QUALCOMM®

5775 Morehouse Drive, San Diego, CA, 92121-2779

Report # 14352:1091699235

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	08/05/2004	**Interval**	12	**Cal Temp**	23
Cal Due	08/05/2005	**Data**	YES	**Humidity**	57
Tech	RICK GILL	**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	05/05/04	11/05/04
K66151	AGILENT TECHNOLOGIES	3335A	SYNTHESIZER/LEVEL GENERATOR	11/06/03	11/05/04
X21296	GIGATRONICS	80301A	POWER SENSOR	04/30/04	04/30/05
K65267	AGILENT TECHNOLOGIES	432A	POWER METER	11/07/03	11/06/04
X10665	AGILENT TECHNOLOGIES	478A	THERMISTOR MOUNT	11/14/03	11/13/04
X03045	AGILENT TECHNOLOGIES	34401A	MULTIMETER	05/05/04	11/05/04
K66151	AGILENT TECHNOLOGIES	3335A	SYNTHESIZER/LEVEL GENERATOR	11/06/03	11/05/04
X21296	GIGATRONICS	80301A	POWER SENSOR	04/30/04	04/30/05
K65267	AGILENT TECHNOLOGIES	432A	POWER METER	11/07/03	11/06/04
X10665	AGILENT TECHNOLOGIES	478A	THERMISTOR MOUNT	11/14/03	11/13/04

Signed: [signature] **Date:** 08/05/2004

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5775 Morehouse Drive, San Diego, CA, 92121-2779

Report # K99845:QC-126688390

Certificate of Calibration

Manufacturer: GIGATRONICS **Model #:** 80601A

Asset #: K99845 **Serial Number:** 1832041

Description: POWER SENSOR

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	01/06/2004	**Interval**	12	**Cal Temp**	22
Cal Due	01/06/2005	**Data**	NO	**Humidity**	40
Tech	TROY HOWARD	**Pass**	YES	**Seals OK**	YES

Condition Received IN TOLERANCE

Condition Returmed MEETS MFR'S SPECS

Physical Condition of Equipment GOOD

Out of Tolerance Conditions/Limitation

Cal Procedure MANUFACTURER **Revisioin** NA

STANDARDS USED FOR CALIBRATION

Asset Number	MFG	Model	Description	Cal Date	Due Date
K74805	GIGATRONICS	8541C	POWER METER	03/06/03	03/06/04
K66152	WEINSCHEL	1805B	RF POWER LEVEL CONTROLLER	03/13/03	03/12/04
K13397	AGILENT TECHNOLOGIES	8350B	SWEEP OSCILLATOR	03/18/03	03/18/04
K84807	AGILENT TECHNOLOGIES	83592B	RF PLUG IN	03/18/03	03/18/04
K66153	WEINSCHEL	F1109	POWER STANDARD	12/23/03	12/22/04

Signed: Kathleen Abreu **Date:** 01/06/2004

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5775 Morehouse Drive, San Diego, CA 92121

Report # K94470:1061802898

Certificate of Calibration

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

Asset #: K94470 **Serial #:** 1834850

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	8/25/2003	**Interval**	12	**Cal Temp**	22°C
Cal Due	8/25/2004	**Data**	YES	**Humidity**	65 %
Tech	DAVID DECH	**Pass**	YES	**Seals OK**	YES

Condition Received: IN TOLERANCE

Condition Returned: MEETS MFR'S SPECS

Physical Condition of Equipment: GOOD

Out of Tolerance Conditions/Limitations of Certificate

NONE

NOTE: For Test Uncertainty Ratio information on this asset, see Data.

Cal Procedure Gigatronics 8540C Series Power Meters **Revision** QUAL- 030703 REV 1.1

STANDARDS USED FOR CALIBRATION

Asset Number	Mfg	Model	Description	Cal Date	Due Date
K66151	AGILENT TECHNOLOGIES	3335A	SYNTHESIZER/LEVEL GENERATOR	12/2/2002	12/2/2003
X10665	AGILENT TECHNOLOGIES	478A	THERMISTOR MOUNT	12/2/2002	12/2/2003
X03045	AGILENT TECHNOLOGIES	34401A	MULTIMETER	5/27/2003	11/27/2003
X21432	GIGATRONICS	80301A	POWER SENSOR	11/14/2002	11/14/2003
K65267	AGILENT TECHNOLOGIES	432A	POWER METER	12/3/2002	12/3/2003

Signed: _____ Date: 8/25/2003

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1733

Manufactured:	September 27, 2002
Last calibration:	December 3, 2002
Recalibrated:	November 24, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **Qualcomm**

CALIBRATION CERTIFICATE

Object(s) ET3DV6 - SN:1733

Calibration procedure(s) QA CAL-01.v2
Calibration procedure for dosimetric E-field probes

Calibration date: November 24, 2003

Condition of the calibrated item In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS No. 251-0340	Apr-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: November 25, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

DASY - Parameters of Probe: ET3DV6 SN:1733

Sensitivity in Free Space

NormX	**1.47** $\mu V/(V/m)^2$
NormY	**1.46** $\mu V/(V/m)^2$
NormZ	**1.43** $\mu V/(V/m)^2$

Diode Compression

DCP X	**94**	mV
DCP Y	**94**	mV
DCP Z	**94**	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.6** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6** ± 9.5% (k=2)	Alpha	**0.30**
ConvF Z	**6.6** ± 9.5% (k=2)	Depth	**2.82**

Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1890 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.3** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.3** ± 9.5% (k=2)	Alpha	**0.46**
ConvF Z	**5.3** ± 9.5% (k=2)	Depth	**2.62**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.2	5.4
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

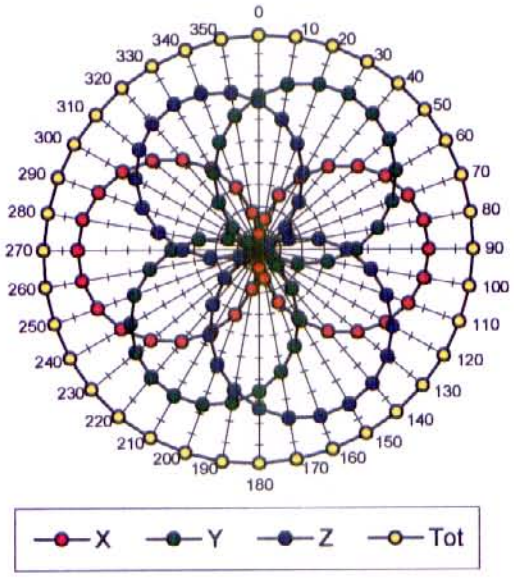
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	10.1
SAR_{be} [%]	With Correction Algorithm	0.3	0.3

Sensor Offset

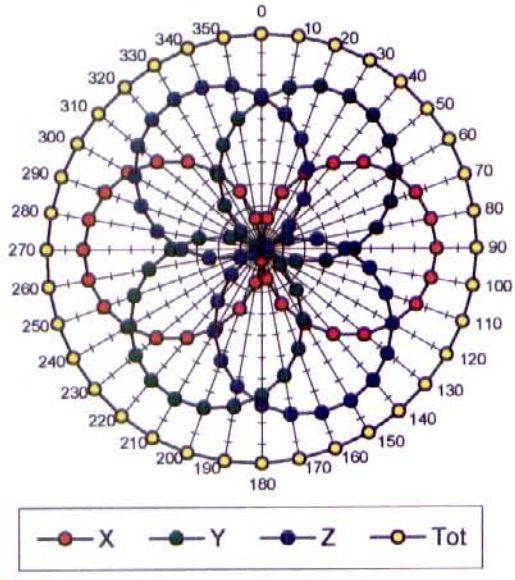
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.6 ± 0.2**	mm

Receiving Pattern (ϕ , θ = 0°

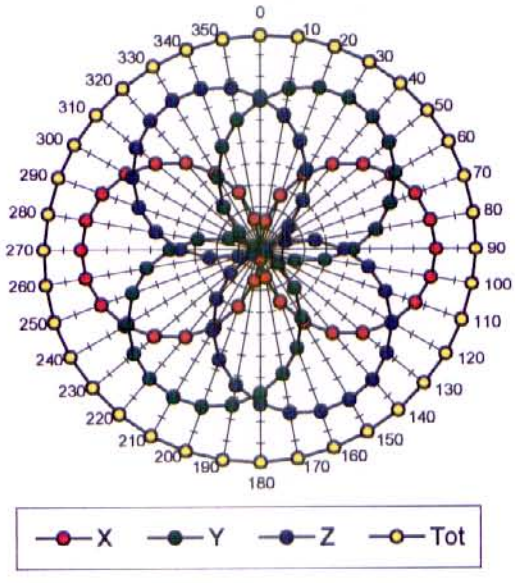
f = 30 MHz, TEM cell ifi110



f = 100 MHz, TEM cell ifi110



f = 300 MHz, TEM cell ifi110



f = 900 MHz, TEM cell ifi110