Compliance Testing, LLC
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Test Report

Prepared for: VidOvation Corporation

Model: GoalCam-TX

Description: VidOvation In-Net Wireless GoalCam Camera System for Goal Verification

Serial Number: 05064-TX

FCC ID: N7Q-GOALCAM-TX

To

FCC Part 15.255

Date of Issue: August 12, 2015

On the behalf of the applicant:	**VidOvation Corporation** **192 Technology Dr.** **Suite V** **Irvine, CA 92618**
Attention of:	**Jim Jachetta, President** **Ph: (949) 777-5435** **E-mail: jimj@vidovation.com**

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Project No: p1220017

Greg Corbin
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	April 9, 2012	John Erhard	Original Document
2.0	December 17, 2014	Mike Graffeo	Updated Power Density test results
3.0	August 10, 2015	Greg Corbin	Recorded new output power data with RF diode detector, updated power density based on new data, recorded new OCC BW data
4.0	August 11, 2015	Amanda Reed	Updated Radiated Spurious test procedure
5.0	August 12, 2015	Greg Corbin	Corrected typo in Calculated Output equation on page 9

Table of Contents

ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009)

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

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TESTING CERT
#2152.01

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The applicant has been cautioned as to the following

15.21: Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator the responsible part may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI C63.10-2009 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (°C)	**Humidity (%)**	**Pressure (mbar)**
26.20	20.00	970.900

EUT Description
Model: GoalCam-TX
Description: VidOvation In-Net Wireless GoalCam Camera System for Goal Verification
Firmware: N/A
Software: N/A

Additional Information
None

EUT Operation during Tests
The EUT was in a normal operating condition.

Accessories: None

Cables: None

Modifications: None

15.203: Antenna Requirement:

X	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
	The EUT must be professionally installed
	The antenna requirement does not apply

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.255 (e)	Output Power	Pass	
15.255 (b)	Calculated Power Density	Pass	
15.255 (e)	Occupied Bandwidth	Pass	
15.255 (c)	Radiated Spurious	Pass	
15.255 (f)	Frequency Stability	Pass	
15.207	AC Powerline Conducted Emission	N/A	The EUT does not connect to the AC mains while in operation

Conducted Output Power
Engineer: Greg Corbin
Test Date: 8/5/2015

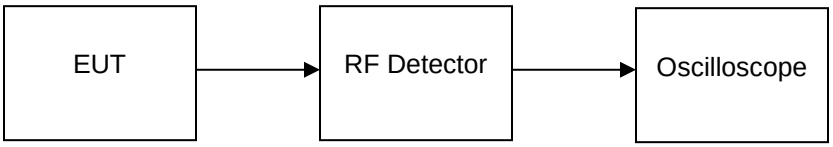
Test Procedure

The EUT was tested conducted as shown in the test setup below. A RF diode Detector was connected to the EUT waveguide output. The peak to peak voltage was recorded, and then the RF Output Power was calculated.

EUT Test Frequency =60.484 GHz
Detector Specification = -1730 mv/mw at 60.5 GHz
Measured Output = -150 mV

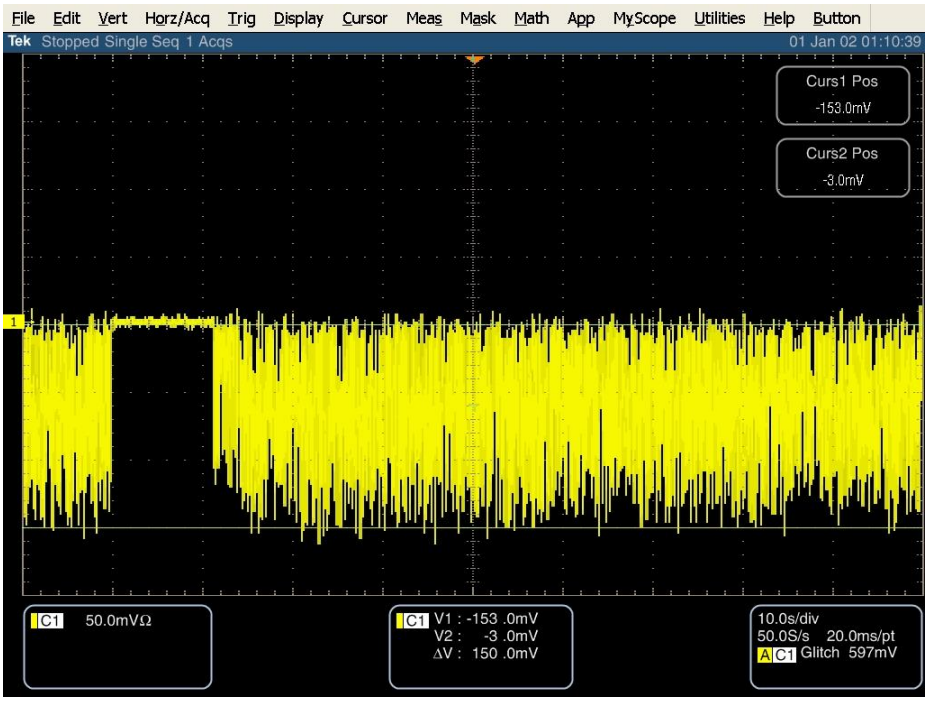
Calculated Output = -150 / -1730 = 0.08867 mW = -10.6 dBm

Test Setup



RF Detector Output

The plot below shows the RF diode detector output as the EUT transmitter is powered on, then off, then back on.



Power Density
Engineer: Greg Corbin
Test Date: 8/5/2015

Test Procedure

Power Density was calculated using the procedures outlined in ANSI C63.10:2013 section 9.

EIRP (dBm) = Pcond + Geut	
Geut = antenna gain (dBi)	20
Pcond	-10.6
EIRP (dBm)	**9.4**

EIRP (watts) = $10^{(EIRP-30)/10)}$	
EIRP (dBm)	9.4
EIRP (watts)	**8.71 mw (0.00871 watts)**

Power Density	
PD (W/m^2) = EIRPlinear/4πd2	
$EIRP_{linear}$ (watts)	0.00871
Distance (meter)	3
Power Density (W/m^2)	**0.000077**

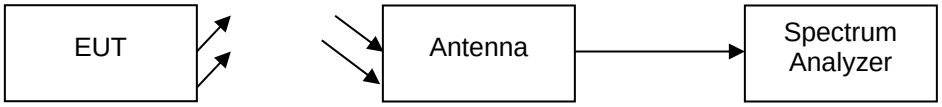
Occupied Bandwidth

Engineer: Greg Corbin
Test Date: 8/5/2015

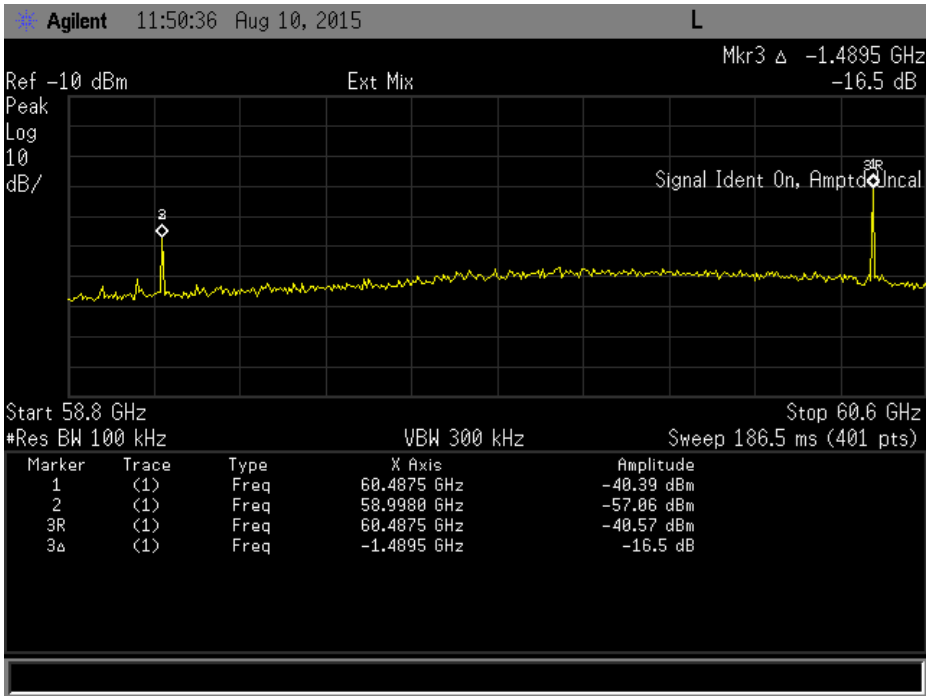
Occupied Bandwidth Test Procedure

The EUT was tested at a distance of 1 meter from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for occupied bandwidth. The markers in this plot indicate the edges of the modulation bandwidth. This is a single sideband AM of 1.485 GHz. The nature of the test equipment and EUT make it impossible to provide a plot displaying the entire spectrum. The instantaneous bandwidth of the spectrum analyzer and the "scan on scan" nature of the test equipment vs. modulation scheme will not allow the data to be fully captured.

Test Setup



Measured Occupied Bandwidth = 1.4895 GHz



Note:
The Signal Ident feature on the spectrum analyzer is turned on, in the spectrum analyzer plot to suppress false signals.

Radiated Spurious Emissions

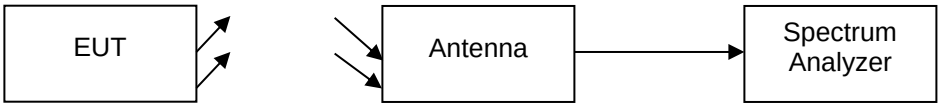
Engineer: John Erhard

Test Date: 4/9/2012

40 – 200 GHz Test Procedure

The EUT was tested in an anechoic chamber at a distance of 1 meter from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions. The distance, antenna correction factors, and mixer conversion loss were summed and input into the spectrum analyzer as a reference level offset to ensure accurate readings were obtained. The following table indicates the highest emission in each of the indicated bands.

Test Setup



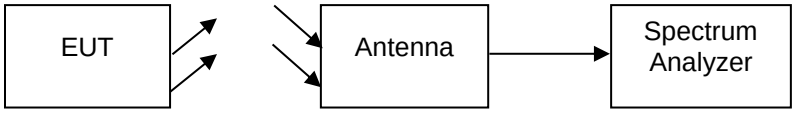
40 – 220 GHz Measurement Results

Frequency Range (GHz)	Measured Frequency (GHz)	Measured Power Density (W/cm^2)	Power Density Limit (W/cm^2)	Result
40 - 60	42	763.8 fW	90 pW	Pass
60 - 90	67	690.8 fW	90 pW	Pass
90 - 140	103.75	2.45 pW	90 pW	Pass
140 - 200	174	2.07 pW	90 pW	Pass

30 MHz – 40 GHz Test Procedure

The EUT was tested in an anechoic chamber at a distance set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the signal levels were maximized. All emissions from 30 MHz to 1 GHz were examined.

Test Setup



Radiated Emissions

Emission Frequency (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Correction Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.085	4.700	17.016	21.716	40.000	-18.284
231.750	7.890	12.338	20.228	46.000	-25.772
397.350	5.570	18.186	23.756	46.000	-22.244
556.400	4.910	21.574	26.484	46.000	-19.516
713.650	5.890	23.324	29.214	46.000	-16.786
920.550	6.700	26.389	33.089	46.000	-12.911

Note:
There were no detectable emissions from 30 MHz to 40 GHz which were above the system noise floor.

Frequency Stability

Engineer: John Erhard

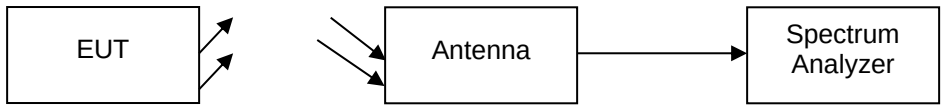
Test Date: 4/6/2012

Test Procedure

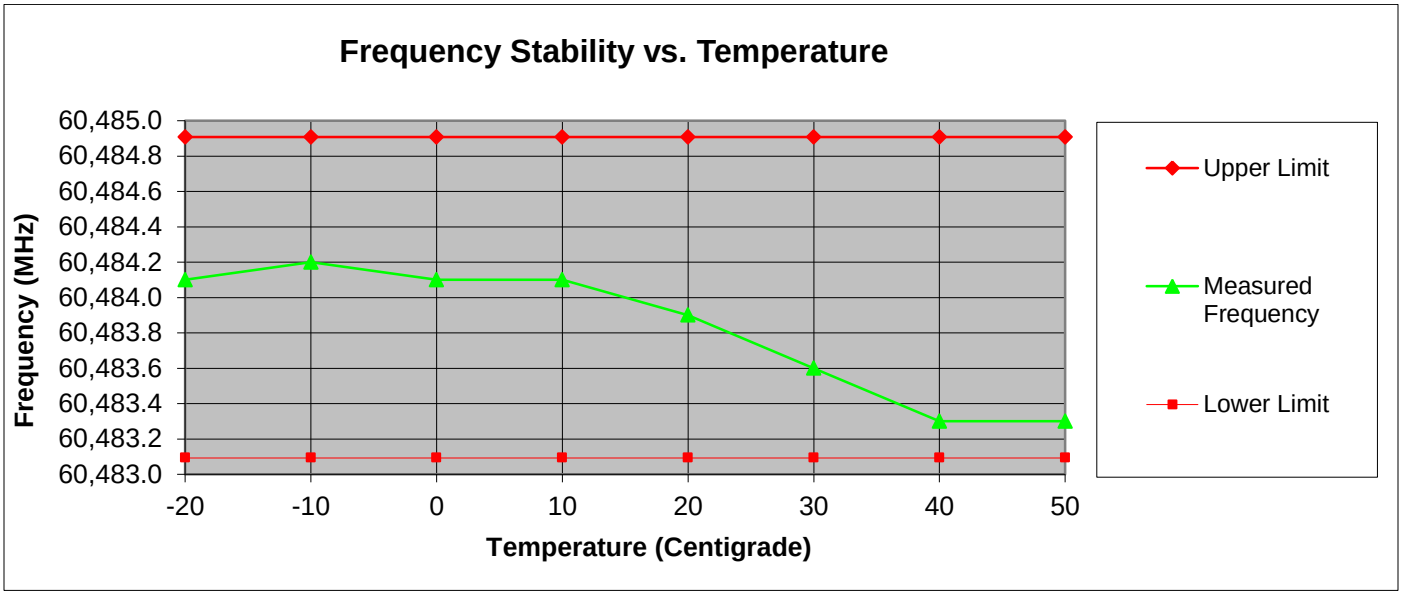
The EUT was tested in an environmental chamber with the transmitting antenna pointing directly out of an access port. A spectrum analyzer was used to measure the frequency stability. There is no specified limit, only a requirement that the frequency stability must ensure that the EUT operate in the band over the temperature range of -20º C to 50º C. For the ease of reporting a set of limit lines at 15 PPM was applied. The EUT operated completely within the band of 57 – 64 GHz in all temperature conditions.

Frequency stability with voltage variation was not measured as this device has an internal voltage monitor preventing operation when the voltage drops below a minimum required level which is higher than 15%. As the EUT cannot operate from the AC mains and only operates from a regulated charging system the supply voltage is never greater than the nominal voltage

Test Setup



Measurement Results



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Temperature Chamber	Tenney	Tenney Jr	i00027	Verified on: 4/6/12	
EMI Receiver	HP	8546A	i00033	12/2/11	12/22/12
Horn Antenna	EMCO	3115	i00103	11/5/10	11/5/12
Bi-Log Antenna	Schaffner	CBL611C	i00267	12/19/11	12/19/13
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	11/5/11	11/5/12
Spectrum Analyzer	Agilent	E4407B	i00331	5/24/11	5/24/12
Data Logger	Fluke	Hydra Data Bucket	i00343	12/15/11	12/15/12
Standard Gain Horn Kit	Pacific Millimeter Products	Mixer Mdl: MD1A 40 – 60 GHz Horn Mdl: UM 60 – 90 GHz Horn Mdl: EM 90 – 140 GHz Horn Mdl: FM 140 – 220 GHz Horn Mdl: EM	i00394	NCR	NCR
RF Diode Detector	Sage Millimeter Products	SFD-503753-15SF-N1	i00456	9/24/14	9/24/15
Harmonic Mixer	HP	HP 11970V	i00465	6/4/15	6/4/16
Horn antenna	Custom Microwave	HO15R	i00456	NCR	NCR

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT