

# CERTIFICATE OF CALIBRATION

ISSUED BY **UL VS LTD**

DATE OF ISSUE: 23/May/2017

CERTIFICATE NUMBER : 11762345JD01B



5248

UL VS LTD  
PAVILION A  
ASHWOOD PARK, ASHWOOD WAY  
BASINGSTOKE, HAMPSHIRE  
RG23 8BG, UK  
TEL: +44 (0) 1256 312000  
FAX: +44 (0) 1256 312001  
Email: LST.UK.Calibration@ul.com



Page 1 of 10

**APPROVED SIGNATORY**

.....  
Naseer Mirza

**Customer :**

UL VS Inc  
47173 Benicia Street  
Fremont, CA 94538, USA

**Equipment Details:**

Description:	Dipole Validation Kit	Date of Receipt:	09/May/2017
Manufacturer:	Speag		
Type/Model Number:	D835V2		
Serial Number:	4d117		
Calibration Date:	22/May/2017		
Calibrated By:	Chanthu Thevarajah Laboratory Engineer		

Signature:

.....

All Calibration have been conducted in the closed laboratory facility: Lab Temperature (22±3) °C and humidity < 70%

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Use of the UKAS mark demonstrates that compliance with the requirements of BS/EN/ISO/IEC 17025 has been independently assessed.

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11762345JD01B

Page 2 of 10

The calibration methods and procedures used were as detailed in:

1. **IEC 62209-1:2005**: 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)
2. **IEC 62209-2:2010**: 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)
3. **IEEE 1528: 2013**: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques
4. FCC KDB Publication Number: **“KDB865664 D01 SAR Measurement 100 MHz to 6 GHz”**
5. **SPEAG DASY4/ DASY5 System Handbook**

The measuring equipment used to perform the calibration, documented in this certificate has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A2110	Data Acquisition Electronics	SPEAG	DAE4	431	18 Nov 2016	12
A2587	Probe	SPEAG	ES3DV3	3341	29 Aug 2016	12
PRE0159049	Dipole	SPEAG	D835V2	438	28 April 2017	12
PRE0151451	Power Monitoring Kit	Art-Fi	ART 100850-01	0001	Cal as part of System	12
PRE0151441	Power Sensor	Rhode & Schwarz	NRP8S	102481	16 Nov 2016	12
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	26 Sept 2016	12
PRE0151154	Network Analyser	Rhode & Schwarz	ZND8	100151	22 Nov 2016	12
PRE0151877	Calibration Kit	Rhode & Schwarz	Z135	102947-Bt	09 May 2016	12
M1768	Signal Generator	Rhode & Schwarz	SME06	837633/001	08 Nov 2016	12

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11762345JD01B

Page 3 of 10

### SAR System Specification

<b>Robot System Positioner:</b>	Stäubli Unimation Corp. Robot Model: RX90L
<b>Robot Serial Number:</b>	F00/SD89A1/A/01
<b>DASY Version:</b>	DASY 4 (v4.7.80)
<b>Phantom:</b>	Flat section of SAM Twin Phantom
<b>Distance Dipole Centre:</b>	15 mm (with spacer)
<b>Frequency:</b>	835 MHz

### Dielectric Property Measurements – Head Simulating Liquid (HSL)

Simulant Liquid	Frequency (MHz)	Room Temp		Liquid Temp		Parameters	Target Value	Measured Value	Uncertainty (%)
		Start	End	Start	End				
Head	835	21.0 °C	21.0 °C	21.0°C	21.0°C	$\epsilon_r$	41.50	39.79	± 5%
						$\sigma$	0.90	0.91	± 5%

### SAR Results – Head Simulating Liquid (HSL)

Simulant Liquid	SAR Measured	250 mW input Power	Normalised to 1.00 W	Uncertainty (%)
Head	SAR averaged over 1g	2.37 W/Kg	<b>9.43 W/Kg</b>	± 17.57%
	SAR averaged over 10g	1.53 W/Kg	<b>6.09 W/Kg</b>	± 17.32%

### Antenna Parameters – Head Simulating Liquid (HSL)

Simulant Liquid	Parameter	Measured Level	Uncertainty (%)
Head	Impedance	46.5 $\Omega$ 1.37 j $\Omega$	± 0.28 $\Omega$ ± 0.044 j $\Omega$
	Return Loss	31.40	± 2.03 dB

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11762345JD01B

Page 4 of 10

### Dielectric Property Measurements – Body Simulating Liquid (MSL)

Simulant Liquid	Frequency (MHz)	Room Temp		Liquid Temp		Parameters	Target Value	Measured Value	Uncertainty (%)
		Start	End	Start	End				
Body	835	21.0 °C	21.0 °C	21.0°C	21.0°C	$\epsilon_r$	55.20	53.58	± 5%
						$\sigma$	0.97	1.00	± 5%

### SAR Results – Body Simulating Liquid (MSL)

Simulant Liquid	SAR Measured	250 mW input Power	Normalised to 1.00 W	Uncertainty (%)
Body	SAR averaged over 1g	2.61 W/Kg	<b>10.39 W/Kg</b>	± 18.06%
	SAR averaged over 10g	1.70 W/Kg	<b>6.76 W/Kg</b>	± 17.44%

### Antenna Parameters – Body Simulating Liquid (MSL)

Simulant Liquid	Parameter	Measured Level	Uncertainty (%)
Body	Impedance	45.70 $\Omega$ 5.83 j $\Omega$	± 0.28 $\Omega$ ± 0.044 j $\Omega$
	Return Loss	22.89	± 2.03 dB

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

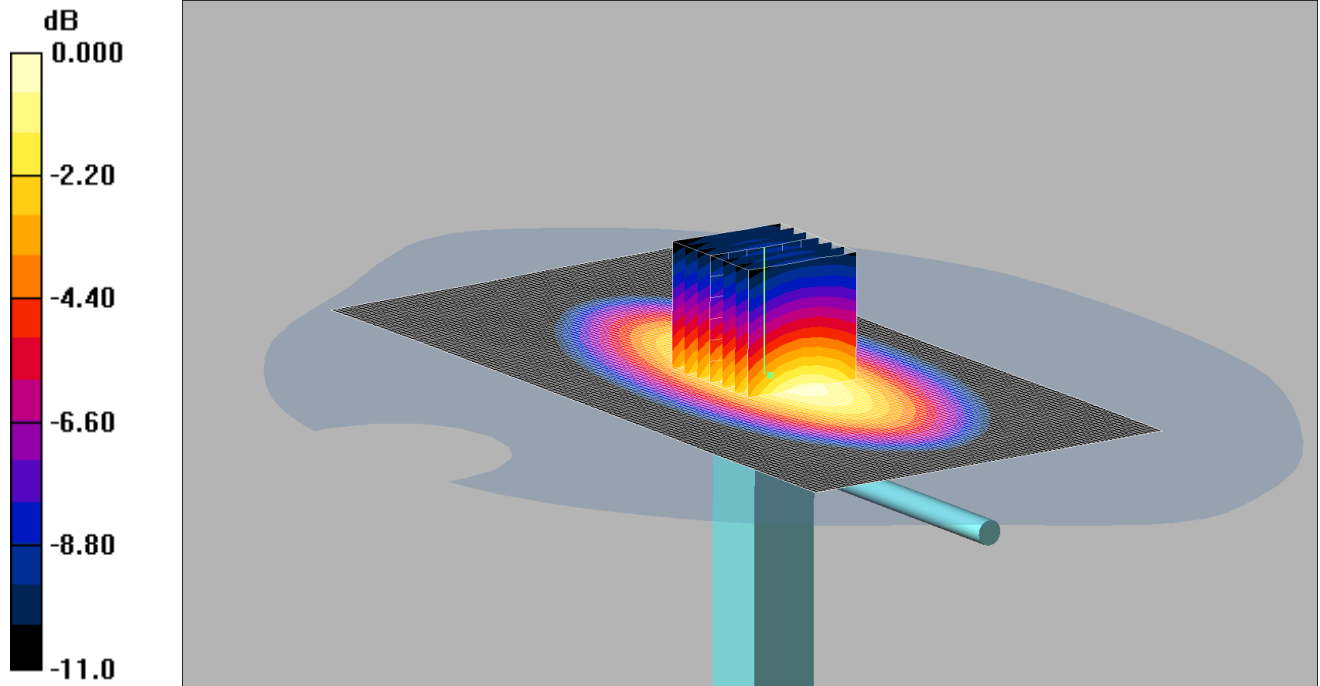
CERTIFICATE  
NUMBER :  
11762345JD01B

UKAS Accredited Calibration Laboratory No. 5248

Page 5 of 10

### DASY Validation Scan for Head Stimulating Liquid (HSL)

DUT: Dipole 835 MHz ; Type: D835V3; Serial: D7835V3 - SN:4d117



0 dB = 2.78mW/g

Communication System: CW 835; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 MHz HSL Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.913$  mho/m;  $\epsilon_r = 39.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3341; ConvF(6.42, 6.42, 6.42);

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn431; Calibrated: 18/11/2016

- Phantom: SAM 12a (Site 57); Type: SAM 4.0; Serial: TP:1020

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=15mm, Pin=250mW 3 2/Area Scan (81x161x1)**; Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 2.73 mW/g

**d=15mm, Pin=250mW 3 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0**; Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.2 V/m; Power Drift = 0.718 dB

Peak SAR (extrapolated) = 3.60 W/kg

**SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.53 mW/g**

Maximum value of SAR (measured) = 2.78 mW/g

# CERTIFICATE OF CALIBRATION

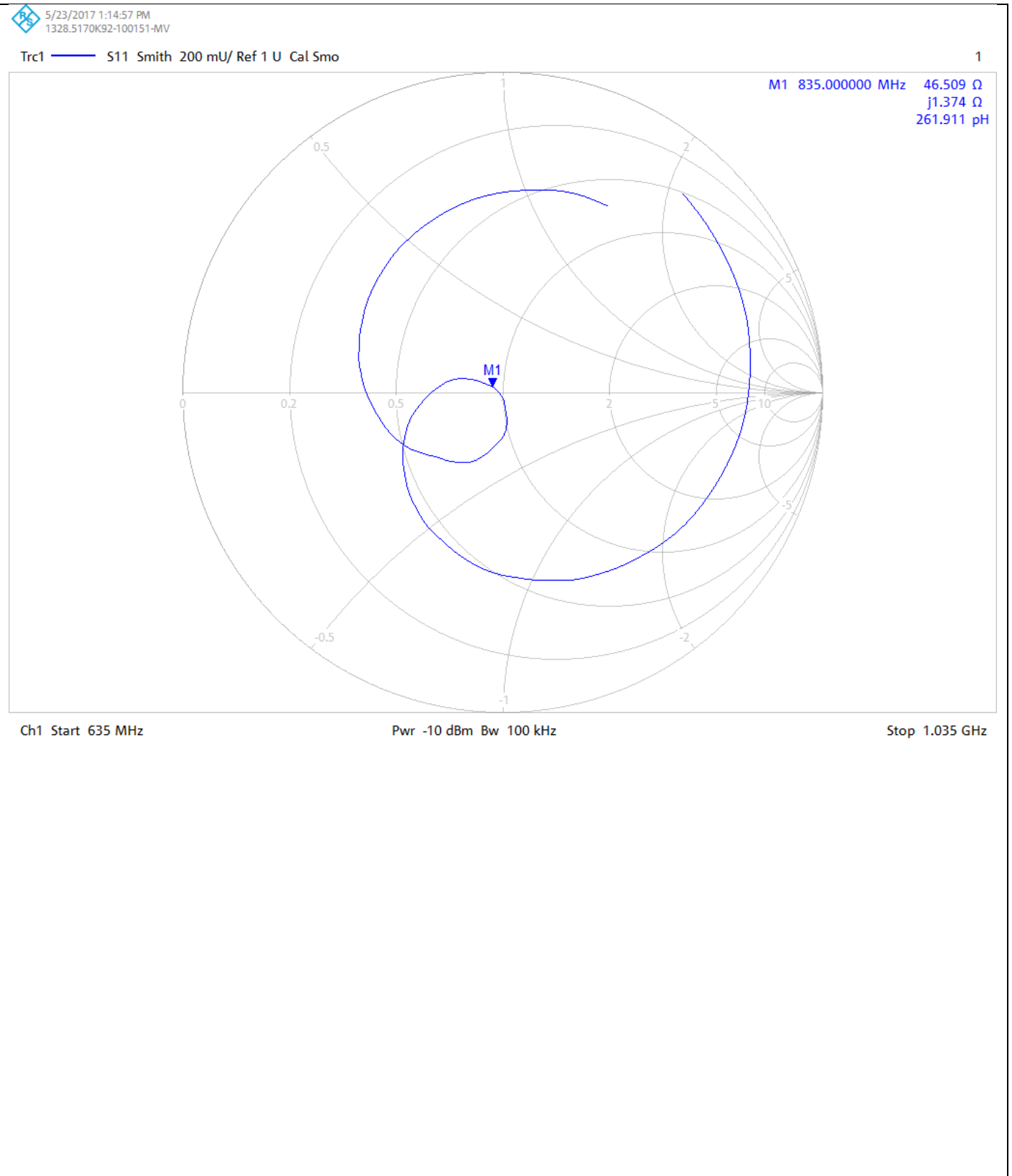
## ISSUED BY UL VS LTD

CERTIFICATE  
NUMBER :  
11762345JD01B

UKAS Accredited Calibration Laboratory No. 5248

Page 6 of 10

### Impedance Measurement Plot for Head Stimulating Liquid (HSL)



# CERTIFICATE OF CALIBRATION

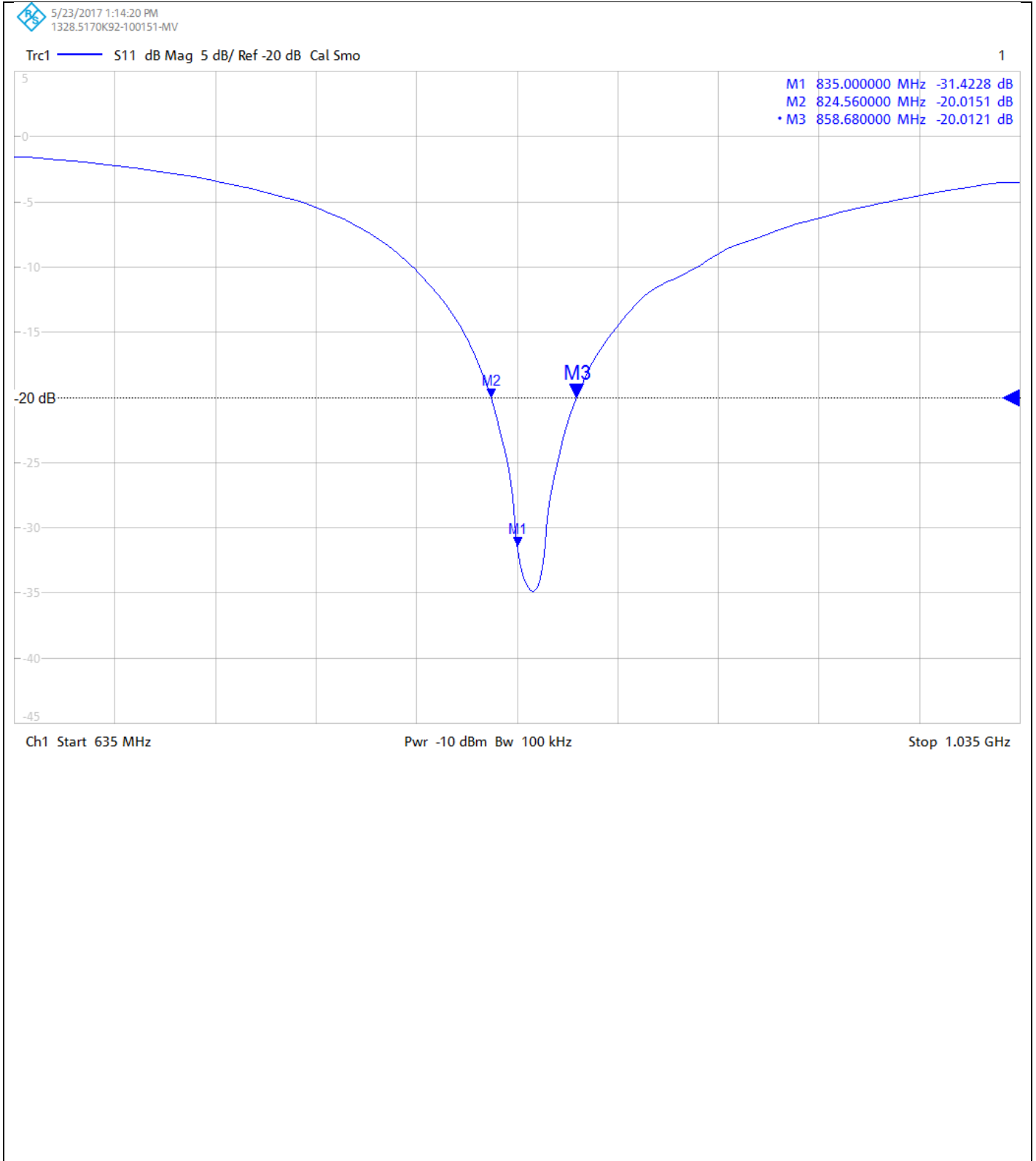
## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11762345JD01B

Page 7 of 10

### Return Loss Measurement Plot for Head Stimulating Liquid (HSL)



# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

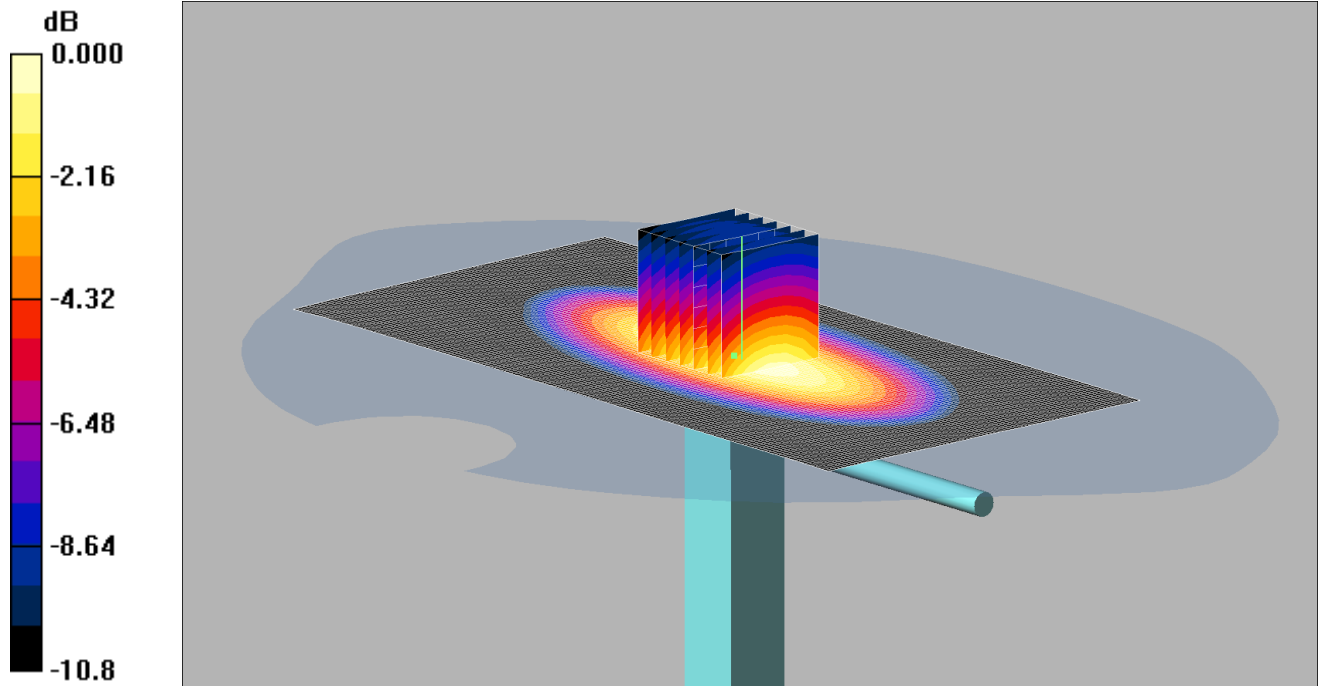
CERTIFICATE  
NUMBER :  
11762345JD01B

UKAS Accredited Calibration Laboratory No. 5248

Page 8 of 10

### DASY Validation Scan for Body Stimulating Liquid (MSL)

DUT: Dipole 835 MHz ; Type: D835V3; Serial: D7835V3 - SN:4d117



0 dB = 3.02mW/g

Communication System: CW 835; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 MHz MSL Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.999$  mho/m;  $\epsilon_r = 53.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3341; ConvF(6.47, 6.47, 6.47);

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn431; Calibrated: 18/11/2016

- Phantom: SAM 12a (Site 57); Type: SAM 4.0; Serial: TP:1020

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=15mm, Pin=250mW 2 /Area Scan (81x161x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 3.03 mW/g

**d=15mm, Pin=250mW 2 /Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.0 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 3.87 W/kg

**SAR(1 g) = 2.61 mW/g; SAR(10 g) = 1.7 mW/g**

Maximum value of SAR (measured) = 3.02 mW/g



# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11762345JD01B

Page 9 of 10

### Impedance Measurement Plot for Body Stimulating Liquid (MSL)



# CERTIFICATE OF CALIBRATION

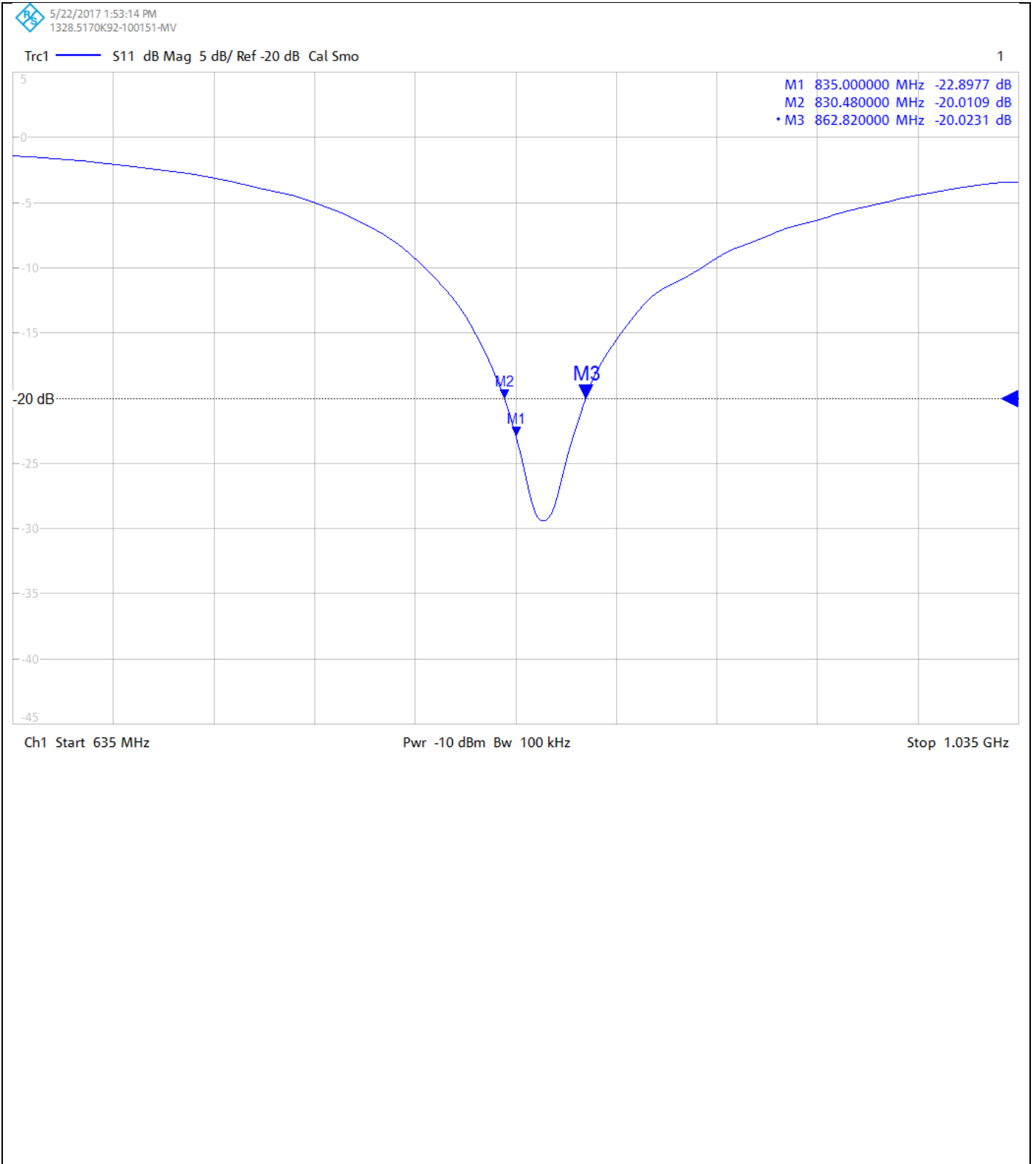
## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248


CERTIFICATE  
NUMBER :  
11762345JD01B


Page 10 of 10


### Return Loss Measurement Plot for Body Stimulating Liquid (MSL)



**Calibration Certificate Label:**

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11762345JD01B</p> <p>Instrument ID: 4d117</p> <p>Calibration Date: 22/May/2017</p> <p>Calibration Due Date:</p>
--	--

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11762345JD01B</p> <p>Instrument ID: 4d117</p> <p>Calibration Date: 22/May/2017</p> <p>Calibration Due Date:</p>
--	--

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11762345JD01B</p> <p>Instrument ID: 4d117</p> <p>Calibration Date: 22/May/2017</p> <p>Calibration Due Date:</p>
--	--

# CERTIFICATE OF CALIBRATION

ISSUED BY **UL VS LTD**

DATE OF ISSUE: 21/Apr/2017

CERTIFICATE NUMBER : 11733349JD01C



5248

UL VS LTD  
PAVILION A  
ASHWOOD PARK, ASHWOOD WAY  
BASINGSTOKE, HAMPSHIRE  
RG23 8BG, UK  
TEL: +44 (0) 1256 312000  
FAX: +44 (0) 1256 312001  
Email: calibration.uk@ul.com



Page 1 of 10

**APPROVED SIGNATORY**

.....  
Naseer Mirza

## Customer :

UL Verification Services Inc  
47173 Benicia Street  
Fremont, CA 94538, USA

## Equipment Details:

Description:	Dipole Validation Kit	Date of Receipt:	13/Apr/2017
Manufacturer:	Schmid & Partner Engineering AG		
Type/Model Number:	D1900V2		
Serial Number:	5d140		
Calibration Date:	19/Apr/2017		
Calibrated By:	Chanthu Thevarajah Laboratory Engineer		

Signature:

.....

All Calibration have been conducted in the closed laboratory facility: Lab Temperature (22±3) °C and humidity < 70%

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Use of the UKAS mark demonstrates that compliance with the requirements of BS/EN/ISO/IEC 17025 has been independently assessed.

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 2 of 10

The calibration methods and procedures used were as detailed in:

1. **IEC 62209-1:2005**: 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)
2. **IEC 62209-2:2010**: 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)
3. **IEEE 1528: 2013**: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques
4. FCC KDB Publication Number: “**KDB865664 D01 SAR Measurement 100 MHz to 6 GHz**”
5. **SPEAG DASY4/ DASY5 System Handbook**

The measuring equipment used to perform the calibration, documented in this certificate has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A2110	Data Acquisition Electronics	SPEAG	DAE4	431	18 Nov 2016	12
A2587	Probe	SPEAG	ES3DV3	3341	29 Aug 2016	12
A2200	Dipole	SPEAG	D1900V2	537	09 Feb 2017	12
PRE0151451	Power Monitoring Kit	Art-Fi	ART 100850-01	0001	Cal as part of System	12
PRE0151441	Power Sensor	Rhode & Schwarz	NRP8S	102481	16 Nov 2016	12
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	26 Sept 2016	12
PRE0151154	Network Analyser	Rhode & Schwarz	ZND8	100151	22 Nov 2016	12
PRE0151877	Calibration Kit	Rhode & Schwarz	Z135	102947-Bt	02 Dec 2016	12
M1768	Signal Generator	Rhode & Schwarz	SME06	837633/001	08 Nov 2016	12

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 3 of 10

### SAR System Specification

Robot System Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Robot Serial Number:	F00/SD89A1/A/01
DASY Version:	DASY 4 (v4.7.80)
Phantom:	Flat section of SAM Twin Phantom
Distance Dipole Centre:	10 mm (with spacer)
Frequency:	1900 MHz

### Dielectric Property Measurements – Head Simulating Liquid (HSL)

Simulant Liquid	Frequency (MHz)	Room Temp		Liquid Temp		Parameters	Target Value	Measured Value	Uncertainty (%)
		Start	End	Start	End				
Head	1900	22.0 °C	22.0 °C	21.9°C	22.0°C	$\epsilon_r$	40.00	41.30	± 5%
						$\sigma$	1.40	1.45	± 5%

### SAR Results – Head Simulating Liquid (HSL)

Simulant Liquid	SAR Measured	250 mW input Power	Normalised to 1.00 W	Uncertainty (%)
Head	SAR averaged over 1g	10.20 W/Kg	<b>40.80 W/Kg</b>	± 17.57%
	SAR averaged over 10g	5.29 W/Kg	<b>21.16 W/Kg</b>	± 17.32%

### Antenna Parameters – Head Simulating Liquid (HSL)

Simulant Liquid	Parameter	Measured Level	Uncertainty (%)
Head	Impedance	48.94 $\Omega$ -2.80 j $\Omega$	± 0.28 $\Omega$ ± 0.044 j $\Omega$
	Return Loss	31.55	± 2.03 dB

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 4 of 10

### Dielectric Property Measurements – Body Simulating Liquid (MSL)

Simulant Liquid	Frequency (MHz)	Room Temp		Liquid Temp		Parameters	Target Value	Measured Value	Uncertainty (%)
		Start	End	Start	End				
Body	1900	22.0 °C	21.8 °C	22.0°C	22.0°C	$\epsilon_r$	53.30	53.46	± 5%
						$\sigma$	1.52	1.59	± 5%

### SAR Results – Body Simulating Liquid (MSL)

Simulant Liquid	SAR Measured	250 mW input Power	Normalised to 1.00 W	Uncertainty (%)
Body	SAR averaged over 1g	10.30 W/Kg	<b>41.20 W/Kg</b>	± 18.06%
	SAR averaged over 10g	5.38 W/Kg	<b>21.52 W/Kg</b>	± 17.44%

### Antenna Parameters – Body Simulating Liquid (MSL)

Simulant Liquid	Parameter	Measured Level	Uncertainty (%)
Body	Impedance	51.84 $\Omega$ -4.61 j $\Omega$	± 0.28 $\Omega$ ± 0.044 j $\Omega$
	Return Loss	26.74	± 2.03 dB

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

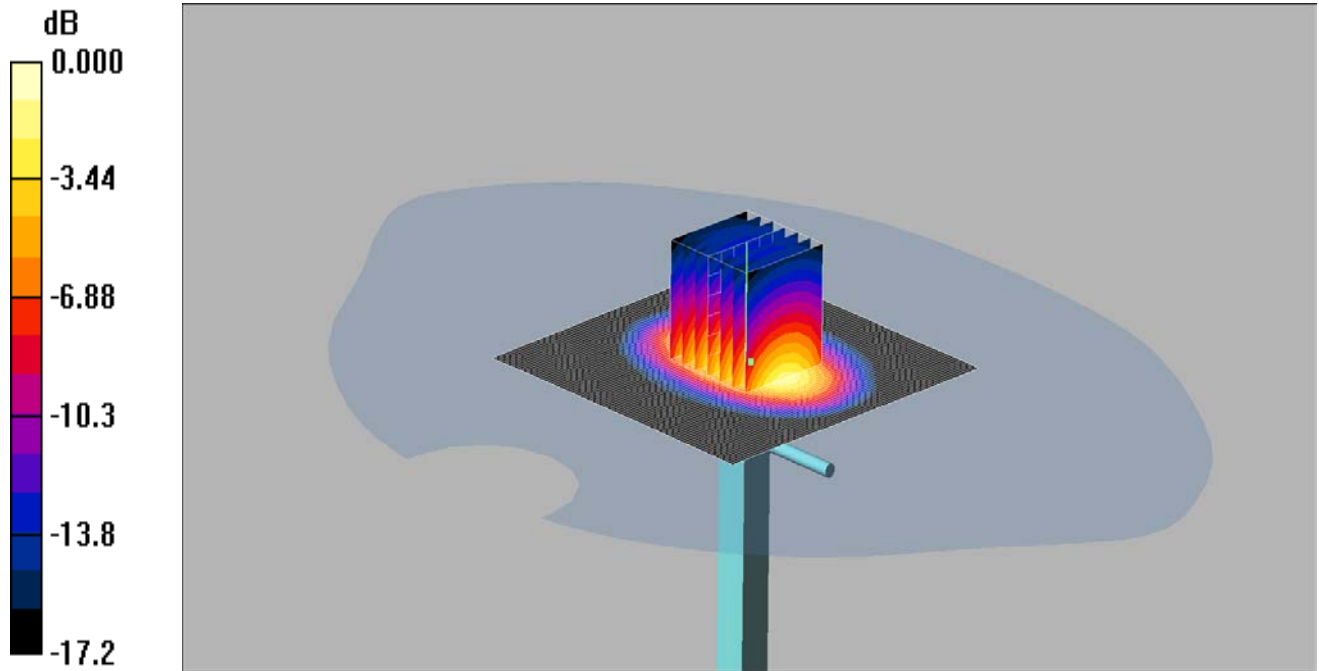
UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 5 of 10

### DASY Validation Scan for Head Stimulating Liquid (HSL)

DUT: Dipole 1900 MHz; SN540; Type: D1900V2; Serial: SN537



0 dB = 11.5mW/g

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 MHz HSL Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3341; ConvF(5.29, 5.29, 5.29);

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn431; Calibrated: 18/11/2016

- Phantom: SAM 12a (Site 57); Type: SAM 4.0; Serial: TP:1020

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=10mm, Pin=250mW 2 2 2/Area Scan (81x81x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 11.5 mW/g

**d=10mm, Pin=250mW 2 2 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.2 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 19.2 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g**

Maximum value of SAR (measured) = 11.5 mW/g



# CERTIFICATE OF CALIBRATION

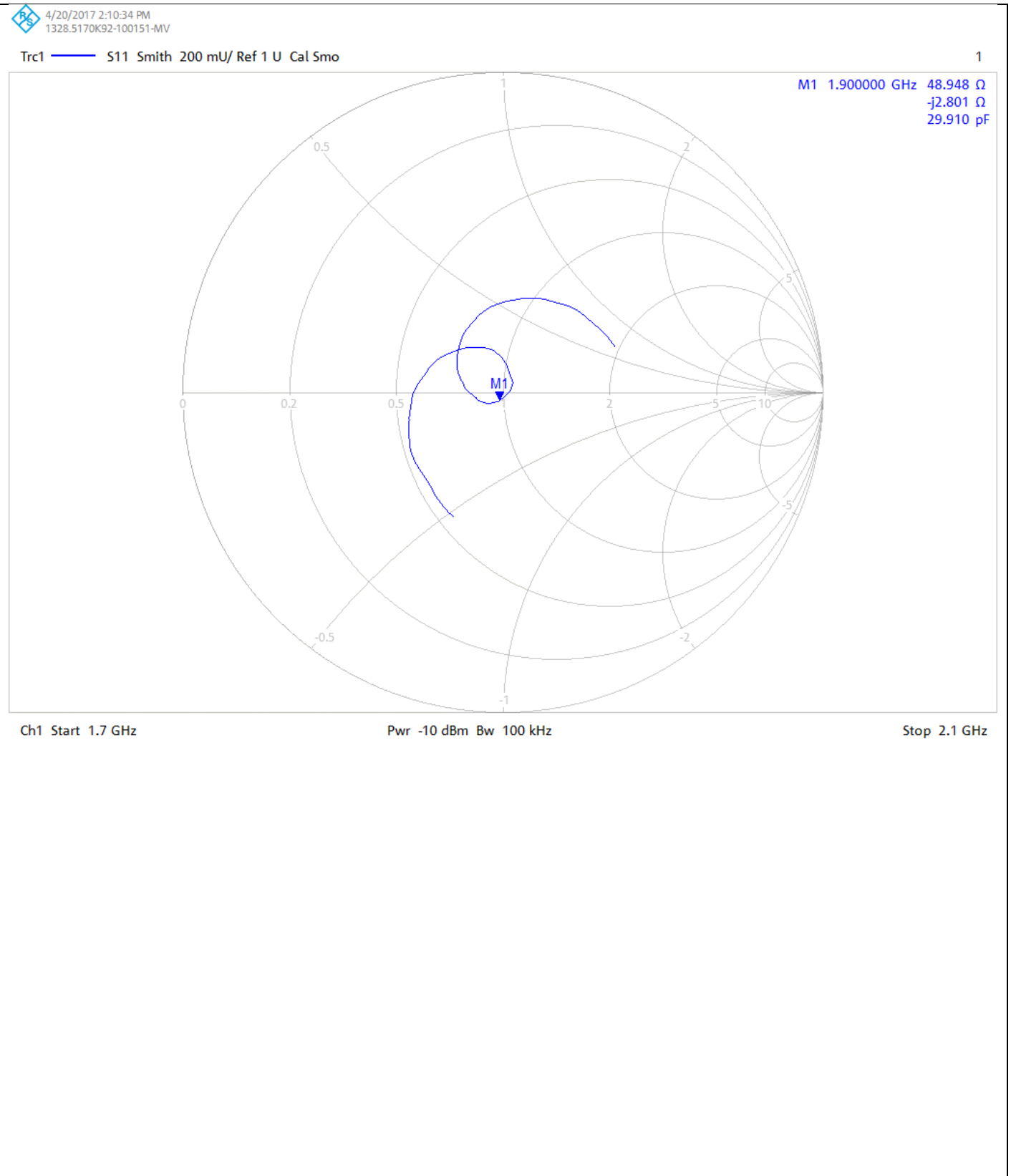
## ISSUED BY UL VS LTD

CERTIFICATE  
NUMBER :  
11733349JD01C

UKAS Accredited Calibration Laboratory No. 5248

Page 6 of 10

### Impedance Measurement Plot for Head Stimulating Liquid (HSL)



# CERTIFICATE OF CALIBRATION

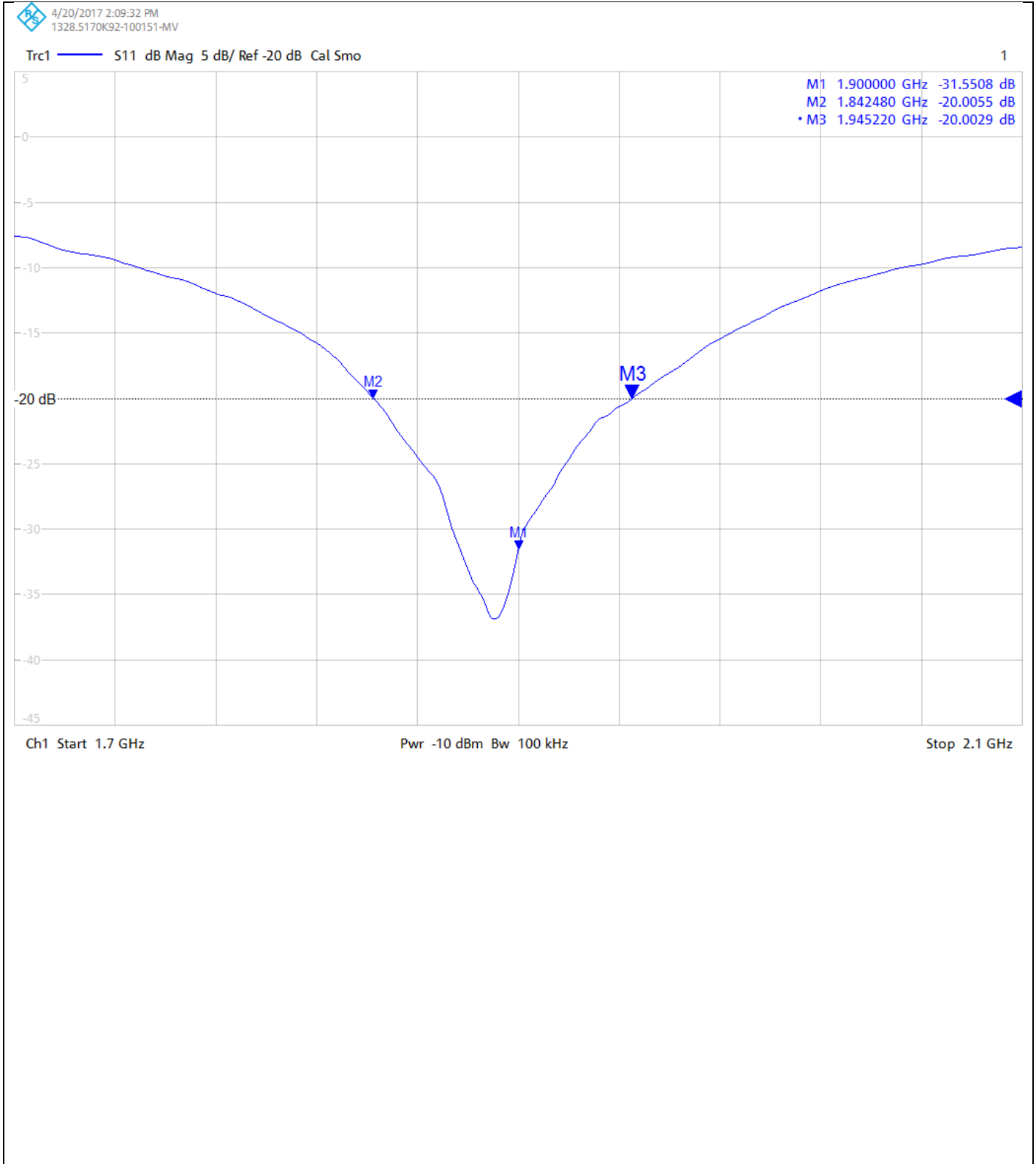
## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 7 of 10

### Return Loss Measurement Plot for Head Stimulating Liquid (HSL)



# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

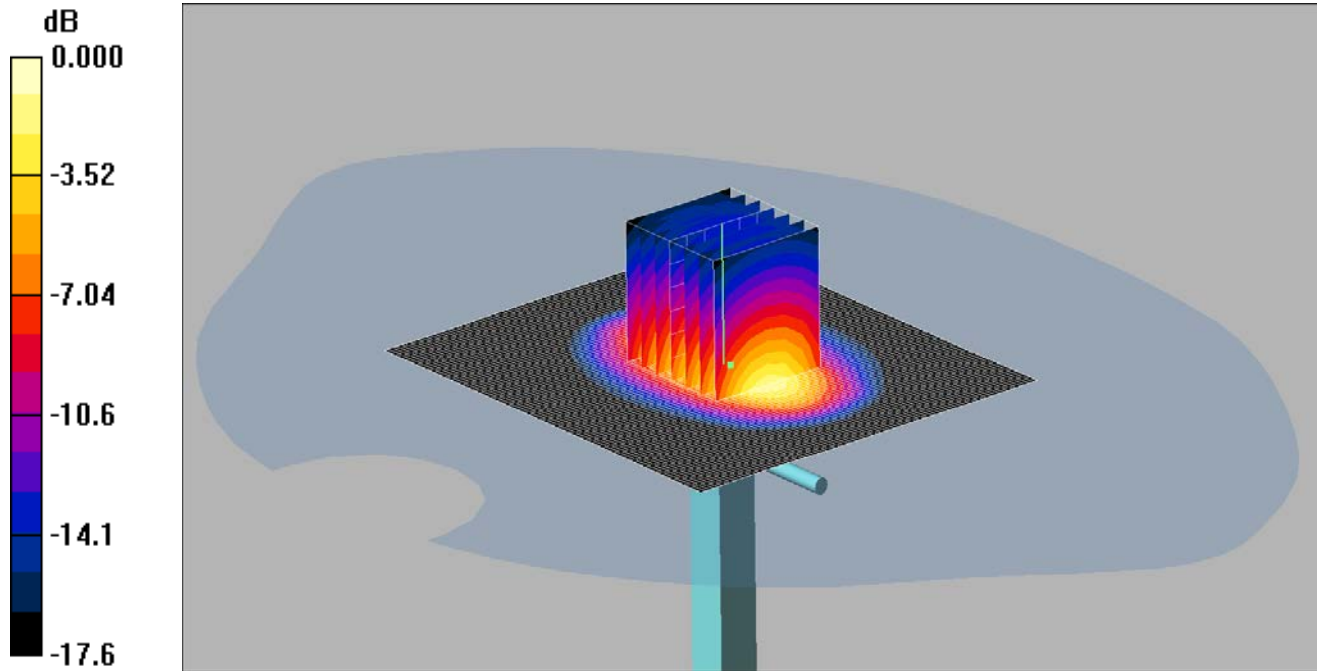
CERTIFICATE  
NUMBER :  
11733349JD01C

UKAS Accredited Calibration Laboratory No. 5248

Page 8 of 10

### DASY Validation Scan for Body Stimulating Liquid (MSL)

DUT: Dipole 1900 MHz; ; Type: D1900V2; Serial: 5d140



0 dB = 13.1mW/g

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: 1750/1800/1900 MHz MSL Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 53.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

#### DASY4 Configuration:

- Probe: ES3DV3 - SN3341; ConvF(4.97, 4.97, 4.97);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn431; Calibrated: 18/11/2016
- Phantom: SAM 12a (Site 57); Type: SAM 4.0; Serial: TP:1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- d=10mm, Pin=250mW 2/Area Scan (81x91x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (interpolated) = 13.4 mW/g
- d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 94.9 V/m; Power Drift = -0.006 dB
- Peak SAR (extrapolated) = 18.3 W/kg
- SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.38 mW/g**
- Maximum value of SAR (measured) = 13.1 mW/g

# CERTIFICATE OF CALIBRATION

## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248

CERTIFICATE  
NUMBER :  
11733349JD01C

Page 9 of 10

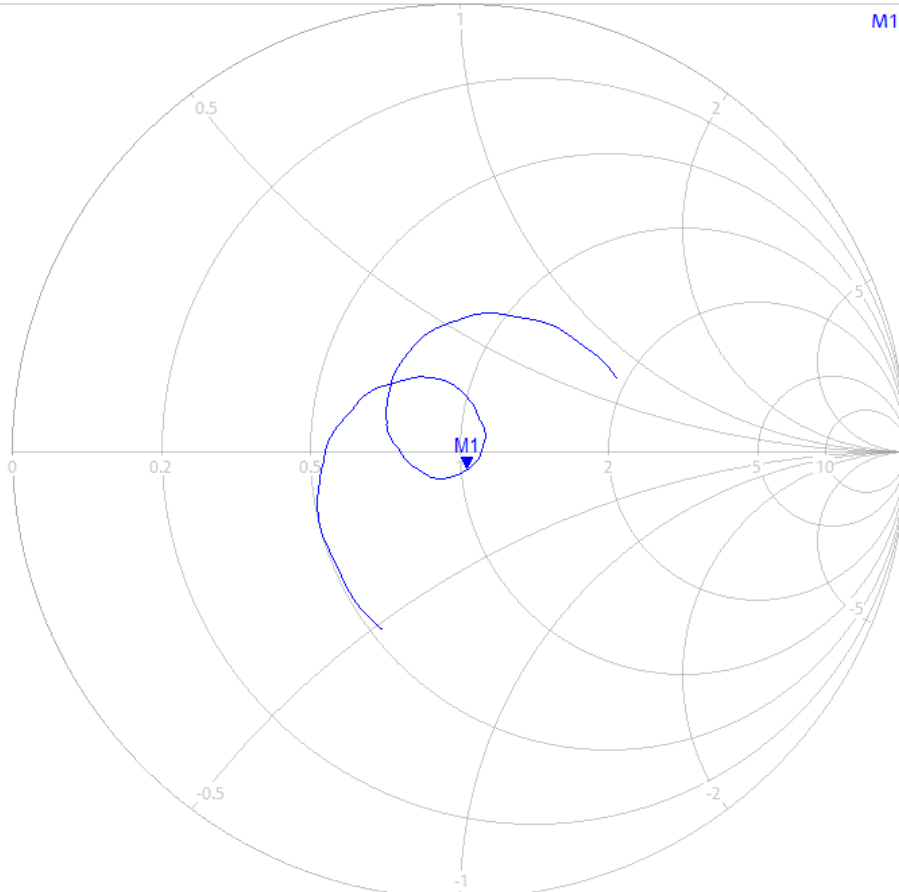
### Impedance Measurement Plot for Body Stimulating Liquid (MSL)

4/19/2017 1:12:15 PM  
1328.5170K92-100151-MV

Trc1 — S11 Smith 200 mU/ Ref 1 U Cal Smo

1

M1 1.900000 GHz 51.849  $\Omega$   
-j4.616  $\Omega$   
18.147 pF



Ch1 Start 1.7 GHz

Pwr -10 dBm Bw 100 kHz

Stop 2.1 GHz

# CERTIFICATE OF CALIBRATION

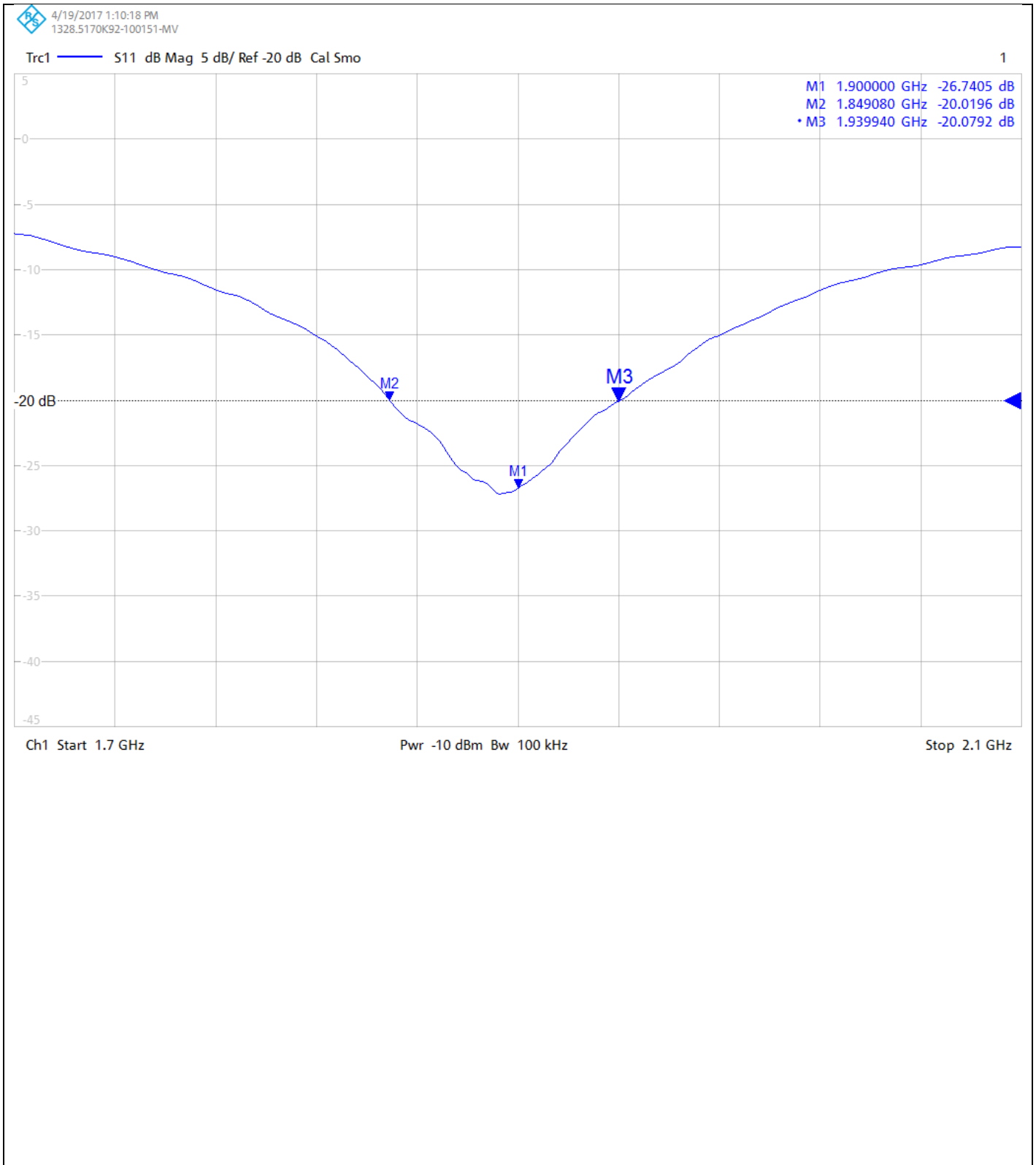
## ISSUED BY UL VS LTD

UKAS Accredited Calibration Laboratory No. 5248


CERTIFICATE  
NUMBER :  
11733349JD01C


Page 10 of 10


### Return Loss Measurement Plot for Body Stimulating Liquid (MSL)



**Calibration Certificate Label:**

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11733349JD01C</p> <p>Instrument ID: 5d140</p> <p>Calibration Date: 19/Apr/2017</p> <p>Calibration Due Date:</p>
--	--

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11733349JD01C</p> <p>Instrument ID: 5d140</p> <p>Calibration Date: 19/Apr/2017</p> <p>Calibration Due Date:</p>
--	--

 <p>UKAS CALIBRATION 5248</p>	<p><b>UL VS LTD - Tel: +44 (0) 1256312000</b></p> <p>Certificate Number: 11733349JD01C</p> <p>Instrument ID: 5d140</p> <p>Calibration Date: 19/Apr/2017</p> <p>Calibration Due Date:</p>
--	--