



# TEST REPORT

**FCC ID: 2AQXU-V10****Product: Mobile phone****Model No.: V10****Additional Model No.: N/A****Trade Mark: VOT****Report No.: FCC18080029A-RF****Issued Date: Sep. 07, 2018**

Issued for:

**One Small Step SAC****Mza. B Lote 24 Urb. Paso Chico Sector II, Lurin, Lima, Peru**

Issued By:

**World Standardization Certification & Testing Group Co., Ltd.  
Building A-B, Baoshi Science & Technology Park, Baoshi Road,  
Bao'an District, Shenzhen, Guangdong, China****TEL: +86-755-26996192****FAX: +86-755-86376605**

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## TABLE OF CONTENTS

<b>1. GENERAL INFORMATION.....</b>	<b>3</b>
<b>2. GENERAL DESCRIPTION OF EUT.....</b>	<b>4</b>
<b>3. FACILITIES AND ACCREDITATIONS.....</b>	<b>6</b>
3.1. TEST FACILITY .....	6
3.2. ACCREDITATIONS .....	6
3.3. EUT SYSTEM CONFIGURATION .....	7
3.4. DESCRIPTION OF TEST CHANNELS AND TEST MODES .....	8
3.5. EQUIPMENT MODIFICATIONS .....	8
<b>4. SUMMARY OF TEST REQUIREMENTS AND RESULTS .....</b>	<b>9</b>
<b>5. MEASUREMENT INSTRUMENTS.....</b>	<b>10</b>
<b>6. EFFECTIVE (ISOTROPIC) RADIATED POWER .....</b>	<b>11</b>
<b>7. SPURIOUS EMISSION (Conducted and Radiated) .....</b>	<b>15</b>
7.1. MEASUREMENT RESULT (PRE-MEASUREMENT).....	15
<b>8. OCCUPIED BANDWIDTH&amp; Emission Bandwidth .....</b>	<b>29</b>
<b>9. BAND EDGE.....</b>	<b>36</b>
<b>10. FREQUENCY STABILITY.....</b>	<b>39</b>
10.1. MEASUREMENT RESULT (WORST).....	40
<b>11. EUT TEST PHOTO.....</b>	<b>41</b>
<b>12. EUT PHOTO.....</b>	<b>42</b>







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## 1. GENERAL INFORMATION

<b>Product:</b>	Mobile phone
<b>Model No.:</b>	V10
<b>Additional Model:</b>	N/A
<b>Applicant:</b>	One Small Step SAC
<b>Address:</b>	Mza. B Lote 24 Urb. Paso Chico Sector II, Lurin, Lima, Peru
<b>Manufacturer:</b>	One Small Step SAC
<b>Address:</b>	Mza. B Lote 24 Urb. Paso Chico Sector II, Lurin, Lima, Peru
<b>Data of receipt:</b>	Aug. 13, 2018
<b>Date of Test:</b>	Aug. 14, 2018 to Sep. 06, 2018
<b>Applicable Standards:</b>	FCC Rules Part 22H and 24E.

The above equipment has been tested by World Standardization Certification & Testing Group Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:** Pu Shixi  
( Pu Shixi)

**Date:** Sep. 07, 2018

**Check By:** Qin Shuiquan  
( Qin Shuiquan)

**Date:** Sep. 07, 2018

**Approved By:** Wang Fengbing  
(Wang Fengbing)

**Date:** Sep. 07, 2018



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## 2. GENERAL DESCRIPTION OF EUT

<b>Equipment Type:</b>	Mobile phone
<b>Hardware version:</b>	FF263
<b>Software version:</b>	FF263M01_B10_VK_VOT_V18H_V04_20180806_173141_9089_notest
<b>Frequency Bands:</b>	<input checked="" type="checkbox"/> GSM 850 <input checked="" type="checkbox"/> PCS 1900 (U.S. Bands)
<b>Antenna Type:</b>	Internal Antenna
<b>Antenna gain:</b>	PCS 1900: -0.5dBi GSM850: -0.4dBi
<b>Battery information:</b>	Li-Polymer Battery : V10 Voltage: 3.7V Capacity: 600mAh Limited Charge Voltage: 4.2V
<b>Adapter Information:</b>	Adapter: V10 Input: AC 100-240V~50/60Hz 0.2A Output: DC 5.0V---500mA
<b>Card(S):</b>	Card 1: GSM Card Slot Card 2: GSM Card Slot
<b>Max power:</b>	See Table 2.1.2
<b>Extreme Vol. Limits:</b>	DC 3.5V to 4.2V (Normal: DC 3.7V)
<b>Extreme Temp. Tolerance</b>	-10 ℃ to +65 ℃







**Table 2.1 The Basic Technical Specification for Working BAND(S).**

OPERATION BAND(S)	Power Class	Mod.	Max Average (dBm)	Max Peak Power (dBm)
GSM850	Class 4	GMSK	32.94	33.18
DCS1900	Class 1	GMSK	30.16	30.01







### 3. FACILITIES AND ACCREDITATIONS

#### 3.1. Test Facility

All measurement facilities used to collect the measurement data are located at Building A-B, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China of the World Standardization Certification & Testing Group Co., Ltd.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

Registration Number: 366353

#### 3.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

**USA**

**NVLAP** (The certificate registration number is NVLAP LAB CODE:600142-0)

**Japan**

**VCCI** (The certificate registration number is C-4790, R-3684, G-837)

**Canada**

**INDUSTRY CANADA**

(The certificated registration number is 7700A-1)

**China**

**CNAS** (The certificated registration number is L3732)

Copies of granted accreditation certificates are available for downloading from our web site,  
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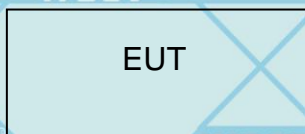




### 3.3. EUT System Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

**Fig. 3.3-1 Configuration of EUT System**



**Table 3.3-1 Equipment Used in EUT System**

Item	Equipment	Model No.	ID or Specification	Note
1	Mobile phone	V10	2AQXU-V10	EUT

\*\*\*Note: All the accessories have been used during the test. The following "EUT" in setup diagram means EUT system.





### 3.4. Description Of Test Channels And Test Modes

#### Test channels:

GSM 850			
Test Channel	BW(MHz)	UL Channel	Frequency(MHz)
Low Range	0.2	128	824.2
Mid Range	0.2	190	836.6
High Range	0.2	251	848.8

PCS 1900			
Test Channel	BW(MHz)	UL Channel	Frequency(MHz)
Low Range	0.2	512	1850.2
Mid Range	0.2	661	1880
High Range	0.2	810	1909.8

Note 1: both QPSK&16QAM modulation has been measured;

Note 2: The worst condition was recorded in the test report if no other modes test data.

### 3.5. Equipment Modifications

Not available for this EUT intended for grant.







#### 4. SUMMARY OF TEST REQUIREMENTS AND RESULTS

##### PCS 1900:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	§2.1046, §24.232(c)	EIRP ≤ 2W(33dBm)	Pass
Bandwidth	§2.1049 §24.238(a)	OBW: No limit. EBW: No limit.	Pass
Band Edges	§2.1051, §24.238(a)	-13dBm	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238(a)	-13dBm	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	-13dBm	Pass
Frequency Stability	§2.1055, §24.235	the fundamental emission stays within the authorized frequency block.	Pass
Peak to average ratio	§24.232(d)	<13dB	Pass

##### GSM850:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	§2.1046, §2.913(a)	EIRP ≤ 7W(38.5dBm)	Pass
Occupied Bandwidth	§2.1049	OBW: No limit.	Pass
Emission Bandwidth	22.917(b)	EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917(a)(b)	KDB 971 168 D02 971168 D02 Misc OOB License Digital Systems v01 & 27.53(m) for detail the limit is upon different OBW	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	-13dBm	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	-13dBm	Pass
Frequency Stability	§2.1055, §22.355	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass







## 5. MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	Calibration Date	Calibration Due.
EMI Test Receiver	R&S	ESCI	100005	08/19/2018	08/18/2019
LISN	AFJ	LS16	16010222119	08/19/2018	08/18/2019
LISN(EUT)	Mestec	AN3016	04/10040	08/19/2018	08/18/2019
Universal Radio Communication Tester	R&S	CMU 200	1100.0008.02	08/19/2018	08/18/2019
Coaxial cable	Megalon	LMR400	N/A	08/12/2018	08/11/2019
GPIO cable	Megalon	GPIO	N/A	08/12/2018	08/11/2019
Spectrum Analyzer	R&S	FSU	100114	08/19/2018	08/18/2019
Pre Amplifier	H.P.	HP8447E	2945A02715	10/13/2017	10/12/2018
Pre-Amplifier	CDSI	PAP-1G18-38	--	10/13/2017	10/12/2018
Loop Antenna	R&S	HFH2-Z2	100296	10/13/2017	10/12/2018
Bi-log Antenna	SUNOL Sciences	JB3	A021907	09/13/2018	09/12/2019
9*6*6 Anechoic	--	--	--	08/21/2018	08/20/2019
Horn Antenna	COMPLIANCE ENGINEERING	CE18000	--	09/13/2017	09/12/2018
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-631	08/23/2018	08/22/2019
Power meter	Anritsu	ML2487A	6K00003613	08/23/2018	08/22/2019
Power meter	Anritsu	MA2491A	32263	08/23/2018	08/22/2019
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	04/24/2018	04/23/2019
System-Controller	CCS	N/A	N/A	N.C.R	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R	N.C.R
RF cable	Murata	MXHQ87WA3000	-	08/21/2018	08/20/2019
Loop Antenna	EMCO	6502	00042960	08/22/2018	08/21/2019
Wideband Radio Communication Tester	R&S	CMW 500	103974	08/19/2018	08/18/2019
Horn Antenna	SCHWARZBECK	BBHA 9170	1123	08/19/2018	08/18/2019
H & T Chamber	Guangzhou gongwen	GDJS-500-40	0329	08/19/2018	08/18/2019







## 6. EFFECTIVE (ISOTROPIC) RADIATED POWER

### Test limit:

According to §22.913, The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232, Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50 (d), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications. According to §27.50 (h), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

See section 4.

### Test procedure:

1. The setup of EUT is according with per TIA/EIA Standard 603 D:2010 or KDB971168 D01 v02r02.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.
5.  $ERP/EIRP = P_{Meas} + GT - LC$

where:

ERP/EIRP = effective or equivalent radiated power

$P_{Meas}$  = measured transmitter output power from SG

GT = gain of the substitution antenna

LC = cable loss between SG and substitution antenna.







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**GSM850 BAND:**

Mode	Frequency (MHz)	Peak Power(dBm)	Avg.Burst Power(dBm)	PAP	Duty cycle Factor(dB)	Frame Power(dBm)
GSM850	824.2	33.08	32.86	0.22	-9	21.86
	836.6	<b>33.18</b>	<b>32.94</b>	0.24	-9	21.94
	848.8	32.95	32.83	0.12	-9	21.83

Duty cycle Factor = 1 Tx Slots,  $10 \cdot \log(1/8) = -9.03\text{dB}$ , 2 Tx Slots,  $10 \cdot \log(2/8) = -6.02\text{dB}$ ,  
 3Tx Slots,  $10 \cdot \log(3/8) = -4.26\text{dB}$ , 4 Tx Slots,  $10 \cdot \log(4/8) = -3.01\text{dB}$



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**PCS1900 BAND:**

Mode	Frequency (MHz)	Peak Power(dBm)	Avg.Burst Power(dBm)	PAP	Duty cycle Factor(dB)	Frame Power(dBm)
GSM1900	1850.2	30.02	29.89	0.13	-9	20.89
	1880	<b>30.16</b>	<b>30.01</b>	0.15	-9	21.01
	1909.8	29.98	29.86	0.12	-9	20.86

Duty cycle Factor = 1 Tx Slots,  $10 \cdot \log(1/8) = -9.03\text{dB}$ , 2 Tx Slots,  $10 \cdot \log(2/8) = -6.02\text{dB}$ ,  
 3Tx Slots,  $10 \cdot \log(3/8) = -4.26\text{dB}$ , 4 Tx Slots,  $10 \cdot \log(4/8) = -3.01\text{dB}$



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## Radiation power test

Note: Record the condition when max power has been detector for radiated method. (X axis)

### Radiated Power (ERP) for GSM 850 MHZ

Mode	Frequency (MHz)	P <sub>Mea</sub> (dBm)	Amplifier Gain (dBi)	Path Loss	Antenna Gain	Correcti on (dB)	ERP (Peak) (dBm)	Polarization
GSM850	824.2	10.87	31.23	1.02	-6.07	2.15	32.86	H
	836.6	10.95	31.23	1.02	-6.07	2.15	<b>32.94</b>	H
	848.8	10.66	31.23	1.02	-6.07	2.15	32.65	H

### Radiated Power (E.I.R.P) for PCS 1900 MHZ

Mode	Frequency (MHz)	P <sub>Mea</sub> (dBm)	Amplifier Gain (dBi)	Path Loss (dB)	Antenna Gain (dB)	Correcti on (dB)	E.I.R.P. (Peak) (dBm)	Polarization
GSM 1900	1850.2	-0.71	31.23	1.02	0.45	0	29.95	H
	1880.0	-0.53	31.23	1.02	0.45	0	<b>30.13</b>	H
	1909.8	-0.83	31.23	1.02	0.45	0	29.83	H







## 7. SPURIOUS EMISSION (Conducted and Radiated)

### 7.1. Measurement Result (Pre-measurement)

#### GSM850:

Test Channel	BW(MHz)	UL Channel	Frequency(MHz)	Judgment
Low Range	0.2	128	824.2	Pass
Middle Range	0.2	190	836.6	Pass
High Range	0.2	251	848.8	Pass

#### PCS 1900 :

Test Channel	BW(MHz)	UL Channel	Frequency(MHz)	Judgment
Low Range	0.2	512	1850.2	Pass
Middle Range	0.2	661	1880.0	Pass
High Range	0.2	810	1909.8	Pass





## Test Plot(s) Conducted method

### Test limit:

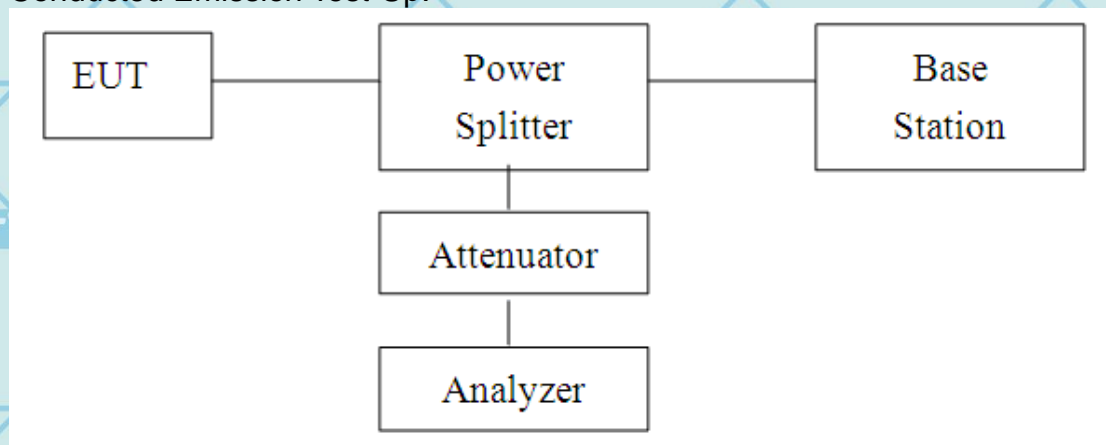
The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.

Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least  $X + 10\log(P)$  dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation  $X + 10\log(P)$  being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e.,  $10\log(P) - \{X + 10\log(P)\}$ ], resulting in an absolute level of -X dBW [or  $(-X + 30)$  dBm]. See section 4.

### Test procedure:

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

### Conducted Emission Test-Up:



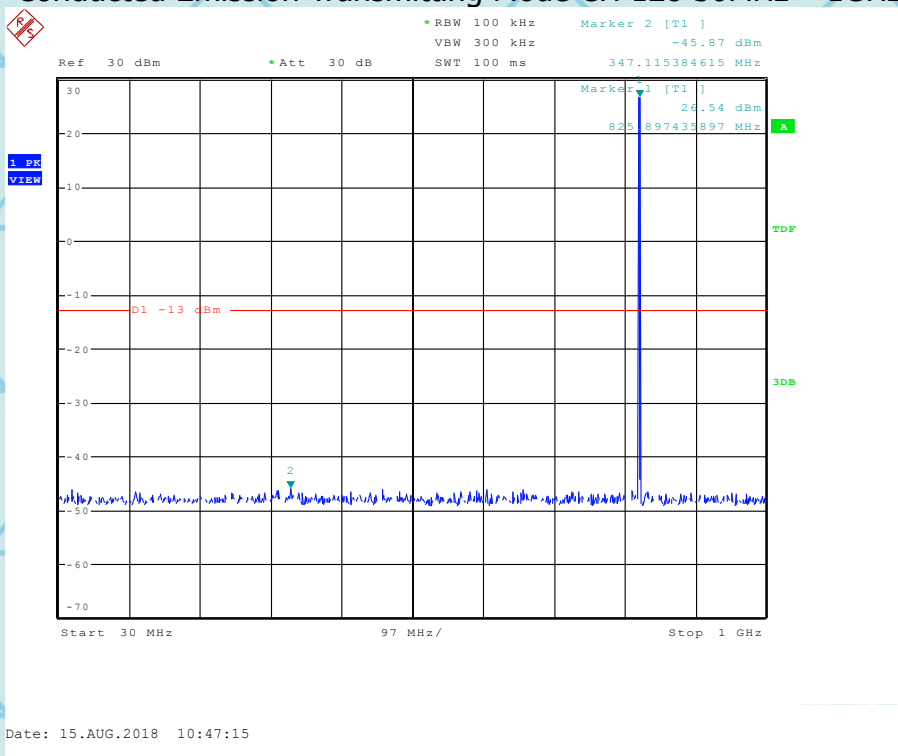




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## CONDUCTED EMISSION IN GSM850 BAND

### Conducted Emission Transmitting Mode CH 128 30MHz – 1GHz



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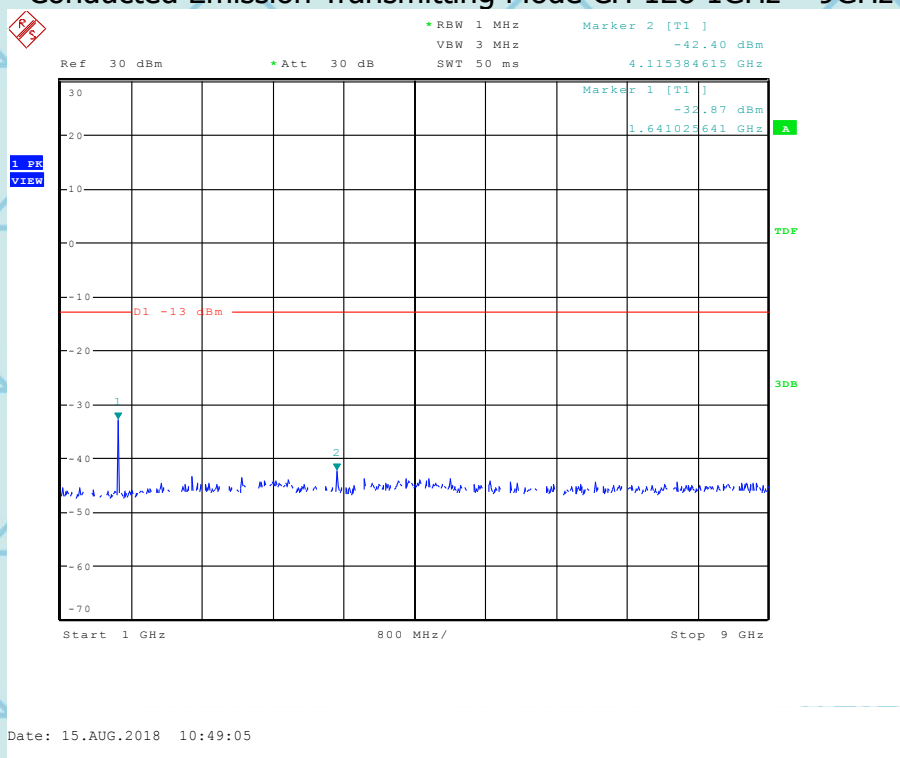
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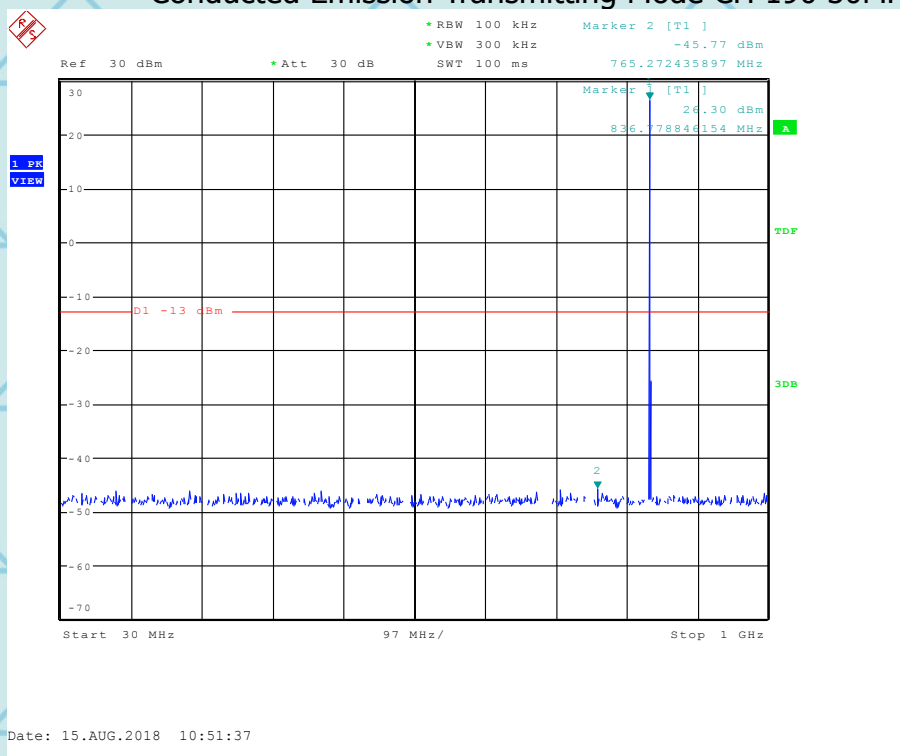




## Conducted Emission Transmitting Mode CH 128 1GHz – 9GHz



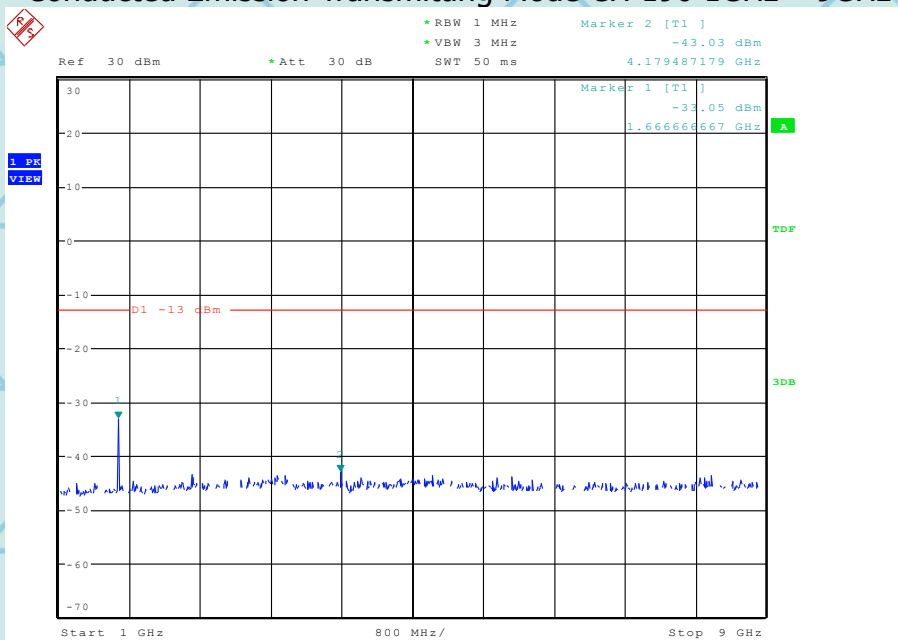
## Conducted Emission Transmitting Mode CH 190 30MHz – 1GHz





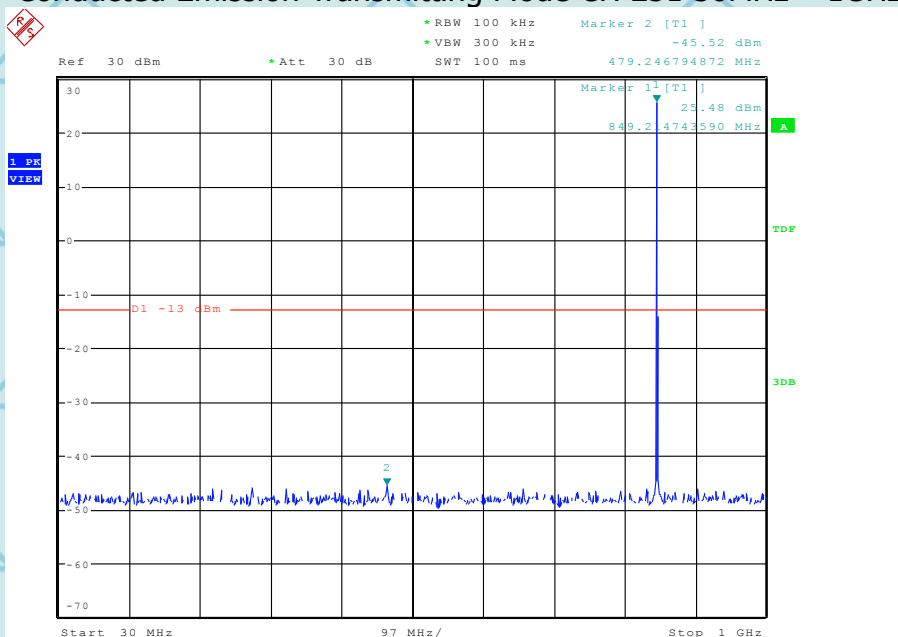


## Conducted Emission Transmitting Mode CH 190 1GHz – 9GHz



Date: 15.AUG.2018 10:53:40

## Conducted Emission Transmitting Mode CH 251 30MHz – 1GHz



Date: 15.AUG.2018 10:55:37

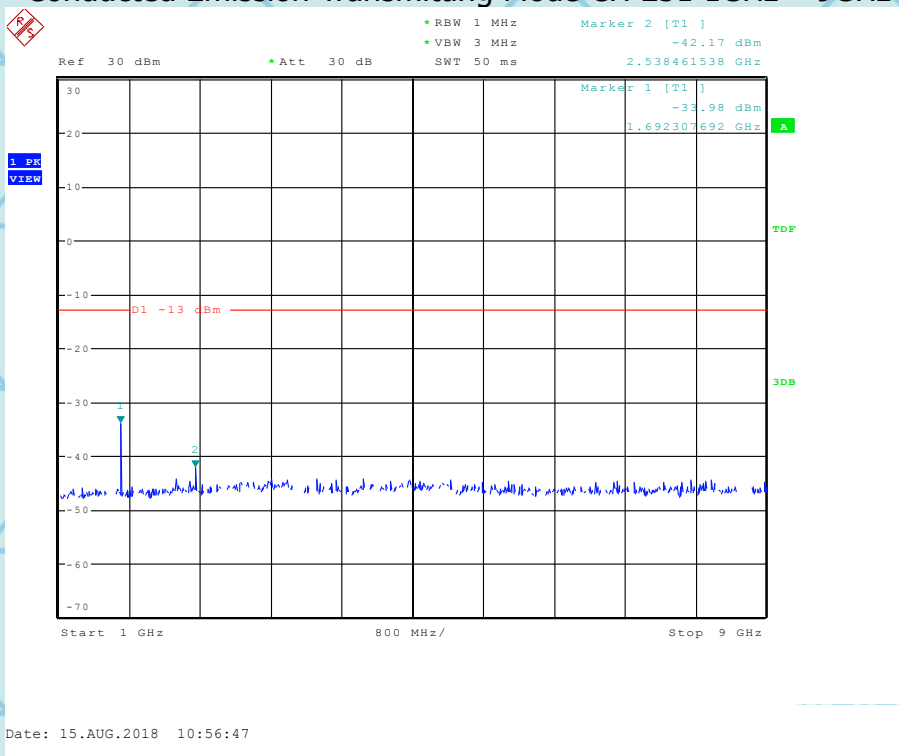




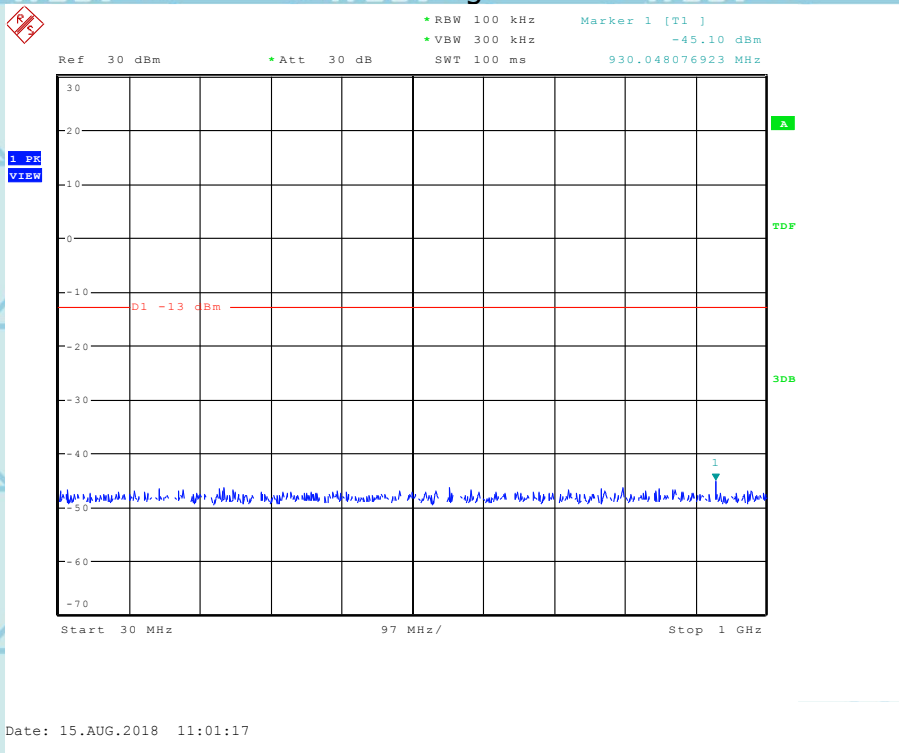


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## Conducted Emission Transmitting Mode CH 251 1GHz – 9GHz



## CONDUCTED EMISSION IN PCS1900 BAND Conducted Emission Transmitting Mode CH 512 30MHz – 1GHz



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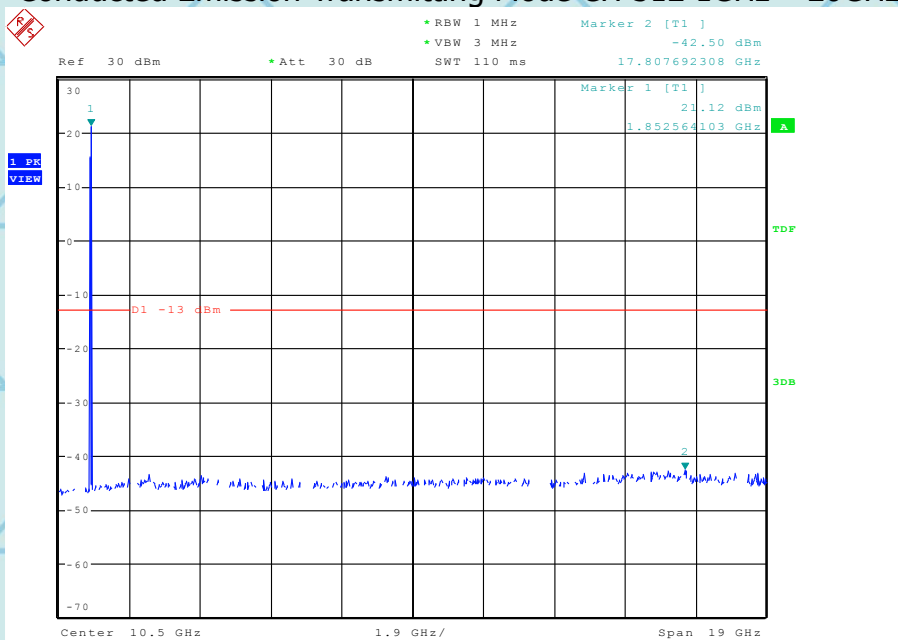
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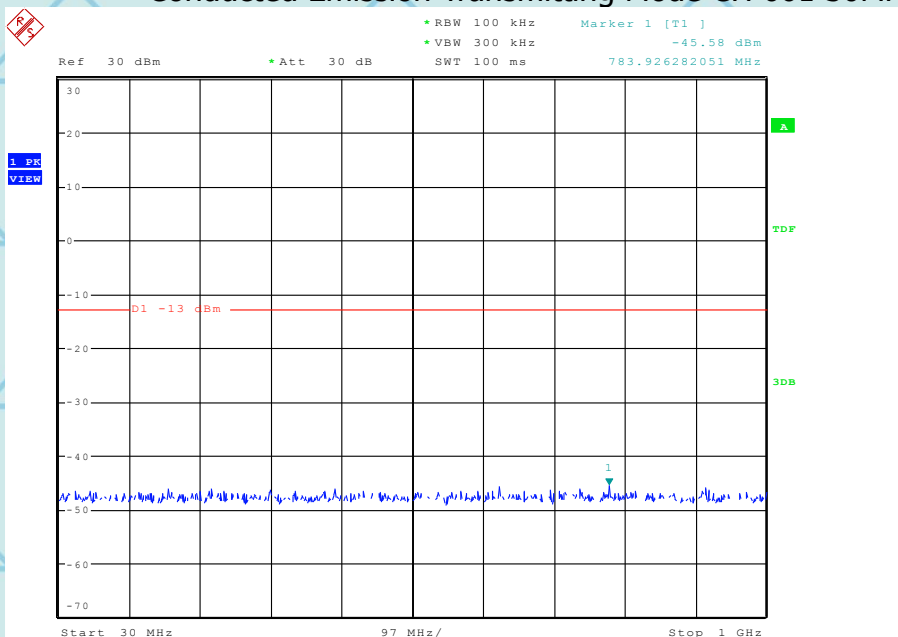


## Conducted Emission Transmitting Mode CH 512 1GHz – 20GHz



Date: 15.AUG.2018 11:05:29

## Conducted Emission Transmitting Mode CH 661 30MHz – 1GHz



Date: 15.AUG.2018 11:07:30

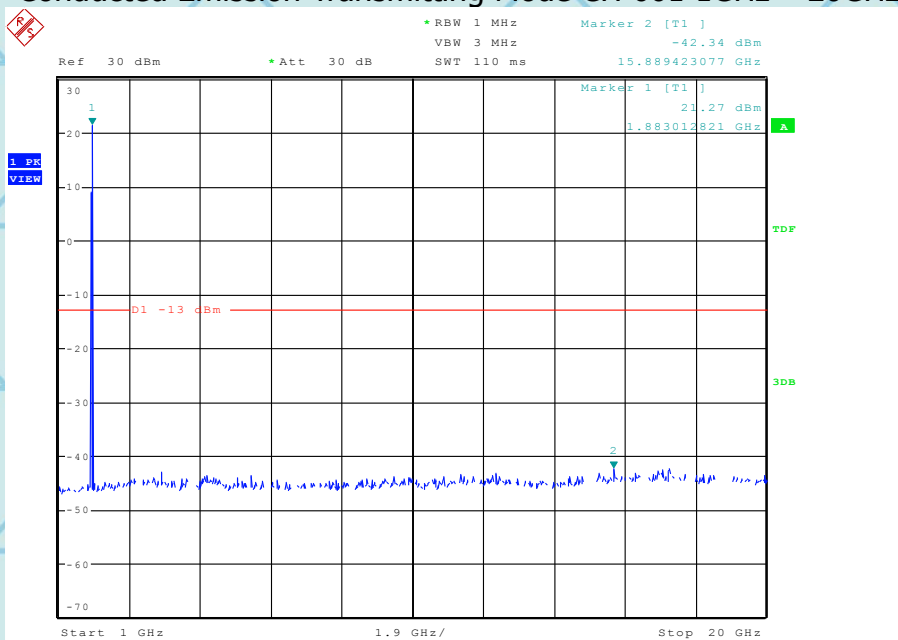






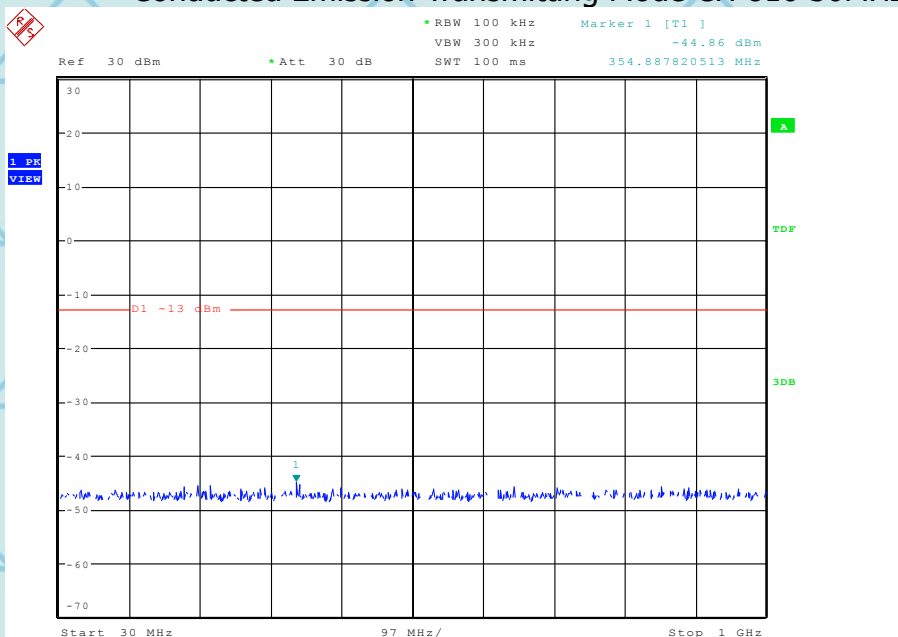
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## Conducted Emission Transmitting Mode CH 661 1GHz – 20GHz



Date: 15.AUG.2018 11:09:32

## Conducted Emission Transmitting Mode CH 810 30MHz – 1GHz



Date: 15.AUG.2018 11:12:09



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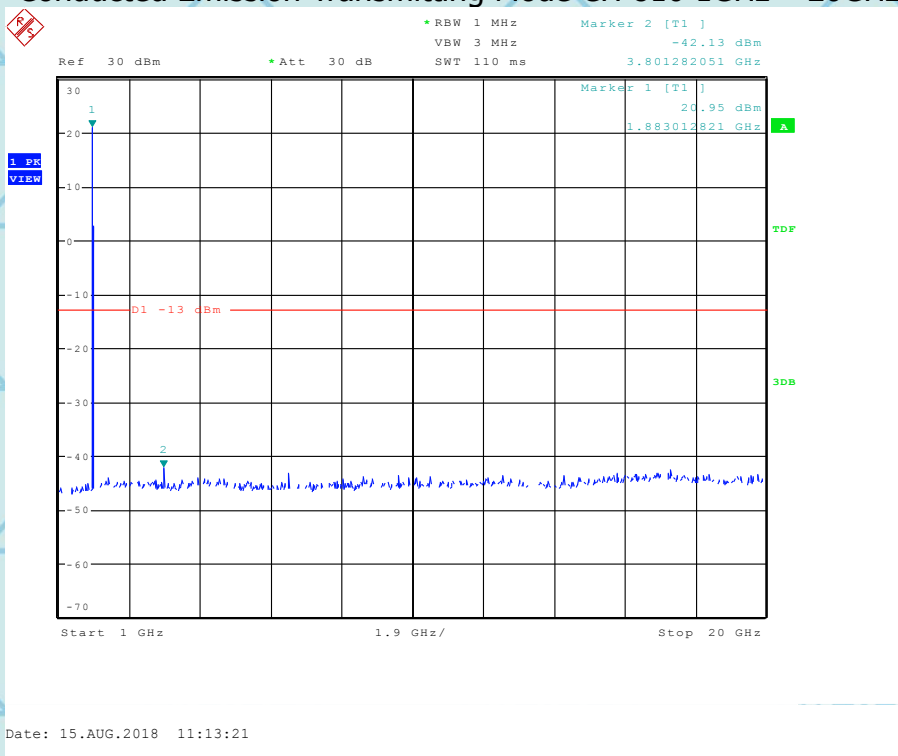
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## Conducted Emission Transmitting Mode CH 810 1GHz – 20GHz



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## Radiated method

### Test limit:

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.

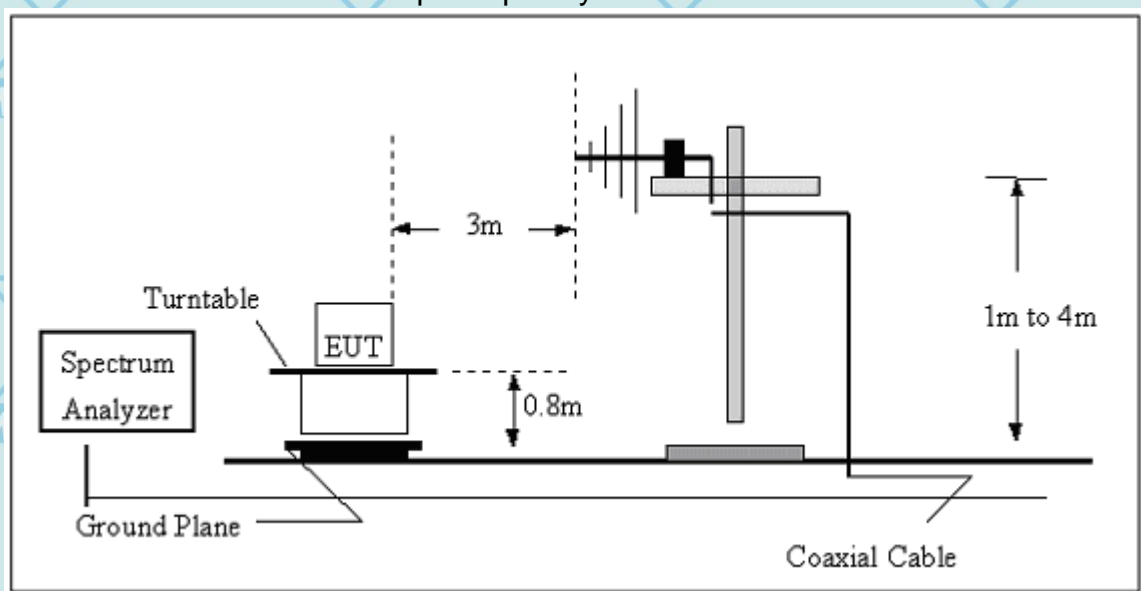
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least  $X + 10\log(P)$  dB, where  $P$  represents the transmitter power expressed in watts and  $X$  is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation  $X + 10\log(P)$  being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e.,  $10\log(P) - \{X + 10\log(P)\}$ ], resulting in an absolute level of  $-X$  dBW [or  $(-X + 30)$  dBm]. See section 4.

### Test procedure:

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

### Test setup:

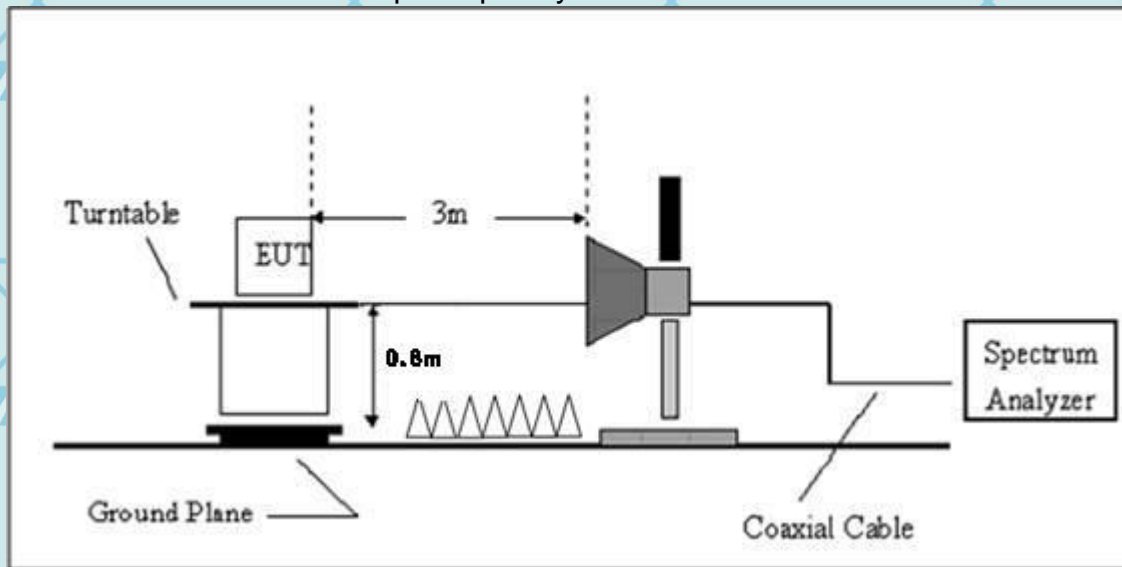
#### (A) Radiated Emission Test-Up Frequency 30MHz~1GHz







(B) Radiated Emission Test-Up Frequency Above 1GHz



**Note:**

- 1, Below 30MHz no Spurious found.
- 2, UE is poistioned at 3 axis at the pre-scan stage, and only the measurement of the worst case(bandwidth:20MHz /Full RB/QPSK) is reported in this part.





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**List of final test modes:  
GSM850:**

Mode	UL Channel	Frequency	Judgement
1	128	824.2	Pass
2	190	836.6	Pass
3	251	848.8	Pass

**PCS1900**

Mode	UL Channel	Frequency	Judgement
1	512	1850.2	Pass
2	661	1880	Pass
3	810	1909.8	Pass







Test record:

Note:

1. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the  $AR_{pl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below:

$$\text{Power} = P_{\text{Mea}} + AR_{pl}$$

2.  $AR_{pl} = \text{Cable loss} + \text{Antenna gain}$

**GSM850:**

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1648.4	-29.91	0.5	-30.41	-13	Horizontal
1648.4	-37.16	0.5	-37.66	-13	Vertical
2472.6	-33.49	0.5	-33.99	-13	Horizontal
2472.6	-32.39	0.5	-32.89	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1673.2	-30.96	0.5	-31.46	-13	Horizontal
1673.2	-34.78	0.5	-35.28	-13	Vertical
2509.8	-34.60	0.5	-35.10	-13	Horizontal
2509.8	-32.74	0.5	-33.24	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1697.6	-29.78	0.5	-30.28	-13	Horizontal
1697.6	-30.77	0.5	-31.27	-13	Vertical
2546.4	-29.93	0.5	-30.43	-13	Horizontal
2546.4	-30.31	0.5	-30.81	-13	Vertical







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## PCS1900:

Mode 1					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3700.4	-35.69	1.48	-37.17	-13	Horizontal
3700.4	-28.19	1.48	-29.67	-13	Vertical
5550.6	-32.52	1.48	-34.00	-13	Horizontal
5550.6	-30.36	1.48	-31.84	-13	Vertical

Mode 2					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3760	-35.66	1.48	-37.14	-13	Horizontal
3760	-33.42	1.48	-34.90	-13	Vertical
5640	-29.94	1.48	-31.42	-13	Horizontal
5640	-32.14	1.48	-33.62	-13	Vertical

Mode 3					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3819.6	-35.11	1.48	-36.59	-13	Horizontal
3819.6	-29.08	1.48	-30.56	-13	Vertical
5729.4	-34.83	1.48	-36.31	-13	Horizontal
5729.4	-37.11	1.48	-38.59	-13	Vertical



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## 8. OCCUPIED BANDWIDTH & Emission Bandwidth

### Test limit:

The occupied bandwidth (OBW), 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 when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user. [i2.1049(h)]

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW 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 by at least X dB below the transmitter power, where the value of X is typically specified as 26.

The relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The test report shall specify which OBW is reported.

A spectrum/signal analyzer or other instrument providing a spectral display is recommended for these measurements and the video bandwidth shall be set to a value at least three times greater than the IF/resolution bandwidth to avoid any amplitude smoothing. Video filtering shall not be used during occupied bandwidth tests.

The OBW shall be measured for all operating conditions that will affect the bandwidth results (e.g. variable modulations, coding, or channel bandwidth settings). See section 4.

### Test procedure:

#### Occupied bandwidth – relative measurement procedure

The reference value is the highest level of the spectral envelope of the modulated signal.

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
- The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
- Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
- NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
- The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target “-X dB down” 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 value).
- Set the detection mode to peak, and the trace mode to max hold.
- Determine the reference value: 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).
- Determine the “-X dB down amplitude” as equal to (Reference Value – X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.
- 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





down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Occupied bandwidth – power bandwidth (99%) measurement procedure

The following procedure shall be used for measuring (99 %) power 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 (i.e., two to five times the OBW).

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

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least  $10\log(\text{OBW} / \text{RBW})$  below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

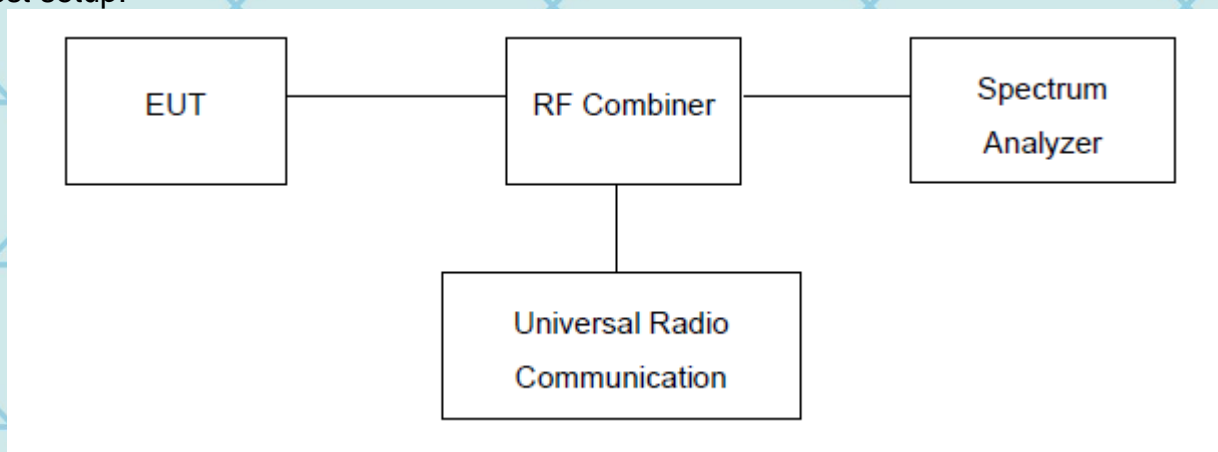
e) Set the detection mode to peak, and the trace mode to max hold..

f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test setup:







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## Measurement Result

### GSM850:

Frequency	OBW(99%)	26dB BW
824.2	246.795KHz	312.500KHz
836.6	248.397KHz	317.308KHz
848.8	245.192KHz	318.910KHz

### PCS1900:

Frequency	OBW(99%)	26dB BW
1850.2	245.192KHz	315.705KHz
1880	241.987KHz	310.897KHz
1909.8	245.192KHz	312.500KHz



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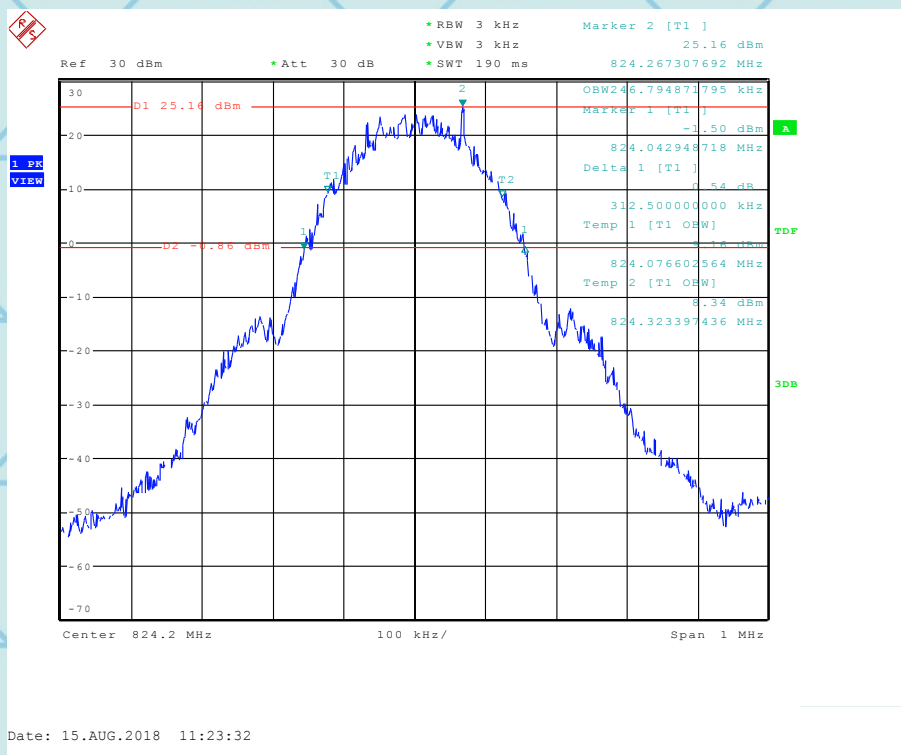




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## Test Plot(s)

Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 128



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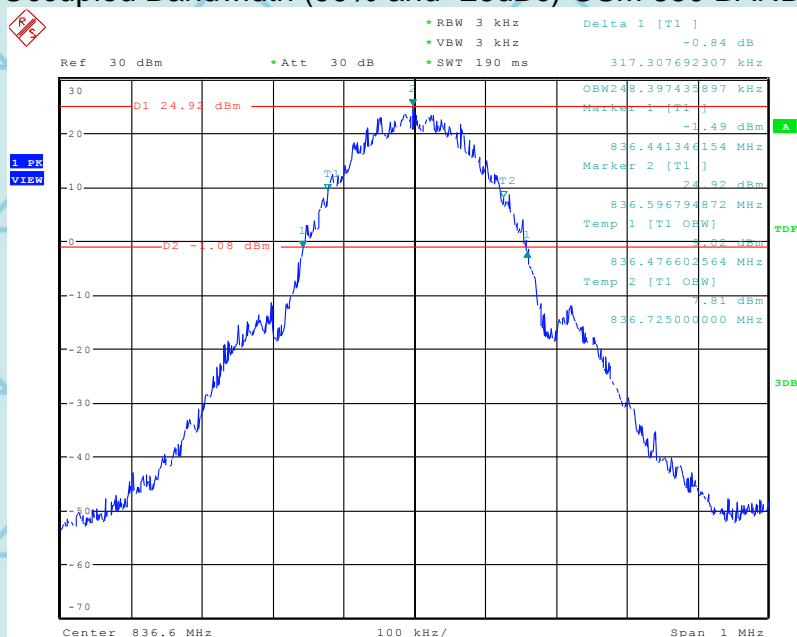
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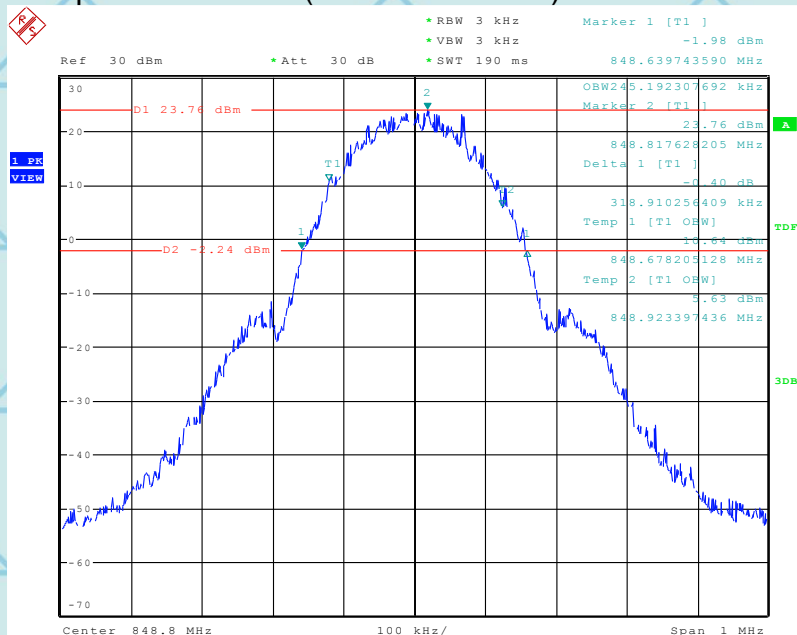
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## Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 190



Date: 15.AUG.2018 11:27:15

## Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 251



Date: 15.AUG.2018 11:31:32



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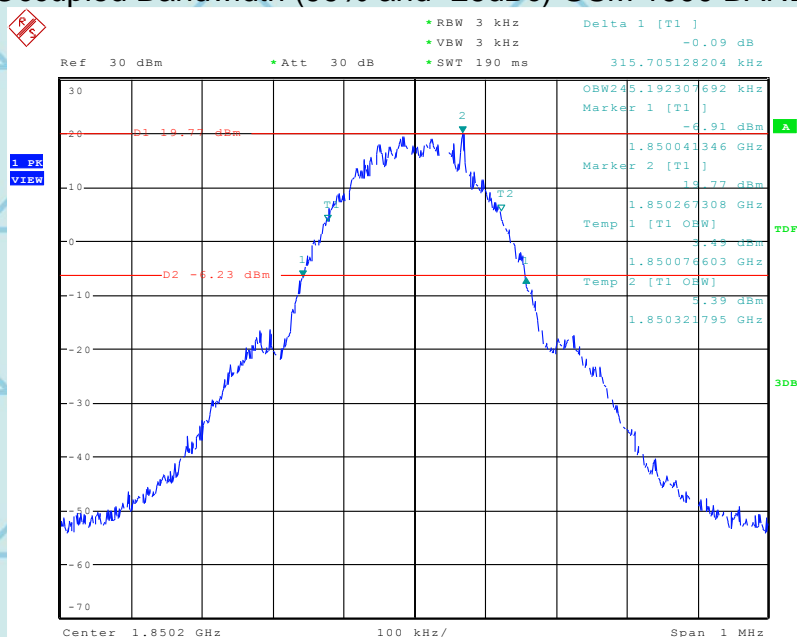
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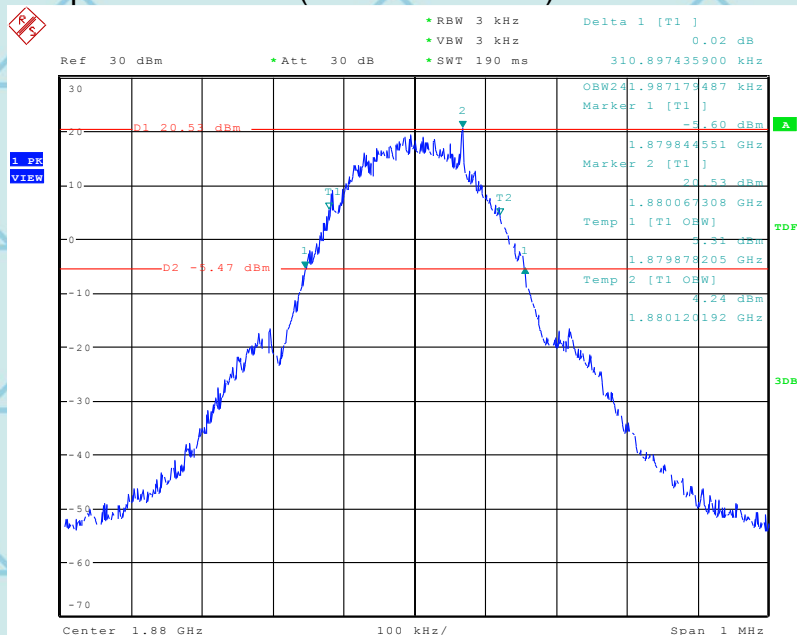
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## Occupied Bandwidth (99% and -26dBc) GSM 1900 BAND CH 512



Date: 15.AUG.2018 11:37:08

## Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 661



Date: 15.AUG.2018 11:44:19



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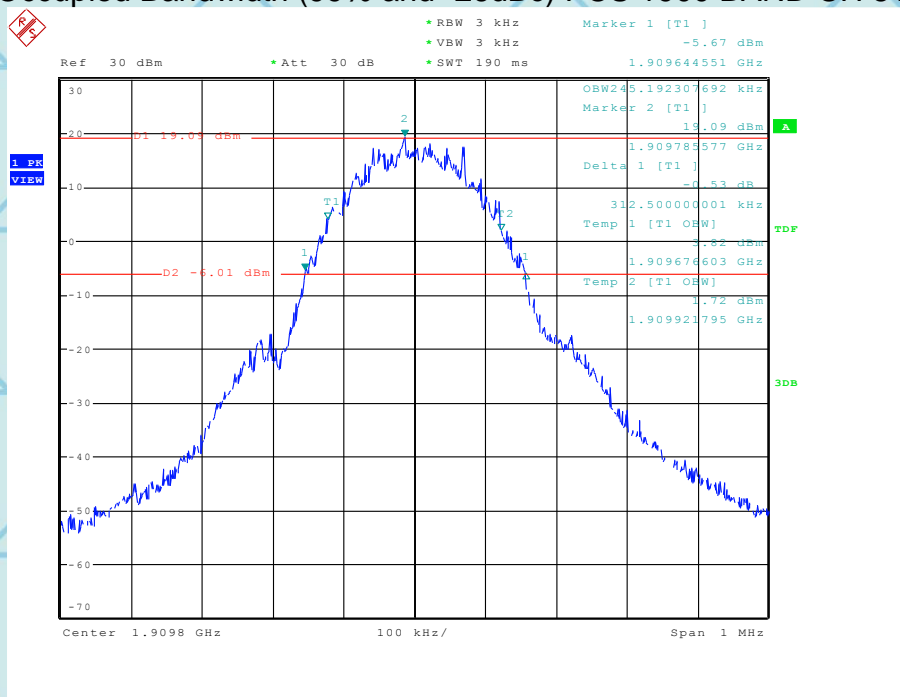
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## Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 810



Date: 15.AUG.2018 11:52:08



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## 9. BAND EDGE

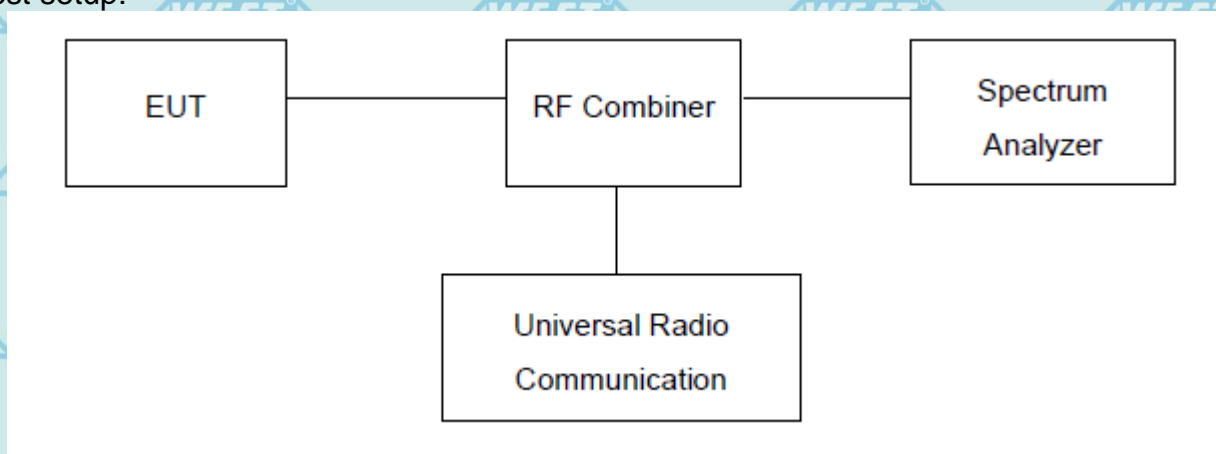
### Test Limit:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified. See section 4.

### Test procedure:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

### Test setup:







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## Measurement Result Test Plot(s)

### Low Band Edge GSM 850 BAND CH 128



### High Band Edge GSM 850 BAND CH 251



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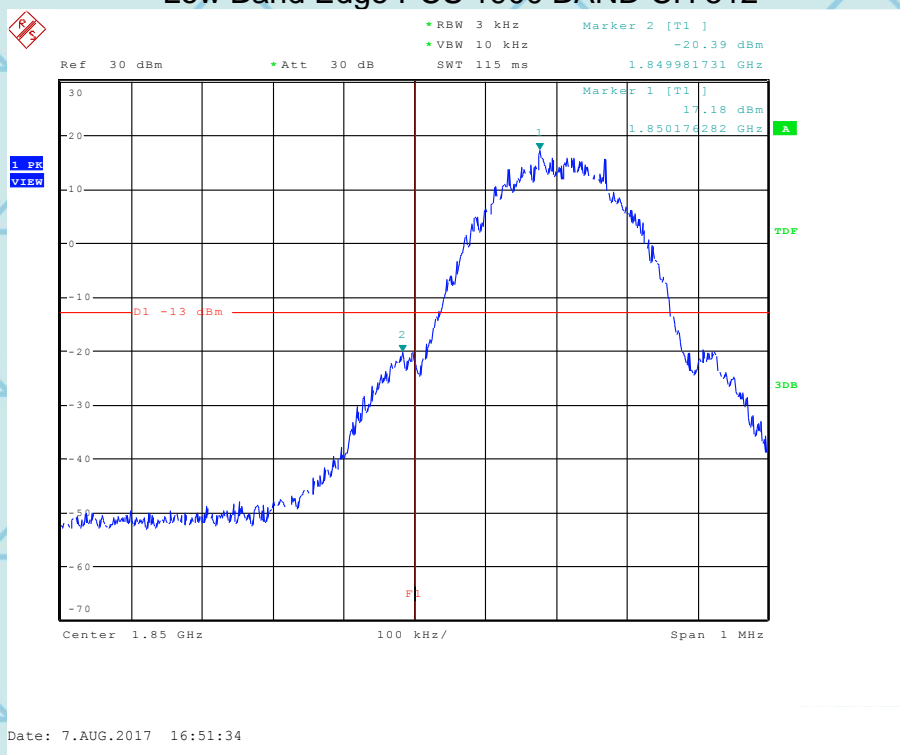
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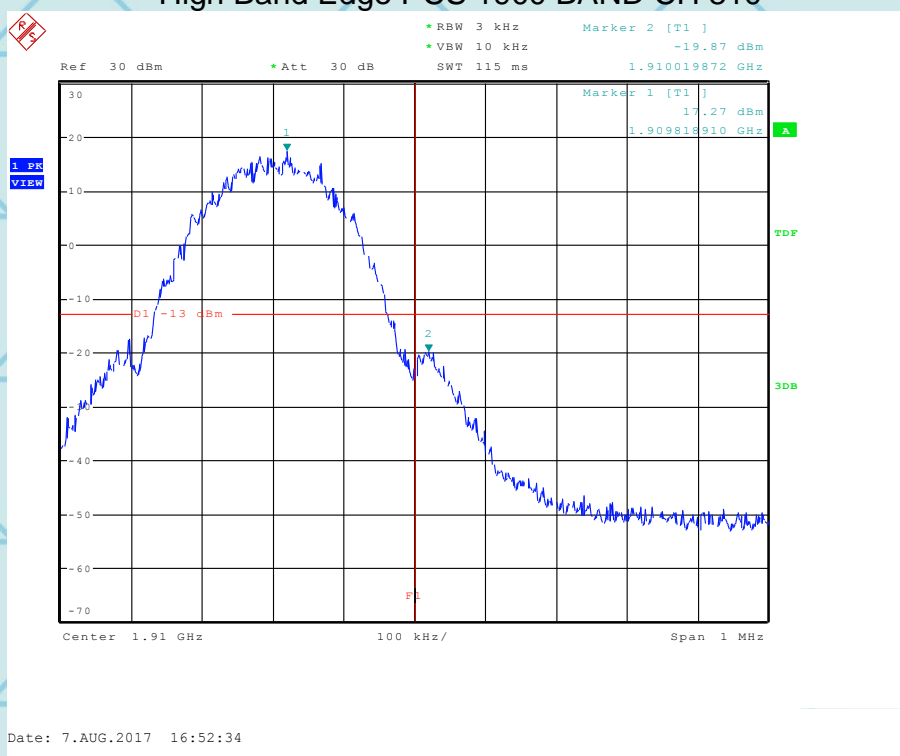


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## Low Band Edge PCS 1900 BAND CH 512



## High Band Edge PCS 1900 BAND CH 810



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## 10. FREQUENCY STABILITY

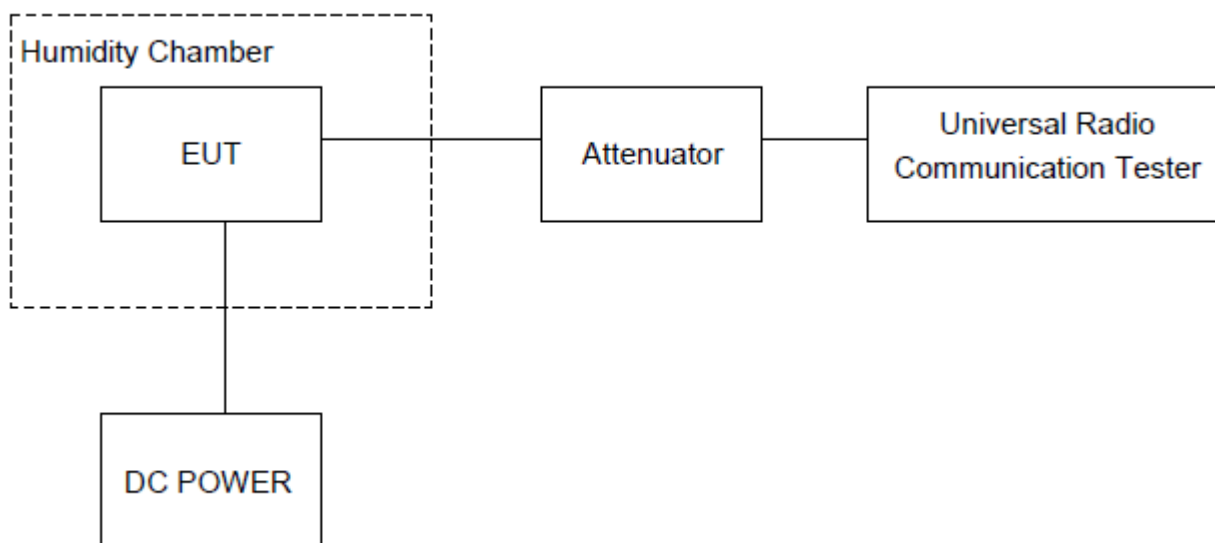
### Test limit:

The frequency stability of the transmitter shall be measured while varying the ambient temperatures and supply voltages over the ranges specified in §2.1055. The specific frequency stability limits are provided in the relevant rules section(s). see section 4.

### Test procedure:

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

### Test setup:





## 10.1. Measurement Result (Worst)

**Frequency Error against Voltage for GSM 850 band (836.6MHz)**

Voltage(V)	Frequency error(Hz)	Frequency error (ppm)
3.5	29	0.035
3.7	33	0.040
4.2	37	0.044

**Frequency Error against Temperature for GSM 850 band (836.6MHz)**

Temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	31	0.037
0	38	0.046
10	29	0.035
20	38	0.046
30	37	0.044
40	38	0.046
50	38	0.045

**Frequency Error against Voltage for PCS 1900 band (1880MHz)**

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	31	0.016
3.7	32	0.017
4.2	36	0.019

**Frequency Error against Temperature for PCS 1900 band (1880MHz)**

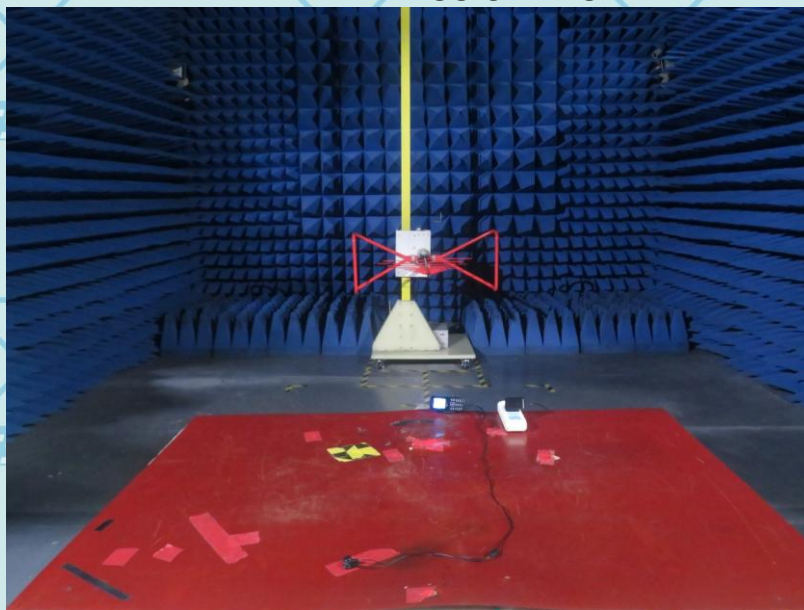
Temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	37	0.020
0	29	0.015
10	34	0.018
20	37	0.019
30	35	0.018
40	33	0.018
50	32	0.017



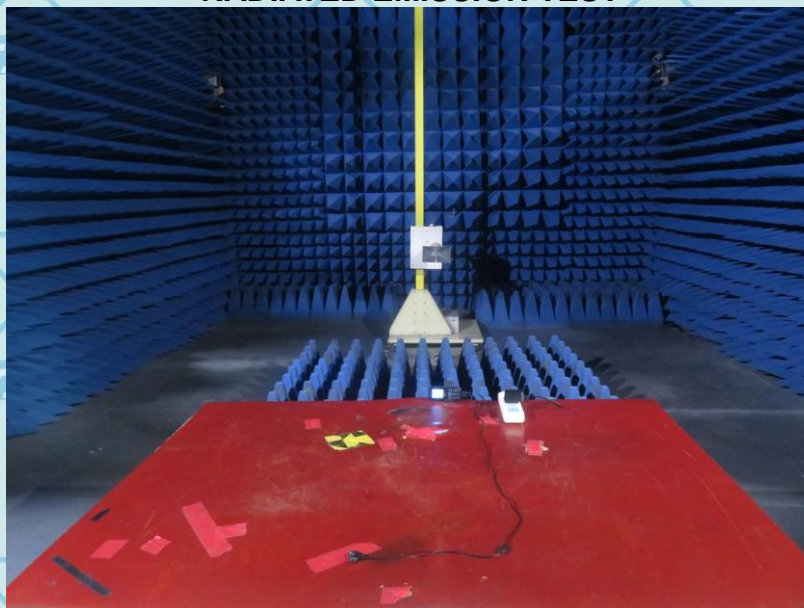


## 11.EUT TEST PHOTO

### RADIATED EMISSION TEST



### RADIATED EMISSION TEST







## 12. EUT PHOTO

Refer to test report “FCC18070037A-15B”.

---END OF REPORT---

