

Nemko Test Report:	66771RUS1
Applicant: IPDatatel, 13110 Sugarland,	Inc. Southwest Freeway TX 77478 USA
Equipment Under Test: (E.U.T.)	IPD-ZGWV2
In Accordance With:	FCC Part 15, Subpart C, 15.247 and Industry Canada, RSS-210, Issue 7 Digital Transmission Systems
Tested By: 802 Lewisville,	Nemko USA, Inc. N. Kealy Texas 75057-3136
TESTED BY: David Light, S	DATE: 15 November 2010 Senior Wireless Engineer
APPROVED BY: Tom T	DATE: 16 November 2010

Number of Pages: 31

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EQUIPMENT: IPD-ZGWV2

FCC PART 15.247 and IC RSS-210

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Section 1. Summary of Test Results

Manufacturer: IPDatatel, Inc.

Model No.: IPD-ZGWV2

Serial No.: None

General: All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47, Part 15, Subpart C, Paragraph 15.247 and Industry Canada, RSS-210, Issue 7 for Digit al Transmission Systems. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and Industry Canada.

\boxtimes	New Submission	\boxtimes	Production Unit
	Class II Permissive Change		Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



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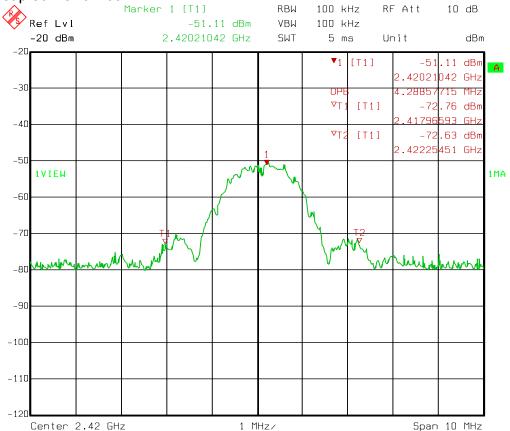
Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a) / RSS-Gen	Complies
Minimum 6 dB Bandwidth	15.247(a)(2) /A8.2(a)	Complies
Maximum Peak Power Output	15.247(b)(3) /A8.4(4)	Complies
Spurious Emissions (Antenna Conducted)	15.247(d) / A8.5	Not tested
Spurious Emissions (Restricted Bands)	15.247(d) & 15.209(a) / RSS-Gen	Complies
Peak Power Spectral Density	15.247(e) / A8.2(b)	Complies
Receiver Spurious Emissions	RSS-Gen	Complies

Footnotes:

The transmitter has an integral PCB antenna. All tests were performed radiated.

99% Occupied Bandwidth:



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Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

EQUIPMENT: IPD-ZGWV2

Frequency Band (MHz): 902-928 2400-2483.5 5725-5850

Operating Frequency of Test Sample: 2405 to 2480 MHz

6 dB Bandwidth: 1.5 MHz

Channel Spacing: 5 MHz

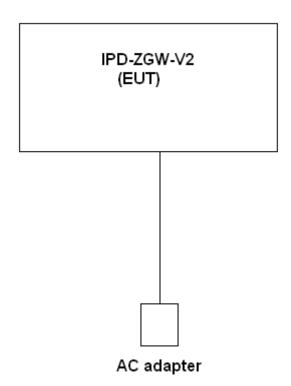
Antenna Gain: 0.8 dBi

User Frequency Adjustment: Software controlled

Description of EUT

Premises alarm. The IPD-ZGWV2 retransmits across ethernet alarm signals from the IPD-ZKI-V2 collected by a Zigbee/802.15.4 protocol.

System Diagram



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EQUIPMENT: IPD-ZGWV2

Section 3. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth PARA. NO.: 15.247(a)(2)/A8.2(a)

TESTED BY: David Light DATE: 12 November 2010

Test Results: Complies.

Measurement Data: See 6 dB BW plot

Measured 6 dB bandwidth: 1.57 MHz maximum

Channel Separation: 5 MHz

Test Conditions: 47 %RH

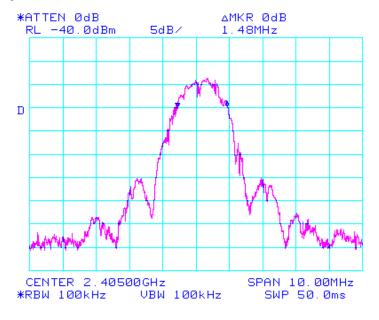
22 °C

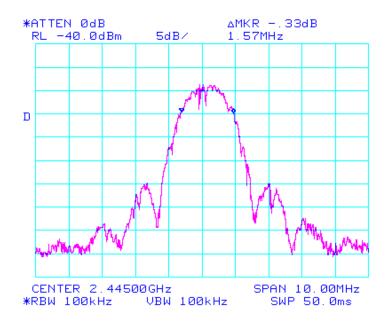
Measurement Uncertainty: +/-1x10⁻⁷ Ppm

Test Equipment Used: 1464-1484-1485-993

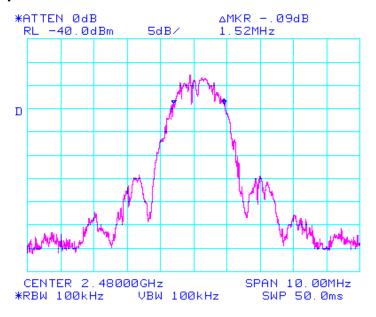
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Test Data – Occupied Bandwidth





Test Data – Occupied Bandwidth



EQUIPMENT: IPD-ZGWV2

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Section 4. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output Power PARA. NO.: 15.247(b)(3) / A8.4(4)

TESTED BY: David Light DATE: 12 November 2010

Test Results: Complies.

Measurement Data: Refer to attached data

Test Conditions: 47 %RH

22 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1484-1485-1464-993

This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.

The device was tested on three channels per 15.31(I).

☐ This test was performed radiated.

Test Data:

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	
2405	-0.3	36.0	
2445	-1.3	36.0	
2480	-0.9	36.0	

The peak output power is estimated to be -1.1 dBm (0.78 mW) based on the stated antenna gain of +0.8 dBi.

RBW=2 MHz VBW=3 MHz Peak detector

EQUIPMENT: IPD-ZGWV2

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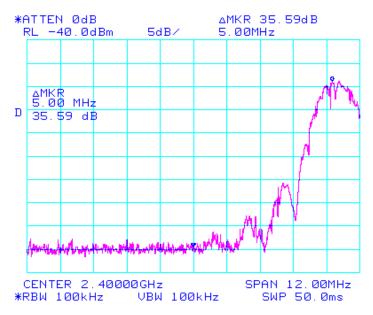
Section 5. Radiated Emissions

RBW=VBW=1 MHz above 1000 MHz (Peak)

RBW= 1 MHz VBW=10Hz (Average)

NAME OF TEST: Radiated Emissions PARA. NO.: 15.247 (d)/RSS-Gen DATE: 12 November 2010 TESTED BY: David Light **Test Results:** Complies. **Measurement Data:** See attached table. **Test Conditions:** 47 %RH 22 °C **Measurement Uncertainty:** +/-1.7 dB **Test Equipment Used:** 1464-1484-1485-993-1480-1016-791 Notes: The EUT was tested on three orthogonal axis' \boxtimes The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33 \boxtimes The device was tested on three channels per 15.31(I). \boxtimes No emissions were detected within 20 dB of the specification limit therefore none are reported per 15.31(o). Band edge data is presented below. RBW=VBW=100 kHz below 1000 MHz

Radiated Emissions



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EQUIPMENT: IPD-ZGWV2

Radiated Emissions

Measu	rement Data	t a: Reading listed by or			er taken.		Te	est Distance	e: 3 Meters	S	
			Horn	Pre-A	Cable	Cable					
#	Freq	Rdng					Dist	Corr	Spec	Margin	Polar
	MHz	dΒμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	2483.5	57.0	+29.0	-23.0	+0.8	+2.3	+0.0	56.1	74.0	-7.9	Vert
	Peak										
2	2483.5	26.3	+29.0	-23.0	+0.8	+2.3	+0.0	25.4	54.0	-18.6	Vert
	Average										
3	2483.5	57.9	+29.0	-23.0	+0.8	+2.3	+0.0	57.0	74.0	-7.0	Horiz
	Peak										
4	2483.5	27.4	+29.0	-23.0	+0.8	+2.3	+0.0	26.5	54.0	-17.5	Horiz
	Average										

Section 6.

EQUIPMENT: IPD-ZGWV2

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NAME OF TEST: Peak Power Spectral Density PARA. NO.: 15.247(e)/A8.2(b)

Peak Power Spectral Density

TESTED BY: David Light DATE: 12 November 2010

Test Results: Complies.

Measurement Data: See attached data...

Test Conditions: 47 %RH

22 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993

RBW/VBW = 3 kHz Span = 1.5 MHz Sweep = 500 s Detector = Peak

Test Data;

Frequency	EIRP	Limit	Margin	Comments
(MHz)	(dBm)	(dBm)	(dB)	
2405	-11.4	8.0	-19.3600	
2440	-11.2	8.0	-19.1600	
2480	-10.7	8.0	-18.6600	

Conducted spectral density is estimated to equal -11.5 dBm maximum based on the stated antenna gain of +0.8 dBi.

Section 7.

EQUIPMENT: IPD-ZGWV2

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NAME OF TEST: Powerline Conducted Emissions PARA. NO.: 15.207(a)/RSS-Gen

Powerline Conducted Emissions

TESTED BY: David Light DATE: 15 November 2010

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

Test Equipment: 1663-674-572-1188

Temp: 23°C

Relative Humidity: 53%

Test Data – Powerline Conducted Emissions

LINE 1

Frequency	FCCB	FCCB	AVG	AVG	QP	QP	
kHz	QP	AVG	Meas	Margin M	eas Margir	1	
	LIMIT	LIMIT		_	_		
151.28	65.963	55.963	26.070	-29.893	48.827 -1	7.137	
158.55	65.756	55.756	25.886	-29.870	48.593 -1	7.162	
167.92	65.488	55.488	25.715	-29.773	48.206 -1	7.282	
173.53	65.328	55.328	25.589	-29.739	47.964 -1	7.364	
184.12	65.025	55.025	25.354	-29.671	47.647 -1	7.379	
190.61	64.840	54.840	25.242	-29.598	47.412 -1	7.428	
200.69	64.552	54.552	25.056	-29.496	47.124 -1	7.428	
210.89	64.260	54.260	24.765	-29.496	46.751 -1	7.509	
224.29	63.877	53.877	24.485	-29.392	46.362 -1	7.515	
257.41	62.931	52.931	23.987	-28.944	45.302 -1	7.629	

Line 2

Frequency	FCCB	FCCB	AVG	AVG	QP	QP	
kHz	QP Limit	AVG	Meas	Margin M	leas Margir	1	
		Limit					
151.12	65.968	55.968	26.413	-29.555	49.886 -1	6.082	
158.83	65.748	55.748	26.286	-29.462	49.573 -1	6.175	
167.22	65.508	55.508	26.121	-29.387	49.327 -1	6.181	
173.76	65.321	55.321	25.969	-29.352	49.139 -1	6.182	
183.47	65.044	55.044	25.834	-29.209	48.975 -1	6.068	
194.41	64.731	54.731	25.657	-29.074	48.632 -1	6.100	
207.64	64.353	54.353	25.346	-29.007	48.365 -1	5.988	
213.33	64.191	54.191	25.245	-28.946	48.296 -1	5.895	
228.57	63.755	53.755	25.045	-28.711	47.903 -1	5.853	
247.44	63.216	53.216	24.800	-28.416	47.580 -1	5.636	

Conducted Emissions Transmit

EQUIPMENT: IPD-ZGWV2

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Section 8. Receiver Spurious Emissions

NAME OF TEST: Receiver Spurious Emissions PARA. NO.: RSS-Gen

TESTED BY: David Light DATE: 12 November 2010

Test Results: Complies. The worst case emission was 53.0 dBµV/m at

7.787 GHz in the vertical polarity. This is 1.0 dB below the average specification limit of 54.0 dBµV/m. This was a peak

reading.

Measurement Data: See attached. There were no emissions detected.

Measurement Uncertainty: +/- 1.7 dB

Test Equipment: 1464-1484-1485-993-1480-791-101688

Temp: 22°C

Relative Humidity: 47%

Measurements < 1000 MHz RBW/VBW = 100 kHz Peak detector

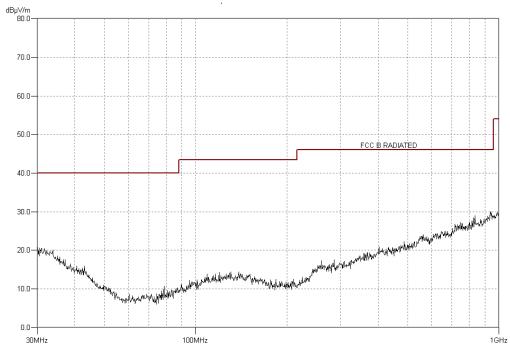
Measurements > 1000 MHz RBW/VBW = 1 MHzPeak detector

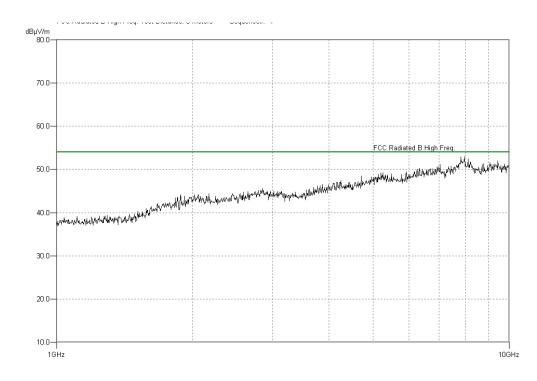
The spectrum was searched from 30 MHz to 10 GHz.

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Test Data – Receiver Spurious Emissions

Vertical

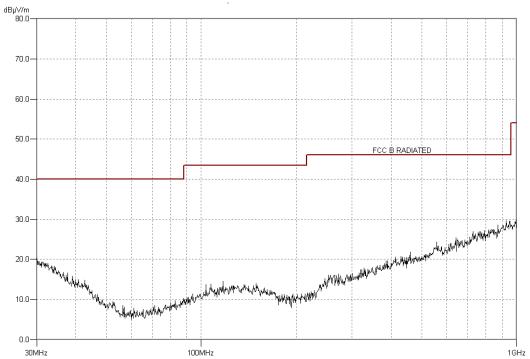


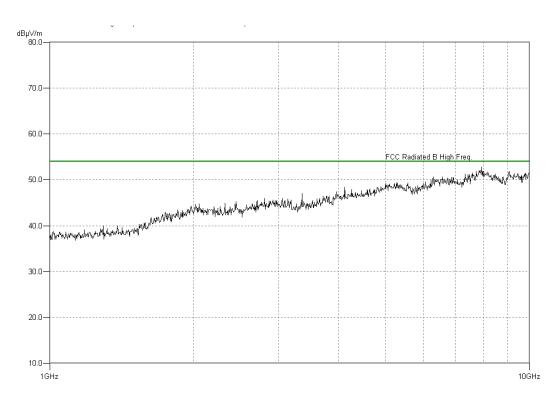


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Test Data – Receiver Spurious Emissions







Section 9. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
674	Limiter	Hewlett	11947A	3107A02200	26-Oct-2010	26-Oct-2011
		Packard				
993	Antenna,	A.H. Systems	SAS-200/571	162	09-Sep-2009	09-Sep-2011
	Horn					
1016	Preamplifier	Hewlett	8449A	2749A00159	19-Jun-2010	19-Jun-2011
		Packard				
1188	LISN	EMCO	3825/2	1214	25-Oct-2010	25-Oct-2011
1464	Spectrum	Hewlett	8563E	3551A04428	27-Feb-2009	27-Feb-2011
	Analyzer	Packard				
1480	Antenna,	Schaffner-	CBL6111C	2572	18-Jan-2010	18-Jan-2011
	Bilog	Chase				
1484	Cable	Storm	PR90-010-072		19-Jun-2010	19-Jun-2011
1485	Cable	Storm	PR90-010-216		19-Jun-2010	19-Jun-2011
1663	Spectrum	Rohde &	FSP3	100073	23-Aug-2010	23-Aug-2011
	Analyzer	Schwartz				
791	PreAmp	Nemko, USA			08-Mar-2010	08-Mar-2011

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EQUIPMENT: IPD-ZGWV2

ANNEX A - TEST DETAILS

NAME OF TEST: Powerline Conducted Emissions PARA. NO.: 15.207(a)

Minimum Standard: §15.207 Conducted limits.

(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 mH/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 of Conducted			Limit (dBmV)			
Emission	(MHz)		Quasi-peak		Average	
0.15-0.5		66	to 56*		56 to 46*	
0.5-5	56			46		
5-30	60			50		
+ D		***				

^{*} Decreases with the logarithm of the frequency.

- (b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:
- (1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- (2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.
- (3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §\$15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.
- (c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

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EQUIPMENT: IPD-ZGWV2

NAME OF TEST: Occupied Bandwidth PARA. NO.: 15.247(a)(2)

Minimum Standard: The minimum 6 dB bandwidth shall be at least 500 kHz

NAME OF TEST: Maximum Peak Output Power PARA. NO.: 15.247(b)(3)

Minimum Standard:

The maximum peak output power shall not exceed 1 watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Substitution Antenna Method for Integral Antennas:

The peak field strength of the carrier is measured in a worst-case configuration with a RBW > 5 times the occupied bandwidth of the transmitted waveform. For cases where the RBW of the test instrument is not sufficient, the power is measured using a peak power meter instead of the spectrum analyzer.

The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

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NAME OF TEST: Occupied Bandwidth PARA. NO.: 15.247(a)(2)

Minimum Standard: Systems using digital modulation techniques may

operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth

shall be at least 500 kHz.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW = VBW = 100 kHz.

Span: Sufficient to display 6 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

EQUIPMENT: IPD-ZGWV2 Test Report No.: 66771RUS1

NAME OF TEST: Spurious Emissions(conducted) PARA. NO.: 15.247(d)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the

transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the

restricted bands of 15.205 shall not exceed the following field

strength limits:

Frequency (MHz)	Field Strength (μV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM IS SEARCHED TO THE 10th HARMONIC OF THE HIGHEST FREQUENCY GENERATED IN THE EUT.

Method Of Measurement:

30 MHz - 10th harmonic plot

RBW: 100 kHz VBW: 300 kHz Sweep: Auto Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level above center frequency.

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Radiated Spurious Emissions PARA. NO.: 15.247(c)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the

transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the

following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (μV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

TOIZEG TOOLITECG BUILD			
MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Tuning range	Number of channels tested	Channel location in band	
1 MHz or less	1	middle	
1 to 10 MHz	2	top and bottom	
more than 10 MHz	3	top, middle, bottom	

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NAME OF TEST: Transmitter Power Density PARA. NO.: 15.247(d)

Minimum Standard: The transmitted power density averaged over any 1 second

interval shall not be greater than +8 dBm in any 3 kHz

bandwidth.

Method Of Measurement: The spectrum analyzer is set as follows:

RBW: 3 kHz VBW: >3 kHz

Span: => measured 6 dB bandwidth

Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep

rate is 1500/3 = 500 sec. LOG dB/div.: 2 dB

Note: For devices with spectrum line spacing =< 3 kHz, the RBW of the

analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear

power units.

For Devices With Integral Antenna:

For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

FCC PART 15.247 and IC RSS-210
Digital Transmission Systems
Test Report No.: 66771RUS1

EQUIPMENT: IPD-ZGWV2

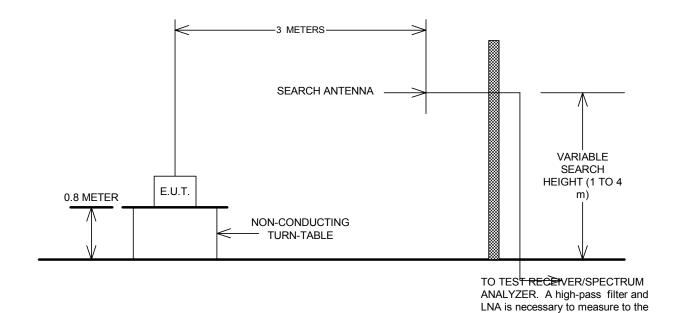
ANNEX B - TEST DIAGRAMS

limits of 15.209.

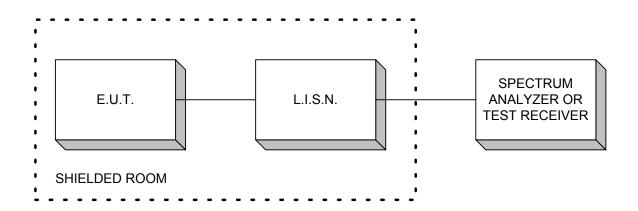
EQUIPMENT: IPD-ZGWV2

Nemko USA, Inc.

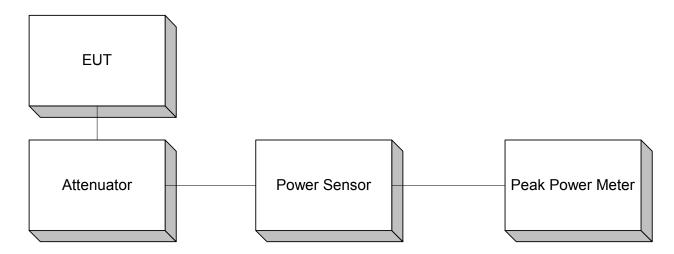
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



Note: A spectrum analyzer may be substituted for Peak Power Meter given that the measurement bandwidth is sufficient to capture the 60 dB bandwidth of the transmitter.

Minimum 6 dB Bandwidth Peak Power Spectral Density Spurious Emissions (conducted)

