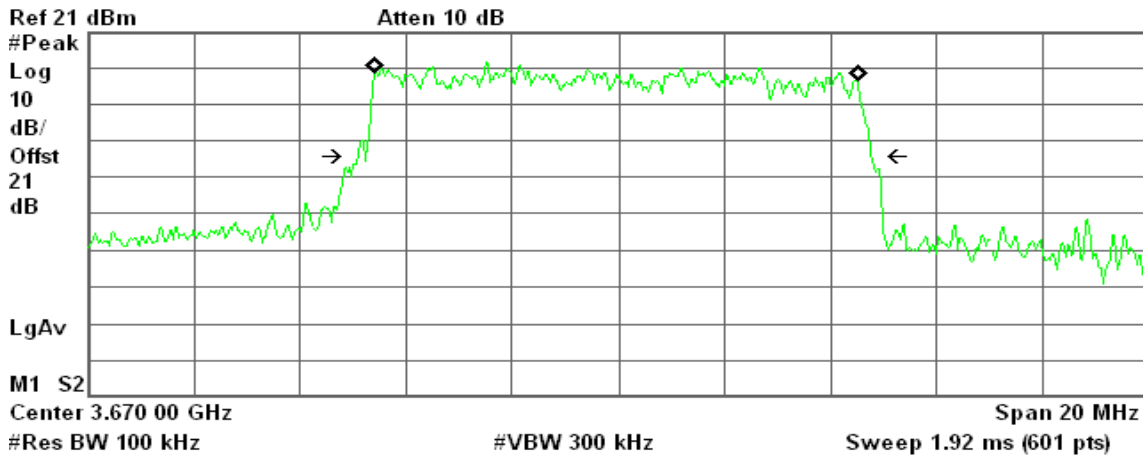
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -15.814 kHz
x dB Bandwidth 9.933 MHz

QPSK Modulation / Carrier frequency: 3670 MHz

Agilent 10:49:43 Aug 22, 2009

R T



Occupied Bandwidth
9.1136 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -39.333 kHz
x dB Bandwidth 9.693 MHz

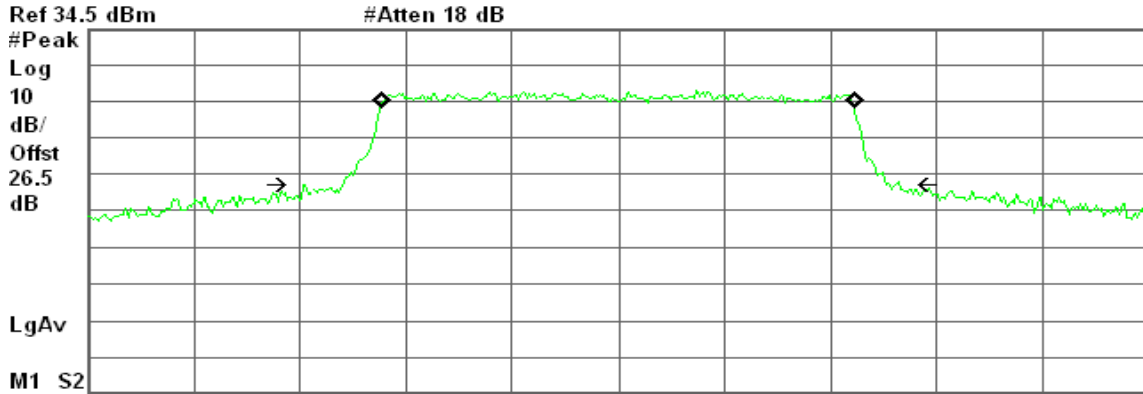


5 MHz 16QAM 99% Bandwidth

16QAM Modulation / Carrier frequency: 3652.5 MHz

Agilent 17:50:30 May 25, 2009

R T



Ref 34.5 dBm #Atten 18 dB

Center 3.652 50 GHz Span 10 MHz

#Res BW 51 kHz #VBW 160 kHz Sweep 3.68 ms (601 pts)

Occupied Bandwidth
4.4730 MHz

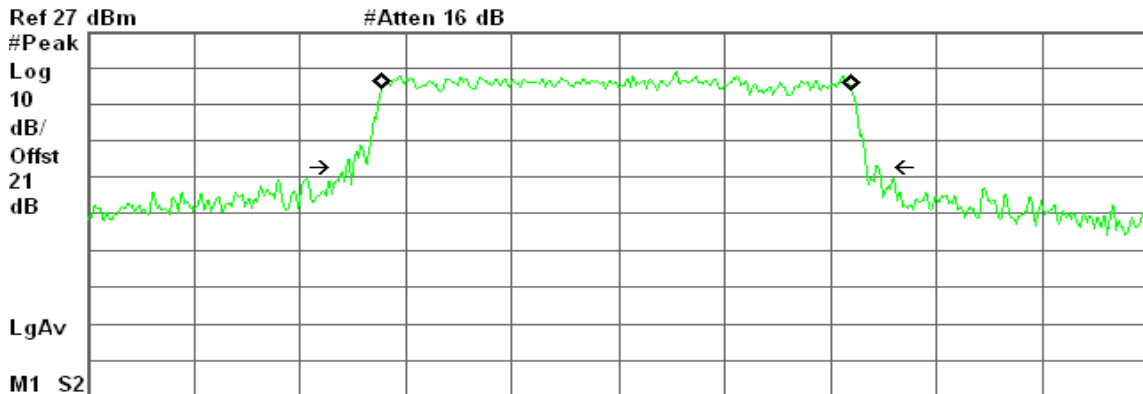
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -5.024 kHz
x dB Bandwidth 5.627 MHz

16QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:39:02 Aug 22, 2009

R T



Ref 27 dBm #Atten 16 dB

Center 3.662 50 GHz Span 10 MHz

#Res BW 51 kHz #VBW 160 kHz Sweep 3.68 ms (601 pts)

Occupied Bandwidth
4.4416 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

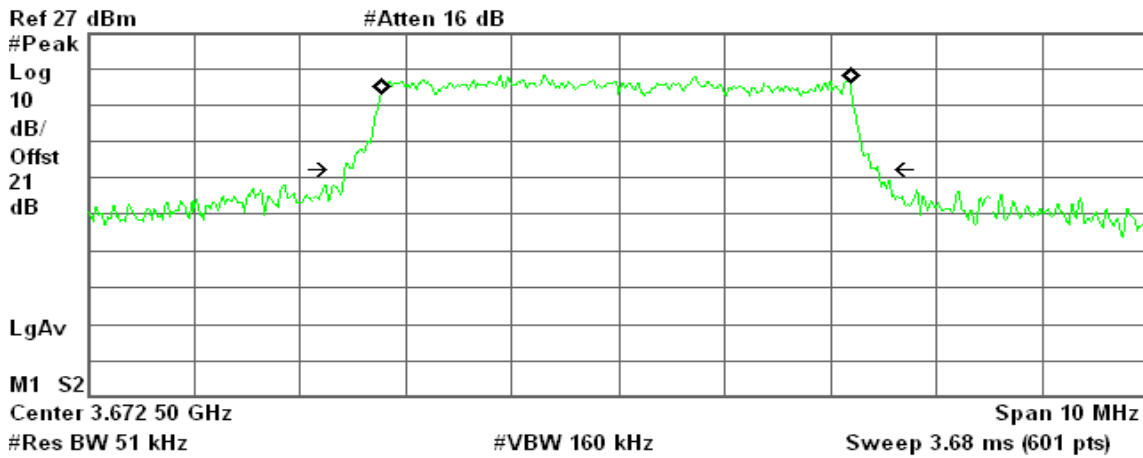
Transmit Freq Error -13.720 kHz
x dB Bandwidth 5.016 MHz



16QAM Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:39:45 Aug 22, 2009

R T



Occupied Bandwidth
4.4361 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

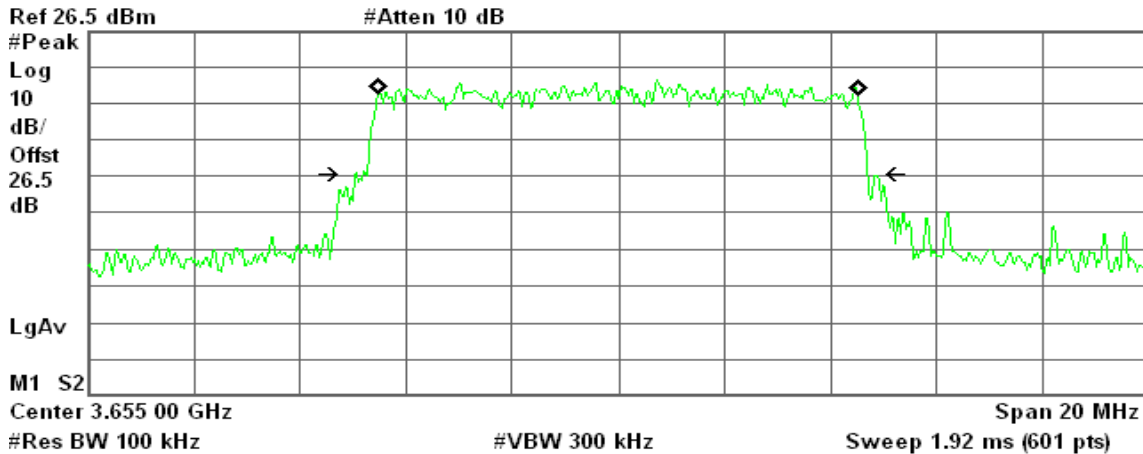
Transmit Freq Error -19.566 kHz
x dB Bandwidth 5.035 MHz

10 MHz 16QAM 99% Bandwidth

16QAM Modulation / Carrier frequency: 3655 MHz

Agilent 18:15:25 May 25, 2009

R T



Occupied Bandwidth
9.0542 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

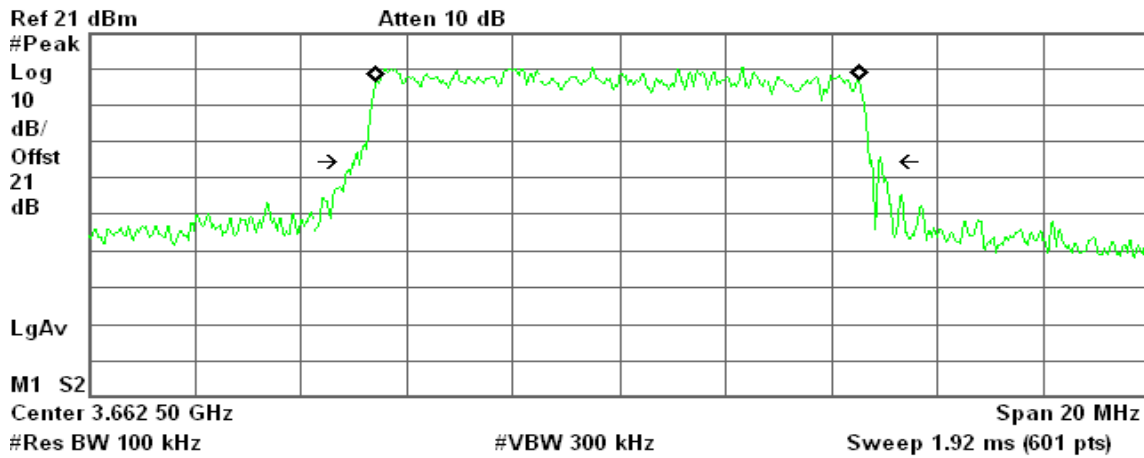
Transmit Freq Error -6.499 kHz
x dB Bandwidth 9.690 MHz



16QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 10:48:03 Aug 22, 2009

R T



Occupied Bandwidth
9.1231 MHz

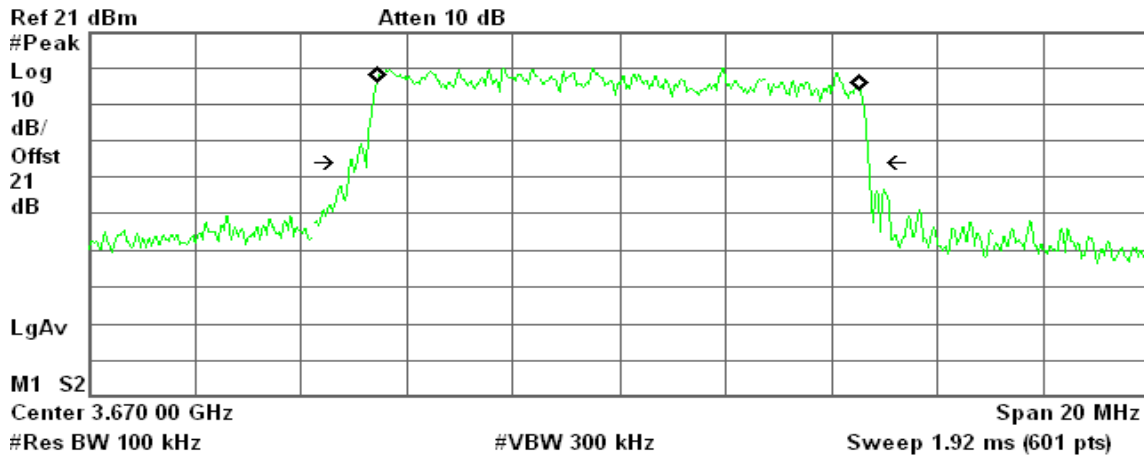
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -24.537 kHz
x dB Bandwidth 9.948 MHz

16QAM Modulation / Carrier frequency: 3670 MHz

Agilent 10:49:34 Aug 22, 2009

R T



Occupied Bandwidth
9.0975 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -24.315 kHz
x dB Bandwidth 9.799 MHz

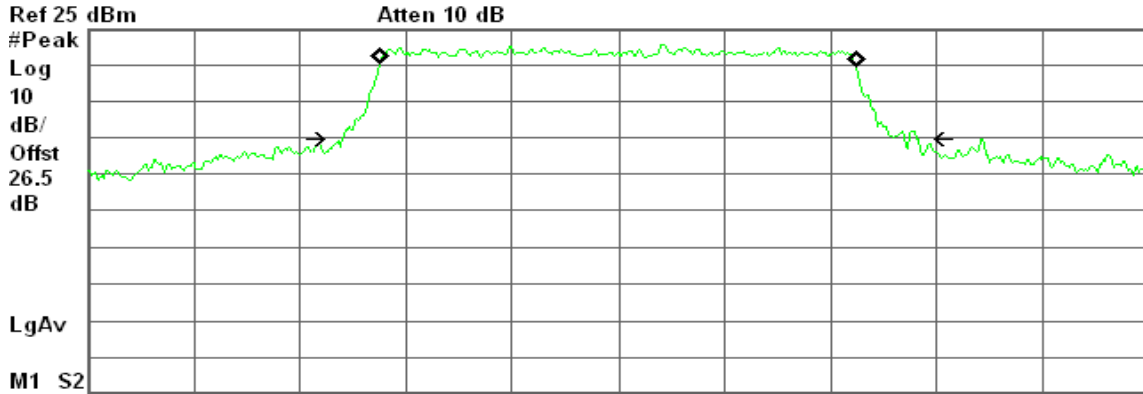


5 MHz 64QAM 99% Bandwidth

64QAM Modulation / Carrier frequency: 3652.5 MHz

Agilent 10:24:17 May 21, 2009

R T



Center 3.652 50 GHz Span 10 MHz
 #Res BW 51 kHz #VBW 160 kHz Sweep 1.24 ms (601 pts)

Occupied Bandwidth
4.4972 MHz

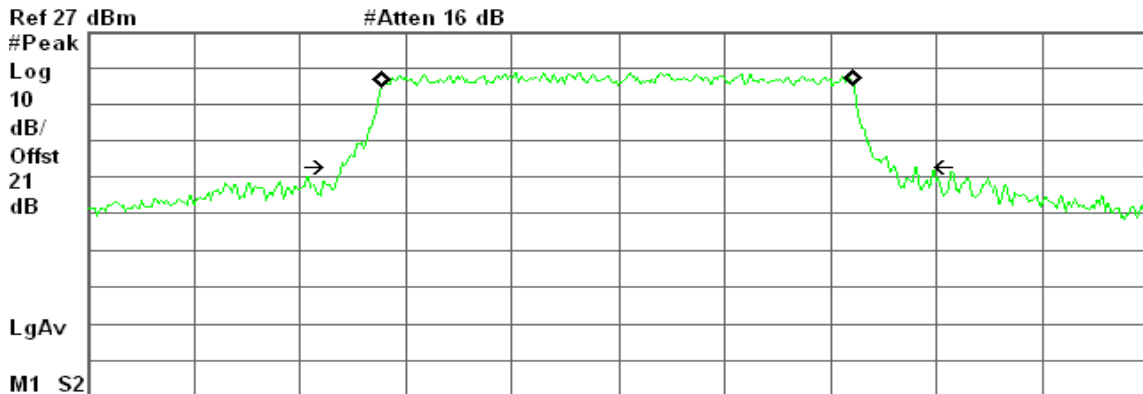
Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error -1.424 kHz
 x dB Bandwidth 5.417 MHz

64QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:38:22 Aug 22, 2009

R T



Center 3.662 50 GHz Span 10 MHz
 #Res BW 51 kHz #VBW 160 kHz Sweep 3.68 ms (601 pts)

Occupied Bandwidth
4.4595 MHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

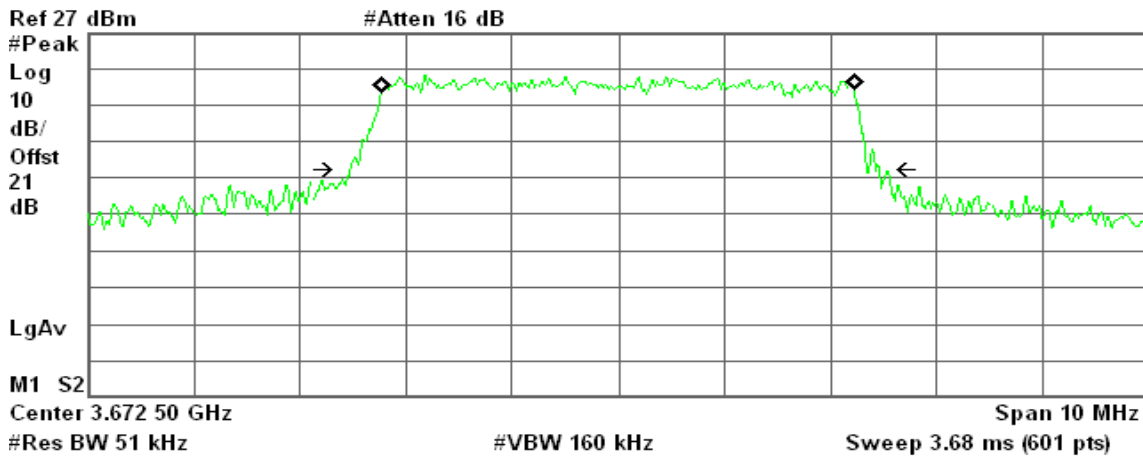
Transmit Freq Error -6.211 kHz
 x dB Bandwidth 5.427 MHz



64QAM Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:39:55 Aug 22, 2009

R T



Occupied Bandwidth
4.4633 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

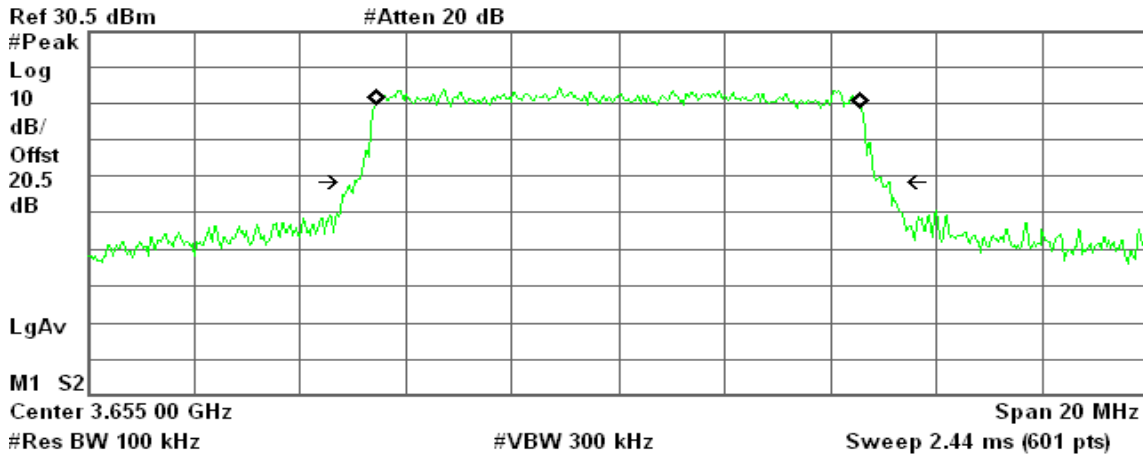
Transmit Freq Error -4.470 kHz
x dB Bandwidth 4.998 MHz

10 MHz 64QAM 99% Bandwidth

64QAM Modulation / Carrier frequency: 3655 MHz

Agilent 11:22:20 May 21, 2009

R T



Occupied Bandwidth
9.1362 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

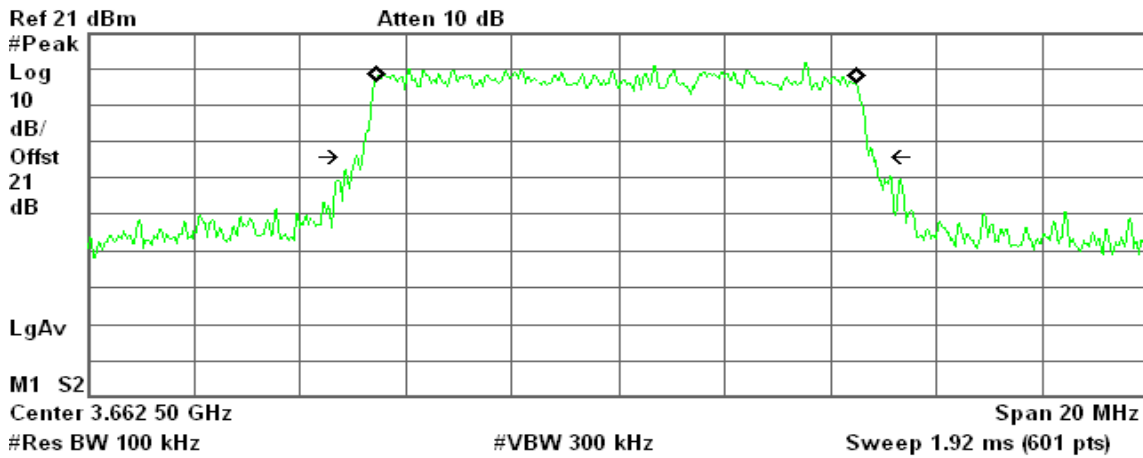
Transmit Freq Error -4.430 kHz
x dB Bandwidth 10.109 MHz



64QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 10:48:16 Aug 22, 2009

R L



Occupied Bandwidth
9.0893 MHz

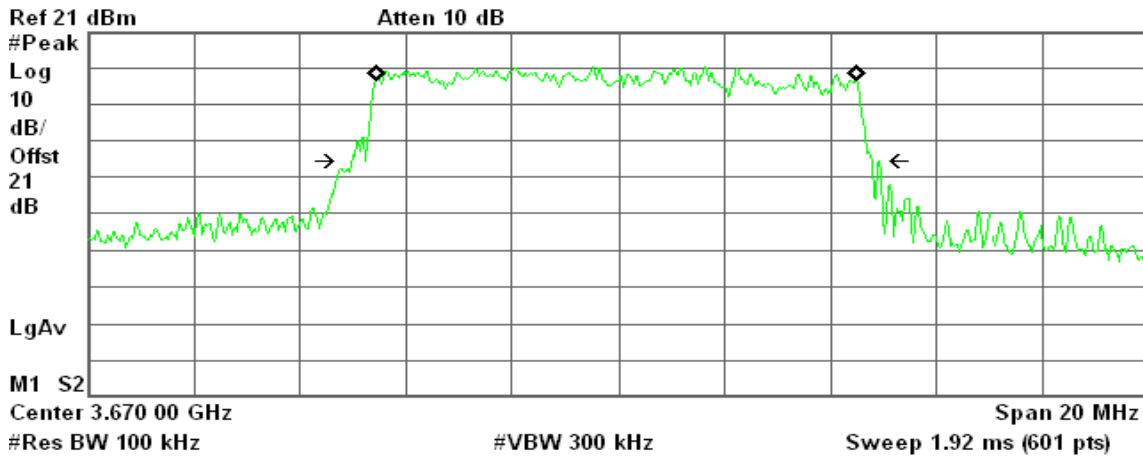
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -35.790 kHz
x dB Bandwidth 9.773 MHz

64QAM Modulation / Carrier frequency: 3670 MHz

Agilent 10:49:23 Aug 22, 2009

R T



Occupied Bandwidth
9.0819 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -34.993 kHz
x dB Bandwidth 9.828 MHz

7.2. Peak Output Power

LIMITS

FCC 47 CFR Part 90, Subpart Z; §90.1321(a)

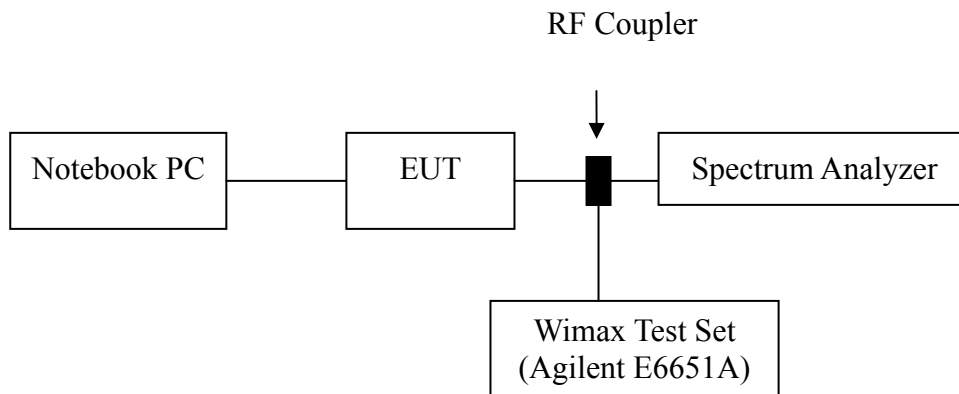
The following power limits apply to the 3650 – 3675 MHz band.

Base and fixed stations are limited to 25W/25 MHz equivalent isotropically radiated power (EIRP). In any event the peak EIRP power density shall not exceed 1 Watt (+30 dBm) in any one Megahertz slice of spectrum.

Power Limit 5 MHz Channel Spacing = +37 dBm

Power Limit 10 MHz Channel Spacing = +40 dBm

Test Configuration



TEST PROCEDURES

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.



TEST RESULTS

QPSK Modulation –Antenna gain 15 dBi

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	Measured output power (dBm)	Calculated EIRP power. (dBm)	FCC EIRP power limit (dBm)
QPSK	5	3652.5	21.42	36.42	37
		3662.5	21.36	36.36	37
		3672.5	21.27	36.27	37
	10	3655	24.68	39.68	40
		3662.5	24.59	39.59	40
		3670	24.23	39.23	40

64QAM Modulation –Antenna gain 15 dBi

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	Measured output power (dBm)	Calculated EIRP power. (dBm)	FCC EIRP power limit (dBm)
64QAM	5	3652.5	21.47	36.47	37
		3662.5	21.46	36.46	37
		3672.5	21.35	36.35	37
	10	3655	24.72	39.72	40
		3662.5	24.56	39.56	40
		3670	24.34	39.34	40

16QAM Modulation –Antenna gain 15 dBi

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	Measured output power (dBm)	Calculated EIRP power. (dBm)	FCC EIRP power limit (dBm)
16QAM	5	3652.5	21.60	36.60	37
		3662.5	21.49	36.49	37
		3672.5	21.30	36.30	37
	10	3655	24.64	39.64	40
		3662.5	24.64	39.64	40
		3670	24.50	39.50	40

Refer to spectrum analyzer plots below.



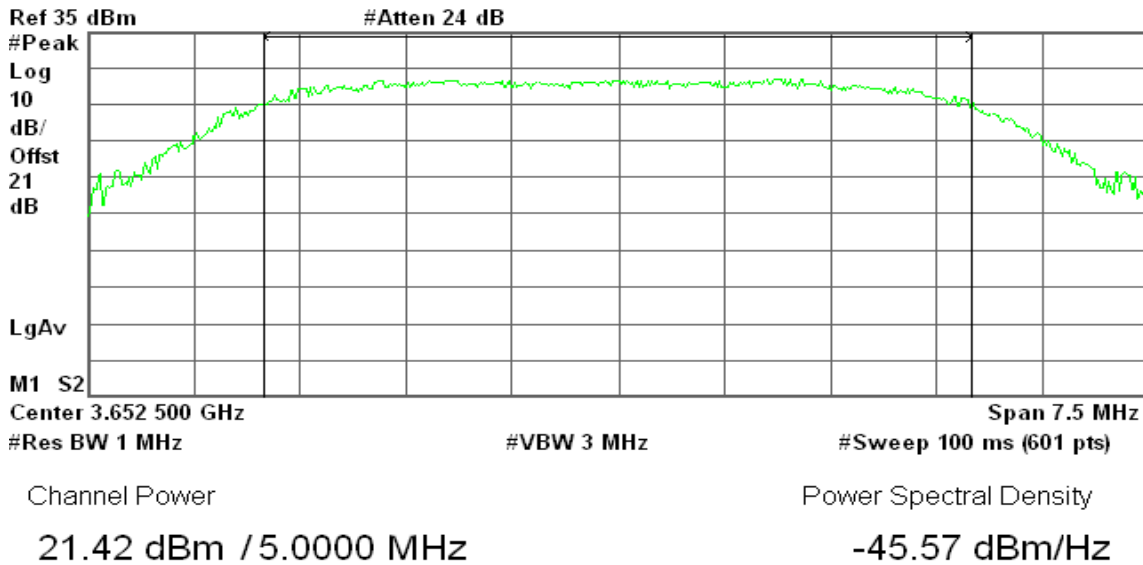
Test Plots

Emissions bandwidth 5 MHz

QPSK Modulation / Carrier frequency: 3652.5 MHz

Agilent 11:54:04 Aug 22, 2009

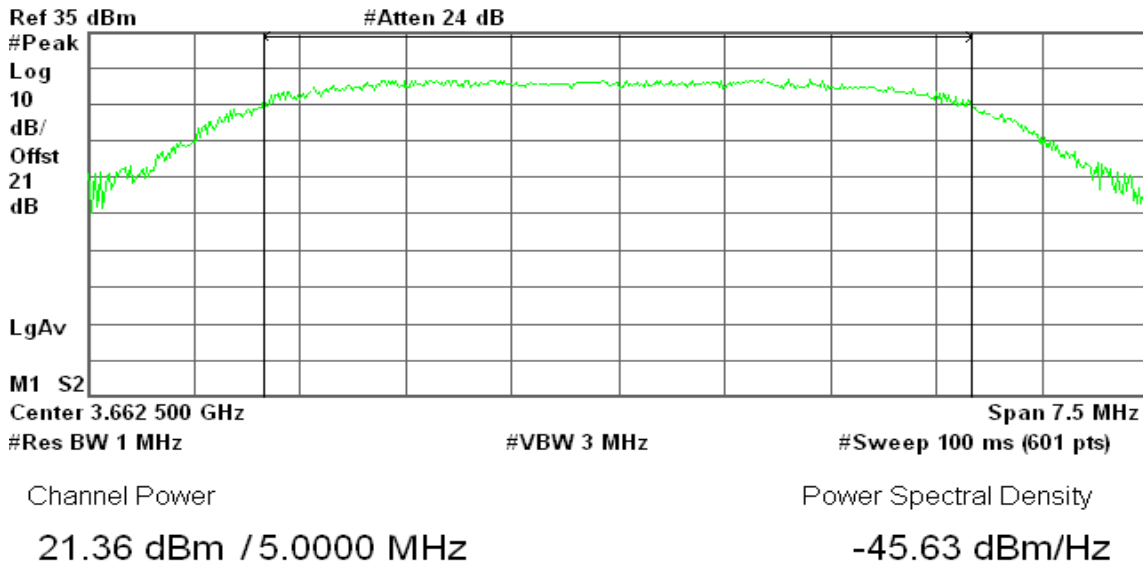
R T



QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:56:12 Aug 22, 2009

R T

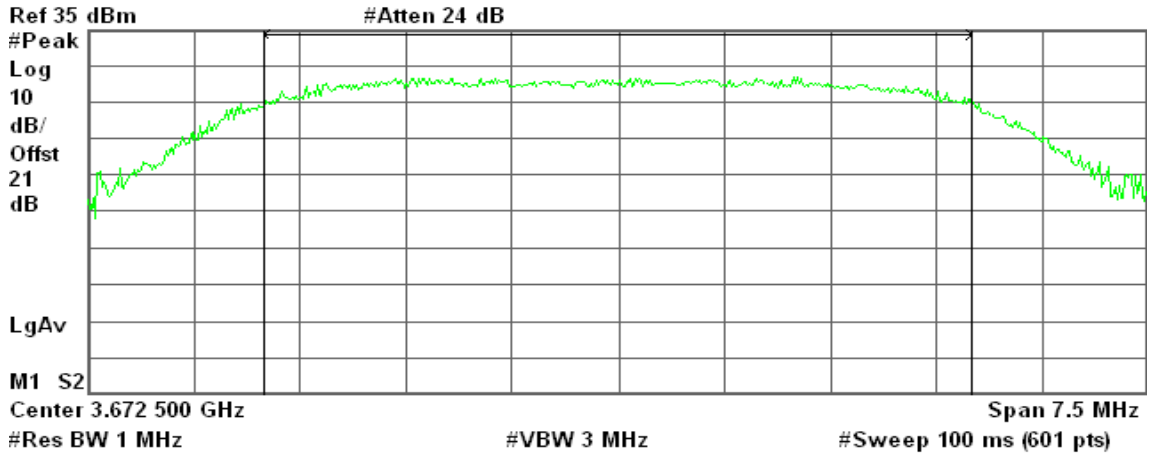




QPSK Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:57:07 Aug 22, 2009

R T



Channel Power

21.27 dBm / 5.0000 MHz

Power Spectral Density

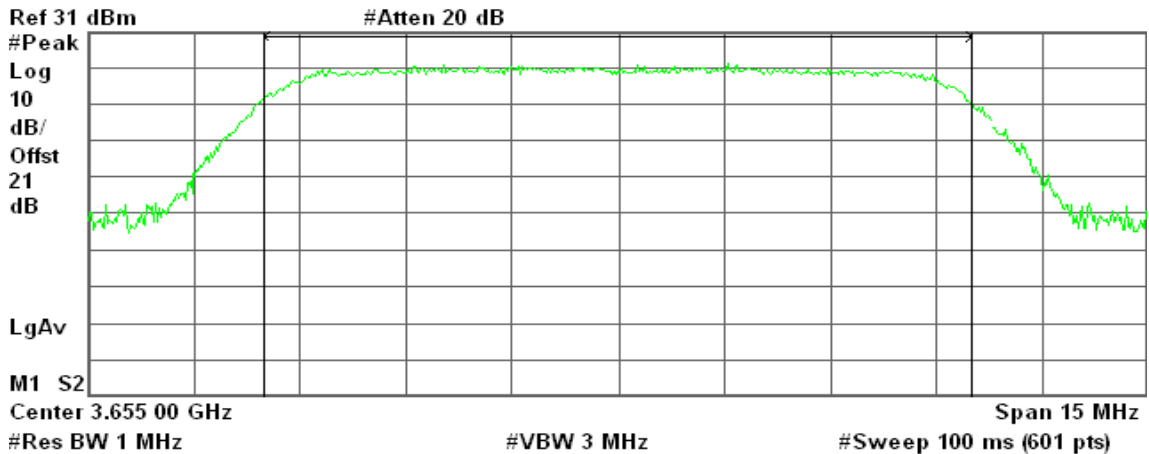
-45.72 dBm/Hz

Emissions bandwidth 10 MHz

QPSK Modulation / Carrier frequency: 3655 MHz

Agilent 12:26:04 Aug 22, 2009

R T



Channel Power

24.68 dBm / 10.0000 MHz

Power Spectral Density

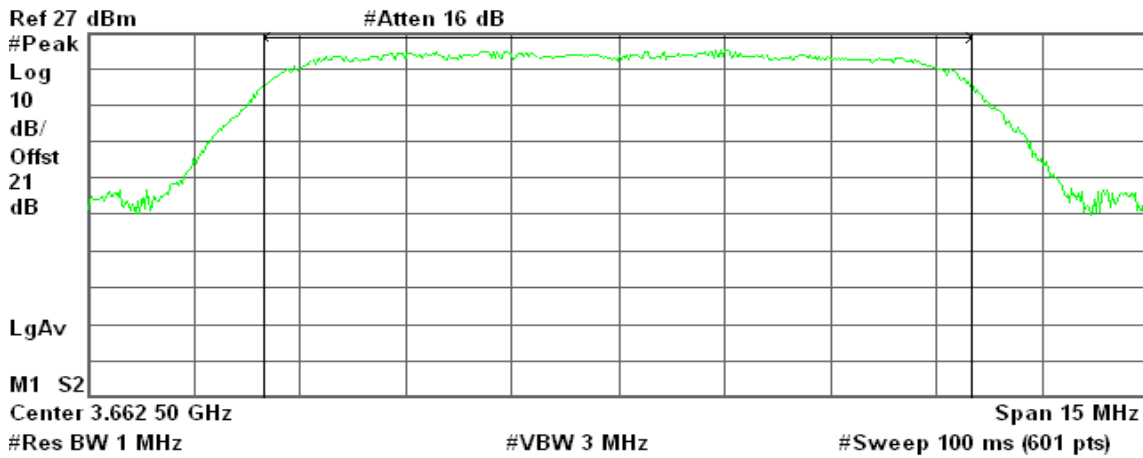
-45.32 dBm/Hz



QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:12:17 Aug 22, 2009

R T



Channel Power

24.59 dBm / 10.0000 MHz

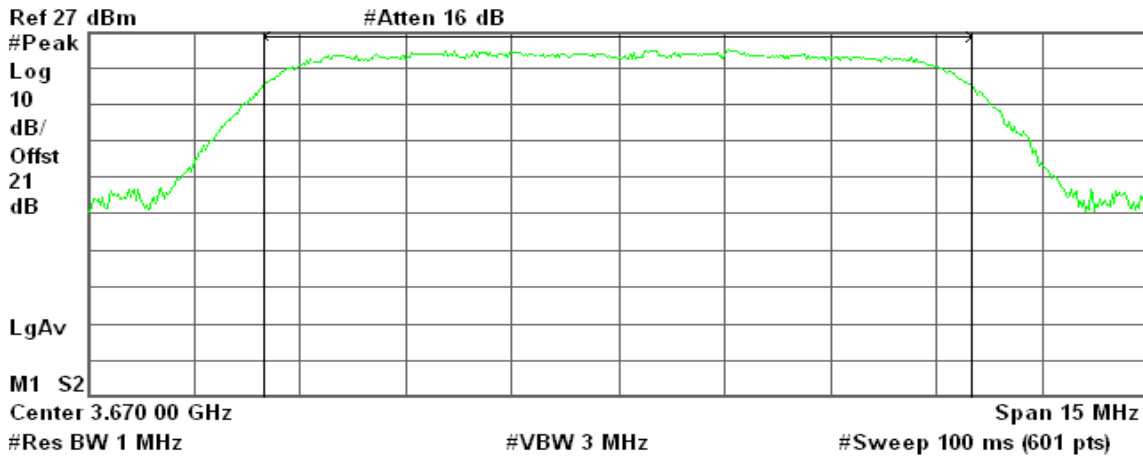
Power Spectral Density

-45.41 dBm/Hz

QPSK Modulation / Carrier frequency: 3670 MHz

Agilent 11:15:26 Aug 22, 2009

R T



Channel Power

24.23 dBm / 10.0000 MHz

Power Spectral Density

-45.77 dBm/Hz

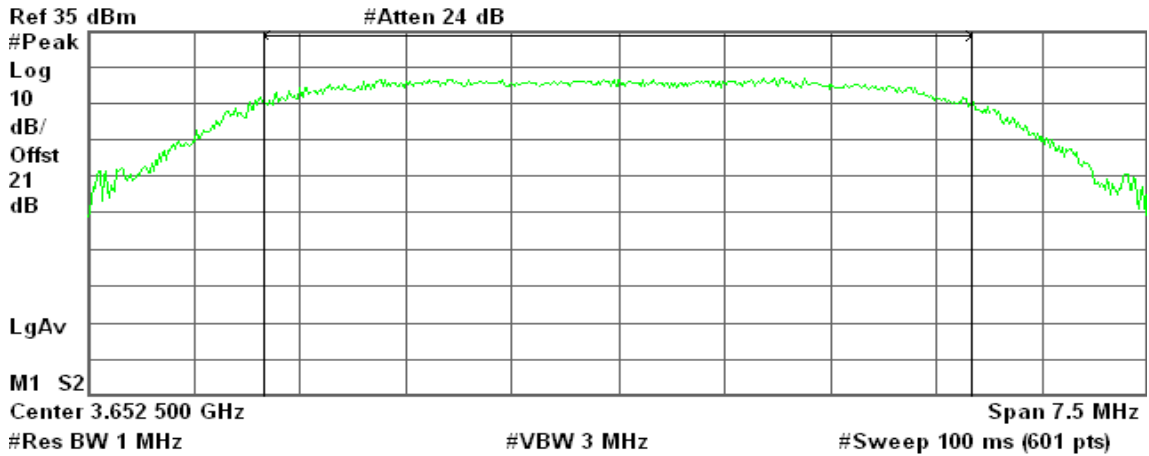


Emissions bandwidth 5 MHz

64QAM Modulation / Carrier frequency: 3652.5 MHz

Agilent 11:54:41 Aug 22, 2009

R T



Channel Power

21.47 dBm /5.0000 MHz

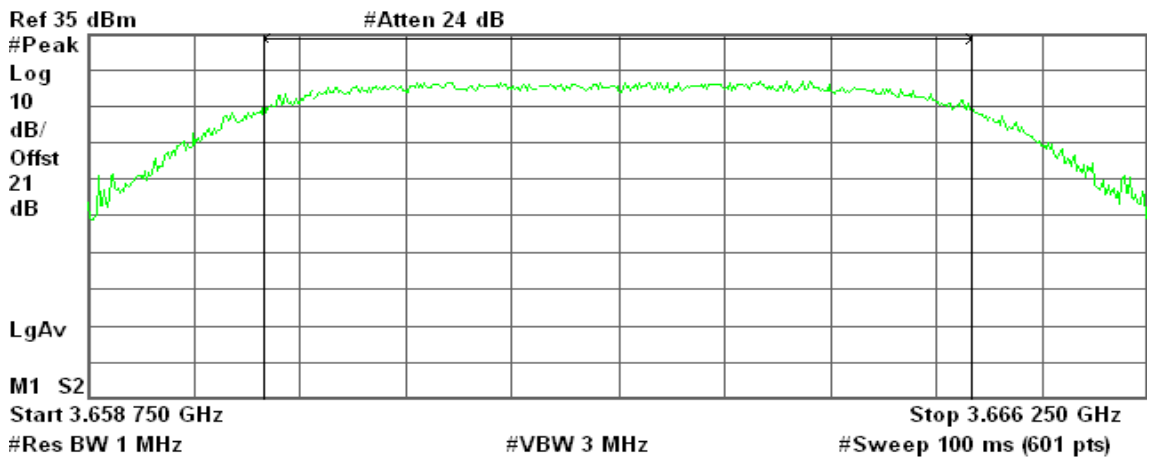
Power Spectral Density

-45.52 dBm/Hz

64QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:55:26 Aug 22, 2009

R T



Channel Power

21.46 dBm /5.0000 MHz

Power Spectral Density

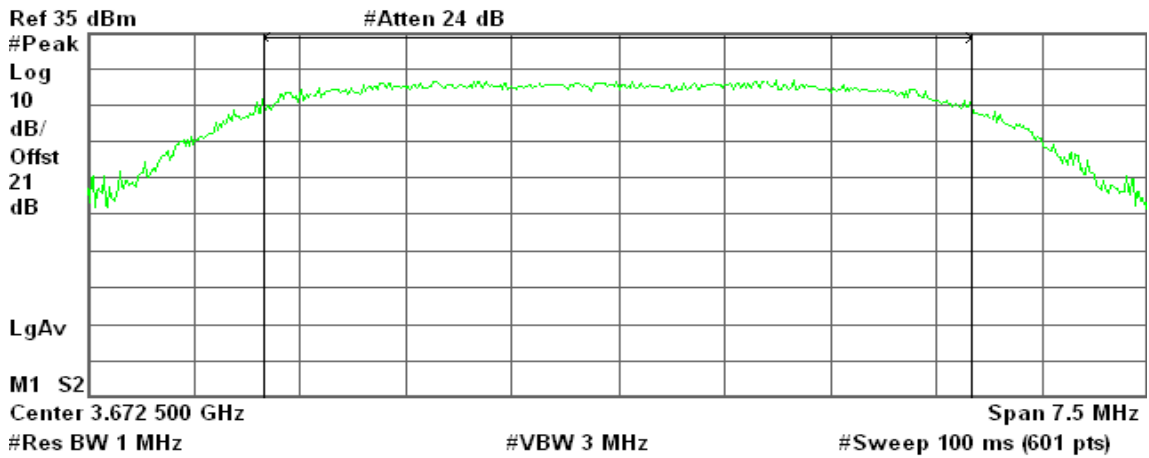
-45.53 dBm/Hz



64QAM Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:57:45 Aug 22, 2009

R T



Channel Power

21.35 dBm / 5.0000 MHz

Power Spectral Density

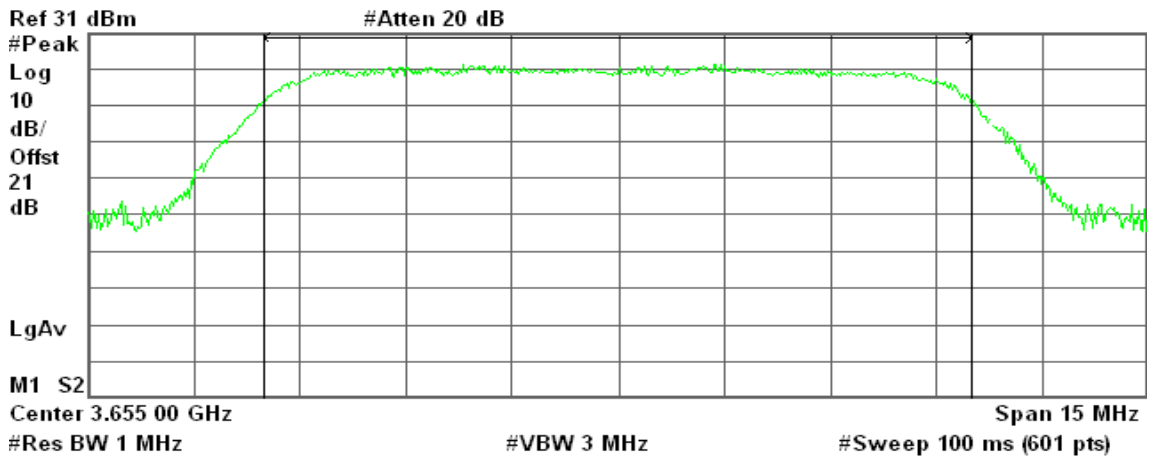
-45.64 dBm/Hz

Emissions bandwidth 10 MHz

64QAM Modulation / Carrier frequency: 3655 MHz

Agilent 12:25:51 Aug 22, 2009

R T



Channel Power

24.72 dBm / 10.0000 MHz

Power Spectral Density

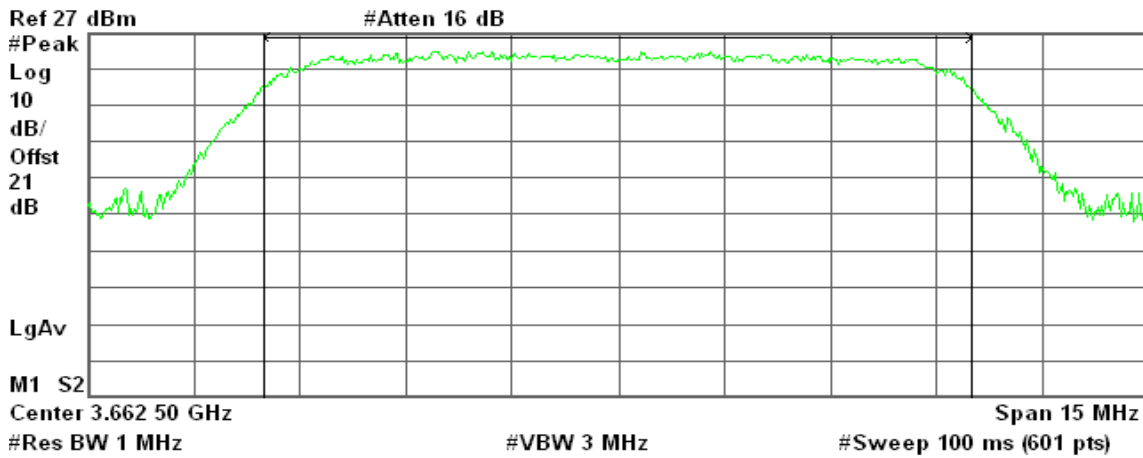
-45.28 dBm/Hz



64QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:12:51 Aug 22, 2009

R T



Channel Power

24.56 dBm / 10.0000 MHz

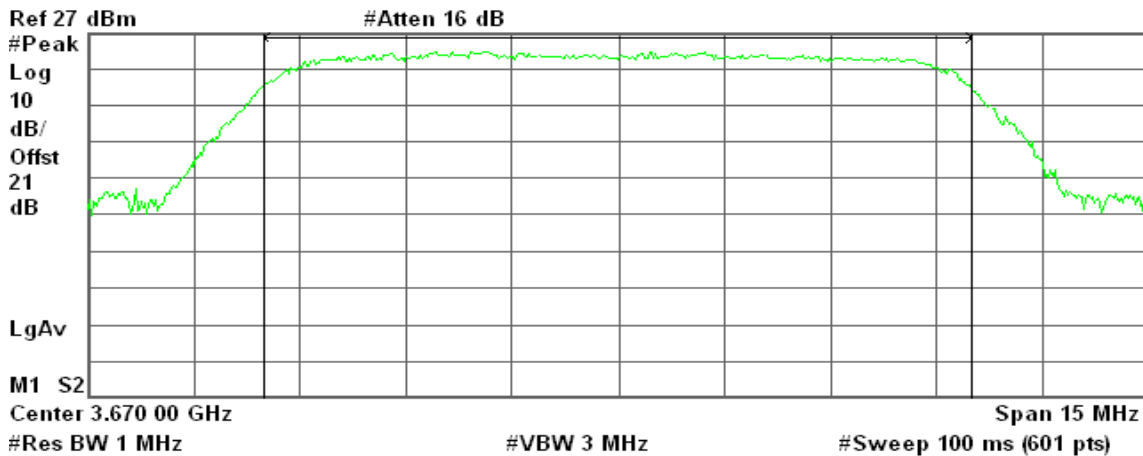
Power Spectral Density

-45.44 dBm/Hz

64QAM Modulation / Carrier frequency: 3670 MHz

Agilent 11:13:47 Aug 22, 2009

R T



Channel Power

24.34 dBm / 10.0000 MHz

Power Spectral Density

-45.66 dBm/Hz

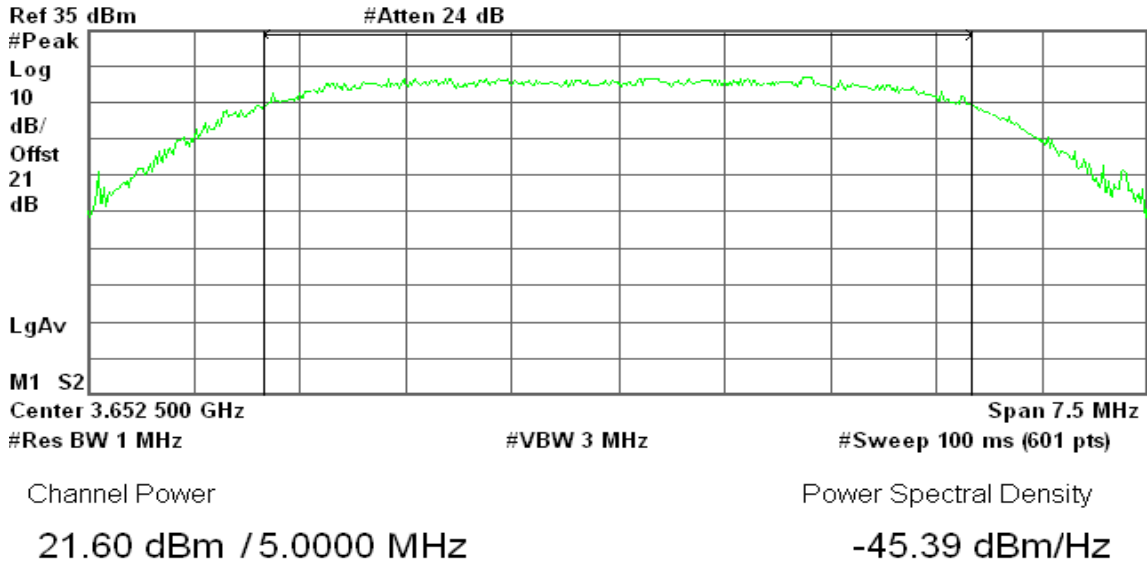


Emissions bandwidth 5 MHz

16QAM Modulation / Carrier frequency: 3652.5 MHz

Agilent 11:54:23 Aug 22, 2009

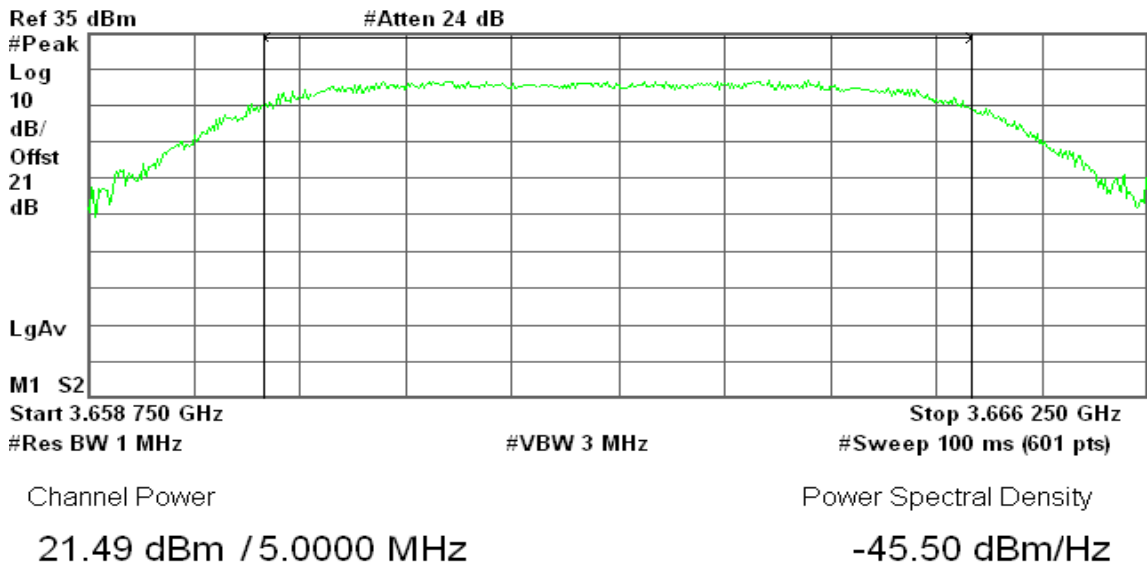
R T



16QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:55:48 Aug 22, 2009

R T

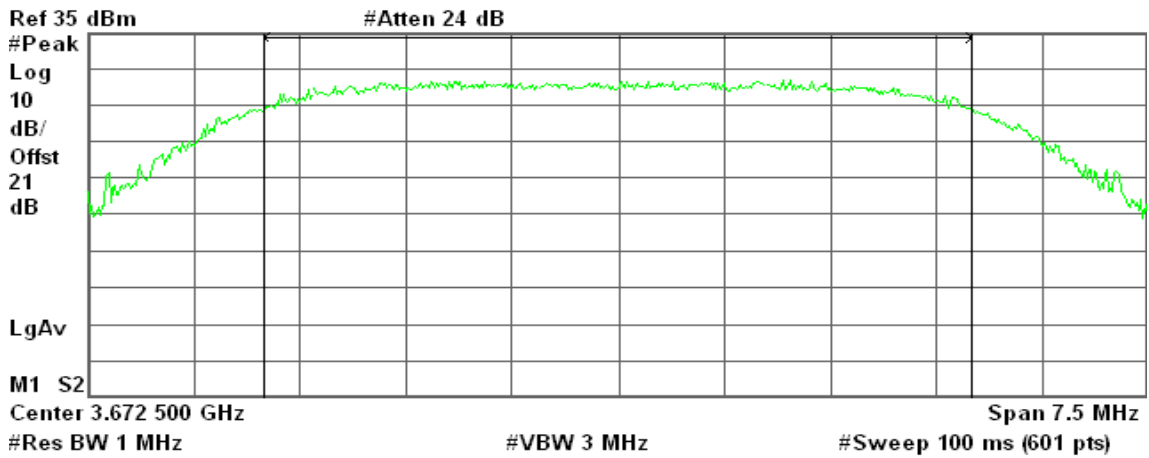




16QAM Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:57:25 Aug 22, 2009

R T



Channel Power

21.30 dBm / 5.0000 MHz

Power Spectral Density

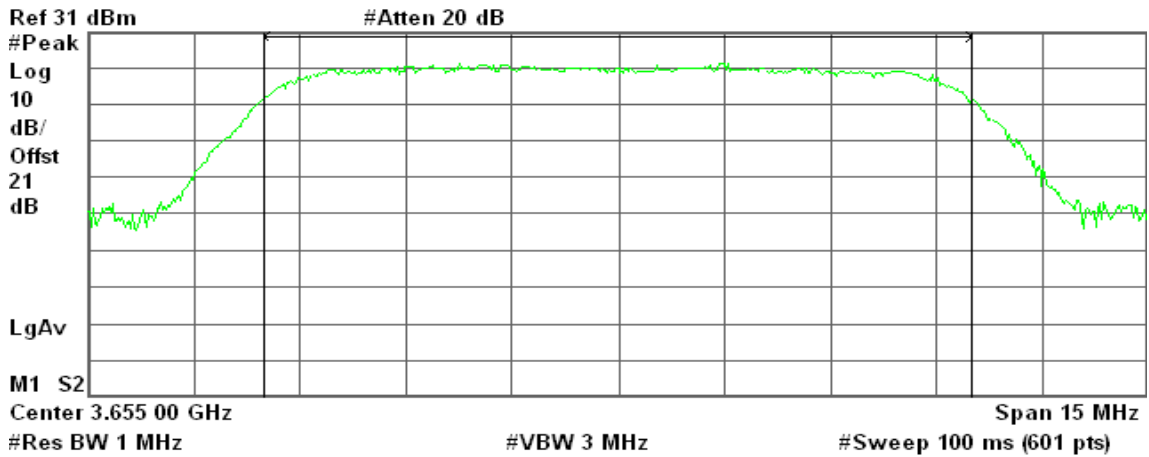
-45.69 dBm/Hz

Emissions bandwidth 10 MHz

16QAM Modulation / Carrier frequency: 3655 MHz

Agilent 12:25:32 Aug 22, 2009

R T



Channel Power

24.64 dBm / 10.0000 MHz

Power Spectral Density

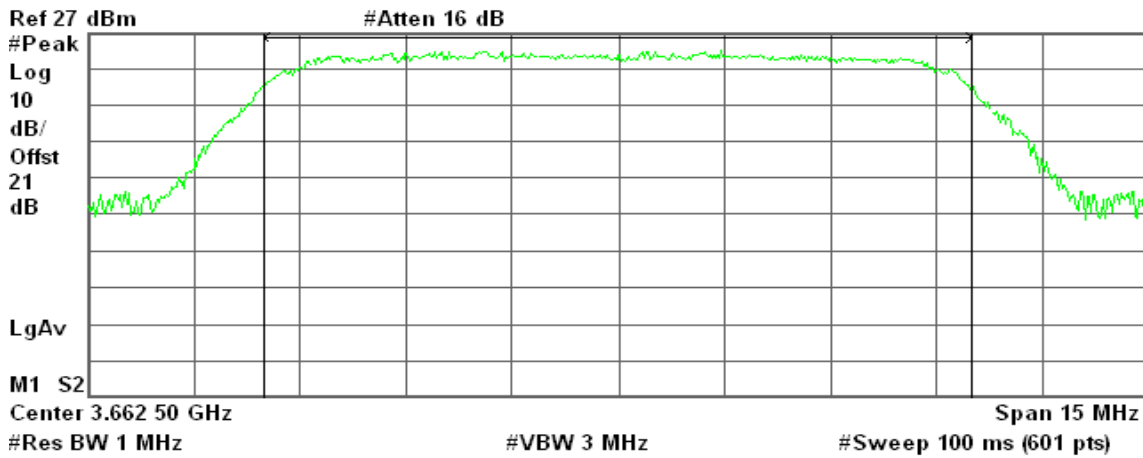
-45.36 dBm/Hz



16QAM Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:12:39 Aug 22, 2009

R T



Channel Power

24.64 dBm / 10.0000 MHz

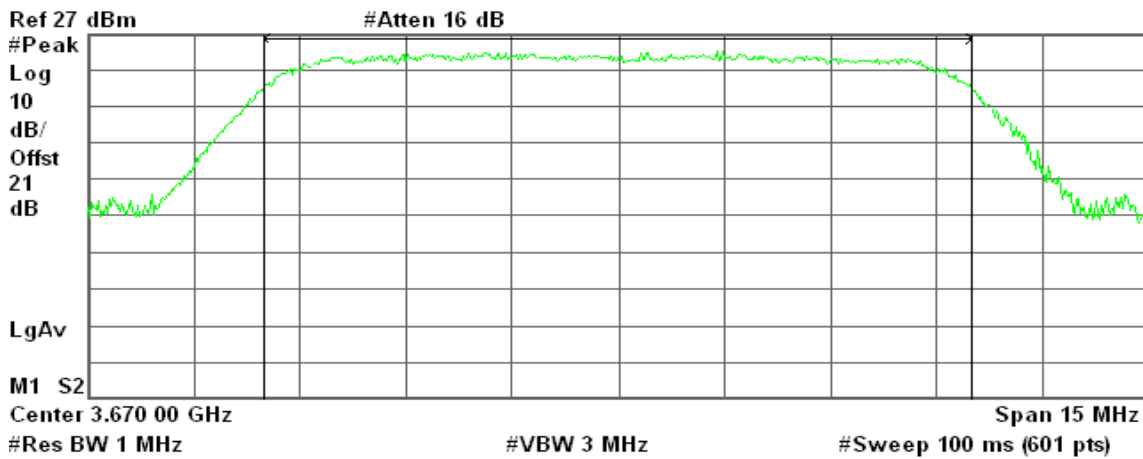
Power Spectral Density

-45.36 dBm/Hz

16QAM Modulation / Carrier frequency: 3670 MHz

Agilent 11:14:17 Aug 22, 2009

R T



Channel Power

24.50 dBm / 10.0000 MHz

Power Spectral Density

-45.50 dBm/Hz

7.3. Power Spectral Density

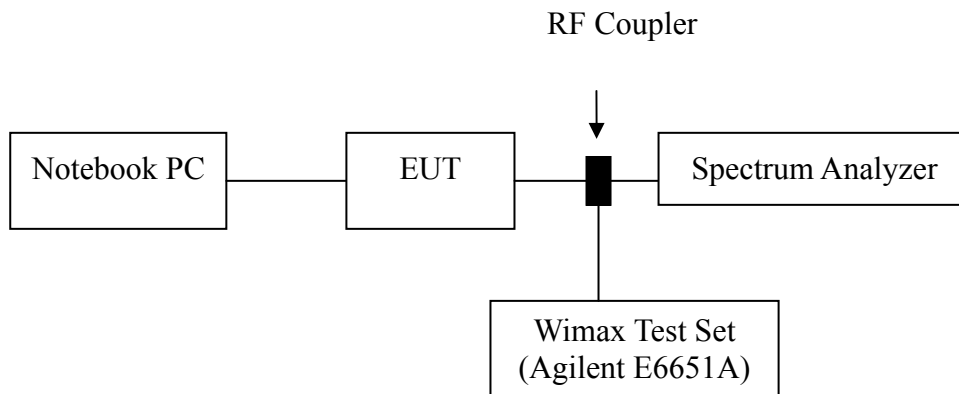
LIMITS

FCC 47 CFR Part 90, Subpart Z; §90.1321(a)

The following power limits apply to the 3650 – 3675 MHz band.

Base and fixed stations are limited to 25W/25 MHz equivalent isotropically radiated power (EIRP). In any event the peak EIRP power density shall not exceed 1 Watt (+30 dBm) in any one Megahertz slice of spectrum.

Test Configuration



TEST PROCEDURES

The test methodology used for this measurement was determined to provide the highest possible power density readings.

Power spectral density measurements were performed via the spectrum analyzer and plots were recorded. The system highest power setting was selected and modulation was ON.



TEST RESULTS

QPSK Modulation

Modulation	Bandwidth (MHz)	Carrier Frequency (MHz)	PPSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
QPSK	5	3652.5	9.67	30	-20.33
		3662.5	10.03		-19.97
		3672.5	9.85		-20.15
	10	3655	9.87		-20.13
		3662.5	9.80		-20.20
		3670	9.46		-20.54

Refer to spectrum analyzer plots below.



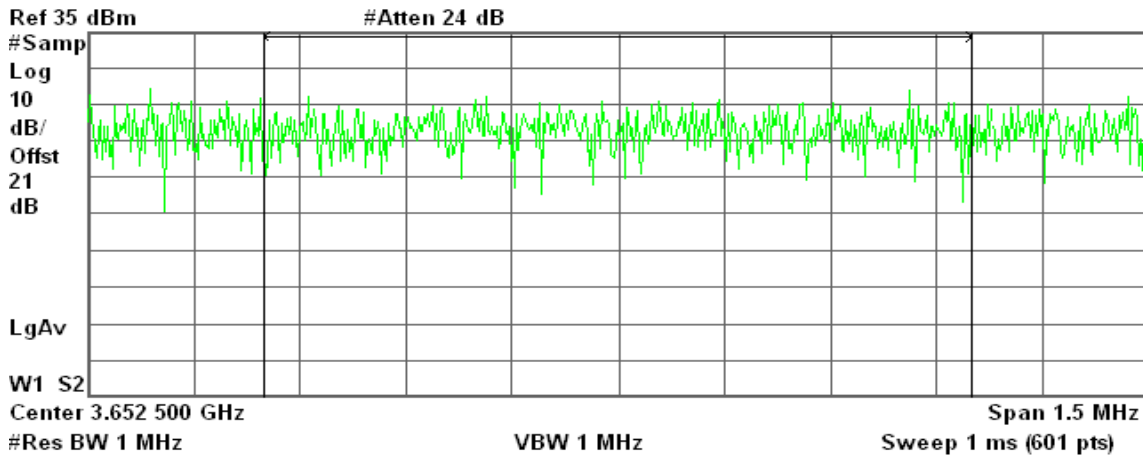
Test Plots

5 MHz QPSK Power Spectral Density

QPSK Modulation / Carrier frequency: 3652.5 MHz

Agilent 12:00:57 Aug 22, 2009

R T



Channel Power

9.67 dBm / 1.0000 MHz

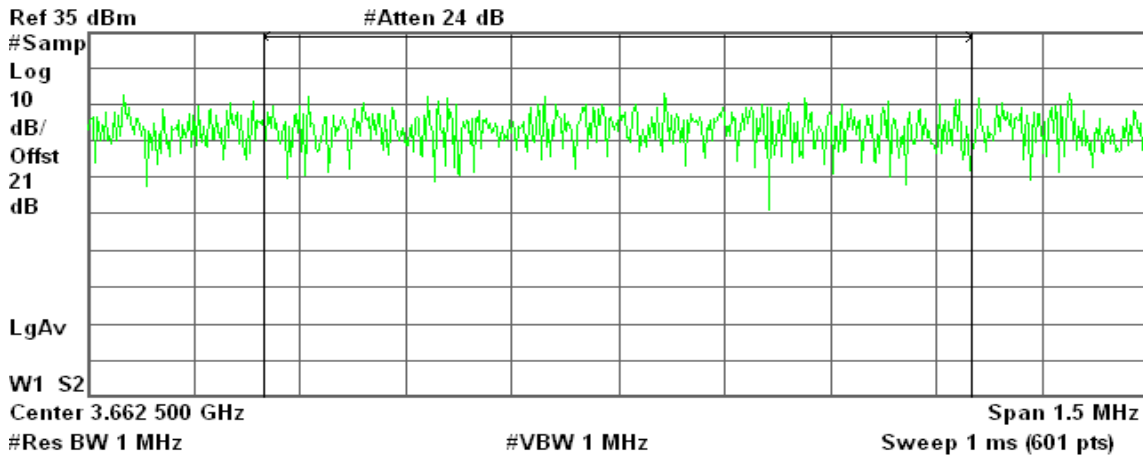
Power Spectral Density

-50.33 dBm/Hz

QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 12:01:29 Aug 22, 2009

R T



Channel Power

10.03 dBm / 1.0000 MHz

Power Spectral Density

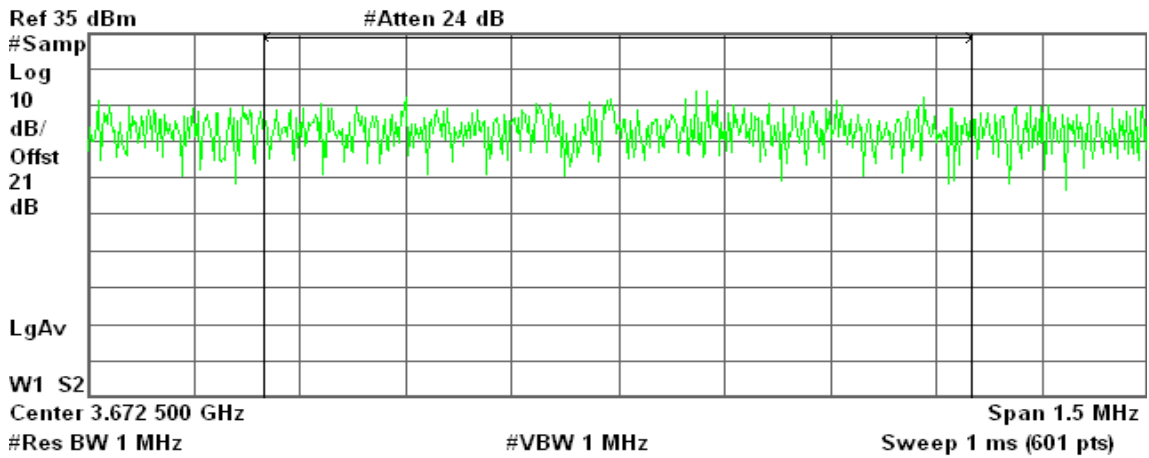
-49.97 dBm/Hz



QPSK Modulation / Carrier frequency: 3672.5 MHz

Agilent 11:59:02 Aug 22, 2009

R T



Channel Power

9.85 dBm / 1.0000 MHz

Power Spectral Density

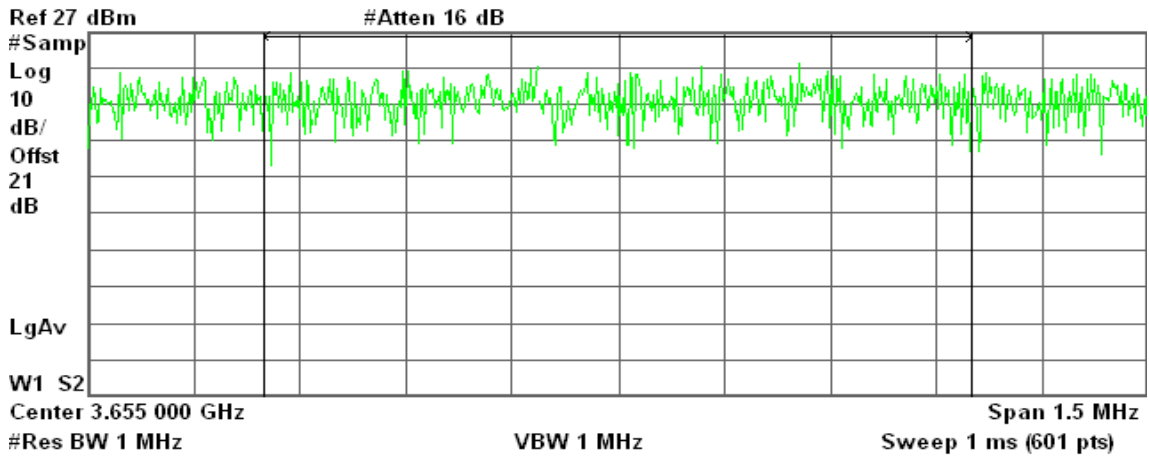
-50.15 dBm/Hz

10 MHz QPSK Power Spectral Density

QPSK Modulation / Carrier frequency: 3655 MHz

Agilent 11:22:42 Aug 22, 2009

R T



Channel Power

9.87 dBm / 1.0000 MHz

Power Spectral Density

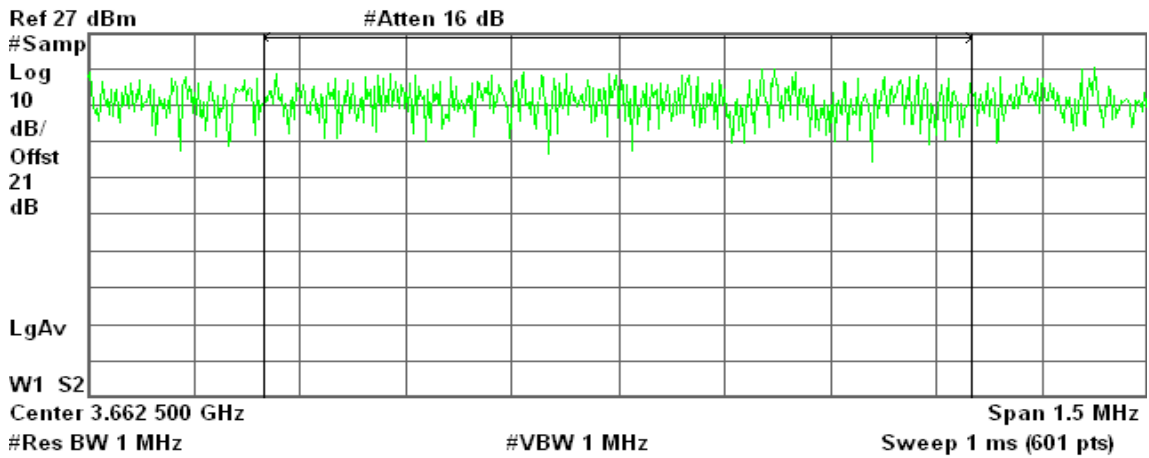
-50.13 dBm/Hz



QPSK Modulation / Carrier frequency: 3662.5 MHz

Agilent 11:22:10 Aug 22, 2009

R T



Channel Power

9.80 dBm / 1.0000 MHz

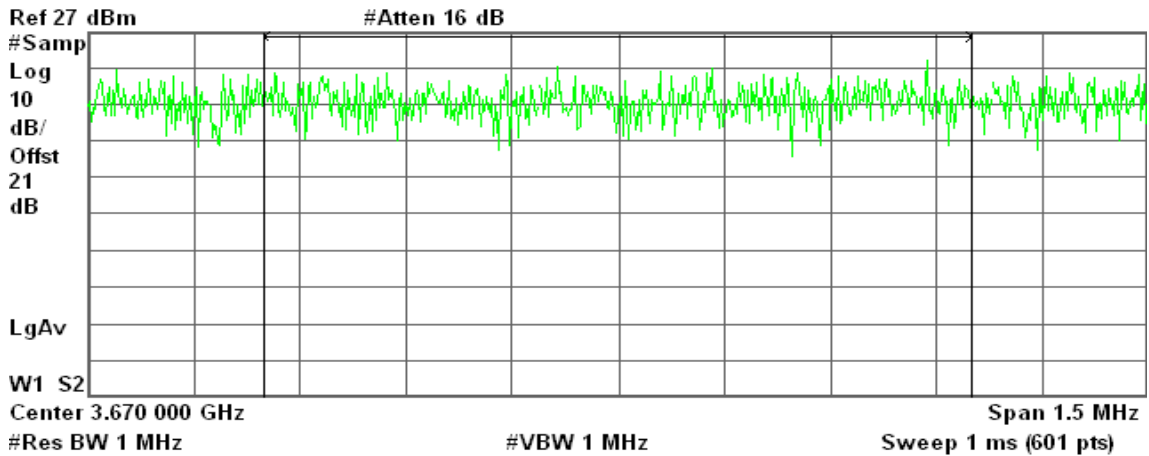
Power Spectral Density

-50.20 dBm/Hz

QPSK Modulation / Carrier frequency: 3670 MHz

Agilent 11:21:39 Aug 22, 2009

R T



Channel Power

9.46 dBm / 1.0000 MHz

Power Spectral Density

-50.54 dBm/Hz

7.4. Spurious Emissions at Antenna Terminals

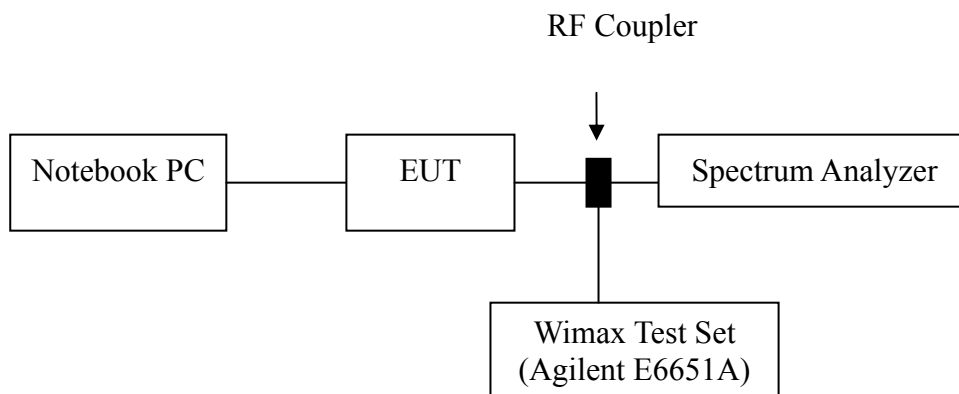
FCC 47 CFR Part 90, Subpart Z; §90.1323, 2.1051

Transmitter Conducted Spurious Emissions (30 M- 40 GHz)

Limit

For operation in the 3650 – 3675 band the power of any emission outside the frequency band of operation shall be attenuated below the transmitter power (P) within the licensed band of operation, measured in Watts, by at least $43 + 10 \cdot \log(P) = -13\text{dBm}$.

Test Configuration



Test Procedure

Transmitter conducted spurious emissions were measured for BPSK modulation state only. Measurements were made while EUT was operating in a modulated transmit mode of operation, at the appropriate center frequency. Conducted spurious emissions were measured to 40 GHz in a peak hold mode.



TEST RESULTS

Test Plot

QPSK Modulation

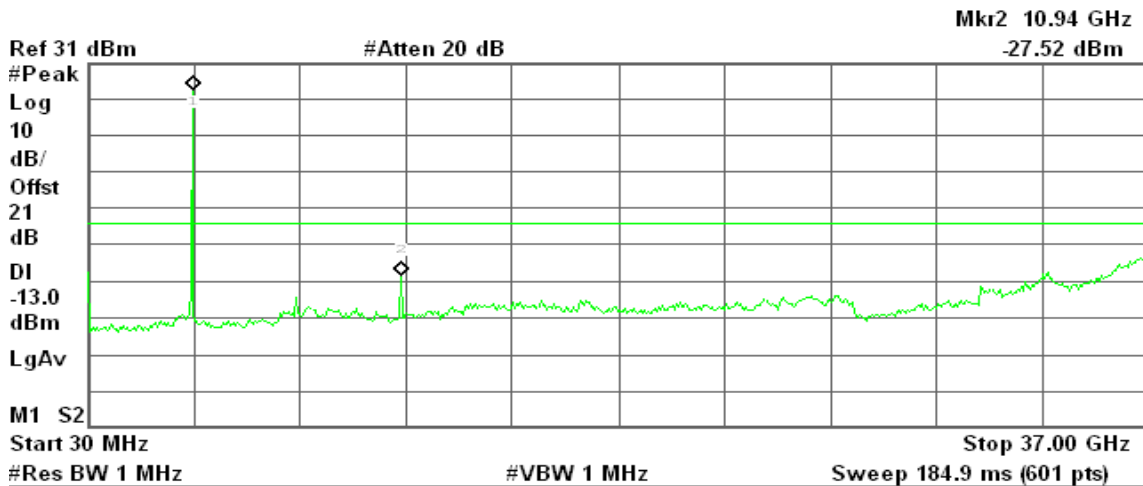
5 MHz Conducted Spurious Emissions

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency(MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
3652.5	30	40000	-27.52	-13	-14.52
3662.5	30	40000	-29.56		-16.56
3672.5	30	40000	-27.94		-14.94

Carrier frequency: 3652.5 MHz

Agilent 11:49:45 Aug 22, 2009

R T



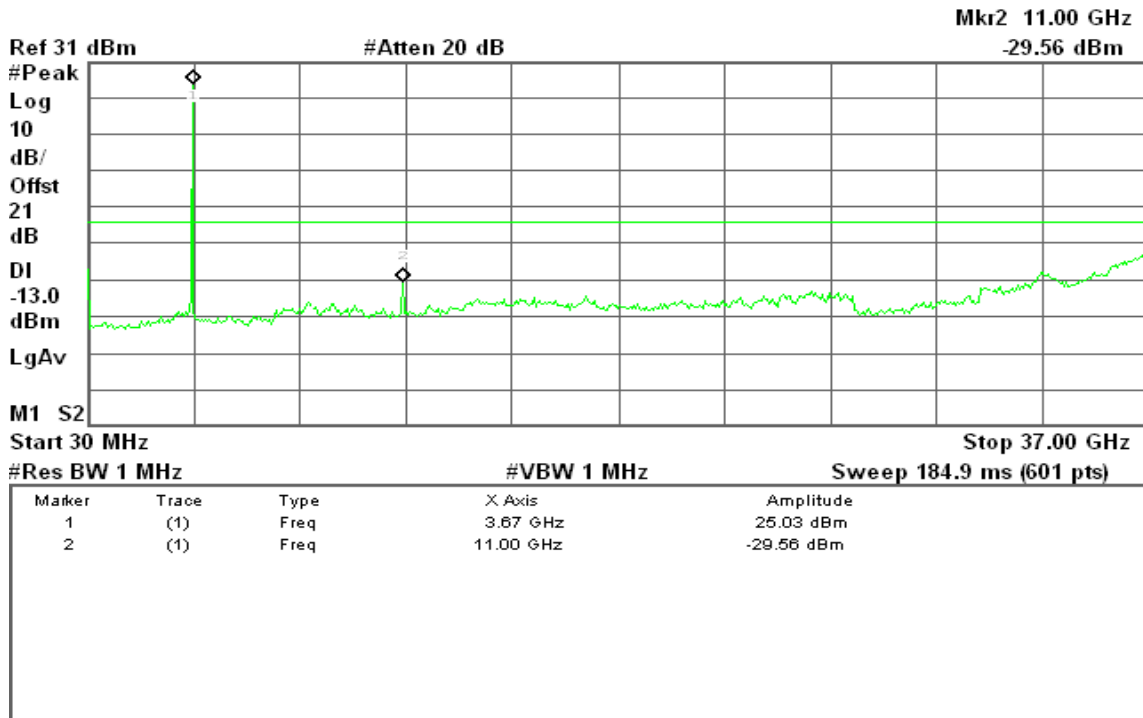
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.67 GHz	23.81 dBm
2	(1)	Freq	10.94 GHz	-27.52 dBm



Carrier frequency: 3662.5 MHz

Agilent 11:46:39 Aug 22, 2009

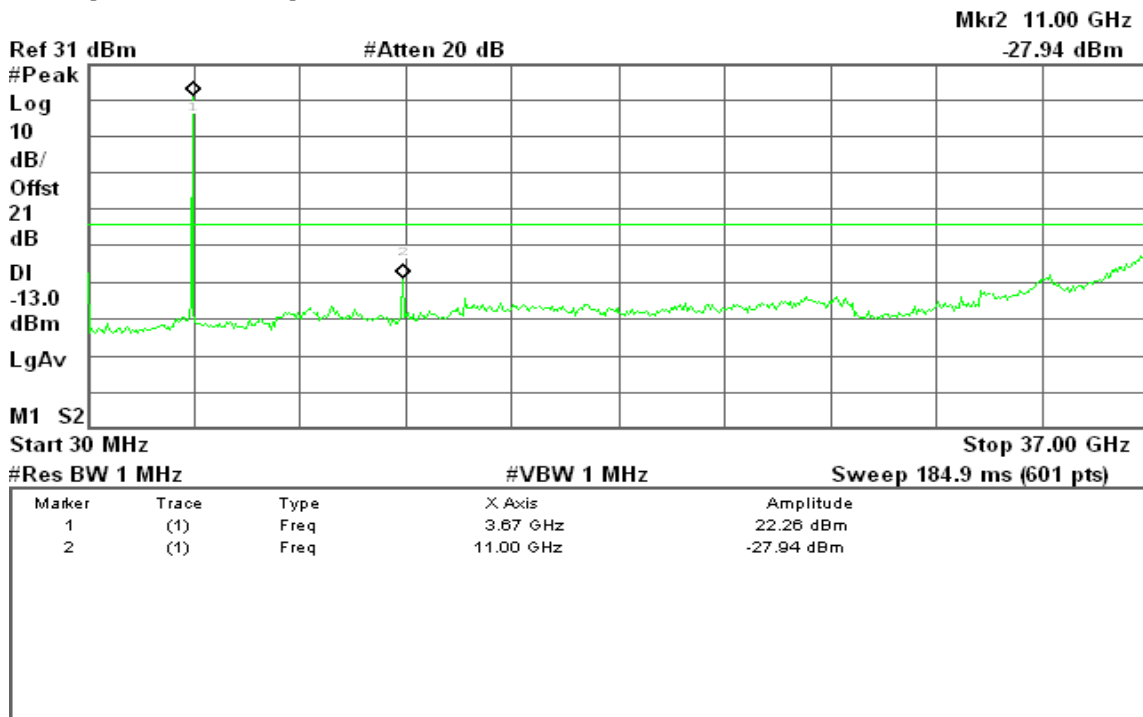
R T



Carrier frequency: 3672.5 MHz

Agilent 11:48:00 Aug 22, 2009

R T



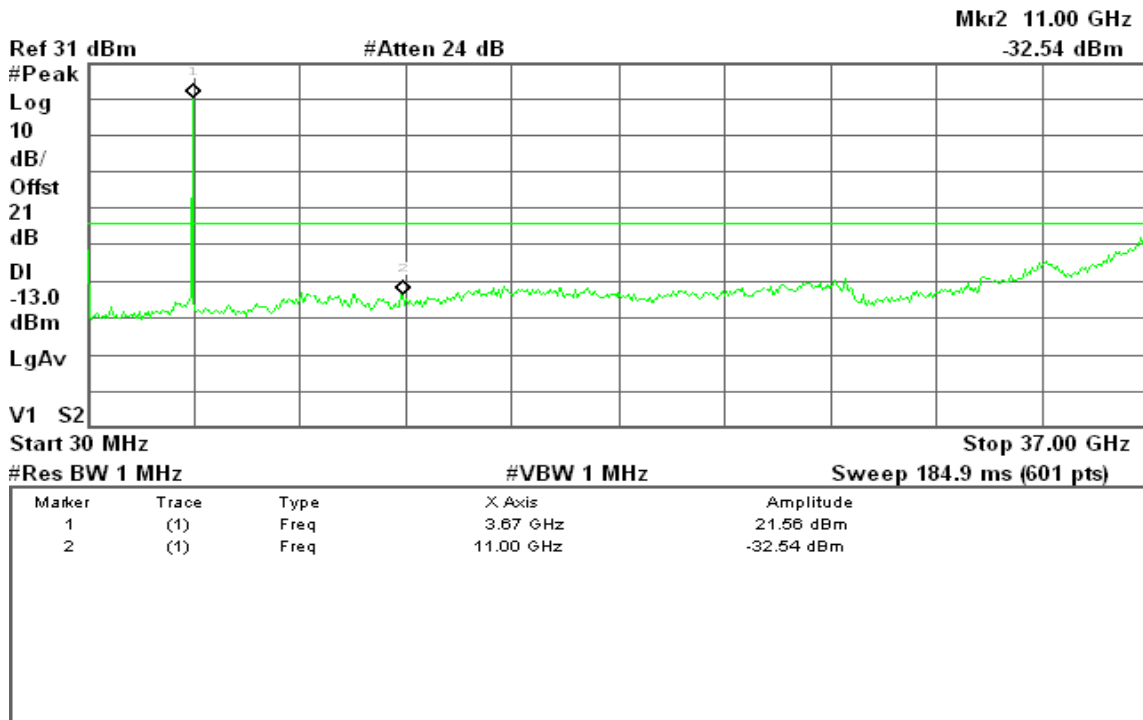


10 MHz Conducted Spurious Emissions

Carrier frequency: 3655 MHz

Agilent 12:22:28 Aug 22, 2009

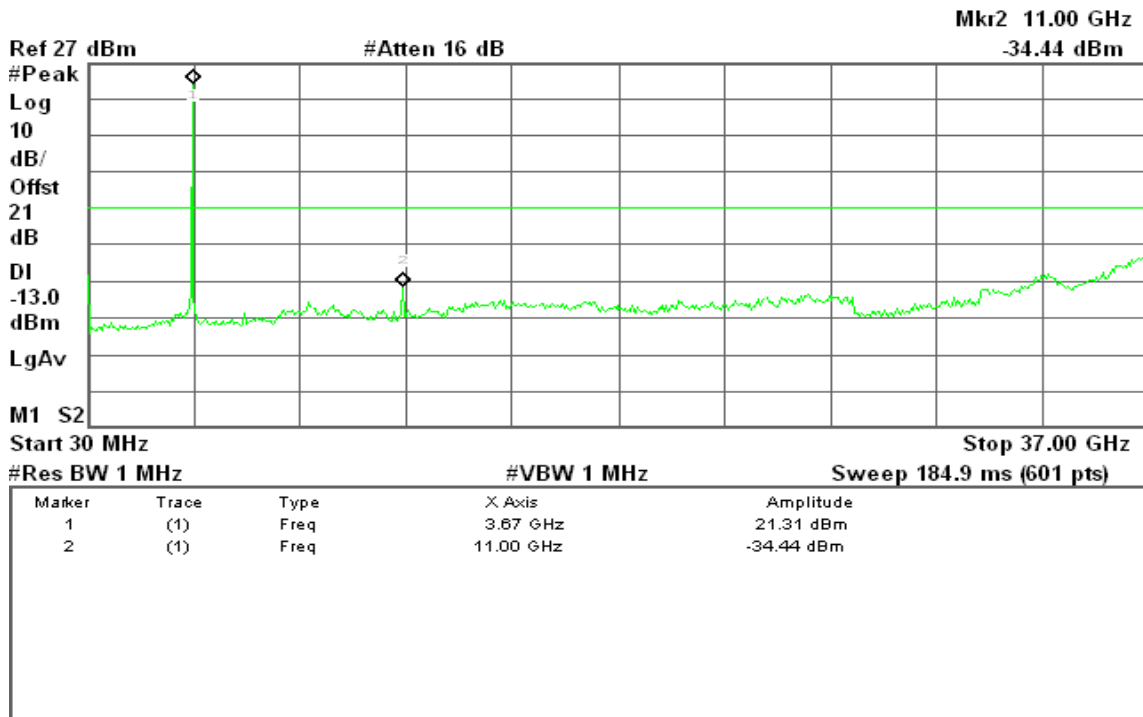
R T



Carrier frequency: 3662.5 MHz

Agilent 10:55:57 Aug 22, 2009

R T

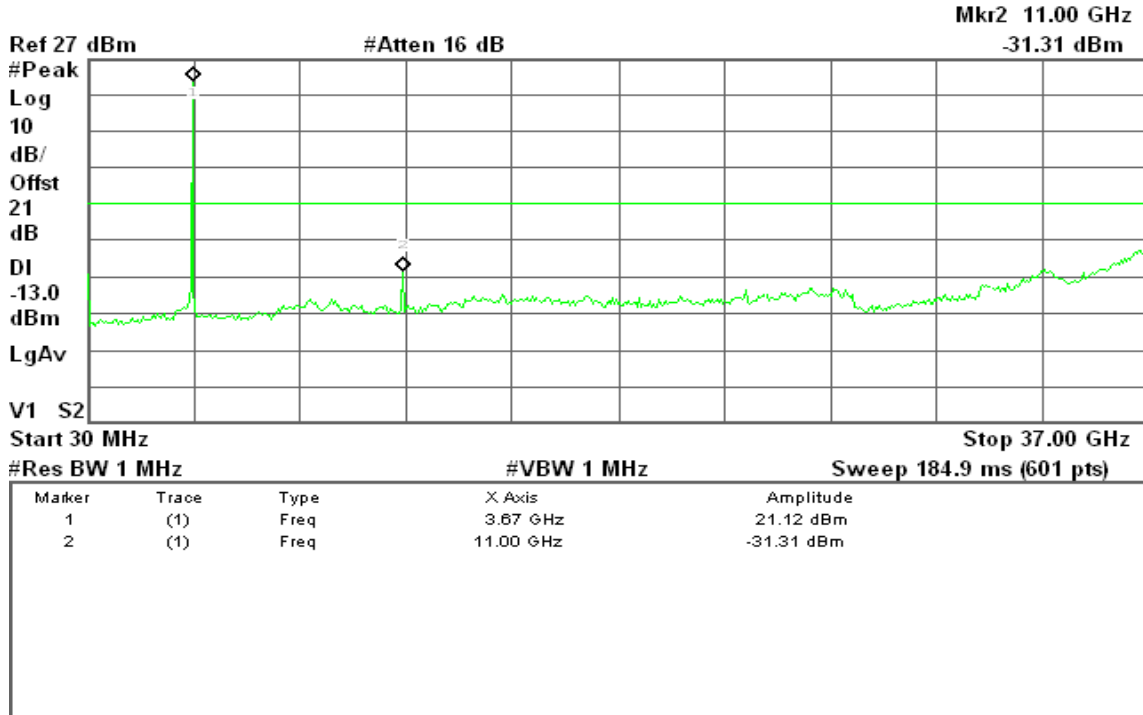




Carrier frequency: 3670 MHz

Agilent 10:54:19 Aug 22, 2009

R T





64QAM Modulation

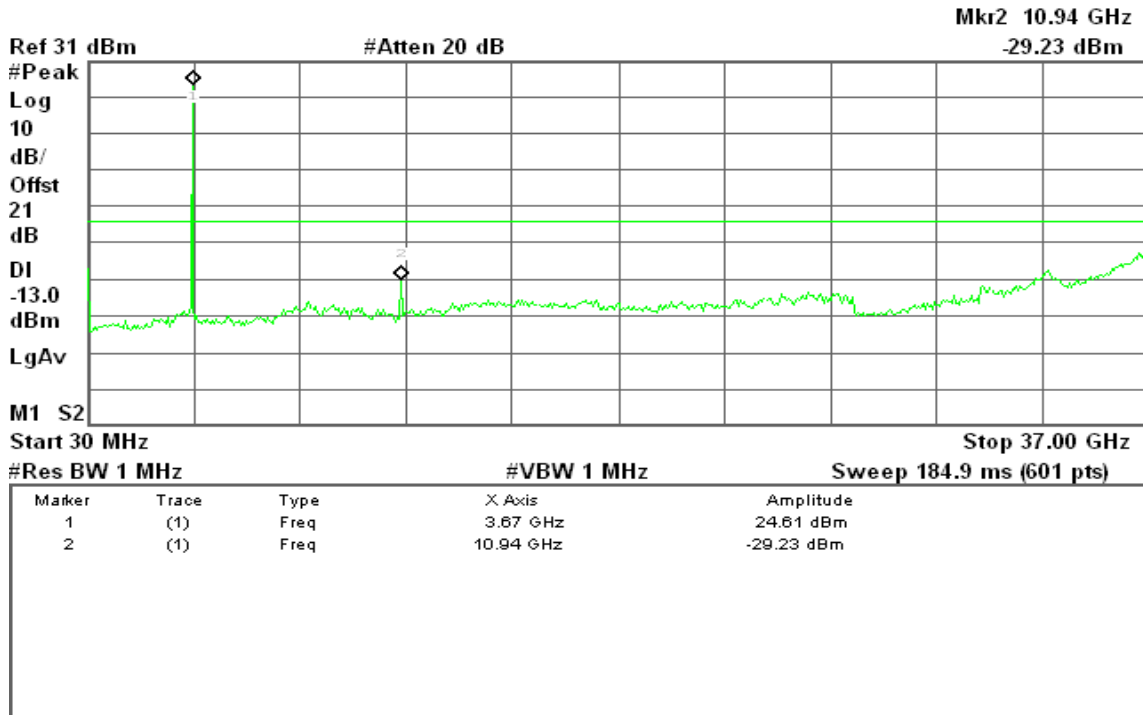
5 MHz Conducted Spurious Emissions

Channel Centre Frequency (MHz)	Start Frequency(MHz)	Stop Frequency(MHz)	Maximum Emission Observed (dBm)	Limit (dBm)	Margin (dB)
3652.5	30	40000	-29.23	-13	-16.23
3662.5	30	40000	-30.11		-17.11
3672.5	30	40000	-26.95		-13.95

Carrier frequency: 3652.5 MHz

Agilent 11:50:05 Aug 22, 2009

R T

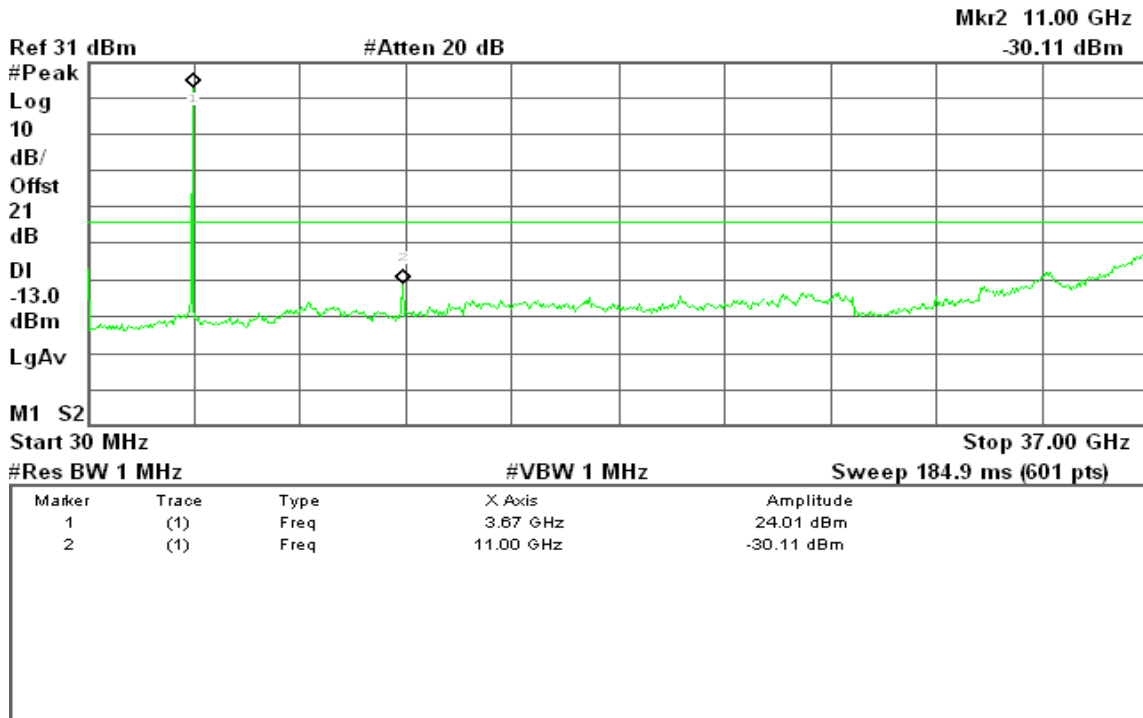




Carrier frequency: 3662.5 MHz

Agilent 11:47:02 Aug 22, 2009

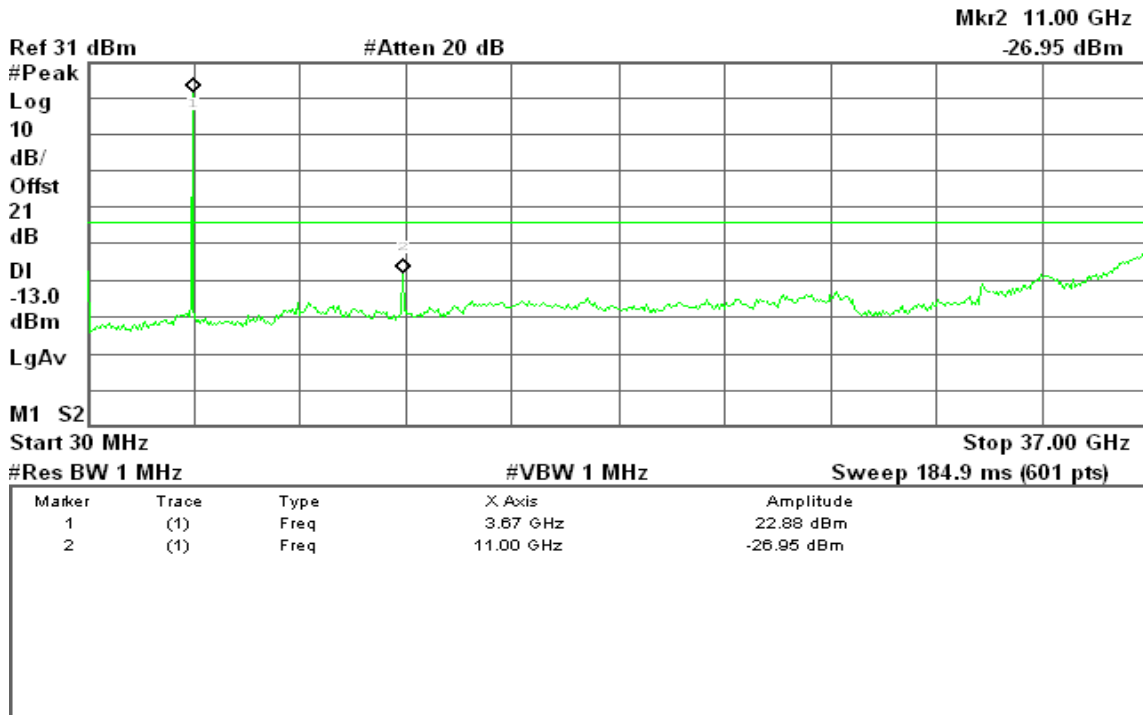
R T



Carrier frequency: 3672.5 MHz

Agilent 11:47:43 Aug 22, 2009

R T



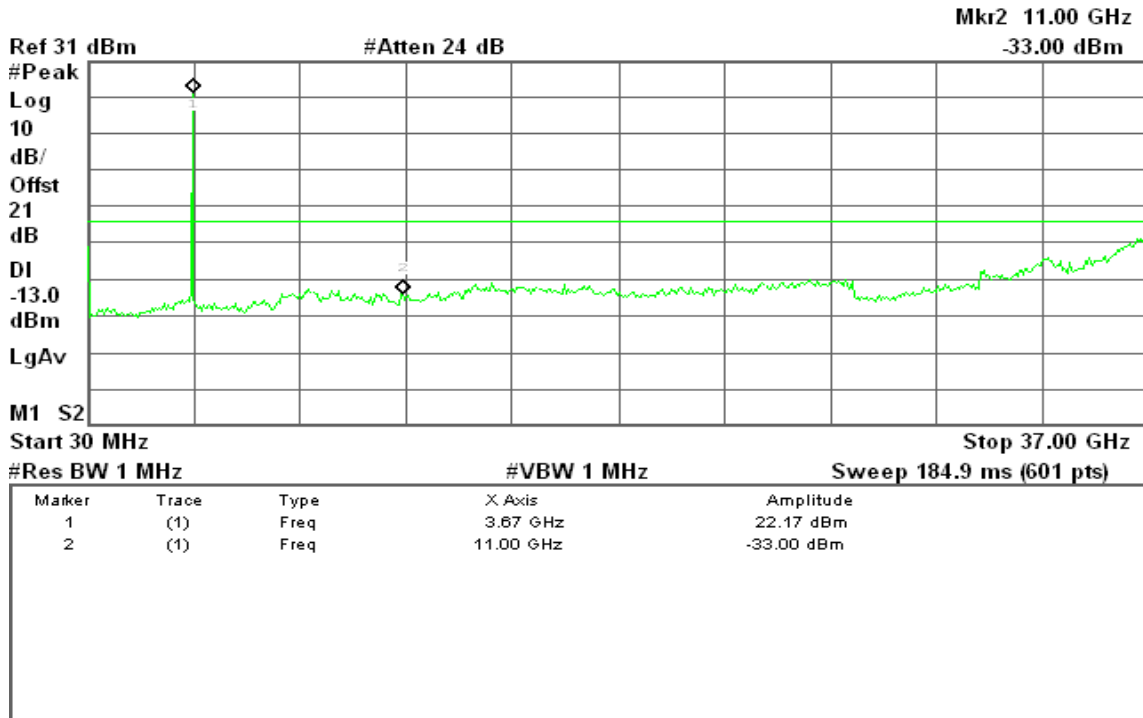


10 MHz Conducted Spurious Emissions

Carrier frequency: 3655 MHz

Agilent 12:22:43 Aug 22, 2009

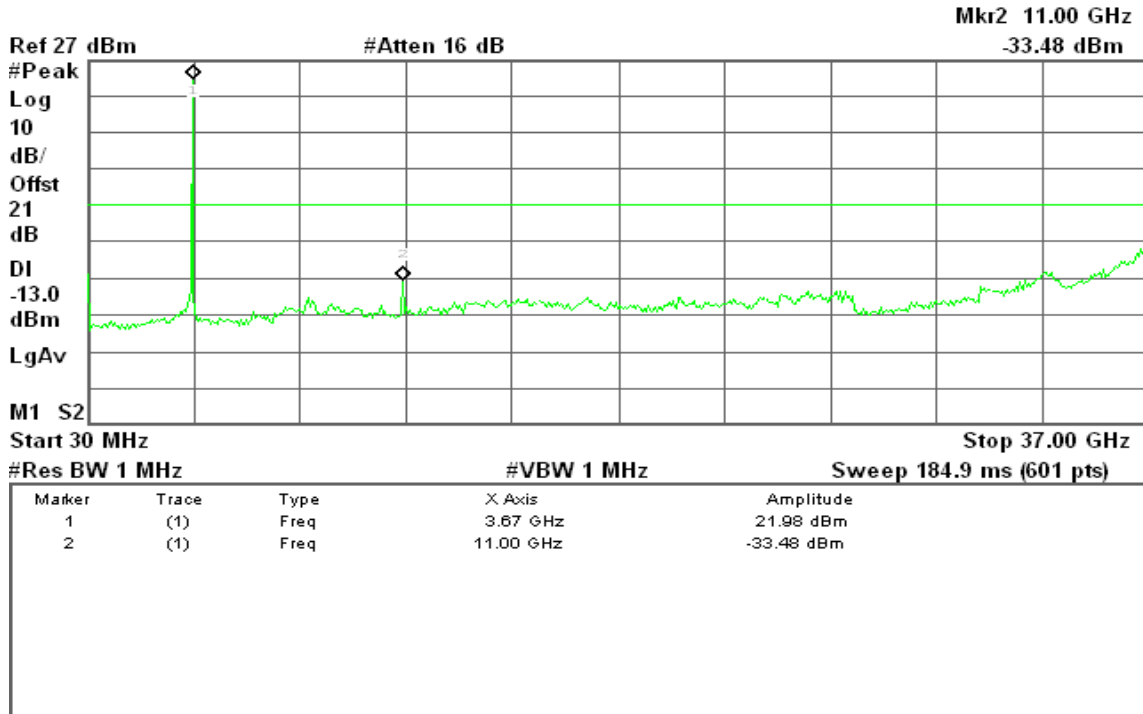
R T



Carrier frequency: 3662.5 MHz

Agilent 10:55:25 Aug 22, 2009

R T

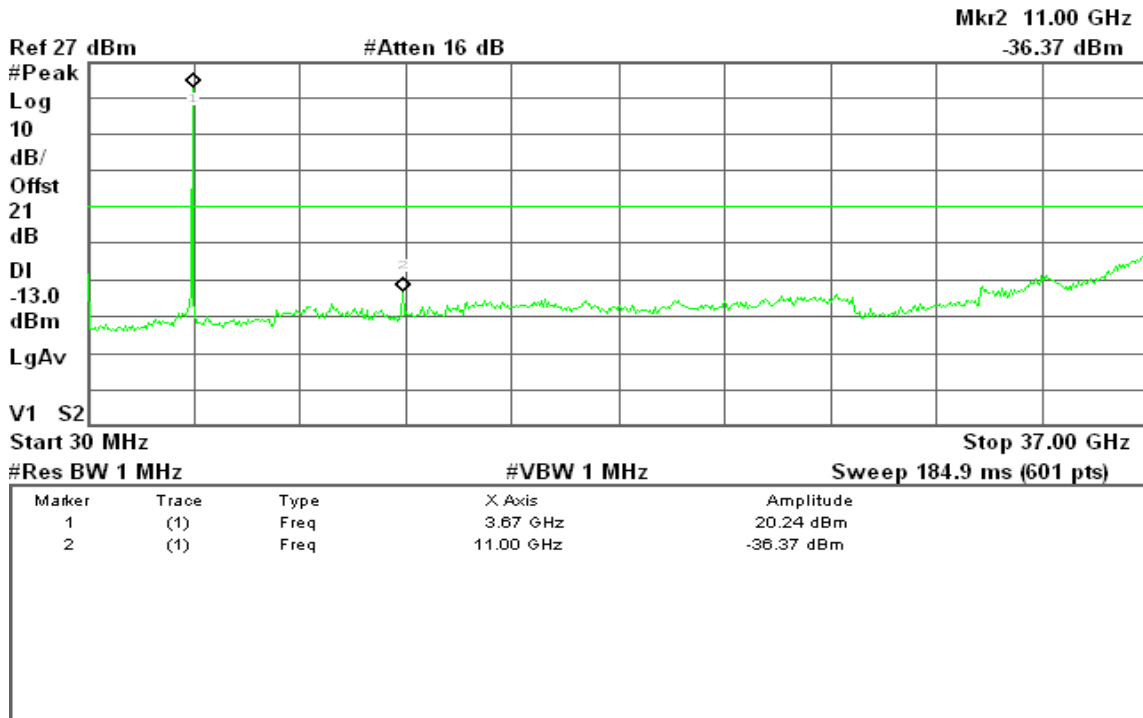




Carrier frequency: 3670 MHz

Agilent 10:54:42 Aug 22, 2009

R T



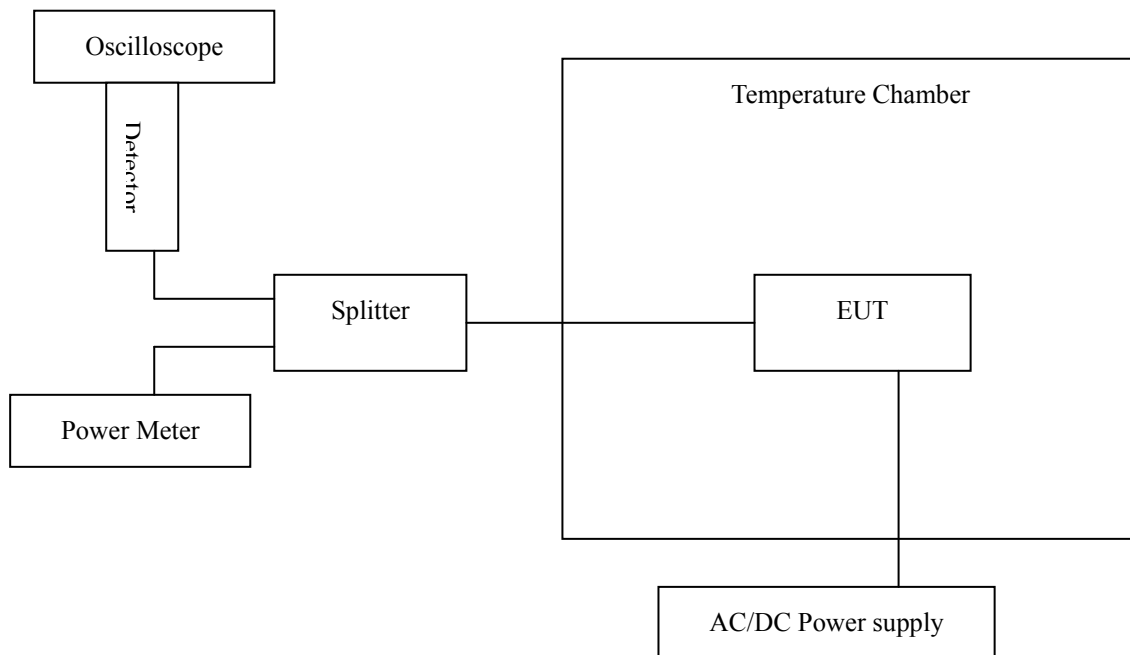
7.5. Frequency Stability; Temperature Variations, and Voltage Variations

FCC 47 CFR Part 90, Subpart Z; 2.1055(a)(1)

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency bands of operation.

Test Configuration



Test Procedure

The transmitter output was connected to a spectrum analyzer and the frequency stability was measured in a modulated operational mode as the transmitter could not operate Continuous Wave (CW). Further there was no carrier breakthrough available to provide a measurement point. Frequency error was measured using the 6 dB points on the spectrum mask and center frequency calculated as $\text{Marker 1} + \frac{1}{2} \Delta \text{Marker 1}$.

Frequency stability was measured through the extremes of temperature on the mid channel only. Before measurements were taken at each temperature the equipment waited until thermal balance was obtained.



Test Results

Emissions bandwidth 5 MHz

20°C Reference Frequency: 3662.5MHz

Limit: +/- 10 ppm = 36.625kHz

Power Supply (AC)	Environment (°C)	Frequency (MHz)	Delta (kHz)	Limit +/- (kHz)	
120.00	Normal (100%)	60	3662.502462	2.46	36.625
		50	3662.503083	3.08	36.625
		40	3662.496487	-3.51	36.625
		30	3662.505632	5.63	36.625
		20	3662.496973	-3.03	36.625
		10	3662.501570	1.57	36.625
		0	3662.502648	2.65	36.625
		-10	3662.509635	9.63	36.625
		-20	3662.500707	0.71	36.625
		-30	3662.490945	-9.05	36.625
	-40	3662.502578	2.58	36.625	
138.00	High (115%)	3662.508533	8.533	36.625	
120.00	Normal (100%)	3662.505565	5.56	36.625	
102.00	Low (85%)	3662.499572	-0.428	36.625	
End Point				36.625	

Emissions bandwidth 10 MHz

20°C Reference Frequency: 3675.0MHz

Limit: +/- 10 ppm = 36.750kHz

Power Supply (AC)	Environment (°C)	Frequency (MHz)	Delta (kHz)	Limit +/- (kHz)	
120.00	Normal (100%)	60	3674.995100	-4.90	36.750
		50	3674.994300	-5.70	36.750
		40	3674.995800	-4.20	36.750
		30	3674.992200	-7.80	36.750
		20	3674.994100	-5.90	36.750
		10	3674.991600	-8.40	36.750
		0	3674.993500	-6.50	36.750
		-10	3675.002200	2.20	36.750
		-20	3675.003400	3.40	36.750
		-30	3675.002200	2.20	36.750
	-40	3675.001600	1.60	36.750	
138.00	High (115%)	3674.991200	-8.800	36.750	
120.00	Normal (100%)	3674.994100	-5.90	36.750	
102.00	Low (85%)	3674.992900	-7.100	36.750	
End Point				36.750	



7.6. Radiated Emissions

FCC, Part 15 Subpart C §15.205/ §15.209

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

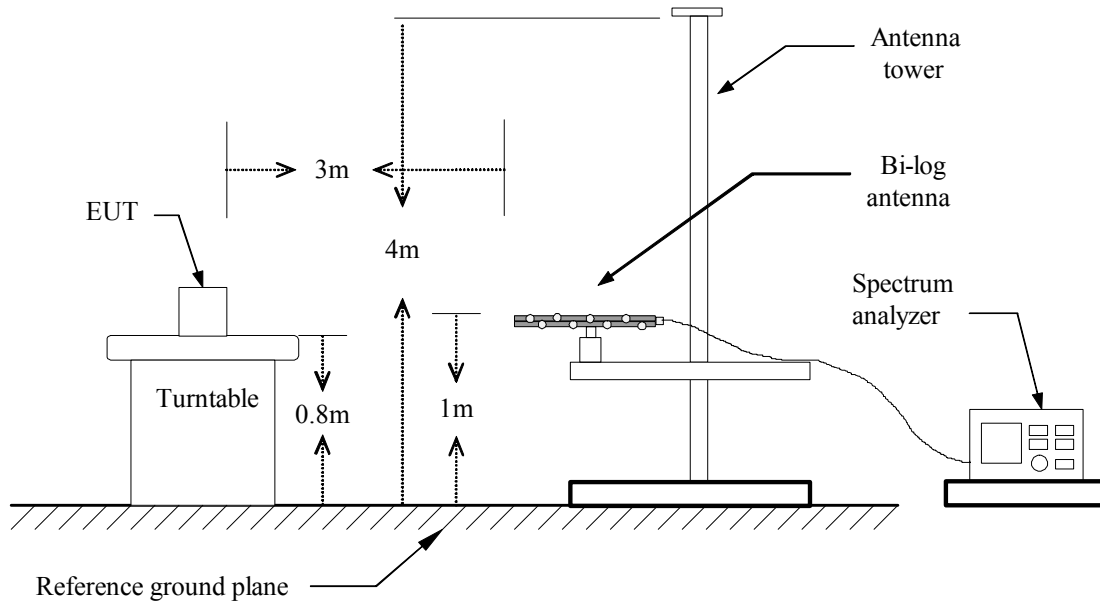
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS****Below 1 GHz****Operation Mode:** Normal Link**Test Date:** May 12, 2009**Temperature:** 23°C**Tested by:** Ryan Chen**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
39.70	V	46.55	-7.67	38.88	40.00	-1.12	QP
55.87	V	50.35	-14.32	36.03	40.00	-3.97	QP
88.20	V	54.50	-15.61	38.89	43.50	-4.61	Peak
175.50	V	50.87	-10.94	39.93	43.50	-3.57	Peak
206.22	V	52.10	-9.37	42.73	43.50	-0.77	QP
249.87	V	44.73	-9.66	35.07	46.00	-10.93	Peak
68.80	H	46.41	-14.80	31.61	40.00	-8.39	Peak
138.32	H	43.58	-9.05	34.52	43.50	-8.98	Peak
207.83	H	51.43	-9.47	41.96	43.50	-1.54	QP
249.87	H	44.58	-9.66	34.92	46.00	-11.08	Peak
374.35	H	42.38	-6.97	35.41	46.00	-10.59	Peak
500.45	H	38.96	-3.98	34.98	46.00	-11.02	Peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser; with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

7.7. Transmitter Radiated Emissions above 1 GHz

FCC 47 CFR Part 90, Subpart Z; §90.1323, 2.1053

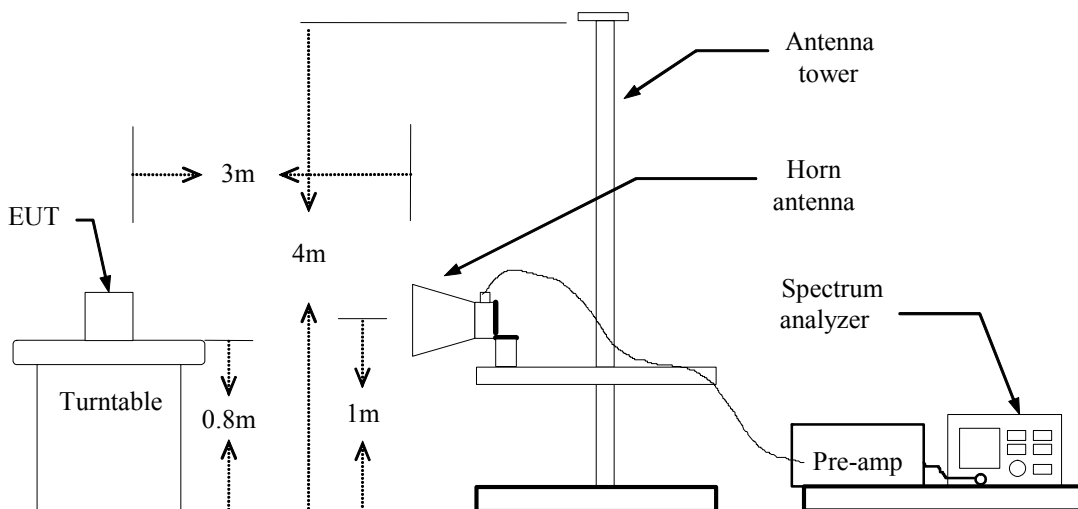
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

Limit

For operation in the 3650 – 3675 band the power of any emission outside the frequency band of operation shall be attenuated below the transmitter power (P) within the licensed band of operation, measured in Watts, by at least $43 + 10 * \text{Log} (P) = -13\text{dBm}$.

Test Configuration

Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
RBW=VBW=1MHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.



Above 1 GHz

QPSK Modulation

Operation Mode: Tx / Bandwidth 5MHz / 3652.5MHz

Test Date: May 11, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7296.67	V	53.79	4.03	57.82	94.00	-36.18	Peak
10958.33	V	42.07	14.33	56.40	94.00	-37.6	Peak
N/A							
7296.67	H	57.97	4.03	62.00	94.00	-32.00	Peak
10958.33	H	44.60	14.33	58.94	94.00	-35.06	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – limit (dBuV/m).



Operation Mode: Tx / Bandwidth 5MHz / 3662.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	50.27	4.02	54.29	94.00	-39.71	Peak
10980.00	V	44.83	14.32	59.14	94.00	-34.86	Peak
N/A							
7318.33	H	49.47	4.02	53.49	94.00	-40.51	Peak
10980.00	H	46.41	14.32	60.72	94.00	-33.28	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 5MHz / 3672.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7340.00	V	50.30	4.01	54.30	94.00	-39.70	Peak
11023.33	V	43.54	14.29	57.83	94.00	-36.17	Peak
N/A							
7340.00	H	49.56	4.01	53.57	94.00	-40.43	Peak
11023.33	H	43.30	14.29	57.59	94.00	-36.41	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 10MHz / 3655MHz

Test Date: May 11, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	47.45	4.02	51.47	94.00	-42.53	Peak
N/A							
7318.33	H	50.71	4.02	54.73	94.00	-39.27	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 10MHz / 3662.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	53.27	4.02	57.28	94.00	-36.72	Peak
11001.67	V	47.07	14.30	61.37	94.00	-32.63	Peak
N/A							
7318.33	H	51.22	4.02	55.24	94.00	-38.76	Peak
10980.00	H	50.09	14.32	64.41	94.00	-29.59	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. $Margin (dB) = Remark\ result (dBuV/m) - Average\ limit (dBuV/m)$



Operation Mode: Tx / Bandwidth 10MHz / 3670MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7340.00	V	52.13	4.01	56.14	94.00	-37.86	Peak
11001.67	V	45.66	14.30	59.96	94.00	-34.04	Peak
N/A							
7340.00	H	50.64	4.01	54.65	94.00	-39.35	Peak
11001.67	H	47.16	14.30	61.46	94.00	-32.54	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



64QAM Modulation

Operation Mode: Tx / Bandwidth 5MHz / 3652.5MHz

Test Date: May 11, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7296.67	V	54.42	4.03	58.45	94.00	-35.55	Peak
10958.33	V	43.15	14.33	57.48	94.00	-36.52	Peak
N/A							
7296.67	H	59.21	4.03	63.25	94.00	-30.75	Peak
10958.33	H	44.81	14.33	59.15	94.00	-34.85	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 5MHz / 3662.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	52.03	4.02	56.05	94.00	-37.95	Peak
10980.00	V	43.84	14.32	58.15	94.00	-35.85	Peak
N/A							
7318.33	H	49.88	4.02	53.90	94.00	-40.10	Peak
10980.00	H	46.54	14.32	60.85	94.00	-33.15	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 5MHz / 3672.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7340.00	V	52.07	4.01	56.08	94.00	-37.92	Peak
11023.33	V	42.23	14.29	56.52	94.00	-37.48	Peak
N/A							
7340.00	H	49.28	4.01	53.28	94.00	-40.72	Peak
11023.33	H	43.22	14.29	57.51	94.00	-36.49	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 10MHz / 3655MHz

Test Date: May 11, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	48.13	4.02	52.15	94.00	-41.85	Peak
N/A							
7318.33	H	51.24	4.02	55.25	94.00	-38.75	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / Bandwidth 10MHz / 3662.5MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7318.33	V	51.62	4.02	55.64	94.00	-38.36	Peak
10980.00	V	47.07	14.32	61.39	94.00	-32.61	Peak
N/A							
7318.33	H	52.57	4.02	56.59	94.00	-37.41	Peak
10980.00	H	49.28	14.32	63.59	94.00	-30.41	Peak
14641.67	H	44.90	15.31	60.20	94.00	-33.80	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. $Margin (dB) = Remark\ result (dBuV/m) - Average\ limit (dBuV/m)$



Operation Mode: Tx / Bandwidth 10MHz / 3670MHz

Test Date: August 22, 2009

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 50% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
7340.00	V	52.29	4.01	56.30	94.00	-37.70	Peak
11001.67	V	46.68	14.30	60.97	94.00	-33.03	Peak
N/A							
7340.00	H	51.42	4.01	55.42	94.00	-38.58	Peak
11001.67	H	48.24	14.30	62.54	94.00	-31.46	Peak
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



7.8. POWERLINE CONDUCTED EMISSIONS

Limit

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** May 22, 2009
Temperature: 22°C **Tested by:** Ryan Chen
Humidity: 45% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1500	55.67	46.77	0.13	55.80	46.90	66.00	56.00	-10.20	-9.10	L1
0.2031	46.71	38.31	0.09	46.80	38.40	63.48	53.48	-16.68	-15.08	L1
0.4596	32.24	30.54	0.06	32.30	30.60	56.70	46.70	-24.40	-16.10	L1
1.6856	19.54	15.34	0.06	19.60	15.40	56.00	46.00	-36.40	-30.60	L1
3.7768	28.74	25.14	0.06	28.80	25.20	56.00	46.00	-27.20	-20.80	L1
18.7600	33.30	29.90	0.40	33.70	30.30	60.00	50.00	-26.30	-19.70	L1
0.1550	52.58	43.28	0.12	52.70	43.40	65.73	55.73	-13.03	-12.33	L2
0.6650	20.44	18.84	0.06	20.50	18.90	56.00	46.00	-35.50	-27.10	L2
1.2850	20.45	16.45	0.05	20.50	16.50	56.00	46.00	-35.50	-29.50	L2
3.8050	7.24	1.14	0.06	7.30	1.20	56.00	46.00	-48.70	-44.80	L2
18.7150	19.91	15.71	0.39	20.30	16.10	60.00	50.00	-39.70	-33.90	L2
25.8500	32.04	28.44	0.56	32.60	29.00	60.00	50.00	-27.40	-21.00	L2

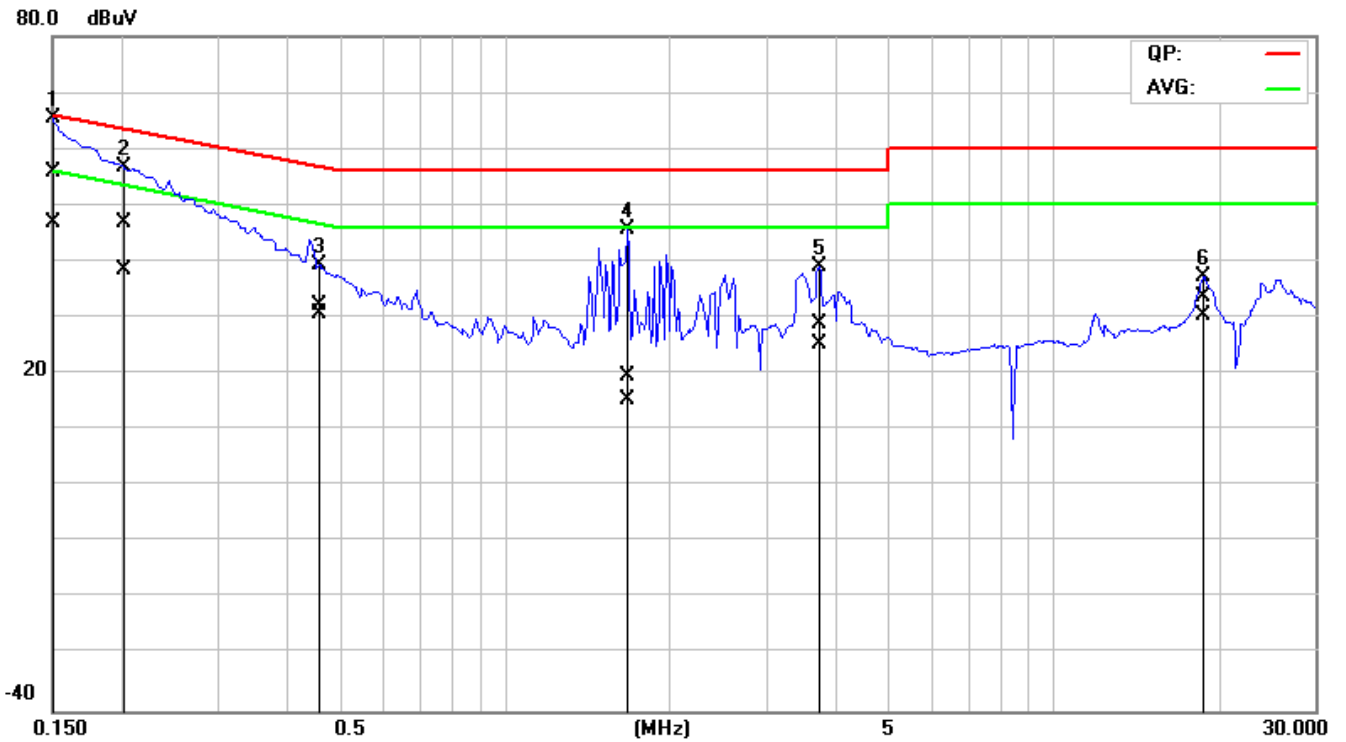
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz.
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

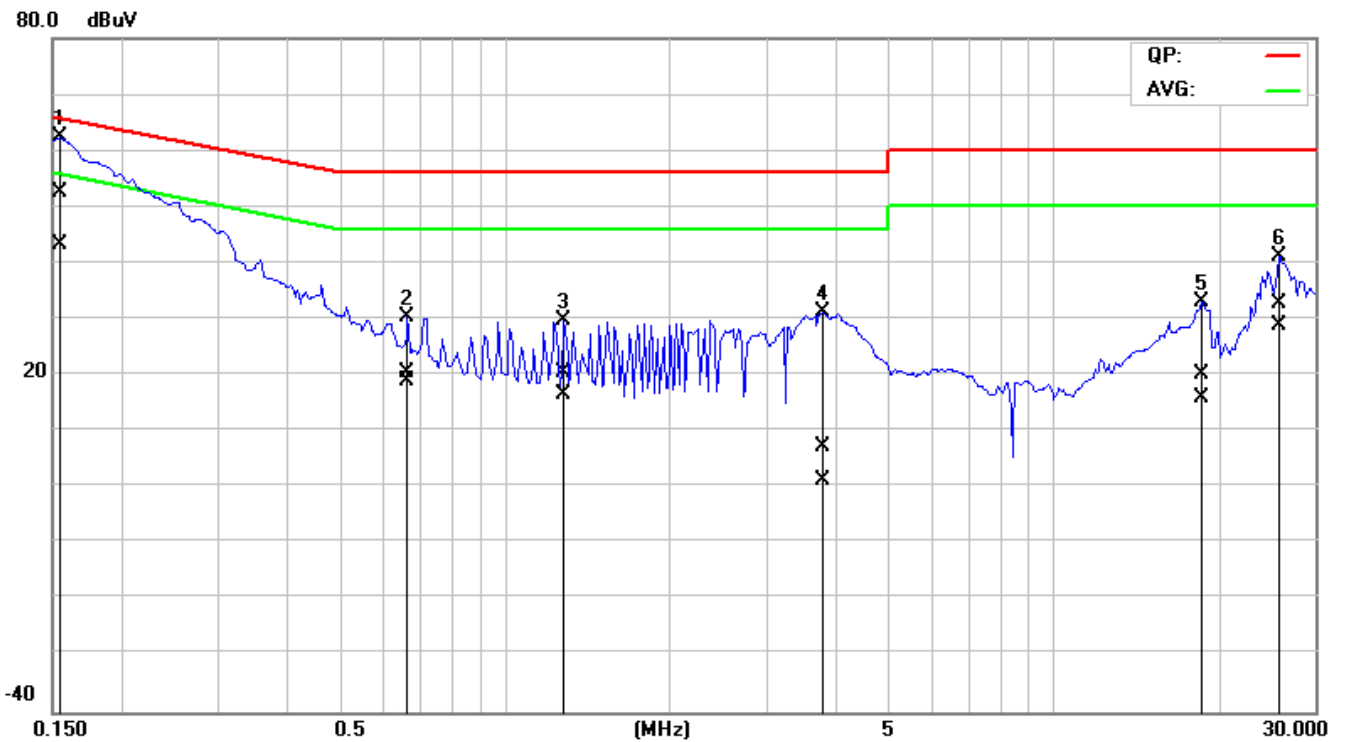


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





APPENDIX I Maximum Permissible Exposure

FCC, Part 90 Subpart C §90.1217

Calculations for Maximum Permissible Exposure Levels

$$\text{Power Density} = P_d \text{ (mW/cm}^2\text{)} = \text{EIRP}/(4\pi d^2)$$

$$\text{EIRP} = P * G$$

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

$$\text{Numeric Gain} = 10^{(G \text{ (dBi)}/10)}$$

The calculated separation distance is for worst case 10 MHz bandwidth (higher power level).

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm²

Freq. Band (GHz)	Antenna Gain (dBi)	Numeric Gain (numeric)	Max Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Safe Distance @ 1mW/cm ² Limit(cm)	Minimum Separation Distance (cm)
3655	15	31.62	24.72	296.48	27.38	27.38

Specification Maximum Permissible Exposure Limits

§90.1217 Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency levels in excess of the Commission's guidelines. See §1.1307 (b)(1) of this chapter.

Limit = 5mW / cm² from 1.310 Table 1

Note: for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.