



RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3841

Report Number: SYBH(R)131012012EB-1

FCC ID: QISRRU3841

IC ID: 6369A-RRU3841

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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.
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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: RRU3841
Version: CDMA:V400R008<E:V100R005

Date of Receipt Sample: 2012-01-19
Start Date of Test: 2012-01-29
End Date of Test: 2011-02-07

Test Result: Pass

Approved by Senior Engineer:	2012-02-08	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2012-02-08	Liang changguan	<i>Liang Changguan</i>
	Date	Name	Signature



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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 (10-1-10 Edition)
IC RSS-Gen (Issue 3, December 2010)
IC RSS-139 (Issue 2, February 2009)

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 to 25 °C
Ambient Relative Humidity: 43 to 71 %
Atmospheric Pressure: Not applicable



2 Test Summary

Test Case	FCC Part No.	Requirements	Result
AWS Band			
Transmitter Output Power	2.1046 & 27.50(d)	Peak EIRP not exceed 1640 W	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(h)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(h)	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(h)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

Test Case	IC Standard No.	Requirements	Result
AWS Band			
Transmitter Output Power	RSS-Gen, §4.8; RSS-139, §6.4	EIRP not exceed 1640 Watts (EBW ≤1MHz) EIRP not exceed 1640 Watts/MHz (EBW > 1MHz) Peak-to-average ratio not exceed 13 dB	Pass
Modulation Characteristics	RSS-139, §6.2	Digital modulation	Pass
Occupied Bandwidth	RSS-Gen, §4.6	(Not specified)	Pass
Band Edges Compliance	RSS-Gen, §4.9; RSS-139, §6.5	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	RSS-Gen, §4.9; RSS-139, §6.5	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 5 th harmonics	Pass
Field Strength of Spurious Radiation	RSS-Gen, §4.9; RSS-139, §6.5	Below -13 dBm/1 MHz	Pass
Frequency Stability	RSS-Gen, §4.7; RSS-139, §6.3	Stay within the authorized frequency block	Pass
Receiver Spurious Emissions (Conducted)	RSS-Gen, §4.10; RSS-Gen, §6; RSS-139, §6.6	Below -57 dBm/120 kHz (CISPR-QP), 30MHz to 1000 MHz Below -53 dBm/1 MHz (AV), 1 GHz to 3 th harmonics	Pass



3 Description of the Equipment under Test (EUT)

3.1 General Description

The RRU3841 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 RRU3841 can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal data. With the Software Defined Radio (SDR) technology, the RRU3841 supports the dual-mode operation of any two modes of CDMA and LTE through software configuration modification.

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
WD5DJRXC20	VER.A	Transceiver Board
49020036	VER.A	Transmission Power Amplifying Module

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
LMPT	---	Huawei	LTE baseband Processing Unit
LBBP	---	Huawei	LTE Main Processing & Transmission Unit
CMPT	---	Huawei	CDMA2000 baseband Processing Unit
HCPM	---	Huawei	CDMA2000 1X Main Processing & Transmission Unit
HECM	---	Huawei	CDMA2000 EVDO Main Processing & Transmission Unit



3.3 Technical Description

3.3.1 Supported Frequency Range

Characteristics	Description
Downlink	2110MHz to 2155MHz
Uplink	1710MHz to 1755MHz

3.3.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	<input type="checkbox"/> GSM <input checked="" type="checkbox"/> CDMA <input type="checkbox"/> UMTS <input type="checkbox"/> WiMAX <input checked="" type="checkbox"/> LTE
TX and RX Antenna Ports	4T4R & 2T4R
TX Output Power (per Antenna Port)	Rated max. 60W (2T4R) Rated max. 30W (4T4R)
Channel Spacing(s) / Bandwidth(s)	CDMA system: 1.25MHz LTE system: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20MHz
Designation of Emissions	CDMA system: 1M25F9W LTE system: 1M40D9W , 3M00D9W , 5M00D9W , 10M0D9W , 15M0D9W, 20M0D9W

3.3.3 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC /AC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: -48 V DC Voltage Range: -36 V to -57 V



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 Test Modes

Test Mode	Test Modes Description
TM 1	CDMA2000 1x RC3
TM 2	CDMA2000 1x EV-DO
E-TM 1.1	3GPP TS 36.141, clause 6.1.1, E-TM 1.1
E-TM 2.0	3GPP TS 36.141, clause 6.1.1, E-TM 2
E-TM 3.1	3GPP TS 36.141, clause 6.1.1, E-TM 3.1

4.2 RF Channels under Test

CDMA:

Operating Band(TX)	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
CDMA AWS band	1	No.25 2111.25MHz	No.450 2132.5MHz	No.875 2153.75MHz
	2	No.25/50 2111.25/2112.5MHz	No.450/475 2132.5/2133.75MHz	No.875/850 2153.75/2152.5MHz
	4	No.25/50/75/100 2111.25/2112.5/ 2113.75/2115MHz	No.400/425/450/475 2130/2131.25/2132.5 /2133.75MHz	No.875/850/825/800 2153.75/2152.5 /2151.25/2150MHz

LTE:

Operating Band (TX)	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
LTE AWS band (1.4MHz bandwidth)	1	No.1957 2110.7MHz	No.2175 2132.5MHz	No.2393 2154.3MHz
LTE AWS band (3MHz bandwidth)	1	No.1965 (B) 2111.5MHz	No.2175 (M) 2132.5MHz	No.2385 (T) 2153.5MHz



LTE AWS band (5MHz bandwidth)	1	No.1975 (B) 2112.5MHz	No.2175 (M) 2132.5MHz	No.2375 (T) 2152.5MHz
LTE AWS band (10MHz bandwidth)	1	No.2000 (B) 2115MHz	No.2175 (M) 2132.5MHz	No.2350 (T) 2150MHz
LTE AWS band (15MHz bandwidth)	1	No.2025 (B) 2117.5MHz	No.2175 (M) 2132.5MHz	No.2325 (T) 2147.5MHz
LTE AWS band (20MHz bandwidth)	1	No.2050 (B) 2120MHz	No.2175 (M) 2132.5MHz	No.2300 (T) 2145MHz
LTE AWS band (5MHz+10MHz bandwidth)	2	No.1975/2050 (B) 2112.5/2120MHz	No.2175/2250 (M) 2132.5/2140MHz	No.2275/2350 (T) 2142.5/2150MHz

CDMA/LTE:

Operating Band	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
2C+1L AWS band	1X+DO+1L_1.4M	No.25/50+1990 2111.25/2112.5 +2114MHz	No.375/400+2175 2128.75/2130+ 2132.5MHz	No 825/850+2393 2151.25/2152.5 +2154.3MHz
	1X+DO+1L_3M	No.25/50+2000 2111.25/2112.5 +2115MHz	No.375/400+2175 2128.75/2130+ 2132.5MHz	No 800/825+2385 2150/2151.25 +2154.3MHz
	1X+DO+1L_5M	No.25/50+2010 2111.25/2112.5 +2116MHz	No.350/375+2175 2127.5/2128.75+ 2132.5MHz	No 750/775+2375 2147.5/2148.75 +2152.5MHz
	1X+DO+1L_10M	No.25/50+2035 2111.25/2112.5 +2118.5MHz	No.300/325+2175 2125/2126.25+ 2132.5MHz	No 650/675+2350 2142.5/2143.75 +2150MHz
	1X+DO+1L_15M	No.25/50+2060 2111.25/2112.5 +2121MHz	No.250/275+2175 2122.5/2123.75+ 2132.5MHz	No 550/575+2325 2137.5/2138.75 +2147.5MHz
	1X+DO+1L_20M	No.25/50+2085 2111.25/2112.5 +2123.5MHz	NA	No 450/475+2300 2132.5/2133.75 +2145MHz

Operating Band (RX)	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
CDMA AWS band RX	1.25M	NA	No.450 1732.5MHz	NA
LTE AWS band RX	5M	NA	No.2175 1732.5MHz	NA



4.3 Test Environments

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

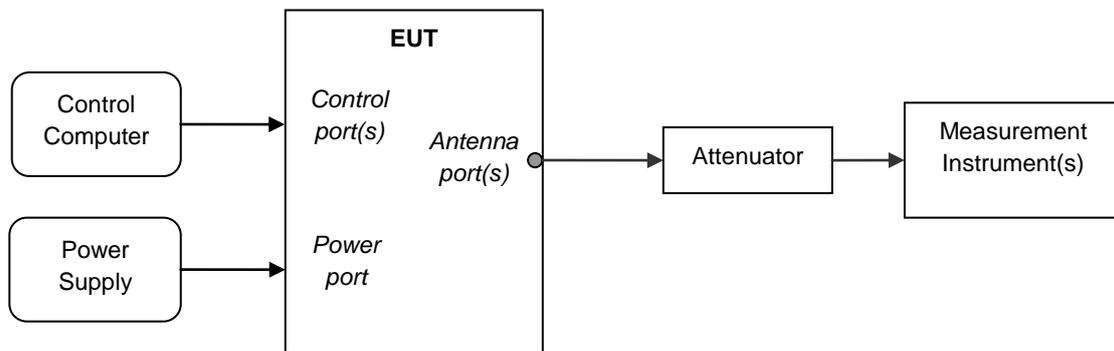
4.4 Test Setups

NOTE: See Appendix I for practical Test Setup Photos.

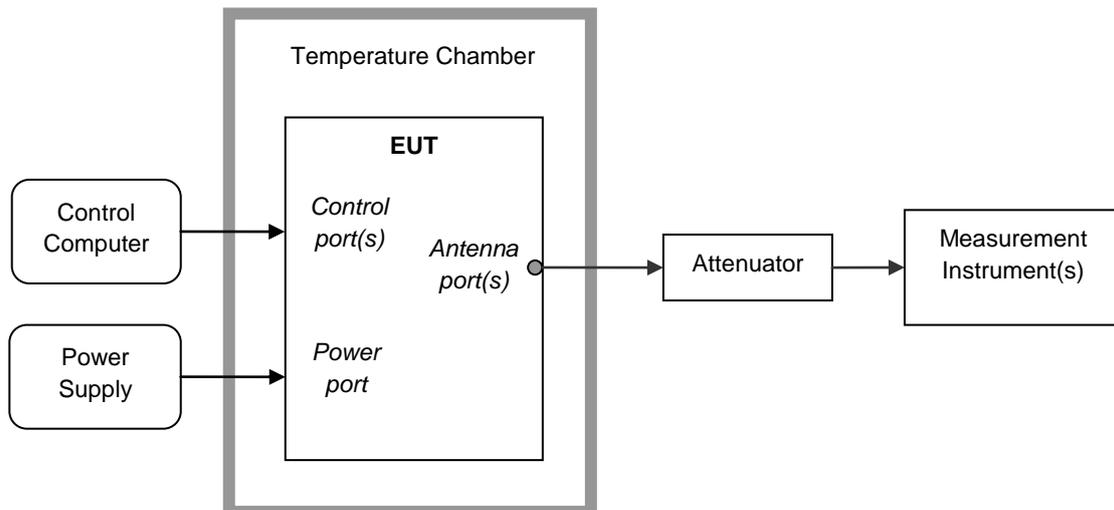
4.4.1 General Test Setup Configurations

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.

4.4.2 Test Setup 1



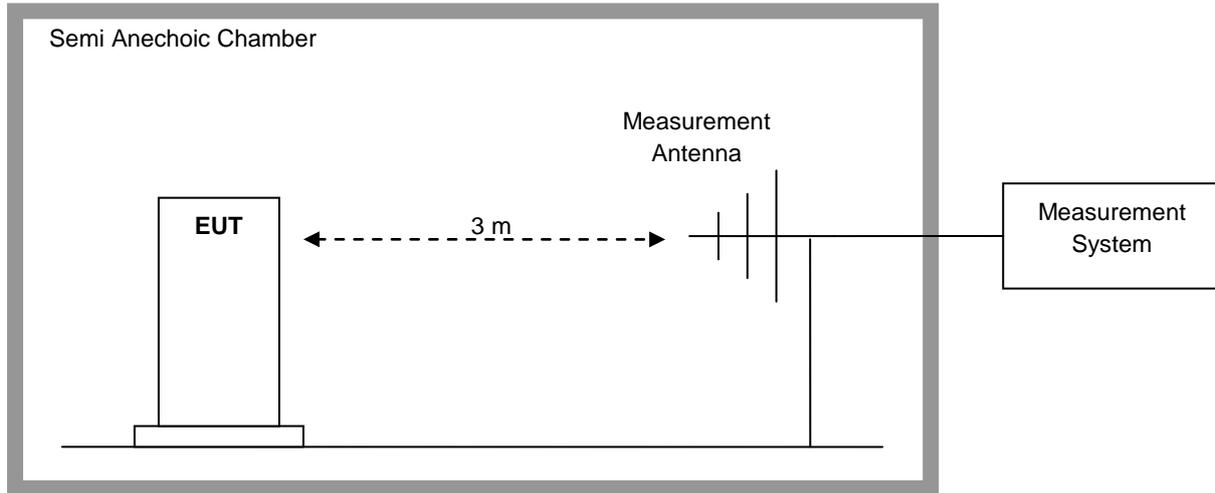
4.4.3 Test Setup 2



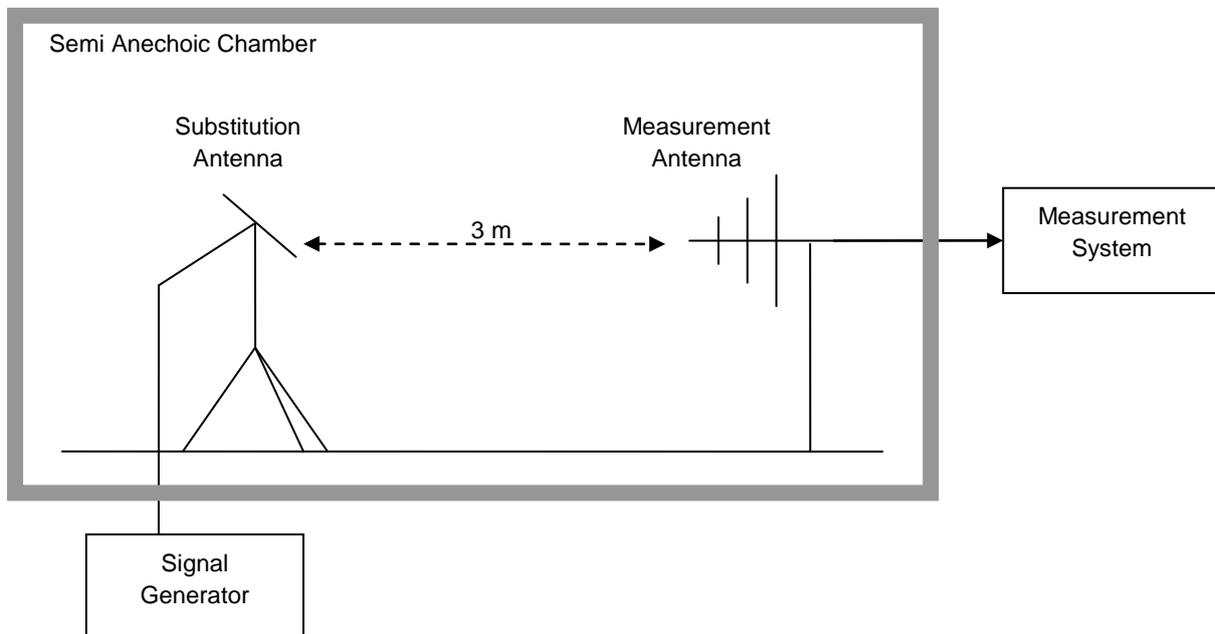
4.4.4 Test Setup 3

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

4.4.4.1 Step 1: Pre-test



4.4.4.2 Step 2: Substitution method to verify the maximum ERP





4.5 Test Conditions

CDMA

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1, 2, 4
	RF Channels (TX)	B, M, T
	Test Mode	TM1 and TM2
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	M
	Test Mode	TM1, TM2,
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, M, T
	Test Mode	TM1 and TM2
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1, 4
	RF Channels (TX)	B, T
	Test Mode	TM1 and TM2
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1 , 4
	RF Channels (TX)	B, M and T
	Test Mode	TM1 and TM2
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	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 Climate.
	Test Setup	Test Seup 2
	Carrier Conf.	1
	RF Channels (TX)	M
	Test Mode	TM1
Receiver Spurious Emissions (Conducted) (Only for	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1



Test Case	Test Conditions	
IC requirement)	RF Channels (TX/RX)	M
	Test Mode	TM1

LTE

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.4M,3M,5M,10M ,15M,20M,5M+10M
	Carrier Conf.	1 ,2
	RF Channels (TX)	B, M, T
	Test Mode	TM1 .1
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	5M
	Carrier Conf.	1
	RF Channels (TX)	M
	Test Mode	TM2.0, TM3.1
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.4M,3M,5M,10M ,15M,20M
	Carrier Conf.	1
	RF Channels (TX)	B, M, T
	Test Mode	TM1.1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.4M,3M,5M,10M ,15M,20M,5M+10M
	Carrier Conf.	1 ,2
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.4M,3M,5M,10M ,15M,20M,5M+10M
	Carrier Conf.	1 and 2
	RF Channels (TX)	B, M and T
	Test Mode	TM1.1
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	1
	RF Channels (TX)	M
	Test Mode	TM1.1
Frequency Stability	NA	NOTE: An arbitrary test mode is selected as a representative since the un-modulation carrier configuration is required by the standards/rules.



Test Case	Test Conditions	
Receiver Spurious Emissions (Conducted) (Only for IC requirement)	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX/RX)	M
	Test Mode	TM1.1

CDMA<E

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.25+1.4M (3M,5M,10M ,15M,20M)
	Carrier Conf.	2C+1L per Antenna 2T4R Port
	RF Channels (TX)	B, M, T
	Test Mode	TM1&TM2+TM1 .1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.25+1.4M (3M,5M,10M ,15M,20M)
	Carrier Conf.	2C+1L per Antenna 2T4R Port
	RF Channels (TX)	B, T
	Test Mode	TM1&TM2+TM1 .1
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Channel band	1.25+1.4M (3M,5M,10M ,15M,20M)
	Carrier Conf.	2C+1L per Antenna 2T4R Port
	RF Channels (TX)	B, M, T
	Test Mode	TM1&TM2+TM1 .1



5 Test Results

No.	Test Item	Test Result
1	Transmitter Output Power	Appendix A
2	Modulation Characteristics	Appendix B
3	Occupied Bandwidth	Appendix C
4	Band Edges Compliance	Appendix D
5	Spurious Emission at Antenna Terminals	Appendix E
6	Field Strength of Spurious Radiation	Appendix F
7	Frequency Stability	Appendix G
8	Receiver Spurious Emissions (Conducted) (Only for IC requirement)	Appendix H



6 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	Agilent	N9030A	MY49431033	2012-04-16
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-05-12
Spectrum Analyzer	Anritsu	MS2692A	6201030306	2012-09-29
Temperature Chamber	Chongqing Yinhe	ESS-KWGDS61I	201000414	2012-03-02
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	-----
EMI Test receiver	R&S	ESU	100144	2012-05-12
Broadband Antenna	TESEQ	CBL6112D	25221	2012-04-08
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