


# TEST REPORT

Applicant Name : SHENZHEN COBAN ELECTRONICS CO.,LTD  
 Address : 5/F, Block 22, Wisdomland Business Park, Guankou 2nd Road, Nantou,  
 Nanshan District, Shenzhen, Guangdong, China. 518052  
 Report Number : SZXX1220301-06489E-RF  
 FCC ID: 2ATUKBN-311

**Test Standard (s)**

FCC PART 22H; FCC PART 24E

**Sample Description**


Product Type: GPS TRACKER  
 Model No.: 311,311ABC,311A,311B,311C,GPS-311A,GPS-311B,GPS-311C,  
 GPS-311ABC,BN-311,BN-311A,BN-311B,BN-311C,BN-311ABC  
 Trade Mark: BAANOOL, DI QIU TU XING   
 Date Received: 2022-03-01  
 Report Date: 2022-04-13


Test Result:	Pass*
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\* In the configuration tested, the EUT complied with the standards above.

**Prepared and Checked By:**

**Approved By:**

  
 \_\_\_\_\_  
 Black Ding  
 EMC Engineer


  
 \_\_\_\_\_  
 Candy Li  
 EMC Engineer

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**GENERAL INFORMATION****Product Description for Equipment under Test (EUT)**

Product	GPS TRACKER
Trade Mark	BAANOOOL, DI QIU TU XING 
Tested Model	311
Multiple Model	311ABC,311A,311B,311C,GPS-311A,GPS-311B,GPS-311C, GPS-311ABC,BN-311,BN-311A,BN-311B,BN-311C,BN-311ABC
Model difference	Please refer to DOS letter.
Frequency Range	GSM 850: 824-849MHz(TX); 869-894MHz(RX) PCS 1900: 1850-1910MHz(TX); 1930-1990MHz(RX)
Maximum Output Power (Conducted power)	GSM 850: 33.26dBm PCS 1900: 29.78dBm
Modulation Technique	GMSK
Antenna Specification*	Internal Antenna: 0 dBi*
Voltage Range	DC12V-24V or DC3.7V backup by battery. Typical testing voltage: Normal Voltage 12V DC; Low Voltage 10.8 V DC; High Voltage 13.2V DC
Sample serial number	SZXX1220301-06489E-RF-S1 (Assigned by ATC)
Received date	2022-03-01
Sample/EUT Status	Good condition

**Objective**

This test report is in accordance with Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability and band edge.

**Test Methodology**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 22 Subpart H - Public Mobile Services  
Part 24 Subpart E - Personal Communication Services

ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±0.73dB
Unwanted Emission, conducted		±1.6dB
RF Frequency		±0.082*10 <sup>-7</sup>
Emissions, Radiated	30MHz - 1GHz	±4.28dB
	1GHz - 18GHz	±4.98dB
	18GHz - 26.5GHz	±5.06dB
Temperature		±1 °C
Humidity		±6%
Supply voltages		±0.4%

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The final qualification test was performed with the EUT operating at normal mode.

The test items were performed with the EUT operating at testing mode. Test was performed with channels as below table:

Band	Channel Bandwidth	Frequency
GSM 850	0.3 MHz	824.2MHz, 836.6MHz, 848.8MHz
PCS 1900	0.3 MHz	1850.2MHz, 1880.0MHz, 1909.8MHz

### Equipment Modifications

No modification was made to the EUT.

### Support Equipment List and Details

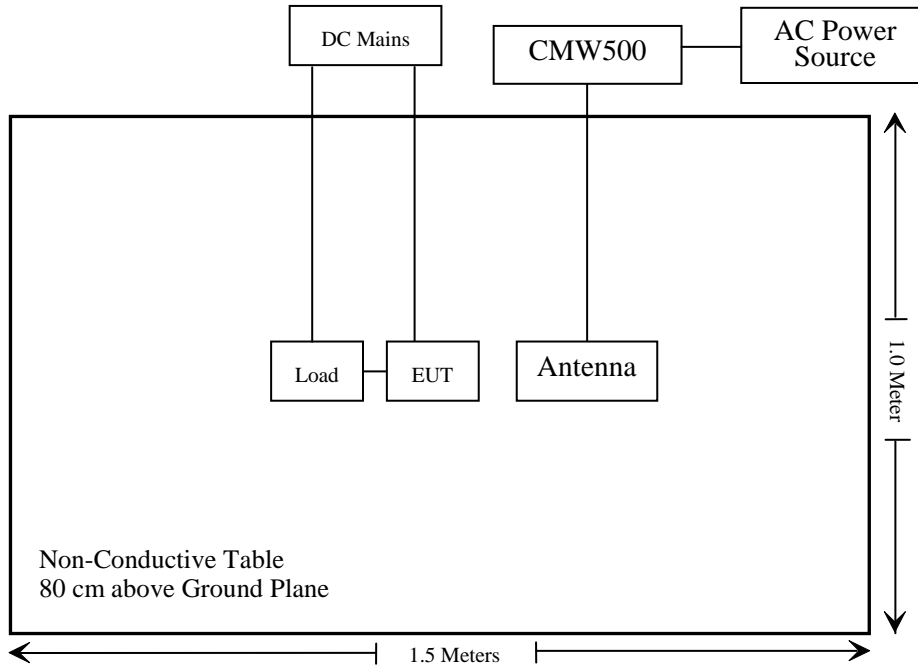
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606
Shenzhen Coban Electronics Co.,Ltd	Load	Unknown	Unknown

### Support Cable Description

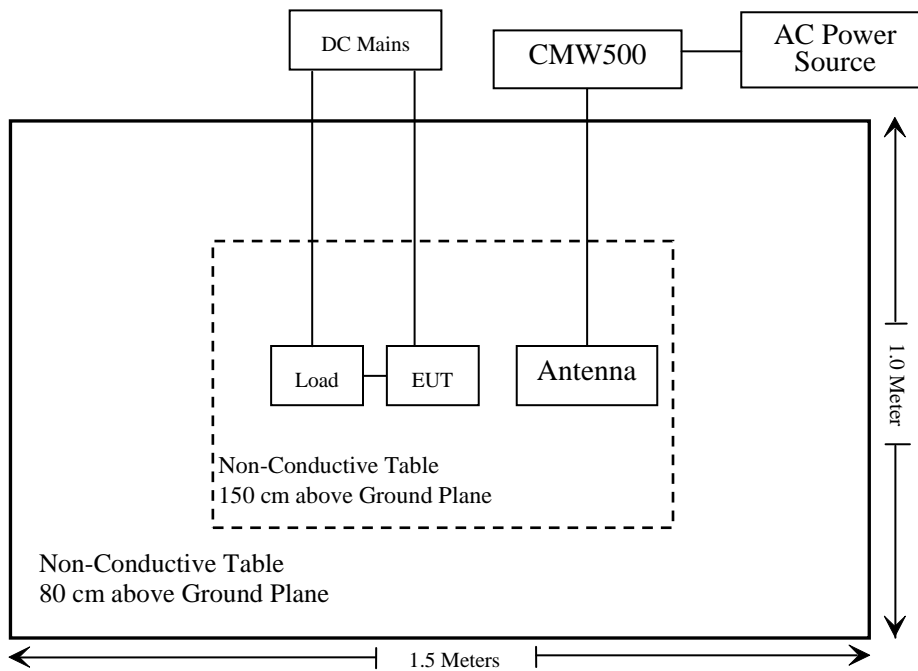
Cable Description	Length (m)	From / Port	To
Unshielded Detachable AC cable	1.2	AC Power	CMW500
Unshielded Detachable DC cable	2.0	DC Power	EUT
Unshielded Detachable DC cable	0.5	Load	EUT
Unshielded Detachable DC cable	2.0	DC Power	Load

### Block Diagram of Test Setup

For Below 1GHz:



For Above 1GHz:



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§1.1307 (b)	RF Exposure	Compliant
§2.1046; § 22.913 (a); § 24.232 (c);	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238;	Occupied Bandwidth	Compliant
§ 2.1051; § 22.917 (a); § 24.238 (a);	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a);	Field Strength of Spurious Radiation	Compliant
§ 22.917 (a); § 24.238 (a);	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235;	Frequency stability	Compliant

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101949	2021/12/13	2022/12/12
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-024-1)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-025-1)	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b(V9)					



Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Unknown	Band Reject Filter	MSF1850-191 OMS-1148	ATCE-142	2021/12/14	2022/12/13
Unknown	Band Reject Filter	MSF824-862 MS-1147	ATCE-141	2021/12/14	2022/12/13
Unknown	High Pass Filter	HPM-1.2/18G -60	110	2021/12/14	2022/12/13
<b>RF Conducted Test</b>					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Rohde& Schwarz	Test Receiver	ESR	101817	2021/12/13	2022/12/12
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/13	2022/12/12
UNI-T	DC Power Supply	UTP8305B	10584	NCR	NCR
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.32	RF-02	Each time	
Unknown	RF Coaxial Cable	No.33	RF-03	Each time	
Fluke	Desktop Multi Meter	45	7664009	2021/12/14	2022/12/13
WEINSCHL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13

\* Statement of Traceability: Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## FCC §1.1307 (b) – RF EXPOSURE

### Applicable Standard

According to §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.3.1-SAR-Based Exemption:

A more comprehensive exemption, considering a variable power threshold that depends on both the separation distance and power, is provided in § 1.1307(b)(3)(i)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with test separation distances between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

Accordingly, a RF source is considered an RF exempt device if its available maximum time-averaged (matched conducted) power or its effective radiated power (ERP), whichever is greater, are below a specified threshold. This exemption threshold was derived based on general population 1-g SAR requirements and is detailed in Appendix C.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

## Result

For worst case:

Mode	Frequency	Maximum Time based Average Power	Antenna Gain		ERP	ERP <sub>20cm</sub>	Distance	SAR-Based Exclusion Threshold		SAR-Based Exclusion
	(MHz)		(dBm)	(dBi)				(dBd)	(dBm)	
<b>GSM850</b>	824-849	<b>26</b>	0	-2.15	<b>23.85</b>	2040f	200	1680	<b>32.25</b>	Yes
<b>PCS1900</b>	1850-1910	<b>23</b>	0	-2.15	<b>20.85</b>	3060	200	3060	<b>34.85</b>	Yes

Note 1: 0dBd=2.15dBi.

Note 2: f = frequency in GHz.

Note 3: The tune-up power was declared by the applicant.

Mode	Tune-up Conducted Power (dBm)	Time based Average Power (dBm)
GSM 850	33.5	24.5
PCS 1900	30	21

Mode	Tune-up Conducted Power (dBm)				Time based Average Power (dBm)			
	1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots
GPRS 850	33	32	30	29	24	<b>26</b>	25.75	<b>26</b>
GPRS 1900	30	29	27	26	21	<b>23</b>	22.75	<b>23</b>

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

## FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER

### Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

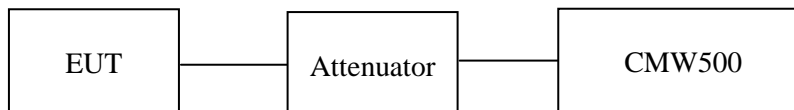
According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

### Test Procedure

#### *Conducted method:*

The RF output of the transmitter was connected to the CMW500 through sufficient attenuation.



#### *Radiated method:*

ANSI C63.26-2015 Section 5.5.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.1 kPa

*The testing was performed by Key. Pei on 2022-04-12.*

**Conducted Power****Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	ERP(dBm)	Limit (dBm)
GSM	128	824.2	33.26	<b>31.11</b>	38.45
	190	836.6	33.19	31.04	38.45
	251	848.8	33.03	30.88	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				ERP(dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.85	31.60	29.71	28.45	30.7	29.45	27.56	26.3	38.45
	190	836.6	32.65	31.46	29.54	28.48	30.5	29.31	27.39	26.33	38.45
	251	848.8	32.58	31.40	29.26	28.70	30.43	29.25	27.11	26.55	38.45

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)  
 For GPRS 850: Antenna Gain = 0dBi\* = -2.15dBd (0dBd=2.15dBi)  
 Limit: ERP ≤ 38.45dBm

**PCS Band (Part 24E)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	EIRP(dBm)	Limit (dBm)
GSM	512	1850.2	29.59	29.59	33
	661	1880.0	29.61	29.61	33
	810	1909.8	29.78	<b>29.78</b>	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				EIRP(dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.20	28.18	26.20	25.10	29.20	28.18	26.20	25.10	33
	661	1880.0	29.21	28.21	26.22	25.12	29.21	28.21	26.22	25.12	33
	810	1909.8	29.40	28.42	26.45	25.31	29.40	28.42	26.45	25.31	33

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)  
 For GPRS 1900: Antenna Gain = 0dBi\*  
 Limit: EIRP ≤ 33dBm

**Peak-to-average ratio (PAR)****Cellular Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	3.14	13
	Middle	3.51	13
	High	3.21	13

**PCS Band (Part 24E)**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	3.22	13
	Middle	3.11	13
	High	3.45	13

## FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

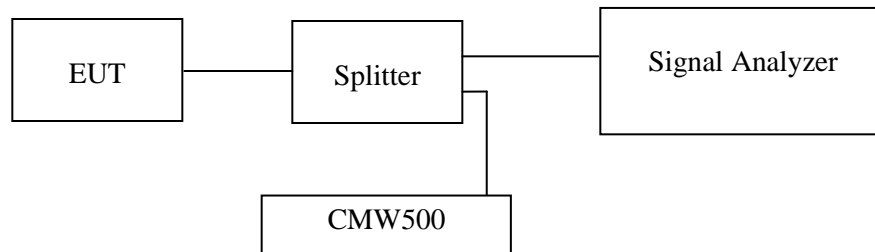
### Applicable Standard

FCC 47 §2.1049, §22.917, §22.905, and §24.238.

### Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



### Test Data

#### Environmental Conditions

Temperature:	24 °C
Relative Humidity:	52 %
ATM Pressure:	101.1 kPa

*The testing was performed by Key.Pei on 2022-04-13.*

*EUT operation mode: Transmitting*

**Test Result: Pass**



**Cellular Band (Part 22H)**

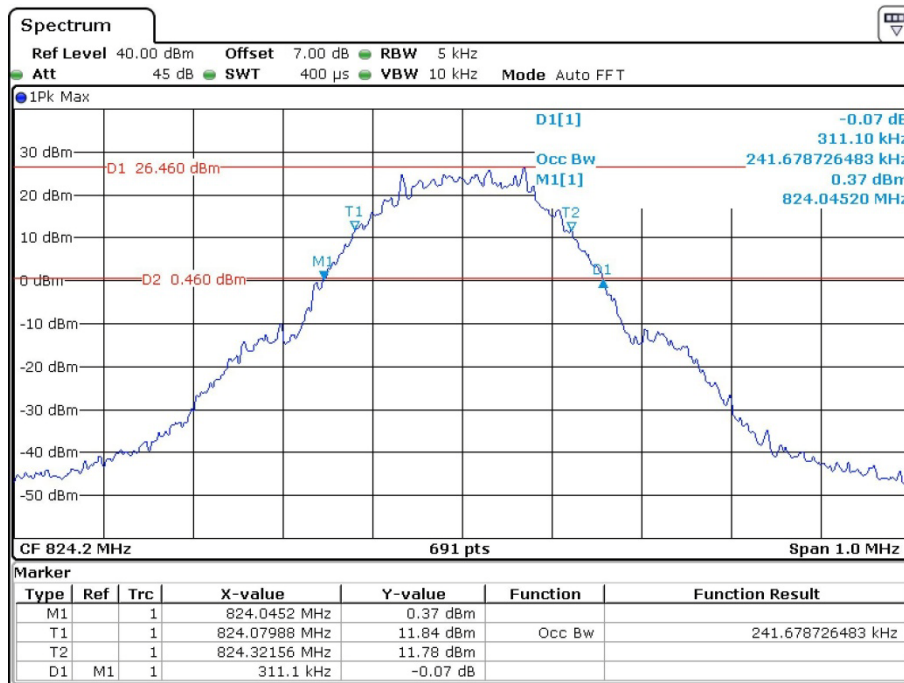
Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM (GMSK)	128	824.2	241.68	311.10
	190	836.6	241.68	308.20
	251	848.8	240.23	303.90

**PCS Band (Part 24E)**

Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM (GMSK)	512	1850.2	241.68	315.50
	661	1880.0	243.13	315.50
	810	1909.8	243.13	314.00

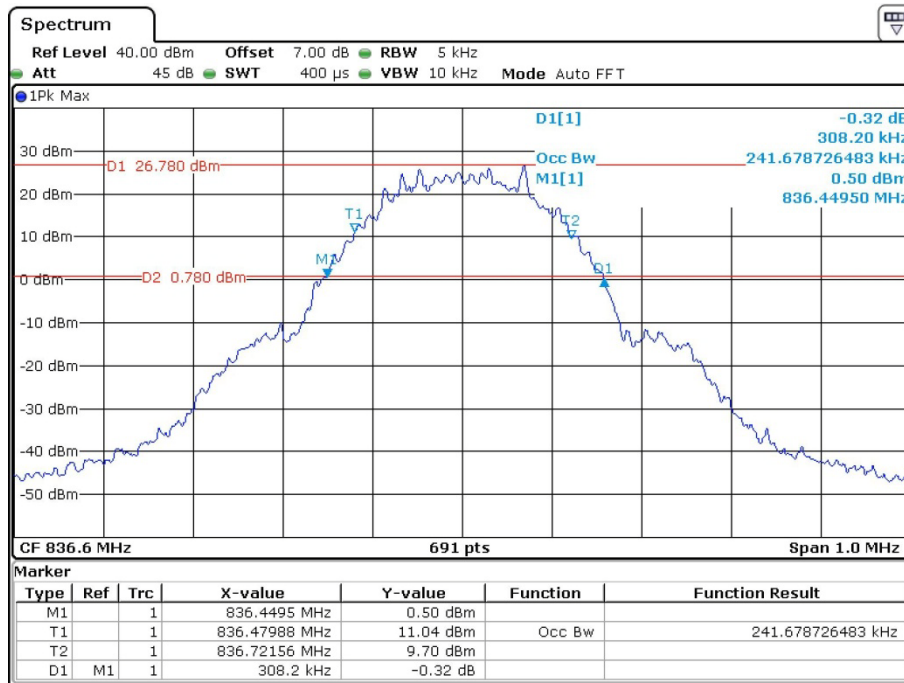
**Cellular Band (Part 22H)**

**26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, Low channel**



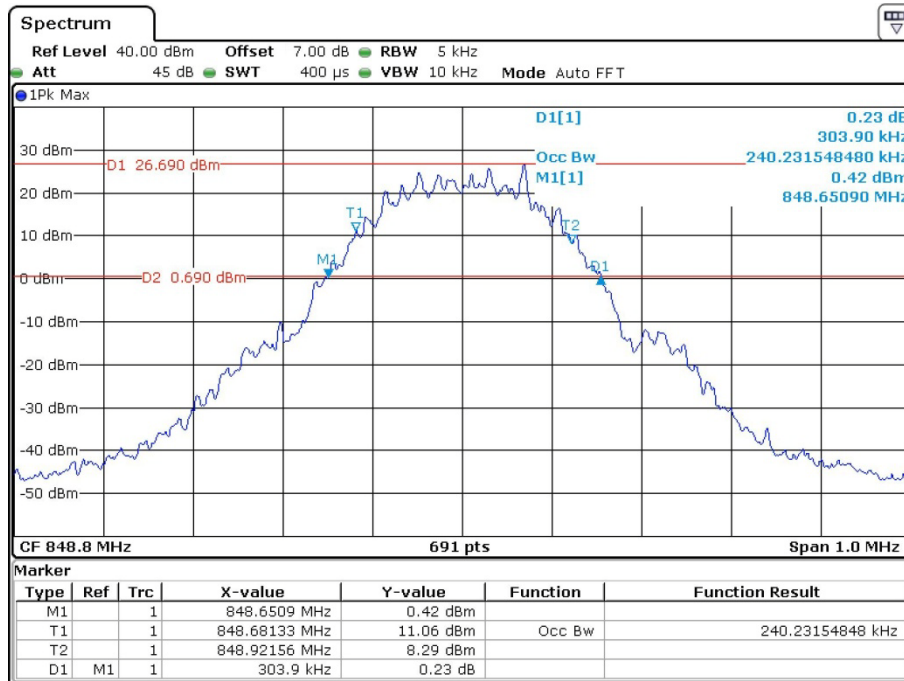
Date: 13.APR.2022 19:54:15

26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, Middle channel



Date: 13.APR.2022 19:55:28

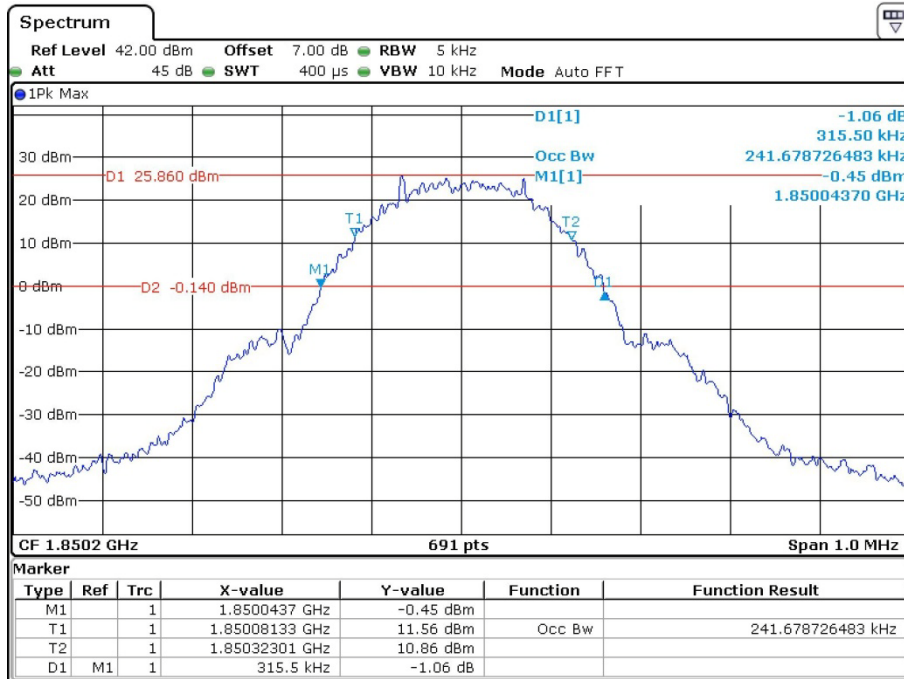
26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, High channel



Date: 13.APR.2022 19:56:36

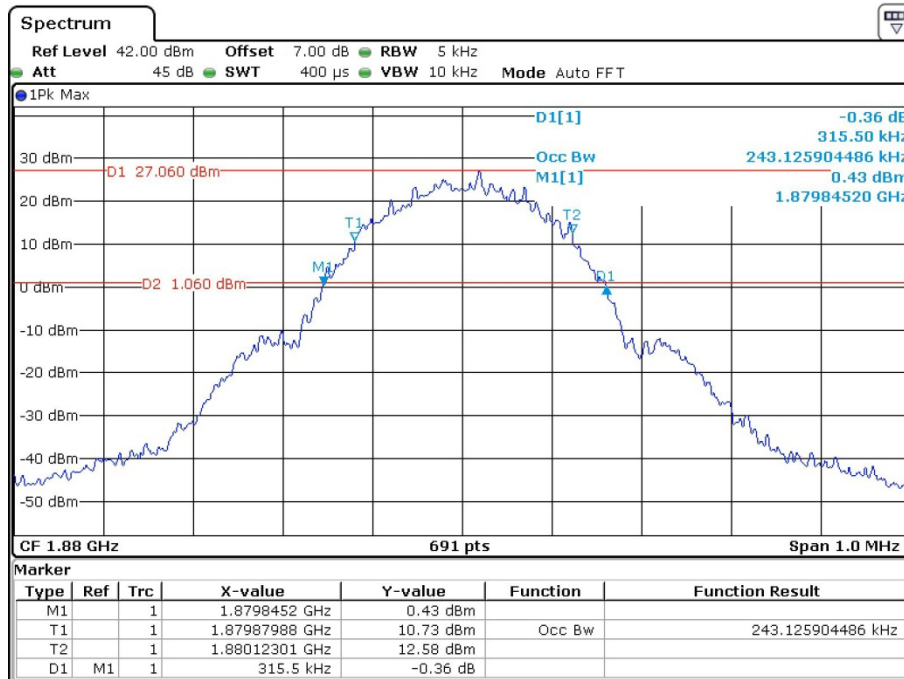
**PCS Band (Part 24E)**

**26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, Low channel**



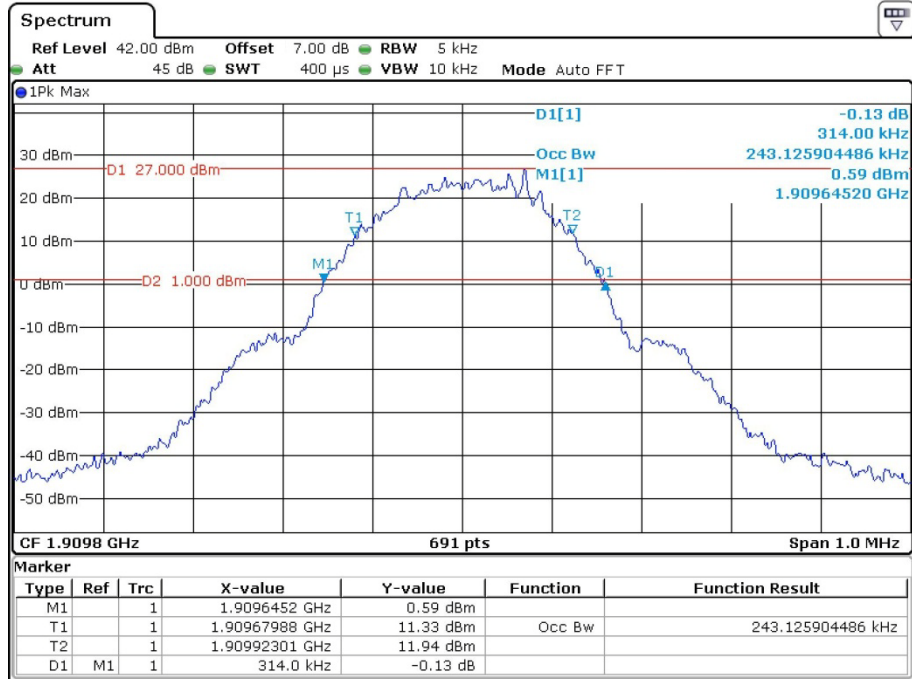
Date: 13.APR.2022 20:01:12

**26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, Middle channel**



Date: 13.APR.2022 20:02:08

**26 dB Emissions & 99% Occupied Bandwidth for GSM(GMSK) Mode, High channel**



Date: 13.APR.2022 20:03:04

## FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

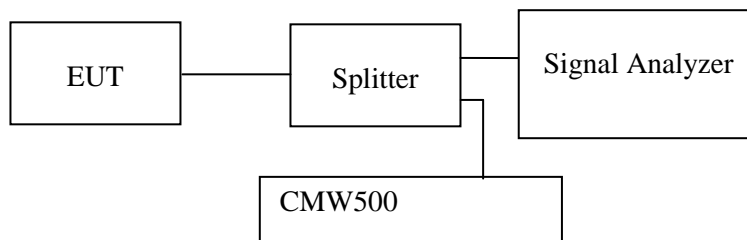
### Applicable Standard

FCC §2.1051, §22.917(a) & §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

### 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 1MHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



### Test Data

#### Environmental Conditions

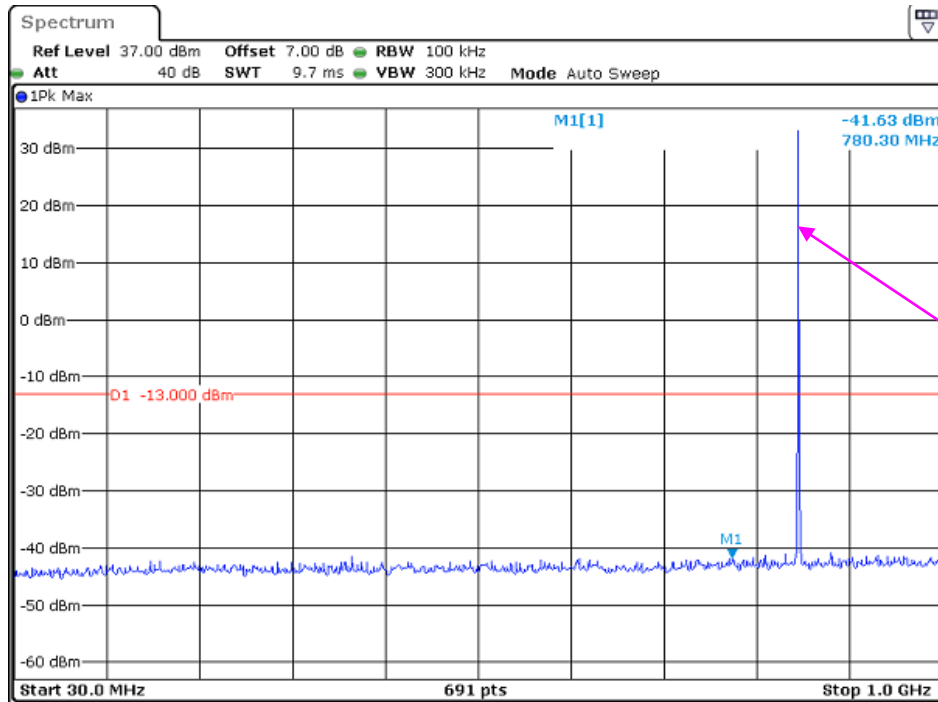
<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.1 kPa

*The testing was performed by Key.Pei on 2022-04-12.*

*EUT operation mode: Transmitting*

**Test result: Pass**

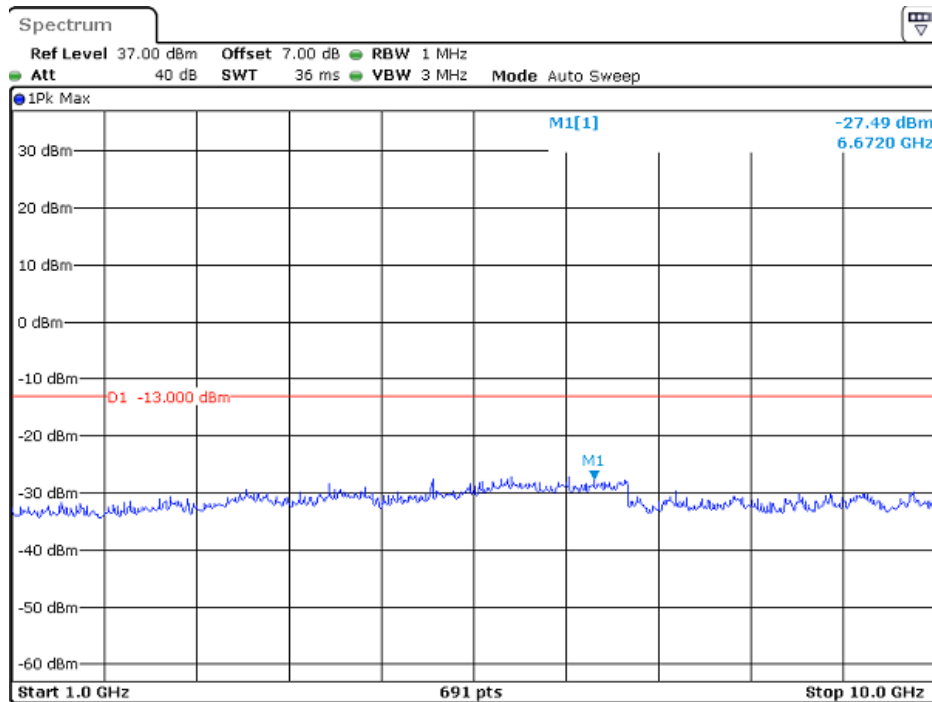
### Cellular Band (Part 22H) GSM Mode 30 MHz – 1 GHz -Low channel



Date: 12.APR.2022 13:15:49

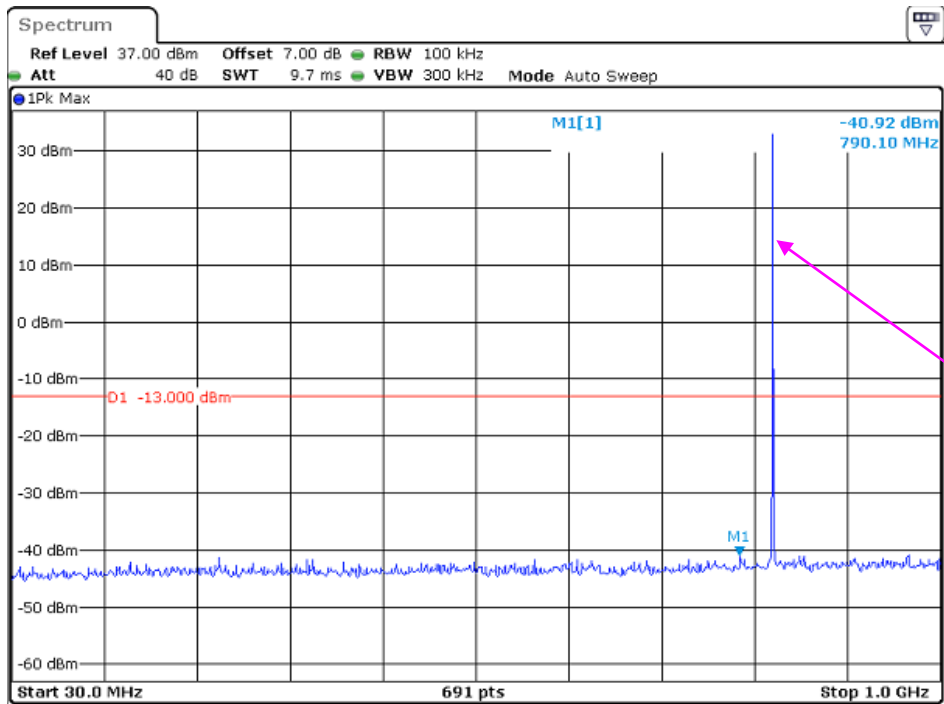
Fundamental test

### 1 GHz – 10 GHz -Low channel



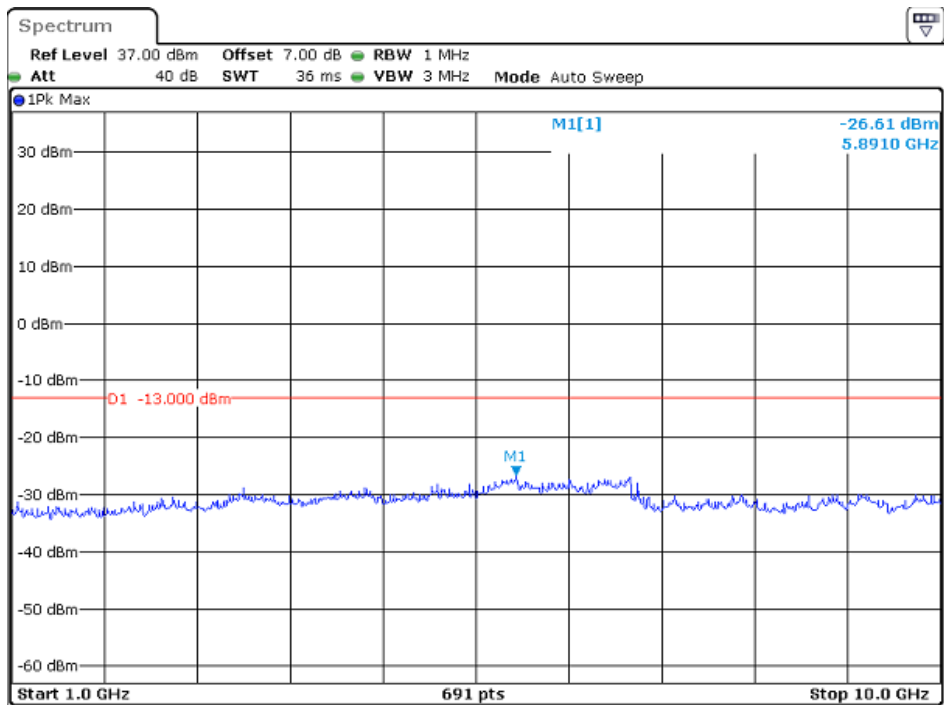
Date: 12.APR.2022 13:17:18

### 30 MHz – 1 GHz -Middle channel

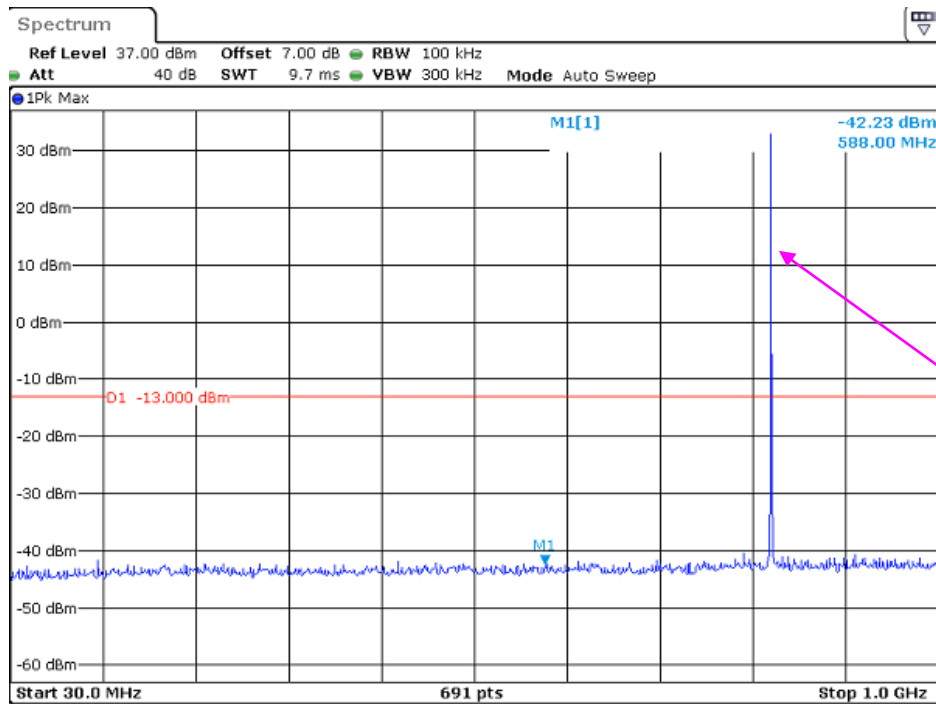


Fundamental test

### 1 GHz – 10 GHz - Middle channel

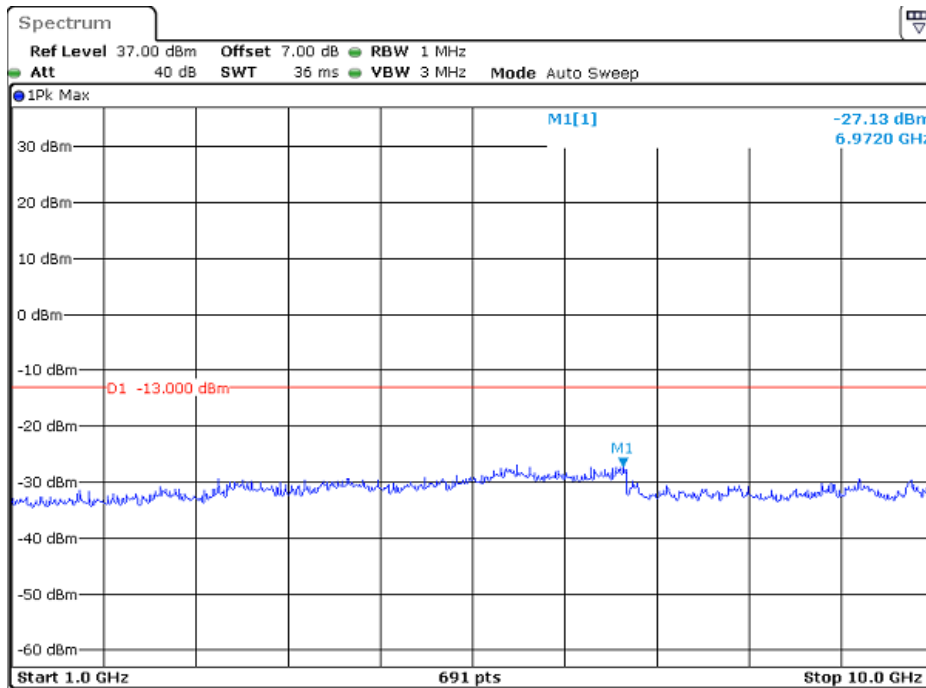


### 30 MHz – 1 GHz -High channel



Date: 12.APR.2022 13:21:37

### 1 GHz – 10 GHz - High channel



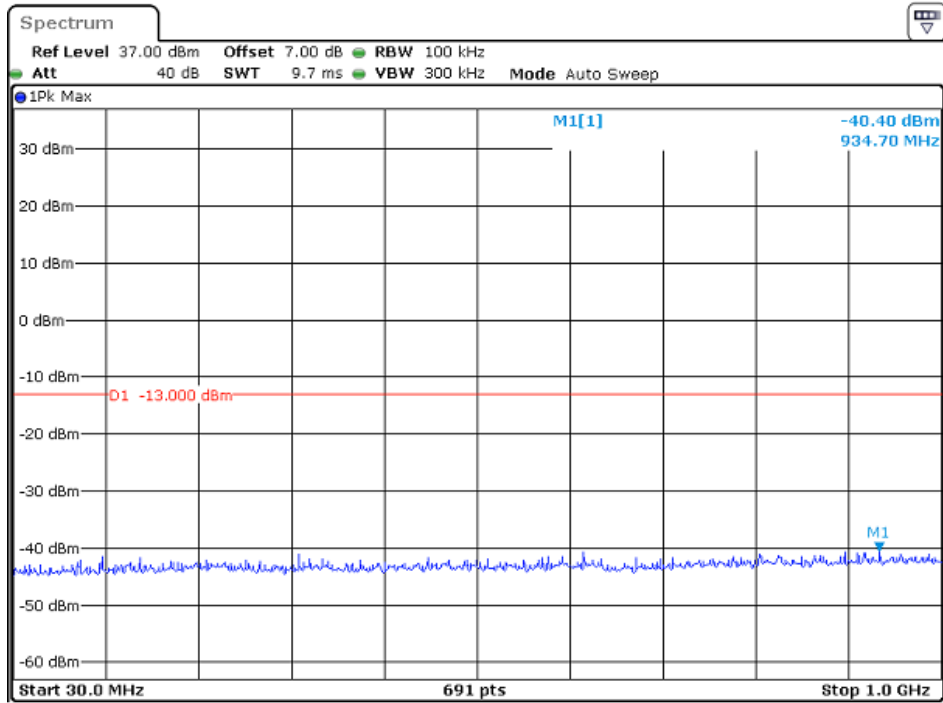
Date: 12.APR.2022 13:23:50



PCS Band (Part 24E)

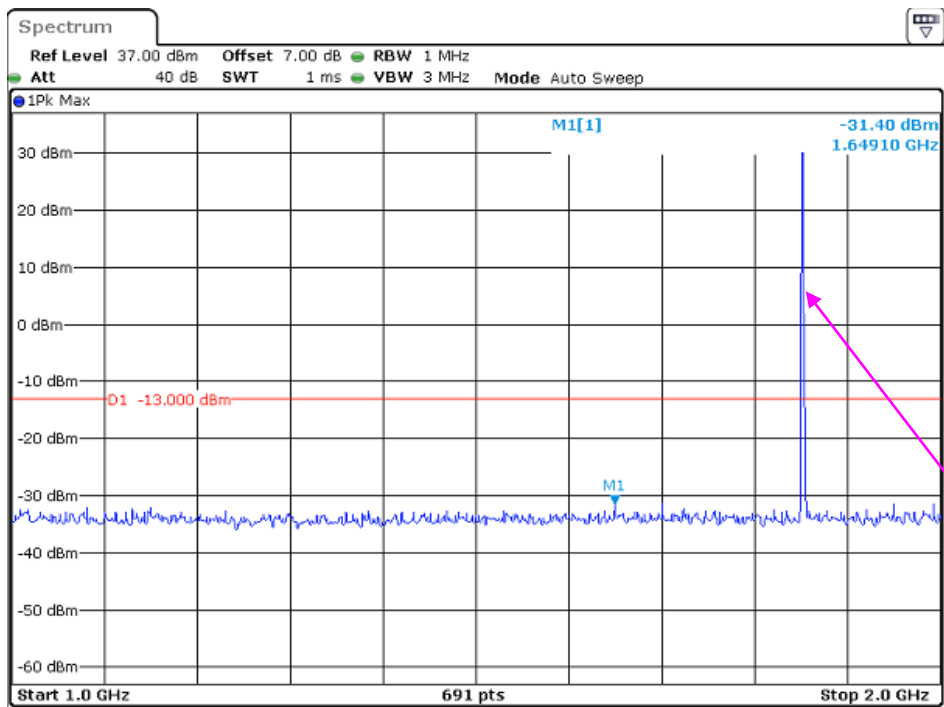
GSM Mode

30 MHz – 1 GHz -Low channel



Date: 12.APR.2022 13:35:07

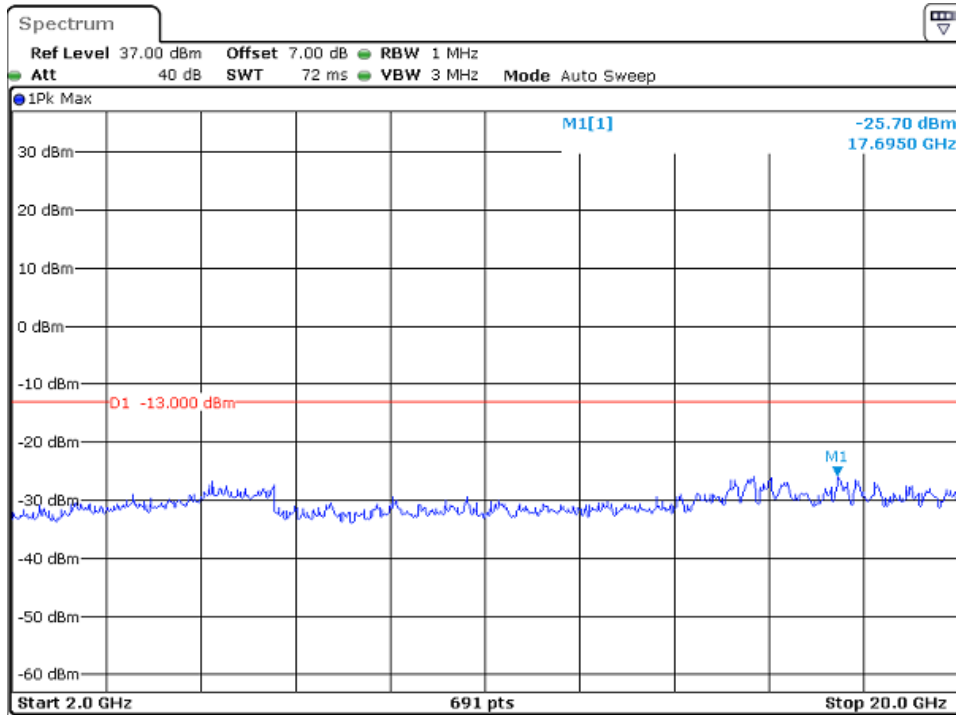
1 GHz – 2 GHz -Low channel



Date: 12.APR.2022 13:36:45

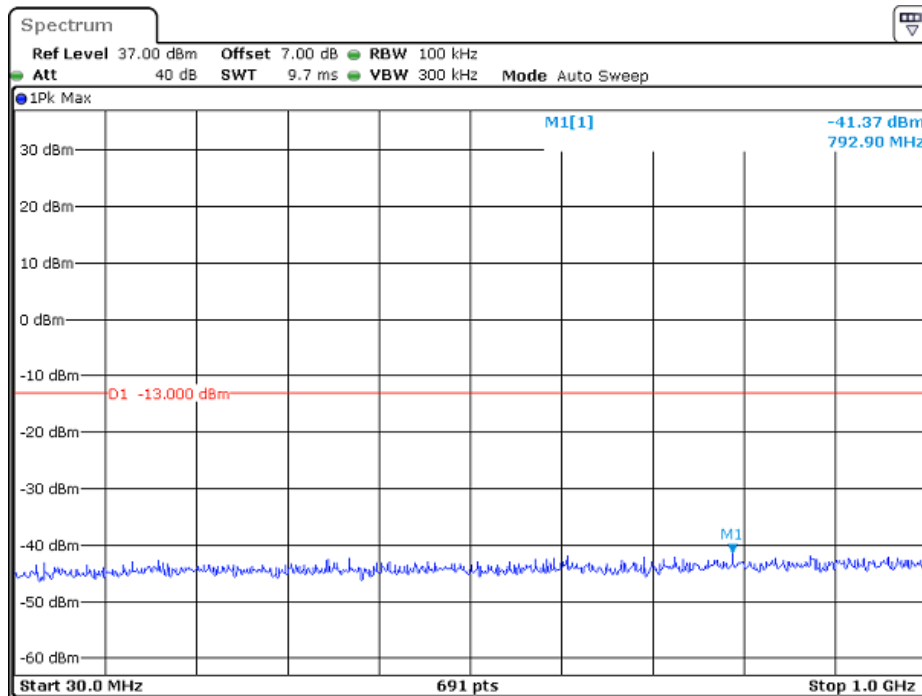
Fundamental test

### 2.0 GHz – 20 GHz -Low channel



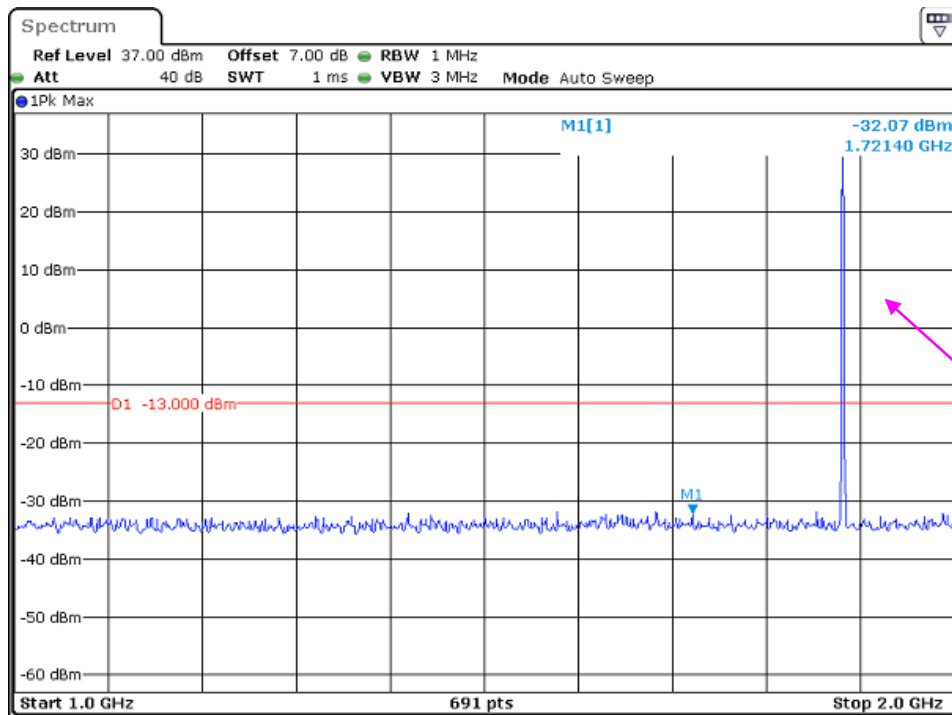
Date: 12.APR.2022 13:37:52

### 30 MHz – 1 GHz - Middle channel



Date: 12.APR.2022 13:40:25

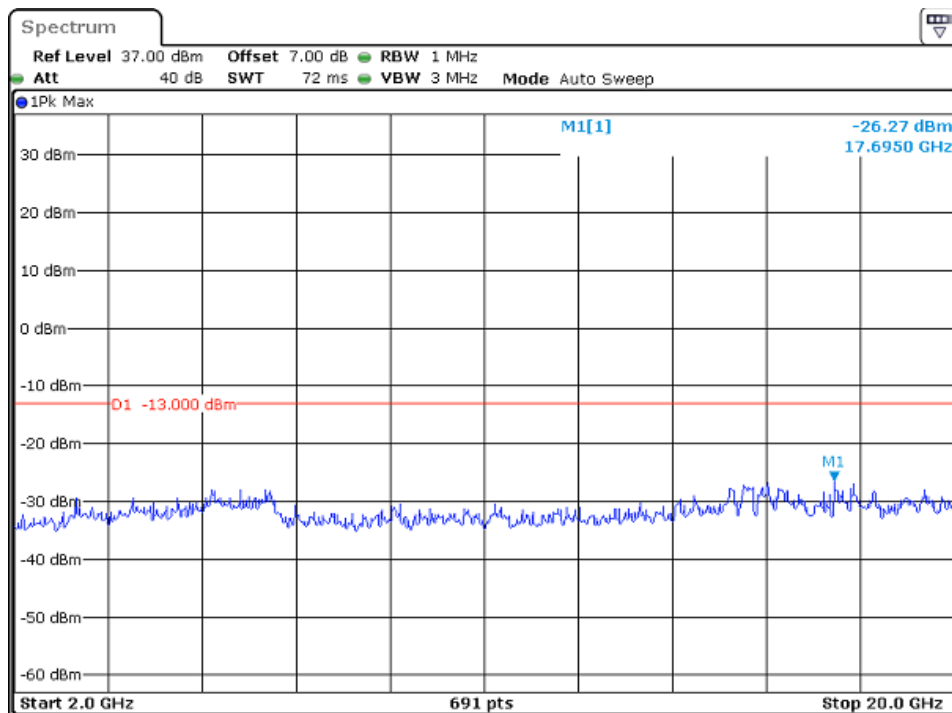
### 1 GHz – 2 GHz Middle channel



Date: 12.APR.2022 13:41:17

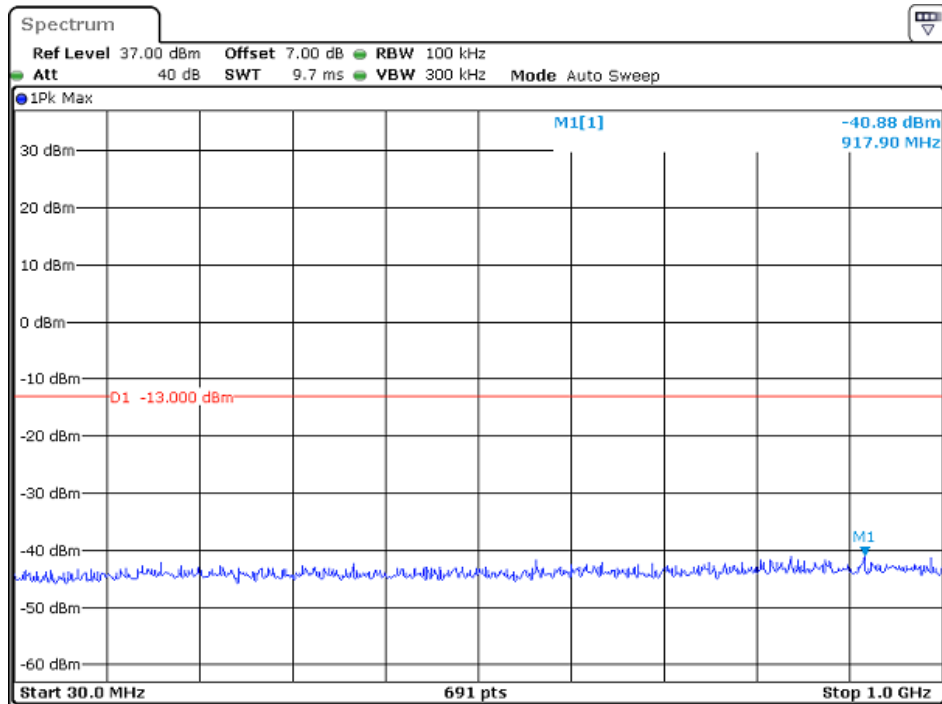
Fundamental test

### 2 GHz – 20 GHz Middle channel

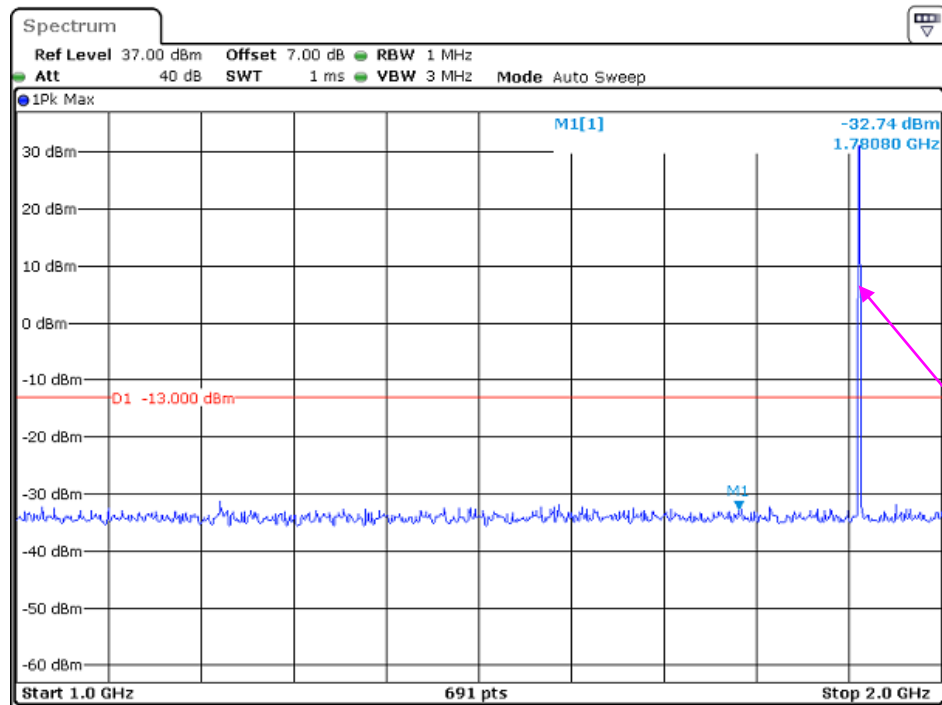


Date: 12.APR.2022 13:41:43

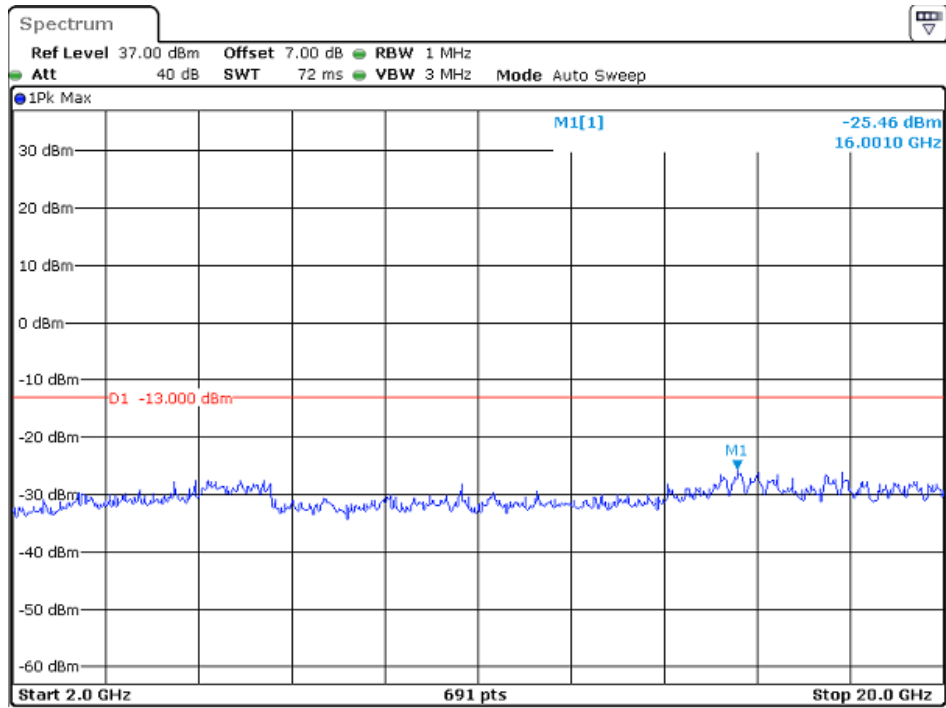
### 30 MHz – 1 GHz - High channel



### 1 GHz – 20 GHz - High channel



### 2 GHz – 20 GHz -High channel



Date: 12.APR.2022 13:38:25

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**FCC § 2.1053; § 22.917 (a); § 24.238 (a) - SPURIOUS RADIATED EMISSIONS**

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**Applicable Standard**

FCC § 2.1053, §22.917(a) & § 24.238(a).

**Test Procedure**

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving 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.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.1 kPa

*The testing was performed by Key.Pei on 2022-04-12.*

*EUT operation mode: Transmitting (Worst case record in the reports)*

*The worst case is as below:*

**30MHz - 20GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/QP/Ave.		Height (m)	Polar (H/V)				
GSM 850, Low Channel									
629.75	-74.49	PK	113	1.8	H	10.26	-64.23	-13	-51.23
171.69	-60.37	PK	71	1.7	V	0.84	-59.53	-13	-46.53
1648.4	-44.93	PK	129	1.4	H	3.52	-41.41	-13	-28.41
1648.4	-45.43	PK	267	1.6	V	3.1	-42.33	-13	-29.33
GSM 850, Middle Channel									
629.75	-73.48	PK	40	1.5	H	10.26	-63.22	-13	-50.22
171.69	-61.19	PK	184	1.6	V	0.84	-60.35	-13	-47.35
1673.2	-45.75	PK	2	1.9	H	3.78	-41.97	-13	-28.97
1673.2	-46.51	PK	128	1.8	V	3.1	-43.41	-13	-30.41
GSM 850, High Channel									
629.75	-74.00	PK	140	1.8	H	10.26	-63.74	-13	-50.74
171.69	-62.53	PK	19	1.9	V	0.84	-61.69	-13	-48.69
1697.6	-45.69	PK	261	1.3	H	4.07	-41.62	-13	-28.62
1697.6	-45.51	PK	195	1.4	V	3.1	-42.41	-13	-29.41
PCS 1900, Low Channel									
629.75	-74.54	PK	116	1.5	H	10.26	-64.28	-13	-51.28
171.69	-62.58	PK	192	1.7	V	0.84	-61.74	-13	-48.74
3700.4	-48.97	PK	316	1.3	H	4.72	-44.25	-13	-31.25
3700.4	-50.29	PK	154	1.6	V	4.61	-45.68	-13	-32.68
PCS 1900, Middle Channel									
629.75	-73.68	PK	154	1.7	H	10.26	-63.42	-13	-50.42
171.69	-62.13	PK	177	2.0	V	0.84	-61.29	-13	-48.29
3760	-50.35	PK	102	1.4	H	4.94	-45.41	-13	-32.41
3760	-50.33	PK	357	1.1	V	4.85	-45.48	-13	-32.48
PCS 1900, High Channel									
629.75	-74.34	PK	343	1.5	H	10.26	-64.08	-13	-51.08
171.69	-61.50	PK	278	1.2	V	0.84	-60.66	-13	-47.66
3819.6	-50.73	PK	194	1.3	H	5.25	-45.48	-13	-32.48
3819.6	-50.90	PK	95	2.1	V	5.08	-45.82	-13	-32.82

**Note:**

Absolute Level = Reading Level + Substituted Factor

Substituted Factor contains: SG Level - Cable loss+ Antenna Gain

Margin = Absolute Level - Limit

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**FCC § 22.917 (a);§ 24.238 (a) - BAND EDGES**

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**Applicable Standard**

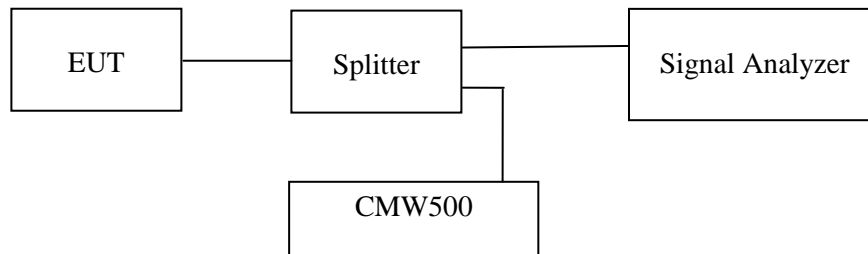
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions 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.

**Test Procedure**

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

The center of the spectrum analyzer was set to block edge frequency





**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.1 kPa

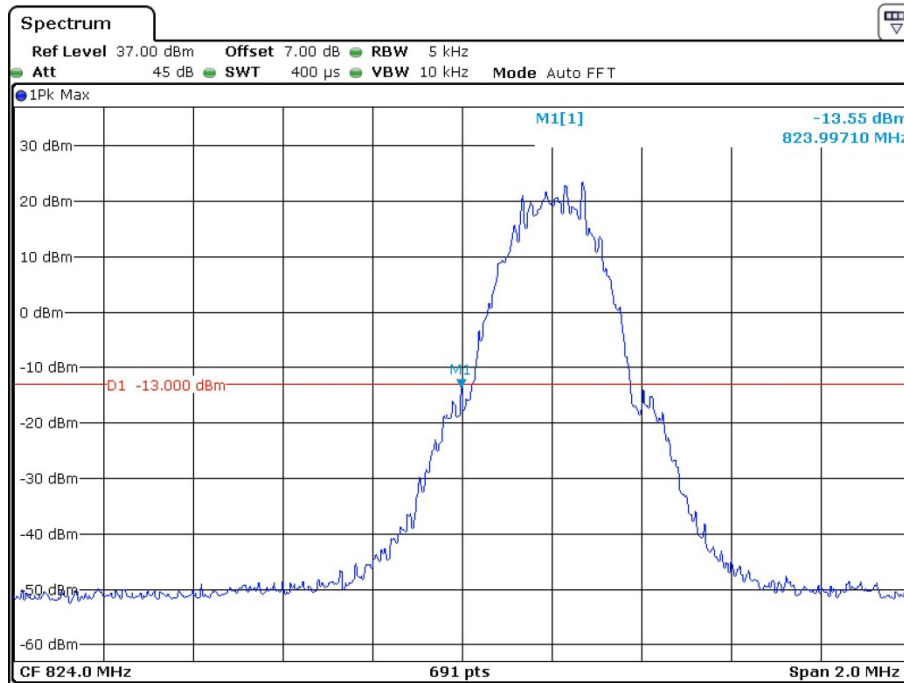
The testing was performed by Key.Peii on 2022-04-12..

EUT operation mode: Transmitting (Worst case)

**Test Result: Pass**

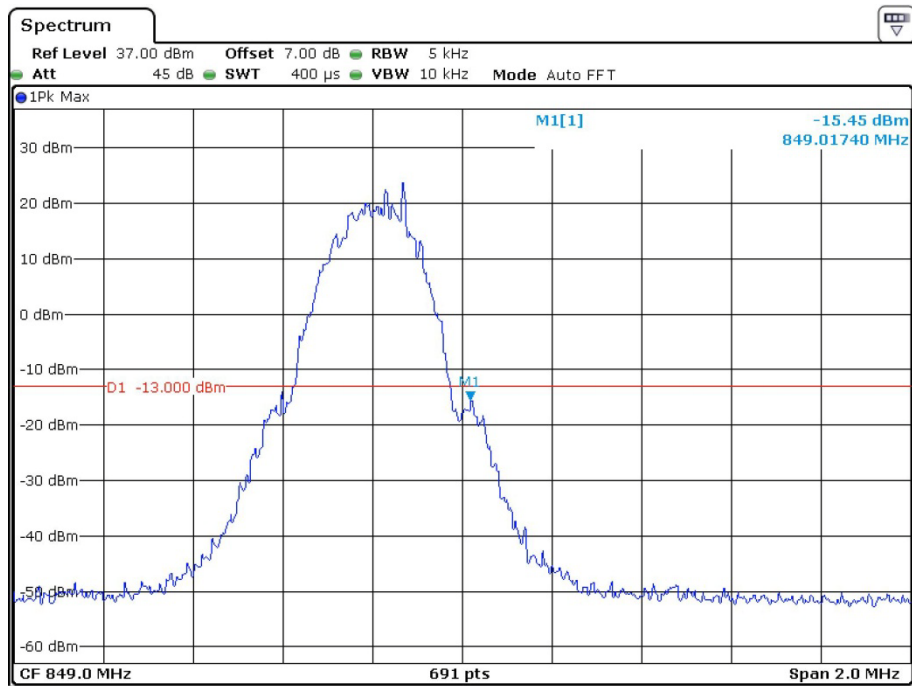
**Cellular Band (Part 22H)**

**Left Band Edge for GSM(GMSK) Mode**



Date: 13.APR.2022 19:52:19

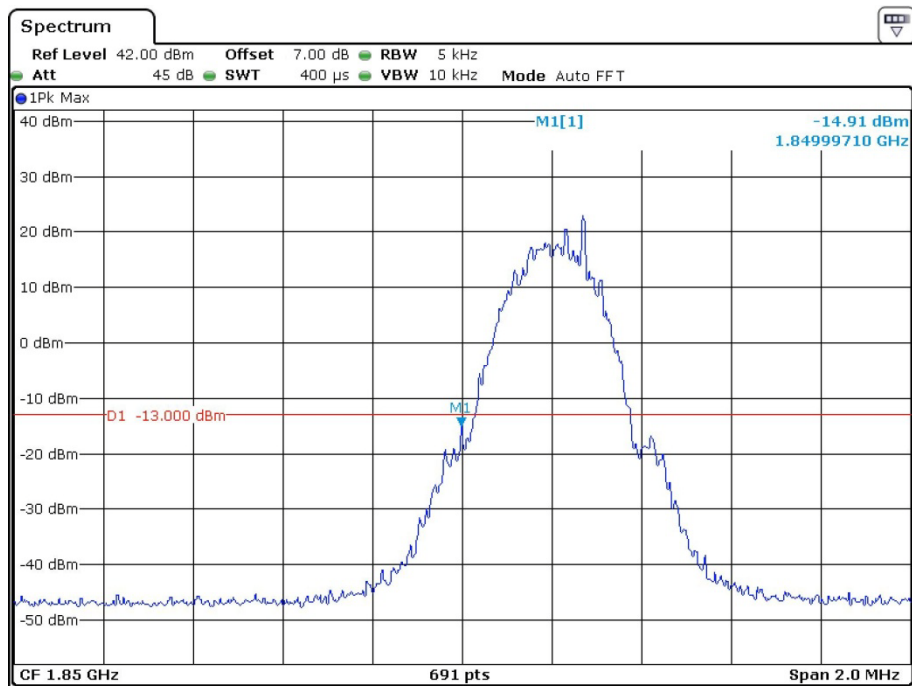
### Right Band Edge for GSM(GMSK) Mode



Date: 13.APR.2022 19:51:39

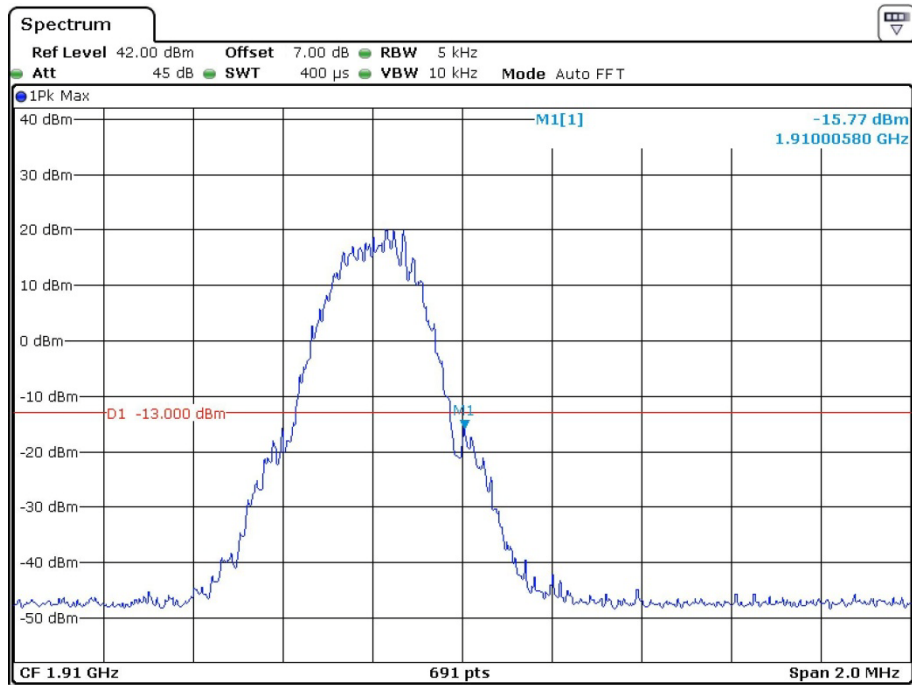
### PCS Band (Part 24E)

### Left Band Edge for GSM(GMSK) Mode



Date: 13.APR.2022 20:06:16

### Right Band Edge for GSM (GMSK) Mode



Date: 13.APR.2022 20:07:11

## FCC § 2.1055; § 22.355; § 24.235 - FREQUENCY STABILITY

### Applicable Standard

FCC § 2.1055, §22.355, §24.235.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile > 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

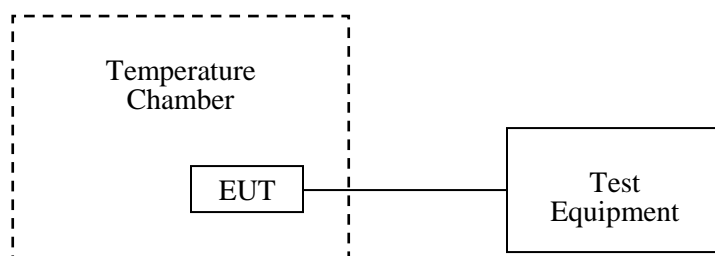
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### Test Procedure

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external AC 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 AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

**Frequency Stability vs. Voltage:** For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



**Test Data****Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.1 kPa

The testing was performed by Key.Pei on 2022-04-12.

EUT operation mode: Transmitting

**Test Result: Pass**

Please refer to the following tables.

Note: The worst case was DC 12V was recorded.

**Cellular Band (Part 22H)****GSM Mode**

Middle Channel, $f_o = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied ( $V_{DC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	12V	4	0.0048	2.5
-20		5	0.0060	2.5
-10		7	0.0084	2.5
0		4	0.0048	2.5
10		6	0.0072	2.5
20		5	0.0060	2.5
30		7	0.0084	2.5
40		6	0.0072	2.5
50		8	0.0096	2.5
20		10.8V	4	0.0048
	13.2V	6	0.0072	2.5

**PCS Band (Part 24E)****GSM Mode**

<b>Middle Channel, <math>f_o = 1880.0</math> MHz</b>				
<b>Temperature (°C)</b>	<b>Voltage Supplied (V<sub>DC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Result</b>
-30	12V	-2	-0.0011	pass
-20		-6	-0.0032	pass
-10		-5	-0.0027	pass
0		-7	-0.0037	pass
10		-4	-0.0021	pass
20		-1	-0.0005	pass
30		-3	-0.0016	pass
40		-5	-0.0027	pass
50		-4	-0.0021	pass
20		10.8V	-3	-0.0016
	13.2V	-6	-0.0032	pass

**\*\*\*\*\* END OF REPORT \*\*\*\*\***