FCC Part 22H 24E 27 Test Report

FCC ID: 2AHGW-BG310

Product Name:	Scouting Camera/Trail Camera
Trademark:	BOLY/Scoutguard/Bolyguard/Lover's Eye
Model Name:	BG310-M SERIES
Prepared For: Address:	Boly Media Communications (Shenzhen) Co., Ltd. 5/F West, 2nd Building, Pengtengda Industrial Park, Huarong Rd., Dalang Subdistrict, Longhua District, Shenzhen, Guangdong, China
Prepared By: Address:	Shenzhen BCTC Testing Co., Ltd. BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Dec. 19, 2019 – Mar. 04, 2020
Date of Report:	Mar. 04, 2020
Report No.:	BCTC1912001334E

VERIFICATION OF COMPLIANCE

Applicant's name .....:	Boly Media Communications (Shenzhen) Co., Ltd.
Address.....:	5/F West, 2nd Building, Pengtengda Industrial Park, Huarong Rd., Dalang Subdistrict, Longhua District, Shenzhen, Guangdong, China
Manufacture's Name .....:	Boly Media Communications (Shenzhen) Co., Ltd.
Address.....:	5/F West, 2nd Building, Pengtengda Industrial Park, Huarong Rd., Dalang Subdistrict, Longhua District, Shenzhen, Guangdong, China
Product description	
Product name .....:	Scouting Camera/Trail Camera
Trademark:	BOLY/Scoutguard/Bolyguard/Lover's Eye
Model Name:	BG310-M SERIES
Test procedure	FCC Part 22H & 24E & 27L

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Test Result : **Pass**

Prepared by(Engineer):	Willem Wang	Willem Wang
Reviewer(Supervisor):	Eric Yang	Eric Yang
Approved(Manager):	Zero Zhou	

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1.TEST SUMMARY

Test Items	Test Requirement	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Passed*
Conducted RF Output Power	2.1046 27.50(d)(4)	PASS
Peak to Average Radio	2.1055,22.355 24.235,27.54	PASS
99% & -26 dB Occupied Bandwidth	2.1049, 22.917 24.238, 27.53(h)	PASS
Frequency Stability	2.1055, 22.355 24.235, 27.54	PASS
Conducted Out of Band Emissions	2.1051,2.1057 22.917, 24.238 27.53(h)	PASS
Band Edge	2.1051,2.1057 22.917, 24.238 27.53(h)	PASS
Transmitter Radiated Power (EIPR/ERP)	22.913, 24.232 27.50	PASS
Radiated Out of Band Emissions	2.1053,2.1057 22.917, 24.238 27.53	PASS

2.GENERAL PRODUCT INFORMATION

2.1. Description of Device (EUT)

Product Name:	Scouting Camera/Trail Camera
Trademark	BOLY/Scoutguard/Bolyguard/Lover's Eye
Model No.:	BG310-M SERIES
Model Difference	N/A
Operation Frequency:	WCDMA Band II: Tx: 1852.40 - 1907.60MHz; Rx: 1932.60 – 1987.40MHz WCDMA Band IV: Tx: 1712.40 - 1752.60MHz; Rx: 2112.60 – 2452.40MHz WCDMA Band V: Tx: 826.40 - 846.60MHz; Rx: 871.40 – 891.60MHz
Modulation technology:	WCDMA Mode with BPSK Modulation HSDPA Mode with QPSK, 16QAM Modulation HSUPA Mode with QPSK, 16QAM Modulation
Antenna Type:	External Antenna
Antenna gain:	WCDMA BAND II: 3dBi WCDMA BAND IV: 3dBi WCDMA BAND V : 3dBi
Power supply:	DC 3.7V from battery

Note:
For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2.2. Product Function

Refer to Technical Construction Form and User Manual.

2.3. Independent Operation Modes

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
WCDMA Band II	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band IV	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band V	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link

Note: The maximum power levels are GSM mode for GMSK link, EGPRS multi-slot class 8 mode for 8PSK link, RMC12.2Kbps mode for WCDMA Band II and V. only these modes were used for all tests.

The conducted average power tables are as follows:

Average Conducted Power									
Band	WCDMA Band II.			WCDMA Band IV.			WCDMA Band V.		
Frequency	1852.4	1880.0	1907.6	1712.4	1732.4	1752.6	826.4	836.6	846.6
RMC 12.2Kbps	22.30	22.43	22.63	21.61	21.96	21.78	22.30	22.55	22.38

3. TEST SITES

3.1. Test Facilities

Site Description

Name of Firm	:	Shenzhen BCTC Testing Co., Ltd.
Site Location	:	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Lab Qualifications	:	FCC Test Firm Registration Number: 712850 IC Registered No.: 23583

3.1.1. Measurement Uncertainty

The reported uncertainty of measurement y ± U , where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2 , providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
3	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
4	Conducted Adjacent channel power	U=1.38dB
5	Conducted output power uncertainty Above 1G	U=1.576dB
6	Conducted output power uncertainty below 1G	U=1.28dB
7	humidity uncertainty	U=5.3%
8	Temperature uncertainty	U=0.59℃

3.2. List of Test and Measurement Instruments

3.2.1. For conducted emission at the mains terminals test

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESR3	102075	Jun. 13, 2019	Jun. 12, 2020
2	LISN	SCHWARZBECK	NSLK8127	8127739	Jun. 13, 2019	Jun. 12, 2020
3	LISN	R&S	ENV216	101375	Jun. 13, 2019	Jun. 12, 2020
4	RF cables	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
5	Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

3.2.2. For radiated test

tem	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	MY45109572	Jun. 13, 2019	Jun. 12, 2020
2	Test Receiver	R&S	ESR7	101154	Jun. 13, 2019	Jun. 12, 2020
3	Bilog Antenna	SCHWARZBECK	VULB9163	VULB9163-942	Jun. 22, 2019	Jun. 21, 2020
4	Horn Antenna	SCHWARZBECK	BBHA9120D	1541	Jun. 22, 2019	Jun. 21, 2020
5	Horn Antenna	SCHWARZBECK	BBHA9170	822	Jun. 22, 2019	Jun. 21, 2020
6	Karaoke Microphone	SCHWARZBECK	BBV9744	9744-0037	Jun. 25, 2019	Jun. 24, 2020
7	Karaoke Microphone	SCHWARZBECK	BBV9718	9718-309	Jun. 25, 2019	Jun. 24, 2020
8	Karaoke Microphone	MITEQ	TTA1840-35-HG	2034381	Jun. 17, 2019	Jun. 16, 2020
9	Loop Antenna	SCHWARZBECK	FMZB1519B	014	Jul. 02, 2019	Jul. 01, 2020
10	RF cables1	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
11	RF cables2	Huber+Suhnar	30MHz-1GHz	1486150	Jun. 25, 2019	Jun. 24, 2020
12	RF cables3	Huber+Suhnar	1GHz-40GHz	1607106	Jun. 25, 2019	Jun. 24, 2020
13	Power Metter	Keysight	E4419B	\	Jun. 17, 2019	Jun. 16, 2020
14	Power Sensor (AV)	Keysight	E9 300A	\	Jun. 17, 2019	Jun. 16, 2020
15	Signal Analyzer	KEYSIGHT	N9020A	MY49100060	Jun. 13, 2019	Jun. 12, 2020
16	Spectrum Analyzer	Aglient	FSP40	100363	Jun. 13, 2019	Jun. 12, 2020
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
19	Spectrum Analyzer	KEYSIGHT	N5182B	MY56200519	Jun. 13, 2019	Jun. 12, 2020
20	Bilog Antenna	Schwarz beck	VULB9163	9163-333	Jun. 13, 2019	Jun. 12, 2020

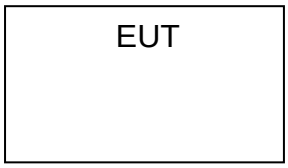
4. TEST SET-UP

4.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

4.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: RidgeTec Lookout)

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4.3. Test Environment:

Ambient conditions in the test laboratory:

Items	Actual
Temperature (℃)	21~23
Humidity (%RH)	50~65

5. EMISSION TEST RESULTS

5.1. Conducted RF Output Power

5.1.1. Limit

According to FCC section 2.1046(a) , FCC part22.913(a), FCC part 24.232(b) and 27.50(c)(10), 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).

5.1.2. Test Setup

The EUT, which is powered by the adapter, 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.

5.1.3. Test Result

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

Measurement data

The conducted power tables are as follows:

Average Conducted Power									
Band	WCDMA Band II.			WCDMA Band IV.			WCDMA Band V.		
Frequency	1852.4	1880.0	1907.6	1712.4	1732.4	1752.6	826.4	836.6	846.6
RMC 12.2Kbps	24.36	24.57	24.30	23.84	24.38	23.83	24.61	24.82	24.76
RMC 64kbps	24.17	24.39	24.22	23.70	24.23	23.80	24.46	24.68	24.67
RMC 144kbps	24.16	24.26	24.10	23.56	24.20	23.63	24.27	24.59	24.65
RMC 384kbps	24.03	24.14	23.99	23.48	24.18	23.59	24.18	24.46	24.63
HSDPA Subtest-1	23.12	23.42	23.18	22.57	22.92	22.7	23.45	23.6	23.52
HSDPA Subtest-2	22.93	23.42	23.03	22.50	22.84	22.59	23.29	23.56	23.45
HSDPA Subtest-3	22.85	23.40	23.01	22.34	22.73	22.47	23.21	23.42	23.37
HSDPA Subtest-4	22.70	23.25	22.95	22.17	22.54	22.44	23.09	23.28	23.25
HSUPA Subtest-1	22.69	22.74	22.62	22.03	22.33	22.35	22.86	23.01	22.97
HSUPA Subtest-2	22.66	22.68	22.49	21.85	22.18	22.24	22.86	22.82	22.90
HSUPA Subtest-3	22.59	22.64	22.43	21.76	22.14	22.22	22.71	22.68	22.70
HSUPA Subtest-4	22.59	22.46	22.37	21.67	21.96	22.16	22.58	22.67	22.55

Note: Measurement Uncertainty: ±2.6 dB.

5.2. Peak-to-average Ratio of Transmitter

5.2.1. Limit

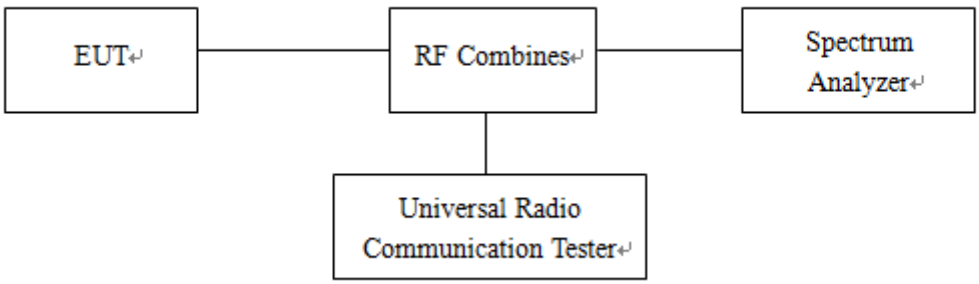
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

5.2.2. Test Setup

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.Record the maximum PAPR level associated with a probability of 0.1%.

Test Configuration for the emission bandwidth testing:



5.2.3. Test Result

For WCDMA Band II

Test Mode	Channel	Frequency (MHz)	PAR(dB)	Limited (dB)
WCDMA	9262	1852.4	2.70	13
	9400	1880.0	2.87	13
	9538	1907.6	2.97	13
HSDPA	9262	1852.4	3.55	13
	9400	1880.0	3.67	13
	9538	1907.6	3.79	13
HSUPA	9262	1852.4	3.61	13
	9400	1880.0	3.75	13
	9538	1907.6	3.81	13

For WCDMA Band IV

Test Mode	Channel	Frequency (MHz)	PAR(dB)	Limited (dB)
WCDMA	1312	1712.4	2.63	13
	1412	1732.4	2.67	13
	1513	1752.6	2.58	13
HSDPA	1312	1712.4	3.57	13
	1412	1732.4	3.63	13
	1513	1752.6	3.52	13
HSUPA	1312	1712.4	3.67	13
	1412	1732.4	3.73	13
	1513	1752.6	3.56	13

For WCDMA Band V

Test Mode	Channel	Frequency (MHz)	PAR(dB)	Limited (dB)
WCDMA	4132	826.4	2.96	13
	4175	836.6	3.45	13
	4233	846.6	3.11	13
HSDPA	4132	826.4	3.65	13
	4175	836.6	4.12	13
	4233	846.6	3.87	13
HSUPA	4132	826.4	3.66	13
	4175	836.6	4.08	13
	4233	846.6	3.87	13

BAND II-L

BAND II-M

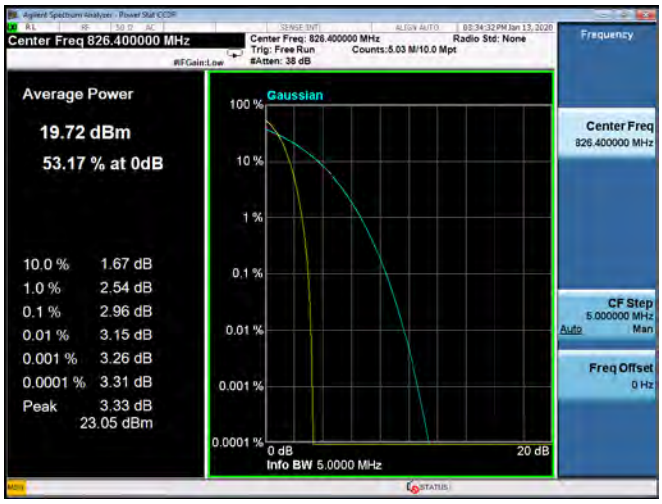
BAND II-H

BAND IV-L

BAND IV-M

BAND IV-H

BAND V-L



BAND V-M

BAND V-H

Center Freq 846.600000 MHz
Center Freq: 846.600000 MHz
Trig: Free Run
#Atten: 38 dB
Counts:3.62 M/10.0 Mpt
Radio Std: None
Frequency
Average Power
19.26 dBm
52.65 % at 0dB
10.0 % 1.74 dB
1.0 % 2.65 dB
0.1 % 3.11 dB
0.01 % 3.32 dB
0.001 % 3.44 dB
0.0001 % 3.53 dB
Peak 3.57 dB
22.83 dBm
Gaussian
100 %
10 %
1 %
0.1 %
0.01 %
0.001 %
0.0001 %
0 dB
20 dB
Info BW 5.0000 MHz
Center Freq
846.600000 MHz
CF Step
5.000000 MHz
Auto
Man
Freq Offset
0 Hz
File <PICTURE.PNG> saved

5.3. -26dB and 99% Occupied Bandwidth

5.3.1. Limit

According to FCC section 2.1049 and FCC part22.913(a), FCC part24.232(b) and 27.53, 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,

5.3.2. Test Setup

The EUT, which is powered by the adapter, 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.

5.3.3. Test Result

Measurement Data

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
WCDMA Band V	4132	826.4	4142	4700
	4175	836.6	4136	4699
	4233	846.6	4155	4694
WCDMA Band IV	1312	1712.4	4140	4719
	1412	1732.4	4141	4719
	1513	1752.6	4141	4715
WCDMA Band II	9262	1852.4	3384	4743
	9400	1880.0	3410	4729
	9538	1907.6	3412	4735

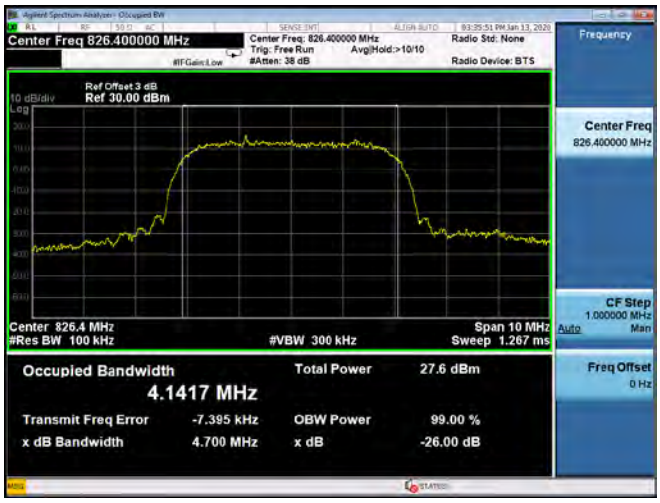
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
HSDPA Band V	4132	826.4	4139	5259
	4175	836.6	4137	4699
	4233	846.6	4160	4738
HSDPA Band IV	1312	1712.4	4145	4695
	1412	1732.4	4139	4717
	1513	1752.6	4141	4701
HSDPA Band II	9262	1852.4	3408	4721
	9400	1880.0	3394	4669
	9538	1907.6	3384	4717

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
HSUPA Band V	4132	826.4	4111	4709
	4175	836.6	4140	4710
	4233	846.6	4157	4706
HSUPA Band IV	1312	1712.4	4140	4677
	1412	1732.4	4129	4694
	1513	1752.6	4149	4720
HSUPA Band II	9262	1852.4	3412	4683
	9400	1880.0	3428	4715
	9538	1907.6	3402	4697

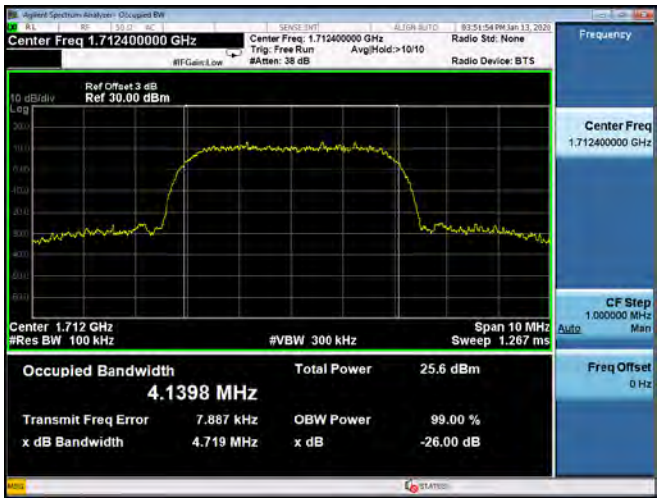
Note: Measurement Uncertainty: ±20Hz.

Test plot as follows:

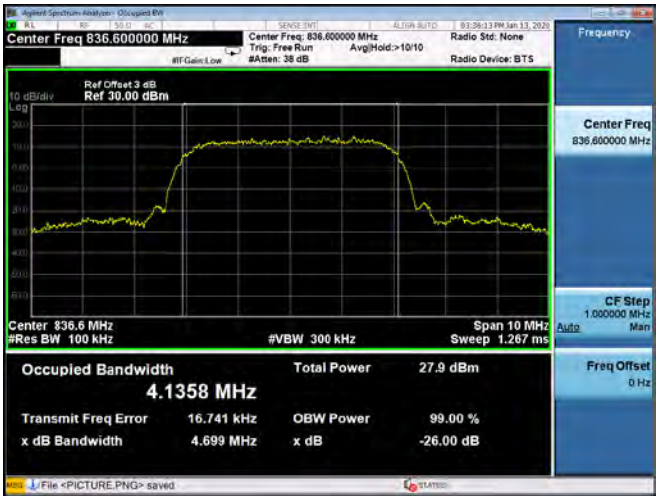
WCDMA Band V Lowest channel



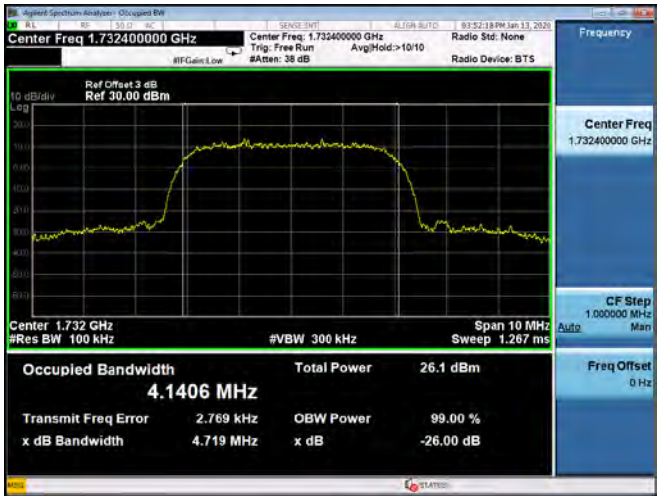
WCDMA Band IV Lowest channel



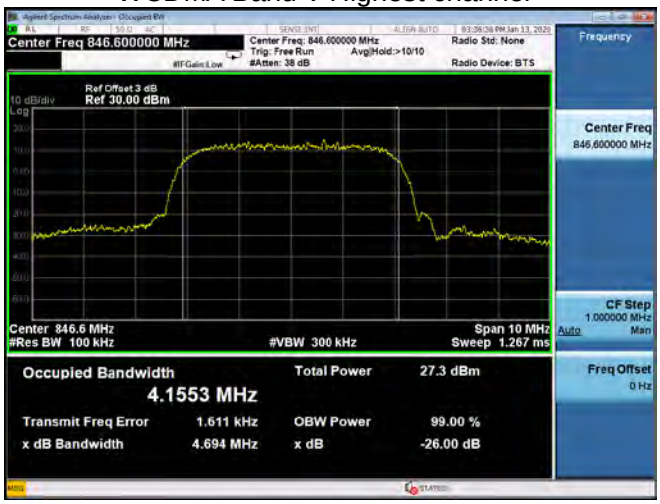
WCDMA Band V Middle channel



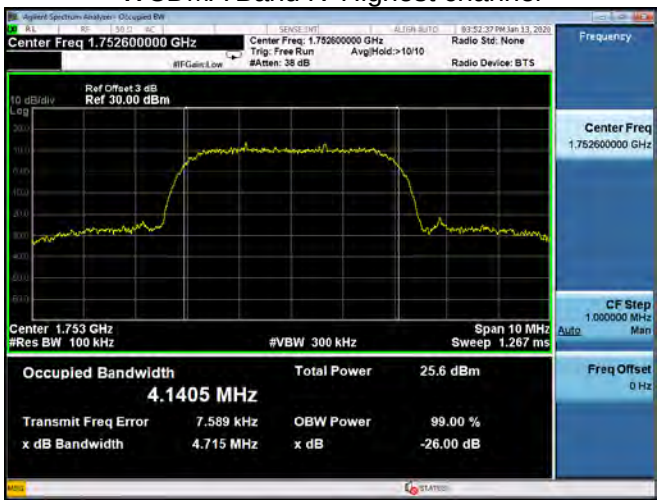
WCDMA Band IV Middle channel



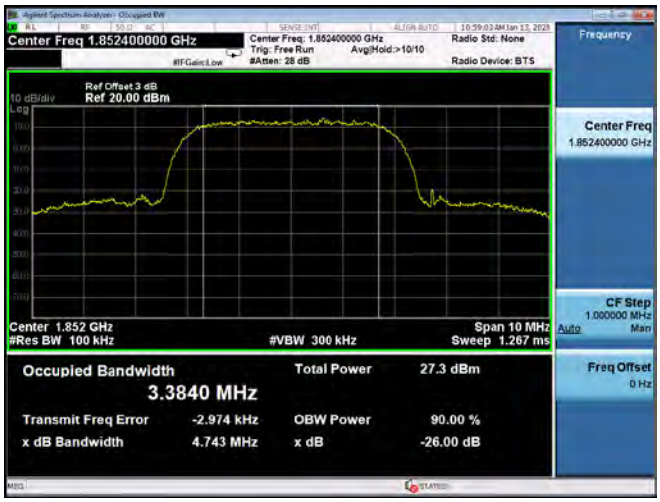
WCDMA Band V Highest channel



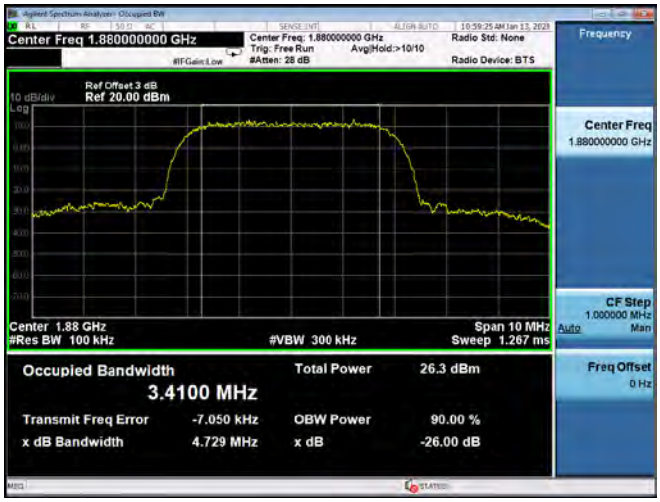
WCDMA Band IV Highest channel



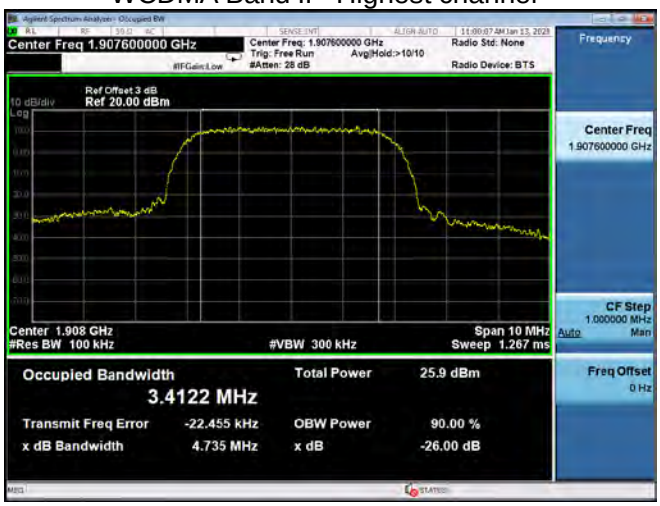
WCDMA Band II Lowest channel



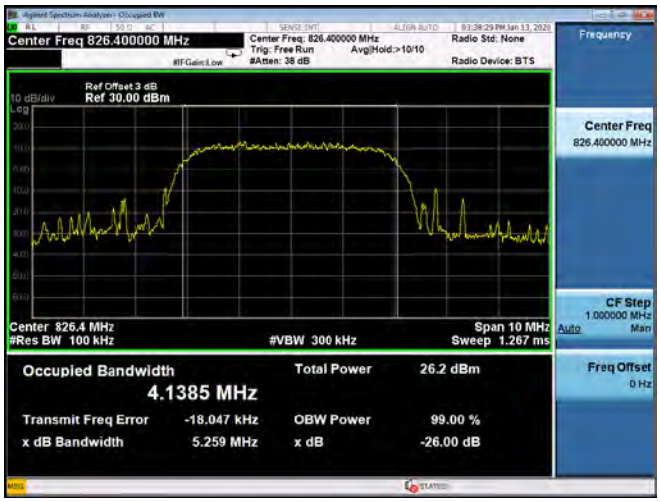
WCDMA Band II Middle channel



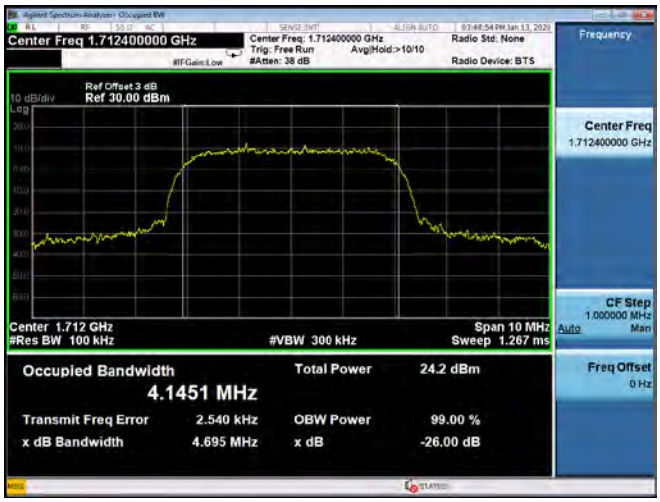
WCDMA Band II Highest channel



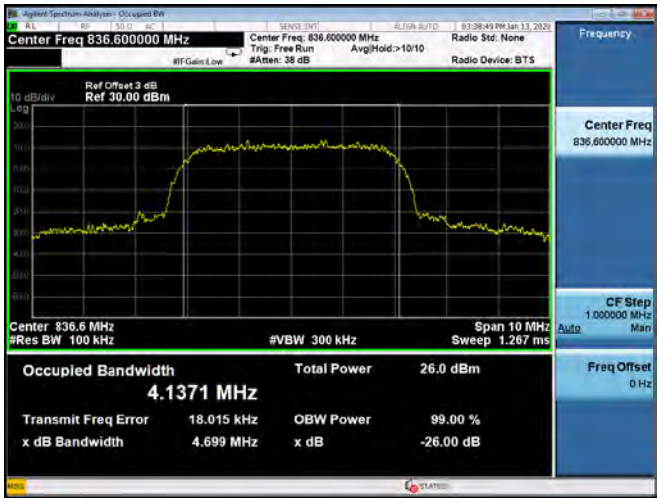
HSDPA Band V Lowest channel



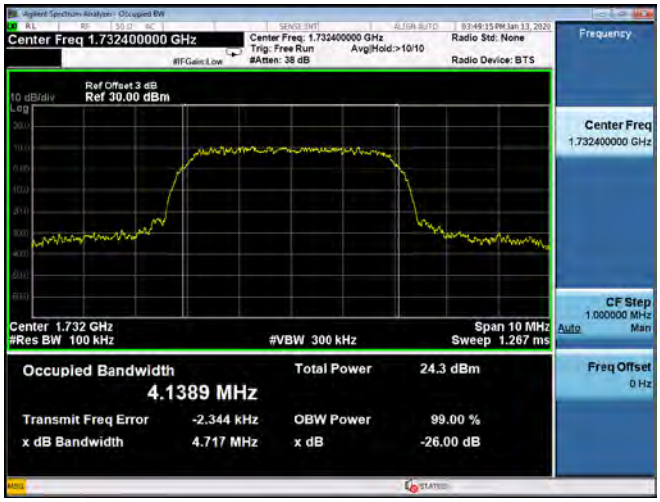
HSDPA Band IV Lowest channel



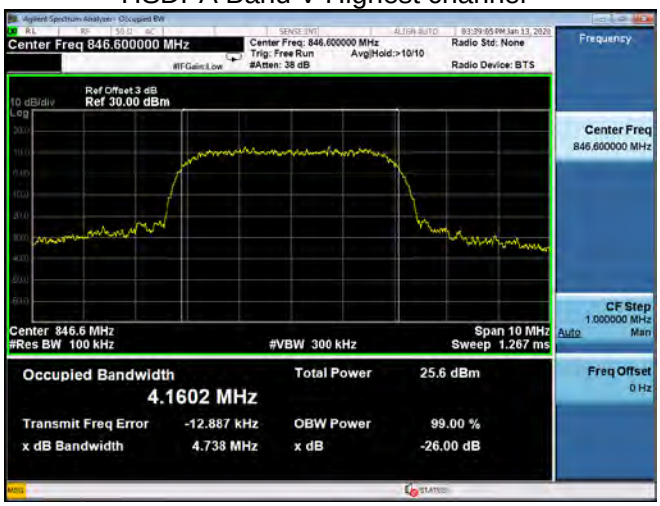
HSDPA Band V Middle channel



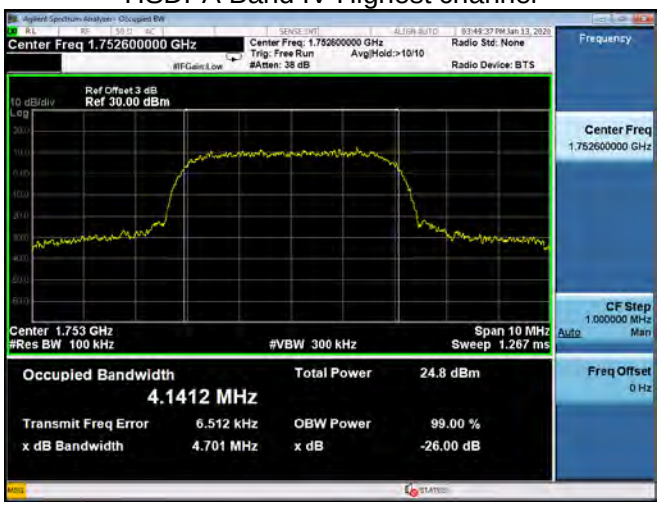
HSDPA Band IV Middle channel



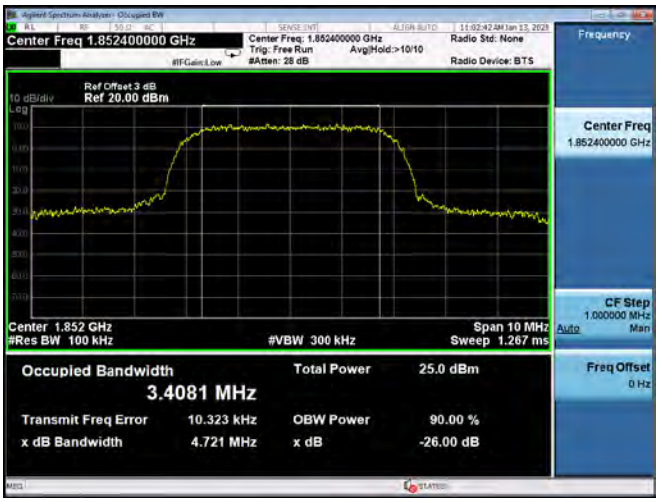
HSDPA Band V Highest channel



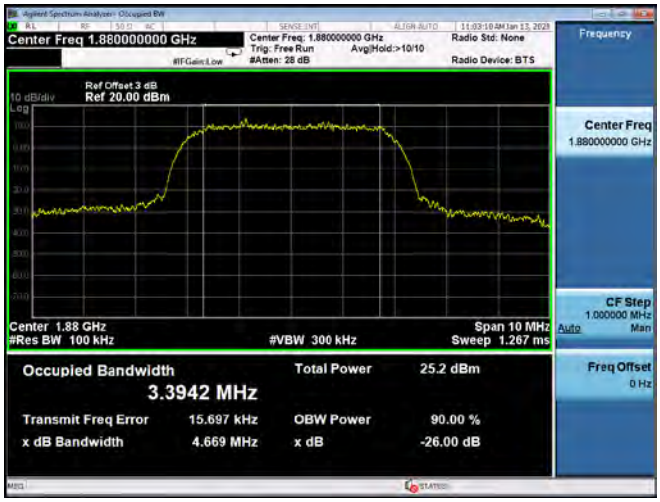
HSDPA Band IV Highest channel



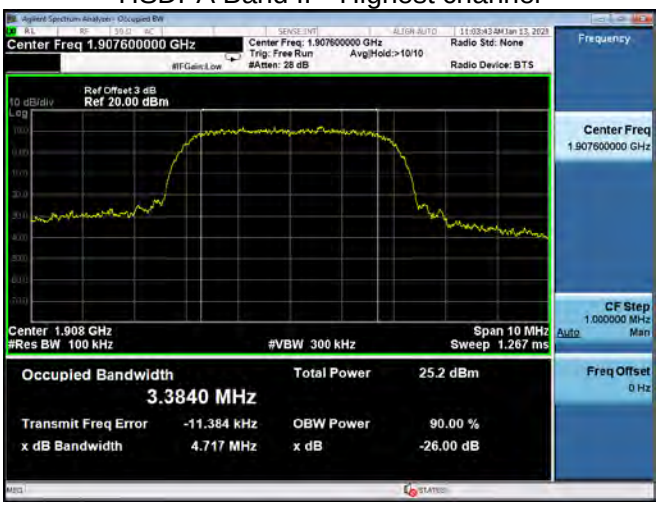
HSDPA Band II Lowest channel



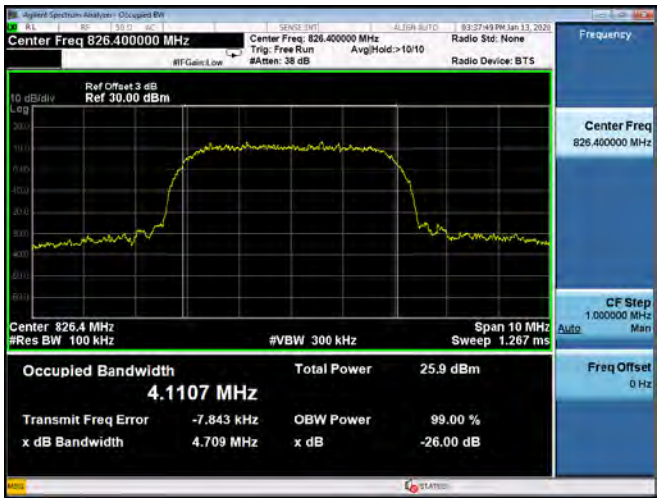
HSDPA Band II Middle channel



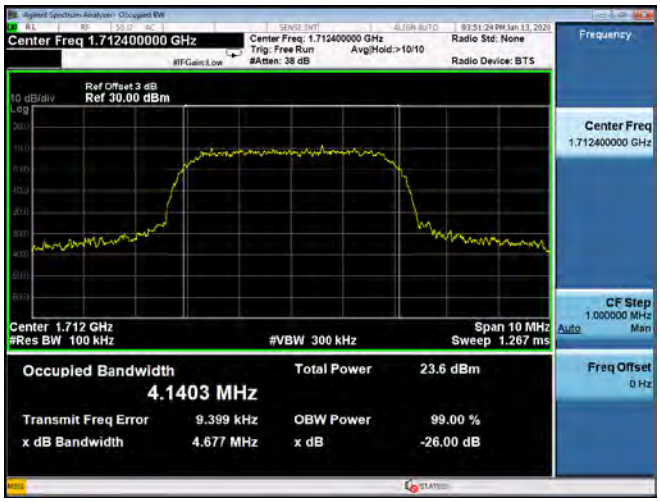
HSDPA Band II Highest channel



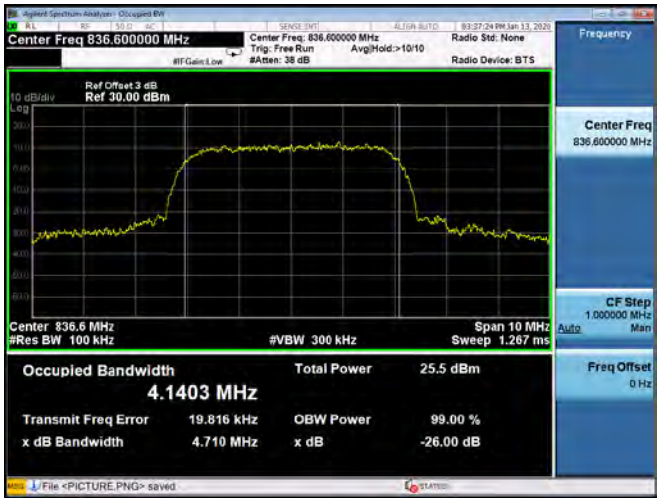
HSUPA Band V Lowest channel



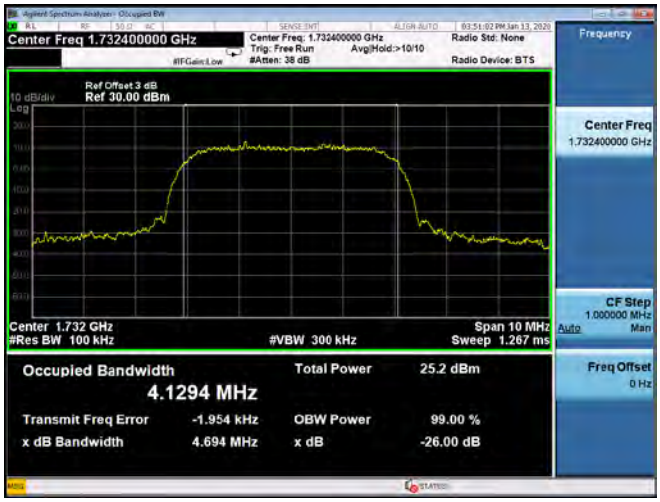
HSUPA Band IV Lowest channel



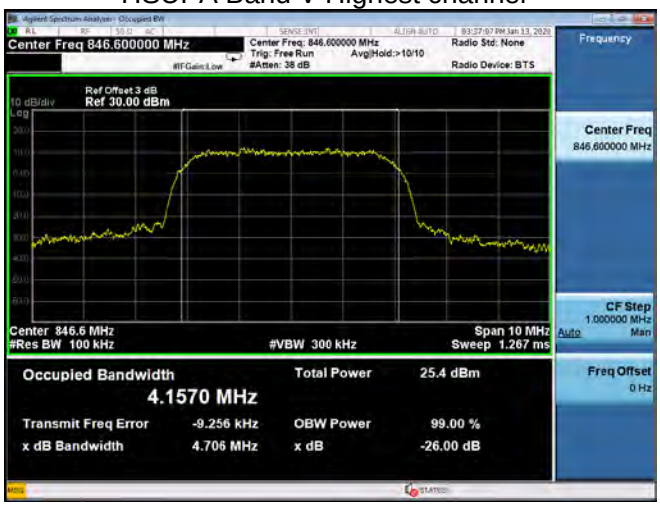
HSUPA Band V Middle channel



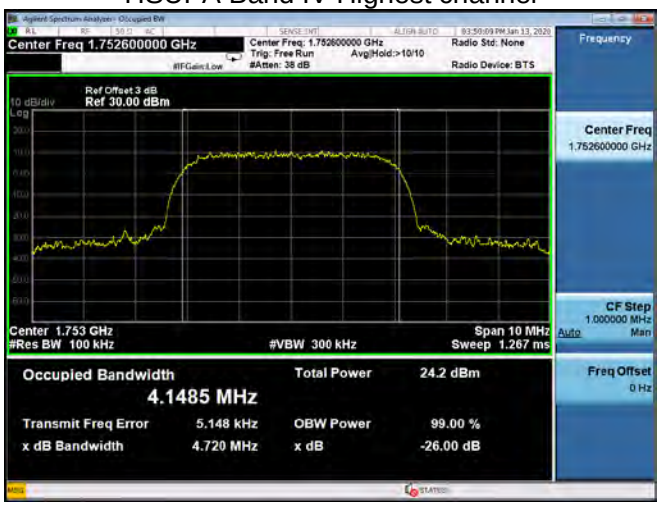
HSUPA Band IV Middle channel



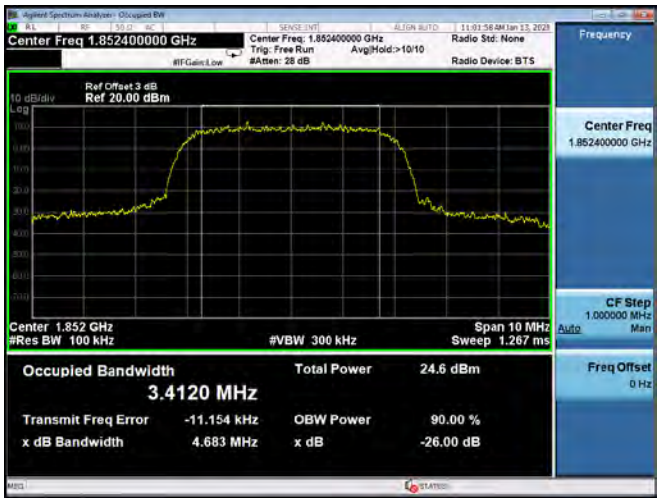
HSUPA Band V Highest channel



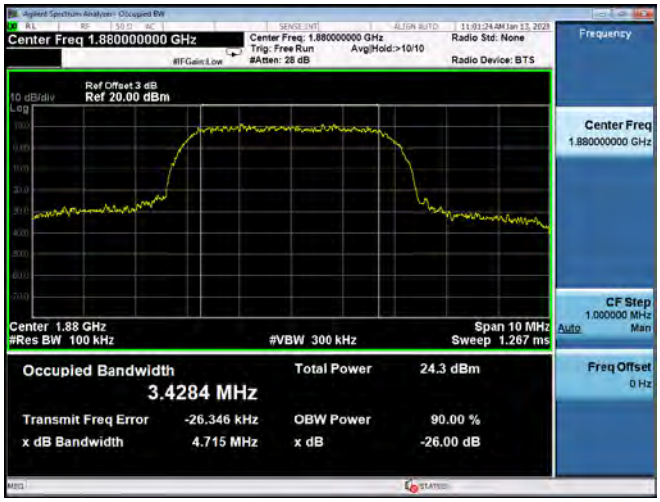
HSUPA Band IV Highest channel



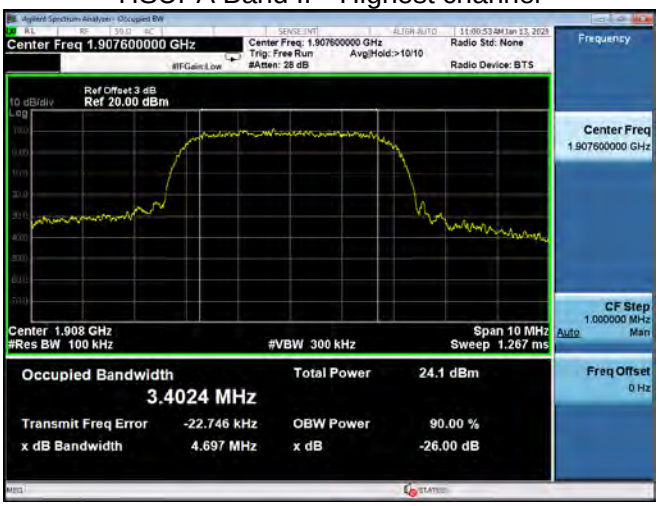
HSUPA Band II Lowest channel



HSUPA Band II Middle channel



HSUPA Band II Highest channel



5.4. Frequency Stability

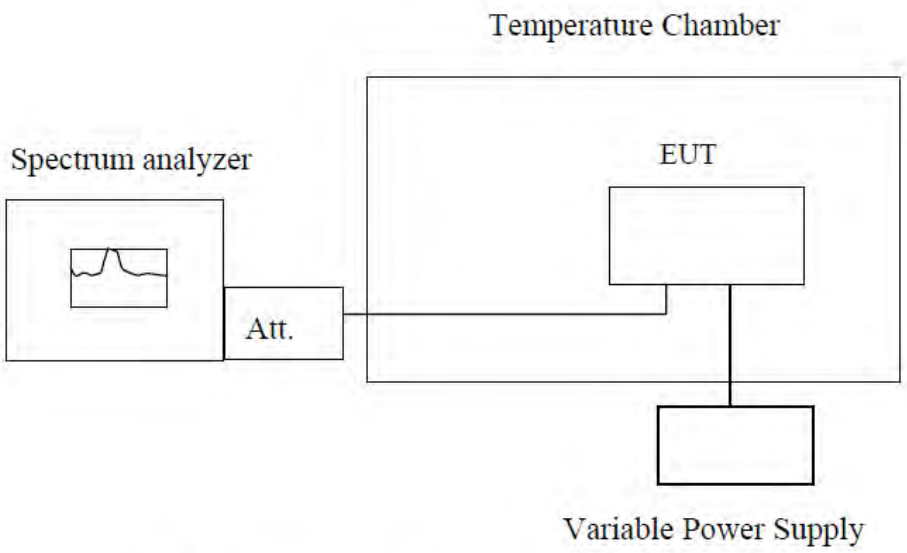
5.4.1. Limit

According to FCC section 22.355, FCC section 24.235 and FCC section 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℃ to +50℃ at intervals of not more than 10℃

(b) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

5.4.2. Test Setup



Note : Measurement setup for testing on Antenna connector

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

5.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.5VDC which are specified by the applicant; the normal temperature here used is 25℃. The frequency deviation limit of 850MHz band is ±2.5ppm, and 1900MHz is ±2.5ppm

Test Conditions			Frequency Deviation			Result
Band	Power(Vdc)	Temperature(℃	Frequency Error(Hz)	ppm	Limit	
WCDMA Band II Middle channel=1880.0MHz	3.7	-30	1	0.000532	±2.5	PASS
	3.7	-20	-3	-0.001596		
	3.7	-10	-5	-0.002660		
	3.7	0	-2	-0.001064		
	3.7	10	-6	-0.003191		
	3.7	20	-8	-0.004255		
	3.7	30	-4	-0.002128		
	3.7	40	-9	-0.004787		
	3.7	50	-11	-0.005851		
	4.2	25	-7	-0.003723		
	3.7	25	-12	-0.006383		
	3.5	25	-14	-0.007447		
WCDMA Band IV Middle channel=1732.4MHz	3.7	-30	15	0.008659	±2.5	PASS
	3.7	-20	-2	-0.001154		
	3.7	-10	-17	-0.009813		
	3.7	0	13	0.007504		
	3.7	10	-5	-0.002886		
	3.7	20	-18	-0.010390		
	3.7	30	11	0.006350		
	3.7	40	-6	-0.003463		
	3.7	50	-19	-0.010967		
	4.2	25	8	0.004618		
	3.7	25	-9	-0.005195		
	3.5	25	-21	-0.012122		
WCDMA Band V Middle channel=836.6MHz	3.7	-30	0	0.000000	±2.5	PASS
	3.7	-20	0	0.000000		
	3.7	-10	-1	-0.001195		
	3.7	0	-2	-0.002391		
	3.7	10	-3	-0.003586		
	3.7	20	-4	-0.004781		
	3.7	30	-5	-0.005977		
	3.7	40	-7	-0.008367		
	3.7	50	-9	-0.010758		
	4.2	25	-8	-0.009563		
	3.7	25	-10	-0.011953		
	3.5	25	-12	-0.014344		

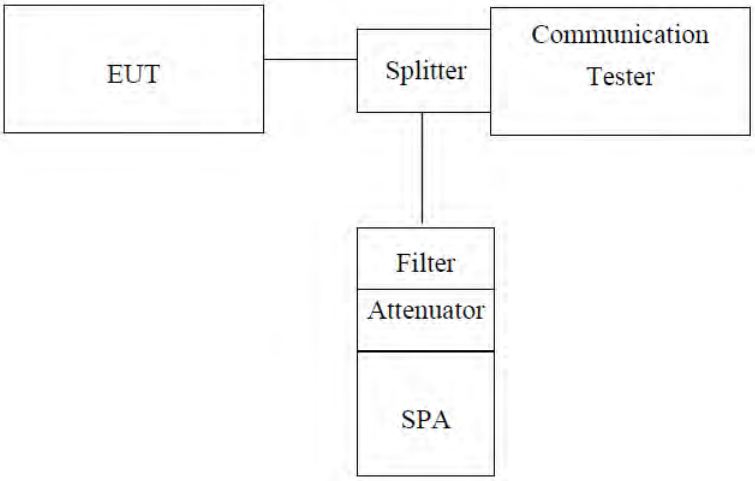
Note: Measurement Uncertainty: ±20Hz.

5.5. Conducted Spurious Emissions

5.5.1. Limit

According to FCC section 22.917(a), FCC section 24.238(a) and FCC section 27.53, 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.

5.5.2. Test Setup



Note: *Measurement setup for testing on Antenna connector*

5.5.3. Measurement Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW/VBW = 100/300KHz, Start=30MHz, Stop= 1GHz

RBW/VBW=1/3MHz, Start=1GHz, Stop=26.5GHz.

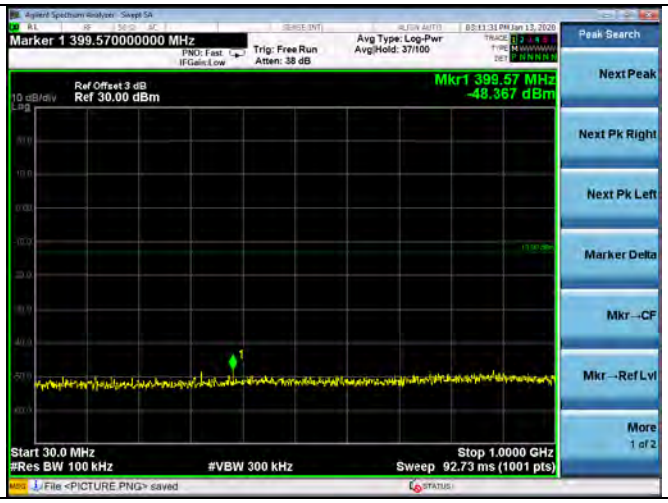
Limit = -13dBm

5.5.4. Test Result

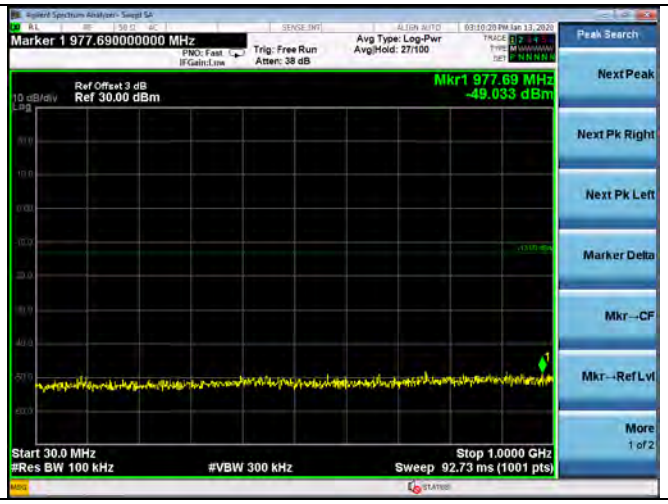
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

Test plot as follows:

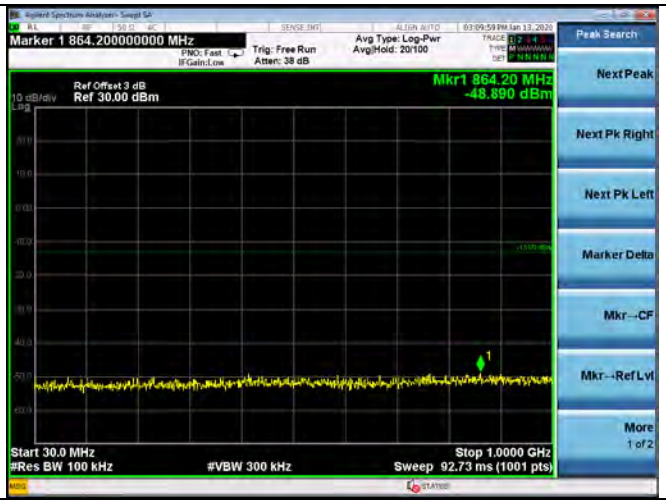
WCDMA Band II Lowest channel



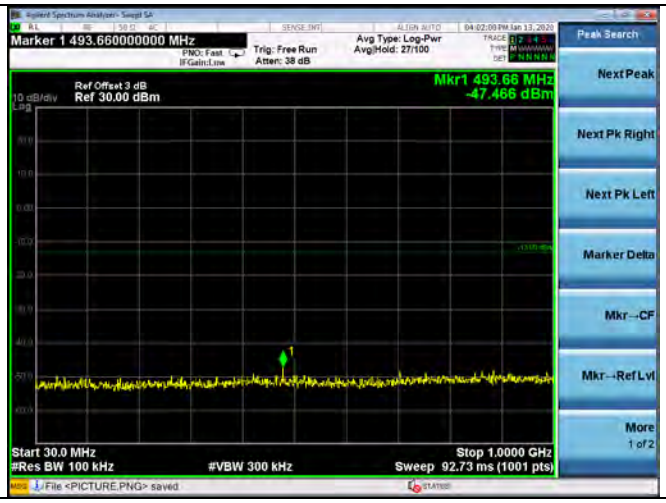
WCDMA Band II Middle channel



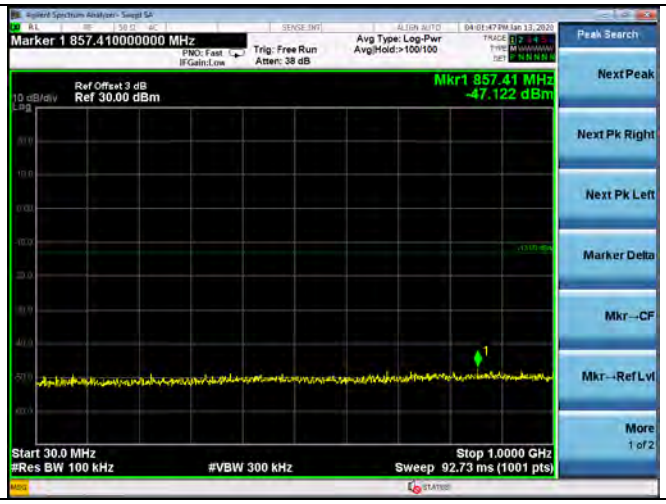
WCDMA Band II Highest channel



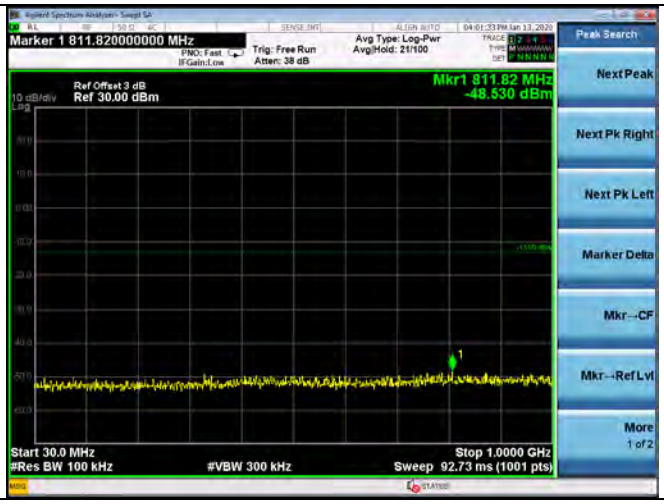
WCDMA Band IV Lowest channel



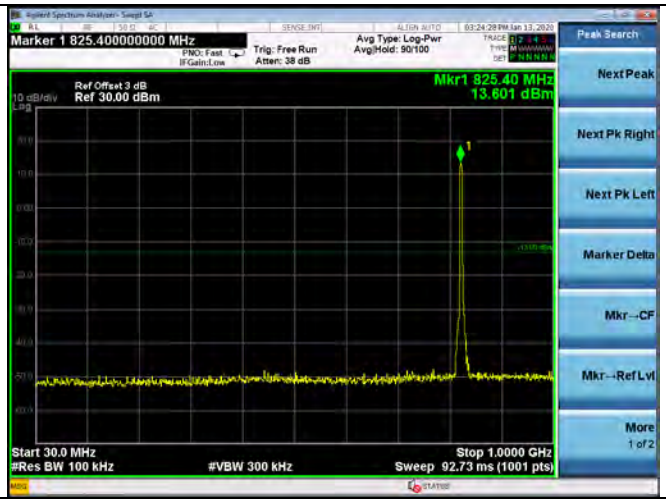
WCDMA Band IV Middle channel



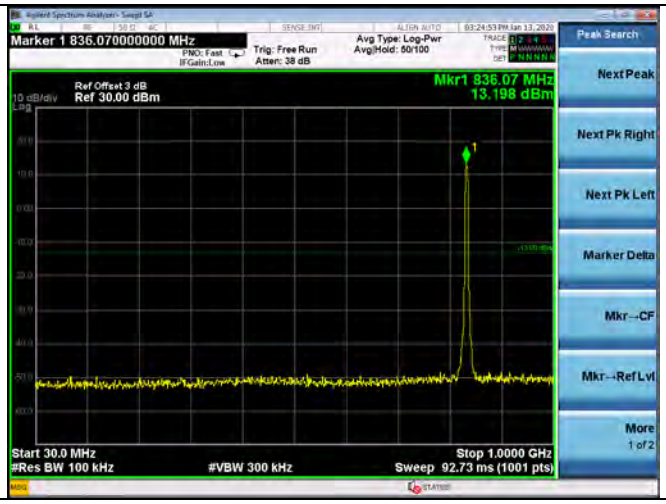
WCDMA Band IV Highest channel



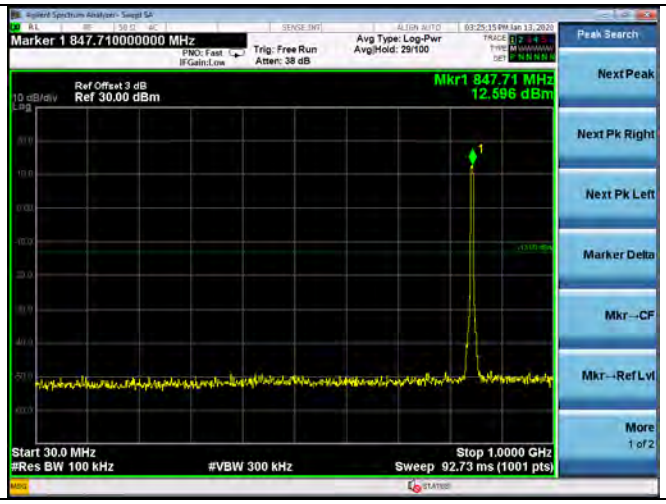
WCDMA Band V Lowest channel



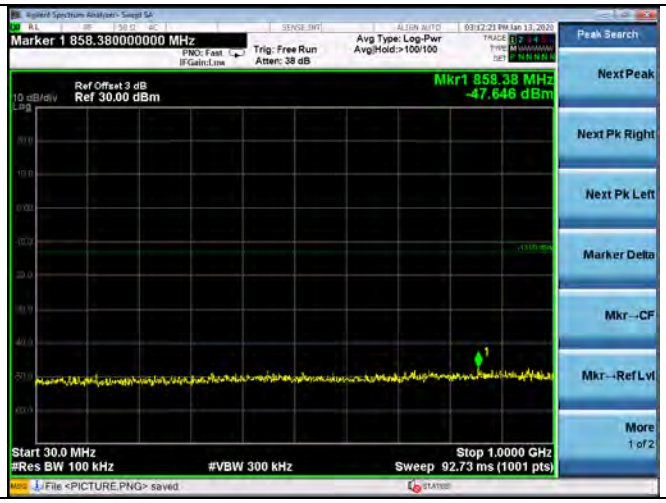
WCDMA Band V Middle channel



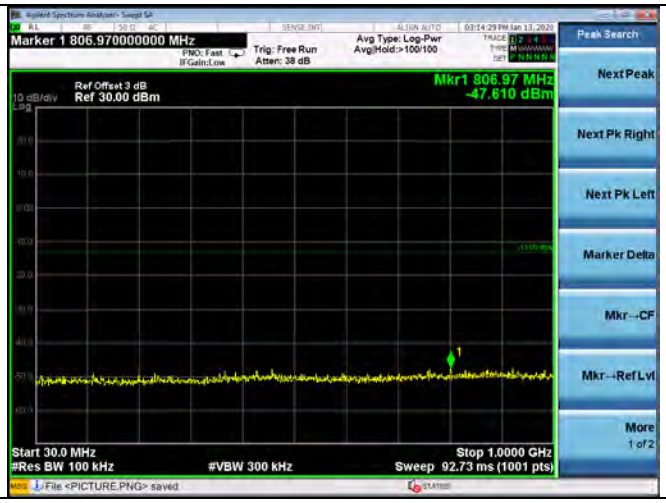
WCDMA Band V Highest channel



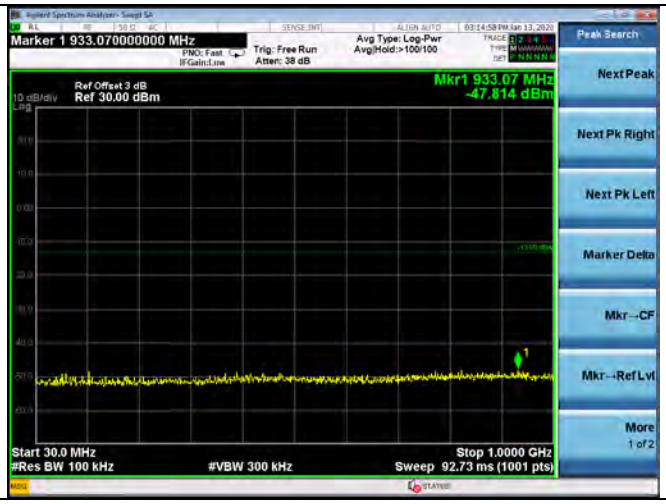
HSDPA Band II Lowest channel



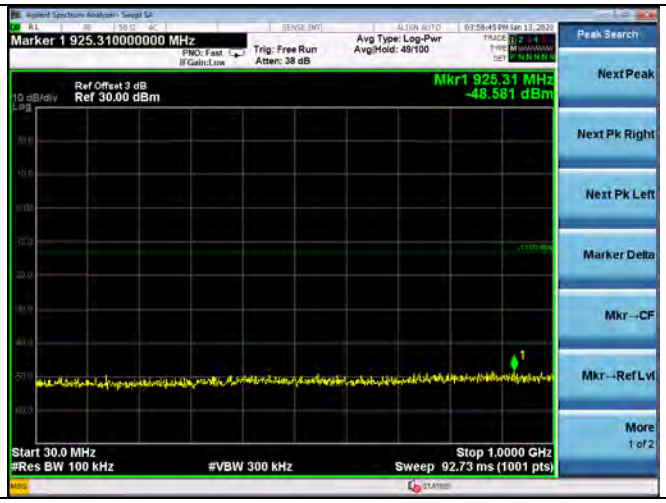
HSDPA Band II Middle channel



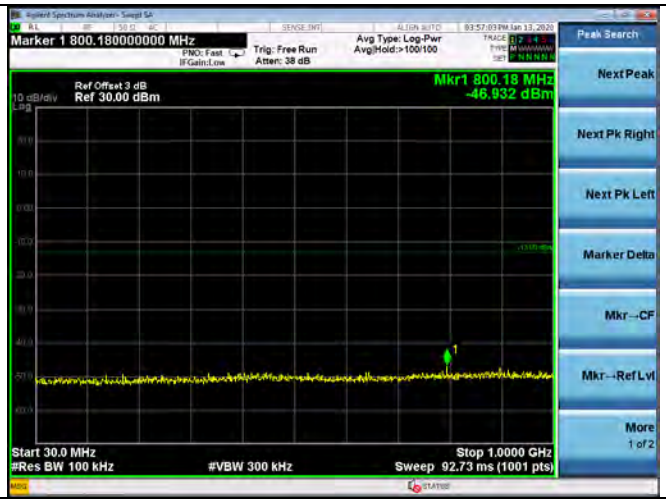
HSDPA Band II Highest channel



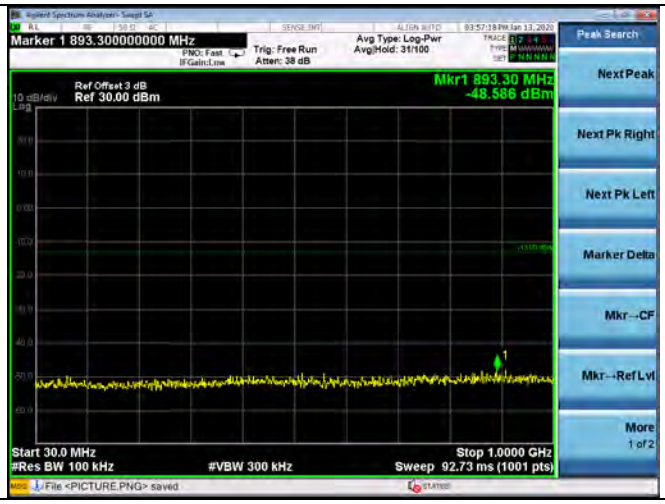
HSDPA Band IV Lowest channel



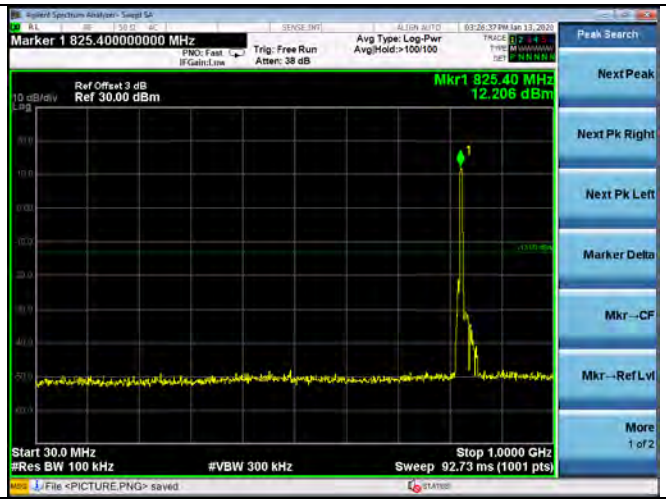
HSDPA Band IV Middle channel



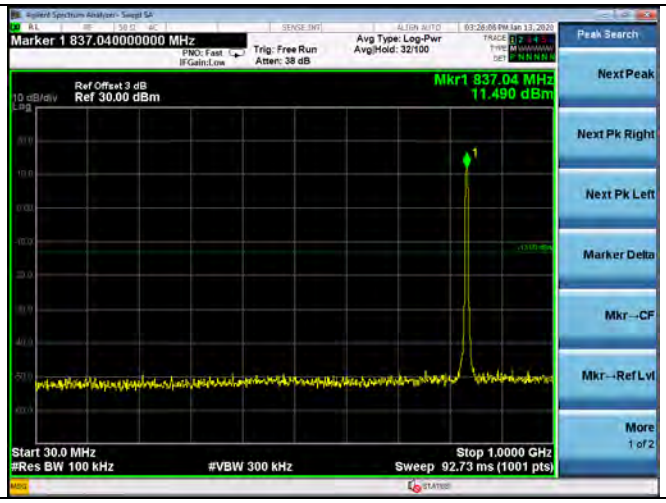
HSDPA Band IV Highest channel



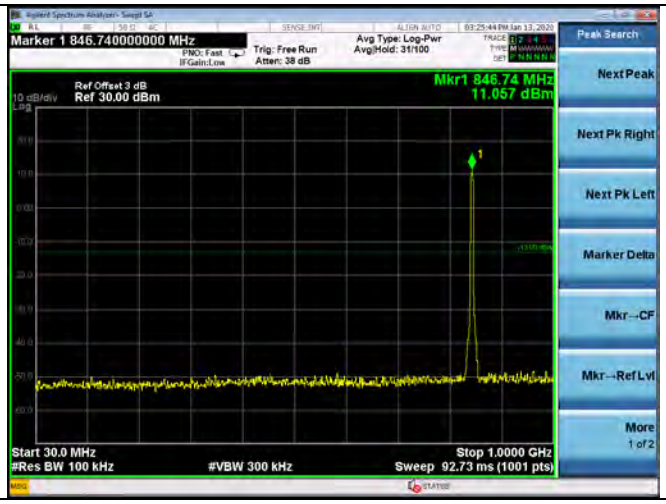
HSDPA Band V Lowest channel



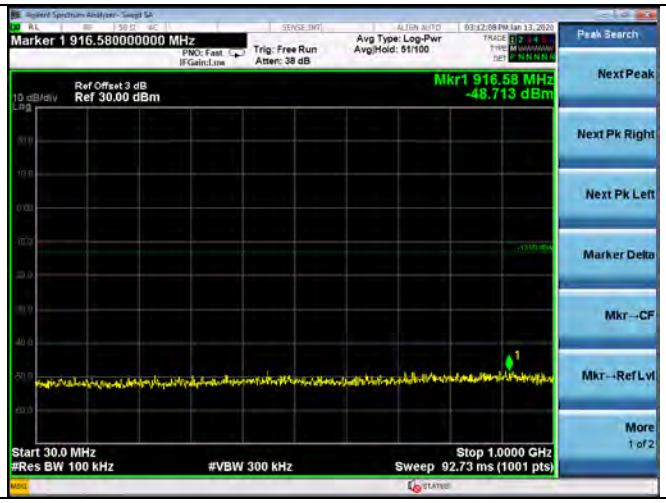
HSDPA Band V Middle channel



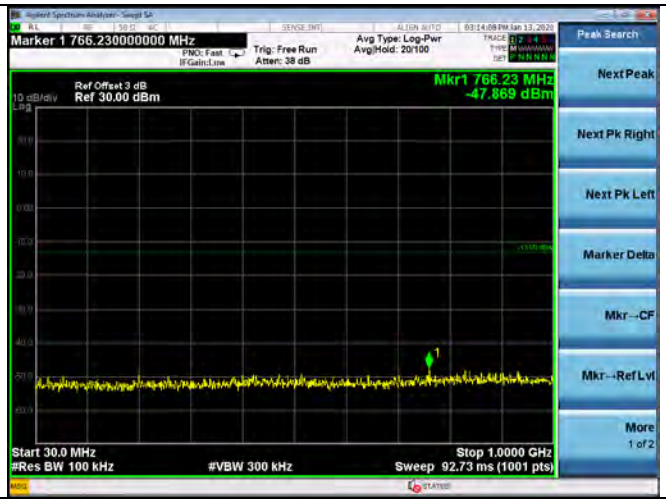
HSDPA Band V Highest channel



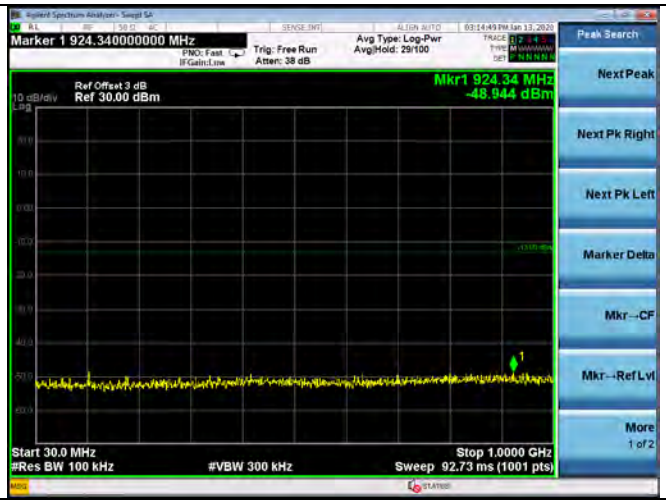
HSUPA Band II Lowest channel



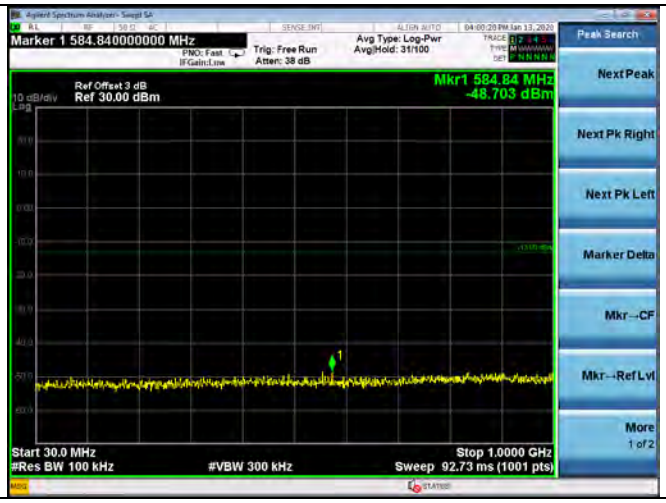
HSUPA Band II Middle channel



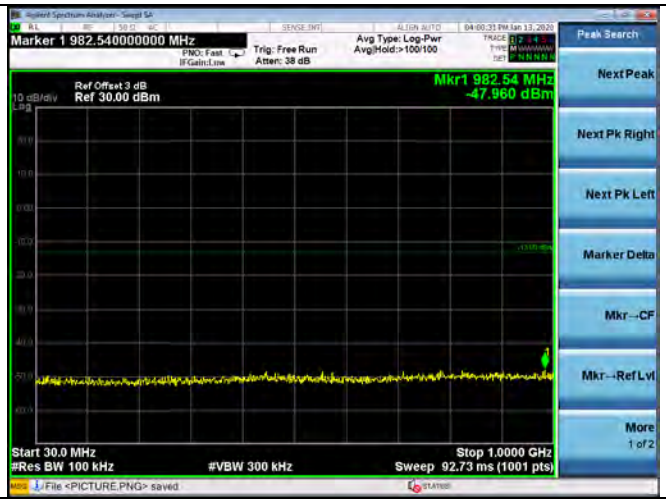
HSUPA Band II Highest channel



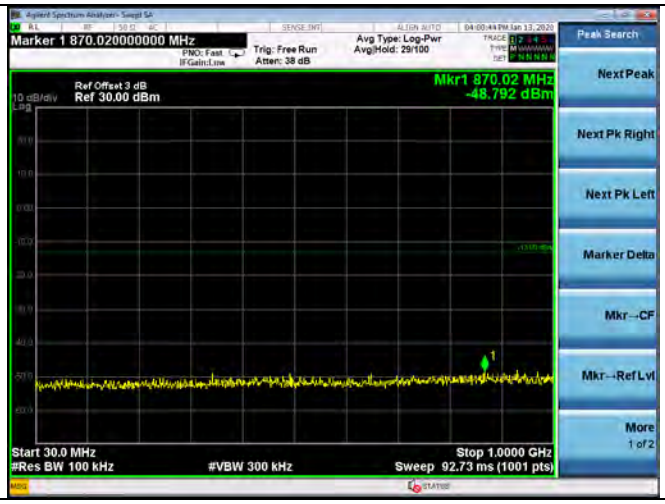
HSUPA Band IV Lowest channel



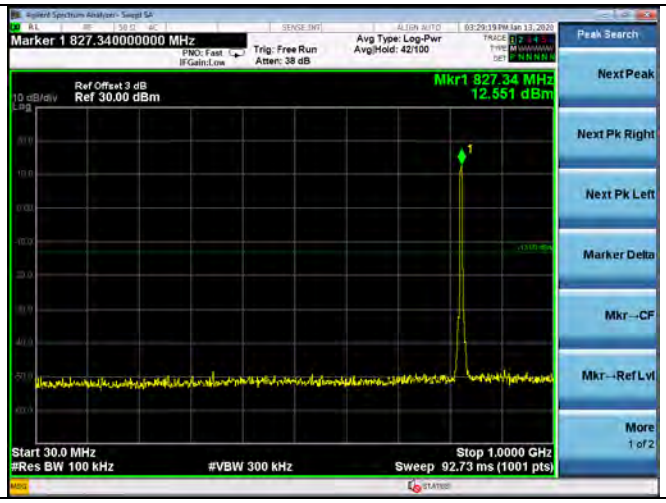
HSUPA Band IV Middle channel



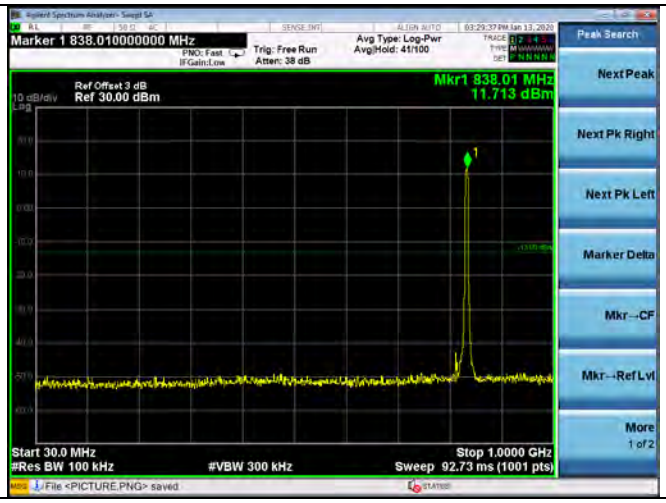
HSUPA Band IV Highest channel



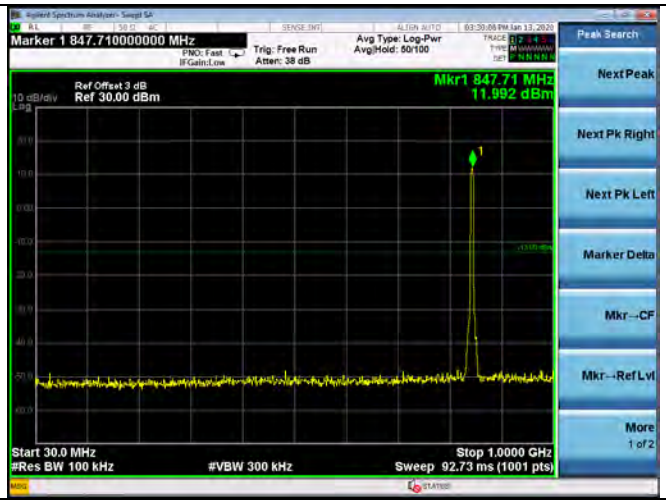
HSUPA Band V Lowest channel



HSUPA Band V Middle channel



HSUPA Band V Highest channel

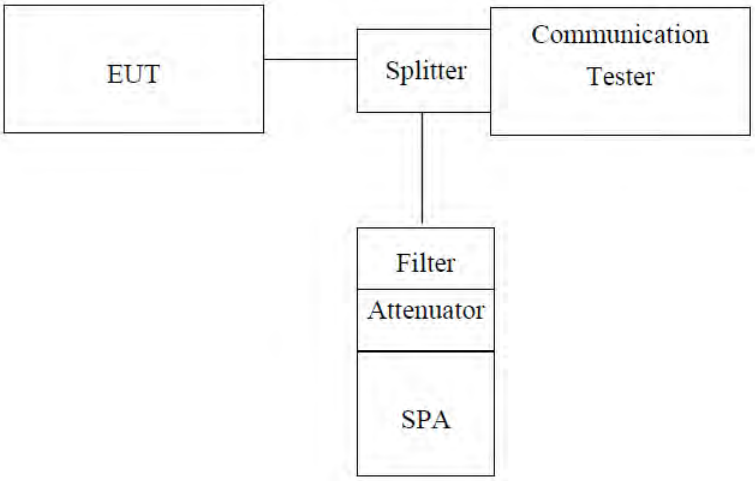


5.6. Conducted Out of Band Emissions

5.6.1. Limit

According to FCC section 22.917(b) and FCC section 24.238(b), 27.53(g)(h) in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

5.6.2. Test Setup



Note: *Measurement setup for testing on Antenna connector*

5.6.3. Measurement Procedure

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer and the System Simulator 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 System Simulator 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 System Simulator.

and reference KDB 971168 D01 Power Meas. License Digital Systems v02v02

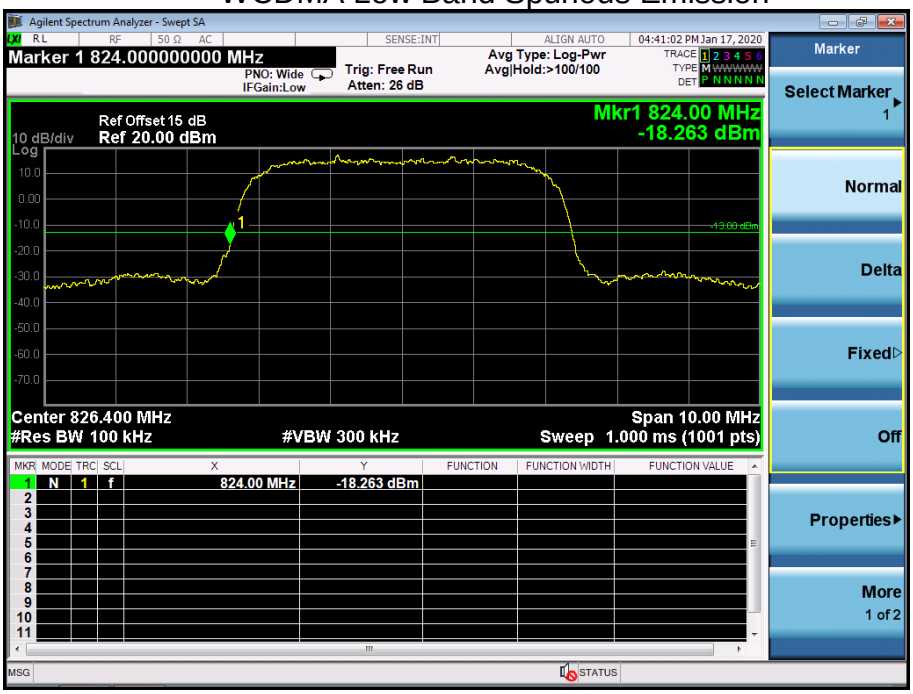
5.6.4. Test Result

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

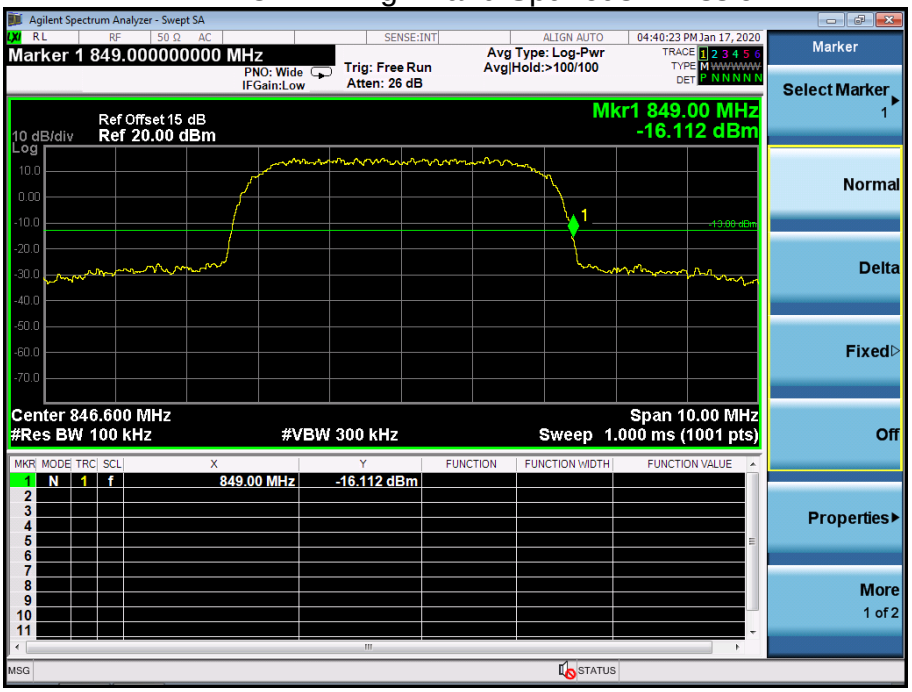
Note: Offset=Cable loss+ 10log((-26dB bandwidth/100)/RBW)

Test plot as follows:

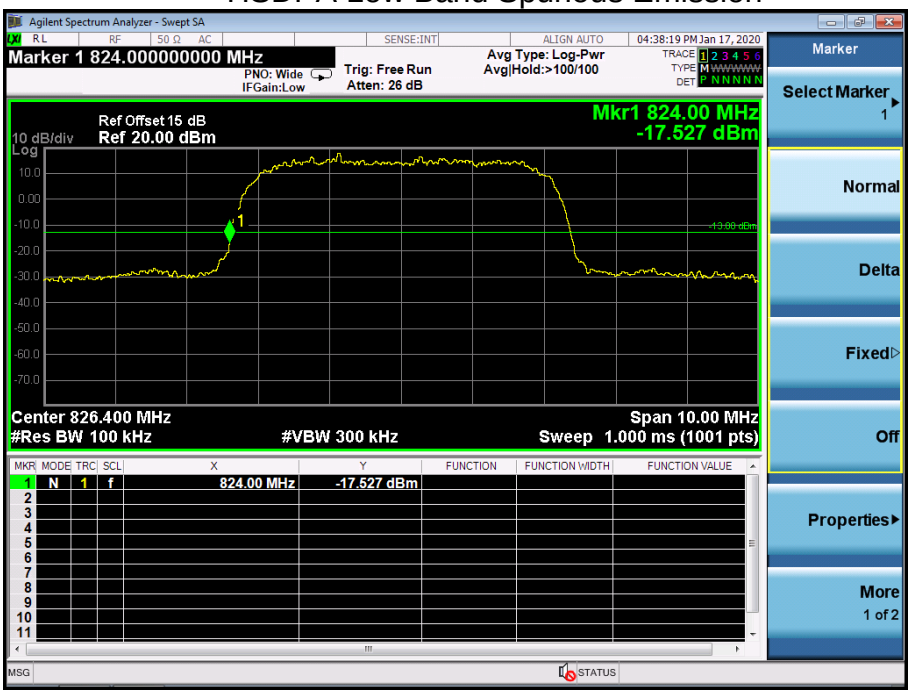
WCDMA Low Band Spurious Emission



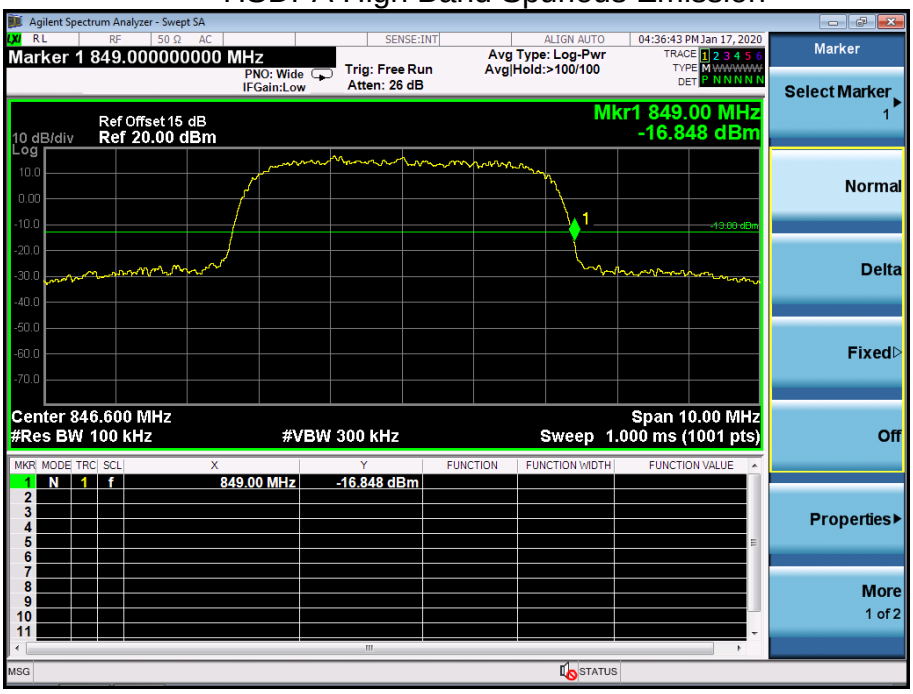
WCDMA High Band Spurious Emission



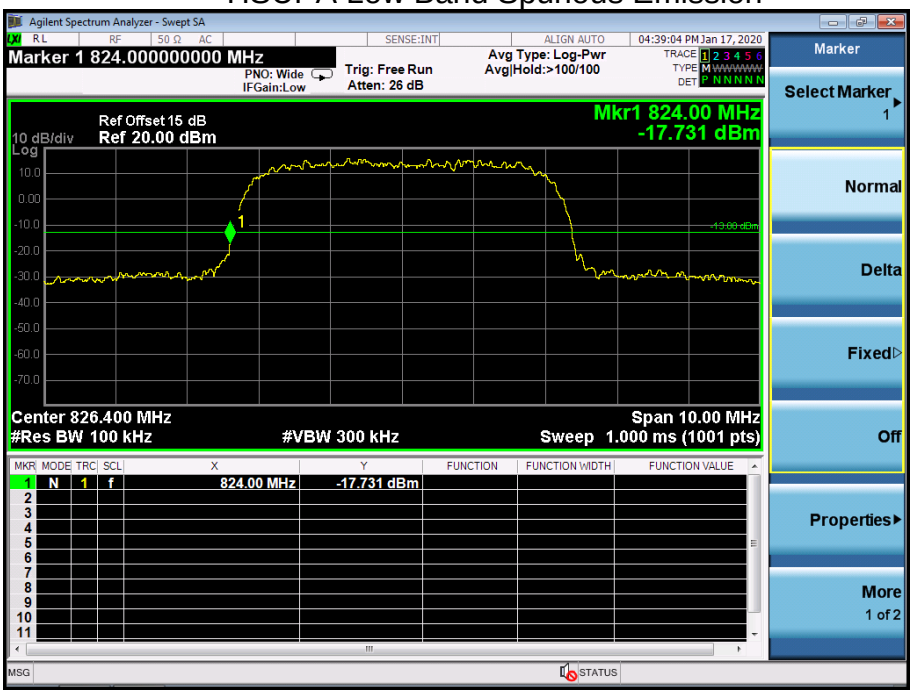
HSDPA Low Band Spurious Emission



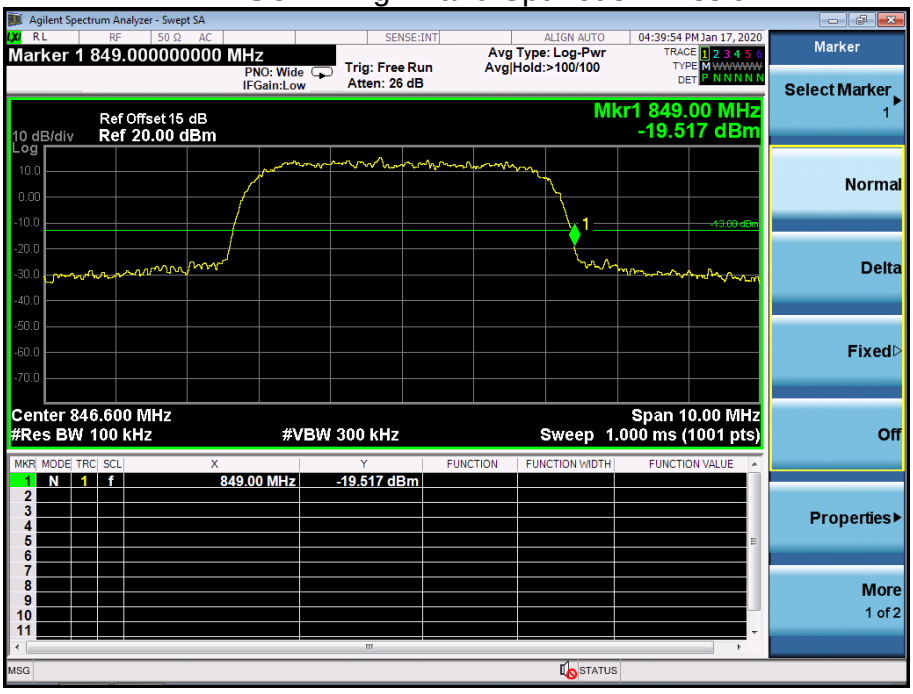
HSDPA High Band Spurious Emission



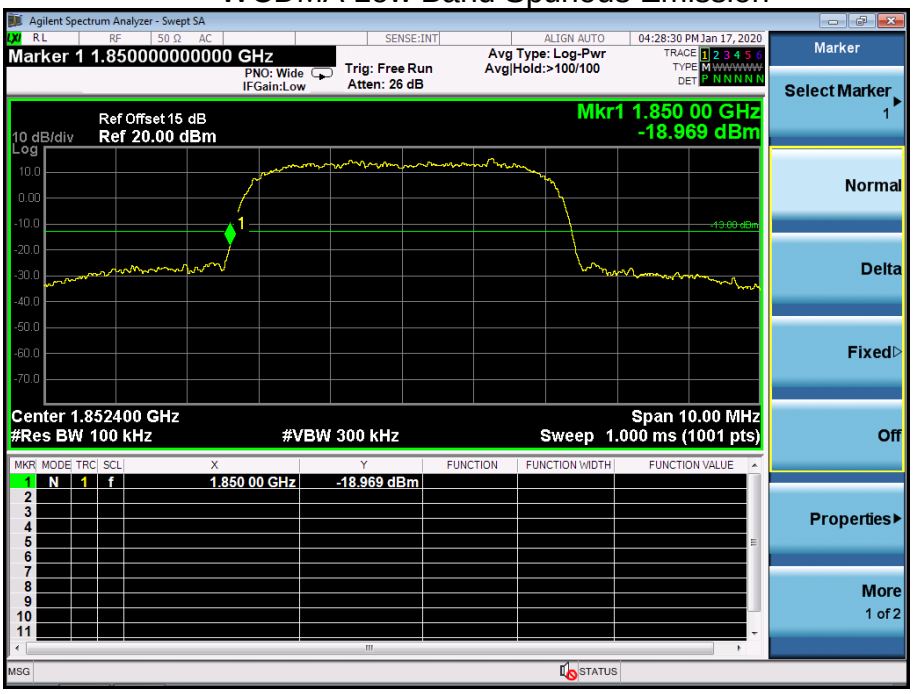
HSUPA Low Band Spurious Emission



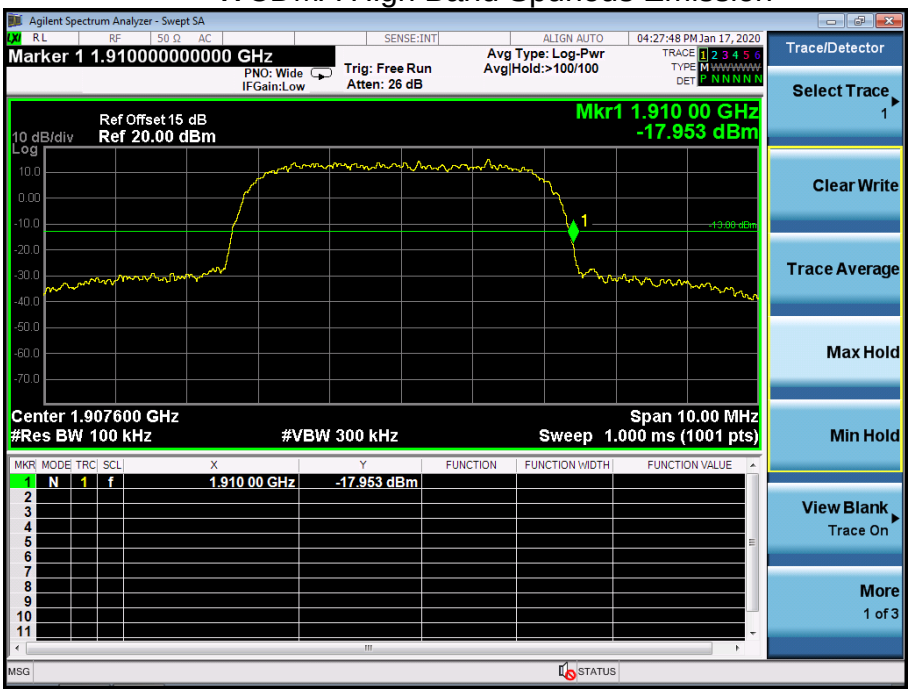
HSUPA High Band Spurious Emission



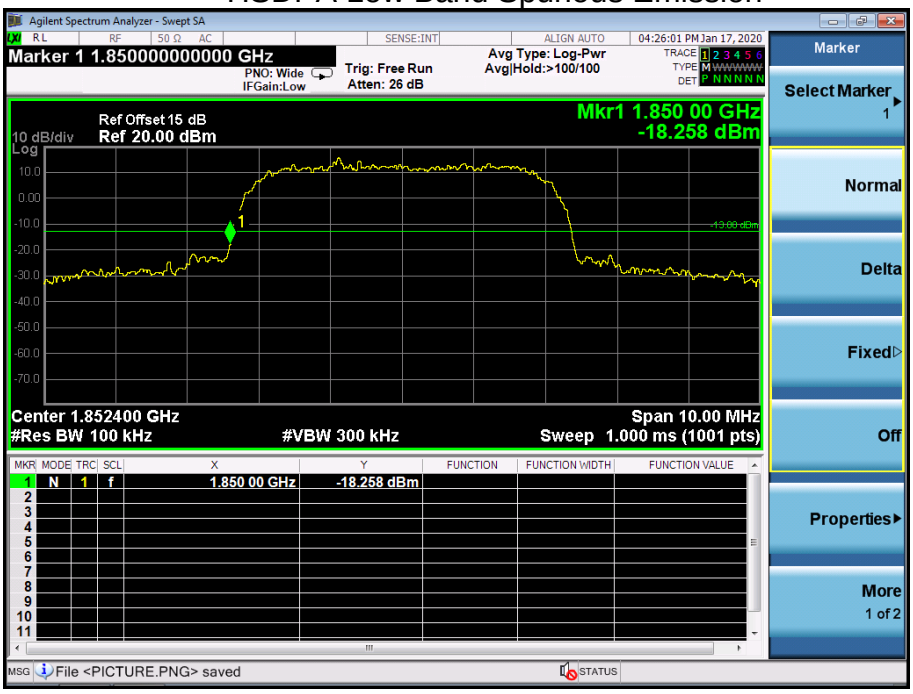
WCDMA Low Band Spurious Emission



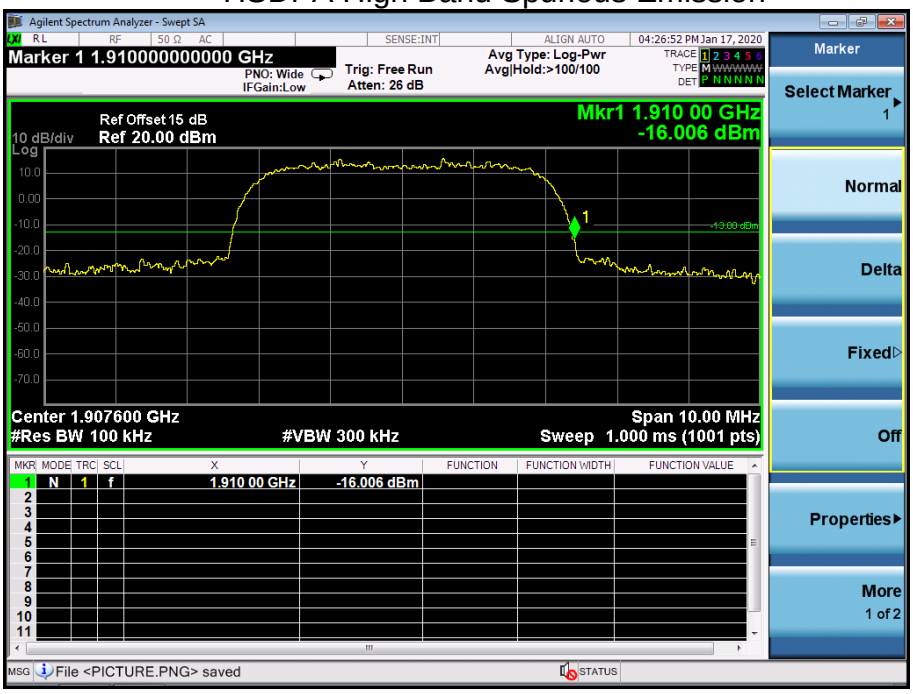
WCDMA High Band Spurious Emission



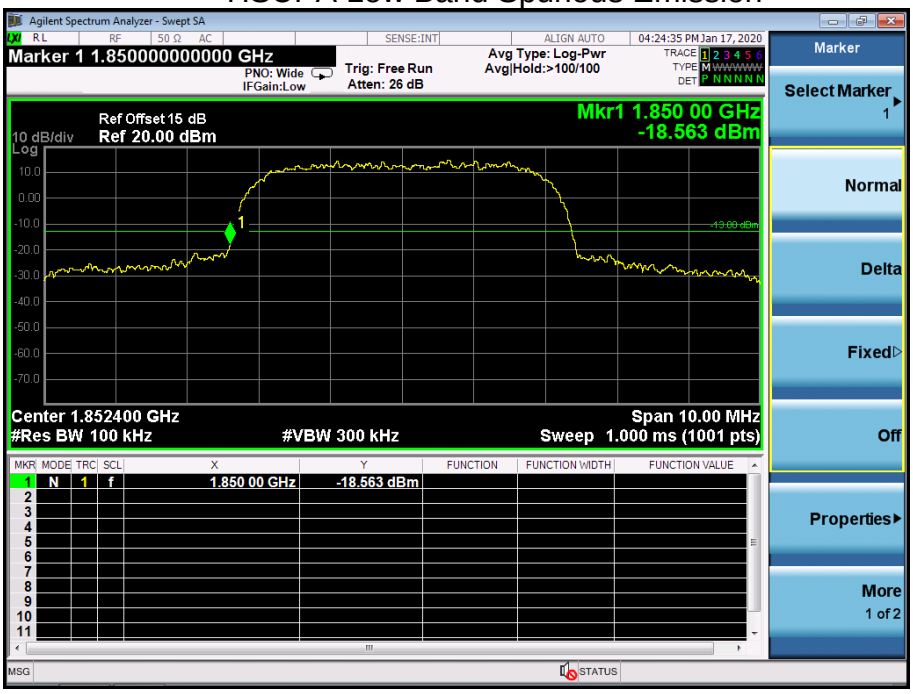
HSDPA Low Band Spurious Emission



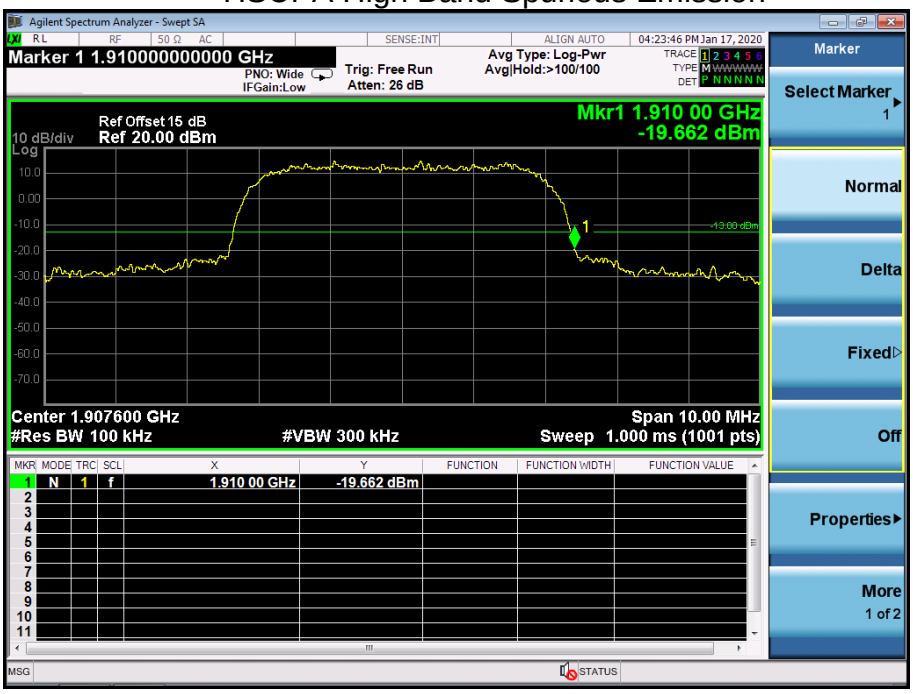
HSDPA High Band Spurious Emission



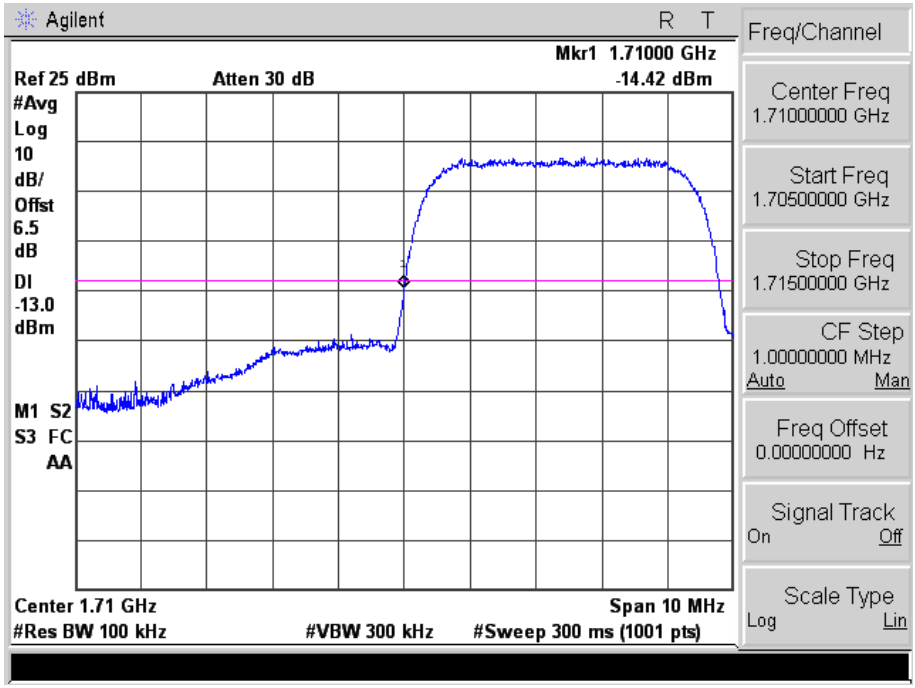
HSUPA Low Band Spurious Emission



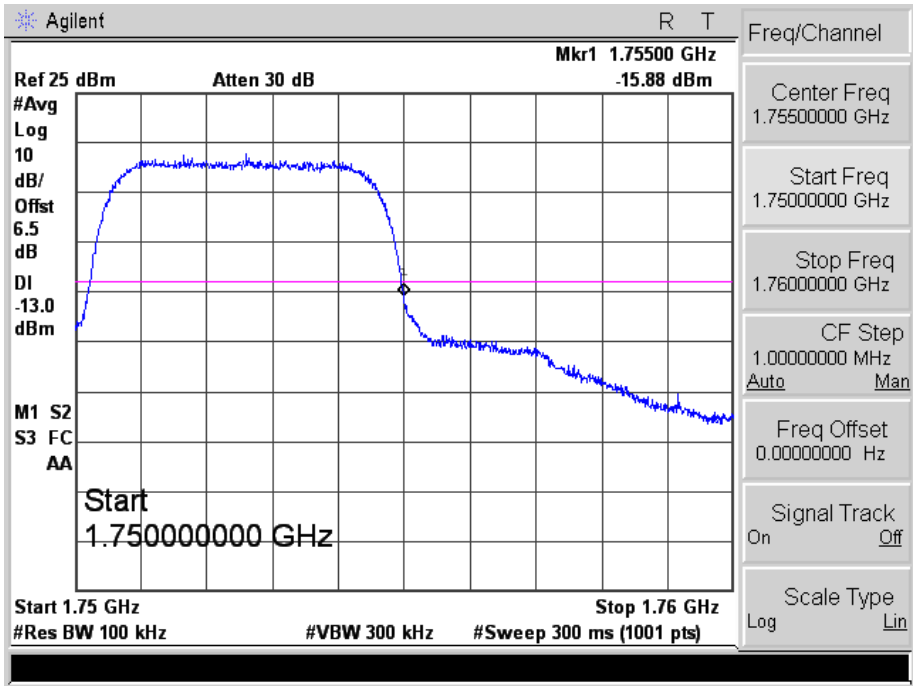
HSUPA High Band Spurious Emission



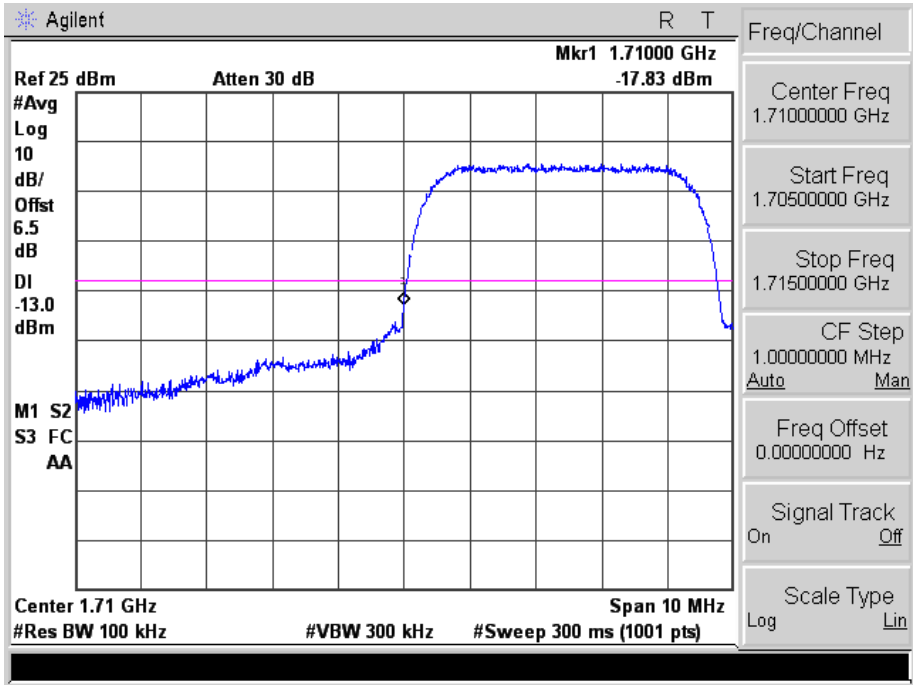
WCDMA Low Band Spurious Emission



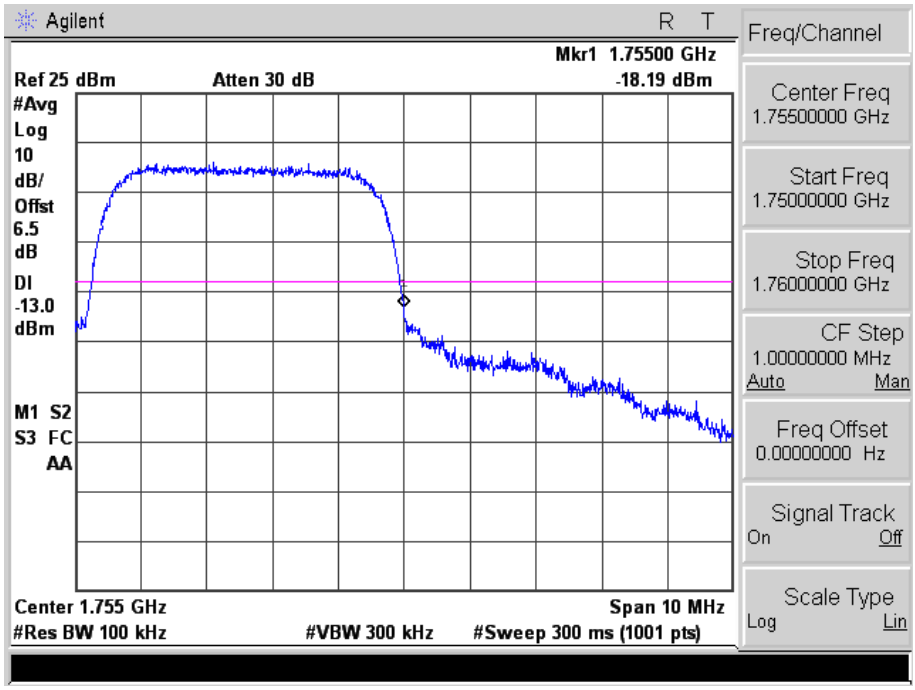
WCDMA High Band Spurious Emission



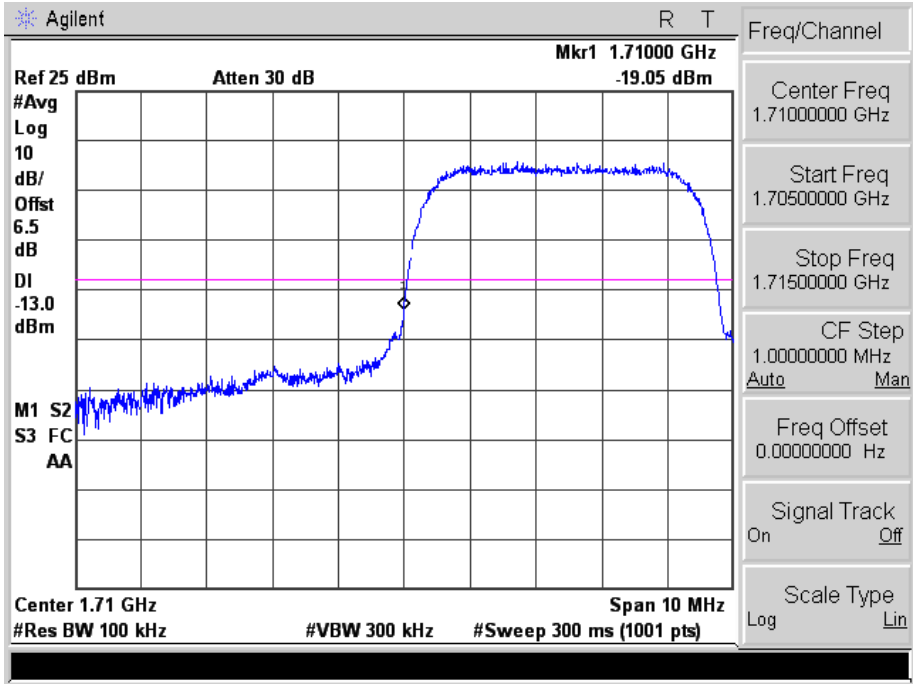
DPA Low Band Spurious Emission



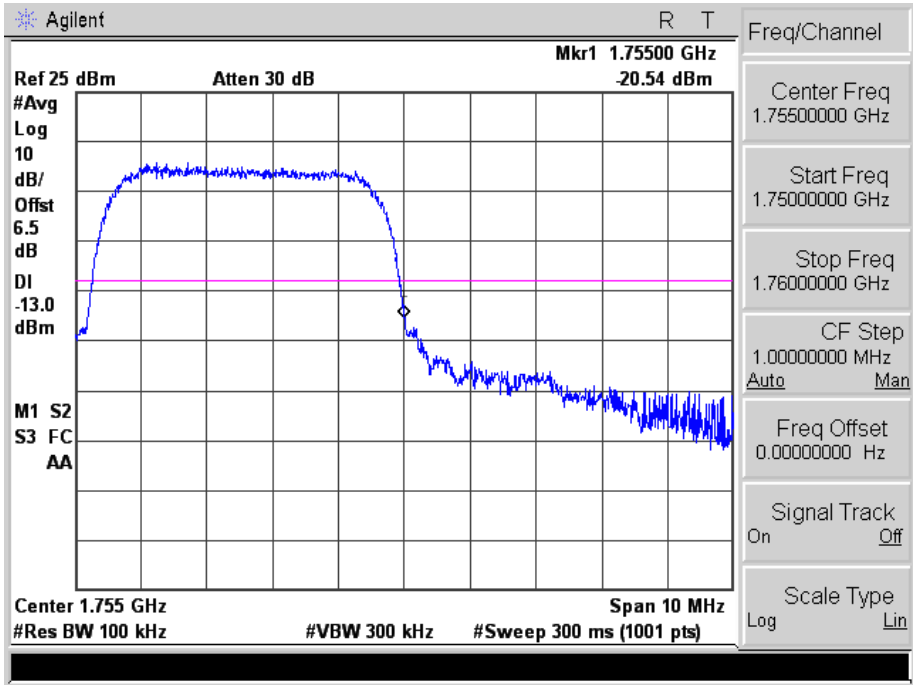
DPA High Band Spurious Emission



UPA Low Band Spurious Emission



UPA High Band Spurious Emission



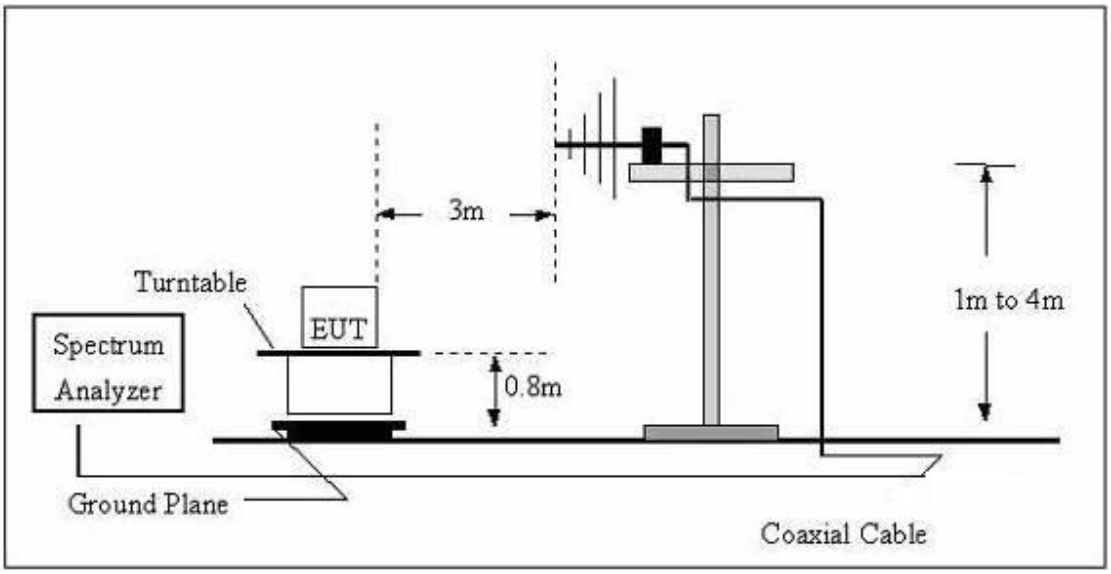
5.7. Transmitter Radiated Power (EIRP/ERP)

5.7.1. Limit

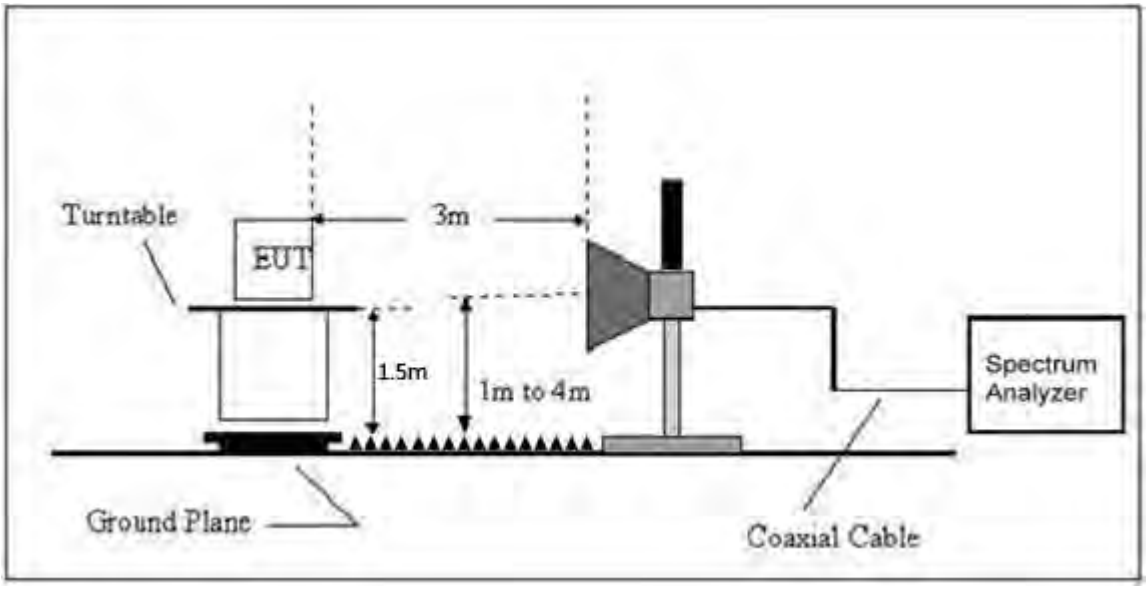
According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, FCC section 27.50, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

5.7.2. Test Setup

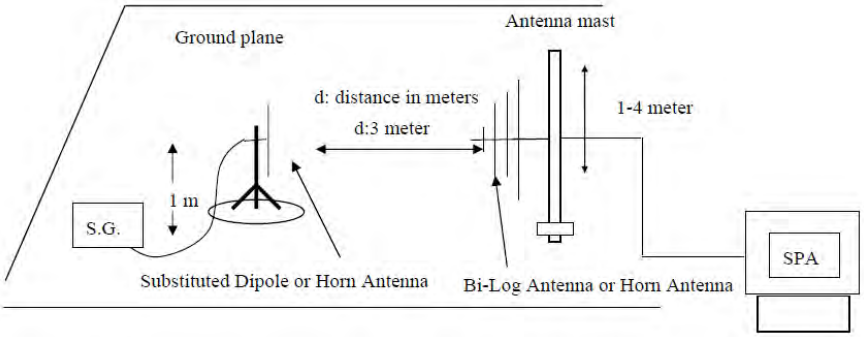
Below 1GHz



Above 1GHz



Substituted method:



5.7.3. Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. all test in Full-Anechoic Chamber.

During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

EIRP in frequency band 1712.4 –1752.6MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

For BAND II:ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

For BAND IV:ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

For BAND V:EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)

5.7.4. Test Result

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
WCDMA Band II	Lowest	V	6.12	19.33	2.52	22.93	33.00	Pass
		H	5.35	19.33	2.52	22.16		
	Middle	V	5.57	19.5	2.6	22.47	33.00	Pass
		H	5.43	19.5	2.6	22.33		
	Highest	V	4.88	19.94	2.71	22.11	33.00	Pass
		H	4.84	19.94	2.71	22.07		

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
WCDMA Band IV	Lowest	V	5.15	19.33	2.52	21.96	30.00	Pass
		H	5.26	19.33	2.52	22.07		
	Middle	V	5.52	19.5	2.6	22.42	30.00	Pass
		H	5.37	19.5	2.6	22.27		
	Highest	V	4.83	19.94	2.71	22.06	30.00	Pass
		H	4.64	19.94	2.71	21.87		

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)	Result
WCDMA Band V	Lowest	V	6.87	15.68	1.65	20.90	38.45	Pass
		H	6.94	15.68	1.65	20.97		
	Middle	V	5.46	15.7	1.67	19.49	38.45	Pass
		H	4.32	15.7	1.67	18.35		
	Highest	V	7.38	15.7	1.71	21.37	38.45	Pass
		H	7.94	15.7	1.71	21.93		

5.8. Radiated Out of Band Emissions

5.8.1. Limit

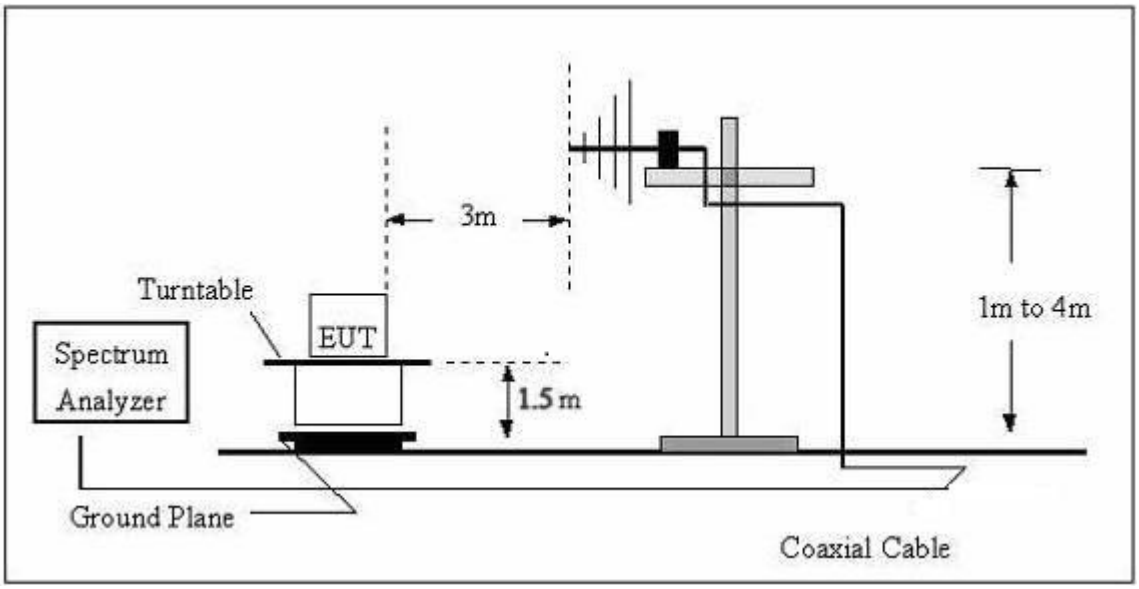
According to FCC section 22.917(a) and section 24.238(a), 27.53(g) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power

(P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

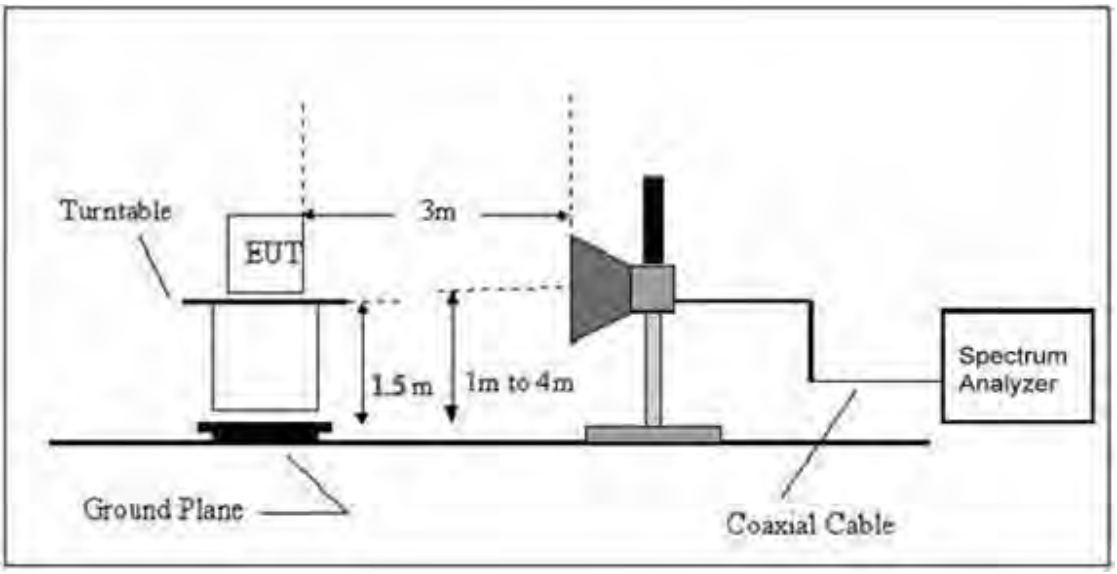
The spurious emission with frequency band 1900 according to FCC section 2.1057.

5.8.2. Test Setup

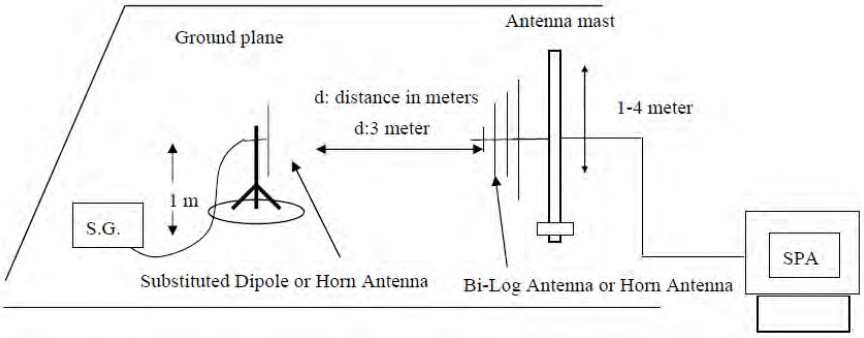
Below 1GHz



Above 1GHz



Substituted method:



5.8.3. Measurement Procedure

The EUT was placed on a non-conductive, The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. all test in Full-Anechoic Chamber.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

EIRP (Level)= S.G. output (dBm) + Antenna Gain(dBi) – Cable Loss (dB)

Note: Measurement Uncertainty: ±3.6 dB.

The data show only the worst results, and the other results are very low and not shown in the report.

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Lowest	87.21	Vertical	-75.45	3.35	0.38	-72.48	-13	PASS
	3700.40	Vertical	-46.16	7.76	3.75	-42.15		
	5550.60	Vertical	-47.33	9.84	4.94	-42.43		
	7400.80	Vertical	-39.75	10.21	5.32	-34.86		
	9251.00	Vertical	-43.14	11.36	6.02	-37.80		
	11101.20	Vertical	-44.62	14.52	6.68	-36.78		
	137.26	Horizontal	-75.56	4.12	0.51	-71.95		
	3700.40	Horizontal	-48.47	7.76	3.75	-44.46		
	5550.60	Horizontal	-47.66	9.84	4.94	-42.76		
	7400.80	Horizontal	-42.34	10.21	5.32	-37.45		
	9251.00	Horizontal	-47.52	11.36	6.02	-42.18		
	11101.20	Horizontal	-47.38	14.52	6.68	-39.54		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Middle	88.39	Vertical	-75.43	3.35	0.38	-72.49	-13	PASS
	3760.00	Vertical	-47.54	7.76	3.75	-43.50		
	5640.00	Vertical	-47.15	9.84	4.94	-42.21		
	7520.00	Vertical	-42.77	10.21	5.32	-37.84		
	9400.00	Vertical	-42.13	11.36	6.02	-36.79		
	11280.00	Vertical	-46.02	14.52	6.68	-38.24		
	137.43	Horizontal	-75.53	4.12	0.51	-71.97		
	3760.00	Horizontal	-45.63	7.76	3.75	-41.92		
	5640.00	Horizontal	-46.62	9.84	4.94	-41.77		
	7520.00	Horizontal	-39.36	10.21	5.32	-34.44		
	9400.00	Horizontal	-43.21	11.36	6.02	-37.88		
	11280.00	Horizontal	-45.02	14.52	6.68	-37.25		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Highest	88.24	Vertical	-75.45	3.35	0.38	-72.48	-13	PASS
	3819.60	Vertical	-47.16	7.79	3.53	-42.90		
	5729.40	Vertical	-41.53	9.88	5.02	-36.67		
	7639.20	Vertical	-37.77	10.25	5.54	-33.06		
	9549.00	Vertical	-44.65	11.38	6.16	-39.43		
	11458.80	Vertical	-47.08	14.56	6.72	-39.24		
	139.04	Horizontal	-75.54	4.12	0.51	-71.93		
	3819.60	Horizontal	-45.47	7.79	3.53	-41.21		
	5729.40	Horizontal	-41.43	9.88	5.02	-36.57		
	7639.20	Horizontal	-37.15	10.25	5.54	-32.44		
	9549.00	Horizontal	-42.77	11.38	6.16	-37.55		
	11458.80	Horizontal	-44.63	14.56	6.72	-36.79		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band IV Lowest	87.21	Vertical	-74.46	3.35	0.38	-71.49	-13	PASS
	3700.40	Vertical	-47.14	7.76	3.75	-43.13		
	5550.60	Vertical	-46.26	9.84	4.94	-41.36		
	7400.80	Vertical	-35.73	10.21	5.32	-30.84		
	9251.00	Vertical	-45.37	11.36	6.02	-40.03		
	11101.20	Vertical	-43.65	14.52	6.68	-35.81		
	137.26	Horizontal	-74.58	4.12	0.51	-70.97		
	3700.40	Horizontal	-46.43	7.76	3.75	-42.42		
	5550.60	Horizontal	-46.65	9.84	4.94	-41.75		
	7400.80	Horizontal	-44.48	10.21	5.32	-39.59		
	9251.00	Horizontal	-45.62	11.36	6.02	-40.28		
	11101.20	Horizontal	-44.36	14.52	6.68	-36.52		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band IV Middle	88.39	Vertical	-73.44	3.35	0.38	-70.47	-13	PASS
	3760.00	Vertical	-46.56	7.76	3.75	-42.55		
	5640.00	Vertical	-47.14	9.84	4.94	-42.24		
	7520.00	Vertical	-43.72	10.21	5.32	-38.83		
	9400.00	Vertical	-41.16	11.36	6.02	-35.82		
	11280.00	Vertical	-45.34	14.52	6.68	-37.50		
	137.43	Horizontal	-74.57	4.12	0.51	-70.96		
	3760.00	Horizontal	-46.95	7.76	3.75	-42.94		
	5640.00	Horizontal	-43.67	9.84	4.94	-38.77		
	7520.00	Horizontal	-36.35	10.21	5.32	-31.46		
	9400.00	Horizontal	-41.26	11.36	6.02	-35.92		
	11280.00	Horizontal	-46.05	14.52	6.68	-38.21		

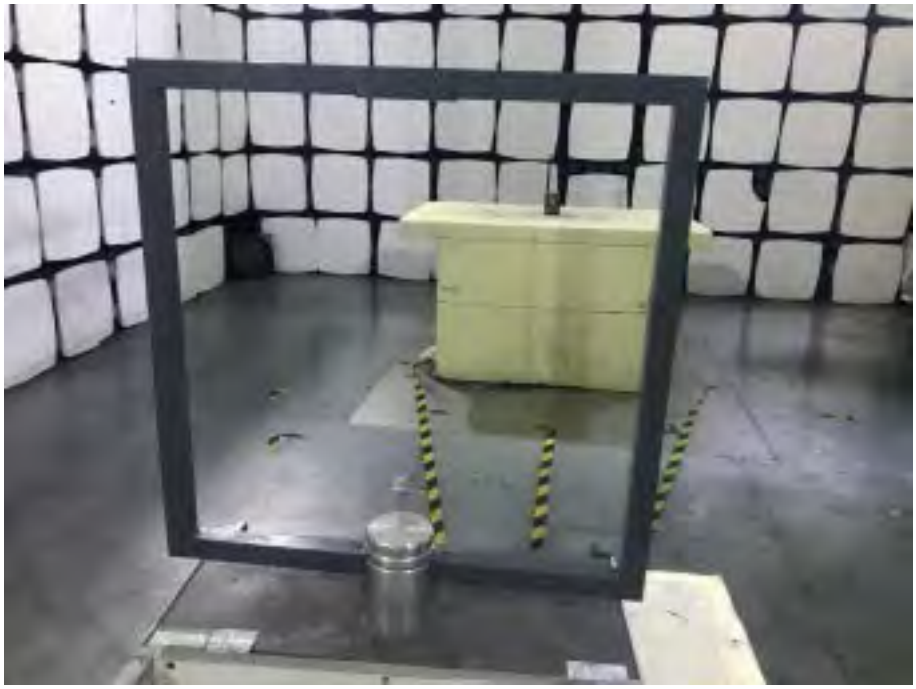
Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band IV Highest	88.24	Vertical	-74.45	3.35	0.38	-71.48	-13	PASS
	3819.60	Vertical	-46.16	7.79	3.53	-41.90		
	5729.40	Vertical	-41.57	9.88	5.02	-36.71		
	7639.20	Vertical	-35.73	10.25	5.54	-31.02		
	9549.00	Vertical	-43.65	11.38	6.16	-38.43		
	11458.80	Vertical	-47.67	14.56	6.72	-39.83		
	139.04	Horizontal	-72.54	4.12	0.51	-68.93		
	3819.60	Horizontal	-42.46	7.79	3.53	-38.20		
	5729.40	Horizontal	-43.33	9.88	5.02	-38.47		
	7639.20	Horizontal	-32.14	10.25	5.54	-27.43		
	9549.00	Horizontal	-45.76	11.38	6.16	-40.54		
	11458.80	Horizontal	-47.67	14.56	6.72	-39.83		

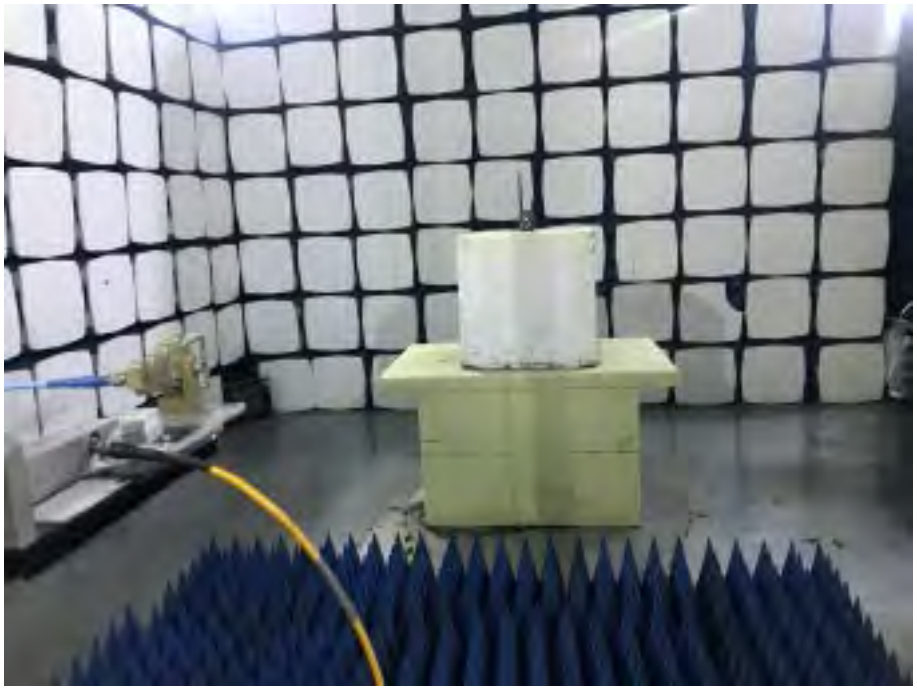
Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Lowest	87.48	Vertical	-75.66	3.35	0.38	-72.69	-13	PASS
	1652.80	Vertical	-29.24	6.51	1.35	-24.08		
	2479.20	Vertical	-35.22	6.88	2.53	-30.87		
	3305.60	Vertical	-37.39	7.61	3.67	-33.45		
	4132.00	Vertical	-45.53	8.67	4.06	-40.92		
	4958.40	Vertical	-40.23	9.35	4.38	-35.26		
	138.21	Horizontal	-75.71	4.12	0.51	-72.10		
	1652.80	Horizontal	-34.11	6.51	1.35	-28.95		
	2479.20	Horizontal	-37.28	6.88	2.53	-32.93		
	3305.60	Horizontal	-45.93	7.61	3.67	-41.99		
	4132.00	Horizontal	-49.23	8.67	4.06	-44.62		
	4958.40	Horizontal	-43.47	9.35	4.38	-38.50		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Middle	87.69	Vertical	-75.44	3.35	0.38	-72.47	-13	PASS
	1670.00	Vertical	-32.26	6.58	1.38	-27.06		
	2505.00	Vertical	-32.34	6.92	2.57	-27.99		
	3340.00	Vertical	-40.27	7.67	3.72	-36.32		
	4175.00	Vertical	-47.85	8.75	4.19	-43.29		
	5010.00	Vertical	-43.67	9.48	4.45	-38.64		
	139.86	Horizontal	-76.15	4.12	0.51	-72.54		
	1670.00	Horizontal	-29.58	6.58	1.38	-24.38		
	2505.00	Horizontal	-32.25	6.92	2.57	-27.90		
	3340.00	Horizontal	-48.53	7.67	3.72	-44.58		
	4175.00	Horizontal	-49.97	8.75	4.19	-45.41		
	5010.00	Horizontal	-39.55	9.48	4.45	-34.52		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Highest	88.26	Vertical	-75.24	3.35	0.38	-72.27	-13	PASS
	1693.20	Vertical	-31.16	6.57	1.48	-26.07		
	2539.80	Vertical	-33.08	6.96	2.67	-28.79		
	3386.40	Vertical	-36.24	7.68	3.78	-32.34		
	4233.00	Vertical	-41.37	8.76	4.24	-36.85		
	5079.60	Vertical	-46.73	9.47	4.63	-41.89		
	137.65	Horizontal	-76.36	4.12	0.51	-72.75		
	1693.20	Horizontal	-29.75	6.57	1.48	-24.66		
	2539.80	Horizontal	-32.48	6.96	2.67	-28.19		
	3386.40	Horizontal	-38.54	7.68	3.78	-34.64		
	4233.00	Horizontal	-47.27	8.76	4.24	-42.75		
	5079.60	Horizontal	-53.46	9.47	4.63	-48.62		

6. PHOTOGRAPHS OF TEST SET-UP





7. PHOTOGRAPHS OF THE EUT

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