FCC OET BULLETIN 65 SUPPLEMENT C 01-01

SAR EVALUATION REPORT

For

GSM phone with 802.11 b/g and Bluetooth

MODEL: P102UEU

FCC ID: O8F-ROAY

REPORT NUMBER: 10U13340-4

ISSUE DATE: August 16, 2010

Prepared for

PALM, INC.
950 MAUDE AVENUE
SUNNYVALE, CA. 94085
UNITED STATES

Prepared by

COMPLIANCE CERTIFICATION SERVICES
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	August 16, 2010	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	PALM, INC. 950 MAUDE AVENUE SUNNYVALE, CA. 94085, UNITED STATES
EUT DESCRIPTION:	GSM phone with 802.11 b/g and Bluetooth
MODEL NUMBER:	P102UEU
SERIAL NUMBER	RD1B6927(GSM), RD1B6944(WiFi)
NADEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	July 29 - August 1, 2010 (GSM), August 11, 2010 (WiFi)

FCC Rule Parts	Frequency Range [MHz]	The Highest 1g SAR (mW/g)	Limit (mW/g)
22H	824 - 849	Head: 1.01 (LHS Touch); Body: 1.29 (Face down)	1.6
24E	1850 - 1910	Head: 0.34 (RHS Touch); Body: 0.943 (Face down)	
15.247	2412 - 2462	Head: 0.239 (LHS Touch); Body: 0.013 (Face up)	

Applicable Standards and Test Procedures	Test Results
FCC OET Bulletin 65 Supplement C 01-01	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For CCS By:

SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01 and the following specific Test Procedures.

- KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1
- KDB 648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05
- KDB 248227 D01 SAR meas for 802 11 a b g v01r02

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	22	2010
Signal Generator	Agilent	8753ES-6	MY40001647	11	22	2010
E-Field Probe	SPEAG	EX3DV3	3531	2	23	2011
Thermometer	ERTCO	639-1S	1718	7	19	2011
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
System Validation Dipole	SPEAG	D835V2	4d002	4	23	2012
System Validation Dipole	SPEAG	D1900V2	5d043	11	24	2012
System Validation Dipole	SPEAG	D2450V2	706	4	18	2013
Power Meter	Giga-tronics	8651A	8651404	3	13	2012
Power Sensor	Giga-tronics	80701A	1834588	3	13	2012
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPEAG	H1900	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M1900	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	H835	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

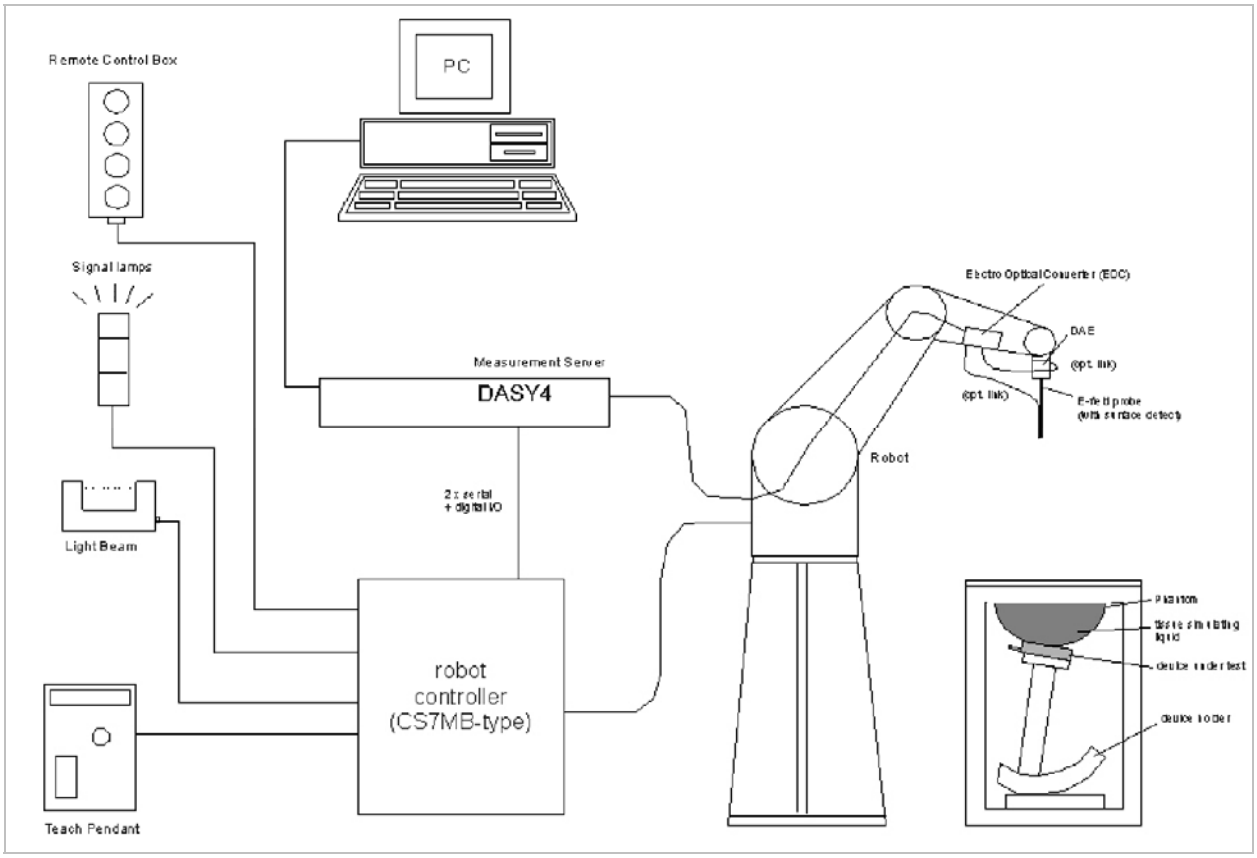
Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement (850MHz)	3.64	Normal	1	0.64	2.33
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement (2450MHz)	2.18	Normal	1	0.6	1.31
				Combined Standard Uncertainty Uc(y) =	9.81
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.62 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.56 dB	

5. EQUIPMENT UNDER TEST

GSM phone with 802.11 b/g and Bluetooth Model: P102UEU	
Mobile phone capability:	☐ Class A[1] ☒ Class B[2] ☐ Class C[3]
GPRS Multi-slot class:	☒ Class 12 ☐ Class 10 ☐ Class 8
Normal operation:	• Held to head (open and closed – by sliding) • Worn on body (Facing-up and Facing-down) with 1.5 cm separation distance
Body worn accessory:	Headset, part #: 180-10632-00
Battery option that could affect the SAR results:	Rechargeable Li-ion Battery - Standard: 3.7 Vdc, 1150 mAh, 4.3 Wh - Extended: N/A
Antenna-to-antenna separation distances:	See section 15 - Photos with antenna-to-antenna separation distances. ○ 7.5 cm from GSM antenna-to-WiFi/BT antenna when slide closed ○ 11.0 cm from GSM antenna-to-WiFi/BT antenna when slide open ○ 0 cm from WiFi antenna-to-BT antenna
Simultaneous transmission:	- GSM can transmit simultaneously with WiFi - GSM can transmit simultaneously with Bluetooth - WiFi can transmit simultaneously with Bluetooth

[1] Class A mobile phones can be connected to both GPRS and GSM services simultaneously.
[2] Class B mobile phones can be attached to both GPRS and GSM services, using one service at a time.
[3] Class C mobile phones are attached to either GPRS or GSM voice service. You need to switch manually between services

6. SYSTEM SPECIFICATIONS



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

7. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

8. TISSUE DIELECTRIC PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 10%.

Reference Values of Tissue Dielectric Parameters for Body (for 300 – 3000 MHz and 5800 MHz)
The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

8.1. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Head 835 MHz
Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	42.14	Relative Permittivity (ε_r):	42.141	41.5	1.54	± 5
	e"	19.25	Conductivity (σ):	0.894	0.90	-0.65	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
July 29, 2010 04:22 PM

Frequency	e'	e"
800000000.	42.5455	19.3270
805000000.	42.4946	19.3241
810000000.	42.4442	19.3087
815000000.	42.3855	19.2594
820000000.	42.3249	19.2863
825000000.	42.2598	19.2365
830000000.	42.2016	19.2423
835000000.	**42.1409**	**19.2494**
840000000.	42.0910	19.1993
845000000.	42.0163	19.1762
850000000.	41.9721	19.1654
855000000.	41.8886	19.1550
860000000.	41.8470	19.1359
865000000.	41.7668	19.1371
870000000.	41.6937	19.1238
875000000.	41.6309	19.1226
880000000.	41.5634	19.1078
885000000.	41.5069	19.1165
890000000.	41.4697	19.0938
895000000.	41.4461	19.0188
900000000.	41.3830	18.9962
905000000.	41.3536	18.9868
910000000.	41.3082	18.9923
915000000.	41.2414	18.9725
920000000.	41.1940	18.9601
925000000.	41.1604	18.9421
930000000.	41.1085	18.9590
935000000.	41.0325	18.9184
940000000.	40.9894	18.8904
945000000.	40.9231	18.9107
950000000.	40.8548	18.8984

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Body 835 MHz
Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	54.72	Relative Permittivity (ε_r):	54.717	55.2	-0.88	± 5
	e"	21.64	Conductivity (σ):	1.005	0.97	3.64	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
July 29, 2010 13:36 PM

Frequency	e'	e"
800000000.	55.0418	21.7833
805000000.	55.0096	21.7440
810000000.	54.9770	21.7282
815000000.	54.9238	21.7142
820000000.	54.8772	21.6926
825000000.	54.8157	21.6657
830000000.	54.7469	21.6566
835000000.	**54.7168**	**21.6411**
840000000.	54.6591	21.6137
845000000.	54.6237	21.5837
850000000.	54.5628	21.5457
855000000.	54.5660	21.5090
860000000.	54.4906	21.4887
865000000.	54.4453	21.4966
870000000.	54.3793	21.4723
875000000.	54.3369	21.4486
880000000.	54.3063	21.4361
885000000.	54.2524	21.4109
890000000.	54.2220	21.3946
895000000.	54.2121	21.2978
900000000.	54.1631	21.2756
905000000.	54.1211	21.2713
910000000.	54.0779	21.2550
915000000.	54.0111	21.2699
920000000.	53.9580	21.2176
925000000.	53.9244	21.1970
930000000.	53.8744	21.2119
935000000.	53.7849	21.1572
940000000.	53.7606	21.1324
945000000.	53.7134	21.1383
950000000.	53.6606	21.1185

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

8.2. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Head 1900 MHz
Room Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Liquid Parameters		Measured Results		Target	Delta (%)	Limit (%)
1900	e'	40.701	Relative Permittivity (ϵ_r):	40.7007	40.0	1.75	± 5
	e"	13.487	Conductivity (σ):	1.42560	1.40	1.83	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
August 01, 2010 11:17 AM

Frequency	e'	e"
1710000000.	41.3505	12.9133
1720000000.	41.3292	12.9470
1730000000.	41.2875	12.9880
1740000000.	41.2356	13.0157
1750000000.	41.2207	13.0563
1760000000.	41.1810	13.0681
1770000000.	41.1570	13.0919
1780000000.	41.1079	13.0993
1790000000.	41.0656	13.1153
1800000000.	41.0242	13.1427
1810000000.	40.9866	13.1843
1820000000.	40.9442	13.2311
1830000000.	40.8794	13.2885
1840000000.	40.8426	13.3369
1850000000.	40.8238	13.3455
1860000000.	40.8174	13.3741
1870000000.	40.8061	13.4078
1880000000.	40.7742	13.4334
1890000000.	40.7304	13.4657
1900000000.	**40.7007**	**13.4873**
1910000000.	40.6405	13.5172

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Body 1900 MHz
Room Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	52.596	Relative Permittivity (ϵ_r):	52.5963	53.3	-1.32	± 5
	e"	14.162	Conductivity (σ):	1.49694	1.52	-1.52	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
August 01, 2010 11:06 AM

Frequency	e'	e"
1710000000.	53.1933	13.5094
1720000000.	53.1773	13.5438
1730000000.	53.1387	13.5704
1740000000.	53.1000	13.6063
1750000000.	53.0658	13.6374
1760000000.	53.0195	13.6746
1770000000.	52.9962	13.7093
1780000000.	52.9669	13.7260
1790000000.	52.9258	13.7605
1800000000.	52.9193	13.7951
1810000000.	52.8690	13.8413
1820000000.	52.8478	13.8556
1830000000.	52.8021	13.9063
1840000000.	52.7673	13.9348
1850000000.	52.7429	13.9659
1860000000.	52.7111	14.0091
1870000000.	52.6872	14.0502
1880000000.	52.6562	14.0790
1890000000.	52.6167	14.1300
1900000000.	**52.5963**	**14.1622**
1910000000.	52.5538	14.2047

The conductivity (σ) can be given as:

$$\sigma = \omega\varepsilon_0 e'' = 2\pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

8.3. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Head 2450 MHz
Room Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	40.05	Relative Permittivity (ε_r):	40.054	39.2	2.18	± 5
	e"	13.60	Conductivity (σ):	1.854	1.80	3.00	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
August 11, 2010 10:36 AM

Frequency	e'	e"
2400000000.	40.2267	13.4282
2405000000.	40.2049	13.4515
2410000000.	40.1890	13.4698
2415000000.	40.1690	13.4849
2420000000.	40.1482	13.5104
2425000000.	40.1329	13.5194
2430000000.	40.1175	13.5349
2435000000.	40.1140	13.5498
2440000000.	40.1014	13.5713
2445000000.	40.0868	13.5957
2450000000.	**40.0539**	**13.6021**
2455000000.	40.0381	13.6161
2460000000.	40.0187	13.6229
2465000000.	40.0035	13.6303
2470000000.	39.9809	13.6389
2475000000.	39.9613	13.6561
2480000000.	39.9381	13.6660
2485000000.	39.9241	13.6757
2490000000.	39.9003	13.7026
2495000000.	39.8768	13.7073
2500000000.	39.8707	13.7285

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

ε_0 = 8.854 * 10^{-12}

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz
Room Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.04	Relative Permittivity (ε_r):	52.044	52.7	-1.24	± 5
	e"	14.35	Conductivity (σ):	1.956	1.95	0.32	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
August 11, 2010 10:42 AM

Frequency	e'	e"
2400000000.	52.1815	14.1584
2405000000.	52.1708	14.1789
2410000000.	52.1537	14.1987
2415000000.	52.1340	14.2148
2420000000.	52.1080	14.2302
2425000000.	52.1024	14.2518
2430000000.	52.1008	14.2749
2435000000.	52.1067	14.2919
2440000000.	52.0746	14.3243
2445000000.	52.0688	14.3266
2450000000.	**52.0444**	**14.3527**
2455000000.	52.0351	14.3758
2460000000.	52.0006	14.3837
2465000000.	51.9680	14.3875
2470000000.	51.9582	14.4029
2475000000.	51.9493	14.4162
2480000000.	51.9279	14.4332
2485000000.	51.9129	14.4571
2490000000.	51.8903	14.4890
2495000000.	51.8717	14.5064
2500000000.	51.8638	14.5258

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

ε_0 = 8.854 * 10^{-12}

9. SYSTEM VERIFICATION

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of ±10%.

Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 SN3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW
- The results are normalized to 1 W input power.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.

System validation dipole	Cal. certificate #	Cal. due date	SAR Avg (mW/g)		
			Tissue:	Head	Body
D835V2	D835V2-4d002_Apr09	04/23/12	SAR_{1g}:	9.64	9.96
			SAR_{10g}:	6.28	6.56
D1900V2	D1900V2-5d043_Nov09	11/24/12	SAR_{1g}:	39.8	40.4
			SAR_{10g}:	20.7	21.4
D2450V2	D2450V2-706_Apr10	04/18/13	SAR_{1g}:	51.6	52.4
			SAR_{10g}:	24.4	24.5

9.1. SYSTEM VERIFICATION RESULTS FOR D835V2

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D835V2	07/29/10	SAR_{1g}:	9.71	9.96	-2.51	±10
		SAR_{10g}:	6.41	6.56	-2.29	

9.2. SYSTEM VERIFICATION RESULTS FOR D1900V2

Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D1900V2	08/01/10	SAR_{1g}:	41.6	40.4	2.97	±10
		SAR_{10g}:	22.1	21.4	3.27	

9.3. SYSTEM CHECK RESULTS FOR D2450V2

Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Head			
D2450V2	08/11/10	SAR_{1g}:	54.7	51.6	6.01	±10
		SAR_{10g}:	25.3	24.4	3.69	

10. OUTPUT POWER VERIFICATION

10.1. GSM

GSM (GMSK)

Band	Ch No.	Frequency	Tx Conducted Power (dBm) (Avg burst Pwr)	
			Average	Peak
GSM850	128	824.2	31.67	31.84
	190	836.6	32.07	32.24
	251	848.8	32.31	32.50
GSM1900	512	1850.2	29.76	29.95
	661	1880	29.61	29.80
	810	1909.8	29.18	29.37

GPRS (GMSK) - Coding Scheme: MCS4

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	3 slot	Frame Avg Pwr	4 slot	Frame Avg Pwr
GSM850	128	824.2	31.66	22.66	29.53	**23.53**	27.64	23.38	26.20	23.20
	190	836.6	32.07	23.07	29.57	**23.57**	27.66	23.40	26.36	23.36
	251	848.8	32.27	23.27	29.60	**23.60**	27.65	23.39	26.20	23.20
GSM1900	512	1850.2	29.67	20.67	29.63	23.63	29.58	**25.32**	28.14	25.14
	661	1880	29.47	20.47	29.40	23.40	29.35	**25.09**	28.06	25.06
	810	1909.8	29.05	20.05	29.03	23.03	28.96	**24.70**	27.88	24.88

EGPRS (8PSK) - Coding Scheme: MCS9

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	3 slot	Frame Avg Pwr	4 slot	Frame Avg Pwr
GSM850	128	824.2	27.49	18.49	27.48	21.48	27.48	23.22	26.59	**23.59**
	190	836.6	27.46	18.46	27.44	21.44	27.43	23.17	26.54	**23.54**
	251	848.8	27.39	18.39	27.38	21.38	27.37	23.11	26.48	**23.48**
GSM1900	512	1850.2	26.91	17.91	26.88	20.88	26.86	22.60	26.84	**23.84**
	661	1880	26.93	17.93	26.91	20.91	26.88	22.62	26.86	**23.86**
	810	1909.8	26.79	17.79	26.78	20.78	26.76	22.50	26.72	**23.72**

Note: According to KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1, noted in the following sections indicated below may be considered to determine SAR test reduction requirements for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance.

1. Since the source-based time-averaged output power for EGPRS mode is lower than that in the GPRS mode, therefore Body SAR test reduction is applicable for this device.
2. Based on output power above and time slots, the following worst-case configurations were chosen for Body SAR testing.
    a. GPRS850 2 time slots
    b. GPRS1900 3 time slots

10.2. WIFI RF OUTPUT POWER

802.11b			
Channel #	Freq. (MHz)	Conducted Avg Power	
		(dBm)	(mW)
1	2412	11.8	15.1
6	2437	11.9	15.5
11	2462	12.2	16.6
802.11g			
1	2412	9.8	9.5
6	2437	9.8	9.5
11	2462	10.2	10.5

Note: KDB 248227 - SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

11. SUMMARY OF TEST RESULTS

11.1. GSM850

LEFT HAND SIDE (LHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM850	GSM	Touch (open)	128	824.2		
			190	836.6	0.650	0.480
			251	848.8		
		Tilt (15°C) (open)	128	824.2		
			190	836.6	0.233	0.177
			251	848.8		
GSM850	GSM	Touch (closed)	128	824.2	0.807	0.588
			190	836.6	**1.010**	0.731
			251	848.8	0.872	0.631
		Tilt (15°C) (closed)	128	824.2		
			190	836.6	0.372	0.283
			251	848.8		

RIGHT HAND SIDE (RHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM850	GSM	Touch (open)	128	824.2		
			190	836.6	0.594	0.446
			251	848.8		
		Tilt (15°C) (open)	128	824.2		
			190	836.6	0.235	0.180
			251	848.8		
GSM850	GSM	Touch (closed)	128	824.2	0.694	0.502
			190	836.6	0.902	0.655
			251	848.8	0.831	0.598
		Tilt (15°C) (closed)	128	824.2		
			190	836.6	0.355	0.269
			251	848.8		

BODY WORN with 1.5 cm separation distance

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM850	GPRS 2 slots	Face up	128	824.2		
			190	836.6	0.770	0.566
			251	848.8		
		Face down	128	824.2	1.060	0.717
			190	836.6	**1.290**	0.888
			251	848.8	1.110	0.760
		w/ headset	190	836.6	1.060	0.713

Notes:
According to KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1, the following sections indicated below SAR test reduction requirements are applicable for this device to demonstrate RF exposure compliance.

1) Since the source-based time-averaged output power for EGPRS mode is lower than that in the GPRS mode, therefore Body SAR test reduction is applicable for this device.
2) Based on output power and time slot, GPRS850 2 time slots was chosen for Body SAR testing.

11.2. GSM1900

LEFT HAND SIDE (LHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM1900	GSM	Touch (open)	512	1850.2		
			661	1880.0	0.195	0.125
			810	1909.8		
		Tilt (15°C) (open)	512	1850.2		
			661	1880.0	0.176	0.111
			810	1909.8		
GSM1900	GSM	Touch (closed)	512	1850.2		
			661	1880.0	0.207	0.114
			810	1909.8		
		Tilt (15°C) (closed)	512	1850.2		
			661	1880.0	0.092	0.057
			810	1909.8		

RIGHT HAND SIDE (RHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM1900	GSM	Touch (open)	512	1850.2		
			661	1880.0	0.328	0.203
			810	1909.8		
		Tilt (15°C) (open)	512	1850.2		
			661	1880.0	0.168	0.109
			810	1909.8		
GSM1900	GSM	Touch (closed)	512	1850.2		
			661	1880.0	**0.340**	0.172
			810	1909.8		
		Tilt (15°C) (closed)	512	1850.2		
			661	1880.0	0.083	0.052
			810	1909.8		

BODY WORN with 1.5 cm separation distance

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
GSM1900	GPRS 3 slots	Face up	512	1850.2		
			661	1880.0	0.256	0.148
			810	1909.8		
		Face down	512	1850.2	0.751	0.408
			661	1880.0	0.905	0.486
			810	1909.8	**0.943**	0.485
		w/ headset	810	1909.8	0.873	0.459

Notes:
According to KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1, the following sections indicated below SAR test reduction requirements are applicable for this device to demonstrate RF exposure compliance.

1) Since the source-based time-averaged output power for EGPRS mode is lower than that in the GPRS mode, therefore Body SAR test reduction is applicable for this device.
2) Based on output power and time slot, GPRS1900 3 time slots was chosen for Body SAR testing.

11.3. WIFI

Note: KDB 248227 - SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels

LEFT HAND SIDE (LHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
2.4 GHz	802.11b	Touch (open)	1	2412		
			6	2437	**0.239**	0.117
			11	2462		
		Tilt (15°C) (open)	1	2412		
			6	2437	0.162	0.076
			11	2462		
		Touch (closed)	1	2412		
			6	2437	0.197	0.087
			11	2462		
		Tilt (15°C) (closed)	1	2412		
			6	2437	0.115	0.055
			11	2462		

RIGHT HAND SIDE (RHS)

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
2.4 GHz	802.11b	Touch (open)	1	2412		
			6	2437	0.120	0.064
			11	2462		
		Tilt (15°C) (open)	1	2412		
			6	2437	0.098	0.050
			11	2462		
		Touch (closed)	1	2412		
			6	2437	0.086	0.045
			11	2462		
		Tilt (15°C) (closed)	1	2412		
			6	2437	0.087	0.043
			11	2462		

BODY WORN with 1.5 cm separation distance

Band	Mode	Test position	Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
2.4 GHz	802.11b	Face up	1	2412		
			6	2437	**0.013**	0.00769
			11	2462		
		w/ headset	6	2437	0.010	0.00635
		Face down	1	2412		
			6	2437	0.00518	0.00302
			11	2462		

12. WORST-CASE SAR TEST PLOTS

Worst-case HEAD SAR Plot for Part 22

Date/Time: 7/29/2010 5:51:28 PM

Test Laboratory: Compliance Certification Services

CELL Band_Left Hand Side_close

DUT: Palm; Type: N/A; Serial: N/A

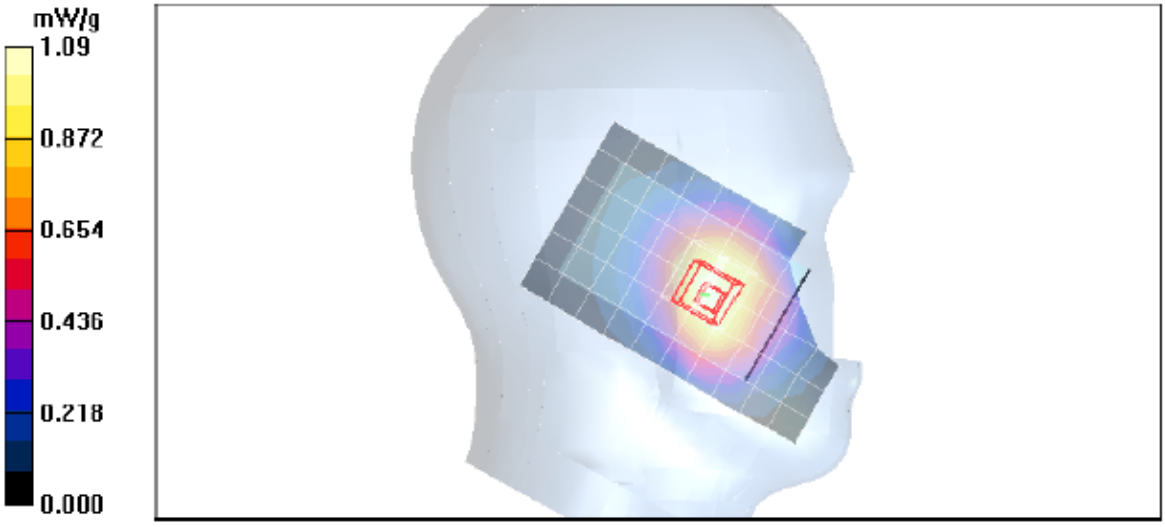
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.895 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Left Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.13, 10.13, 10.13); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch_M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.09 mW/g

Touch_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 34.8 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.731 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.12 mW/g



Worst-case HEAD SAR Plot for Part 24

Date/Time: 8/1/2010 4:38:03 PM

Test Laboratory: Compliance Certification Services

PCS Band_Right Hand Side_close

DUT: Palm; Type: N/A; Serial: N/A

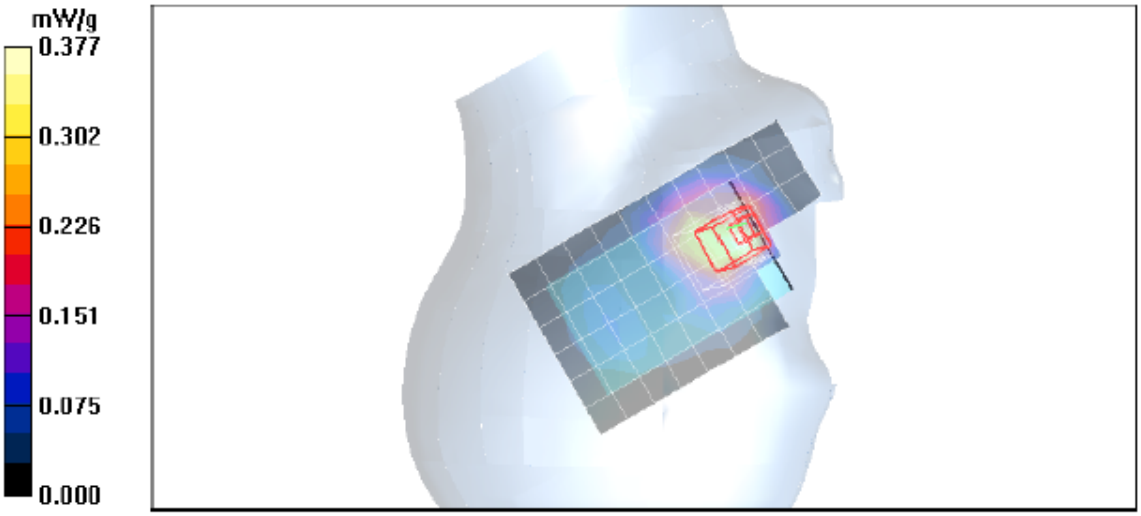
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1880 MHz; σ = 1.4 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Right Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.64, 8.64, 8.64); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch_M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.377 mW/g

Touch_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 16.6 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 0.612 W/kg
SAR(1 g) = 0.340 mW/g; SAR(10 g) = 0.172 mW/g
Maximum value of SAR (measured) = 0.433 mW/g



Worst-case HEAD SAR Plot for Part 15 C

Date/Time: 8/11/2010 3:16:16 PM

Test Laboratory: Compliance Certification Services

WiFi_Left Hand Side_open

DUT: Palm; Type: N/A; Serial: N/A

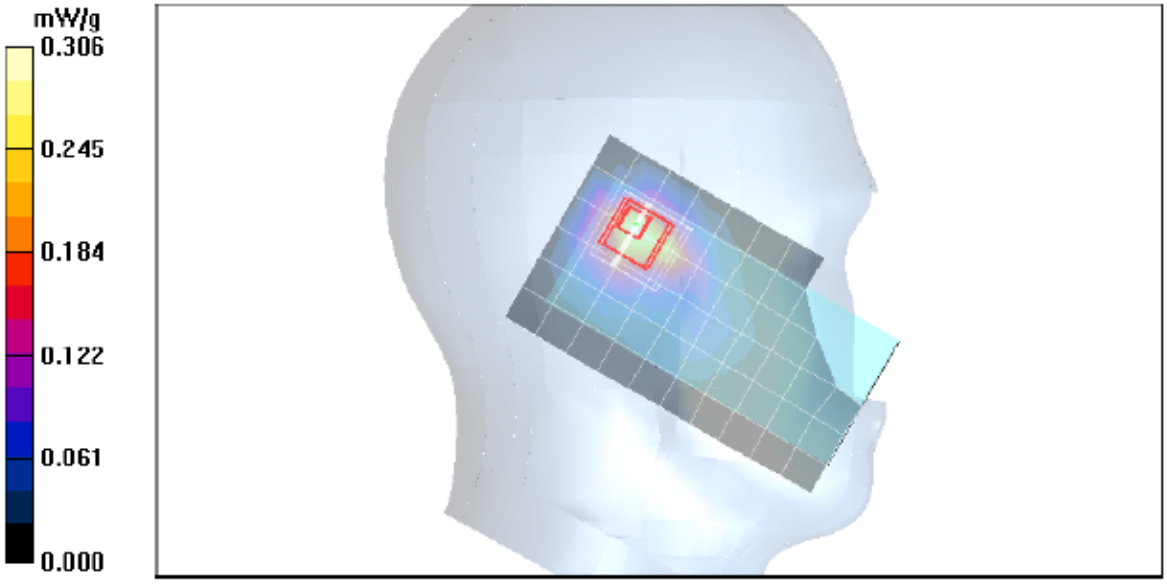
Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.84 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3
Phantom section: Left Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.6, 7.6, 7.6); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch_M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.306 mW/g

Touch_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.0 V/m; Power Drift = -0.209 dB
Peak SAR (extrapolated) = 0.566 W/kg
SAR(1 g) = 0.239 mW/g; SAR(10 g) = 0.117 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.314 mW/g



Worst-case BODY SAR plot for Part 22

Date/Time: 7/29/2010 2:15:12 PM

Test Laboratory: Compliance Certification Services

GPRS 850_Body

DUT: Palm; Type: NA; Serial: NA

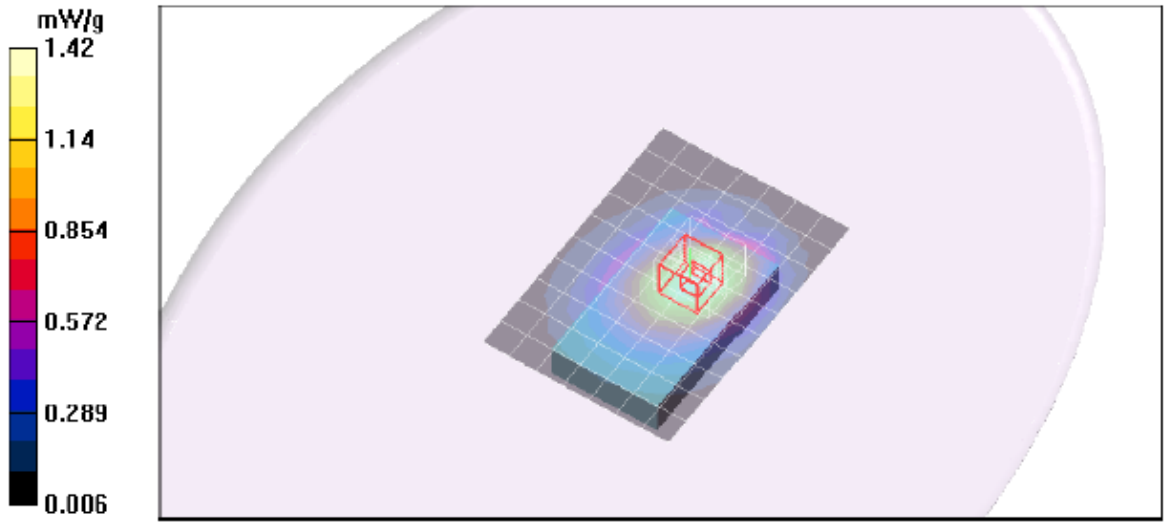
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 836.6 MHz; σ = 1.01 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Face down_2 slot_M-ch/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.42 mW/g

Face down_2 slot_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 38.0 V/m; Power Drift = -0.525 dB
Peak SAR (extrapolated) = 1.82 W/kg
SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.888 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.47 mW/g



Worst-case BODY SAR plot for Part 24

Date/Time: 8/1/2010 2:53:27 PM

Test Laboratory: Compliance Certification Services

PCS Band_Body

DUT: Palm; Type: NA; Serial: NA

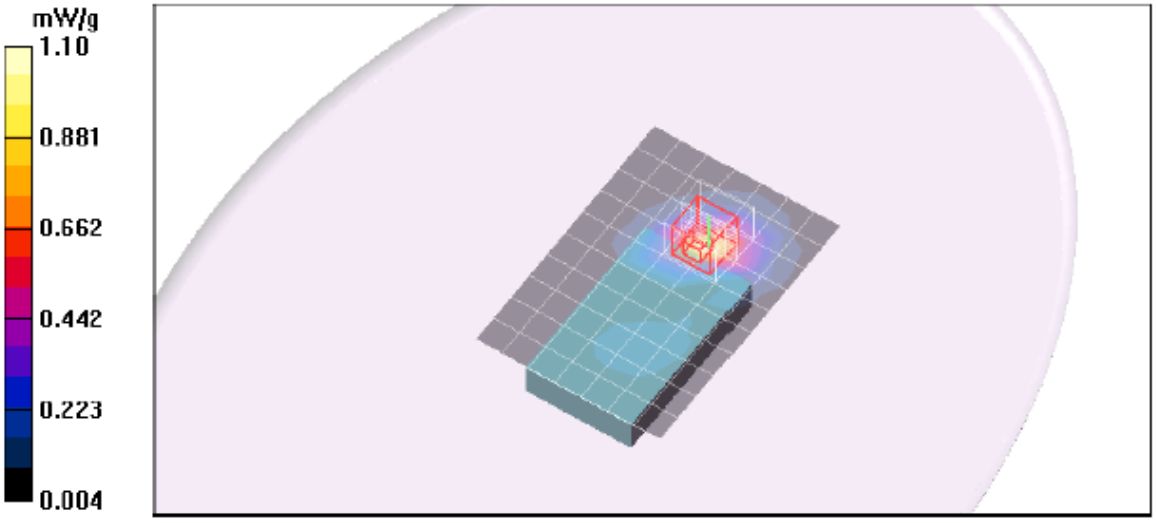
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2.67
Medium parameters used: f = 1910 MHz; σ = 1.51 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Face down_3 slot_H-ch/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.10 mW/g

Face down_3 slot_H-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 27.3 V/m; Power Drift = 0.055 dB
Peak SAR (extrapolated) = 4.32 W/kg
SAR(1 g) = 0.943 mW/g; SAR(10 g) = 0.485 mW/g
Maximum value of SAR (measured) = 1.11 mW/g



Worst-case BODY SAR plot for Part 15 C

Date/Time: 8/11/2010 6:24:51 PM

Test Laboratory: Compliance Certification Services

WiFi_Body

DUT: Palm; Type: N/A; Serial: N/A

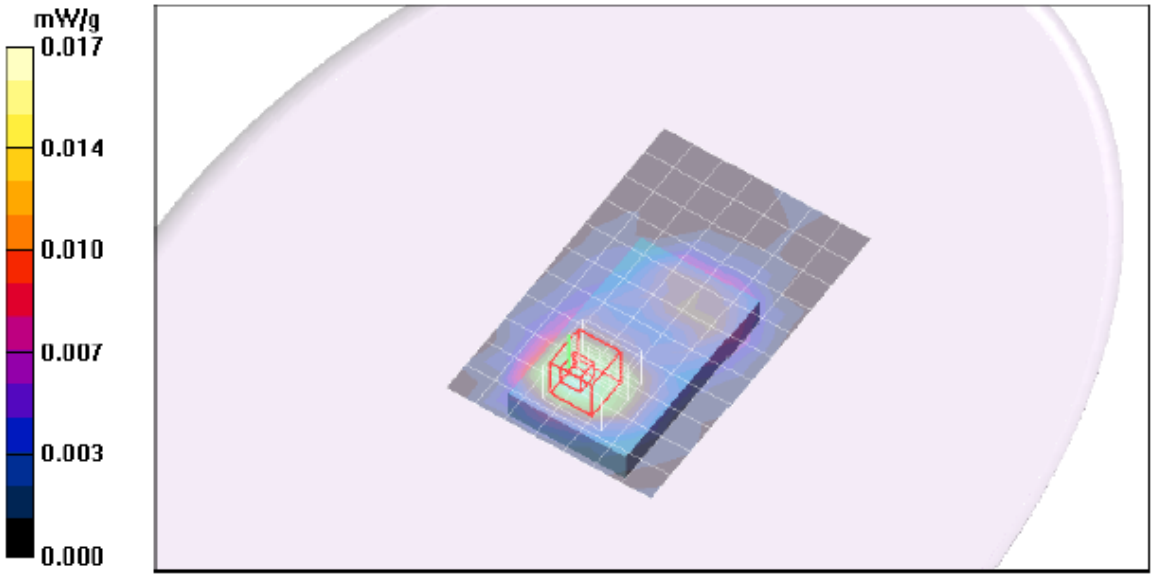
Communication System: 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Face up_M-ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.017 mW/g

Face up_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 2.90 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 0.026 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00769 mW/g
Info: Interpolated medium parameters used for SAR evaluation.



13. KDB 648474 SIMULTANEOUS TRANSMISSION CONSIDERATION

SUMMARY OF SAR EVALUATION FOR A CELL PHONE WITH MULTIPLE TRANSMITTERS

Transmitter	Stand-alone SAR
GSM	Yes
WiFi	Yes
Bluetooth	Not required due to average output is < P_{Ref} (12 mW)

SIMULTANEOUS TRANSMISSION

- GSM can transmit simultaneously with WiFi
- GSM can transmit simultaneously with Bluetooth
- WiFi can transmit simultaneously with Bluetooth

ANTENNA-TO-ANTENNA SEPARATION DISTANCES:

7.5 cm - GSM antenna-to-WiFi/BT main antenna when slide closed
11.0 cm - GSM antenna-to-WiFi/BT main antenna when slide open
0 cm - WiFi antenna-to-BT antenna. (WiFi and BT transmitters sharing a common antenna)

Highest SAR value and the sum of the 1-g SAR for GSM & WiFi

Tes position	Highest 1-g SAR (W/kg)			∑ 1-g SAR (W/kg)
	GSM		WiFi	
Head (LHS Touch closed)	Cellular	1.010	0.197	1.207
Head (RHS Touch closed)	PCS	0.340	0.086	0.537
Body (Face down)	Cellular	1.29	0.00518	1.295
	PCS	0.943	0.00518	0.948

Highest SAR value and the sum of the 1-g SAR for WiFi & GSM

Tes position	Highest 1-g SAR (W/kg)			∑ 1-g SAR (W/kg)
	GSM		WiFi	
Head (LHS touch open)	Cellular	0.650	0.239	0.889
	PCS	0.195		0.434
Body (Face up)	Cellular	0.77	0.013	0.783
	PCS	0.256		0.256

CONCLUSION:

GSM & WFi - Simultaneous transmission SAR not required for GSM & WiFi because the antenna is > 5 cm from each others and the sum of the 1-g SA is < 1.6 W/kg.
GSM & Bluetooth - Simultaneous transmission SAR not required for GSM & Bluetooth because stand-alone SAR not required due to Bluetooth's output < 2. PRef (24 mW) and antenna is > 5 cm from other antenna.
WiFi & Bluetooth - Simultaneous transmission SAR not required for WiFi & Bluetooth because stand-alone SAR not required due to Bluetooth's output < P_{Ref} (12 mW)

14. ATTACHMENTS

No.	Contents	No. of page (s)
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3	Certificate of E-Field Probe – EX3DV4 SN3686	10
4	Certificate of System Validation Dipole - D835V2 SN:4d002	9
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