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TESTING
CNAS L0310



FCC RF Test Report

Product Name: LTE CPE

Model Number: B525s-65a

Report No: SYBH(Z-RF)007012017-2002

FCC ID: QISB525S-65A

Reliability Laboratory of Huawei Technologies Co.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd)

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1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
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8. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
9. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample: 2017-01-17
Start Date of Test: 2017-01-17
End Date of Test: 2017-02-24

Test Result: Pass

Approved by Senior	2017-02-27	Roger Zhang	<i>Roger Zhang</i>
Engineer:	Date	Name	Signature

Prepared by:	2017-02-27	zhoulingbo	<i>zhoulingbo</i>
	Date	Name	Signature

CONTENT

1	General Information.....	5
1.1	Applied Standard.....	5
1.2	Test Location	5
1.3	Test Environment Condition	5
2	Test Summary	6
3	Description of the Equipment under Test (EUT)	7
3.1	General Description	7
3.2	EUT Identity	7
3.3	Technical Description.....	8
4	General Test Conditions / Configurations	9
4.1	Test Modes	9
4.2	EUT Configurations.....	9
4.3	Test Environments	11
4.4	Antenna requirements.....	11
4.5	Description of tests.....	12
4.6	Test Setups.....	13
4.7	Test Conditions	14
5	Main Test Instruments	17
6	Appendixes.....	18



1 General Information

1.1 Applied Standard

Applied Rules:	47 CFR FCC Part 2, Subpart J 2014 47 CFR FCC Part 15, Subpart C 2014
Test Method:	FCC KDB 558074 D01 DTS Meas Guidance v03r04 FCC KDB 662911 D01 Multiple Transmitter Output v02

1.2 Test Location

Test Location:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature:	19.5to 25 °C
Ambient Relative Humidity:	40 to 55 %
Atmospheric Pressure:	Not applicable

2 Test Summary

Test Item	FCC Part No.	Requirements	Test Result	Verdict
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	Appendix A	Pass
Occupied Bandwidth	---	---	Appendix B	Pass
Duty Cycle	KDB 558074 (6.0)	No limit	Appendix C	Pass
Maximum Conducted Average Output Power	15.247(b)(3)	For directional gain: < 30 dBm – (G[dBi] – 6 [dB]), Average; Otherwise: < 30 dBm, Average.	Appendix D	Pass
Maximum Power Spectral Density Level	15.247(e)	For directional gain: < 8 dBm/3 kHz – (G[dBi] – 6 [dB]), Average. Otherwise: < 8 dBm/3 kHz, Average.	Appendix E	Pass
Band Edges Compliance	15.247(d)	< -30 dBm/100 kHz if total average power ≤ power limit.	Appendix F	Pass
Unwanted Emissions into Non-Restricted Frequency Bands			Appendix G	Pass
NOTE 1: According to KDB 558074, antenna-port conducted measurements are acceptable as an alternative to radiated measurements for demonstrating compliance to the limits in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case emissions will also be required.				

3 Description of the Equipment under Test (EUT)

3.1 General Description

B525s-65a LTE/DC-HSPA+/WCDMA/EDGE/GPRS/GSM multi-mode LTE CPE is subscriber equipment in the LTE/UMTS/GSM system and support WLAN 802.11a/b/g/n/ac. B525s-65a implement such functions as RF signal receiving/transmitting, LTE/DC-HSPA+/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. It provides USIM card interface, RJ45/RJ11 Ethernet interface, USB port and external antenna interfaces

NOTE: We do not test RSE data.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Board		
Description	Hardware Version	Software Version
Main Board	WL1B525I	11.232.08.DM.00

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-120200U01	Huawei Technologies Co., Ltd.	Input Voltage :100-240V ~50/60Hz 0.8A Output Voltage:  12V 2A Rated Power: 24W

3.3 Technical Description

Characteristics	Description			
IEEE 802.11 WLAN Mode Supported	☒ 802.11b (20 MHz channel bandwidth), ☒ 802.11g (20 MHz channel bandwidth) ☒ 802.11n (20 MHz channel bandwidth), ☒ 802.11n (40 MHz channel bandwidth),			
TX/RX Operating Range	2432-2462 MHz band	fc = 2407 MHz + N * 5 MHz, where: - fc = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 3 to 11 for the 20 MHz channel bandwidth, N = “Channel Number” with the range from 5 to 9 for the 40 MHz channel bandwidth		
Data Rate	802.11b	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps		
	802.11g	6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps		
	802.11n (SISO)	MCS 0 to MCS 7		
	802.11n (MIMO)	MCS 8 to MCS 15		
Modulation Type	DBPSK/DQPSK/CCK (DSSS), BPSK/QPSK/16QAM/64QAM (OFDM).			
Emission Designator	8M58G7D (for 802.11b mode), 16M5G7D (for 802.11g mod), 17M8G7D (for 802.11n20 mode), 17M8G7D (for 802.11n20m mode) 36M5G7D (for 802.11n40 mode), 36M4G7D (for 802.11n40m mode)			
TX Power Control	☐ Supported, ☒ Not Supported			
Standby Mode	☐ Supported, ☒ Not Supported			
Equipment Type	☐ Stand-alone equipment, ☐ Plug-in radio device, ☒ Combined equipment			
Antenna	Description	Isotropic Antenna		
	Type	☐ External, ☒ Integrated		
	Ports	☒ Ant 1, ☒ Ant 2, ☐ Ant 3		
	Smart System	☒ SISO (for 802.11b/g/n), ☒ MIMO (for 802.11n): 2 Tx & 2 Rx, ☐ Diversity (for 802.11b/g) : Tx & Rx		
	Gain	ANT1:1 dBi (per antenna port, max.) ANT2:1 dBi(per antenna port, max.)		
	Remark	When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.		
Power Supply	Type	☒ AC/DC Adapter	☐ PoE:	☐ Other:

4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

Test Mode	Test Modes Description
11B	IEEE 802.11b with data rate of 1 Mbps using SISO mode.
11G	IEEE 802.11g with data rate of 6 Mbps using SISO mode.
11N20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11N20m	IEEE 802.11n with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode.
11N40	IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11N40m	IEEE 802.11n with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.

4.2 EUT Configurations

4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, - All TX tests are performed at all TX antenna ports of the EUT, and - All RX tests are performed at all RX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

4.2.2 Customized Configurations

Test Mode	RF Ch.	TX Freq. [MHz]	Antenna Port	RX Freq. [MHz]	Ch. BW [MHz]	Power Conf., per Port	Duty cycle [%]
11B	L	Ch No. 5 / 2432 MHz	Ant1	---	20	16	99
			Ant2	---	20	16	99
	M	Ch No.8 / 2447 MHz	Ant1	---	20	16	99
			Ant2	---	20	16	99
	H	Ch No. 11 / 2462 MHz	Ant1	---	20	16	99
			Ant2	---	20	16	99
11G	L	Ch No. 5 / 2432 MHz	Ant1	---	20	17	96.5
			Ant2	---	20	17	96.5
	M	Ch No.8 / 2447 MHz	Ant1	---	20	17	96.5
			Ant2	---	20	17	96.5
	H	Ch No. 11 / 2462 MHz	Ant1	---	20	17	96.5
			Ant2	---	20	17	96.5
11N20	L	Ch No. 5 / 2432 MHz	Ant1	---	20	17	76
			Ant2	---	20	17	76
	M	Ch No.8 / 2447 MHz	Ant1	---	20	17	76
			Ant2	---	20	17	76
	H	Ch No. 11 / 2462 MHz	Ant1	---	20	17	76
			Ant2	---	20	17	76
11N20m	L	Ch No. 5 / 2432 MHz	Ant1	---	20	14	67
			Ant2	---	20	14	67
	M	Ch No.8 / 2447 MHz	Ant1	---	20	14	67
			Ant2	---	20	14	67
	H	Ch No. 11 / 2462 MHz	Ant1	---	20	14	67
			Ant2	---	20	14	67
11N40	L	Ch No. 7 / 2442 MHz	Ant1	---	20	17	64.5
			Ant2	---	20	17	64.5
	M	Ch No.8 / 2447 MHz	Ant1	---	20	17	64.5
			Ant2	---	20	17	64.5
	H	Ch No. 9 / 2452 MHz	Ant1	---	20	17	64.5
			Ant2	---	20	17	64.5
11N40m	L	Ch No. 7 / 2442 MHz	Ant1	---	20	14	60
			Ant2	---	20	14	60
	M	Ch No.8 / 2447 MHz	Ant1	---	20	14	60
			Ant2	---	20	14	60
	H	Ch No. 9 / 2452 MHz	Ant1	---	20	14	60
			Ant2	---	20	14	60

4.3 Test Environments

NOTE: The values used in the test report may be stringent than the declared.

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	Ambient	12VDC	Ambient

4.4 Antenna requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

The antennas of the **B525s-65a** are **permanently attached**.

There are no provisions for connection to an external antenna.

Conclusion:

The **EUT FCC ID: QISB525s-65a** unit complies with the requirement of §15.203.

Ch. Frequency (MHz)

Ch.	Frequency (MHz)
05	2432
.	.
.	.
08	2447
.	.
.	.
11	2462

Frequency/ Channel Operations

4.5 Description of tests

4.5.1 Bandwidth measurement

- (a) Connect EUT test port to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz, then set the measured frequency number and test the bandwidth with spectrum analyzer.

4.5.2 Duty Cycle measurement

- (a) Connect EUT test port to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz, then set the measured frequency number and test the Duty Cycle with spectrum analyzer.

4.5.3 Maximum Conducted Average Output Power

- (a) Connect EUT test port to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted output power separately.

4.5.4 Band edge spurious emission

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, low frequency and measure the conducted band edge spurious separately.

4.5.5 Conducted RF spurious

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted spurious separately.

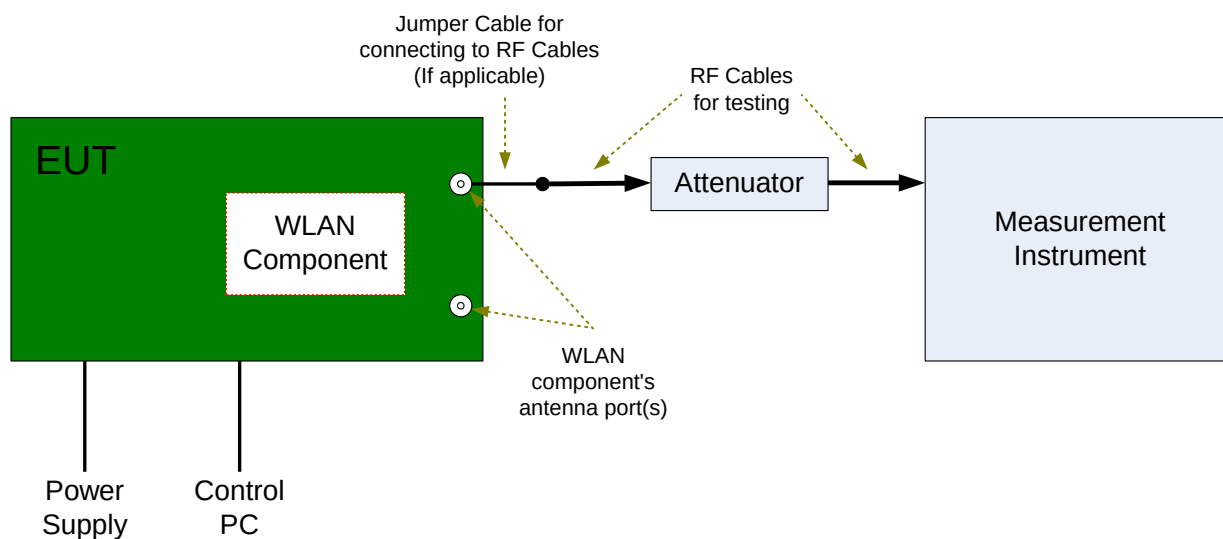
4.5.6 Power spectral density

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted power spectral density.

4.6 Test Setups

4.6.1 Test Setup 1

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



4.7 Test Conditions

Test Case	Test Conditions	
	Configuration	Description
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 §8.1 Option 2.
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Occupied Bandwidth	Measurement Method	FCC KDB 558074 §8.2 Option 2.
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Maximum Conducted Average Output Power	Measurement Method	FCC KDB 558074 §9.2 .2. 4
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2,

Test Case	Test Conditions	
	Configuration	Description
		11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Maximum Power Spectral Density Level	Measurement Method	FCC KDB 558074 §10.1 (peak PSD).
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Band Edges Compliance	Measurement Method	FCC KDB 558074 §13.0.
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Unwanted Emissions into Non-Restricted Frequency Bands	Measurement Method	FCC KDB 558074 §11.0
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2,

Test Case	Test Conditions	
	Configuration	Description
		11G_H@Ant1, 11G_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,

5 Main Test Instruments

Main Test Equipments					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal- Due
Power supply	KEITHLEY	2303	1342889	2016/10/13	2017/10/12
Wireless Communication Test set	Agilent	N4010A	MY49081592	2016/8/5	2017/8/5
Universal Radio Communication Tester	R&S	CMU200	123299	2016/11/14	2017/11/14
Spectrum Analyzer	Agilent	N9020A	MY52090652	2016/6/29	2017/6/29
Universal Radio Communication Tester	R & S	CMW500	126854	2016/12/29	2017/12/29
Signal Analyzer	R&S	FSQ31	200021	2016/8/5	2017/8/5
Spectrum Analyzer	Agilent	N9030A	MY49431698	2016/8/5	2017/8/5
Temperature Chamber	WEISS	WKL64	56246002940010	2016/12/21	2017/12/20
Signal generator	Agilent	E8257D	MY49281095	2016/8/5	2017/8/5
Vector Signal Generator	R&S	SMU200A	104162	2016/8/5	2017/8/5
Test receiver	R&S	ESU26	100387	2016/6/21	2017/6/21
Spectrum analyzer	R&S	FSU3	200474	2016/5/24	2017/5/24
Spectrum analyzer	R&S	FSU43	100144	2016/6/2	2017/6/2
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100262	2015/4/30	2017/4/29
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2015/4/30	2017/4/29
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-490	2015/4/30	2017/4/29
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-520	2015/4/30	2017/4/29
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2015/4/30	2017/4/29
double ridged horn antenna (0.8G-18GHz)	R&S	HF907	100305	2015/4/30	2017/4/29
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	Sep-60	5140299	2015/7/15	2017/7/14
Artificial Main Network	R&S	ENV4200	100134	2016/6/2	2017/6/2
Line Impedance Stabilization Network	R&S	ENV216	100382	2016/6/2	2017/6/2



6 Appendixes

Appendix No.	Description
SYBH(Z-RF)007012017-2002-A	Appendix for 2.4G WLAN

END