MEASUREMENT CONDITIONS

Temperature: 22.0 °C	Humidity: 42 %	Pressure: 100.3 kPa

MEASUREMENT EQUIPMENT

Model	Model Description	Equipment ID	Cal Due Date	Certificate Number	Trace Value
M 546	Reference power meter	163	24 March 2022	1/111-174-20	RF Power
M 568	Reference power meter	164	24 March 2022	1/111-175-20	RF Power
G4-161	Signal generator	3	12 October 2021	20-20	RF Power
G4-186	Signal generator	5	12 October 2021	21-20	RF Power
V7-34	Universal voltmeter	0067787	23 September 2021	2742-42	DC Voltage
RCH3-72	Frequency meter	931200	18 September 2021	2822-43	Frequency
MG3694C	Signal generator	133805	11 September 2021	2726-43	RF Power Frequency
E4407B	Spectrum analyzer	MY45110807	14 September 2021	2734-43	RF Power Frequency

MEASUREMENT RESULTS

SSB conversion loss RF to IF port for an LO input power of 10 dBm in Standard LO Frequency operation. IF power measured from "IF Output" port with IF frequency fixed at 400 MHz.

Table 1

RF frequency, GHz	50	58	60	64	75
RF input power, dBm	-15.0	-15.0	-15.0	-15.0	-15.0
LO frequency, MHz	4 133	4 800	4 967	5 300	6 217
LO input power, dBm	10.0	10.0	10.0	10.0	10.0
IF frequency, MHz	400.0				
IF measured level, dBm	-9.58	-7.96	-7.66	-8.79	-8.87
Conversion loss, dB	**-5.4**	**-7.0**	**-7.3**	**-6.2**	**-6.1**
Expanded uncertainty, dB	1.4	1.5	1.5	1.5	1.5

The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution.

Engineer _____

This measurement report issued in duplicate and sent to:
1. DEKRA Testing and Certification Co., Ltd No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan
2. Calibration Laboratory of Microwave Measuring Equipment
Duplication of Measurement report (complete or partial) must be authorized by the laboratory.

Calibration Laboratory of Microwave Measuring Equipment of MWMLab

ISO 17025
ACCREDITED LABORATORY

Calibration certificate

Accreditation certificate No. **№ BY/112 5.0065** **of** **09.01.2015**

Certificate number **44-20** **Date when calibrated** **02.11.2020** **Page** 1 **of** 2

Item calibrated **Antenna RCH015 (SAX156)**

Customer DEKRA Testing and Certification Co., Ltd
No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan

Method of calibration GOST 20271.1, MK KL 8.2-16

All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF. Conversion loss measurements above 178 GHz are to confirm operation functionality and traceable only to MWMLab standards and OML. This certificate shall not be reproduced, except in full. Any publication extracts from the calibration certificate requires written permission of the issuing calibration laboratory of microwave measuring equipment.

Authorising signature / Technical manager **Date of issue** **02.11.2020**

MWM Lab. BSUIR, 6, P.Brovki str., Minsk, 220013, Belarus *Phone/Fax: +375 17 293-84-96/E-mail: info@mwmlab.com*

Calibration Certificate

Calibration is performed by using

Model	Model Description	Equipment ID	Cal Due Date	Certificate Number	Trace Value
M 546	Reference power meter	163	24 March 2022	1/111-174-20	RF Power
M 568	Reference power meter	164	24 March 2022	1/111-175-20	RF Power
G4-161	Signal generator	3	12 October 2021	20-20	RF Power
G4-186	Signal generator	5	12 October 2021	21-20	RF Power
V7-34	Universal voltmeter	0067787	23 September 2021	2742-42	DC Voltage
RCH3-72	Frequency meter	931200	18 September 2021	2822-43	Frequency
P6-134	Measuring horn antenna	14002	23 September 2021	2372-43	Gain

Calibration conditions

Temperature: 22.0 ºC.
Humidity: 42.0 %.
Pressure: 100.3 kPa.

Calibration results are given in the measurement report # 44-20

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	50 – 75 GHz	Corresponds
2	Antenna Gain	21* dBi	Corresponds (Table 1)
3	Antenna Factor	45 dB/m	Corresponds (Table 1)

* – Expanded uncertainty of measurements 2.0 dB/

The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution.

Signature of the person who has performed calibration _____ / Engineer

Calibration Laboratory of
Microwave Measuring Equipment
Accreditation certificate
No. BY/112 5.0065
Address: 6, P. Brovki str., Minsk
220013, Belarus
Phone/Fax: +375 17 2938496

Technical Manager

November 02, 2020

MEASUREMENT REPORT # 44-20

November 02, 2020

Customer:	DEKRA Testing and Certification Co., Ltd No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan
Item calibrated:	**Antenna RCH015 (SAX156)**
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	09.10.2020
Date of calibration:	From 09.10.2020 to 02.11.2020

MEASUREMENT CONDITIONS

Temperature: 22.0 °C	Humidity: 42 %	Pressure: 100.3 kPa

MEASUREMENT EQUIPMENT

Model	Model Description	Equipment ID	Cal Due Date	Certificate Number	Trace Value
M 546	Reference power meter	163	24 March 2022	1/111-174-20	RF Power
M 568	Reference power meter	164	24 March 2022	1/111-175-20	RF Power
G4-161	Signal generator	3	12 October 2021	20-20	RF Power
G4-186	Signal generator	5	12 October 2021	21-20	RF Power
V7-34	Universal voltmeter	0067787	23 September 2021	2742-42	DC Voltage
RCH3-72	Frequency meter	931200	18 September 2021	2822-43	Frequency
P6-134	Measuring horn antenna	14002	23 September 2021	2372-43	Gain

MEASUREMENT RESULTS

Distance between tested and generating antenna 1.5 m.

Table 1

Frequency, GHz	50	58	60	64	75
Power density of electromagnetic field, W/m^2	0.068	0.087	0.095	0.108	0.143
Maximum level of measured power, dBm	-17.1	-16.5	-16.2	-16.0	-16.1
Gain, dBi	20.0	20.8	21.0	21.2	21.3
Expanded uncertainty, dB	2.0	2.0	2.0	2.0	2.0
Antenna Factor, dB/m	44.2	44.7	44.8	45.2	46.4

The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution

Engineer _____

Calibration Laboratory of Microwave Measuring Equipment of MWMLab

ISO 17025
ACCREDITED LABORATORY

ИСО 9001

Calibration certificate

Accreditation certificate No. **№ BY/112 5.0065** **of** **09.01.2015**

Certificate number **46-20** **Date when calibrated** **02.11.2020** **Page** 1 **of** 2

Item calibrated **Spectrum Analyzer Extension Module SAX 092**
 # US53250010 (power supply # 1604)

Customer DEKRA Testing and Certification Co., Ltd
No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan

Method of calibration GOST 20271.1, MK KL 8.2-16

All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF. Conversion loss measurements above 178 GHz are to confirm operation functionality and traceable only to MWMLab standards and OML. This certificate shall not be reproduced, except in full. Any publication extracts from the calibration certificate requires written permission of the issuing calibration laboratory of microwave measuring equipment.

Authorising signature / Technical manager **Date of issue** **02.11.2020**

Calibration Certificate

Calibration is performed by using

Model	Model Description	Equipment ID	Cal Due Date	Certificate Number	Trace Value
M 546	Reference power meter	163	24 March 2022	1/111-174-20	RF Power
M 534	Reference power meter	161	24 March 2022	1/111-173-20	RF Power
RG4-14	Signal generator	22	12 October 2021	20-20	RF Power
G4-186	Signal generator	5	12 October 2021	22-20	RF Power
V7-34	Universal voltmeter	0067787	23 September 2021	2742-42	DC Voltage
RCH3-72	Frequency meter	931200	18 September 2021	2822-43	Frequency
MG3694C	Signal generator	133805	11 September 2021	2726-43	RF Power Frequency
E4407B	Spectrum analyzer	MY45110807	14 September 2021	2734-43	RF Power Frequency

Calibration conditions

Temperature: 22.0 ºC.
Humidity: 42.0 %.
Pressure: 100.3 kPa.

Calibration results are given in the measurement report # 46-20

#	Parameter	Specifications required	Specifications tested and measured
1	RF Frequency Band	75 – 110 GHz	Corresponds
2	Multiplication Factor (Low / High)	12 / 6	Corresponds
3	Low Freq. LO Input Power (Typical / Damage)	10 dBm ± 3dB / 20 dBm	Corresponds
4	High Freq. LO Input Power (Typical / Damage)	0 dBm ± 3dB / 6 dBm	Corresponds
5	RF Power Limits: Compression / Damage	-10 / 0 dBm	Corresponds
6	Conversion loss RF to IF output (configuration "B")	-4.5 – -6.5* dB	Corresponds (Table 1)
7	IF Output Standard Frequency Range	16 kHz – 2.5 GHz	Corresponds

* – Expanded uncertainty of measurements 1.5 dB (IF Frequency 400 MHz).

The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution.

Signature of the person who has performed calibration / Engineer

Calibration Laboratory of
Microwave Measuring Equipment
Accreditation certificate
No. BY/112 5.0065
Address: 6, P. Brovki str., Minsk
220013, Belarus
Phone/Fax: +375 17 2938496

Technical Manager

November 02, 2020

MEASUREMENT REPORT # 46-20

November 02, 2020

Customer:	DEKRA Testing and Certification Co., Ltd No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan
Item calibrated:	**Spectrum Analyzer Extension Module SAX 092** **# US53250010** (power supply # 1604)
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	09.10.2020
Date of calibration:	From 09.10.2020 to 02.11.2020

MEASUREMENT CONDITIONS

Temperature: 22.0 °C	Humidity: 42 %	Pressure: 100.3 kPa

MEASUREMENT EQUIPMENT

Model	Model Description	Equipment ID	Cal Due Date	Certificate Number	Trace Value
M 546	Reference power meter	163	24 March 2022	1/111-174-20	RF Power
M 534	Reference power meter	161	24 March 2022	1/111-173-20	RF Power
RG4-14	Signal generator	22	12 October 2021	20-20	RF Power
G4-186	Signal generator	5	12 October 2021	22-20	RF Power
V7-34	Universal voltmeter	0067787	23 September 2021	2742-42	DC Voltage
RCH3-72	Frequency meter	931200	18 September 2021	2822-43	Frequency
MG3694C	Signal generator	133805	11 September 2021	2726-43	RF Power Frequency
E4407B	Spectrum analyzer	MY45110807	14 September 2021	2734-43	RF Power Frequency

MEASUREMENT RESULTS

SSB conversion loss RF to IF port for an LO input power of 10 dBm in Standard LO Frequency operation. IF power measured from "IF Output" port with IF frequency fixed at 400 MHz.

Table 1

RF frequency, GHz	75	78	81	95	110
RF input power, dBm	-15.0	-15.0	-15.0	-15.0	-15.0
LO frequency, MHz	6 217	6 467	6 717	7 883	9 133
LO input power, dBm	10.0	10.0	10.0	10.0	10.0
IF frequency, MHz	400.0				
IF measured level, dBm	-10.32	-9.68	-8.66	-9.19	-10.47
Conversion loss, dB	-4.7	-5.3	-6.3	-5.8	-4.5
Expanded uncertainty, dB	1.5	1.5	1.5	1.5	1.5

The uncertainty evaluation has been performed in accordance with ISO/IEC Guide 98-3:2008 (GUM). The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. This probability corresponds to a coverage factor of k=2 for a normal distribution

Engineer _____

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