SAR TEST REPORT

Test Report No. : 32AE0094-HO-A-R1

Applicant	:	**SAMSUNG ELECTRONICS CO., LTD.**
Type of Equipment	:	**850/1900 GSM/GPRS, EDGE Rx only , 850/1900WCDMA with Bluetooth and WLAN Phone**
Model No.	:	**GT-S5360L**
FCC ID	:	**A3LGTS5360L**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C (Edition 01-01)**
Test Result	:	**Complied**

FCC Part 22H	Head	: 0.751W/kg
	Body-hotspot /Body-worn	: 0.887W/kg (10mm distance)
FCC Part 24E	Head	: 0.997W/kg
	Body-hotspot /Body-worn	: 1.03W/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.
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6. This report is a revised version of 32AE0094-HO-A. 32AE0094-HO-A is replaced with this report.

Date of test: August 9 to 12, 2011

Representative test engineer:

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

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SECTION 1: Customer information

Company Name	SAMSUNG ELECTRONICS CO., LTD.
Address	416, MAETAN 3-DONG, YEONGTONG-GU SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

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

2.1 Identification of E.U.T.

Type of EUT	850/1900 GSM/GPRS, EDGE Rx only , 850/1900WCDMA with Bluetooth and WLAN Phone
Model No.	GT-S5360L
Serial No.	FI 192 A
Rating	Li-ion Battery (M/N;EB454357VU) DC3.7V/ 1200mAh
Option Battery	N/A
Body-worn Accessory	Ear phone (typical)
Device category	Portable
Antenna to antenna separation distance	8.2cm 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

2.2 Product description

Radio Specification

GSM

Equipment Type	Transceiver
Frequency of Operation	[Up Link] GSM850: 824 – 849MHz PCS1900: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS1900: 1930 – 1990MHz
Type of Modulation	GSM/GPRS (GMSK) , EGPRS(8PSK) RX only
Mobile phone capability	Class B
Multi slots class	Class 12

W-CDMA

Equipment Type	Transceiver
Frequency of Operation	[Up Link] 850 Band V: 824 – 849MHz 1900 Band II: 1850 – 1910MHz [Down Link] 850 Band V: 869 – 894MHz 1900 Band II: 1930 – 1990MHz
Type of Modulation	QPSK (UP link)
Category for HSDPA	Category 7
Category for HSUPA	N/A

WLAN (IEEE802.11b/g/n-20)

Equipment Type	Transceiver
Mode	IEEE802.11b/g/n HT20
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM

Bluetooth

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS

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 1/2 *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

Mode	1g Head SAR [W/kg]	1g Body/Body-wornSAR [W/kg]
GSM850	0.751	0.887
PCS1900	0.730	0.841
W-CDMA Band V	0.488	0.558
W-CDMA Band II	0.997	1.03
WLAN	0.315	0.280
Bluetooth	Exemption	Exemption

*For the WLAN, refer to report number 32AE0094-HO-C-R1.

4.2 Simultaneous transmission SAR result

<Simultaneous Procedure>

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

a) WWAN + WLAN
b) WWAN + Bluetooth

a)WWAN + WLAN
Simultaneous transmitter evaluation based on the KDB648474.
Step1. WWAN antenna is >5cm form 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
Max. ∑1gSAR Measured (WWAN + WLAN) :1312 W/kg
Step6. No simultaneous transmission.

Head SAR				
Test Position	Worst Band	Worst SAR(WWAN)	Worst SAR(WLAN)	∑ 1-g SAR (W/kg)
Left Touch	WCDMA Band II	0.997	0.315	1.312
Body/Body-worn SAR				
Test Position	Worst Band	Worst SAR(WWAN)	Worst SAR(WLAN)	∑ 1-g SAR (W/kg)
Back 10mm	WCDMA Bnad II	1.03	0.280	1.310

*For the simultaneous transmission, the combination of other mode also satisfies the limit value enough.

b)WWAN + Bluetooth
Simultaneous transmitter evaluation based on the KDB648474.
Step1. WWAN antenna is >5cm form Bluetooth antenna
Step2. Bluetooth power < 2Pref (=60/f $_{[GHz]}$).
Refer to the FCC15.247 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

Mode	Duty cycle or Multi class(GSM)	Test Frequency	Modulation
GSM850	Multi class 12	824.2MHz (128ch) 836.6MHz(190ch) 848.8MHz(251ch)	GSM GPRS (CS-1)
PCS1900	Multi class 12	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
WCDMA II	100%	1852.4MHz(9262ch) 1880.0MHz(9400ch) 1907.6MHz(9538ch)	
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			

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 leve >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

1.The GPRS 2up mode was maximum time-based average power. The other slots 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 GPRS 2up mode.

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	-2.03	23.30	1.41	22.68	26.79	5.40	32.19
			190	836.6	-2.16	23.30	1.41	22.55	26.41	5.40	31.81
			251	848.8	-2.05	23.30	1.41	22.66	26.63	5.40	32.03
GPRS (CS1)	1slot	8.3	128	824.2	-2.25	23.30	1.41	22.46	25.28	5.40	30.68
			190	836.6	-2.45	23.30	1.41	22.26	24.88	5.40	30.28
			251	848.8	-2.28	23.30	1.41	22.43	25.09	5.40	30.49
	2slots	4.2	128	824.2	-0.64	23.30	1.41	24.07	23.31	5.40	28.71
			190	836.6	-0.94	23.30	1.41	23.77	24.88	5.40	30.28
			251	848.8	-0.66	23.30	1.41	24.05	25.09	5.40	30.49
	3slots	2.8	128	824.2	-0.82	23.30	1.41	23.89	23.31	5.40	28.71
			190	836.6	-1.15	23.30	1.41	23.56	22.91	5.40	28.31
			251	848.8	-0.97	23.30	1.41	23.74	23.04	5.40	28.44
	4slots	2.1	128	824.2	-1.53	23.30	1.41	23.18	21.28	5.40	26.68
			190	836.6	-1.75	23.30	1.41	22.96	20.89	5.40	26.29
			251	848.8	-1.78	23.30	1.41	22.93	20.92	5.40	26.32

Time based AVG Results = P/M Reading + Atten.Loss + Cable Loss
Slotted AVG Results = Agilent Reading + Cable Loss
:Maximum time based AVG power mode

2) PCS1900

1.The GPRS 2up mode was maximum time-based average power. The other slots 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 GPRS 2up mode.

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	-5.36	23.34	2.21	20.19	23.07	6.43	29.50
			661	1880.0	-5.49	23.34	2.21	20.06	22.48	6.43	28.91
			810	1909.8	-5.21	23.34	2.21	20.34	23.11	6.43	29.54
GPRS (CS1)	1slot	8.3	512	1850.2	-5.52	23.34	2.21	20.03	23.10	6.43	29.53
			661	1880.0	-5.90	23.34	2.21	19.65	22.52	6.43	28.95
			810	1909.8	-5.45	23.34	2.21	20.10	23.13	6.43	29.56
	2slots	4.2	512	1850.2	-3.83	23.34	2.21	21.72	21.62	6.43	28.05
			661	1880.0	-4.42	23.34	2.21	21.13	21.00	6.43	27.43
			810	1909.8	-3.77	23.34	2.21	21.78	21.64	6.43	28.07
	3slots	2.8	512	1850.2	-4.08	23.34	2.21	21.47	19.60	6.43	26.03
			661	1880.0	-4.62	23.34	2.21	20.93	19.02	6.43	25.45
			810	1909.8	-3.99	23.34	2.21	21.56	19.62	6.43	26.05
	4slots	2.1	512	1850.2	-4.87	23.34	2.21	20.68	17.57	6.43	24.00
			661	1880.0	-5.42	23.34	2.21	20.13	17.01	6.43	23.44
			810	1909.8	-4.73	23.34	2.21	20.82	17.63	6.43	24.06

Time based AVG Results = P/M Reading + Atten.Loss + Cable Loss
Slotted AVG Results = Agilent Reading + Cable Loss
:Maximum time based AVG power mode

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	16.78	5.40	22.18
	4183	836.6	16.76	5.40	22.16
	4233	846.6	16.72	5.40	22.12
RMC 12.2kbps	4132	826.4	16.79	5.40	22.19
	4183	836.6	16.76	5.40	22.16
	4233	846.6	16.72	5.40	22.12
HSDPA Subtest1	4132	826.4	16.76	5.40	22.16
	4183	836.6	16.71	5.40	22.11
	4233	846.6	16.67	5.40	22.07
HSDPA Subtest2	4132	826.4	16.72	5.40	22.12
	4183	836.6	16.70	5.40	22.10
	4233	846.6	16.54	5.40	21.94
HSDPA Subtest3	4132	826.4	16.26	5.40	21.66
	4183	836.6	16.20	5.40	21.60
	4233	846.6	16.15	5.40	21.55
HSDPA Subtest4	4132	826.4	16.14	5.40	21.54
	4183	836.6	15.94	5.40	21.34
	4233	846.6	15.91	5.40	21.31

Results = Reading + Loss

: Maximum power

4) WCDMA II (Power class 3)

Note:

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 IIband (Power Class 3)					
Mode	Ch	Frequency [MHz]	Reading AVG [dBm]	Cable [dB]	Result [dBm]
AMR	9262	1852.4	15.60	6.43	22.03
	9400	1880.0	15.80	6.43	22.23
	9538	1907.6	15.70	6.43	22.13
RMC 12.2kbps	9262	1852.4	15.90	6.43	22.33
	9400	1880.0	15.91	6.43	22.34
	9538	1907.6	16.03	6.43	22.46
HSDPA Subtest1	9262	1852.4	15.79	6.43	22.22
	9400	1880.0	15.79	6.43	22.22
	9538	1907.6	16.03	6.43	22.46
HSDPA Subtest2	9262	1852.4	15.76	6.43	22.19
	9400	1880.0	15.74	6.43	22.17
	9538	1907.6	15.97	6.43	22.40
HSDPA Subtest3	9262	1852.4	15.62	6.43	22.05
	9400	1880.0	15.59	6.43	22.02
	9538	1907.6	15.78	6.43	22.21
HSDPA Subtest4	9262	1852.4	15.40	6.43	21.83
	9400	1880.0	15.38	6.43	21.81
	9538	1907.6	15.55	6.43	21.98

Results = Reading + Loss

: Maximum power mode

5.3 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.

SECTION6 : Description of the Head/Body-Worn/Body 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(Worst mode in Data transmission)**
WCDMA V/II	**12.2k RMC**

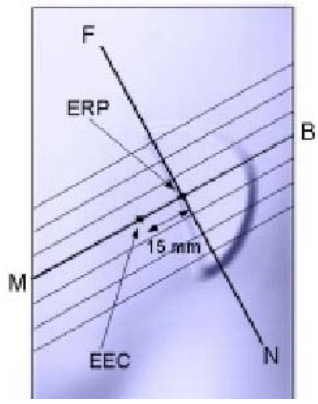
iii)Test position

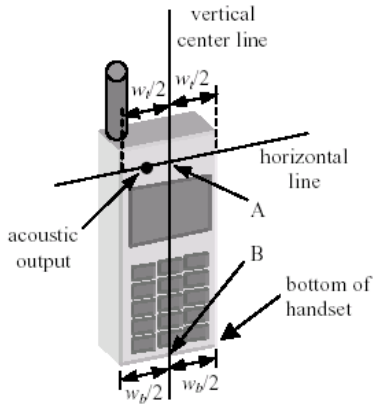
(1) Left cheek
(2) Left tilt
(3) Right cheek
(4) Right tilt

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".





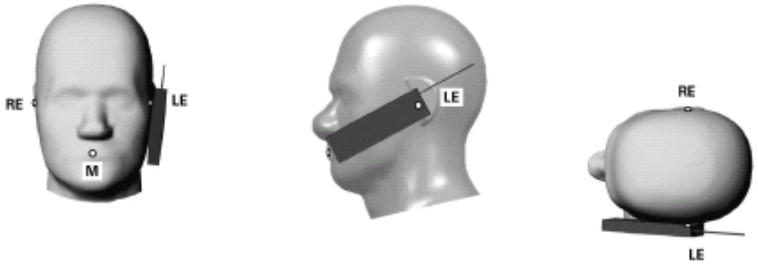
Cheek position

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:

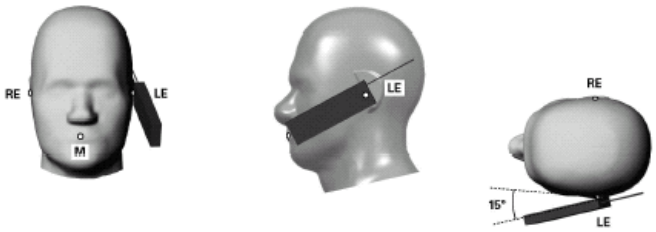
i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

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.

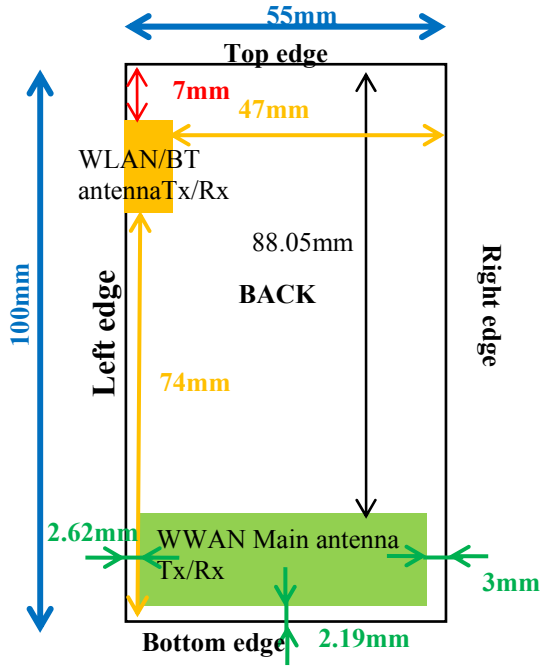
6.2 Description of the Body/Body-worn setup

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):100x55x12

ii)Test mode

GSM850/PCS1900	**Mobile hotspot** **Data transmission mode (GPRS)/ Voice mode (GSM)**
WCDMA V/II	**Mobile hotspot** **Data transmission mode (12.2kRMC)**



Position	WWAN
Front	Tested
Back	Tested
Left edge	Tested
Right edge	Tested
Top edge	Not required
Bottom edge	Tested

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) Back (10mm) :
The measurement separated 10mm distance between the back 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) Bottom edge (10mm) :
The measurement separated 10mm distance between the bottom edge of EUT and flat section of SAM Twin Phantom.

<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.

SECTION 7 : Test surrounding

7.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY5 measurement system according to the SPEAG documents[2] 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	47
Device holder uncertainty	±3.6	Normal	1	1	±3.6	8
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.)	-3.1	Rectangular	1	0.64	±2.0	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	-3.1	Rectangular	1	0.6	±1.9	∞
Combined Standard Uncertainty					**±12.885**	
Expanded Uncertainty (k=2)					**±25.8**	

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 GPRS 2up mode was maximum based time average power. The power of other mode was lower than GPRS 2up mode.
2)The other channel was not required since middle channel SAR vale 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 [%]
9-Aug	24.7	55	HSL900	24.7	835	εr	41.5	41.6	0.2	+/-5
						σ [mho/m]	0.90	0.88	-2.2	+/-5

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

(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	**0.621**
190	836.6	GSM	Left	Fixed	Tilt	0	**0.263**
190	836.6	GSM	Right	Fixed	Cheek	0	**0.469**
190	836.6	GSM	Right	Fixed	Tilt	0	**0.236**
Step.2 VOIP mode (GPRS)							
190	836.6	GPRS 2slots	Left	Fixed	Cheek	0	**0.751**

8.2 GSM 850MHz Body/Body-worn 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.
Step2. The changing to the voice mode (GSM)
The test was performed at the worst condition of Step1.
Step3. The changing to the channels (Low,High)
The test was performed at the worst condition of Step1 to Step2.

Note:
1) The GPRS 2up mode was maximum based time average power.The power of other mode was lower than GPRS 2up mode.

(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 [%]
12-Aug	24.8	52	MSL 900	24.5	835	εr	55.2	53.5	-3.1	+/-5
						σ [mho/m]	0.97	0.94	-3.1	+/-5

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

(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 2slots	Flat	Fixed	Front	10	**0.565**
190	836.6	GPRS 2slots	Flat	Fixed	Back	10	**0.887**
190	836.6	GPRS 2slots	Flat	Fixed	Left edge	10	**0.267**
190	836.6	GPRS 2slots	Flat	Fixed	Right edge	10	**0.386**
190	836.6	GPRS 2slots	Flat	Fixed	Bottom edge	10	**0.126**
Step.2 Voice mode (GSM)							
190	836.6	GSM	Flat	Fixed	Back	10	**0.614**
Step.3 Channel change (SAR level in Step.1 > 0.8 w/kg)							
128	824.2	GPRS 2slots	Flat	Fixed	Back	10	**0.858**
251	848.8	GPRS 2slots	Flat	Fixed	Back	10	**0.845**

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 GPRS 2up mode was maximum based time average power. The power of other mode was lower than GPRS 2up mode.
2)The other channel was not required since middle channel SAR vale 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 [%]
10-Aug	24.9	51	HSL 1800	24.8	1880	εr	40.0	40.4	1.0	+/-5
						σ [mho/m]	1.40	1.38	-1.4	+/-5

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

(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	**0.526**
661	1880.0	GSM	Left	Fixed	Tilt	0	**0.154**
661	1880.0	GSM	Right	Fixed	Cheek	0	**0.484**
661	1880.0	GSM	Right	Fixed	Tilt	0	**0.191**
Step.2 VOIP mode (GPRS)							
661	1880.0	GPRS 2 slots	Left	Fixed	Cheek	0	**0.730**

8.4 PCS1900MHz Body/Body-worn 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.

Step2. The changing to the voice mode (GSM)
The test was performed at the worst condition of Step1.

Step3. The changing to the channels (Low, High)
The test was performed at the worst condition of Step1 to Step2.

Note:
1)The GPRS 2up mode was maximum based time average power. The power of other mode was lower than GPRS 2up mode.

(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 [%]
11-Aug	25	48	MSL 1800	24.8	1880	εr	53.3	52.6	-1.3	+/-5
						σ [mho/m]	1.52	1.49	-2.0	+/-5

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

(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 2slots	Flat	Fixed	Front	10	**0.371**
661	1880.0	GPRS 2slots	Flat	Fixed	Back	10	**0.829**
661	1880.0	GPRS 2slots	Flat	Fixed	Left edge	10	**0.065**
661	1880.0	GPRS 2slots	Flat	Fixed	Right edge	10	**0.095**
661	1880.0	GPRS 2slots	Flat	Fixed	Bottom edge	10	**0.588**
Step.2 Voice mode (GSM)							
661	1880.0	GSM	Flat	Fixed	Back	10	**0.735**
Step.3 Channel change (SAR level in Step.1 > 0.8 w/kg)							
512	1850.2	GPRS 2slots	Flat	Fixed	Back	10	**0.841**
810	1909.8	GPRS 2slots	Flat	Fixed	Back	10	**0.830**

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 AMR mode because the maximum average output power for AMR mode is less than 1/4dB higher than that measured 12.2k RMC mode.
2)The other channel was not required since middle channel SAR vale 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 [%]
9-Aug	24.7	55	HSL900	24.7	835	εr	41.5	41.6	0.2	+/-5
						σ [mho/m]	0.90	0.88	-2.2	+/-5

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

(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	**0.488**
4183	836.6	12.2k RMC	Left	Fixed	Tilt	0	**0.212**
4183	836.6	12.2k RMC	Right	Fixed	Cheek	0	**0.386**
4183	836.6	12.2k RMC	Right	Fixed	Tilt	0	**0.203**

8.6 WCDMA Band V Body/Body-worn 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 BODY SAR is not required for HSDPA mode because the maximum average output power for HSDPA mode is less than 1/4dB higher than that measured 12.2k RMC mode.

2)The other channel was not required since middle channel SAR vale 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 [%]
12-Aug	24.8	52	MSL 900	24.5	835	εr	55.2	53.5	-3.1	+/-5
						σ [mho/m]	0.97	0.94	-3.1	+/-5

εr: Relative Permittivity / σ : Coductivity

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

(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	**0.367**
4183	836.6	12.2k RMC	Flat	Fixed	Back	10	**0.558**
4183	836.6	12.2k RMC	Flat	Fixed	Left edge	10	**0.160**
4183	836.6	12.2k RMC	Flat	Fixed	Right edge	10	**0.213**
4183	836.6	12.2k RMC	Flat	Fixed	Bottom edge	10	**0.087**

8.7 WCDMA Band II 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 channels (Low, High)
The test was performed at the worst condition of from Step1.

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

(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 [%]
10-Aug	24.9	51	HSL 1800	24.8	1880	εr	40.0	40.4	1.0	+/-5
						σ [mho/m]	1.40	1.38	-1.4	+/-5

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

(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							
9400	1880.0	12.2k RMC	Left	Fixed	Cheek	0	**0.997**
9400	1880.0	12.2k RMC	Left	Fixed	Tilt	0	**0.310**
9400	1880.0	12.2k RMC	Right	Fixed	Cheek	0	**0.785**
9400	1880.0	12.2k RMC	Right	Fixed	Tilt	0	**0.339**
Step.2 Channel change (If SAR level in Step.1 > 0.8 w/kg)							
9262	1852.4	12.2k RMC	Left	Fixed	Cheek	0	**0.881**
9538	1907.6	12.2k RMC	Left	Fixed	Cheek	0	**0.943**

8.8 WCDMA Band II Body/Body-worn 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.

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

Note:
1)The BODY SAR is not required for HSDPA mode because the maximum average output power for HSDPA mode is less than 1/4dB higher than that measured 12.2k RMC mode.

(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 [%]
11-Aug	25.0	48	MSL 1800	24.8	1880	εr	53.3	52.6	-1.3	+/-5
						σ [mho/m]	1.52	1.49	-2.0	+/-5

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

(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							
9400	1880.0	12.2k RMC	Flat	Fixed	Front	10	**0.447**
9400	1880.0	12.2k RMC	Flat	Fixed	Back	10	**1.03**
9400	1880.0	12.2k RMC	Flat	Fixed	Left edge	10	**0.164**
9400	1880.0	12.2k RMC	Flat	Fixed	Right edge	10	**0.110**
9400	1880.0	12.2k RMC	Flat	Fixed	Bottom edge	10	**0.695**
Step.2 Channel change (If SAR level in Step.1 > 0.8 w/kg)							
9262	1852.4	12.2k RMC	Flat	Fixed	Back	10	**0.976**
9538	1907.6	12.2k RMC	Flat	Fixed	Back	10	**0.970**

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 measurement SAR	2009/10/20 * 36
MCC-116	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	290221/4	Power measurement	2010/08/05 * 12
MAT-24	Attenuator(10dB)(above1 GHz)	Agilent	8493C	71389	Power measurement	2011/06/23 * 12
MAT-25	Attenuator(10dB)(above1 GHz)	Agilent	8493C	71642	Power measurement	2011/06/23 * 12
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	52258	Power measurement	2011/03/17 * 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	2010/09/08 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	SAR	2011/03/10 * 12
MHDC-11	Dual Directional Coupler	Hewlett Packard	778D	16605		Pre Check
MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	SAR	Pre Check
MNA-01	Network Analyzer	Agilent/HP	E8358A	US41080381	SAR	2010/08/19 * 12
MDPK-01	Dielectric probe kit	Agilent	85070D	702	SAR	2010/10/25 * 36
MNCK-01	Type N Calibration Kit	Agilent	85032F	MY41495257	SAR	2010/08/10 * 12
MPB-03	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV3	3507	SAR	2011/03/16 * 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
MPS-01	SAM Phantom	Schmid&Partner Engineering AG	SAM Twin Phantom V4.0	1196	SAR	Pre Check
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%	
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.