SAR TEST REPORT

Test Report No. : 32EE0075-HO-I-R1

Applicant	:	**NEC Corporation of America**
Type of Equipment	:	**Digital Portable Cellular Telephone**
Model No.	:	**KMP7N4AC1-3A**
FCC ID	:	**A98-QOE9653**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C (Edition 01-01)**
Test Result	:	**Complied**

FCC Part 22H	Head	: 0.47W/kg
	Body-hotspot	: 0.72W/kg (10mm distance)
FCC Part 24E	Head	: 0.66W/kg
	Body-hotspot	: 1.06W/kg (10mm distance)
FCC Part15.247	Head	: 0.11W/kg
	Body-hotspot	: 0.02W/kg (10mm distance)

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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.
6. This report is a revised version of 32EE0075-HO-I. 32EE0075-HO-I is replaced with this report.

Date of test: December 16 to 21, 2011

Representative test engineer:

Miyo Kishimoto
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.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

SECTION 1: Customer information

Company Name	:	NEC Corporation of America
Address	:	Radio Communications Systems Division 6535N. State Highway 161, Irving, TX 75039-2402 USA
Telephone Number	:	+1 214 262 4241
Facsimile Number	:	+1 214 262 4225
Contact Person	:	Sanjay Wadhwa

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Portable Cellular Telephone
Model No.	:	KMP7N4AC1-3A
Serial No.	:	WWAN: 004401200840185 WLAN: 004401200840177
Rating	:	Li-ion Battery (M/N;N32) DC3.8V/ 1400mAh 5.4Wh
Receipt Date of Sample	:	December 15, 2011
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype
Modification of EUT	:	No Modification by the test lab
Antenna to antenna separation distance	:	10.76cm from WWAN antenna to WLAN/BT antenna 0cm from WLAN antenna to Bluetooth antenna (shared with BT)
Simultaneous transmission	:	WWAN can transmit simultaneously with WLAN WWAN can transmit simultaneously with Bluetooth WLAN cannot transmit simultaneously with Bluetooth

Radio Specification [1/2]

Bluetooth (Ver.2.1 + EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Other Clock Frequency	19.2MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Connector Type	Integrated antenna

Low Energy (Ver.4.0)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Other Clock Frequency	19.2MHz
Bandwidth & Channel spacing	1MHz & 2MHz
Antenna Connector Type	Integrated antenna

WLAN (IEEE802.11b/g/n (SISO/HT20))

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Other Clock Frequency	19.2MHz
Type of Modulation	DSSS, OFDM
Antenna Connector Type	Integrated antenna

Radio Specification [2/2]

GSM

Equipment Type	Transceiver
Frequency of Operation	[Up Link] GSM850: 824 – 849MHz PCS: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS: 1930 – 1990MHz
Other Clock Frequency	19.2MHz
Type of Modulation	GMSK
Channel spacing	200kHz
Antenna Connector Type	Integrated antenna
Multi slot class	Class 8

WCDMA

Equipment Type	Transceiver
Frequency of Operation	[Up Link] Band V: 824 – 849MHz [Down Link] Band V: 869 – 894MHz
Other Clock Frequency	19.2MHz
Type of Modulation	HPSK
Channel spacing	5MHz
Antenna Connector Type	Integrated antenna

GPS

Equipment Type	Receiver
Receiver Type	Direct Down conversion
Frequency of Operation	1575.42MHz
Other Clock Frequency	19.2MHz
Antenna Connector Type	Integrated antenna

RFID

Equipment Type	Transceiver
Frequency of Operation	13.56MHz
Type of Modulation	ASK
Antenna Connector Type	Integrated antenna

SECTION 3 : Test standard information

3.1 Test Specification

Title : **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;

KDB447498D01(v04):	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB648474D01:	SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas
KDB941225D01(v02):	SAR Measurement Procedures for 3G Devices
KDB941225D02(v02v01):	3GPP R6 HSPA and R7 HSPA+ SAR Guidance
KDB941225D03(v01):	Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE
KDB941225D04(v01):	Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode
KDB94122506(v01):	SAR test procedures for devices incorporating SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities (Hot Spot SAR)
KDB248227(rev.1.2):	SAR Measurement Procedures for 802.11a//b/g Transmitters

Reference

[1]ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.
[2]SPEAG uncertainty document (AN 15-7/AN19-17) for DASY 5 System from SPEAG (Shimid & Partner Engineering AG).

3.2 Procedure

Transmitter	WWAN	WLAN	Bluetooth
Test Procedure	FCC OET BULLETIN 65, SUPPLEMENT C	FCC OET BULLETIN 65, SUPPLEMENT C	Exemption (Power < 12mW)
	SAR	SAR	
Category	FCC47CFR 2.1093	FCC47CFR 2.1093	FCC47CFR 2.1093
Note: UL Japan, Inc. 's SAR Work Procedures 13-EM-W0429 and 13-EM-W0430			

*Bluetooth mode is excluded from SAR test since power was less than1/2 *60/$f_{[GHz]}$[mW].

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

SECTION 4 : Test result

4.1 Stand-alone SAR result

No.	Capable Tx configrations		Head SAR	Body-worn SAR	Body SAR (HotSpot)	Note
1	WWAN	GSM/GPRS 850 MHz	Yes	Exemption*1	Yes	-
2		GSM/GPRS 1900 MHz	Yes	Exemption*1	Yes	-
3		12.2kRMC band V	Yes	Exemption*1	Yes	-
4	WLAN	WLAN 2.4G	Yes	Exemption*1	Yes	With VOIP
5	Bluetooth	Bluetooth BDR/EDR/Low Energy	Exemption*2			-

Note
*1 It is not necessary to test Body-worn SAR if the test separation distance(10mm) for hotspot mode is more conservative than Body-worn test(15mm),according to KDB 941225 D06 Hotspot SAR procedure.
*2 Bluetooth power is less than 1/2 *60/$f_{[GHz]}$[mW].

Mode	1g Head SAR [W/kg]	1g Body-worn SAR [W/kg]	1g BodySAR [W/kg]
GSM850	0.436	Exemption	0.720
PCS1900	0.661	Exemption	1.06
WCDMA band V	0.466	Exemption	0.610
WLAN 11b/g/n(2.4G)	0.111	Exemption	0.015
Bluetooth	Exemption		

4.2 Simultaneous transmission SAR result

<Simultaneous Procedure>
This EUT has the unlicensed transmitter such as WLAN (802.11b/g/n) & Bluetooth devices besides licensed transmitter WWAN (GSM/WCDMA), and the following simultaneous transmission is possible.

No.	Capable Tx configrations		Head SAR	Body SAR (HotSpot)	Note
6	WWAN+WLAN	GSM/GPRS + WLAN2.4G	Yes	Yes	-
7		WCDMA + WLAN2.4G	Yes	Yes	-
8	WWAN+Bluetooth		Yes (Exemption)		
9	WLAN+Bluetooth		No operating		

<WWAN + WLAN >
Simultaneous transmitter evaluation based on the KDB648474. Refer to the Section 8.

Step1.	WWAN antenna is >5cm from Wireless LAN antenna
Step2.	WLAN power > 2Pref (=60/$f_{[GHz]}$).
Step3.	Stand-alone SAR for WLAN
Step4.	Simultaneous transmission is possible (WWAN + WLAN)
Step5.	∑1g SAR (WWAN + WLAN) < 1.6W/kg Head: 0.724W/kg Body:1.073W/kg
Step6.	No simultaneous transmission.

<WWAN + Bluetooth >
Simultaneous transmitter evaluation based on the KDB648474.

Step1.	WWAN antenna is >5cm from Bluetooth antenna

Step2.	Bluetooth power < Pref (=1/2 *60/$f_{[GHz]}$). Refer to the FCC 15.247 test report
Step3.	No stand-alone SAR for Bluetooth
Step4.	No simultaneous transmission SAR

SECTION 5 : Description of the operating mode

5.1 Output power operating modes

Band	Duty cycle or Multi class(GSM)	Test Frequency	Mode
GSM850	Multi class 8	824.2MHz (128ch) 836.6MHz(190ch) 848.8MHz(251ch)	GSM GPRS (CS-1)
PCS1900	Multi class 8	1850.2MHz(512ch) 1880.0MHz(661ch) 1909.8MHz(810ch)	
WCDMA V	100%	826.4MHz (4132ch) 836.6MHz(4183ch) 846.6MHz(4233ch)	AMR 12.2k RMC HSDPA HSUPA
WWAN			
The communication link was set up with the Wireless Communications Test Set (Agilent). The EUT was command to operate at maximum transmit power. GSM850 :PCL 5 PCS1900 :PCL 0 W-CDMA :All up bits			

Mode	Duty cycle	Frequency Band	Test Frequency	Modulation
IEEE802.11b	100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	DSSS (DBPSK.DQPSK.CCK)
IEEE802.11g	100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	OFDM (BPSK.QPSK.16QAM,64QAM)
IEEE802.11n20 (2.4G)	100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	
WLAN				
*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.				

5.2 SAR testing operating modes

The operating mode for SAR testing was decided by the output power

Output power measurement for GSM

[GSM]
*Connection Type :AUTO
*Power control level :5(GSM850), 0(PCS1900)

[GPRS]
*Connection Type : Type B
*Power control level : 5(GSM850), 0(PCS1900)
*Coding Scheme : CS-1

SAR measurement for GSM

1) GSM850

GSM850 SAR Power											
Mode		CF (Crest Factor)	Ch	Frequency [MHz]	Time-based AVG				Slotted-AVG		
					P/M Reading [dBm] Time-AVG	Atten. [dB]	Cable Loss [dB]	Result [dBm] Time-AVG	Agilent Reading [dBm] slotted AVG	Cable Loss [dB]	Result [dBm] Slotted AVG
GSM	1slot	8.3	128	824.2	0.53	23.49	0.47	24.49	29.90	4.04	33.94
			190	836.6	0.75	23.49	0.47	24.71	29.99	4.04	34.03
			251	848.8	0.50	23.49	0.47	24.46	29.86	4.04	33.90
GPRS (CS1)	1slot	8.3	128	824.2	0.30	23.49	0.47	24.26	29.85	4.04	33.89
			190	836.6	0.30	23.49	0.47	24.26	29.97	4.04	34.01
			251	848.8	0.29	23.49	0.47	24.25	29.85	4.04	33.89

Time based AVG Results = P/M Reading + Atten.Loss + Cable Loss
Slotted AVG Results = Agilent Reading + Cable Loss

2) PCS1900

PCS1900 SAR Power											
Mode		CF (Crest Factor)	Ch	Frequency [MHz]	Time-based AVG				Slotted-AVG		
					P/M Reading [dBm] Time-AVG	Atten. [dB]	Cable Loss [dB]	Result [dBm] Time-AVG	Agilent Reading [dBm] slotted AVG	Cable Loss [dB]	Result [dBm] Slotted AVG
GSM	1slot	8.3	512	1850.2	-2.78	23.49	0.68	21.39	26.32	4.35	30.67
			661	1880.0	-2.28	23.49	0.68	21.89	26.83	4.35	31.18
			810	1909.8	-2.48	23.49	0.68	21.69	26.75	4.35	31.10
GPRS (CS1)	1slot	8.3	512	1850.2	-3.15	23.49	0.68	21.02	26.27	4.35	30.62
			661	1880.0	-2.57	23.49	0.68	21.60	26.80	4.35	31.15
			810	1909.8	-2.69	23.49	0.68	21.48	26.71	4.35	31.06

Time based AVG Results = P/M Reading + Atten.Loss + Cable Loss
Slotted AVG Results = Agilent Reading + Cable Loss

Output power measurement for W-CDMA

Maximum output power for W-CDMA and HSPA was verified on the high, middle and low channels according to the procedures described in section 5.2 of 3GPP TS 34.121 and "KDB 941225 document".
The WCDMA and HSPA modes of EUT were verified each channel and "sub-tests" according to Release-6 procedures in section5.2 of 3GPP TS 34.121.
[Rel.99]
The communication test set was using a 12.2k RMC (reference measurement channel) with TPC (transmit power control) set to all "1's" configured in Test Loop Mode 1.
[HSDPA]
The communication test set was using an FRC (Fixed reference channel) with H-set 1 and 12.2kbps RMC with TPC (transmit power control) set to all "1's". Output power was measured according requirements for HS-DPCCH Sub-test 1-4.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Test Equipment Setting Summary Table

The following table is the key parameters that was configured in test equipment.

Subtest	Mode	Loopback Mode	Rel99 RMC	HSDPA FRC	HSUPA Test	Common Setting		βc/βd	MPR	Power Class 3 limit
						βc	βd			
	Rel99	Test Mode 1	12.2kbps RMC	-	-			8/15		24(+1.7/-3.7dB)
1	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (HPSK)	-	2/15	15/15	2/15	0	24(+1.7/-3.7dB)
2	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (HPSK)	-	12/15	15/15	12/15	0	24(+1.7/-3.7dB)
3	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (HPSK)	-	15/15	8/15	15/8	0.5	23.5(+2.2/-3.7dB)
4	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (HPSK)	-	15/15	4/15	15/4	0.5	23.5(+2.2/-3.7dB)

Subtest	HSDPA Specific Settings						
	ΔACK	ΔNACK	ΔCQI	Ack-Nack repetition factor	CQI Feedback	CQI Repetition Factor	Ahs=βhs/βc
Rel 6 HSDPA							
1	8	8	8	3	4ms	2	30/15
2	8	8	8	3	4ms	2	30/15
3	8	8	8	3	4ms	2	30/15
4	8	8	8	3	4ms	2	30/15

SAR measurement for W-CDMA

3) WCDMA V

1.The 12.2k RMC mode was maximum average power. The AMR/HSDPA SAR is not required for other mode because the maximum average output power for other mode is less than 1/4dB higher than that measured 12.2k RMC mode.

WCDMA V band (Power class 3)					
Mode	Ch	Frequency [MHz]	Reading AVG [dBm]	Cable loss [dB]	Result [dBm]
AMR	4132	826.4	23.06	0.47	23.53
	4183	836.6	23.01	0.47	23.48
	4233	846.6	23.16	0.47	23.63
RMC 12.2kbps	4132	826.4	23.05	0.47	23.52
	4183	836.6	23.03	0.47	23.50
	4233	846.6	23.19	0.47	23.66
HSDPA Subtest1	4132	826.4	23.02	0.47	23.49
	4183	836.6	22.98	0.47	23.45
	4233	846.6	23.19	0.47	23.66
HSDPA Subtest2	4132	826.4	23.06	0.47	23.53
	4183	836.6	23.01	0.47	23.48
	4233	846.6	23.15	0.47	23.62
HSDPA Subtest3	4132	826.4	22.68	0.47	23.15
	4183	836.6	22.49	0.47	22.96
	4233	846.6	22.76	0.47	23.23
HSDPA Subtest4	4132	826.4	22.63	0.47	23.10
	4183	836.6	22.52	0.47	22.99
	4233	846.6	22.76	0.47	23.23
HSUPA Subtest1	4132	826.4	22.41	0.47	22.88
	4183	836.6	22.54	0.47	23.01
	4233	846.6	23.00	0.47	23.47
HSUPA Subtest2	4132	826.4	21.52	0.47	21.99
	4183	836.6	20.68	0.47	21.15
	4233	846.6	21.43	0.47	21.90
HSUPA Subtest3	4132	826.4	21.88	0.47	22.35
	4183	836.6	21.35	0.47	21.82
	4233	846.6	21.54	0.47	22.01
HSUPA Subtest4	4132	826.4	21.67	0.47	22.14
	4183	836.6	21.74	0.47	22.21
	4233	846.6	21.64	0.47	22.11
HSUPA Subtest5	4132	826.4	22.45	0.47	22.92
	4183	836.6	22.54	0.47	23.01
	4233	846.6	22.98	0.47	23.45

Results = Reading + Loss

: Maximum power

MPR Explanation

The product implements an Enhanced MPR (E-MPR) software algorithm that also considers power compression (Scaling), a requirement per 3GPP 25.214 section 5.1.2.6, to generate a more accurate Cubic Metric (CM) value that is used to determine the magnitude of power reduction for HSPA signals. The Enhanced MPR solution can introduce a deviation of the actual observed power reduction from the MPR target values configured for a device.

In the power scaling process defined by 3GPP TS 25.214, the channel beta values are modified as the transmitted signal approaches maximum power to ensure that the transmit power does not exceed the maximum rated transmit power and is also compliant with emissions requirements. The power scaling process considers the software-defined MPR target values based on the CM for the signal to be transmitted to determine the required power reduction for a given signal. The actual CM value of the signal transmitted after power scaling, however, is often different from the estimated CM value used in the power reduction algorithm.

An accurate CM value is desirable as the goal of power reduction is to maintain compliance with emissions limits. By using a more accurate CM value, the E-MPR process minimizes the magnitudes of power reduction required to maintain emissions compliance whereas the legacy MPR software may incorporate a magnitude of power reduction that is higher than is required for emissions compliance.

The enhanced power reduction may result in around 1dB of variance from the MPR target values depending on HSPA channel configuration (e.g. 34.121 subtest) and characteristics of hardware RF design.

5.3 SAR testing operating modes

Decision of SAR test channel

The operating mode for SAR testing was decided by the output power
The average output power for 802.11a was measured on all channels in each frequency band.

Mode	GHz	Channel	Turbo Channel	"Default Test Channel"	
				FCC 15.247	
				802.11b	802.11g
802.11 b/g	2.412	1		√	Δ
	2.437	6	6	√	Δ
	2.462	11		√	Δ

√ = "default test channels"
Δ = Possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"

4) WLAN (11b/g/n(2.4G))
Test mode : 11b 1bps
Channel : 1ch
Crest factor : 1

Note:
1.The 11b mode was maximum average power. The 11g/n SAR is not required for other mode because the maximum average output power for other mode is less than 1/4dB higher than that measured 11b mode.
2.The other channels are measured if the SAR result at max. AVG power channel will be above 0.8W/kg

[IEEE802.11b] Rate Check

Rate [Mbps]	Freq. [MHz]	Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1.0	2412	0.76	0.80	10.07	11.63	14.55
2.0	2412	0.71	0.80	10.07	11.58	14.39
5.5	2412	0.65	0.80	10.07	11.52	14.19
11.0	2412	0.55	0.80	10.07	11.42	13.87
1.0	2437	0.35	0.80	10.07	11.22	13.24
2.0	2437	0.29	0.80	10.07	11.16	13.06
5.5	2437	0.36	0.80	10.07	11.23	13.27
11.0	2437	0.21	0.80	10.07	11.08	12.82
1.0	2462	-0.14	0.80	10.07	10.73	11.83
2.0	2462	-0.14	0.80	10.07	10.73	11.83
5.5	2462	-0.21	0.80	10.07	10.66	11.64
11.0	2462	-0.28	0.80	10.07	10.59	11.46

:Maximum AVG power for 11b mode

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

[IEEE802.11g] Rate Check

Rate [Mbps]	Frequency [MHz]	Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	2412	0.75	0.80	10.07	11.62	14.52
9.0	2412	0.71	0.80	10.07	11.58	14.39
12.0	2412	0.63	0.80	10.07	11.50	14.13
18.0	2412	0.70	0.80	10.07	11.57	14.35
24.0	2412	0.64	0.80	10.07	11.51	14.16
36.0	2412	0.61	0.80	10.07	11.48	14.06
48.0	2412	0.45	0.80	10.07	11.32	13.55
54.0	2412	0.40	0.80	10.07	11.27	13.40
6.0	2437	0.44	0.80	10.07	11.31	13.52
9.0	2437	0.40	0.80	10.07	11.27	13.40
12.0	2437	0.37	0.80	10.07	11.24	13.30
18.0	2437	0.32	0.80	10.07	11.19	13.15
24.0	2437	0.21	0.80	10.07	11.08	12.82
36.0	2437	0.16	0.80	10.07	11.03	12.68
48.0	2437	0.13	0.80	10.07	11.00	12.59
54.0	2437	0.01	0.80	10.07	10.88	12.25
6.0	2462	-0.24	0.80	10.07	10.63	11.56
9.0	2462	-0.43	0.80	10.07	10.44	11.07
12.0	2462	-0.39	0.80	10.07	10.48	11.17
18.0	2462	-0.49	0.80	10.07	10.38	10.91
24.0	2462	-0.52	0.80	10.07	10.35	10.84
36.0	2462	-0.61	0.80	10.07	10.26	10.62
48.0	2462	-0.73	0.80	10.07	10.14	10.33
54.0	2462	-0.80	0.80	10.07	10.07	10.16

:Maximum AVG power for 11g mode

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

[IEEE802.11n20] Rate Check Long GI

Rate	Frequency [MHz]	Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	2412	0.71	0.80	10.07	11.58	14.39
MCS1	2412	0.71	0.80	10.07	11.58	14.39
MCS2	2412	0.66	0.80	10.07	11.53	14.22
MCS3	2412	0.66	0.80	10.07	11.53	14.22
MCS4	2412	0.57	0.80	10.07	11.44	13.93
MCS5	2412	0.48	0.80	10.07	11.35	13.65
MCS6	2412	0.41	0.80	10.07	11.28	13.43
MCS7	2412	-2.53	0.80	10.07	8.34	6.82
MCS0	2437	0.30	0.80	10.07	11.17	13.09
MCS1	2437	0.26	0.80	10.07	11.13	12.97
MCS2	2437	0.22	0.80	10.07	11.09	12.85
MCS3	2437	0.21	0.80	10.07	11.08	12.82
MCS4	2437	0.09	0.80	10.07	10.96	12.47
MCS5	2437	0.03	0.80	10.07	10.90	12.30
MCS6	2437	0.02	0.80	10.07	10.89	12.27
MCS7	2437	-3.19	0.80	10.07	7.68	5.86
MCS0	2462	-0.44	0.80	10.07	10.43	11.04
MCS1	2462	-0.45	0.80	10.07	10.42	11.02
MCS2	2462	-0.42	0.80	10.07	10.45	11.09
MCS3	2462	-0.47	0.80	10.07	10.40	10.96
MCS4	2462	-0.58	0.80	10.07	10.29	10.69
MCS5	2462	-0.64	0.80	10.07	10.23	10.54
MCS6	2462	-0.71	0.80	10.07	10.16	10.38
MCS7	2462	-3.72	0.80	10.07	7.15	5.19

:Maximum AVG power for 11n20 Long GI mode

[IEEE802.11n20] Rate Check Short GI

Rate	Frequency [MHz]	Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	2412	0.63	0.80	10.07	11.50	14.13
MCS1	2412	0.51	0.80	10.07	11.38	13.74
MCS2	2412	0.41	0.80	10.07	11.28	13.43
MCS3	2412	0.37	0.80	10.07	11.24	13.30
MCS4	2412	0.25	0.80	10.07	11.12	12.94
MCS5	2412	0.14	0.80	10.07	11.01	12.62
MCS6	2412	0.27	0.80	10.07	11.14	13.00
MCS7	2412	-2.98	0.80	10.07	7.89	6.15
MCS0	2437	0.27	0.80	10.07	11.14	13.00
MCS1	2437	0.23	0.80	10.07	11.10	12.88
MCS2	2437	0.16	0.80	10.07	11.03	12.68
MCS3	2437	0.12	0.80	10.07	10.99	12.56
MCS4	2437	0.02	0.80	10.07	10.89	12.27
MCS5	2437	-0.09	0.80	10.07	10.78	11.97
MCS6	2437	-0.13	0.80	10.07	10.74	11.86
MCS7	2437	-3.28	0.80	10.07	7.59	5.74
MCS0	2462	-0.34	0.80	10.07	10.53	11.30
MCS1	2462	-0.43	0.80	10.07	10.44	11.07
MCS2	2462	-0.45	0.80	10.07	10.42	11.02
MCS3	2462	-0.50	0.80	10.07	10.37	10.89
MCS4	2462	-0.64	0.80	10.07	10.23	10.54
MCS5	2462	-0.72	0.80	10.07	10.15	10.35
MCS6	2462	-0.76	0.80	10.07	10.11	10.26
MCS7	2462	-3.78	0.80	10.07	7.09	5.12

:Maximum AVG power for 11n20 Short GI mode

Sample Calculation: Result = Reading + Cable Loss + Attenuator

5.4 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)
SAR power is equal to DATA of EMC test based on the following reason.

- EMC and SAR tests are performed with the same test sample under the same condition.
- EMC and SAR tests are performed at the same laboratory.

<Peak power result for maximum data rate in FCC 15.247 test>

IEEE802.11b 11Mbps

Ch	Frequency	P/M Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	3.41	0.55	0.80	10.07	14.28	11.42	26.79	13.87
6	2437	3.03	0.21	0.80	10.07	13.90	11.08	24.55	12.82
11	2462	2.41	-0.28	0.80	10.07	13.28	10.59	21.28	11.46

IEEE802.11g 48Mbps

Ch	Frequency	P/M Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	10.05	0.45	0.80	10.07	20.92	11.32	123.59	13.55
6	2437	9.79	0.13	0.80	10.07	20.66	11.00	116.41	12.59
11	2462	9.42	-0.73	0.80	10.07	20.29	10.14	106.91	10.33

IEEE802.11n20 Long GI MCS6

Ch	Frequency	P/M Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	10.06	0.41	0.80	10.07	20.93	11.28	123.88	13.43
6	2437	9.80	0.02	0.80	10.07	20.67	10.89	116.68	12.27
11	2462	9.35	-0.71	0.80	10.07	20.22	10.16	105.20	10.38

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

5.5 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.

SECTION6 : Description of the Head/ Body / Body-Worn setup

6.1 Test position for Head setup

i)Procedure for SAR testing

The EUT was tested in accordance with FCC OET Bulletin 65 Supplement C: 2001-01 and IEEE 1528: 2003 for both the "Cheek/Touch" and "Ear/Tilt" positions at the left and right sides of the SAM phantom head region. The FCC KDB 648474 D01 was also incorporated.

ii)Test mode

GSM850/PCS1900	**Voice mode (GSM)/VOIP mode(Data transmission)**
WCDMA V	**12.2k RMC**
WLAN	**VOIP mode (11b)**

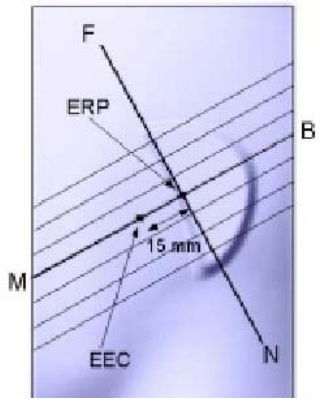
iii)Test position

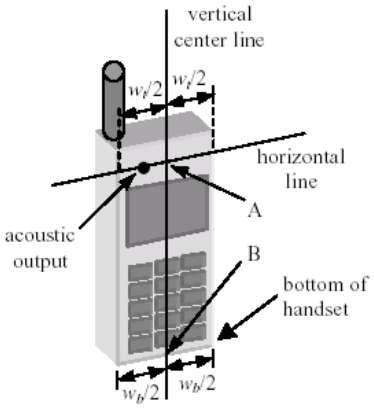
(1) Left cheek
(2) Left tilt
(3) Right cheek
(4) Right tilt

Initial ear position

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom.

The device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane".





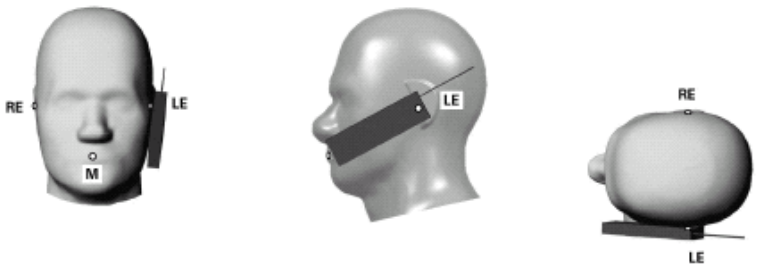
Cheek position

The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line.

This test position is established:

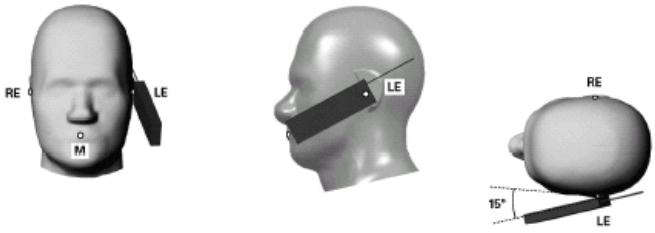
i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

ii) (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.



Tilt position

If the earpiece of the handset is not in full contact with the phantom's ear spacer and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer. Otherwise the handset should be moved away from the cheek perpendicular to the line passes through both "ear reference points" for approximate 2-3 cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously.



<Antenna position>

The antennas use for WWAN and WLAN are both separate in a single fixed position. The antennas are integral part of the device.

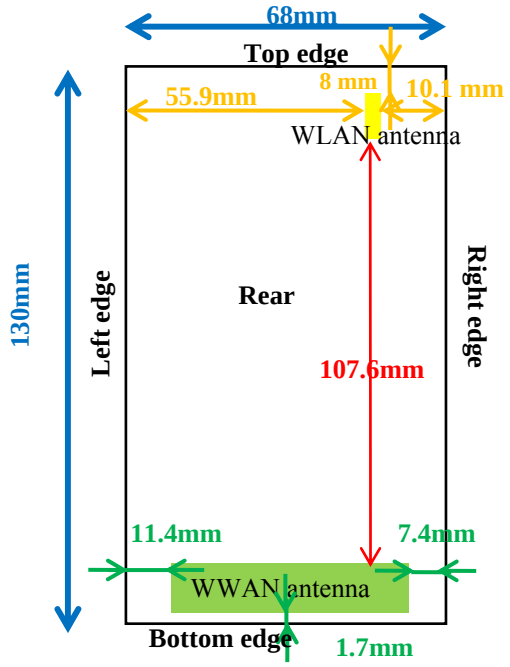
6.2 Description of the Body setup

i)Procedure for SAR testing

-The tested distance were performed according to the KDB941225 D06 v01 (SAR Evaluation Procedures for portable Devices with Wireless Router Capabilities) Device dimensions (HxWxD):130x68x7

ii)Test mode

GSM850/PCS1900	**Data transmission mode (GPRS)**
WCDMA V	**Data transmission mode (12.2kRMC)**
WLAN	**Data transmission mode (11b)**



Position	WWAN	WLAN
Front	Tested	Tested
Rear	Tested	Tested
Left edge	Tested	Not required
Right edge	Tested	Tested
Top edge	Not required	Tested
Bottom edge	Tested	Not required

NOTE: Test position is required to the edge within 2.5cm from antenna according to the KDB 941225 D06.

(1) Front (10mm) :
The measurement separated 10mm distance between the front face of EUT and flat section of SAM Twin Phantom.
(2) Rear (10mm) :
The measurement separated 10mm distance between the rear face of EUT and flat section of SAM Twin Phantom.
(3) Left edge (10mm) :
The measurement separated 10mm distance between the left edge of EUT and flat section of SAM Twin Phantom.
(4) Right edge (10mm) :
The measurement separated 10mm distance between the right edge of EUT and flat section of SAM Twin Phantom.
(5) Top edge (10mm) :
The measurement separated 10mm distance between the top edge of EUT and flat section of SAM Twin Phantom.
(6) Bottom edge (10mm) :
The measurement separated 10mm distance between the bottom edge of EUT and flat section of SAM Twin Phantom.

6.3 Description of the Body-worn setup

i)Procedure for SAR testing

According to KDB 941225 D06 Hotspot SAR procedure, test Body-worn for WWAN & WLAN2.4GHz not necessary since the test separation distance (10mm) for hotspot mode is more conservative than Body-worn test(15mm).

SECTION 7 : Test surrounding

7.1 Measurement uncertainty

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or veff
Measurement System						
Probe calibration	±6.0	Normal	1	1	±6.0	∞
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	±1.0	Rectangular	√3	1	±0.6	∞
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	±0.4	Rectangular	√3	1	±0.2	∞
Probe positioning	±2.9	Rectangular	√3	1	±1.7	∞
Max.SAR Eval.	±1.0	Rectangular	√3	1	±0.6	∞
Test Sample Related						
Device positioning	±2.9	Normal	1	1	±2.9	40
Device holder uncertainty	±3.6	Normal	1	1	±3.6	9
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.)	+4.3	Rectangular	1	0.64	±2.8	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	-4.1	Rectangular	1	0.6	±2.5	∞
Combined Standard Uncertainty					**±11.392**	
Expanded Uncertainty (k=2)					**±22.8**	

SECTION 8 : Measurement results

8.1 GSM 850MHz HEAD SAR

(1)Method of measurement

Step1. The searching for the worst position
The test was performed in middle channel.
Step2. The changing to the DATA transmitter for VOIP mode (GPRS)
The test was performed at the worst position of Step1.

Note:
1)The other channel was not required since middle channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
20-Dec	24	43	HSL900	23.5	835	εr	41.5	42.1	1.4	+/-5
						σ [mho/m]	0.90	0.89	-1.1	+/-5

εr: Relative Permittivity / σ : Coductivity
*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
0.735	43.4728	19.4716	0.795	0.845	41.9812	19.1716	0.900
0.745	43.3741	19.4948	0.807	0.855	41.8763	19.1843	0.911
0.755	43.2982	19.5009	0.818	0.865	41.7803	19.1985	0.923
0.765	43.1631	19.4691	0.827	0.875	41.692	19.2019	0.933
0.775	43.01	19.4118	0.836	0.885	41.5715	19.1976	0.944
0.785	42.8561	19.3262	0.843	0.895	41.4321	19.1535	0.952
0.795	42.7196	19.2327	0.849	0.905	41.2869	19.0814	0.959
0.805	42.5828	19.1911	0.858	0.915	41.1404	18.9953	0.966
0.815	42.416	19.1866	0.869	0.925	41.0131	18.9312	0.973
0.825	42.2505	19.1735	0.879	0.935	40.88	18.8887	0.981
0.835	42.1003	19.1665	0.889				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of HEAD SAR

HEAD SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
190	836.6	GSM	Left	Fixed	Cheek	0	**0.308**
190	836.6	GSM	Left	Fixed	Tilt	0	**0.282**
190	836.6	GSM	Right	Fixed	Cheek	0	**0.436**
190	836.6	GSM	Right	Fixed	Tilt	0	**0.305**
Step.2 VOIP mode (GPRS)							
190	836.6	GPRS 1slot	Right	Fixed	Cheek	0	**0.402**

8.2 GSM 850MHz Body SAR

(1)Method of measurement

<Body (Hotspot mode)>

Step1. The searching for the worst position
The test was performed in middle channel.

Note:
1)The other channel was not required since middle channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
19-Dec	24	45	MSL 900	23.0	835	εr	55.2	53.3	-3.4	+/-5
						σ [mho/m]	0.97	0.96	-1.0	+/-5

εr: Relative Permittivity / σ : Coductivity
*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
0.735	54.4766	21.0012	0.858	0.845	53.2625	20.6818	0.971
0.745	54.3784	20.9536	0.867	0.855	53.1666	20.6281	0.980
0.755	54.2437	20.8977	0.877	0.865	53.0575	20.5757	0.989
0.765	54.1221	20.8583	0.886	0.875	52.9455	20.5292	0.998
0.775	53.9902	20.8125	0.896	0.885	52.8415	20.4865	1.007
0.785	53.8495	20.7931	0.907	0.895	52.7475	20.481	1.018
0.795	53.7211	20.7737	0.918	0.905	52.661	20.4913	1.030
0.805	53.6095	20.7639	0.929	0.915	52.5802	20.5157	1.043
0.815	53.5106	20.7539	0.940	0.925	52.507	20.5336	1.055
0.825	53.4124	20.7293	0.950	0.935	52.456	20.5333	1.067
0.835	53.3491	20.7133	0.961				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of Body SAR

BODY SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
190	836.6	GPRS 1slots	Flat	Fixed	Front	10	**0.527**
190	836.6	GPRS 1slots	Flat	Fixed	Rear	10	**0.720**
190	836.6	GPRS 1slots	Flat	Fixed	Left edge	10	**0.316**
190	836.6	GPRS 1slots	Flat	Fixed	Right edge	10	**0.319**
190	836.6	GPRS 1slots	Flat	Fixed	Bottom edge	10	**0.074**

8.3 PCS1900 MHz HEAD SAR

(1)Method of measurement

Step1. The searching for the worst position
The test was performed in middle channel.
Step2. The changing to the Multi slot of DATA transmitter for VOIP mode (GPRS)
The test was performed at the worst position of Step1.

Note:
1)The other channel was not required since middle channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
16-Dec	23.5	39	HSL 1800	23.0	1880	εr	40.0	39.2	-2.0	+/-5
						σ [mho/m]	1.40	1.46	4.3	+/-5

εr: Relative Permittivity / σ : Coductivity
*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
1.8	39.5782	13.7119	1.371	1.91	39.1184	13.9864	1.484
1.81	39.5336	13.7412	1.382	1.92	39.0851	14.0079	1.494
1.82	39.4882	13.7737	1.393	1.93	39.0529	14.0298	1.504
1.83	39.4446	13.7992	1.403	1.94	39.0232	14.0519	1.514
1.84	39.3986	13.8265	1.413	1.95	38.992	14.0769	1.525
1.85	39.3522	13.8511	1.424	1.96	38.9565	14.0989	1.535
1.86	39.3082	13.8786	1.434	1.97	38.9205	14.1166	1.545
1.87	39.2711	13.9037	1.444	1.98	38.8824	14.1388	1.555
1.88	39.2286	13.9259	1.455	1.99	38.8411	14.1589	1.565
1.89	39.1881	13.9453	1.464	2	38.8045	14.1798	1.576
1.9	39.1513	13.9654	1.474				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of HEAD SAR

HEAD SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
661	1880.0	GSM	Left	Fixed	Cheek	0	**0.661**
661	1880.0	GSM	Left	Fixed	Tilt	0	**0.164**
661	1880.0	GSM	Right	Fixed	Cheek	0	**0.430**
661	1880.0	GSM	Right	Fixed	Tilt	0	**0.145**
Step.2 VOIP mode (GPRS)							
661	1880.0	GPRS 1 slot	Left	Fixed	Cheek	0	**0.581**

8.4 PCS1900MHz Body SAR

(1)Method of measurement

<Body (Hotspot mode)>

Step1. The searching for the worst position
The test was performed in middle channel.

Step2. The changing to the channels (Low, High)
The test was performed at the worst condition of Step1.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
18-Dec	24	37	MSL 1800	23.0	1880	εr	53.3	51.1	-4.1	+/-5
						σ [mho/m]	1.52	1.56	2.6	+/-5

εr: Relative Permittivity / σ : Coductivity

*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
1.8	51.4112	14.7545	1.475	1.91	51.0292	14.9774	1.589
1.81	51.3862	14.7759	1.486	1.92	51.0163	15.0076	1.601
1.82	51.3457	14.8003	1.496	1.93	51.0038	15.0298	1.612
1.83	51.3077	14.8139	1.506	1.94	50.9856	15.0452	1.622
1.84	51.2593	14.82	1.515	1.95	50.9579	15.0556	1.631
1.85	51.2087	14.8308	1.524	1.96	50.9222	15.0597	1.640
1.86	51.1632	14.8443	1.534	1.97	50.8816	15.0693	1.649
1.87	51.1212	14.8633	1.544	1.98	50.8444	15.0858	1.659
1.88	51.0871	14.8857	1.555	1.99	50.8073	15.1116	1.671
1.89	51.061	14.9188	1.566	2	50.7745	15.1422	1.682
1.9	51.0456	14.9507	1.578				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of Body SAR

BODY SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
661	1880.0	GPRS 1slots	Flat	Fixed	Front	10	**0.766**
661	1880.0	GPRS 1slots	Flat	Fixed	Rear	10	**1.04**
661	1880.0	GPRS 1slots	Flat	Fixed	Left edge	10	**0.079**
661	1880.0	GPRS 1slots	Flat	Fixed	Right edge	10	**0.169**
661	1880.0	GPRS 1slots	Flat	Fixed	Bottom edge	10	**0.858**
Step.2 Channel change (SAR level in Step.1 > 0.8 w/kg)							
512	1850.2	GPRS 1slots	Flat	Fixed	Rear	10	**1.06**
512	1850.2	GPRS 1slots	Flat	Fixed	Bottom edge	10	**0.818**
810	1909.8	GPRS 1slots	Flat	Fixed	Rear	10	**1.05**
810	1909.8	GPRS 1slots	Flat	Fixed	Bottom edge	10	**0.771**

8.5 WCDMA Band V HEAD SAR

(1)Method of measurement

Step1. The searching for the worst position
The test was performed in middle channel.

Note:
1) The SAR is not required for handset with AMR mode because the maximum average output power with AMR is less than 1/4dB higher than that measured using 12.2kbps RMC.
2)The other channel was not required since middle channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
20-Dec	24	43	HSL900	23.5	835	εr	41.5	42.1	1.4	+/-5
						σ [mho/m]	0.90	0.89	-1.1	+/-5

εr: Relative Permittivity / σ : Coductivity
*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
0.735	43.4728	19.4716	0.795	0.845	41.9812	19.1716	0.900
0.745	43.3741	19.4948	0.807	0.855	41.8763	19.1843	0.911
0.755	43.2982	19.5009	0.818	0.865	41.7803	19.1985	0.923
0.765	43.1631	19.4691	0.827	0.875	41.692	19.2019	0.933
0.775	43.01	19.4118	0.836	0.885	41.5715	19.1976	0.944
0.785	42.8561	19.3262	0.843	0.895	41.4321	19.1535	0.952
0.795	42.7196	19.2327	0.849	0.905	41.2869	19.0814	0.959
0.805	42.5828	19.1911	0.858	0.915	41.1404	18.9953	0.966
0.815	42.416	19.1866	0.869	0.925	41.0131	18.9312	0.973
0.825	42.2505	19.1735	0.879	0.935	40.88	18.8887	0.981
0.835	42.1003	19.1665	0.889				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of HEAD SAR

HEAD SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
4183	836.6	12.2k RMC	Left	Fixed	Cheek	0	**0.372**
4183	836.6	12.2k RMC	Left	Fixed	Tilt	0	**0.279**
4183	836.6	12.2k RMC	Right	Fixed	Cheek	0	**0.466**
4183	836.6	12.2k RMC	Right	Fixed	Tilt	0	**0.312**

8.6 WCDMA Band V Body SAR

(1)Method of measurement

<Body (Hotspot mode)>

Step1. The searching for the worst position

The test was performed in mode of the maximum output power.

Note:

1)The other channel was not required since middle channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
20-Dec	24	43	MSL 900	23.5	835	εr	55.2	53.0	-4.0	+/-5
						σ [mho/m]	0.97	0.99	2.1	+/-5

εr: Relative Permittivity / σ : Coductivity

*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
0.735	54.1409	20.7398	0.847	0.845	52.9261	20.9655	0.984
0.745	53.9299	20.5709	0.851	0.855	52.8271	20.5886	0.978
0.755	53.7496	20.5938	0.864	0.865	52.723	20.3373	0.977
0.765	53.6015	20.7746	0.883	0.875	52.5664	20.242	0.984
0.775	53.4906	21.0846	0.908	0.885	52.3881	20.2546	0.996
0.785	53.403	21.4385	0.935	0.895	52.2295	20.352	1.012
0.795	53.3222	21.7433	0.960	0.905	52.1332	20.5157	1.031
0.805	53.2445	21.9142	0.980	0.915	52.0708	20.696	1.052
0.815	53.1632	21.9071	0.992	0.925	52.0541	20.816	1.070
0.825	53.0788	21.7111	0.995	0.935	52.1078	20.8645	1.084
0.835	53.004	21.3647	0.991				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of Body SAR

BODY SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
4183	836.6	12.2k RMC	Flat	Fixed	Front	10	**0.593**
4183	836.6	12.2k RMC	Flat	Fixed	Rear	10	**0.610**
4183	836.6	12.2k RMC	Flat	Fixed	Left edge	10	**0.383**
4183	836.6	12.2k RMC	Flat	Fixed	Right edge	10	**0.353**
4183	836.6	12.2k RMC	Flat	Fixed	Bottom edge	10	**0.093**

8.7 WLAN HEAD SAR

(1)Method of measurement

Step1. The searching for the worst position

The test was performed in mode of the maximum average output power.

Note:

1) The SAR is not required for 11g/n mode because the maximum average output power for 11g/n mode is less than 1/4dB higher than that measured 11b mode.
2) The other channel was not required since maximum average output power channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
21-Dec	24	38	HSL 2450	23.5	2412	εr	39.2	38.5	-1.8	+/-5
						σ [mho/m]	1.80	1.82	1.1	+/-5

εr: Relative Permittivity / σ : Coductivity

*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
2.35	38.7445	13.413	1.751	2.46	38.2177	13.7032	1.873
2.36	38.7424	13.4826	1.768	2.47	38.2044	13.7752	1.890
2.37	38.7331	13.5396	1.783	2.48	38.2029	13.8456	1.908
2.38	38.7084	13.5804	1.796	2.49	38.2058	13.9105	1.924
2.39	38.6672	13.5967	1.805	2.5	38.2019	13.958	1.939
2.4	38.6057	13.5997	1.813	2.51	38.1821	13.9807	1.950
2.41	38.5295	13.588	1.819	2.52	38.1419	13.978	1.957
2.42	38.4506	13.5799	1.826	2.53	38.0797	13.9608	1.962
2.43	38.3724	13.5791	1.833	2.54	38.0031	13.9405	1.967
2.44	38.3035	13.5983	1.843	2.55	37.9248	13.9251	1.973
2.45	38.2517	13.6424	1.857				

σ [mho/m]=e"* frequency[GHz]/18

(3)Result of HEAD SAR

HEAD SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
6	2437	11b 1Mbps	Left	Fixed	Cheek	0	**0.063**
6	2437	11b 1Mbps	Left	Fixed	Tilt	0	**0.014**
6	2437	11b 1Mbps	Right	Fixed	Cheek	0	**0.111**
6	2437	11b 1Mbps	Right	Fixed	Tilt	0	**0.044**

8.8 WLAN Body SAR

(1)Method of measurement

Step1. The searching for the worst position

The test was performed in mode of the maximum average output power

Note:

1) The BODY SAR is not required for 11g/n mode because the maximum average output power for 11g/n mode is less than 1/4dB higher than that measured 11b mode.
2) The other channel was not required since maximum average output power channel SAR value is less than 0.8W/kg.

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070D dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS										
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value*1	Measured	Deviation [%]	Limit [%]
21-Dec	24	44	MSL 2450	23.5	2412	εr	52.7	50.9	-3.4	+/-5
						σ [mho/m]	1.95	2.00	2.6	+/-5

εr: Relative Permittivity / σ : Coductivity

*1 The Target value is a parameter defined in FCC OET65.

frequency [GHz]	e'	e"	σ [mho/m]	frequency [GHz]	e'	e"	σ [mho/m]
2.35	51.1242	14.4705	1.889	2.46	50.7493	14.916	2.039
2.36	51.0757	14.4911	1.900	2.47	50.656	14.9507	2.052
2.37	51.0412	14.5534	1.916	2.48	50.563	14.9984	2.066
2.38	50.9948	14.6455	1.936	2.49	50.5046	15.0652	2.084
2.39	50.9519	14.7523	1.959	2.5	50.4828	15.1461	2.104
2.4	50.9287	14.8441	1.979	2.51	50.4955	15.2329	2.124
2.41	50.9258	14.8958	1.994	2.52	50.5155	15.2992	2.142
2.42	50.9289	14.919	2.006	2.53	50.5294	15.3406	2.156
2.43	50.905	14.9179	2.014	2.54	50.5317	15.3507	2.166
2.44	50.871	14.9087	2.021	2.55	50.5235	15.3427	2.174
2.45	50.8257	14.9065	2.029				

σ [mho/m]=e"* frequency[GHz]/18

3)Result of Body SAR

BODY SAR MEASUREMENT RESULTS							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step.1 Position searching							
1	2412	11b 1Mbps	Flat	Fixed	Front	10	**0.015**
1	2412	11b 1Mbps	Flat	Fixed	Rear	10	**0.013**
1	2412	11b 1Mbps	Flat	Fixed	Right edge	10	**0.012**
1	2412	11b 1Mbps	Flat	Fixed	Top edge	10	**0.00214**

8.9 Simultaneous transmission evaluation for HEAD

Result of SUM ΣSAR1g

SUM ΣSAR1g (WWAN +WLAN(2.4G))				
Position	Separation [mm]	Stand alone worst SAR(1g) [W/kg]		SUM SAR(1g)[W/kg]
		GSM850 Band	WLAN 2.4G	WWAN + WLAN(2.4G)
Right cheek	0	0.436	0.111	0.547
	[mm]	PCS1900 Band	WLAN 2.4G	WWAN + WLAN(2.4G)
Left cheek	0	0.661	0.063	0.724
	[mm]	WCDMA band	WLAN 2.4G	WWAN + WLAN(2.4G)
Right cheek	0	0.466	0.111	0.577

: Highest SUM ΣSAR1g Head simultaneous transmission

8.10 Simultaneous transmission evaluation for Body

Result of SUM ΣSAR1g

SUM ΣSAR1g (WWAN+WLAN(2.4G))				
Position	Separation [mm]	Stand alone SAR(1g) [W/kg]		SUM SAR(1g)[W/kg]
		GSM850 Band	WLAN 2.4G	WWAN + WLAN(2.4G)
Front	10	0.527	0.015	0.542
Rear	10	0.720	0.013	0.733
Left edge	10	0.316	-*1	0.316
Right edge	10	0.319	0.012	0.331
Top edge	10	-*1	0.00214	0.002
Bottom edge	10	0.074	-*1	0.074
Position	Separation	PCS1900 Band	WLAN 2.4G	WWAN + WLAN(2.4G)
Front	10	0.766	0.015	0.781
Rear	10	1.060	0.013	1.073
Left edge	10	0.079	-*1	0.079
Right edge	10	0.169	0.012	0.181
Top edge	10	-*1	0.00214	0.002
Bottom edge	10	0.858	-*1	0.858
Position	Separation	WCDMA Band	WLAN 2.4G	WWAN + WLAN(2.4G)
Front	10	0.593	0.015	0.608
Rear	10	0.610	0.013	0.623
Left edge	10	0.383	-*1	0.383
Right edge	10	0.353	0.012	0.365
Top edge	10	-*1	0.00214	0.002
Bottom edge	10	0.093	-*1	0.093

: Highest SUM ΣSAR1g Body simultaneous transmission

*1: This position was excluded in stand-alone SAR,

SECTION 9 Test instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MURC-02	Wireless Communication Test Set	Agilent	E5515C	GB47050683	Power , SAR	2011/11/26 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0825002	Power	2011/08/09 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738285	Power	2011/08/09 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	Power	2011/03/14 * 12
MAT-20	Attenuator(10dB)(above1GHz)	Agilent	8493C	71389	Power	2011/06/23 * 12
MCC-98	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	30819/2	Power	2011/05/27 * 12
MPSC-01	Power splitters/Combiners	Mini-Circuit	ZFSC-2-2500	0124	Power	2011/09/27 * 12
MPM-01	Power Meter	Agilent	E4417A	GB41290639	SAR	2011/02/01 * 12
MPSE-01	Power Sensor	Agilent	E9300B	US40010300	SAR	2011/01/28 * 12
MPSE-03	Power sensor	Agilent	E9327A	US40440576	SAR	2011/02/02 * 12
MAT-15	Attenuator(30dB)	Agilent	8498A	US40010300	SAR	2011/02/16 * 12
MSG-10	Signal Generator	Agilent	N5181A	MY47421098	SAR	2011/09/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	SAR	2011/03/10 * 12
MHDC-11	Dual Directional Coupler	Hewlett Packard	778D	16605	SAR	Pre Check
MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	SAR	Pre Check
MNA-01	Network Analyzer	Agilent/HP	E8358A	US41080381	SAR	2011/08/22 * 12
MDPK-01	Dielectric probe kit	Agilent	85070D	702	SAR	2010/10/25 * 36
MNCK-01	Type N Calibration Kit	Agilent	85032F	MY41495257	SAR	2011/08/12 * 12
MRENT-82	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3540	SAR	2011/07/21 * 12
MDAE-01	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	509	SAR	2011/07/20 * 12
COTS-MSAR-03	Dasy5	Schmid&Partner Engineering AG	DASY52.6.1.408	-	SAR	-
COTS-MSAR-02	S-Parameter Network Analyzer	Agilent	-	-	SAR	-
MDA-05	Dipole Antenna	Schmid&Partner Engineering AG	D900V2	155	SAR	2010/12/06 * 36
MDA-06	Dipole Antenna	Schmid&Partner Engineering AG	D1800V2	2d040	SAR	2010/12/09 * 36
MDA-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	SAR	2010/09/13 * 36
MPSAM-02	SAM Phantom	Schmid&Partner Engineering AG	SAM Twin Phantom V4.0	1333	SAR	2011/04/01 * 12
MDH-01	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	SAR	Pre Check
MOS-26	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q29	SAR	2011/05/26 * 12
MOS-10	Digtal thermometer	HANNA	Checktemp-2	MOS-10	SAR	2011/08/22 * 12
MBM-13	Barometer	Sunoh	SBR121	837	SAR	2011/03/14 * 36
HSL/MSL900				Daily check Target value ± 5%		
HSL/MSL1800				Daily check Target value ± 5%		
HSL/MSL2450				Daily check Target value ± 5%		
SAR room				Daily check Ambient Noise<0.012W/kg		

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.