

RF Test Report

Product Name: Remote Radio Unit of Distributed Base Station

Product Model: RRU3232

Report Number: SYBH(R)051022012EB-1

FCC ID: QISRRU3232-BAND41

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808

Fax: +86 755 89652518



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Applicant: Huawei Technologies Co., Ltd.
Address: Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Product Name: Remote Radio Unit of Distributed Base Station
Product Model: RRU3232
Version: V100R003C00

	WiMAX	LTE Band 41
Date of Receipt Sample:	2011-06-01	2012-02-17
Start Date of Test:	2011-06-01	2012-02-17
End Date of Test:	2011-06-13	2012-06-04

Test Result: Pass

Approved by Senior Engineer:	2012-06-04	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2012-06-04	Hu Wei	<i>Hu Wei</i>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	SYBH(R)017052011EB-1	First report.
2	SYBH(R)051022012EB-1	Update LTE Band from Band38 to Band41



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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J (10-1-09 Edition)
47 CFR FCC Part 27, Subpart C (10-1-09 Edition)

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

1.3 Test Environment Condition

Ambient Temperature: 21– 24 °C
Ambient Relative Humidity: 57 – 65 %
Atmospheric Pressure: Not applicable



2 Test Summary

Test Case	FCC Part No.	Requirements	Result
BRS&EBS Band			
Transmitter Output Power	2.1046 & 27.50(h)(1)	EIRP not exceed 33 dBW + 10 lg(X/Y) dBW	Pass
Peak-to-Average Ratio	§27.50 (a)(1)(B)	Peak-to-average ratio not exceed 13 dB	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(m)(2) & 27.53(m)(6)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(m)(2) & 27.53(m)(6)	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/1 MHz, 30 MHz to 10 th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(m)(2) & 27.53(m)(6)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass



3 Description of the Equipment under Test (EUT)

3.1 General Description

The DBS3900 TDLTE, a future-oriented E-UTRAN NodeB (eNodeB) product launched by Huawei, is a distributed eNodeB supporting TDD LTE. The DBS3900 TDLTE fully exploits Huawei platform resources and uses a variety of technologies.

The DBS3900 WiMAX is a distributed WiMAX BS developed by Huawei. It complies with IEEE 802.16e standards. It has only two basic functional modules: BBU and RRU. The BBU and RRU are connected through the optical cable.

The Remote Radio Unit (RRU) is the remote radio unit of the DBS3900 TDLTE or the DBS3900 WiMAX.

It implements conversion between baseband signals, IF signals, and RF signals, demodulates the received radio signals, and modulates the signals to be transmitted, and amplifies the transmit power of the 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
RRU3232 (WiMAX)	VER.D	Remote Radio Unit of Distributed Base Station for WiMAX
RRU3232 (LTE)	VER.D	Remote Radio Unit of Distributed Base Station for LTE

3.2.2 Sub-Assembly

Sub-Assembly				
Sub-Assembly Name	Model	Manufacturer	Version	Description
BBU3900 (WiMAX)	---	HUAWEI	V300R003C01	Base band units for WiMAX
BBU3900 (LTE)	---	HUAWEI	V100R003C00	Base band units for LTE



3.3 Technical Description

3.3.1 Supported Frequency Range

Characteristics	Description	
	WiMAX	LTE
Downlink	2496 MHz - 2690 MHz	2496 MHz - 2690 MHz
Uplink	2496 MHz - 2690 MHz	2496 MHz - 2690 MHz

3.3.2 Transmitter / Receiver Characteristics

Characteristics	Description	
	WiMAX	LTE
System Type	WiMAX	LTE
TX and RX Antenna Ports	4 * TRX	4 * TRX
Multiple Carrier Supported	1, 2, 3, 4	1, 2
TX Output Power (per Antenna Port)	1 carrier * 20 W 2 carriers * 10 W 3 carriers * 6.6 W 4 carriers * 3.98 W	10 MHz/20MHz: 1 carrier * 20W 10 MHz + 10 MHz: 1 carrier * 10 W + 1 carrier *10 W 10 MHz + 20 MHz: 1 carrier * 10 W + 1 carrier *10 W 20 MHz + 20 MHz: 1 carrier * 10 W + 1 carrier *10 W
Channel Spacing(s) / Bandwidth(s)	5 MHz, 10 MHz	10 MHz, 20 MHz
Designation of Emissions	5M00W7D, 10M0W7D	10M0D9W, 20M0D9W
Modulation	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM



3.3.3 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: $\overline{\overline{\overline{-48}}}$ V DC Voltage Range: $\overline{\overline{\overline{-36}}}$ V to $\overline{\overline{\overline{-57}}}$ V

4 General Test Conditions / Configurations

4.1 RF Channels under Test

WiMAX:

TX / RX	Multiple Carriers	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX (5 MHz)	1	2498.5 MHz	2593 MHz	2687.5 MHz
	2	2498.5 MHz, 2503.5 MHz	2590.5 MHz, 2595.5 MHz	2687.5 MHz, 2682.5 MHz
	3	2498.5 MHz, 2503.5 MHz, 2508.5 MHz	2588 MHz, 2593 MHz, 2598 MHz	2687.5 MHz, 2682.5 MHz, 2677.5 MHz
	4 (MAX)	2498.5 MHz, 2503.5 MHz, 2508.5 MHz, 2513.5 MHz	2585.5 MHz, 2590.5 MHz, 2595.5 MHz, 2600.5 MHz	2687.5 MHz, 2682.5 MHz, 2677.5 MHz, 2672.5 MHz
TX (10 MHz)	1	2501 MHz	2588 MHz	2685 MHz
	2	2501 MHz, 2511 MHz	2588 MHz, 2598 MHz	2685 MHz, 2675 MHz
	3	2501 MHz, 2511 MHz, 2521 MHz	2583 MHz, 2593 MHz, 2603 MHz	2685 MHz, 2675 MHz, 2665 MHz
	4 (MAX)	2501 MHz, 2511 MHz, 2521 MHz, 2531 MHz	2578 MHz, 2588 MHz, 2598 MHz, 2608 MHz	2685 MHz, 2675 MHz, 2665 MHz, 2655 MHz

LTE:

TX / RX	Multiple Carriers	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX (10 MHz)	1	2501 MHz	2593 MHz	2685 MHz
TX (20 MHz)	1	2506 MHz	2593 MHz	2680 MHz
TX (10 MHz + 10 MHz)	2	2501 MHz, 2511 MHz	2588 MHz, 2598 MHz	2675 MHz, 2685 MHz
TX (10 MHz + 20 MHz)	2	2501 MHz, 2516 MHz	2583 MHz, 2598 MHz	2665 MHz, 2680 MHz
TX (20 MHz + 20 MHz)	2	2506 MHz, 2526 MHz	2583 MHz, 2603 MHz	2660 MHz, 2680 MHz



4.2 Test Modes

WiMAX:

Test Mode	Test Modes Description
TM1	WiMAX QPSK modulation
TM2	WiMAX 16QAM modulation
TM3	WiMAX 64QAM modulation

LTE:

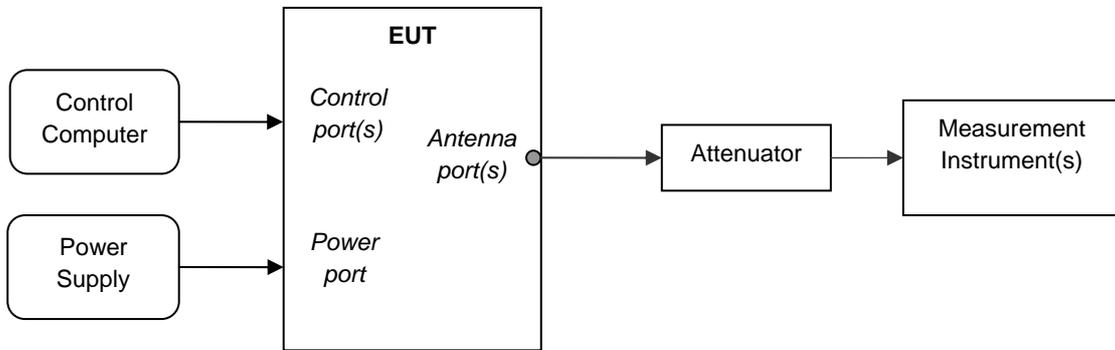
Test Mode	Test Modes Description
TM 1.1	3GPP TS 36.141, clause 6.1.1, E-TM 1.1, QPSK modulation
TM 3.1	3GPP TS 36.141, clause 6.1.1, E-TM 3.1, 64QAM modulation

4.3 Test Setups

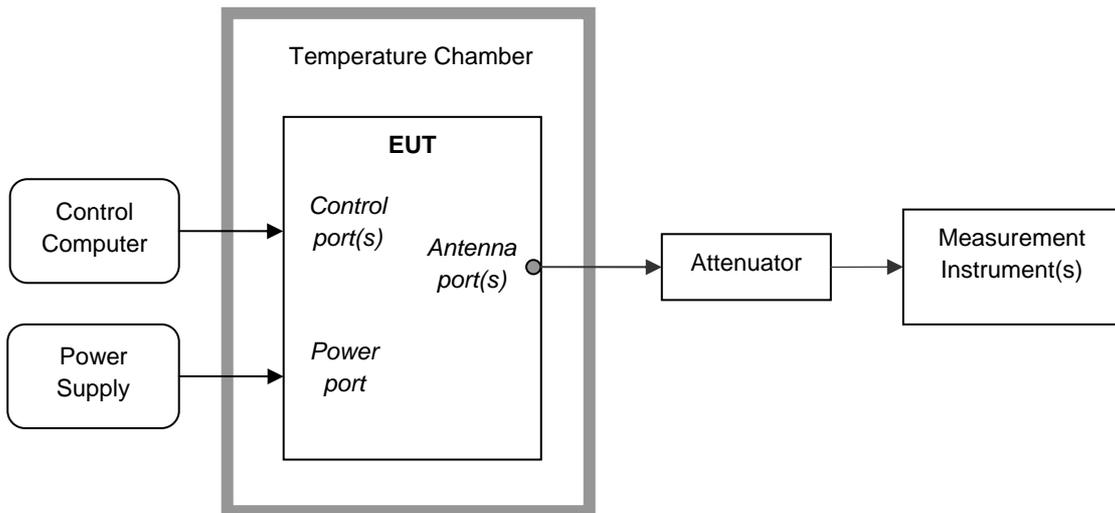
4.3.1 General Test Setup Configurations

Configuration	Description
Test Antenna Ports	Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) 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.

4.3.2 Test Setup 1



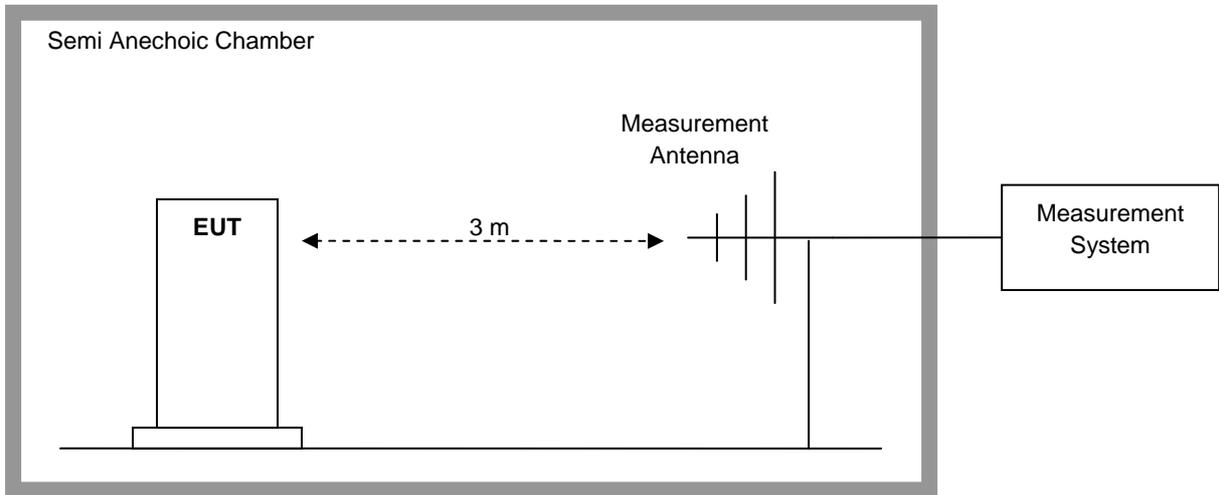
4.3.3 Test Setup 2



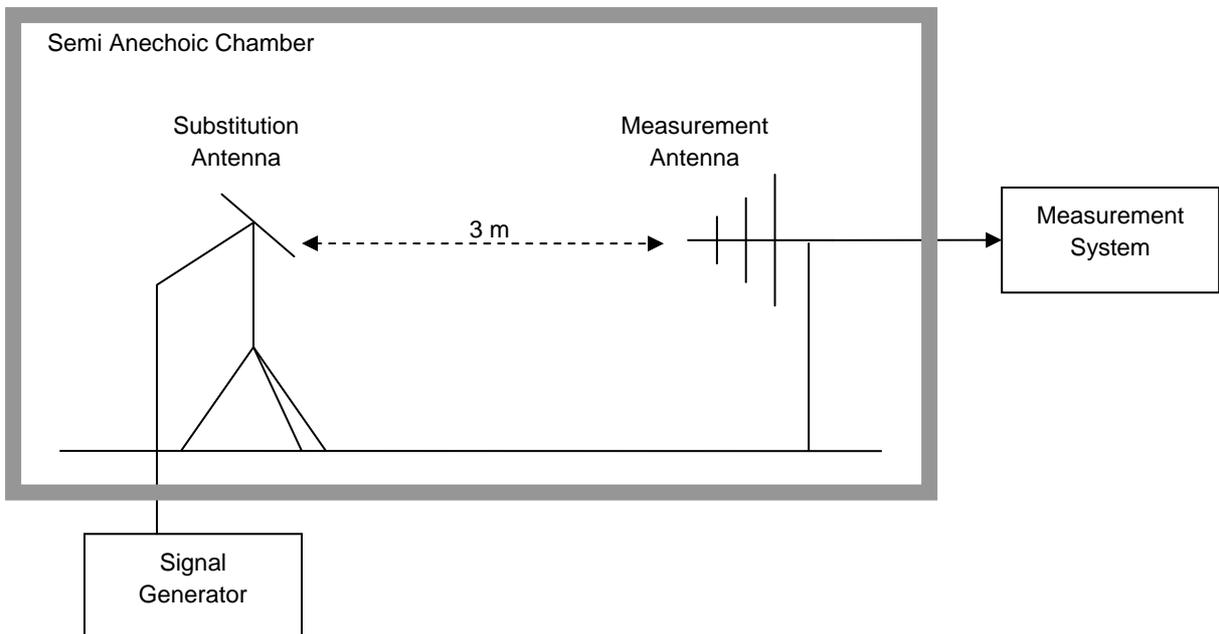
4.3.4 Test Setup 3

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

4.3.4.1 Step 1: Pre-test



4.3.4.2 Step 2: Substitution method to verify the maximum ERP





4.4 Test Conditions

WiMAX:

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1 to 4
	RF Channels (TX)	B, M, T
	Test Mode	TM1, TM2, TM3
Modulation Characteristics	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1
	RF Channels (TX)	M
	Test Mode	TM3
Occupied Bandwidth	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1
	RF Channels (TX)	B, M, T
	Test Mode	TM1, TM2, TM3
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1, 4
	RF Channels (TX)	B, T
	Test Mode	TM1, TM2, TM3
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1, 4
	RF Channels (TX)	B, M, T
	Test Mode	TM1
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Multiple Carriers	1
	RF Channels (TX)	M
	Test Mode	TM1
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 Temperature.
	Test Setup	Test Setup 2
	Multiple Carriers	1
	RF Channels (TX)	M
	Test Mode	TM1



LTE:

Test Case	Test Conditions		
Transmitter Output Power	Average Power	Test Configuration	Ambient Temperature & Rated Voltage
		Test Setup	Test Setup 1
		Multiple Carriers	1, 2
		RF Channels (TX)	1 Carrier, 10 MHz: B, M, T 1 Carrier, 20 MHz: B,M, T 2 Carriers, 10 MHz +10 MHz: B,M,T 2 Carriers, 10 MHz + 20 MHz: B,M,T 2 Carriers, 20 MHz + 20 MHz: B,M,T
		Test Mode	TM1.1
	Peak-to-Average Ratio	Test Configuration	Ambient Temperature & Rated Voltage
		Test Setup	Test Setup 1
		Multiple Carriers	1
		RF Channels (TX)	1 Carrier, 10 MHz: B, M, T 1 Carrier, 20 MHz: B,M, T
		Test Mode	TM1.1
Modulation Characteristics	Test Configuration		Ambient Temperature & Rated Voltage
	Test Setup		Test Setup 1
	Multiple Carriers		1
	RF Channels (TX)		M
	Test Mode		TM3.1
Occupied Bandwidth	Test Configuration		Ambient Temperature & Rated Voltage
	Test Setup		Test Setup 1
	Multiple Carriers		1
	RF Channels (TX)		1 Carrier, 10 MHz: B, M, T 1 Carrier, 20 MHz: B, M, T
	Test Mode		TM1.1
Band Edges Compliance	Test Configuration		Ambient Temperature & Rated Voltage
	Test Setup		Test Setup 1
	Multiple Carriers		1, 2
	RF Channels (TX)		1 Carrier, 10 MHz: B, T 1 Carrier, 20 MHz: B, T 2 Carriers, 20 MHz + 20 MHz: B, T
	Test Mode		TM1.1
Spurious Emission at Antenna Terminals	Test Configuration		Ambient Temperature & Rated Voltage
	Test Setup		Test Setup 1
	Multiple Carriers		1, 2
	RF Channels (TX)		1 Carrier, 10 MHz: B, M, T 1 Carrier, 20 MHz: B, M, T 2 Carriers, 20 MHz + 20 MHz: B,M,T
	Test Mode		TM1.1



Test Case	Test Conditions	
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Multiple Carriers	1
	RF Channels (TX)	M
	Test Mode	TM1.1
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 Temperature.
	Test Setup	Test Setup 2
	Multiple Carriers	1
	RF Channels (TX)	1 Carrier, 20 MHz: M
	Test Mode	TM1.1



5 Test Results

5.1 Transmitter Output Power

5.1.1 Average Power

WiMAX, 5 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1	1	B	42.78	18.97	1660	Pass
		M	42.90	19.50	1660	Pass
		T	42.82	19.14	1660	Pass
	2	B	42.81	19.10	1660	Pass
		M	43.00	19.98	1660	Pass
		T	42.78	18.97	1660	Pass
	3	B	42.67	18.50	1660	Pass
		M	42.78	18.96	1660	Pass
		T	42.67	18.50	1660	Pass
	4	B	41.73	14.90	1660	Pass
		M	41.64	14.57	1660	Pass
		T	41.87	15.37	1660	Pass
TM2	1	B	42.84	19.23	1660	Pass
		M	42.90	19.50	1660	Pass
		T	42.84	19.23	1660	Pass
	2	B	42.68	18.52	1660	Pass
		M	43.07	20.25	1660	Pass
		T	42.76	18.88	1660	Pass
	3	B	42.64	18.37	1660	Pass
		M	42.74	18.79	1660	Pass
		T	42.88	19.43	1660	Pass
	4	B	41.93	15.58	1660	Pass
		M	41.58	14.40	1660	Pass
		T	41.94	15.63	1660	Pass
TM3	1	B	42.81	19.10	1660	Pass
		M	42.96	19.77	1660	Pass
		T	43.00	20.00	1660	Pass
	2	B	42.84	19.21	1660	Pass
		M	43.09	20.35	1660	Pass
		T	42.82	19.14	1660	Pass
	3	B	42.58	18.09	1660	Pass
		M	42.63	18.33	1660	Pass
		T	42.65	18.43	1660	Pass



Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
	4	B	41.83	15.23	1660	Pass
		M	41.56	14.38	1660	Pass
		T	41.89	15.45	1660	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1	1	B	42.67	18.50	3311	Pass
		M	43	20.00	3311	Pass
		T	42.92	19.59	3311	Pass
	2	B	43.23	21.02	3311	Pass
		M	43.08	20.30	3311	Pass
		T	43.23	21.04	3311	Pass
	3	B	42.55	17.99	3311	Pass
		M	42.56	18.04	3311	Pass
		T	42.65	18.43	3311	Pass
	4	B	41.45	13.98	3311	Pass
		M	41.64	14.59	3311	Pass
		T	41.78	15.05	3311	Pass
TM2	1	B	42.82	19.14	3311	Pass
		M	43	20.00	3311	Pass
		T	42.88	19.40	3311	Pass
	2	B	43.28	21.26	3311	Pass
		M	43.18	20.77	3311	Pass
		T	43.21	20.94	3311	Pass
	3	B	42.58	18.11	3311	Pass
		M	42.54	17.96	3311	Pass
		T	42.53	17.91	3311	Pass
	4	B	41.55	14.27	3311	Pass
		M	41.59	14.44	3311	Pass
		T	41.70	14.80	3311	Pass
TM3	1	B	42.97	19.82	3311	Pass
		M	42.98	19.86	3311	Pass
		T	43.07	20.28	3311	Pass
	2	B	43.37	21.73	3311	Pass
		M	43.31	21.43	3311	Pass
		T	43.29	21.33	3311	Pass
	3	B	42.54	19.97	3311	Pass
		M	42.57	18.09	3311	Pass
		T	42.65	18.42	3311	Pass
	4	B	41.65	14.61	3311	Pass



Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
		M	41.72	14.85	3311	Pass
		T	41.71	14.83	3311	Pass

LTE:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1.1	1 (10 MHz)	B	43.58	22.80	3311	Pass
		M	43.73	23.60	3311	Pass
		T	43.59	22.86	3311	Pass
	1(20 MHz)	B	43.75	23.71	6606	Pass
		M	43.77	23.82	6606	Pass
		T	43.67	23.28	6606	Pass
	2 (10 MHz + 10 MHz)	B	43.68	23.33	3311	Pass
		M	43.69	23.39	3311	Pass
		T	43.47	22.23	3311	Pass
	2 (10 MHz + 20 MHz)	B	43.51	22.44	3311	Pass
		M	43.75	23.71	3311	Pass
		T	43.66	23.23	3311	Pass
	2 (20 MHz + 20 MHz)	B	43.72	23.55	6606	Pass
		M	43.82	24.10	6606	Pass
		T	43.75	23.71	6606	Pass

5.1.2 Peak-to-Average Ratio

LTE:

Test Mode	Multiple Carriers	RF Channel	Peak-to-Average Ratio [dB]	Verdict
TM1.1	1 (10 MHz)	B	7.37	Pass
		M	7.21	Pass
		T	7.34	Pass
	1 (20 MHz)	B	7.51	Pass
		M	7.13	Pass
		T	7.45	Pass



5.2 Modulation Characteristics

NOTE: See Annex of this report for detailed measurement results.



5.3 Occupied Bandwidth

NOTE: See Annex of this report for detailed measurement results.

WiMAX, 5 MHz Channel Bandwidth:

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
TM1	B	4.577	No limit	Pass
	M	4.615	No limit	Pass
	T	4.615	No limit	Pass
TM2	B	4.577	No limit	Pass
	M	4.615	No limit	Pass
	T	4.615	No limit	Pass
TM3	B	4.577	No limit	Pass
	M	4.615	No limit	Pass
	T	4.615	No limit	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
TM1	B	9.135	No limit	Pass
	M	9.135	No limit	Pass
	T	9.135	No limit	Pass
TM2	B	9.135	No limit	Pass
	M	9.175	No limit	Pass
	T	9.135	No limit	Pass
TM3	B	9.135	No limit	Pass
	M	9.135	No limit	Pass
	T	9.135	No limit	Pass

LTE, 10 MHz Channel Bandwidth:

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
TM1.1	B	8.945	No limit	Pass
	M	8.941	No limit	Pass
	T	8.943	No limit	Pass

LTE, 20 MHz Channel Bandwidth:

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
TM1.1	B	17.839	No limit	Pass
	M	17.839	No limit	Pass
	T	17.837	No limit	Pass

5.4 Band Edges Compliance

NOTE 1: See Annex of this report for detailed measurement results.

NOTE 2: The offset of measurement filter -3dB point may be considered when identifying the maximum emission for e.g. the CDMA, WCDMA, LTE, WiMAX systems.

WiMAX, 5 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1	1	B	-21.99	< -13	Pass
		T	-22.98	< -13	Pass
	4	B	-23.32	< -13	Pass
		T	-16.55	< -13	Pass
TM2	1	B	-21.52	< -13	Pass
		T	-22.75	< -13	Pass
	4	B	-22.47	< -13	Pass
		T	-16.76	< -13	Pass
TM3	1	B	-21.88	< -13	Pass
		T	-23.04	< -13	Pass
	4	B	-23.08	< -13	Pass
		T	-17.10	< -13	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1	1	B	-21.79	< -13	Pass
		T	-25.39	< -13	Pass
	4	B	-28.48	< -13	Pass
		T	-23.97	< -13	Pass
TM2	1	B	-19.44	< -13	Pass
		T	-24.50	< -13	Pass
	4	B	-28.40	< -13	Pass
		T	-24.32	< -13	Pass
TM3	1	B	-21.84	< -13	Pass
		T	-22.70	< -13	Pass
	4	B	-28.39	< -13	Pass
		T	-22.98	< -13	Pass



LTE, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1.1	1	B	-20.54	< -13	Pass
		T	-17.40	< -13	Pass

LTE, 20 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1.1	1	B	-23.58	< -13	Pass
		T	-22.16	< -13	Pass
	2	B	-23.15	< -13	Pass
		T	-22.06	< -13	Pass



5.5 Spurious Emission at Antenna Terminals

NOTE: See Annex of this report for detailed measurement results.

WiMAX, 5 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1	1	B	-22.87	< -13	Pass
		M	-22.77	< -13	Pass
		T	-22.75	< -13	Pass
	4	B	-22.76	< -13	Pass
		M	-22.82	< -13	Pass
		T	-22.66	< -13	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1	1	B	-22.72	< -13	Pass
		M	-22.83	< -13	Pass
		T	-22.77	< -13	Pass
	4	B	-22.75	< -13	Pass
		M	-22.86	< -13	Pass
		T	-22.77	< -13	Pass

LTE, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1.1	1	B	-26.06	< -13	Pass
		M	-26.09	< -13	Pass
		T	-25.90	< -13	Pass

LTE, 20 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1.1	1	B	-25.90	< -13	Pass
		M	-26.07	< -13	Pass
		T	-26.06	< -13	Pass
	2	B	-26.06	< -13	Pass
		M	-26.05	< -13	Pass
		T	-25.85	< -13	Pass



5.6 Field Strength of Spurious Radiation

NOTE: See Annex of this report for detailed measurement results.

WiMAX:

Test Mode	Multiple Carriers	RF Channel	Field Strength of Spurious Radiation [dBm]	Limit [dBm]	Verdict
TM1	1	M	<-13	< -13	Pass

LTE:

Test Mode	Multiple Carriers	RF Channel	Field Strength of Spurious Radiation [dBm]	Limit [dBm]	Verdict
TM1.1	1	M	<-13	< -13	Pass



5.7 Frequency Stability

5.7.1 Frequency Error vs. Temperature

WiMAX, 5 MHz Channel Bandwidth

Voltage	Temperature	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
100% Rated	-30 °C	-12.82	-0.005	---	---	Pass
	-20 °C	-4.67	-0.002	---	---	Pass
	-10 °C	-10.15	-0.004	---	---	Pass
	0 °C	-13.85	-0.005	---	---	Pass
	10 °C	-8.15	-0.003	---	---	Pass
	20 °C	-10.37	-0.004	---	---	Pass
	30 °C	-7.81	-0.003	---	---	Pass
	40 °C	-9.24	-0.004	---	---	Pass
	50 °C	-8.33	-0.003	---	---	Pass

WiMAX 10 MHz Channel Bandwidth:

Voltage	Temperature	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
100% Rated	-30 °C	-6.66	-0.003	---	---	Pass
	-20 °C	-8.31	-0.003	---	---	Pass
	-10 °C	-9.65	-0.004	---	---	Pass
	0 °C	-8.2	-0.003	---	---	Pass
	10 °C	-6.85	-0.003	---	---	Pass
	20 °C	-10.02	-0.004	---	---	Pass
	30 °C	-6.04	-0.002	---	---	Pass
	40 °C	-11.82	-0.005	---	---	Pass
	50 °C	-6.8	-0.003	---	---	Pass

LTE, 20 MHz Channel Bandwidth:

Voltage	Temperature	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
100% Rated	-30 °C	9.93	0.003	---	---	Pass
	-20 °C	10.77	0.004	---	---	Pass
	-10 °C	11.76	0.004	---	---	Pass
	0 °C	11.33	0.004	---	---	Pass
	10 °C	8.66	0.003	---	---	Pass
	20 °C	12.28	0.004	---	---	Pass
	30 °C	0.34	0.0001	---	---	Pass
	40 °C	0.37	0.0001	---	---	Pass
	50 °C	0.38	0.0001	---	---	Pass

5.7.2 Frequency Error vs. Voltage

WiMAX, 5 MHz Channel Bandwidth:

Temperature	% Voltage of Rated	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
20 °C	85 %	-5.3	-0.002	---	---	Pass
	100 %	-7.04	-0.003	---	---	Pass
	115 %	-10.47	-0.004	---	---	Pass

WiMAX, 10 MHz Channel Bandwidth:

Temperature	% Voltage of Rated	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
20 °C	85 %	-11.09	-0.004	---	---	Pass
	100 %	-6.04	-0.002	---	---	Pass
	115 %	-7.42	-0.003	---	---	Pass

LTE, 20 MHz Channel Bandwidth:

Temperature	% Voltage of Rated	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
20 °C	85 %	0.36	-0.0001	---	---	Pass
	100 %	0.36	-0.0001	---	---	Pass
	115 %	0.40	-0.0001	---	---	Pass



6 Main Test Instruments

Wimax

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2012-05-13
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-05-13
Temperature Chamber	Chongqingyinhe	EBS-SDJ61F	201000062	2012-05-19
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	-----
EMI Test receiver	R&S	ESU	100144	2012-05-12
Broadband Antenna	SCHAFFNER	CBL6112B	2747	2011-12-10
Horn Antenna	R&S	HF906	359287/005	2012-05-07

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Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2012-10-19
Spectrum Analyzer	R&S	FSQ26	200845	2012-11-13
Spectrum Analyzer	Agilent	E4440A	MY49420179	2013-05-14
Temperature Chamber	ACS	CH1500C	11004	2012-03-27
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	-----
EMI Test receiver	R&S	ESU	100144	2012-05-12
Broadband Antenna	SCHAFFNER	CBL6112B	2747	2013-01-12
Horn Antenna	R&S	HF906	359287/006	2012-05-19



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
Occupied Bandwidth	Magnitude (%)	U=0.2%
Band Edge Compliance	Disturbance Power (dBm)	U=2.0 dB
Conducted Spurious Emissions	Disturbance Power (dBm)	U=2.0 dB
Field Strength of Spurious Radiation	ERP (dBm)	U=4.6 dB (30 MHz – 1GHz) U=3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy (ppm)	U=0.21 ppm