



*Full*

# TEST REPORT

**No. I18D00006-SRD04**

*For*

**Client : Lenovo(Shanghai) Electronics  
Technology Co., Ltd.**

**Production : Portable Tablet Computer**

**Model Name : Lenovo TB-8504X**

**FCC ID: O57TB8504X**

**Hardware Version: Lenovo Tablet TB-8504X**

**Software Version: TB-8504X\_RF01\_170520**

**Issued date: 2018-02-07**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

**Test Laboratory:**

ECIT Shanghai, East China Institute of Telecommunications

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**Revision Version**

<b>Report Number</b>	<b>Revision</b>	<b>Date</b>	<b>Memo</b>
I18D00006-SRD04	00	2018-01-26	Initial creation of test report
I18D00006-SRD04	01	2018-02-07	Second creation of test report

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

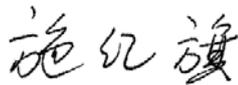
### 1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-10/+55°C
Relative Humidity:	20-75%

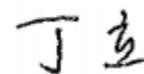
### 1.3. Project data

Project Leader:	Yu Yuting
Testing Start Date:	2018-01-09
Testing End Date:	2018-02-07

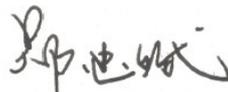
### 1.4. Signature



**Shi Hongqi**  
(Prepared this test report)



**Ding Li**  
(Reviewed this test report)



**Zheng Zhongbin**  
Director of the laboratory  
(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

Company Name: Lenovo(Shanghai) Electronics Technology Co., Ltd.  
Address: NO.68 BUILDING, 199 FENJU RD, China (Shanghai) Pilot Free  
Trade Zone, 200131, CHINA  
Postcode: N/A  
Telephone: 18116117205

### 2.2. Manufacturer Information

Company Name: Lenovo PC HK Limited  
Address: 23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay,  
Hong Kong  
Postcode: N/A  
Telephone: 18116117205

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

EUT Description	Portable Tablet Computer
Model name	Lenovo TB-8504X
FCC ID	O57TB8504X
Frequency	GSM850/900/1800/1900; WCDMA Band I/II/V/VIII LTE FDD1/3/5/7/8/20 TDD38/40
Extreme Temperature	-10/+55 °C
Nominal Voltage	3.85V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.65V

Note: Photographs of EUT are shown in ANNEX A of this test report.

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N11	863768030009003	Lenovo Tablet TB-8504X	TB-8504X_RF01_170 520	2018-01-08

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	Dummy Battery	---

\*AE ID: is used to identify the test sample in the lab internally.

#### 3.4. Statements

The Lenovo TB-8504X, supporting GSM/GPRS/EDGE/WCDMA/LTE/WLAN/BT/BLE/GPS, manufactured by Lenovo PC HK Limited, which is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2014
FCC Part 22	PUBLIC MOBILE SERVICES	2014
ANSI-TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

**5. SUMMARY OF TEST RESULTS**

Item	Test items	FCC rules	result
1	Output Power	2.1046/22.913(a)/24.232(c)	Pass
2	Peak-to-Average Ratio	24.232(d)	Pass
3	99%Occupied Bandwidth	2.1049(h)(i)/ 22.917(b)	Pass
4	-26dB Emission Bandwidth	22.917(b)/§24.238(b)	Pass
5	Band Edge at antenna terminals	22.917(a)/24.238(a)	Pass
6	Frequency stability	2.1055/24.235	Pass
7	Conducted Spurious mission	2.1053/22.917(a)/24.238(a)	Pass
8	Emission Limit	2.1051/22.917/24.238/22.913/24.232	Pass

## 6. Test Equipment Utilized

### Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Climate chamber	SH-641	92012011	ESPEC	2017-12-25	2 Year

### Radiated emission test system

The test equipment and ancillaries used are as follows.

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2017-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2017-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2017-05-11	1 Year
6	Substitution Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
7	RF Signal Generator	SMF100A	102314	R&S	2017-05-11	1 Year
8	Substitution Antenna	VUBA9117	9117-266	Schwarzbeck	2017-11-18	3 Year
9	Amplifier	SCU08	10146	R&S	2017-05-11	1 Year

**Conducted test system**

No.	Name	Type	SN	Manufacture	Calibration date	Cal.interval
1	Spectrum Analyzer	FSQ26	101096	R&S	2017-05-11	1 Year
2	Universal Radio Communicat	CMU200	123124	R&S	2017-05-11	1 Year
3	DC Power Supply	ZUP60-1 4	LOC-220Z006 -0007	TDL-Lambda	2017-05-11	1 Year

## 7. Test Environment

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

**Control room** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber1** (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

## **ANNEX A. MEASUREMENT RESULTS**

### **ANNEX A.1. OUTPUT POWER**

#### **A.1.1. Summary**

During the process of testing, the EUT was controlled Rhode & Schwarz Digital Radio. Communication tester (CMU-200) to ensure max power transmission and proper modulation. This result contains peak output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

#### **A.1.2. Conducted**

##### **A.1.2.1. Method of Measurements**

Method of measurements please refer to KDB971168 D01 v03 clause 5.

The EUT was set up for the max output power with pseudo random data modulation.

The power was measured with Rhode & Schwarz Spectrum Analyzer FSQ(peak).

These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

These measurements were done at 3 frequencies, 1852.4 MHz, 1880.0MHz and 1907.6MHz for WCDMA Band II; 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V. (bottom, middle and top of operational frequency range).

##### **A.1.2.2 Test procedures:**

1. The transmitter output port was connected to base station.
2. Set the EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

##### **A.1.2.3 Limit:**

22.913(a) Mobile stations are limited to 7watts.

24.232(c) Mobile and portable stations are limited to 2 watts.

##### **A.1.2.4 Test Procedure:**

The transmitter output power was connected to calibrated attenuator, the other end of which was connected to signal analyzer. Transmitter output power was read off the power in dBm. The power outputs at the transmitter antenna port was determined by adding the value of attenuator to the signal analyzer reading.

##### **A.1.2.5 GSM Test Condition:**

RBW	VBW	Sweep time	Span
-----	-----	------------	------

1MHz	1MHz	300ms	10MHz
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**A.1.2.6 WCDMA Test Condition:**

RBW	VBW	Sweep time	Span
10MHz	10MHz	800ms	50MHz

**A.1.2.7 Measurement results:**

GSM 850 (GMSK)			
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)	
Mid 189/836.4	33.57	33.24	
Low 128/824.2	33.64	33.34	
High 251/848.8	33.48	33.22	
GPRS 850 (GMSK 1 Slot)			
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)	
Mid 189/836.4	33.6	33.3	
Low 128/824.2	33.67	33.37	
High 251/848.8	33.49	33.25	
EDGE 850 (8PSK 1 Slot)			
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)	
Mid 189/836.4	30.04	26.86	
Low 128/824.2	30.49	27.2	
High 251/848.8	30.19	26.93	

GSM 1900(GMSK)			
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)	
Mid 661/1880	30.71	30.3	
Low 512/1850.2	30.21	29.71	
High 810/1909.8	30.33	29.88	

GPRS 1900 (GMSK 1 Slot)		
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)
Mid 661/1880	30.74	30.32
Low 512/1850.2	30.25	29.77
High 810/1909.8	30.34	29.9
EDGE 1900 (8PSK 1 Slot)		
Channel/fc(MHz)	Peak power (dBm)	Average power(dBm)
Mid 661/1880	28.78	25.43
Low 512/1850.2	28.64	25.13
High 810/1909.8	28.44	24.98

WCDMA II		
Channel/fc(MHz)	Peak power (dBm)	AV power (dBm)
Mid 9400 /1880	26.65	22.81
Low 9262/1852.4	26.45	22.79
High 9538/1907.6	26.75	22.93
WCDMA BAND V		
Channel/fc(MHz)	Peak power (dBm)	AV power (dBm)
Mid 4183/836.6	25.64	22.99
Low 4132/826.4	25.84	23.03
High 4233/846.6	25.97	22.94

HSUPA 16QAM Band II		
Channel/fc(MHz)	HSUPA Peak power (dBm)	HSUPA Average power (dBm)
Mid 9400 /1880	25.06	20.42
Low 9262/1852.4	24.78	20.34

High 9538/1907.6	24.73	20.39
HSUPA 16QAM Band V		
Channel/fc(MHz)	HSUPA Peak power (dBm)	HSUPA Average power (dBm)
Mid 4183/836.6	23.92	20.12
Low 4132/826.4	24.01	20.13
High 4233/846.6	23.87	20.32

**Conclusion: PASS**

## ANNEX A.2. Peak-to-Average Power Ratio

Method of test measurements please refer to KDB971168 D01 v03 clause 5.7.

### A.2.1 PAPR Limit

The peak-to-average power ratio (PAPR) of the transmission may not exceed 13dB

### A.2.2 Test procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2.
  - 1) Select the spectrum analyzer CCDF function.
  - 2) Set RBW  $\geq$  signal's occupied bandwidth.
  - 3) Set the number of counts to a value that stabilizes the measured CCDF curve;
  - 4) Sweep time  $\geq$  1s.
3. Record the maximum PAPR level associated with a probability of 0.1%.

### A.2.3 Test results:

GSM850			
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
PAPR(dB)	8.46	8.43	8.44
GPRS850			
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8

PAPR(dB)	8.45	8.39	8.56
<b>EDGE850</b>			
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
PAPR(dB)	8.47	8.43	8.54

<b>GSM1900</b>			
Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
PAPR(dB)	8.40	8.35	8.43

<b>GPRS1900</b>			
Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
PAPR(dB)	8.48	8.41	8.38

<b>EDGE1900</b>			
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
PAPR(dB)	8.65	8.44	8.31

<b>WCDMA Band II</b>			
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
PAPR(dB)	8.49	8.43	8.49

<b>WCDMA Band V</b>			
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.4	846.6
PAPR(dB)	8.46	8.43	8.46

<b>HSUPA 16QAM Band II</b>			
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
PAPR(dB)	3.81	4.04	4.04
<b>HSUPA 16QAM Band V</b>			
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.6	846.6
PAPR(dB)	3.88	3.85	3.78

**Conclusion: PASS**

### **ANNEX A.3. Occupied Bandwidth**

Method of test please refer to KDB971168 D01 v03 clause 4.0.

#### **A.3.1. Occupied Bandwidth**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

#### **A.3.2 Test Procedure:**

1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW  $\geq$  3 times RBW,.
3. 99% bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

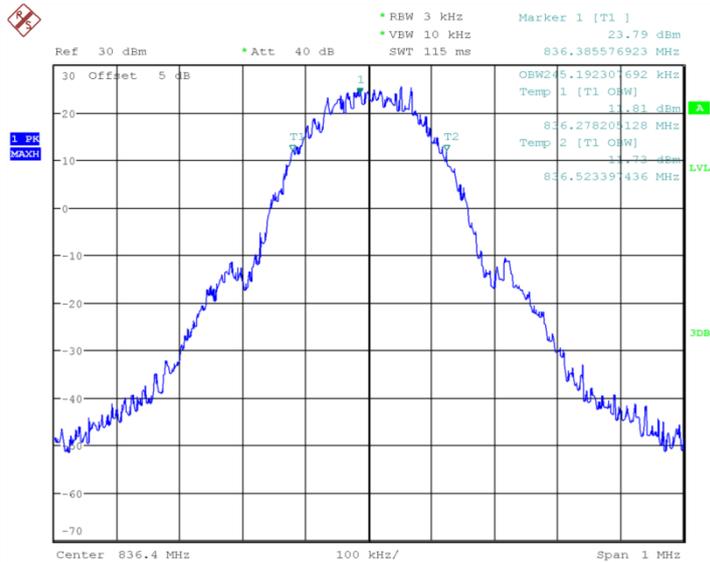
#### **A.3.3 Test result:**

<b>GSM850</b>		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 189	836.4	245.192
Low 128	824.2	245.192
High 251	848.8	241.987
<b>GPRS850</b>		

Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 189	836.4	241.987
Low 128	824.2	246.795
High 251	848.8	245.192
EDGE850		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 189	836.4	246.795
Low 128	824.2	245.192
High 251	848.8	240.385

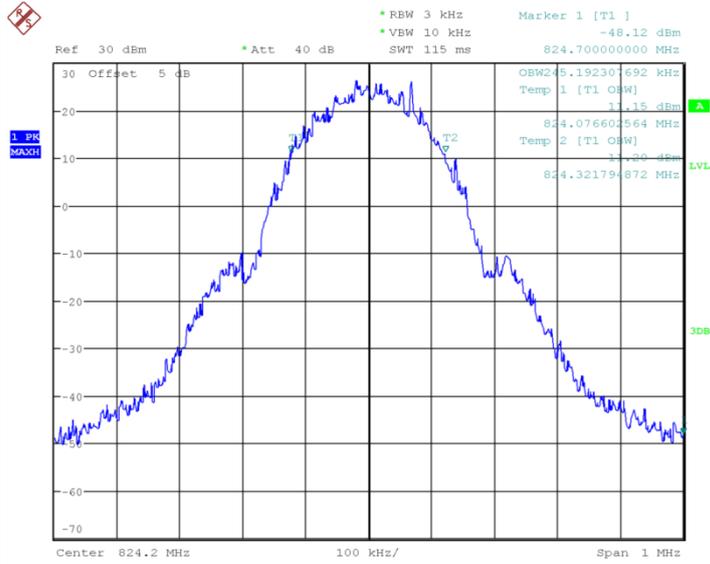
**Conclusion: PASS**

**GSM 850**



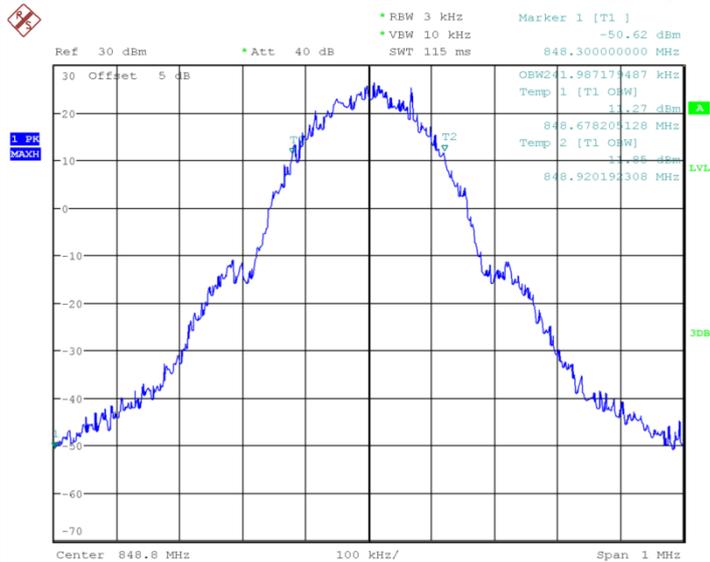
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### Channel 189-Occupied Bandwidth (99%)



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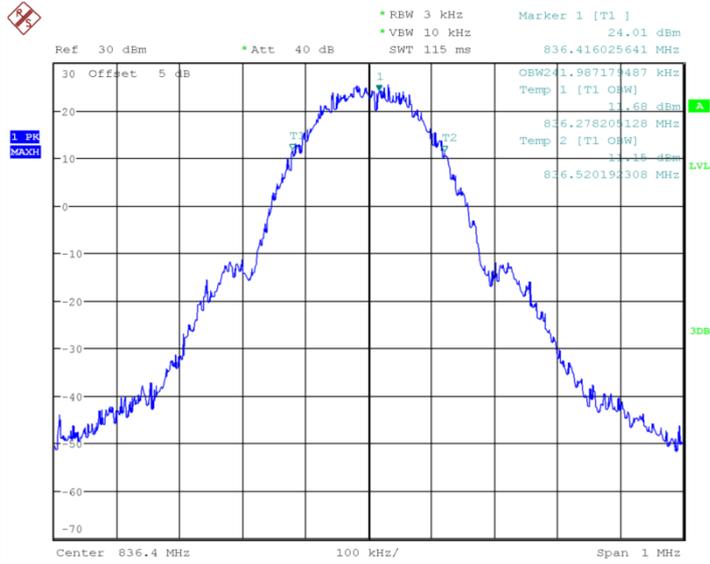
### Channel 128-Occupied Bandwidth (99%)



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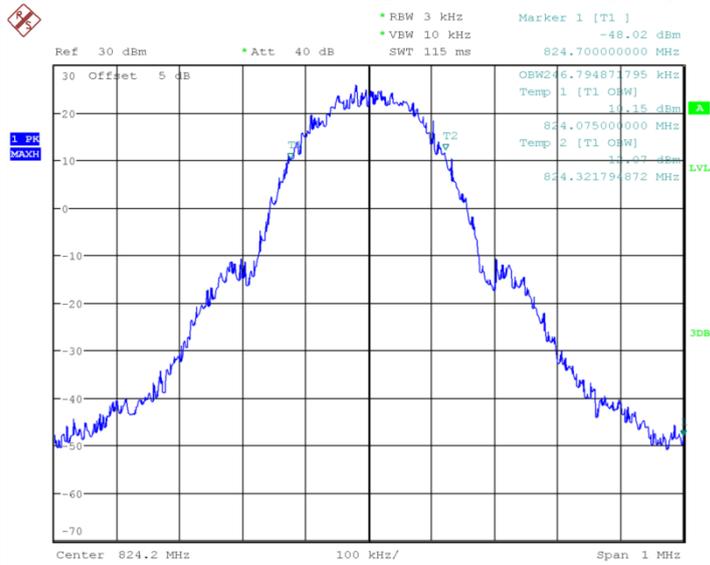
### Channel 251-Occupied Bandwidth (99%)

**GPRS 850**



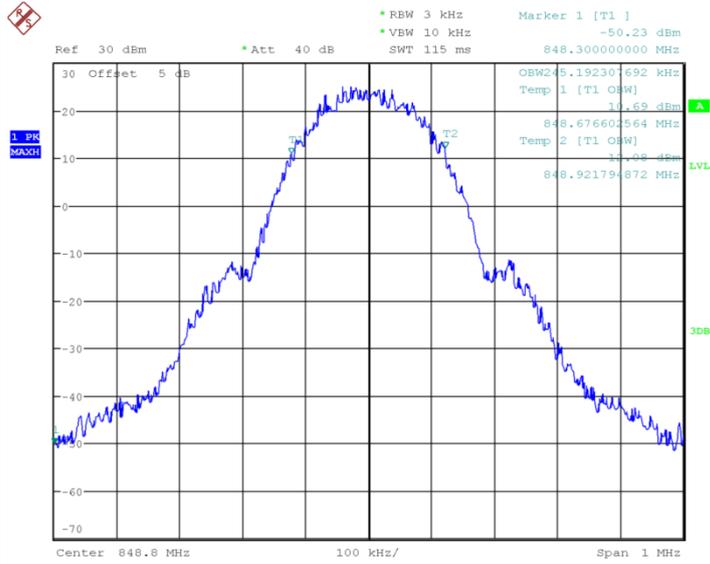
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### Channel 189-Occupied Bandwidth (99%)



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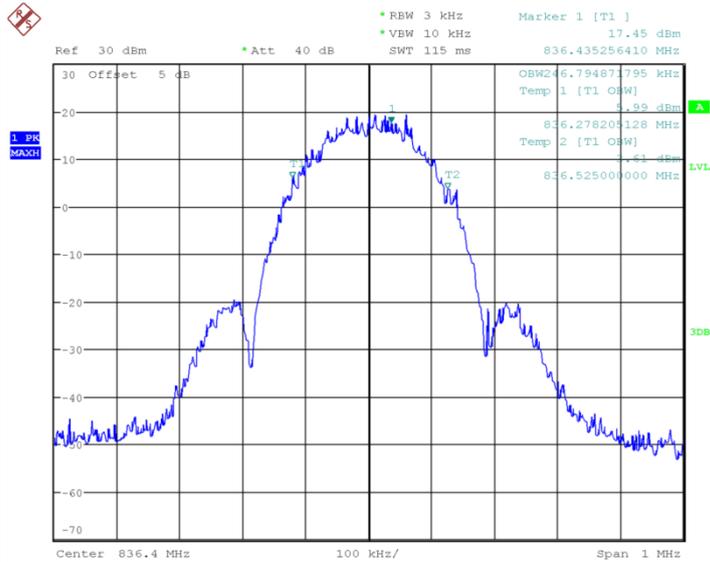
### Channel 128-Occupied Bandwidth (99%)



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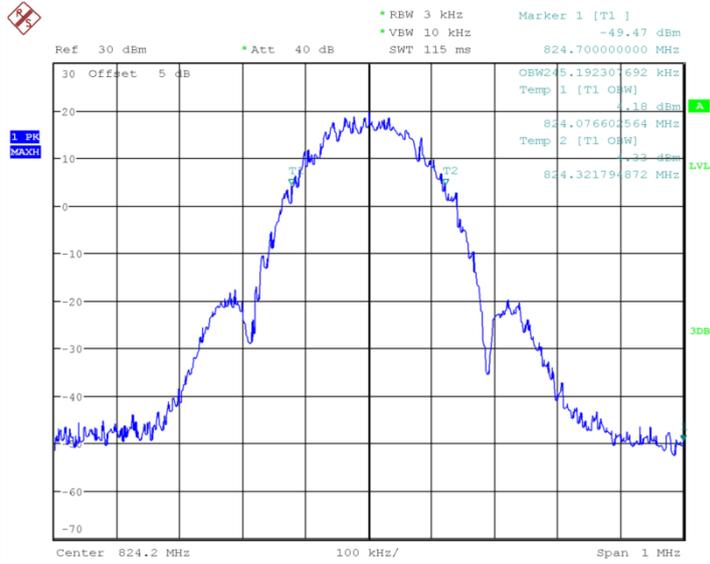
## Channel 251-Occupied Bandwidth (99%)

EDGE 850



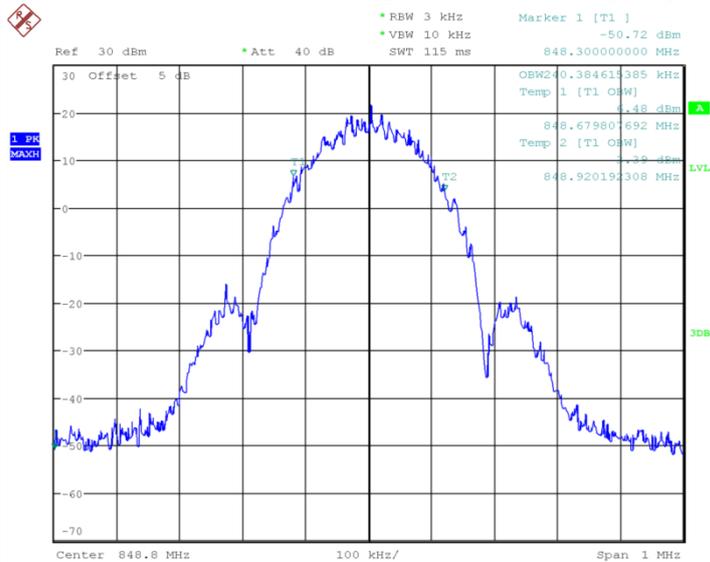
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## Channel 189-Occupied Bandwidth (99%)



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### Channel 128-Occupied Bandwidth (99%)



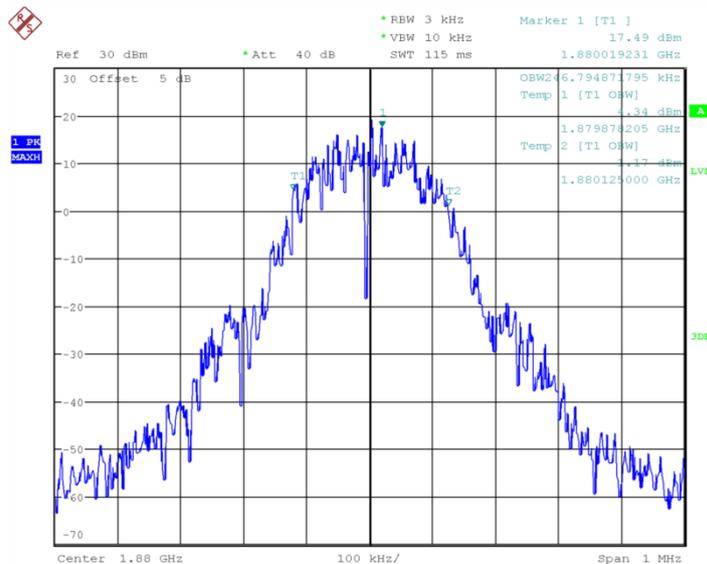
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### Channel 251-Occupied Bandwidth (99%)

GSM1900		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 661	1880	246.795
Low 512	1850.2	245.192
High 810	1909.8	250.000

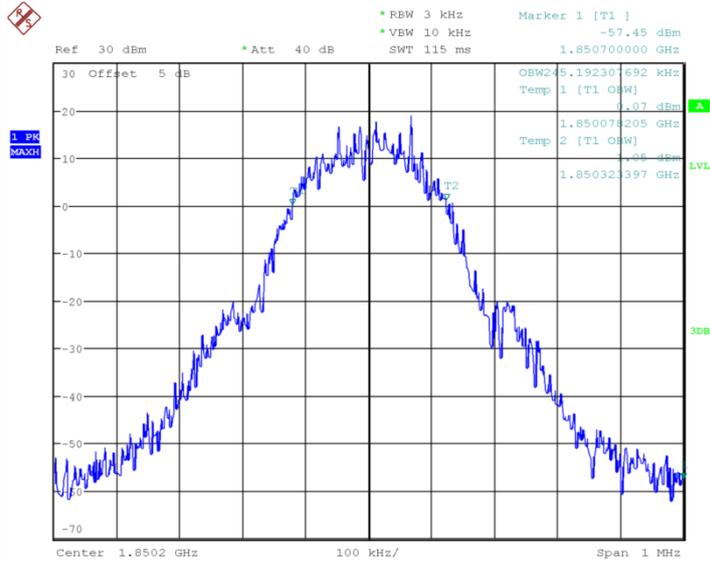
GPRS1900		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 661	1880	245.192
Low 512	1850.2	245.192
High 810	1909.8	241.987
EDGE1900		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(KHz)
Mid 661	1880	243.590
Low 512	1850.2	248.397
High 810	1909.8	222.756

**Conclusion: PASS**  
**GSM 1900**



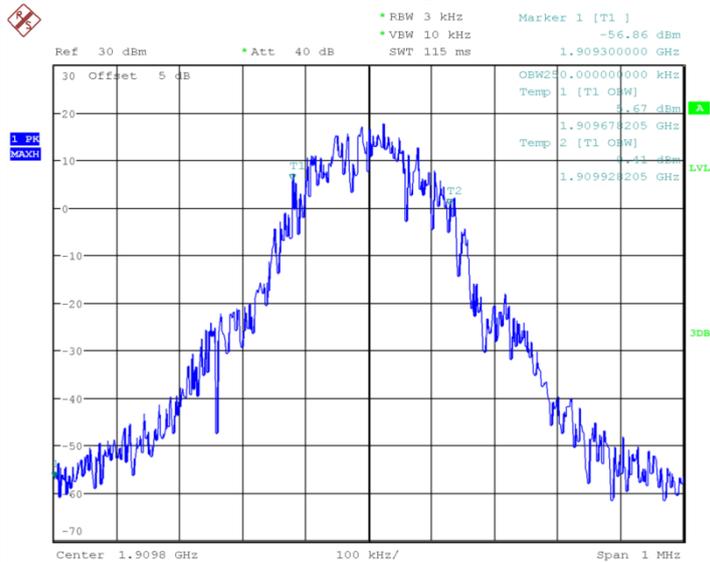
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### Channel 661-Occupied Bandwidth



Date: 10.JAN.2018 11:00:38

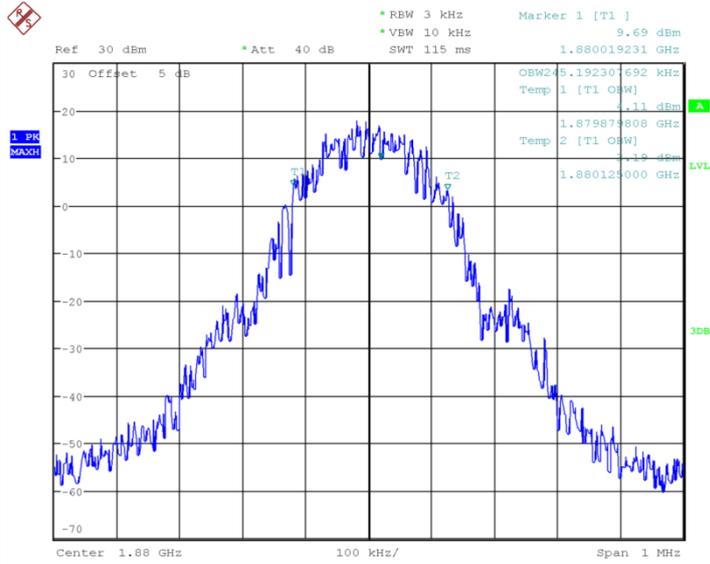
## Channel512-Occupied Bandwidth



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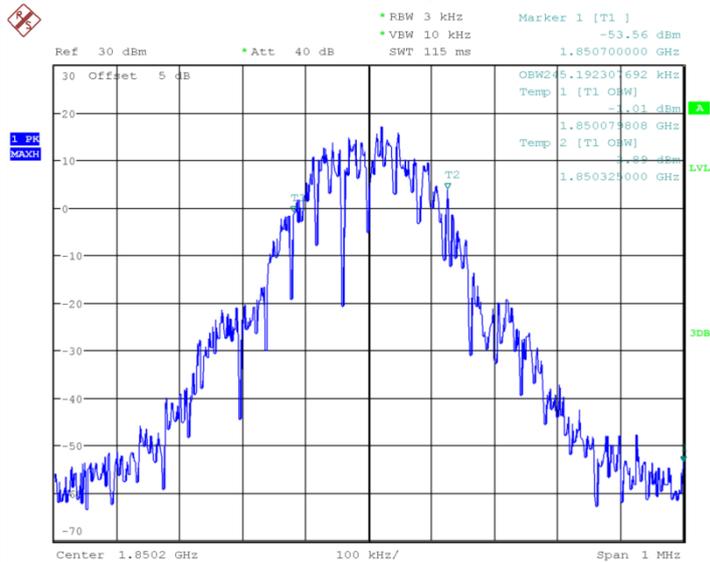
## Channel 810-Occupied Bandwidth

**GPRS 1900**



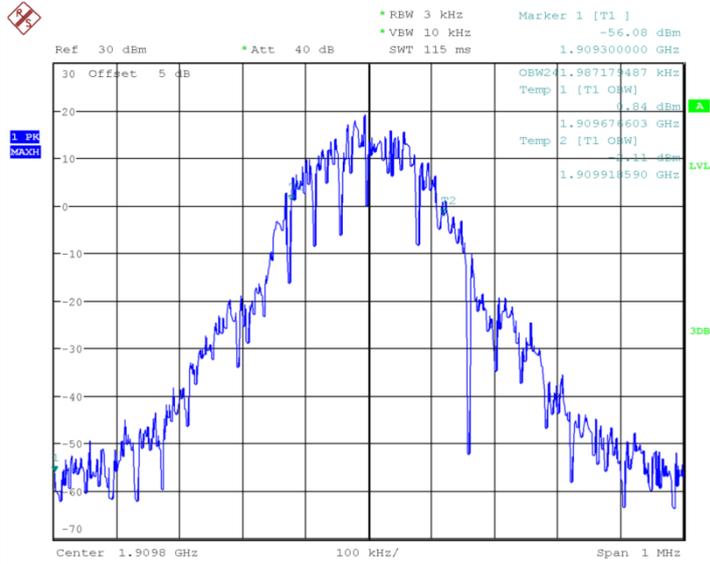
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## Channel 661-Occupied Bandwidth



Date: 10.JAN.2018 11:03:11

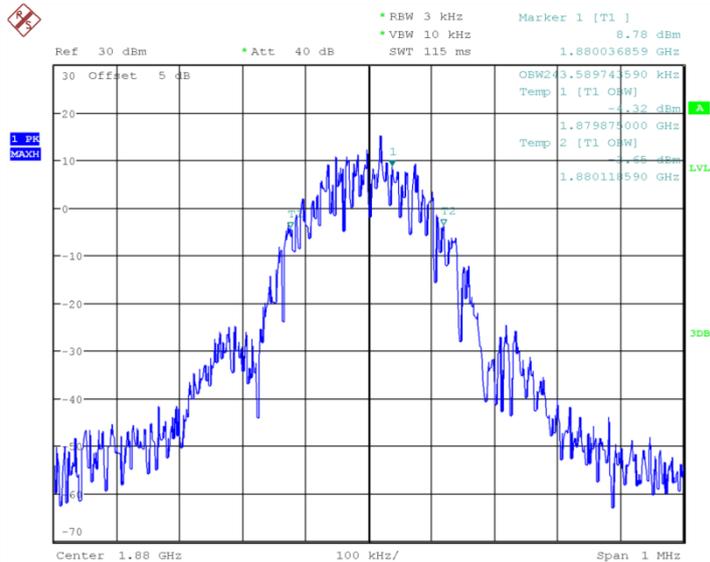
## Channel 512-Occupied Bandwidth



Date: 10.JAN.2018 11:03:31

## Channel 810-Occupied Bandwidth

### EDGE 1900



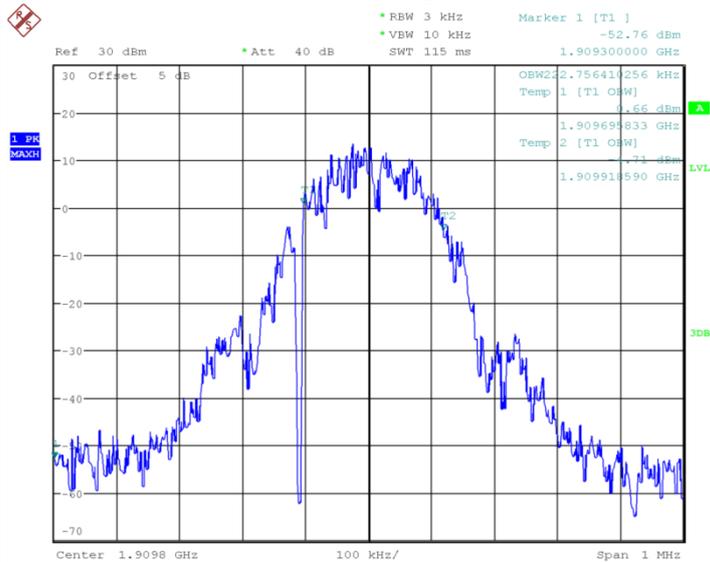
Date: 10.JAN.2018 11:05:54

## Channel 661-Occupied Bandwidth



Date: 10.JAN.2018 11:06:13

### Channel512-Occupied Bandwidth

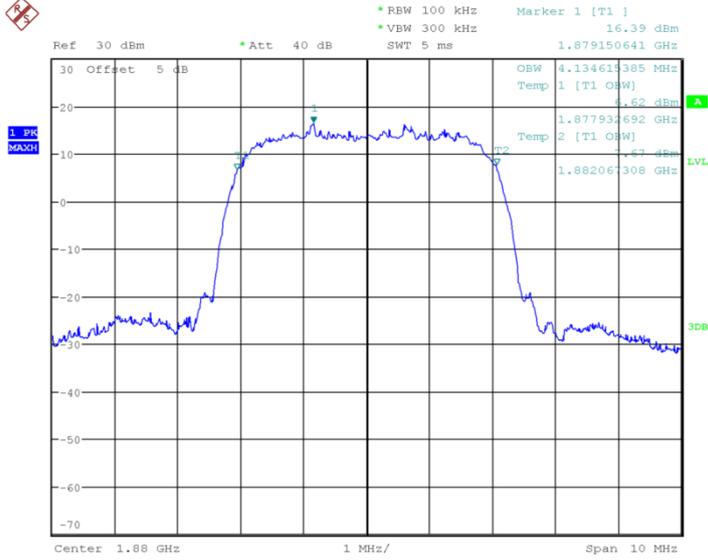


Date: 10.JAN.2018 11:06:32

### Channel 810-Occupied Bandwidth

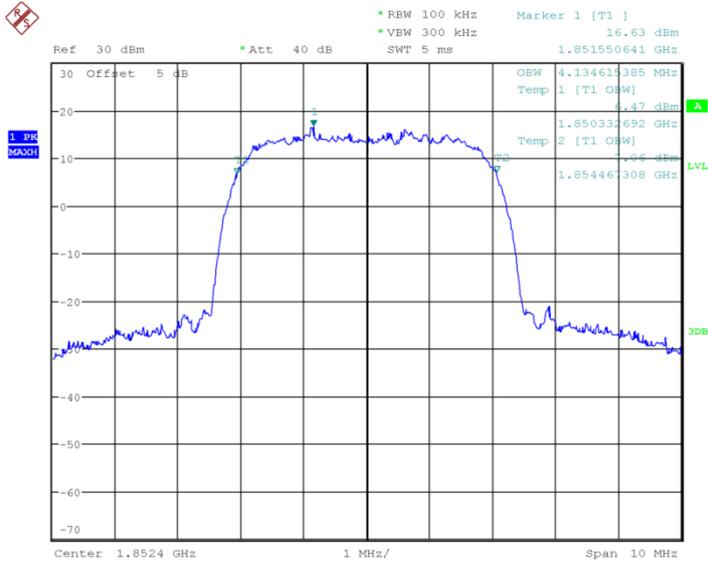
WCDMA BAND II		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 9400	1880	4.13
Low 9262	1852.4	4.13
High 9538	1907.6	4.13

**Conclusion: PASS**  
**WCDMA BAND II**



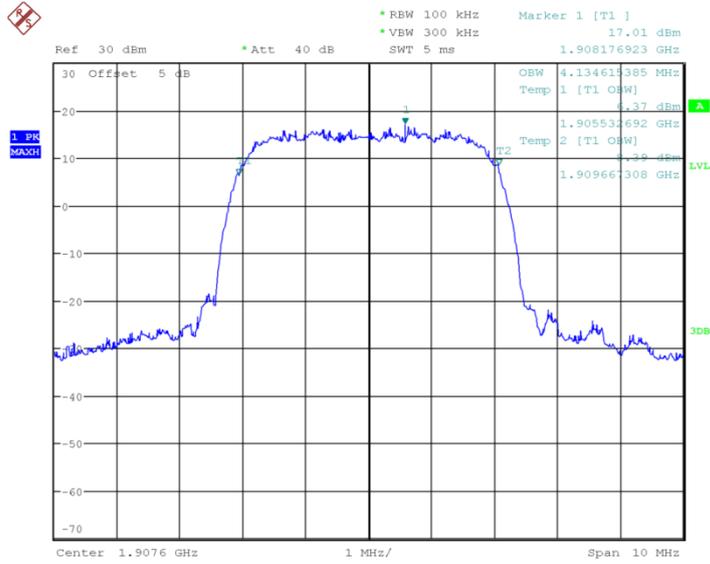
Date: 9.JAN.2018 08:14:24

## Channel 9400-Occupied Bandwidth



Date: 9.JAN.2018 08:15:27

## Channel 9296-Occupied Bandwidth



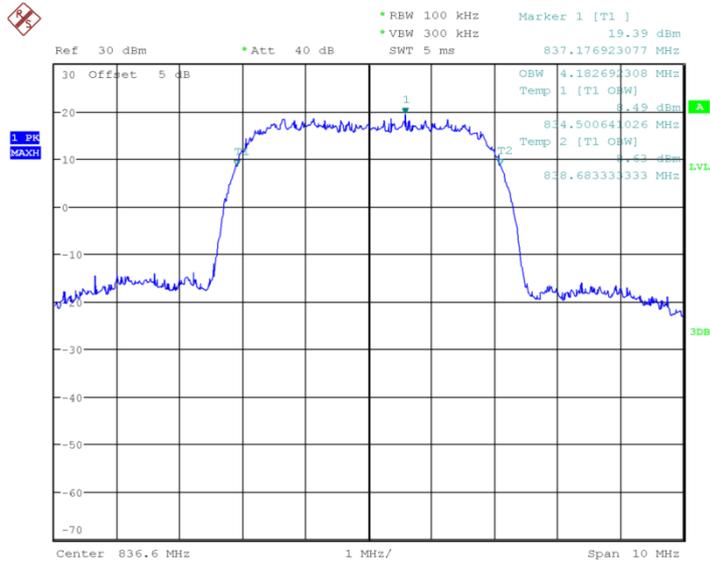
Date: 9.JAN.2018 08:16:30

### Channel 9538-Occupied Bandwidth

WCDMA BAND V		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 4183	836.6	4.18
Low 4132	826.4	4.17
High 4233	846.6	4.15

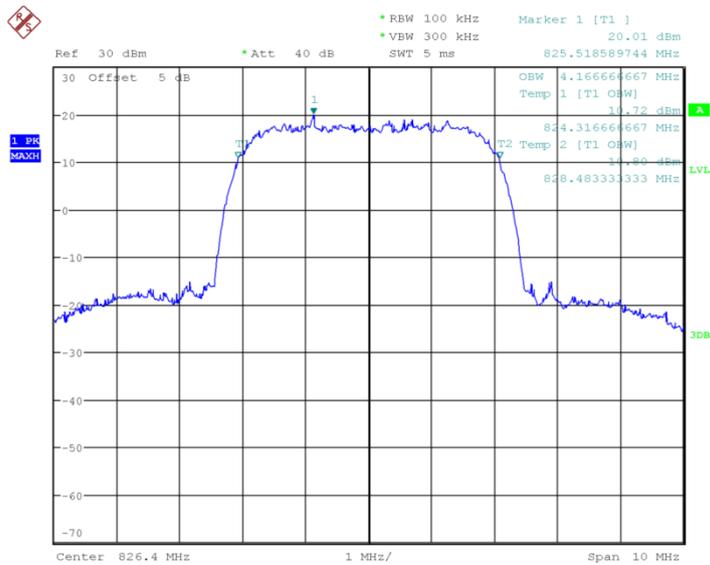
**Conclusion: PASS**

## WCDMA BAND V



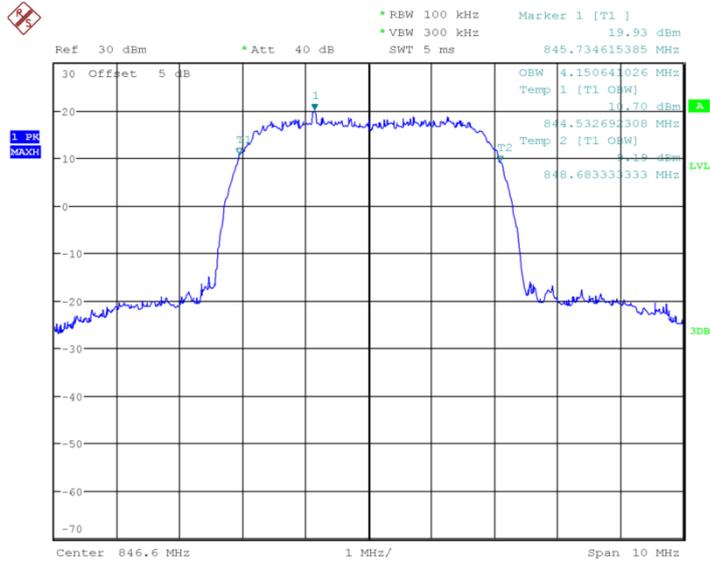
Date: 9.JAN.2018 08:17:42

### Channel 4183-Occupied Bandwidth



Date: 9.JAN.2018 08:18:47

### Channel 4132-Occupied Bandwidth

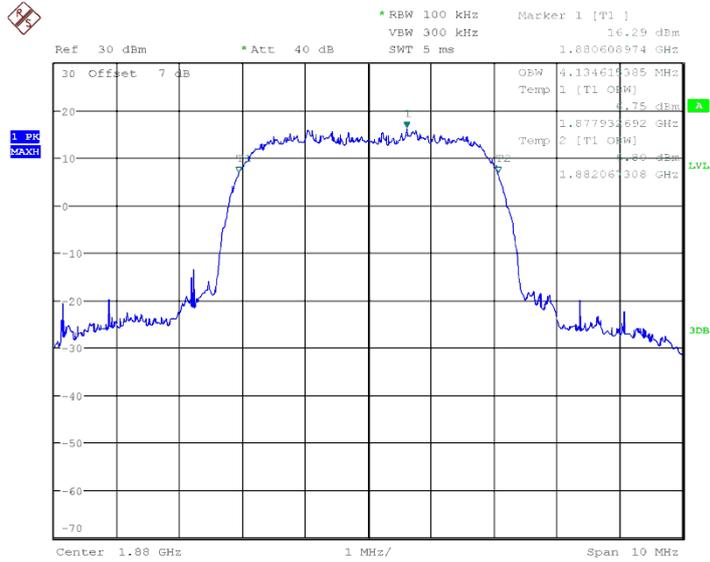


Date: 9.JAN.2018 08:19:52

## Channel 4233-Occupied Bandwidth

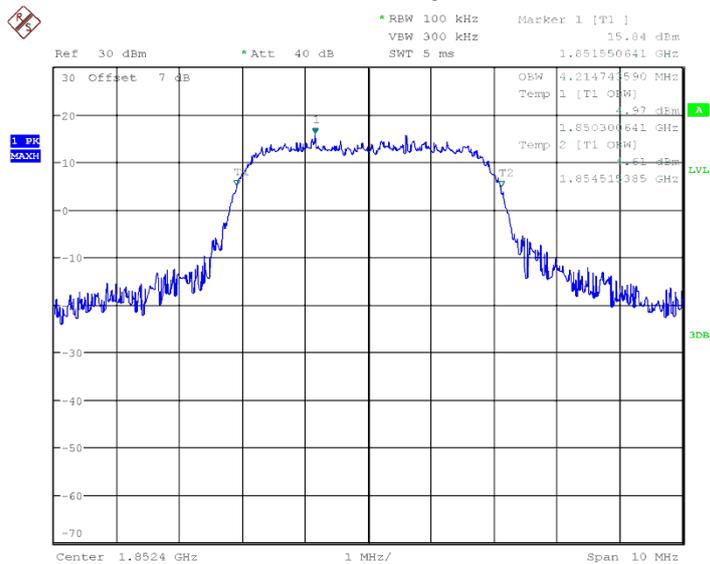
HSUPA 16QAM BAND II		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 9400	1880	4.13
Low 9262	1852.4	4.21
High 9538	1907.6	4.11

**Conclusion: PASS**  
**HSUPA 16QAM BAND II**



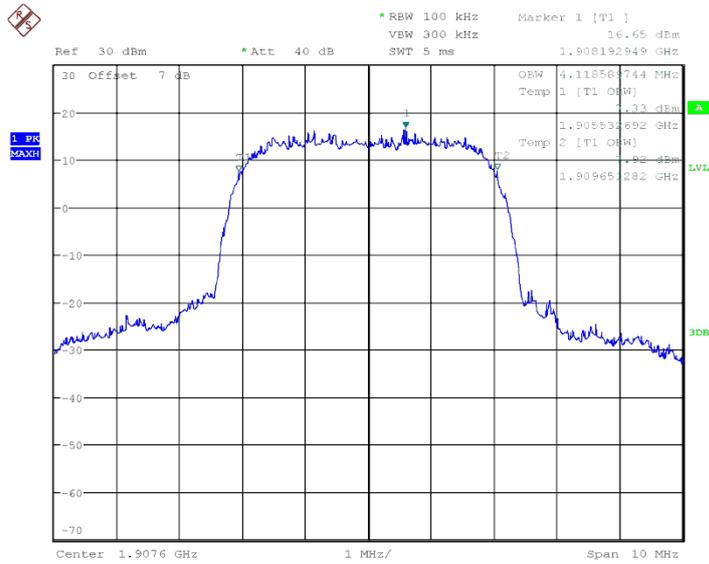
Date: 5.FEB.2018 14:24:48

## Channel9400-Occupied Bandwidth



Date: 5.FEB.2018 14:28:32

## Channel9262-Occupied Bandwidth

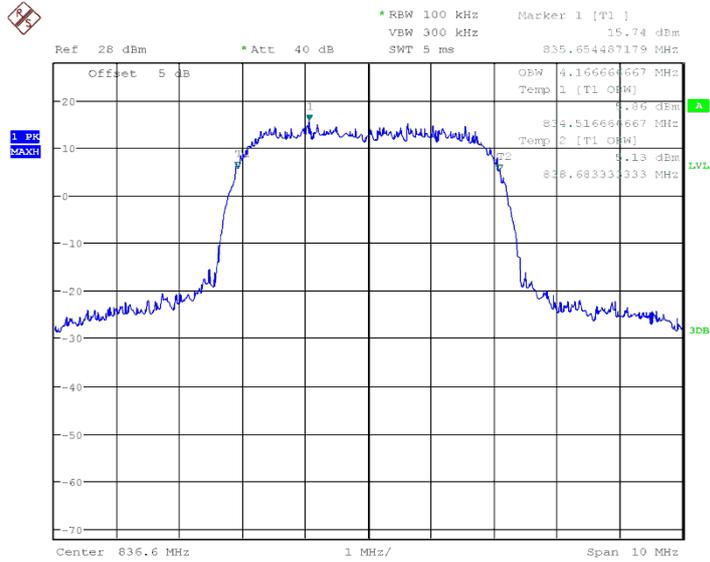


Date: 5.FEB.2018 14:29:22

### Channel9538-Occupied Bandwidth

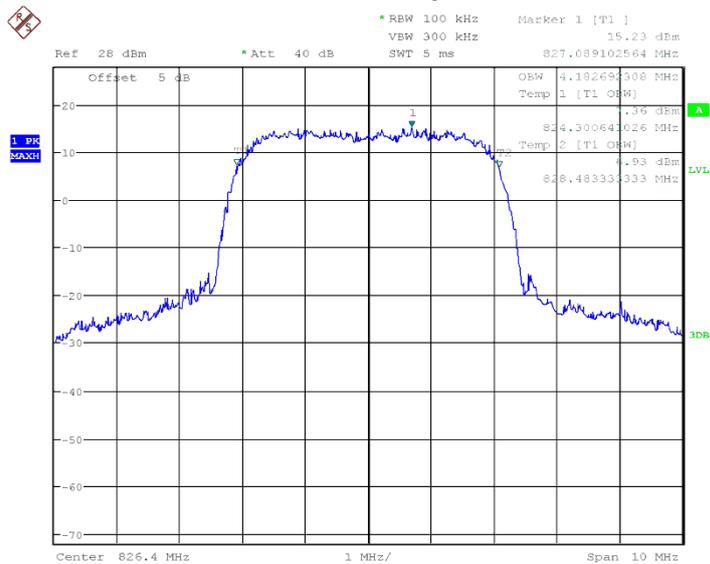
HSUPA 16QAM BAND V		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 4183	836.6	4.16
Low 4132	826.4	4.18
High 4233	846.6	4.16

**Conclusion: PASS**  
**HSUPA 16QAM BAND V**



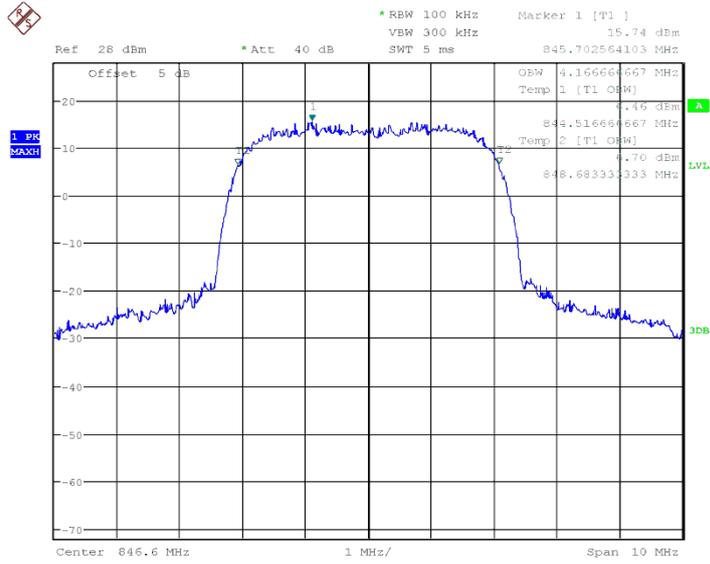
Date: 5.FEB.2018 14:32:55

## Channel4183-Occupied Bandwidth



Date: 5.FEB.2018 14:33:35

## Channel4132-Occupied Bandwidth



Date: 5.FEB.2018 14:35:21

## Channel4233-Occupied Bandwidth

## ANNEX A.4. -26dB Emission Bandwidth

Method of test please refer to KDB971168 D01 v03 clause 4.0.

### A.4.1. -26dB Emission Bandwidth

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

### A.4.2 Test Procedure:

1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW  $\geq$  3 times RBW,.
3. 26dB bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

### A.4.3 Measurement methods:

For GSM: signal analyzer setting as: RBW=3KHz;VBW=10KHz;Span=1MHz.

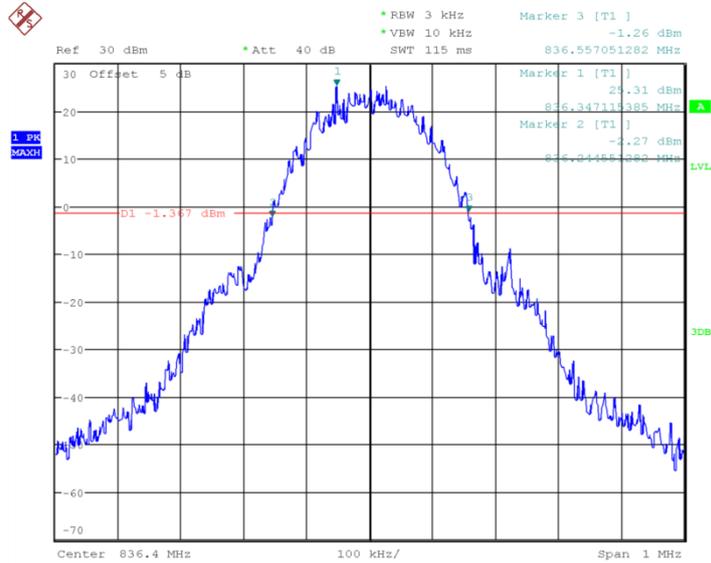
For WCDMA: signal analyzer setting as: RBW=50KHz;VBW=200KHz;Span=10MHz.

### A.4.4 Test results:

GSM 850		
Test channel	Frequency (MHz)	-26dBc Emission Bandwidth(KHz)
Mid 189	836.4	312.5
Low 128	824.2	312.5
High 251	848.8	309.295
GPRS 850		
Test channel	Frequency (MHz)	-26dBc Emission Bandwidth(KHz)
Mid 189	836.4	314.103
Low 128	824.2	318.91
High 251	848.8	312.5
EDGE 850		
Test channel	Frequency (MHz)	-26dBc Emission Bandwidth(KHz)
Mid 189	836.4	306.09

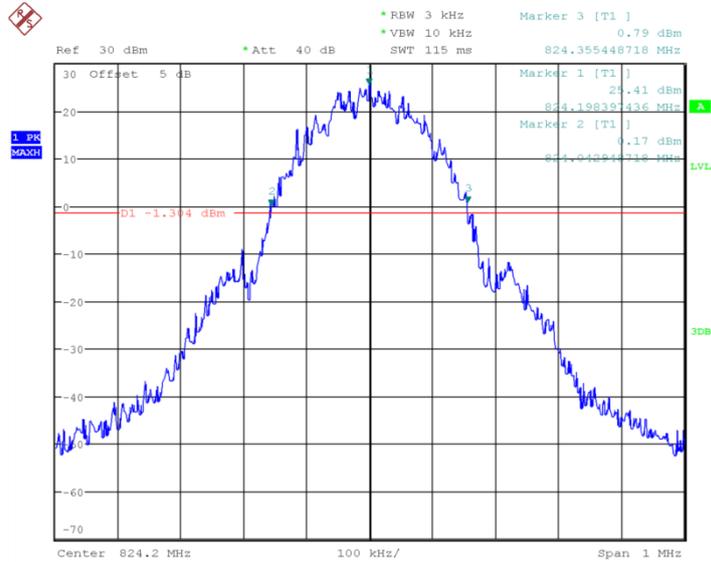
Low 128	824.2	310.897
High 251	848.8	306.09

**Conclusion: PASS**  
**GSM 850**



Date: 10.JAN.2018 11:20:09

### Channel 189- Emission Bandwidth (-26dBc BW)



Date: 10.JAN.2018 11:20:40

### Channel 128- Emission Bandwidth (-26dBc BW)