

SNUPI Technologies

TEST REPORT FOR

**Water Sensor Node
Model: 810-00011**

Tested To The Following Standards:

FCC Part 15 Subpart C § 15.247

Report No.: 96653-16

Date of issue: February 17, 2015



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

SNUPI Technologies
4512 University Way NE
Seattle, WA 98105

Representative: Patrick Vilbrandt
Customer Reference Number: 1095

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 96653

DATE OF EQUIPMENT RECEIPT:
DATE(S) OF TESTING:

January 27, 2015
January 27-29, 2015

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C § 15.247

Test Procedure	Description	Modifications*	Results
15.247(a)(2)	-6dB Occupied Bandwidth	NA	Pass
15.247(b)(3)	Maximum Power Output	NA	Pass
15.247(d)	Radiated Spurious Emissions and Band Edge	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass

NA = Not applicable

Modifications* During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

*Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Water Sensor Node

Manuf: SNUPI Technologies

Model: 810-00011

Serial: 90-7A-F1-FF-FB-FC

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

N300 Wireless Router

Manuf: Netgear

Model: WNR2000 v4

Serial: NA

Laptop

Manuf: Dell

Model: Precision M4400

Serial: NA

FCC PART 15 SUBPART C

15.247(a)(2) -6dB Occupied Bandwidth

Test Conditions / Setup

The EUT's antenna is non-removable, thus the data is gathered through radiated measurements. The EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is investigated in its laying and standing positions with only the worst case being reported.

Temperature: 23°C

Relative Humidity: 41%

Pressure: 103.3kPa

Date Tested: 1/27/15

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

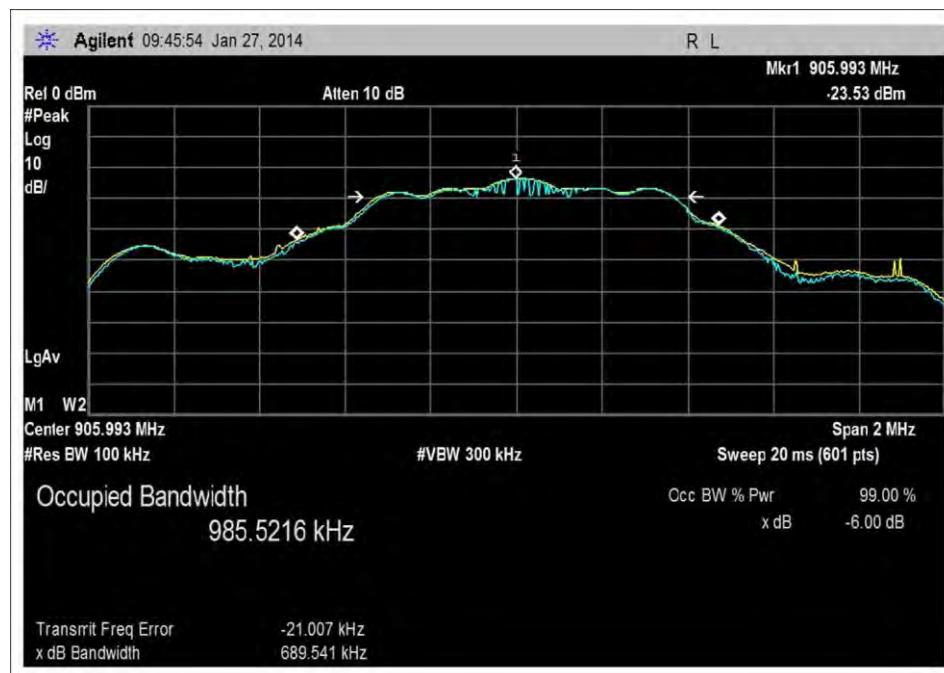
Engineer: Steven Pittsford

Test Equipment

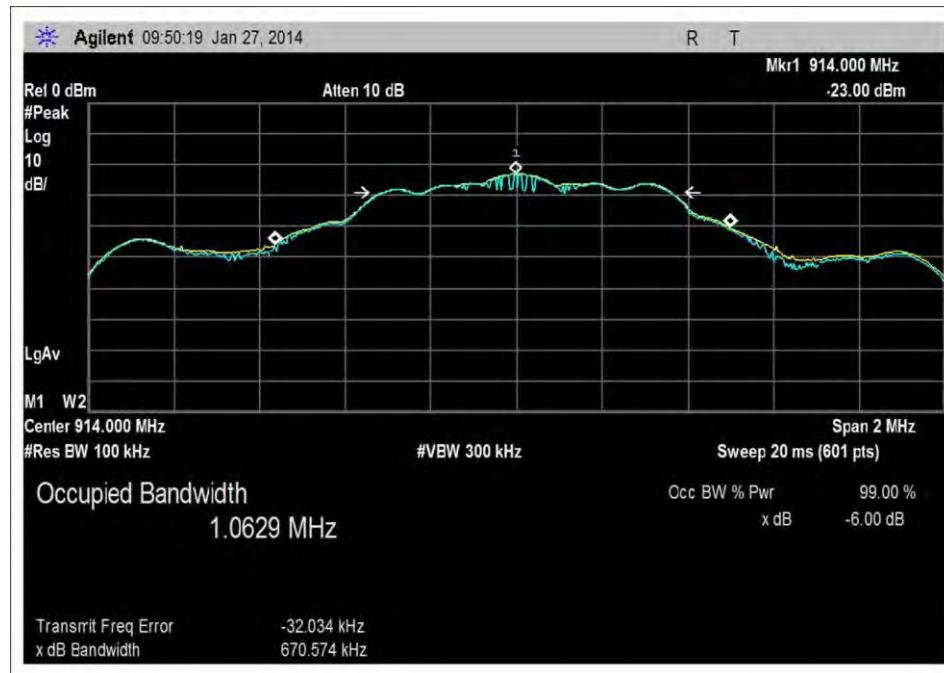
Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Frequency (MHz)	-6dB Bandwidth (Sensor Node)
906	689.5kHz
914	666.8kHz
924	669.8kHz

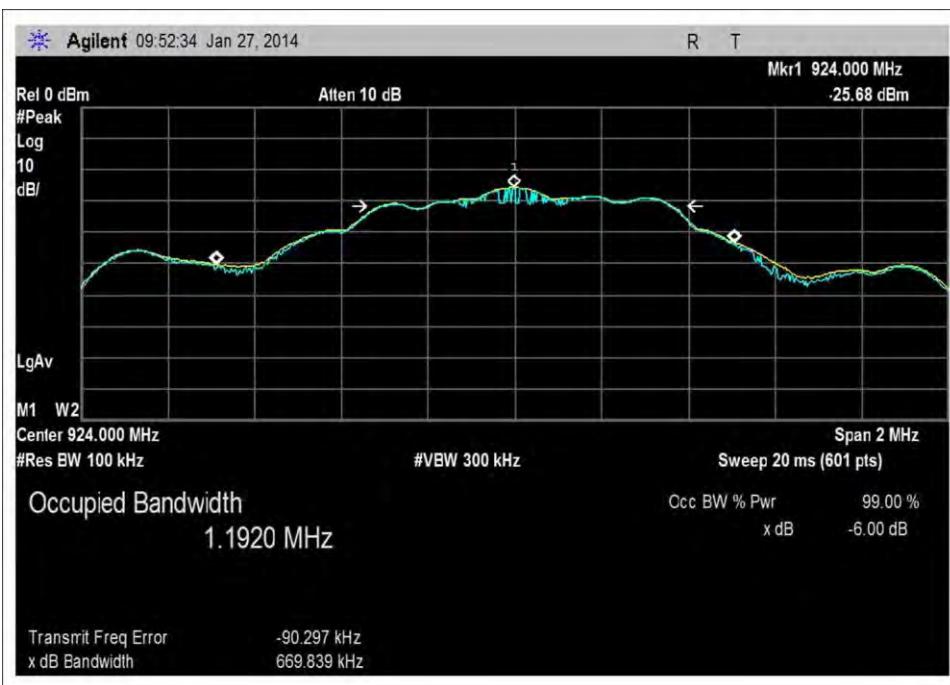
Test Data



Low



Middle



High

Test Setup Photos



15.247(b)(3) Maximum Power Output

Test Conditions / Setup

The EUT's antenna is non-removable, thus the data is gathered through radiated measurements. The EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is investigated in its laying and standing positions with only the worst case being reported.

Test Conditions:

Temperature: 23°C

Relative Humidity: 41%

Pressure: 103.3kPa

Date Tested: 1/29/15

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Engineer: Steven Pittsford

Test Equipment

Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Correction factors are factored into the spectrum analyzer screen captures.

$$P = (Ed)^2 / (30 * G)$$

E = Field strength of the measurement converted to V/M

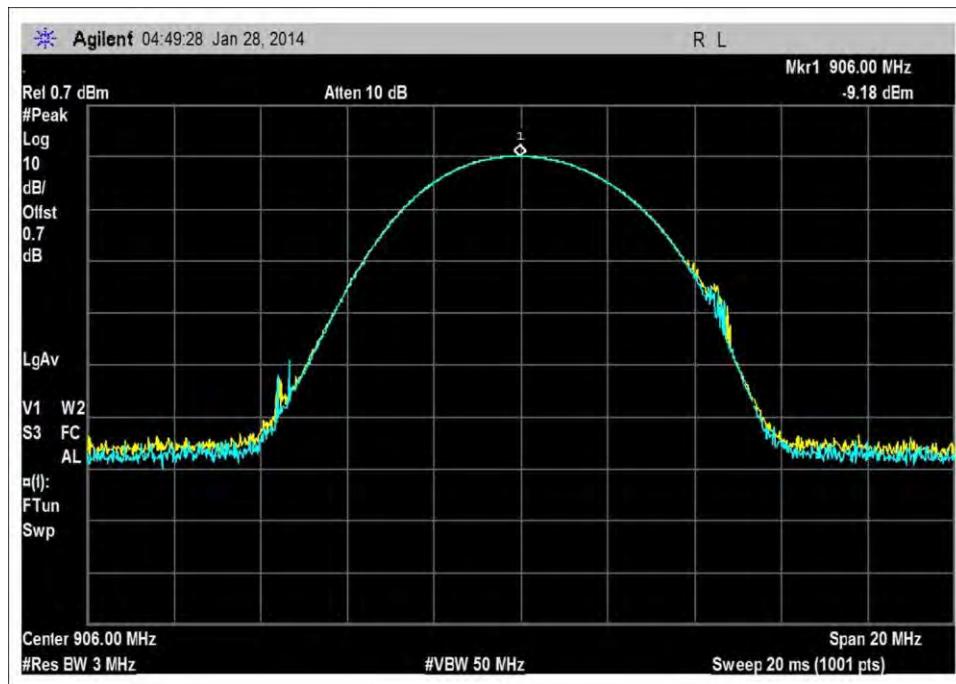
d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

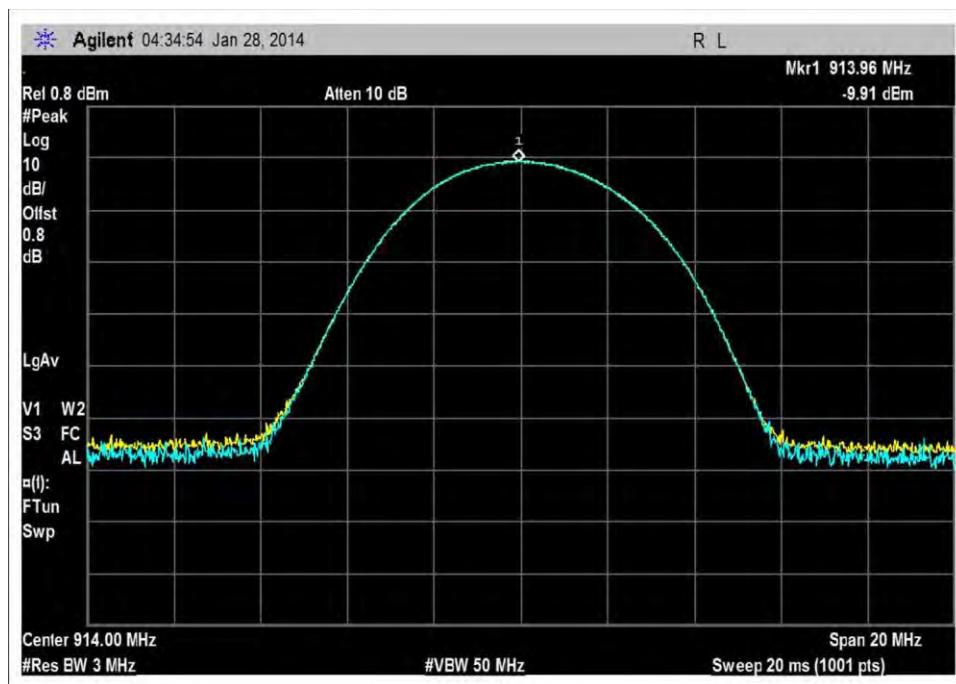
P = The power in watts for which we are solving

Frequency (MHz)	Corrections due to cables, Amplifiers and antennas (dB)	Corrected Reading (dBm)	Antenna Gain (dBi)	Conducted Power (Watts)
906	0.7	-9.2	-7.4	0.1
914	0.8	-9.9	-8.1	0.1
924	1.0	-11.2	-9.4	0.1

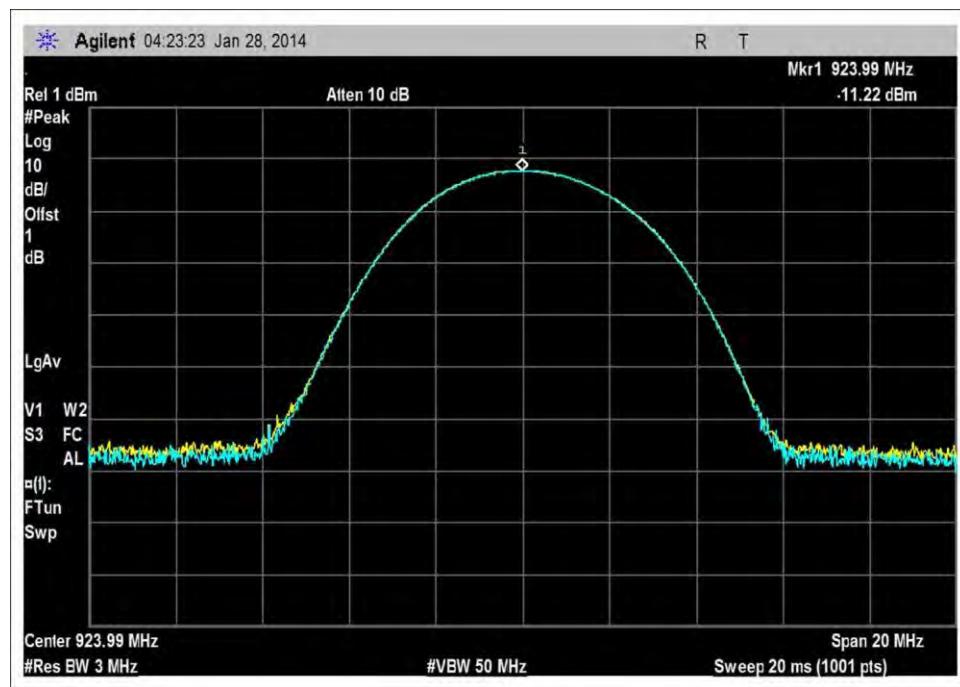
Test Data



Low



Middle



High

Test Setup Photos



15.247(d) Radiated Spurious Emissions and Band Edge

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **SNUPI Technologies**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **96653** Date: **1/29/2015**
 Test Type: **Maximized Emissions** Time: **14:30:18**
 Equipment: **Water Sensor Node** Sequence#: **11**
 Manufacturer: **SNUPI Technologies** Tested By: **Steven Pittsford**
 Model: **810-00011**
 S/N: **90-7A-F1-FF-FB-FC**

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03209	Preamp	83051A	3/5/2013	3/5/2015
T2	AN01467	Horn Antenna-ANSI	3115	9/16/2013	9/16/2015
		C63.5 Calibration			
T3	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T4	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN03170	High Pass Filter	HM1155-11SS	10/14/2013	10/14/2015
T6	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016
T7	AN02307	Preamp	8447D	3/14/2014	3/14/2016
T8	AN01996	Biconilog Antenna	CBL6111C	7/16/2014	7/16/2016
T9	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T10	ANP05963	Cable	RG-214	2/21/2014	2/21/2016

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Water Sensor Node*	SNUPI Technologies	810-00011	90-7A-F1-FF-FB-FC

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temperature: 23°C
Pressure: 103.3kPa
Humidity: 41%
Frequency: 9k-9.28GHz
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02
Mode: The EUT is Transmitting at Low Mid and High Channels
The EUT's antenna is non-removable, thus the data is gathered through radiated measurements.
The EUT is located on top of a Styrofoam table, 80cm over the ground plane.
The EUT is investigated in its laying and standing positions with only the worst case being reported.

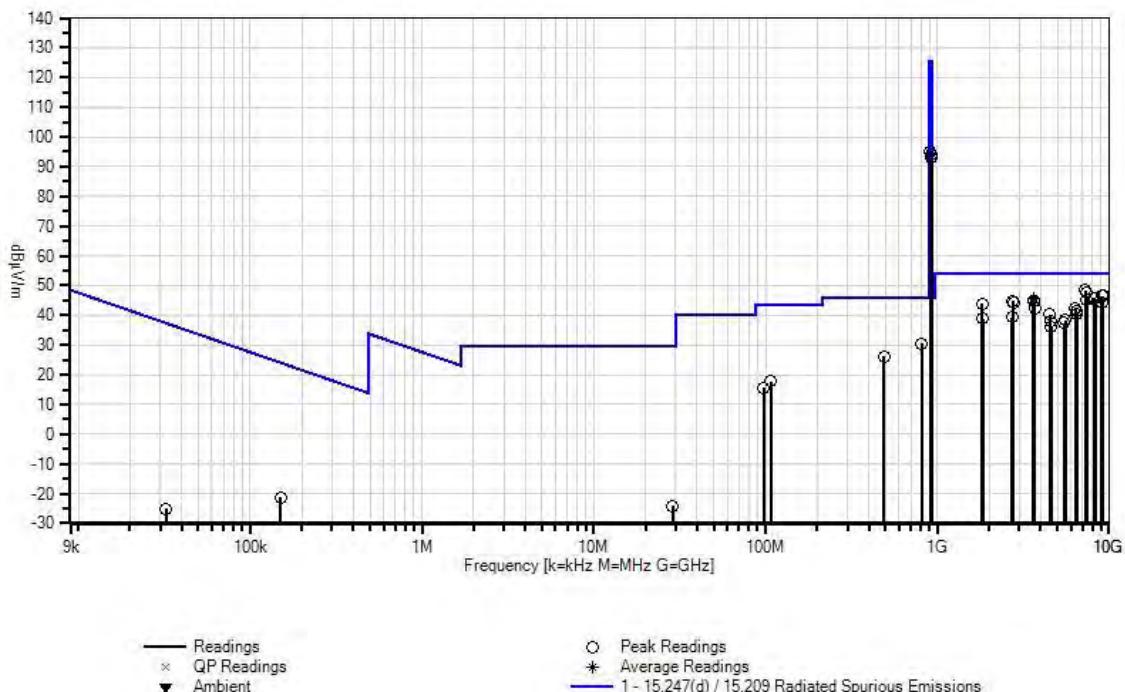
Ext Attn: 0 dB

Measurement Data:			Reading listed by margin.				Test Distance: 3 Meters					
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar	
			MHz	dB μ V	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	7247.890M	32.5	-28.2 +0.1 +0.0	+36.7 +0.0 +0.0	+4.8 +0.0 +0.0	+2.4 +0.0	+0.0 297	48.3	54.0	-5.7	V & H	
2	7312.005M	31.6	-28.2 +0.2 +0.0	+37.0 +0.0 +0.0	+4.8 +0.0 +0.0	+2.4 +0.0	+0.0	47.8	54.0	-6.2	V & H	
3	9239.866M	28.7	-27.7 +0.2 +0.0	+36.9 +0.0 +0.0	+5.7 +0.0 +0.0	+2.8 +0.0	+0.0 268	46.6	54.0	-7.4	Horiz	
4	9138.790M	28.8	-27.6 +0.2 +0.0	+36.7 +0.0 +0.0	+5.5 +0.0 +0.0	+2.8 +0.0	+0.0 360	46.4	54.0	-7.6	V & H	
5	8225.120M	29.1	-28.1 +0.1 +0.0	+36.7 +0.0 +0.0	+5.6 +0.0 +0.0	+2.5 +0.0	+0.0	45.9	54.0	-8.1	V & H	
6	3624.000M Ave	41.9	-30.9 +0.3 +0.0	+29.7 +0.0 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0 24	45.8	54.0	-8.2	V & H	
^	3623.970M	45.8	-30.9 +0.3 +0.0	+29.7 +0.0 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0 25	49.7	54.0	-4.3	V & H	
8	8315.781M	28.7	-28.0 +0.1 +0.0	+36.5 +0.0 +0.0	+5.6 +0.0 +0.0	+2.6 +0.0	+0.0 330	45.5	54.0	-8.5	Horiz	
9	8153.930M	28.6	-28.1 +0.1 +0.0	+36.8 +0.0 +0.0	+5.6 +0.0 +0.0	+2.5 +0.0	+0.0 76	45.5	54.0	-8.5	V & H	
10	7391.972M	29.0	-28.2 +0.1 +0.0	+37.3 +0.0 +0.0	+4.7 +0.0 +0.0	+2.5 +0.0	+0.0 360	45.4	54.0	-8.6	Horiz	
11	3623.695M	41.0	-30.9 +0.3 +0.0	+29.7 +0.0 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0 233	44.9	54.0	-9.1	V & H	
12	2742.125M	41.8	-30.2 +0.3 +0.0	+28.8 +0.0 +0.0	+2.8 +0.0 +0.0	+1.4 +0.0	+0.0	44.9	54.0	-9.1	V & H	
13	9059.930M	27.2	-27.6 +0.2 +0.0	+36.5 +0.0 +0.0	+5.3 +0.0 +0.0	+2.8 +0.0	+0.0	44.4	54.0	-9.6	V & H	
14	2771.995M	41.1	-30.2 +0.3 +0.0	+28.9 +0.0 +0.0	+2.8 +0.0 +0.0	+1.5 +0.0	+0.0	44.4	54.0	-9.6	Horiz	
15	3656.000M Ave	40.4	-30.9 +0.3 +0.0	+29.8 +0.0 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0	44.4	54.0	-9.6	V & H	
											136	

^	3656.065M	44.2	-30.9	+29.8	+3.2	+1.6	+0.0	48.2	54.0	-5.8	V & H
			+0.3	+0.0	+0.0	+0.0	360		Mid		136
			+0.0	+0.0							
17	1828.075M	43.4	-30.6	+27.2	+2.3	+1.2	+0.0	43.9	54.0	-10.1	V & H
			+0.4	+0.0	+0.0	+0.0	360		Mid		124
			+0.0	+0.0							
18	3695.715M	38.5	-31.0	+29.8	+3.3	+1.6	+0.0	42.5	54.0	-11.5	Horiz
			+0.3	+0.0	+0.0	+0.0			High		112
			+0.0	+0.0							
19	6339.965M	30.5	-29.0	+33.9	+4.3	+2.4	+0.0	42.3	54.0	-11.7	V & H
			+0.2	+0.0	+0.0	+0.0	238		Low		125
			+0.0	+0.0							
20	6468.093M	29.3	-28.9	+34.1	+4.3	+2.3	+0.0	41.3	54.0	-12.7	Horiz
			+0.2	+0.0	+0.0	+0.0	360		High		109
			+0.0	+0.0							
21	6397.910M	28.6	-29.0	+34.0	+4.3	+2.4	+0.0	40.5	54.0	-13.5	V & H
			+0.2	+0.0	+0.0	+0.0	360		Mid		115
			+0.0	+0.0							
22	4530.215M	34.0	-31.0	+31.3	+3.5	+2.1	+0.0	40.2	54.0	-13.8	V & H
			+0.3	+0.0	+0.0	+0.0			Low		125
			+0.0	+0.0							
23	2718.205M	36.3	-30.2	+28.7	+2.8	+1.4	+0.0	39.3	54.0	-14.7	V & H
			+0.3	+0.0	+0.0	+0.0			Low		125
			+0.0	+0.0							
24	1847.855M	38.1	-30.6	+27.4	+2.3	+1.2	+0.0	38.8	54.0	-15.2	Horiz
			+0.4	+0.0	+0.0	+0.0			High		102
			+0.0	+0.0							
25	810.800M	31.4	+0.0	+0.0	+0.0	+0.8	+0.0	30.4	46.0	-15.6	V & H
			+0.0	+0.0	-27.7	+22.6	360				112
			+1.9	+1.4							
26	5544.035M	28.5	-30.1	+33.0	+4.1	+2.6	+0.0	38.3	54.0	-15.7	Horiz
			+0.2	+0.0	+0.0	+0.0			High		109
			+0.0	+0.0							
27	4569.910M	31.4	-31.0	+31.4	+3.6	+2.2	+0.0	37.9	54.0	-16.1	V & H
			+0.3	+0.0	+0.0	+0.0	360		Mid		106
			+0.0	+0.0							
28	5483.910M	27.8	-30.1	+32.9	+4.1	+2.6	+0.0	37.5	54.0	-16.5	V & H
			+0.2	+0.0	+0.0	+0.0			Mid		131
			+0.0	+0.0							
29	5436.215M	27.7	-30.2	+32.9	+4.1	+2.7	+0.0	37.4	54.0	-16.6	V & H
			+0.2	+0.0	+0.0	+0.0	170		Low		125
			+0.0	+0.0							
30	4618.220M	29.6	-31.0	+31.5	+3.6	+2.2	+0.0	36.2	54.0	-17.8	Horiz
			+0.3	+0.0	+0.0	+0.0	360		High		112
			+0.0	+0.0							
31	488.800M	33.0	+0.0	+0.0	+0.0	+0.7	+0.0	26.1	46.0	-19.9	V & H
			+0.0	+0.0	-28.1	+18.0	360				112
			+1.4	+1.1							
32	107.600M	33.4	+0.0	+0.0	+0.0	+0.3	+0.0	17.7	43.5	-25.8	V & H
			+0.0	+0.0	-27.8	+10.7	360				112
			+0.6	+0.5							

33	97.600M	32.3	+0.0	+0.0	+0.0	+0.3	+0.0	15.7	43.5	-27.8	V & H
			+0.0	+0.0	-27.8	+9.9	268				99
			+0.6	+0.4							
34	906.010M	94.2	+0.0	+0.0	+0.0	+0.9	+0.0	94.9	125.2	-30.3	V & H
			+0.0	+0.0	-27.4	+23.7					99
			+2.0	+1.5							
35	914.010M	93.4	+0.0	+0.0	+0.0	+0.9	+0.0	94.2	125.2	-31.0	V & H
			+0.0	+0.0	-27.3	+23.7	-9				99
			+2.0	+1.5							
36	923.990M	91.9	+0.0	+0.0	+0.0	+0.9	+0.0	92.9	125.2	-32.3	V & H
			+0.0	+0.0	-27.3	+23.8					99
			+2.1	+1.5							
37	150.000k	49.1	+0.0	+0.0	+0.0	+0.0	-80.0	-21.3	24.1	-45.4	Perp
			+0.0	+9.6	+0.0	+0.0	360				112
			+0.0	+0.0							
38	28.866M	10.7	+0.0	+0.0	+0.3	+0.2	-40.0	-24.2	29.5	-53.7	Perp
			+0.0	+4.6	+0.0	+0.0	360				112
			+0.0	+0.0							
39	32.406k	43.2	+0.0	+0.0	+0.0	+0.0	-80.0	-25.1	37.4	-62.5	Perp
			+0.0	+11.7	+0.0	+0.0					112
			+0.0	+0.0							

CKC Laboratories, Inc. Date: 1/29/2015 Time: 14:30:18 SNUPI Technologies WO#: 96653
 Test Distance: 3 Meters Sequence#: 11 V & H
 SNUPI Technologies Water Sensor Node P/N: 810-00011



Band Edge

Test Conditions / Setup

The EUT's antenna is non-removable, thus the data is gathered through radiated measurements. The EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is investigated in its laying and standing positions with only the worst case being reported.

Test Conditions:

Temperature: 23°C

Relative Humidity: 41%

Pressure: 103.3kPa

Date Tested: 1/29/15

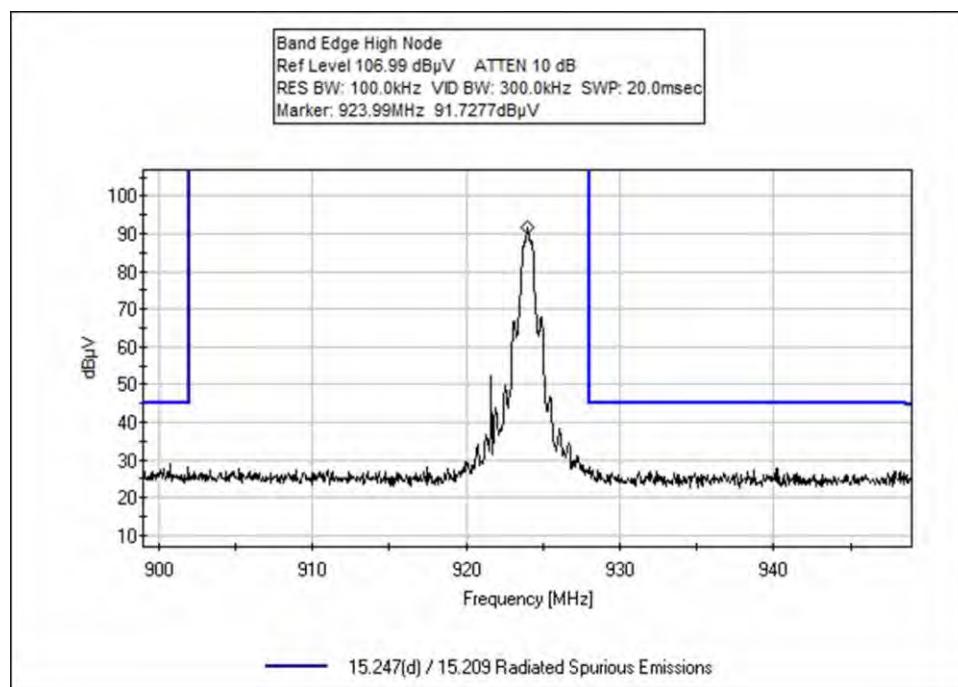
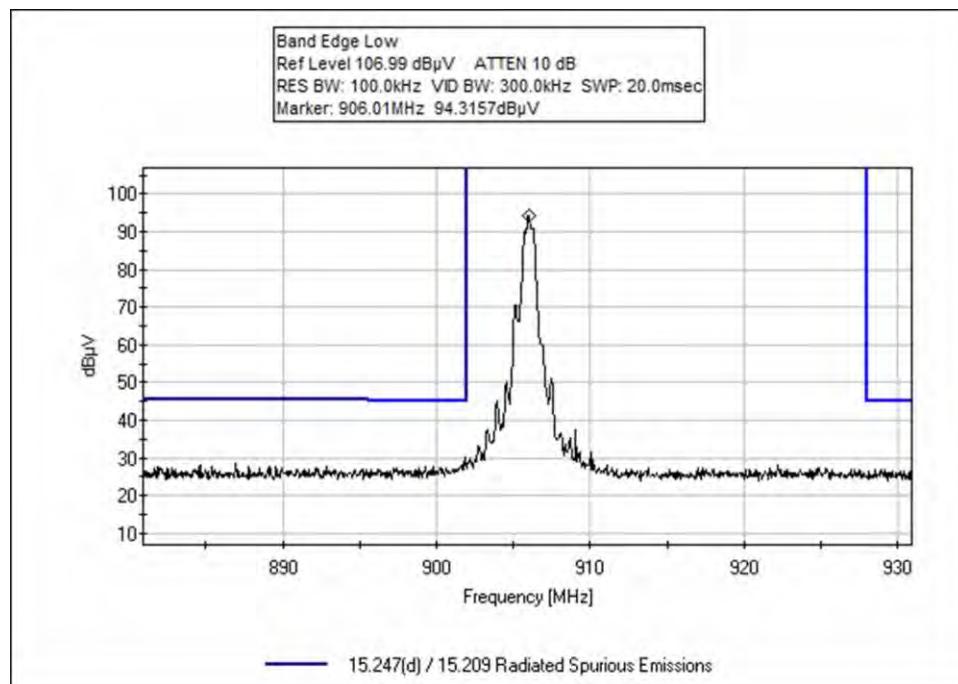
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Engineer: Steven Pittsford

Test Equipment

Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Test Data



Test Setup Photos



15. 247(e) Power Spectral Density

Test Conditions / Setup

The EUT's antenna is non-removable, thus the data is gathered through radiated measurements. The EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is connected to Wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M. This router is then connected to the laptop.

Test Conditions:

Temperature: 23°C

Relative Humidity: 41%

Pressure: 103.3kPa

Date Tested: 1/29/15

Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Test Engineer: Steven Pittsford

Test Equipment

Asset #	Description	Manufacturer	Model	Cal Date	Cal Due
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Correction factors are factored into the spectrum analyzer screen captures.

$$P = 10\log((Ed)^2 / (30 * G) * 1000)$$

E = Field strength of the measurement converted to V/M

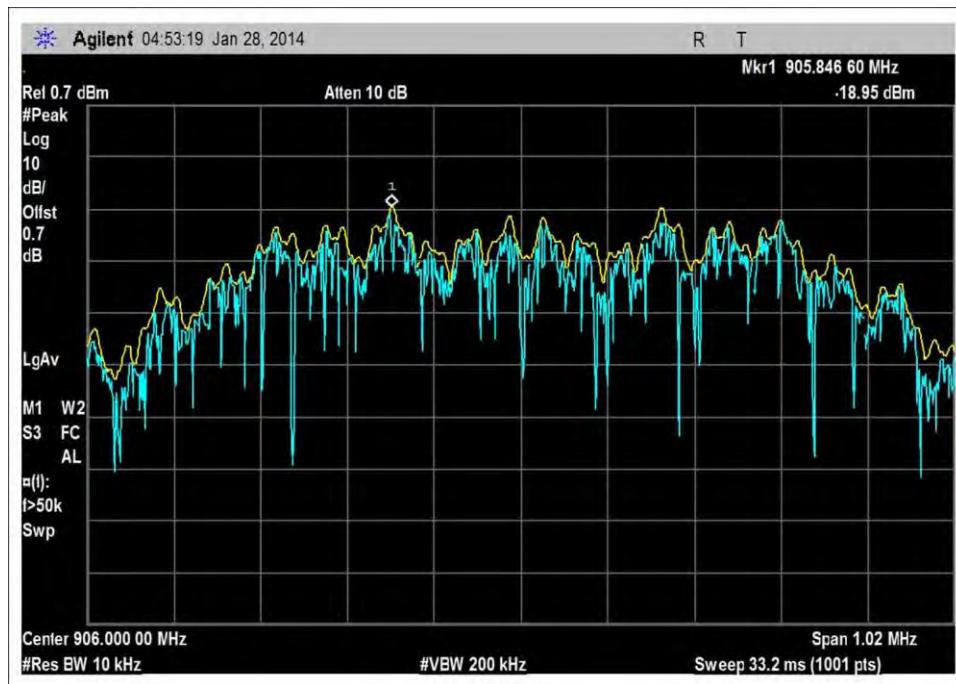
d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

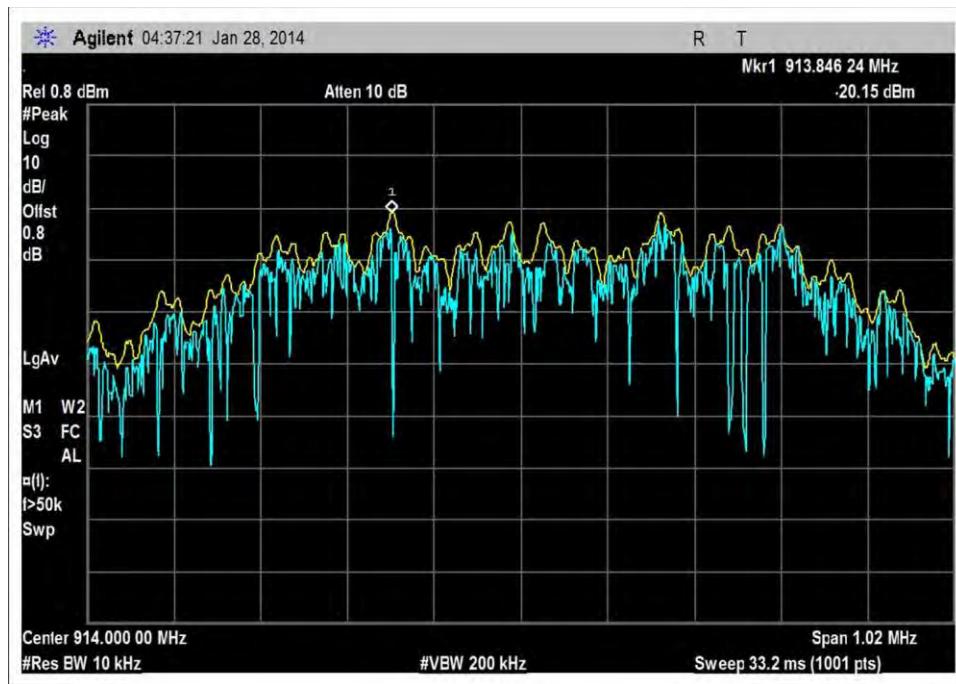
P = The power in dBm for which we are solving

Frequency (MHz)	Corrections due to cables, amplifiers, antennas (dB)	Corrected Reading (dBm)	Antenna Gain (dBi)	Spectral Density (dBm)
906	0.7	-19.0	-7.4	-1.78
914	0.8	-20.2	-8.1	-0.28
924	1.0	-21.5	-9.4	-0.33

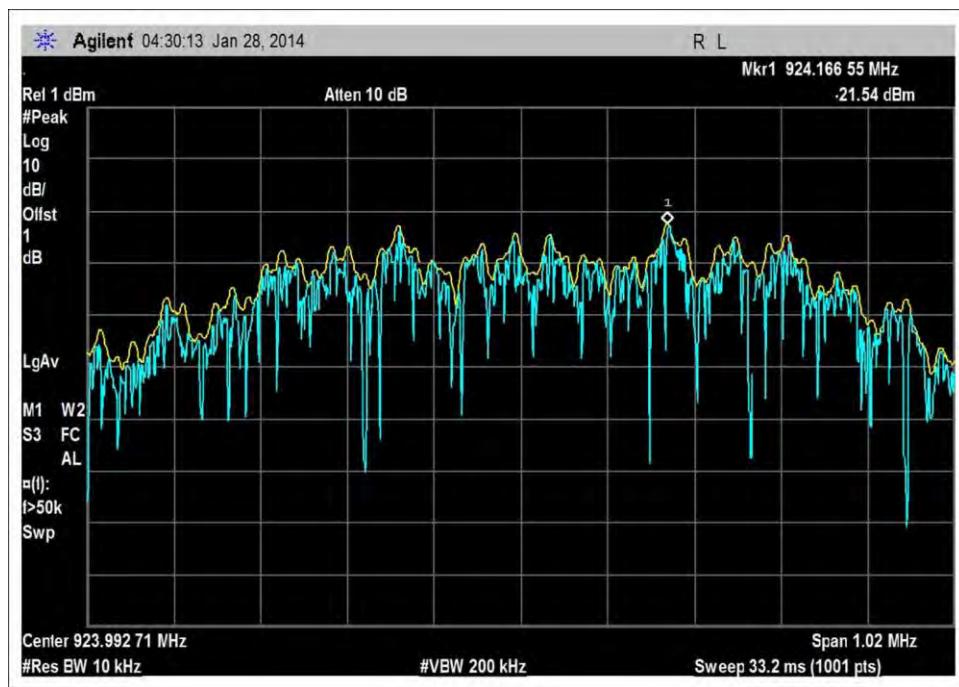
Test Data



Low



Middle



Test Setup Photos



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS	
Meter reading	(dB μ V)
+ Antenna Factor	(dB)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.