TEST REPORT

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2019-01-25

2. Use of Report : -

3. Name of Product and Model : Mobile Phone / SM-A105M/DS

4. Manufacturer and Country of Origin : Samsung Electronics Co., Ltd. / Korea

5. FCC ID : A3LSMA105M

6. Date of Test : 2019-02-17 to 2019-03-04

7. Test Standards : FCC Part 2
FCC Part 22 subpart H
FCC Part 24 subpart E
FCC Part 27 subpart C

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Kwonse Kim (Signature)	Technical Manager Name : Bongok Ko (Signature)

2019-03-06

KCTL Inc.

Report revision history

Date	Revision	Page No
2019-03-05	Initial report	-
2019-03-06	Updated a note	8

CONTENTS

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-3327, G-198, C-3706, T-1849 Industry Canada Registration No. : 8035A-2 KOLAS No.: KT231

2. Device information

Equipment under test	:	Mobile Phone
Model	:	SM-A105M/DS
Derivative model	:	SM-A105M
Frequency range	:	Bluetooth(BDR/EDR/BLE), ANT+_2 402 ㎒ ~ 2 480 ㎒ WIFI(802.11b/g/n20)_2 412 ㎒ ~ 2 472 ㎒ LTE Band12_699.7 ㎒ ~ 715.3 ㎒ LTE Band17_706.5 ㎒ ~ 713.5 ㎒ LTE Band5_824.7 ㎒ ~ 848.3 ㎒ LTE Band4_1 710.7 ㎒ ~ 1 754.3 ㎒ LTE Band2_1 850.7 ㎒ ~ 1 909.3 ㎒ GSM850_824.2 ㎒ ~ 848.8 ㎒ GSM1900_1850.2 ㎒ ~ 1909.8 ㎒ WCDMA850_826.4 ㎒ ~ 846.6 ㎒ WCDMA1700_1 712.4 ㎒ ~ 1 752.6 ㎒ WCDMA1900_1 852.4 ㎒ ~ 1 907.6 ㎒
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE), ANT+_GFSK WIFI(802.11b/g/n20)_DSSS, OFDM LTE_QPSK, 16QAM GSM_GMSK, 8-PSK WCDMA_QPSK

Number of channels	:	Bluetooth(BDR/EDR)_79ch Bluetooth(BLE)_40ch ANT+_79ch WIFI(802.11b/g/n20)_13ch
Power source	:	DC 3.85 V
Antenna specification	:	Internal Antenna
Software version	:	A105M.001
Hardware version	:	REV1.0
Test device serial No.	:	R38M10M74PH, R38M10J386Z, R38M10J383Y
Operation temperature	:	-30 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Earphone information	ALMUS	EHS61ASFWE	-	-
Travel Adapter	Samsung Electronics Co., Ltd.	ETA0U84IWE	R37K9RC6DD3RC3	AC 100-240V 50-60 Hz, 0.15A
Micro USB Data Cable	Samsung Electronics Co., Ltd.	ECB-DU68WE	-	-

2.2. Information about derivative model

The difference between basic model and derivative models is:

For SM-A105M, it does not support Dual-Sim card, support Single-Sim card and changed from Dual SIM tray to Single SIM tray.

2.3. Frequency/channel operations

This device contains the following capabilities:
Bluetooth(BDR/EDR/BLE), ANT+, WIFI(802.11b/g/n20)
LTE Band12, LTE Band17, LTE Band4, LTE Band5, LTE Band2
GSM850, GSM1900
WCDMA850, WCDMA1700, WCDMA1900

GSM850

Ch.	Frequency (㎒)
128	824.2
190	836.6
251	848.8

Table 2.3.1.
GPRS/EDGE

GSM1900

Ch.	Frequency (㎒)
512	1 850.2
661	1 880.0
810	1 909.8

Table 2.3.2.
GPRS/EDGE

WCDMA850

Ch.	Frequency (㎒)
4132	826.4
4183	836.6
4233	846.6

Table 2.3.3.
RMC/HSDPA/HSUPA

WCDMA1700

Ch.	Frequency (㎒)
1312	1 712.4
1412	1 732.4
1513	1 752.6

Table 2.3.4.
RMC/HSDPA/HSUPA

WCDMA1900

Ch.	Frequency (㎒)
9262	1 852.4
9400	1 880.0
9538	1 907.6

Table 2.3.5.
RMC/HSDPA/HSUPA

3. Maximum ERP/EIRP power

GSM850 / WCDMA850

Mode	Tx Frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
GSM850 (GPRS)	824.2 ~ 848.8	244KGXW	28.02	0.634
GSM850 (EDGE)		248KG7W	21.29	0.135
WCDMA850	826.4 ~ 846.6	4M26F9W	22.99	0.199

GSM1900 / WCDMA1700 / WCDMA1900

Mode	Tx Frequency (㎒)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
GSM1900 (GPRS)	1 850.2 ~ 1 909.8	243KGXW	26.20	0.417
GSM1900 (EDGE)		242KG7W	23.85	0.243
WCDMA1700	1 712.4 ~ 1 752.6	4M16F9W	22.90	0.195
WCDMA1900	1 852.4 ~ 1 907.6	4M15F9W	21.84	0.153

4. Summary of tests

FCC Part section(s)	Parameter	Test results
2.1046 22.913(a)(5) 24.232(c) 27.50(d)(4)	Conducted Output Power	N/A[Note1)]
2.1049	Occupied Bandwidth & 26 dB Bandwidth	Pass
2.1051 22.917(a) 24.238(a) 27.53(h)	Band Edge Emissions at Antenna Terminal	Pass
	Spurious Emissions at Antenna Terminal	Pass
22.913(d) 24.232(d) 27.53(d)(5)	Peak to Average Power Ratio	Pass
2.1055 22.355 24.235 27.54	Frequency stability	Pass
22.913(a)(5) 24.232(c) 27.50(d)(4)	Effective Radiated Power & Equivalent Isotropic Radiated Power	Pass
2.1053 22.917(a) 24.238(a) 27.53(h)	Radiated Spurious Emissions	Pass

Notes:

1. Please refer to the conducted power of SAR test report.
2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
3. The fundamental of the EUT was tested in three orthogonal orientations X, Y and Z and in all possible test configurations and positioning.
4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.26-2015
   - ANSI/TIA-603-E-2016
   - KDB 971168 D01 v03r01
5. Per evaluation report, all of the data contained herein is reused from the reference FCC ID: A3LSMA105F report.
   The reuse bands as following:
   GSM850 and WCDMA850/1900
6. The test was fully perform for GSM1900 and WCDMA1700.

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty(±dB)	
Conducted RF power	1.76 dB	
Conducted spurious emissions	4.03 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.28 dB
	30 MHz ~ 1 GHz	3.68 dB
	Above 1 GHz	5.72 dB

6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.
With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

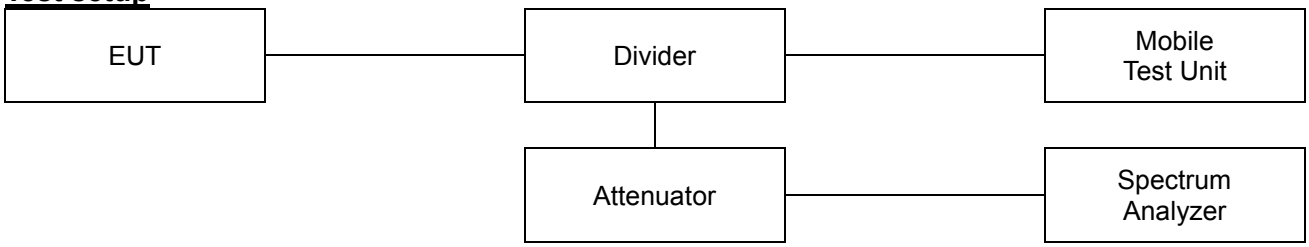
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	16.61	8 000	18.19
50	16.62	9 000	18.33
100	16.64	10 000	18.51
200	16.70	11 000	18.56
300	16.72	12 000	18.77
400	16.76	13 000	19.08
500	16.79	14 000	19.18
600	16.83	15 000	19.04
700	16.84	16 000	19.07
800	16.86	17 000	18.73
900	16.90	18 000	17.68
1 000	17.09	19 000	18.33
1 700	17.11	20 000	19.21
1 800	17.15	21 000	19.53
1 900	17.16	22 000	20.20
2 000	17.20	23 000	20.98
2 100	17.21	24 0 00	20.31
2 500	17.26	25 000	19.62
2 600	17.30	26 000	19.09
2 700	17.31	26 500	19.59
3 000	17.35	27 000	19.45
4 000	17.46	28 000	19.00
5 000	17.59	29 000	19.23
6 000	17.74	30 000	18.77
7 000	18.04		

Note.
Offset(㏈) = RF cable loss(㏈) + Divider (㏈) + Attenuator (㏈)

7. Test results

7.1. 99% Occupied Bandwidth & 26dB Bandwidth

Test setup



Limit

The occupied bandwidth, that 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 shall be measured.

Test procedure

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

Test settings

26dB Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT

modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

99% Occupied Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Notes:

1. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF Function. Please refer to the page 10.

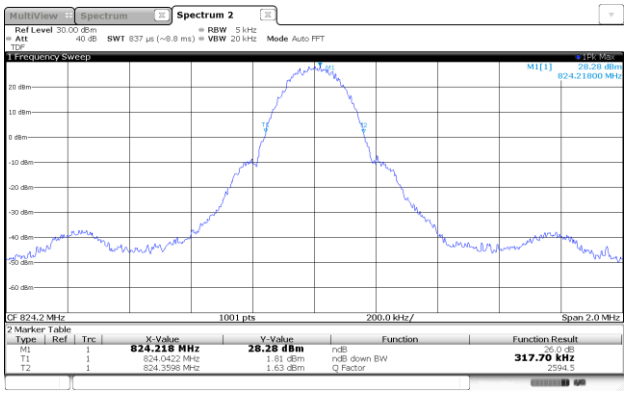
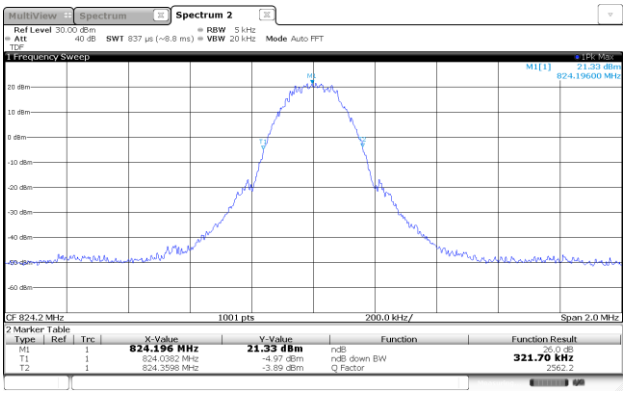
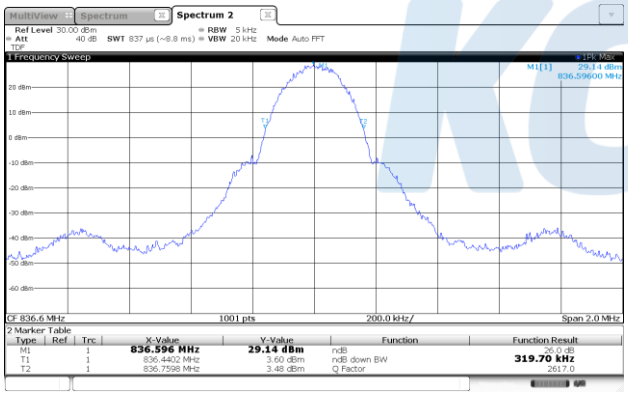
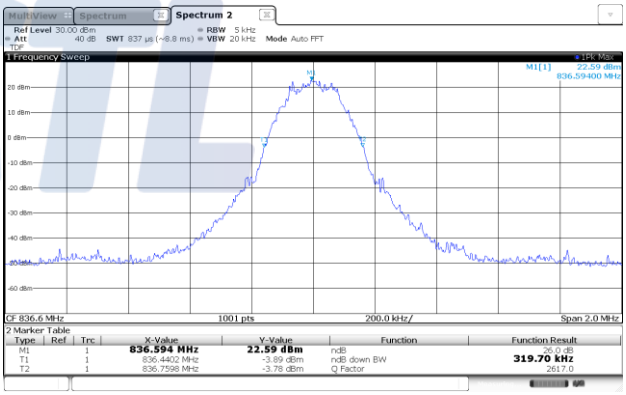
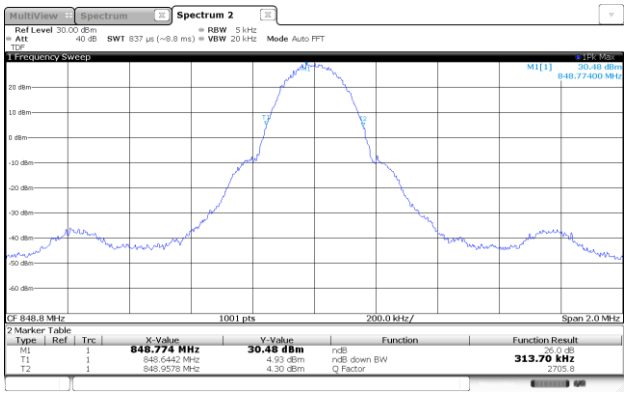
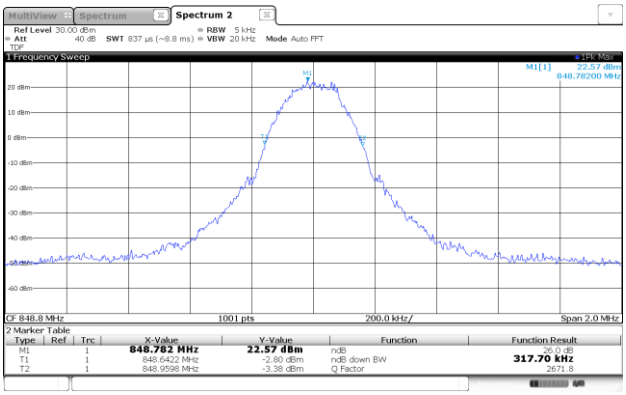
Test results

Test mode		Frequency (㎒)	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
GSM850	GPRS	824.2	0.318	0.244
		836.6	0.319	0.243
		848.8	0.314	0.244
	EDGE	824.2	0.321	0.242
		836.6	0.320	0.248
		848.8	0.318	0.250
GSM1900	GPRS	1 850.2	0.318	0.243
		1 880.0	0.320	0.243
		1 909.8	0.316	0.243
	EDGE	1 850.2	0.318	0.242
		1 880.0	0.318	0.241
		1 909.8	0.314	0.242
WCDMA850	RMC	826.4	4.88	4.28
		836.6	4.78	4.20
		846.6	5.35	4.26
	HSDPA	826.4	4.78	4.21
		836.6	4.74	4.20
		846.6	5.78	4.28
	HSUPA	826.4	4.72	4.14
		836.6	4.72	4.14
		846.6	5.83	4.24
WCDMA1700	RMC	1 712.4	4.79	4.17
		1 732.4	5.77	4.24
		1 752.6	4.78	4.16
	HSDPA	1 712.4	4.78	4.17
		1 732.4	5.74	4.25
		1 752.6	4.78	4.16
	HSUPA	1 712.4	4.74	4.16
		1 732.4	4.79	4.23
		1 752.6	4.72	4.16

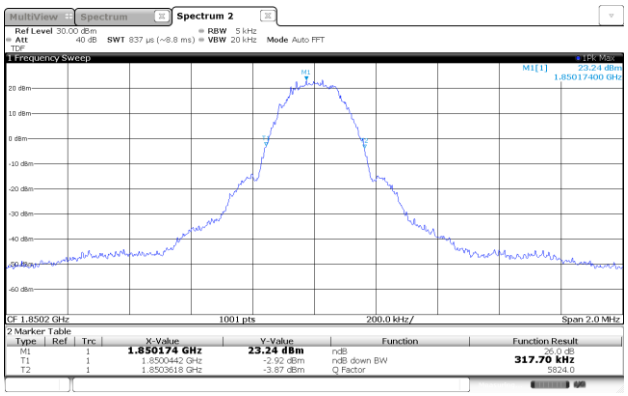
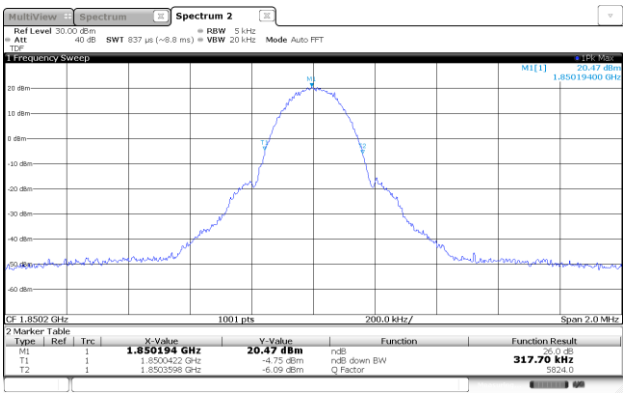
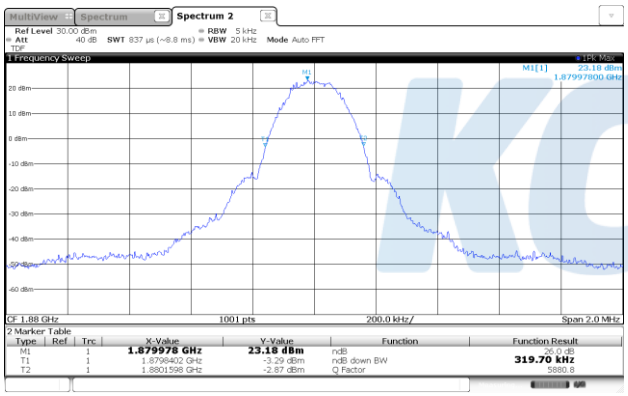
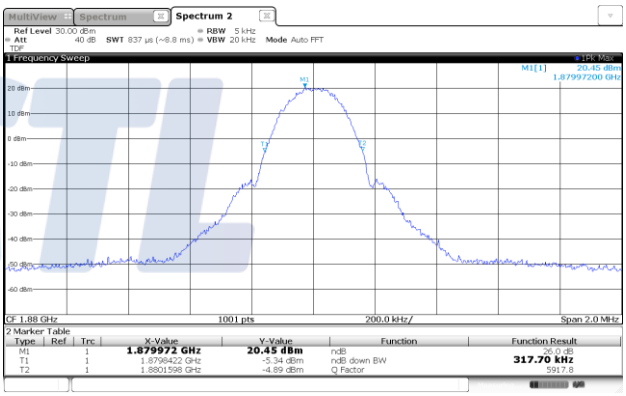
Test mode		Frequency (㎒)	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
WCDMA1900	RMC	1 852.4	4.75	4.15
		1 880.0	4.76	4.15
		1 907.6	4.79	4.17
	HSDPA	1 852.4	4.74	4.15
		1 880.0	4.75	4.15
		1 907.6	4.79	4.17
	HSUPA	1 852.4	4.78	4.19
		1 880.0	4.75	4.20
		1 907.6	5.35	4.23

26dB Bandwidth

Test mode: GSM850

GPRS / Low ch.	EDGE / Low ch.
	
GPRS / Mid ch.	**EDGE / Mid ch.**
	
GPRS / High ch.	**EDGE / High ch.**
	

Test mode: GSM1900

GPRS / Low ch.	EDGE / Low ch.
	
GPRS / Mid ch.	**EDGE / Mid ch.**
	
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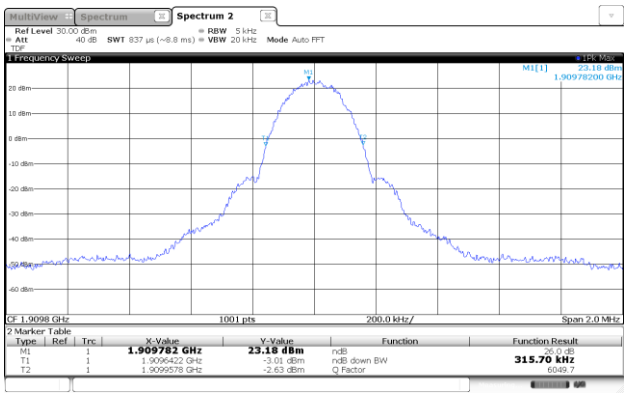
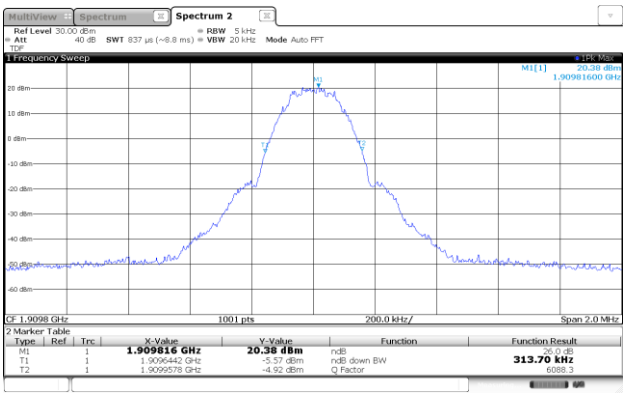
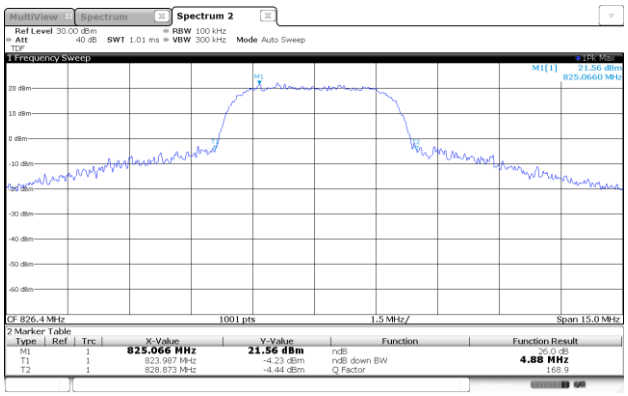
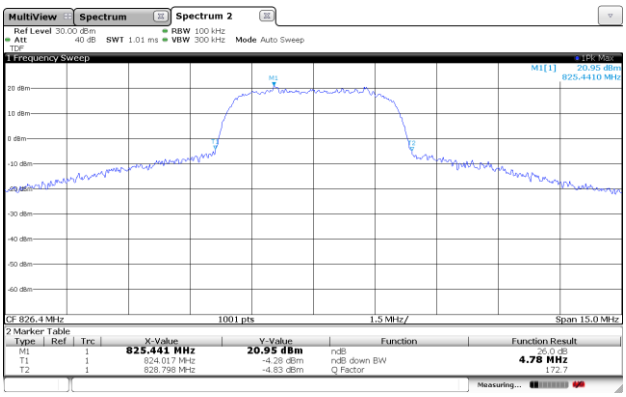
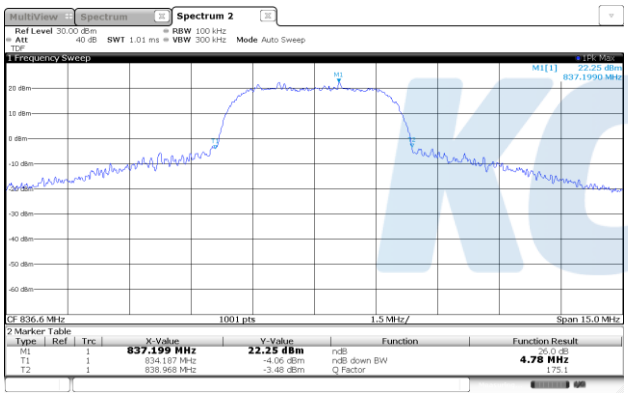
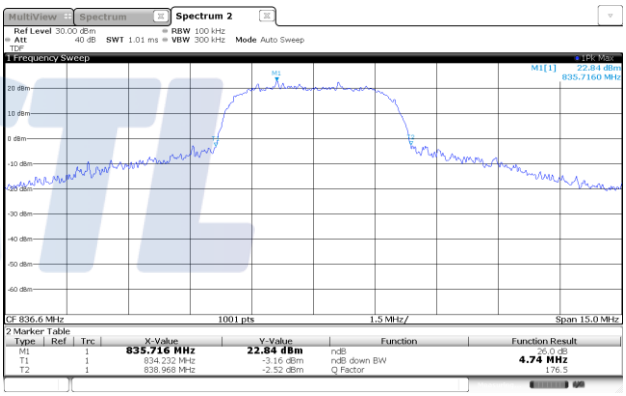
	

Test mode: WCDMA850

RMC / Low ch.	HSDPA / Low ch.
	
RMC / Mid ch.	**HSDPA / Mid ch.**
	
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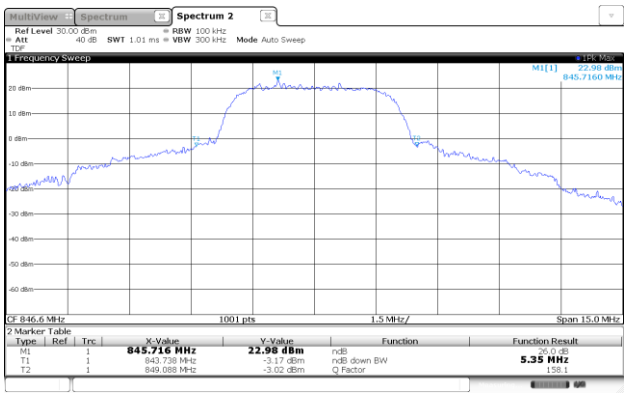
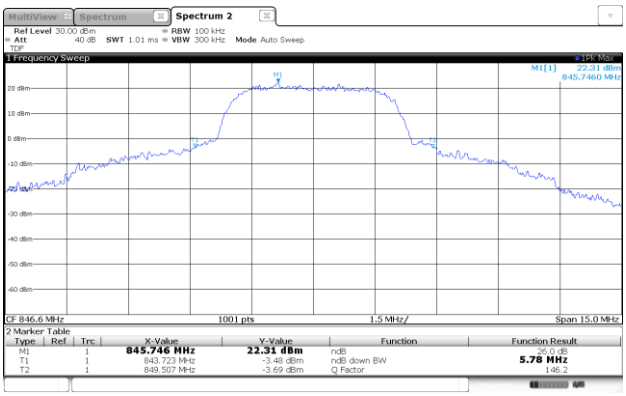
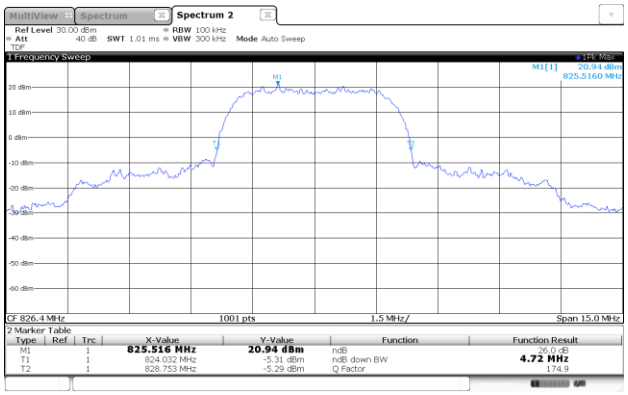
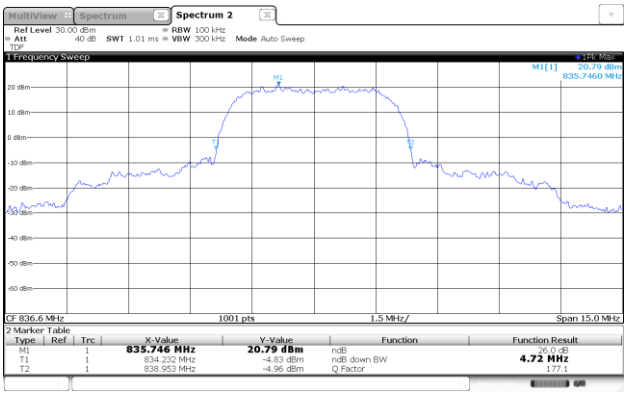
	

HSUPA / Low ch.	HSUPA / Mid ch.
	
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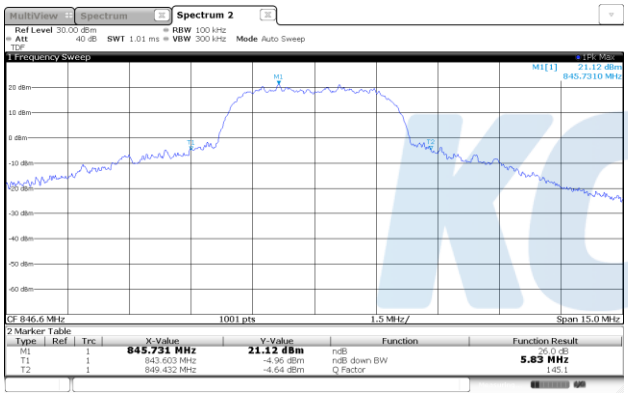
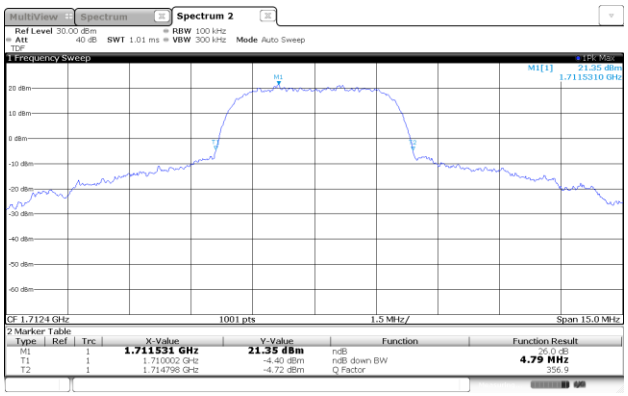
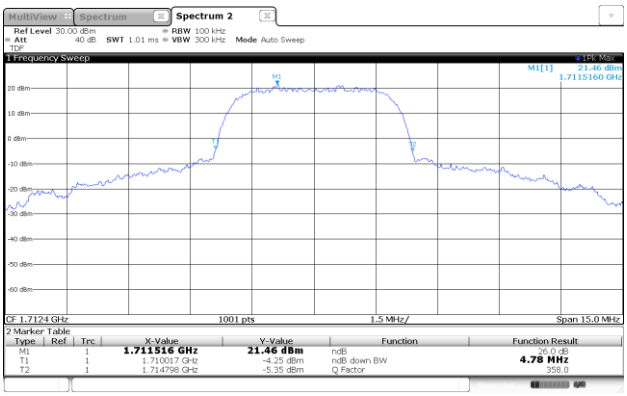
	Blank

Test mode: WCDMA1700

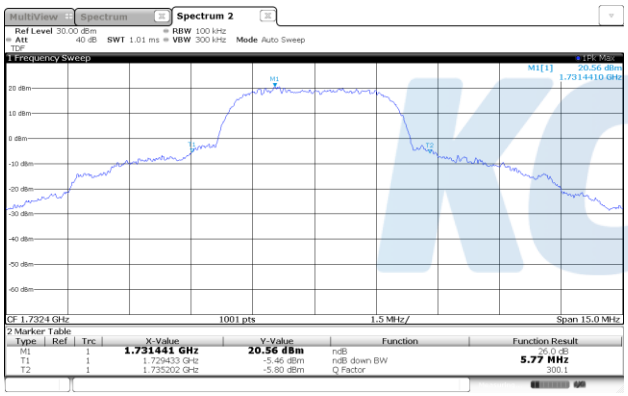
RMC / Low ch.



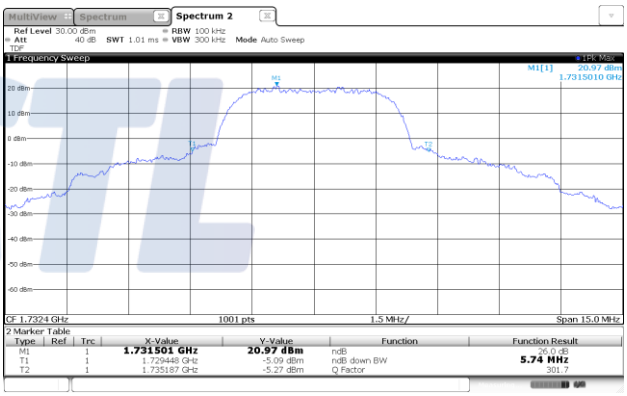
HSDPA / Low ch.



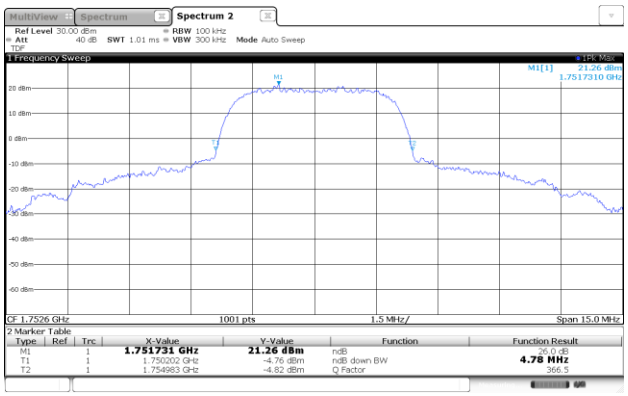
RMC / Mid ch.



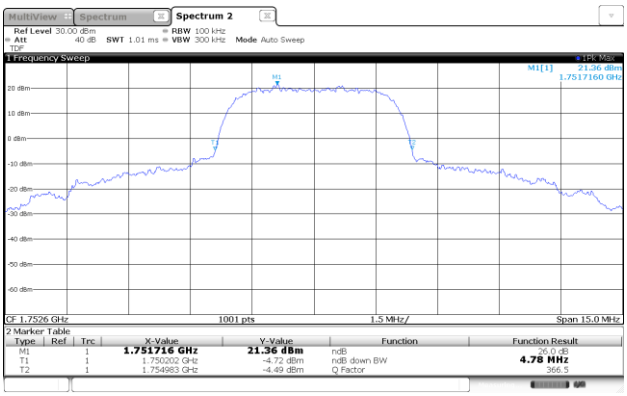
HSDPA / Mid ch.

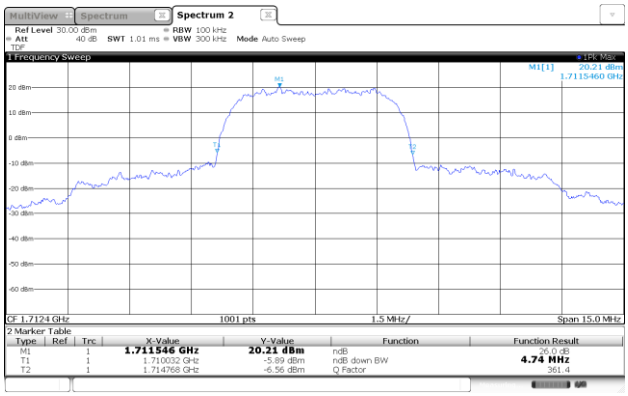
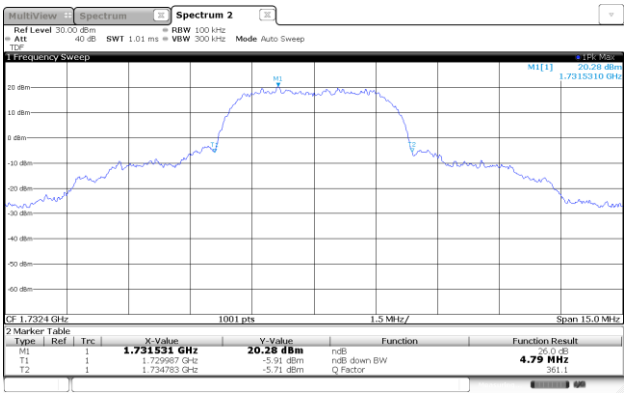
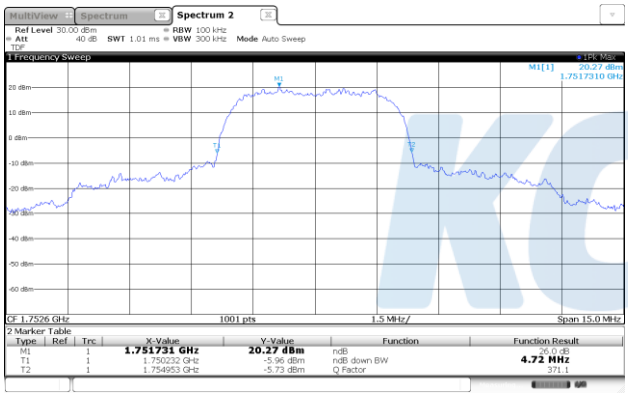


RMC / High ch.



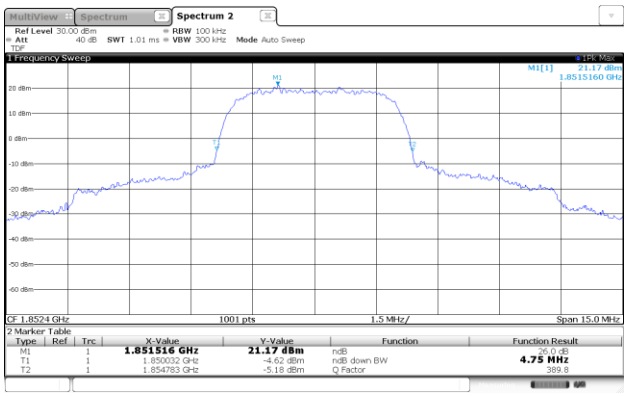
HSDPA / High ch.



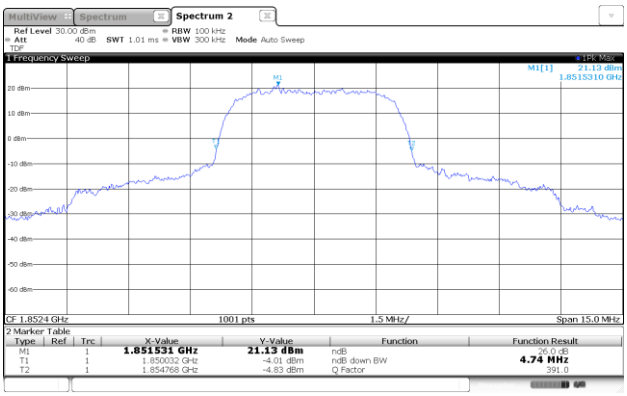
HSUPA / Low ch.	HSUPA / Mid ch.
	
HSUPA / High ch.	
	Blank

Test mode: WCDMA1900

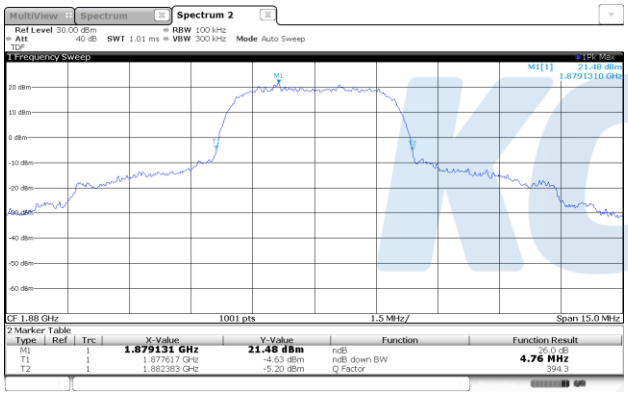
RMC / Low ch.



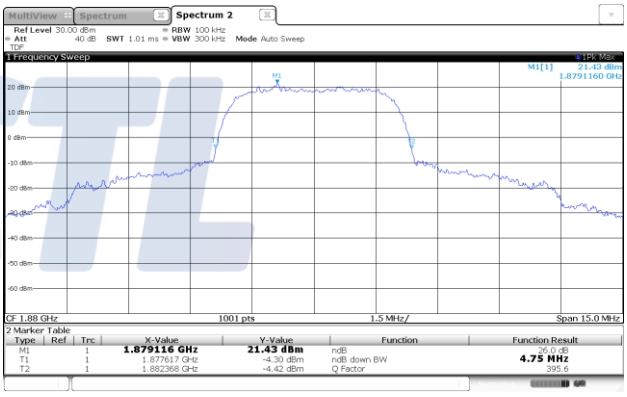
HSDPA / Low ch.



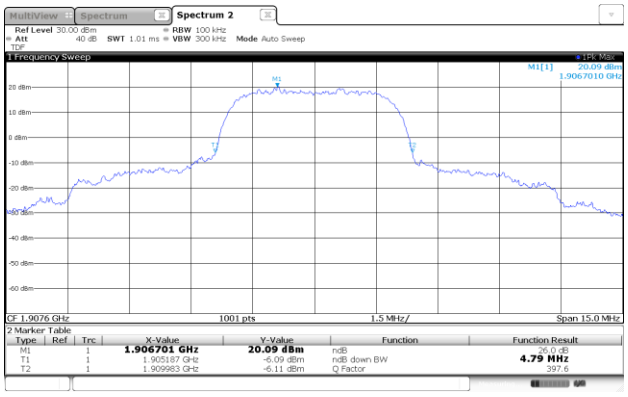
RMC / Mid ch.



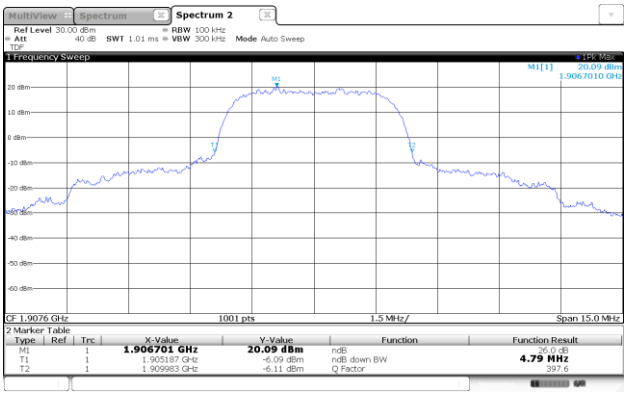
HSDPA / Mid ch.

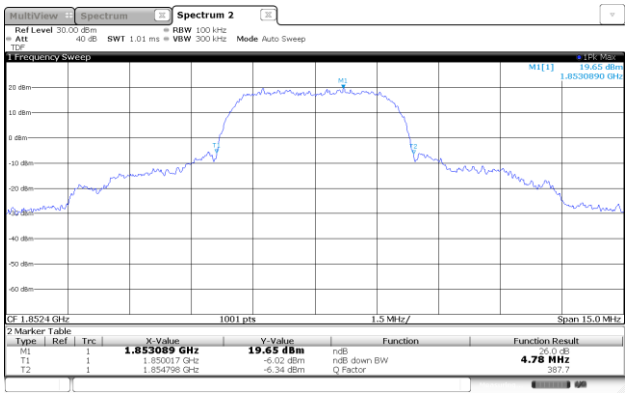
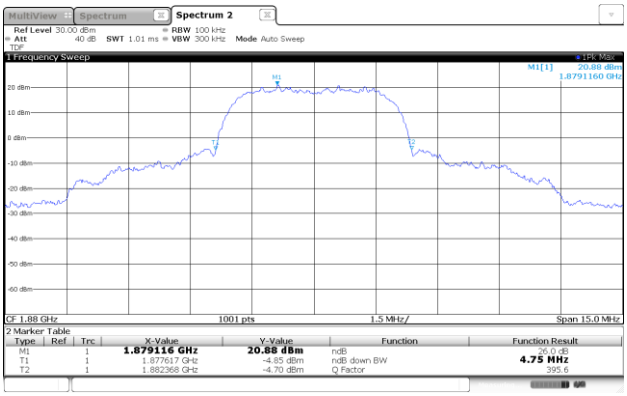
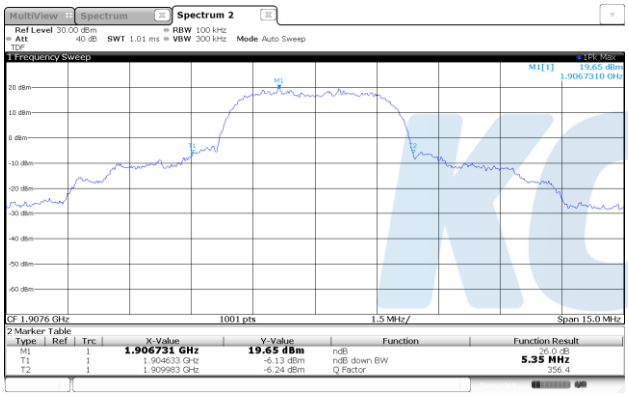


RMC / High ch.



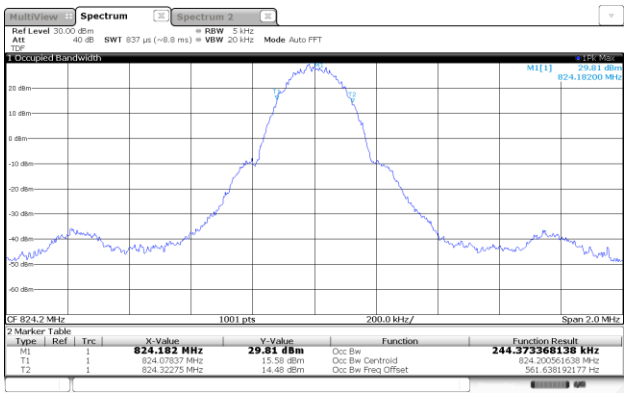
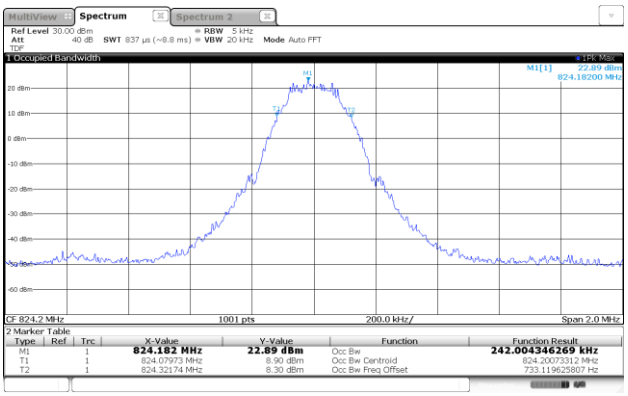
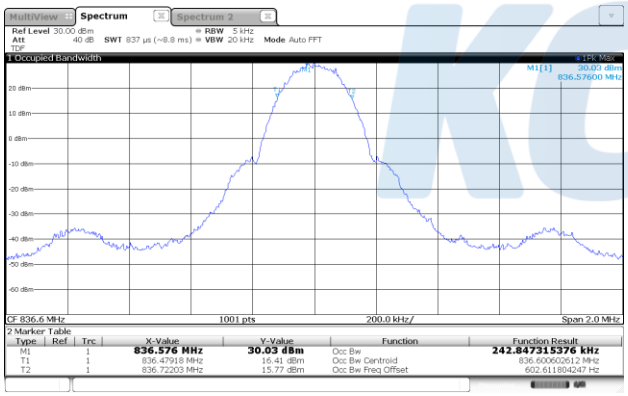
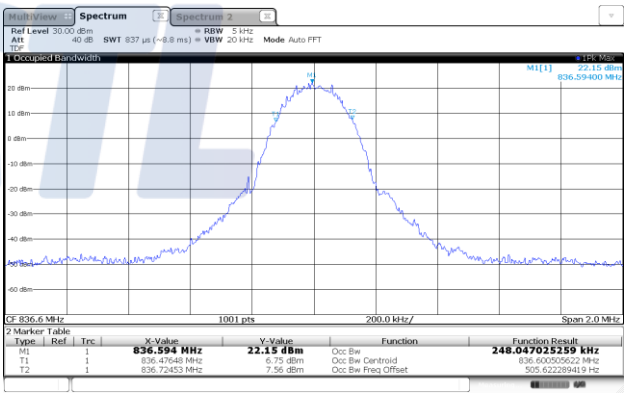
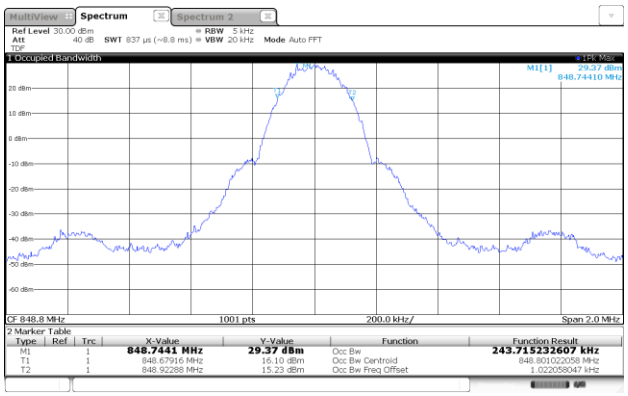
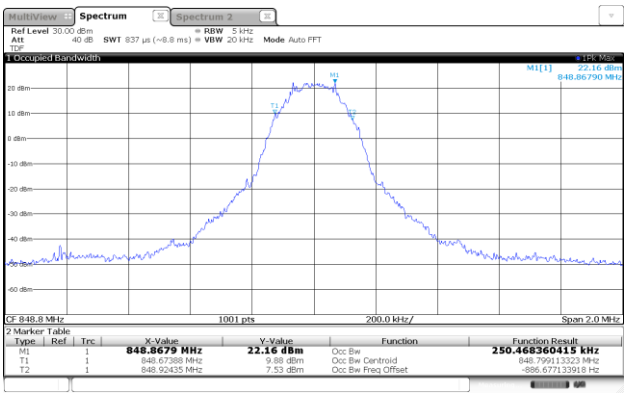
HSDPA / High ch.



HSUPA / Low ch.	HSUPA / Mid ch.
	
HSUPA / High ch.	
	Blank

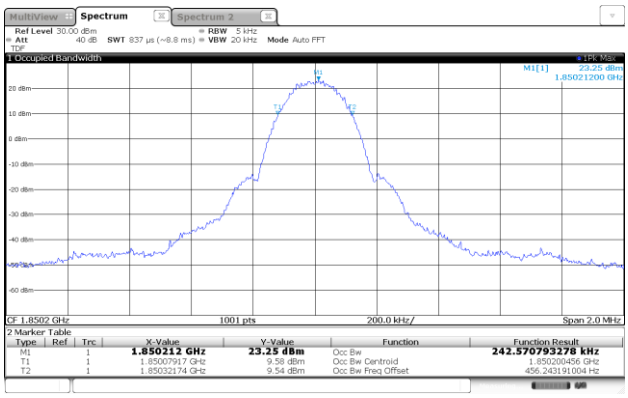
99% Occupied Bandwidth

Test mode: GSM850

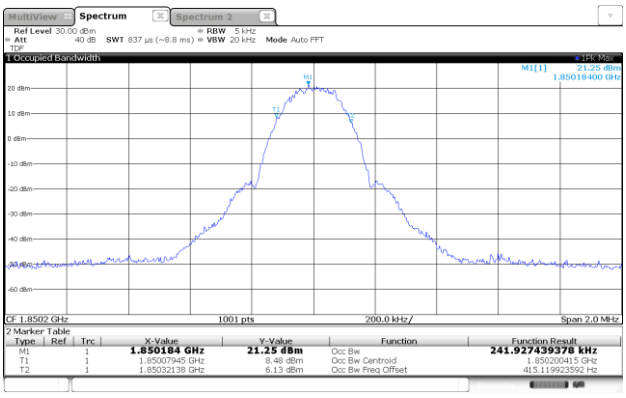
GPRS / Low ch.	EDGE / Low ch.
	
GPRS / Mid ch.	**EDGE / Mid ch.**
	
GPRS / High ch.	**EDGE / High ch.**
	

Test mode: GSM1900

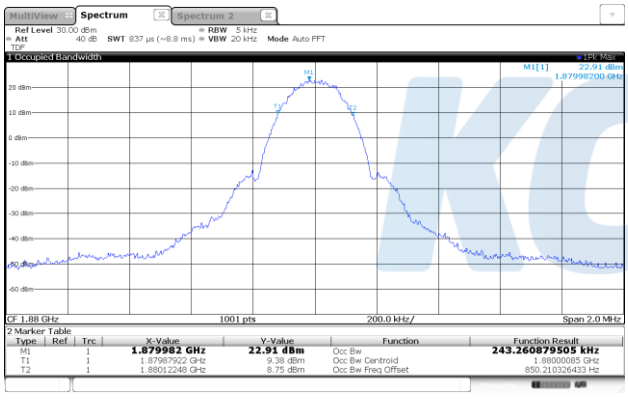
GPRS / Low ch.



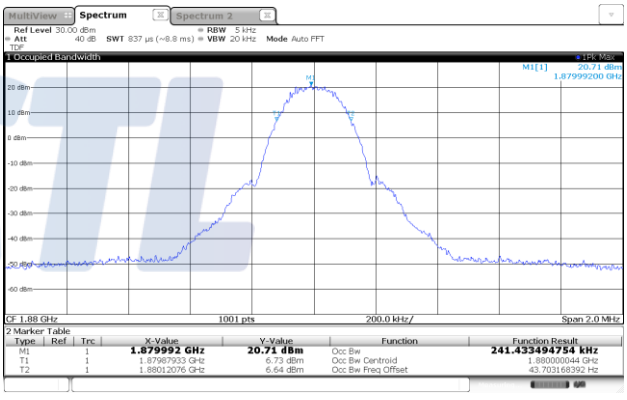
EDGE / Low ch.



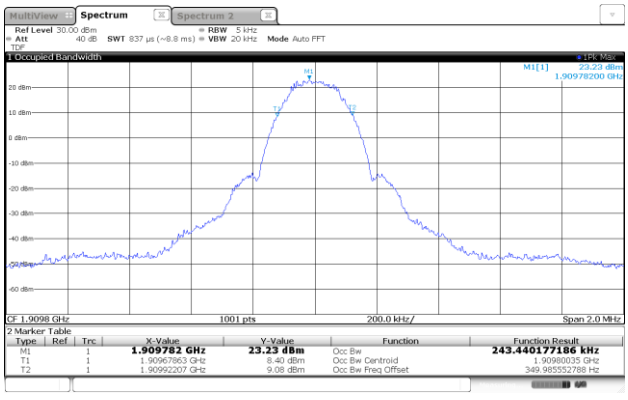
GPRS / Mid ch.



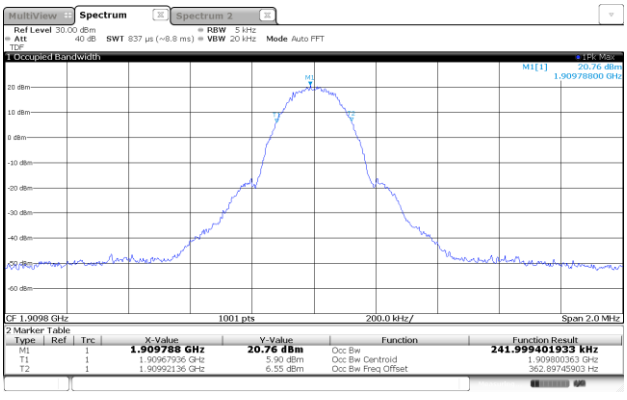
EDGE / Mid ch.



GPRS / High ch.

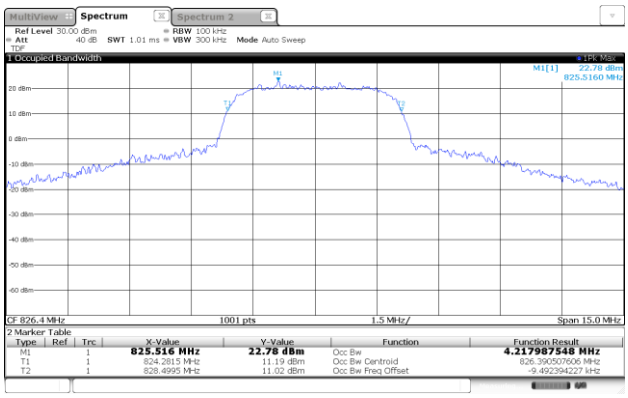


EDGE / High ch.

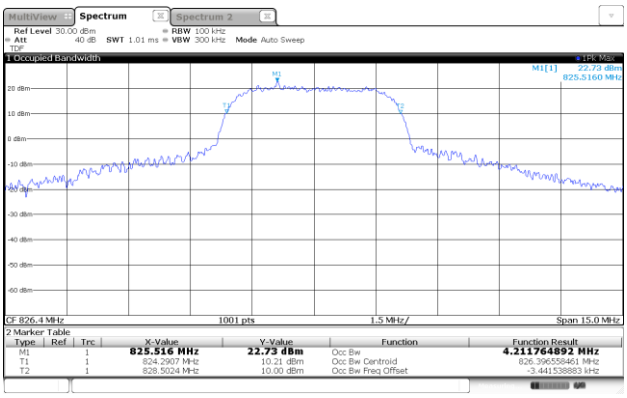


Test mode: WCDMA850

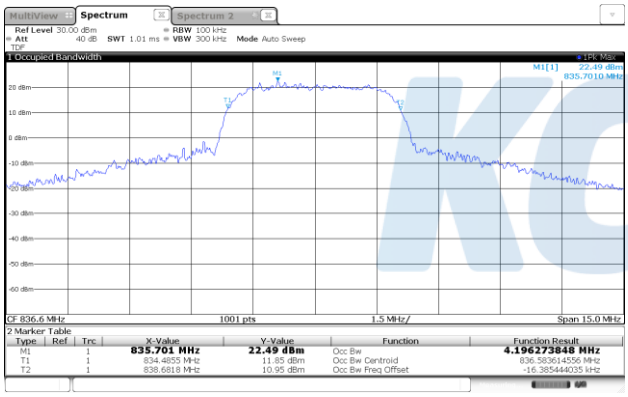
RMC / Low ch.



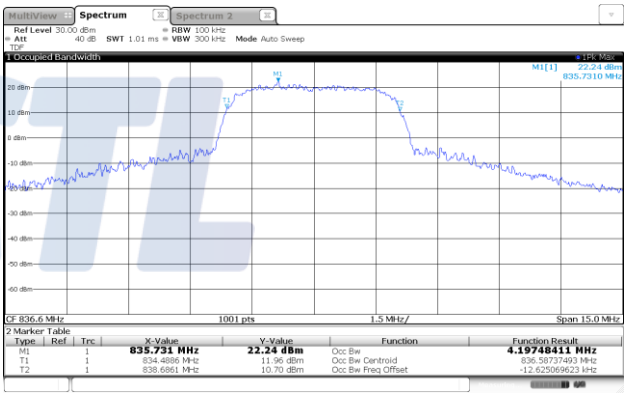
HSDPA / Low ch.



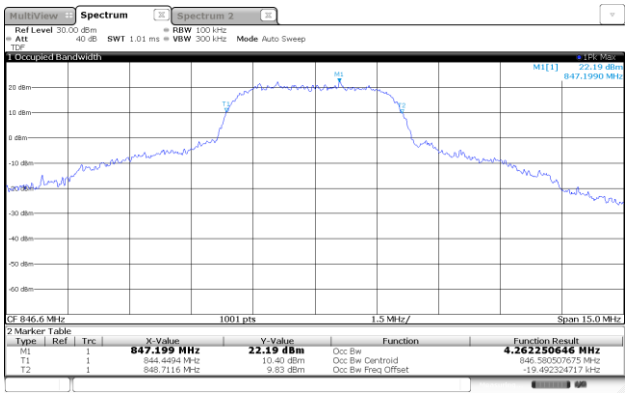
RMC / Mid ch.



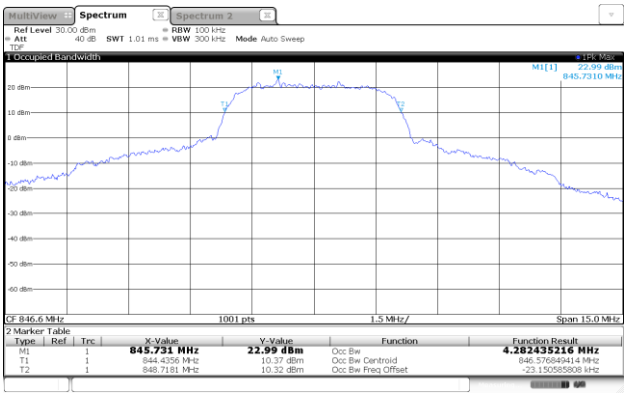
HSDPA / Mid ch.

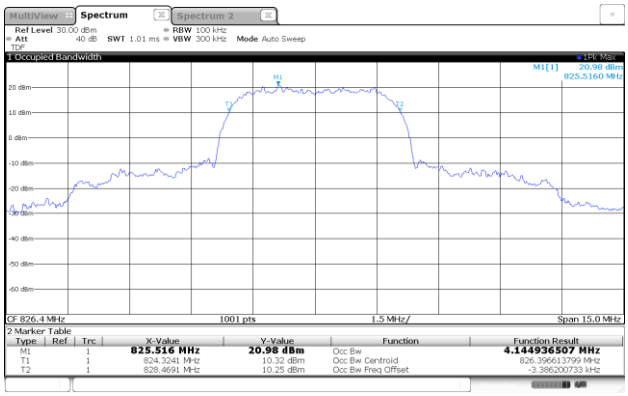
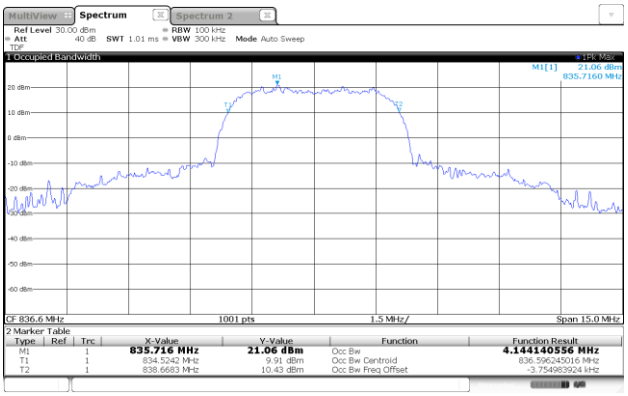
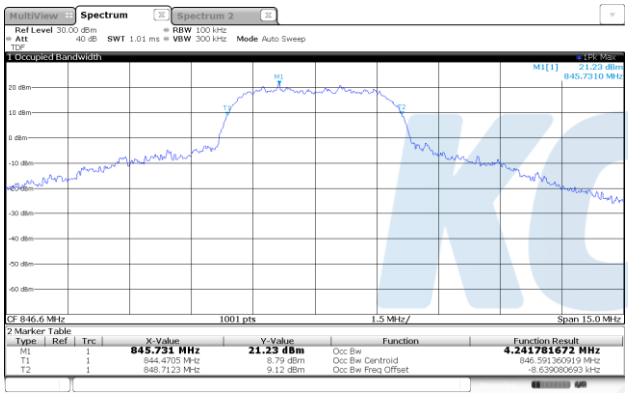


RMC / High ch.



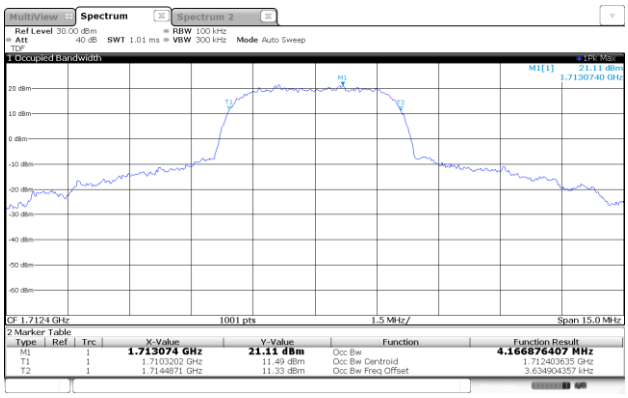
HSDPA / High ch.



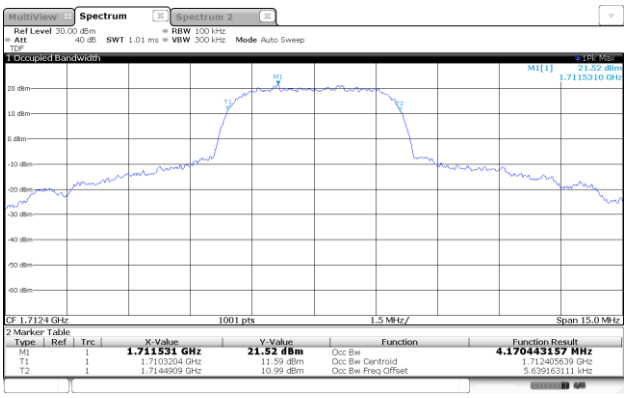
HSUPA / Low ch.	HSUPA / Mid ch.
	
HSUPA / High ch.	
	Blank

Test mode: WCDMA1700

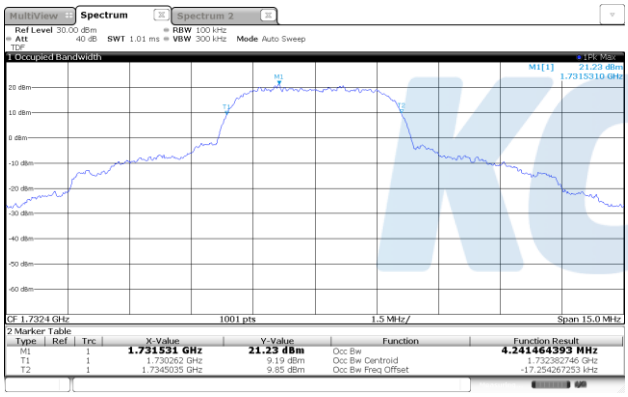
RMC / Low ch.



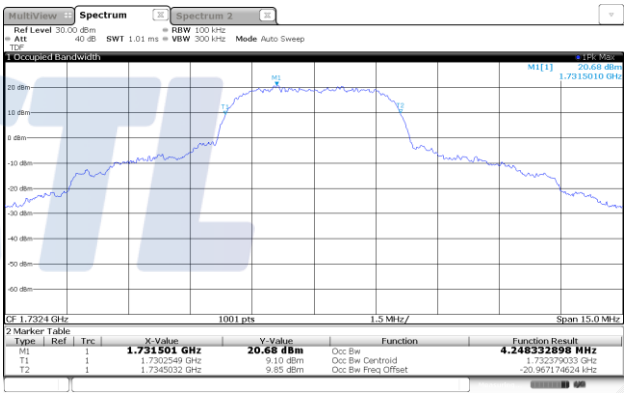
HSDPA / Low ch.



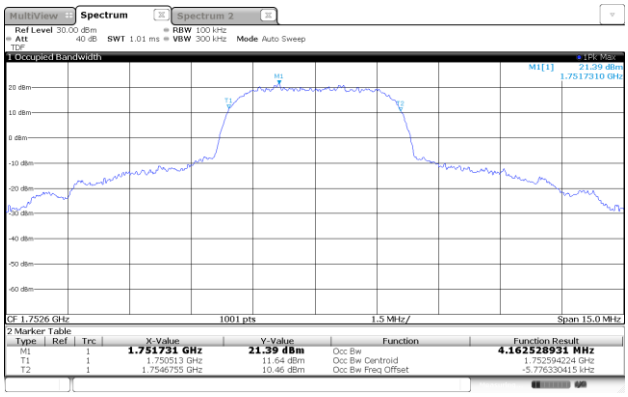
RMC / Mid ch.



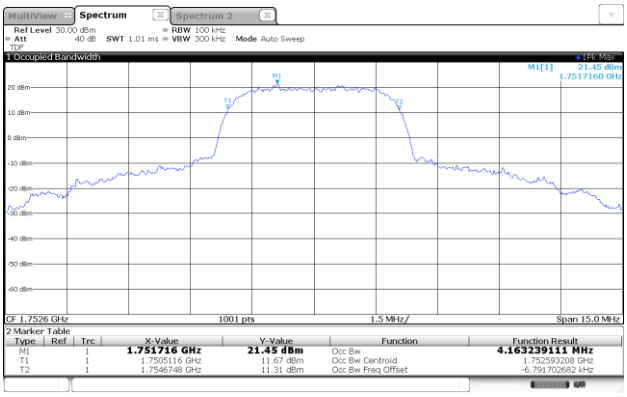
HSDPA / Mid ch.

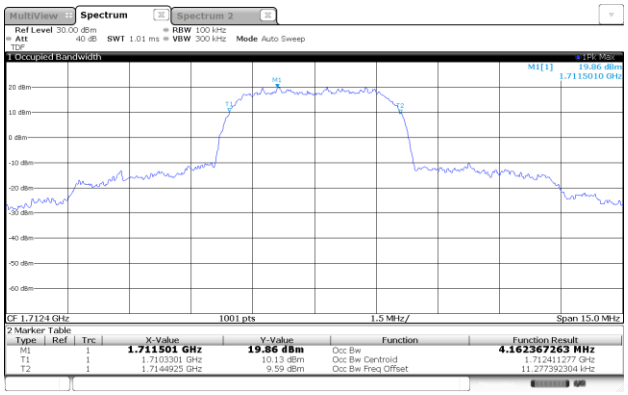
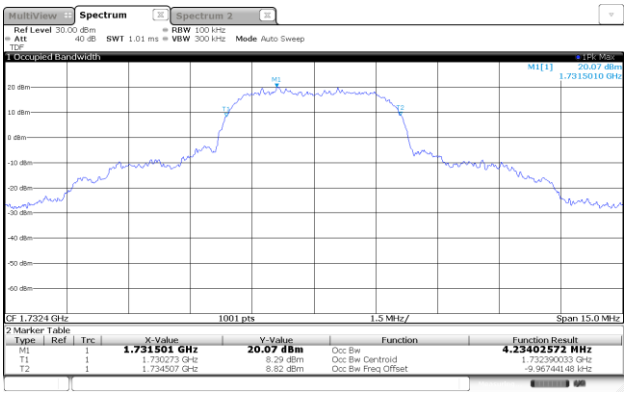
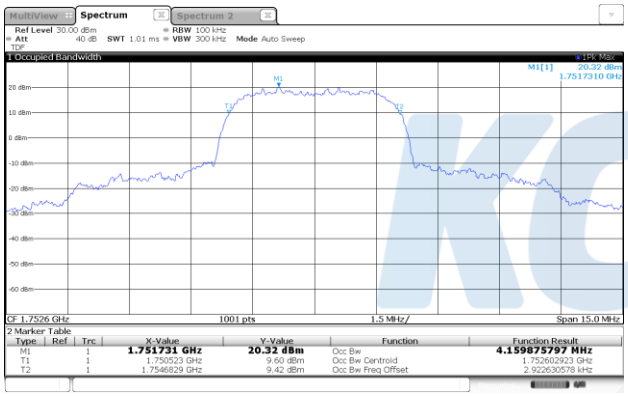


RMC / High ch.

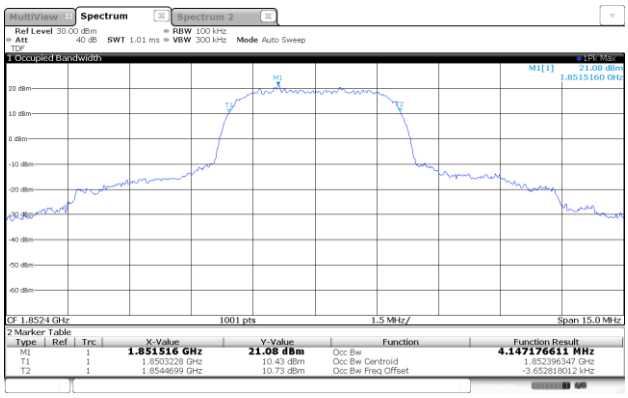
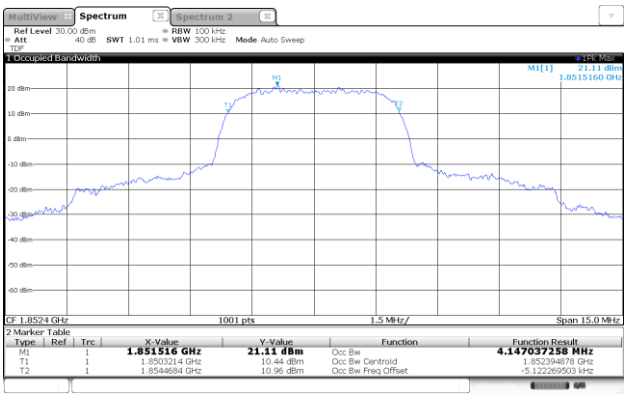
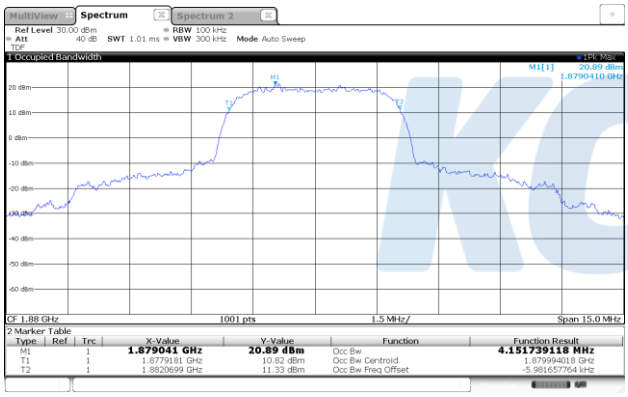
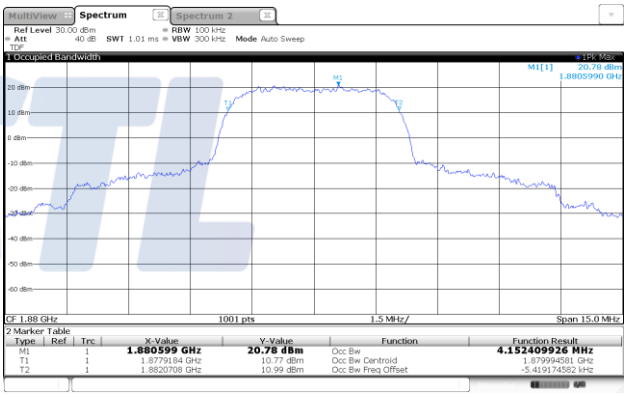
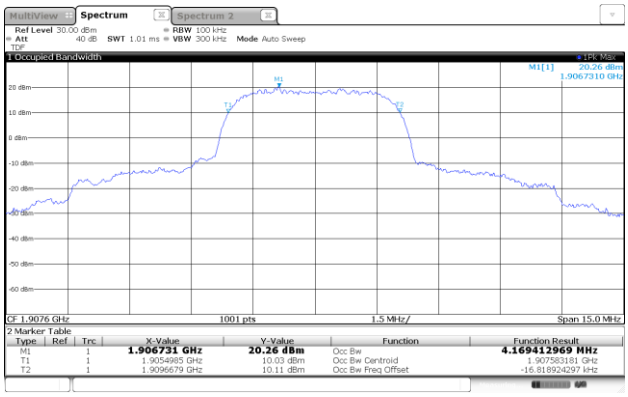
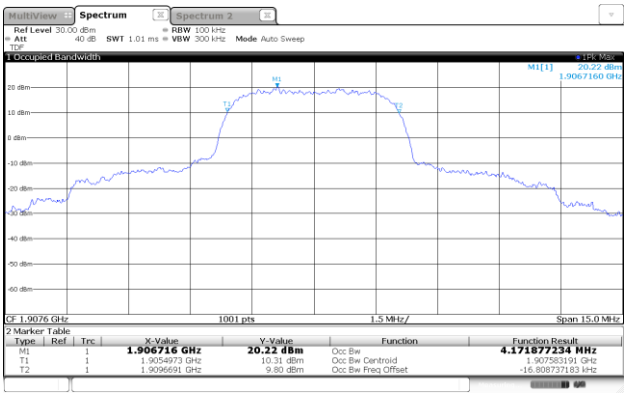


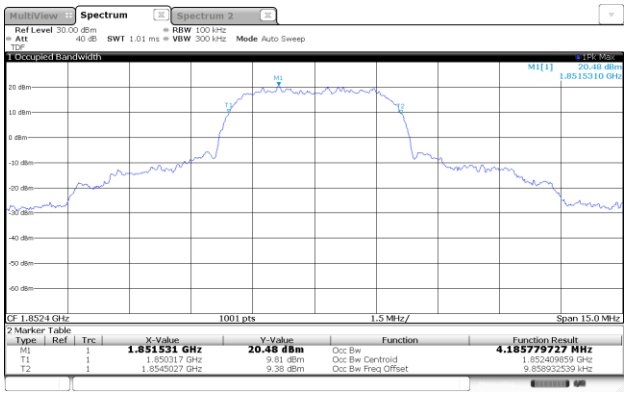
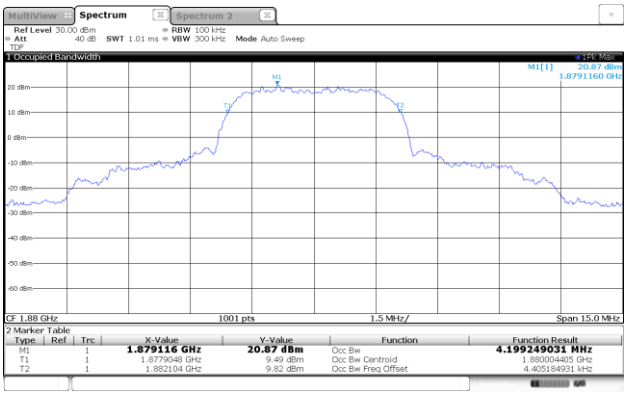
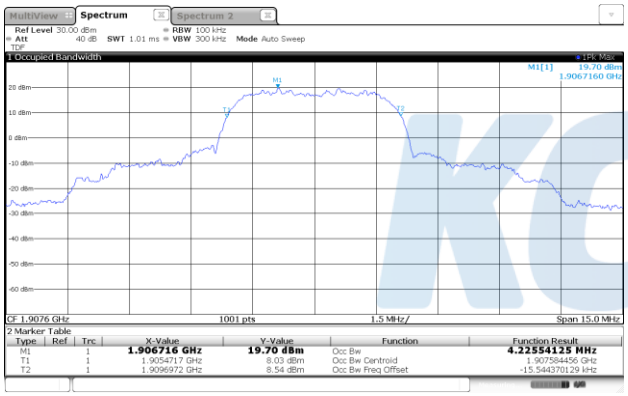
HSDPA / High ch.



HSUPA / Low ch.	HSUPA / Mid ch.
	
HSUPA / High ch.	
	Blank

Test mode: WCDMA1900

RMC / Low ch.	HSDPA / Low ch.
	
RMC / Mid ch.	**HSDPA / Mid ch.**
	
RMC / High ch.	**HSDPA / High ch.**
	

HSUPA / Low ch.	HSUPA / Mid ch.
	
HSUPA / High ch.	
	Blank