FCC
RF Test Report

Product Name: Fixed Wireless Terminal

Model Number: FT2260VW

Report No.: SYBH(Z-RF)016062013-2001

FCC ID：QISFT2260

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Tel: +86 755 28780808 Fax: +86 755 89652518

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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:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample:	2013-07-01
Start Date of Test:	2013-07-01
End Date of Test:	2013-07-04

Test Result: Pass

Approved by Senior Engineer:	2013-07-05	Dai Linjun	
	Date	Name	Signature

Prepared by:	2013-07-05	Zhu Mingjing	
	Date	Name	Signature

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Modification Record

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

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CONTENT

1 General Information 6
1.1 Applied Standard 6
1.2 Test Location 6
1.3 Test Environment Condition 6
2 Test Summary 7
2.1 Cellular Band (824-849 MHz paired with 869-894 MHz) 7
2.2 PCS Band (1850-1910 MHz paired with 1930-1990 MHz) 8
3 Description of the Equipment under Test (EUT) 9
3.1 General Description 9
The followed table is show the difference between the two. 9
3.2 EUT Identity 11
3.3 Technical Specification 13
4 General Test Conditions / Configurations 14
4.1 Test Modes 14
4.2 Test Environment 14
4.3 Test Frequency 15
4.4 DESCRIPTION OF TESTS 16
4.5 Test Setups 17
4.6 Test Conditions 18
5 Main Test Instruments 19
6 Measurement Uncertainty 20

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1 General Information

1.1 Applied Standard

Applied Rules:	47 CFR FCC Part 02:2012 47 CFR FCC Part 22: 2012 47 CFR FCC Part 24: 2012
Test Method:	FCC KDB 971168 D01 Power Meas License Digital Systems v01

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:	19.5 to 25 °C
Ambient Relative Humidity:	40 to 55 %
Atmospheric Pressure:	Not applicable

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2 Test Summary

2.1 Cellular Band (824-849 MHz paired with 869-894 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
Transmit Output Power Data	§2.1046, §22.913	FCC: ERP ≤ 7 W	Appendix A	Pass
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	N/T
Bandwidth	§2.1049, §22.917	OBW: No limit. EBW: No limit.	Appendix D	N/T
Band Edges Compliance	§2.1051, §22.917	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix E	N/T
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix F	N/T
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: ≤ -13 dBm/100 kHz.	Appendix G	Pass
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Appendix H	N/T

NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna.

NOTE 2: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.

NOTE: Only Delta test cases = **PASS**, other test cases refer to SYBHZ(R)E031062010EB-2 of FT2260 (FCC ID: QISFT2260).

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2.2 PCS Band (1850-1910 MHz paired with 1930-1990 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
Transmit Output Power Data	§2.1046, §24.232	EIRP ≤ 2 W	Appendix A	Pass
Peak-Average Ratio	§2.1046, §24.232	FCC: Limit≤13 dB	Appendix B	N/T
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	N/T
Bandwidth	§2.1049, §22.917	OBW: No limit. EBW: No limit.	Appendix D	N/T
Band Edges Compliance	§2.1051, §24.238	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix E	N/T
Spurious Emission at Antenna Terminals	§2.1051, §24.238	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix F	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238	≤ -13 dBm/1 MHz.	Appendix G	N/T
Frequency Stability	§2.1055, §24.235	FCC: within authorized frequency block.	Appendix H	N/T

NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna.

NOTE 2: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.

NOTE: Only Delta test cases = **PASS**, other test cases refer to SYBHZ(R)E031062010EB-3 of FT2260 (FCC ID: QISFT2260).

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3 Description of the Equipment under Test (EUT)

3.1 General Description

FT2260VW is a CDMA Fixed Wireless Terminal. It's operated in Band Class 0 and Band Class 1. The Wireless Terminal implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice, data etc. The TX is 824MHz-849MHz, the RX is 869MHz-894MHz for Band Class 0; The TX is 1850MHz-1910MHz, the RX is 1930MHz-1990MHz for Band Class 1.
Externally it provides USB interface (to computers), antenna interface, and power interface, in addition to the charging interface.

The original one and the modified one support the same function.

The PCBA is different. The differences between the original and the modified are: the modified one removed the SIM card socket on the PCB, and the Shield Cover is different from the original of the appearance, the layout is the same. The modified added a adapter of new model.

The followed table is show the difference between the two.

	FT2260VW(the original)	FT2260VW(the modified)
SIM card socket	Mounted on board	Un-mounted
Shield Cover	Covered	Covered, different appearance
Adapter	Adapter Model: CNR2260 HW-120050U5W	Adapter Model: CNR2260 HW-120050U5W HW-120050U1W

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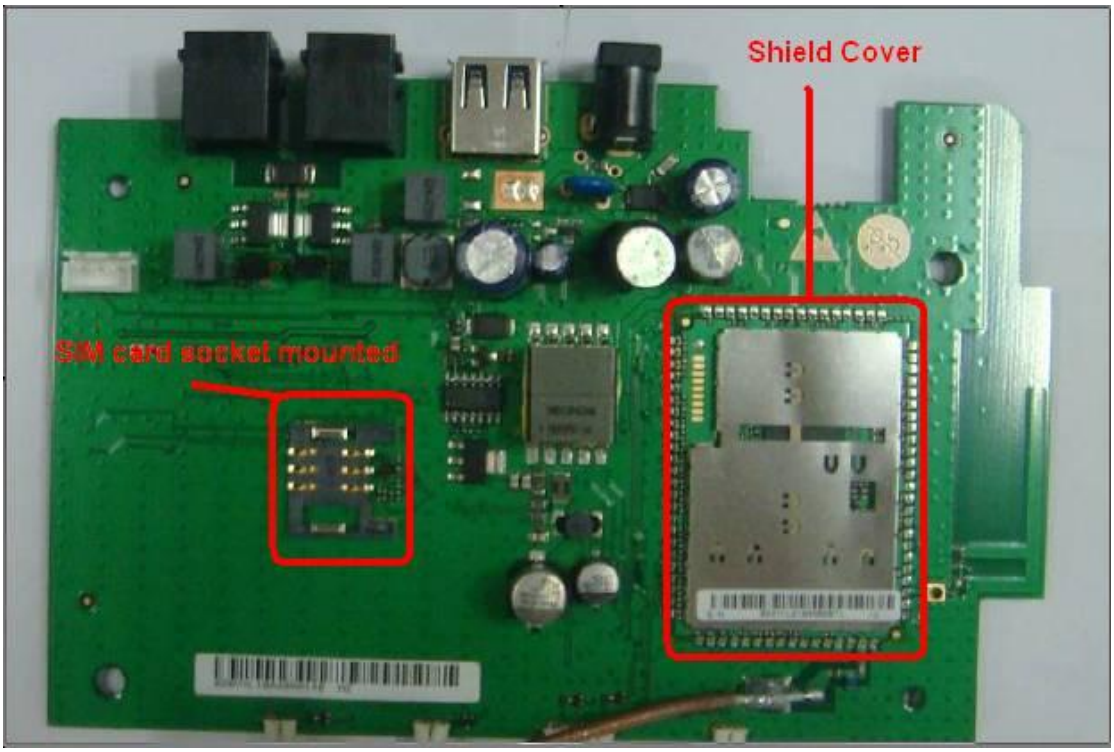
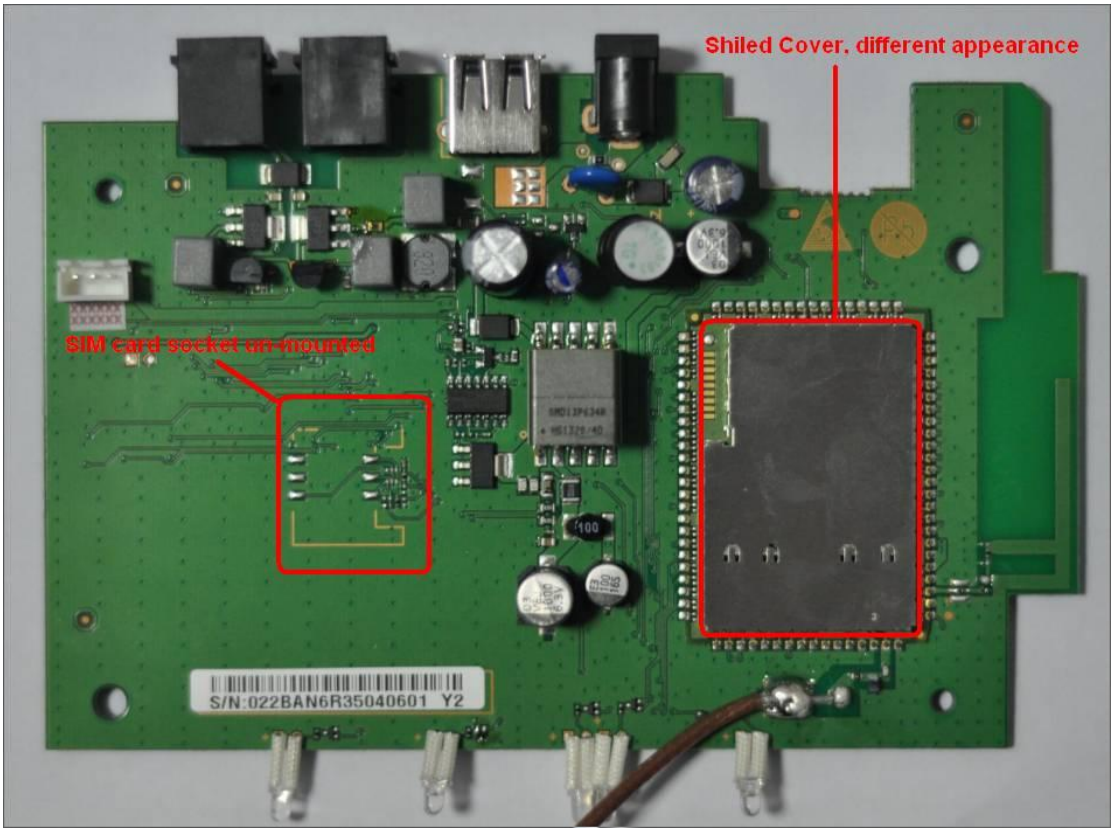
The photos of the two FT2260VW:

FT2260VW (the original):



FT2260VW (the modified):



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Explanation:

a) Adapter change:

The plastic shell and the materials of the two are the same.

b) PCBA change:

As the above pictures, the modified one removed the SIM card socket on the PCBA, and the Shield Cover is different from the original of the appearance. The modified added a adapter of new model. The chipset and the platform are the same.

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		
Serial Number	Hardware Version	Description
731052107581	WL1FT2260M	Centre Processing Unit
731052102596	WL1FT2260I	Interface Processing Unit

3.2.2 Sub-Assembly

Name	Model	Manufacture	Description
Adapter	CNR2260	HUAWEI Technologies Co.LTD.	Input Voltage : 100-240V ~50/60Hz, 0.25A Output Voltage: ⎓ 12V 500mA Rated Power: 6W
Adapter	HW-120050U5W	HUAWEI Technologies Co.LTD.	Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: ⎓ 12V 500mA Rated Power: 6W
Adapter	HW-120050U1W	HUAWEI Technologies Co.LTD.	Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: ⎓ 12V 500mA Rated Power: 6W

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Rechargeable Ni-MH	HGB-15AAx3	HUAWEI Technologies Co.LTD.	Rated capacity: 1500mAh Nominal Voltage: ⎓ +3.6V Charging Voltage: ⎓ +4.2V

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3.3 Technical Specification

Characteristics	Description		
Radio System Type	☒ CDMA		
Supported Frequency Range	CDMA BAND 0	Transmission (TX):	824 to 849 MHz
		Receiving (RX):	869 to 894 MHz
	CDMA BAND 1	Transmission (TX):	1850 to 1910 MHz
		Receiving (RX):	1930 to 1990 MHz
TX and RX Antenna Ports	TX & RX port:	1	
	TX-only port:	0	
	RX-only port:	0	

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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
TM1	CDMA2000 1x mode QPSK modulation
TM3	CDMA2000 1x mode HPSK modulation

4.2 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.5 V
	VN	3.7 V
	VH	4.2 V

NOTE: VL= lower extreme test voltage
VN= nominal voltage
VH= upper extreme test voltage
TN= normal temperature

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4.3 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
CDMA BC0	TX	Channel 1013	Channel 384	Channel 777
		824.7MHz	836.52MHz	848.31MHz
	RX	Channel 1013	Channel 384	Channel 777
		869.7MHz	881.52MHz	893.31MHz
CDMA BC1	TX	Channel 25	Channel 600	Channel 1175
		1851.25MHz	1880.0MHz	1908.75MHz
	RX	Channel 25	Channel 600	Channel 1175
		1931.25MHz	1960.0MHz	1988.75MHz

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4.4 DESCRIPTION OF TESTS

4.4.1 Radiated Power and Radiated Spurious Emissions

Radiated spurious emissions are investigated indoors in a semi-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-C-2004. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Emissions are also investigated with the receive antenna horizontally and vertically polarized.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.

A half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB].

The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power}_{[\text{Watts}]})$.

Note: Reference test setup 1

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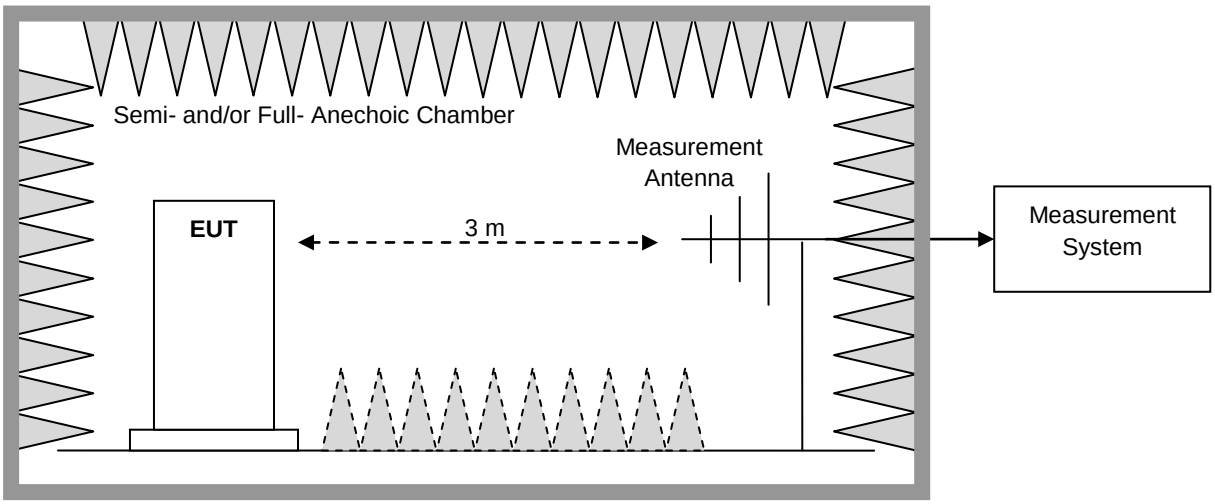
4.5 Test Setups

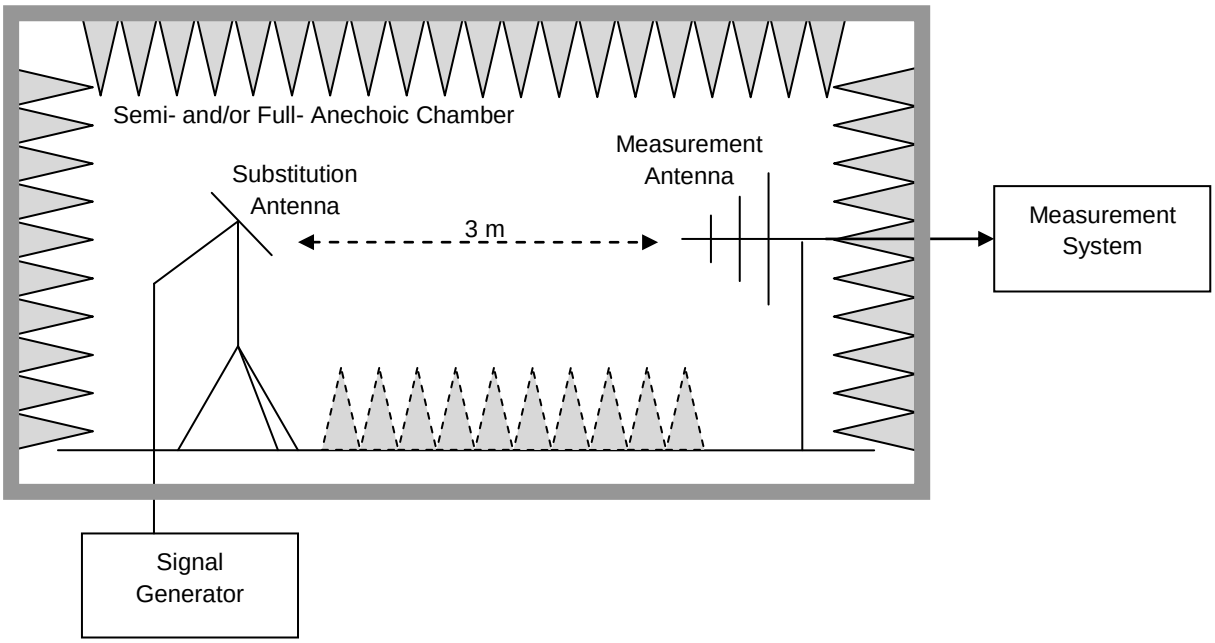
4.5.1 Test Setup 1

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

4.5.1.1 Step 1: Pre-test



4.5.1.2 Step 2: Substitution method to verify the maximum ERP



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4.6 Test Conditions

Test Case	Test Conditions	
Field Strength of Spurious Radiation	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Test Mode	CDMA 1X/TM1, CDMA 1X/TM3 NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)

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5 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal. Due
Power supply	KEITHLEY	2303	1288003	2012-11-19	2014-11-18
Universal Radio Communication Tester	R&S	CMU200	123299	2012-09-20	2013-09-19
Spectrum Analyzer	Agilent	E4440A	MY48250119	2012-08-20	2013-08-19
Signal Analyzer	R&S	FSQ31	200021	2012-11-09	2013-11-08
Spectrum Analyzer	Agilent	N9030A	MY49431698	2012-11-09	2013-11-08
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	2012-11-09	2013-11-08
Temperature Chamber	WEISS	WKL64	5624600294001 0	2013-01-29	2014-01-28
Signal generator	Agilent	E8257D	MY49281095	2012-09-14	2013-09-13
Vector Signal Generator	R&S	SMU200A	104162	2012-10-16	2013-10-15
Spectrum analyzer	R&S	FSU3	200474	2013-01-29	2014-01-28
Spectrum analyzer	R&S	FSU43	100144	2013-01-29	2014-01-28
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2013-02-02	2014-02-01
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-521	2011-12-09	2013-12-08
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	00091989	2011-10-20	2013-10-19
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100262	2013-03-.23	2015-03-22
150M－1G Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA 9117	9117-213	2013-02-02	2014-02-01
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	2011-10-12	2013-10-11
Universal Radio Communication Tester	R & S	CMW500	126855	2012-08-06	2013-08-05

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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
Transmit Output Power Data	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

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