FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE STD 1528:2003
RSS-102 Issue 4, March 2010
RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011
EN 62209-2:2010
Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003, taking into account Amendment Standard 2011 (No. 2)
NZS 2772.1:1999 Radiofrequency fields - Maximum exposure levels - 3 kHz to 300 GHz incl Amendment No. 1, 1999

SAR EVALUATION REPORT

For
802.11bgn WLAN + Bluetooth PCI-E Mini Card
(Tested inside of PC, TPN-W108)

MODEL: BCM94313HMGB
FCC ID: QDS-BRCM1051I
IC: 4324A-BRCM1051

REPORT NUMBER: 11U14176-1B
ISSUE DATE: January 30, 2012

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	January 19, 2012	Initial Issue	--
A	January 23, 2012	Added ACA and NZS SAR standard	Chakrit.T
B	January 30, 2012	Updated report based on reviewer's comment 1. Sec. 1: Changed frequency from 2462 to 2472 2. Sec. 6: Updated power table 3. Sec 13: Updated frequency from 2462 to 2472 & Average power.	Chakrit.T

Table of Contents

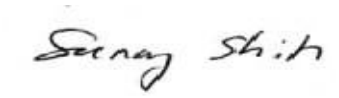
1. Attestation of Test Results

Applicant:	BROADCOM CORPORATION		
EUT description:	802.11bgn WLAN + Bluetooth PCI-E Mini Card (Tested inside of PC, model TPN-W108)		
Model number:	QDS-BRCM1051I		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	January 3, 2012		
FCC/IC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (W/kg)	Limit (W/kg)
15.247/ RSS-102	2412 - 2472	0.04 W/kg (Lap-Held)	1.6
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528:2003 RSS-102 Issue 4, March 2010 and RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011 and EN 62209-2: 2010 Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003, taking into account Amendment Standard 2011 (No. 2) NZS 2772.1:1999 Radiofrequency fields - Maximum exposure levels - 3 kHz to 300 GHz incl Amendment No. 1, 1999			Pass

Compliance Certification Services, Inc. (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:



Sunny Shih
Engineering Team Leader
Compliance Certification Services (UL CCS)

Tested By:

Chakrit Thammanavarat
Test Engineer
Compliance Certification Services (UL CCS)

2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528:2003, RSS-102 Issue 4, March 2010, RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011, Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003, taking into account Amendment Standard 2011 (No. 2), NZS 2772.1:1999 Radiofrequency fields - Maximum exposure levels - 3 kHz to 300 GHz incl Amendment No. 1, 1999 and the following KDB Test Procedures.

- 248227 D01 SAR meas for 802 11abg v01r02
- 616217 D03 SAR Supp Note and Netbook Laptop V01

3. Facilities and Accreditation

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

UL 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
Dielectronic Probe kit	HP	85070C	N/A	N/A		
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV3	3531	12	19	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1258	5	2	2012
System Validation Dipole	SPEAG	*D2450V2	706	4	19	2012
Power Meter	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

Notes:

*Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement. (See Appendix “15.4_Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix “15.4_Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data)

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	2.01	Normal	1	0.64	1.29
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	-3.11	Normal	1	0.6	-1.87
Combined Standard Uncertainty Uc(y) =					9.71
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				19.42	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.54	dB

5. Equipment Under Test

802.11bgn WLAN + Bluetooth PCI-E Mini Card (Tested inside of Notebook PC, Model TPN-W108)			
Mode of operation:	Laptop Mode (with display open at 90º to the keyboard)		
Antenna-to-antenna and antenna-to-user's distances:	Please refer to Antenna Locations & Separation Distances		
Antenna tested:	Manufactured	Part number	Antenna Gain (dBi)
	☒ ACON	Main:APP8P-700360	0.01
		Aux:APP8P-700361	1.94
	☐ WNC	Main: 81.EL815.G42	-2.34
		Aux: 81.EL815.G43	-3.79
Simultaneous transmission:	WiFi cannot transmit simultaneously with Bluetooth		

6. RF Output Power Verification

The following procedures had been used to prepare the EUT for the SAR test.

The client provided a special driver and program, wl_tools, which enable to control the frequency and output power of the module.

Main Antenna

Mode	Ch. #	Freq. (MHz)	Rate	Target Pwr (dBm)	Measured Pwr (dBm)
802.11b	1	2412	1 Mbps	16.18	16.30
	6	2437	1 Mbps	16.02	**16.35**
	13	2472	1 Mbps	10.55	16.05
802.11g	1	2412	6 Mbps	16.13	16.21
	6	2437	6 Mbps	14.31	14.50
	13	2472	6 Mbps	8.08	8.15
802.11n HT20	1	2412	6 Mbps	12.16	
	6	2437	6 Mbps	12.12	
	13	2472	6 Mbps	6.02	

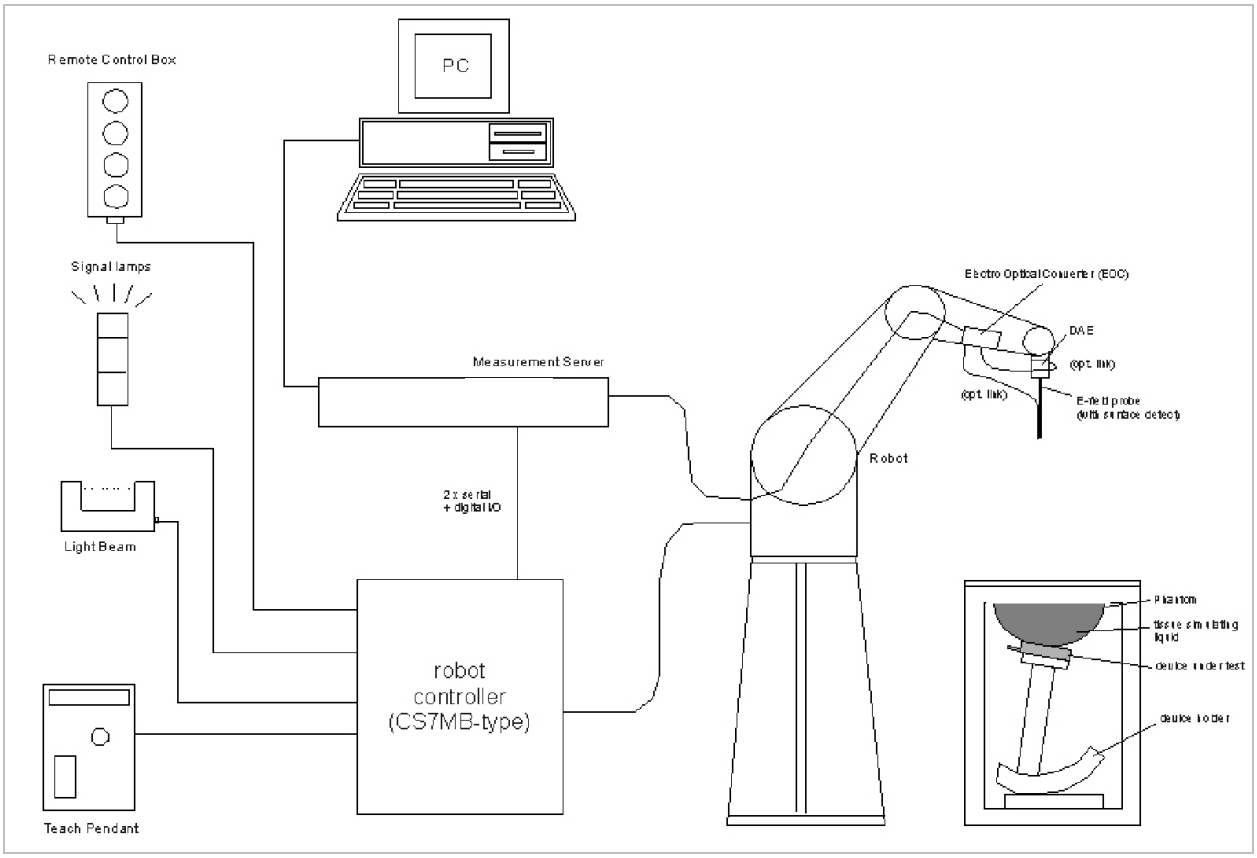
Aux Antenna

Mode	Ch. #	Freq. (MHz)	Rate	Target Pwr (dBm)	Measured Pwr (dBm)
802.11b	1	2412	1 Mbps	16.18	16.30
	6	2437	1 Mbps	16.02	**16.35**
	13	2472	1 Mbps	10.55	16.05
802.11g	1	2412	6 Mbps	16.13	16.21
	6	2437	6 Mbps	14.31	14.50
	13	2472	6 Mbps	8.08	8.15
802.11n HT20	1	2412	6 Mbps	12.16	
	6	2437	6 Mbps	12.12	
	13	2472	6 Mbps	6.02	

Note(s):

The modes with highest output power channel were chosen for the conducted output power measurement. Please refer to original RF report # T11112930404-RP2, (FCC ID: QDS-BRCM1051I) for Average power information as documented in 01/20/2012 CIIPC filing.

7. System Specifications



The DASY 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.
- DASY 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 validating the proper functioning of the system.

8. 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

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

9. Liquid Parameters

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 just under 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 Head & Body Phantom
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

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

Reference Values of Tissue Dielectric Parameters for Body Phantom (for 3000 MHz – 5800 MHz)
In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).
SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured suing a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz).

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

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

9.1. Liquid Check Results

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
1/3/2012	Body 2450	e'	51.1358	Relative Permittivity (ϵ_r):	51.14	52.70	-2.97	5
		e"	14.5973	Conductivity (σ):	1.99	1.95	1.98	5
	Body 2410	e'	51.2937	Relative Permittivity (ϵ_r):	51.29	52.76	-2.78	5
		e"	14.4572	Conductivity (σ):	1.94	1.91	1.56	5
	Body 2435	e'	51.1978	Relative Permittivity (ϵ_r):	51.20	52.73	-2.90	5
		e"	14.5411	Conductivity (σ):	1.97	1.93	1.95	5
	Body 2475	e'	51.0299	Relative Permittivity (ϵ_r):	51.03	52.67	-3.11	5
		e"	14.7143	Conductivity (σ):	2.02	1.99	2.01	5

10. SAR Measurement Procedure

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures ≥ 7x7x9 (above 3 GHz) or 5x5x7 (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

11. 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%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The DASY system with an E-Field Probe 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.

Cal. certificate #	Cal. date	System validation dipole	Freq. (MHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D2450V2-706	4/19/10	D2450V2	2450	1g SAR:	51.60	52.40
				10g SAR:	24.40	24.50

11.1. System Check Results

Date Tested	System validation dipole	Freq. (MHz)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
01/03/12	D2450V2	2450	1g SAR:	54.80	52.40	4.58	±10
			10g SAR:	25.30	24.50	3.27	

11.2. System Check Plots

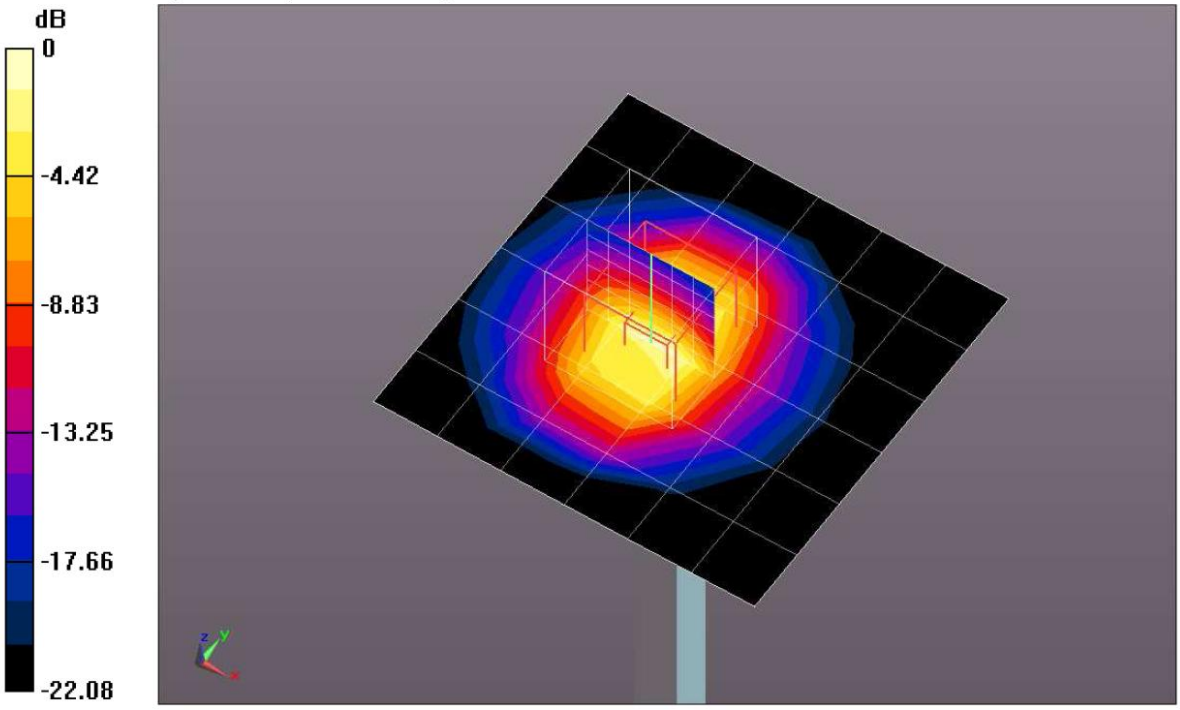
Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

20120103_SystemPerformanceCheck-D2450V2 SN 706

Frequency: 2450 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.136; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Probe: EX3DV3 - SN3531; ConvF(7.44, 7.44, 7.44); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Body/Pin=100 mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.085 mW/g

Body/Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.307 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 11.4420
SAR(1 g) = 5.48 mW/g; SAR(10 g) = 2.53 mW/g
Maximum value of SAR (measured) = 7.764 mW/g



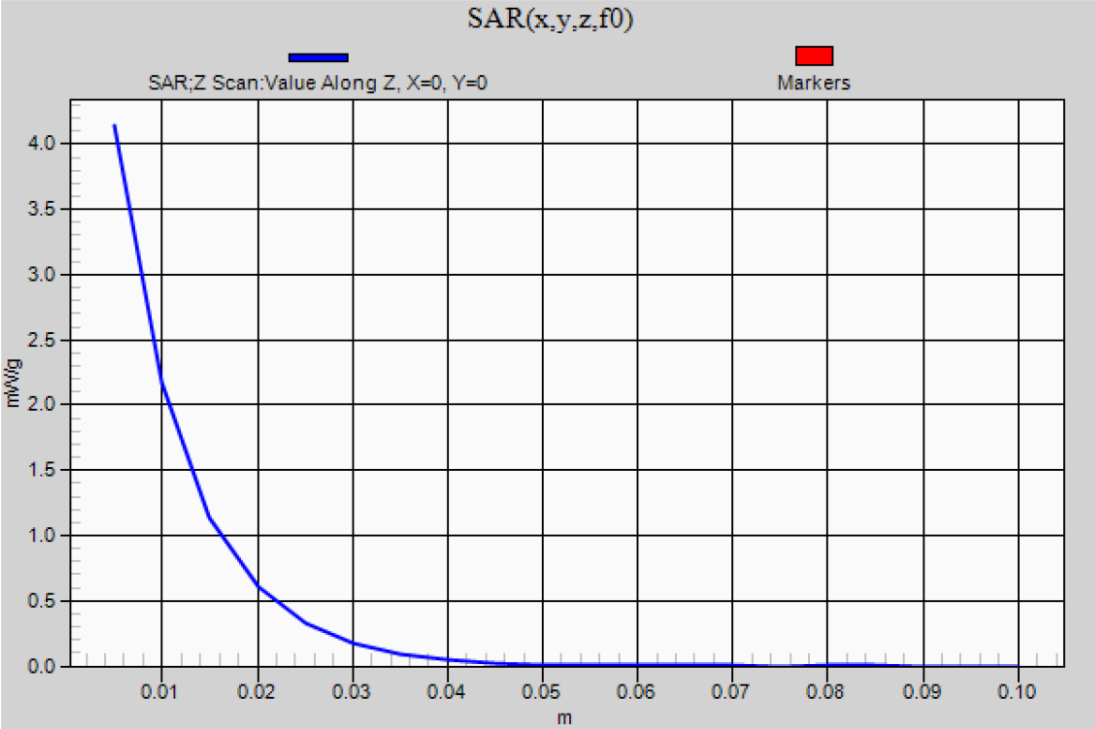
0 dB = 7.760mW/g = 17.80 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

20120103_SystemPerformanceCheck-D2450V2 SN 706

Frequency: 2450 MHz; Duty Cycle: 1:1

Body/Pin=100 mW/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 4.140 mW/g



12. Summary of Test Configurations

Configuration	Antenna-to-User distance	SAR required	Note
Lap-held	14 mm from Main to-user	Yes	
Lap-held	14 mm from Aux to-user	Yes	
Bystanders	--	No	Covered by lap-held test configuration
Bystanders	--	No	Covered by lap-held test configuration

13. SAR Test Results

Main Antenna

Test position	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Lap-held	802.11b	1	2412	16.30			1
		6	2437	16.35	0.035	0.018	
		13	2472	16.05			1

Aux Antenna

Test position	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Lap-held	802.11b	1	2412	16.30			1
		6	2437	16.35	0.036	0.016	
		13	2472	16.05			1

Note(s):

1. Testing was performed on the channel with the highest output power only as the SAR was $\leq$ 0.8 W/kg with the operating frequency band having a range of < 100 MHz. Per KDB 447498 1) e) i).

14. SAR Plots

Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

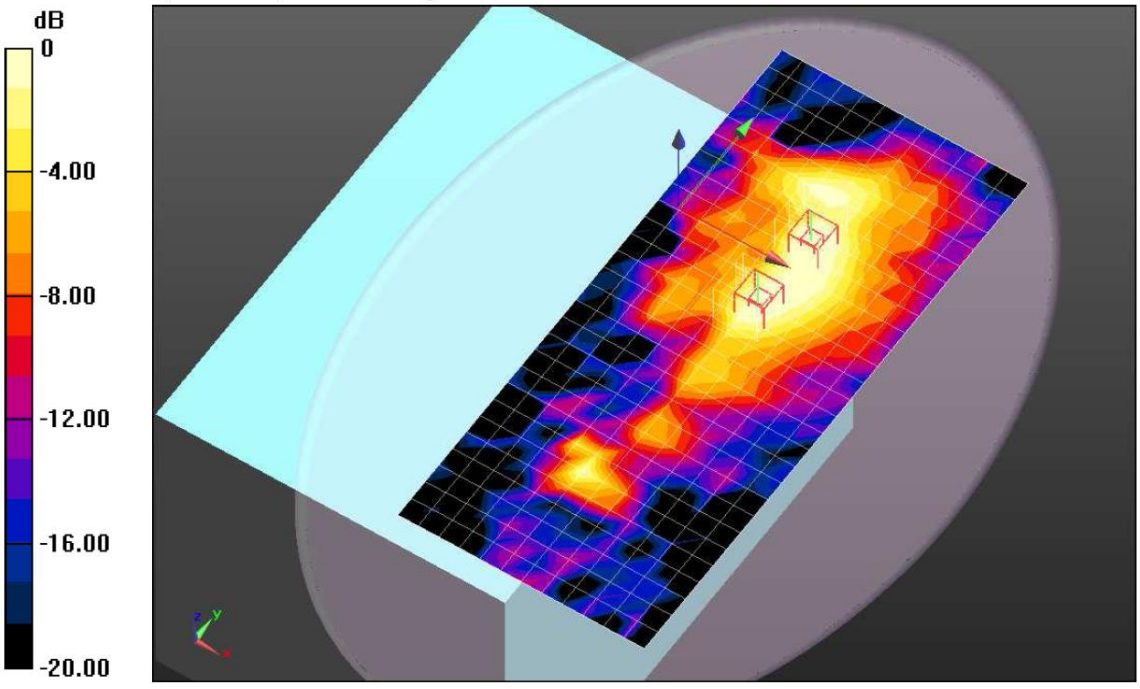
Lap_Held

Frequency: 2437 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.972 mho/m; ε_r = 51.189; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Probe: EX3DV3 - SN3531; ConvF(7.44, 7.44, 7.44); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

802.11b_Main_Ant/ch 6/Area Scan (13x29x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.039 mW/g

802.11b_Main_Ant/ch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.310 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.0700
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.018 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.048 mW/g

802.11b_Main_Ant/ch 6/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.310 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.0500
SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.013 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.035 mW/g



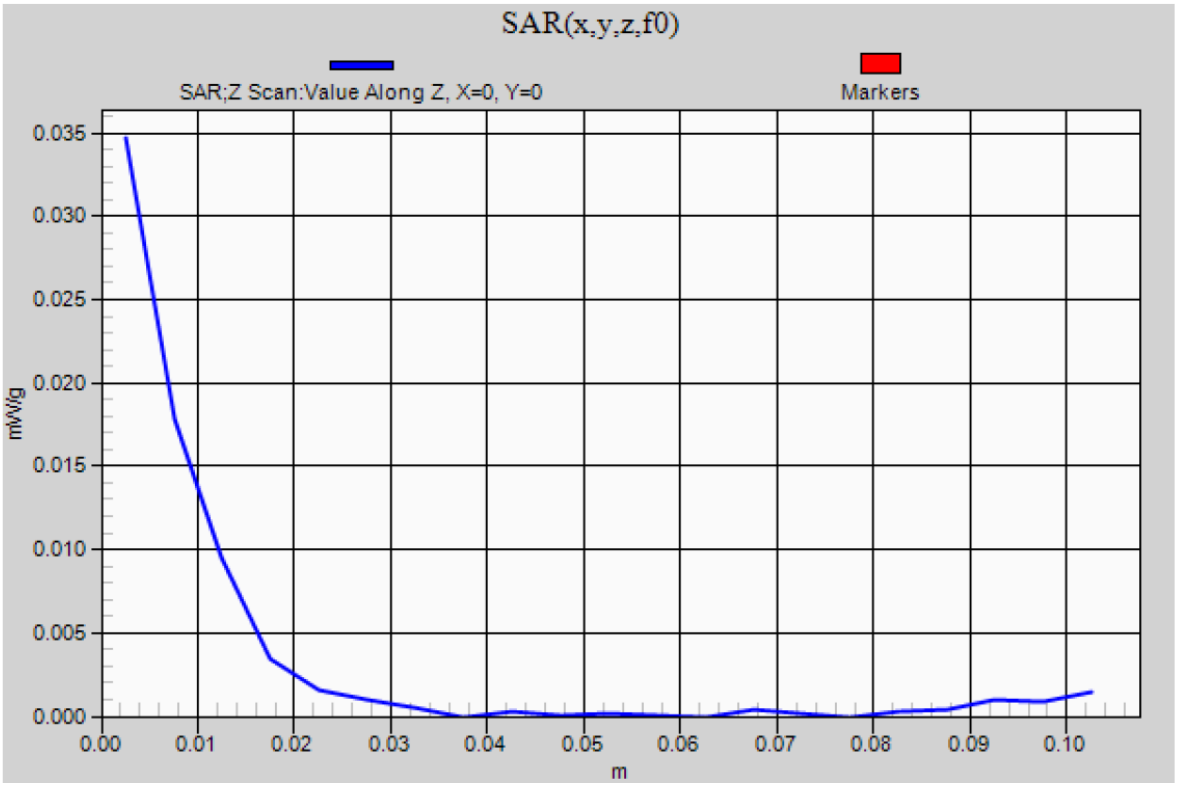
0 dB = 0.030mW/g = -30.46 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

Lap_Held

Frequency: 2437 MHz; Duty Cycle: 1:1

802.11b_Main_Ant/ch 6/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.035 mW/g



Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

Lap_Held

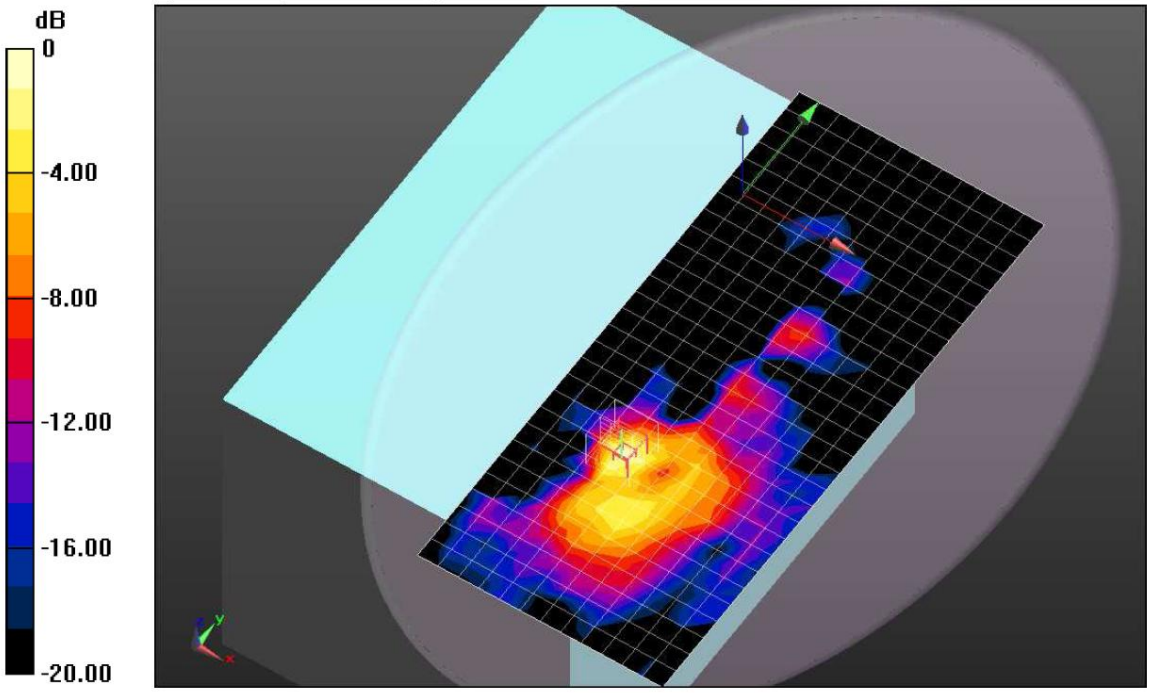
Frequency: 2437 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.972 mho/m; ε_r = 51.189; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Probe: EX3DV3 - SN3531; ConvF(7.44, 7.44, 7.44); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

802.11b_Aux_Ant/ch 6/Area Scan (13x29x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.045 mW/g

802.11b_Aux_Ant/ch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.716 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.0760
SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.016 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.050 mW/g



0 dB = 0.050mW/g = -26.02 dB mW/g

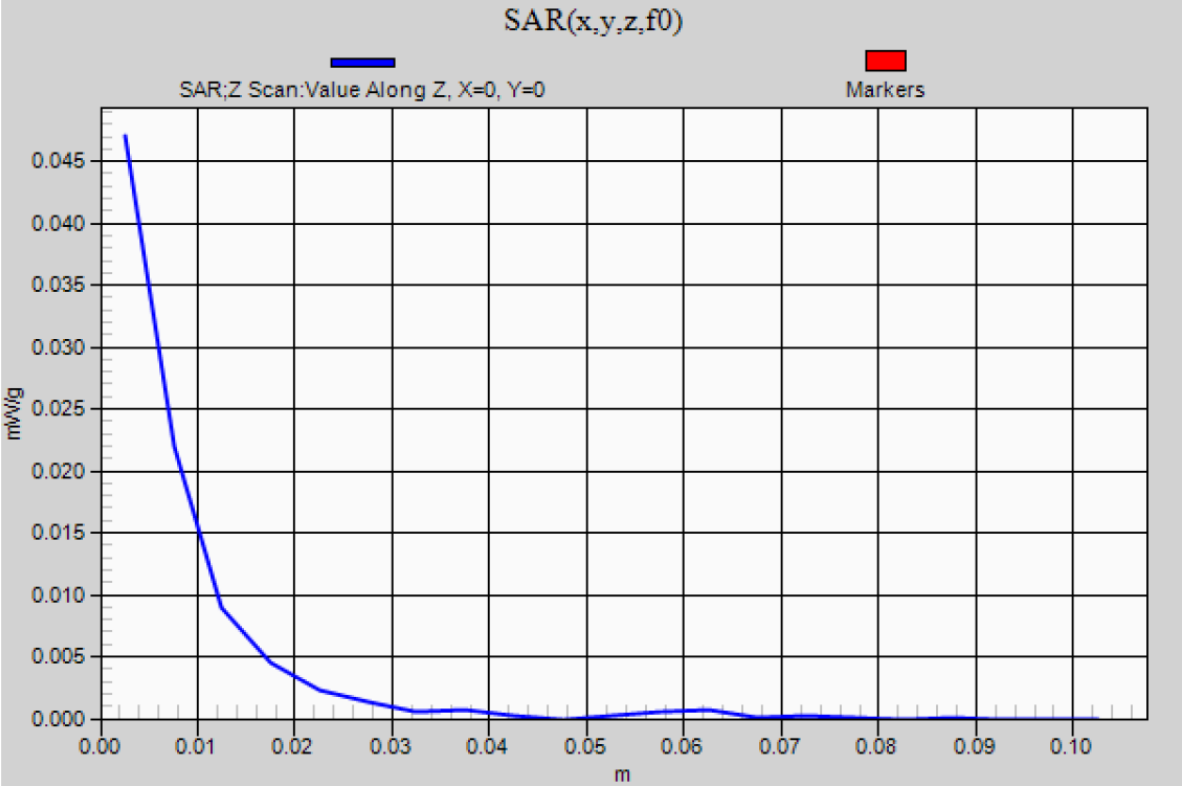
Test Laboratory: UL CCS SAR Lab B Date: 1/3/2012

Lap_Held

Frequency: 2437 MHz; Duty Cycle: 1:1

802.11b_Aux_Ant/ch 6/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.047 mW/g



15. Appendixes

Refer to separated files for the following appendixes.

15.1. Calibration certificate for E-Field Probe EX3DV4 SN 3686

15.2. Calibration certificate for D2450V2 SN: 706 w/ extended cal. Data