SAR TEST REPORT

Test Report No. : 32BE0278-HO-I-R2

Applicant	:	**SAMSUNG ELECTRONICS CO., LTD.**
Type of Equipment	:	**Cellular/PCS GSM/GPRS/EDGE, Tablet with 802.11abgn, BT3.0**
Model No.	:	**SC-02D**
FCC ID	:	**A3LSWDSC02D**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C (Edition 01-01)**
Test Result	:	**Complied** **FCC Part 15.247** Body : 0.698W/kg (2.4GHz) **FCC Part 15.407** Body: : 0.982W/kg (5.3GHz)

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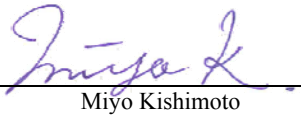
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6 This report is a revised version of 32BE0278-HO-I. 32BE0278-HO-I is replaced with this report.

Date of test: October 19 to 20, November 8 to 9, 2011

Representative test engineer:



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Leader of WiSE Japan
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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	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	Cellular/PCS GSM/GPRS/EDGE, Tablet with 802.11abgn, BT3.0
Model No.	SC-02D
Serial No.	358857/04/000986/3
Rating	DC 4.0V
Option Battery	N/A
Body-worn Accessory	N/A
Device category	Portable
Antenna to antenna separation distance	108.2mm from WWAN antenna to WLAN antenna 57.35mm from WWAN antenna to BT antenna 138mm from WLAN antenna to Bluetooth antenna
Simultaneous transmission	WWAN can transmit simultaneously with WLAN WWAN can transmit simultaneously with Bluetooth WLAN can transmit simultaneously with Bluetooth
Size of EUT	19.36cm x 12.235cm (Diagonal dimension :22cm)

2.2 Product description

Radio Specification

Bluetooth

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Type	PIFA
Antenna Gain	-0.63 dBi

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

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz
Type of Modulation	DSSS, OFDM	OFDM
Bandwidth & Channel spacing	20MHz & 5MHz	20MHz & 20MHz
Antenna Type	SEMI-PIFA	
Antenna Gain	2.4G: -0.4dBi	5G: -3.8dBi

WLAN (IEEE802.11n-40)

Equipment Type	Transceiver
Frequency of Operation	5190-5230MHz 5270-5310MHz 5510-5670MHz 5755-5795MHz
Type of Modulation	OFDM
Bandwidth & Channel spacing	40MHz & 40MHz
Antenna Type	SEMI-PIFA
Antenna Gain	-3.8dBi

GSM

Equipment Type	Transceiver
Frequency of Operation	[Up Link] GSM850: 824 – 849MHz PCS: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS: 1930 – 1990MHz
Type of Modulation	GMSK , 8PSK
Antenna Type	PIFA
Antenna Gain	GSM850: -5.0dBi PCS: -1.5dBi

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
KDB865664:	SAR Measurement Requirements for 3 to 6 GHz

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

No.	Capable Tx configrations		Head SAR	Body SAR	Hot Spot SAR*[1]	Note
1	WWAN	GSM/GPRS/EGPRS 850 MHz	-	Yes	Reference only	Not supported voice mode
2		GSM/GPRS/EGPRS 1900 MHz	-	Yes	Reference only	
3	WLAN	WLAN 2.4G	-	Yes	Reference only	
4		WLAN 5G	-	Yes	-	
5	Bluetooth	Bluetooth BDR/EDR	-	Exemption	Exemption	

Note*[1]:Although the hotspot mode is supported, the test was performed for reference only because the diagonal dimension of EUT exceeds 20cm.

Mode	1g BodySAR [W/kg]
GSM850	0.983
PCS1900	0.765
WLAN 11b/g/n(2.4G)	0.698
WLAN 11a/n(5G) 15.247	0.310
WLAN 11a/n(5G) 15.407	0.982
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), and the following simultaneous transmission is possible.

No.	Capable Tx configrations		BodySAR	Hot Spot SAR*[2]	Note
6	WWAN+WLAN	GSM + WLAN2.4G	Yes	-	-
7		GPRS/EGPRS + WLAN2.4G	Yes	Exemption	-
8		GSM + WLAN 5G	Yes	-	-
9		GPRS/EGPRS + WLAN 5G	Yes	-	-
10	WWAN+Bluetooth		Exemption	Exemption	-
11	WLAN+Bluetooth		Exemption	Exemption	-

Note*[2]:Although the hotspot mode is supported, the test was performed for reference only because the diagonal dimension of EUT exceeds 20cm and the simultaneous transmission condition was be covered by the body SAR testing.

<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	Σ1g SAR(WWAN + WLAN) >1.6W/kg **Max. SAR Measured (WWAN + WLAN) :1.731 W/kg**
Step6	No simultaneous transmission.	Antenna pair SAR to peak SAR separation ratio<0.3 **Σ1g SAR(WWAN + WLAN) / 13.06 cm : 0.147**
Step7		No simultaneous transmission SAR

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

Step1	WWAN antenna is >5cm from Bluetooth antenna
Step2	Bluetooth power < 2Pref (=60/$f_{[GHz]}$). Refer to the FCC 15.247 test report
Step3	No stand-alone SAR for Bluetooth
Step4	No simultaneous transmission SAR

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

Step1	WLAN antenna is >5cm from Bluetooth antenna
Step2	Bluetooth power < 2Pref (=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

Mode	Duty cycle	Frequency Band	Test Frequency	Modulation
IEEE802.11b	Close to 100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	DSSS (DBPSK.DQPSK.CCK)
IEEE802.11g	Close to 100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	OFDM (BPSK.QPSK.16QAM,64QAM)
IEEE802.11n20 (2.4G)	Close to 100%	2412-2462MHz	2412MHz (1ch) 2437MHz(6ch) 2462MHz(11ch)	
IEEE802.11a	Close to 100%	5180-5320MHz	All channel	
		5500-5700MHz	All channel	
		5745-5825 MHz	All channel	
IEEE802.11n20 (5G)	Close to 100%	5180-5320MHz	All channel	
		5500-5700MHz	All channel	
		5745-5825 MHz	All channel	
IEEE802.11n40 (5G)	Close to 100%	5190-5310MHz	All channel	
		5510-5670MHz	All channel	
		5755-5795MHz	All channel	

WLAN

Power of the EUT was set by the software as follows;
Software name & version: HW Rev 0.0, SW: N024.001
[Power Setting]
11a: 8dBm
11b: 12dBm
11g: 12dBm
11n-20(2.4GHz): 12dBm
11n-20(5GHz):8dBm
11n-40(5GHz): 8dBm
*The above setting of the 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

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	"Default Test Channel"			
				FCC 15.247		UNII	
				802.11b	802.11g		
802.11 b/g/n20		2.412	1	√	Δ		
		2.437	6	√	Δ		
		2.462	11	√	Δ		
802.11a/n20	UNII	5.18	36			√	
		5.20	40				*
		5.22	44				*
		5.24	48			√	
		5.26	52			√	
		5.28	56				*
		5.30	60				*
		5.32	64			√	
		5.50	100				*
		5.52	104			√	
		5.54	108				*
		5.56	112				*
		5.58	116			√	
		5.60	120				*
		5.62	124			√	
		5.64	128				*
		5.66	132				*
		5.68	136			√	
		5.70	140				*
	UNII or FCC 15.247	5.745	149	√		√	
		5.765	153		*		*
		5.785	157	√			*
		5.805	161		*	√	
	FCC 15.247	5.825	165	√			
802.11n40	UNII	5.19	38			√	
		5.23	46			√	
		5.27	54			√	
		5.31	62			√	
		5.51	102			√	
		5.55	110			√	
		5.59	118				*
		5.63	126			√	
		5.67	134			√	
	UNII or FCC 15.247	5.755	151	√		√	
	FCC 15.247	5.795	159	√		√	

√ = "default test channels"

* = Possible 802.11a channels with maximum average output > the "default test channels"

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

1) WLAN (11b/g/n(2.4G))

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	Freq.	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
[Mbps]	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1.0	2437	4.21	1.61	0.50	10.01	14.72	12.12	29.65	16.29
2.0	2437	4.16	1.55	0.50	10.01	14.67	12.06	29.31	16.07
5.5	2437	4.17	1.50	0.50	10.01	14.68	12.01	29.38	15.89
11.0	2437	4.05	1.46	0.50	10.01	14.56	11.97	28.58	15.74

: Worst data rate

IEEE802.11b 1Mbps

Ch	Frequency	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	5.27	2.62	0.50	10.01	15.78	13.13	37.84	20.56
6	2437	4.21	1.61	0.50	10.01	14.72	12.12	29.65	16.29
11	2462	4.83	2.22	0.50	10.01	15.34	12.73	34.20	18.75

:SAR test channel

[IEEE802.11g] Rate Check

Rate	Frequency	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
[Mbps]	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
6.0	2437	12.21	1.83	0.50	10.01	22.72	12.34	187.07	17.14
9.0	2437	12.14	1.79	0.50	10.01	22.65	12.30	184.08	16.98
12.0	2437	12.17	1.81	0.50	10.01	22.68	12.32	185.35	17.06
18.0	2437	12.20	1.80	0.50	10.01	22.71	12.31	186.64	17.02
24.0	2437	12.37	1.61	0.50	10.01	22.88	12.12	194.09	16.29
36.0	2437	12.03	1.41	0.50	10.01	22.54	11.92	179.47	15.56
48.0	2437	11.98	1.41	0.50	10.01	22.49	11.92	177.42	15.56
54.0	2437	12.07	1.34	0.50	10.01	22.58	11.85	181.13	15.31

: Worst data rate

IEEE802.11g 6Mbps

Ch	Frequency	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	12.73	2.39	0.50	10.01	23.24	12.90	210.86	19.50
6	2437	12.21	1.83	0.50	10.01	22.72	12.34	187.07	17.14
11	2462	12.39	1.78	0.50	10.01	22.90	12.29	194.98	16.94

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-20] Rate Check

Rate	Frequency	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
MCS0	2437	11.41	1.26	0.50	10.01	21.92	11.77	155.60	15.03
MCS1	2437	11.23	1.18	0.50	10.01	21.74	11.69	149.28	14.76
MCS2	2437	11.82	1.23	0.50	10.01	22.33	11.74	171.00	14.93
MCS3	2437	11.39	1.22	0.50	10.01	21.90	11.73	154.88	14.89
MCS4	2437	11.34	0.85	0.50	10.01	21.85	11.36	153.11	13.68
MCS5	2437	11.55	1.12	0.50	10.01	22.06	11.63	160.69	14.55
MCS6	2437	12.19	0.71	0.50	10.01	22.70	11.22	186.21	13.24
MCS7	2437	11.45	1.06	0.50	10.01	21.96	11.57	157.04	14.35

: Worst data rate

IEEE802.11n-20 MCS0

Ch	Frequency	Power meter Reading [dBm]		Cable Loss	Atten.	Result [dBm]		Result [mW]	
	[MHz]	PK	AVG	[dB]	[dB]	PK	AVG	PK	AVG
1	2412	12.02	2.06	0.50	10.01	22.53	12.57	179.06	18.07
6	2437	11.41	1.26	0.50	10.01	21.92	11.77	155.60	15.03
11	2462	11.68	1.49	0.50	10.01	22.19	12.00	165.58	15.85

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

2) WLAN (11a/n(5180-5240MHz))

1.The 11a mode was maximum average power. The 11n 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 11a mode.

2.The other channels are measured if the SAR result at max. AVG power channel will be above 0.8W/kg

[IEEE802.11a 5180-5240MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5240	-1.55	1.00	10.05	9.50	8.91
9.0	5240	-1.74	1.00	10.05	9.31	8.53
12.0	5240	-1.72	1.00	10.05	9.33	8.57
18.0	5240	-1.72	1.00	10.05	9.33	8.57
24.0	5240	-1.95	1.00	10.05	9.10	8.13
36.0	5240	-2.22	1.00	10.05	8.83	7.64
48.0	5240	-2.12	1.00	10.05	8.93	7.82
54.0	5240	-2.32	1.00	10.05	8.73	7.46

: Worst data rate

IEEE802.11a 5180-5240MHz band 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
36	5180	-1.55	1.00	10.05	9.50	8.91
40	5200	-1.67	1.00	10.05	9.38	8.67
44	5220	-1.86	1.00	10.05	9.19	8.30
48	5240	-1.55	1.00	10.05	9.50	8.91

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing

* : This channel was tested instead of an adjacent"default test channel".

[IEEE802.11n-20 5180-5240MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5240	-2.42	1.00	10.05	8.63	7.29
MCS1	5240	-2.44	1.00	10.05	8.61	7.26
MCS2	5240	-2.47	1.00	10.05	8.58	7.21
MCS3	5240	-2.56	1.00	10.05	8.49	7.06
MCS4	5240	-2.53	1.00	10.05	8.52	7.11
MCS5	5240	-2.57	1.00	10.05	8.48	7.05
MCS6	5240	-2.60	1.00	10.05	8.45	7.00
MCS7	5240	-2.64	1.00	10.05	8.41	6.93

: Worst data rate

IEEE802.11n-20 5180-5240MHz band MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
36	5180	-1.83	1.00	10.05	9.22	8.36
40	5200	-1.90	1.00	10.05	9.15	8.22
44	5220	-2.47	1.00	10.05	8.58	7.21
48	5240	-2.42	1.00	10.05	8.63	7.29

[IEEE802.11n-40 5190-5230MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5230	-1.57	1.00	10.05	9.48	8.87
MCS1	5230	-1.69	1.00	10.05	9.36	8.63
MCS2	5230	-1.92	1.00	10.05	9.13	8.18
MCS3	5230	-1.70	1.00	10.05	9.35	8.61
MCS4	5230	-1.72	1.00	10.05	9.33	8.57
MCS5	5230	-1.64	1.00	10.05	9.41	8.73
MCS6	5230	-1.74	1.00	10.05	9.31	8.53
MCS7	5230	-1.80	1.00	10.05	9.25	8.41

: Worst data rate

IEEE802.11n-40 5190-5230MHz band MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
38	5190	-1.56	1.00	10.05	9.49	8.89
46	5230	-1.57	1.00	10.05	9.48	8.87

Sample Calculation: Result = Reading + Cable Loss + Attenuator

3) WLAN (11a/n(5260-5320MHz))

1.The 11n40 mode was maximum average power.

2. The 11a mode is required as a representative of 20Mband.

3.The other channels are measured if the SAR result at max. AVG power channel will be above 0.8W/kg

[IEEE802.11a 5260-5320MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5280	-2.69	1.00	10.05	8.36	6.85
9.0	5280	-2.91	1.00	10.05	8.14	6.52
12.0	5280	-2.98	1.00	10.05	8.07	6.41
18.0	5280	-2.77	1.00	10.05	8.28	6.73
24.0	5280	-2.71	1.00	10.05	8.34	6.82
36.0	5280	-2.72	1.00	10.05	8.33	6.81
48.0	5280	-2.74	1.00	10.05	8.31	6.78
54.0	5280	-2.71	1.00	10.05	8.34	6.82

: Worst data rate

IEEE802.11a 5260-5320MHz band 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
52	5260	-2.61	1.00	10.05	8.44	6.98
56	5280	-2.69	1.00	10.05	8.36	6.85
60*	5300	-2.97	1.00	10.05	8.08	6.43
64	5320	-3.17	1.00	10.05	7.88	6.14

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing

* : This channel was tested instead of an adjacent"default test channel".

[IEEE802.11n-20 5260-5320MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5280	-2.49	1.00	10.05	8.56	7.18
MCS1	5280	-2.51	1.00	10.05	8.54	7.14
MCS2	5280	-2.56	1.00	10.05	8.49	7.06
MCS3	5280	-2.60	1.00	10.05	8.45	7.00
MCS4	5280	-2.71	1.00	10.05	8.34	6.82
MCS5	5280	-2.76	1.00	10.05	8.29	6.75
MCS6	5280	-2.82	1.00	10.05	8.23	6.65
MCS7	5280	-2.86	1.00	10.05	8.19	6.59

: Worst data rate

IEEE802.11n-20 5250-5320MHz band MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
52	5260	-2.54	1.00	10.05	8.51	7.10
56	5280	-2.49	1.00	10.05	8.56	7.18
60	5300	-2.77	1.00	10.05	8.28	6.73
64	5320	-2.96	1.00	10.05	8.09	6.44

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-40 5270-5310MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5270	-1.60	1.00	10.05	9.45	8.81
MCS1	5270	-1.88	1.00	10.05	9.17	8.26
MCS2	5270	-1.95	1.00	10.05	9.10	8.13
MCS3	5270	-1.69	1.00	10.05	9.36	8.63
MCS4	5270	-1.68	1.00	10.05	9.37	8.65
MCS5	5270	-1.86	1.00	10.05	9.19	8.30
MCS6	5270	-1.88	1.00	10.05	9.17	8.26
MCS7	5270	-1.91	1.00	10.05	9.14	8.20

: Worst data rate

IEEE802.11n-40 5270-5310MHz band MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
54	5270	-1.60	1.00	10.05	9.45	8.81
62	5310	-1.59	1.00	10.05	9.46	8.83

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing

4) WLAN (11a/n(5500-5700MHz))

1.The 11n 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 11a mode.

2.The data rate for highest power and the lowest data rate are required.

3.The other channels are measured if the SAR result at max. AVG power channel will be above 0.4W/kg

[IEEE802.11a 5500-5700MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5580	-1.69	1.00	10.06	9.37	8.65
9.0	5580	-1.82	1.00	10.06	9.24	8.39
12.0	5580	-1.75	1.00	10.06	9.31	8.53
18.0	5580	-1.76	1.00	10.06	9.30	8.51
24.0	5580	-1.31	1.00	10.06	9.75	9.44
36.0	5580	-1.46	1.00	10.06	9.60	9.12
48.0	5580	-1.50	1.00	10.06	9.56	9.04
54.0	5580	-1.56	1.00	10.06	9.50	8.91

: Worst data rate

[IEEE802.11a 5500-5700MHz band] band 24Mbps

Ch	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
100*	5500	-1.35	1.00	10.06	9.71	9.35
104	5520	-1.43	1.00	10.06	9.63	9.18
108	5540	-1.49	1.00	10.06	9.57	9.06
112	5560	-1.54	1.00	10.06	9.52	8.95
116	5580	-1.31	1.00	10.06	9.75	9.44
120	5600	-1.87	1.00	10.06	9.19	8.30
124	5620	-1.94	1.00	10.06	9.12	8.17
128*	5640	-1.43	1.00	10.06	9.63	9.18
132	5660	-1.44	1.00	10.06	9.62	9.16
136	5680	-1.41	1.00	10.06	9.65	9.23
140	5700	-1.41	1.00	10.06	9.65	9.23

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing

* : This channel was tested instead of an adjacent"default test channel".

[IEEE802.11a 5500-5700MHz band] band 6Mbps

Ch	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
100*	5500	-1.71	1.00	10.06	9.35	8.61
104	5520	-1.72	1.00	10.06	9.34	8.59
108	5540	-1.78	1.00	10.06	9.28	8.47
112	5560	-1.87	1.00	10.06	9.19	8.30
116	5580	-1.69	1.00	10.06	9.37	8.65
120	5600	-2.14	1.00	10.06	8.92	7.80
124	5620	-2.25	1.00	10.06	8.81	7.60
128*	5640	-1.76	1.00	10.06	9.30	8.51
132	5660	-1.77	1.00	10.06	9.29	8.49
136	5680	-1.76	1.00	10.06	9.30	8.51
140	5700	-1.78	1.00	10.06	9.28	8.47

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing * : This channel was tested instead of an adjacent"default test channel".

[IEEE802.11n-20 5500-5700MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5600	-1.89	1.00	10.06	9.17	8.26
MCS1	5600	-1.98	1.00	10.06	9.08	8.09
MCS2	5600	-2.03	1.00	10.06	9.03	8.00
MCS3	5600	-1.98	1.00	10.06	9.08	8.09
MCS4	5600	-2.12	1.00	10.06	8.94	7.83
MCS5	5600	-2.39	1.00	10.06	8.67	7.36
MCS6	5600	-2.40	1.00	10.06	8.66	7.35
MCS7	5600	-2.57	1.00	10.06	8.49	7.06

: Worst data rate

[IEEE802.11n-20 5500-5700MHz band] band MCS0

Ch	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
100	5500	-1.45	1.00	10.06	9.61	9.14
104	5520	-1.61	1.00	10.06	9.45	8.81
108	5540	-1.78	1.00	10.06	9.28	8.47
112	5560	-1.97	1.00	10.06	9.09	8.11
116	5580	-1.96	1.00	10.06	9.10	8.13
120	5600	-1.89	1.00	10.06	9.17	8.26
124	5620	-1.99	1.00	10.06	9.07	8.07
128	5640	-1.65	1.00	10.06	9.41	8.73
132	5660	-1.53	1.00	10.06	9.53	8.97
136	5680	-1.44	1.00	10.06	9.62	9.16
140	5700	-1.35	1.00	10.06	9.71	9.35

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-40 5500-5700MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5590	-1.64	1.00	10.06	9.42	8.75
MCS1	5590	-1.68	1.00	10.06	9.38	8.67
MCS2	5590	-1.82	1.00	10.06	9.24	8.39
MCS3	5590	-1.41	1.00	10.06	9.65	9.23
MCS4	5590	-1.57	1.00	10.06	9.49	8.89
MCS5	5590	-1.65	1.00	10.06	9.41	8.73
MCS6	5590	-1.76	1.00	10.06	9.30	8.51
MCS7	5590	-1.84	1.00	10.06	9.22	8.36

: Worst data rate

[IEEE802.11n-40 5500-5700MHz band] band MCS3

Ch	Freq. [MHz]	meter Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
102	5510	-1.36	1.00	10.06	9.70	9.33
110	5550	-1.44	1.00	10.06	9.62	9.16
118	5590	-1.41	1.00	10.06	9.65	9.23
126	5630	-1.43	1.00	10.06	9.63	9.18
134	5670	-1.32	1.00	10.06	9.74	9.42

Sample Calculation: Result = Reading + Cable Loss + Attenuator

5) WLAN (11a/n(5745-5825MHz))

1.The 11n 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 11a mode.
2.The other channels are measured if the SAR result at max. AVG power channel will be above 0.8W/kg

[IEEE802.11a 5745-5825MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5785.0	-1.12	1.00	10.07	9.95	9.89
9.0	5785.0	-1.25	1.00	10.07	9.82	9.59
12.0	5785.0	-1.17	1.00	10.07	9.90	9.77
18.0	5785.0	-1.19	1.00	10.07	9.88	9.73
24.0	5785.0	-1.34	1.00	10.07	9.73	9.40
36.0	5785.0	-1.22	1.00	10.07	9.85	9.66
48.0	5785.0	-1.27	1.00	10.07	9.80	9.55
54.0	5785.0	-1.40	1.00	10.07	9.67	9.27

: Worst data rate

IEEE802.11a 5745-5825MHz band 6Mbps

Ch	Freq. [MHz]	P/M Reading AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
149	5745.0	-1.22	1.00	10.07	9.85	9.66
153	5765.0	-1.27	1.00	10.07	9.80	9.55
157	5785.0	-1.12	1.00	10.07	9.95	9.89
161	5805.0	-1.37	1.00	10.07	9.70	9.33
165	5825.0	-1.30	1.00	10.07	9.77	9.48

Sample Calculation: Result = Reading + Cable Loss + Attenuator

: Channel of SAR testing

[IEEE802.11n-20 5745-5825MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5785.0	-1.23	1.00	10.07	9.84	9.64
MCS1	5785.0	-1.32	1.00	10.07	9.75	9.44
MCS2	5785.0	-1.30	1.00	10.07	9.77	9.48
MCS3	5785.0	-1.15	1.00	10.07	9.92	9.82
MCS4	5785.0	-1.19	1.00	10.07	9.88	9.73
MCS5	5785.0	-1.17	1.00	10.07	9.90	9.77
MCS6	5785.0	-1.22	1.00	10.07	9.85	9.66
MCS7	5785.0	-1.25	1.00	10.07	9.82	9.59

: Worst data rate

IEEE802.11n-20 5745-5825MHz band MCS3

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
149	5745.0	-1.24	1.00	10.07	9.83	9.62
153	5765.0	-1.28	1.00	10.07	9.79	9.53
157	5785.0	-1.15	1.00	10.07	9.92	9.82
161	5805.0	-1.27	1.00	10.07	9.80	9.55
165	5825.0	-1.34	1.00	10.07	9.73	9.40

[IEEE802.11n-40 5755-5795MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	5755.0	-1.16	1.00	10.07	9.91	9.79
MCS1	5755.0	-1.27	1.00	10.07	9.80	9.55
MCS2	5755.0	-1.38	1.00	10.07	9.69	9.31
MCS3	5755.0	-1.49	1.00	10.07	9.58	9.08
MCS4	5755.0	-1.53	1.00	10.07	9.54	8.99
MCS5	5755.0	-1.69	1.00	10.07	9.38	8.67
MCS6	5755.0	-1.88	1.00	10.07	9.19	8.30
MCS7	5755.0	-1.85	1.00	10.07	9.22	8.36

: Worst data rate

IEEE802.11n-40 5755-5795MHz band MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
151	5755.0	-1.16	1.00	10.07	9.91	9.79
159	5795.0	-1.18	1.00	10.07	9.89	9.75

Sample Calculation: Result = Reading + Cable Loss + Attenuator

5.3 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)

5.4 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 Body setup

6.1 Specification of sensor

This EUT has two grip sensors for power reduction. These sensors detect the human skin within 7mm from the rear case and 3mm from top edge of EUT.

Sensor specification			
Position	**Yes/No**	**Type**	**Distance detected**
Front	No	-	-
Rear	Yes	Grip	7mm
Left edge	No	-	-
Right edge	No	-	-
Top edge	Yes	Grip	3mm
Bottom edge	No	-	-

6.2 Power reduction implementation

Mode	**Power reduction level [dB]**
GSM850 GSM/GPRS/EGPRS	9
PCS1900 GSM/GPRS/EGPRS	5.5
WLAN 11b/g/n	Power reduction is not implemented for WLAN
WLAN 11a/n	

6.3 Description of the Body setup

i)Procedure for SAR testing

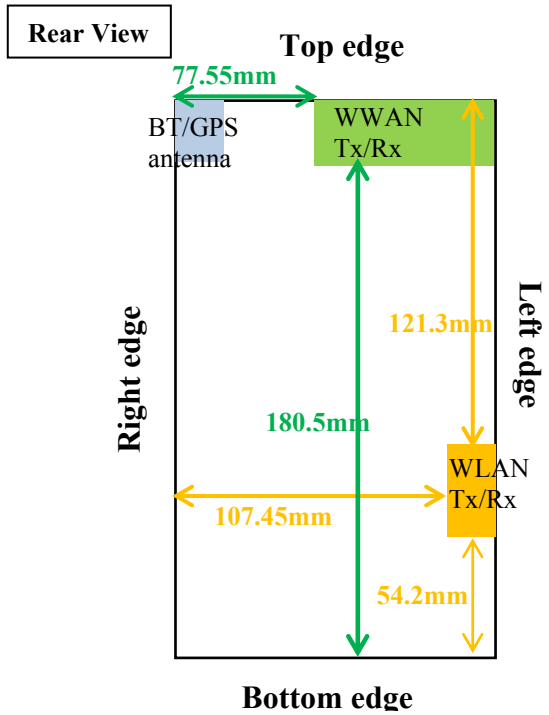
-The tested distance were performed according to the KDB447498D01 (Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies)

- <Reference procedure>The tested distance were performed according to the KDB941225 D06 v01 (SAR Evaluation Procedures for portable Devices with Wireless Router Capabilities) (Device dimensions : 193.6 mm x 122.35mm (Diagonal dimension:220mm))

ii)Test mode

GSM850/PCS1900	**Data transmission mode (GPRS)**
WLAN	**Data transmission mode**

iii)Test Position



Position	WWAN	WLAN
Front (Hotspot)	Tested for reference	Tested for reference (2.4G only)
Rear	Tested	Tested
Right edge	Not required	Not required
Left edge	Tested	Tested
Top edge	Tested	Not required
Bottom edge	Not required	Not required
Top 45degree	Tested	Not required

NOTE: Test position is required to the edge within 5cm from antenna according to the KDB 447498D1.
NOTE2: Although front position for hotspot mode is not required test was performed as a reference.

iv) Test configurations

EUT checked to the condition with or without headset. As the result, all tests were performed in the EUT without headset as worst condition.

<WWAN>
(1) Rear (10mm) :
The measurement separated 10mm distance between the rear surface of EUT with normal power to the flat Phantom.
This condition is reference data for a hotspot mode procedure.
(2) Rear (7mm) :
The measurement separated 7mm distance between the rear surface of EUT with normal power to the flat Phantom.
(3) Rear (0mm) :
The measurement touched to the rear surface of EUT with power reduction to the flat Phantom.
(4) Top (3mm) :
The measurement separated 3mm distance between the top edge of EUT with normal power to the flat Phantom.
(5) Top (0mm) :
The measurement touched to the top edge of EUT with power reduction to the flat Phantom.
(6) Left edge (0mm) :
The measurement touched to the left edge of EUT with normal power to the flat Phantom.
(7) Front (10mm) :
The measurement separated 10mm distance between the front surface of EUT with normal power to the flat Phantom.
This condition is reference data for a hotspot mode procedure.
(8) Top 45 degree :
The measurement leaned a top edge of EUT to 45 degrees from the vertex touched to flat phantom. The condition of power was a normal power. The vertex position was the corner where the WWAN antenna is the closest.

<WLAN>
(1) Rear (10mm) :
The measurement separated 10mm distance between the rear surface of EUT to the flat Phantom.
This condition is reference data for a hotspot mode procedure.
(2) Rear (7mm) :
The measurement separated 7mm distance between the rear surface of EUT to the flat Phantom.
This condition is for evaluation of simultaneous transmission
(3) Rear (0mm) :
The measurement touched to the rear surface of EUT to the flat Phantom.
(4)Left edge (0mm) :
The measurement touched to the left edge of EUT to the flat Phantom.
(5) Front (10mm) :
The measurement separated 10mm distance between the front surface of EUT to the flat Phantom.
This condition is reference data for a hotspot mode procedure.

<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.

<WLAN 300M-3GHz>

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or veff
Measurement System						
Probe calibration	±5.5	Normal	1	1	±5.5	∞
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	4
Device holder uncertainty	±3.6	Normal	1	1	±3.6	4
Power drift	±5.0	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	∞
Liquid conductivity (target)	±5.0	Rectangular	√3	0.64	±1.8	∞
Liquid conductivity (meas.)	+4.1	Rectangular	1	0.64	±2.6	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	-3.2	Rectangular	1	0.6	±1.9	∞
Combined Standard Uncertainty					**±10.998**	
Expanded Uncertainty (k=2)					**±22.0**	

<WLAN 3-6GHz>

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	21
Device holder uncertainty	±3.6	Normal	1	1	±3.6	2
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.)	+4.8	Rectangular	1	0.64	±3.1	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	-5.0	Rectangular	1	0.6	±3.0	∞
Combined Standard Uncertainty					**±13.305**	
Expanded Uncertainty (k=2)					**±26.6**	

SECTION 8 : Measurement results

8.1 WLAN Body SAR (2.4G)

(1)Method of measurement

Step1. The searching for the worst position
The test was performed in mode of the maximum average output power
Step2. Hotspot mode change
This measurement is reference data.
The test was performed at front 10mm and rear 10mm.

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 [%]
20-Oct	24.5	59	MSL 2450	24.7	2450	εr	52.7	51.0	-3.2	+/-5
						σ [mho/m]	1.95	2.03	4.1	+/-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							
1	2412	11b 1Mbps	Flat	Fixed	Rear	0	**0.698**
1	2412	11b 1Mbps	Flat	Fixed	Left edge	0	**0.075**
Step.2 Hotspot mode (This measurement conditions is reference data for hotspot mode.)							
1	2412	11b 1Mbps	Flat	Fixed	Front	10	**0.022**
1	2412	11b 1Mbps	Flat	Fixed	Rear	10	**0.060**

Stand-alone SAR for simultaneous transmission evaluation

This test was performed with condition of maximum 2.4GHz WLAN SAR in order to evaluate a simultaneous transmission at rear 7mm position.

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
1	2412	11b 1Mbps	Flat	Fixed	Rear	7	**0.127**

8.2 WLAN Body SAR (5G)

(1)Method of measurement

Step1. Data rate check
The test was performed in data rate of the maximum average output power and lowest data rate.
Step2. The searching for the worst position
The test was performed at the worst condition of Step1.
Step3. The changing to the other channels

Note:

1) The BODY SAR is not required for 11n mode because the maximum average output power for 11n mode is less than 1/4dB higher than that measured 11a mode.
2) For 5260-5320MHz, The measurements were performed in the 11n40 mode of maximum average power , and 11a mode as a representative of 20Mband.

3) For 5180-5240MHz, 5745-5825MHz band, 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 [%]
19-Oct	24.0	42	MSL 3-6GHz	23.5	5200	εr	49.0	46.9	-4.3	+/-5
						σ [mho/m]	5.30	5.49	3.6	+/-5
19-Oct	24.0	42	MSL 3-6GHz	23.5	5300	εr	48.9	46.7	-4.5	+/-5
						σ [mho/m]	5.42	5.63	3.9	+/-5
19-Oct	24.0	42	MSL 3-6GHz	23.5	5500	εr	48.6	46.4	-4.5	+/-5
						σ [mho/m]	5.65	5.81	2.8	+/-5
19-Oct	24.0	42	MSL 3-6GHz	23.5	5600	εr	48.5	46.1	-4.9	+/-5
						σ [mho/m]	5.77	5.94	2.9	+/-5
19-Oct	24.0	42	MSL 3-6GHz	23.5	5700	εr	48.3	45.9	-5.0	+/-5
						σ [mho/m]	5.88	6.07	3.2	+/-5
19-Oct	24.0	42	MSL 3-6GHz	23.5	5800	εr	48.2	45.9	-4.8	+/-5
						σ [mho/m]	6.00	6.27	4.5	+/-5

εr: Relative Permittivity / σ : Coductivity

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

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 [%]
8-Nov	24.3	43	MSL 3-6GHz	24.0	5200	εr	49.0	47.2	-3.7	+/-5
						σ [mho/m]	5.30	5.54	4.5	+/-5
8-Nov	24.3	43	MSL 3-6GHz	24.0	5300	εr	48.9	47.0	-3.9	+/-5
						σ [mho/m]	5.42	5.68	4.8	+/-5
8-Nov	24.3	43	MSL 3-6GHz	24.0	5500	εr	48.6	46.4	-4.5	+/-5
						σ [mho/m]	5.65	5.90	4.4	+/-5
8-Nov	24.3	43	MSL 3-6GHz	24.0	5600	εr	48.5	46.1	-4.9	+/-5
						σ [mho/m]	5.77	6.04	4.7	+/-5
8-Nov	24.3	43	MSL 3-6GHz	24.0	5700	εr	48.3	46.0	-4.8	+/-5
						σ [mho/m]	5.88	6.14	4.4	+/-5
9-Nov	24.3	43	MSL 3-6GHz	24.0	5800	εr	48.2	46.0	-4.6	+/-5
						σ [mho/m]	6.00	6.28	4.7	+/-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 (5180-5240MHz)							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
48	5240	11a 6Mbps	Flat	Fixed	Rear	0	**0.482**
48	5240	11a 6Mbps	Flat	Fixed	Left edge	0	**0.186**

BODY SAR MEASUREMENT RESULTS (5260-5320MHz)							
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 Data rate check							
62	5310	11n40 MCS0	Flat	Fixed	Rear	0	**0.958**
52	5260	11a 6Mbps	Flat	Fixed	Rear	0	**0.700**
Step.2 Position searching							
62	5310	11n40 MCS0	Flat	Fixed	Left edge	0	**0.344**
Step.3 Channel change							
54	5270	11n40 MCS0	Flat	Fixed	Rear	0	**0.686**
60	5300	11a 6Mbps	Flat	Fixed	Rear	0	**0.982**

BODY SAR MEASUREMENT RESULTS(5500-5700MHz)							
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 Data rate check							
116	5580	11a 24Mbps	Flat	Fixed	Rear	0	**0.423**
116	5580	11a 6Mbps	Flat	Fixed	Rear	0	**0.557**
Step.2 Position searching							
116	5580	11a 6Mbps	Flat	Fixed	Left edge	0	**0.232**
Step.3 Channel change (SAR level in Step.1&2 > 0.4 w/kg)							
100	5500	11a 24Mbps	Flat	Fixed	Rear	0	**0.523**
124	5640	11a 24Mbps	Flat	Fixed	Rear	0	**0.371**
136	5680	11a 24Mbps	Flat	Fixed	Rear	0	**0.320**
100	5500	11a 6Mbps	Flat	Fixed	Rear	0	**0.679**
124	5640	11a 6Mbps	Flat	Fixed	Rear	0	**0.620**
136	5680	11a 6Mbps	Flat	Fixed	Rear	0	**0.486**

BODY SAR MEASUREMENT RESULTS (5745-5825MHz)							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation	Maximum value
157	5785	11a 6Mbps	Flat	Fixed	Rear	0	**0.310**
157	5785	11a 6Mbps	Flat	Fixed	Left edge	0	**0.160**

Stand-alone SAR for simultaneous transmission evaluation
These tests were performed with condition of maximum 5GHz WLAN SAR in order to evaluate a simultaneous transmission at rear 7mm position.

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
64	5320	11a 6Mbps	Flat	Fixed	Rear	7	**0.231**
100	5500	11a 6Mbps	Flat	Fixed	Rear	7	**0.245**
157	5785	11a 6Mbps	Flat	Fixed	Rear	7	**0.139**

8.3 Simultaneous transmission evaluation

Result of SUM ΣSAR1g

SUM ΣSAR1g (GSM850 +WLAN(2.4G/5G))						
Position	Separation [mm]	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
		GSM850 Band	WLAN 2.4G	WLAN 5G	WWAN + WLAN(2.4G)	WWAN + WLAN(5G)
Rear (Reference)	10	0.727	0.060	-*2	0.787	-
Rear	7	0.983	0.127	0.231	1.110	1.214
Rear	0	0.301	0.698	0.982	0.999	1.283
Top	3	0.843	- *1	- *1	-	-
Top	0	0.133	- *1	- *1	-	-
Left edge	0	0.608	0.075	0.232	0.683	0.840
Front (Reference)	10	0.641	0.022	- *2	0.663	-
Top	45degree	0.100	- *1	- *1	-	-

: SUM ΣSAR1g >1.6W/kg

SUM ΣSAR1g (PCS1900 +WLAN(2.4G/5G))						
Position	Separation [mm]	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
		PCS1900 Band	WLAN 2.4G	WLAN 5G	WWAN + WLAN(2.4G)	WWAN + WLAN(5G)
Rear (Reference)	10	0.447	0.060	-*2	0.507	-
Rear	7	0.669	0.127	0.231	0.796	0.900
Rear	0	0.749	0.698	0.982	**1.447**	1.731
Top	3	0.469	- *1	- *1	-	-
Top	0	0.225	- *1	- *1	-	-
Left edge	0	0.765	0.075	0.232	0.840	0.997
Front (Reference)	10	0.365	0.022	- *2	0.387	-
Top	45degree	0.352	- *1	- *1	-	-

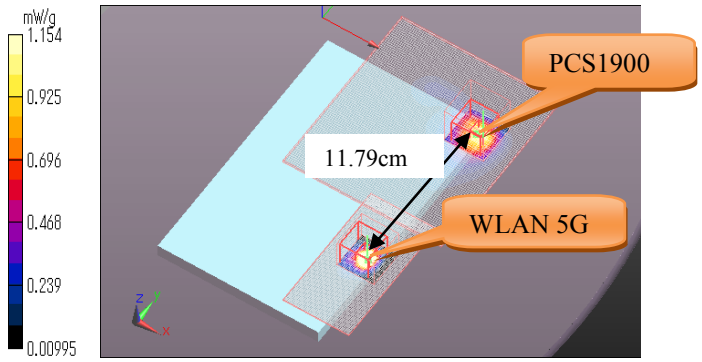
: SUM ΣSAR1g >1.6W/kg
: Highest SUMΣSAR1g Body Simultaneous transmissions (in SUMΣSAR1g <1.6W/kg)

*1 This position is not required in WLAN SAR mode since distance from antenna is over 5cm.
*2 This position is not required since WLAN 5GHz has not hotspot mode.

SAR to Peak Location Separation Ratio
SUM ∑ 1-g SAR > 1.6 W/kg

ΣSAR1g >1.6W/kg Condition	∑ 1-g SAR (W/kg)	3D distance (cm)	SAR to peak location separation ratio
Body PCS1900 + Body WLAN5GHz	1.731	11.79	0.147

Body PCS1900 + Body WLAN5GHz



	Mode	Value of SAR mW/g	X m	Y m	Z m
1	PCS1900	1.15	0.065	0.0855	-0.179
2	WLAN 5G	2.25	0.055	-0.032	-0.179

(d) cm	0.1179	**11.79**
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)	

(d)cm : The actual measured distance between peak SAR locations

SECTION 9 Test instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	Power Measurement	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	Power Measurement	2011/09/13 * 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
MPSC-01	Power splitters/Combiners	Mini-Circuit	ZFSC-2-2500	0124	Power Measurement	2011/09/27 * 12
MCC-91	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	30812/2	Power Measurement	2011/05/27 * 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
MRFA-08	Pre Amplifier	TSJ	TCBP0206	-	SAR	2011/03/27 * 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
MPB-03	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV3	3507	SAR	2011/03/16 * 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-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	SAR	2010/09/13 * 36
MDA-08	Dipole Antenna	Schmid&Partner Engineering AG	D5GHzV2	1020	SAR	2011/08/23 * 12
MPF-02	2mmOval Flat Phantom ERI 4.0	Schmid&Partner Engineering AG	QD VA 001B (ERI4.0)	1045	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
MSL2450				Daily check	Target value ± 5%	
MSL 3-6GHz				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.