



RF Test Report

Product Name: pico Remote Radio Unit

Product Model: pRRU3901

Report Number: SYBH(R)01349980EB-1

FCC ID: QISPRRU3901

IC: 6369A-PRRU3901

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
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Notice

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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 for the test site located in Shenzhen is 97456, and the recognition numbers for the test site located in Shanghai is 684868.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers are 6369A-1 for the 3m chamber test site located at G2 building, 6369A-2 for the 3m chamber test site located at K3 building and 6369A-3 for the 10m chamber test site located at K3 building in Shenzhen; the recognition numbers are 6369D-1 for the 3m chamber test site and 6369D-2 for the 10m chamber test site located in Shanghai.
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7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. 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.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
 Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: pico Remote Radio Unit
Product Model: pRRU3901

Date of Receipt Sample: 2014-05-19
Start Date of Test: 2014-05-19
End Date of Test: 2014-05-31

Test Result: Pass

Approved by Senior Engineer:	2014-06-19	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2014-06-19	Hu Wei	<i>Hu Wei</i>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	---	First report.



CONTENT

1	General Information.....	6
1.1	Applied Standard.....	6
1.2	Test Location	6
1.3	Test Environment Condition.....	6
2	Test Summary	7
2.1	AWS Band (1710-1755 MHz paired with 2110-2155 MHz).....	7
2.2	PCS Band (1850-1915 MHz paired with 1930-1995 MHz).....	10
3	Description of the Equipment under Test (EUT).....	13
3.1	General Description	13
3.2	EUT Identity	13
3.3	Technical Specification	14
4	General Test Conditions / Configurations.....	18
4.1	Test Modes	18
4.2	EUT Configurations.....	19
4.3	Test Environments	21
4.4	Test Setups.....	22
4.5	Test Conditions	24
5	Radiated (Spurious) Emissions test results	28
5.1	Result Table.....	28
5.2	The setting of analyzer.....	28
5.3	Test Plot.....	28
6	Main Test Instruments	36
7	Measurement Uncertainty.....	37



1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2 (10-1-13 Edition)
47 CFR FCC Part 24 (10-1-13 Edition)
47 CFR FCC Part 27 (10-1-13 Edition)
IC RSS-Gen (Issue 3, December 2010)
IC RSS-133 (Issue 6, January 2013)
IC RSS-139 (Issue 2, February 2009)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v01r02 (if applicable)
FCC KDB 662911 D02 MIMO with Cross-Polarized Antennas v01 (if applicable)

1.2 Test Location

Test Location 1 (TL1): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Test Location 2 (TL2): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, 201206, P.R.C

Test Location 3 (TL3): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.1899 Xiyuan Avenue, Hi-tech Western District, Chengdu, 611731, P.R.C

1.3 Test Environment Condition

Temperature: 21 to 24 °C (Ambient)
Relative Humidity: 60 to 72 % (Ambient)
Atmospheric Pressure: Not applicable



2 Test Summary

2.1 AWS Band (1710-1755 MHz paired with 2110-2155 MHz)

2.1.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location	
Transmitter Output Power	§2.1046, §27.50(d)	RSS-Gen,§4.8; RSS-139,§6.4; RSS-139,§4.1	FCC	Base Station / Fixed Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1640 W (for EBW \leq 1 MHz). Average EIRP PD \leq 1640 W/MHz (for EBW $>$ 1 MHz). PAPR \leq 13 dB@0.1%. 	Appendix A1	Pass	TL1
				Mobile Station / Portable Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1 W. PAPR \leq 13dB@0.1%. 			
			IC	Base Station / Fixed Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1640 W (for ChBW \leq 1 MHz). Average EIRP PD \leq 1640 W/MHz (for ChBW $>$ 1 MHz). PAPR \leq 13 dB@0.1%. 			
				Mobile Station / Portable (hand-held) Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1 W. PAPR \leq 13dB@0.1%. 			
Bandwidth	§2.1049, §27.53(h)	RSS-Gen,§4.6; RSS-139,§2.3	FCC	<ul style="list-style-type: none"> OBW: No limit. EBW (-26 dBc): No limit. 	Appendix B1	Pass	TL1	
			IC	<ul style="list-style-type: none"> OBW: No limit, may in lieu of EBW (-20 dBc). 				



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location	
			<ul style="list-style-type: none"> EBW (-20 dBc): No limit. 				
Band Edges Compliance	§2.1051, §27.53(h)	RSS-Gen,§4.9; RSS-139,§6.5	FCC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -26 dBc EBW)	Appendix C1	Pass	TL1
			IC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -20 dBc EBW, or OBW)			
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	RSS-Gen,§4.9; RSS-139,§6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix D1	Pass	TL1	
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	RSS-Gen,§4.9; RSS-139,§6.5	≤ -13 dBm/1 MHz.	See chapter 5	Pass	TL1	
Frequency Stability	§2.1055, §27.54	RSS-Gen,§4.7; RSS-139,§6.3	FCC	<ul style="list-style-type: none"> Test method: Fundamental emissions (Fc_meas) within the authorized bands of operation. Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV. 	Appendix E1	Pass	TL1
			IC	<ul style="list-style-type: none"> Test method: EBW (EBW_lower to EBW_higher) within frequency block. Test conditions: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. (EBW is -20 dBc EBW, or OBW) 			
Receiver Spurious Emissions	---	IC NOTICE 2012-DRS0126	---	Appendix F1	---	---	
Photos of Test Setups	---	---	---	---	---	---	

2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§27.5(h)	RSS-139,§6.1	1710-1755 MHz paired with 2110-2155 MHz:	See technical	Comply



Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
				specification description.	
Modulation Characteristics	§2.1047	RSS-139,§6.2	Any modulation.	See technical specification description.	Comply



2.2 PCS Band (1850-1915 MHz paired with 1930-1995 MHz)

2.2.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	§2.1046, §24.232	RSS-Gen, §4.8; RSS-133, §6.4; RSS-133, §4.1	FCC	Base Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1640 W (for EBW \leq 1 MHz). Average EIRP PD \leq 1640 W/MHz (for EBW $>$ 1 MHz). PAPR \leq 13 dB@0.1%. 	Appendix A2	Pass	TL1
				Mobile Station / Portable Station	<ul style="list-style-type: none"> Average EIRP \leq 2 W. PAPR \leq 13 dB@0.1%. 			
			IC	Base Station	<ul style="list-style-type: none"> Average EIRP Power \leq 1640 W (for ChBW \leq 1 MHz). Average EIRP PD \leq 1640 W/MHz (for ChBW $>$ 1 MHz). Average Conducted Power \leq 100 W. PAPR \leq 13 dB@0.1%. 			
				Mobile Station / Hand-held Portable Station	<ul style="list-style-type: none"> Average EIRP Power \leq 2 W. PAPR \leq 13 dB@0.1%. 			
Bandwidth	§2.1049, §24.238	RSS-Gen, §4.6; RSS-133, §2.3	FCC	<ul style="list-style-type: none"> OBW: No limit. EBW (-26 dBc): No limit. 	Appendix B2	Pass	TL1	
			IC	<ul style="list-style-type: none"> OBW: No limit, may in lieu of EBW (-20 dBc). EBW (-20 dBc): No limit. 				
Band Edges	§2.1051,	RSS-Gen, §4.9;	FCC	\leq -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the		Appendix	Pass	TL1



Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location	
Compliance	§24.238	RSS-133,§6.5		frequency block. (EBW is -26 dBc EBW)	C2			
			IC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -20 dBc EBW, or OBW)				
Spurious Emission at Antenna Terminals	§2.1051, §24.238	RSS-Gen,§4.9; RSS-133,§6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency blocks.		Appendix D2	Pass	TL1	
Field Strength of Spurious Radiation	§2.1053, §24.238	RSS-Gen,§4.9; RSS-133,§6.5	≤ -13 dBm/1 MHz.		See chapter 5	Pass	TL1	
Frequency Stability	§2.1055, §24.235	RSS-Gen,§4.7; RSS-133,§6.3	FCC	<ul style="list-style-type: none"> Test method: Fundamental emissions (Fc_meas) within the authorized frequency block. Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV. 	Appendix E2	Pass	TL1	
			IC	Base Station				<ul style="list-style-type: none"> Test method option #1: (Fc_meas - Fc_meas@20°C&NV) / Fc_meas@20°C&NV ≤ ±1.0 ppm. Test method option#2: EBW (EBW_lower to EBW_higher) within frequency block. Test conditions: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. (EBW is -20 dBc EBW, or OBW)
				Mobile Station				<ul style="list-style-type: none"> Test method option #1: (Fc_meas - Fc_meas@20°C&NV) / Fc_meas@20°C&NV ≤ ±2.5 ppm. Test method option #2: EBW (EBW_lower to EBW_higher) within



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			frequency block. ● Test conditions: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. (EBW is -20 dBc EBW, or OBW)			
Receiver Spurious Emissions	---	IC NOTICE 2012-DRS0126	---	Appendix F2	---	---
Photos of Test Setups	---	---	---	---	---	---

2.2.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§24.229	RSS-133,§6.1	1850-1915 MHz paired with 1930-1995 MHz: 	See technical specification description.	Comply
Modulation Characteristics	§2.1047	RSS-133,§6.2	Digital modulation.	See technical specification description.	Comply



3 Description of the Equipment under Test (EUT)

3.1 General Description

The pRRU3901 is the indoor remote radio unit. which is the elements of LampSite indoor coverage network solutions, need to be used with the BBU and RHUB3908, using for support buildings scenes indoor coverage, a product at the Operators layer launched by Huawei Technologies Co., Ltd., It is the RF module of the distributed BTS and is installed close to the antenna.The pRRU3901 performs modulation, demodulation, data processing, and combination and division of baseband signals and RF signals.

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		
Board Name	Hardware Version	Description
WD6DIPX220	Ver.C	Manufactured Board,pRU01,WD6DIPX220,Multi-Mode 1.9G Radio Board,2T2R,200mW
WD6DLPX240	Ver.C	Manufactured Board,pRU01,WD6DLPX240,LTE FDD AWS Radio Board,2T2R,2*100mW
WD6EXRUIBA	Ver.B	Manufactured Board,pRRU 3901,WD6EXRUIBA,pRRU Interface Board
WD6EMRI	Ver.B	Manufactured Board,pRRU 3901,WD6EMRI,pRRU Interface Board

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
UMPT	UMPTb	HUAWEI	BBU3900-WD22UMPTb2-Universal Main Processing & Transmission unit with 4E1 and 2FE/GE interface, With Ublock Card
LBBP	LBBPd	HUAWEI	Manufactured Board,BBU3900,WD22LBBPD3,LTE Baseband Processing and Interface Unit(6 cell 2T2R), 1*1
WBBP	WBBPf	HUAWEI	Manufactured Board,BBU3900,QWL1WBBPF4,Baseband Processing Unit (CE:UL512/DL768),1*1
Adapter	HW-60-12AC14D	Huntkey	60W AC Power Module 12V/5A-2PIN In/4PIN Out
Adapter	HW-60-12AC14D	Fuhua	60W AC Power Module 12V/5A-2PIN In/4PIN Out



3.3 Technical Specification

3.3.1 AWS Band

Characteristics	Description
Radio System Type	Single Radio <input type="checkbox"/> GSM Access Technology (Single-RAT): <input checked="" type="checkbox"/> UMTS <input checked="" type="checkbox"/> LTE <input type="checkbox"/> CDMA <input type="checkbox"/> WiMAX Multi-Standard Radio (MSR): <input type="checkbox"/> GSM & UMTS <input type="checkbox"/> GSM & LTE <input type="checkbox"/> GSM & UMTS & LTE <input type="checkbox"/> UMTS & LTE <input type="checkbox"/> WiMAX & LTE <input type="checkbox"/> CDMA & LTE
Equipment Type	#1 <input checked="" type="checkbox"/> Base Station <input type="checkbox"/> CPE (Customer Premises Equipment) Station <input type="checkbox"/> Subscriber Station (User Equipment) #2 <input checked="" type="checkbox"/> Fixed Station <input type="checkbox"/> Mobile Station <input type="checkbox"/> Portable Station #3 <input checked="" type="checkbox"/> Indoor Station <input type="checkbox"/> Outdoor Station
Supported Frequency Range	Transmission (TX): 2110 to 2155 MHz Receiving (RX): 1710 to 1755 MHz
TX and RX Antenna Ports	TX & RX port: 1(for UMTS), 2(for LTE) TX-only port: 0 RX-only port: 1(for UMTS), 0(for LTE)
Multiple Carrier Supported	2(for UMTS), 1(for LTE)
Maximum RF Bandwidth	Not applicable
TX Output Power	Max. 200 mW
Supported Channel Bandwidth	GSM system: <input type="checkbox"/> 200 kHz UMTS system: <input checked="" type="checkbox"/> 5 MHz LTE system: <input type="checkbox"/> 1.4 MHz, <input type="checkbox"/> 3 MHz, <input checked="" type="checkbox"/> 5 MHz, <input checked="" type="checkbox"/> 10 MHz, <input checked="" type="checkbox"/> 15 MHz, <input checked="" type="checkbox"/> 20 MHz CDMA system: <input type="checkbox"/> 1.23 MHz, <input type="checkbox"/> 1.25 MHz WiMAX system: <input type="checkbox"/> 5 MHz, <input type="checkbox"/> 7 MHz, <input type="checkbox"/> 10 MHz
Modulation Type	GSM system: Not applicable UMTS system: Base-band: QPSK, 16QAM, 64QAM Carrier: CDMA LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA CDMA system: Not applicable



Characteristics	Description
	WiMAX system: Not applicable
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM system: Not applicable UMTS system: 4M19F9W LTE system: 4M49D9W, 8M97D9W, 13M5D9W, 17M9D9W CDMA system: Not applicable WiMAX system: Not applicable
Power Supply	Power Supply Type: <input type="checkbox"/> External AC mains, <input type="checkbox"/> External DC mains, <input checked="" type="checkbox"/> AC/DC Adapter, <input checked="" type="checkbox"/> Powered over Ethernet (PoE) Nominal Voltage, Input to EUT: PoE power supply: -48 VDC Voltage Range, Input to EUT: AC/DC power supply: 120VAC PoE power supply: -36VDC to -60VDC AC/DC power supply: 100VAC to 240VAC
Antenna Assembles	Antenna Type: <input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated Smart Antenna: <input checked="" type="checkbox"/> MIMO(for LTE), <input checked="" type="checkbox"/> Non MIMO(for UMTS) Antenna Gain: 4 dBi (per antenna port, max.) Remark: When the EUT is put into service, the practical maximum antenna gain may exceed the value as described above, and if exceed, the combination of the practical output power and the practical antenna gain should NOT exceed the required ERP/EIRP limit.

3.3.2 PCS Band

Characteristics	Description
Radio System Type	Single Radio <input type="checkbox"/> GSM Access Technology (Single-RAT): <input checked="" type="checkbox"/> UMTS, <input checked="" type="checkbox"/> LTE, <input type="checkbox"/> CDMA, <input type="checkbox"/> WiMAX Multi-Standard Radio (MSR): <input type="checkbox"/> GSM & UMTS, <input type="checkbox"/> GSM & LTE, <input type="checkbox"/> GSM & UMTS & LTE, <input type="checkbox"/> UMTS & LTE, <input type="checkbox"/> WiMAX & LTE, <input type="checkbox"/> CDMA & LTE
Equipment Type	#1 <input checked="" type="checkbox"/> Base Station, <input type="checkbox"/> CPE (Customer Premises Equipment) Station, <input type="checkbox"/> Subscriber Station (User Equipment)



Characteristics	Description
	#2 <input checked="" type="checkbox"/> Fixed Station <input type="checkbox"/> Mobile Station <input type="checkbox"/> Portable Station #3 <input checked="" type="checkbox"/> Indoor Station <input type="checkbox"/> Outdoor Station
Supported Frequency Range	Transmission (TX): 1930 to 1990 MHz Receiving (RX): 1850 to 1910 MHz
TX and RX Antenna Ports	TX & RX port: 1(for UMTS), 2(for LTE) TX-only port: 0 RX-only port: 1(for UMTS), 0(for LTE)
Multiple Carrier Supported	2(for UMTS), 1(for LTE)
Maximum RF Bandwidth	Not applicable
TX Output Power	Max. 200 mW
Supported Channel Bandwidth	GSM system: <input type="checkbox"/> 200 kHz UMTS system: <input checked="" type="checkbox"/> 5 MHz LTE system: <input type="checkbox"/> 1.4 MHz, <input type="checkbox"/> 3 MHz, <input checked="" type="checkbox"/> 5 MHz, <input checked="" type="checkbox"/> 10 MHz, <input checked="" type="checkbox"/> 15 MHz, <input checked="" type="checkbox"/> 20 MHz CDMA system: <input type="checkbox"/> 1.23 MHz, <input type="checkbox"/> 1.25 MHz WiMAX system: <input type="checkbox"/> 5 MHz, <input type="checkbox"/> 7 MHz, <input type="checkbox"/> 10 MHz
Modulation Type	GSM system: Not applicable UMTS system: Base-band: QPSK, 16QAM, 64QAM Carrier: CDMA LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA CDMA system: Not applicable WiMAX system: Not applicable
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM system: Not applicable UMTS system: 4M18F9W LTE system: 4M50D9W, 8M98D9W, 13M5D9W, 17M9D9W CDMA system: Not applicable WiMAX system: Not applicable
Power Supply	Power Supply Type: <input type="checkbox"/> External AC mains, <input type="checkbox"/> External DC mains, <input checked="" type="checkbox"/> AC/DC Adapter, <input checked="" type="checkbox"/> Powered over Ethernet (PoE) Nominal Voltage, Input to EUT: PoE power supply: -48 VDC AC/DC power supply: 120VAC Voltage Range, Input to EUT: PoE power supply: -36VDC to -60VDC AC/DC power supply: 100VAC to 240VAC
Antenna Assemblies	Antenna Type: <input type="checkbox"/> External <input checked="" type="checkbox"/> Integrated



Characteristics	Description
	<p>Smart Antenna: <input checked="" type="checkbox"/> MIMO(for LTE) <input checked="" type="checkbox"/> Non MIMO(for UMTS)</p> <p>Antenna Gain: 4 dBi (per antenna port, max.)</p> <p>Remark: When the EUT is put into service, the practical maximum antenna gain may exceed the value as described above, and if exceed, the combination of the practical output power and the practical antenna gain should NOT exceed the required ERP/EIRP limit.</p>



4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications, and these test mode(s) reflect the worst case scenario.

Test Mode	Test Modes Description
UMTS/TM1	UMTS system, 3GPP TS 25.141 clause 6.1.1, Test Model 1, QPSK modulation
LTE/TM1.1	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.1

4.2 EUT Configurations

4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, <ul style="list-style-type: none"> All TX tests are ONLY performed at the main TX antenna port (e.g. TRXA, TXA or similar) of the EUT, and All RX tests are ONLY performed at the main RX antenna port (e.g. TRXA, RXB or similar) 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

NOTE: For the carrier configurations, the description of “n*TxxxM(yyyW)@zzz” denotes the n * multiple carriers of the radio system type T (G - GSM system, U - UMTS system, L - LTE system, C - CDMA system, W - WiMAX system), for which the channel bandwidth of each carrier is xxx MHz (applicable for T supporting various channel bandwidths) and the power level of each carrier is yyy Watts, at the antenna port zzz (if specified). While the combinations of several “n*TxxxM(yyyW)@zzz”s denotes the carrier configurations of the MSR system.

4.2.2.1 AWS Band

EUT Conf.	RF Ch.	RX Freq. [MHz]	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
5M_B	B	1712.5	2112.5	5	20	LTE/TM1.1
5M_M	M	1732.5	2132.5	5	20	LTE/TM1.1
5M_T	T	1752.5	2152.5	5	20	LTE/TM1.1
10M_B	B	1715	2115	10	20	LTE/TM1.1
10M_M	M	1732.5	2132.5	10	20	LTE/TM1.1
10M_T	T	1750	2150	10	20	LTE/TM1.1
15M_B	B	1717.5	2117.5	15	20	LTE/TM1.1
15M_M	M	1732.5	2132.5	15	20	LTE/TM1.1
15M_T	T	1747.5	2147.5	15	20	LTE/TM1.1
20M_B	B	1720	2120	20	20	LTE/TM1.1
20M_M	M	1732.5	2132.5	20	20	LTE/TM1.1
20M_T	T	1745	2145	20	20	LTE/TM1.1
1U_B	B	1712.4	2112.4	5	23	UMTS/TM1
1U_M	M	1732.4	2132.4	5	23	UMTS/TM1
1U_T	T	1752.6	2152.6	5	23	UMTS/TM1
2U_B	B	1712.4,1717.4	2112.4,2117.4	5,5	20,20	UMTS/TM1
2U_M	M	1730,1735	2130,2135	5,5	20,20	UMTS/TM1



EUT Conf.	RF Ch.	RX Freq. [MHz]	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
2U_T	T	1747.6,1752.6	2147.6,2152.6	5,5	20,20	UMTS/TM1

4.2.2.2 PCS Band

EUT Conf.	RF Ch.	RX Freq. [MHz]	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
5M_B	B	1852.5	1932.5	5	20	LTE/TM1.1
5M_M	M	1880	1960	5	20	LTE/TM1.1
5M_T	T	1907.5	1987.5	5	20	LTE/TM1.1
10M_B	B	1855	1935	10	20	LTE/TM1.1
10M_M	M	1880	1960	10	20	LTE/TM1.1
10M_T	T	1905	1985	10	20	LTE/TM1.1
15M_B	B	1857.5	1937.5	15	20	LTE/TM1.1
15M_M	M	1880	1960	15	20	LTE/TM1.1
15M_T	T	1902.5	1982.5	15	20	LTE/TM1.1
20M_B	B	1860	1940	20	20	LTE/TM1.1
20M_M	M	1880	1960	20	20	LTE/TM1.1
20M_T	T	1900	1980	20	20	LTE/TM1.1
1U_B	B	1852.4	1932.4	5	23	UMTS/TM1
1U_M	M	1880	1960	5	23	UMTS/TM1
1U_T	T	1907.6	1987.6	5	23	UMTS/TM1
2U_B	B	1852.4,1857.4	1932.4,1937.4	5,5	20,20	UMTS/TM1
2U_M	M	1880,1885	1960,1965	5,5	20,20	UMTS/TM1
2U_T	T	1902.6,1907.6	1982.6,1987.6	5,5	20,20	UMTS/TM1

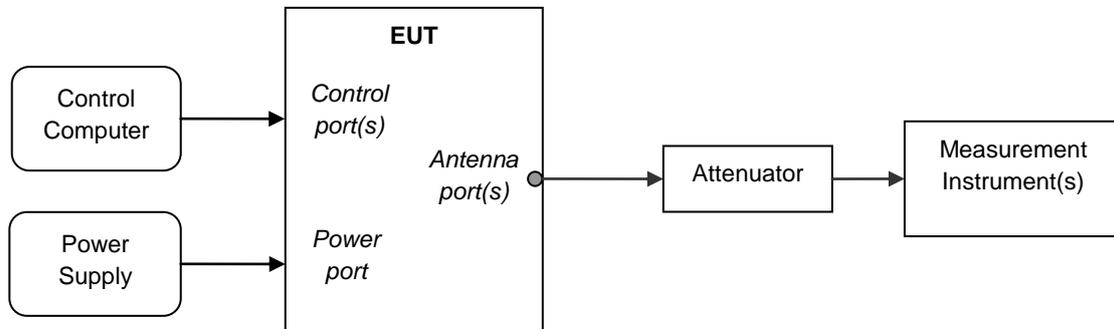


4.3 Test Environments

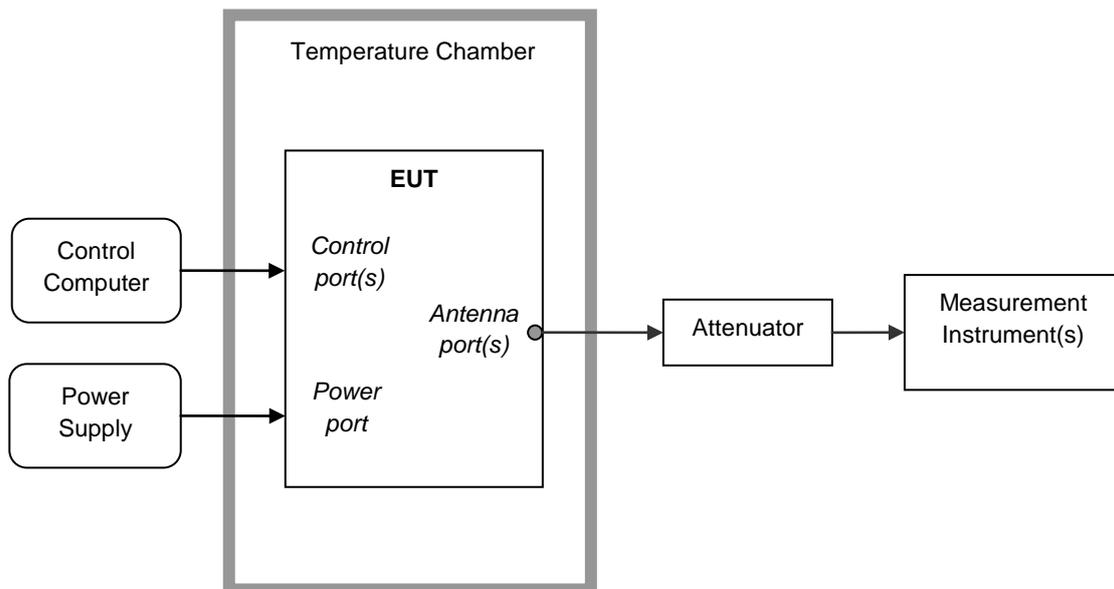
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



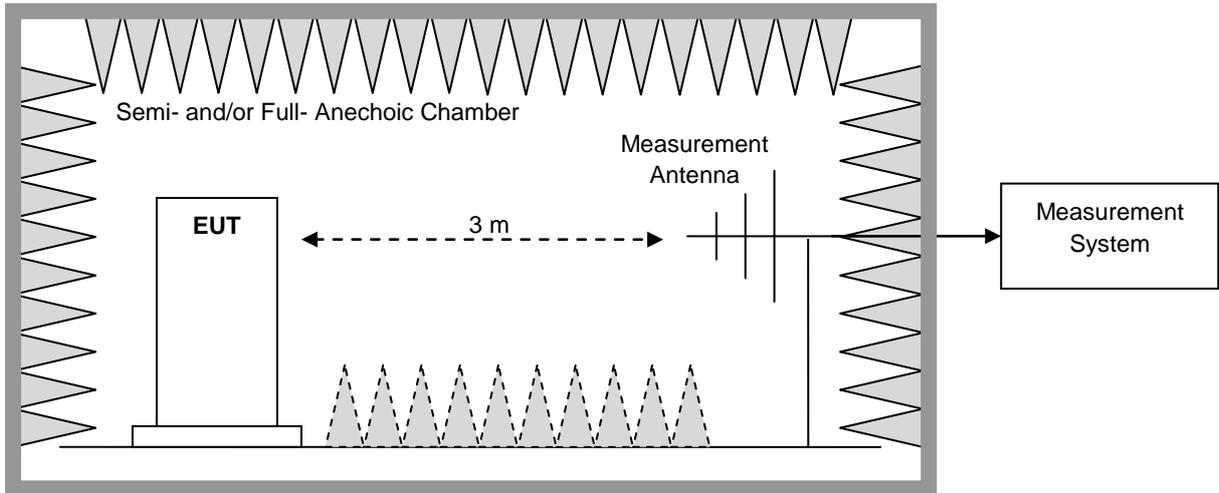
4.4.2 Test Setup 2



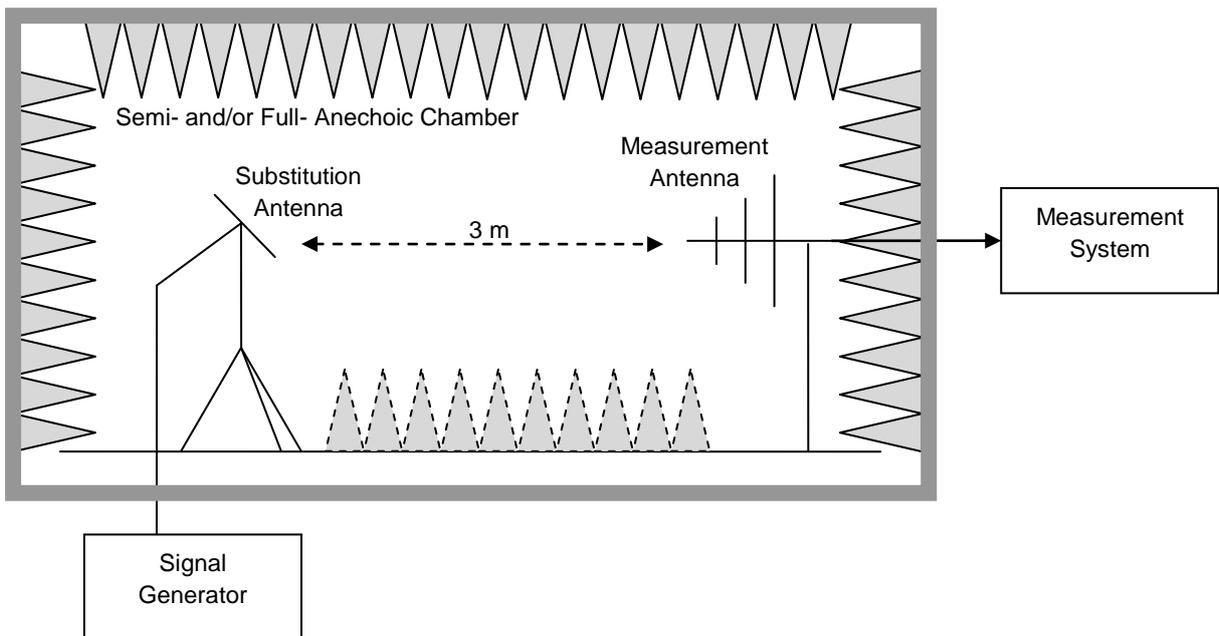
4.4.3 Test Setup 3

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

4.4.3.1 Step 1: Pre-test



4.4.3.2 Step 2: Substitution method to verify the maximum ERP



4.5 Test Conditions

4.5.1 AWS Band

Test Case		Test Conditions	
Transmitter Output Power	Channel Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T 2U_B,2U_M,2U_T
	Power Spectral Density	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 1U_B,1U_M,1U_T
	Peak-to-Average Ratio	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 1U_B,1U_M,1U_T
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T
	Emission Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T
Band Edges Compliance	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Setup 1	
	EUT Conf.	5M_B,5M_T 20M_B,20M_T 1U_B,1U_T 2U_B,2U_T	
Spurious Emission at Antenna Terminals	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Setup 1	
	EUT Conf.	5M_B,5M_M,5M_T	

Test Case		Test Conditions	
			1U_B,1U_M,1U_T 2U_B,2U_M,2U_T
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 3
		EUT Conf.	5M_M,1U_M NOTE: If applicable, the EUT Conf. that has maximum power density (based on the equivalent power level) is selected.
Frequency Stability	Frequency Error	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
		Test Setup	Test Setup 2
		EUT Conf.	5M_M NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules.
	Frequency Range (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 2
		EUT Conf.	Not applicable
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	Not applicable

4.5.2 PCS Band

Test Case		Test Conditions	
Transmitter Output Power	Channel Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T 2U_B,2U_M,2U_T
	Power Spectral Density	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 1U_B,1U_M,1U_T
	Peak-to-Average Ratio	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 1U_B,1U_M,1U_T



Test Case		Test Conditions	
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T
	Emission Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 10M_B,10M_M,10M_T 15M_B,15M_M,15M_T 20M_B,20M_M,20M_T 1U_B,1U_M,1U_T
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_T 20M_B,20M_T 1U_B,1U_T 2U_B,2U_T
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	5M_B,5M_M,5M_T 1U_B,1U_M,1U_T 2U_B,2U_M,2U_T
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 3
		EUT Conf.	5M_M,1U_M NOTE: If applicable, the EUT Conf. that has maximum power density (based on the equivalent power level) is selected.
Frequency Stability	Frequency Error	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
		Test Setup	Test Setup 2
		EUT Conf.	5M_M NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules.
	Frequency Range	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 2



Test Case		Test Conditions	
	(if required)	EUT Conf.	Not applicable
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	Not applicable



5 Radiated (Spurious) Emissions test results

5.1 Result Table

EUT Conf.	Measured Curve Conformed to the Emission Limit?	Verdict
AWS Band 5M_M	Yes	Pass
AWS Band 1U_M & AWS Band 5M_M	Yes	Pass
PCS Band 1U_M & AWS Band 5M_M	Yes	Pass
PCS Band 1U_M & PCS Band 5M_M	Yes	Pass
PCS Band 1U_M	Yes	Pass

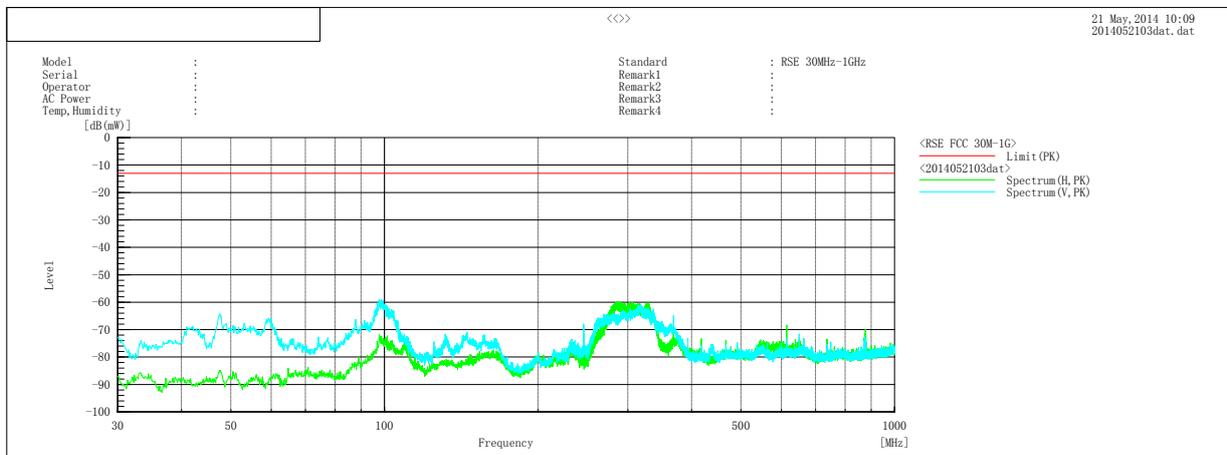
5.2 The setting of analyzer

Frequency range	RBW	Detector
30MHz to 1GHz	1MHz	Peak
1GHz to 12.75GHz	1MHz	Peak
12.75GHz to 22GHz	1MHz	Peak

5.3 Test Plot

5.3.1 30MHz-1GHz

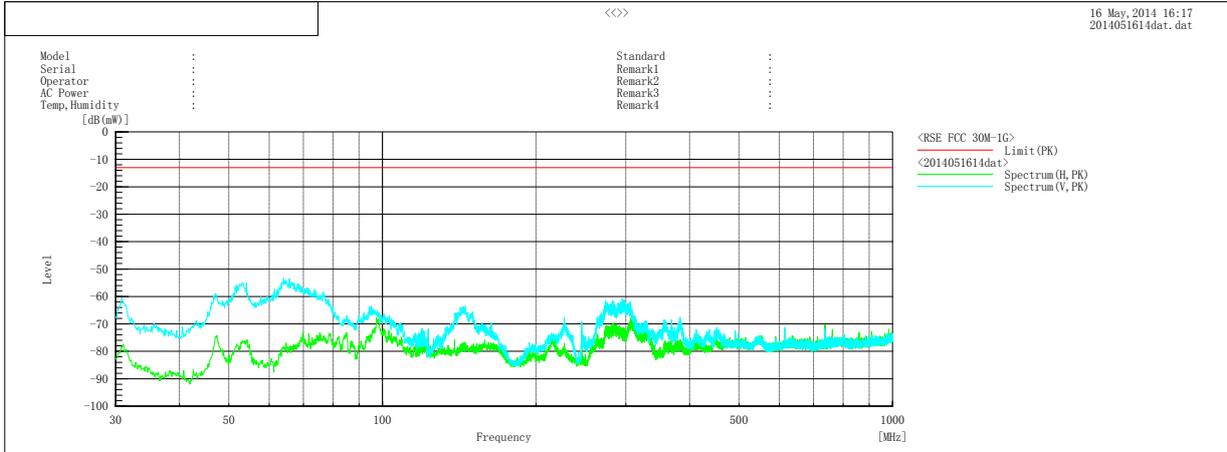
5.3.1.1 AWS Band 1U_M & AWS Band 5M_M



Final Result

No.	Frequency (P)	c. f	Height	Angle	Remark
	[MHz]	[dB]	[cm]	[°]	[備]

5.3.1.2 PCS Band 1U_M & AWS Band 5M_M

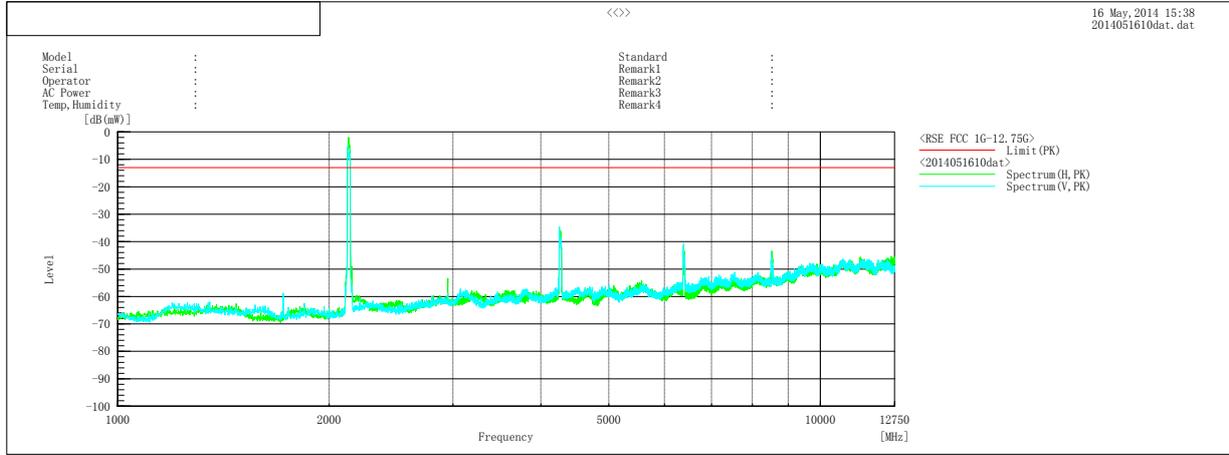


Final Result

No.	Frequency (P)	c. f	Height	Angle	Remark
	[MHz]	[dB]	[cm]	[°]	

5.3.2 1GHz-12.75GHz

5.3.2.1 AWS Band 5M_M

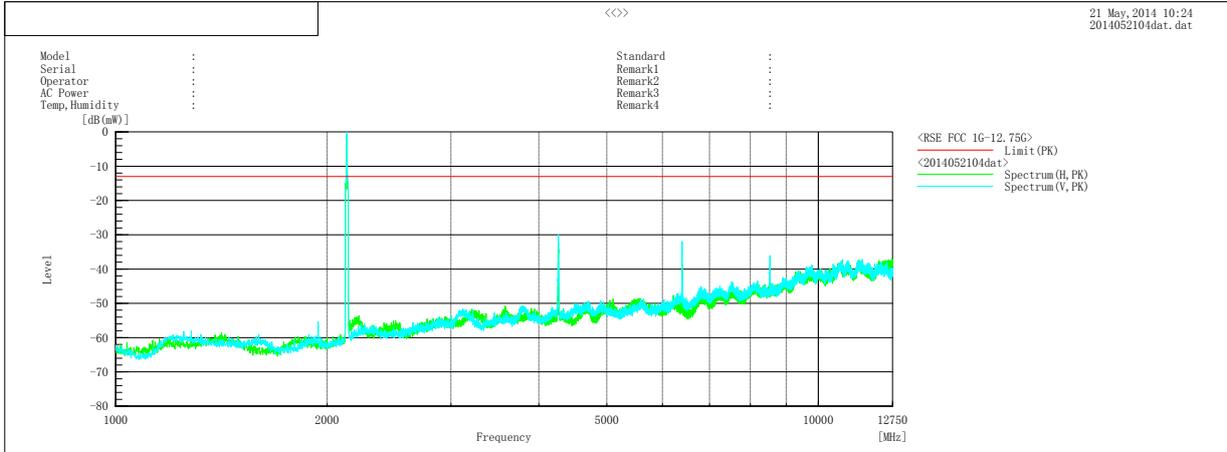


Final Result

No.	Frequency (P) [MHz]	c. f [dB]	Height [cm]	Angle	Remark



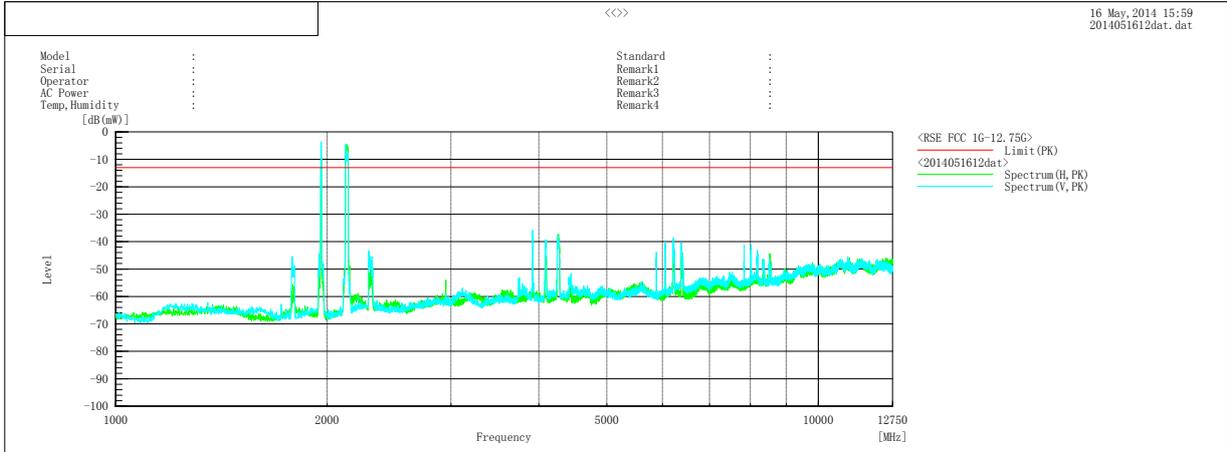
5.3.2.2 AWS Band 1U_M & AWS Band 5M_M



Final Result

No.	Frequency (P)	c. f	Height	Angle	Remark
	[MHz]	[dB]	[cm]	[°]	

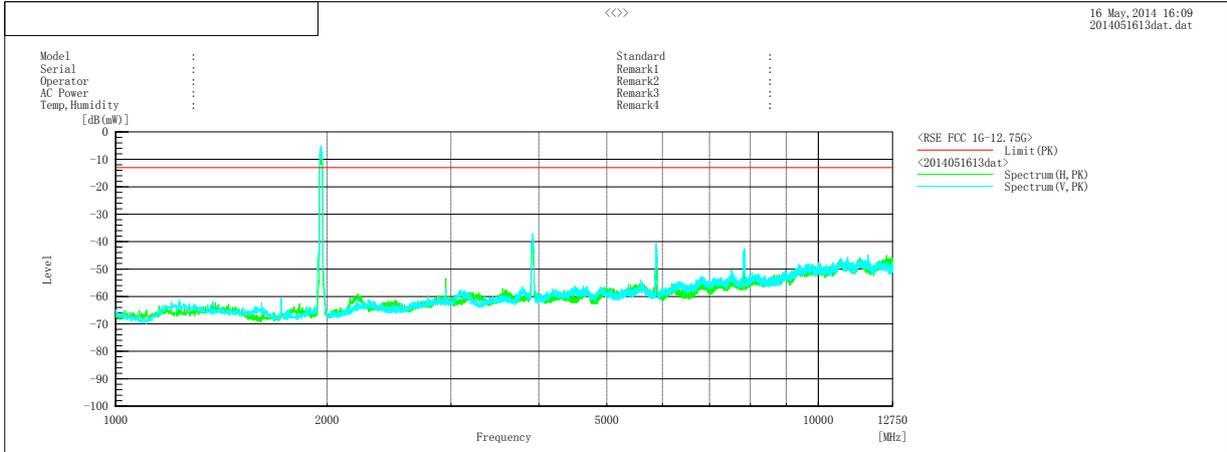
5.3.2.3 PCS Band 1U_M & AWS Band 5M_M



Final Result

No.	Frequency (P) [MHz]	c. f. [dB]	Height [cm]	Angle [°]	Remark

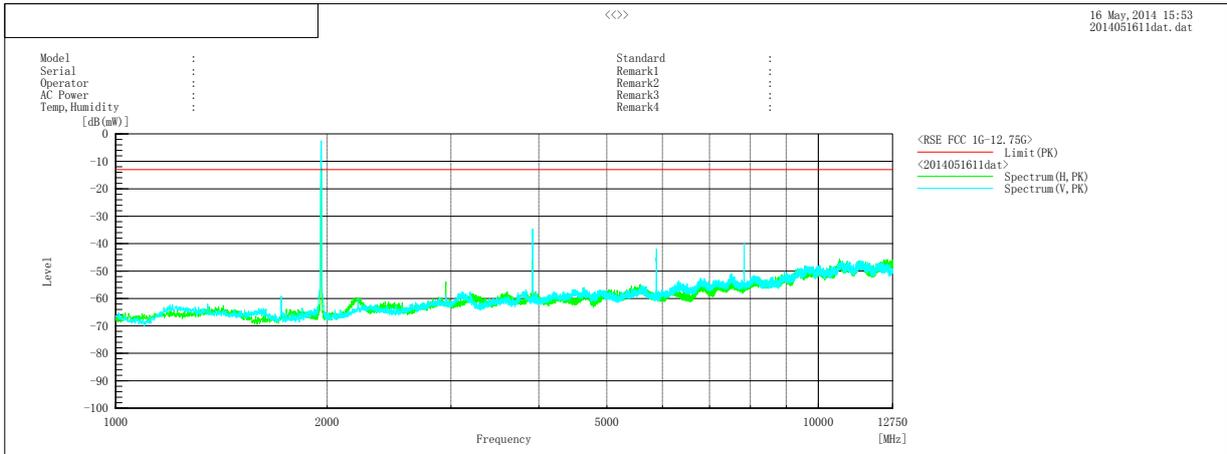
5.3.2.4 PCS Band 1U_M & PCS Band 5M_M



Final Result

No.	Frequency (P)	c. f	Height	Angle	Remark
	[MHz]	[dB]	[cm]	[°]	

5.3.2.5 PCS Band 1U_M



Final Result

No.	Frequency (P) [MHz]	c. f [dB]	Height [cm]	Angle [°]	Remark



Note: the signal exceeding the limit line is the wanted signal.

5.3.3 12.75GHz-22GHz

(no obvious spikes found)

Note: The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.



6 Main Test Instruments

NOTE: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2014-11-26
Spectrum Analyzer	Agilent	E4440A	MY49420179	2014-08-30
Spectrum Analyzer	Agilent	N9020A	MY51240619	2015-02-18
Vector Signal Generator	Agilent	E8257D	MY49281095	2014-09-21
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-25
Test Setup 3				
EMI Test receiver	Agilent	N9038A	MY52260169	2014-12-01
Spectrum analyser	Agilent	N9010A	MY52220816	2015-03-17
Bilog Antenna	TESQ	CBL 6112D	35238	2015-12-01
Horn Antenna	SWARZBECK	BBHA 9120D	1077	2015-12-01
Horn Antenna	ETS	3160-09	00117544	2015-12-26



7 Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmitter Output Power	Power [dBm]	U = 0.39 dB
Bandwidth	Magnitude [%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 2.0 dB
Field Strength of Spurious Radiation	ERP [dBm]	For 3 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz) For 10 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END