TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 22H

FCC PART 24E

TEST REPORT

For

Rosenberger Technologies Co.,Ltd

No.6 Shenan Road, Dianshanhu Town, Kunshan , Jiangsu, China

FCC ID: 2AW6JIM2U091921NF01

Report Type:	**Product Type:**
Original Report	IM2U – Master Unit

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Report Number:	RKSA200618002-00A
Report Date:	2020-09-17
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Rosenberger Technologies Co.,Ltd
Tested Model	IM2U-N10-091921-NF-01
Product Type	IM2U – Master Unit
Power Supply	DC 48V
RF Function:	GSM, WCDMA
Operating Band/Frequency:	GSM850: 824-849 MHz(TX), 869-894 MHz(RX) PCS1900: 1850-1910 MHz(TX), 1930-1990MHz(RX) WCDMA Band II: 1850-1910 MHz(TX), 1930-1990MHz(RX) WCDMA Band V: 824-849 MHz(TX), 869-894 MHz(RX)
Modulation Type:	GSM: GMSK/8PSK WCDMA: BPSK,QPSK,16QAM
Antenna Type:	Omni Antenna
Maximum Antenna Gain:	GSM/WCDMA: 3.0 dBi

**All measurement and test data in this report was gathered from production sample serial number: 20200618002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-06-18)*

Objective

This type approval report is prepared on behalf of Rosenberger Technologies Co.,Ltd in accordance with Part 2, Part 22-Subpart H and Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the Compliant 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.

Related Submittal(s)/Grant(s)

FCC Part 24E submissions with FCC ID: 2AW6JIRU091921QF01

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

Applicable Standards: ANSI C63.26-2015

All radiated and conducted emissions measurements were performed at Bay Area Compliant Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6GHz~18GHz	4.92dB
	18GHz~40GHz	5.21dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliant Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliant Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.26-2015.

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

Channel List

Mode	Channel		Frequency (MHz)
GSM 850	Low	128	824.2
	Middle	190	836.6
	High	251	848.8
PCS 1900	Low	512	1850.2
	Middle	661	1880.0
	High	810	1909.8
WCDMA Band II	Low	9262	1852.4
	Middle	9400	1880.0
	High	9538	1907.6
WCDMA Band V	Low	4132	826.4
	Middle	4183	836.6
	High	4233	846.6

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

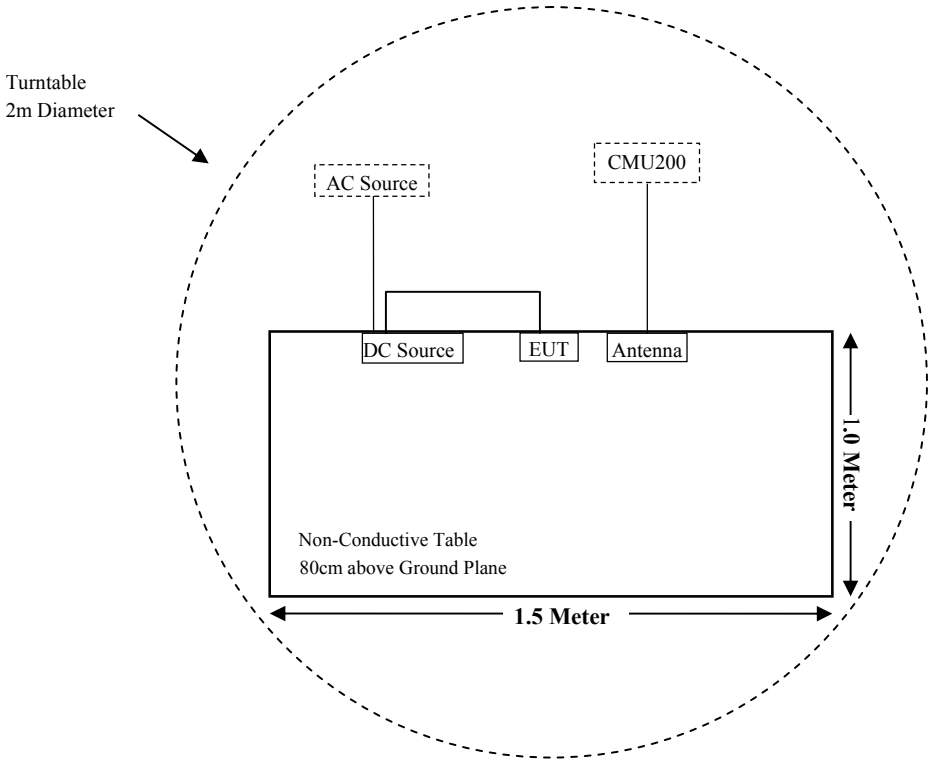
Manufacturer	Description	Model	Serial Number
Aihuaixin	Antenna	/	/
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605
ZHAOXIN	DC Power Supply	RXN-605D	DC002

External I/O Cable

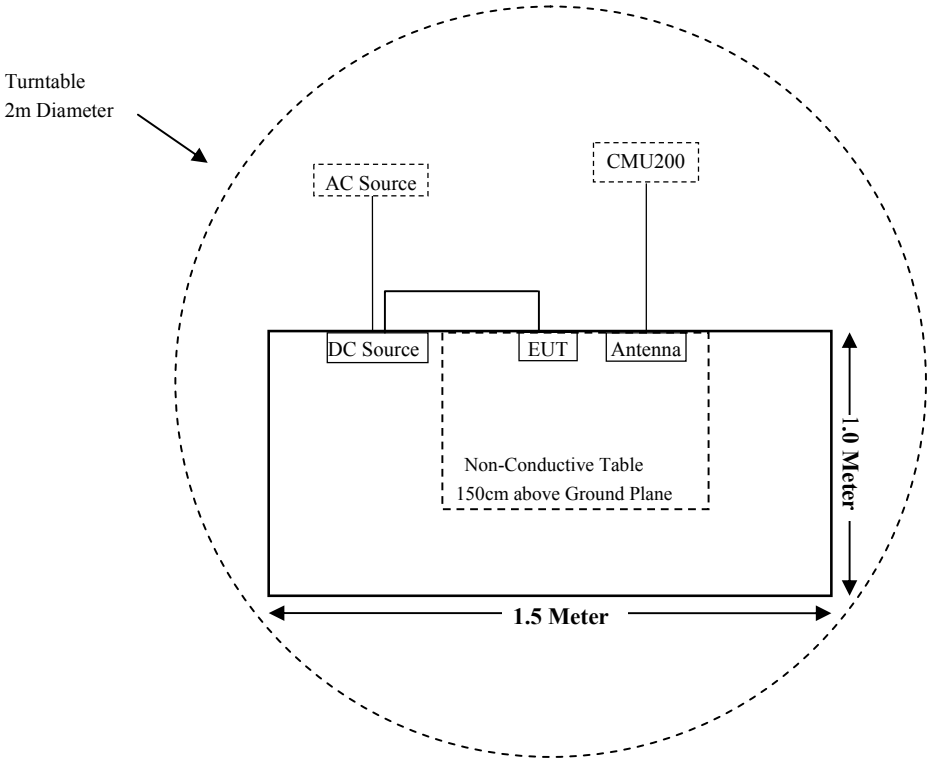
Cable Description	Length (m)	From Port	To
DC Cable	1.5	EUT	DC Source
Power Cable	1.5	DC Source	AC Source

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz)):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§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)	Spurious Radiated Emissions	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
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-12-14	2020-12-13
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2017-12-26	2020-12-25
Sunol Sciences	Bilog antenna	JB3	A060217	2020-08-04	2021-08-03
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-10	2023-01-09
ETS-LINDGREN	Horn Antenna	3116	84159	2019-12-12	2022-12-11
ETS-LINDGREN	Horn Antenna	3116	2516	2020-01-17	2023-01-16
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2020-03-22	2021-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-12-12	2020-12-11
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2020-08-15	2021-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2019-12-14	2020-12-13
Narda	Attenuator	6dB	006	2020-01-10	2021-01-09
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31
Mini-Ciruits	Power splitter	ZFRSC-14-S+	SF019411452	2019-11-10	2020-11-09
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-12-20	2020-12-19
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2019-10-10	2020-10-09
Rosenberger	RF Cable	Rosenberger C01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Kunshan) 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 & §2.1091 – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	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;

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
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);

Calculated Data (worst case):

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
GSM850 (GPRS/EGPRS)	824.2-848.8	3.00	2.00	29.50	891.25	30	0.1572	0.55
PCS1900 (GPRS/EGPRS)	1850.2-1909.8	3.00	2.00	25.50	354.81	30	0.0626	1.00
WCDMA Band II	1852.4-1907.6	3.00	2.00	23.50	223.87	30	0.0395	1.00
WCDMA Band V	826.4-846.6	3.00	2.00	23.00	199.53	30	0.0352	0.55

Note 1:
GPRS850: Tune-up maximum output power with 1 slot is 33.50 dBm, 2 slots is 33.00 dBm, 3 slots is 33.00 dBm, 4 slots is 32.50 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 29.50dBm.
EGPRS850: Tune-up maximum output power with 1 slot is 26.50 dBm, 2 slots is 26.50 dBm, 3 slots is 26.00 dBm, 4 slots is 25.50 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 22.50 dBm.
GPRS1900: Tune-up maximum output power with 1 slot is 31.50 dBm, 2 slots is 30.00 dBm, 3 slots is 29.00 dBm, 4 slots is 28.50 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 25.50dBm.
EGPRS1900: Tune-up maximum output power with 1 slot is 26.00 dBm, 2 slots is 25.50 dBm, 3 slots is 25.00 dBm, 4 slots is 24.50 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 21.50 dBm.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Result: The device meet FCC MPE at 30 cm distance.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H and 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 Standards

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts (38.45dBm).

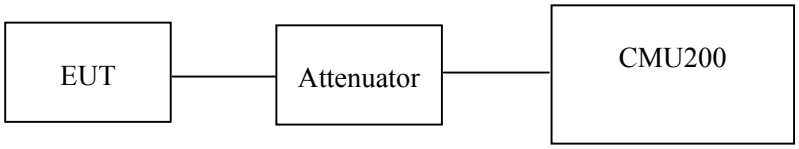
According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts (33dBm) EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

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 CMU200 through sufficient attenuation.



Radiated Output Power:

The measurements procedures specified in ANSI C63.26-2015 were applied.

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360o azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used,raise and lower the test antenna to obtain a maximum reading. LOSS = Generator Output Power (dBm) – Analyzer reading (dBm)

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:
ERP (dBm) = LVL (dBm) + LOSS (dB)

f) The maximum ERP is the maximum value determined in the preceding step.
(Note: Effective Isotropic Radiated Power (EIRP) can be computed using the following:
EIRP (dBm) = ERP (dBm) + 2.15 (dB)

Test Data

Environmental Conditions

Temperature:	25.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Jack Jiao on 2020-08-16.

Conducted Power:

GSM 850 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	33.21	32.85	32.45	32.08	38.45
	190	836.6	33.28	32.78	32.41	32.12	38.45
	251	848.8	33.18	32.89	32.58	32.25	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.31	26.05	25.11	25.04	38.45
	190	836.6	26.12	25.96	25.72	25.41	38.45
	251	848.8	26.21	25.94	25.69	25.37	38.45

WCDMA Band V

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	Rel 99	1	22.12	22.54	22.39
		HSDPA	1	22.22	22.48	22.51
			2	22.37	22.5	22.51
			3	22.31	22.61	22.49
			4	22.45	22.59	22.52
		HSUPA	1	22.46	22.75	22.49
			2	22.52	22.76	22.49
			3	22.49	22.74	22.61
			4	22.54	22.71	22.64
			5	22.68	22.72	22.74
		HSPA+	1	22.71	22.77	22.82

PCS 1900 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	31.42	29.71	28.92	25.46	33
	661	1880.0	30.71	29.13	28.42	28.02	33
	810	1909.8	31.12	29.42	28.71	28.42	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	24.52	23.88	23.21	22.89	33
	661	1880.0	25.41	24.54	23.54	23.34	33
	810	1909.8	25.63	25.13	24.47	24.28	33

WCDMA Band II

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	Rel 99	1	22.24	22.39	22.65
		HSDPA	1	22.20	22.42	22.74
			2	22.33	22.38	22.90
			3	22.34	22.44	22.96
			4	22.49	22.43	22.99
		HSUPA	1	22.41	22.48	23.10
			2	22.41	22.54	23.04
			3	22.51	22.58	23.16
			4	22.51	22.56	23.28
			5	22.55	22.61	23.31
		HSPA+	1	22.65	22.72	23.23

Peak-to-average ratio (PAR):

GSM 850 Band

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.03	13
	Middle	2.23	13
	High	2.23	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.12	13
	Middle	1.99	13
	High	1.97	13

PCS 1900 Band

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.01	13
	Middle	2.05	13
	High	2.12	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.14	13
	Middle	2.11	13
	High	2.05	13

WCDMA Band V

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	2.22	≤ 13
	Middle	2.44	≤ 13
	High	2.36	≤ 13
WCDMA (HSDPA)	Low	2.14	≤ 13
	Middle	2.58	≤ 13
	High	1.93	≤ 13
WCDMA (HSUPA)	Low	2.36	≤ 13
	Middle	2.58	≤ 13
	High	2.14	≤ 13
WCDMA (HSPA+)	Low	2.41	≤ 13
	Middle	2.34	≤ 13
	High	2.88	≤ 13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	1.85	≤ 13
	Middle	1.94	≤ 13
	High	2.01	≤ 13
WCDMA (HSDPA)	Low	2.36	≤ 13
	Middle	2.58	≤ 13
	High	2.41	≤ 13
WCDMA (HSUPA)	Low	2.25	≤ 13
	Middle	2.64	≤ 13
	High	2.63	≤ 13
WCDMA (HSPA+)	Low	2.08	≤ 13
	Middle	1.99	≤ 13
	High	2.54	≤ 13

Radiated Power:

GSM Mode

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
GPRS 850, Low Channel (ERP)										
824.2	99.43	279	160	H	34.53	0.62	-1.18	32.73	38.45	5.72
824.2	96.35	154	165	V	31.45	0.62	-1.18	29.65	38.45	8.8
GPRS 850, Middle Channel (ERP)										
836.6	99.58	305	150	H	34.72	0.63	-1.14	32.95	38.45	5.50
836.6	96.57	268	140	V	31.71	0.63	-1.14	29.94	38.45	8.51
GPRS 850, High Channel (ERP)										
848.8	98.37	322	145	H	33.54	0.63	-1.10	31.81	38.45	6.64
848.8	95.49	92	160	V	30.56	0.63	-1.10	28.83	38.45	9.62
EGPRS 850,Low Channel (ERP)										
824.2	91.77	171	155	H	26.87	0.62	-1.18	25.07	38.45	13.38
824.2	88.91	103	105	V	24.01	0.62	-1.18	22.21	38.45	16.24
EGPRS 850, Middle Channel (ERP)										
836.6	91.65	128	160	H	26.79	0.63	-1.14	25.02	38.45	13.43
836.6	88.72	269	110	V	23.86	0.63	-1.14	22.09	38.45	16.36
EGPRS 850,High Channel (ERP)										
848.8	91.03	104	150	H	26.2	0.63	-1.10	24.47	38.45	13.98
848.8	88.62	81	120	V	23.69	0.63	-1.10	21.96	38.45	16.49
GPRS 1900,Low Channel (EIRP)										
1850.2	92.03	217	160	H	21.69	0.84	8.76	29.61	33	3.39
1850.2	87.13	62	130	V	16.79	0.84	8.76	24.71	33	8.29
GPRS 1900, Middle Channel (EIRP)										
1880.0	91.32	84	170	H	21.19	0.85	8.81	29.15	33	3.85
1880.0	87.22	199	110	V	17.09	0.85	8.81	25.05	33	7.95
GPRS 1900, High Channel (EIRP)										
1909.8	91.26	344	150	H	21.34	0.85	8.85	29.34	33	3.66
1909.8	86.36	241	120	V	16.44	0.85	8.85	24.44	33	8.56
EGPRS 1900, Low Channel (EIRP)										
1850.2	85.63	161	170	H	15.29	0.84	8.76	23.21	33	9.79
1850.2	79.68	230	110	V	9.34	0.84	8.76	17.26	33	15.74
EGPRS 1900, Middle Channel (EIRP)										
1880.0	85.64	22	160	H	15.51	0.85	8.81	23.47	33	9.53
1880.0	80.06	141	100	V	9.93	0.85	8.81	17.89	33	15.11
EGPRS 1900, High Channel (EIRP)										
1909.8	85.21	272	150	H	15.29	0.85	8.85	23.29	33	9.71
1909.8	79.42	286	100	V	9.50	0.85	8.85	17.5	33	15.5

WCDMA Mode

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Band V, Low Channel(ERP)										
826.4	88.46	178	150	H	23.57	0.63	-1.17	21.77	38.45	16.68
826.4	85.77	134	150	V	20.88	0.63	-1.17	19.08	38.45	19.37
WCDMA Band V, Middle Channel(ERP)										
836.6	89.58	151	200	H	24.72	0.63	-1.14	22.95	38.45	15.50
836.6	86.21	106	150	V	21.35	0.63	-1.14	19.58	38.45	18.87
WCDMA Band V, High Channel(ERP)										
846.6	88.76	234	180	H	23.92	0.63	-1.11	22.18	38.45	16.27
846.6	85.83	146	150	V	20.99	0.63	-1.11	19.25	38.45	19.2
WCDMA Band II, Low Channel(EIRP)										
1852.4	85.36	223	190	H	15.02	0.84	8.76	22.94	33	10.06
1852.4	82.93	58	150	V	12.59	0.84	8.76	20.51	33	12.49
WCDMA Band II, Middle Channel(EIRP)										
1880.0	85.11	78	200	H	14.98	0.85	8.81	22.94	33	10.06
1880.0	83.03	196	150	V	12.9	0.85	8.81	20.86	33	12.14
WCDMA Band II, High Channel(EIRP)										
1907.6	84.11	275	200	H	14.97	0.85	8.85	22.97	33	10.03
1907.6	81.98	27	150	V	12.84	0.85	8.85	20.84	33	12.16

Note:
All above data were tested without amplifier.
Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)
Margin (dB) = Limit (dBm) - Absolute Level (dBm)

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

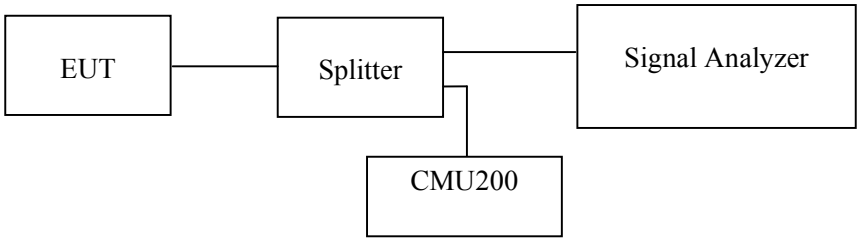
Applicable Standards

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 5 kHz (Cellular /PCS) &100 kHz (WCDMA), and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	24.5-25.3 ℃
Relative Humidity:	48-53 %
ATM Pressure:	101.3-101.6 kPa

The testing was performed by Jack Jiao from 2020-08-14 to 2020-09-17.

EUT operation mode: Transmitting

Test Result: Compliant.

GSM 850 Band

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GPRS (GMSK)	824.2	0.319	0.246
	836.6	0.317	0.246
	848.8	0.321	0.246
EGPRS (8PSK)	824.2	0.323	0.248
	836.6	0.316	0.246
	848.8	0.319	0.244

WCDMA Band V

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	826.4	4.689	4.148
	836.6	4.689	4.148
	846.6	4.869	4.208
WCDMA (HSDPA)	826.4	4.709	4.168
	836.6	4.689	4.148
	846.6	4.870	4.228
WCDMA (HSUPA)	826.4	4.709	4.168
	836.6	4.709	4.148
	846.6	4.990	4.248
WCDMA (HSPA+)	826.4	4.810	4.148
	836.6	4.729	4.148
	846.6	4.970	4.228

PCS 1900 Band

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GPRS (GMSK)	1850.2	0.323	0.244
	1880.0	0.317	0.240
	1909.8	0.317	0.242
EGPRS (8PSK)	1850.2	0.317	0.246
	1880.0	0.315	0.246
	1909.8	0.327	0.244

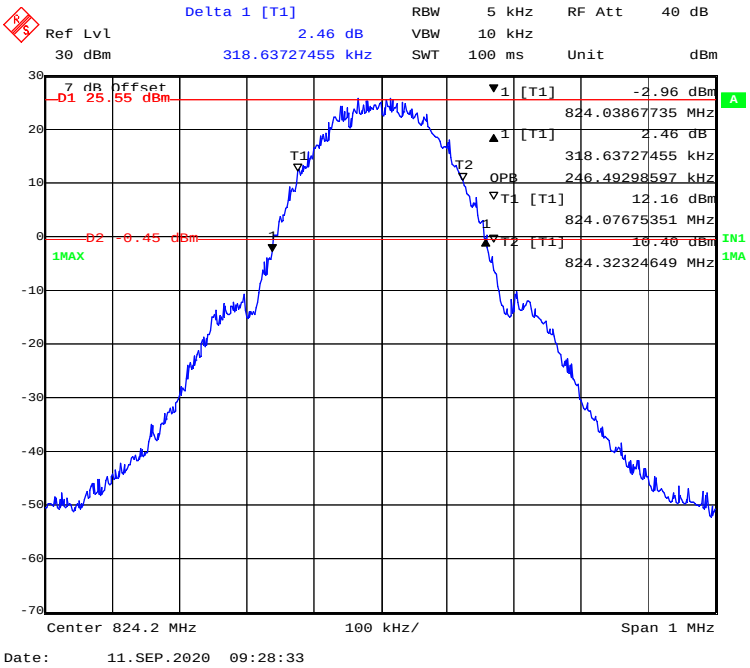
WCDMA Band II

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	1852.4	4.709	4.168
	1880.0	4.709	4.168
	1907.6	4.709	4.168
WCDMA (HSDPA)	1852.4	4.709	4.168
	1880.0	4.709	4.148
	1907.6	4.709	4.148
WCDMA (HSUPA)	1852.4	4.709	4.168
	1880.0	4.689	4.128
	1907.6	4.709	4.148
WCDMA (HSPA+)	1852.4	4.770	4.128
	1880.0	4.709	4.168
	1907.6	4.790	4.148

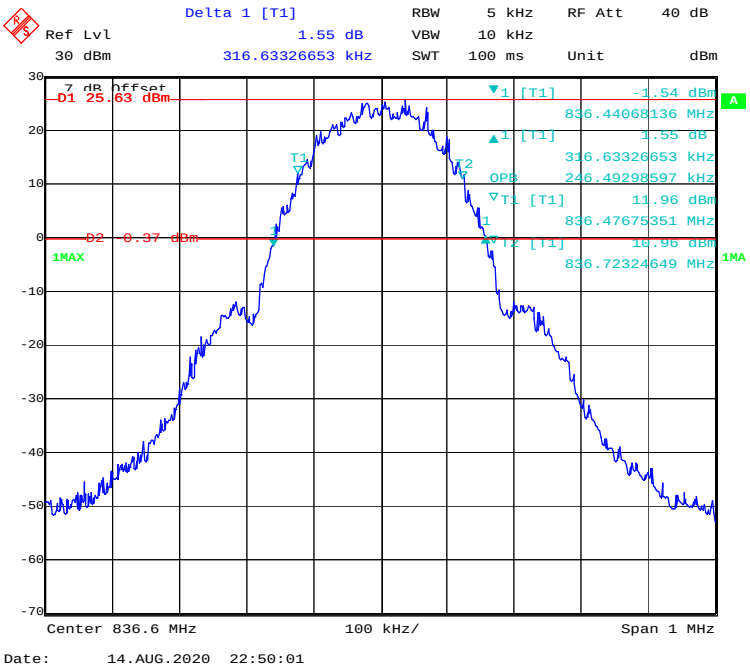
GSM 850 Band

99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode

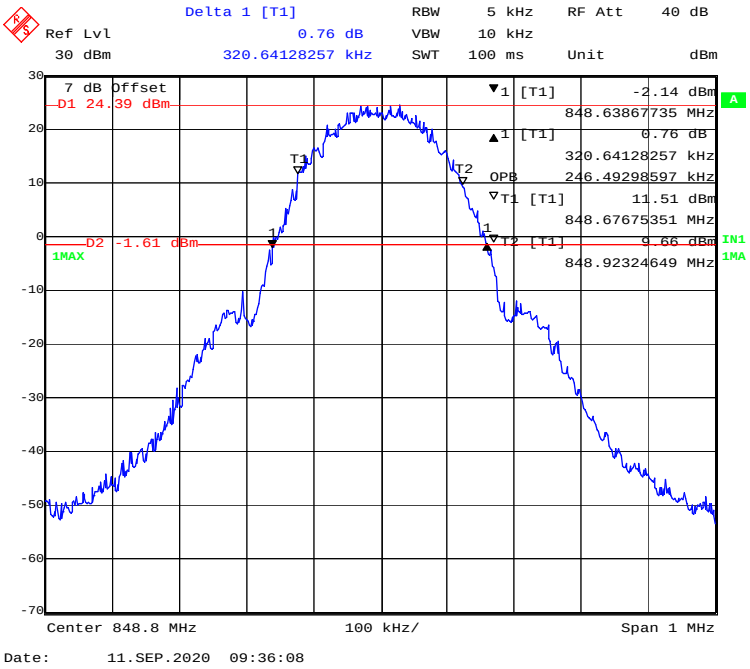
Low Channel



Middle Channel

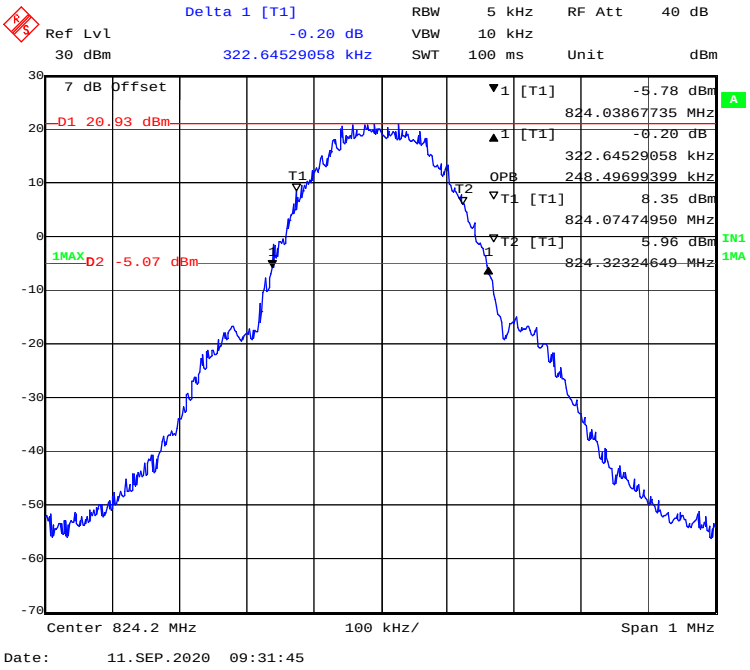


High Channel

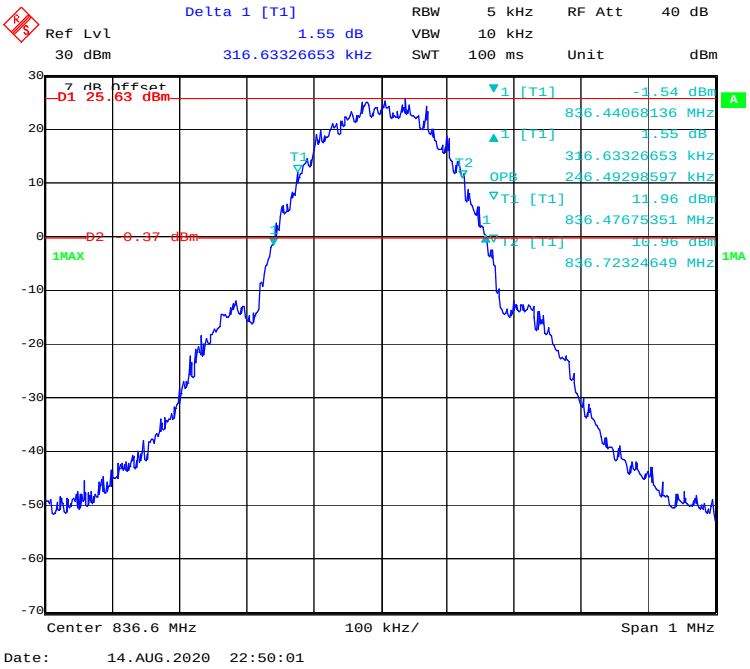


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (8PSK) Mode

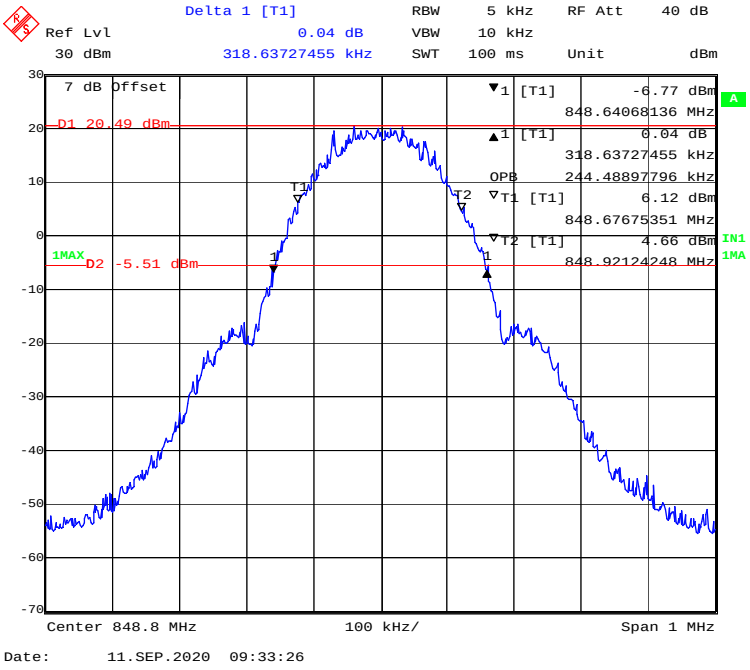
Low Channel



Middle Channel



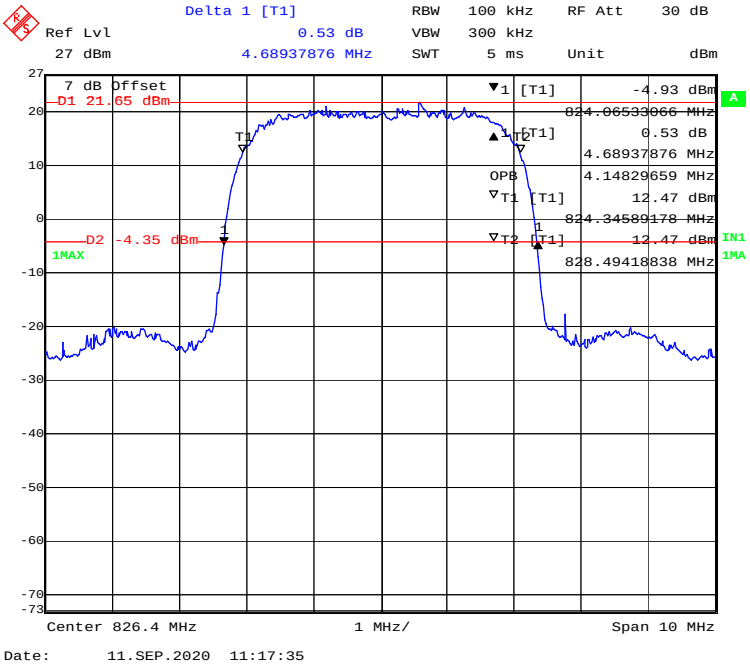
High Channel



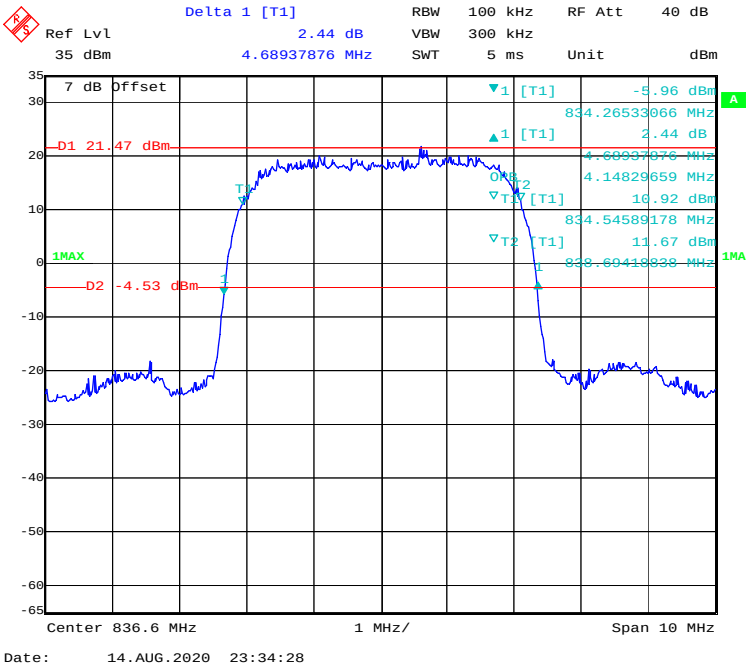
WCDMA Band V

99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode

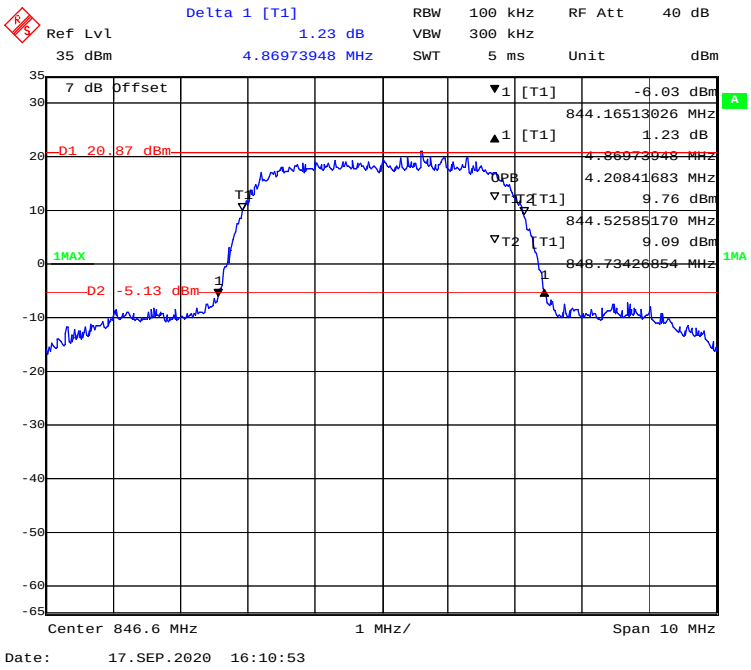
Low Channel



Middle Channel

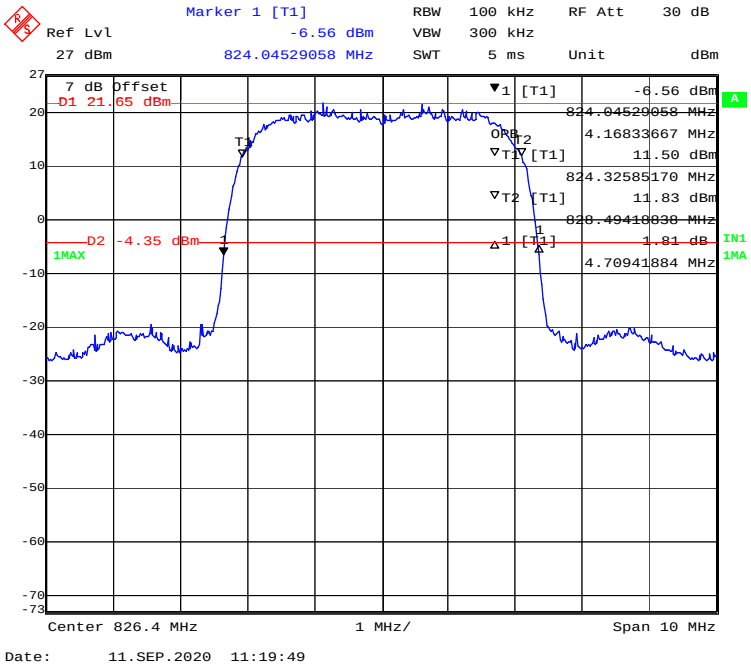


High Channel

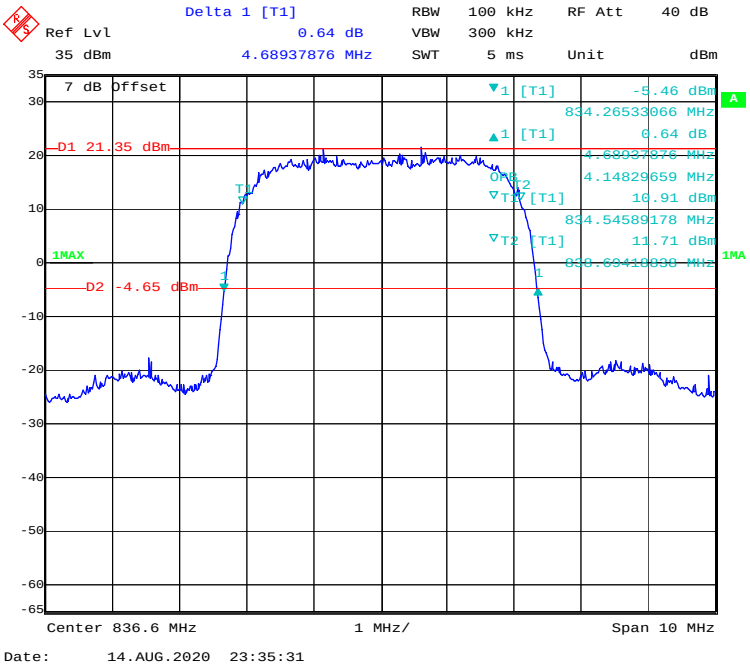


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode

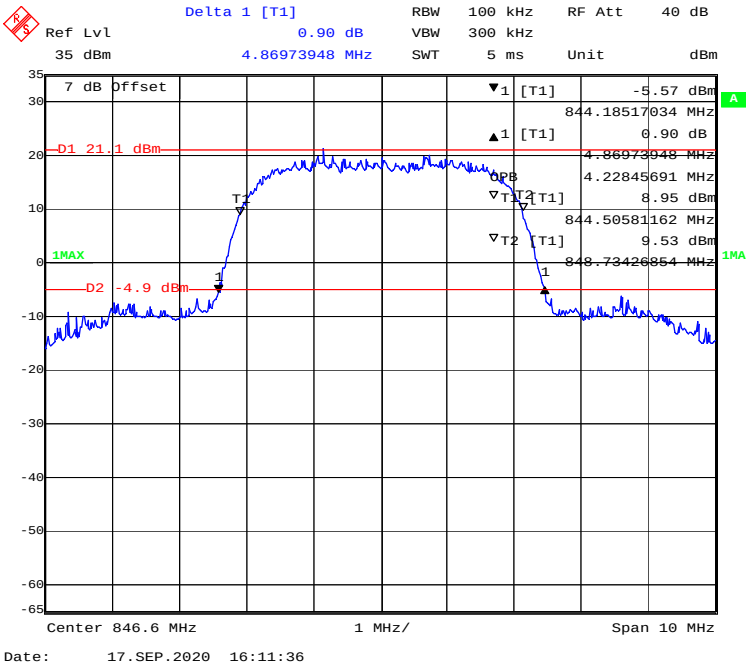
Low Channel



Middle Channel

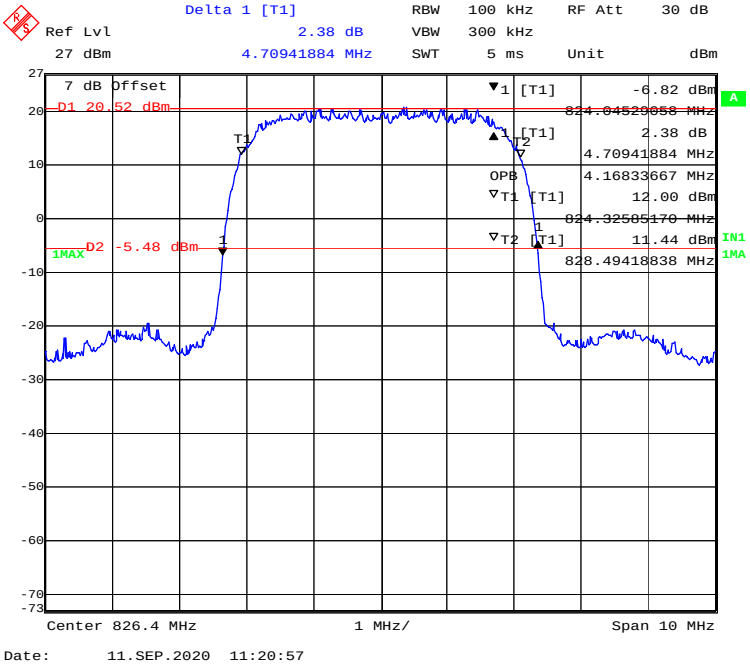


High Channel

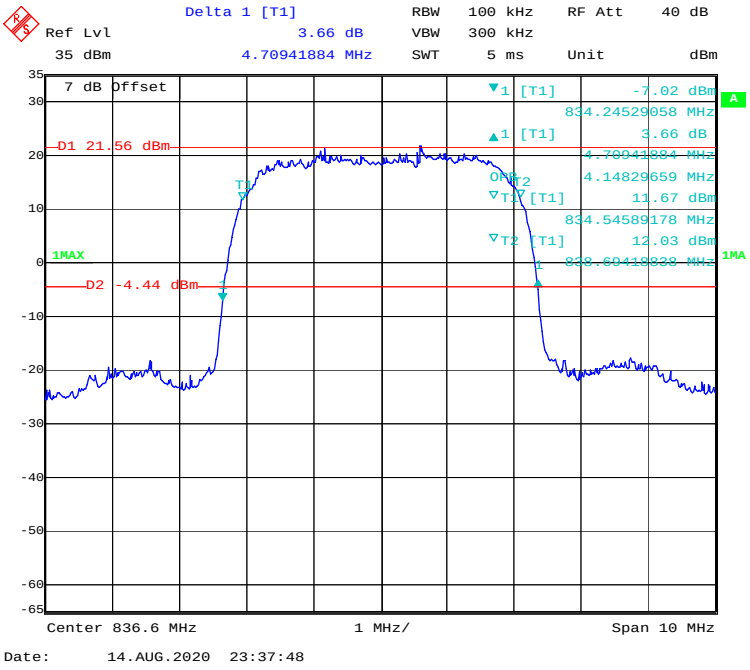


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode

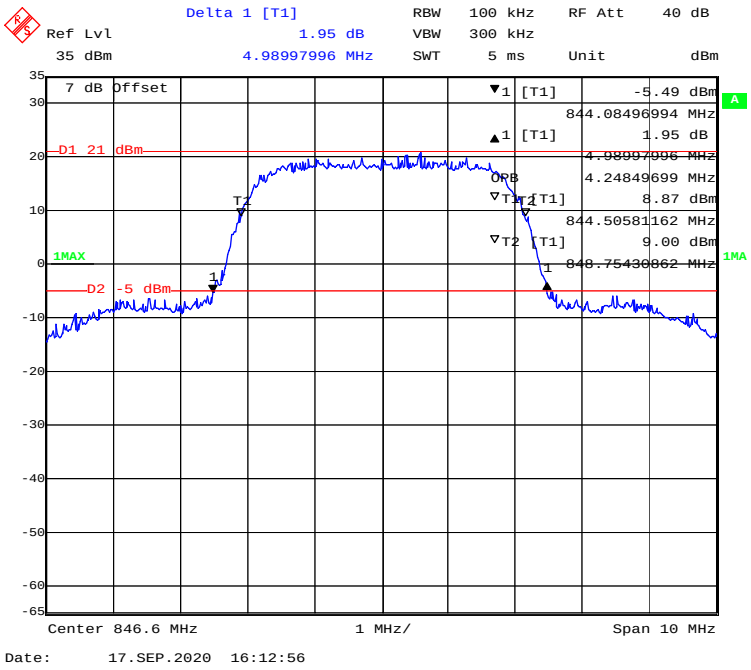
Low Channel



Middle Channel

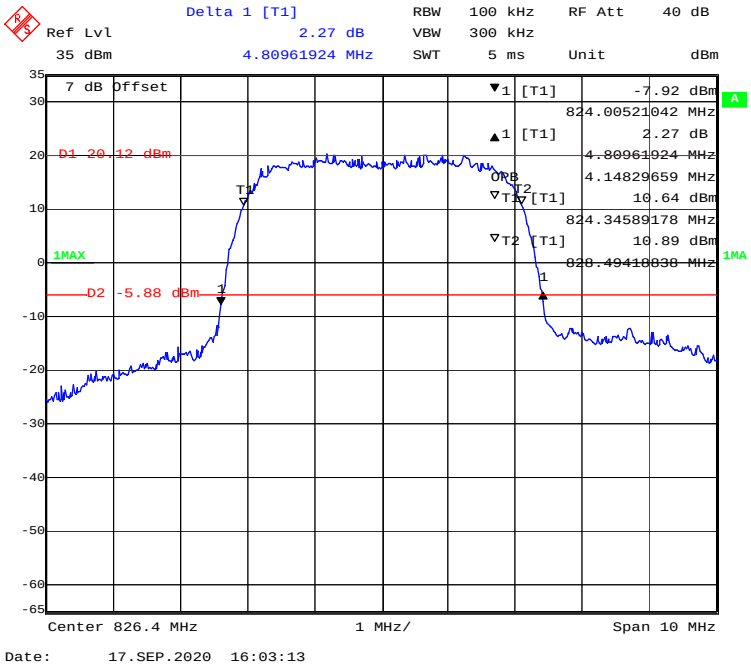


High Channel

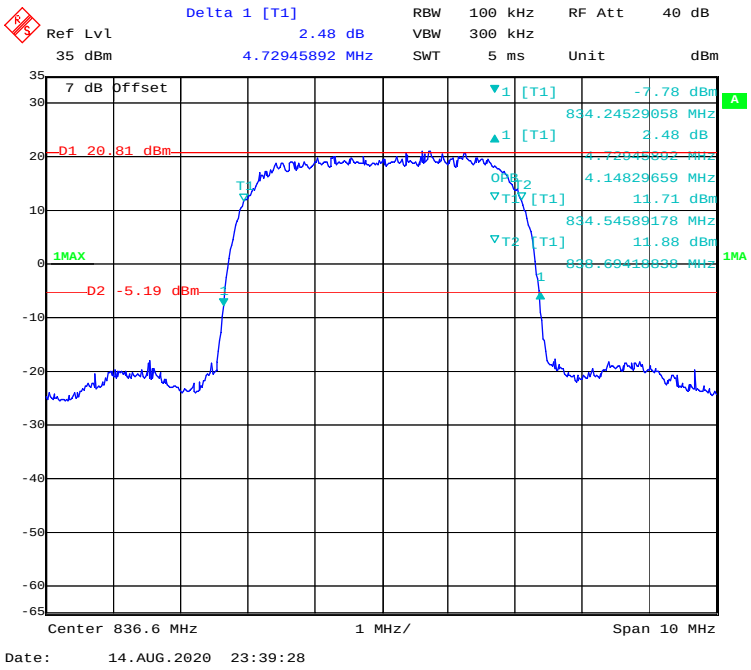


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode

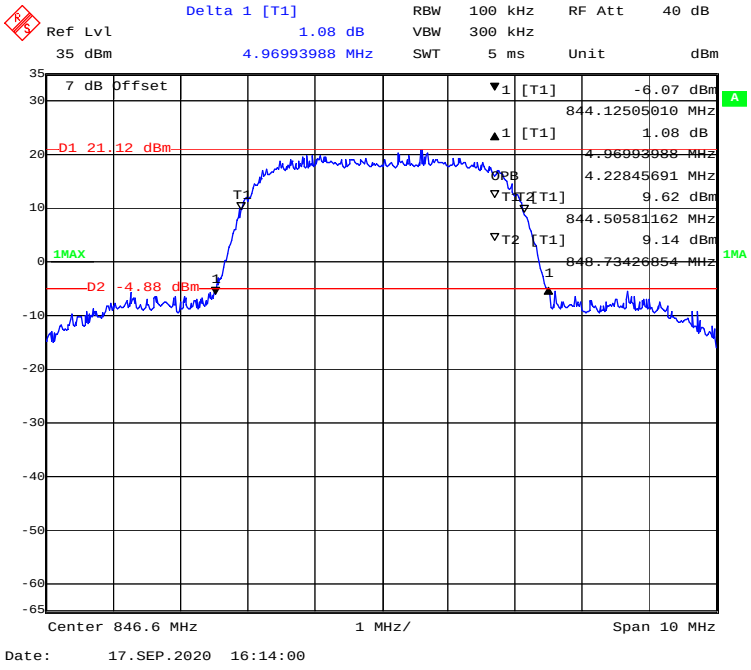
Low Channel



Middle Channel



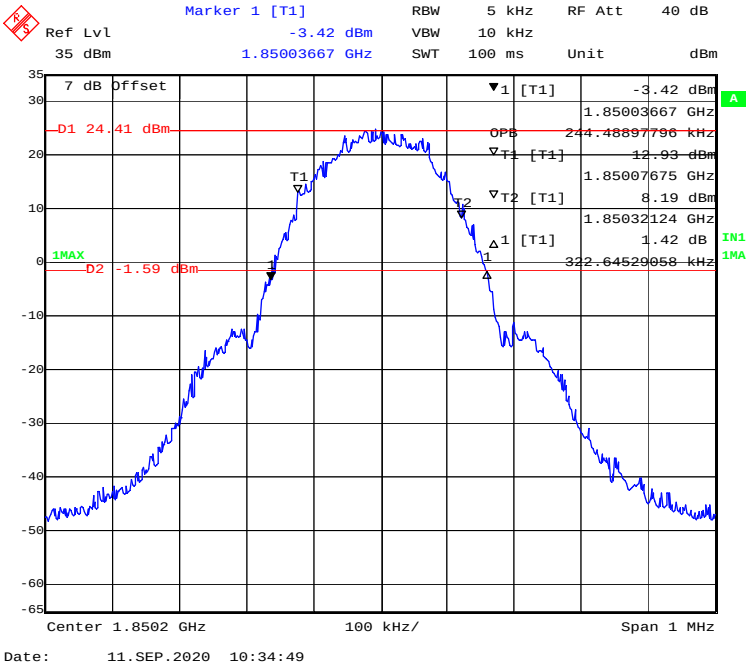
High Channel



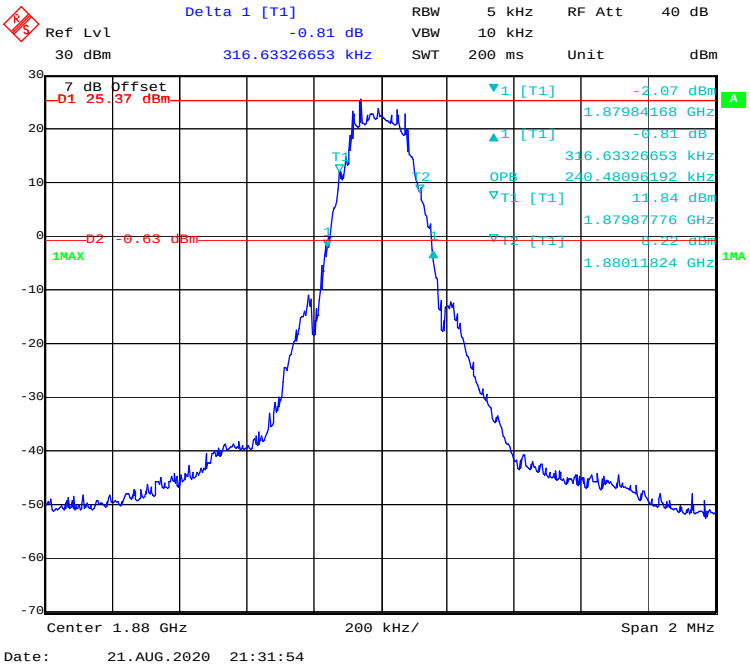
PCS 1900Band

99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode

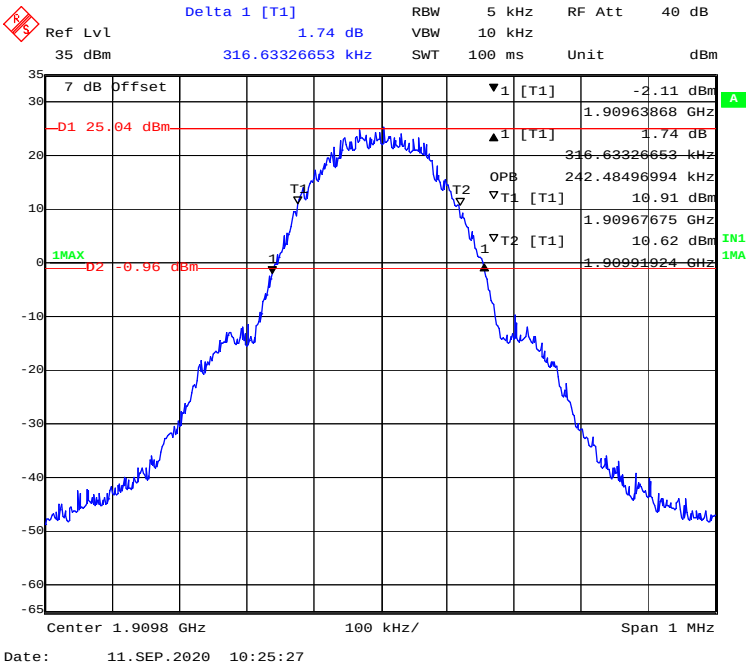
Low channel



Middle Channel

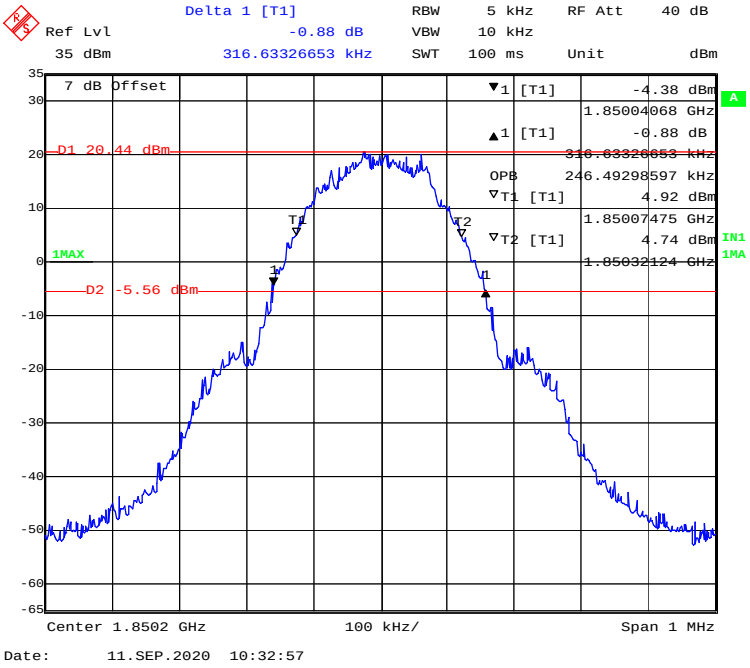


High Channel

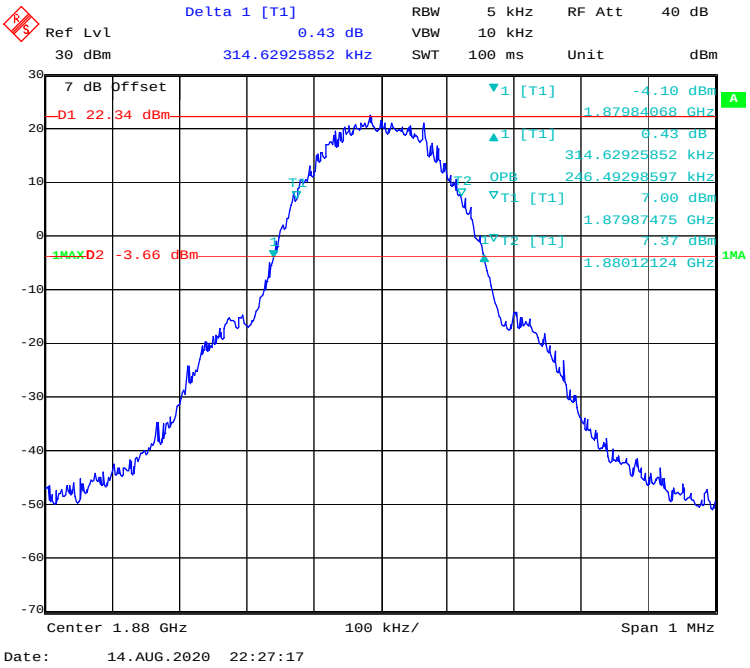


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (8PSK) Mode

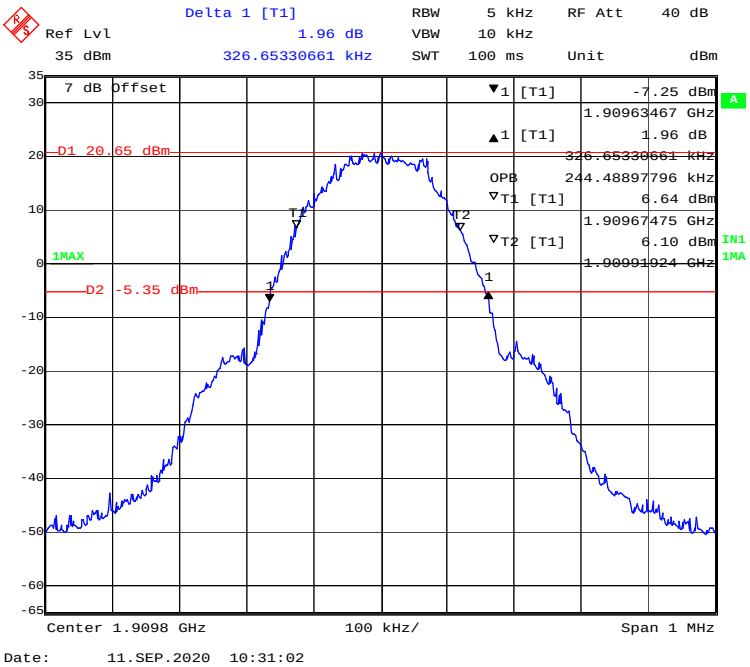
Low Channel



Middle Channel



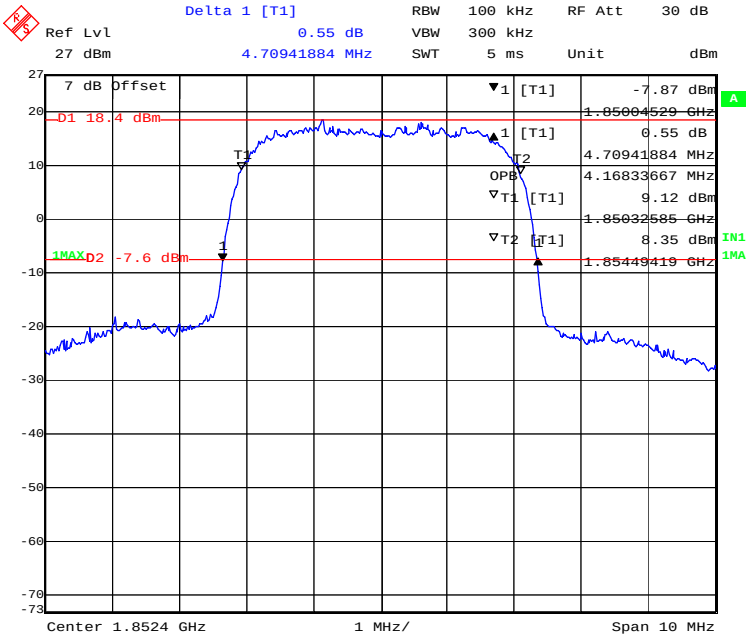
High Channel



WCDMA Band II

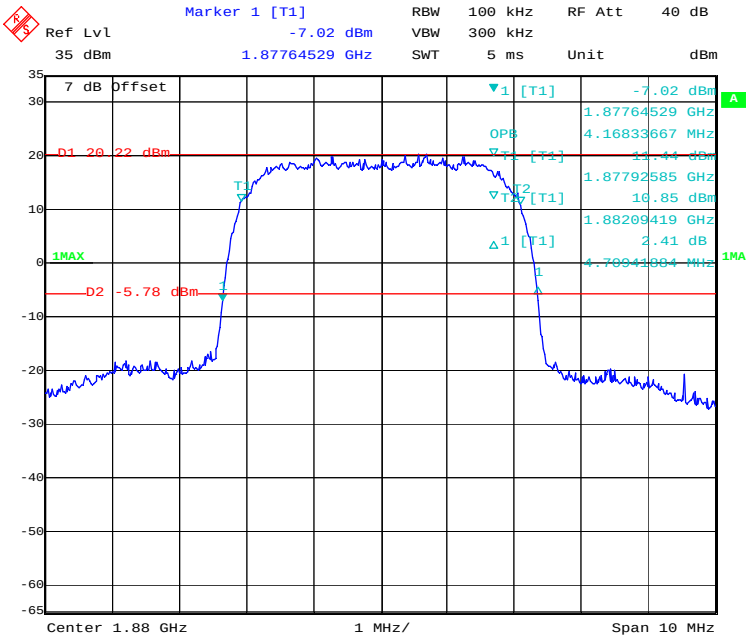
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode

Low Channel



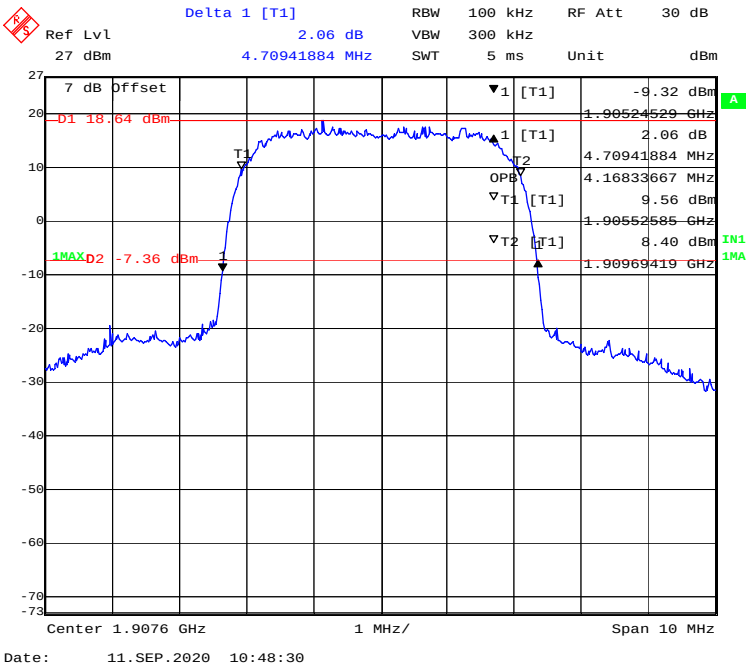
Date: 11.SEP.2020 10:58:14

Middle Channel



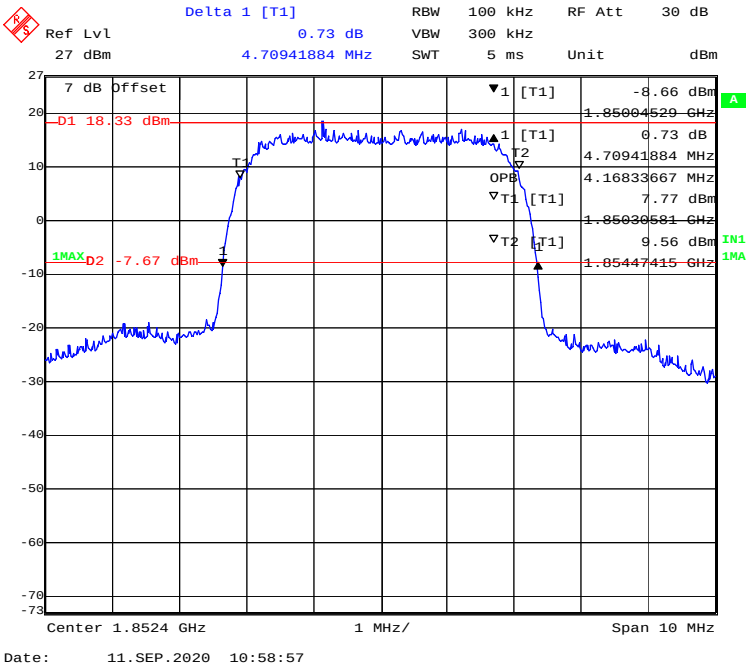
Date: 14.AUG.2020 23:13:58

High Channel

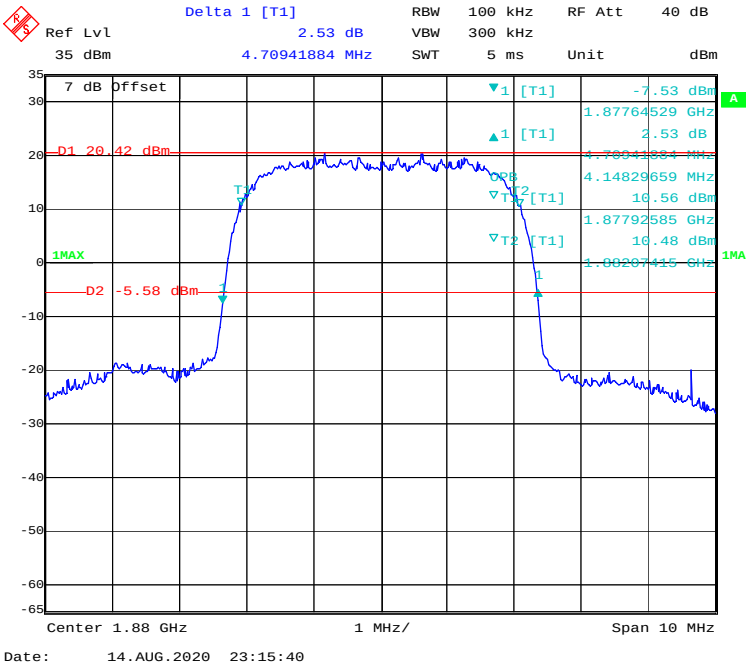


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode

Low Channel

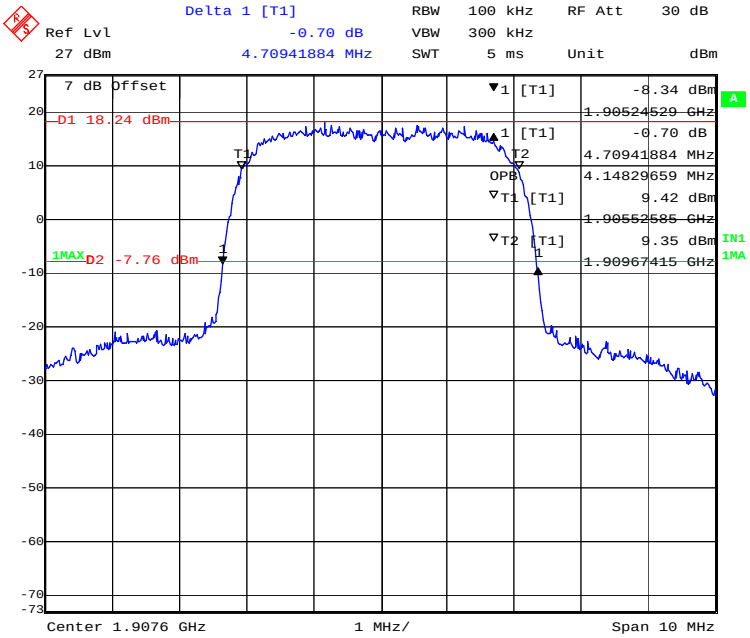


Middle Channel



Date: 14.AUG.2020 23:15:40

High Channel



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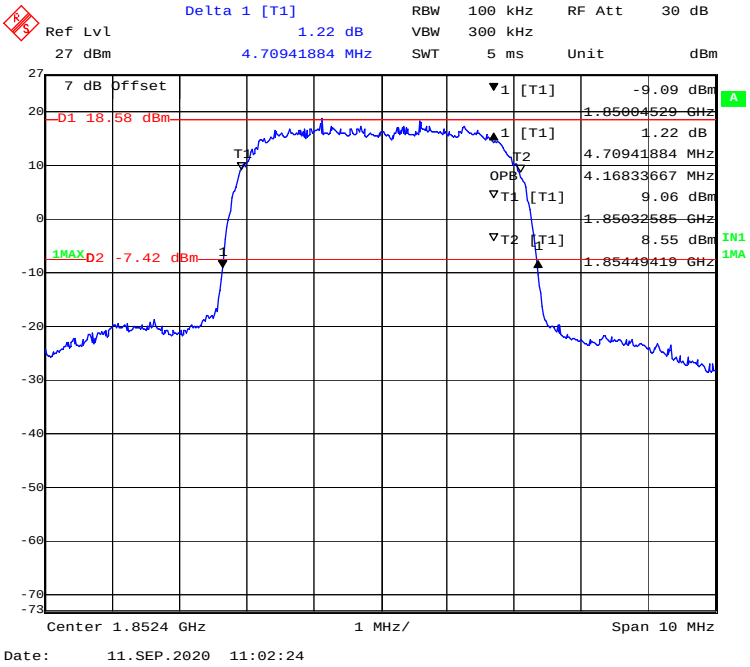
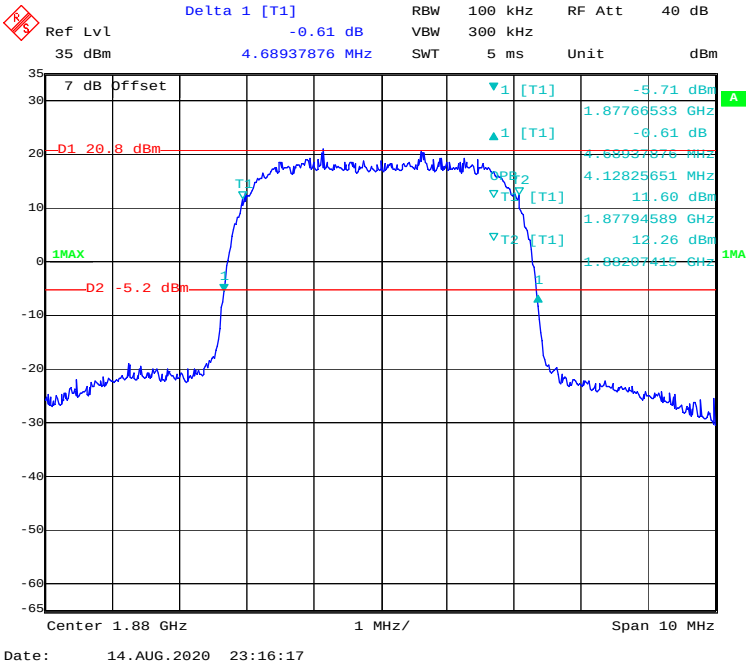
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode

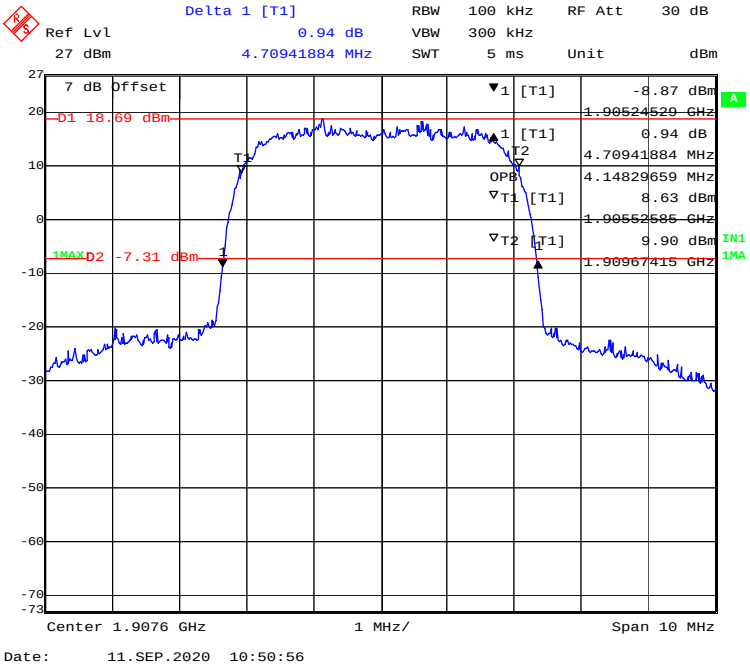
Low Channel



Middle Channel

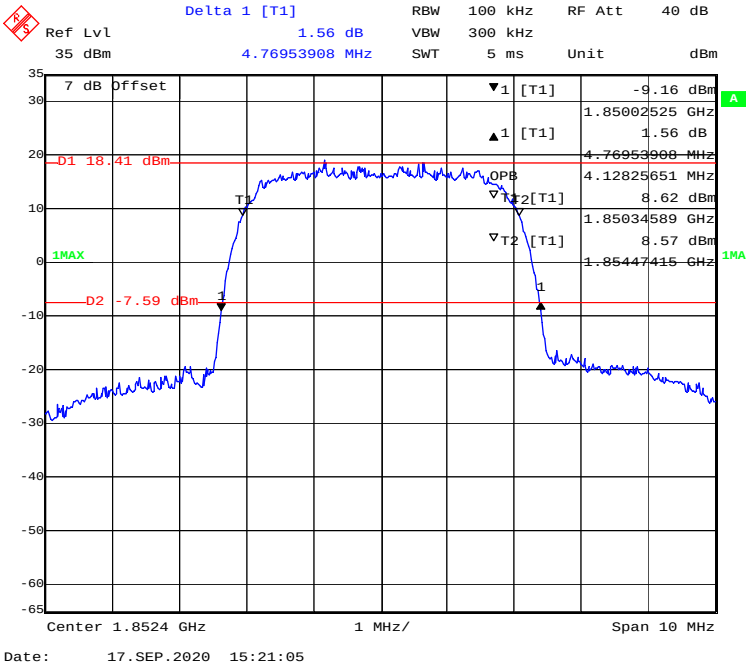


High Channel

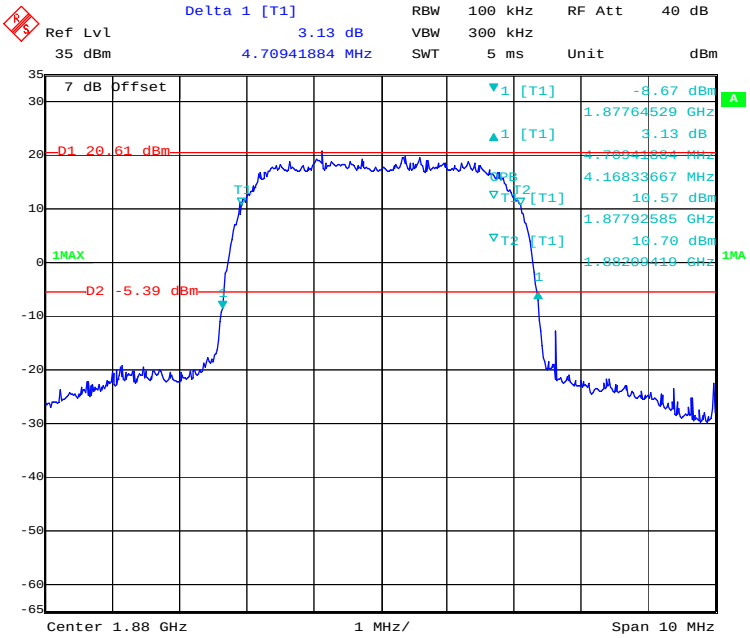


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode

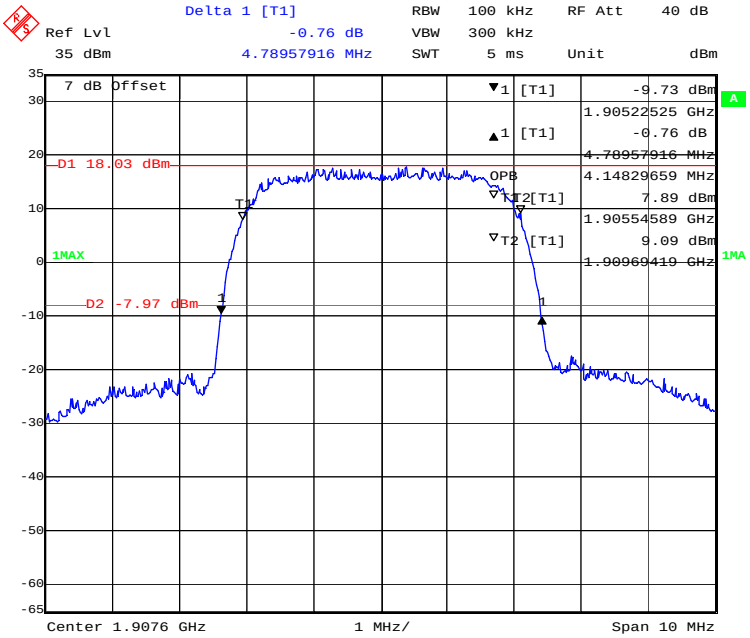
Low Channel



Middle Channel



High Channel



FCC § 2.1051; § 22.917 (a); § 24.238 (a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

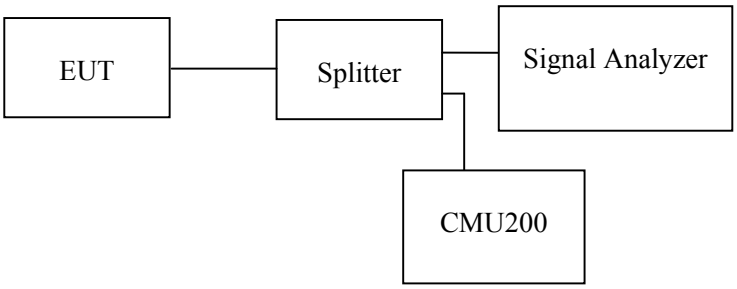
Applicable Standards

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 100 kHz for below 1GHz & 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	24.5-25.3 ℃
Relative Humidity:	48-51 %
ATM Pressure:	101.2-101.6 kPa

The testing was performed by Jack Jiao from 2020-08-14 to 2020-09-17

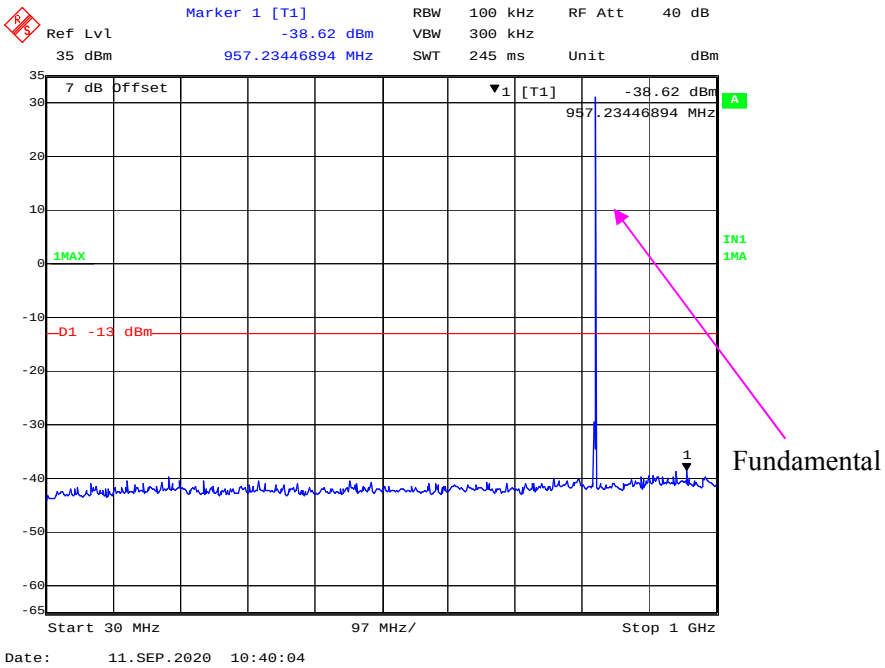
EUT operation mode: Transmitting

Test Result: Compliant.

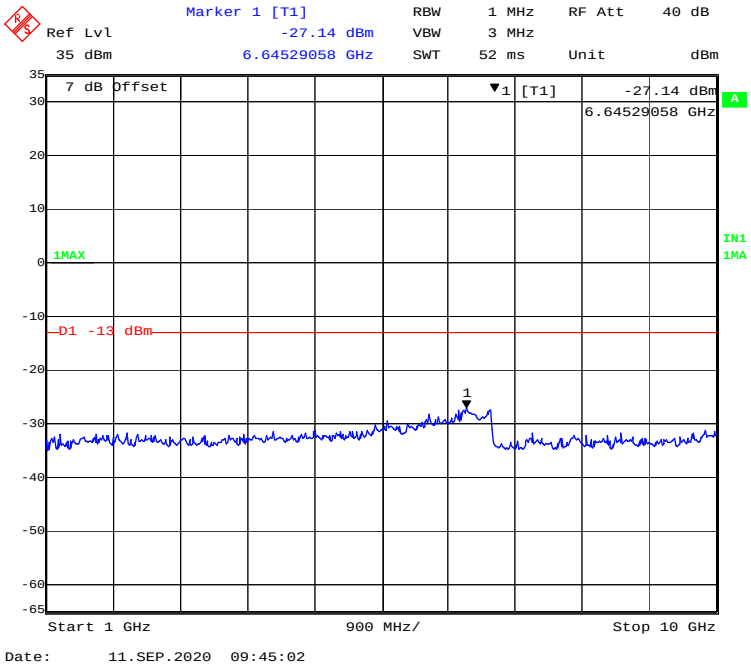
GSM 850 Band:

Low Channel

30 MHz – 1GHz(GPRS Mode)

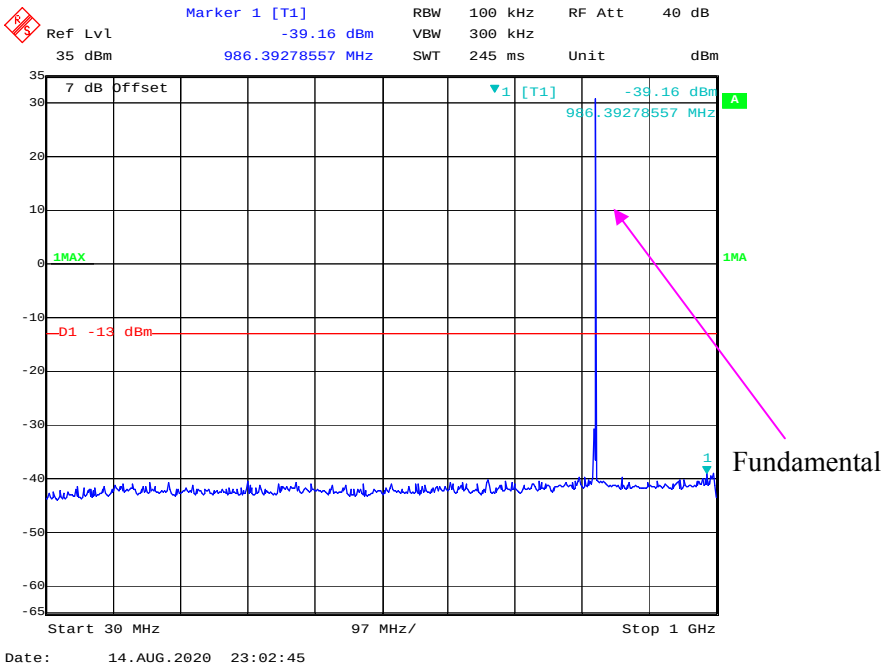


1 GHz – 10 GHz (GPRS Mode)

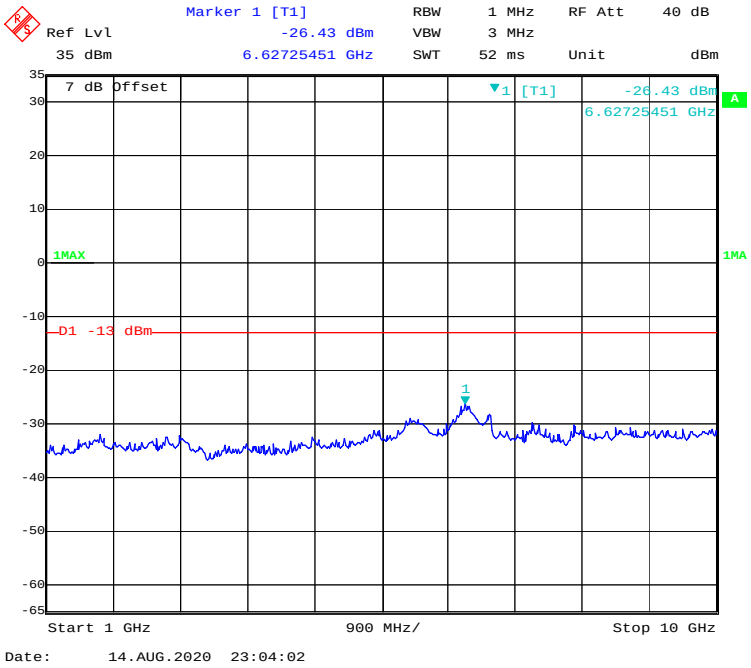


Middle Channel

30 MHz – 1GHz(GPRS Mode)

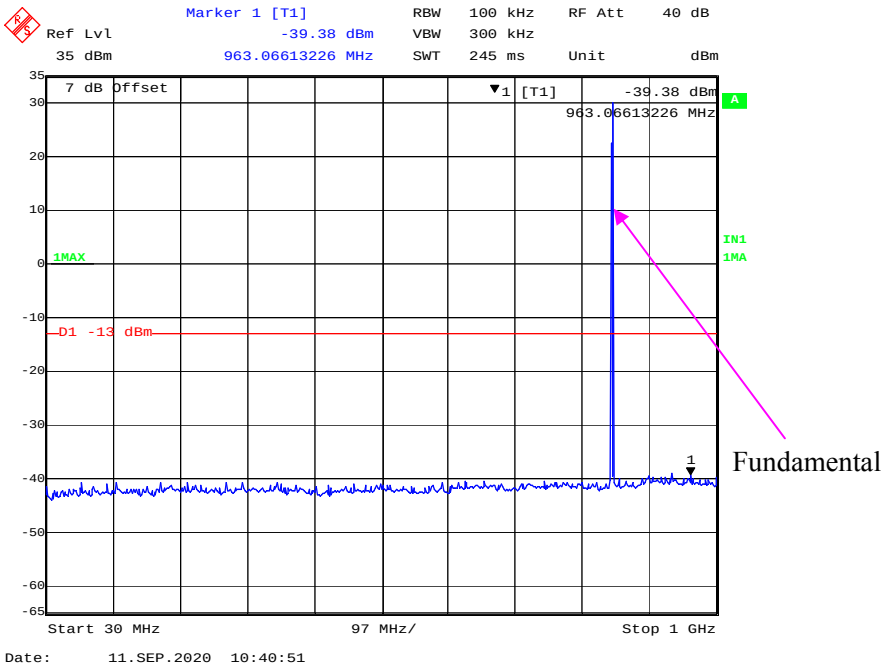


1 GHz – 10 GHz (GPRS Mode)

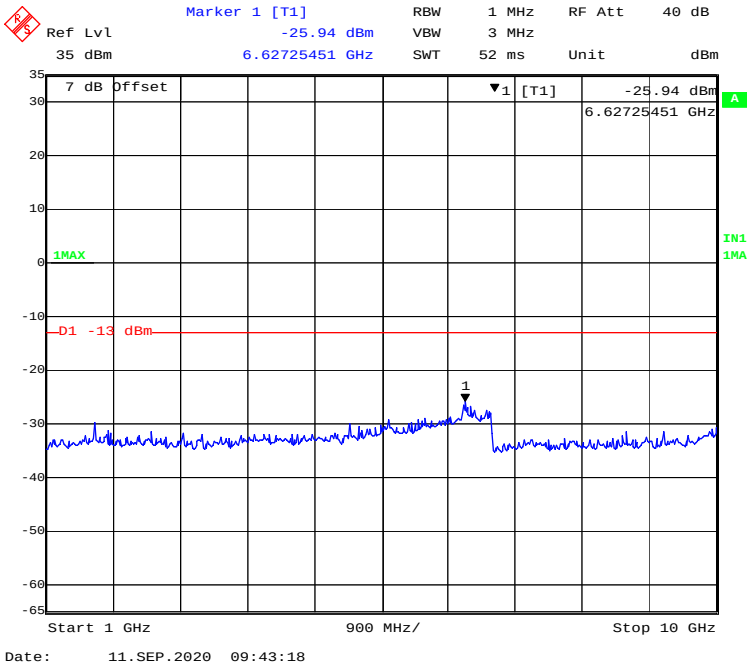


High Channel

30 MHz – 1GHz(GPRS Mode)

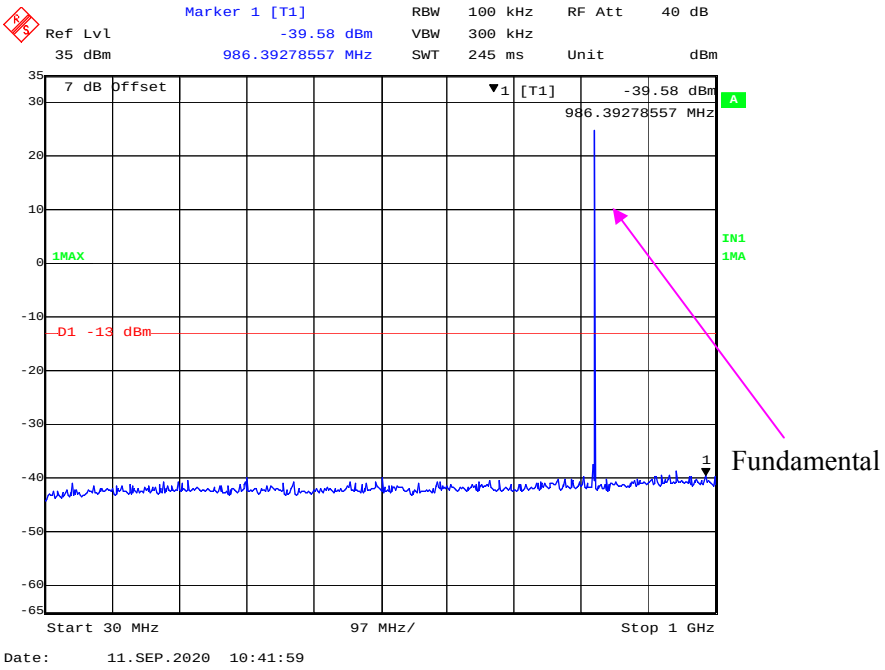


1 GHz – 10 GHz (GPRS Mode)

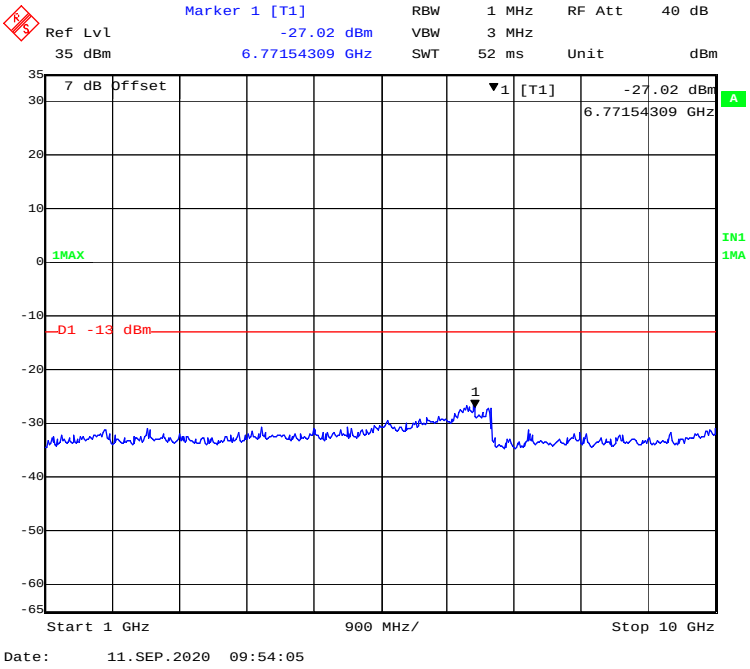


Low Channel

30 MHz – 1GHz(EGPRS Mode)

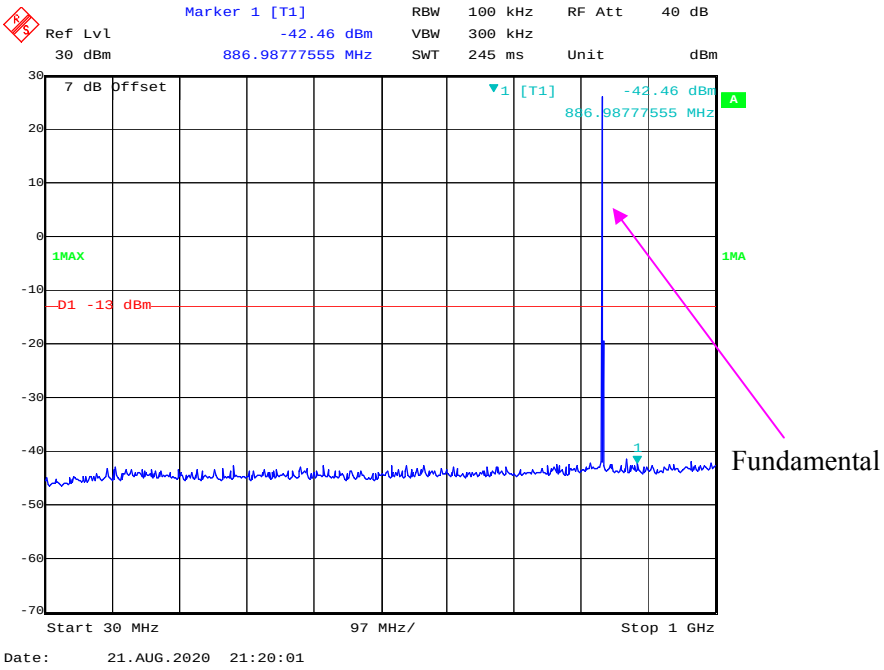


1 GHz – 10 GHz (EGPRS Mode)

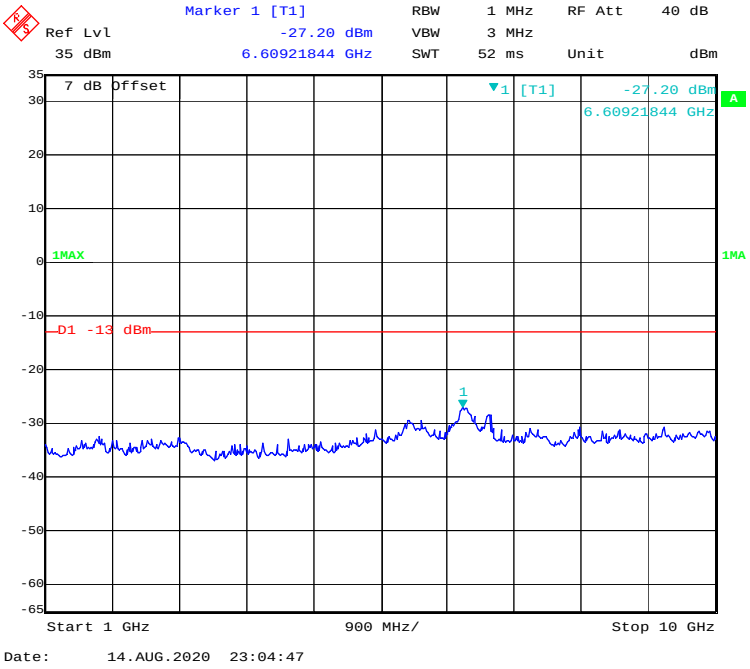


Middle Channel

30 MHz – 1GHz(EGPRS Mode)

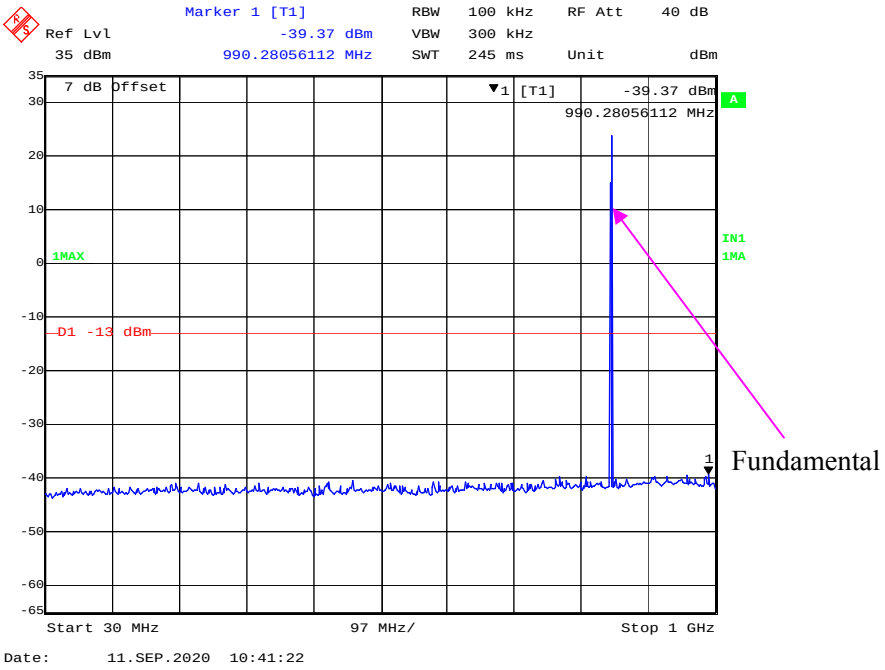


1 GHz – 10 GHz (EGPRS Mode)

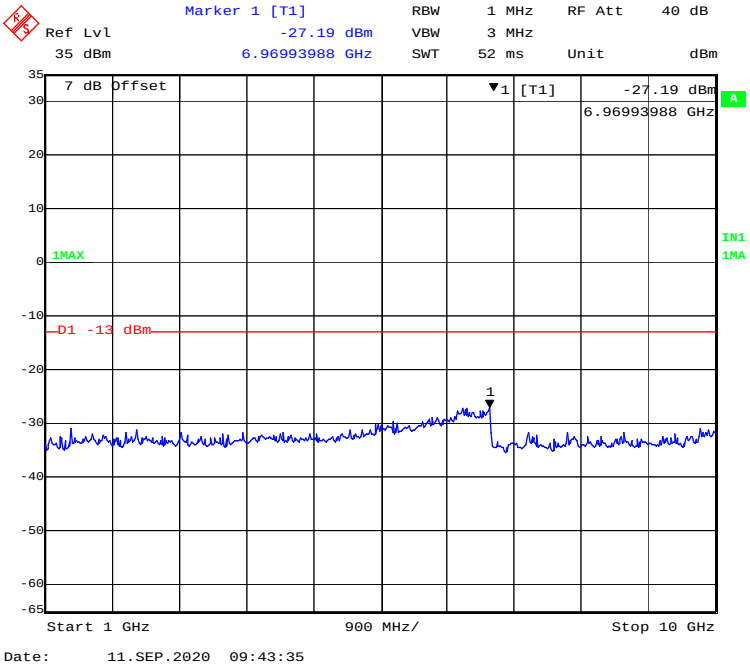


High Channel

30 MHz – 1GHz(EGPRS Mode)



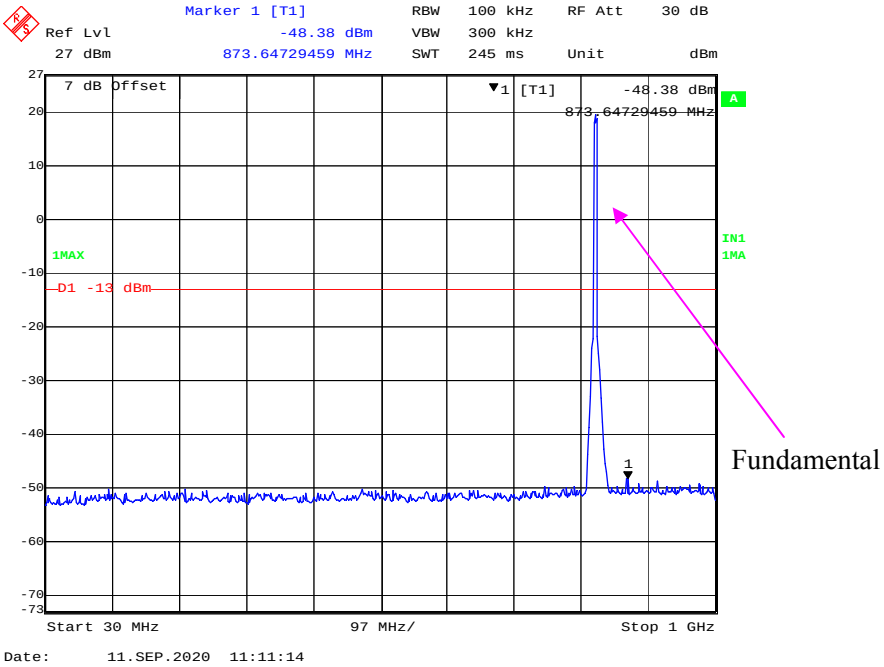
1 GHz – 10 GHz (EGPRS Mode)



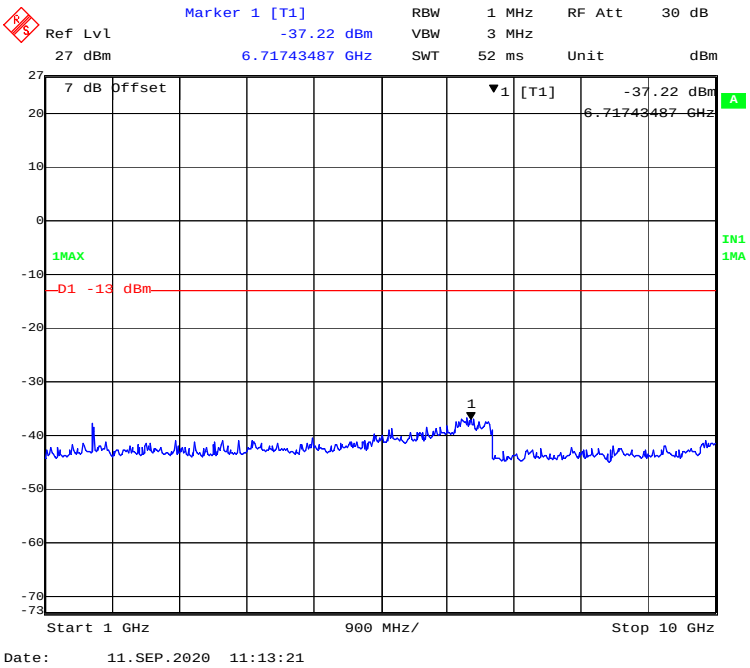
WCDMA Band V:

Low Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

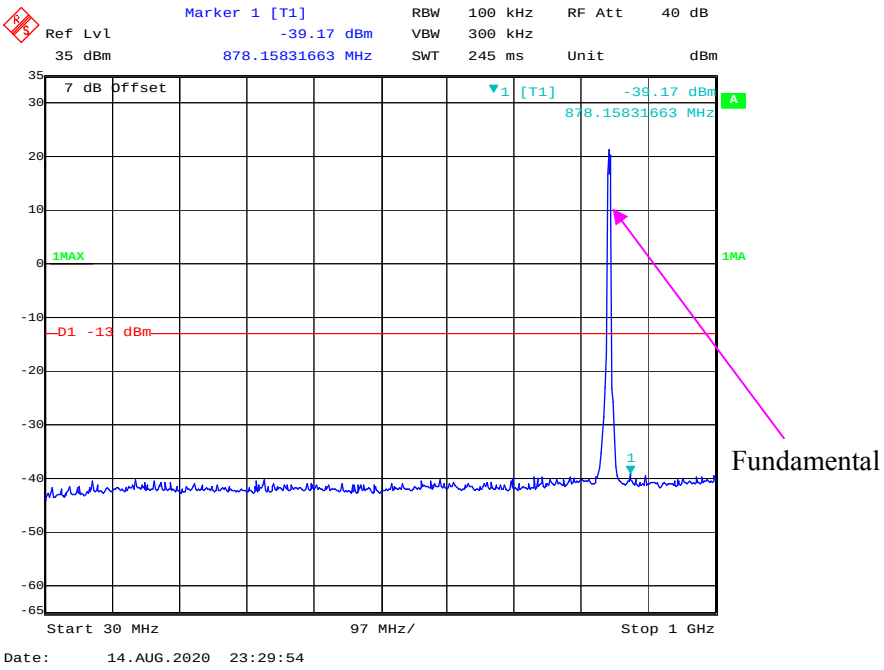


1 GHz – 10 GHz WCDMA (Rel 99) Mode

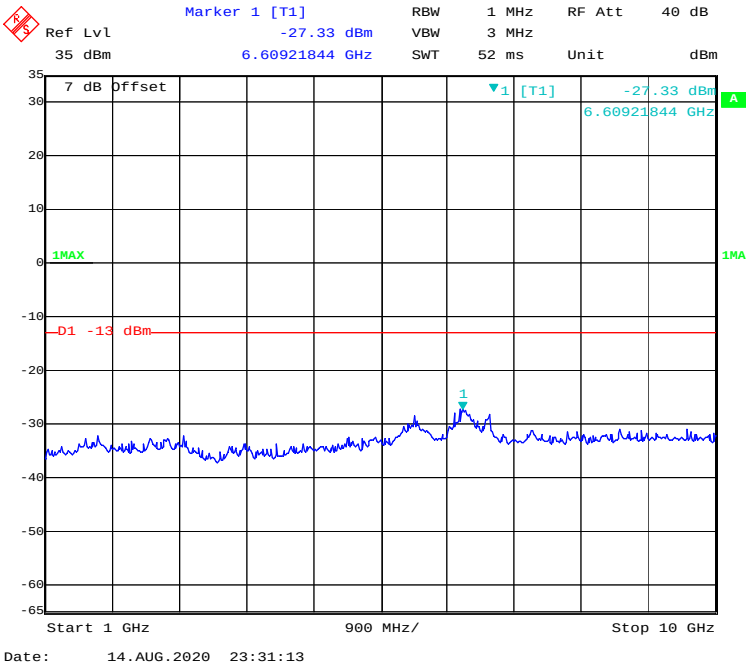


Middle Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

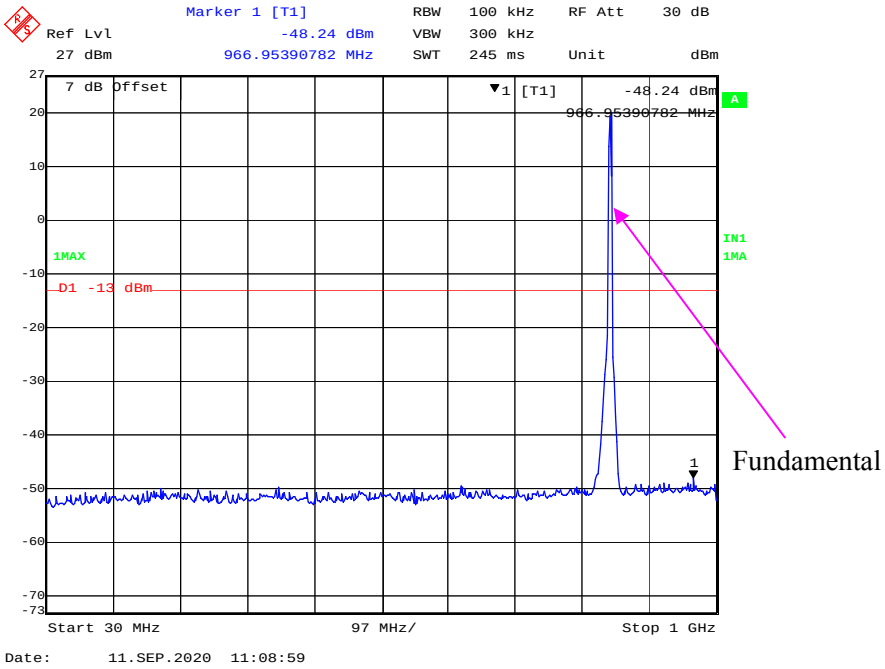


1 GHz – 10 GHz WCDMA (Rel 99) Mode

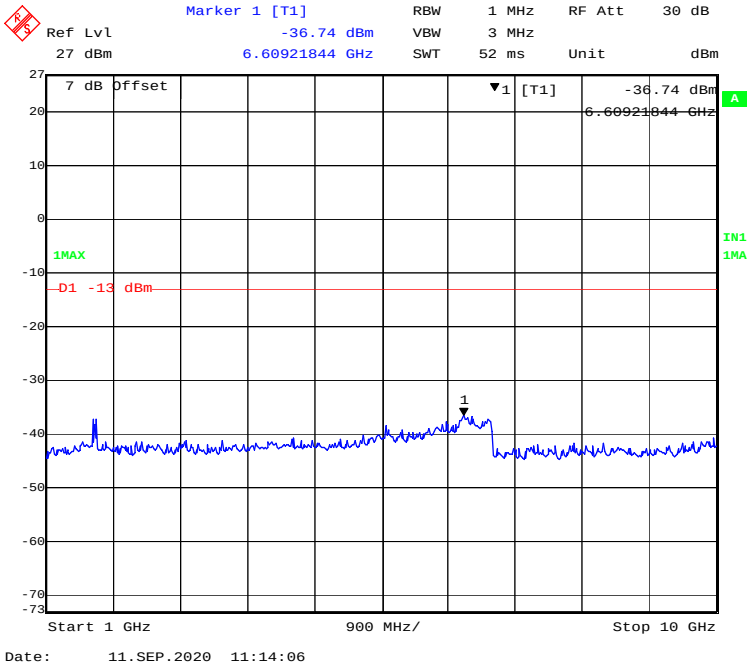


High Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

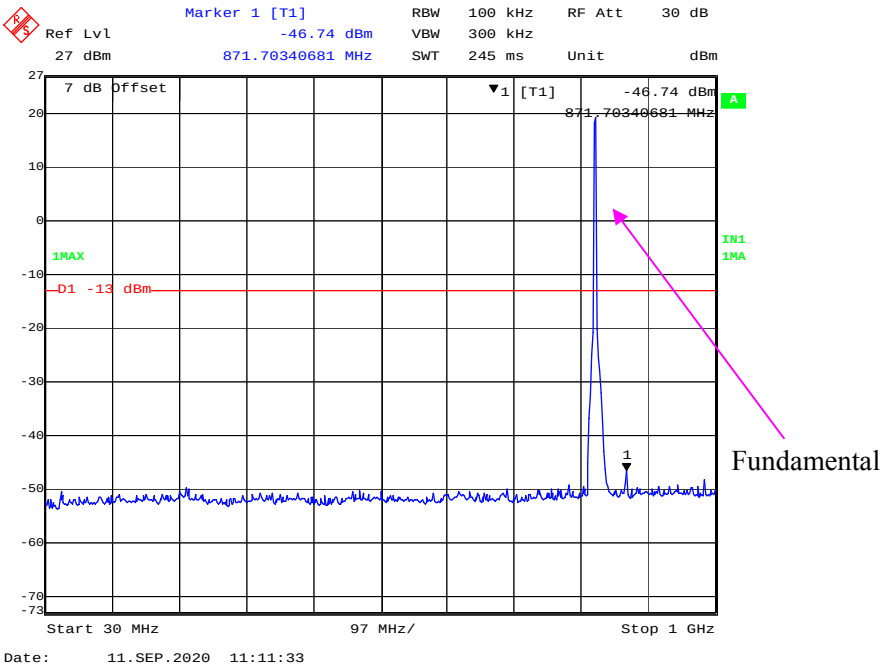


1 GHz – 10 GHz WCDMA (Rel 99) Mode

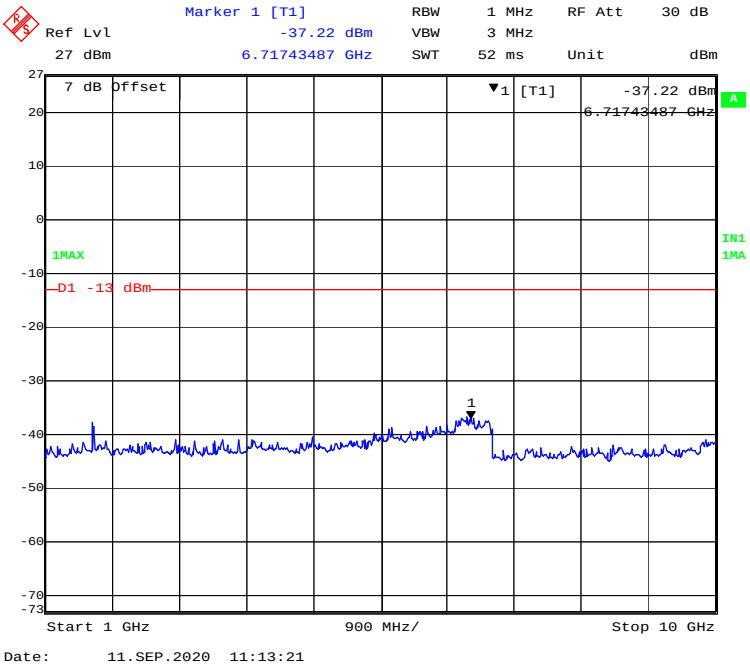


Low Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

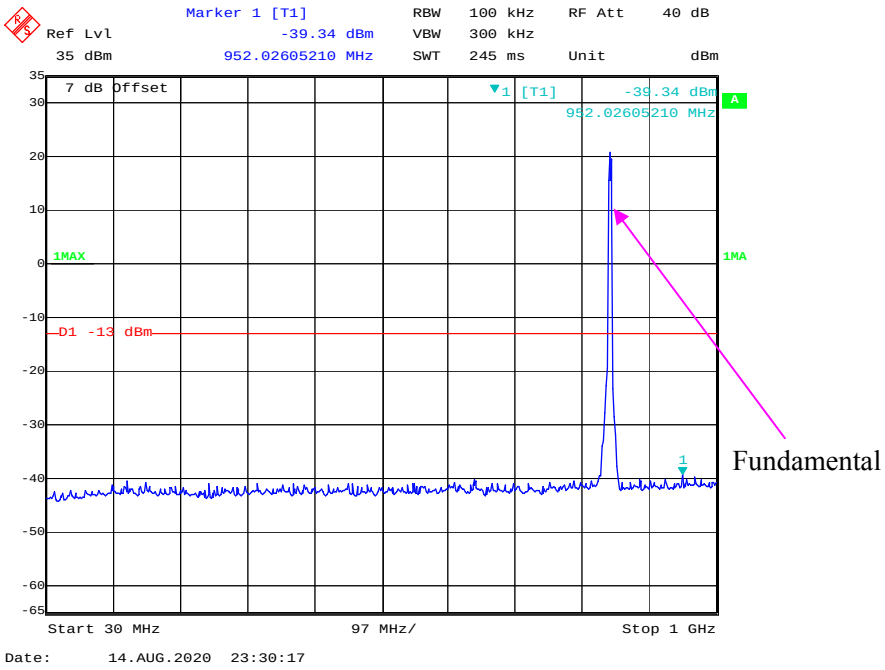


1 GHz – 10 GHz WCDMA (HSDPA) Mode

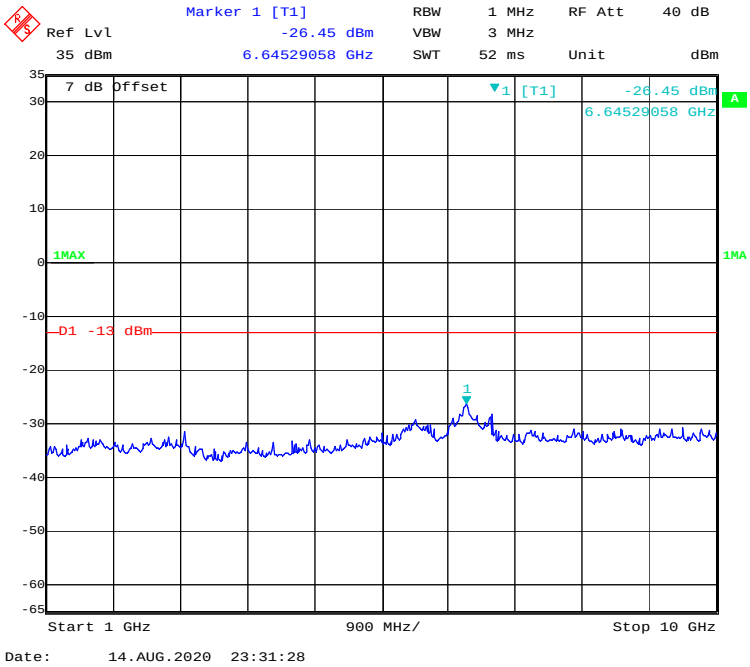


Middle Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

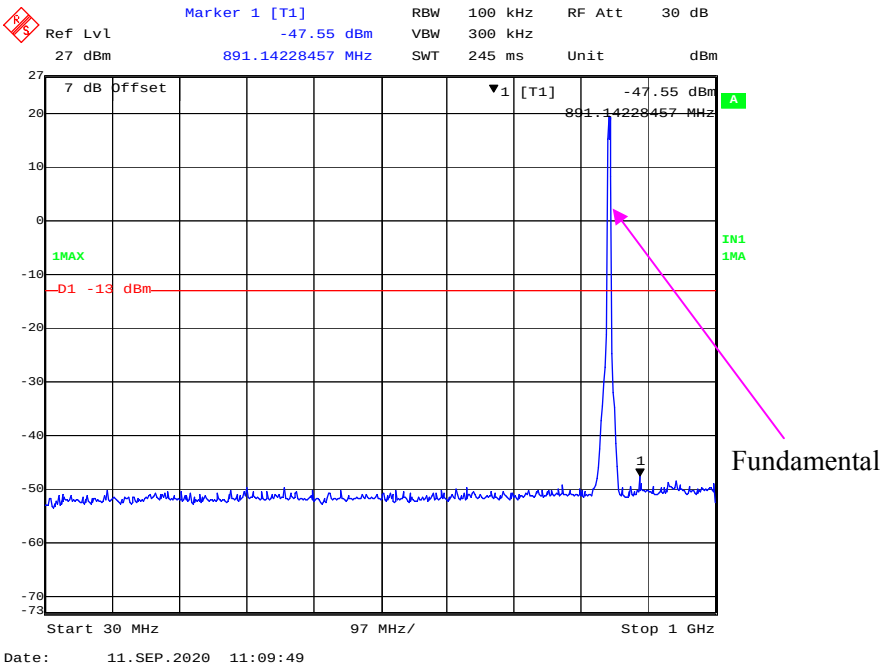


1 GHz – 10 GHz WCDMA (HSDPA) Mode

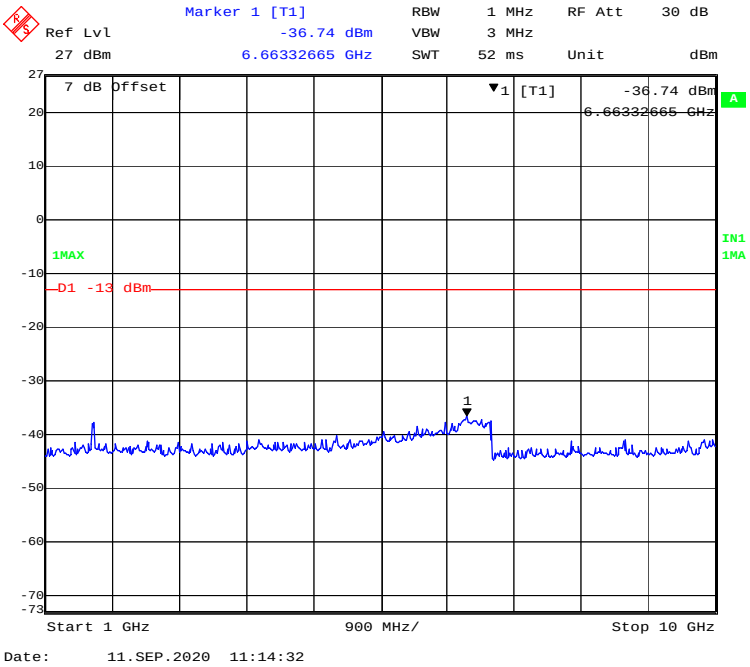


High Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

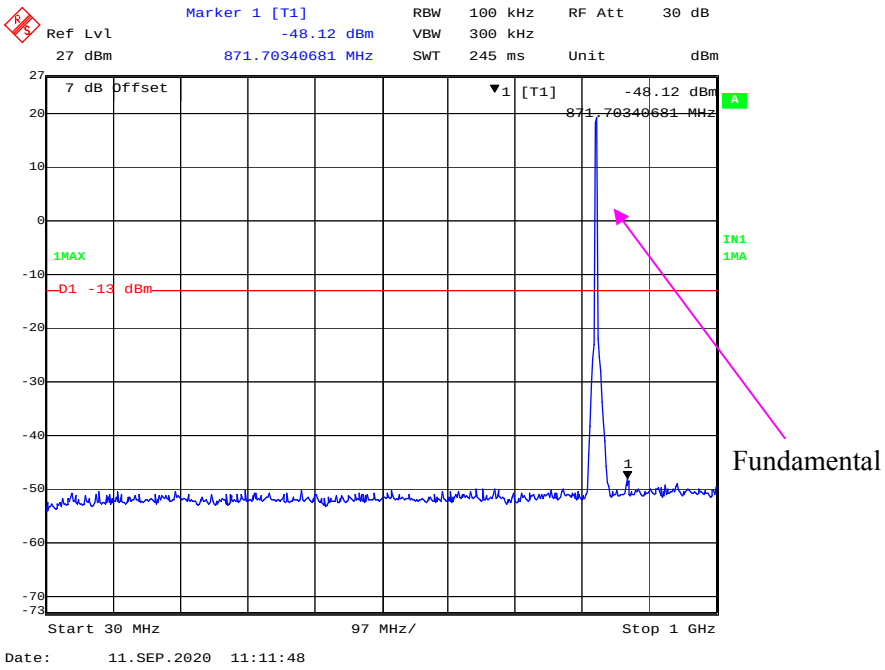


1 GHz – 10 GHz WCDMA (HSDPA) Mode

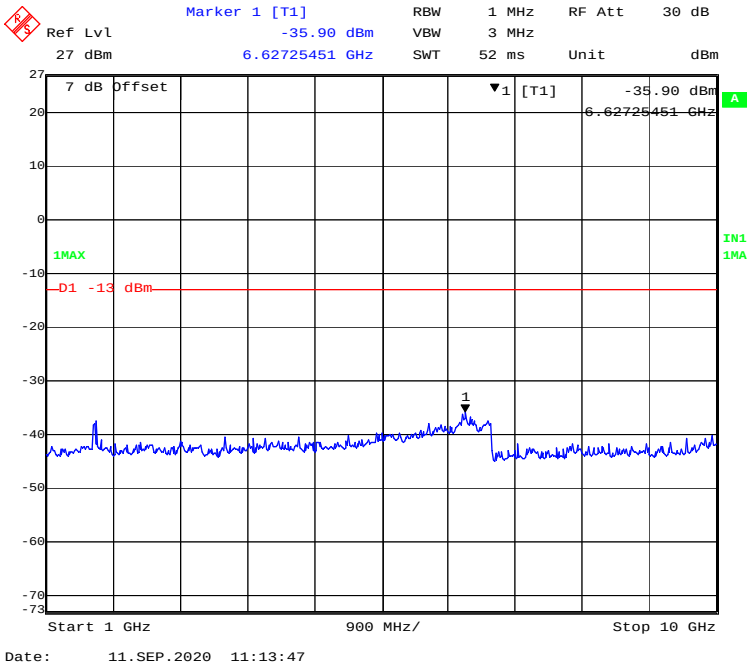


Low Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

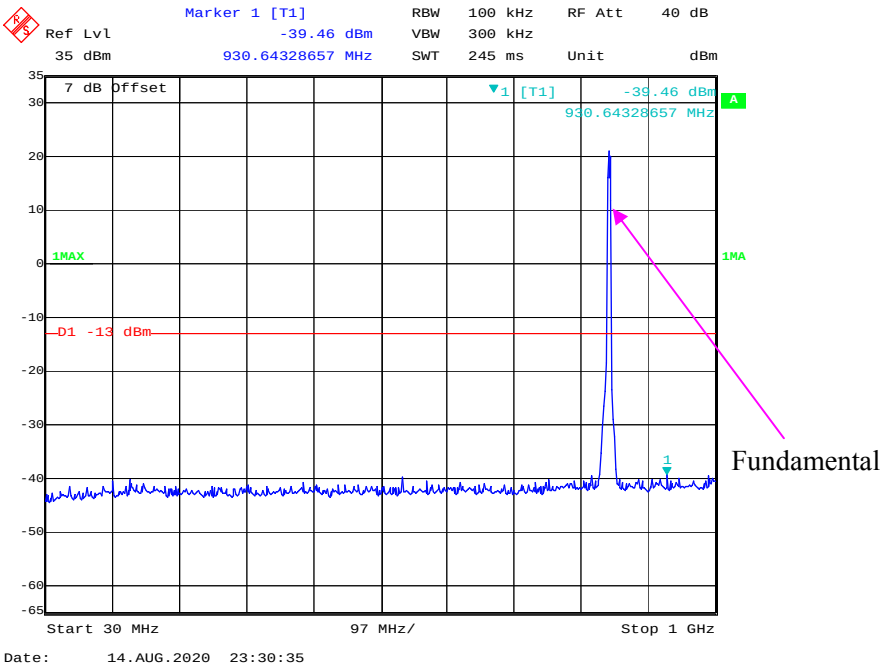


1 GHz – 10 GHz WCDMA (HSUPA) Mode

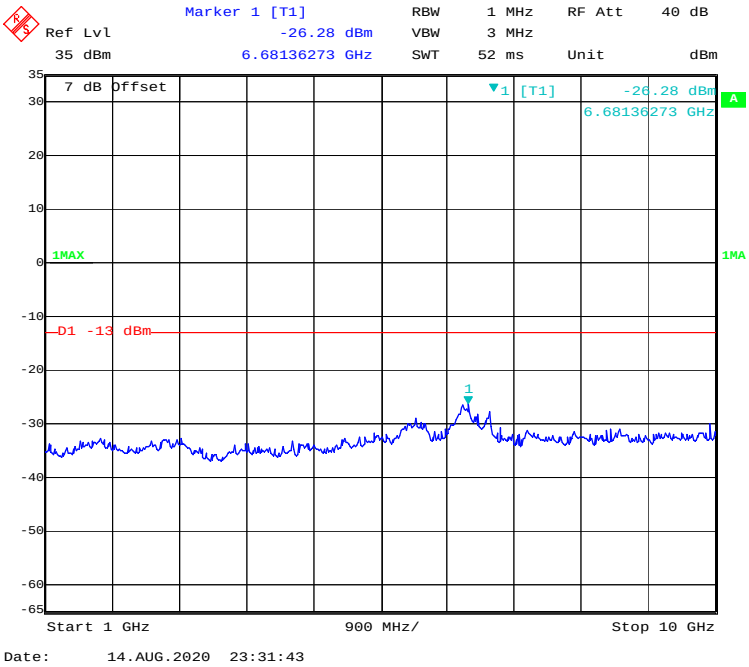


Middle Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

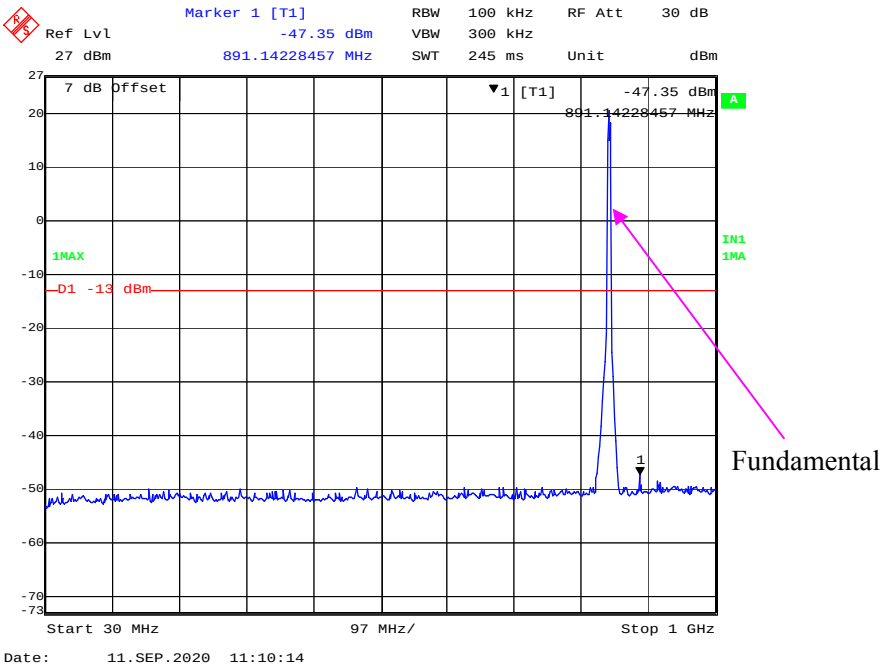


1 GHz – 10 GHz WCDMA (HSUPA) Mode

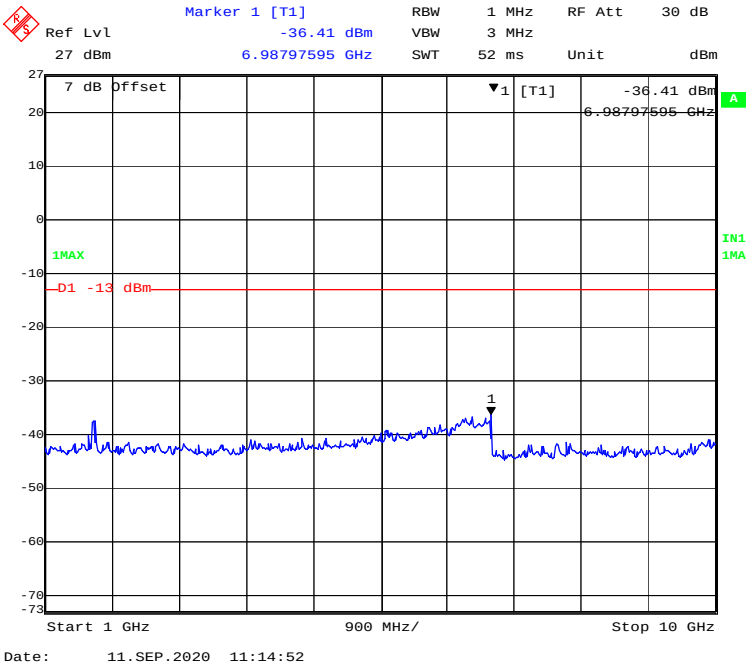


High Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

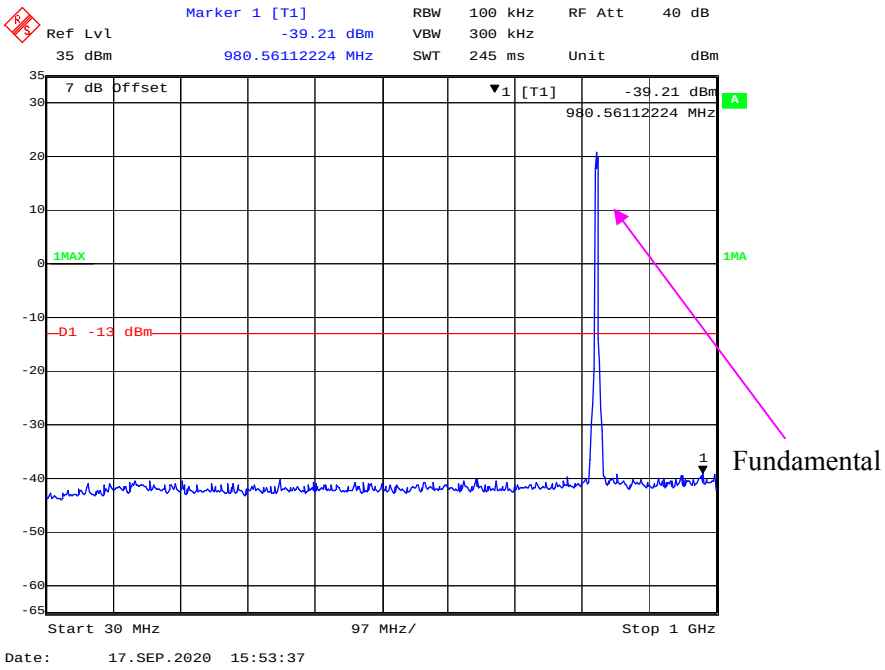


1 GHz – 10 GHz WCDMA (HSUPA) Mode

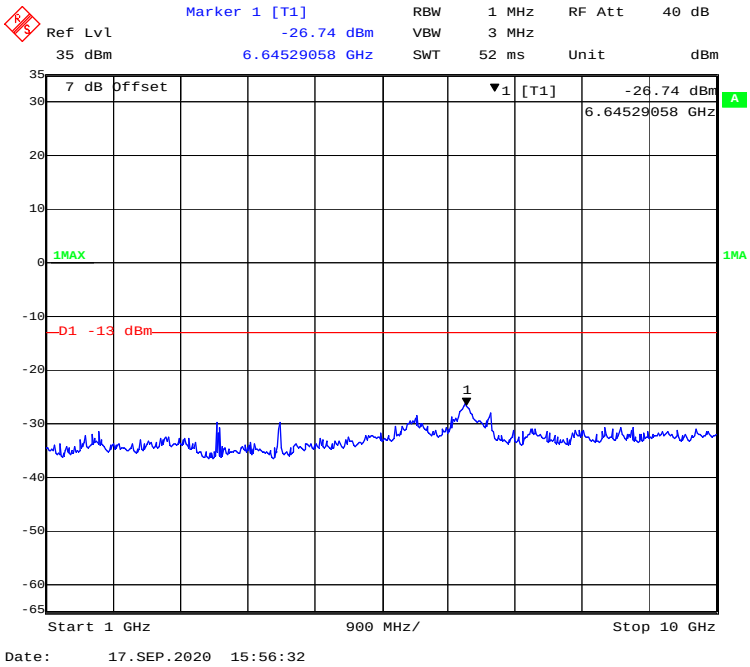


Low Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode

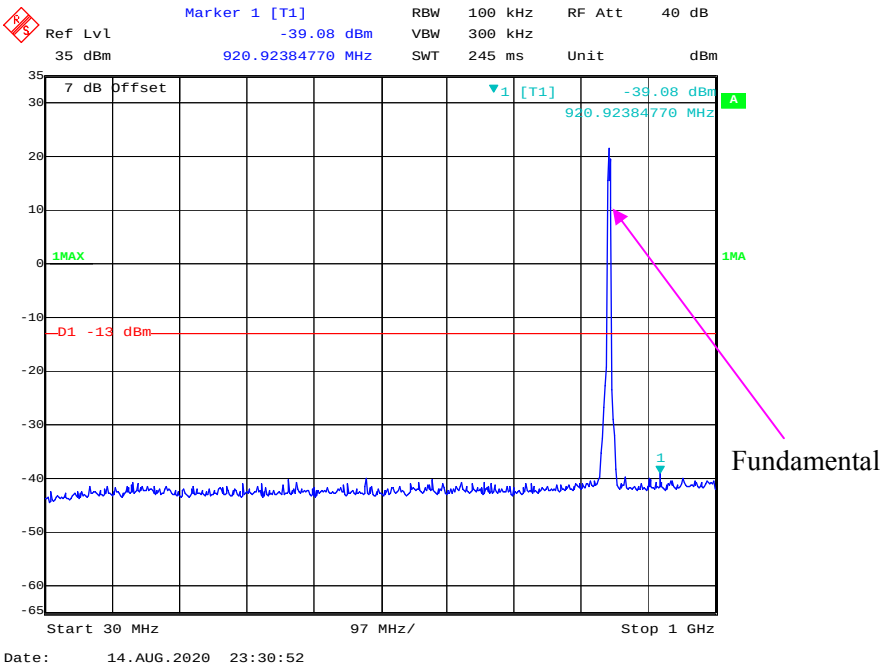


1 GHz – 10 GHz WCDMA (HSPA+) Mode

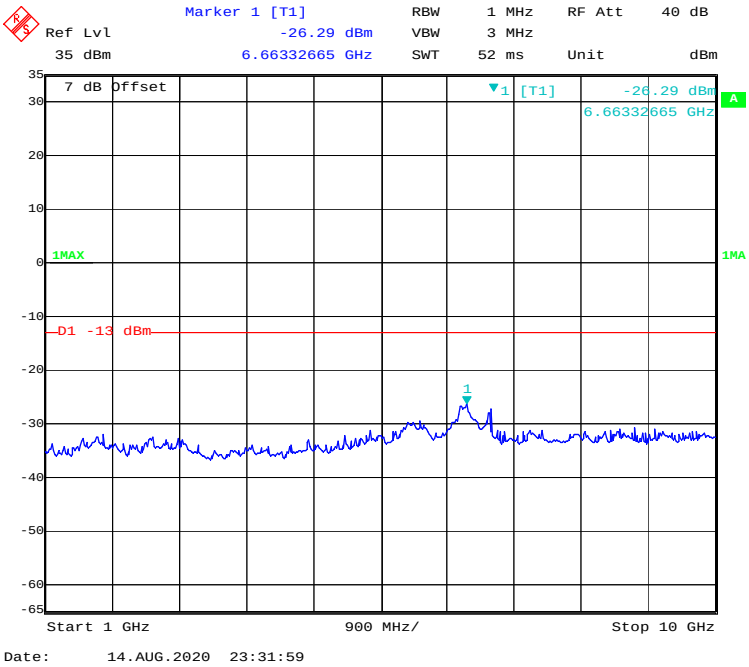


Middle Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode

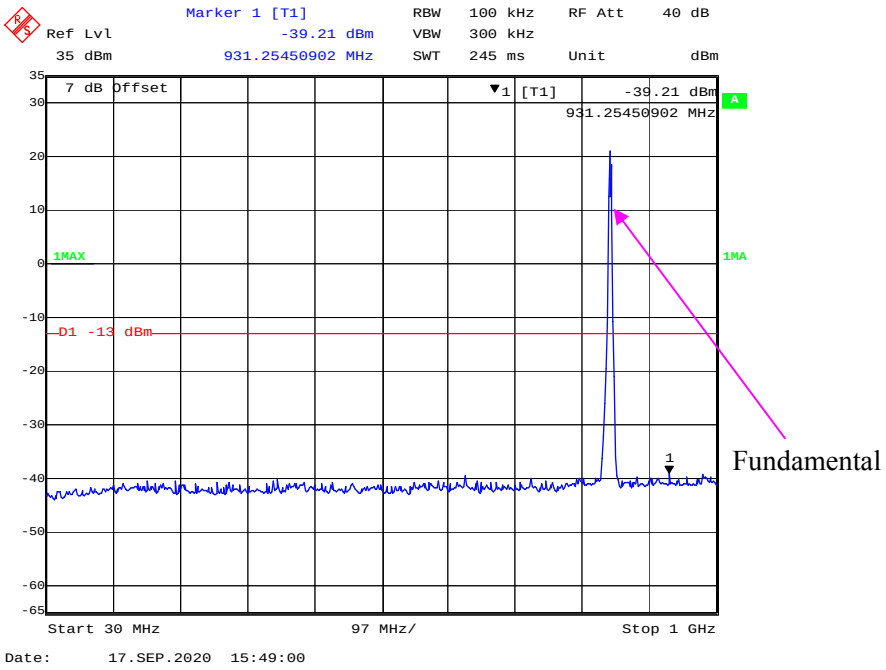


1 GHz – 10 GHz WCDMA (HSPA+) Mode

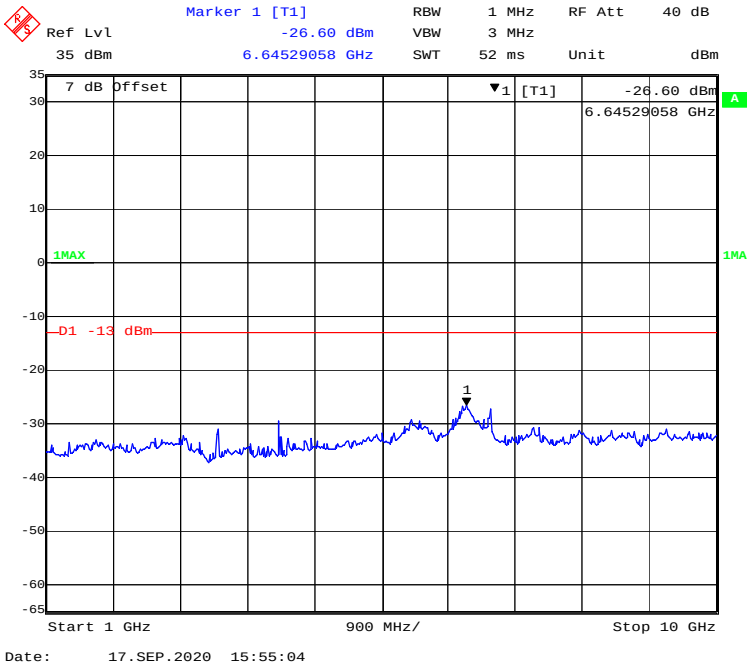


High Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode



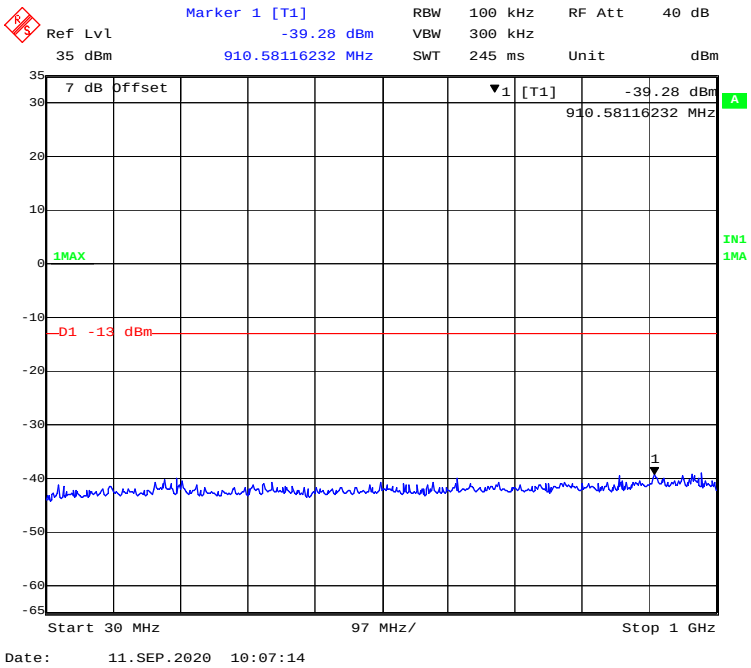
1 GHz – 10 GHz WCDMA (HSPA+) Mode



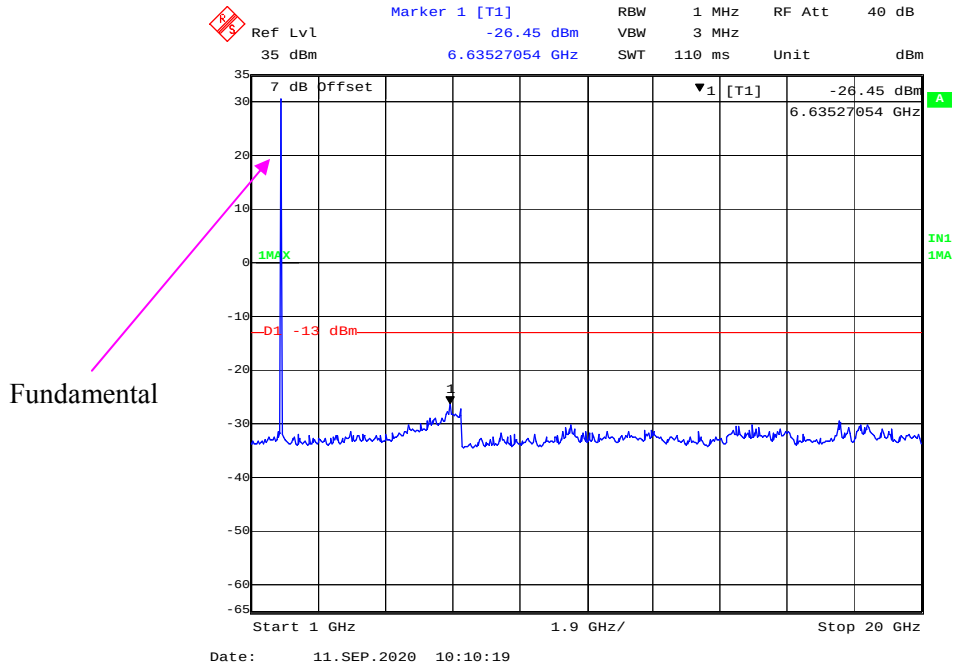
PCS 1900 Band:

Low Channel

30 MHz – 1GHz(GPRS Mode)

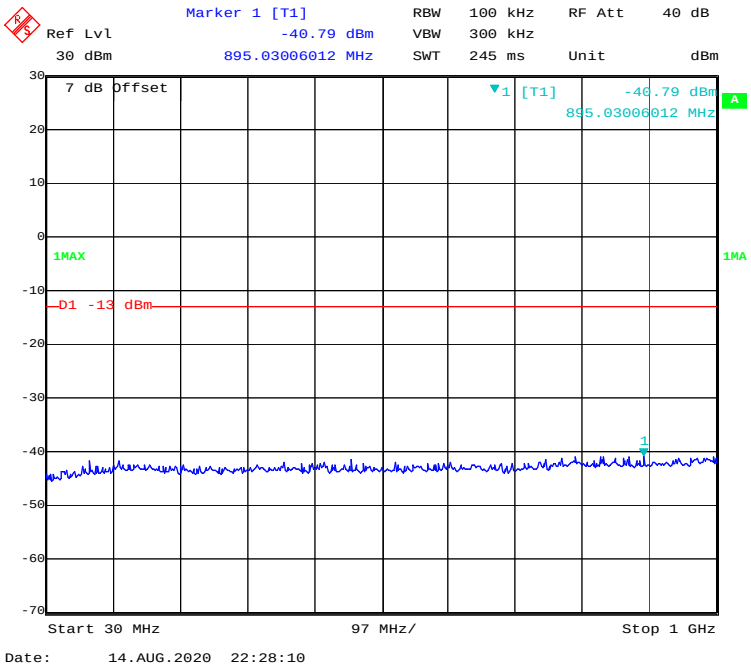


1 GHz – 20 GHz (GPRS Mode)

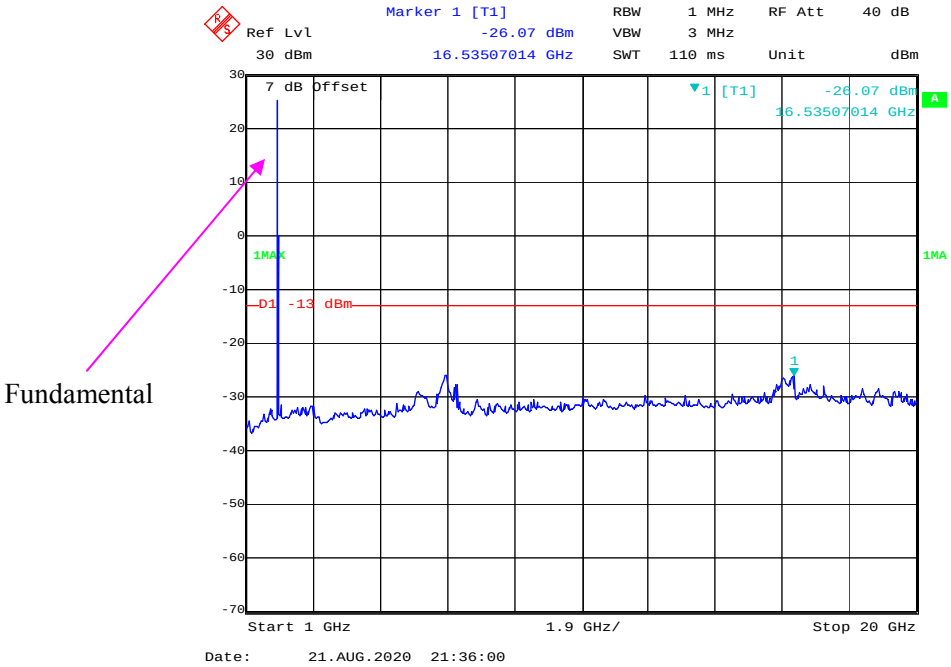


Middle Channel

30 MHz – 1GHz(GPRS Mode)

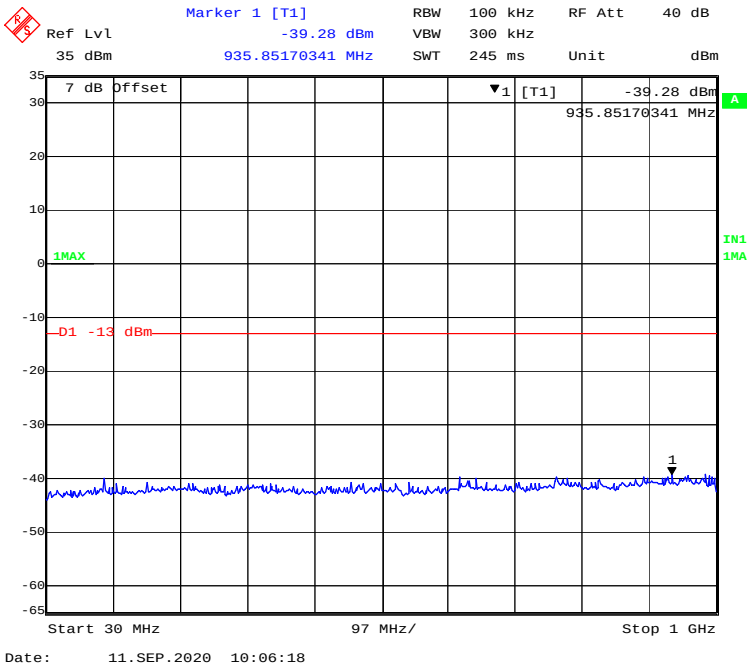


1 GHz – 20 GHz (GPRS Mode)

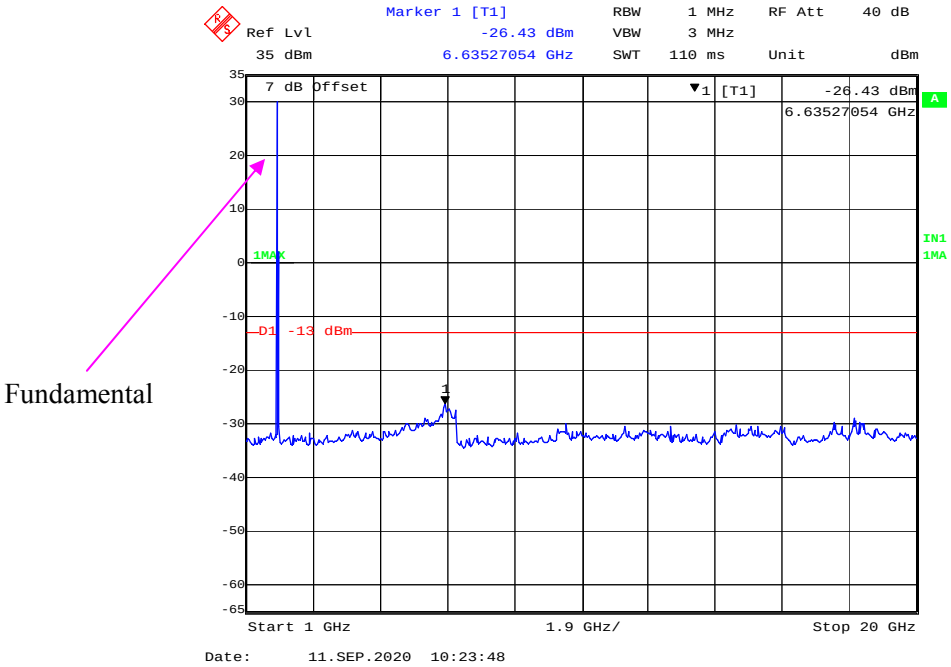


High Channel

30 MHz – 1GHz(GPRS Mode)

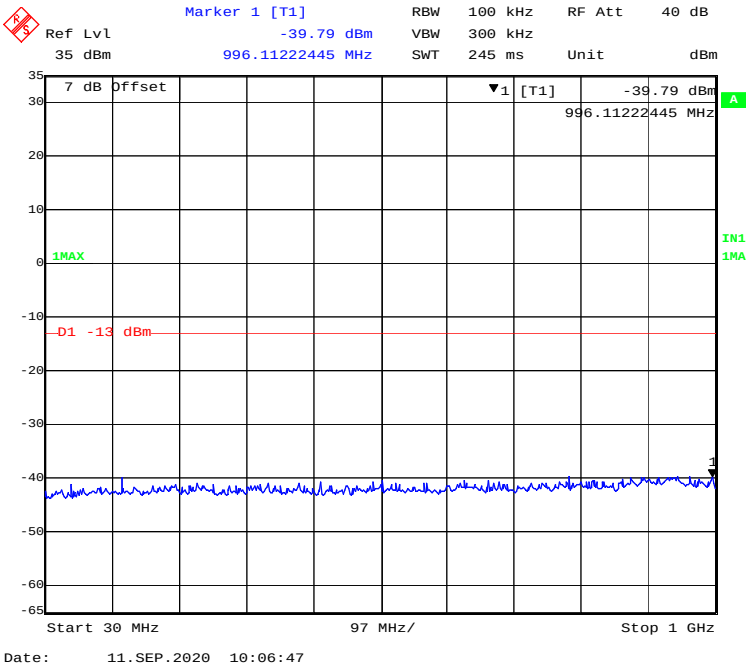


1 GHz – 20 GHz (GPRS Mode)

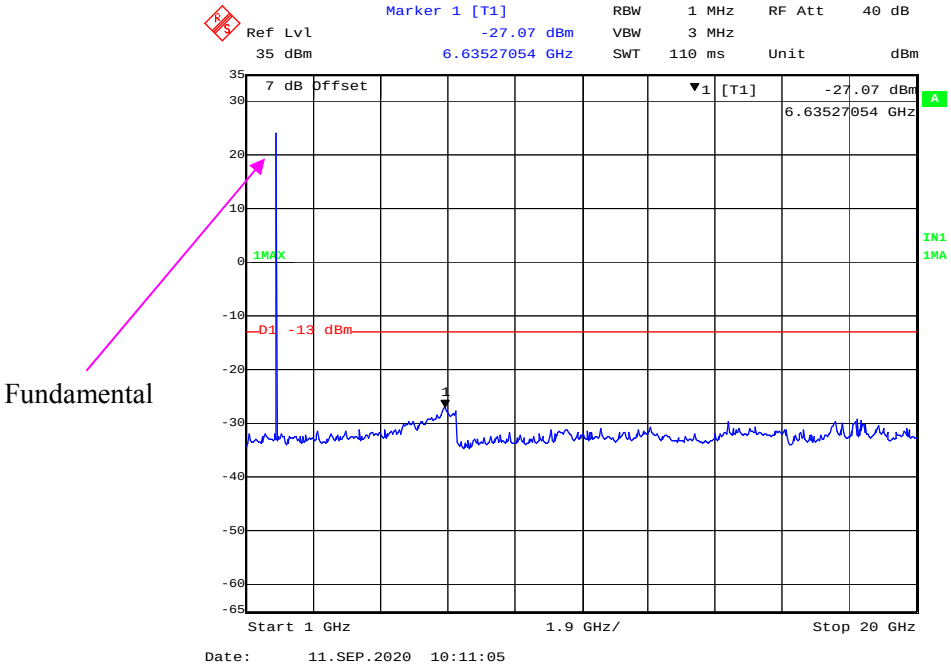


Low Channel

30 MHz – 1GHz(EGPRS Mode)

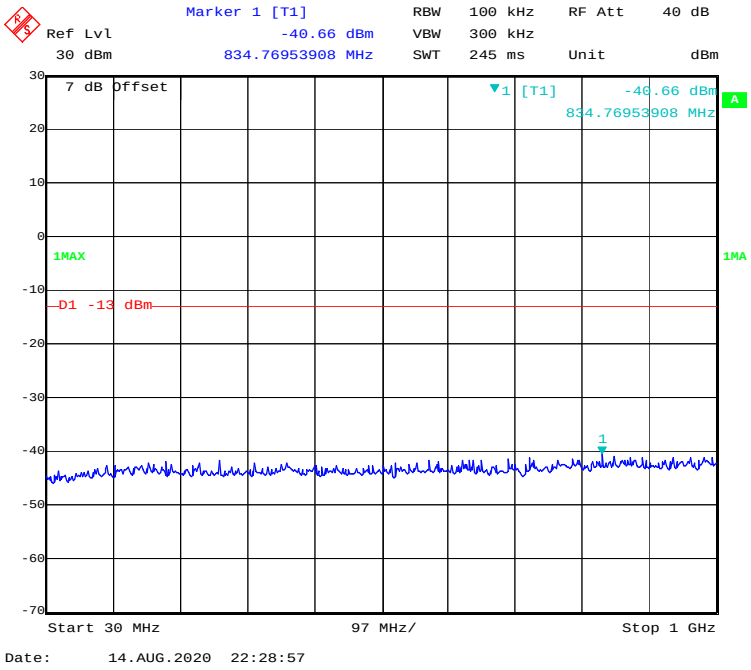


1 GHz – 20 GHz (EGPRS Mode)

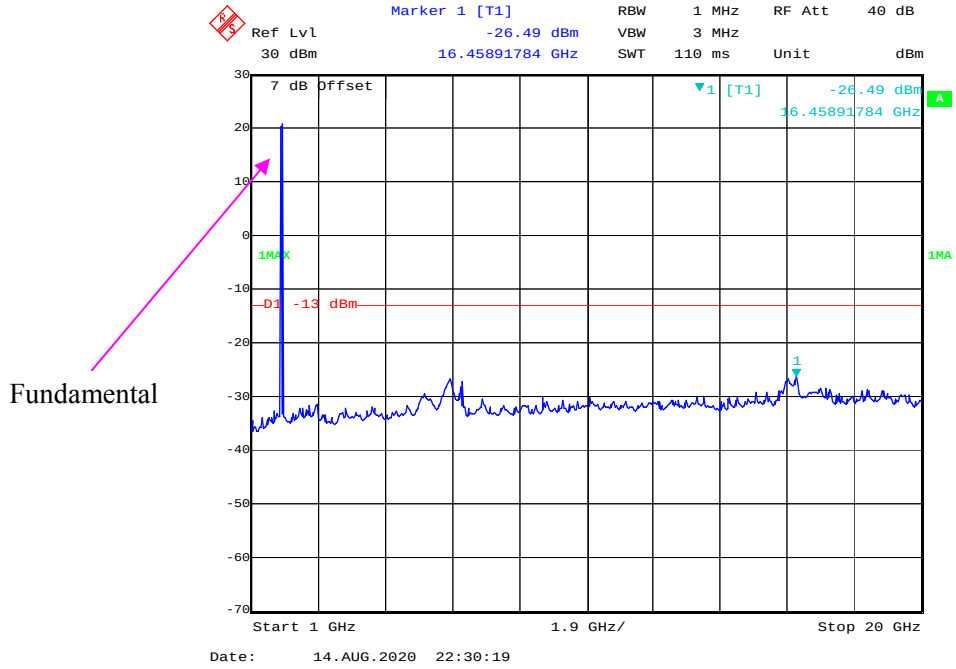


Middle Channel

30 MHz – 1GHz(EGPRS Mode)

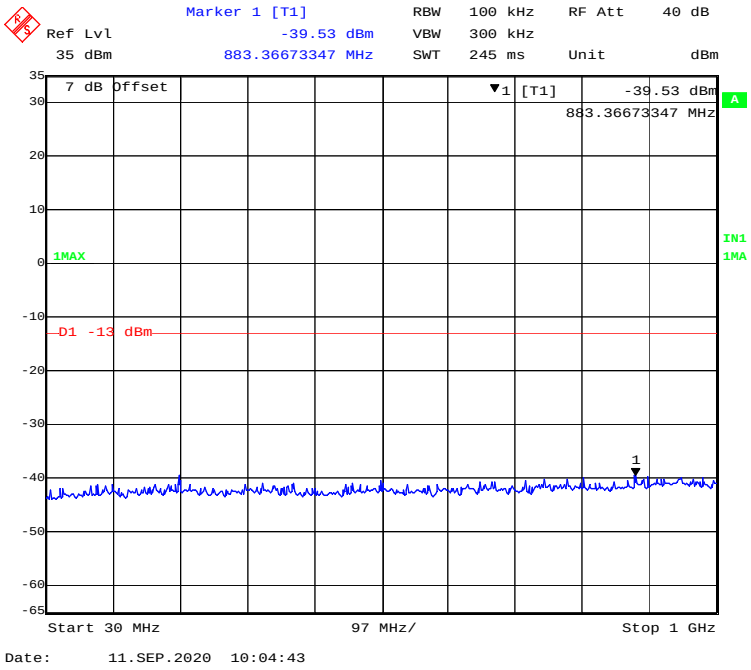


1 GHz – 20 GHz (EGPRS Mode)

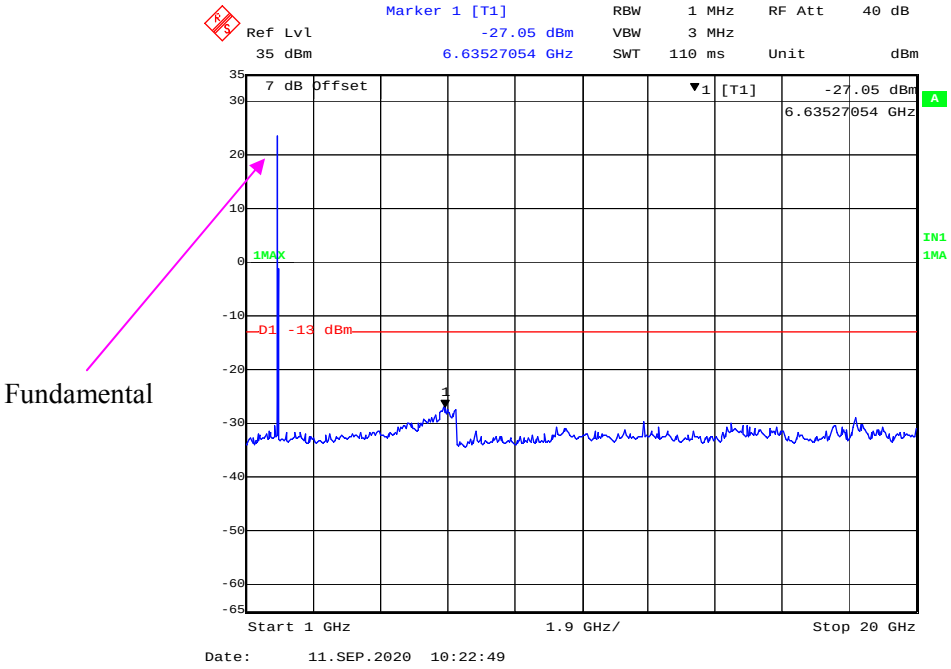


High Channel

30 MHz – 1GHz(EGPRS Mode)



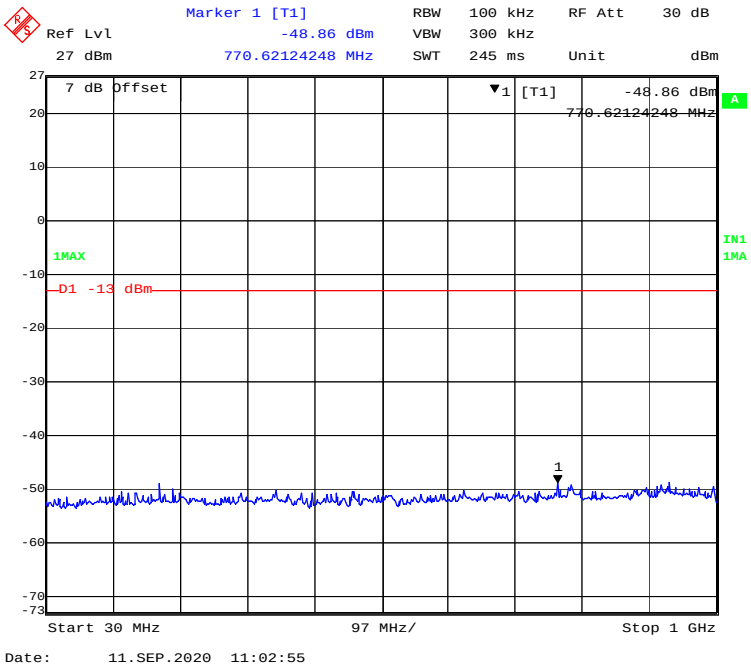
1 GHz – 20 GHz (EGPRS Mode)



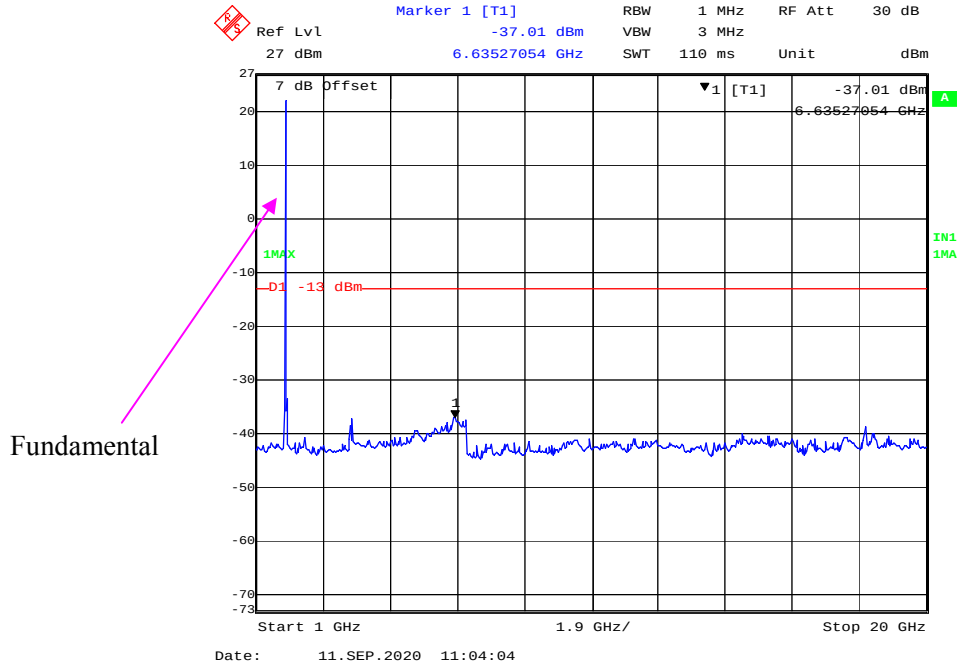
WCDMA Band II:

Low Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

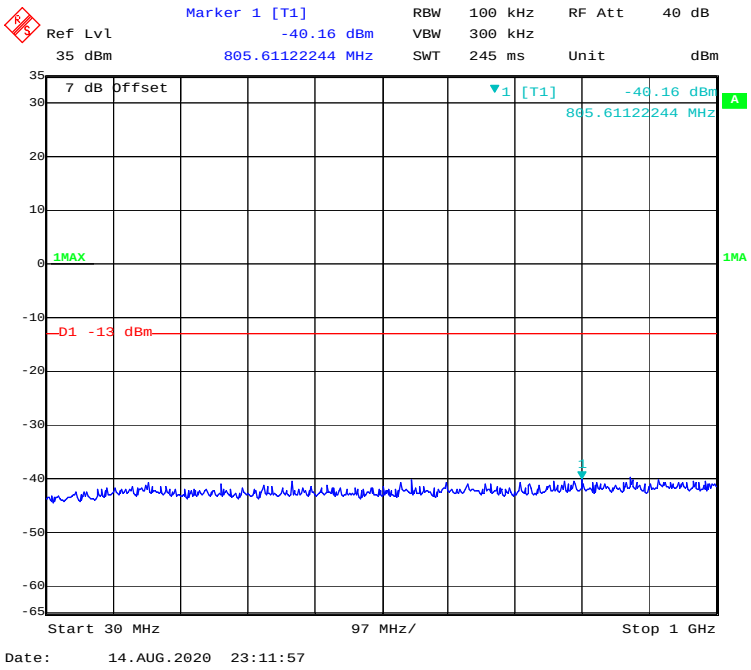


1 GHz – 20 GHz WCDMA (Rel 99) Mode

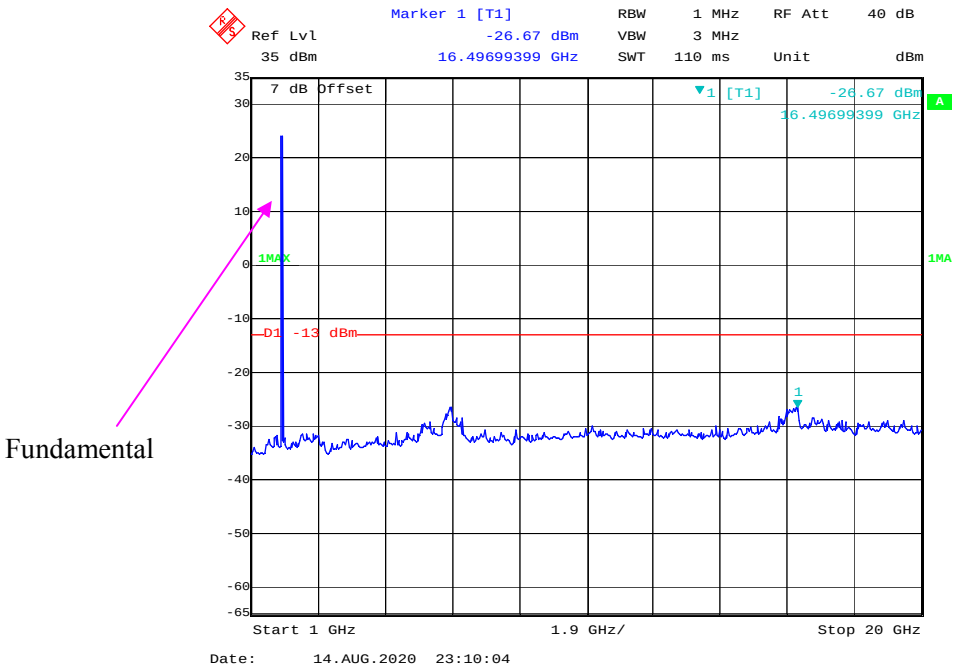


Middle Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

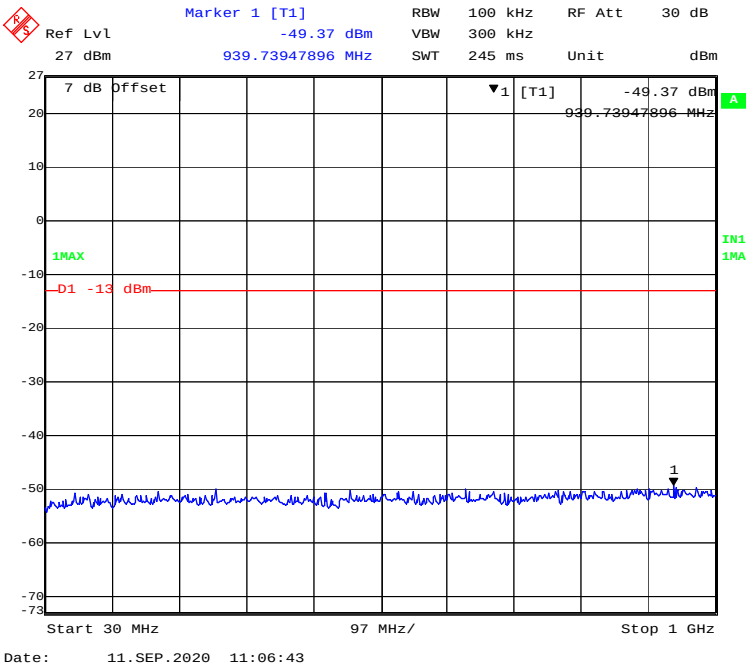


1 GHz – 20 GHz WCDMA (Rel 99) Mode

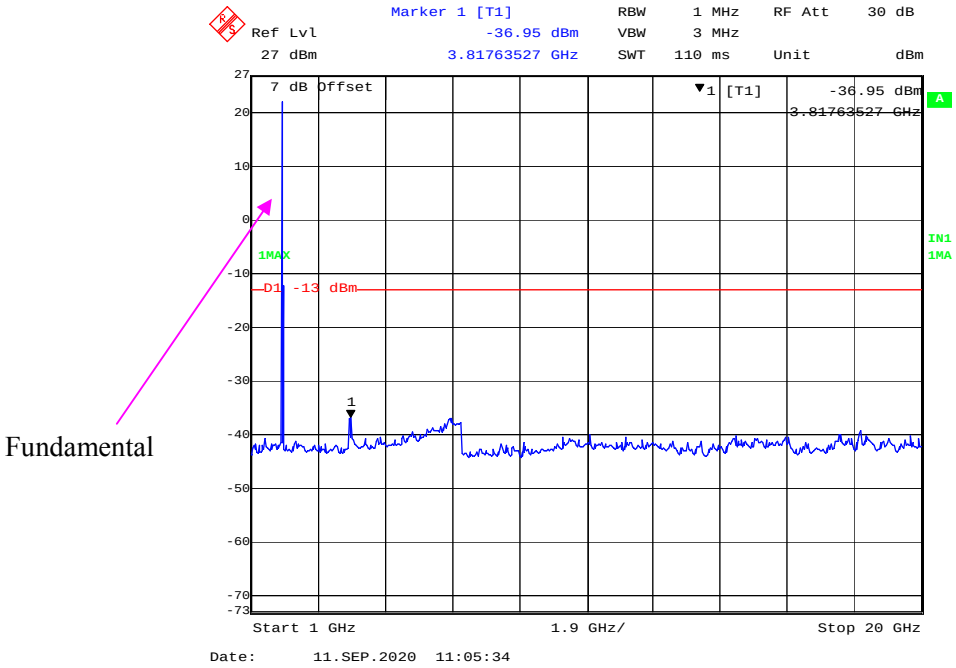


High Channel

30 MHz – 1GHz WCDMA (Rel 99) Mode

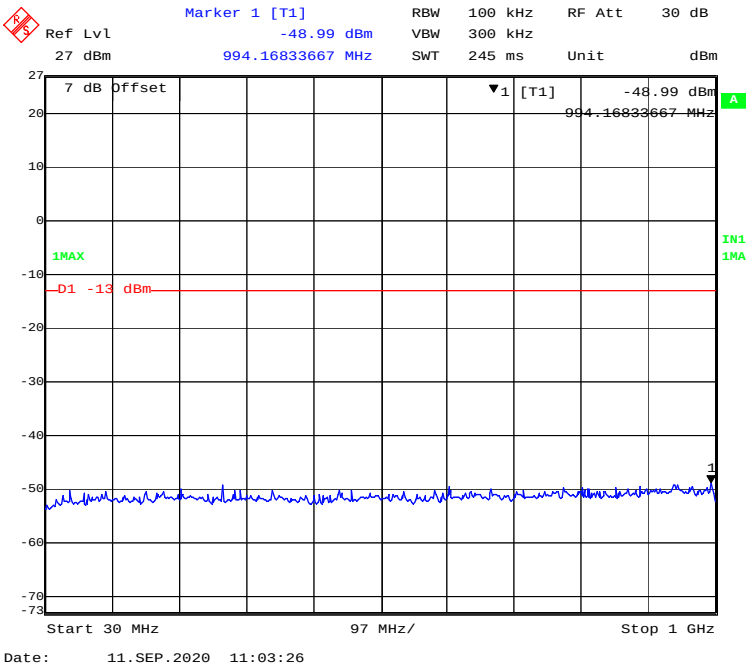


1 GHz – 20 GHz WCDMA (Rel 99) Mode

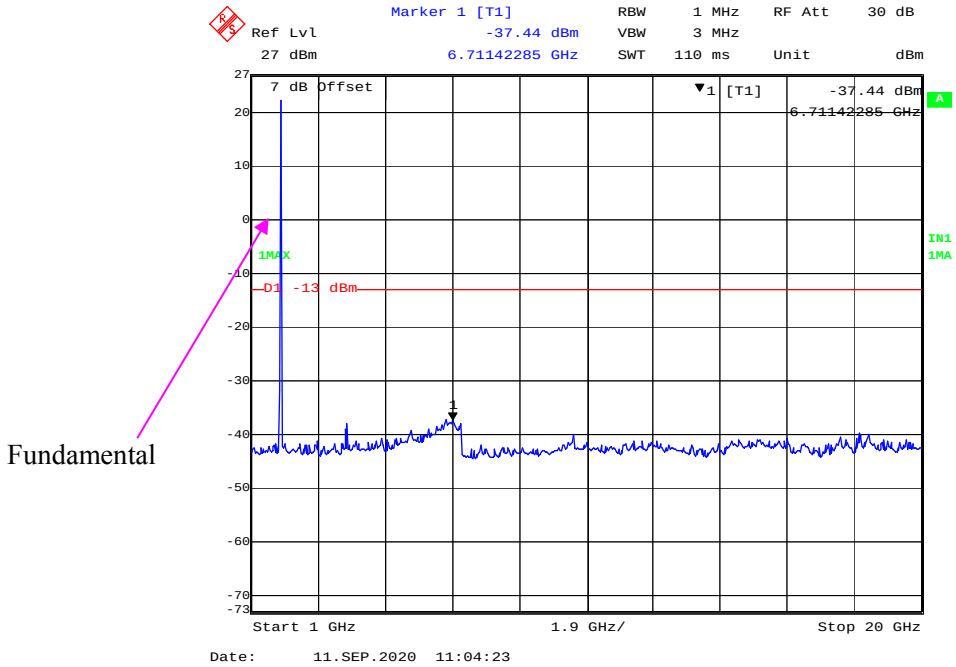


Low Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

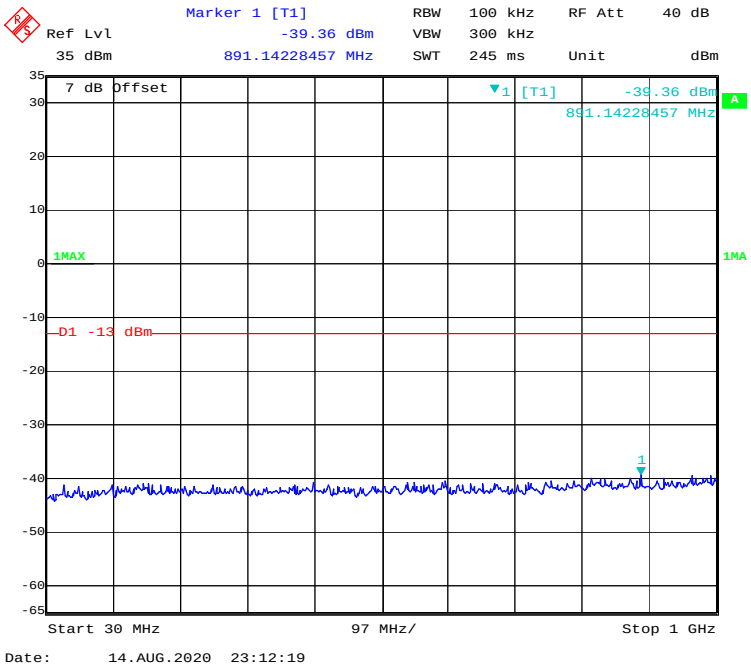


1 GHz – 20 GHz WCDMA (HSDPA) Mode

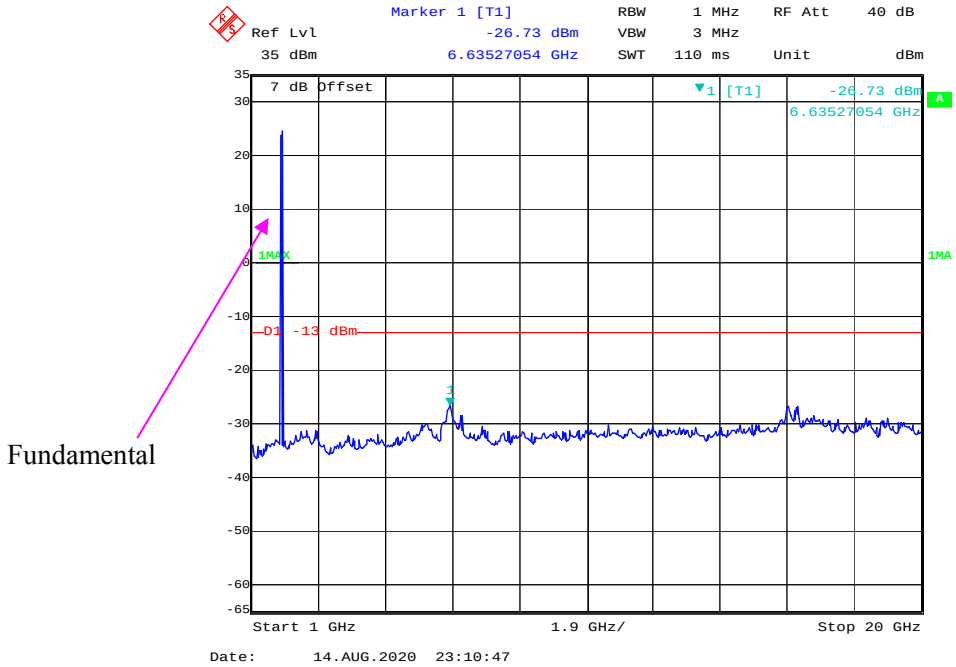


Middle Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

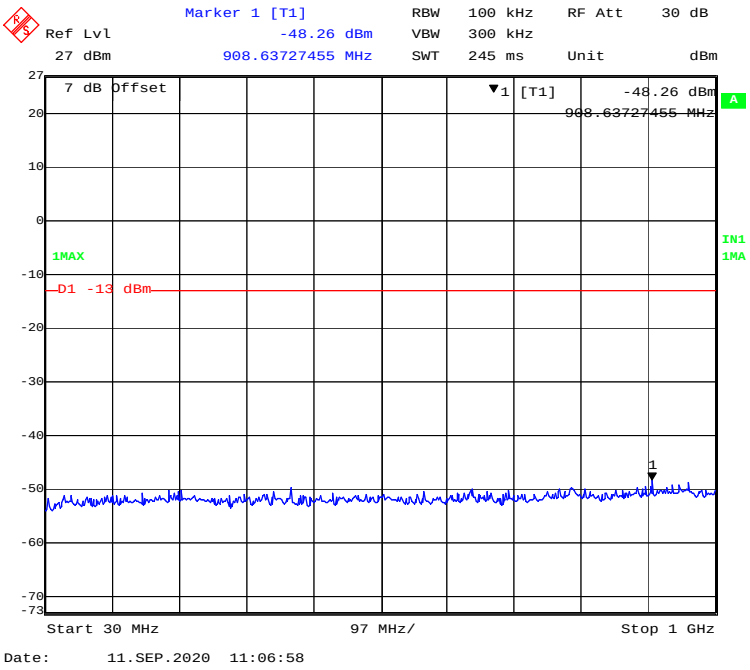


1 GHz – 20 GHz WCDMA (HSDPA) Mode

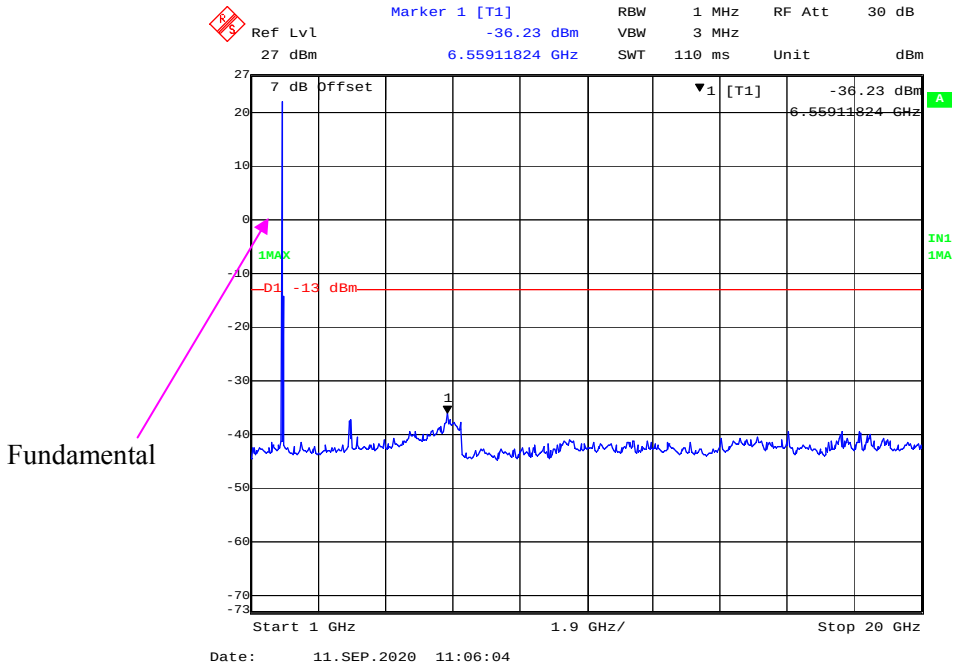


High Channel

30 MHz – 1GHz WCDMA (HSDPA) Mode

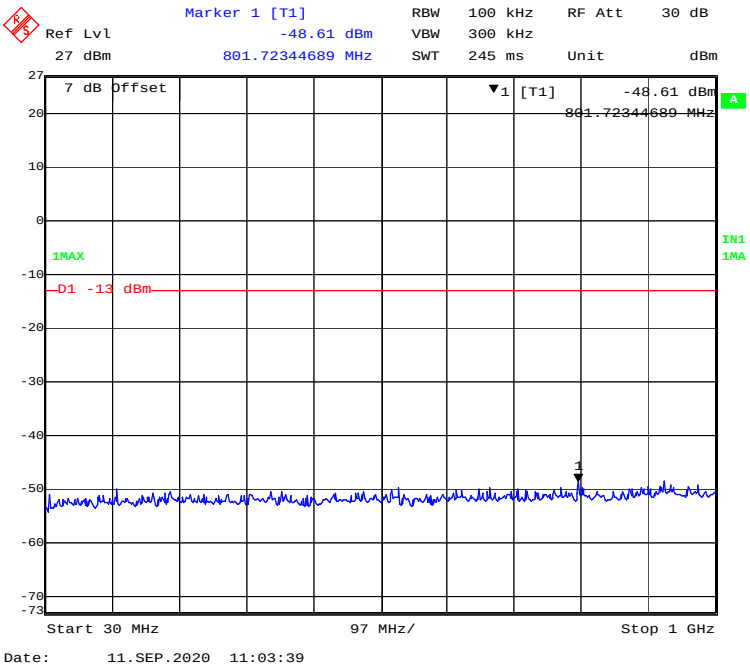


1 GHz – 20 GHz WCDMA (HSDPA) Mode

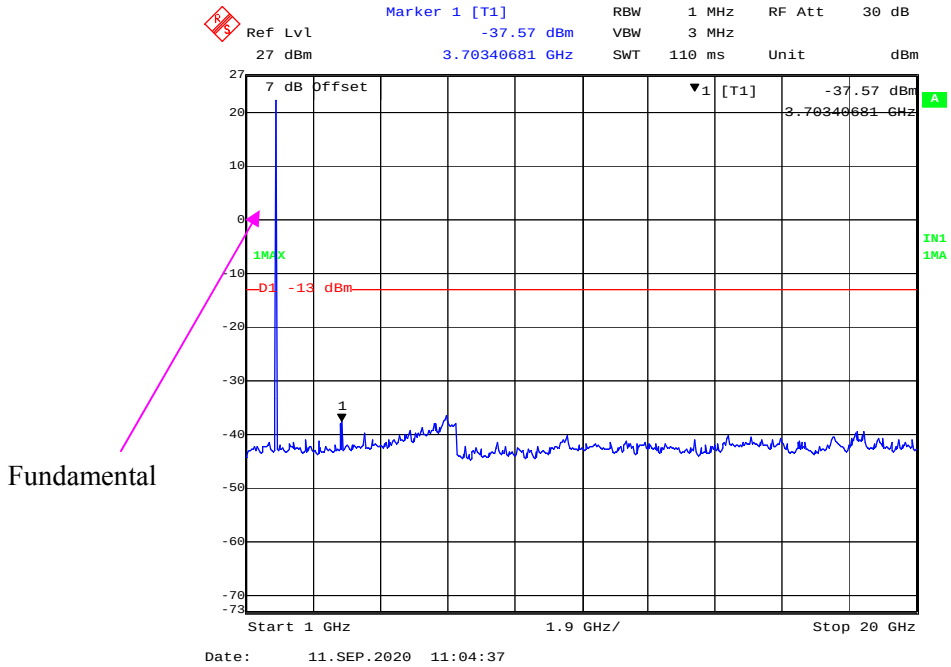


Low Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

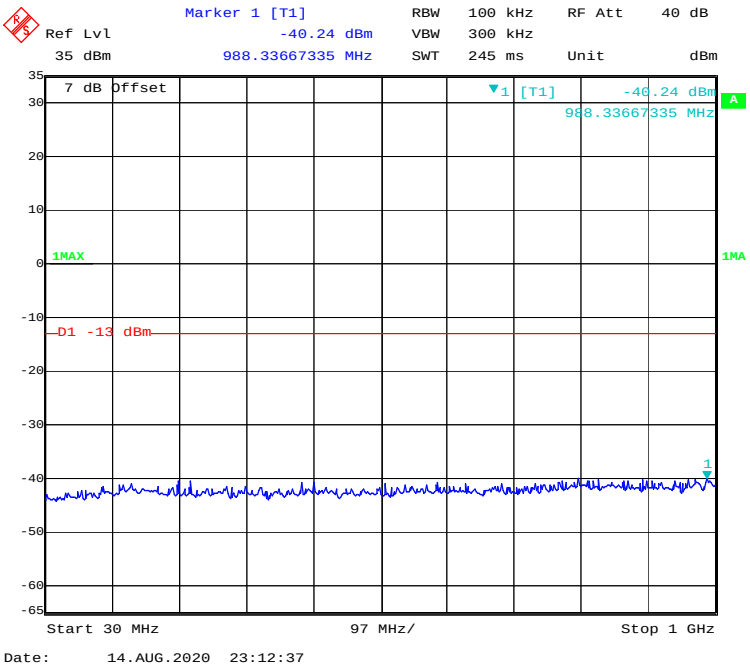


1 GHz – 20 GHz WCDMA (HSUPA) Mode

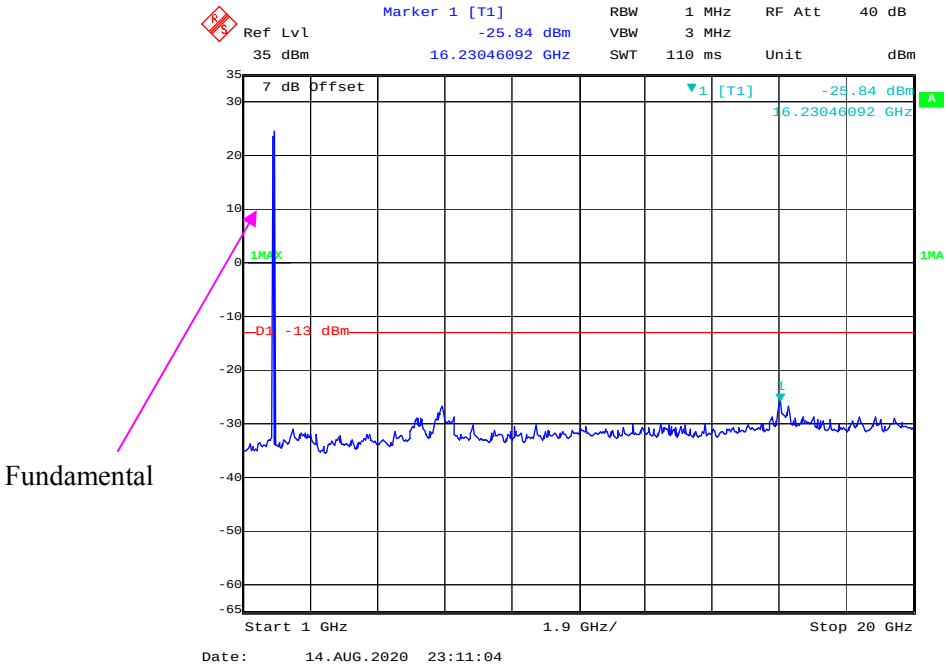


Middle Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

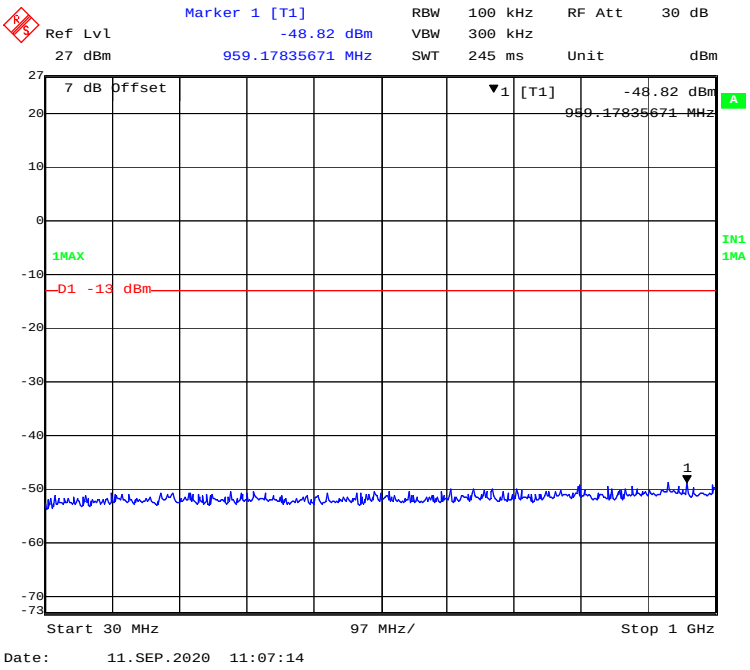


1 GHz – 20 GHz WCDMA (HSUPA) Mode

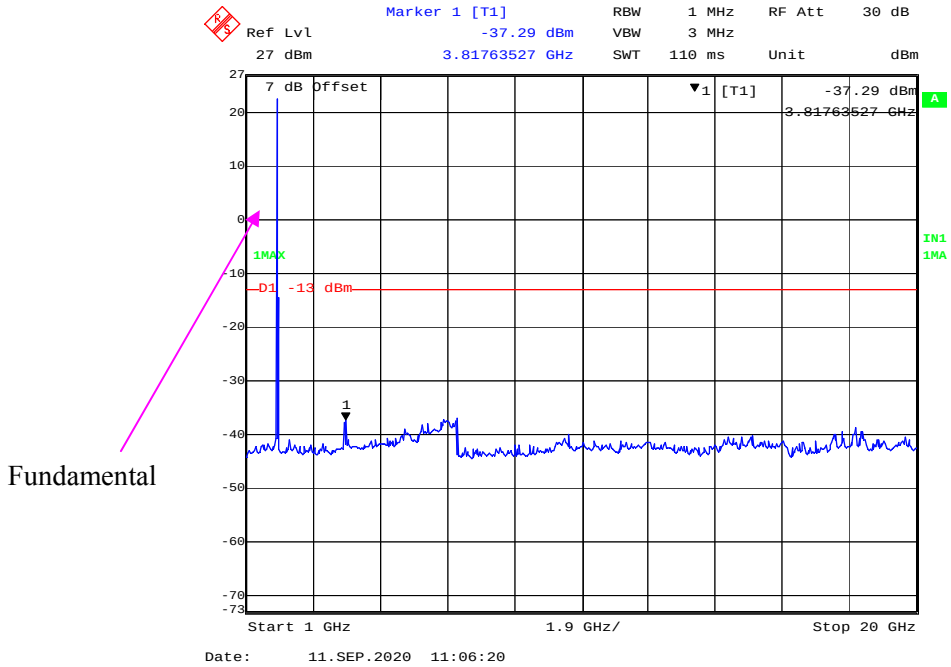


High Channel

30 MHz – 1GHz WCDMA (HSUPA) Mode

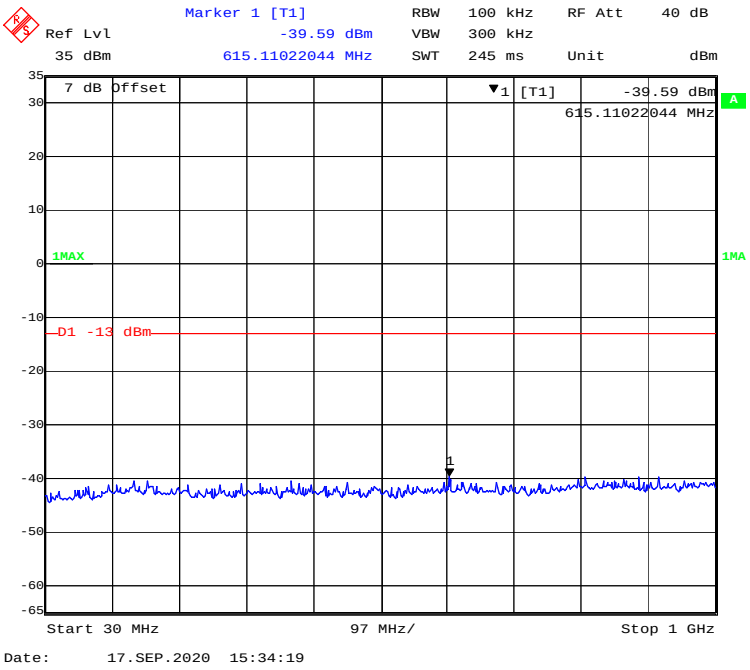


1 GHz – 20 GHz WCDMA (HSUPA) Mode

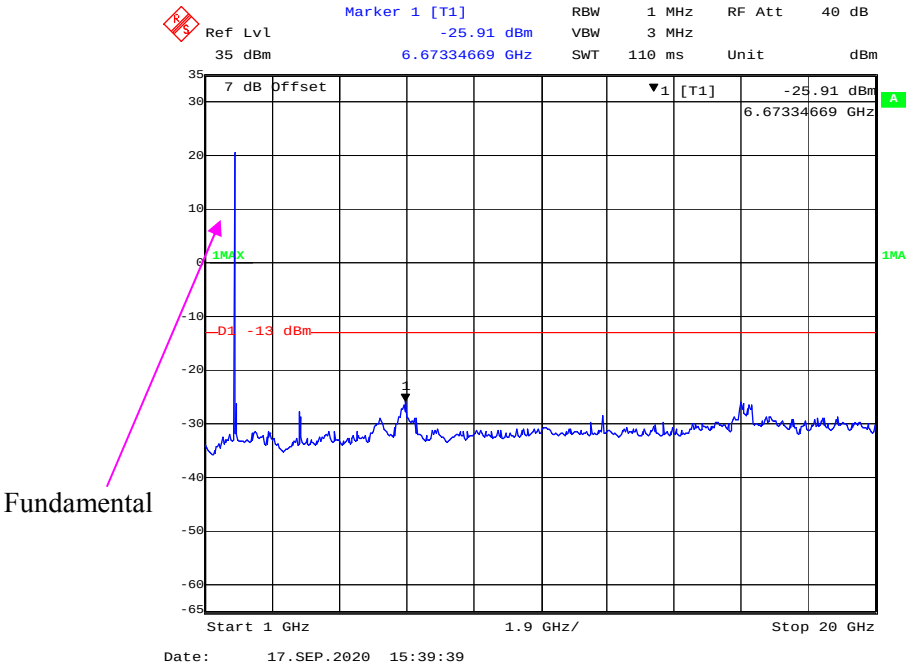


Low Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode

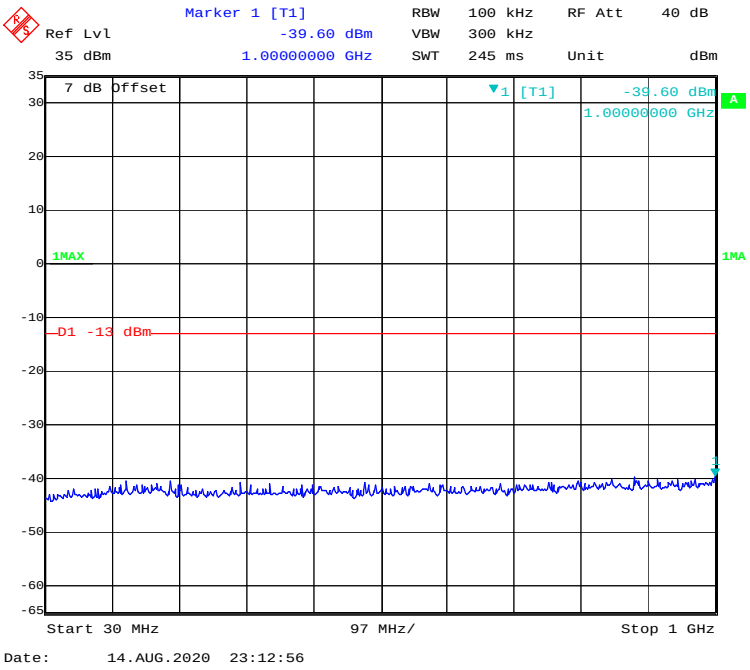


1 GHz – 20 GHz WCDMA (HSPA+) Mode

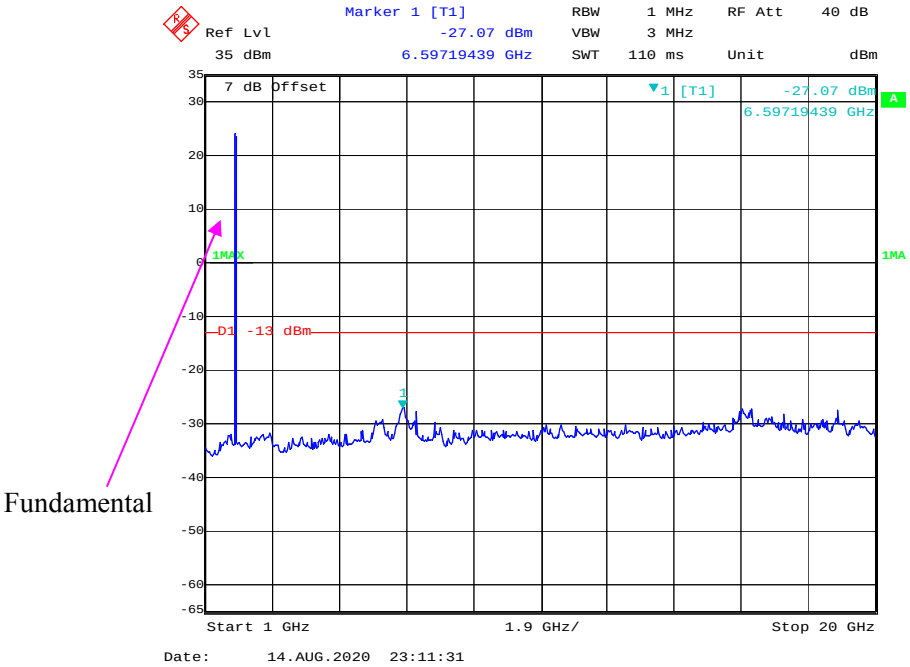


Middle Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode

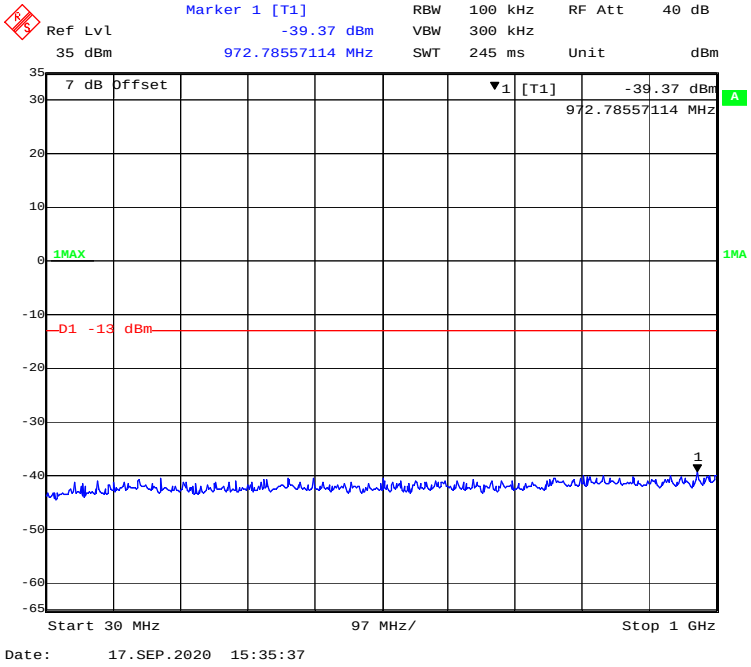


1 GHz – 20 GHz WCDMA (HSPA+) Mode

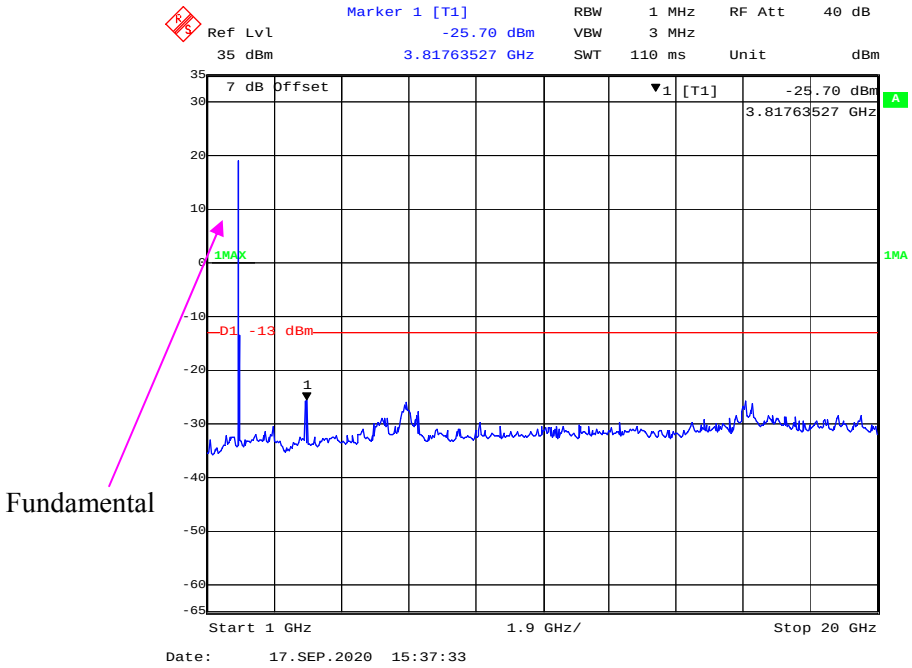


High Channel

30 MHz – 1GHz WCDMA (HSPA+) Mode



1 GHz – 20 GHz WCDMA (HSPA+) Mode



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

Applicable Standards

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

22.917 (a) Out of band emissions. 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.

24.238 (a) Out of band emissions. 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 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 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_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	25.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Jack Jiao on 2020-08-16.

Test mode: Transmitting (the worse case data as below)

30 MHz ~ 10 GHz:

GSM 850 Band

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GPRS Mode, Low channel										
694.58	56.32	103	100	H	-43.51	0.62	-1.69	-45.82	-13	32.82
694.58	55.17	221	150	V	-44.66	0.62	-1.69	-46.97	-13	33.97
1648.4	59.77	46	150	H	-43.28	0.84	8.44	-35.68	-13	22.68
1648.4	58.31	149	150	V	-45.08	0.84	8.44	-37.48	-13	24.48
2472.6	56.32	302	100	H	-44.62	0.89	10.04	-35.47	-13	22.47
2472.6	54.11	277	200	V	-46.83	0.89	10.04	-37.68	-13	24.68
GPRS Mode, Middle channel										
694.58	57.52	146	100	H	-42.31	0.62	-1.69	-44.62	-13	31.62
694.58	56.54	354	150	V	-43.29	0.62	-1.69	-45.60	-13	32.60
1673.20	60.52	1	150	H	-42.87	0.84	8.48	-35.23	-13	22.23
1673.20	59.21	327	150	V	-44.18	0.84	8.48	-36.54	-13	23.54
2509.80	57.85	31	100	H	-43.09	0.89	10.09	-33.89	-13	20.89
2509.80	55.24	29	200	V	-45.70	0.89	10.09	-36.50	-13	23.50
GPRS Mode, High channel										
694.58	56.87	201	100	H	-42.96	0.62	-1.69	-45.27	-13	32.27
694.58	55.96	272	150	V	-43.87	0.62	-1.69	-46.18	-13	33.18
1697.6	59.68	5	150	H	-43.71	0.84	8.52	-36.03	-13	23.03
1697.6	58.77	75	150	V	-44.62	0.84	8.52	-36.94	-13	23.94
2546.4	57.62	22	100	H	-43.32	0.89	10.04	-34.17	-13	21.17
2546.4	55.31	177	200	V	-45.63	0.89	10.04	-36.48	-13	23.48

WCDMA Band V

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Low channel										
694.58	58.35	26	150	H	-41.48	0.62	-1.69	-43.79	-13	30.79
694.58	57.65	245	150	V	-42.18	0.62	-1.69	-44.49	-13	31.49
1652.8	56.88	118	100	H	-46.51	0.84	8.44	-38.91	-13	25.91
1652.8	59.12	277	100	V	-44.27	0.84	8.44	-36.67	-13	23.67
2479.2	59.13	78	150	H	-41.81	0.89	10.05	-32.65	-13	19.65
2479.2	60.03	31	200	V	-40.91	0.89	10.05	-31.75	-13	18.75
WCDMA Mode, Middle channel										
694.58	60.21	267	150	H	-39.62	0.62	-1.69	-41.93	-13	28.93
694.58	58.32	60	150	V	-41.51	0.62	-1.69	-43.82	-13	30.82
1673.20	57.21	250	100	H	-46.18	0.84	8.48	-38.54	-13	25.54
1673.20	59.55	285	100	V	-43.84	0.84	8.48	-36.20	-13	23.20
2509.80	59.56	147	150	H	-41.38	0.89	10.09	-32.18	-13	19.18
2509.80	60.47	84	200	V	-40.47	0.89	10.09	-31.27	-13	18.27
WCDMA Mode, High channel										
694.58	59.25	216	150	H	-40.58	0.62	-1.69	-42.89	-13	29.89
694.58	57.93	202	150	V	-41.9	0.62	-1.69	-44.21	-13	31.21
1693.2	57.65	248	100	H	-45.74	0.84	8.51	-38.07	-13	25.07
1693.2	59.03	68	100	V	-44.36	0.84	8.51	-36.69	-13	23.69
2539.8	59.35	176	150	H	-41.59	0.89	10.04	-32.44	-13	19.44
2539.8	60.37	293	200	V	-40.57	0.89	10.4	-31.06	-13	18.06

30 MHz ~ 20 GHz:

PCS 1900 Band

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GPRS Mode, Low channel										
694.58	59.18	219	100	H	-40.65	0.62	-1.69	-42.96	-13	29.96
694.58	59.22	222	100	V	-40.61	0.62	-1.69	-42.92	-13	29.92
3700.4	60.32	185	200	H	-46.26	0.95	9.78	-37.43	-13	24.43
3700.4	59.11	357	200	V	-47.81	0.95	9.78	-38.98	-13	25.98
5550.6	61.03	203	150	H	-42.12	1.14	10.36	-32.9	-13	19.9
5550.6	57.36	49	150	V	-46.09	1.14	10.36	-36.87	-13	23.87
GPRS Mode, Middle channel										
694.58	60.21	172	100	H	-39.62	0.62	-1.69	-41.93	-13	28.93
694.58	59.25	126	100	V	-40.58	0.62	-1.69	-42.89	-13	29.89
3760.00	61.24	310	200	H	-45.54	0.95	9.74	-36.75	-13	23.75
3760.00	60.20	186	200	V	-46.90	0.95	9.74	-38.11	-13	25.11
5640.00	62.85	18	150	H	-40.32	1.15	10.74	-30.73	-13	17.73
5640.00	59.54	50	150	V	-43.93	1.15	10.74	-34.34	-13	21.34
GPRS Mode, High channel										
694.58	59.35	232	100	H	-40.48	0.62	-1.69	-42.79	-13	29.79
694.58	59.36	84	100	V	-40.47	0.62	-1.69	-42.78	-13	29.78
3819.6	61.63	4	200	H	-45.17	0.96	9.71	-36.42	-13	23.42
3819.6	60.03	191	200	V	-47.09	0.96	9.71	-38.34	-13	25.34
5729.4	61.11	158	150	H	-42.08	1.15	10.58	-32.65	-13	19.65
5729.4	58.98	169	150	V	-44.54	1.15	10.58	-35.11	-13	22.11

WCDMA Band II

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Low channel										
694.58	60.02	106	150	H	-39.81	0.62	-1.69	-42.12	-13	29.12
694.58	56.35	260	150	V	-43.48	0.62	-1.69	-45.79	-13	32.79
3704.8	60.35	251	200	H	-46.23	0.95	9.78	-37.4	-13	24.4
3704.8	62.11	133	100	V	-44.81	0.95	9.78	-35.98	-13	22.98
5557.2	60.33	2	100	H	-42.82	1.14	10.37	-33.59	-13	20.59
5557.2	60.74	97	150	V	-42.71	1.14	10.37	-33.48	-13	20.48
WCDMA Mode, Middle channel										
694.58	61.22	51	150	H	-38.61	0.62	-1.69	-40.92	-13	27.92
694.58	56.54	293	150	V	-43.29	0.62	-1.69	-45.60	-13	32.60
3760.00	61.58	249	200	H	-45.20	0.95	9.74	-36.41	-13	23.41
3760.00	62.14	327	100	V	-44.96	0.95	9.74	-36.17	-13	23.17
5640.00	60.85	118	100	H	-42.32	1.15	10.74	-32.73	-13	19.73
5640.00	60.23	21	150	V	-43.24	1.15	10.74	-33.65	-13	20.65
WCDMA Mode, High channel										
694.58	60.32	32	150	H	-39.51	0.62	-1.69	-41.82	-13	28.82
694.58	67.89	344	150	V	-31.94	0.62	-1.69	-34.25	-13	21.25
3815.2	60.16	81	200	H	-46.63	0.96	9.71	-37.88	-13	24.88
3815.2	61.33	95	100	V	-45.8	0.96	9.71	-37.05	-13	24.05
5722.8	60.03	330	100	H	-43.19	1.15	10.57	-33.77	-13	20.77
5722.8	59.78	79	150	V	-43.75	1.15	10.57	-34.33	-13	21.33

Note:
1) Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)
2) Margin (dB) = Limit (dBm) - Absolute Level (dBm)

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

Applicable Standards

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.

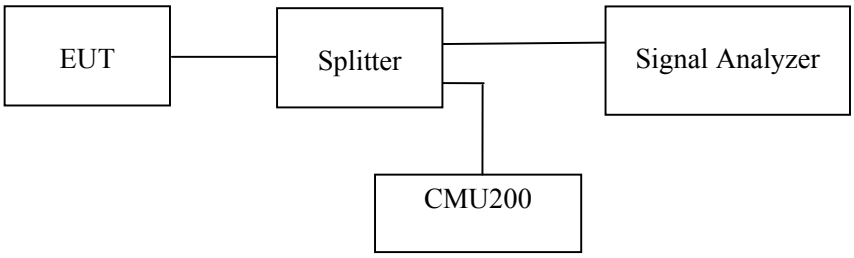
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

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:	24.5-25.3 ℃
Relative Humidity:	48-51 %
ATM Pressure:	101.2-101.6 kPa

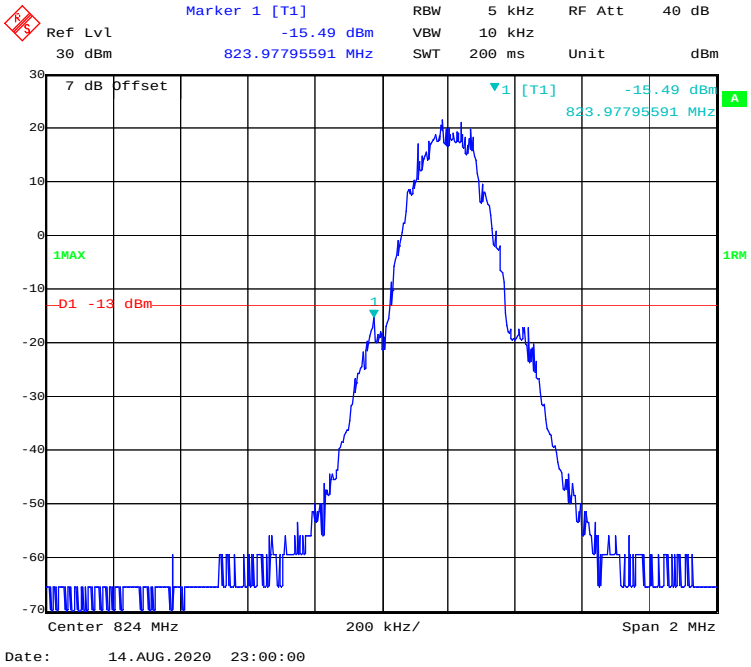
The testing was performed by Jack Jiao from 2020-08-14 to 2020-08-21.

EUT operation mode: Transmitting

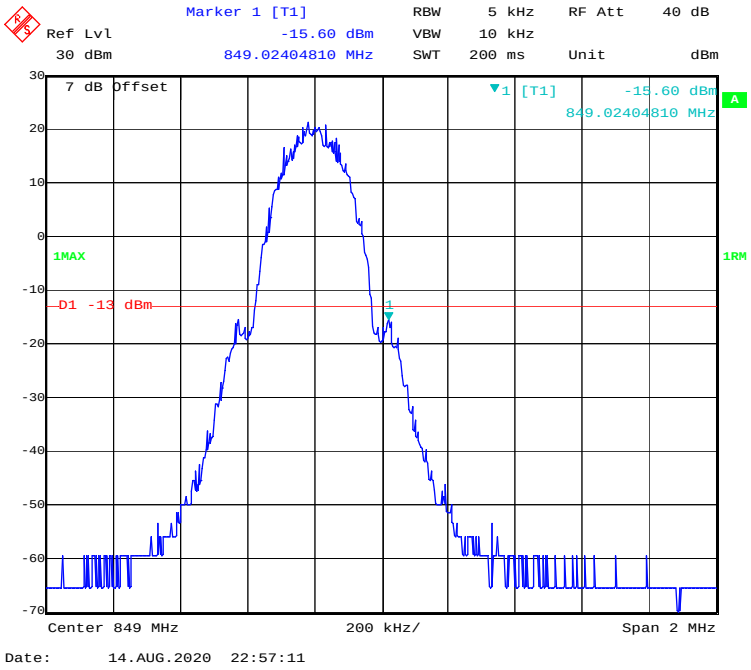
Test Result: Compliant.

GSM 850 Band:

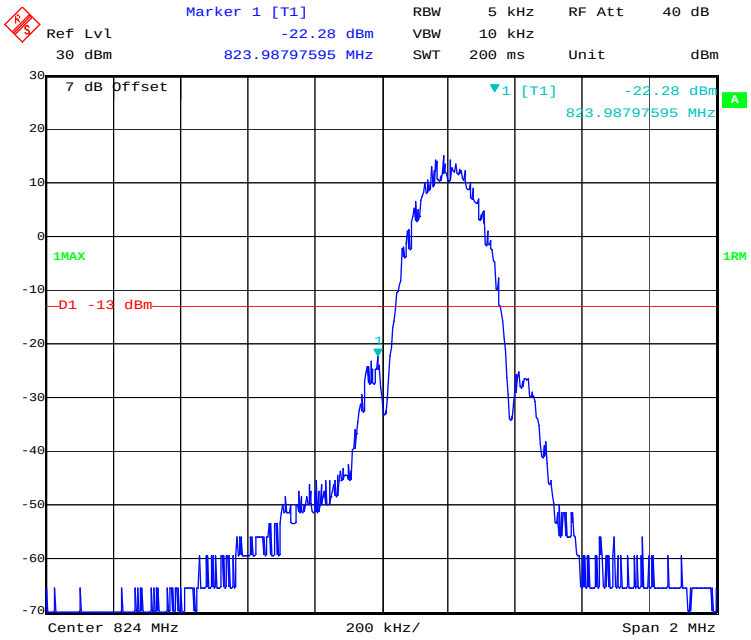
GPRS Mode, Left Band Edge



GPRS Mode, Right Band Edge

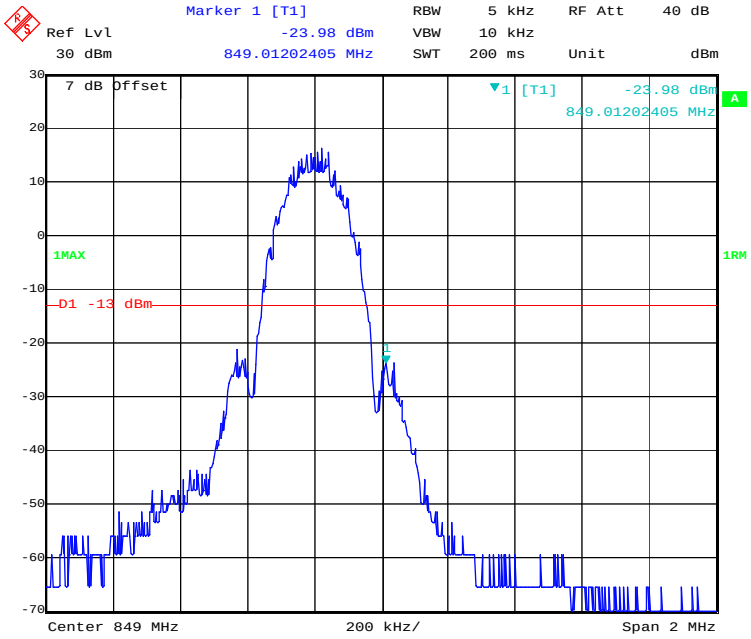


EGPRS Mode, Left Band Edge



Date: 21.AUG.2020 21:20:55

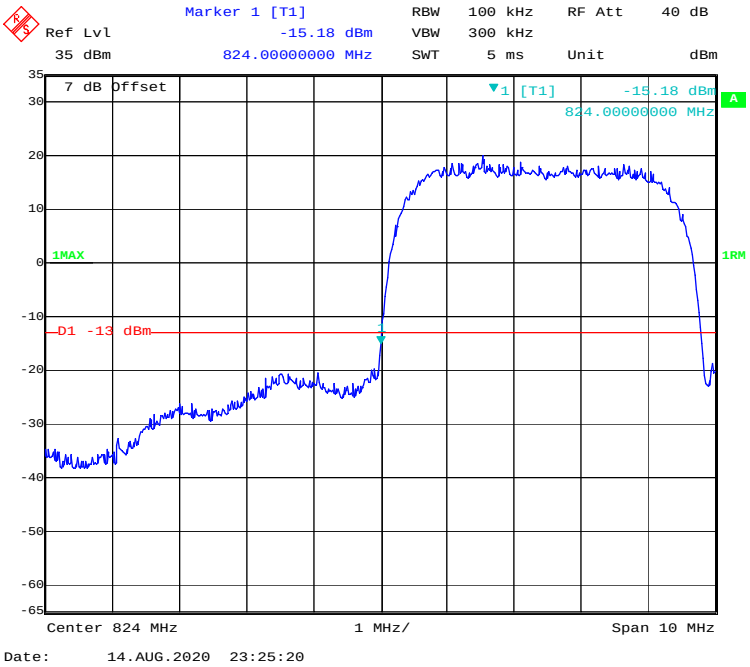
EGPRS Mode, Right Band Edge



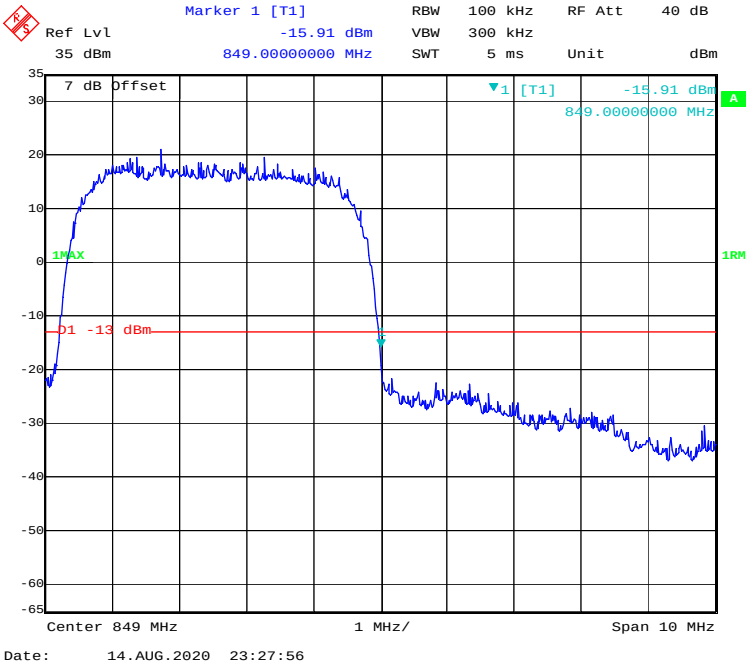
Date: 21.AUG.2020 21:21:30

WCDMA Band V

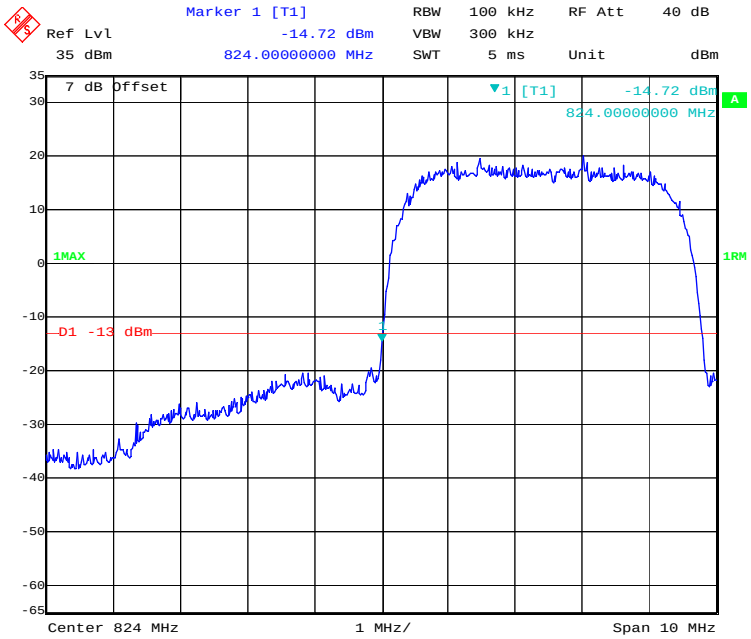
WCDMA (Rel 99) Mode, Left Band Edge



WCDMA (Rel 99) Mode, Right Band Edge

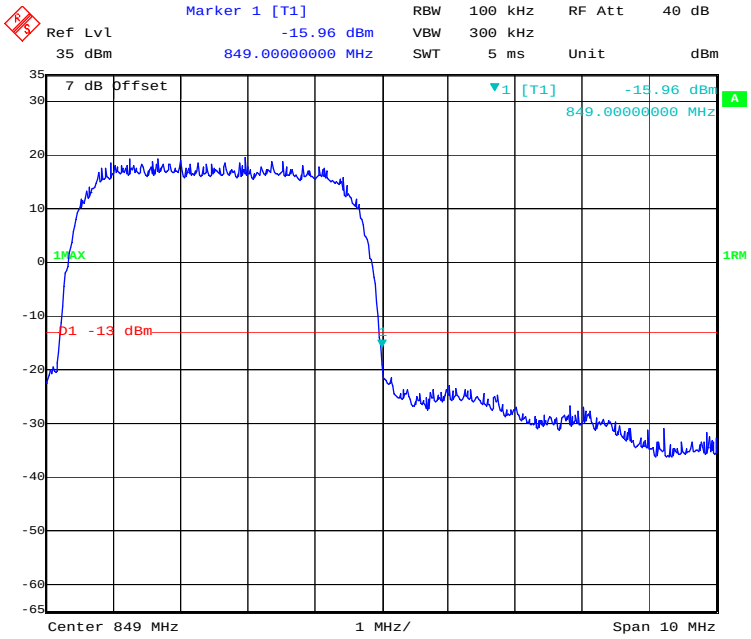


WCDMA (HSDPA) Mode, Left Band Edge



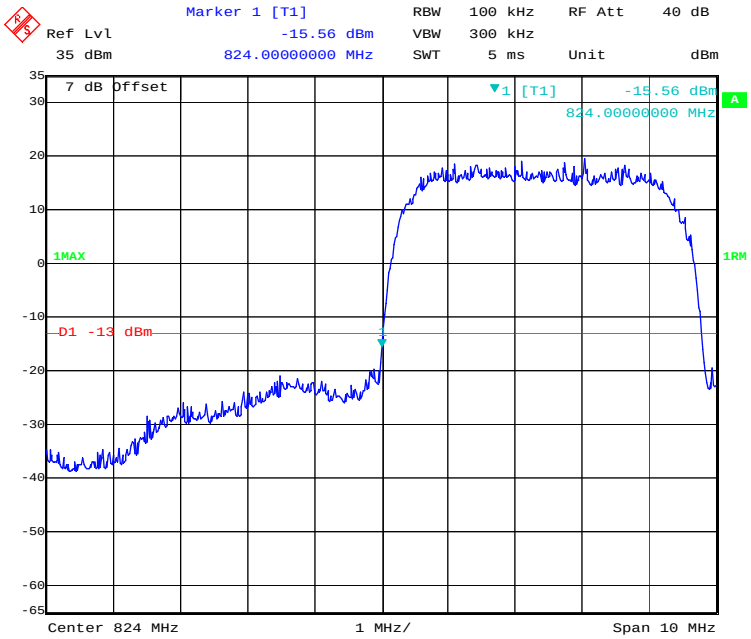
Date: 14.AUG.2020 23:26:31

WCDMA (HSDPA) Mode, Right Band Edge



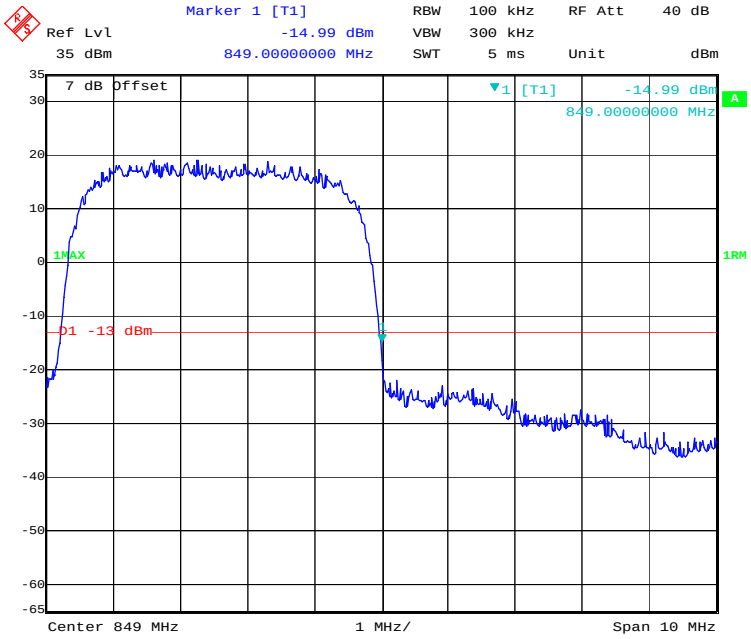
Date: 14.AUG.2020 23:28:25

WCDMA (HSUPA) Mode, Left Band Edge



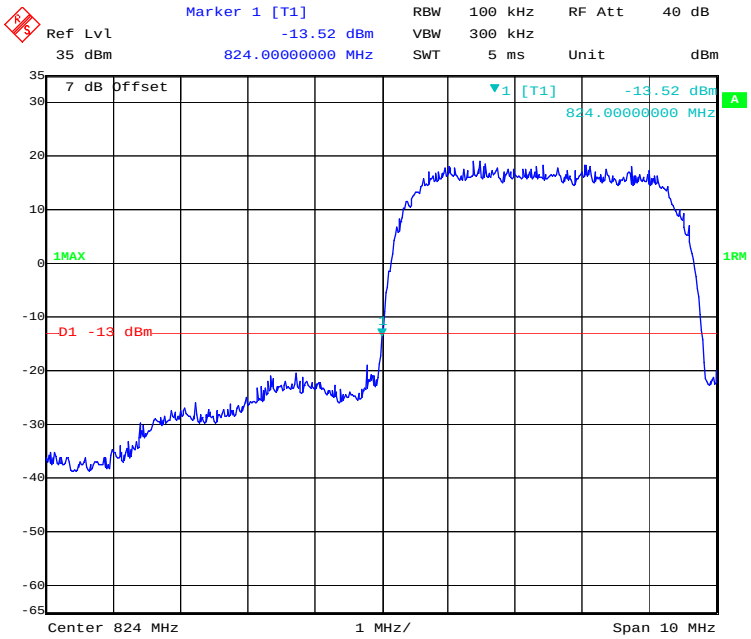
Date: 14.AUG.2020 23:26:54

WCDMA (HSUPA) Mode, Right Band Edge



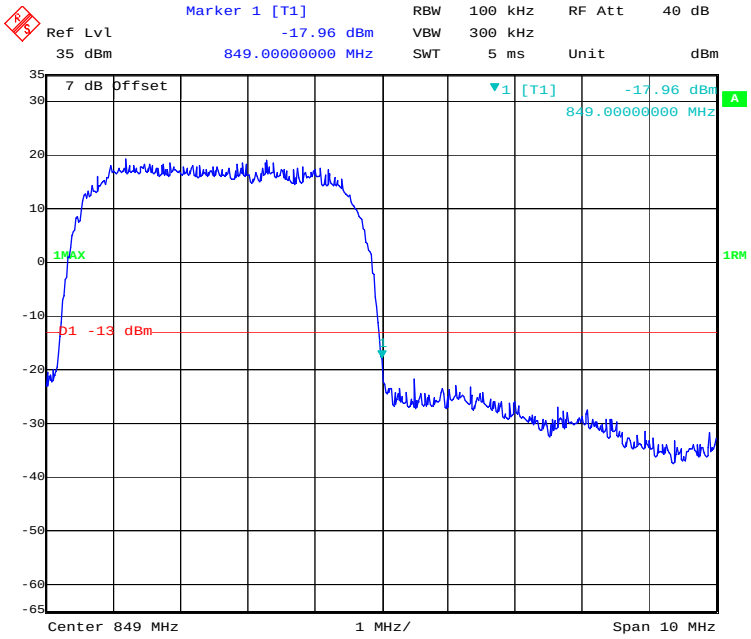
Date: 14.AUG.2020 23:28:42

WCDMA (HSPA+) Mode, Left Band Edge



Date: 14.AUG.2020 23:27:17

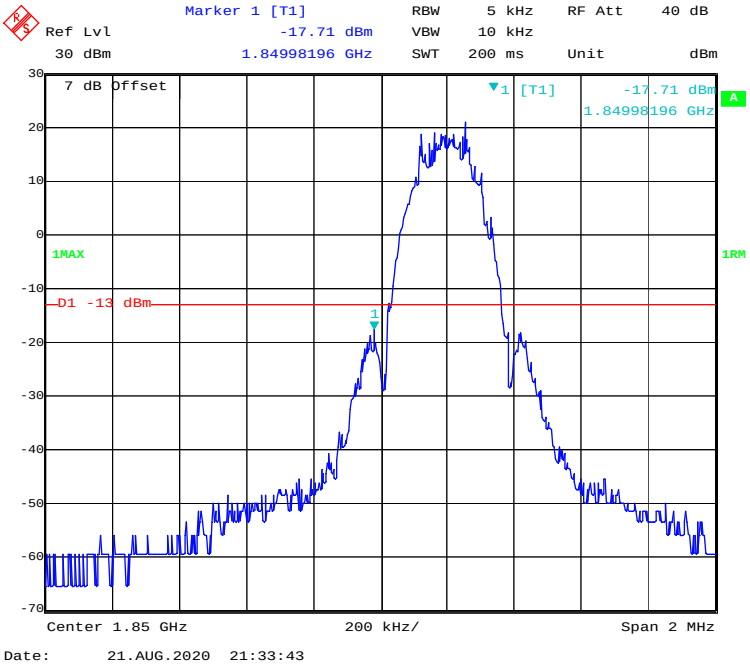
WCDMA (HSPA+) Mode, Right Band Edge



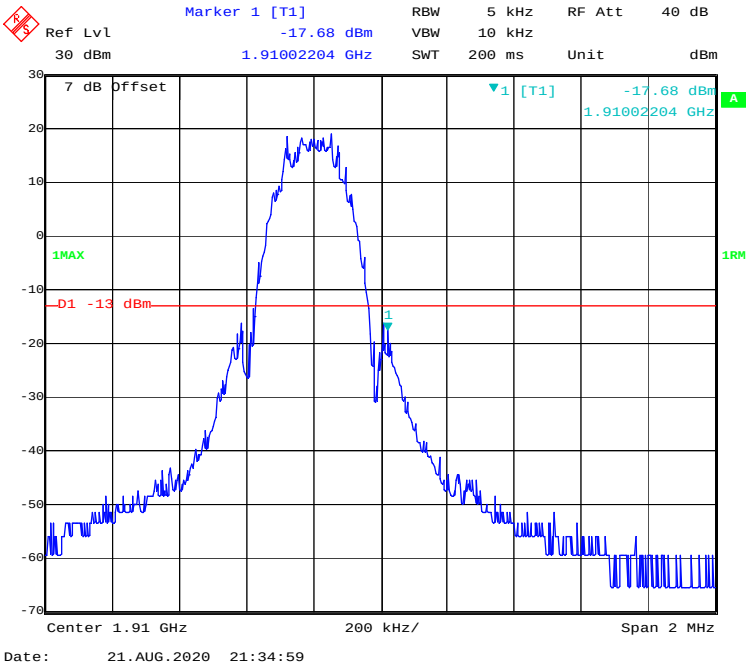
Date: 14.AUG.2020 23:28:56

PCS 1900 Band:

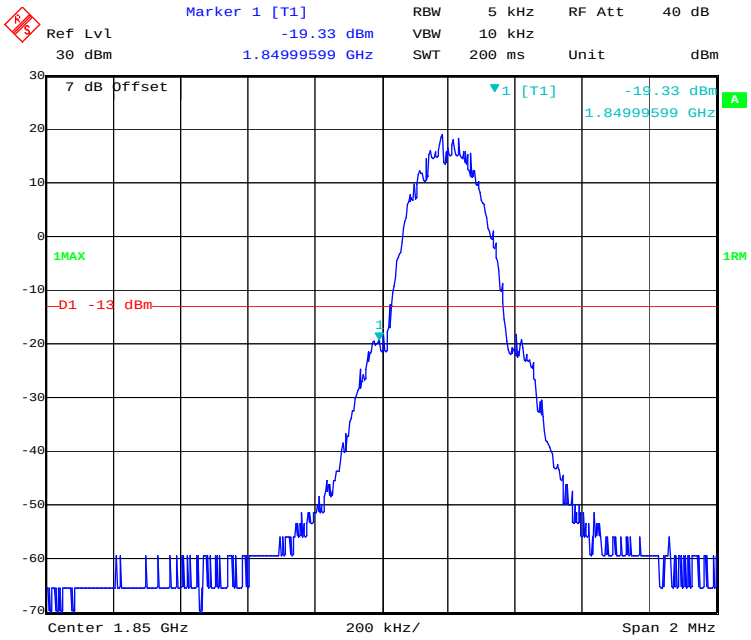
GPRS Mode, Left Band Edge



GPRS Mode, Right Band Edge

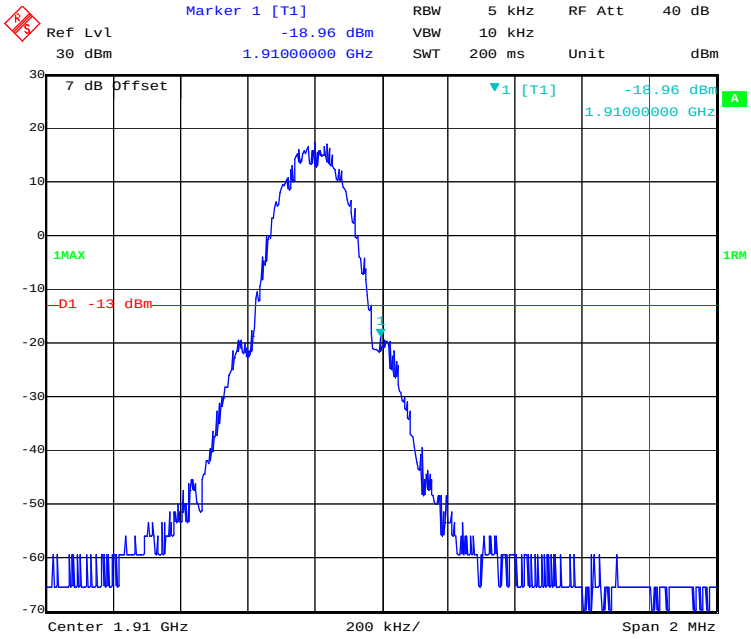


EGPRS Mode, Left Band Edge



Date: 14.AUG.2020 22:33:27

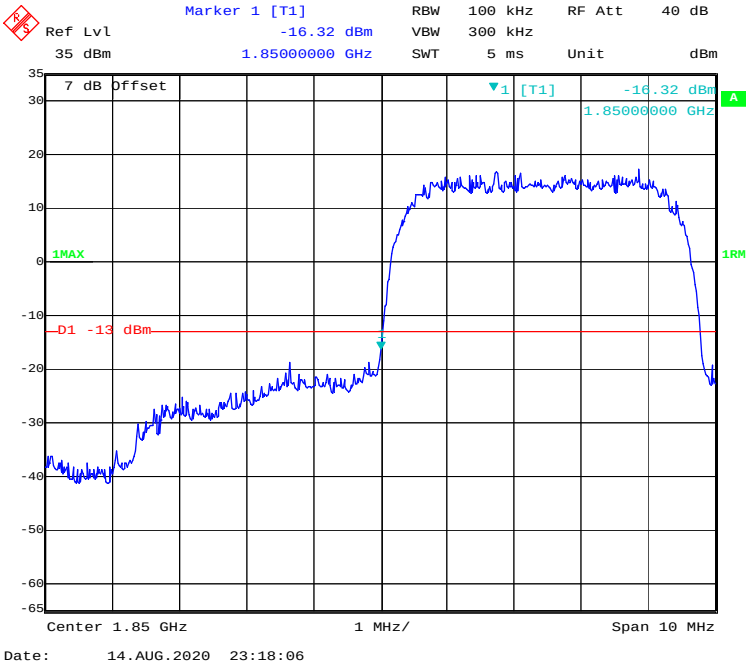
EGPRS Mode, Right Band Edge



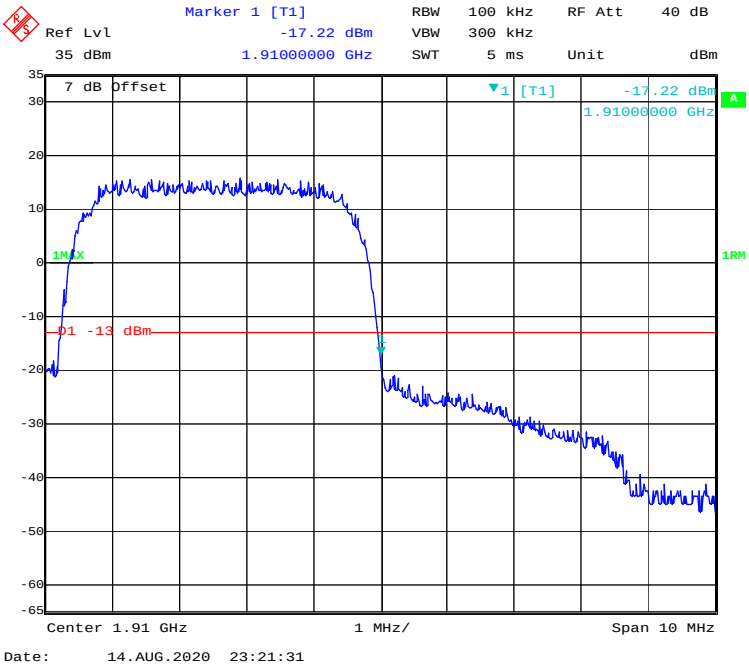
Date: 14.AUG.2020 22:36:23

WCDMA Band II

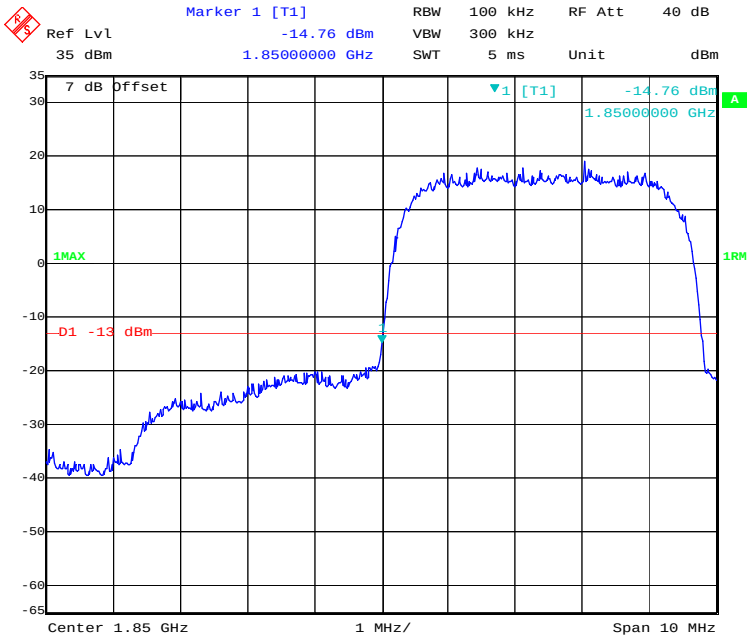
WCDMA (Rel99) Mode, Left Band Edge



WCDMA (Rel99) Mode, Right Band Edge

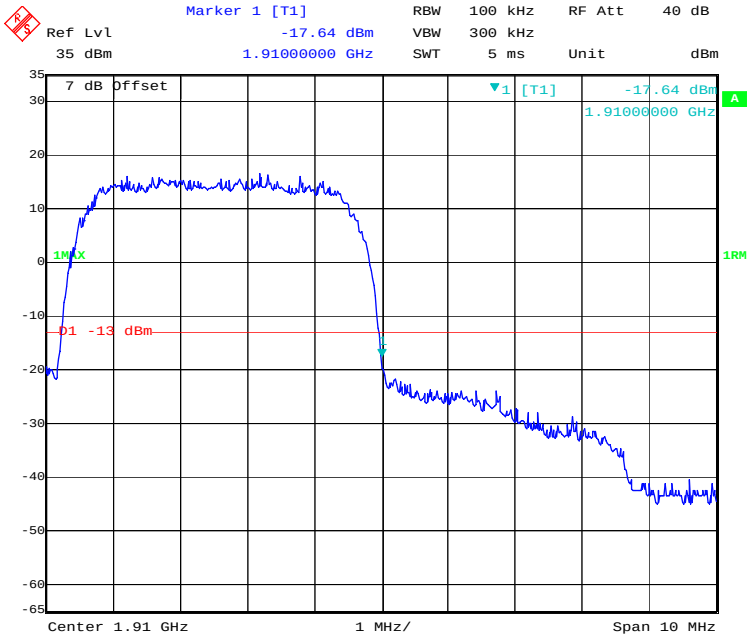


WCDMA (HSDPA) Mode, Left Band Edge



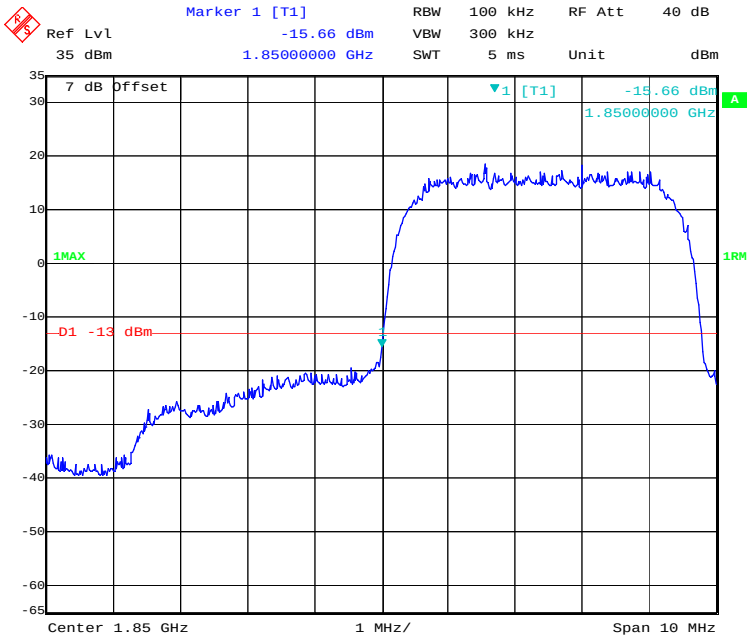
Date: 14.AUG.2020 23:19:07

WCDMA (HSDPA) Mode, Right Band Edge



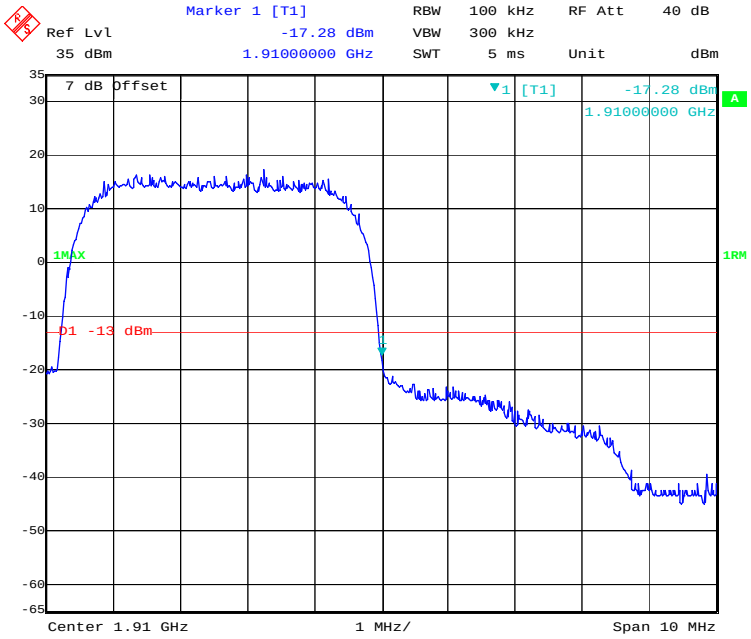
Date: 14.AUG.2020 23:22:31

WCDMA (HSUPA) Mode, Left Band Edge



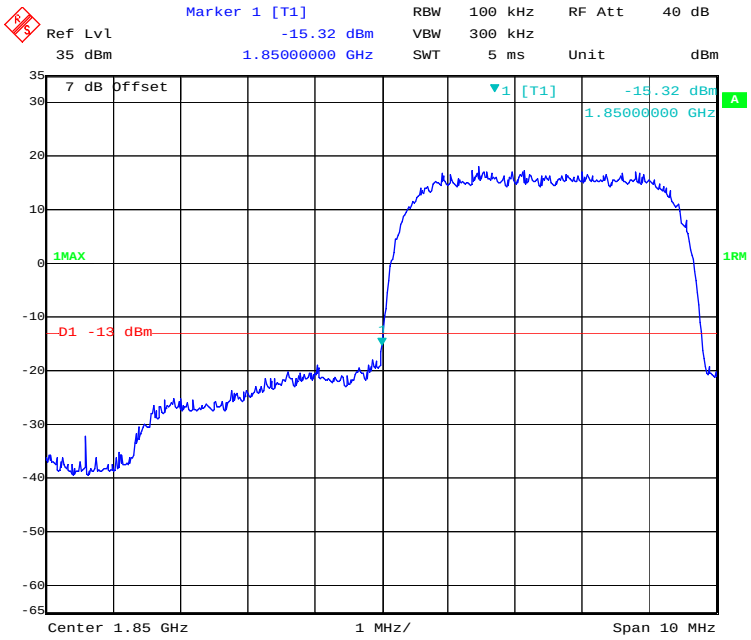
Date: 14.AUG.2020 23:19:42

WCDMA (HSUPA) Mode, Right Band Edge



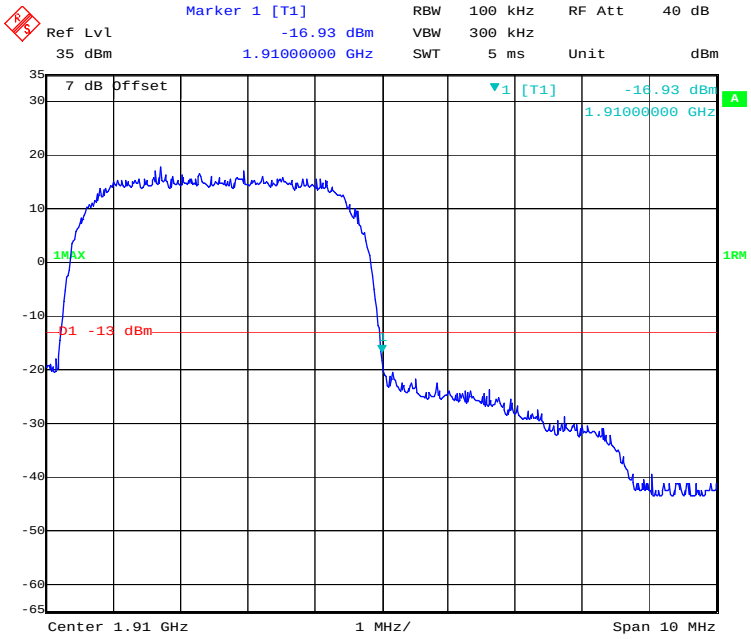
Date: 14.AUG.2020 23:23:10

WCDMA (HSPA+) Mode, Left Band Edge



Date: 14.AUG.2020 23:20:35

WCDMA (HSPA+) Mode, Right Band Edge



Date: 14.AUG.2020 23:24:11

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

Applicable Standards

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

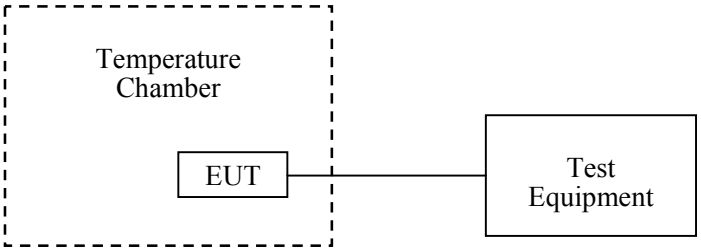
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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

Temperature:	25.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Jack Jiao on 2020-08-16.

EUT operation mode: Transmitting

Test Result: Compliant.

GSM 850 Band:

GPRS Mode, Middle Channel, f_o=836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	48	12	0.014344	2.5
-20		11	0.013148	2.5
-10		10	0.011953	2.5
0		9	0.010758	2.5
10		15	0.017930	2.5
20		13	0.015539	2.5
30		11	0.013148	2.5
40		12	0.014344	2.5
50		13	0.015539	2.5
20	V min.= 43.2	12	0.014344	2.5
20	V max.=52.8	10	0.011953	2.5

EGPRS Mode, Middle Channel, f_o=836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	48	12	0.014344	2.5
-20		11	0.013148	2.5
-10		11	0.013148	2.5
0		12	0.014344	2.5
10		15	0.017930	2.5
20		14	0.016734	2.5
30		12	0.014344	2.5
40		10	0.011953	2.5
50		11	0.013148	2.5
20	V min.= 43.2	13	0.015539	2.5
20	V max.=52.8	11	0.013148	2.5

WCDMA Band V:

Middle Channel, f_o = 836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	48	16	0.019125	2.5
-20		15	0.017930	2.5
-10		12	0.014344	2.5
0		9	0.010758	2.5
10		11	0.013148	2.5
20		12	0.014344	2.5
30		15	0.017930	2.5
40		12	0.014344	2.5
50		15	0.017930	2.5
20	V min.= 43.2	16	0.019125	2.5
20	V max.=52.8	11	0.013148	2.5

PCS 1900 Band:

GPRS Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	48	19	0.010106	pass
-20		11	0.005851	pass
-10		17	0.009043	pass
0		21	0.011170	pass
10		15	0.007979	pass
20		19	0.010106	pass
30		16	0.008511	pass
40		15	0.007979	pass
50		11	0.005851	pass
20	V min.= 43.2	15	0.007979	pass
20	V max.=52.8	21	0.011170	pass

EGPRS Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	48	12	0.006383	pass
-20		16	0.008511	pass
-10		13	0.006915	pass
0		14	0.007447	pass
10		13	0.006915	pass
20		11	0.005851	pass
30		14	0.007447	pass
40		13	0.006915	pass
50		11	0.005851	pass
20	V min.= 43.2	15	0.007979	pass
20	V max.=52.8	16	0.008511	pass

WCDMA Band II:

WCDMA Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	48	25	0.013298	pass
-20		14	0.007447	pass
-10		16	0.008511	pass
0		11	0.005851	pass
10		18	0.009574	pass
20		13	0.006915	pass
30		15	0.007979	pass
40		14	0.007447	pass
50		18	0.009574	pass
20	V min.= 43.2	14	0.007447	pass
20	V max.=52.8	16	0.008511	pass

Declarations

1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

5: This report cannot be reproduced except in full, without prior written approval of the Company.

6: This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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