DASY5 Validation Report for Body TSL

Date/Time: 15.09.2008 14:13:19

Test Laboratory: SPEAG, Zurich, Switzerland

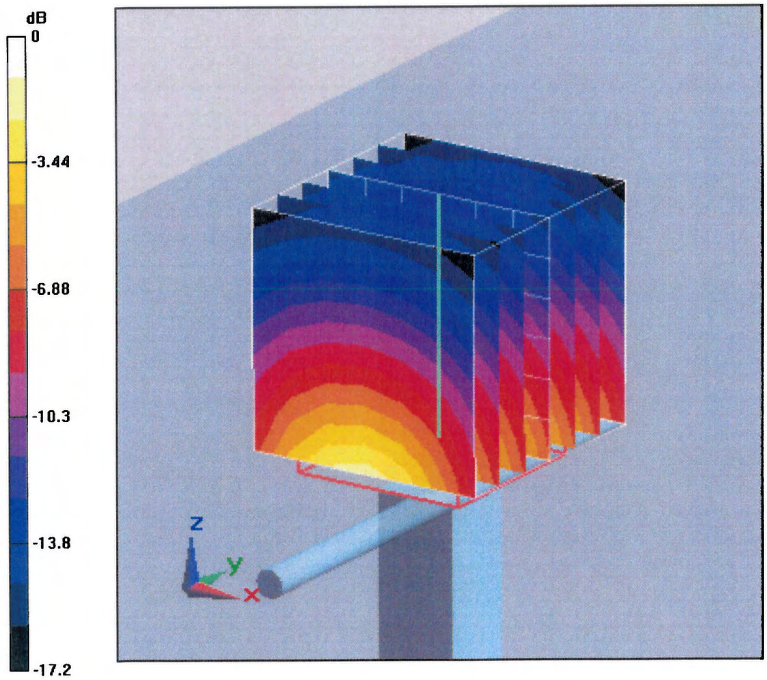
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d016

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB
Medium parameters used: f = 1900 MHz; σ = 1.6 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

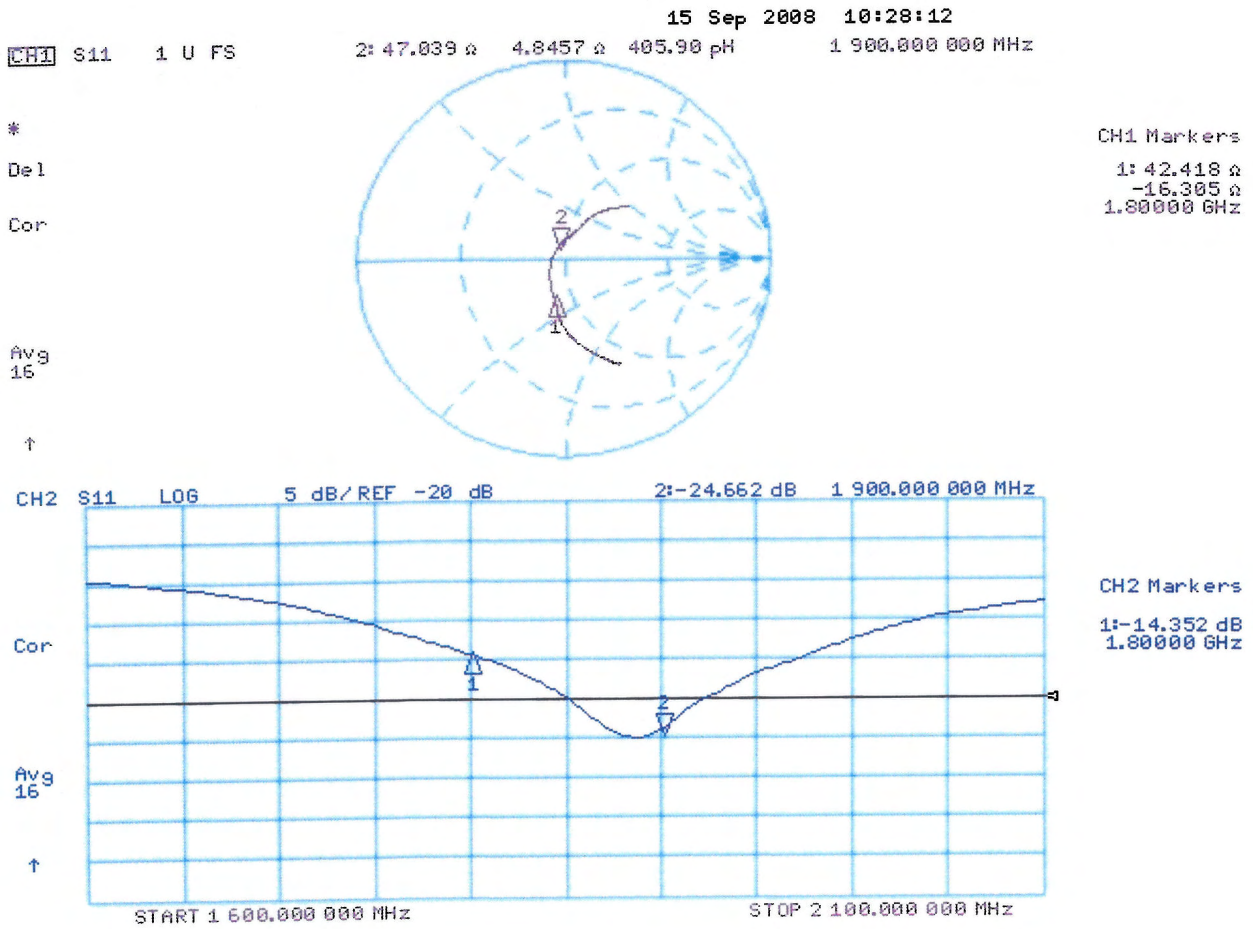
- Probe: ES3DV2 - SN3025; ConvF(4.5, 4.5, 4.5); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Pin = 250 mW; dip = 10 mm, scan at 3.4mm/Zoom Scan (dist=3.4mm, probe 0deg) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.3 V/m; Power Drift = 0.00376 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.31 mW/g
Maximum value of SAR (measured) = 12.5 mW/g



0 dB = 12.5mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **Qualcomm USA**

Certificate No: **D835V2-466_Nov07**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 466
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	November 12, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ET3DV6 (HF)	SN 1507	26-Oct-07 (SPEAG, No. ET3-1507_Oct07)	Oct-08
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	04-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 14, 2007

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.4 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature during test	(21.9 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.34 mW / g
SAR normalized	normalized to 1W	9.36 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.34 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 mW / g
SAR normalized	normalized to 1W	6.12 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.09 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR normalized	normalized to 1W	9.48 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.27 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.15 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω - 5.1 jΩ
Return Loss	- 25.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω - 6.6 jΩ
Return Loss	- 22.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.384 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 27, 2002

DASY4 Validation Report for Head TSL

Date/Time: 07.11.2007 12:23:00

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:466

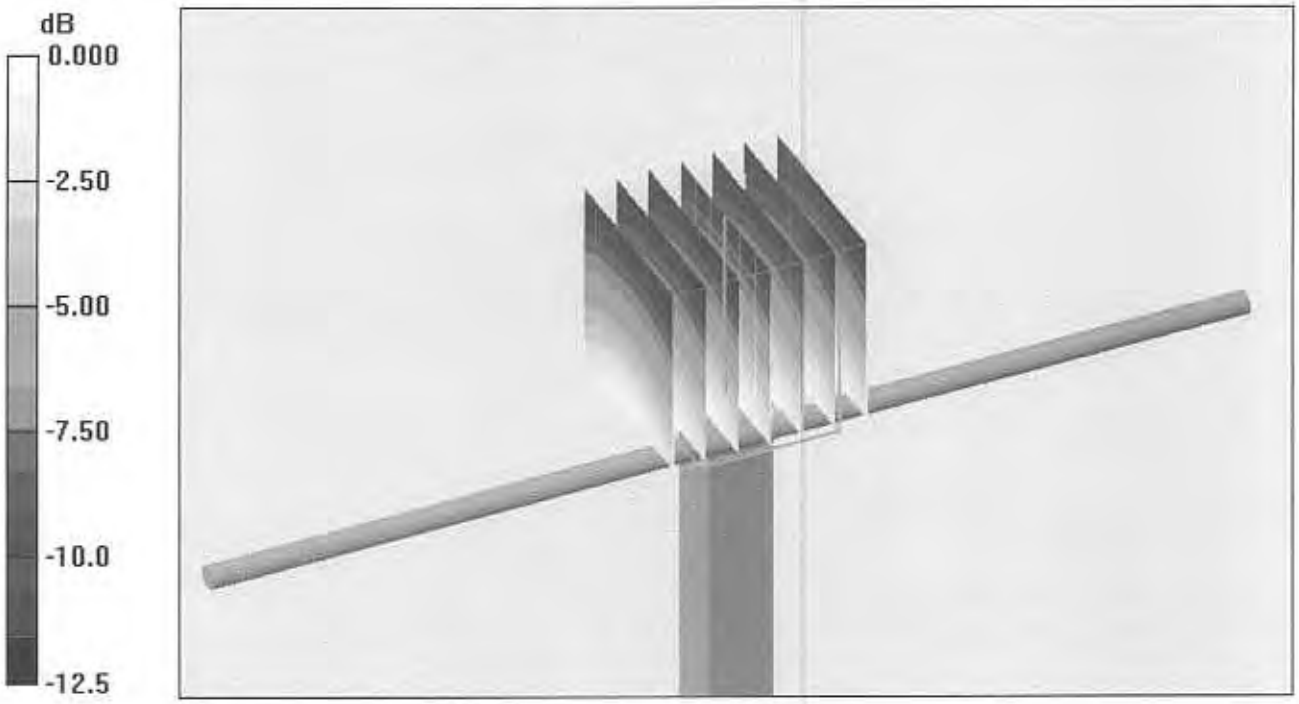
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.01, 6.01, 6.01); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

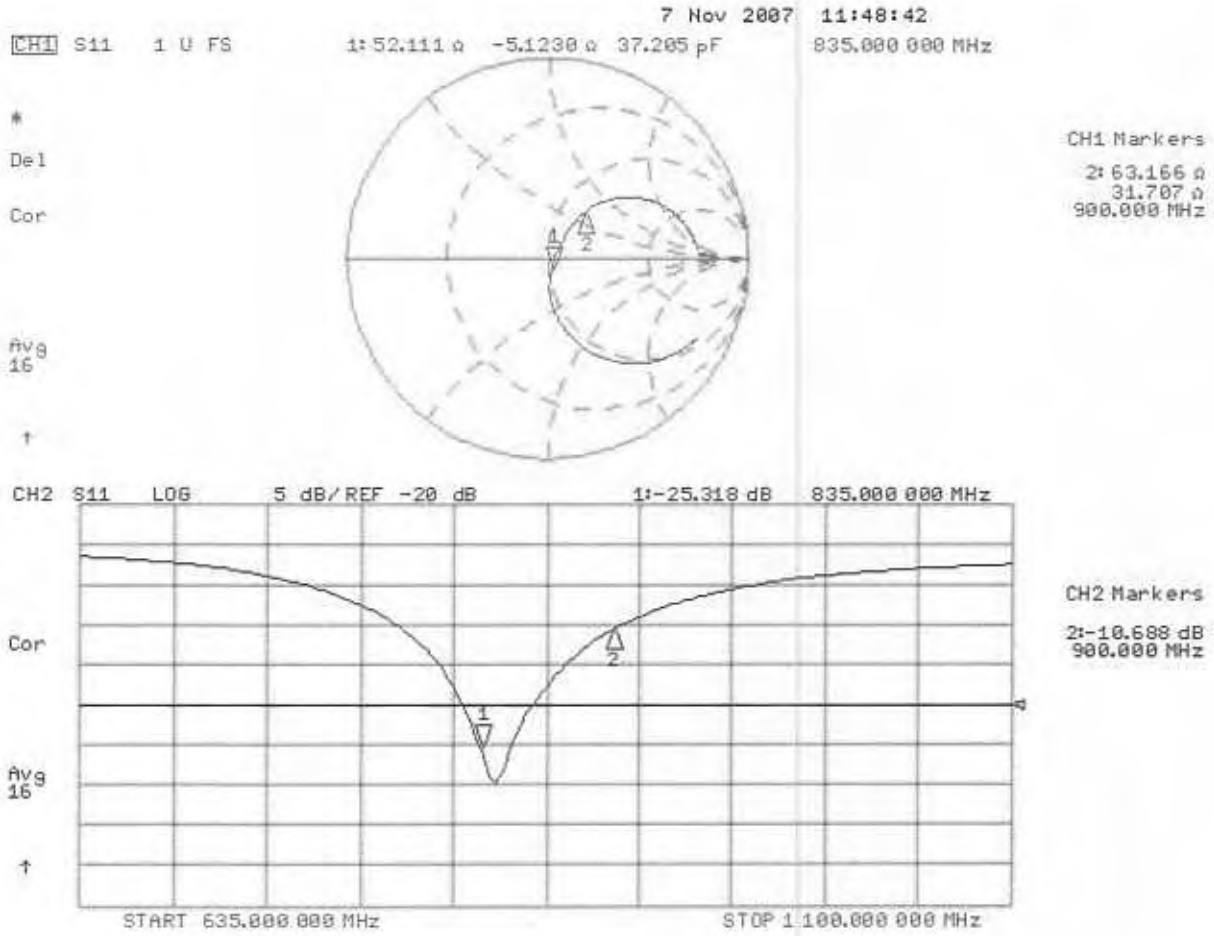
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.5 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.51 mW/g



0 dB = 2.51mW/g

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 12.11.2007 12:06:39

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:466

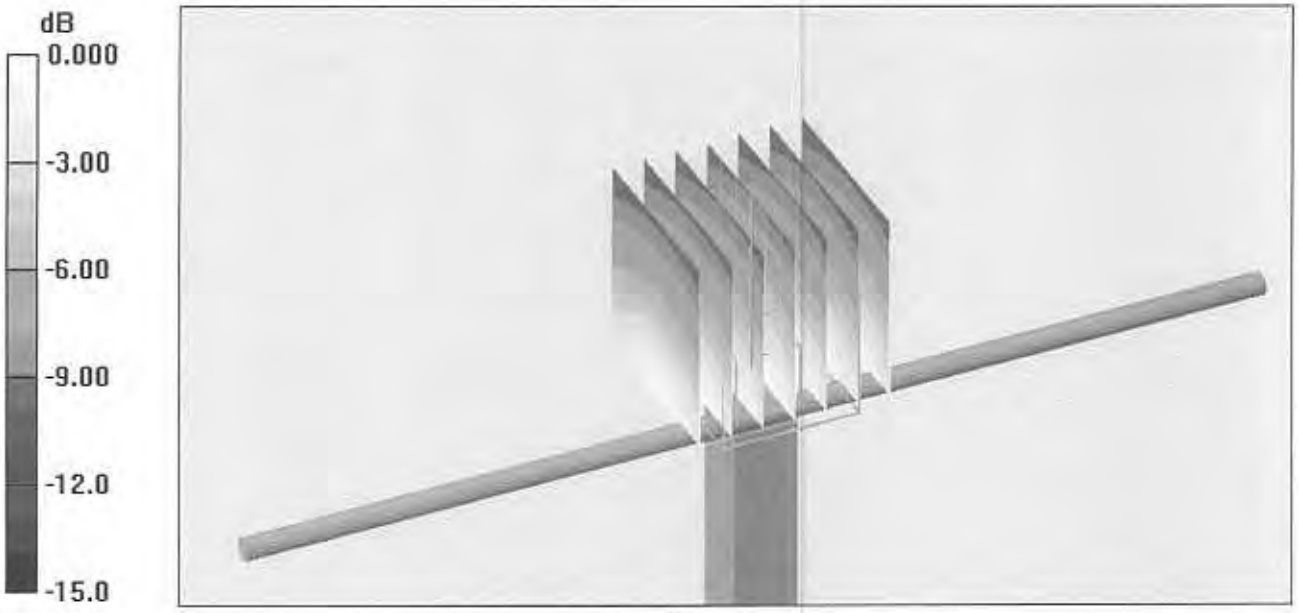
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900;
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.83, 5.83, 5.83); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

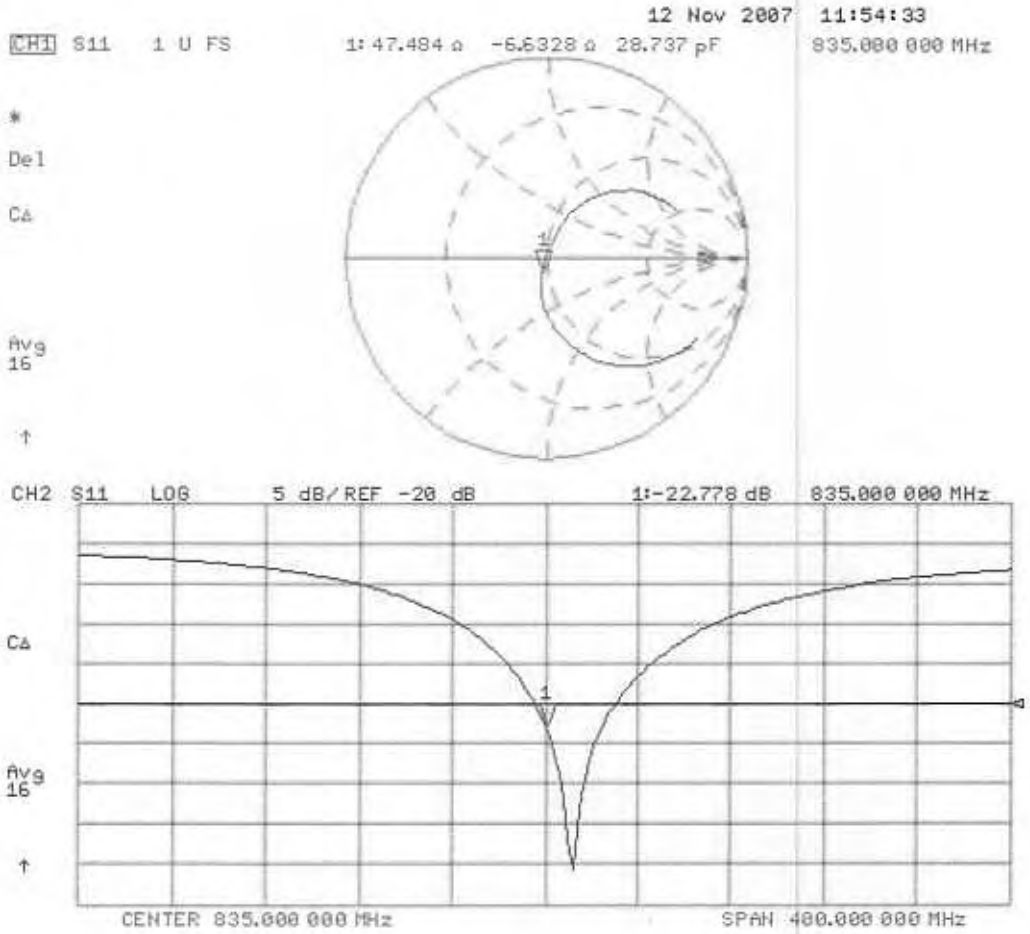
Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.1 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.56 mW/g



0 dB = 2.56mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **Qualcomm USA**

Certificate No: **DAE3-400_Mar08**

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 400
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	March 5, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (Elcal AG, No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (Elcal AG, No: 6465)	Oct-08
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	25-Jun-07 (SPEAG, in house check)	In house check Jun-08

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: March 5, 2008

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1µV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.689 ± 0.1% (k=2)	405.159 ± 0.1% (k=2)	403.680 ± 0.1% (k=2)
Low Range	3.96738 ± 0.7% (k=2)	3.96885 ± 0.7% (k=2)	3.91978 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	347 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	199999.6	0.00
Channel X	+ Input	20000	20006.05	0.03
Channel X	- Input	20000	-20001.79	0.01
Channel Y	+ Input	200000	199999.8	0.00
Channel Y	+ Input	20000	20006.87	0.03
Channel Y	- Input	20000	-19998.83	-0.01
Channel Z	+ Input	200000	200000	0.00
Channel Z	+ Input	20000	20004.03	0.02
Channel Z	- Input	20000	-20004.39	0.02

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000	0.00
Channel X	+ Input	200	199.82	-0.09
Channel X	- Input	200	-199.40	-0.30
Channel Y	+ Input	2000	2000	0.00
Channel Y	+ Input	200	199.99	0.00
Channel Y	- Input	200	-200.53	0.27
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	198.94	-0.53
Channel Z	- Input	200	-200.89	0.44

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-5.64	-7.20
	- 200	9.15	7.89
Channel Y	200	-8.45	-8.44
	- 200	7.61	7.76
Channel Z	200	20.82	20.67
	- 200	-20.24	-23.02

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.30	-0.21
Channel Y	200	1.14	-	4.22
Channel Z	200	-0.34	1.22	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15653	15677
Channel Y	15956	15909
Channel Z	16453	16956

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.55	-1.14	1.75	0.57
Channel Y	-1.31	-3.09	0.00	0.54
Channel Z	-1.26	-2.81	0.25	0.52

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	197.2
Channel Y	0.2002	198.6
Channel Z	0.1999	198.7

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9

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s p e a g

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IMPORTANT NOTICE

USAGE OF THE DAE 3

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE3 unit is connected to a fragile 3-pin battery connector. Customer is responsible to apply outmost caution not to bend or damage the connector when changing batteries.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration Customer shall remove the batteries and pack the DAE in an antistatic bag. The packaging shall protect the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, Customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Schmid & Partner Engineering

QUALCOMM®

5775 Morehouse Drive, San Diego, CA 92121-2779

Report # 14352:1190361639

Certificate of Calibration

Manufacturer: GIGATRONICS **Model #:** 8542C

Asset #: K82228 **Serial Number:** 1834430

Description: POWER METER

QUALCOMM Incorporated hereby certifies that...

the above described instrument met or exceeded all published specifications at the time of calibration specified below; and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (NIST) within the limitations of the Institute's calibration services, or have been derived from accepted values or physical constants, or have been derived by ratio or self calibration techniques. The collective uncertainty of the measurement standards have not exceeded 4:1 test accuracy ratio for each characteristic calibrated, unless otherwise noted. All calibration activities performed are in compliance with MIL-STD-45662A, ANSI/NCSL Z540-1-1994, ISO-9001-1994, and ISO 10012-1:1992. This report and its results refer only to the item(s) calibrated and are not to be reproduced, except in full, without the written approval of the Qualcomm Incorporated Calibration Laboratory.

CALIBRATION INFORMATION

Cal Date	09/21/2007	**Interval**	12	**Cal Temp**	22
Cal Due	09/21/2008	**Data**	YES	**Humidity**	53
Tech	Troy Howard	**Pass**	YES	**Seals OK**	YES

Condition Received IN TOLERANCE

Condition Returned MEETS MFR'S SPECS

Physical Condition of Equipment GOOD

Out of Tolerance Conditions/Limitation

Cal Procedure Gigatronics 8540C Series Power Meters **Revision** QUAL- 031125 REV 1.1

STANDARDS USED FOR CALIBRATION

Asset Number	MFG	Model	Description	Cal Date	Due Date
X03045	AGILENT TECHNOLOGIES	34401A	MULTIMETER	05/10/07	11/09/07
X11013	AGILENT TECHNOLOGIES	3335A	SYNTHESIZER/LEVEL GENERATOR	07/26/07	07/25/08
X21296	GIGATRONICS	80301A	POWER SENSOR	10/24/06	10/24/07
K65267	AGILENT TECHNOLOGIES	432A	POWER METER	11/22/06	11/22/07
X10665	AGILENT TECHNOLOGIES	478A	THERMISTOR MOUNT	11/08/06	11/08/07

Signed: [signature] **Date:** 09/21/2007

K147392

Agilent Technologies

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Malaysia

5962-0476

Certificate Of Calibration

Certificate No: E5515CMY47510396

Manufacturer: Agilent Technologies
Model No: E5515C
Options Installed With Specifications: 002 003 H08

Description: WIRELESS COM.TST.SET
Serial No: MY47510396

Date of Calibration: 03-APR-2008
Temperature: (24 +/- 4)°C
Procedure: ATM-15-C0000

Humidity: 20% - 80% RH

This certifies that the above product was calibrated in compliance with a quality system registered to ISO 9001:2000, using applicable Agilent Technologies' procedures.

As Received: Factory tested - No incoming data available.

As Shipped Conditions: At the completion of the calibration, measured values were IN-SPECIFICATION at the points tested.

These calibration procedures and test points are those recommended in a procedure developed by Agilent.

Remarks or special requirements:

Traceability Information: Traceability is to national standards administered by the U. S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc.) or other recognized standards laboratories. Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. Supporting documentation relative to traceability is available for review by appointment. This report shall not be reproduced, except in full, without prior written approval of the calibration facility.

Calibration Equipment Used:

Date Used: Date equipment used in this Calibration.

Model Number	Model Description	Trace Number	Date Used	Cal Due Date
11715A	AM/FM TEST SOURCE	PA2481	03-APR-2008	18-DEC-2008
11715A	AM/FM TEST SOURCE	PA2485	03-APR-2008	18-DEC-2008
3458A	8-1/2 DIGIT MULTIMETER	PA2343	03-APR-2008	25-JUL-2008
3458A	8-1/2 DIGIT MULTIMETER	PA2484	03-APR-2008	18-DEC-2008
35W1000	AMPLIFIER	PA2390	03-APR-2008	10-SEP-2008
54602B	OSCILLOSCOPE	PA2479	03-APR-2008	18-DEC-2008
8481D	POWER SENSOR	PA2382	03-APR-2008	10-SEP-2008
8481D	POWER SENSOR	PA2494	03-APR-2008	17-JAN-2009

Print Date: 04-APR-2008

Tay Eng Su
Quality Manager

cert form rev d

Agilent Technologies

Agilent Technologies (M) Sdn Bhd (012767-W)
Bayan Lepas Free Industrial Zone
11900 Penang
Malaysia

5962-0476

Certificate Of Calibration

Certificate No: E5515CMY47510396

Calibration Equipment Used:

Date Used: Date equipment used in this Calibration.

Model Number	Model Description	Trace Number	Date Used	Cal Due Date
8482A	POWER SENSOR	PA2125	03-APR-2008	08-APR-2008
8482A	POWER SENSOR	PA2357	03-APR-2008	30-SEP-2008
8482A	POWER SENSOR	PA2495	03-APR-2008	16-JAN-2009
8563E	SPECTRUM ANALYZER	PA2021	03-APR-2008	11-OCT-2008
8663A	SYNTHESIZED SIGNAL GENERATOR	PA2486	03-APR-2008	18-DEC-2008
8665B	SYNTHESIZED SIGNAL GENERATOR	PA2134	03-APR-2008	30-JUL-2008
8901A	MODULATION ANALYZER	PA2487	03-APR-2008	22-OCT-2008
8903B	AUDIO ANALYZER	PA2346	03-APR-2008	23-JUL-2008
8903B	AUDIO ANALYZER	PA2488	03-APR-2008	06-NOV-2008
8904A	MULTIFUNCTION SYNTHESIZER	PA2340	03-APR-2008	23-JUL-2008
8904A	MULTIFUNCTION SYNTHESIZER	PA2480	03-APR-2008	18-DEC-2008
89441A	VECTOR SIGNAL ANALYZER	PA2087	03-APR-2008	15-JAN-2009
E4419B	EPM SERIES POWER METER	PA2056	03-APR-2008	17-AUG-2008
E4419B	EPM SERIES POWER METER	PA2371	03-APR-2008	10-SEP-2008
E4419B	EPM SERIES POWER METER	PA2496	03-APR-2008	16-JAN-2009
E4437B	SIGNAL GENERATOR	PA2077	03-APR-2008	22-DEC-2008
E4437B	SIGNAL GENERATOR	PA2082	03-APR-2008	05-NOV-2008
E4437B	SIGNAL GENERATOR	PA2369	03-APR-2008	31-JUL-2008
E4438C	SIGNAL GENERATOR	PA2078	03-APR-2008	06-NOV-2008
E4440A	SPECTRUM ANALYZER	PA2501	03-APR-2008	17-JAN-2009
ET30897	REF SOURCE 0DBM	PA2500	03-APR-2008	27-AUG-2008
GRF5008	RF POWER AMP 2-4GHZ	PA2368	03-APR-2008	10-SEP-2008
GRF5022	RF POWER AMP 1-2GHZ	PA2375	03-APR-2008	10-SEP-2008
PS-400	AUDIO POWER AMPLIFIER	PA2389	03-APR-2008	23-JUL-2008

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K82012

Agilent Technologies AGILENT TECHNOLOGIES INTERNAL ASSESSMENT PROGRAM : EMG E102/1995	U.S. EPSG Service Centers Irvine Branch 17811 Sky Park Circle BLDG9 SuiteFG Irvine, CA 92614 (800) 829-4444

Certificate of Calibration

Agilent Calibration

Certificate Number: 1-1332469872-1

Manufacturer: Hewlett-Packard Co.
Model Number: 8714C
Serial Number: US38171129
Customer:
Qualcomm Inc
9393 Waples St Ste 150
Receiving
SAN DIEGO CA 92121-3907
UNITED STATES

Description: RF Network Analyzer, 3 GHz
Options Installed:
Customer Asset No: K82012
Location of Calibration:
U.S. EPSG Service Centers
Irvine Branch
17811 Sky Park Circle BLDG9 SuiteFG
Irvine, CA 92614 (800) 829-4444

Procedure: STE-50112873-A.05.02A
Date of Calibration: 1 Jul 2008
Temperature: (23 +/- 5) °C

Customer PO Number FITO CISNEROS-CC
Humidity: (50 +/- 30)% RH

This certifies that the above product was calibrated in compliance with a quality system registered to ISO 9001:2000 using applicable Agilent Technologies procedures.

As Received Conditions:
Initial testing found the equipment to be **IN-SPECIFICATION** at the points tested.

As Shipped Conditions:
At the completion of the calibration, measured values were **IN-SPECIFICATION** at the points tested.

Remarks or Special Requirements:

Our calibration procedures are designed to provide measurement uncertainty of less than or equal to one quarter of the specification of the unit under test, where possible, with a coverage factor of 2.

The test limits stated in the report correspond to the published specifications of the equipment, at the points tested.

This certificate is composed of 2 pages containing a summary of calibration information.

Based on the recommended calibration interval, the next calibration is due on 1 Jul 2009.

Print Date: 1 Jul 2008

Rick Whitcomb Americas Delivery Mgr.

Agilent Technologies

AGILENT TECHNOLOGIES
INTERNAL ASSESSMENT
PROGRAM : EMG
E102/1995

U.S. EPSG Service Centers
Irvine Branch
17811 Sky Park Circle BLDG9 SuiteFG
Irvine, CA 92614 (800) 829-4444

Certificate of Calibration

Agilent Calibration

Certificate Number: 1-1332469872-1

Traceability Information:

Technician ID Number: 571473

Traceability is to national standards administered by the U.S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc,) or other recognized standards laboratories.

Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements.

Supporting documentation relative to traceability is available for review by appointment.

Calibration Equipment Used:

Model Number:	Model Description:	Trace Number:	Cal Due Date:	Certificate Number:
33250A	FUNCTION/ARB WAVEFORM GENERATO	33250A13208	13 Feb 2009	1-1209345471-9
8491B	Coaxial Attenuator, dc-18 GHz, Type N	8491B22687	12 Oct 2008	1-1116360923-1
85032B	50-ohm Type N Calibration Kit	85032B00590	15 May 2009	1-1296338903-1
8491B	Coaxial Attenuator, dc-18 GHz, Type N	8491B20469	12 Oct 2008	1-1116393221-1
8491B	Coaxial Attenuator, dc-18 GHz, Type N	8491B21967	12 Oct 2008	1-1116280674-1
11667A	DC-18 GHz power splitter, Type N, 50 ohm	11667A14796	28 Aug 2008	1-736835579-1
8491B	Coaxial Attenuator, dc-18 GHz, Type N	8491B28495	12 Oct 2008	1-1116280193-1
5343A	Microwave Frequency Counter	5343A01869	14 May 2009	1-1284667857-16
438A	Dual-channel power meter with GPIB	438A05992	13 Aug 2008	1-735025904-17
8482A	Power sensor, 100 kHz to 4.2 GHz	8482A15126	22 Aug 2008	1-742109126-1
8496G	0-110dB Prog. Step Attenuator, 0-4GHz	8496G40661	15 May 2009	1-1296374720-1
E4448A	PSA Spectrum Analyzer 3 Hz - 50 GHz	E4448A00183	28 Aug 2008	1-742887744-1

Measurement Report

AGILENT TECHNOLOGIES
17811 Sky Park Circle
Building 9, Suite FG
Irvine, CA 92614

Report Number: 1-1332469872-1
Customer: QUALCOMM INC
Manufacturer: Hewlett-Packard Co. (Agilent Technologies)
Cust. Unit No.: K82012
Model Number: 8714C (HP8714C)
Serial Number: US38171129
Options Installed: none
Firmware Version:

Test Date: 1 Jul 2008
Tested By: 571473
Temperature: 23±5 °C
Humidity: 5 to 80% RH

Test Program Name: HP871X Part No. 5011-2873
Test Program Version: A.05.02A
Test Executive: STE/9000 C.08.21 (MENDOR B.06.13A)

Specification Limits:

Unless indicated otherwise, the units for minimum and/or maximum specification limits are the same as the units stated for the measured value.

Calibration Standards Used

Model No.	Serial No.	Trace No.	Cal Due Date
AGT8496G	MY42140661	8496G40661	15 May 2009
AGTE4448A	MY45300183	E4448A00183	28 Aug 2008
HP11667A	14796	11667A14796	28 Aug 2008
HP33250A	MY40013208	33250A13208	13 Feb 2009
HP438A	2822A05992	438A05992	13 Aug 2008
HP5343A	2438A01869	5343A01869	14 May 2009
HP8482A	2652A15126	8482A15126	22 Aug 2008
HP8491B	028495	8491B28495	12 Oct 2008
HP8491B	20469	8491B20469	12 Oct 2008
HP8491B	21967	8491B21967	12 Oct 2008
HP8491B	22687	8491B22687	12 Oct 2008
HP85032B	2541A00590	85032B00590	15 May 2009

Measurement Report

Report Number: 1-1332469872-1 **Test Date:** 1 Jul 2008
Model Number: HP8714C
Serial Number: US38171129 **Cust. Unit No.:** K82012

FREQUENCY ACCURACY

PASSED

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM
Frequency Error at			
10.000000 MHz	-0.050	-0.007 kHz	0.050
50.000000 MHz	-0.250	-0.034 kHz	0.250
123.456789 MHz	-0.617	-0.086 kHz	0.617
500.000000 MHz	-2.500	-0.349 kHz	2.500
1000.000000 MHz	-5.000	-0.698 kHz	5.000
1300.000000 MHz	-6.500	-0.908 kHz	6.500
1905.000000 MHz	-9.525	-1.332 kHz	9.525
1915.000000 MHz	-9.575	-1.339 kHz	9.575
2500.000000 MHz	-12.500	-1.747 kHz	12.500
2850.000000 MHz	-14.250	-1.992 kHz	14.250

GAIN COMPRESSION

PASSED

TEST CONDITIONS	MEASURED	MAXIMUM
0.3 MHz	0.144 dB	0.367
1.0 MHz	0.000 dB	0.367
10.0 MHz	0.000 dB	0.367
100.0 MHz	0.000 dB	0.367
500.0 MHz	0.000 dB	0.367
1000.0 MHz	0.000 dB	0.367
2000.0 MHz	0.000 dB	0.367
3000.0 MHz	0.013 dB	0.367

NOISE FLOOR

PASSED

TEST CONDITIONS	MEASURED	MAXIMUM
Narrowband Detector Mode		
Fine BW, Spur Avoid ON		
300 kHz - 5 MHz	-108.8 dBm	-50.0
5 MHz - 3000 MHz	-97.4 dBm	-90.0
Broadband Detector Mode		
Narrow BW, Spur Avoid OFF		

continued...

Measurement Report

Report Number: 1-1332469872-1 **Test Date:** 1 Jul 2008
Model Number: HP8714C
Serial Number: US38171129 **Cust. Unit No.:** K82012

ABSOLUTE ACCURACY

PASSED

TEST CONDITIONS	MINIMUM	MEASURED	MAXIMUM
+16.0 dBm	-0.55	0.13 dB	0.55
+10.0 dBm	-0.50	0.10 dB	0.50
+5.0 dBm	-0.50	0.16 dB	0.50
0.0 dBm	-0.50	0.15 dB	0.50
-5.0 dBm	-0.50	0.11 dB	0.50
-10.0 dBm	-0.50	0.12 dB	0.50
-15.0 dBm	-0.50	0.13 dB	0.50
-20.0 dBm	-0.50	0.13 dB	0.50
-25.0 dBm	-0.50	0.14 dB	0.50
-30.0 dBm	-0.50	0.14 dB	0.50
-35.0 dBm	-0.75	0.38 dB	0.75
-40.0 dBm	-1.00	0.43 dB	1.00
-45.0 dBm	-1.50	0.63 dB	1.50
-50.0 dBm	-2.00	0.65 dB	2.00
-55.0 dBm	-7.00	2.02 dB	7.00

BROADBAND FREQUENCY RESPONSE

PASSED

TEST CONDITIONS	MEASURED	MAXIMUM
Nominal Input Level		
-6 dBm	1.02 dB	2.00

DIRECTIVITY

PASSED

TEST CONDITIONS	MEASURED	MAXIMUM
Directivity	-42.5 dB	-30.0
Source Match	-45.7 dB	-20.0
Input Match	-21.3 dB	-18.0