

# TEST REPORT

Applicant Name : Telepower Communication Co., Ltd.  
Address : 5 Bld, Zone A, Hantian Technology Town No.17 ShenHai RD,  
Nanhai District Foshan, China  
Report Number : SZNS211110-57918E-RF-00D  
FCC ID: 2AJ2B-F10

## Test Standard (s)

FCC PART 22H, PART 24E

## Sample Description

Product Type: F10 face recognition smart terminal  
Model No.: F10  
Multiple Model(s) No.: F10T  
Date Received: 2021/11/10  
Date of Test: 2021/11/25~2022/01/05  
Report Date: 2022/01/13

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

## Prepared and Checked By:



Black Ding  
EMC Engineer

## Approved By:



Robert Li  
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\*" .

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Frequency Range	WCDMA Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) WCDMA Band 5: 824-849MHz(TX); 869-894MHz(RX) LTE Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) LTE Band 5: 824-849MHz(TX); 869-894MHz(RX)
Modulation Technique	3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM
Antenna Specification*	WCDMA Band 2/ LTE Band 2: 2.6dBi WCDMA Band5/LTE Band 5: 1.9dBi (It is provided by the applicant)
Voltage Range	DC 12V from adapter.
Sample serial number	SZNS211110-57918E-RF-S1 (For Radiated Test) SZNS211110-57918E-RF-S2 (RF Conducted Test ) (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: BI24-120200-AdU Input: AC 100-240V, 50/60Hz, 0.8A Output: DC 12V, 2A

### Objective

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

The objective is to determine the compliance of 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, Sub-Part 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.

Each test item follows test standards and with no deviation.

## Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082 \times 10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
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 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), 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.

Test was performed as below table:

Frequency band	Bandwidth (MHz)	Test Frequency(MHz)		
		Low	Middle	High
WCDMA B2	4.2	1852.4	1880	1907.6
WCDMA B5	4.2	826.4	836.6	846.6
LTE B2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE B5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844

### Equipment Modifications

No modification was made to the EUT.

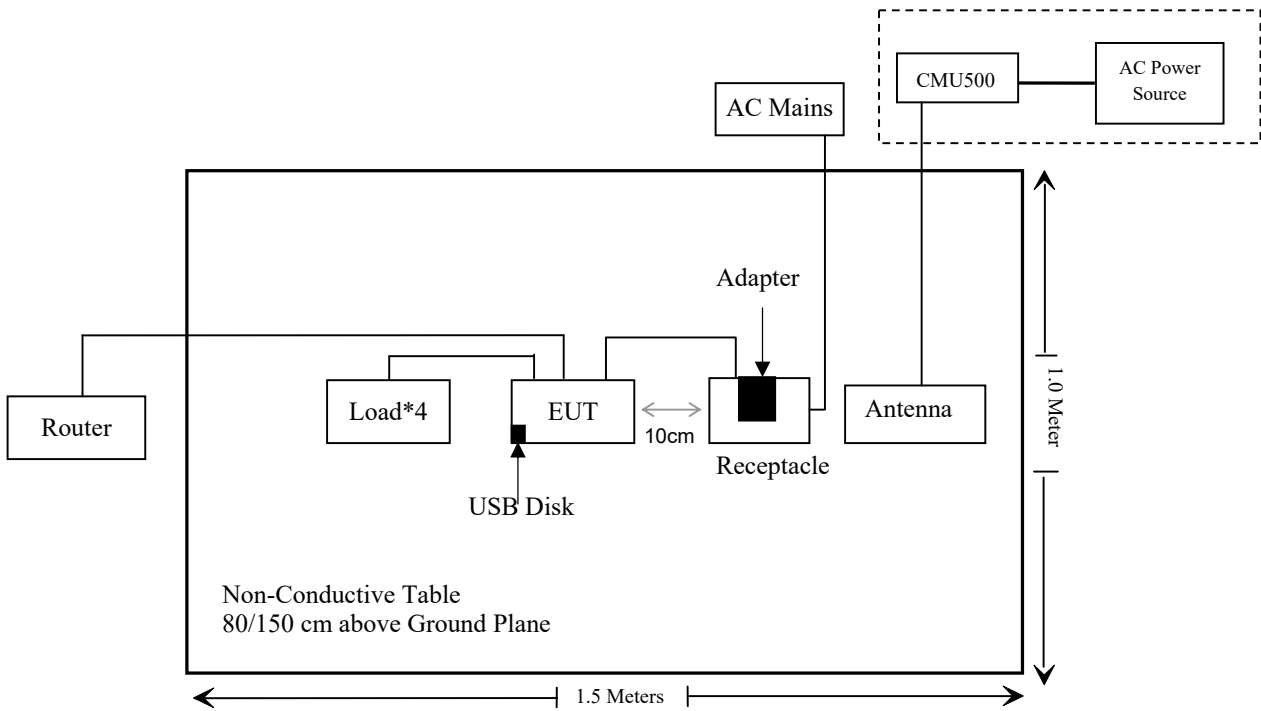
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication tester	CMW500	146520
HUAWEI	Router	WS5100	A4933FEF1D01
Unknown	Load*4	Unknown	Unknown
Kingston	USB Disk	DTSE9G2 32G	DTSE9G2

**Support Cable Description:**

Cable Description	Length (m)	From / Port	To
Un-shielded Un-detachable AC cable	1.2	AC Power	CMU500
Un-shielded detachable DC cable	1.0	adapter	EUT
Un-shielded detachable DC cable	0.3	EUT	Load
Un-shielded detachable RJ45 cable	5.0	EUT	Router

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§1.1307 , §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	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	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
PASTERNAK	Horn Antenn	PE9852/2F-20	1120	2020/01/05	2023/01/04
PASTERNAK	Horn Antenn	PE9850/2F-20	720	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
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13
CD	High Pass Filter	HPM-1.2/18G-60	110	2021/12/14	2022/12/13
Rohde & Schwarz	Signal Generator	SMB100A	108362	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b (V9)					



Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>RF Conducted Test</b>					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101948	2021/05/27	2022/05/26
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/03/02	2022/03/01
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2020/12/14	2021/12/13
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/10/14	2022/10/13
HP	6dB Attenuator	8493B 6dB Attenuator	2708A 04769	2020/12/14	2021/12/13
Unknown	RF Cable	Unknown	Unknown	Each time	/

\* 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).

## §1.1307 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to §1.1307 and § 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
BT	2402-2480	1.8	1.51	1.5	1.41	20	0.0004	1
BLE	2402-2480	1.8	1.51	1.5	1.41	20	0.0004	1
2.4GHz Wi-Fi	2412-2462	1.8	1.51	17.0	50.12	20	0.015	1
5GHz Wi-Fi	5150-5250/ 5725-5850	1.8	1.51	16.0	39.81	20	0.012	1
WCDMA B2	1850-1910	2.6	1.82	24.0	251.19	20	0.091	1
WCDMA B5	824-849	1.9	1.55	24.0	251.19	20	0.077	0.55
LTE B2	1850-1910	2.6	1.82	24.0	251.19	20	0.091	1
LTE B5	824-849	1.9	1.55	24.0	251.19	20	0.077	0.55

Note: 1. The antenna gain and tune up conducted power was declared by the applicant.

2. The BT/Wi-Fi can transmit at the same time with the WWAN, the BT, BLE, 2.4GHz Wi-Fi and 5GHz Wi-Fi cannot transmit simultaneously.

Simultaneous transmitting consideration (worst case):

The ratio= $MPE_{2.4G\ Wi-Fi}/limit + MPE_{WWAN}/limit = 0.015/1 + 0.077/0.55 = 0.155 < 1.0$

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

**Result:** Compliant.

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## **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.

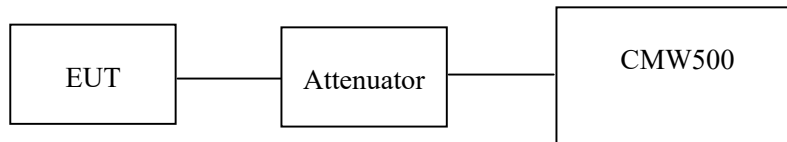
According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

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.



ANSI C63.26-2015 section 5.5.3.

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	27.2 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Black Ding on 2021-11-25.*

**Conducted Power****Cellular Band**

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 5)	RMC12.2k		23.66	23.65	23.57	23.21	23.20	23.12
	HSDPA	1	21.65	21.70	21.50	21.2	21.25	21.05
		2	21.31	21.29	21.17	20.86	20.84	20.72
		3	21.37	21.41	21.25	20.92	20.96	20.8
		4	21.31	21.35	21.20	20.86	20.90	20.75
	HSUPA	1	20.29	20.29	20.09	19.84	19.84	19.64
		2	20.46	20.52	20.30	20.01	20.07	19.85
		3	20.40	20.37	20.24	19.95	19.92	19.79
		4	20.29	20.36	20.20	19.84	19.91	19.75
		5	20.43	20.49	20.24	19.98	20.04	19.79
	HSPA+	1	20.30	20.35	20.17	19.85	19.90	19.72

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable loss(dB)  
 For WCDMA Band5: Antenna Gain = 1.9dBi = -0.25dBd (0dBd=2.15dBi)  
 Cable Loss=0.2dB\* (provided by the applicant)  
 Limit: ERP≤38.45dBm

**PCS Band**

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 2)	RMC12.2k		23.68	23.66	23.49	25.78	25.76	25.59
	HSDPA	1	21.72	21.72	21.54	23.82	23.82	23.64
		2	21.35	21.31	21.15	23.45	23.41	23.25
		3	21.36	21.41	21.21	23.46	23.51	23.31
		4	21.30	21.30	21.20	23.4	23.4	23.3
	HSUPA	1	20.28	20.27	20.14	22.38	22.37	22.24
		2	20.56	20.53	20.34	22.66	22.63	22.44
		3	20.33	20.33	20.20	22.43	22.43	22.3
		4	20.33	20.37	20.17	22.43	22.47	22.27
		5	20.46	20.41	20.30	22.56	22.51	22.4
	HSPA+	1	20.27	20.27	20.15	22.37	22.37	22.25

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable loss(dB)  
 For WCDMA Band2: Antenna Gain = 2.6dBi  
 Cable Loss=0.5dB\*(provided by the applicant)  
 Limit: EIRP≤33dBm

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

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.18	13
	Middle	3.37	13
	High	3.28	13
HSDPA (16QAM)	Low	4.21	13
	Middle	3.99	13
	High	3.78	13
HSUPA (BPSK)	Low	3.48	13
	Middle	3.67	13
	High	3.61	13
HSPA+	Low	3.37	13
	Middle	3.19	13
	High	3.55	13

**PCS Band**

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.24	13
	Middle	3.28	13
	High	2.92	13
HSDPA (16QAM)	Low	3.67	13
	Middle	4.02	13
	High	4.47	13
HSUPA (BPSK)	Low	3.64	13
	Middle	3.74	13
	High	3.89	13
HSPA+	Low	3.33	13
	Middle	3.27	13
	High	3.69	13

**LTE Band 2:****Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	23.37	23.23	23.37	25.47	25.33	25.47
		RB1#3	23.42	23.17	23.36	25.52	25.27	25.46
		RB1#5	23.32	23.11	23.37	25.42	25.21	25.47
		RB3#0	23.29	23.12	23.39	25.39	25.22	25.49
		RB3#3	23.35	23.13	23.37	25.45	25.23	25.47
		RB6#0	22.30	22.15	22.34	24.4	24.25	24.44
	16QAM	RB1#0	22.41	22.22	22.46	24.51	24.32	24.56
		RB1#3	22.31	22.24	22.48	24.41	24.34	24.58
		RB1#5	22.34	22.21	22.43	24.44	24.31	24.53
		RB3#0	22.32	22.26	22.28	24.42	24.36	24.38
		RB3#3	22.40	22.33	22.27	24.5	24.43	24.37
		RB6#0	21.30	21.13	21.37	23.4	23.23	23.47
3.0	QPSK	RB1#0	23.30	23.34	23.37	25.4	25.44	25.47
		RB1#8	23.29	23.22	23.30	25.39	25.32	25.4
		RB1#14	23.35	23.19	23.18	25.45	25.29	25.28
		RB6#0	22.43	22.27	22.43	24.53	24.37	24.53
		RB6#9	22.29	22.21	22.38	24.39	24.31	24.48
		RB15#0	22.28	22.17	22.38	24.38	24.27	24.48
	16QAM	RB1#0	22.97	22.40	22.52	25.07	24.5	24.62
		RB1#8	22.86	22.42	22.55	24.96	24.52	24.65
		RB1#14	22.89	22.26	22.51	24.99	24.36	24.61
		RB6#0	21.51	21.32	21.39	23.61	23.42	23.49
		RB6#9	21.41	21.21	21.32	23.51	23.31	23.42
		RB15#0	21.35	21.14	21.56	23.45	23.24	23.66



Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	23.45	23.65	23.55	25.55	25.75	25.65
		RB1#13	23.43	23.30	23.49	25.53	25.4	25.59
		RB1#24	23.30	23.24	23.27	25.4	25.34	25.37
		RB15#0	22.36	22.25	22.52	24.46	24.35	24.62
		RB15#10	22.36	22.22	22.45	24.46	24.32	24.55
		RB25#0	22.37	22.30	22.49	24.47	24.4	24.59
	16QAM	RB1#0	22.30	22.59	22.82	24.4	24.69	24.92
		RB1#13	22.32	22.52	22.56	24.42	24.62	24.66
		RB1#24	22.32	22.48	22.28	24.42	24.58	24.38
		RB15#0	21.44	21.31	21.57	23.54	23.41	23.67
		RB15#10	21.43	21.17	21.55	23.53	23.27	23.65
		RB25#0	21.46	21.29	21.54	23.56	23.39	23.64
10.0	QPSK	RB1#0	23.57	23.71	23.77	25.67	25.81	25.87
		RB1#25	23.53	23.29	23.56	25.63	25.39	25.66
		RB1#49	23.29	23.28	23.37	25.39	25.38	25.47
		RB25#0	22.49	22.40	22.57	24.59	24.5	24.67
		RB25#25	22.42	22.21	22.53	24.52	24.31	24.63
		RB50#0	22.45	22.30	22.65	24.55	24.4	24.75
	16QAM	RB1#0	23.18	22.82	22.65	25.28	24.92	24.75
		RB1#25	23.08	22.45	22.40	25.18	24.55	24.5
		RB1#49	22.84	22.43	22.46	24.94	24.53	24.56
		RB25#0	21.49	21.41	21.66	23.59	23.51	23.76
		RB25#25	21.52	21.25	21.63	23.62	23.35	23.73
		RB50#0	21.47	21.35	21.57	23.57	23.45	23.67

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
15.0	QPSK	RB1#0	23.59	23.70	23.76	25.69	25.8	25.86
		RB1#38	23.58	23.26	23.38	25.68	25.36	25.48
		RB1#74	23.68	23.64	23.74	25.78	25.74	25.84
		RB36#0	22.38	22.30	22.47	24.48	24.4	24.57
		RB36#39	22.53	22.32	22.55	24.63	24.42	24.65
		RB75#0	22.48	22.32	22.47	24.58	24.42	24.57
	16QAM	RB1#0	23.27	22.87	23.21	25.37	24.97	25.31
		RB1#38	22.97	22.43	22.91	25.07	24.53	25.01
		RB1#74	23.21	22.76	23.04	25.31	24.86	25.14
		RB36#0	21.41	21.28	21.51	23.51	23.38	23.61
		RB36#39	21.59	21.32	21.52	23.69	23.42	23.62
		RB75#0	21.44	21.39	21.51	23.54	23.49	23.61
20.0	QPSK	RB1#0	23.72	23.93	23.63	25.82	26.03	25.73
		RB1#50	23.43	23.45	23.51	25.53	25.55	25.61
		RB1#99	23.63	23.50	23.65	25.73	25.6	25.75
		RB50#0	22.59	22.34	22.55	24.69	24.44	24.65
		RB50#50	22.46	22.39	22.60	24.56	24.49	24.7
		RB100#0	22.41	22.39	22.55	24.51	24.49	24.65
	16QAM	RB1#0	22.96	22.61	23.13	25.06	24.71	25.23
		RB1#50	22.65	22.42	23.18	24.75	24.52	25.28
		RB1#99	22.95	22.86	23.08	25.05	24.96	25.18
		RB50#0	21.46	21.38	21.55	23.56	23.48	23.65
		RB50#50	21.60	21.35	21.55	23.7	23.45	23.65
		RB100#0	21.42	21.44	21.58	23.52	23.54	23.68

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi) - Cable Loss(dB)

For Band2: Antenna Gain = 2.6dBi

Cable Loss=0.5dB\*(provided by the applicant)

Limit: EIRP ≤ 33dBm

**Peak-to-average ratio (PAR)****20MHz Bandwidth**

<b>Modulation</b>	<b>Low channel (dB)</b>	<b>Middle channel (dB)</b>	<b>High channel (dB)</b>	<b>PAR Limit (dB)</b>	<b>Result</b>
QPSK (1RB Size)	4.61	4.96	4.99	13	Pass
QPSK (100RB Size)	4.81	5.01	4.96	13	Pass
16QAM (1RB Size)	5.39	5.88	5.94	13	Pass
16QAM (100RB Size)	5.68	5.94	5.91	13	Pass

**LTE Band 5:****Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	23.00	23.14	22.97	22.55	22.69	22.52
		RB1#3	23.06	23.51	23.23	22.61	23.06	22.78
		RB1#5	22.96	23.45	23.28	22.51	23	22.83
		RB3#0	23.11	23.45	23.27	22.66	23	22.82
		RB3#3	23.06	23.41	23.27	22.61	22.96	22.82
		RB6#0	22.01	22.46	22.27	21.56	22.01	21.82
	16QAM	RB1#0	22.01	22.59	22.55	21.56	22.14	22.1
		RB1#3	22.06	22.66	22.57	21.61	22.21	22.12
		RB1#5	21.98	22.58	22.52	21.53	22.13	22.07
		RB3#0	22.24	22.50	22.62	21.79	22.05	22.17
		RB3#3	22.27	22.50	22.55	21.82	22.05	22.1
		RB6#0	21.11	21.46	21.23	20.66	21.01	20.78
3.0	QPSK	RB1#0	23.13	23.22	23.06	22.68	22.77	22.61
		RB1#8	23.13	23.44	23.45	22.68	22.99	23
		RB1#14	23.10	23.38	23.30	22.65	22.93	22.85
		RB6#0	22.11	22.58	22.48	21.66	22.13	22.03
		RB6#9	22.14	22.46	22.41	21.69	22.01	21.96
		RB15#0	22.16	22.49	22.43	21.71	22.04	21.98
	16QAM	RB1#0	22.63	22.71	22.67	22.18	22.26	22.22
		RB1#8	22.62	22.62	22.76	22.17	22.17	22.31
		RB1#14	22.64	22.51	22.60	22.19	22.06	22.15
		RB6#0	21.19	21.55	21.44	20.74	21.1	20.99
		RB6#9	21.22	21.54	21.37	20.77	21.09	20.92
		RB15#0	21.22	21.47	21.71	20.77	21.02	21.26

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	23.12	23.32	23.16	22.67	22.87	22.71
		RB1#13	23.27	23.38	23.46	22.82	22.93	23.01
		RB1#24	23.15	23.30	23.30	22.7	22.85	22.85
		RB15#0	22.13	22.54	22.61	21.68	22.09	22.16
		RB15#10	22.18	22.49	22.46	21.73	22.04	22.01
		RB25#0	22.14	22.58	22.50	21.69	22.13	22.05
	16QAM	RB1#0	22.08	22.93	22.66	21.63	22.48	22.21
		RB1#13	22.16	22.85	22.50	21.71	22.4	22.05
		RB1#24	22.13	22.74	22.25	21.68	22.29	21.8
		RB15#0	21.20	21.57	21.64	20.75	21.12	21.19
		RB15#10	21.27	21.53	21.60	20.82	21.08	21.15
		RB25#0	21.28	21.56	21.60	20.83	21.11	21.15
10.0	QPSK	RB1#0	23.26	23.40	23.33	22.81	22.95	22.88
		RB1#25	23.51	23.51	23.79	23.06	23.06	23.34
		RB1#49	23.56	23.44	23.61	23.11	22.99	23.16
		RB25#0	22.18	22.70	22.71	21.73	22.25	22.26
		RB25#25	22.33	22.62	22.75	21.88	22.17	22.3
		RB50#0	22.27	22.60	22.79	21.82	22.15	22.34
	16QAM	RB1#0	22.76	22.82	22.93	22.31	22.37	22.48
		RB1#25	23.05	22.65	22.90	22.6	22.2	22.45
		RB1#49	23.04	22.63	22.90	22.59	22.18	22.45
		RB25#0	21.19	21.83	21.74	20.74	21.38	21.29
		RB25#25	21.34	21.61	21.87	20.89	21.16	21.42
		RB50#0	21.25	21.59	21.82	20.8	21.14	21.37

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd) - Cable Loss(dB)

For Band5: Antenna Gain = 1.9dBi = -0.25dBd (0dBd=2.15Bi)

Cable Loss=0.2dB\* (provided by the applicant)

Limit: ERP≤38.45dBm

**Peak-to-average ratio (PAR)****10MHz Bandwidth**

<b>Modulation</b>	<b>Low channel (dB)</b>	<b>Middle channel (dB)</b>	<b>High channel (dB)</b>	<b>PAR Limit (dB)</b>	<b>Result</b>
QPSK (1RB Size)	4.26	4.70	3.97	13	Pass
QPSK (50RB Size)	5.04	4.55	4.90	13	Pass
16QAM (1RB Size)	5.19	5.62	4.93	13	Pass
16QAM (50RB Size)	6.09	5.80	5.80	13	Pass

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

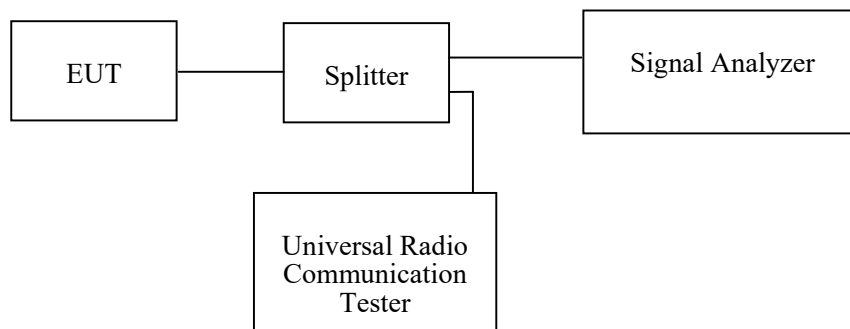
### **Applicable Standard**

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 1~5% of nominal bandwidth and the 26 dB & 99% bandwidth was recorded.



### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	27.2 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Black Ding on 2021-11-25.*

*EUT operation mode: Transmitting*

*Test Result: Compliant. Please refer to the following tables and plots.*

**Cellular Band (Part 22H)**

	<b>Frequency (MHz)</b>	<b>Occupied Bandwidth (MHz)</b>	<b>26dB Bandwidth (MHz)</b>
RMC	826.4	4.14	4.75
	836.6	4.11	4.72
	846.6	4.12	4.72
HSDPA	826.4	4.14	4.73
	836.6	4.14	4.94
	846.6	4.11	4.72
HSUPA	826.4	4.14	4.73
	836.6	4.14	4.85
	846.6	4.12	4.72

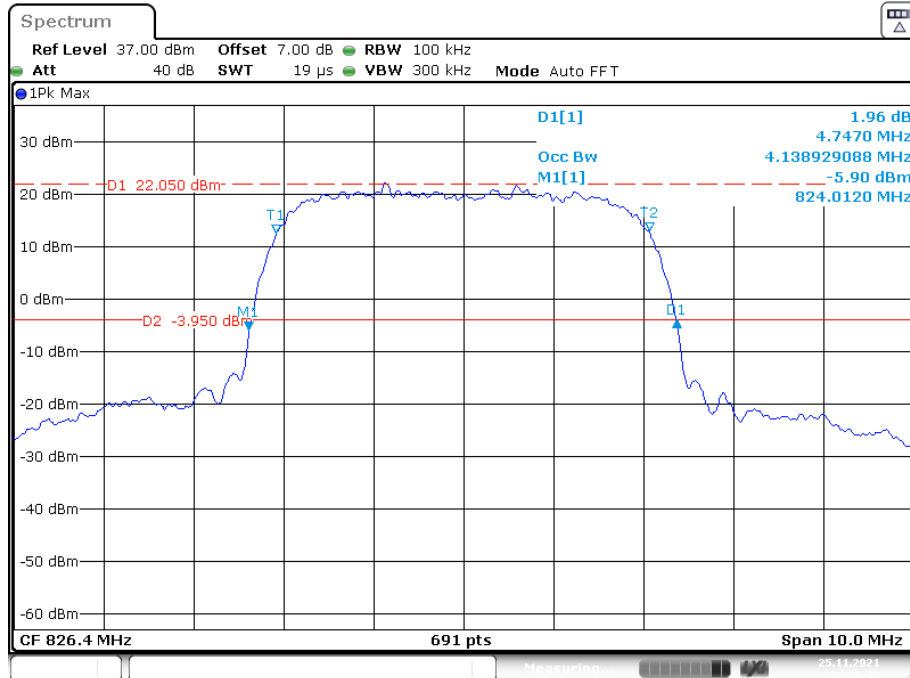
**PCS Band (Part 24E)**

	<b>Frequency (MHz)</b>	<b>Occupied Bandwidth (MHz)</b>	<b>26dB Bandwidth (MHz)</b>
RMC	1852.4	4.14	4.75
	1880.0	4.14	4.75
	1907.6	4.14	4.76
HSDPA	1852.4	4.14	4.73
	1880.0	4.14	4.75
	1907.6	4.14	4.75
HSUPA	1852.4	4.14	4.76
	1880.0	4.14	4.72
	1907.6	4.15	4.72

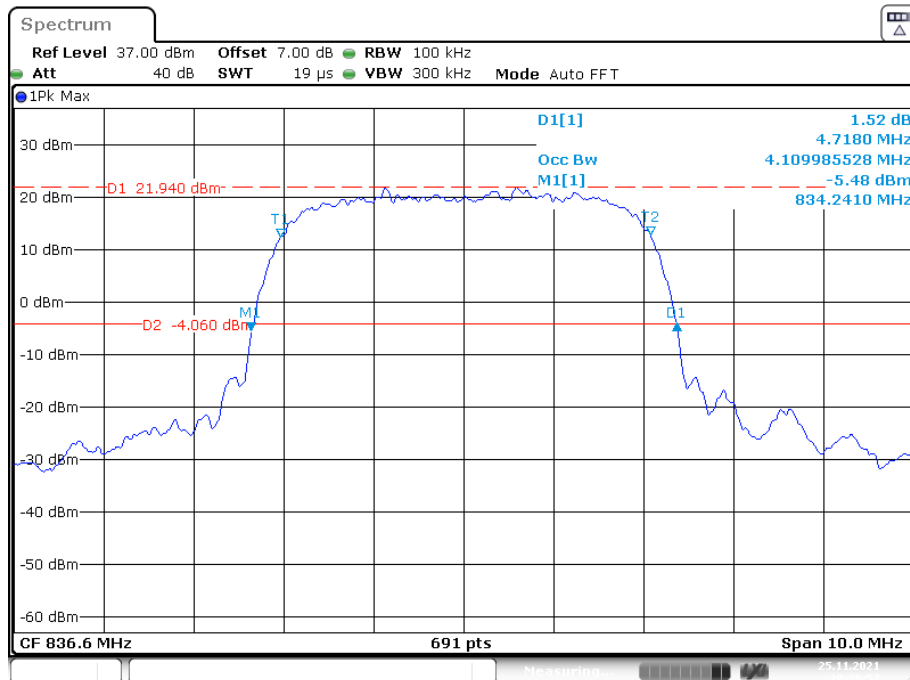


**Cellular Band (Part 22H)**

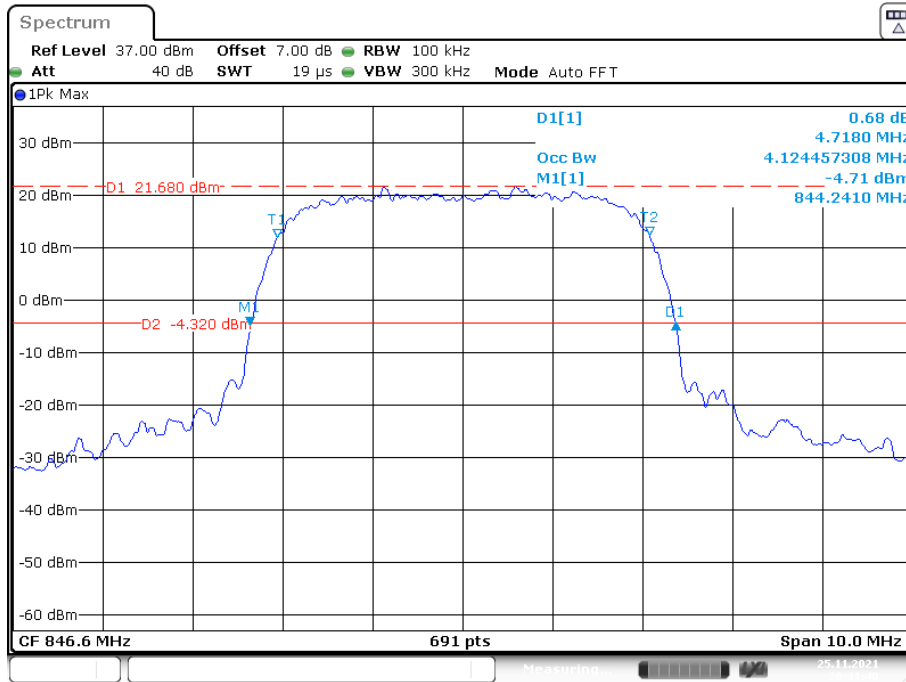
**26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, Low channel**



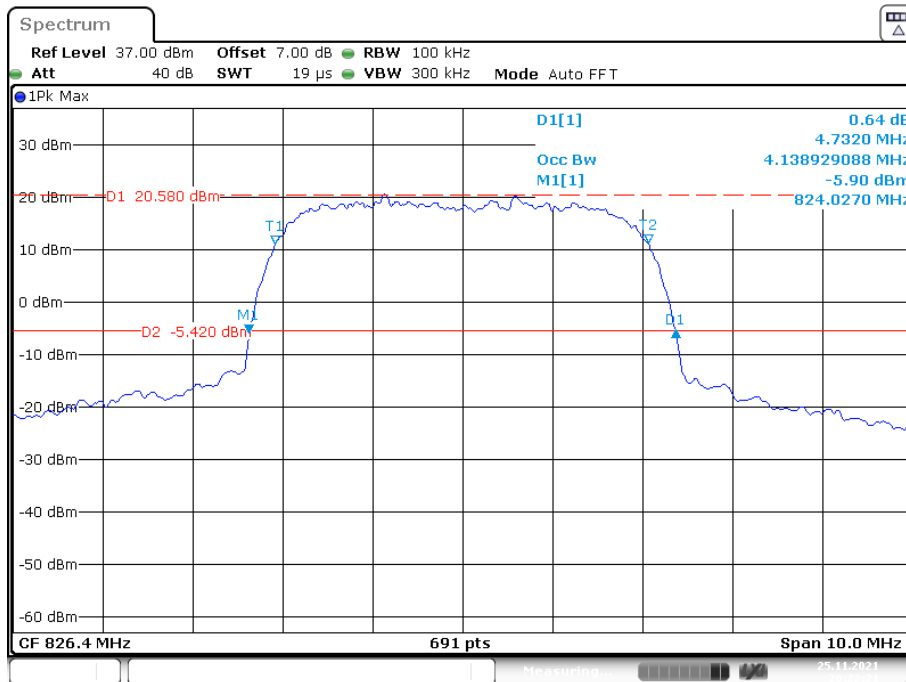
**26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, Middle channel**



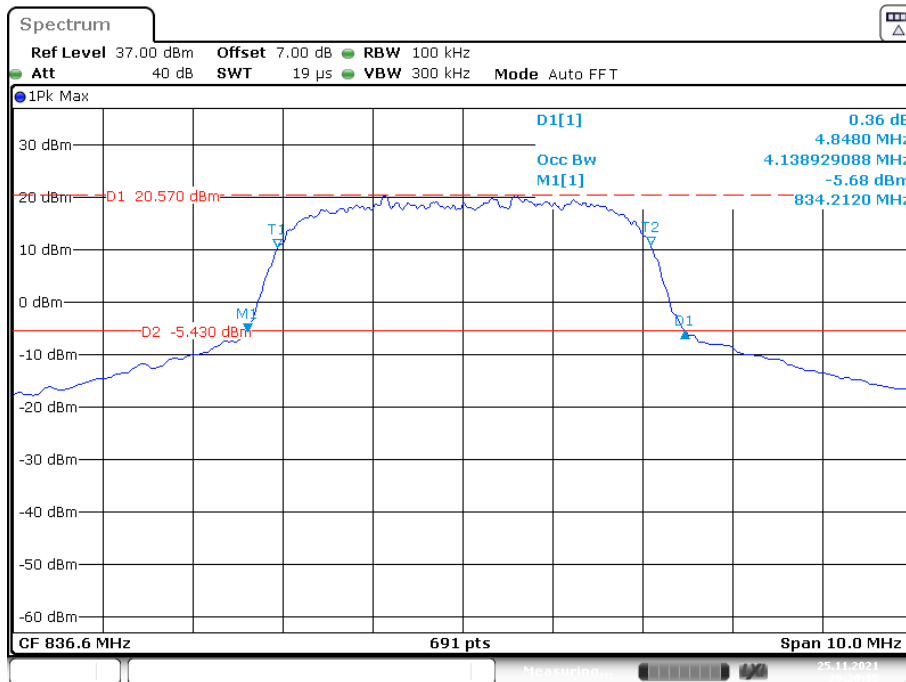
**26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, High channel**



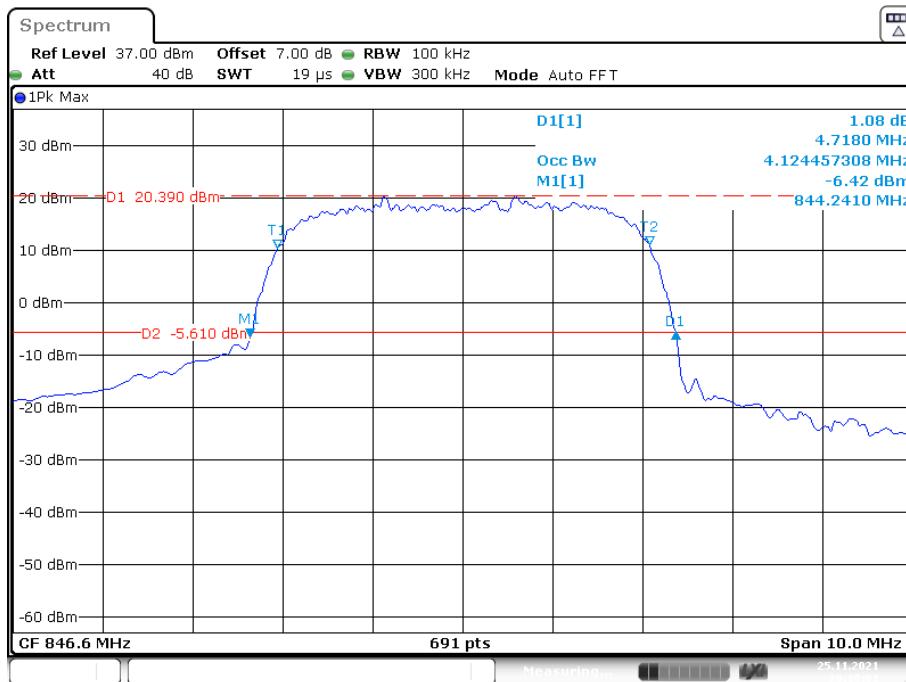
**26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode, Low channel**



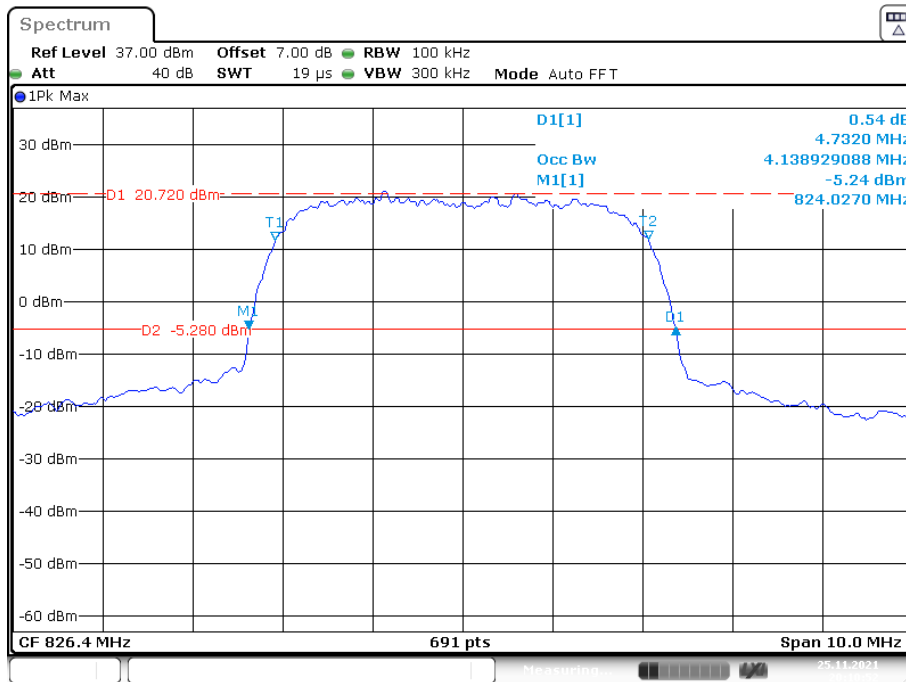
**26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode, Middle channel**



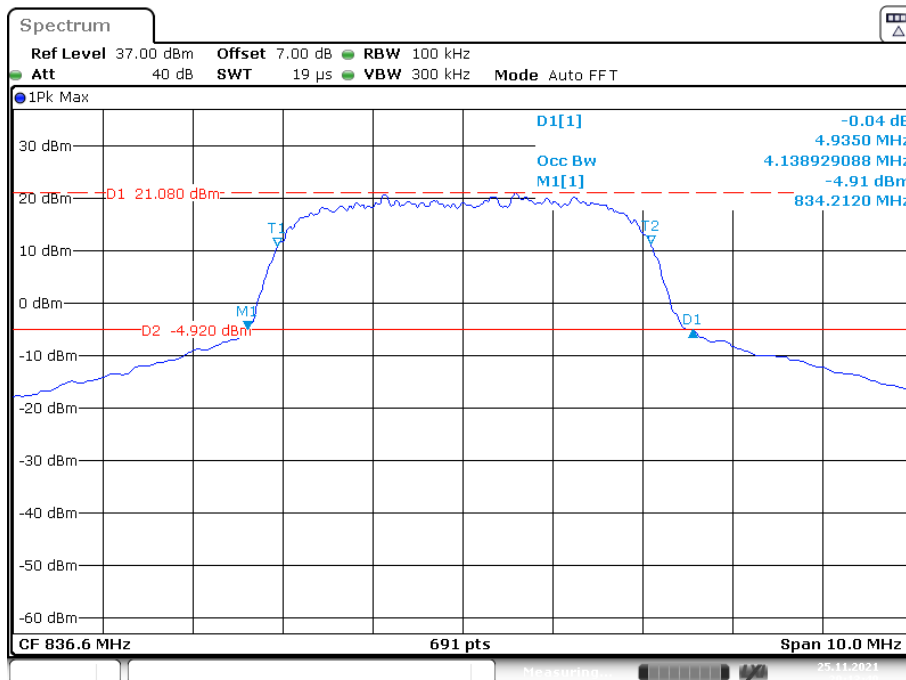
**26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode, High channel**



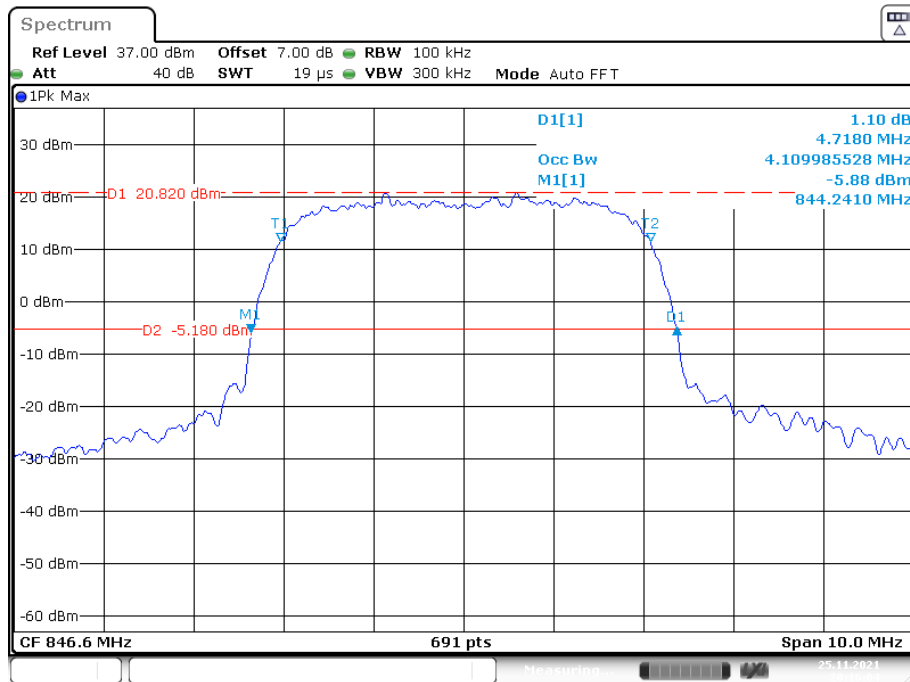
**26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, Low channel**



**26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, Middle channel**



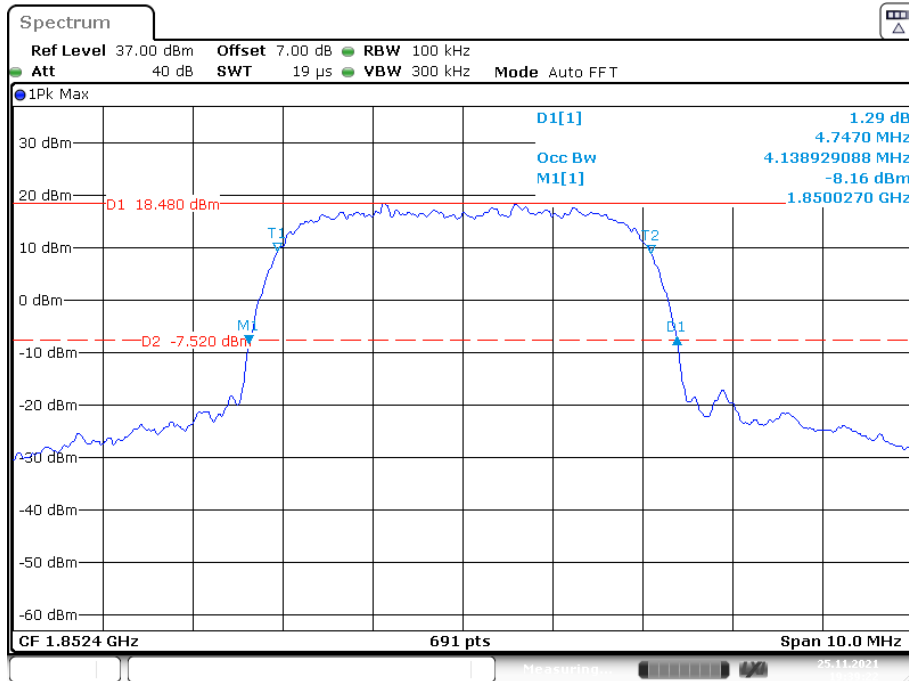
### 26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, High channel



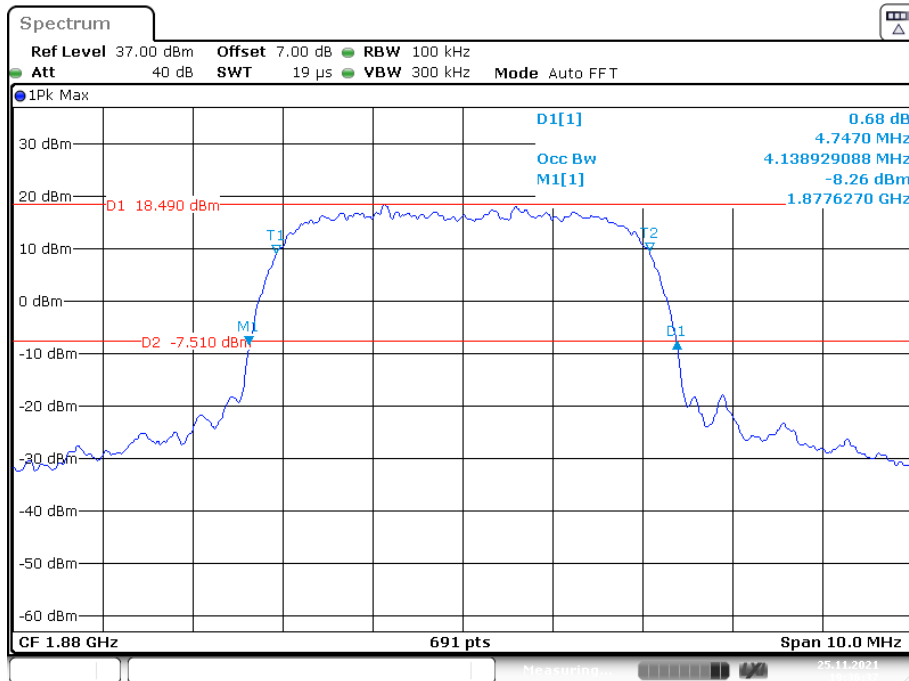
Date: 25.NOV.2021 20:16:04

PCS Band (Part 24E)

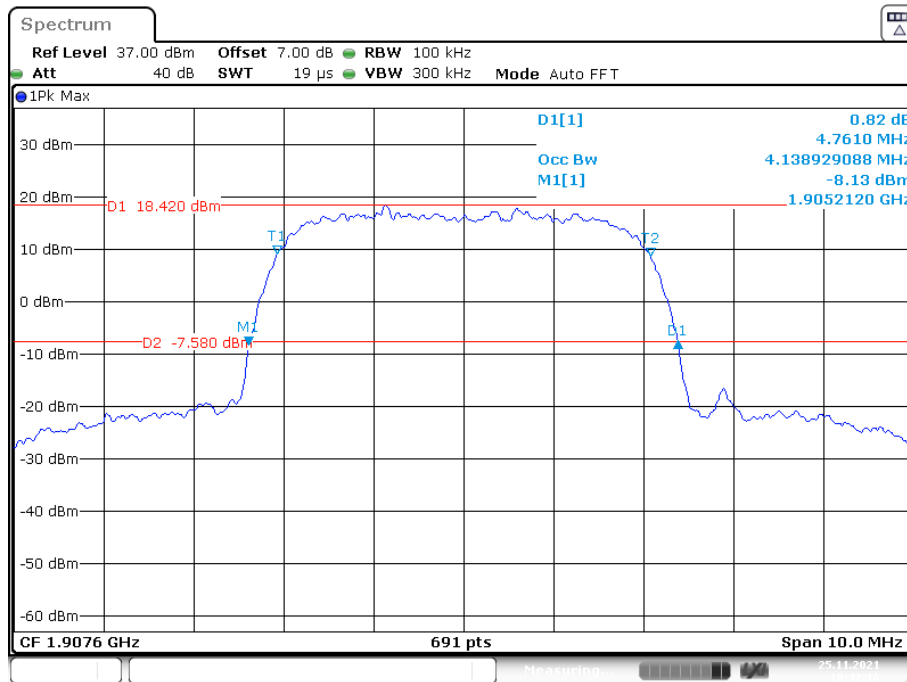
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, Low channel



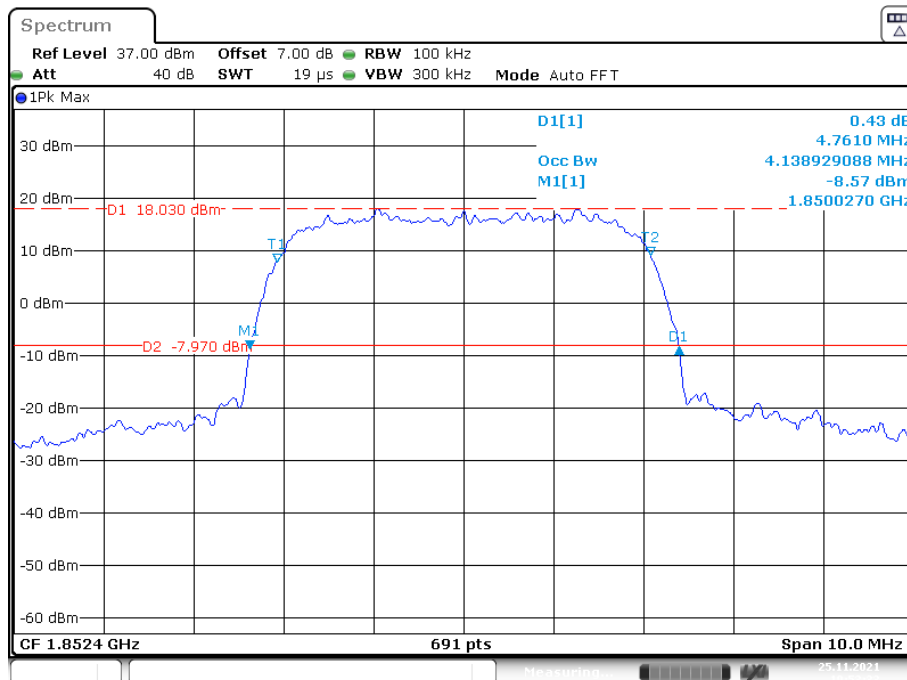
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, Middle channel



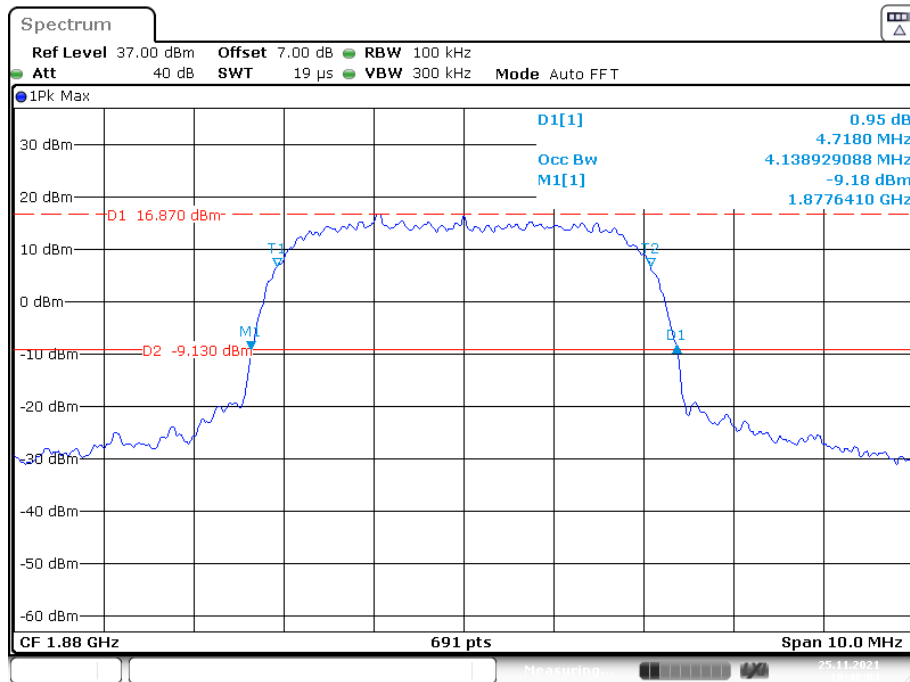
**26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode, High channel**



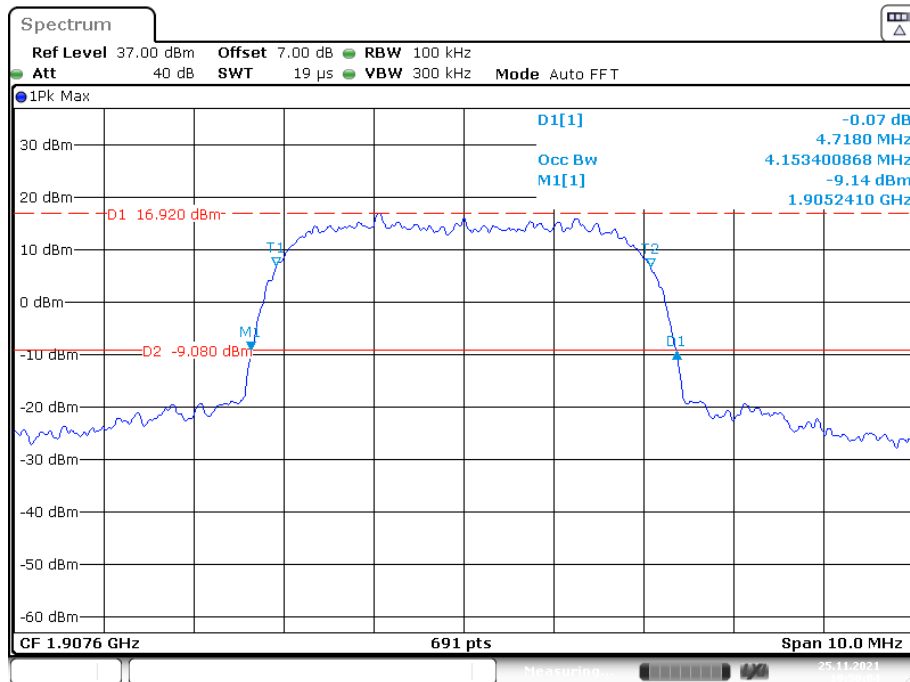
**26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode, Low channel**



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

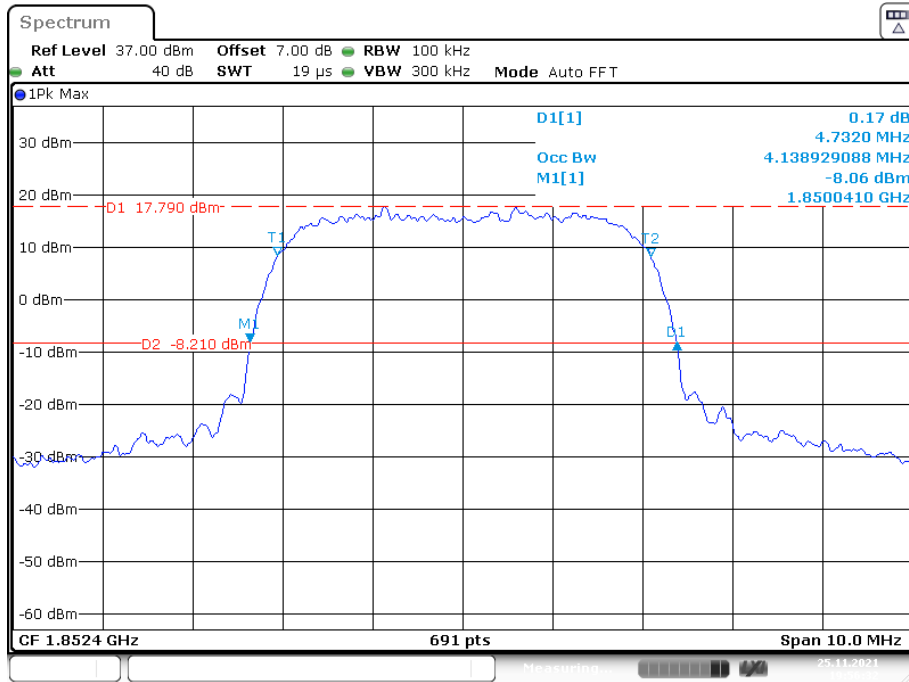


**26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode, High channel**

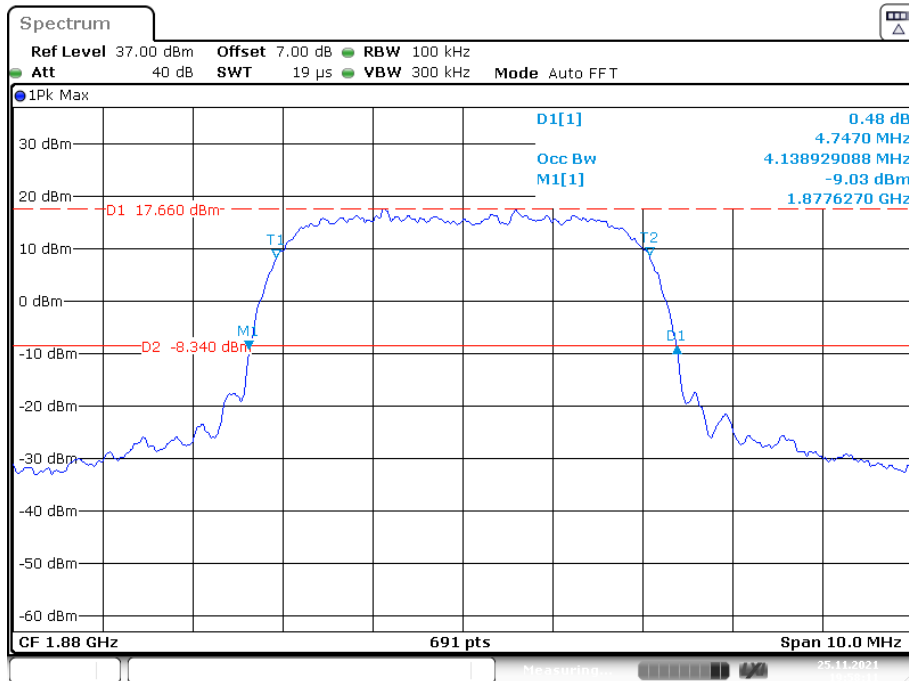




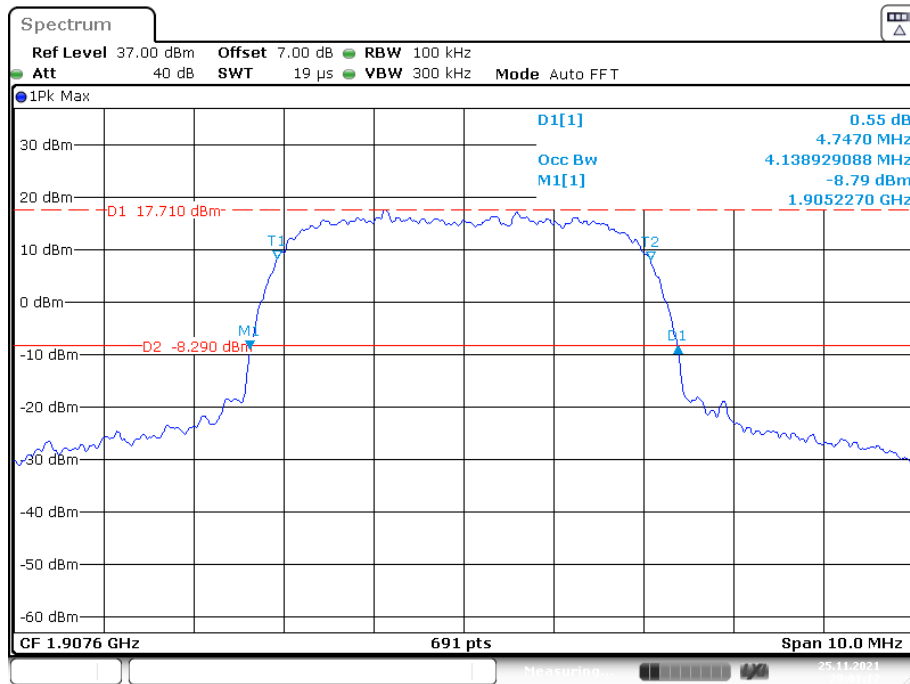
**26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, Low channel**



**26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, Middle channel**



**26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode, High channel**



**LTE Band 2:**

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.102	1.320	1.108	1.296	1.096	1.314
	16QAM	1.096	1.308	1.102	1.308	1.102	1.320
3 MHz	QPSK	2.695	2.940	2.695	2.940	2.683	2.976
	16QAM	2.695	2.964	2.683	2.952	2.683	2.964
5 MHz	QPSK	4.511	5.040	4.511	5.060	4.511	5.020
	16QAM	4.511	5.000	4.531	5.040	4.511	5.040
10 MHz	QPSK	8.942	9.840	8.942	9.760	8.942	9.720
	16QAM	8.942	9.680	8.942	9.720	8.942	9.720
15 MHz	QPSK	13.473	14.940	13.473	14.700	13.473	14.880
	16QAM	13.473	14.700	13.473	14.700	13.473	14.760
20 MHz	QPSK	17.884	19.280	17.884	19.440	17.964	19.520
	16QAM	17.964	19.360	17.964	19.440	17.884	19.520

**LTE Band 5:**

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.096	1.314	1.096	1.320	1.102	1.284
	16QAM	1.102	1.314	1.096	1.296	1.102	1.308
3 MHz	QPSK	2.683	2.940	2.695	2.940	2.683	2.952
	16QAM	2.683	2.976	2.683	2.964	2.683	2.940
5 MHz	QPSK	4.531	5.040	4.491	5.020	4.491	5.020
	16QAM	4.491	5.040	4.531	5.040	4.511	5.040
10 MHz	QPSK	8.982	9.840	8.901	9.680	8.982	9.840
	16QAM	8.942	9.680	8.901	9.680	8.982	9.800

The test plots of LTE band please refer to the Appendix A.

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

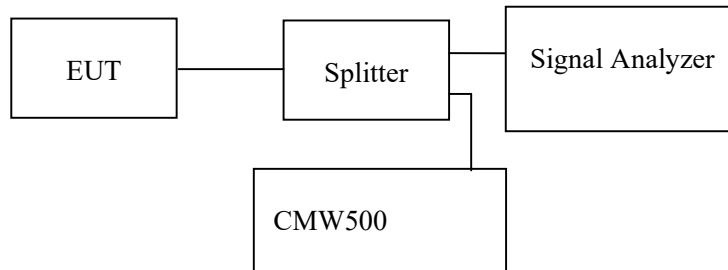
### Applicable Standard

FCC §2.1051, §22.917(a) and §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 100kHz for below 1GHz and 1MHz for above 1GHz. 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>	27.2 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.0 kPa

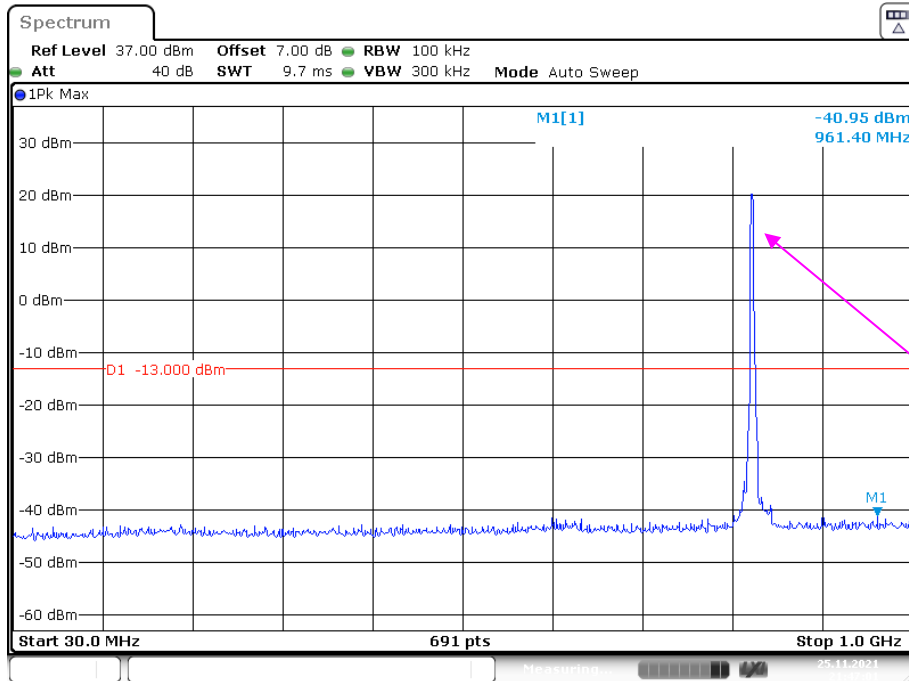
*The testing was performed by Black Ding on 2021-11-25.*

*EUT operation mode: Transmitting*

*Test result: Compliant, please refer to the following plots.*

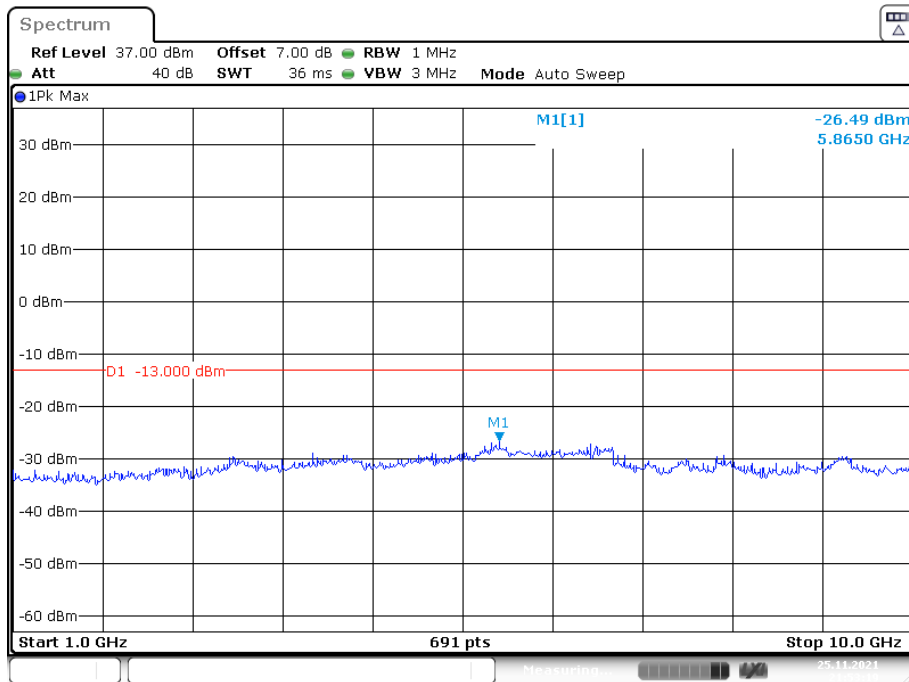
### Cellular Band (Part 22H) Low Channel

#### 30 MHz – 1 GHz (WCDMA Mode)



Date: 25.NOV.2021 21:47:01

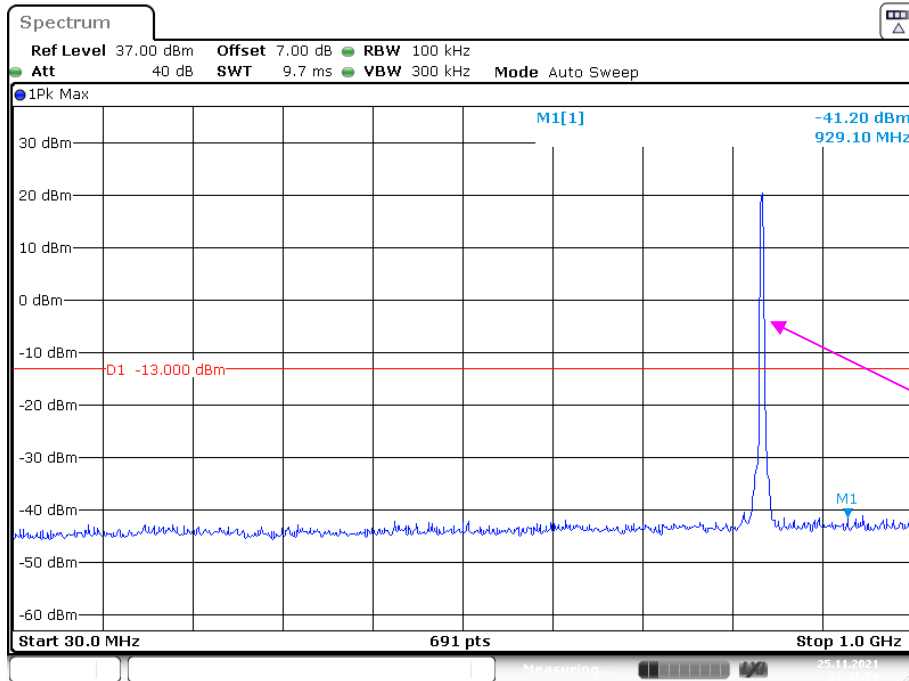
#### 1 GHz – 10 GHz (WCDMA Mode)



Date: 25.NOV.2021 21:53:19

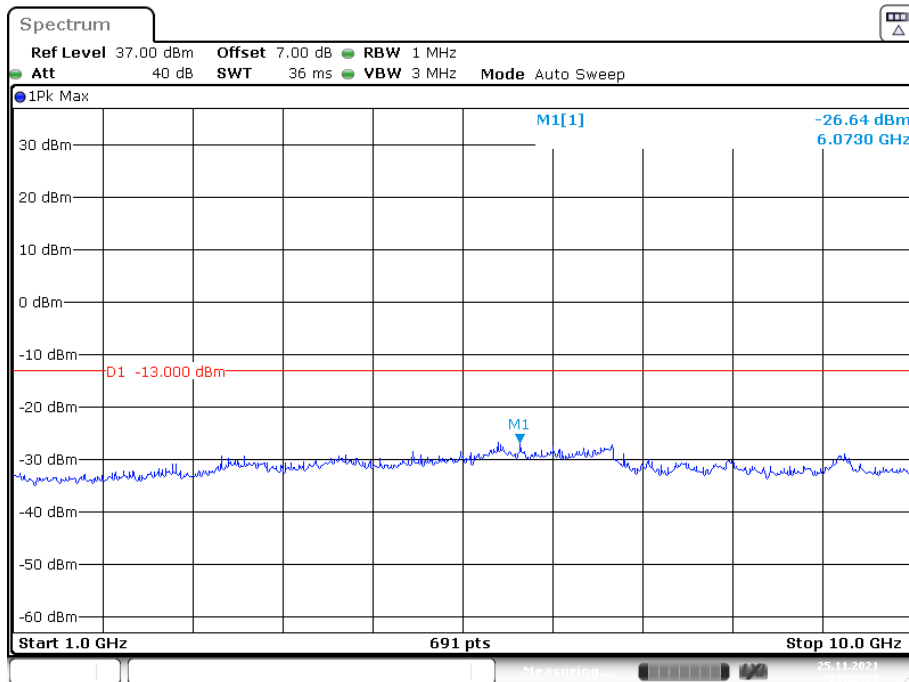
### Middle Channel

#### 30 MHz – 1 GHz (WCDMA Mode)



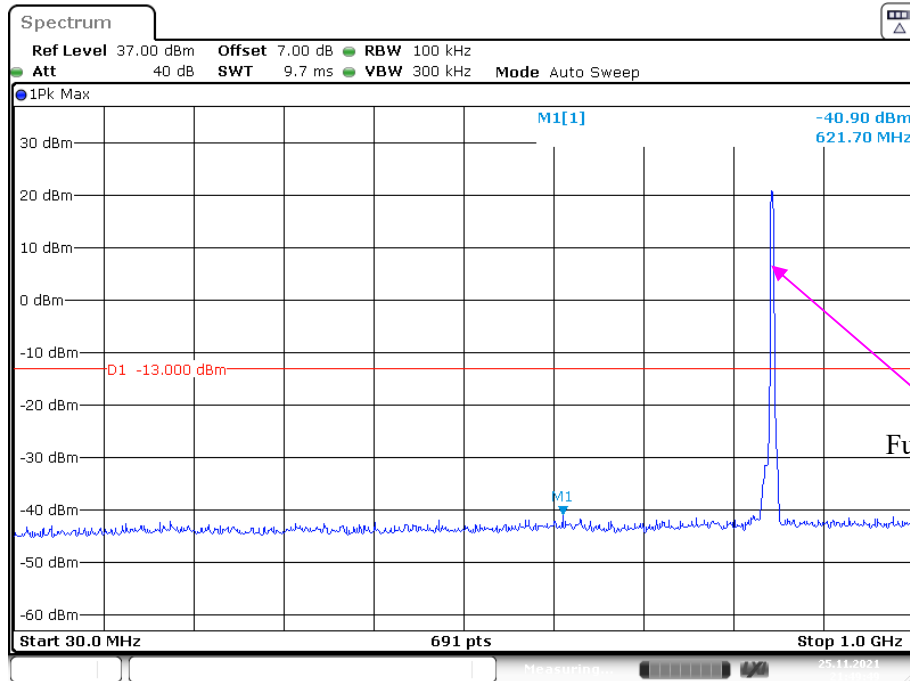
Fundamental test

#### 1 GHz – 10 GHz (WCDMA Mode)



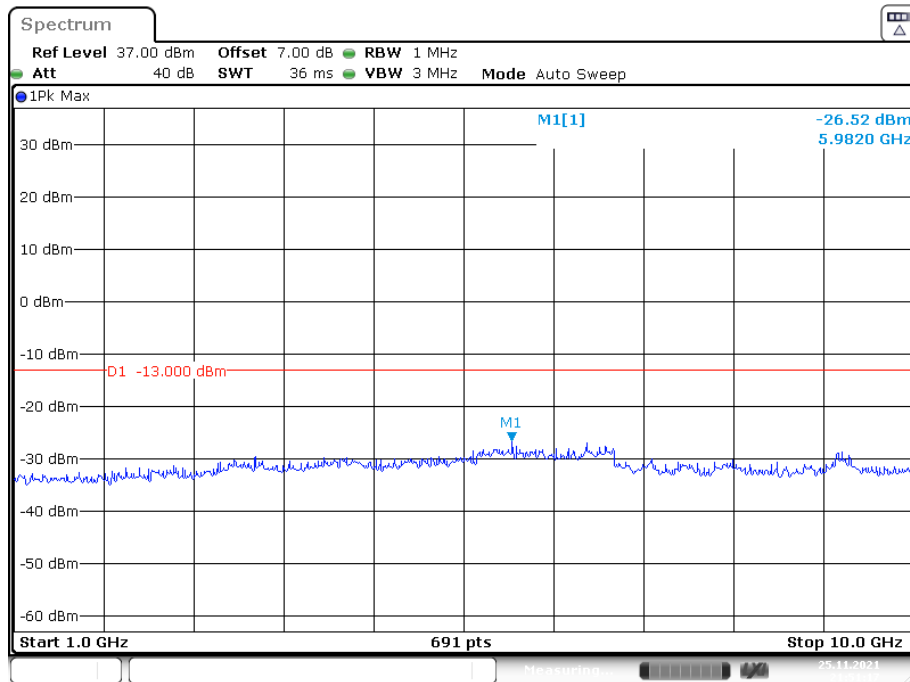
### High Channel

#### 30 MHz – 1 GHz (WCDMA Mode)



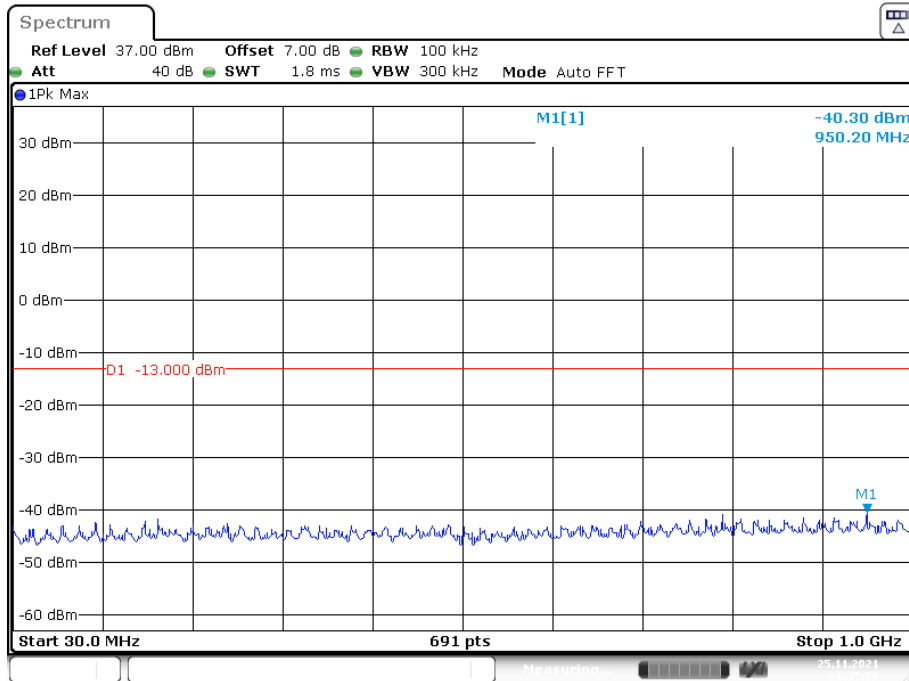
Fundamental test

#### 1 GHz – 10 GHz (WCDMA Mode)

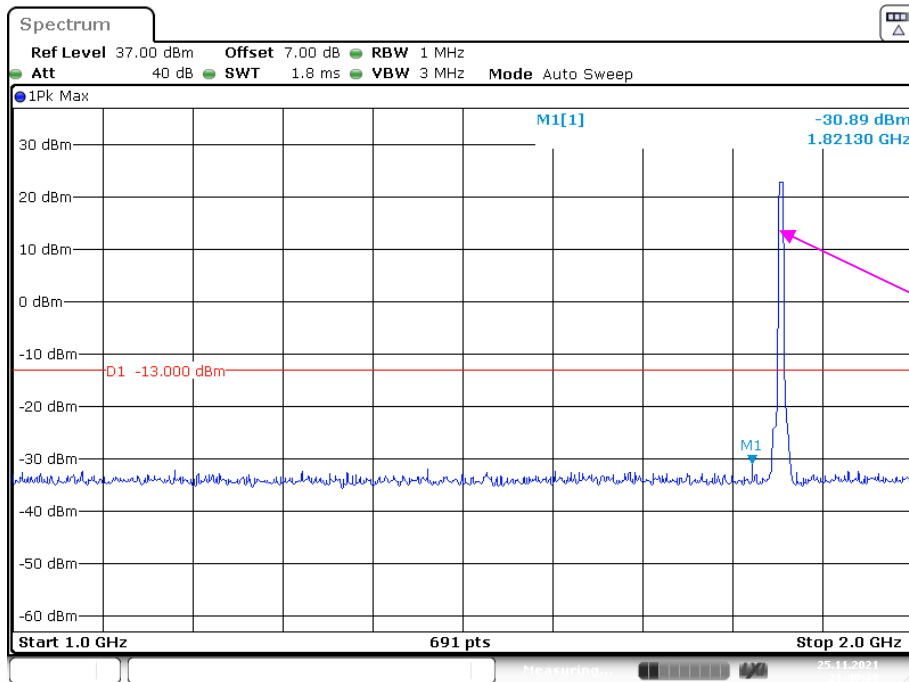


### PCS Band (Part 24E) Low Channel

#### 30 MHz – 1 GHz (WCDMA Mode)

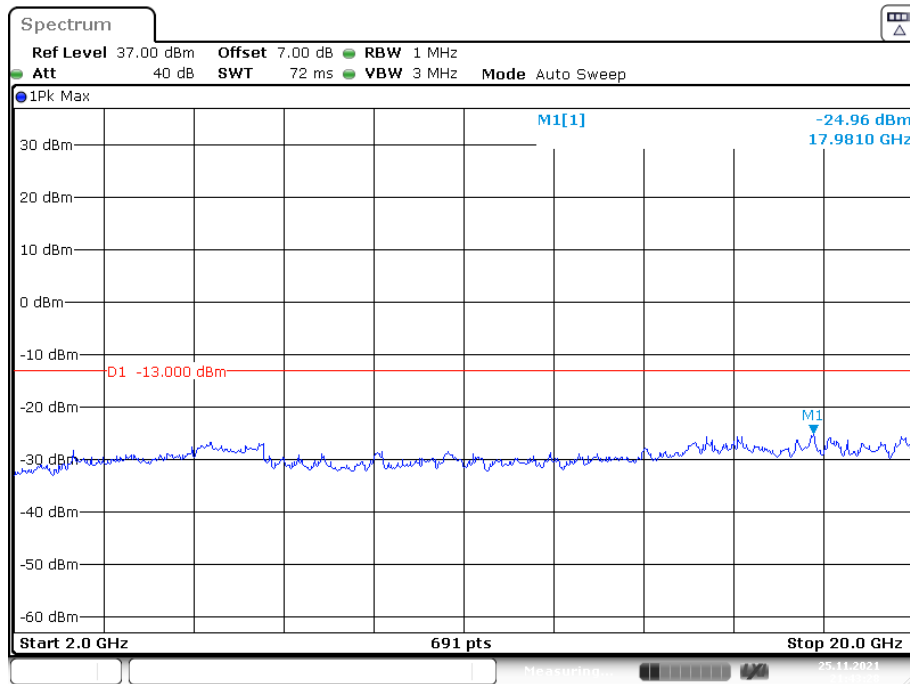


#### 1 GHz – 2 GHz (WCDMA Mode)



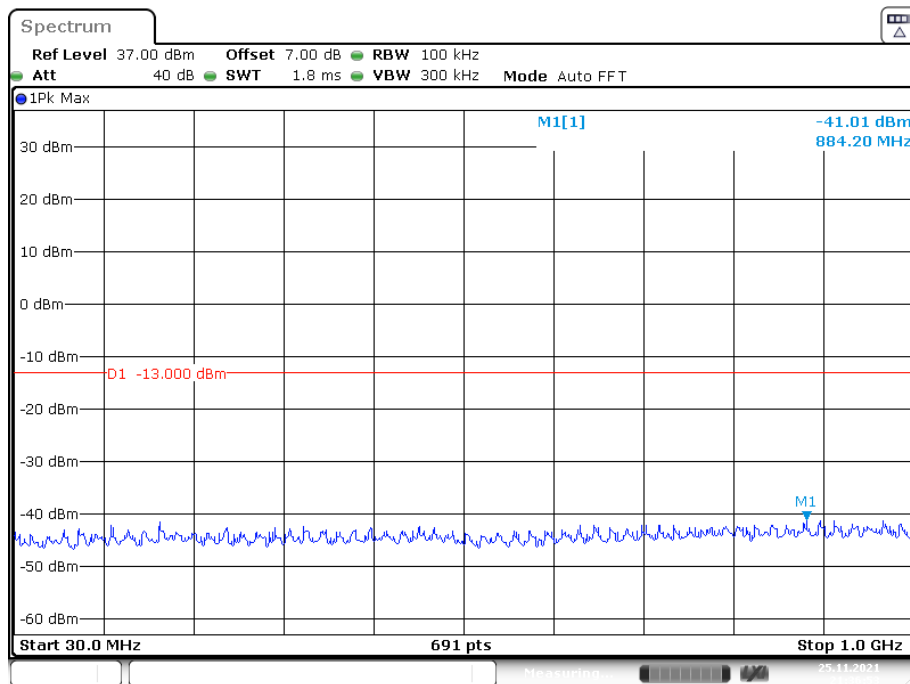


### 2 GHz – 20 GHz (WCDMA Mode)

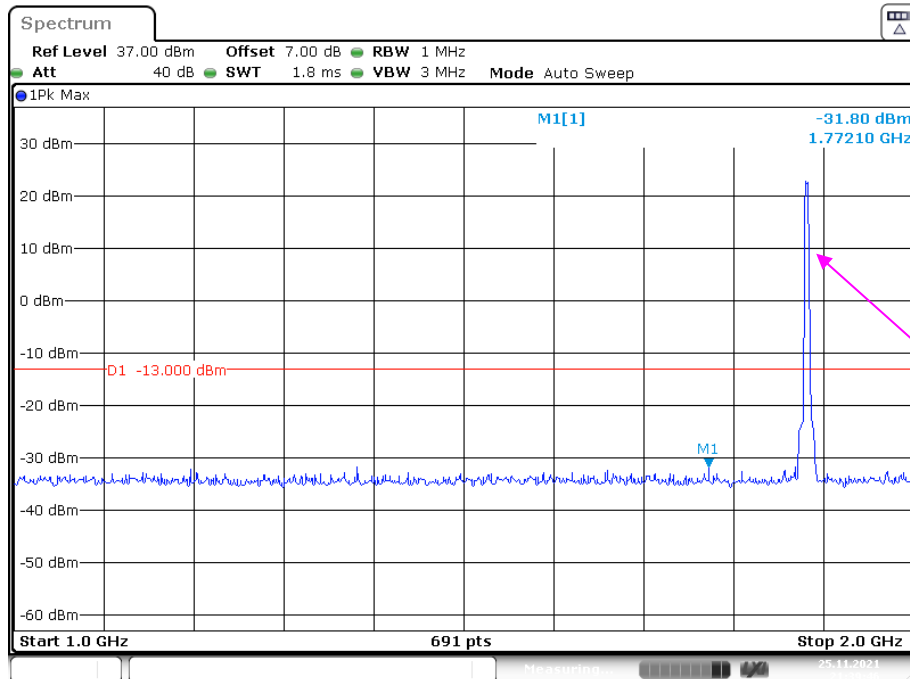


### Middle Channel

### 30 MHz – 1 GHz (WCDMA Mode)



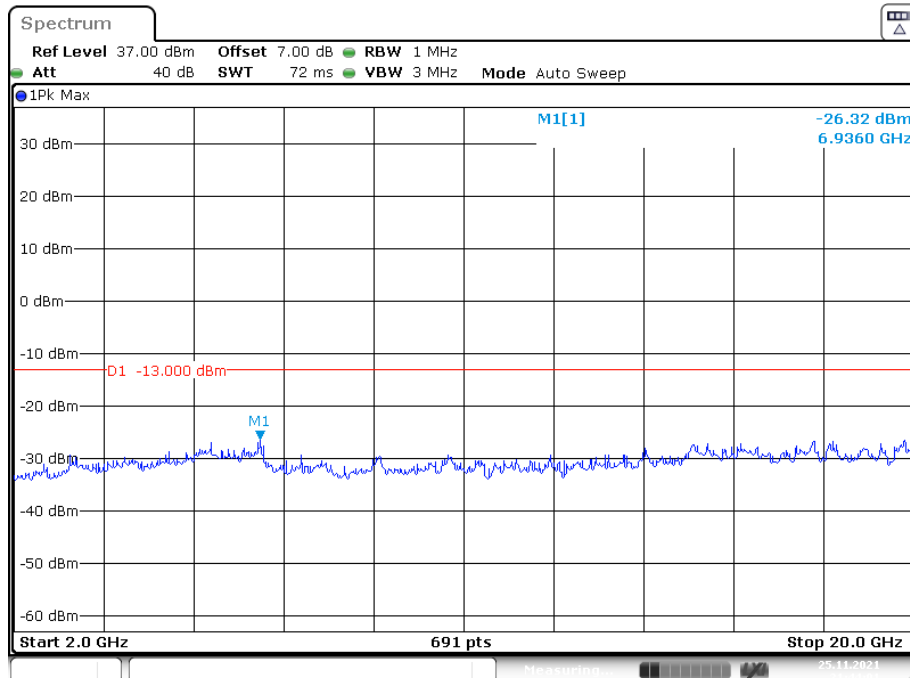
### 1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 25.NOV.2021 21:39:46

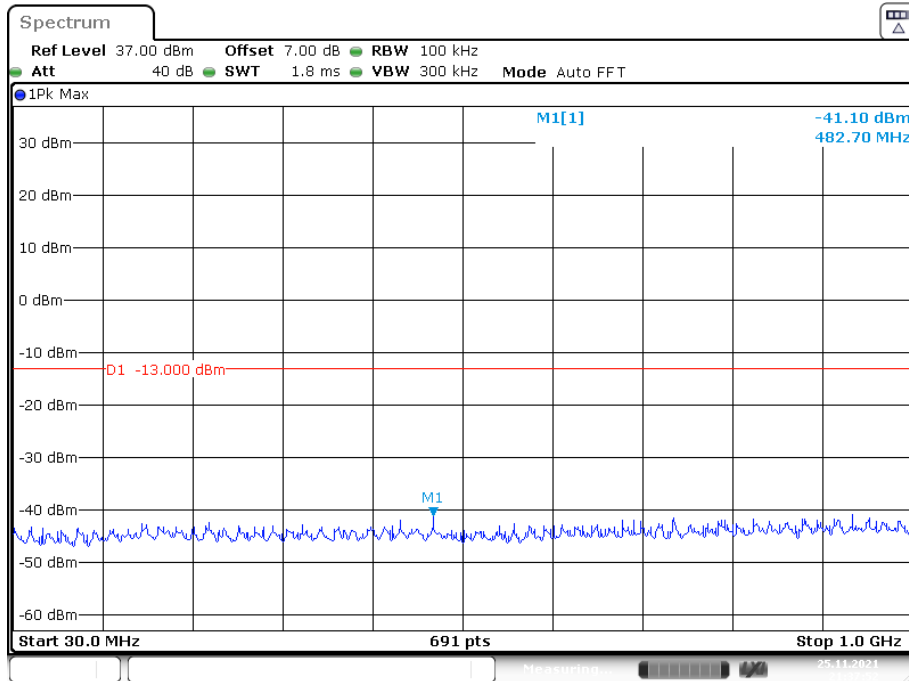
### 2 GHz – 20 GHz (WCDMA Mode)



Date: 25.NOV.2021 21:44:01

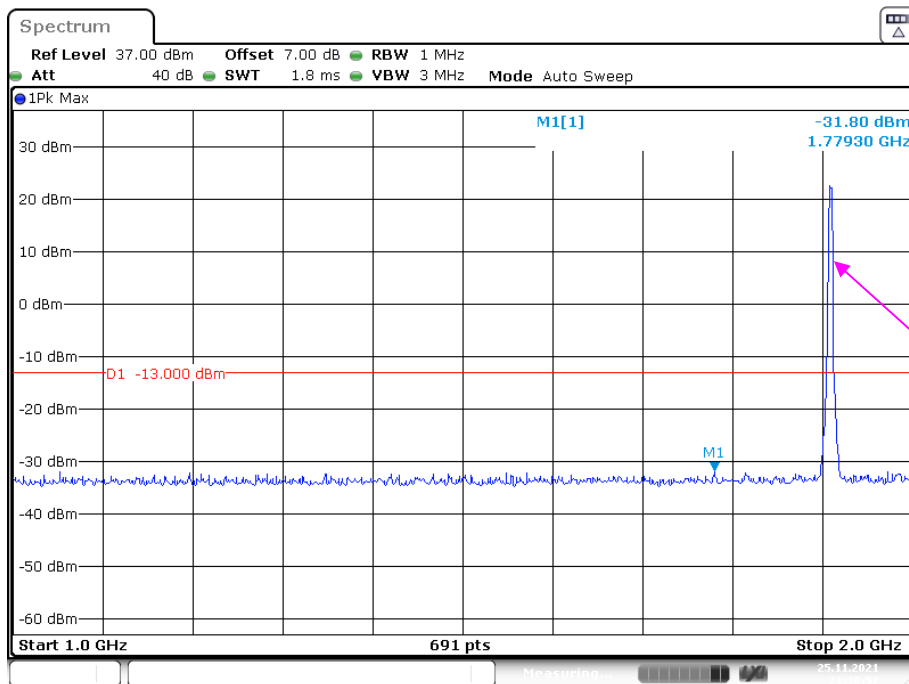
### High Channel

#### 30 MHz – 1 GHz (WCDMA Mode)



Date: 25.NOV.2021 21:37:52

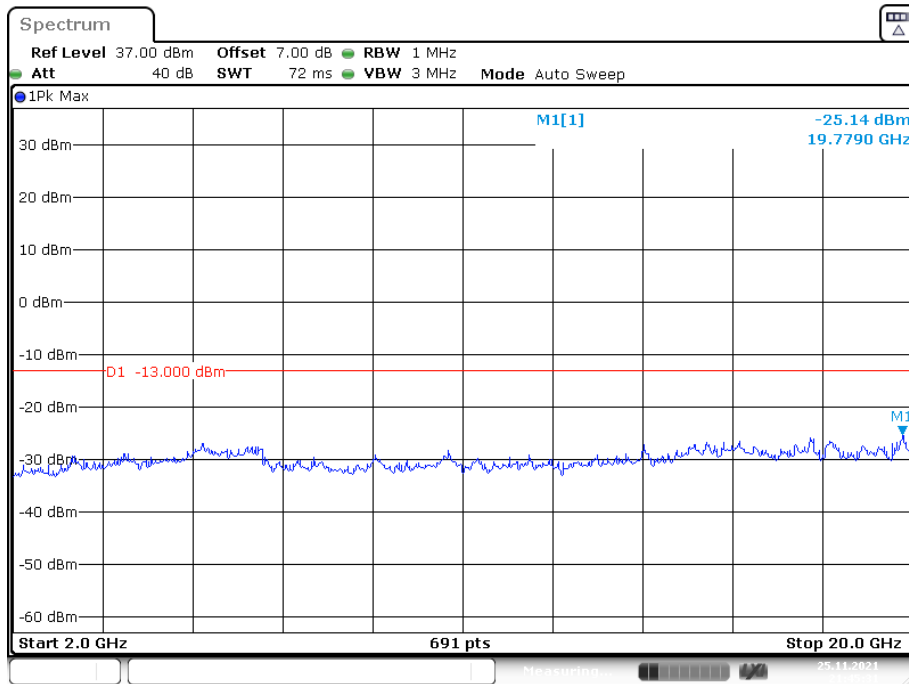
#### 1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 25.NOV.2021 21:38:57

### 2 GHz – 20 GHz (WCDMA Mode)



Date: 25.NOV.2021 21:45:30

The test plots of LTE band please refer to the Appendix B.

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

### **Applicable Standard**

FCC § 2.1053, §22.917(a) and § 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.

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.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log<sub>10</sub> (power out in Watts)

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	26~27°C
<b>Relative Humidity:</b>	54~56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Bin Deng on 2021-12-31 for below 1GHz and 2022-01-05 for above 1GHz.*

*EUT operation mode: Transmitting*

**30 MHz ~ 10 GHz:****Cellular Band (Part 22H)**

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
WCDMA Band 5								
Low Channel(826.4MHz)								
959.94	-55.07	60	1.4	H	10	-45.07	-13	-32.07
959.94	-56.74	6	1.5	V	11.7	-45.04	-13	-32.04
1652.8	-54.00	66	1.5	H	3.5	-50.50	-13	-37.50
1652.8	-51.40	332	2.3	V	3.1	-48.30	-13	-35.30
2479.2	-57.90	81	2.3	H	6.6	-51.30	-13	-38.30
2479.2	-56.30	65	1	V	5.8	-50.50	-13	-37.50
Middle Channel(836.6MHz)								
960.4	-54.56	198	2.4	H	10	-44.56	-13	-31.56
960.4	-56.5	250	1.7	V	11.7	-44.8	-13	-31.8
1673.2	-56.40	88	1.6	H	3.8	-52.60	-13	-39.60
1673.2	-55.30	57	2.2	V	3.1	-52.20	-13	-39.20
2509.8	-57.10	210	2.4	H	6.2	-50.90	-13	-37.90
2509.8	-55.80	350	2.5	V	5.6	-50.20	-13	-37.20
High Channel(846.6MHz)								
960.16	-55.31	148	1.9	H	10	-45.31	-13	-32.31
960.16	-57.16	52	1.5	V	11.7	-45.46	-13	-32.46
1693.2	-57.40	263	1.1	H	4.1	-53.30	-13	-40.30
1693.2	-56.10	346	2.2	V	3.1	-53.00	-13	-40.00
2539.8	-56.80	311	1.7	H	6.1	-50.70	-13	-37.70
2539.8	-56.00	39	1.6	V	5.8	-50.20	-13	-37.20

**30 MHz ~ 20 GHz:****PCS Band (Part 24E)**

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
WCDMA Band 2								
Low Channel(1852.4MHz)								
959.98	-54.99	259	2.1	H	10	-44.99	-13	-31.99
959.98	-57.13	157	1.2	V	11.7	-45.43	-13	-32.43
3704.8	-49.30	286	2.1	H	8.1	-41.20	-13	-28.20
3704.8	-45.50	92	1.2	V	7.6	-37.90	-13	-24.90
5557.2	-52.50	337	2.3	H	9.6	-42.90	-13	-29.90
5557.2	-50.70	31	1.7	V	9.1	-41.60	-13	-28.60
Middle Channel (1880MHz)								
960.03	-55.39	258	2.4	H	10	-45.39	-13	-32.39
960.03	-57.05	204	1.7	V	11.7	-45.35	-13	-32.35
3760	-47.10	164	1.1	H	8.8	-38.30	-13	-25.30
3760	-44.10	44	1.1	V	8	-36.10	-13	-23.10
5640	-47.40	274	2.1	H	10.2	-37.20	-13	-24.20
5640	-45.70	238	1.9	V	9.4	-36.30	-13	-23.30
High Channel(1907.6MHz)								
959.51	-55.19	307	1.5	H	10	-45.19	-13	-32.19
959.51	-57.47	201	1.7	V	11.7	-45.77	-13	-32.77
3815.2	-42.30	283	2.4	H	8.7	-33.60	-13	-20.60
3815.2	-39.50	95	1.2	V	7.9	-31.60	-13	-18.60
5722.8	-46.70	180	1.9	H	10.6	-36.10	-13	-23.10
5722.8	-44.10	346	1	V	10.2	-33.90	-13	-20.90

**LTE Band:** (prescan all bandwidth, the worst case as below)

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
Band 2								
Test frequency range: 30MHz-20GHz								
1.4MHz bandwidth, Low Channel(1850.7 MHz)								
960.41	-54.94	64	1.3	H	10	-44.94	-13	-31.94
960.41	-56.72	44	2.3	V	11.7	-45.02	-13	-32.02
3701.4	-44.30	98	2.4	H	8.1	-36.20	-13	-23.20
3701.4	-40.40	10	1.2	V	7.6	-32.80	-13	-19.80
5552.1	-49.70	7	2.3	H	9.6	-40.10	-13	-27.10
5552.1	-46.20	316	1.1	V	9.1	-37.10	-13	-24.10
1.4MHz bandwidth, Middle Channel(1880 MHz)								
960.01	-54.62	252	2.2	H	10	-44.62	-13	-31.62
960.01	-56.6	270	1.3	V	11.7	-44.9	-13	-31.9
3760	-39.80	237	1.1	H	8.8	-31.00	-13	-18.00
3760	-36.50	11	2.1	V	8	-28.50	-13	-15.50
5640	-49.60	300	1.1	H	10.2	-39.40	-13	-26.40
5640	-44.30	335	1.2	V	9.4	-34.90	-13	-21.90
1.4MHz bandwidth, High Channel(1909.3 MHz)								
959.54	-55.37	80	2	H	10	-45.37	-13	-32.37
959.54	-56.81	76	1.2	V	11.7	-45.11	-13	-32.11
3818.6	-35.10	37	1.2	H	8.7	-26.40	-13	-13.40
3818.6	-32.40	97	2.2	V	7.9	-24.50	-13	-11.50
5727.9	-40.20	209	2.3	H	10.6	-29.60	-13	-16.60
5727.9	-37.20	117	1.2	V	10.2	-27.00	-13	-14.00



Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
Band 5								
Test frequency range: 30MHz-10GHz								
1.4MHz bandwidth, Low Channel(824.7 MHz)								
960.15	-55.41	143	1.2	H	10	-45.41	-13	-32.41
960.15	-56.67	255	2	V	11.7	-44.97	-13	-31.97
1649.4	-54.20	167	2.5	H	3.5	-50.70	-13	-37.70
1649.4	-50.30	258	2.1	V	3.1	-47.20	-13	-34.20
2474.1	-44.10	26	2	H	6.6	-37.50	-13	-24.50
2474.1	-41.80	104	1.4	V	5.8	-36.00	-13	-23.00
3298.8	-52.20	96	2.2	H	6.4	-45.80	-13	-32.80
3298.8	-51.80	16	1.3	V	5.7	-46.10	-13	-33.10
1.4MHz bandwidth, Middle Channel(836.5 MHz)								
960.47	-54.97	164	1.9	H	10	-44.97	-13	-31.97
960.47	-57.31	304	1.5	V	11.7	-45.61	-13	-32.61
1673.0	-51.80	235	2.1	H	3.8	-48.00	-13	-35.00
1673.0	-49.00	356	2.1	V	3.1	-45.90	-13	-32.90
2509.5	-47.90	216	2	H	6.2	-41.70	-13	-28.70
2509.5	-48.00	252	2.1	V	5.6	-42.40	-13	-29.40
3346.0	-52.80	211	2.3	H	6.6	-46.20	-13	-33.20
3346.0	-51.30	23	1.2	V	5.4	-45.90	-13	-32.90
1.4MHz bandwidth, High Channel(848.3 MHz)								
960.21	-54.91	227	1.3	H	10	-44.91	-13	-31.91
960.21	-56.52	137	1	V	11.7	-44.82	-13	-31.82
1696.6	-54.60	225	2.1	H	4.1	-50.50	-13	-37.50
1696.6	-52.40	90	1.1	V	3.1	-49.30	-13	-36.30
2544.9	-48.30	102	2.5	H	6.1	-42.20	-13	-29.20
2544.9	-46.10	284	2.0	V	5.8	-40.30	-13	-27.30
3393.2	-52.60	354	1.2	H	6.2	-46.40	-13	-33.40
3393.2	-51.40	318	2.1	V	5.4	-46.00	-13	-33.00

Note:

Absolute Level = Reading Level + Substituted Factor

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

Margin = Absolute Level - Limit

For simultaneous transmitting condition, please refer to DTS report.

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

### Applicable Standard

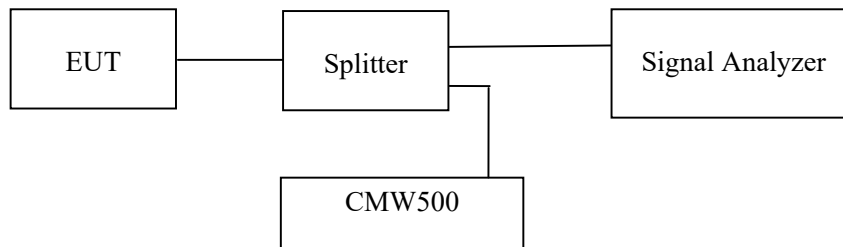
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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

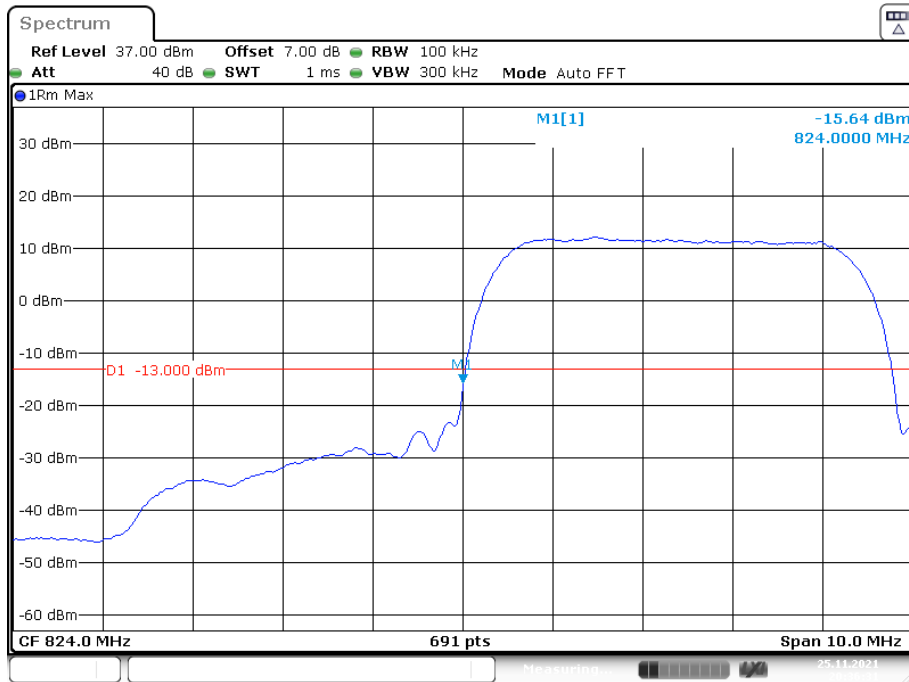
<b>Temperature:</b>	27.2 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Black Ding on 2021-11-25.*

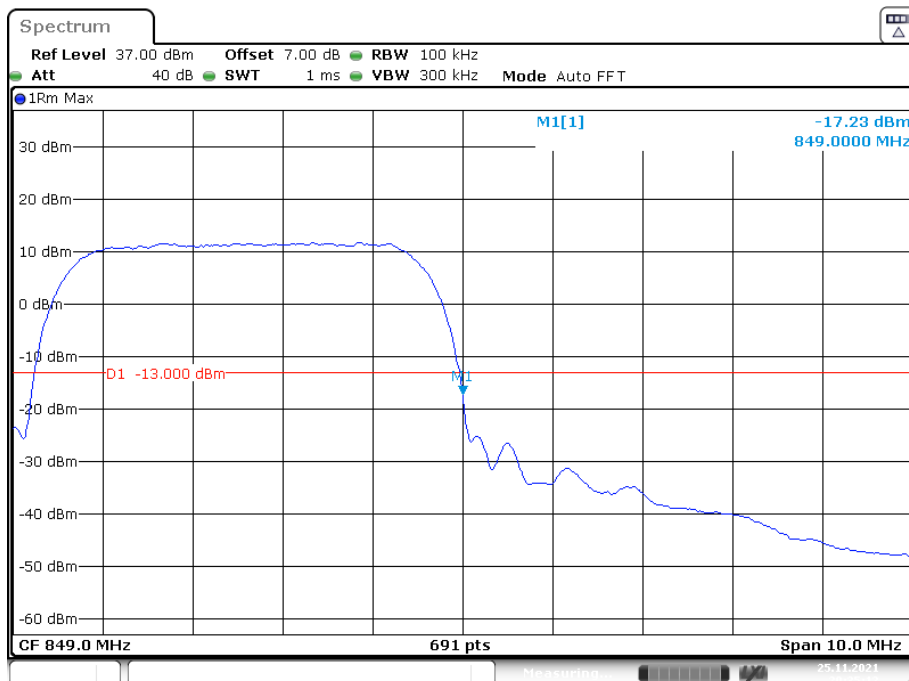
*EUT operation mode: Transmitting*

*Test Result: Compliant. Please refer to the following plots.*

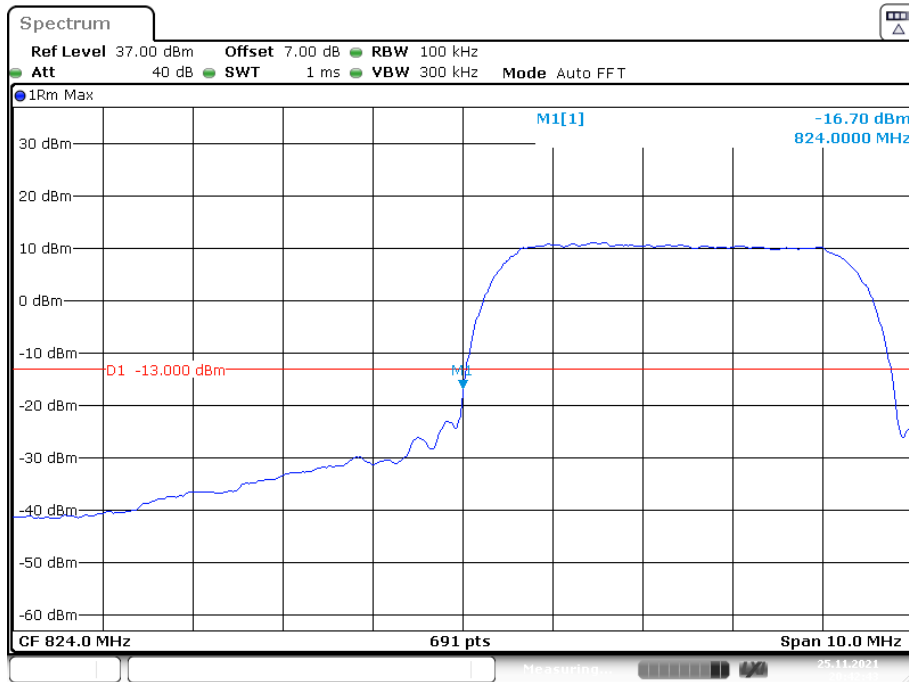
### Cellular Band, Left Band Edge for RMC (BPSK) Mode



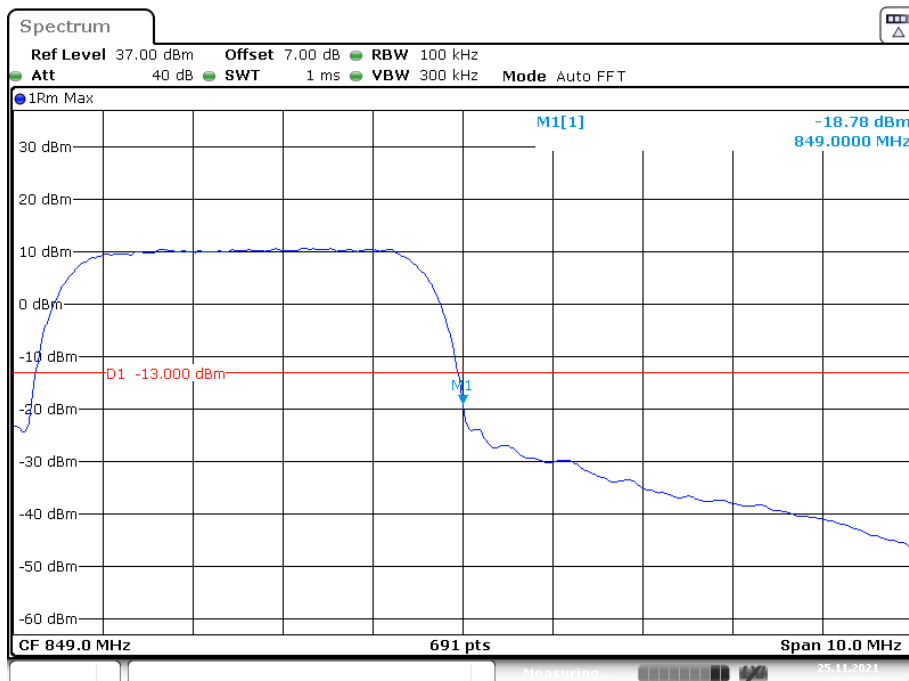
### Cellular Band, Right Band Edge for RMC (BPSK) Mode



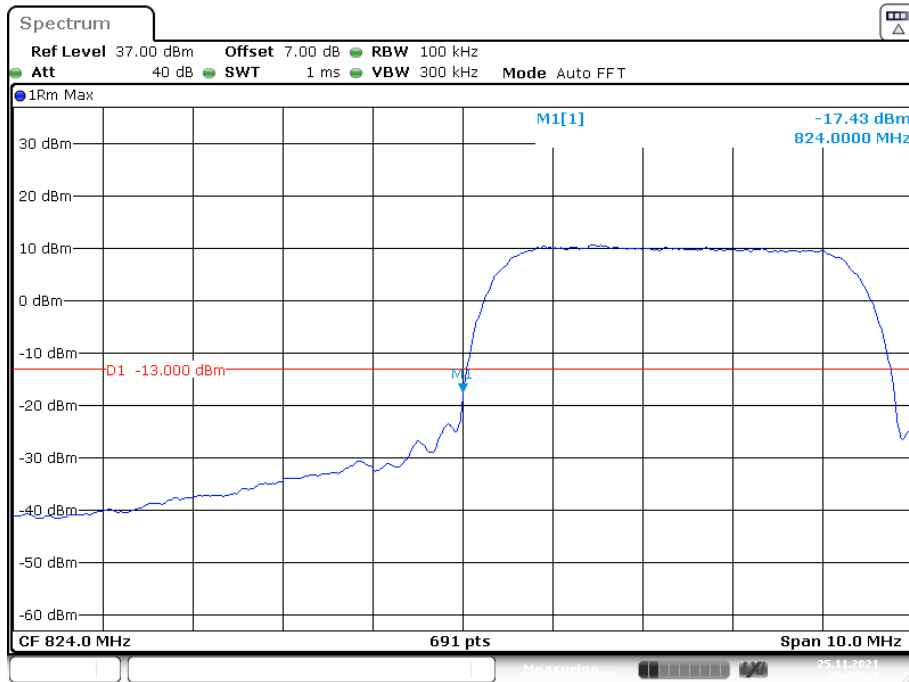
### Cellular Band, Left Band Edge for HSDPA(16QAM) Mode



### Cellular Band, Right Band Edge for HSDPA (16QAM) Mode

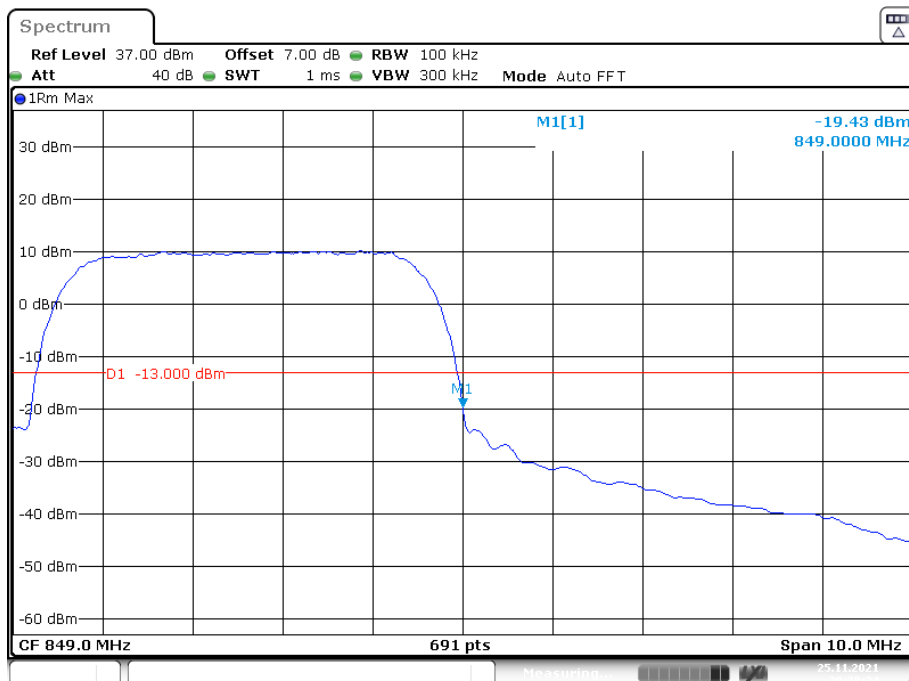


### Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



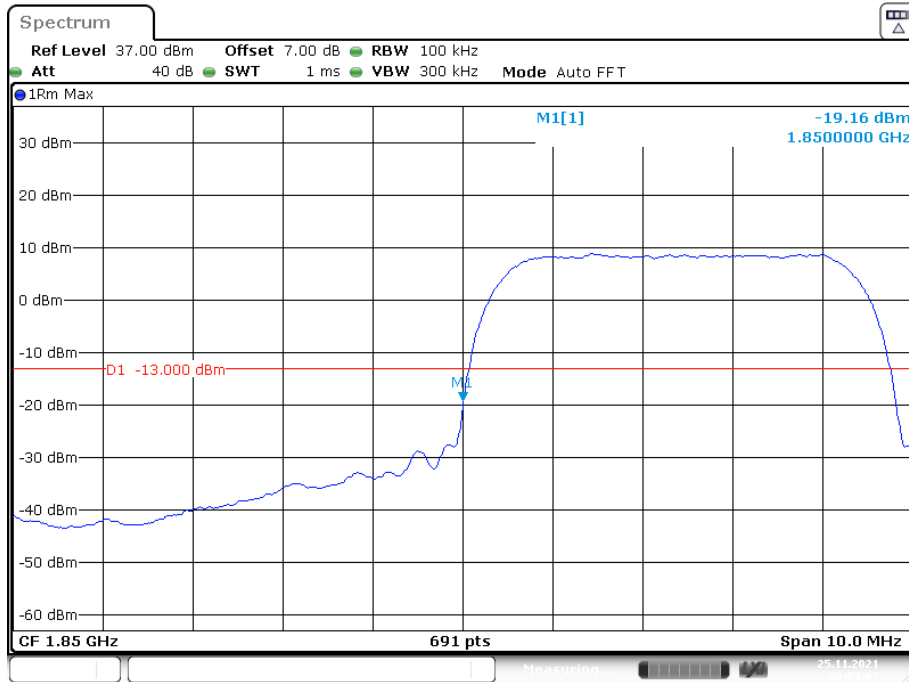
Date: 25.NOV.2021 20:37:34

### Cellular Band, Right Band Edge for HSUPA (BPSK) Mode

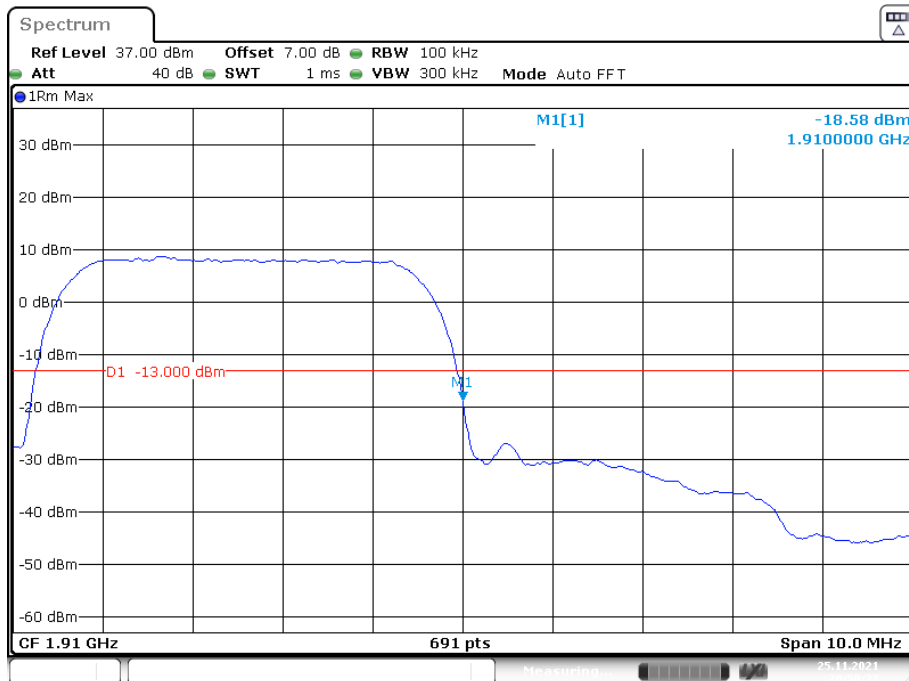


Date: 25.NOV.2021 20:38:25

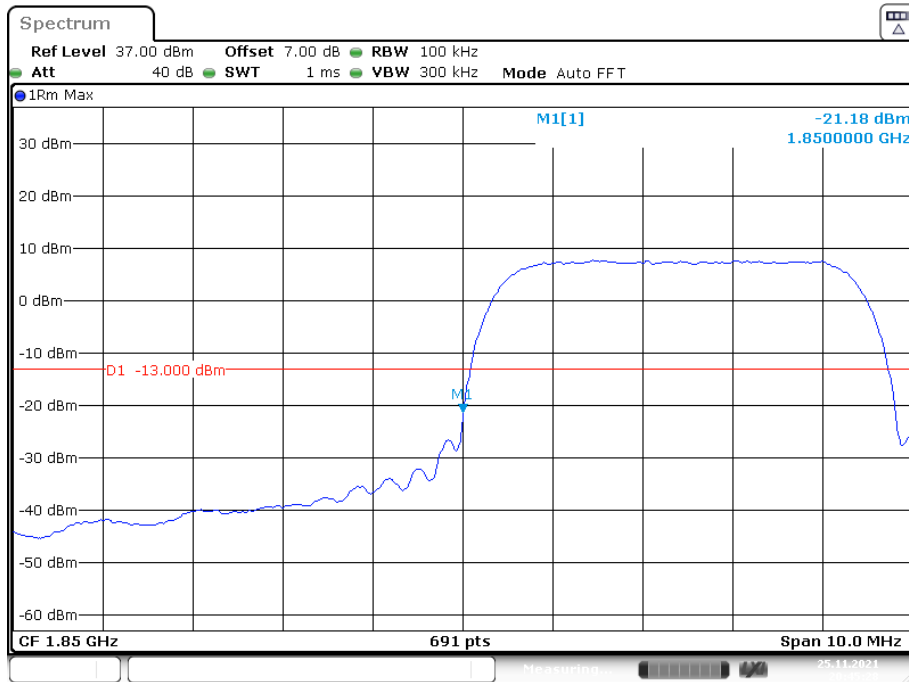
### PCS Band, Left Band Edge for RMC (BPSK) Mode



### PCS Band, Right Band Edge for RMC (BPSK) Mode

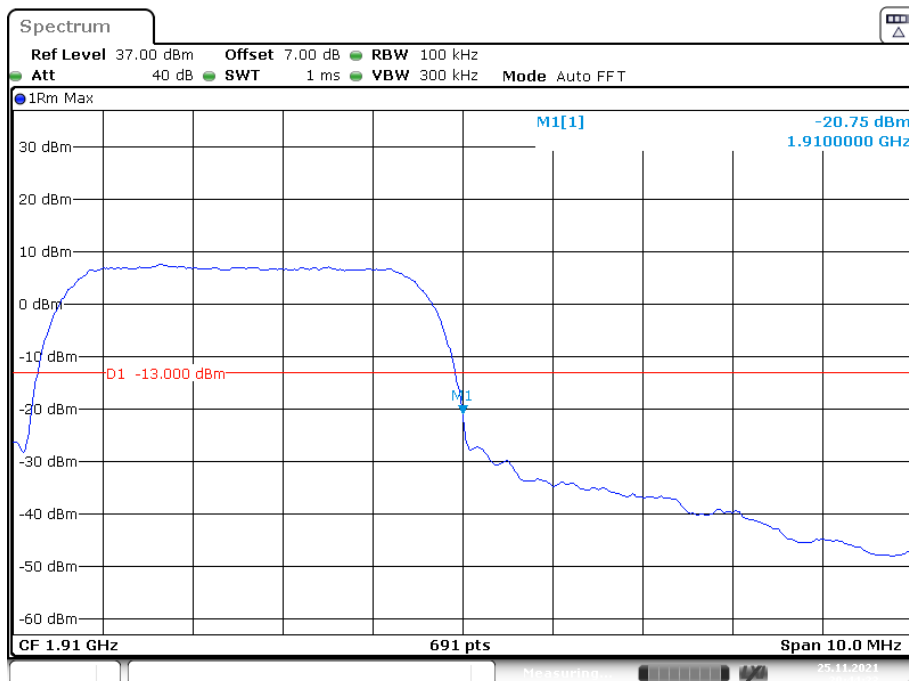


### PCS Band, Left Band Edge forHSDPA(16QAM) Mode



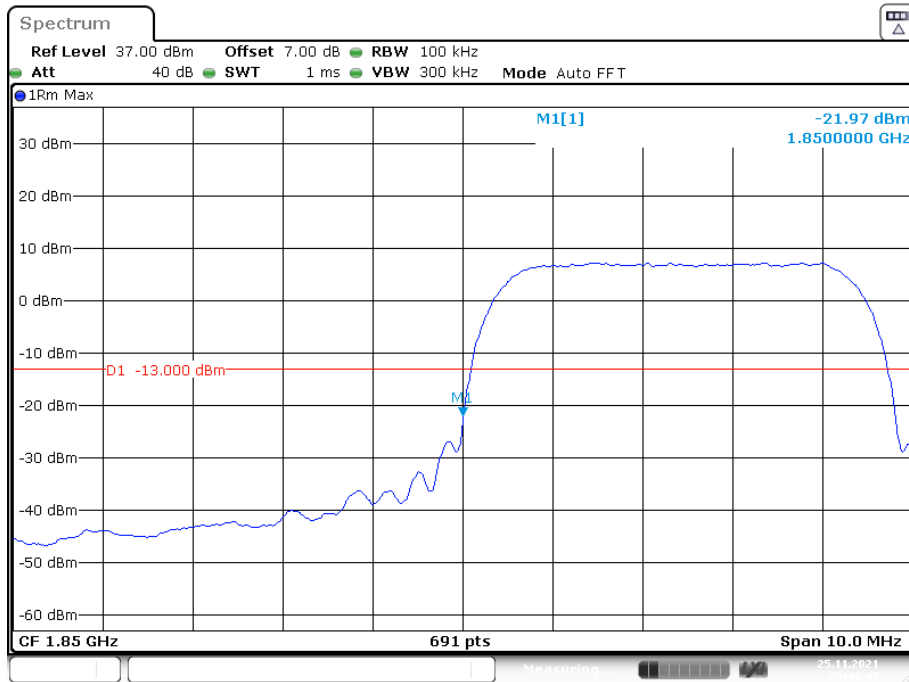
Date: 25.NOV.2021 20:45:29

### PCS Band, Right Band Edge forHSDPA (16QAM) Mode

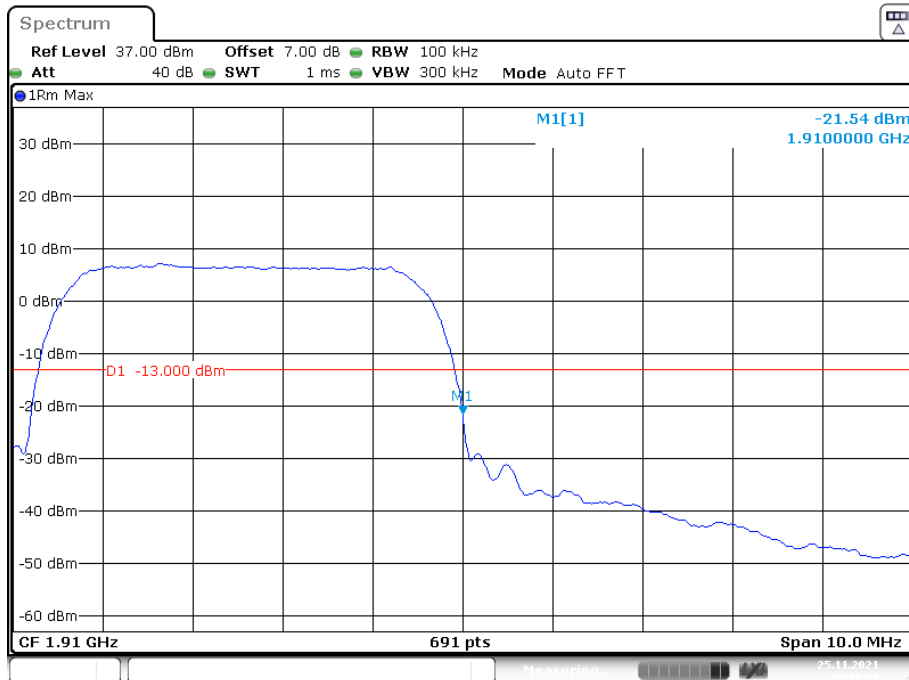


Date: 25.NOV.2021 20:44:24

### PCS Band, Left Band Edge for HSUPA (BPSK) Mode



### PCS Band, Right Band Edge for HSUPA (BPSK) Mode



The test plots of LTE bands please refer to the Appendix C.



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

### **Applicable Standard**

FCC § 2.1055, §22.355 and §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

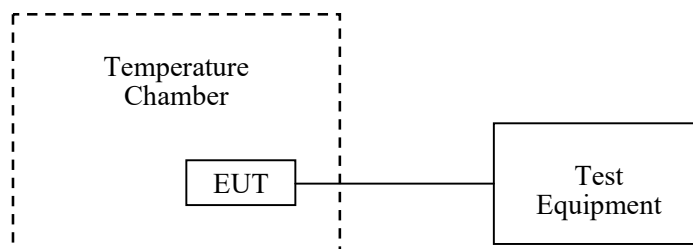
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **Test Procedure**

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external 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.

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>	27.2 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Black Ding on 2021-11-25.*

*EUT operation mode: Transmitting*

*Test Result: Compliant. Please refer to the following tables.*

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

<b>Middle Channel, <math>f_0=836.6\text{MHz}</math></b>				
<b>Temperature (°C)</b>	<b>Voltage Supplied (V<sub>AC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Limit (ppm)</b>
-30	120	10	0.0120	2.5
-20		9	0.0108	2.5
-10		10	0.0120	2.5
0		11	0.0131	2.5
10		9	0.0108	2.5
20		8	0.0096	2.5
30		9	0.0108	2.5
40		8	0.0096	2.5
50		11	0.0131	2.5
20		102	10	0.0120
	138	11	0.0131	2.5

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

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Voltage Supplied ( $V_{AC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	120	10	0.0053	pass
-20		9	0.0048	pass
-10		9	0.0048	pass
0		10	0.0053	pass
10		11	0.0059	pass
20		10	0.0053	pass
30		9	0.0048	pass
40		10	0.0053	pass
50		10	0.0053	pass
20		102	9	0.0048
	138	11	0.0059	pass

**LTE:**  
**QPSK:**  
**Band 2:**

10.0 MHz Middle Channel, $f_0=1880$ MHz				
Temperature (°C)	Voltage Supplied ( $V_{AC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	120	-1.29	-0.0007	pass
-20		-9.97	-0.0053	pass
-10		-6.13	-0.0033	pass
0		6.17	0.0033	pass
10		7.92	0.0042	pass
20		6.46	0.0034	pass
30		-6.52	-0.0035	pass
40		7.18	0.0038	pass
50		-9.69	-0.0052	pass
20		102	-8.17	-0.0043
	138	-7.05	-0.0038	pass

**Band 5:**

10.0 MHz Middle Channel, $f_0 = 836.5\text{MHz}$				
Temperature (°C)	Voltage Supplied ( $V_{AC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	120	-0.49	-0.0006	2.5
-20		9.11	0.0109	2.5
-10		8.51	0.0102	2.5
0		-7.15	-0.0085	2.5
10		-5.29	-0.0063	2.5
20		7.24	0.0087	2.5
30		-5.81	-0.0069	2.5
40		5.59	0.0067	2.5
50		6.87	0.0082	2.5
20		102	9.94	0.0119
	138	9.99	0.0119	2.5

**16QAM:****Band 2:**

10.0 MHz Middle Channel, $f_0 = 1880\text{MHz}$				
Temperature (°C)	Voltage Supplied ( $V_{AC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	120	0.13	0.0001	pass
-20		-6.68	-0.0036	pass
-10		9.77	0.0052	pass
0		-7.62	-0.0041	pass
10		-9.91	-0.0053	pass
20		-9.82	-0.0052	pass
30		-6.68	-0.0036	pass
40		-8.85	-0.0047	pass
50		5.67	0.0030	pass
20		102	6.05	0.0032
	138	7.52	0.0040	pass

**Band 5:**

10.0 MHz Middle Channel, $f_0 = 836.5\text{MHz}$				
Temperature (°C)	Voltage Supplied ( $V_{AC}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	120	-0.89	-0.0011	2.5
-20		6.80	0.0081	2.5
-10		-9.52	-0.0114	2.5
0		-8.15	-0.0097	2.5
10		-8.88	-0.0106	2.5
20		-9.82	-0.0117	2.5
30		8.38	0.0100	2.5
40		6.75	0.0081	2.5
50		-5.89	-0.0070	2.5
20		102	8.98	0.0107
	138	-7.83	-0.0094	2.5

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