FCC TEST REPORT

FCC Part 22 / Part 24 / Part 27

Report Reference No.....:	**LCS180124013AEB**
FCC ID.....:	**2AG6GH8956**
Date of Issue. .....:	**March 15, 2018**
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address .....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....:	**Hongdian Corporation**
Address .....:	14-16, Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China, 518112
Test specification .....**:**	
Standard .....:	**FCC Part 22: Public Mobile Services** **FCC Part 24: Personal Communication Services** **FCC Part 27: Miscellaneous Wireless Communications Services**
Test Report Form No .....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....:	Dated 2011-03

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Test item description .....:	**Cellular Wi-Fi Router**
Trade Mark .....:	宏电 Hongdian
Model/Type reference.....:	H8956
Listed Models .....:	H8956-4GSPT, H8956-4GVZW, H8956-NM, H8956-4GEU
Ratings .....:	DC 12V, 1.5A by AC/DC Adapter
Hardware version .....:	V31
Software version .....:	V703SE
Frequency.....	UMTS Band II / UMTS Band IV / UMTS Band V
Result.....:	**PASS**

Compiled by:	**Supervised by:**	**Approved by:**
Aking Jin	Dick Su	Gavin Liang
Aking Jin/ File administrators	Dick Su/ Technique principal	Gavin Liang/ Manager

T E S T R E P O R T

Test Report No. :	LCS180124013AEB	March 15, 2018 Date of issue

Equipment under Test	:	Cellular Wi-Fi Router
Model /Type	:	H8956
Listed Models	:	H8956-4GSPT, H8956-4GVZW, H8956-NM, H8956-4GEU
Applicant	:	**Hongdian Corporation**
Address	:	14-16, Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China, 518112
Manufacturer	:	**Hongdian Corporation**
Address	:	14-16, Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China, 518112
Factory	:	**Hongdian Corporation**
Address	:	14-16, Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China, 518112

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revisions	Revised By
00	March 15, 2018	Initial Issue	Gavin Liang

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 22: Private Land Mobile Radio Services.
FCC Part 24: Public Mobile Services.
FCC Part 27: Miscellaneous Wireless Communications Services.
ANSI C63.26:2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
47 CFR FCC Part 15 Subpart B: Unintentional Radiators.
FCC Part 2: Frequency Allocations And Radio Treaty Matters: General Rules And Regulations.
ANSI C63.4:2014: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
FCC KDB971168D01 Power Meas License Digital Systems.

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2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	January 12, 2018
Testing commenced on	:	January 12, 2018
Testing concluded on	:	March 15, 2018

2.2 Product Description

The **Hongdian Corporation**'s Model: H8956 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Cellular Wi-Fi Router
Model Number	H8956, H8956-4GSPT, H8956-4GVZW, H8956-NM, H8956-4GEU
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Test Model	H8956
Power Supply	DC 12V, 1.5A by AC/DC Adapter
Modulation Type	QPSK for UMTS, QPSK, 16QAM for LTE
Antenna Gain	3.0dBi (max.) For all WCDMA Band; 3.0dBi (max.) For all LTE Band; 3.0dBi (max.) For WLAN
Hardware version	V31
Software version	V703SE
UMTS Operation Frequency Band	UMTS FDD Band II/IV/V
LTE Operation Frequency Band	FDD: Band 2, Band 4, Band 5, Band 12, Band 13, Band 25, Band 26, Band 29 (Downlink Only), Band 30 TDD: Band 41
WCDMA Release Version	R99
HSDPA Release Version	Release 9
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
LTE Release Version	R7
LTE/UMTS Power Class	Level 3
WLAN FCC Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
WLAN FCC Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz
Antenna Type	R-SMA Antenna
Extreme temp. Tolerance	-20°C to +60°C
Extreme vol. Limits	102VAC to 132VAC (nominal: 120 VAC)

2.3 Equipment under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 12.0V Adapter from AC 120V/60Hz

Test frequency list

Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band V	TX	Channel 4132	Channel 4183	Channel 4233
		826.4 MHz	836.6 MHz	846.6 MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz
Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band II	TX	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz
Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band IV	TX	Channel 1312	Channel 1413	Channel 1513
		1712.4 MHz	1732.6 MHz	1752.6 MHz
	RX	Channel 1537	Channel 1638	Channel 1738
		2112.4 MHz	2132.6 MHz	2152.6 MHz

2.4 Short description of the Equipment under Test (EUT)

2.4.1 General Description

H8956 is subscriber equipment in the WCDMA/LTE system. The HSPA/UMTS frequency band is Band II/IV/V, LTE frequency band is Band 2, Band 4, Band 5, Band 12, Band 13, Band 25, Band 26, Band 29 (Downlink Only), Band 30, Band 41, but only WCDMA frequency Band II, Band IV and Band V test data included in this report. The Cellular Wi-Fi Router implements such functions as RF signal receiving/transmitting, HSPA/UMTS protocol processing. Externally it provides SIM card interface.

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.

2.5 Internal Identification of AE used during the test

AE ID*	Description
AE1	Adapter

AE1
Model: TS-A018-120015CB
INPUT: AC100-240V 50/60Hz 0.6A
OUTPUT: DC 12.0V 1.5A

*AE ID: is used to identify the test sample in the lab internally.

2.6 Normal Accessory setting

AC/DC Adapter was used during the test.

2.7 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AG6GH8956** filing to comply with FCC Part 22, Part 24 and Part 27 Rules.

2.9 Modifications

No modifications were implemented to meet testing criteria.

2.10 General Test Conditions/Configurations

2.10.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
UMTS/TM1	WCDMA system, QPSK modulation
UMTS/TM2	HSDPA system, QPSK modulation
UMTS/TM3	HSUPA system, QPSK modulation

Note:
1. As WCDMA, HSDPA with the same emission designator, test result recorded in this report at the worst case UMTS/TM1 only after exploratory scan.

2.10.2 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	108V
	VN	120V
	VH	132V

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

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen LCS Compliance Testing Laboratory Ltd

1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
The sites are constructed in conformance with the requirements of ANSI C63.4 (2014) and CISPR Publication 22.

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001.
NVLAP Registration Code is 600167-0.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

(1)expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.4 Test Description

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

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§ 2.1046, § 22.913	FCC: ERP ≤ 7W.	PASS
Modulation Characteristics	§ 2.1047	Digital modulation	N/A
Bandwidth	§ 2.1049	OBW: No limit. EBW: No limit.	PASS
Band Edges Compliance	§ 2.1051, § 22.917	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	PASS
Spurious Emission at Antenna Terminals	§ 2.1051, § 22.917	≤ -13dBm/1MHz, from 9 KHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
Field Strength of Spurious Radiation	§ 2.1053, § 22.917	≤ -13dBm/1 MHz.	PASS
Frequency Stability	§ 2.1055, § 22.355	≤ ±2.5ppm.	PASS
Peak-Average Ratio	§ 22.913	≤ -13	PASS
Receiver Spurious Emissions	N/A	--	PASS
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”.			

3.4.2 PCS Band (1850-1915MHz paired with 1930-1995MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§ 2.1046, § 24.232	EIRP ≤ 2W	PASS
Peak-Average Ratio	§ 2.1046, § 24.232	≤13dB	PASS
Modulation Characteristics	§ 2.1047	Digital modulation	N/A
Bandwidth	§ 2.1049	OBW: No limit. EBW: No limit.	PASS
Band Edges Compliance	§ 2.1051, § 24.238	≤ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block.	PASS
Spurious Emission at Antenna Terminals	§ 2.1051, § 24.238	≤-13dBm/1MHz, from 9 KHz to10th harmonics but outside authorized Operating frequency ranges.	PASS
Field Strength of Spurious Radiation	§ 2.1053, § 24.238	≤ -13dBm/1MHz.	PASS
Frequency Stability	§ 2.1055, § 24.235	≤ ±2.5ppm.	PASS
Receiver Spurious Emissions	N/A	--	PASS
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”.			

3.4.3 AWS Band (1710-1755MHz pairedwith 2110-2155MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§ 2.1046, § 27.50 (d) (4)	EIRP ≤ 1W	PASS
Peak-Average Ratio	§ 2.1046, § 27.50 (d) (5)	Limit≤13dB	PASS
Modulation Characteristics	§ 2.1047	Digital modulation	N/A
Bandwidth	§ 2.1049	OBW: No limit. EBW: No limit.	PASS
Band Edges Compliance	§ 2.1051, § 27.53(h)	≤ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block.	PASS
Spurious Emission at Antenna Terminals	§ 2.1051, § 27.53(h)	≤-13dBm/1MHz, from 9 KHz to10th harmonics but outside authorized Operating frequency ranges.	PASS
Field Strength of Spurious Radiation	§ 2.1051, § 27.53(h)	≤ -13dBm/1MHz.	PASS
Frequency Stability	§ 2.1053, § 27.54	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.	PASS
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”			

Remark:

1. *The measurement uncertainty is not included in the test result.*

3.5 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2017-06-17	2018-06-16
2	Power Sensor	R&S	NRV-Z81	100458	2017-06-17	2018-06-16
3	Power Sensor	R&S	NRV-Z32	10057	2017-06-17	2018-06-16
4	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080022	2017-10-26	2018-10-25
5	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2017-10-26	2018-10-25
6	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
7	RF Control Unit	Ascentest	AT890-RFB	N/A	2017-06-17	2018-06-16
8	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-17	2018-11-16
9	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2017-06-17	2018-06-16
10	SPECTRUM ANALYZER	R&S	FSP	100503	2017-06-17	2018-06-16
11	MXG Vector Signal	Agilent	N5182A	MY47071151	2017-11-17	2018-11-16
12	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2017-11-17	2018-11-16
13	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2017-11-17	2018-11-16
14	Universal Radio Communication Tester	R&S	CMU 200	105788	2017-06-17	2018-06-16
15	WIDEBAND RADIO COMMUNICATION	R&S	CMW 500	103818	2017-06-17	2018-06-16
16	RF Control Unit	Tonscend	JS0806-1	N/A	2017-06-17	2018-06-16
17	DC Power Supply	Agilent	E3642A	N/A	2017-11-17	2018-11-16
18	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
19	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2017-10-11	2018-10-10
20	DC Source	CHROMA	62012P-80-	34782951	2017-10-11	2018-10-10
21	RF Filter	Micro-Tronics	BRC50718	S/N-017	2017-06-17	2018-06-16
22	RF Filter	Micro-Tronics	BRC50719	S/N-011	2017-06-17	2018-06-16
23	RF Filter	Micro-Tronics	BRC50720	S/N-011	2017-06-17	2018-06-16
24	RF Filter	Micro-Tronics	BRC50721	S/N-013	2017-06-17	2018-06-16
25	RF Filter	Micro-Tronics	BRM50702	S/N-195	2017-06-17	2018-06-16
26	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2017-06-17	2018-06-16
27	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2017-06-17	2018-06-16
28	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2017-06-17	2018-06-16
29	Exposure Level Tester	Narda	ELT-400	N-0713	2017-04-03	2018-04-02
30	B-Field Probe	Narda	ELT-400	M-1154	2017-04-11	2018-04-10
31	3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17	2018-06-16
32	Positioning Controller	MF	MF-7082	/	2017-06-17	2018-06-16
33	EMI Test Software	AUDIX	E3	N/A	2017-06-17	2018-06-16
34	EMI Test Receiver	R&S	ESR 7	101181	2017-06-17	2018-06-16
35	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-17	2018-11-16
36	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2017-06-23	2018-06-22
37	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-05-02	2018-05-01
38	Horn Antenna	EMCO	3115	6741	2017-06-23	2018-06-22
39	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2017-09-21	2018-09-20
40	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2017-09-21	2018-09-20
41	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-17	2018-06-16
42	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-17	2018-06-16
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

3.6 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen LCS Compliance Testing Laboratory Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen LCS Compliance Testing Laboratory Ltd. is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.70 dB	(1)
Radiated Emission	18-40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occuiped Bandwidth	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

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4 TEST CONDITIONS AND RESULTS

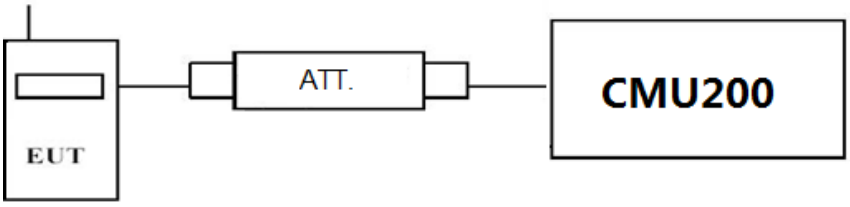
4.1 Output Power

TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMU200) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

4.1.1. Conducted Output Power

TEST CONFIGURATION



TEST PROCEDURE

Conducted Power 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 CMU200 by an Att.
c) EUT Communicate with CMU200 then selects a channel for testing.
d) Add a correction factor to the display CMU200, and then test.

TEST RESULTS

Item	band	WCDMA Band II result (dBm)			WCDMA Band V result (dBm)			WCDMA Band IV result (dBm)		
		Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)		
	sub-test	9262/ 1852.4	9400/ 1880	9538/ 1907.6	4132/ 826.4	4183/ 836.6	4233/ 846.6	1312/ 1712.4	1413/ 1732.6	1513/ 1752.6
RMC	12.2kbps	23.78	23.85	23.79	23.90	23.80	23.73	23.82	23.81	23.85
HSDPA	Sub –Test 1	23.64	23.55	23.62	23.74	23.78	23.55	23.33	23.66	23.36
	Sub –Test 2	22.77	22.45	22.33	22.36	22.26	22.65	22.54	22.23	22.52
	Sub –Test 3	21.56	21.33	21.55	21.58	21.45	21.51	21.22	21.25	21.45
	Sub –Test 4	21.25	21.05	21.25	21.36	21.33	21.22	21.05	21.15	21.33
HSUPA	Sub –Test 1	22.58	22.26	22.21	22.25	22.84	22.48	22.65	22.70	22.65
	Sub –Test 2	21.36	21.11	21.32	21.48	21.65	21.65	21.48	21.48	21.51
	Sub –Test 3	21.44	21.25	21.45	21.32	21.55	21.54	21.32	21.26	21.25
	Sub –Test 4	21.25	21.22	21.14	21.15	21.32	21.40	21.15	21.15	21.05
	Sub –Test 5	20.32	21.11	20.52	20.47	20.41	21.12	20.24	20.26	20.47

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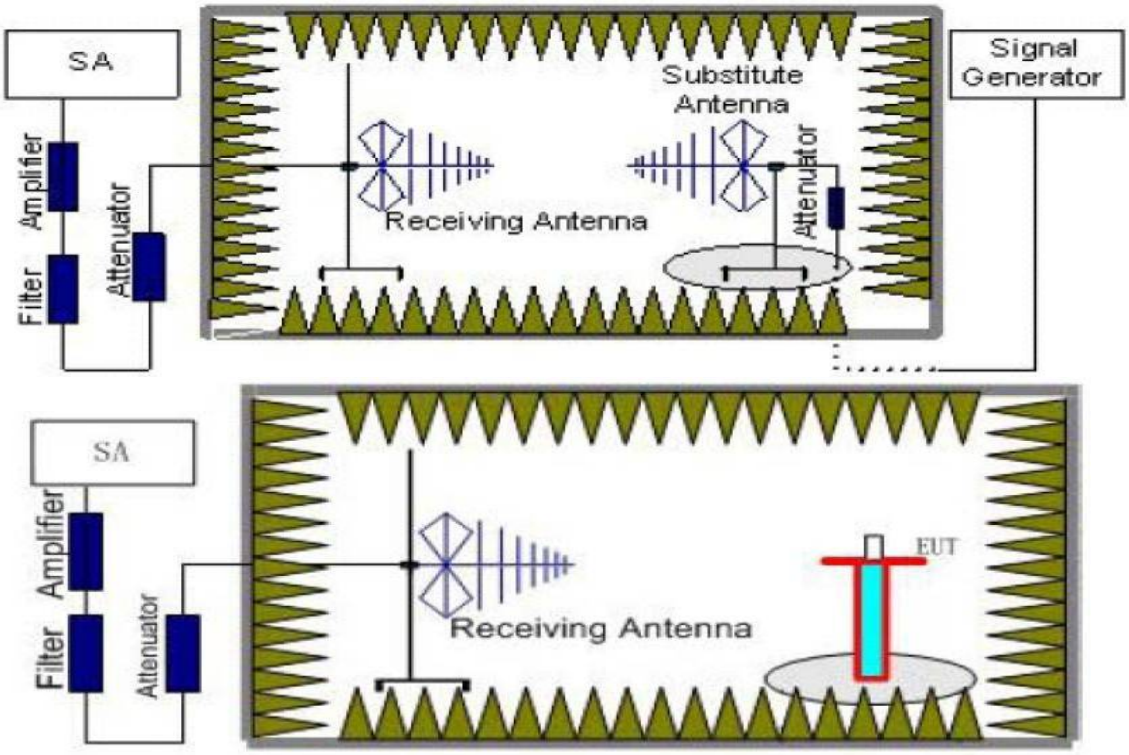
4.1.1 Radiated Output Power

TEST DESCRIPTION

This is the test for the maximum radiated power from the EUT.
Rule Part §24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power";
Rule Part §24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."
Rule Part §22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."
Rule Part §27.50 (d) (4) specifies " Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP."

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=10MHz,VBW=10MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}+ P_{Ag} - P_{cl} + G_a
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST LIMIT

According to 22.913(a), 24.232(c), the ERP(EIRP) should be not exceeding following table limits:

	Burst Average EIRP
UMTS Band II	33.01 dBm (2W)

	Burst Average EIRP
UMTS Band IV	30.00 dBm (1W)

	Burst Average ERP
UMTS Band V	38.45 dBm (7W)

TEST RESULTS

Remark:
1. *We were tested all Configuration refer 3GPP TS134 121.*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)*
3. *ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.*
4. *Margin = Emission Level - Limit*
5. *We test the H direction and V direction recorded worst case.*

UMTS/TM1/UMTS Band II

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain (dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.40	-16.80	4.03	8.38	35.51	**23.06**	33.01	-9.94	V
1880.00	-16.80	4.08	8.33	35.56	23.01	33.01	-9.99	V
1907.60	-17.58	4.14	8.26	35.63	22.17	33.01	-10.83	V

UMTS/TM1/UMTS Band IV

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain (dB)	P_{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.40	-15.53	3.95	8.41	34.36	23.29	30.00	-6.71	V
1732.60	-15.38	3.95	8.39	34.26	23.32	30.00	-6.68	V
1752.60	-14.57	4.03	8.33	34.65	**24.38**	30.00	-5.62	V

UMTS/TM1/UMTS Band V

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain (dB)	Correction (dB)	P_{Ag} (dB)	Burst Average ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.40	-15.65	3.45	8.45	2.15	33.79	**20.99**	38.45	-17.46	V
836.60	-16.46	3.49	8.45	2.15	33.85	20.20	38.45	-18.25	V
846.60	-17.31	3.55	8.36	2.15	33.88	19.23	38.45	-19.22	V

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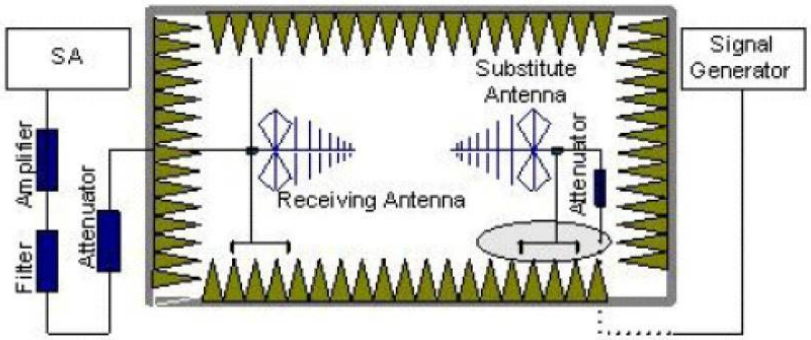
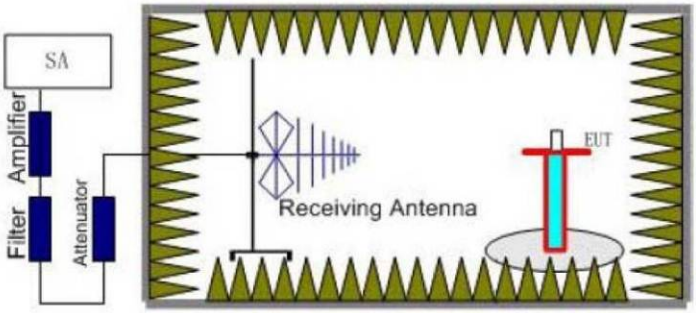
4.2 Radiated Spurious Emssion

TEST APPLICABLE

According to the ANSI C63.26 and FCC Part 2.1033 test method, The Receiver or Spectrum was scanned from lowest frequency frequency generated within the equipment to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238, Part 22.917, RSS-132 §5.5 and RSS-133 §6.5. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II and WCDMA Band V.

TEST CONFIGURATION





TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:
Power(EIRP)=P_{Mea}+ P_{Ag} - P_{cl} + G_a

6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
8. In order to make sure test results more clearly,we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
UMTS/TM1/ WCDMA Band V	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
UMTS/TM1/ WCDMA Band II	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2
UMTS/TM1/ WCDMA Band IV	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3

TEST LIMITS

According to 24.238, 22.917 and 27.54 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Frequency	Channel	Frequency Range	Verdict
UMTS/TM1/ WCDMA Band V	Low	9 KHz – 10 GHz	PASS
	Middle	9 KHz – 10 GHz	PASS
	High	9 KHz – 10 GHz	PASS
UMTS/TM1/ WCDMA Band II	Low	9 KHz – 20 GHz	PASS
	Middle	9 KHz – 20 GHz	PASS
	High	9 KHz – 20 GHz	PASS
UMTS/TM1/ WCDMA Band IV	Low	9 KHz – 18 GHz	PASS
	Middle	9 KHz – 18 GHz	PASS
	High	9 KHz – 18 GHz	PASS

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TEST RESULTS

Remark:
1. We were tested all Configuration refer 3GPP TS134 121.
2. EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)
3. ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.
4. Margin = EIRP - Limit

UMTS/TM1/ WCDMA Band II _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3704.80	-42.95	5.26	3.00	9.88	-38.33	-13.00	-25.33	H
5557.20	-48.04	6.11	3.00	11.36	-42.79	-13.00	-29.79	H
3704.80	-45.98	5.26	3.00	9.88	-41.36	-13.00	-28.36	V
5557.20	-49.66	6.11	3.00	11.36	-44.41	-13.00	-31.41	V

UMTS/TM1/ WCDMA Band II _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.00	-44.27	5.32	3.00	10.03	-39.56	-13.00	-26.56	H
5640.00	-49.17	6.19	3.00	11.41	-43.95	-13.00	-30.95	H
3760.00	-45.27	5.32	3.00	10.03	-40.56	-13.00	-27.56	V
5640.00	-50.61	6.19	3.00	11.41	-45.39	-13.00	-32.39	V

UMTS/TM1/ WCDMA Band II _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3815.20	-44.87	5.36	3.00	9.62	-40.61	-13.00	-27.61	H
5722.80	-48.75	6.24	3.00	11.46	-43.53	-13.00	-30.53	H
3815.20	-46.98	5.36	3.00	9.62	-42.72	-13.00	-29.72	V
5722.80	-50.80	6.24	3.00	11.46	-45.58	-13.00	-32.58	V

UMTS/TM1/ WCDMA Band IV _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3424.80	-39.22	5.12	3.00	9.74	-34.03	-13.00	-21.03	H
5137.20	-44.55	6.02	3.00	11.23	-39.63	-13.00	-26.63	H
3424.80	-43.55	5.12	3.00	9.74	-38.36	-13.00	-25.36	V
5137.20	-49.58	6.02	3.00	11.23	-44.66	-13.00	-31.66	V

UMTS/TM1/ WCDMA Band IV _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.20	-38.33	5.21	3.00	9.95	-33.12	-13.00	-20.12	H
5197.80	-43.93	6.08	3.00	11.26	-39.01	-13.00	-26.01	H
3465.20	-43.59	5.21	3.00	9.95	-38.38	-13.00	-25.38	V
5197.80	-47.40	6.08	3.00	11.26	-42.48	-13.00	-29.48	V

UMTS/TM1/ WCDMA Band IV _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3505.20	-43.49	5.22	3.00	9.45	-38.24	-13.00	-25.24	H
5257.80	-51.51	6.15	3.00	11.33	-46.55	-13.00	-33.55	H
3505.20	-45.62	5.22	3.00	9.45	-40.37	-13.00	-27.37	V
5257.80	-52.17	6.15	3.00	11.33	-47.21	-13.00	-34.21	V

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UMTS/TM1/ WCDMA Band V _ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1652.80	-46.09	3.86	3.00	8.56	-41.39	-13.00	-28.39	H
2479.20	-47.10	4.29	3.00	6.98	-44.41	-13.00	-31.41	H
1652.80	-45.42	3.86	3.00	8.56	-40.72	-13.00	-27.72	V
2479.20	-48.44	4.29	3.00	6.98	-45.75	-13.00	-32.75	V

UMTS/TM1/ WCDMA Band V _ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1672.80	-46.19	3.90	3.00	8.58	-41.51	-13.00	-28.51	H
2509.20	-46.71	4.32	3.00	6.80	-44.23	-13.00	-31.23	H
1672.80	-46.31	3.90	3.00	8.58	-41.63	-13.00	-28.63	V
2509.20	-49.58	4.32	3.00	6.80	-47.10	-13.00	-34.10	V

UMTS/TM1/ WCDMA Band V _ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.20	-44.37	3.91	3.00	9.06	-39.22	-13.00	-26.22	H
2539.80	-45.25	4.32	3.00	6.65	-42.92	-13.00	-29.92	H
1693.20	-46.14	3.91	3.00	9.06	-40.99	-13.00	-27.99	V
2539.80	-47.84	4.32	3.00	6.65	-45.51	-13.00	-32.51	V

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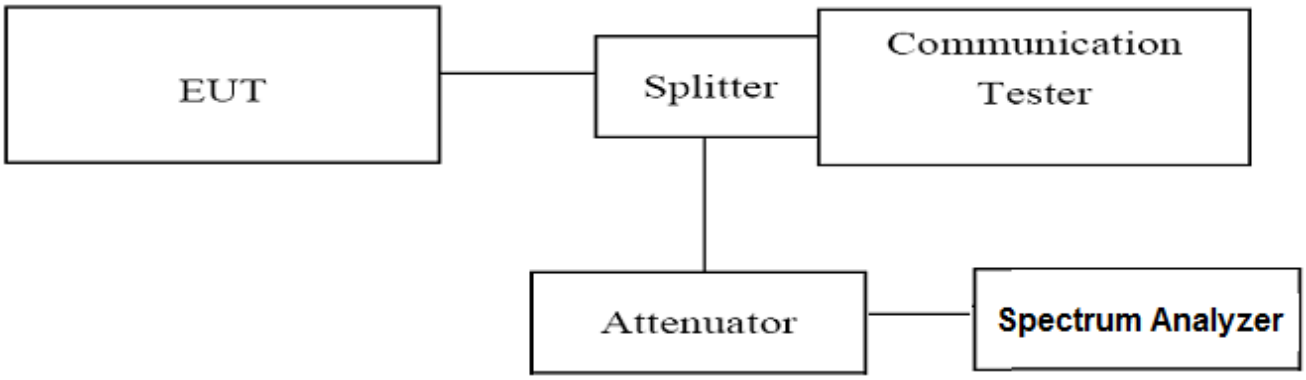
4.3 Occupied Bandwidth and Emission Bandwith

TEST APPLICABLE

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. The table below lists the measured 99% Bandwidth and -26dBc Bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth and Emission Bandwidth were measured with Aglient Spectrum Analyzer N9020A (peak);
3. Set RBW=100 KHz,VBW=300 KHz,Span=10 MHz,SWT=Auto;
4. Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth
5. These measurements were done at 3 frequencies for WCDMA band II/V/IV. (low, middle and high of operational frequency range).

TEST RESULTS

Test Mode	Channel	Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)	Emission Bandwidth (-26 dBc BW) (MHz)	Verdict
UMTS/TM1/ WCDMA Band V	4132	826.40	4.1589	4.6950	PASS
	4183	836.60	4.1636	4.6940	PASS
	4233	846.60	4.1608	4.6750	PASS
UMTS/TM1/ WCDMA Band II	9262	1852.40	4.1780	4.7120	PASS
	9400	1880.00	4.1626	4.7070	PASS
	9538	1907.60	4.1679	4.6940	PASS
UMTS/TM1/ WCDMA Band IV	1312	1712.40	4.1440	4.6940	PASS
	1413	1732.60	4.1544	4.6740	PASS
	1513	1752.60	4.1659	4.6990	PASS

Remark:
1. *Test results including cable loss;*
2. *Please refer refer to following plots.*

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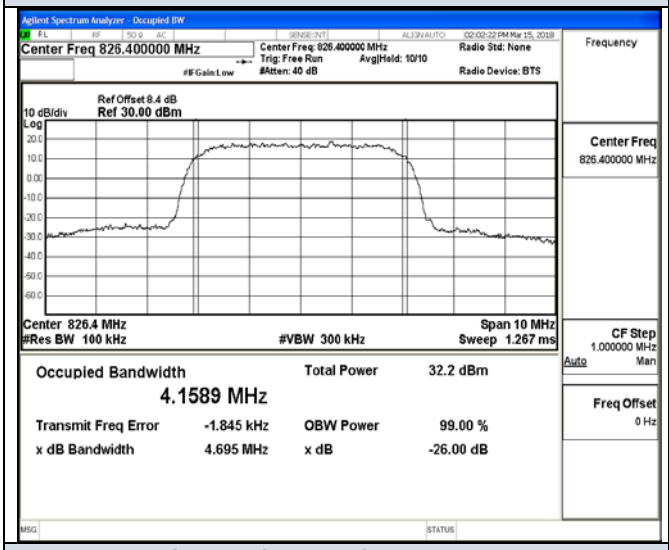
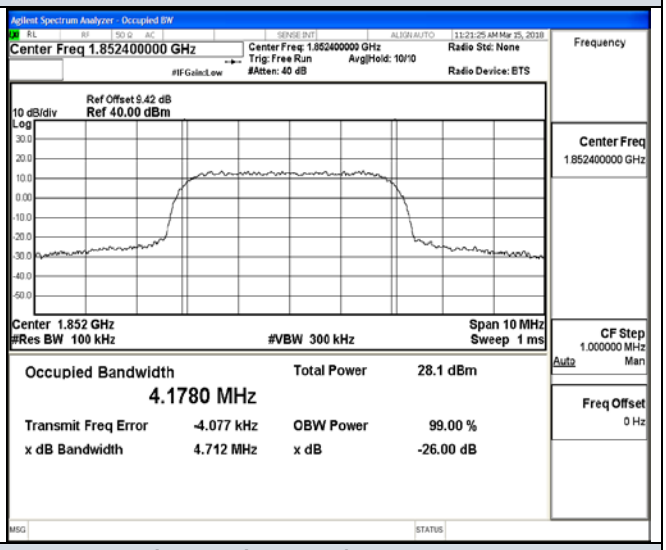
Occupied Bandwidth and Emission Bandwidth

UMTS/TM1/ WCDMA Band V

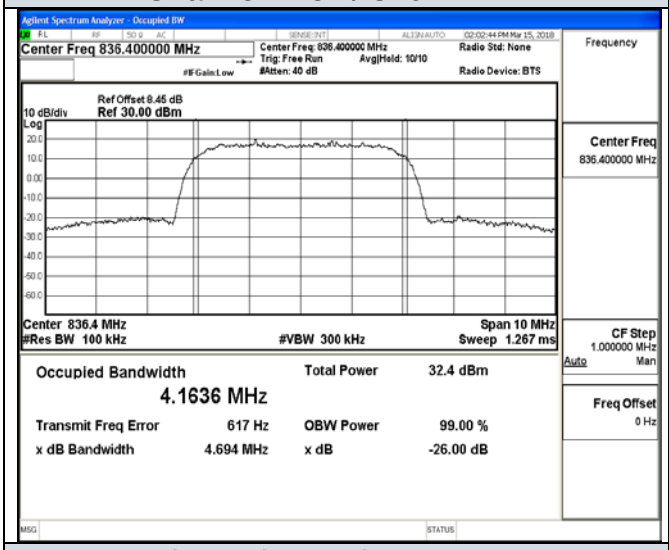


Channel 4132 / 826.4 MHz

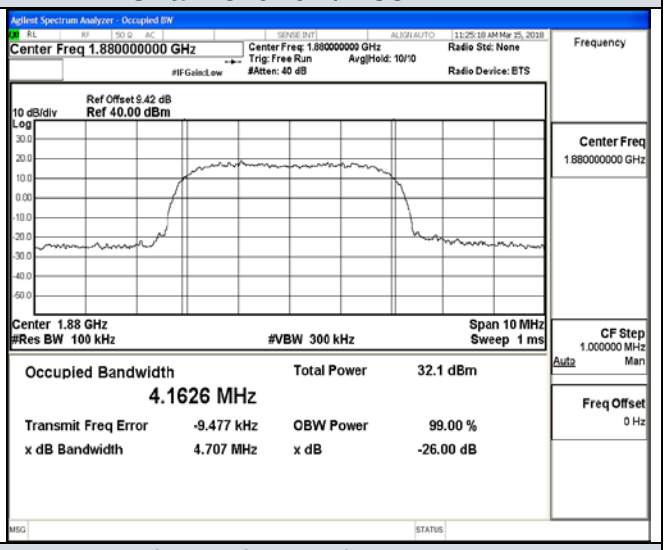
UMTS/TM1/ WCDMA Band II



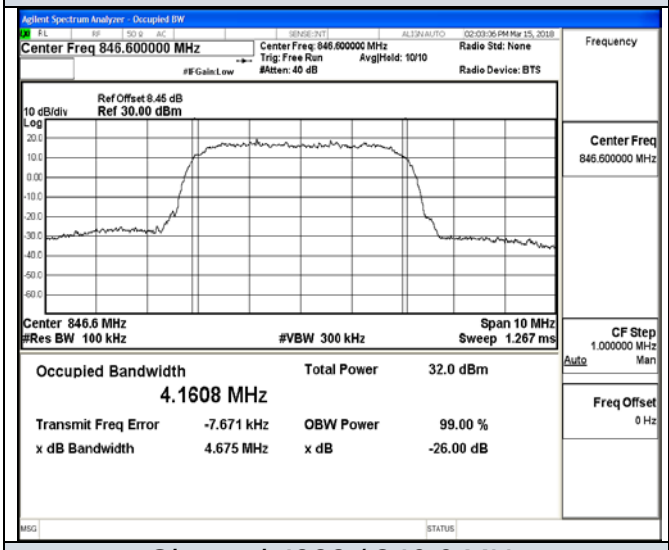
Channel 9262 / 1852.4 MHz



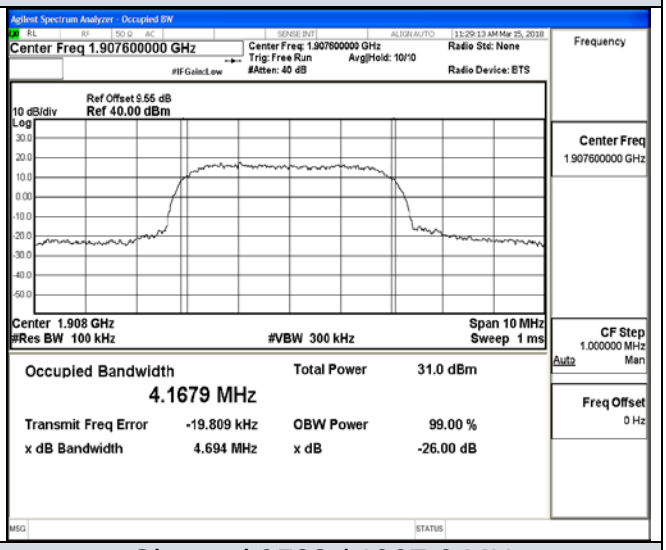
Channel 4182 / 836.4 MHz



Channel 9400 / 1880.0 MHz



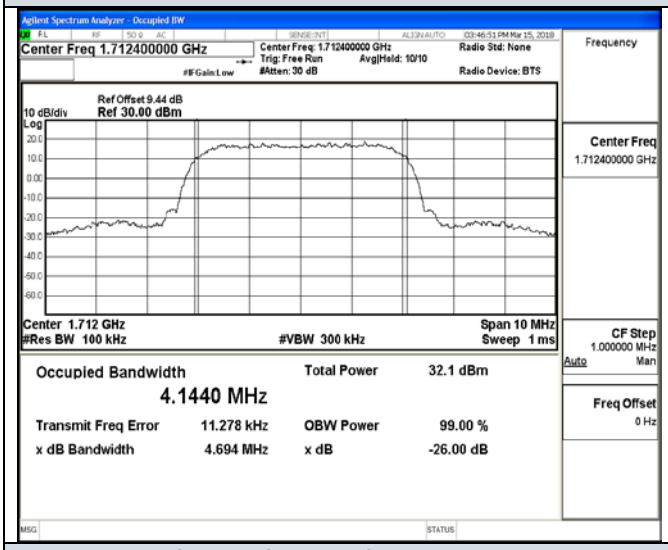
Channel 4233 / 846.6 MHz



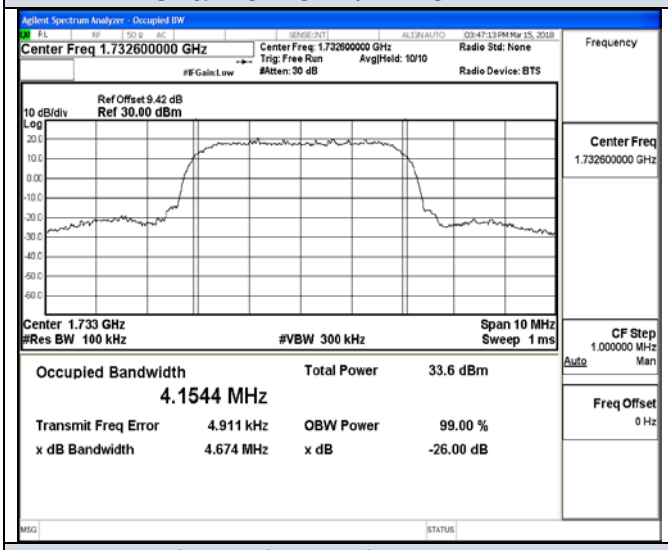
Channel 9538 / 1907.6 MHz

Occupied Bandwidth and Emission Bandwidth

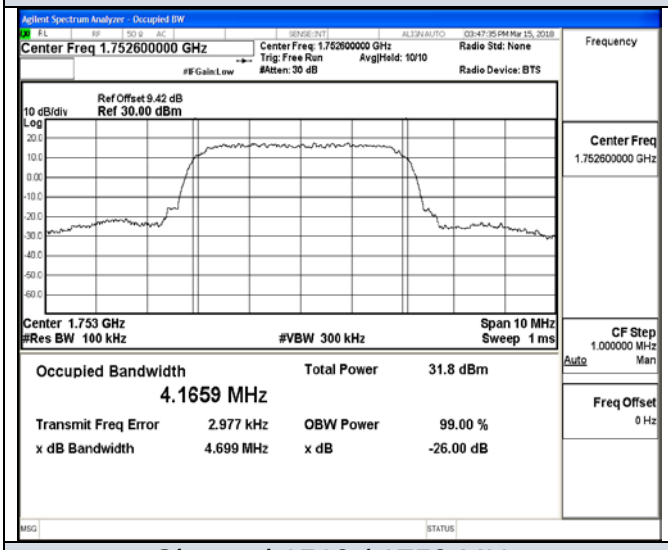
UMTS/TM1/ WCDMA Band IV



Channel 1312 / 1713 MHz



Channel 1450 / 1740 MHz



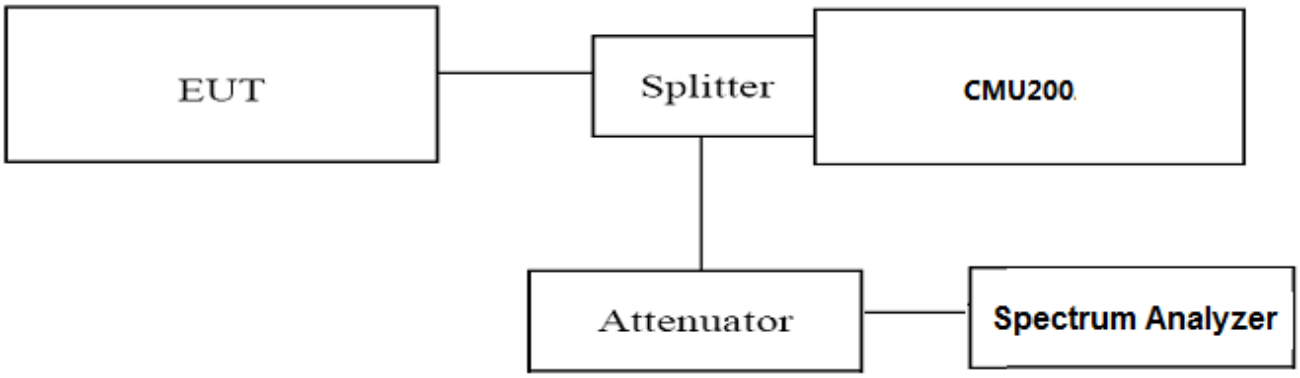
Channel 1512 / 1752 MHz

4.4 Band Edge Compliance

TEST APPLICABLE

During the process of testing, the EUT was controlled via Digital Radio Communication tester (CMU200) to ensure max power transmission and proper modulation.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Spectrum Analyzer N9020A;
3. Set RBW=100KHz,VBW=300KHz,Span=10MHz,SWT=Auto,Dector: RMS;

These measurements were done at 2 frequencies for WCDMA Band II/V/IV. (low and high of operational frequency range).

TEST RESULTS

UMTS/TM1/WCDMA Band V					
Test Mode	Channel	Frequency (MHz)	Band Edg Compliance (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA Band V	4132	826.40	<-13dBm	-13dBm	PASS
	4233	846.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band II					
Test Mode	Channel	Frequency (MHz)	Band Edg Compliance (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA Band II	9262	1852.40	<-13dBm	-13dBm	PASS
	9538	1907.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band IV					
Test Mode	Channel	Frequency (MHz)	Band Edg Compliance (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA Band IV	1312	1712.40	<-13dBm	-13dBm	PASS
	1513	1752.60	<-13dBm	-13dBm	

Remark:
1. *Test results including cable loss;*
2. *Please refer to following plots.*

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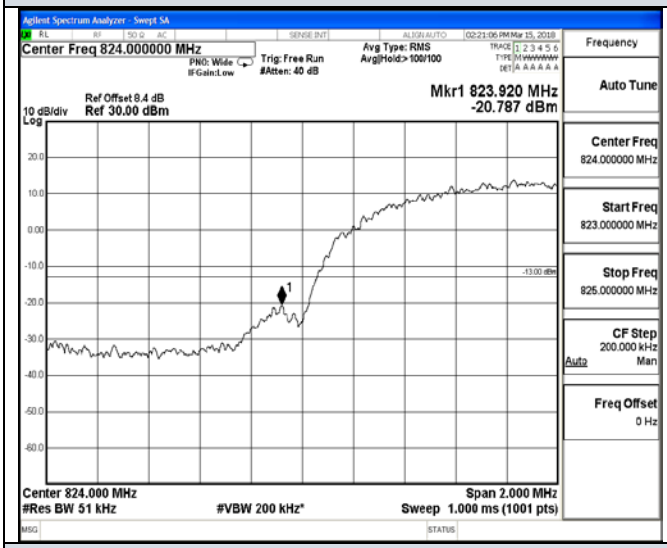
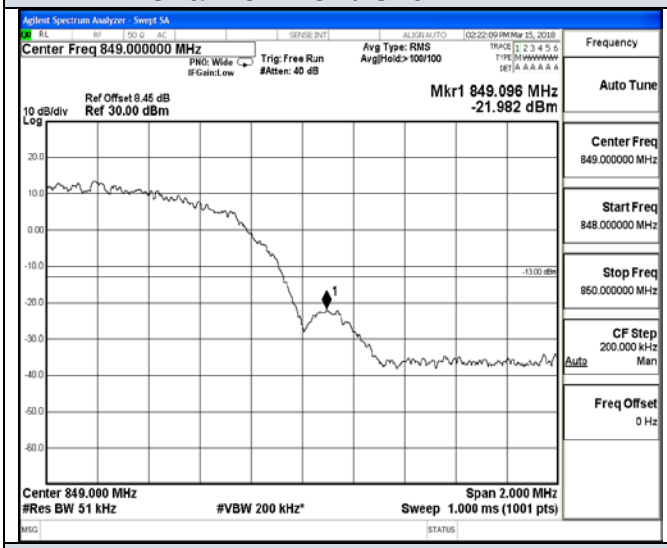
Band-edge Compliance

UMTS/TM1/WCDMA Band V

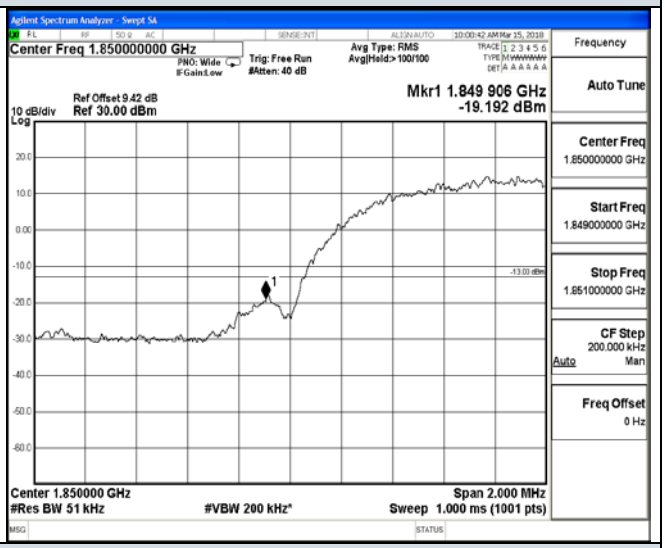


Channel 4132 / 826.4 MHz



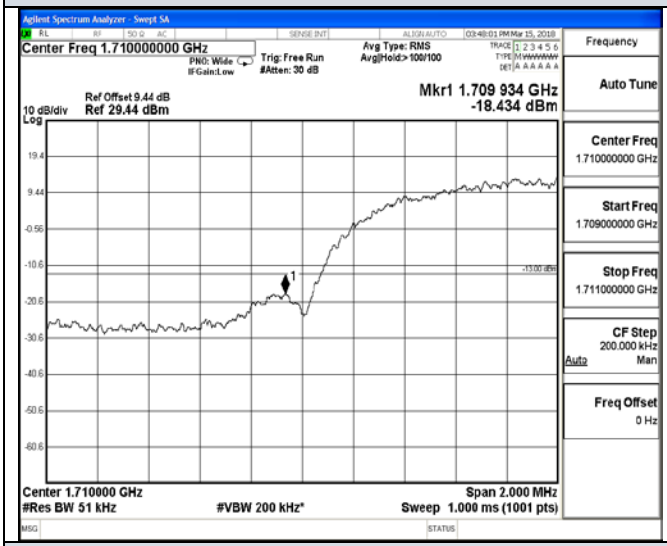
Channel 4233 / 846.6 MHz

UMTS/TM1/WCDMA Band II



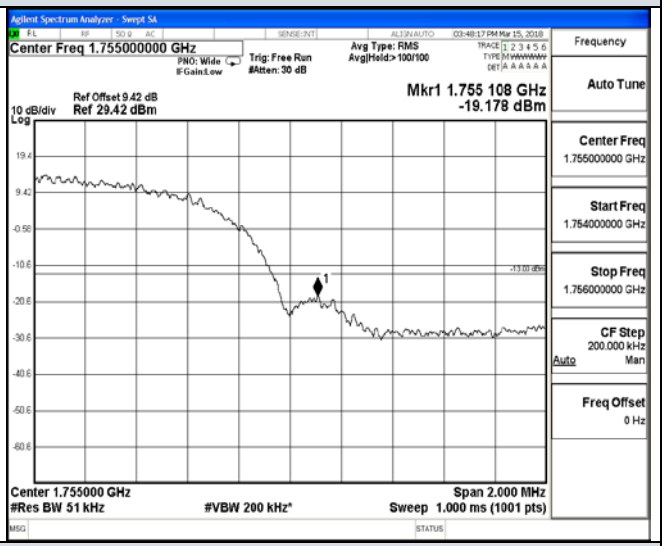
Channel 9538 / 1907.6 MHz

UMTS/TM1/WCDMA Band IV



Channel 1312 / 1712.4 MHz

UMTS/TM1/WCDMA Band IV



Channel 1513 / 1752.6 MHz

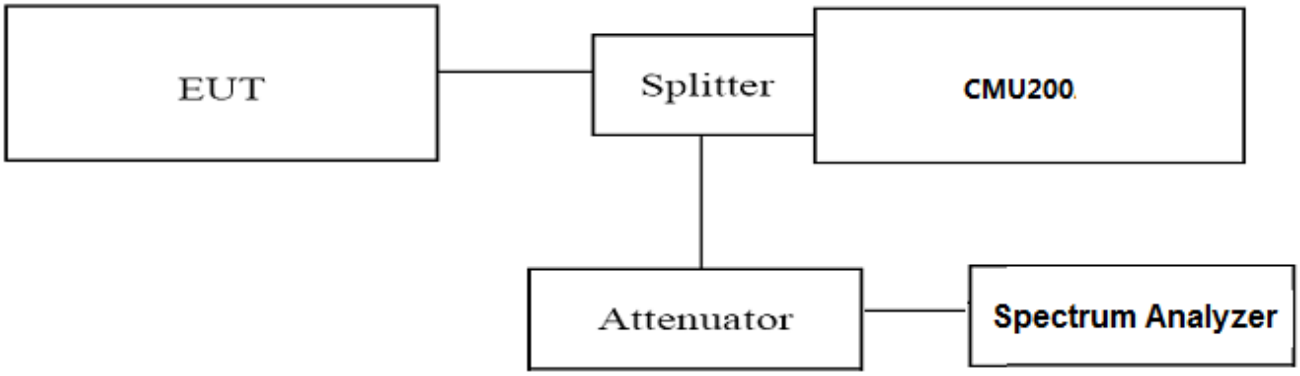
4.5 Spurious Emssion on Antenna Port

TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA band II/IV, this equates to a frequency range of 9 KHz to 20GHz, data taken from 30 MHz to 20 GHz. For WCDMA Band V, this equates to a frequency range of 9 KHz to 9 GHz,data taken from 30 MHz to 9 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
   The trace mode is set to MaxHold to get the highest signal at each frequency;
   Wait 25 seconds;
   Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Spectrum Analyzer N9020A;
3. These measurements were done at 3 frequencies for WCDMA band II/V. (low, middle and high of operational frequency range).

TEST LIMIT

Part §24.238, Part §22.917 and Part §27.53 (h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

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TEST RESULTS

Test Mode	Channel	Frequency (MHz)	Spurious RF Conducted Emission (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA Band V	4132	826.40	<-13dBm	-13dBm	PASS
	4183	836.60	<-13dBm	-13dBm	
	4233	846.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band II	9262	1852.40	<-13dBm	-13dBm	PASS
	9400	1880.00	<-13dBm	-13dBm	
	9538	1907.60	<-13dBm	-13dBm	
UMTS/TM1/WCDMA Band IV	1312	1712.40	<-13dBm	-13dBm	
	1413	1732.60	<-13dBm	-13dBm	
	1513	1752.60	<-13dBm	-13dBm	

Remark:
1. *Test results including cable loss;*
2. *Please refer to following plots;*
3. *Not reorded test plots from 9 KHz to 30 MHz as emission levels 20dB lower than emission limit;*

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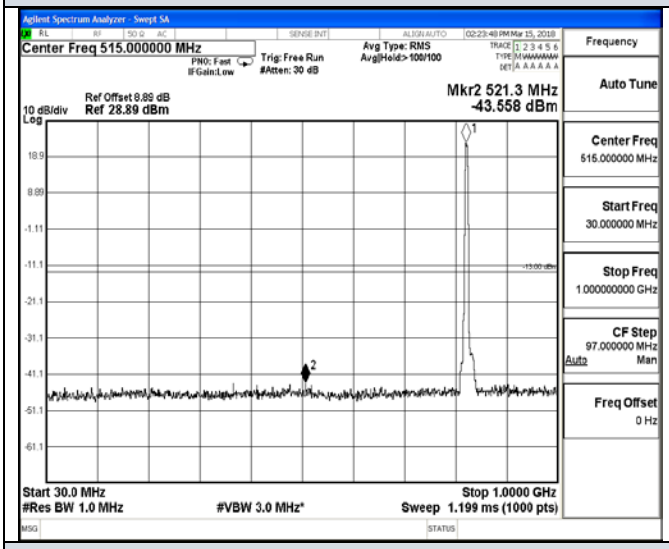
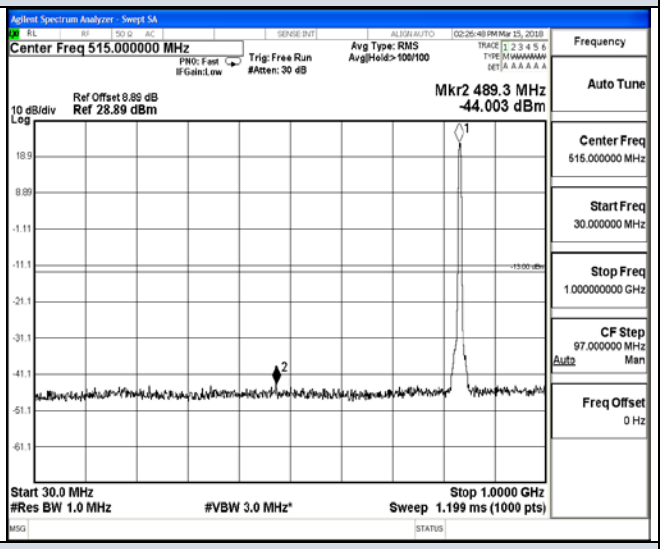
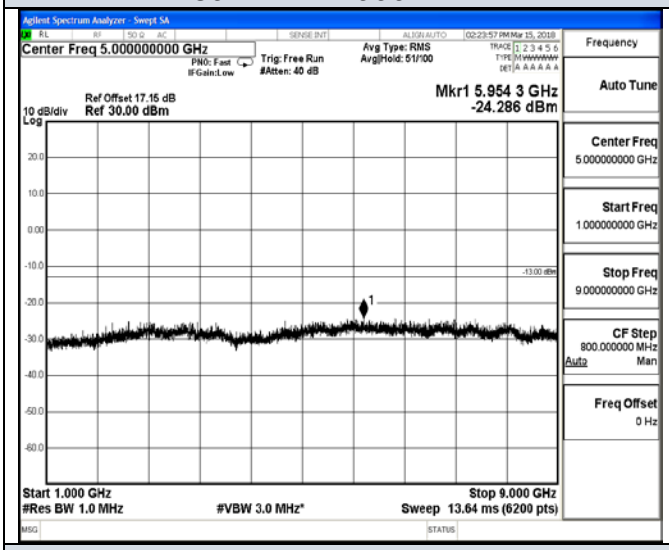
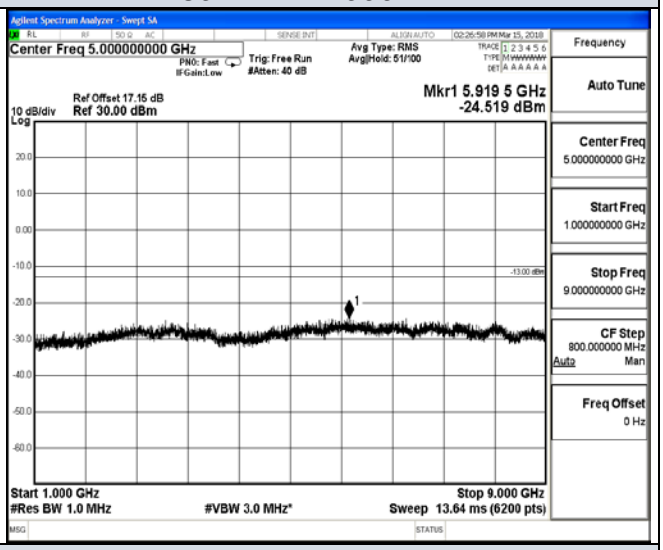
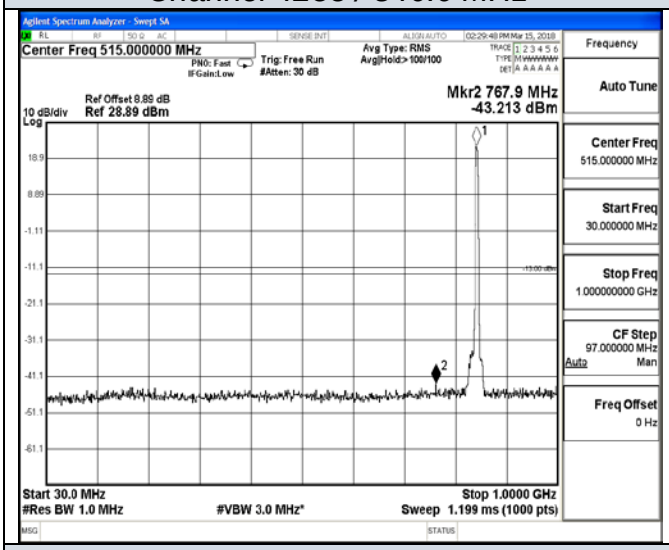
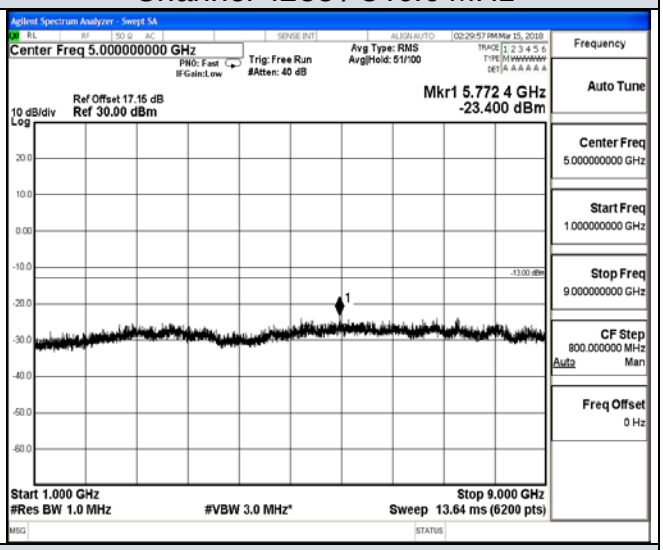
Spurious Emssion on Antenna Port

UMTS/TM1/WCDMA Band V

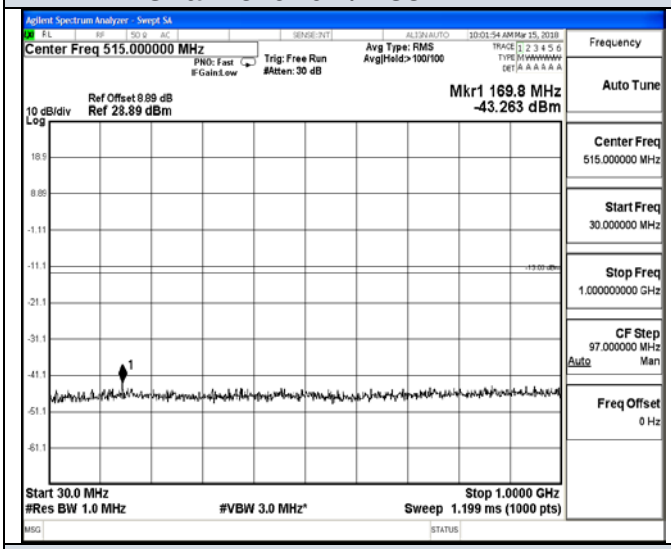
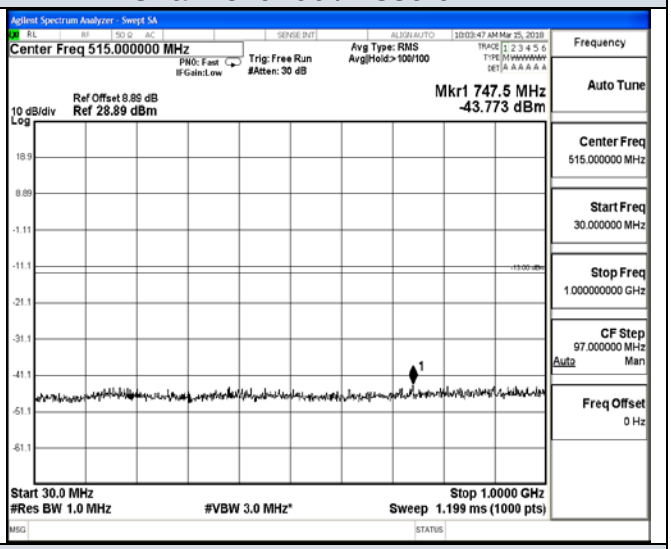
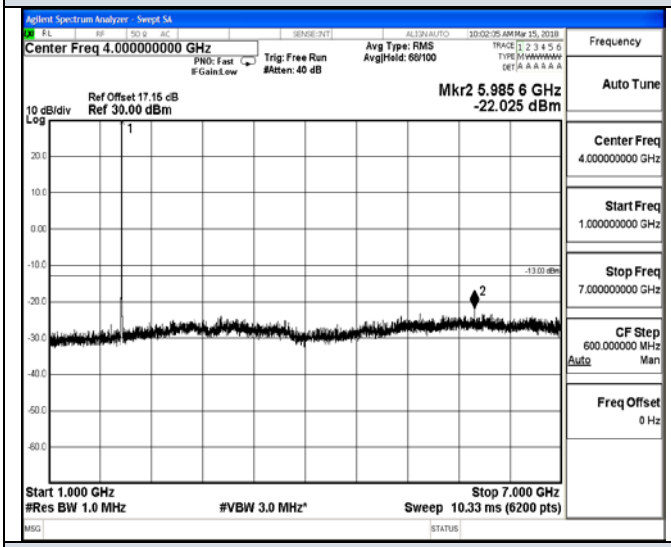
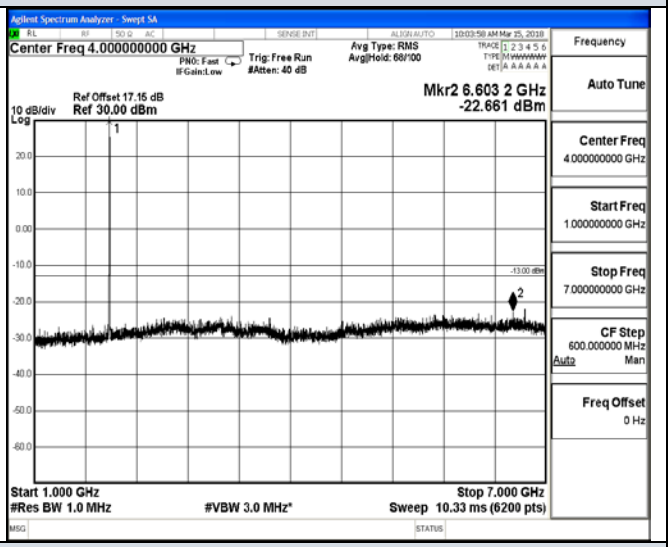
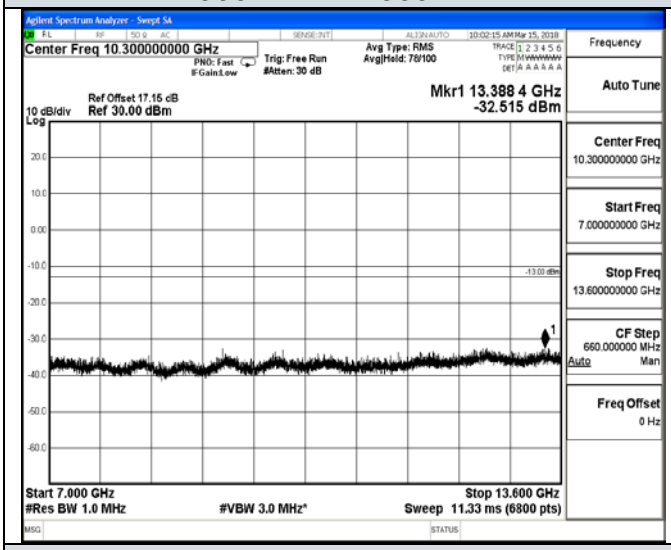
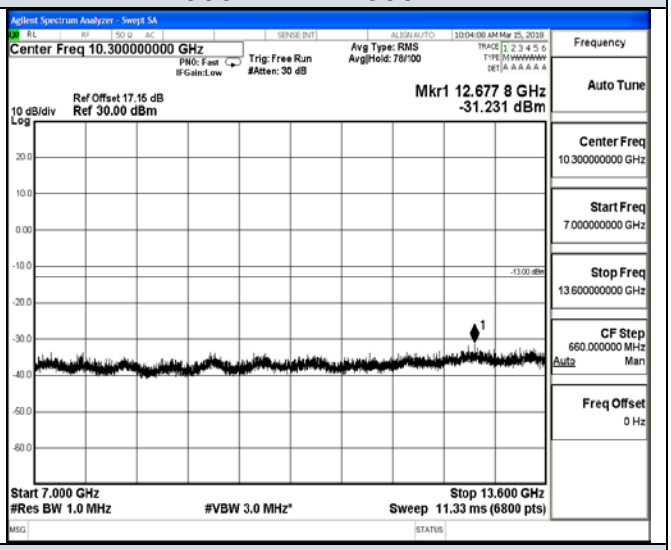
Channel 4132 / 826.4 MHz	Channel 4182 / 836.4 MHz
	
30 MHz – 1000 MHz	30 MHz – 1000 MHz
	
1 GHz – 9 GHz	1 GHz – 9 GHz

UMTS/TM1/WCDMA Band V

Channel 4233 / 846.6 MHz	Channel 4233 / 846.6 MHz
	
30 MHz – 1000 MHz	1 GHz – 9 GHz

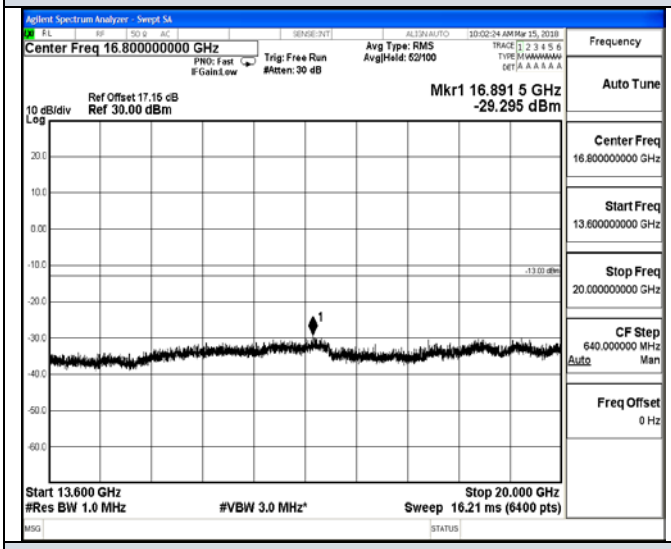
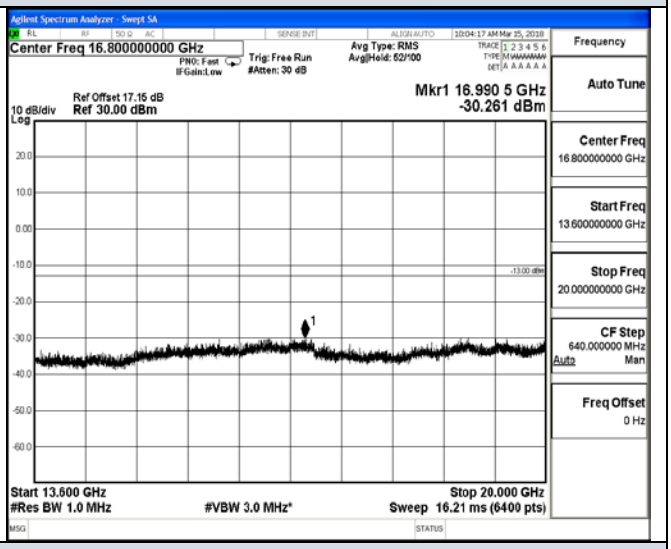
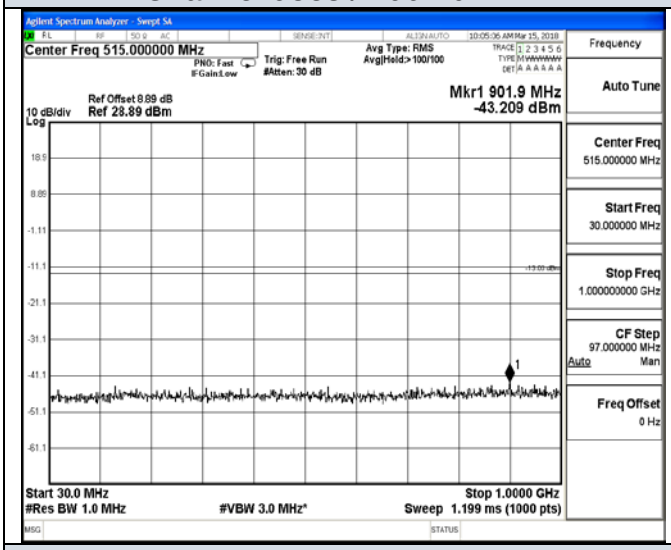
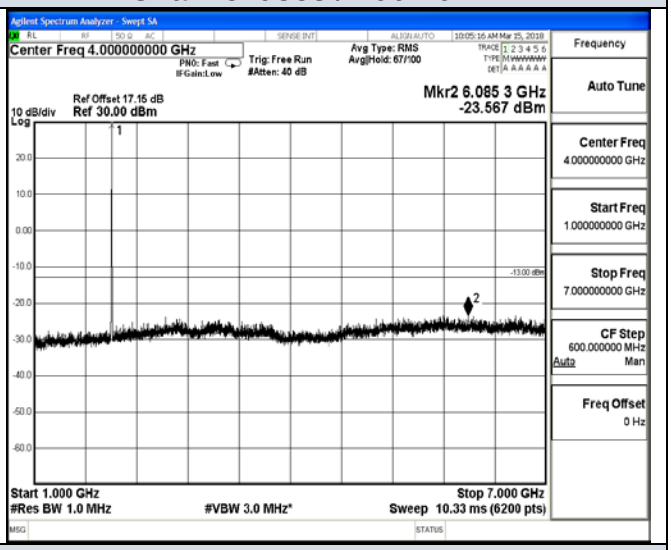
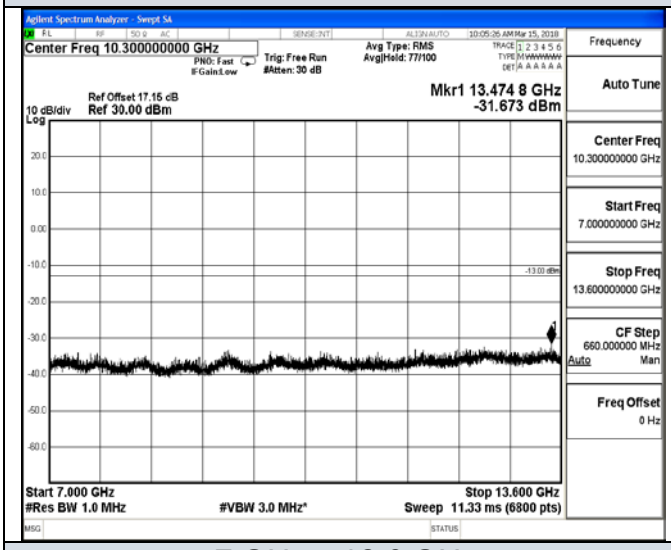
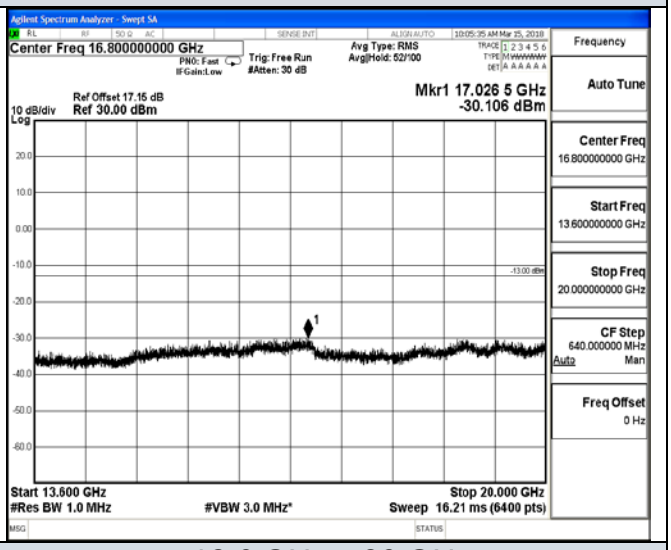
Spurious Emssion on Antenna Port

UMTS/TM1/WCDMA Band II

Channel 9262 / 1852.4 MHz	Channel 9400 / 1880.0 MHz
	
30 MHz – 1000 MHz	30 MHz – 1000 MHz
	
1000 MHz – 7000 MHz	1000 MHz – 7000 MHz
	
7 GHz – 13.6 GHz	7 GHz – 13.6 GHz

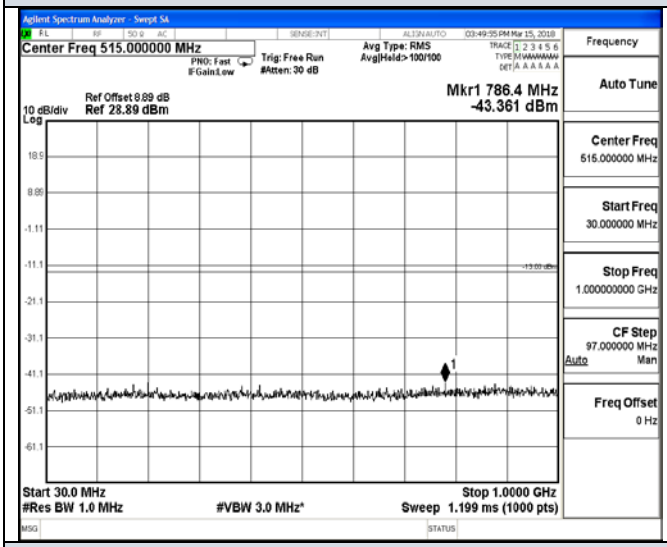
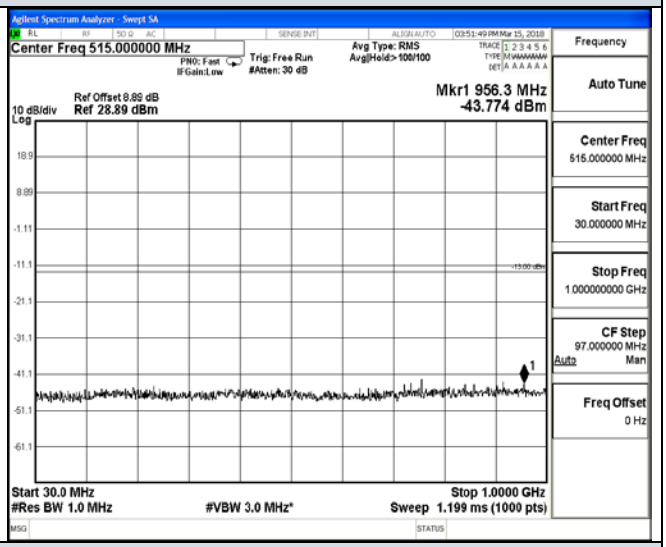
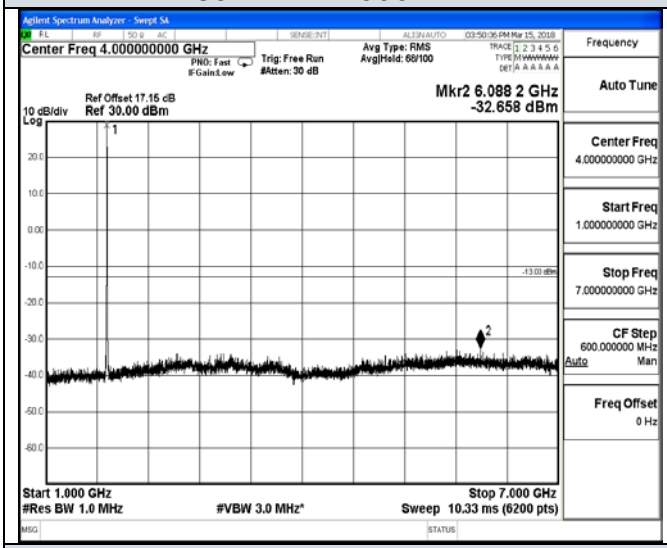
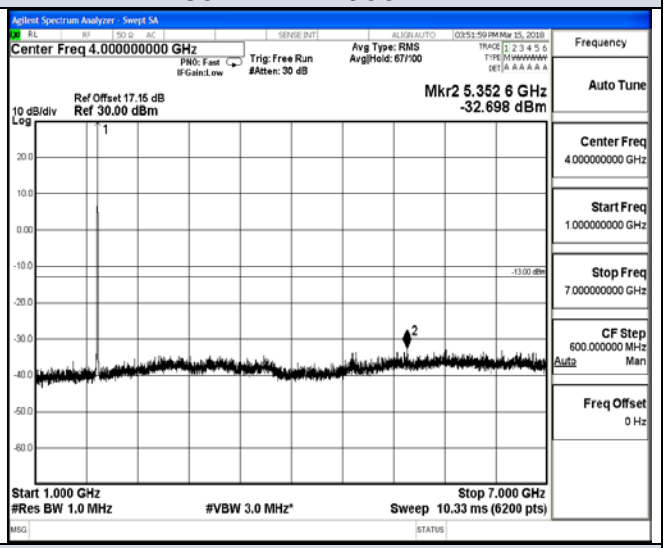
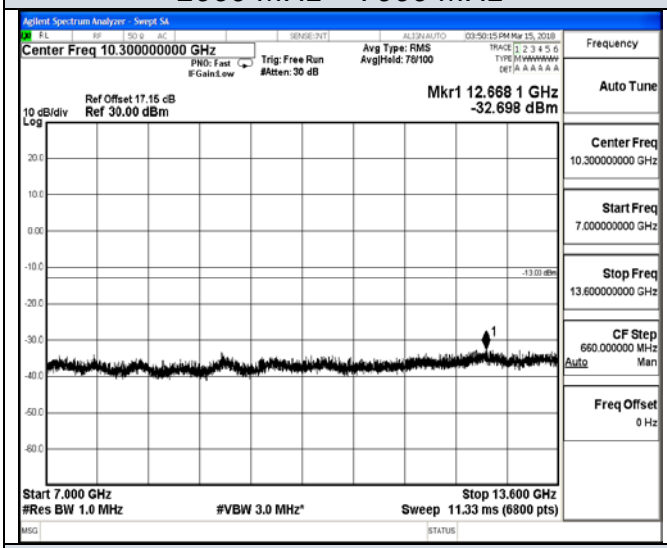
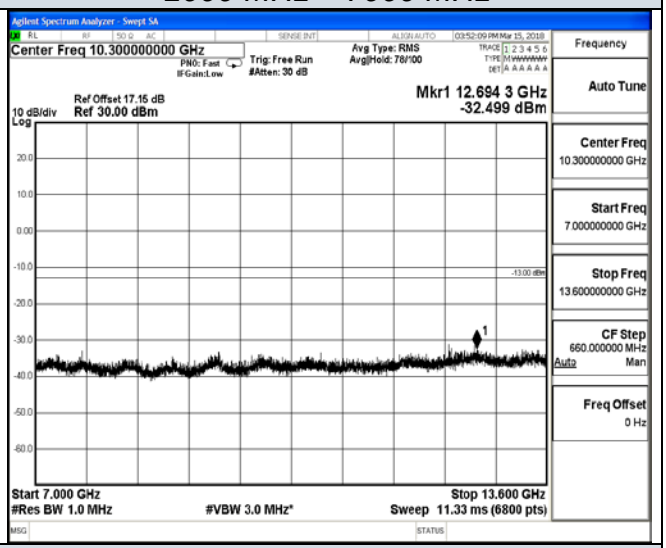
Spurious Emssion on Antenna Port

UMTS/TM1/WCDMA Band II

Channel 9262 / 1852.4 MHz	Channel 9400 / 1880.0 MHz
	
13.6 GHz – 20 GHz	13.6 GHz – 20 GHz
Channel 9538 / 1907.6 MHz	**Channel 9538 / 1907.6 MHz**
	
30 MHz – 1000 MHz	1000 MHz – 7000 MHz
	
7 GHz – 13.6 GHz	13.6 GHz – 20 GHz

Spurious Emssion on Antenna Port

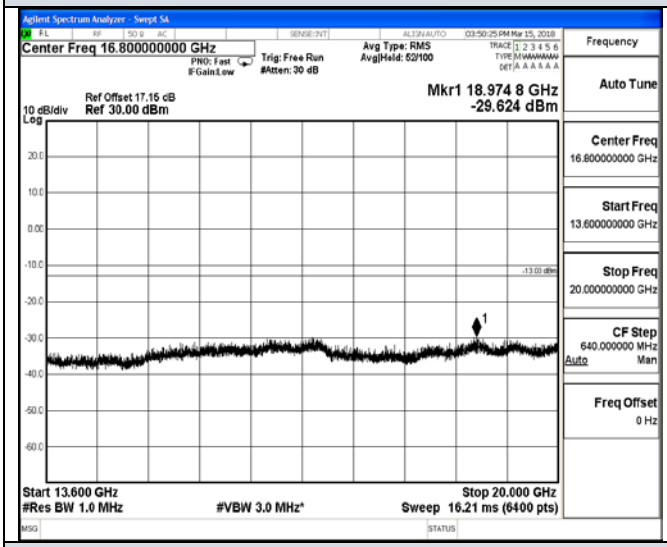
UMTS/TM1/WCDMA Band IV

Channel 1312 / 1712.4 MHz	Channel 1413 / 1732.6 MHz
	
30 MHz – 1000 MHz	30 MHz – 1000 MHz
	
1000 MHz – 7000 MHz	1000 MHz – 7000 MHz
	
7 GHz – 13.6 GHz	7 GHz – 13.6 GHz

Spurious Emssion on Antenna Port

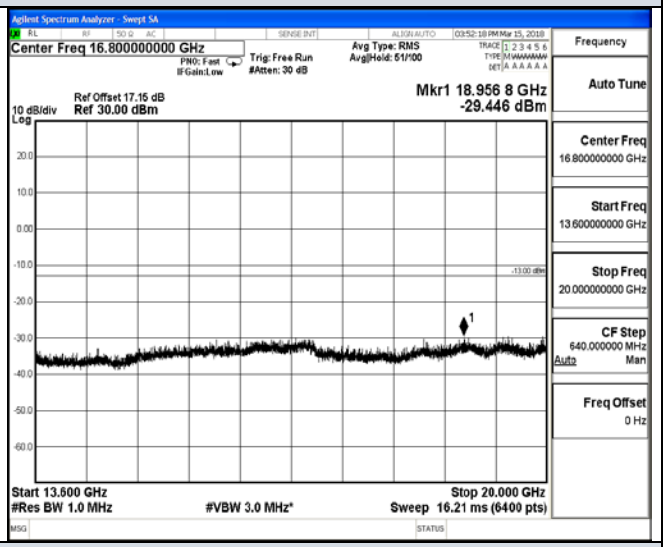
UMTS/TM1/WCDMA Band IV

Channel 1312 / 1712.4 MHz



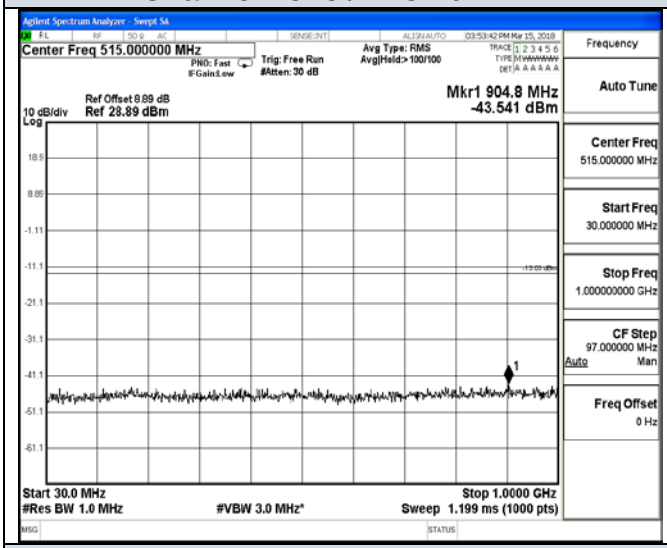
13.6 GHz – 20 GHz

Channel 1413 / 1732.6 MHz



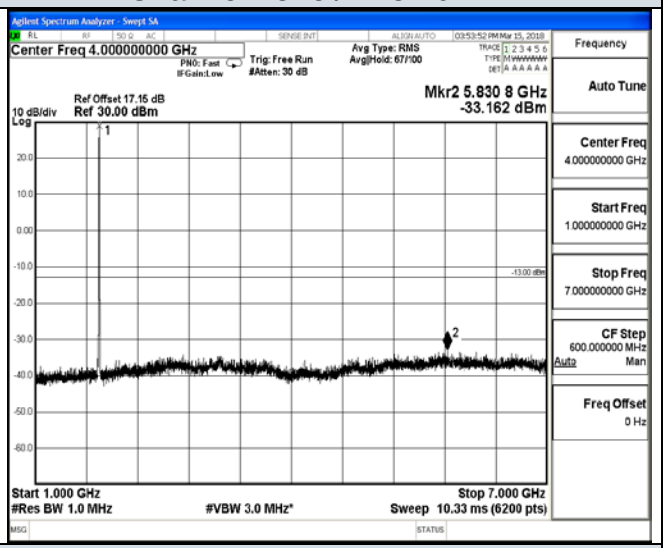
13.6 GHz – 20 GHz

Channel 1513 / 1752.6 MHz

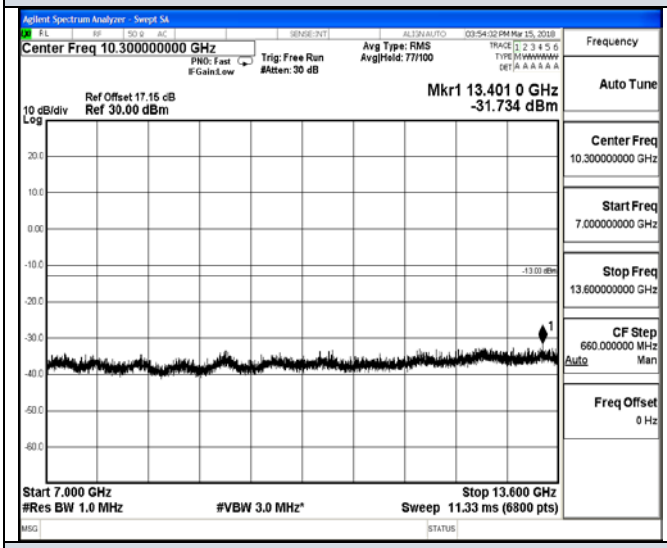


1000 MHz – 7000 MHz

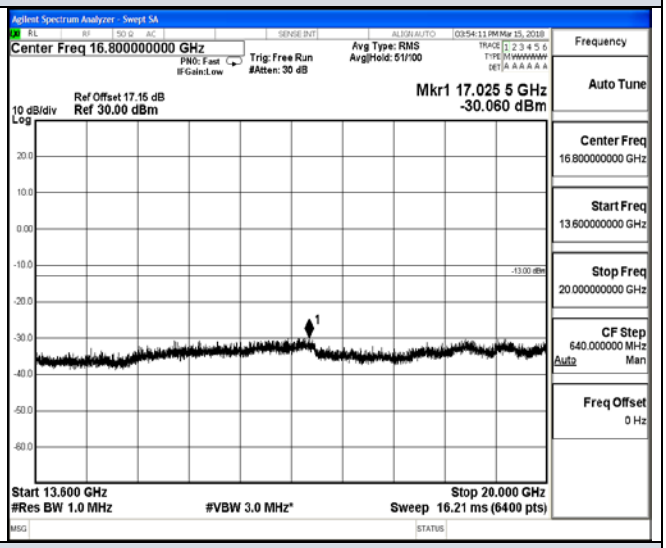
Channel 1513 / 1752.6 MHz



1000 MHz – 7000 MHz



7 GHz – 13.6 GHz



7 GHz – 13.6 GHz

4.6 Frequency Stability Test

TEST APPLICABLE

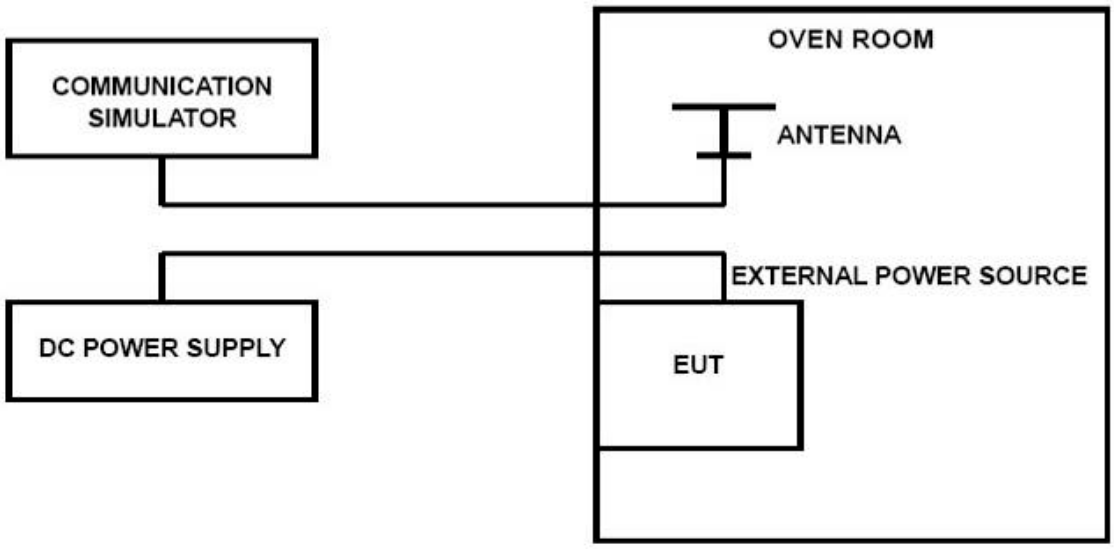
1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.
2. According to FCC Part 2 Section 2.1055 (e)(2) and RSS-GEN, for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment.

TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature;
2. Subject the EUT to overnight soak at -30℃;
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of WCDMA Band II/IV/V, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
6. Subject the EUT to overnight soak at +50℃;
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
8. Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure;

TEST CONFIGURATION



TEST LIMITS

For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 6.66VDC and 8.14VDC, with a nominal voltage of 12.0DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST RESULTS

UMTS/TM1/WCDMA Band II					
AC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
108	25	22.96	0.012	2.50	PASS
120	25	12.58	0.007	2.50	PASS
132	25	23.00	0.012	2.50	PASS
120	-30	30.59	0.016	2.50	PASS
120	-20	28.86	0.015	2.50	PASS
120	-10	23.18	0.012	2.50	PASS
120	0	30.34	0.016	2.50	PASS
120	10	15.62	0.008	2.50	PASS
120	20	10.40	0.006	2.50	PASS
120	30	11.84	0.006	2.50	PASS
120	40	17.20	0.009	2.50	PASS
120	50	24.83	0.013	2.50	PASS

UMTS/TM1/WCDMA Band V					
AC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
108	25	21.22	0.025	2.50	PASS
120	25	14.35	0.017	2.50	PASS
132	25	23.69	0.028	2.50	PASS
120	-30	31.80	0.038	2.50	PASS
120	-20	27.33	0.033	2.50	PASS
120	-10	23.76	0.028	2.50	PASS
120	0	31.69	0.038	2.50	PASS
120	10	15.58	0.019	2.50	PASS
120	20	11.30	0.014	2.50	PASS
120	30	11.07	0.013	2.50	PASS
120	40	17.14	0.020	2.50	PASS
120	50	25.99	0.031	2.50	PASS

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UMTS/TM1/WCDMA Band IV					
AC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict
108	25	26.20	0.015	2.50	PASS
120	25	21.07	0.012	2.50	PASS
132	25	14.47	0.008	2.50	PASS
120	-30	22.43	0.013	2.50	PASS
120	-20	23.34	0.013	2.50	PASS
120	-10	26.80	0.015	2.50	PASS
120	0	22.61	0.013	2.50	PASS
120	10	14.60	0.008	2.50	PASS
120	20	27.78	0.016	2.50	PASS
120	30	33.85	0.020	2.50	PASS
120	40	17.04	0.010	2.50	PASS
120	50	18.44	0.011	2.50	PASS

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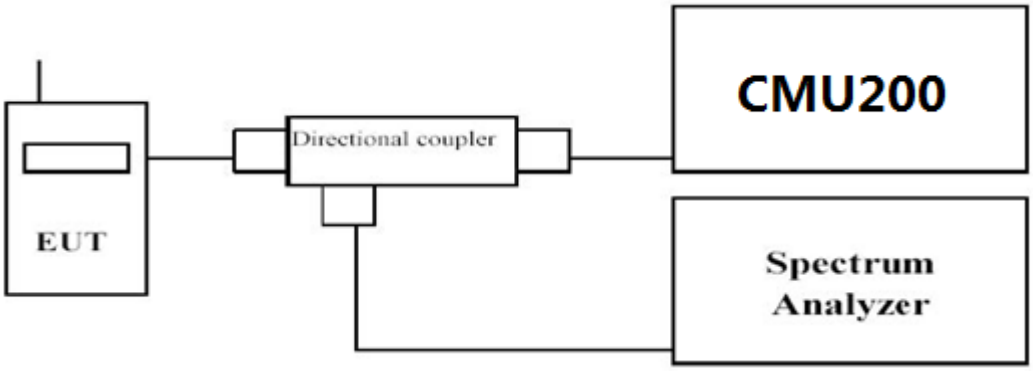
4.7 Peak-to-Average Ratio (PAR)

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
   1). for continuous transmissions, set to 1 ms,
   2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

TEST RESULTS

Test Mode	Channel	Frequency (MHz)	PAPR Value (dB)	Limits (dB)	Verdict
UMTS/TM1/ WCDMA Band II	9262	1852.40	2.99	13.0	PASS
	9400	1880.00	2.59	13.0	PASS
	9538	1907.60	2.50	13.0	PASS
UMTS/TM1/ WCDMA Band V	4132	826.40	2.78	13.0	PASS
	4183	836.60	2.53	13.0	PASS
	4233	846.60	3.01	13.0	PASS
UMTS/TM1/ WCDMA Band IV	1312	1712.40	4.94	13.0	PASS
	1413	1732.60	3.17	13.0	PASS
	1513	1752.60	3.15	13.0	PASS

Remark:
1. *Test results including cable loss;*
2. *Please refer to following plots.*

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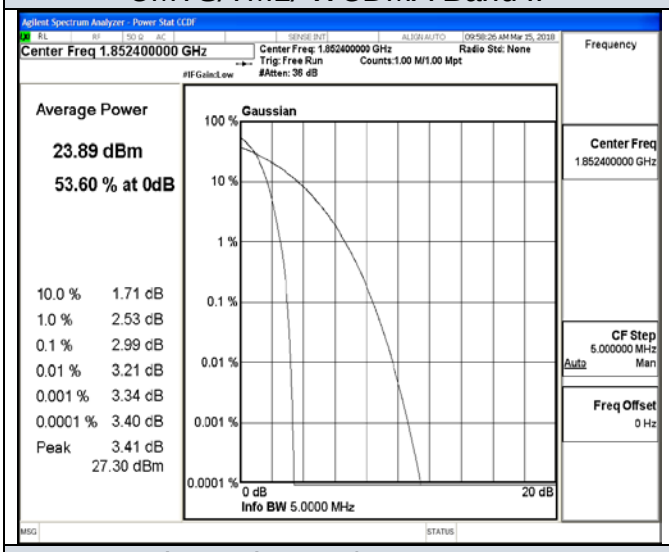
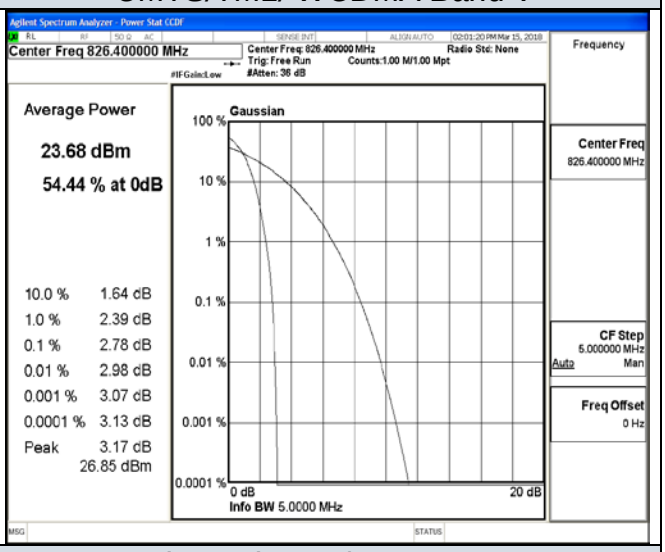
Peak-to-Average Ratio (PAR)

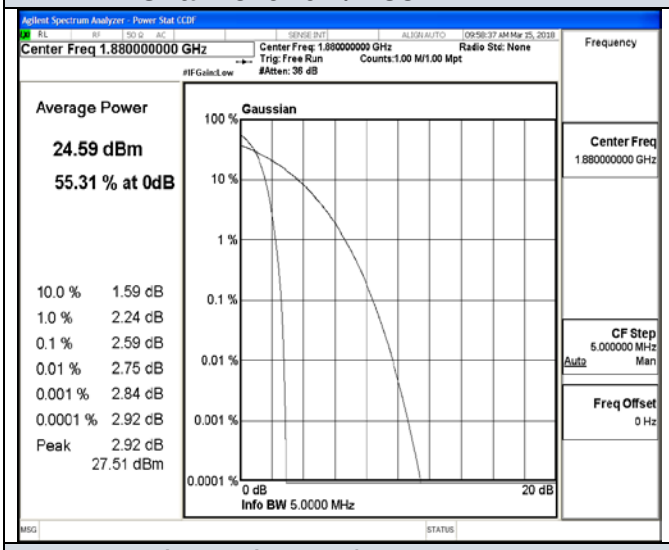
UMTS/TM1/ WCDMA Band II



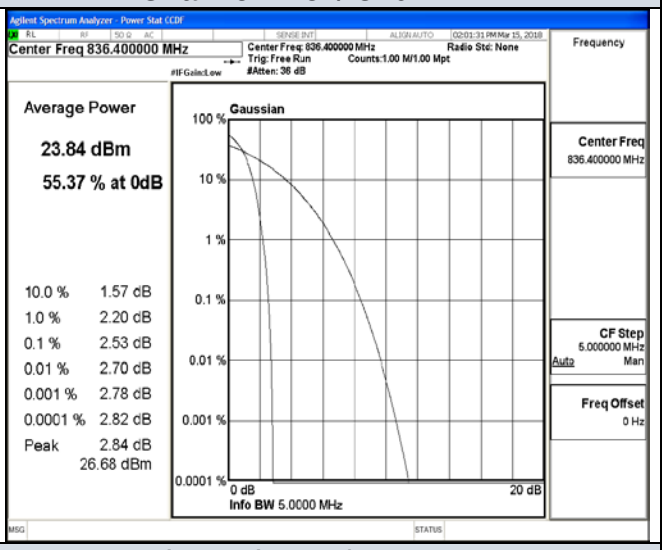
UMTS/TM1/ WCDMA Band V



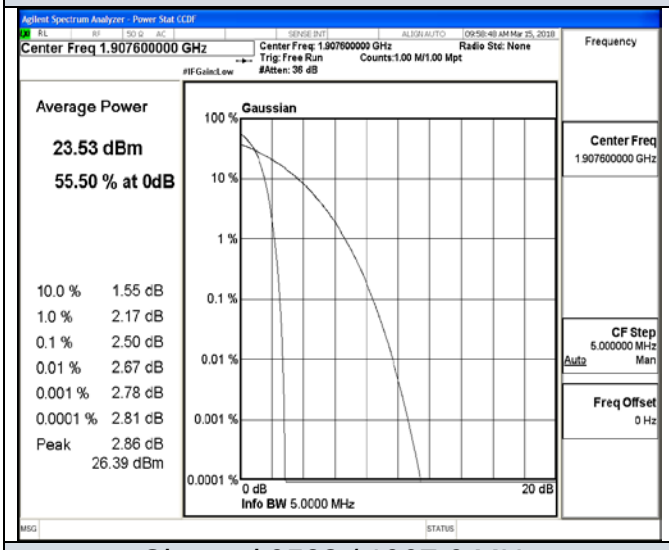
Channel 9262 / 1852.4 MHz



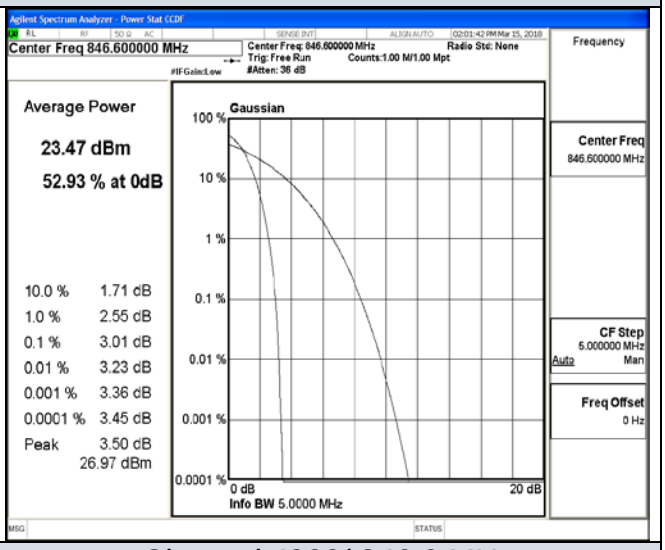
Channel 4132/ 826.4 MHz



Channel 9400 / 1880.0 MHz



Channel 4183/ 836.6 MHz

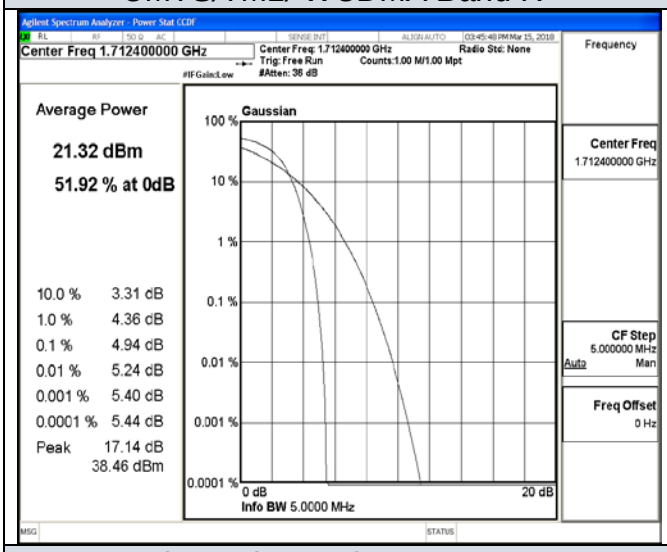


Channel 9538 / 1907.6 MHz

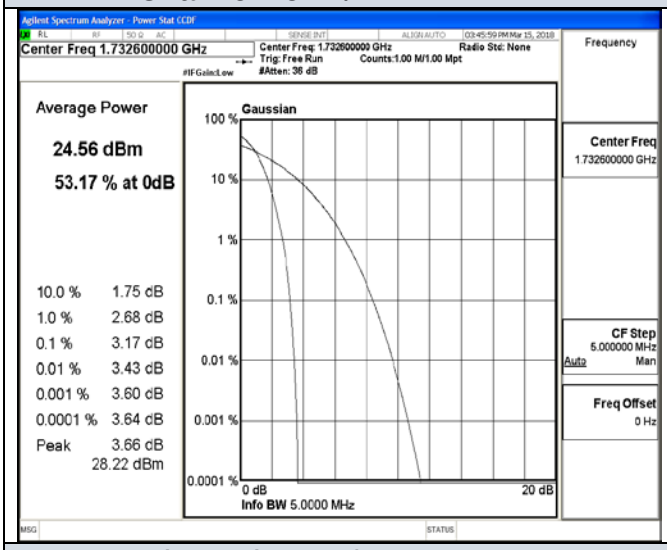
Channel 4233/ 846.6 MHz

Peak-to-Average Ratio (PAR)

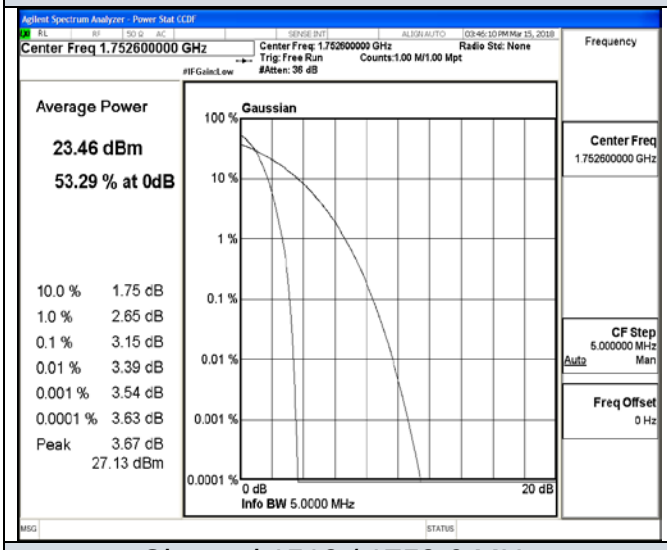
UMTS/TM1/ WCDMA Band IV



Channel 1312 / 1712.4 MHz



Channel 1413 / 1732.6 MHz



Channel 1513 / 1752.6 MHz

5 Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6 External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

7 Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

.....End of Report.....