



REPORT No.: SZ18090294W02

# TEST REPORT

**APPLICANT** : Dongxia Datong(Beijing) Management and Consulting Co.,Ltd

**PRODUCT NAME** : CCU

**MODEL NAME** : ESU1

**BRAND NAME** : ofo

**FCC ID** : 2AMBSSCOOTER-1

**STANDARD(S)** : 47 CFR Part 22 Subpart H  
: 47 CFR Part 24 Subpart E

**TEST DATE** : 2018-08-15 to 2018-10-18

**ISSUE DATE** : 2018-10-18

Tested by:

Wang Meng  
Wang Meng (Test Engineer)

Approved by:

Peng Huarui  
Peng Huarui ( Supervisor )

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Change History		
Issue	Date	Reason for change
1.0	2018-10-18	First edition



# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

<b>Applicant:</b>	Dongxia Datong(Beijing) Management and Consulting Co.,Ltd
<b>Applicant Address:</b>	10th Floor, Ideal Plaza, No.58, North 4th Ring Road West, Haidian District, Beijing, P.R. China
<b>Manufacturer:</b>	Dongxia Datong(Beijing) Management and Consulting Co.,Ltd
<b>Manufacturer Address:</b>	10th Floor, Ideal Plaza, No.58, North 4th Ring Road West, Haidian District, Beijing, P.R. China

## 1.2. Equipment Under Test (EUT) Description

<b>Product Name:</b>	CCU	
<b>Serial No:</b>	(N/A, marked #1 by test site)	
<b>Hardware Version:</b>	SCT_V11	
<b>Software Version:</b>	0X101E	
<b>Modulation Type:</b>	WCDMA Mode with QPSK Modulation HSDPA Mode with QPSK Modulation HSUPA Mode with QPSK Modulation HSPA+ Mode with QPSK Modulation	
<b>Operating Frequency Range:</b>	WCDMA 850MHz Tx: 826.4 - 846.6MHz (at intervals of 200kHz); Rx: 871.4 - 891.6MHz (at intervals of 200kHz) WCDMA 1900MHz Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz); Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)	
<b>Emission Designators:</b>	WCDMA 850:4M09F9W , WCDMA1900:4M07F9W	
<b>Antenna Type:</b>	FPC Antenna	
<b>Antenna Gain:</b>	WCDMA 850:	0.89 dBi
	WCDMA 1900:	0.89 dBi
<b>Operating voltage:</b>	Normal(NV):	36V
	Lowest(LV):	34V
	Highest(HV):	37V



**Note 1:** The transmitter (Tx) frequency arrangement of the WCDMA 850MHz band used by the EUT can be represented with the formula  $F(n)=826.4+0.2*(n-4132)$ ,  $4132 \leq n \leq 4233$ ; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4182(836.4MHz) and 4233 (846.6MHz).

**Note 2:** The transmitter (Tx) frequency arrangement of the WCDMA 1900MHz band used by the EUT can be represented with the formula  $F(n)=1852.4+0.2*(n-9262)$ ,  $9262 \leq n \leq 9538$ ; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

**Note 3:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



## 1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2 (10-1-12 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 (10-1-12 Edition)	Public Mobile Services
3	47 CFR Part 24 (10-1-12 Edition)	Personal Communications Services

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result
1	2.1046	Conducted RF Output Power	Aug 15, 2018	Wang Meng	PASS
2	24.232(d)	Peak - Average Ratio	Aug 15, 2018	Wang Meng	PASS
3	2.1049	99% Occupied Bandwidth	Aug 15, 2018	Wang Meng	PASS
4	2.1055,22.355, 24.235	Frequency Stability	Aug 15, 2018	Wang Meng	PASS
5	2.1051, 22.917(a), 24.238(a)	Conducted Out of Band Emissions	Aug 15, 2018	Wang Meng	PASS
6	2.1051, 22.917(a), 24.238(a), 27.53(h)	Band Edge	Aug 16, 2018	Wang Meng	PASS
7	22.913(a), 24.232(a)	Transmitter Radiated Power (EIPR/ERP)	Oct 18, 2018	Zheng Fengjian	PASS
8	2.1051, 22.917(a), 24.238(a)	Radiated Out of Band Emissions	Oct 15, 2018	Zheng Fengjian	PASS

**Note:** The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 (Oct 27, 2017) and ANSI/TIA-603-E-2016.

## 1.4. Environmental Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

## 2.47 CFR Part 2, Part 22H & 24E Requirements

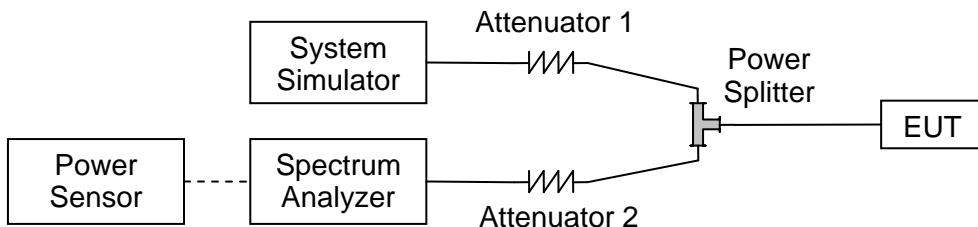
### 2.1. Conducted RF Output Power

#### 2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals 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 section 2.1033(c)(8).

#### 2.1.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



### 2.1.3. Test Results

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

#### WCDMA Test Verdict:

WCDMA 850		Average Power (dBm)		
TX Channel		4132	4182	4233
Frequency (MHz)		826.4	836.4	846.6
3GPP Rel 99	AMR 12.2Kbps	22.65	22.70	22.48
3GPP Rel 6	HSDPA Subtest-1	22.60	22.76	22.46
3GPP Rel 6	HSDPA Subtest-2	22.37	22.52	22.22
3GPP Rel 6	HSDPA Subtest-3	22.13	22.23	21.91
3GPP Rel 6	HSDPA Subtest-4	21.87	21.97	21.72
3GPP Rel 6	HSUPA Subtest-1	22.01	21.78	21.98
3GPP Rel 6	HSUPA Subtest-2	21.92	21.74	21.89
3GPP Rel 6	HSUPA Subtest-3	22.10	21.92	22.03
3GPP Rel 6	HSUPA Subtest-4	22.09	21.87	22.13
3GPP Rel 6	HSUPA Subtest-5	22.32	22.33	22.25
3GPP Rel 7	HSPA+(16QAM)Subtest-1	22.12	22.26	21.72

WCDMA 1900		Average Power (dBm)		
TX Channel		9262	9400	9538
Frequency (MHz)		1852.4	1880.0	1907.6
3GPP Rel 99	AMR 12.2Kbps	21.51	21.99	21.72
3GPP Rel 6	HSDPA Subtest-1	21.87	22.00	21.87
3GPP Rel 6	HSDPA Subtest-2	21.65	21.84	21.70
3GPP Rel 6	HSDPA Subtest-3	21.43	21.62	21.47
3GPP Rel 6	HSDPA Subtest-4	21.19	21.33	21.25
3GPP Rel 6	HSUPA Subtest-1	21.09	20.92	20.99
3GPP Rel 6	HSUPA Subtest-2	21.16	21.00	21.08
3GPP Rel 6	HSUPA Subtest-3	21.01	20.82	20.87
3GPP Rel 6	HSUPA Subtest-4	21.05	20.93	21.10
3GPP Rel 6	HSUPA Subtest-5	21.07	20.91	21.01
3GPP Rel 7	HSPA+(16QAM)Subtest-1	21.29	21.40	21.28

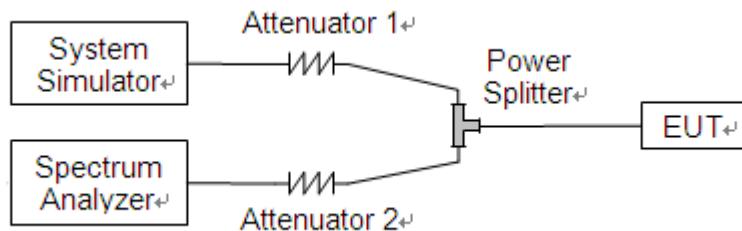
## 2.2. Peak to Average Ratio

### 2.2.1. Requirement

According to FCC 24.232(d) the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

### 2.2.3. Test procedure

1 .For GSM/EGPRS operating mode:

- a. Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.
- b. Set EUT in maximum output power, and triggered the burst signal.
- c. Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average ratio.

2. For UMTS operating mode:

- a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.



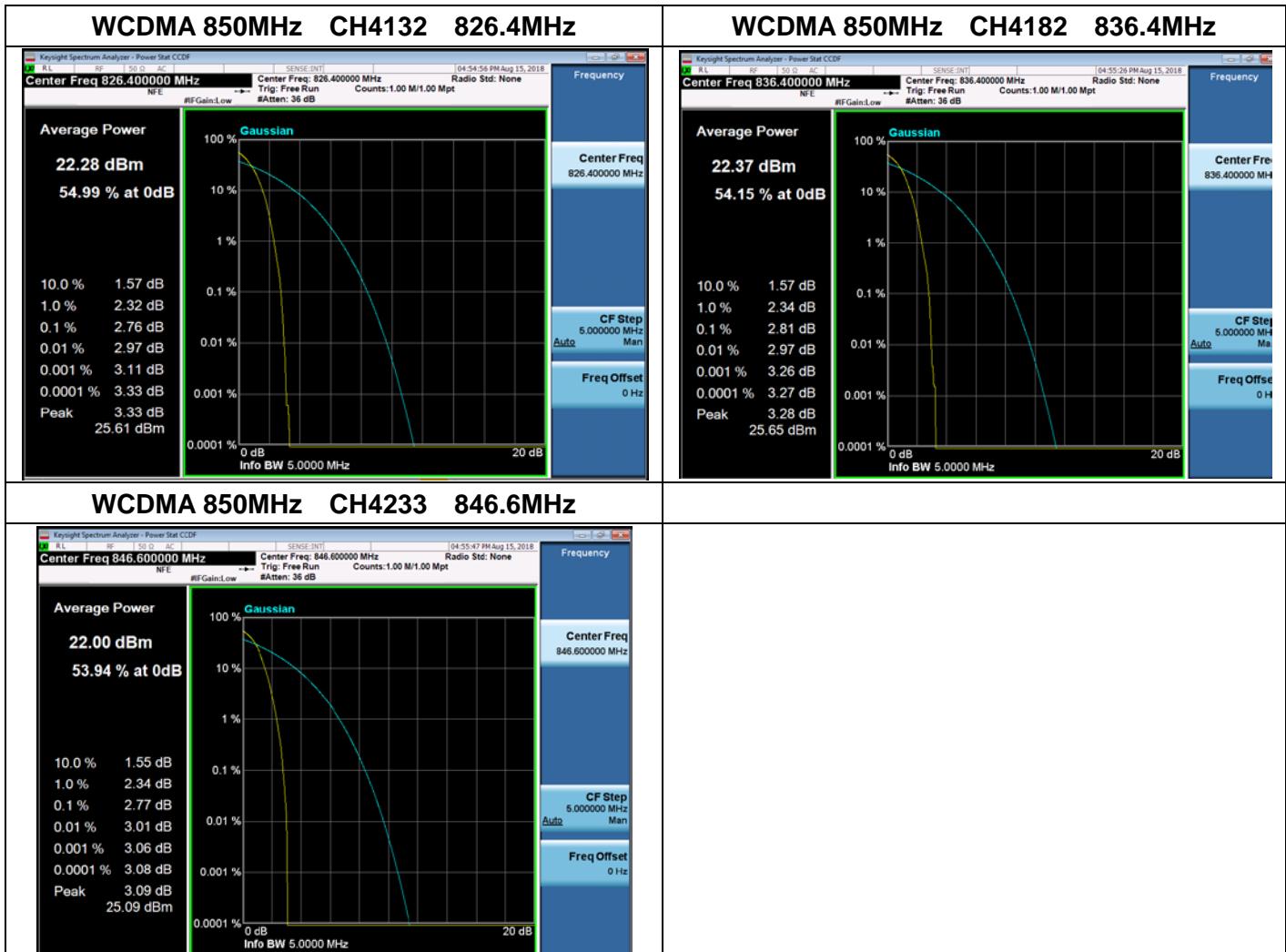
## 2.2.4. Test Result

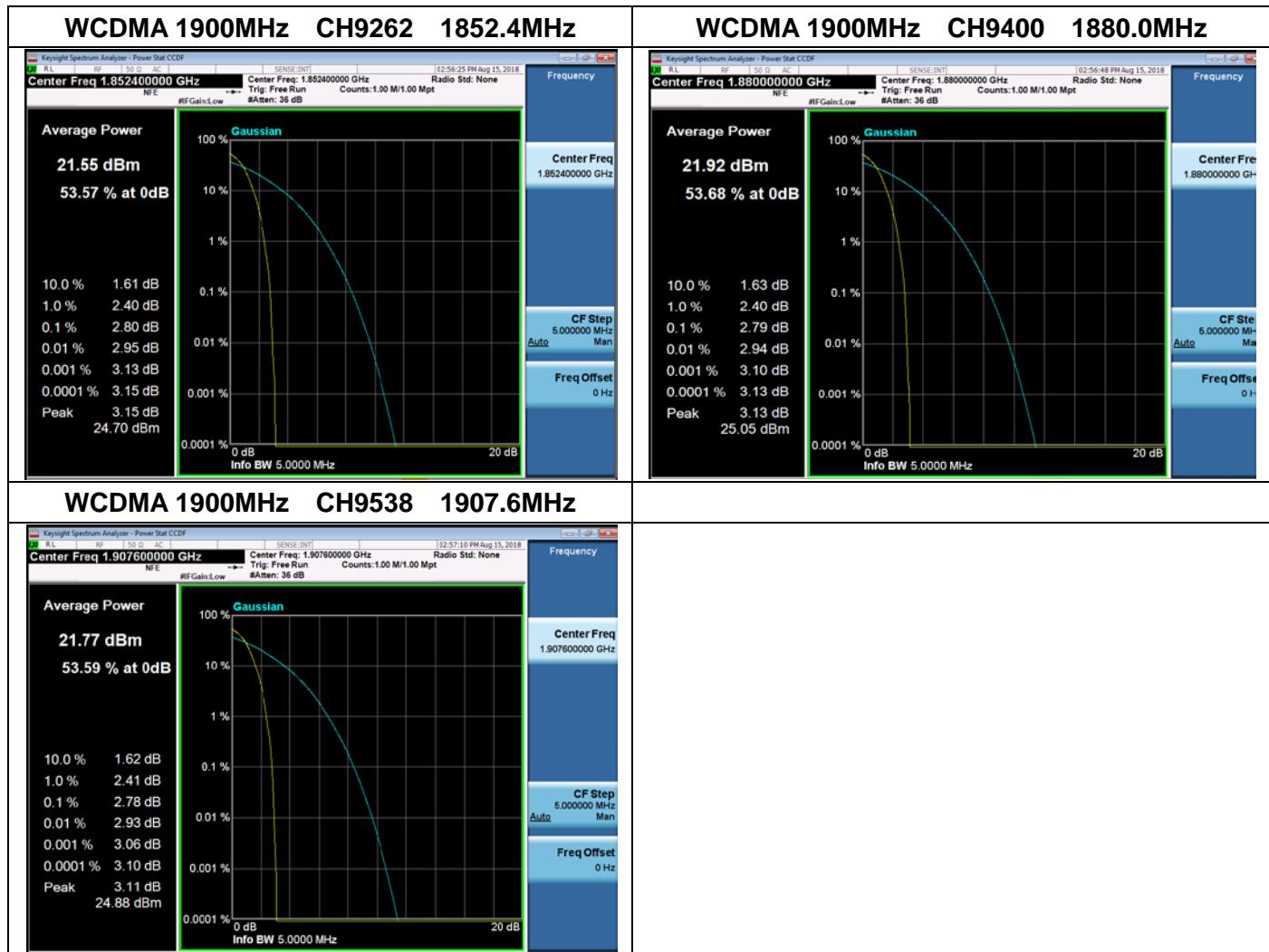
The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

### A. Test Verdict:

Band	Channel	Frequency (MHz)	Peak to Average ratio	Limit	Verdict
			dB		
WCDMA 850MHz	4132	826.4	2.76	13	PASS
	4182	836.4	2.81		PASS
	4233	846.6	2.77		PASS
WCDMA 1900MHz	9262	1852.4	2.80	13	PASS
	9400	1880.0	2.79		PASS
	9538	1907.6	2.78		PASS

## B. Test Plots:





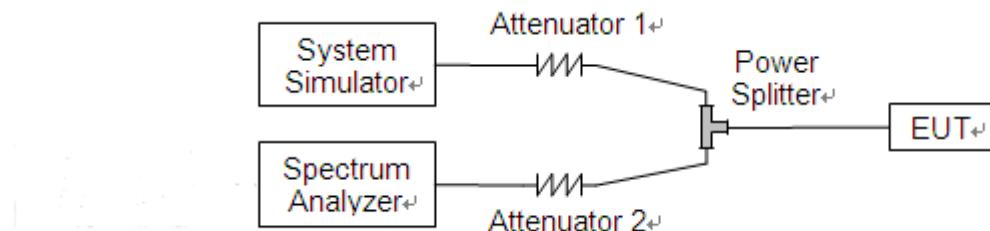
## 2.3. 99% Occupied Bandwidth

### 2.3.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is 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. Occupied bandwidth is also known as the 99% emission bandwidth.

### 2.3.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



### 2.3.3. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 99% occupied bandwidth.

#### WCDMA Test Verdict:

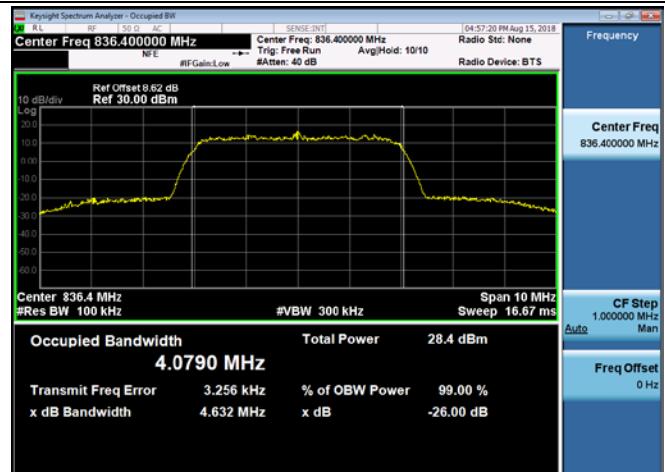
Band	Channel	Frequency (MHz)	26dB bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA 850MHz	4132	826.4	4.632	4.081
	4182	836.4	4.632	4.079
	4233	846.6	4.624	4.077
WCDMA 1900MHz	9262	1852.4	4.627	4.061
	9400	1880.0	4.622	4.062
	9538	1907.6	4.625	4.066
HSDPA 850MHz	4132	826.4	4.592	4.051
	4182	836.4	4.598	4.056
	4233	846.6	4.587	4.056
HSDPA 1900MHz	9262	1852.4	4.613	4.055
	9400	1880.0	4.618	4.055
	9538	1907.6	4.623	4.052
HSUPA 850MHz	4132	826.4	4.657	4.082
	4182	836.4	4.624	4.085
	4233	846.6	4.643	4.083
HSUPA 1900MHz	9262	1852.4	4.646	4.067
	9400	1880.0	4.629	4.070
	9538	1907.6	4.631	4.067
HSPA+ 850MHz	4132	826.4	4.634	4.076
	4182	836.4	4.646	4.080
	4233	846.6	4.618	4.079
HSPA+ 1900MHz	9262	1852.4	4.645	4.071
	9400	1880.0	4.634	4.068
	9538	1907.6	4.642	4.067

## Test Plots

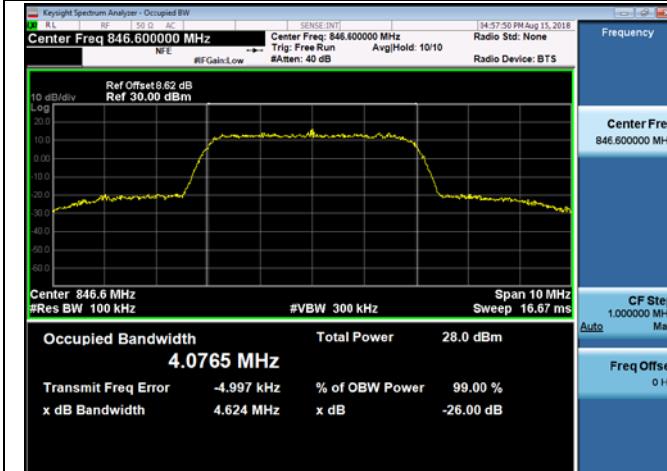
## WCDMA 850MHz CH4132 826.4MHz



## WCDMA 850MHz CH4182 836.4MHz



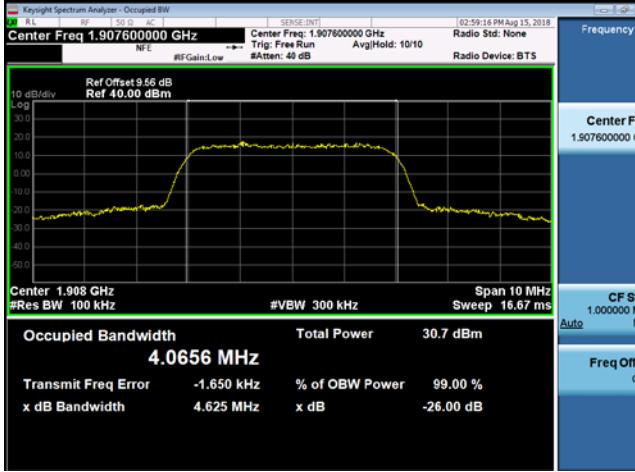
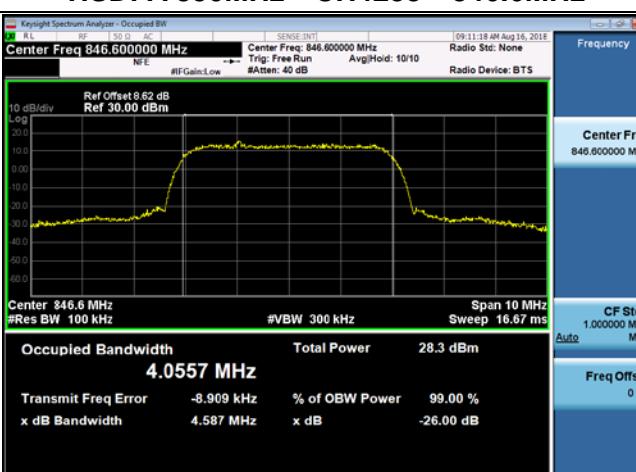
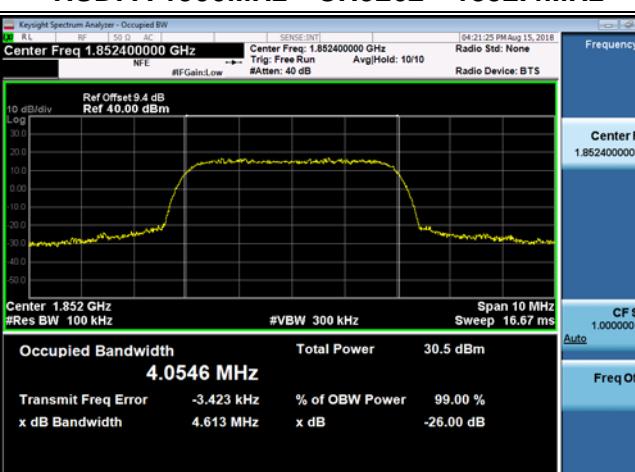
## WCDMA 850MHz CH4233 846.6MHz



## WCDMA 1900MHz CH9262 1852.4MHz

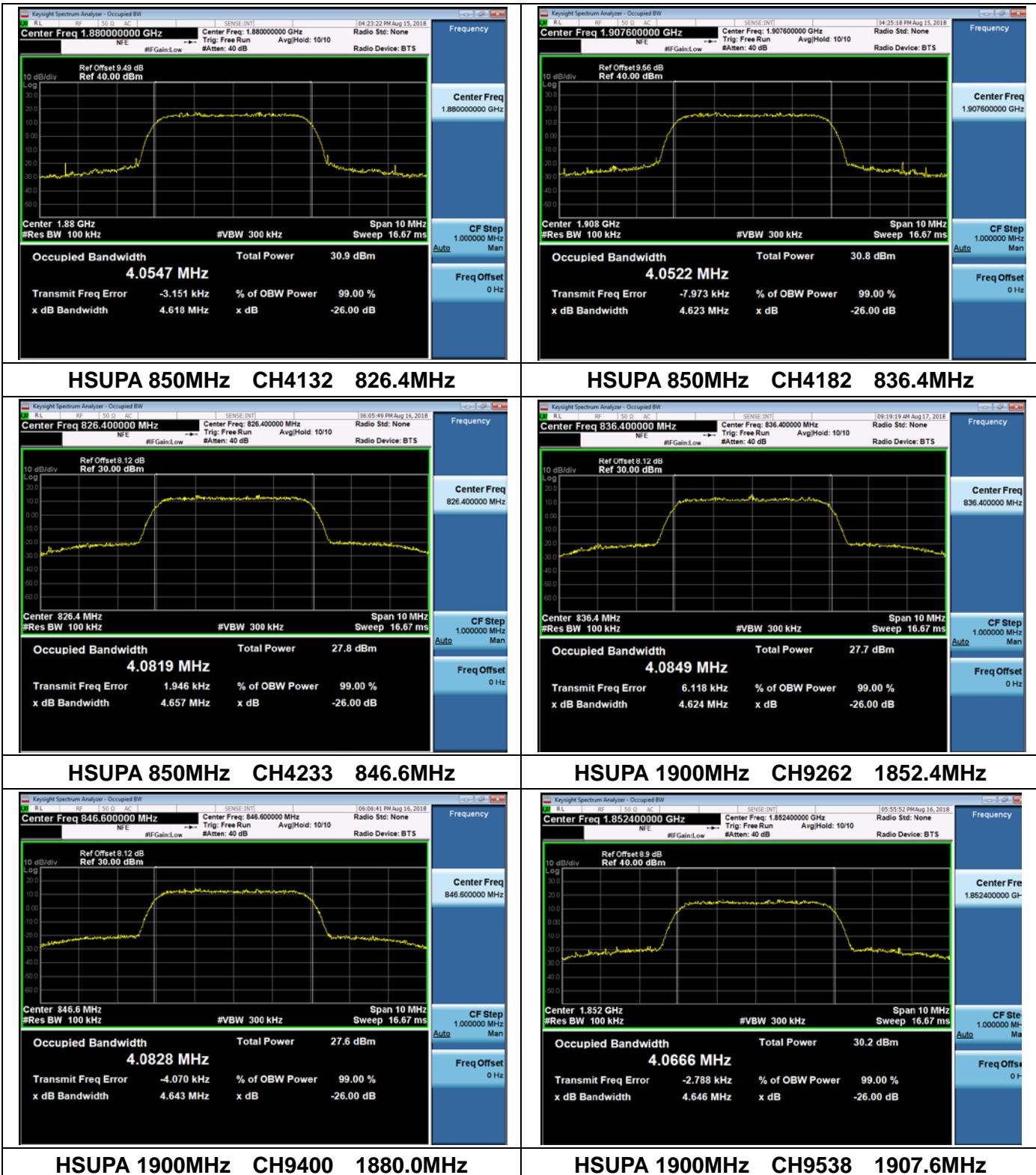




<b>WCDMA 1900MHz CH9400 1880.0MHz</b>	<b>WCDMA 1900MHz CH9538 1907.6MHz</b>
 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 1.88000000 GHz NFE #IFGain:Low Ref Offset 9.49 dB Ref 40.00 dBm Center 1.88 GHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0618 MHz Total Power 30.8 dBm Transmit Freq Error 4.315 kHz % of OBW Power 99.00 % x dB Bandwidth 4.622 MHz x dB -26.00 dB</p>	 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 1.90760000 GHz NFE #IFGain:Low Ref Offset 9.56 dB Ref 40.00 dBm Center 1.908 GHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0656 MHz Total Power 30.7 dBm Transmit Freq Error -1.650 kHz % of OBW Power 99.00 % x dB Bandwidth 4.625 MHz x dB -26.00 dB</p>
<b>HSDPA 850MHz CH4132 826.4MHz</b>	<b>HSDPA 850MHz CH4182 836.4MHz</b>
 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 826.400000 MHz NFE #IFGain:Low Ref Offset 8.62 dB Ref 30.00 dBm Center 826.4 MHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0507 MHz Total Power 28.6 dBm Transmit Freq Error -3.578 kHz % of OBW Power 99.00 % x dB Bandwidth 4.592 MHz x dB -26.00 dB</p>	 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 836.400000 MHz NFE #IFGain:Low Ref Offset 8.62 dB Ref 30.00 dBm Center 836.4 MHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0556 MHz Total Power 28.8 dBm Transmit Freq Error -5.406 kHz % of OBW Power 99.00 % x dB Bandwidth 4.598 MHz x dB -26.00 dB</p>
<b>HSDPA 850MHz CH4233 846.6MHz</b>	<b>HSDPA 1900MHz CH9262 1852.4MHz</b>
 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 846.600000 MHz NFE #IFGain:Low Ref Offset 8.62 dB Ref 30.00 dBm Center 846.6 MHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0557 MHz Total Power 28.3 dBm Transmit Freq Error -8.909 kHz % of OBW Power 99.00 % x dB Bandwidth 4.587 MHz x dB -26.00 dB</p>	 <p>Keystream Spectrum Analyzer - Occupied BW Center Freq 1.85240000 GHz NFE #IFGain:Low Ref Offset 9.44 dB Ref 40.00 dBm Center 1.8524 GHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 16.67 ms Occupied Bandwidth 4.0546 MHz Total Power 30.5 dBm Transmit Freq Error -3.423 kHz % of OBW Power 99.00 % x dB Bandwidth 4.613 MHz x dB -26.00 dB</p>
<b>HSDPA 1900MHz CH9400 1880.0MHz</b>	<b>HSDPA 1900MHz CH9538 1907.6MHz</b>



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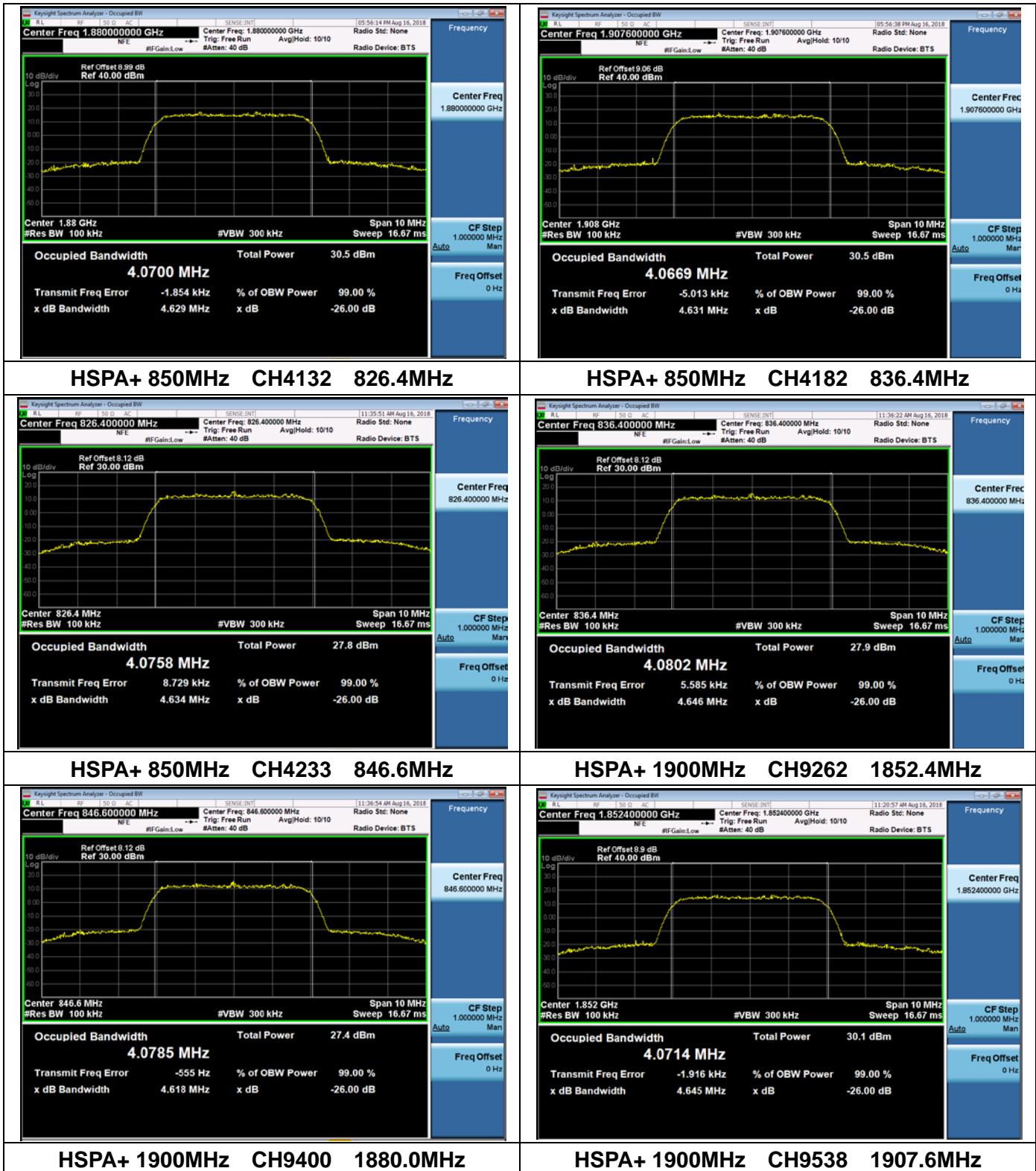
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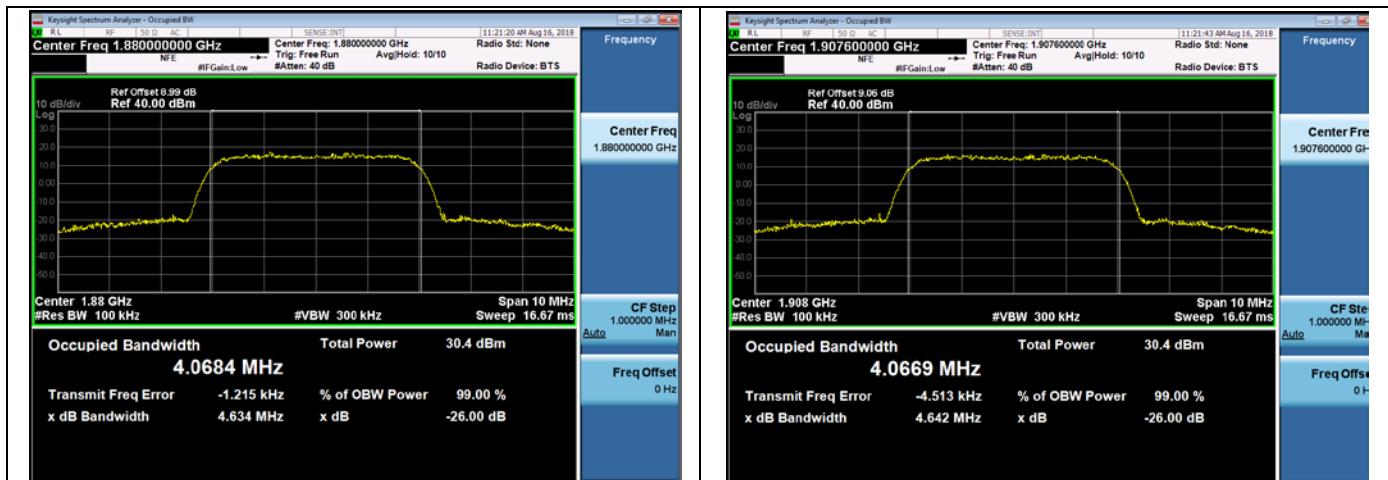
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## 2.4. Frequency Stability

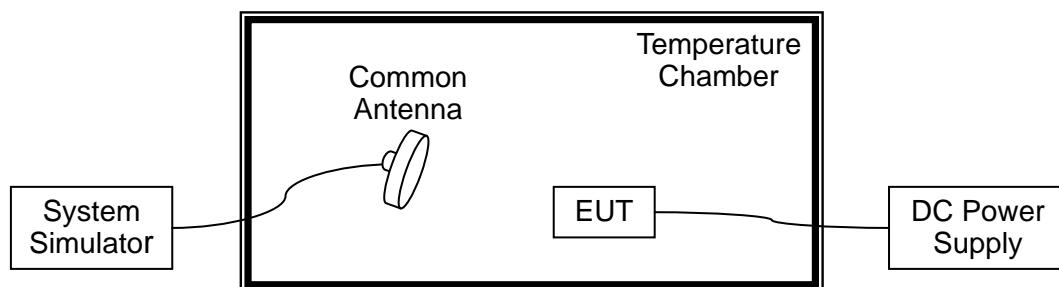
### 2.4.1. Requirement

According to FCC section 22.355, 24.235 and 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer. 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.

### 2.4.2. Test Description

Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.



### 2.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately 36VDC, 37VDC and 34VDC, which are specified by the applicant; the normal temperature here used is 25°C.

#### A. Test Verdict:

WCDMA 850MHz, Channel 4182, Frequency 836.4MHz					
Limit = $\pm 2.5$ ppm					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	36	+20(Ref)	-8.06	-0.010	PASS
100		-30	-18.60	-0.022	
100		-20	-20.67	-0.025	
100		-10	-8.20	-0.010	
100		0	-15.46	-0.018	
100		+10	-22.09	-0.026	
100		+20	-2.40	-0.003	
100		+30	-10.74	-0.013	
100		+40	-14.93	-0.018	
100		+50	-24.96	-0.030	
115		+20	-11.98	-0.014	
85	34	+20	-6.72	-0.008	

WCDMA 1900MHz, Channel 9400, Frequency 1880.0MHz					
Limit =Within Authorized Band					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	36	+20(Ref)	-49.20	-0.026	PASS
100		-30	-51.90	-0.028	
100		-20	-49.67	-0.026	
100		-10	-50.13	-0.027	
100		0	-46.52	-0.025	
100		+10	-47.04	-0.025	
100		+20	-41.79	-0.022	
100		+30	-38.57	-0.021	
100		+40	-38.87	-0.021	
100		+50	-32.62	-0.017	
115		+20	-47.18	-0.025	
85	34	+20	-4.89	-0.003	

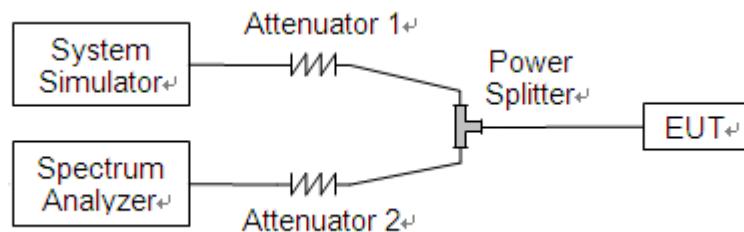
## 2.5. Conducted Out of Band Emissions

### 2.5.1. Requirement

According to FCC section 22.917(a), 24.238(a) and 27.53(h) 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. This calculated to be -13dBm.

### 2.5.2. Test Description

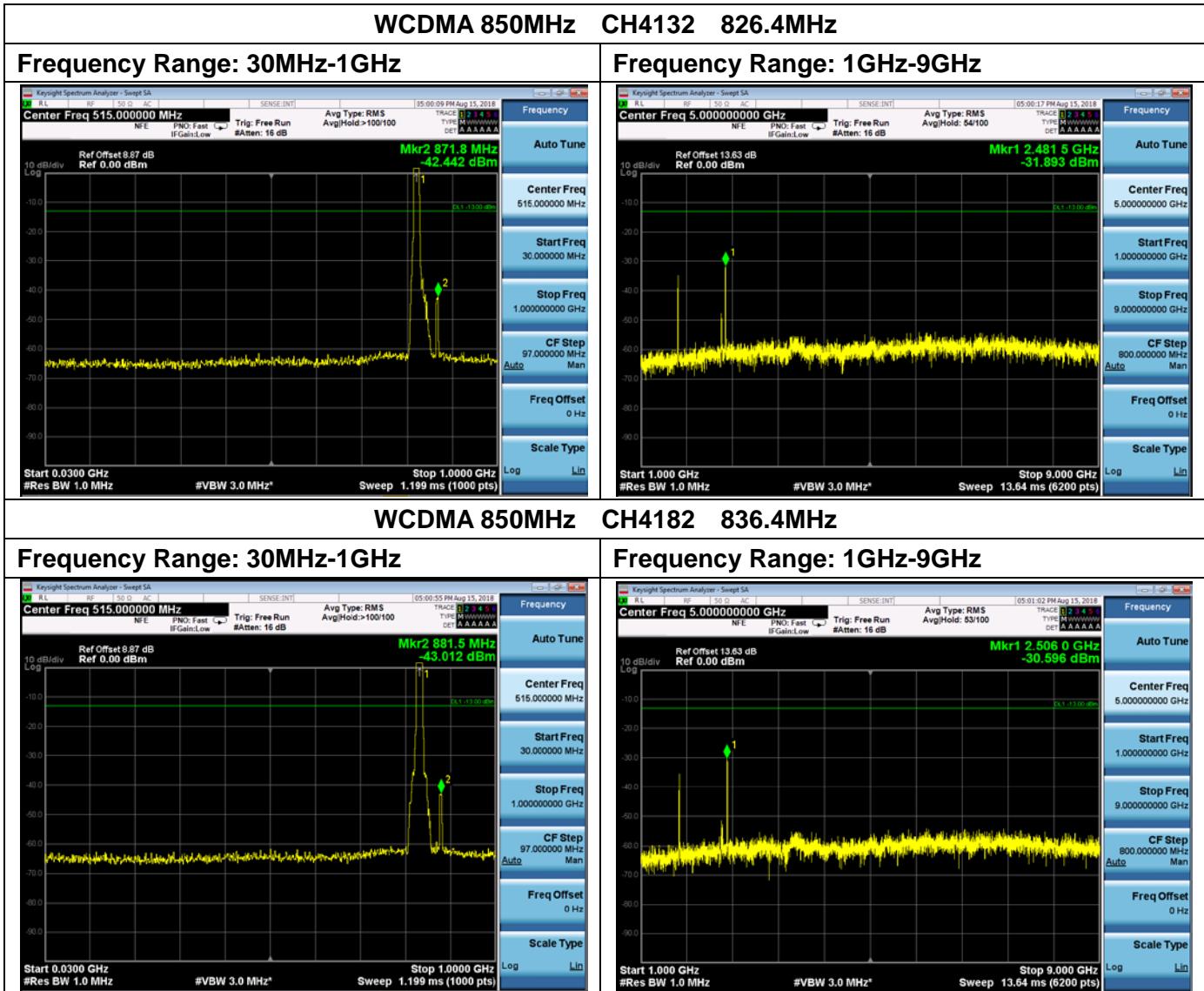
Test Setup:

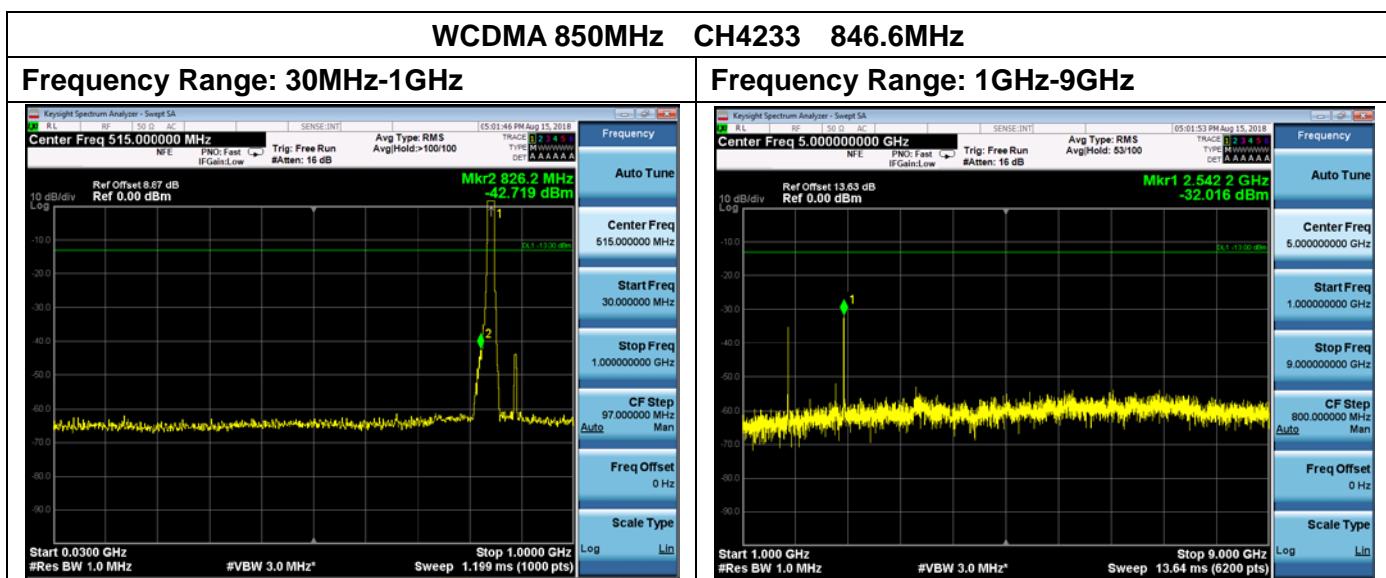


The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

### 2.5.3. Test Result

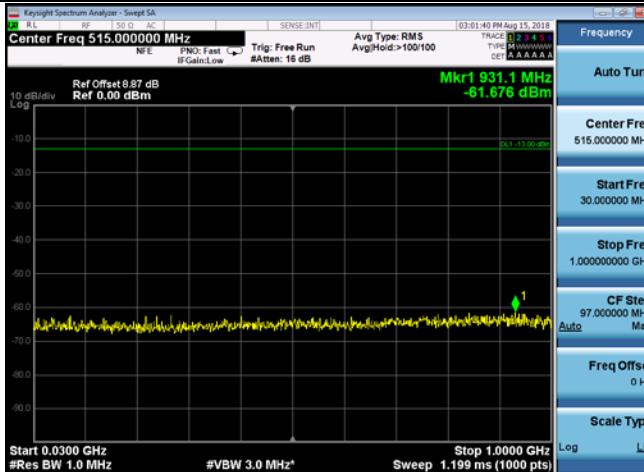
The measurement frequency range is from 30MHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.



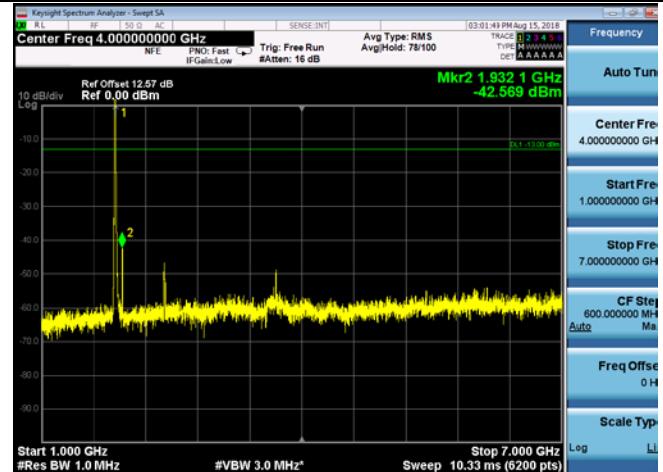


## WCDMA 1900MHz CH9262 1852.4MHz

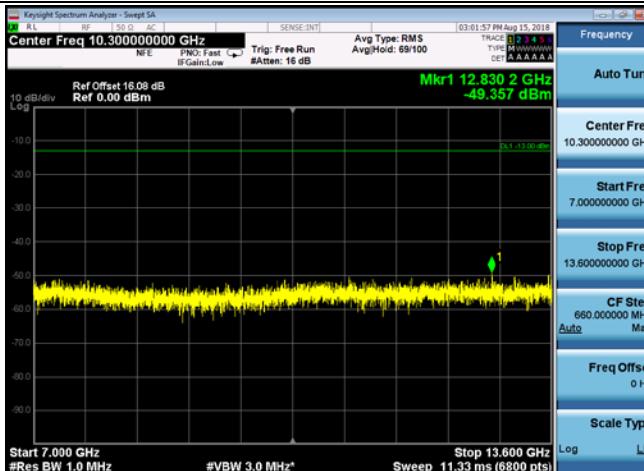
## Frequency Range: 30MHz-1GHz



## Frequency Range: 1GHz-7GHz



## Frequency Range: 7GHz-13.6GHz



## Frequency Range: 13.6GHz-20GHz

