Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC Part 22 Subpart H / Part 24 Subpart E / Part 27

Report Reference No.:	**CTL1505301453-WU**	
Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
Tested by: (position+printed name+signature)	Nice Nong (Test Engineer)	Nice Nong
Approved by: (position+printed name+signature)	Tracy Qi (Manager)	Tracy Qi

Product Name.....:	Tablet phone
Model/Type reference.....:	SKY 7.0Q
List Model(s).....:	/
Trade Mark.....:	N/A
FCC ID.....:	**2AE4P-SKY70Q**
Applicant's name.....:	**ShenZhen KINODA Technology Co.,Ltd**
Address of applicant.....:	ROOM 5B-9, CHE KUNG TEMPLE OF TRADE AND INDUSTRY PARK 213, FUTIAN DISTRICT, SHENZHEN, CHINA
Test Firm.....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm.....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification.....:	
Standard.....:	**FCC CFR Title 47 Part 2, Part 22H, Part 24E and Part 27** **EIA/TIA 603-C: 2004**
TRF Originator……..:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF……:	Dated 2011-01
Date of Receipt.....:	May 30, 2015
Date of Test Date.....:	May 30, 2015 - June 17, 2015
Data of Issue.....:	June 18, 2015
Result.....:	Positive

TEST REPORT

Test Report No. :	CTL1505301453-WU	June 18, 2015 Date of issue

Equipment under Test	:	Tablet phone
Model /Type	:	SKY 7.0Q
Applicant	:	**ShenZhen KINODA Technology Co.,Ltd**
Address	:	ROOM 5B-9, CHE KUNG TEMPLE OF TRADE AND INDUSTRY PARK 213, FUTIAN DISTRICT, SHENZHEN, CHINA
Manufacturer		**ShenZhen KINODA Technology Co.,Ltd**
Address		ROOM 5B-9, CHE KUNG TEMPLE OF TRADE AND INDUSTRY PARK 213, FUTIAN DISTRICT, SHENZHEN, CHINA

Test Result according to the standards on page 4:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Part 22 Subpart H: Public Mobile Services

FCC Part 24 Subpart E: Personal Communications Services

FCC Part 27 Subpart: MISCELLANEOUS WIRE-LESS COMMUNICATIONS SERV-ICES

EIA/TIA 603-C: 2004

FCC CFR Title 47 Part 2

2. SUMMARY

2.1. Equipment Under Test

Power supply system utilised

Power supply voltage : ● 120V / 60 Hz o 115V / 60Hz
o 12 V DC o 24 V DC
● Other (specified in blank below)

DC 3.7V from battery

2.2. Description of The Equipment Under Test (EUT)

The **ShenZhen KINODA Technology Co., Ltd**'s Model: SKY 7.0Q or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

General Description	
Name of EUT	Tablet phone
Brand	/
Model	SKY 7.0Q
Hardware version	M699_8312_MB_V1.2_150430
Software version	V1.2
IMEI	352585060680174
Device category	Portable Device
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Rated Vlotage	DC 3.70 Battery
Hotsopt	Supported, power not reduced when Hotspot open
The EUT is GSM850/900/DCS1800/PCS1900, UMTS Band I,II,V Tablet phone. the Tablet phone is intended for speech and Multimedia Message Service (MMS) transmission. It is equipped with GPRS/EDGE class 12 for GSM850, PCS1900, UMTS Band II, Band V and Bluetooth, WiFi, and camera functions. For more information see the following datasheet	

Technical Characteristics	
2G	
Support Networks	GSM, GPRS, EDGE
Support Band	GSM850/PCS1900
Uplink Frequency	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
Type of Modulation	GMSK, 8PSK for only downlink
Antenna Type	Internal Antenna
Antenna Gain	1.0 dBi for GSM850 0.5 dBi for DCS 1900
GPRS/EDGE Class	Class 12
HSDPA UE Category	10
HSUPA UE Category	6
GSM Release Version	R99
GPRS operation mode	Class B
DTM Mode	Not Supported
3G	
Support Networks	UMTS
Support Band	UMTS Band II, Band V
Type of Modulation	QPSK
Antenna Type	Internal Antenna
Antenna Gain	1.0 dBi for WCDMA Band V 0.5 dBi for WCDMA Band II
WiFi	
Support Standards	802.11b, 802.11g, 802.11n
Frequency Range	2412-2462MHz for 11b/g/n(HT20) 2422-2452MHz for 11n(HT40)

Type of Modulation	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels	11 for 11b/g/n(HT20), 7 for 11n(HT40)
Channel Separation	5MHz
Antenna Type	Internal Antenna
Antenna Gain	0 dBi
Bluetooth	
Bluetooth Version	V3.0+EDR/V4.0
Frequency Range	2402-2480MHz
Data Rate	1Mbps, 2Mbps, 3Mbps
Modulation	GFSK, π/4 QDPSK, 8DPSK
Quantity of Channels	79/40
Channel Separation	1MHz/2MHz
Antenna Type	Internal Antenna
Antenna Gain	0 dBi

2.3. EUT operation mode

CTL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: GSM850
Mode 2: PCS1900
Mode 3: GPRS850
Mode 4: GPRS1900
Mode 5: WCDMA Band II
Mode 6: WCDMA Band V
Mode 7: HSDPA Band II
Mode 8: HSUPA Band II
Mode 9: HSDPA Band V
Mode 10: HSUPA Band V

Note:
1. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.
3. Radiated power output working at GSM link was higher than that working at GPRS link, so all of test items were done working at GSM mode. Refer to peak power output for more details.
4. This device is a composite device in accordance with Part 15 Subpart B regulations.
5. EDGE mode test result is not shown in this report, because it just supports GMSK modulation and CS1~CS4 data rate, and also transmit power is lower than GSM/GPRS mode.
6. We have tested both SIM1 and SIM2, only recorded the worst case at SIM1.

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

o - supplied by the lab

● AC adapter	Manufacturer :	Dongguan Jin Ding Bao Electronics Techology Co.LTD
	Model No. :	SKY 7.0Q

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AE4P-SKY70Q** filing to comply with of the FCC Part 22 and Part 24 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

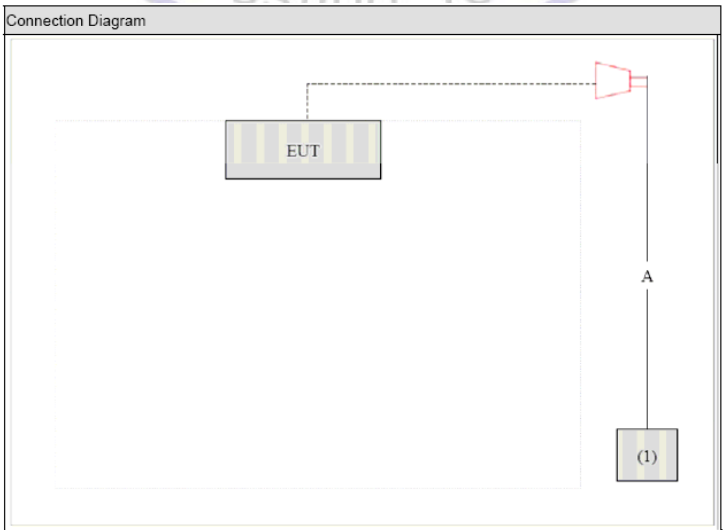
3.3. Environmental conditions

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

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Signal Cable Type		Signal cable Description
A	Coaxial Cable	Shielded, >5m

3.5. EUT Exercise Software

1. Setup the EUT and simulators as shown on above.
2. Turn on the power of all equipment.
3. EUT Communicate with CMU200, then select channel to test.

3.6. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.7. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-ROADBAND ANTENNA	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2015/05/21	2016/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2015/05/21	2016/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2015/05/19	2016/05/18
Active Loop Antenna	Daze	ZN30900A	N/A	2015/05/19	2016/05/18
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
ISN	FCC	F-071115-1057-1-09	11229	2015/05/19	2016/05/18
Amplifier	Agilent	8349B	3008A02306	2015/05/19	2016/05/18
Amplifier	Agilent	8447D	2944A10176	2015/05/19	2016/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2015/06/02	2016/06/01
Radio Communication Tester	R&S	CMU200	115419	2015/05/22	2016/05/21
Temperature/Humidity Meter	Gangxing	CTH-608	02	2015/05/20	2016/05/19
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2015/05/20	2016/05/19
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2015/05/20	2016/05/19
Climate Chamber	ESPEC	EL-10KA	A20120523	2015/05/20	2016/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2015/05/20	2016/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2015/05/20	2016/05/19
RF Cable	HUBER+SUHNER	RG214	N/A	2015/05/20	2016/05/19

3.8. Summary of Test Result

No deviations from the test standards
For GSM 850/WCDMA Band V (FCC Part 22H & Part 2)

Emission			
Performed Item	Normative References	Test Performed	Deviation
Peak Output Power	FCC Part 22.913(a)(2) and Part 2.1046 EIA/TIA 603-C	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	Yes	No
Occupied Bandwidth	FCC Part 2.1049	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 22.917(a) and Part 2.1049	Yes	No
Spurious Emission	FCC Part 22.917(b) and Part 2.1051, 2.1053 EIA/TIA 603-C	Yes	No
Frequency Stability Under Temperature & Voltage Variations	FCC Part 22.355 and 2.1055 EIA/TIA 603-C	Yes	No

For PCS 1900/WCDMA Band II (FCC Part 24E & Part 2)

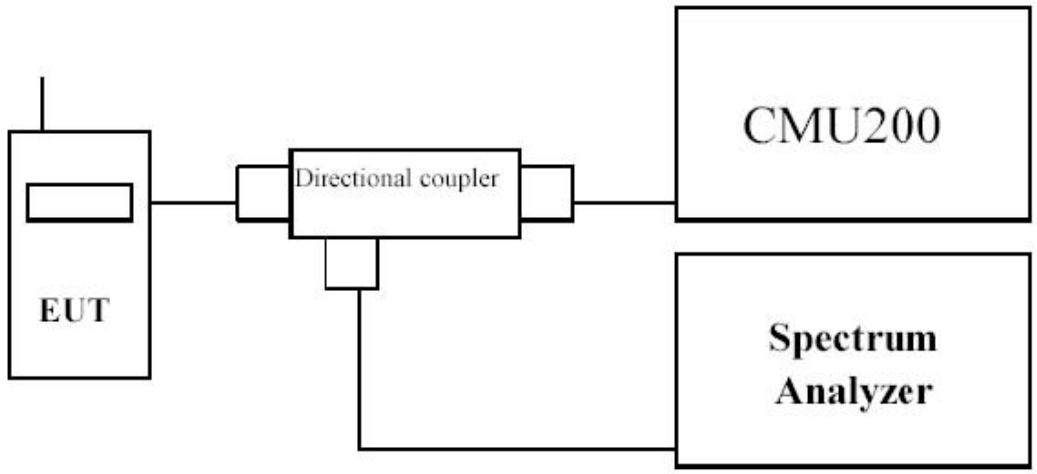
Emission			
Performed Item	Normative References	Test Performed	Deviation
Peak Output Power	FCC Part 24.232(b) and Part 2.1046 EIA/TIA 603-C	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	Yes	No
Occupied Bandwidth	FCC Part 24.238(b) and Part 2.1049	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 24.238(a) and Part 2.1049	Yes	No
Spurious Emission	FCC Part 24.238(b) and Part 2.1051, 2.1053 EIA/TIA 603-C	Yes	No
Frequency Stability Under Temperature & Voltage	FCC Part 24.235 and 2.1055 EIA/TIA 603-C	Yes	No

4. TEST CONDITIONS AND RESULTS

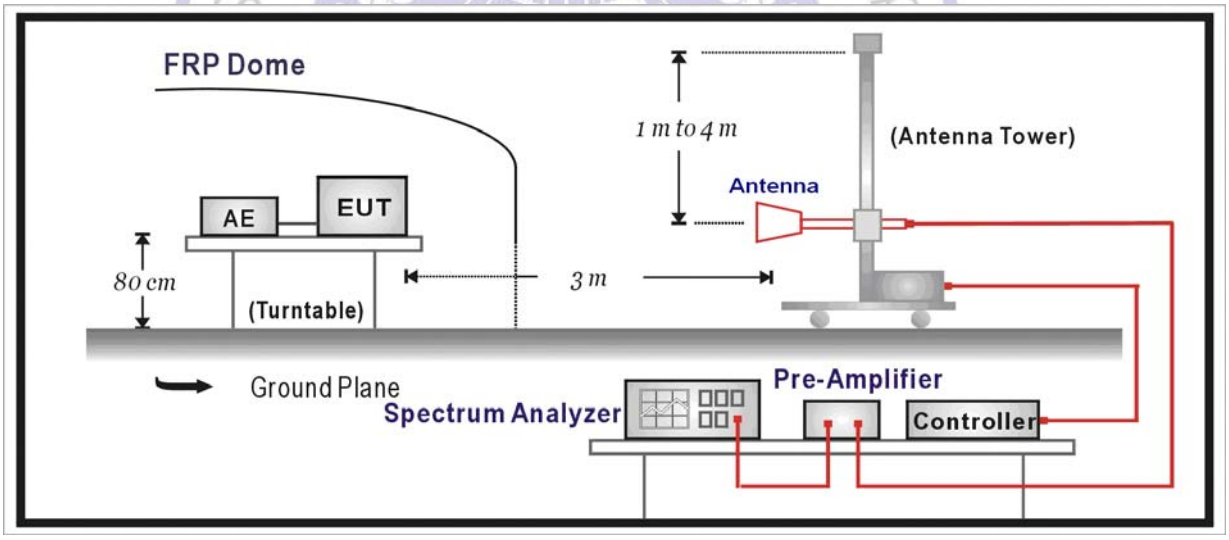
4.1. Peak Output Power

TEST CONFIGURATION

Conducted Power Measurement:



Radiated Power Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Conducted Power Measurement:

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.
c) EUT Communicate with CMU200, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.

b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter

c) The output of the test antenna shall be connected to the measuring receiver.

d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.

e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

h) The maximum signal level detected by the measuring receiver shall be noted.

i) The transmitter shall be replaced by a substitution antenna.

j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

k) The substitution antenna shall be connected to a calibrated signal generator.

l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

q) Test site anechoic chamber refer to ANSI C63.4: 2003.

Base station simulator settings for each test mode:

1. For GSM/GPRS
   Configure R&S CMU200 to support GMSK call respectively, and set one timeslot transmission for GMSK GSM/GPRS.
   Measure and record power outputs for both modulations.

2. For WCDMA
   Configure the CMU-200 to support all WCDMA tests in respect to the 3GPP 34.121.
   Measure the EUT output power at 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V, and 1852.4MHz, 1880MHz and 1907.6MHz for WCDMA Band II.
   For Rel 99
   • Set a Test Mode 1 loop back with a 12.2kbps Reference Measurement Channel (RMC)
   • Set and send continuously Up power control commands to the Gobi2000
   • Measure the power at the Gobi2000 Module antenna connector by using CMU-200.

LIMIT

For FCC Part 22.913(a)(2):
The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC Part 24.232(b):
The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 2 Watts.

For FCC Part 27:
The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 1 Watts.

TEST RESULTS

Conducted Power Measurement Results(GSM 850/1900)

GSM 850		Burst Conducted power (dBm) Channel/Frequency(MHz)			/	Time-Average power (dBm) Channel/Frequency(MHz)		
		128/824.2	**190/836.6**	**251/848.8**		**128/824.2**	**190/836.6**	**251/848.8**
GSM		33.20	33.35	33.31	-9.03dB	**24.17**	**24.32**	**24.28**
GPRS (GMSK)	1TX slot	33.16	33.30	33.24	-9.03dB	24.13	24.27	24.21
	2TX slot	31.01	31.19	31.08	-6.02dB	24.99	25.17	25.06
	3TX slot	28.58	28.70	28.64	-4.26dB	24.32	24.44	24.38
	4TX slot	27.96	28.11	28.03	-3.01dB	**24.95**	**25.10**	**25.02**
EGPRS (GMSK)	1TX slot	33.12	33.27	33.20	-9.03dB	24.09	24.24	24.17
	2TX slot	31.01	31.15	31.04	-6.02dB	24.99	25.13	25.02
	3TX slot	28.55	28.68	28.59	-4.26dB	24.29	24.42	24.33
	4TX slot	27.92	28.07	28.00	-3.01dB	**24.91**	**25.06**	**24.99**
GSM 1900		**Burst Conducted power (dBm) Channel/Frequency(MHz)**			**/**	**Time-Average power (dBm) Channel/Frequency(MHz)**		
		512/ 1850.2	**661/ 1880**	**810/ 1909.8**		**512/ 1850.2**	**661/ 1880**	**810/ 1909.8**
GSM		30.35	30.49	30.20	-9.03dB	**21.32**	**21.46**	**21.17**
GPRS (GMSK)	1TX slot	30.31	30.45	30.20	-9.03dB	21.28	21.42	21.17
	2TX slot	28.12	28.16	28.09	-6.02dB	22.10	22.14	22.07
	3TX slot	26.55	26.59	26.51	-4.26dB	22.29	22.33	22.25
	4TX slot	25.74	25.80	25.70	-3.01dB	**22.73**	**22.79**	**22.69**
EGPRS (GMSK)	1TX slot	30.28	30.45	30.17	-9.03dB	21.25	21.42	21.14
	2TX slot	28.10	28.13	28.02	-6.02dB	22.08	22.11	22.00
	3TX slot	26.51	26.57	26.50	-4.26dB	22.25	22.31	22.24
	4TX slot	25.70	25.78	25.66	-3.01dB	**22.69**	**22.77**	**22.65**

Since GSM mode has higher power, so the test items below were not performed to GPRS and EGPRS mode.

Conducted Power Measurement Results(UMTS Band II/V)

Item	band	UMTS Band II result (dBm) Channel/Frequency(MHz)			UMTS Band V result (dBm) Channel/Frequency(MHz)		
	ARFCN	9262/1852.4	9400/1880	9538/1907.6	4132/826.4	4183/836.6	4233/846.6
RMC	12.2kbps RMC	23.50	23.61	23.34	23.56	23.59	23.50
	64kbps RMC	23.44	23.49	23.32	23.52	23.56	23.45
	144kbps RMC	23.32	23.40	23.25	23.46	23.49	23.41
	384kbps RMC	23.18	23.24	23.10	23.40	23.43	23.36
HSDPA	Sub - Test 1	23.12	23.28	23.04	23.41	23.59	23.35
	Sub - Test 2	21.75	21.86	21.66	22.12	22.24	22.09
	Sub - Test 3	20.71	20.79	20.63	21.39	21.48	21.32
	Sub - Test 4	20.56	20.66	20.45	20.75	20.81	20.68
HSUPA	Sub - Test 1	22.52	22.66	22.43	22.66	22.73	22.54
	Sub - Test 2	21.10	21.22	21.09	21.02	21.14	21.00
	Sub - Test 3	22.06	22.14	22.01	22.26	22.34	22.18
	Sub - Test 4	21.34	21.56	21.19	21.98	22.01	21.86
	Sub - Test 5	22.79	22.67	22.55	23.50	23.53	23.47

Radiated Measurement

Mode	Frequency (MHz)	Antenna Pol.	SA Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP	Limit (dBm)	Result
GSM850	824.2	V	-12.85	32.25	1.76	-0.02	30.47	38.50	Pass
		H	-1.20	23.82	1.76	-0.02	22.04		
	836.4	V	-13.36	31.61	1.75	0.10	29.96		
		H	0.43	24.76	1.75	0.10	23.11		
	848.8	V	-11.34	32.61	1.78	0.13	30.96		
		H	1.44	25.16	1.78	0.13	23.51		

Mode	Frequency (MHz)	Antenna Pol.	SA Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP	Limit (dBm)	Result
PCS1900	1850.2	V	21.66	20.26	2.68	10.40	27.98	33.00	Pass
		H	12.91	11.32	2.68	10.40	19.04		
	1880.0	V	21.30	19.80	2.68	10.43	27.55		
		H	12.25	10.41	2.68	10.43	18.16		
	1909.8	V	21.24	19.89	2.70	10.44	27.63		
		H	12.90	11.10	2.70	10.44	18.84		

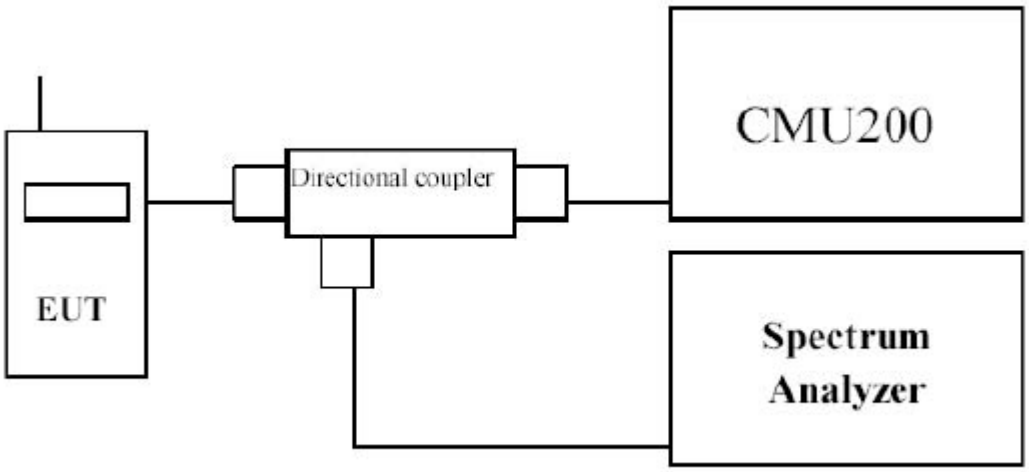
Mode	Frequency (MHz)	Antenna Pol.	SA Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP	Limit (dBm)	Result
WCDMA BAND II	1852.4	V	15.67	14.45	2.68	10.40	22.17	33.00	Pass
		H	7.98	6.31	2.68	10.40	14.03		
	1880.0	V	15.51	14.01	2.68	10.43	21.76		
		H	7.85	6.00	2.68	10.43	13.75		
	1907.6	V	15.59	14.22	2.70	10.44	21.96		
		H	8.37	6.52	2.70	10.44	14.26		

Mode	Frequency (MHz)	Antenna Pol.	SA Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP	Limit (dBm)	Result
WCDMA BAND V	826.4	V	-10.05	24.41	1.76	-0.02	22.63	38.50	Pass
		H	-18.16	16.36	1.76	-0.02	14.58		
	836.4	V	-9.23	24.76	1.75	0.10	23.11		
		H	-18.41	16.41	1.75	0.10	14.76		
	846.6	V	-9.70	24.23	1.78	0.13	22.58		
		H	-19.06	15.56	1.78	0.13	13.91		

Note: ERP=SG Reading-Cable Loss+Gain
EIRP=SG Reading-Cable Loss+Gain

4.2. Modulation Characteristic

TEST CONFIGURATION



LIMIT

N/A

TEST PROCEDURE

GMSK is a form of binary signaling schemes which represent digital states as a shift between discrete sinusoidal frequencies called Frequency Shift Keying (FSK). Minimum Shift Keying (MSK) is continuous phase FSK with the smallest possible modulation index h. Modulation index is defined as:
h = 2*F*Tb
where F = Peak frequency deviation in Hz and Tb = Bit period in seconds

Two discrete frequencies, representing two distinct digital states, with equal phases at switch time t = 0 requires a minimum value of h = 0.5. The Gaussian part of GMSK describes the fact that the digital pulses are filtered in the time domain. This results in bits which are sinusoidal rather than square. The effective spectrum is then compressed with the average carrier frequency in the center of the passband. This is a great advantage because of the significantly reduced bandwidth. GMSK is utilized because of these bandwidth conservation properties.

The bandwidth for GSM is a 60 MHz up-link at 1850-1910 MHz and down-link at 1930-1990 MHz. The 65 MHz is divided into 299 channels, each of which is 200 kHz wide. Slight spectral spillage is allowed into neighboring channels (which is minimized by GMSK). This separated transmit/receive frequencies scheme under GSM enables easier duplex filtering.

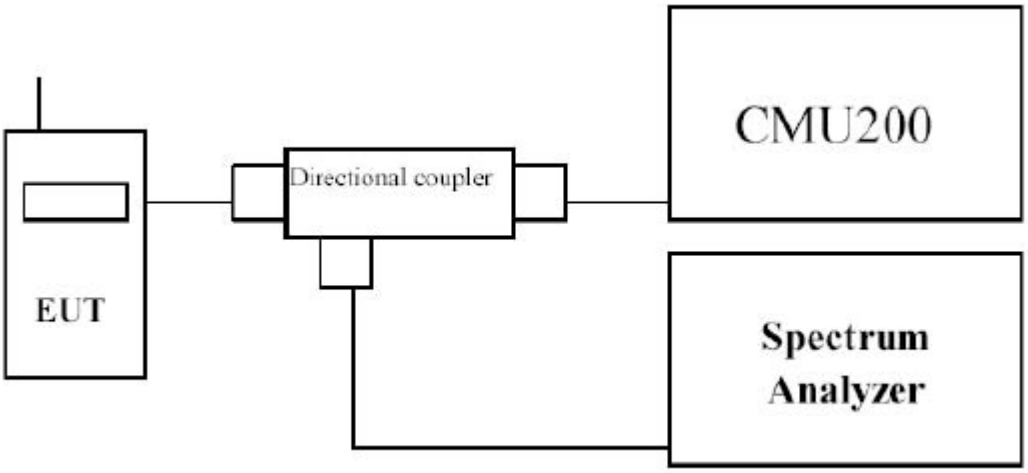
Within the bandwidth, individual channels are subdivided into multiframes (made of 26 frames), frames (made of 8 time slots), and time slots (made of 8 fields). The time slots are 0.57 ms long allowing 156.25 bits of information including overhead.

TEST RESULTS

The modulation of GSM/WCDMA was verified and confirmed compliance with requirement.

4.3. Occupied Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

Using Occupied Bandwidth measurement function of spectrum analyzer, and setting as follows:

For GPRS 850/1900 test --- RBW = 3 kHz and VBW = 10 kHz

For WCDMA FDD Band II/IV/V test --- RBW = 50 kHz and VBW = 200 kHz

LIMIT

N/A

TEST RESULTS

GSM 850:

Figure Channel 128 (824.20MHz)

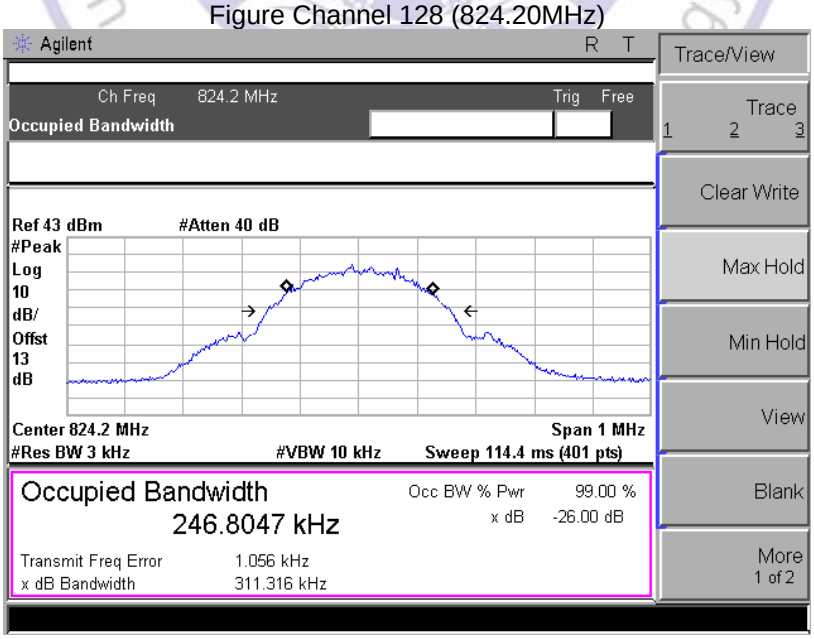


Figure Channel 189 (836.40MHz)

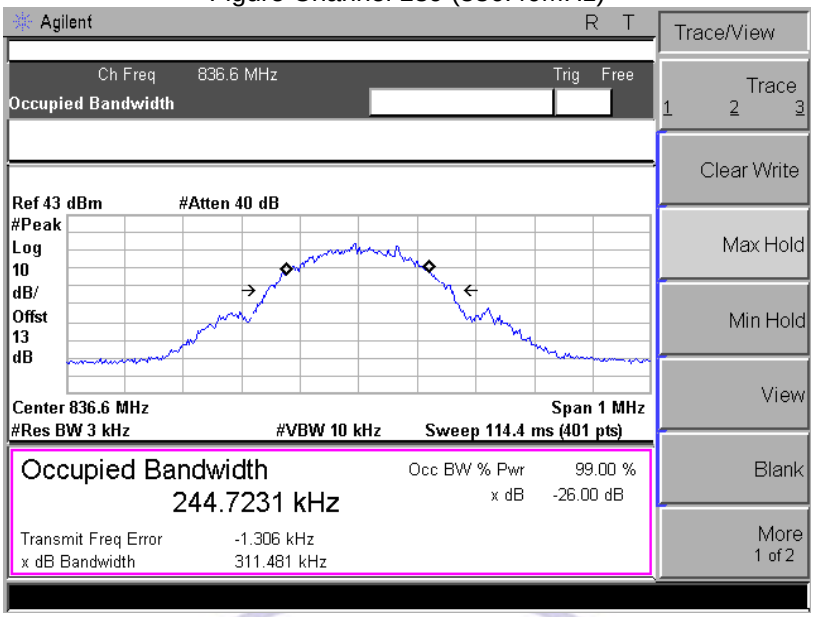
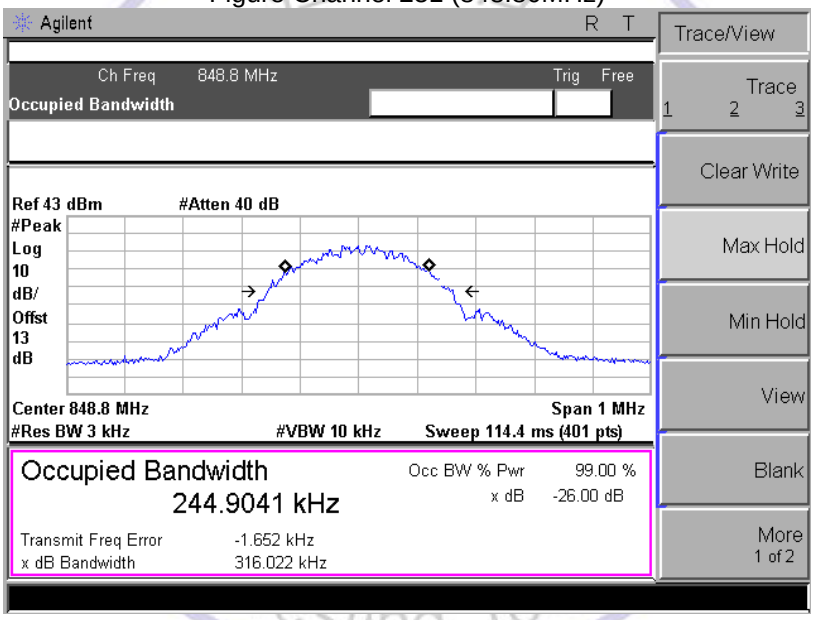


Figure Channel 251 (848.80MHz)



DCS 1900:

Figure Channel 512 (1850.20MHz)

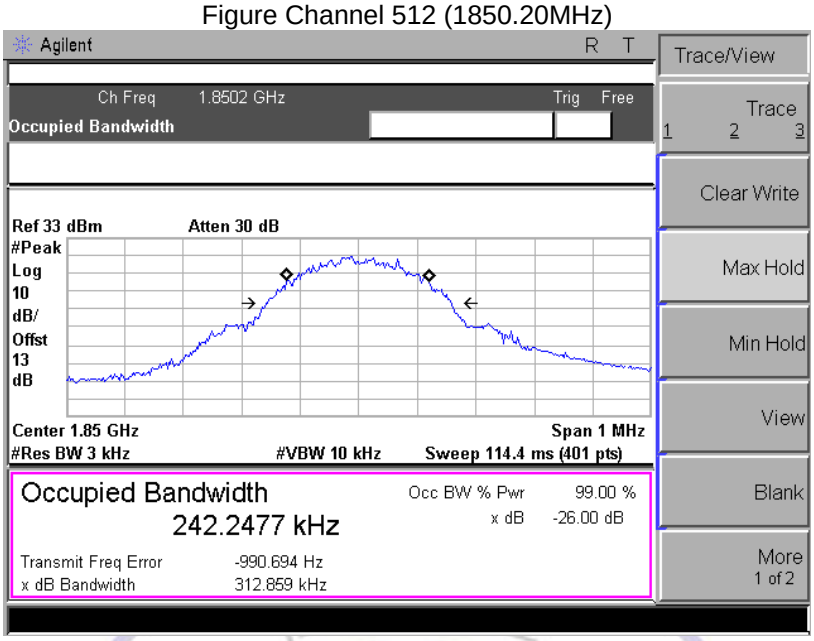


Figure Channel 661 (1880.00MHz)

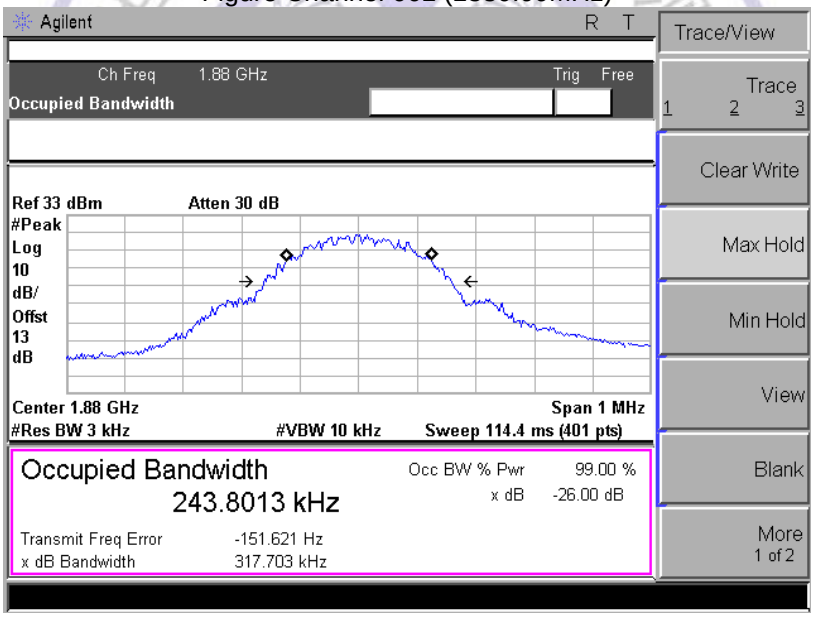
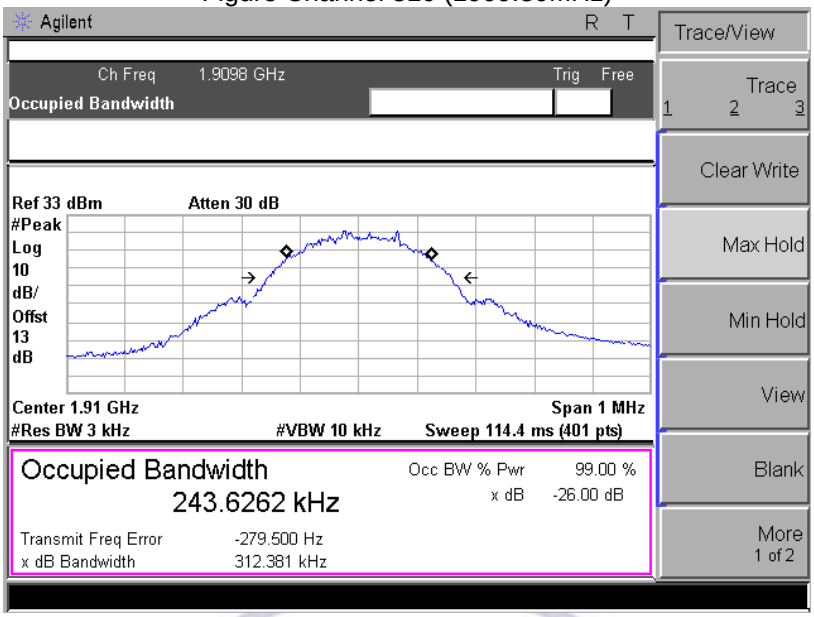


Figure Channel 810 (1909.80MHz)



WCDMA Band II:

Figure Channel 9262 (1852.40MHz)

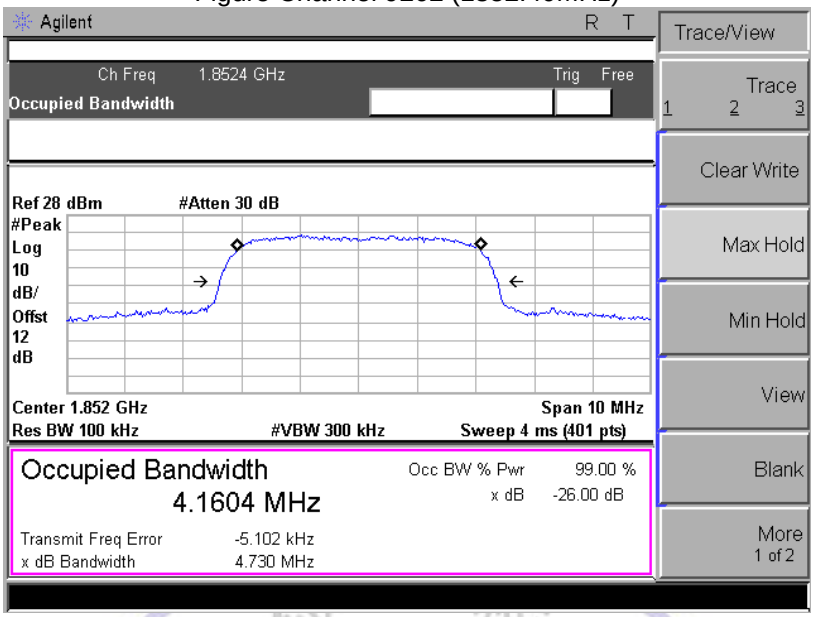


Figure Channel 9400 (1880.0MHz)

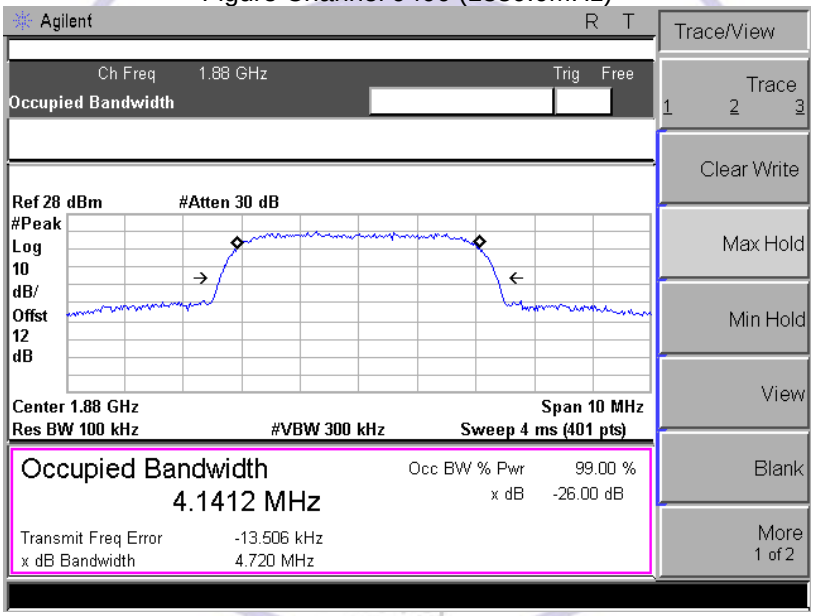
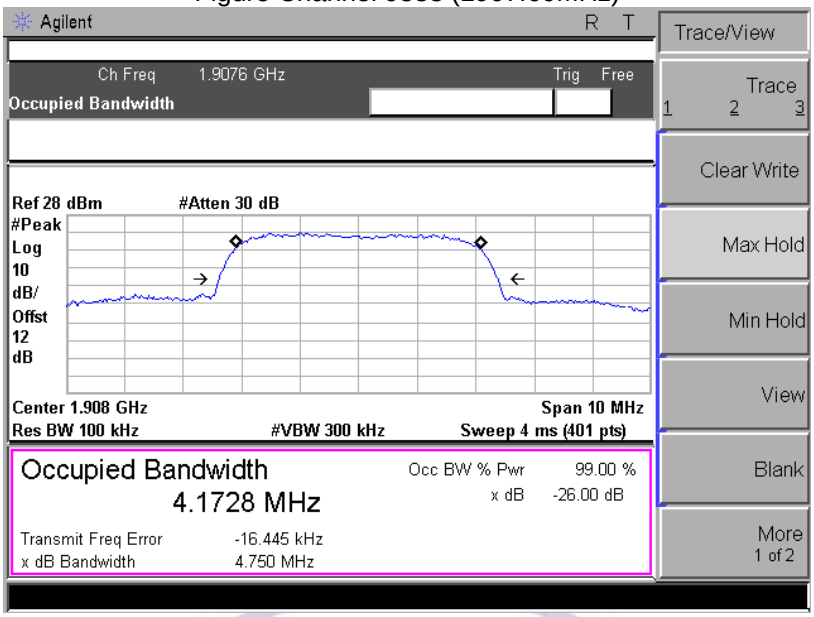


Figure Channel 9538 (1907.60MHz)



WCDMA Band V:

Figure Channel 4132 (826.40MHz)

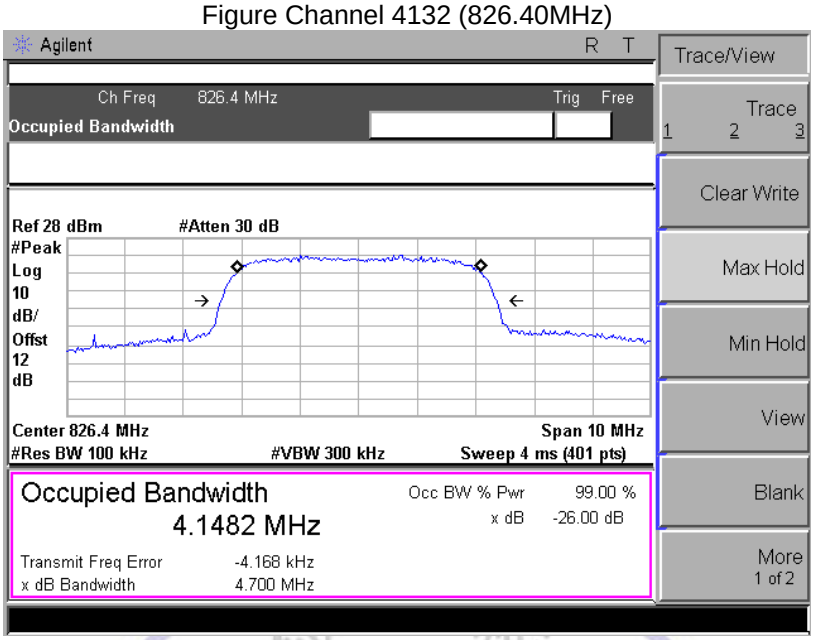


Figure Channel 4182 (836.40MHz)

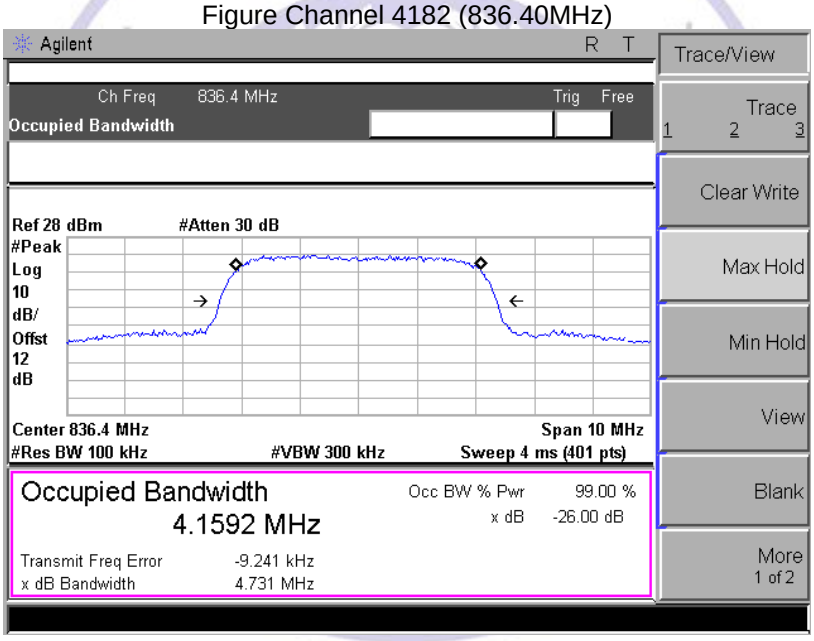
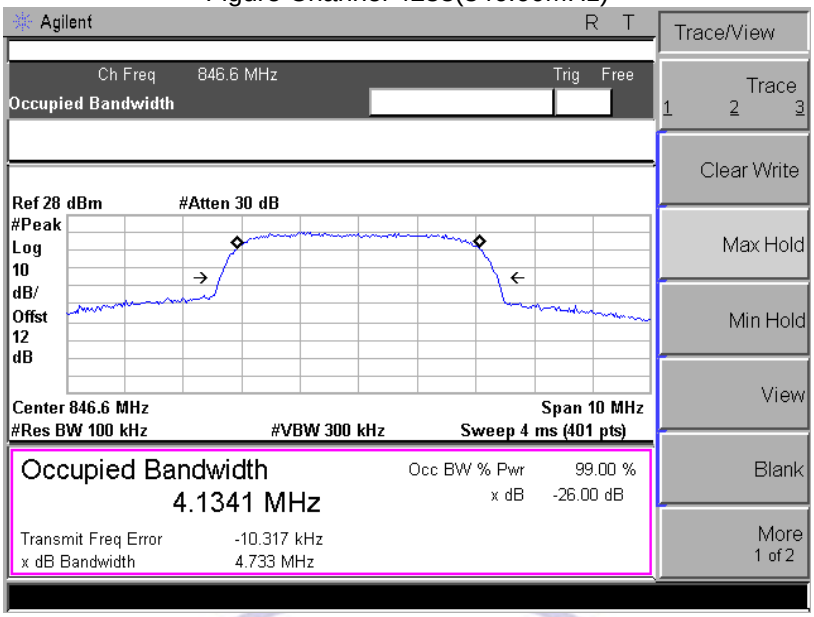
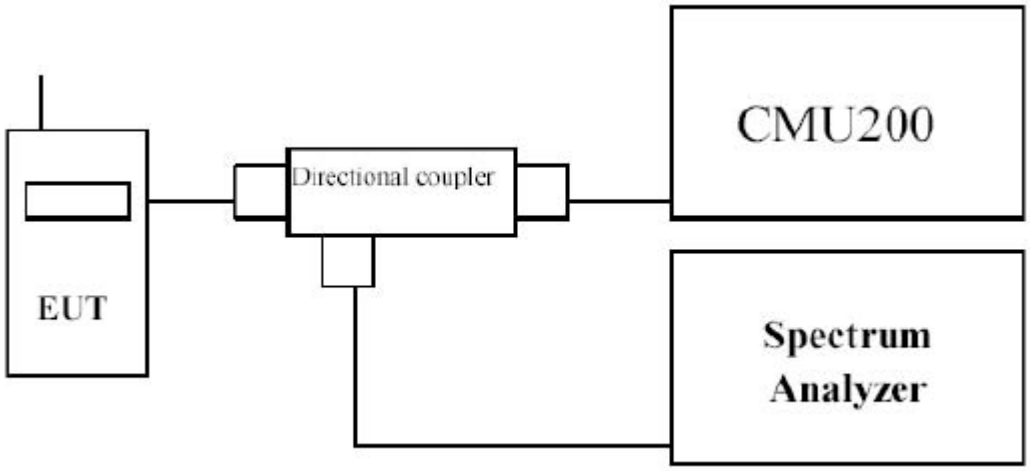


Figure Channel 4233(846.60MHz)



4.4. Spurious Emission At Antenna Terminals (+/- 1MHz)

TEST CONFIGURATION



TEST PROCEDURE

In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

LIMIT

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 + 10log(P) dB.

TEST RESULTS

GSM 850:

Figure Channel 128 (824.20MHz)

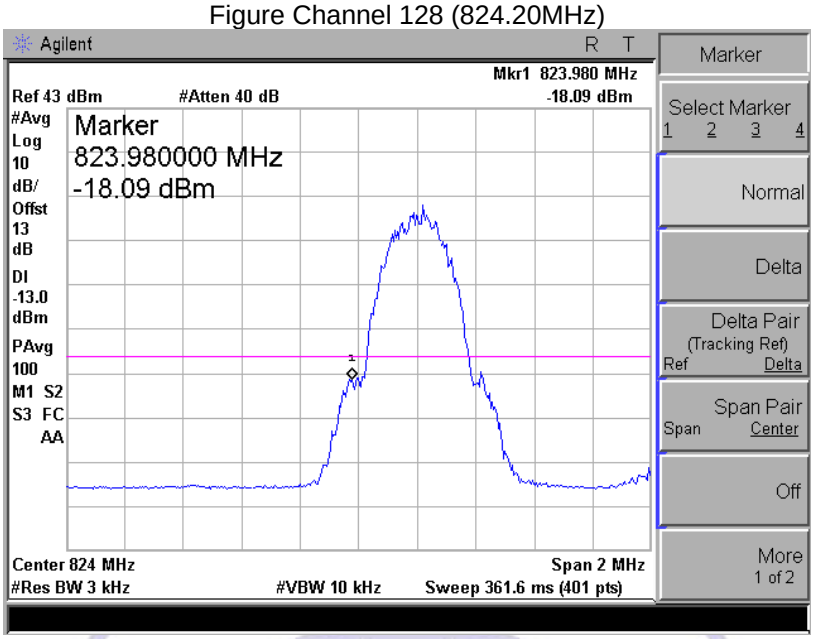
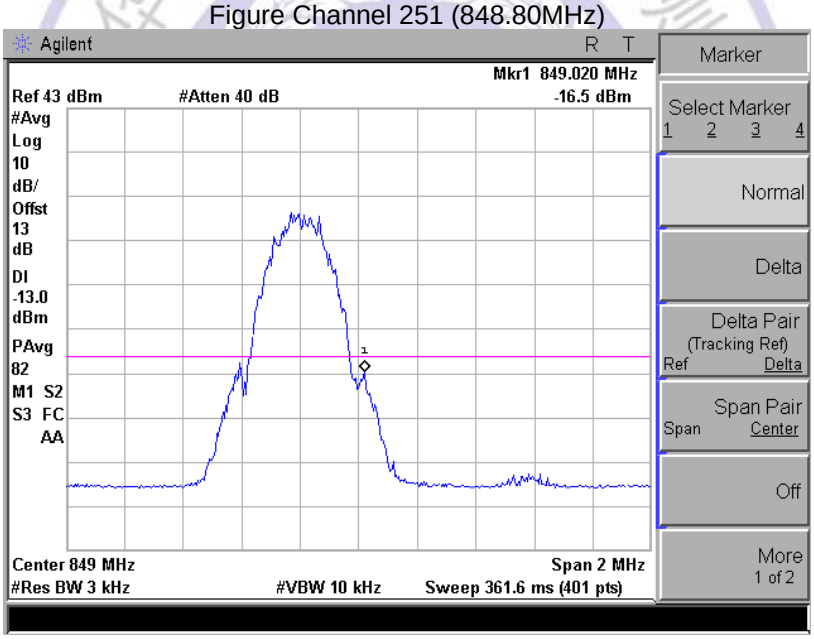


Figure Channel 251 (848.80MHz)



DCS 1900:

Figure Channel 512 (1850.20MHz)

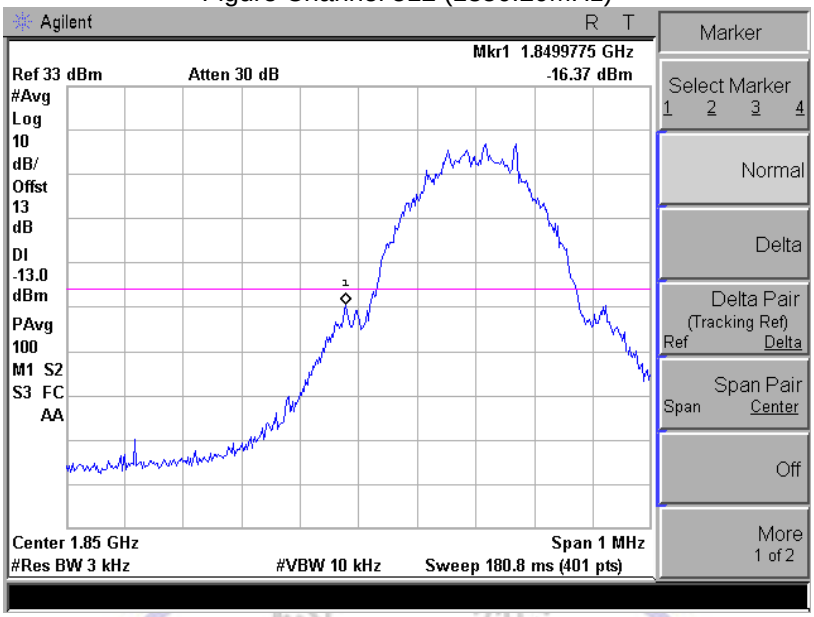
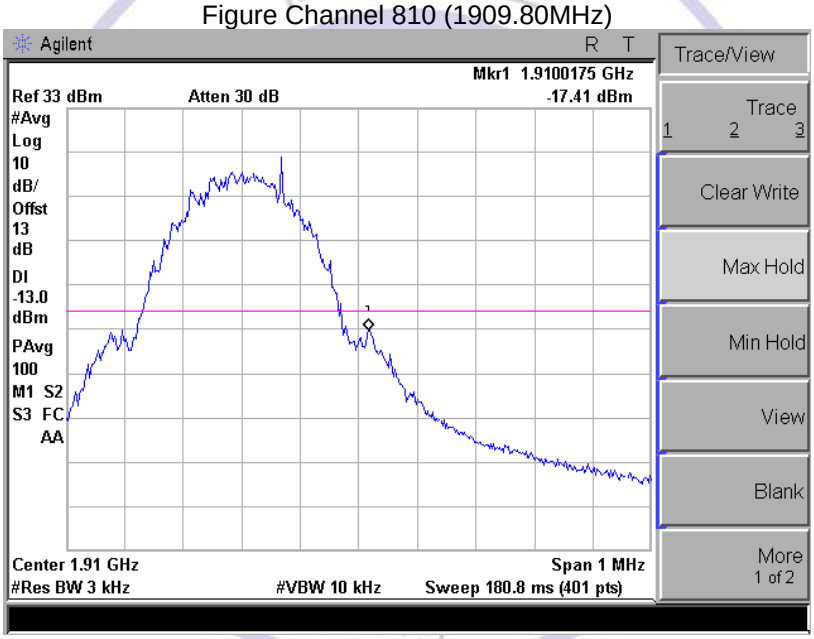


Figure Channel 810 (1909.80MHz)



WCDMA BAND II:

Figure Channel 9262 (1852.40MHz)

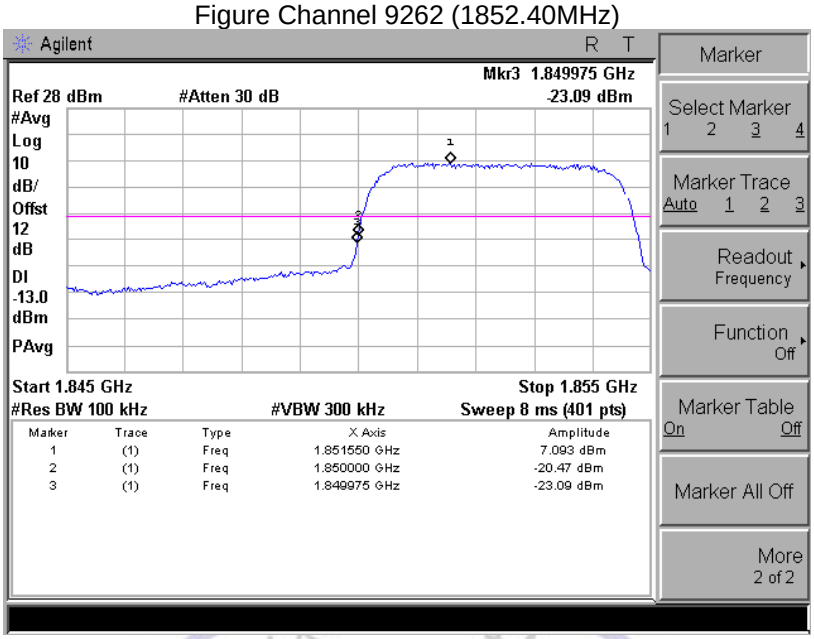
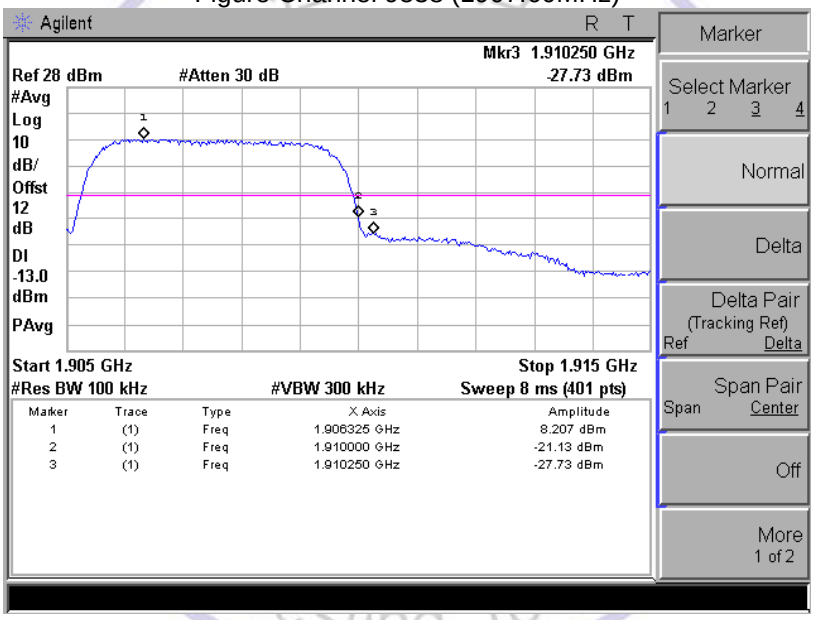


Figure Channel 9538 (1907.60MHz)



WCDMA BAND V:

Figure Channel 4132 (826.40MHz)

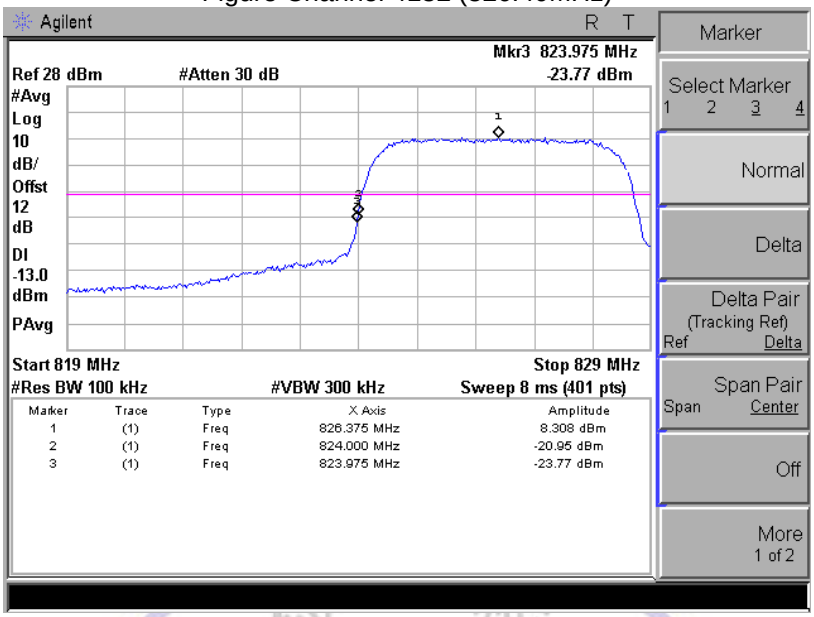
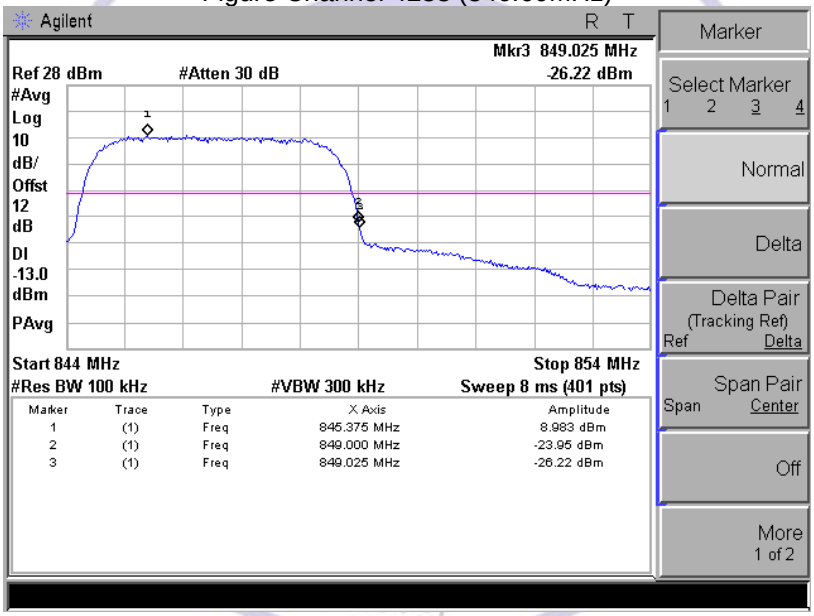


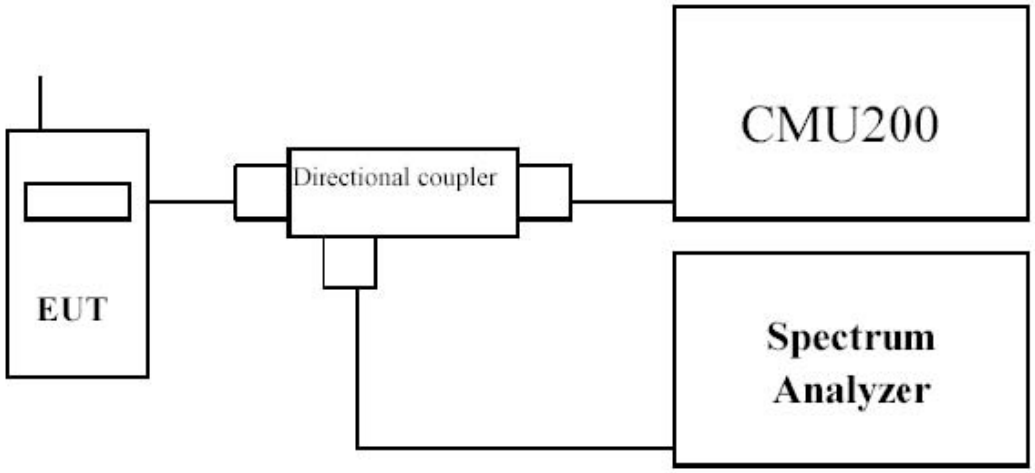
Figure Channel 4233 (846.60MHz)



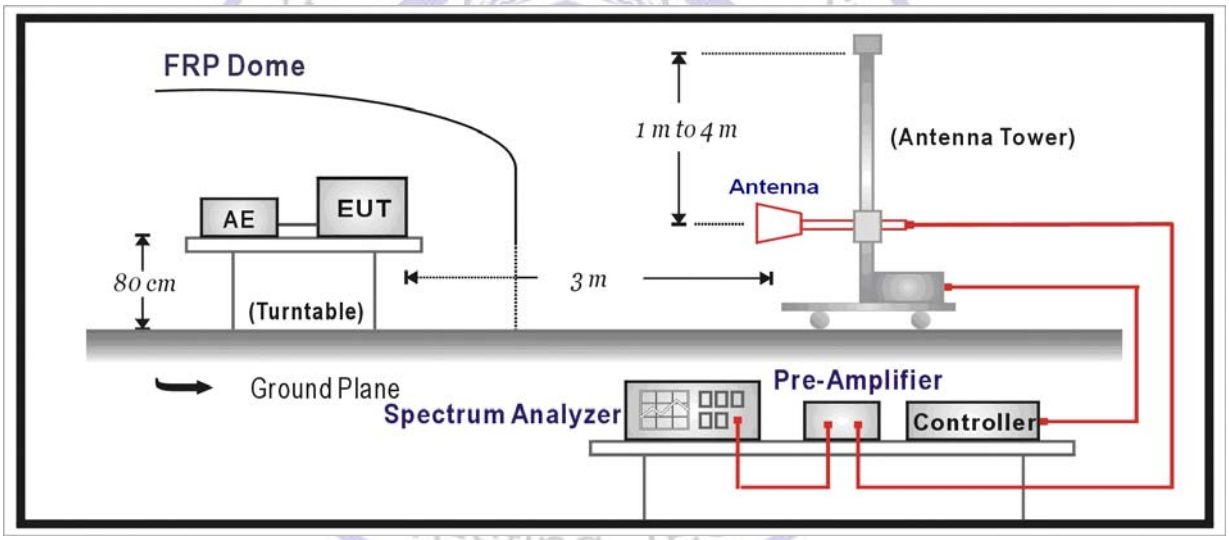
4.5. Spurious Emission

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Conducted Spurious Measurement:

a) Place the EUT on a bench and set it in transmitting mode.

b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.

c) EUT Communicate with CMU200, then select a channel for testing.

d) Add a correction factor to the display of spectrum, and then test.

e) The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24 and 27, sufficient scans were taken to show the out of band Emission if any up to10th harmonic.

Radiated Spurious Measurement:

a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.

b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter

c) The output of the test antenna shall be connected to the measuring receiver.

d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.

e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

q) The maximum signal level detected by the measuring receiver shall be noted.

h) The transmitter shall be replaced by a substitution antenna.

i) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

j) The substitution antenna shall be connected to a calibrated signal generator.

k) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

l) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

m) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

n) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

o) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

p) The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24 and 27. The frequency range was checked up to 10th harmonic.

q) Test site anechoic chamber refer to ANSI C63.4: 2009

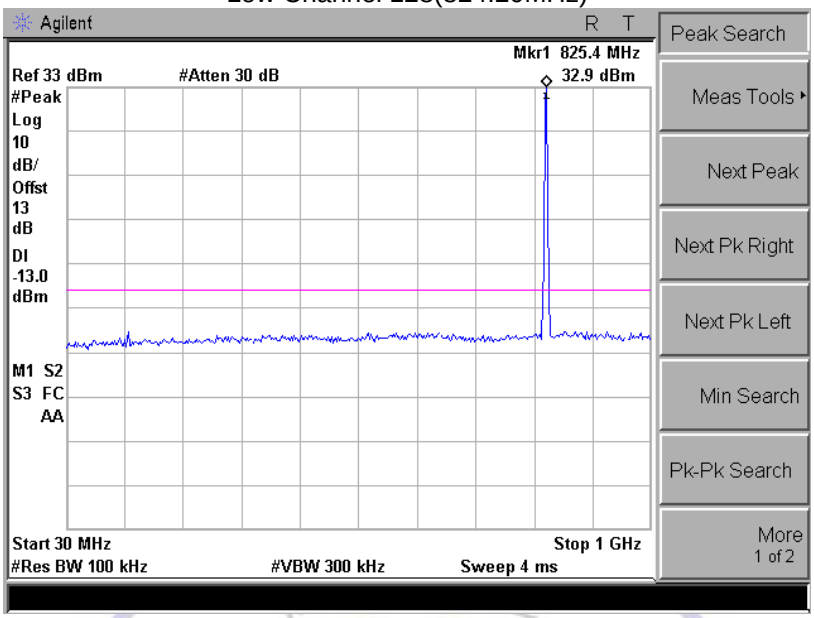
LIMIT

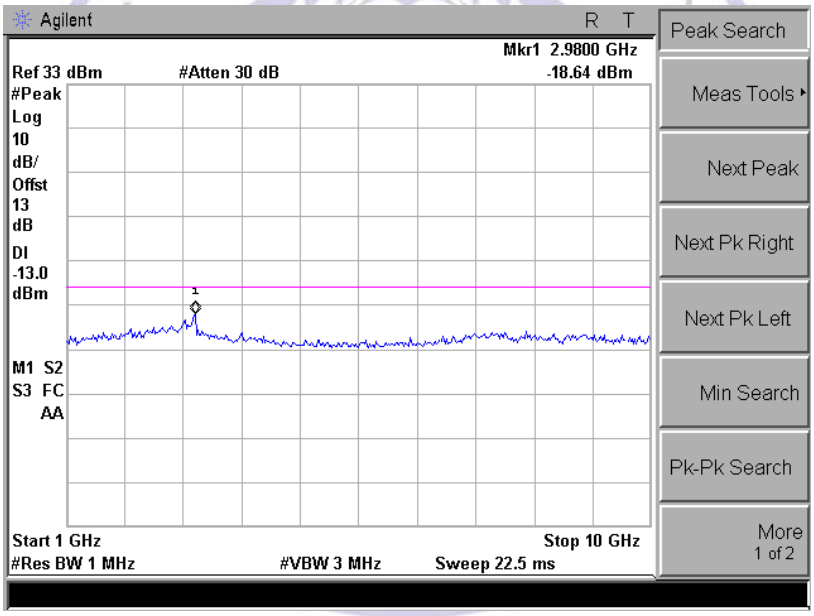
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

TEST RESULTS

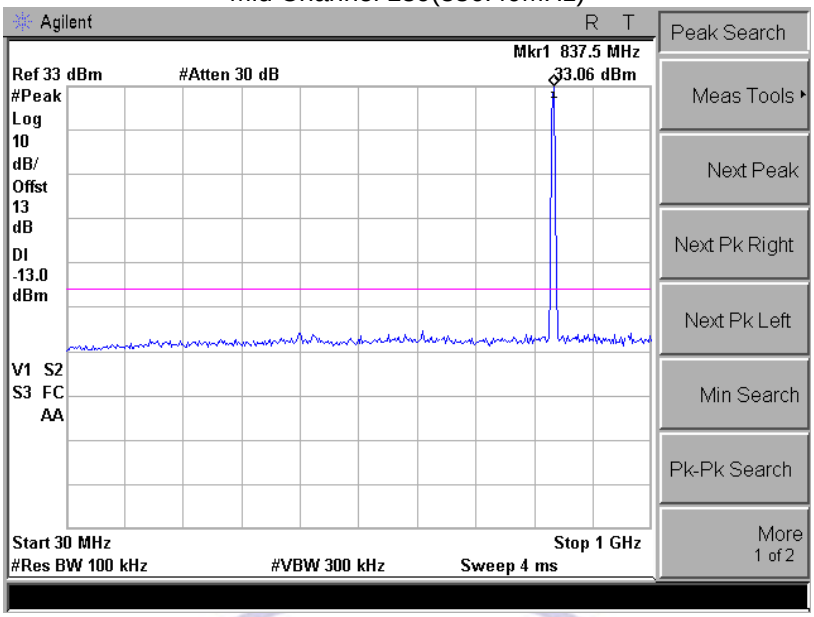
GSM 850:

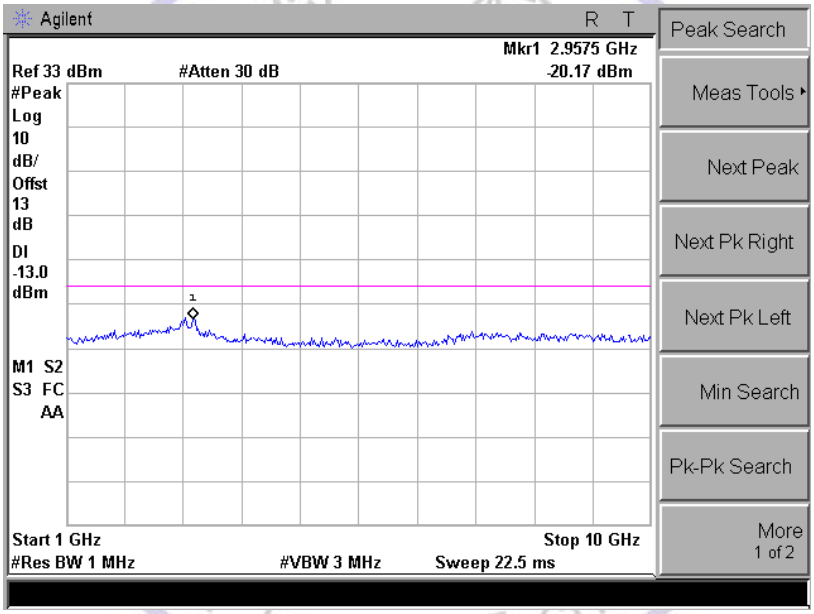
Low Channel 128(824.20MHz)



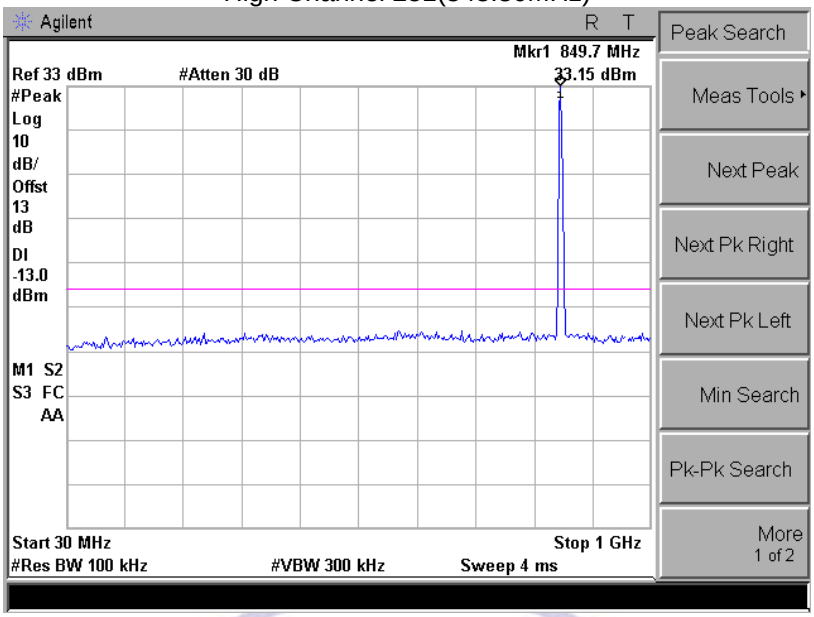


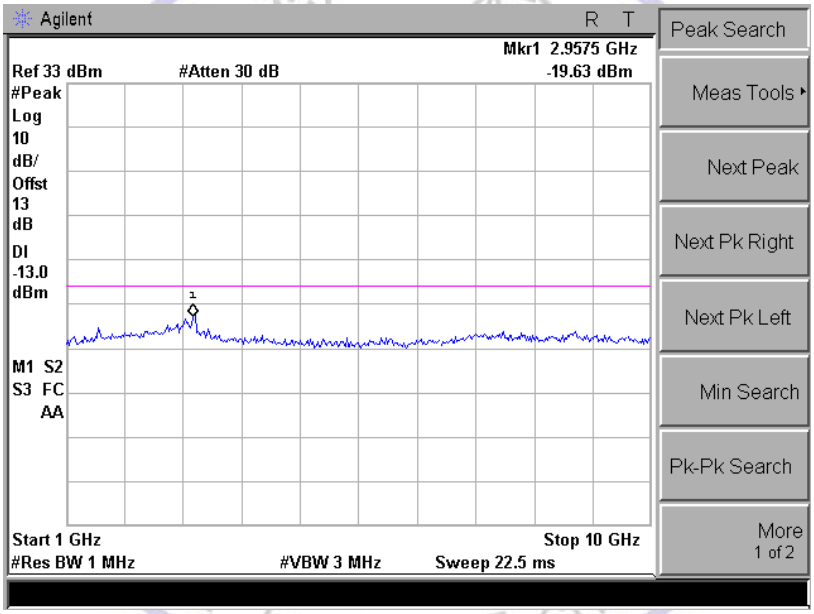
Mid Channel 189(836.40MHz)





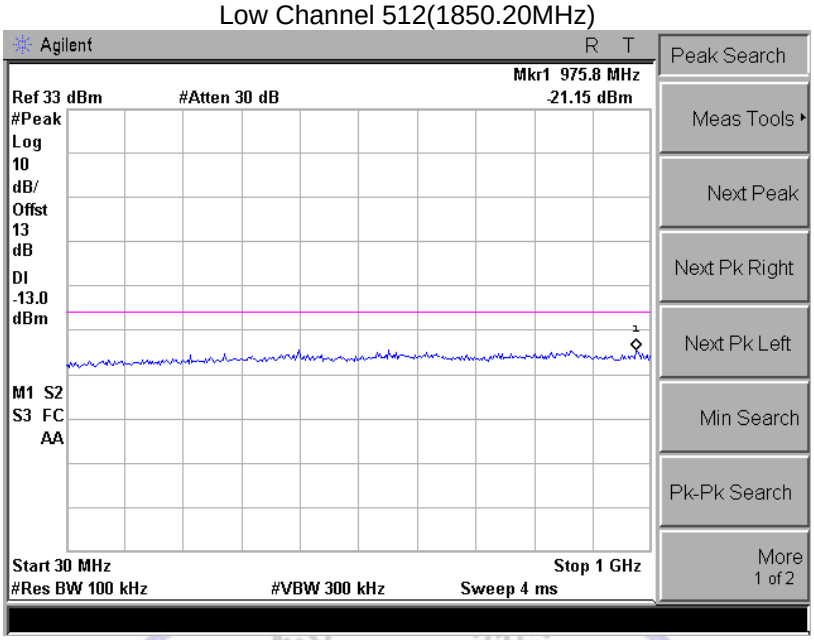
High Channel 251(848.80MHz)

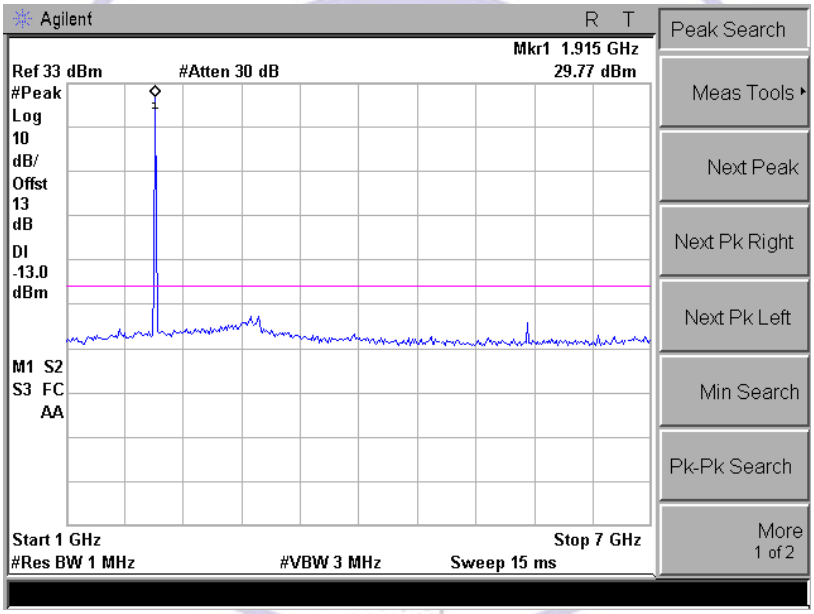


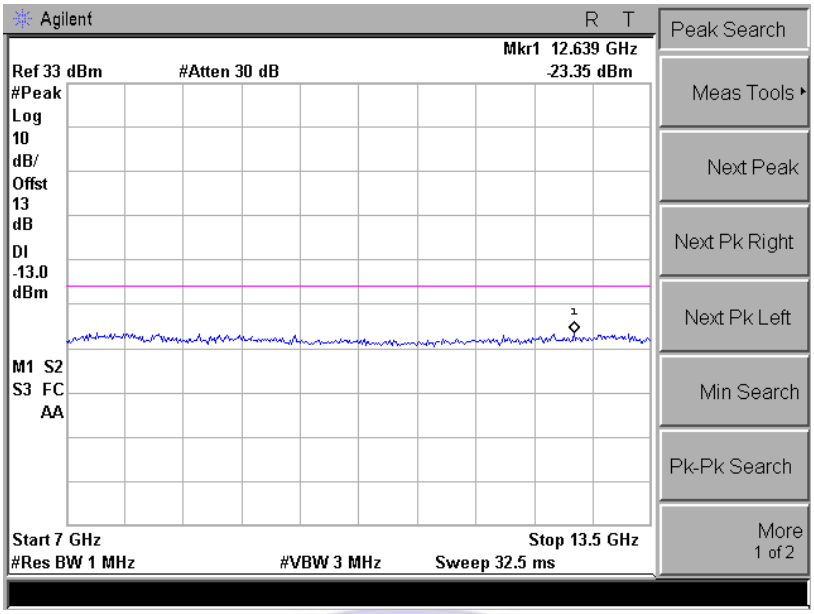


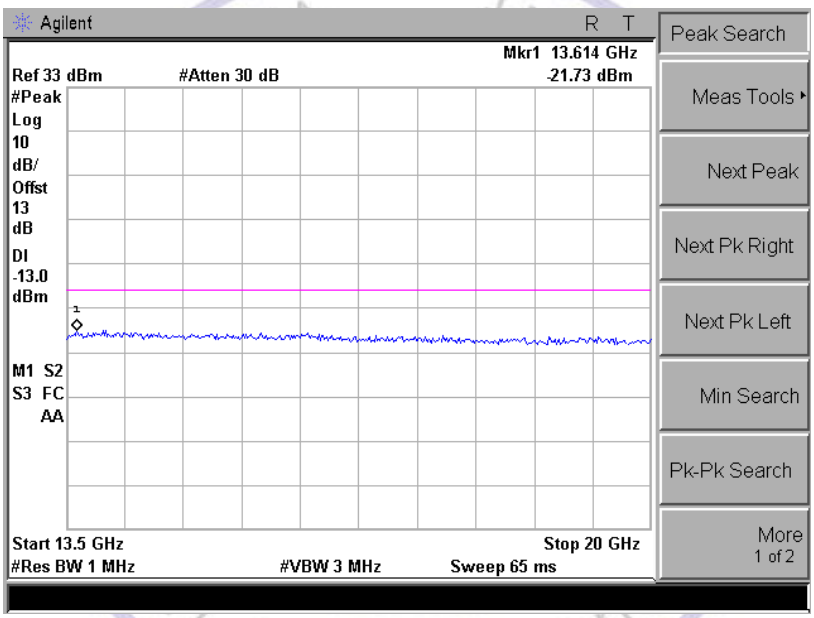
DCS1900:

Low Channel 512(1850.20MHz)

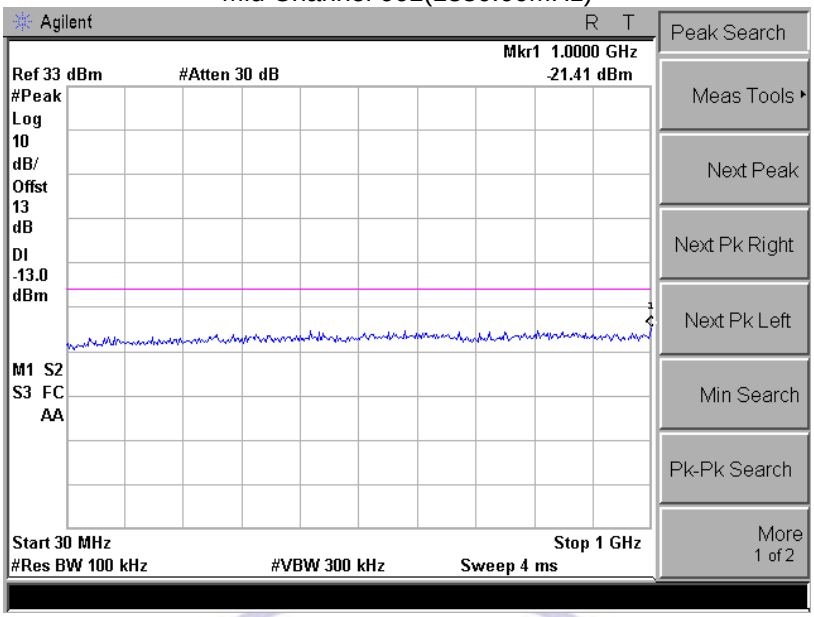


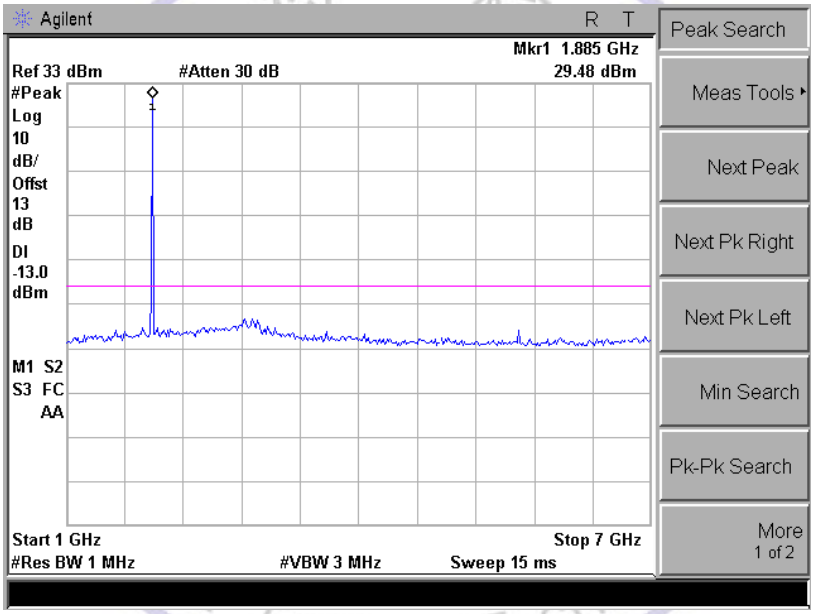


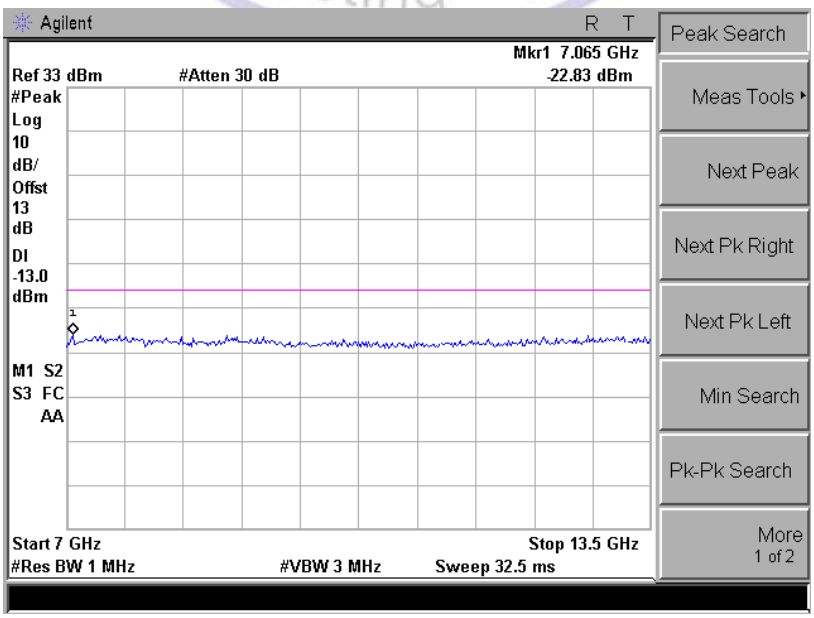

Agilent
R T
Mkr1 12.639 GHz
Ref 33 dBm
#Atten 30 dB
-23.35 dBm
#Peak
Log
10
dB/
Offst
13
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 13.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 32.5 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

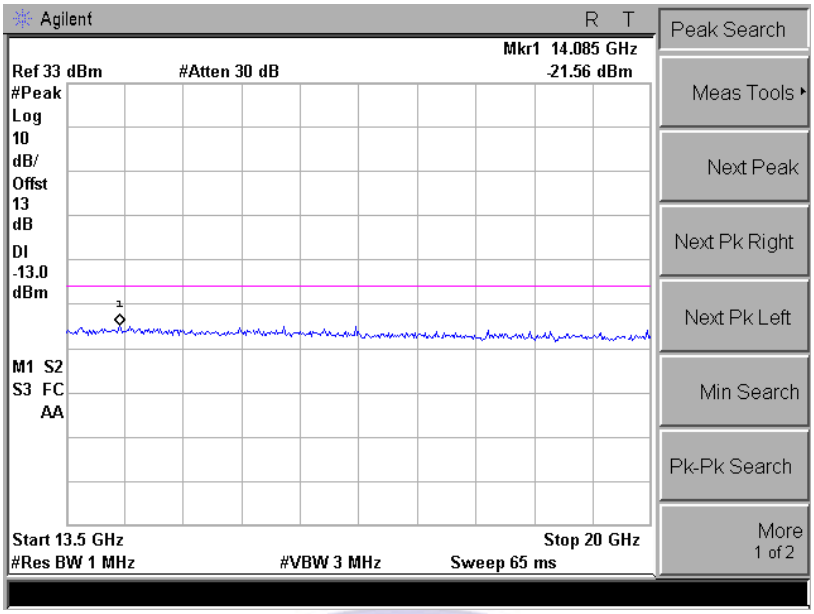

Agilent
R T
Mkr1 13.614 GHz
Ref 33 dBm
#Atten 30 dB
-21.73 dBm
#Peak
Log
10
dB/
Offst
13
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 13.5 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 65 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

Mid Channel 661(1880.00MHz)

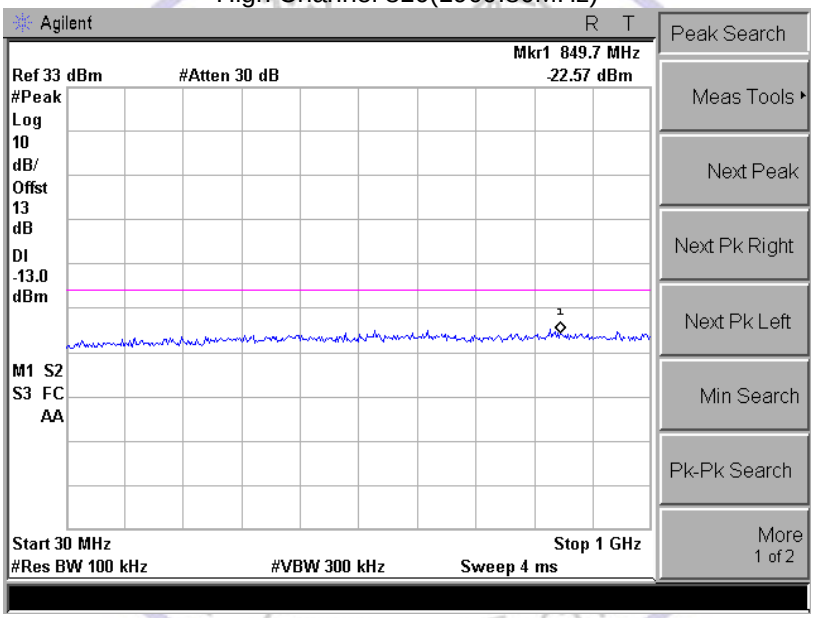


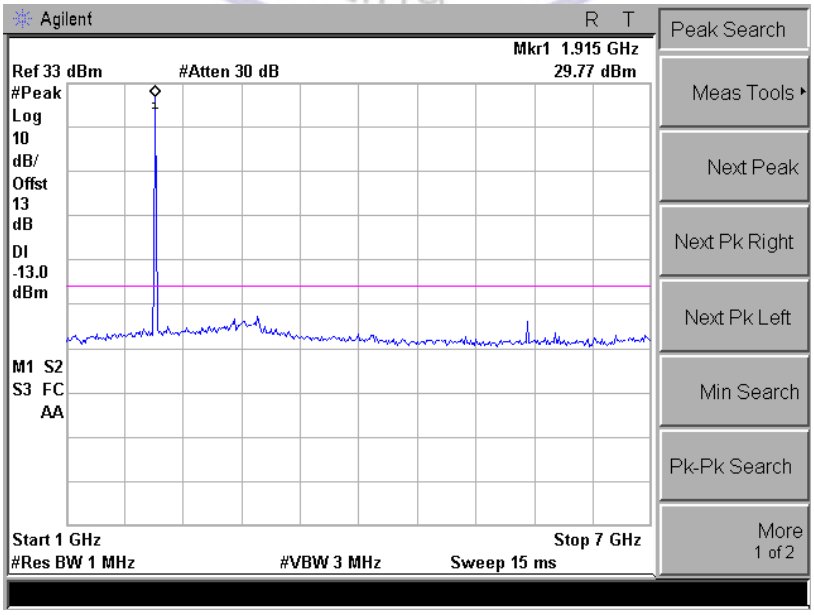


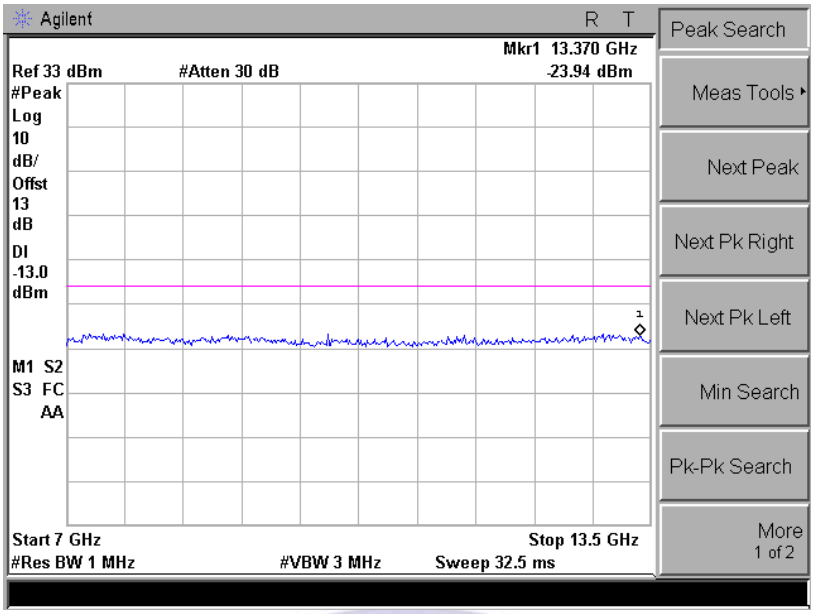


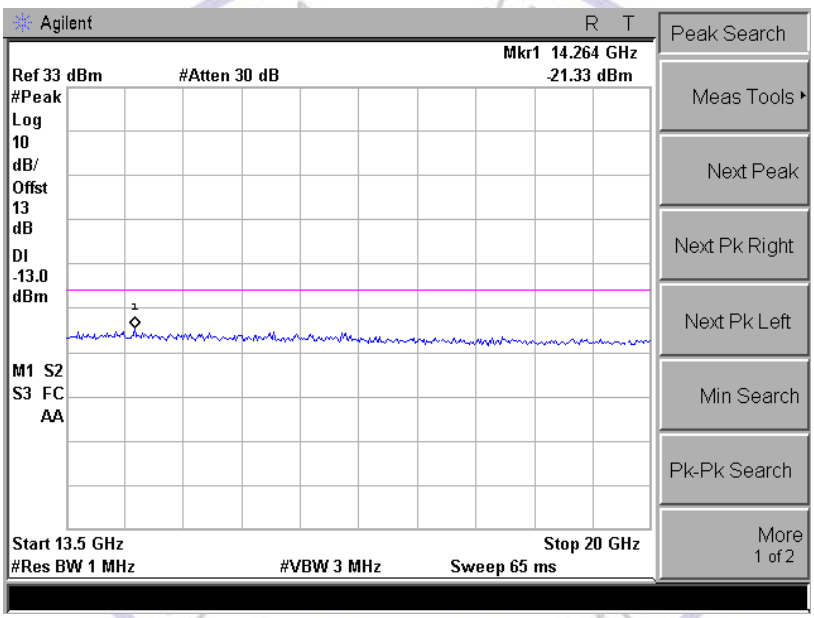


High Channel 810(1909.80MHz)



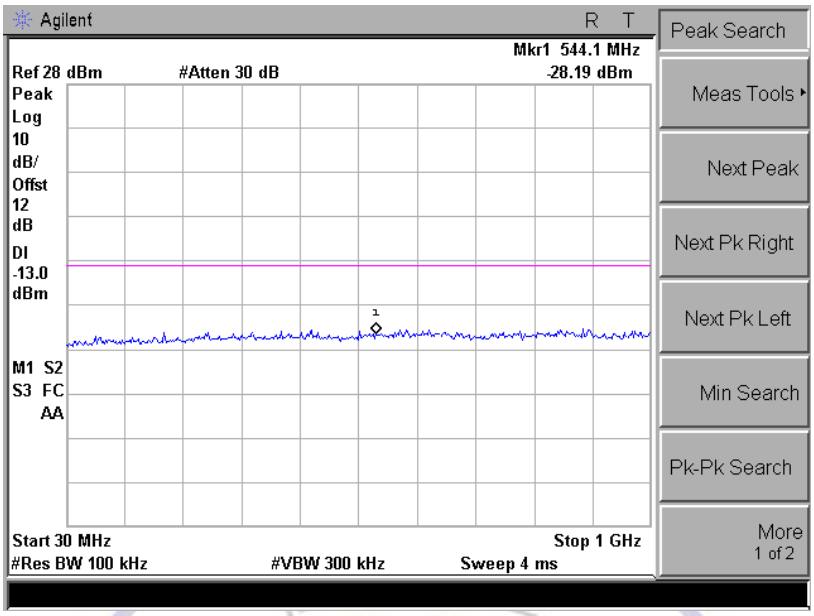


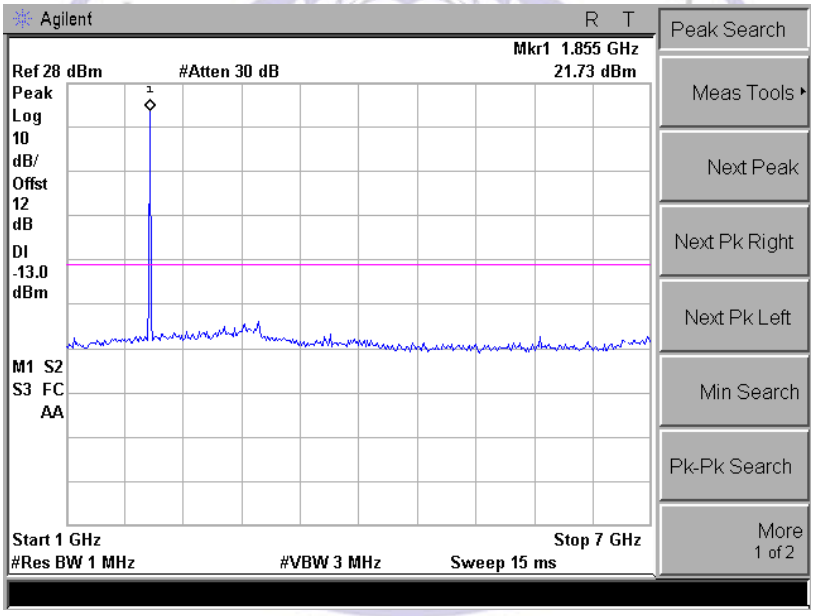

Agilent
R T
Mkr1 13.370 GHz
Ref 33 dBm
#Atten 30 dB
-23.94 dBm
#Peak
Log
10
dB/
Offst
13
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 13.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 32.5 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

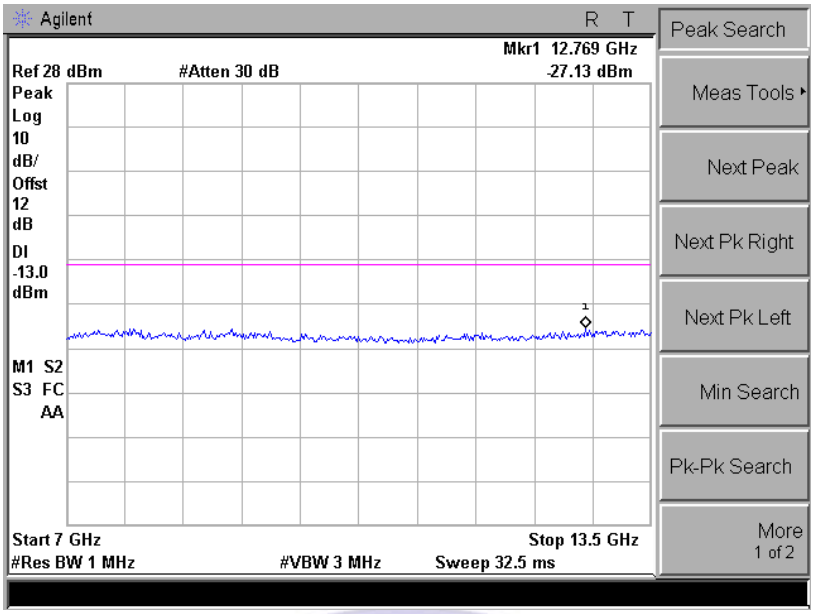

Agilent
R T
Mkr1 14.264 GHz
Ref 33 dBm
#Atten 30 dB
-21.33 dBm
#Peak
Log
10
dB/
Offst
13
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 13.5 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 65 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

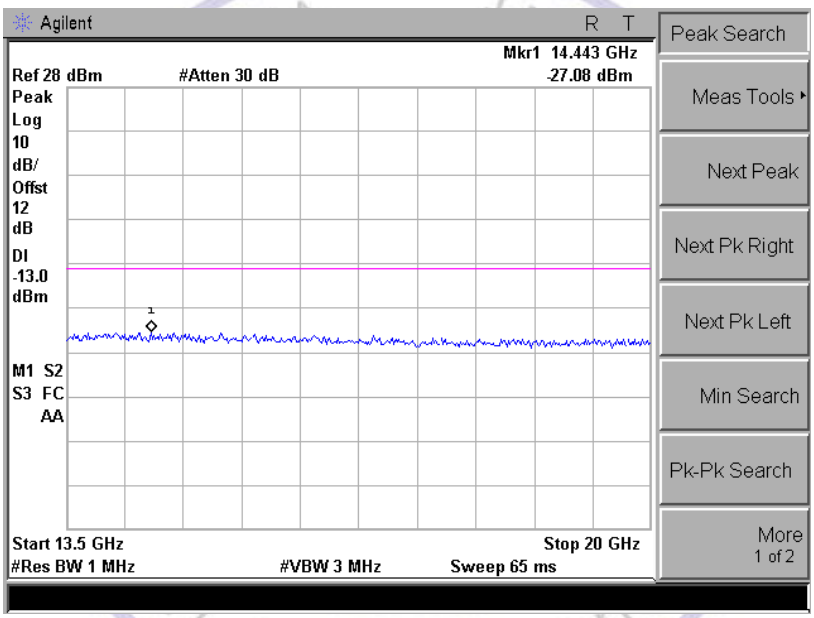
WCDMA Band II:

Low Channel 9262(1852.40MHz)

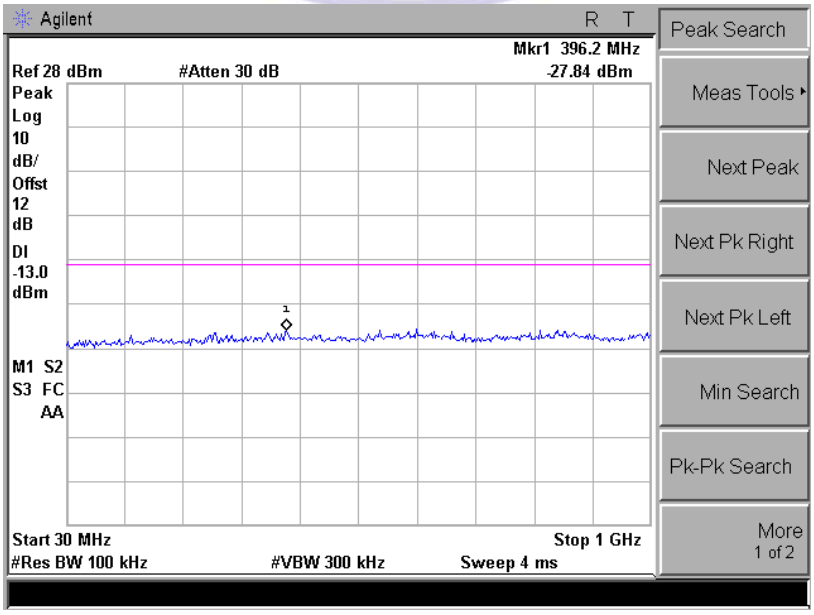


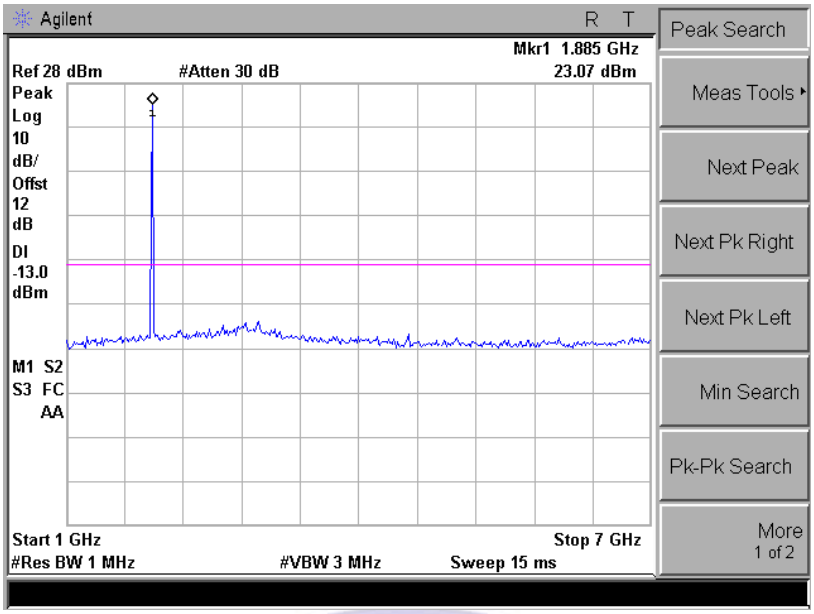


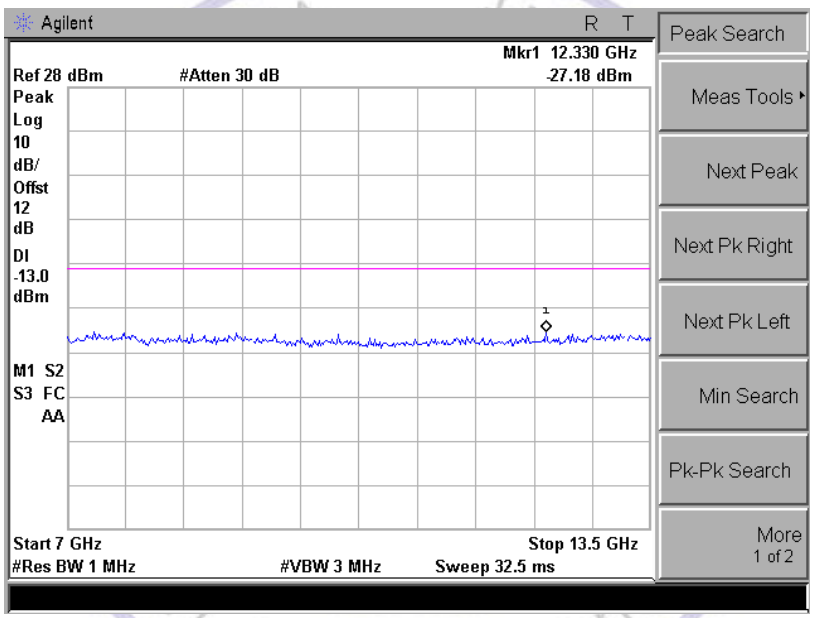


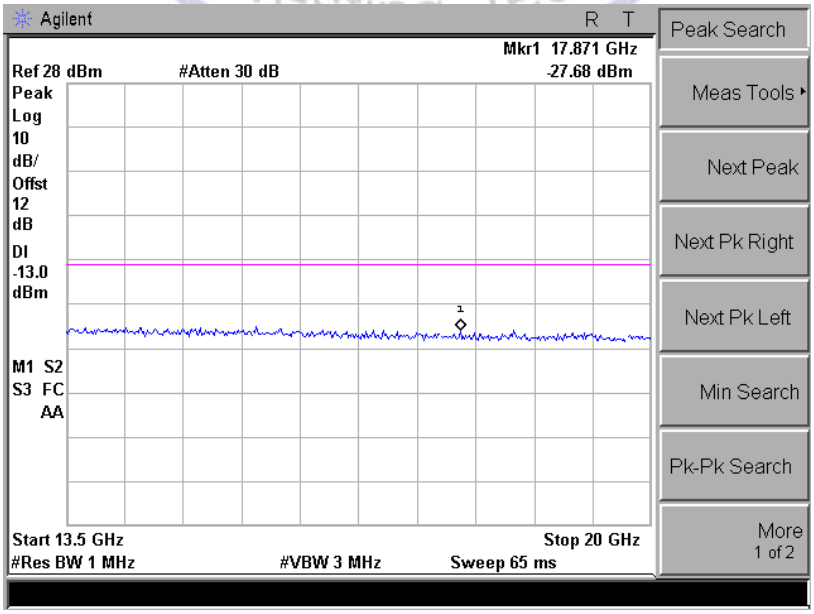


Mid Channel 9400(1880.00MHz)

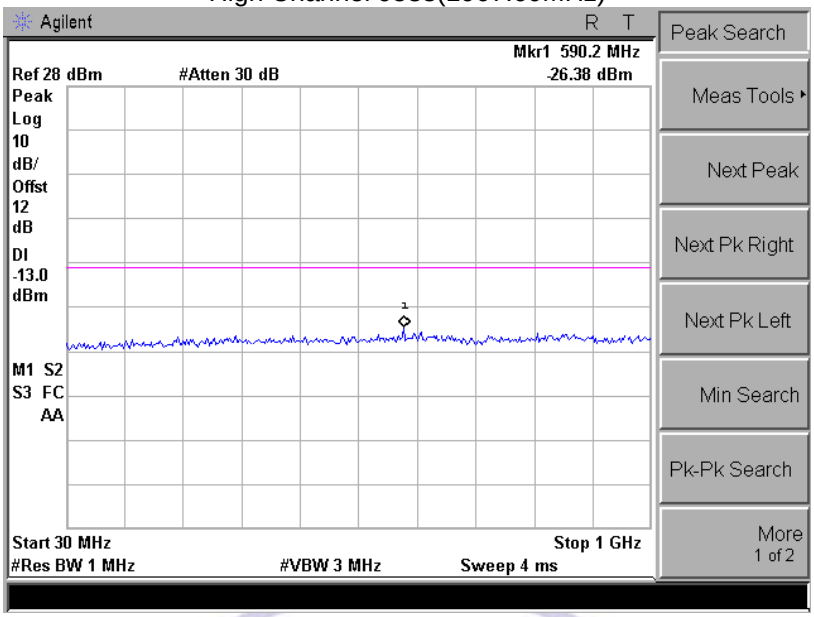


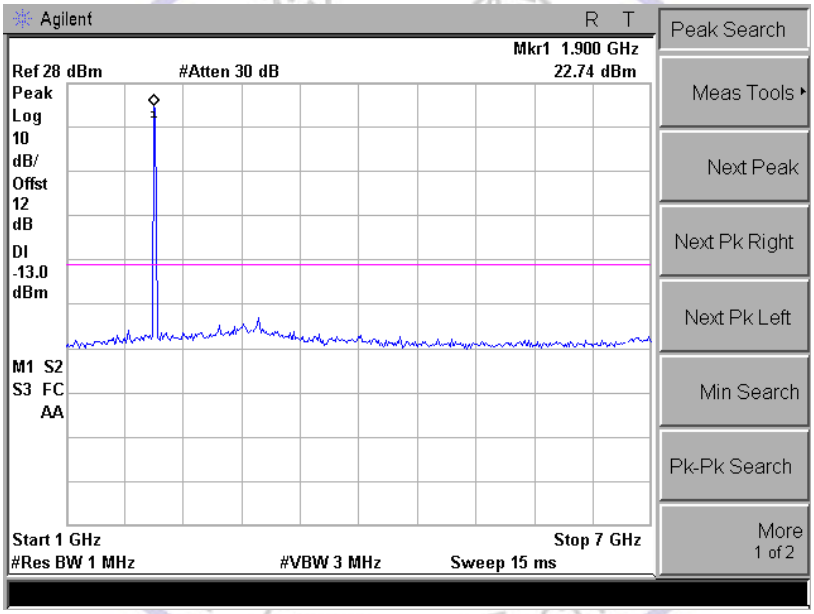

Agilent
R T
Mkr1 1.885 GHz
Ref 28 dBm
#Atten 30 dB
23.07 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
Stop 7 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

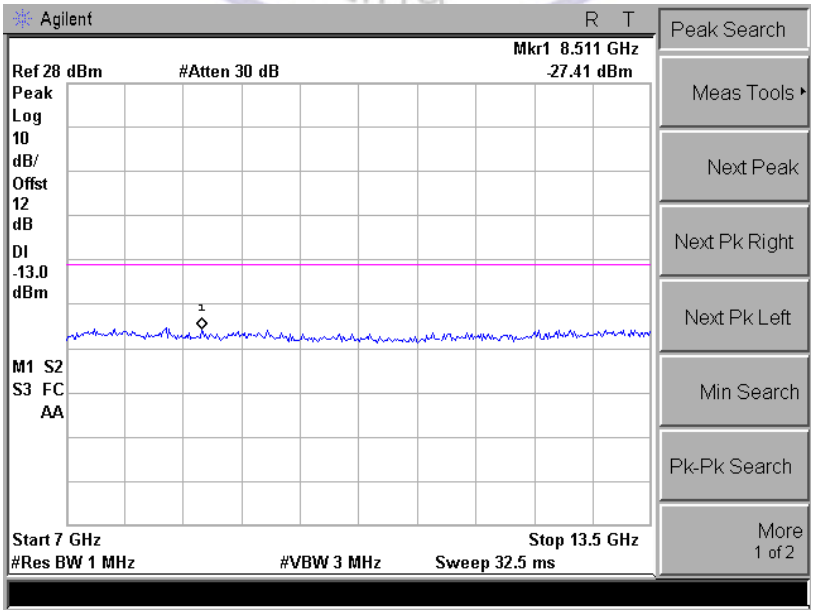

Agilent
R T
Mkr1 12.330 GHz
Ref 28 dBm
#Atten 30 dB
-27.18 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 13.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 32.5 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

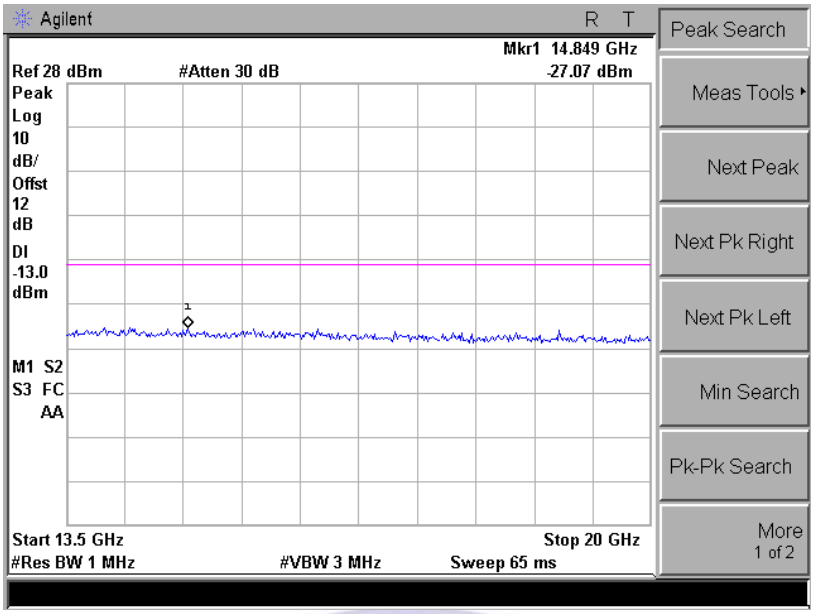

Agilent
R T
Mkr1 17.871 GHz
Ref 28 dBm
#Atten 30 dB
-27.68 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 13.5 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 65 ms
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

High Channel 9538(1907.60MHz)



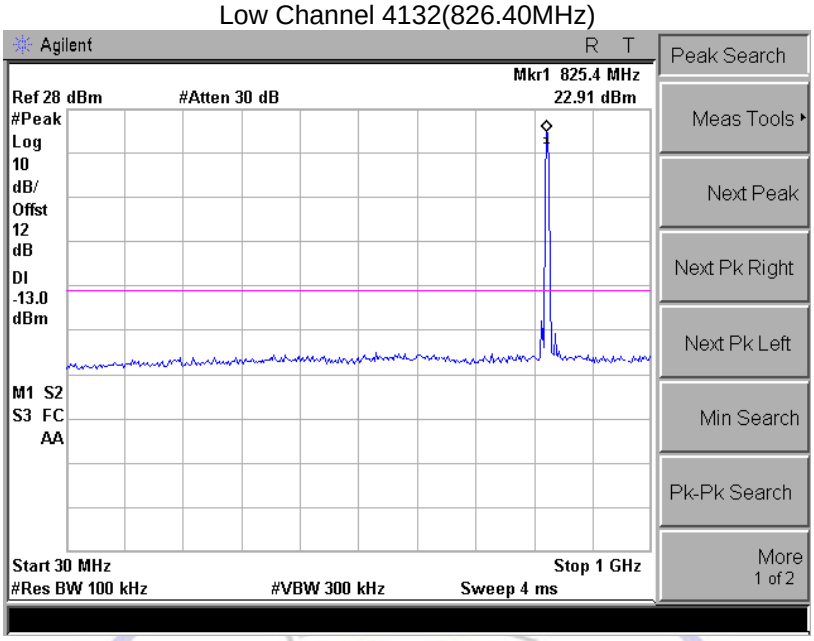


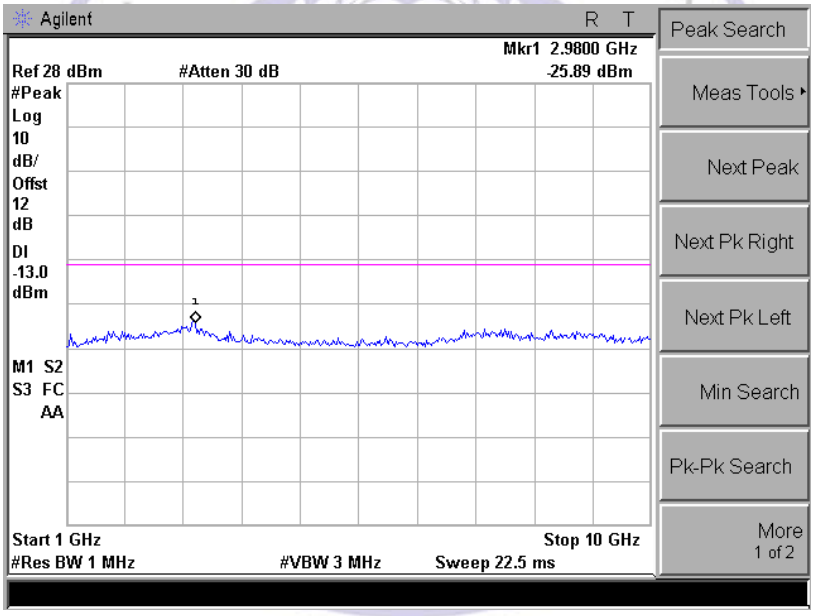




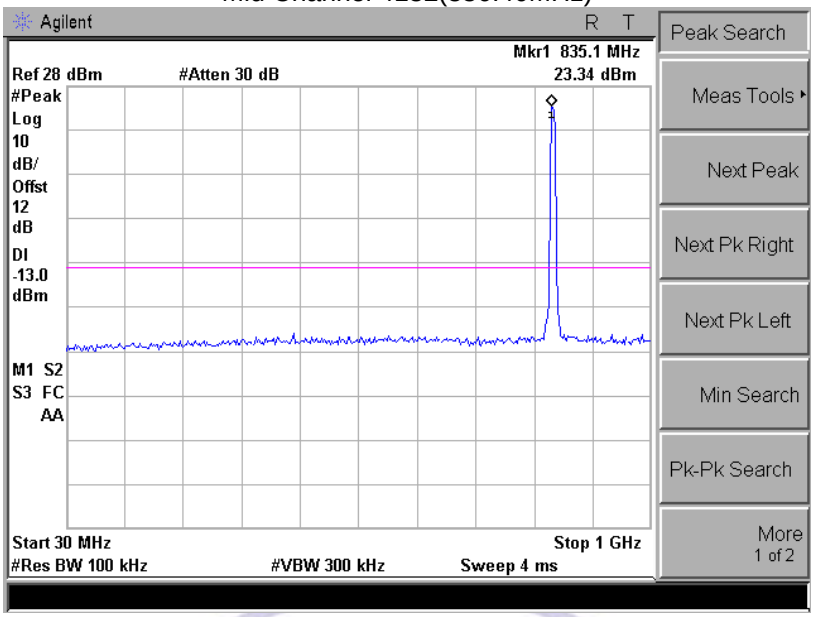
WCDMA Band V:

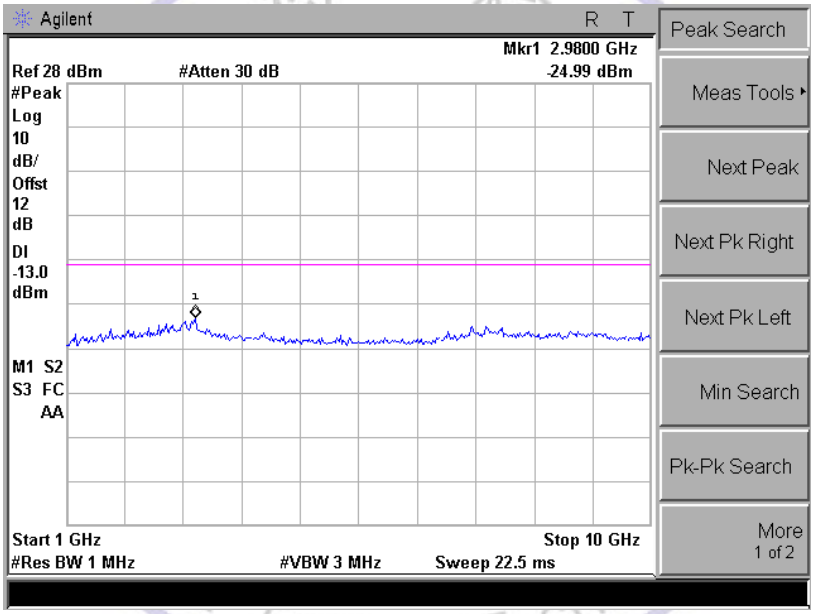
Low Channel 4132(826.40MHz)



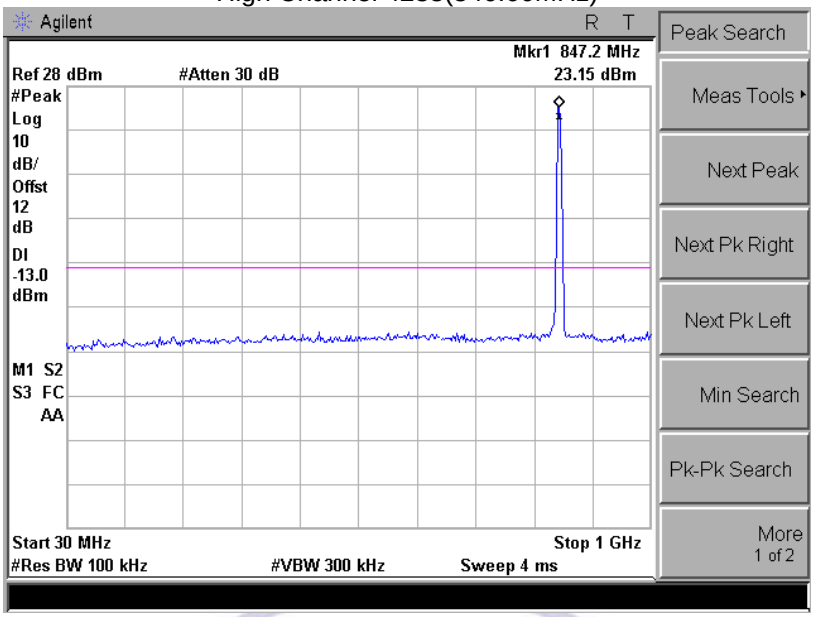


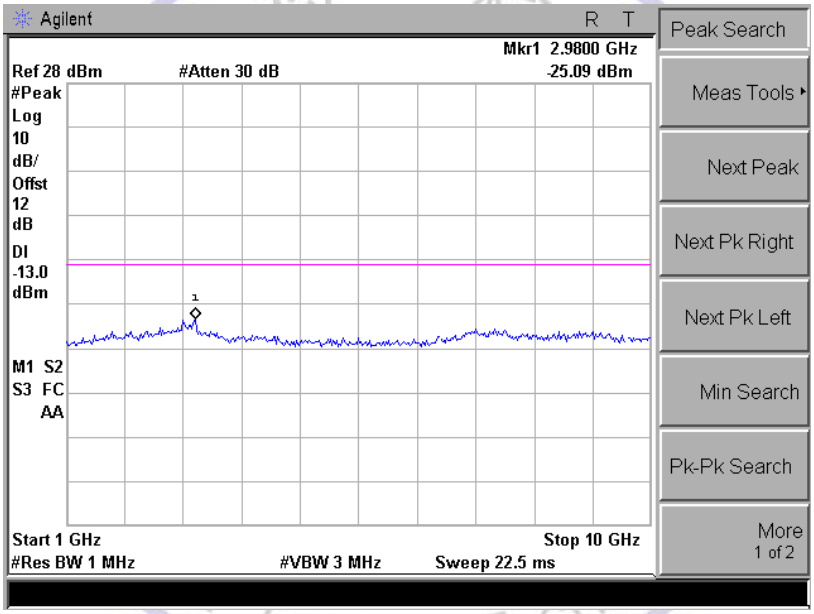
Mid Channel 4182(836.40MHz)





High Channel 4233(846.60MHz)





Test Item	Radiated Spurious Emission
Test Mode	Mode 1: GSM 850 Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.20MHz)								
1646.0	-46.01	V	-48.58	2.50	9.75	-41.33	-13	28.33
2470.5	-54.91	V	-53.94	3.12	10.48	-46.58	-13	33.58
1646.0	-50.3	H	-52.96	2.50	9.75	-45.71	-13	32.71
2470.5	-57.3	H	-56.19	3.12	10.48	-48.83	-13	35.83
Middle Channel 189 (836.40MHz)								
1671.5	-46.98	V	-49.65	2.52	9.95	-42.22	-13	29.22
2513.0	-57.19	V	-56.5	3.18	10.62	-49.06	-13	36.06
1671.5	-47.35	H	-49.77	2.52	9.95	-42.34	-13	29.34
2513.0	-57.25	H	-56.18	3.18	10.62	-48.74	-13	35.74
High Channel 251 (848.80MHz)								
1697.0	-45.31	V	-48.04	2.54	10.06	-40.52	-13	27.52
2547.0	-57.72	V	-56.15	3.14	10.68	-48.61	-13	35.61
1697.0	-46.28	H	-48.28	2.54	10.06	-40.76	-13	27.76
2547.0	-56.85	H	-55.03	3.14	10.68	-47.49	-13	34.49

Test Item	Radiated Spurious Emission
Test Mode	Mode 2: DCS 1900 Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.20MHz)								
3700	-62.86	V	-59.43	2.50	9.75	-52.18	-13	39.18
5550	-63.91	V	-55.4	3.12	10.48	-48.04	-13	35.04
3700	-62.59	H	-59.22	2.50	9.75	-51.97	-13	38.97
5550	-64.28	H	-56.39	3.12	10.48	-49.03	-13	36.03
Middle Channel 661 (1880.00MHz)								
3760	-62.62	V	-59.41	2.52	9.95	-51.98	-13	38.98
5640	-62.71	V	-54.77	3.18	10.62	-47.33	-13	34.33
3760	-62.33	H	-59.05	2.52	9.95	-51.62	-13	38.62
5640	-63.09	H	-55.48	3.18	10.62	-48.04	-13	35.04
High Channel 810 (1909.80MHz)								
3818	-64.31	V	-60.58	2.54	10.06	-53.06	-13	40.06
5727	-62.78	V	-54.15	3.14	10.68	-46.61	-13	33.61
3818	-64.39	H	-60.5	2.54	10.06	-52.98	-13	39.98
5727	-60.72	H	-52.48	3.14	10.68	-44.94	-13	31.94

Test Item	Radiated Spurious Emission
Test Mode	Mode 3: WCDMA Band II Link

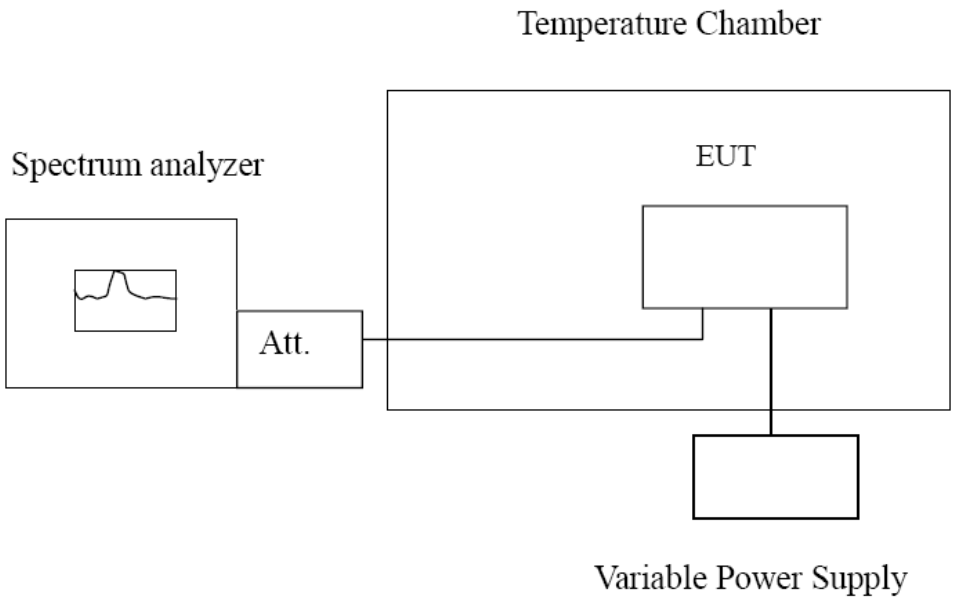
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 9262 (1852.40MHz)								
3704.8	-63.27	V	-58.88	2.50	9.75	-51.63	-13	38.63
5557.2	-63.41	V	-54.91	3.12	10.48	-47.55	-13	34.55
3704.8	-63.02	H	-58.71	2.50	9.75	-51.46	-13	38.46
5557.2	-63.43	H	-55.55	3.12	10.48	-48.19	-13	35.19
Middle Channel 9400 (1880.00MHz)								
3760.0	-63.97	V	-59.46	2.52	9.95	-52.03	-13	39.03
5640.0	-64.04	V	-56.1	3.18	10.62	-48.66	-13	35.66
3760.0	-64.76	H	-60.18	2.52	9.95	-52.75	-13	39.75
5640.0	-65.25	H	-56.62	3.18	10.62	-49.18	-13	36.18
High Channel 9538 (1907.60MHz)								
3815.2	-65.05	V	-60.31	2.54	10.06	-52.79	-13	39.79
5722.8	-63.45	V	-54.82	3.14	10.68	-47.28	-13	34.28
3815.2	-65.74	H	-60.83	2.54	10.06	-53.31	-13	40.31
5722.8	-62.36	H	-54.14	3.14	10.68	-46.6	-13	33.6

Test Item	Radiated Spurious Emission
Test Mode	Mode 4: WCDMA Band V Traffic

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 4132 (826.40MHz)								
1654.5	-62.33	V	-64.09	2.50	9.75	-56.84	-13	43.84
2479.0	-64.93	V	-63.15	3.12	10.48	-55.79	-13	42.79
1654.5	-61.45	H	-63.23	2.50	9.75	-55.98	-13	42.98
2479.0	-68.07	H	-66.07	3.12	10.48	-58.71	-13	45.71
Middle Channel 4182 (836.40MHz)								
1671.5	-61.35	V	-63.21	2.52	9.95	-55.78	-13	42.78
2513.0	-65.58	V	-63.8	3.18	10.62	-56.39	-13	43.39
1671.5	-60.52	H	-62.13	2.52	9.95	-54.70	-13	41.7
2513.0	-67.64	H	-65.50	3.18	10.62	-58.06	-13	45.06
High Channel 4233 (846.60MHz)								
1697.0	-58.56	V	-60.49	2.54	10.06	-52.97	-13	39.97
2539.8	-63.39	V	-60.93	3.14	10.68	-53.39	-13	40.39
1697.0	-60.97	H	-61.94	2.54	10.06	-54.42	-13	41.42
2538.5	-66.07	H	-63.35	3.14	10.68	-55.81	-13	42.81

4.6. Frequency Stability under Temperature & Voltage Variations

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Limit < ± 2.5 ppm

TEST RESULTS

Test Item	Frequency Stability Under Temperature & Voltage Variations
Test Mode	Mode 1: GSM 850 Link

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	836.40	36	± 2091
-20	836.40	68	± 2091
-10	836.40	-29	± 2091
0	836.40	-13	± 2091
10	836.40	15	± 2091
20	836.40	-10	± 2091
30	836.40	-47	± 2091
40	836.40	39	± 2091
50	836.40	61	± 2091

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	836.40	-33	± 2091
3.7	836.40	18	± 2091
4.2	836.40	-42	± 2091

Test Item	Frequency Stability Under Temperature & Voltage Variations
Test Mode	Mode 2: GSM1900 Link

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	1880.00	-59	± 4700
-20	1880.00	47	± 4700
-10	1880.00	51	± 4700
0	1880.00	38	± 4700
10	1880.00	-20	± 4700
20	1880.00	-17	± 4700
30	1880.00	29	± 4700
40	1880.00	30	± 4700
50	1880.00	-42	± 4700

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	1880.00	58	± 4700
3.7	1880.00	-21	± 4700
4.2	1880.00	-47	± 4700

Test Item	Frequency Stability Under Temperature & Voltage Variations
Test Mode	Mode 5: WCDMA Band II Link

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	1880.00	47	± 4700
-20	1880.00	-21	± 4700
-10	1880.00	58	± 4700
0	1880.00	-29	± 4700
10	1880.00	16	± 4700
20	1880.00	-17	± 4700
30	1880.00	-28	± 4700
40	1880.00	-39	± 4700
50	1880.00	45	± 4700

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	1880.00	49	± 4700
3.7	1880.00	-12	± 4700
4.2	1880.00	36	± 4700

Test Item	Frequency Stability Under Temperature & Voltage Variations
Test Mode	Mode 6: WCDMA Band V Link

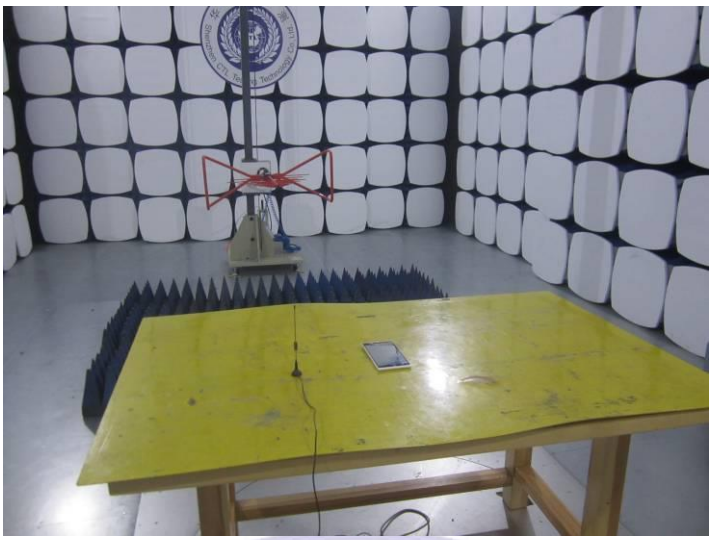
Frequency Stability under Temperature

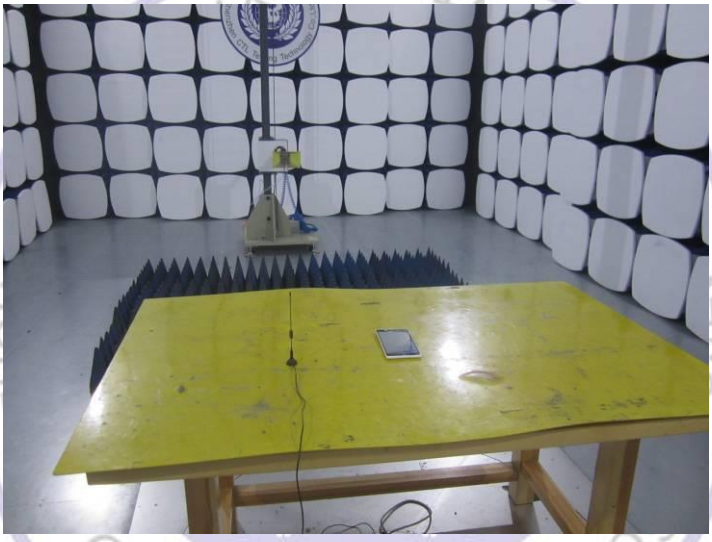
Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	836.40	55	± 2091
-20	836.40	-49	± 2091
-10	836.40	38	± 2091
0	836.40	29	± 2091
10	836.40	14	± 2091
20	836.40	13	± 2091
30	836.40	38	± 2091
40	836.40	-44	± 2091
50	836.40	-52	± 2091

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
3.5	836.40	-32	± 2091
3.7	836.40	-26	± 2091
4.2	836.40	36	± 2091

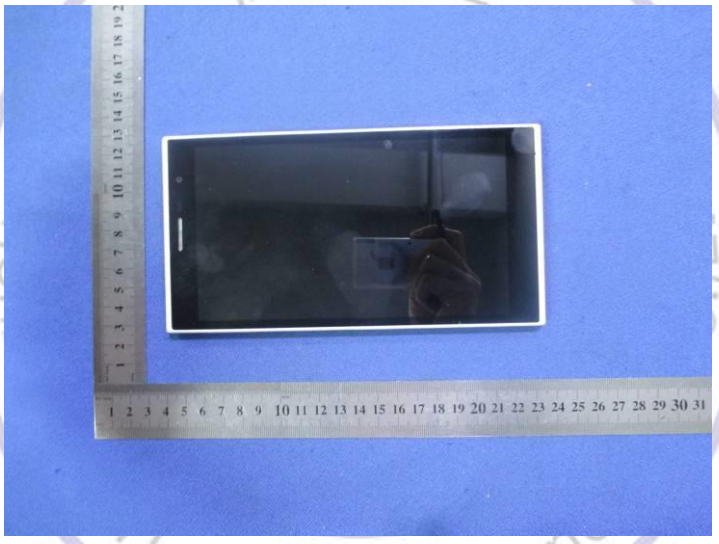
5. Test Setup Photos of the EUT

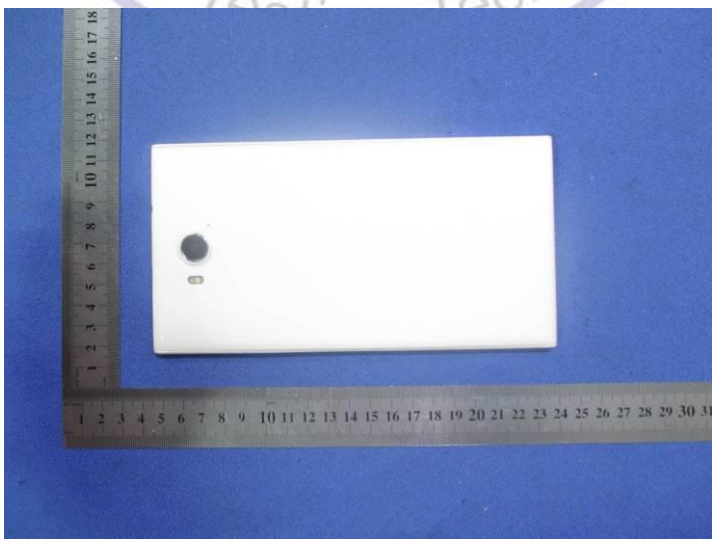




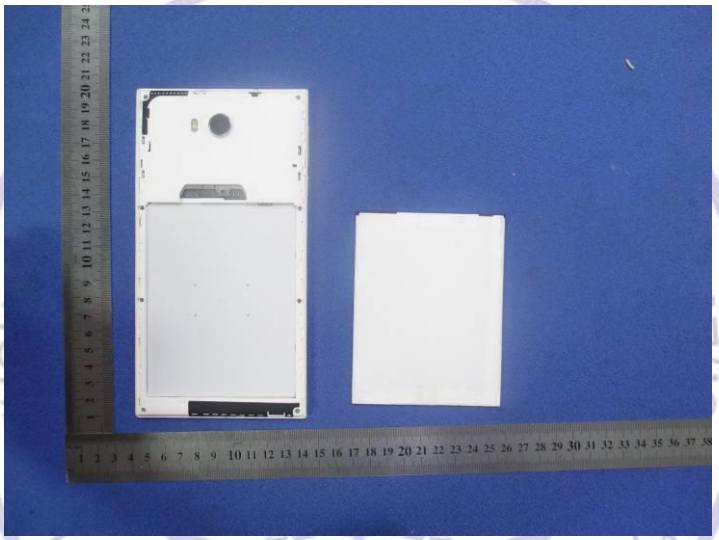
6. External and Internal Photos of the EUT

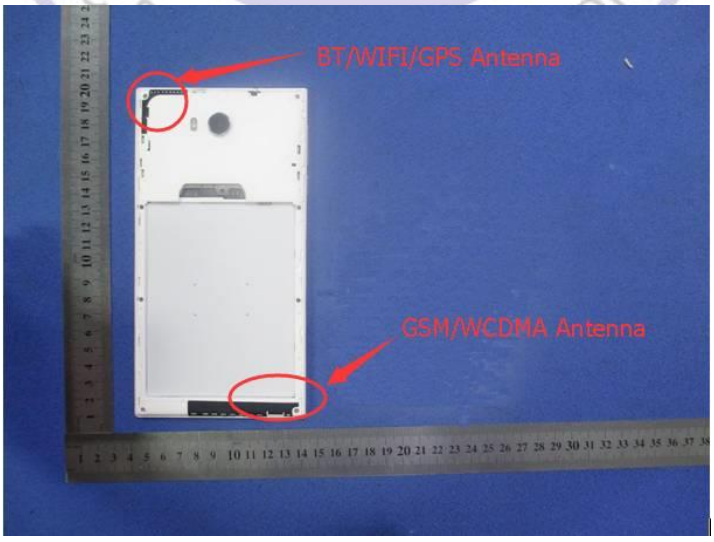
External Photos of EUT

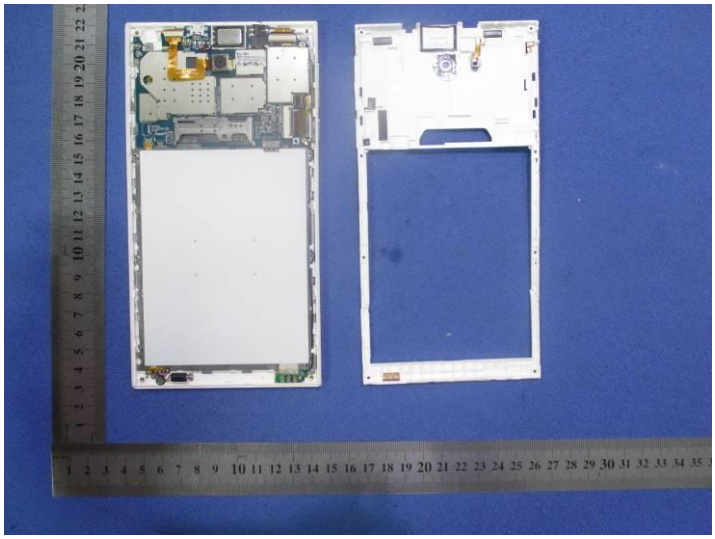


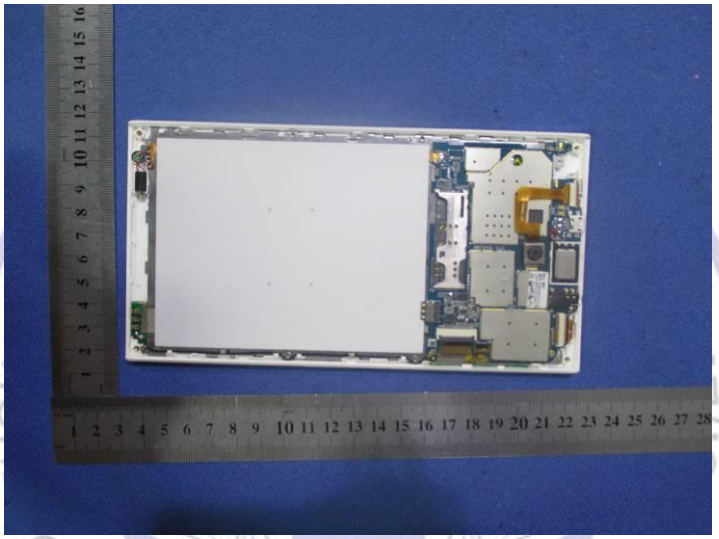


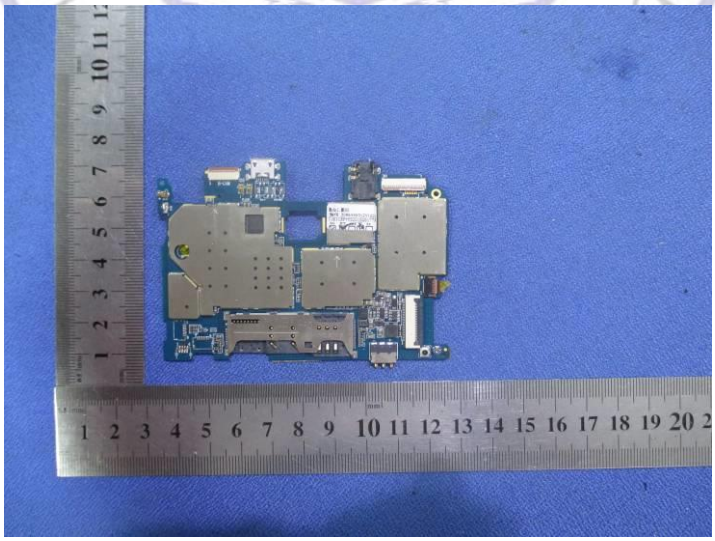
Internal Photos of EUT

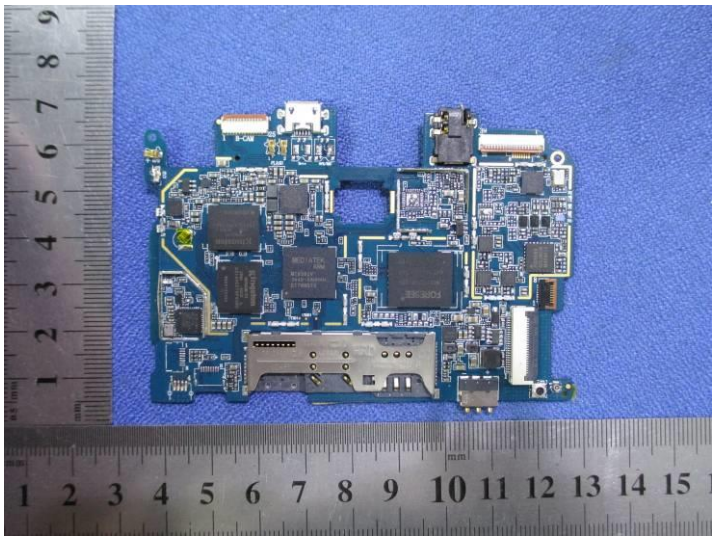


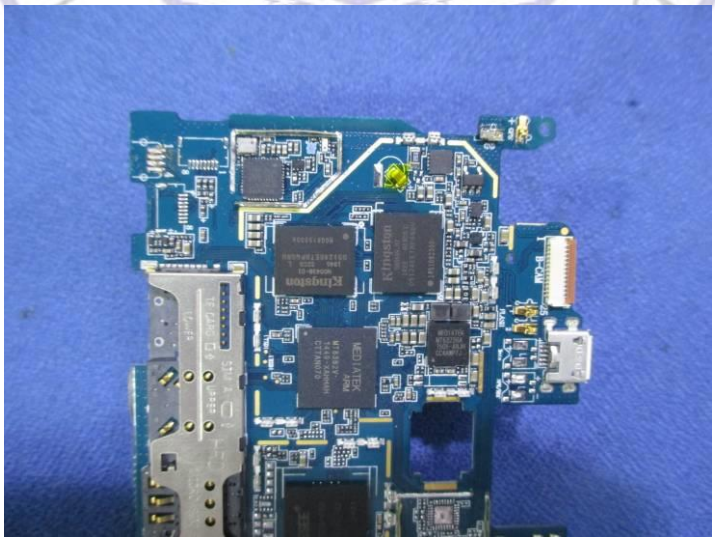


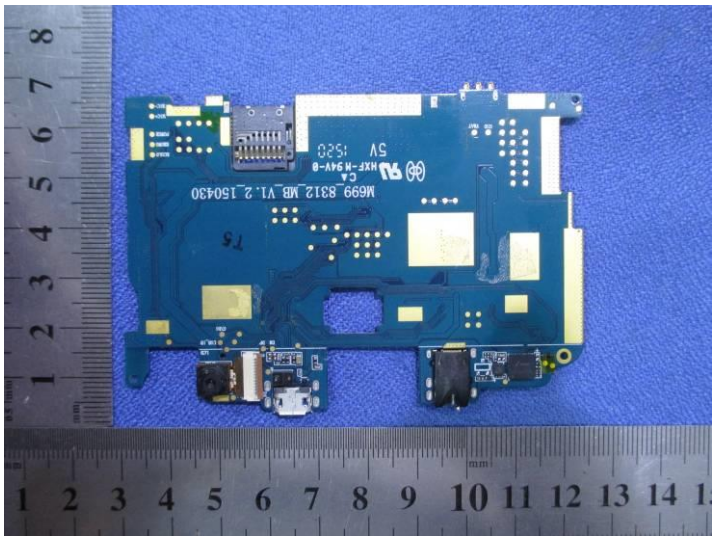












.....End of Report.....