TEST REPORT

Report Number: 100825363MPK-028
Project Number: G100825363
August 22, 2013

Testing performed on the
Qolsys Security Panel
Model: IQPanel-VRZ
FCC ID: 2AAJXQS-9004-VRZ
Contains FCC ID: MIVCNN0301
IC: 11205A-QS9004VRZ
Contains IC: 4160A-CNN0301
to

FCC Part 15 Subpart C (15.247)
FCC Part 15, Subpart B
Industry Canada RSS-210 Issue 8, Annex 8
Industry Canada ICES-003

for

Qolsys, Inc.

Test Performed by:	**Test Authorized by:**
Intertek	Qolsys, Inc.
1365 Adams Court	20111 Stevens Creek Blvd., Suite 280
Menlo Park, CA 94025 USA	Cupertino, CA 95014 USA

Prepared by: _____ **Date:** August 22, 2013
Minh Ly

Reviewed by: _____ **Date:** August 22, 2013
Krishna K Vemuri

VERIFICATION OF COMPLIANCE
Report No. 100825363MPK-028

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below.

Equipment Under Test:	Qolsys security panel
Trade Name:	Qolsys, Inc.
Model Number:	IQPanel-VRZ
Serial Number:	QSNA132800204
Applicant:	Qolsys, Inc
Contact:	Mark Skeen
Address:	20111 Stevens Creek Blvd., Suite 280 Cupertino, CA 95014
Country	USA
Tel. Number:	(408) 857-8415
Email:	mark.skeen@qolsys.com
Applicable Regulation**:**	FCC Part 15 Subpart C (15.247) FCC Part 15, Subpart B Industry Canada RSS-210 Issue 8, Annex 8 Industry Canada ICES-003
Date of Test:	August 12 to 20, 2013

We attest to the accuracy of this report:

Minh Ly	Krishna K Vemuri
Project Engineer	EMC Senior Staff Engineer

TABLE OF CONTENTS

1.0 Summary of Tests

Test	Reference FCC	Reference Industry Canada	Result
RF Output Power	15.247(b)(3)	RSS-210, A8.4	Complies
6 dB Bandwidth	15.247(a)(2)	RSS-210, A8.2	Complies
Power Density	15.247(e)	RSS-210, A8.2b	Complies
Out of Band Antenna Conducted Emission	15.247(d)	RSS-210, A8.5	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205, 15.109	RSS-210, A8.5	Complies
AC Line Conducted Emission	15.207, 15.107	RSS-GEN	Complies
Antenna Requirement	15.203	RSS-GEN	Complies.

EUT receive date: August 12, 2013.
EUT receive condition: The pre-production version of the EUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.
Test start date: August 12, 2013
Test completion date: August 20, 2013
The test results in this report pertain only to the item tested.

2.0 General Information

2.1 Product Description

The Equipment Under Test (EUT) is the Qolsys Security Panel, model number IQPanel-VRZ, is a combination wireless home security, life safety, and home automation system. It consists of one Home Security RF receiver, one Zigbee radio, one Zwave radio, one WiFi radio and one CDMA radio.

The CDMA radio is a modular approved CDMA module with FCC ID: MIVCNN0301 and IC: 4160A-CNN0301. This test report covers only the Zwave radio. A separate test report, report # 100825363MPK-029, covers the Zwave radio and a separate test report, report # 100825363MPK-030, covers the WiFi radio.

The IQ Panel was powered via a 12VDC through an AC/DC power supply which connected to 120VAC/60Hz mains.

Information about the Zigbee radio is presented below:

Applicant	Qolsys, Inc.
Manufacturer name & address	Qolsys, Inc. 20111 Stevens Creek Blvd., Suite 280 CUPERTINO, CA 95014 USA
Model Number	IQPanel-VRZ
FCC Identifier	2AAJXQS-9004-VRZ Contains FCC ID: MIVCNN0301
IC	11205A-QS9004VRZ Contains IC: 4160A-CNN0301
Use of Product	Home Security Control
Type of Transmission	DSSS
Rated RF Output	2.8 dBm peak, Conducted power
Frequency Range	912-924 MHz (Channels: 912/914/916/918/920/922/924Mhz)
Number of Channel(s)	7 channels
Modulation Type	BPSK/O-QPSK
Data Rate	<200kbps
Antenna(s) type & Gain	Quarter wavelength dipole wire antenna, (-)3dBi

2.2 Related Submittal(s) Grants

None.

2.3 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.4 Test Methodology

Antenna conducted measurements were performed according to the FCC documents "Guidance for Performing Compliance Measurement on Digital Transmission Systems (DTS) Operating under §15.247" (KDB 558074).

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise.

All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

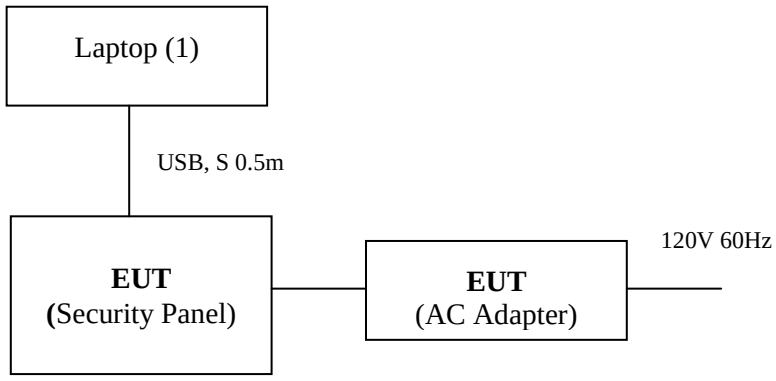
Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-
Unwanted emissions - antenna conducted	1.1 dB	1.3 dB	1.9 dB
Bandwidth – antenna conducted	-	30 Hz	-
Radiated emissions	4.2 dB	3.4 dB	3.6 dB
AC mains conducted emissions	2.4 dB	-	-

3.0 System Test Configuration

3.1 Support Equipment and description

Item #	Description	Model No./ Part No.	Serial No.
1	HP Laptop	6735B	Not Labeled

3.2 Block Diagram of Test Setup



AC Adapter: Model: SW-120200A, Manufacturer: SURE-POWER

S = Shielded **U** = Unshielded	**F** = With Ferrite **M** = Meter

3.3 Justification

To show compliance with the FCC Rules, the document 55074 “Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) Operating Under §15.247” was used

3.4 Mode of Operation During Test

During transmitter testing, the transmitter was setup to transmit at maximum RF power on low, middle and high channels.

3.5 Modifications Required for Compliance

Intertek installed no modifications during compliance testing in order to bring the product into compliance.

3.6 Additions, Deviations and Exclusions from Standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 6-dB Bandwidth and Occupied Bandwidth
FCC Rule: 15.247(a)(2); RSS-210 A8.2 and RSS-GEN;

4.1.1 Requirement

The minimum 6-dB bandwidth shall be at least 500 kHz

4.1.2 Procedure

The Procedure described in the FCC Publication 558074 was used.

The antenna port of the EUT was connected to the input of a spectrum analyzer (SA). For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6-dB bandwidth was determined from where the channel output spectrum intersected the display line.

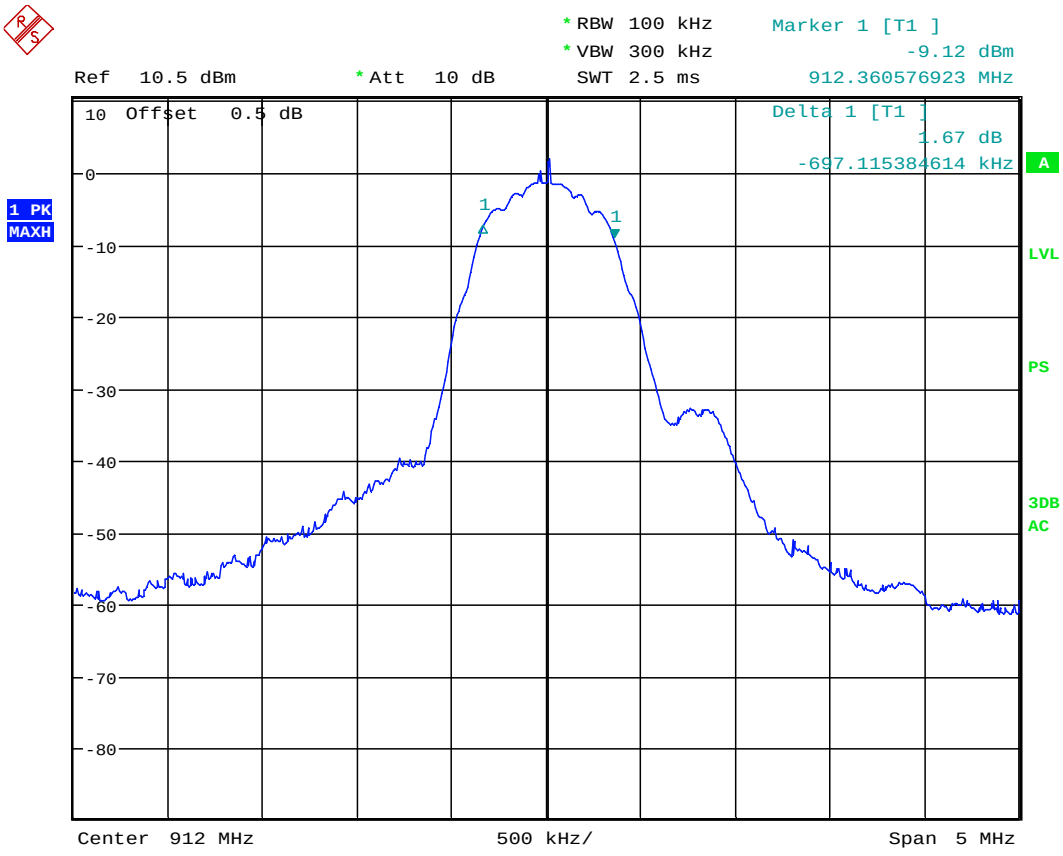
The occupied bandwidth was measured using the built-in spectrum analyzer function for 99% power bandwidth measurement.

4.1.3 Test Result

Frequency (MHz)	6-dB bandwidth kHz	Occupied bandwidth kHz
912.0	697.11	809.29
918.0	681.09	801.28
924.0	681.09	809.29

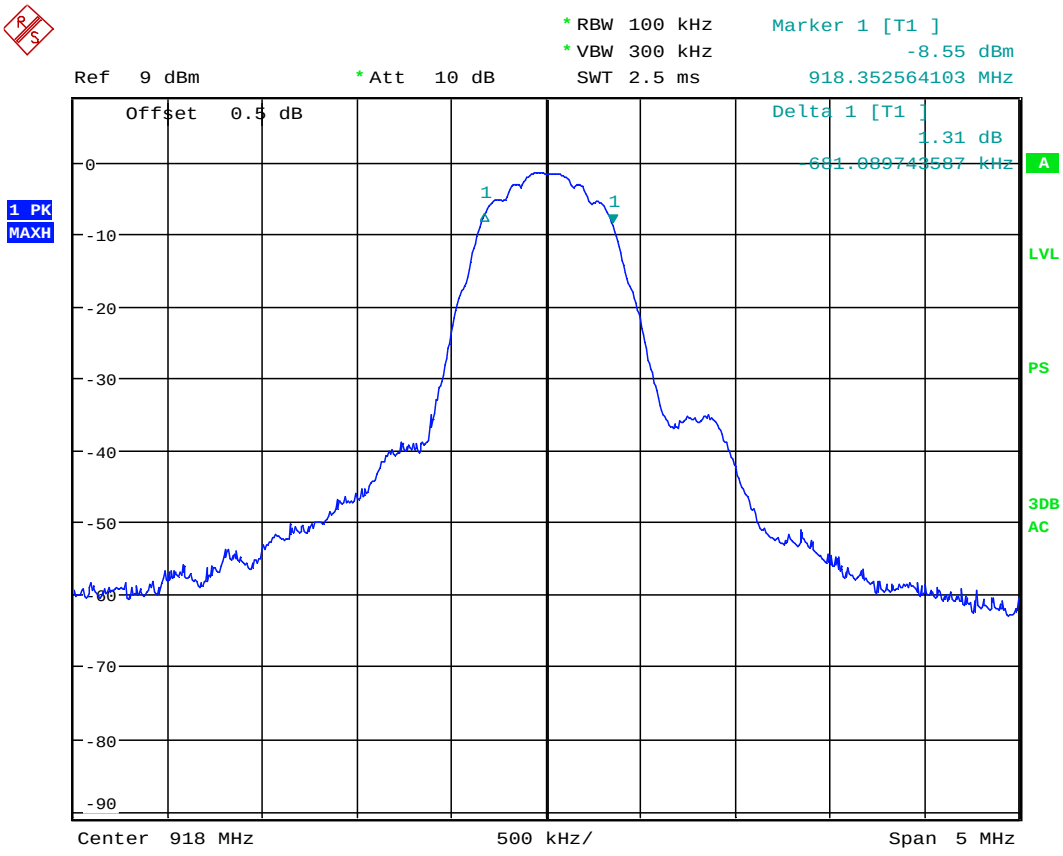
6-dB bandwidth is presented on plots 1.1 – 1.3.
Occupied Bandwidth is presented on plots 1.4 – 1.6.

Plot 1. 1



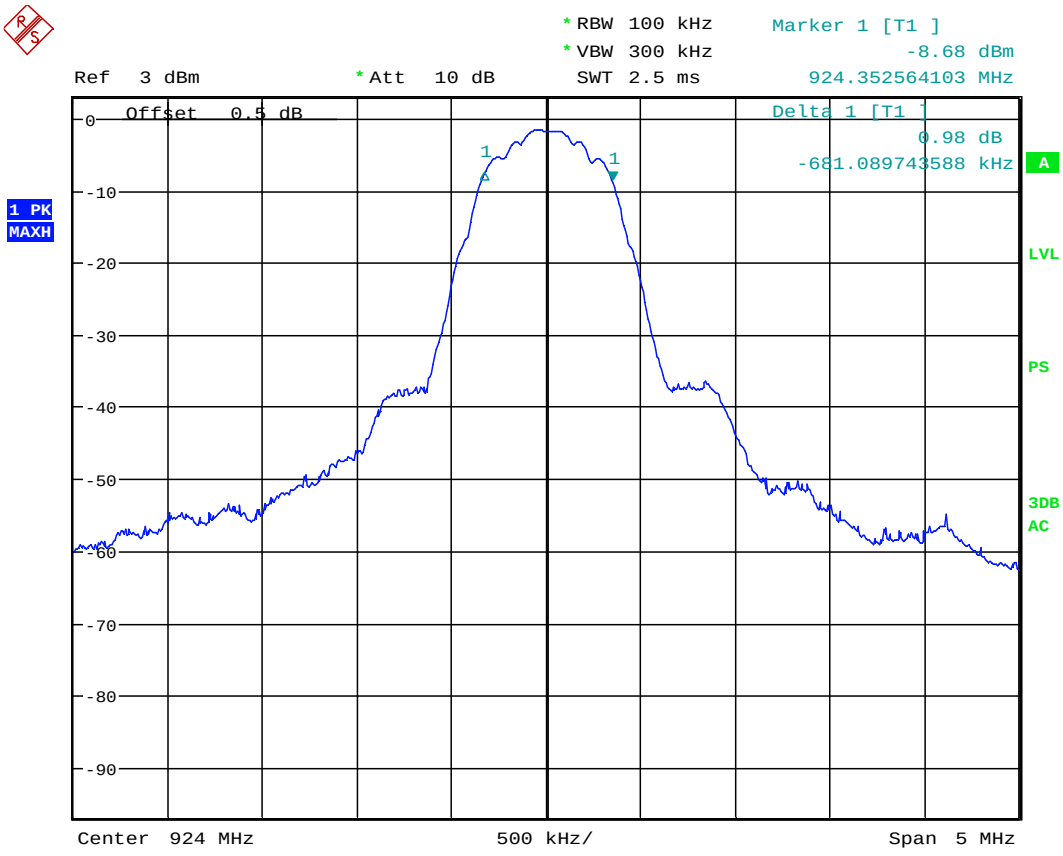
6-dB bandwidth

Plot 1. 2



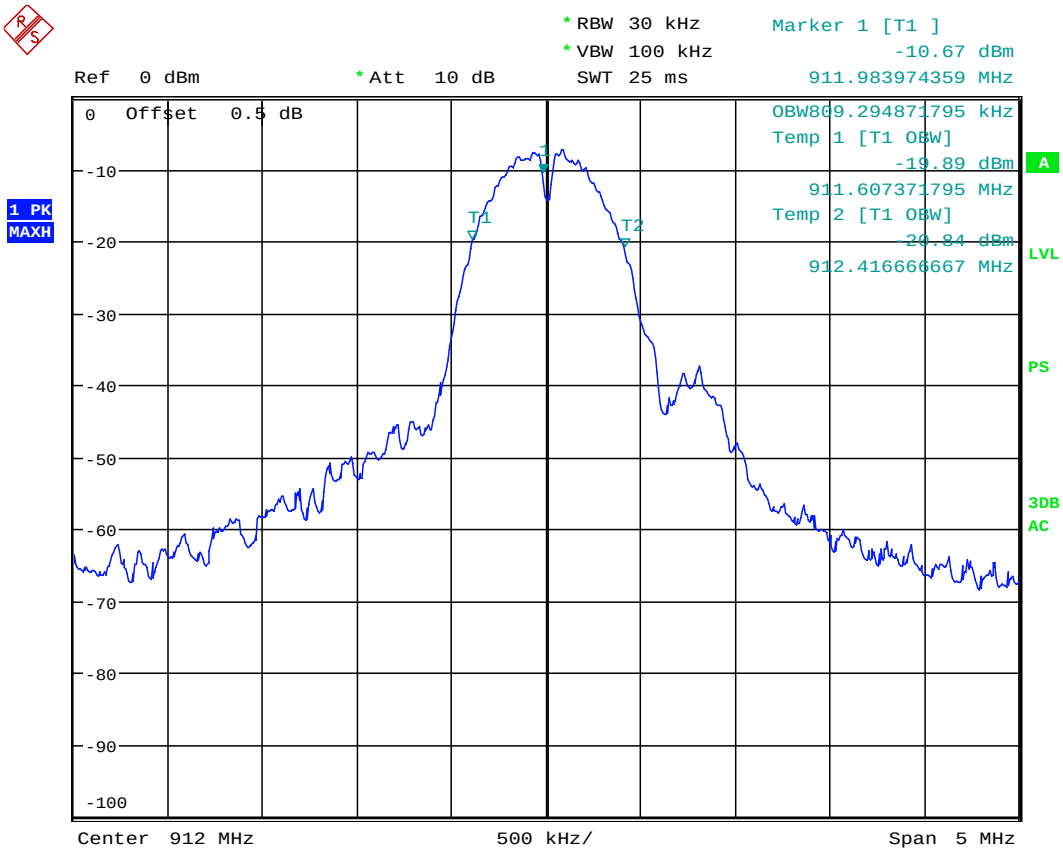
6-dB bandwidth

Plot 1. 3



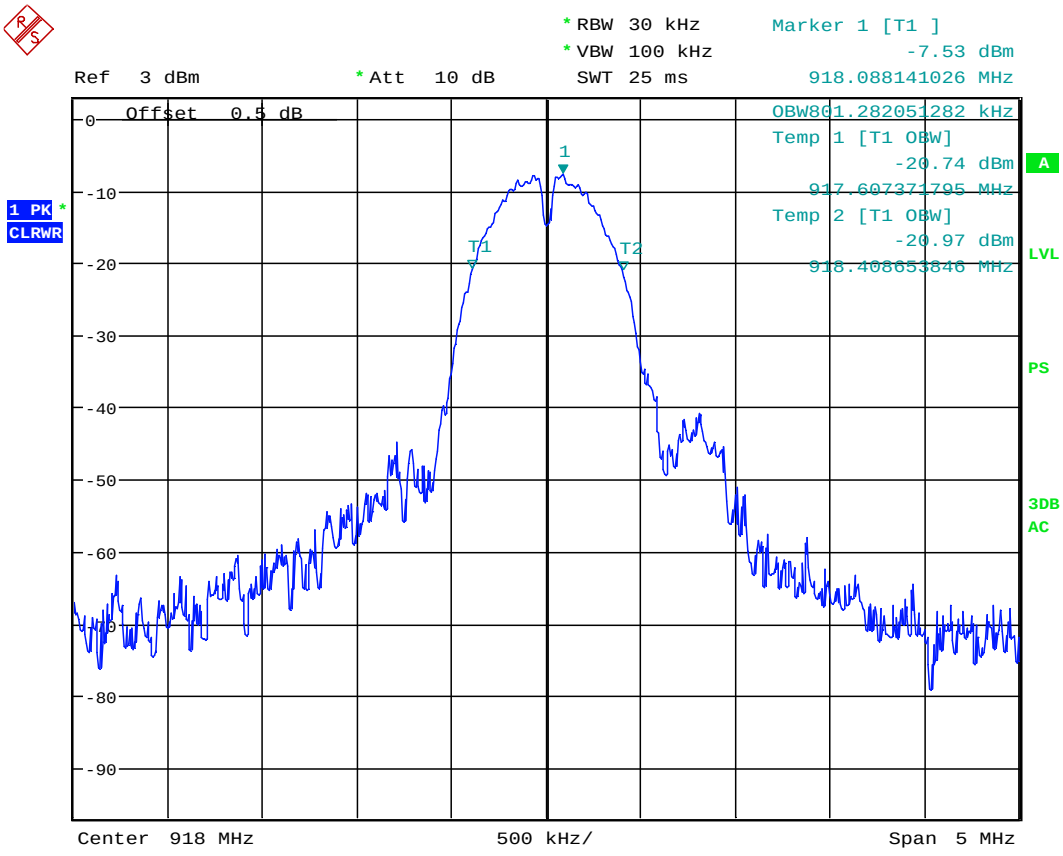
6-dB bandwidth

Plot 1. 4



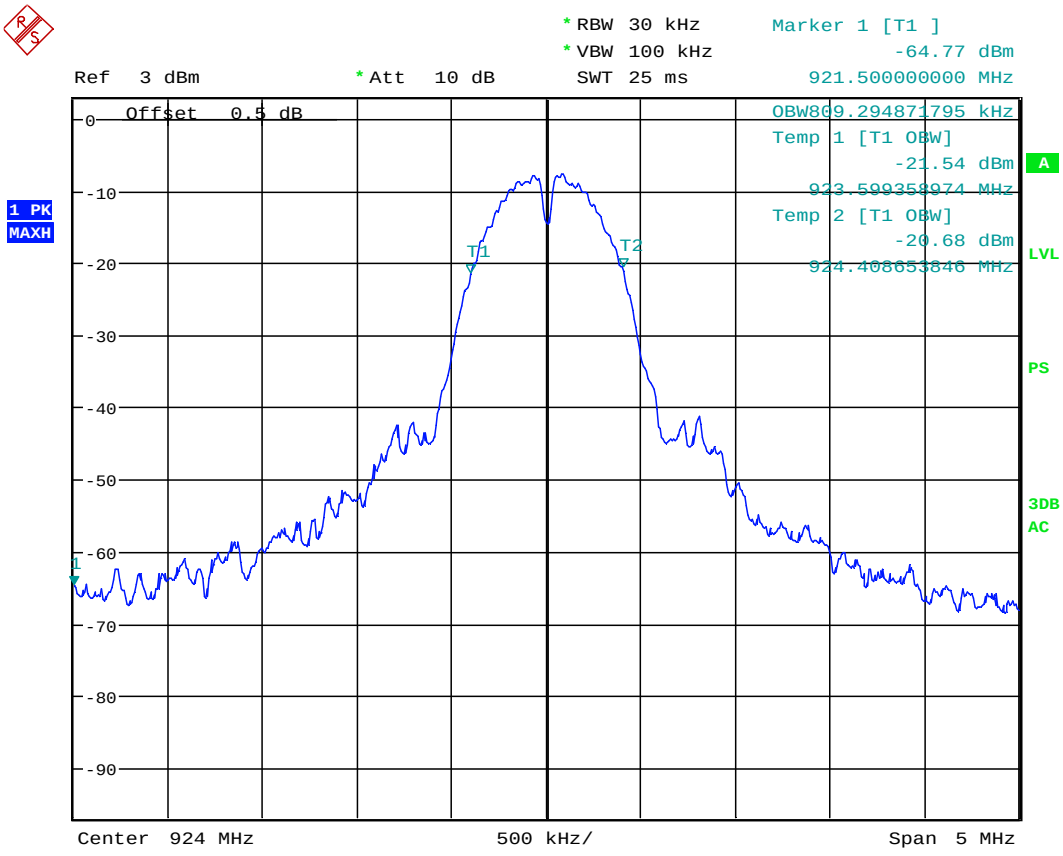
Occupied bandwidth

Plot 1.5



Occupied bandwidth

Plot 1. 6



Occupied bandwidth

4.2 Maximum Conducted Output Power at Antenna Terminals
FCC Rule: 15.247(b)(3); RSS-210 A8.4;

4.2.1 Requirement

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt or 30 dBm.
For antennas with gains greater than 6 dBi, transmitter output level must be decreased appropriately, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2 Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer/power meter to measure the Maximum Conducted Transmitter Output Power.

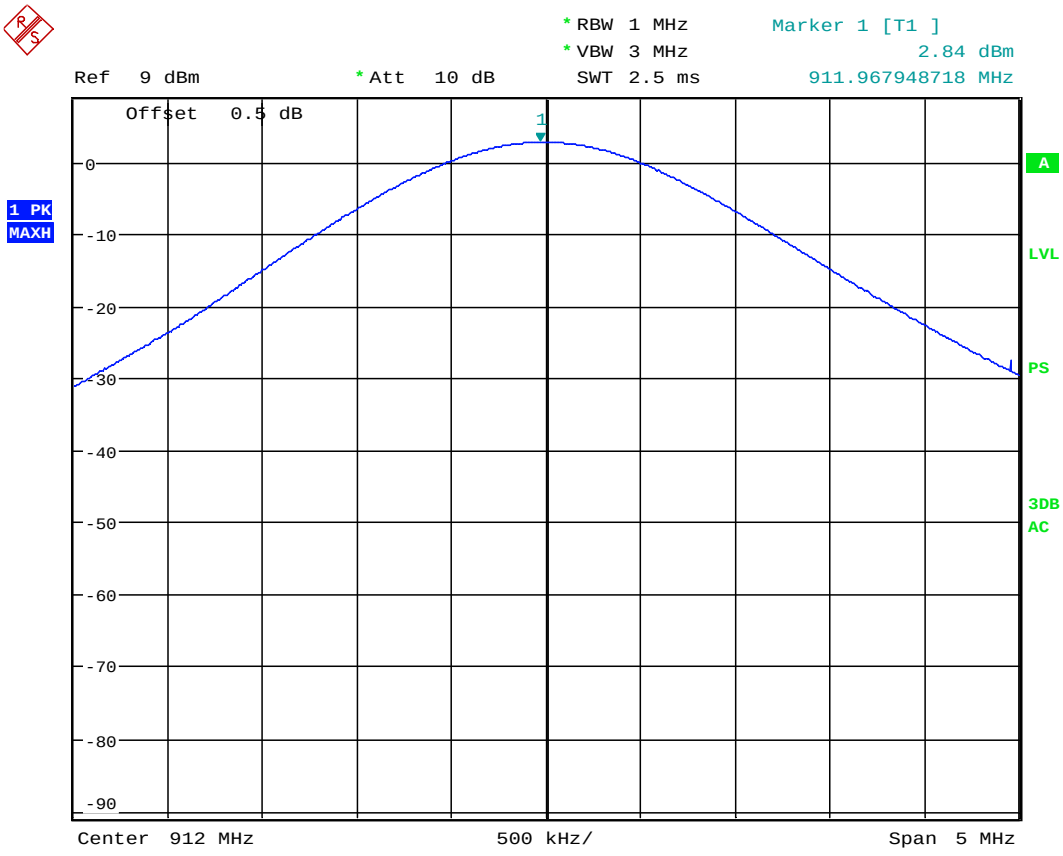
The procedure described in FCC Publication 558074, was used. Specifically, section 9.1.1., with peak detector and max hold function.

4.3.3 Test Result

Refer to the following plots for the test result

Frequency (MHz)	**Conducted Power (peak) dBm**	**Plot**
912.0	2.84	2.1
918.0	2.78	2.2
924.0	2.63	2.3

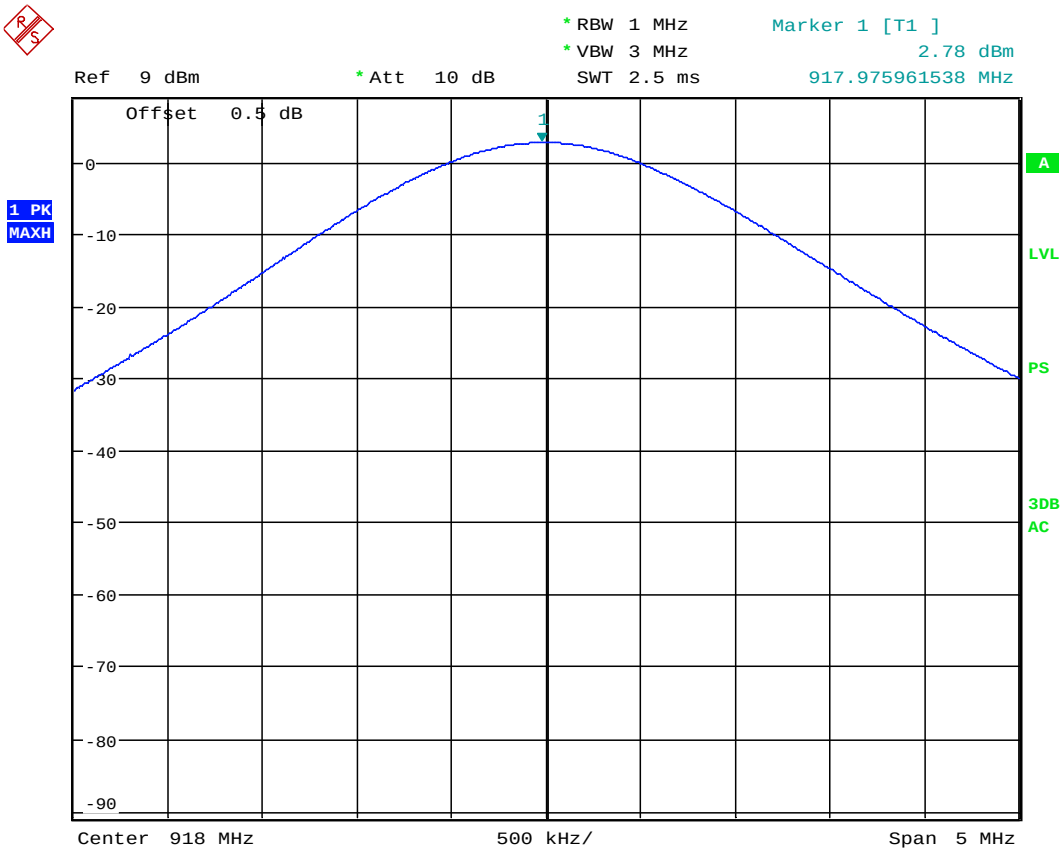
Plot 2. 1



Conducted Power

Date: 12.AUG.2013 17:07:13

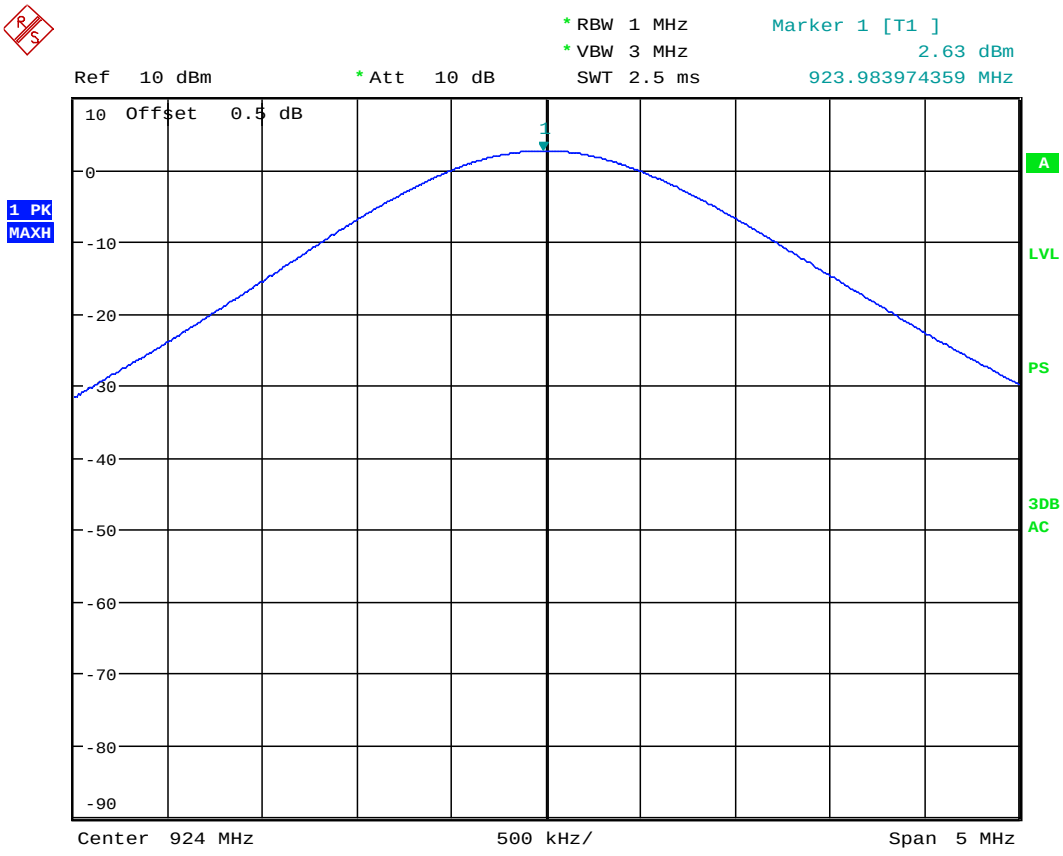
Plot 2. 2



Conducted Power

Date: 12.AUG.2013 17:09:13

Plot 2. 3



Conducted Power

Date: 12.AUG.2013 17:19:14

4.3 Maximum Power Spectral Density
FCC: 15.247 (e); RSS-210 A8.2b;

4.3.1 Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna should not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2 Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer to measure the Transmitter Power Density (PSD).

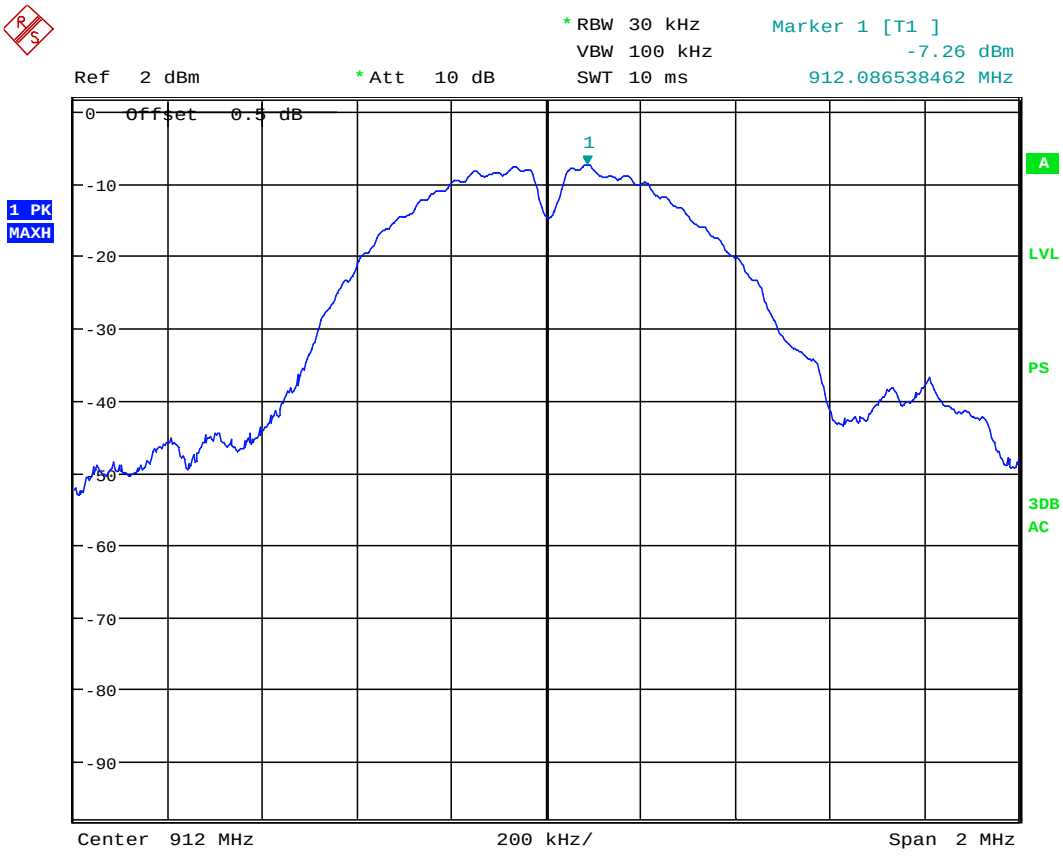
The procedure described in FCC Publication 558074 was used. Specifically, section 9.2, Option 2**,** with RMS detector and trace averaging mode over100 traces. Spectrum analyzer resolution bandwidth was set to 3 kHz and span to at least 1.5 times the DTS (6 dB) channel bandwidth.

4.3.3 Test Result

Refer to the following plots for the test result

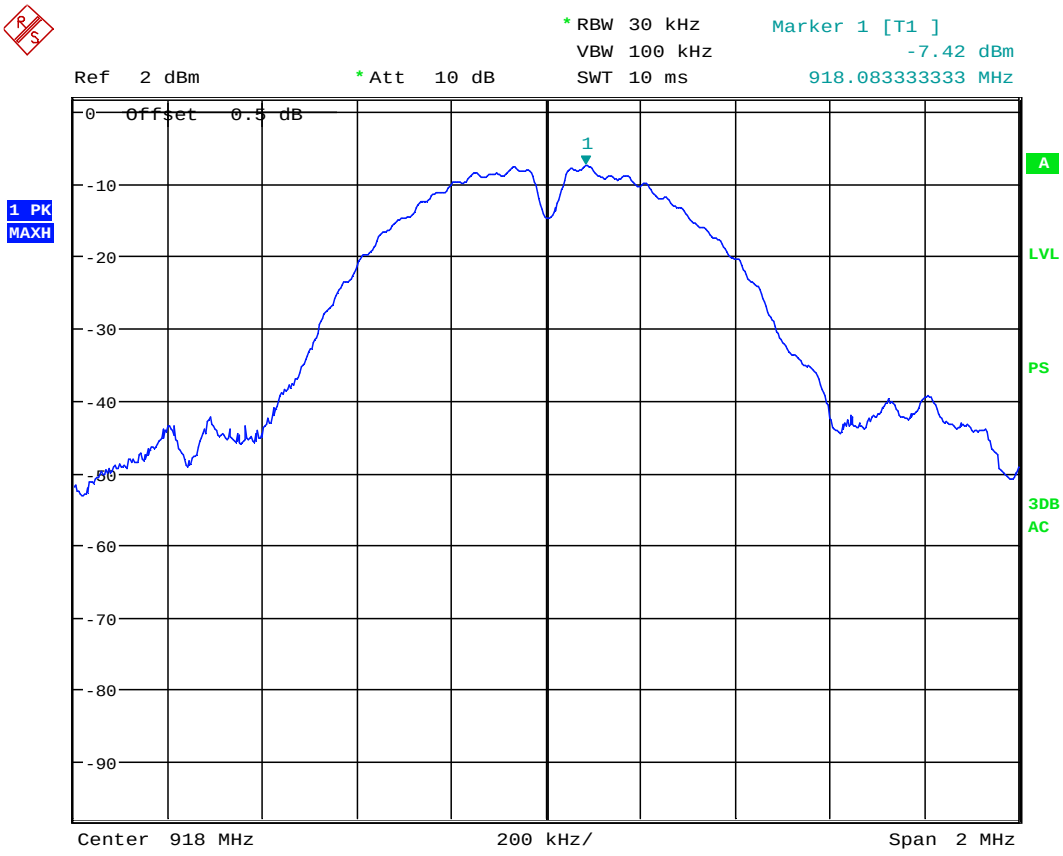
Frequency **MHz**	**Maximum Power Spectral Density** **dBm**	**Maximum Power Spectral Density Limit** **dBm**	**Margin** **dB**	**Plot**
912.0	-7.26	8.0	-15.26	3.1
918.0	-7.42	8.0	-15.42	3.2
924.0	-7.59	8.0	-15.59	3.3

Plot 3. 1



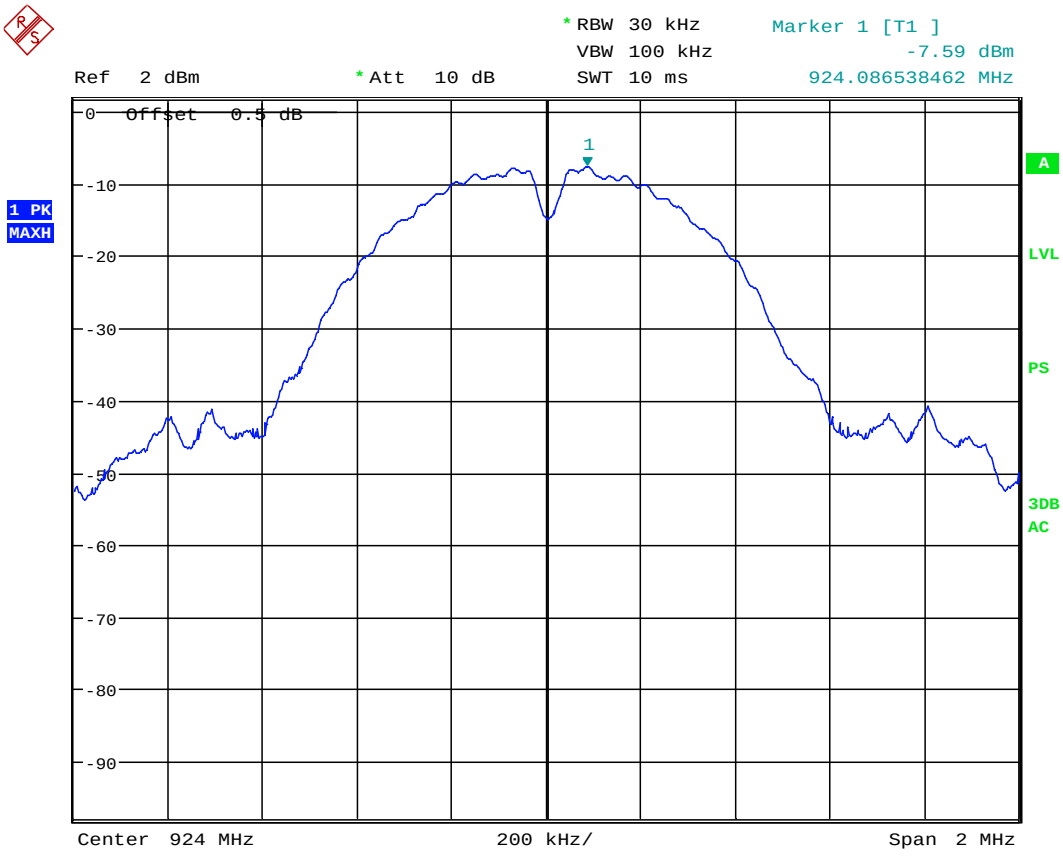
Maximum Power Spectral Density

Plot 3. 2



Maximum Power Spectral Density

Plot 3. 3



Maximum Power Spectral Density

4.4 Unwanted Conducted Emissions
FCC: 15.247(d); RSS-210 A8.5;

4.4.1 Requirement

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be below the maximum in-band 100 kHz emissions by at least 20 dB (if peak power of in-band emission is measured) or 30 dB (if average power of in-band emission is measured).

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

4.4.2 Procedure

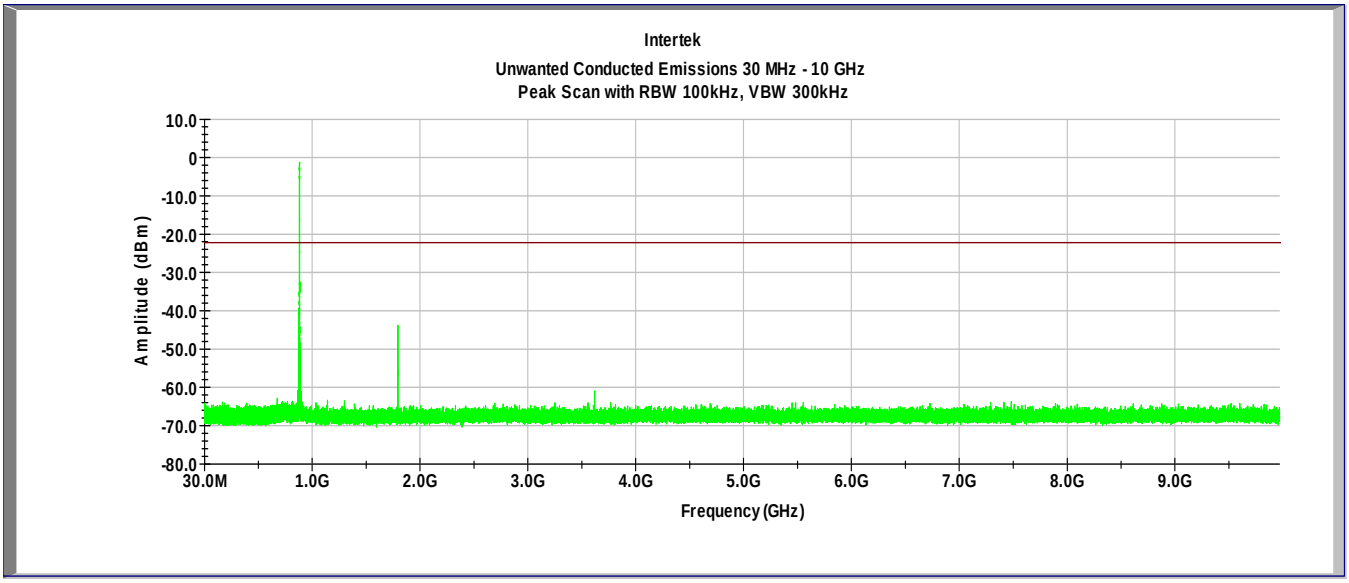
A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated, the unwanted peak emission measurements (with max hold) were performed.

The unwanted emissions were measured from 30 MHz to 10 GHz.

4.4.3 Test Result

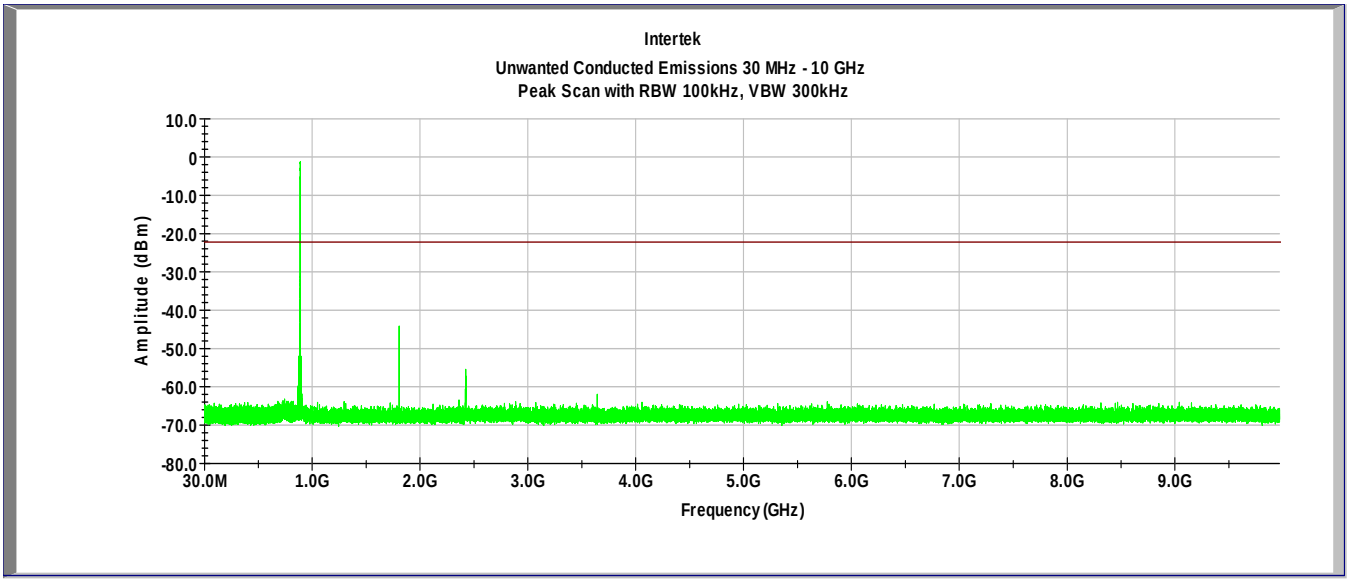
Refer to the following plots 4.1 – 4.3 for unwanted conducted emissions. The plot shows -20dB attenuation limit line.

Plot 4.1



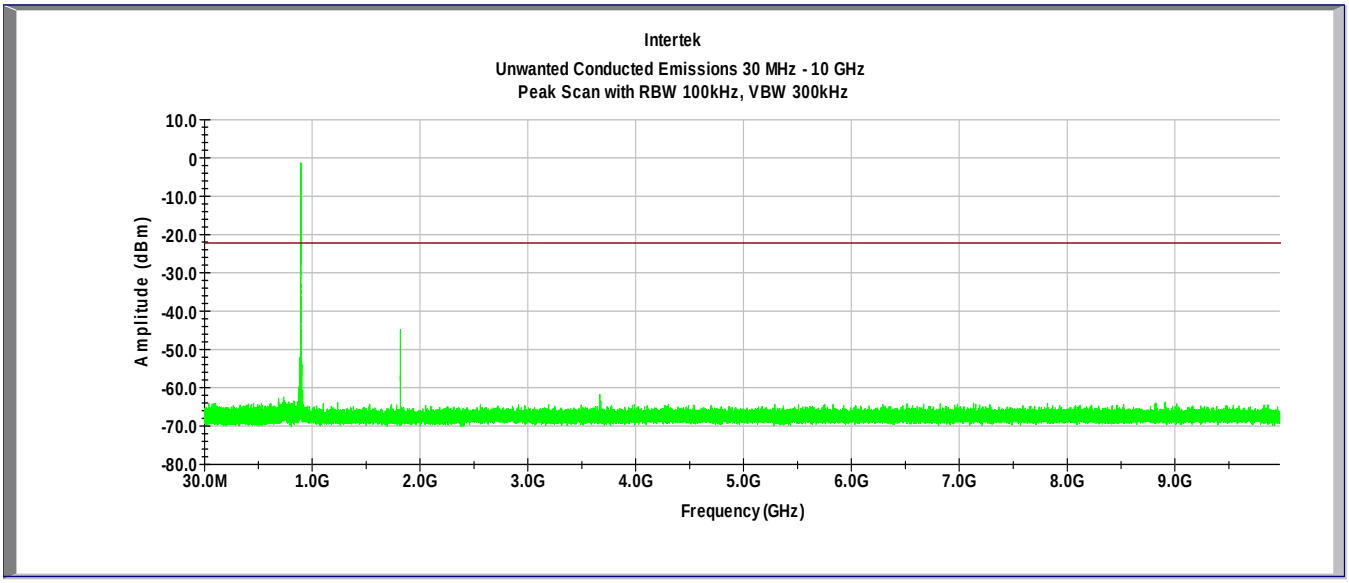
Tx @ 912 MHz

Plot 4.2



Tx @ 918 MHz

Plot 4.3



Tx @ 924 MHz

Results	**Complies**

4.5 Transmitter Radiated Emissions
FCC Rules: 15.247(d), 15.209, 15.205; RSS-210;

4.5.1 Requirement

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be below the maximum in-band 100 kHz emissions by at least 20 dB (if peak power of in-band emission is measured) or 30 dB (if average power of in-band emission is measured).

4.5.2 Procedure

Radiated emission measurements were performed from 30 MHz to 10 GHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz. Above 1000 MHz Peak and Average measurements were performed.

The EUT is placed on a plastic turntable that is 80 cm in height. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters for frequencies above 1 GHz and at 10 meters for frequencies below 1 GHz.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels).

4.5.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV); AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

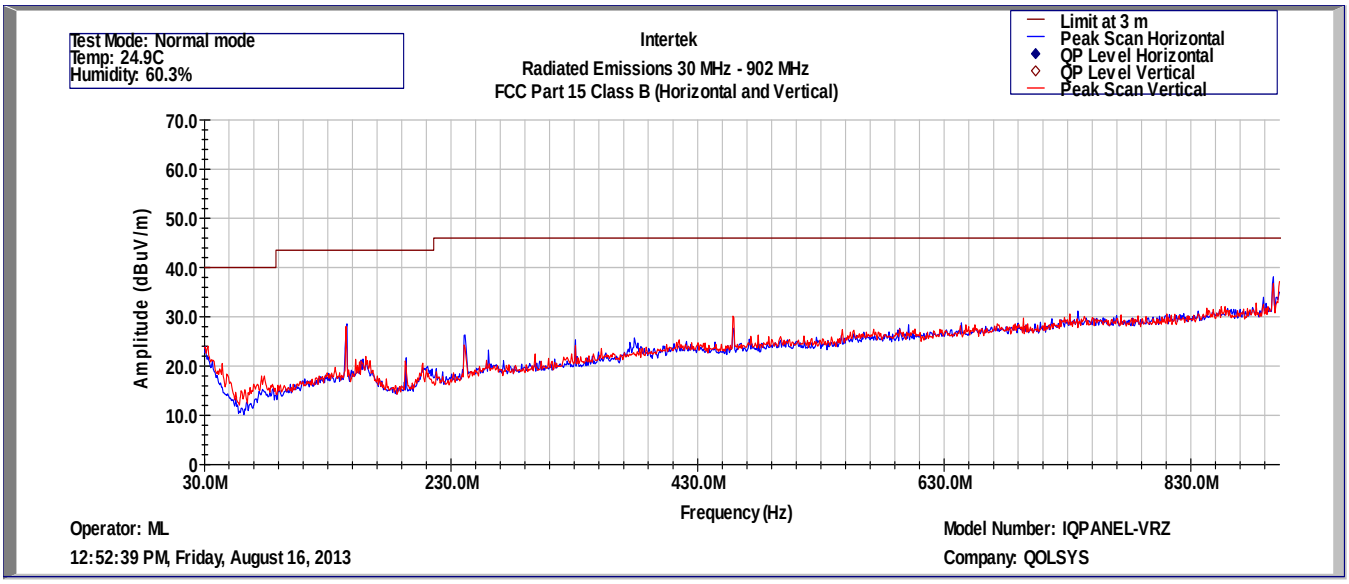
Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
AF = 7.4 dB(1/m)
CF = 1.6 dB
AG = 29.0 dB
FS = 52.0+7.4+1.6-29.0 = 32 dB(μV/m).
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m.

4.5.3 Test Results

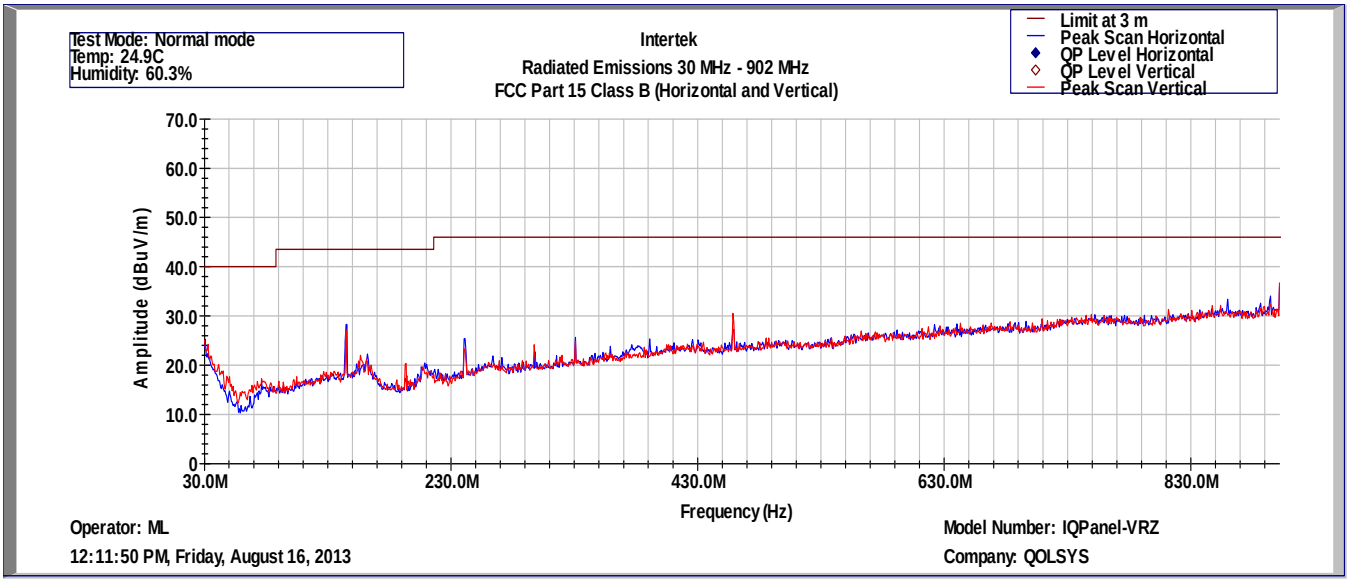
The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

The EUT passed 3.4dB.

Transmitter Radiated Emissions below 1GHz

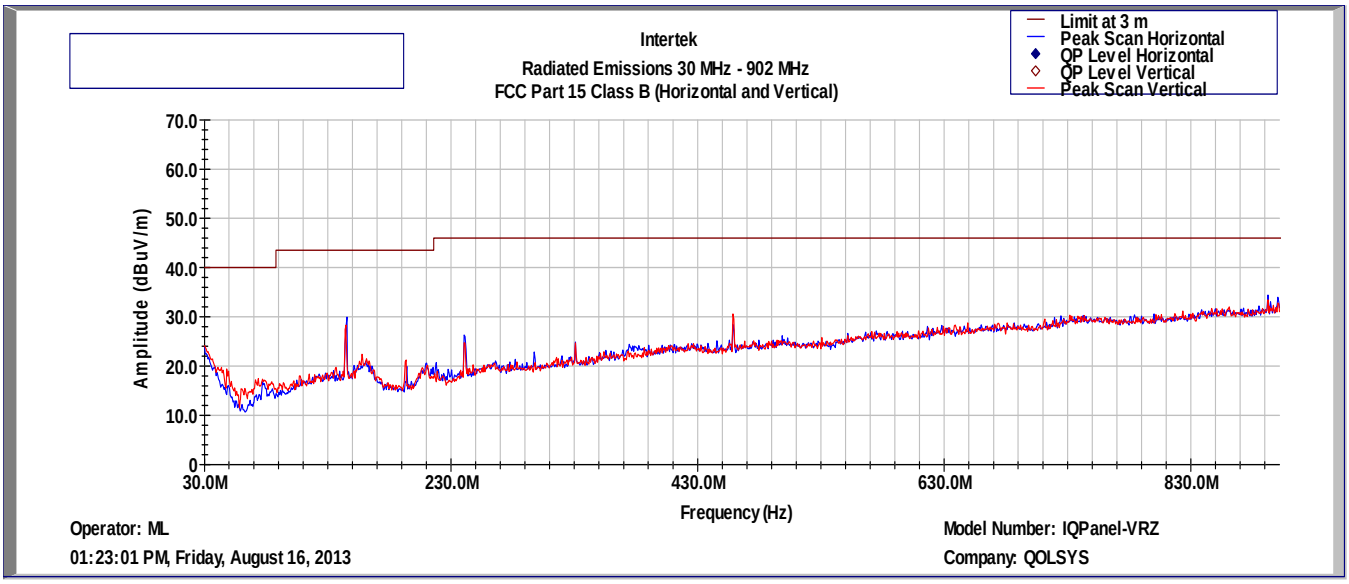


Plot 1: Tx @912MHz, Spurious Emissions, 30MHz to 902MHz, Peak

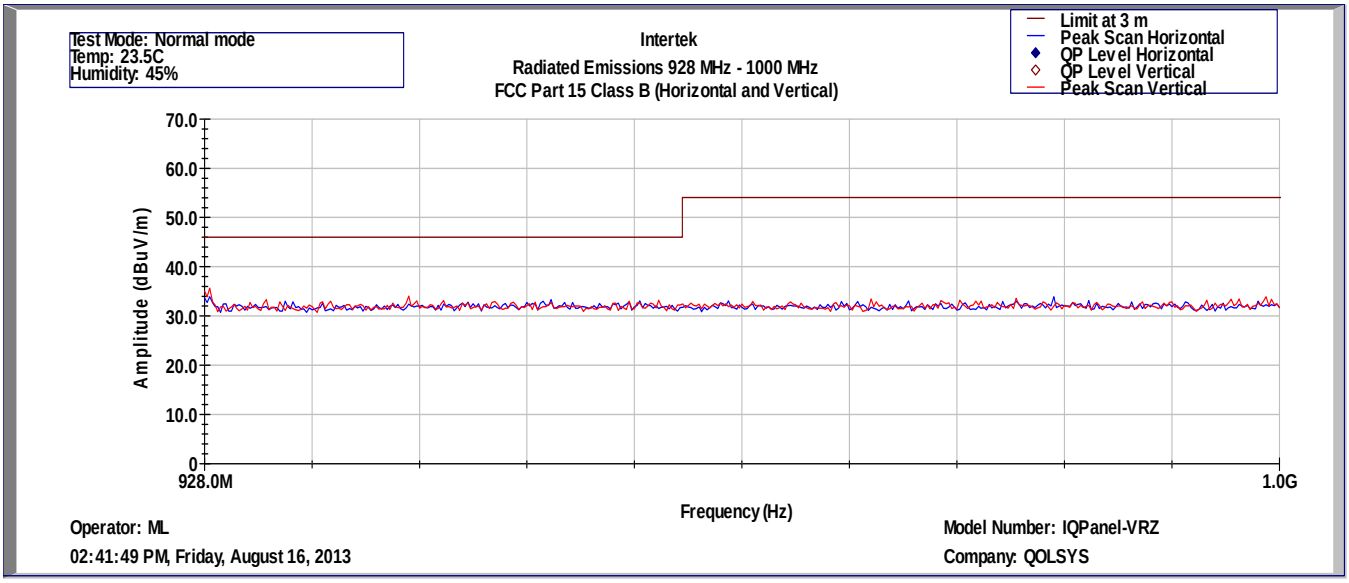


Plot 2: Tx @918MHz, Spurious Emissions, 30MHz to 902MHz, Peak

Transmitter Radiated Emissions below 1GHz

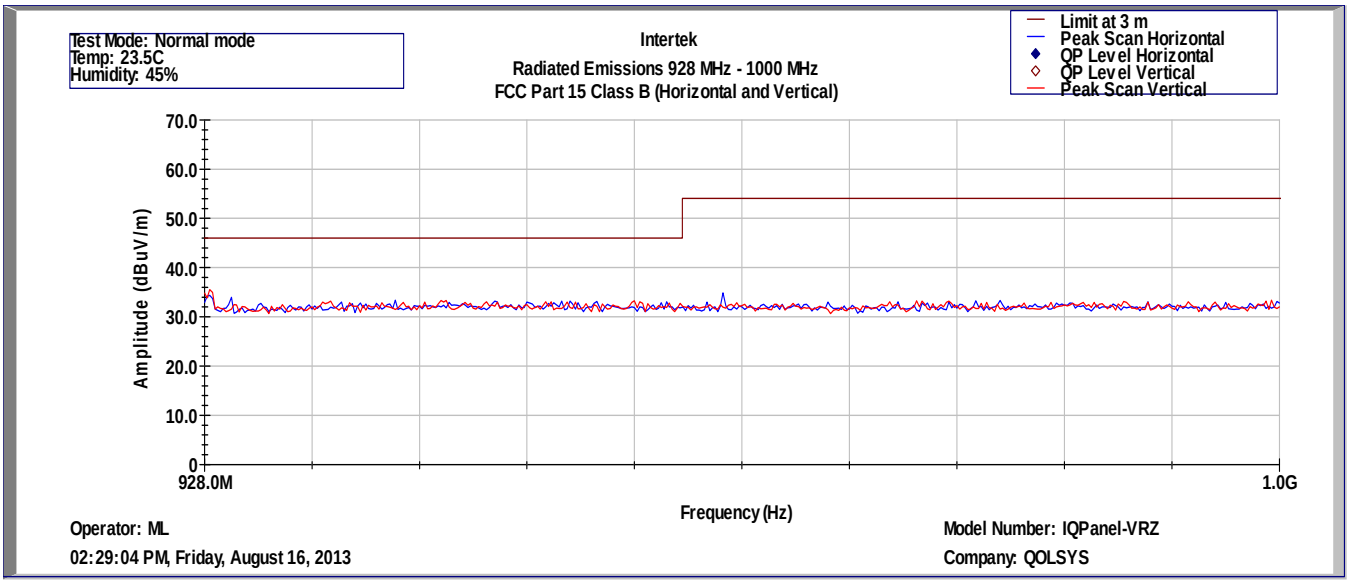


Plot 3: Tx @924MHz, Spurious Emissions, 30MHz to 902MHz, Peak

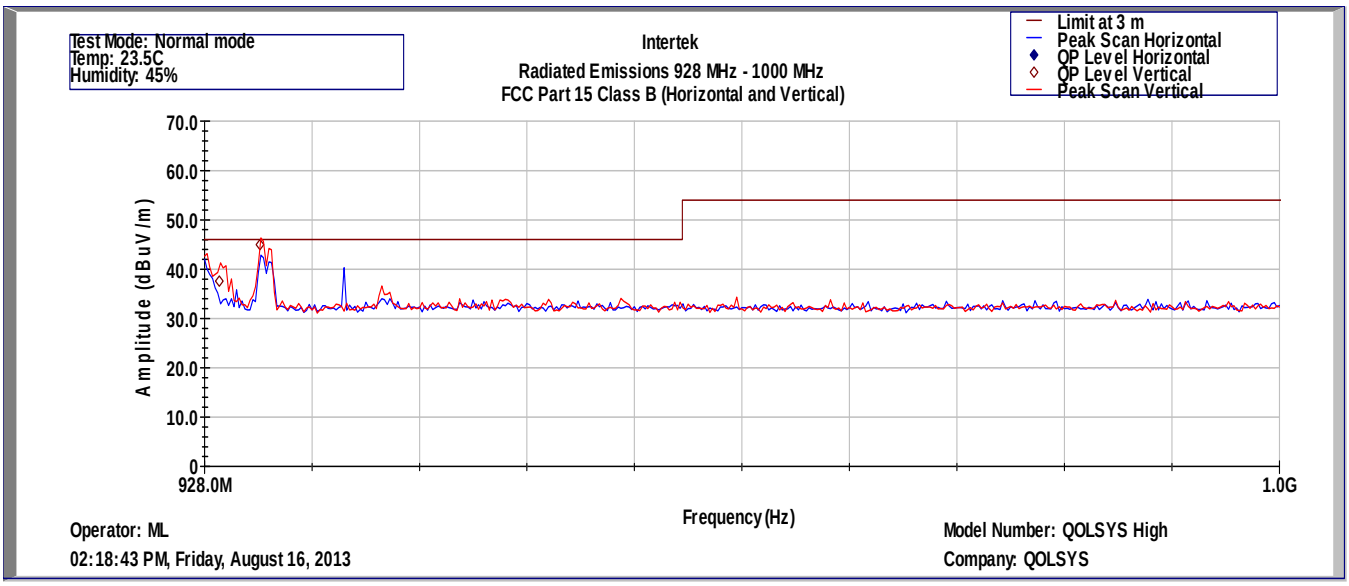


Plot 4: Tx @912MHz, Spurious Emissions, 928MHz – 1000MHz, Peak

Transmitter Radiated Emissions below 1GHz



Plot 5: Tx @918MHz, Spurious Emissions, 928MHz – 1000MHz, Peak



Plot 6: Tx @924MHz, Spurious Emissions, 928MHz – 1000MHz, Peak

Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Vertical)

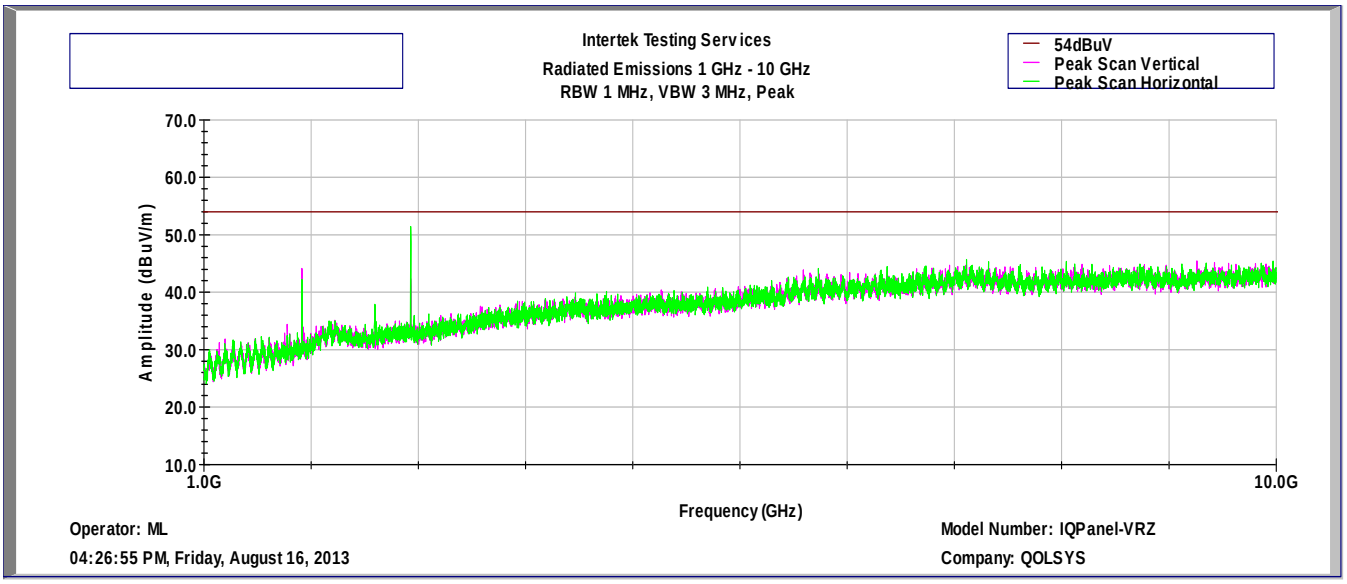
Operator: ML Model Number: IQPanel-VRZ
16-Aug-13 Company: QOLSYS

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
9.29E+08	38.8	71.9*	-33.1	11.3	3.6	0	0	23.9
9.32E+08	46.0	71.9*	-25.9	18.5	3.6	0	0	23.9

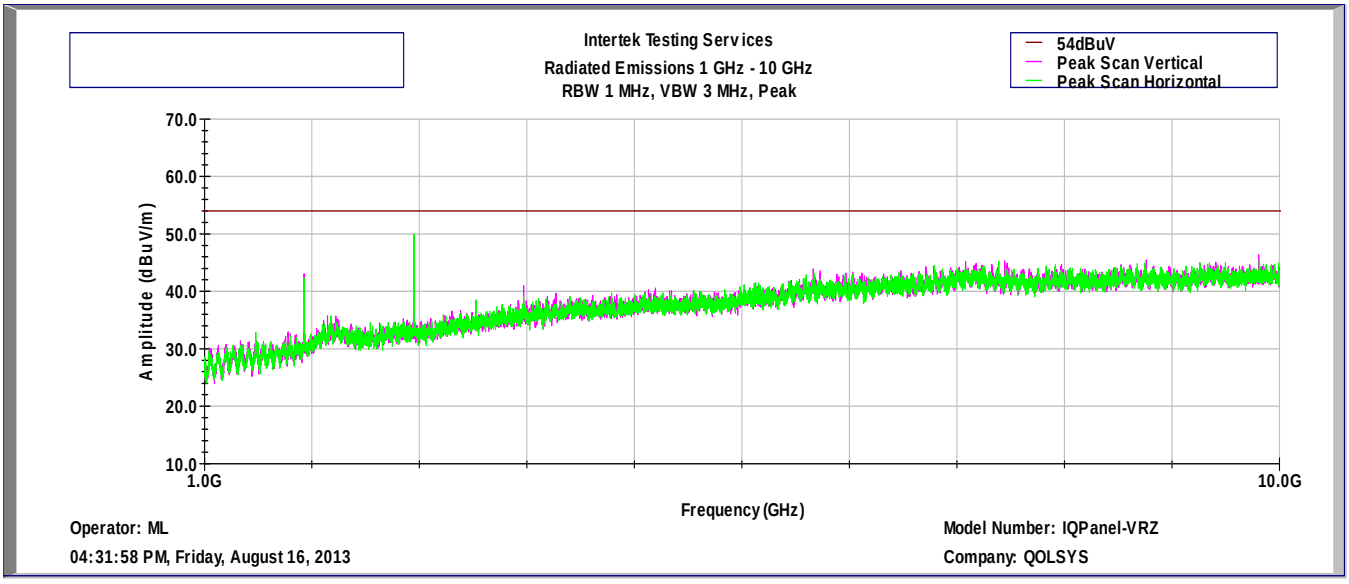
* Peak power measured in in-band emission was 91.9 dB(μV/m). Hence 71.9 dB(μV/m) is considered as limit level which is 20dB below the in-band emissions.

Test Mode: Tx@924MHz
Temp: 23.5C
Humidity: 45%

Transmitter Radiated Emissions Above 1GHz

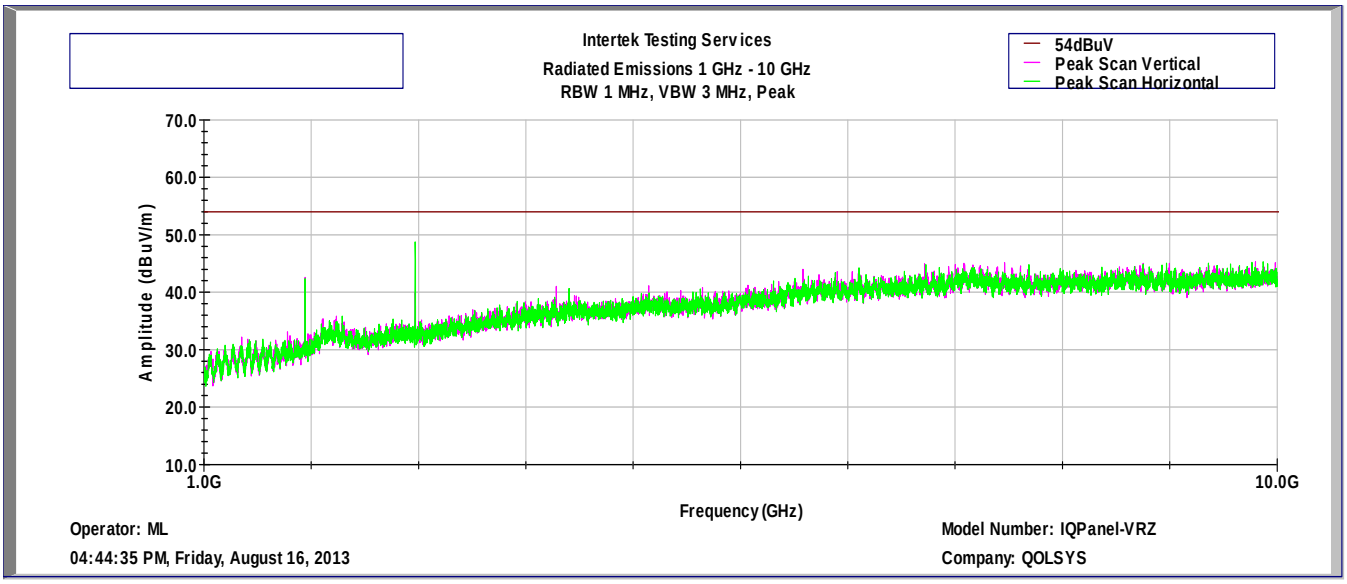


Plot 7: Tx @912MHz, Spurious Emissions, 1GHz – 10GHz, Peak



Plot 8: Tx @918MHz, Spurious Emissions, 1GHz – 10GHz, Peak

Transmitter Radiated Emissions Above 1GHz



Plot 9: Tx @924MHz, Spurious Emissions, 1GHz – 10GHz, Peak

Transmitter Radiated Emissions above 1GHz

Frequency MHz	SA reading dB(uV)	Detector	Antenna Factor dB(1/m)	Cable Factor dB	Amplifier Gain dB	FS dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Tx @ 912 MHz								
2736	53.6	Peak	28.8	4.5	34.1	52.8	74.0	-21.2
2736	36.5	Average	28.8	4.5	34.1	35.7	54.0	-18.3
3648	37.2*	Peak	30.9	5.2	34.8	38.4**	74.0	-35.6
Tx @ 918 MHz								
2754	51.4	Peak	28.7	4.5	34.0	50.6**	74.0	-23.4
3672	40.4*	Peak	31.0	5.2	34.7	41.9**	74.0	-32.1
Tx @ 924 MHz								
2772	51.0	Peak	28.7	4.5	34.0	50.2**	74.0	-23.8
3696	39.3*	Peak	31.1	5.2	34.7	40.9**	74.0	-33.1

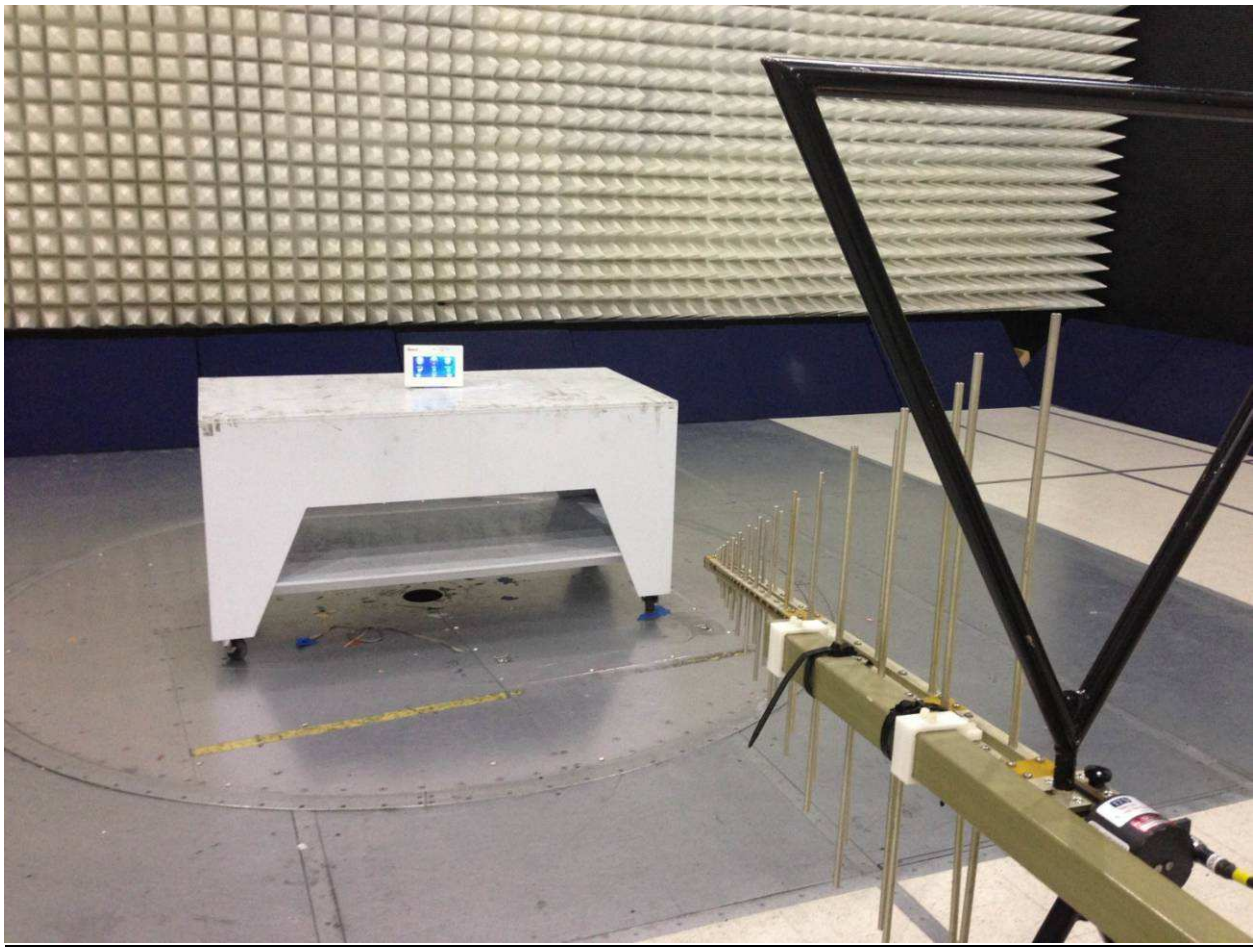
*Noise floor.

** Peak FS < Average FS Limit [54 dB(uV/m)]

Note: All other emissions not reported are noise floor which is at least 10 dB below the limit.

4.5.4 Test setup photographs

The following photographs show the testing configurations used.



4.5.4 Test setup photographs (Continued)

4.6 Radiated Emissions from Digital Parts
FCC Ref: 15.109

4.6.1 Requirement

Limits for Electromagnetic Radiated Emissions, FCC Section 15.109(b) and ICES 003 *

Frequency (MHz)	Class A at 10m dB(µV/m)	Class B at 3m dB(µV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

4.6.2 Procedure

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz and with the average detector instrument in the frequency range above 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 10 meters from the EUT. If the field-strength measurements at 10m cannot be made because of high ambient noise level or for other reasons, measurements of Class B equipment may be made at a closer distance, for example 3m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for a larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4 (2003).

Example Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor to from the measured reading, followed by subtracting the Amplifier Gain (if any) and Distance Correction Factor (if any). The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – PA – DCF
Where FS = Field Strength in dB (μV/m)
RA = Receiver Amplitude (including preamplifier) in dB (μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB (1/m)
AG = Amplifier Gain in dB
DCF=Distance Correction Factor in dB
(Formula: DCF = $20\log_{10}$ (measurement distance/specification distance)

Assume a receiver reading of 52.0 dB (μV) is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB and DCF of 10.5 dB (DCF in this example: $20\log_{10}$ (10/3)) is subtracted, giving field strength of 21.5 dB (μV/m).

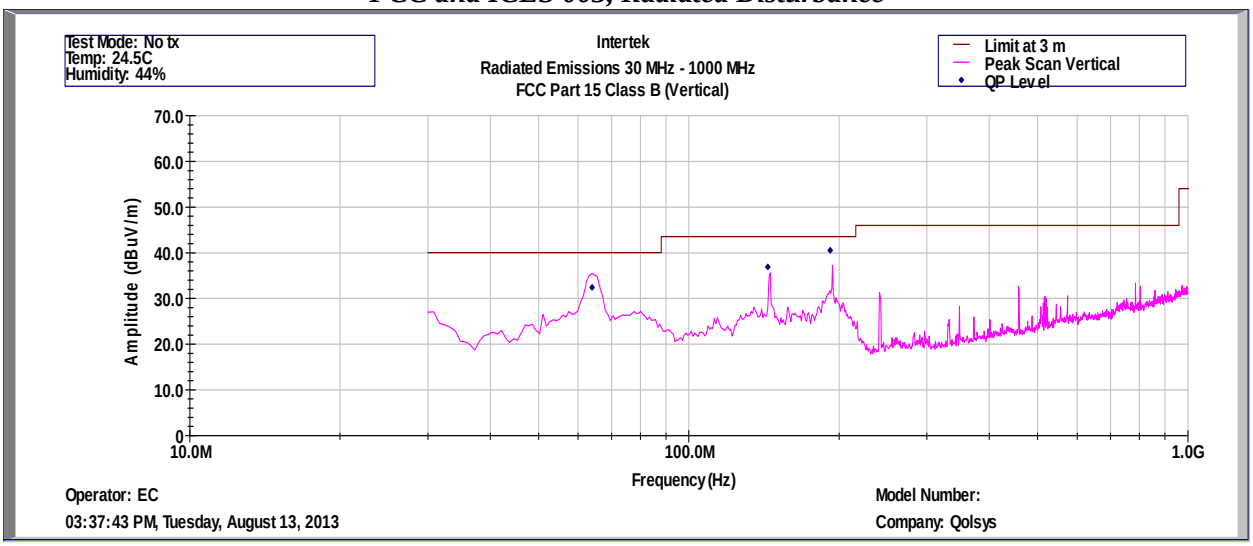
RA = 52.0 dB (μV)
AF = 7.4 dB (1/m)
CF = 1.6 dB
AG = 29.0 dB
DCF=10.5 dB
FS = RF + AF + CF – AG – DCF
FS = 52.0 + 7.4 + 1.6 – 29.0 – 10.5
FS = 21.5 dB (μV/m)

4.6.3 Test Results

Radiated emission measurements were performed from 30 MHz to 1000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater below 1000 MHz and 1 MHz - above 1000 MHz.

The EUT passed by 3.0 dB for Class B.

FCC and ICES 003, Radiated Disturbance



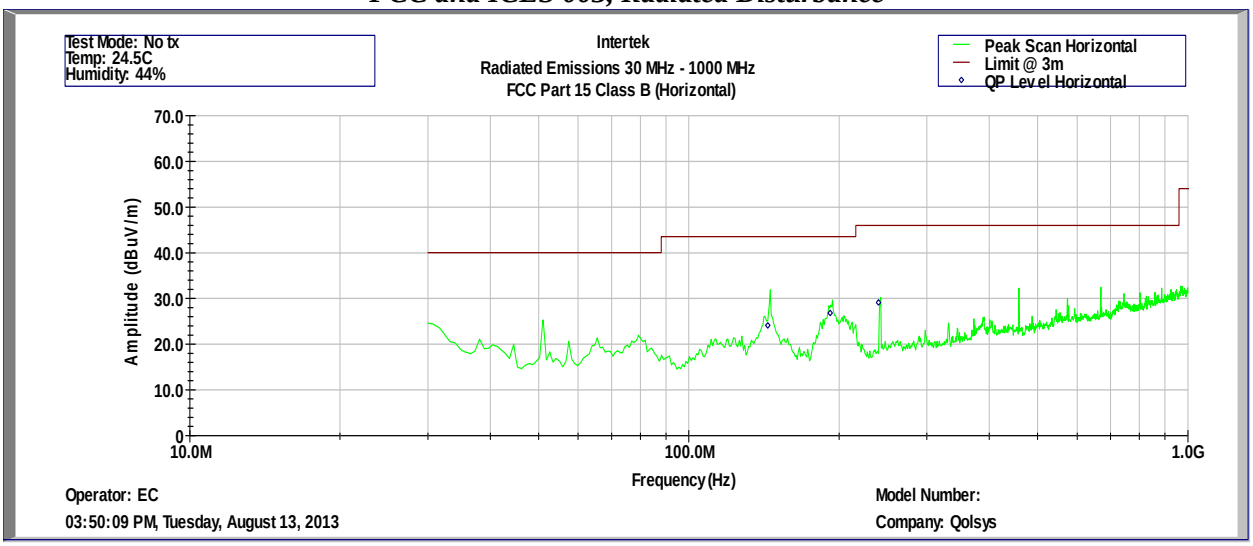
Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Vertical)

Operator: EC
August 13, 2013

Model Number: IQPanel-VRZ
Company: Qolsys, Inc

Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB	dB	dB	dB	dB(1/m)
6.40E+07	32.4	40	-7.6	47.7	0.9	32.1	10.5	5.8
1.44E+08	36.9	43.5	-6.6	46.5	1.4	32	10.5	11.2
1.92E+08	40.5	43.5	-3.0	52.2	1.6	32	10.5	9

Test Mode: Digital Parts Emissions
Temperature: 24.5 C
Humidity : 44 %



Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Vertical)

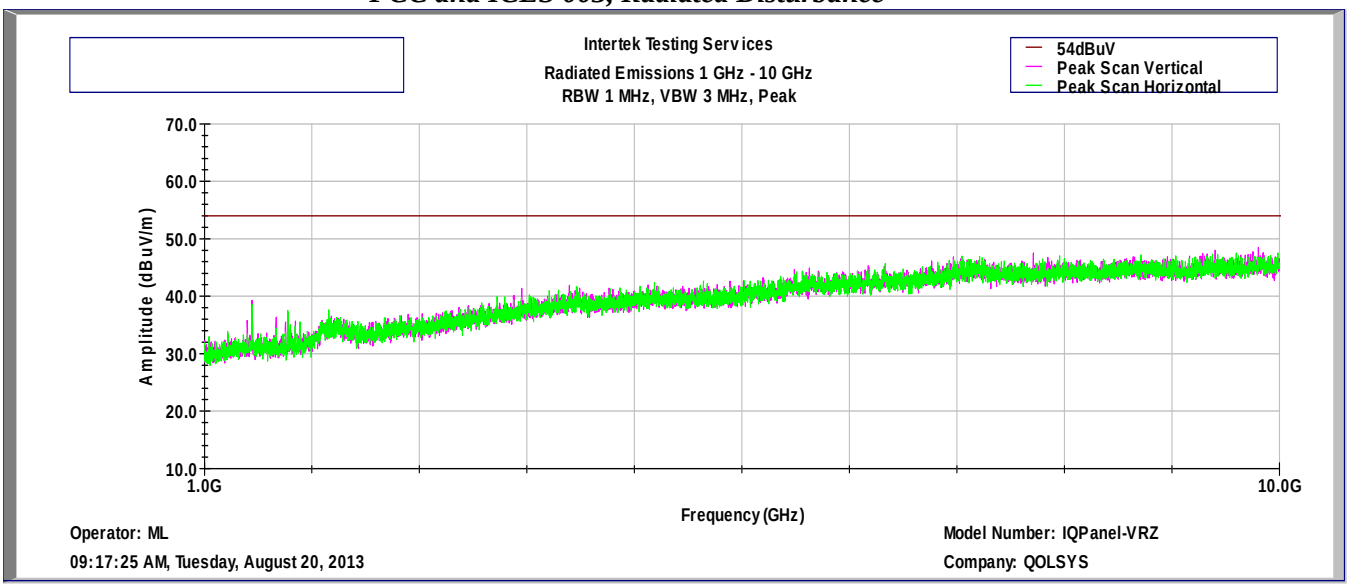
Operator: EC
August 13, 2013

Model Number: IQPanel-VRZ
Company: Qolsys, Inc

Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB	dB	dB	dB	dB(1/m)
1.44E+08	24.1	43.5	-19.4	33.7	1.4	32	10.5	11.2
1.92E+08	26.8	43.5	-16.7	38.5	1.6	32	10.5	9.0
2.40E+08	29.1	46.0	-16.9	38.5	1.8	32	10.5	11.2

Test Mode: Digital Parts Emissions
Temperature: 24.5 C
Humidity : 44 %

FCC and ICES 003, Radiated Disturbance



4.6.4 Test setup photographs

4.6.4 Test setup photographs (Continued)

4.7 AC Line Conducted Emission
FCC 15.207, 15.107

4.7.1 Requirement

Frequency Band MHz	Class B Limit dB(μV)		Class A Limit dB(μV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

*Note: *Decreases linearly with the logarithm of the frequency*
At the transition frequency the lower limit applies.

4.7.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

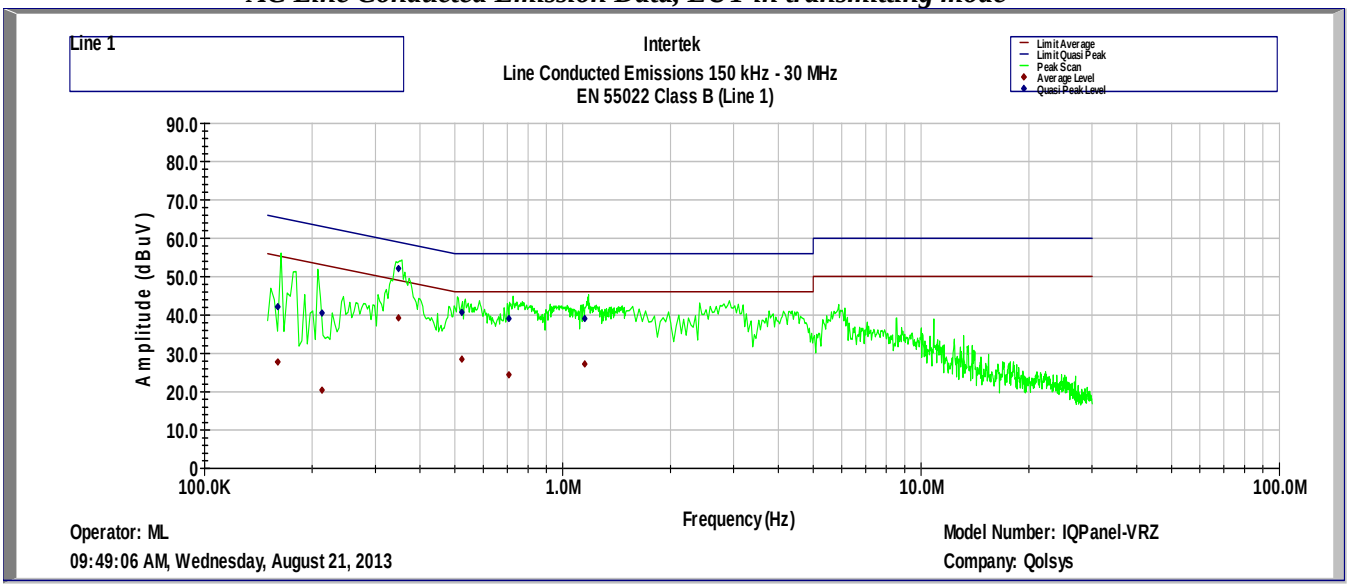
The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

4.7.3 Test Result

AC Line Conducted Emission Data, EUT in transmitting mode



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC Class B (Line 1)

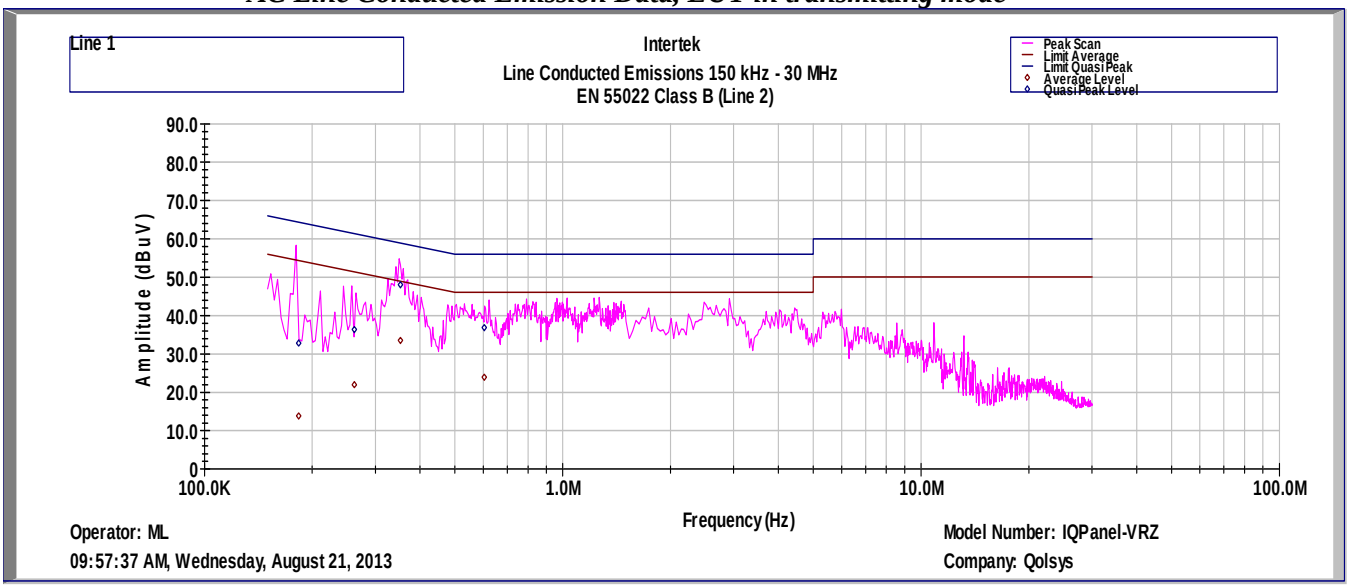
Operator: ML
August 21, 2013

Model Number: IQPanel-VRZ
Company: Qolsys, Inc

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
160248	27.7	42.2	55.7	65.7	-28	-23.5
213060	20.4	40.5	54.2	64.2	-33.8	-23.7
348300	39.2	52.1	50.3	60.3	-11.1	-8.2
522700	28.5	40.7	46	56	-17.5	-15.3
706740	24.4	39.1	46	56	-21.6	-16.9
1.15E+06	27.2	39	46	56	-18.8	-17

Test Mode: Transmitter On, 120V 60Hz
Temp.: 23.9C
Humidity: 52.9%

AC Line Conducted Emission Data, EUT in transmitting mode



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC Class B (Line 2)

Operator: ML
August 21, 2013

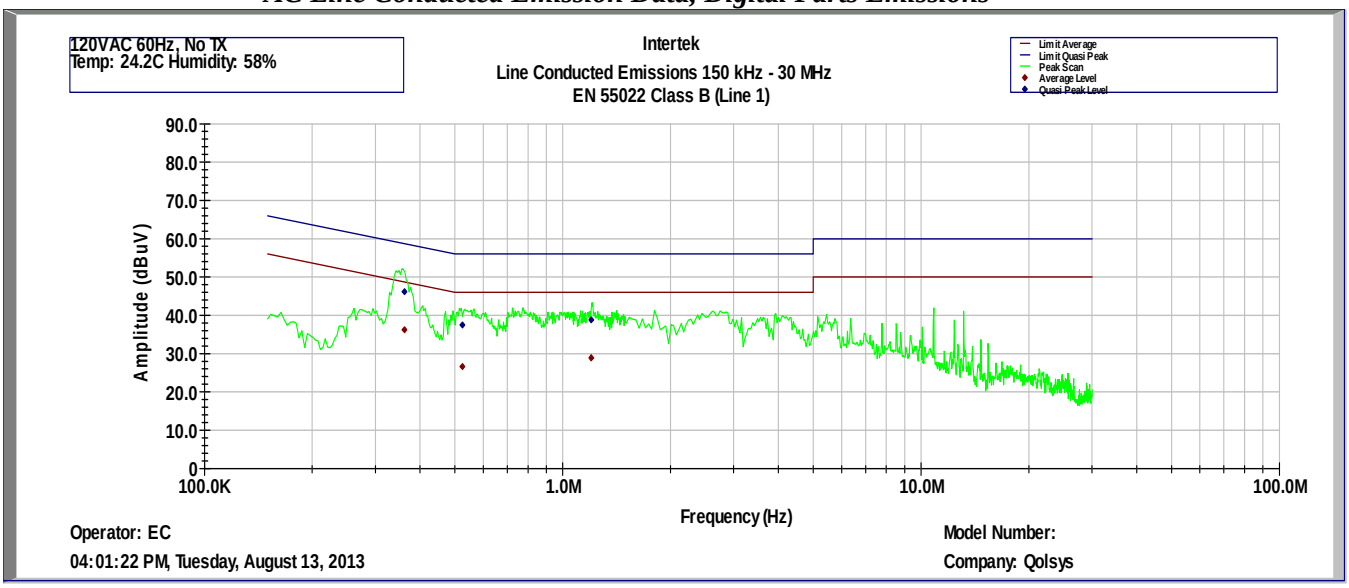
Model Number: IQPanel-VRZ
Company: Qolsys, Inc

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
183232	13.8	32.8	55.1	65.1	-41.2	-32.3
261840	22	36.3	52.8	62.8	-30.8	-26.5
352610	33.5	48	50.2	60.2	-16.7	-12.2
603480	23.9	36.9	46	56	-22.1	-19.1

Test Mode: Transmitter On, 120V 60Hz
Temp.: 23.9C
Humidity: 52.9%

Results	**Complies** by 2.0 dB

AC Line Conducted Emission Data, Digital Parts Emissions



Intertek
Line Conducted Emissions 150 kHz - 30 MHz
FCC Class B (Line 1)

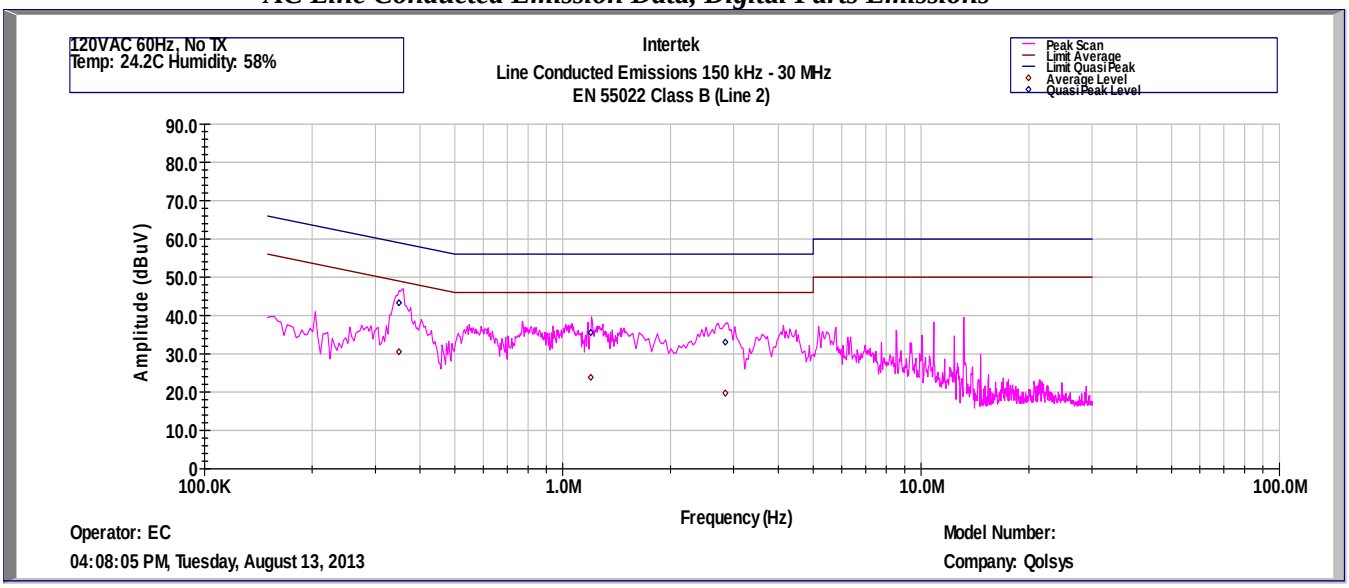
Operator: EC
August 13, 2013

Model Number: IQPanel-VRZ
Company: QOLSYS, Inc

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
361720	36.2	46.2	50	60	-13.8	-13.8
525090	26.7	37.4	46	56	-19.3	-18.6
1.20E+06	28.9	38.8	46	56	-17.1	-17.2

Test Mode: Transmitter Off, 120V 60Hz
Temp.: 24.2C
Humidity: 58%

AC Line Conducted Emission Data, Digital Parts Emissions



Intertek
Line Conducted Emissions 150 kHz - 30 MHz
FCC Class B (Line 2)

Operator: EC
August 13, 2013

Model Number: IQPanel-VRZ
Company: QOLSYS, Inc

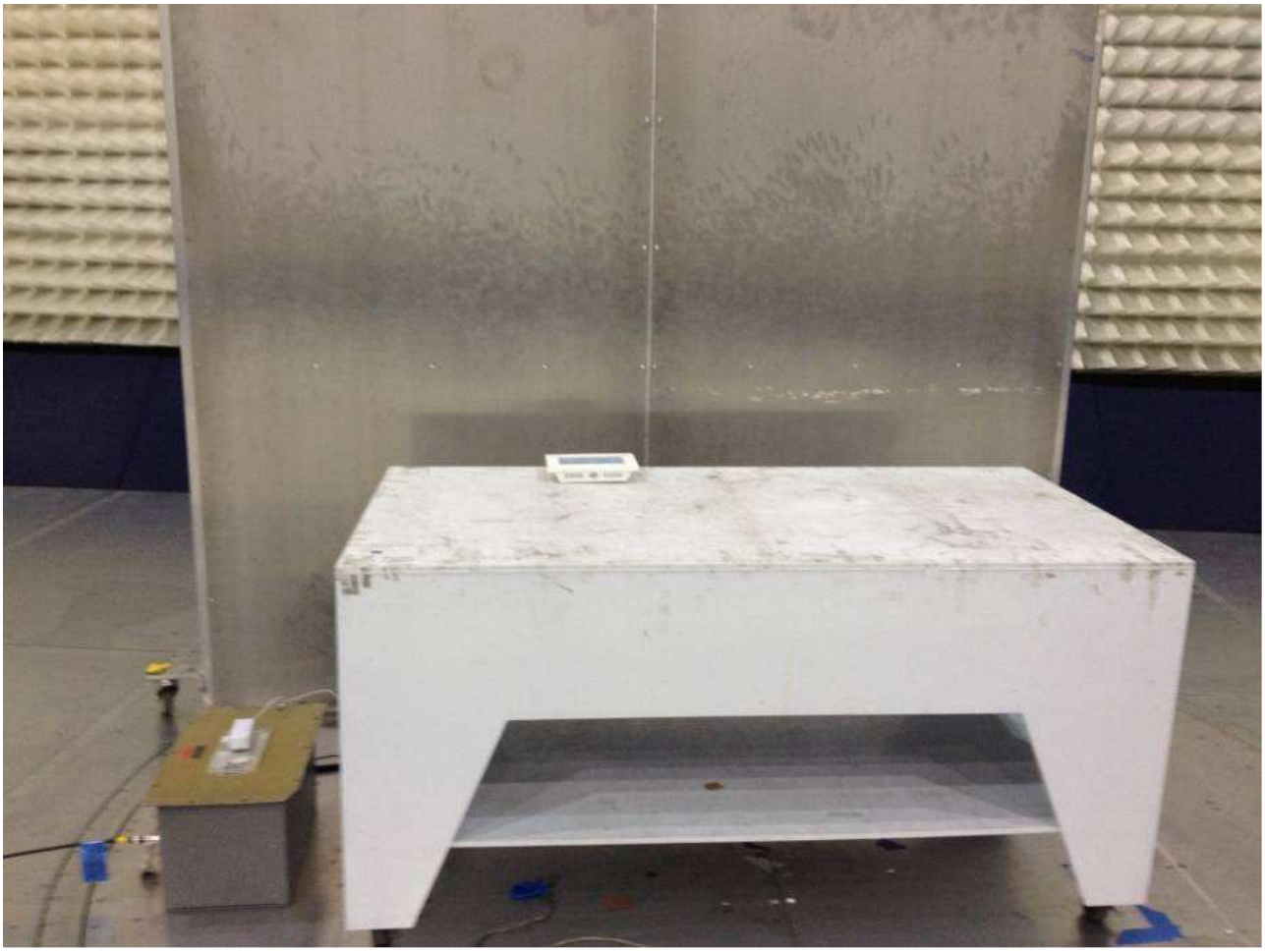
Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	**dBuV**	**dBuV**	**dBuV**	**dBuV**	**dB**	**dB**
348960	30.6	43.3	50.3	60.3	-19.8	-17
1.20E+06	23.8	35.5	46	56	-22.2	-20.5
2.84E+06	19.7	33.1	46	56	-26.3	-22.9

Test Mode: Transmitter Off, 120V 60Hz
Temp.: 24.2C
Humidity: 58%

Results	**Complies** by 4.3 dB

4.7.4 Test Configuration Photographs

The following photographs show the testing configurations used.



4.7.4 Test Configuration Photographs (Continued)

5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	03/12/14
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	03/12/14
Bilog Antenna	Teseq	CBL 6111D	31222	12	11/07/13
BI-Log Antenna	ARA	LPB-2513/A	1154	12	08/01/14
Pre-Amplifier	Sonoma Instrument	310	185634	12	12/12/13
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	02/28/14
Spectrum Analyzer	Rohde and Schwartz	FSP	100030	12	11/19/13
Horn Antenna	ETS Lindgren	3115	00126795	12	11/15/13
Pre-Amplifier (1-18GHz)	Miteq	AMF-4D-001180-24-10P	799159	12	09/10/13
Spectrum Analyzer	Rohde and Schwartz	ESU	100172	12	10/05/13
Spectrum Analyzer	Rohde and Schwarz	FSU	200482	12	04/05/14

No Calibration required

6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / G100825363	ML	August 21, 2013	Original document