

RADIO TEST REPORT

For

SHENZHEN SAMHOO SCI&TECH CO.,LTD

Digital Two Way Radio

Test Model: SPM6050

Prepared for : SHENZHEN SAMHOO SCI&TECH CO.,LTD
Address : Room 401, Building 2th, Huaqiangyun Industrial Park, Meixiu Road, Meilin, Futian District, Shenzhen, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : April 25, 2016
Number of tested samples : 1
Serial number : Prototype
Date of Test : April 25, 2016 ~ June 08, 2016
Date of Report : June 08, 2016

**RADIO TEST REPORT
FCC Per 47 CFR 2.1091(b)**

Report Reference No. : **LCS1606231829E**

Date of Issue : June 08, 2016

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards
Partial application of Harmonised standards
Other standard testing method

Applicant's Name..... : **SHENZHEN SAMHOO SCI&TECH CO.,LTD**

Address : Room 401, Building 2th, Huaqiangyun Industrial Park, Meixiu Road, Meilin, Futian District, Shenzhen, China

Test Specification

Standard : FCC Per 47 CFR 2.1091(b)

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description. : **Digital Two Way Radio**

Trade Mark..... : Samhoo

Test Model : SPM6050

Ratings : DC 13.60V by External DC power supply

Result : **Positive**

Compiled by:



Supervised by:



Approved by:



Aking Jin/ File administrators

Glin Lu/ Technique principal

Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS1606231829E	<u>June 08, 2016</u> Date of issue
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Test Model.....	: SPM6050
EUT.....	: Digital Two Way Radio
Applicant.....	: SHENZHEN SAMHOO SCI&TECH CO.,LTD
Address.....	: Room 401, Building 2th, Huaqiangyun Industrial Park, Meixiu Road, Meilin, Futian District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: SHENZHEN SAMHOO SCI&TECH CO.,LTD
Address.....	: Room 401, Building 2th, Huaqiangyun Industrial Park, Meixiu Road, Meilin, Futian District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	: SHENZHEN SAMHOO SCI&TECH CO.,LTD
Address.....	: Room 401, Building 2th, Huaqiangyun Industrial Park, Meixiu Road, Meilin, Futian District, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive
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The test report merely corresponds to the test sample.
 It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	2016-06-08	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	: Digital Two Way Radio
Test Model	: SPM6050
Power Supply	: DC 13.6V by External DC power supply
Hardware Version	: SPM6000V4.0
Software Version	: V1.02.01.007
Frequency Range	: 450MHz-520MHz
Channel Separation	: Analog Voice 12.5KHz Digital Voice/Data 12.5KHz Digital Data 12.5KHz
Modulation Type	: FM for Analog Voice 4FSK for Digital Voice/Digital Data 4FSK for Digital Data
Emission Designator	: 11K0F3E for FM Modulation at 12.5KHz Channel Separation 7K60FXD for Digital Data only at 12.5KHz Channel Separation 7K60FXW for Digital Data & Digital Voice at 12.5KHz Channel Separation
Antenna Description	: External, 3.65dBi (Max)
Rated Power	: 45Wattes/5Watts
GPS Receiver	:
Receive Frequency	: 1575.42MHz
Channel Number	: 1

Note: The product has the same digital working characters when operating in both two digitized voice/data mode. So only one set of test results for digital modulation modes are provided in this test report.

1.2. Objective

The tests were performed according to following standards:

[FCC Part 2: FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS](#)

[KDB447498 v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.](#)

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

1.5. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

1.6. External I/O

I/O Port Description	Quantity	Cable
Micro SD Card Slot	1	N/A
Handheld Microphone Interface	1	N/A
Accessories Interface	1	N/A
RF Antenna Base	1	N/A
Power Interface	1	N/A
Positioning Module Antenna Interface	1	N/A

1.7. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Description	Error
ETS Filed Meter	$\pm 3\%$
Repeatability Accuracy	$\pm 7\%$

1.8. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

1.9. Description Of Test Modes

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

EUT operation mode no.	Description of operation mode	Additional information
Op 1	FM+BW12.5KHz+TX	The equipment is set with FM modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 13.60V
Op 2	FM+BW12.5KHz+TX	The equipment is set with FM modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 13.60V

Op 3	4FSK+BW12.5KHz+TX	The equipment is set with 4FSK modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 13.60V
Op 4	4FSK+BW12.5KHz+TX	The equipment is set with 4FSK modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 13.60V
Op 5	FM+BW12.5KHz+RX (Standby)	The equipment is set with FM modulation and 12.5KHz bandwidth at Receiver/Standby mode, powered by DC 13.60V
Op 6	4FSK+BW12.5KHz+RX (Standby)	The equipment is set with 4FSK modulation and 12.5KHz bandwidth at Receiver/Standby mode, powered by DC 13.60V

Test frequency list

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	
			TX	RX
Analog/FM	12.5KHz	Ch1	450.025	450.025
		Ch2	467.775	467.775
		Ch3	511.9875	511.9875
Digital/4FSK	12.5KHz	Ch7	450.025	450.025
		Ch8	467.775	467.775
		Ch9	511.9875	511.9875

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

3. Method of measurement

3.1. EME measurements made on trunk mounted antennas

3.1.1. External/Bystander vehicle EME measurement

(Antenna mounted in trunk center)

With the field meter and probe, take ten (10) measurements, at the standard test distance of 60 cm to the antenna, from the back of the vehicle in a vertical line and then average the results. These measurements are taken and recorded at every twenty (20) centimeters over a range starting at twenty (20) centimeters above ground and ending at 2.0 meters.

The offered antennas mounted at the center of the trunk were assessed at the rear of the vehicle while maintaining a minimum of twenty (20) centimeter separation distance between the probe sensor and vehicle body. The worst case tested at a 45° radial at the corner of the trunk, and 90° radial at the side of the trunk.

3.1.2. Internal /Passenger vehicle EME measurement

(Antenna mounted in trunk center)

While rotating field meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area
- c) Lower Trunk area

3.2. EME measurements made on center roof mounted antennas

3.2.1. External/Bystander vehicle EME measurement

With the field meter and probe, take ten (10) measurements, at the standard test distance of 110 cm from the vehicle-mounted antenna, The measurement probe is positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna) and tested around the car in 35 degree steps among 180 degree, aimed directly at the antenna's axis. Recorded worst case at positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna); Then average the results. These measurements are taken and recorded at every twenty (20) centimetres over a range starting at twenty (20) centimetres above ground and ending at 2.0 meters; this would be representative of a person standing next to a vehicle during a mobile radio transmission.

3.2.2. Internal/Passenger vehicle EME measurement

The probe handle is oriented parallel (horizontal) to the ground and pointed towards the back of the vehicle. The probe handle is not oriented normal to the seat surface. The probe head (incorporating the field sensors) is scanned continuously (using the max-hold function available in the meter) along three test axes which are parallel to the seat angle (intended as the line determined by the intersection of the plane of the seat and the plane of the backrest) and are 20 cm from the seat surface. One test axis is at the Head height, another is at the Chest height, and another is at the Lower Trunk height. The maximum field level value recorded for each test axis is logged. The MPE is determined by averaging these three maximum values regardless of the

geometrical location where they were observed. For instance, the locations of the three maxima may lie on different vertical (relative to ground) lines.

While rotating field meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area
- c) Lower Trunk area

4. Approved Accessories

Antenna:

Model: TQC-150DII

Roof Mount: 450MHz-520MHz

Gain: 3.65dBi

Vehicle:

Band: BYD

Model: F6

5. Test Result

The following table's present detailed MPE measurement information for each test configuration; person external or internal to the vehicle, TX frequency, antenna (location, model and gain), distance from antenna to probe sensor, E/H field measurements, calibration factor, MPE average over body, initial power, power density calc, power density max calc, IEEE controlled and uncontrolled limits and maximum output power.

The Average over Body test methodology is consistent with IEEE/ANSI C95.3-2002 guidelines

MPE results are based on a 50% duty cycle which is in accordance with the User Manual instructions.

Below is an explanation of how the MPE results are calculated.

External to vehicle - 10 measurements are averaged over the body (Body_Avg).

Internal to vehicle - 3 measurements are averaged over the body (Body_Avg).

ETS Field Meter measures in percent of the controlled limit. Therefore the averages over the body used in the calculations below reflect percentages

MPE results are based on a Push-To-Talk (PTT) 50% duty cycle in CW mode.

Therefore;

$$\text{Average_over_Body} = \text{Body_Avg} * \text{Controlled_Limit}$$

$$\text{Pwr_Density_Calc} = \text{Average_over_Body} * \text{Duty_Cycle}$$

$$\text{Pwr_Density_Max_Calc} = \text{Pwr_Density_Calc} * \frac{\text{Max_Output_Power}}{\text{Initial_Output_Power}}$$

Note; For Initial Output Power > Max_Output_Power, Max_Output_Power / Initial Output Power = 1

Measurement Information			
Measurement Frequency (MHz)	450.025	467.775	511.9875
Raw Data Power(W)	44.5656	44.7713	44.8745
Controlled Limit(mW/cm ²)	1.5001	1.5593	1.7066
Uncontrolled Limit(mW/cm ²)	0.30002	0.31186	0.34132
Calibration	1.00	1.00	1.00
Antenna / gain(dBi)	Whip / 3.65	Whip / 3.65	Whip / 3.65
External Vehicle Power Density(50% duty)	Average over body/2		
Internal Vehicle Power Density(50% duty)	Average over (head/chest/leg)/2		

External Vehicle MPE Assessment at 450.125 MHz						
Antenna Location	Antenna/ gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm ²)
Trunk	Whip / 3.65	60	E	1.00	0.242	0.121
Measurement Grid						
Test position	Height (cm)	% of controlled limit	Test position	Height (cm)	% of controlled limit	
1	20	6.11%	6	120	38.13%	
2	40	8.57%	7	140	25.55%	
3	60	19.12%	8	160	14.04%	
4	80	22.02%	9	180	13.16%	
5	100	30.79%	10	200	11.09%	

External Vehicle MPE Assessment at 467.775 MHz						
Antenna Location	Antenna/ gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm ²)
Trunk	Whip / 3.65	60	E	1.00	0.288	0.144
Measurement Grid						
Test position	Height (cm)	% of controlled limit	Test position	Height (cm)	% of controlled limit	
1	20	3.87%	6	120	35.54%	
2	40	8.21%	7	140	23.43%	
3	60	16.46%	8	160	12.22%	
4	80	23.37%	9	180	10.36%	
5	100	30.12%	10	200	8.18%	

External Vehicle MPE Assessment at 511.9875 MHz						
Antenna Location	Antenna/gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm ²)
Trunk	Whip / 3.65	60	E	1.00	0.231	0.116
Measurement Grid						
Test position	Height (cm)	% of controlled limit	Test position	Height (cm)	% of controlled limit	
1	20	5.05%	6	120	40.25%	
2	40	11.37%	7	140	32.23%	
3	60	22.16%	8	160	24.14%	
4	80	25.55%	9	180	19.79%	
5	100	34.19%	10	200	17.17%	

External Vehicle MPE Assessment at 467.775 MHz						
Antenna Location	Antenna/gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm ²)
Roof	Whip / 3.65	60	E	1.00	0.174	0.087
Measurement Grid						
Test position	Height (cm)	% of controlled limit	Test position	Height (cm)	% of controlled limit	
1	20	2.94%	6	120	38.18%	
2	40	8.88%	7	140	26.56%	
3	60	22.26%	8	160	24.24%	
4	80	25.95%	9	180	18.71%	
5	100	32.27%	10	200	14.62%	

Internal Vehicle MPE Assessment at 450.025 MHz						
Antenna Location	Antenna Gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average over Head, Chest, Leg Back/Front Seats (mW/cm ²)	Pwr. Density of Higher Level (mW/cm ²)
Trunk	Whip / 3.65	Highest Reading	E	1.00	0.258/0.102	0.129/0.051
Measurement Grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back Seat	19.22%		15.52%		14.13%	
Front Seat	10.24%		8.63%		5.24%	

Internal Vehicle MPE Assessment at 467.775 MHz						
Antenna Location	Antenna Gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average over Head, Chest, Leg Back/Front Seats (mW/cm ²)	Pwr. Density of Higher Level (mW/cm ²)
Trunk	Whip / 3.65	Highest Reading	E	1.00	0.277/0.126	0.139/0.063
Measurement Grid						
Test position		% of controlled limit Head	% of controlled limit Chest		% of controlled limit Leg	
Back Seat		30.14%	24.55%		13.77%	
Front Seat		14.23%	10.62%		7.85%	

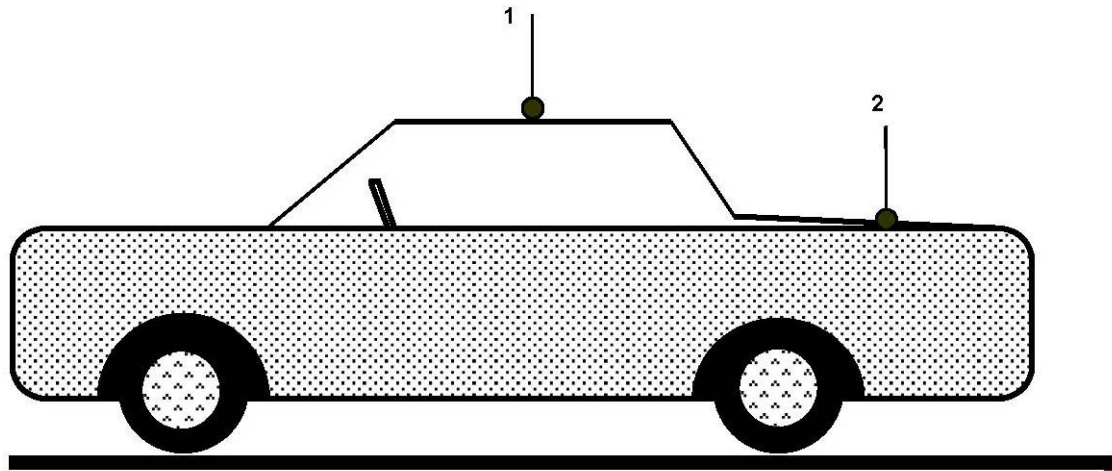
Internal Vehicle MPE Assessment at 511.9875 MHz						
Antenna Location	Antenna Gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average over Head, Chest, Leg Back/Front Seats (mW/cm ²)	Pwr. Density of Higher Level (mW/cm ²)
Trunk	Whip / 3.65	Highest Reading	E	1.00	0.216/0.098	0.108/0.049
Measurement Grid						
Test position		% of controlled limit Head	% of controlled limit Chest		% of controlled limit Leg	
Back Seat		18.46%	15.42%		12.03%	
Front Seat		9.55%	7.67%		4.99%	

Internal Vehicle MPE Assessment at 467.775 MHz						
Antenna Location	Antenna Gain	Measurement Distance (cm)	E/H Field	Calibration Factor	Average over Head, Chest, Leg Back/Front Seats (mW/cm ²)	Pwr. Density of Higher Level (mW/cm ²)
Roof	Whip / 3.65	Highest Reading	E	1.00	0.174/0.081	0.087/0.041
Measurement Grid						
Test position		% of controlled limit Head	% of controlled limit Chest		% of controlled limit Leg	
Back Seat		34.45%	25.44%		20.33%	
Front Seat		19.14%	16.03%		12.27%	

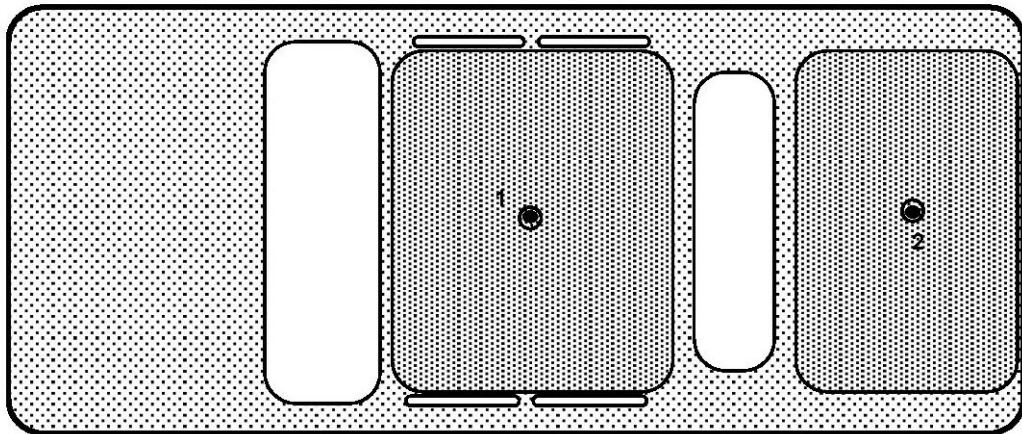
6. Conclusion

The measurement results comply with the FCC Limit Per 47 CFR 2.1091 (b) for the controlled RF Exposure.

7. Antenna Location Drawing



- 1 - Roof (center)
- 2 - Trunk (center)



8. Probe Calibration Certificates



中国赛宝实验室
(工业和信息化部电子第五研究所)
CHINA CEPREI LABORATORY

校准证书

CALIBRATION CERTIFICATE

证书编号: 2GB14003170-0001
Certificate No.



委托单位: Client	广东省惠州市质量计量监督检测所
委托方地址: Address	惠州市惠城区江北文明二路质监检测大楼
仪器名称: Description	激光场强探头
型号规格: Model/Type	HI-6105
制造商: Manufacturer	ETS
机身号: Serial No.	00156104
校准日期: Cal. Date	2014-05-04
结论: Conclusion	按校准结果使用(Performance Tested Only)

校准:
Calibrated by

刘君荣

核验:
Inspected by

黄帅

签发:
Approved by

杨桥新

无线电室主任
Director of Radio
Lab

印章:
Stamp

赛宝计量检测中心
广州总部地址: 广州天河区东莞庄路110号
客服电话: 020-87237633 传真: 020-87236189
投诉电话: 020-87236896、020-87236789
邮件: cal@ceprei.com
网址: www.ceprei-cal.com

CEPREI Calibration and Testing Center
H.Q. Addr: No.110 Dongguanhuang Road, Tianhe District, Guangzhou
Tel: 020-87237633 Fax: 020-87236189
Complaint phone: 020-87236896 ,020-87236789
Email: cal@ceprei.com
Website: www.ceprei-cal.com

Page 1 of 4

说 明

DIRECTIONS

证书编号(Certificate No.) 2GB14003170-0001

1. 本机构是国家质量监督检验检疫总局授权的国家法定计量技术机构，授权证编号：(国)法计(2012)00068号。质量管理体系符合ISO/IEC 17025的要求，获得中国合格评定国家认可委员会(CNAS)认可，认可证书号为：CNAS L0462。

This laboratory is the legal metrological institute authorized by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, No. (国)法计(2012)00068. Its quality management system meets the ISO/IEC 17025 and is accredited by the China National Accreditation Service for Conformity Assessment, No. CNAS L0462.

2. 本机构出具的数据均可溯源到国家计量基准和国际单位制(SI)。

The data issued by this laboratory is traceable to national primary standards and International system of Units (SI).

3. 本次校准的技术依据(Reference documents):

IEEE 1309-2005、JJG 561-1988

4. 本次校准所使用的主要测量标准(Main measurement standards used during the calibration):

名称 Description	技术指标 Specification	有效期至 Due Date	证书编号 Certificate No.
电场探头	$\pm 2.5\text{dB}$	2014-08-16	XDdj2013-2663
封闭式50Ω带状线 (TEM小室)	VSWR: $U_r=5.0\%(k=2)$, 插入损耗: $U_r=0.01\text{dB}(k=2)$, 阻抗: $U_r=10\%(k=2)$,	2014-08-21	XDdj2013-2701
功率放大器	Gain: $\geq 47\text{dB}$; Gain Flatness: $\pm 1.5\text{dB}$	2015-01-17	4GC14000016-0004
EPM-P系列双通道功率计/ EPM-P Series Dual Channel Power Meter	P: $\pm 0.5\%$	2014-11-05	4GC13000316-0002
ESG矢量信号发生器/ESG Vector Signal Generator	f: $\pm 1 \times 10^{-7}$; L: $\pm 0.5\text{dB}$; AM: $\pm 5\%$; FM: $\pm 3.5\%$; ϕM : $\pm 5\%$; EVM: $0.5\% \text{rms}$ s ($k=2$); 幅度误差: $0.35\% \text{rms}$ ($k=2$)) ; 相位误差: 0.25°rms ($k=2$)	2014-08-07	4GC13000245-0001

5. 校准地点(The location where the calibrations were carried out):

赛宝计量检测中心广州实验室

6. 环境条件(Environmental condition):

温度(Temperature): 23°C

相对湿度(Relative Humidity): 60 %

7. 证书数据页中"P"代表"合格", "F"代表"不合格", "N/A"代表"不适用".

(In the data sheet, "P" stands for "Pass", "F" stands for "Fail", "N/A" stands for "Not applicable".)

注: 1. 本证书未经本机构书面授权, 不得部分复制。

(The certificate shall not be partly reproduced without written approval of the laboratory.)

2. 本次校准结果仅与被校物有关。(The results are only related to the items calibrated.)



赛宝计量检测中心

CEPREI

CEPREI CALIBRATION & TESTING CENTER

证书编号 (Certificate No.): 2GB14003170-0001

1 外观检查(Appearance Check)

结论
(Pass/Fail)

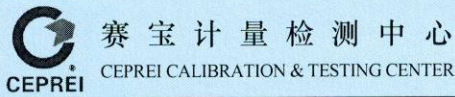
P

2 幅值线性(Amplitude Linearity)

频率 (Frequency) (MHz)	标准场强 (Reference) (V/m)	指示值 (Indicated) (V/m)	校准因子 Cal Factor ()
30	2.00	2.54	0.787
30	10.00	11.76	0.850
30	20.00	22.78	0.878
30	30.00	34.29	0.875
30	50.00	55.43	0.902
30	80.00	89.89	0.890
30	100.00	112.23	0.891

3 校准因子(Calibration Factor)

频率 (Frequency) (MHz)	标准场强 (Reference) (V/m)	指示值 (Indicated) (V/m)	校准因子 Cal Factor ()
10	20.00	21.93	0.912
30	20.00	22.78	0.878
50	20.00	22.15	0.903
100	20.00	22.65	0.883
200	20.00	22.03	0.908
300	20.00	22.10	0.905
400	20.00	20.77	0.963
500	20.00	25.61	0.781
600	20.00	27.06	0.739
700	20.00	29.20	0.685
800	20.00	34.42	0.581
900	20.00	22.22	0.900
1000	20.00	29.11	0.687



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3 校准因子(Calibration Factor) (Cont'd)

频率 (Frequency) (GHz)	标准场强 (Reference) (V/m)	指示值 (Indicated) (V/m)	校准因子 Cal Factor ()
2	20.00	19.92	1.004
3	20.00	19.14	1.045
4	20.00	18.52	1.080
5	20.00	17.64	1.134
6	20.00	18.52	1.080

附(Appendix):

关于测量结果不确定度的说明

(Directions of measurement uncertainty)

1 依据 (Reference Document)

JJF 1059.1-2012 测量不确定度评定与表示

(JJF 1059.1-2012 Evaluation and Expression of Uncertainty in Measurement)

2 本次测量结果的扩展不确定度(The expanded uncertainty of the measurement results)(k=2)

2.1 校准因子(Calibration Factor)

1.1dB@(DC~300MHz)

1.4dB@(300MHz~1GHz)

1.8dB@(1GHz~18GHz)

以下空白/No data hereafter

.....The End of Report.....