

# **Appendix B - DAE & Probe Calibration Certificate**

eughausstrasse 43, 8004 Zuric		and alaber	Swiss Calibration Service
ccredited by the Swiss Accredite he Swiss Accreditation Servic fultilateral Agreement for the r	e is one of the signatories	to the EA	No.: SCS 0108
lient SGS-TW (Aude	en)	Certificate N	DAE4-877_Mar19
CALIBRATION O	CERTIFICATE		
Object	DAE4 - SD 000 D	04 BM - SN: 877	
Calibration procedure(s)	QA CAL-06.v29 Calibration procee	lure for the data acquisition elec	ctronics (DAE)
Calibration date:	March 22, 2019		
The measurements and the unce	ertainties with confidence pro	nal standards, which realize the physical ur obability are given on the following pages an facility: environment temperature (22 ± 3) <sup>o</sup>	nd are part of the certificate.
The measurements and the unce All calibrations have been condu	ertainties with confidence pro	obability are given on the following pages ar	nd are part of the certificate.
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards	ertainties with confidence pro- cted in the closed laboratory TE critical for calibration)	bability are given on the following pages ar facility: environment temperature $(22 \pm 3)^{\circ}$ Cal Date (Certificate No.)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards	ertainties with confidence pro- cted in the closed laboratory TE critical for calibration)	obability are given on the following pages ar facility: environment temperature $(22 \pm 3)^{\circ}$	nd are part of the certificate. C and humidity < 70%.
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Keithley Multimeter Type 2001 Secondary Standards	ertainties with confidence pro- loted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID #	bability are given on the following pages ar facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 03-Sep-18 (No:23488) Check Date (In house)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19 Scheduled Check
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit	etainties with confidence pro- cted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID # SE UWS 053 AA 1001	bability are given on the following pages ar facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 03-Sep-18 (No:23488)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit	ertainties with confidence pro- cted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID # SE UWS 053 AA 1001 SE UMS 006 AA 1002	bability are given on the following pages ar facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 03-Sep-18 (No:23488) Check Date (in house) 07-Jan-19 (in house check) 07-Jan-19 (in house check)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19 Scheduled Check In house check: Jan-20 In house check: Jan-20
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit Calibrator Box V2.1	etainties with confidence pro- cted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID # SE UWS 053 AA 1001	bability are given on the following pages at facility: environment temperature (22 ± 3) <sup>e</sup> Cal Date (Certificate No.) 03-Sep-18 (No:23488) Check Date (in house) 07-Jan-19 (in house check)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19 Scheduled Check In house check: Jan-20
The measurements and the unce All calibrations have been condu Calibration Equipment used (M& Primary Standards Keithley Multimeter Type 2001 Secondary Standards Auto DAE Calibration Unit Calibrator Box V2.1	ertainties with confidence pro- teted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID # SE UWS 053 AA 1001 SE UMS 006 AA 1002 Name	bability are given on the following pages at facility: environment temperature (22 ± 3) <sup>e</sup> Cal Date (Certificate No.) 03-Sep-18 (No:23488) Check Date (In house) 07-Jan-19 (In house check) 07-Jan-19 (In house check) 07-Jan-19 (In house check)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19 Scheduled Check In house check: Jan-20 In house check: Jan-20
The measurements and the unce	ertainties with confidence pro- teted in the closed laboratory TE critical for calibration) ID # SN: 0810278 ID # SE UWS 053 AA 1001 SE UMS 006 AA 1002 Name	bability are given on the following pages at facility: environment temperature (22 ± 3) <sup>e</sup> Cal Date (Certificate No.) 03-Sep-18 (No:23488) Check Date (In house) 07-Jan-19 (In house check) 07-Jan-19 (In house check) 07-Jan-19 (In house check)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep-19 Scheduled Check In house check: Jan-20 In house check: Jan-20

Certificate No: DAE4-877 Mar19

Page 1 of 5

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488



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

Accredited by the Swiss Accreditation Service (SAS)



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura **Swiss Calibration Service** 

S

С

S

The Swiss Accreditation Service is one of the signatories to the EA

Accreditation No.: SCS 0108

Glossary

DAE Connector angle

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

#### Methods Applied and Interpretation of Parameters

Multilateral Agreement for the recognition of calibration certificates

- 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: Typical value for information: 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.

Certificate No: DAE4-877 Mar19

Page 2 of 5

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

> No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

```
www.tw.sas.com
```



#### **DC Voltage Measurement**

A/D - Converter Reso High Range:	1LSB =	6.1uV.	full range =	-100+300 mV
Low Range:	1LSB =	61nV .		-1+3mV
DASY measurement	parameters: Aut	to Zero Time: 3	sec; Measuring	time: 3 sec

<b>Calibration Factors</b>	Х	Y	Z
High Range	405.009 ± 0.02% (k=2)	404.575 ± 0.02% (k=2)	404.999 ± 0.02% (k=2)
Low Range	3.98156 ± 1.50% (k=2)	3.98173 ± 1.50% (k=2)	3.97143 ± 1.50% (k=2)

**Connector Angle** 

Connector Angle to be used in DASY system	324.0 ° ± 1 °
---	---------------

Certificate No: DAE4-877\_Mar19

Page 3 of 5

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Company's sole except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488



### Appendix (Additional assessments outside the scope of SCS0108)

#### 1. DC Voltage Linearity

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	200032.98	-1.14	-0.00
Channel X + Input	20007.92	2.70	0.01
Channel X - Input	-20004.25	1.79	-0.01
Channel Y + Input	200036.80	2.70	0.00
Channel Y + Input	20007.07	1.87	0.01
Channel Y - Input	-20005.67	0.46	-0.00
Channel Z + Input	200029.76	-4.15	-0.00
Channel Z + Input	20005.98	1.01	0.01
Channel Z - Input	-20005.75	0.42	-0.00

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	2000.31	-0.51	-0.03
Channel X + Input	200.71	-0.18	-0.09
Channel X - Input	-198.89	0.16	-0.08
Channel Y + Input	2000,66	-0.14	-0.01
Channel Y + Input	199.70	-1.15	-0.57
Channel Y - Input	-199.73	-0,70	0.35
Channel Z + Input	2000.33	-0.39	-0.02
Channel Z + Input	199.36	-1.50	-0.75
Channel Z - Input	-201.36	-2.21	1.11

#### 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	15.42	13.43
	- 200	-11.67	-13.84
Channel Y	200	-18.90	-19.48
	- 200	18.01	18.21
Channel Z	200	20.03	19.90
	- 200	-23.15	-23.35

#### 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	1	0.30	-3.40
Channel Y	200	7.13	×	1.49
Channel Z	200	8.92	4.35	~

Certificate No: DAE4-877\_Mar19

Page 4 of 5

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488

```
www.tw.sas.com
```



#### 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	16001	16135
Channel Y	15878	16754
Channel Z	15739	17168

#### 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	0.70	-0.90	2.31	0.60
Channel Y	0.66	-0.90	2.30	0.71
Channel Z	0.60	-1.31	2.66	0.79

#### 6. Input Offset Current

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

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

#### 8. Low Battery Alarm Voltage (Typical values for information)

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

#### 9. Power Consumption (Typical values for information)

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

Certificate No: DAE4-877\_Mar19

Page 5 of 5

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



Matrix Secreditation Service is one of the signatories to the EA         Multilateral Agreement for the recognition of calibration certificates         Client       SGS (Auden)       Certificate No: I         CALIBRATION CERTIFICATE         Object       EX3DV4 - SN:7509         Calibration procedure(s)       QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-23.v5, QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-01.v9, QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-01.v9, QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-01.v9, QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-01.v2, 2019         Calibration procedure(s)       QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-01.v2, 2019         This calibration certificate documents the traceability to national standards, which realize the physical units of the measurements and the uncertainties with confidence probability are given on the following pages and a All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C ar         Calibration Equipment used (M&TE critical for calibration)       Quarter 18 (No. 217-02672)         Power sensor NRP-291       SN: 104778       Quarter 18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       Quarter 18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       Quarter 18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       Quarter 18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       Quarter 18 (No. 217-02672)	editation No.: SCS 0108
CALIBRATION CERTIFICATE         Object       EX3DV4 - SN:7509         Calibration procedure(s)       QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-23.v5, QA CAL-23.v5, QA CAL-24.v5, QA CAL-25.v5, QA CAL-25.	EX3-7509_Mar19
Object         EX3DV4 - SN:7509           Calibration procedure(s)         QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-24,	
Calibration procedure(s)       QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-24, QA VA, QA VA, VA, VA VA, VA	
Calibration procedure for dosimetric E-field probes         Calibration date:       March 25, 2019         Calibration certificate documents the traceability to national standards, which realize the physical units of The measurements and the uncertainties with confidence probability are given on the following pages and a         All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C ar         Calibration Equipment used (M&TE critical for calibration)         Primary Standards       ID       Cal Date (Certificate No.)         Power meter NRP       SN: 104778       04-Apr-18 (No. 217-02672/02673)         Power sensor NRP-291       SN: 103244       04-Apr-18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       04-Apr-18 (No. 217-02672)         Date4       SN: 03243       01-Dec-18 (No. 217-02673)         Date4       SN: 103245       04-Apr-18 (No. 217-02673)         Date4       SN: 103245       04-Apr-18 (No. 217-02673)         Date4       SN: 103245       04-Apr-18 (No. 217-02673)         Dec-18 (No. DET-02678)       Dater<04-460_Dec18)	
This calibration certificate documents the traceability to national standards, which realize the physical units of the measurements and the uncertainties with confidence probability are given on the following pages and a All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C are Calibration Equipment used (M&TE critical for calibration)         Primary Standards       ID       Cal Date (Certificate No.)         Power meter NRP       SN: 104778       04-Apr-18 (No. 217-02672/02673)         Power sensor NRP-291       SN: 103245       04-Apr-18 (No. 217-02672)         Power sensor NRP-291       SN: 103245       04-Apr-18 (No. 217-02673)         Reference 20 dB Attenuator       SN: S5277 (20x)       04-Apr-18 (No. 217-02673)         DAE4       SN: 660       19-Dec-18 (No. DAE4-660 Dec18)         Reference Probe ES3DV2       SN: 3013       31-Dec-18 (No. DAE4-660 Dec18)         Secondary Standards       ID       Check Date (in house)         Power sensor E4412A       SN: GB41293874       06-Apr-16 (in house check Jun-18)         Power sensor E4412A       SN: 000110210       06-Apr-16 (in house check Jun-18)         Power sensor E4412A       SN: US3642U01700       04-Apr-14 (in house check Jun-18)         Reference THP 8648C       SN: US41080477       31-Mar-14 (in house check Oct-18)	AL-25.v7
The measurements and the uncertainties with confidence probability are given on the following pages and a All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C ar Calibration Equipment used (M&TE critical for calibration) Primary Standards ID Cal Date (Certificate No.) Power meter NRP SN: 104778 04-Apr-18 (No. 217-02672/02673) Power sensor NRP-Z91 SN: 103244 04-Apr-18 (No. 217-02672) Power sensor NRP-Z91 SN: 103245 04-Apr-18 (No. 217-02672) Power sensor NRP-Z91 SN: 103245 04-Apr-18 (No. 217-02673) Reference 20 dB Attenuator SN: S5277 (20x) 04-Apr-18 (No. 217-02682) DAE4 SN: 660 19-Dec-18 (No. DAE4-660 Dec18) Reference Probe ES3DV2 SN: 3013 31-Dec-18 (No. ES3-3013_Dec18) Secondary Standards ID Check Date (in house) Power meter E4419B SN: GB41293874 06-Apr-16 (in house check Jun-18) Power sensor E4412A SN: WY41498087 06-Apr-16 (in house check Jun-18) RF generator HP 8648C SN: US3642U01700 04-Aug-99 (in house check Jun-18) Network Analyzer E8358A SN: US41080477 31-Mar-14 (in house check Oct-18)	
Power meter NRP         SN: 104778         04-Apr-18 (No. 217-02672/02673)           Power sensor NRP-Z91         SN: 103244         04-Apr-18 (No. 217-02672)           Power sensor NRP-Z91         SN: 103245         04-Apr-18 (No. 217-02673)           Reference 20 dB Attenuator         SN: S5277 (20x)         04-Apr-18 (No. 217-02673)           DAE4         SN: 660         19-Dec-18 (No. 217-02682)           DAE4         SN: 660         19-Dec-18 (No. DAE4-660_Dec18)           Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013_Dec18)           Secondary Standards         ID         Check Date (in house)           Power sensor E4412A         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: WY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: US3642U01700         04-Apr-18 (in house check Jun-18)           RF generator HP 8648C         SN: US41080477         31-Mar-14 (in house check Oct-18)	
Power meter NRP         SN: 104778         04-Apr-18 (No. 217-02672/02673)           Power sensor NRP-Z91         SN: 103244         04-Apr-18 (No. 217-02672)           Power sensor NRP-Z91         SN: 103245         04-Apr-18 (No. 217-02673)           Reference 20 dB Attenuator         SN: S5277 (20x)         04-Apr-18 (No. 217-02673)           DAE4         SN: 660         19-Dec-18 (No. 217-02682)           DAE4         SN: 660         19-Dec-18 (No. DAE4-660_Dec18)           Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013_Dec18)           Secondary Standards         ID         Check Date (in house)           Power sensor E4412A         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: US3642U01700         04-Apr-14 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Scheduled Calibration
Power sensor NRP-Z91         SN: 103245         04-Apr-18 (No. 217-02673)           Reference 20 dB Attenuator         SN: S5277 (20x)         04-Apr-18 (No. 217-02673)           DAE4         SN: 660         19-Dec-18 (No. 247-02682)           DAE4         SN: 660         19-Dec-18 (No. DAE4-660_Dec18)           Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013_Dec18)           Secondary Standards         ID         Check Date (in house)           Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Apr-19
Power sensor NRP-Z91         SN: 103245         04-Apr-18 (No. 217-02673)           Reference 20 dB Attenuator         SN: S5277 (20x)         04-Apr-18 (No. 217-02682)           DAE4         SN: 660         19-Dec-18 (No. DAE4-660, Dec18)           Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013, Dec18)           Secondary Standards         ID         Check Date (in house)           Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Apr-19
DAE4         SN: 660         19-Dec-18 (No. DAE4-660, Dec18)           Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013_Dec18)           Secondary Standards         ID         Check Date (in house)           Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Apr-19
Reference Probe ES3DV2         SN: 3013         31-Dec-18 (No. ES3-3013_Dec18)           Secondary Standards         ID         Check Date (in house)           Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           RF generator HP 8648C         SN: US41080477         31-Mar-14 (in house check Oct-18)	Apr-19
Secondary Standards         ID         Check Date (in house)           Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Dec-19
Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Dec-19
Power meter E4419B         SN: GB41293874         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Calculated Objects
Power sensor E4412A         SN: MY41498087         06-Apr-16 (in house check Jun-18)           Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	Scheduled Check In house check; Jun-20
Power sensor E4412A         SN: 000110210         06-Apr-16 (in house check Jun-18)           RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	
RF generator HP 8648C         SN: US3642U01700         04-Aug-99 (in house check Jun-18)           Network Analyzer E8358A         SN: US41080477         31-Mar-14 (in house check Oct-18)	L In tiouse check: Jun-20
Network Analyzer E8358A SN: US41080477 31-Mar-14 (in house check Oct-18)	In house check: Jun-20
Nexus Product	In house check: Jun-20
	where the second s
Calibrated by: Claudio Leubler Laboratory Technician	In house check: Jun-20 In house check: Jun-20 In house check: Oct-19
Approved by: Katja Pokovic Technical Manager	In house check: Jun-20 In house check: Jun-20

Certificate No: EX3-7509\_Mar19

Page 1 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's induced of this document is advised information contained reliefor reliefor the company's induced at the time of its intervention only and within the initial contained information contained reliefor reliefor the company's induced at the time of its relieformer and the induced at the time of its client as a structure of the induced at the time of its client as a structure of the company's induced at the time of its client as a structure of the induced at the time of its client as a structure of the its client as a structure of the company's induced at the time of its client as a structure of the time o prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

f (886-2) 2298-0488



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



- Schweizerischer Kalibrierdienst S Service suisse d'étalonnage C Servizio svizzero di taratura S
- Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx, 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 (p	o rotation around probe axis
Polarization 9	$\vartheta$ 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
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

information used in DASY system to align probe sensor X to the robot coordinate system Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement
- Techniques", June 2013 IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from handb)
- held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016 c) IEC 62209-2, "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)". March 2010 d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Methods Applied and Interpretation of Parameters:

- NORMx, y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz; R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E2-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,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.
- DCPx,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
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,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 NORMx,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.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no. uncertainty required).

Certificate No: EX3-7509 Mar19

Page 2 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

f (886-2) 2298-0488



#### EX3DV4 - SN:7509

March 25, 2019

### DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	0.47	0,49	0.47	± 10,1 %
DCP (mV) <sup>B</sup>	99.6	98.6	102.3	- 10.1 70

#### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Max dev.	Unc <sup>E</sup> (k=2)
0 C	CW	X	0.0	0.0	1.0	0.00 176	176.8	±3.3 %	±4.7 %
		Y	0.0	0.0	1.0		186.0		1.1
		Y	0.0	0.0	1.0		183.5		

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%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>3</sup>-field uncertainty inside TSL (see Pages 5 and 6)

 <sup>b</sup> Numerical linearization parameter: uncertainty or trequired.
 <sup>c</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value

Certificate No: EX3-7509 Mar19

Page 3 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

f (886-2) 2298-0488



EX3DV4-SN:7509

March 25, 2019

### DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

#### **Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (*)	-47.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Certificate No: EX3-7509\_Mar19

Page 4 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms\_ad\_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488

www.tw.sgs.com



Report No. :E5/2019/C0017 Rev: 01 Page: 10 of 15

EX3DV4- SN:7509

March 25, 2019

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	41.9	0.89	10.41	10.41	10.41	0.51	0.80	± 12.0 %
835	41.5	0.90	10.13	10.13	10.13	0.48	0.85	± 12.0 %
900	41.5	0.97	9.89	9.89	9.89	0.44	0.84	± 12.0 %
1750	40.1	1.37	8.84	8.84	8.84	0.28	0.98	± 12.0 %
1900	40.0	1.40	8.50	8.50	8.50	0.30	0.85	± 12.0 %
2000	40.0	1.40	8.39	8.39	8.39	0.35	0.85	± 12,0 %
2300	39.5	1.67	8.13	8.13	8.13	0.29	0.88	± 12.0 %
2450	39.2	1.80	7.79	7.79	7.79	0.30	0.88	± 12.0 %
2600	39.0	1.96	7.70	7.70	7.70	0.36	0.86	± 12.0 %
5200	36.0	4.66	5.46	5.46	5.46	0.40	1.80	± 13.1 %
5300	35.9	4.76	5.20	5.20	5.20	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.77	4.77	4.77	0.40	1,80	± 13.1 %
5800	35.3	5.27	4.94	4.94	4.94	0.40	1.80	± 13.1 %

Calibration Parameter Determined in Head Tissue Simulating Media

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz. The validity of tissue parameters (c 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 (c and σ) can be relaxed to ± 10% if liquid compensation formula is applied to the ConvF uncertainty for indicated larget lissue parameters. <sup>(C</sup> 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 the ConvF uncertainty for indicated larget lissue parameters. <sup>(C</sup> 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 the the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

diameter from the boundary

Certificate No: EX3-7509 Mar19

Page 5 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

f (886-2) 2298-0488



Report No. :E5/2019/C0017 Rev: 01 Page: 11 of 15

EX3DV4-SN:7509

March 25, 2019

### DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	55.5	0.96	10.91	10.91	10.91	0.45	0.80	± 12.0 %
835	55.2	0.97	10,59	10.59	10.59	0.40	0.88	± 12.0 %
900	55.0	1.05	10.47	10.47	10.47	0.40	0.80	± 12.0 %
1750	53.4	1.49	8.63	8.63	8.63	0.35	0.85	± 12.0 %
1900	53.3	1.52	8,24	8.24	8.24	0.36	0.85	± 12.0 %
2000	53.3	1.52	8.19	8.19	8.19	0.22	1.16	± 12.0 %
2300	52.9	1.81	8.11	8.11	8.11	0.35	0.88	± 12,0 %
2450	52.7	1.95	8.05	8.05	8.05	0.28	0.93	±12.0 %
2600	52.5	2.16	7.76	7.76	7.76	0.25	0.98	± 12.0 %
5200	49.0	5.30	4.81	4.81	4.81	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.66	4.66	4.66	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.19	4.19	4.19	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.20	4.20	4.20	0.50	1.90	± 13.1 %

Calibration Parameter Determined in Body Tissue Simulating Media

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is ± 9.9 MHz, and ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz. The measured SAR values. At frequencies below 3 GHz, the validity of tissue parameters (ic and o) 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 (ic and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty to indicated target tissue parameters. <sup>®</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-7509\_Mar19

Page 6 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

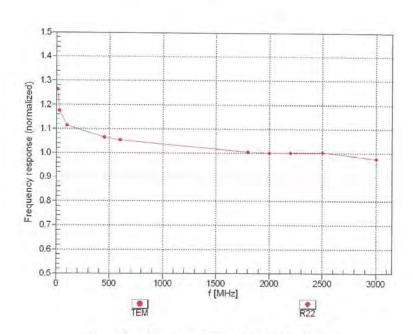
f (886-2) 2298-0488



Report No. :E5/2019/C0017 Rev: 01 Page: 12 of 15

EX3DV4- SN:7509

March 25, 2019



#### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: EX3-7509\_Mar19

Page 7 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

f (886-2) 2298-0488

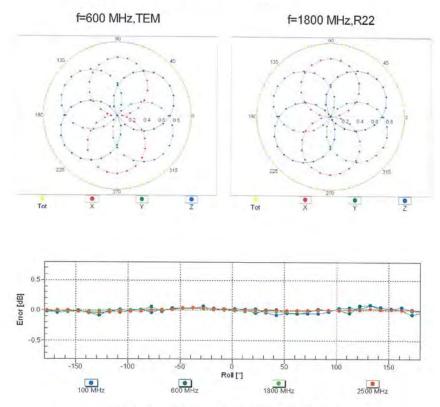
www.tw.sas.com



Report No. :E5/2019/C0017 Rev: 01 Page: 13 of 15

EX3DV4- SN:7509

March 25, 2019



### Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$

Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: EX3-7509 Mar19

Page 8 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

f (886-2) 2298-0488

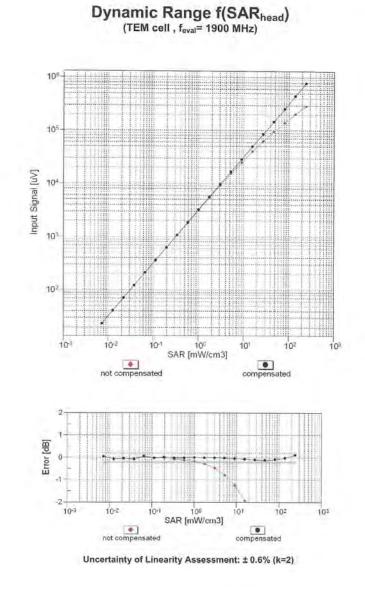
www.tw.sas.com



Report No. :E5/2019/C0017 Rev: 01 Page: 14 of 15

EX3DV4- SN:7509

March 25, 2019



Certificate No: EX3-7509 Mar19

Page 9 of 10

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

t (886-2) 2299-3279 台灣檢驗科技股份有限公司

f (886-2) 2298-0488

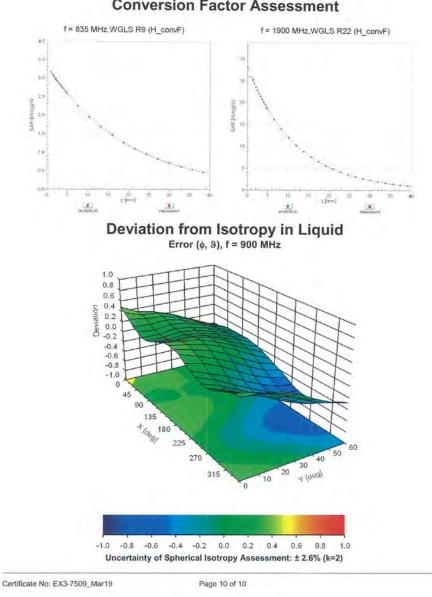
www.tw.sas.com



Report No. :E5/2019/C0017 Rev: 01 Page: 15 of 15

EX3DV4- SN:7509

March 25, 2019



### **Conversion Factor Assessment**

- End of report -

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留<sup>90</sup>天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms\_and\_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd. f (886-2) 2298-0488 台灣檢驗科技股份有限公司 www.tw.sas.com

t (886-2) 2299-3279