

FCC MEASUREMENT AND TEST REPORT

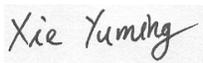
For

ZTE Corporation

ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen,
Guangdong, China 518057

FCC ID: Q78-BS8922S1900

Jun 12, 2016

This Report Concerns: <input checked="" type="checkbox"/> Original Report		Equipment Type: Macro Radio Remote Unit
Test Engineer:	Jennie HE 	
Report No.:	RF20151022RP	
Test Date:	May 27 – Jun 8, 2016	
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1 GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

With the developing of mobile communication, high quality networks have to be built up to meet growing requirements. Hot spot, indoor and rural area coverage should be taken into consideration. At the same time, telecom operators are facing challenges in equipment room, engineering and noise pollution. As a compact BTS, ZXSDR BS8922 is hence designed to meet these requirements.

Technical specification:

Size: 290mm(H) × 270mm (W)× 90mm (D)

Input voltage: 220V AC

Frequency range: 1930MHz to 1990MHz,

Max RF output power: 37dBm

Gain of the antenna: 9.5dBi

Modulation type of emission: UMTS is QPSK,16QAM,64QAM;

Appearance of EUT:



Objective

This Type approval report is prepared on behalf of ZTE Corporation in accordance with Part 1、 Part 2、 Part 15、 Part 24 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2. as well as the following parts:

Part 24 Wireless Communication Services

Applicable Standards: TIA EIA 137-A, TIA EIA 97-D, TIA/EIA 603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All radiated and conducted measurement was performed at ZTE Corporation Reliability Testing Center. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The predecessor of the EMC Laboratory of Shenzhen Zoom Rel Testing Technology Co., Ltd. is the ZRT EMC Shenzhen Laboratory, whose FCC registration number is 373926 and the date of listing is May 10, 2016.

The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on June 10, 2011. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 0007895832. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

2 SYSTEM TEST CONFIGURATION

Description of Test Configuration

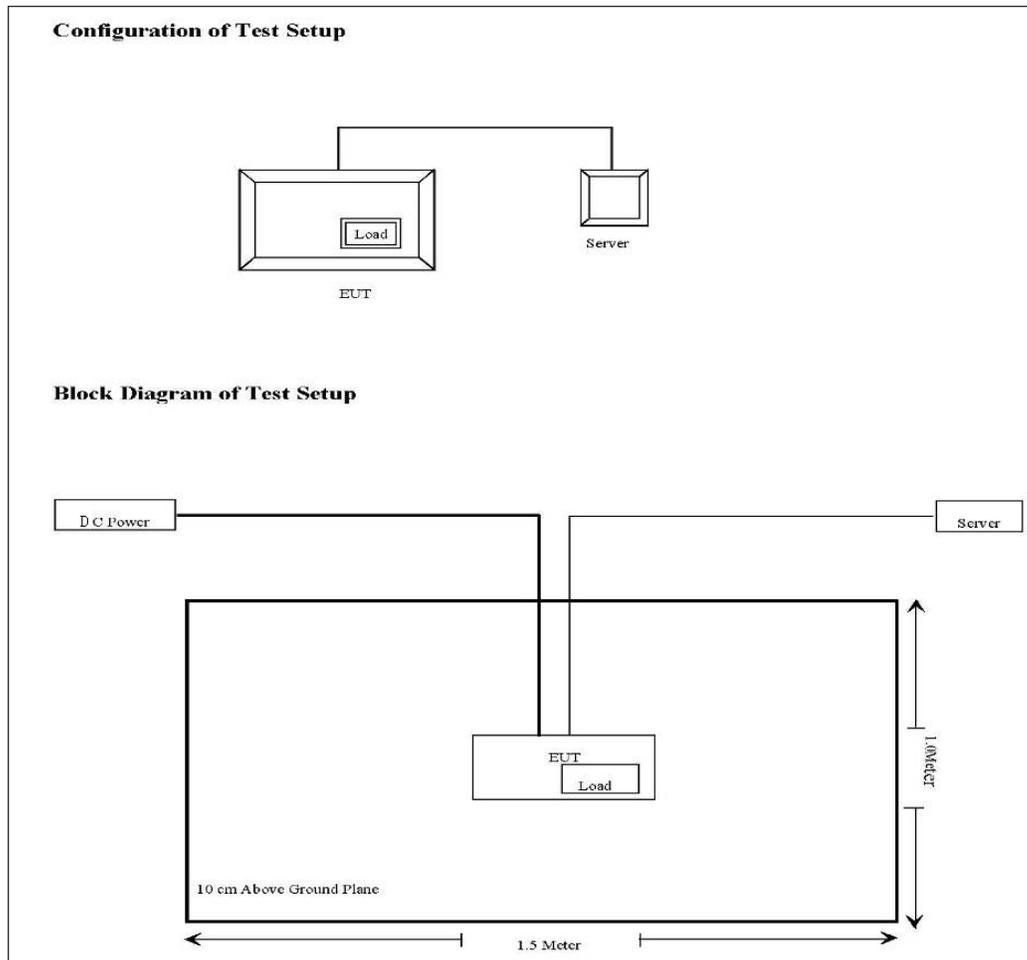
Justification

The EUT was configured for testing according to TIA/EIA-603C.

The final qualification test was performed with EUT operating at normal mode.

Equipment Modifications

ZTE Corporation has not done any modification on the EUT.



3 TEST RESULTS

3.1 TRANSMITTER OUTPUT POWER

Applicable Standard: FCC §2.1046 §24.232

According to FCC §2.1046 & §24.232, the EIRP (equivalent isotropically radiated power) must not exceed 1640 Watts.

According to RSS-133, SRSP 510 5.1.1 the EIRP (equivalent isotropically radiated power) must not

exceed 3280Watts/MHz for base station transmitters operating in the band of 1930 MHz to 1995MHz with the antenna height above average terrain up to 300 meters. If used in urban area, the limit should be 1640Watts/MHz.

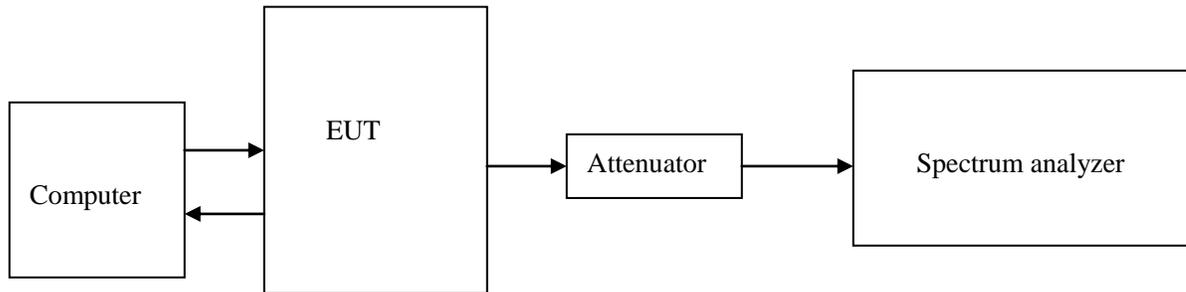
Note: EIRP= Max output Power+ Antenna gain- Cable Loss

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	50dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

Test Procedure



The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. External attenuation Loss is 40dB, Cable Loss is about 3.5dB.

Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

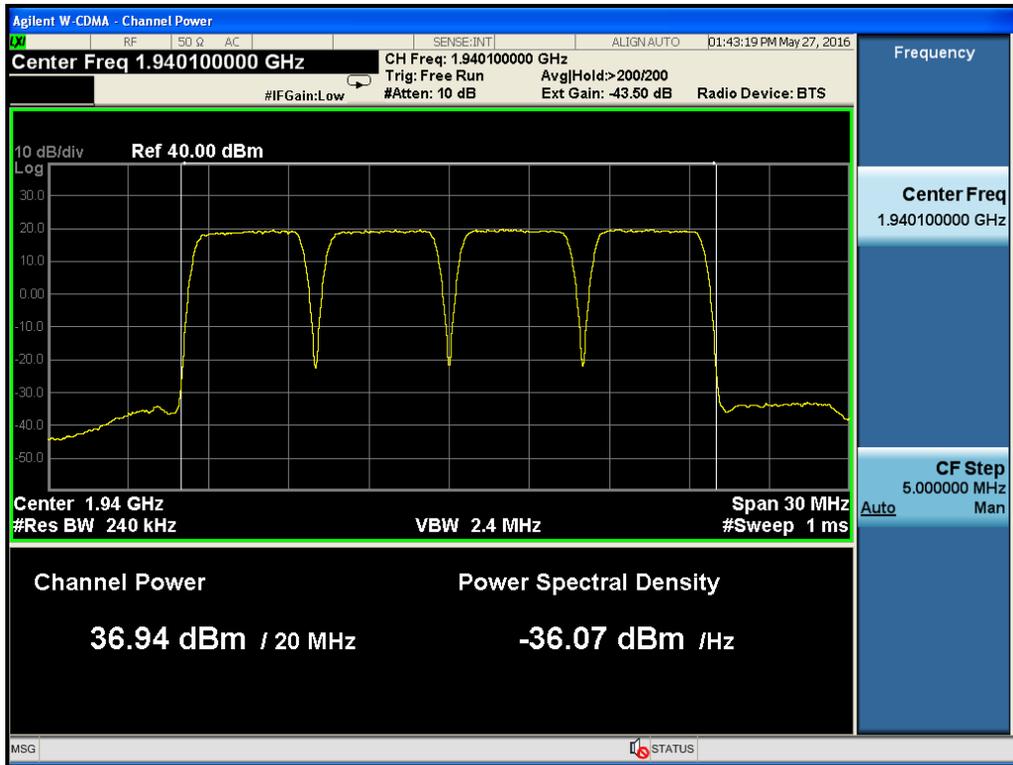
Test Result: Pass

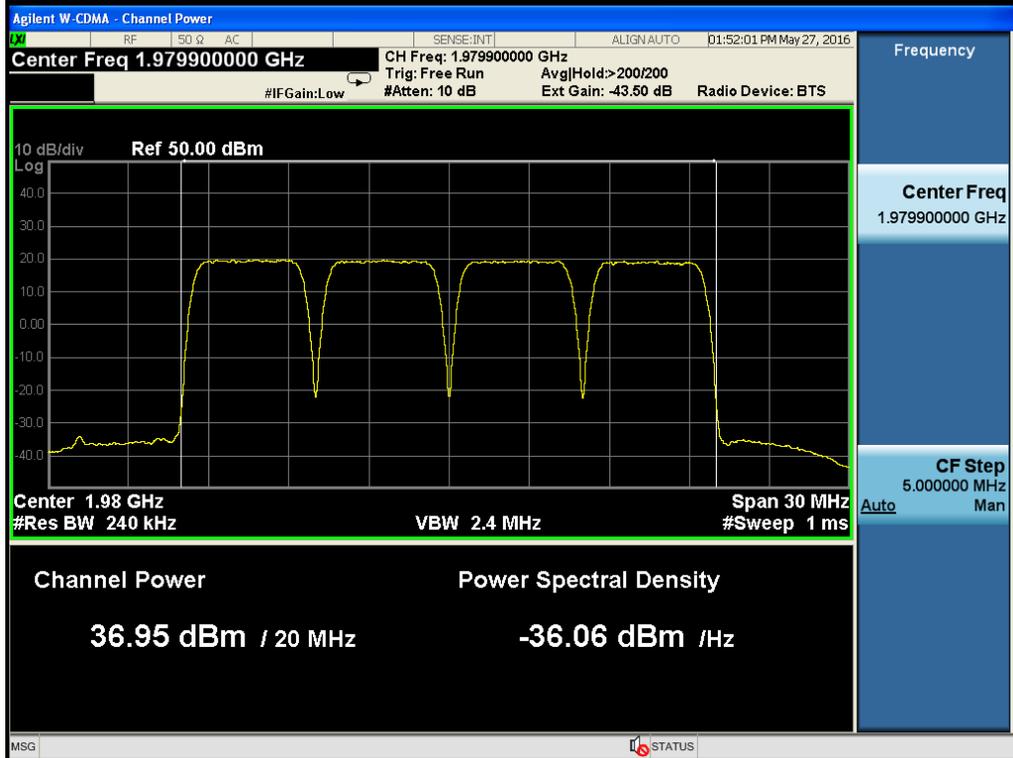
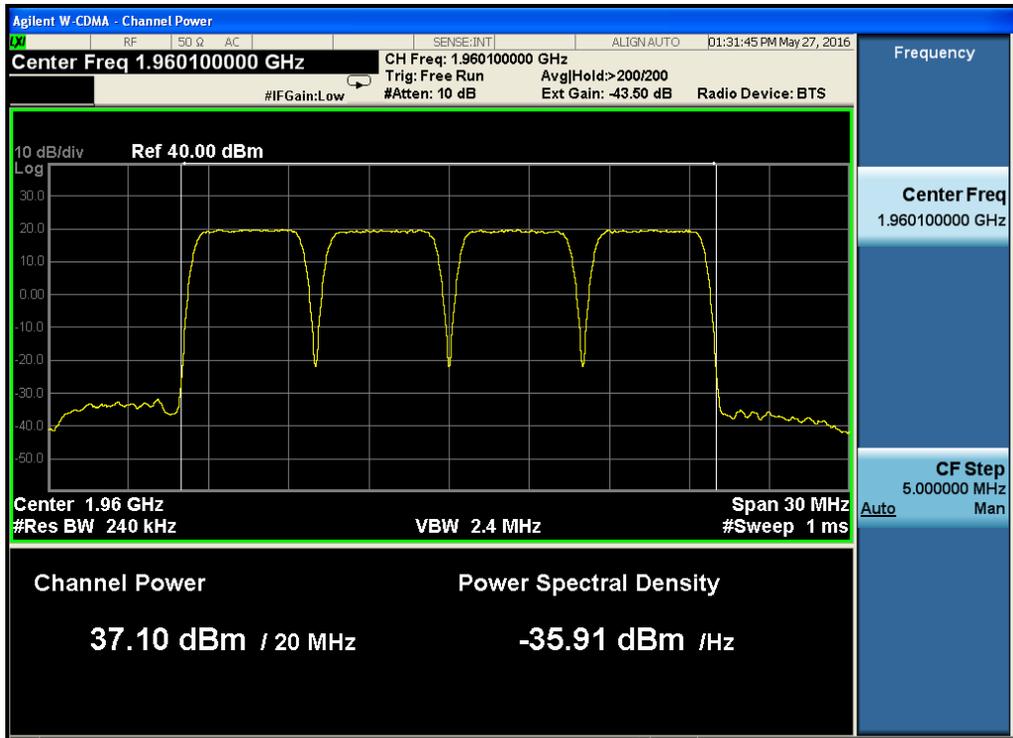
Test Mode: Transmitting UMTS

Test Data:

Four carriers

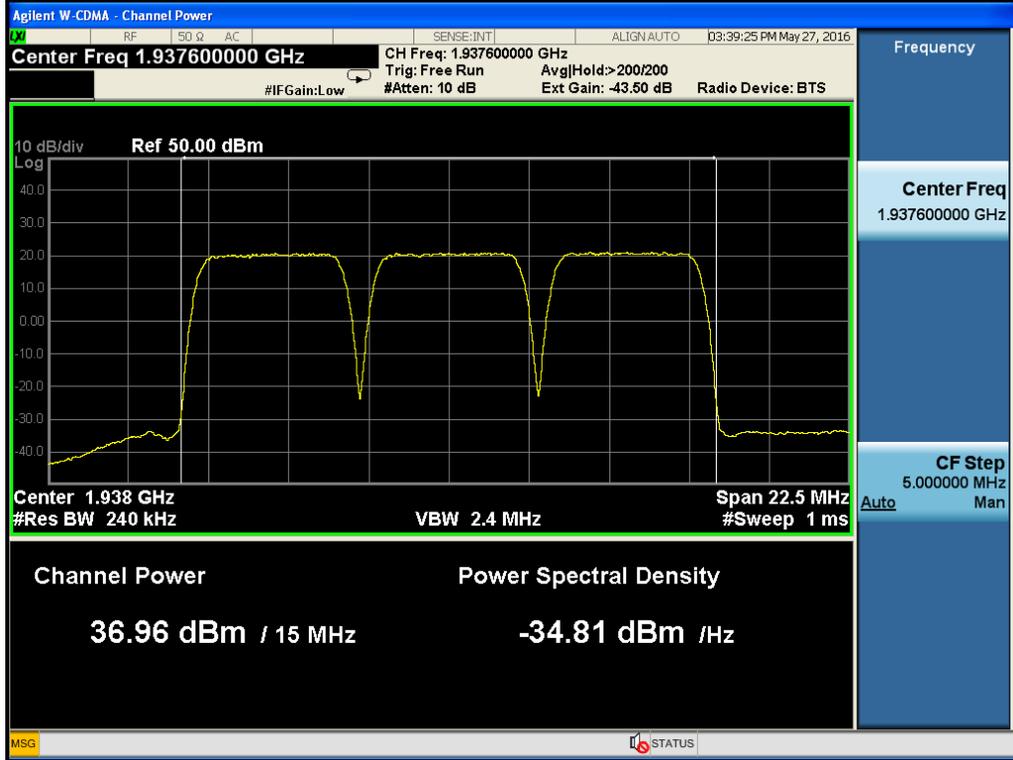
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1940.1	1932.6/1937.6/1942.6/1947.6	36.94
1960.1	1952.6/1957.6/1962.6/1967.6	37.10
1979.9	1972.4/1977.4/1982.4/1987.4	36.95

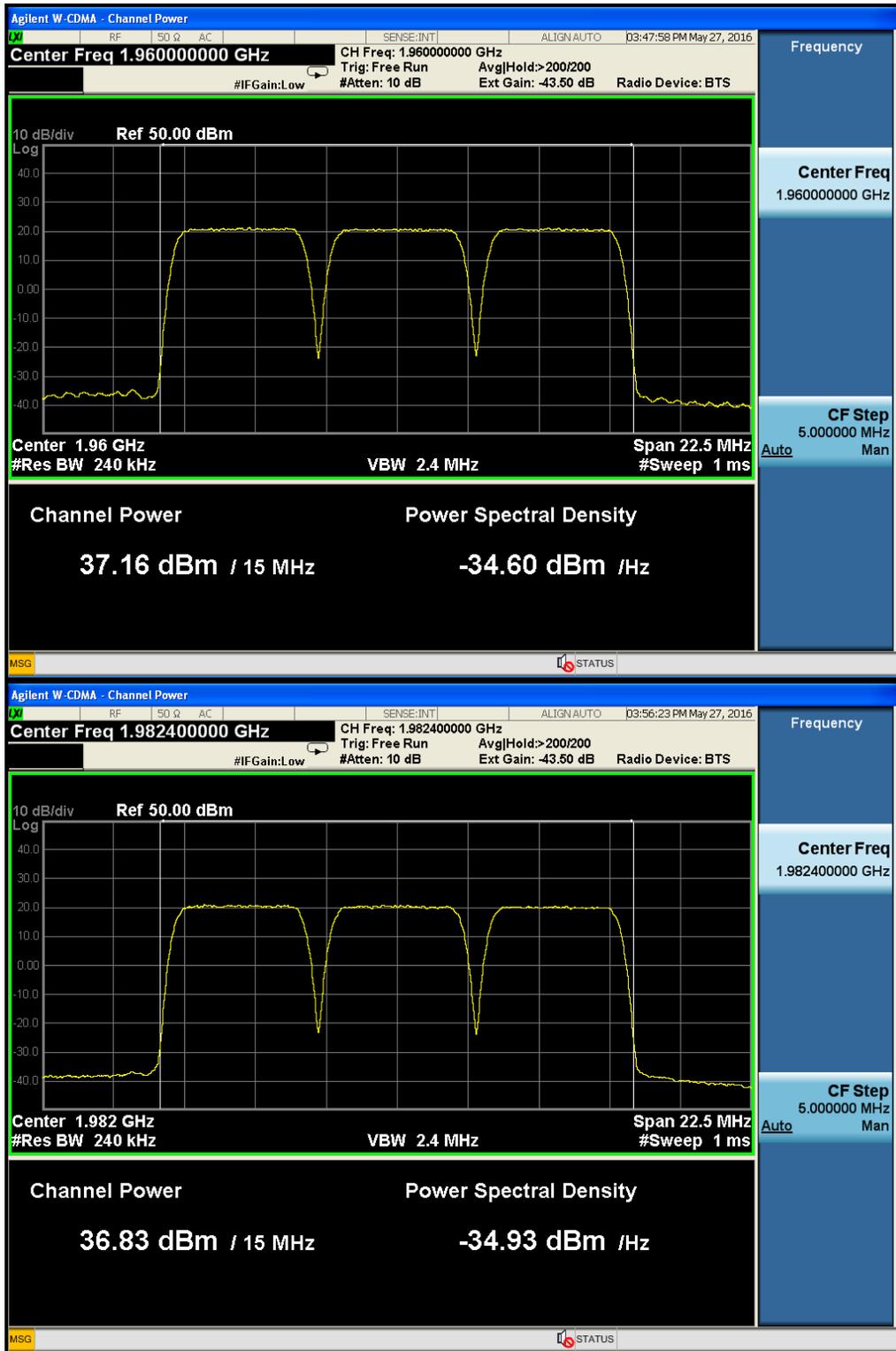




Three carriers

Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1937.6	1932.6/1937.6/1942.6	36.96
1960	1955/1960/1965	37.16
1982.4	1977.4/1982.4/1987.4	36.83

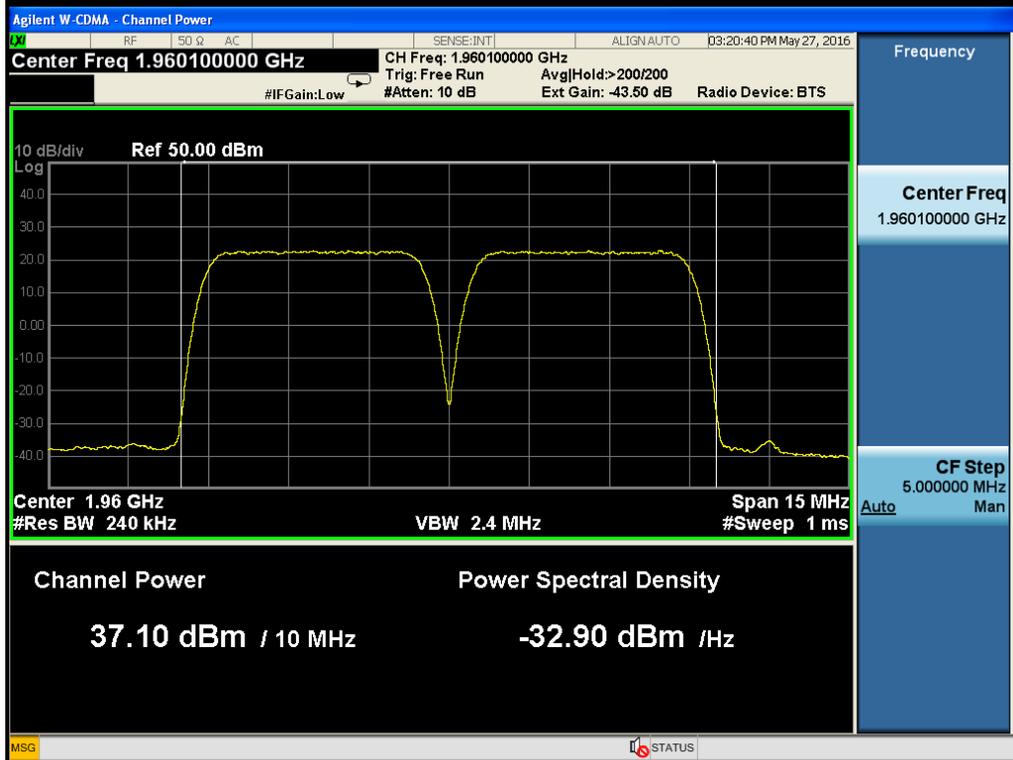
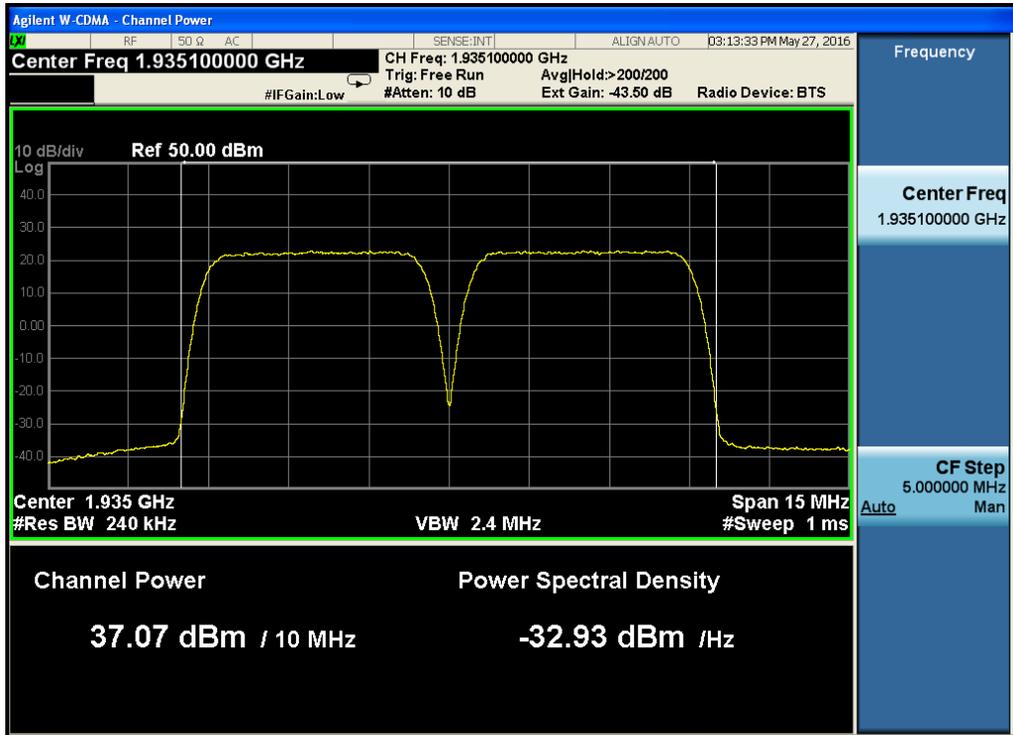


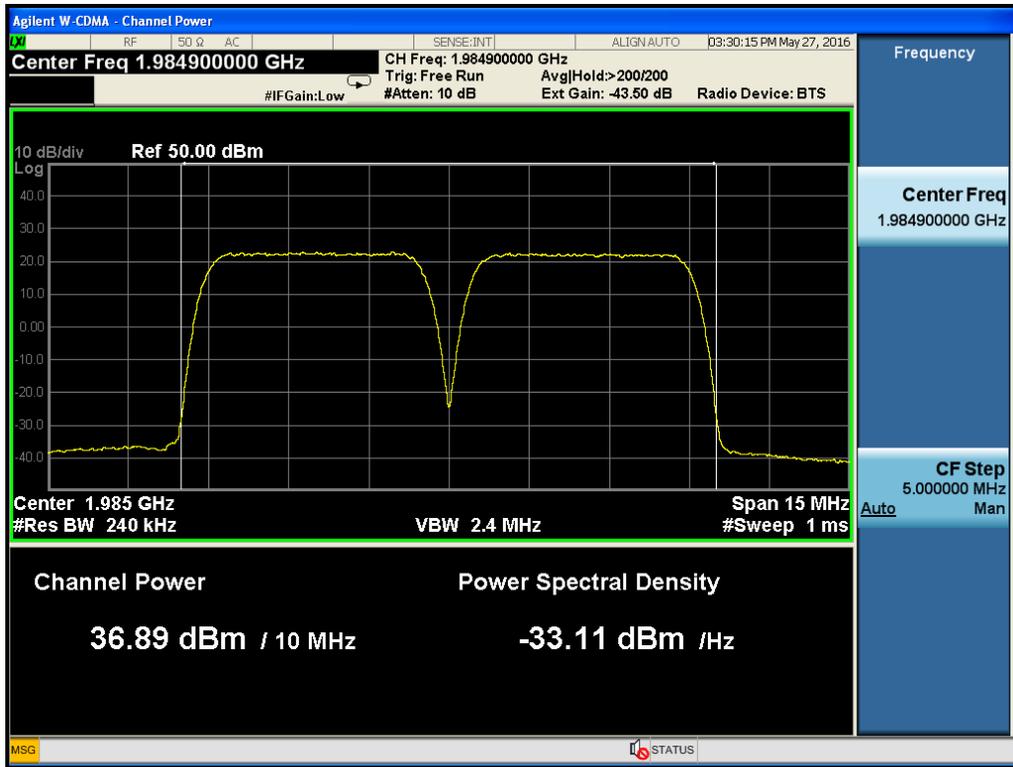


Two carriers

Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
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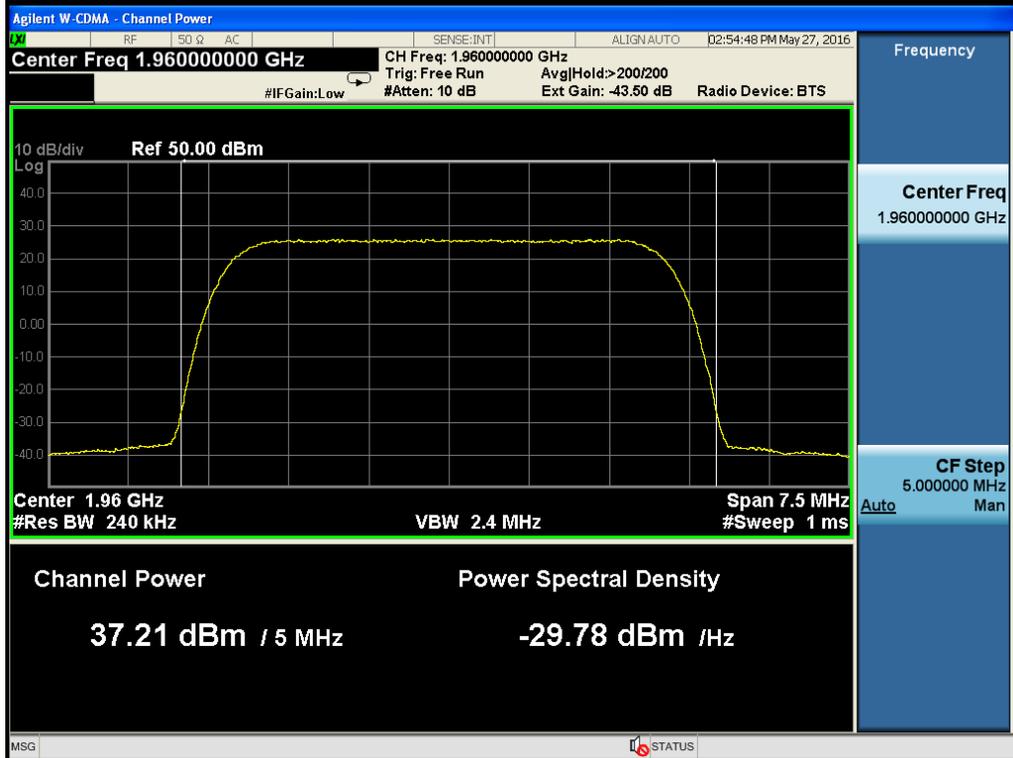
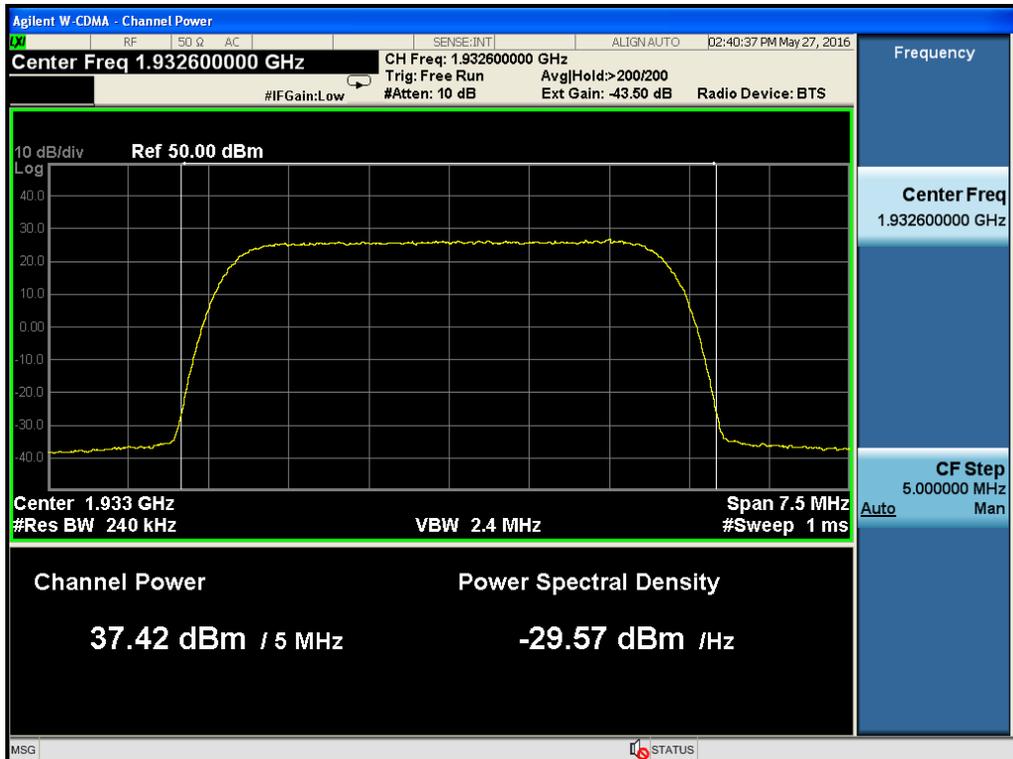
1935.1	1932.6/1937.6	37.07
1960.1	1957.6/1962.6	37.10
1984.9	1982.4/1987.4	36.89

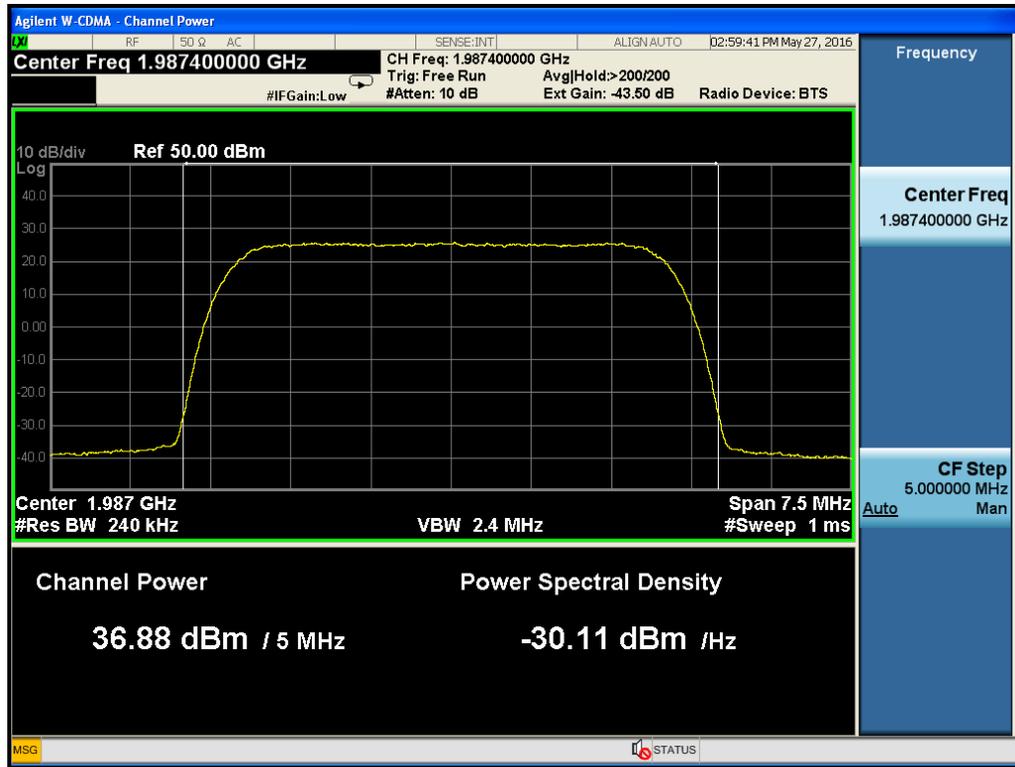




One carrier

Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1932.6	1932.4	37.42
1960	1950	37.21
1987.4	1967.6	36.88





3.2 RF EXPOSURE

Applicable standard: FCC §2.1091 and §1.1310

Limit

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated. Limits for Maximum Permissible Exposure (MPE)

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

Test Data

Predication of MPE limit at a given distance
 Equation from page 18 of OET Bulletin 65, Edition 97-01
 $S = EIRP / 4\pi R^2$
 Where: S = power density
 EIRP = equivalent isotropically radiated power=ERP+2.15dB
 $R = \text{distance to the center of radiation of the antenna} = [(ERP+2.15 \text{ dB}) / 4\pi S]^{1/2}$

Maximum EIRP, In general, the equivalent isotropically radiated power (EIRP) of base transmitters and cellular repeaters must not exceed 1640 Watts.
 Frequency is between 1500MHz and 100,000MHz, and the Maximum $S=1.0\text{mW}/\text{cm}^2$, so $R=3.61\text{m}$.
 This equipment should be installed and operated with minimum distance 3.61m between the radiator& your body.

Test Result: pass

3.3 MODULATION CHARACTERISTIC

Applicable Standard: FCC §2.1047

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	40dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

Test Procedure

UMTS digital mode is used by EUT.

Test Data Environmental Conditions

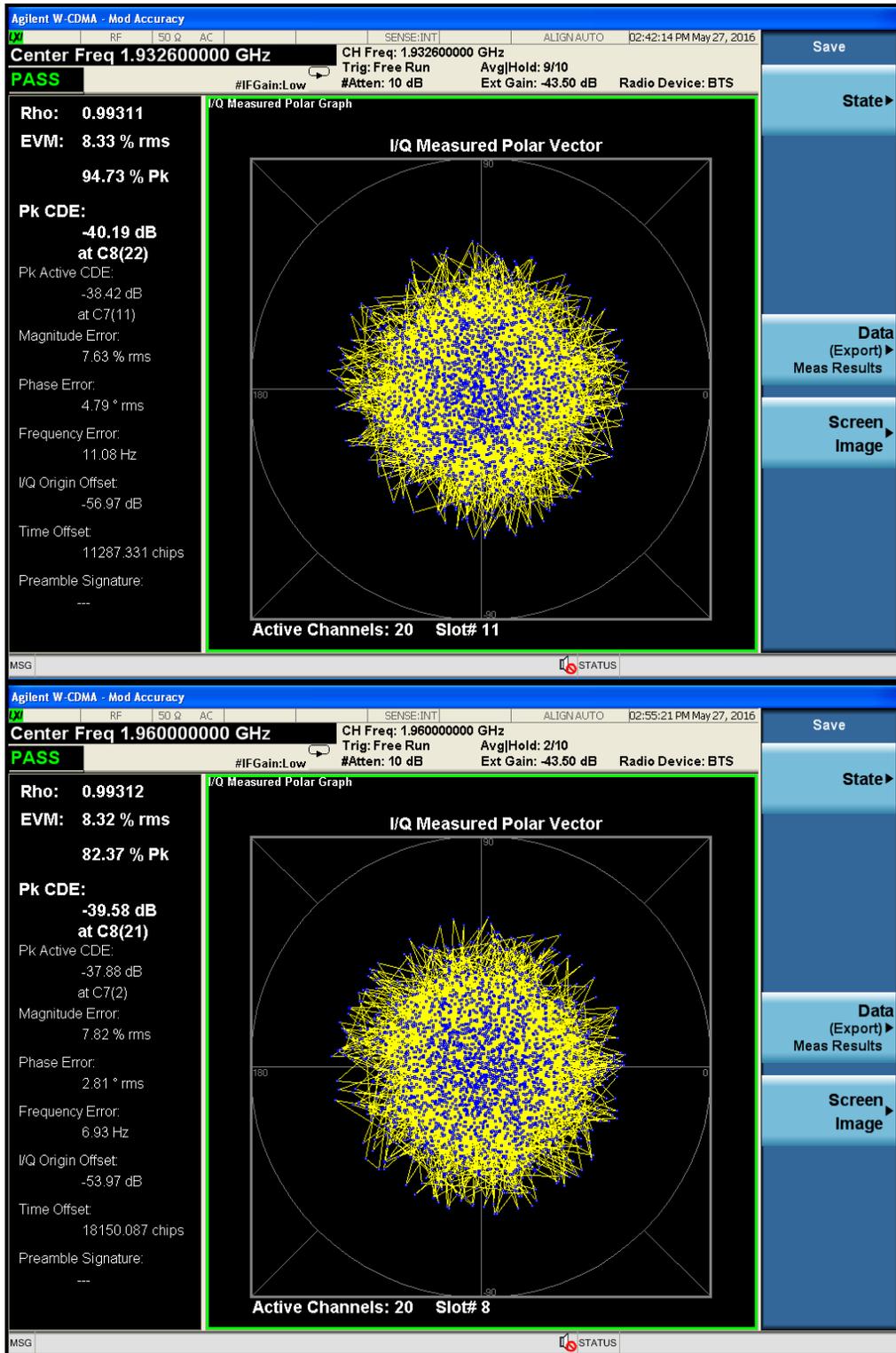
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

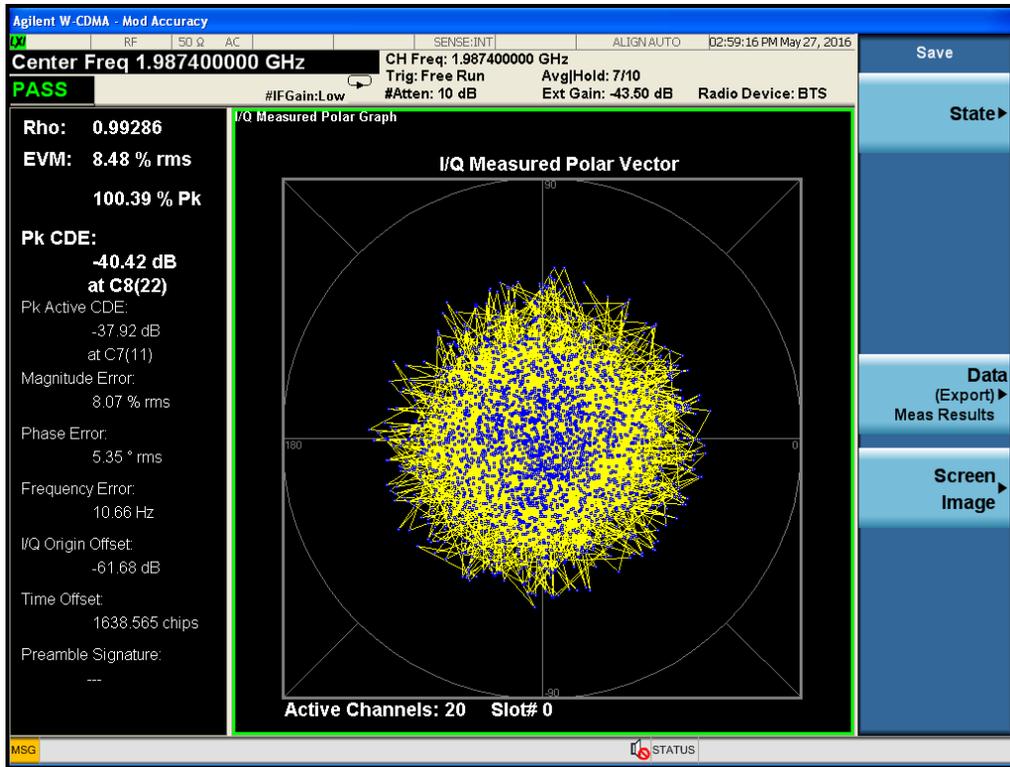
Test Result: Pass

Test Mode: Transmitting UMTS

Test Data:

Frequency (MHz)	EVM(%rms)
1932.6	8.33
1960	8.32
1987.4	8.48





3.4 SPURIOUS RADIATED EMISSIONS

Applicable Standard: FCC CFR 47, §2.1053

Test Equipment List and Details

Manufacturer	Equipment	Model	Serial Number	Last Cal.	Cal. Interval
R&S	SIGNAL GENERATOR	SMR20	A00017351	2015-09-09	1 year
Albatross	Anechoic Chamber	3m Site	A00017354	2015-12-01	1 year
R&S	EMI Test Receiver	ESIB26	100058	2015-10-29	1 year
R&S	Ultra Breitband Antennas	HL562	100022	2015-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100032	2015-7-29	1 year

R&S	Double-Ridged Waveguide Horn Antenna	HF906	100446	2015-7-29	1 year
SCHWARZ-BECK K	Biconical Antenna	VUBA9117	9117-122	2015-7-29	1 year

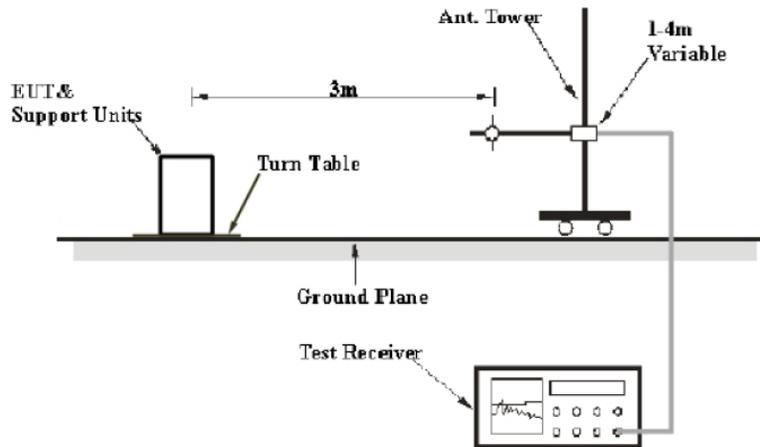
***statement of traceability:** ZTE Corporation Testing lab attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emissions measurement at the EMC lab of ZTE Corp. is 3.6dB.

EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the FCC part 2.1053. The specification used was the FCC 2.1053 limits.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43+10 Lg P (power out in Watts)

The resolution bandwidth of the spectrum analyzer was set at 100KHz for 30MHz to 1GHz

scanning, set at 1MHz or 3MHz for 1GHz to 20GHz scanning.

Test Results Summary: PASS

Environmental Conditions

Temperature:	26°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

Test data

Frequency (GHz)	Polar H/V	Corr. (dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
97.512	V	-127.0	-64.16	2.15	-66.31	-13	53.31
117.688	V	-124.1	-62.87	2.15	-65.02	-13	52.02
1000.0	V	-107.3	-57.29	2.15	-59.44	-13	46.44
1961.6	V	-104.4	-23.75	2.15	-25.9	-13	12.9
2132.8	V	-103.5	-46.48	2.15	-48.63	-13	35.63
2993.6	V	-94.5	-44.3	2.15	-46.45	-13	33.45
3803.2	V	-89.1	-50.43	2.15	-52.58	-13	39.58
4504.0	V	-87.7	-49.65	2.15	-51.8	-13	38.8
6040.0	V	-82.6	-47.03	2.15	-49.18	-13	36.18
7000.0	V	-80.7	-47.16	2.15	-49.31	-13	36.31
8545.6	V	-77.5	-44.09	2.15	-46.24	-13	33.24
11747.2	V	-76.3	-44.28	2.15	-46.43	-13	33.43
120.016	H	-124.6	-68.15	2.15	-70.3	-13	57.3
750.128	H	-122.4	-69.94	2.15	-72.09	-13	59.09
1000.0	H	-107.5	-56.72	2.15	-58.87	-13	45.87
1960.0	H	-101.3	-24.15	2.15	-26.3	-13	13.3
2139.2	H	-102.0	-44.54	2.15	-46.69	-13	33.69
3000.0	H	-96	-45.29	2.15	-47.44	-13	34.44
3659.2	H	-89.3	-50.56	2.15	-52.71	-13	39.71
4603.2	H	-85.0	-47.12	2.15	-49.27	-13	36.27
5537.6	H	-79.7	-44.32	2.15	-46.47	-13	33.47
6292.8	H	-77.9	-43.55	2.15	-45.7	-13	32.7
8697.4	H	-72.9	-39.93	2.15	-42.08	-13	29.08
11738.0	H	-73.2	-41.96	2.15	-44.11	-13	31.11

Radiation emission spurious

3.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard: FCC§2.1051, §24.238

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified.

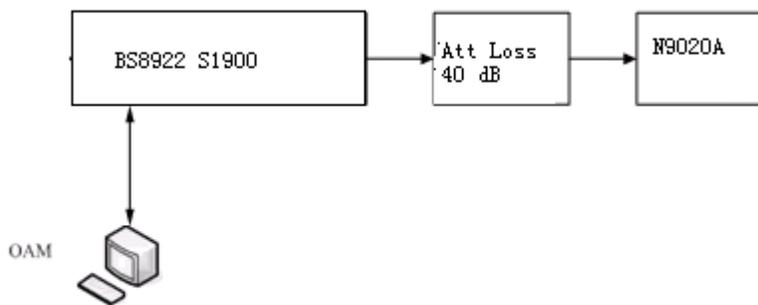
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	50dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

Test Procedure

EUT Setup:



REMARKS: Attenuator loss (dB)=40dB, Cable Loss (dB)=3.5dB.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz for 30MHz

to 1GHz scanning, set at 1MHz for 1GHz to 13.8GHz scanning. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

Test Result: Pass

Test Mode: Transmitting UMTS

Test Data:

Four Carriers (working in bottom frequency)







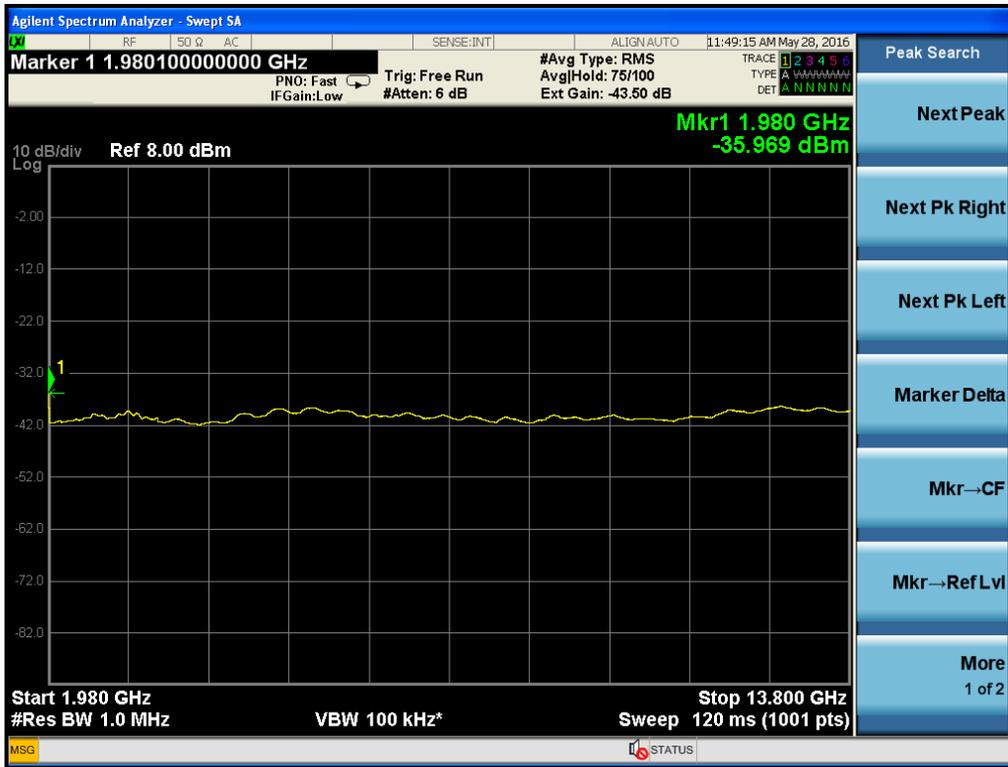


Four carriers (working in middle frequency)









Four Carriers (working in top frequency)









Three carriers (working in bottom frequency)

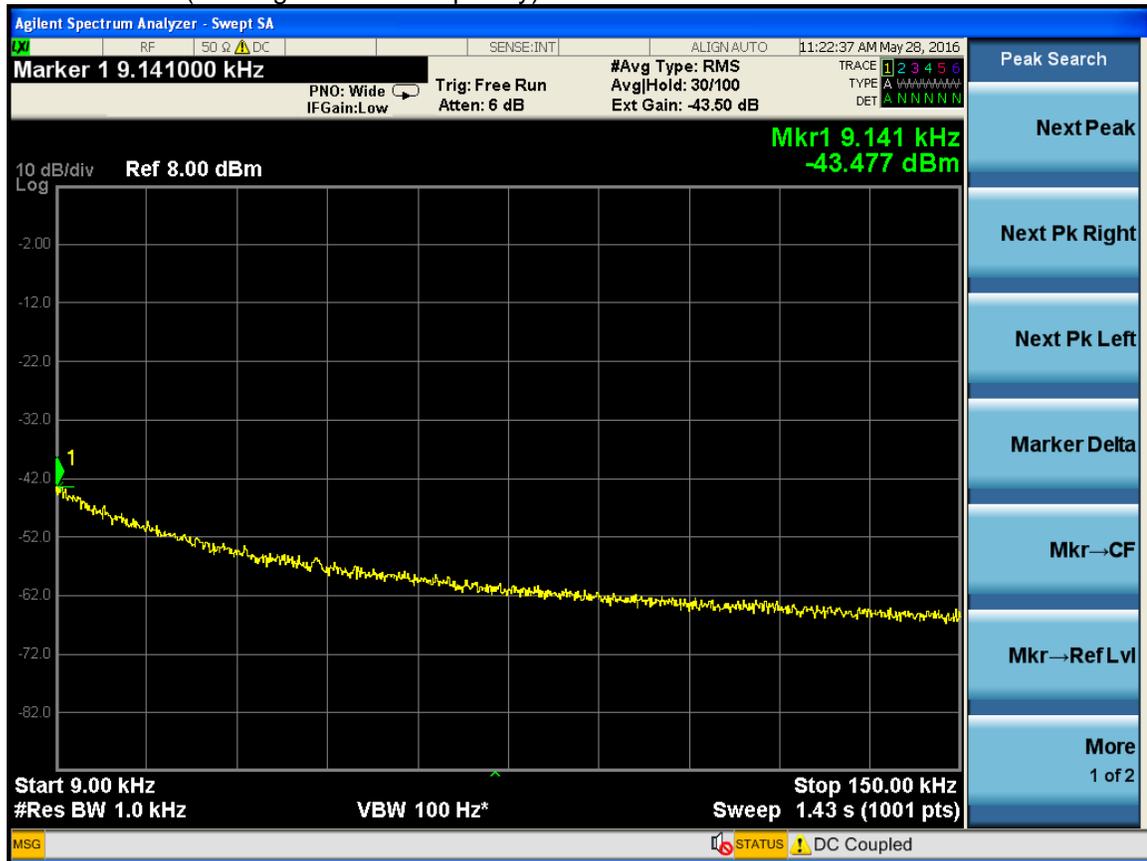








Three carriers (working in middle frequency)









Three carriers (working in top frequency)







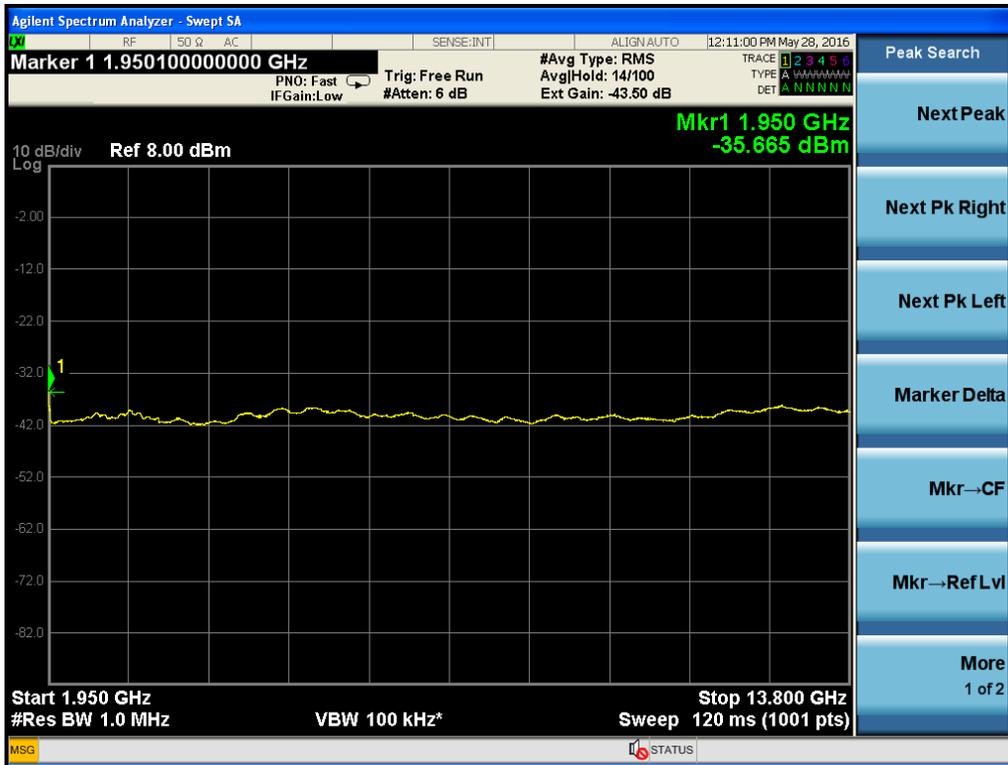


Two carrier (working in bottom frequency)



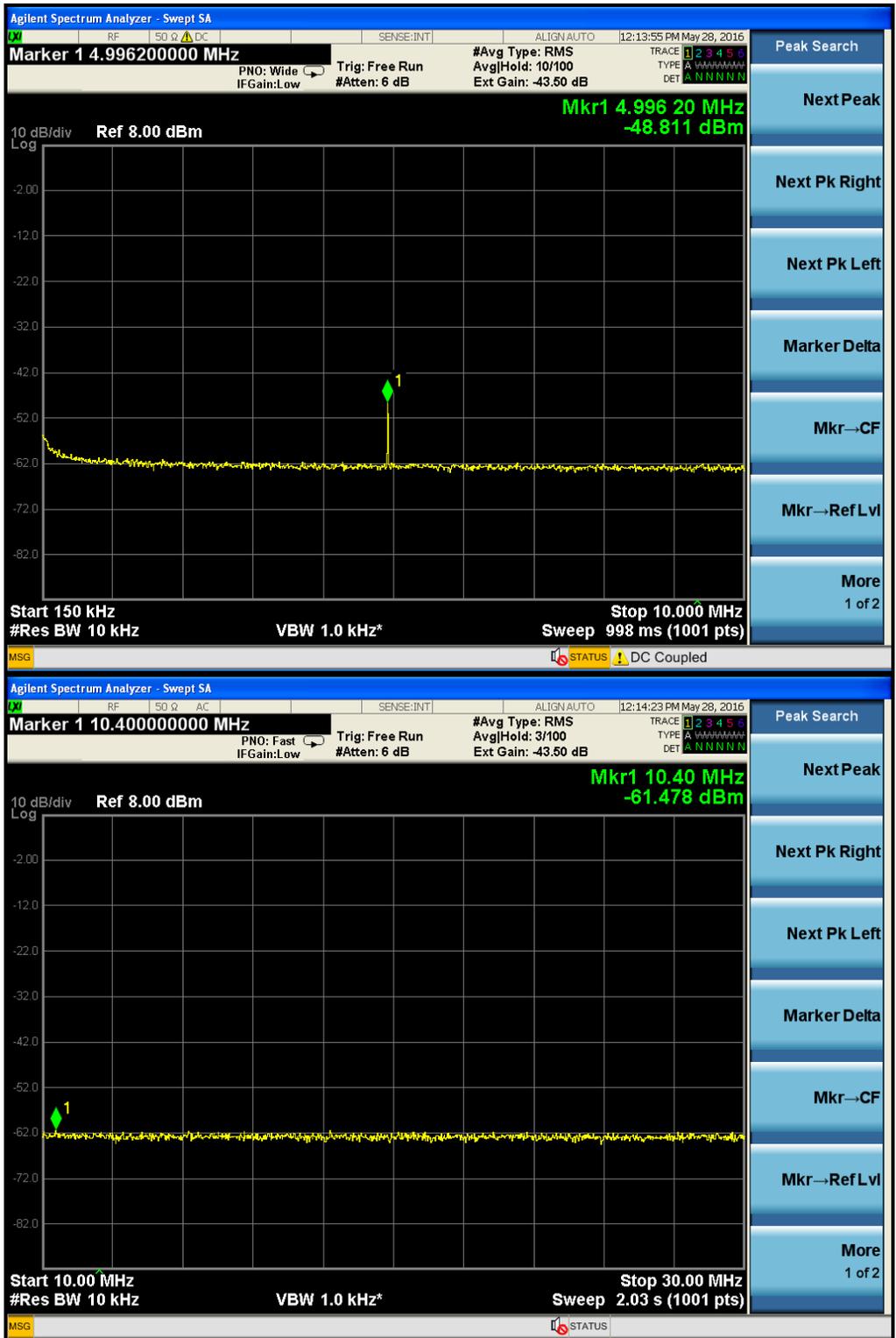




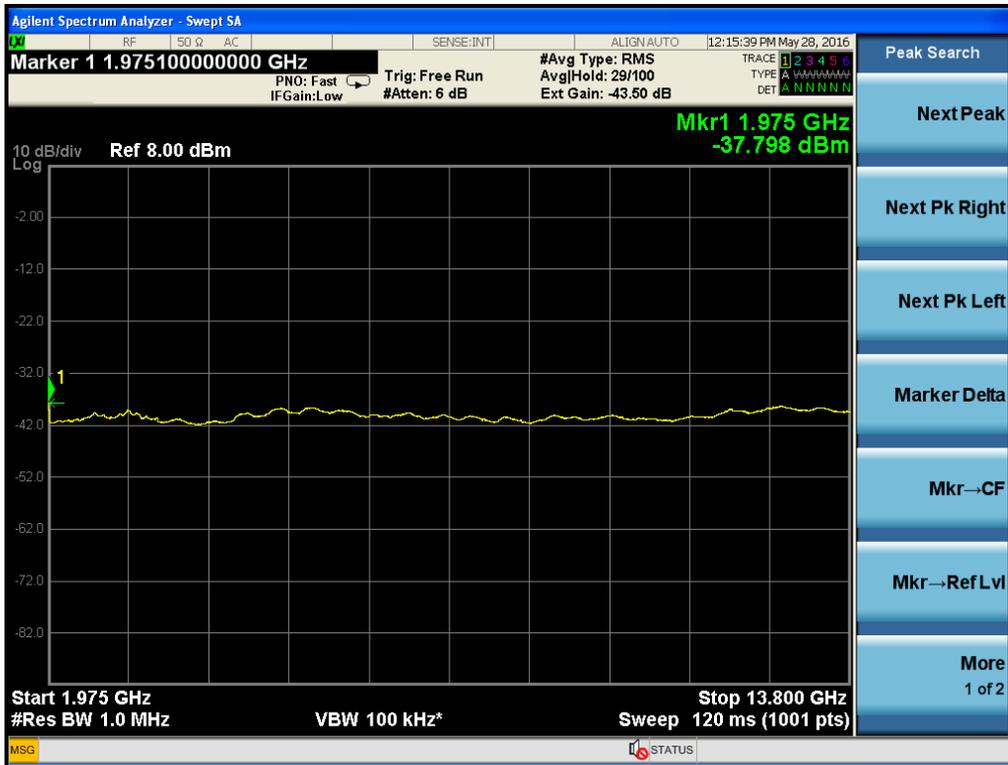


Two carriers (working in middle frequency)



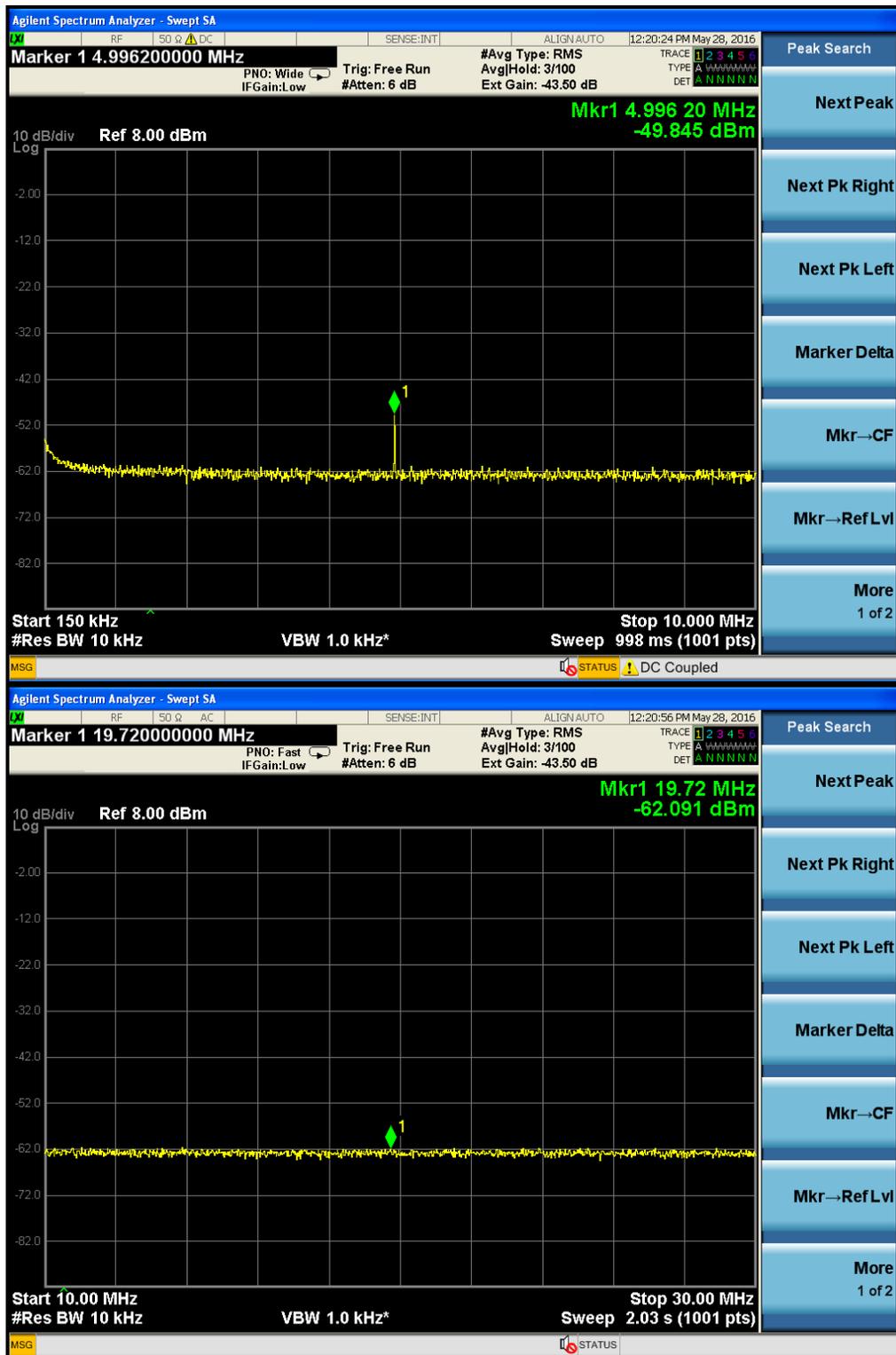






Two carriers (working in top frequency)









One carrier (working in bottom frequency)









One carrier (working in middle frequency)









One carrier (working in top frequency)









3.6 OCCUPIED BANDWIDTH

Applicable Standard: FCC §2.1049 §24.229 §24.238

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	50dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

The RF out of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth of the spectrum analyzer was set at 1% of the span or higher and 99%Power bandwidth was recorded.

Environmental Conditions

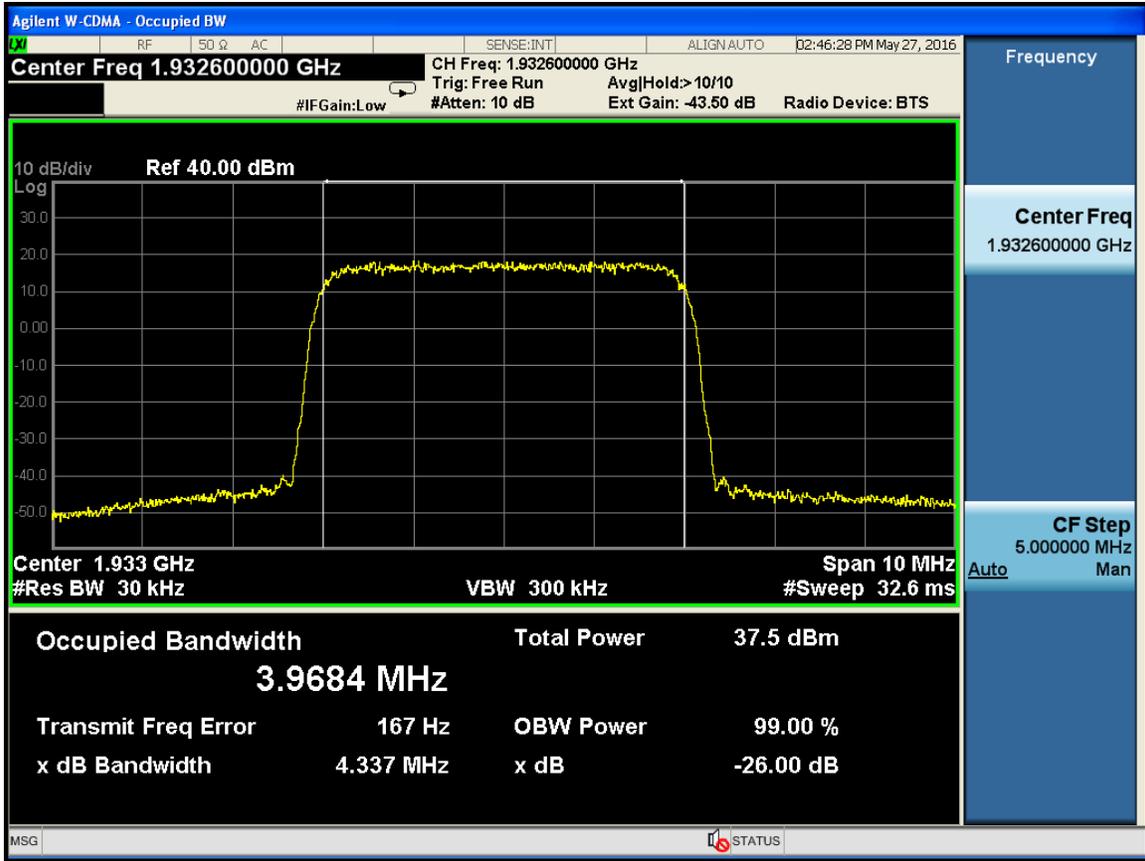
Temperature:	20 ° C
Relative Humidity:	53%
ATM Pressure:	1009mbar

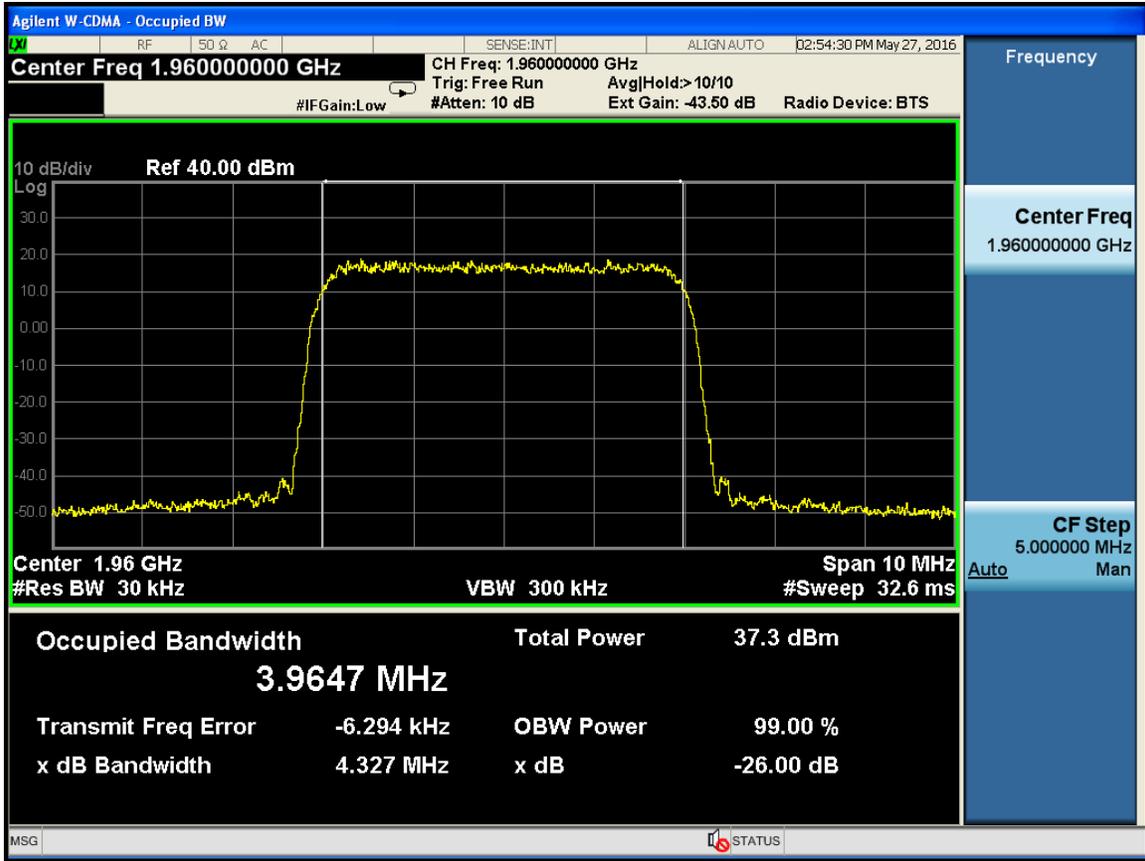
Test Result: Pass

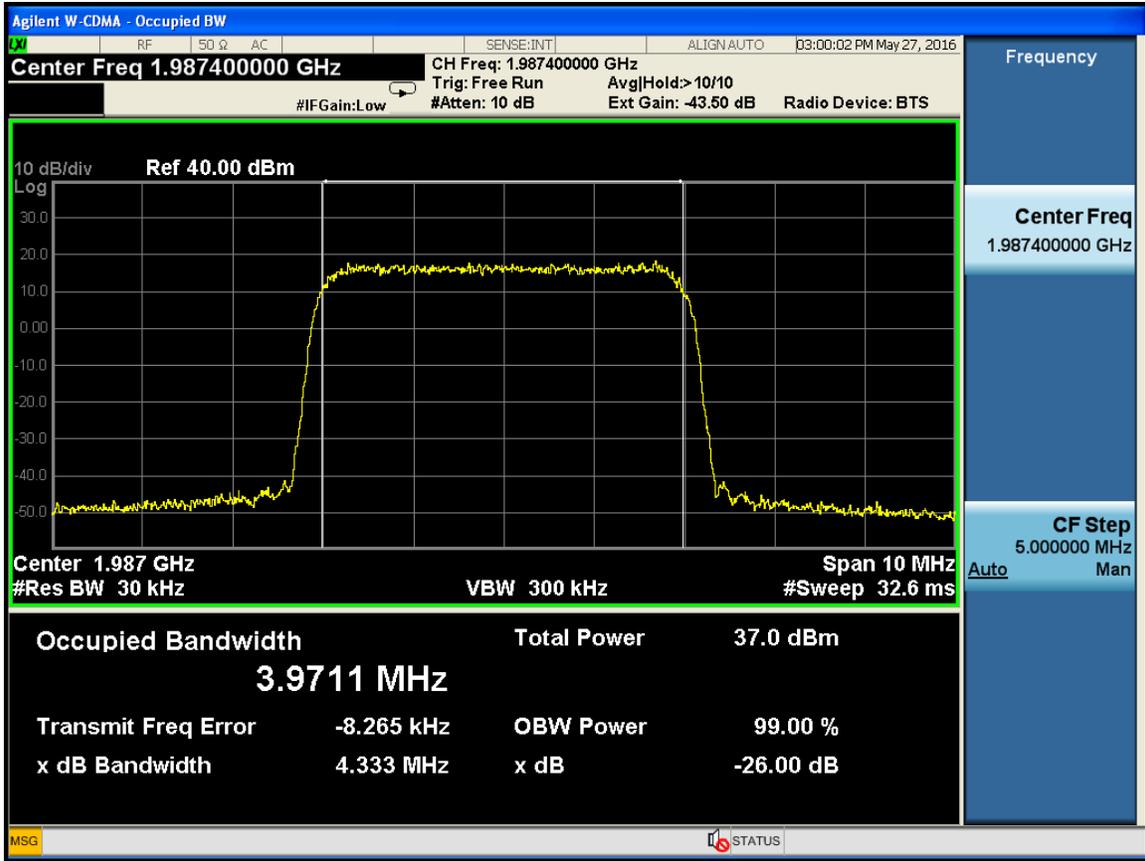
Test Mode: Transmitting UMTS

Test Data

Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1932.6/1960/1987.4	3.9684/3.9647/3.9711	<4.2







3.7 BAND EDGES

Applicable Standard: FCC §2.1051 §24.238

According to §2.1051 and §24.238, 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 limit (dBm) should $P - (43 + 10 \log(P)) = -13 \text{ dBm}$.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date

Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	50dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
 The center of the spectrum analyzer was set to block edge frequency.

Test Data Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53%
ATM Pressure:	1009mbar

Test Result: Pass

Test Mode: Transmitting UMTS

Test Data

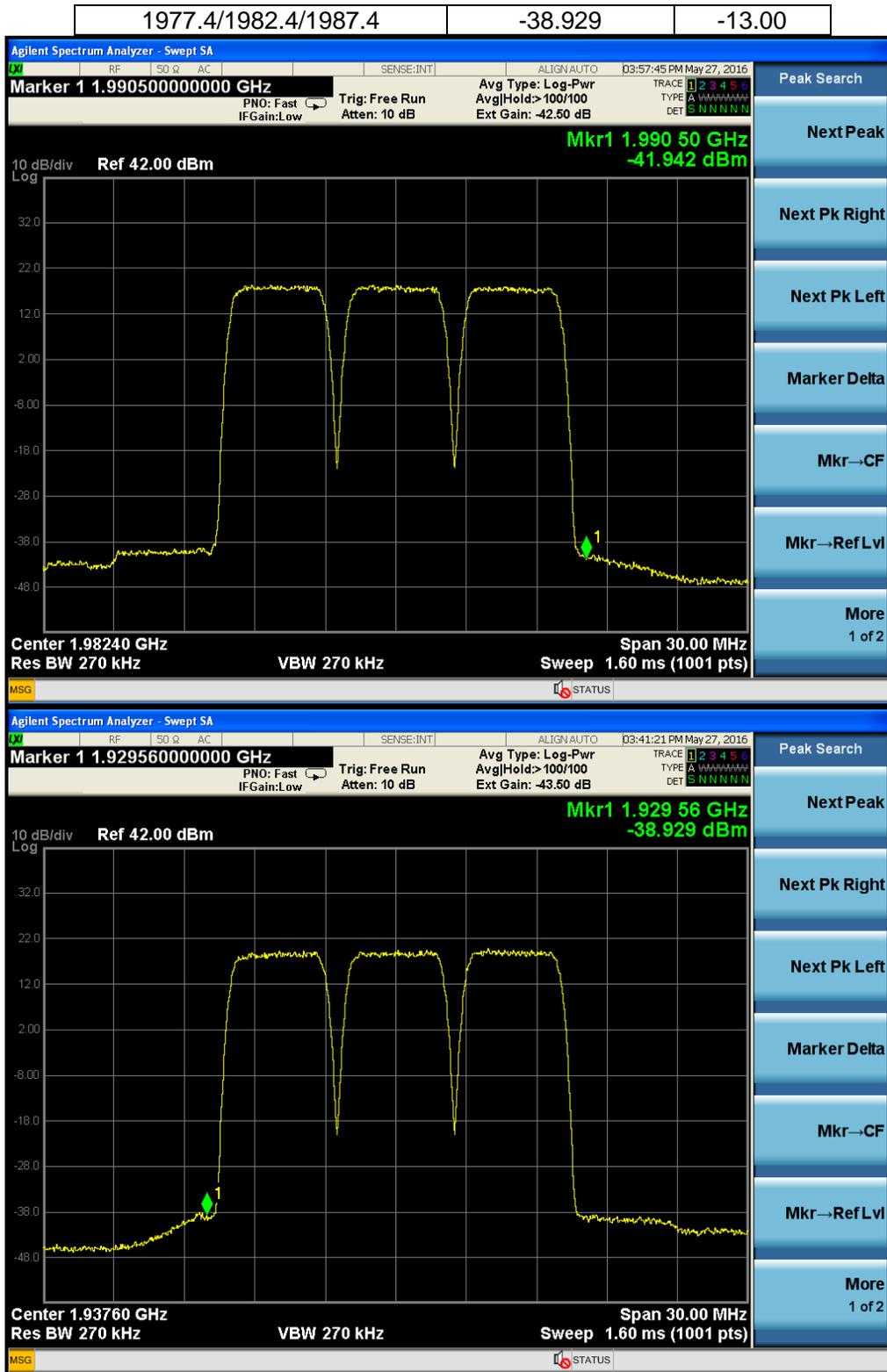
Four carriers

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1932.6/1937.6/1942.6/1947.6	-37.858	-13.00
1972.4/1977.4/1982.4/1987.4	-39.044	-13.00



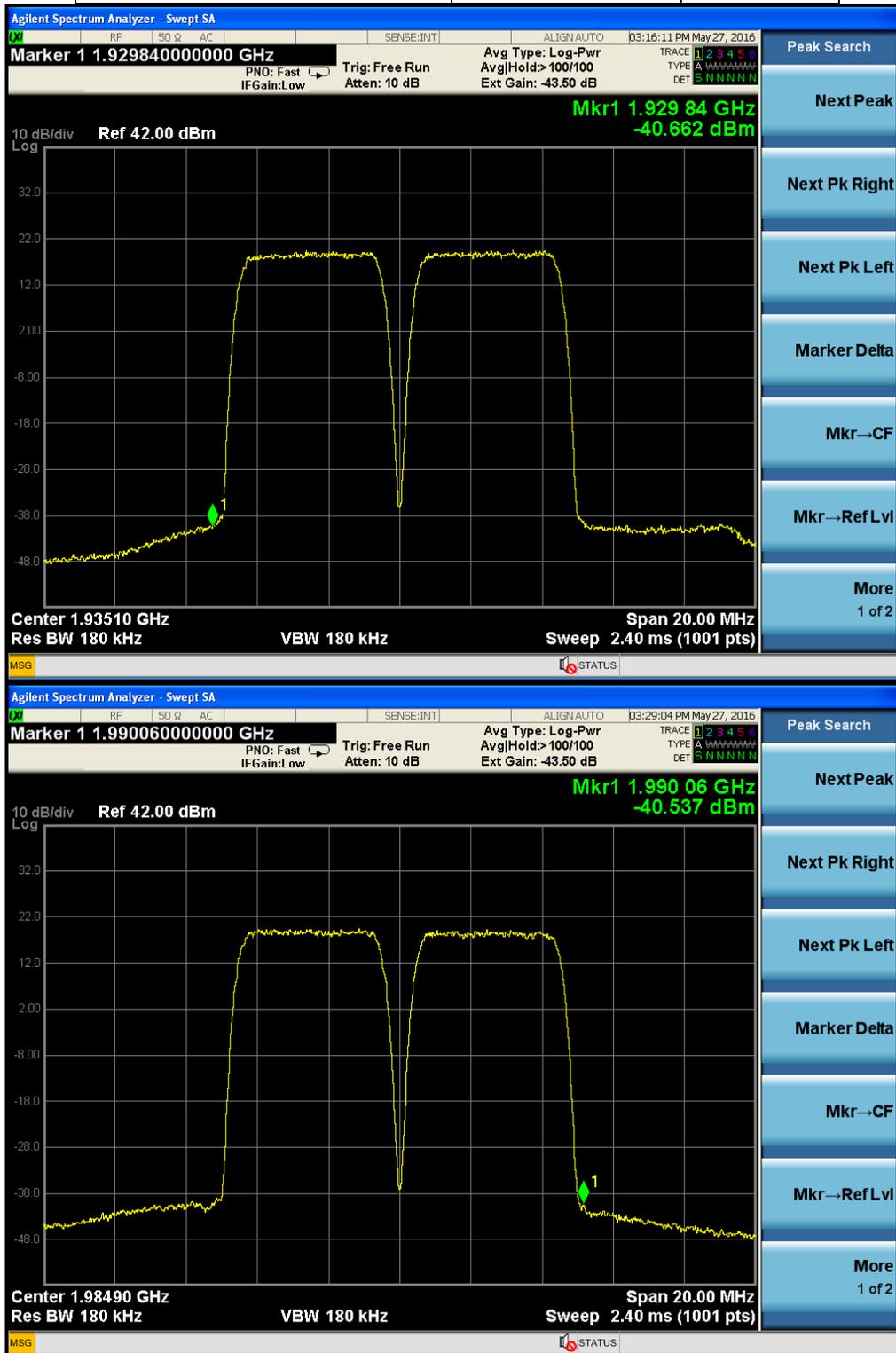
Three carriers

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1932.6/1937.6/1942.6	-41.942	-13.00



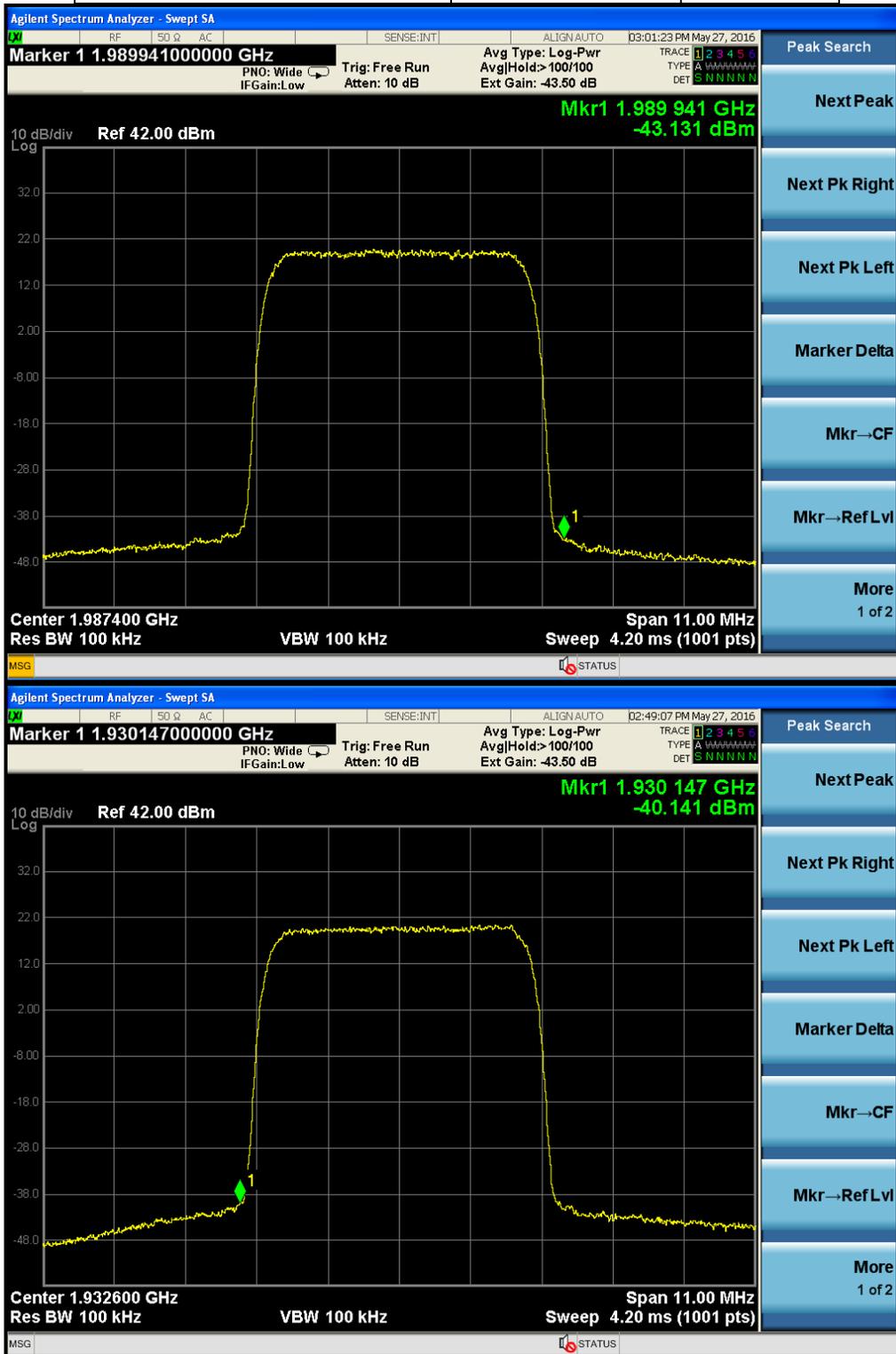
Two carriers

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1932.6/1937.6	-40.662	-13.00
1982.4/1987.4	-40.537	-13.00



One carrier

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1932.6	-43.131	-13.00
1987.4	-40.141	-13.00



3.8 FREQUENCY STABILITY

Applicable Standard: FCC § 2.1055 § 24.235

Requirements: FCC § 2.1055 (a)(d) .The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
GZ-ESPEC	Temperature Chamber	EW0470	06113028	2016-1-26	2017-1-26
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51160170	2015-8-20	2016-8-19
Atten	50dB Attenuator	ATSI150-4-40	11300100204204	2015-7-11	2016-7-11
Forstar	Forstar RF Cable	002	1034	2015-9-8	2016-9-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 150 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable AC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Environmental Conditions

Normal condition:	25° C
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Relative Humidity:	54%
ATM Pressure:	1011 mbar

Test Result: Pass

Test Mode: Transmitting UMTS

Test Data

Frequency Stability Versus Temperature

Frequency Stability vs. Temperature					
Temperature °C	Power Supplied VAC	Frequency Measure Error Hz	Error ppm	Limit ppm	Result
B(1932.6MHz)					
-40	220	3.4	0.001759	0.02	PASS
-30	220	-2.1	-0.00109	0.02	PASS
-20	220	-4.3	-0.00222	0.02	PASS
-10	220	3.8	0.001966	0.02	PASS
0	220	-4.1	-0.00212	0.02	PASS
10	220	3.7	0.001915	0.02	PASS
20	220	4.2	0.002173	0.02	PASS
30	220	3.8	0.001966	0.02	PASS
40	220	-2.7	-0.0014	0.02	PASS
50	220	-5.3	-0.00274	0.02	PASS
55	220	5.2	0.002691	0.02	PASS
M(1960MHz)					
-40	220	4.7	0.002398	0.02	PASS
-30	220	3.2	0.001633	0.02	PASS
-20	220	-3.3	-0.00168	0.02	PASS
-10	220	5.1	0.002602	0.02	PASS
0	220	-3.4	-0.00173	0.02	PASS
10	220	5.2	0.002653	0.02	PASS

20	220	-3.6	-0.00184	0.02	PASS
30	220	-4.3	-0.00219	0.02	PASS
40	220	-4.2	-0.00214	0.02	PASS
50	220	5.4	0.002755	0.02	PASS
55	220	5.1	0.002602	0.02	PASS
T (1987.6MHz)					
-40	220	-5.6	-0.00282	0.02	PASS
-30	220	-5.3	-0.00267	0.02	PASS
-20	220	4.1	0.002063	0.02	PASS
-10	220	4.1	0.002063	0.02	PASS
0	220	3.6	0.001811	0.02	PASS
10	220	3.7	0.001862	0.02	PASS
20	220	-3.2	-0.00161	0.02	PASS
30	220	-3.5	-0.00176	0.02	PASS
40	220	3.7	0.001862	0.02	PASS
50	220	5.3	0.002667	0.02	PASS
55	220	4.2	0.002113	0.02	PASS

Frequency Stability Versus Voltage

Frequency Stability vs. Voltage					
Voltage Vac	Temperature	Frequency Measure Error Hz	Error ppm	Limit ppm	Result
B(1932.6M)					
90	20	3.6	0.001863	0.02	
115	20	-3.3	-0.00171	0.02	PASS
140	20	-4.7	-0.00243	0.02	PASS
165	20	-5.2	-0.00269	0.02	PASS
190	20	-4.6	-0.00238	0.02	PASS
215	20	-2.8	-0.00145	0.02	PASS
264	20	3.5	0.001811	0.02	PASS
M(1960M)					
90	20	3.7	0.001888	0.02	PASS
115	20	-3.8	-0.00194	0.02	PASS
140	20	-3.3	-0.00168	0.02	PASS
165	20	4.8	0.002449	0.02	PASS
190	20	-3.8	-0.00194	0.02	PASS
215	20	-4.9	-0.0025	0.02	PASS
264	20	5.6	0.002857	0.02	PASS

T(1987.4M)					
90	20	-3.5	-0.00176	0.02	PASS
115	20	4.2	0.002113	0.02	PASS
140	20	-3.7	-0.00186	0.02	PASS
165	20	2.9	0.001459	0.02	PASS
190	20	2.8	0.001409	0.02	PASS
215	20	-4.3	-0.00216	0.02	PASS
264	20	-3.1	-0.00156	0.02	PASS