

FCC Part22H Test Report

Product Name : Wireless Module
Model No. : MC7354B
FCC ID : N7NMC7354B
IC : 2417C-MC7354B

Applicant : Sierra Wireless Inc.
Address : 13811 Wireless Way Richmond, British Columbia,
Canada, V6V 3A4.

Date of Receipt : Jun. 08, 2015
Test Date : Jun. 08, 2015~ Jun. 23, 2015
Issued Date : Jun. 25, 2015
Report No. : 1560266R-HP-US-P07V02
Report Version : V 1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by any agency of the government.

The test report shall not be reproduced without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : Jun. 25, 2015

Report No. : 1560266R-HP-US-P07V02



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Applicant : Sierra Wireless Inc.

Address : 13811 Wireless Way Richmond, British Columbia, Canada,
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Manufacturer : Sierra Wireless Inc.

Address : 13811 Wireless Way Richmond, British Columbia, Canada,
V6V 3A4.

Model No. : MC7354B

FCC ID : N7NMC7354B

IC : 2417C-MC7354B

EUT Voltage : DC 5V

Applicable Standard : FCC CFR Title 47 Part 2, TIA/EIA 603-D
FCC Part22 Subpart H
Industry Canada RSS-132, Issue 3

Test Result : Complied

Performed Location : Suzhou EMC Laboratory
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TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: 800392; IC Lab Code: 4075B

Documented By : _____

Reviewed By : _____

Approved By : _____

Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	:	BSMI, NCC, TAF
USA	:	FCC
Japan	:	VCCI

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://www.quietek.com/english/about/certificates.aspx?bval=5>
The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1560266R-HP-US-P07V02	V1.0	Initial Issued Report Mod	Jun. 25, 2015

1. General Information

1.1. EUT Description

Product Name	Wireless Module
Model No.	MC7354B
EUT Voltage	DC 5V
3G	
Support Band	WCDMA Band 5
Uplink	WCDMA Band 5: 824~849MHz
Downlink	WCDMA Band 5: 869~894MHz
Release Version	Rel-8
Type of modulation	QPSK for Uplink
Antenna Type	Dipole
Antenna Gain	Band 5: 1dBi

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: WCDMA Band V Link

Note:

1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.
3. RMC 12.2Kbps Mode for WCDMA band V only these modes were used for all tests.

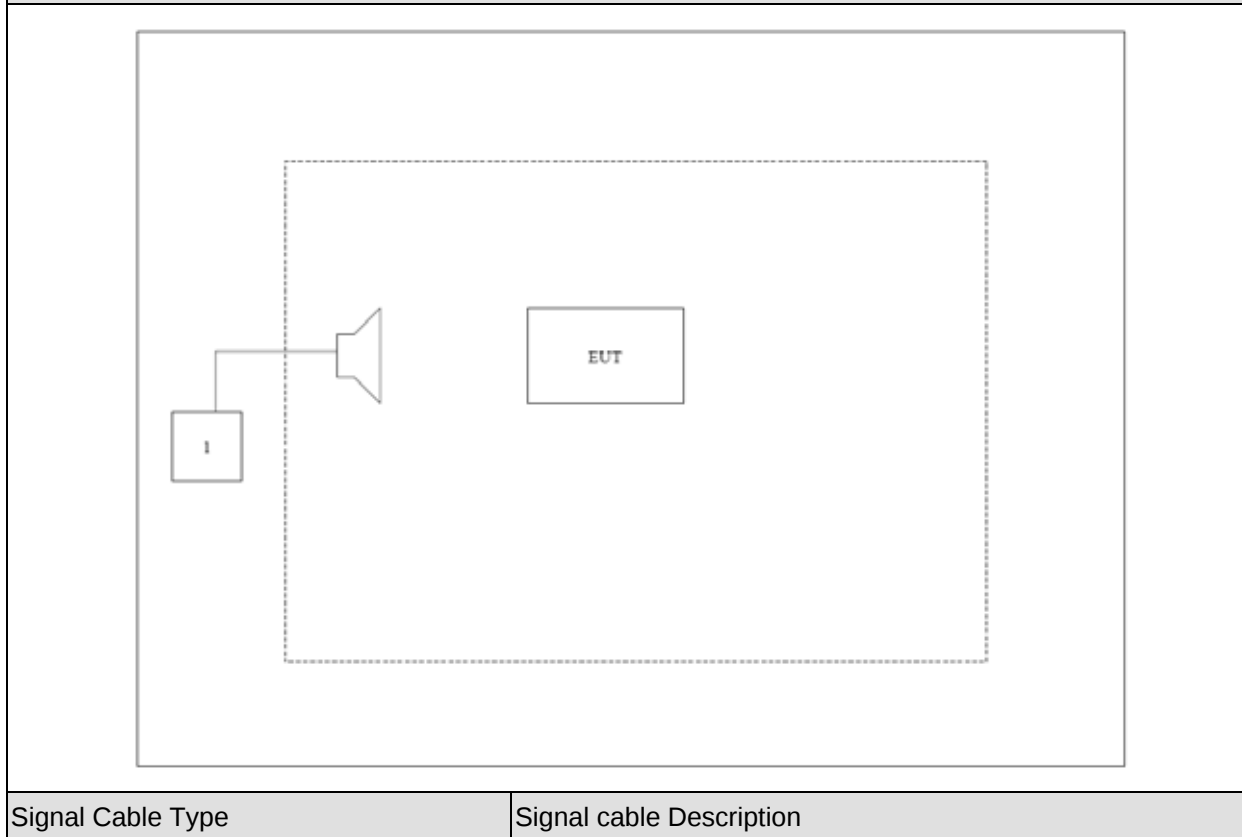
1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Radio Communication Tester	R&S	CMU 200	106388	N/A

1.4. Configuration of Tested System

Connection Diagram



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	EUT Communicate with CMU200, then select channel to test.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

For WCDMA Band V

(FCC Part 22 Subpart H, Industry Canada RSS-132, Issue 3, Industry Canada RSS-GEN Issue 4)

Performed Item	FCC Rule	IC Rule	Limit	Result
Maximum Output Power	§2.1033 §2.1046 §22.913	§5.4	< 7 Watts	Pass
Equivalent Isotropic Radiated Power	§22.913	§5.4	< 7 Watts	Pass
Modulation characteristics	§2.1047	§5.2	N/A	Pass
Occupied Bandwidth	§2.1049	RSS-GEN §4.2	N/A	Pass
Conducted Band Edge Emissions	§22.917	§5.5	< -13dBm	Pass
Field Strength of Spurious Radiation	§2.1053 §§22.917	§5.5	< -13dBm	Pass
Frequency Stability Under Temperature & Voltage Variations	§2.1055 §22.335	§5.3	< 2.5 ppm	Pass

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	23
Humidity (%RH)	25-75	52
Barometric pressure (mbar)	860-1060	950-1000

3. Maximum Output Power and Effective Isotropic Radiated Power Measurement

3.1. Test Equipment

Peak Conducted Output Power / AC-6

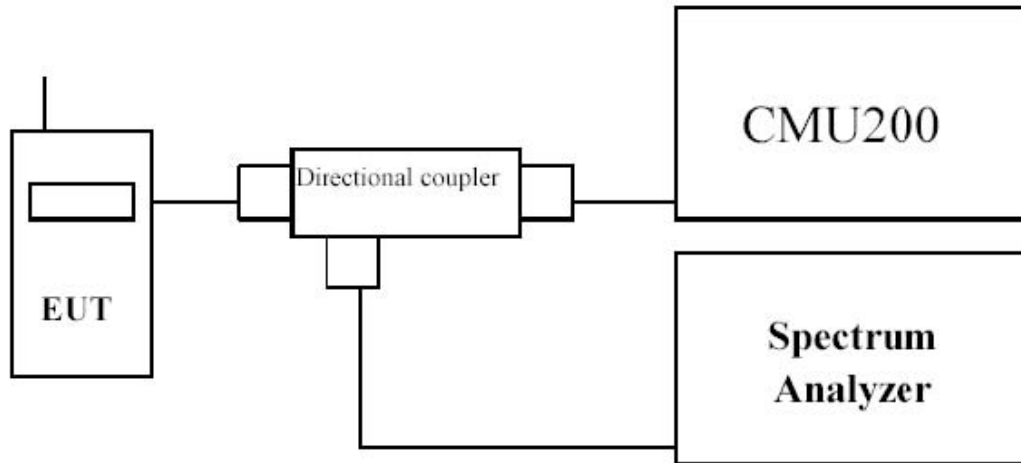
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

Peak Radiated Output Power / AC-5

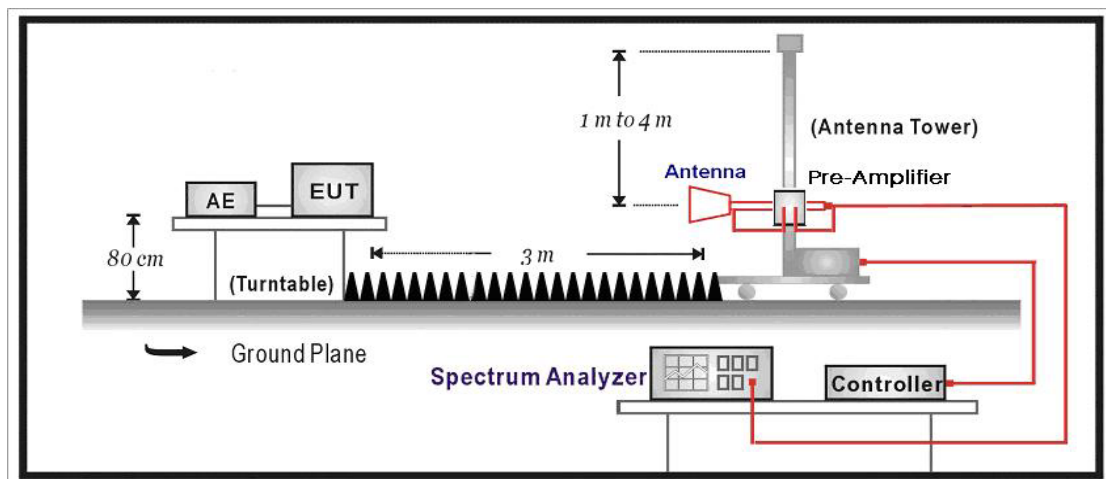
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Preamplifier	Miteq	NSP1800-25	1364185	2016/05/03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016/05/03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2016/10/15
DRG Horn	ETS-Lindgren	3117	00123988	2016/01/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016/03/10
EMI Receiver	Agilent	N9038A	MY51210196	2015/08/07
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016/01/07

3.2. Test Setup

Conducted Power Measurement:



Radiated Power Measurement:



3.3. Test Procedure

For Conducted Power Measurement:

- The RF output of the transmitter was connected to base station simulator.
- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement..
- Set EUT at maximum average power by base station simulator.
- Measure lowest, middle, and highest channels for each bandwidth and different modulation.

For Effective Isotropic Radiated Power Measurement:**Radiated Power Measurement:**

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q) Test site anechoic chamber refer to ANSI C63.4: 2009.

3.4. Uncertainty

The measurement uncertainty is defined as for Conducted Power Measurement ± 1.2 dB, for Radiated Power Measurement ± 3.2 dB

3.5. Test Result

Product	Wireless Module		
Test Item	Maximum Output Power		
Date of Test	2015/06/18	Test Site	TR-8

Mode	3GPP Subtest	Band V (850MHz) Channel			MPR
		Conducted Power (dBm)			
		4132	4182	4233	
WCDMA R99	1	23.31	23.18	23.05	N/A
Rel5 HSDPA	1	23.25	23.14	23.01	0
	2	23.22	23.15	23.03	0
	3	22.73	22.65	22.50	0.5
	4	22.69	22.61	22.51	0.5
Rel6 HSUPA	1	23.08	23.03	22.91	0.0
	2	21.03	20.98	20.92	2.0
	3	22.06	21.96	21.95	1.0
	4	20.99	20.96	20.95	2.0
	5	23.05	22.97	22.93	0.0
Rel7 HSPA+	1	22.32	22.17	22.06	2.5
Rel5 HSDPA	1	23.23	23.12	23.02	0
	2	23.19	23.14	23.04	0
	3	22.73	22.13	22.49	0.5
	4	22.70	22.11	22.48	0.5

Note: All conducted measurements are based on a RMS detector.

Product	Wireless Module		
Test Item	Effective Isotropic Radiated Power		
Date of Test	2015/06/19	Test Site	AC-5

Radiated Power EIRP/ERP				
Band	Modulation	Freq. (MHz)	EIRP (dBm)	H/V
WCDMA Band 5	QPSK	826.4	24.56	H
		836.4	24.41	H
		846.6	24.33	H
		826.4	22.12	V
		836.4	22.01	V
		846.6	21.89	V

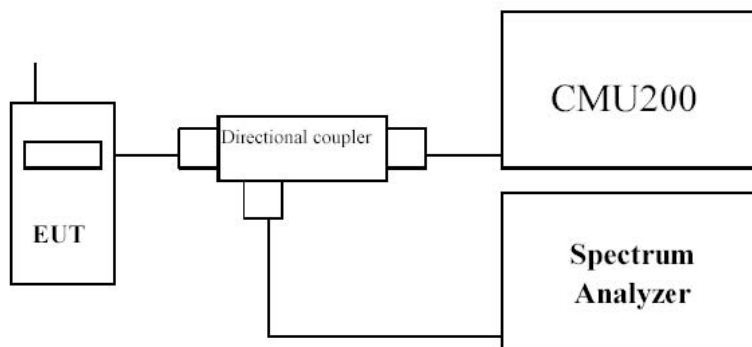
4. Modulation Characteristic

4.1. Test Equipment

Modulation Characteristic / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

4.2. Test Setup



4.3. Uncertainty

The measurement uncertainty is defined as 0.1%

4.4. Test Result

The modulation of GSM/WCDMA was verified and confirmed compliance with requirement.

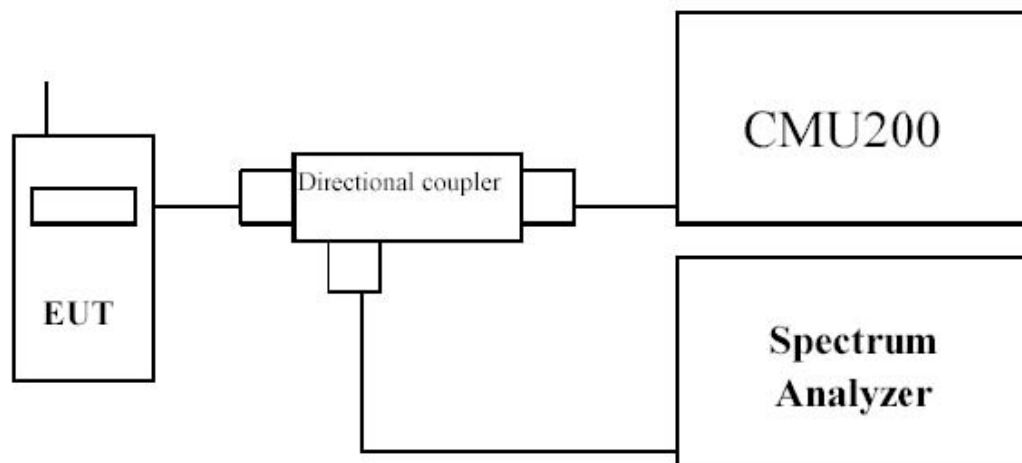
5. Occupied Bandwidth

5.1. Test Equipment

Occupied Bandwidth / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

5.2. Test Setup



5.3. Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth and 26 dB bandwidth of the low & middle & high channel for the highest RF powers were measured.

5.4. Uncertainty

The measurement uncertainty is defined as ± 10 Hz

5.5. Test Result

Product	Wireless Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: WCDMA Band V Link		
Date of Test	2015/06/19	Test Site	AC6

Channel No.	Frequency (MHz)	-26dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
4132	826.4	4262.0	4151.3
4182	836.4	4617.0	4156.3
4233	846.6	4626.0	4132.2

Figure Channel 4132 (826.40MHz)

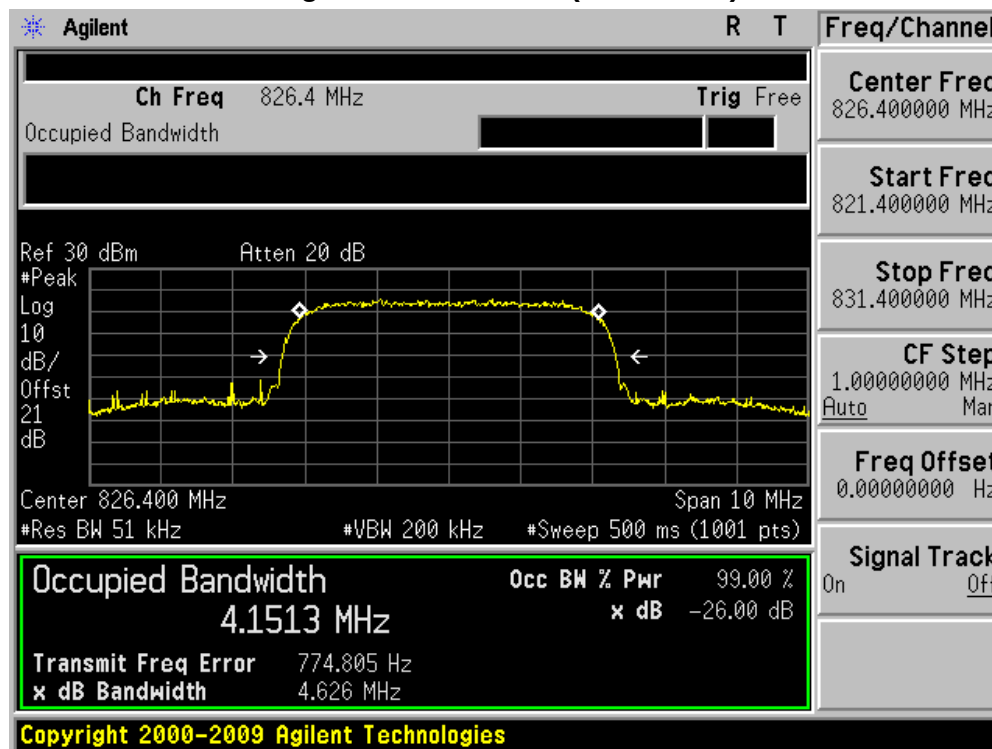


Figure Channel 4182 (836.40MHz)

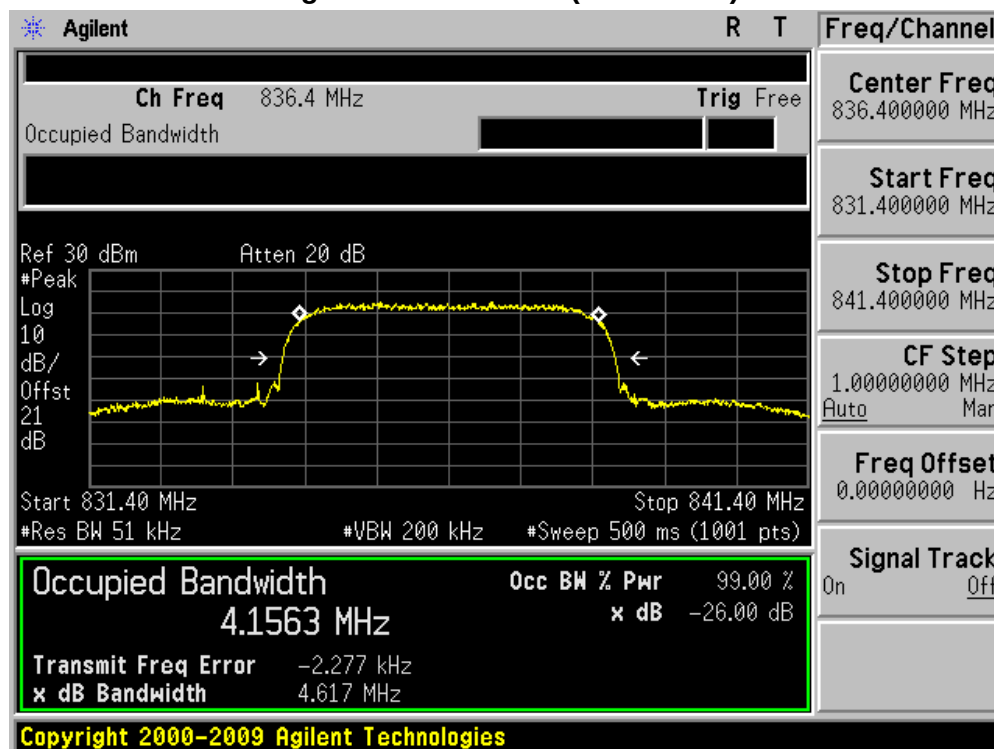
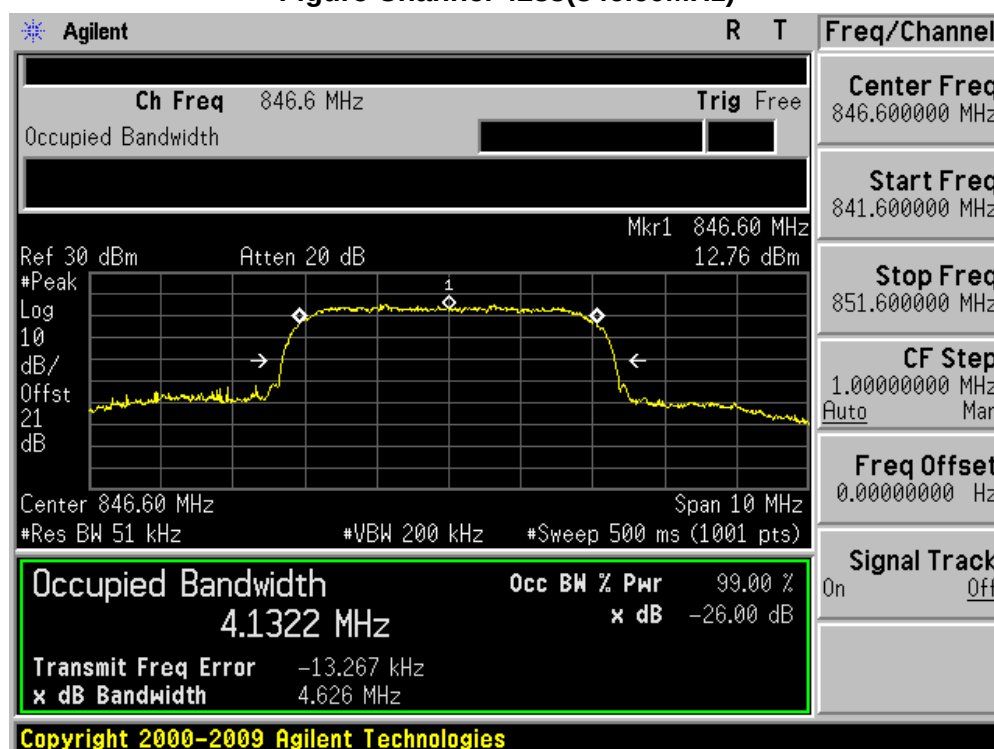


Figure Channel 4233(846.60MHz)



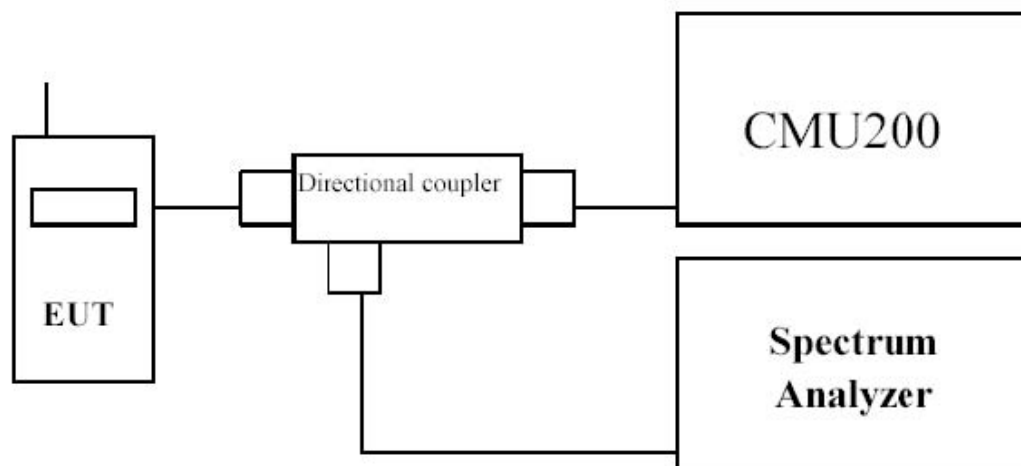
6. Conducted Band Edge

6.1. Test Equipment

Conducted Band Edge / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

6.2. Test Setup



6.3. Test Procedure

1. The EUT was connected to spectrum analyzer and System Simulator via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The conducted spurious emission for the whole frequency range was taken.
4. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

6.4. Uncertainty

The measurement uncertainty is defined as ± 1.2 dB.

6.5. Test Result

Product	Wireless Module		
Test Item	Conducted Band Edge		
Test Mode	Mode 1: WCDMA Band V Link		
Date of Test	2015/06/19	Test Site	AC6

Figure Channel 4132 (826.40MHz)

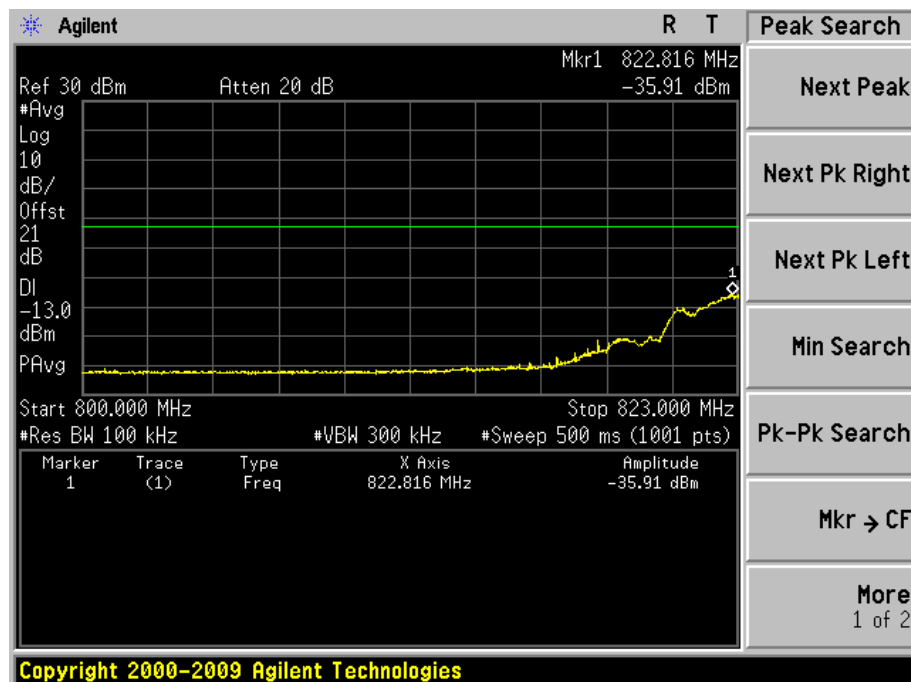
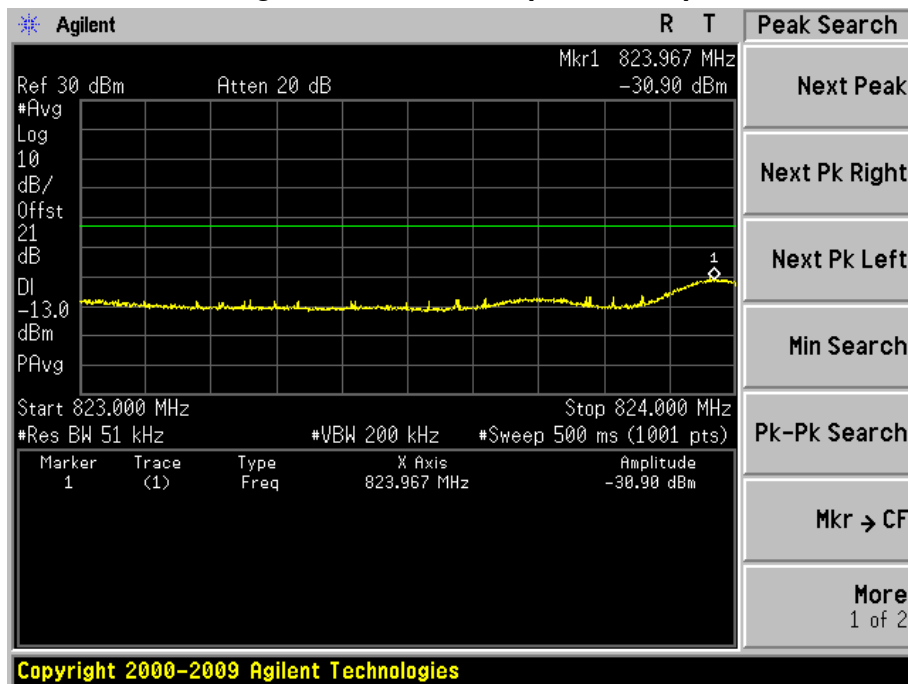
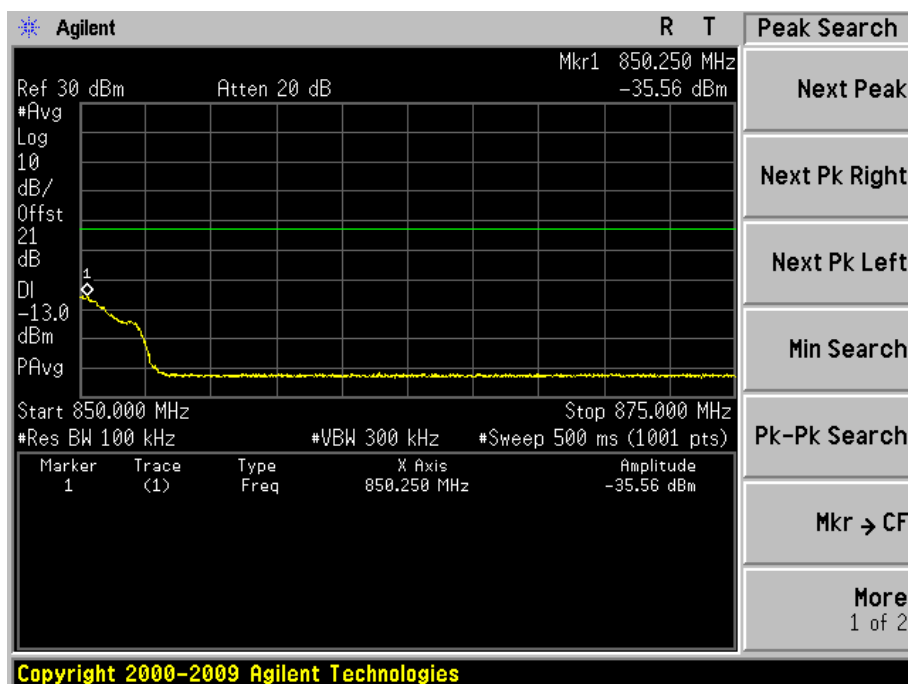
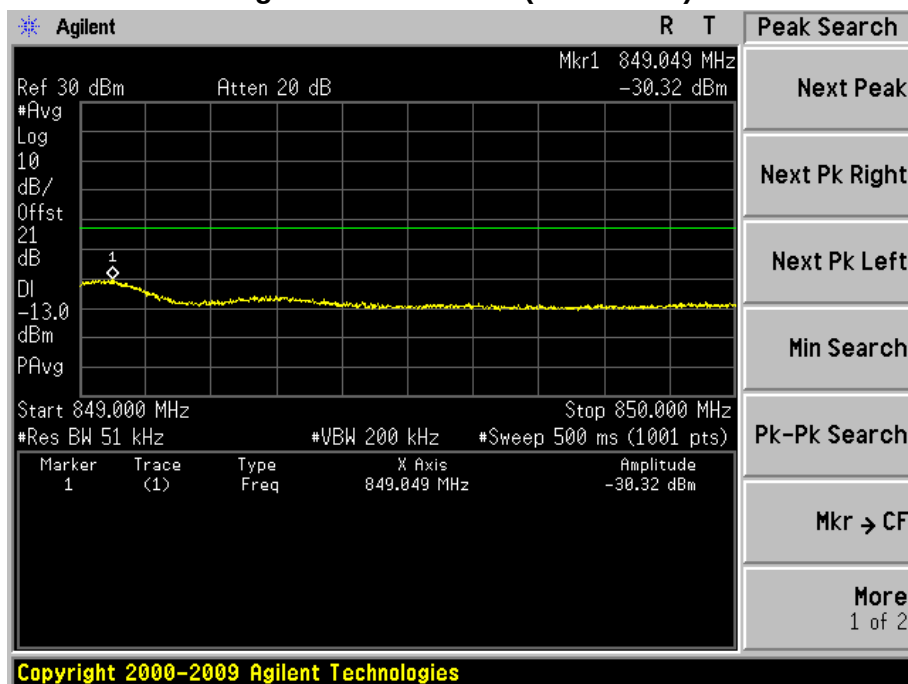


Figure Channel 4233 (846.60MHz)



7. Spurious Emission

7.1. Test Equipment

Conducted Emission / AC-6

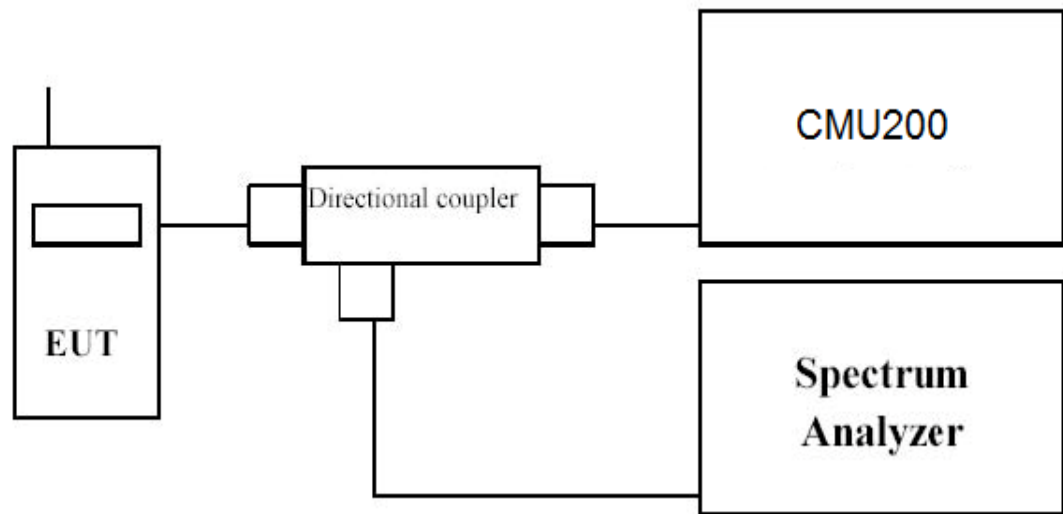
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

Radiated Spurious Emission / AC-5

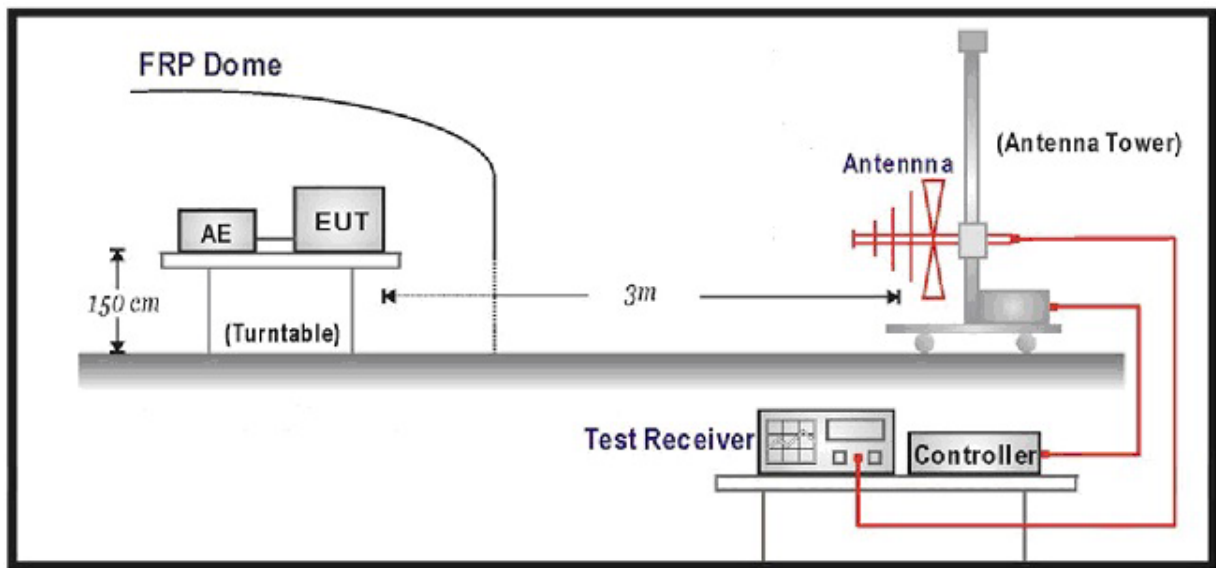
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
EMI Receiver	Agilent	N9038A	MY51210196	2015/08/07
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
PSG Analog Signal Generator	Agilent	E8257D	MY44321116	2016/03/10
Preamplifier	QuieTek	AP-025C	CHM-0503006	2016/04/11
Preamplifier	Miteq	NSP1800-25	1364185	2016/05/03
DRG Horn	ETS-Lindgren	3117	00123988	2016/01/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016/03/01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016/03/10
EMI Receiver	Agilent	N9038A	MY51210196	2016/01/07
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016/01/07

7.2. Test Setup

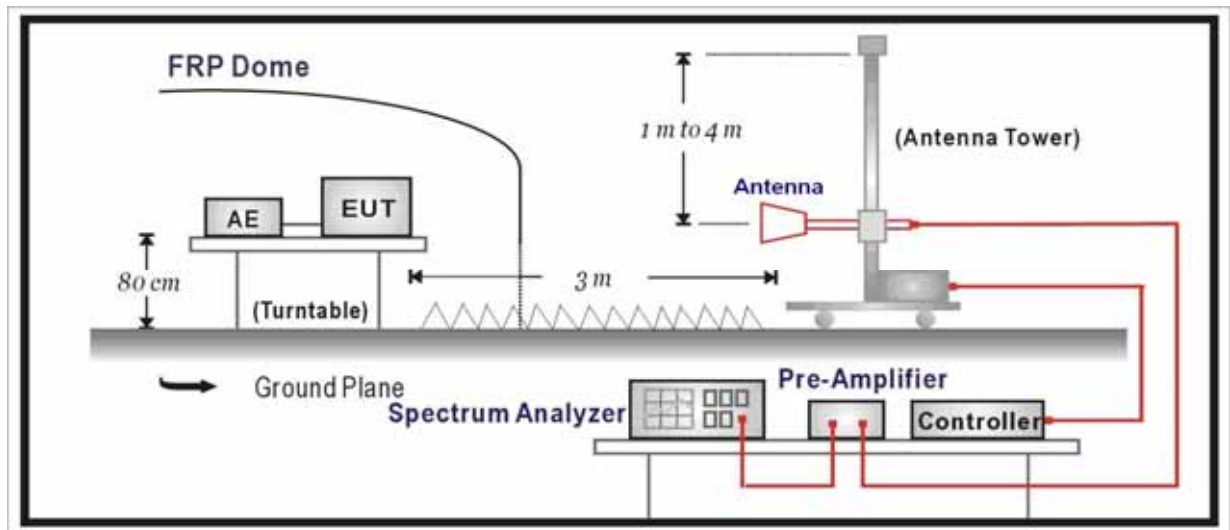
Conducted Spurious Measurement: below 1GHz



Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



7.3. Test Procedure

Conducted Spurious Measurement:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.
- c) EUT Communicate with CMU200, then select a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.
- e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

Radiated Spurious Measurement:

- f) The EUT was placed on a rotatable wooden table with 1.5 meter above ground.
- g) The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- h) The table was rotated 360 degrees to determine the position of the highest spurious emission.
- i) The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
- j) Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 1MHz, Sweep 500ms, Taking the record of maximum spurious emission.
- k) A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- l) Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- m) Taking the record of output power at antenna port
- n) Repeat step 7 to step 8 for another polarization.I receiver.
- o) $EIRP = SG - \text{Cable loss} + \text{Antenna Gain}$

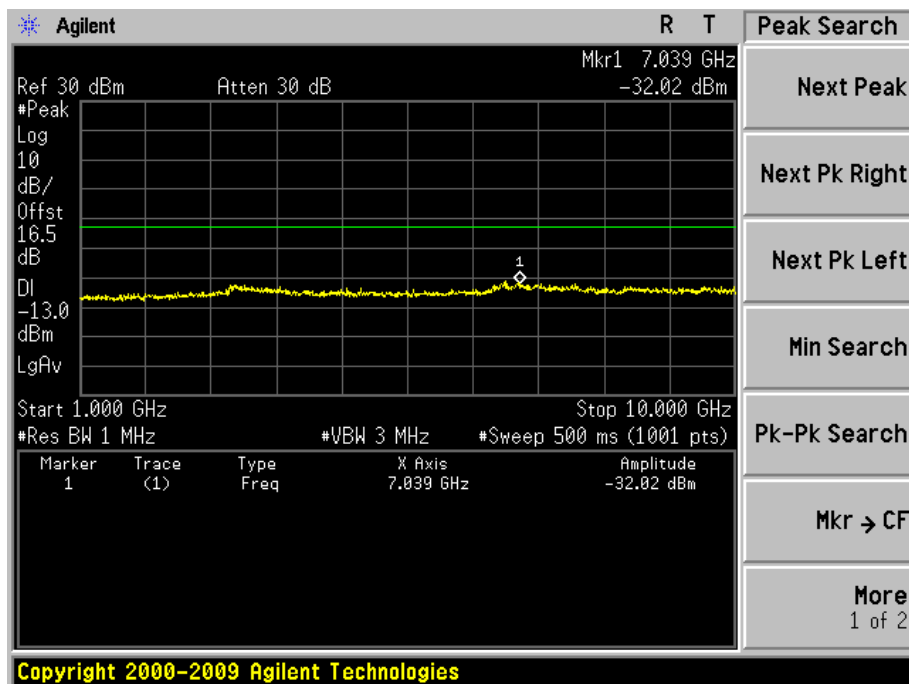
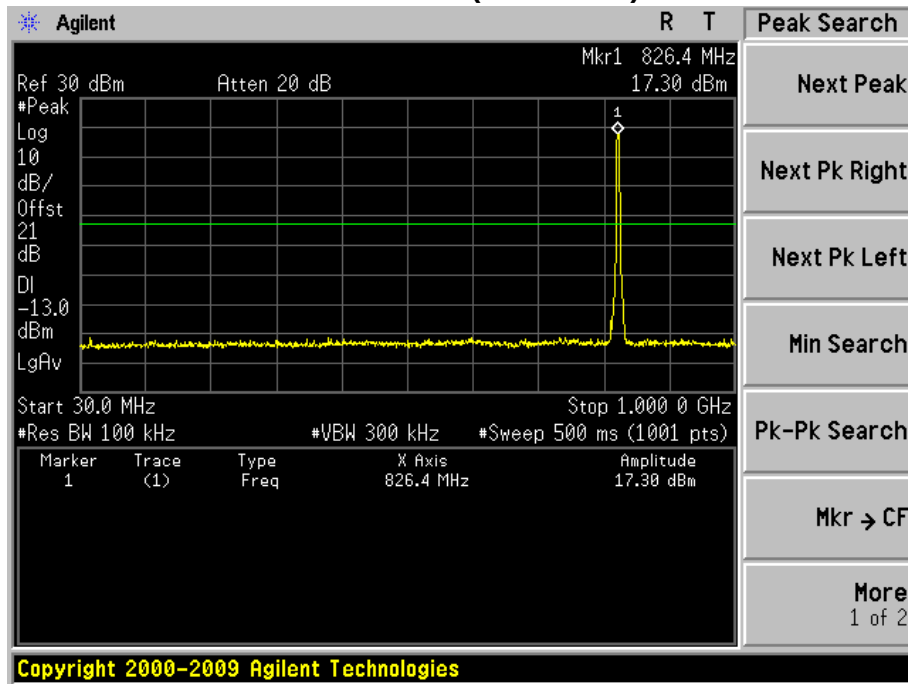
7.4. Uncertainty

The measurement uncertainty is defined as 3.2 dB for Radiated Power Measurement.

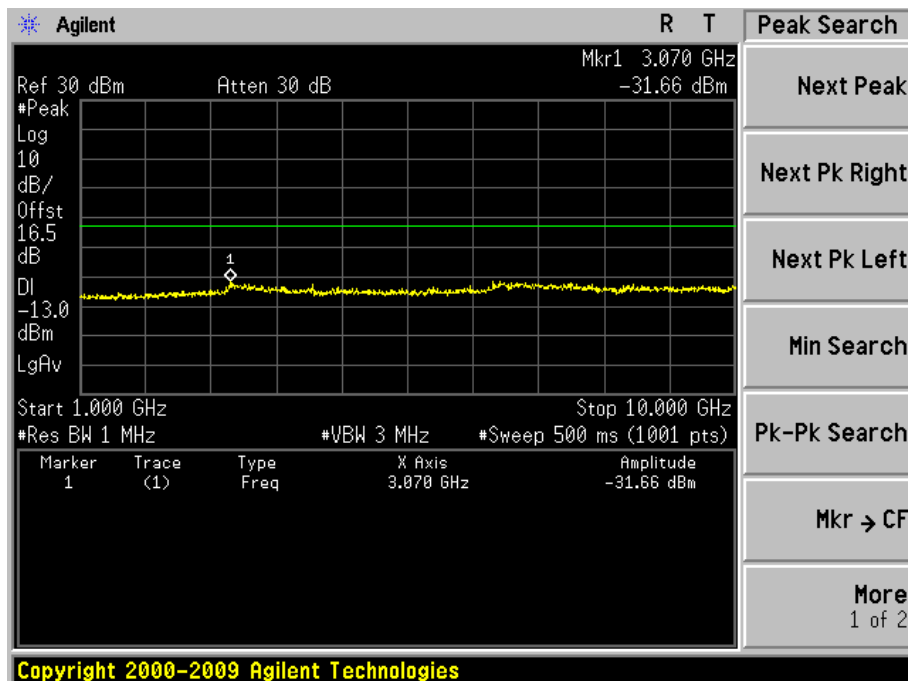
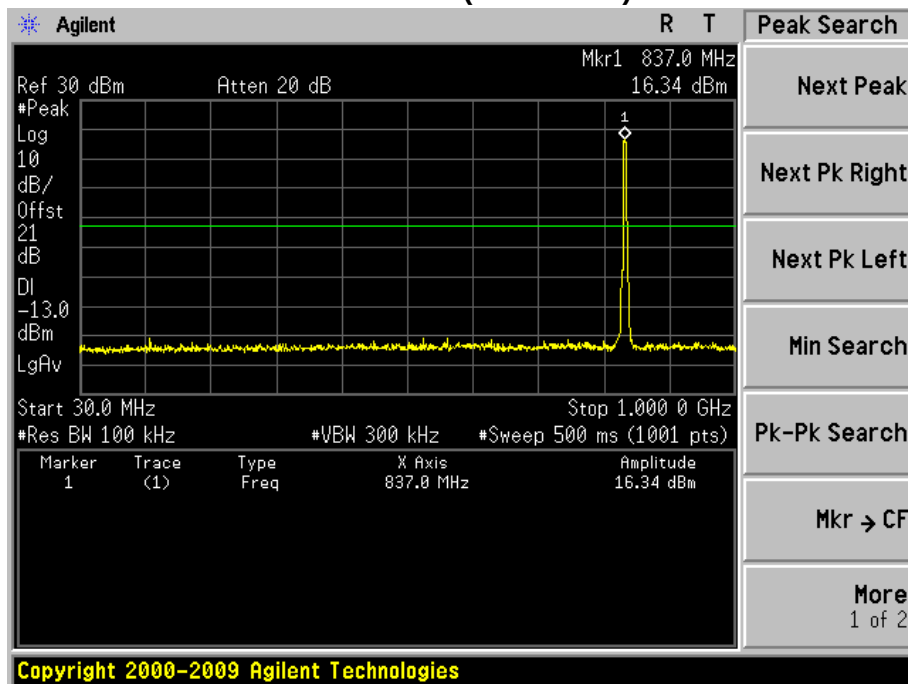
7.5. Test Result

Product	Wireless Module		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 6: WCDMA Band V Link		
Date of Test	2015/06/19	Test Site	TR8

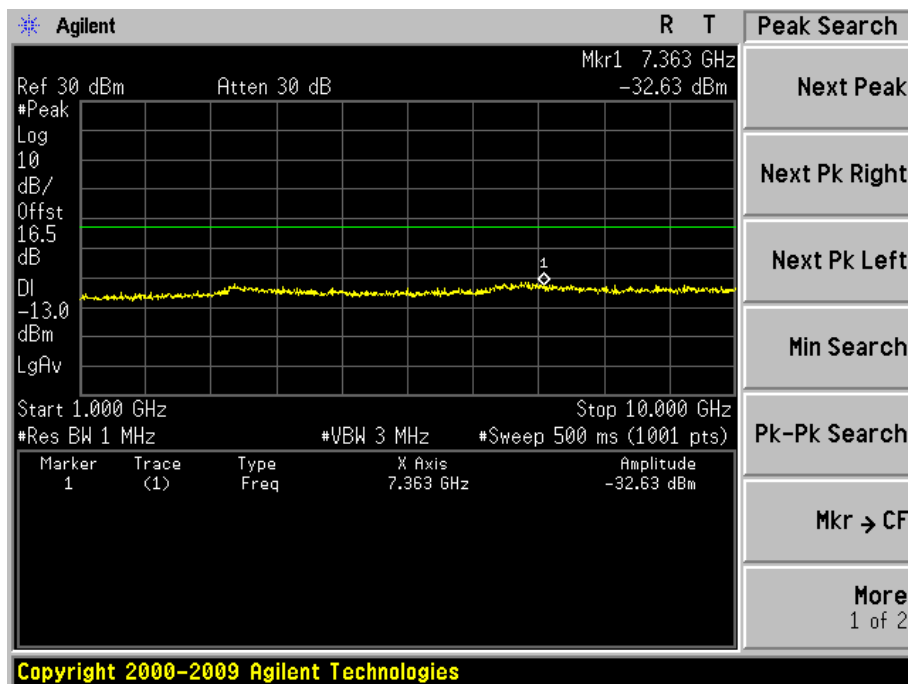
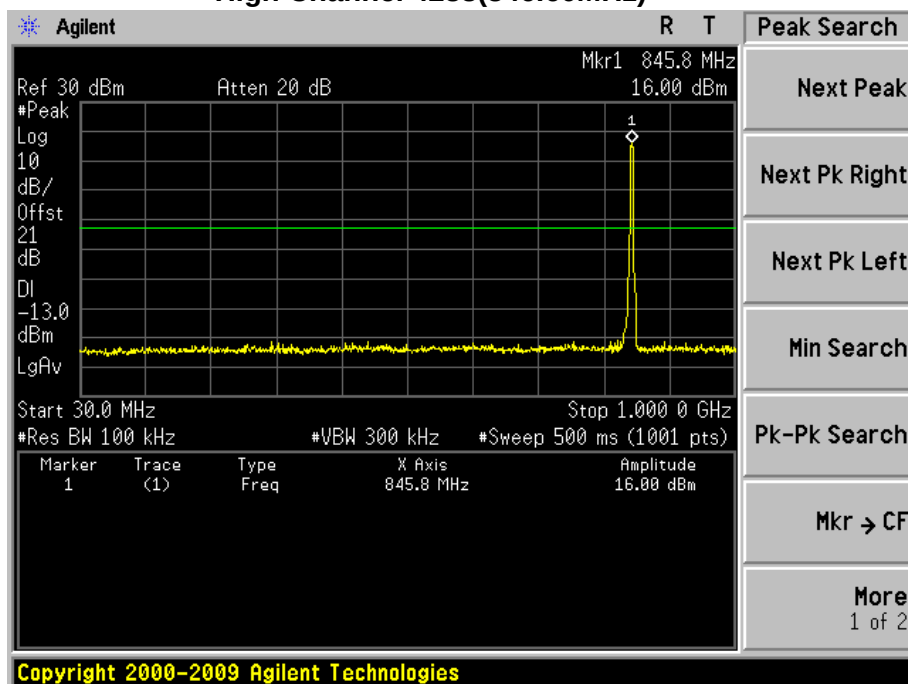
Low Channel 4132(826.40MHz)



Mid Channel 4182(836.40MHz)



High Channel 4233(846.60MHz)



Product	Wireless Module		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 1: WCDMA Band V Traffic		
Date of Test	2015/06/19	Test Site	AC5

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 4132 (826.40MHz)								
1654.50	-57.82	V	-59.59	3.28	9.75	-53.12	-13.00	-40.12
2479.20	-66.40	V	-62.05	4.10	10.48	-55.67	-13.00	-42.67
1654.50	-58.53	H	-60.28	3.28	9.75	-53.81	-13.00	-40.81
2479.00	-67.72	H	-62.17	4.10	10.48	-55.79	-13.00	-42.79
Middle Channel 4182 (836.40MHz)								
1671.50	-59.94	V	-61.53	3.32	9.95	-54.90	-13.00	-41.90
2513.00	-64.21	V	-62.07	4.31	10.62	-55.76	-13.00	-42.76
1671.50	-59.31	H	-61.18	3.32	9.95	-54.55	-13.00	-41.55
2513.00	-63.63	H	-61.88	4.31	10.62	-55.57	-13.00	-42.57
High Channel 4233 (846.60MHz)								
1697.00	-63.18	V	-64.44	3.35	10.06	-57.73	-13.00	-44.73
2539.80	-63.55	V	-60.79	3.91	10.33	-54.37	-13.00	-41.37
1697.00	-62.95	H	-64.66	4.19	10.68	-58.17	-13.00	-45.17
2538.50	-64.02	H	-61.58	4.33	10.79	-55.12	-13.00	-42.12

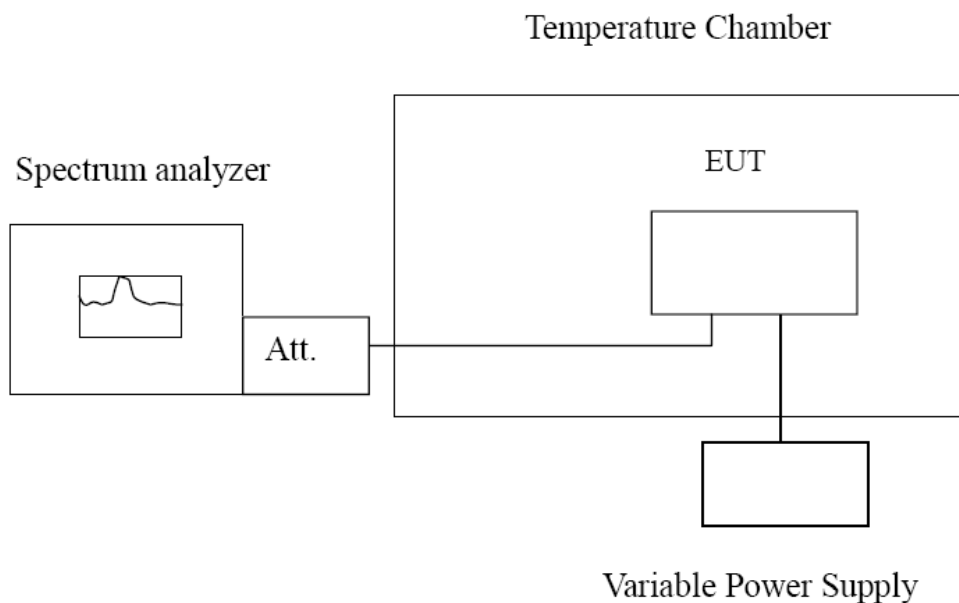
8. Frequency Stability Under Temperature & Voltage Variations

8.1. Test Equipment

Frequency Stability Under Temperature & Voltage Variations / TR-7

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016/03/10
Radio Communication Tester	R&S	CMU 200	117088	2016/03/10
Dual Directional Coupler	Agilent	778D	20160	2016/03/10
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/10
DC Power Supply	IDRC	CD-035-020PR	977272	2016/03/10
Temperature & Humidity Chamber	Gaoyu	TH-1P-B	WIT-05121302	2016/01/07
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2016/01/07

8.2. Test Setup



8.3. Test Procedure

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

8.4. Uncertainty

The measurement uncertainty is defined as ± 10 Hz.

8.5. Test Result

Product	Wireless Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: WCDMA Band V Link		
Date of Test	2015/06/19	Test Site	TR7

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	836.40	33	± 2091
-20	836.40	-54	± 2091
-10	836.40	-64	± 2091
0	836.40	77	± 2091
10	836.40	48	± 2091
20	836.40	-38	± 2091
30	836.40	-65	± 2091
40	836.40	44	± 2091
50	836.40	-48	± 2091

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
5.25	836.40	-55	± 2091
5.00	836.40	38	± 2091
4.75	836.40	49	± 2091

_____ The End _____