

**Electromagnetic Compatibility
Test Report
RSS-119-ISSUE11,
FCC CFR47, PART 15, SUBPART B 15.109 &
FCC CFR47, PART 90, SUBPART I 90.217**

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International Accreditation Service Inc: Accredited Laboratory: No. TL-239

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Test Standard.....: RSS-119-ISSUE11
FCC CFR47, PART 15, SUBPART B 15.109
FCC CFR47, PART 90, SUBPART I 90.217

Test item description.....: DR2 UHF Transceiver Module



Manufacturer: Digital Control, Inc.
Model Number: DR2
FCC ID: KKGB2DIG1
IC: 2213A-B2DIG1



DR2 UHF Transceiver Module (EUT)



Revision History

Date	Report Number	Rev #	Details	Authors Initials
Oct-15- 2014	EJ0011-1401	0.0	Draft Test Report	JQ
Oct-16- 2014	EJ0031	1.0	Final Test Report	JQ
All previous versions of this Report have been superseded by the latest dated Revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.				

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Section I: GENERAL TEST INFORMATION

EMC TEST SUMMARY

The following tests demonstrate the testimony to "IC & FCC" Mark Electromagnetic compatibility testing for "DR2 UHF Transceiver Module" manufactured by Digital Control, Inc. The testing was performed pursuant to RSS-119-ISSUE11, FCC CFR47, PART 15, Subpart B 15.109 and FCC CFR47, PART 90, Subpart I 90.217.

Test Description	Specification	Test Method	Pass/Fail
Receiver Spurious Emissions	RSS-119-Issue11 & FCC 15.109:2013	ANSI C63.4:2009	Pass
Occupied Bandwidth	RSS-119-Issue11 & FCC 90.217:2013	ANSI/TIA/EIA-603-C-2004	Pass
Emissions Mask	RSS-119-Issue11 & FCC 90.217:2013	ANSI/TIA/EIA-603-C-2004	Pass
Radiated Output Power	RSS-119-Issue11 & FCC 90.217:2013	ANSI C63.10:2009, TIA/EIA-603-B:2002	Pass
Output Power	RSS-119-Issue11 & FCC 90.217:2013	ANSI/TIA/EIA-603-C-2004	Pass
Spurious Conducted Emissions	RSS-119-Issue11 & FCC 90.217:2013	ANSI/TIA/EIA-603-C-2004	Pass
Transmitter Spurious Emissions	RSS-119-Issue11 & FCC 90.217:2013	ANSI/TIA/EIA-603-C-2004	Pass

Tests were conducted on a sample of the equipment as requested by Digital Control, Inc. for the purpose of demonstrating compliance with RSS-119-Issue11, FCC CFR47, PART 15, Subpart B 15.109 & FCC CFR47, PART 90, Subpart I 90.217. Digital Control, Inc. is responsible for the tested product configuration, continued product compliance with these standards listed, and for the appropriate auditing of subsequent products, as required. Please note that this list of tests may only comprise a partial list of the tests that are required before an IC & FCC label can be produced by the manufacturer.

This is to certify that the following report is true and correct to the best of our knowledge.

X

Rajinder S. Atwal

Tested By Rajinder Atwal,
RF/EMC Test Engineer

X

Aman Jathaul

Reviewed By Aman Jathaul,
EMC Project Manager

PRODUCT DESCRIPTION

Applicant: Digital Control, Inc.
Equipment Under Test: DR2 UHF Transceiver Module
Trade Name: DR2 UHF Transceiver Module
Model Number: DR2
Date of Test: Sep 16, 17, 18 2014

EUT DESCRIPTION

EUT	DR2 UHF Transceiver Module
Operational Description	The DigiRadio2 Transceiver Module (DR2) is populated with a ST Microelectronics STM32F103CB microcontroller (MCU) and a Silicon Laboratories Si4464 Wireless transceiver as well as a header for connecting to a host devices and a low-dropout regulator power supply. The STM32F103CB is an ARM based Cortex-M3 microcontroller and the Silicon Laboratories EZRadioPRO Si4464 is a highly integrated, single chip wireless transceiver. The Si4464 can be programmed to an output power of +20dBm and offers almost continuous coverage from 119-960MHz. The Si4464's digital receive architecture features a high-performance ADC and DSP based modem which performs demodulation, filtering, and packet handling for increased flexibility and performance. The direct digital transmit modulation and automatic PA power ramping ensure precise transmit modulation and reduced spectral spreading ensuring compliance with global regulations including FCC, ETSI, ARIB, and 802.15.4d regulations. The module has a metal shield soldered directly over the RF circuitry. The DR2 comes standard with a high precision Temperature Compensated Crystal Oscillator (TCXO) with a stability of 2.5 PPM over the entire operating range.
FCC ID	KKGB2DIG1
IC	2213A-B2DIG1
Serial No.	1A919773
Transmitter Type	UHF Transceiver
Transmitter Frequency	464.5MHz or 469.55MHz
Transmit Power	20dBm
Modulation	FM(GFSK)
Number of Channels	2
Antenna	Monopole with ground plane, 2.0 dBi gain
EUT Input Voltage	5Vdc
Software and Firmware	1.0.2.27
Received Date	Sep-15-2014
Received By	Aman
Sample Log	QAI Product Control Log (QM 1305 - Sample Inventory)
Auxiliary Equipment	Laptop Dell Latitude E6520

FACILITIES AND ACCREDITATION

Main Laboratory Headquarters:	Quality Auditing Institute
Headquarters Location/Address:	16 – 211 Schoolhouse Street, Coquitlam, BC, 3K 4X9, Canada
Associated Laboratory:	Quality Auditing Institute (Remote Location)
EMC Laboratory Address:	19473 Fraser Way, Pitt Meadows, BC, V3Y 2V4, Canada
FCC Test Site Registration Number: (3 m /10 m Open Area Test Site [OATS] and 3 m Semi-Anechoic Chamber [SAC]):	226383
Industry Canada Test Site Registration Number (3m SAC):	9543B-1
Standard Council of Canada: ISO/IEC 17025:2005 Accredited Laboratory No.	743
International Accreditation Service Inc.: ISO/IEC 17025:2005 Accredited Laboratory: No.	TL-239
Tested by:	Rajinder Atwal
Reviewed by:	Aman Jathaul

ENVIROMENTAL CONDITIONS:

INDOORS, Temperature: 22-28°C, R.H.: 39.7 - 54.4%

TESTING METHODOLOGY

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR47 Part 15, Subpart C and Part 90 Subpart I. The tests were conducted in accordance with ANSI C63.4-2009 and ANSI/TIA/EIA-603-C-2004

EUT TESTING CONFIGURATION

EUT was powered up using USB power supply from laptop and set up to transmit at 464.5MHz or 469.55MHz continuously in modulated modes of operation.

WORST TEST CASE

Worst-case orientation was determined by rotating the EUT on three axis, during the pre-compliance test and final radiated emissions tests were performed in that orientation.

GENERAL TEST PROCEDURES

The EUT is placed on the turntable 0.8m above a ground plane 3m away from a receiving antenna. Height of receiving antenna varied from 1m to 4m, its polarity changes from vertical to horizontal. Turntable rotates 360 degrees. Motion of turntable and receiving antenna allows determining position of maximum emission level. Quasi-peak detector applies for measurements of emissions with frequency range of 30 to 1000MHz. and average/peak detector otherwise.

MEASUREMENT UNCERTAINTY

Radio Frequency	$\pm 1.5 \times 10^{-5}$
Total RF power, conducted.....	± 1 dB
RF power density, conducted.....	± 2.75 dB
Spurious emissions, conducted.....	± 3 dB
All emissions, radiated.....	± 3.5 dB
Temperature.....	$\pm 1^{\circ}\text{C}$
Humidity.....	± 5 %
DC and low frequency voltages.....	± 3 %

TEST EQUIPMENT LIST

Semi-Anechoic Chamber Equipment List

Manufacturer	Model	Description	Serial No.	Last Cal	Cal Due Date
ETS Lindgren	2165	Turntable	00043677	N/A	N/A
ETS Lindgren	2125	Mast	00077487	N/A	N/A
Sunol Sciences	JB3	Biconilog Antenna 30MHz-3GHz (Prescan use only)	A120106	28-Oct-2013	28-Oct-2015
Rohde & Schwarz	ESU40	EMI Receiver	100011	26-June-2012	26-Jun-2015
ETS Lindgren	3117	Horn Antenna	00001118	29-Aug-13	29-Aug-15
ETS Lindgren	S201	5 meter Semi-Anechoic Chamber	1030	Conditional Use	Conditional Use
AH Systems	PAM118	Amplifier 10KHz-18GHz	189	Conditional Use	Conditional Use
AH Systems	PAM-1840H	Amplifier 18-40GHz	152	14-Jun-2013	14-Jun-2016

Measurement Software List

Manufacturer	Model	Version	Description
Rhode & Schwarz	EMC 32	6.20.0	Emissions Pre-scan Test Software

Section II: Requirements for the Canada(IC) & US(FCC) Market

General

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with RSS-119-Issue11, FCC CFR47, PART 15, Subpart B 15.109 & FCC CFR47, PART 90, Subpart I 90.217.

	Standard	Test Description	Test Method	Performance
Part 1	RSS-119-Issue11 & FCC CFR47, Part 15 Subpart B C15.109:2013	Receiver Spurious Emissions	ANSI C63.4:2009	Complies
Part 2	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Occupied Bandwidth	ANSI/TIA/EIA-603-C-2004	Complies
Part 3	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Emissions Mask	ANSI/TIA/EIA-603-C-2004	Complies
Part 4	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Radiated Output Power	ANSI C63.10:2009, TIA/EIA-603-B:2002	Complies
Part 5	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Output Power	ANSI/TIA/EIA-603-C-2004	Complies
Part 6	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Spurious Conducted Emissions	ANSI/TIA/EIA-603-C-2004	Complies
Part 7	RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I 90.217:2013	Transmitter Spurious Emissions	ANSI/TIA/EIA-603-C-2004	Complies



Part 1 - Receiver Spurious Emissions (Unintentional)

DATE: Sep-16-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47 Part 15 Subpart B C15.109:2013

TEST METHOD: ANSI C63.4:2009

TEST VOLTAGE: 5VDC/USB

SUMMARY OF STANDARD: Except as provided elsewhere in RSS-119-Issue11 & FCC CFR47, Part 15, Subpart B, the emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table

Class B Limits

Frequency (MHz)	Field Strength (dB μ V/m) at 3m
30 – 88	40
88 – 216	43.5
216 - 960	46
960 – above	54

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

TEST DESCRIPTION:

The equipment was set up in 3m Semi Anechoic Chamber for preliminary measurements and it was set up at a 3m/10m Open Air Test Site and measured at 10meters for final measurements. All cables over 1 meter in length were bundled at 1 meter and retained from the floor. A typical application was tested. Emissions in both horizontal and vertical polarizations were measured while rotating the EUT on a turntable to maximize the emissions signal strength. In cases where the presence of high ambient noise makes it impossible to measure an emission at the required distance, the measurement is performed at a closer distance, either on the OATS or in the SAC, and the limit is adjusted per IEC61000-6-3:2007 using the formula:

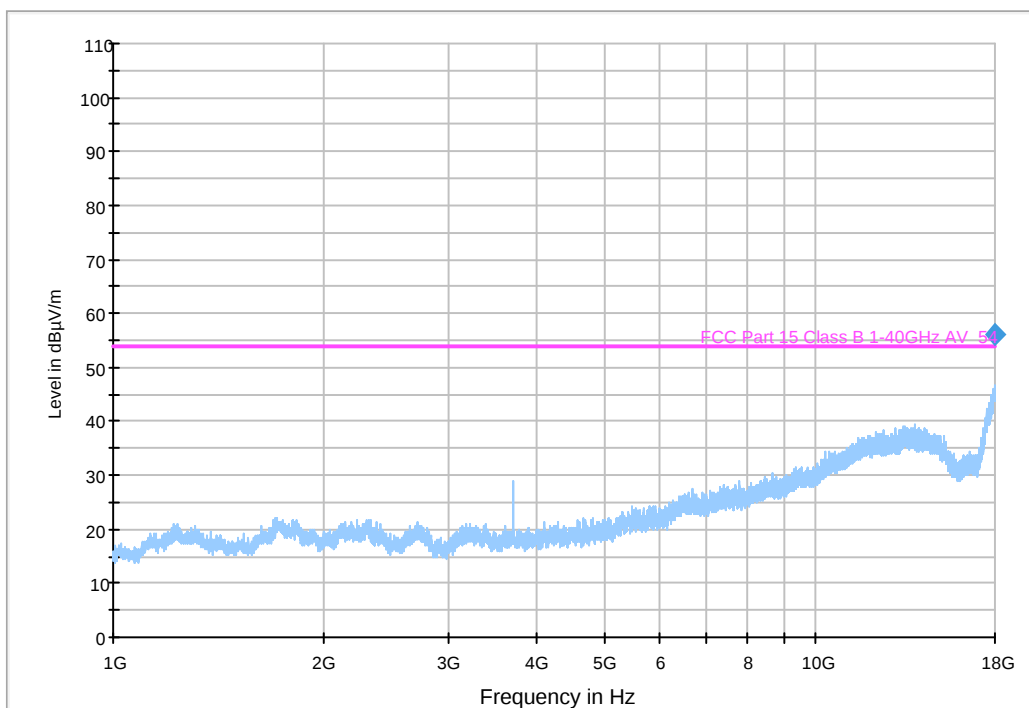
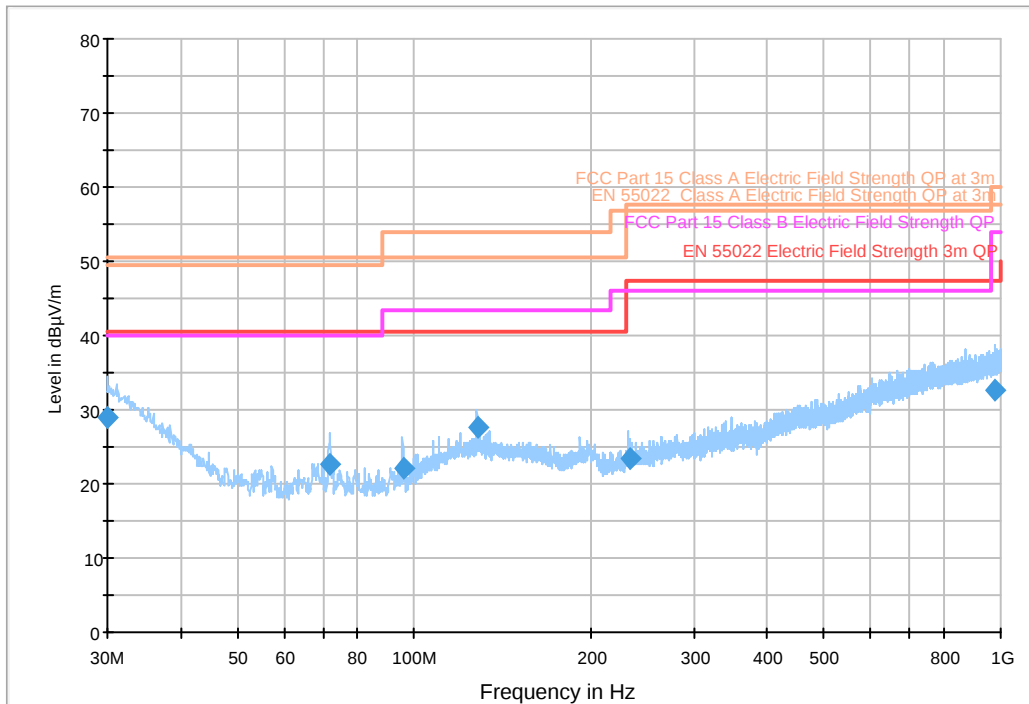
$20 \log (D1/D2)$
Where D1 = New Distance D2 = Required Distance
The result is added or subtracted to the required emission level to ensure compliance at the new distance.

MODIFICATIONS: No modification is required to comply for this test.

TEST RESULTS: Pass

PERFORMANCE: Complies with standard.

MEASUREMENT DATA:



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (s)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.071760	28.9	1	120.000	343.0	H	254.0	28.7	11.1	40
71.987680	22.6	1	120.000	400.0	H	98.0	15.3	17.4	40
95.709560	22.1	1	120.000	316.0	H	270.0	15.6	21.4	43.5
128.012480	27.6	1	120.000	400.0	V	0.0	20.9	15.9	43.5
233.234320	23.4	1	120.000	158.0	V	198.0	18.7	22.6	46
978.151720	32.7	1	120.000	158.0	H	244.0	30.6	21.3	54



Part 2 - Occupied Bandwidth

DATE: Sep-17-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47, Part 90 Subpart I C90.217:2013

TEST METHOD: ANSI/TIA/EIA-603-C-2004

TEST VOLTAGE: 5VDC/USB

TEST DESCRIPTION: The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation at its lowest and highest transmit frequency. The spectrum analyzer's resolution bandwidth was set to between 1% and 3% of the 20dB bandwidth and the video bandwidth was at least 3 times the resolution bandwidth. A peak detector was used.

MODIFICATIONS: No modification is required to comply for this test.

PERFORMANCE: Complies with standard.

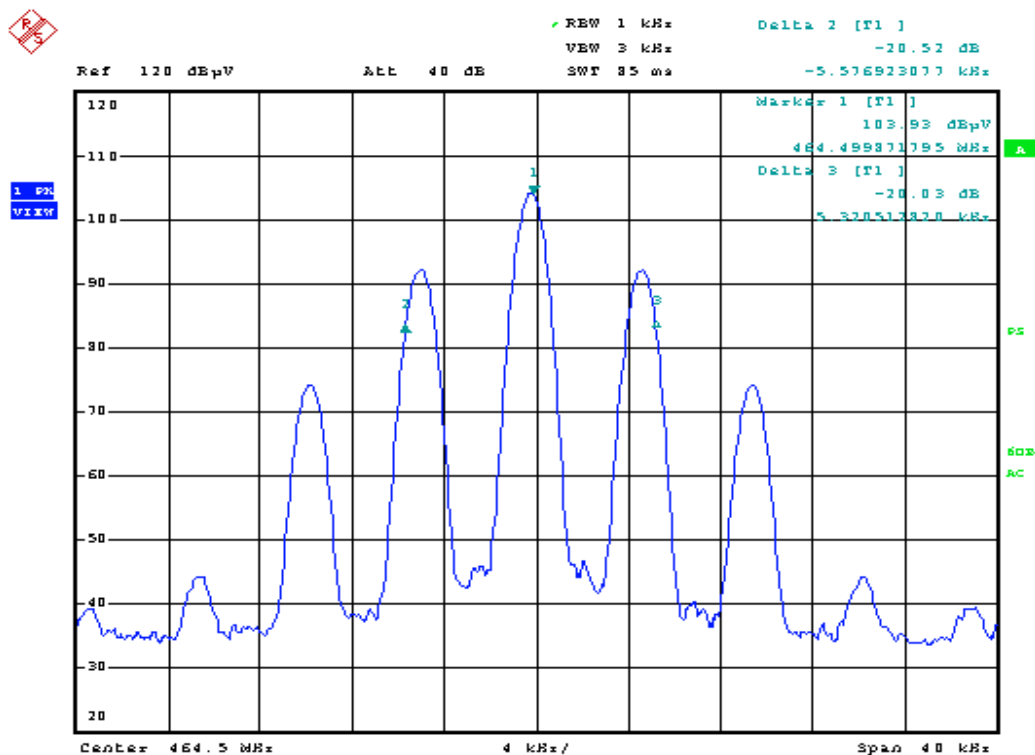
MEASUREMENT DATA:

20dB Occupied Bandwidth

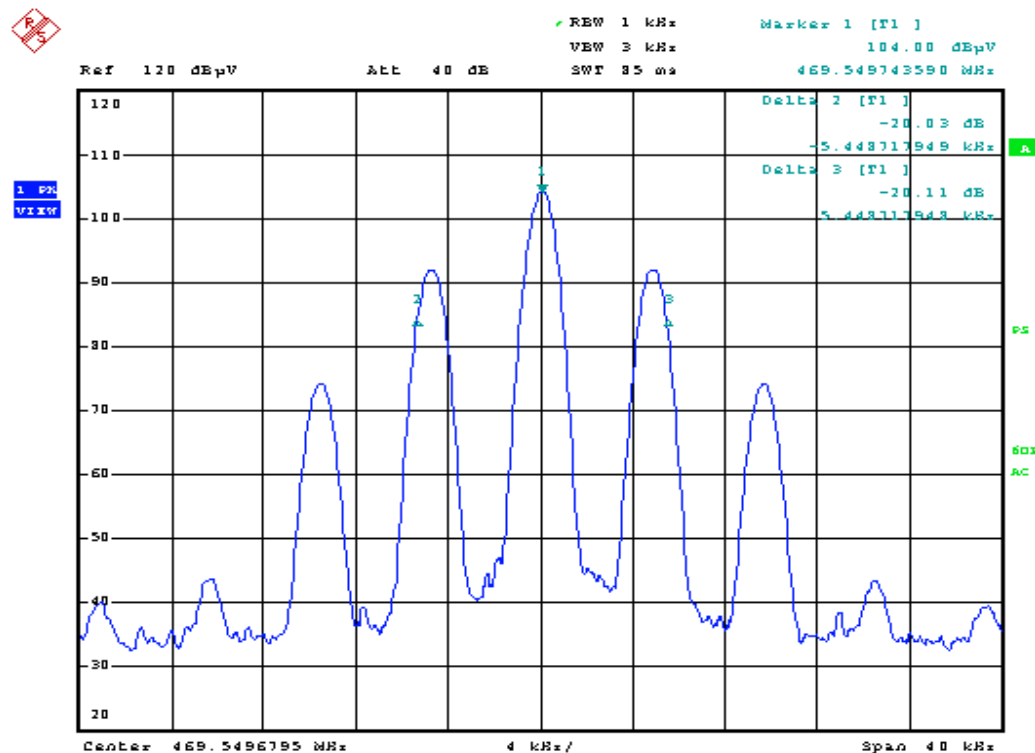
	Frequency (MHz)	Value(kHz)	Limit (kHz)	Result
Low Channel	464.5	10.95	12.5	Pass
High Channel	469.55	10.88	12.5	Pass

99% Occupied Bandwidth

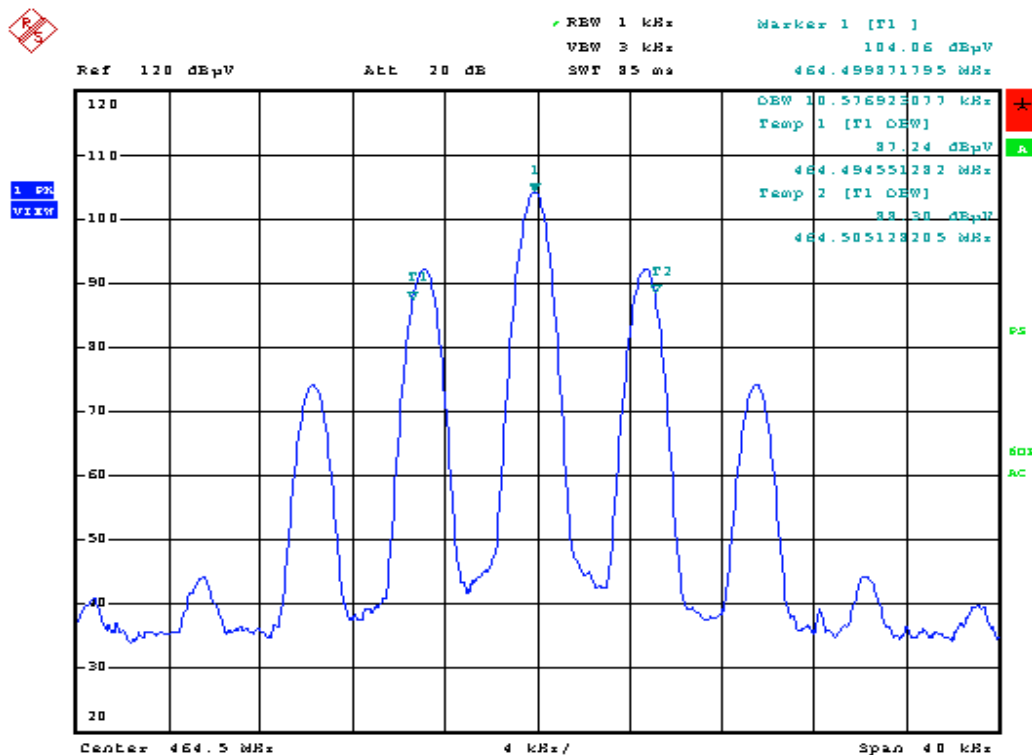
	Frequency (MHz)	Value(kHz)	Limit (kHz)	Result
Low Channel	464.5	10.58	12.5	Pass
High Channel	469.55	10.58	12.5	Pass



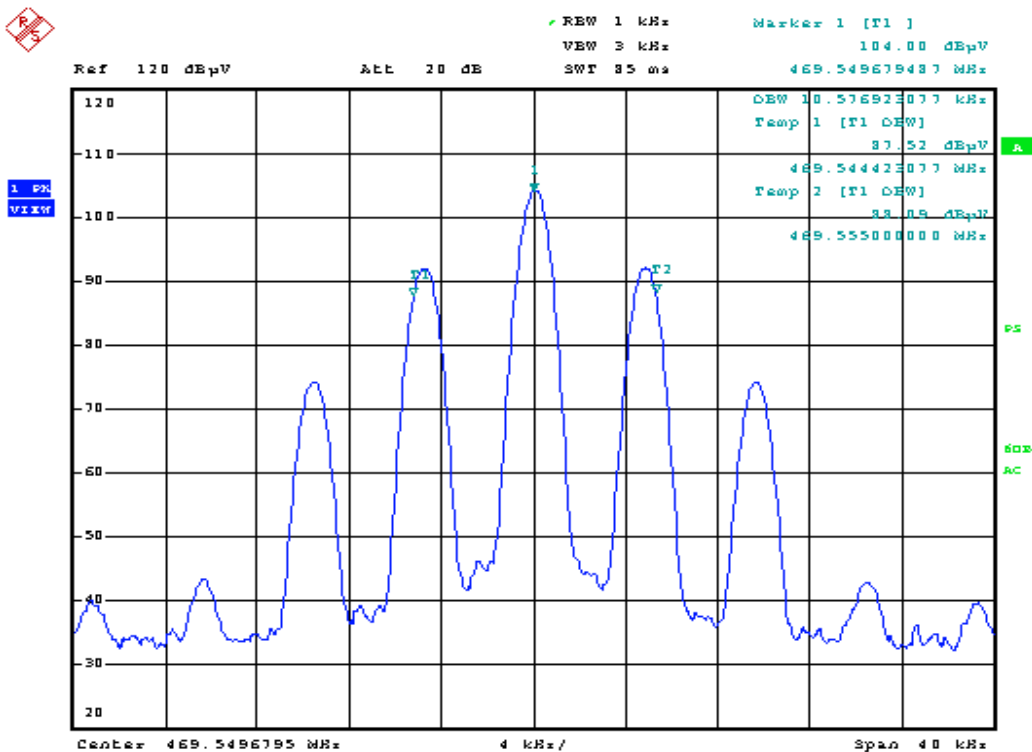
Low Channel 20dB Occupied Bandwidth



High Channel 20dB Occupied Bandwidth



Low Channel 99% Occupied Bandwidth



High Channel 99% Occupied Bandwidth



Part 3 - Emissions Mask

DATE: Sep-17-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47 Part 90, Subpart I C90.217:2013

TEST METHOD: ANSI/TIA/EIA-603-C-2004

TEST VOLTAGE: 5VDC/USB

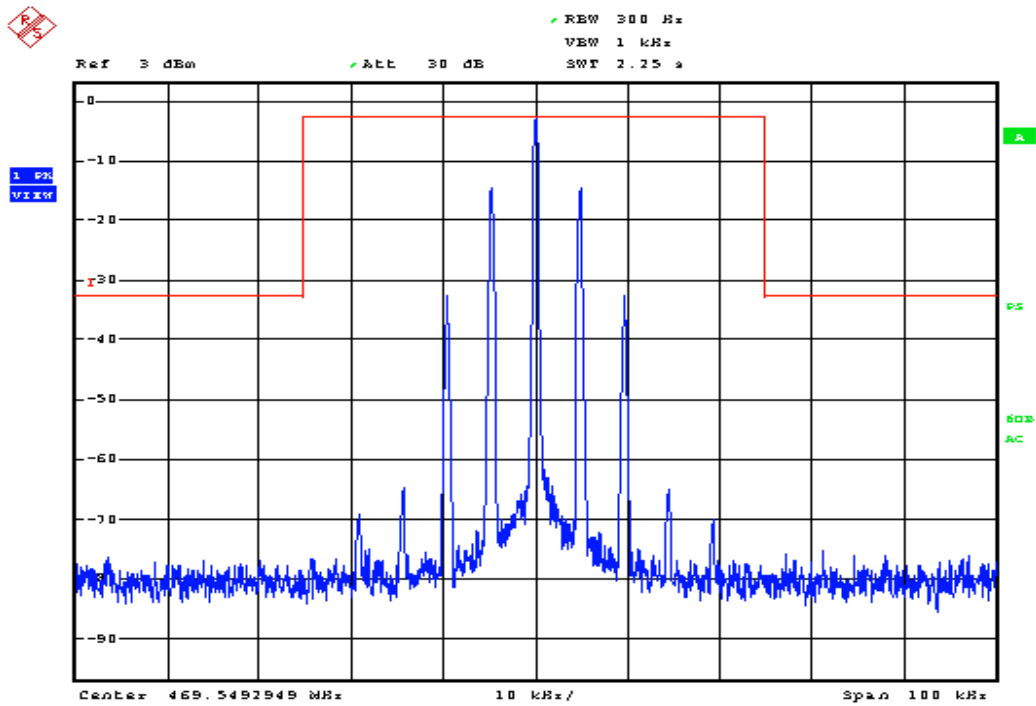
TEST DESCRIPTION: The emission mask defined by 90.217(b) for 12.5 kHz channel bandwidth devices is shown on each plot. The 0 dB reference for the mask is the measured output power of the un-modulated carrier at that frequency. A 20 dB external attenuator was used. The attenuator and coaxial cable loss were compensated in the spectrum analyzer. A 300Hz resolution bandwidth with no video filtering and a peak detector were used.

MODIFICATIONS: No modification is required to comply for this test.

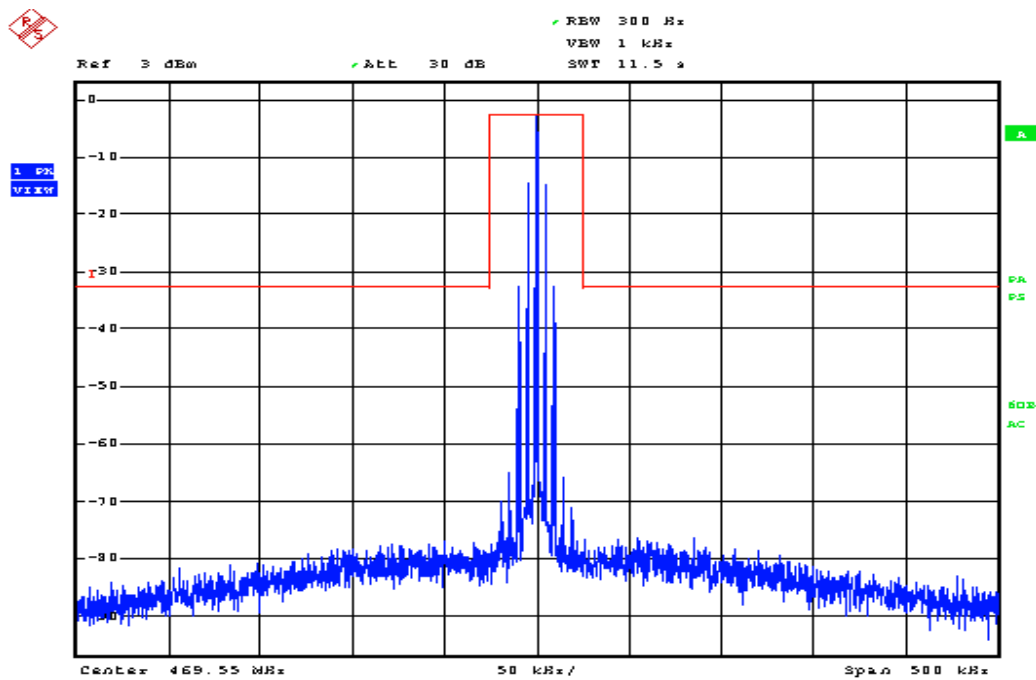
PERFORMANCE: Complies with standard.

MEASUREMENT DATA:

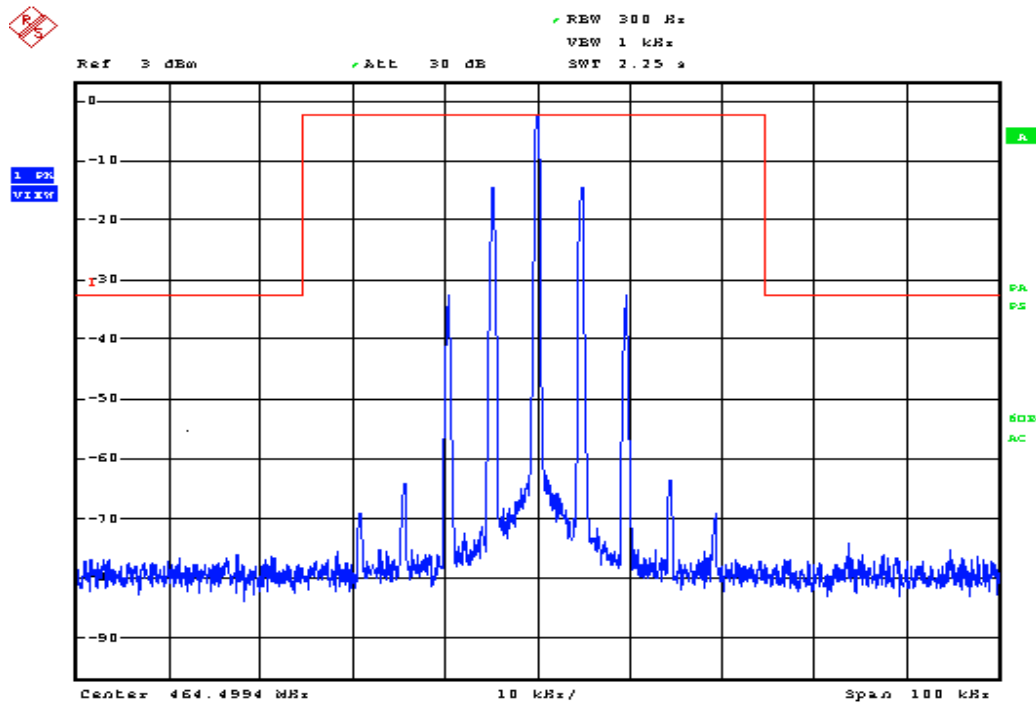
		Value	Limit	Result
Low Channel, 464.5MHz	fC $\pm$ 50 kHz	See Graph	See Mask	Pass
	fC $\pm$ 250 kHz	See Graph	See Mask	Pass
High Channel, 469.55MHz	fC $\pm$ 50 kHz	See Graph	See Mask	Pass
	fC $\pm$ 250 kHz	See Graph	See Mask	Pass



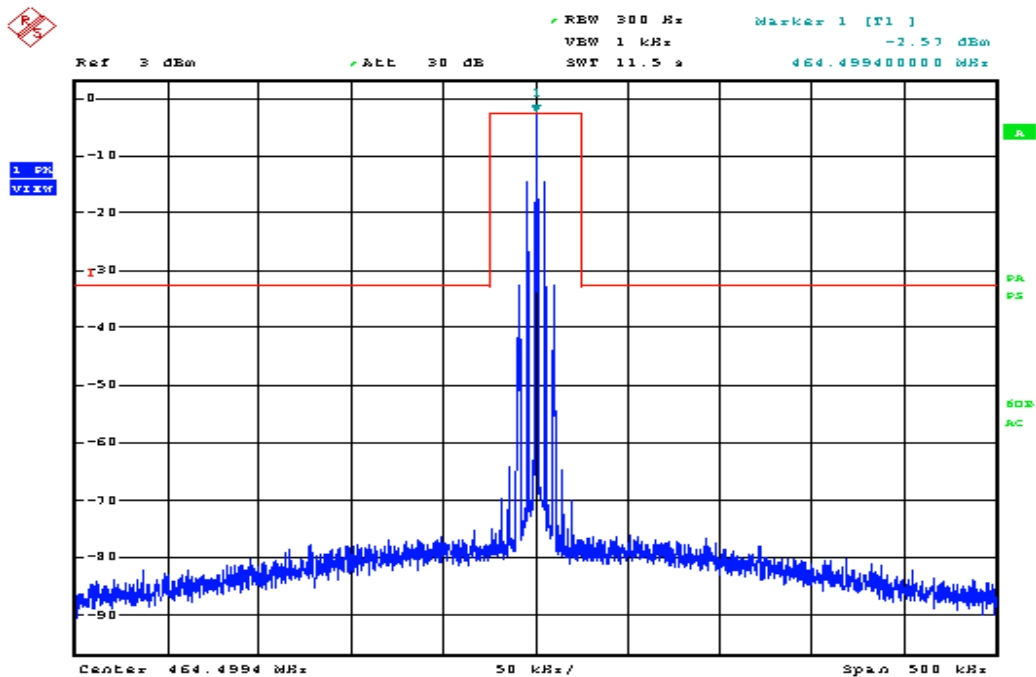
High Channel, 469.55 MHz, $f_C \pm 50$ kHz



High Channel, 469.55 MHz, $f_C \pm 250$ kHz



Low Channel, 464.5 MHz, $f_C \pm 50$ kHz



Low Channel, 464.5 MHz, $f_C \pm 250$ kHz



Part 4 - Radiated Output Power

DATE: Sep-17-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47 Part 90, Subpart I C90.217:2013

TEST METHOD: ANSI C63.10:2009, TIA/EIA-603-B: 2002

TEST VOLTAGE: 5VDC/USB

TEST DESCRIPTION: Radiated output power was measured in the far-field at an FCC Listed OATS at Low and High channel. A spectrum analyzer, signal generator, and linearly polarized antennas were used to measure the field strength of the fundamental. The orientation of the EUT and measurement antenna was manipulated to maximize the level of emissions. The EUT was configured to transmit at the highest output power. For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.17 describes a method for measuring radiated output power that utilizes an antenna substitution method: At an approved test site, the transmitter is placed on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a $\frac{1}{2}$ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal $\frac{1}{2}$ wave dipole antenna is determined for each radiated spurious emission. For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The 3 meter limit was calculated to be 118.2 dBuV/m at 3 meters. The final measurements must be made utilizing the substitution method described above and applied against the ERP limit of 20.8 dBm determined from the maximum allowable power of 120 mW.

MODIFICATIONS: No modification is required to comply for this test.

PERFORMANCE: Complies with standard.

MEASUREMENT DATA:

Fundamental Emissions for Low Channel(464.5MHz)

Frequency	QuasiPeak	Meas. Time	Band width	Antenna height	Pol.	Turntable position	Corr.	ERP**	ERP Limit
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	dBm	dBm
464.5	117.30	1000	120	100	V	234.7	24.1	20.0	20.79
464.5	117.00	1000	120	165.4	H	303.4	24.1	19.7	20.79

Fundamental Emissions for High Channel(469.55MHz)

Frequency	QuasiPeak	Meas. Time	Band width	Antenna height	Pol.	Turntable position	Corr.	ERP**	ERP Limit
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	dBm	dBm
469.55	117.60	1000	120	100	V	229.7	24.1	20.3	20.79
469.55	110.40	1000	120	179.3	H	200.6	24.1	13.1	20.79

Note: 120mW limit= 20.79dBm ERP



Part 5 - Output Power

DATE: Sep-17-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47 Part 90 Subpart I C90.217:2013

TEST METHOD: ANSI/TIA/EIA-603-C-2004

TEST VOLTAGE: 5VDC/USB

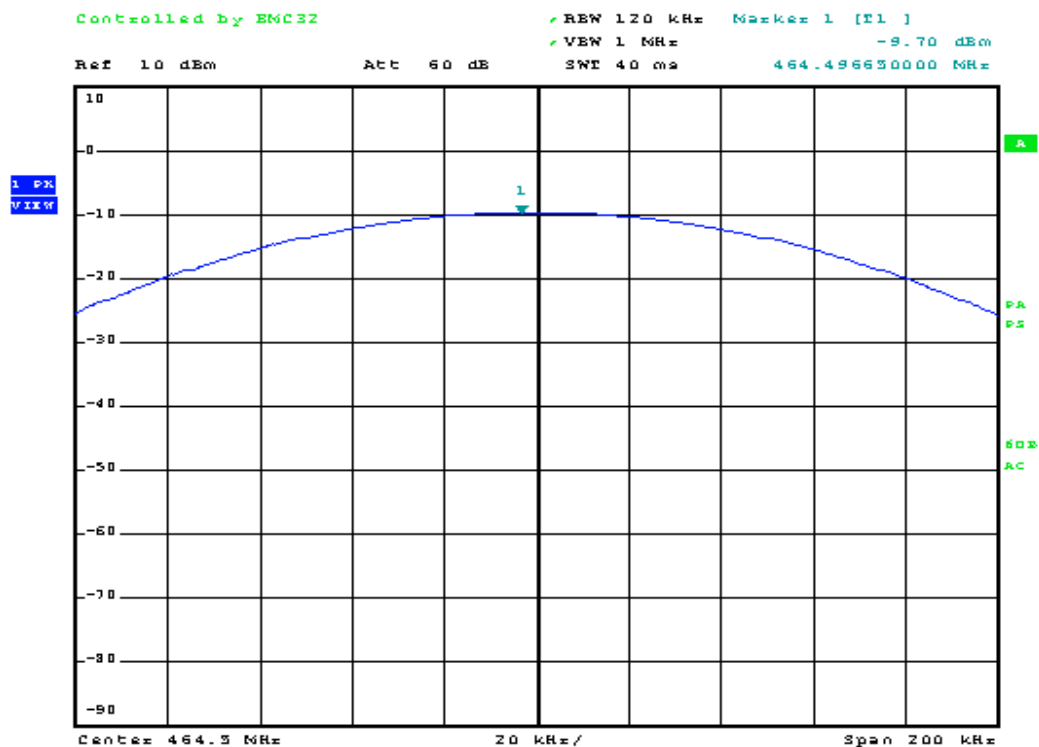
TEST DESCRIPTION: The peak output power was measured with the EUT set to low and high transmit frequencies. The EUT was transmitting with its normal modulation. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer in a linear mode.

MODIFICATIONS: No modification is required to comply for this test.

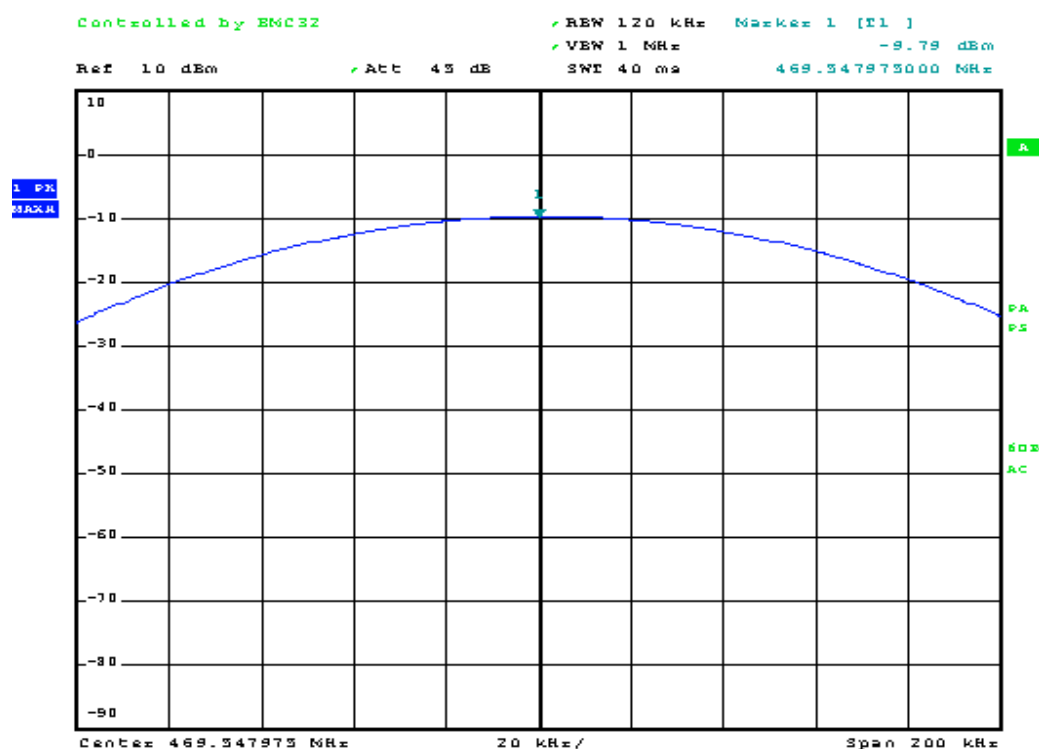
RESULTS: Pass and Complies with standard.

MEASUREMENT DATA:

Frequency Mhz	Un-Corr power dBm	Cable loss dB	Corrected Peak dBm	Power mW	Limit mW	Margin mW	Result
464.5	-9.7	30.22	20.52	112.72	120	7.28	Pass
469.55	-9.82	30.22	20.4	109.65	120	10.35	Pass



Output Power – Low Channel



Output Power – High Channel



Part 6 - Spurious Conducted Emissions

DATE: Sep-17-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47 Part 90 Subpart I C90.217:2013

TEST METHOD: ANSI/TIA/EIA-603-C-2004

TEST VOLTAGE: 5VDC/USB

TEST DESCRIPTION: The antenna port spurious conducted emissions were measured at the RF output terminal of the EUT with 20dB of external attenuation on the RF input of the spectrum analyzer. Analyzer plots were made from 30 MHz to 5 GHz. The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than or equal to the -30 dB down from the carrier limit for both high and low channels.

MODIFICATIONS: No modification is required to comply for this test.

RESULTS: Pass and Complies with standard.

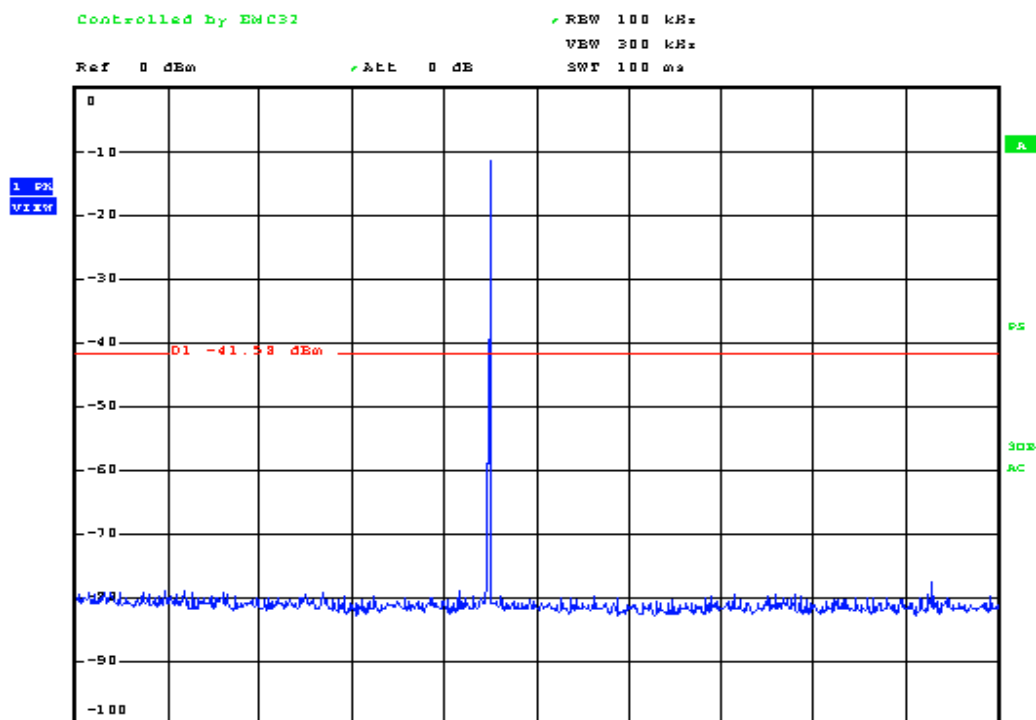
MEASUREMENT DATA:

Low channel (464.5MHz) conducted spurious emissions

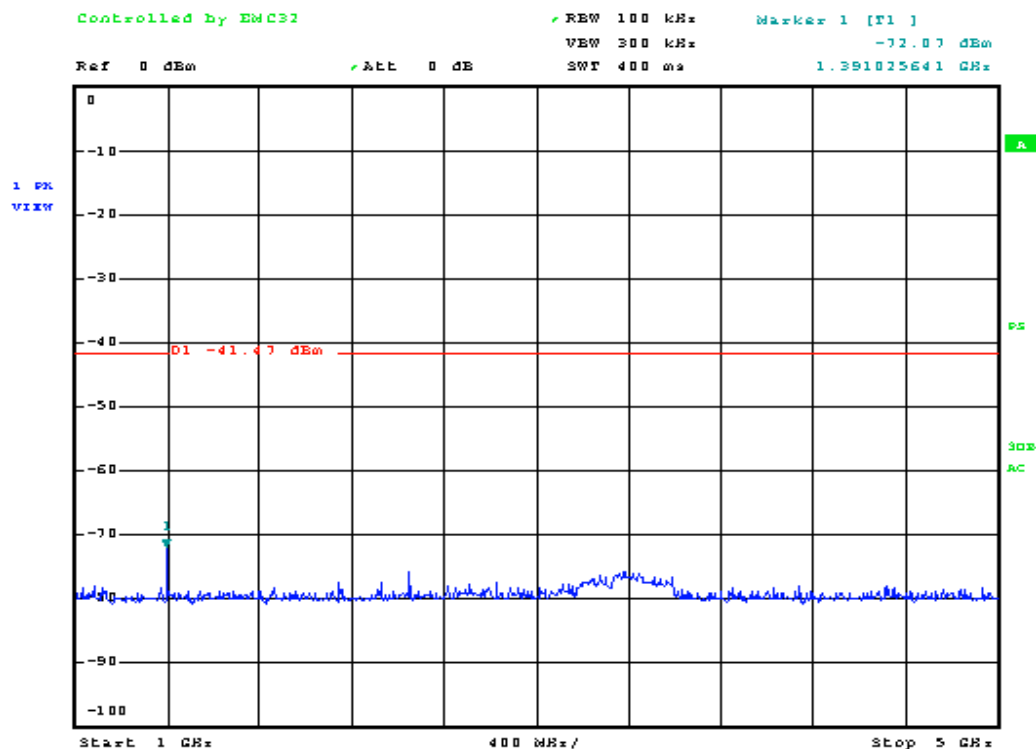
Frequency MHz	Un corrected Peak dBm	Cable Loss dB	Corrected Peak dBm	Limit dBm	Result
929.01	-75.6	30.26	-45.34	-9.48	Pass
1393.5	-72.45	30.31	-42.14	-9.48	Pass

Hi Channel (469.55MHz) conducted spurious emissions

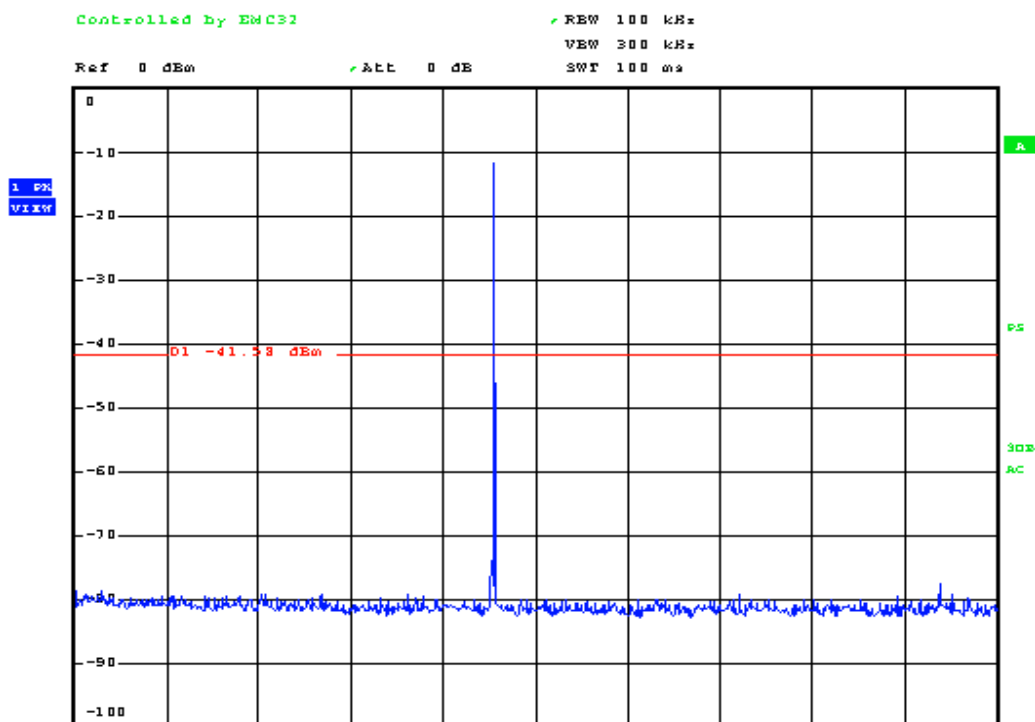
Frequency MHz	Un corrected Peak dBm	Cable Loss dB	Corrected Peak dBm	Limit dBm	Result
939.1	-75.6	30.23	-45.37	-9.6	Pass
1408.6	-72.03	30.37	-41.66	-9.6	Pass



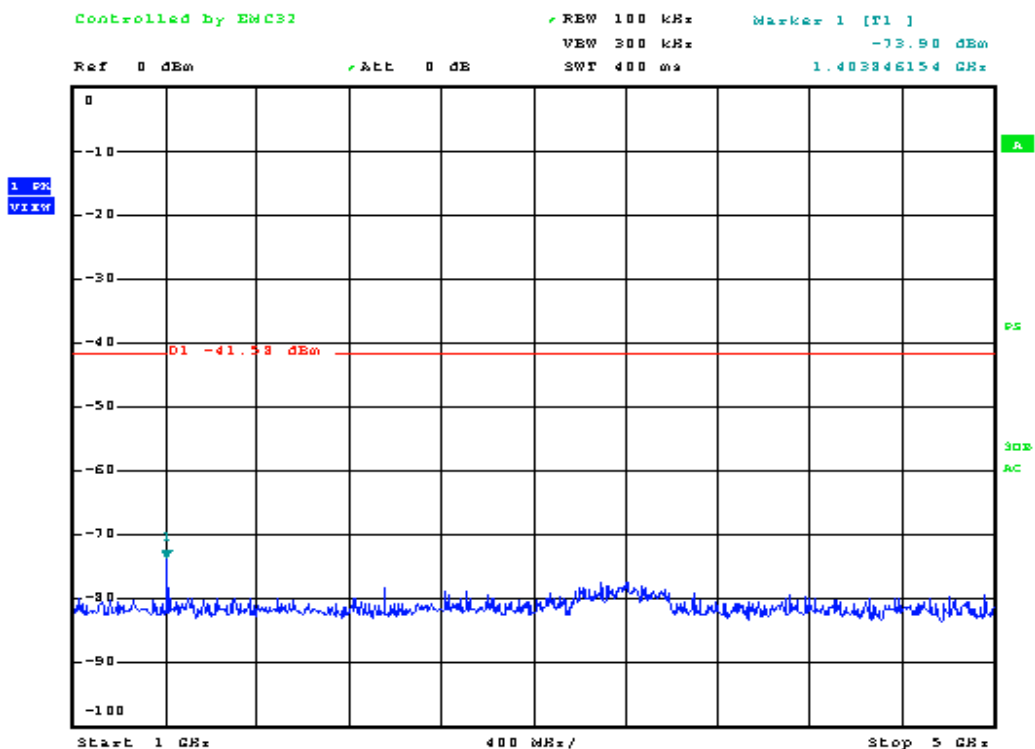
Spurious Conducted Emissions – Low channel



Spurious Conducted Emissions – Low channel



Spurious Conducted Emissions – High channel



Spurious Conducted Emissions – High channel



Part 7 - Transmitter Spurious Emissions

DATE: Sep-18-2014

TEST STANDARD: RSS-119-Issue11 & FCC CFR47, Part 90, Subpart I C90.217:2013

TEST METHOD: ANSI/TIA/EIA-603-C-2004

TEST VOLTAGE: 5VDC/USB

TEST DESCRIPTION: The Field Strength of Spurious Radiation was measured in the far-field at an FCC Listed OATS up to 10 GHz. Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure radiated harmonics and spurious emissions. The orientation of the EUT and measurement antenna was manipulated to maximize the level of emissions. The EUT was configured to transmit at the highest output power.

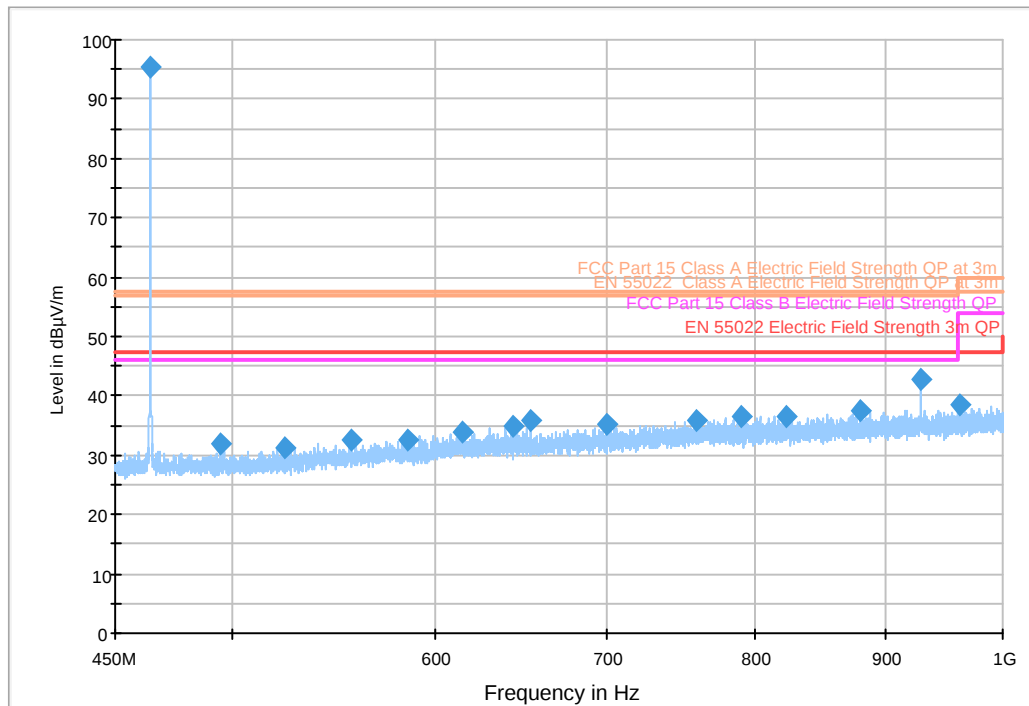
For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method: At an approved test site, the transmitter is placed on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a $\frac{1}{2}$ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal $\frac{1}{2}$ wave dipole antenna is determined for each radiated spurious emission.

MODIFICATIONS: No modification is required to comply for this test.

RESULTS: Pass and Complies with standard.

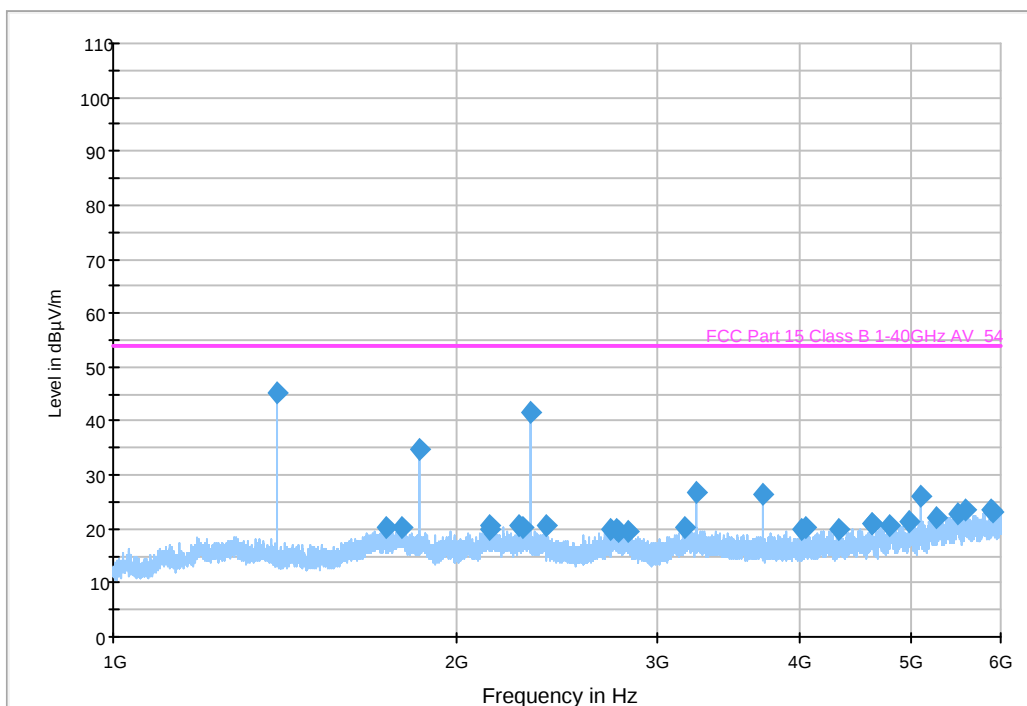
MEASUREMENT DATA:

Spurious/Harmonics Emissions for Low Channel(464.5MHz) – 450MHz-1G



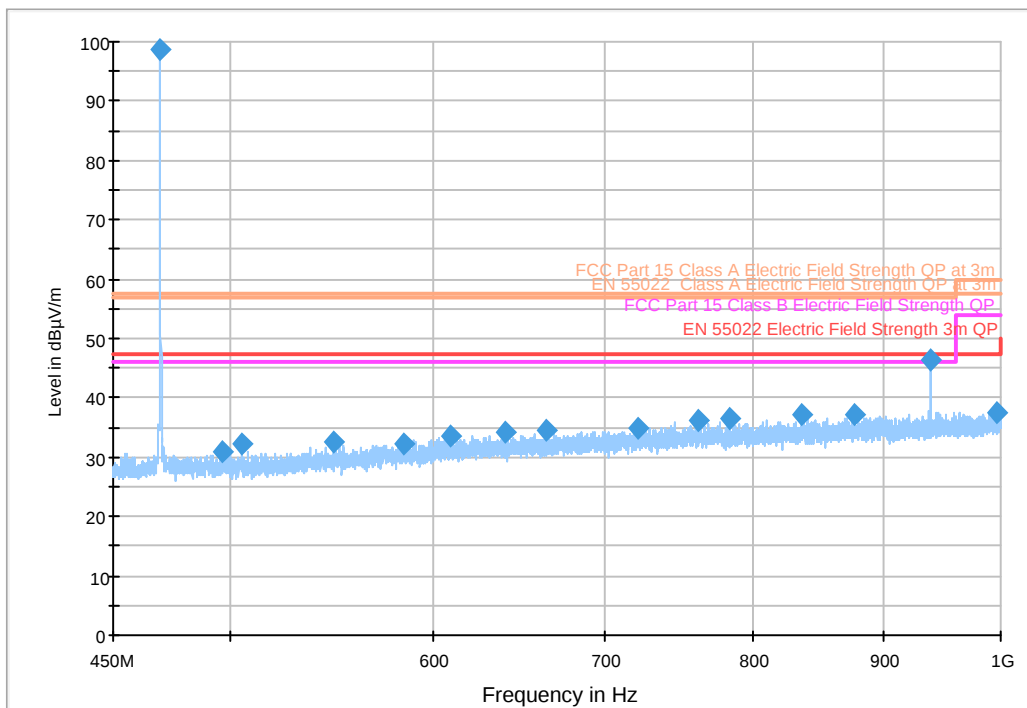
Frequency	QuasiPeak	Meas. Time	Bandwidth	Antenna height	Polarity	Turntable position	Corr.	ERP**	ERP Limit	Results
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	(dBm)	(dBm)	
929.00	46.80	1000	120	100	V	59.6	29.6	-50.5	-13	Pass
929.00	44.80	1000	120	100	H	137.6	29.6	-52.5	-13	Pass

Spurious/Harmonics Emissions for Low Channel(464.5MHz) – 1GHz-6GHz



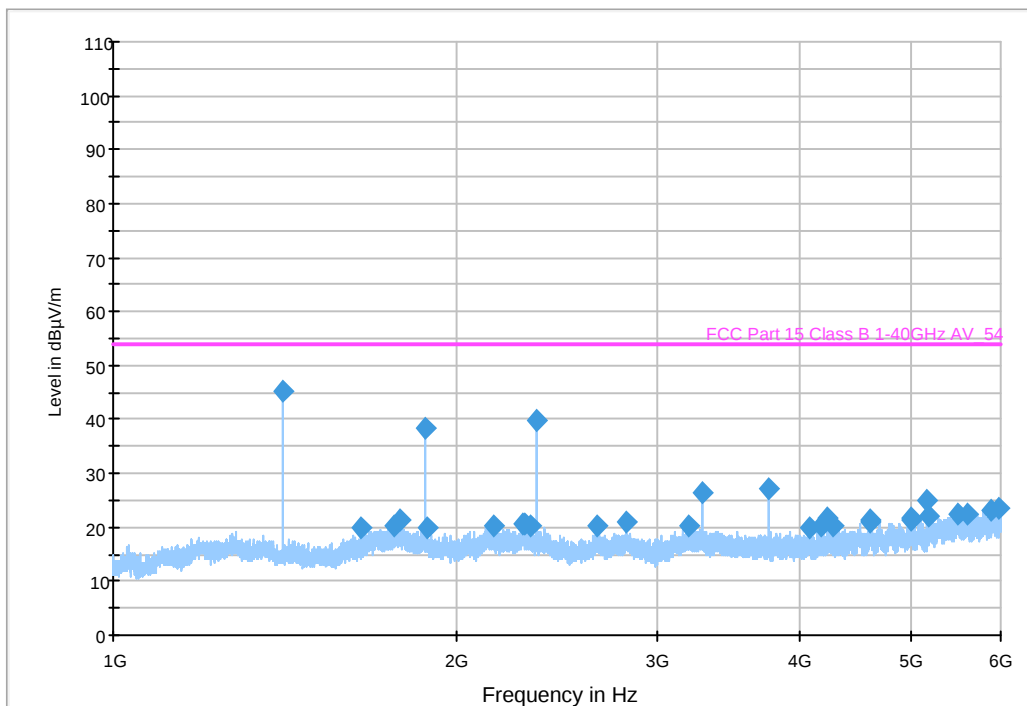
Frequency	Average	Meas. Time	Bandwidth	Antenna height	Polarity	Turntable position	Corr.	ERP**	ERP Limit	Results
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	dBm	dBm	
1393.50	54.23	1000	1000	111	V	244.7	-2.9	-43.1	-13	Pass
1393.50	50.33	1000	1000	176.9	H	138.8	-2.9	-47.0	-13	Pass
1858.00	44.50	1000	1000	102.3	V	228	-0.1	-52.8	-13	Pass
1858.00	40.20	1000	1000	184.7	H	215.8	-0.1	-57.1	-13	Pass
2322.50	49.35	1000	1000	103.1	V	183.3	0.6	-48.0	-13	Pass
2322.50	50.75	1000	1000	133.6	H	211.7	0.6	-46.6	-13	Pass
2787.00	25.90	1000	1000	173.7	V	177.6	-0.6	-71.4	-13	Pass
2787.00	28.90	1000	1000	154.4	H	235.2	-0.6	-68.4	-13	Pass
3251.50	37.46	1000	1000	183.1	V	215.3	0.8	-59.9	-13	Pass
3251.50	36.16	1000	1000	134.1	H	260.2	0.8	-61.2	-13	Pass
3716.00	41.10	1000	1000	134.4	V	243.7	1.5	-56.2	-13	Pass
3716.00	35.40	1000	1000	158.3	H	269.3	1.5	-61.9	-13	Pass
4180.50	29.30	1000	1000	100	V	78.5	3.2	-68.0	-13	Pass
4180.50	28.80	1000	1000	131.9	H	17.4	3.2	-68.5	-13	Pass

Spurious/Harmonics Emissions for High Channel (469.55MHz) – 450MHz-1G



Frequency	QuasiPeak	Meas. Time	Bandwidth	Antenna height	Polarity	Turntable position	Corr.	ERP**	ERP Limit	Results
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	(dBm)	(dBm)	
939.1	48.80	1000	120	100	V	41.6	29.7	-48.5	-13	Pass
939.1	46.10	1000	120	100	H	140.7	29.7	-51.2	-13	Pass

Spurious/Harmonics Emissions for High Channel (469.55MHz) – 1GHz-6GHz



Frequency	Average	Meas. Time	Bandwidth	Antenna height	Polarity	Turntable position	Corr.	ERP**	ERP Limit	Results
(MHz)	(dBμV/m)	(ms)	(kHz)	(cm)		(deg)	(dB)	dBm	dBm	
1408.65	54.66	1000	1000	104.2	V	251.9	-2.9	-42.6	-13	Pass
1408.65	50.66	1000	1000	169.3	H	134.1	-2.9	-46.6	-13	Pass
1878.2	49.74	1000	1000	100	V	227.9	2.2	-47.6	-13	Pass
1878.2	43.84	1000	1000	174.3	H	216	2.2	-53.5	-13	Pass
2347.75	47.92	1000	1000	103.2	V	225.1	-0.9	-49.4	-13	Pass
2347.75	48.42	1000	1000	128	H	232.5	-0.9	-48.9	-13	Pass
2817.3	27.89	1000	1000	145.1	V	201.5	-1.3	-69.4	-13	Pass
2817.3	30.19	1000	1000	100	H	225.4	-1.3	-67.1	-13	Pass
3286.85	35.21	1000	1000	100	V	215.7	0.8	-62.1	-13	Pass
3286.85	36.21	1000	1000	119.1	H	264.9	0.8	-61.1	-13	Pass
3756.4	41.21	1000	1000	134.4	V	236.8	2.0	-56.1	-13	Pass
3756.4	35.71	1000	1000	150.7	H	241.1	2.0	-61.6	-13	Pass
4225.95	28.80	1000	1000	117	V	86.3	3.6	-68.5	-13	Pass
4225.95	27.80	1000	1000	141.2	H	237.8	3.6	-69.5	-13	Pass

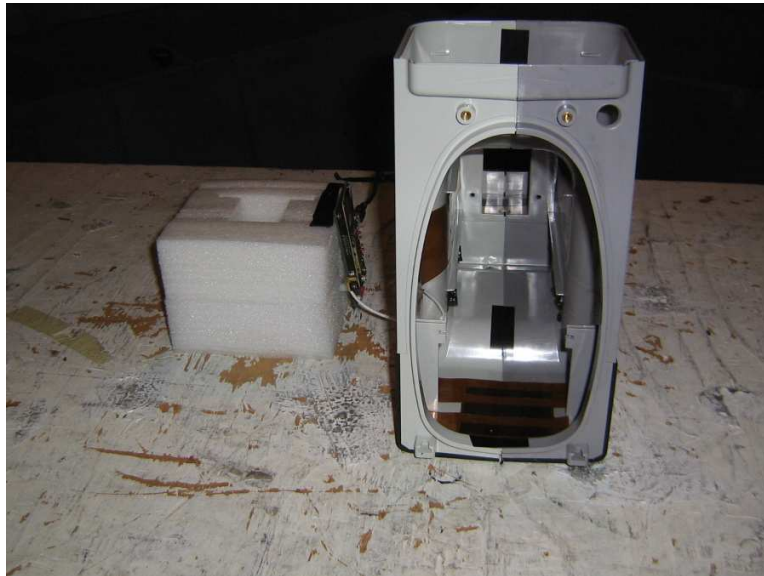
Appendix A: Test Setup Pictures



Radiated Emissions Test Setup



Radiated Emissions Test Setup



Radiated Emissions Test Setup