SAR TEST REPORT

Test Report No. : 29IE0011-HO-01-E

Applicant	:	**FUJITSU FRONTECH LIMITED**
Type of Equipment	:	**B-PAD**
Model No.	:	**FWT33E2WR**
FCC ID	:	**XGP-BPAD06**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET BULLETIN 65, SUPPLEMENT C**
Test Result	:	**Complied**
Max. SAR Value	:	**0.487W/kg (Body, 2412MHz)**

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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.
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Date of test:

June 3 to 4, 2009

Tested by:

Miyo Kishimoto
EMC Services

Approved by :

Tetsuo Maeno
Site Manager of EMC Services

NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name	:	FUJITSU FRONTECH LIMITED
Address	:	1776 Yanokuchi, Inagi-shi, Tokyo 206-8555, Japan
Telephone Number	:	+81-42-377-0646
Facsimile Number	:	+81-42-378-9765
Contact Person	:	Hiroki Kishimoto

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

Type of Equipment	:	B-PAD		
Model No.	:	FWT33E2WR		
Serial No.	:	3		
Rating	:	AC100 - 240V, DC3.7V (Battery)		
Battery	:	Model Name	:	CA50601-1003
		Product Name	:	Li-ion Battery
		Rating	:	DC3.7V/1800Ah
		Manufacture	:	TOKAD ENERGY CO.,LTD.
Option Battery	:	N/A		
Accessories	:	Earphone		
Size	:	W 84mm* L 188mm*D 43mm		
Receipt Date of Sample	:	April 18, 2009		
Country of Mass-production	:	Japan		
Condition of EUT		Production 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

Model No: FWT33E2WR (referred to as the EUT in this report) is the B-PAD.
The EUT contains IEEE802.11b/g Wireless LAN and Bluetooth modules. Those modules do not transmit simultaneously.
This EUT has variant models, IPAD100-xx and FWT3xxxxR.
'xx', 'xxxx' is described by '0-9', 'A-Z' which is distinguished by country of destination, adapting to PCI v1.3 or not.
And here is no influence in the product property.

General Specification

Clock frequencies of the EUT are as follows

CPU	520MHz, 13MHz, 125MHz, 32.768kHz
3.5 inch TFT color transmissive LCD (320x240 pixel), LED back light, touch panel	6.25MHz
Built in numeric keypad	4.033355MHz
Audio Codec	24.576MHz
CF Card	48MHz
Integrated Magnetic Card Reader	4.915MHz
IEEE802.11b/g Wireless LAN Module	40MHz
Bluetooth Module	16MHz, 32.768kHz

Radio Specification

The EUT has Wireless LAN and Bluetooth transmitters but does not transmit simultaneously.

		IEEE802.11b/g Wireless LAN
Frequency band	**Lower limit**	2412MHz
	Upper limit	2462MHz
Type of Modulation		DSSS, OFDM
Antenna Type		λ/4 dielectric chip antenna
Antenna Connector Type		W. FL
Antenna Gain		1.8dBi
ITU code		G1D(DSSS), D1D(OFDM)
Power Supply (Inner)		DC 3.3V

		Bluetooth
Frequency band	**Lower limit**	2402MHz
	Upper limit	2480MHz
Bandwidth & Channel spacing		1MHz & 1MHz / CH
Type of Modulation		FHSS
Antenna Type		λ/4 dielectric chip antenna
Antenna Connector Type		U. FL
Antenna Gain		-4.3dBi
ITU code		F1D
Power Supply (Inner)		DC 3.3V

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.

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 Max.SAR = 0.487 W/kg
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

Result of Max. SAR value

Max. SAR Value: 0.487W/kg (Body, 2412MHz)

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

3.5 Confirmation before SAR testing

3.5.1 Correlation of Output Power between EMC and SAR tests (WLAN IEEE802.11b/g)

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
The result is shown in Section 6.1.

- **Peak power at EMC test (May 28, 2009)**
  EMC power was measured for SAR test sample (S/N: 3).

- **Peak power at SAR test (June 3, 2009)**
  SAR power was measured for SAR test sample (S/N: 3).

3.5.2 Average power for SAR testing

Step.1 Data rate check
The data rate check was measurement all data rate in the middle frequency of each frequency band.
Reference of modulation table

11b		**11g**	
Modulation	**Data rate [Mbps]**	**Modulation**	**Data rate [Mbps]**
DBPSK	1	BPSK	6
DQPSK	2	BPSK	9
CCK	5.5	QPSK	12
CCK	11	QPSK	18
-	-	16QAM	24
-	-	16QAM	36
-	-	64QAM	48
-	-	64QAM	54

3.6 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 DASY4 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.

DASY4 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.
S=E*H=E^2/ η =P/4 π r^2 (η : Space impedance)
P=E^2*4 π r^2/η
Therefore, The correlation of power and the E-filed
XdB=10log(P)=10log(E)^2=20log(E)

From the above mentioned,
The calculated power drift of DASY4 System must be the less than +/-0.212dB.

3.7 Measurement procedure

IEEE 802.11b(Radiated power is always monitored by Spectrum Analyzer.)
The 11b (DSSS) mode test was performed on the CCK[5.5Mbps] modulation, because it was the highest average power and close to 100% duty factor.

Step1. The searching for the worst position

Step2. Change to the Low and High channels
This test was performed at the worst position of Step 1.

IEEE 802.11g (Radiated power is always monitored by Spectrum Analyzer.)

Step3. The data rate in the higher average power* of each modulation was decided, then the worst modulation was searched in the SAR testing.

Step4. The searching for the worst position
This test was performed at the worst modulation of Step3.

Step5. The changing to the Low and High channels
This test was performed at the worst position of Step 4.

*Refer to Section 6.1.3.

Change distance between EUT and Flat Phantom(Radiated power is always monitored by Spectrum Analyzer.)

Step6. Change separation
The measurement was performed with the distance 5mm and 10mm to check if the shortest distance may not have the worst value at the conditions of the highest SAR value.

3.8 Test setup of EUT

When users operate or carry the EUT, it could be considered to touch or get close to their bodies. In order to assume this situation, we performed the test at the following positions. Please refer to "APPENDIX 1" for more details.

(1) Front:
The test was performed in touch with Front surface of the EUT to the flat phantom.

(2) Rear :
The test was performed in touch with Rear surface of the EUT to the flat phantom.

(3) Right Side :
The test was performed in touch with Right Side surface of the EUT to the flat phantom.

(4) Left Side :
The test was performed in touch with Left Side surface of the EUT to the flat phantom.

(5) Top :
The test was performed in touch with Top surface of the EUT to the flat phantom.

(6) Front (5mm) :
The measurement opened 5mm distance between the EUT and flat Phantom.

(7) Front (10mm) :
The measurement opened 10mm distance between the EUT and flat Phantom.

* Bottom position was not tested since separated more than 5cm from antenna.

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

4.1 Operating modes for SAR testing

4.1.1 Setting of EUT

This EUT has IEEE.802.11b/g continuous transmitting modes.
The frequency band and the modulation used in the testing of IEEE.802.11b/g is shown as a following.

1. IEEE 802.11b mode
Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DSSS (CCK)
DATA sequence : Pseudo random sequence(PN9)
Crest factor : Refer to the following

2. IEEE 802.11g mode
Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : OFDM (BPSK, QPSK, 16QAM, 64QAM)
DATA sequence : Pseudo random sequence(PN9)
Crest factor : Refer to the following

Note: Details of crest factor

Modulation (data	Frequency[MHz	On time[ms]	1cycle[ms]	Duty[%]	Crest factor
CCK (5.5Mbps)	2437	0.9867	1.025	96	1
CCK (5.5Mbps)	2412	0.9867	1.025	96	1
CCK (5.5Mbps)	2462	0.9867	1.025	96	1
BPSK (6Mbps)	2437	0.75	1.017	74	1
QPSK (12Mbps)	2437	0.3887	1.022	38	3
16QAM (24Mbps)	2437	0.2119	1.022	21	5
64QAM (48Mbps)	2437	0.1163	1.023	11	9
BPSK (6Mbps)	2412	0.75	1.017	74	1
BPSK (6Mbps)	2462	0.75	1.017	74	1

*1 Duty[%] = on time / 1cycle x 100
*2 Crest factor = 1 / (on time / 1cycle)

SECTION 5 : Test surrounding

5.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents[6][7] 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	±6.8	Normal	1	1	±6.8	∞
Axial isotropy of the probe	±4.7	Rectangular	√3	$(1\text{-cp})^{1/2}$	±1.9	∞
Spherical isotropy of the probe	±9.6	Rectangular	√3	$(cp)^{1/2}$	±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	18
Device holder uncertainty	±3.6	Normal	1	1	±3.6	6
Power drift	±5.0	Rectangular	√3	1	±5.8	∞
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					**±14.360**	
Expanded Uncertainty (k=2)					**±28.7**	

SECTION 6 : Confirmation before testing

6.1.1 EMC power

This data is reference data of EMC test(Report No. 29IE0011-HO-01-A).
Date of test: May 28, 2009

IEEE802.11b , 5.5Mbps

Ch	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	2.62	0.87	10.08	13.57	22.75
Mid	2437.0	2.37	0.87	10.08	13.32	21.48
High	2462.0	2.55	0.88	10.08	13.51	22.44

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

IEEE802.11g , 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	8.30	0.87	10.08	19.25	84.14
Mid	2437.0	8.08	0.87	10.08	19.03	79.98
High	2462.0	8.25	0.88	10.08	19.21	83.37

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

6.1.2 SAR power

Date of test: June 3,2009

IEEE802.11b , 5.5Mbps

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
Low	2412.0	2.66	-0.98	0.87	10.08	13.61	9.97	22.96	9.93
Mid	2437.0	2.38	-1.06	0.87	10.08	13.33	9.89	21.53	9.75
High	2462.0	2.56	-1.18	0.88	10.08	13.52	9.78	22.49	9.51

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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
Low	2412.0	8.31	-2.34	0.87	10.08	19.26	8.61	84.33	7.26
Mid	2437.0	8.12	-2.49	0.87	10.08	19.07	8.46	80.72	7.01
High	2462.0	8.26	-2.56	0.88	10.08	19.22	8.40	83.56	6.92

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

6.1.3 Reference data of SAR test (Data rate determination)

Date of test: May 28,2009

Average power

[IEEE802.11b] Rate check

Modulation	Data rate [Mbps]	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
DBPSK	1	2437.0	-3.01	0.87	10.08	7.94	6.22
DQPSK	2	2437.0	-2.89	0.87	10.08	8.06	6.40
CCK	5.5	2437.0	-1.08	0.87	10.08	9.87	9.71
CCK	11	2437.0	-2.70	0.87	10.08	8.25	6.68

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Average power

[IEEE802.11g] Rate check

Modulation	Data rate [Mbps]	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
BPSK	6	2437.0	-2.69	0.87	10.08	8.26	6.70
BPSK	9	2437.0	-4.10	0.87	10.08	6.85	4.84
QPSK	12	2437.0	-4.93	0.87	10.08	6.02	4.00
QPSK	18	2437.0	-6.76	0.87	10.08	4.19	2.62
16QAM	24	2437.0	-7.85	0.87	10.08	3.10	2.04
16QAM	36	2437.0	-9.30	0.87	10.08	1.65	1.46
64QAM	48	2437.0	-10.24	0.87	10.08	0.71	1.18
64QAM	54	2437.0	-10.52	0.87	10.08	0.43	1.10

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

SECTION 7 : Measurement results

7.1 Body SAR 2450MHz

Liquid Depth (cm)	: **15.0**	Model	: **FWT33E2WR**
Parameters	: **εr =50.3, σ =2.02**	Serial No.	: **3**
Ambient temperature(deg.c.)	: **24.0(June 3to 4)**	Modulation	: **DSSS/OFDM**
Relative Humidity (%)	: **51(June 3to 4)**	Crest factor	: **See to section 4.1**
Date	: **June 3 to 4, 2009**	Measured By	: **Miyo Kishimoto**

BODY SAR RESULT

Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Band	Channe	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value
	Step 1. Search for the worst position									
	6	2437	CCK(5.5Mbps)	Flat	Fixed	Front	0	23.5	23.5	**0.308**
	6	2437	CCK(5.5Mbps)	Flat	Fixed	Rear	0	23.5	23.5	**0.00443**
	6	2437	CCK(5.5Mbps)	Flat	Fixed	Right Side	0	23.5	23.5	**0.00637**
11b	6	2437	CCK(5.5Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.00737**
	6	2437	CCK(5.5Mbps)	Flat	Fixed	Top	0	23.5	23.5	**0.086**
	Step 2. Change to the channels									
	1	2412	CCK(5.5Mbps)	Flat	Fixed	Front	0	23.5	23.4	**0.487**
	11	2462	CCK(5.5Mbps)	Flat	Fixed	Front	0	23.4	23.3	**0.177**
	Step 3. Search for the worst modulation									
	6	2437	BPSK(6Mbps)	Flat	Fixed	Front	0	23.5	23.5	**0.240**
	6	2437	QPSK(12Mbps)	Flat	Fixed	Front	0	23.5	23.5	**0.115**
	6	2437	16QAM(24Mbps)	Flat	Fixed	Front	0	23.5	23.5	**0.074**
	6	2437	64QAM(48Mbps)	Flat	Fixed	Front	0	23.5	23.5	**0.038**
	Step 4. Search for the worst position									
11g	6	2437	BPSK(6Mbps)	Flat	Fixed	Rear	0	23.4	23.4	**0.000948**
	6	2437	BPSK(6Mbps)	Flat	Fixed	Right Side	0	23.4	23.1	**0.00789**
	6	2437	BPSK(6Mbps)	Flat	Fixed	Left side	0	23.1	23.1	**0.00706**
	6	2437	BPSK(6Mbps)	Flat	Fixed	Top	0	23.1	23.1	**0.063**
	Step 5. Change to the channels									
	1	2412	BPSK(6Mbps)	Flat	Fixed	Front	0	23.1	23.3	**0.389**
	11	2462	BPSK(6Mbps)	Flat	Fixed	Front	0	23.3	23.3	**0.129**
	Step 6. Change to the separation									
11b	1	2412	CCK(5.5Mbps)	Flat	Fixed	Front	5	23.3	23.3	**0.185**
	1	2412	CCK(5.5Mbps)	Flat	Fixed	Front	10	23.3	23.3	**0.115**