



RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3702

Report Number: SYBH(R)005112011EB-1

FCC ID: QISRRU3702-2500

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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
Product Model: RRU3702
Version: WiMAX:V300R003 & LTE:V100R004

Date of Receipt Sample:	WiMAX:2009-01-04	LTE/WiMAX<E: 2011-11-04
Start Date of Test:	2009-02-06	2011-11-06
End Date of Test:	2009-02-18	2011-11-16

Test Result: Pass

Approved by Senior Engineer:	2011-11-18	Zhang Xinghai	<i>Zhang Xinghai</i>
	Date	Name	Signature

Prepared by:	2011-11-18	Liang Changguan	<i>Liang Changguan</i>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	Not applicable	First report.



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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J (10-1-10 Edition)
47 CFR FCC Part 27, Subpart C&M (10-1-10 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: 20– 25 °C
Ambient Relative Humidity: 48– 70 %
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
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

RRU3702 is a remote radio frequency (RF) module for base stations (BSs) and works on 2.3 GHz, 2.5 GHz, or 3.5 GHz. RRU3702s can be used by the WiMAX system, Long Term Evolution (LTE) system.

The RRU3702 mainly performs the following functions:

Amplifies weak signals from the antenna system, down-converting the signals to intermediate frequency (IF) signals, performing analog-to-digital conversion, digital down-conversion, matched filtering, and digital automatic gain control (DAGC) on the IF signals, and transmitting these signals to the baseband unit (BBU)

Receives downlink baseband digital signals from the BBU, performing matched filtering, digital up-conversion, clipping on the signals, modulating the output I/Q differential signals to required TX signals, amplifying the signals, and transmitting them through antennas

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
QL42TRU1	VER.B	Transceiver Unit (2.5 GHz)
QL41PAU1	VER.B	Power Amplifier Unit (2.5 GHz)

3.2.2 Sub-Assembly

Sub-Assembly				
Sub-Assembly Name	Model	Manufacturer	Version	Description
BBU3900 (WiMAX)	---	HUAWEI	V300R003	Baseband Units for WiMAX
BBU3900 (LTE)	---	HUAWEI	V100R004	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	WiMAX<E
System Type	WiMAX	LTE	WiMAX<E
TX and RX Antenna Ports	4 * TRX	4 * TRX	4 * TRX
Multiple Carrier Supported	1, 2,	1, 2	2
TX Output Power (per Antenna Port)	1 carrier * 10 W for 5M,10M 2 carriers * 5 W for 10M+10M	1 (carrier * 10 W) for 10M,20M 2 (carriers * 5 W) for 10M+10M 2(carriers * 3.3W+ carriers * 6.6W) for 10M+20M	2 (carriers * 5 W) for 10 WiMAX+10M LTE 2(carriers * 3.3W+ carriers * 6.6W) for 10M WiMAX+20M LTE
Channel Spacing(s) / Bandwidth(s)	5 MHz, 10 MHz	10 MHz, 20 MHz	10 MHz, 20 MHz
Designation of Emissions	5M00W7D, 10M0W7D	10M0D9W, 20M0D9W	10M0W7D, 10M0D9W, 20M0D9W
Modulation	QPSK,16QAM, 64QAM	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: \equiv -48 V DC Voltage Range: \equiv -36 V to -57 V
DC current maximal:	8.0 A

3.3.4 Environmental Requirements

Specification	Description
Minimum temperature:	-40 °C
Maximum temperature:	+55 °C
Relative Humidity:	5% to 100% RH



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
TX (10 MHz)	1	2501 MHz	2588 MHz	2685 MHz
	2	2501 MHz, 2511 MHz	2588 MHz 2598 MHz	2675 MHz 2685 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 (10 MHz + 10 MHz)	2	2501 MHz, 2511 MHz	2588 MHz 2598 MHz	2675 MHz 2685 MHz,
TX (20 MHz)	1	2506 MHz	2593MHz	2680 MHz
TX (10 MHz + 20 MHz)	2	2501 MHz, 2516MHz	2583 MHz 2598 MHz	2665 MHz 2680 MHz,

WiMAX & LTE:

TX / RX	Multiple Carriers	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX(10MHz WiMAX +10MHz LTE)	2	2501 MHz, 2511 MHz	2588 MHz 2598 MHz	2675 MHz 2685 MHz,
TX(10MHz WiMAX +20MHz LTE)	2	2501 MHz, 2516MHz	2583 MHz 2598 MHz	2665 MHz 2680 MHz,



4.2 Test Modes

WiMAX:

Test Mode	Test Modes Description
TM1	Modulation: QPSK CTC 1/2
TM2	Modulation: QPSK CTC 3/4
TM3	Modulation: 16QAM CTC 1/2
TM4	Modulation: 16QAM CTC 3/4
TM5	Modulation: 64QAM CTC 1/2
TM6	Modulation: 64QAM CTC 2/3
TM7	Modulation: 64QAM CTC 3/4
TM8	Modulation: 64QAM CTC 5/6

LTE:

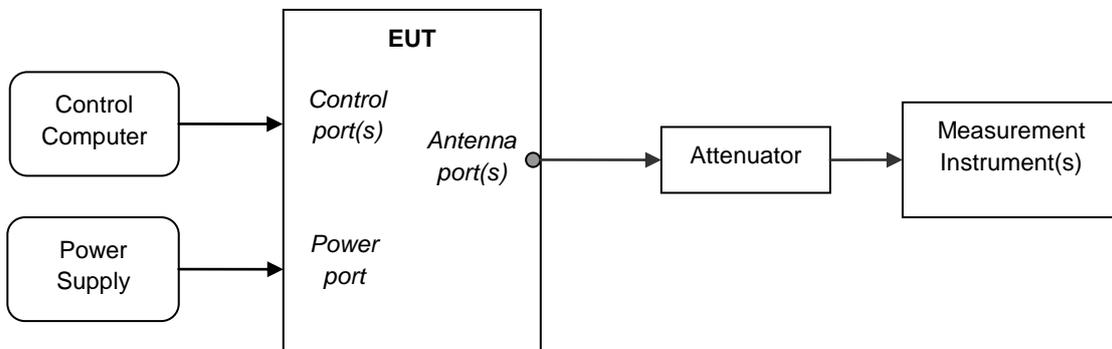
Test Mode	Test Modes Description
TM 1.1	3GPP TS 36.141, clause 6.1.1, E-TM 1.1, QPSK modulation
TM 3.1	3GPP TS 36.141, clause 6.1.1, E-TM 3.1, 64QAM modulation

4.3 Test Setups

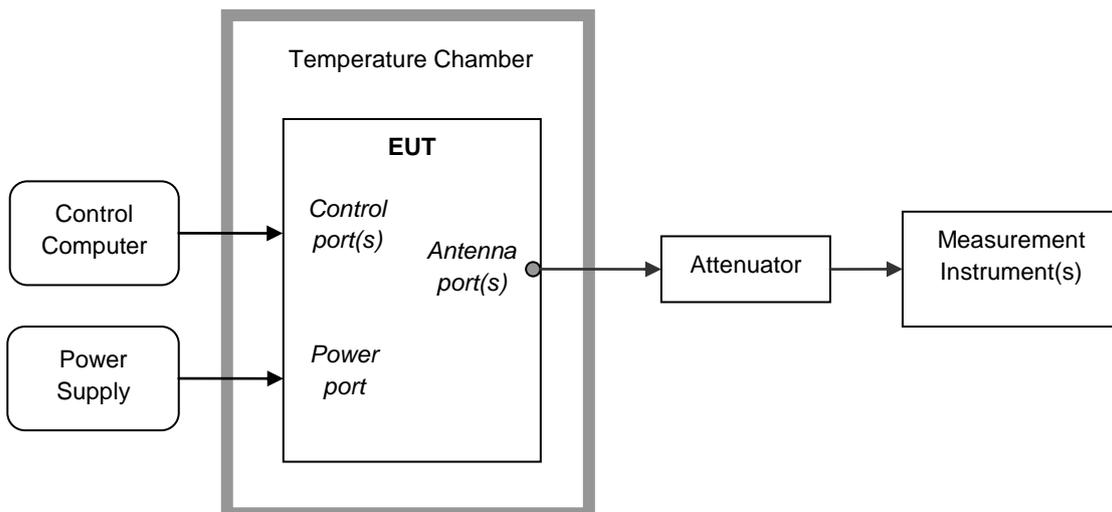
4.3.1 General Test Setup Configurations

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



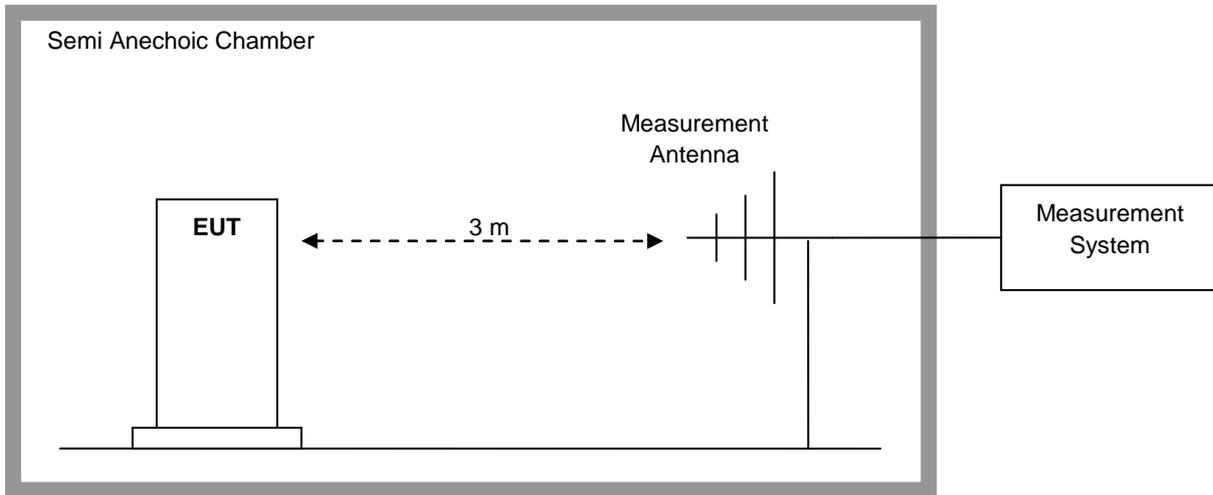
4.3.3 Test Setup 2



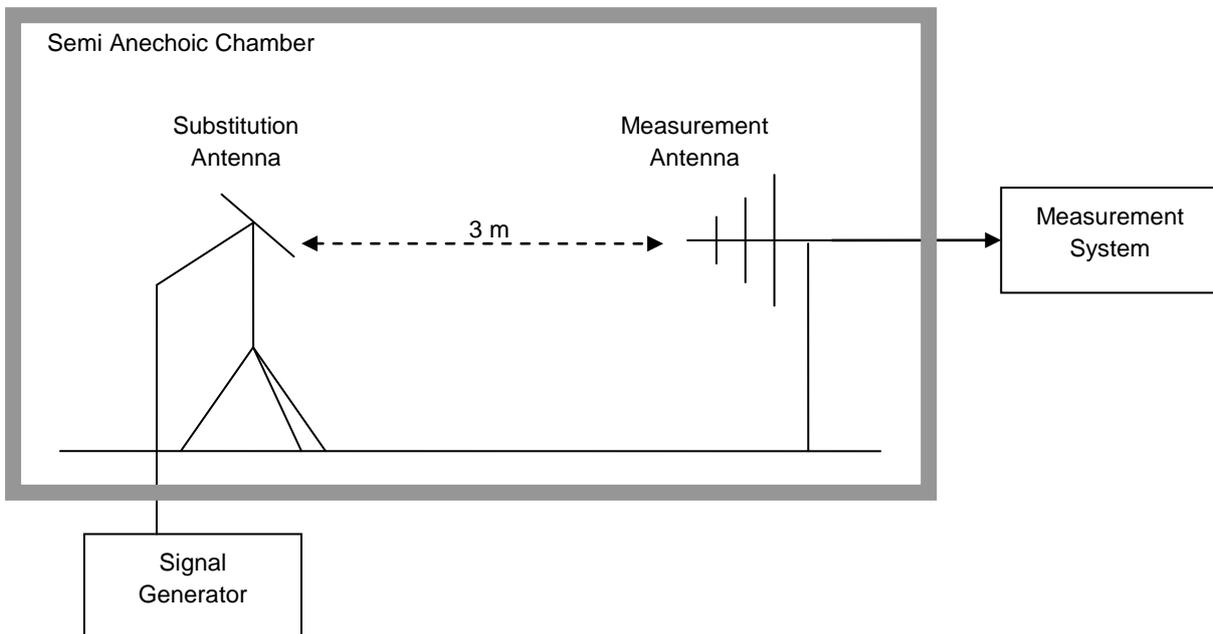
4.3.4 Test Setup 3

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 2
	RF Channels (TX)	B, M, T
	Test Mode	TM1, TM2, TM3, TM4, TM5, TM6, TM7, TM8
Modulation Characteristics	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1
	RF Channels (TX)	M
	Test Mode	TM1, TM2, TM3, TM4, TM5, TM6, TM7, TM8
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, 2
	RF Channels (TX)	B, T
	Test Mode	TM1, TM2, TM3, TM4, TM5, TM6, TM7, TM8
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1, 2
	RF Channels (TX)	B, M, T
	Test Mode	TM1, TM2, TM3, TM4, TM5, TM6, TM7, TM8
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	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1, 2
	RF Channels (TX)	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	TM2, TM3.1
Occupied Bandwidth	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1
	RF Channels (TX)	B, M, T
	Test Mode	TM1.1
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	1, 2
	RF Channels (TX)	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)	B, M, T
	Test Mode	TM1.1
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)	M
	Test Mode	TM3.1



WiMAX & LTE:

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	2
	RF Channels (TX)	B, M, T
	Test Mode	TM1&TM1.1
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	2
	RF Channels (TX)	B, T
	Test Mode	TM1&TM1.1
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Multiple Carriers	2
	RF Channels (TX)	B, M, T
	Test Mode	TM1&TM1.1
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Multiple Carriers	2
	RF Channels (TX)	M
	Test Mode	TM1&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	40.15	10.35	1660	Pass
		M	40.22	10.52	1660	Pass
		T	40.03	10.07	1660	Pass
TM2	1	B	40.11	10.26	1660	Pass
		M	40.20	10.47	1660	Pass
		T	40.02	10.05	1660	Pass
TM3	1	B	40.33	10.79	1660	Pass
		M	40.40	10.96	1660	Pass
		T	40.21	10.50	1660	Pass
TM4	1	B	40.10	10.23	1660	Pass
		M	40.17	10.40	1660	Pass
		T	40.00	10.00	1660	Pass
TM5	1	B	40.07	10.16	1660	Pass
		M	40.14	10.33	1660	Pass
		T	39.95	9.89	1660	Pass
TM6	1	B	40.16	10.38	1660	Pass
		M	40.24	10.57	1660	Pass
		T	40.05	10.12	1660	Pass
TM7	1	B	40.00	10.00	1660	Pass
		M	40.07	10.16	1660	Pass
		T	39.90	9.77	1660	Pass
TM8	1	B	39.83	9.62	1660	Pass
		M	39.96	9.91	1660	Pass
		T	39.95	9.89	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	39.65	9.23	3311	Pass
		M	39.44	8.79	3311	Pass
		T	39.59	9.10	3311	Pass
TM2	1	B	39.65	9.23	3311	Pass
		M	39.44	8.79	3311	Pass



Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
		T	39.57	9.06	3311	Pass
TM3	1	B	39.68	9.29	3311	Pass
		M	39.47	8.85	3311	Pass
		T	39.58	9.08	3311	Pass
TM4	1	B	39.54	8.99	3311	Pass
		M	39.33	8.57	3311	Pass
		T	39.44	8.79	3311	Pass
TM5	1	B	39.43	8.77	3311	Pass
		M	39.21	8.34	3311	Pass
		T	39.33	8.57	3311	Pass
TM6	1	B	39.75	9.44	3311	Pass
		M	39.53	8.97	3311	Pass
		T	39.64	9.20	3311	Pass
TM7	1	B	39.37	8.65	3311	Pass
		M	39.15	8.22	3311	Pass
		T	39.25	8.41	3311	Pass
TM8	1	B	39.68	9.29	3311	Pass
		M	39.46	8.83	3311	Pass
		T	39.55	9.02	3311	Pass

WiMAX, 10 MHz+10MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1	2	B	39.21	8.34	3311	Pass
		M	39.90	9.77	3311	Pass
		T	39.77	9.48	3311	Pass
TM2	2	B	39.22	8.36	3311	Pass
		M	39.89	9.75	3311	Pass
		T	39.78	9.51	3311	Pass
TM3	2	B	39.26	8.43	3311	Pass
		M	39.92	9.82	3311	Pass
		T	39.80	9.55	3311	Pass
TM4	2	B	39.10	8.13	3311	Pass
		M	39.77	9.48	3311	Pass
		T	39.66	9.25	3311	Pass
TM5	2	B	38.96	7.87	3311	Pass
		M	39.65	9.23	3311	Pass
		T	39.55	9.02	3311	Pass
TM6	2	B	39.34	8.59	3311	Pass
		M	39.96	9.91	3311	Pass
		T	39.86	9.68	3311	Pass



Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM7	2	B	38.9	7.76	3311	Pass
		M	39.6	9.12	3311	Pass
		T	39.49	8.89	3311	Pass
TM8	2	B	39.27	8.45	3311	Pass
		M	39.91	9.79	3311	Pass
		T	39.72	9.00	3311	Pass

LTE:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1.1	1 (10 MHz)	B	40.22	10.52	3311	Pass
		M	40.01	10.02	3311	Pass
		T	40.00	10.00	3311	Pass
	1 (20 MHz)	B	40.43	11.04	6606	Pass
		M	40.09	10.21	6606	Pass
		T	40.02	10.05	6606	Pass
	2 (10 MHz + 20 MHz)	B	40.32	10.76	3311	Pass
		M	40.08	10.19	3311	Pass
		T	39.96	9.91	3311	Pass
	2 (20 MHz + 20 MHz)	B	39.88	9.73	6606	Pass
		M	39.87	9.71	6606	Pass
		T	39.80	9.55	6606	Pass

WiMAX & LTE:

Test Mode	Multiple Carriers	RF Channel	Average Power [dBm]	Average Power [W]	Limit [W]	Verdict
TM1 & TM1.1	1(10M) WiMAX +1(10M) LTE	T	40.35	10.84	3311	Pass
		B	40.17	10.40	3311	Pass
		M	39.97	9.93	3311	Pass
	1(10M) WiMAX +1(20M) LTE	T	40.45	11.09	6606	Pass
		B	40.32	10.76	6606	Pass
		M	40.25	10.59	6606	Pass



5.2 Modulation Characteristics

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



5.3 Occupied Bandwidth

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

WiMAX, 5 MHz Channel Bandwidth:

Test Mode	Occupied Bandwidth[MHz]				
	Ch. B	Ch. M	Ch. T	Limit [MHz]	Verdict
TM1	4.60	4.60	4.60	No limit	Pass
TM2	4.60	4.60	4.60	No limit	Pass
TM3	4.60	4.60	4.60	No limit	Pass
TM4	4.60	4.60	4.60	No limit	Pass
TM5	4.60	4.60	4.60	No limit	Pass
TM6	4.60	4.60	4.60	No limit	Pass
TM7	4.60	4.60	4.60	No limit	Pass
TM8	4.60	4.60	4.60	No limit	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	Occupied Bandwidth[MHz]				
	Ch. B	Ch. M	Ch. T	Limit [MHz]	Verdict
TM1	9.15	9.15	9.15	No limit	Pass
TM2	9.15	9.15	9.15	No limit	Pass
TM3	9.15	9.15	9.15	No limit	Pass
TM4	9.15	9.15	9.15	No limit	Pass
TM5	9.15	9.15	9.15	No limit	Pass
TM6	9.15	9.15	9.15	No limit	Pass
TM7	9.15	9.15	9.15	No limit	Pass
TM8	9.15	9.15	9.15	No limit	Pass

LTE, 10MHz&20 MHz Channel Bandwidth:

Test Mode	Occupied Bandwidth[MHz]				
	Ch. B	Ch. M	Ch. T	Limit [MHz]	Verdict
TM1.1-10MHz	8.91	8.92	8.90	No limit	Pass



Test Mode	Occupied Bandwidth[MHz]				
	Ch. B	Ch. M	Ch. T	Limit [MHz]	Verdict
TM1.1-20MHz	17.80	17.79	17.81	No limit	Pass

5.4 Band Edges Compliance

NOTE 1: See Annex C 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	-17.10	< -13	Pass
		T	-16.37	< -13	Pass
TM2	1	B	-17.02	< -13	Pass
		T	-16.41	< -13	Pass
TM3	1	B	-16.59	< -13	Pass
		T	-17.90	< -13	Pass
TM4	1	B	-16.91	< -13	Pass
		T	-17.91	< -13	Pass
TM5	1	B	-15.00	< -13	Pass
		T	-17.87	< -13	Pass
TM6	1	B	-16.24	< -13	Pass
		T	-18.65	< -13	Pass
TM7	1	B	-16.37	< -13	Pass
		T	-16.56	< -13	Pass
TM8	1	B	-17.04	< -13	Pass
		T	-16.74	< -13	Pass

WiMAX, 10 MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1	1	B	-26.55	< -13	Pass
		T	-27.08	< -13	Pass
TM2	1	B	-26.09	< -13	Pass
		T	-27.13	< -13	Pass
TM3	1	B	-26.38	< -13	Pass
		T	-27.33	< -13	Pass
TM4	1	B	-26.84	< -13	Pass
		T	-26.20	< -13	Pass
TM5	1	B	-26.75	< -13	Pass
		T	-26.52	< -13	Pass



Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM6	1	B	-26.32	< -13	Pass
		T	-25.86	< -13	Pass
TM7	1	B	-26.58	< -13	Pass
		T	-27.41	< -13	Pass
TM8	1	B	-26.41	< -13	Pass
		T	-26.81	< -13	Pass

WiMAX, 10 MHz +10MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1	2	B	-28.09	< -13	Pass
		T	-28.31	< -13	Pass
TM2	2	B	-26.46	< -13	Pass
		T	-27.98	< -13	Pass
TM3	2	B	-28.68	< -13	Pass
		T	-28.34	< -13	Pass
TM4	2	B	-28.82	< -13	Pass
		T	-28.38	< -13	Pass
TM5	2	B	-28.84	< -13	Pass
		T	-28.38	< -13	Pass
TM6	2	B	-28.04	< -13	Pass
		T	-28.24	< -13	Pass
TM7	2	B	-28.41	< -13	Pass
		T	-28.33	< -13	Pass
TM8	2	B	-24.86	< -13	Pass
		T	-28.81	< -13	Pass

LTE, 10 MHz, 20MHz, 10MHz+10MHz and 10MHz+20MHz Channel Bandwidth:

Test Mode	Channel Bandwidth	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1.1	10MHz	B	-28.93	< -13	Pass
		T	-33.75	< -13	Pass
TM1.1	20MHz	B	-30.70	< -13	Pass
		T	-32.21	< -13	Pass
TM1.1	10MHz+10MHz	B	-30.28	< -13	Pass
		T	-31.51	< -13	Pass
TM1.1	10MHz+20MHz	B	-25.15	< -13	Pass
		T	-32.53	< -13	Pass



WiMAX & LTE, 10MHz+10MHz and 10MHz+20MHz Channel Bandwidth:

Test Mode	Channel Bandwidth	RF Channel	Band Edges Emissions [dBm]	Limit [dBm]	Verdict
TM1& TM1.1	10MHz+10MHz	B	-30.91	< -13	Pass
		T	-30.16	< -13	Pass
TM1& TM1.1	10MHz+20MHz	B	-27.39	< -13	Pass
		T	-23.83	< -13	Pass



5.5 Spurious Emission at Antenna Terminals

NOTE: See Annex D 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	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM2	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM3	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM4	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM5	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM6	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM7	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
TM8	1	B	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 1 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 1 of 4)]	< -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	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM2	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass



Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM3	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM4	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM5	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM6	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM7	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
TM8	1	B	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 2 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 2 of 4)]	< -13	Pass

WiMAX, 10MHz+10MHz Channel Bandwidth:

Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM2	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM3	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM4	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM5	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM6	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass



Test Mode	Multiple Carriers	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM7	2	M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
TM8	2	B	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 3 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 3 of 4)]	< -13	Pass

LTE, 10 MHz, 20MHz, 10MHz+10MHz and 10MHz+20MHz Channel Bandwidth:

Test Mode	Channel Bandwidth	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1.1	10MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
TM1.1	10MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
TM1.1	10MHz +10MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
TM1.1	10MHz +10MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass

WiMAX & LTE, 10MHz+10MHz and 10MHz+20MHz Channel Bandwidth:

Test Mode	Channel Bandwidth	RF Channel	Spurious Emission at Antenna Terminals [dBm]	Limit [dBm]	Verdict
TM1 & TM1.1	10MHz +10MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
TM1 & TM1.1	10MHz +20MHz	B	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		M	< -13 [See Annex D (part 4 of 4)]	< -13	Pass
		T	< -13 [See Annex D (part 4 of 4)]	< -13	Pass



5.6 Field Strength of Spurious Radiation

NOTE: See Annex E 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 (See Annex E)	< -13	Pass

LTE:

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

WiMAX & LTE:

Test Mode	Multiple Carriers	RF Channel	Field Strength of Spurious Radiation [dBm]	Limit [dBm]	Verdict
TM1&TM 1.1	1	M	<-13 (See Annex E)	< -13	Pass

5.7 Frequency Stability

5.7.1 Frequency Error vs. Temperature

WiMAX, 10MHz middle channel:

Voltage	Temperature	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
100% Rated	-30 °C	44.44	0.02	---	---	Pass
	-20 °C	44.59	0.02	---	---	Pass
	-10 °C	45.00	0.02	---	---	Pass
	0 °C	44.55	0.02	---	---	Pass
	10 °C	44.57	0.02	---	---	Pass
	20 °C	46.24	0.02	---	---	Pass
	30 °C	45.68	0.02	---	---	Pass
	40 °C	45.10	0.02	---	---	Pass
	50 °C	46.38	0.02	---	---	Pass

LTE, 20MHz middle channel:

Voltage	Temperature	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
100% Rated	-30 °C	6.08	0.003	---	---	Pass
	-20 °C	5.25	0.002	---	---	Pass
	-10 °C	6.13	0.003	---	---	Pass
	0 °C	5.12	0.002	---	---	Pass
	10 °C	3.85	0.001	---	---	Pass
	20 °C	6.75	0.003	---	---	Pass
	30 °C	6.25	0.003	---	---	Pass
	40 °C	4.74	0.002	---	---	Pass
	50 °C	3.77	0.002	---	---	Pass

5.7.2 Frequency Error vs. Voltage

WiMAX, 10MHz middle channel:

Temperature	% Voltage of Rated	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
20 °C	85 %	45.41	0.02	---	---	Pass
	100 %	45.04	0.02	---	---	Pass
	115 %	45.34	0.02	---	---	Pass



LTE, 20 MHz middle channel:

Temperature	% Voltage of Rated	Frequency Stability [Hz]	Frequency relative to rated [ppm]	Frequency relative to 20 °C [ppm]	Limit [ppm]	Verdict
20 °C	85 %	4.88	0.002	---	---	Pass
	100 %	3.56	0.002	---	---	Pass
	115 %	2.19	0.002	---	---	Pass



6 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2012-10-20
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-05-13
Temperature Chamber	Chongqingyinhe	EBS-SDJ61FC	200900016	2012-02-25
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



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

END