

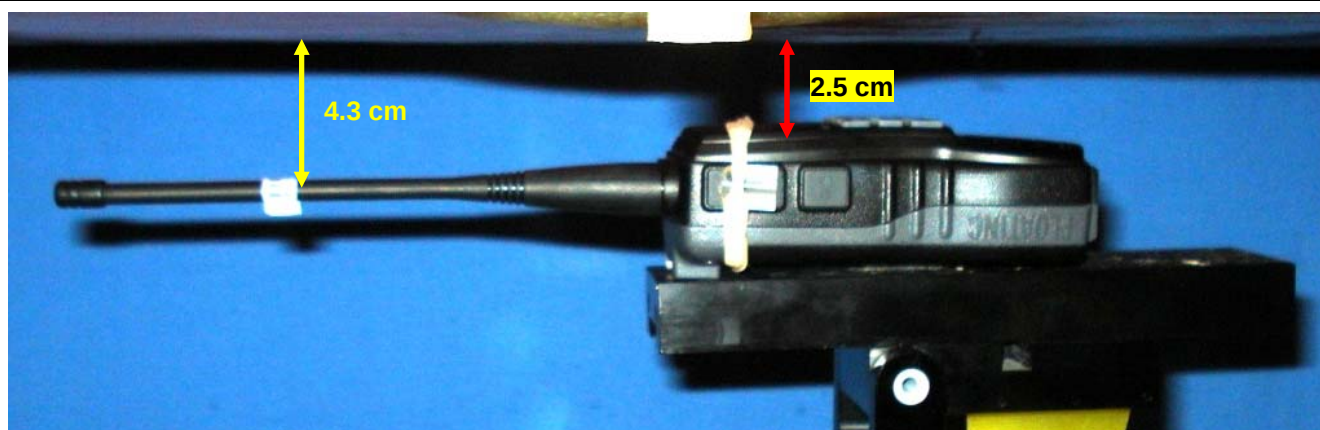
	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	  Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

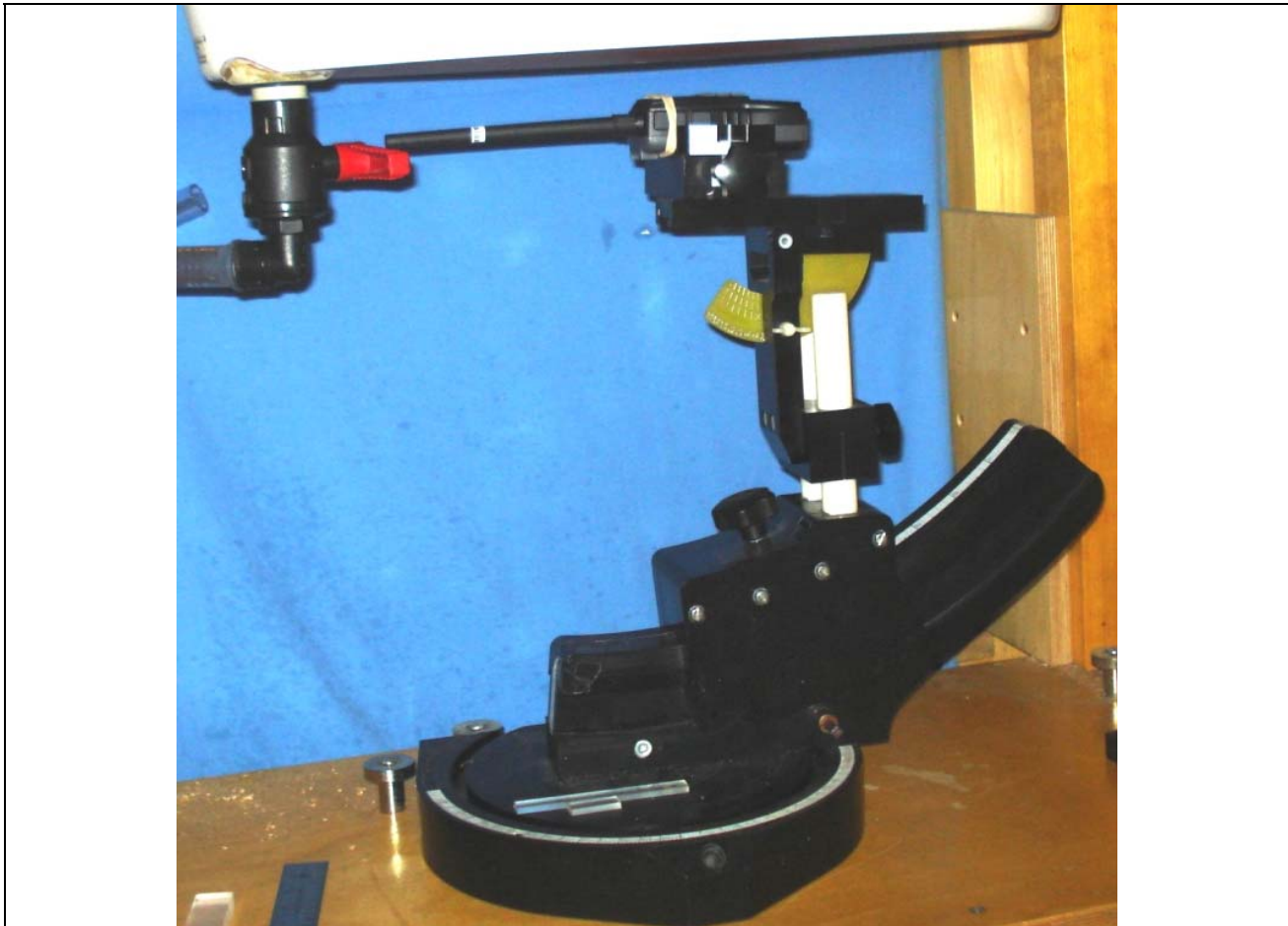


Face-held Test Setup with Barski Phantom

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver		
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



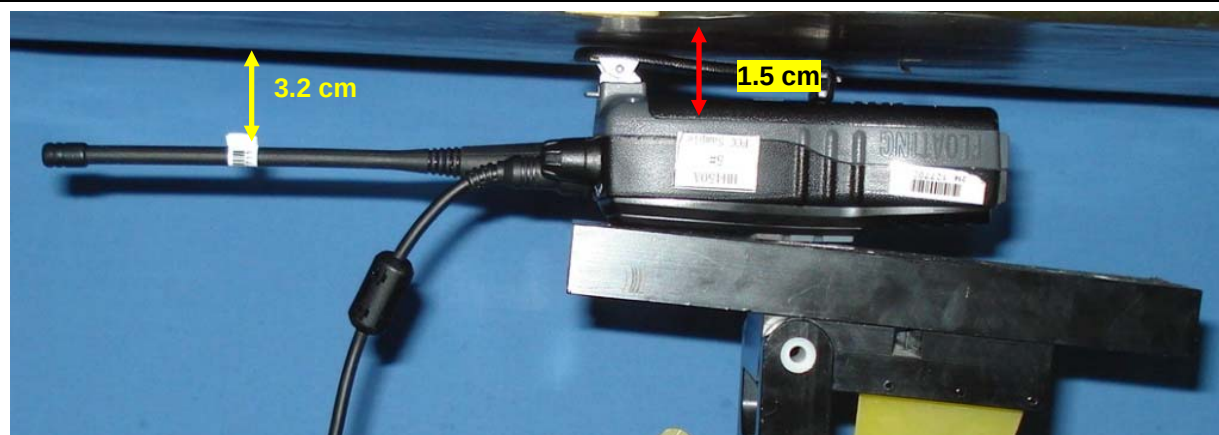
Face-held Test Setup with ELI Phantom

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

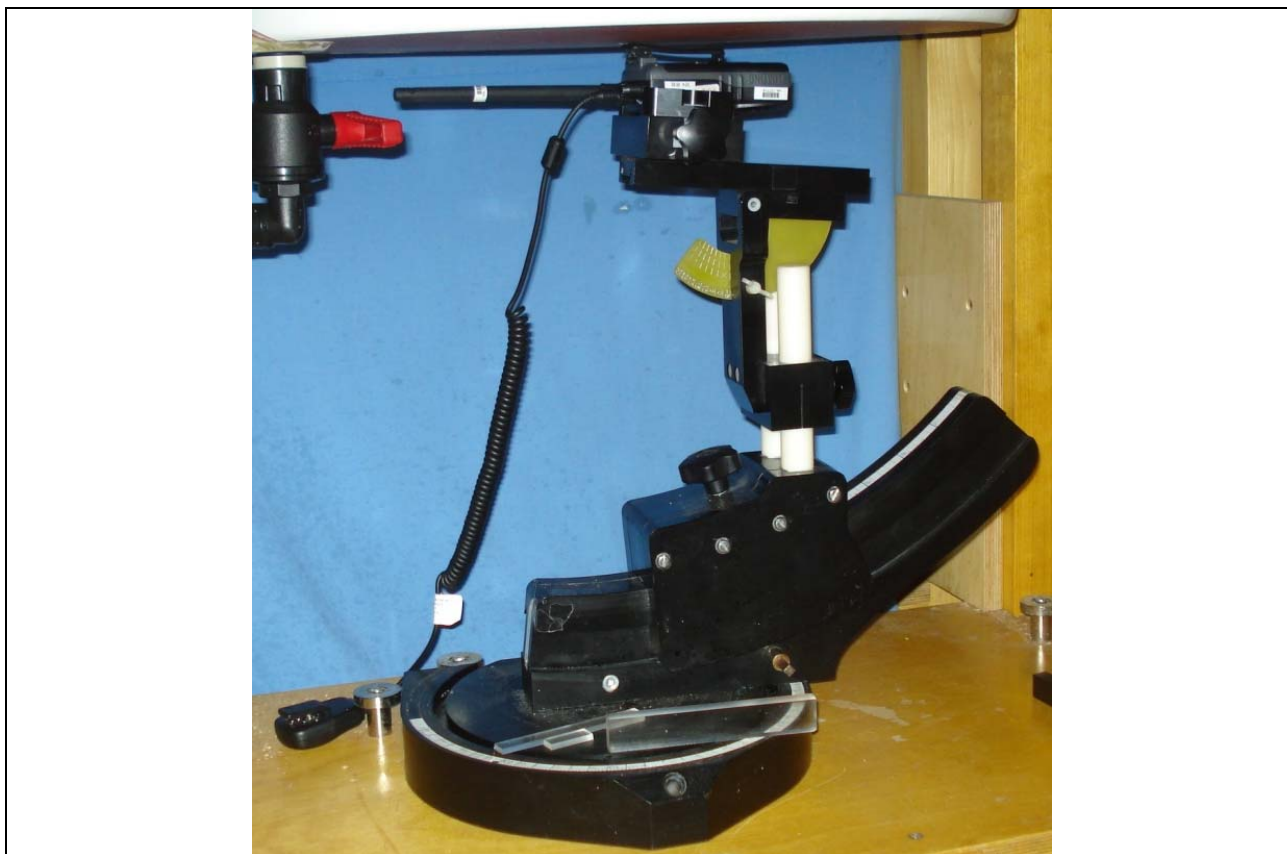


Body-worn Test Setup with Barski Phantom

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	  Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS



Body-worn Test Setup with ELI Phantom

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver		
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 Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	  Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS



DUT Front side



DUT Back side



Right Side of DUT



Left Side of DUT



DUT Top Side



DUT Bottom Side

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	  Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	



Radio Back with Belt-Clip



Right Side of DUT with Belt-Clip



DUT Top Side with Belt-Clip



Left Side of DUT with Belt-Clip



Bottom of Radio with Belt-Clip



Belt-Clip Top



Belt-Clip Bottom

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	



Top of Lithium-Polymer Battery



Bottom of Lithium-Polymer Battery



Radio Charger



Speaker-Microphone Audio Accessory



Antenna

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver		
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	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX E - DIPOLE CALIBRATION

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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					Page 63 of 66

	<u>Date:</u> May 29, 2013	<u>Revision No.</u> Rev. 1.1	 Test Lab Certificate No. 2470.01
	450 MHz Dipole Extended Calibration		

Dipole: D450V3
Serial Number: 1068
Last Calibrated: Apr. 27, 2012

Antenna Parameters with Head TSL						
	Impedance Real (ohms)	Deviation from cal	Impedance Imaginary (ohms)	Deviation from cal	Return Loss (dB)	Deviation from Cal
Last Calibration	57.7	-	-4.7	-	-21.6	-
Extended Cal May 29, 2013	55.1	2.6	-7.2	2.5	-21.5	0.4

Antenna Parameters with Body TSL						
	Impedance Real (ohms)	Deviation from cal (ohms)	Impedance Imaginary (ohms)	Deviation from cal (ohms)	Return Loss (dB)	Deviation from Cal (%)
Last Calibration	54.6	-	-8.1	-	-21.0	-
Extended Cal May 8, 2013	51.3	3.3	-11.9	3.8	-20.1	4.3



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D450V3-1068_Apr12**

CALIBRATION CERTIFICATE

Object **D450V3 - SN: 1068**

Calibration procedure(s) **QA CAL-15.v6**
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: **April 27, 2012**

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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 654	03-May-11 (No. DAE4-654_May11)	May-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	

Approved by:	Katja Pokovic	Technical Manager	
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Issued: April 27, 2012

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Multilateral Agreement for the recognition of calibration certificates

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:

- 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
- 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
- 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:

- DASY4/5 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.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	44.1 $\pm$ 6 %	0.87 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.87 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	4.71 mW / g $\pm$ 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.25 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	3.15 mW / g $\pm$ 17.6 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	56.7	0.94 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.9 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	398 mW input power	1.81 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	4.52 mW / g $\pm$ 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	398 mW input power	1.21 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	3.02 mW / g $\pm$ 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.7 Ω - 4.7 j Ω
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	54.6 Ω - 8.1 j Ω
Return Loss	- 21.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.755 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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	July 16, 2009

DASY5 Validation Report for Head TSL

Date: 27.04.2012

Test Laboratory: SPEAG

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN: 1068

Communication System: CW; Frequency: 450 MHz

Medium parameters used: $f = 450$ MHz; $\sigma = 0.87$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

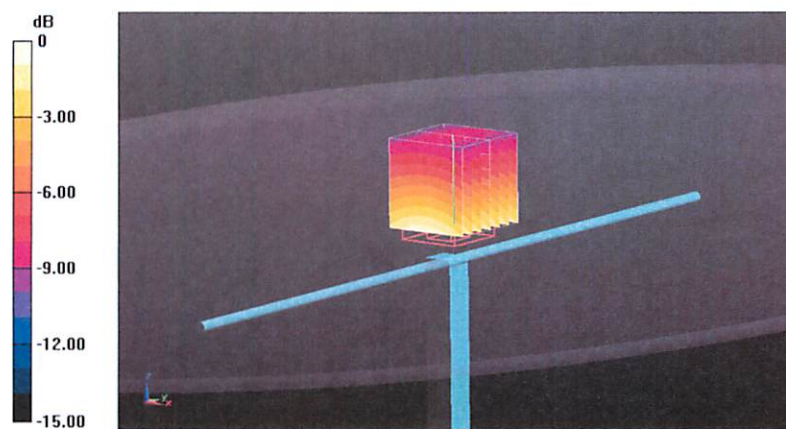
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 49.745 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 2.835 mW/g

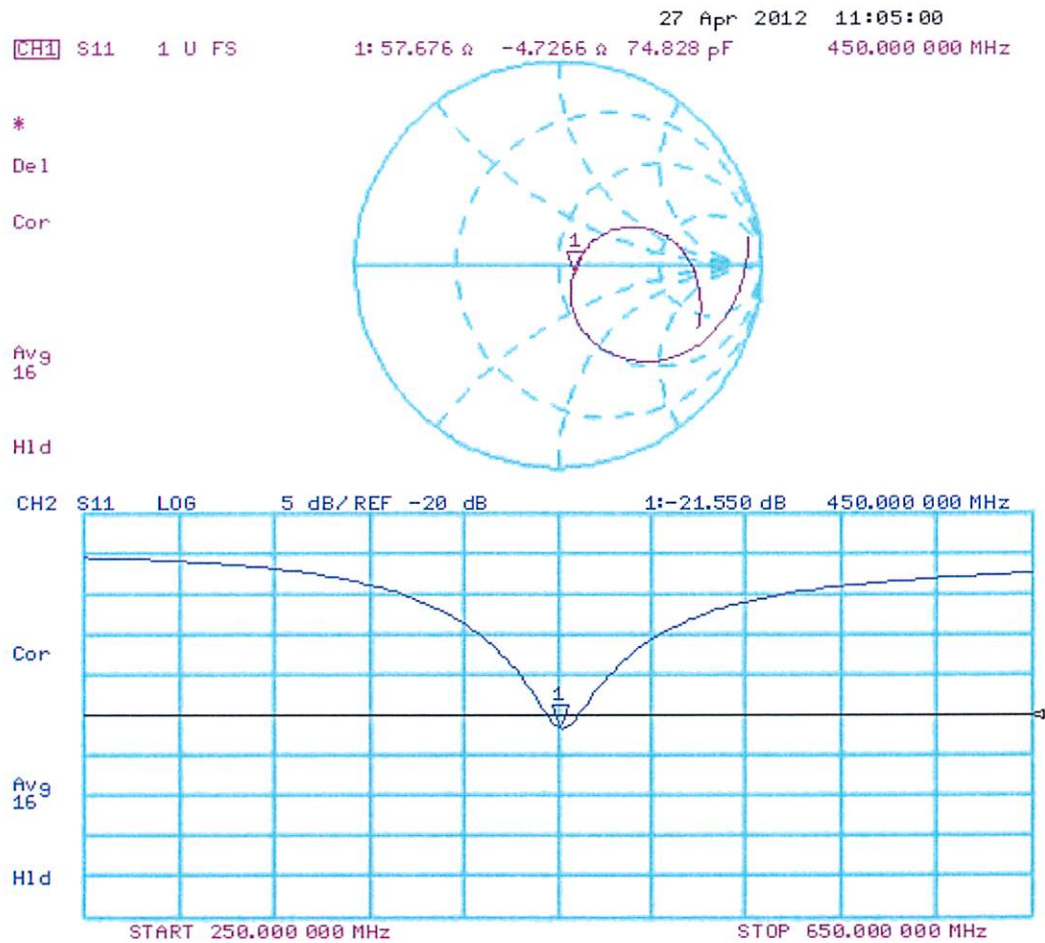
SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.25 mW/g

Maximum value of SAR (measured) = 2.00 mW/g



0 dB = 2.00 mW/g = 6.02 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.04.2012

Test Laboratory: SPEAG

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN: 1068

Communication System: CW; Frequency: 450 MHz

Medium parameters used: $f = 450$ MHz; $\sigma = 0.94$ mho/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.05, 7.05, 7.05); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

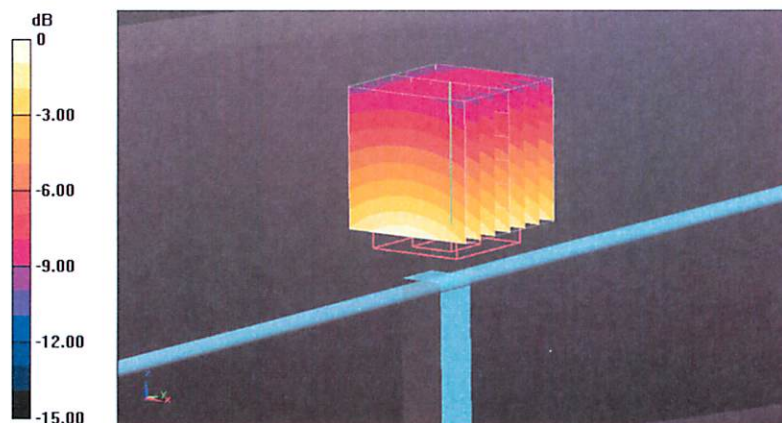
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 46.572 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 2.834 mW/g

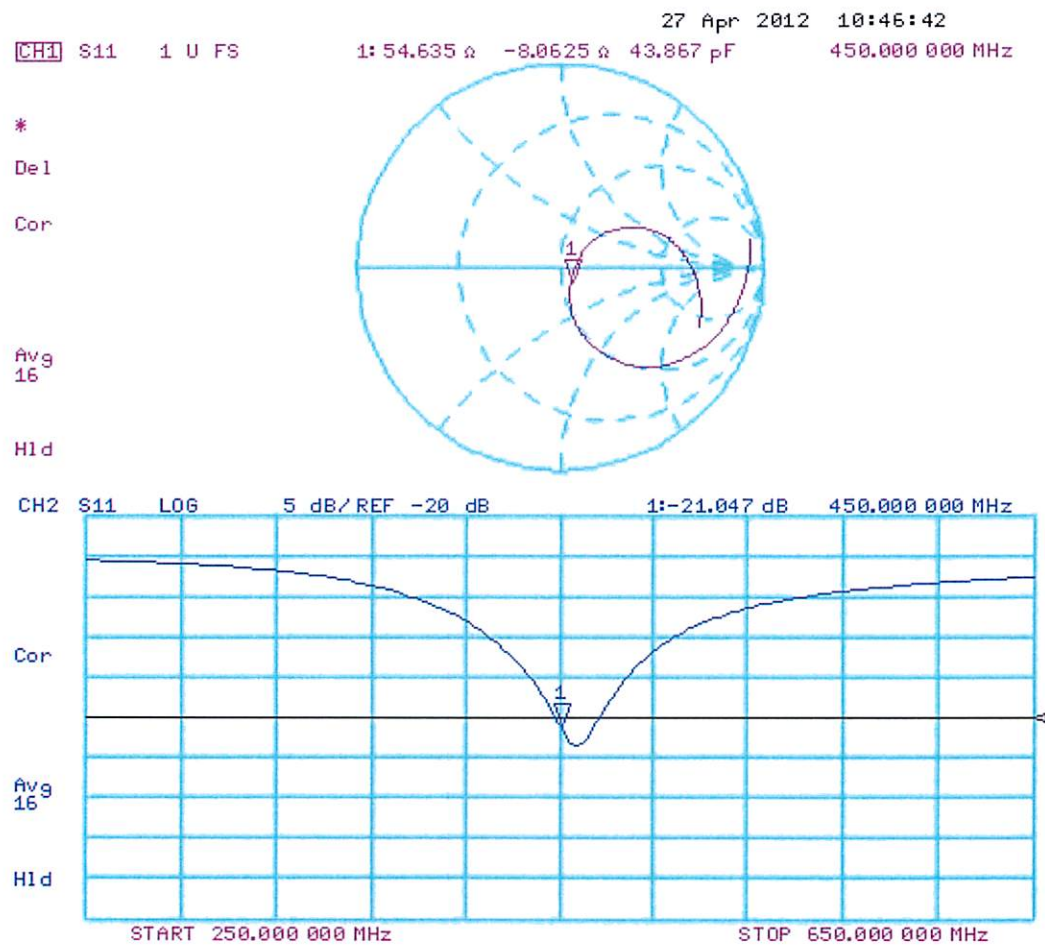
SAR(1 g) = 1.81 mW/g; SAR(10 g) = 1.21 mW/g

Maximum value of SAR (measured) = 1.94 mW/g



0 dB = 1.94 mW/g = 5.76 dB mW/g

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D300V3-1009_Apr12**

CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1009**

Calibration procedure(s) **QA CAL-15.v6**
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: **April 17, 2012**

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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 900	11-Apr-12 (No. DAE4-900_Apr12)	Apr-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2012

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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:

- 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
- 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
- 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:

- DASY4/5 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.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	45.3	0.87 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	44.9 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	2.88 mW /g $\pm$ 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	0.770 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	1.90 mW /g $\pm$ 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.8 Ω - 2.9 j Ω
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 ns
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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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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	February 26, 2009

DASY5 Validation Report for Head TSL

Date: 17.04.2012

Test Laboratory: SPEAG

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009

Communication System: CW; Frequency: 300 MHz

Medium parameters used: $f = 300$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 44.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn900; Calibrated: 11.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

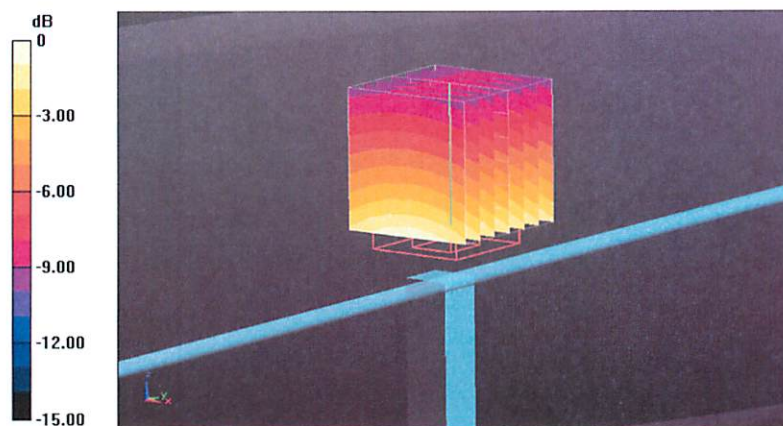
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.838 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.974 mW/g

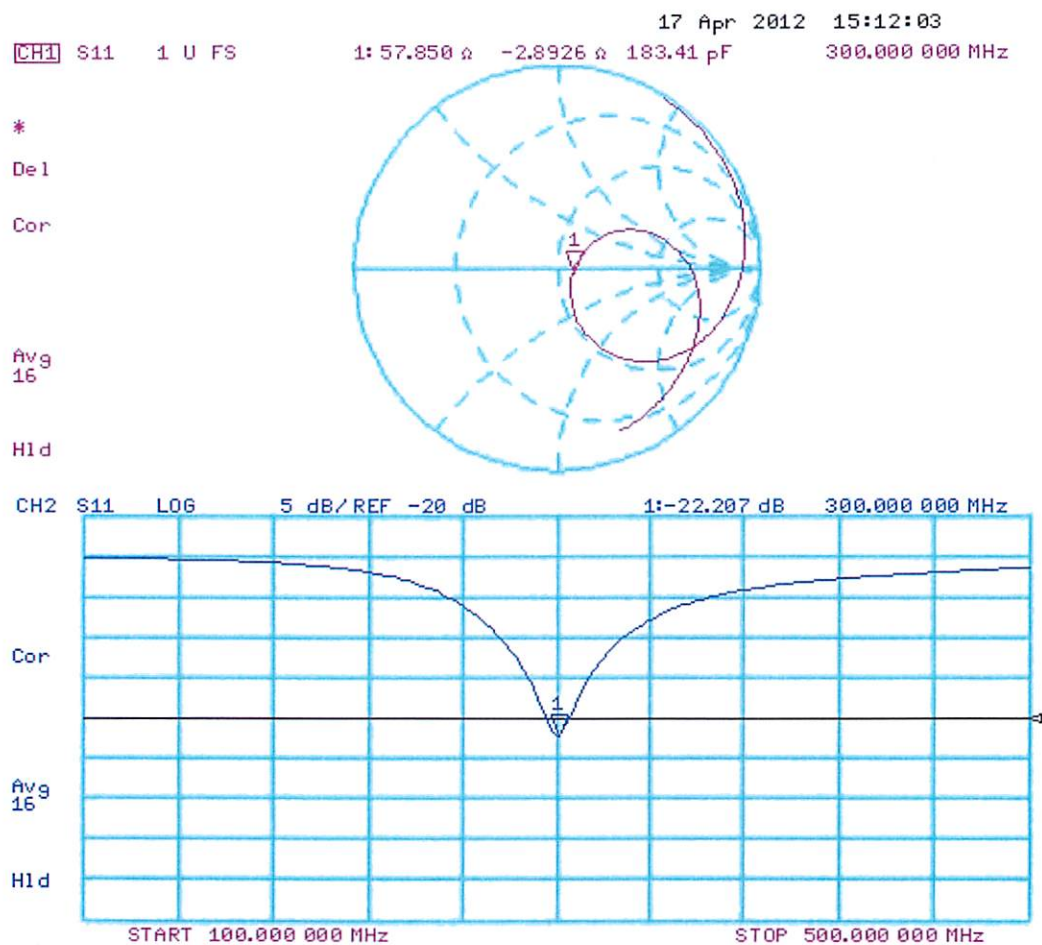
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.770 mW/g

Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24 mW/g = 1.87 dB mW/g

Impedance Measurement Plot for Head TSL



 Celltech Testing and Engineering Services Lab	<u>Date:</u> May 16, 2013	<u>Revision No.</u> Rev. 1.0	 Test Lab Certificate No. 2470.01
	450 MHz Dipole Extended Calibration		

Dipole: D300V3
Serial Number: 1009
Last Calibrated: Apr. 27, 2012 (Head)
Jan. 8, 2013 (Body)

Antenna Parameters with Head TSL						
	Impedance Real (ohms)	Deviation from cal	Impedance Imaginary (ohms)	Deviation from cal	Return Loss (dB)	Deviation from Cal
Last Calibration	57.8	-	-2.9	-	-22.2	-
Extended Cal May 16, 2013	54.0	3.8	-7.5	4.6	-21.8	1.8%

Antenna Parameters with Body TSL						
	Impedance Real (ohms)	Deviation from cal (ohms)	Impedance Imaginary (ohms)	Deviation from cal (ohms)	Return Loss (dB)	Deviation from Cal (%)
Last Calibration	57.1	-	-5.9	-	-21.3	-



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Accreditation No.: **SCS 108**

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Client **Celltech**

Certificate No: **D300V3-1009_Jan13**

CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1009**

Calibration procedure(s) **QA CAL-15.v7**
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: **January 08, 2013**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	28-Dec-12 (No. ET3-1507_Dec12)	Dec-13
DAE4	SN: 654	18-Apr-12 (No. DAE4-654_Apr12)	Apr-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 8, 2013

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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:

- 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
- 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
- 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:

- DASY4/5 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.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz $\pm$ 1 MHz	

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	58.2	0.92 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	57.6 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	0.717 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	2.89 W/kg $\pm$ 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.483 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	1.94 W/kg $\pm$ 17.6 % (k=2)

Appendix

Antenna Parameters with Body TSL

Impedance, transformed to feed point	57.1 Ω - 5.9 j Ω
Return Loss	- 21.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 ns
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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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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	February 26, 2009

DASY5 Validation Report for Body TSL

Date: 08.01.2013

Test Laboratory: SPEAG, Zürich, Switzerland

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009

Communication System: CW; Frequency: 300 MHz

Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.91 \text{ S/m}$; $\epsilon_r = 57.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.08, 7.08, 7.08); Calibrated: 28.12.2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

Dipole Calibration for Body Tissue/ $d=15\text{mm}$, $P_{in}=250\text{mW}$ /Zoom Scan (7x7x7)/Cube 0:

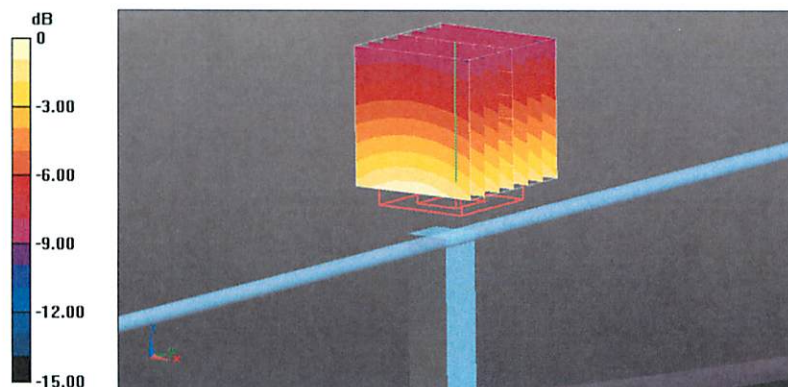
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 29.820 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.11 W/kg

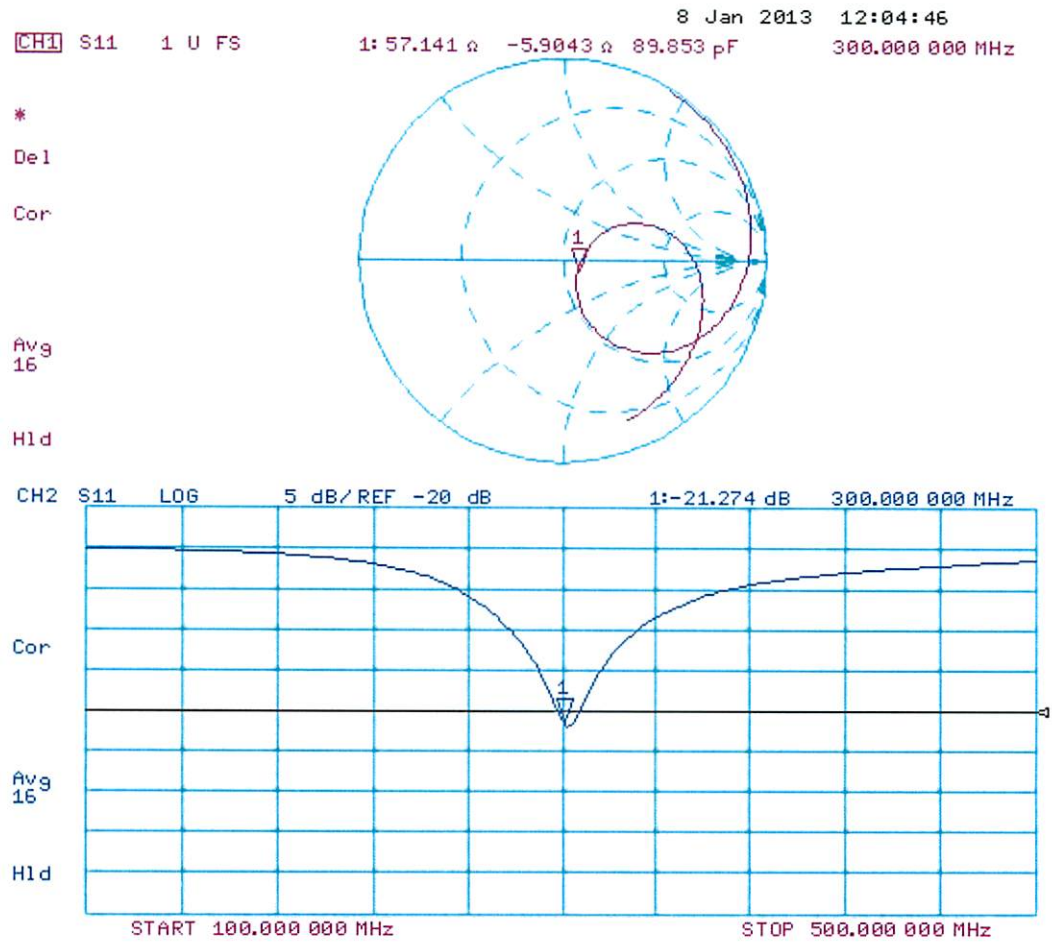
SAR(1 g) = 0.717 W/kg; SAR(10 g) = 0.483 W/kg

Maximum value of SAR (measured) = 0.763 W/kg



0 dB = 0.763 W/kg = -1.17 dBW/kg

Impedance Measurement Plot for Body TSL



	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX F - PROBE CALIBRATION

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **ET3-1590_Apr13**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **April 24, 2013**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
Issued: April 27, 2013			
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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}; A, B, C, D** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1590

Manufactured: March 19, 2001
Calibrated: April 24, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.73	1.85	1.61	$\pm 10.1 \%$
DCP (mV) ^B	94.7	99.4	88.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	186.7	$\pm 2.7 \%$
		Y	0.0	0.0	1.0		151.0	
		Z	0.0	0.0	1.0		171.2	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.53	7.53	7.53	0.21	2.23	± 13.4 %
750	41.9	0.89	7.24	7.24	7.24	0.25	3.00	± 12.0 %
835	41.5	0.90	6.84	6.84	6.84	0.26	3.00	± 12.0 %
900	41.5	0.97	6.68	6.68	6.68	0.28	3.00	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Calibration Parameter Determined in Body Tissue Simulating Media

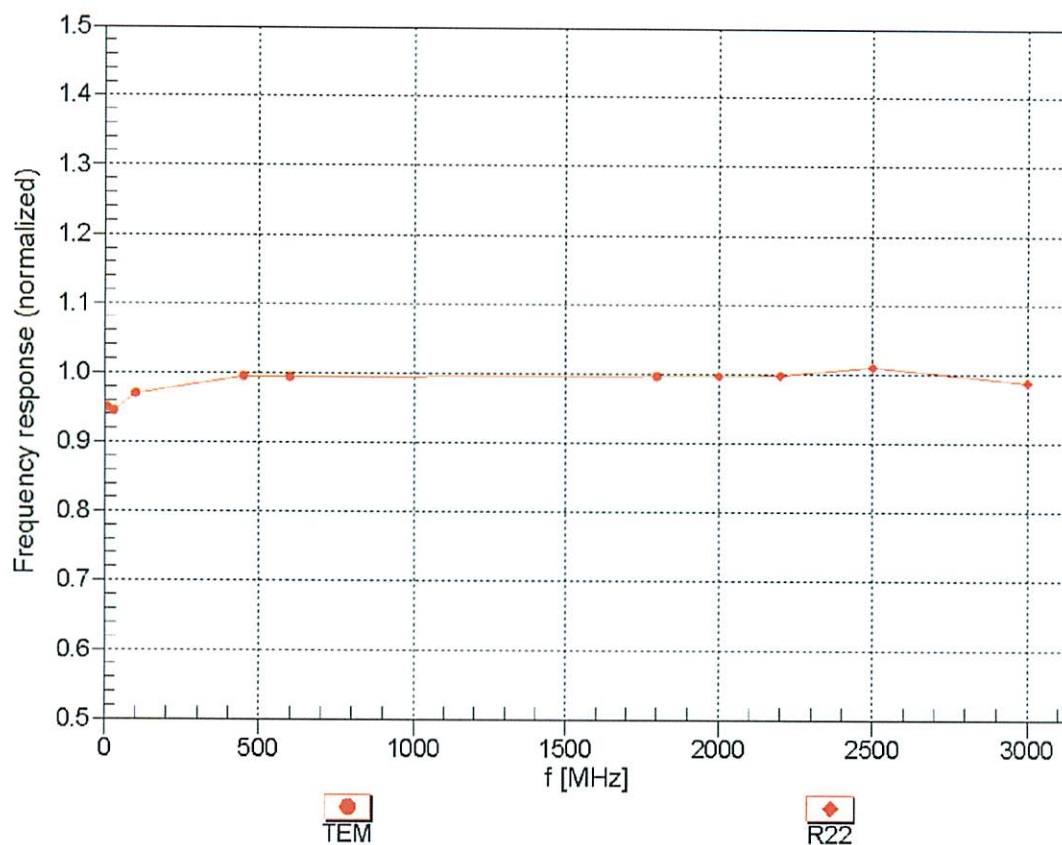
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.98	7.98	7.98	0.13	2.14	± 13.4 %
750	55.5	0.96	6.84	6.84	6.84	0.31	2.49	± 12.0 %
835	55.2	0.97	6.67	6.67	6.67	0.29	2.67	± 12.0 %
900	55.0	1.05	6.63	6.63	6.63	0.26	3.00	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

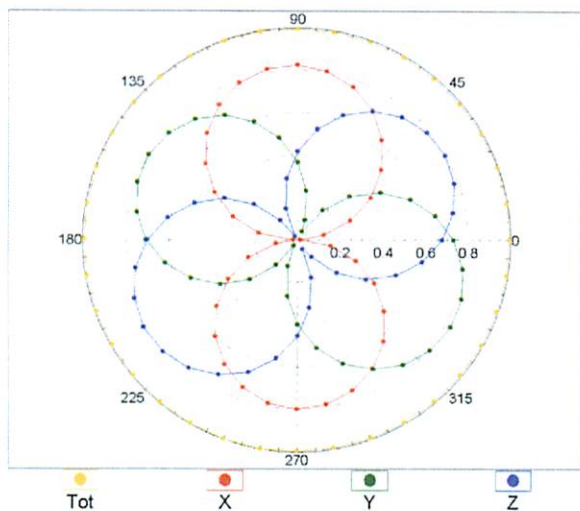
(TEM-Cell:ifi110 EXX, Waveguide: R22)



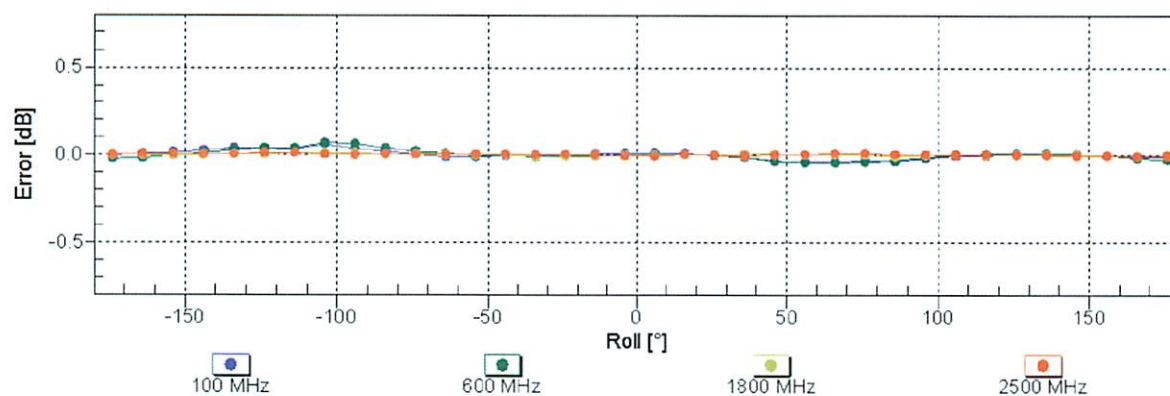
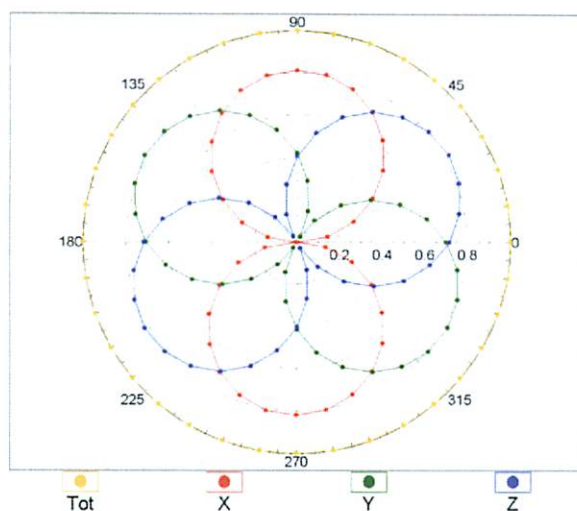
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f=600 MHz,TEM

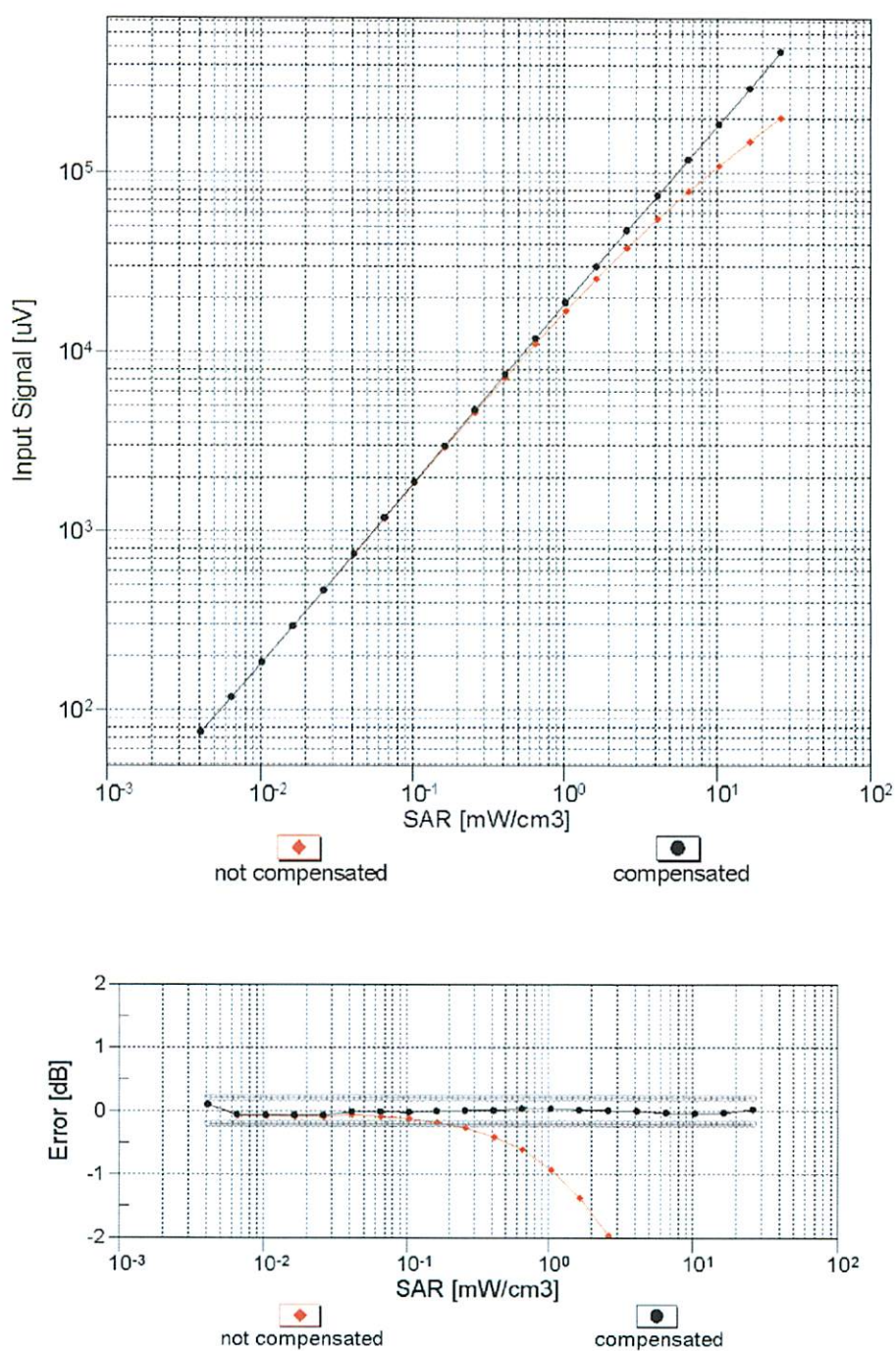


f=1800 MHz,R22



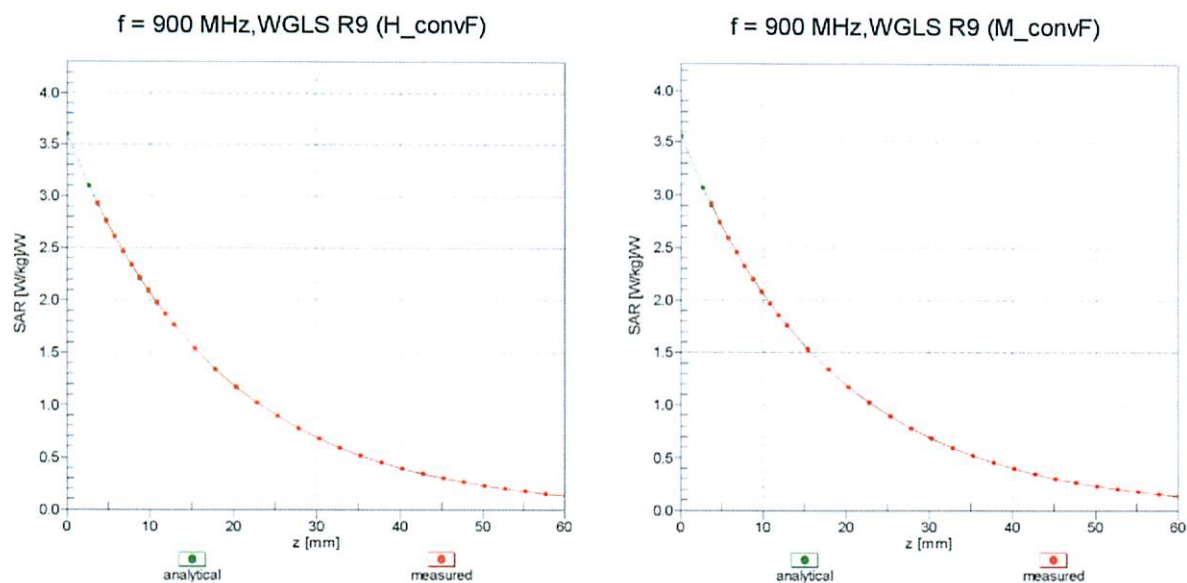
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



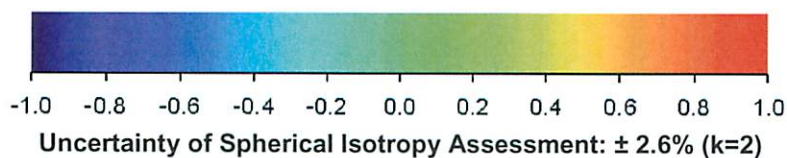
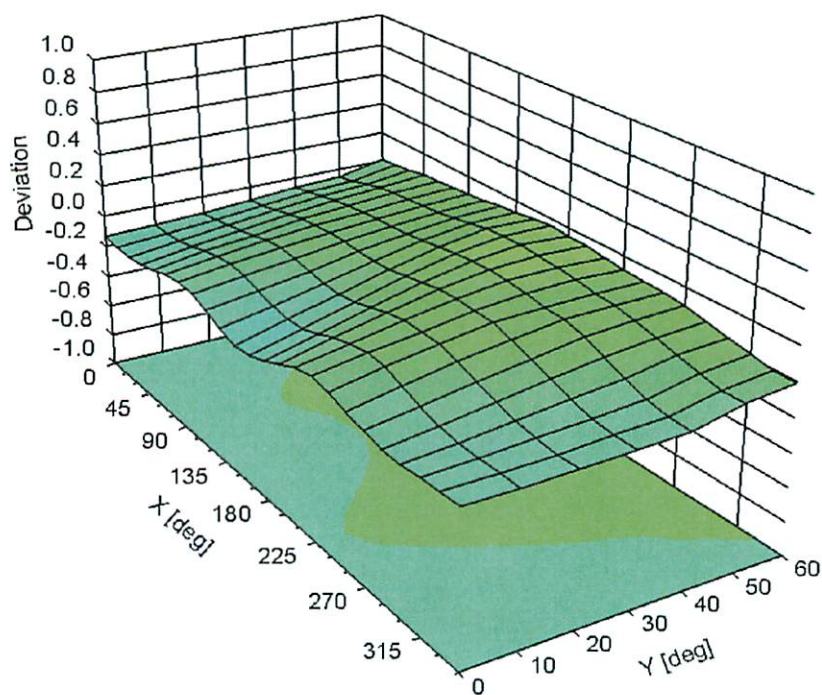
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

April 29, 2013

Probe Calibration Date:

April 24, 2013

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ($\pm$ standard deviation)

150 $\pm$ 50 MHz *ConvF* 9.31 $\pm$ 10%

$\epsilon_r = 52.3 \pm 5\%$
 $\sigma = 0.76 \pm 5\%$ mho/m
 (head tissue)

300 $\pm$ 50 MHz *ConvF* 8.36 $\pm$ 9%

$\epsilon_r = 45.3 \pm 5\%$
 $\sigma = 0.87 \pm 5\%$ mho/m
 (head tissue)

150 $\pm$ 50 MHz *ConvF* 8.65 $\pm$ 10%

$\epsilon_r = 61.9 \pm 5\%$
 $\sigma = 0.80 \pm 5\%$ mho/m
 (body tissue)

300 $\pm$ 50 MHz *ConvF* 8.41 $\pm$ 9%

$\epsilon_r = 58.2 \pm 5\%$
 $\sigma = 0.92 \pm 5\%$ mho/m
 (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX G - BARSKI PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: _____

A handwritten signature in black ink, appearing to read 'Daniel Chailier', is written over a horizontal line.

Daniel Chailier



Fiberglass Planar Phantom - Top View



Fiberglass Planar Phantom - Front View



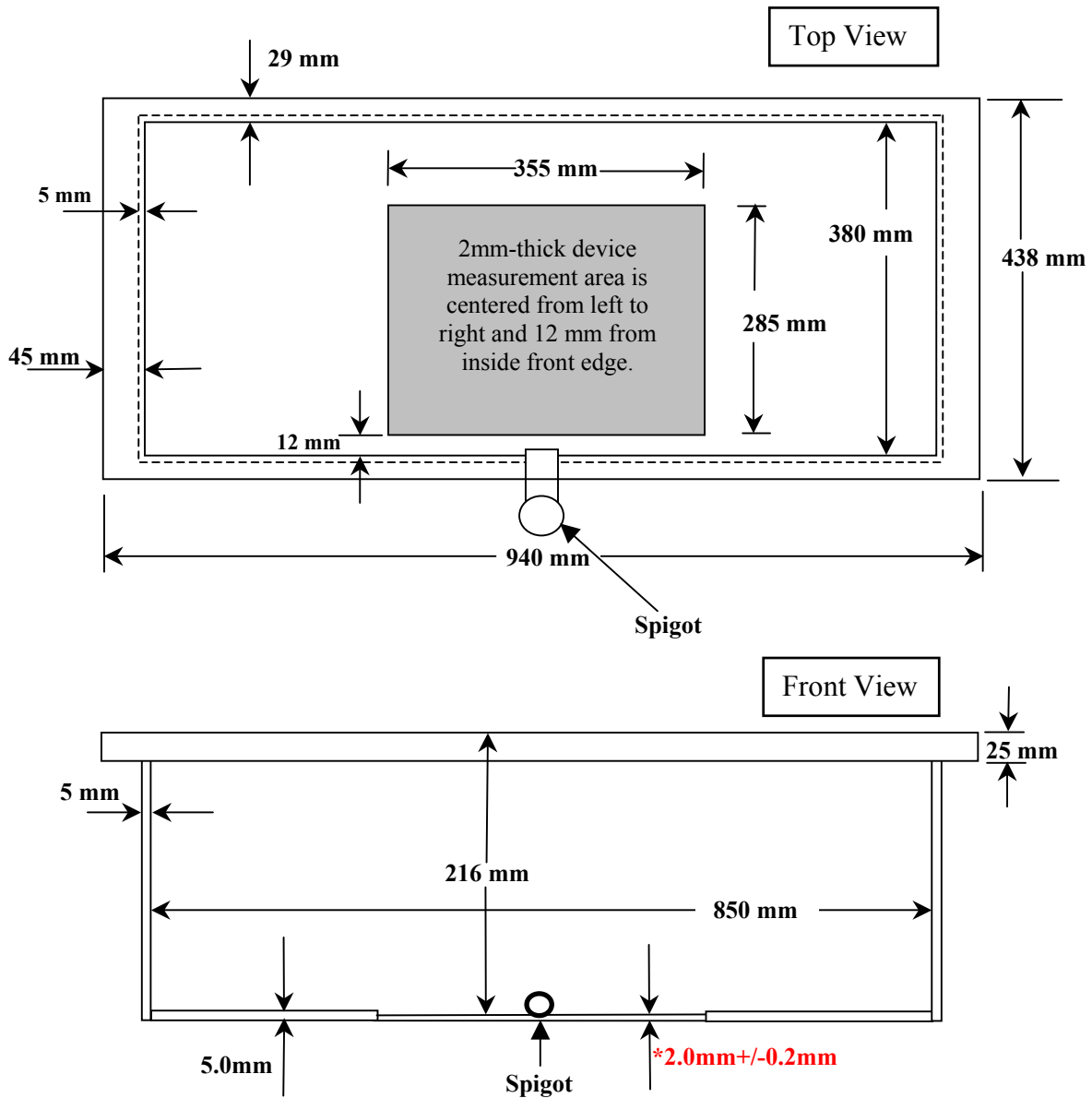
Fiberglass Planar Phantom - Back View



Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



**Note: Measurements that aren't repeated for the opposite sides are the same as the side measured.
This drawing is not to scale.**

	<u>Date(s) of Evaluation</u> Dec 17/13-Jan15/14	<u>Test Report Serial No.</u> 01232014BBO-1277	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> 23 Jan 2014	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX H - ELI PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Cobra Electronics Corporation		FCC ID:	BBO	
Model(s):	MR HH450	Portable Dual-Band UHF GMRS and VHF Marine PTT Radio Transceiver			
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Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 5.0
Type No	QD OVA 002 A
Series No	1108 and higher
Manufacturer	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

Tests

Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

Test	Requirement	Details	Units tested
Shape	Internal dimensions, depth and sagging are compatible with standards	Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for $f > 375$ MHz	Prototypes
Material thickness	Bottom: 2.0mm +/- 0.2mm	dimension compliant with [3] for $f > 800$ MHz	all
Material parameters	rel. permittivity 2 – 5, loss tangent ≤ 0.05 , at $f \leq 6$ GHz	rel. permittivity 3.5 +/- 0.5 loss tangent ≤ 0.05	Material samples
Material resistivity	Compatibility with tissue simulating liquids .	Compatible with SPEAG liquids. **	Phantoms, Material sample
Sagging	Sagging of the flat section in tolerance when filled with tissue simulating liquid.	within tolerance for filling height up to 155 mm	Prototypes, samples

** Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

Standards

- [1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
- [2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
- [3] IEC 62209–1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", 2005-02-18
- [4] IEC 62209–2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", 2010-03-30

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of **body-worn** SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

s p e a g

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