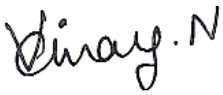
Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**02423360 001**		**Seite 1 von 44** *Page 1 of 44*
Auftraggeber: *Client:*	**Vihaan Networks Ltd.** **21-B, Sector 18, Udyog Vihar** **Gurgaon, Haryana** **India-122015**		
Gegenstand der Prüfung: *Test item:*	**VBTS 850MHz R2, R1.0**		
Bezeichnung: *Identification:*	**VBTS 850MHz R2, R1.0**	**Serien-Nr.:** *Serial No.*	**V2C10SE10511252**
Wareneingangs-Nr.: *Receipt No.:*	**1403015583**	**Eingangsdatum:** *Date of receipt:*	**25.07.2011**
Prüfort: *Testing location:*	**Refer Page 4 of 44 for test facilities**		
Prüfgrundlage: *Test specification:*	**FCC Part 2** **FCC Part 22**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The tests item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** Alpha Tower, Sigma Soft Tech Park, # 7, Whitefield Main Road, Varthur Kodi, Bangalore – 560066, India		

geprüft / *tested by:*			**kontrolliert /** *reviewed by:*		
16.08.2011	Vinay.N Test Engineer		18.08.2011	Varma Kalyan Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges /*Other Aspects:*	**FCC ID : ZO7-VBTS850R2** **Contains FCC ID:SWX-XR5**

Abkürzungen:				***Abbreviations:***			
P(ass)	=	***entspricht Prüfgrundlage***		***P(ass)***	=	***passed***	
F(ail)	=	***entspricht nicht Prüfgrundlage***		***F(ail)***	=	***failed***	
N/A	=	***nicht anwendbar***		***N/A***	=	***not applicable***	
N/T	=	***nicht getestet***		***N/T***	=	***not tested***	

Test Result Summary

Clause	Test Item	Result
2.1046 / 22.913	Maximum Channel Power	Pass
2.1047	Modulation Characteristics	Pass
2.1049	Occupied Bandwidth	Pass
2.1051 / 22.917	Band Edges Compliance	Pass
2.1051 / 22.917	Spurious Emission at Antenna Terminal	Pass
2.1053 / 22.917	Radiated Spurious Emission	Pass
2.1055 / 22.355	Frequency Stability	Pass

Content

List of Test and Measurement Instruments

Wipro Technologies, Bangalore

List of Test and Measurements

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB40	100306	24.03.2012
Hybrid Log Periodic Antenna	TDK	HLP3003C	130334	21.03.2012
Broadband Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9170	9170-344	21.03.2012
Double Ridged Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9120D	9120D-687	21.03.2012
Pre-Amplifier	TDK-RFSolution	PA-02	100008	15.02.2012
Digital Radio Communication Tester	Rohde & Schwarz	CMU 300	100342	07.07.2012
Spectrum Analyzer	Agilent Technologies	E4407B	US41192772	27.01.2012

Testing Facilities

1) Wipro Technologies
Survey No. 70, 77, 78 / 8A, Dodda Kannelli,
Sarjapur Road, Bangalore – 560 035
India

General Product Information

Product Function and Intended Use

A BTS provides coverage for a cell, which is usually located at the centre of a cell. A BTS provides the connectivity between the network and the mobile station via the Air-interface using the RF frequencies. The VNL VBTS-850 with TU in built in DMB card, RU and power system corresponds to BTS/Cell-Site in 850MHz GSM band. The VBTS shall have smaller coverage, and it shall be with VPA/DLNA.

Ratings and System Details

Operating Frequency	869 MHz – 894 MHz
No. of channel	124
Channel Spacing	200 kHz
Transmitted Power	+33.08 dBm
Modulation	GMSK
Antenna Type	Omni Directional
Antenna Gain	~10 dBi
Supply Voltage	24V DC
Dimensions	674mm x 422.3mm x 223.3mm
Environmental	Storage: -65 to +125degrees C , Operational: –40 to +60 degrees C.

Test Conditions:

24 V Battery Supply

Environmental conditions:

Temperature: +23 º C **RH:** 62%

Operation Descriptions

In case of VBTS-850, RU along with DMB is inside the VBTS unit. In this case Abis link will be on the air, so external RU and TU are needed to extract Ethernet packets and then to generate standard E1 traffic respectively, which is then to be fed into the BSC Simulator.

The base band system is divided in three parts: Main block, and two slaves block. The main block consists of an ARM9 based processor (Freescale i.MX27L) responsible for all common tasks in the system. The two slaves block is used to control of the TRX's (one block for each TRX). The slave blocks consists of two (Analog Devices) Blackfin BF547 processors each (total of four Blackfins).For each TRX there are two slave CPU's. The SPI interfaces used for control of the radio parts are only connected to one of these slave CPU's. The interfaces used for data transmission are connected to both slave CPU's. The received data from each TRX are connected to all four slave CPU's.There are a total of two Tx DACs in the system, one on each RTM. The DAC uses a parallel interface for data transfer. This interface is connected to each of the Blackfin CPU's controlling one TRX.There are a total of two Rx ADCs in the system, one on each RTM

Test Set-up and Operation Mode

Principle of Configuration Selection

The test was performed under continuous transmission to obtain the maximum emissions.

Test Operation and Test Software

Console Computer was used to enable the continuous transmission and changing channels (low/mid/high) on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment

The EUT was tested together with the following additional accessory:

- Console computer used to set the test configuration (channel and power level)

Countermeasures to achieve EMC Compliance

- None

Table of carrier frequencies

Frequency Band	Channel No.	Frequency (MHz)
869 MHz – 894 MHz	128	869.2
	129	869.4
	130	869.6
	. . . . . .	. . . . . .
	249	893.4
	250	893.6
	251	893.8

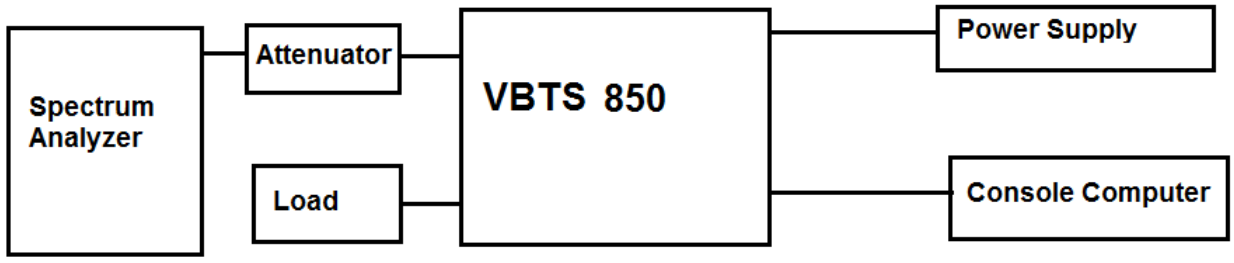
Test Results

Maximum Channel Power **Section 2.1046 / 22.913**
Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1046 and part 22.913
Test Method	TIA-603-C:2004.
Measured at	Antenna Connector
Test Configuration	Transmitter 1 – Channel Low, Mid and High Transmitter 2 – Channel Low, Mid and High

Test Method:

The EUT was connected to the Spectrum Analyzer via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the Maximum Channel Power of the Base Station by the Spectrum Analyzer.



Limits:

The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts

Maximum Output Power (Watts)	< 500 Watts
Maximum Output Power (dBm)	< 57 dBm

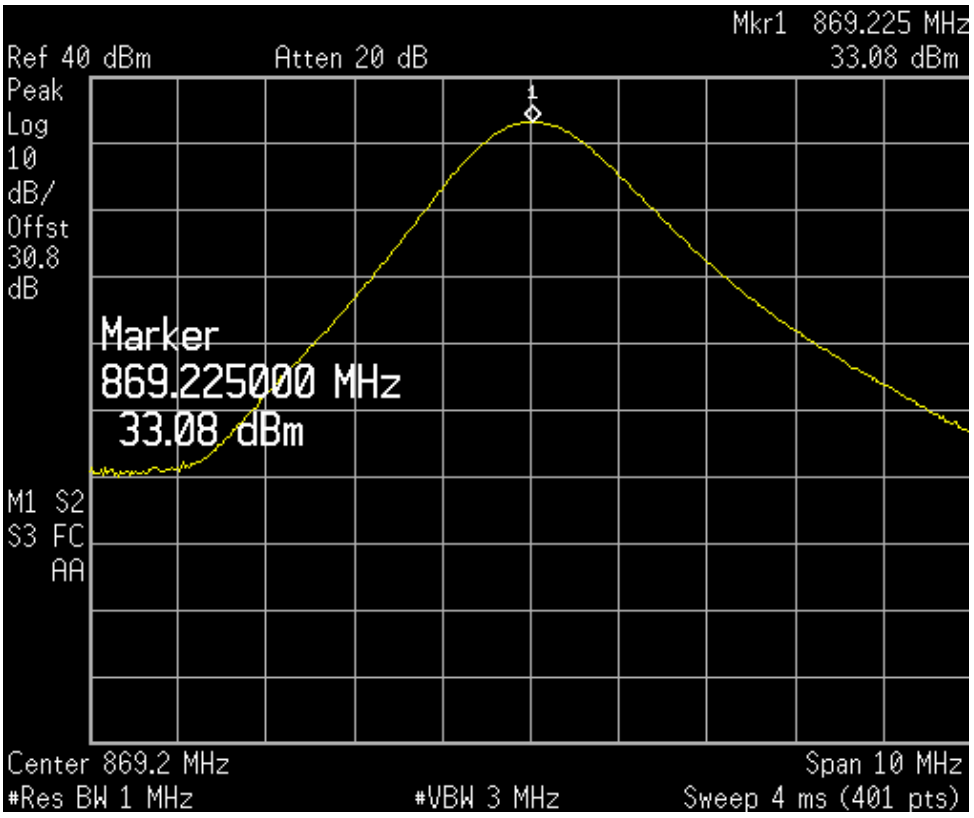
Test Conditions:

Supply Voltage: 24V DC
Temperature: 25° C

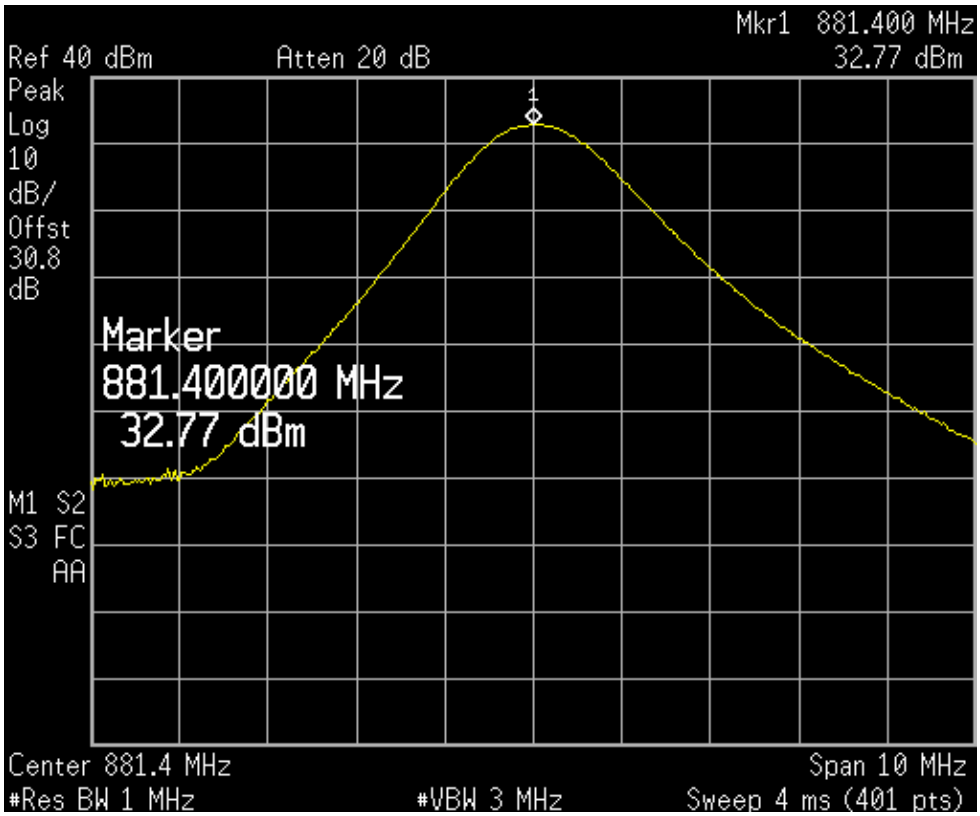
Test Results:

Transmitter 1

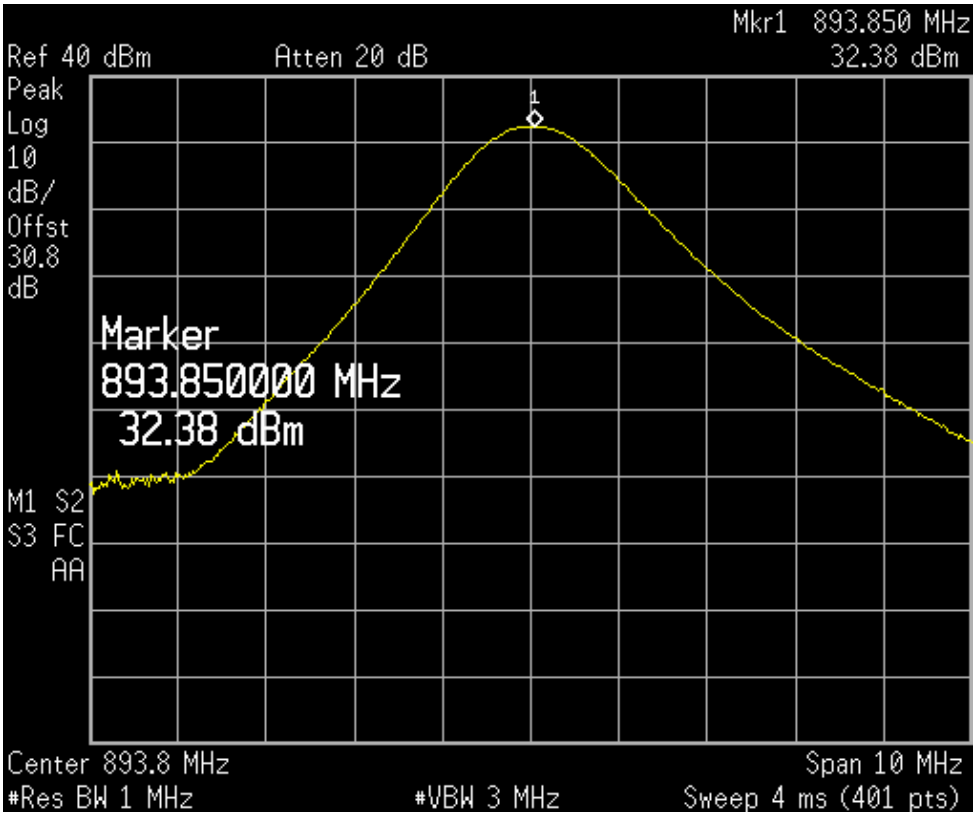
Channel Number	Channel Frequency (MHz)	Measured RF Output power (dBm)	Limit (dBm)	Margin (dB)
128	869.2	33.08	57	-23.92
189	881.4	32.77	57	-24.23
251	893.8	32.38	57	-24.62



Channel: 128



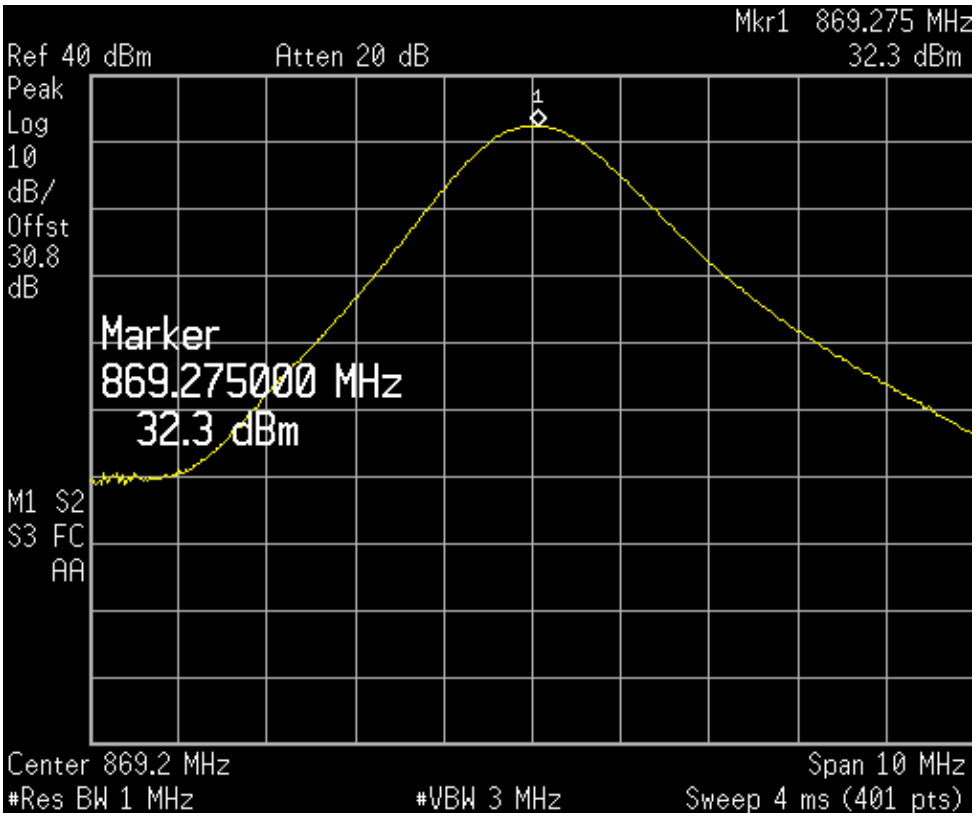
Channel: 189



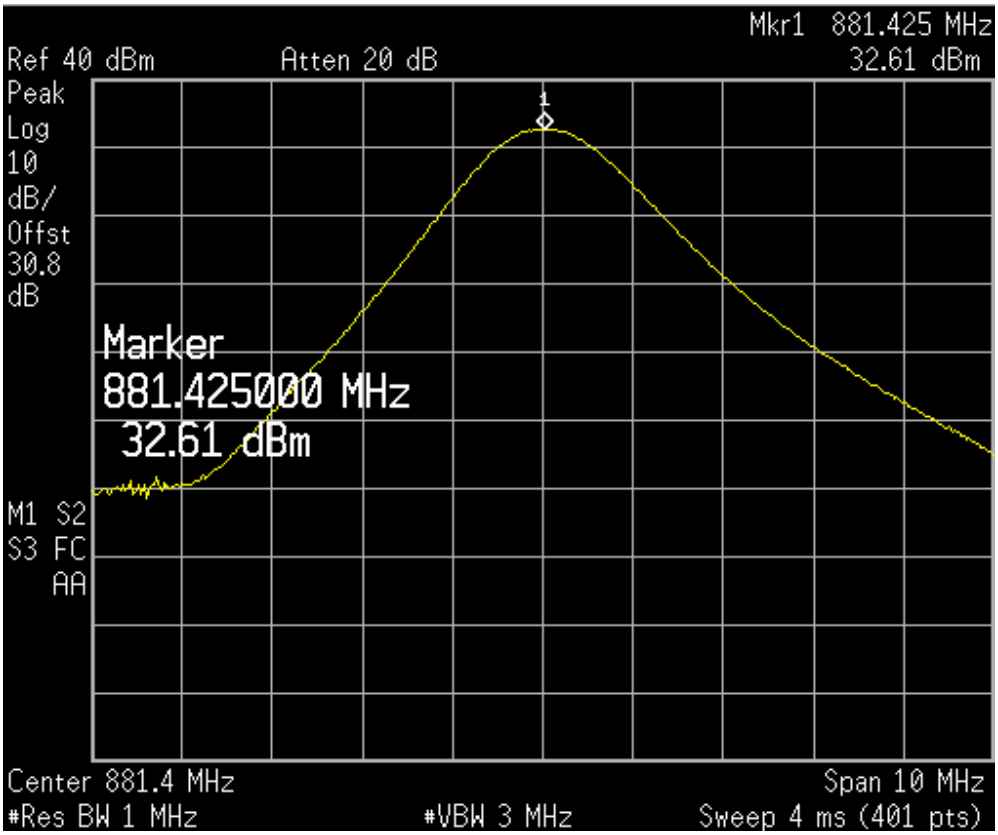
Channel: 251

Transmitter 2

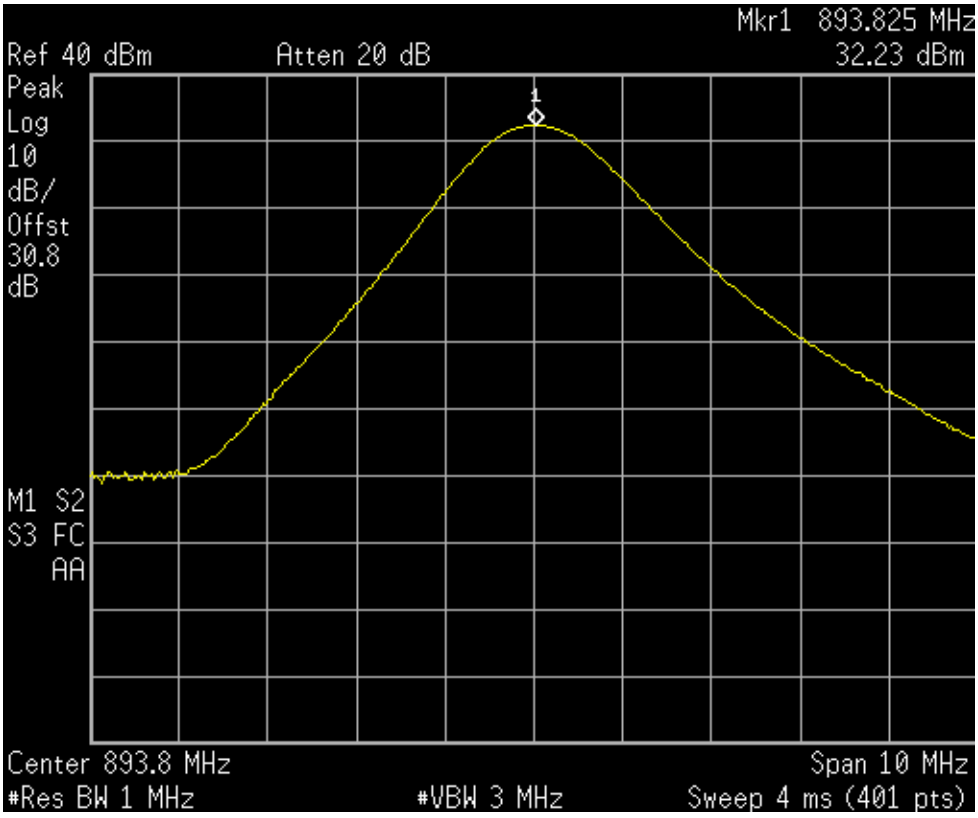
Channel Number	Channel Frequency (MHz)	Measured RF Output power (dBm)	Limit (dBm)	Margin (dB)
128	869.2	32.30	57	-24.70
189	881.4	32.61	57	-24.39
251	893.8	32.23	57	-24.77



Channel: 128



Channel: 189



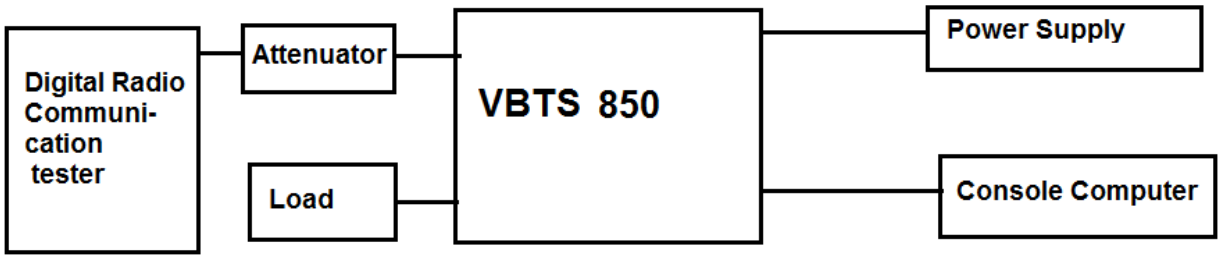
Channel: 251

Modulation Characteristics **Section 2.1047**
Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1047 and part 22
Test Method	TIA-603-C: 2004.
Measured at	Antenna Connector
Test Configuration	Transmitter 1 – Channel Mid Transmitter 2 – Channel Mid

Test Method:

The EUT was connected to the Digital Radio Communication tester via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the Modulation Characteristics of the Base Station by the Digital Radio Communication tester.



Limits:

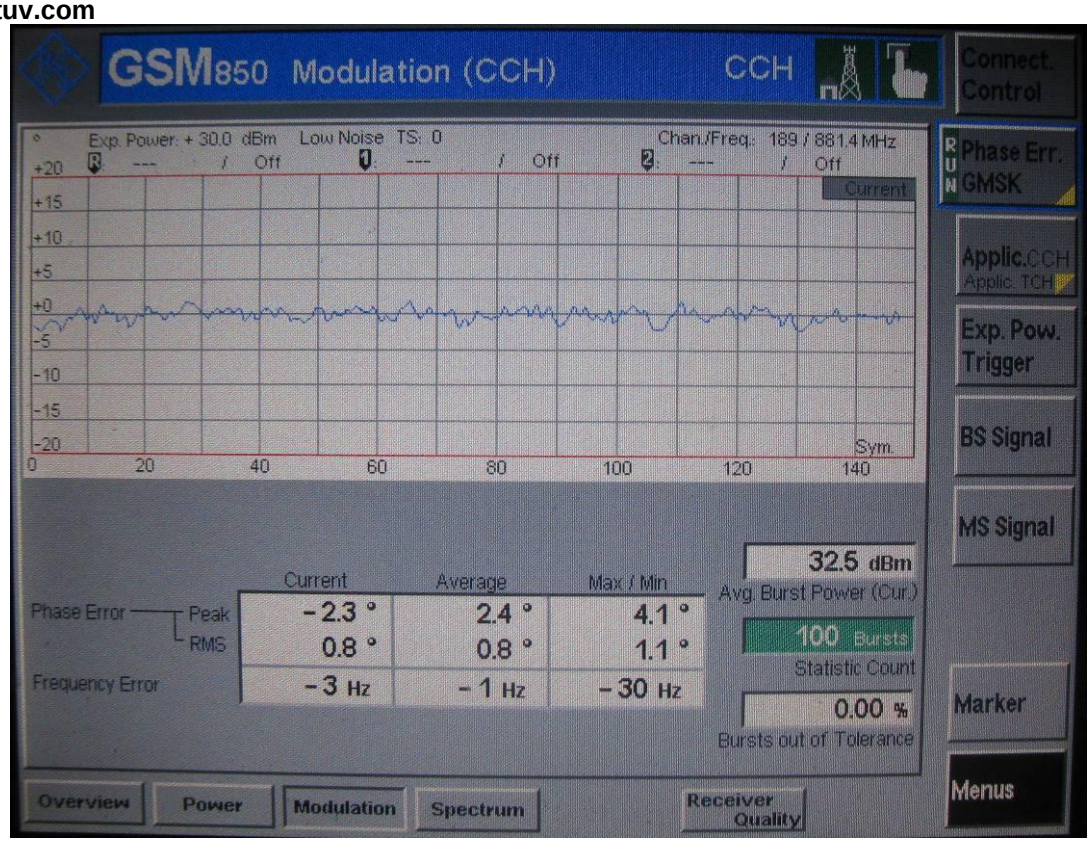
No specific modulation characteristics requirement limits in part 2.1047 and part 22 subpart H.

Limits According to 3GPP TS 11.21

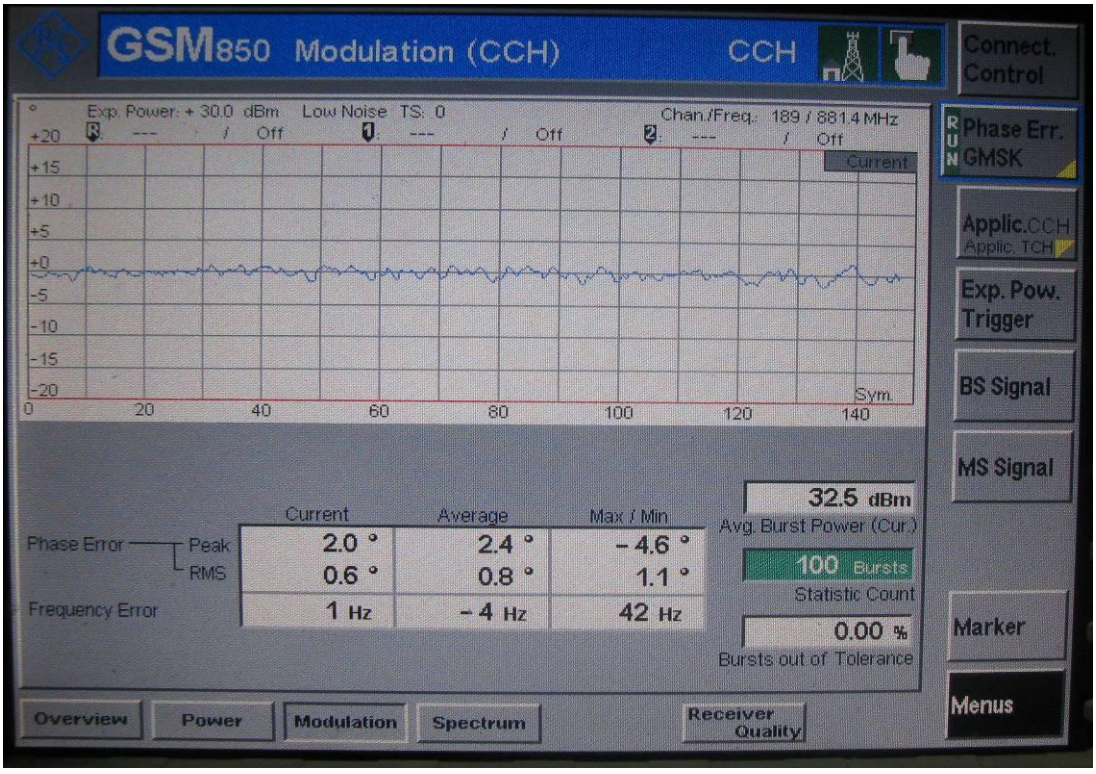
Modulation: GMSK	rms phase error (°)	<5
	peak phase error (°)	<20

Test Result:

Test Conditions	Modulation GMSK			
	Measured		Limit	
	Phase Error (°)		Phase Error (°)	
	° rms	peak °	rms °	° peak
Transmitter 1 Channel 189 (889.4 MHz)	1.1	|4.1|	<5	<20
Transmitter 2 Channel 189 (889.4 MHz)	1.1	|-4.6|	<5	<20



Transmitter 1: Channel 189



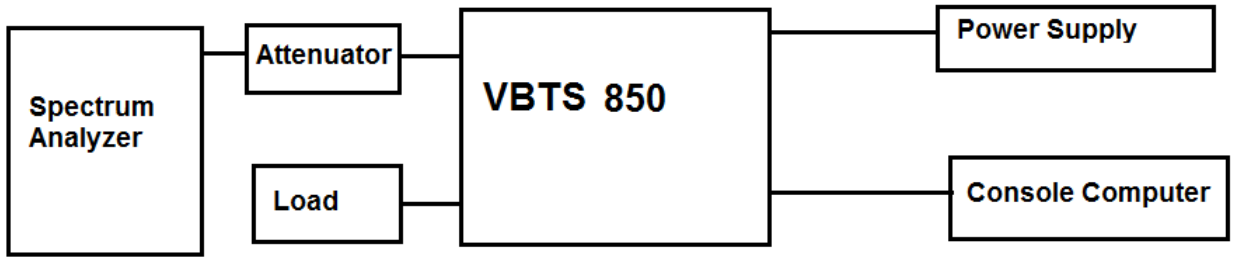
Transmitter 2: Channel 189

Occupied Bandwidth **Section 2.1049**
Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1049
Test Method	TIA-603-C: 2004.
Measured at	Antenna Connector
Test Configuration	Transmitter 1 – Channel Low, Mid and High Transmitter 2 – Channel Low, Mid and High

Test Method:

The EUT was connected to the Spectrum Analyzer via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the Occupied Bandwidth of the Base Station by the Spectrum Analyzer.



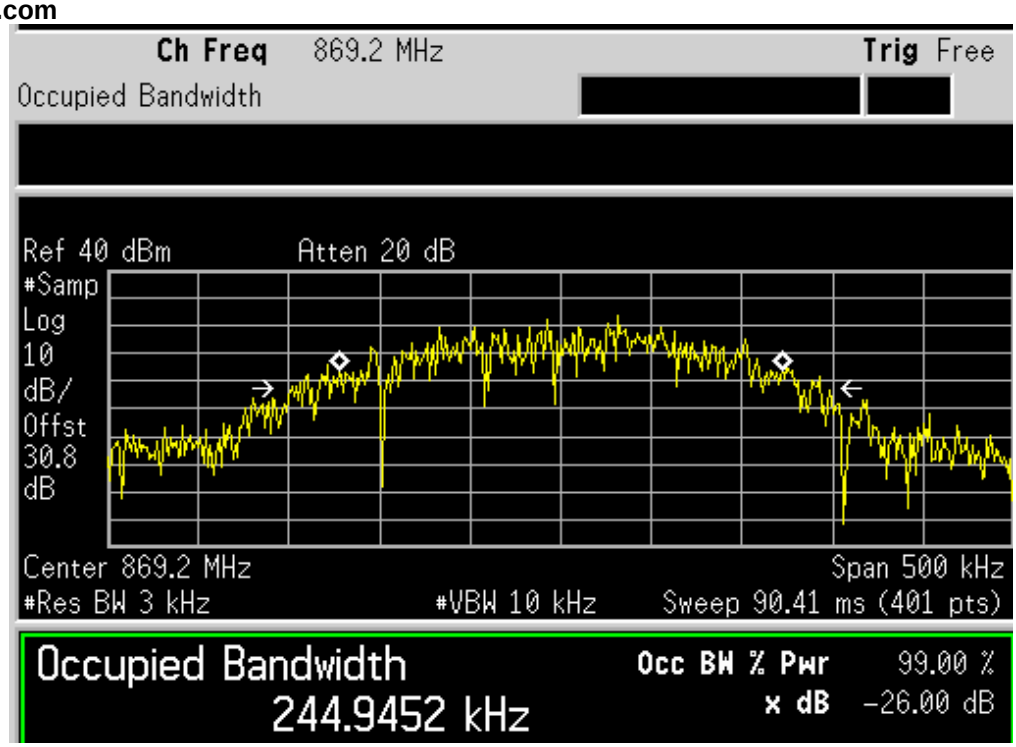
Limits:

No specific occupied bandwidth requirement in FCC part 22 subpart H, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

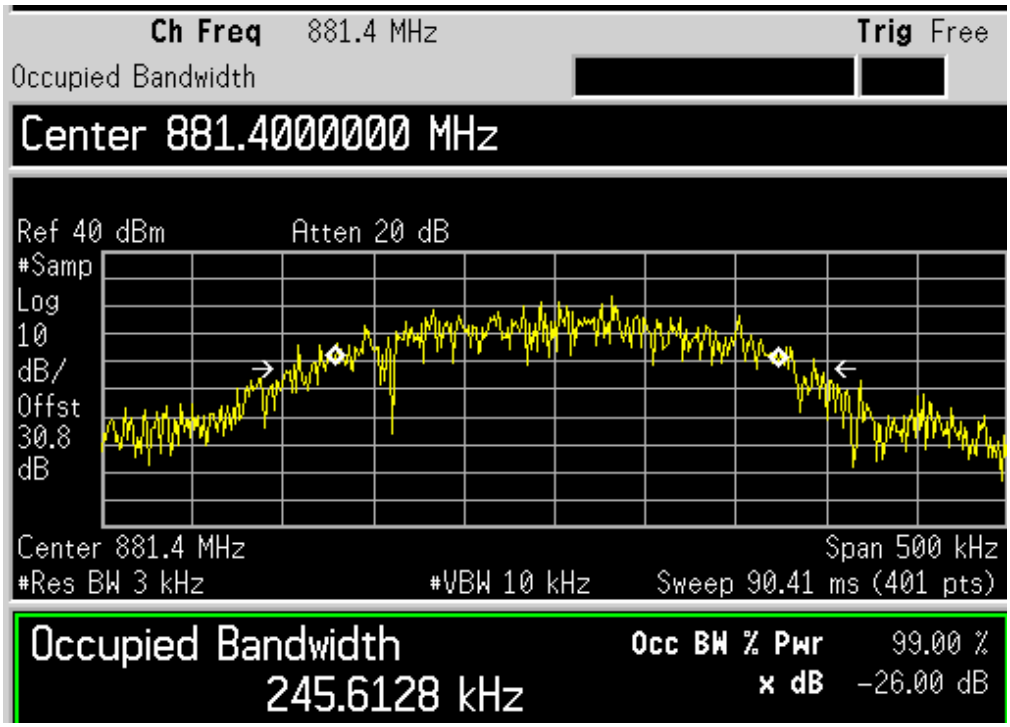
Test Results:

Transmitter 1

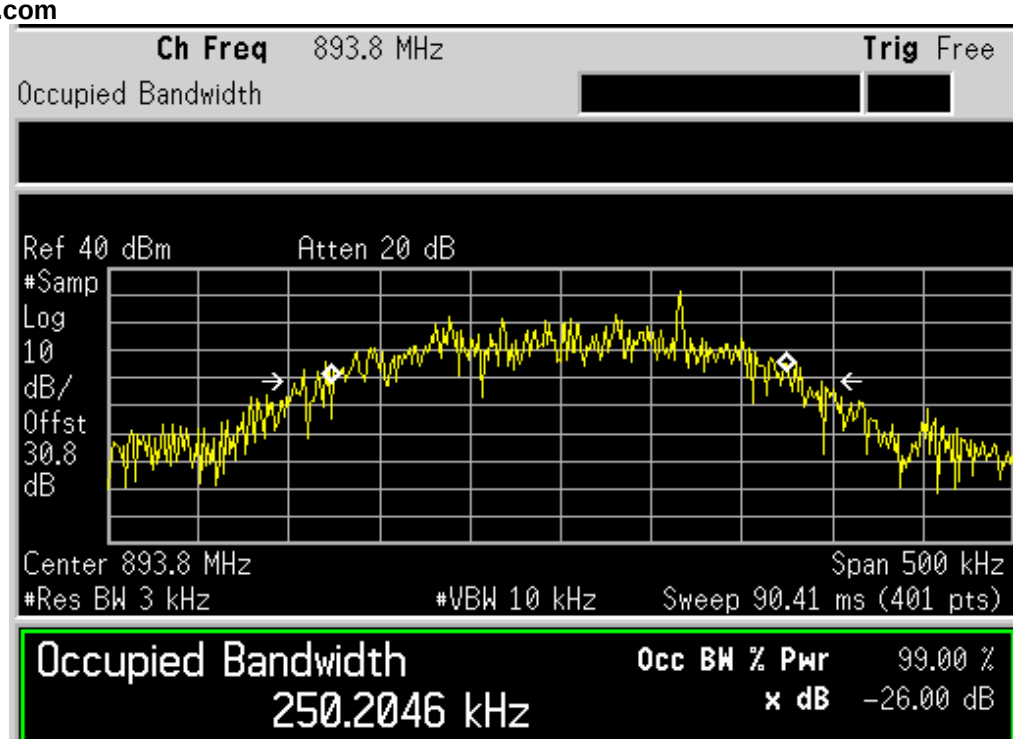
Channel	Channel Frequency (MHz)	Occupied Bandwidth (kHz)
128	869.2	244.94
189	881.4	245.61
251	893.8	250.20



Channel: 128



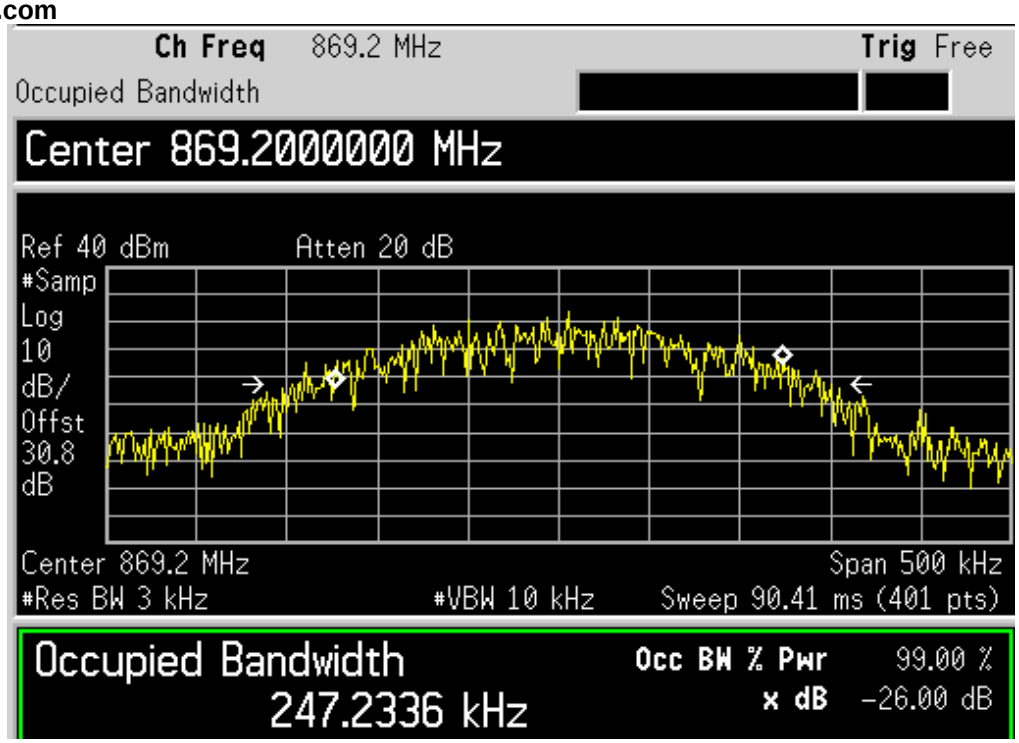
Channel: 189



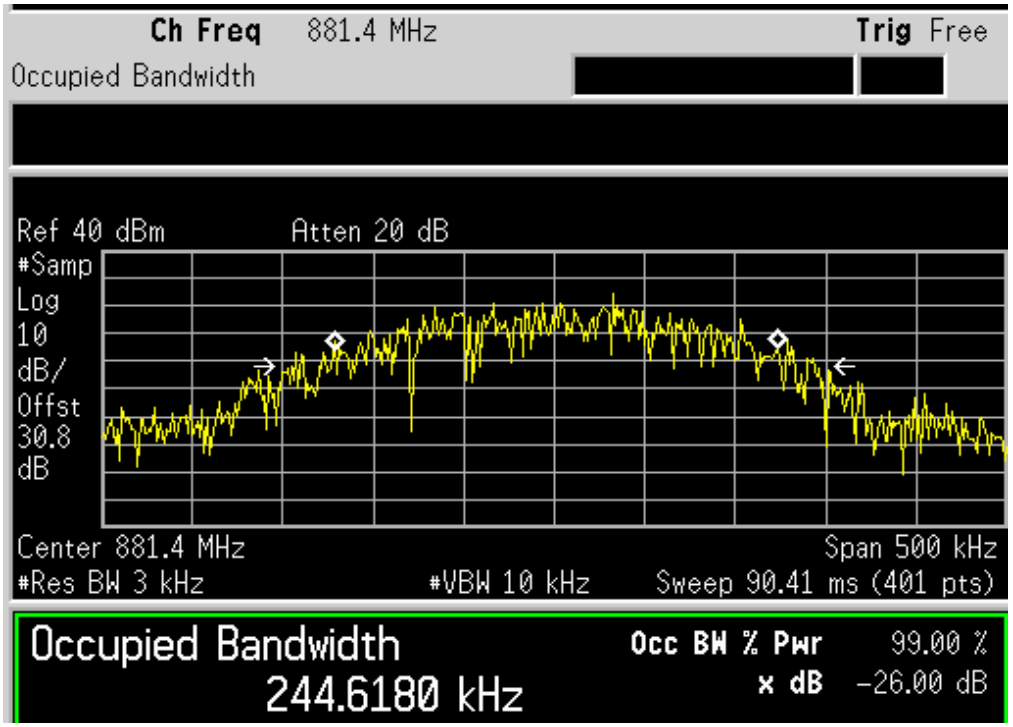
Channel: 251

Transmitter 1

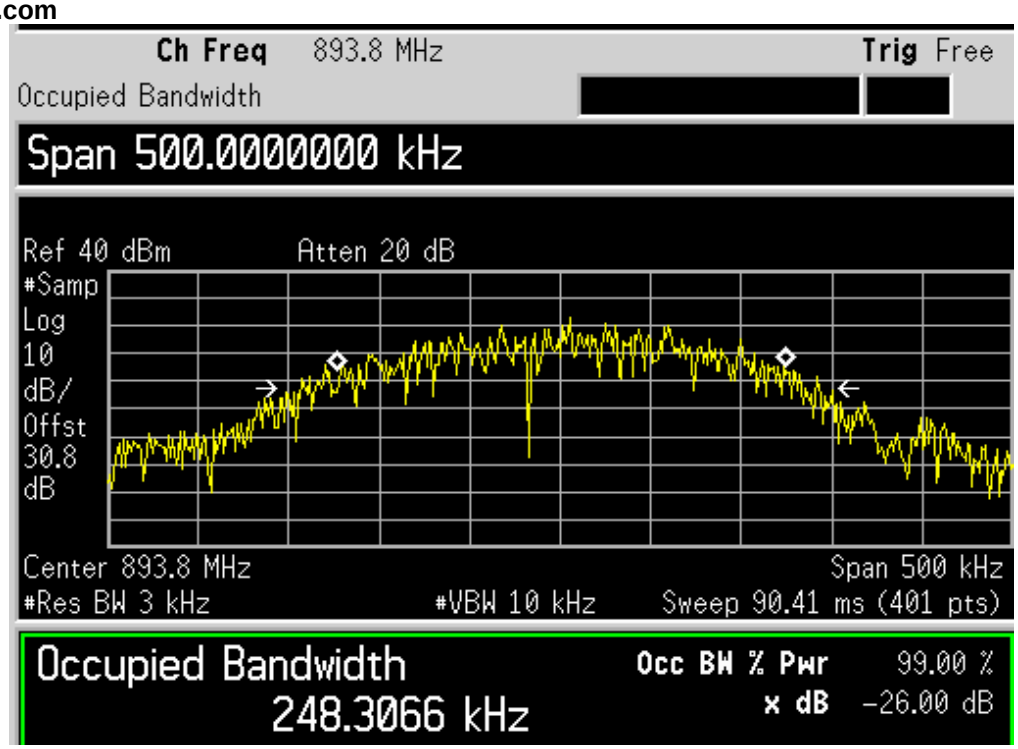
Channel	Channel Frequency (MHz)	Occupied Bandwidth (kHz)
128	869.2	247.23
189	881.4	244.61
251	893.8	248.30



Channel: 128



Channel: 189


Ch Freq 893.8 MHz
Trig Free
Occupied Bandwidth
Span 500.0000000 kHz
Ref 40 dBm
Atten 20 dB
#Samp
Log
10
dB/
Offst
30.8
dB
Center 893.8 MHz
Span 500 kHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 90.41 ms (401 pts)
Occupied Bandwidth
248.3066 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Channel: 251

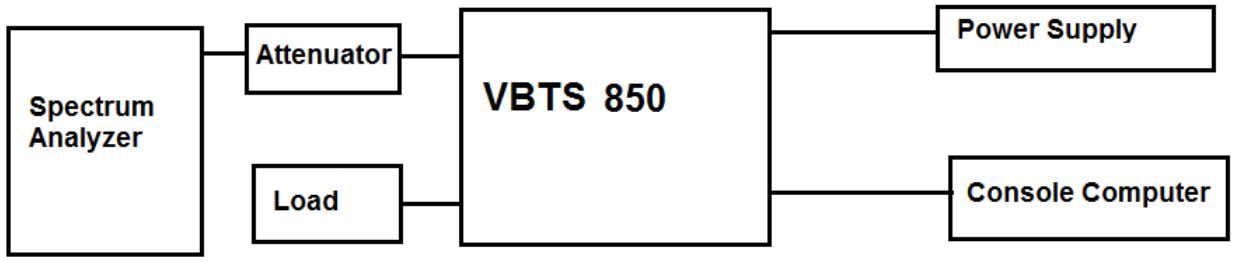
Band-edge Compliance **Section 2.1051 and 22.917**

Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1051 and Part 22.917
Test Method	TIA-603-C: 2004.
Measured at	Antenna Connector
Test Configuration	Transmitter 1 – Channel Low and High Transmitter 2 – Channel Low High

Test Method:

The EUT was connected to the Spectrum Analyzer via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the power at band edge of the Base Station by the Spectrum Analyzer.



Limits:

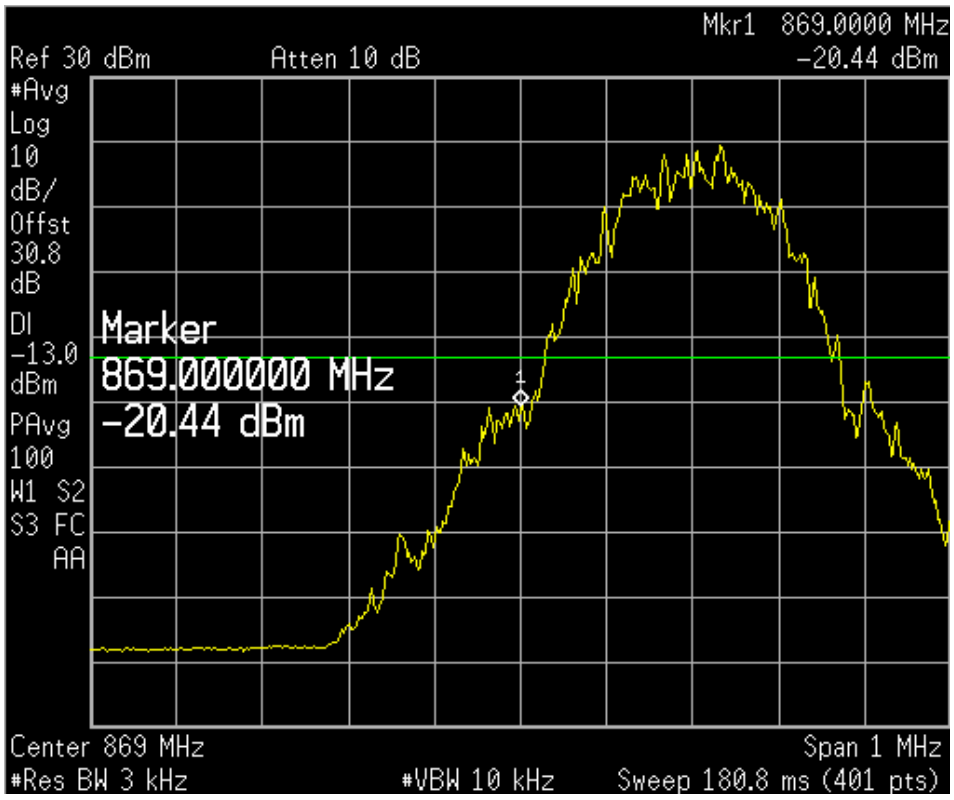
Compliance with FCC part 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Limit	P-(43+10$\log_{10}$P)=10$\log_{10}$(1000P)-43-10$\log_{10}$P=30-43=-13 dBm

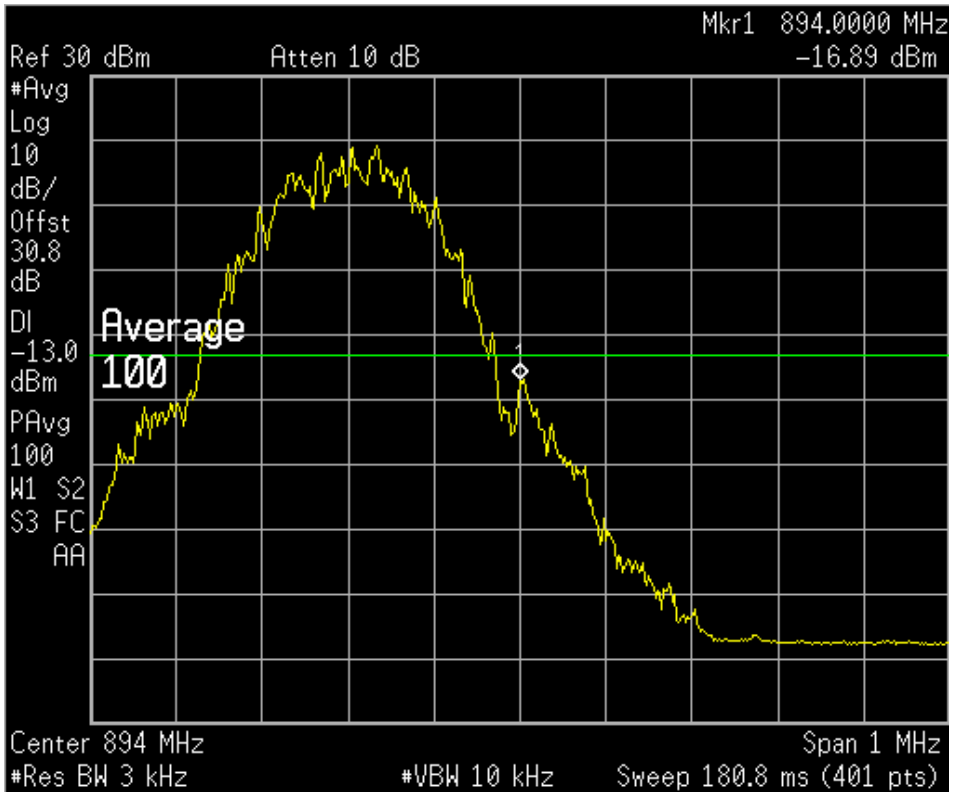
Test Result:

Transmitter 1

Channel	Fundamental Frequency (MHz)	Measured Emission (dBm)	Limit (dBm)
128	869.2	-20.44	-13
251	893.8	-16.89	-13



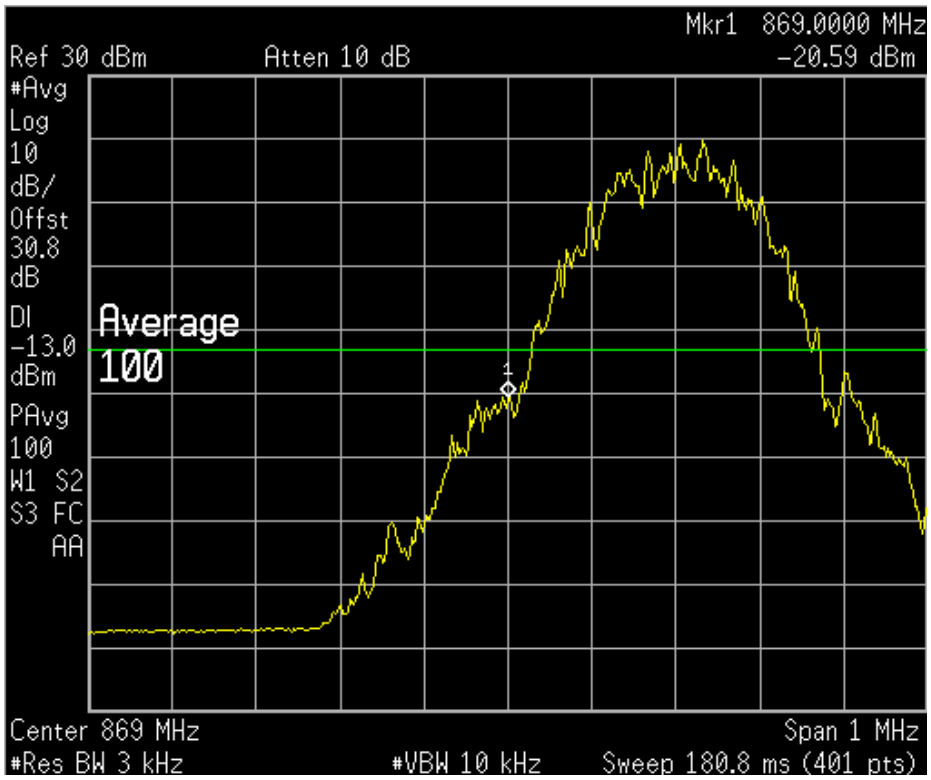
Channel 128



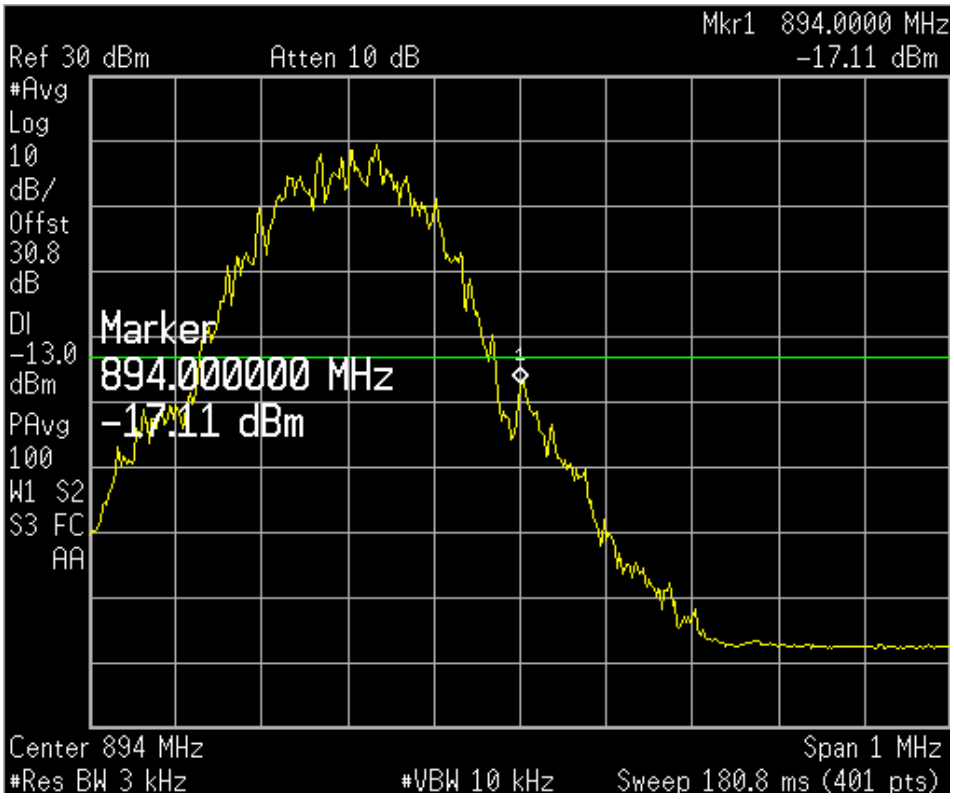
Channel 251

Transmitter 2

Channel	Fundamental Frequency (MHz)	Measured Emission (dBm)	Limit (dBm)
128	869.2	-20.59	-13
251	893.8	-17.11	-13



Channel 128


Mkr1 894.0000 MHz
Ref 30 dBm
Atten 10 dB
-17.11 dBm
#Avg
Log
10
dB/
Offst
30.8
dB
Dl
-13.0
dBm
PAvg
100
W1 S2
S3 FC
AA
Marker
894.000000 MHz
-17.11 dBm
Center 894 MHz
Span 1 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 180.8 ms (401 pts)

Channel 251

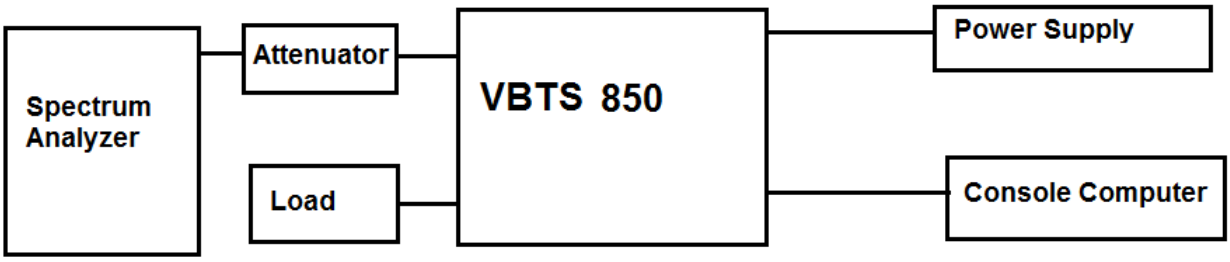
Spurious Radiated Emissions at antenna terminals **Section 2.2051 and 22.917**

Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1051 and Part 22.917
Test Method	TIA-603-C: 2004.
Measured at	Antenna Connector
Test Configuration	Transmitter 1 – Channel Low, Mid and High Transmitter 2 – Channel Low, Mid and High

Test Method

The EUT was connected to the Spectrum Analyzer via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the power at spurious emissions of the Base Station by the Spectrum Analyzer.



According to 47CFR part 22.917, this defined the measurement bandwidth of as following:

Measurement bandwidth (RBW) for 9 kHz up to 10th harmonic included: 100 kHz;

Limit:

Compliance with FCC part 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

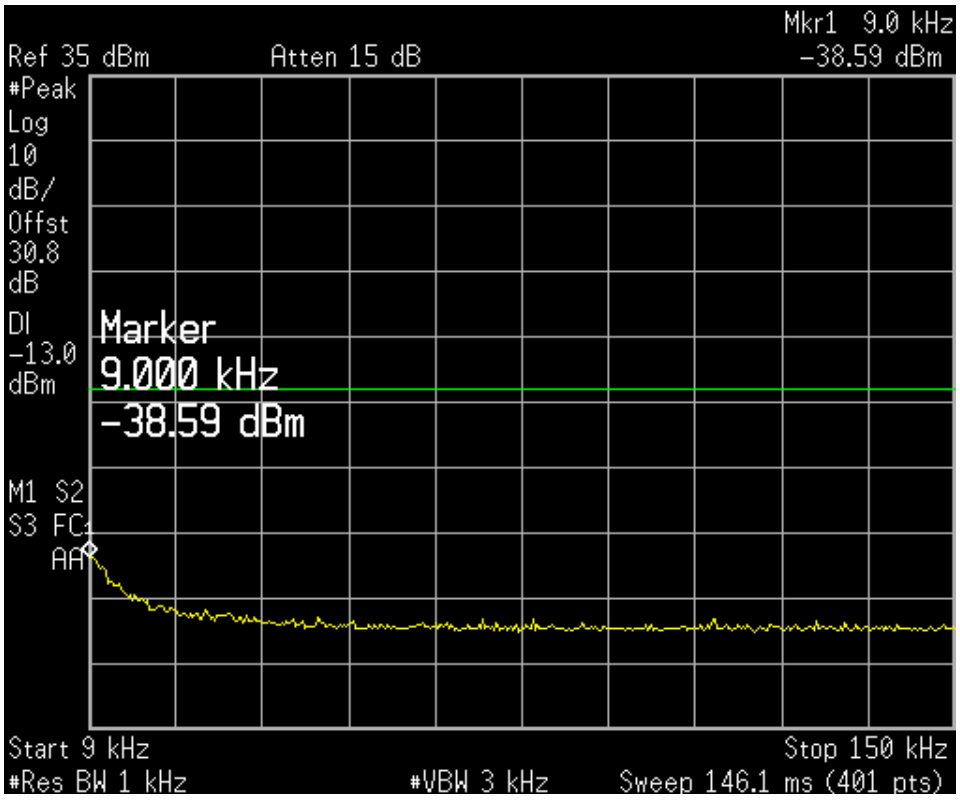
Limit	P-(43+10$\log_{10}$P)=10$\log_{10}$(1000P)-43-10$\log_{10}$P=30-43=-13 dBm

Test Results

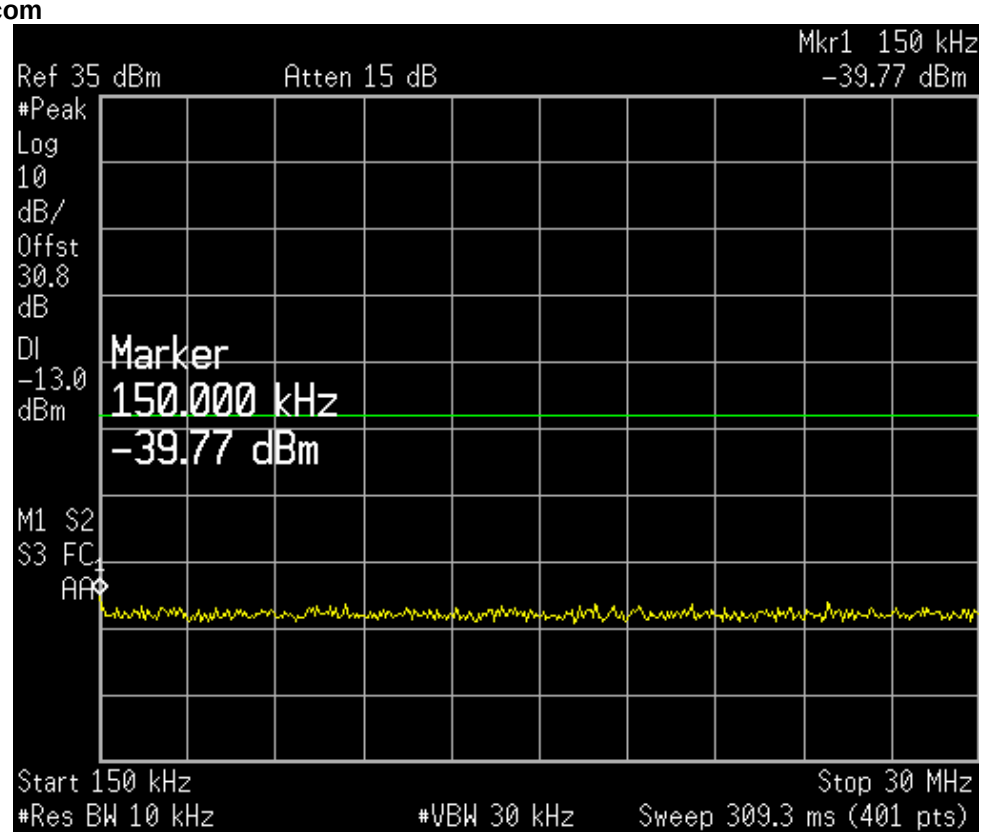
Transmitter 1

Channel	Channel Frequency (MHz)	Test Frequency	Measured Maximum Emission (dBm)	Limit (dBm)
128	869.2	9 kHz – 10 GHz	-20.59	-13
189	881.4	9 kHz – 10 GHz	-19.53	-13
251	893.8	9 kHz – 10 GHz	-19.13	-13

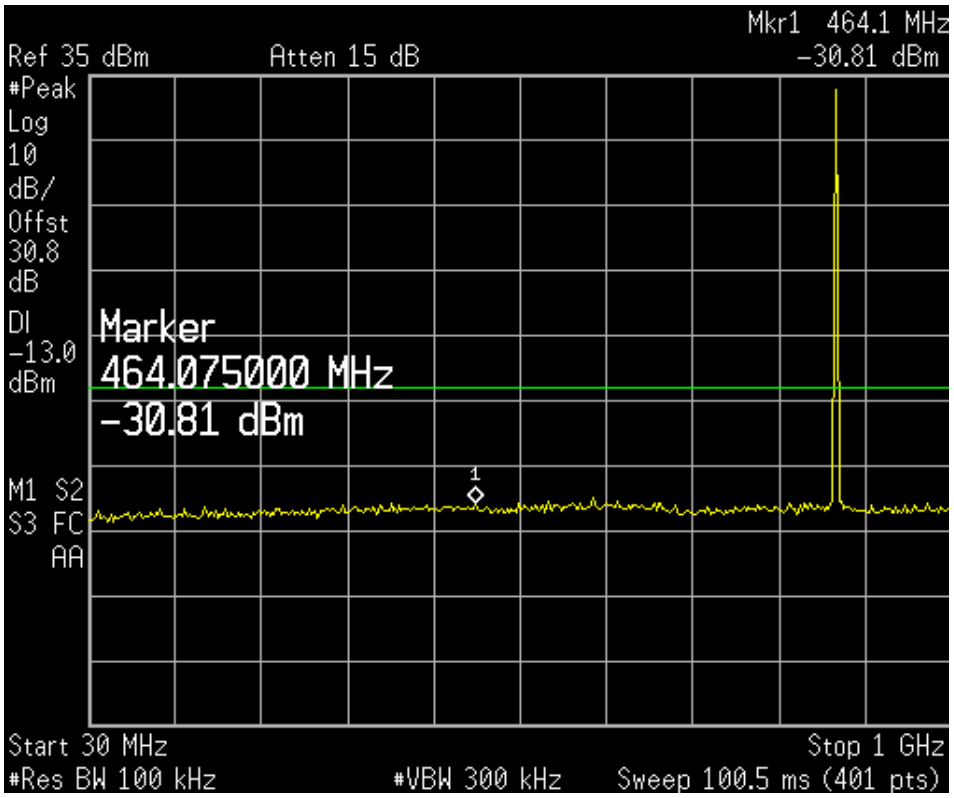
Channel low



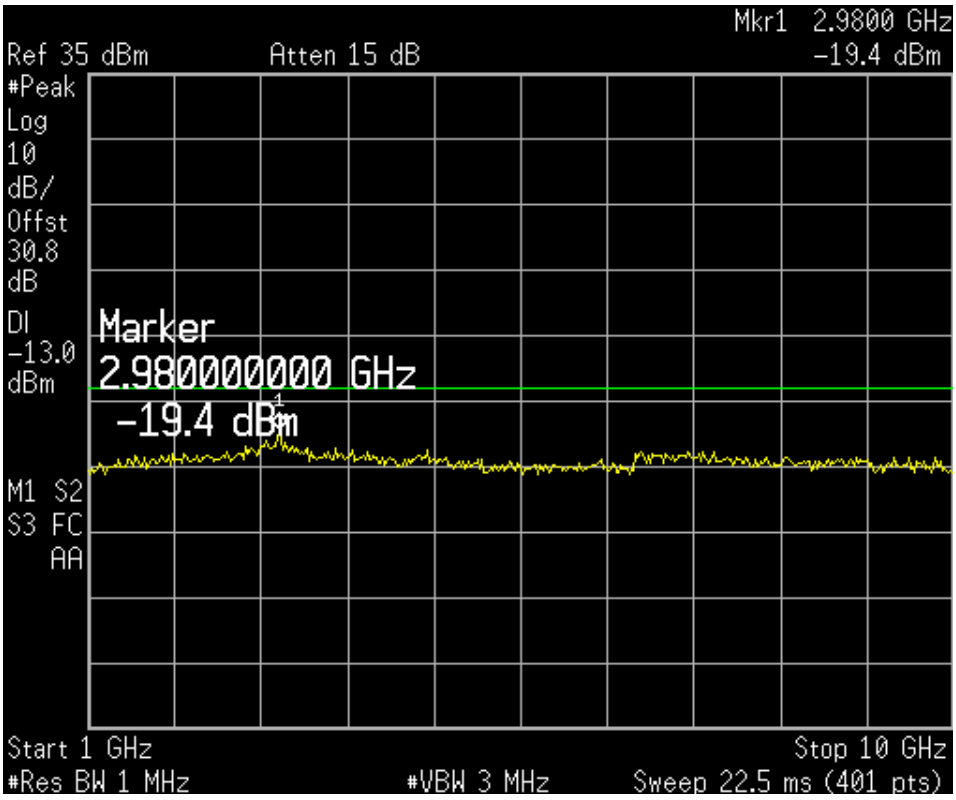
9 kHz to 150 kHz



150 kHz to 30 MHz

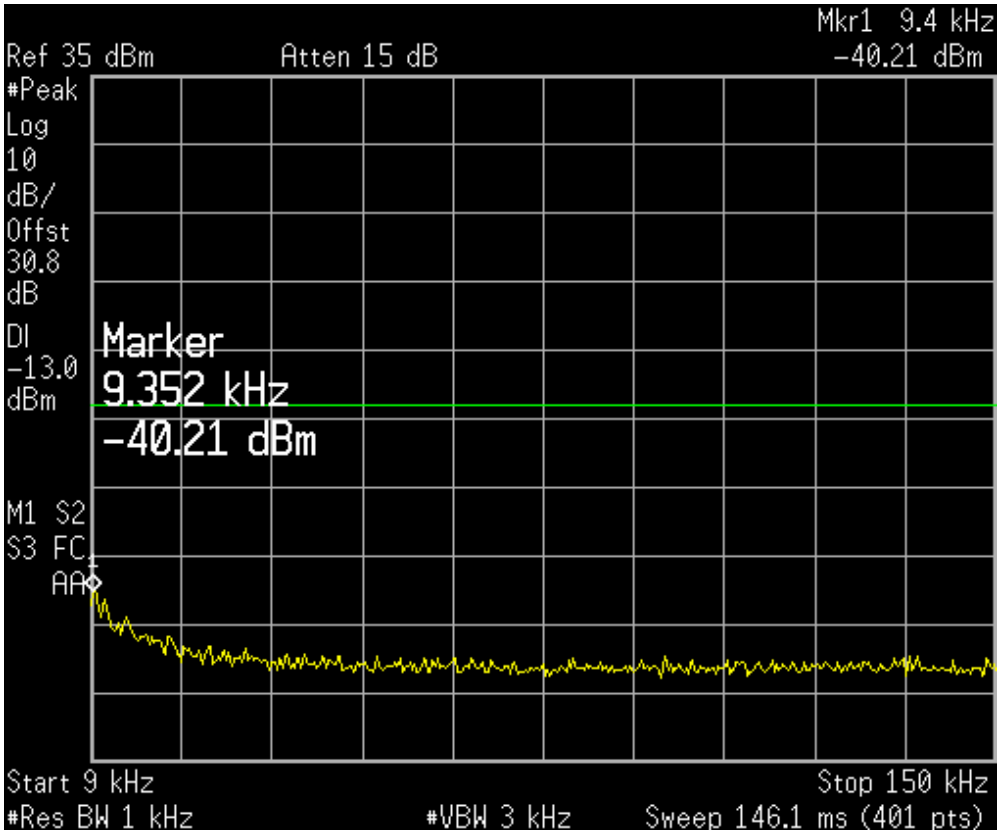


30 MHz to 1 GHz

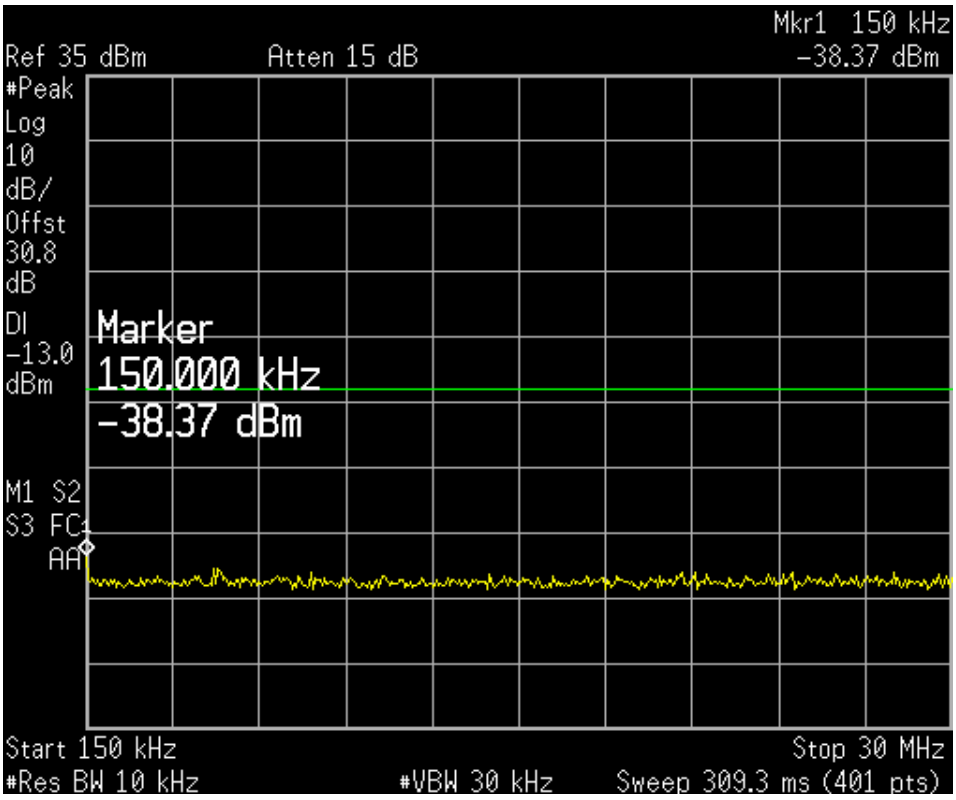


1GHz to 10 GHz

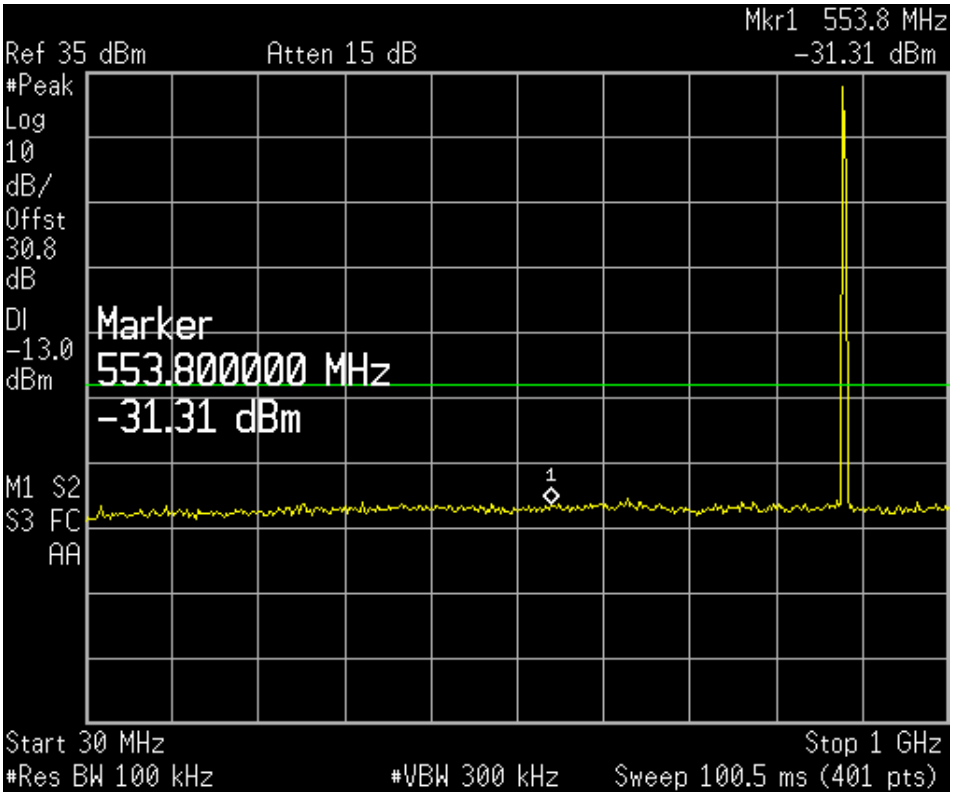
Channel Mid



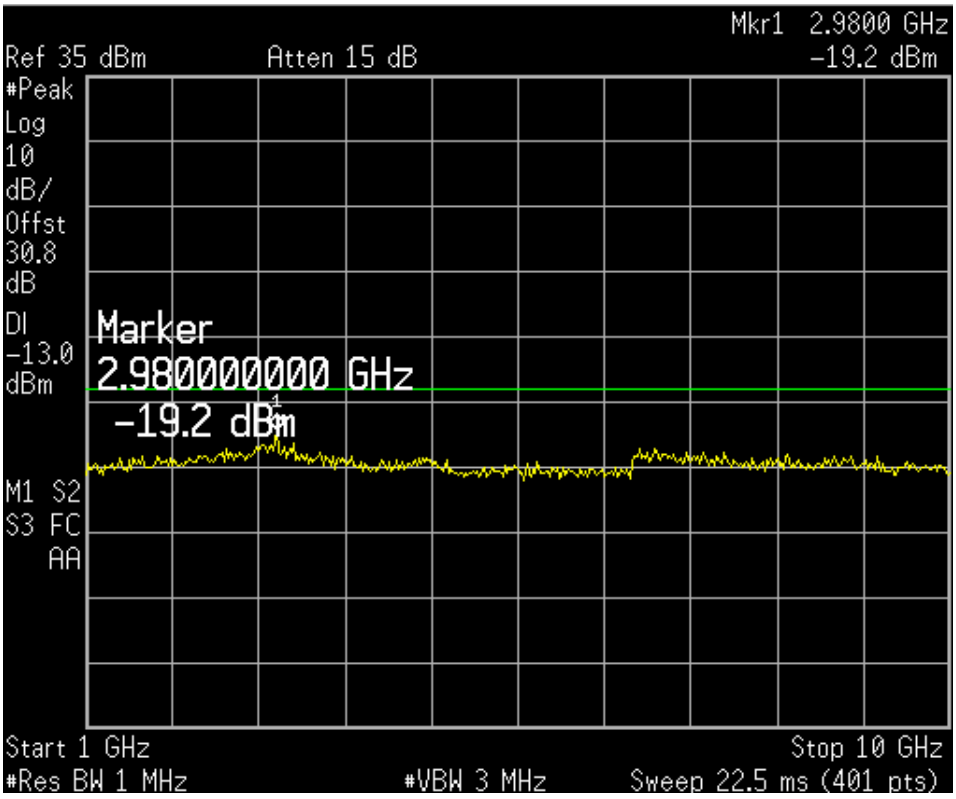
9 kHz to 150 kHz



150 kHz to 30 MHz

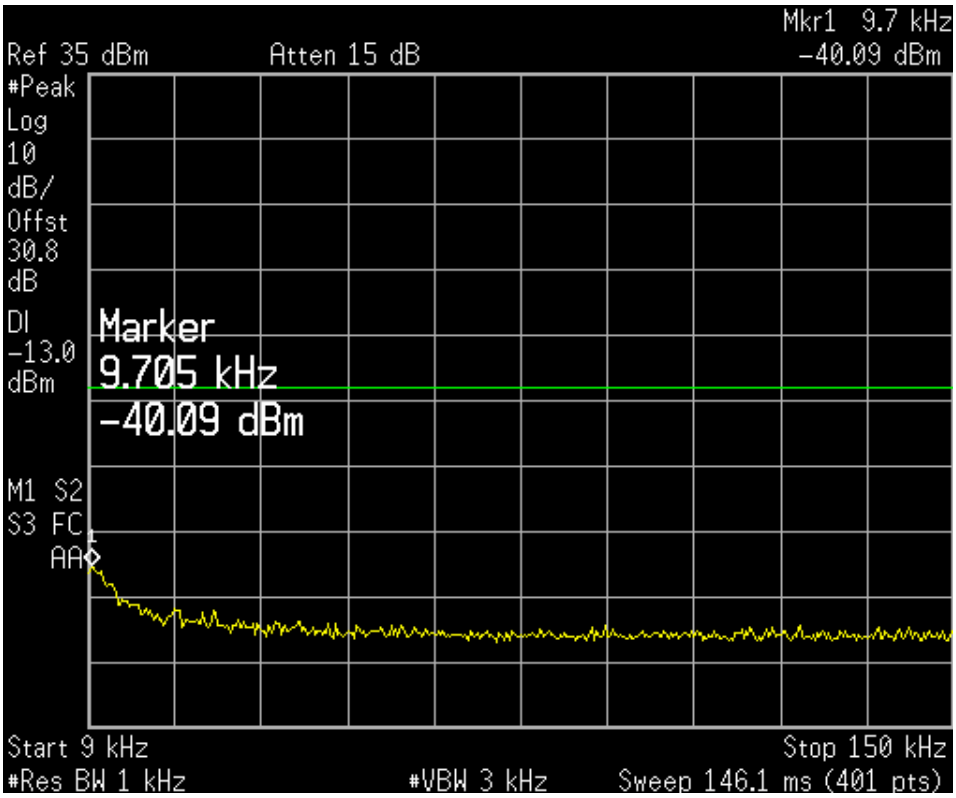


30 MHz to 1 GHz

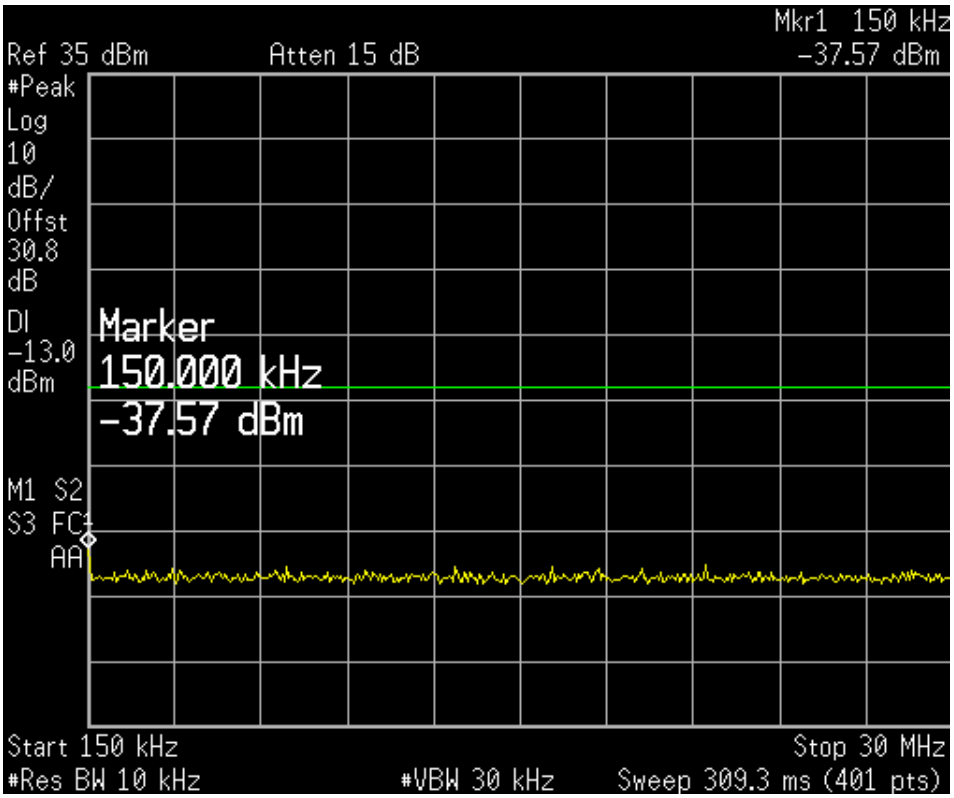


1GHz to 10 GHz

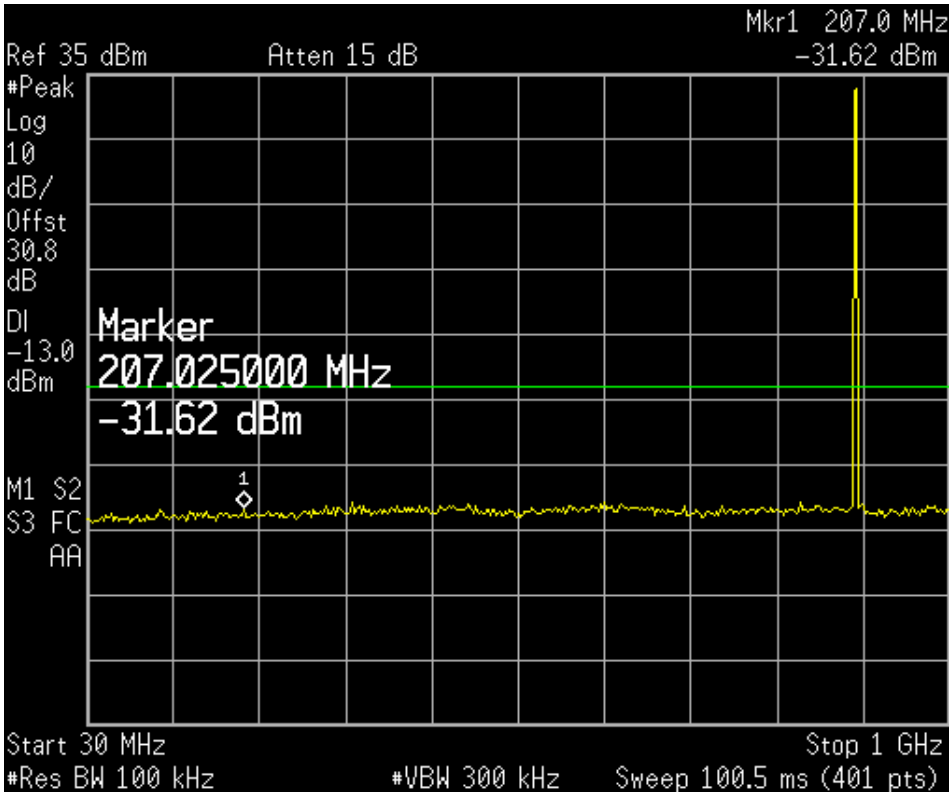
Channel High



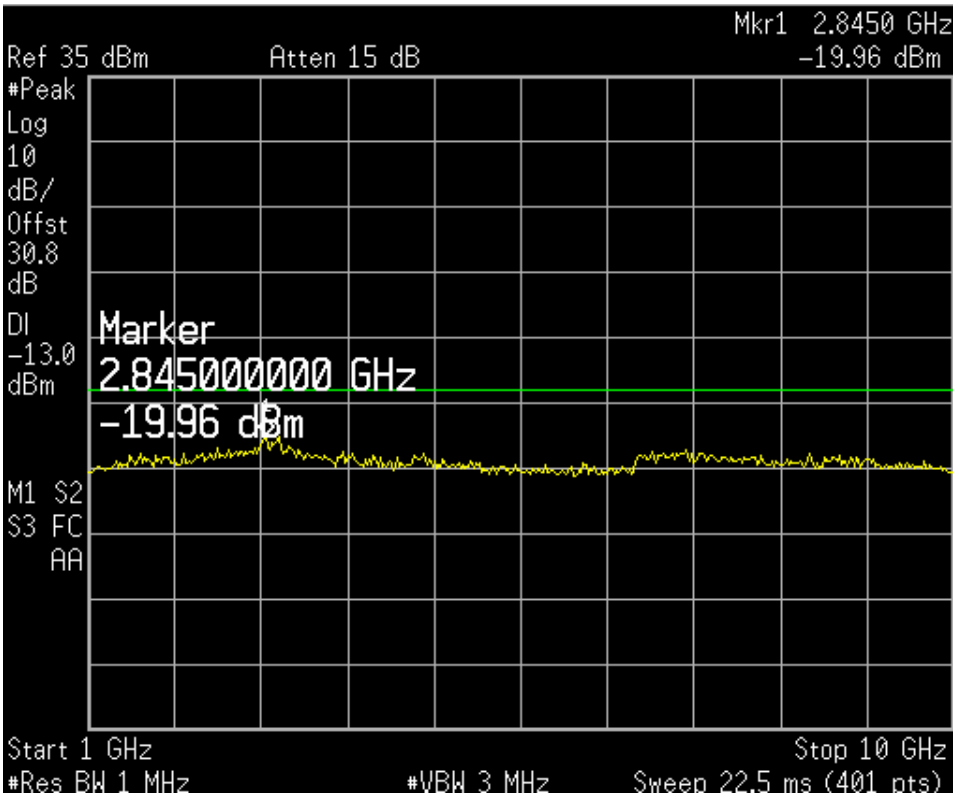
9 kHz to 150 kHz



150 kHz to 30 MHz



30 MHz to 1 GHz

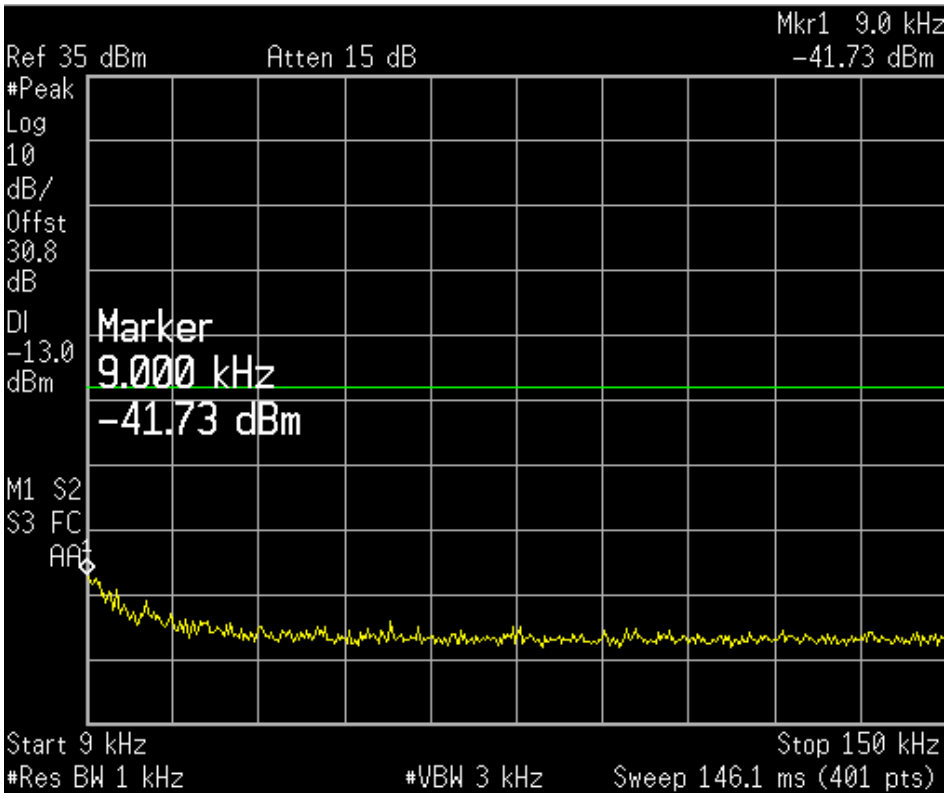


1GHz to 10 GHz

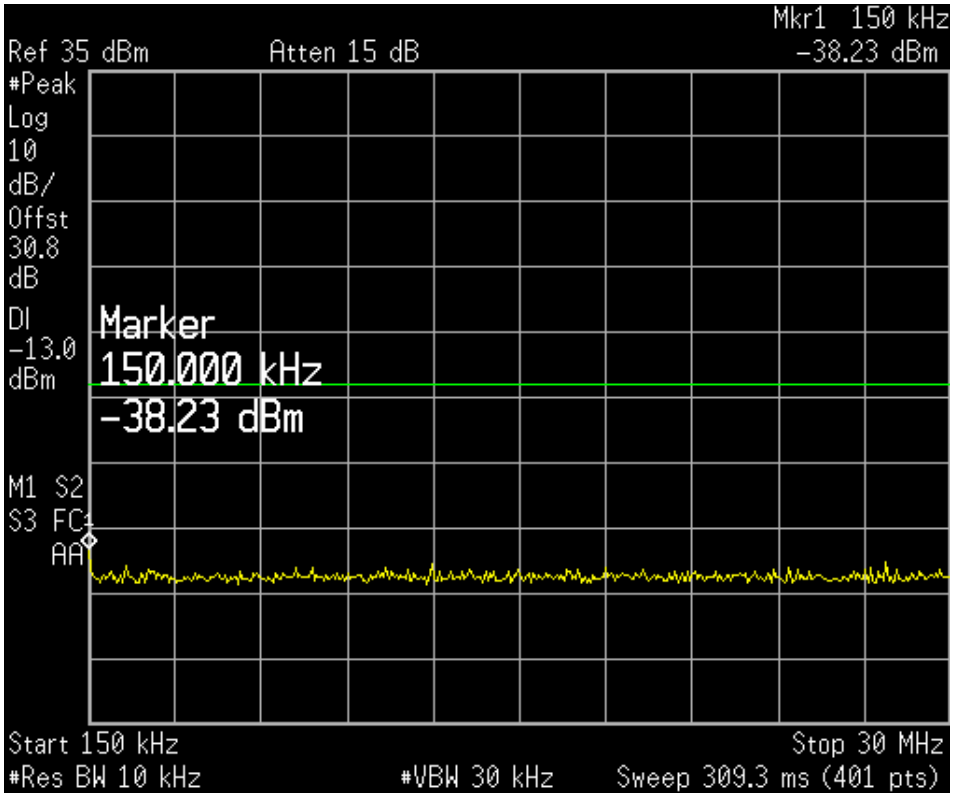
Transmitter 2:

Channel	Channel Frequency (MHz)	Test Frequency	Measured Maximum Emission (dBm)	Limit (dBm)
128	869.2	9 kHz – 10 GHz	-21.29	-13
189	881.4	9 kHz – 10 GHz	-19.51	-13
251	893.8	9 kHz – 10 GHz	-20.55	-13

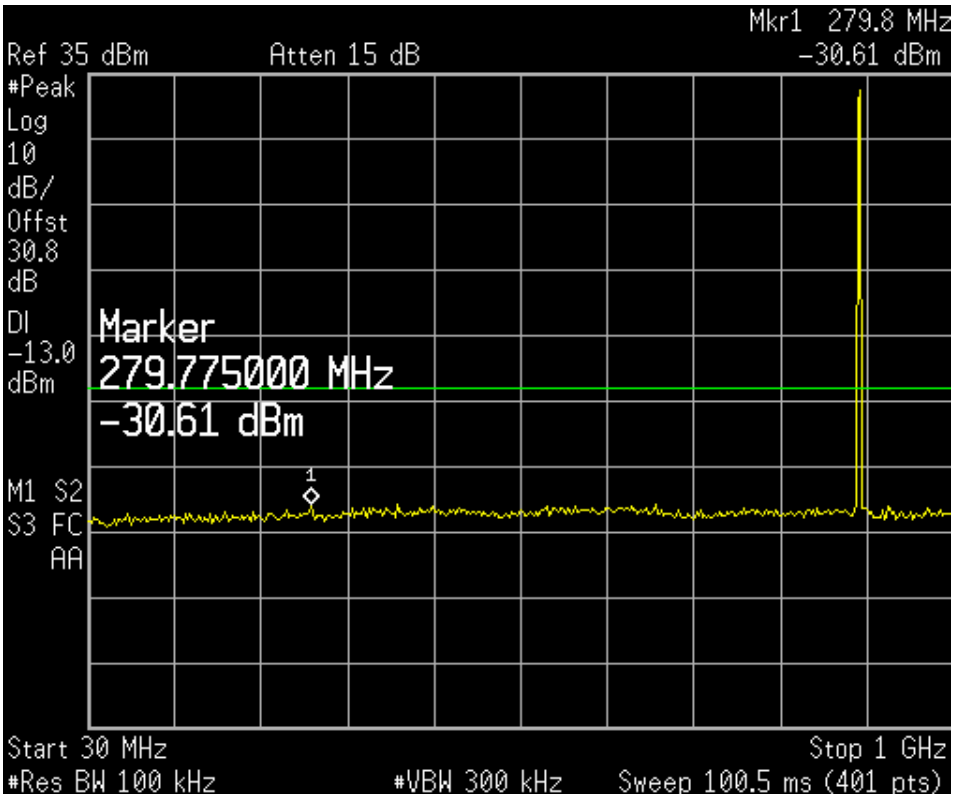
Channel low



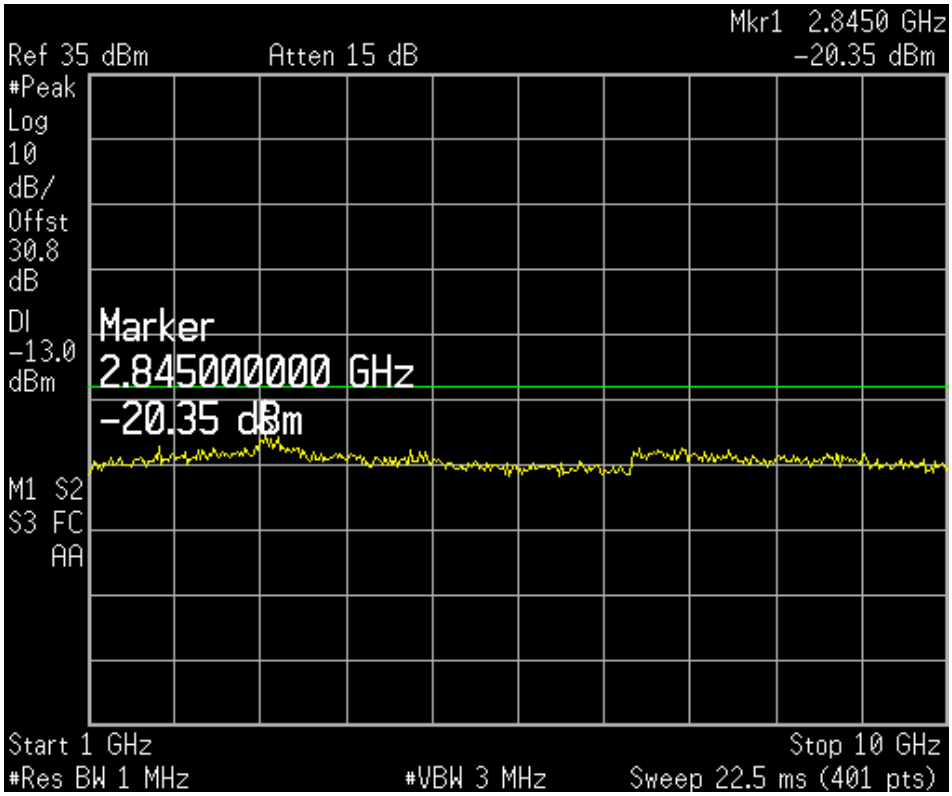
9 kHz to 150 kHz



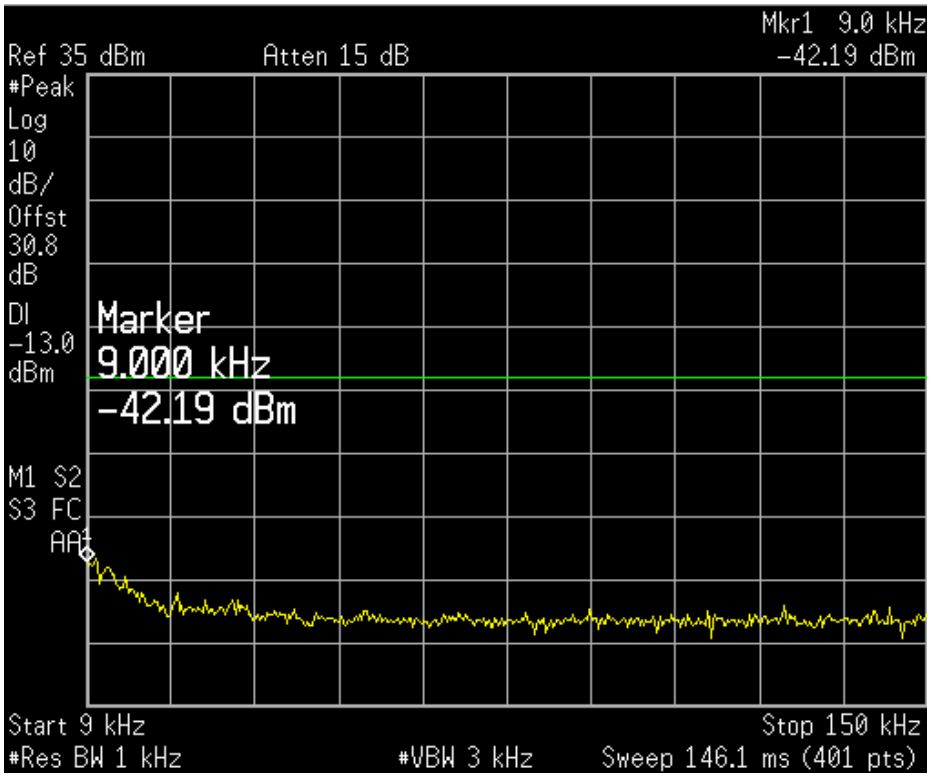
150 kHz to 30 MHz



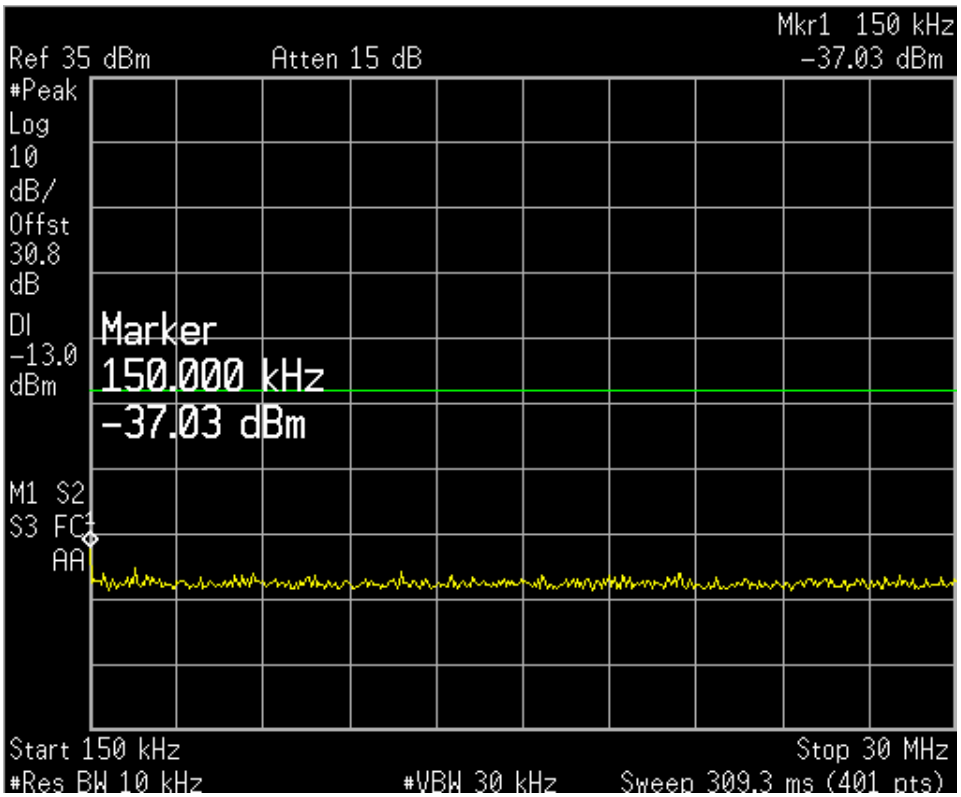
30 MHz to 1 GHz



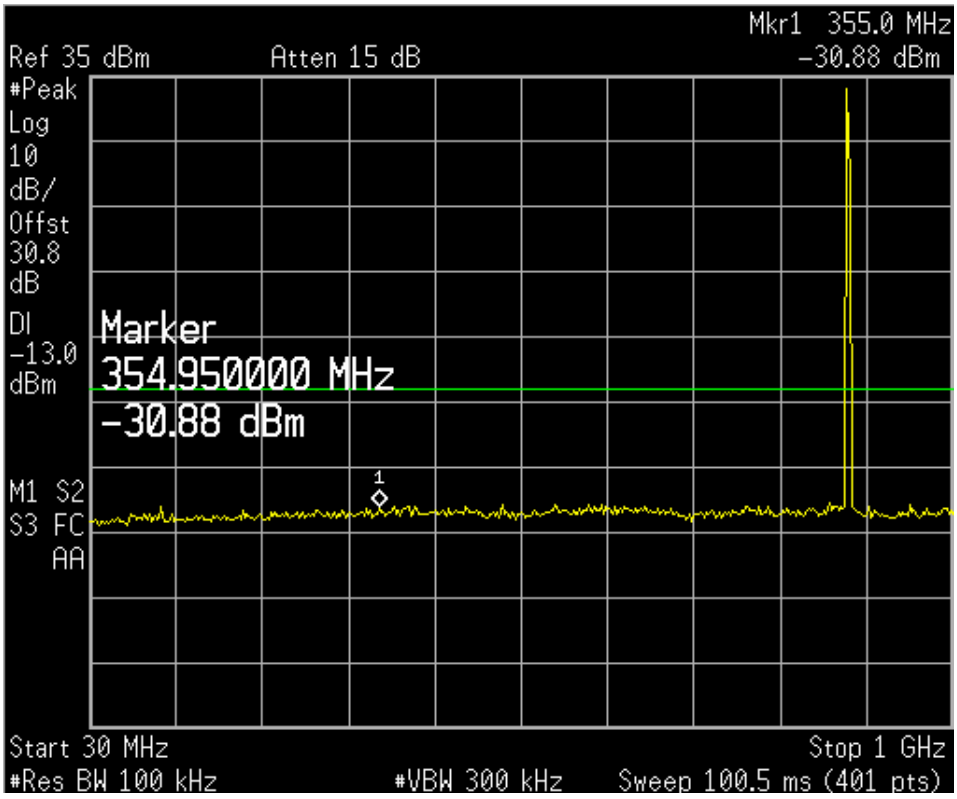
1GHz to 10 GHz



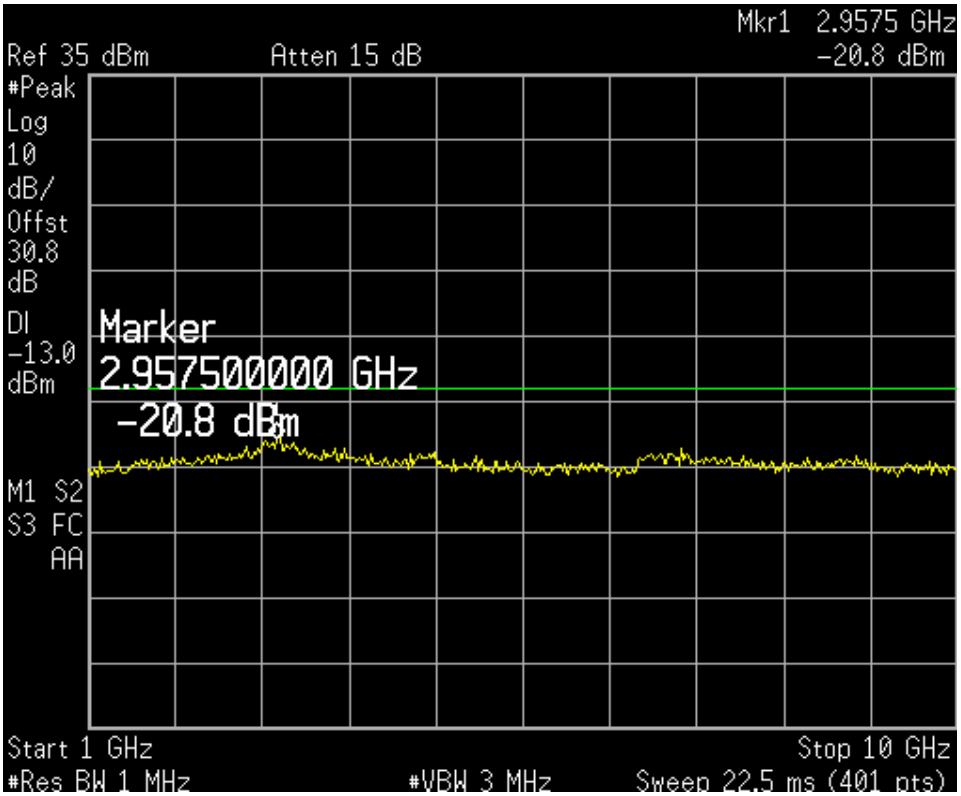
9 kHz to 150 kHz



150 kHz to 30 MHz

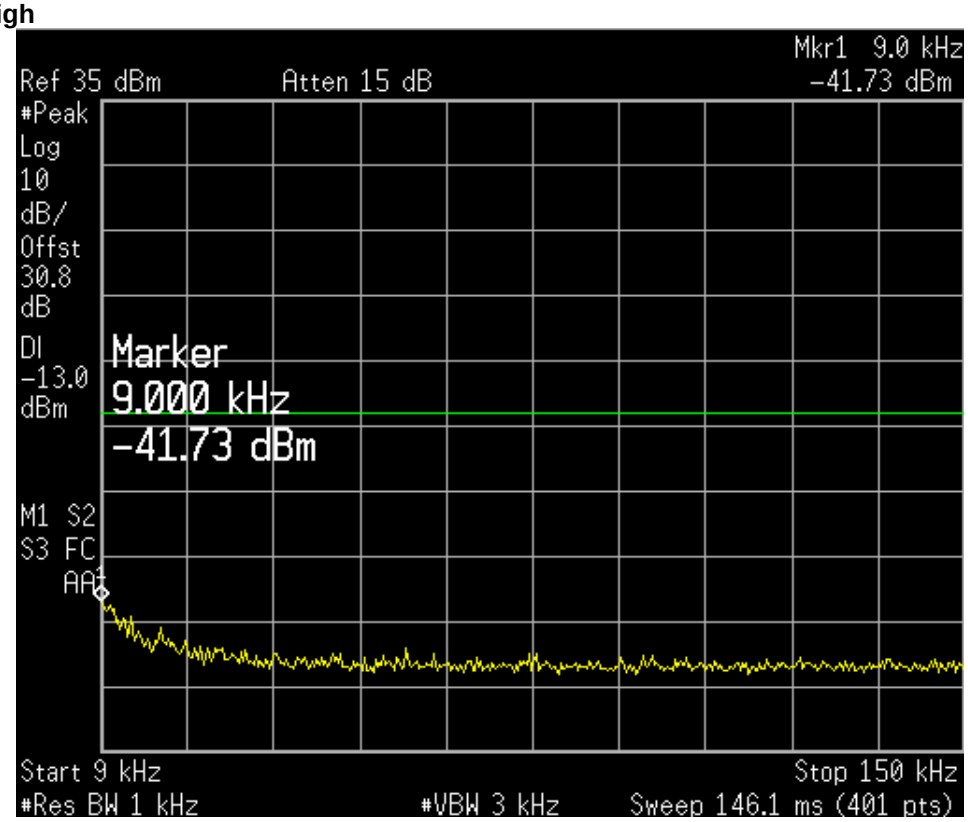


30 MHz to 1 GHz

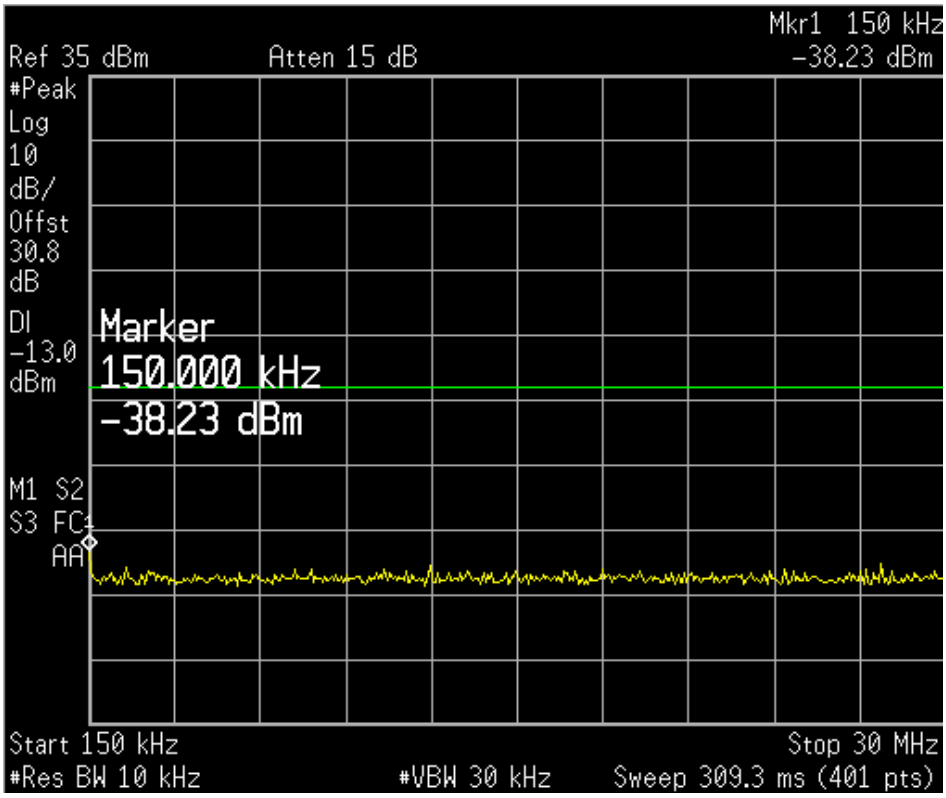


1GHz to 10 GHz

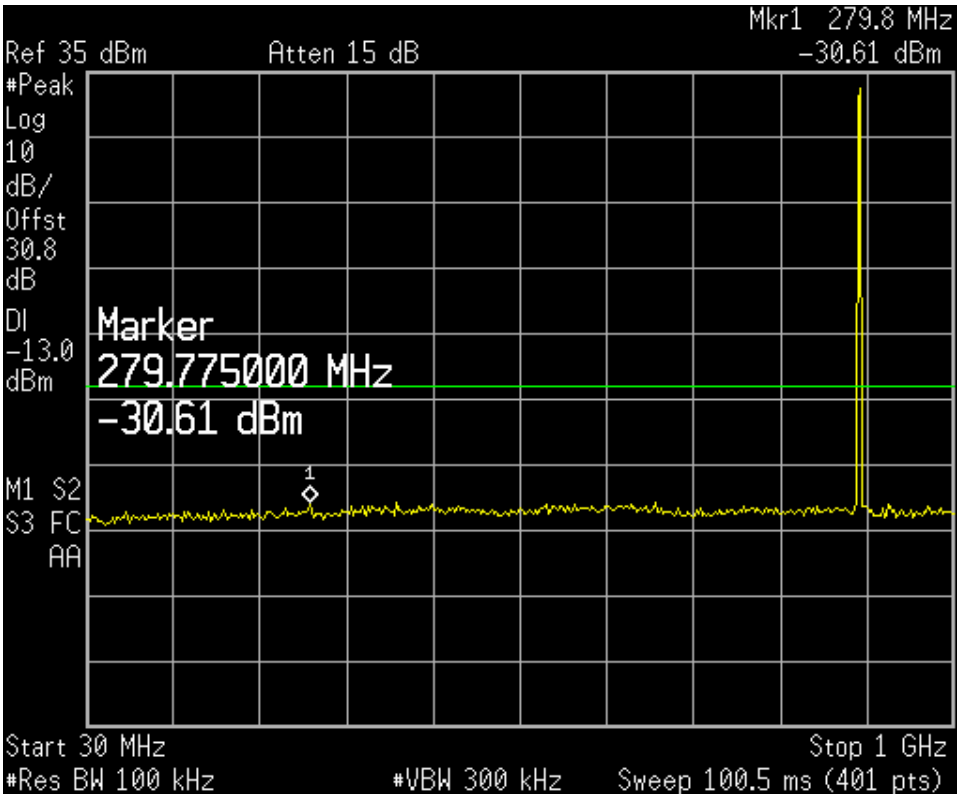
Channel High



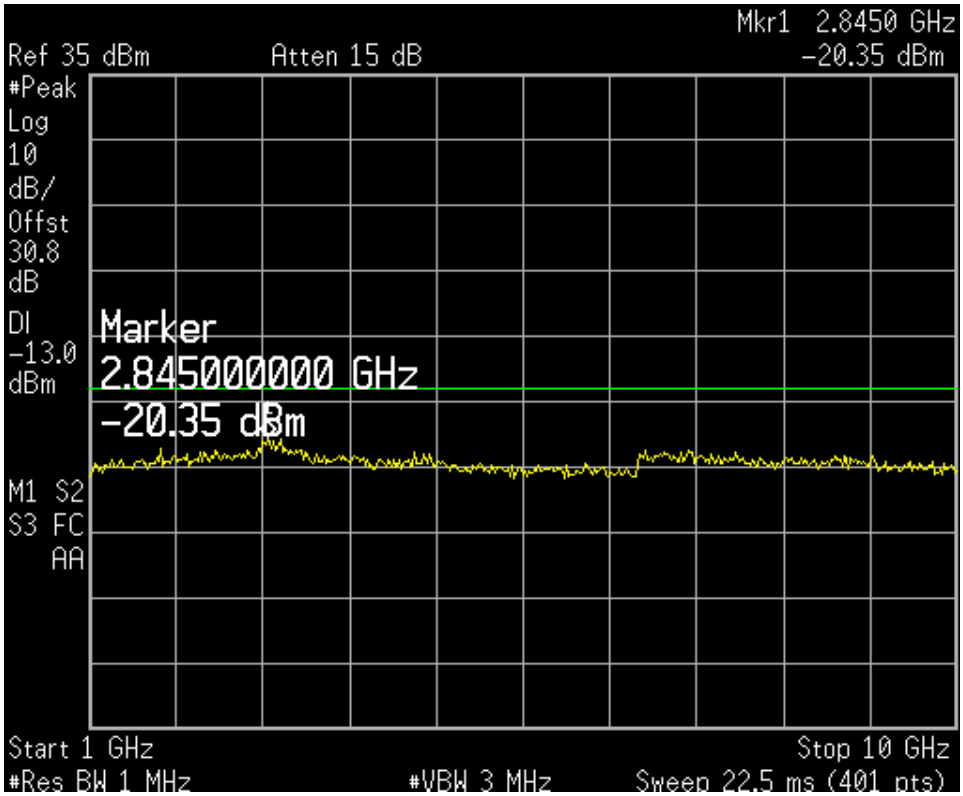
9 kHz to 150 kHz



150 kHz to 30 MHz



30 MHz to 1 GHz



1GHz to 10 GHz

Radiated Spurious Emissions **Section 2.2051 and 22.917**

Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1051 and Part 22.917
Test Method	TIA-603-C: 2004.
Measured at	Antenna Connector
Test Configuration	Channel Low, Mid and High

Test Method:

BTS is connected to match loads. The console computer controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operates on a typical channel.

The test procedure:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, E.R.P. shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC 2.1033(c)(8). The EUT was connected to ancillary in order to simulate normal operating conditions with reference to the guidance given in the standard for this type of equipment.

(b) Test the radiated maximum output power by the R&S test receiver ESMI received from test antenna.

(c) Use substitution method to verify the Maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on ESMI, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

According to 47CFR part 22.917, this defined the measurement bandwidth of as following:

Measurement bandwidth (RBW) for 9 kHz up to 10th harmonic included: 100kHz;

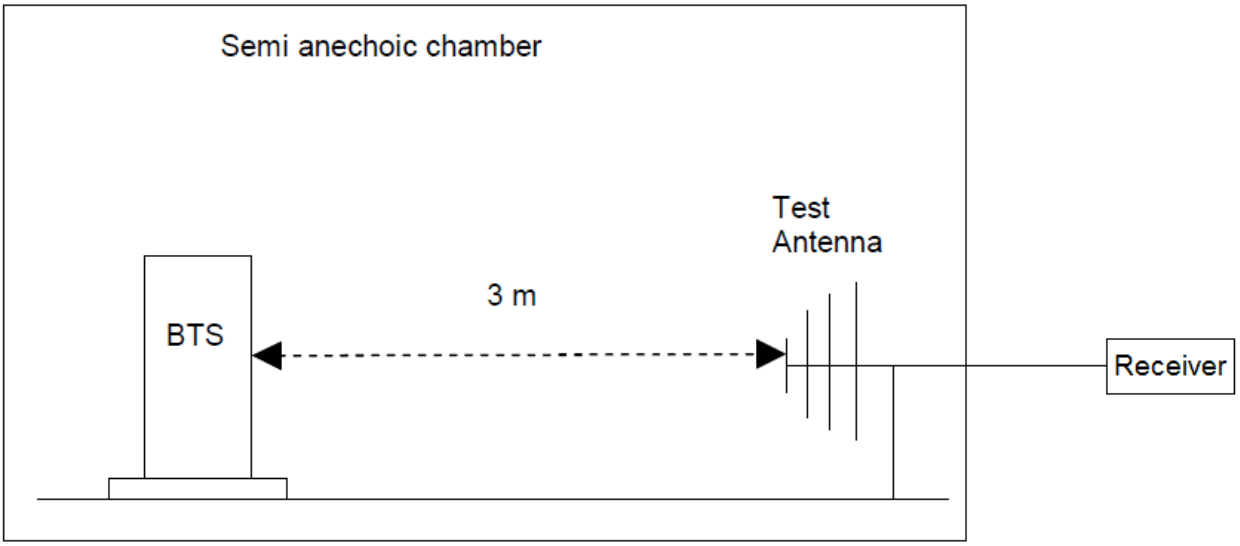
According to IC RSS-133 clause 6.5, this defined the measurement bandwidth of as following:

Measurement bandwidth (RBW): 1MHz;

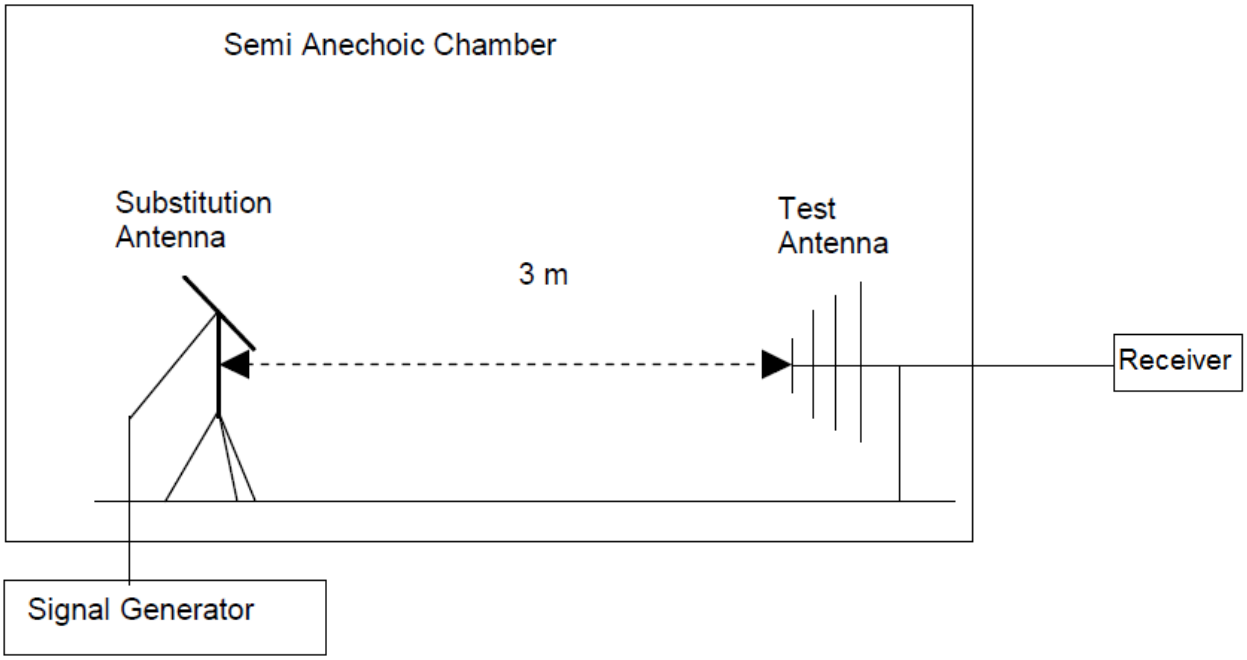
The product was pre-tested with vertical placement also, but worst test results were found with EUT Horizontal placement. Hence the final test was done EUT Horizontal placement.

Also, The final test was made with EUT on table of 80cm high.

Pre test:



Substitution test:



Test Results

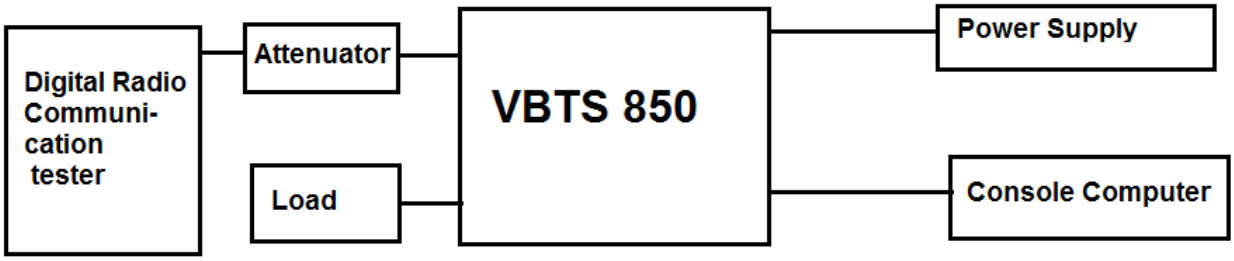
Channel	Polarization	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)
128 (869.2 MHz)	V	31.94	-67.71	-13.00	-54.71
		59.15	-71.75	-13.00	-58.75
		836.71	-49.95	-13.00	-36.95
		868.91	-40.15	-13.00	-27.15
	H	30.97	-62.71	-13.00	-49.71
		56.24	-69.37	-13.00	-56.37
		835.74	-52.95	-13.00	-39.95
		868.78	-42.15	-13.00	-29.15
189 (881.4 MHz)	V	31.94	-66.71	-13.00	-53.71
		59.15	-71.75	-13.00	-58.75
		836.71	-51.95	-13.00	-38.95
		881.42	-48.15	-13.00	-35.15
	H	31.94	-63.71	-13.00	-50.71
		57.21	-70.37	-13.00	-57.37
		836.71	-52.95	-13.00	-39.95
		881.42	-47.15	-13.00	-34.15
251 (889.8 MHz)	V	31.94	-67.71	-13.00	-54.71
		59.15	-71.75	-13.00	-58.75
		836.71	-50.95	-13.00	-37.95
		895.03	-44.15	-13.00	-31.15
	H	31.94	-62.71	-13.00	-49.71
		57.21	-70.37	-13.00	-57.37
		101.92	-69.10	-13.00	-56.10
		836.71	-51.95	-13.00	-38.95
		895.03	-44.15	-13.00	-31.15

Frequency Stability **Section 2.1055 and 22.355**
Result **Pass**

Test Specification	CFR 47 (FCC) part 2.1055 and part 22.355
Measured at	Antenna Connector
Test Method	TIA-603-C: 2004.
Test Configuration	Transmitter 1 – Channel Low, Mid and High Transmitter 2 – Channel Low, Mid and High

Test Method

The EUT was connected to the Radio Communication Tester via the one RF connector. Other RF connectors were connected to match load. BTS was controlled to transmit Maximum power by console computer. Measure and record the Frequency drift of the Base Station by the Radio Communication Tester.



The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30 ° to +50 ° centigrade for all equipment except that specified in subparagraphs
(2) and (3) of FCC paragraph 2.1055
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10_{o} centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on

frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

Limit:

According to FCC part 22.355, the carrier frequency of each transmitter must be maintained within the tolerances of ±1.5 ppm.

According to IC RSS-132 clause 4.3, the carrier frequency shall not depart from the reference frequency in excess of ±1.5 ppm for base stations.

Test Results
Frequency Error vs. Temperature
Transmitter 1

Channel	Temperature (°C)	Measured Frequency Error (Hz)	Error (ppm)	Limit
128 (869.2 MHz)	-30	-28	-0.032	±1.5
	-20	-28	-0.032	±1.5
	-10	-23	-0.026	±1.5
	0	-27	-0.031	±1.5
	10	-29	-0.033	±1.5
	20	34	0.039	±1.5
	30	45	0.052	±1.5
	40	-44	-0.051	±1.5
	50	-38	-0.044	±1.5
189 (881.4 MHz)	-30	-25	-0.028	±1.5
	-20	-25	-0.028	±1.5
	-10	-21	-0.024	±1.5
	0	-26	-0.029	±1.5
	10	-38	-0.043	±1.5
	20	-30	-0.034	±1.5
	30	-38	-0.043	±1.5
	40	-29	-0.033	±1.5
	50	35	0.040	±1.5
251 (889.8 MHz)	-30	-26	-0.029	±1.5
	-20	-26	-0.029	±1.5
	-10	-23	-0.026	±1.5
	0	-21	-0.023	±1.5
	10	-30	-0.034	±1.5
	20	40	0.045	±1.5
	30	-39	-0.044	±1.5
	40	39	0.044	±1.5
	50	34	0.038	±1.5

Transmitter 2

Channel	Temperature (°C)	Measured Frequency Error (Hz)	Error (ppm)	Limit
128 (869.2 MHz)	-30	-43	-0.049	±1.5
	-20	-32	-0.037	±1.5
	-10	-30	-0.035	±1.5
	0	-24	-0.028	±1.5
	10	-34	-0.039	±1.5
	20	-33	-0.038	±1.5
	30	-35	-0.040	±1.5
	40	-34	-0.039	±1.5
	50	-33	-0.038	±1.5
189 (881.4 MHz)	-30	-36	-0.041	±1.5
	-20	-30	-0.034	±1.5
	-10	-25	-0.028	±1.5
	0	29	0.033	±1.5
	10	37	0.042	±1.5
	20	42	0.048	±1.5
	30	-42	-0.048	±1.5
	40	-38	-0.043	±1.5
	50	-39	-0.044	±1.5
251 (889.8 MHz)	-30	-26	-0.029	±1.5
	-20	-35	-0.039	±1.5
	-10	-30	-0.034	±1.5
	0	-25	-0.028	±1.5
	10	-29	-0.032	±1.5
	20	-27	-0.030	±1.5
	30	-38	-0.043	±1.5
	40	-41	-0.046	±1.5
	50	-41	-0.046	±1.5

Frequency Error vs. Voltage

Transmitter	Voltage	Channel	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
Transmitter 1	85% Vnorm (20.4V DC)	128 (869.2 MHz)	-34	-0.039	±1.5
		189 (881.4 MHz)	-31	-0.035	±1.5
		251 (889.8 MHz)	38	0.043	±1.5
	115% Vnorm (27.6 V DC)	128 (869.2 MHz)	-36	-0.041	±1.5
		189 (881.4 MHz)	-31	-0.035	±1.5
		251 (889.8 MHz)	38	0.043	±1.5
Transmitter 2	85% Vnorm (20.4V DC)	128 (869.2 MHz)	-38	-0.044	±1.5
		189 (881.4 MHz)	-34	-0.039	±1.5
		251 (889.8 MHz)	-40	-0.045	±1.5
	115% Vnorm (27.6 V DC)	128 (869.2 MHz)	-35	-0.040	±1.5
		189 (881.4 MHz)	-33	-0.037	±1.5
		251 (889.8 MHz)	-35	-0.039	±1.5