SAR TEST REPORT

Test Report No. : 30LE0087-HO-04-A

Applicant	:	**ALPS ELECTRIC CO., LTD.**
Type of Equipment	:	**Remote Controller**
Model No.	:	**NSG-MR3U**
FCC ID	:	**CWTSBRT0700**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C (Edition 01-01)**
Test Result	:	**Complied**
Max SAR Measured IEEE802.11b/g	:	**0.045W/kg**

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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 limits of 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.

Date of test: April 26, 2011

Representative test engineer:

Miyo Kishimoto
Engineer of WiSE Japan,
UL Verification Service

Approved by :

Mitsuru Fujimura
Leader of WiSE Japan
UL Verification Service

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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

SECTION 1: Customer information

Company Name	:	ALPS Electric Co., Ltd.
Address	:	6-3-36, FURUKAWANAKAZATO,OSAKI-SHI, MIYAGI 989-6181 JAPAN
Telephone Number	:	+81-229-23-6896
Facsimile Number	:	+81-229-24-6334
Contact Person	:	Yuji Ouchi

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

2.1 Identification of E.U.T.

Type of Equipment	:	Remote Controller
Model No.	:	NSG-MR3U
Serial No.	:	F35
Rating	:	DC3.0V Size AA battery (two)
Receipt Date of Sample	:	December 6, 2010
Country of Mass-production	:	China
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

General Specification

Clock frequency(ies) in the system	:	Remote Controller: 8MHz, RF4CE module: 32MHz, WLAN: 40MHz

Radio Specification

WLAN11b/g

Radio Type	:	Transceiver
Frequency of Operation	:	2412-2462MHz
Modulation	:	DSSS, OFDM
Power Supply (radio part input)	:	DC 3.3V
Antenna type	:	Planar Invented F Antenna
Antenna Gain	:	-1.2dBi

Zigbee (RF4CE)

Radio Type	:	Transceiver
Frequency of Operation	:	2425-2475MHz
Modulation	:	DSSS
Power Supply (radio part input)	:	DC 2.8V
Antenna type	:	lambda/4 Metal Antenna
Antenna Gain	:	1.1dBi

SECTION 3 : Test standard information

3.1 Requirements for compliance testing defined by the FCC

The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

1 Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).
2 IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01):

Supplement C (Edition 01-01) - Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions
OET Bulletin 65 (Edition 97-01) - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

IEEE Std 1528-2003:

IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Supplement C

In additions;

KDB 447498 D01(v04):	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 248227 (rev.1.2):	SAR Measurement Procedures for 802.11a//b/g Transmitters

3.2 Procedure and result

No.	Item	Test Procedure	Limit	Remarks	Exclusion	Result
1	Human Exposure	FCC OET BULLETIN 65, SUPPLEMENT C	FCC47CFR 2.1093	SAR Measurement	N/A	Complied
Note: UL Japan, Inc. 's SAR Work Procedures 13-EM-W0429 and 13-EM-W0430						

Max SAR Measured standalone SAR

IEEE802.11b/g	Zigbee (RF4CE)
0.045W/kg	No required (P:60/f [mW] or less)

Simultaneous transmission SAR
This EUT does not have a simultaneous transmission.

3.3 Exposure limit

(A) Limits for Occupational/Controlled Exposure (W/kg)

Spatial Average (averaged over the whole body)	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.4	8.0	20.0

(B) Limits for General population/Uncontrolled Exposure (W/kg)

Spatial Average (averaged over the whole body	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.08	1.6	4.0

Occupational/Controlled Environments: are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments: are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE
SPATIAL PEAK(averaged over any 1g of tissue) LIMIT
1.6 W/kg

3.4 Test Location

*Shielded room for SAR testings
UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

SECTION4 Description of the operating mode

4.1 Operating modes

Mode	Duty cycle	Packet DATA	Testing item
IEEE 802.11b (11b)	100%	PN9	Power , SAR
IEEE 802.11g (11g)	100%	PN9	Power
EUT has the power settings by the software as follows; - Power settings: same as production model - Software: RFTest.exe, version 1.3 *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.			

Test mode for SAR testing

IEEE802.11b

Frequency band : 2412MHz-2462MHz
Channel : 6ch(2437MHz)
Modulation : 11b DBPSK(1Mbps)
Crest factor : 1

*The 11b DBPSK /6ch mode was maximum average power. The power of other mode was lower than SAR tested mode.

[IEEE802.11b] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG	Remark
1.0	2437	0.55	0.30	10.00	10.85	12.16	Worst rate
2.0	2437	0.38	0.30	10.00	10.68	11.69	
5.5	2437	0.34	0.30	10.00	10.64	11.59	
11.0	2437	0.30	0.30	10.00	10.60	11.48	

IEEE802.11b 1Mbps

Ch	Frequency [MHz]	P/M Reading [dBm] PK	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] PK	Result [dBm] AVG	Result [mW] PK	Result [mW] AVG	Remark
1	2412	3.12	0.47	0.30	10.00	13.42	10.77	21.98	11.94	
6	2437	3.33	0.55	0.30	10.00	13.63	10.85	23.07	12.16	SAR tested
11	2462	3.95	0.42	0.30	10.00	14.25	10.72	26.61	11.80	

:Maximum AVG power

[IEEE802.11g] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG	Remark
6.0	2437	-1.72	0.30	10.00	8.58	7.21	Worst rate
9.0	2437	-1.76	0.30	10.00	8.54	7.14	
12.0	2437	-1.76	0.30	10.00	8.54	7.14	
18.0	2437	-1.78	0.30	10.00	8.52	7.11	
24.0	2437	-1.79	0.30	10.00	8.51	7.10	
36.0	2437	-1.81	0.30	10.00	8.49	7.06	
48.0	2437	-1.82	0.30	10.00	8.48	7.05	
54.0	2437	-1.80	0.30	10.00	8.50	7.08	

IEEE802.11g 6Mbps

Ch	Frequency [MHz]	P/M Reading [dBm] PK	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] PK	Result [dBm] AVG	Result [mW] PK	Result [mW] AVG
1	2412	6.72	-1.85	0.30	10.00	17.02	8.45	50.35	7.00
6	2437	6.88	-1.72	0.30	10.00	17.18	8.58	52.24	7.21
11	2462	6.48	-1.99	0.30	10.00	16.78	8.31	47.64	6.78

**: SAR is not required for 802.11g channels when the maximum average output power is less than 1/4dB higher than that measured on the corresponding 802.11b channels.

Sample Calculation: Result = Reading + Cable Loss + Attenuator

4.2 Confirmation before SAR testing

Correlation of Output Power between EMC and SAR tests
It was checked that the antenna port peak power was correlated within 0~+5% (FCC requirements)
EMC Power was refer to the FCC 15.247 Report (30LE0087-HO-02-A) / IC RSS 210 Report (30LE0087-HO-02-D)

IEEE802.11b 1Mbps

Ch	Frequency	P/M (PK) Reading [dBm]		Cable Loss	Atten.	Result				
						[dBm]		[mW]		Deviation
	[MHz]	EMC	SAR	[dB]	[dB]	EMC	SAR	EMC	SAR	[%]
1	2412	3.03	3.12	0.30	10.00	13.33	13.42	21.53	21.98	2.09
6	2437	3.25	3.33	0.30	10.00	13.55	13.63	22.65	23.07	1.86
11	2462	3.91	3.95	0.30	10.00	14.21	14.25	26.36	26.61	0.93

Sample Calculation:
Result = Reading + Cable Loss (no used) + Attenuator

4.3 Confirmation after SAR testing

It was checked that the power drift [W] is within +/-5%.The verification of power drift during the SAR test is that DASY5 system calculates the power drift by measureing the e-filed at the same location at beginning and the end of the scan measurement for each test position.

DASY5 system calucation Power drift value[dB] =20log(Ea)/(Eb)
Before SAR testing : Eb[V/m]
After SAR testing : Ea[V/m]

Limit of power drift[W] =+/-5%
X[dB]=10log[P]=10log(1.05/1)=10log(1.05)-10log(1)=0.212dB

from E-filed relations with power.
p=E^2/η=E^2/
Therefore, The correlation of power and the E-filed
XdB=10log(P)=10log(E)^2=20log(E)

Therefore,
The calculated power drift of DASY5 System must be the less than +/-0.212dB.

SECTION 5 Description of the Body setup

5.1 Test position

(1)Top edge :
The measurement was performed in touch the top edge of EUT to Flat Phantom.

(2) Bottom edge :
The measurement was performed in touch the bottom edge of EUT to Flat Phantom.

(3) Left edge:
The measurement was performed in touch the left edge of EUT to Flat Phantom.

(4) Right edge
The measurement was performed in touch the right edge of EUT to Flat Phantom.

(5) Front surface:
The measurement was performed in touch the front surface of EUT to Flat Phantom.

(6) Rear surface
The measurement was performed in touch therear surface of EUT to Flat Phantom.

Refer to the Appendix 1.

SECTION 6 : Measurement results

6.1 Body WLAN SAR

1. Method of measurement

Step1. The searching for the worst position
The test was performrd in mode of the maximum output power.

Note:
1. The SAR is not required a 11g mode because the maximum average output power for 11g mode is less than 1/4dB higher than that measured in a 11b mode.
2. The other channel was not required since max. AVG channel SAR vale is less than 0.8W/kg.

2. Result of measurement

Model	:	**NSG-MR3U**	Modulation	:	**DBPSK**
Serial No.	:	**F35**	Crest factor	:	**1**

Date	:	**April 26, 2011**
Liquid Depth (cm)	:	**15.0**
Parameters	:	ε_r =**51.4** σ =**1.95**
Ambient temperature (deg.c.)	:	**24.5**
Relative Humidity (%)	:	**41**
Measured By	:	**Miyo Kishimoto**

BODY SAR MEASUREMENT RESULTS									
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum of multi-peak
Step 1. Search for the worst position									
Mid	2437	DBPSK 1Mbps	Flat	Fixed	Top edge	0	23.5	23.5	**0.045**
Mid	2437	DBPSK 1Mbps	Flat	Fixed	Bottom edge	0	23.5	23.5	**0.00247**
Mid	2437	DBPSK 1Mbps	Flat	Fixed	Left edge	0	23.5	23.5	**0.00343**
Mid	2437	DBPSK 1Mbps	Flat	Fixed	Right edge	0	23.5	23.5	**0.00972**
Mid	2437	CCK 5.5Mbps	Flat	Fixed	Front surface	0	23.5	23.5	**0.00446**
Mid	2437	CCK 5.5Mbps	Flat	Fixed	Rear surface	0	23.5	23.5	**0.034**

SECTION 7 : Test surrounding

7.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY5 measurement system according to the SPEAG documents[6] and is given in the following Table.

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or veff
Measurement System						
Probe calibration	±6.55	Normal	1	1	±6.55	∞
Axial isotropy of the probe	±4.7	Rectangular	√3	0.7	±1.9	∞
Spherical isotropy of the probe	±9.6	Rectangular	√3	0.7	±3.9	∞
Boundary effects	±2.0	Rectangular	√3	1	±1.2	∞
Probe linearity	±4.7	Rectangular	√3	1	±2.7	∞
Detection limit	±1.0	Rectangular	√3	1	±0.6	∞
Readout electronics	±0.3	Normal	1	1	±0.3	∞
Response time	±0.8	Rectangular	√3	1	±0.5	∞
Integration time	±2.6	Rectangular	√3	1	±1.5	∞
RF ambient Noise	±3.0	Rectangular	√3	1	±1.7	∞
RF ambient Reflections	±3.0	Rectangular	√3	1	±1.7	∞
Probe Positioner	±0.8	Rectangular	√3	1	±0.5	∞
Probe positioning	±9.9	Rectangular	√3	1	±5.7	∞
Max.SAR Eval.	±4.0	Rectangular	√3	1	±2.3	∞
Test Sample Related						
Device positioning	±2.9	Normal	1	1	±2.9	39
Device holder uncertainty	±3.6	Normal	1	1	±3.6	4
Power drift	±5.0	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	∞
Liquid conductivity (target)	±5.0	Rectangular	√3	0.64	±1.8	∞
Liquid conductivity (meas.)	±5.0	Rectangular	1	0.64	±3.2	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	±5.0	Rectangular	1	0.6	±3.0	∞
Combined Standard Uncertainty					**±13.356**	
Expanded Uncertainty (k=2)					**±26.7**	