RADIO TEST REPORT

Test Report No. : 31JE0273-HO-01-A-R1

Applicant	:	**Olympus Medical Systems Corp.**
Type of Equipment	:	**WIRELESS TRANSMITTER**
Model No.	:	**UWIT-Y0001-TX**
FCC ID	:	**S8Q-RU5796**
Test regulation	:	**FCC Part 15 Subpart C: 2011**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 31JE0273-HO-01-A. 31JE0273-HO-01-A is replaced with this report.

Date of test: July 25 to August 10, 2011

Representative test engineer:

Hironobu Ohnishi
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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SECTION 1: Customer information

Company Name	:	Olympus Medical Systems Corp.
Address	:	2951 Ishikawa-cho, Hachiouji-shi, Tokyo, 192-8507 Japan
Telephone Number	:	+81-42-642-2632
Facsimile Number	:	+81-42-642-2032
Contact Person	:	Hideki Tashiro

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	WIRELESS TRANSMITTER
Model No.	:	UWIT-Y0001-TX
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC12V via AC adapter (OLP-K027-M) AC adapter : AC100-240V input
Receipt Date of Sample	:	July 23, 2011
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

HDTV video signal (1920 x 1080 60p max. when using DVI) was transmitted over radio frequency channel with no compression and low latency between a pair of Wireless Transmitter and Receiver.
By operating SELECT button of the Wireless Transmitter and Receiver, the pair of Transmitter and Receiver can be set manually.

General Specification

Clock frequency(ies) in the system	:	OSC: 54MHz, BB IC: 317MHz, CPU: 100MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	LRP: 60.321375GHz, 60.480000GHz, 60.638625GHz, 62.481375GHz, 62.640000GHz, 62.798625GHz HRP: 60.48GHz, 62.64GHz
Modulation	:	LRP: OFDM, BPSK HRP: OFDM, QPSK, 16-QAM
Medium access protocol	:	The RF chip manufactured by Silicon Image, Inc. is mounted on the EUT. The MAC is no modification by the Olympus Medical Systems Corp.
Antenna Type	:	Internal Antenna (embedded into the device package)
Antenna Connector	:	None
Antenna Gain	:	LRP: 16dBi (max.) HRP: 22dBi (max.)
Usage location	:	Indoor use only
Power Supply (inner)	:	DC 1.0V, DC 2.5V
Description	:	This EUT has a Wireless A/V Source (A/V stream transmitter) radio part. The A/V stream is transmitted via single channel of High Rate Physical layer (HRP). The HRP transmitting antenna is an adaptive beam steering array. The EUT transmits and receives Low Rate Physical layer (LRP) which provides control and management functions (e.g. MAC, antenna beam steering).

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2011, final revised on July 8, 2011 and effective August 8, 2011
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits. Section 15.255 Operation within the band 57-64GHz.

*The revision on July 8, 2011 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4:2003 7. AC powerline Conducted Emission measurements	**FCC:** Section 15.207	**QP** 13.2dB, 0.17583MHz, L **AV** 16.9dB, 13.26800MHz, N	Complied	-
	IC: RSS-Gen 7.2.4	**IC:** RSS-Gen 7.2.4			
6dB Bandwidth	**FCC:** Section 15.255(e) (1)	**FCC:** -	See data.	-	Radiated
	IC: RSS-Gen 4.6.2	**IC:** -			
26dB Bandwidth	**FCC:** "MILLIMETER WAVE TEST PROCEDURES"	**FCC:** Section 15.255(f)		Complied	Radiated
	IC: -	**IC:** RSS-210 A13.2.5			
Power Density	**FCC:** "MILLIMETER WAVE TEST PROCEDURES"	**FCC:** Section 15.255(b) (1)		Complied	Radiated
	IC: -	**IC:** RSS-210 A13.2.2(1) (i)			
Peak Output Power	**FCC:** Section 15.255(e)	**FCC:** Section 15.255(e)		Complied	Radiated
	IC: RSS-210 A13.2.3(1)	**IC:** RSS-210 A13.2.3			
Spurious Emissions	**FCC:** ANSI C63.4:2003, "MILLIMETER WAVE TEST PROCEDURES"	**FCC:** Section 15.255(c)	1.0dB 1484.937MHz, AV, Hori.	Complied	Radiated
	IC: RSS-Gen 4.9	**IC:** RSS-210 A13.2.2(2) RSS-Gen 7.2.3			
Frequency Stability	**FCC:** "MILLIMETER WAVE TEST PROCEDURES"	**FCC:** Section 15.255(f)	See data.	Complied	Radiated
	IC: RSS-Gen 4.7, 7.2.4	**IC:** RSS-210 A13.2.5			
RF Exposure	**FCC:** -	**FCC:** Section 15.255(g)	See Appendix.	Complied	-
	IC: RSS-Gen 5.5	**IC:** RSS-102 4.2			
Group Installation	**FCC:** -	**FCC:** Section 15.255(h)	See data.	Complied	-
	IC: -	**IC:** RSS-210 A13.2.6			
Transmitter Identification	**FCC:** -	**FCC:** Section 15.255(i)	See data.	Complied	-
	IC: -	**IC:** RSS-210 A13.2.7			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. Millimeter wave measurement was performed accordance with FCC KDB 200443 (MILLIMETER WAVE TEST PROCEDURES).					

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

This EUT provides stable voltage(DC1.0V and DC2.5V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	**IC:** RSS-Gen 4.6.1	**IC:** RSS-Gen 4.6.1	N/A	-	Radiated
Receiver Spurious Emission	**IC:** RSS-Gen 4.10	**IC:** RSS-Gen 6	- *1)	Complied	Radiated

*1) Transmitting and receiving is operating simultaneously. The limits are same as transmitter spurious emission limits. Therefore, these results were included within transmitter results.

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.1dB
No.2	3.3dB
No.3	3.7dB
No.4	3.2dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	3.5dB	5.1dB	5.2dB	4.8dB	5.1dB	4.4dB	4.3dB
No.2	4.0dB	5.1dB	5.2dB	4.8dB	5.0dB	4.3dB	4.2dB
No.3	4.2dB	4.7dB	5.2dB	4.8dB	5.0dB	4.5dB	4.2dB
No.4	4.0dB	5.0dB	5.1dB	4.8dB	5.0dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission (±dB)	
40GHz-50GHz	3.9dB
50GHz-75GHz	5.1dB
75GHz-110GHz	5.4dB
110GHz-170GHz	5.2dB
170GHz-260GHz	5.2dB

Conducted Emission test
The data listed in this test report has enough margin, more than the site margin.

Radiated emission test (3m)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Data of EMI, RF Exposure and Test instruments

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Mode	Remarks
Low Rate Physical layer (LRP)	Beacon only mode
High Rate Physical layer (HRP)	Quarter rate *
*The worst condition was determined based on the test result of Peak Output Power.	
*Power of the EUT was set by the software as follows; Power settings: FCC Software: F/W Ver. 2.8.20A *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested channel	Tested frequency
Conducted Emission	HRP Tx	HRP 2 HRP 3	60.480000GHz 62.640000GHz
6dB Bandwidth 26dB Bandwidth	HRP Tx	HRP 2 HRP 3	60.480000GHz 62.640000GHz
Power Density Peak Output Power	LRP Tx	LRP 1 of HRP 2 LRP 2 of HRP 2 LRP 3 of HRP 2 LRP 1 of HRP 3 LRP 2 of HRP 3 LRP 3 of HRP 3	60.321375GHz 60.480000GHz 60.638625GHz 62.481375GHz 62.640000GHz 62.798625GHz
Spurious Emission (9kHz – 10GHz)	HRP Tx *1)	HRP 2 HRP 3	60.480000GHz 62.640000GHz
Spurious Emission (10GHz – 200GHz)	HRP Tx	HRP 2 HRP 3	60.480000GHz 62.640000GHz
Frequency Stability	HRP Tx	HRP 2	60.480000GHz
*1) The test results contains spurious emissions of Wireless A/V Sink (A/V stream receiver). Because measuring was performed on communication mode with Wireless A/V Sink.			

4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector	**: QP and AV**
Measurement range	**: 0.15-30MHz**
Test data	**: APPENDIX**
Test result	**: Pass**

SECTION 6: Radiated Emission (Spurious Emission, Power Density)

Test Procedure
[Up to 40GHz]
EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m(9kHz – 10GHz), 0.5m by 1.0m(10GHz – 40GHz) , raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane. The height of the measuring antenna varied between 1 and 4m (frequency 9kHz – 30MHz: loop antenna was fixed height at 1.0m) and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength. The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table. When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	9kHz-150kHz	150kHz–30MHz	30MHz-1GHz	1GHz-40GHz	
Instrument used	Test Receiver	Test Receiver	Test Receiver	Spectrum Analyzer	
Detector	QP, AV	QP, AV	QP	PK	AV
IF Bandwidth	BW 200Hz	BW 9kHz	BW 120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz
Test Distance	3m	3m	3m	3m (below 10GHz), 1m*1) (10-40GHz)	

*1) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

[Above 40GHz]
The test was performed based on "MILLIMETER WAVE TEST PROCEDURES".
The EUT was placed on a urethane platform, raised 1.5m above the conducting ground plane.
The measurements were performed on handheld method.

Set spectrum analyzer RBW, VBW, span, etc., to the proper values. Note these values. Enable two traces—one set to "clear write," and the other set to "max hold."
Begin hand-held measurements with the test antenna (horn) at a distance of 1 m from the EUT in a horizontally polarized position. Slowly adjust its position, entirely covering the plane 1 m from the EUT.
Observation of the two active traces on the spectrum analyzer will allow refined horn positioning at the point(s) of maximum field intensity. Repeat with the horn in a vertically polarized position. If the emission cannot be detected at 1 m, reduce the RBW to increase system sensitivity. Note the value. If the emission still cannot be detected, move the horn closer to the EUT, noting the distance at which a measurement is made.

Note the maximum level indicated on the spectrum analyzer. Adjust this level, if necessary, by the antenna gain, conversion loss of the external mixer and gain of LNA used, at the frequency under investigation. Calculate the field strength of the emission at the measurement distance from the Friis' transmission equation.

[About carrier measurement]
The carrier levels were confirmed at maximum direction of transmission. The maximum direction was searched under carefully since beam-widths are extremely narrow.

The carrier levels were measured in the far field. The distance of the fair field was calculated from follow equation.

$$r = \frac{2D^2}{\lambda}$$

where

r is the distance from the radiating element of the EUT to the edge of the far field, in m
D is the largest dimension of both the radiating element and the test antenna (horn), in m
Rambda is the wavelength of the emission under investigation [300/f (MHz)], in m

Frequency [GHz]	Rambda [m]	Maximum Dimention D [m]	Far Field Boundary r [m]
60.480	0.005	0.040	0.645
62.640	0.005		0.668

The test was made on EUT at the normal use position. For the carrier and spurious emissions (near the carrier), were tested at the position that has the maximum emission.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 9kHz-200GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Frequency Stability

Test Procedure
The external mixer was placed in side of the temperature chamber drain hole.

The power supply set to 100 % nominal setting, raise EUT operating temperature to 50 deg. C.
Record the frequency excursion of the EUT emission mask.
Repeat measurements at each 10 deg. C increment down to –20 deg. C.

Varied EUT power supply between 85 % and 115 % of nominal and record the frequency excursion of the EUT emission mask when temperature is 20 deg. C.

Emission mask was measured 26dB bandwidth. Center frequency was measured characteristic waveform.

Test data : APPENDIX
Test result : Pass