



TESTREPORT

Applicant Name : Shenzhen Omni Intelligent Technology Co., Ltd.
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Nanwan street, Longgang District, Shenzhen, China
Report Number: SZNS220803-35269E-RF-00A
FCC ID: 2AI2O-D128IOT

Test Standard (s)

FCC PART 27; FCC PART 22H; FCC PART 24E

Sample Description

Product Type: IOT
Model No.: D128IOT
Multiple Model(s) No.: N/A
Trade Mark: N/A
Date Received: 2022/08/03
Report Date: 2022/08/23

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

Prepared and Checked By:

Approved By:

Andy Yu
EMC Engineer

Candy 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 4: 1710-1755MHz(TX); 2110-2155MHz(RX) LTE Band 12: 699-716MHz(TX); 729-746MHz(RX)
Modulation Technique	3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM
Antenna Specification*	WCDMA Band 5: -0.87dBi WCDMA Band 2/ LTE Band 2: -1.25dBi LTE Band 4: -0.86dBi LTE Band 12: -0.72dBi (provided by the applicant)
Voltage Range	DC 30-90V or DC3.7V from Backup Battery
Sample serial number	SZNS220803-35269E-RF-S2 for Radiated Emissions SZNS220803-35269E-RF-S4 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition
Normal/Extreme Condition	N.V.: Nominal Voltage: 36V _{DC} L.V.: Low Voltage 30V _{DC} H.V.: High Voltage 90V _{DC}

Objective

This test report is in accordance with Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E, and Subpart 27 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
Part 27 - Miscellaneous Wireless Communications 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		0.082×10^{-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.

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	836.4	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 B4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE B12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704.0	707.5	711

Equipment Modifications

No modification was made to the EUT.

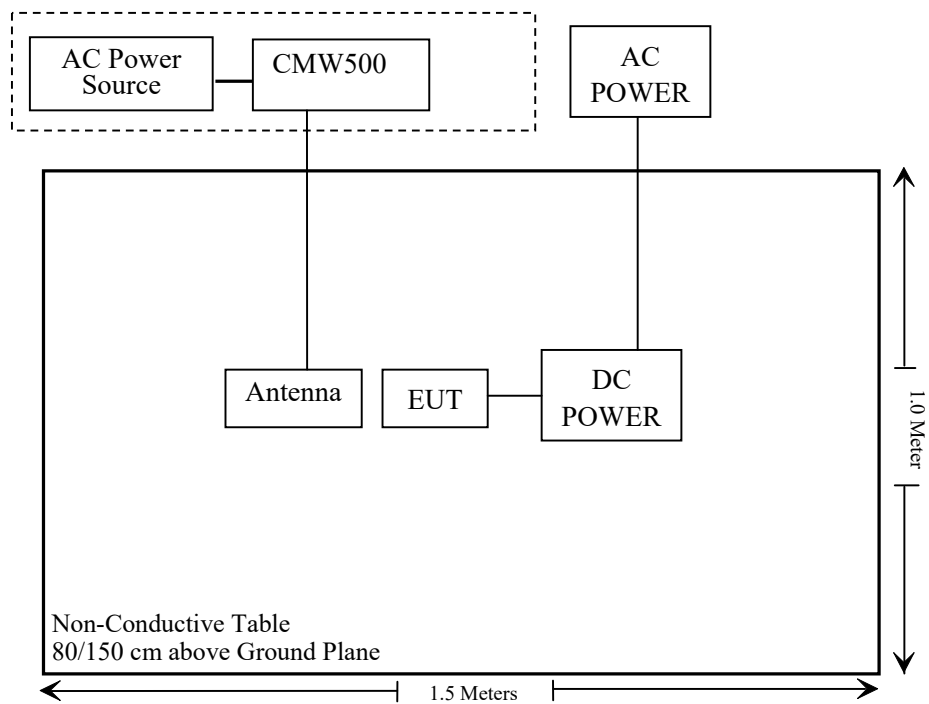
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication tester	CMW500	154606
Manson	DC Power	KPS-6604	ATCS-205

Support Cable Description

Cable Description	Length (m)	From / Port	To
Un-shielded Un-detachable AC cable	1.2	AC Power	CMW500
Un-shielding Detachable DC Cable	0.5	EUT	DC Power

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §1.1307(b) & 2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (c) (h);	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliant
§ 2.1051; §22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliant
§ 22.917 (a); § 24.238 (a); §27.53 (g) (h) (m)	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
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-184055 36-J0	15964001002	2021/11/11	2022/11/10
Radiated Emission Test Software: e3 19821b (V9)					
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
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 Antenn	PE9852/2F-20	1120 (ATC-BA-024-1)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenn	PE9852/2F-20	1120 (ATC-BA-025-1)	2020/01/05	2023/01/04
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
Unknown	RF Coaxial Cable	No.16	N200	2021/12/14	2022/12/13
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101948	2021/12/13	2022/12/12
SPECTRUM ANALYZER	Rohde & Schwarz	FSU26	200982	2022/07/06	2023/07/05
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
WEINSCHHEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/14	2022/12/13
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/10/14	2022/10/13
Fluke	Multi Meter	45	7664009	2021/12/14	2022/12/13
Manson	DC Power Source	KPS-6604	ATCS-205	NCR	NCR
Unknown	RF Coaxial Cable	No.33	RF-03	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).

FCC §1.1307(b) & 2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2f$.
1,500-100,000	$19.2R^2$.

f = frequency in MHz;

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Result**For worst case:**

Mode	Frequency (MHz)	Tune up conducted power (dBm)	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
			(dBi)	(dBd)	(dBm)	(W)		
BLE	2402-2480	-3.0	0.58	-1.57	-4.57	0.00035	0.2	0.768
WCDMA Band 2	1850-1910	24.0	-1.25	-3.40	20.60	0.115	0.2	0.768
WCDMA Band 5	824-849	25.0	-0.87	-3.02	21.98	0.158	0.2	0.422
LTE Band 2	1850-1910	22.5	-1.25	-3.40	19.10	0.081	0.2	0.768
LTE Band 4	1710-1755	22.5	-0.86	-3.01	19.49	0.089	0.2	0.768
LTE Band 12	699-716	24.0	-0.72	-2.87	21.13	0.130	0.2	0.358

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

Note 2: 0dBd=2.15dBi.

Simultaneous transmitting consideration (worst case):

The ratio= $ERP_{BLE}/limit_{BLE} + ERP_{WCDMA B5}/limit_{WCDMA B5} = 0.00035/0.768 + 0.158/0.422 = 0.375 < 1.0$

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

According to FCC § 2.1047(d), Part 22H,24E&27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046,§ 22.913 (a)&§ 24.232 (c); §27.50 (c)(h)- 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.

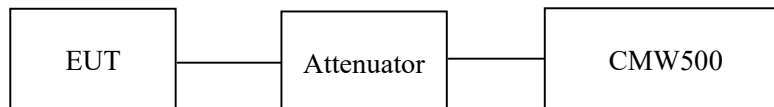
According to §27.50(c), Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP. And Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2496-2690MHz.

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.

Test Data

Environmental Conditions

Temperature:	26~27 °C
Relative Humidity:	56~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu from 2022-08-12 to 2022-08-15.

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

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 5)	RMC12.2k		24.53	24.52	24.36	21.51	21.50	21.34
	HSDPA	1	23.45	23.37	23.26	20.43	20.35	20.24
		2	23.41	23.25	23.21	20.39	20.23	20.19
		3	23.25	23.21	23.15	20.23	20.19	20.13
		4	23.14	23.19	23.19	20.12	20.17	20.17
	HSUPA	1	22.90	22.88	22.78	19.88	19.86	19.76
		2	22.58	22.58	22.64	19.56	19.56	19.62
		3	22.64	22.48	22.31	19.62	19.46	19.29
		4	22.45	22.41	22.28	19.43	19.39	19.26
		5	22.43	22.33	22.29	19.41	19.31	19.27
	HSPA+	1	22.41	22.34	22.37	19.39	19.32	19.35

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)
WCDMA Band5: Antenna Gain = -0.87dBi = -3.02dBd (0dBd=2.15dBi)
Limit: ERP ≤ 38.45dBm

PCS Band (Part 24E)

Mode	Test Mode	3GPP Sub Test	Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
WCDMA (Band 2)	RMC12.2k		23.70	23.43	23.52	22.45	22.18	22.27
	HSDPA	1	22.78	22.61	22.69	21.53	21.36	21.44
		2	22.55	22.51	22.35	21.30	21.26	21.10
		3	22.41	22.49	22.46	21.16	21.24	21.21
		4	22.33	22.37	22.44	21.08	21.12	21.19
	HSUPA	1	22.26	22.07	22.23	21.01	20.82	20.98
		2	22.21	22.01	22.02	20.96	20.76	20.77
		3	22.18	22.11	22.08	20.93	20.86	20.83
		4	22.16	22.06	22.04	20.91	20.81	20.79
		5	22.19	22.04	22.05	20.94	20.79	20.80
	HSPA+	1	22.23	22.07	22.02	20.98	20.82	20.77

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)
For WCDMA Band2: Antenna Gain = -1.25dBi
Limit: EIRP ≤ 33dBm

LTE Band 2

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	21.64	21.74	21.24	20.39	20.49	19.99
		RB1#3	21.65	21.77	21.29	20.40	20.52	20.04
		RB1#5	21.66	21.72	21.15	20.41	20.47	19.90
		RB3#0	21.65	21.75	21.34	20.40	20.50	20.09
		RB3#3	21.65	21.75	21.31	20.40	20.50	20.06
		RB6#0	20.70	20.83	20.28	19.45	19.58	19.03
	16QAM	RB1#0	20.70	20.94	20.55	19.45	19.69	19.30
		RB1#3	20.43	20.98	20.71	19.18	19.73	19.46
		RB1#5	20.30	20.72	20.63	19.05	19.47	19.38
		RB3#0	20.64	20.87	20.20	19.39	19.62	18.95
		RB3#3	20.50	20.90	20.20	19.25	19.65	18.95
		RB6#0	19.32	19.68	19.29	18.07	18.43	18.04
3.0	QPSK	RB1#0	21.75	21.68	21.25	20.50	20.43	20.00
		RB1#8	21.72	21.87	21.16	20.47	20.62	19.91
		RB1#14	21.58	21.75	21.09	20.33	20.50	19.84
		RB6#0	20.65	20.77	20.13	19.40	19.52	18.88
		RB6#9	20.59	20.75	20.16	19.34	19.50	18.91
		RB15#0	20.60	20.75	20.15	19.35	19.50	18.90
	16QAM	RB1#0	20.41	21.03	20.83	19.16	19.78	19.58
		RB1#8	20.49	20.81	20.76	19.24	19.56	19.51
		RB1#14	20.47	20.35	21.23	19.22	19.10	19.98
		RB6#0	19.63	19.62	19.51	18.38	18.37	18.26
		RB6#9	19.58	19.70	19.57	18.33	18.45	18.32
		RB15#0	19.81	19.92	19.47	18.56	18.67	18.22

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	21.58	21.32	21.19	20.33	20.07	19.94
		RB1#13	21.58	21.58	21.34	20.33	20.33	20.09
		RB1#24	21.51	21.60	21.23	20.26	20.35	19.98
		RB15#0	20.59	20.64	20.20	19.34	19.39	18.95
		RB15#10	20.51	20.63	20.29	19.26	19.38	19.04
		RB25#0	20.50	20.60	20.23	19.25	19.35	18.98
	16QAM	RB1#0	20.24	19.79	20.50	18.99	18.54	19.25
		RB1#13	20.28	19.89	20.51	19.03	18.64	19.26
		RB1#24	20.23	19.92	20.50	18.98	18.67	19.25
		RB15#0	19.53	19.65	19.16	18.28	18.40	17.91
		RB15#10	19.60	19.57	19.27	18.35	18.32	18.02
		RB25#0	19.60	19.78	19.22	18.35	18.53	17.97
10.0	QPSK	RB1#0	21.61	21.57	21.42	20.36	20.32	20.17
		RB1#25	21.80	21.78	21.46	20.55	20.53	20.21
		RB1#49	21.40	21.63	21.27	20.15	20.38	20.02
		RB25#0	20.50	20.85	20.30	19.25	19.60	19.05
		RB25#25	20.49	20.74	20.23	19.24	19.49	18.98
		RB50#0	20.53	20.84	20.15	19.28	19.59	18.90
	16QAM	RB1#0	20.32	20.95	20.69	19.07	19.70	19.44
		RB1#25	20.15	21.54	20.86	18.90	20.29	19.61
		RB1#49	20.12	20.71	20.36	18.87	19.46	19.11
		RB25#0	19.71	19.83	19.45	18.46	18.58	18.20
		RB25#25	19.91	19.83	19.42	18.66	18.58	18.17
		RB50#0	20.57	20.67	20.21	19.32	19.42	18.96

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	21.58	21.59	21.38	20.33	20.34	20.13
		RB1#38	21.66	21.84	21.27	20.41	20.59	20.02
		RB1#74	21.53	21.50	21.18	20.28	20.25	19.93
		RB36#0	20.49	20.78	20.34	19.24	19.53	19.09
		RB36#39	20.68	20.67	20.29	19.43	19.42	19.04
		RB75#0	20.47	20.75	20.32	19.22	19.50	19.07
	16QAM	RB1#0	20.40	21.14	20.86	19.15	19.89	19.61
		RB1#38	20.52	21.84	20.64	19.27	20.59	19.39
		RB1#74	20.31	21.07	20.52	19.06	19.82	19.27
		RB36#0	20.53	20.66	20.34	19.28	19.41	19.09
		RB36#39	20.53	20.58	20.23	19.28	19.33	18.98
		RB75#0	20.45	20.64	20.28	19.20	19.39	19.03
20.0	QPSK	RB1#0	21.60	21.59	21.56	20.35	20.34	20.31
		RB1#50	21.94	22.02	21.50	20.69	20.77	20.25
		RB1#99	21.44	21.49	21.32	20.19	20.24	20.07
		RB50#0	20.45	20.67	20.45	19.20	19.42	19.20
		RB50#50	20.65	20.68	20.30	19.40	19.43	19.05
		RB100#0	20.54	20.64	20.33	19.29	19.39	19.08
	16QAM	RB1#0	21.21	21.2	20.41	19.96	19.95	19.16
		RB1#50	21.72	21.85	20.39	20.47	20.60	19.14
		RB1#99	21.48	21.08	20.21	20.23	19.83	18.96
		RB50#0	20.49	20.61	20.46	19.24	19.36	19.21
		RB50#50	20.56	20.66	20.19	19.31	19.41	18.94
		RB100#0	20.59	20.63	20.28	19.34	19.38	19.03

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)
For Band2: Antenna Gain = -1.25dBi
Limit: EIRP ≤ 33dBm

LTE Band 4

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	21.68	21.4	21.48	20.82	20.54	20.62
		RB1#3	21.70	21.62	21.58	20.84	20.76	20.72
		RB1#5	21.66	21.47	21.91	20.80	20.61	21.05
		RB3#0	21.54	21.56	21.55	20.68	20.70	20.69
		RB3#3	21.54	21.75	21.74	20.68	20.89	20.88
		RB6#0	20.55	20.63	20.57	19.69	19.77	19.71
	16QAM	RB1#0	20.60	21.14	20.67	19.74	20.28	19.81
		RB1#3	20.87	21.32	21.20	20.01	20.46	20.34
		RB1#5	20.72	20.87	20.37	19.86	20.01	19.51
		RB3#0	20.64	20.59	20.59	19.78	19.73	19.73
		RB3#3	20.70	20.73	21.14	19.84	19.87	20.28
		RB6#0	19.60	19.80	19.53	18.74	18.94	18.67
3.0	QPSK	RB1#0	21.57	21.35	21.85	20.71	20.49	20.99
		RB1#8	21.64	21.49	21.59	20.78	20.63	20.73
		RB1#14	21.52	21.63	21.79	20.66	20.77	20.93
		RB6#0	20.60	20.57	20.60	19.74	19.71	19.74
		RB6#9	20.54	20.59	20.59	19.68	19.73	19.73
		RB15#0	20.58	20.64	20.64	19.72	19.78	19.78
	16QAM	RB1#0	20.42	20.67	21.06	19.56	19.81	20.20
		RB1#8	20.58	20.73	21.01	19.72	19.87	20.15
		RB1#14	20.49	20.90	21.22	19.63	20.04	20.36
		RB6#0	19.31	19.61	20.03	18.45	18.75	19.17
		RB6#9	19.55	19.62	19.66	18.69	18.76	18.80
		RB15#0	19.78	19.70	19.43	18.92	18.84	18.57

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	21.57	21.59	21.52	20.71	20.73	20.66
		RB1#13	21.60	21.62	21.60	20.74	20.76	20.74
		RB1#24	21.44	21.55	21.75	20.58	20.69	20.89
		RB15#0	20.59	20.62	20.83	19.73	19.76	19.97
		RB15#10	20.57	20.64	20.73	19.71	19.78	19.87
		RB25#0	20.54	20.71	20.75	19.68	19.85	19.89
	16QAM	RB1#0	20.61	20.14	20.85	19.75	19.28	19.99
		RB1#13	20.19	19.99	20.83	19.33	19.13	19.97
		RB1#24	20.13	20.12	21.06	19.27	19.26	20.20
		RB15#0	19.54	19.44	19.80	18.68	18.58	18.94
		RB15#10	19.53	19.46	19.69	18.67	18.60	18.83
		RB25#0	19.57	19.69	19.74	18.71	18.83	18.88
10.0	QPSK	RB1#0	21.62	21.84	21.54	20.76	20.98	20.68
		RB1#25	21.87	21.71	21.95	21.01	20.85	21.09
		RB1#49	21.55	21.57	21.87	20.69	20.71	21.01
		RB25#0	20.58	20.72	20.54	19.72	19.86	19.68
		RB25#25	20.49	20.70	20.64	19.63	19.84	19.78
		RB50#0	20.65	20.72	20.59	19.79	19.86	19.73
	16QAM	RB1#0	20.57	21.12	20.30	19.71	20.26	19.44
		RB1#25	20.37	21.43	20.37	19.51	20.57	19.51
		RB1#49	20.19	21.38	20.20	19.33	20.52	19.34
		RB25#0	19.93	19.83	19.69	19.07	18.97	18.83
		RB25#25	19.87	19.80	19.76	19.01	18.94	18.90
		RB50#0	20.73	20.68	20.59	19.87	19.82	19.73

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	21.61	21.47	21.84	20.75	20.61	20.98
		RB1#38	21.52	21.67	21.61	20.66	20.81	20.75
		RB1#74	21.39	21.70	21.62	20.53	20.84	20.76
		RB36#0	20.54	20.54	20.83	19.68	19.68	19.97
		RB36#39	20.37	20.66	20.71	19.51	19.80	19.85
		RB75#0	20.50	20.75	20.70	19.64	19.89	19.84
	16QAM	RB1#0	20.54	21.00	21.28	19.68	20.14	20.42
		RB1#38	20.68	21.11	21.04	19.82	20.25	20.18
		RB1#74	19.91	20.95	20.90	19.05	20.09	20.04
		RB36#0	20.47	20.53	20.83	19.61	19.67	19.97
		RB36#39	20.35	20.62	20.64	19.49	19.76	19.78
		RB75#0	20.39	20.55	20.58	19.53	19.69	19.72
20.0	QPSK	RB1#0	21.48	21.42	21.66	20.62	20.56	20.80
		RB1#50	21.83	21.59	21.71	20.97	20.73	20.85
		RB1#99	21.58	21.62	21.58	20.72	20.76	20.72
		RB50#0	20.62	20.50	20.91	19.76	19.64	20.05
		RB50#50	20.56	20.61	20.64	19.70	19.75	19.78
		RB100#0	20.70	20.72	20.76	19.84	19.86	19.90
	16QAM	RB1#0	21.32	21.00	21.64	20.46	20.14	20.78
		RB1#50	21.77	21.41	22.00	20.91	20.55	21.14
		RB1#99	21.41	21.32	21.40	20.55	20.46	20.54
		RB50#0	20.45	20.61	20.89	19.59	19.75	20.03
		RB50#50	20.56	20.56	20.57	19.70	19.70	19.71
		RB100#0	20.53	20.64	20.74	19.67	19.78	19.88

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)
For Band4: Antenna Gain = -0.86dBi
Limit: EIRP ≤ 30dBm

LTE Band 12

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	23.55	23.18	23.13	20.68	20.31	20.26
		RB1#3	23.44	23.60	23.32	20.57	20.73	20.45
		RB1#5	23.49	23.56	23.12	20.62	20.69	20.25
		RB3#0	23.31	23.14	23.22	20.44	20.27	20.35
		RB3#3	23.24	23.20	23.27	20.37	20.33	20.40
		RB6#0	22.45	22.27	22.29	19.58	19.40	19.42
	16QAM	RB1#0	22.50	22.32	22.59	19.63	19.45	19.72
		RB1#3	22.43	22.58	23.02	19.56	19.71	20.15
		RB1#5	22.28	22.47	22.63	19.41	19.60	19.76
		RB3#0	22.43	22.05	22.61	19.56	19.18	19.74
		RB3#3	22.58	22.10	22.31	19.71	19.23	19.44
		RB6#0	21.56	21.02	21.13	18.69	18.15	18.26
3.0	QPSK	RB1#0	23.28	23.04	23.12	20.41	20.17	20.25
		RB1#8	23.08	23.26	23.36	20.21	20.39	20.49
		RB1#14	22.92	23.11	23.25	20.05	20.24	20.38
		RB6#0	22.43	22.20	22.31	19.56	19.33	19.44
		RB6#9	22.19	22.30	22.43	19.32	19.43	19.56
		RB15#0	22.30	22.32	22.43	19.43	19.45	19.56
	16QAM	RB1#0	22.14	22.50	22.37	19.27	19.63	19.50
		RB1#8	21.99	22.50	22.91	19.12	19.63	20.04
		RB1#14	21.67	22.49	22.95	18.80	19.62	20.08
		RB6#0	21.37	21.15	21.47	18.50	18.28	18.60
		RB6#9	21.05	21.24	21.73	18.18	18.37	18.86
		RB15#0	21.51	21.15	21.64	18.64	18.28	18.77

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	23.30	23.06	23.24	20.43	20.19	20.37
		RB1#13	23.14	23.17	23.27	20.27	20.30	20.40
		RB1#24	22.96	23.20	23.31	20.09	20.33	20.44
		RB15#0	22.37	22.23	22.32	19.50	19.36	19.45
		RB15#10	22.04	22.29	22.35	19.17	19.42	19.48
		RB25#0	22.23	22.15	22.23	19.36	19.28	19.36
	16QAM	RB1#0	22.27	21.66	22.56	19.40	18.79	19.69
		RB1#13	21.82	21.57	22.61	18.95	18.70	19.74
		RB1#24	21.82	22.13	22.91	18.95	19.26	20.04
		RB15#0	21.37	21.18	21.22	18.50	18.31	18.35
		RB15#10	20.96	21.40	21.47	18.09	18.53	18.60
		RB25#0	21.26	21.17	21.30	18.39	18.30	18.43
10.0	QPSK	RB1#0	23.10	22.73	22.93	20.23	19.86	20.06
		RB1#25	23.10	23.33	23.31	20.23	20.46	20.44
		RB1#49	23.24	22.90	23.00	20.37	20.03	20.13
		RB25#0	22.20	22.08	22.19	19.33	19.21	19.32
		RB25#25	22.14	22.11	22.11	19.27	19.24	19.24
		RB50#0	22.30	21.99	22.16	19.43	19.12	19.29
	16QAM	RB1#0	22.50	21.69	22.72	19.63	18.82	19.85
		RB1#25	21.81	22.07	23.21	18.94	19.20	20.34
		RB1#49	22.33	21.80	22.39	19.46	18.93	19.52
		RB25#0	21.44	21.21	21.22	18.57	18.34	18.35
		RB25#25	21.20	21.13	21.13	18.33	18.26	18.26
		RB50#0	22.20	22.08	22.17	19.33	19.21	19.30

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)
For Band12: Antenna Gain = -0.72dBi = -2.87dBd (0dBd=2.15dBi)
Limit: ERP ≤ 34.77dBm

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

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.17	13
	Middle	3.32	13
	High	3.25	13
HSDPA (16QAM)	Low	4.22	13
	Middle	3.52	13
	High	3.71	13
HSUPA (BPSK)	Low	3.45	13
	Middle	3.67	13
	High	3.63	13
HSPA+	Low	3.35	13
	Middle	3.24	13
	High	3.52	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.25	13
	Middle	3.24	13
	High	3.52	13
HSDPA (16QAM)	Low	4.67	13
	Middle	4.22	13
	High	4.49	13
HSUPA (BPSK)	Low	3.65	13
	Middle	3.72	13
	High	3.87	13
HSPA+	Low	3.33	13
	Middle	3.25	13
	High	3.64	13

LTE Band 2 20MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	3.14	3.62	4.23	13	Pass
QPSK (100RB Size)	5.19	5.22	5.29	13	Pass
16QAM (1RB Size)	4.13	4.68	5.64	13	Pass
16QAM (100RB Size)	6.15	6.12	6.09	13	Pass

LTE Band 4 20MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.52	5.06	4.39	13	Pass
QPSK (100RB Size)	5.64	5.64	5.42	13	Pass
16QAM (1RB Size)	5.64	5.96	5.48	13	Pass
16QAM (100RB Size)	6.51	6.54	6.35	13	Pass

LTE Band 12 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.72	8.24	7.66	13	Pass
QPSK (50RB Size)	9.43	7.82	7.24	13	Pass
16QAM (1RB Size)	8.94	7.24	6.43	13	Pass
16QAM (50RB Size)	7.61	8.01	8.96	13	Pass

FCC §2.1049, §22.917, §22.905 & §24.238&§27.53 - OCCUPIED BANDWIDTH

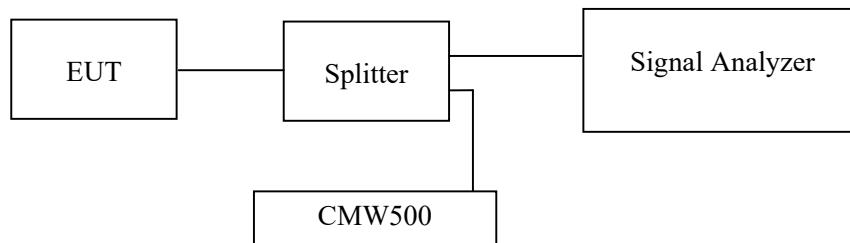
Applicable Standard

FCC 47 §2.1049, §22.917, §22.905, §24.238 and §27.53.

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:	26~27 °C
Relative Humidity:	56~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu from 2022-08-12 to 2022-08-15.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables and plots.

Cellular Band (Part 22H)

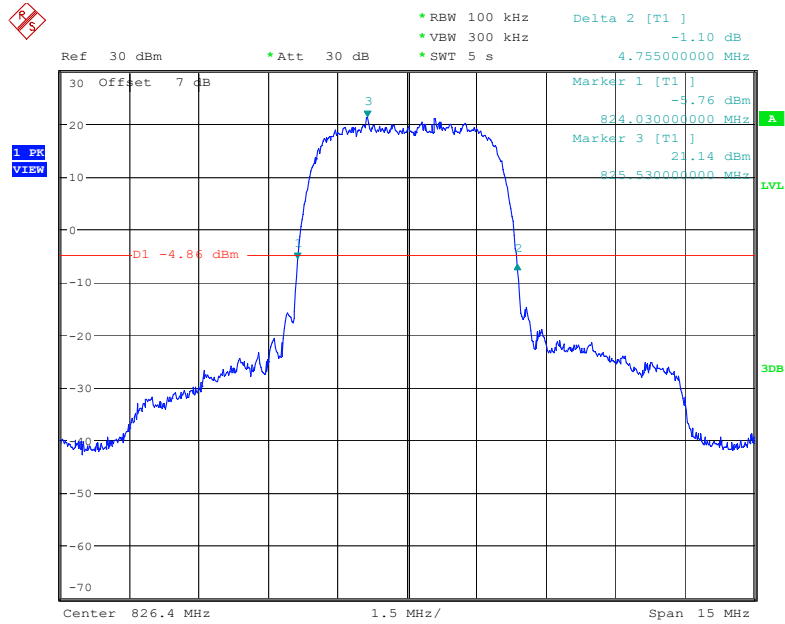
	Frequency (MHz)	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
RMC	826.4	4.13	4.76
	836.4	4.13	4.76
	846.6	4.11	4.74
HSDPA	826.4	4.14	4.74
	836.4	4.13	4.73
	846.6	4.13	4.73
HSUPA	826.4	4.14	4.76
	836.4	4.13	4.74
	846.6	4.13	4.74

PCS Band (Part 24E)

	Frequency (MHz)	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)
RMC	1852.4	4.13	4.73
	1880.0	4.11	4.71
	1907.6	4.13	4.73
HSDPA	1852.4	4.14	4.73
	1880.0	4.14	4.71
	1907.6	4.13	4.73
HSUPA	1852.4	4.14	4.71
	1880.0	4.13	4.73
	1907.6	4.13	4.73

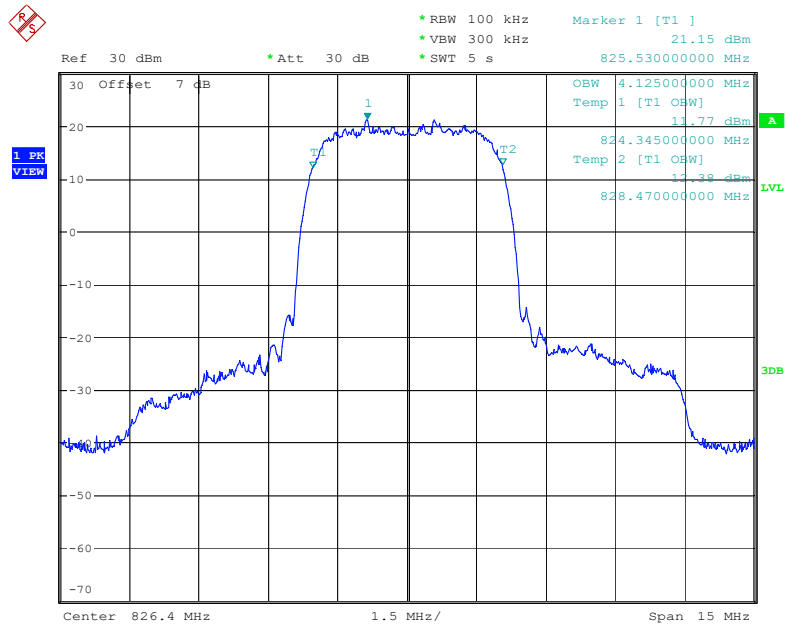
Cellular Band (Part 22H)

26 dB Emissions Bandwidth for RMC (BPSK) Mode, Low channel



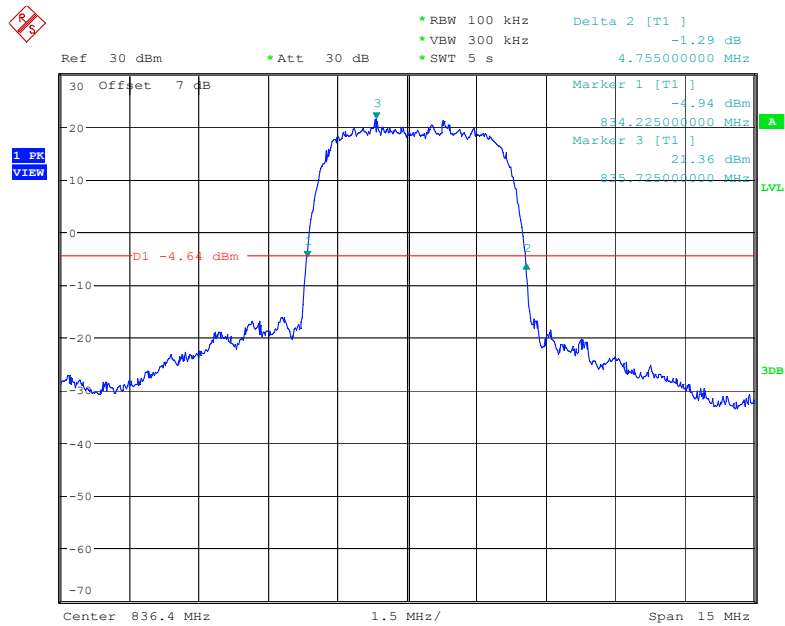
Date: 15.AUG.2022 14:56:15

99% Occupied Bandwidth for RMC (BPSK) Mode, Low channel



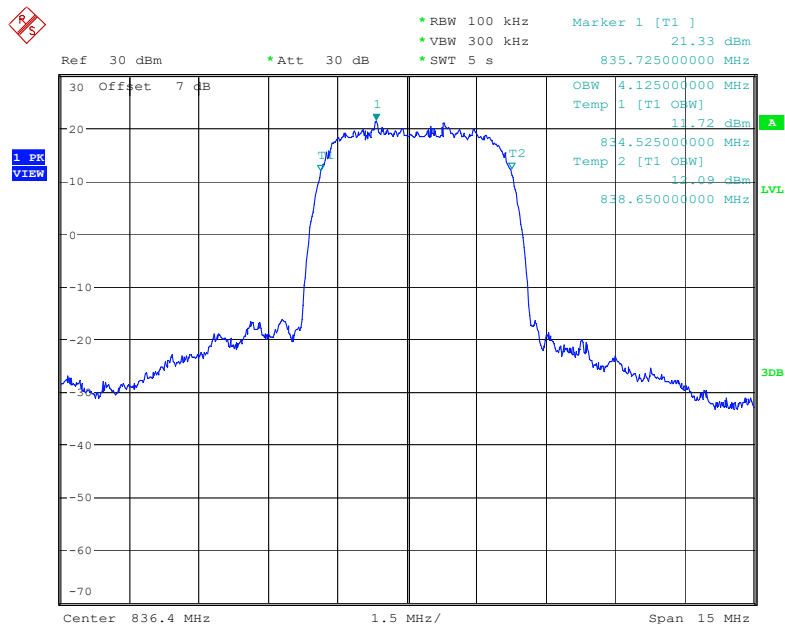
Date: 15.AUG.2022 14:55:37

26 dB Emissions Bandwidth for RMC (QPSK) Mode, Middle channel



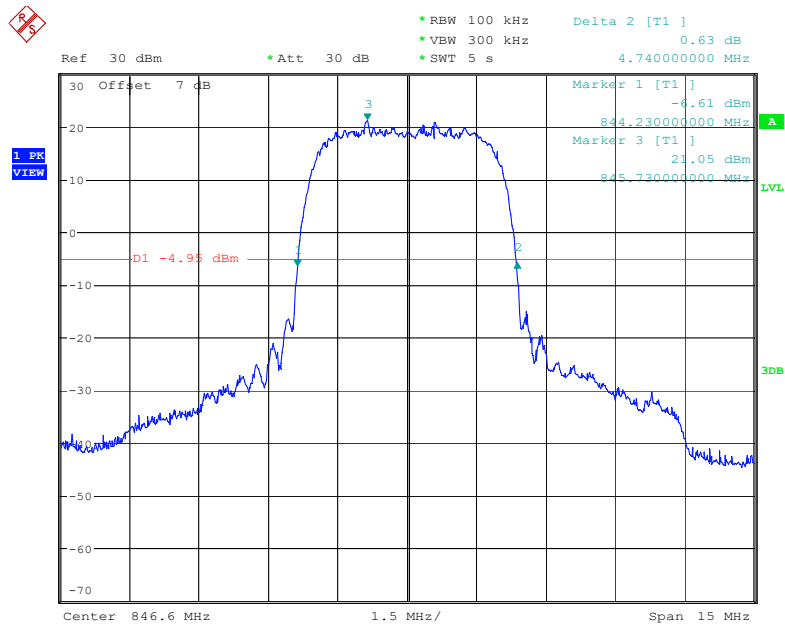
Date: 15.AUG.2022 15:00:16

99% Occupied Bandwidth for RMC (QPSK) Mode, Middle channel



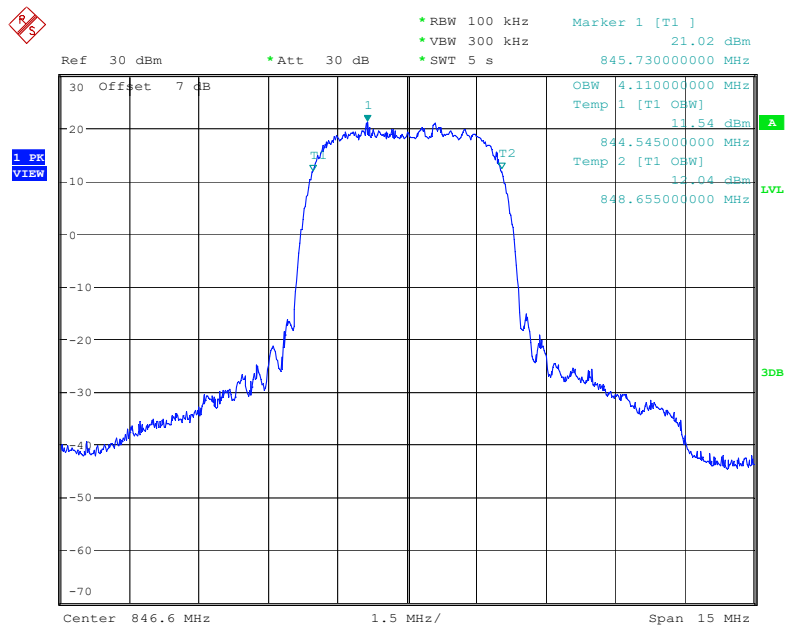
Date: 15.AUG.2022 14:59:39

26 dB Emissions Bandwidth for RMC (QPSK) Mode, High channel



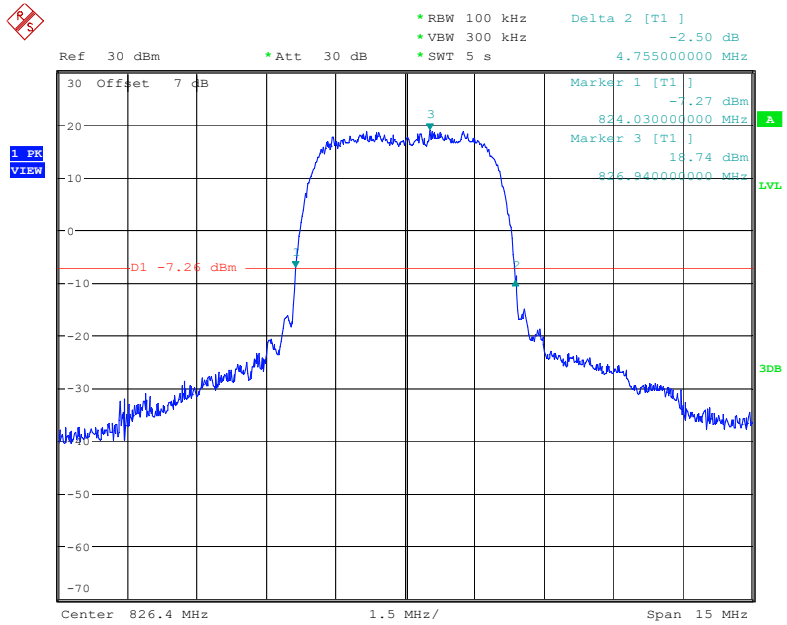
Date: 15.AUG.2022 15:03:06

99% Occupied Bandwidth for RMC (QPSK) Mode, High channel



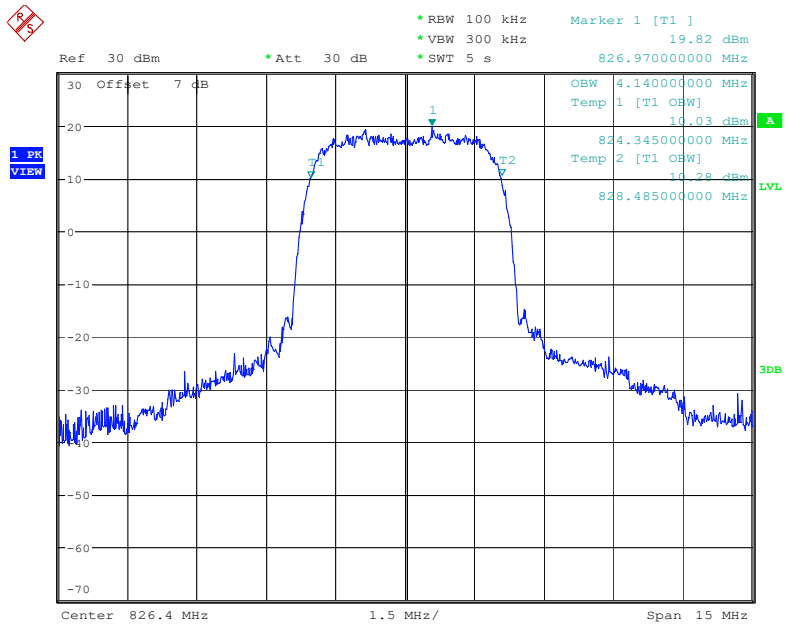
Date: 15.AUG.2022 15:02:28

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, Low channel



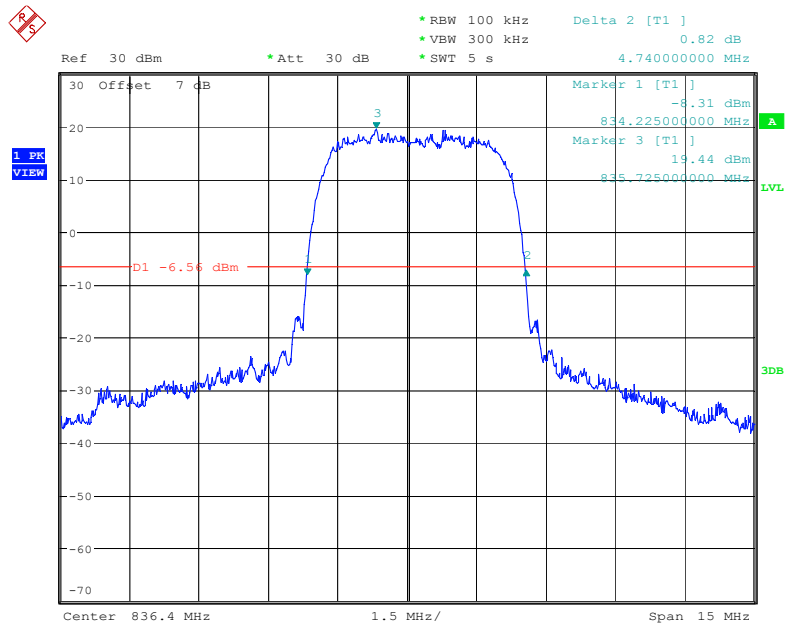
Date: 15.AUG.2022 15:23:13

99% Occupied Bandwidth for HSUPA (QPSK) Mode, Low channel



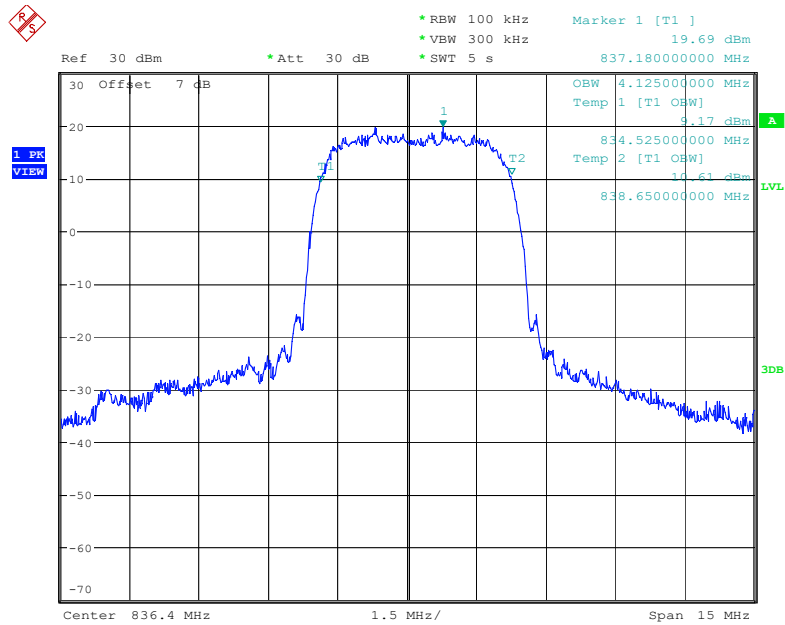
Date: 15.AUG.2022 15:22:34

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, Middle channel



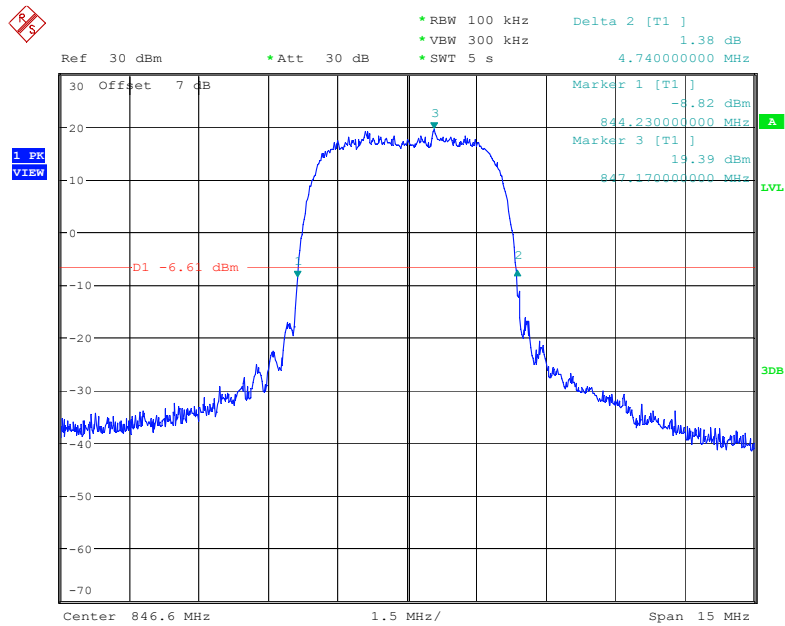
Date: 15.AUG.2022 15:26:33

99% Occupied Bandwidth for HSUPA (QPSK) Mode, Middle channel



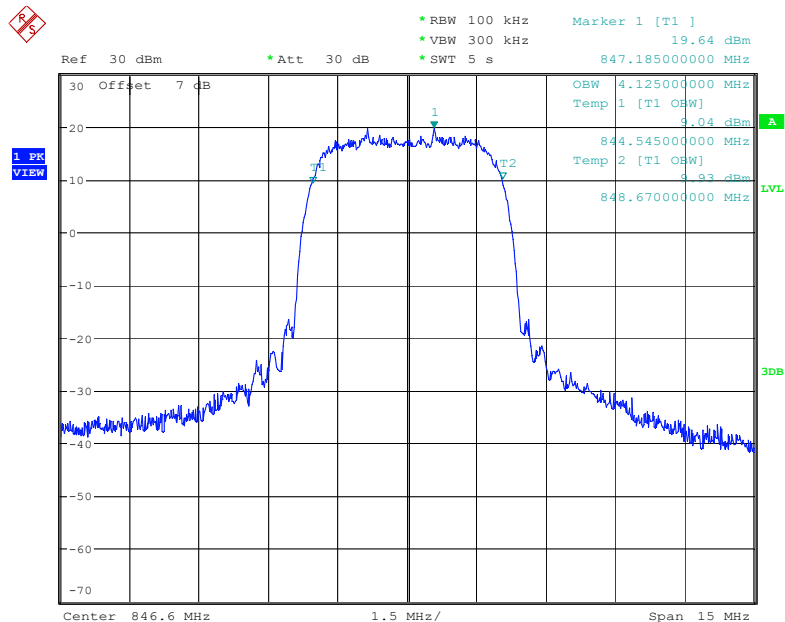
Date: 15.AUG.2022 15:25:55

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, High channel



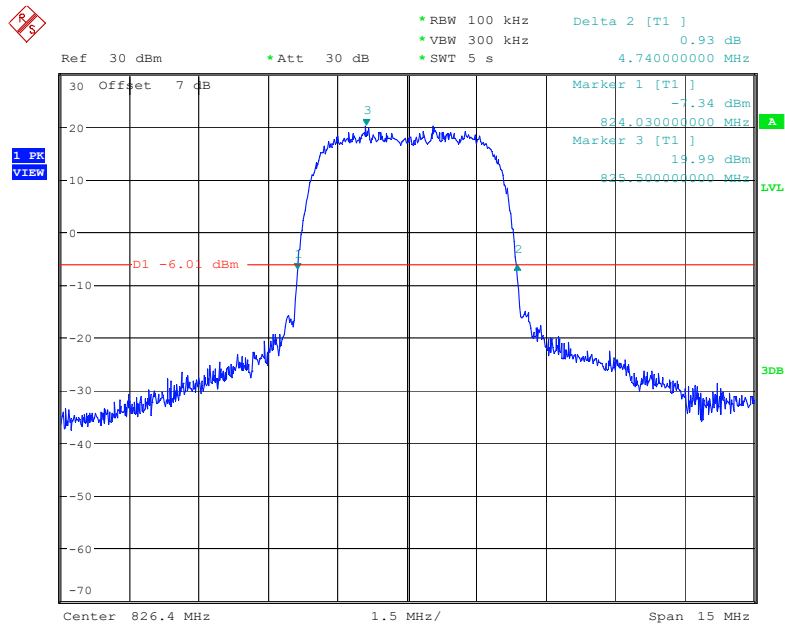
Date: 15.AUG.2022 15:31:07

99% Occupied Bandwidth for HSUPA (QPSK) Mode, High channel



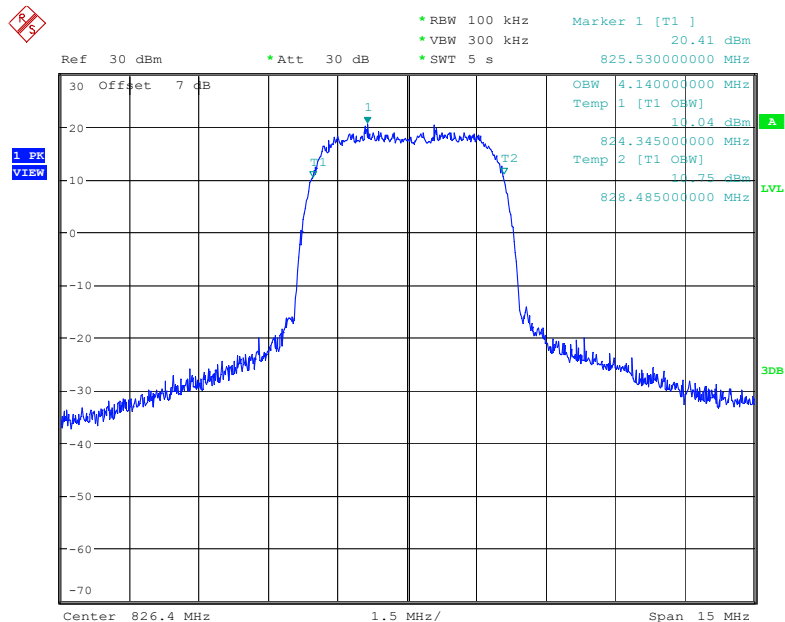
Date: 15.AUG.2022 15:30:30

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, Low channel



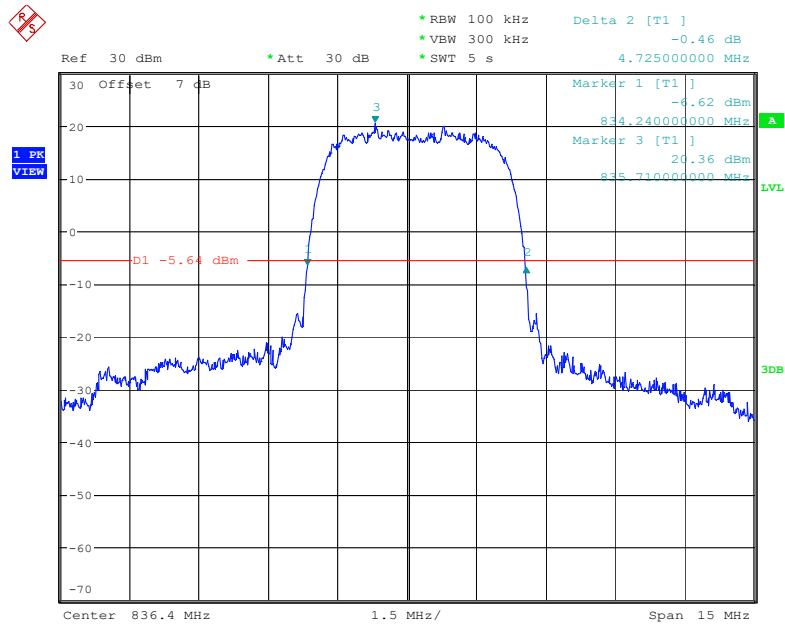
Date: 15.AUG.2022 15:09:34

99% Occupied Bandwidth for HSDPA (16QAM) Mode, Low channel



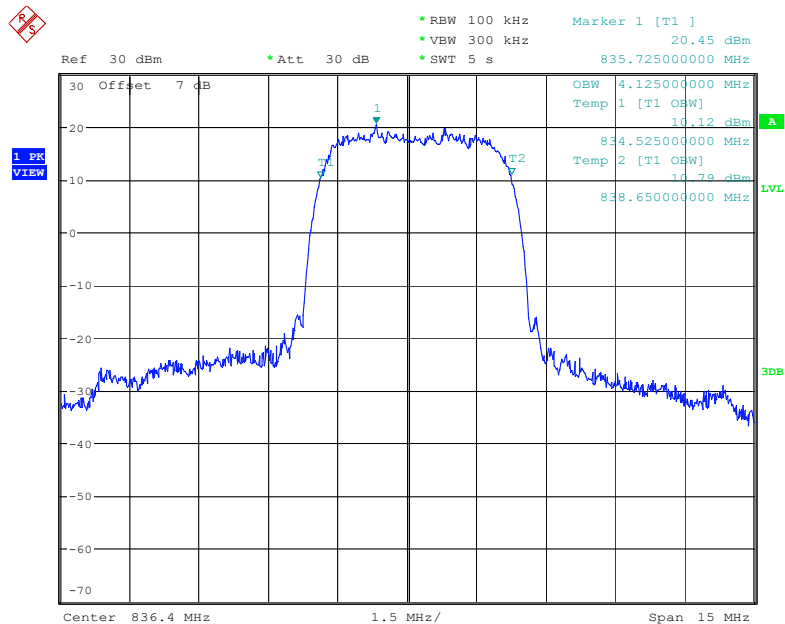
Date: 15.AUG.2022 15:08:56

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, Middle channel



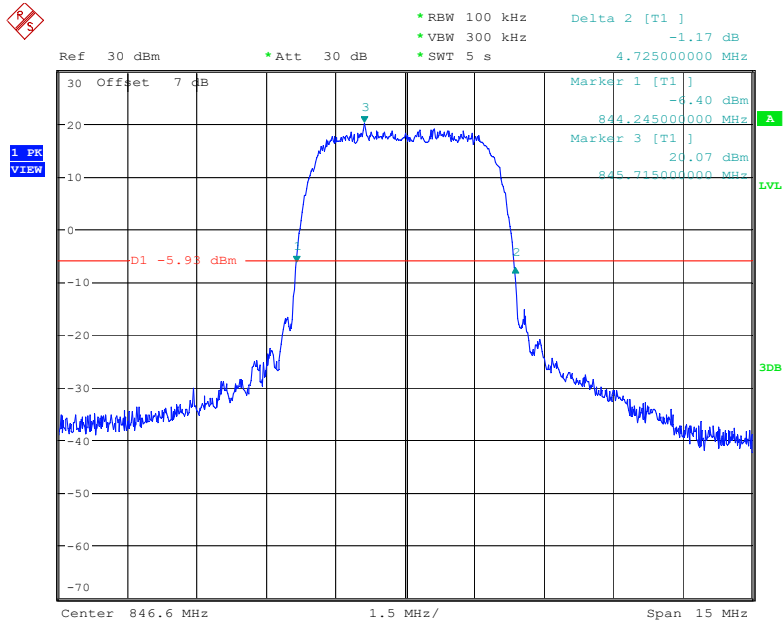
Date: 15.AUG.2022 15:15:32

99% Occupied Bandwidth for HSDPA (16QAM) Mode, Middle channel



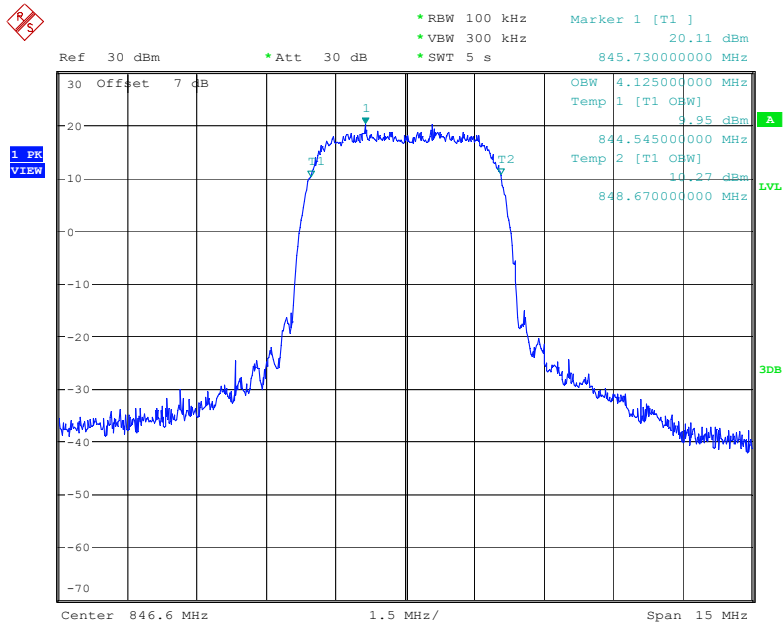
Date: 15.AUG.2022 15:14:55

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, High channel



Date: 15.AUG.2022 15:18:21

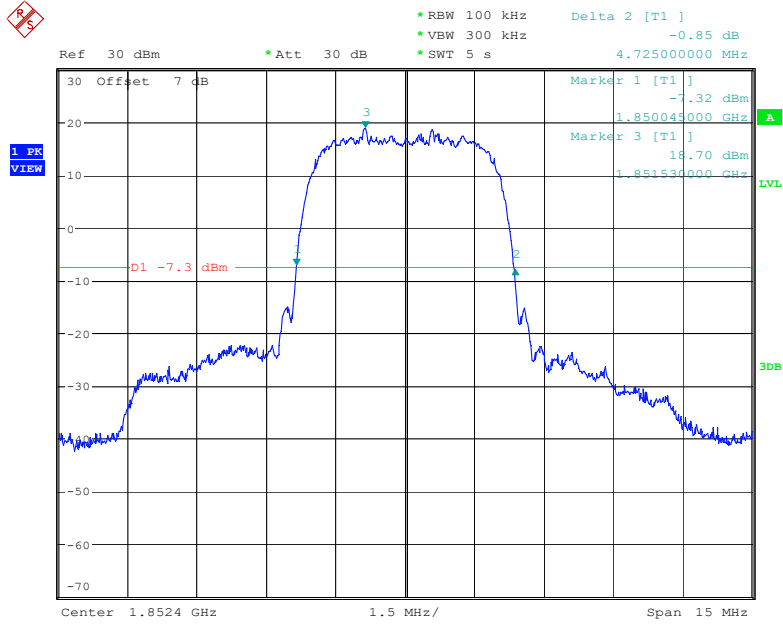
99% Occupied Bandwidth for HSDPA (16QAM) Mode, High channel



Date: 15.AUG.2022 15:17:43

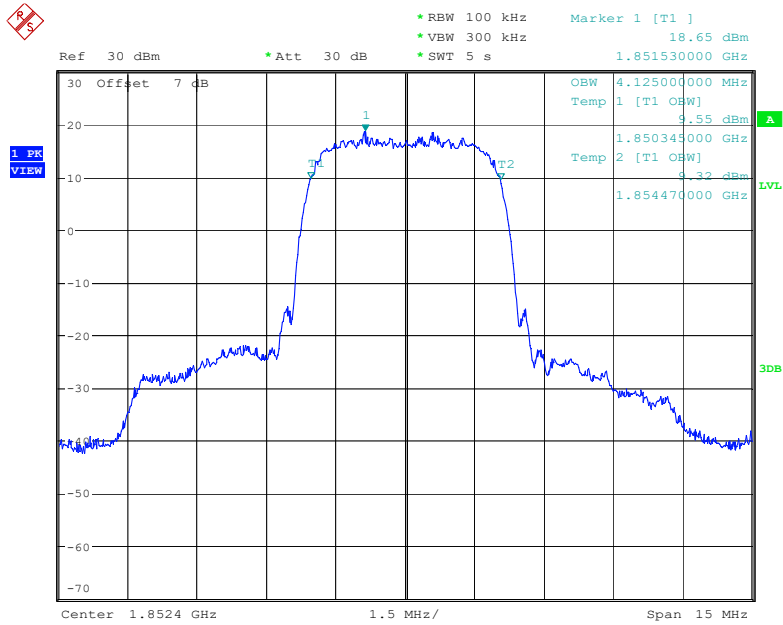
PCS Band (Part 24E)

26 dB Emissions Bandwidth for RMC (BPSK) Mode, Low channel



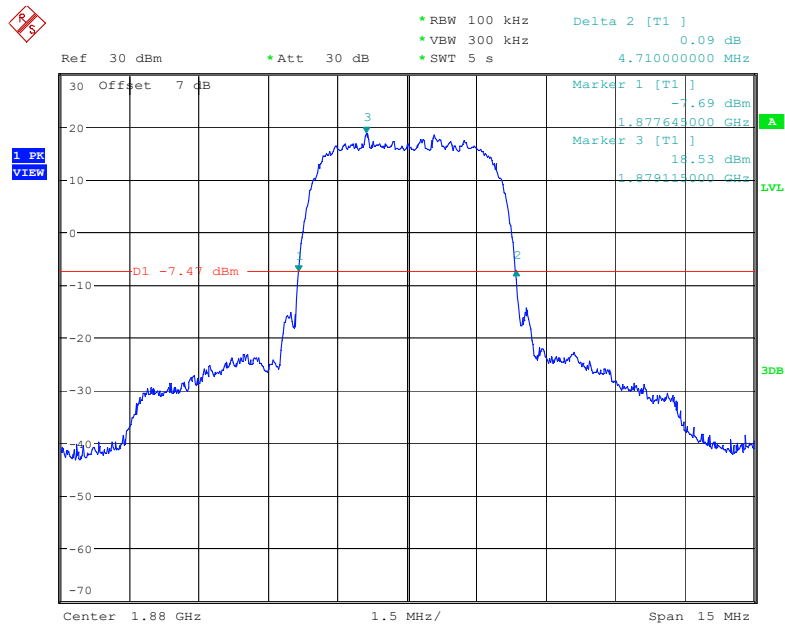
Date: 15.AUG.2022 15:36:05

99% Occupied Bandwidth for RMC (BPSK) Mode, Low channel



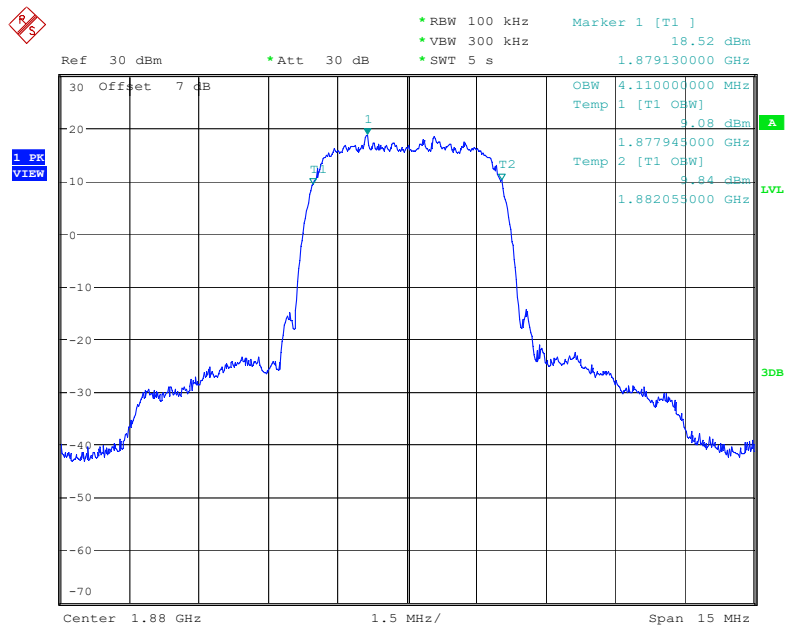
Date: 15.AUG.2022 15:35:27

26 dB Emissions Bandwidth for RMC (QPSK) Mode, Middle channel



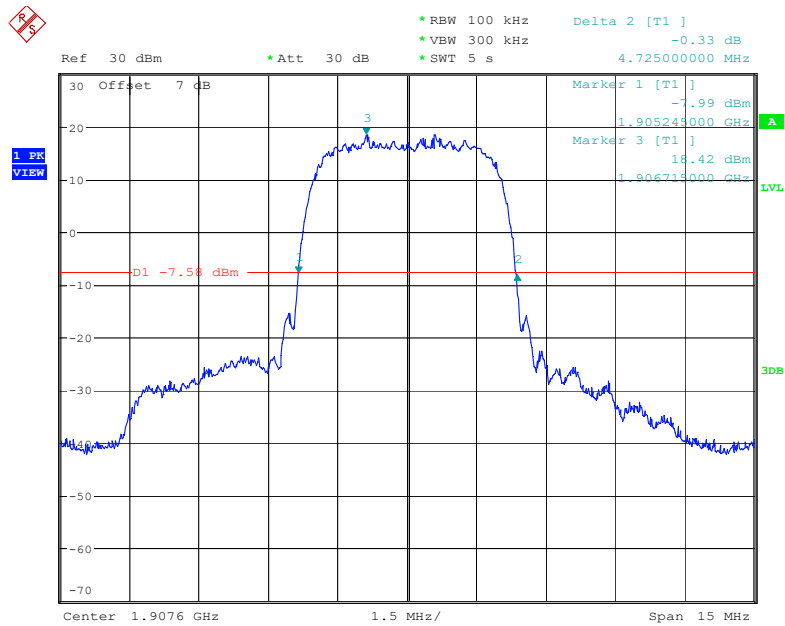
Date: 15.AUG.2022 15:40:28

99% Occupied Bandwidth for RMC (QPSK) Mode, Middle channel



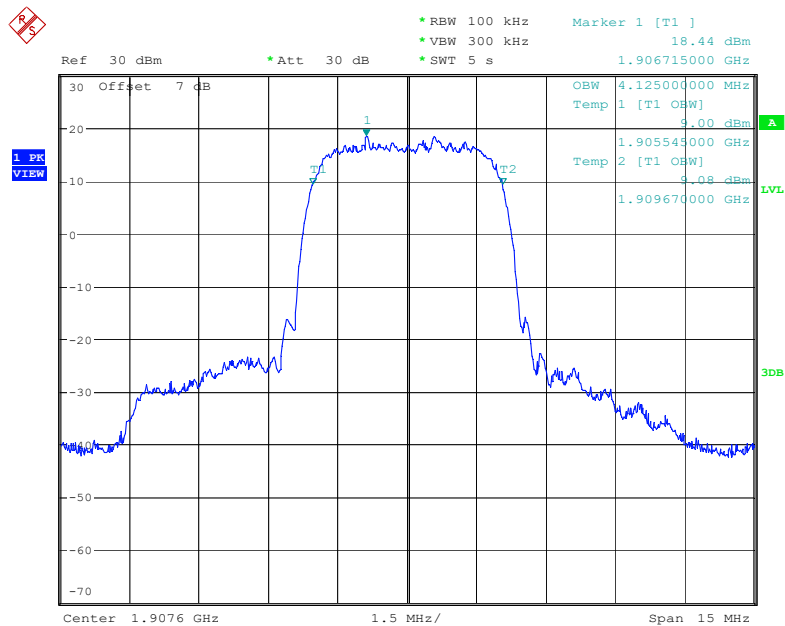
Date: 15.AUG.2022 15:39:50

26 dB Emissions Bandwidth for RMC (QPSK) Mode, High channel



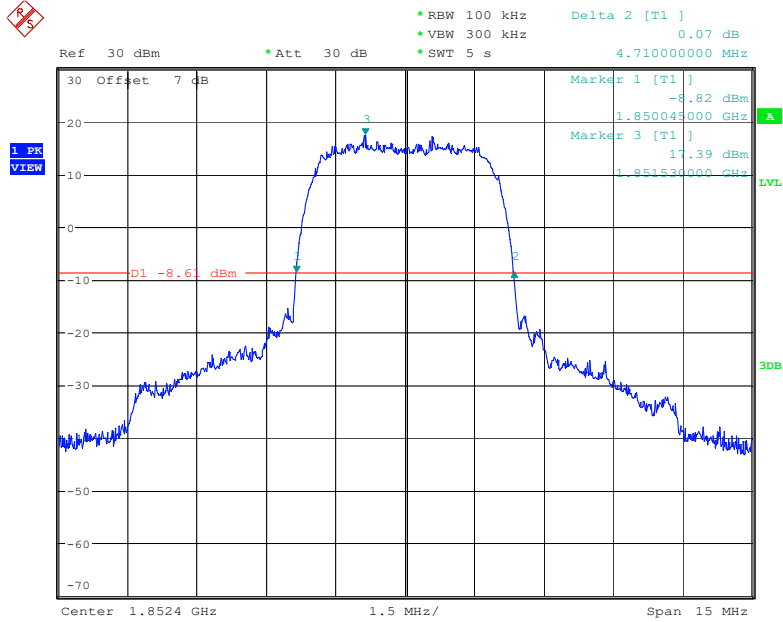
Date: 15.AUG.2022 15:44:08

99% Occupied Bandwidth for RMC (QPSK) Mode, High channel



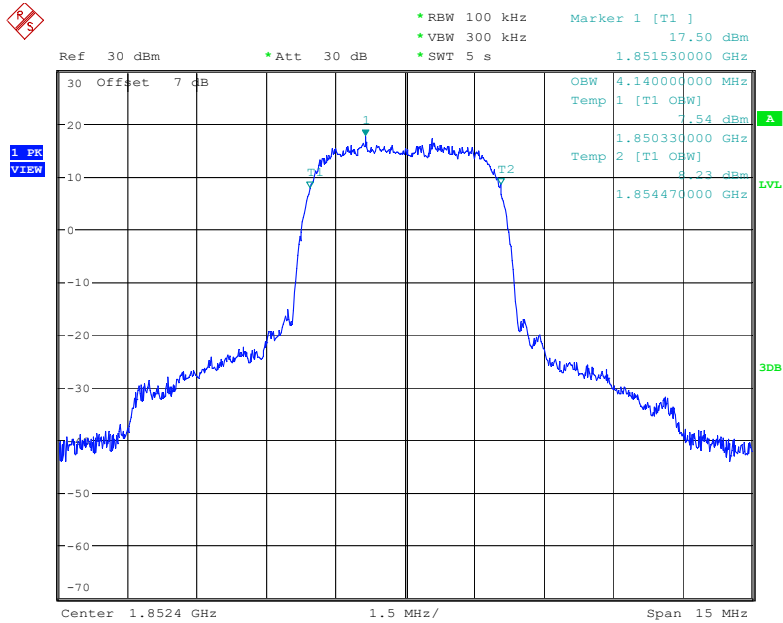
Date: 15.AUG.2022 15:43:30

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, Low channel



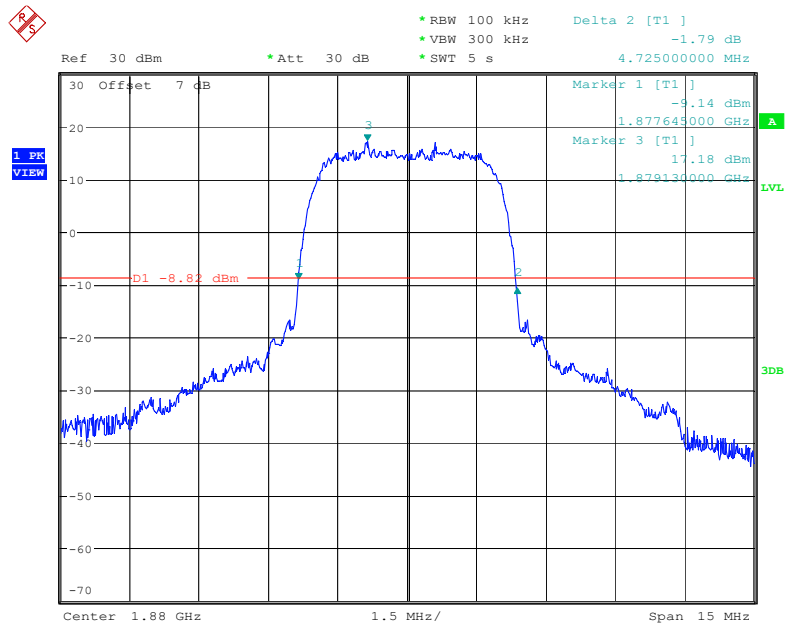
Date: 15.AUG.2022 16:02:51

99% Occupied Bandwidth for HSUPA (QPSK) Mode, Low channel



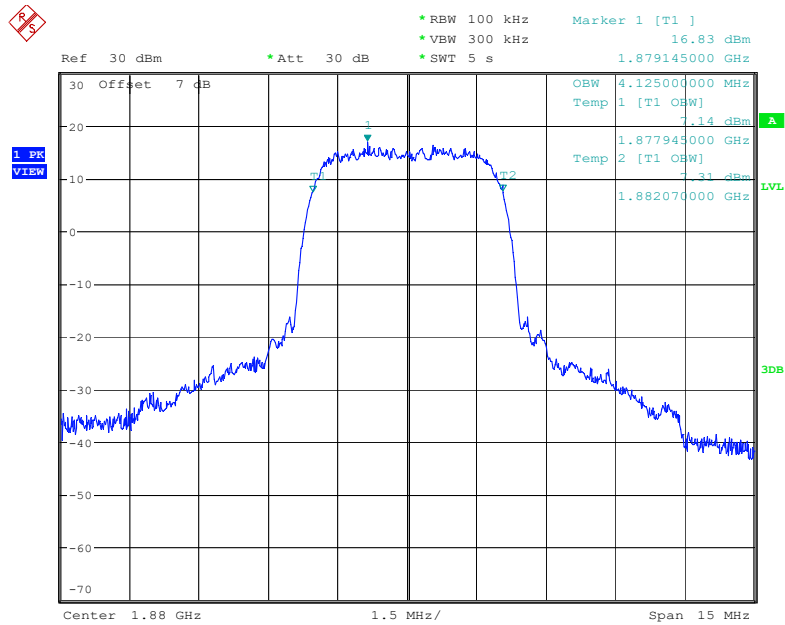
Date: 15.AUG.2022 16:02:13

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, Middle channel



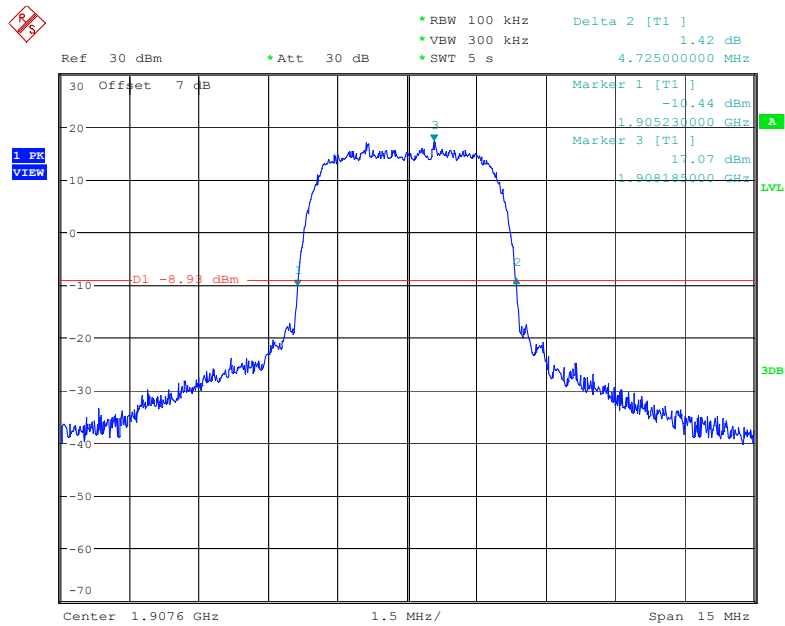
Date: 15.AUG.2022 16:06:56

99% Occupied Bandwidth for HSUPA (QPSK) Mode, Middle channel



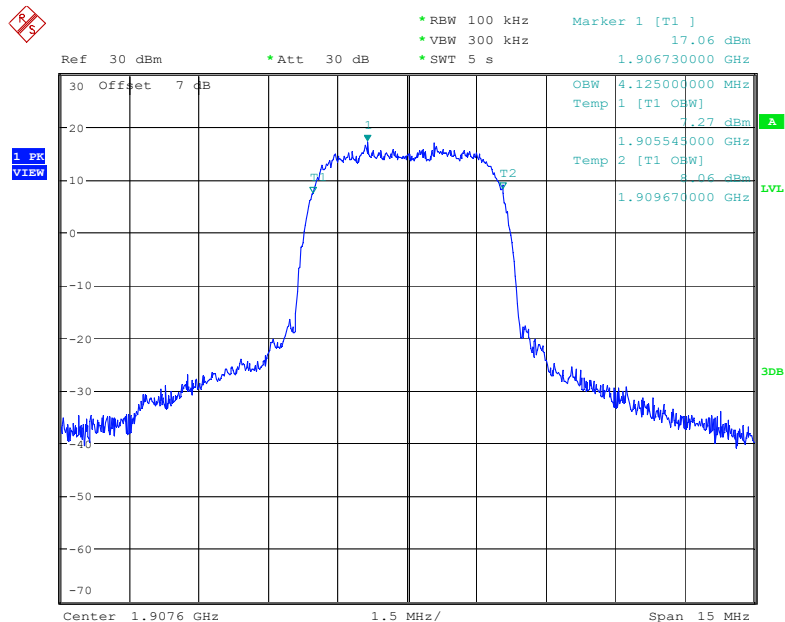
Date: 15.AUG.2022 16:06:19

26 dB Emissions Bandwidth for HSUPA (QPSK) Mode, High channel



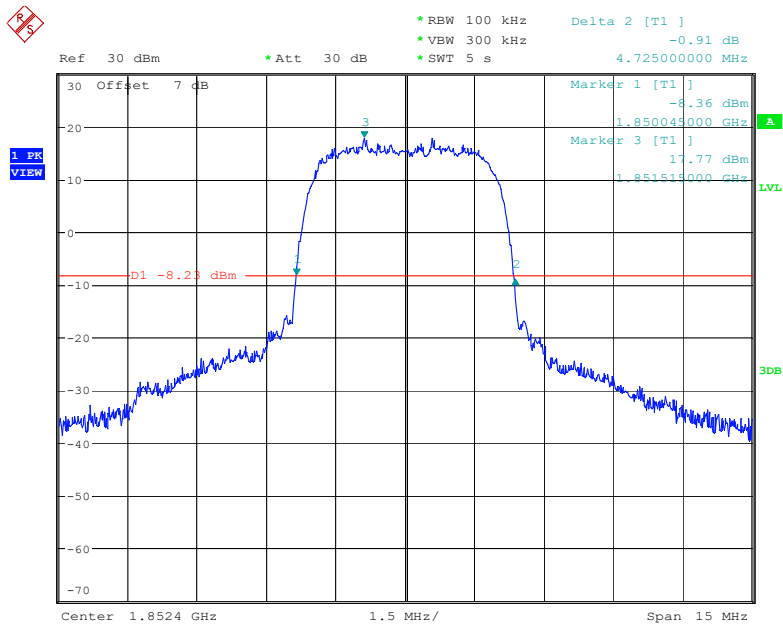
Date: 15.AUG.2022 16:10:10

99% Occupied Bandwidth for HSUPA (QPSK) Mode, High channel



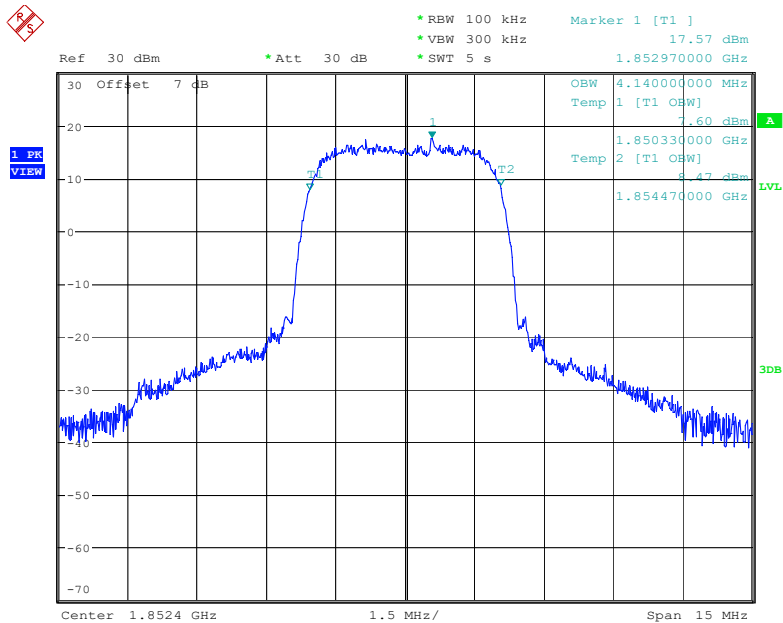
Date: 15.AUG.2022 16:09:34

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, Low channel



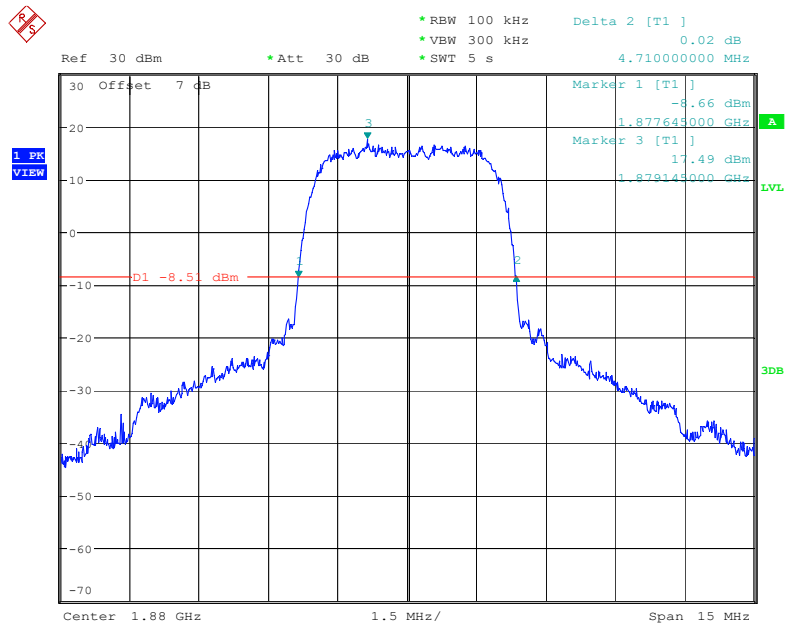
Date: 15.AUG.2022 15:49:01

99% Occupied Bandwidth for HSDPA (16QAM) Mode, Low channel



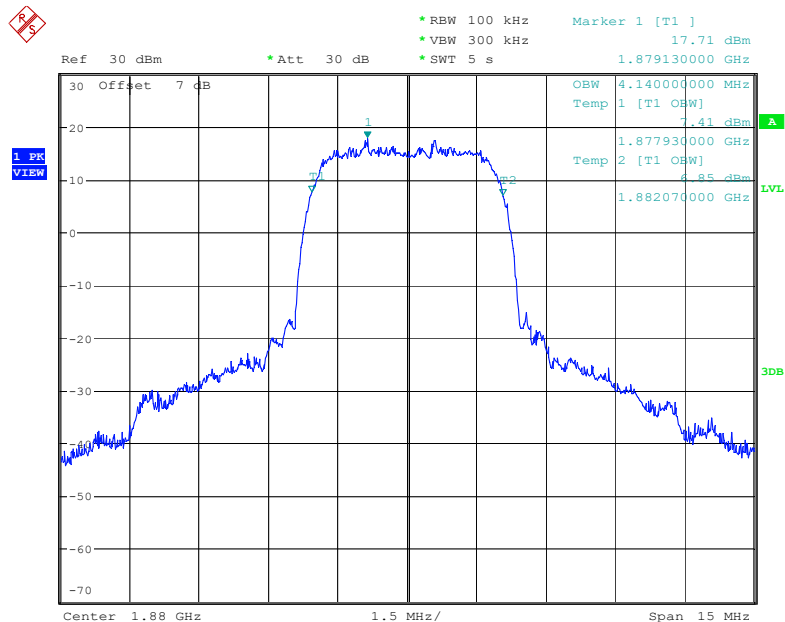
Date: 15.AUG.2022 15:48:25

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, Middle channel



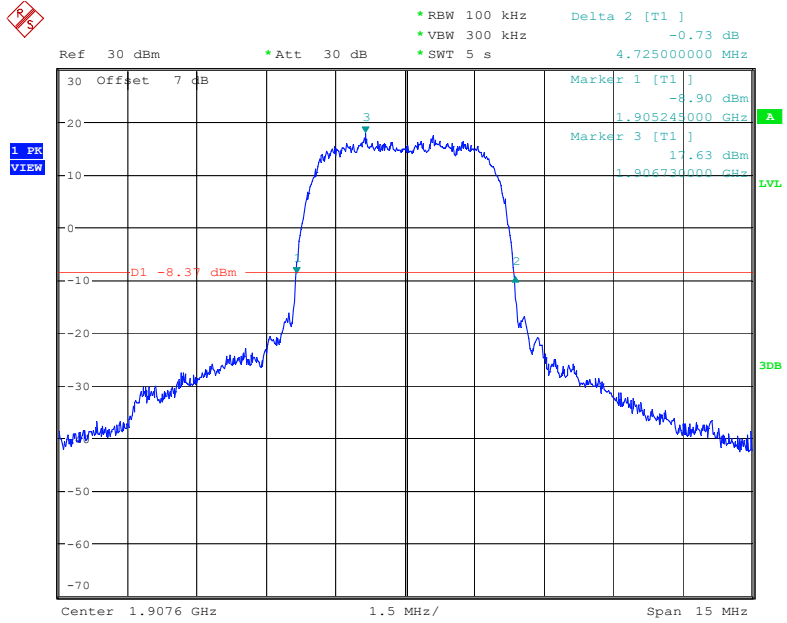
Date: 15.AUG.2022 15:53:01

99% Occupied Bandwidth for HSDPA (16QAM) Mode, Middle channel



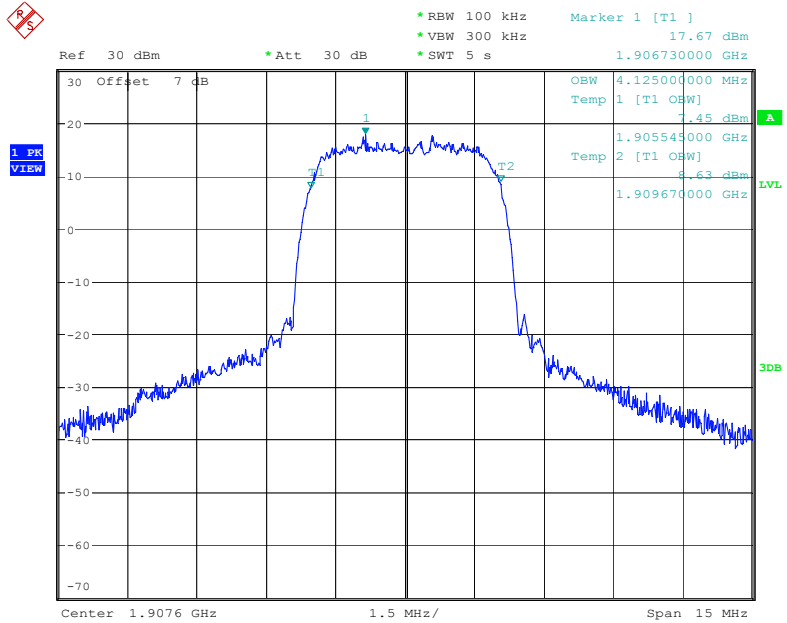
Date: 15.AUG.2022 15:52:23

26 dB Emissions Bandwidth for HSDPA (16QAM) Mode, High channel



Date: 15.AUG.2022 15:56:18

99% Occupied Bandwidth for HSDPA (16QAM) Mode, High channel



Date: 15.AUG.2022 15:55:40

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	1.104	1.314	1.110	1.300	1.110	1.326
	16QAM	1.098	1.296	1.104	1.314	1.110	1.302
3 MHz	QPSK	2.688	2.964	2.700	2.940	2.700	2.940
	16QAM	2.688	2.940	2.688	2.964	2.688	2.952
5 MHz	QPSK	4.520	5.000	4.520	5.040	4.520	5.040
	16QAM	4.540	5.060	4.520	4.980	4.520	5.000
10 MHz	QPSK	8.960	9.800	8.960	9.840	8.960	9.800
	16QAM	8.960	9.640	8.960	9.720	8.960	9.600
15 MHz	QPSK	13.500	14.760	13.440	14.820	13.560	14.820
	16QAM	13.560	15.000	13.500	14.940	13.500	14.820
20 MHz	QPSK	17.920	19.520	17.840	19.440	18.000	19.600
	16QAM	18.000	19.600	17.920	19.440	17.920	19.520

LTE Band 4:

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	1.104	1.326	1.098	1.296	1.104	1.314
	16QAM	1.098	1.302	1.104	1.320	1.110	1.308
3 MHz	QPSK	2.688	2.964	2.700	2.952	2.700	2.940
	16QAM	2.688	2.952	2.688	2.952	2.700	2.964
5 MHz	QPSK	4.520	5.040	4.520	5.000	4.520	5.020
	16QAM	4.500	5.000	4.540	5.060	4.540	5.060
10 MHz	QPSK	8.960	9.640	8.960	9.800	8.960	9.680
	16QAM	8.960	9.720	8.960	9.720	8.960	9.720
15 MHz	QPSK	13.500	14.820	13.500	14.880	13.500	14.880
	16QAM	13.500	14.820	13.500	14.820	13.440	14.880
20 MHz	QPSK	18.000	19.600	18.000	19.520	17.840	19.280
	16QAM	17.920	19.360	18.000	19.680	17.920	19.520

LTE Band 12:

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	1.104	1.314	1.104	1.296	1.104	1.302
	16QAM	1.098	1.296	1.098	1.308	1.110	1.314
3 MHz	QPSK	2.688	2.964	2.688	2.940	2.700	2.940
	16QAM	2.688	2.952	2.688	2.976	2.688	2.952
5 MHz	QPSK	4.520	5.000	4.500	5.020	4.540	5.040
	16QAM	4.540	5.000	4.520	5.040	4.500	5.040
10 MHz	QPSK	8.960	9.680	8.920	9.640	8.960	9.760
	16QAM	8.960	9.720	8.960	9.720	9.000	9.840

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

FCC §2.1051, §22.917(a) & §24.238(a)& §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

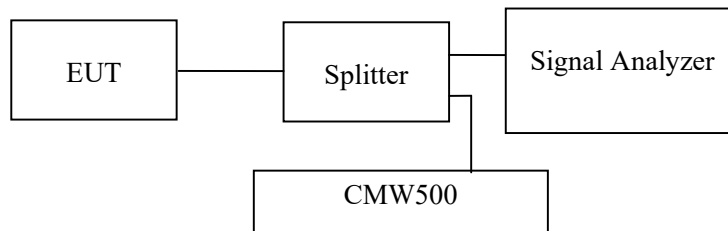
Applicable Standard

FCC §2.1051, §22.917(a) & §24.238(a)&§27.53.

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 10th harmonic.



Test Data

Environmental Conditions

Temperature:	26~27 °C
Relative Humidity:	56~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu from 2022-08-12 to 2022-08-22.

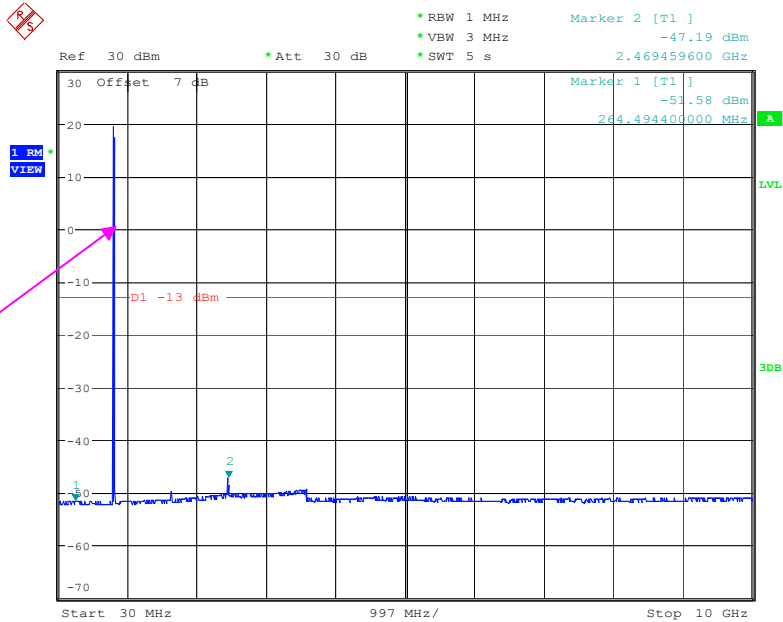
EUT operation mode: Transmitting

Test result: Pass

Please refer to the following plots.

**Cellular Band
Low Channel:**

30 MHz – 10 GHz (WCDMA Mode)

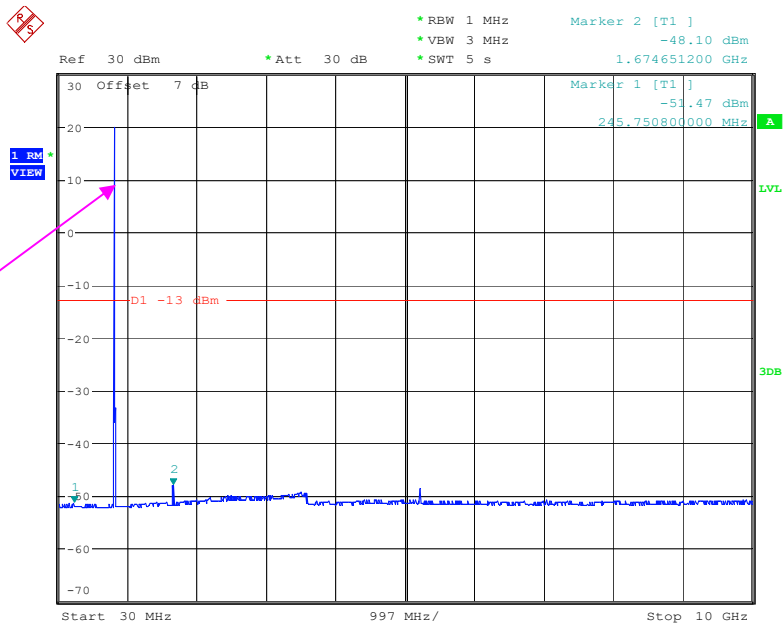


Fundamental test

Date: 15.AUG.2022 14:57:31

Middle Channel:

30 MHz – 10 GHz (WCDMA Mode)

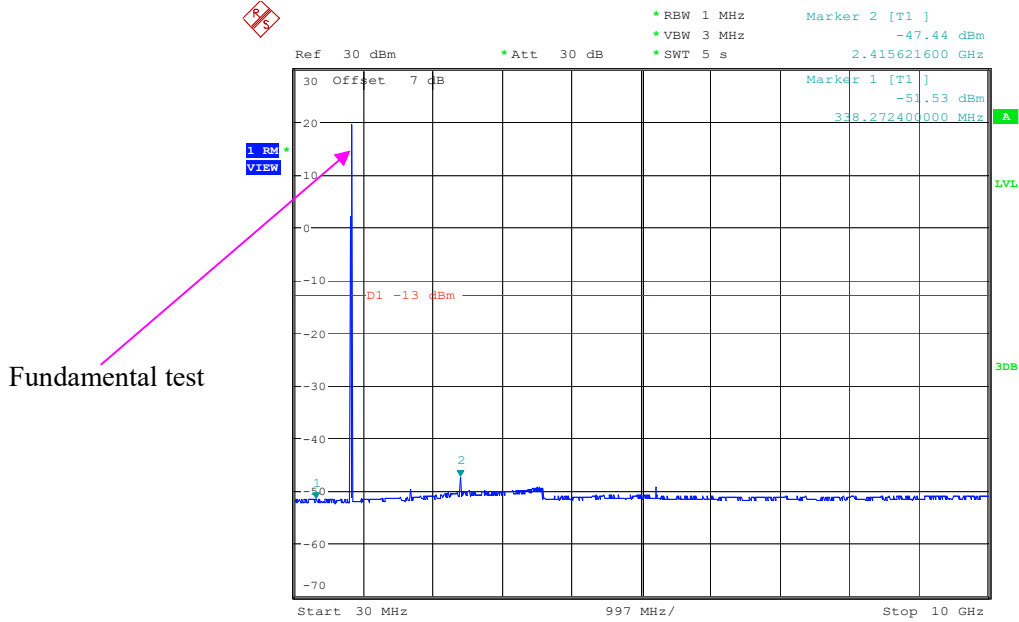


Fundamental test

Date: 15.AUG.2022 15:00:54

High Channel:

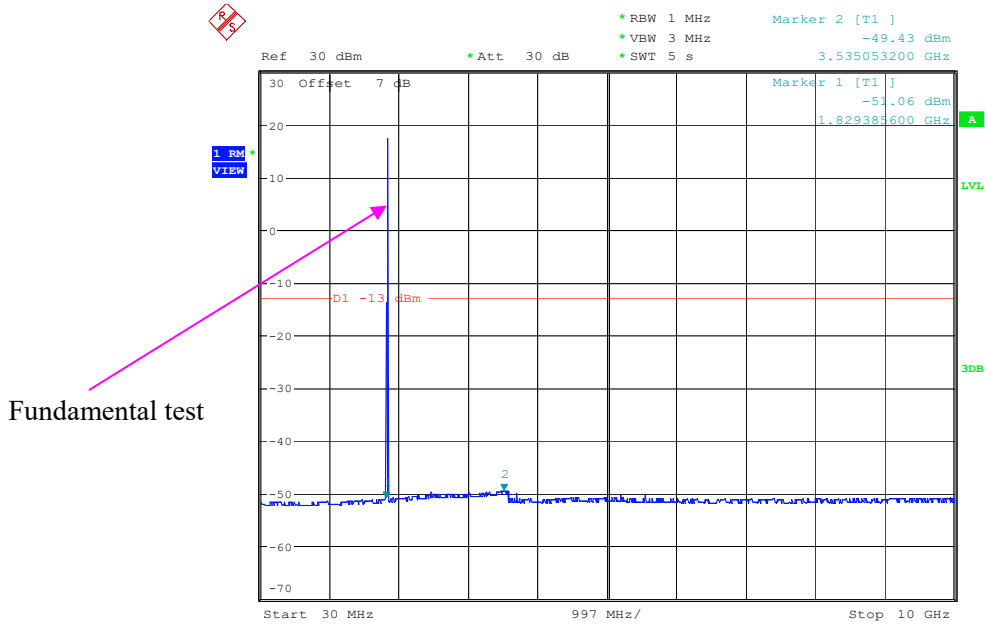
30 MHz – 1 GHz (WCDMA Mode)



Date: 15.AUG.2022 15:04:22

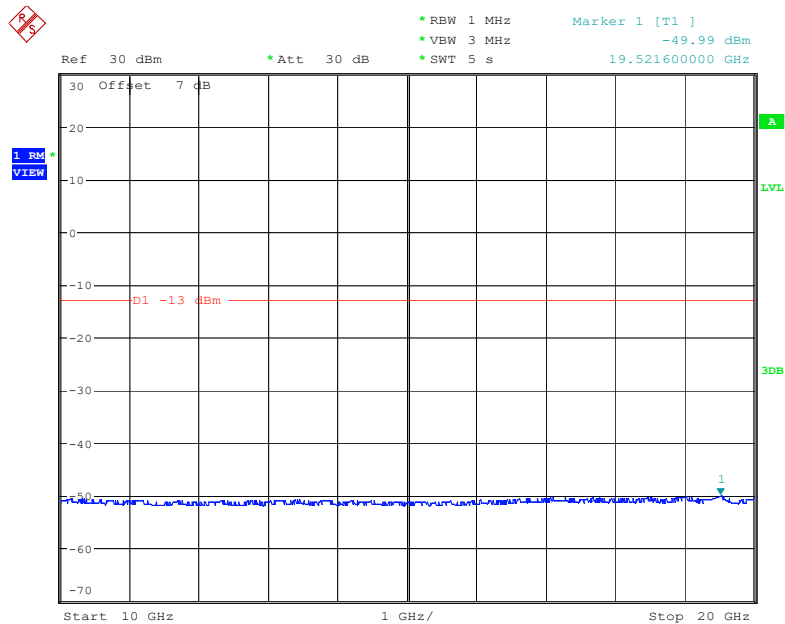
**PCS Band
Low Channel:**

30 MHz – 10 GHz (WCDMA Mode)



Date: 15.AUG.2022 15:37:22

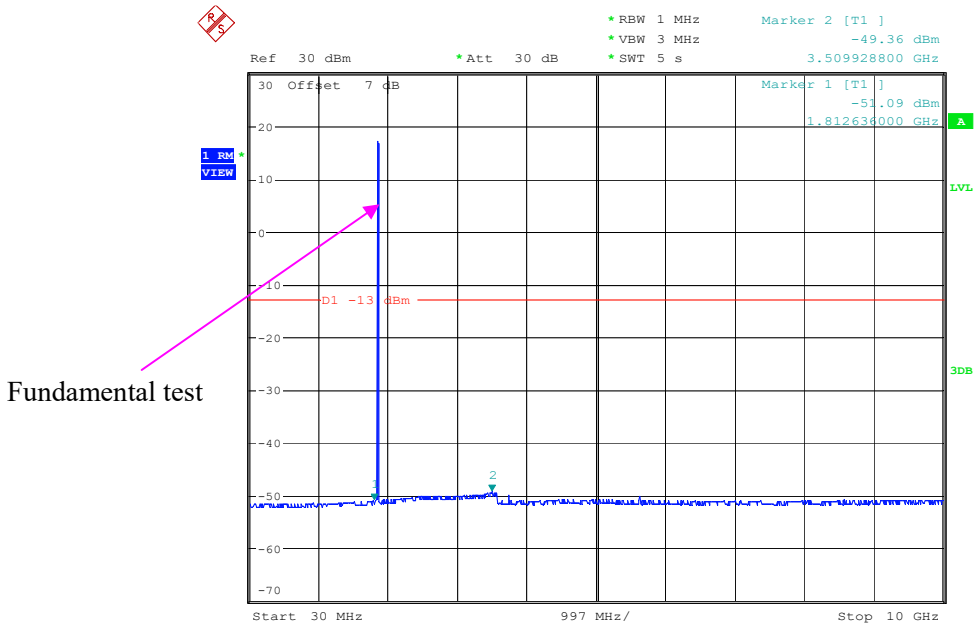
10 GHz – 20GHz (WCDMA Mode)



Date: 15.AUG.2022 15:38:02

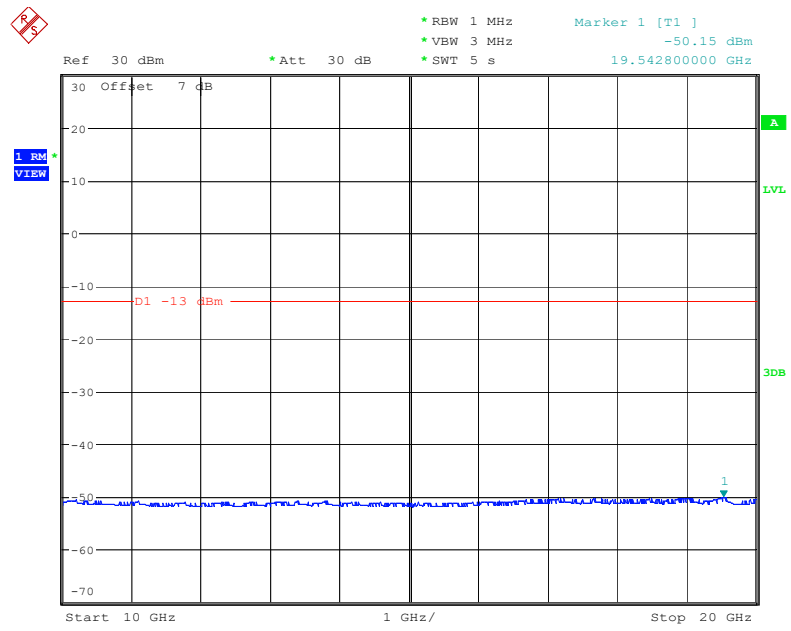
Middle Channel:

30 MHz – 10GHz (WCDMA Mode)



Date: 15.AUG.2022 15:41:06

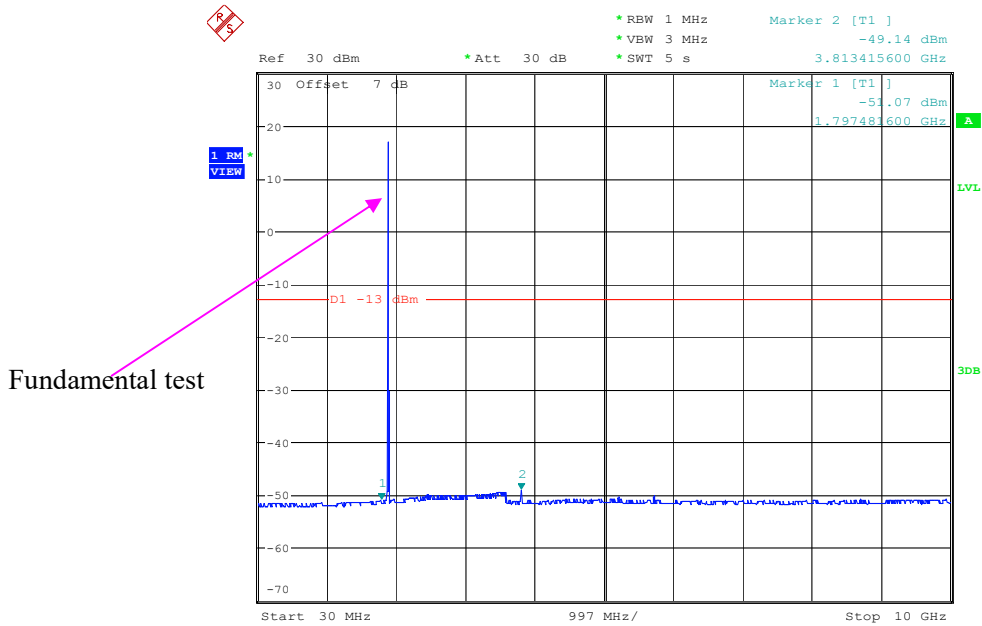
10 GHz – 20GHz (WCDMA Mode)



Date: 15.AUG.2022 15:41:46

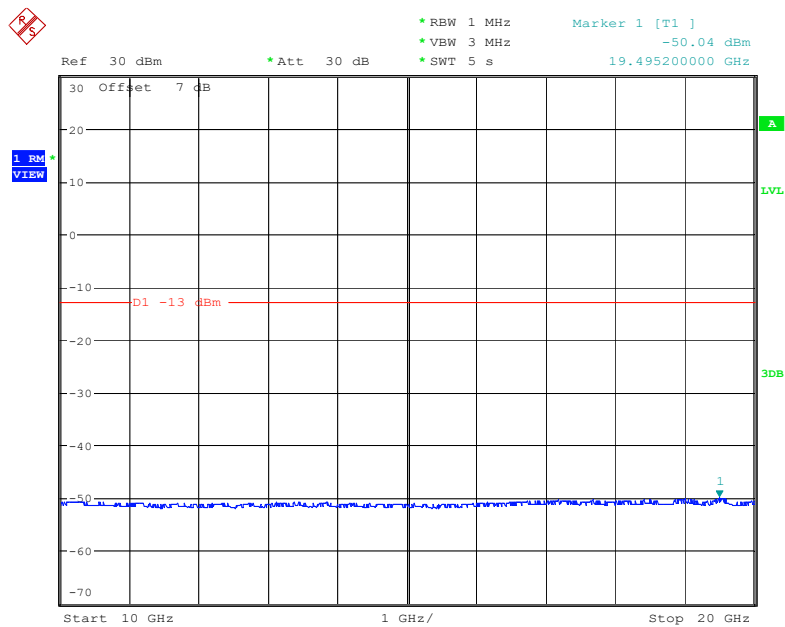
High Channel:

30 MHz – 10 GHz (WCDMA Mode)



Date: 15.AUG.2022 15:45:24

10 GHz – 20GHz (WCDMA Mode)



Date: 15.AUG.2022 15:46:04

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

FCC § 2.1053; § 22.917 (a); § 24.238 (a); §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917(a)& § 24.238(a) & § 27.53.

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

Temperature:	28.3~29 °C
Relative Humidity:	46~55%
ATM Pressure:	101.0 kPa

The testing was performed by Level Li on 2022-08-17 for below 1GHz and Zeki Ma on 2022-08-13 for above 1GHz.

EUT operation mode: Transmitting (Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case Y-AXIS was recorded)

The worst case is 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)				
Test frequency range: 30MHz-20GHz								
WCDMA Band 2,1852.4MHz								
55.26	-63.26	241	2.3	H	4.3	-58.96	-13	-45.96
55.26	-63.46	243	2	V	-0.9	-64.36	-13	-51.36
3704.8	-42.70	276	1.6	H	8.1	-34.60	-13	-21.60
3704.8	-43.60	316	2.4	V	7.6	-36.00	-13	-23.00
WCDMA Band 2,1880MHz								
55.23	-62.39	142	1.7	H	4.3	-58.09	-13	-45.09
55.23	-63.42	200	1.8	V	-0.9	-64.32	-13	-51.32
3760	-44.60	45	2	H	8.8	-35.80	-13	-22.80
3760	-43.70	258	2.2	V	8	-35.70	-13	-22.70
WCDMA Band 2,1907.6MHz								
54.61	-61.65	73	1.7	H	4.3	-57.35	-13	-44.35
54.61	-63.25	45	1.6	V	-0.9	-64.15	-13	-51.15
3815.2	-43.10	46	1.6	H	8.7	-34.40	-13	-21.40
3815.2	-43.50	265	2.1	V	7.9	-35.60	-13	-22.60

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
Test frequency range: 30MHz-10GHz								
WCDMA Band 5,826.4MHz								
54.79	-62.36	188	2	H	4.3	-58.06	-13	-45.06
54.79	-62.98	191	1.4	V	-0.9	-63.88	-13	-50.88
1652.8	-42.50	276	1.8	H	3.5	-39.00	-13	-26.00
1652.8	-41.10	131	2.3	V	3.1	-38.00	-13	-25.00
2479.2	-53.90	172	1.1	H	6.6	-47.30	-13	-34.30
2479.2	-53.60	46	2.5	V	5.8	-47.80	-13	-34.80
3305.6	-45.10	20	1.8	H	6.4	-38.70	-13	-25.70
3305.6	-46.70	143	1.7	V	5.7	-41.00	-13	-28.00
WCDMA Band 5,836.4MHz								
55.61	-62.34	351	1.1	H	4.3	-58.04	-13	-45.04
55.61	-63.86	7	1.9	V	-0.9	-64.76	-13	-51.76
1672.8	-41.70	292	2.2	H	3.8	-37.90	-13	-24.90
1672.8	-42.40	286	2.2	V	3.1	-39.30	-13	-26.30
2509.2	-55.00	304	1.7	H	6.2	-48.80	-13	-35.80
2509.2	-55.50	345	1.2	V	5.6	-49.90	-13	-36.90
3345.6	-44.90	288	2.4	H	6.6	-38.30	-13	-25.30
3345.6	-46.10	12	2.2	V	5.4	-40.70	-13	-27.70
WCDMA Band 5,846.6MHz								
55.03	-61.83	106	1.4	H	4.3	-57.53	-13	-44.53
55.03	-63.29	202	1.2	V	-0.9	-64.19	-13	-51.19
1693.2	-43.10	149	1.6	H	4.1	-39.00	-13	-26.00
1693.2	-40.80	43	1.2	V	3.1	-37.70	-13	-24.70
2539.8	-54.30	306	2.3	H	6.1	-48.20	-13	-35.20
2539.8	-54.80	108	1.7	V	5.8	-49.00	-13	-36.00
3386.4	-45.40	166	1.5	H	6.2	-39.20	-13	-26.20
3386.4	-45.70	316	2.4	V	5.4	-40.30	-13	-27.30

LTE Bands: (pre-scan all bandwidth/modulation, 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)				
LTE Band 2, Test frequency range: 30MHz-20GHz								
QPSK,1.4MHz,1850.7MHz								
54.86	-62.53	88	1	H	4.3	-58.23	-13	-45.23
54.86	-63.76	207	1.2	V	-0.9	-64.66	-13	-51.66
3701.4	-42.10	218	1.3	H	8.1	-34.00	-13	-21.00
3701.4	-43.70	61	2.0	V	7.6	-36.10	-13	-23.10
5552.1	-48.80	93	2.4	H	9.6	-39.20	-13	-26.20
5552.1	-46.80	255	2.1	V	9.1	-37.70	-13	-24.70
QPSK,1.4MHz,1880MHz								
55.5	-62.81	169	1.7	H	4.3	-58.51	-13	-45.51
55.5	-63.63	16	2.3	V	-0.9	-64.53	-13	-51.53
3760	-46.00	127	1.5	H	8.8	-37.20	-13	-24.20
3760	-42.40	81	1.4	V	8	-34.40	-13	-21.40
5640	-50.10	338	2.2	H	10.2	-39.90	-13	-26.90
5640	-50.40	252	1.1	V	9.4	-41.00	-13	-28.00
QPSK,1.4MHz,1909.3MHz								
54.35	-61.73	344	1.4	H	4.3	-57.43	-13	-44.43
54.35	-63.31	245	1.5	V	-0.9	-64.21	-13	-51.21
3818.6	-42.30	236	2.2	H	8.7	-33.60	-13	-20.60
3818.6	-44.50	189	1	V	7.9	-36.60	-13	-23.60
5727.9	-49.20	74	1.6	H	10.6	-38.60	-13	-25.60
5727.9	-46.90	121	1.8	V	10.2	-36.70	-13	-23.70

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 4, Test frequency range: 30MHz-20GHz								
QPSK, 1.4MHz, 1710.7MHz								
55.12	-62.83	17	1.9	H	4.3	-58.53	-13	-45.53
55.12	-63.65	305	1.2	V	-0.9	-64.55	-13	-51.55
3421.4	-39.00	134	1.8	H	6.4	-32.60	-13	-19.60
3421.4	-39.10	297	2.5	V	5.8	-33.30	-13	-20.30
5132.1	-54.70	325	1.6	H	11.4	-43.30	-13	-30.30
5132.1	-54.40	151	2.3	V	10.8	-43.60	-13	-30.60
QPSK, 1.4MHz, 1732.5MHz								
55.13	-62.94	286	1.4	H	4.3	-58.64	-13	-45.64
55.13	-63.18	74	1.3	V	-0.9	-64.08	-13	-51.08
3465	-40.8	263	1.3	H	7	-33.80	-13	-20.80
3465	-34.3	252	1.1	V	6.2	-28.10	-13	-15.10
5197.5	-53.8	195	1.9	H	10.4	-43.40	-13	-30.40
5197.5	-51.8	312	2.2	V	9.8	-42.00	-13	-29.00
QPSK, 1.4MHz, 1754.3MHz								
54.72	-62.02	150	1.8	H	4.3	-57.72	-13	-44.72
54.72	-63.3	211	1.1	V	-0.9	-64.20	-13	-51.20
3508.6	-49.30	115	1.7	H	7.8	-41.50	-13	-28.50
3508.6	-51.80	88	1.7	V	6.5	-45.30	-13	-32.30
5262.9	-51.30	306	2	H	9.4	-41.90	-13	-28.90
5262.9	-52.50	299	2.3	V	9	-43.50	-13	-30.50

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 12, Test frequency range: 30MHz-10GHz								
QPSK, 1.4MHz, 699.7MHz								
55.18	-62.19	218	1.3	H	4.3	-57.89	-13	-44.89
55.18	-62.96	87	1	V	-0.9	-63.86	-13	-50.86
1399.4	-41.3	28	2.4	H	6.3	-35.00	-13	-22.00
1399.4	-45	346	1.3	V	5.7	-39.30	-13	-26.30
2099.1	-24.8	305	1.8	H	4.9	-19.90	-13	-6.90
2099.1	-26.2	176	1.9	V	3.9	-22.30	-13	-9.30
2798.8	-46.5	172	1.1	H	6.6	-39.90	-13	-26.90
2798.8	-48.4	313	1.6	V	6	-42.40	-13	-29.40
QPSK, 1.4MHz, 707.5MHz								
55.22	-63.29	308	1.7	H	4.3	-58.99	-13	-45.99
55.22	-64.04	299	2.2	V	-0.9	-64.94	-13	-51.94
1415	-36.8	317	1.1	H	5.9	-30.90	-13	-17.90
1415	-40.1	345	1.8	V	5.9	-34.20	-13	-21.20
2122.5	-25.4	90	2.4	H	6.3	-19.10	-13	-6.10
2122.5	-26.5	192	1.4	V	5.1	-21.40	-13	-8.40
2830	-45.1	236	1.6	H	6.7	-38.40	-13	-25.40
2830	-44	51	2	V	6.7	-37.30	-13	-24.30
QPSK, 1.4MHz, 715.3MHz								
54.14	-61.96	114	1.9	H	4.3	-57.66	-13	-44.66
54.14	-63.76	234	1.8	V	-0.9	-64.66	-13	-51.66
1430.6	-38.3	319	1.3	H	5.9	-32.40	-13	-19.40
1430.6	-40.2	197	1.2	V	5.9	-34.30	-13	-21.30
2145.9	-22.6	349	2.2	H	6.3	-16.30	-13	-3.30
2145.9	-24.7	292	1.8	V	5.1	-19.60	-13	-6.60
2861.2	-46	100	1.1	H	6.7	-39.30	-13	-26.30
2861.2	-46.8	72	2.4	V	6.7	-40.10	-13	-27.10

Note:

Absolute Level = Reading Level + Substituted Factor

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

Margin = Absolute Level - Limit

FCC§ 22.917 (a);§ 24.238 (a); §27.53 (g)(h)(m) - 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.

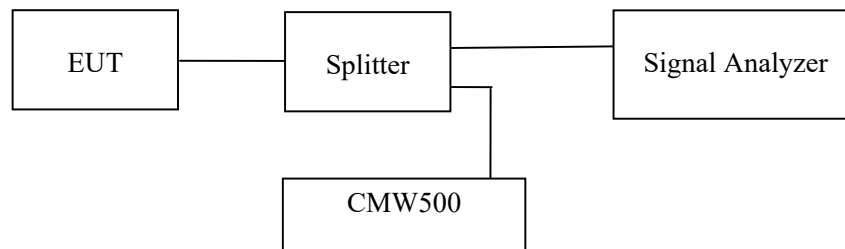
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to FCC §27.53 (g)(h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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**

Temperature:	26~27 °C
Relative Humidity:	56~62 %
ATM Pressure:	101.0 kPa

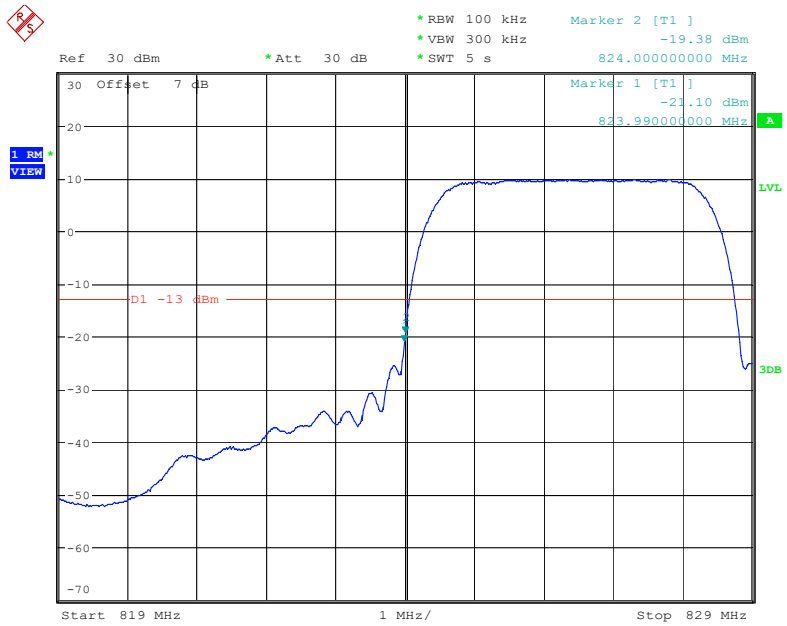
The testing was performed by Andy Yu from 2022-08-12 to 2022-08-15.

EUT operation mode: Transmitting (Worst case)

Test Result: Pass

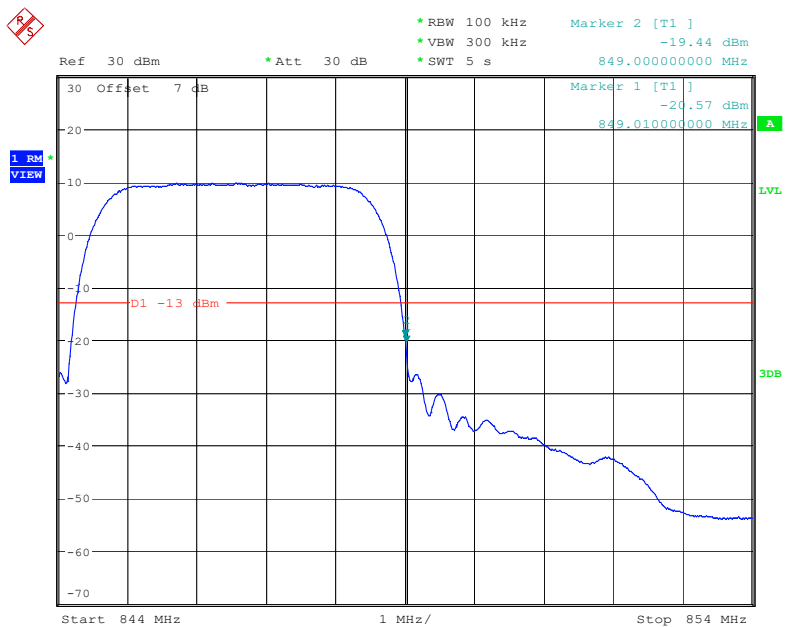
Please refer to the following plots.

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



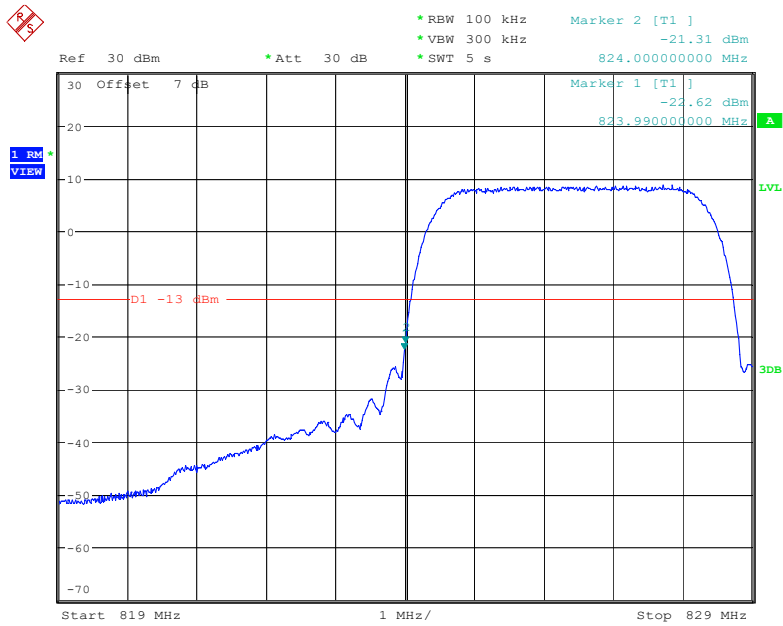
Date: 15.AUG.2022 14:56:53

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



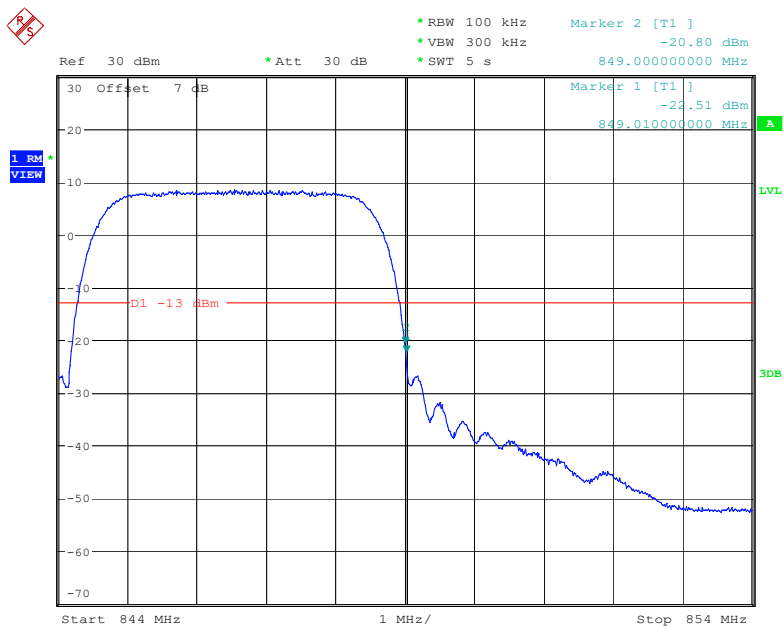
Date: 15.AUG.2022 15:03:44

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



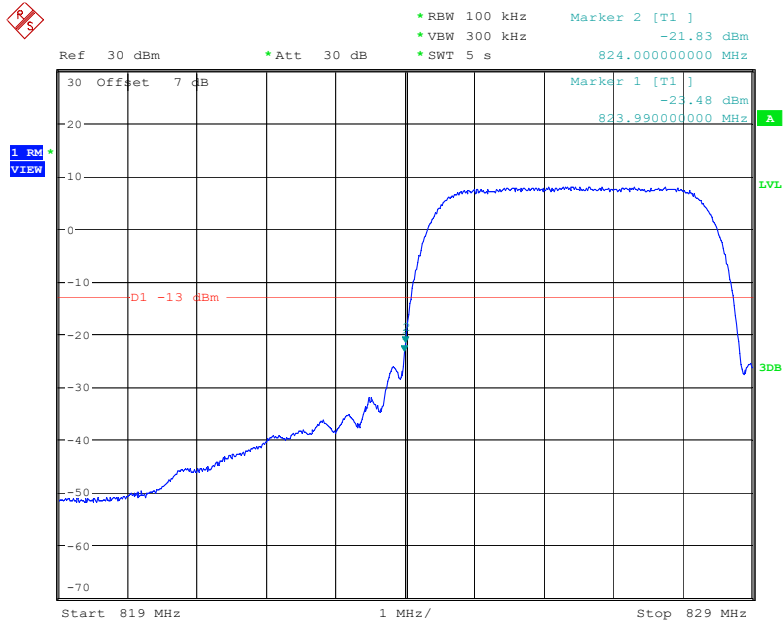
Date: 15.AUG.2022 15:10:12

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



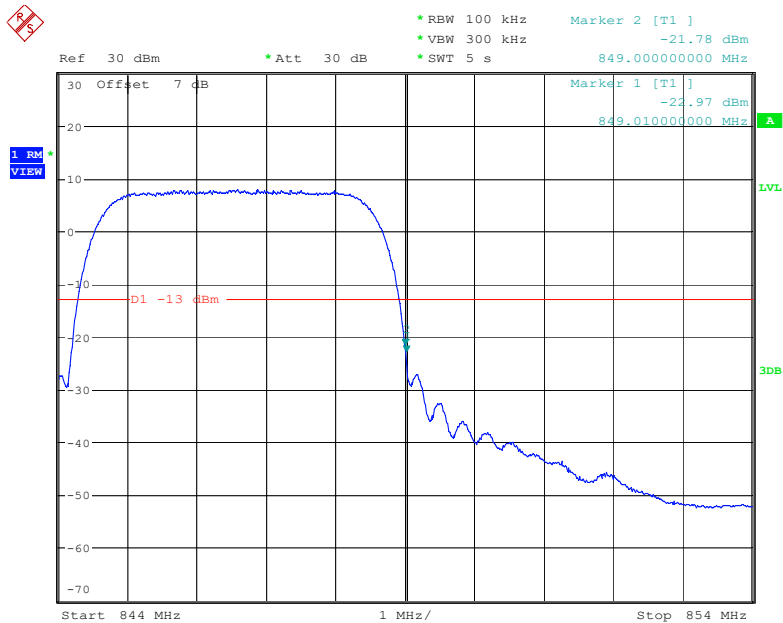
Date: 15.AUG.2022 15:18:59

Cellular Band, Left Band Edge for HSUPA (QPSK) Mode



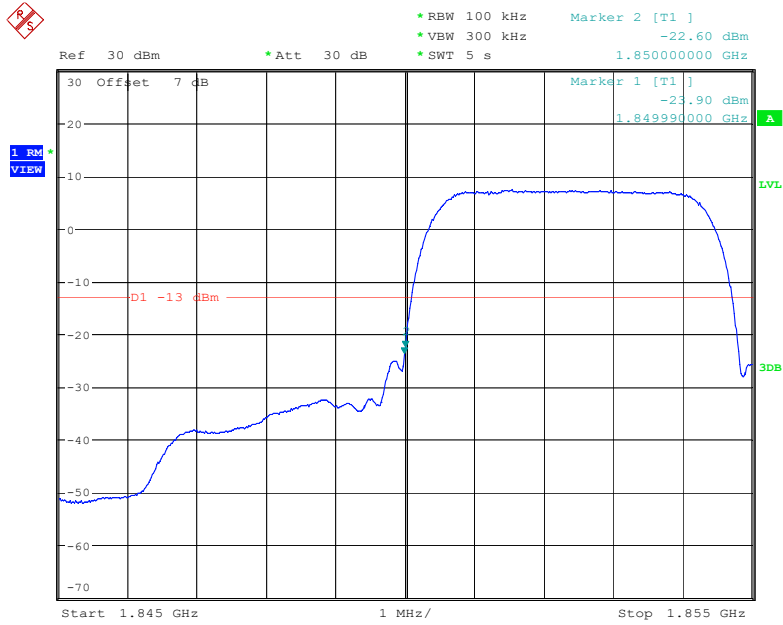
Date: 15.AUG.2022 15:23:50

Cellular Band, Right Band Edge for HSUPA (QPSK) Mode



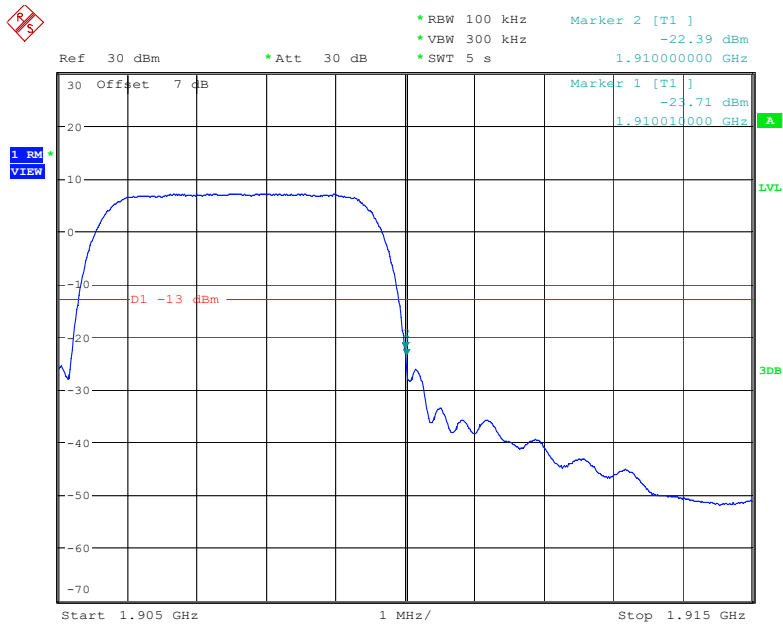
Date: 15.AUG.2022 15:31:46

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



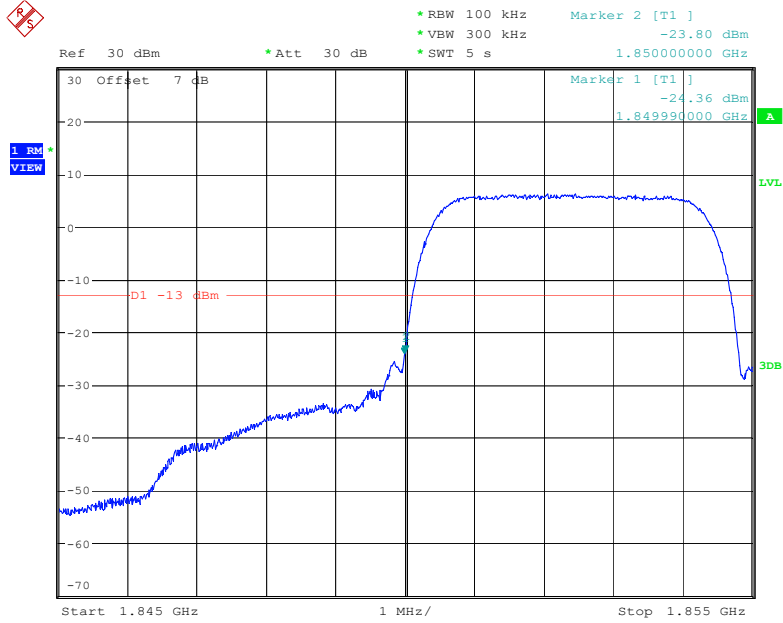
Date: 15.AUG.2022 15:36:44

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



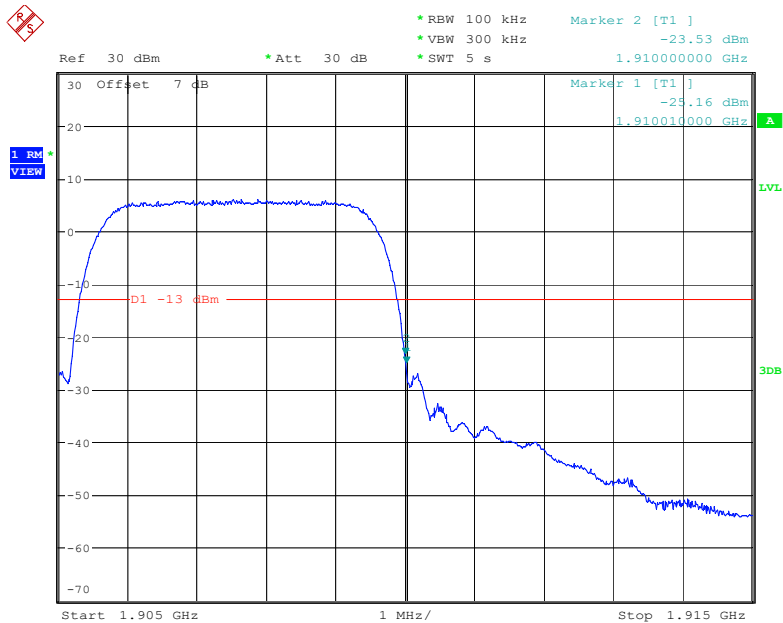
Date: 15.AUG.2022 15:44:46

PCS Band, Left Band Edge for HSDPA(16QAM) Mode



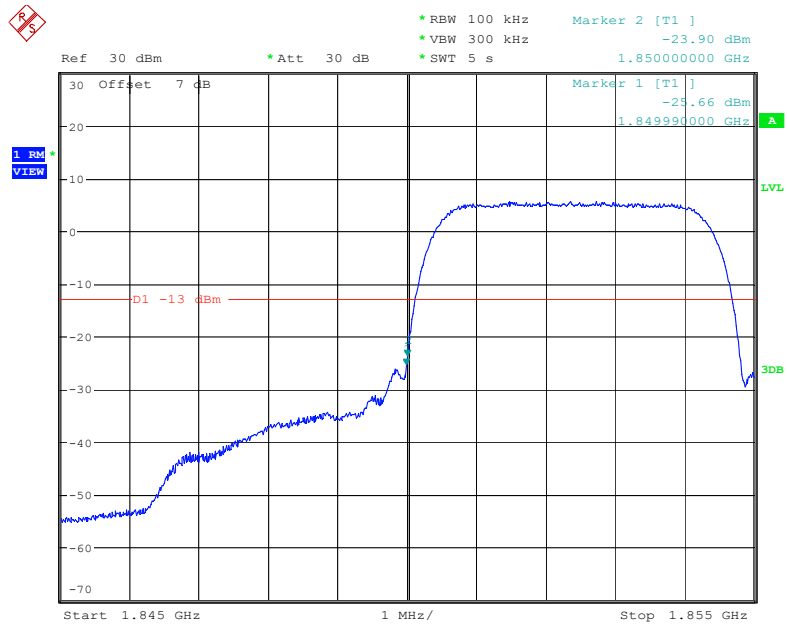
Date: 15.AUG.2022 15:49:40

PCS Band, Right Band Edge for HSDPA (16QAM) Mode



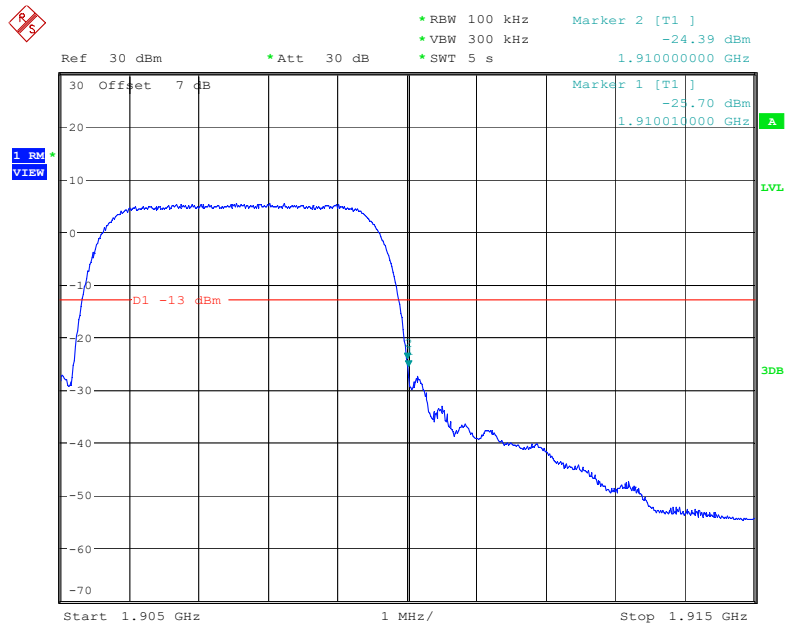
Date: 15.AUG.2022 15:56:56

PCS Band, Left Band Edge for HSUPA (QPSK) Mode



Date: 15.AUG.2022 16:03:28

PCS Band, Right Band Edge for HSUPA (QPSK) Mode



Date: 15.AUG.2022 16:10:48

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

FCC § 2.1055; § 22.355; § 24.235; §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055, §22.355, §24.235&§27.54.

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

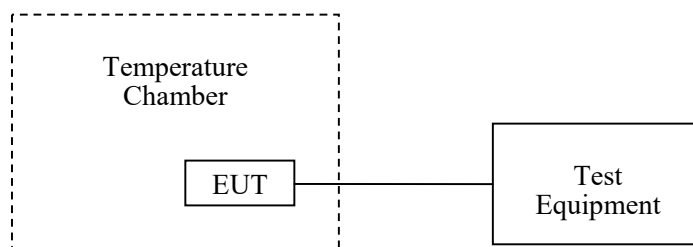
According to §24.235&§27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to a DC power source 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**

Temperature:	26~27 °C
Relative Humidity:	56~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu from 2022-08-12 to 2022-08-15.

EUT operation mode: Transmitting

Test Result: Pass

Note: The two power supply modes were test for this item, only the worst case DC 30-90V test was reported.

Please refer to the following tables.

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

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	N.V.	1.58	0.0019	2.5
-20		2.01	0.0024	2.5
-10		2.21	0.0026	2.5
0		1.36	0.0016	2.5
10		1.54	0.0018	2.5
20		1.68	0.0020	2.5
30		1.55	0.0019	2.5
40		1.78	0.0021	2.5
50		1.86	0.0022	2.5
20		L.V.	1.69	0.0020
	H.V.	1.49	0.0018	2.5

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

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	1.42	0.0008	pass
-20		1.36	0.0007	pass
-10		1.59	0.0008	pass
0		1.42	0.0008	pass
10		1.39	0.0007	pass
20		1.35	0.0007	pass
30		1.51	0.0008	pass
40		1.44	0.0008	pass
50		1.49	0.0008	pass
20		L.V.	1.43	0.0008
	H.V.	1.58	0.0008	pass

**LTE:
QPSK:
Band 2:**

10.0 MHz Middle Channel, $f_0=1880$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	-3.75	-0.0020	pass
-20		9.28	0.0049	pass
-10		-7.12	-0.0038	pass
0		-8.19	-0.0044	pass
10		-7.45	-0.0040	pass
20		7.95	0.0042	pass
30		-9.17	-0.0049	pass
40		8.75	0.0047	pass
50		8.49	0.0045	pass
20		L.V.	-8.87	-0.0047
	H.V.	9.05	0.0048	pass

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	1710.1166	1754.8738	1710	1755
-20		1710.1158	1754.8736	1710	1755
-10		1710.1152	1754.8737	1710	1755
0		1710.1154	1754.8738	1710	1755
10		1710.1147	1754.8757	1710	1755
20		1710.1142	1754.8755	1710	1755
30		1710.1139	1754.8754	1710	1755
40		1710.1130	1754.8756	1710	1755
50		1710.1129	1754.8749	1710	1755
20		L.V.	1710.1128	1754.8748	1710
	H.V.	1710.1024	1754.8742	1710	1755

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	699.0374	715.9632	699	716
-20		699.0362	715.9627	699	716
-10		699.0362	715.9671	699	716
0		699.0318	715.9665	699	716
10		699.0345	715.9647	699	716
20		699.0384	715.9672	699	716
30		699.0378	715.9665	699	716
40		699.0377	715.9691	699	716
50		699.0362	715.9654	699	716
20		L.V.	699.0338	715.9672	699
	H.V.	699.0375	715.9647	699	716

16QAM:**Band 2:**

10.0 MHz Middle Channel, $f_0=1880\text{MHz}$				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	-2.92	-0.0016	pass
-20		9.65	0.0051	pass
-10		-6.60	-0.0035	pass
0		6.09	0.0032	pass
10		9.29	0.0049	pass
20		-8.98	-0.0048	pass
30		9.28	0.0049	pass
40		-7.02	-0.0037	pass
50		-5.98	-0.0032	pass
20		L.V.	8.53	0.0045
	H.V.	-5.10	-0.0027	pass

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	1710.2966	1754.7672	1710	1755
-20		1710.2958	1754.7562	1710	1755
-10		1710.2751	1754.7672	1710	1755
0		1710.2652	1754.7452	1710	1755
10		1710.2633	1754.7435	1710	1755
20		1710.2643	1754.7626	1710	1755
30		1710.2572	1754.7625	1710	1755
40		1710.2658	1754.7652	1710	1755
50		1710.2636	1754.7752	1710	1755
20		L.V.	1710.2621	1754.7536	1710
	H.V.	1710.2715	1754.7524	1710	1755

Band 12:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	699.0387	715.9688	699	716
-20		699.0355	715.9627	699	716
-10		699.0398	715.9674	699	716
0		699.0345	715.9676	699	716
10		699.0355	715.9657	699	716
20		699.0407	715.9628	699	716
30		699.0355	715.9626	699	716
40		699.0342	715.9644	699	716
50		699.0385	715.9636	699	716
20		L.V.	699.0367	715.9665	699
	H.V.	699.0345	715.9676	699	716

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