

FCC MEASUREMENT AND TEST REPORT

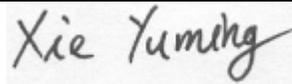
For

ZTE Corporation

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

FCC ID: ZXSDR RSU82 S1900

Mar 6, 2017

This Report Concerns: <input checked="" type="checkbox"/> Original Report		Equipment Type: Remote Radio Unit	
Test Engineer:	Jennie.He 		
Report No.:	RF20170508005RP		
Test Date:	Feb 27 – Mar 6, 2017		
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Note: The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of ZTE Corporation. This report must not be used by the client to claim product certification 、 approval 、 or endorsement by any agency of the US Government.

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2 GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The ZTE Corporation's product, model number: ZXSDR RSU82 S1900 or the "EUT" as referred to in this report is a Remote Radio Unit.

Technical specification:

Size: 482.6 mm x 72 mm x 365.6 mm (HxWxD)

Input voltage: -37V~-60V

Frequency range: UL:1850MHz~1910MHz; DL: 1930MHz~1990 MHz

Max RF output power per TX: 47.7dBm (60W)

Gain of the antenna: 15dBi

Appearance of EUT:



FIGURE 1 APPEARANCE OF ZXSDR RSU82 S1900

Objective

This type approval report is prepared on behalf of ZTE Corporation in accordance with Part 1、 Part 2、 part15、 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 MISCELLANEOUS WIRELESS COMMUNICATIONS 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 Test site used by Shenzhen ZTE Technology Service Co., Ltd to collect test data is located in the ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China, Tel: +86-755-26770000, Fax: +86-755-26771999. Test site at ZRT EMC Shenzhen Laboratory has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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.

3 SYSTEM TEST CONFIGURATION

Description of Test Configuration

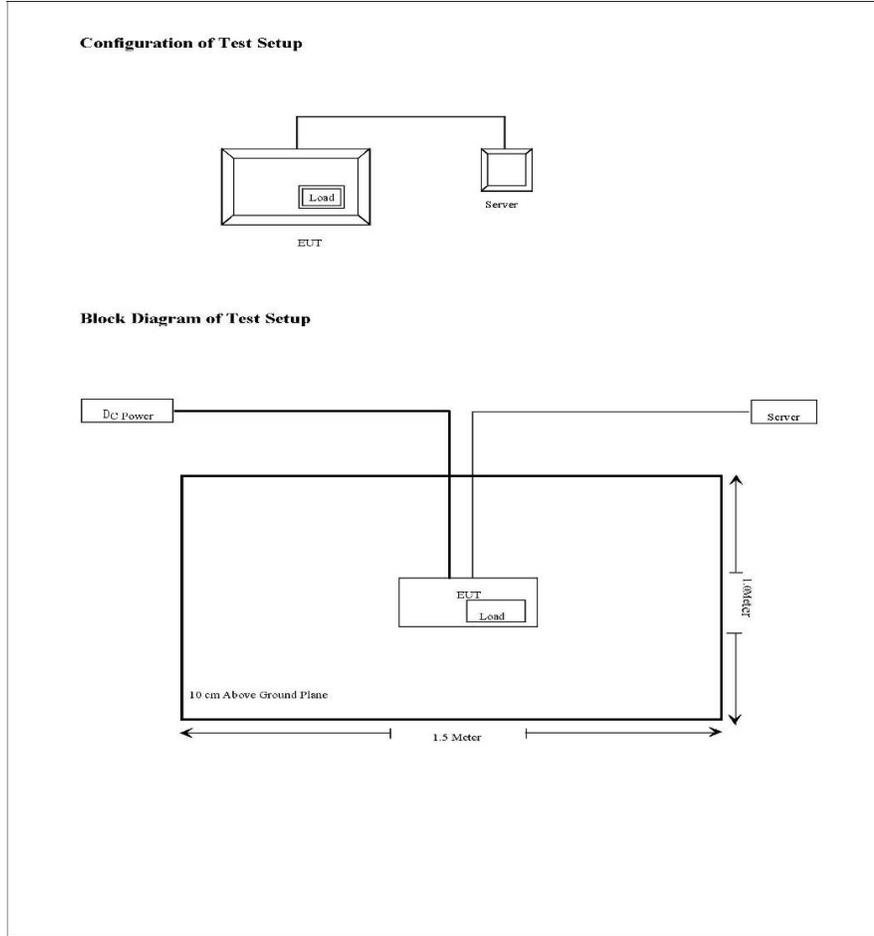
Justification

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.



4 SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 2.1046 , §24.232	Transmitter output Power	Compliant
§ 2.1091 ,§1.1037	RF Exposure	Compliant
§ 2.1047	Modulation Characteristic	Compliant
§ 2.1053, §24.238	Spurious Radiated Emissions	Compliant
§ 2.1051, §24.238	Spurious Emissions AT Antenna Terminals	Compliant
§ 2.1049	Occupied Bandwidth	Compliant
§ 2.1051,§24.238	Band Edge	Compliant
§ 2.1055, ,§24.235	Frequency stability	Compliant

5 TRANSMITTER OUTPUT POWER

Applicable Standard: FCC §2.1046, §24.232

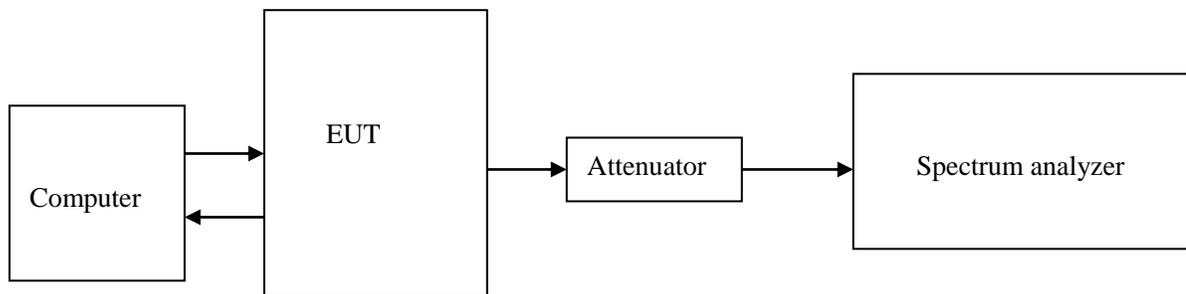
According to FCC §2.1046 & 24.232, the EIRP (equivalent isotropically radiated power) must not exceed 1640Watts.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2016.09.12	2017.09.12
Silverline	Silverline RF Cable	SLA18-NMN1T	100311-04-0001	N/A	N/A

***statement of traceability:** ZRT EMC Shenzhen Laboratory attests that all calibration has 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 2.5dB

Environmental Conditions

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

Test Result: Pass

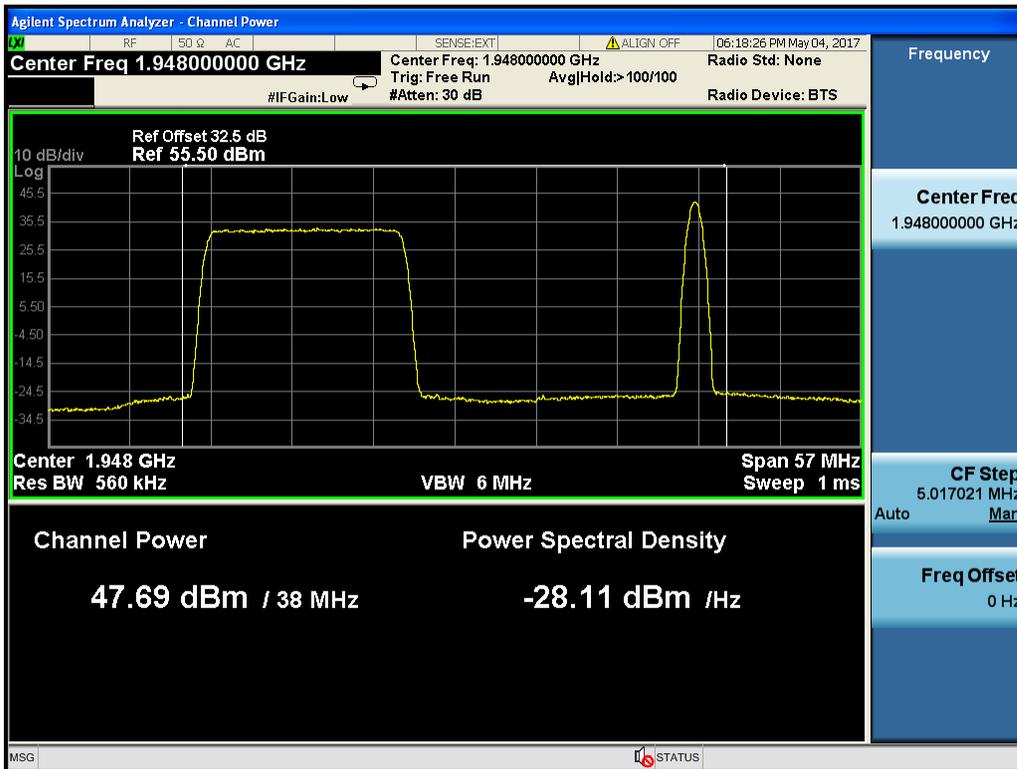
Test Mode: Transmitting LTE+GSM

Test Data:

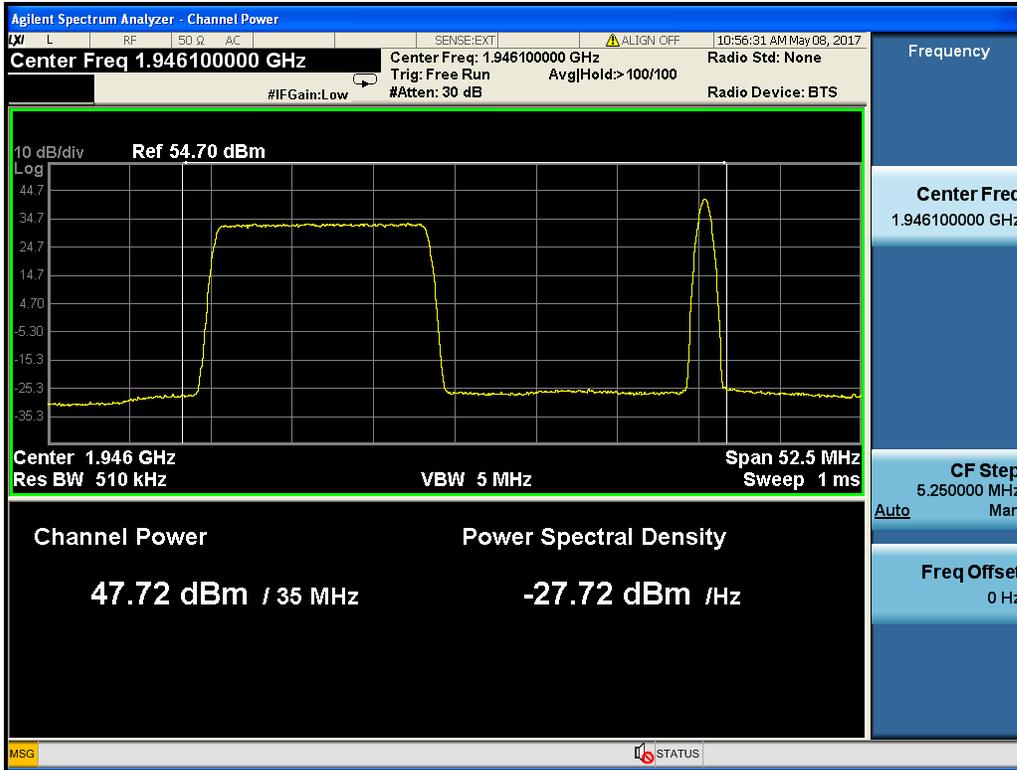
LTE 15M: 1930-1945 MHz @40W (LTE+GSM)

Port	GSM Freq. (MHz)	LTE Freq. (MHz)	Max output Power in dBm
1	1964.8	1937.5	47.69
4	1962.2	1937.5	47.72

Port 1 –GSM: 1964.8MHz@20W



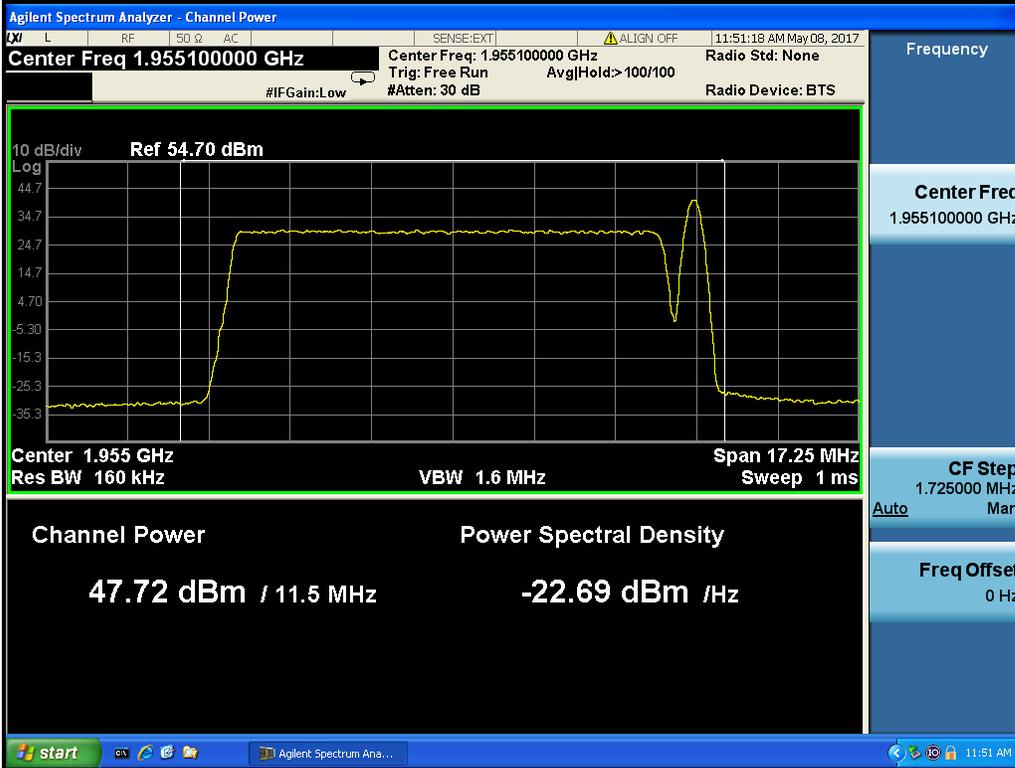
Port 4 - GSM: 1962.2MHz@20W



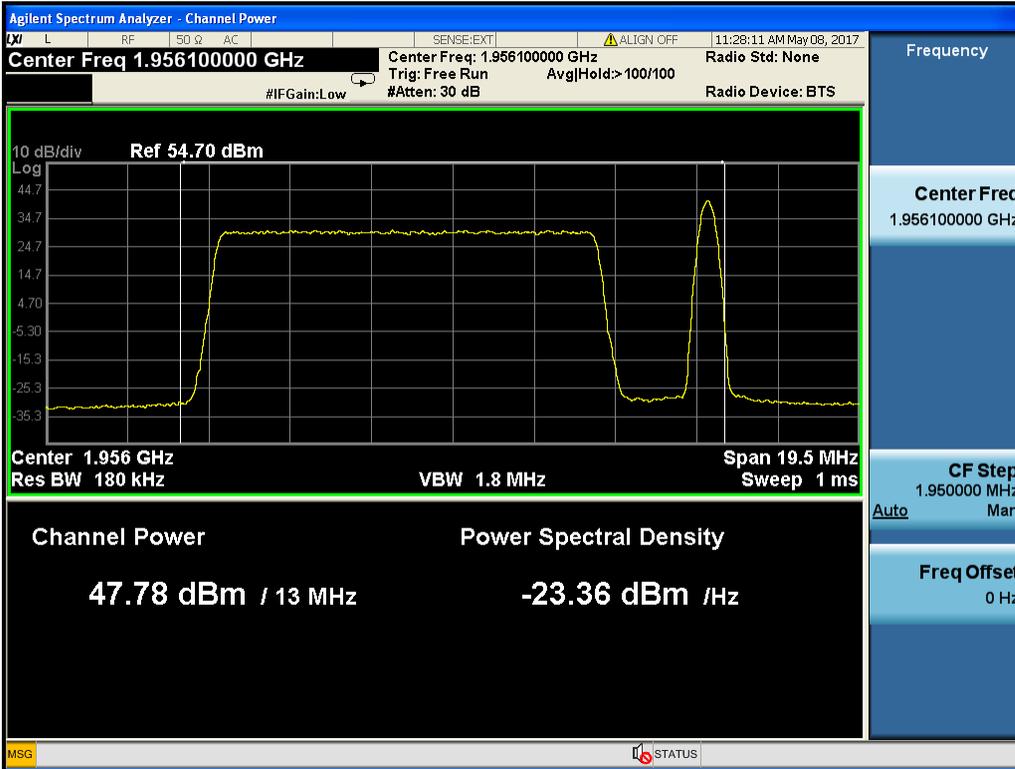
LTE 10M: 1950-1960 MHz @40W (LTE+GSM)

Port	GSM Freq. (MHz)	LTE center Freq. (MHz)	Max output Power in dBm
1	1960.2	1955	47.72
4	1962.2	1955	47.78

Port 1 - GSM: 1960.2MHz@20W



Port 4 - GSM: 1962.2MHz@20W



6 RF EXPOSURE

Applicable standard: FCC §2.1091 §1.1037

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

$$S = \text{EIRP} / 4\pi R^2$$

Where: S = power density

R = distance to the center of radiation of the antenna = $[\text{EIRP} / 4\pi S]^{1/2}$

According to §24.232, the equivalent isotropically radiated power (EIRP) of base transmitters and cellular repeaters must not exceed 1640 Watts.

Frequency 1990MHz is between 1500MHz and 100,000MHz, and the Maximum S=1mW/cm²

R=3.61m.

This equipment should be installed and operated with minimum distance 3.61m between the radiator & your body.

Test Result: pass

7 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	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2016.09.12	2017.09.12
Silverline	Silverline RF Cable	SLA18-NMN1T	100311-04-0001	N/A	N/A

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

Test Procedure

GUL digital mode is used by EUT.

Test Data Environmental Conditions

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

Test Result: Pass

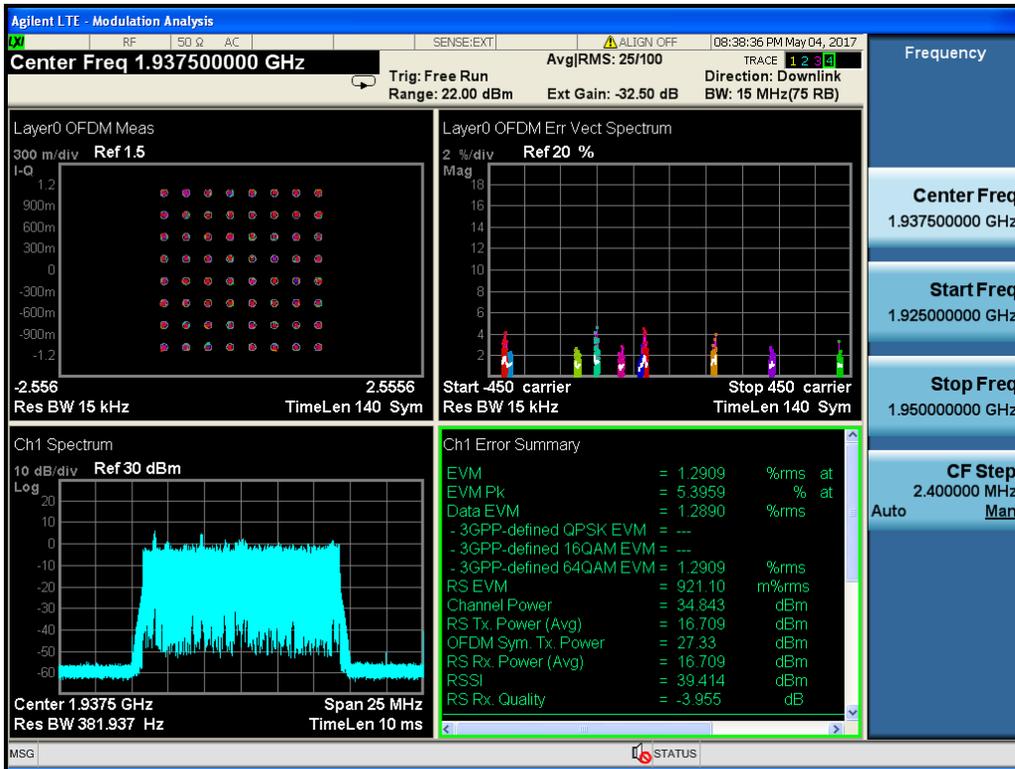
Test Mode: Transmitting LTE+GSM

Test Data (LTE) :

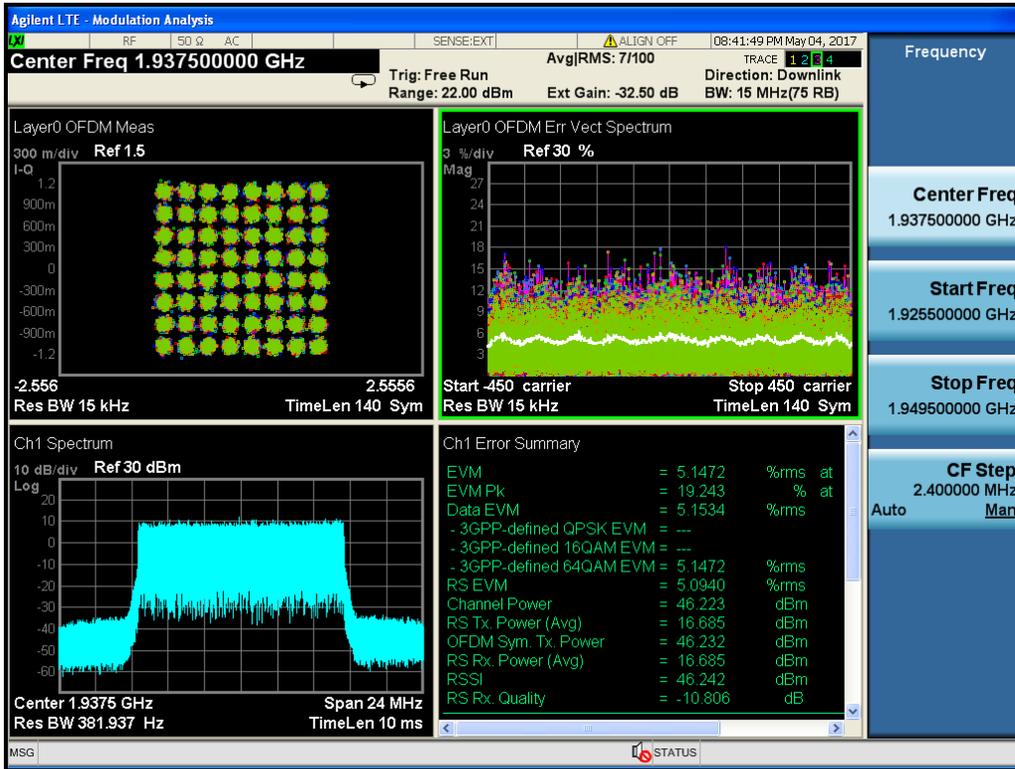
LTE 15M: 1930-1945 MHz @40W (LTE+GSM)

Port	GSM Freq. (MHz)	LTE Center Freq. (MHz)	Test mode	EVM%
1	1964.8	1937.5	E-TM2	1.2909
			E-TM3.1	5.1472
			E-TM 3.2	7.0593
			E-TM 3.3	8.5550
4	1962.2	1937.5	E-TM2	1.3265
			E-TM3.1	4.8338
			E-TM 3.2	6.9209
			E-TM 3.3	8.1727

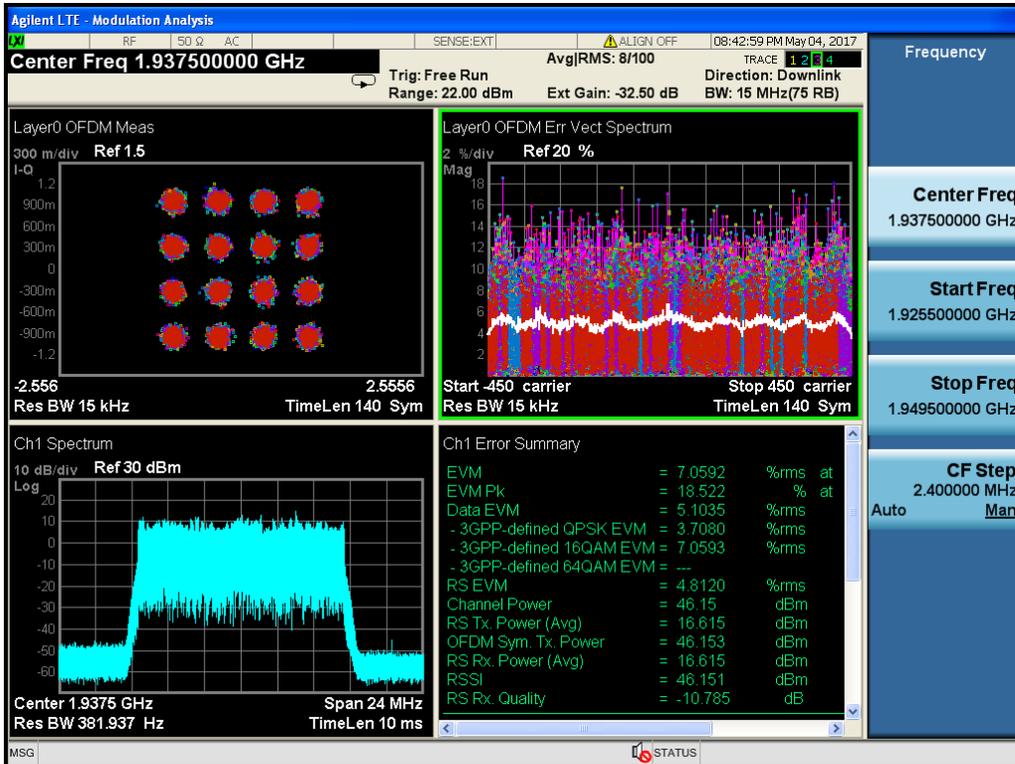
Port 1- GSM: 1964.8MHz@20W -TM2



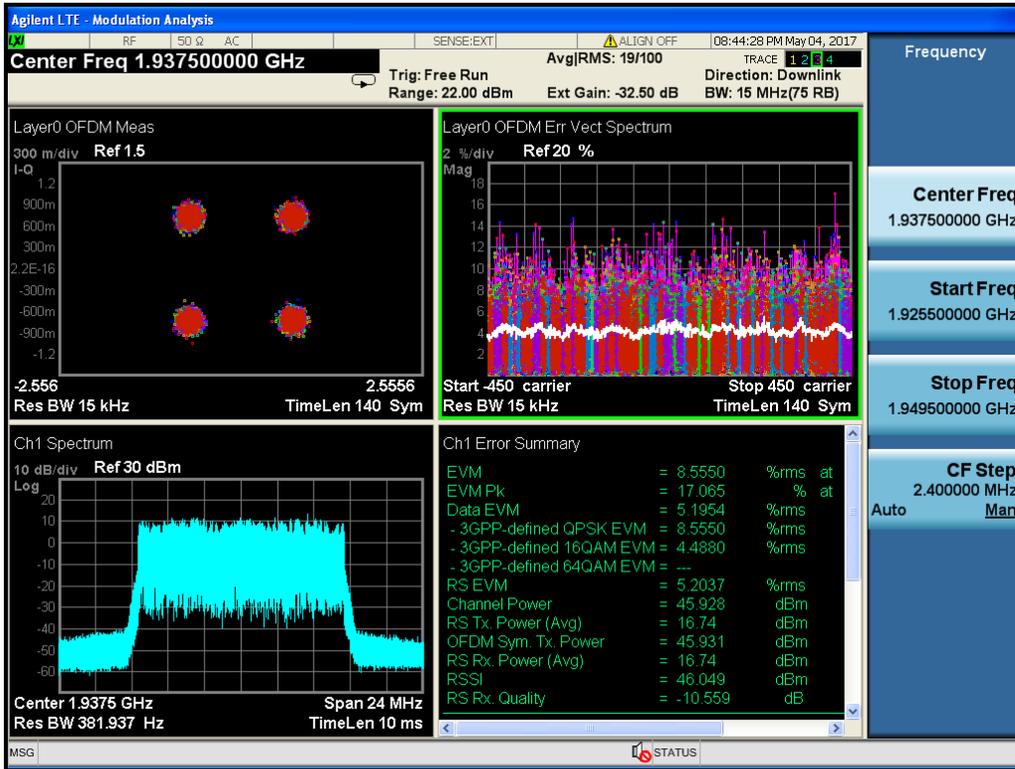
Port 1- GSM: 1964.8MHz@20W –TM3.1



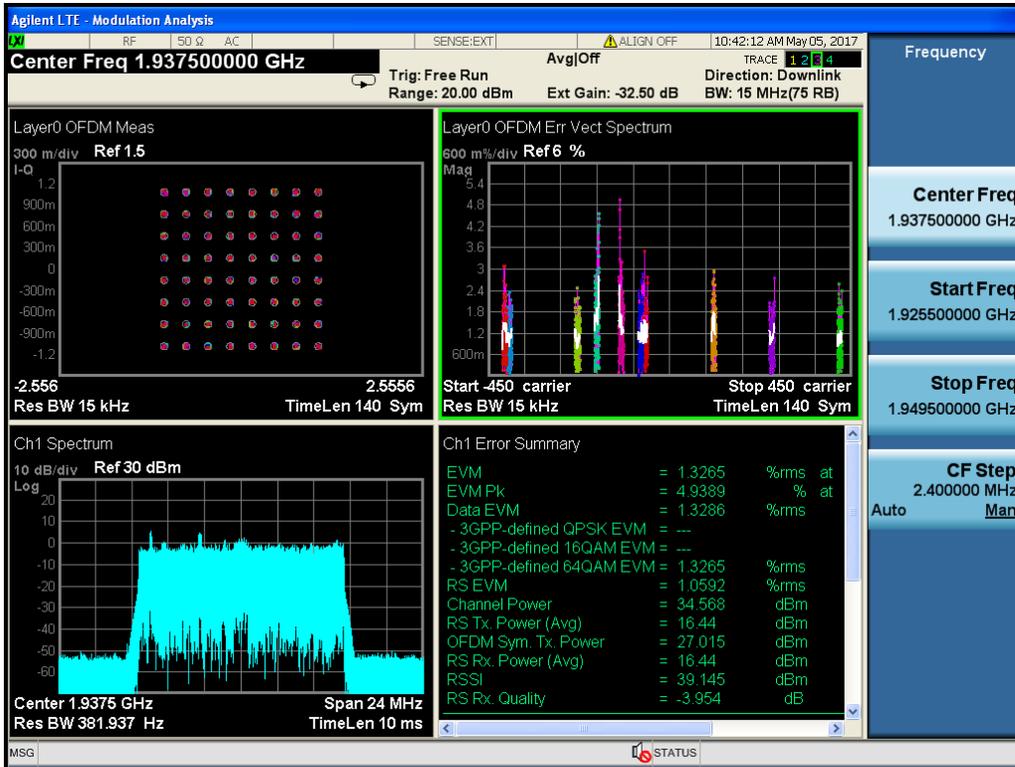
Port 1- GSM: 1964.8MHz@20W –TM3.2



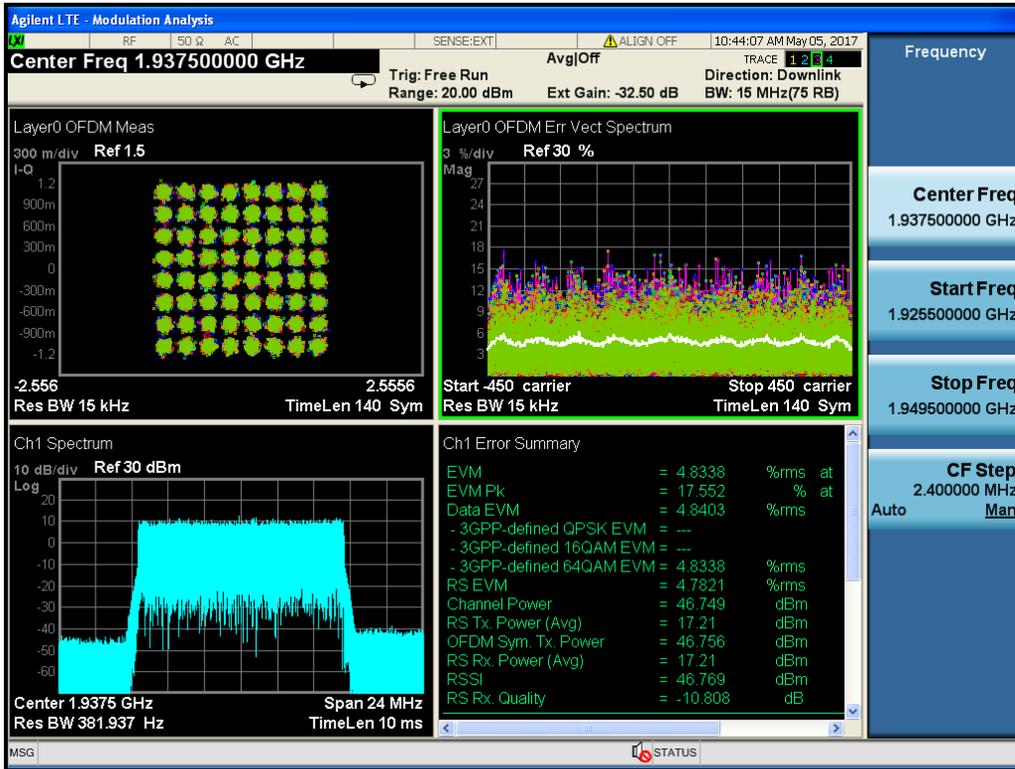
Port 1- GSM: 1964.8MHz@20W -TM3.3



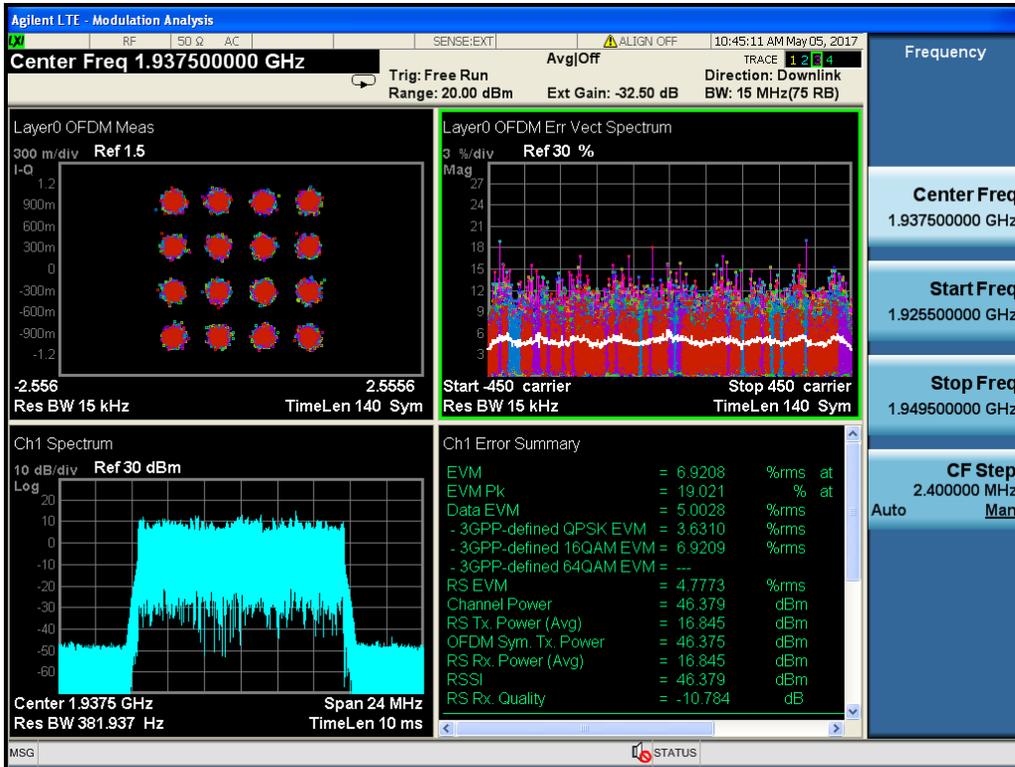
Port 4- GSM: 1962.2MHz@20W -TM2



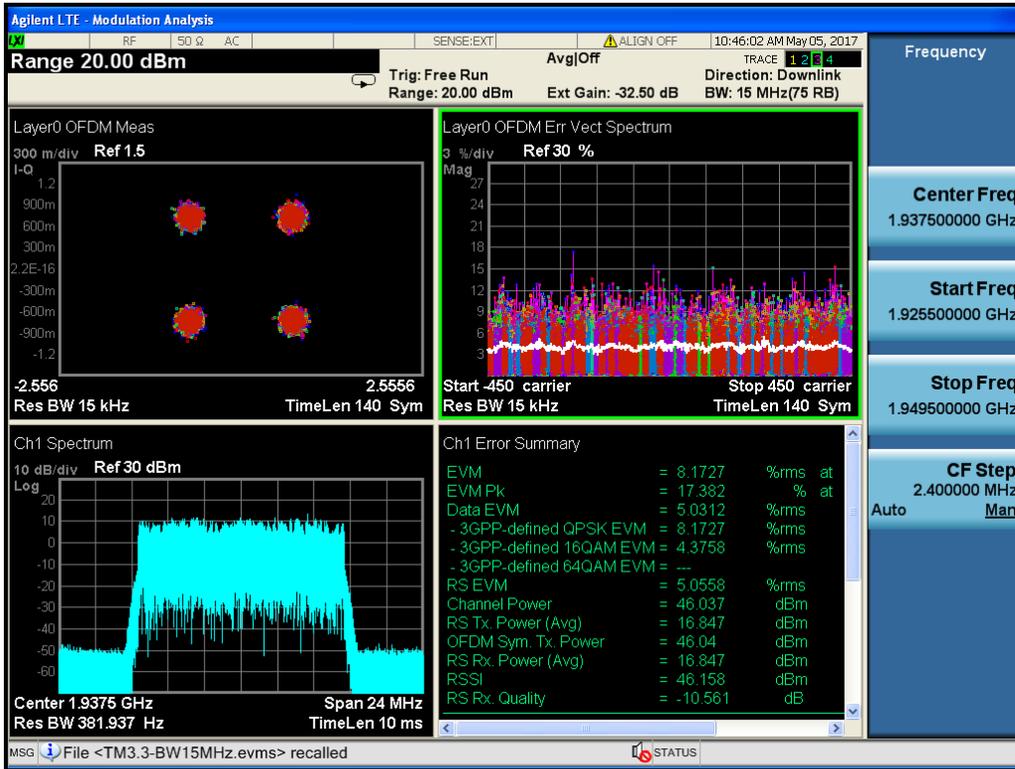
Port 4- GSM: 1962.2MHz@20W –TM3.1



Port 4- GSM: 1962.2MHz@20W –TM3.2



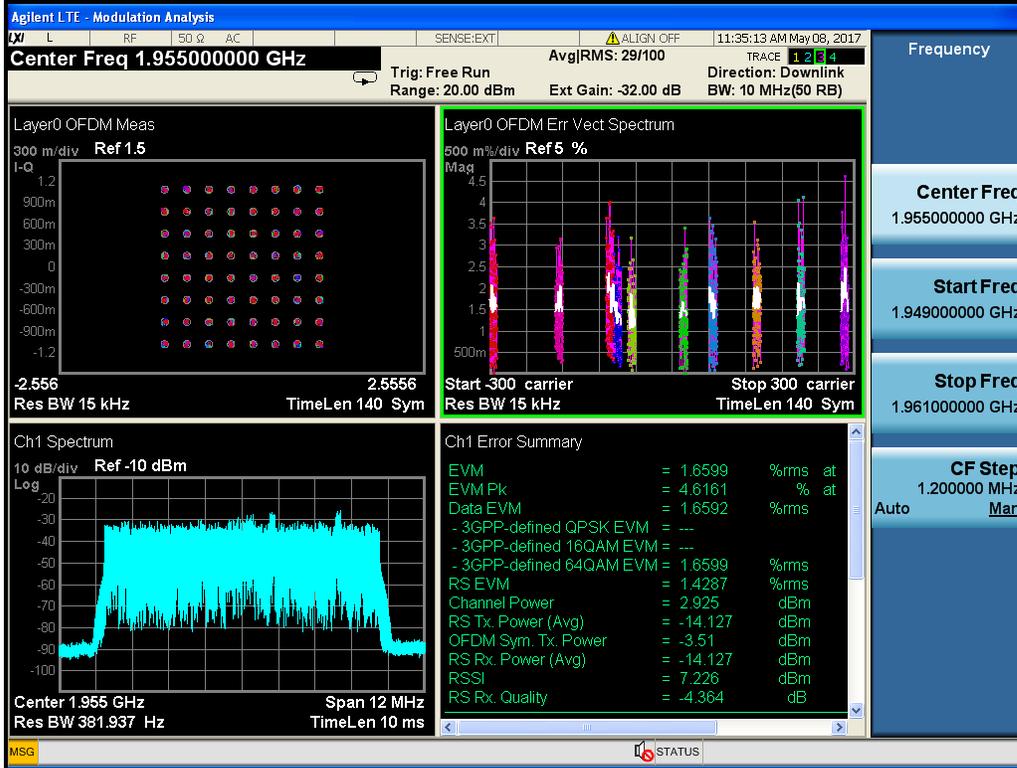
Port 4- GSM: 1962.2MHz@20W –TM3.3



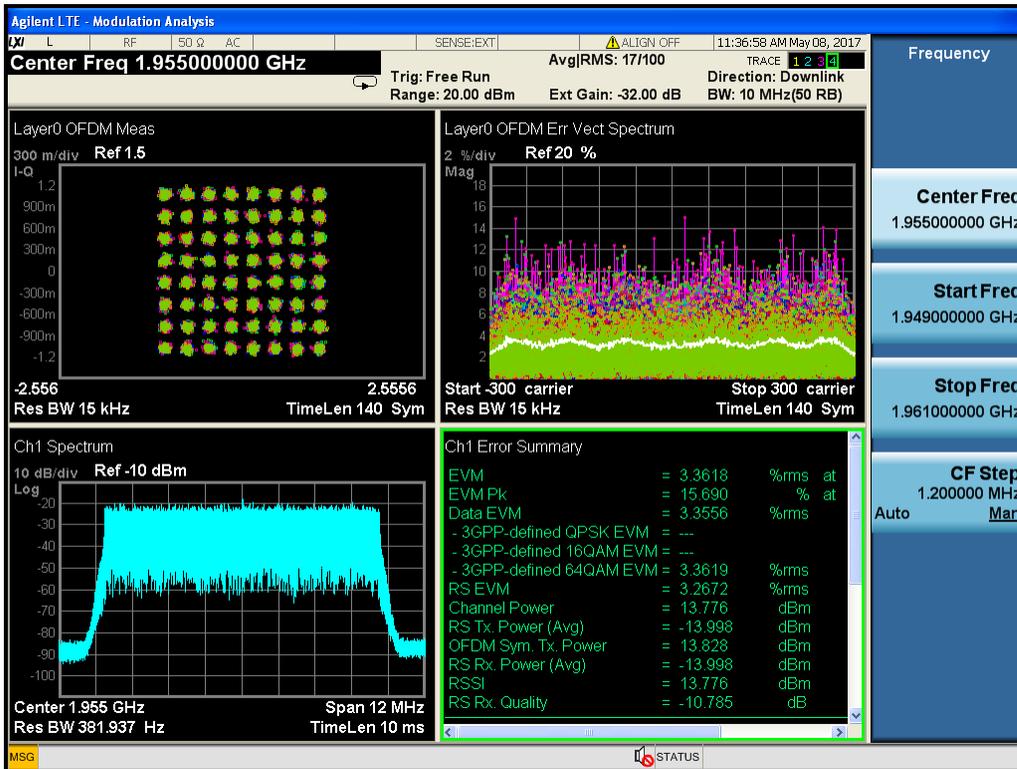
LTE 10M: 1950-1960 MHz @40W (LTE+GSM)

Port	GSM Freq. (MHz)	LTE Center Freq. (MHz)	Test mode	EVM%
1	1960.2	1955	E-TM2	1.6599
			E-TM3.1	3.3619
			E-TM 3.2	4.2675
			E-TM 3.3	5.7531
4	1962.2	1955	E-TM2	1.6786
			E-TM3.1	3.3740
			E-TM 3.2	4.2384
			E-TM 3.3	5.7735

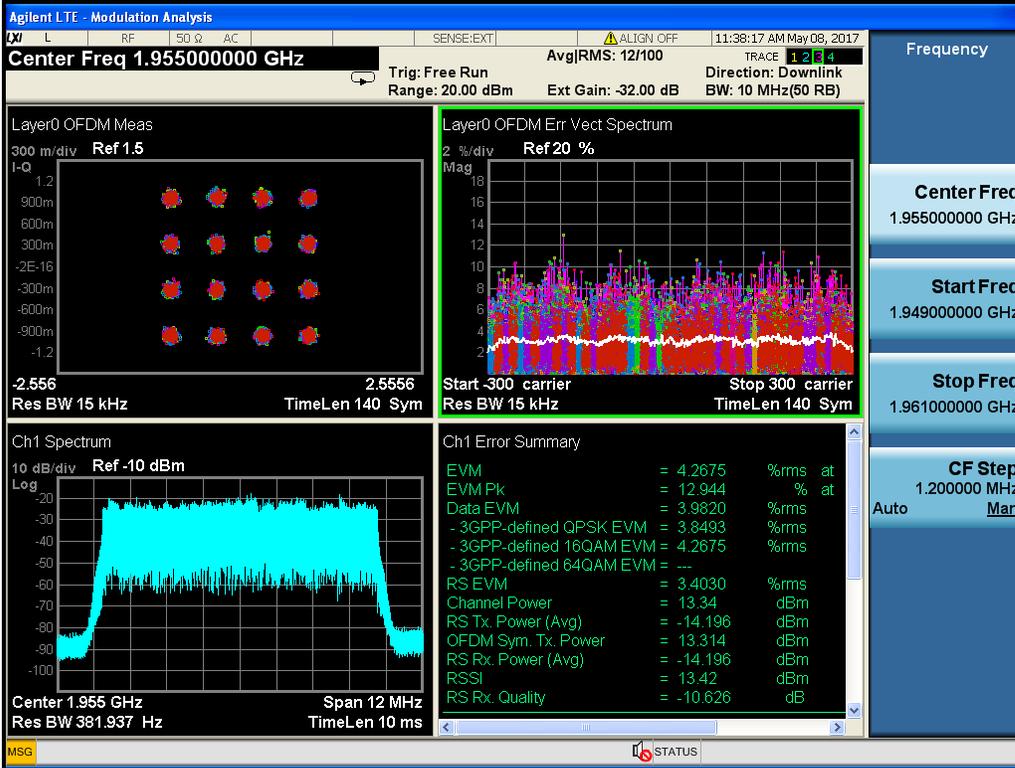
Port 1- GSM: 1960.2MHz@20W -TM2



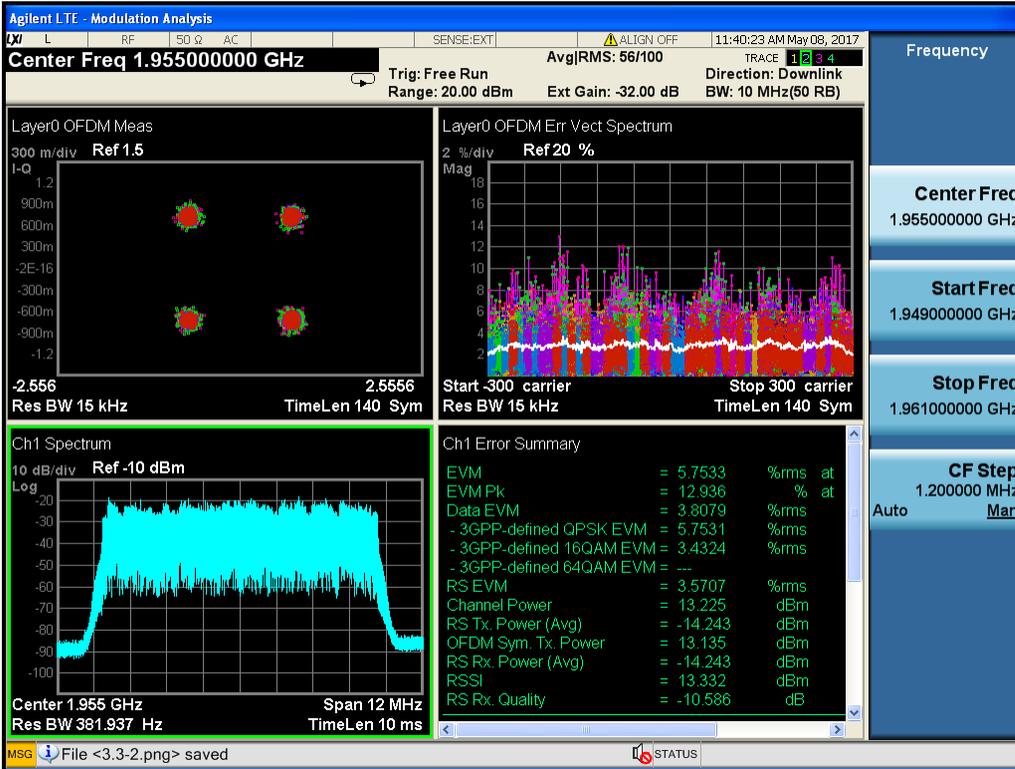
Port 1- GSM: 1960.2MHz@20W –TM3.1



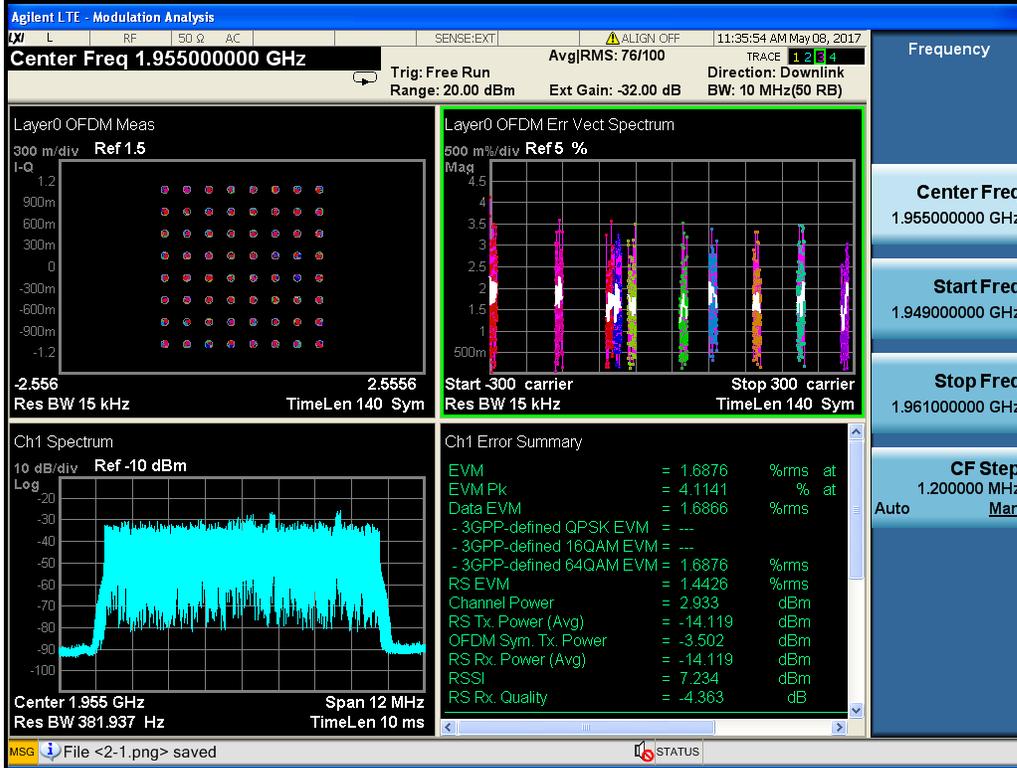
Port 1- GSM: 1960.2MHz@20W –TM3.2



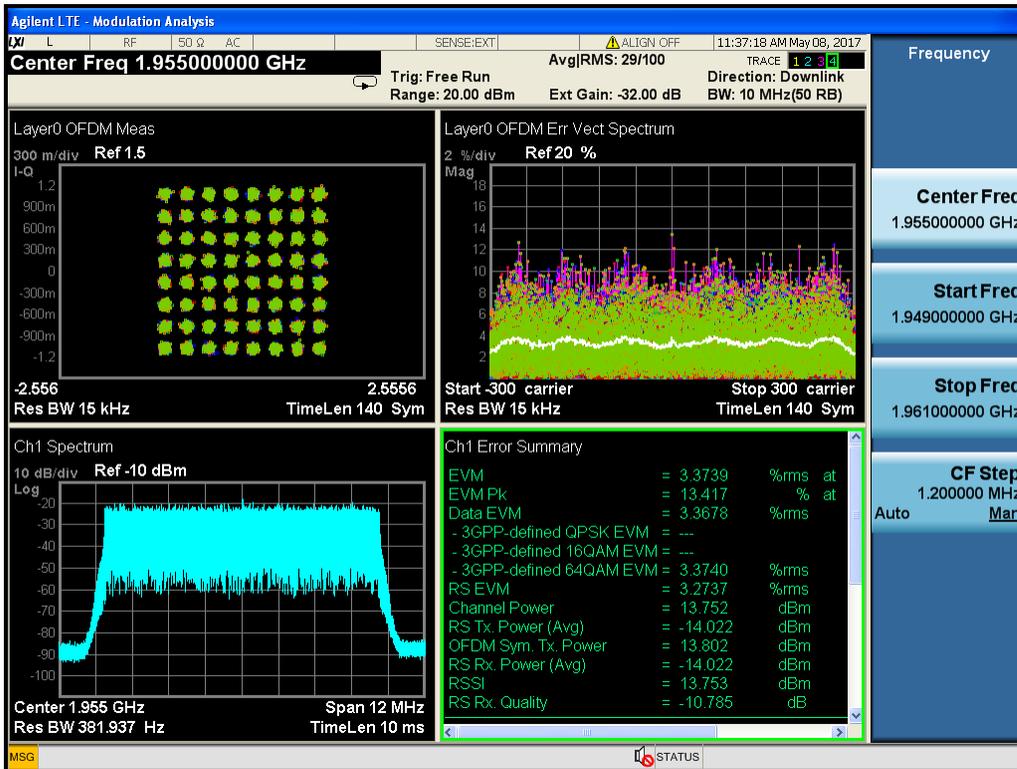
Port 1- GSM: 1960.2MHz@20W -TM3.3



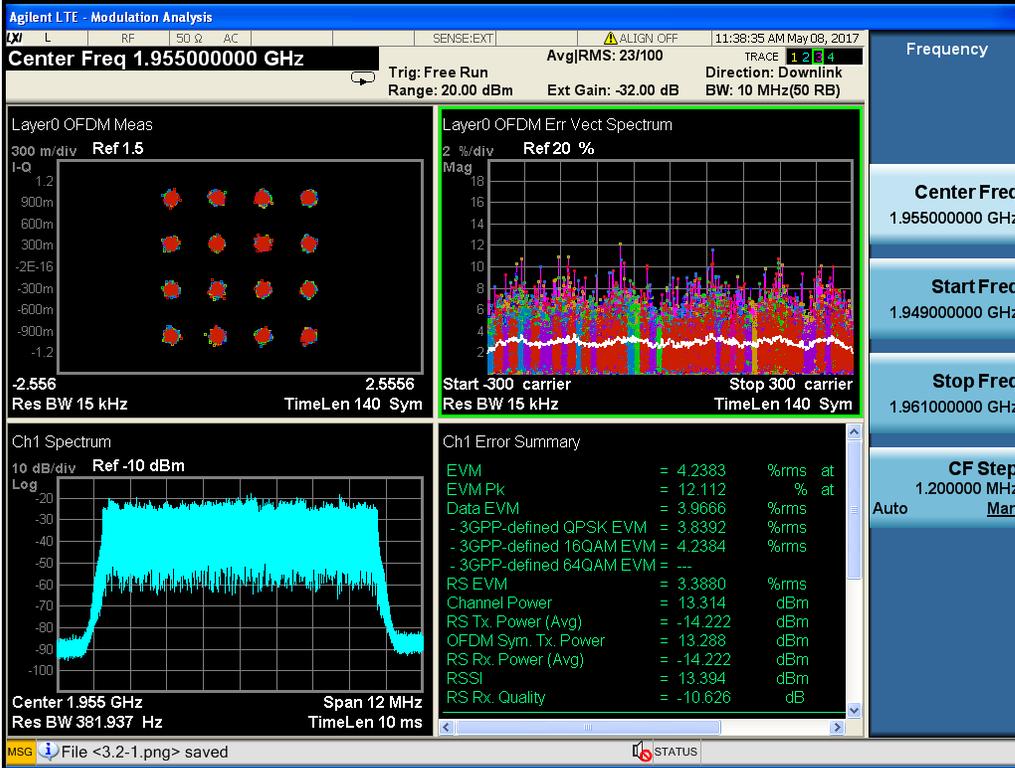
Port 4- GSM: 1962.2MHz@20W -TM2



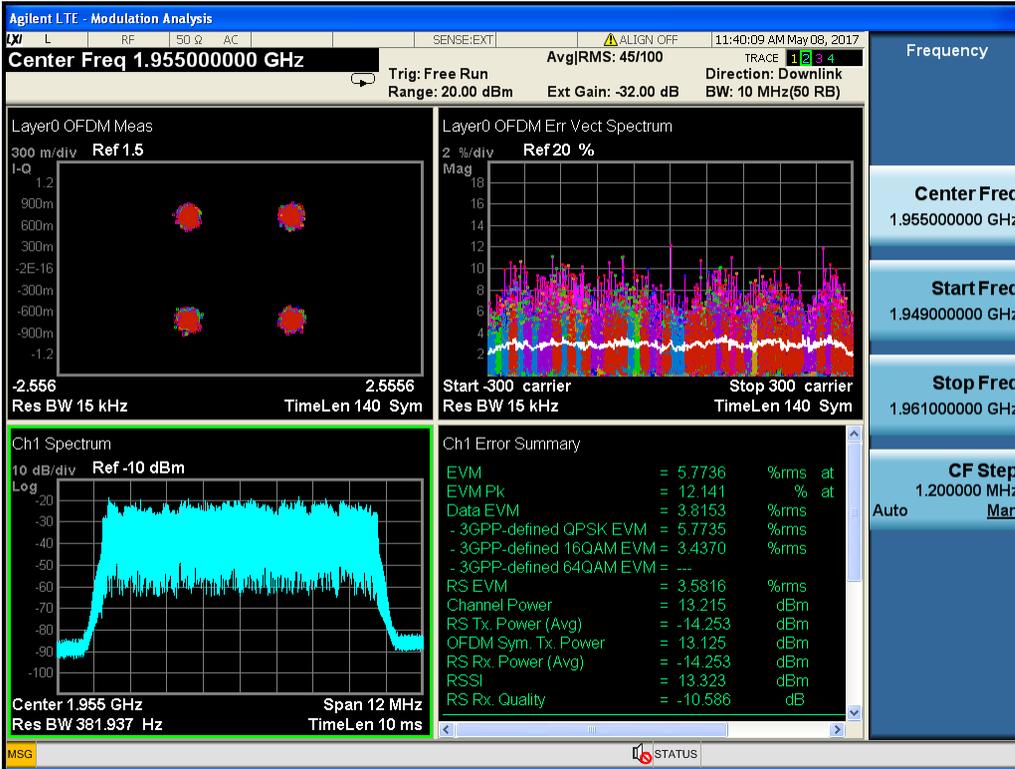
Port 4- GSM: 1962.2MHz@20W –TM3.1



Port 4- GSM: 1962.2MHz@20W –TM3.2



Port 4- GSM: 1962.2MHz@20W -TM3.3

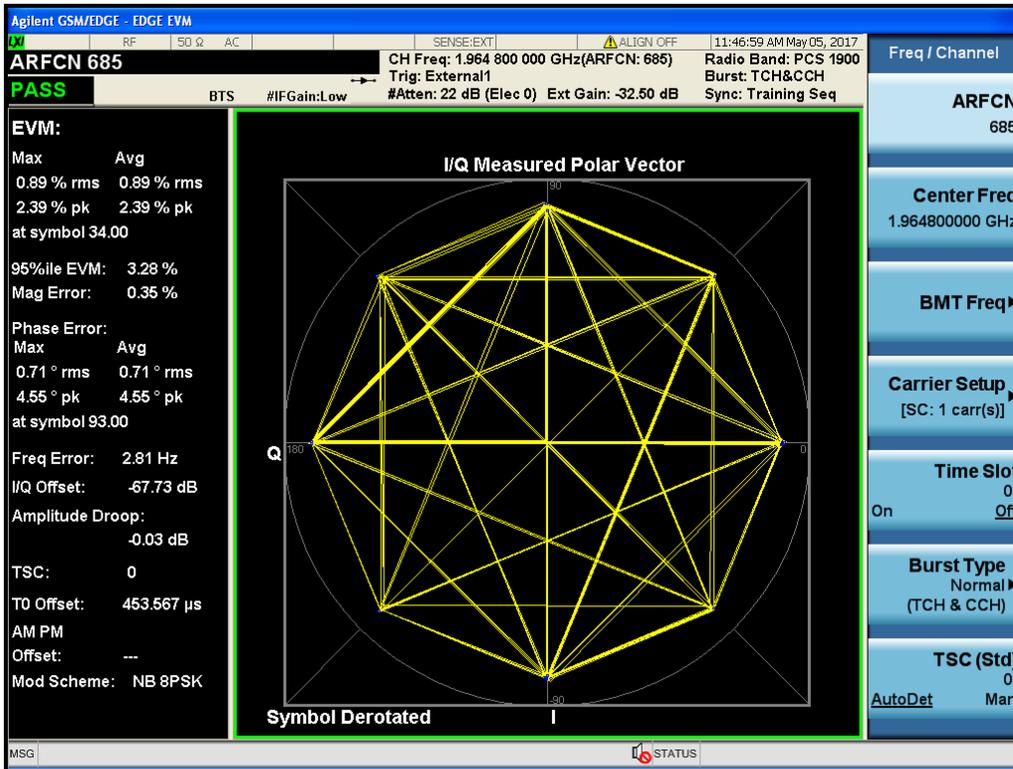


Test Data (GSM) :

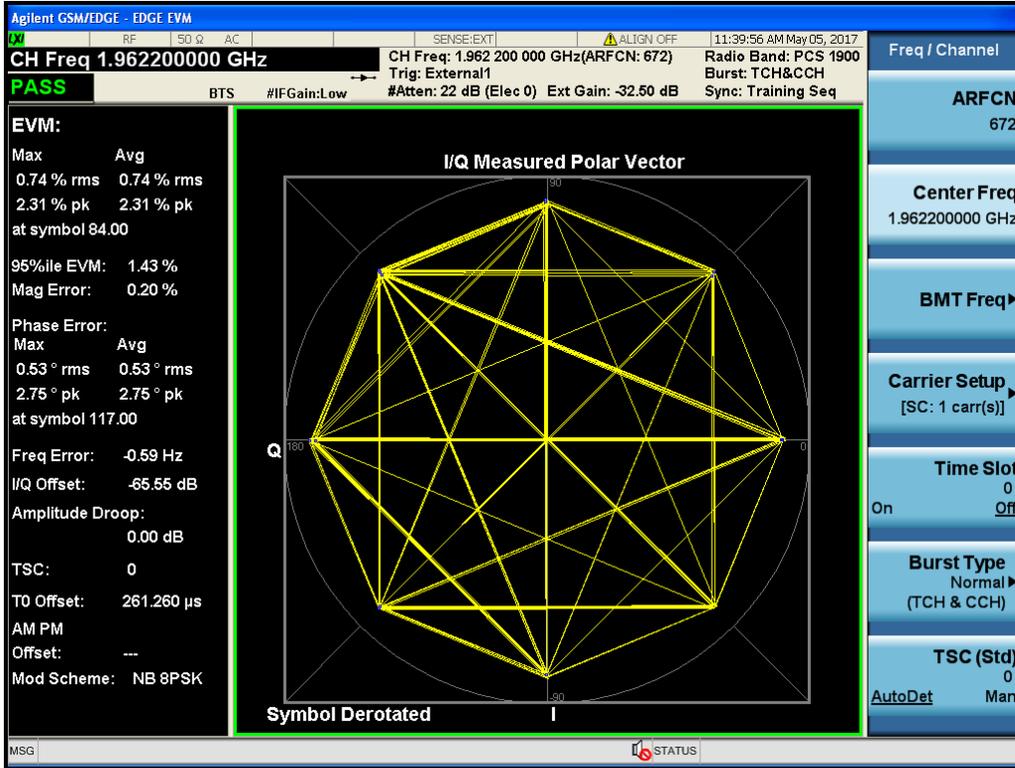
LTE 15M: 1930-1945 MHz @40W (LTE+GSM)

Port	Frequency (MHz)	Test mode	EVM%
1	1964.8	8PSK	0.89
4	1962.2	8PSK	0.74

Port 1- GSM: 1964.8MHz@20W



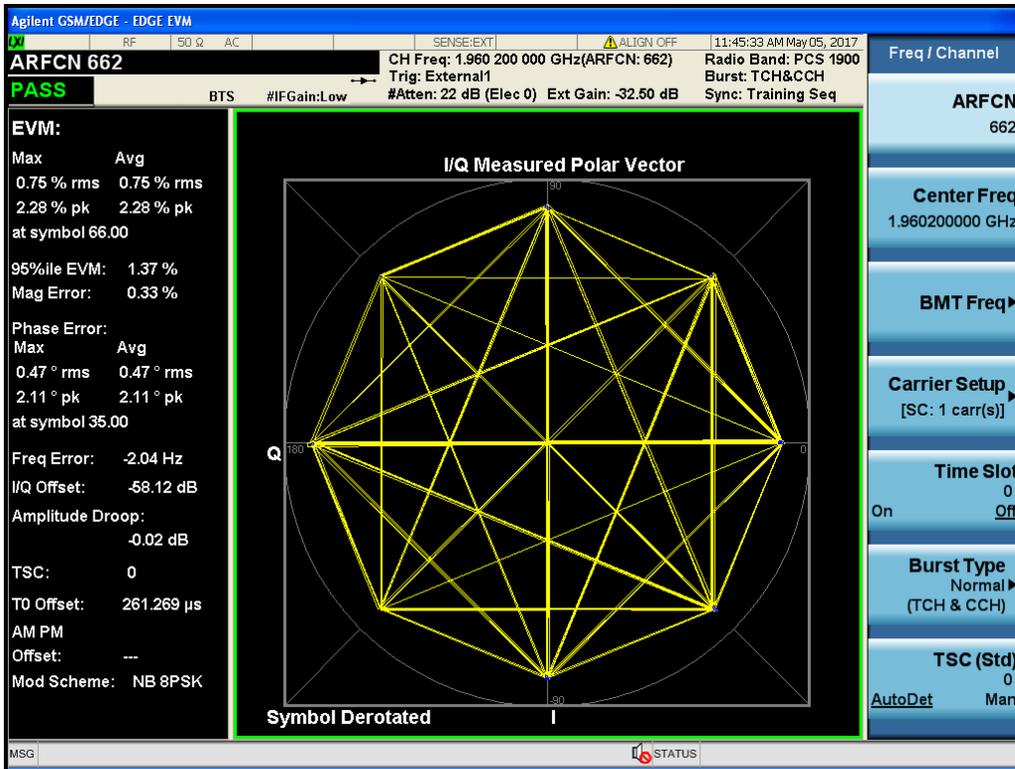
Port 4- GSM: 1962.2MHz@20W



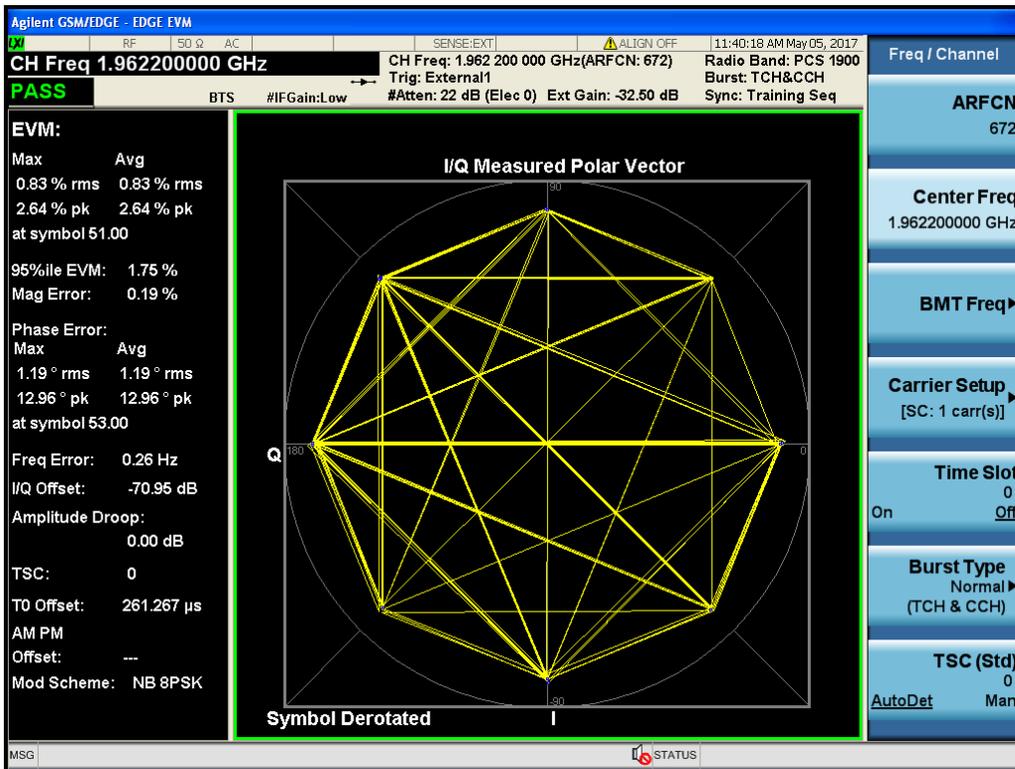
LTE 10M: 1950-1960 MHz @40W (LTE+GSM)

Port	Frequency (MHz)	Test mode	EVM%
1	1960.2	8PSK	0.75
4	1962.2	8PSK	0.83

Port 1- GSM: 1960.2MHz@20W



Port 4- GSM: 1962.2MHz@20W



8 SPURIOUS RADIATED EMISSIONS

Applicable Standard: FCC CFR 47 §2.1053

Test Equipment List and Details

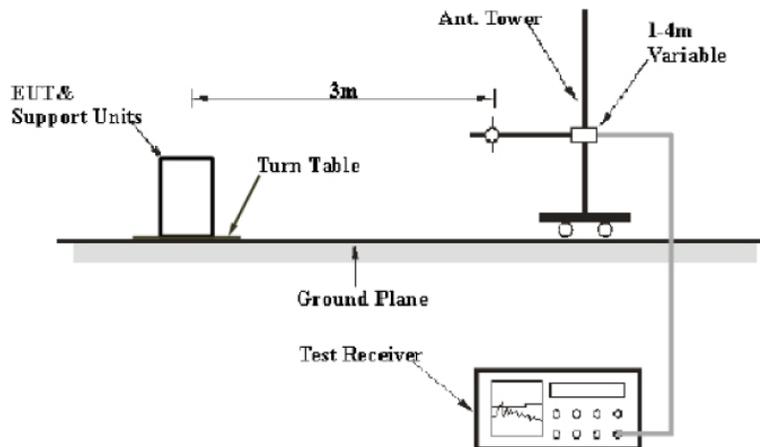
Manufacturer	Equipment	Model	Serial Number	Last Cal.	Cal. Interval
R&S	SIGNAL GENERATOR	SMR20	A00017351	2016-10-29	1 year
Albatross	Anechoic Chamber	3m Site	A00017354	2016-8-30	1 year
R&S	EMI Test Receiver	ESIB26	100058	2016-10-29	1 year
R&S	Ultra Breitband Antennas	HL562	100022	2016-8-5	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100032	2016-8-5	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100446	2016-8-5	1 year
SCHWARZ-BECK	Biconical Antenna	VUBA9117	9117-122	2016-8-5	1 year

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. 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 tenth 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 1 percent as specified for 30MHz to 1GHz scanning, set at 1MHz for 1GHz to 20GHz scanning.

Test Results Summary: PASS

Environmental Conditions

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

Test data

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dB μV)	Polar H/V	Level (dBm)	Antenna Gain Correction						
47.552302	28.41	V	-33.98	-33.69	0.5	-70.32	2.15	-72.47	-13	59.47
91.382766	18.62	V	-47.93	-31.63	0.5	-82.21	2.15	-84.36	-13	71.36
119.418838	21.48	V	-63.44	-12.48	0.8	-78.87	2.15	-81.02	-13	68.02
871.903808	24.00	V	-68.23	-2.23	1.1	-73.71	2.15	-75.86	-13	62.86
1089.398798	19.99	V	-74.52	-0.27	1.1	-78.04	2.15	-80.19	-13	67.19
1569.318637	24.04	V	-70.06	-1.35	1.8	-75.36	2.15	-77.51	-13	64.51
2343.406814	60.82	V	-37.22	-0.95	2.3	-42.62	2.15	-44.77	-13	31.77
2944.288577	38.98	V	-66.48	4.25	2.8	-67.18	2.15	-69.33	-13	56.33
33.887776	22.26	H	-30.48	-42.03	0.3	-74.96	2.15	-77.11	-13	64.11
70.821643	12.58	H	-61.97	-23.56	0.6	-88.28	2.15	-90.43	-13	77.43
117.474950	21.39	H	-64.77	-12.48	0.8	-80.2	2.15	-82.35	-13	69.35
771.903808	23.66	H	-72.17	-2.23	1.1	-77.65	2.15	-79.80	-13	66.80
1289.398798	20.49	H	-78.9	-0.27	1.1	-82.42	2.15	-84.57	-13	71.57
1671.262525	23.82	H	-69.73	-1.3	1.8	-74.98	2.15	-77.13	-13	64.13
2541.462926	63.94	H	-33.23	-0.95	2.3	-38.63	2.15	-40.78	-13	27.78
2860.320641	39.09	H	-67.11	4.25	2.9	-67.91	2.15	-70.06	-13	57.06

Radiation emission spurious below 3GHz

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dB μ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
3569.539078	41.25	V	-66.76	7.75	5.2	-66.36	2.15	-68.51	-13	55.51
4227.655311	42.89	V	-64.71	9.15	5.9	-63.61	2.15	-65.76	-13	52.76
5915.831663	50.71	V	-55.92	9.15	6	-54.92	2.15	-57.07	-13	44.07
7664.228457	50.28	V	-62.07	9.25	7.9	-62.87	2.15	-65.02	-13	52.02
8846.192385	55.98	V	-52.84	9.95	8.9	-53.94	2.15	-56.09	-13	43.09
12242.985972	56.03	V	-54.69	12.05	9.8	-54.59	2.15	-56.74	-13	43.74
3697.394790	40.60	H	-67.74	7.75	5.1	-67.24	2.15	-69.39	-13	56.39
4226.452906	43.24	H	-60.08	7.95	5.5	-59.78	2.15	-61.93	-13	48.93
6150.300601	47.91	H	-55.48	9.05	6.9	-55.48	2.15	-57.63	-13	44.63
6927.855711	49.93	H	-55.49	9.25	7.3	-55.69	2.15	-57.84	-13	44.84
9846.192385	55.64	H	-53.3	9.95	8.9	-54.4	2.15	-56.55	-13	43.55
11785.310621	56.07	H	-50.13	11.85	9.6	-50.03	2.15	-52.18	-13	39.18

Radiation emission spurious above 3GHz

9 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.

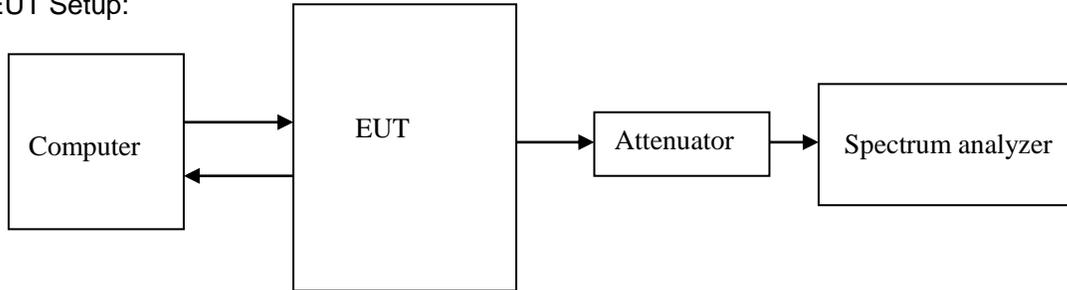
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2016.09.12	2017.09.12

***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)=2.5dB.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. 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

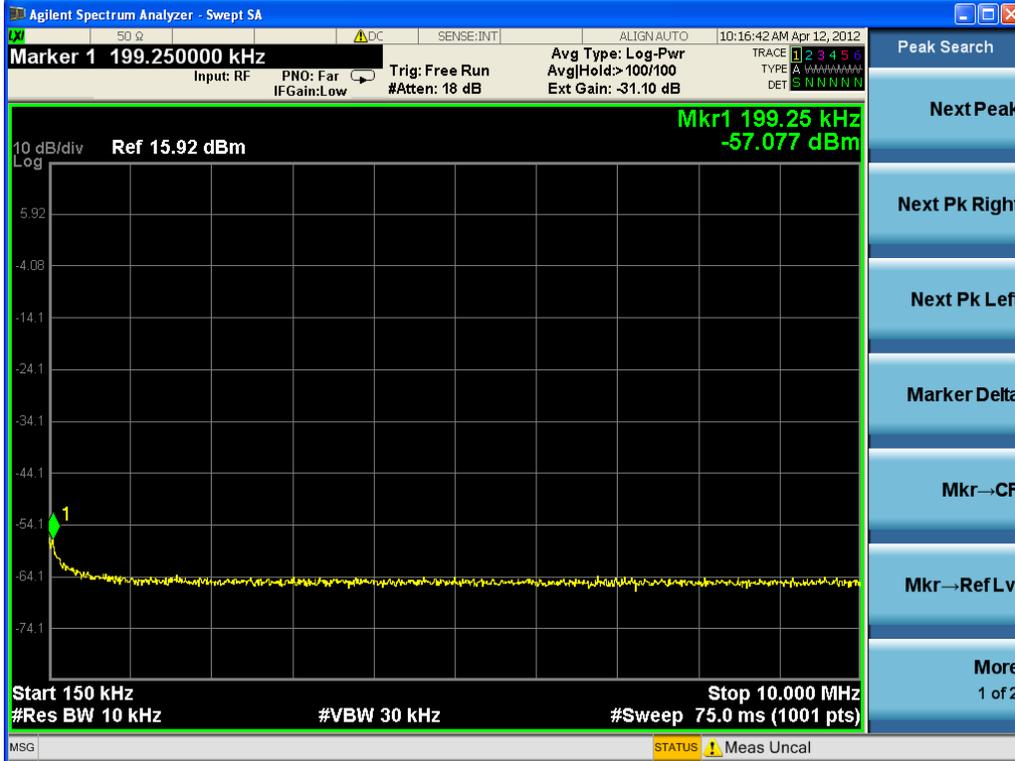
Test Mode: Transmitting LTE+GSM

Test Data:

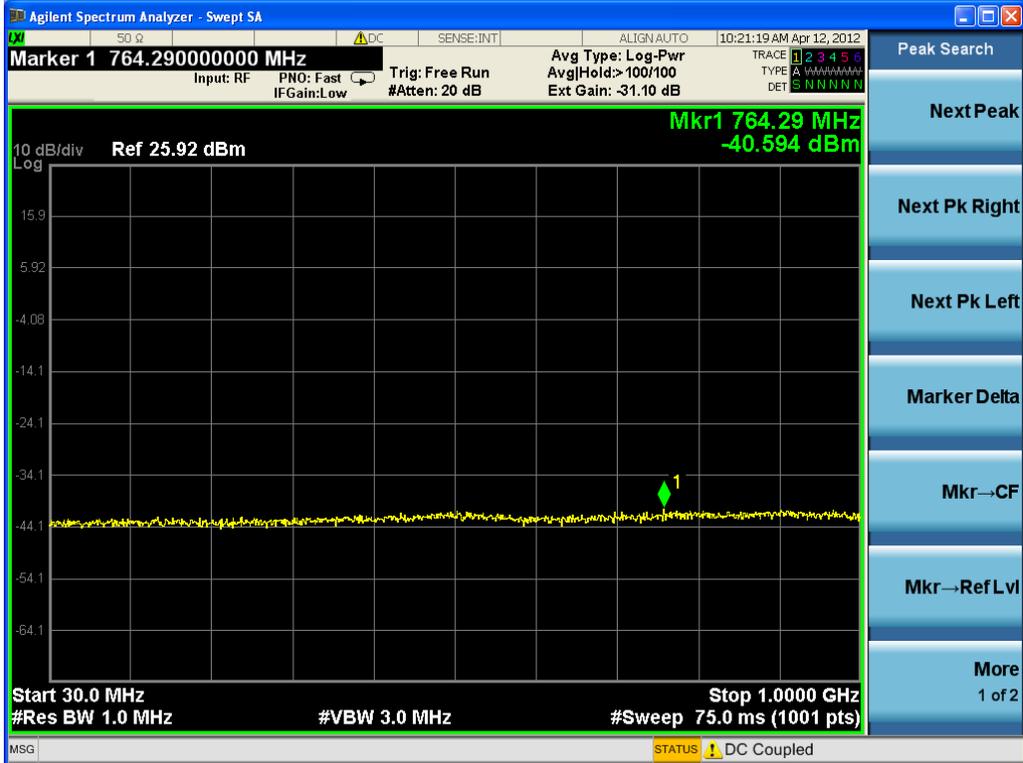
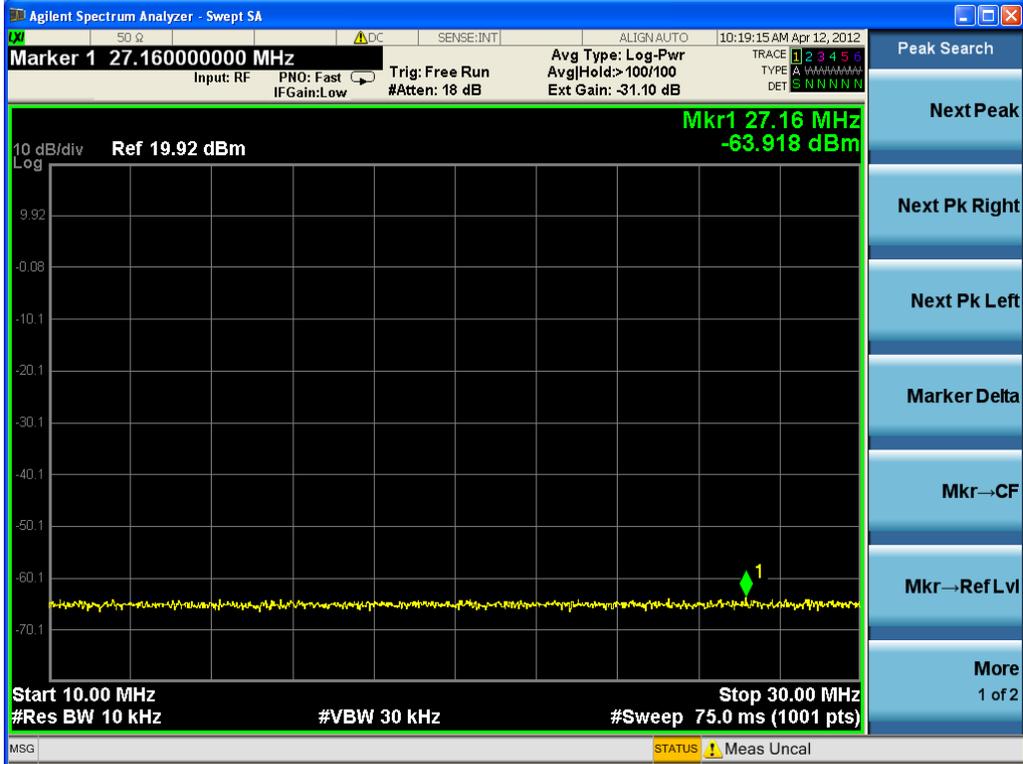
LTE 15M -Port 1 –GSM 1964.8MHz



- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2



- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2



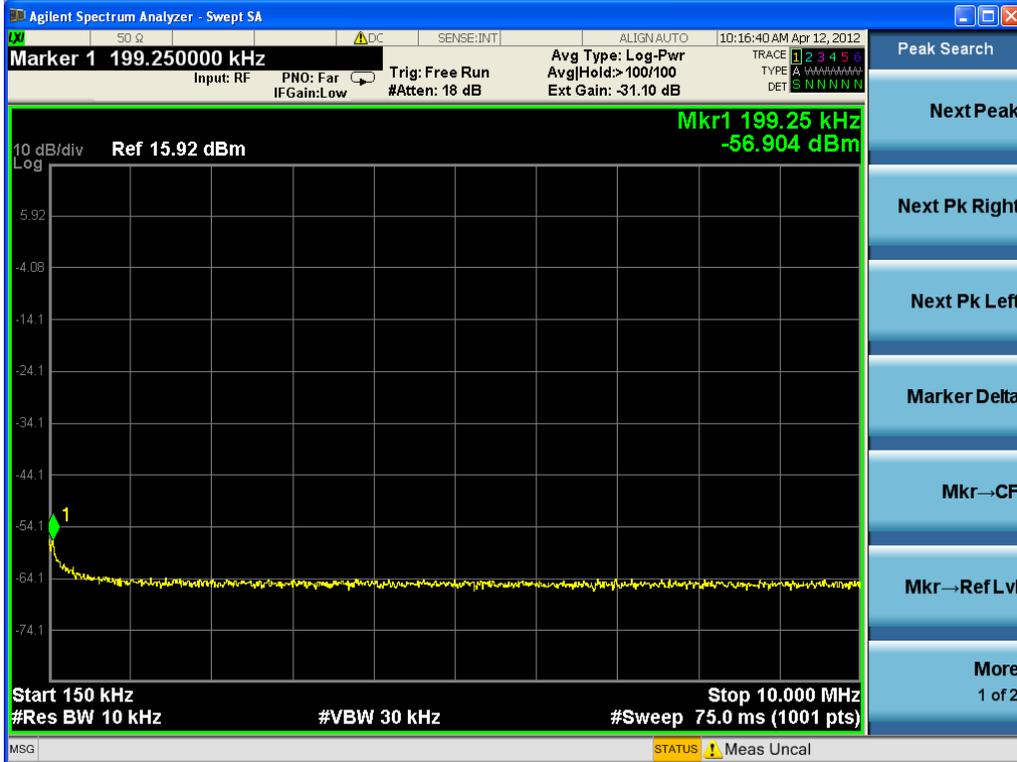


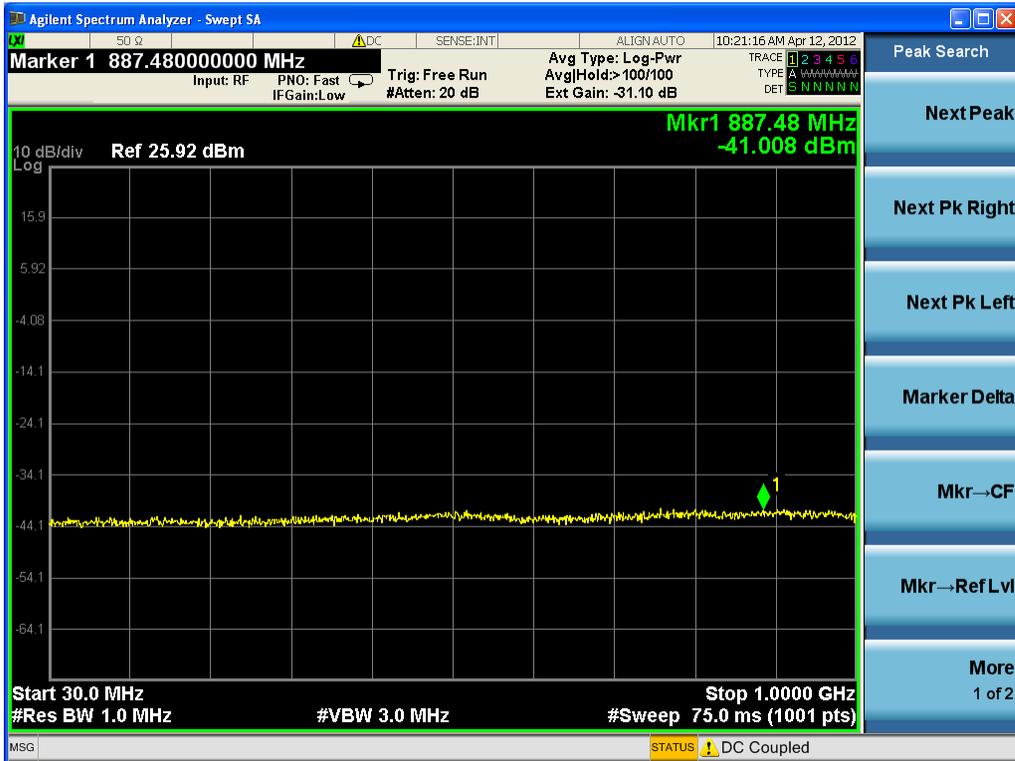
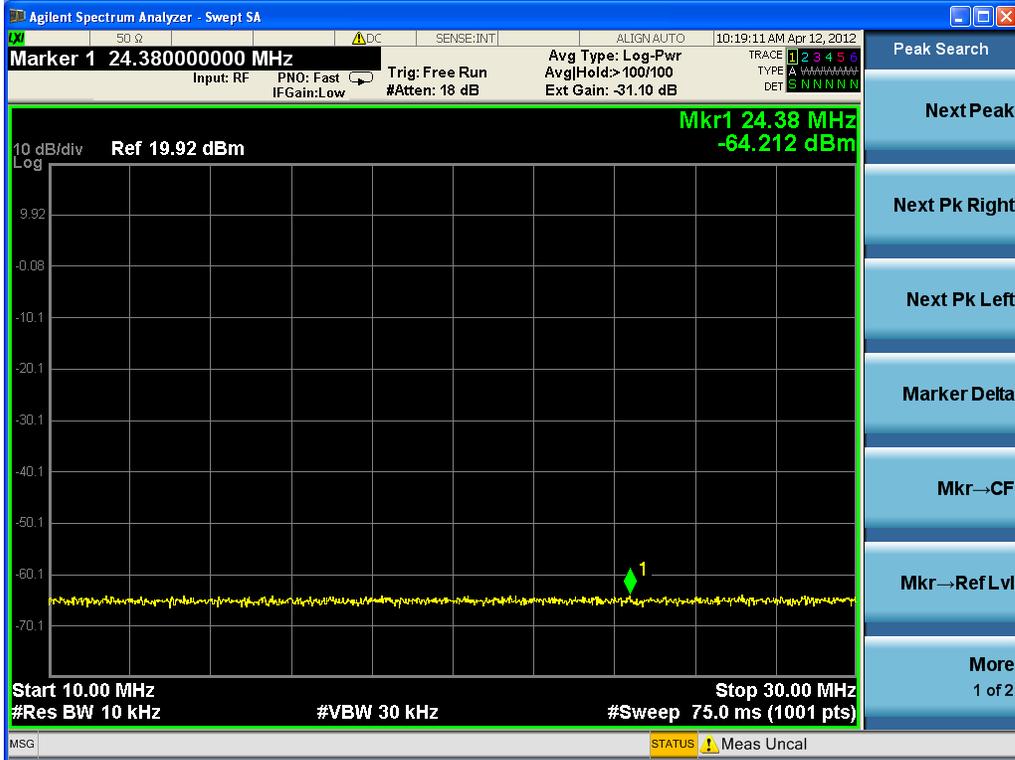
- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2



- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr→CF
- Mkr→Ref Lvl
- More 1 of 2

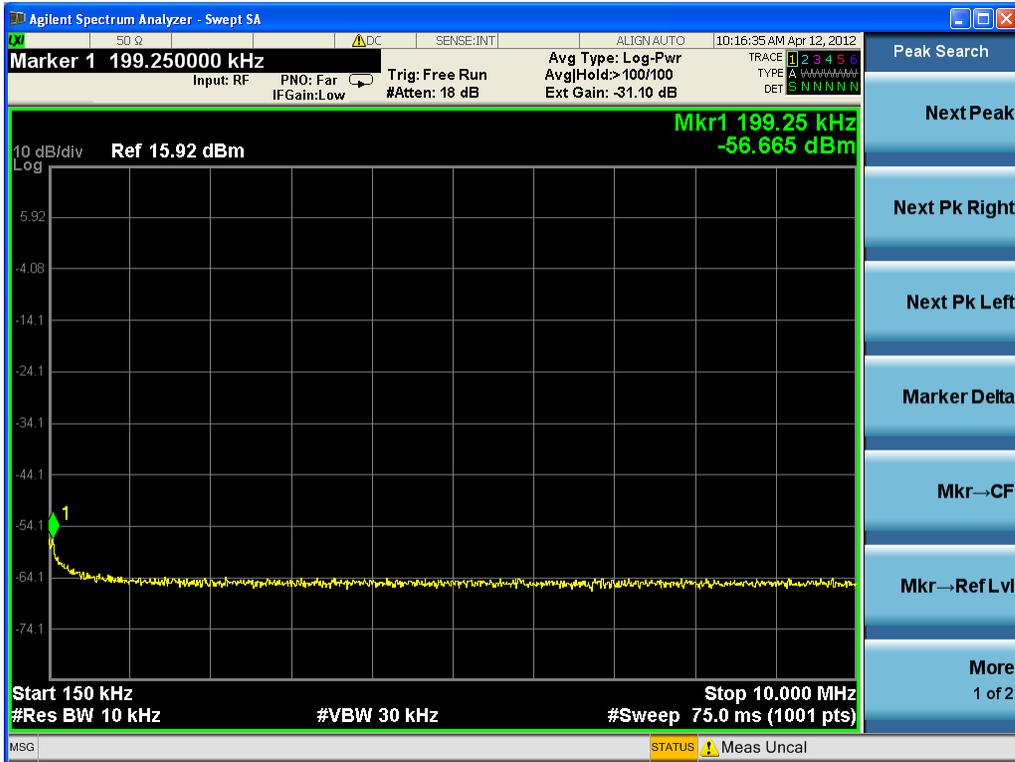
LTE 15M -Port 4 -GSM 1962.2MHz

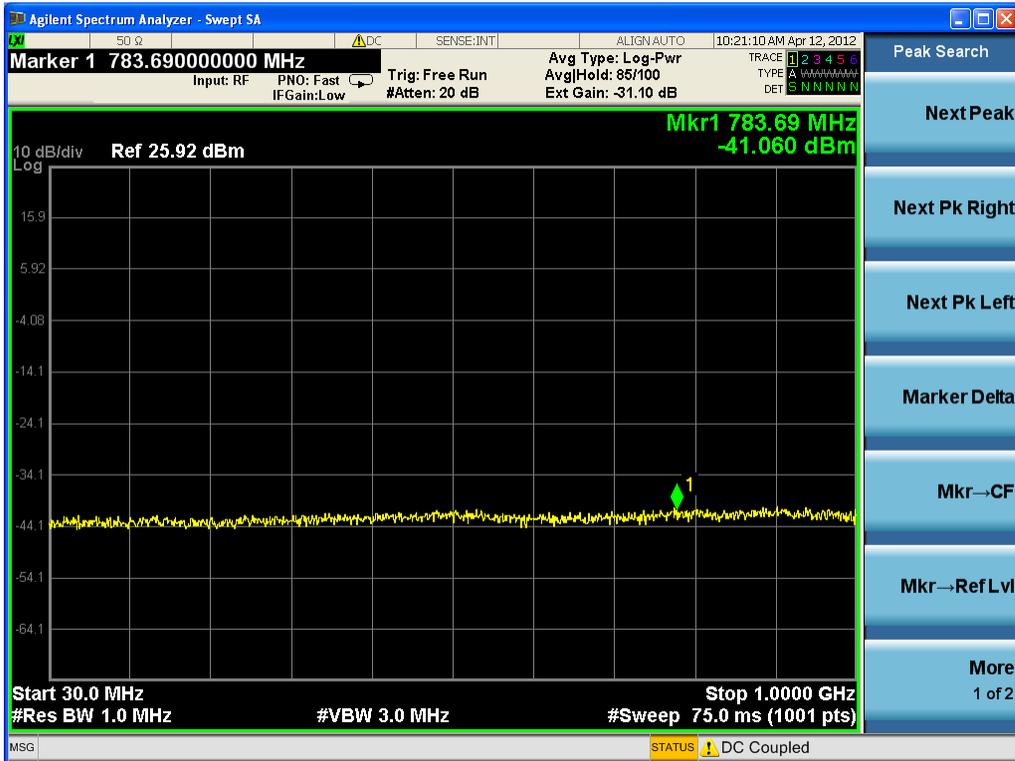
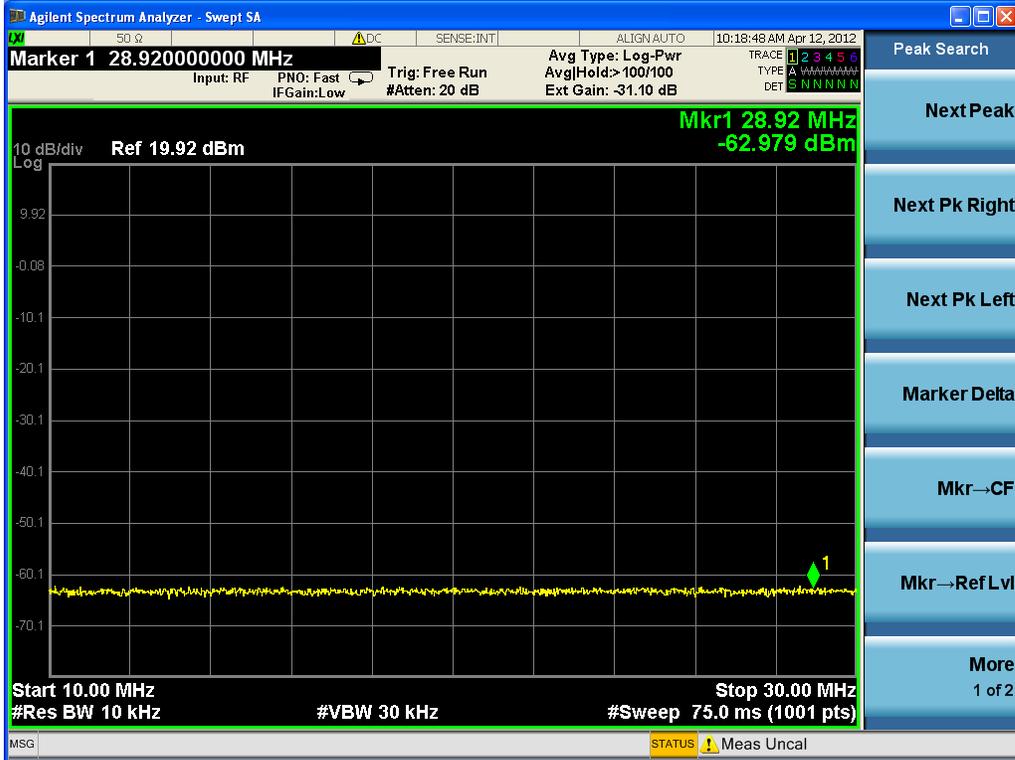






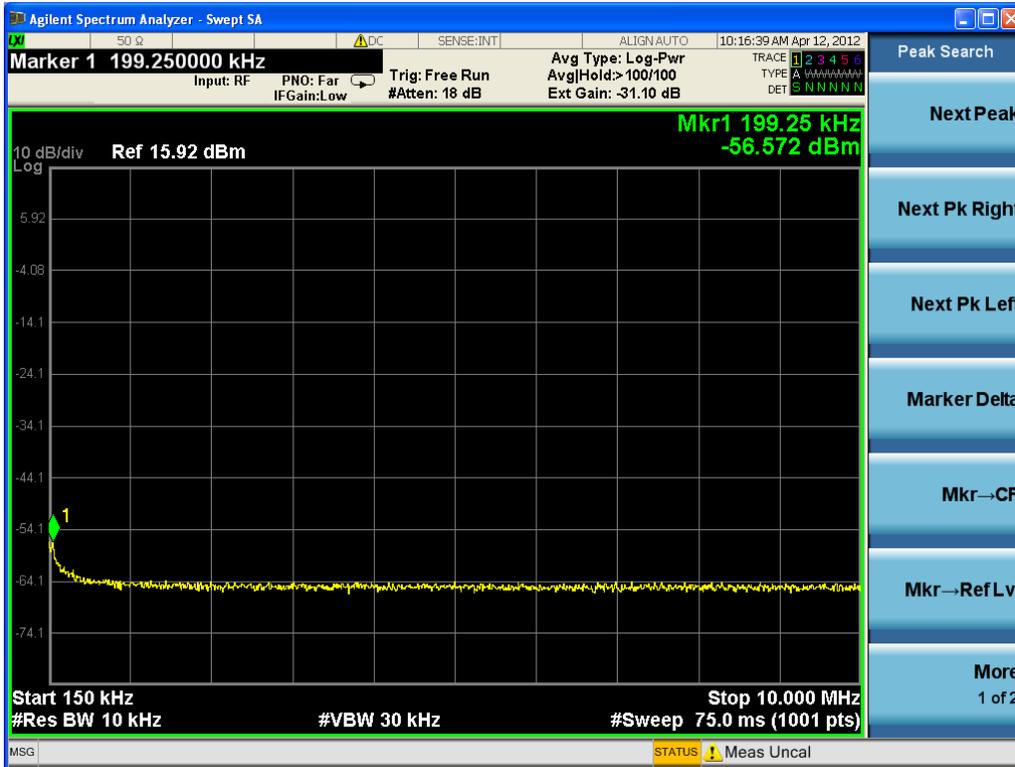
LTE 10M -Port 1 -GSM 1960.2MHz

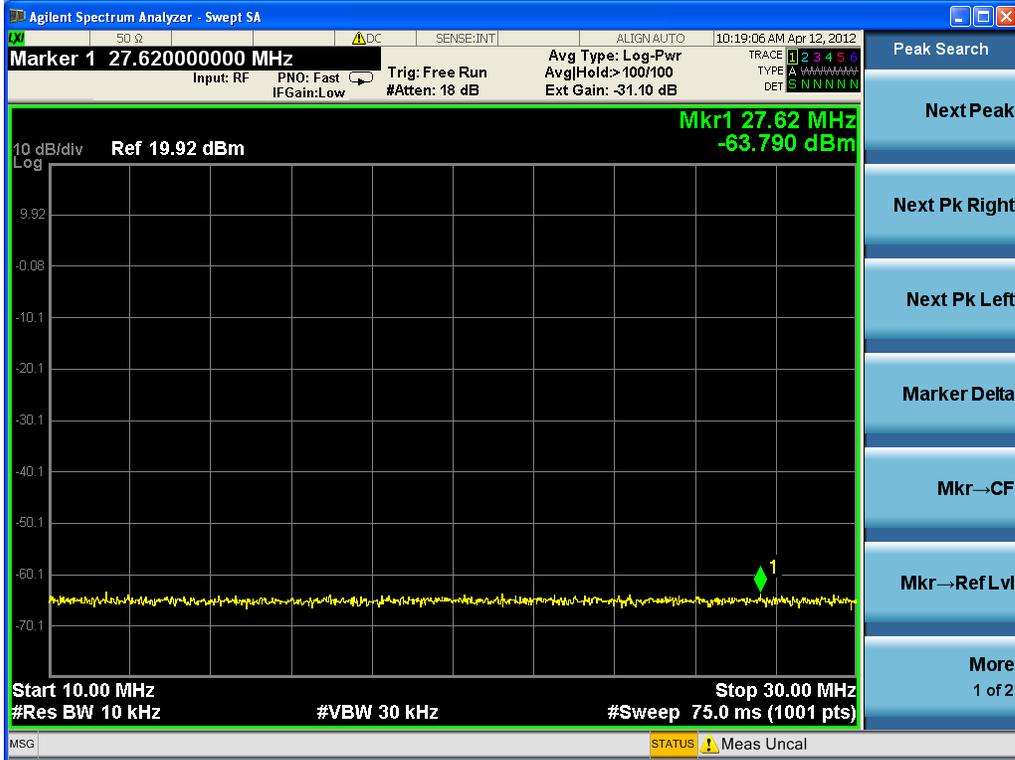






LTE 10M -Port 4 -GSM 1962.2MHz







10 OCCUPIED BANDWIDTH

Applicable Standard: FCC §2.1049

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2016.09.12	2017.09.12

***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. 99%Power bandwidth was recorded.

Environmental Conditions

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

Test Result: Pass

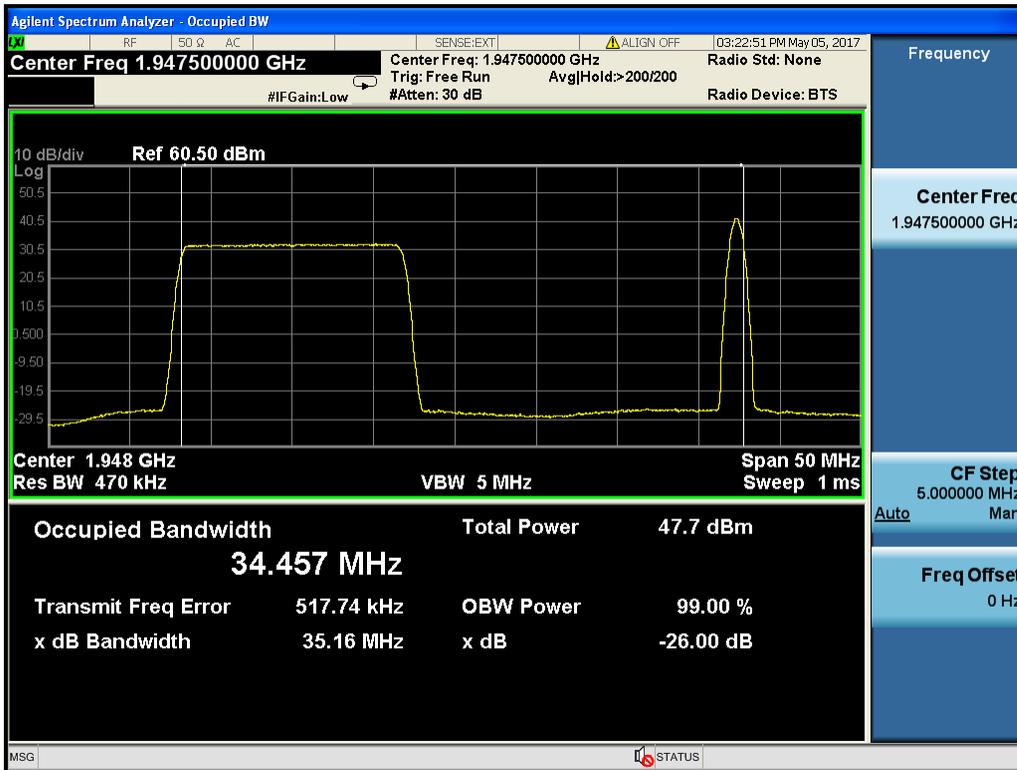
Test Mode: Transmitting LTE+GSM,

Test Data

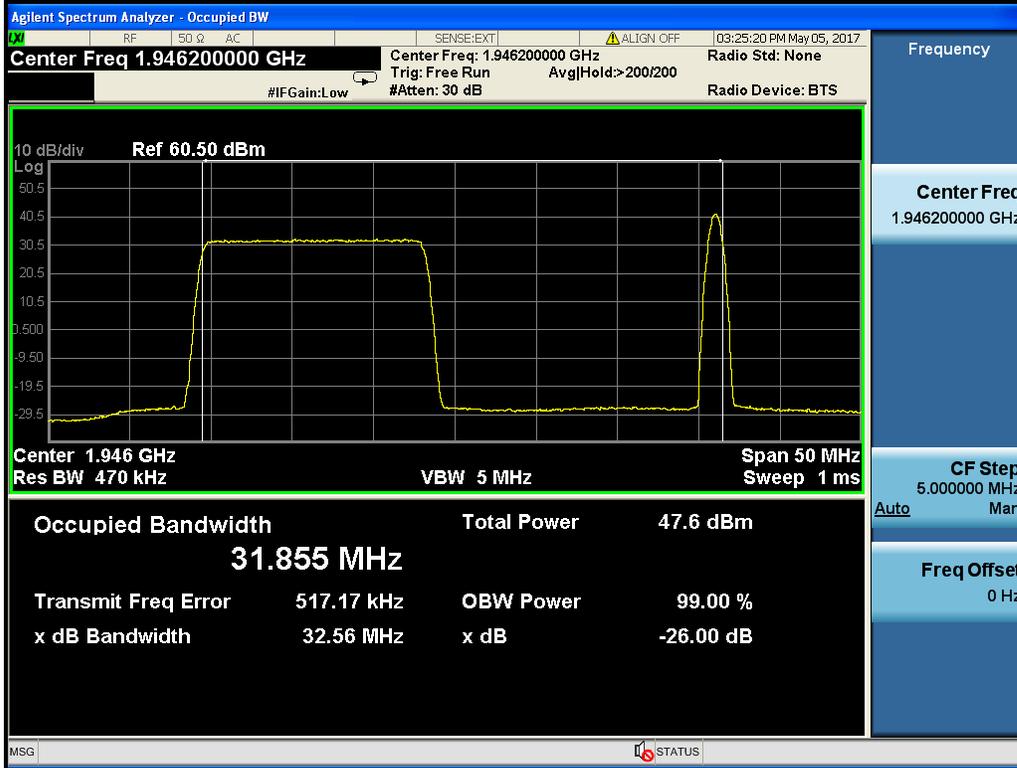
LTE 15M (LTE +GSM)

Port	RF Center Freq. (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1	1947.5	34.457	35M
4	1950	31.855	32.6M

LTE 15M -Port 1 –GSM 1964.8MHz



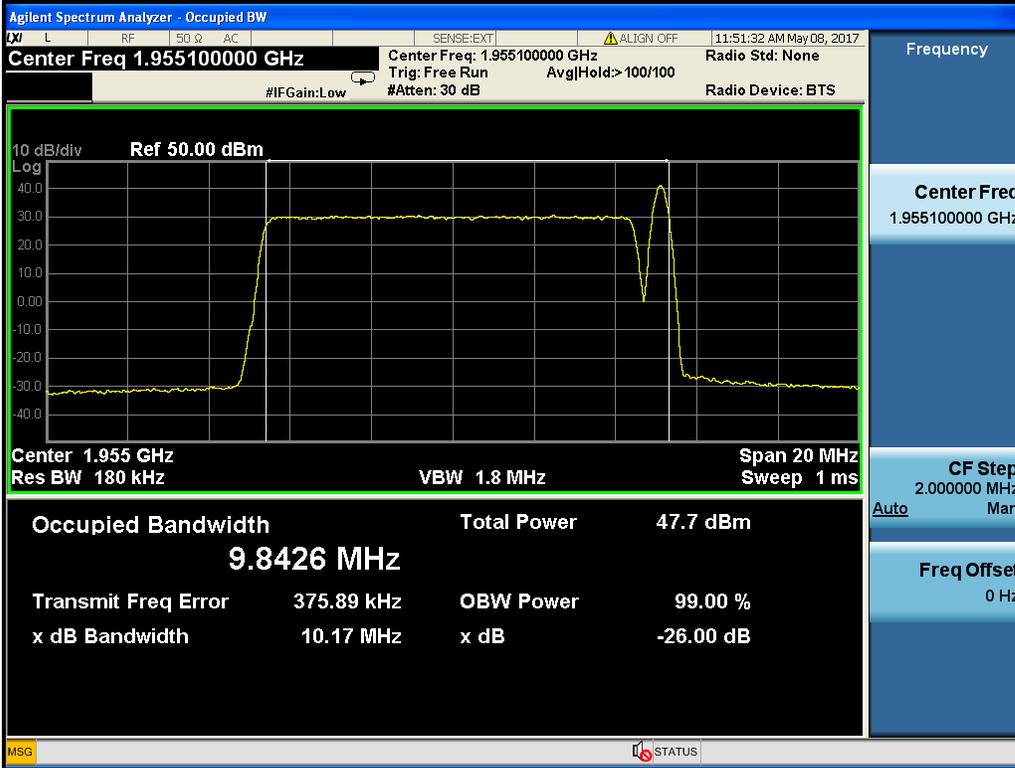
LTE 15M -Port 4 –GSM 1962.2MHz



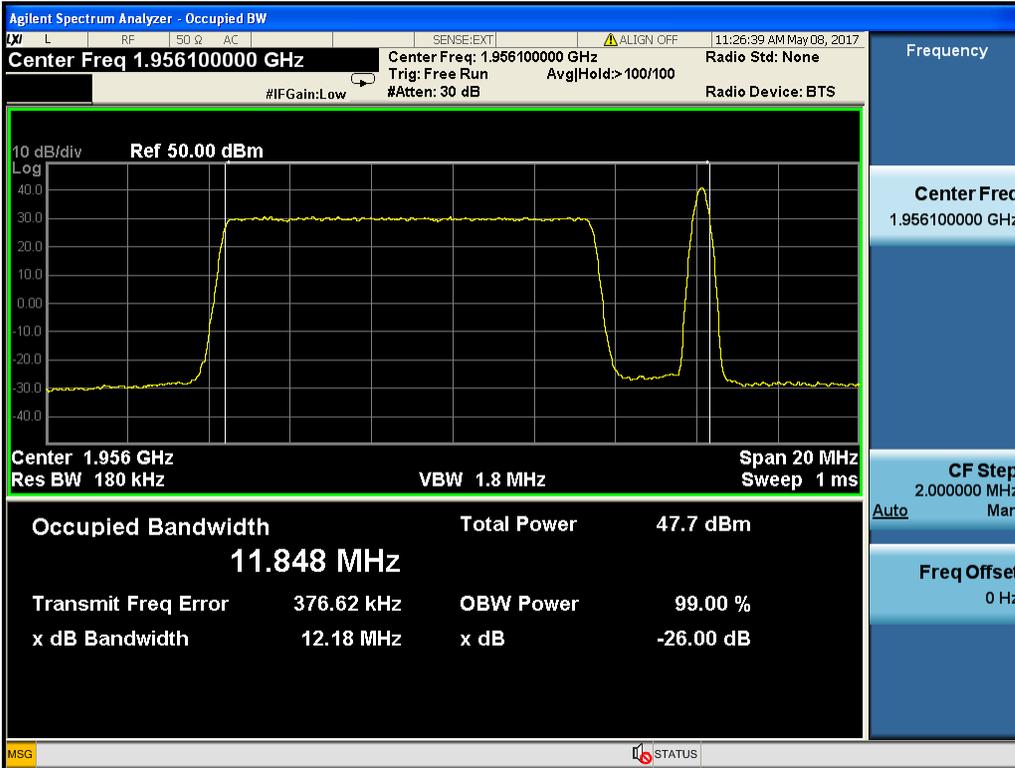
LTE 10M (LTE +GSM)

Port	RF Center Freq. (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1	1955.1	9.843	10M
4	1956.1	11.848	12M

LTE 10M -Port 1 –GSM 1962.2MHz



LTE 10M -Port 4 -GSM 1962.2MHz



11 BAND EDGES

Applicable Standard: FCC §2.1051, §24.238

According to §2.1051, 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	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2016.09.12	2017.09.12

***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

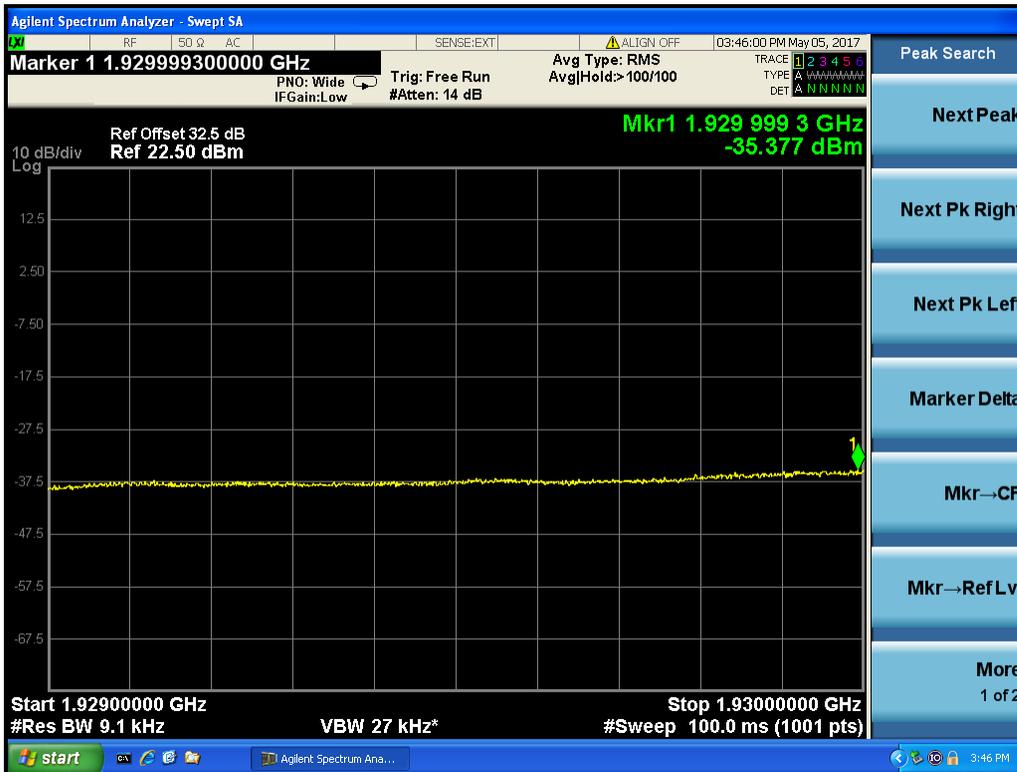
Test Mode: Transmitting LTE+GSM

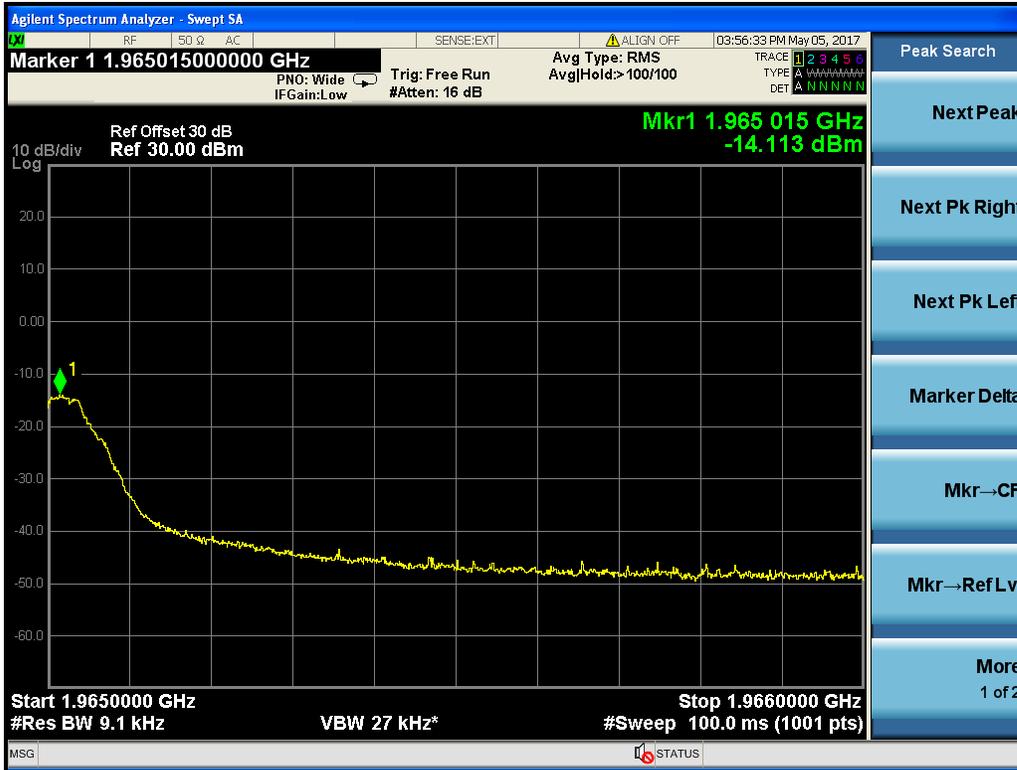
Test Data

LTE 15M (LTE +GSM)

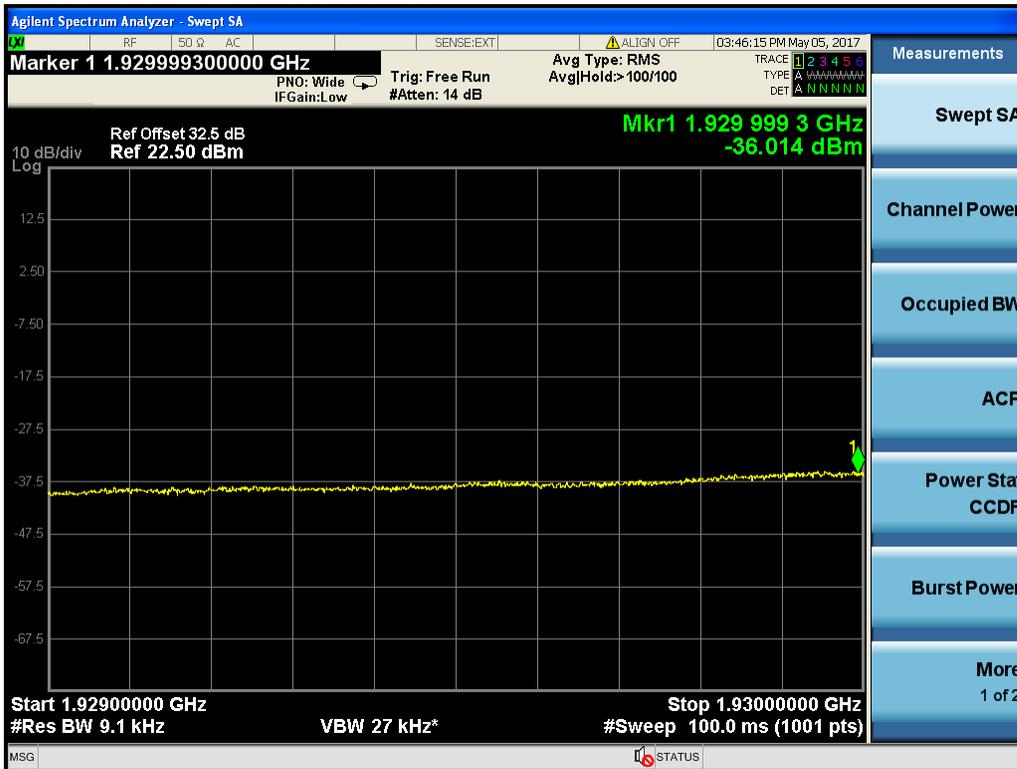
Port	LTE Center Freq. (MHz)	Max bandedge Emission (dBm)	Limit (dBm)
1	1937.5	-14.113	-13
4	1937.5	-14.119	-13

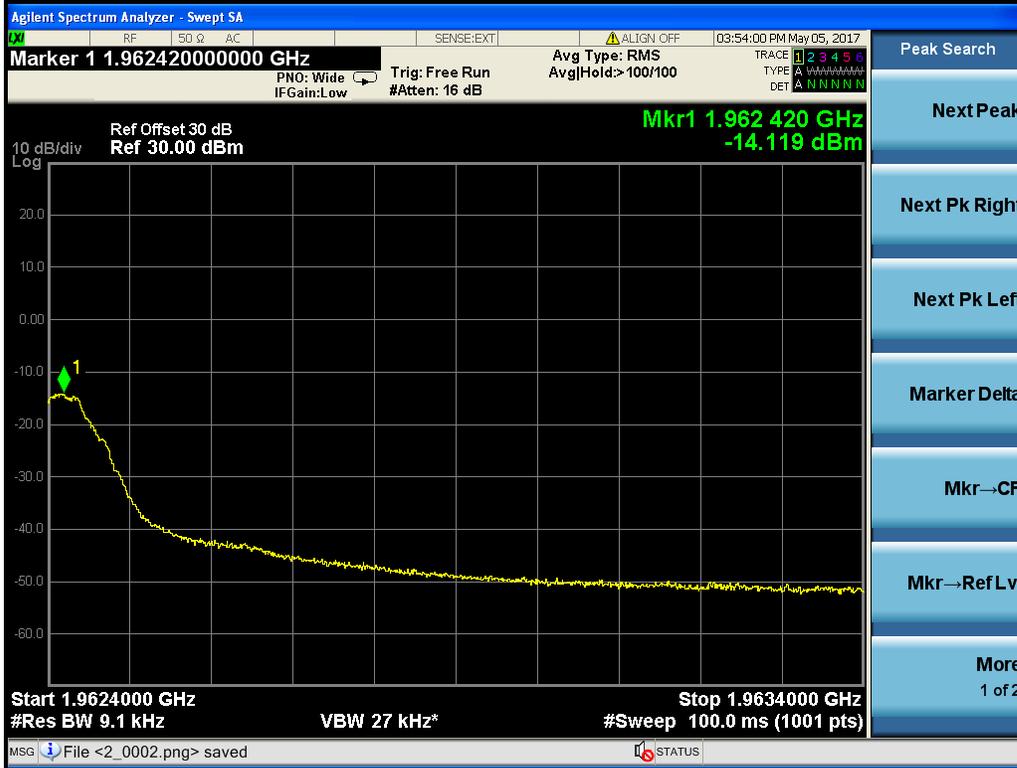
LTE 15M -Port 1 –GSM 1964.8MHz





LTE 15M -Port 4-GSM 1962.2MHz





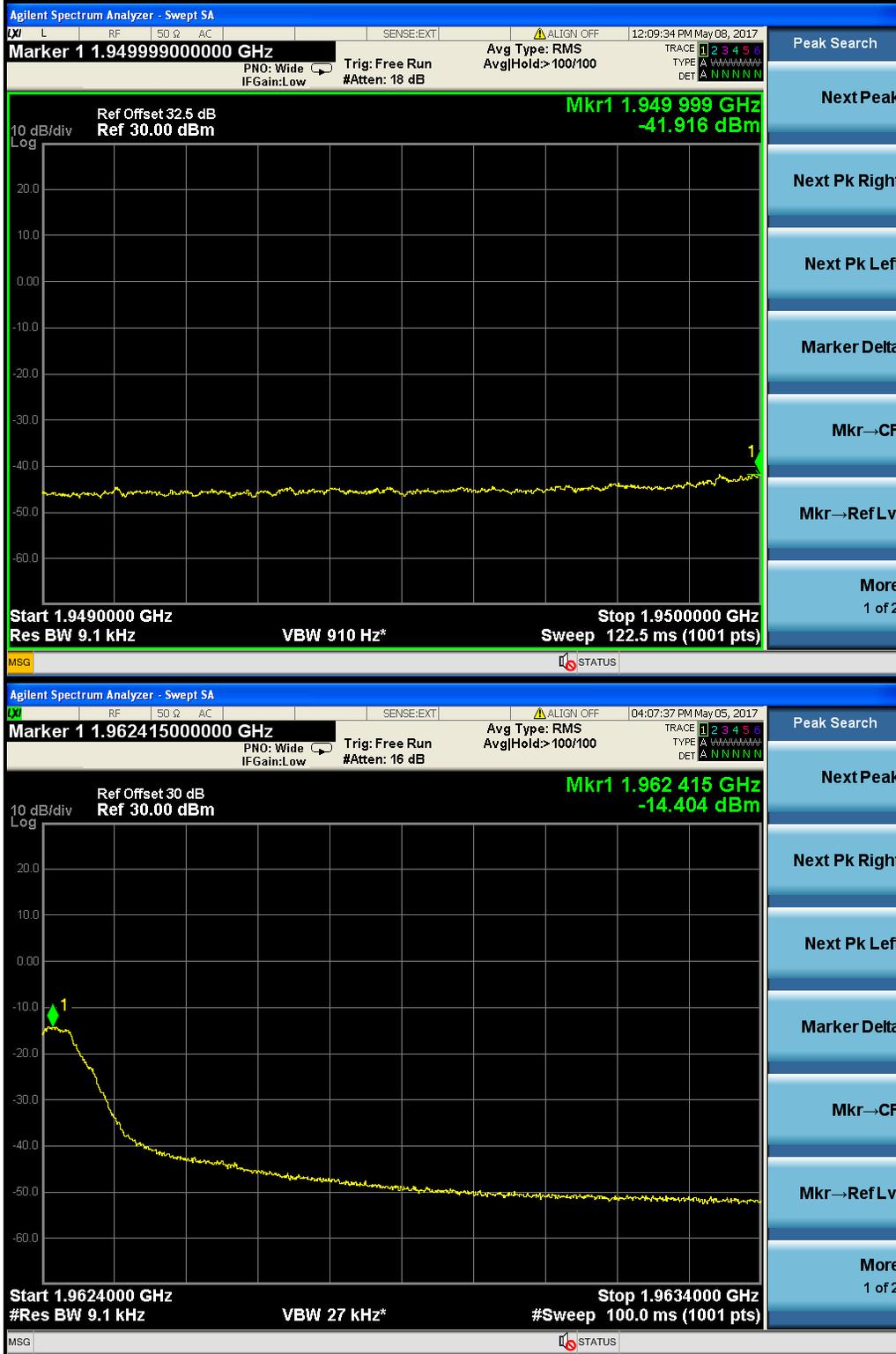
LTE 10M (LTE +GSM)

Port	LTE Center Freq. (MHz)	Max bandedge Emission (dBm)	Limit (dBm)
1	1955	-14.577	-13
4	1955	-14.404	-13

LTE 10M -Port 1 –GSM 1960.2MHz



LTE 10M -Port 4 -GSM 1962.2MHz



12 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	2016.09.12	2017.09.12
Agilent	MXA Series Spectrum Analyzer	N9030A	MY49431143	2016.09.12	2017.09.12
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2015.04.17	2016.04.17

***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 DC 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 DC 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 DC 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
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Test Result: Pass

Test Mode: Transmitting LTE+GSM

Test Data (LTE)

Frequency Stability Versus Temperature

Frequency Stability vs Temperature (LTE+GSM LTE :15MHz)								
Temperature (°C)	Power Supplied (V _{DC})	Port	LTE Frequency (MHz)	Frequency Measure Error (Hz)	E-TM	Limit (ppm)	Limit (Hz)	Result
-40	-48	1	1937.5	1.107	TM2.0	0.05	99.5	PASS
				1.183	TM3.1	0.05	99.5	PASS
				1.088	TM3.2	0.05	99.5	PASS
				1.265	TM3.3	0.05	99.5	PASS
		4	1937.5	1.534	TM2.0	0.05	99.5	PASS
				1.289	TM3.1	0.05	99.5	PASS
				1.275	TM3.2	0.05	99.5	PASS
				1.614	TM3.3	0.05	99.5	PASS
-30	-48	1	1937.5	1.153	TM2.0	0.05	99.5	PASS
				1.411	TM3.1	0.05	99.5	PASS
				1.014	TM3.2	0.05	99.5	PASS
				1.070	TM3.3	0.05	99.5	PASS
		4	1937.5	1.150	TM2.0	0.05	99.5	PASS
				1.488	TM3.1	0.05	99.5	PASS
				1.396	TM3.2	0.05	99.5	PASS
				1.383	TM3.3	0.05	99.5	PASS
-20	-48	1	1937.5	1.172	TM2.0	0.05	99.5	PASS
				1.162	TM3.1	0.05	99.5	PASS
				1.234	TM3.2	0.05	99.5	PASS

		4	1937.5	1.357	TM3.3	0.05	99.5	PASS
				1.318	TM2.0	0.05	99.5	PASS
				1.376	TM3.1	0.05	99.5	PASS
				1.077	TM3.2	0.05	99.5	PASS
-10	1	1937.5	1.312	TM3.3	0.05	99.5	PASS	
			1.162	TM2.0	0.05	99.5	PASS	
			1.164	TM3.1	0.05	99.5	PASS	
			1.143	TM3.2	0.05	99.5	PASS	
	4	1937.5	1.163	TM3.3	0.05	99.5	PASS	
			1.468	TM2.0	0.05	99.5	PASS	
			1.476	TM3.1	0.05	99.5	PASS	
			1.079	TM3.2	0.05	99.5	PASS	
0	1	1937.5	1.081	TM3.3	0.05	99.5	PASS	
			1.137	TM2.0	0.05	99.5	PASS	
			1.441	TM3.1	0.05	99.5	PASS	
			1.225	TM3.2	0.05	99.5	PASS	
	4	1937.5	1.107	TM3.3	0.05	99.5	PASS	
			1.058	TM2.0	0.05	99.5	PASS	
			1.358	TM3.1	0.05	99.5	PASS	
			1.271	TM3.2	0.05	99.5	PASS	
10	1	1937.5	1.229	TM3.3	0.05	99.5	PASS	
			1.376	TM2.0	0.05	99.5	PASS	
			1.239	TM3.1	0.05	99.5	PASS	
			1.165	TM3.2	0.05	99.5	PASS	
	4	1937.5	1.212	TM3.3	0.05	99.5	PASS	
			1.151	TM2.0	0.05	99.5	PASS	
			1.020	TM3.1	0.05	99.5	PASS	
			1.414	TM3.2	0.05	99.5	PASS	
20	1	1937.5	1.333	TM3.3	0.05	99.5	PASS	
			1.222	TM2.0	0.05	99.5	PASS	
			1.308	TM3.1	0.05	99.5	PASS	
			1.435	TM3.2	0.05	99.5	PASS	
	4	1937.5	1.403	TM3.3	0.05	99.5	PASS	
			1.042	TM2.0	0.05	99.5	PASS	
			1.382	TM3.1	0.05	99.5	PASS	
			1.004	TM3.2	0.05	99.5	PASS	
30	1	1937.5	1.366	TM3.3	0.05	99.5	PASS	
			1.293	TM2.0	0.05	99.5	PASS	
			1.023	TM3.1	0.05	99.5	PASS	

40		4	1937.5	1.254	TM3.2	0.05	99.5	PASS		
				1.191	TM3.3	0.05	99.5	PASS		
				1.268	TM2.0	0.05	99.5	PASS		
				1.064	TM3.1	0.05	99.5	PASS		
				1.396	TM3.2	0.05	99.5	PASS		
				1.438	TM3.3	0.05	99.5	PASS		
		50		1	1937.5	1.409	TM2.0	0.05	99.5	PASS
						1.400	TM3.1	0.05	99.5	PASS
						1.500	TM3.2	0.05	99.5	PASS
						1.103	TM3.3	0.05	99.5	PASS
				4	1937.5	1.229	TM2.0	0.05	99.5	PASS
						1.143	TM3.1	0.05	99.5	PASS
1.012	TM3.2					0.05	99.5	PASS		
1.370	TM3.3					0.05	99.5	PASS		
55		1	1937.5	1.239	TM2.0	0.05	99.5	PASS		
				1.467	TM3.1	0.05	99.5	PASS		
				1.280	TM3.2	0.05	99.5	PASS		
				1.118	TM3.3	0.05	99.5	PASS		
		4	1937.5	1.181	TM2.0	0.05	99.5	PASS		
				1.255	TM3.1	0.05	99.5	PASS		
				1.330	TM3.2	0.05	99.5	PASS		
				1.310	TM3.3	0.05	99.5	PASS		
55		1	1937.5	1.235	TM2.0	0.05	99.5	PASS		
				1.409	TM3.1	0.05	99.5	PASS		
				1.332	TM3.2	0.05	99.5	PASS		
				1.144	TM3.3	0.05	99.5	PASS		
		4	1937.5	1.382	TM2.0	0.05	99.5	PASS		
				1.059	TM3.1	0.05	99.5	PASS		
				1.118	TM3.2	0.05	99.5	PASS		
				1.008	TM3.3	0.05	99.5	PASS		

Frequency Stability vs Temperature (LTE+GSM LTE :10MHz)

Temperature (°C)	Power Supplied (V _{DC})	Port	LTE Frequency (MHz)	Frequency Measure Error (Hz)	E-TM	Limit (ppm)	Limit (Hz)	Result
-40	-48	1	1955	1.310	TM2.0	0.05	99.5	PASS
				1.500	TM3.1	0.05	99.5	PASS

		4	1955	1.410	TM3.2	0.05	99.5	PASS
				1.230	TM3.3	0.05	99.5	PASS
				1.450	TM2.0	0.05	99.5	PASS
				1.036	TM3.1	0.05	99.5	PASS
				1.057	TM3.2	0.05	99.5	PASS
				1.045	TM3.3	0.05	99.5	PASS
-30	1	1955	1.452	TM2.0	0.05	99.5	PASS	
			1.485	TM3.1	0.05	99.5	PASS	
			1.196	TM3.2	0.05	99.5	PASS	
			1.182	TM3.3	0.05	99.5	PASS	
	4	1955	1.176	TM2.0	0.05	99.5	PASS	
			1.077	TM3.1	0.05	99.5	PASS	
			1.450	TM3.2	0.05	99.5	PASS	
			1.382	TM3.3	0.05	99.5	PASS	
-20	1	1955	1.037	TM2.0	0.05	99.5	PASS	
			1.065	TM3.1	0.05	99.5	PASS	
			1.152	TM3.2	0.05	99.5	PASS	
			1.249	TM3.3	0.05	99.5	PASS	
	4	1955	1.253	TM2.0	0.05	99.5	PASS	
			1.019	TM3.1	0.05	99.5	PASS	
			1.022	TM3.2	0.05	99.5	PASS	
			1.460	TM3.3	0.05	99.5	PASS	
-10	1	1955	1.101	TM2.0	0.05	99.5	PASS	
			1.292	TM3.1	0.05	99.5	PASS	
			1.194	TM3.2	0.05	99.5	PASS	
			1.037	TM3.3	0.05	99.5	PASS	
	4	1955	1.306	TM2.0	0.05	99.5	PASS	
			1.163	TM3.1	0.05	99.5	PASS	
			1.285	TM3.2	0.05	99.5	PASS	
			1.388	TM3.3	0.05	99.5	PASS	
0	1	1955	1.417	TM2.0	0.05	99.5	PASS	
			1.288	TM3.1	0.05	99.5	PASS	
			1.298	TM3.2	0.05	99.5	PASS	
			1.272	TM3.3	0.05	99.5	PASS	
	4	1955	1.097	TM2.0	0.05	99.5	PASS	
			1.310	TM3.1	0.05	99.5	PASS	
			1.441	TM3.2	0.05	99.5	PASS	
			1.143	TM3.3	0.05	99.5	PASS	
10	1	1955	1.351	TM2.0	0.05	99.5	PASS	

				1.304	TM3.1	0.05	99.5	PASS		
				1.350	TM3.2	0.05	99.5	PASS		
				1.101	TM3.3	0.05	99.5	PASS		
				4	1955	1.379	TM2.0	0.05	99.5	PASS
						1.052	TM3.1	0.05	99.5	PASS
						1.425	TM3.2	0.05	99.5	PASS
						1.154	TM3.3	0.05	99.5	PASS
20		1	1955	1.322	TM2.0	0.05	99.5	PASS		
				1.055	TM3.1	0.05	99.5	PASS		
				1.173	TM3.2	0.05	99.5	PASS		
				1.313	TM3.3	0.05	99.5	PASS		
		4	1955	1.185	TM2.0	0.05	99.5	PASS		
				1.163	TM3.1	0.05	99.5	PASS		
				1.240	TM3.2	0.05	99.5	PASS		
1.494	TM3.3			0.05	99.5	PASS				
30		1	1955	1.207	TM2.0	0.05	99.5	PASS		
				1.360	TM3.1	0.05	99.5	PASS		
				1.050	TM3.2	0.05	99.5	PASS		
				1.254	TM3.3	0.05	99.5	PASS		
		4	1955	1.041	TM2.0	0.05	99.5	PASS		
				1.053	TM3.1	0.05	99.5	PASS		
				1.459	TM3.2	0.05	99.5	PASS		
1.375	TM3.3			0.05	99.5	PASS				
40		1	1955	1.097	TM2.0	0.05	99.5	PASS		
				1.036	TM3.1	0.05	99.5	PASS		
				1.450	TM3.2	0.05	99.5	PASS		
				1.415	TM3.3	0.05	99.5	PASS		
		4	1955	1.365	TM2.0	0.05	99.5	PASS		
				1.357	TM3.1	0.05	99.5	PASS		
				1.168	TM3.2	0.05	99.5	PASS		
1.028	TM3.3			0.05	99.5	PASS				
50		1	1955	1.088	TM2.0	0.05	99.5	PASS		
				1.088	TM3.1	0.05	99.5	PASS		
				1.365	TM3.2	0.05	99.5	PASS		
				1.493	TM3.3	0.05	99.5	PASS		
		4	1955	1.089	TM2.0	0.05	99.5	PASS		
				1.197	TM3.1	0.05	99.5	PASS		
				1.242	TM3.2	0.05	99.5	PASS		
1.020	TM3.3			0.05	99.5	PASS				

55	1	1955	1.113	TM2.0	0.05	99.5	PASS
			1.472	TM3.1	0.05	99.5	PASS
			1.333	TM3.2	0.05	99.5	PASS
			1.153	TM3.3	0.05	99.5	PASS
	4	1955	1.248	TM2.0	0.05	99.5	PASS
			1.333	TM3.1	0.05	99.5	PASS
			1.091	TM3.2	0.05	99.5	PASS
			1.437	TM3.3	0.05	99.5	PASS

Frequency Stability Versus Voltage

Frequency Stability vs Voltage (LTE+GSM LTE :15MHz)								
Power Supplied (V _{DC})	Temperature (°C)	Port	LTE Frequency (MHz)	Frequency Measure Error (Hz)	E-TM	Limit (ppm)	Limit (Hz)	Result
-37	20	1	1937.5	1.352	TM2.0	0.05	99.5	PASS
				1.046	TM3.1	0.05	99.5	PASS
				1.133	TM3.2	0.05	99.5	PASS
				1.231	TM3.3	0.05	99.5	PASS
		4	1937.5	1.183	TM2.0	0.05	99.5	PASS
				1.406	TM3.1	0.05	99.5	PASS
				1.352	TM3.2	0.05	99.5	PASS
				1.171	TM3.3	0.05	99.5	PASS
-42	20	1	1937.5	1.090	TM2.0	0.05	99.5	PASS
				1.424	TM3.1	0.05	99.5	PASS
				1.408	TM3.2	0.05	99.5	PASS
				1.364	TM3.3	0.05	99.5	PASS
		4	1937.5	1.080	TM2.0	0.05	99.5	PASS
				1.043	TM3.1	0.05	99.5	PASS
				1.313	TM3.2	0.05	99.5	PASS
				1.128	TM3.3	0.05	99.5	PASS
-48	20	1	1937.5	1.203	TM2.0	0.05	99.5	PASS
				1.219	TM3.1	0.05	99.5	PASS
				1.007	TM3.2	0.05	99.5	PASS
				1.440	TM3.3	0.05	99.5	PASS
		4	1937.5	1.343	TM2.0	0.05	99.5	PASS
				1.238	TM3.1	0.05	99.5	PASS

-54		1	1937.5	1.083	TM3.2	0.05	99.5	PASS		
				1.378	TM3.3	0.05	99.5	PASS		
				1.423	TM2.0	0.05	99.5	PASS		
				1.209	TM3.1	0.05	99.5	PASS		
		4	1937.5			1.459	TM3.2	0.05	99.5	PASS
						1.204	TM3.3	0.05	99.5	PASS
						1.465	TM2.0	0.05	99.5	PASS
						1.114	TM3.1	0.05	99.5	PASS
-60		1	1937.5	1.062	TM3.2	0.05	99.5	PASS		
				1.017	TM3.3	0.05	99.5	PASS		
				1.075	TM2.0	0.05	99.5	PASS		
				1.389	TM3.1	0.05	99.5	PASS		
		4	1937.5			1.005	TM3.2	0.05	99.5	PASS
						1.081	TM3.3	0.05	99.5	PASS
						1.227	TM2.0	0.05	99.5	PASS
						1.393	TM3.1	0.05	99.5	PASS
				1.495	TM3.2	0.05	99.5	PASS		
				1.080	TM3.3	0.05	99.5	PASS		

Frequency Stability vs Voltage (LTE+GSM LTE :10MHz)										
Power Supplied (V _{DC})	Temperature (°C)	Port	LTE Frequency (MHz)	Frequency Measure Error (Hz)	E-TM	Limit (ppm)	Limit (Hz)	Result		
-37	20	1	1955	1.029	TM2.0	0.05	99.5	PASS		
				1.236	TM3.1	0.05	99.5	PASS		
				1.347	TM3.2	0.05	99.5	PASS		
				1.065	TM3.3	0.05	99.5	PASS		
		4	1955			1.019	TM2.0	0.05	99.5	PASS
						1.358	TM3.1	0.05	99.5	PASS
						1.298	TM3.2	0.05	99.5	PASS
						1.323	TM3.3	0.05	99.5	PASS
-42		1	1955	1.199	TM2.0	0.05	99.5	PASS		
				1.049	TM3.1	0.05	99.5	PASS		
				1.171	TM3.2	0.05	99.5	PASS		
				1.497	TM3.3	0.05	99.5	PASS		
		4	1955			1.023	TM2.0	0.05	99.5	PASS
						1.235	TM3.1	0.05	99.5	PASS
				1.357	TM3.2	0.05	99.5	PASS		

				1.317	TM3.3	0.05	99.5	PASS
-48		1	1955	1.163	TM2.0	0.05	99.5	PASS
				1.044	TM3.1	0.05	99.5	PASS
				1.282	TM3.2	0.05	99.5	PASS
				1.387	TM3.3	0.05	99.5	PASS
		4	1955	1.442	TM2.0	0.05	99.5	PASS
				1.082	TM3.1	0.05	99.5	PASS
				1.172	TM3.2	0.05	99.5	PASS
				1.404	TM3.3	0.05	99.5	PASS
-54		1	1955	1.286	TM2.0	0.05	99.5	PASS
				1.341	TM3.1	0.05	99.5	PASS
				1.132	TM3.2	0.05	99.5	PASS
				1.259	TM3.3	0.05	99.5	PASS
		4	1955	1.014	TM2.0	0.05	99.5	PASS
				1.065	TM3.1	0.05	99.5	PASS
				1.306	TM3.2	0.05	99.5	PASS
				1.411	TM3.3	0.05	99.5	PASS
-60		1	1955	1.380	TM2.0	0.05	99.5	PASS
				1.086	TM3.1	0.05	99.5	PASS
				1.269	TM3.2	0.05	99.5	PASS
				1.062	TM3.3	0.05	99.5	PASS
		4	1955	1.457	TM2.0	0.05	99.5	PASS
				1.318	TM3.1	0.05	99.5	PASS
				1.196	TM3.2	0.05	99.5	PASS
				1.181	TM3.3	0.05	99.5	PASS

Test Data (GSM)

Frequency Stability Versus Temperature

Frequency Stability vs. Temperature LTE 15M GSM 1964.8					
Temperature °C	Power Supplied VDC	Frequency Measure Error Hz	Limit (ppm)	Limit (Hz)	Result
(1964.8MHz)					
-40	-48	-0.39	0.05	96.51	PASS
-30	-48	1.07	0.05	96.51	PASS
-20	-48	-0.26	0.05	96.51	PASS

-10	-48	-0.54	0.05	96.51	PASS
0	-48	-0.21	0.05	96.51	PASS
10	-48	0.88	0.05	96.51	PASS
20	-48	0.75	0.05	96.51	PASS
30	-48	0.68	0.05	96.51	PASS
40	-48	-0.46	0.05	96.51	PASS
50	-48	-1.15	0.05	96.51	PASS
55	-48	-0.86	0.05	96.51	PASS

Frequency Stability vs. Temperature LTE 15M GSM 1962.2

(1962.2MHz)

-40	-48	0.78	0.05	96.51	PASS
-30	-48	0.96	0.05	96.51	PASS
-20	-48	-0.59	0.05	96.51	PASS
-10	-48	0.15	0.05	96.51	PASS
0	-48	-1.12	0.05	96.51	PASS
10	-48	1.88	0.05	96.51	PASS
20	-48	0.68	0.05	96.51	PASS
30	-48	-1.55	0.05	96.51	PASS
40	-48	-0.36	0.05	96.51	PASS
50	-48	2.16	0.05	96.51	PASS
55	-48	2.23	0.05	96.51	PASS

Frequency Stability vs. Temperature LTE 10M GSM 1960.2

(1960.2MHz)

-40	-48	0.99	0.05	96.51	PASS
-30	-48	0.87	0.05	96.51	PASS
-20	-48	-0.58	0.05	96.51	PASS
-10	-48	-0.45	0.05	96.51	PASS
0	-48	1.48	0.05	96.51	PASS
10	-48	-1.11	0.05	96.51	PASS
20	-48	-0.13	0.05	96.51	PASS
30	-48	0.77	0.05	96.51	PASS
40	-48	-0.47	0.05	96.51	PASS
50	-48	0.94	0.05	96.51	PASS
55	-48	0.92	0.05	96.51	PASS

Frequency Stability vs. Temperature LTE 10M GSM 1962.2

(1962.2MHz)

-40	-48	1.09	0.05	96.51	PASS
-30	-48	0.87	0.05	96.51	PASS
-20	-48	-0.98	0.05	96.51	PASS

-10	-48	-1.45	0.05	96.51	PASS
0	-48	1.28	0.05	96.51	PASS
10	-48	-1.21	0.05	96.51	PASS
20	-48	-0.13	0.05	96.51	PASS
30	-48	0.77	0.05	96.51	PASS
40	-48	-1.47	0.05	96.51	PASS
50	-48	0.94	0.05	96.51	PASS
55	-48	0.85	0.05	96.51	PASS

Frequency Stability Versus Voltage

Frequency Stability vs. Voltage					
Voltage Vdc	Temperature	Frequency Measure Error Hz	Limit (ppm)	Limit (Hz)	Result
LTE 15M GSM 1964.8					
-37	20	0.76	0.05	96.51	PASS
-42	20	0.84	0.05	96.51	PASS
-48	20	-1.21	0.05	96.51	PASS
-54	20	1.76	0.05	96.51	PASS
-60	20	-0.58	0.05	96.51	PASS
LTE 15M GSM 1962.2					
-37	20	-1.69	0.05	96.51	PASS
-42	20	-1.15	0.05	96.51	PASS
-48	20	1.86	0.05	96.51	PASS
-54	20	0.88	0.05	96.51	PASS
-60	20	0.95	0.05	96.51	PASS
LTE 10M GSM 1960.2					
-37	20	0.75	0.05	96.51	PASS
-42	20	1.52	0.05	96.51	PASS
-48	20	-0.79	0.05	96.51	PASS
-54	20	-0.61	0.05	96.51	PASS
-60	20	1.04	0.05	96.51	PASS
LTE 10M GSM 1962.2					
-37	20	0.85	0.05	96.51	PASS
-42	20	1.22	0.05	96.51	PASS
-48	20	-0.95	0.05	96.51	PASS
-54	20	-1.14	0.05	96.51	PASS
-60	20	0.84	0.05	96.51	PASS