



Nemko Test Report: 61730RUS1

Applicant: IPDatatel, Inc.
13110 Southwest Freeway
Sugar Land, TX 77478
USA

Equipment Under Test: IPD-KZIV2
(E.U.T.)

FCC Identifier: YUX-IPDKZIV2

In Accordance With: **CFR 47, Part 15, Subpart C, 15.247 &**
Industry Canada RSS-210, Issue 7
Digital Transmission System Transmitter

Tested By: Nemko USA, Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

TESTED BY: 
David Light, Senior Wireless Engineer **DATE:** 12 October 2010

APPROVED BY: 
Tom Tidwell, Reviewer **DATE:** 13 October 2010

Number of Pages: 30

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EQUIPMENT: IPD-ZKIV2

Section 1. Summary of Test Results

Manufacturer: IPDatatel, Inc.

Model No.: IPD-KZIV2

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 Digital Transmission Systems. Radiated tests were conducted in 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.



New Submission



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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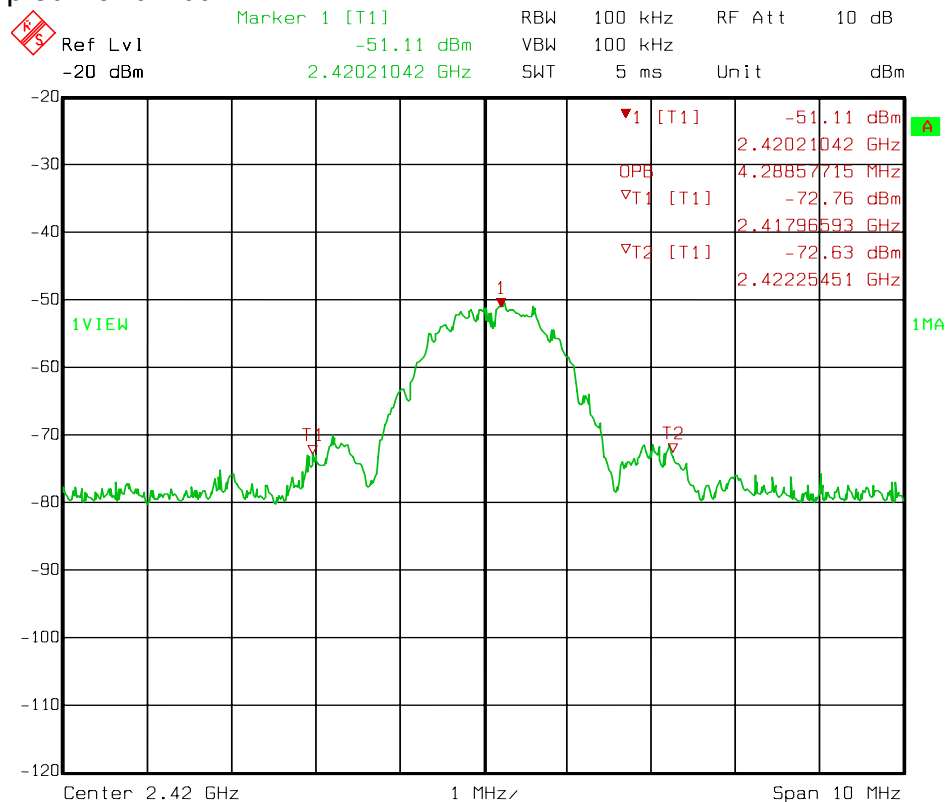
Summary Of Test Data

NAME OF TEST	FCC PARA. NO.	IC PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	RSS-Gen 7.2.2	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)	A8.5	Complies
Peak Power Spectral Density	15.247(e)	A8.2(b)	Complies
Receiver Spurious Emissions	NA	RSS-Gen7.2.3	Complies

Footnotes:

*The EUT does not have an external antenna connector. All tests were performed radiated.

99% Occupied Bandwidth:



EQUIPMENT: IPD-ZKIV2**Section 2. Equipment Under Test (E.U.T.)****General Equipment Information**

Frequency Band (MHz):	902-928	2400-2483.5	5725-5850
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Operating Frequency of Test Sample: 2405 to 2480 MHz**6 dB Bandwidth:** 1.7 MHz**Spectral Density;** -14.4 dBm**Peak Power:** 0.4 mW**User Frequency Adjustment:** Software controlled**Description of EUT**

EUT Collects Data from various third party household burglary control panel and broadcasts data in a Zigbee/802.15.4 protocol.

EQUIPMENT: IPD-ZKIV2

Section 3. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: David Light	DATE: 07 October 2010

Test Results: Complies.

Measurement Data: See 6 dB BW plot

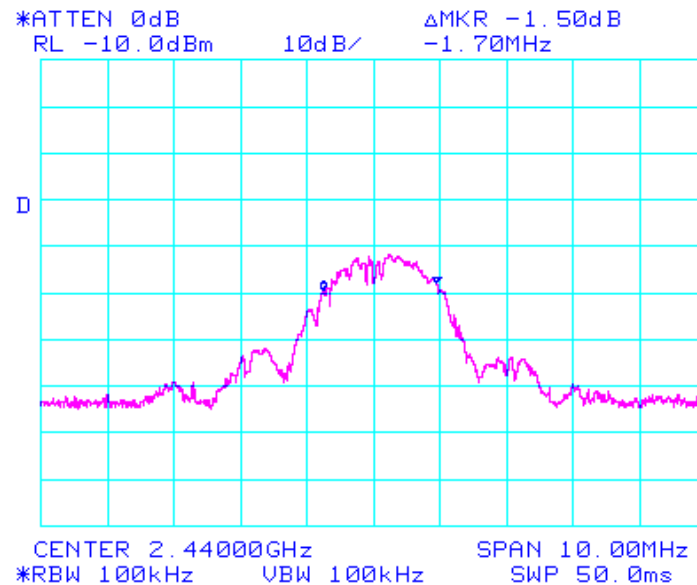
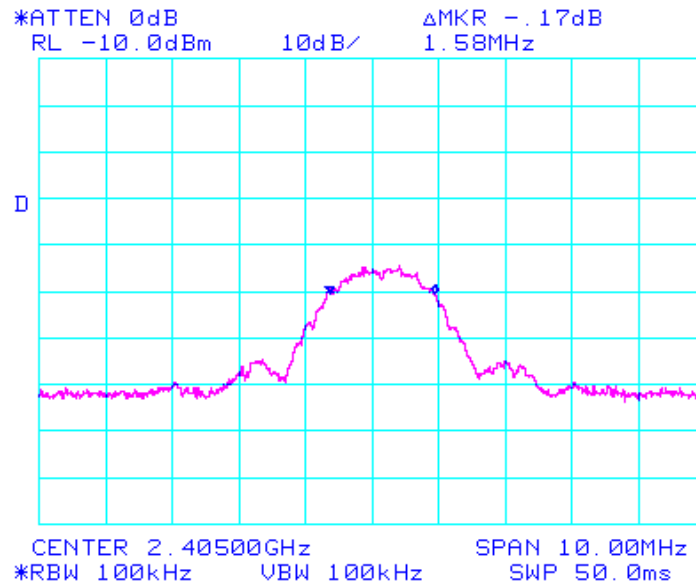
Measured 6 dB bandwidth: 1.70 MHz

Test Conditions: 50 %RH
 25 °C

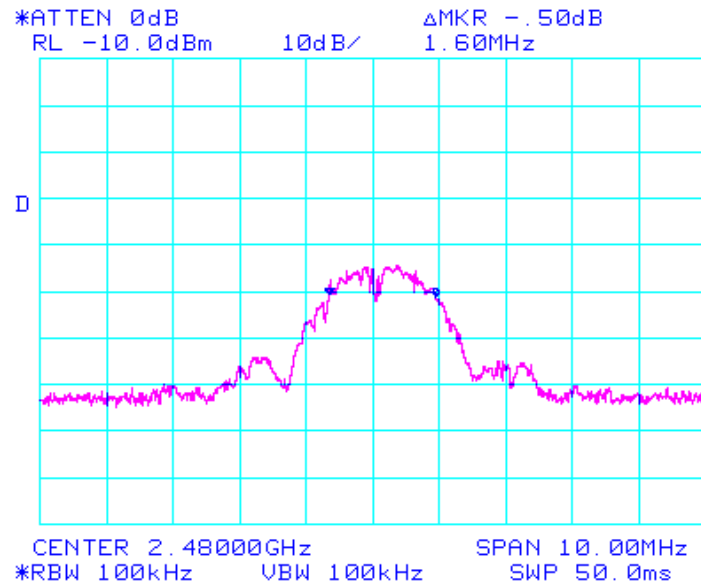
Measurement Uncertainty: +/-1x10⁻⁷ ppm

Test Equipment Used: 1464-1082-802

Test Data – Occupied Bandwidth



Test Data – Occupied Bandwidth



Section 4. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(3)
TESTED BY: David Light	DATE: 07 October 2010

Test Results: Complies.

Measurement Data: Refer to attached data

Test Conditions: 50 %RH
25 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993

- ☒ This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.
- ☐ For battery powered equipment, the device was tested with a fresh battery per 15.31(e).
- ☒ The device was tested on three channels per 15.31(l).
- ☒ This test was performed radiated.

Test Data – Peak Power

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
2405	-46.0	-11.1		0	7.8	-3.3	36.0	-39.2600	V	
2440	-46.6	-11.7		0	7.8	-3.9	36.0	-39.8600	V	
2480	-49.1	-14.2		0	7.8	-6.4	36.0	-42.3600	V	
Notes:										

The peak conducted power is estimated to be -4.1 dBm (0.4 mW) based on the stated antenna gain of 0.8 dBi.

Spectrum Analyzer Settings: RBW = 2 MHz
 VBW = 3 MHz
 Peak detector
 Span = 10 MHz
 Sweep = Auto

Section 5. Radiated Emissions

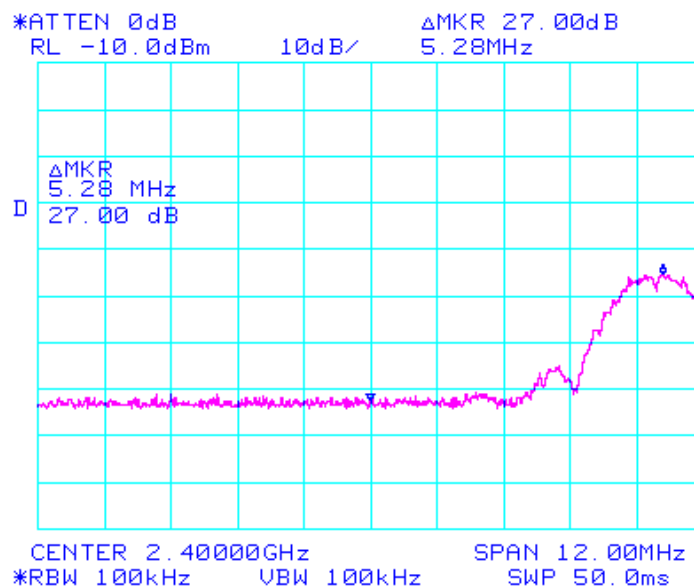
NAME OF TEST: Radiated Emissions	PARA. NO.: 15.247 (d)
TESTED BY: David Light	DATE: 07 October 2010

Test Results: Complies.**Measurement Data:** See attached table.**Test Conditions:** 50 %RH
25 °C**Measurement Uncertainty:** +/-3.7 dB**Test Equipment Used:** 1464-1484-1485-791-1016-993-1480**Notes:**

- ☒ For handheld devices, the EUT was tested on three orthogonal axis'
- ☒ The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33
- ☒ The device was tested on three channels per 15.31(l).
- ☒ 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.

Radiated Emissions

Lower Band Edge

**Measurement Data:**

Reading listed by order taken.

Test Distance: 3 Meters

Freq MHz	Rdng dBμV	Horn dB	Pre-A dB	Cable dB	Cable dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
2483.5	61.8	+29.0	-33.0	+0.8	+2.3	+0.0	60.9	74.0	-13.1	Vert
2483.5	52.3	+29.0	-33.0	+0.8	+2.3	+0.0	51.4	54.0	-2.6	Vert
Ave										
2483.5	53.7	+29.0	-33.0	+0.8	+2.3	+0.0	52.8	54.0	-1.2	Horiz

Corr. Reading (dBμV/m)=Rdng (dBμV) + Antenna (dB) +Cable (dB) + Amplifier (dB)

All measurements are Peak unless otherwise noted. If a peak measurement complied with the Average limit, then an average measurement was not made.

Peak Measurements: RBW/VBW = 1 MHz
Peak detector

Average Measurements: RBW = 1 MHz VBW = 100 kHz
Peak detector

EQUIPMENT: IPD-ZKIV2

Section 6. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(e)
TESTED BY: David Light	DATE: 07 October 2010

Test Results: Complies.

Measurement Data: See attached data..

Test Conditions: 50 %RH
25 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1484-1485-993

Peak Power Spectral Density

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
2405	-56.3	-21.4		0	7.8	-13.6	8.0	-21.5600	V	
2440	-57.1	-22.2		0	7.8	-14.4	8.0	-22.3600	V	
2480	-59.3	-24.4		0	7.8	-16.6	8.0	-24.5600	V	
Notes:										

The conducted peak spectral density is estimated to be -14.4 dBm based on the stated antenna gain of 0.8 dBi.

RBW/VBW = 3 kHz

Detector = Peak

Span = 1 MHz

Sweep = 360 seconds

Section 7. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: David Light	DATE: 11 October 2010

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

Test Equipment Used: 1188-1663-674-1484

Test Data – Powerline Conducted Emissions**Line 1**

Frequency	FCC B	FCC B	AVG	AVG	QP	QP
kHz	QP LIMIT	AVG LIMIT	Meas	Margin	Meas	Margin
150.09	65.997	55.997	29.117	-26.881	55.740	-10.257
155.79	65.834	55.834	28.707	-27.128	55.069	-10.766
165.1	65.568	55.568	27.775	-27.793	53.319	-12.250
171.69	65.380	55.380	27.078	-28.302	51.963	-13.417
180.79	65.120	55.120	26.258	-28.862	50.091	-15.030
188.82	64.891	54.891	25.581	-29.310	48.601	-16.290
198.35	64.619	54.619	25.014	-29.604	46.858	-17.760
200.27	64.564	54.564	24.906	-29.658	46.685	-17.879
208.37	64.332	54.332	24.236	-30.096	45.042	-19.290
215.84	64.119	54.119	23.847	-30.272	43.830	-20.289
208.37	64.332	54.332	24.236	-30.096	45.042	-19.290
200.27	64.564	54.564	24.906	-29.658	46.685	-17.879
198.35	64.619	54.619	25.014	-29.604	46.858	-17.760
188.82	64.891	54.891	25.581	-29.310	48.601	-16.290
180.79	65.120	55.120	26.258	-28.862	50.091	-15.030
171.69	65.380	55.380	27.078	-28.302	51.963	-13.417
165.1	65.568	55.568	27.775	-27.793	53.319	-12.250
155.79	65.834	55.834	28.707	-27.128	55.069	-10.766
150.09	65.997	55.997	29.117	-26.881	55.740	-10.257

Line 2

Frequency	FCC B	FCC B	AVG	AVG	QP	QP
kHz	QP Limit	AVG Limit	Meas	Margin	Meas	Margin
151.89	65.946	55.946	29.163	-26.783	55.667	-10.279
159.59	65.726	55.726	28.432	-27.294	54.356	-11.370
167.5	65.500	55.500	27.624	-27.876	52.781	-12.719
175.82	65.262	55.262	26.751	-28.511	50.936	-14.326
184.14	65.025	55.025	25.999	-29.025	49.247	-15.778
192.67	64.781	54.781	25.380	-29.401	47.584	-17.197
184.14	65.025	55.025	25.999	-29.025	49.247	-15.778
175.82	65.262	55.262	26.751	-28.511	50.936	-14.326
167.5	65.500	55.500	27.624	-27.876	52.781	-12.719
159.59	65.726	55.726	28.432	-27.294	54.356	-11.370
151.89	65.946	55.946	29.163	-26.783	55.667	-10.279

Section 8. Receiver Spurious Emissions

NAME OF TEST: Receiver Spurious Emissions	PARA. NO.: RSS-Gen 7.2.3.2
TESTED BY: David Light	DATE: 08 October 2010

Test Results: Complies.

Measurement Data: See attached table.

Test Conditions: 50 %RH
25 °C

Measurement Uncertainty: +/-3.7 dB

Test Equipment Used: 1464-1484-1485-791-1016-993-1480

Test Data – Receiver Spurious Emissions

Frequency MHz	Limit (dBuV/m)	Horizontal QP	QP Margin	Vertical QP	Vertical Margin
30.0	40.0	9.8	-30.2		
59.0	40.0			7.8	-32.2
78.0	40.0			39.6	-0.4
78.3	40.0	38.7	-1.3		
107.8	43.5	33.3	-10.2		
107.8	43.5			50.8	7.2
141.3	43.5			30.4	-13.1
144.0	43.5	23.1	-20.4		
200.8	43.5	24.7	-18.8		
200.9	43.5			30.2	-13.3
231.5	46.0	30.0	-16.0		
310.5	46.0			30.3	-15.7
413.5	46.0			26.5	-19.6
413.9	46.0	20.4	-25.6		
630.0	46.0	28.7	-17.3		
780.0	46.0	30.7	-15.3		
880.0	46.0			27.1	-18.9

The spectrum was searched from 30 MHz to the fifth harmonic of the highest frequency generated.

Analyzer settings; Peak Measurements <1000 MHz RBW/VBW = 100 kHz
 QP Measurements <1000 MHz IF bandwidth = 120 kHz
 Peak Measurements >1000 MHz RBW/VBW = 1 MHz
 Average Measurements >1000 MHz RBW=1 MHz VBW=1 kHz

Section 9. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #
674	Limiter	Hewlett Packard	11947A	3107A02200
802	Near Field Probe Set	EMCO	7405	103
993	Antenna, Horn	A.H. Systems	SAS-200/571	162
1016	Preamplifier	Hewlett Packard	8449A	2749A00159
1082	Cable, 2m	Astrolab	32027-2-29094-72TC	
1188	LISN	EMCO	3825/2	1214
1464	Spectrum Analyzer	Hewlett Packard	8563E	3551A04428
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572
1484	Cable	Storm	PR90-010-072	
1485	Cable	Storm	PR90-010-216	
1663	Spectrum Analyzer	Rohde & Schwartz	FSP3	100073
791	PreAmp	Nemko, USA		

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 Emission (MHz)		Limit (dBmV)	
		Quasi-peak	Average
0.15-0.5	66	to 56*	56 to 46*
0.5-5	56	46	
5-30	60	50	

* 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.

EQUIPMENT: IPD-ZKIV2

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

Number of channels tested:

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-ZKIV2

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

Number of channels tested:

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: 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 ($\mu\text{V/m}$ @ 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.

Number of channels tested:

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 ($\mu\text{V/m}$ @ 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

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		

Number of channels tested:

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: 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:

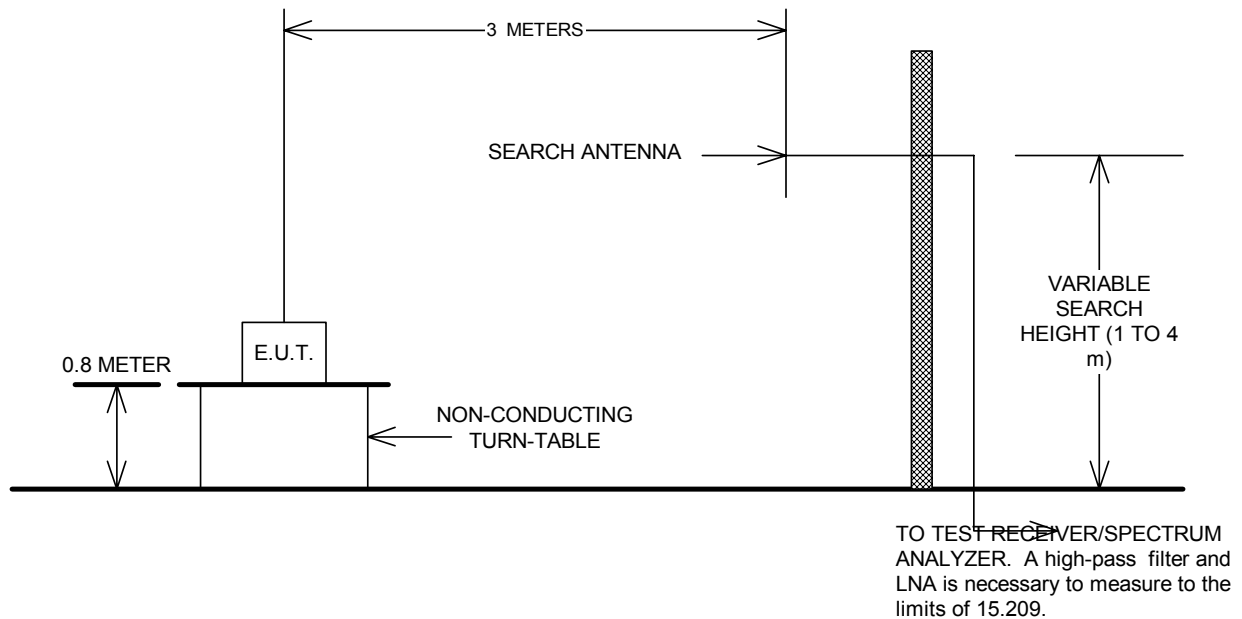
For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent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

Number of channels tested:

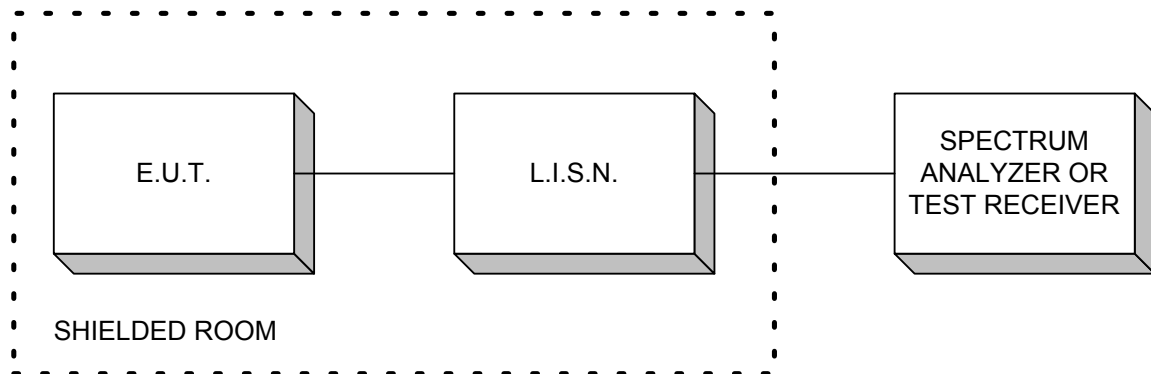
Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom

ANNEX B - TEST DIAGRAMS

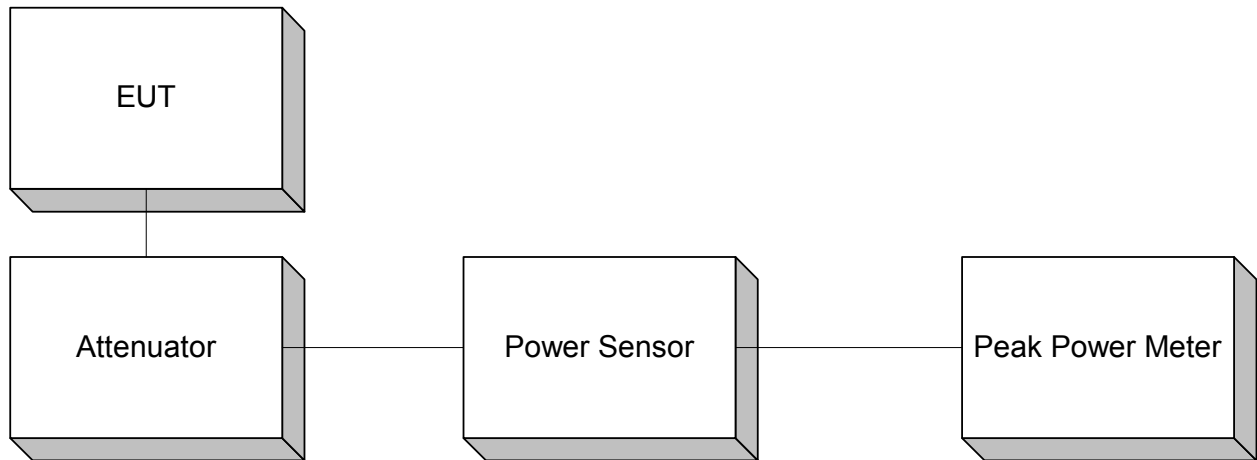
Test Site For Radiated Emissions



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)**

