

Calibration Certificate

Certificate number **25-18**

Page 2 of 2

Calibration is performed by using

#	Measuring equipment	Serial number
1	Wattmeter M 568	164
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator G4-161	3
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-133	15005

Calibration conditions

Temperature: 22.5 °C.


Humidity: 44.0 %.

Pressure: 99.9 kPa.

Calibration results are given in the Measuring report # 25-18.

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	40 – 60 GHz	Corresponds (Table 1)
2	Waveguide Interface	WR-19	Corresponds
3	Antenna Gain	24 dB	Corresponds (Table 1)
4	Antenna Factor	42 dB/m	Corresponds (Table 1)

Signature of the person who has performed calibration


M. Kasperovich/ Engineer
Name and function

**Calibration Laboratory of
Microwave Measuring Equipment**

Accreditation certificate

No. BY/112 02.5.0.0065

Address: 6, P. Brovki str., Minsk
220027, Belarus

Phone/Fax: +375 17 2938496



Technical Manager

M. Svirid

August 17, 2018

MEASURING REPORT # 25-18

August 17, 2018

Customer:	Sporton International Inc. No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.
Item calibrated:	Antenna QWH-UPRR00 # 923600007
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	07/20/2018
Date of calibration:	From 07/23/2018 to 08/17/2018

MEASURING CONDITIONS

Temperature: 22.5 °C	Humidity: 44 %	Pressure: 99.9 kPa
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MEASURING EQUIPMENT

#	Measuring equipment	Serial number
1	Wattmeter M 568	164
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator G4-161	3
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-133	15005

MEASURING RESULTS

Distance between the testing and generating antennas was 2 m.

Table 1

Frequency, GHz	40	50	60
Input power, mW	10.0	10.0	10.0
Power density of electromagnetic field, W/m ²	0.049	0.067	0.072
Maximum level of measured power, μW	36.56	37.07	31.98
Gain, dB	22.2	22.8	23.5
Antenna factor, dB/m	40.0	41.4	42.3
Expanded uncertainty, dB	2.1	2.1	2.1

Engineer



M. Kasperovich

Quality Manager



A. Kostrikin

This Measuring report issued in duplicate and sent to:

1. Sporton International INC.

Address: No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.

2. Calibration Laboratory of Microwave Measuring Equipment

Duplication of Measuring report (complete or partial) must be authorized by the laboratory.



Calibration certificate

ISO 17025
ACCREDITED LABORATORY



Accreditation certificate No. **№ BY/112 02.5.0.0065** of **09.01.2015**

Certificate number **28-18** Date when calibrated **08/17/2018** Page **1** of **2**

Item

calibrated

Antenna QWH-EPRR00 # 784600034

Description of measurement standard / measuring instrument / identification

Customer

Sporton International Inc.

No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District,
TaoYuan City 333, Taiwan, R.O.C.

Name of the customer, address

**Method of
calibration**

GOST 20271.1, MK KL 8.2-16

Name of the method / identification

All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF. 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**



M. Svirid/ Technical manager
Name and position

Date of issue 08/17/2018

Calibration Certificate

Certificate number **28-18**

Page 2 of 2

Calibration is performed by using

#	Measuring equipment	Serial number
1	Wattmeter M 534	161
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator RG4-14	22
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-134	14002
8	Horn antenna P6-31A	35864

Calibration conditions

Temperature: 22.5 °C.


Humidity: 44.0 %.

Pressure: 99.9 kPa.

Calibration results are given in the Measuring report # 28-18.

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	60 – 90 GHz	Corresponds (Table 1)
2	Waveguide Interface	WR-12	Corresponds
3	Antenna Gain	24 dB	Corresponds (Table 1)
4	Antenna Factor	45 dB/m	Corresponds (Table 1)

Signature of the person who has performed calibration


M. Kasperovich/ Engineer
Name and function

**Calibration Laboratory of
Microwave Measuring Equipment**

Accreditation certificate

No. BY/112 02.5.0.0065

Address: 6, P. Brovki str., Minsk
220027, Belarus

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Technical Manager

M. Svirid

August 17, 2018

MEASURING REPORT # 28-18

August 17, 2018

Customer:	Sporton International Inc. No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.
Item calibrated:	Antenna QWH-EPRR00 # 784600034
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	07/20/2018
Date of calibration:	From 07/23/2018 to 08/17/2018

MEASURING CONDITIONS

Temperature: 22.5 °C	Humidity: 44 %	Pressure: 99.9 kPa
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MEASURING EQUIPMENT

#	Measuring equipment	Serial number
1	Wattmeter M 534	161
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator RG4-14	22
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-134	14002
8	Horn antenna P6-31A	35864

MEASURING RESULTS

Distance between the testing and generating antennas was 1.8 m at 60-75 GHz and 1.5 m at 90 GHz.

Table 1

Frequency, GHz	60	75	90
Input Power, mW	10.0	10.0	8.0
Power density of electromagnetic field, W/m ²	0.063	0.081	0.121
Maximum level of measured power, μ W	21.44	21.84	26.14
Gain, dB	22.3	23.3	23.9
Antenna Factor, dB/m	43.5	44.5	45.4
Expanded uncertainty, dB	2.1	2.1	2.1

Engineer



M. Kasperovich

Quality Manager



A. Kostrikin

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1. Sporton International INC.

Address: No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.

2. Calibration Laboratory of Microwave Measuring Equipment

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Calibration certificate



Accreditation certificate No. № BY/112 02.5.0.0065 of 09.01.2015

Certificate number 30-18 Date when calibrated 08/17/2018 Page 1 of 2

Item

calibrated

Antenna QWH-FPRR00 # 923800008

Description of measurement standard / measuring instrument / identification

Customer

Sporton International Inc.

No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District,
TaoYuan City 333, Taiwan, R.O.C.

Name of the customer, address

**Method of
calibration**

GOST 20271.1, MK KL 8.2-16

Name of the method / identification

*All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF.
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permission of the issuing calibration laboratory of microwave measuring equipment.*

**Authorising
signature**



M. Svirid/ Technical manager
Name and position

Date of issue 08/17/2018

Calibration Certificate

Certificate number **30-18**

Page 2 of 2

Calibration is performed by using

#	Measuring equipment	Serial number
1	Wattmeter M 523	162
2	Wattmeter M 534	161
3	Voltmeter V7-34	0067787
4	Frequency meter RCH3-72	931200
5	Signal generator RG4-14	22
6	Signal generator G4-161	282
7	Antenna P6-31A	35864
8	Antenna P6-32	115671

Calibration conditions

Temperature: 22.5 °C.

Humidity: 44.0 %.

Pressure: 99.9 kPa.

Calibration results are given in the Measuring report # 30-18.

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	90 – 140 GHz	Corresponds (Table 1)
2	Waveguide Interface	WR-8	Corresponds
3	Antenna Gain	24 dB	Corresponds (Table 1)
4	Antenna Factor	48 dB/m	Corresponds (Table 1)

Signature of the person who has performed calibration

M. Kasperovich/ Engineer

Name and function

**Calibration Laboratory of
Microwave Measuring Equipment**

Accreditation certificate

No. BY/112 02.5.0.0065

Address: 6, P. Brovki str., Minsk
220027, Belarus

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Technical Manager



M. Svirid

August 17, 2018

MEASURING REPORT # 30-18

August 17, 2018

Customer:	Sporton International Inc. No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.
Item calibrated:	Antenna QWH-FPRR00 # 923800008
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	07/20/2018
Date of calibration:	From 07/23/2018 to 08/17/2018

MEASURING CONDITIONS

Temperature: 22.5 °C	Humidity: 44 %	Pressure: 99.9 kPa
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MEASURING EQUIPMENT

#	Measuring equipment	Serial number
1	Wattmeter M 523	162
2	Wattmeter M 534	161
3	Voltmeter V7-34	0067787
4	Frequency meter RCH3-72	931200
5	Signal generator RG4-14	22
6	Signal generator G4-161	282
7	Antenna P6-31A	35864
8	Antenna P6-32	115671

MEASURING RESULTS

Distance between the testing and generating antennas was 1.5 m at 90-115 GHz and 1.2 m at 140 GHz.

Table 1


Frequency, GHz	90	115	140
Input Power, mW	8.0	8.0	5.0
Power density of electromagnetic field, W/m ²	0.125	0.174	0.212
Maximum level of measured power, μW	18.03	20.22	21.08
Gain, dB	22.1	23.3	24.4
Antenna Factor, dB/m	47.2	48.1	48.8
Expanded uncertainty, dB	2.1	2.2	2.2

Engineer



M. Kasperovich

Quality Manager



A. Kostrikin

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1. Sporton International INC.

Address: No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.

2. Calibration Laboratory of Microwave Measuring Equipment

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Calibration Laboratory of Microwave Measuring Equipment
of MWM lab



Calibration certificate

ISO 17025
ACCREDITED LABORATORY



Accreditation certificate No. № BY/112 02.5.0.0065 of 09.01.2015

Certificate number 35-18 Date when calibrated 08/17/2018 Page 1 of 2

Item

calibrated

Antenna QWH-GPRR00 # 923900001

Description of measurement standard / measuring instrument / identification

Customer

Sporton International Inc.

No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District,
TaoYuan City 333, Taiwan, R.O.C.

Name of the customer, address

Method of
calibration

GOST 20271.1, MK KL 8.2-16

Name of the method / identification

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Authorising
signature



M. Svirid/ Technical manager

Name and position

Date of issue 08/17/2018

Calibration Certificate

Certificate number **35-18**

Page 2 of 2

Calibration is performed by using

#	Measuring equipment	Serial number
1	Wattmeter M 523	162
2	Wattmeter M 514	165
3	Signal generator RG4-14	4
4	Voltmeter V7-34	0067787
5	Frequency meter RCH3-72	931200
6	Frequency multiplier	02
7	Horn antenna P6-32	115671
8	Horn antenna 2P1	138421

Calibration conditions

Temperature: 22.5 °C.

Humidity: 44.0 %.

Pressure: 99.9 kPa.

Calibration results are given in the Measuring report # 35-18.

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	140 – 220 GHz	Corresponds (Table 1)
2	Waveguide Interface	WR-5	Corresponds
3	Antenna Gain	24 dB	Corresponds (Table 1)
4	Antenna Factor	52 dB/m	Corresponds (Table 1)

Signature of the person who has performed calibration


M. Kasperovich/ Engineer
Name and function

**Calibration Laboratory of
Microwave Measuring Equipment**

Accreditation certificate

No. BY/112 02.5.0.0065

Address: 6, P. Brovki str., Minsk
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Technical Manager

_____ M. Svirid

August 17, 2018

MEASURING REPORT # 35-18

August 17, 2018

Customer:	Sporton International Inc. No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.
Item calibrated:	Antenna QWH-GPRR00 # 923900001
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	07/20/2018
Date of calibration:	From 07/23/2018 to 08/17/2018

MEASURING CONDITIONS

Temperature: 22.5 °C	Humidity: 44 %	Pressure: 99.9 kPa
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MEASURING EQUIPMENT

#	Measuring equipment	Serial number
1	Wattmeter M 523	162
2	Wattmeter M 514	165
3	Signal generator RG4-14	4
4	Voltmeter V7-34	0067787
5	Frequency meter RCH3-72	931200
6	Frequency multiplier	02
7	Horn antenna P6-32	115671
8	Horn antenna 2P1	138421

MEASURING RESULTS

Distance between the testing and generating antennas was 1 m at 140 GHz, 0.6 m at 180 GHz and 0.3 m at 220 GHz.

Table 1

Frequency, GHz	140	180	220
Input power, mW	5.0	2.0	2.0
Power density of electromagnetic field, W/m ²	0.311	0.369	0.327
Maximum level of measured power, μW	18.15	16.71	11.42
Gain, dB	22.0	23.1	23.7
Antenna factor, dB/m	51.1	52.2	53.4
Expanded uncertainty, dB	2.2	2.3	2.5

Engineer  M. Kasperovich

Quality Manager  A. Kostrikin

This Measuring report issued in duplicate and sent to:

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Address: No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.

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