SAR TEST REPORT

Test Report No. : 29GE0077-HO-01-B-R2

Applicant	:	**KYOCERA Corporation**
Type of Equipment	:	**iBurst User Terminal USB type**
Model No.	:	**UTU03-1890F-US-A**
FCC ID	:	**JOYIUU19AC**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET BULLETIN 65, SUPPLEMENT C** **(Worst condition test only for Class II change)**
Test Result	:	**Complied**
Max. SAR Value	:	**0.896W/kg (Body 1899.6875MHz)**

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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 test report are traceable to the national or international standards.
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Date of test: February 27, 2009

Tested by: Miyo Kishimoto
EMC Services

Approved by : Tetsuo Maeno
Site Manager of EMC Services

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SECTION 1: Customer information

Company Name	:	KYOCERA Corporation
Address	:	Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku, Yokohama-shi, Kanagawa 224-8502, Japan
Telephone Number	:	+81-45-943-6189
Facsimile Number	:	+81-45-943-6172
Contact Person	:	Yasuo Honma

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

2.1 Identification of E.U.T.

Type of Equipment	:	iBurst User Terminal USB type
Model No.	:	UTU03-1890F-US-A
Serial No.	:	No.18
Rating	:	DC 5V (from USB interface) (PC's input: AC 120V / 60Hz)
Receipt Date of Sample	:	February 24, 2009
Country of Manufacture	:	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

Model No.: UTU03-1890F-US-A (referred to as the EUT in this report) is iBurst User Terminal USB type.

[Change of original model]
The amplifier of radio circuit was changed.

Equipment Type	:	Transceiver
Frequency Range	:	1890MHz to 1910MHz
Frequency operation	:	1890.3125MHz to 1909.6875MHz
Type of modulation	:	BPSK, BPSK+, QPSK,QPSK+, 8PSK, 8PSK+, 12QAM, 16QAM
Bandwidth	:	500kHz
Channel spacing	:	625kHz
Intermediate Frequency	:	340kHz
Antenna Type	:	Extensible Helical Antenna
Antenna Gain	:	2.9dBi (max)
Other Clock Frequency	:	96MHz, 24MHz, 18MHz, 9MHz, 6MHz, 32.768kHz
Operating voltage (Inner)	:	DC 5V
Temperature of operation	:	0 deg. C. to + 40 deg. C.

Modulation of iBurst USER TERMINAL USB TYPE (UTU) is max.16QAM（Up Link）, a single carrier(no OFDM) and no MIMO, not 802.20. The expansion type of iBurst had been standardized as 625K-MC which one of 802.20 standard.

Detailed timeslot structure is shown below.

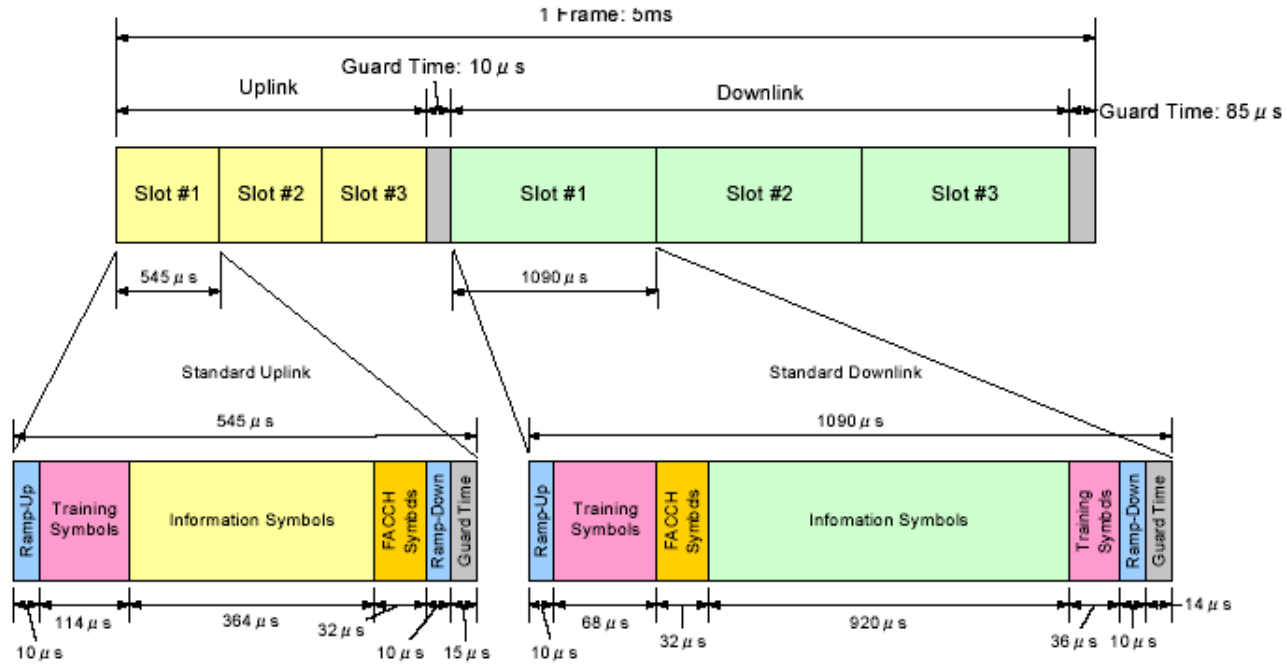

Figure 2 iBurst Timeslot Structure

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

Test configuration
This SAR test was evaluation for change approval. The mode and the modulation of change approval EUT and original approval EUT are quite the same.

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 = 0.896 W/kg (Body 1899.6875MHz)
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

The 1-g SAR was <1.2W/kg for all configurations.
Therefore according to the KDB447498 D01, the EUT was approved for used in a single platform.
***single platform : Personal computer without co-location transmitter.**

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

Correlation of Output Power between EMC and SAR tests
It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
In addition it was checked that the deviation between original approval and change approval was 0.5dBm less.

The result is shown in Section 6.1.2 and 6.1.3

- EIRP power at EMC test (S/N: No.18).
  EMC power was measured for EMC test on March 3, 2009.

- EIRP power at SAR test (S/N: No.18).
  SAR power was measured for SAR test on February 27, 2009.

Average power for SAR tests
It was checked that the antenna port average power for all modes having SAR test.
The result is shown in Section 6.1.4 and 6.1.5.

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

This test was performed at based on the original approval of SAR results since this SAR test was evaluation for change approval. Therefore
Therefore the test was measured three channels (Low,Middle and High channels) at the position of the SAR value that was the result of 0.8 W/kg or more in the SAR test of original approval.

3.8 Test setup of EUT (Test of insert to the PC)

(1) Rear (extended):
The test was performed in touch to the flat section of flat phantom with bottom surface of PC with inserted EUT.
Then the EUT was measured in the rear surface with extended antenna.

(2) Rear (retracted):
The test was performed in touch to the flat section of flat phantom with bottom surface of PC with inserted EUT.
Then the EUT was measured in the rear surface with retracted antenna.

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

4.1 Operating modes

4.1.1 Setting of EUT (Power testing)

Tx frequency band : 1890MHz – 1910MHz
Channel : 0ch(1890.3125MHz),3ch(1899.6875MHz),7ch(1909.6875MHz)
Modulation : BPSK,BPSK+,QPSK,QPSK+,8PSK,8PSK+,12QAM,16QAM (Refer to **Note.1**)

4.1.2 Setting of EUT (SAR testing)

Tx frequency band : 1890MHz – 1910MHz
Channel : 0ch(1890.3125MHz),3ch(1899.6875MHz),7ch(1909.6875MHz)
Modulation : BPSK+
Crest factor : Refer to **Note2**

Note1: Details of modulation
The data rate used in SAR test were decided the higher average power of each modulation. (BPSK,QPSK,8PSK,12QAM ,16QAM) Refer to the section6.1.4.

Modulation Class	Method
Modulation 0	BPSK
Modulation 1	BPSK+
Modulation 2	QPSK
Modulation 3	QPSK+
Modulation 4	8PSK
Modulation 5	8PSK+
Modulation 6	12QAM
Modulation 7	16QAM

Note2: Duty factor and crest factor
The all SAR testing was used crest factor for duty cycle.
For all modulations, 1 data frame structure is 3 slots (545usec./slot) in 5msec in every time.
<Result of measurement>

Modulation	BPSK+
On time[ms]	1.635
1cycle[ms]	5.001
Duty factor	32.7
Crest factor	3.1

Duty factor[%] = On time / 1cycle *100
Crest factor = 100/ Duty factor

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	Probability	divisor	(ci)	Standard	vi

	value ± %	distribution		1g	Uncertainty (1g)	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	5
Device holder uncertainty	±3.6	Normal	1	1	±3.6	1
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/after testing

6.1 Correlation of EMC power and SAR power

6.1.1 EMC EIRP power (Original approval)

This conducted data was extracted from EIRP power data of EMC test. (Report No. 29BE0211-HO-A-R1)
Date of test: November 7, 2008

Modulation 7 (PK worst) (Gate on)					
Ch	Frequency [MHz]	P/M (PK) Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Conducted Power Result [dBm]
Low	1890.3125	4.45	19.94	0.00	24.39
Mid	1899.6875	4.72	19.94	0.00	24.66
High	1909.6875	4.62	19.95	0.00	24.57

Sample Calculation : Conducted Power Result = P/M (PK) Reading + Atten. + Cable Loss.
*The limit is rounded down to one decimal place.
*The test result is round off to one or two decimal places, so some differences might be observed.

6.1.2 EMC EIRP power for change approval

The deviation between original approval and change approval was 0.5dBm less.
Date of test: March 3, 2009

Modulation 7 (PK worst) (Gate on)					
Ch	Frequency [MHz]	P/M (PK) Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Conducted Power Result [dBm]
Low	1890.3125	14.70	9.98	0.00	24.68
Mid	1899.6875	15.03	9.98	0.00	25.01
High	1909.6875	15.01	9.98	0.00	24.99

Sample Calculation : Conducted Power Result = P/M (PK) Reading + Atten. + Cable Loss.
*The limit is rounded down to one decimal place.
*The test result is round off to one or two decimal places, so some differences might be observed.

6.1.3 SAR EIRP power for change approval

Date of test: February 27, 2009

Modulation 7 (PK worst) (Gate on)					
Ch	Frequency [MHz]	P/M (PK) Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Conducted Power Result [dBm]
Low	1890.3125	4.77	20.04	0.00	24.81
Mid	1899.6875	4.97	20.04	0.00	25.01
High	1909.6875	4.96	20.04	0.00	25.00

Sample Calculation : Conducted Power Result = P/M (PK) Reading + Atten. + Cable Loss.
*The limit is rounded down to one decimal place.
*The test result is round off to one or two decimal places, so some differences might be observed.

6.1.4 SAR Average power

Date of test: February 27, 2009

Modulation 1(Modulation for SAR testing)									
Ch	Frequency	P/M Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
Low	1890.3125	2.47	-4.04	0.00	20.04	22.51	16.00	178.24	39.81
Mid	1899.6875	3.41	-3.85	0.00	20.04	23.45	16.19	221.31	41.59
High	1909.6875	3.31	-3.76	0.00	20.04	23.35	16.28	216.27	42.46

Result[dBm] = P/M (PK or AVG) Reading + Atten. + Cable Loss.

Result[mW] = $10^{(\text{Result [dBm]}/10)}$

*The limit is rounded down to one decimal place.

6.1.5 Reference data of SAR test (Data rate determination)

Date of test: February 27, 2009

(Reference data (Precheck))

(Gate off)

Modulation		Frequency [MHz]	P/M(AV) Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]
0	BPSK	1899.6875	-3.89	20.04	0.00	16.15
1	BPSK+	1899.6875	-3.85	20.04	0.00	**16.19**
2	QPSK	1899.6875	-4.96	20.04	0.00	15.08
3	QPSK+	1899.6875	-4.94	20.04	0.00	15.10
4	8PSK	1899.6875	-4.82	20.04	0.00	15.22
5	8PSK+	1899.6875	-4.90	20.04	0.00	15.14
6	12QAM	1899.6875	-5.93	20.04	0.00	14.11
7	16QAM	1899.6875	-6.24	20.04	0.00	13.80

Result = P/M (AVG) Reading + Atten. + Cable Loss.

SECTION 7 : Measurement results

7.1 Body SAR (Insert to the PC)

Liquid Depth (cm) : **15.0**
Parameters : **εr =55, σ =1.59**
Ambient temperature(deg.c.) : **24.5**
Relative Humidity (%) : **38**
Date : **February 27, 2009**
Model : **UTU03-1890F-US-A**
Serial No. : **No.18**
Modulation : **BPSK+**
Crest factor : **3.1**
Measured By : **Miyo Kishimoto**

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 value
Low	1890.3125	BPSK+	Flat	extended	Rear	0	24.0	24.0	**0.832**
Mid	1899.6875	BPSK+	Flat	extended	Rear	0	24.0	24.0	**0.867**
High	1909.6875	BPSK+	Flat	extended	Rear	0	24.0	24.0	**0.813**
Low	1890.3125	BPSK+	Flat	retracted	Rear	0	23.5	23.5	**0.740**
Mid	1899.6875	BPSK+	Flat	retracted	Rear	0	23.5	23.2	**0.821**
High	1909.6875	BPSK+	Flat	retracted	Rear	0	23.2	23.0	**0.843**