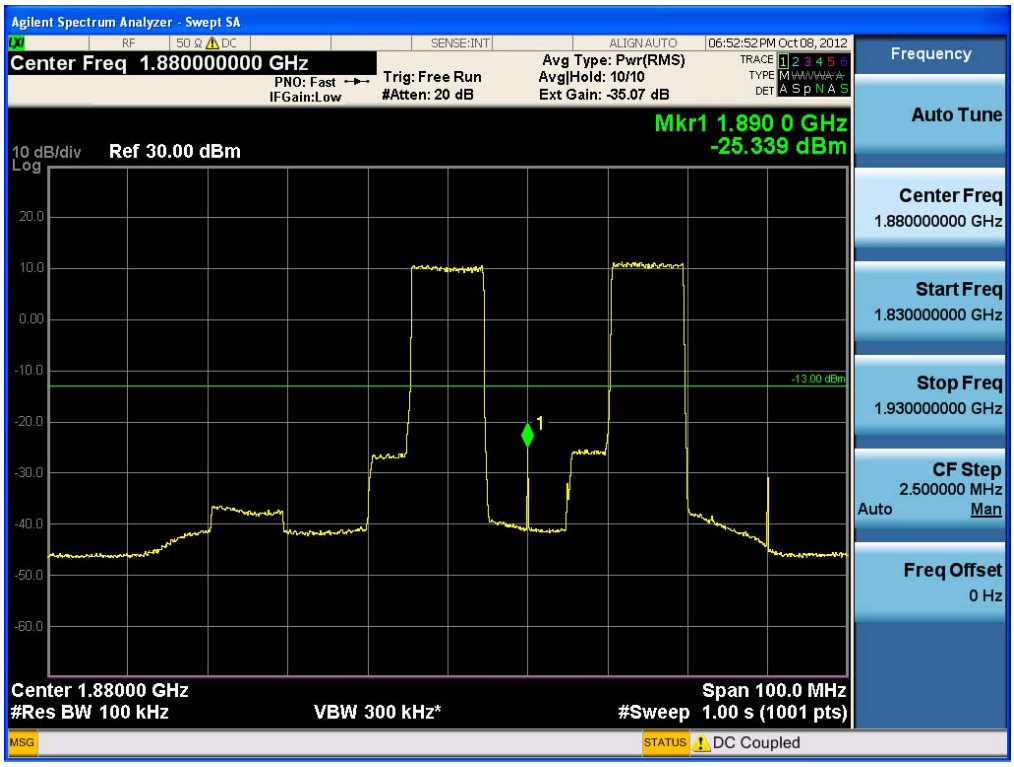
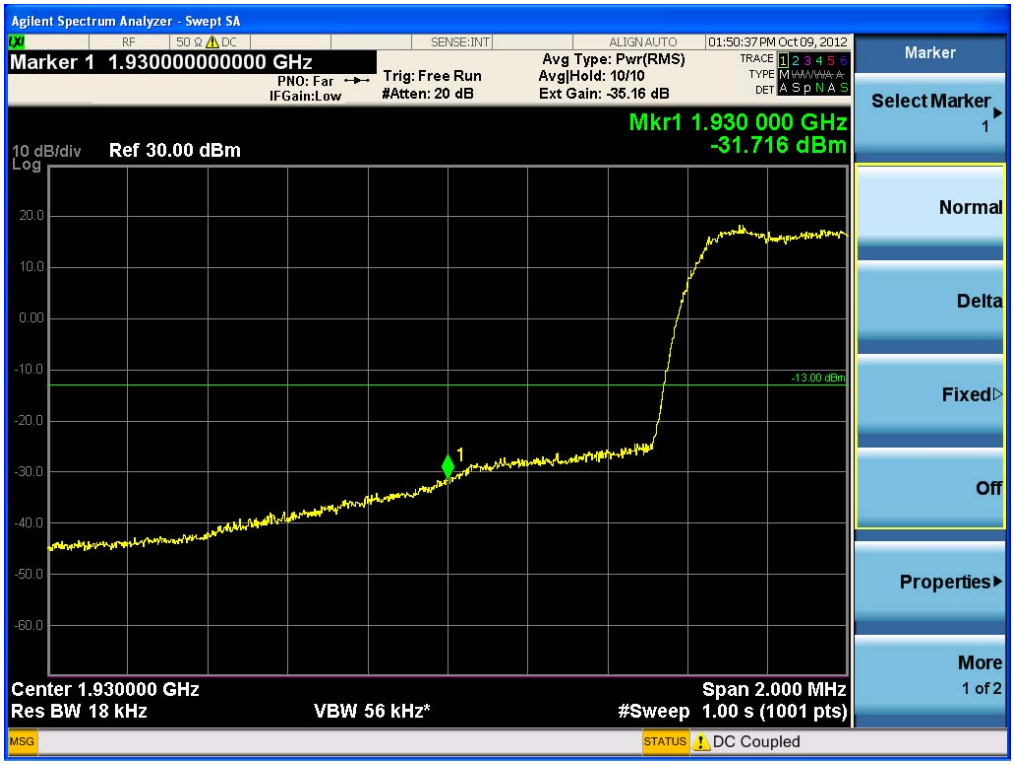
[LTE Uplink Low 10 MHz]

[LTE Uplink High 10 MHz]



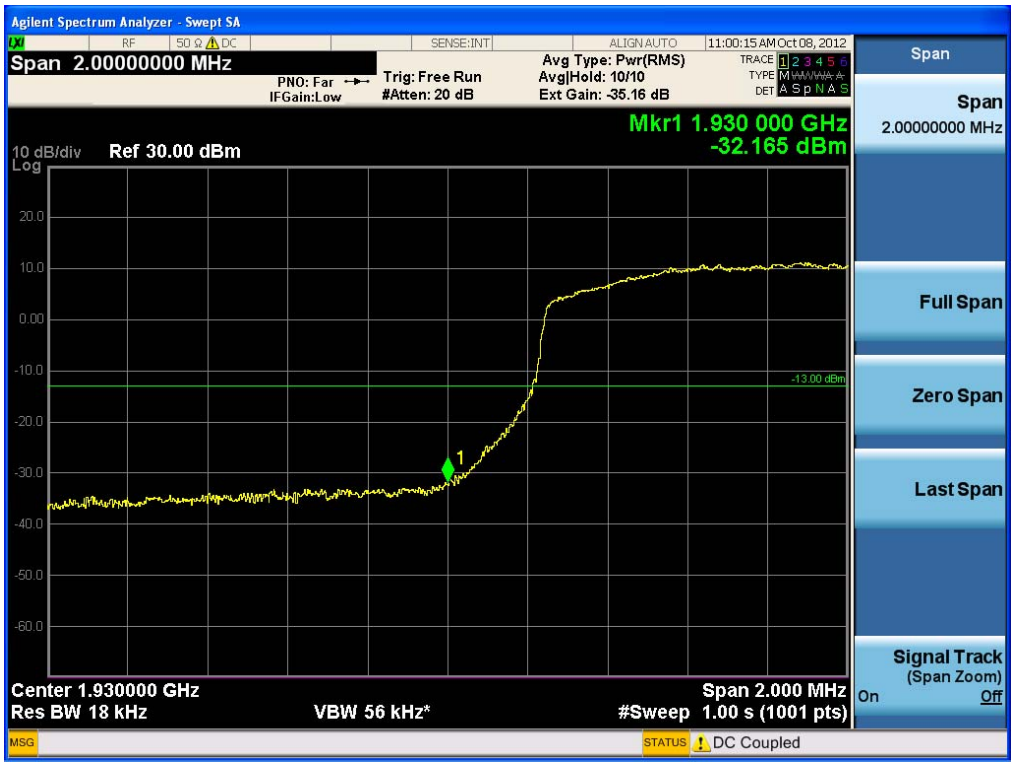
Band Edge

[CDMA Downlink Low]



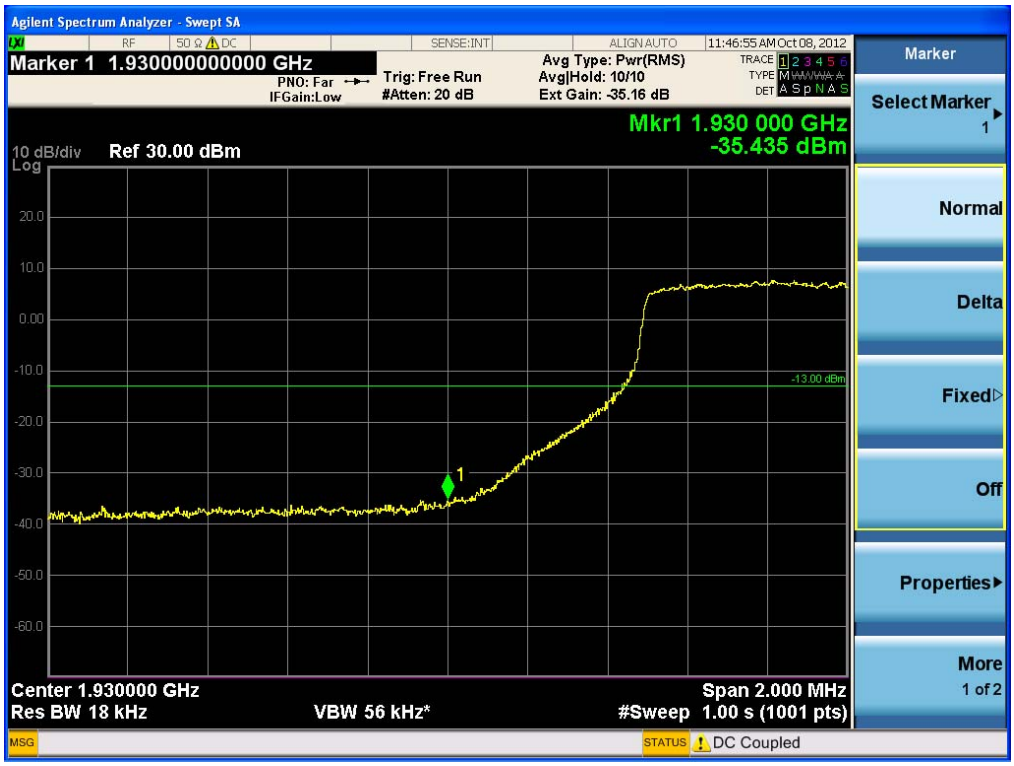
[CDMA Downlink High]

[LTE Downlink Low 5 MHz]



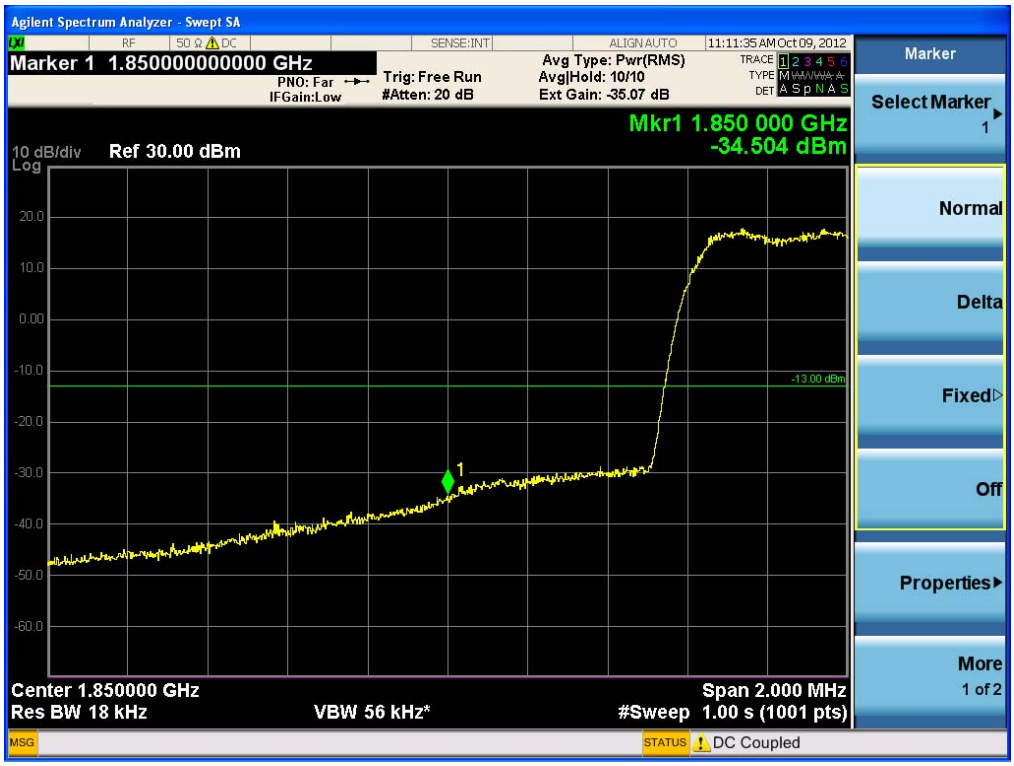
[LTE Downlink High 5 MHz]

[LTE Downlink Low 10 MHz]



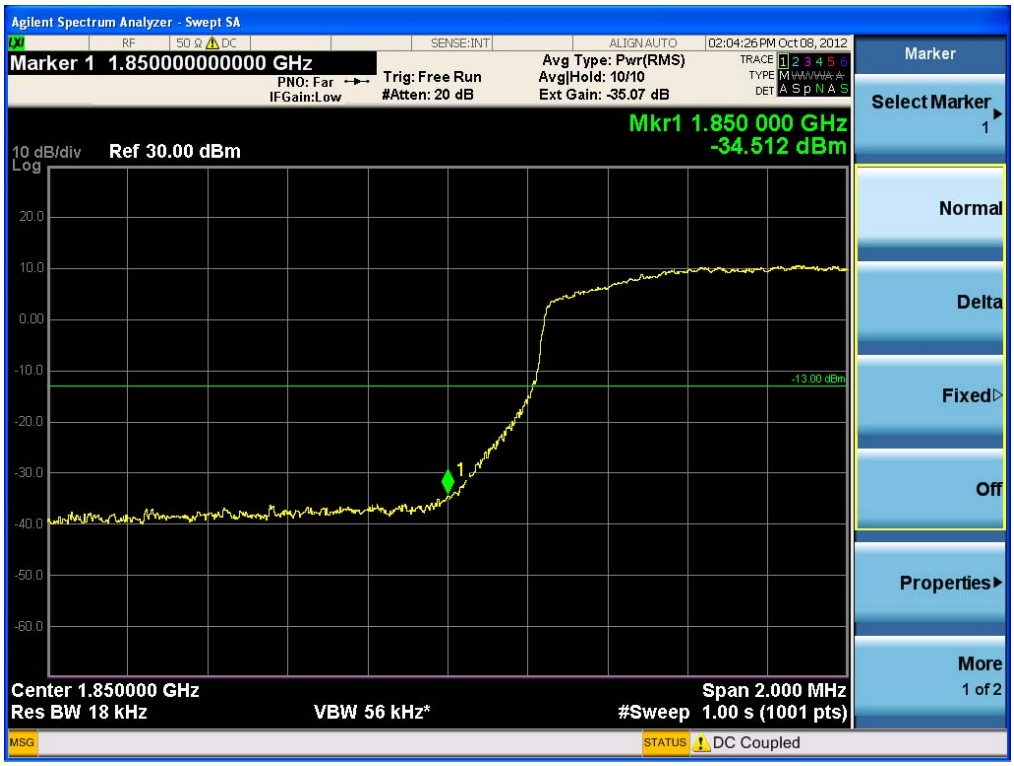
[LTE Downlink High 10 MHz]

[CDMA Uplink Low]



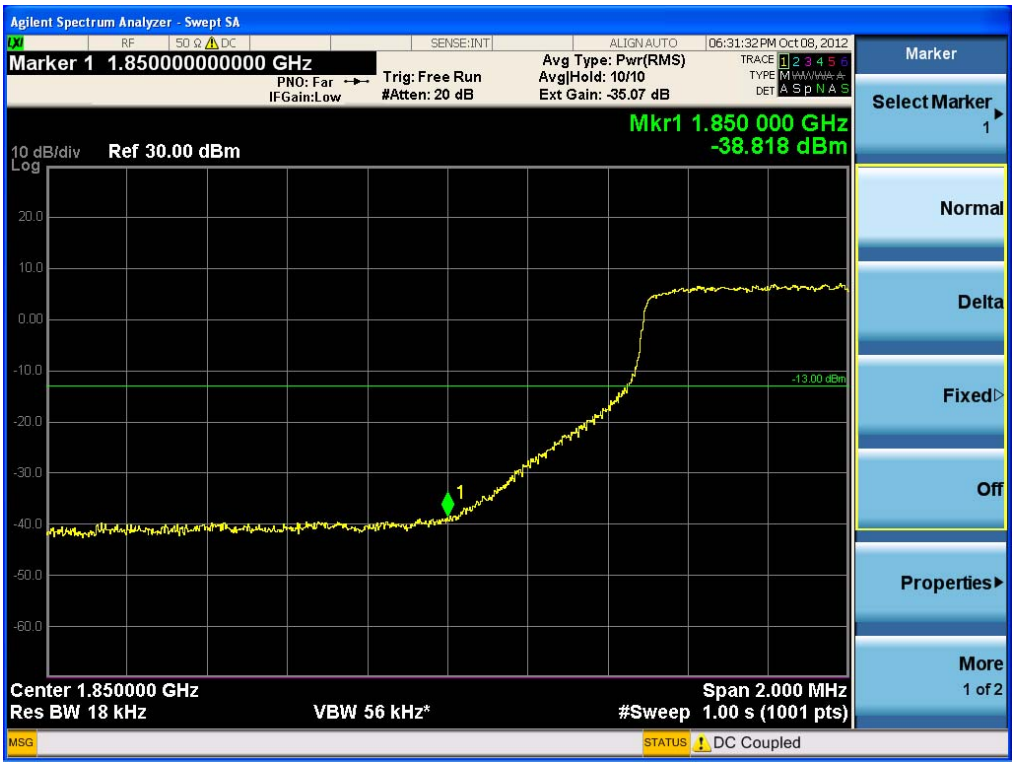
[CDMA Uplink High]

[LTE Uplink Low 5 MHz]



[LTE Uplink High 5 MHz]

[LTE Uplink Low 10 MHz]



[LTE Uplink High 10 MHz]

8. FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be Radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to The transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was

rotated about 360

and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried. out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

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Test Results:

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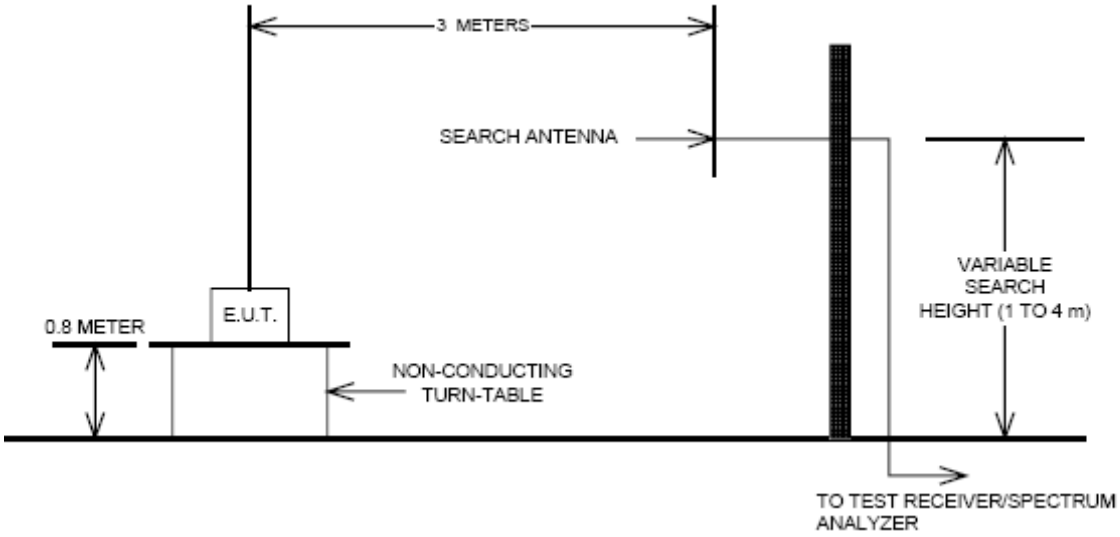
Radiated Spurious Emissions Test Setup



Sample Calculation

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	C.L	SigGen Level [dBm]	Pol.	EIRP (dBm)	Margin (dB)
2167	-73.34	10.57	5.91	-41.13	V	-36.47	23.47

EIRP = Substitude LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

-36.47 = -41.13 + 10.57 - 5.91

1) The EUT mounted on a table on 0.8 meter above test site ground level.

2) During the test, the turn table is rotated and the antenna height is also varied from 1 to 4 meters until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**EIRP**).

Test Result:

[Downlink]

Test Frequency	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	C.L	SigGen Level [dBm]	Pol.	EIRP (dBm)	Margin (dB)
1935	2167	-73.34	10.57	5.91	-41.13	V	-36.47	23.47
	3315	-71.08	11.87	7.41	-38.03	V	-33.57	20.57
1965	1834	-77.59	10.25	5.34	-45.84	V	-40.93	27.93
	2172	-73.21	10.69	5.92	-40.97	V	-36.2	23.2
1985	1640	-77.27	9.52	4.95	-47.3	V	-42.77	29.77
	2154	-71.49	10.57	5.89	-39.4	V	-34.67	21.67

[Uplink]

Test Frequency	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	C.L	SigGen Level [dBm]	Pol.	EIRP (dBm)	Margin (dB)
1852.5	2040	-80.57	10.56	5.7	-49.1	V	-44.21	31.21
	2442	-75.43	10.5	6.37	-41.67	V	-37.54	24.54
1885	2483	-75.89	10.59	6.44	-44.61	V	-40.46	27.46
	3125	-74.62	11.39	7.26	-39.17	V	-35.04	22.04
1905	2160	-77.31	10.57	5.9	-45.8	V	-41.14	28.14
	3800	-73.67	12.57	8.27	-36.58	V	-32.28	19.28

9. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

Test Requirement(s): RSS-GEN 4.7 Transmitter Frequency Stability, RSS-131 4.5 Frequency Stability

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

The reference temperature for transmitters is +20°C, unless specified otherwise in the applicable RSS to the device.

A hand-held device that is only capable of operating using internal batteries shall be tested using a new battery without any further requirement to vary the supply voltage. Alternatively, an external supply voltage can be used and set at the battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency-determining circuit element shall be made subsequent to this initial set-up.

With the transmitter installed in an environment test chamber, the unmodulated carrier frequency shall be measured under the conditions specified below. A sufficient stabilization period at each temperature shall be used prior to each frequency measurement. The following temperatures and supply voltage ranges apply, unless specified otherwise in the applicable RSS.

1. at temperatures of -30°C, +20°C and +50°C, and at the manufacturer's rated supply voltage; and

2. at temperature of +20°C and at ±15 percent of the manufacturer's rated supply voltage.

If the frequency stability limits are only met at a different temperature range than specified in (a), the frequency stability requirement will be deemed met if the transmitter is automatically inhibited from operating outside this different temperature range and, the published equipment operating characteristics are revised to reflect this different temperature range.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained using a frequency counter with gating time set to an appropriately large multiple of symbol periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Test Procedures: Frequency Stability measurements were made at the RF output terminals using a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber.

A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50 °C.

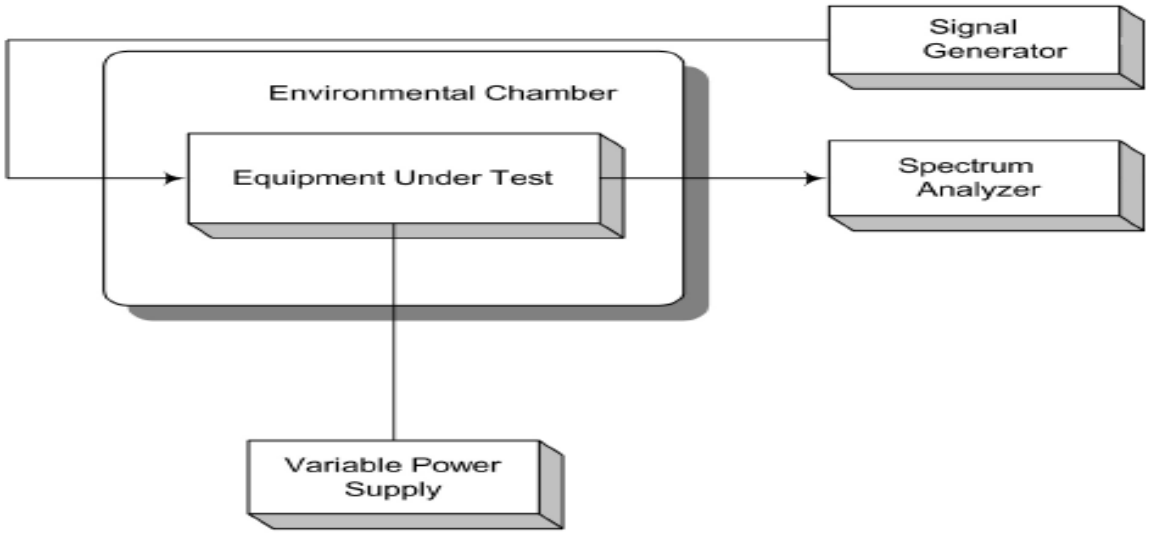
Voltage supplied to EUT is 120 Vac reference temperature was done at 20°C.

The voltage was varied by ± 15 % of nominal

Test Results:

The E.U.T was found in compliance for Frequency Stability and Voltage Test

Test Setup:



Frequency Stability and Voltage Test Results

Reference: 110 Vac at 20°C **Freq.** = 1960 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1959 999 991	-9.4	0.0	0.0000
	-30	1959 999 991	-9.1	0.3	0.0002
	-20	1959 999 991	-9.2	0.2	0.0001
	-10	1959 999 991	-9.3	0.1	0.0001
	0	1959 999 991	-9.1	0.3	0.0002
	+10	1959 999 991	-9.1	0.3	0.0002
	+30	1959 999 991	-8.9	0.5	0.0003
	+40	1959 999 991	-9.2	0.2	0.0001
	+50	1959 999 991	-9.3	0.1	0.0001
115%	+20	1959 999 991	-9.2	0.2	0.0001
85%	+20	1959 999 991	-9.2	0.2	0.0001

Reference: 110 Vac at 20°C **Freq.** = 1880 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1879 999 991	-8.9	0.0	0.0000
	-30	1879 999 991	-8.8	0.1	0.0001
	-20	1879 999 991	-9.0	-0.1	-0.0001
	-10	1879 999 991	-8.8	0.1	0.0001
	0	1879 999 991	-8.8	0.1	0.0001
	+10	1879 999 991	-8.7	0.2	0.0001
	+30	1879 999 991	-8.9	0.0	0.0000
	+40	1879 999 992	-8.2	0.7	0.0004
	+50	1879 999 991	-8.9	0.0	0.0000
115%	+20	1879 999 991	-8.8	0.1	0.0001
85%	+20	1879 999 991	-8.9	0.0	0.0000

10. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm^2)	Averaging time (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

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

2-1 Limit (Down Link)

Max Peak output Power at antenna input terminal	33.11000	dBm
Max Peak output Power at antenna input terminal	2.04644	W
Prediction distance	20.00000	cm
Prediction frequency	1985.00000	MHz
Antenna Gain(typical)	3.00000	dBi
Antenna Gain(numeric)	1.99526	-
Power density at prediction frequency (S)	0.81233	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

2-2 Limit (Up Link)

Max Peak output Power at antenna input terminal	33.10000	dBm
Max Peak output Power at antenna input terminal	2.04174	W
Prediction distance	50.00000	cm
Prediction frequency	1905.00000	MHz
Antenna Gain(typical)	9.00000	dBi
Antenna Gain(numeric)	7.94328	-
Power density at prediction frequency (S)	0.51624	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

3. RESULTS

The power density level at 20 cm is 0.81233 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at Down Link

The power density level at 50 cm is 0.51624 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at Up Link

Warning: In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, it must also have a minimum distance of 50 cm from the body during normal operation.