





# TEST REPORT

<p><b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a></p>	<p>Report No.: KR23-SRF0008 Page (1) of (63)</p>	 
<p><b>1. Client</b></p> <ul style="list-style-type: none"> <li>◦ Name : Samsung Electronics Co., Ltd.</li> <li>◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea</li> <li>◦ Date of Receipt : 2022-10-17</li> </ul> <p><b>2. Use of Report</b> : Certification</p> <p><b>3. Name of Product / Model</b> : Mobile phone / SM-A346M/DSN</p> <p><b>4. Manufacturer / Country of Origin</b> : Samsung Electronics Co., Ltd. / Vietnam</p> <p><b>5. FCC ID</b> : A3LSMA346M</p> <p><b>6. Date of Test</b> : 2022-11-09 to 2023-01-04</p> <p><b>7. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)</p> <p><b>8. Test method used</b> : FCC Part 2 FCC Part 22 Subpart H FCC Part 24 Subpart E FCC Part 27 Subpart C</p> <p><b>9. Test Result</b> : Refer to the test result in the test report</p>		
<p>Affirmation</p>	<p>Tested by</p> <p>Name : Sunghyun Yoon (Signature)</p>	<p>Technical Manager</p> <p>Name : Seungyong Kim (Signature)</p>
<p style="text-align: right;">2023-01-06</p> <p style="text-align: center;"><b>Eurofins KCTL Co.,Ltd.</b></p> <p>As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.</p>		

**REPORT REVISION HISTORY**

Date	Revision	Page No
2023-01-06	Originally issued	-

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**General remarks for test reports**

**Statement concerning the uncertainty of the measurement systems used for the tests**

(may be required by the product standard or client)

**Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

**Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

**Statement not required by the standard or client used for type testing**

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## 2.1. Frequency/channel operations

This device contains the following capabilities:

WLAN (11a/b/g/n/ac), Bluetooth (BDR/EDR/BLE), NR n5/66, LTE B2/4/5/12/13/17/26/41/66,  
 GSM 850/1900, WCDMA 850/1700/1900, NFC

### GSM 850

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

Table 2.2.1.  
 GSM/GPRS/EDGE

### GSM 1900

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

Table 2.2.2.  
 GSM/GPRS/EDGE

### WCDMA 850

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

Table 2.2.3.  
 RMC/HSDPA/HSUPA/  
 DC-HSDPA

### WCDMA 1700

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

Table 2.2.4.  
 RMC/HSDPA/HSUPA/  
 DC-HSDPA

### WCDMA 1900

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

Table 2.2.5.  
 RMC/HSDPA/HSUPA/  
 DC-HSDPA

### 3. Maximum ERP/EIRP power

#### GSM 850

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
GSM 850 (Voice)	824.2 ~ 848.8	246KGXW	30.31	1.074
GSM 850 (EDGE)	824.2 ~ 848.8	248KG7W	23.12	0.205

#### GSM 1900

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
GSM 1900 (Voice)	1 850.2 ~ 1 909.8	248KGXW	28.89	0.774
GSM 1900 (EDGE)	1 850.2 ~ 1 909.8	246KG7W	23.36	0.217

#### WCDMA 850

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
WCDMA 850	826.4 ~ 846.6	4M17F9W	20.05	0.101

#### WCDMA 1700 / WCDMA 1900

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
WCDMA 1700	1 712.4 ~ 1 752.6	4M15F9W	19.88	0.097
WCDMA 1900	1 852.4 ~ 1 907.6	4M17F9W	22.14	0.164

#### 4. Summary of tests

FCC Part Section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046	Conducted Output Power	N/A	Conducted	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/A		Pass
2.1051 22.917(a) 24.238(a) 27.53(h)	Band Edge Emissions at Antenna Terminal	<43 + 10Log <sub>10</sub> (P) dB		Pass
	Spurious Emissions at Antenna Terminal			Pass
24.232(d) 27.50(d)(5)	Peak to Average Power Ratio	< 13 dB		Pass
2.1055 22.355 24.235 27.54	Frequency stability	< 2.5 ppm		Pass
		Emission must remain in band		
22.913(a)(5)	Effective Radiated Power	< 7 Watts max. ERP	Radiated	Pass
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		Pass
27.50(d)(4)		< 1 Watts max. EIRP		Pass
2.1053 22.917(a) 24.238(a) 27.53(h)	Radiated Spurious Emissions	<43 + 10Log <sub>10</sub> (P) dB		Pass

**Notes:**

- 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
  - ◆ KDB 971168 D02 v02r01

#### 4.1. Worst case orientation

1. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations in the test data.
2. All the radiated tests have been performed several case. (Stand-alone, with accessories (DLC Cable etc.))  
 Worst case: stand-alone
1. EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.

#### 2. Test Condition

Band	Test condition	
	Conducted	Radiated
GSM 850	GSM (GPRS), EDGE (1 Tx Slot)	GSM (Voice)
GSM 1900	GSM (GPRS), EDGE (1 Tx Slot)	GSM (Voice)
WCDMA 850	RMC (12.2 kbps)	RMC (12.2 kbps)
WCDMA 1700	RMC (12.2 kbps)	RMC (12.2 kbps)
WCDMA 1900	RMC (12.2 kbps)	RMC (12.2 kbps)



## 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 or 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 ( $\pm$ )	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.1 dB	
Radiated spurious emissions	Below 1 000 MHz	4.3 dB
	1 000 MHz ~ 18 000 MHz	3.8 dB
	Above 1 8000 MHz	5.9 dB



## 6. Measurement results explanation example

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	7.69	11 000	10.93
50	7.30	12 000	11.30
100	7.16	13 000	11.25
200	7.33	14 000	10.98
300	7.44	15 000	9.93
400	7.54	16 000	10.80
500	7.69	17 000	11.42
600	7.76	18 000	10.61
700	7.76	19 000	12.87
800	7.79	20 000	12.29
900	7.79	21 000	11.74
1 000	7.85	22 000	12.60
2 000	8.27	23 000	12.12
3 000	8.75	24 000	12.17
4 000	8.59	25 000	11.78
5 000	9.00	26 000	12.35
6 000	9.24	26 500	12.75
7 000	9.14	27 000	12.90
8 000	9.16	28 000	12.73
9 000	9.59	29 000	12.95
10 000	9.77	30 000	13.87

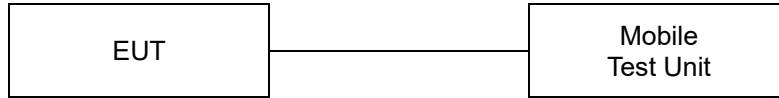
**Note.**

Offset(dB) = RF cable loss(dB) + Divider (dB)

## 7. Test results

### 7.1. Conducted output power

#### Test setup



#### Test procedure

971168 D01 v03r01 – Section 5.2  
ANSI C63.26-2015 – Section 5.2.4.2  
CFR 47, - Section §2.1046

#### Test settings

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

- a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
- b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to  $\pm 2\%$ ) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to  $[10\log (1/\text{duty cycle})]$ . See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

#### Notes:

1. Offset(dB) = RF cable loss(dB)

## Test results

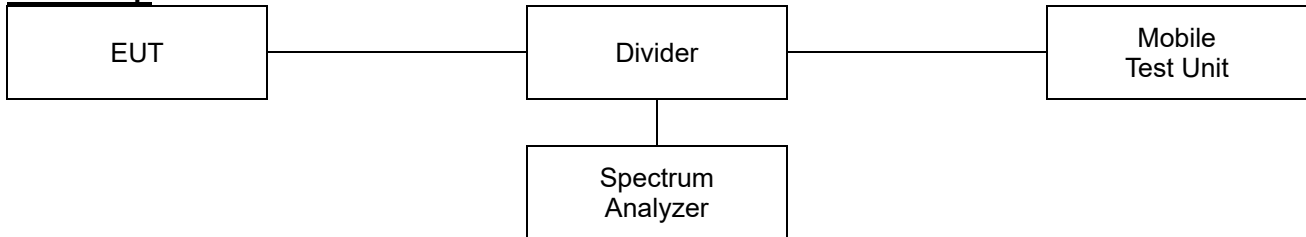
Maximum Burst-Average Output Power (dBm)										
Test Band	Channel	GSM	GPRS				EDGE			
		Voice	1Tx	2Tx	3Tx	4Tx	1Tx	2Tx	3Tx	4Tx
GSM850	128	33.38	33.39	31.84	29.01	27.73	27.01	25.85	23.55	22.50
	190	33.36	33.37	31.81	28.99	27.72	26.94	25.74	23.54	22.58
	251	33.29	33.31	31.84	28.93	27.66	26.84	25.64	23.50	22.50
GSM1900	512	30.57	30.58	28.92	26.18	24.85	25.80	24.63	22.25	20.81
	661	30.63	30.67	29.04	26.30	24.99	25.94	24.74	22.38	21.03
	810	30.53	30.55	28.96	26.25	24.91	25.94	24.72	22.42	21.06



Test Band	Test mode	Average Conducted Power (dBm)			MPR (dB)
		Frequency (MHz)			
		Low	Middle	High	
WCDMA 850	RMC	23.61	23.59	23.58	-
	HSDPA-Subtest 1	22.58	22.56	22.55	0
	HSDPA-Subtest 2	22.05	22.05	22.02	0
	HSDPA-Subtest 3	21.51	21.61	21.67	0.5
	HSDPA-Subtest 4	21.76	21.51	21.51	0.5
	HSUPA-Subtest 1	21.07	21.03	21.02	0
	HSUPA-Subtest 2	20.47	20.42	20.42	2
	HSUPA-Subtest 3	20.59	20.53	20.53	1
	HSUPA-Subtest 4	20.46	20.43	20.44	2
	HSUPA-Subtest 5	21.54	21.51	21.51	0
	DC-HSDPA-Subtest 1	22.91	22.54	22.58	0
	DC-HSDPA-Subtest 2	22.61	22.55	22.57	0
	DC-HSDPA-Subtest 3	22.14	22.07	22.12	0.5
	DC-HSDPA-Subtest 4	22.08	22.04	22.07	0.5
WCDMA 1700	RMC	23.61	23.42	23.15	-
	HSDPA-Subtest 1	22.61	22.40	22.23	0
	HSDPA-Subtest 2	22.00	21.46	21.45	0
	HSDPA-Subtest 3	21.11	20.66	20.92	0.5
	HSDPA-Subtest 4	20.95	20.72	20.56	0.5
	HSUPA-Subtest 1	21.03	20.81	20.61	0
	HSUPA-Subtest 2	19.48	19.30	19.09	2
	HSUPA-Subtest 3	20.53	20.32	20.12	1
	HSUPA-Subtest 4	19.53	19.33	19.13	2
	HSUPA-Subtest 5	21.50	21.29	21.09	0
	DC-HSDPA-Subtest 1	22.57	22.41	22.22	0
	DC-HSDPA-Subtest 2	22.58	22.41	22.22	0
	DC-HSDPA-Subtest 3	22.14	21.94	21.76	0.5
	DC-HSDPA-Subtest 4	22.10	21.89	21.71	0.5
WCDMA 1900	RMC	23.24	23.36	23.48	-
	HSDPA-Subtest 1	22.27	22.38	22.51	0
	HSDPA-Subtest 2	21.33	21.61	21.56	0
	HSDPA-Subtest 3	20.62	20.84	20.95	0.5
	HSDPA-Subtest 4	20.61	20.71	20.79	0.5
	HSUPA-Subtest 1	20.15	20.77	20.86	0
	HSUPA-Subtest 2	19.14	19.28	19.33	2
	HSUPA-Subtest 3	20.15	20.27	20.38	1
	HSUPA-Subtest 4	19.50	19.48	19.47	2
	HSUPA-Subtest 5	21.10	21.22	21.33	0
	DC-HSDPA-Subtest 1	22.53	22.30	22.42	0
	DC-HSDPA-Subtest 2	22.17	22.29	22.40	0
	DC-HSDPA-Subtest 3	21.71	21.81	21.95	0.5
	DC-HSDPA-Subtest 4	21.71	21.79	21.92	0.5

## 7.2. 99% Occupied Bandwidth & 26dB Bandwidth

### Test setup



### Limit

According to §2.1049, 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  $\geq 3 \times$  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).

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- 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.”
- k) 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  $1.5 \times \text{OBW}$  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  $\geq 3 \times \text{RBW}$ .
- 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).

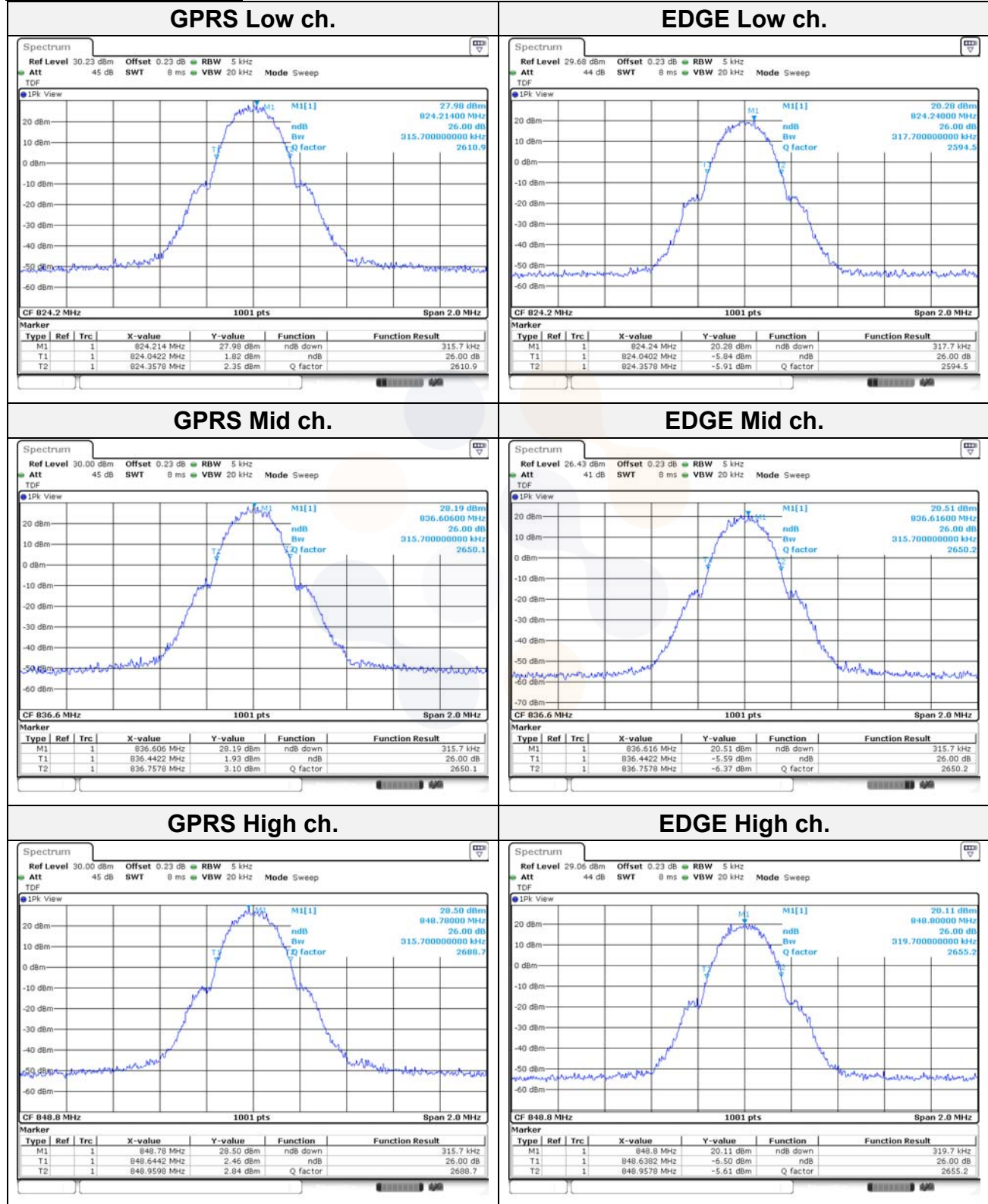
**Test results**

Test mode		Frequency (MHz)	26 dB bandwidth (MHz)	99 % bandwidth (MHz)
GSM 850	GPRS	824.2	0.316	0.246
		836.6	0.316	0.246
		848.8	0.316	0.246
	EDGE	824.2	0.318	0.244
		836.6	0.316	0.248
		848.8	0.320	0.244
GSM 1900	GPRS	1 850.2	0.308	0.244
		1 880.0	0.318	0.248
		1 909.8	0.310	0.246
	EDGE	1 850.2	0.318	0.246
		1 880.0	0.318	0.246
		1 909.8	0.316	0.242
WCDMA 850	RMC	826.4	4.705	4.151
		836.6	4.705	4.151
		846.6	4.720	4.166
WCDMA 1700	RMC	1 712.4	4.705	4.151
		1 732.4	4.720	4.151
		1 752.6	4.705	4.151
WCDMA 1900	RMC	1 852.4	4.735	4.166
		1 880.0	4.705	4.151
		1 907.6	4.720	4.166



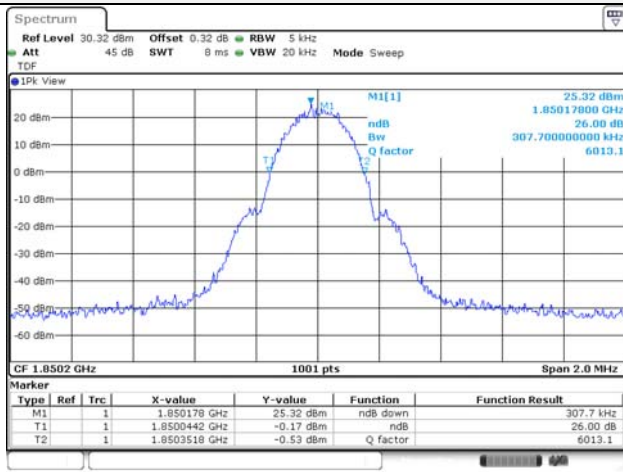
**26dB Bandwidth**

**Test mode: GSM 850**

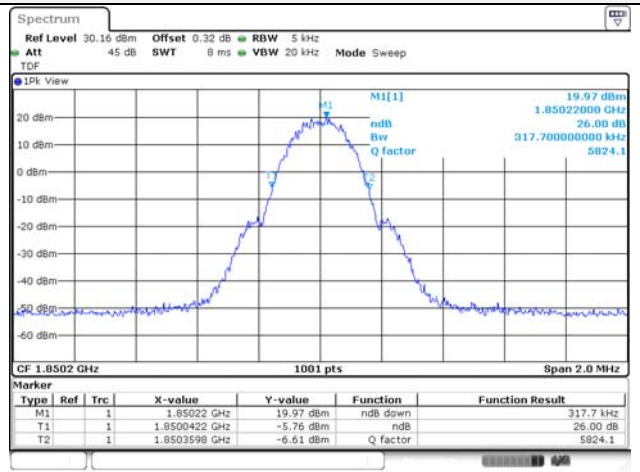


**Test mode: GSM 1900**

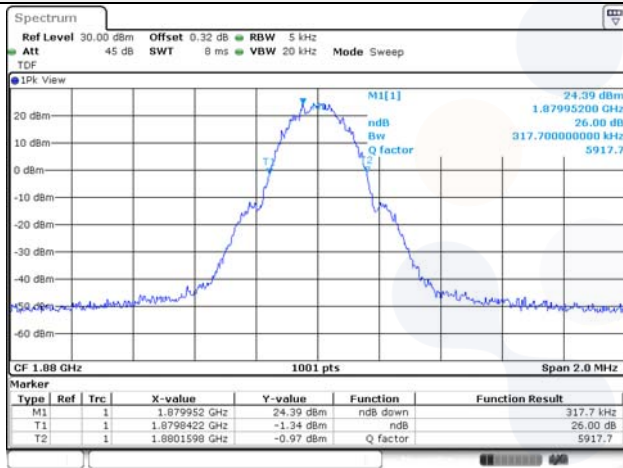
**GPRS Low ch.**



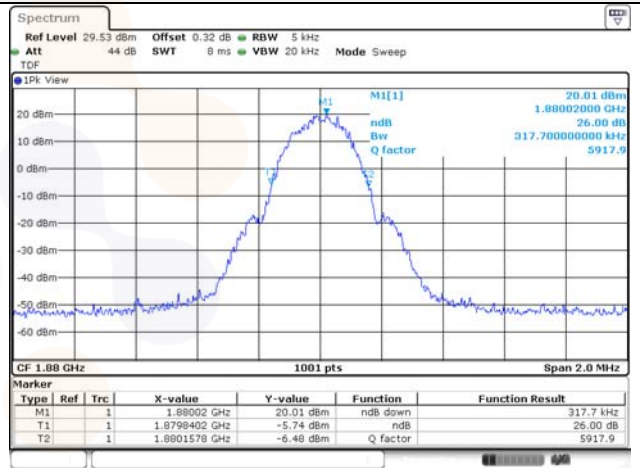
**EDGE Low ch.**



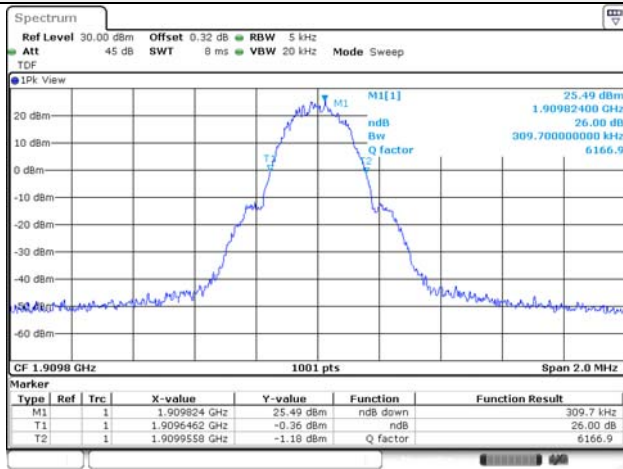
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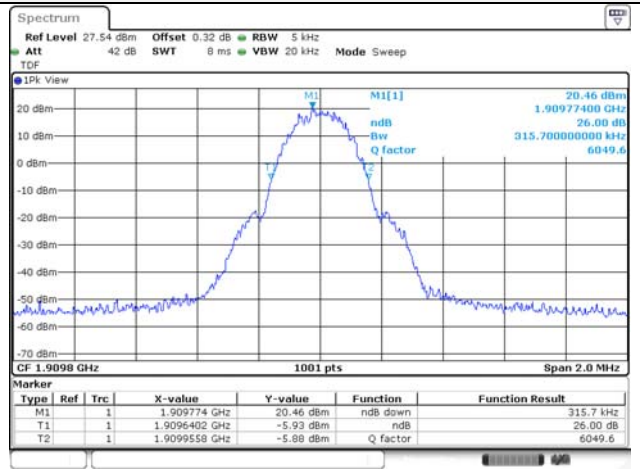
**EDGE Mid ch.**



**GPRS High ch.**

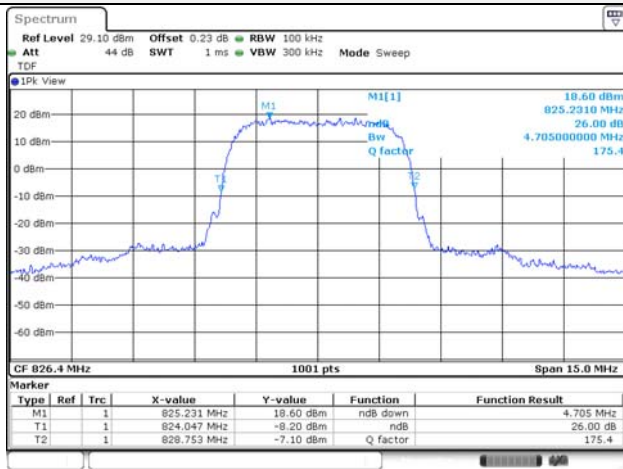


**EDGE High ch.**

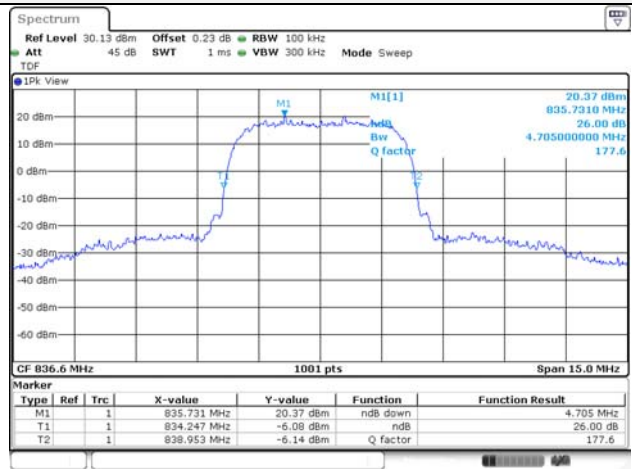


**Test mode: WCDMA 850**

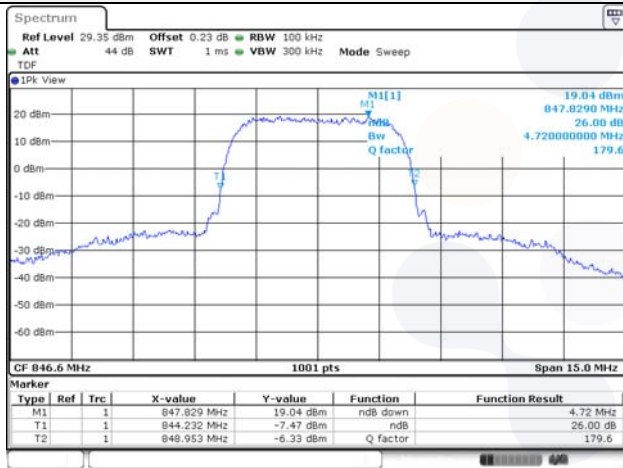
**RMC / Low ch.**



**RMC / Mid ch.**



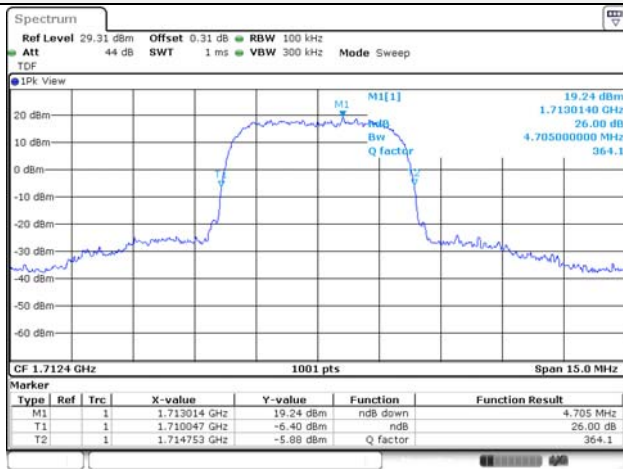
**RMC / High ch.**



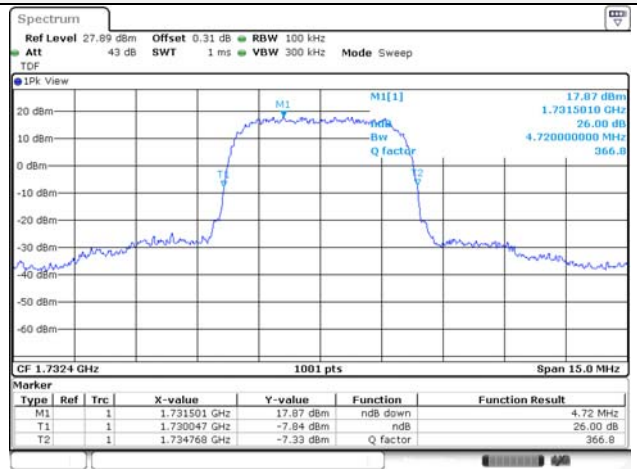
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**Test mode: WCDMA 1700**

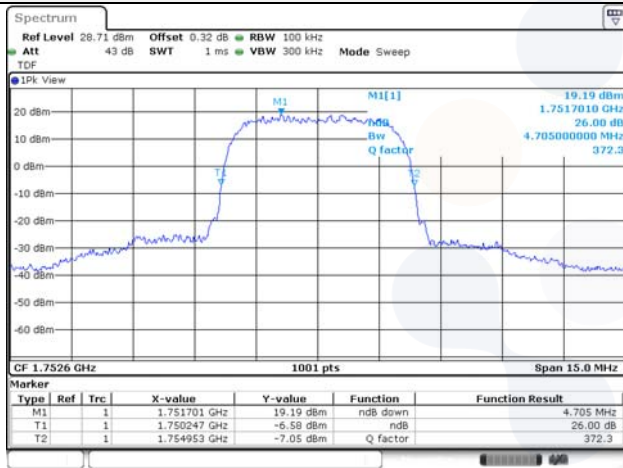
**RMC / Low ch.**



**RMC / Mid ch.**



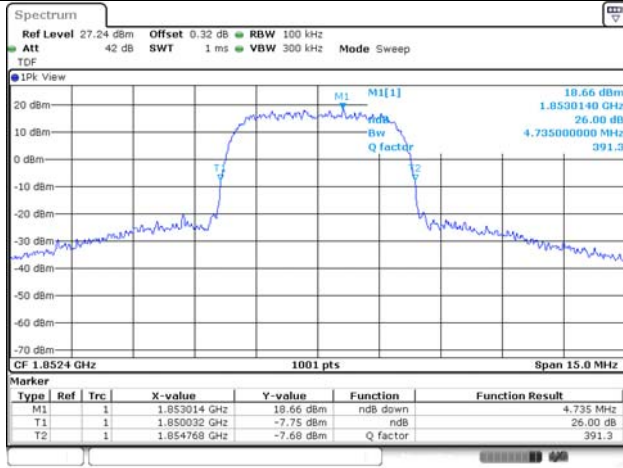
**RMC / High ch.**



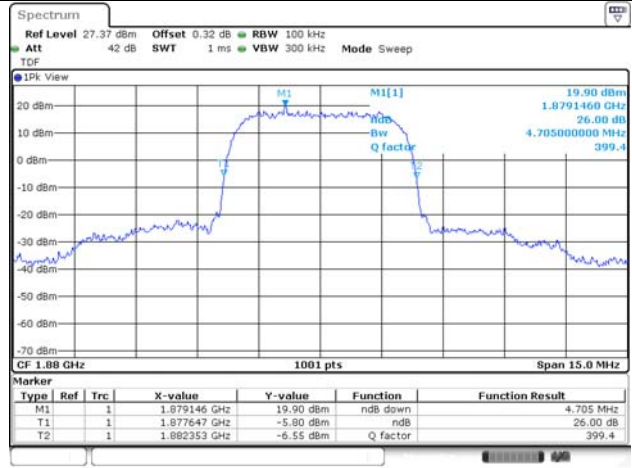
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**Test mode: WCDMA 1900**

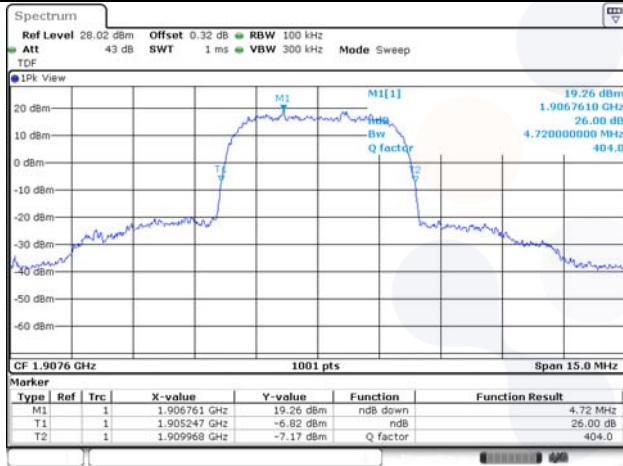
**RMC / Low ch.**



**RMC / Mid ch.**



**RMC / High ch.**

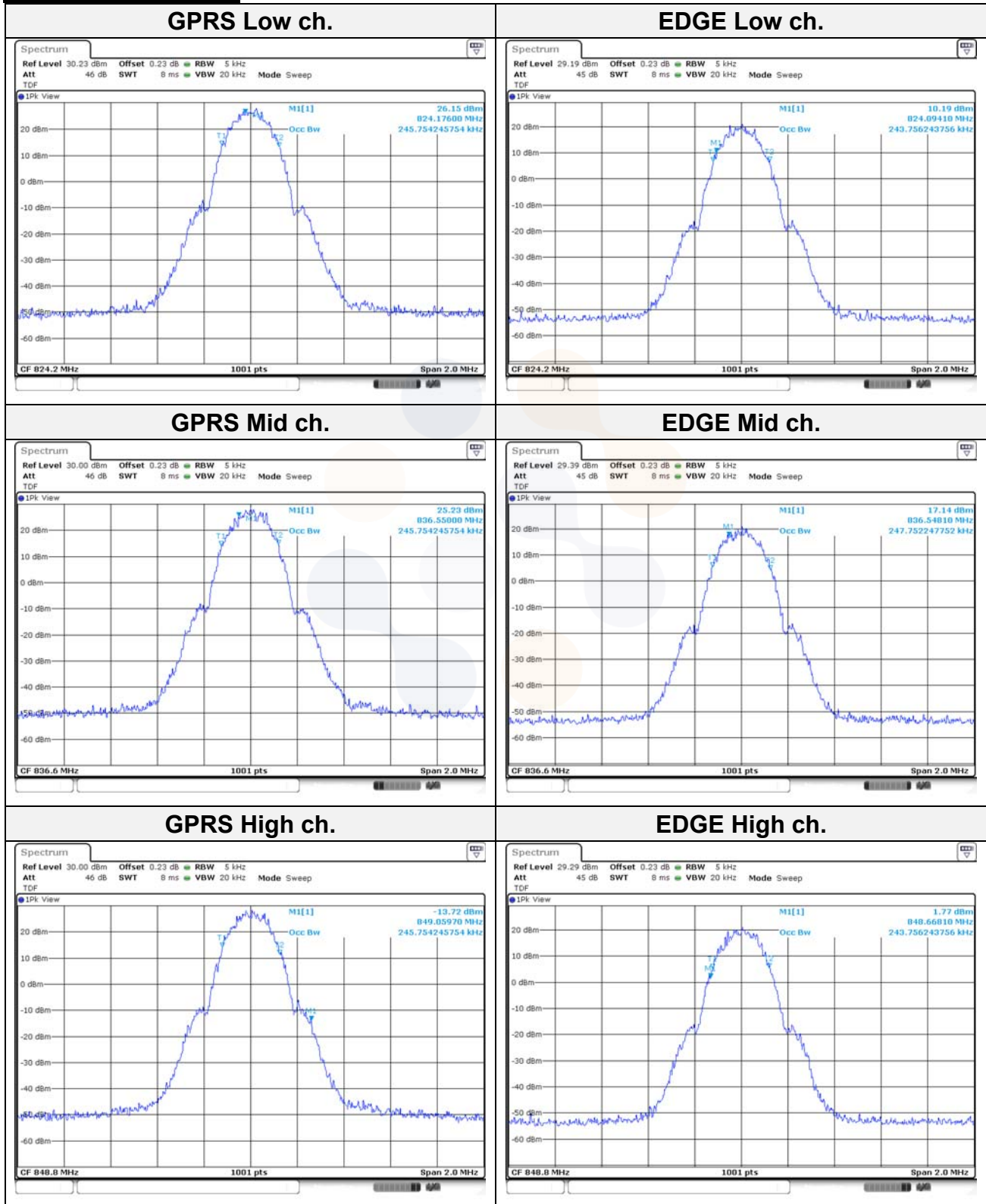


Blank

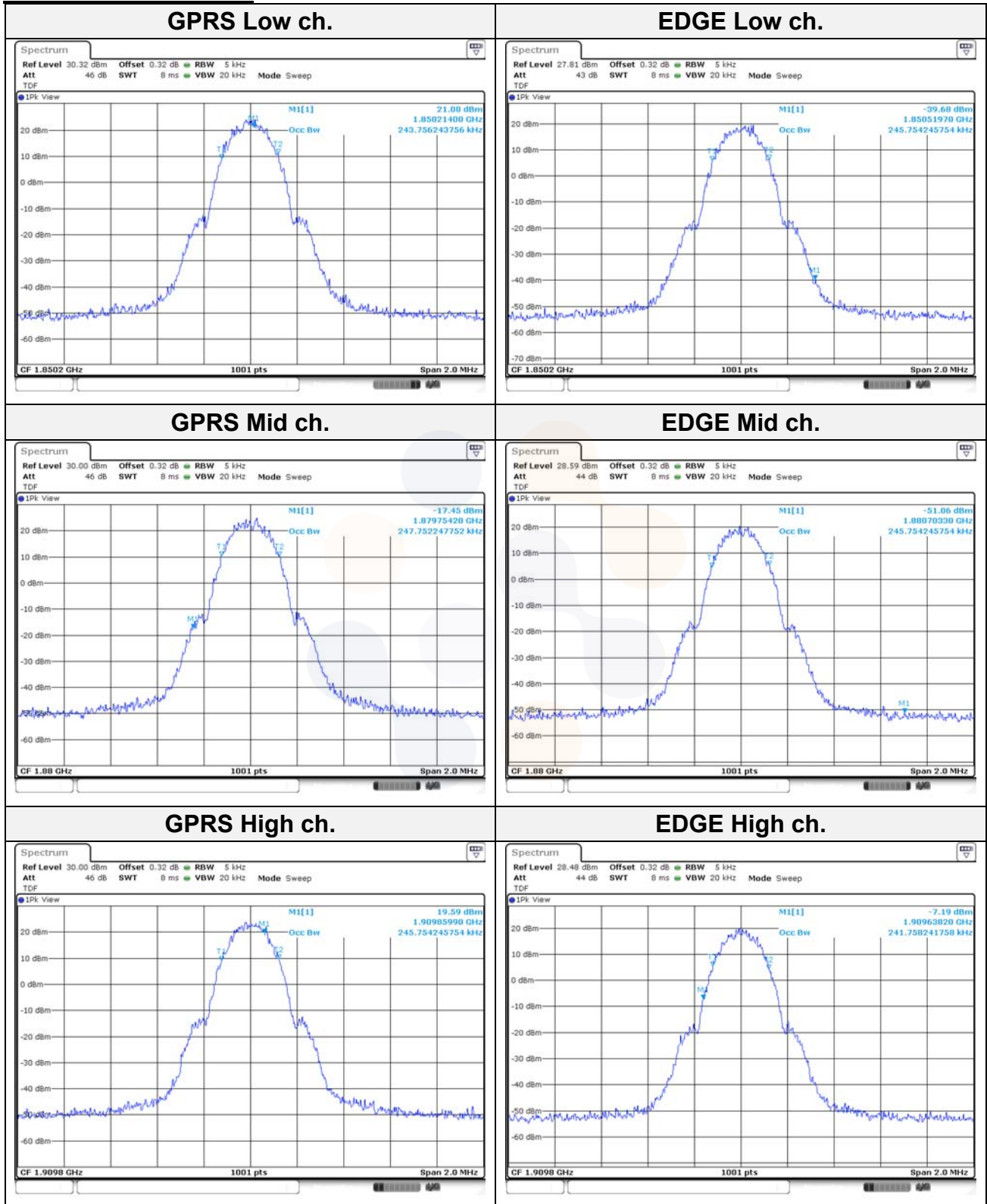


**99% Occupied Bandwidth**

**Test mode: GSM 850**

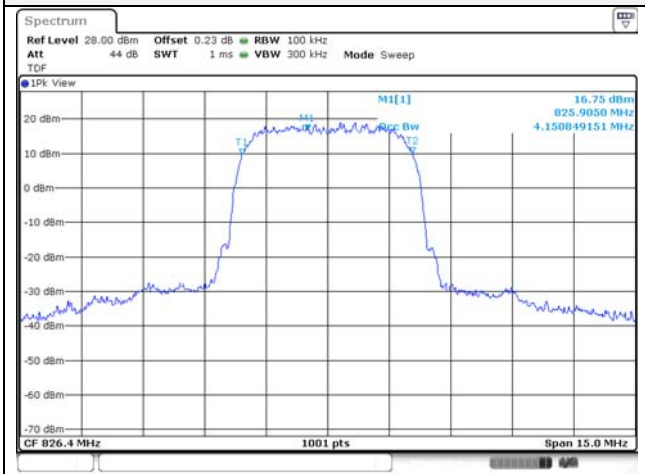


**Test mode: GSM 1900**

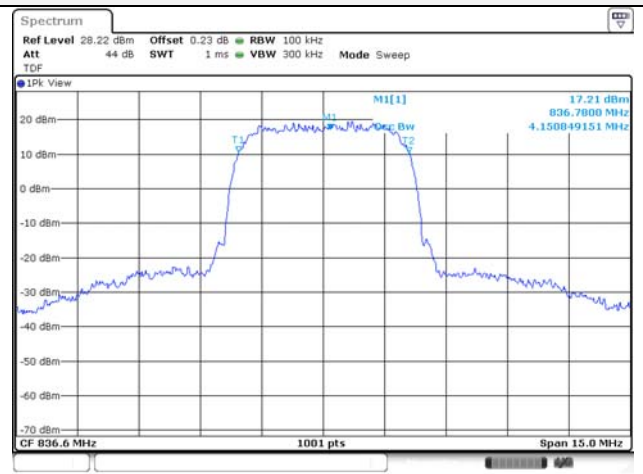


**Test mode: WCDMA 850**

**RMC / Low ch.**



**RMC / Mid ch.**



**RMC / High ch.**

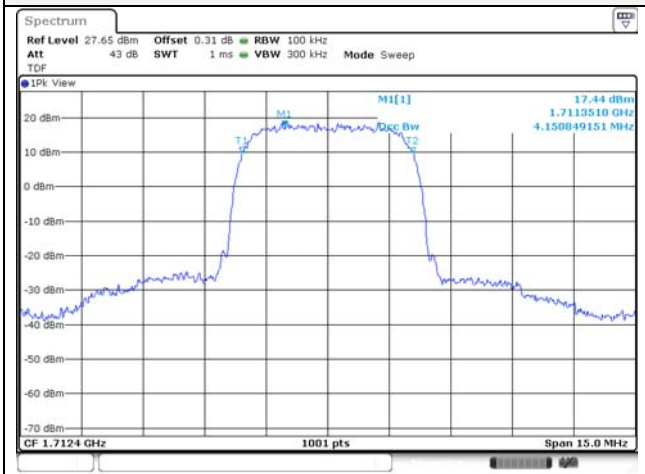


Blank

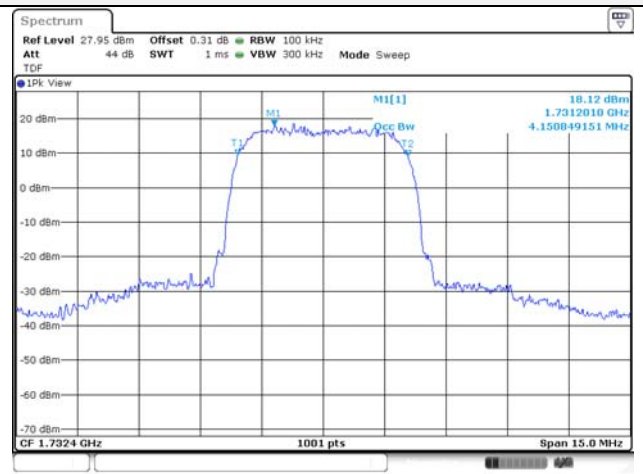


**Test mode: WCDMA 1700**

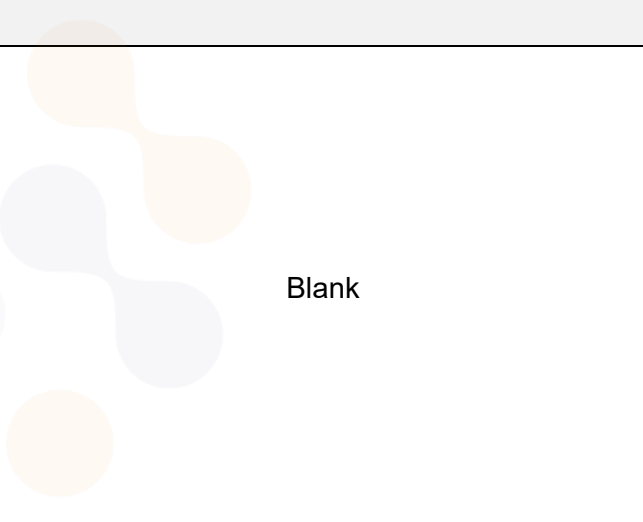
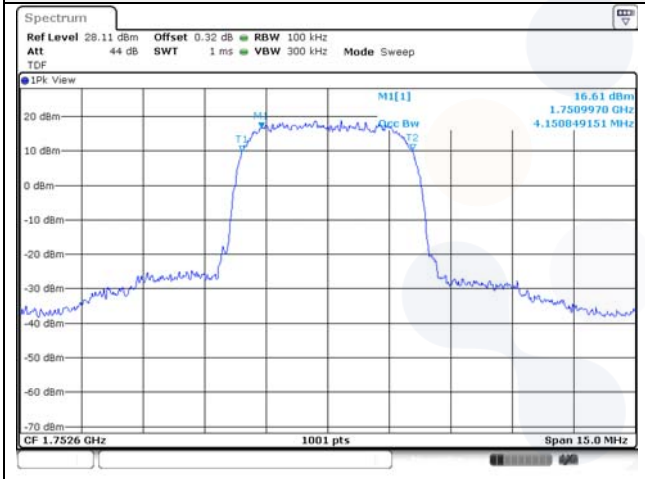
**RMC / Low ch.**



**RMC / Mid ch.**



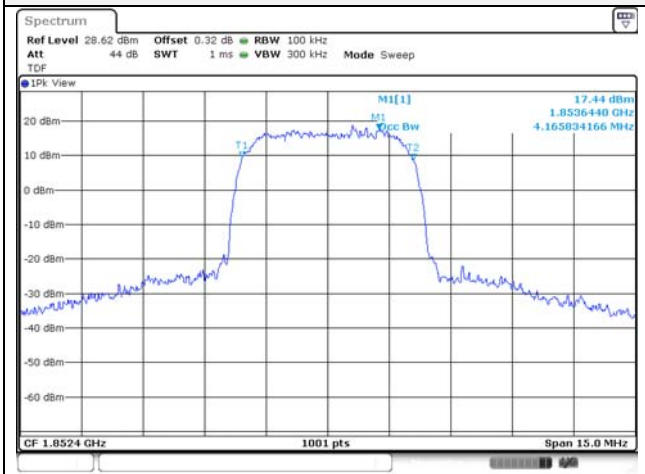
**RMC / High ch.**



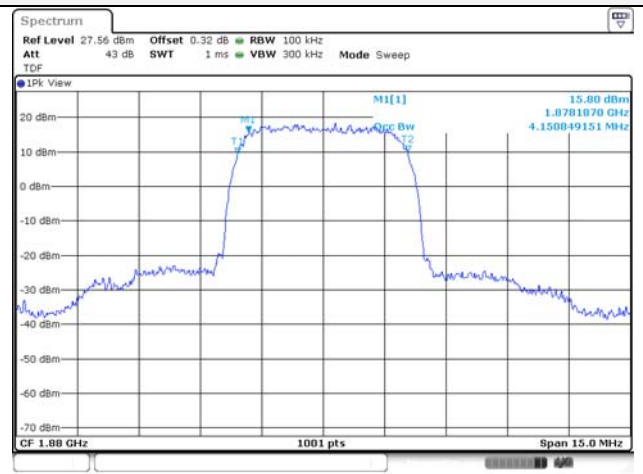
Blank

**Test mode: WCDMA 1900**

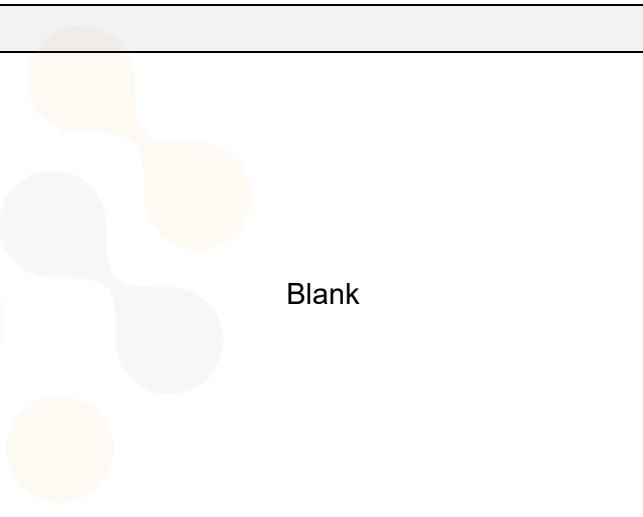
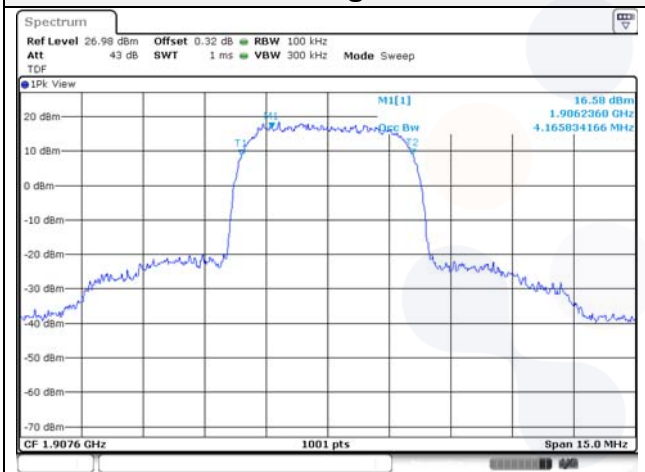
**RMC / Low ch.**



**RMC / Mid ch.**



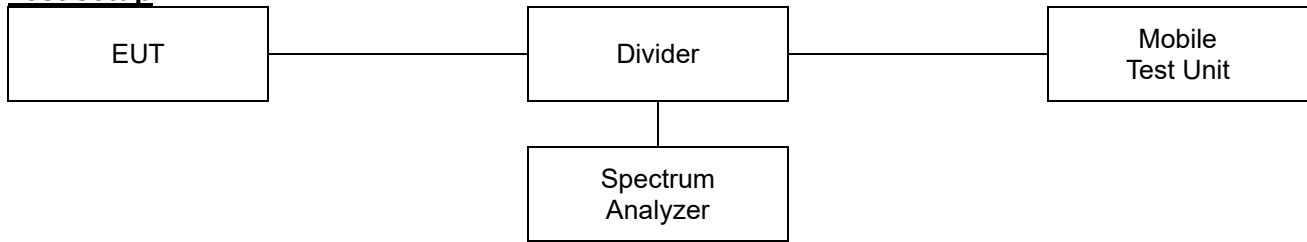
**RMC / High ch.**



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### 7.3. Spurious Emissions at Antenna Terminal

#### Test setup



#### Limit

According to §22.917(a), §24.238(a), 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.

According to §27.53(h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10\log(P_{\text{[Watts]}})$  dB.

#### Test procedure

971168 D01 v03r01 - Section 6  
ANSI 63.26-2015 – Section 5.7

#### Test settings

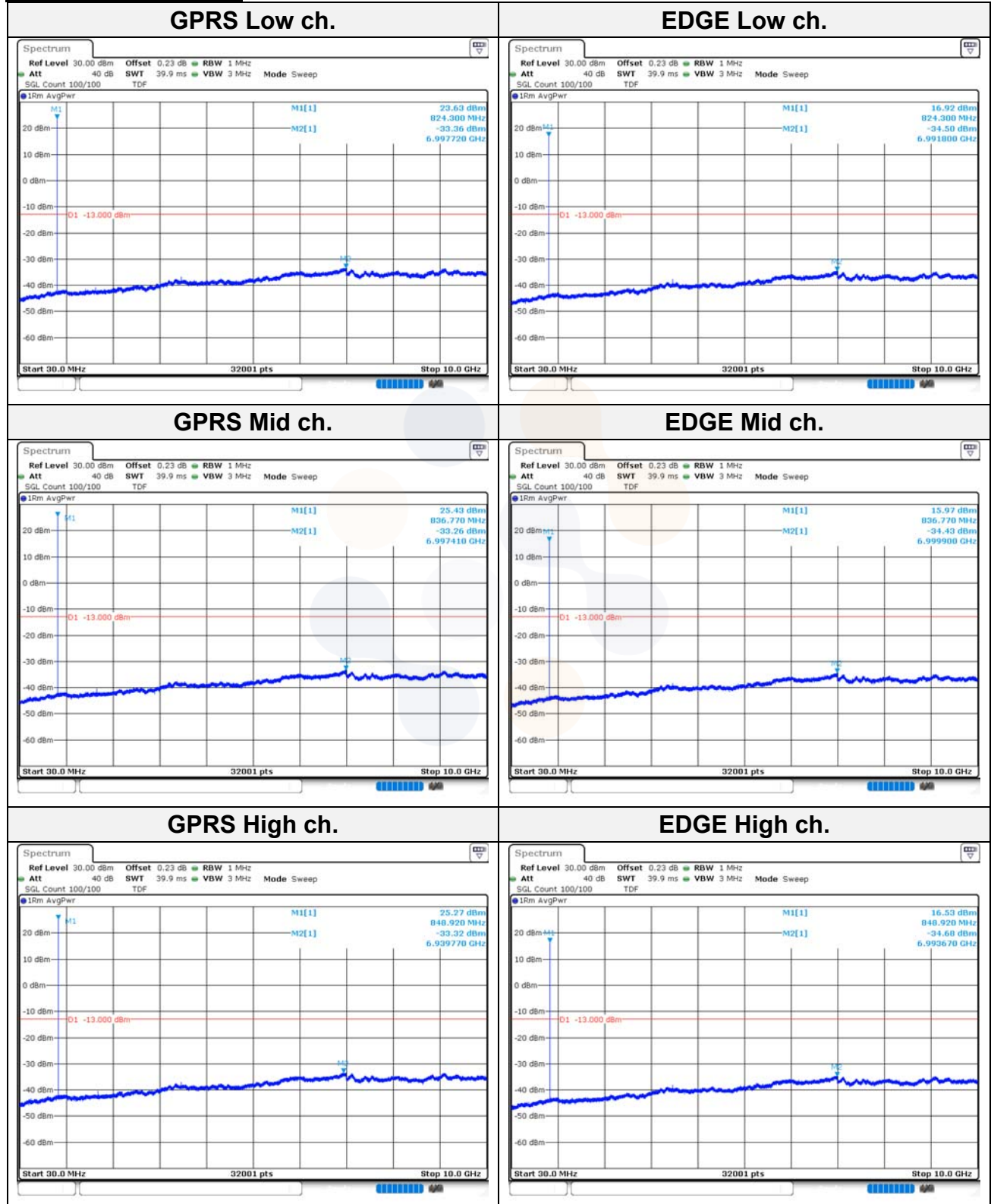
- 1) Start frequency was set to 30 MHz and stop frequency was set to at least 10<sup>th</sup> the fundamental frequency.
- 2) Detector = RMS
- 3) Sweep time = auto couple.
- 4) Trace mode = trace average
- 5) Allow trace to fully stabilize.
- 6) Please see test notes below RBW and VBW settings.

#### Notes:

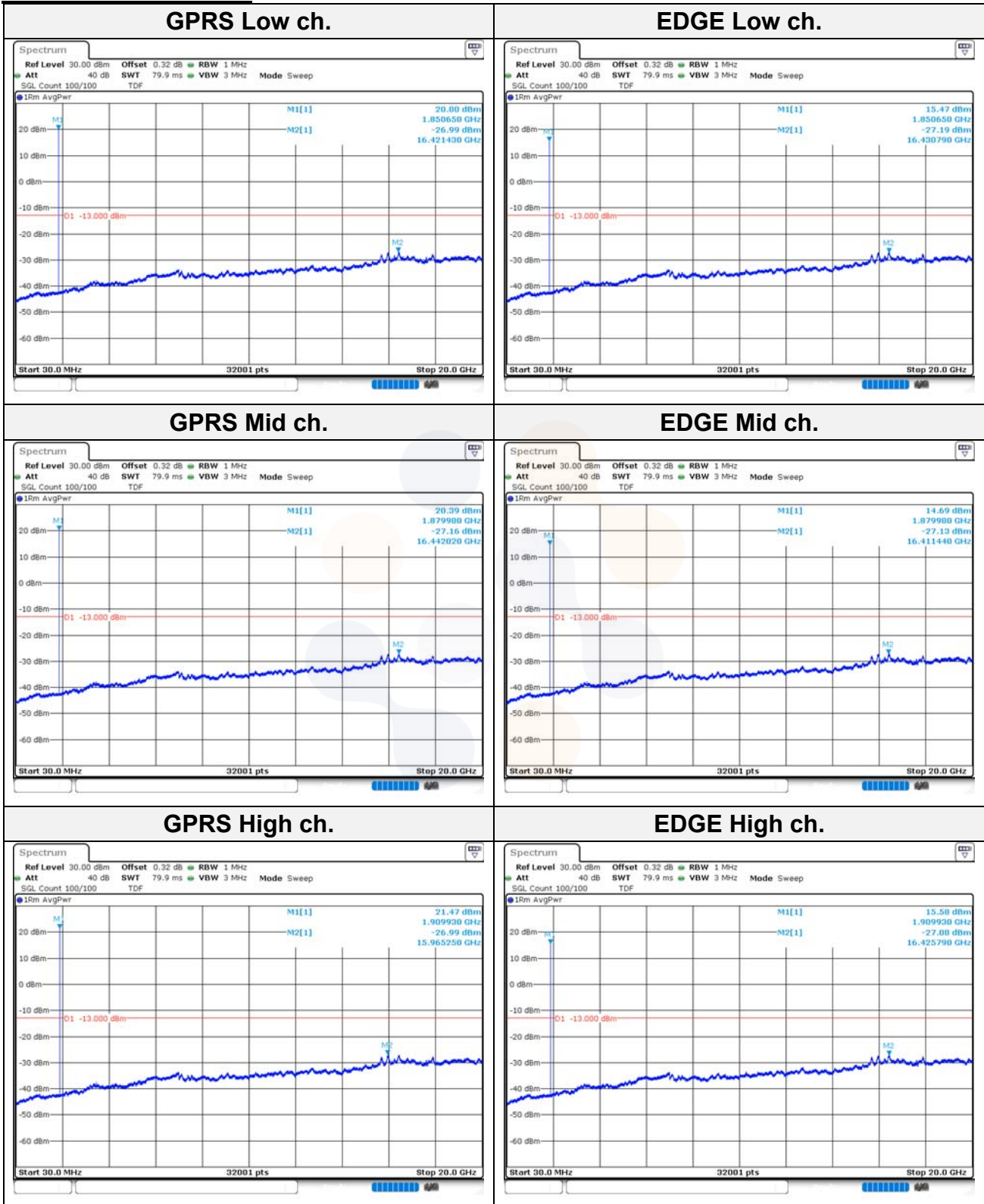
1. Per 22.917(b), 24.238(b), 27.53(h)(3), compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**Test results**

**Test mode: GSM 850**

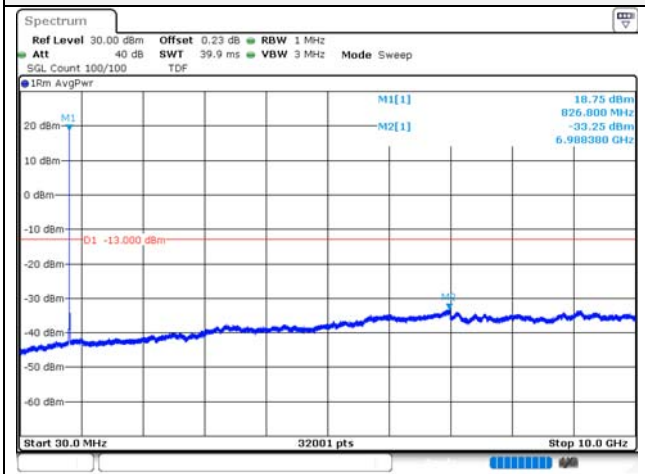


**Test mode: GSM 1900**

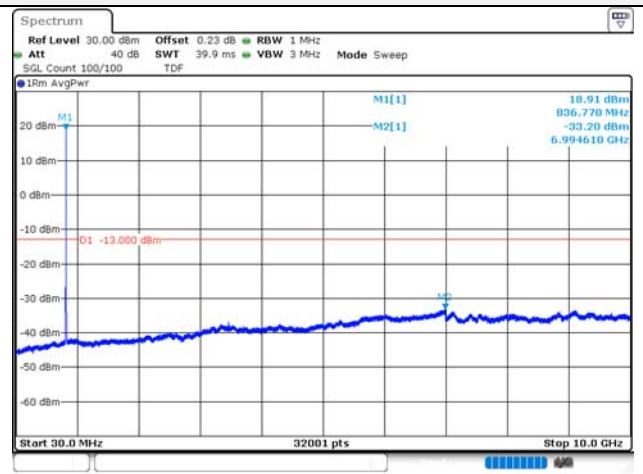


**Test mode: WCDMA 850**

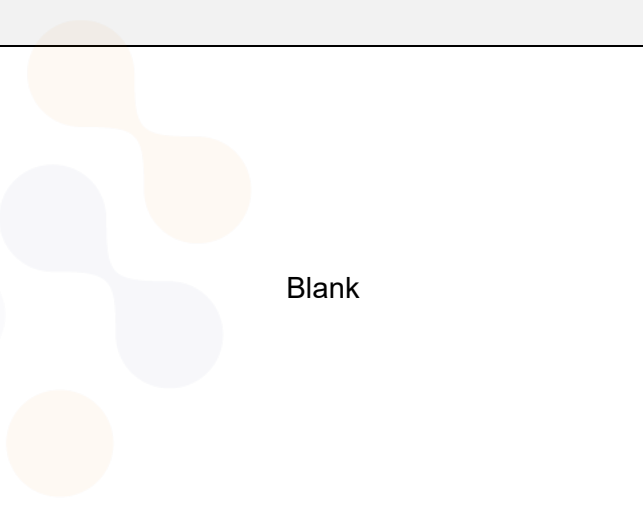
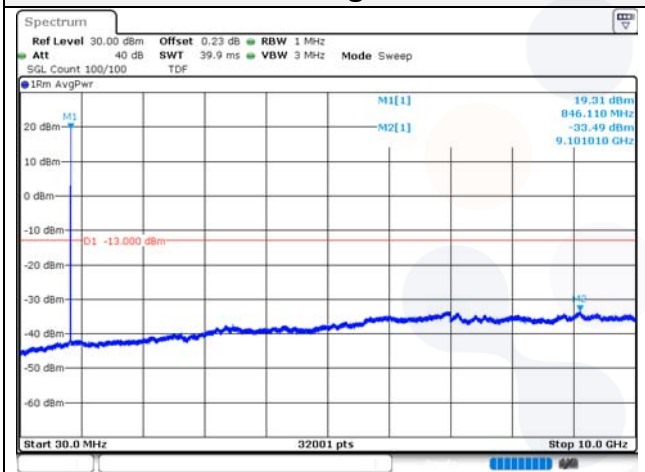
**RMC / Low ch.**



**RMC / Mid ch.**



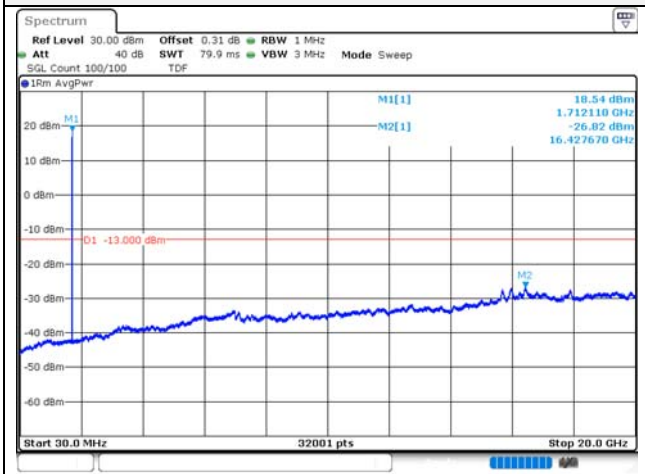
**RMC / High ch.**



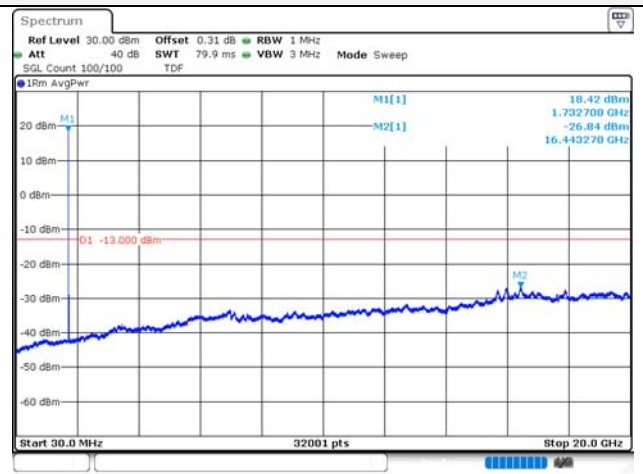


**Test mode: WCDMA 1700**

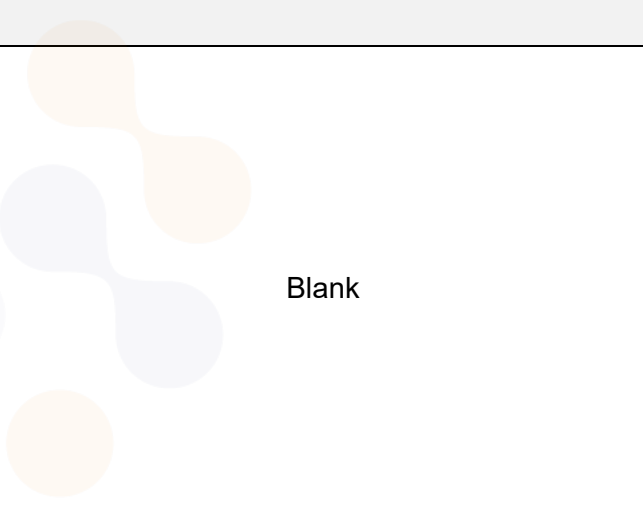
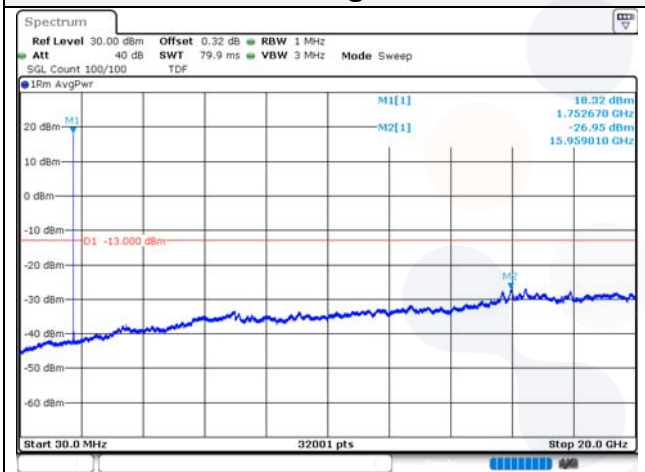
**RMC / Low ch.**



**RMC / Mid ch.**

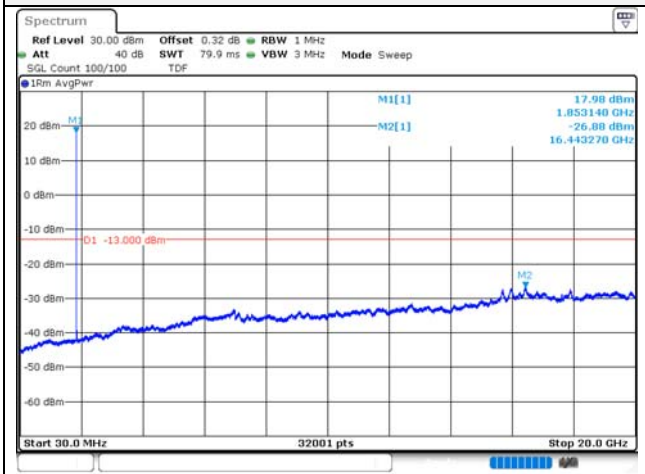


**RMC / High ch.**

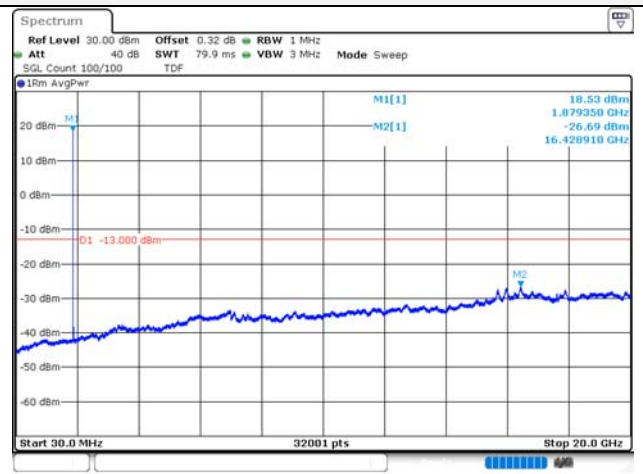


**Test mode: WCDMA 1900**

**RMC / Low ch.**



**RMC / Mid ch.**



**RMC / High ch.**

