

TESTING CERT #2174.01

RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3942 1900M

Report Number: SYBH(R)01271108EB-2

FCC ID: QISRRU3942-1900M

IC ID: 6369A-3942B2S

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice

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 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.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers for the test site No.1 located at G2 building in Shenzhen are R-3892, G-415, C-4361, and T-1348, and the accreditation numbers for the test site No.2 located at K3 building in Shenzhen are R-3760, G-485, C-4210 and T-1237.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
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: Remote Radio Unit
Product Model: RRU3942 1900M

Date of Receipt Sample: 2012-05-24 2013-12-24
Start Date of Test: 2012-05-24 2013-12-30
End Date of Test: 2012-08-08 2014-03-16

Test Result: Pass

Approved by Senior

2014-03-25

Zhang Xinghai

Zhang Xing hai

Engineer:

Date

Name

Signature

Prepared by:

2014-03-25

Huang Yuanqiu

Huang yuanqiu

Date

Name

Signature



Modification Record

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



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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 02 (10-1-11 Edition)
47 CFR FCC Part 24 (10-1-12 Edition)
IC RSS-Gen (Issue 3, December 2010)
IC RSS-133 (Issue 6, January 2013)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02
FCC KDB 662911 D01 Multiple Transmitter Output v02

1.2 Test Location

Test Location 1: 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: 22 to 26 °C
Ambient Relative Humidity: 54 to 70 %
Atmospheric Pressure: Not applicable



2 Test Summary

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

2.1.1 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	- Average EIRP Power ≤ 1640 W (for EBW ≤ 1 MHz). - Average EIRP PD ≤ 1640 W/MHz (for EBW > 1 MHz). - PAPR ≤ 13 dB@0.1%.	Annex A	Pass	TL1
				Mobile Station / Portable Station	- Average EIRP ≤ 2 W. - PAPR ≤ 13 dB@0.1%.			
			IC	Base Station	- Average EIRP Power ≤ 1640 W (for ChBW ≤ 1 MHz). - Average EIRP PD ≤ 1640 W/MHz (for ChBW > 1 MHz). - Average Conducted Power ≤ 100 W. - PAPR ≤ 13 dB@0.1%.			
				Mobile Station / Hand-held Portable Station	- Average EIRP Power ≤ 2 W. - PAPR ≤ 13 dB@0.1%.			
Bandwidth	§2.1049, §24.238	RSS-Gen,§4.6; RSS-133,§2.3	FCC	- OBW: No limit. - EBW (-26 dBc): No limit.		Annex B	Pass	TL1
			IC	- OBW: No limit, may in lieu of EBW (-20 dBc). - EBW (-20 dBc): No limit.				

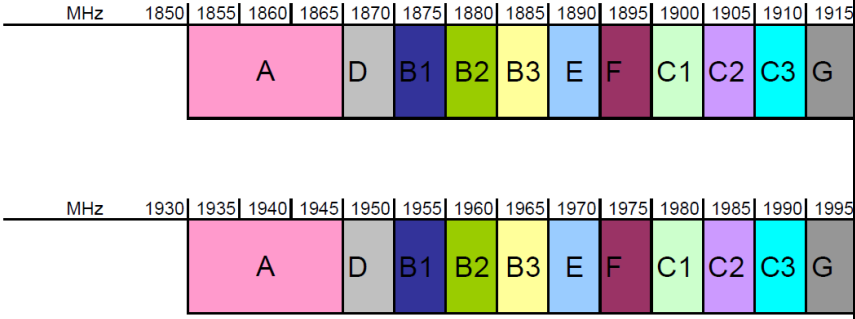


Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location
Band Edges Compliance	§2.1051, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	FCC	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. (EBW is -26 dBc EBW)	Annex C	Pass	TL1
			IC	≤ -13 dBm/1%*EBW, in 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, §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.		Annex D	Pass	TL1
Field Strength of Spurious Radiation	§2.1053, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1 MHz.		Annex E	Pass	TL1
Frequency Stability	§2.1055, §24.235	RSS-Gen, §4.7; RSS-133, §6.3	FCC	- 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.	Annex F	Pass	TL1
			IC	Base Station			
			IC	Mobile Station			



Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
					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	---			Annex G	---	---
Photos of Test Setups	---	---	---			Annex H	---	---

2.1.2 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 RRU is an outdoor remote radio unit. It is the radio frequency (RF) part of a distributed base station and can be located near antennas. The RRU can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal 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		
Board Name	Hardware Version	Description
WD5GMRAC20	Ver.B	Power Amplifier Board
WD5GMRXC20	Ver.A	Transceiver Board

3.2.2 Sub-Assembly

Sub-Assembly		
Sub-Assembly Name	Manufacturer	Description
WBBP	Huawei	NodeB baseband Unit
WMPT	Huawei	NodeB Main Processing Unit
LBBP	Huawei	LTE baseband Unit
LMPT	Huawei	LTE Main Processing Unit
GTMU	Huawei	GBTS baseband Unit

3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio Access ☒ GSM Technology ☒ UMTS (Single-RAT): ☒ LTE ☐ CDMA ☐ WiMAX Multi-Standard Radio ☒ GSM & UMTS (MSR): ☒ GSM & LTE ☒ UMTS & LTE ☐ GSM & UMTS & LTE ☐ WiMAX & LTE ☐ CDMA & LTE
Equipment Type	☒ Base Station, ☐ Subscriber Station, ☐ Fixed Station, ☐ Mobile Station, ☐ Portable Station
Supported Frequency Range	Transmission (TX): 1930 to 1990 MHz Receiving (RX): 1850 to 1910 MHz
TX and RX Antenna Ports	TX & RX port: 2 TX-only port: 0 RX-only port: 2
Multiple Carrier Supported	8
Maximum RF Bandwidth	35 MHz(GSM, GSM&UMTS, GSM<E) 40 MHz(UMTS, LTE, UMTS<E)
TX Output Power	60 W (antenna port A) and 60 W (antenna port B) or 40 W (antenna port A) and 80 W (antenna port B)
Supported Channel Bandwidth	GSM system: ☒ 200 kHz UMTS system: ☒ 5 MHz LTE system: ☒ 1.4 MHz, ☒ 3 MHz, ☒ 5 MHz, ☒ 10 MHz, ☒ 15 MHz, ☒ 20 MHz CDMA system: ☐ 1.23 MHz, ☐ 1.25 MHz WiMAX system: ☐ 5 MHz, ☐ 7 MHz, ☐ 10 MHz
Modulation Type	GSM system: Base-band: GMSK, 8PSK Carrier: TDMA UMTS system: Base-band: QPSK, 16QAM, 64QAM Carrier: CDMA LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA
Designation of Emissions	GSM system: 300KGXW, 300KG7W UMTS system: 5M00F9W LTE system: 1M40D9W, 3M00D9W, 5M00D9W, 10M0D9W, 15M0D9W, 20M0D9W



Characteristics	Description
	CDMA system: Not applicable WiMAX system: Not applicable
Power Supply	Power Supply Type: ☐ External AC mains, ☒ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE) Nominal Voltage, -48 VDC Input to EUT: Voltage Range, -36 to -57 VDC Input to EUT:
Antenna Assembles	Antenna Type: ☒ External ☐ Integrated Antenna Gain: See Appendix Remark: The antenna gain is the maximum gain when the EUT is the declared maximum power. When the EUT is put into service, the practical maximum antenna gain will be changed with the actual antenna conducted power, the combination of the practical output power and the practical antenna gain should NOT exceed the required ERP/EIRP limit.

4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
GSM/GMSK	GSM system, GSM/GPRS, GMSK modulation
GSM/8PSK	GSM system, EDGE, 8PSK modulation
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
GU/TM1	MSR system, 3GPP TS 37.141 clause 4.9.2 (GSM/GMSK; UMTS/TM1)
GL/TM1	MSR system, 3GPP TS 37.141 clause 4.9.2 (GSM/GMSK; LTE/TM1.1)
UL/TM1	MSR system, 3GPP TS 37.141 clause 4.9.2 (UMTS/TM1; LTE/TM1.1)



4.2 EUT Configurations

4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, - As the TRx A and TRx B are electrical identical, for 40 W (antenna port A) and 80 W (antenna port B) configuration, all TX tests are performed at the TRx B antenna port of the EUT, and additional tests on TRx A to verify the total test result. For 60 W (antenna port A) and 60 W (antenna port B) configuration, all TX tests are performed at the TRx A antenna port of the EUT. - 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

The test consists of two parts, one is test number SYBH(R)00102012, the other one is test number SYBH(R)01271108.

4.2.2.1 For test number SYBH(R)00102012

TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX	1*U(60W)	1932.4 MHz	1960 MHz	1987.6 MHz
	2*U(30W)	1932.4/1937.4 MHz	1960/1965 MHz	1982.6/1987.6 MHz
	3*U(20W)	1932.4/1937.4/1942.4 MHz	1955/1960/1965 MHz	1977.6/11982.6/1987.6 MHz
	4*U(15W)	1932.4/1937.4/1942.4/1947.4 MHz	1955/1960/1965/1970 MHz	1972.6/1977.6/11982.6/1987.6 MHz
	1*G(60W)	1930.4 MHz	1960 MHz	1989.6 MHz
	2*G(30W)	1930.4/1931 MHz	1960/1960.6 MHz	1989/1989.6 MHz
	3*G(20W)	1930.4/1931/1931.6 MHz	1959.4/1960/1960.6 MHz	1988.4/1989/1989.6 MHz
	4*G(15W)	1930.4/1931/1931.6/1932.2 MHz	1959.4/1960/1960.6/1961.2 MHz	1987.8/1988.4/1989/1989.6 MHz
	1*L1.4M(60W)	1930.7 MHz	1960 MHz	1989.3 MHz



TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
	1*L3M(60W)	1931.5 MHz	1960 MHz	1988.5 MHz
	1*L5M(60W)	1932.5 MHz	1960 MHz	1987.5 MHz
	1*L10M(60W)	1935 MHz	1960 MHz	1985 MHz
	1*L15M(60W)	1937.5MHz	1960MHz	1982.5MHz
	2*L1.4M(30W)	1930.7/1932.1 MHz	1959.3/1960.7 MHz	1987.9/1989.3 MHz
	2*L3M(30W)	1931.5/1934.5 MHz	1958.5/1961.5 MHz	1985.5/1988.5 MHz
	2*L5M(30W)	1932.5/1937.5 MHz	1957.5/1962.5 MHz	1982.5/1987.5 MHz
	2*L10M(30W)	1935/1945 MHz	1955/1965 MHz	1975/1985 MHz
	2*L15M(30W)	1937.5/1952.5 MHz	---	1967.5/1982.5 MHz
	1*G(30W) & 1*U(30W)	G: 1930.4/1965 MHz; U: 1947.6 MHz;	---	G: 1955/1989.6 MHz; U: 1972.6 MHz;
	2*G(20W) & 1*U(20W)	G: 1930.4/1965 MHz; U: 1947.6 MHz;	---	G: 1955 /1989.6 MHz ; U: 1972.6 MHz;
	2*G(20W) & 2*U(10W)	G: 1930.4/1965 MHz; U: 1945/1950MHz;	---	G: 1955/1989.6 MHz; U: 1970/1975 MHz;
	3*G(15W) & 1*U(15W)	G: 1930.4/1931/1965 MHz; U: 1947.6 MHz;	---	G: 1955/1989/1989.6 MHz; U: 1972.6 MHz;
	1*G(30W) & 2*U(15W)	G: 1930.4 MHz; U: 1957.6/1962.6 MHz;	---	G: 1989.6 MHz; U: 1957.4/1962.4 MHz;
	1*G(15W) & 3*U(15W)	G: 1930.4 MHz; U: 1952.6/1957.6/1962.6 MHz;	---	G: 1989.6 MHz; U: 1952.4/1957.4/1962.4 MHz;
	1*G(40W) & 1*U(20W)	G: 1930.4/1865 MHz; U: 1947.6 MHz;	---	G: 1955/1989.6 MHz; U: 1972.6 MHz;
RX	1*U(60W)	---	1880 MHz	---
	1*G(60W)	---	1880 MHz	---
	1*L5M(60W)	---	1880 MHz	---



TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
NOTE:	For the Carrier Configurations, the “n*TxxxM(yyyW)” 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. While the combinations of several “n*TxxxM(yyyW)”s denotes the carrier configurations of the MSR (multiple standard radio) system.			

4.2.2.2 For test number SYBH(R)01271108

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.

NOTE2: the setting below were deemed representative for all traffic scenarios when setting with different modulations, channel bandwidths, number of carriers and RF configurations has been tested to find the worst case setting.

EUT Conf.	RF Ch	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1U_80W_B_TM1_TRXB	B	1*U(80W) @TRXB	1932.4	1852.4	5	49	UMTS/TM1
1U_80W_M_TM1_TRXB	M	1*U(80W) @TRXB	1960	1880	5	49	UMTS/TM1
1U_80W_T_TM1_TRXB	T	1*U(80W) @TRXB	1987.6	1907.6	5	49	UMTS/TM1
1U_40W_B_TM1_TRXA	B	1*U(40W) @TRXA	1932.4	1852.4	5	46	UMTS/TM1
1U_40W_M_TM1_TRXA	M	1*U(40W) @TRXA	1960	1880	5	46	UMTS/TM1
1U_40W_T_TM1_TRXA	T	1*U(40W) @TRXA	1987.6	1907.6	5	46	UMTS/TM1
4U_80W_B_TM1_TRXB	B	4*U(20W) @TRXB	1932.4, 1937.4, 1962.6, 1967.6	1852.4, 1857.4, 1882.6, 1887.6	5,5,5,5	43,43,43,43	UMTS/TM1
4U_80W_M_TM1_TRXB	M	4*U(20W) @TRXB	1942.4, 1947.4, 1952.6, 1957.6	1962.4, 1867.4, 1872.6, 1877.6	5,5,5,5	43,43,43,43	UMTS/TM1
4U_80W_T_TM1_TRXB	T	4*U(20W) @TRXB	1952.4,1957.4,1982.6,1987.6	1872.4, 1877.4, 1902.6, 1907.6	5,5,5,5	43,43,43,43	UMTS/TM1
1G_80W_B_TM1_TRXB	B	1*G(80W) @TRXB	1930.4	1850.4	0.2	49	GSM/GMSK
1G_80W_M_TM1_TRXB	M	1*G(80W) @TRXB	1960	1880	0.2	49	GSM/GMSK



EUT Conf.	RF Ch	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1G_80W_T_TM1_TRXB	T	1*G(80W) @TRXB	1989.6	1909.6	0.2	49	GSM/GMSK
1G_40W_B_TM1_TRXA	B	1*G(40W) @TRXA	1930.4	1850.4	0.2	46	GSM/GMSK
1G_40W_M_TM1_TRXA	M	1*G(40W) @TRXA	1960	1880	0.2	46	GSM/GMSK
1G_40W_T_TM1_TRXA	T	1*G(40W) @TRXA	1989.6	1909.6	0.2	46	GSM/GMSK
8G_80W_B_TM1_TRXB	B	8*G(6W) @TRXB	1930.4, 1931, 1931.6, 1932.2, 1932.8, 1933.4, 1934, 1934.6	1850.4, 1851, 1851.6, 1852.2, 1852.8, 1853.4, 1854, 1854.6	0.2,0.2,0.2, 0.2,0.2,0.2, 0.2,0.2	37.8, 37.8, 37.8, 37.8, 37.8, 37.8	GSM/GMSK
8G_80W_M_TM1_TRXB	M	8*G(6W) @TRXB	1958, 1958.6, 1959.2, 1959.8, 1960.4, 1961, 1961.6, 1962.2	1878, 1878.6, 1879.2, 1879.8, 1880.4, 1881, 1881.6, 1882.2	0.2,0.2,0.2, 0.2,0.2,0.2, 0.2,0.2	37.8, 37.8, 37.8, 37.8, 37.8, 37.8	GSM/GMSK
8G_80W_T_TM1_TRXB	T	8*G(6W) @TRXB	1985.4, 1986, 1986.6, 1987.2, 1987.8, 1988.4, 1989, 1989.6	1905.4, 1906, 1906.6, 1907.2, 1907.8, 1908.4, 1909, 1909.6	0.2,0.2,0.2, 0.2,0.2,0.2, 0.2,0.2	37.8, 37.8, 37.8, 37.8, 37.8, 37.8	GSM/GMSK
1G1U_80W_B_TM1_TRXB	B	1*G(40W)&1*U(40W)@TRXB	1930.4, 1962.6	1850.4, 1862.8	0.2, 5	46,46	GU/TM1
1G1U_80W_M_TM1_TRXB	M	1*G(40W)&1*U(40W)@TRXB	1942.8, 1975	1862.8, 1897	0.2, 5	46,46	GU/TM1
1G1U_80W_T_TM1_TRXB	T	1*G(40W)&1*U(40W)@TRXB	1955.4, 1987.5	1875.4, 1907.6	0.2, 5	46,46	GU/TM1
1G1U_40W_B_TM1_TRXA	B	1*G(20W)&1*U(20W)@TRXA	1930.4, 1962.6	1850.4, 1862.8	0.2, 5	43,43	GU/TM1
1G1U_40W_M_TM1_TRXA	M	1*G(20W)&1*U(20W)@TRXA	1942.8, 1975	1862.8, 1897	0.2, 5	43,43	GU/TM1



EUT Conf.	RF Ch	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1G1U_40W_T_TM1_TR XA	T	1*G(20W)&1*U(20 W)@TRXA	1955.4, 1987.5	1875.4, 1907.6	0.2, 5	43,43	GU/TM1
3G1U_80W_B_TM1_TR XB	B	3*G(20W)&1*U(20 W) @TRXB	1930.4, 1931, 1947.6, 1964.8	1850.4, 1851, 1867.6, 1884.8	0.2, 0.2, 5, 0.2	43, 43, 43, 43	GU/TM1
3G1U_80W_M_TM1_TR XB	M	3*G(20W)&1*U(20 W) @TRXB	1942.8, 1943.4, 1960, 1977.2	1862.8, 1863.4, 1880, 1897.2	0.2, 0.2, 5, 0.2	43, 43, 43, 43	GU/TM1
3G1U_80W_T_TM1_TR XB	T	3*G(20W)&1*U(20 W) @TRXB	1955.2, 1955.8, 1972.6, 1989.6	1875.2, 1875.8, 1892.6, 1909.6	0.2, 0.2, 5, 0.2	43, 43, 43, 43	GU/TM1
1U1L_1.4M_80W_B_TM 1_TRXB	B	1*U(40W)&1*L(40W) @TRXB	1932.4,1969.3	1852.4,1889.3	5,1.4	46,46	UL/TM1
1U1L_1.4M_80W_M_TM 1_TRXB	M	1*U(40W)&1*L(40W) @TRXB	1942.4,1979.3	1962.4,1899.3	5,1.4	46,46	UL/TM1
1U1L_1.4M_80W_T_TM 1_TRXB	T	1*U(40W)&1*L(40W) @TRXB	1952.4,1989.3	1872.4,1909.3	5,1.4	46,46	UL/TM1
1U1L_1.4M_40W_B_TM 1_TRXA	B	1*U(20W)&1*L(20W) @TRXA	1932.4,1969.3	1852.4,1889.3	5,1.4	43,43	UL/TM1
1U1L_1.4M_40W_M_TM 1_TRXA	M	1*U(20W)&1*L(20W) @TRXA	1942.4,1979.3	1962.4,1899.3	5,1.4	43,43	UL/TM1
1U1L_1.4M_40W_T_TM 1_TRXA	T	1*U(20W)&1*L(20W) @TRXA	1952.4,1989.3	1872.4,1909.3	5,1.4	43,43	UL/TM1
1U1L_20M_80W_B_TM 1_TRXB	B	1*U(40W)&1*L(40W) @TRXB	1932.4,1960	1852.4,1880	5,20	46,46	UL/TM1
1U1L_20M_80W_M_TM 1_TRXB	M	1*U(40W)&1*L(40W) @TRXB	1942.4,1970	1962.4,1890	5,20	46,46	UL/TM1
1U1L_20M_80W_T_TM1 _TRXB	T	1*U(40W)&1*L(40W) @TRXB	1952.4,1980	1872.4,1900	5,20	46,46	UL/TM1



EUT Conf.	RF Ch	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
3U1L_1.4M_80W_B_TM 1_TRXB	B	3*U(20W)&1*L(20W)) @TRXB	1932.4,1937.4,1942.4,1969.3	1852.4,1857.4,1862.4,1989.3	5,5,5,1.4	43,43,43,43	UL/TM1
3U1L_1.4M_80W_M_TM 1_TRXB	M	3*U(20W)&1*L(20W)) @TRXB	1942.4,1947.4,1952.4,1979.3	1862.4,1867.4,1872.4,1899.3	5,5,5,1.4	43,43,43,43	UL/TM1
3U1L_1.4M_80W_T_TM 1_TRXB	T	3*U(20W)&1*L(20W)) @TRXB	1952.4,1957.4,1962.4,1989.3	1872.4,1877.4,1882.4,1909.3	5,5,5,1.4	43,43,43,43	UL/TM1
3U1L_20M_80W_B_TM 1_TRXB	B	3*U(20W)&1*L(20W)) @TRXB	1932.4,1937.4,1942.4,1960	1852.4,1857.4,1862.,1980	5,5,5,20	43,43,43,43	UL/TM1
3U1L_20M_80W_M_TM 1_TRXB	M	3*U(20W)&1*L(20W)) @TRXB	1942.4,1947.4,1952.4,1970	1862.4,1867.4,1872.4,1890	5,5,5,20	43,43,43,43	UL/TM1
3U1L_20M_80W_T_TM1 _TRXB	T	3*U(20W)&1*L(20W)) @TRXB	1952.4,1957.4,1962.4,1980	1872.4,1877.4,1882.4,1900	5,5,5,20	43,43,43,43	UL/TM1
1G1L_1.4M_60W_B_TM 1_TRXA	B	1*G(30W)&1*L(30W)) @TRXA	1930.4,1964.3	1850.4,1884.3	0.2,1.4	44.8,44.8	GL/TM1
1G1L_1.4M_60W_M_TM 1_TRXA	M	1*G(30W)&1*L(30W)) @TRXA	1942.8,1976.8	1962.8,1896.8	0.2,1.4	44.8,44.8	GL/TM1
1G1L_1.4M_60W_T_TM 1_TRXA	T	1*G(30W)&1*L(30W)) @TRXA	1955.2,1989.3,	1875.2,1909.3	0.2,1.4	44.8,44.8	GL/TM1
1G1L_20M_60W_B_TM 1_TRXA	B	1*G(30W)&1*L(30W)) @TRXA	1930.4,1955	1850.4,1875	0.2,20	44.8,44.8	GL/TM1
1G1L_20M_60W_M_TM 1_TRXA	M	1*G(30W)&1*L(30W)) @TRXA	1942.8,1967.5	1962.2,1887.5	0.2,20	44.8,44.8	GL/TM1
1G1L_20M_60W_T_TM 1_TRXA	T	1*G(30W)&1*L(30W)) @TRXA	1955.2,1980	1875.2,1900	0.2,20	44.8,44.8	GL/TM1
3G1L_1.4M_60W_B_TM 1_TRXA	B	3*G(12W)&1*L(20W)) @TRXA	1930.4,1931,1947.5,1964.8	1850.4,1851,1867.5,1884.8	0.2,0.2,1.4, 0.2	40.8, 40.8, 43, 40.8	GL/TM1



EUT Conf.	RF Ch	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
3G1L_1.4M_60W_M_TM1_TRXA	M	3*G(12W)&1*L(20W) @TRXA	1942.8,1943.4,1960,1977.2	1862.8,1863.4,1880.1897.2	0.2,0.2,1.4,0.2	40.8, 40.8, 43, 40.8	GL/TM1
3G1L_1.4M_60W_T_TM1_TRXA	T	3*G(12W)&1*L(20W) @TRXA	1955.2,1955.8,1972.5,1989.6	1875.2,1875.8,1892.5,1909.6	0.2,0.2,1.4,0.2	40.8, 40.8, 43, 40.8	GL/TM1
3G1L_20M_60W_B_TM1_TRXA	B	3*G(12W)&1*L(20W) @TRXA	1930.4,1931,1947.5,1964.8	1850.4,1851,1867.5,1884.8	0.2,0.2,20,0.2	40.8, 40.8, 43, 40.8	GL/TM1
3G1L_20M_60W_M_TM1_TRXA	M	3*G(12W)&1*L(20W) @TRXA	1942.8,1943.4,1960,1977.2	1862.8,1863.4,1880.1897.2	0.2,0.2,20,0.2	40.8, 40.8, 43, 40.8	GL/TM1
3G1L_20M_60W_T_TM1_TRXA	T	3*G(12W)&1*L(20W) @TRXA	1955.2,1955.8,1972.5,1989.6	1875.2,1875.8,1892.5,1909.6	0.2,0.2,20,0.2	40.8, 40.8, 43, 40.8	GL/TM1
1L_20M_60W_B_TM1_TRXA	B	1*L(60W) @TRXA	1940	1860	20	47.8	LTE/TM1.1
1L_20M_60W_M_TM1_TRXA	M	1*L(60W) @TRXA	1960	1880	20	47.8	LTE/TM1.1
1L_20M_60W_T_TM1_TRXA	T	1*L(60W) @TRXA	1980	1900	20	47.8	LTE/TM1.1
2L_20M_60W_B_TM1_TRXA	B	2*L(30W) @TRXA	1940,1960	1860,1880	20, 20	44.8, 44.8	LTE/TM1.1
2L_20M_60W_T_TM1_TRXA	T	2*L(30W) @TRXA	1960,1980	1880,1900	20, 20	44.8, 44.8	LTE/TM1.1

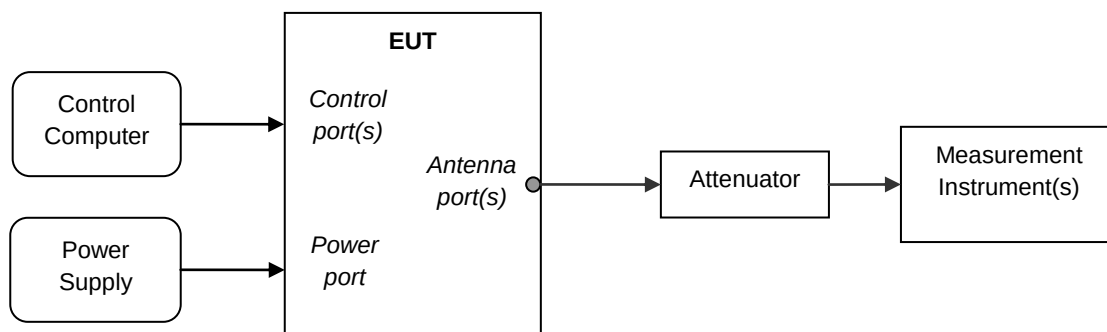


4.3 Test Environments

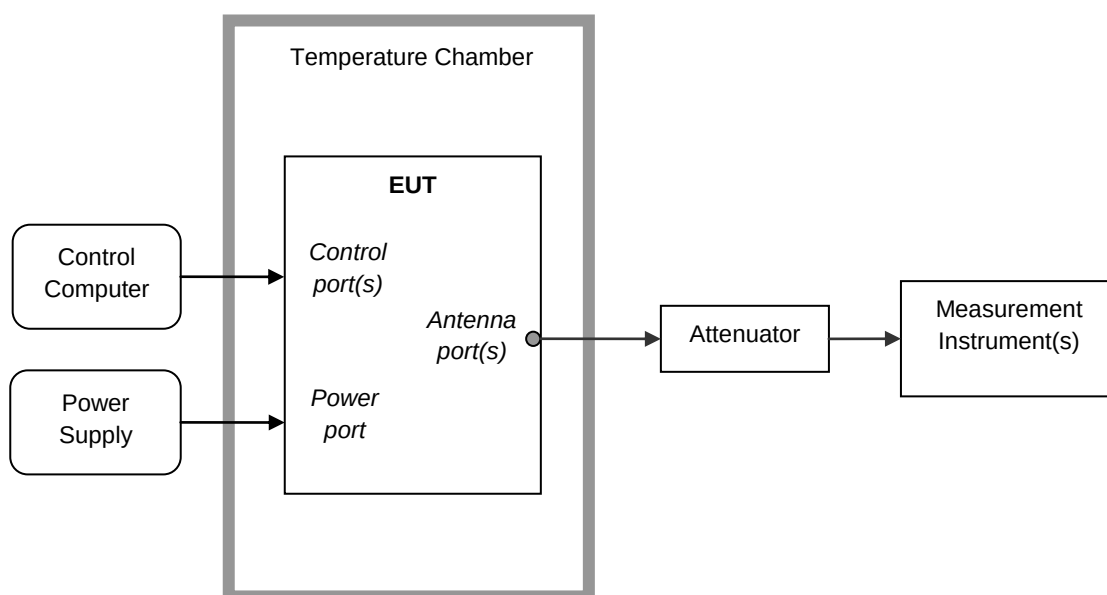
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



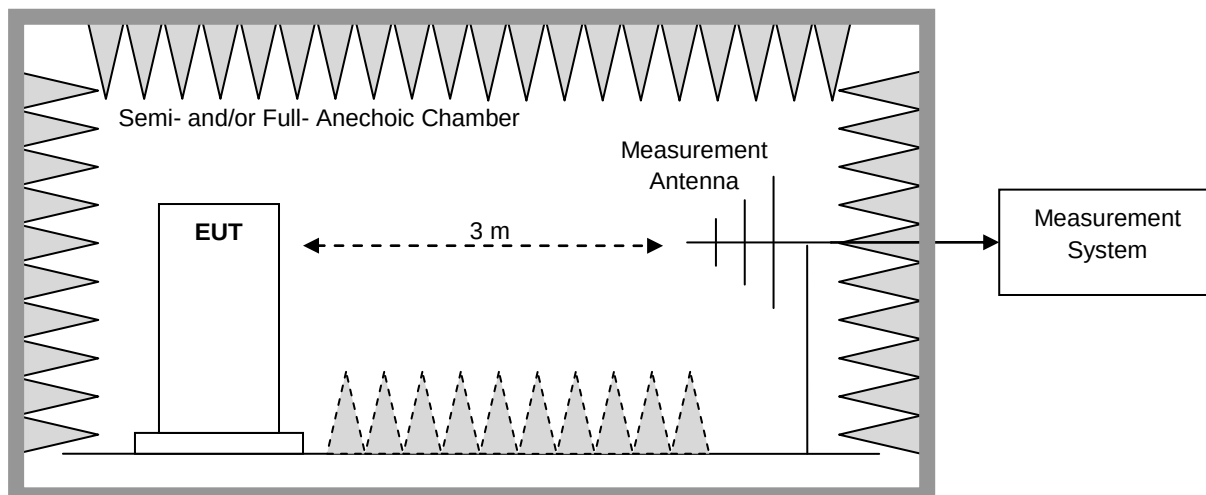
4.4.2 Test Setup 2



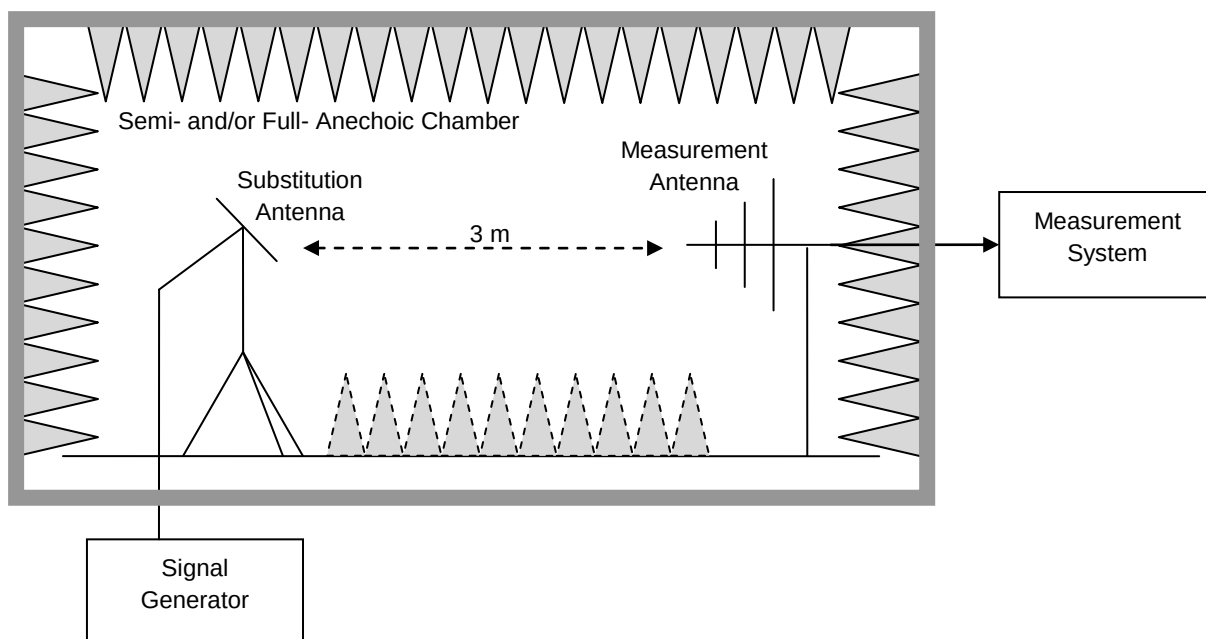
4.4.3 Test Setup 3

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

4.5.1.1 For test number SYBH(R)00102012

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	UMTS system: 1*U(60W) 2*U(30W) 3*U(20W) 4*U(15W) GSM system: 1*G(60W) 2*G(30W) 3*G(20W) 4*G(15W) LTE system: 1*L1.4M(60W) 1*L3M(60W) 1*L5M(60W) 1*L10M(60W) 1*L15M(60W) 2*L1.4M(30W) 2*L3M(30W) 2*L5M(30W) 2*L10M(30W) 2*L15M(30W) MSR system (GSM&UMTS): 1*G(30W) & 1*U(30W) 2*G(20W) & 1*U(20W) 3*G(15W) & 1*U(15W) 1*G(30W) & 2*U(15W) 2*G(20W) & 2*U(10W) 1*G(15W) & 3*U(15W)
	RF Channels (TX)	GSM, UMTS, LTE system: B, M, T MSR system(GSM&UMTS): B,T
	Test Mode	UMTS system: TM-1 GSM system: GMSK, 8PSK LTE system: E-TM 1.1 MSR system: MSR_TM1
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	UMTS system: 1*U(60W)

Test Case	Test Conditions	
		GSM system: 1*G(60W) LTE system: 1*L10M(60W)
	RF Channels (TX)	M
	Test Mode	UMTS system: TM-1 GSM system: GMSK, 8PSK LTE system: E-TM 3.1 NOTE: An arbitrary test mode is selected to demonstrate compliance.
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	UMTS system: 1*U(60W) GSM system: 1*G(60W) LTE system: 1*L1.4M(60W) 1*L3M(60W) 1*L5M(60W) 1*L10M(60W) 1*L15M(60W)
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: TM-1 GSM system: GMSK, 8PSK LTE system: E-TM 1.1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	UMTS system: 1*U(60W) 4*U(15W) GSM system: 1*G(60W) 4*G(15W) LTE system: 1*L1.4M(60W) 1*L15M(60W) 2*L1.4M(30W) 2*L15M(30W) MSR system (GSM&UMTS): 1*G(40W) & 1*U(20W) 3*G(15W) & 1*U(15W) 1*G(15W) & 3*U(15W)
	RF Channels (TX)	B, T
	Test Mode	UMTS system: TM-1 GSM system: GMSK, 8PSK LTE system: E-TM 1.1

Test Case	Test Conditions	
Spurious Emission at Antenna Terminals		MSR system: MSR_TM1, MSR_TM2
	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	UMTS system: 1*U(60W) 4*U(15W) GSM system: 1*G(60W) 4*G(15W) LTE system: 1*L1.4M(60W) 1*L15M(60W) 2*L1.4M(30W) 2*L15M(30W) MSR system (GSM&UMTS): 1*G(40W) & 1*U(20W) 3*G(15W) & 1*U(15W) 1*G(15W) & 3*U(15W)
	RF Channels (TX)	B, T
	Test Mode	UMTS system: TM-1 GSM system: GMSK, 8PSK LTE system: E-TM 1.1 MSR system: MSR_TM1
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 3
	Carrier Conf.	GSM system: 1*G(60W) (each TRX) 1*G(40W) (TRXA) + 1*G(80W) (TRXB)
	RF Channels (TX)	M
	Test Mode	GSM system: GMSK NOTE: The mode of higher power density level between GSM, UMTS and LTE systems under the same maximum power level, i.e. the system with the narrowest channel bandwidth, is selected.
Frequency Stability	Test Configuration	(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
	Carrier Conf.	GSM system: 1*G(60W)
	RF Channels (TX)	M
	Test Mode	GSM system: GMSK

Test Case	Test Conditions	
		NOTE: An arbitrary test mode is selected as a representative since the un-modulation carrier configuration is required by the standards/rules.
Receiver Spurious Emissions (Conducted) (Only for IC requirement)	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 1
	Carrier Conf.	GSM system: 1*G(60W) LTE system: 1*L5M(60W)
	RF Channels (TX/RX)	M
	Test Mode	GSM system: GMSK, 8PSK LTE system: E-TM 1.1

4.5.1.2 For test number SYBH(R)01271108

Test Case		Test Conditions	
Transmitter Output Power	Average Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		EUT Conf.	1U_80W_B_TM1_TRXB, 1U_80W_M_TM1_TRXB, 1U_80W_T_TM1_TRXB, 1U_40W_B_TM1_TRXA, 1U_40W_M_TM1_TRXA, 1U_40W_T_TM1_TRXA, 4U_80W_B_TM1_TRXB, 4U_80W_M_TM1_TRXB, 4U_80W_T_TM1_TRXB, 1G_80W_B_TM1_TRXB, 1G_80W_M_TM1_TRXB, 1G_80W_T_TM1_TRXB, 1G_40W_B_TM1_TRXA, 1G_40W_M_TM1_TRXA, 1G_40W_T_TM1_TRXA, 8G_80W_B_TM1_TRXB, 8G_80W_M_TM1_TRXB, 8G_80W_T_TM1_TRXB, 1G1U_80W_B_TM1_TRXB, 1G1U_80W_M_TM1_TRXB, 1G1U_80W_T_TM1_TRXB, 1G1U_40W_B_TM1_TRXA, 1G1U_40W_M_TM1_TRXA, 1G1U_40W_T_TM1_TRXA, 3G1U_80W_B_TM1_TRXB, 3G1U_80W_M_TM1_TRXB, 3G1U_80W_T_TM1_TRXB, 1U1L_1.4M_80W_B_TM1_TRXB, 1U1L_1.4M_80W_M_TM1_TRXB, 1U1L_1.4M_80W_T_TM1_TRXB, 1U1L_1.4M_40W_B_TM1_TRXA, 1U1L_1.4M_40W_M_TM1_TRXA, 1U1L_1.4M_40W_T_TM1_TRXA, 1U1L_20M_80W_B_TM1_TRXB, 1U1L_20M_80W_M_TM1_TRXB, 1U1L_20M_80W_T_TM1_TRXB, 3U1L_1.4M_80W_B_TM1_TRXB, 3U1L_1.4M_80W_M_TM1_TRXB, 3U1L_1.4M_80W_T_TM1_TRXB, 3U1L_20M_80W_B_TM1_TRXB,

Test Case		Test Conditions	
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_60W_B_TM1_TRXA, 1L_20M_60W_M_TM1_TRXA, 1L_20M_60W_T_TM1_TRXA
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_60W_B_TM1_TRXA, 1L_20M_60W_M_TM1_TRXA, 1L_20M_60W_T_TM1_TRXA
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1U_80W_B_TM1_TRXB, 1U_80W_T_TM1_TRXB, 4U_80W_B_TM1_TRXB, 4U_80W_T_TM1_TRXB 1G_80W_B_TM1_TRXB, 1G_80W_T_TM1_TRXB, 8G_80W_B_TM1_TRXB, 8G_80W_T_TM1_TRXB, 1G1U_80W_B_TM1_TRXB, 1G1U_80W_T_TM1_TRXB, 3G1U_80W_B_TM1_TRXB, 3G1U_80W_T_TM1_TRXB, 1U1L_1.4M_80W_B_TM1_TRXB, 1U1L_1.4M_80W_T_TM1_TRXB, 1U1L_20M_80W_B_TM1_TRXB, 1U1L_20M_80W_T_TM1_TRXB, 3U1L_1.4M_80W_B_TM1_TRXB, 3U1L_1.4M_80W_T_TM1_TRXB, 3U1L_20M_80W_B_TM1_TRXB, 3U1L_20M_80W_T_TM1_TRXB, 1G1L_1.4M_60W_B_TM1_TRXA, 1G1L_1.4M_60W_T_TM1_TRXA, 1G1L_20M_60W_B_TM1_TRXA,



Test Case	Test Conditions	
		1G1L_20M_60W_T_TM1_TRXA, 3G1L_1.4M_60W_B_TM1_TRXA, 3G1L_1.4M_60W_T_TM1_TRXA, 3G1L_20M_60W_B_TM1_TRXA, 3G1L_20M_60W_T_TM1_TRXA, 1L_20M_60W_B_TM1_TRXA, 1L_20M_60W_T_TM1_TRXA, 2L_20M_60W_B_TM1_TRXA, 2L_20M_60W_T_TM1_TRXA
Spurious Emission at Antenna Terminals	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	EUT Conf.	1U_80W_B_TM1_TRXB, 1U_80W_M_TM1_TRXB, 1U_80W_T_TM1_TRXB, 4U_80W_B_TM1_TRXB, 4U_80W_M_TM1_TRXB, 4U_80W_T_TM1_TRXB 1G_80W_B_TM1_TRXB, 1G_80W_M_TM1_TRXB, 1G_80W_T_TM1_TRXB, 8G_80W_B_TM1_TRXB, 8G_80W_M_TM1_TRXB, 8G_80W_T_TM1_TRXB, 1G1U_80W_B_TM1_TRXB, 1G1U_80W_M_TM1_TRXB, 1G1U_80W_T_TM1_TRXB, 3G1U_80W_B_TM1_TRXB, 3G1U_80W_M_TM1_TRXB, 3G1U_80W_T_TM1_TRXB, 1U1L_1.4M_80W_B_TM1_TRXB, 1U1L_1.4M_80W_M_TM1_TRXB, 1U1L_1.4M_80W_T_TM1_TRXB, 1U1L_20M_80W_B_TM1_TRXB, 1U1L_20M_80W_M_TM1_TRXB, 1U1L_20M_80W_T_TM1_TRXB, 3U1L_1.4M_80W_B_TM1_TRXB, 3U1L_1.4M_80W_M_TM1_TRXB, 3U1L_1.4M_80W_T_TM1_TRXB, 3U1L_20M_80W_B_TM1_TRXB, 3U1L_20M_80W_M_TM1_TRXB, 3U1L_20M_80W_T_TM1_TRXB, 1G1L_1.4M_60W_B_TM1_TRXA, 1G1L_1.4M_60W_M_TM1_TRXA, 1G1L_1.4M_60W_T_TM1_TRXA, 1G1L_20M_60W_B_TM1_TRXA, 1G1L_20M_60W_M_TM1_TRXA, 1G1L_20M_60W_T_TM1_TRXA, 3G1L_1.4M_60W_B_TM1_TRXA, 3G1L_1.4M_60W_M_TM1_TRXA, 3G1L_1.4M_60W_T_TM1_TRXA, 3G1L_20M_60W_B_TM1_TRXA, 3G1L_20M_60W_M_TM1_TRXA, 3G1L_20M_60W_T_TM1_TRXA, 1L_20M_60W_B_TM1_TRXA, 1L_20M_60W_M_TM1_TRXA, 1L_20M_60W_T_TM1_TRXA,



Test Case	Test Conditions	
		2L_20M_60W_B_TM1_TRXA, 2L_20M_60W_T_TM1_TRXA
Field Strength of Spurious Radiation	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	EUT Conf.	Refer to the test result of single RAT, which report No is YBH(R)001012012EB-1
Frequency Stability	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 Seup 2
	EUT Conf.	Refer to the test result of single RAT, which report No is SYBH(R)001012012EB-1
Receiver Spurious Emissions	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	EUT Conf.	Refer to the test result of single RAT, which report No is SYBH(R)001012012EB-1



5 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	Agilent	N9020A	MY50110169	2014-12-15
Spectrum Analyzer	R&S	FSQ40	100025	2014-11-26
Spectrum Analyzer	Agilent	E4440A	MY49420179	2014-08-30
Temperature Chamber	Chongqingyinhe	ESS-SDJ62	2006001	2014-05-30
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-25
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	---
EMI Test Receiver	R&S	ESU40	100144	2014-12-23
Bilog Antenna	Schaffner	CBL 6112B	2536	2015-03-22
Horn Antenna	R&S	HF906	359287/005	2016-03-21



6 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
RF Power Output	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