



NVLAP Lab Code 100426-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Nemko USA, Inc. is a NVLAP accredited laboratory.

Test Report issued under the responsibility of:



www.nemko.com

### TEST REPORT

CFR 47, Part 15, Subpart D  
RSS 213, Issue 2  
Isochronous UPCS Device  
1920 – 1930 MHz

Report Reference No. .... : 10236228\_trf2

Compiled by (+ signature) ..... : David Light

Approved by (+ signature) ..... : Tom Tidwell

Date of issue ..... : 7-Mar-13

Report Revision ..... : 4

Total number of pages ..... : 89

Testing Laboratory ..... : Nemko USA, Inc. (Dallas)

Address ..... : 802 N. Kealy Ave.  
Lewisville, TX 75057  
USA

Tel: +1 972 436 9600  
Fax: +1 972 436 2667

Applicant's name ..... : Uniden America Corporation

Address ..... : 4700 Amon Carter Boulevard, Fort Worth, Texas 76155

Model(s) Tested ..... : D1680v, D1660v, and DCX160v cordless telephone handset

FCC ID ..... : AMWUN368R

**Test specification:**

Standard ..... : CFR 47, Part 15, Subpart D and RSS 213, Issue 2

Test procedure ..... : ANSI C63.17-2006

Non-standard test method ..... : N/A

TRF Revision ..... : 7-Feb-13

## Revision History

#	Description	Date
0	Original Report Release	28-Feb-13
1	Added engineering judgment (pg. 6)	4-Mar-13
2	Added model DCX160v	7-Mar-13
3	Corrected model numbers	13-Mar-13
4	Corrected frequency ranges throughout test report	21-Mar-13

### Notices:

1. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
2. The test results presented in this report relate only to the object tested.
3. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.
4. "(see Enclosure #)" refers to additional information appended to the report.
5. Throughout this report a point is used as the decimal separator.
6. Dimensions in English units for convenience only, metric units prevail.
7. It is the manufacturer's responsibility to provide special instructions, if needed, to the user regarding the use of special cables (length, shielded/unshielded, type, grounding, etc.), clamp-on ferrite beads, etc for use with their product(s).

## Table of Contents

Revision History .....	2
Normative References.....	4
Equipment Under Test (EUT) .....	5
Details: .....	5
EUT Configuration .....	7
EUT Photo(s) .....	8
Summary of Testing – CFR Title 47, Part 15, Subpart D .....	10
Summary of Testing – RSS 213, Issue 2 .....	12
Testing Location.....	13
Test Methods .....	13
Frequency Measurements .....	14
Timing Measurements .....	14
Antenna Conducted Emission Measurement .....	14
Radiated Emissions Testing .....	15
Power Line Conducted Emissions .....	15
Monitoring Tests .....	16
List of Test Equipment .....	16
Coordination with fixed microwave.....	18
Digital modulation techniques .....	18
Labeling requirements.....	19
Antenna requirement.....	19
Channel frequencies .....	20
Test Results – Automatic discontinuation of transmission .....	21
Test Results – Peak power output.....	23
Test Results – Emission bandwidth.....	29
Test Results – Power spectral density .....	34
Test Results – In-band unwanted emissions.....	39
Test Results – Out-of-band emissions .....	43
Test Results – Carrier frequency stability .....	54
Test Results – Frame repetition stability .....	56
Test Results – Frame period and jitter .....	59
Test Results – Monitoring threshold, LIC .....	62
Test Results – Threshold monitoring bandwidth .....	66
Test Results – Reaction time and monitoring interval .....	68
Test Results – Time and Spectrum Window Access Procedure .....	72
Test Results – Acknowledgements and Transmission Duration.....	74
Test Results – Dual access criteria check.....	77
Test Results – Alternative monitoring interval .....	79
Test Results – Power line conducted emissions .....	81
Test Results – Radiated Spurious Emissions.....	83
Setup Photos.....	86

## Normative References

The following document(s) have been appropriately considered in the performance of the test results detailed in this report.

CFR Title 47, Part 2, Subpart J – Equipment Authorization Procedures

CFR Title 47, Part 15, Subpart D – Unlicensed Personal Communication Services (UPCS) Devices

ANSI C63.17 : 2006 – Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

RSS 213, Issue 2 : Dec 2005 – 2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)

## Equipment Under Test (EUT)

### Details:

#### Test item description:

Model ..... : D1680v, D1660v, and DCX160v  
Serial Number ..... : Handset #1(radiated), Handset #2 (antenna conducted)  
Production Status ..... :  Production  Pre-Production  Prototype  
Other Status Info ..... : [Click here to enter text.](#)  
EUT Received Date ..... : 17-Dec-12  
Ratings ..... : 2.4VDC (Battery)  1 $\phi$   3 $\phi$   
Product Type..... : Handset  
Modulation Type ..... : GFSK  
Operating Frequency Range ..... : 1920 - 1930 MHz  
Number of Channels..... : 5  
  
User Frequency Adjustment..... : None

#### General product description:

The EUT is a cordless telephone handset. The cordless phone uses DECT 6.0 protocol with changes to frequency range to make the phone operate within the frequency band 1920 to 1930 MHz as required by CFR 47, Part 15, Subpart D. Power for the handset is provided by rechargeable 2.4 Vdc battery pack.

#### Modifications to the EUT required for compliance:

There have been no modifications to the EUT as a result of this evaluation.

#### Deviations from Test Methodology:

None



**Engineering Judgements:**

Model D1680v and model D1660v handset are electrically identical in the radio circuit. Full testing was performed on model D1680v. Since the two models are electrically identical, the test data in this report is considered to be representative of model D1680v and D1660v.

Model DCX160v is identical and is only a model number assigned to the handset when it is sold separately.

Approved by (+ signature) .....: Tom Tidwell

*Table 1 – EUT Internal Operating Frequencies*

Frequency (MHz)	Description	Frequency (MHz)	Description
1920.672 MHz - 1927.584 MHz	Local oscillator		
1880 – 1935 MHz	PLL		
2829 – 2903 MHz	VCO		
13.824 MHz	Crystal Oscillator		

*Table 2 – EUT Operating Modes*

Mode #	Description
1	Transmit continuous data burst mode
2	
3	

## EUT Configuration

Figure 1 – EUT Configuration Diagram

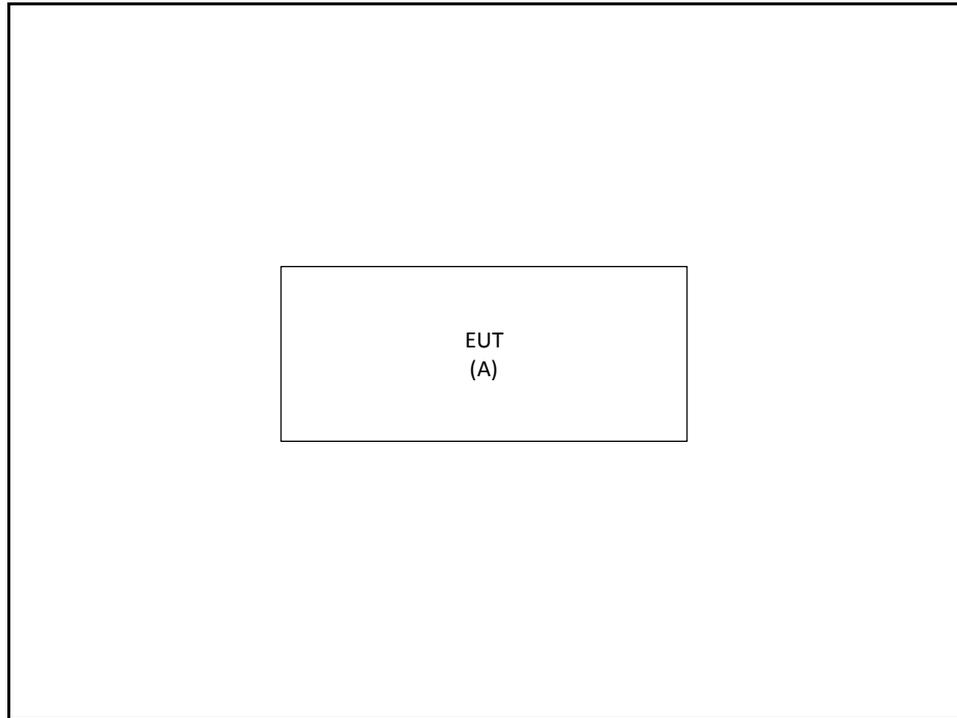


Table 3 – EUT & Auxiliary Equipment List

Item	Use*	Product Type	Manufacturer	Model	Serial No.
A	EUT	Cordless phone handset	Uniden Corp. Japan	D1680v	Handset #1 or Handset #2
B					
C					
D					
E					
F					
Note: * Use = EUT – Equipment Under Test, AE – Auxiliary/Associated Equipment, or SIM – Simulator (Not Subjected to Test)					

Table 4 – Interconnecting Cables List

Item	Use*	Cable Type
1		
2		
3		
4		
5		
6		
7		

**EUT Photo(s)**

Photo 1	EUT Photo – Front/Top View
	
<p><b>Supplemental Information:</b>            D1680v/D1660v Handset</p>	

Photo 2 EUT Photo – Rear/Side View



**Supplemental Information:**

D1680v/D1660v Handset

Photo 3 EUT Photo – Front/Top View



**Supplemental Information:**

D1680v/D1660v Handset

## Summary of Testing – CFR Title 47, Part 15, Subpart D

### Possible test case verdicts:

- test case does not apply to the test object : N/A
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement : F (Fail)
- not tested (not part of this evaluation)..... : NT

Date(s) of performance of tests..... : Jan. 16 – Feb 19, 2013

Clause	Test Description	Verdict	Comment
15.307	Coordination with fixed microwave		
15.319(b)	Digital modulation techniques	P	
15.19(a)(3)	Labelling requirements	P	
15.203, 15.317	Antenna requirement	P	
15.107(a), 15.207(a)	Power line conducted emissions	N/A	Battery powered
15.323(a)	Emission bandwidth	P	
15.323(d)	In-band emissions	P	
15.323(d)	Out-of-band emissions	P	
15.319(c), 15.31(e)	Peak transmit power	P	
15.319(d)	Power spectral density	P	
15.319(f)	Automatic discontinuation of transmission	P	
15.323(f)	Carrier frequency stability	P	
15.323(e)	Frame repetition stability	P	
15.323(e)	Frame period and jitter	P	
15.323(c)(2);(5);(9)	Monitoring threshold, Least Interfered Channel	P	
15.323(c)(1)	Monitoring of intended transmit window and maximum reaction time	P	
15.323(c)(7)	Threshold monitoring bandwidth	P	
15.323(c)(1);(5);(7)	Reaction time and monitoring interval	P	
15.323(c)(4);(6)	Access criteria test interval	N/A	Note 1
15.323(c)(4);(6)	Access criteria functional test	N/A	Note 1
15.323(c)(4)	Acknowledgements	P	
15.323(c)(3)	Transmission duration	P	
15.323(c)(10)	Dual access criteria	P	
15.323(c)(10)(11)	Alternative monitoring interval	N/A	Note 2
15.323(d)	Spurious emissions (antenna conducted)	P	
15.319(g) 15.109(a) 15.209(a)	Spurious emissions (radiated)	P	

### Notes:

<sup>1</sup>Only applies for equipment that transmits unacknowledged control and signalling information.

<sup>2</sup>The client declares that the tested equipment does not implement this provision.

<sup>3</sup>The tested equipment has integrated antennas only.



**General remarks:**

**Summary of compliance with national requirements:**

Compliance with this standard provides one means of demonstrating conformity with the specified requirements of CFR Title 47, Part 15, Subpart D.

## Summary of Testing – RSS 213, Issue 2

### Possible test case verdicts:

- test case does not apply to the test object : N/A
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement : F (Fail)
- not tested (not part of this evaluation)..... : NT

Date(s) of performance of tests..... : Jan. 16 – Feb 19, 2013

Clause	Test Description	Verdict	Comment
6.1	Digital modulation techniques	P	
RSS-GEN 5.2	Labelling requirements	P	
4.1(e)	Antenna requirement	P	
6.3 RSS-GEN 7.2.2	Power line conducted emissions	N/A	Battery powered
6.4	Emission bandwidth	P	
6.7.2	In-band emissions	P	
6.7.1	Out-of-band emissions	P	
6.5	Peak transmit power	P	
4.3.2.1	Power spectral density	P	
4.3.4(a)	Automatic discontinuation of transmission	P	
6.2	Carrier frequency stability	P	
4.3.4(c)	Frame repetition stability	P	
4.3.4(c)	Frame period and jitter	P	
4.3.4(b)	Monitoring threshold, Least Interfered Channel	P	
4.3.4	Monitoring of intended transmit window and maximum reaction time	P	
4.3.4	Threshold monitoring bandwidth	P	
4.3.4	Reaction time and monitoring interval	P	
4.3.4	Access criteria test interval	N/A	Note 1
4.3.4	Access criteria functional test	N/A	Note 1
4.3.4	Acknowledgements	P	
4.3.4	Transmission duration	P	
4.3.4	Dual access criteria	P	
4.3.4	Alternative monitoring interval	N/A	Note 2
6.7.1	Spurious emissions (antenna conducted)	P	
4.3.3 RSS-GEN 7.2.3	Spurious emissions (radiated)	P	
6.8	Receiver spurious emissions	P	

### Notes:

<sup>1</sup>Only applies for equipment that transmits unacknowledged control and signalling information.

<sup>2</sup>The client declares that the tested equipment does not implement this provision.

<sup>3</sup>The tested equipment has integrated antennas only.

### General remarks:



**Summary of compliance with national requirements:**  
 Compliance with this standard provides one means of demonstrating conformity with the specified requirements of RSS 213, Issue.

<b>Testing Location</b>	
<b>Testing Laboratory:</b>	Nemko USA, Inc. (Dallas)
Testing location/ address .....	802 N. Kealy Ave. Lewisville, TX 75057 USA
Testing procedure: TMP	
Tested by (name + signature) :	
Approved by (+ signature) :	
Testing location/ address .....	
<b>Supplemental Information:</b>	
Testing results contained herein were performed at the location(s) listed above.	

**Test Methods**

Battery operated products: Batteries used for testing are as supplied. Testing is performed with fully charged battery.

Products powered by AC mains connection: Testing is performed at 120 VAC. The voltage is varied to determine if the rf power output varies with voltage variation.

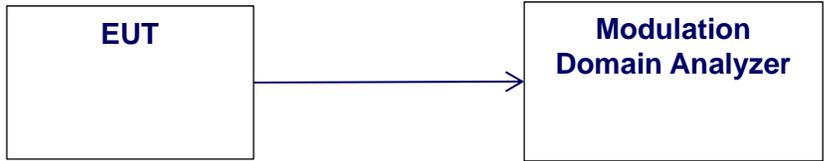
Temperature and humidity:

*Normal Conditions*

Parameter	Minimum	Nominal	Maximum
Temperature (°C)	21	---	23
Relative Humidity (%)	20	---	40

Testing is performed according to ANSI C63.17:2006

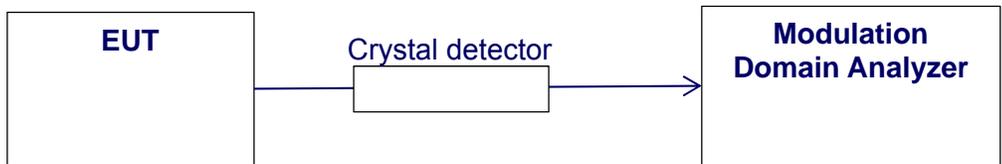
### Frequency Measurements



Carrier frequency stability at normal and extreme temperatures

Modulation pattern: 010101...

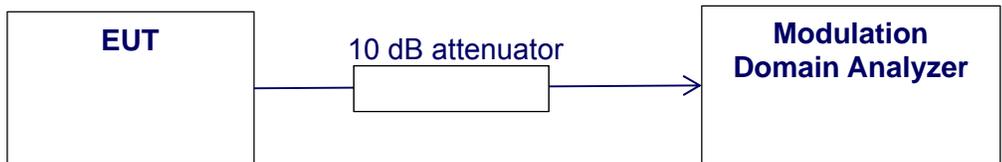
### Timing Measurements



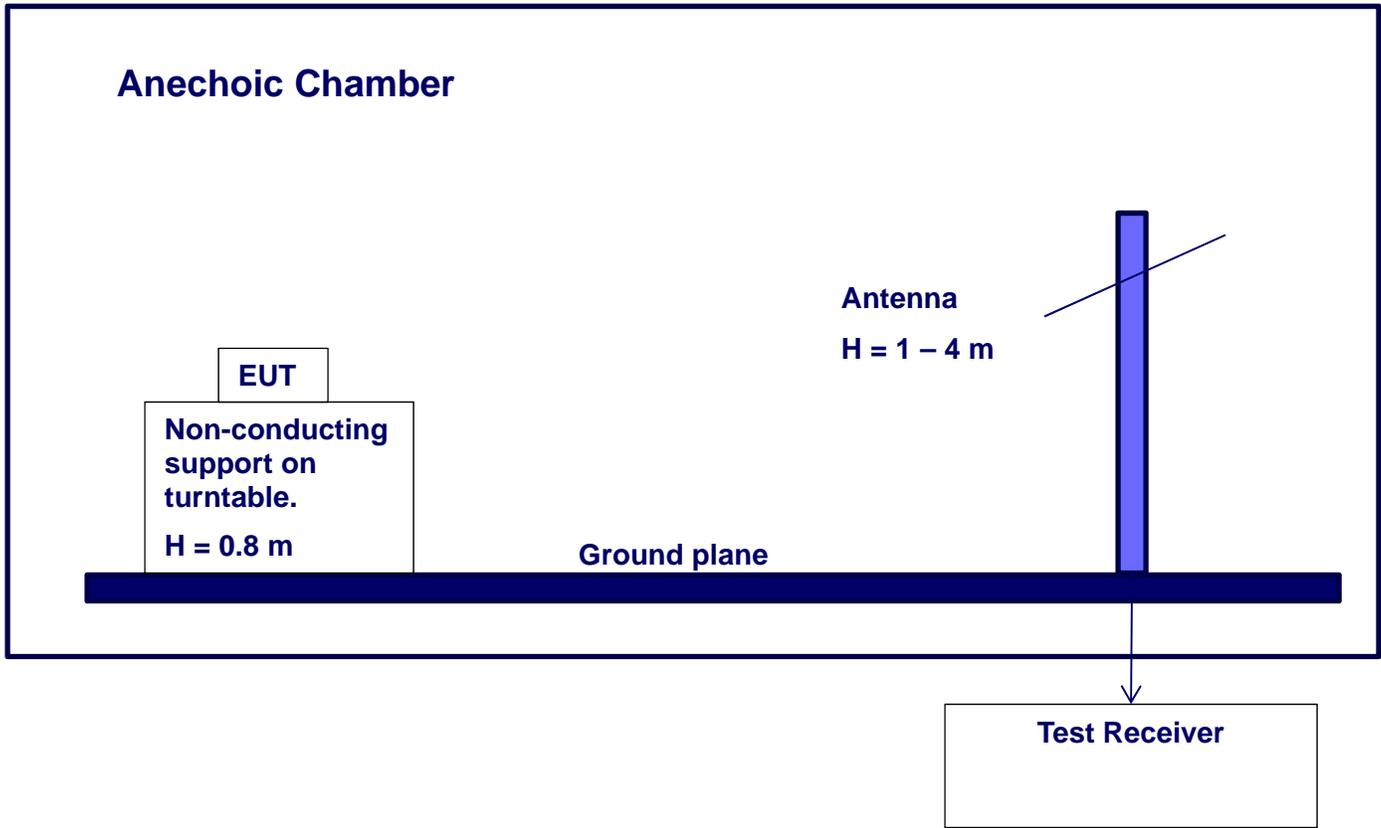
Frame repetition stability, Frame period and Jitter

Modulation pattern: 010101...

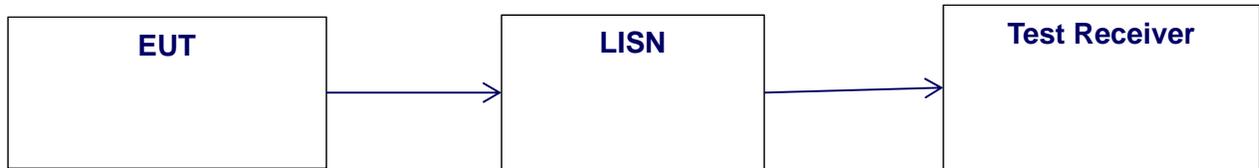
### Antenna Conducted Emission Measurement



### Radiated Emissions Testing

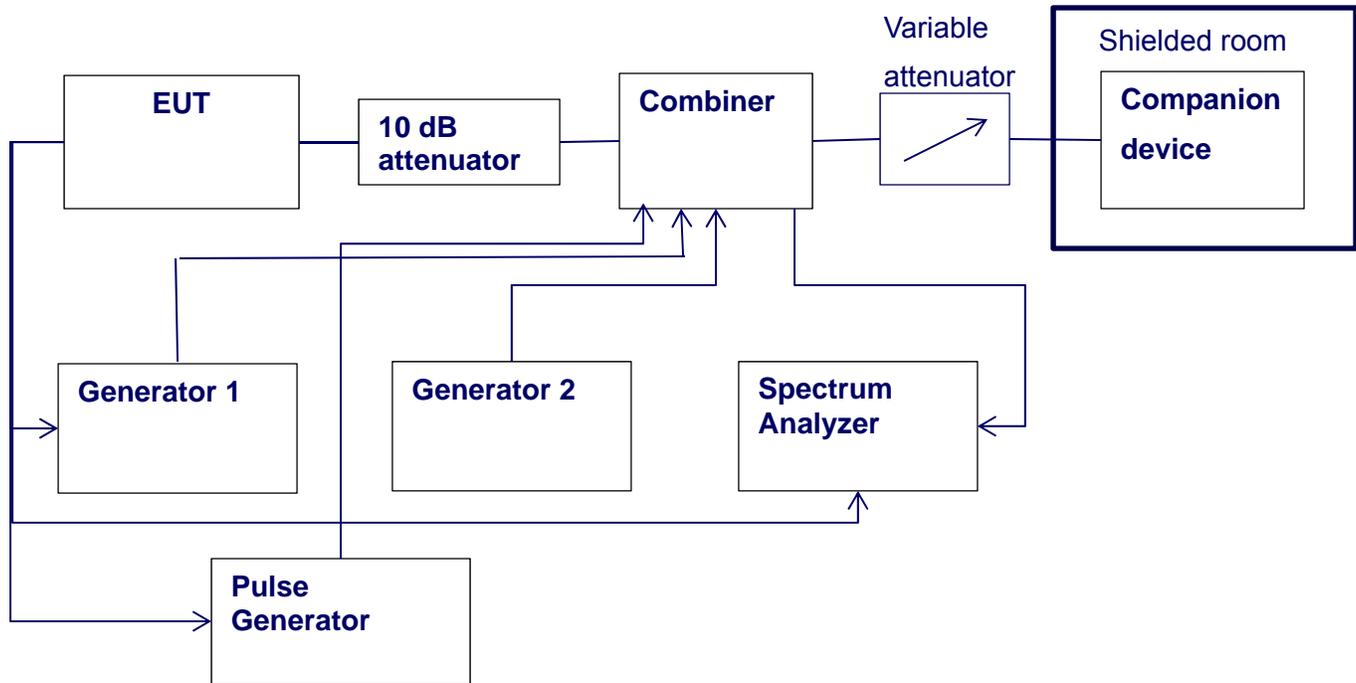


### Power Line Conducted Emissions



Measurement range (MHz)	Receiver bandwidth	Detector
0.150 to 30	10 kHz	Peak
0.150 to 30	9 kHz	Average
0.150 to 30	9 kHz	CISPR Quasi-Peak

## Monitoring Tests



Path loss between the generators and the EUT is measured using a calibrated spectrum analyzer before the test.

The CLK100 signal is used to synchronize the pulse signal generator, the interfering signal generators and the spectrum analyzer to the start of the DECT frame. CLK100 always comes from the base station, therefore, if the EUT is a handset then the CLK100 comes from the Companion Device in the above drawing.

The EUT was limited by administrative commands to operate on only two RF carriers. Generator 1 is an I/Q generator capable of generating an interference signal on multiple channels. Generator 2 is used to block specific channels as required. The pulse generator was used to generate 50 µsec and 35 µsec. rf pulses.

## List of Test Equipment

The following test equipment was used in the performance of the testing herein.

Table 5 – Test Equipment Used

Asset Tag	Description	Manufacturer	Model	Serial Number	Cal. Cycle
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	1 YR
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	2 YR
1052	Generator, I/Q Modulation	Rohde & Schwartz	AMIQ	830848/0005	N/R
1053	Generator, Vector Signal 300 KHz	Rohde & Schwartz	SMIQ 03	DE22081	N/R
1094	Combiner	Mini Circuits	ZA3PD-2	-	N/R
1095	Combiner	Mini Circuits	ZA3PD-4	-	N/R



1289	Watkins Johnson 1 to 6GHz Pre Amplifier	Nemko USA, Inc.	CRA53	162001	1 YR
1310	Antenna, Horn	Electro Metrics	RGA-60	6174	2 YR
1733	Antenna, Active Loop	EMCO	6507	45939	1 YR
1763	Antenna, Bilog	Schaffner	CBL 6111D	22926	1 YR
1767	Receiver, EMI Test 20Hz - 26.5 GHz - 150 - +30 dBm LCD	Rohde & Schwartz	ESIB26	837491/0002	1 YR
1824	Generator, Vector Signal 300k-3GHz	Rohde & Schwarz	SMIQ-03B	835467/007	N/R
1783	Cable Assy. 3m Chamber	Nemko	Chamber	-	1 YR
1937	PSG Analog Signal Generator	Agilent Technologies	E8257D	MY51500351	1 YR
-	Crystal detector	RLC Electronics	CR-232	-	N/R
1467	Attenuator, 10 dB	MCL, Inc.	BW-S10W 2 10db-2WD C	-	Verify before use
1468	Attenuator, 10 dB	MCL, Inc.	BW-S10W 2 10db-2WD C	-	Verify before use
4030	Modulation Domain Analyzer	HP	53310A	3121A01845	1 YR





## Labeling requirements

Table No. 3	Labeling requirements	Verdict
See separate label exhibit document.		P
<b>Requirement:</b>		
<p>The FCC identifier shall be displayed on the label and the device shall bear the following statement in a conspicuous location on the device or in the user manual, if the device is too small:</p> <p><i>This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</i></p> <p>The label shall be of a permanent type, and shall last the life of the equipment.</p>		
Evaluated by (+ signature) .....		 David Light

## Antenna requirement

Table No. 4	Antenna requirement	Verdict
<p>Does the EUT have a detachable antenna? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If detachable, is the antenna connector non-standard? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>The EUT has only integral antenna. The conducted tests were performed on a sample with a temporary antenna connector.</p>		P
<b>Requirement:</b>		
The antenna shall be non-detachable or shall be a unique connector.		
Evaluated by (+ signature) .....		 David Light

## Channel frequencies

UPCS Channel	Frequency (MHz)
Upper band edge	1930.000
0	1928.448
1	1926.720
2	1924.992
3	1923.264
4	1921.536
Lower band edge	1920.000

### Requirement:

The frequency must remain within 1920 – 1930 MHz band for isochronous devices.

## **Test Results – Automatic discontinuation of transmission**



Table No. 5	<b>Automatic discontinuation of transmission</b>	Verdict
		P

The EUT transmits control and signaling information?  Yes  No

Type of EUT:  Initiating device  Responding device

Number	Test	EUT reaction	Verdict
1	Power removed from the EUT	C - Connection breakdown. Companion device transmits control and signaling information.	Pass
2	EUT switch off	C - Connection breakdown. Companion device transmits control and signaling information.	Pass
3	Hook-On by companion device	N/A	Pass
4	Hook-On by EUT	C - Connection breakdown. Companion device transmits control and signaling information.	Pass
5	Power removed from companion device	A - Connection breakdown. Transmissions cease.	Pass
6	Companion device switch off	N/A	Pass

**Requirement:**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Tested by (+ signature) .....

David Light

## Test Results – Peak power output





**Requirement:**

Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Tested by (+ signature) .....

David Light

A handwritten signature in black ink, appearing to read 'David Light', is written over the printed name.







## Test Results – Emission bandwidth







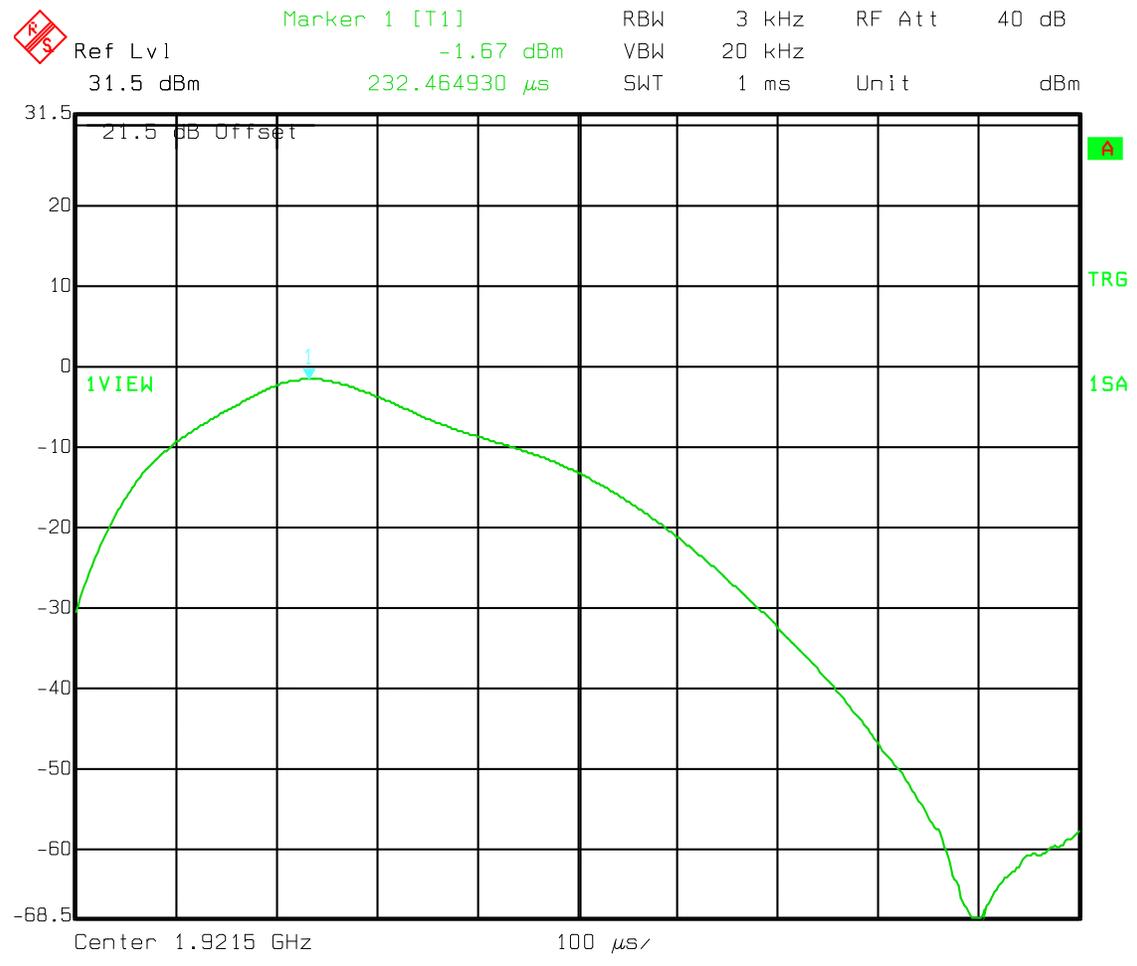


## Test Results – Power spectral density





Table No. 15	Power spectral density – Lower channel	Verdict
		P



**Supplemental Information:**

Tested by (+ signature) ..... : David Light *David Light*



Table No. 16	<b>Power spectral density – Middle channel</b>	Verdict
		P



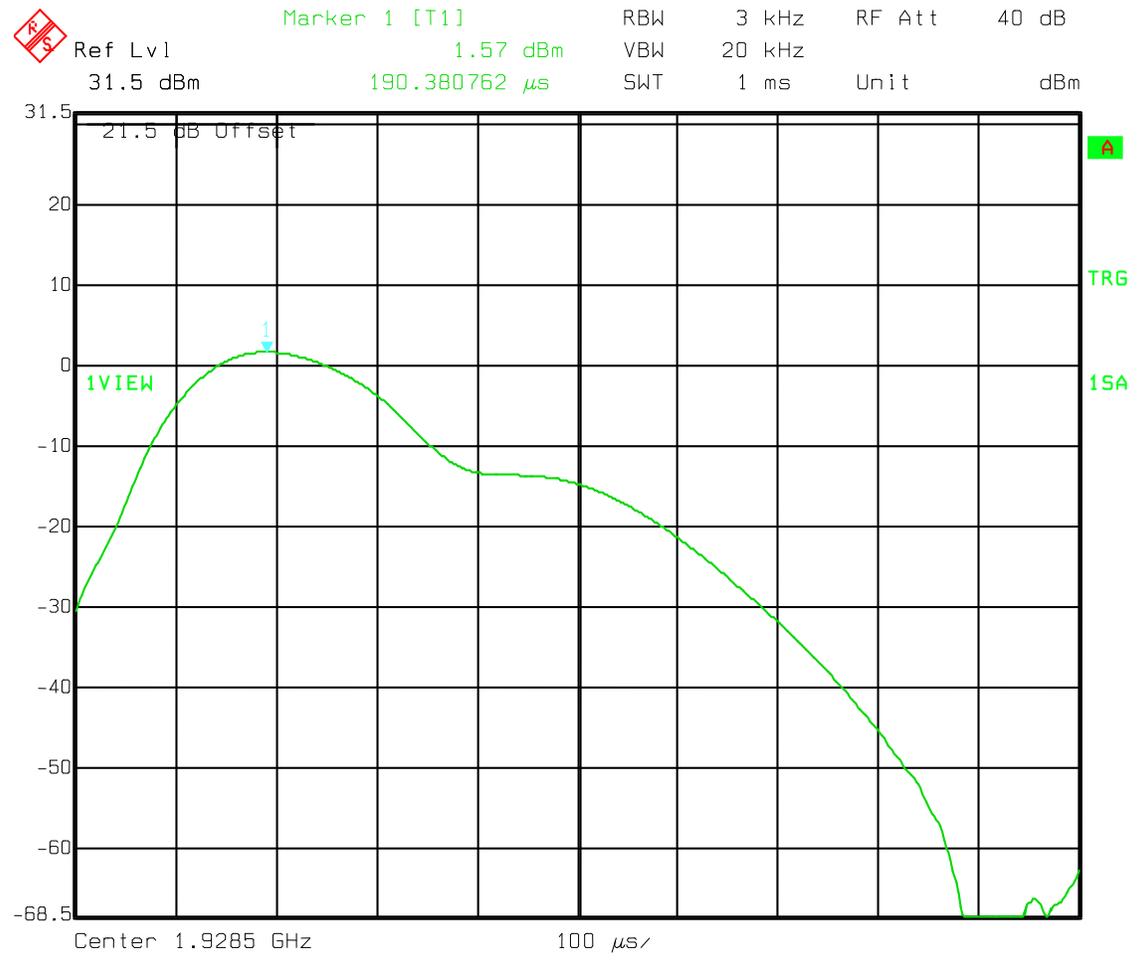
**Supplemental Information:**

Averaged over 1000 sweeps  
 Detector: Sample

Tested by (+ signature) ..... : David Light 



Table No. 17	Power spectral density – Upper channel	Verdict
		P



**Supplemental Information:**

Tested by (+ signature) ..... : *David Light* David Light



## Test Results – In-band unwanted emissions







## Test Results – Out-of-band emissions





















## Test Results – Carrier frequency stability



## Test Results – Frame repetition stability



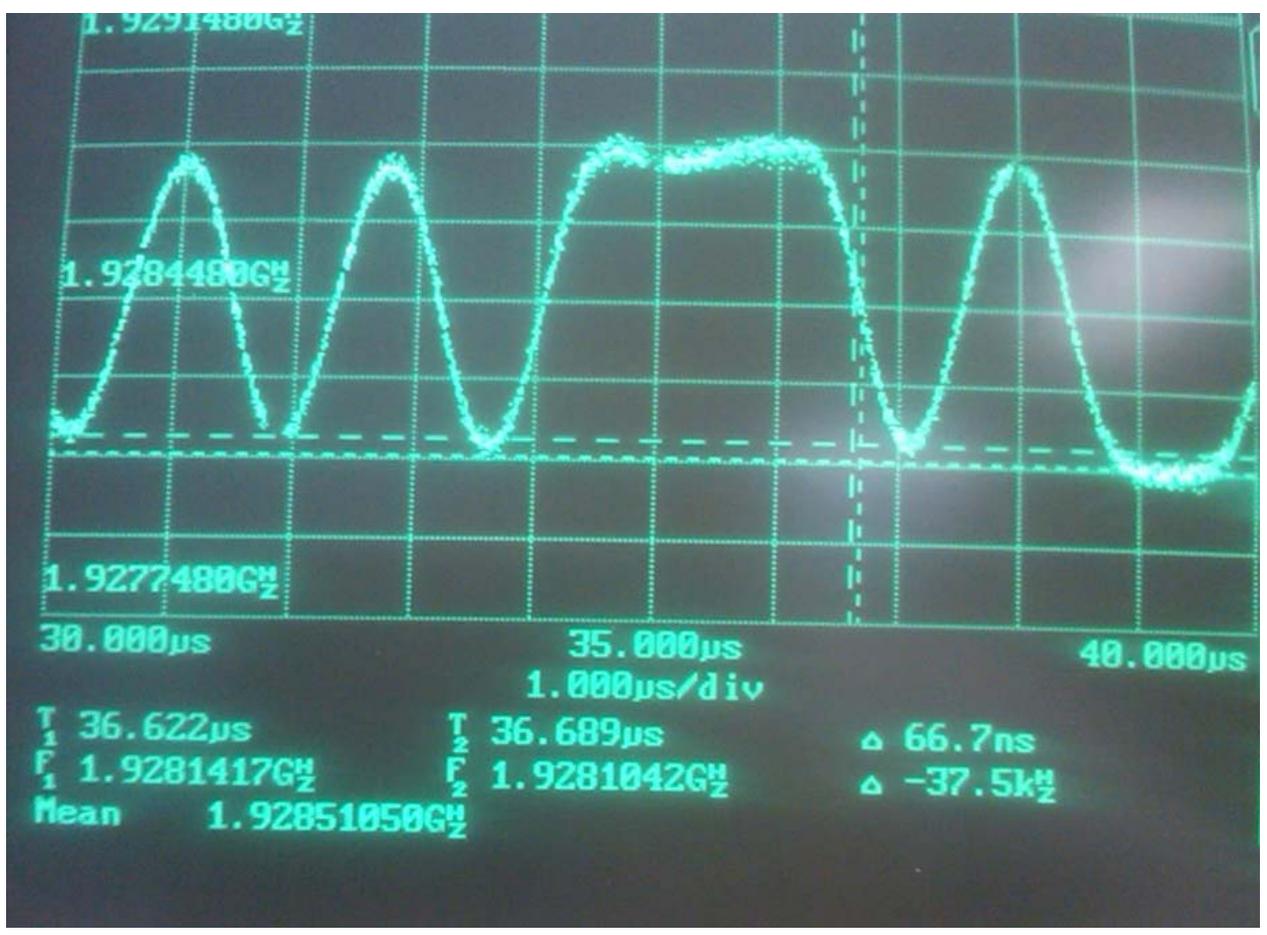


## Test Results – Frame period and jitter



Table No. 35	Frame period and jitter	Verdict
		P

Test Requirement ..... : 15.323(e)  
 Test Method..... : ANSI C63.17, clause 6.2.3  
 EUT Configuration ..... :  
 Test Date ..... : 16-Jan-13  
 Temperature ..... : 21°C                      Relative Humidity .... : 22.3 %  
 Test Equipment Asset Tag List :



**Supplemental Information:**

Tested by (+ signature) ..... :                      David Light                      *David Light*

## Test Results – Monitoring threshold, LIC









## Test Results – Threshold monitoring bandwidth



## Test Results – Reaction time and monitoring interval







## Test Results – Time and Spectrum Window Access Procedure





## **Test Results – Acknowledgements and Transmission Duration**







## Test Results – Dual access criteria check



## Test Results – Alternative monitoring interval



## **Test Results – Power line conducted emissions**



## Test Results – Radiated Spurious Emissions





## Setup Photos

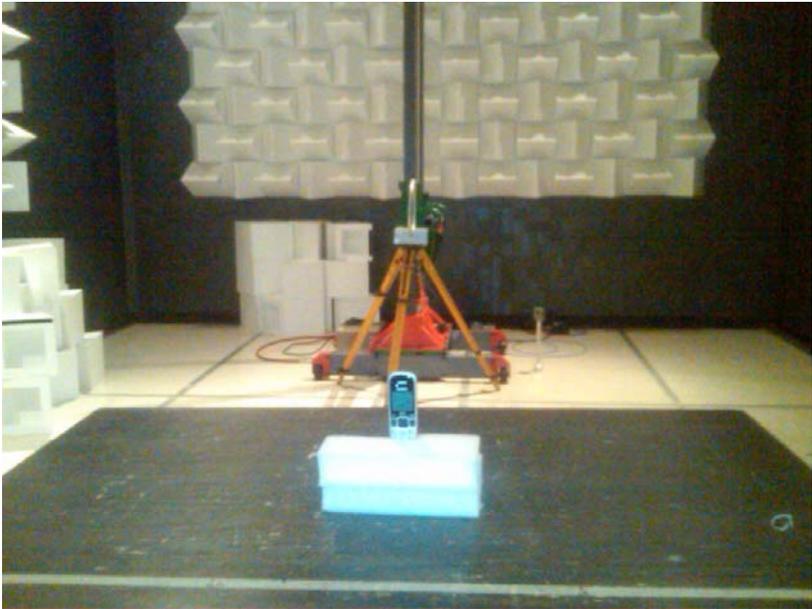
Photo 4	<b>Test Setup – Radiated Emissions</b>	
		
<b>Supplemental Information:</b>		

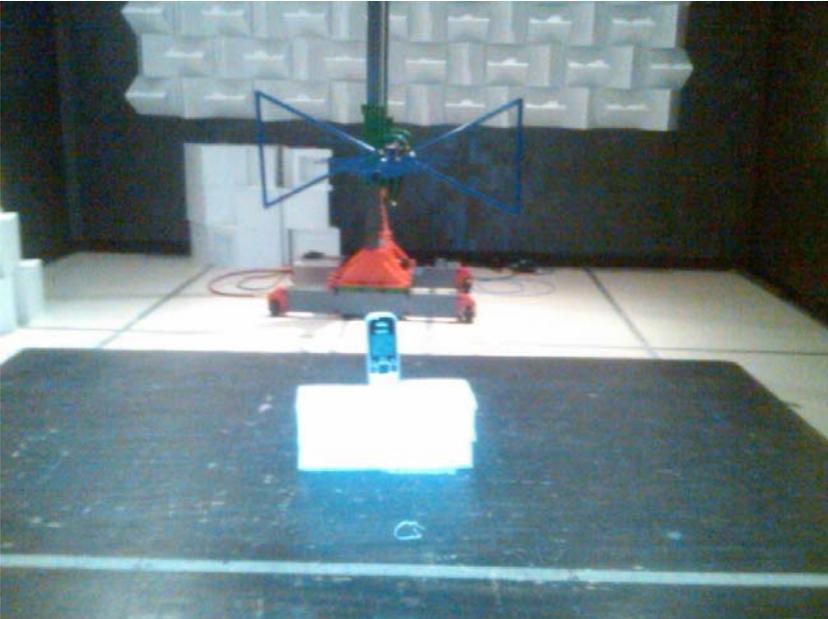
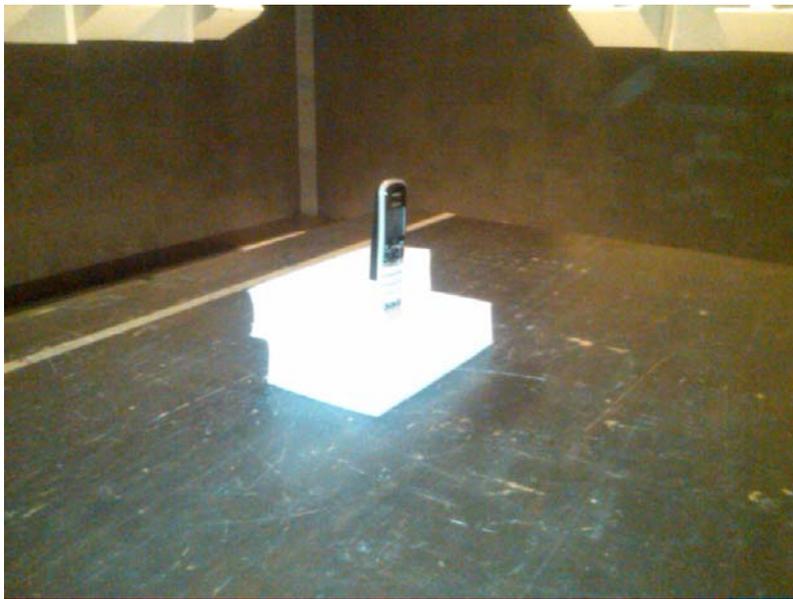
Photo 5	<b>Test Setup – Radiated Emissions</b>	
		
<b>Supplemental Information:</b>		

Photo 6	<b>Test Setup – Radiated Emissions</b>	
---------	--	--



**Supplemental Information:**

Photo 7	<b>Test Setup – X axis</b>	
---------	----------------------------	--



**Supplemental Information:**

Photo 8	Test Setup – Y axis	
		
<b>Supplemental Information:</b>		

Photo 9	Test Setup – Z axis	
		
<b>Supplemental Information:</b>		