TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 27

FCC PART 22H, PART 24E

TEST REPORT

For

BBPOS International Limited

Suite 1903-04, 19/F, Tower 2, Nina Tower, No.8 Yeung UK Road, Tsuen Wan, N.T. HK

FCC ID: 2AB7X-WISEPOSEPLUS

Report Type:	**Product Type:**
Original Report	WisePOS E+

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Report Number:	RKSA200519001-00B
Report Date:	2020-08-10
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	BBPOS International Limited
Tested Model:	WisePOS E+
Product Type:	WisePOS E+
Power Supply:	DC 7.4 V from Battery ; DC 5.0 V charging by adapter
RF Function:	GPRS/EGPRS, WCDMA, LTE
Operating Band/Frequency:	GPRS/EGPRS 850: 824-849 MHz(TX), 869-894 MHz(RX) PCS1900: 1850MHz-1910MHz(TX), 1930MHz-1990MHz(RX) WCDMA Band II: 1850-1910 MHz MHz(TX), 1930-1990 MHz(RX) WCDMA Band V: 824-849 MHz(TX), 869-894 MHz(RX) LTE Band 5: 824-849 MHz(TX), 869-894 MHz(RX) LTE Band 7: 2500-2570 MHz(TX), 2620-2690 MHz(RX) LTE Band 38: 2570-2620 MHz(TX), 2570-2620 MHz(RX) LTE Band 41: 2555-2655 MHz(TX), 2555-2655MHz(RX)
Modulation Type:	GPRS/EGPRS: GMSK/8PSK; WCDMA: BPSK,QPSK,16QAM LTE: QPSK,16QAM
Antenna Type:	FPC Antenna
Maximum Antenna Gain:	0.5dBi

**All measurement and test data in this report was gathered from production sample serial number: 20200519001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-05-19)*

Objective

This type approval report is prepared on behalf of *BBPOS International Limited* in accordance with Part 2, Part 22-Subpart H and Part 24-Subpart E , Part 27 of the Federal Communication Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submissions with FCC ID: 2AB7X-WISEPOSEPLUS
FCC Part 15.247 DTS submissions with FCC ID: 2AB7X-WISEPOSEPLUS
FCC Part 15.407 NII submissions with FCC ID: 2AB7X-WISEPOSEPLUS
FCC Part 15.225 DXX submissions with FCC ID: 2AB7X-WISEPOSEPLUS

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
Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA-603-E.

All radiated and conducted emissions measurements were performed at Bay Area Compliance 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 Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance 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 D01. 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 TIA-603-E.

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

Channel List

Mode		Channel		Frequency (MHz)
GPRS/EGPRS 850		Low	128	824.2
		Middle	190	836.6
		High	251	848.8
WCDMA Band V		Low	4132	826.4
		Middle	4183	836.6
		High	4233	846.6
GPRS/EGPRS 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
LTE Band 5	1.4M	Low	20407	824.7
		Middle	20525	836.5
		High	20643	848.3
	3M	Low	20415	825.5
		Middle	20525	836.5
		High	20635	847.5
	5M	Low	20425	826.5
		Middle	20525	836.5
		High	20625	846.5
	10M	Low	20450	829.0
		Middle	20525	836.5
		High	20600	844.0

Mode		Channel		Frequency (MHz)
LTE Band 7	5M	Low	20775	2502.5
		Middle	21100	2535.0
		High	21425	2567.5
	10M	Low	20800	2505.0
		Middle	21100	2535.0
		High	21400	2565.0
	15M	Low	20825	2507.5
		Middle	21100	2535.0
		High	21375	2562.5
	20M	Low	20850	2510.0
		Middle	21100	2535.0
		High	21350	2560.0
LTE Band 38	5M	Low	37775	2572.5
		Middle	38000	2595.0
		High	38225	2617.5
	10M	Low	37800	2575.0
		Middle	38000	2595.0
		High	38200	2615.0
	15M	Low	37825	2577.5
		Middle	38000	2595.0
		High	38175	2612.5
	20M	Low	37850	2580.0
		Middle	38000	2595.0
		High	38150	2610.0
LTE Band 41	5M	Low	40265	2557.5
		Middle	40740	2605.0
		High	41215	2652.5
	10M	Low	40290	2560.0
		Middle	40740	2605.0
		High	41190	2650.0
	15M	Low	40315	2562.5
		Middle	40740	2605.0
		High	41165	2647.5
	20M	Low	40340	2565.0
		Middle	40740	2605.0
		High	41140	2645.0

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

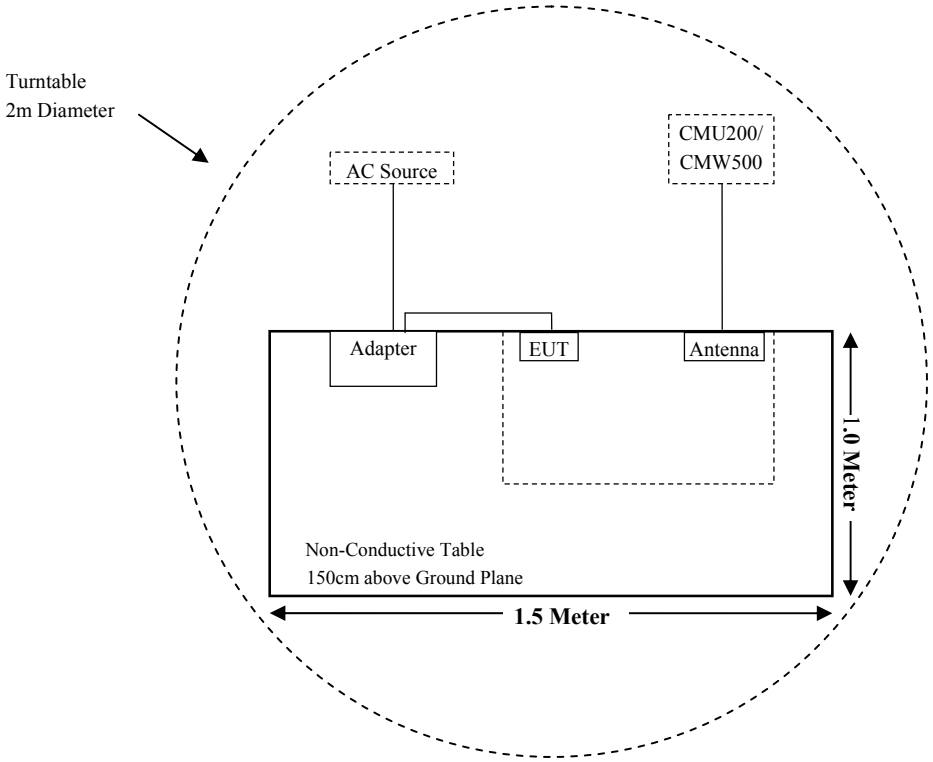
Manufacturer	Description	Model	Serial Number
Aihuaxin technology	Antenna	/	/
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478
SZTY	Adapter	TPA-46B050100UU	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
USB Cable	1.2	EUT	Adapter
Power Cable	1.0	Adapter	AC Source

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz & Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307(b)(1)& §2.1093	RF Exposure Information	Compliant
§2.1046; § 22.913 (a); § 24.232 (c); 27.50 h(2)	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(m)	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a) § 24.238 (a); §27.53 (m);	Spurious Radiated Emissions	Compliant
§ 22.917 (a); § 24.238 (a);	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（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	2017-08-04	2020-08-03
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2019-08-05	2020-08-04
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	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-10	2023-01-09
ETS-LINDGREN	Horn Antenna	3116	00084159	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	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2019-08-15	2020-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2019-08-05	2020-08-04

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
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2019-12-14	2020-12-13
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2020-04-01	2021-03-31
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2019-08-05	2020-08-04
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2020-08-05	2021-08-04
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
BBPOS International Limited	RF Cable	BBPOS International Limited C01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliance 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(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1307,§2.1093.

Test Result

Compliance, please refer to the SAR report: R2006155-SAR.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 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 h(2) - 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.

According to §27.50(h) (2), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

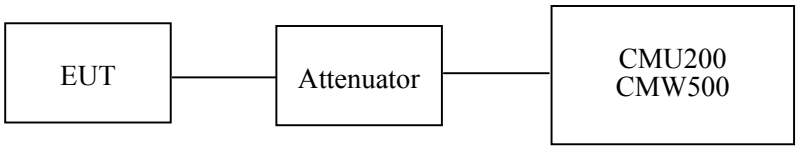
According to FCC §2.1046, The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw)

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

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.



Radiated Output Power:

The measurements procedures specified in TIA-603-E 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:	24.9 ℃
Relative Humidity:	53 %
ATM Pressure:	101.9 kPa

The testing was performed by Jack Jiao on 2020-06-16.

Conducted Power:

GPRS/EGPRS 850 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.20	33.86	33.31	32.45	32.12	38.45
	190	836.60	33.25	32.69	32.32	31.51	38.45
	251	848.80	33.51	33.32	33.11	32.76	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.20	26.42	26.14	25.21	25.63	38.45
	190	836.60	26.22	26.07	25.72	25.43	38.45
	251	848.80	26.32	26.03	25.73	25.42	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	22.87	22.59	22.87
		HSDPA	1	22.81	22.68	22.89
			2	22.76	22.66	22.89
			3	22.72	22.68	22.99
			4	22.77	22.68	23.03
		HSUPA	1	22.73	22.62	23.08
			2	22.83	22.54	23.03
			3	22.86	22.52	23.06
			4	22.97	22.48	23.08
			5	23.04	22.47	23.09
		HSPA+	1	23.05	22.42	23.23

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	31.59	29.84	29.04	28.59	33
	661	1880.0	30.83	29.24	28.55	28.16	33
	810	1909.8	31.25	29.58	28.87	28.54	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	24.69	23.92	23.43	22.84	33
	661	1880.0	25.56	24.62	23.76	23.23	33
	810	1909.8	25.73	25.23	24.54	24.21	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	22.76	22.68	22.75
		HSDPA	1	22.93	22.77	22.81
			2	22.87	22.80	22.77
			3	22.84	22.92	22.73
			4	22.88	23.01	22.78
		HSUPA	1	22.88	23.00	22.86
			2	22.93	23.04	22.96
			3	22.90	23.14	23.01
			4	22.87	23.17	23.10
			5	22.82	23.30	23.22
		HSPA+	1	22.77	23.36	23.28

Maximum Output Power:

LTE Band 5

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	1#0	21.85	21.89	21.87
		1#3	21.85	21.84	22.00
		1#5	21.88	21.83	21.98
		3#0	21.95	21.81	21.99
		3#1	21.91	21.83	21.97
		3#3	21.93	21.72	21.99
		6#0	21.93	21.68	22.08
	16-QAM	1#0	21.90	21.78	22.15
		1#3	21.84	21.85	22.16
		1#5	21.84	21.94	22.16
		3#0	21.81	22.07	22.10
		3#1	21.86	22.09	22.10
		3#3	21.82	22.17	22.06
		6#0	21.70	22.05	22.06
3M	QPSK	1#0	21.68	21.96	22.18
		1#7	21.63	22.00	22.24
		1#14	21.69	22.06	22.31
		8#0	21.73	21.99	22.26
		8#4	21.65	21.90	22.31
		8#7	21.65	21.97	22.21
		15#0	21.55	21.93	22.20
	16-QAM	1#0	21.52	21.96	22.21
		1#7	21.47	21.94	22.24
		1#14	21.57	22.07	22.25
		8#0	21.6	22.01	22.29
		8#4	21.54	22.08	22.31
		8#7	21.50	22.15	22.42
		15#0	21.37	22.09	22.36

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	21.36	21.99	22.36
		1#12	21.37	22.08	22.35
		1#24	21.37	22.02	22.34
		12#0	21.46	21.97	22.35
		12#6	21.43	21.97	22.29
		12#11	21.41	22.02	22.37
		25#0	21.36	22.04	22.46
	16-QAM	1#0	21.45	22.05	22.56
		1#12	21.55	22.06	22.51
		1#24	21.57	21.94	22.52
		12#0	21.48	22.06	22.60
		12#6	21.46	21.95	22.50
		12#11	21.35	22.06	22.49
		25#0	21.28	21.95	22.35
10M	QPSK	1#0	21.33	21.93	22.29
		1#24	21.35	21.92	22.35
		1#49	21.31	21.90	22.36
		25#0	21.31	21.90	22.28
		25#12	21.24	21.87	22.33
		25#24	21.32	21.85	22.27
		50#0	21.29	21.85	22.24
	16-QAM	1#0	21.27	21.73	22.12
		1#24	21.22	21.69	22.15
		1#49	21.18	21.67	22.08
		25#0	21.21	21.68	22.00
		25#12	21.21	21.68	21.91
		25#24	21.33	21.68	21.90
		50#0	21.30	21.70	21.95

LTE Band 7

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	21.31	21.29	21.43
		1#12	21.99	21.41	21.81
		1#24	21.84	21.27	21.05
		12#0	22.23	21.98	21.21
		12#6	21.69	21.91	21.26
		12#11	21.29	21.60	21.86
		25#0	21.99	21.37	21.32
	16-QAM	1#0	22.16	21.91	21.97
		1#12	22.00	21.54	21.60
		1#24	22.09	22.00	21.10
		12#0	21.64	21.99	21.86
		12#6	22.05	21.54	21.97
		12#11	22.00	22.08	21.05
		25#0	21.87	21.15	21.17
10M	QPSK	1#0	21.86	21.52	21.94
		1#24	21.93	21.98	21.56
		1#49	21.34	21.52	22.06
		25#0	21.17	22.13	22.06
		25#12	21.14	22.11	21.77
		25#24	21.42	21.87	22.12
		50#0	21.20	21.67	21.72
	16-QAM	1#0	22.01	21.20	21.96
		1#24	21.58	21.19	21.44
		1#49	21.22	21.92	21.49
		25#0	21.71	21.28	21.97
		25#12	21.72	21.80	21.71
		25#24	21.10	21.61	22.13
		50#0	21.76	21.91	21.48

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	21.30	21.93	21.24
		1#37	21.31	21.41	21.99
		1#74	21.35	21.63	21.74
		36#0	21.64	21.23	21.80
		36#17	21.10	21.23	22.01
		36#35	21.49	21.35	21.53
		75#0	21.58	21.83	21.28
	16-QAM	1#0	21.13	21.38	21.79
		1#37	20.89	21.38	21.90
		1#74	21.36	21.30	21.16
		36#0	21.34	21.41	21.96
		36#17	21.00	21.48	21.78
		36#35	21.58	21.07	21.78
		75#0	20.92	21.37	21.78
20M	QPSK	1#0	21.55	21.42	21.07
		1#49	21.71	21.57	21.64
		1#99	21.36	21.36	21.69
		50#0	21.40	21.84	20.83
		50#24	21.60	21.16	21.62
		50#49	20.94	21.32	21.01
		100#0	21.60	21.68	21.31
	16-QAM	1#0	21.29	21.20	20.83
		1#49	21.46	21.86	21.77
		1#99	21.70	21.69	20.91
		50#0	21.78	20.97	21.54
		50#24	21.38	21.83	21.69
		50#49	21.64	21.88	21.20
		100#0	21.15	21.76	21.08

LTE Band 38

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	21.96	22.00	21.07
		1#12	21.42	21.52	21.16
		1#24	21.56	21.75	21.49
		12#0	21.47	21.49	21.37
		12#6	22.25	21.24	21.71
		12#11	21.38	21.80	21.72
		25#0	22.20	21.70	21.15
	16-QAM	1#0	21.87	21.63	21.54
		1#12	21.90	21.43	21.95
		1#24	21.40	21.45	21.35
		12#0	21.69	21.27	21.11
		12#6	21.47	21.94	21.61
		12#11	21.67	21.33	21.06
		25#0	21.41	21.81	21.83
10M	QPSK	1#0	21.08	21.46	21.91
		1#24	21.95	21.67	21.60
		1#49	21.97	21.71	22.33
		25#0	21.61	21.78	22.10
		25#12	21.08	21.21	22.17
		25#24	21.60	21.17	21.39
		50#0	21.15	22.11	22.35
	16-QAM	1#0	21.21	21.28	21.38
		1#24	21.53	21.51	21.92
		1#49	21.90	22.11	21.72
		25#0	21.79	21.79	22.07
		25#12	21.57	21.76	21.95
		25#24	21.18	21.64	21.89
		50#0	21.59	22.14	22.29

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	20.94	21.24	21.37
		1#37	21.04	21.12	21.52
		1#74	20.97	21.57	21.73
		36#0	21.06	21.59	22.07
		36#17	21.04	21.25	21.26
		36#35	21.07	22.05	21.65
		75#0	21.71	21.77	21.64
	16-QAM	1#0	21.56	21.42	22.13
		1#37	21.33	21.49	21.71
		1#74	21.69	21.81	21.22
		36#0	20.95	21.82	21.28
		36#17	20.79	21.94	22.12
		36#35	20.92	21.71	22.01
		75#0	20.82	21.61	21.40
20M	QPSK	1#0	21.07	21.90	21.58
		1#49	20.88	21.47	21.61
		1#99	20.90	21.61	21.50
		50#0	20.99	21.83	21.07
		50#24	21.61	21.77	21.22
		50#49	21.36	21.86	21.50
		100#0	21.35	21.86	21.75
	16-QAM	1#0	21.67	21.37	21.67
		1#49	21.77	21.10	21.25
		1#99	21.34	21.62	21.32
		50#0	21.63	21.65	21.44
		50#24	20.99	21.52	21.71
		50#49	21.20	21.78	21.38
		100#0	21.83	21.76	21.46

LTE Band 41

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	1#0	21.53	22.05	21.95
		1#12	21.60	21.58	21.93
		1#24	21.48	21.51	21.13
		12#0	21.97	22.00	21.39
		12#6	22.05	21.95	21.88
		12#11	21.55	21.62	21.75
		25#0	22.20	21.85	21.53
	16-QAM	1#0	21.52	22.05	21.42
		1#12	22.22	22.10	21.41
		1#24	21.33	21.99	21.27
		12#0	22.12	21.51	21.39
		12#6	22.02	21.91	21.16
		12#11	21.95	21.38	21.38
		25#0	21.97	21.49	21.92
10M	QPSK	1#0	21.52	21.52	21.51
		1#24	21.57	21.90	22.05
		1#49	21.43	22.13	22.13
		25#0	21.57	22.07	21.87
		25#12	21.34	21.23	21.41
		25#24	21.92	21.72	21.55
		50#0	21.71	21.66	21.43
	16-QAM	1#0	21.31	21.61	21.61
		1#24	21.38	21.21	21.82
		1#49	21.15	21.17	22.19
		25#0	21.34	21.41	21.76
		25#12	21.97	22.07	21.45
		25#24	21.18	21.76	21.48
		50#0	21.47	21.23	22.27

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15M	QPSK	1#0	21.33	21.97	21.42
		1#37	21.39	21.74	21.61
		1#74	21.00	21.44	22.08
		36#0	21.20	21.83	21.63
		36#17	21.15	21.86	21.28
		36#35	21.45	21.73	22.11
		75#0	21.52	21.93	21.86
	16-QAM	1#0	21.19	22.04	21.20
		1#37	21.11	21.54	22.01
		1#74	21.08	21.76	21.75
		36#0	20.81	21.23	21.99
		36#17	21.17	21.29	21.40
		36#35	21.24	21.85	21.46
		75#0	21.61	21.39	21.99
20M	QPSK	1#0	21.35	20.95	21.63
		1#49	21.20	21.13	21.12
		1#99	21.49	20.99	21.38
		50#0	21.27	21.04	21.73
		50#24	21.50	21.64	21.38
		50#49	21.83	21.37	21.71
		100#0	21.74	21.00	21.52
	16-QAM	1#0	21.65	21.87	21.40
		1#49	21.38	21.00	21.75
		1#99	21.72	21.01	21.00
		50#0	21.45	21.52	21.57
		50#24	21.79	21.90	21.20
		50#49	20.91	21.89	21.30
		100#0	21.29	21.90	21.07

Peak-to-average ratio (PAR):

GPRS/ EGPRS 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

WCDMA Band V

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	2.19	≤ 13
	Middle	2.19	≤ 13
	High	2.01	≤ 13
WCDMA (HSDPA)	Low	1.96	≤ 13
	Middle	2.23	≤ 13
	High	2.12	≤ 13
WCDMA (HSUPA)	Low	2.07	≤ 13
	Middle	2.17	≤ 13
	High	1.94	≤ 13
WCDMA (HSPA+)	Low	1.96	≤ 13
	Middle	2.07	≤ 13
	High	2.17	≤ 13

PCS 1900

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.05	13
	Middle	2.21	13
	High	2.04	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.16	13
	Middle	2.19	13
	High	2.19	13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (Rel99)	Low	2.14	≤ 13
	Middle	1.99	≤ 13
	High	2.19	≤ 13
WCDMA (HSDPA)	Low	2.11	≤ 13
	Middle	2.06	≤ 13
	High	2.04	≤ 13
WCDMA (HSUPA)	Low	2.17	≤ 13
	Middle	1.96	≤ 13
	High	2.12	≤ 13
WCDMA (HSPA+)	Low	1.99	≤ 13
	Middle	2.02	≤ 13
	High	2.05	≤ 13

LTE Band 5

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	10M	3.13	3.18	3.13	≤ 13
	50 RB		5.16	5.15	5.18	≤ 13
16-QAM	1 RB	10M	4.18	4.03	4.19	≤ 13
	50 RB		6.19	6.15	6.10	≤ 13

LTE Band 7

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.01	3.02	3.02	≤ 13
	100 RB		5.11	5.07	5.01	≤ 13
16-QAM	1 RB	20M	4.14	4.11	4.16	≤ 13
	100 RB		6.13	6.13	6.19	≤ 13

LTE Band 38

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.12	3.11	3.04	≤ 13
	100 RB		5.07	5.18	5.15	≤ 13
16-QAM	1 RB	20M	4.17	4.12	4.11	≤ 13
	100 RB		6.08	6.19	6.12	≤ 13

LTE Band 41

Test Modulation		Test Bandwidth	Low Channel (dB)	Middle Channel (dB)	High Channel (dB)	Limit(dB)
QPSK	1 RB	20M	3.11	3.20	3.07	≤ 13
	100 RB		5.03	5.14	5.19	≤ 13
16-QAM	1 RB	20M	4.10	4.06	4.11	≤ 13
	100 RB		6.18	6.16	6.20	≤ 13

Radiated Power:

GPRS/EGPRS 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, Middle Channel (ERP)										
836.6	99.25	295	100	H	34.39	0.63	-1.14	32.62	38.45	5.83
836.6	97.51	299	150	V	32.65	0.63	-1.14	30.88	38.45	7.57
EGPRS 850, Middle Channel (ERP)										
836.6	95.16	70	150	H	30.30	0.63	-1.14	28.53	38.45	9.92
836.6	92.84	29	100	V	27.98	0.63	-1.14	26.21	38.45	12.24
PCS 1900, Middle Channel (EIRP)										
1880.0	90.11	327	150	H	19.98	0.85	8.81	27.94	33.00	5.06
1880.0	88.54	290	100	V	18.41	0.85	8.81	26.37	33.00	6.63
EGPRS 1900, Middle Channel (EIRP)										
1880.0	87.59	73	150	H	17.46	0.85	8.81	25.42	33.00	7.58
1880.0	85.46	4	100	V	15.33	0.85	8.81	23.29	33.00	9.71

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, Middle Channel(ERP)										
836.6	90.25	207	200	H	25.39	0.63	-1.14	23.62	38.45	14.83
836.6	87.42	59	150	V	22.56	0.63	-1.14	20.79	38.45	17.66
WCDMA Band II, Middle Channel(EIRP)										
1880.0	86.15	286	200	H	16.02	0.85	8.81	23.98	33.00	9.02
1880.0	84.82	46	150	V	14.69	0.85	8.81	22.65	33.00	10.35

ERP:

LTE Band 5

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4M BW Middle Channel								
836.5	H	88.67	24.8	0.63	-1.14	23.03	38.45	15.42
836.5	V	87.97	24.1	0.63	-1.14	22.33	38.45	16.12
16-QAM 1.4M BW Middle Channel								
836.5	H	88.45	24.58	0.63	-1.14	22.81	38.45	15.64
836.5	V	87.34	23.47	0.63	-1.14	21.70	38.45	16.75
QPSK 3M BW Middle Channel								
836.5	H	88.59	24.72	0.63	-1.14	22.95	38.45	15.50
836.5	V	87.15	23.28	0.63	-1.14	21.51	38.45	16.94
16-QAM 3M BW Middle Channel								
836.5	H	88.34	24.47	0.63	-1.14	22.70	38.45	15.75
836.5	V	87.64	23.77	0.63	-1.14	22.00	38.45	16.45
QPSK 5M BW Middle Channel								
836.5	H	88.65	24.78	0.63	-1.14	23.01	38.45	15.44
836.5	V	87.15	23.28	0.63	-1.14	21.51	38.45	16.94
16-QAM 5M BW Middle Channel								
836.5	H	88.63	24.76	0.63	-1.14	22.99	38.45	15.46
836.5	V	87.66	23.79	0.63	-1.14	22.02	38.45	16.43
QPSK 10M BW Middle Channel								
836.5	H	88.44	24.57	0.63	-1.14	22.80	38.45	15.65
836.5	V	87.21	23.34	0.63	-1.14	21.57	38.45	16.88
16-QAM 10M BW Middle Channel								
836.5	H	87.25	23.38	0.63	-1.14	21.61	38.45	16.84
836.5	V	86.69	22.82	0.63	-1.14	21.05	38.45	17.40

EIRP:

LTE band 7

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5M BW Middle Channel								
2535.00	H	87.52	11.63	0.89	10.05	20.79	33.00	12.21
2535.00	V	87.33	11.44	0.89	10.05	20.60	33.00	12.40
16-QAM 5M BW Middle Channel								
2535.00	H	88.20	12.31	0.89	10.05	21.47	33.00	11.53
2535.00	V	87.20	11.31	0.89	10.05	20.47	33.00	12.53
QPSK 10M BW Middle Channel								
2535.00	H	88.07	12.18	0.89	10.05	21.34	33.00	11.66
2535.00	V	87.65	11.76	0.89	10.05	20.92	33.00	12.08
16-QAM 10M BW Middle Channel								
2535.00	H	88.95	13.06	0.89	10.05	22.22	33.00	10.78
2535.00	V	87.60	11.71	0.89	10.05	20.87	33.00	12.13
QPSK 15M BW Middle Channel								
2535.00	H	88.77	12.88	0.89	10.05	22.04	33.00	10.96
2535.00	V	87.06	11.17	0.89	10.05	20.33	33.00	12.67
16-QAM 15M BW Middle Channel								
2535.00	H	88.76	12.87	0.89	10.05	22.03	33.00	10.97
2535.00	V	87.33	11.44	0.89	10.05	20.60	33.00	12.40
QPSK 20M BW Middle Channel								
2535.00	H	88.50	12.61	0.89	10.05	21.77	33.00	11.23
2535.00	V	87.22	11.33	0.89	10.05	20.49	33.00	12.51
16-QAM 20M BW Middle Channel								
2535.00	H	88.10	12.21	0.89	10.05	21.37	33.00	11.63
2535.00	V	87.66	11.77	0.89	10.05	20.93	33.00	12.07

LTE band 38

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5M BW Middle Channel								
2595.00	H	85.67	11.78	0.9	9.97	20.85	33.00	12.15
2595.00	V	84.35	10.46	0.9	9.97	19.53	33.00	13.47
16-QAM 5M BW Middle Channel								
2595.00	H	85.66	11.77	0.9	9.97	20.84	33.00	12.16
2595.00	V	84.91	11.02	0.9	9.97	20.09	33.00	12.91
QPSK 10M BW Middle Channel								
2595.00	H	85.19	11.30	0.9	9.97	20.37	33.00	12.63
2595.00	V	84.54	10.65	0.9	9.97	19.72	33.00	13.28
16-QAM 10M BW Middle Channel								
2595.00	H	85.39	11.50	0.9	9.97	20.57	33.00	12.43
2595.00	V	84.67	10.78	0.9	9.97	19.85	33.00	13.15
QPSK 15M BW Middle Channel								
2595.00	H	85.08	11.19	0.9	9.97	20.26	33.00	12.74
2595.00	V	84.79	10.90	0.9	9.97	19.97	33.00	13.03
16-QAM 15M BW Middle Channel								
2595.00	H	85.97	12.08	0.9	9.97	21.15	33.00	11.85
2595.00	V	84.74	10.85	0.9	9.97	19.92	33.00	13.08
QPSK 20M BW Middle Channel								
2595.00	H	85.32	11.43	0.9	9.97	20.50	33.00	12.50
2595.00	V	84.92	11.03	0.9	9.97	20.10	33.00	12.90
16-QAM 20M BW Middle Channel								
2595.00	H	85.50	11.61	0.9	9.97	20.68	33.00	12.32
2595.00	V	84.71	10.82	0.9	9.97	19.89	33.00	13.11

LTE Band 41

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5M BW Middle Channel								
2605.00	H	85.36	12.37	0.9	9.95	21.42	33.00	11.58
2605.00	V	84.61	11.62	0.9	9.95	20.67	33.00	12.33
16-QAM 5M BW Middle Channel								
2605.00	H	85.31	12.32	0.9	9.95	21.37	33.00	11.63
2605.00	V	84.13	11.14	0.9	9.95	20.19	33.00	12.81
QPSK 10M BW Middle Channel								
2605.00	H	85.40	12.41	0.9	9.95	21.46	33.00	11.54
2605.00	V	84.96	11.97	0.9	9.95	21.02	33.00	11.98
16-QAM 10M BW Middle Channel								
2605.00	H	85.39	12.40	0.9	9.95	21.45	33.00	11.55
2605.00	V	84.93	11.94	0.9	9.95	20.99	33.00	12.01
QPSK 15M BW Middle Channel								
2605.00	H	85.86	12.87	0.9	9.95	21.92	33.00	11.08
2605.00	V	84.84	11.85	0.9	9.95	20.90	33.00	12.10
16-QAM 15M BW Middle Channel								
2605.00	H	85.18	12.19	0.9	9.95	21.24	33.00	11.76
2605.00	V	84.45	11.46	0.9	9.95	20.51	33.00	12.49
QPSK 20M BW Middle Channel								
2605.00	H	85.37	12.38	0.9	9.95	21.43	33.00	11.57
2605.00	V	84.53	11.54	0.9	9.95	20.59	33.00	12.41
16-QAM 20M BW Middle Channel								
2605.00	H	85.02	12.03	0.9	9.95	21.08	33.00	11.92
2605.00	V	84.85	11.86	0.9	9.95	20.91	33.00	12.09

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, §27.53- OCCUPIED BANDWIDTH

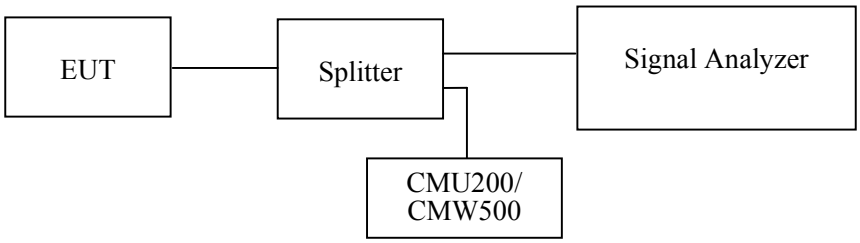
Applicable Standards

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 5 kHz (Cellular /PCS) & 100 kHz (WCDMA) & 20 kHz/30 kHz/50 kHz/100 kHz/200 kHz (LTE), and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	24.9~25.3 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.7~102.9 kPa

The testing was performed by Jack Jiao from 2020-06-06 to 2020-08-10.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GSM (GMSK)	836.6	0.321	0.246
EGPRS (8PSK)	836.6	0.321	0.244

WCDMA Band V

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (Rel 99)	836.6	4.729	4.148
WCDMA (HSDPA)	836.6	4.729	4.148
WCDMA (HSUPA)	836.6	4.770	4.148
WCDMA (HSPA+)	836.6	4.729	4.148

PCS 1900

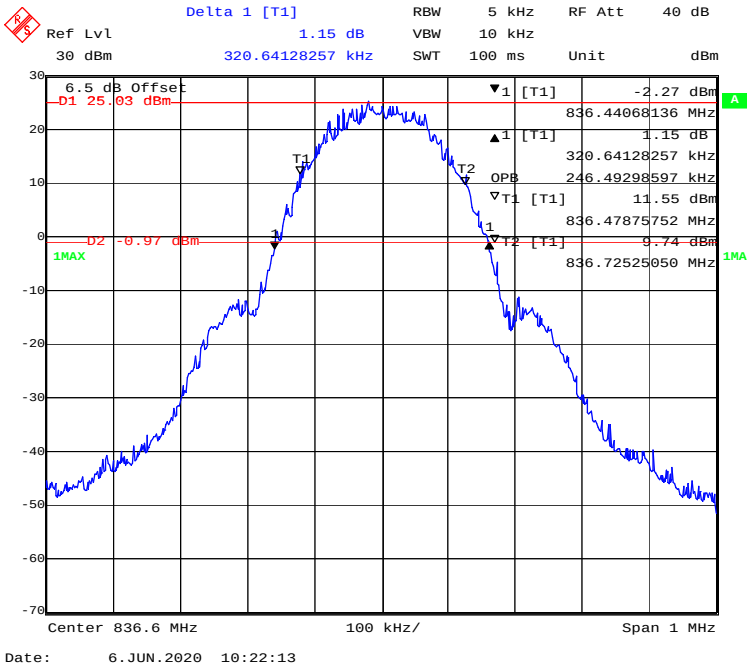
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GPRS (GMSK)	1880	0.321	0.244
EGPRS (8PSK)	1880	0.317	0.248

WCDMA Band II

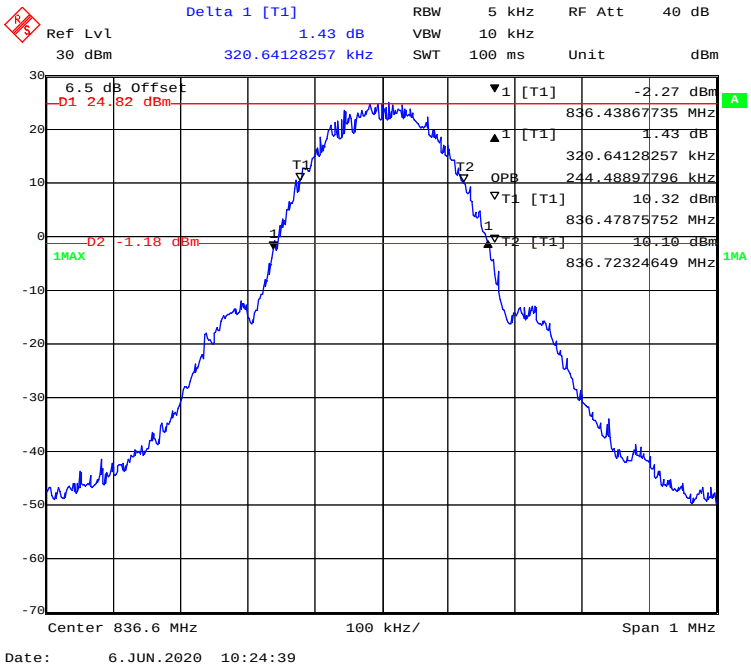
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (Rel 99)	1880	4.749	4.168
WCDMA (HSDPA)	1880	4.770	4.168
WCDMA (HSUPA)	1880	4.770	4.168
WCDMA (HSPA+)	1880	4.770	4.168

GSM 850 Band

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

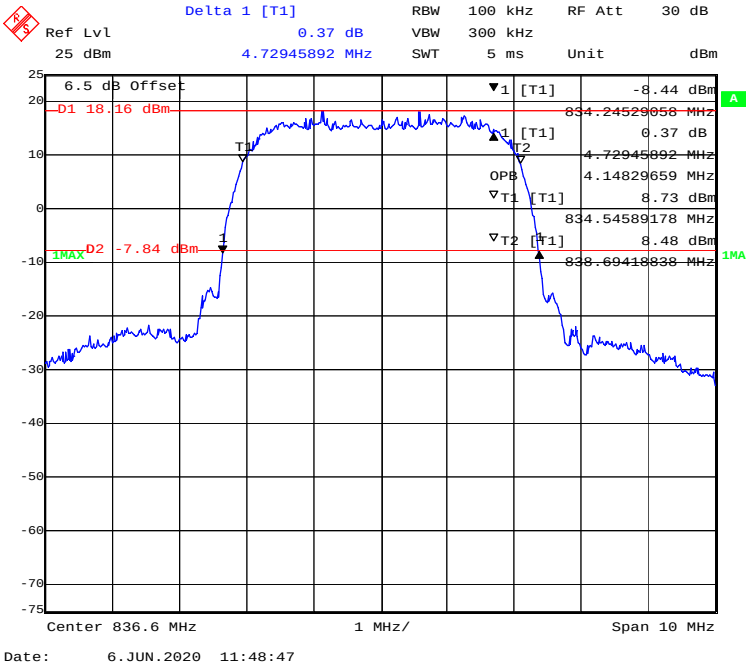


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (GMSK) Mode

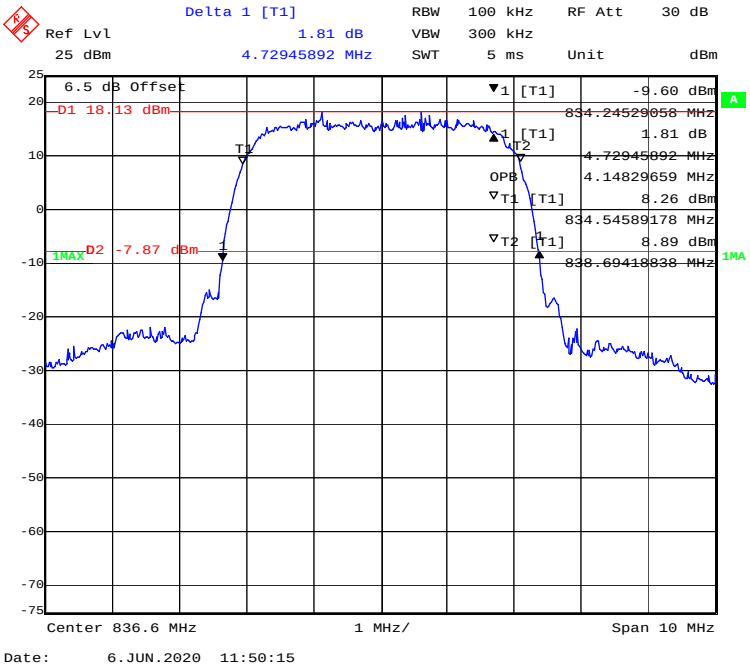


WCDMA Band V

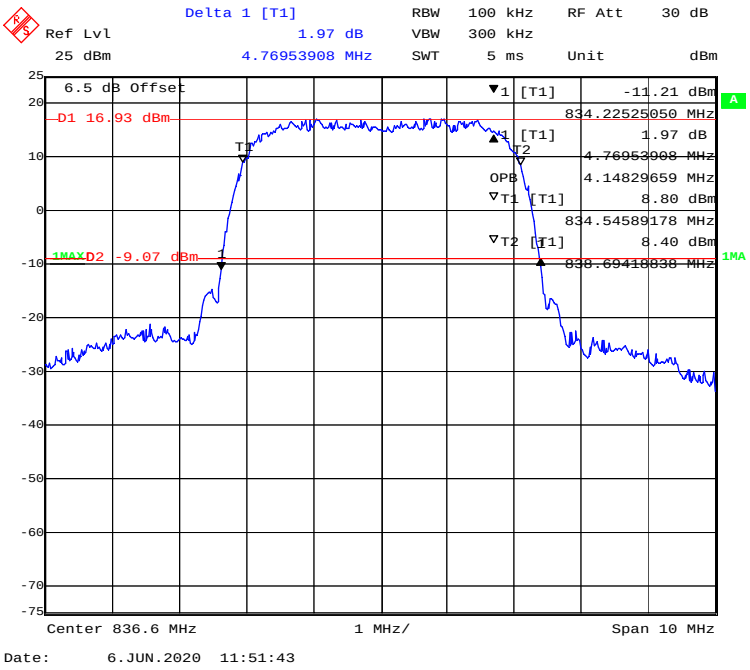
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



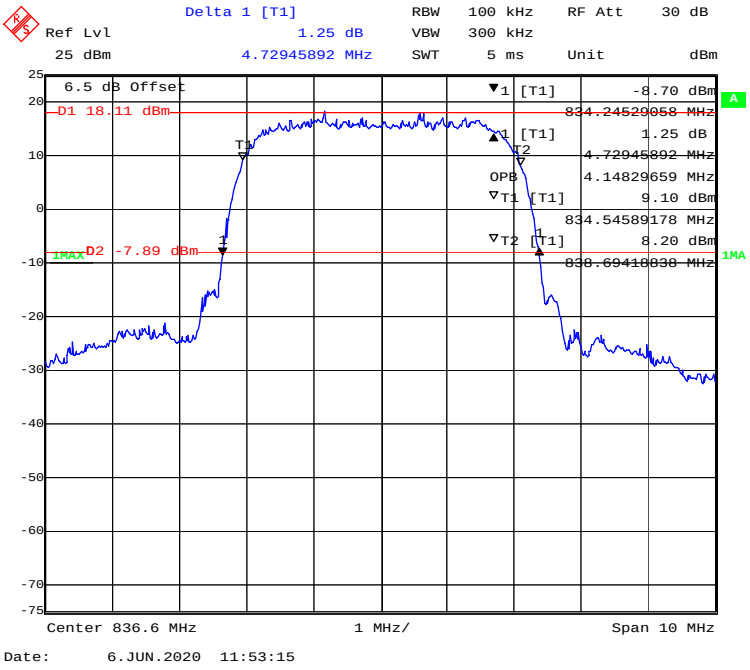
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



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

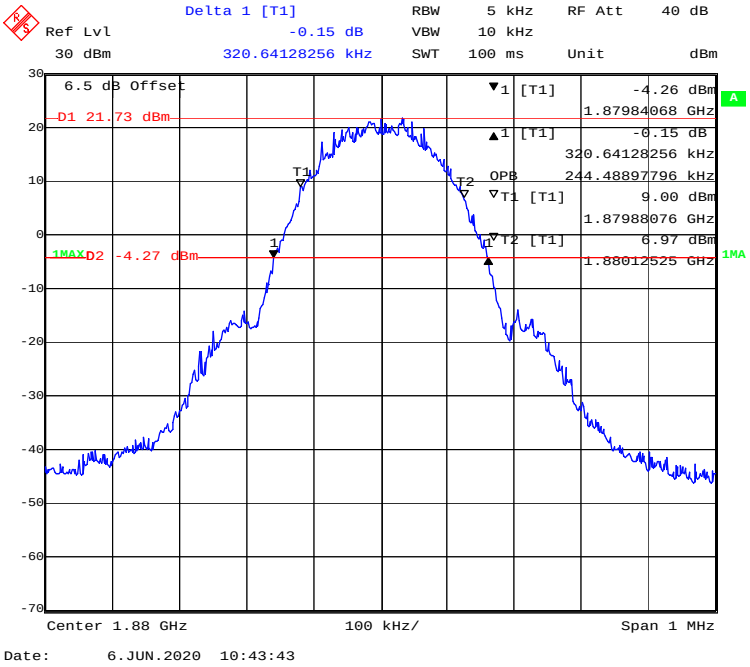


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode

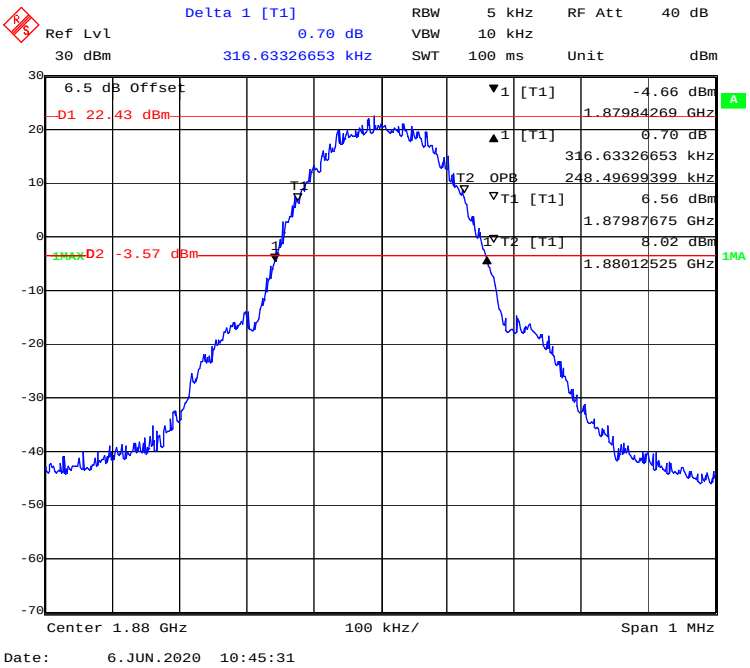


PCS 1900 Band

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

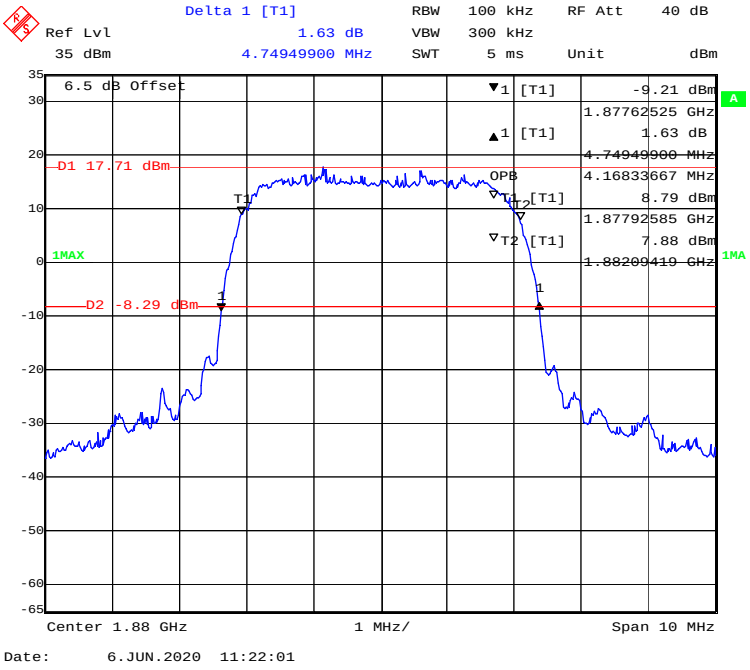


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (8PSK) Mode

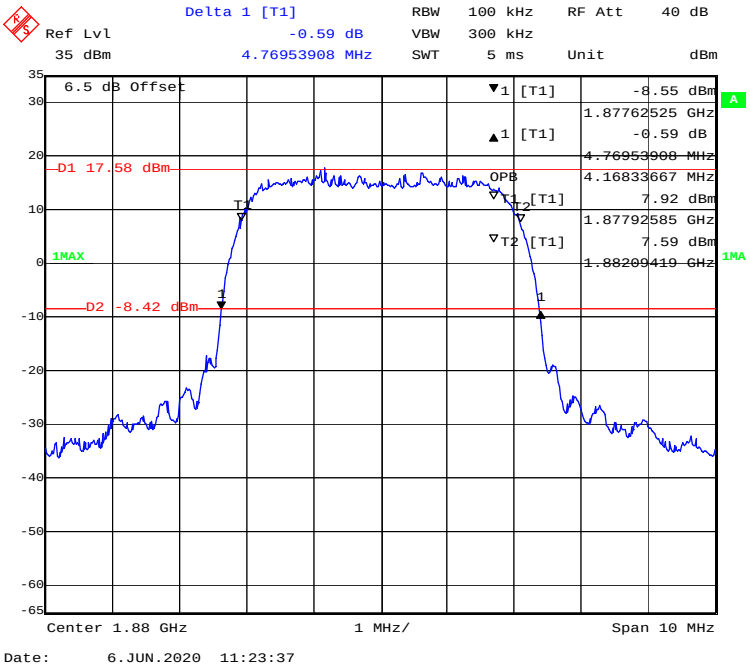


WCDMA Band II

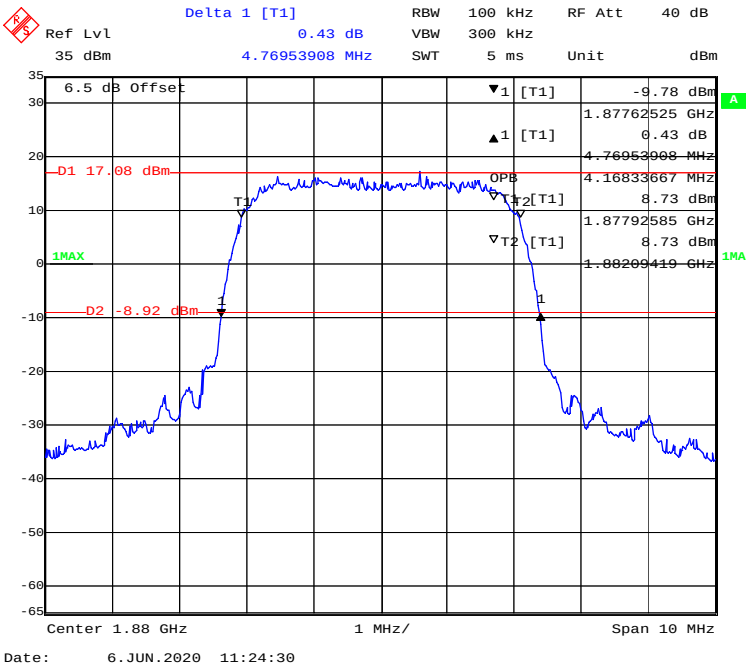
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



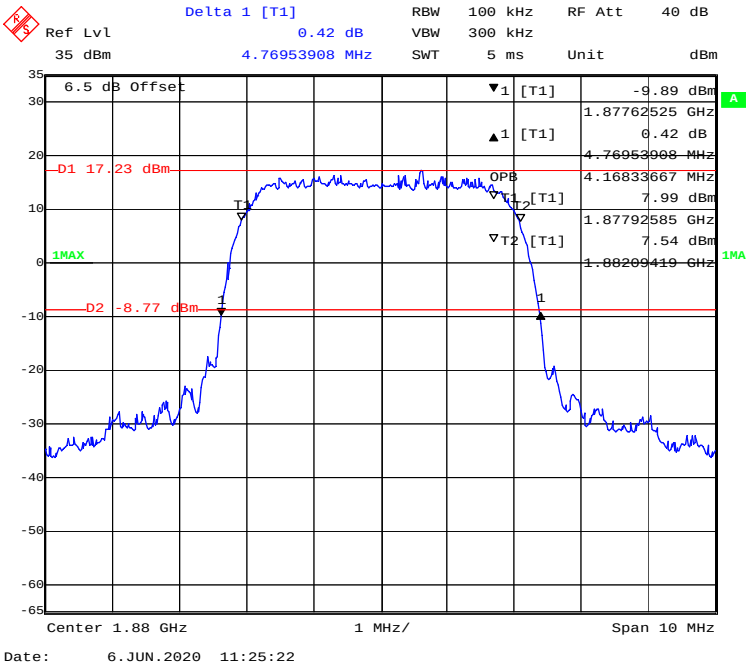
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



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



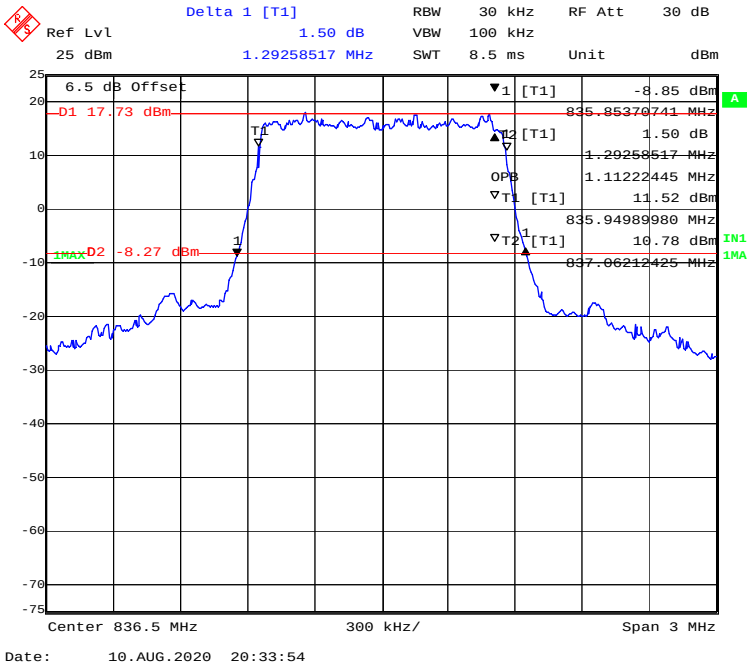
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode



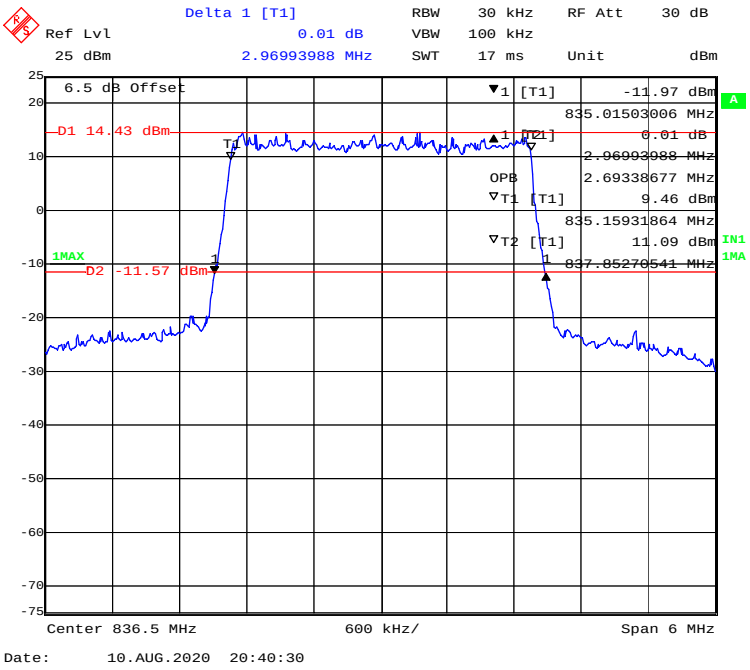
LTE Band 5:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	1.4M	Middle	1.293	1.112
	3M		2.970	2.693
	5M		5.070	4.549
	10M		9.900	8.978
16-QAM	1.4M	Middle	1.305	1.118
	3M		2.958	2.705
	5M		5.070	4.549
	10M		9.860	8.978

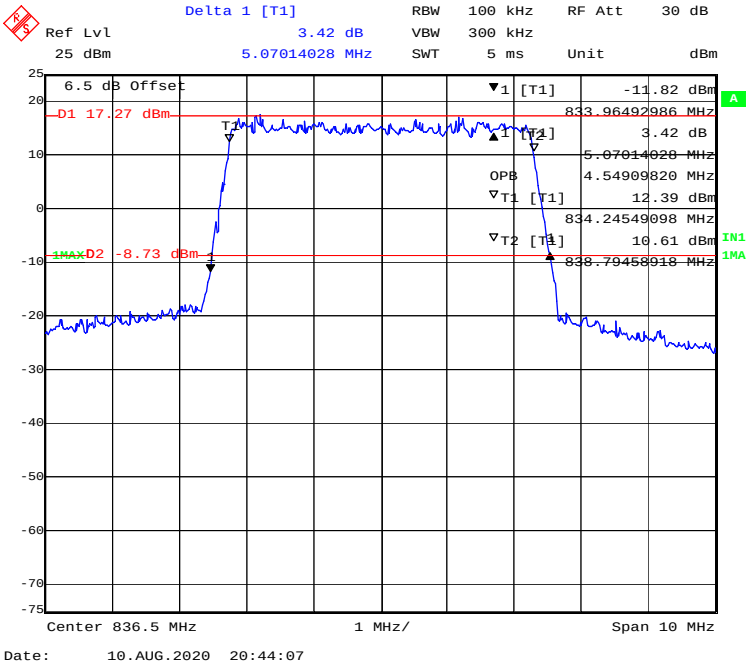
QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



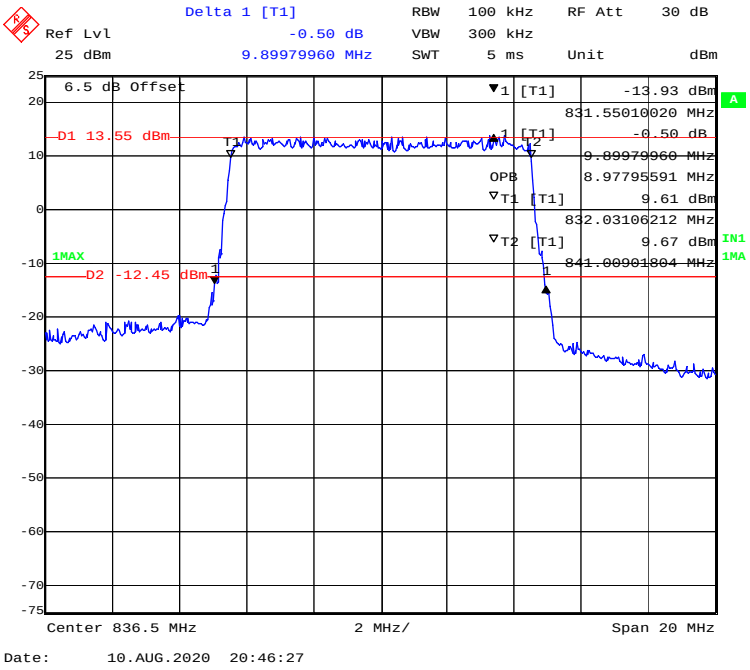
QPSK (3.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



QPSK (5.0MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

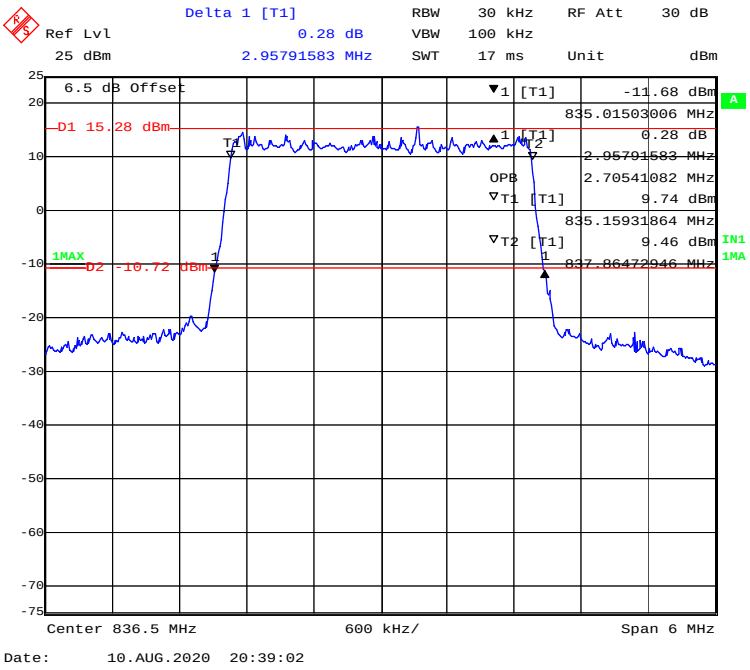


QPSK (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

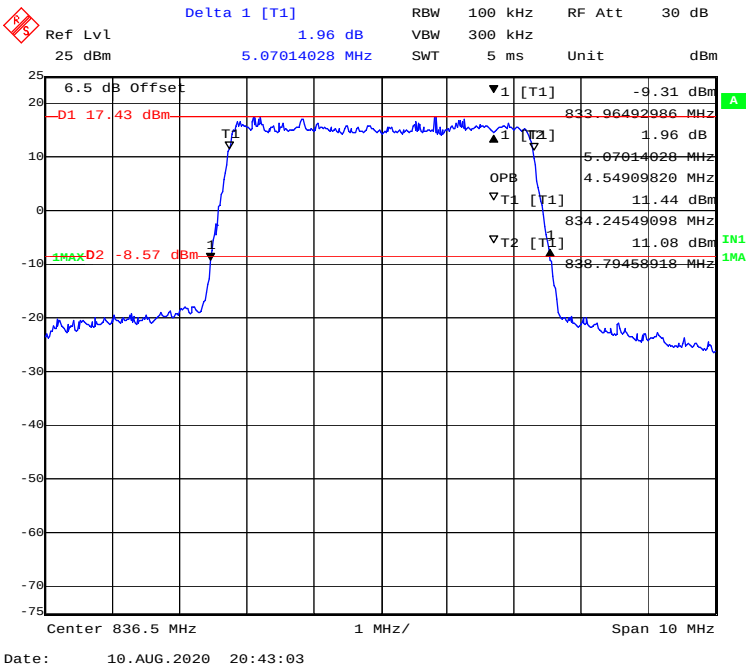


16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

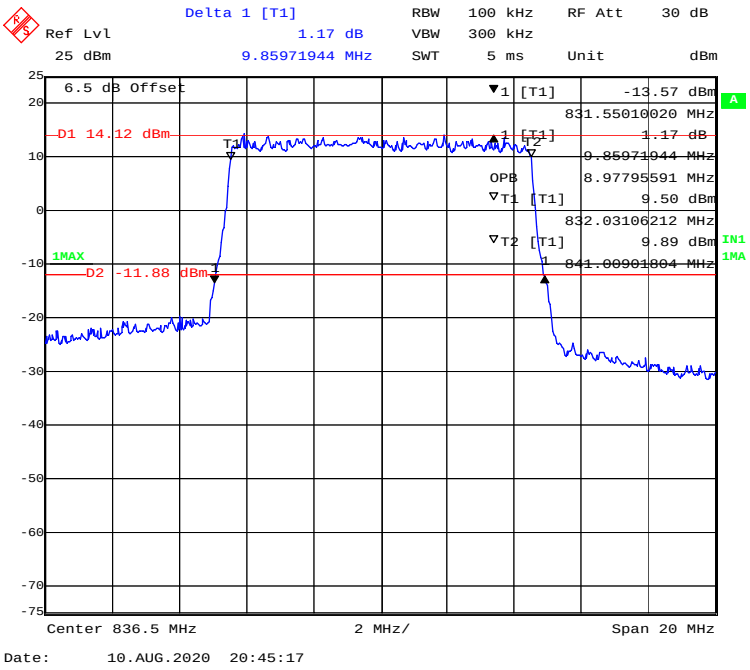
16-QAM (3.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



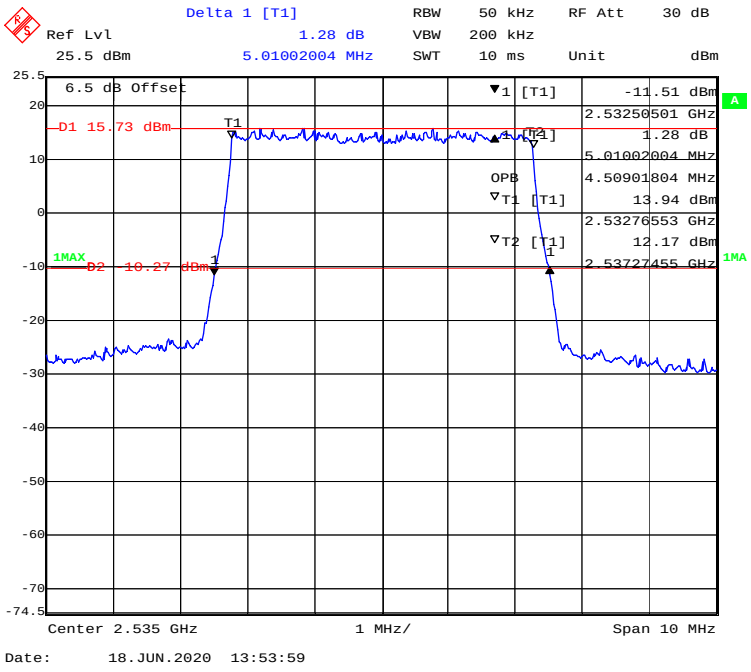
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



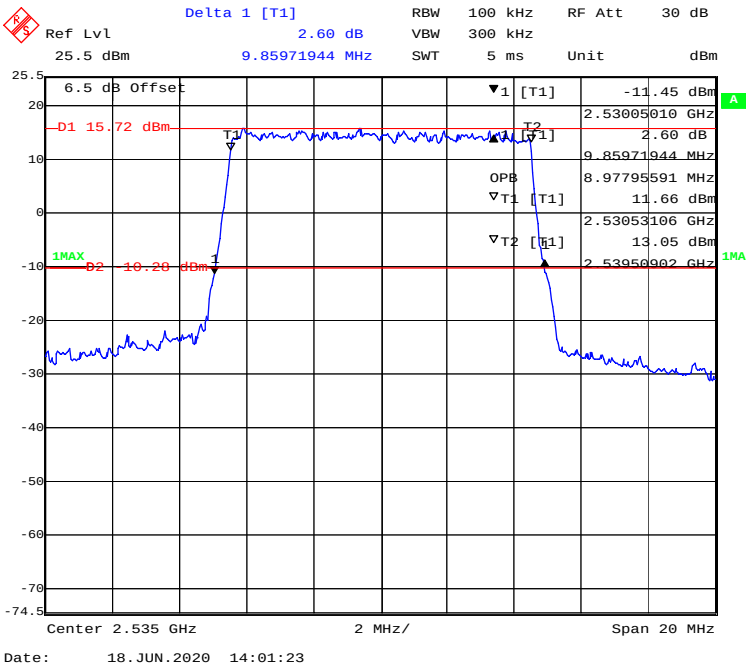
LTE Band 7:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	5.010	4.509
	10M		9.860	8.978
	15M		15.03	13.527
	20M		19.399	17.876
16-QAM	5M	Middle	4.970	4.509
	10M		9.900	8.978
	15M		14.970	13.527
	20M		19.479	17.956

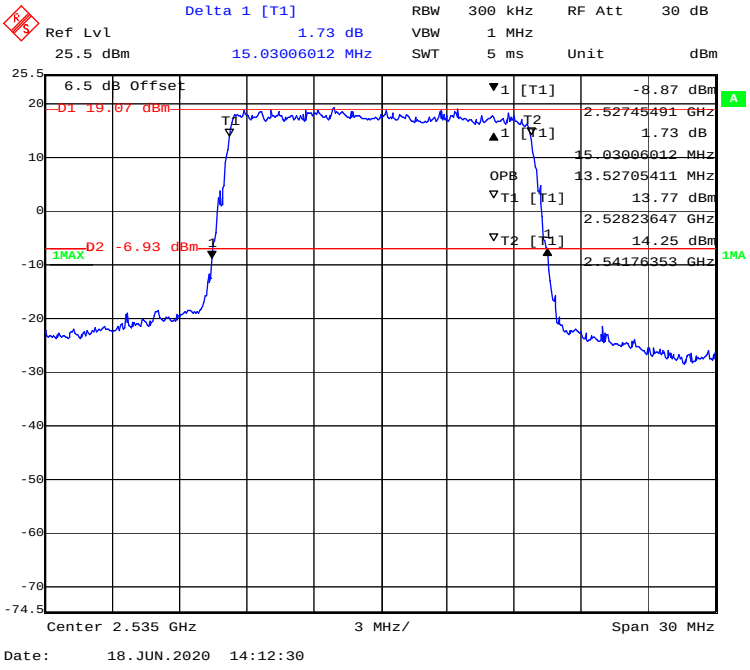
QPSK (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



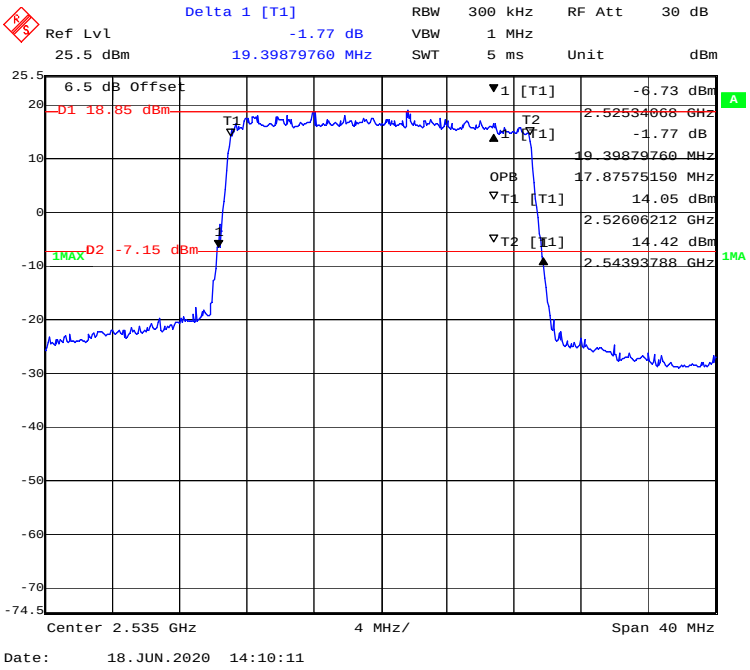
QPSK (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



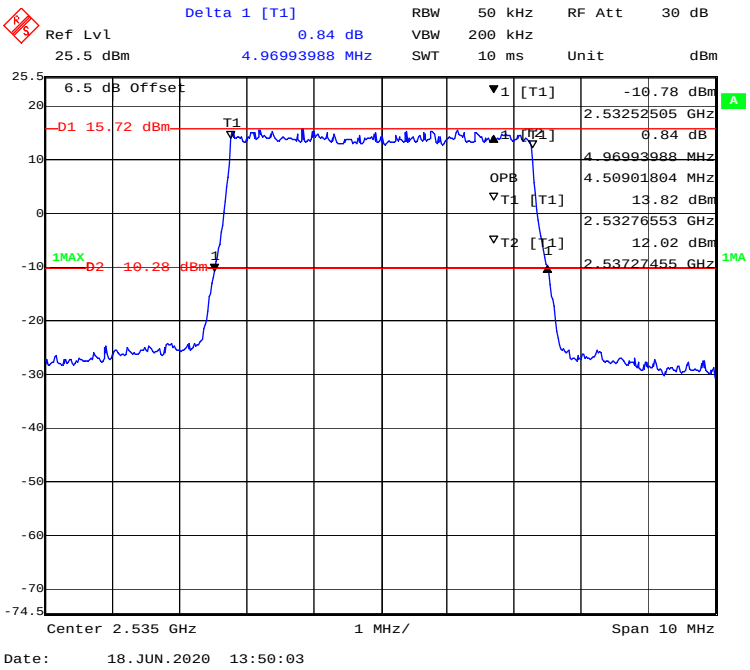
QPSK (15.0MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



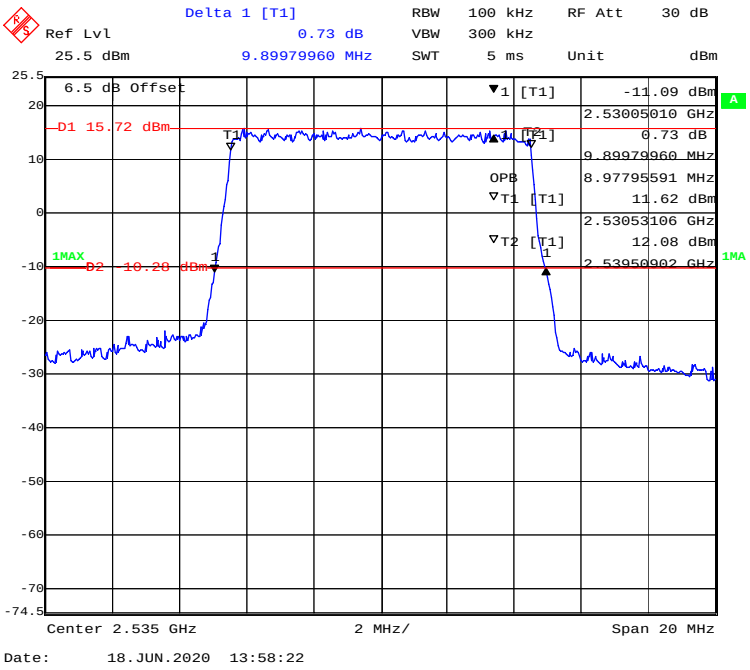
QPSK (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



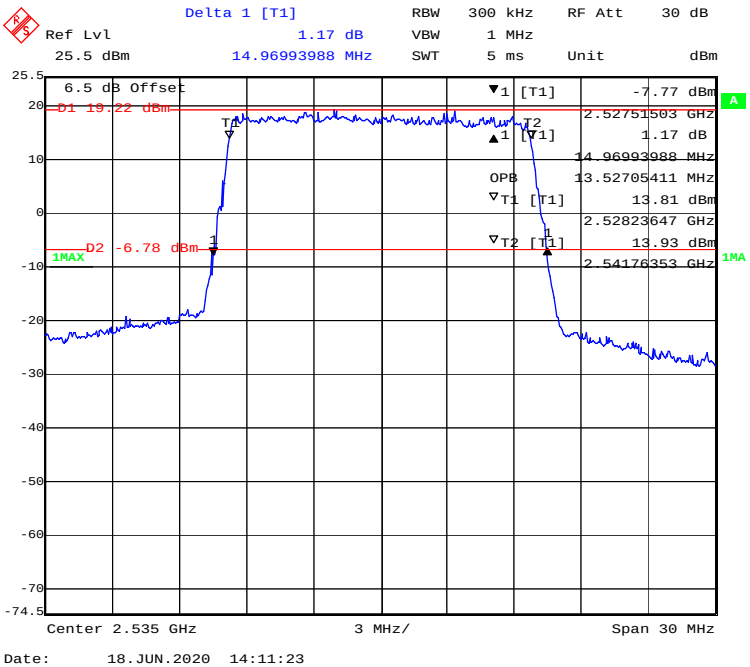
16-QAM (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



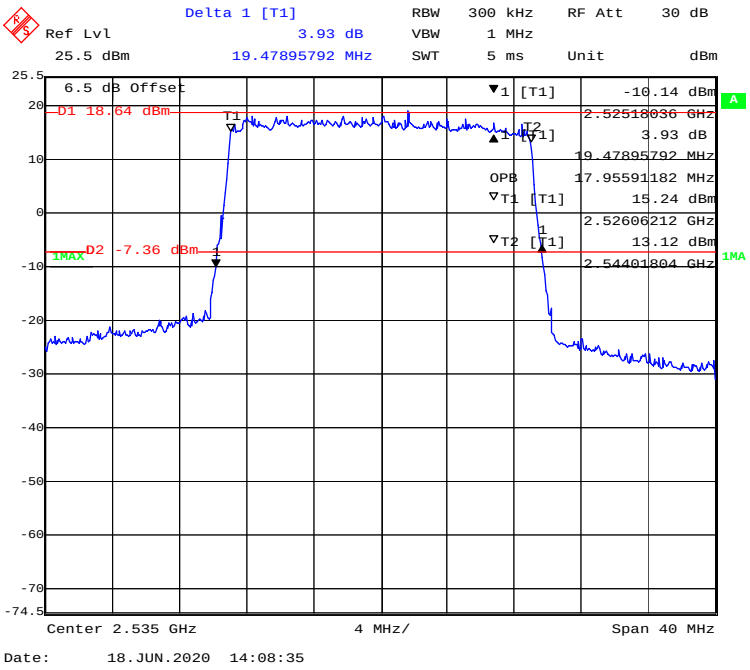
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (15.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



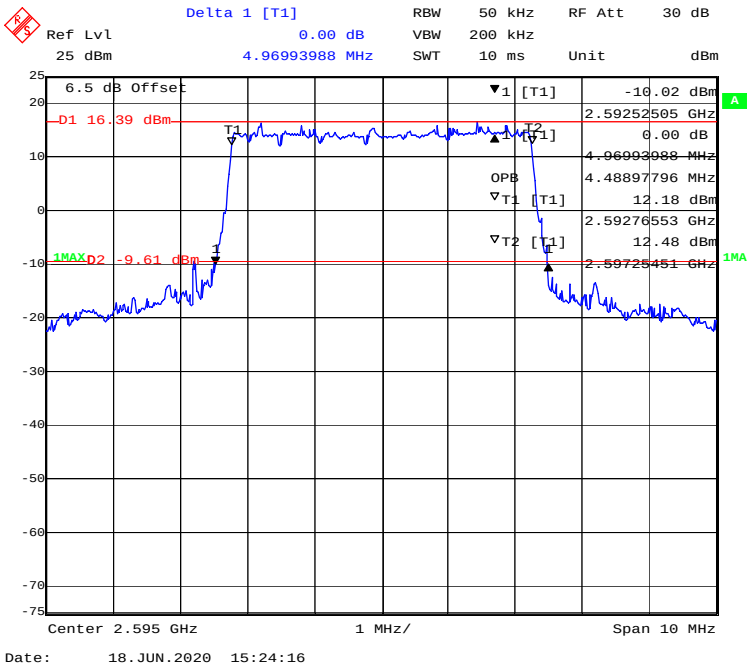
16-QAM (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



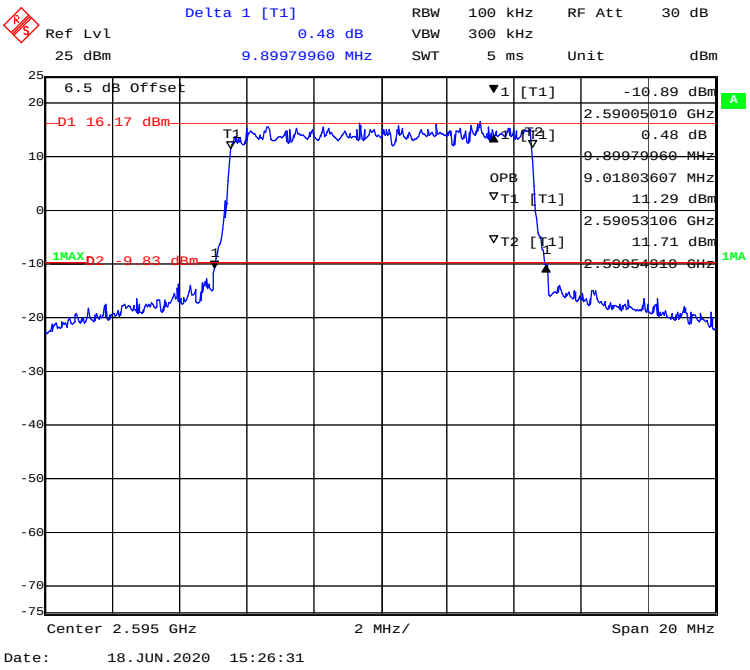
LTE Band 38:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	4.970	4.489
	10M		9.900	9.018
	15M		17.796	13.647
	20M		19.559	18.036
16-QAM	5M	Middle	5.030	4.509
	10M		9.860	8.978
	15M		17.435	13.647
	20M		19.479	17.956

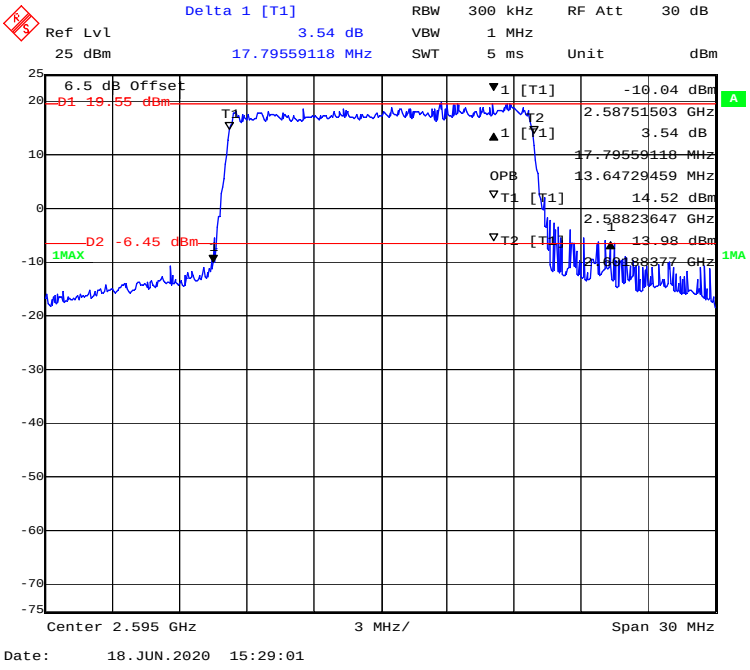
QPSK (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



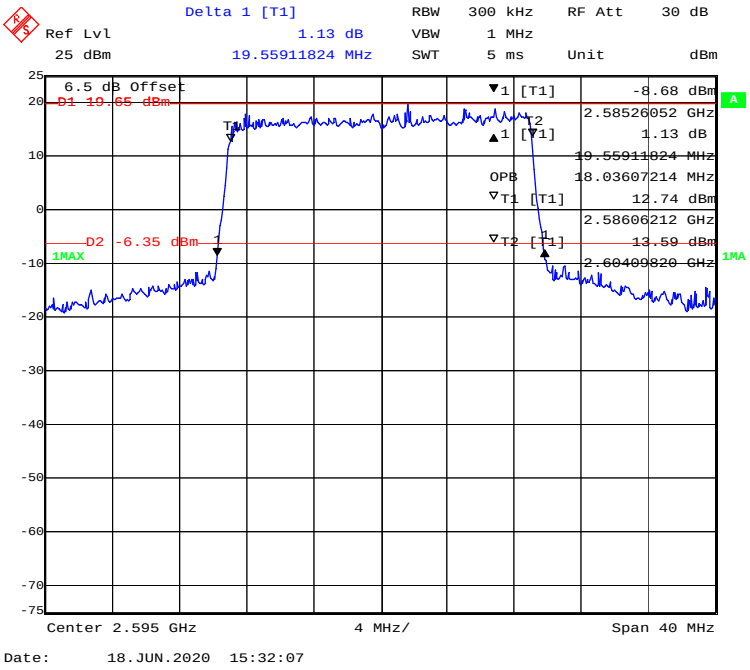
QPSK (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



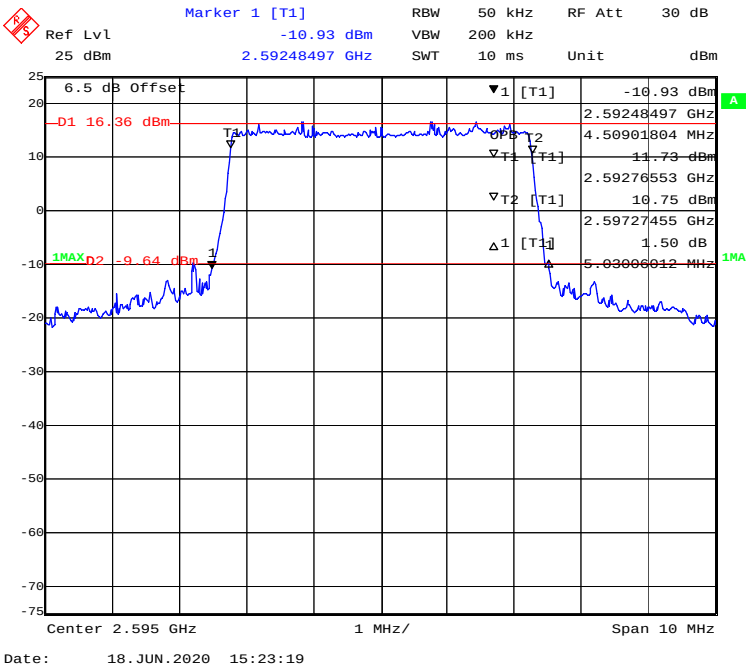
QPSK (15.0MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



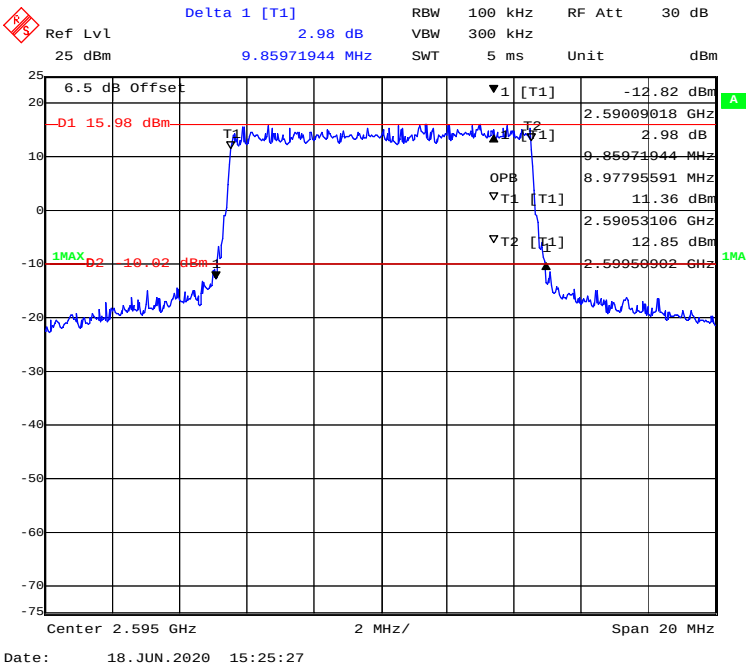
QPSK (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



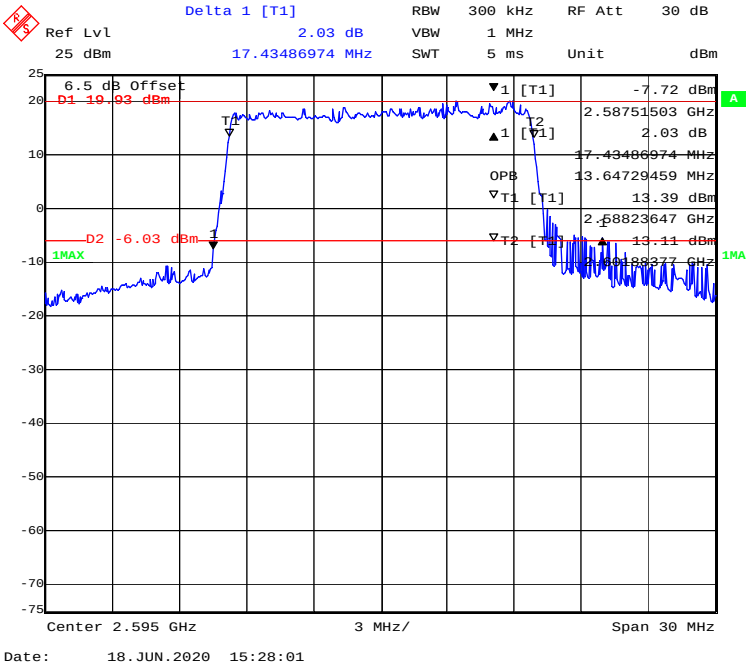
16-QAM (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (15.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

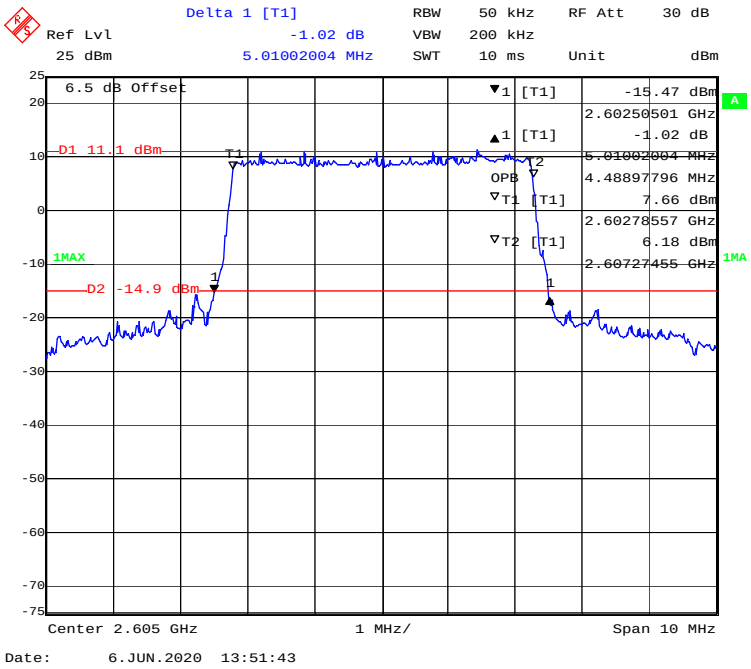


16-QAM (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

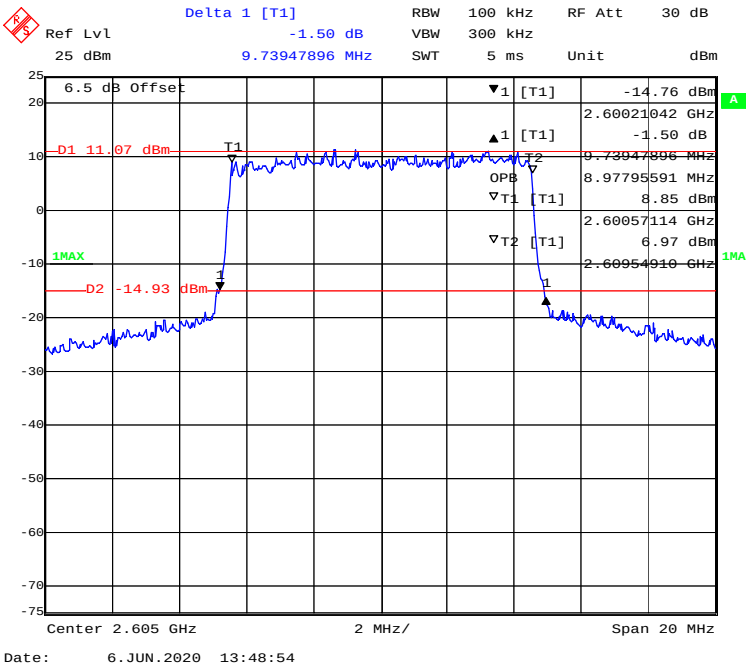
LTE Band 41:

Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth	99% Occupied Bandwidth
			MHz	MHz
QPSK	5M	Middle	5.010	4.489
	10M		9.739	8.978
	15M		15.691	13.587
	20M		19.479	18.036
16-QAM	5M	Middle	4.990	4.509
	10M		9.659	8.978
	15M		16.172	13.587
	20M		19.559	18.036

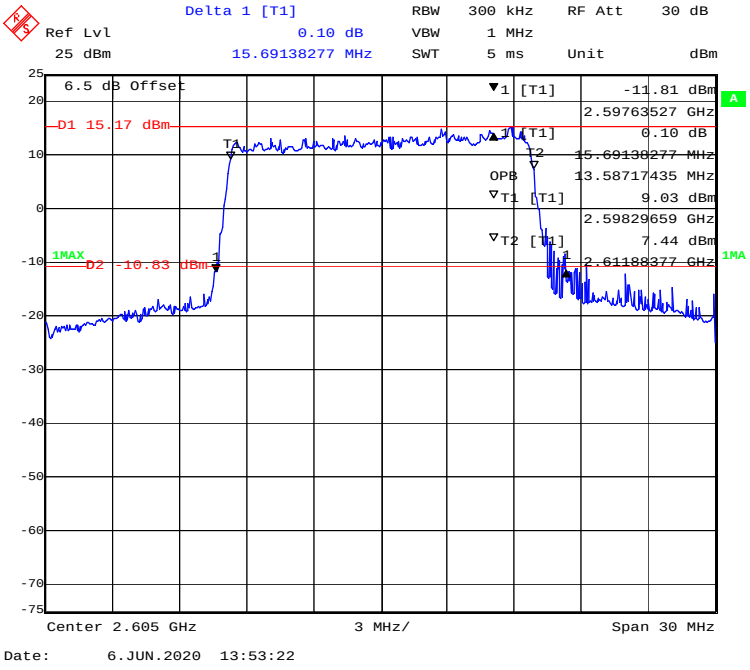
QPSK (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



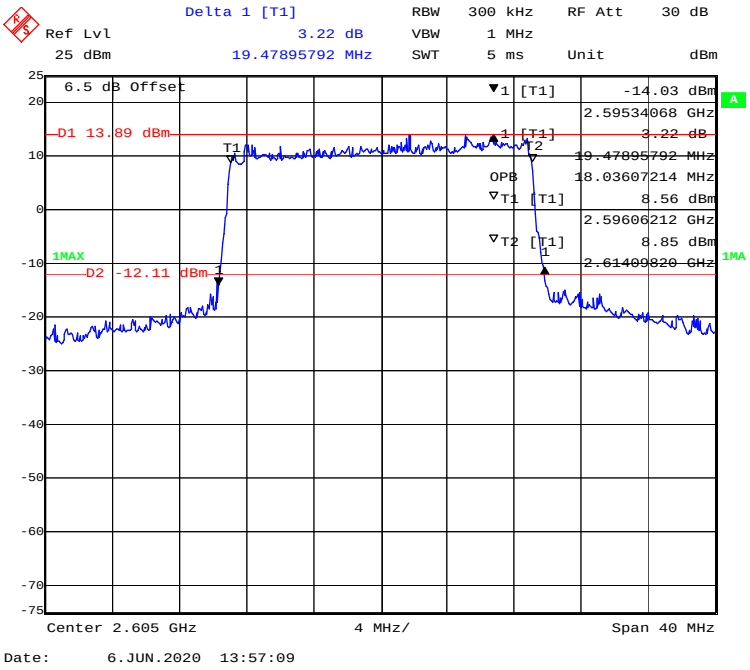
QPSK (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



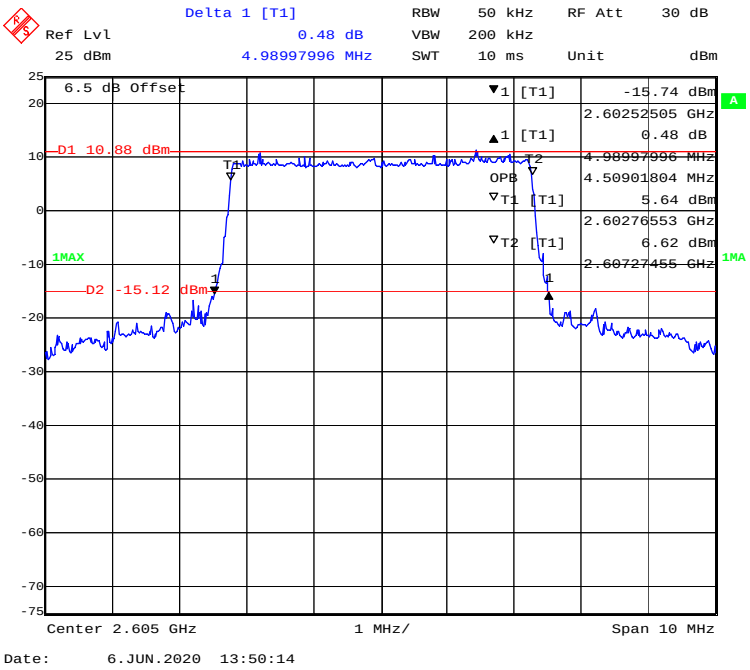
QPSK (15.0MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



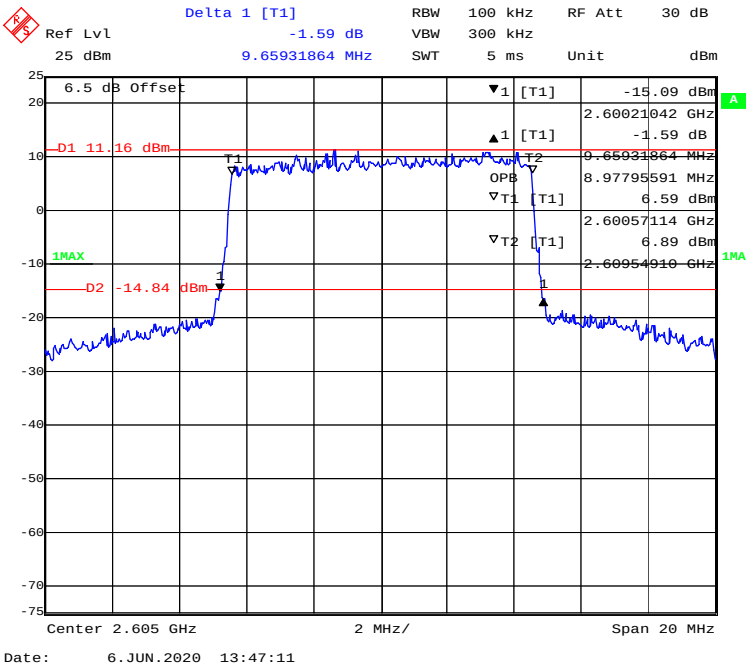
QPSK (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



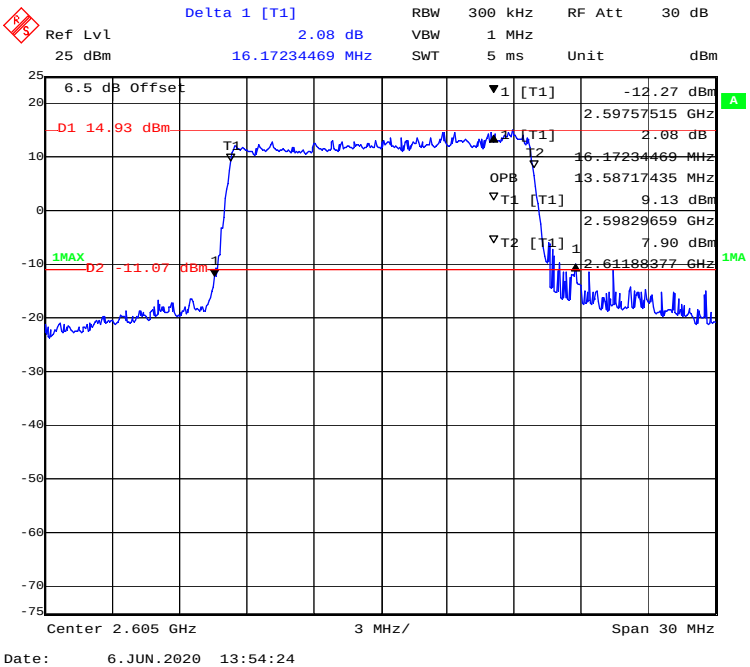
16-QAM (5.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



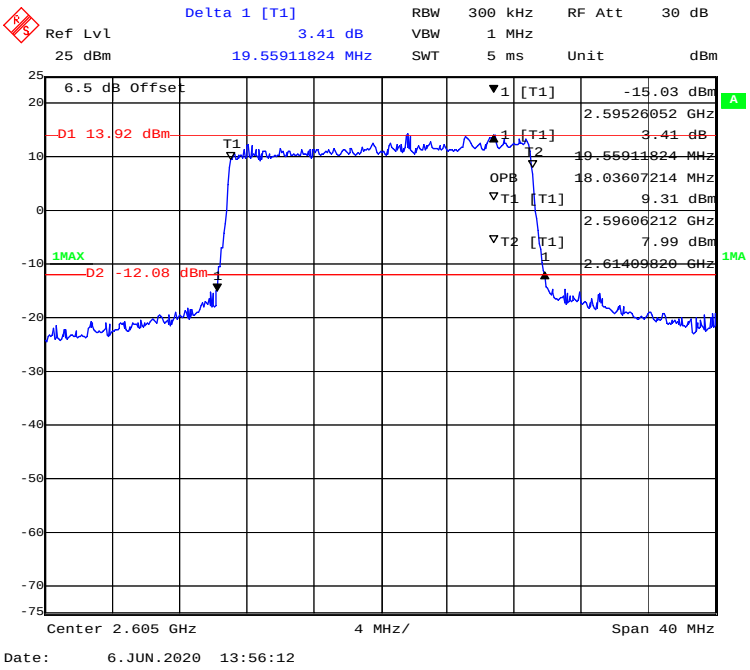
16-QAM (10.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (15.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



16-QAM (20.0 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



FCC § 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (m) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standards

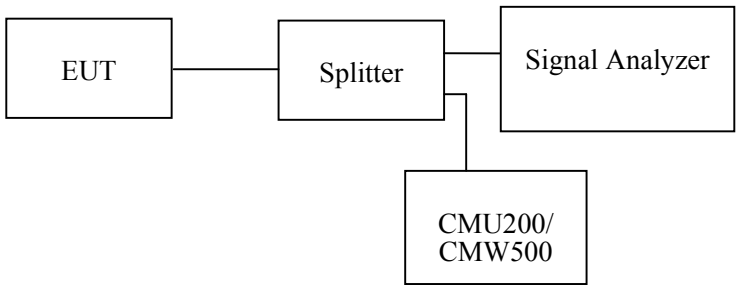
FCC §2.1051, §22.917(a), §24.238(a) and §27.53 (m).

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

According to §27.53(m),for mobile digital stations, any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 55 + 10 log(P) dB.

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:	23.5~24.9 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.7~101.9 kPa

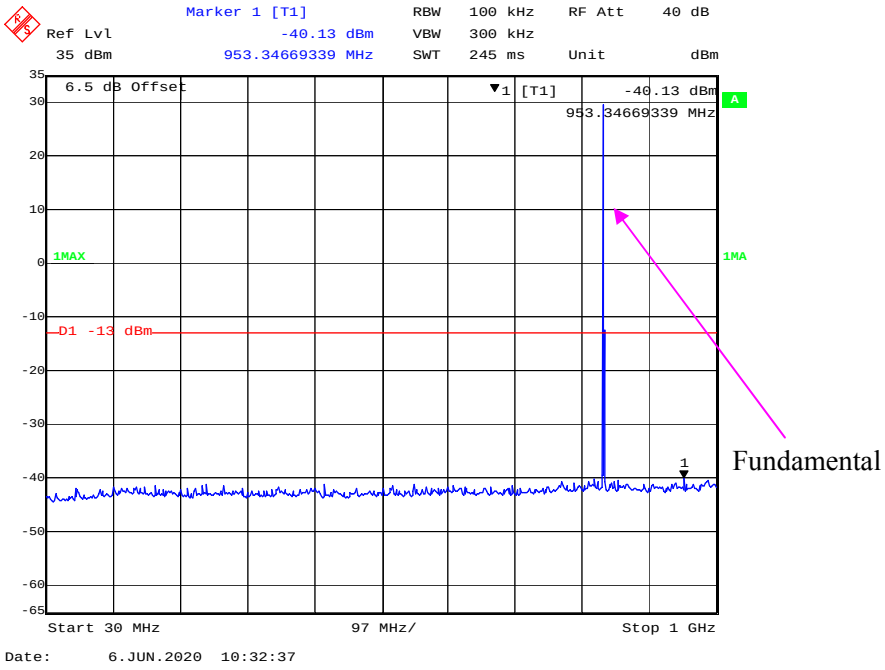
The testing was performed by Jack Jiao from 2020-06-06 to 2020-06-29.

EUT operation mode: Transmitting

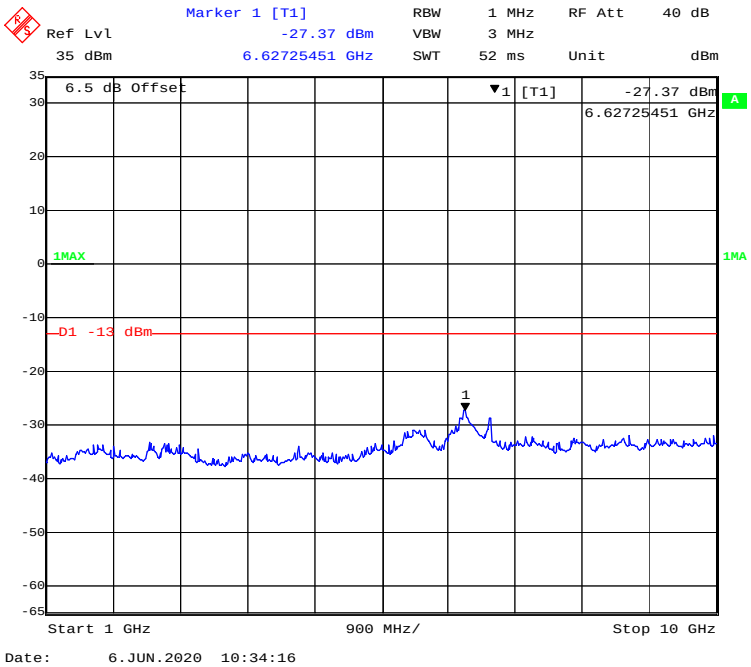
Test Result: Compliance.

GSM 850 Band:

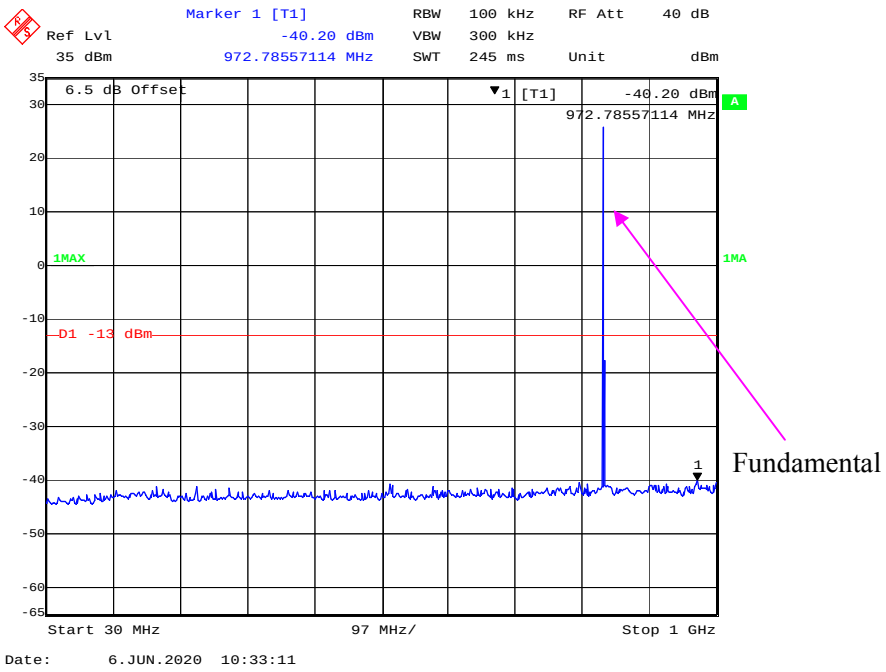
30 MHz – 1GHz(GPRS Mode)



1 GHz – 10 GHz (GPRS Mode)

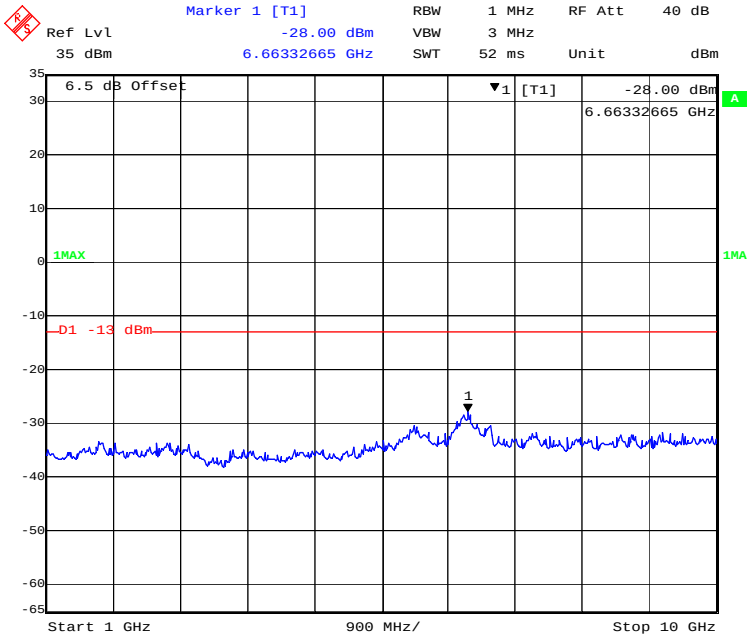


30 MHz – 1GHz(EGPRS Mode)



Date: 6.JUN.2020 10:33:11

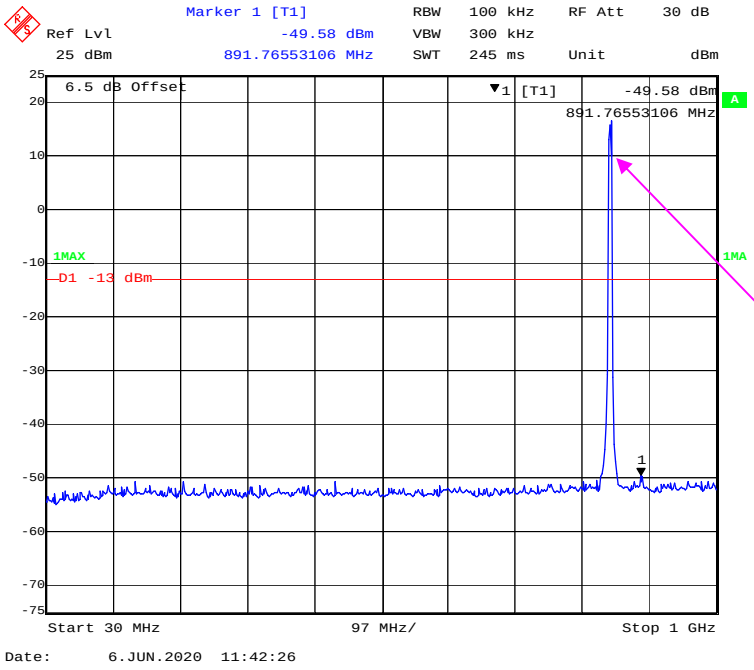
1 GHz – 10 GHz (EGPRS Mode)



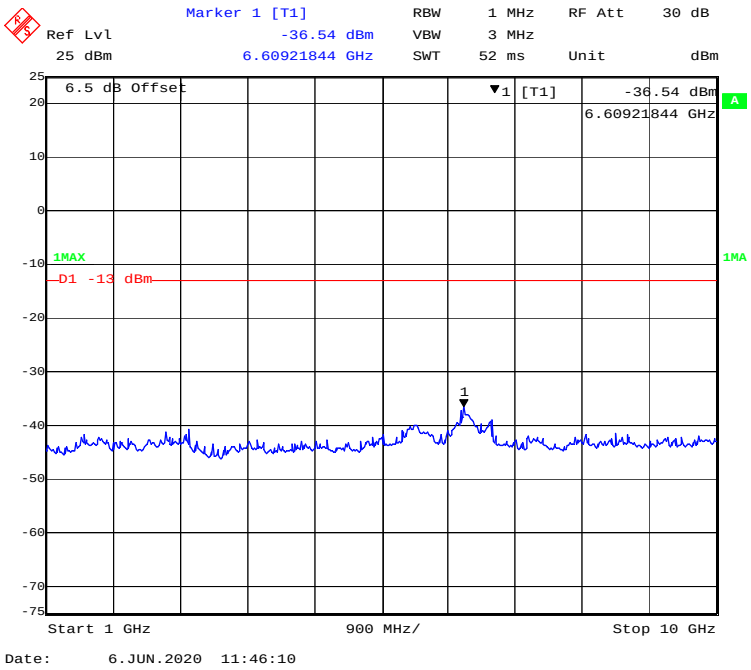
Date: 6.JUN.2020 10:33:38

WCDMA Band V:

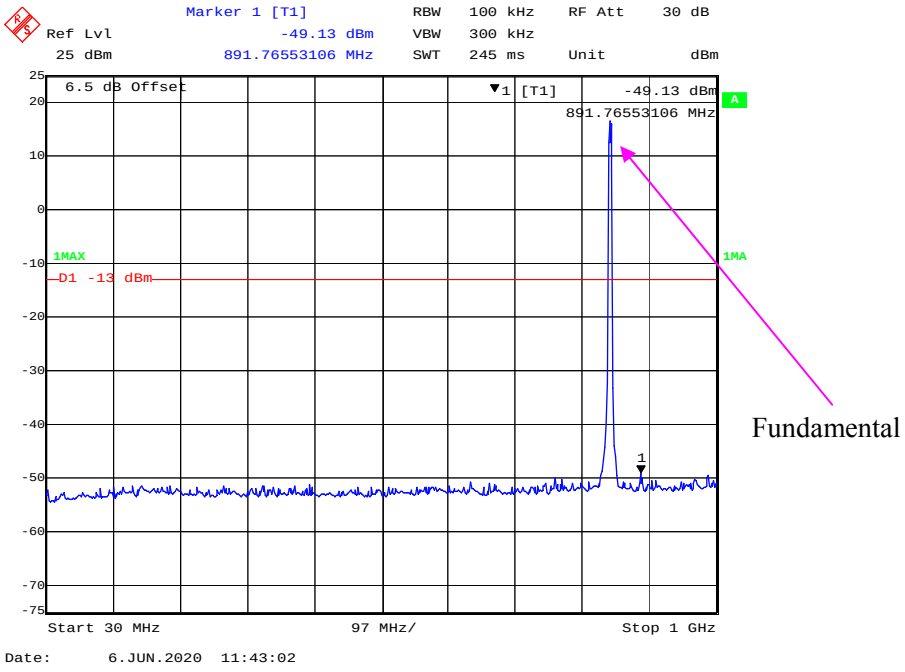
30 MHz – 1GHz WCDMA (Rel 99) Mode



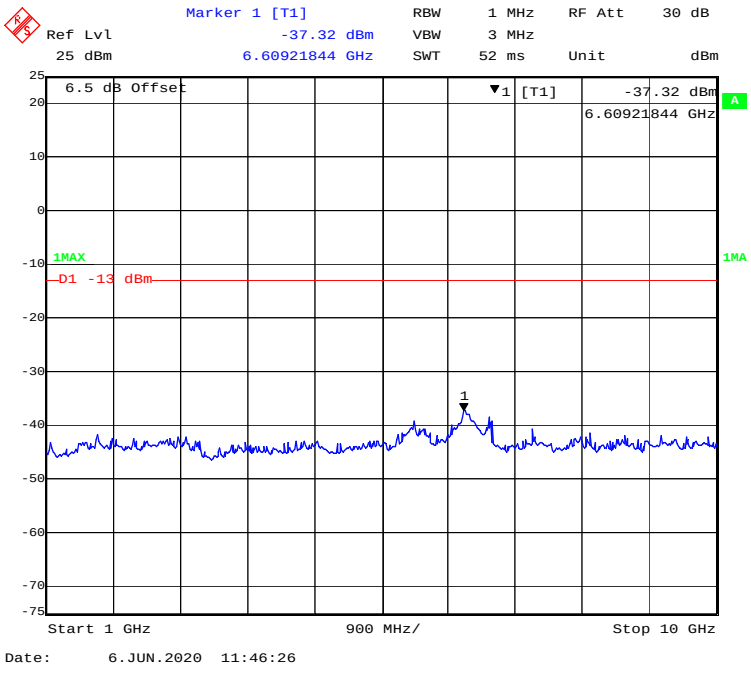
1 GHz – 10 GHz WCDMA (Rel 99) Mode



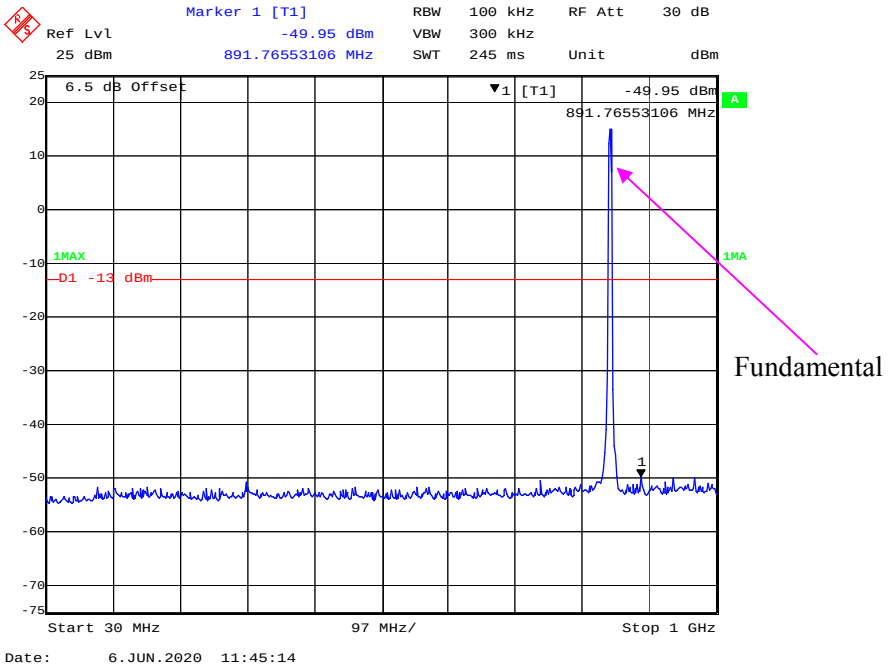
30 MHz – 1GHz WCDMA (HSDPA) Mode



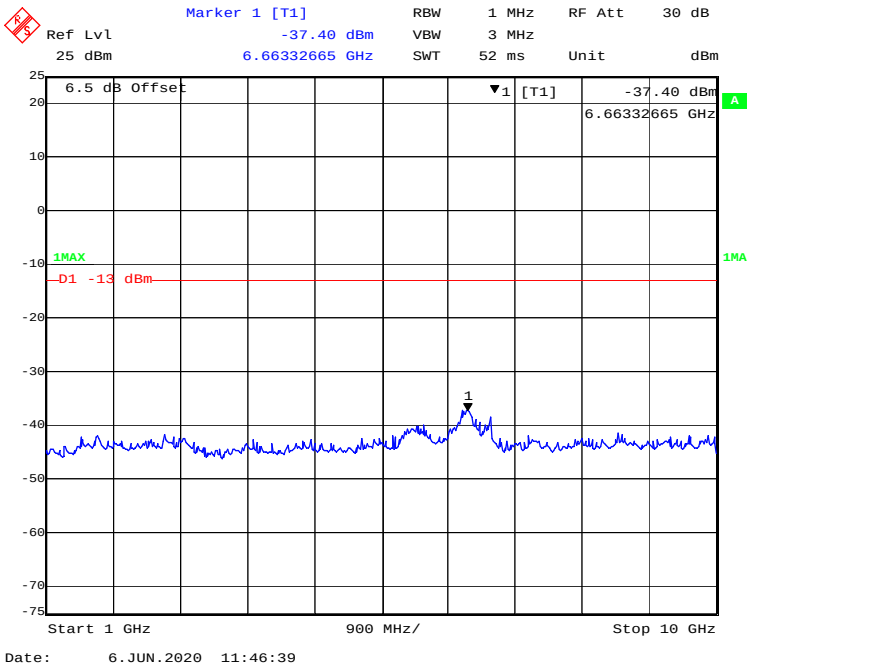
1 GHz – 10 GHz WCDMA (HSDPA) Mode



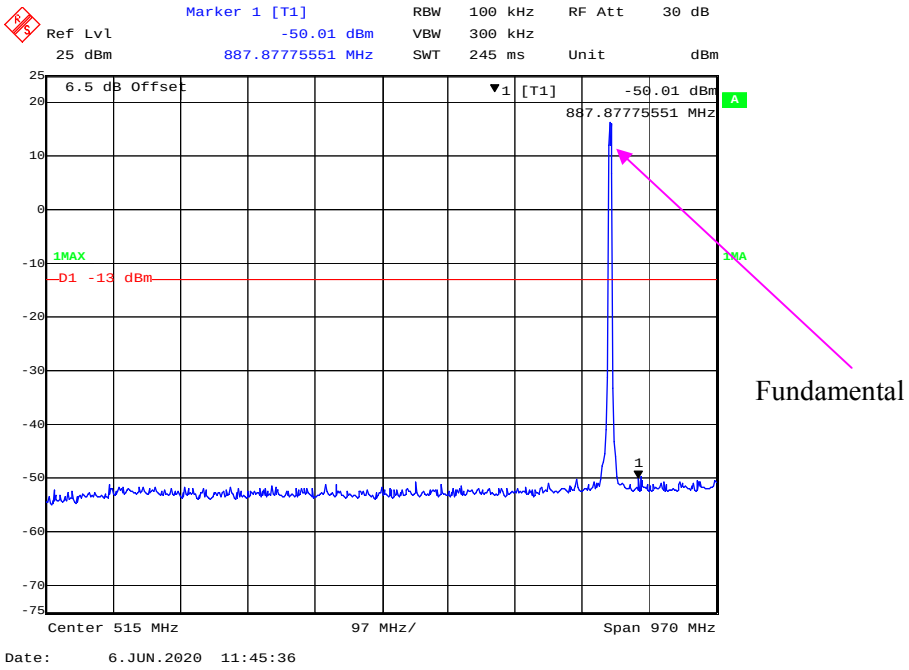
30 MHz – 1GHz WCDMA (HSUPA) Mode



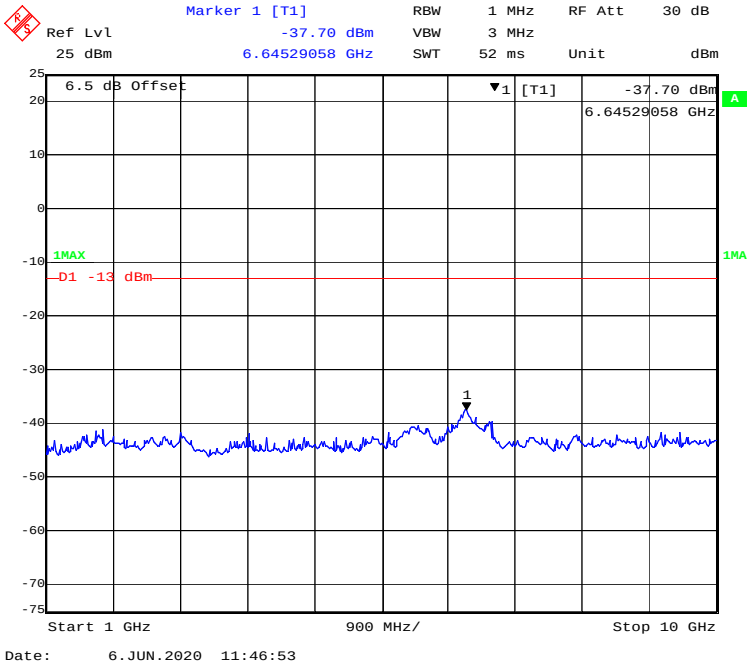
1 GHz – 10 GHz WCDMA (HSUPA) Mode



30 MHz – 1GHz WCDMA (HSPA+) Mode

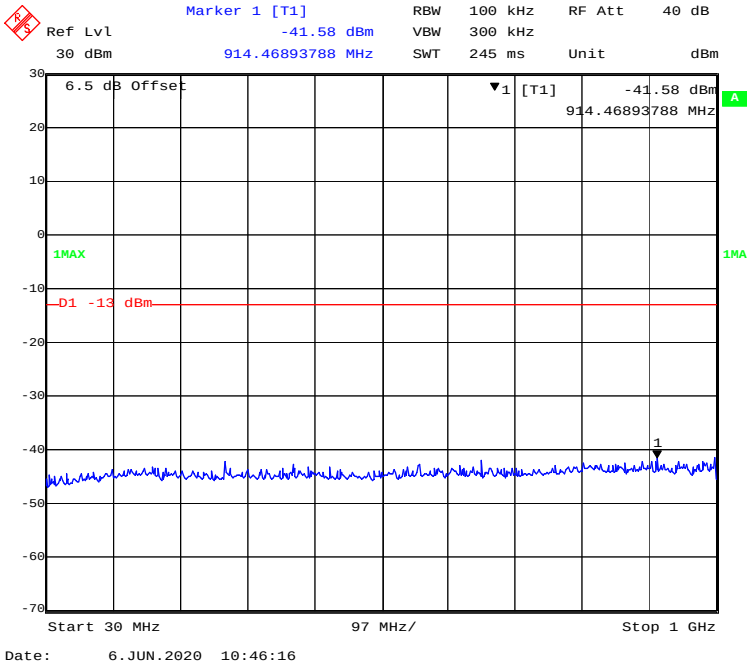


1 GHz – 10 GHz WCDMA (HSPA+) Mode

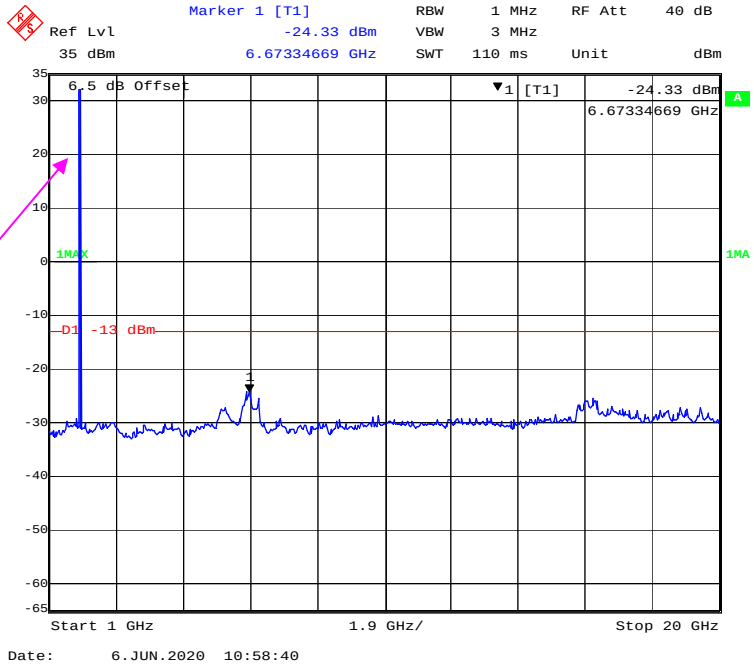


PCS 1900 Band:

30 MHz – 1GHz(GPRS Mode)

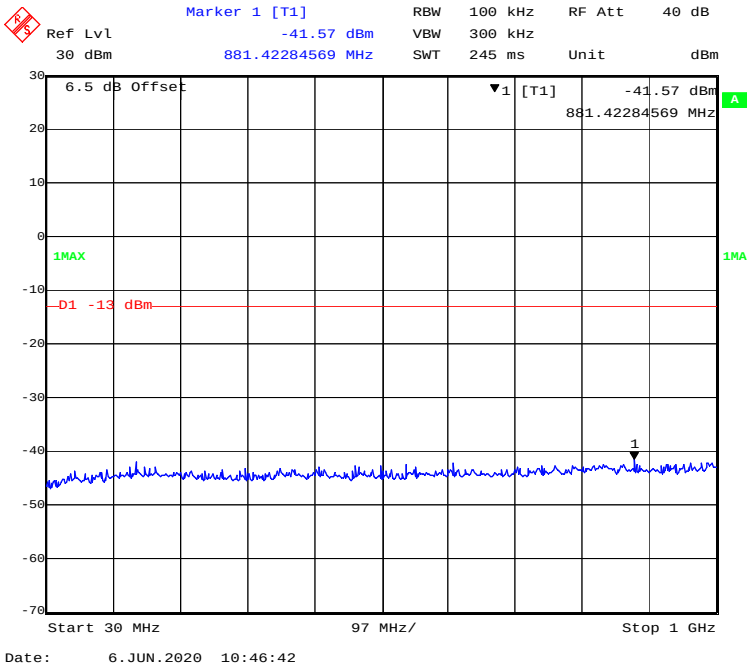


1 GHz – 20 GHz (GPRS Mode)

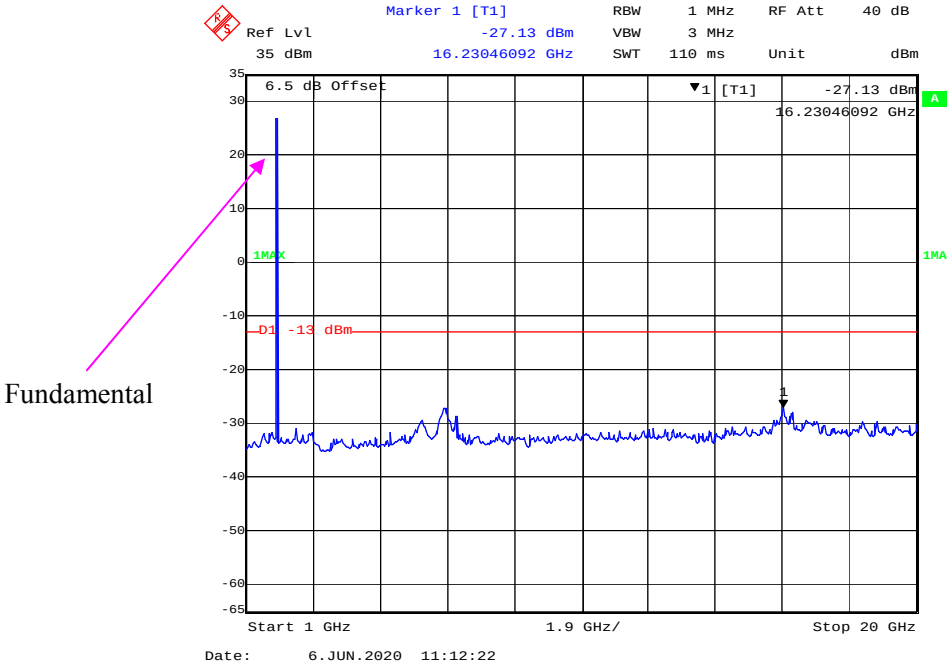


Fundamental

30 MHz – 1GHz(EGPRS Mode)

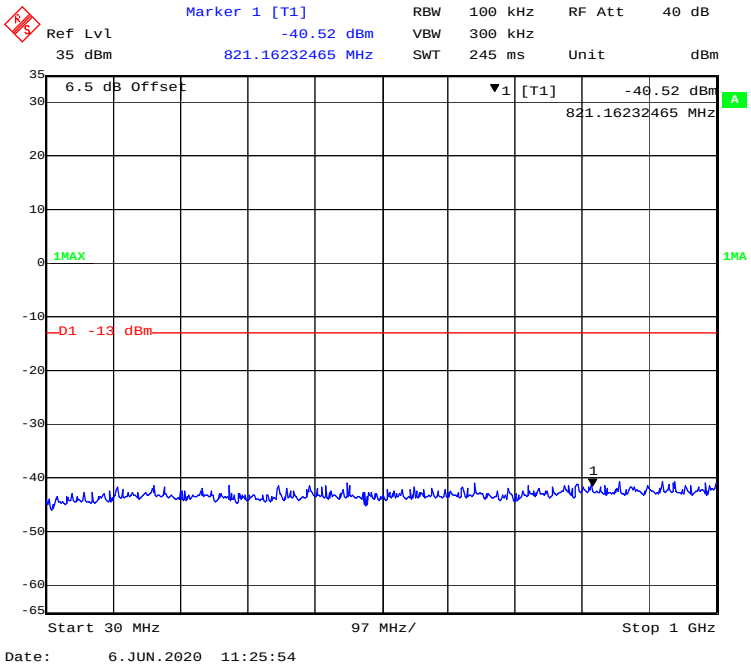


1 GHz – 20 GHz (EGPRS Mode)

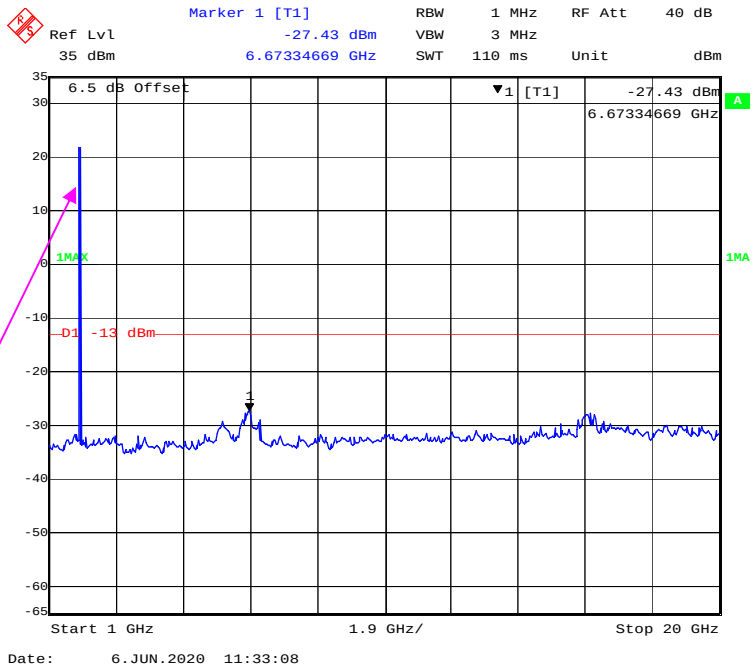


WCDMA Band II:

30 MHz – 1GHz WCDMA (Rel 99) Mode

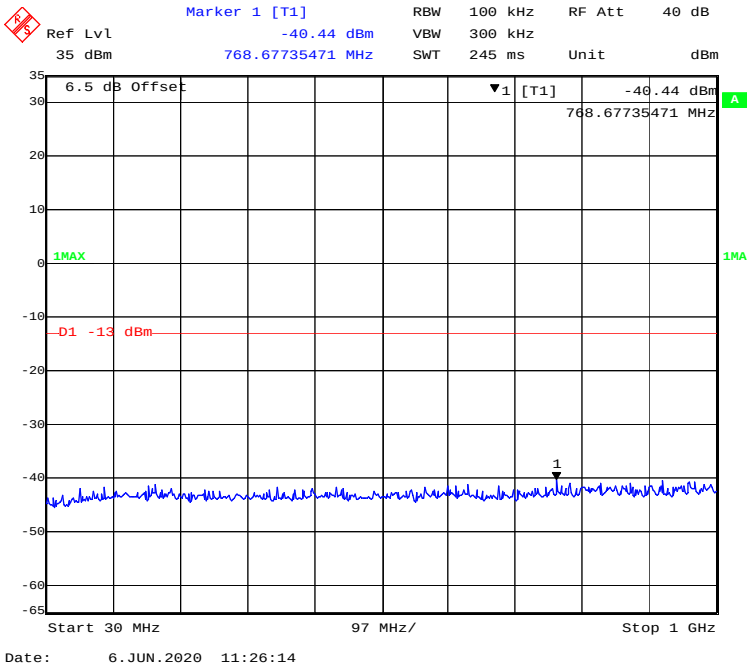


1 GHz – 20 GHz WCDMA (Rel 99) Mode

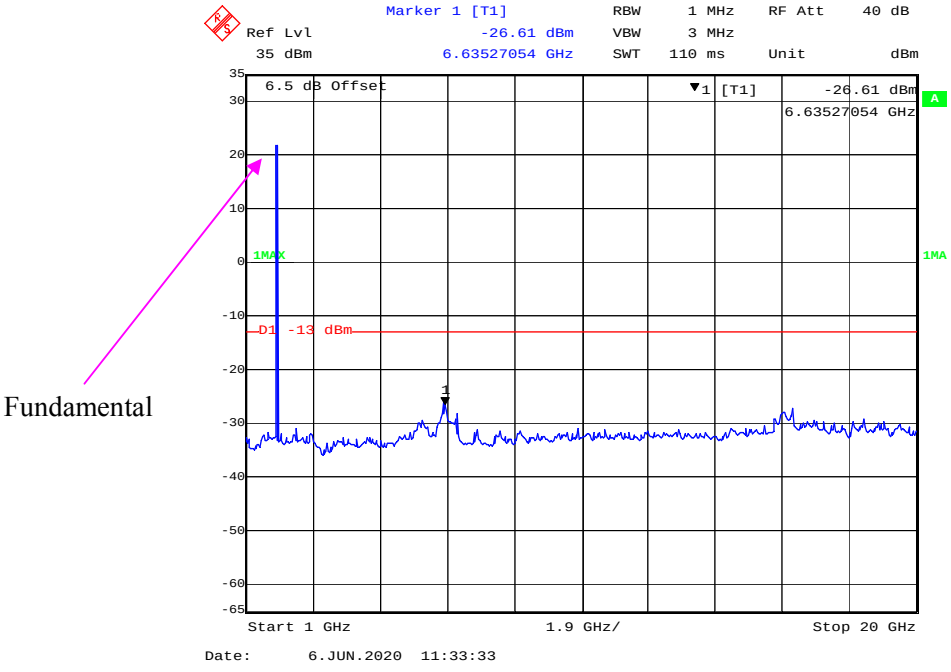


Fundamental

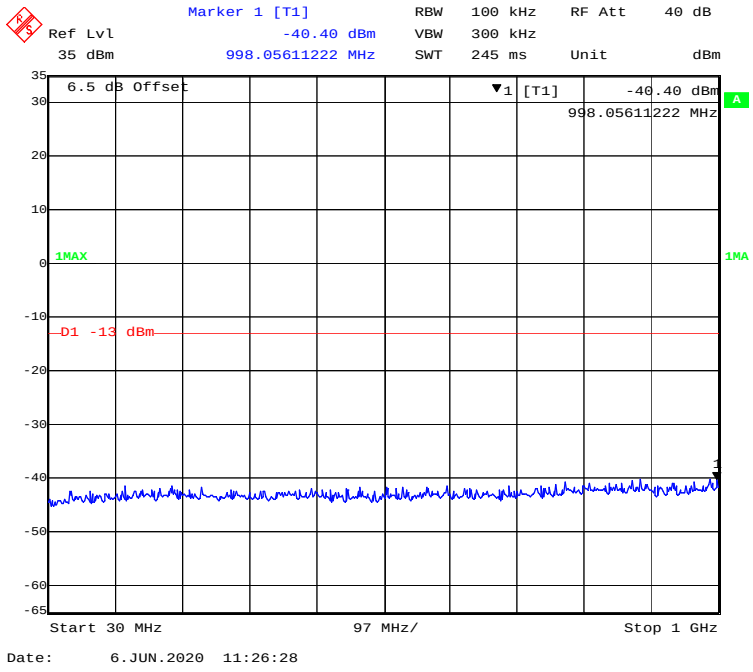
30 MHz – 1GHz WCDMA (HSDPA) Mode



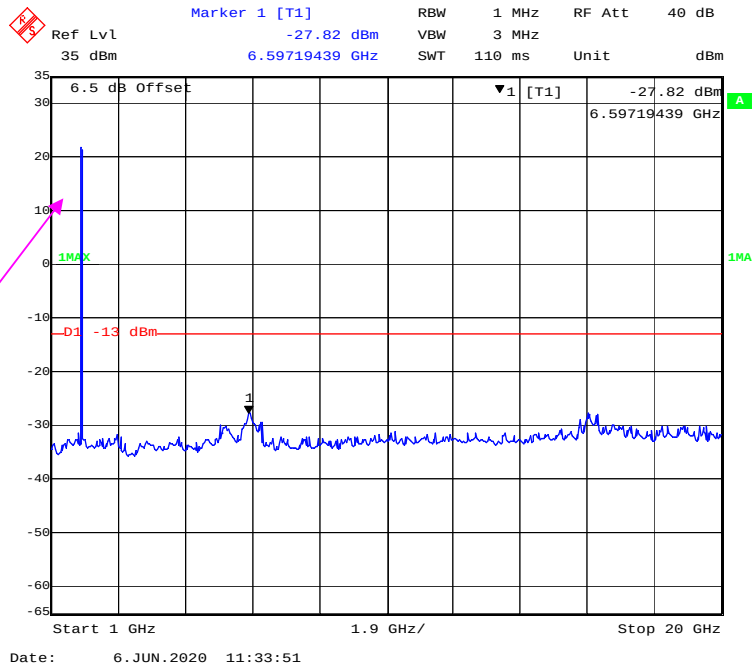
1 GHz – 20 GHz WCDMA (HSDPA) Mode



30 MHz – 1GHz WCDMA (HSUPA) Mode

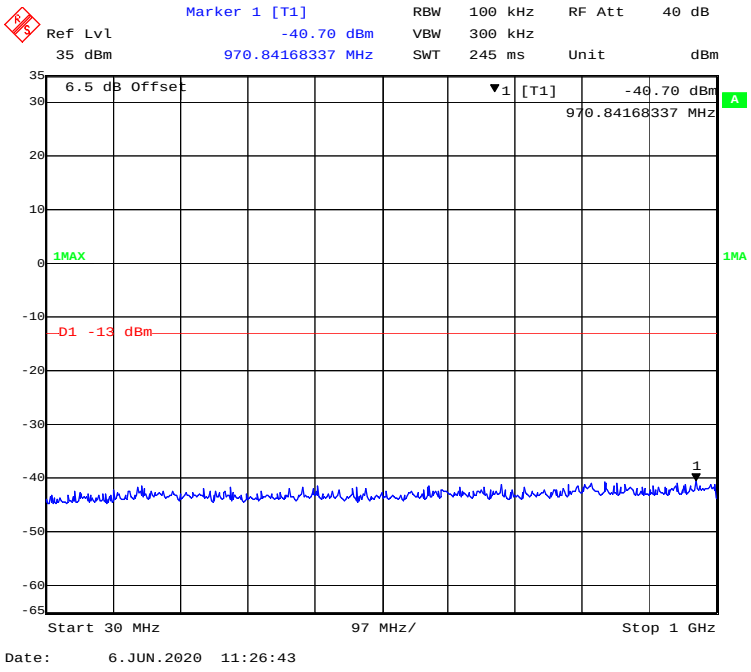


1 GHz – 20 GHz WCDMA (HSUPA) Mode

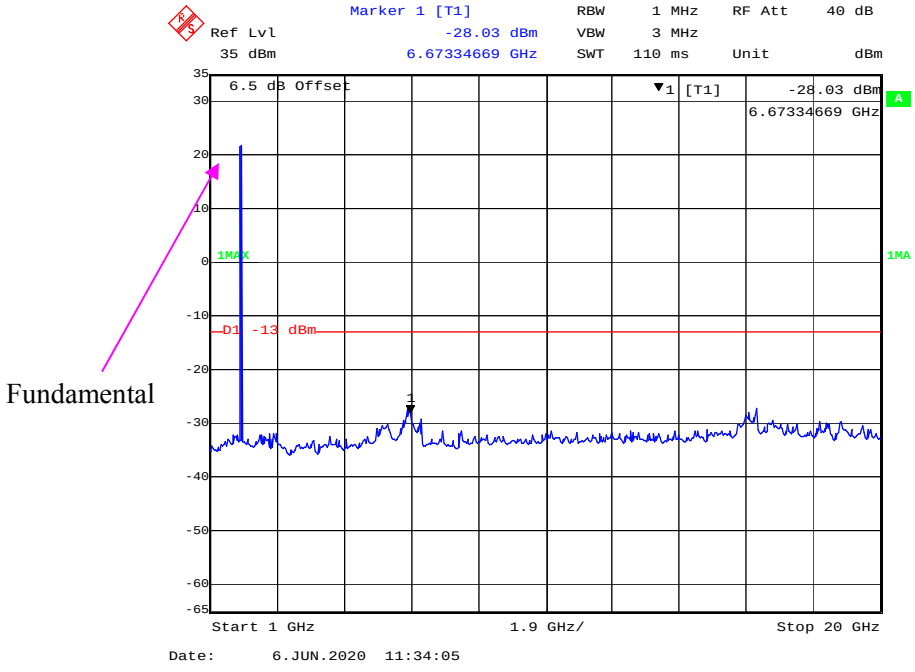


Fundamental

30 MHz – 1GHz WCDMA (HSPA+) Mode

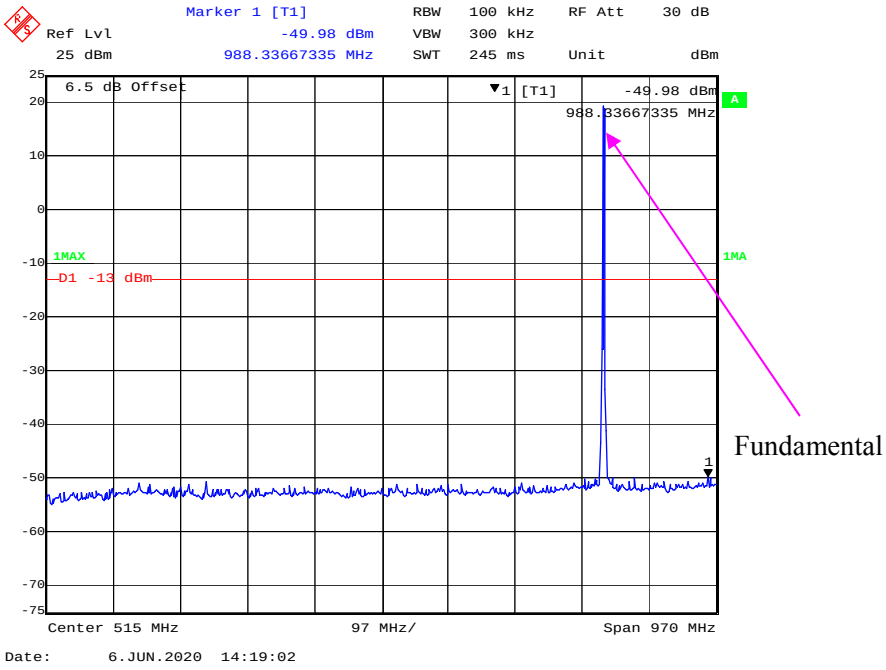


1 GHz – 20 GHz WCDMA (HSPA+) Mode

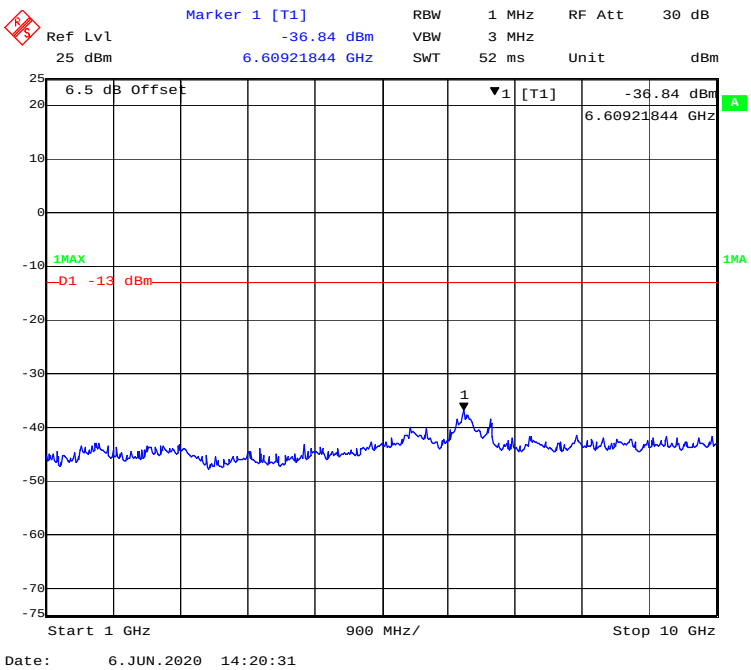


LTE Band 5:

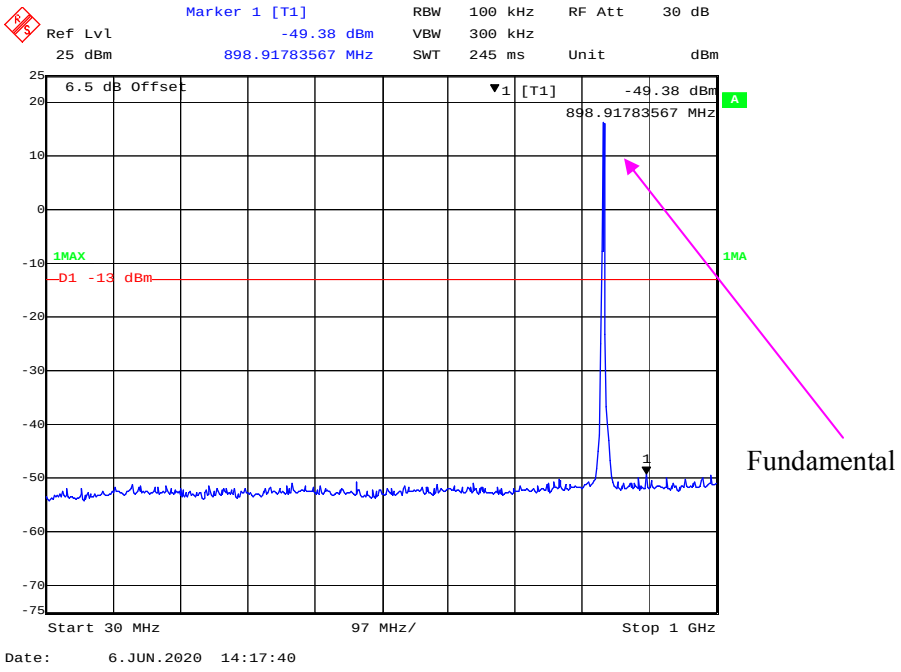
30 MHz - 1 GHz (QPSK, 1.4 MHz, Middle Channel)



1 GHz – 10 GHz (QPSK, 1.4 MHz, Middle Channel)



30 MHz - 1 GHz (QPSK, 3.0 MHz, Middle Channel)

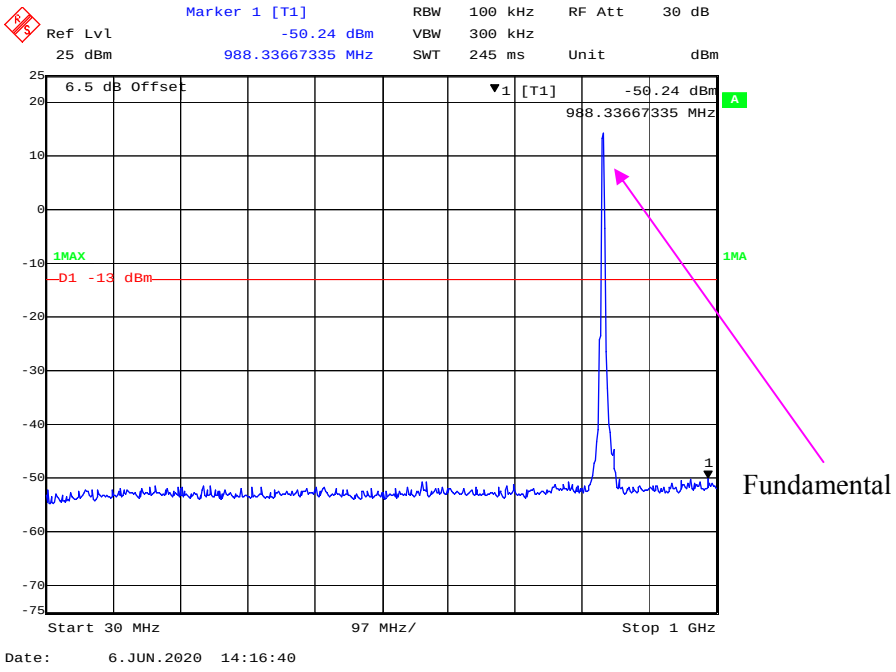


Date: 6.JUN.2020 14:17:40

1 GHz – 10 GHz (QPSK, 3.0 MHz, Middle Channel)

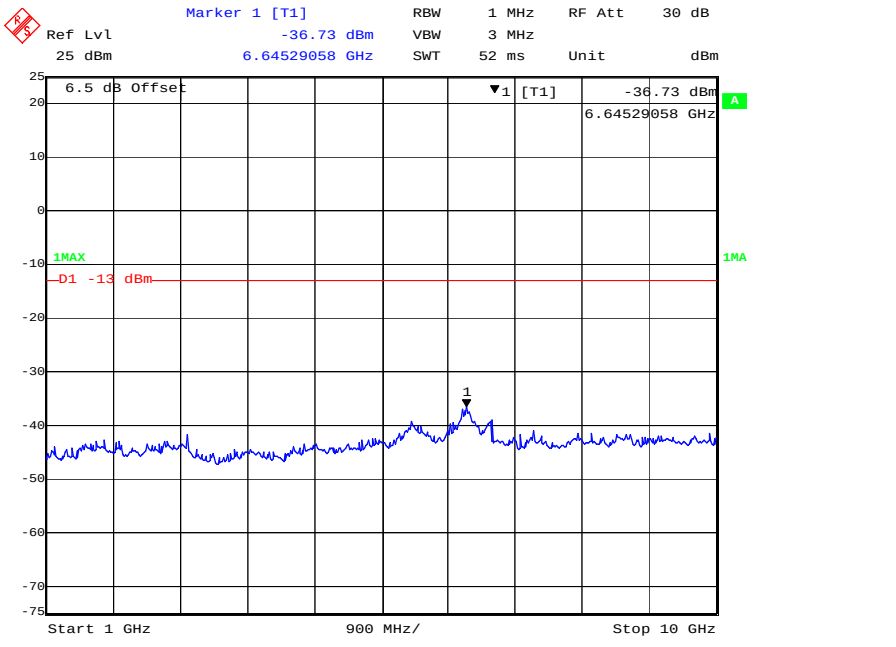
Date: 6.JUN.2020 14:21:14

30 MHz - 1 GHz (QPSK, 5.0 MHz, Middle Channel)



Date: 6.JUN.2020 14:16:40

1 GHz – 10 GHz (QPSK, 5.0MHz, Middle Channel)



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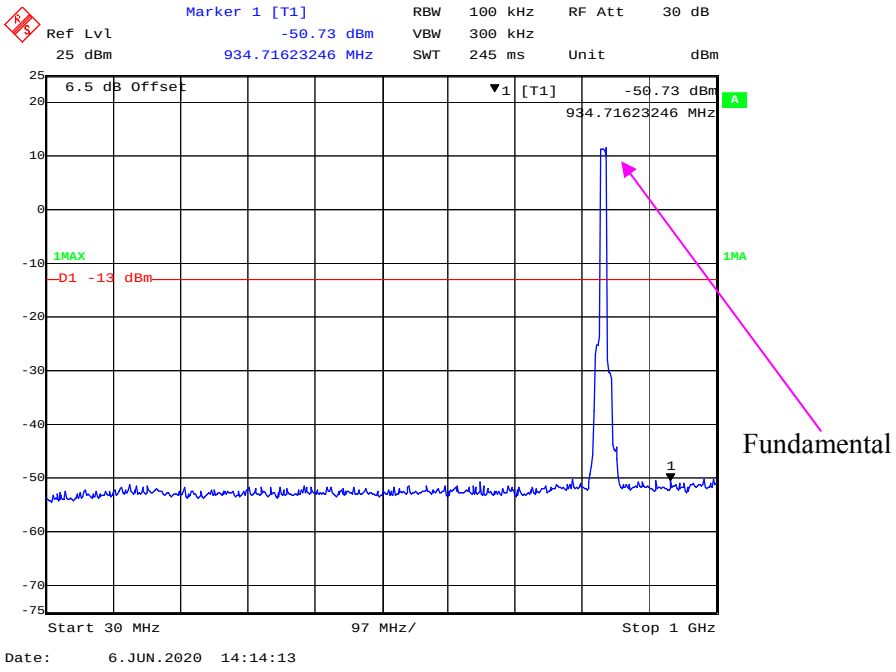
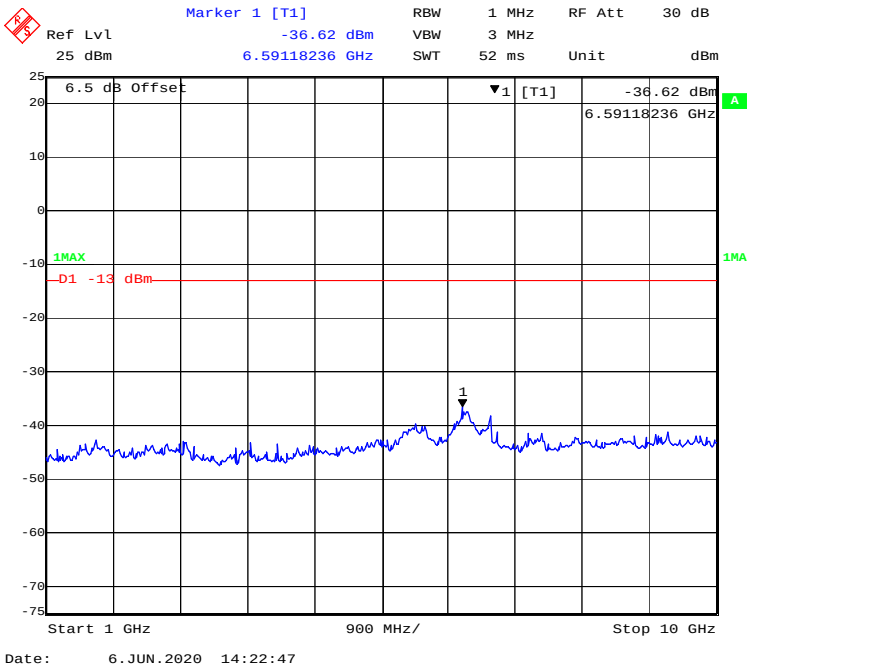
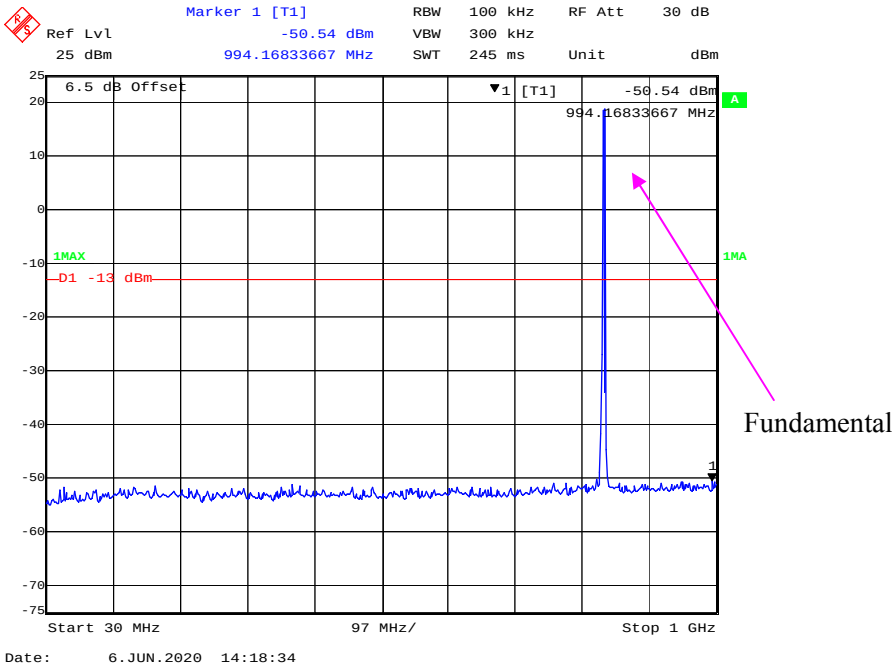
30 MHz - 1 GHz (QPSK, 10.0 MHz, Middle Channel)



1 GHz – 10 GHz (QPSK, 10.0 MHz, Middle Channel)



30 MHz - 1 GHz (16QAM, 1.4 MHz, Middle Channel)



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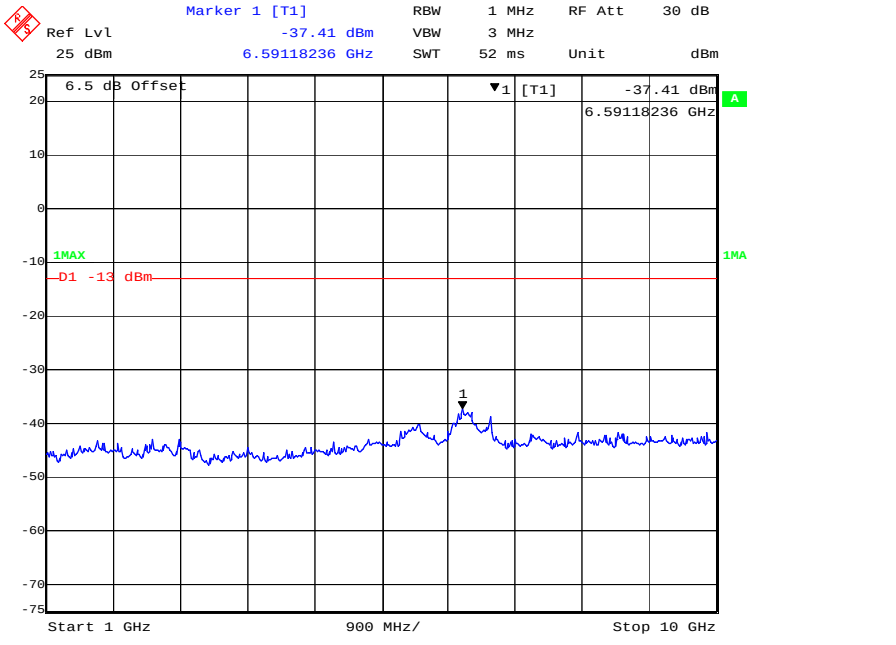
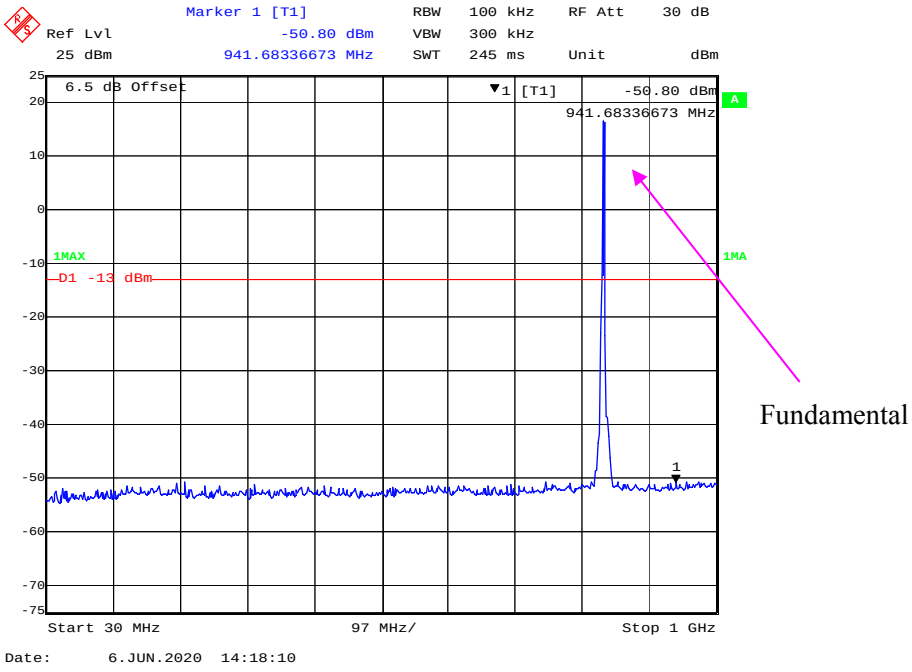
1 GHz – 10 GHz (16QAM, 1.4 MHz, Middle Channel)



Date: 6.JUN.2020 14:20:11

30 MHz - 1 GHz (16QAM, 3.0 MHz, Middle Channel)



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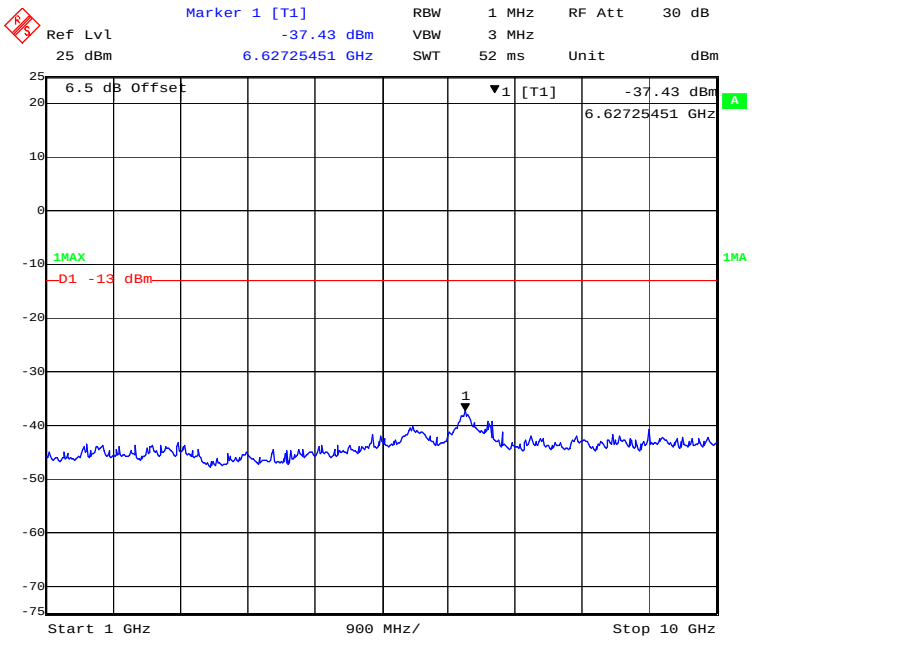
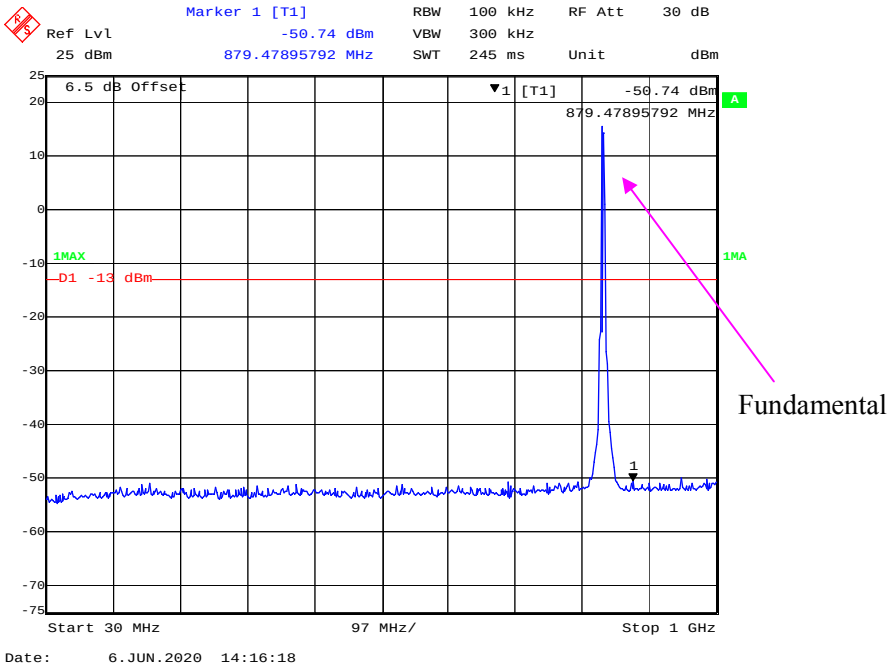
1 GHz – 10 GHz (16QAM, 3.0 MHz, Middle Channel)

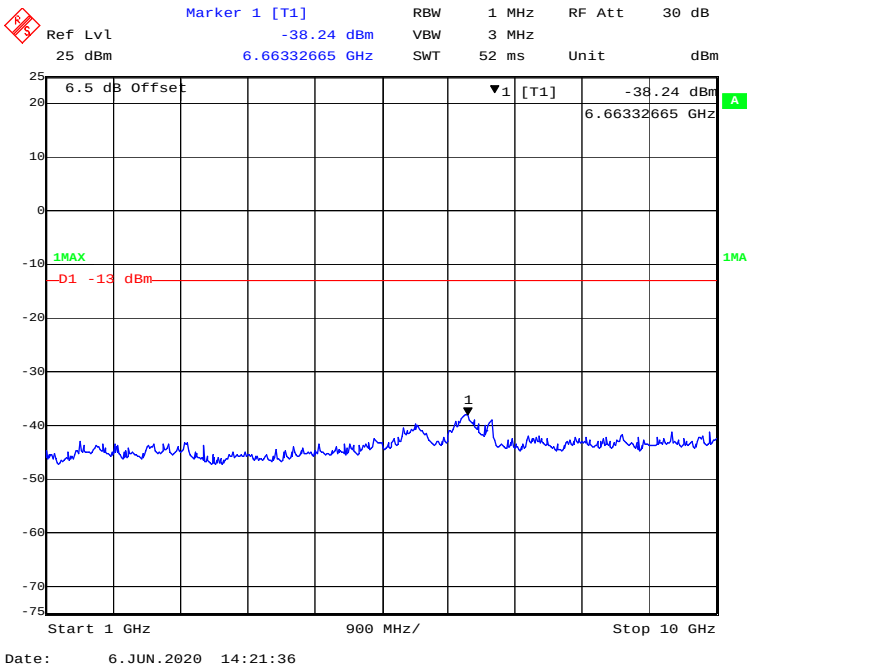


Date: 6.JUN.2020 14:20:56

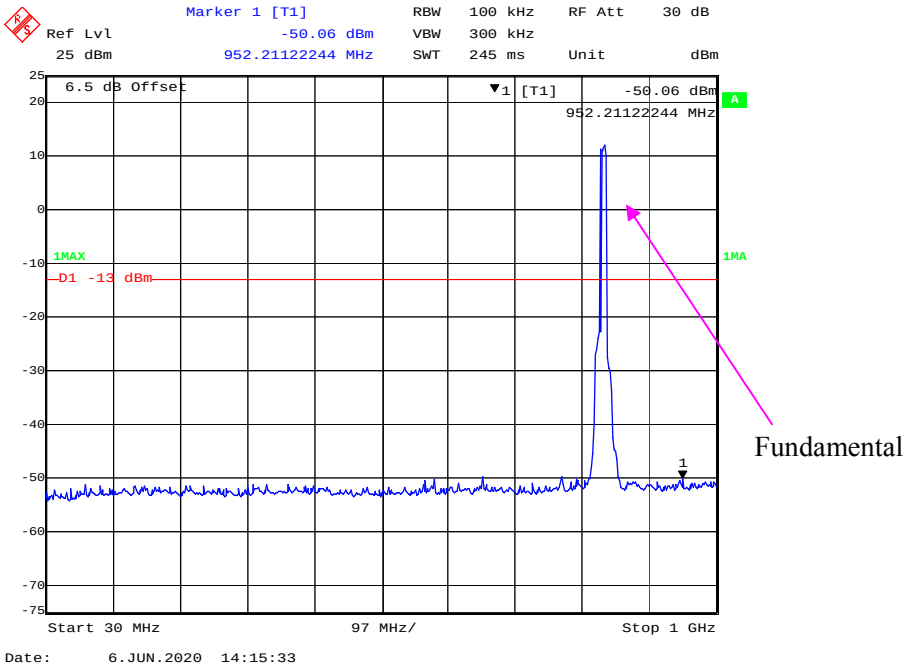
30 MHz - 1 GHz (16QAM, 5.0 MHz, Middle Channel)



1 GHz – 10 GHz (16QAM, 5.0MHz, Middle Channel)

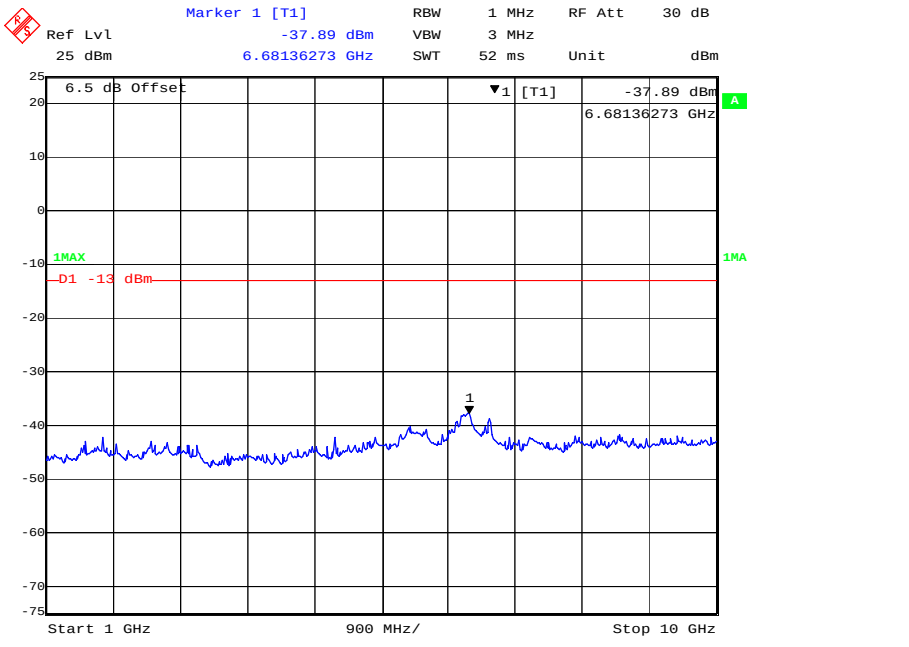


30 MHz - 1 GHz (16QAM, 10.0 MHz, Middle Channel)



Date: 6.JUN.2020 14:15:33

1 GHz – 10 GHz (16QAM, 10.0 MHz, Middle Channel)



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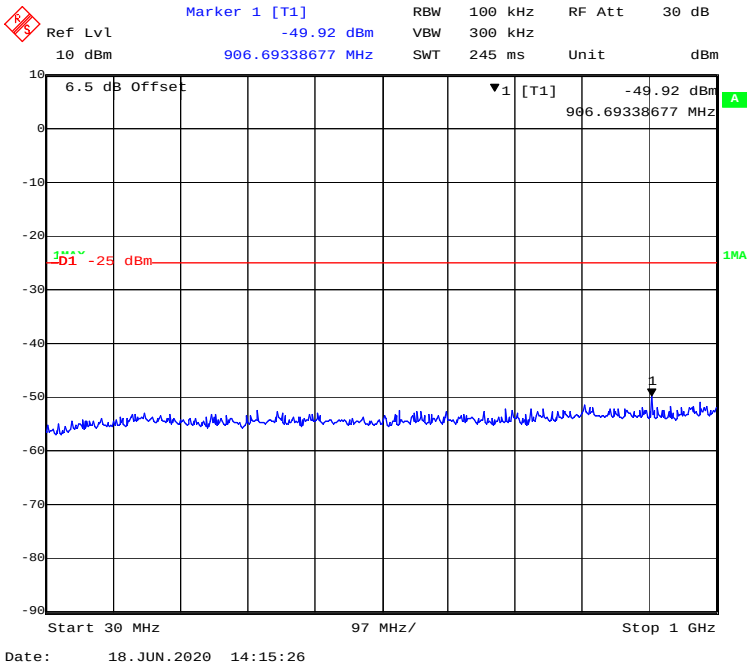
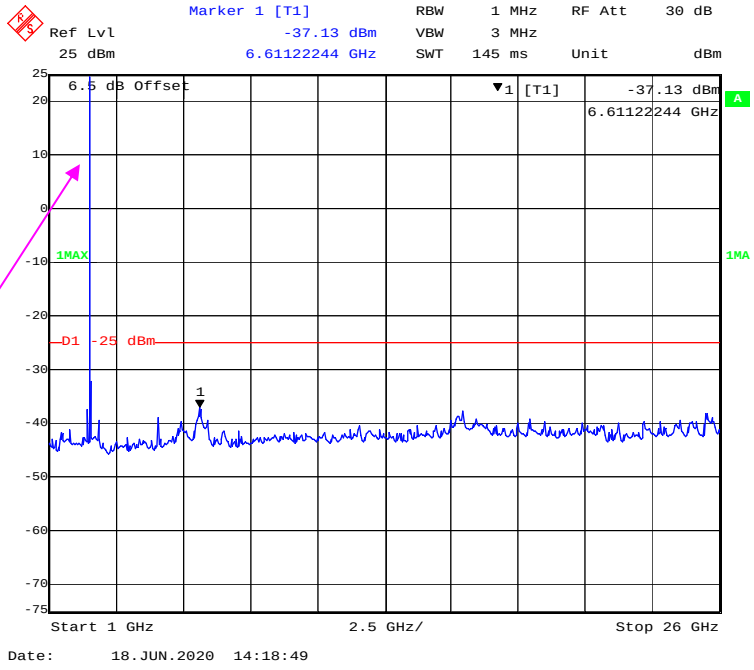
LTE Band 7

30 MHz - 1 GHz (QPSK, 5.0 MHz, Middle Channel)

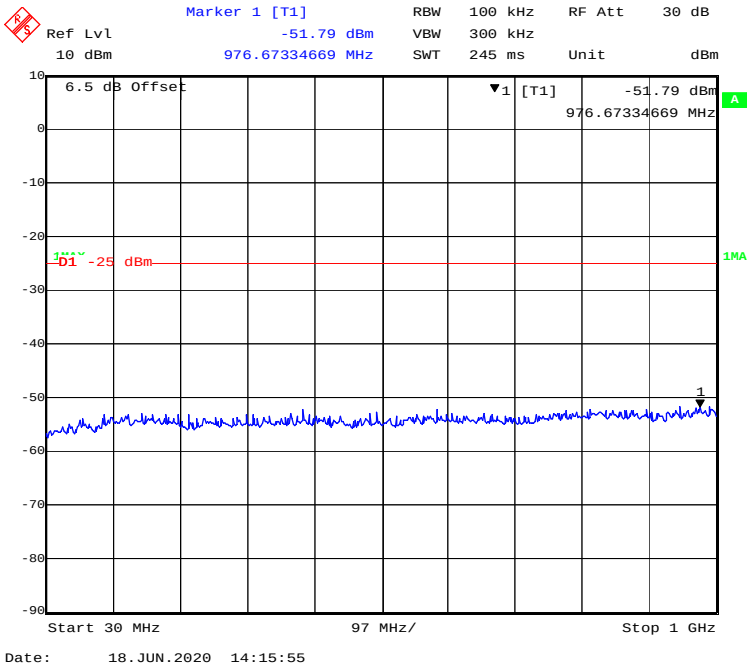


1 GHz – 26 GHz (QPSK, 5.0 MHz, Middle Channel)

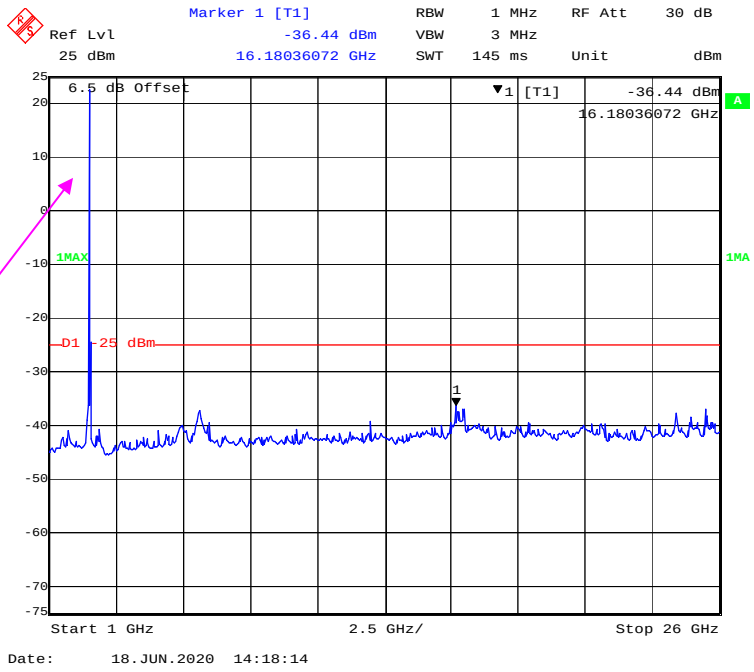


Fundamental

30 MHz - 1 GHz (QPSK, 10.0 MHz, Middle Channel)

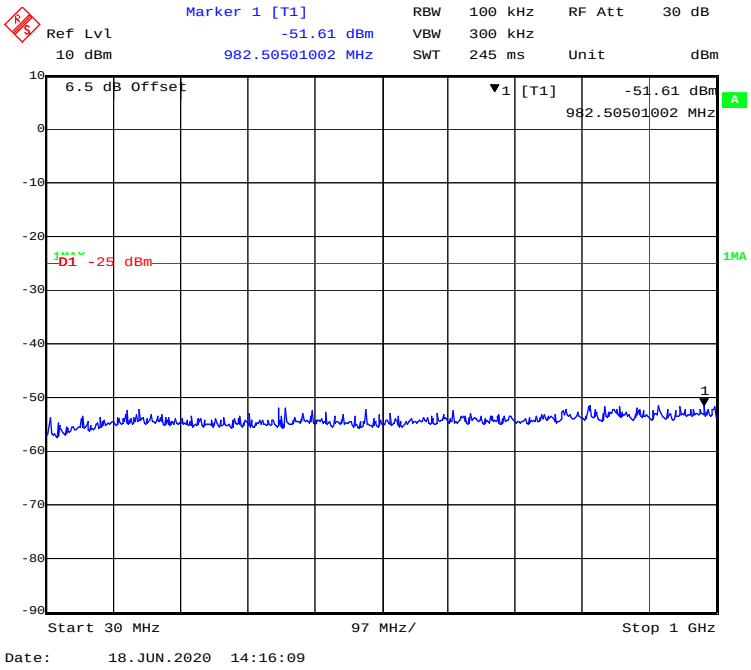


1 GHz – 26 GHz (QPSK, 10.0 MHz, Middle Channel)

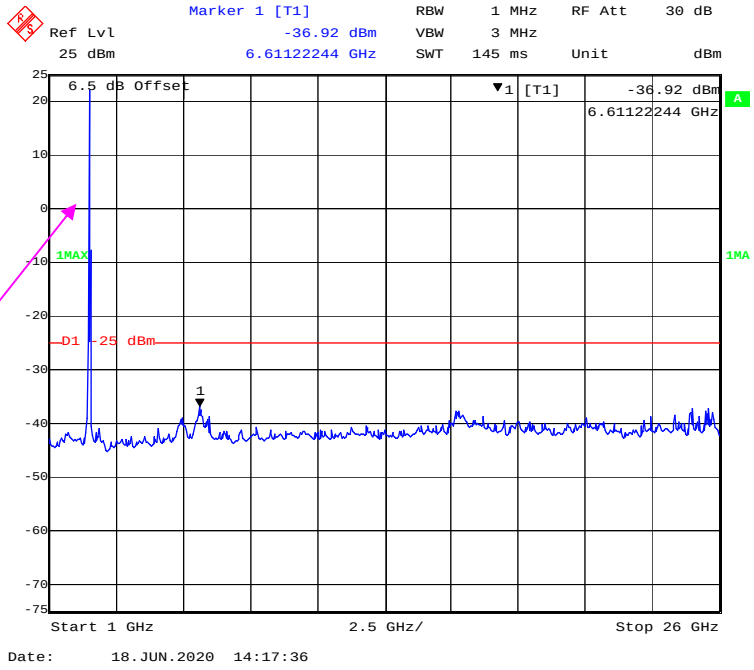


Fundamental

30 MHz - 1 GHz (QPSK, 15.0 MHz, Middle Channel)

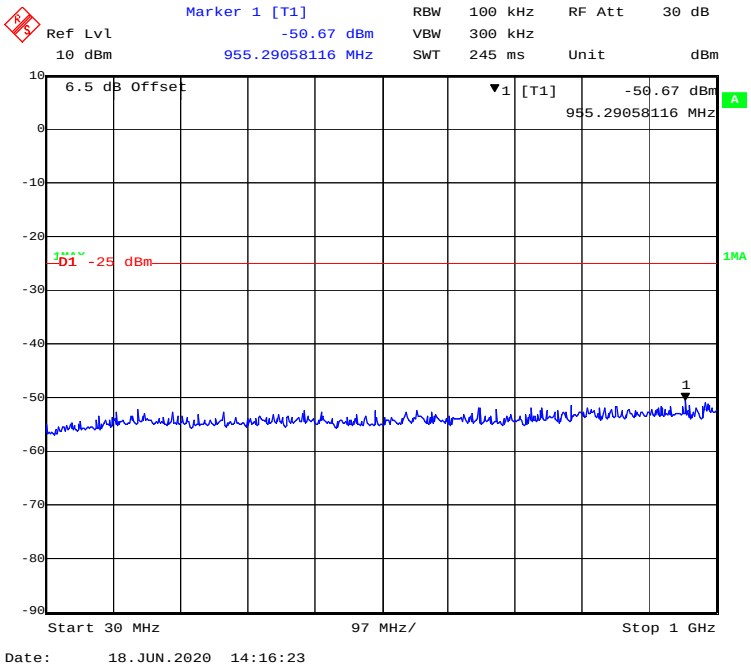


1 GHz – 26 GHz (QPSK, 15.0MHz, Middle Channel)

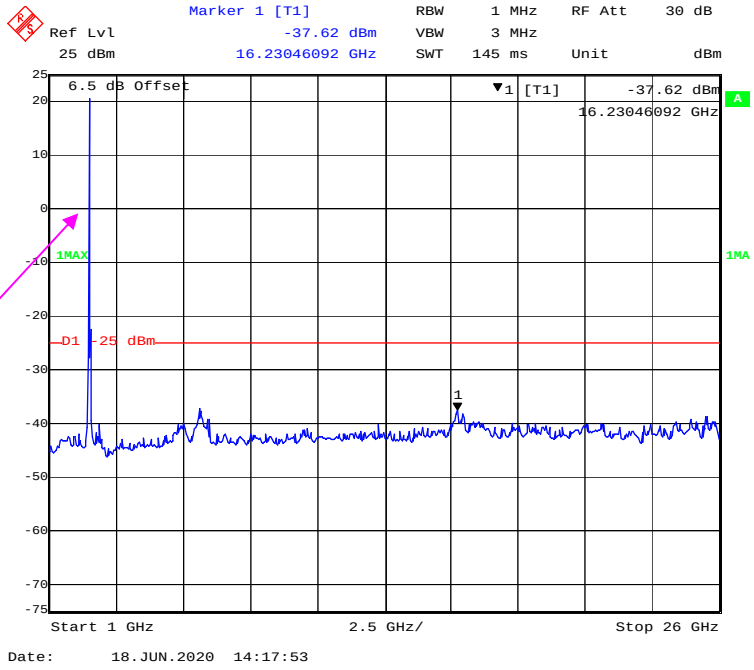


Fundamental

30 MHz - 1 GHz (QPSK, 20.0 MHz, Middle Channel)

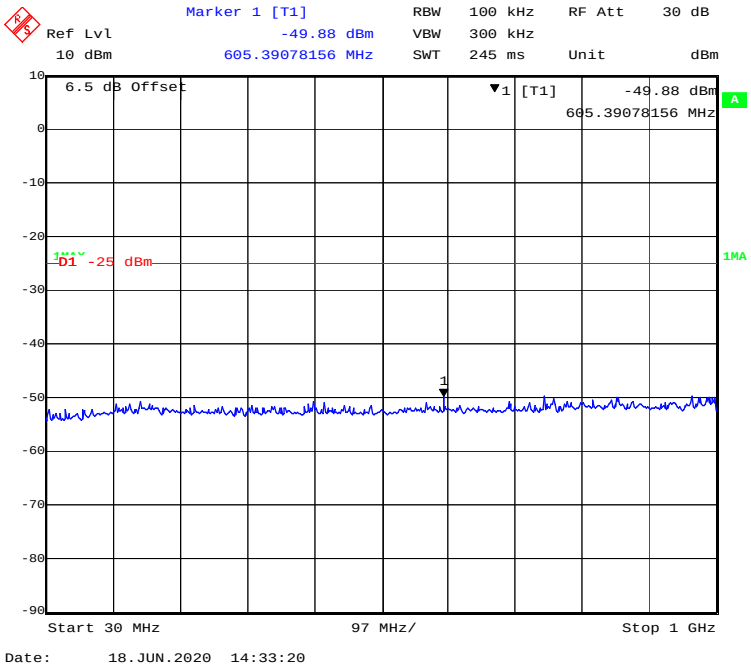


1 GHz – 26 GHz (QPSK, 20.0 MHz, Middle Channel)

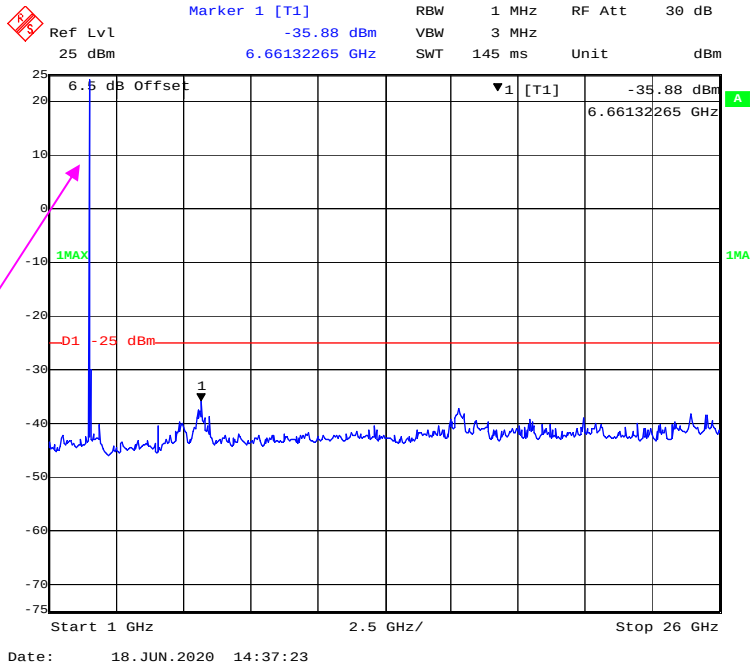


Fundamental

30 MHz - 1 GHz (16QAM, 5.0 MHz, Middle Channel)

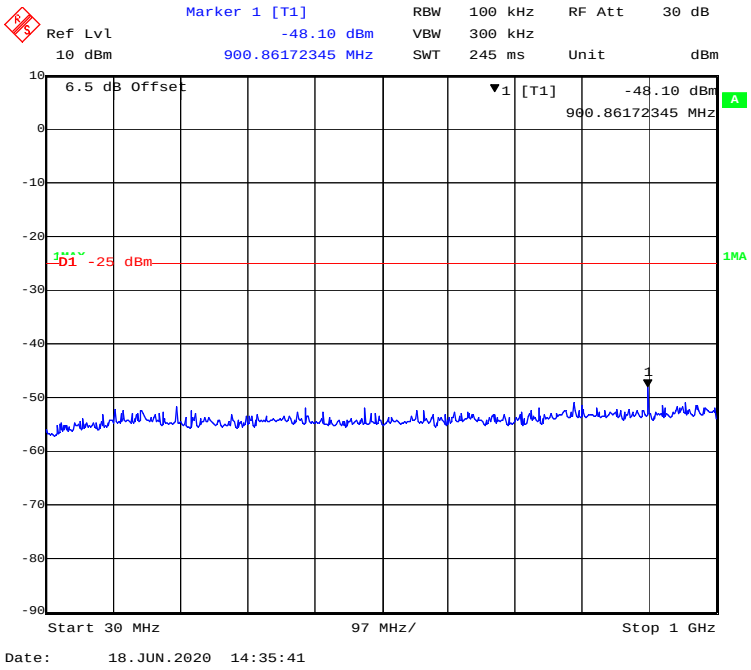


1 GHz – 26 GHz (16QAM, 5.0 MHz, Middle Channel)

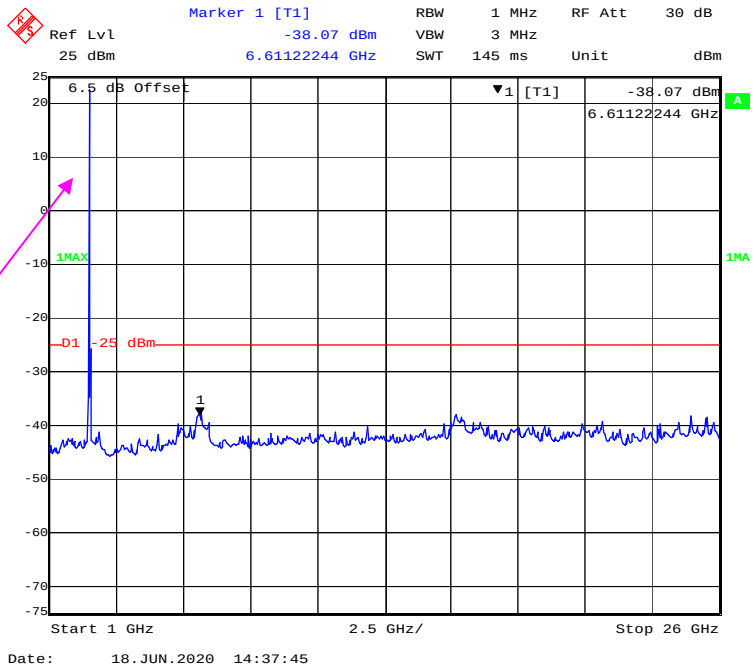


Fundamental

30 MHz - 1 GHz (16QAM, 10.0 MHz, Middle Channel)

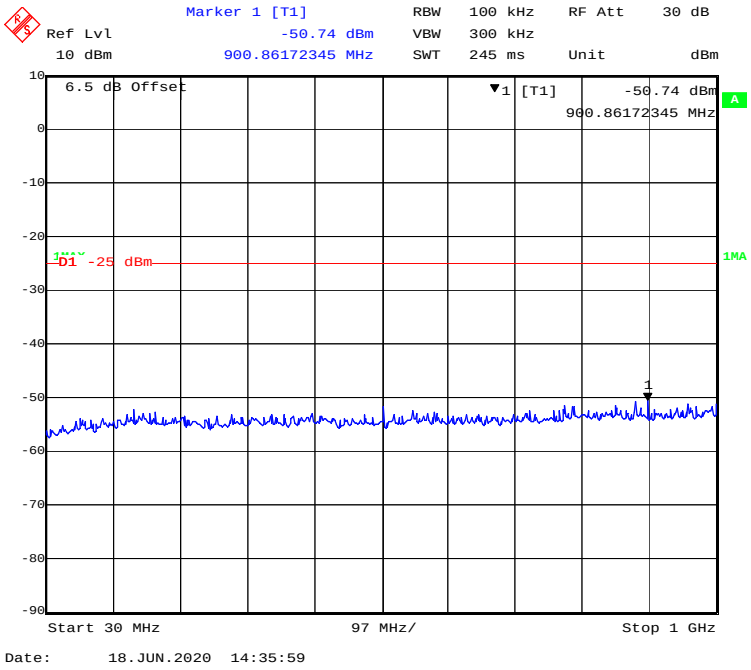


1 GHz – 26 GHz (16QAM, 10.0 MHz, Middle Channel)

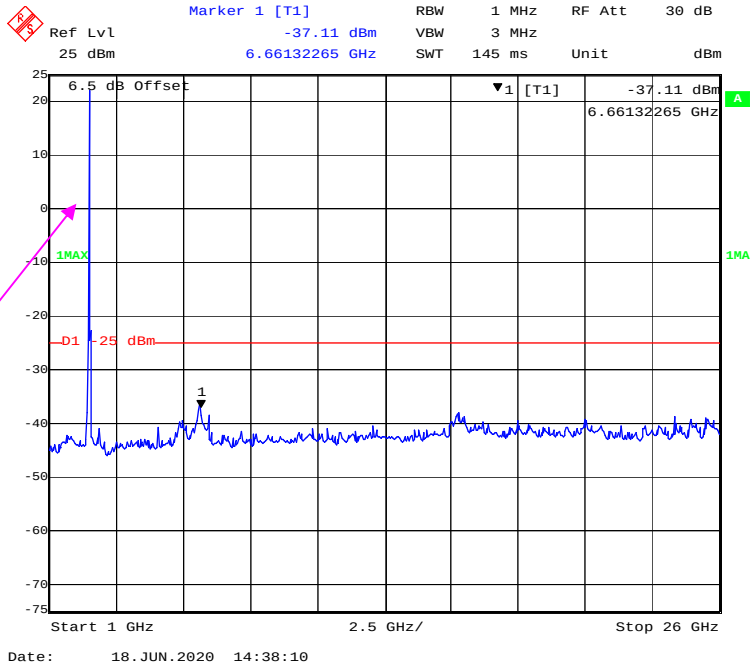


Fundamental

30 MHz - 1 GHz (16QAM, 15.0 MHz, Middle Channel)

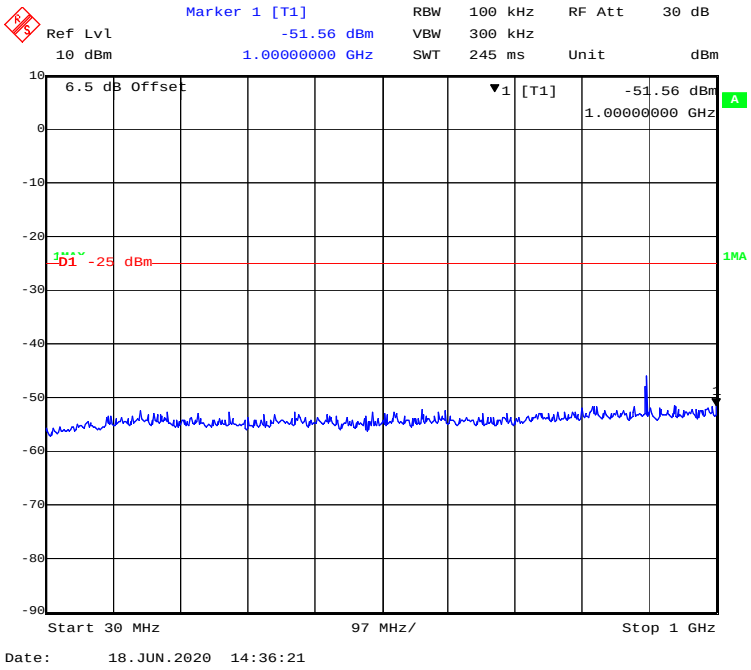


1 GHz – 26 GHz (16QAM, 15.0MHz, Middle Channel)

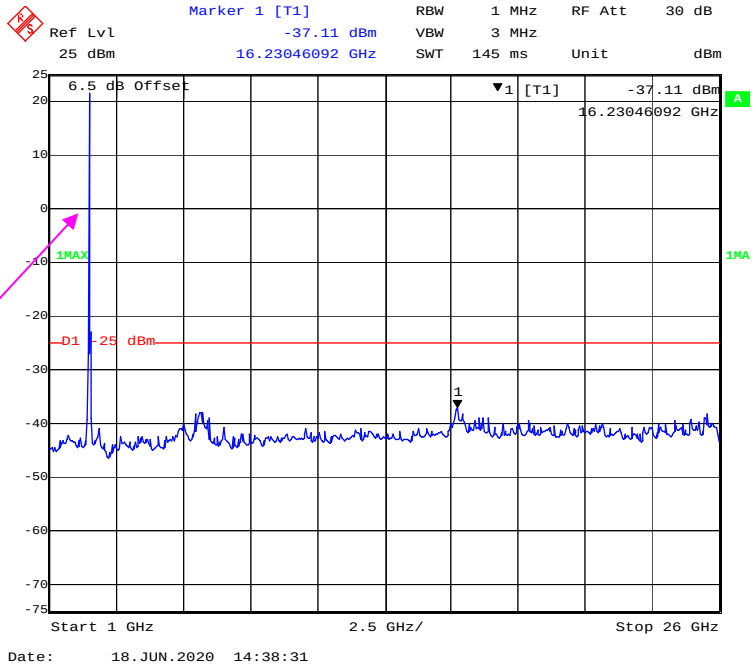


Fundamental

30 MHz - 1 GHz (16QAM, 20.0 MHz, Middle Channel)



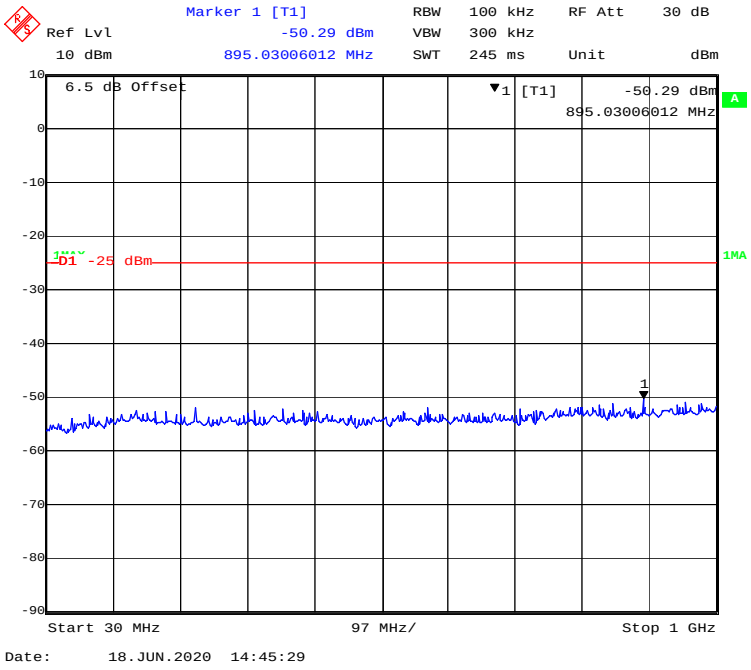
1 GHz – 26 GHz (16QAM, 20.0 MHz, Middle Channel)



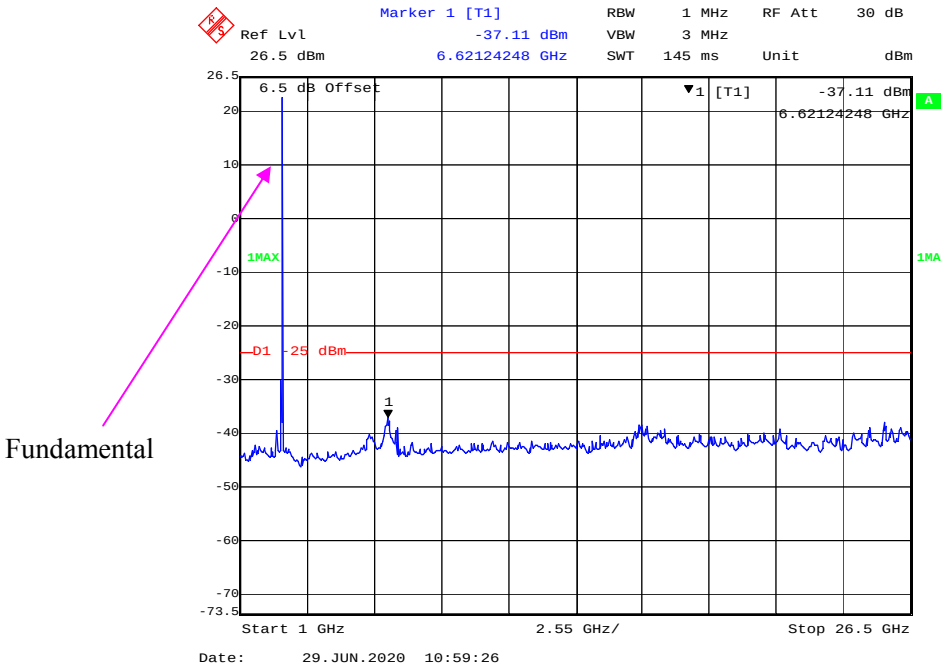
Fundamental

LTE Band 38

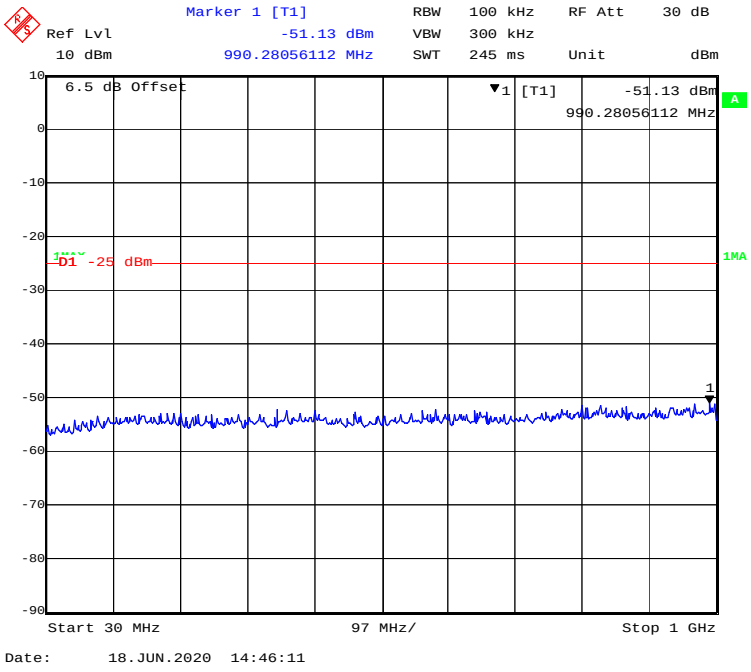
30 MHz - 1 GHz (QPSK, 5.0 MHz, Middle Channel)



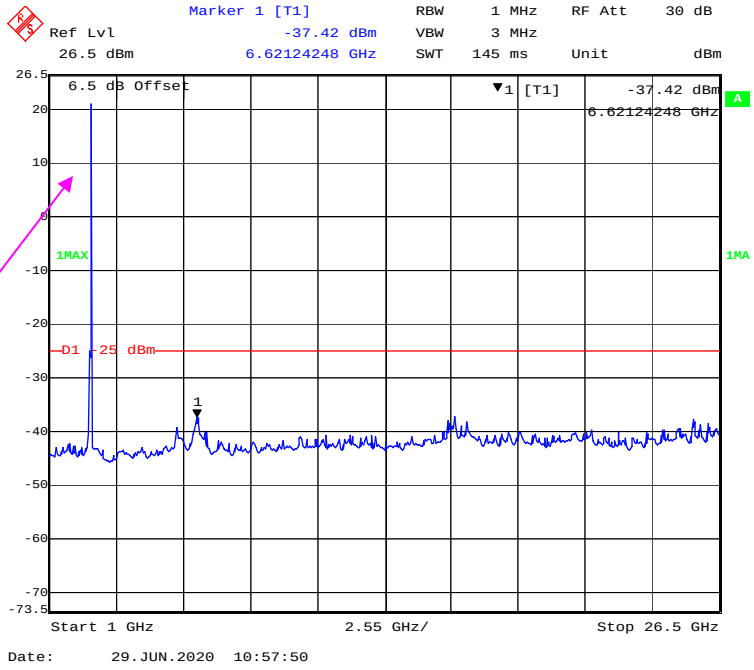
1 GHz – 26.5 GHz (QPSK, 5.0 MHz, Middle Channel)



30 MHz - 1 GHz (QPSK, 10.0 MHz, Middle Channel)

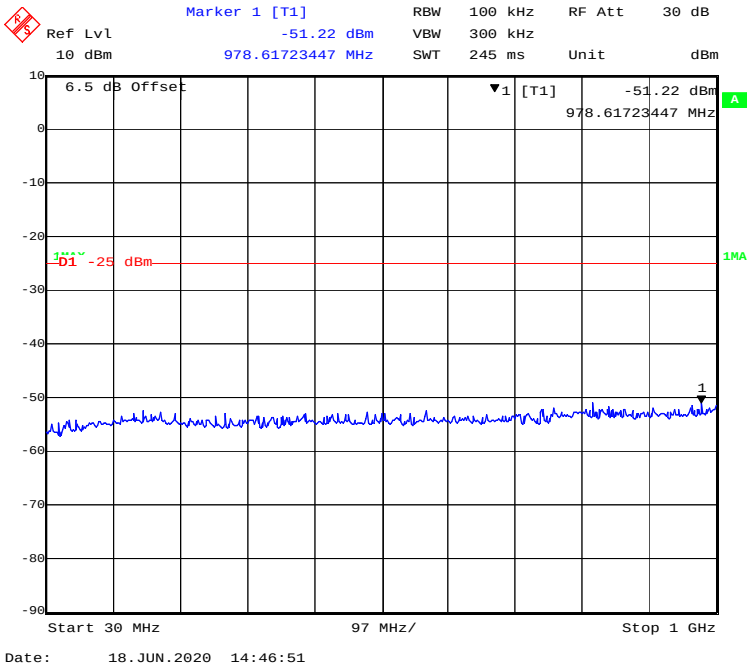


1 GHz – 26.5 GHz (QPSK, 10.0 MHz, Middle Channel)

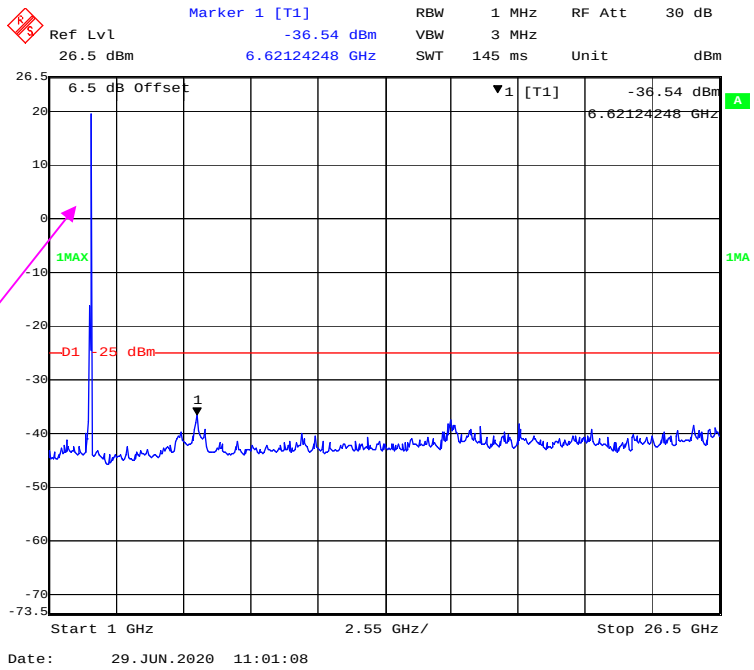


Fundamental

30 MHz - 1 GHz (QPSK, 15.0 MHz, Middle Channel)

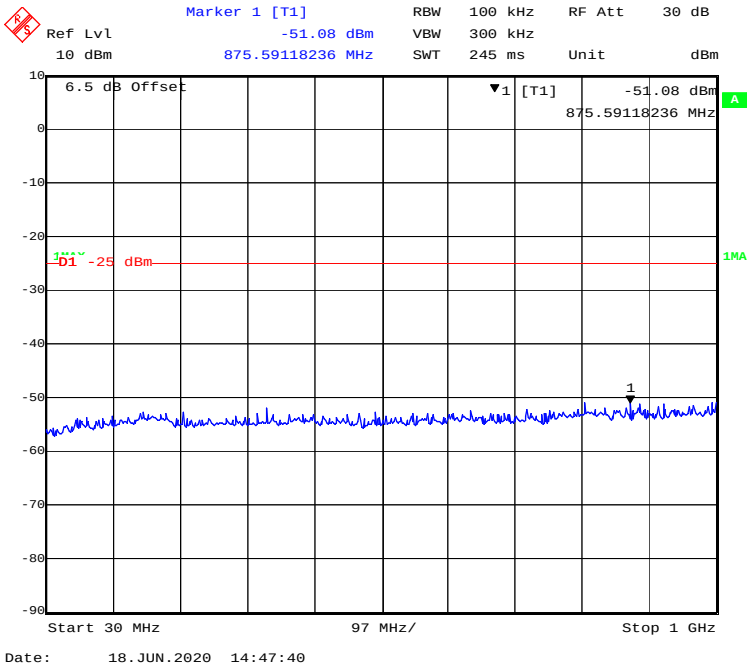


1 GHz – 26.5 GHz (QPSK, 15.0MHz, Middle Channel)

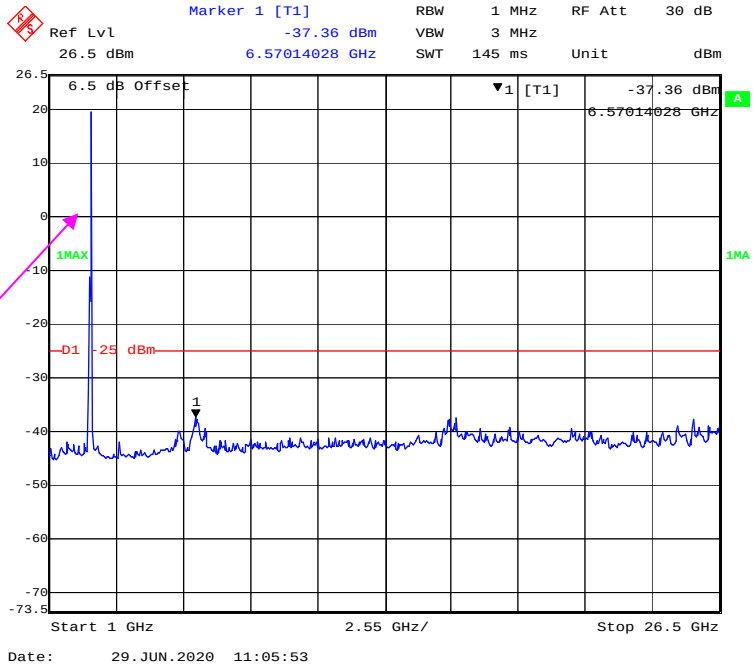


Fundamental

30 MHz - 1 GHz (QPSK, 20.0 MHz, Middle Channel)

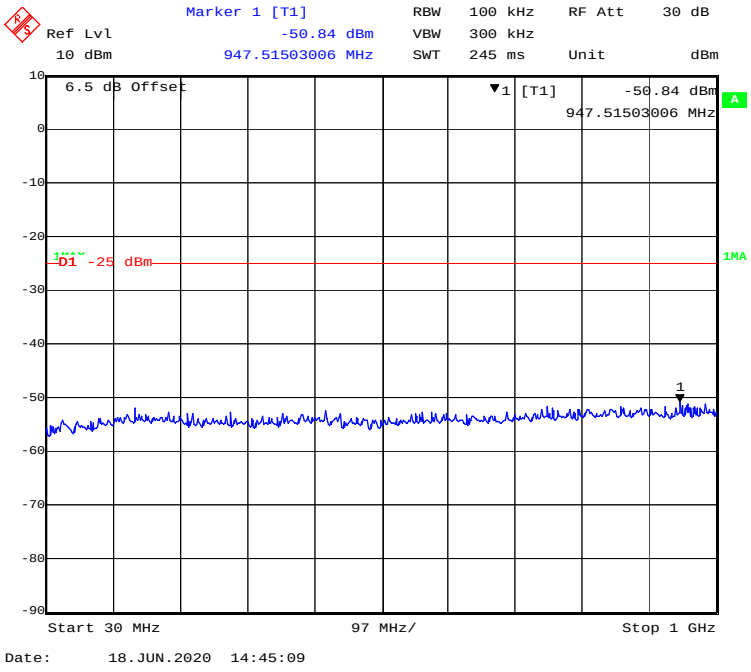


1 GHz – 26.5 GHz (QPSK, 20.0 MHz, Middle Channel)

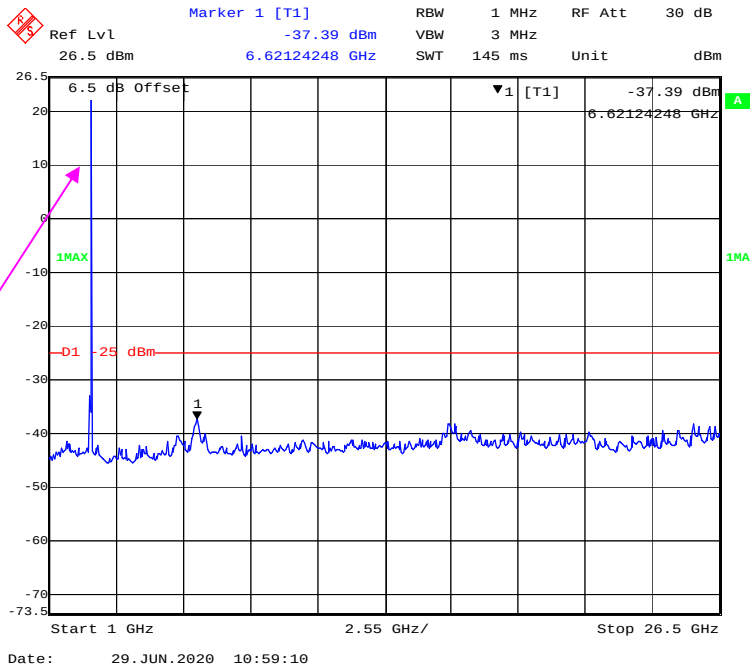


Fundamental

30 MHz - 1 GHz (16QAM, 5.0 MHz, Middle Channel)

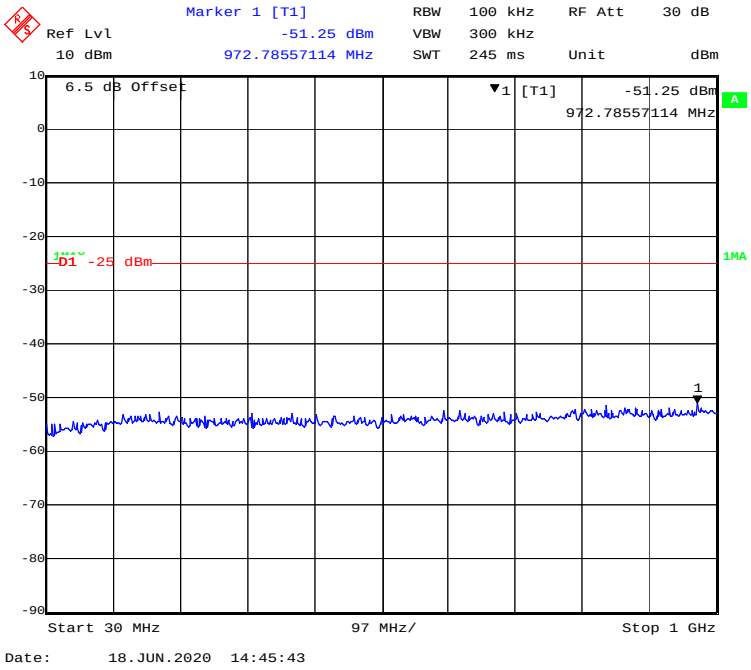


1 GHz – 26.5 GHz (16QAM, 5.0 MHz, Middle Channel)

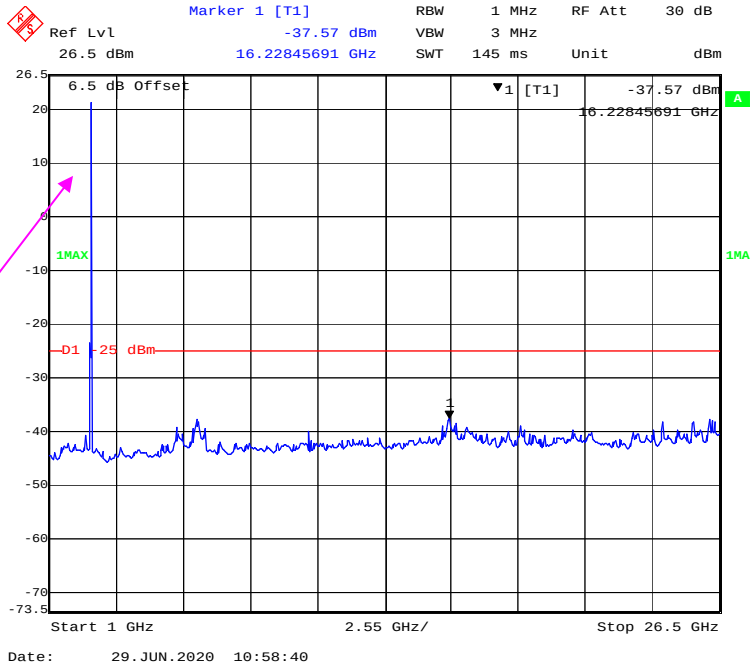


Fundamental

30 MHz - 1 GHz (16QAM, 10.0 MHz, Middle Channel)

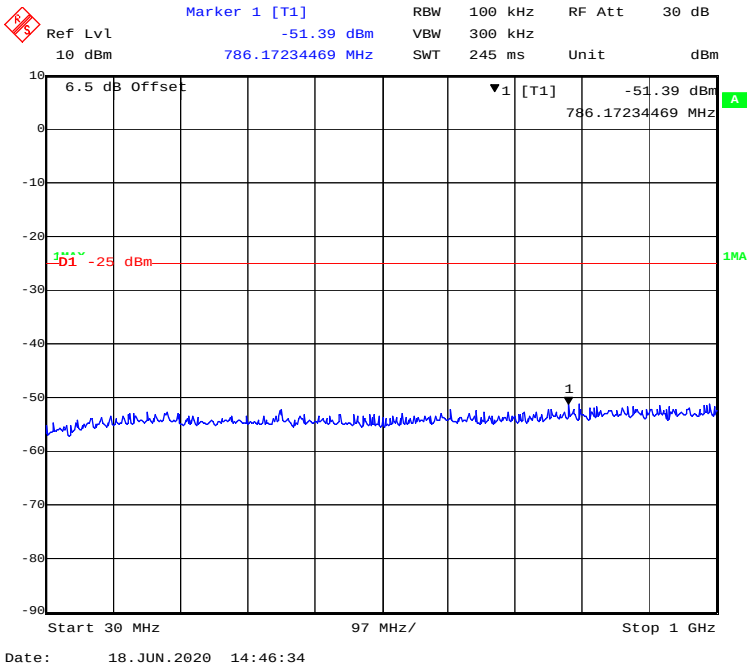


1 GHz – 26.5 GHz (16QAM, 10.0 MHz, Middle Channel)

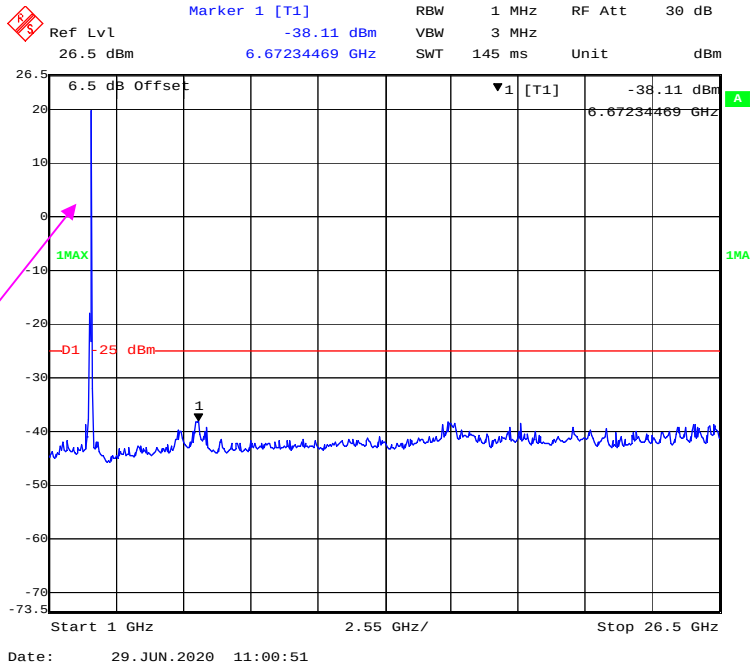


Fundamental

30 MHz - 1 GHz (16QAM, 15.0 MHz, Middle Channel)

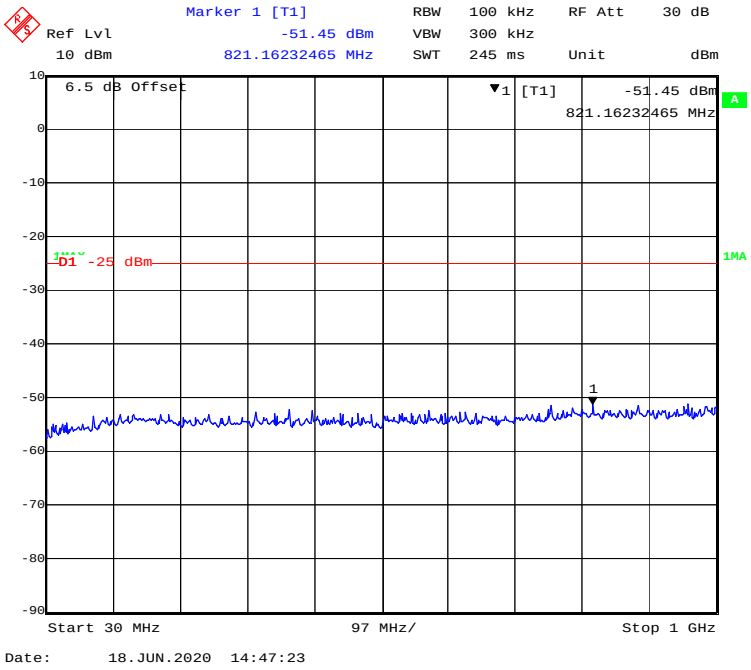


1 GHz – 26.5 GHz (16QAM, 15.0MHz, Middle Channel)

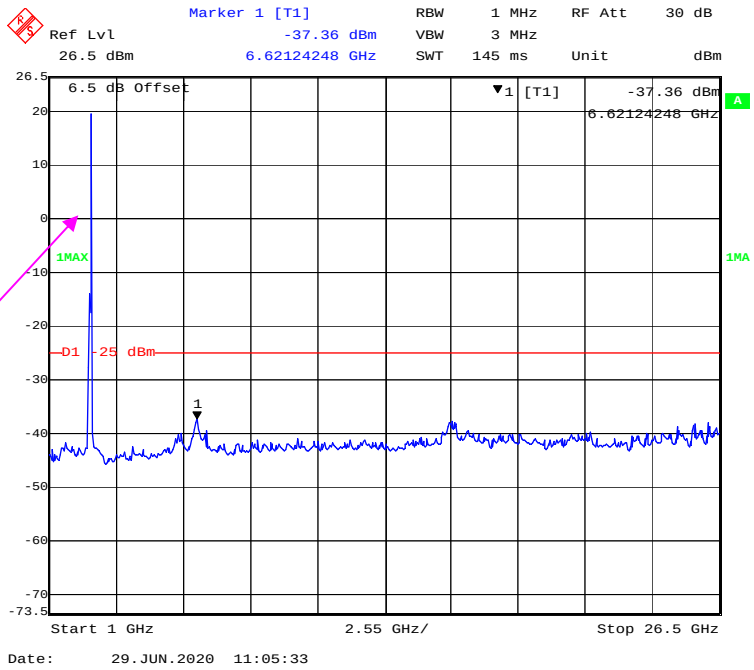


Fundamental

30 MHz - 1 GHz (16QAM, 20.0 MHz, Middle Channel)



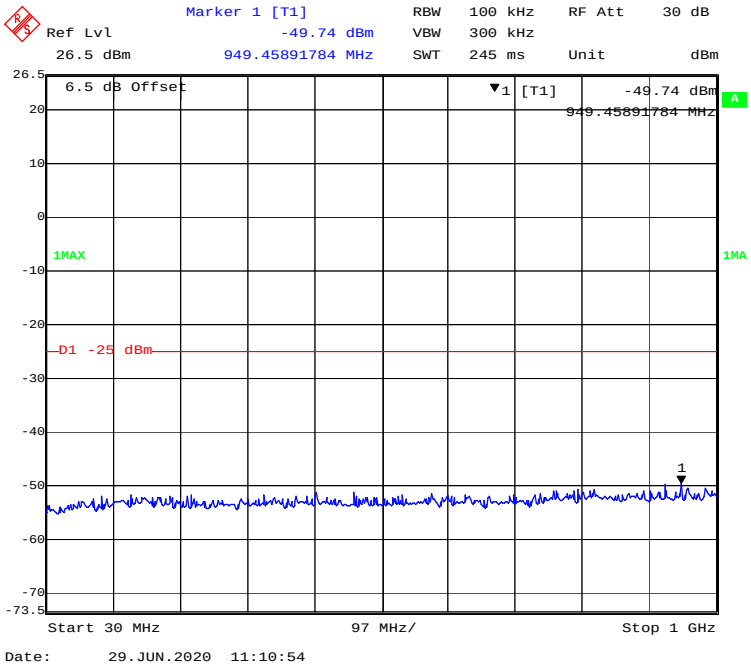
1 GHz – 26.5 GHz (16QAM, 20.0 MHz, Middle Channel)



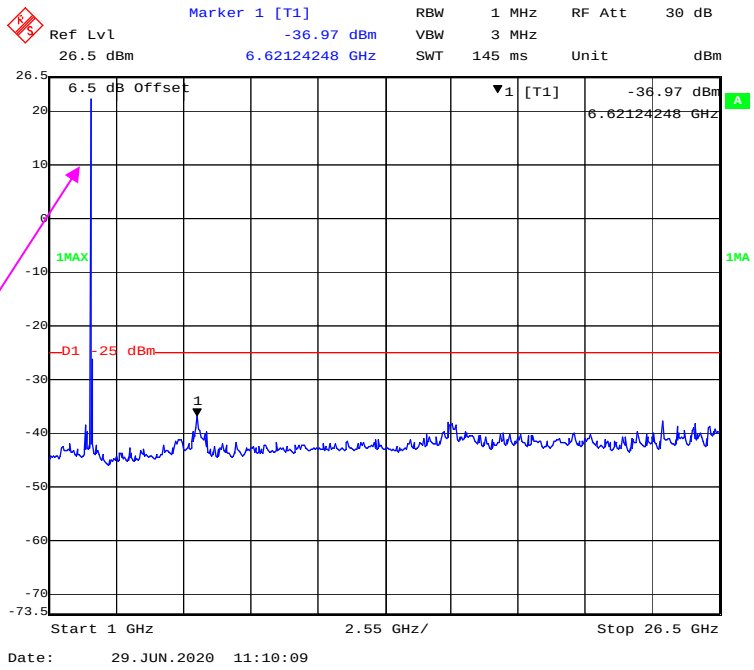
Fundamental

LTE Band 41

30 MHz - 1 GHz (QPSK, 5.0 MHz, Middle Channel)

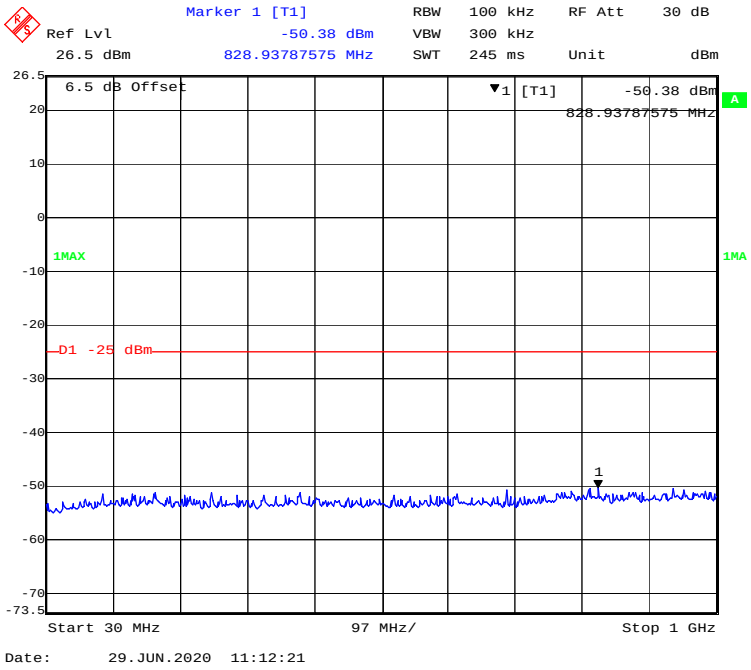


1 GHz – 26.5 GHz (QPSK, 5.0 MHz, Middle Channel)

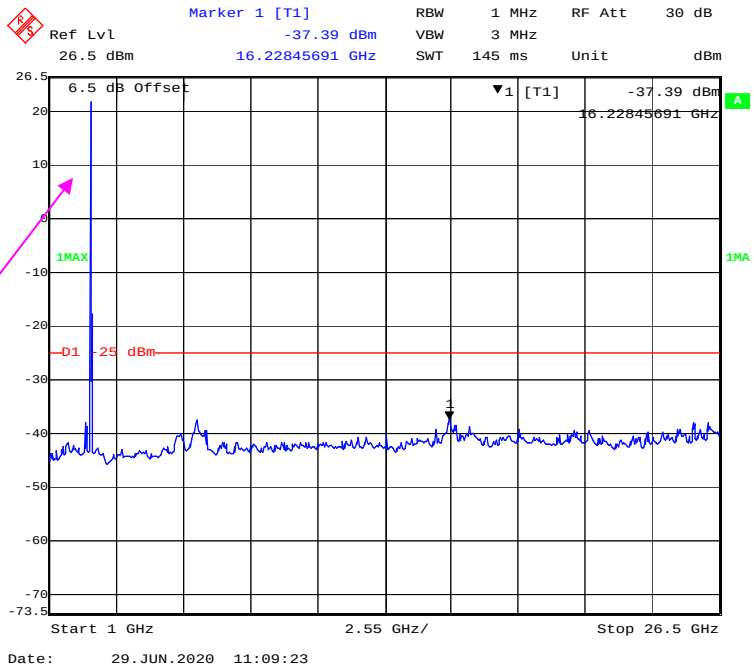


Fundamental

30 MHz - 1 GHz (QPSK, 10.0 MHz, Middle Channel)

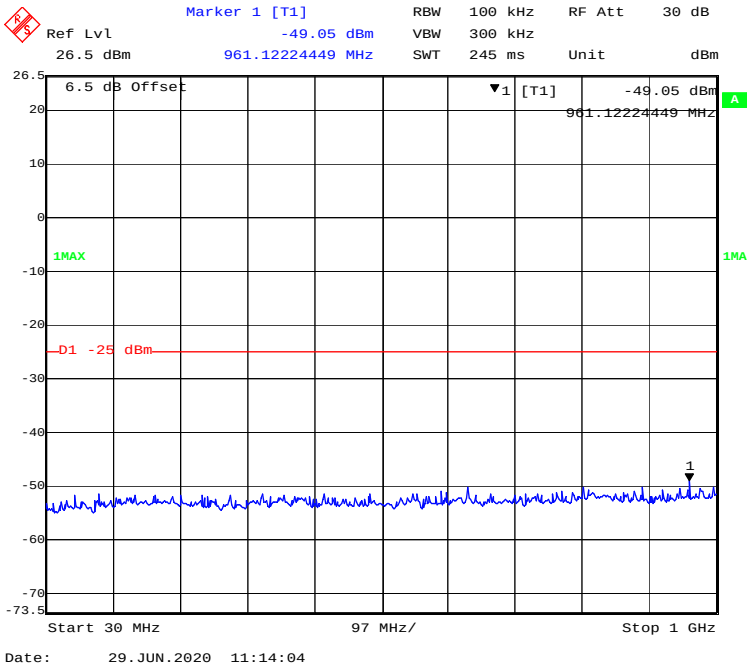


1 GHz – 26.5 GHz (QPSK, 10.0 MHz, Middle Channel)

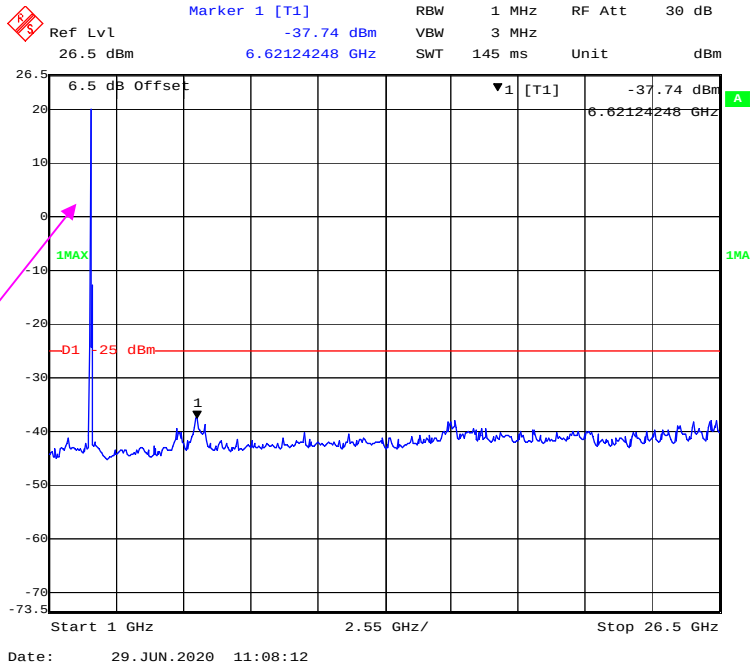


Fundamental

30 MHz - 1 GHz (QPSK, 15.0 MHz, Middle Channel)

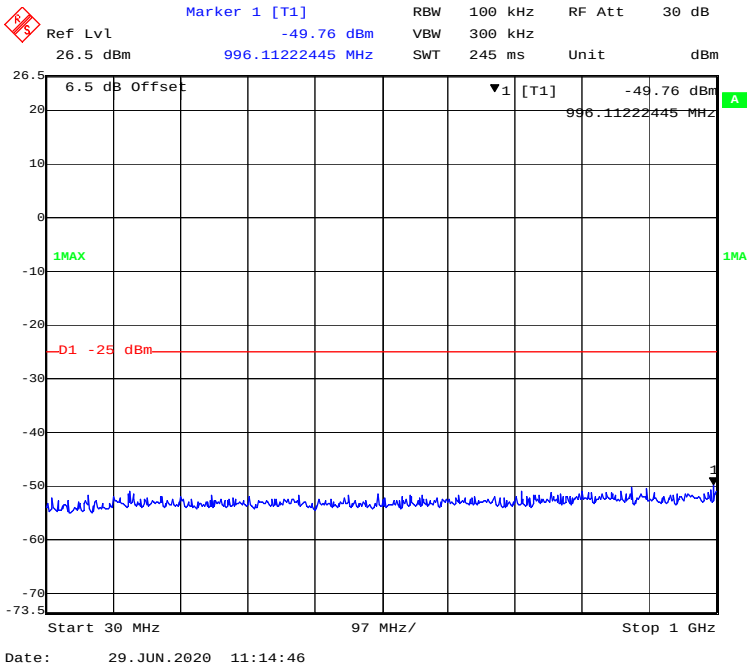


1 GHz – 26.5 GHz (QPSK, 15.0MHz, Middle Channel)

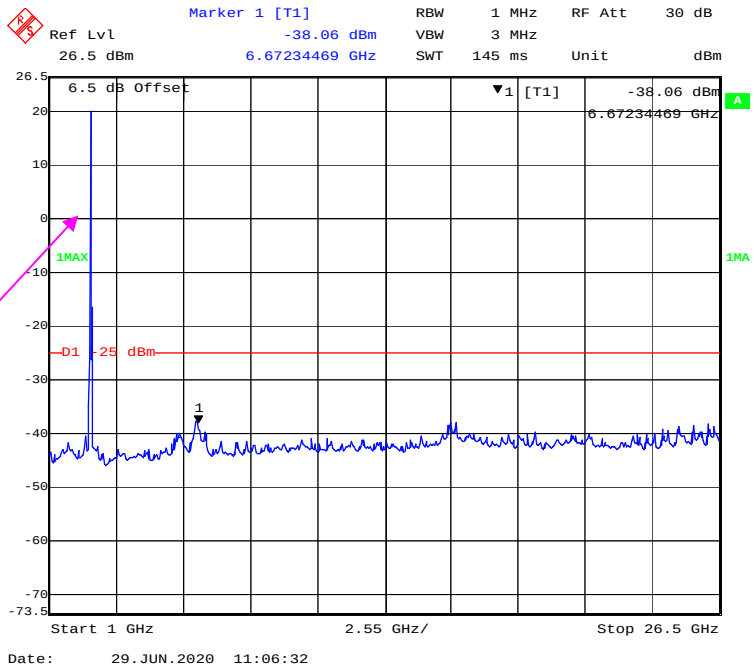


Fundamental

30 MHz - 1 GHz (QPSK, 20.0 MHz, Middle Channel)

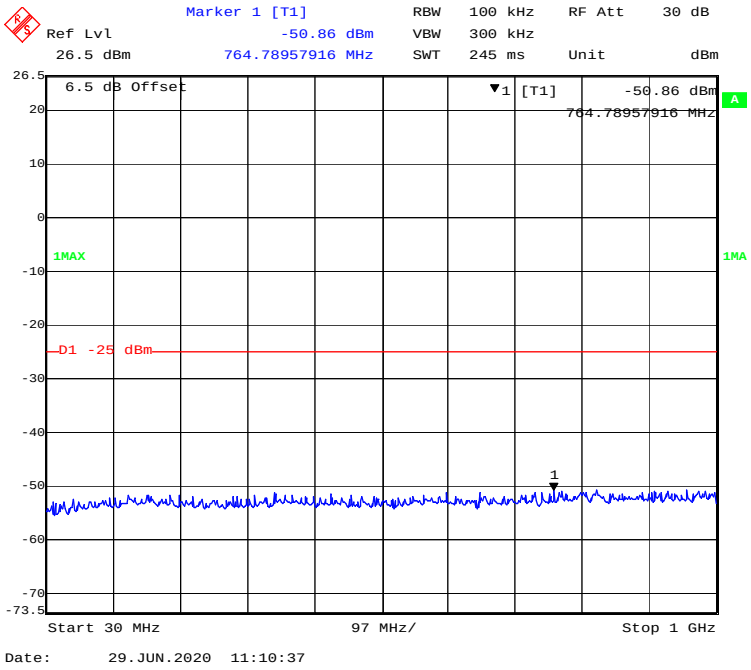


1 GHz – 26.5 GHz (QPSK, 20.0 MHz, Middle Channel)

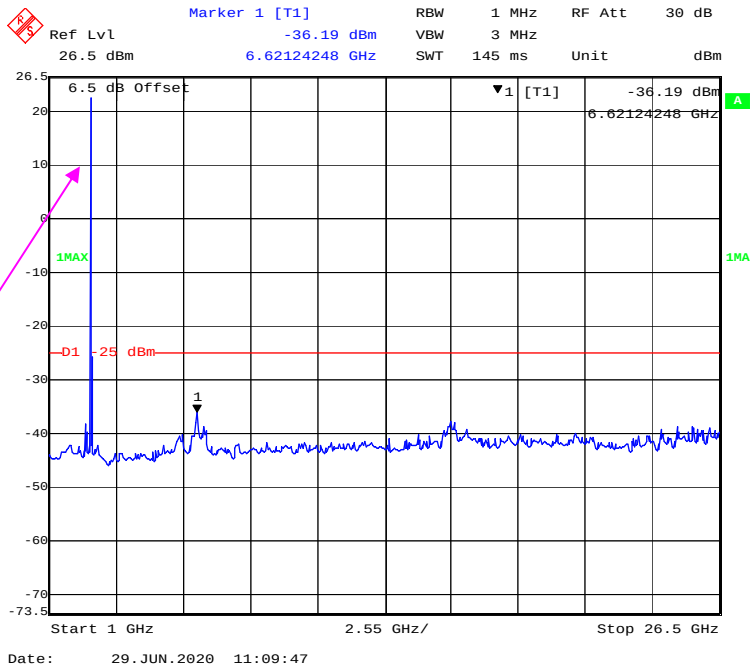


Fundamental

30 MHz - 1 GHz (16QAM, 5.0 MHz, Middle Channel)

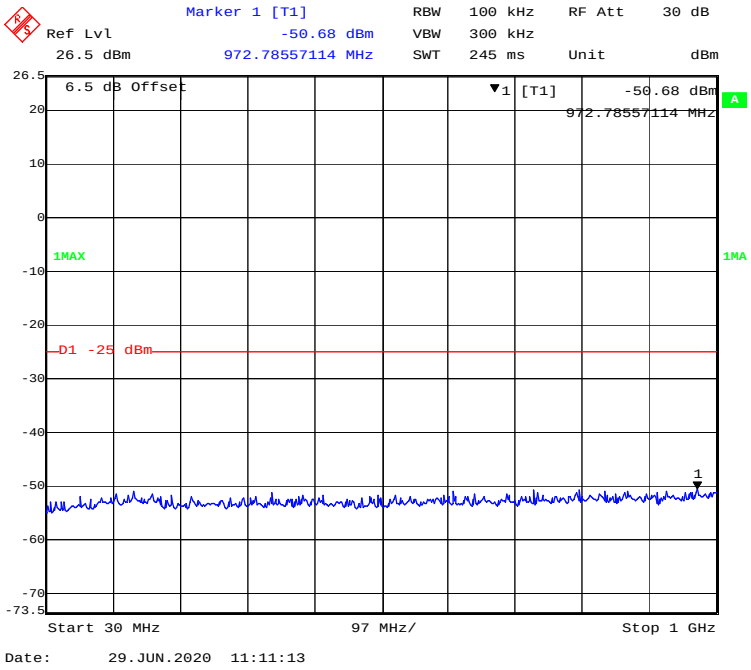


1 GHz – 26.5 GHz (16QAM, 5.0 MHz, Middle Channel)

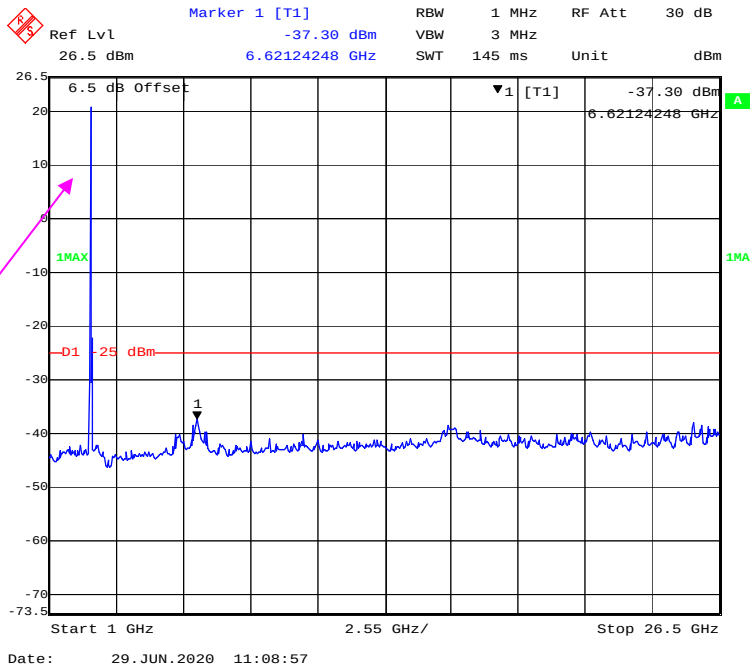


Fundamental

30 MHz - 1 GHz (16QAM, 10.0 MHz, Middle Channel)

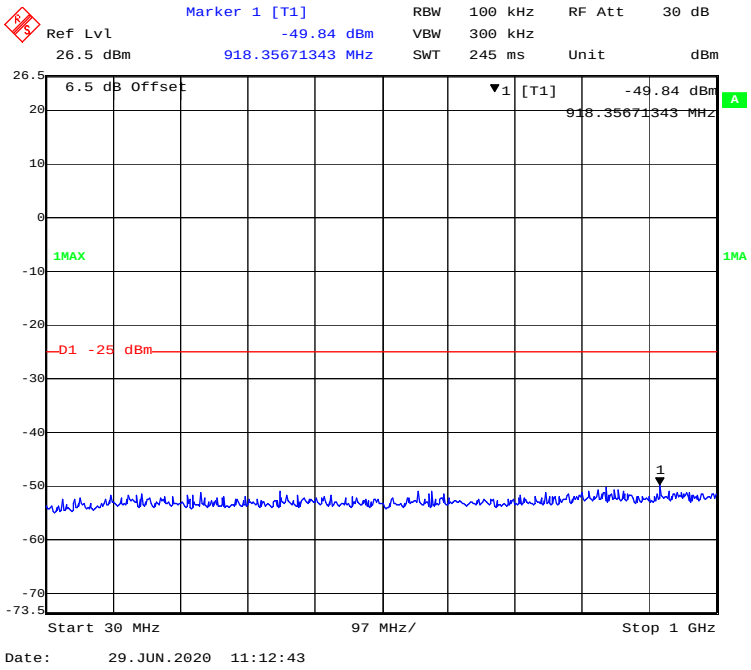


1 GHz – 26.5 GHz (16QAM, 10.0 MHz, Middle Channel)

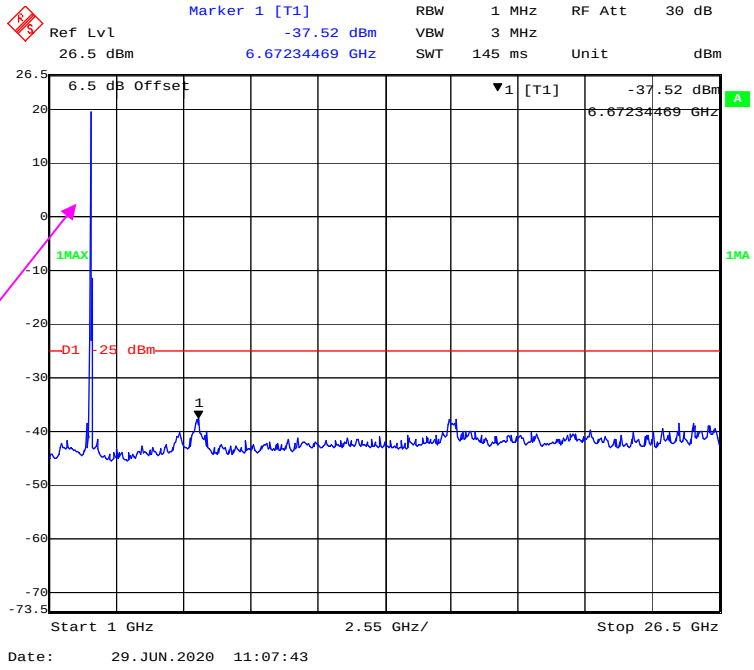


Fundamental

30 MHz - 1 GHz (16QAM, 15.0 MHz, Middle Channel)

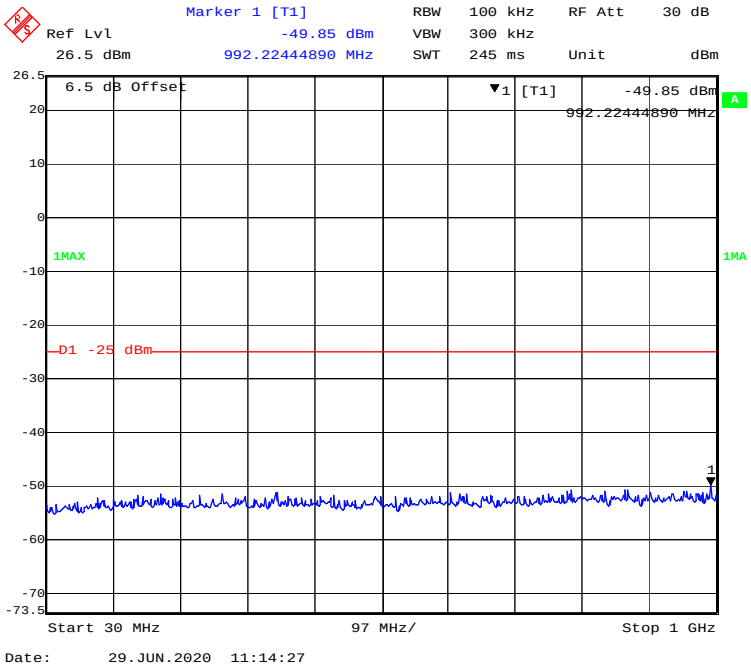


1 GHz – 26.5 GHz (16QAM, 15.0MHz, Middle Channel)

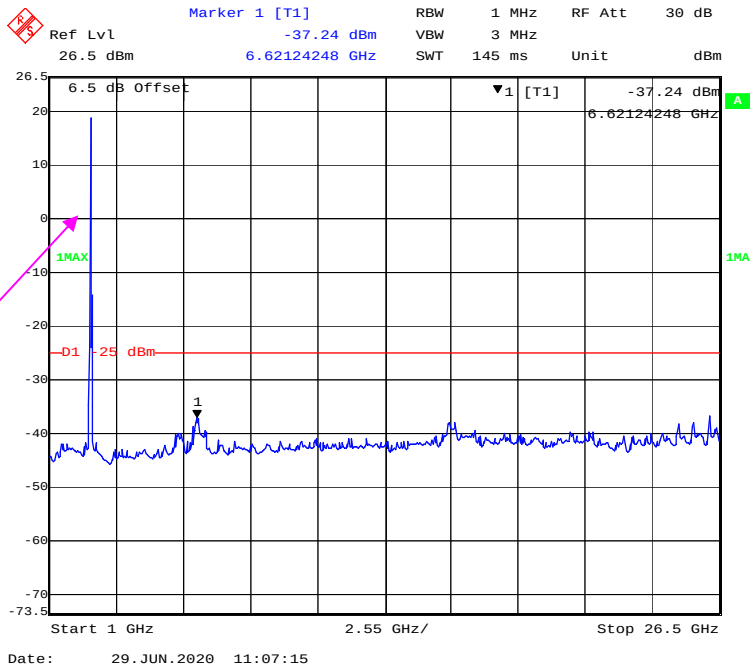


Fundamental

30 MHz - 1 GHz (16QAM, 20.0 MHz, Middle Channel)



1 GHz – 26.5 GHz (16QAM, 20.0 MHz, Middle Channel)



Fundamental

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

Applicable Standards

FCC § 2.1053, §22.917(a), § 24.238(a) and § 27.53 (m)

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.

27.53 (m), 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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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:	23.5~24.9 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.7~101.9 kPa

The testing was performed by Jack Jiao from 2020-06-06 to 2020-06-18.

Test mode: Transmitting (Pre-scan with low, middle and high channels, and the worse case data as below)

30 MHz ~ 10 GHz:

GPRS 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, Middle channel										
694.58	56.52	203	100	H	-43.31	0.62	-1.69	-45.62	-13.00	32.62
694.58	55.42	225	150	V	-44.41	0.62	-1.69	-46.72	-13.00	33.72
1673.20	59.51	27	150	H	-43.88	0.84	8.48	-36.24	-13.00	23.24
1673.20	58.21	34	150	V	-45.18	0.84	8.48	-37.54	-13.00	24.54
2509.80	56.21	264	100	H	-44.73	0.89	10.09	-35.53	-13.00	22.53
2509.80	53.41	162	200	V	-47.53	0.89	10.09	-38.33	-13.00	25.33

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, Middle channel										
694.58	59.21	245	150	H	-40.62	0.62	-1.69	-42.93	-13.00	29.93
694.58	57.12	169	150	V	-42.71	0.62	-1.69	-45.02	-13.00	32.02
1673.20	56.21	143	100	H	-47.18	0.84	8.48	-39.54	-13.00	26.54
1673.20	58.12	87	100	V	-45.27	0.84	8.48	-37.63	-13.00	24.63
2509.80	58.65	195	150	H	-42.29	0.89	10.09	-33.09	-13.00	20.09
2509.80	59.32	98	200	V	-41.62	0.89	10.09	-32.42	-13.00	19.42

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, Middle channel										
694.58	59.21	335	100	H	-40.62	0.62	-1.69	-42.93	-13.00	29.93
694.58	58.32	295	100	V	-41.51	0.62	-1.69	-43.82	-13.00	30.82
3760.00	60.36	300	200	H	-46.42	0.95	9.74	-37.63	-13.00	24.63
3760.00	59.24	136	200	V	-47.86	0.95	9.74	-39.07	-13.00	26.07
5640.00	61.25	345	150	H	-41.92	1.15	10.74	-32.33	-13.00	19.33
5640.00	58.69	243	150	V	-44.78	1.15	10.74	-35.19	-13.00	22.19

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, Middle channel										
694.58	59.63	157	150	H	-40.2	0.62	-1.69	-42.51	-13.00	29.51
694.58	54.52	300	150	V	-45.31	0.62	-1.69	-47.62	-13.00	34.62
3760.00	63.21	324	200	H	-43.57	0.95	9.74	-34.78	-13.00	21.78
3760.00	59.58	9	100	V	-47.52	0.95	9.74	-38.73	-13.00	25.73
5640.00	62.21	249	100	H	-40.96	1.15	10.74	-31.37	-13.00	18.37
5640.00	60.54	162	150	V	-42.93	1.15	10.74	-33.34	-13.00	20.34

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

Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)

30 MHz ~ 10 GHz:

LTE Band 5:

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)			
QPSK 1.4MHz Bandwidth Middle Channel										
693.87	58.51	167	100	H	-41.25	0.62	-1.68	-38.95	-13.00	25.95
693.87	55.21	254	200	V	-44.55	0.62	-1.68	-42.25	-13.00	29.25
1673.00	49.54	30	150	H	-53.85	0.84	8.48	-46.21	-13.00	33.21
1673.00	48.50	57	100	V	-54.89	0.84	8.48	-47.25	-13.00	34.25
2509.50	44.97	190	200	H	-55.98	0.89	10.09	-46.78	-13.00	33.78
2509.50	43.64	236	150	V	-57.31	0.89	10.09	-48.11	-13.00	35.11
16-QAM 1.4MHz Bandwidth Middle Channel										
693.87	56.21	298	150	H	-43.55	0.62	-1.68	-41.25	-13.00	28.25
693.87	54.23	139	150	V	-45.53	0.62	-1.68	-43.23	-13.00	30.23
1673.00	48.67	348	200	H	-54.72	0.84	8.48	-47.08	-13.00	34.08
1673.00	46.53	146	200	V	-56.86	0.84	8.48	-49.22	-13.00	36.22
2509.50	44.63	182	150	H	-56.32	0.89	10.09	-47.12	-13.00	34.12
2509.50	42.52	325	150	V	-58.43	0.89	10.09	-49.23	-13.00	36.23

30MHz~26GHz:

LTE Band 7:

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)			
QPSK 5MHz Bandwidth Middle Channel										
693.87	58.21	11	200	H	-41.55	0.62	-1.68	-39.25	-25.00	14.25
693.87	54.16	189	200	V	-45.6	0.62	-1.68	-43.30	-25.00	18.30
5070.00	33.86	55	100	H	-61.42	1.09	10.30	-52.21	-25.00	27.21
5070.00	31.95	56	150	V	-63.33	1.09	10.30	-54.12	-25.00	29.12
7605.00	32.12	152	150	H	-58.53	1.78	10.08	-50.23	-25.00	25.23
7605.00	28.48	237	150	V	-62.17	1.78	10.08	-53.87	-25.00	28.87
16-QAM 5MHz Bandwidth Middle Channel										
693.87	57.45	229	100	H	-42.31	0.62	-1.68	-40.01	-25.00	15.01
693.87	53.52	312	150	V	-46.24	0.62	-1.68	-43.94	-25.00	18.94
5070.00	33.53	120	150	H	-61.75	1.09	10.30	-52.54	-25.00	27.54
5070.00	31.91	239	200	V	-63.37	1.09	10.30	-54.16	-25.00	29.16
7605.00	32.77	103	100	H	-57.88	1.78	10.08	-49.58	-25.00	24.58
7605.00	30.81	66	150	V	-59.84	1.78	10.08	-51.54	-25.00	26.54

LTE Band 38:

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)			
QPSK 5MHz Bandwidth Middle Channel										
694.87	59.55	343	100	H	-40.31	0.62	-1.69	-38.00	-25.00	13.00
694.87	54.62	20	200	V	-45.24	0.62	-1.69	-42.93	-25.00	17.93
5190.00	39.47	29	100	H	-55.42	1.10	10.30	-46.22	-25.00	21.22
5190.00	39.47	268	150	V	-55.42	1.10	10.30	-46.22	-25.00	21.22
7785.00	37.57	228	200	H	-52.55	1.81	10.04	-44.32	-25.00	19.32
7785.00	39.20	163	150	V	-50.92	1.81	10.04	-42.69	-25.00	17.69
16-QAM 5MHz Bandwidth Middle Channel										
694.87	58.66	104	100	H	-41.2	0.62	-1.69	-38.89	-25.00	13.89
694.87	55.14	111	150	V	-44.72	0.62	-1.69	-42.41	-25.00	17.41
5190.00	42.48	1	100	H	-52.41	1.10	10.30	-43.21	-25.00	18.21
5190.00	43.61	252	200	V	-51.28	1.10	10.30	-42.08	-25.00	17.08
7785.00	35.91	116	100	H	-54.21	1.81	10.04	-45.98	-25.00	20.98
7785.00	34.37	331	150	V	-55.75	1.81	10.04	-47.52	-25.00	22.52

LTE Band 41:

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)			
QPSK 5MHz Bandwidth Middle Channel										
694.87	58.11	351	150	H	-41.75	0.62	-1.69	-39.44	-25.00	14.44
694.87	54.21	129	200	V	-45.65	0.62	-1.69	-43.34	-25.00	18.34
5210.00	41.39	146	100	H	-53.44	1.11	10.30	-44.25	-25.00	19.25
5210.00	39.46	69	100	V	-55.37	1.11	10.30	-46.18	-25.00	21.18
7815.00	35.30	111	150	H	-54.74	1.82	10.04	-46.52	-25.00	21.52
7815.00	32.67	221	200	V	-57.37	1.82	10.04	-49.15	-25.00	24.15
16-QAM 5MHz Bandwidth Middle Channel										
694.87	57.21	316	200	H	-42.65	0.62	-1.69	-40.34	-25.00	15.34
694.87	52.48	149	150	V	-47.38	0.62	-1.69	-45.07	-25.00	20.07
5210.00	43.06	207	150	H	-51.77	1.11	10.30	-42.58	-25.00	17.58
5210.00	40.42	326	100	V	-54.41	1.11	10.30	-45.22	-25.00	20.22
7815.00	34.71	329	100	H	-55.33	1.82	10.04	-47.11	-25.00	22.11
7815.00	32.67	39	200	V	-57.37	1.82	10.04	-49.15	-25.00	24.15

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); §27.53 (m) - 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.

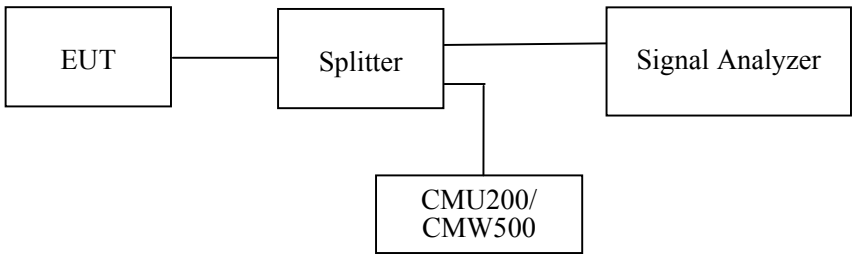
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to FCC §27.53 (m), 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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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

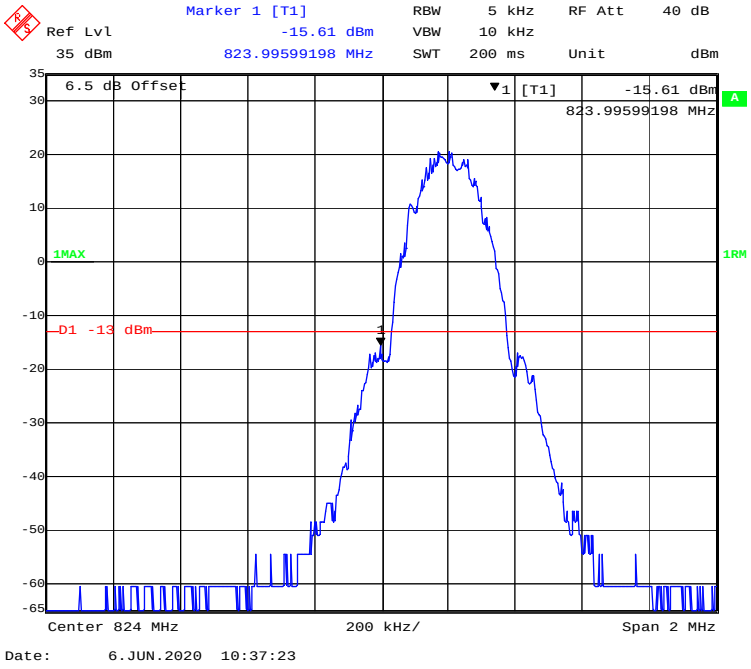
Temperature:	24.9~25.3 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.7~102.9 kPa

The testing was performed by Jack Jiao from 2020-06-06 to 2020-06-29.

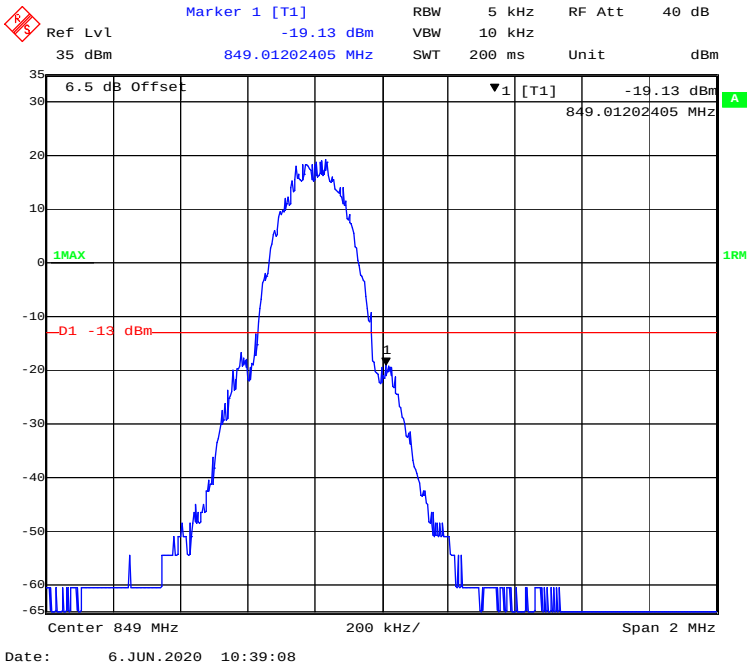
EUT operation mode: Transmitting
Test Result: Compliance.

GSM 850 Band:

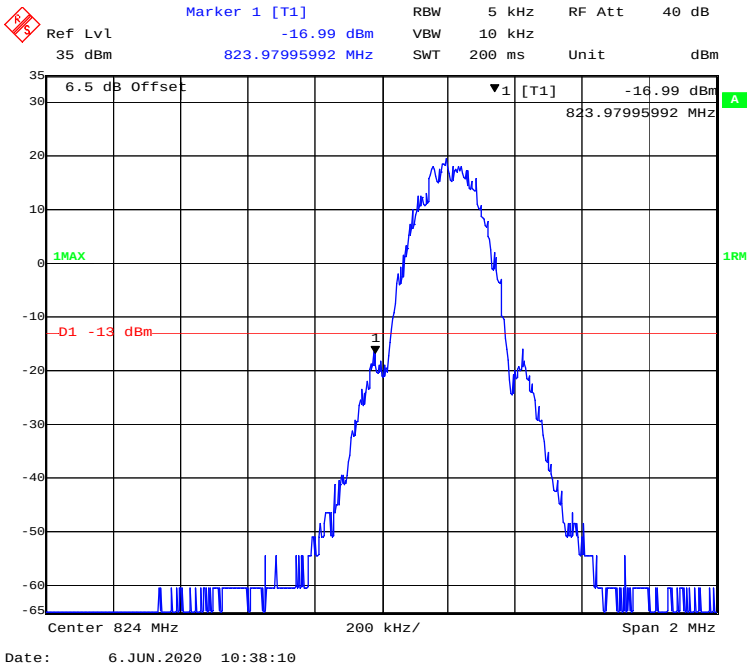
GPRS Mode, Left Band Edge



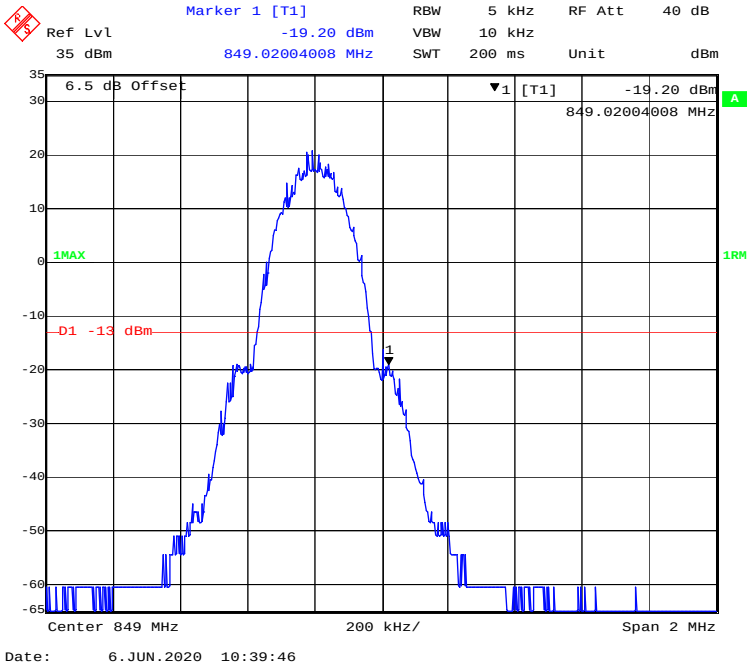
GPRS Mode, Right Band Edge



EGPRS Mode, Left Band Edge

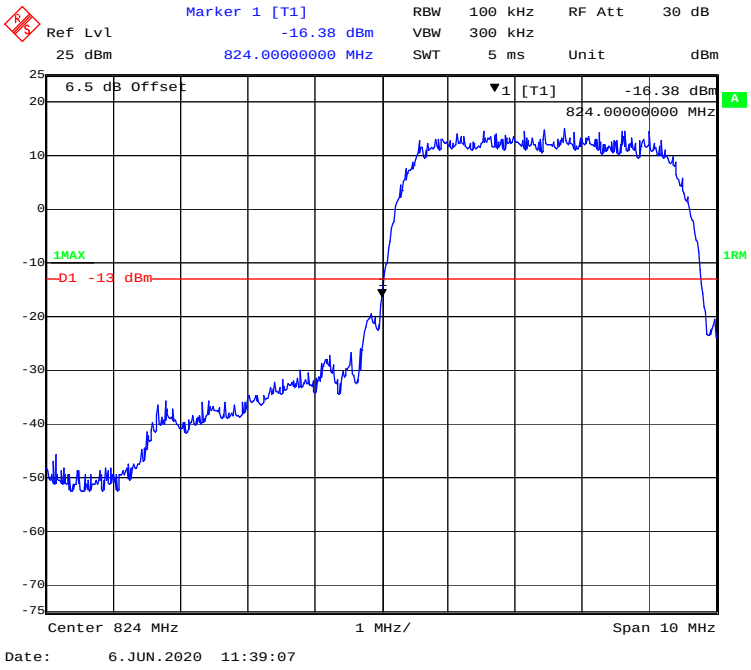


EGPRS Mode, Right Band Edge

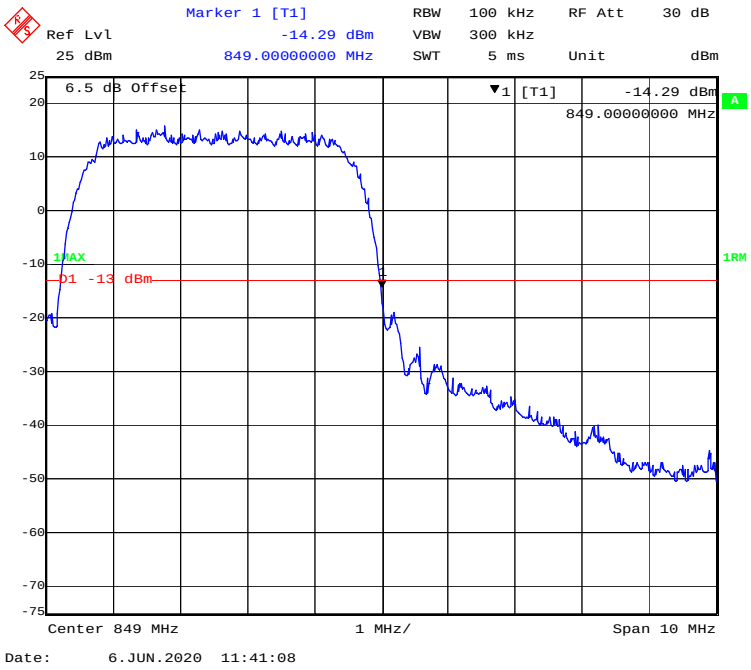


WCDMA Band V

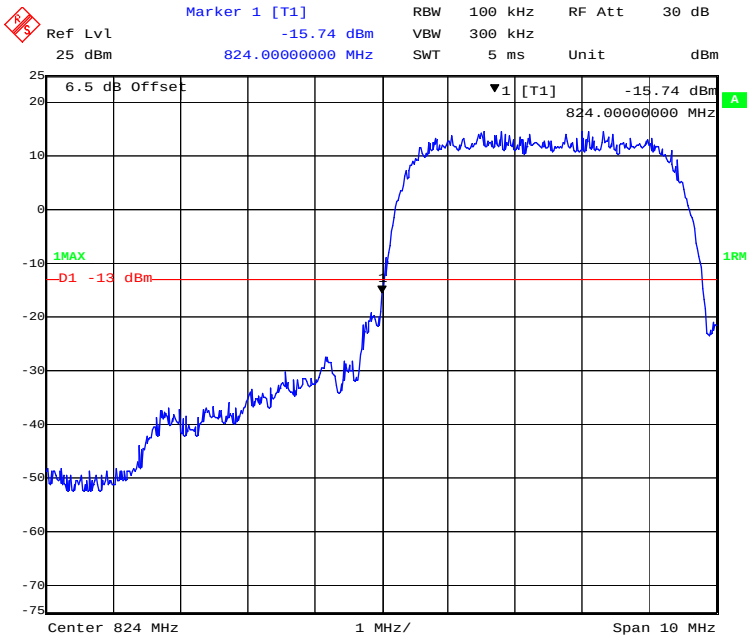
WCDMA (Rel 99) Mode, Left Band Edge



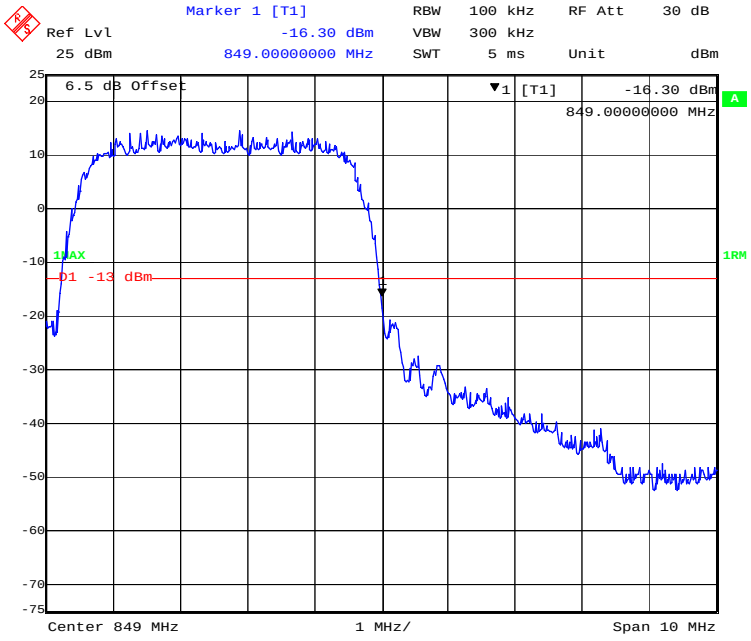
WCDMA (Rel 99) Mode, Right Band Edge



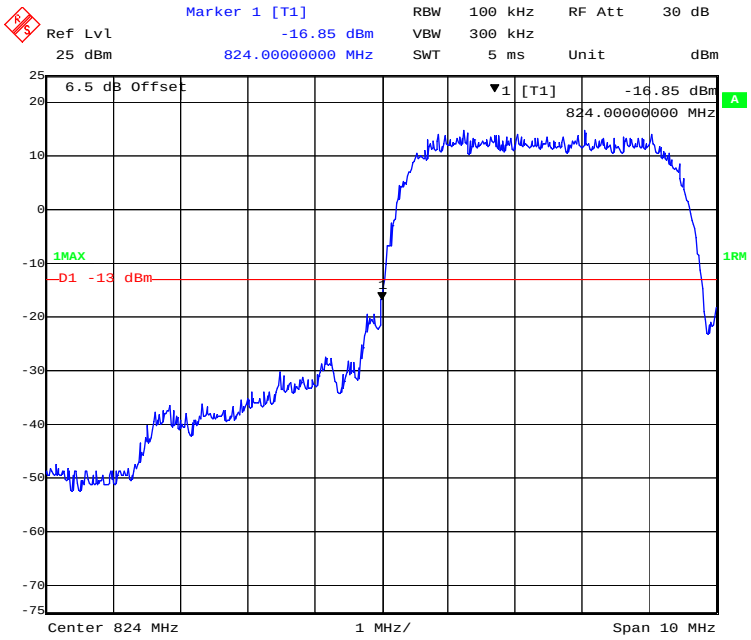
WCDMA (HSDPA) Mode, Left Band Edge



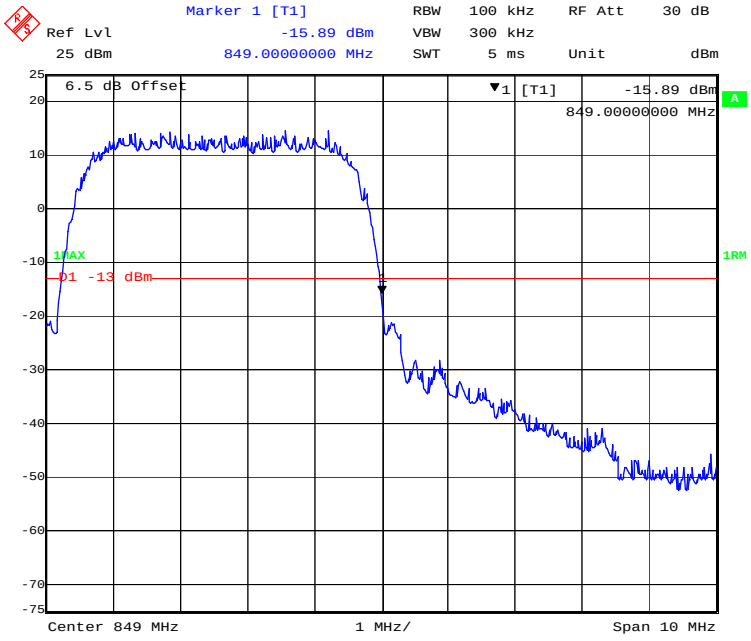
WCDMA (HSDPA) Mode, Right Band Edge



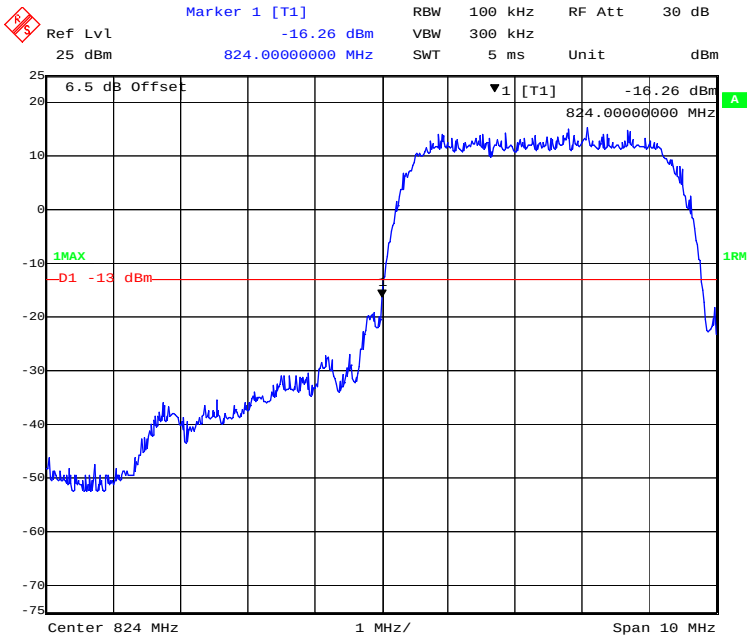
WCDMA (HSUPA) Mode, Left Band Edge



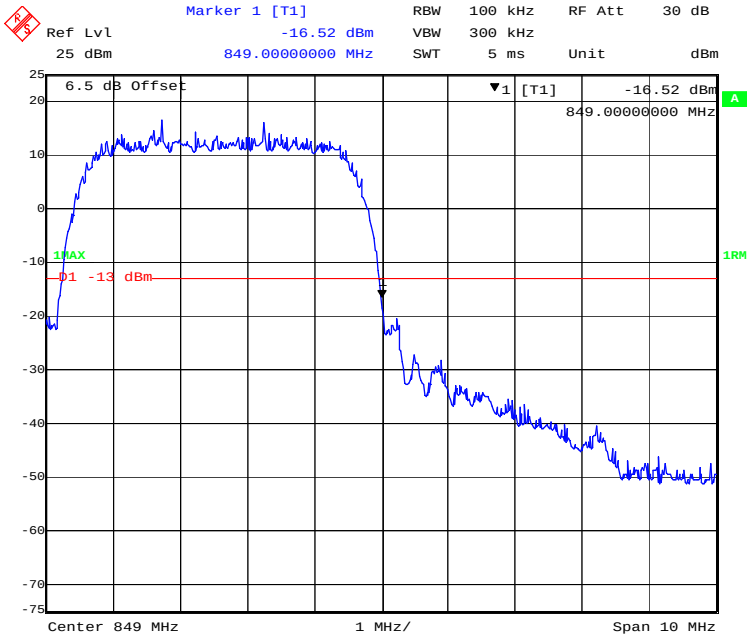
WCDMA (HSUPA) Mode, Right Band Edge



WCDMA (HSPA+) Mode, Left Band Edge

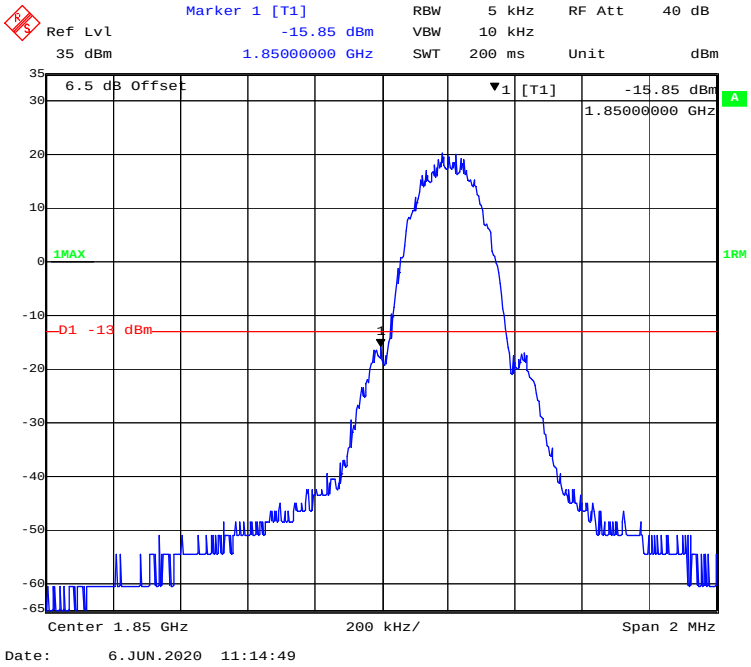


WCDMA (HSPA+) Mode, Right Band Edge

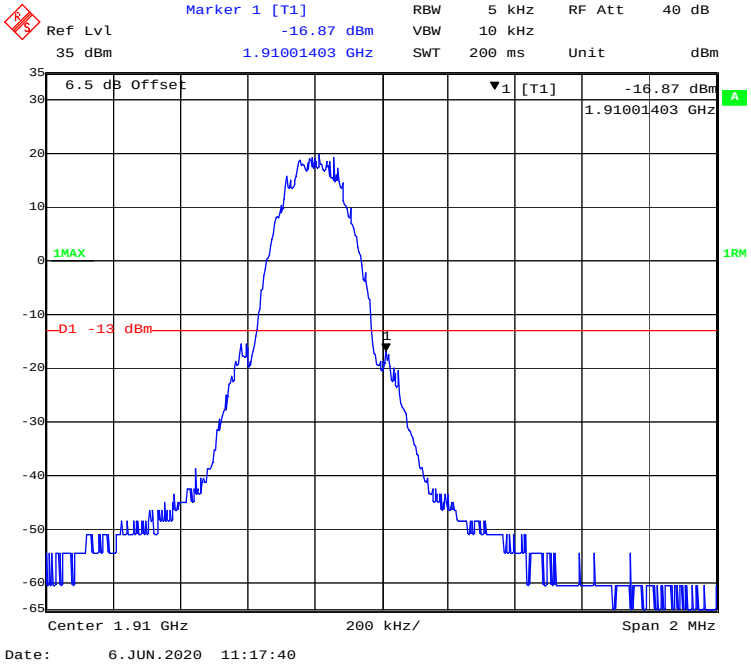


PCS 1900 Band:

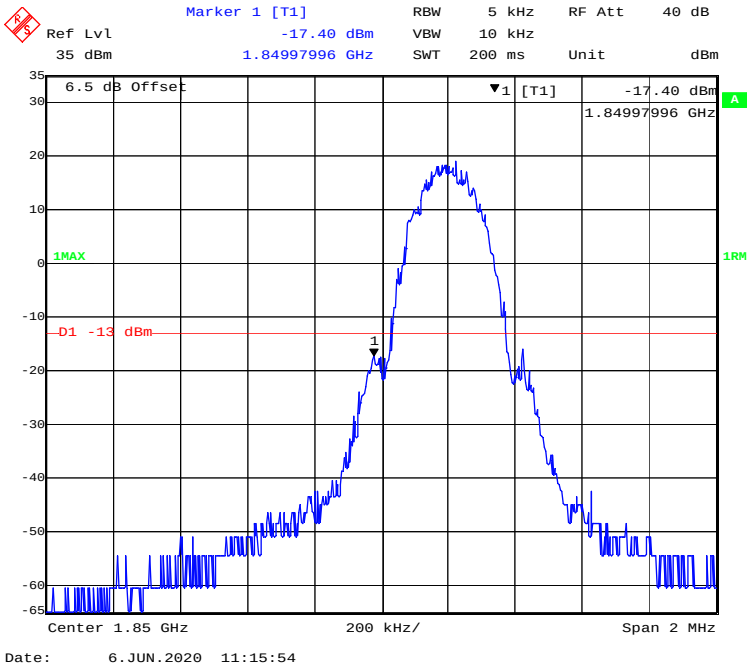
GPRS Mode, Left Band Edge



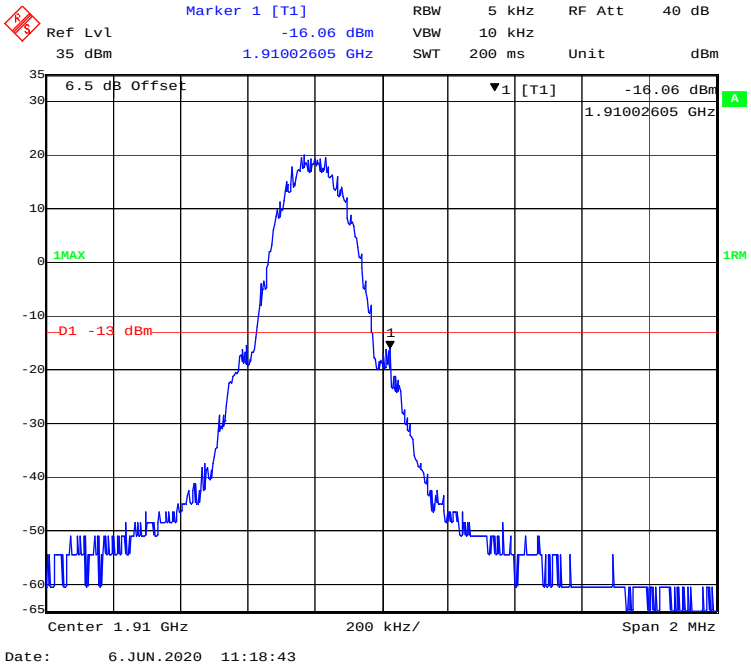
GPRS Mode, Right Band Edge



EGPRS Mode, Left Band Edge

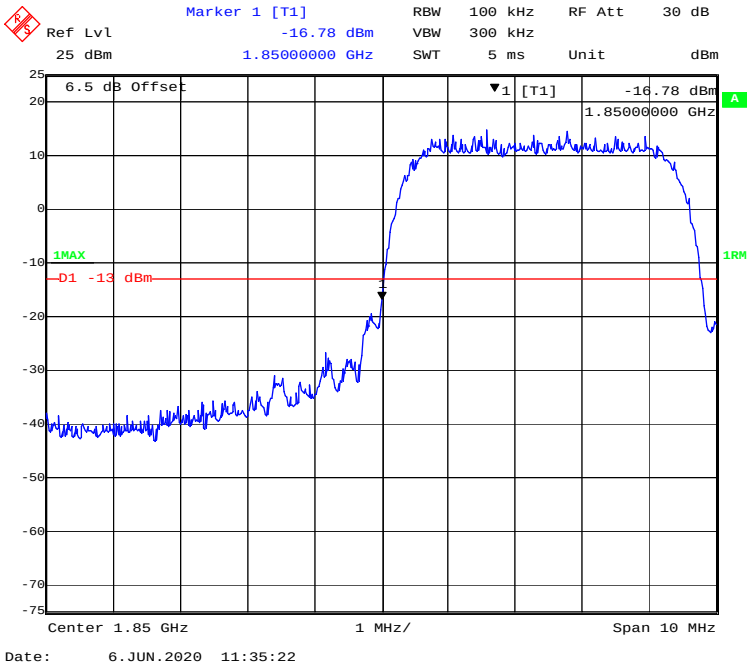


EGPRS Mode, Right Band Edge

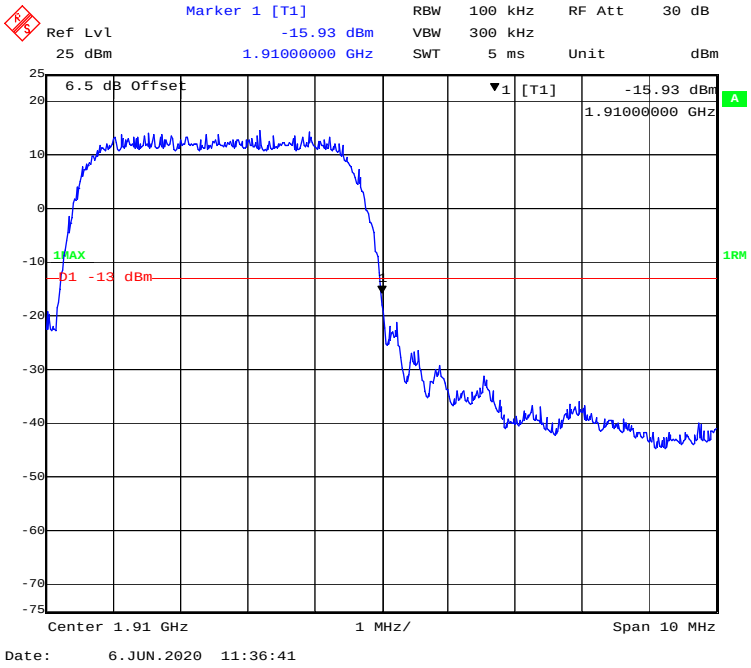


WCDMA Band II

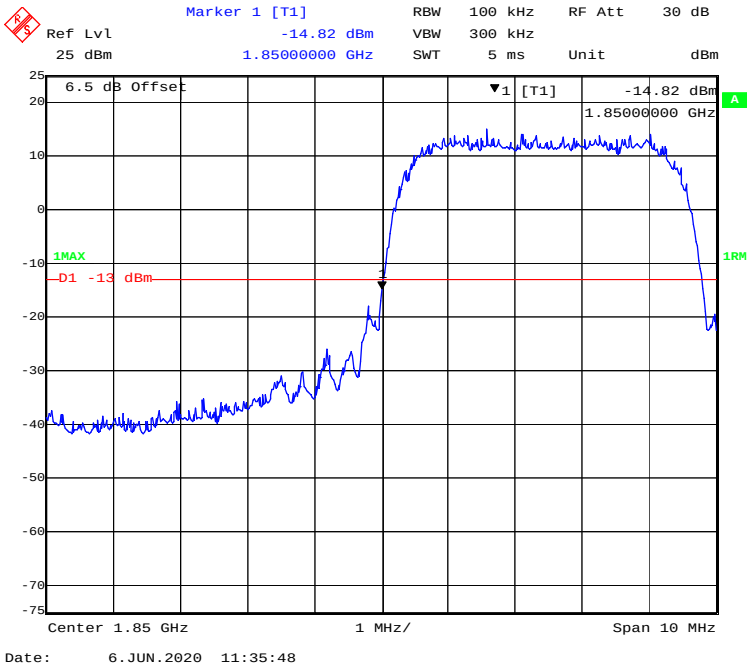
WCDMA (Rel 99) Mode, Left Band Edge



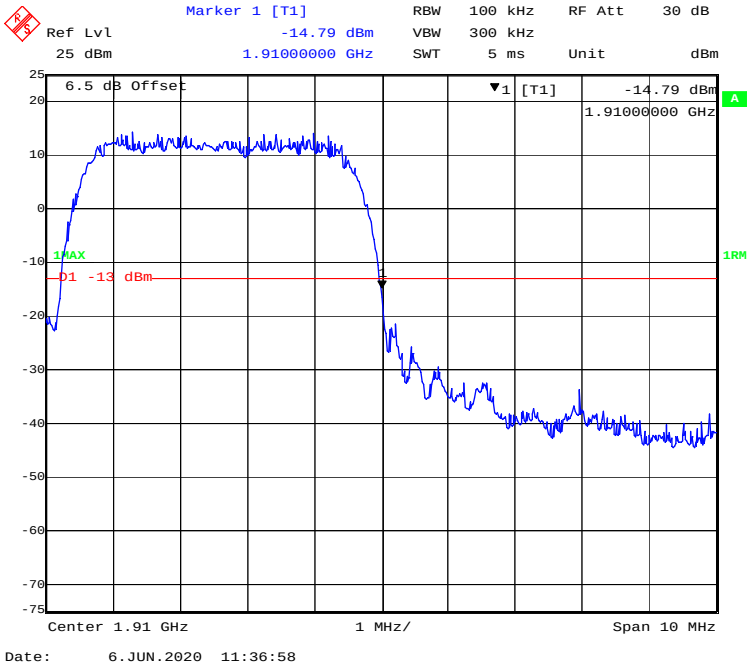
WCDMA (Rel 99) Mode, Right Band Edge



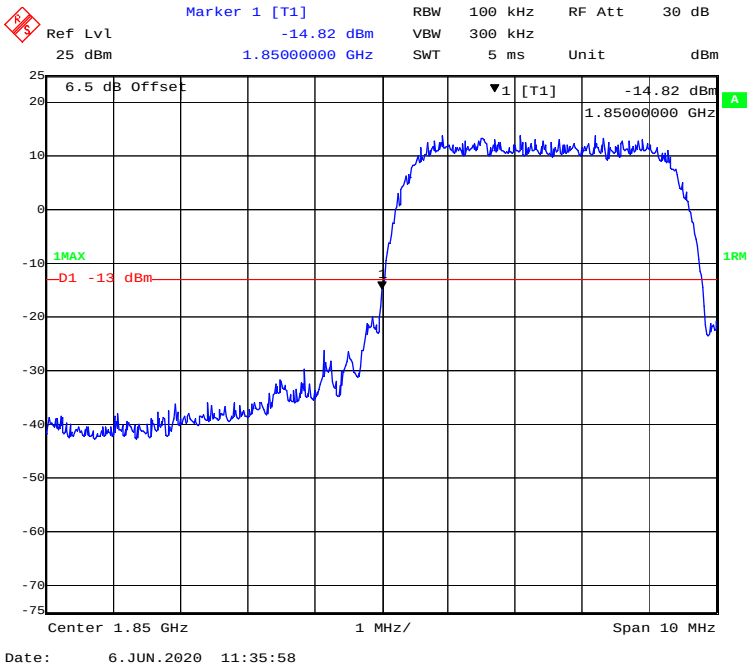
WCDMA (HSDPA) Mode, Left Band Edge



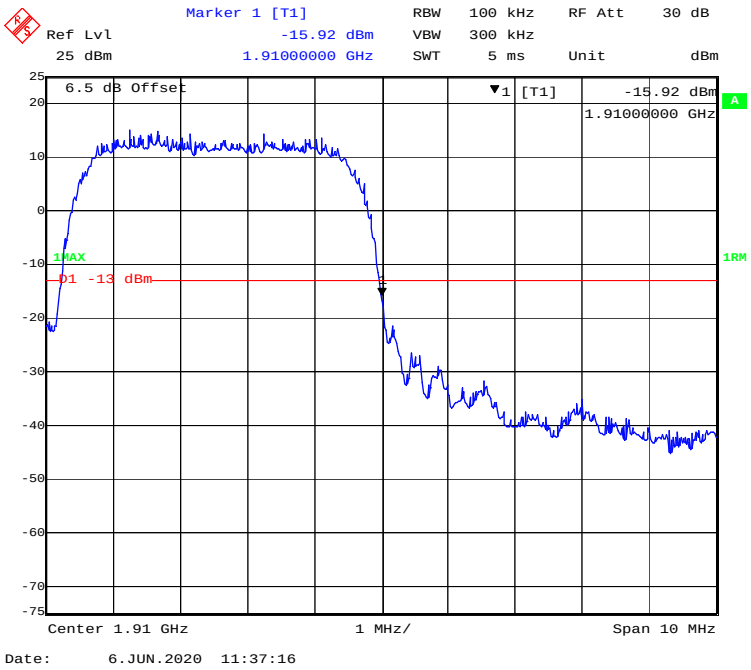
WCDMA (HSDPA) Mode, Right Band Edge



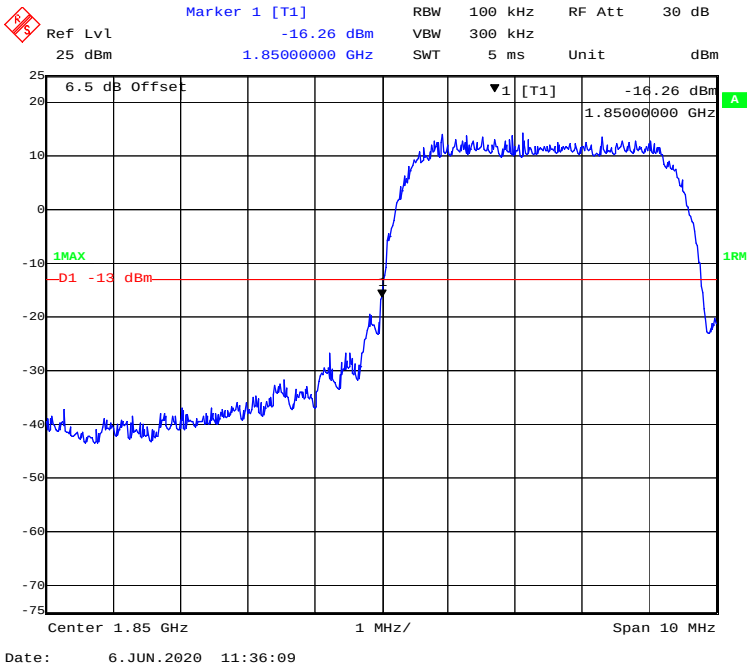
WCDMA (HSUPA) Mode, Left Band Edge



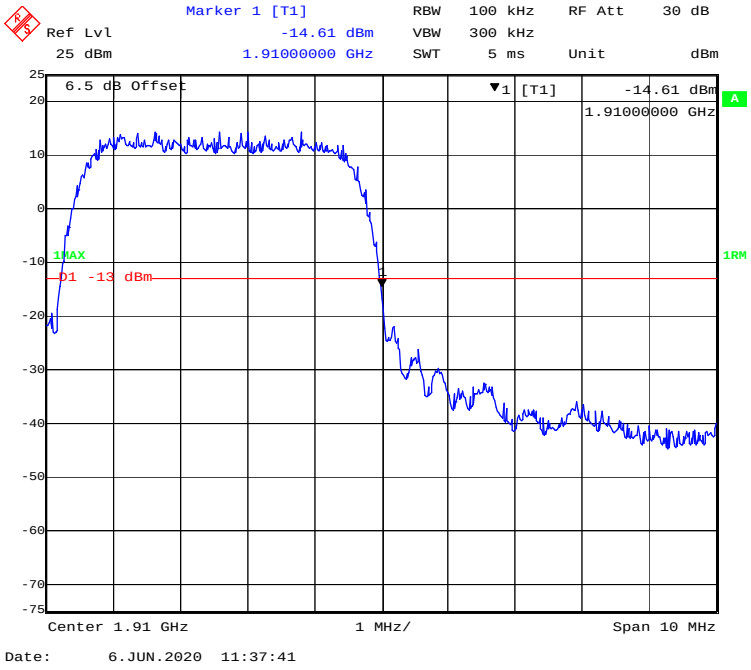
WCDMA (HSUPA) Mode, Right Band Edge



WCDMA (HSPA+) Mode, Left Band Edge

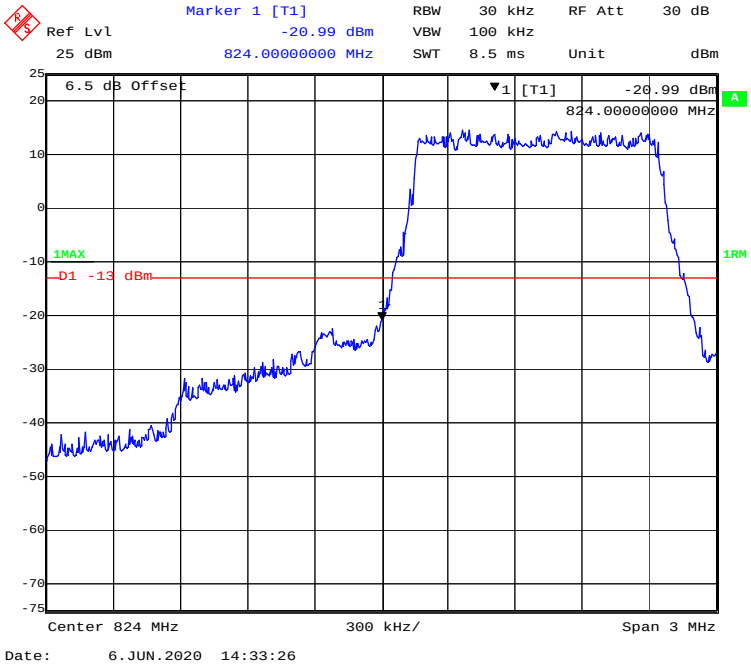


WCDMA (HSPA+) Mode, Right Band Edge

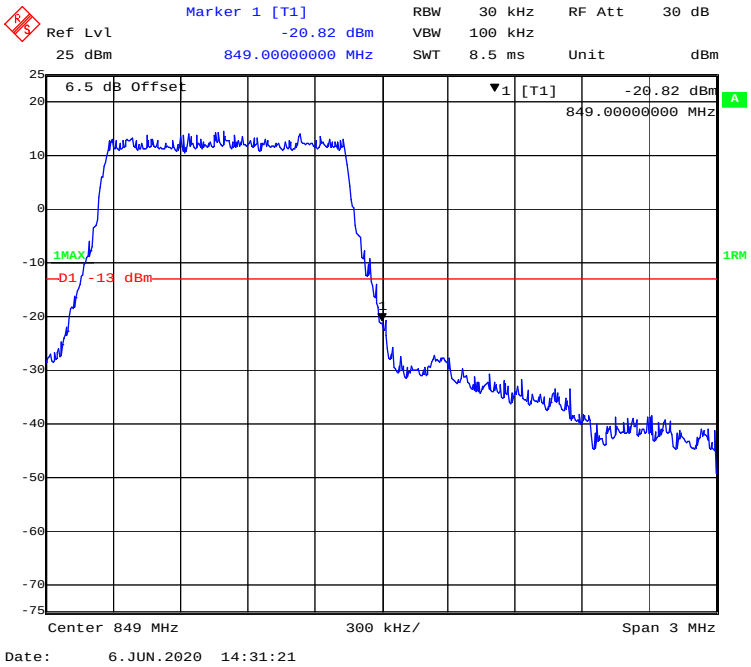


LTE Band 5:

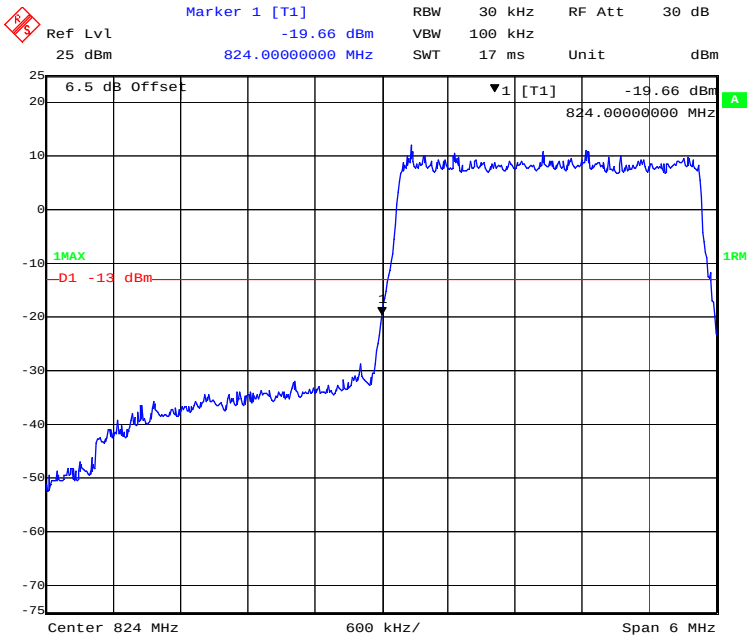
QPSK (1.4 MHz, FULL RB) - Left Band Edge



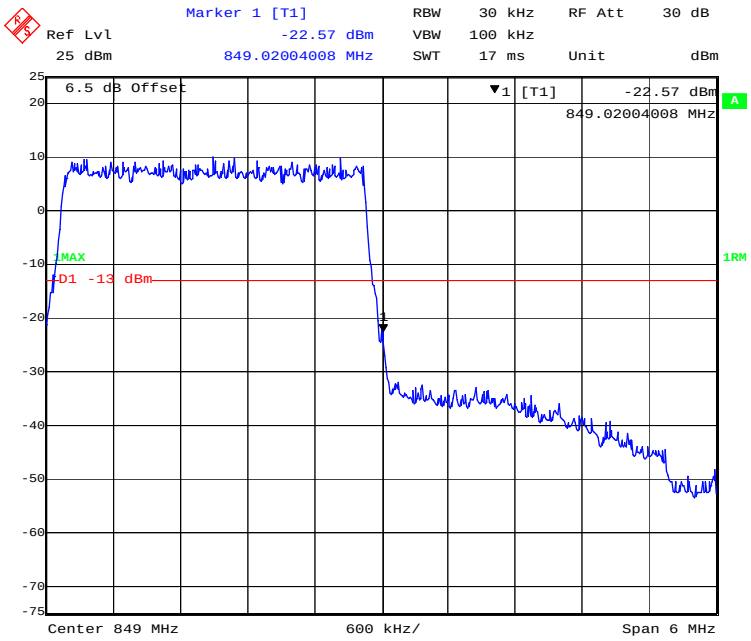
QPSK (1.4 MHz, FULL RB) - Right Band Edge



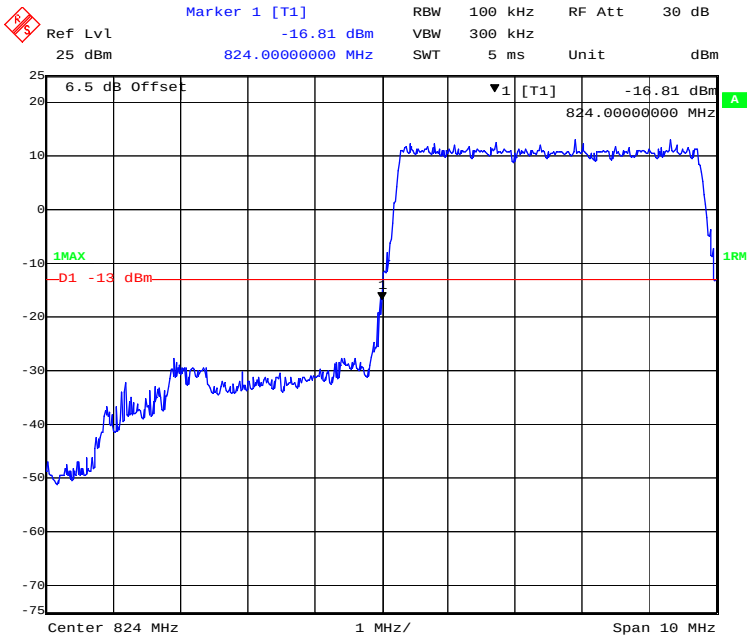
QPSK (3.0 MHz, FULL RB) - Left Band Edge



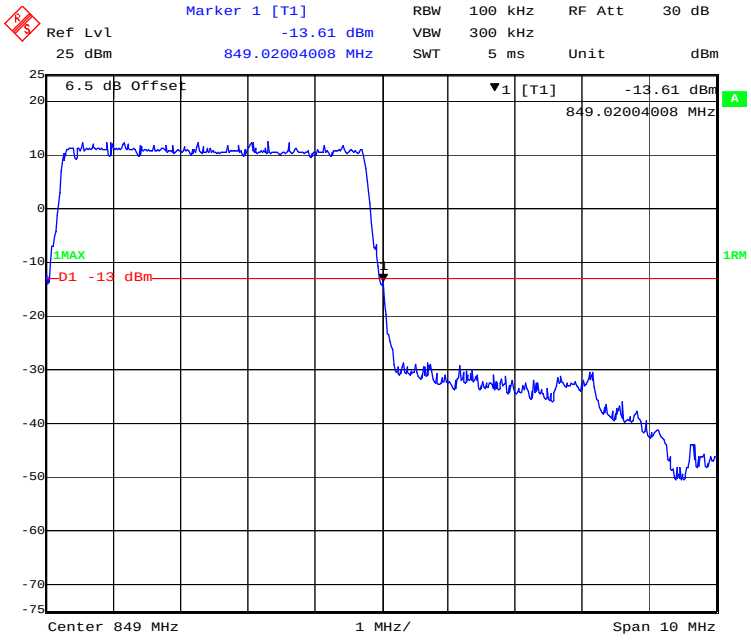
QPSK (3.0 MHz, FULL RB) - Right Band Edge



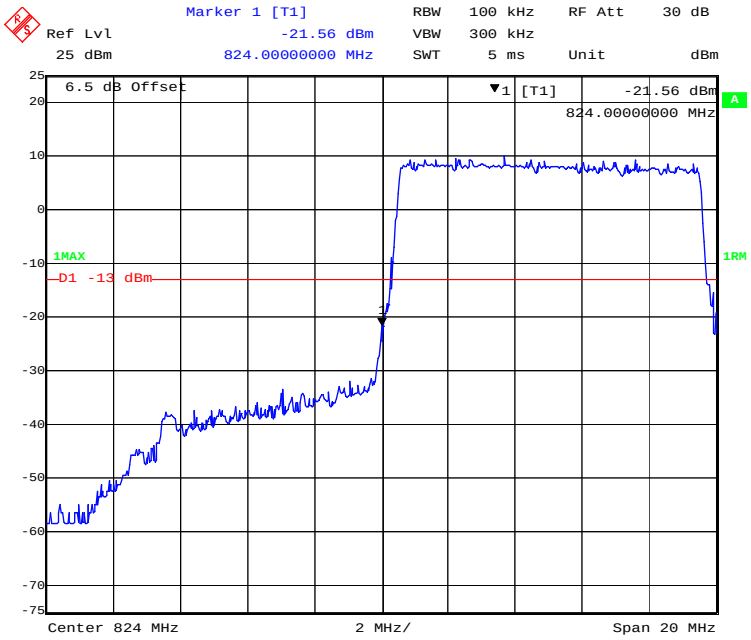
QPSK (5.0 MHz, FULL RB) - Left Band Edge



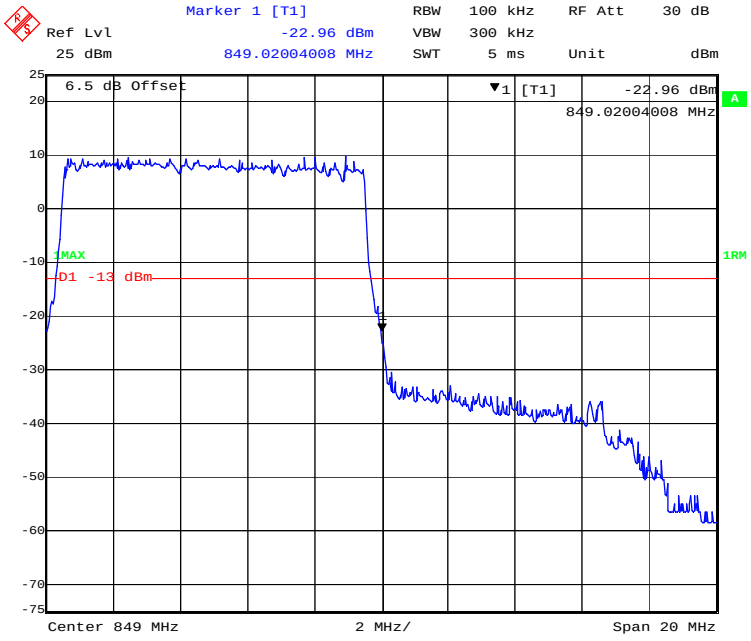
QPSK (5.0 MHz, FULL RB) - Right Band Edge



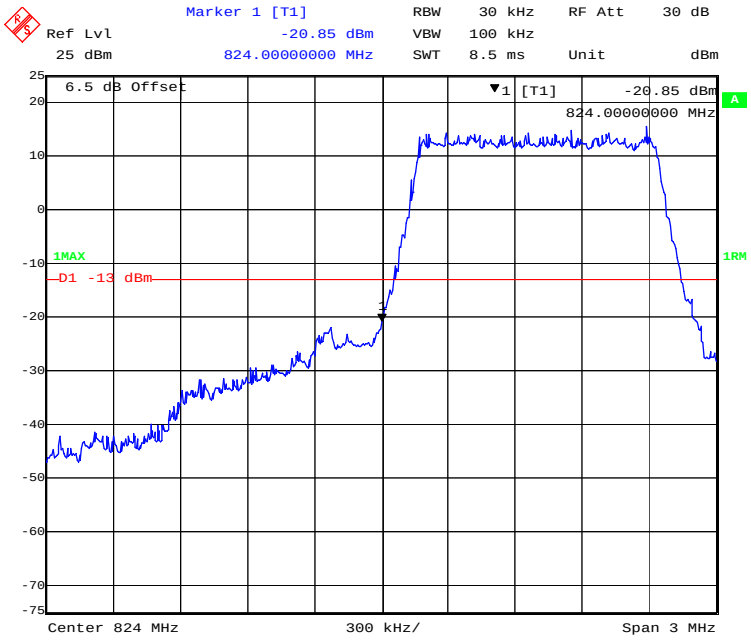
QPSK (10.0 MHz, FULL RB) - Left Band Edge



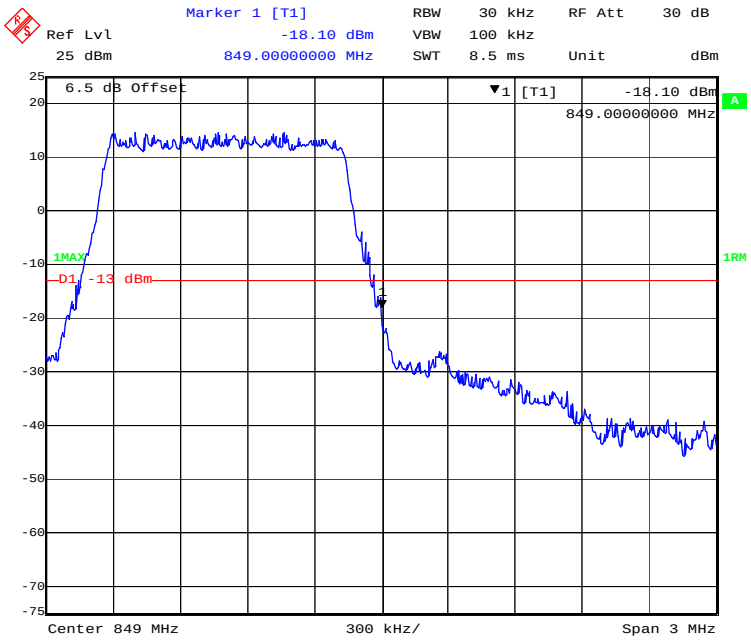
QPSK (10.0 MHz, FULL RB) - Right Band Edge



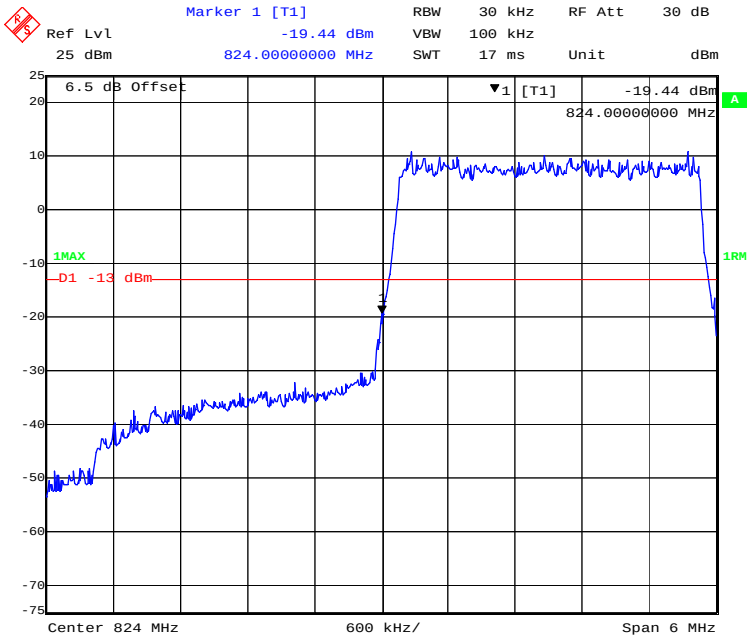
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



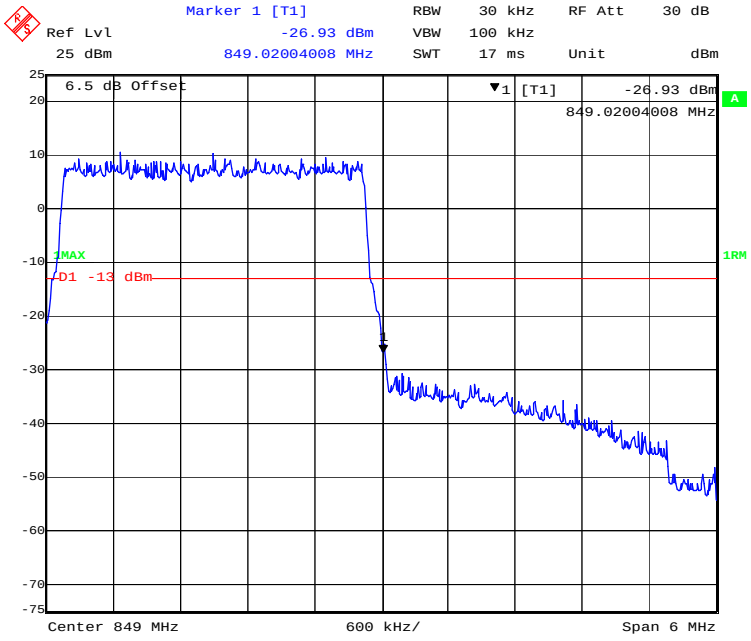
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



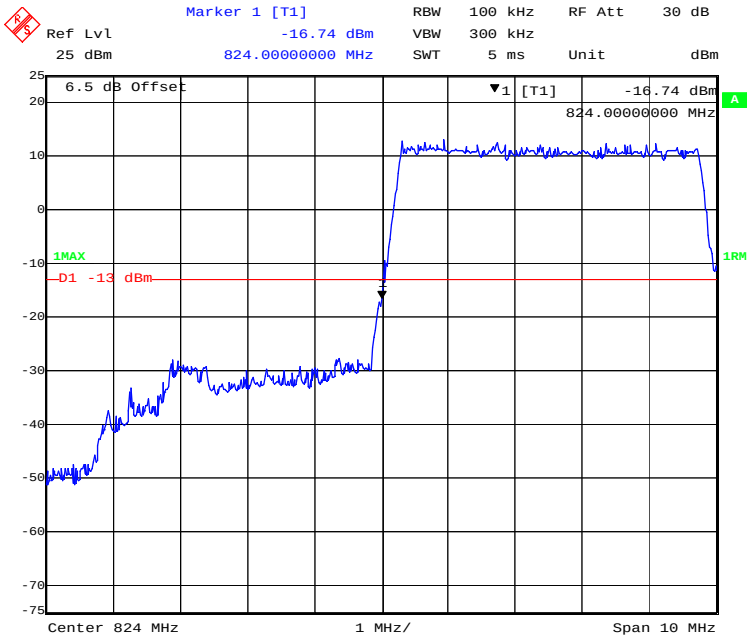
16-QAM (3.0 MHz, FULL RB) - Left Band Edge



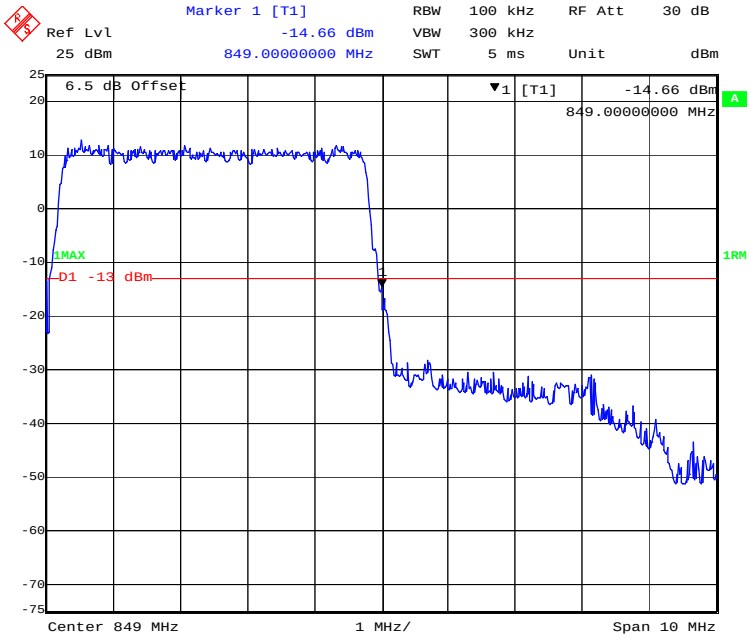
16-QAM (3.0 MHz, FULL RB) - Right Band Edge



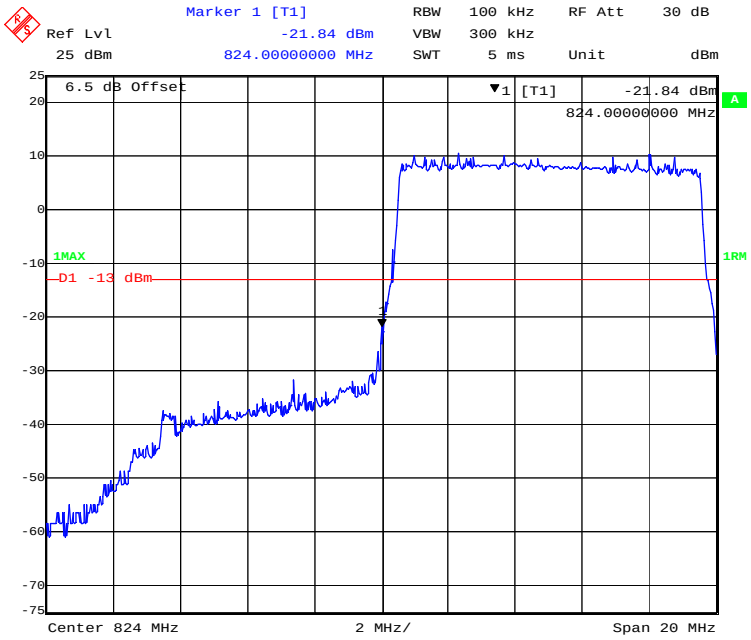
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



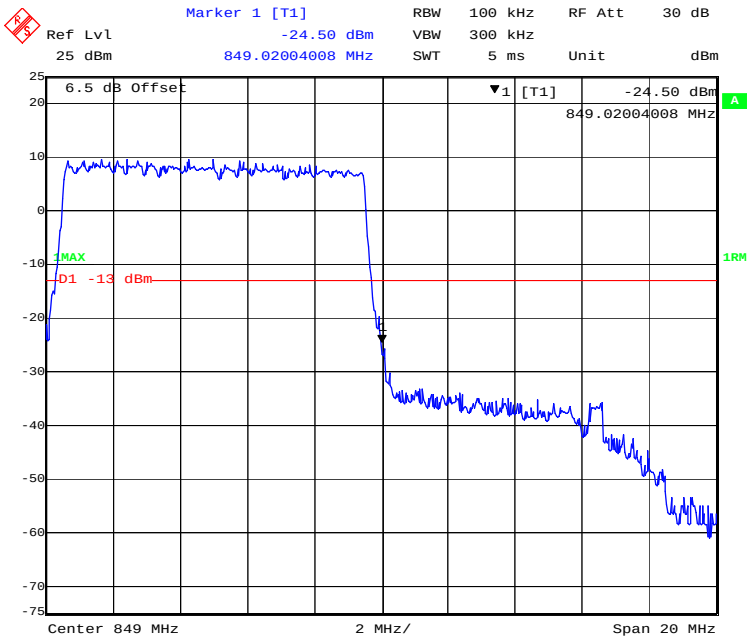
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



16-QAM (10.0 MHz, FULL RB) - Left Band Edge

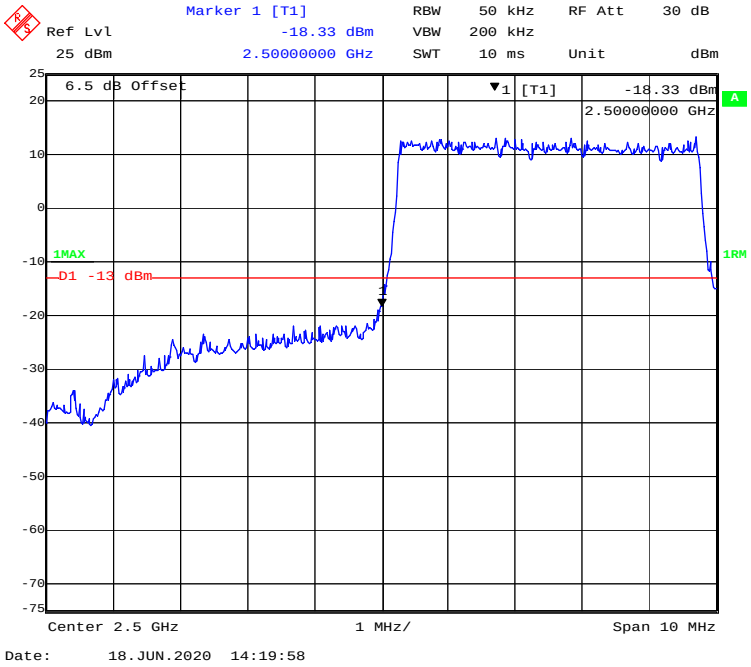


16-QAM (10.0 MHz, FULL RB) - Right Band Edge

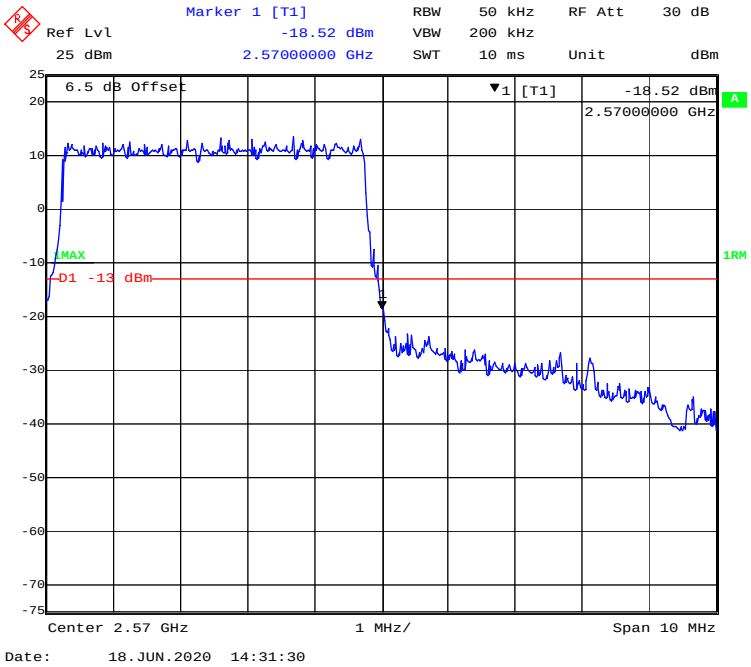


LTE Band 7:

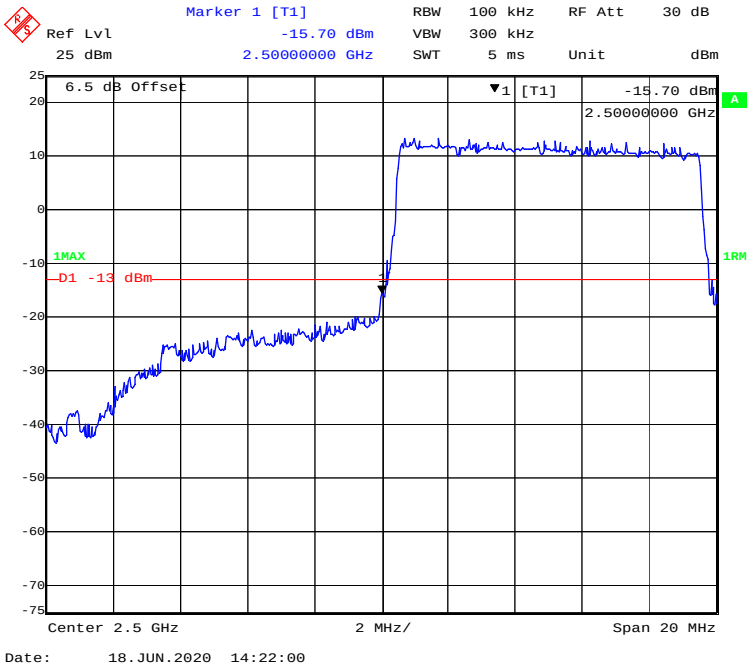
QPSK (5.0 MHz, FULL RB) - Left Band Edge



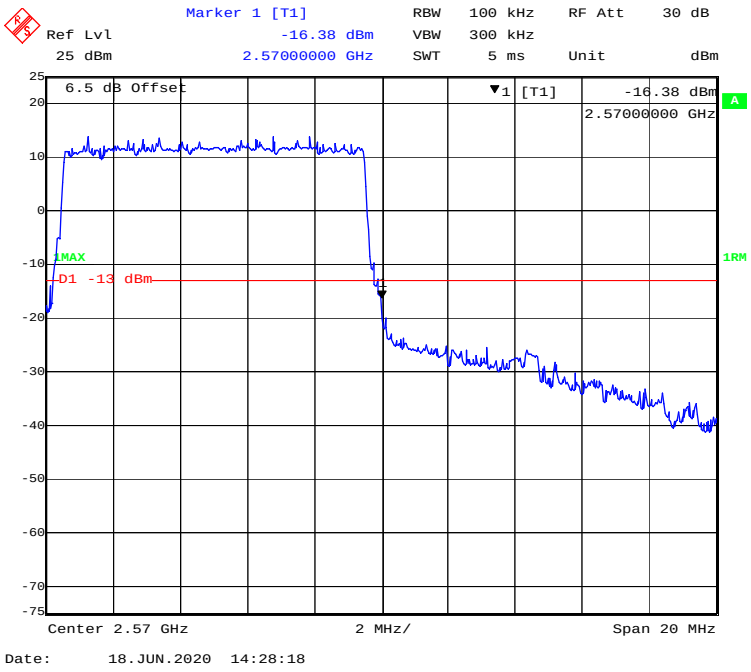
QPSK (5.0 MHz, FULL RB) - Right Band Edge



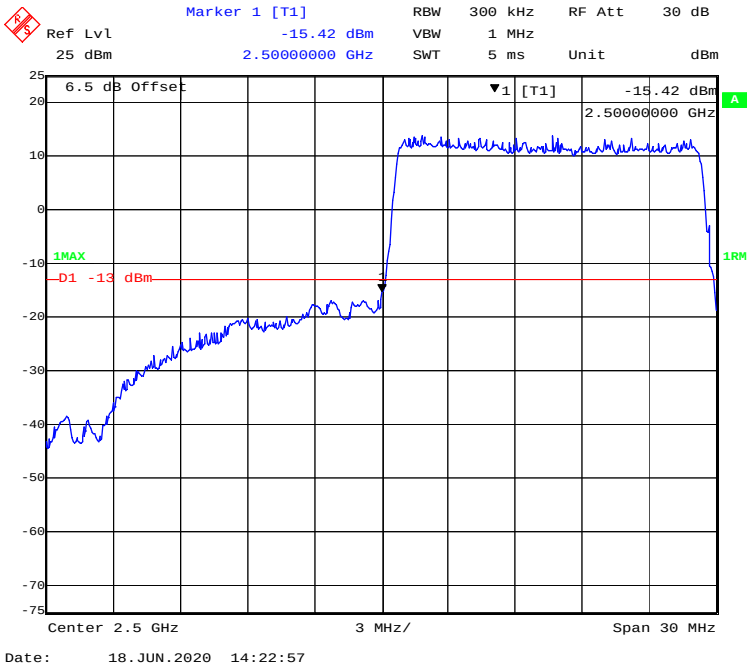
QPSK (10.0 MHz, FULL RB) - Left Band Edge



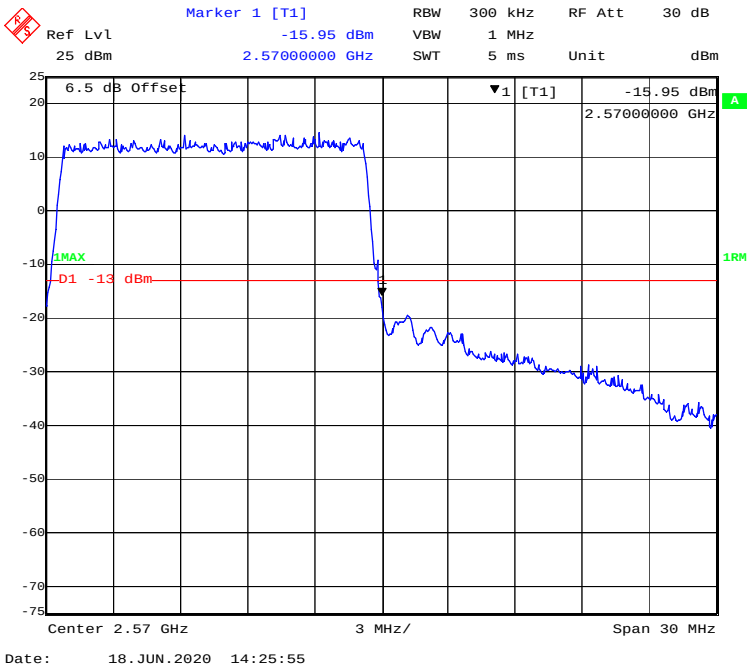
QPSK (10.0 MHz, FULL RB) - Right Band Edge



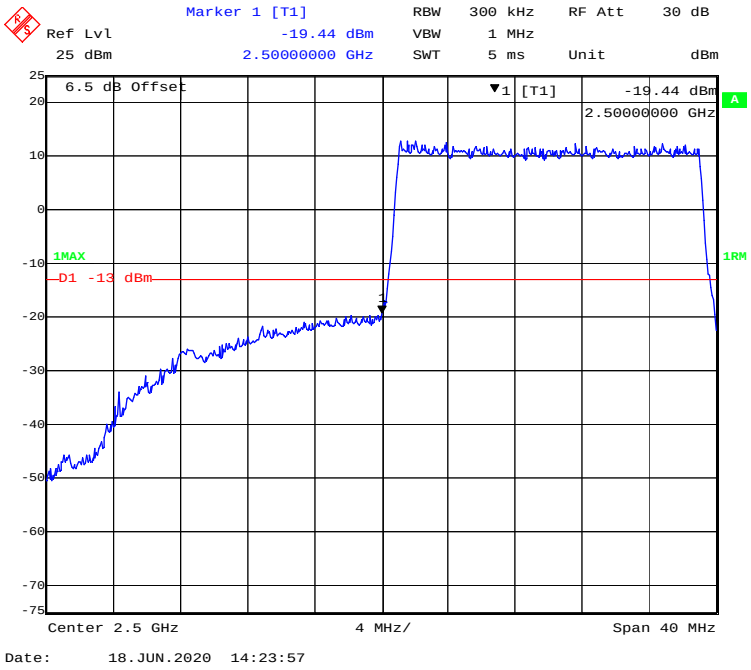
QPSK (15.0 MHz, FULL RB) - Left Band Edge



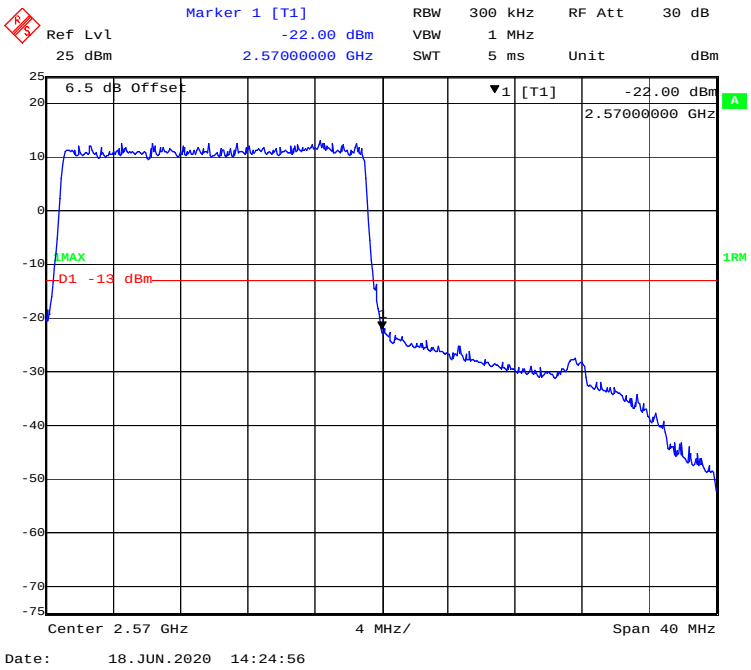
QPSK (15.0 MHz, FULL RB) - Right Band Edge



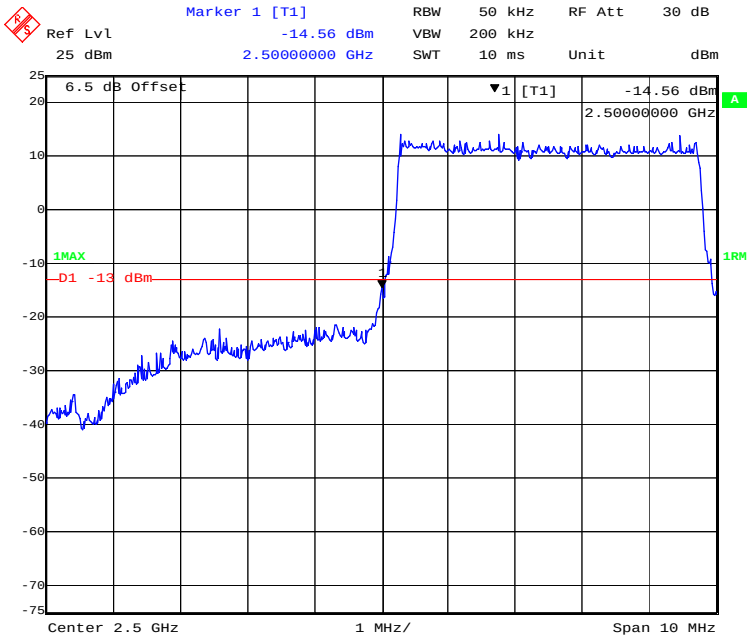
QPSK (20.0 MHz, FULL RB) - Left Band Edge



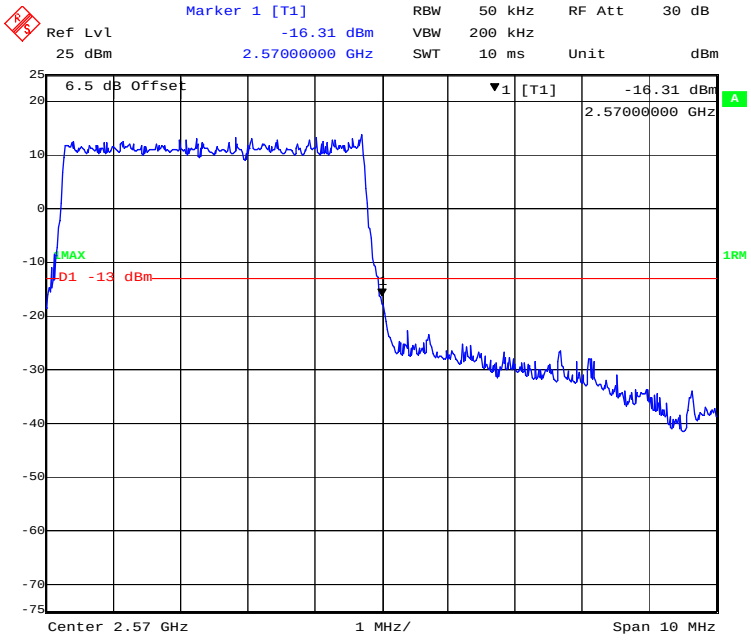
QPSK (20.0 MHz, FULL RB) - Right Band Edge



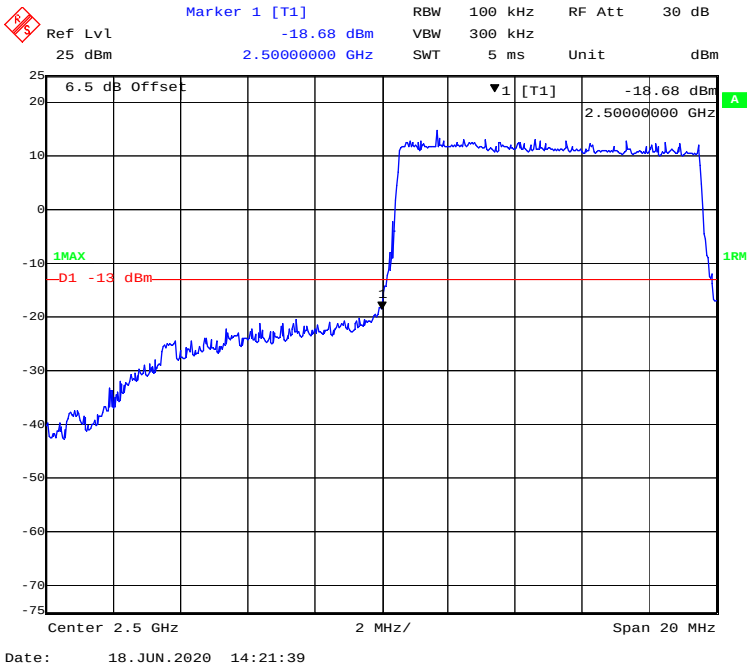
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



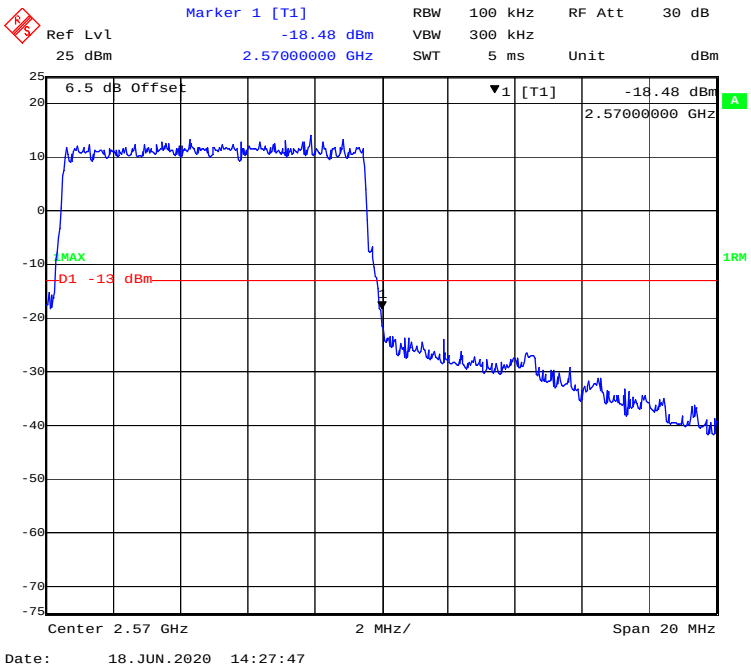
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



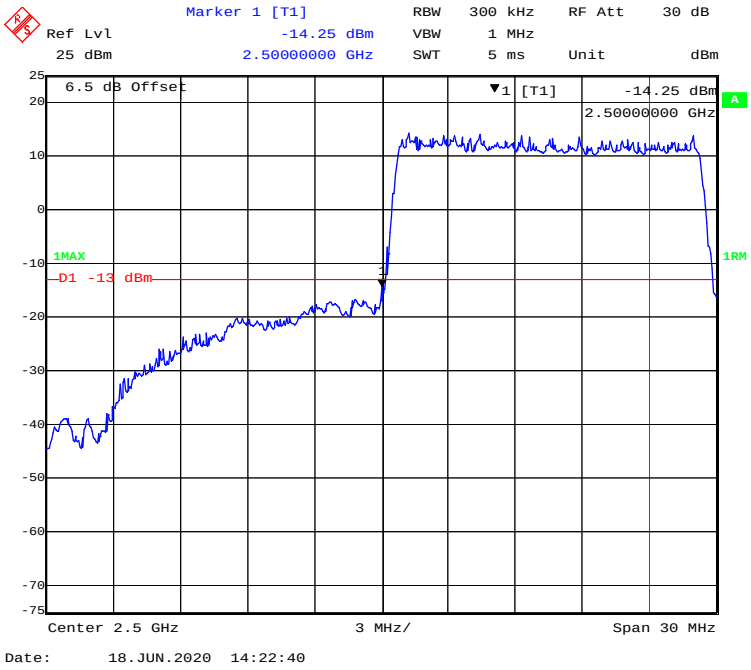
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



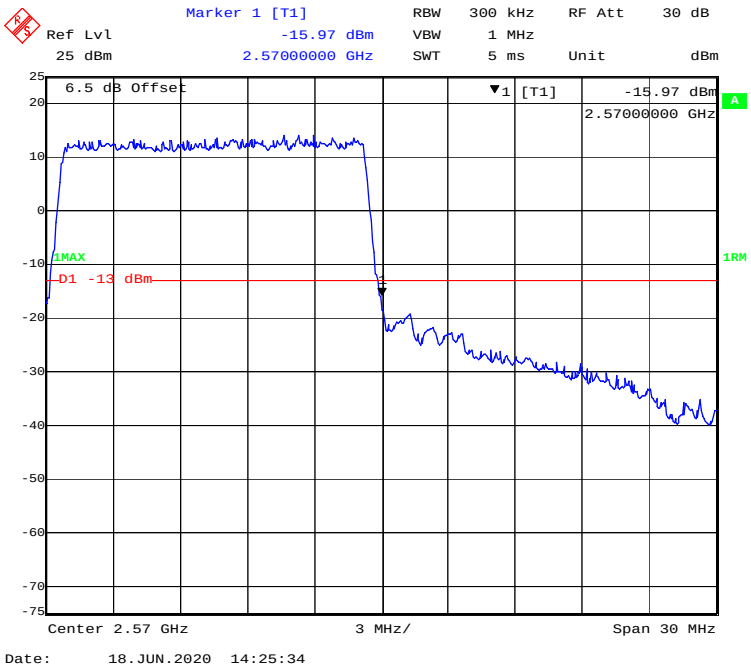
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



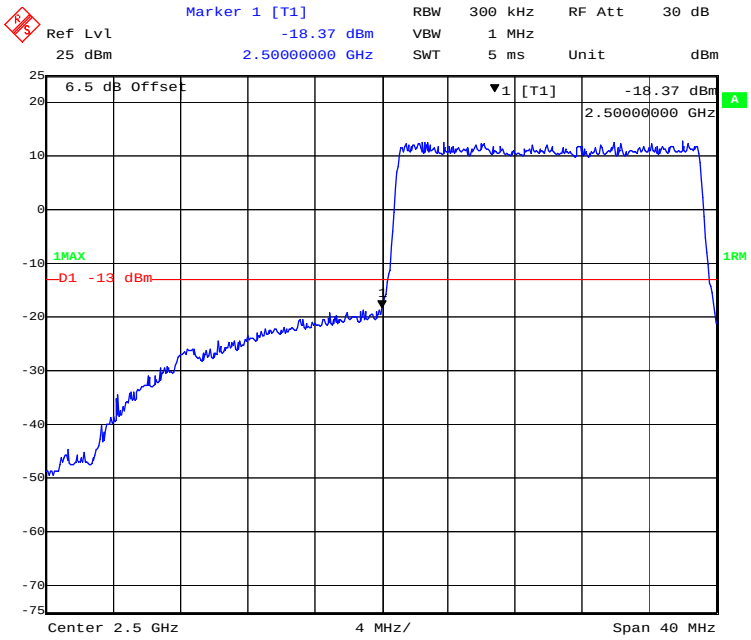
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



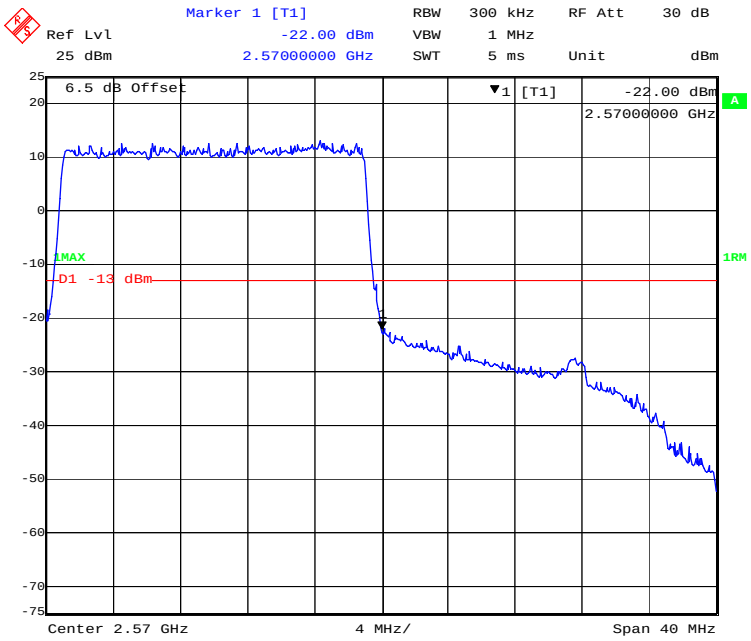
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



16-QAM (20.0 MHz, FULL RB) - Left Band Edge

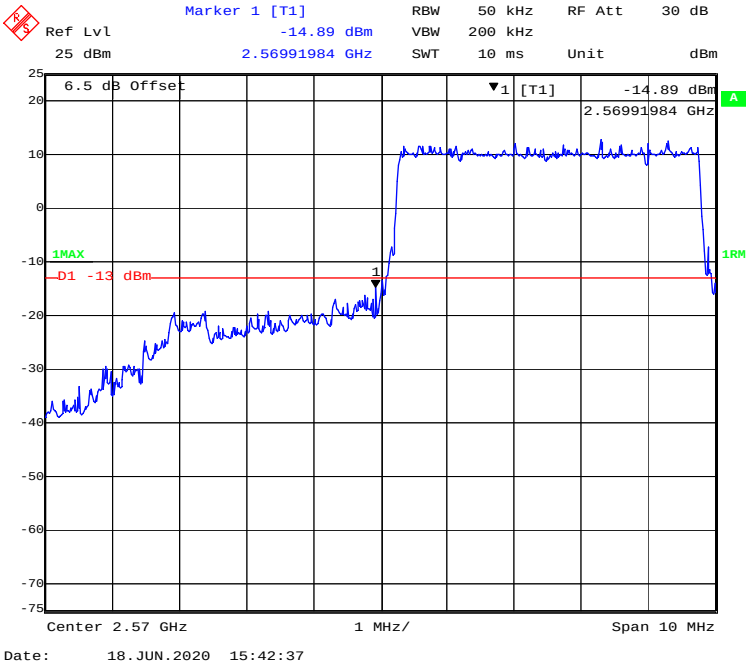


16-QAM (20.0 MHz, FULL RB) - Right Band Edge

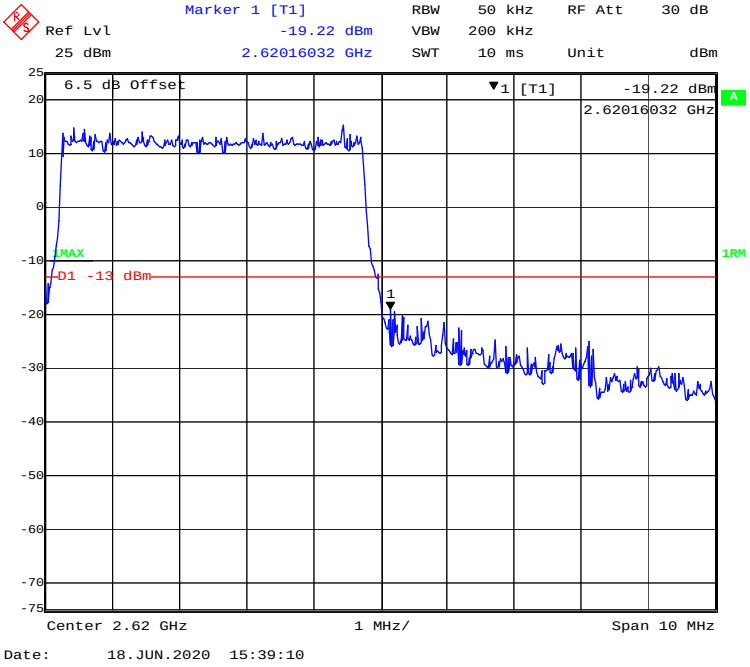


LTE Band 38:

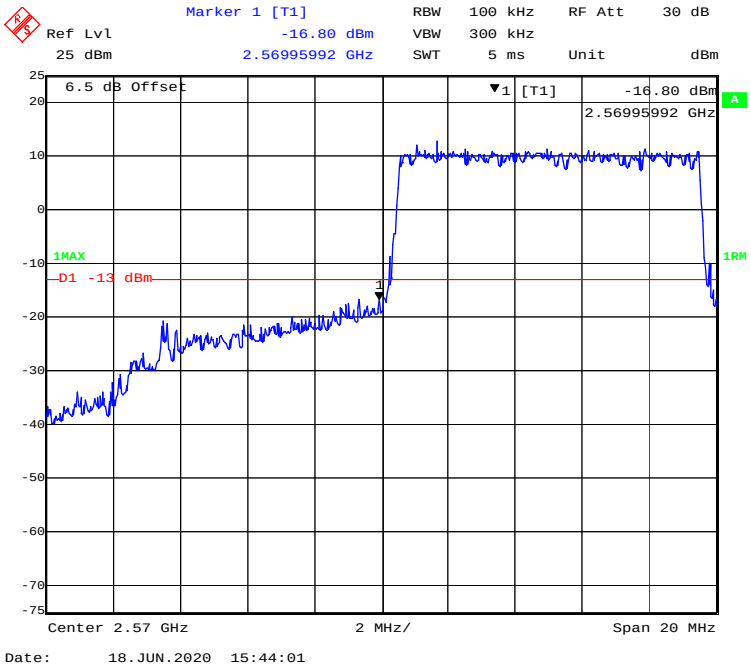
QPSK (5.0 MHz, FULL RB) - Left Band Edge



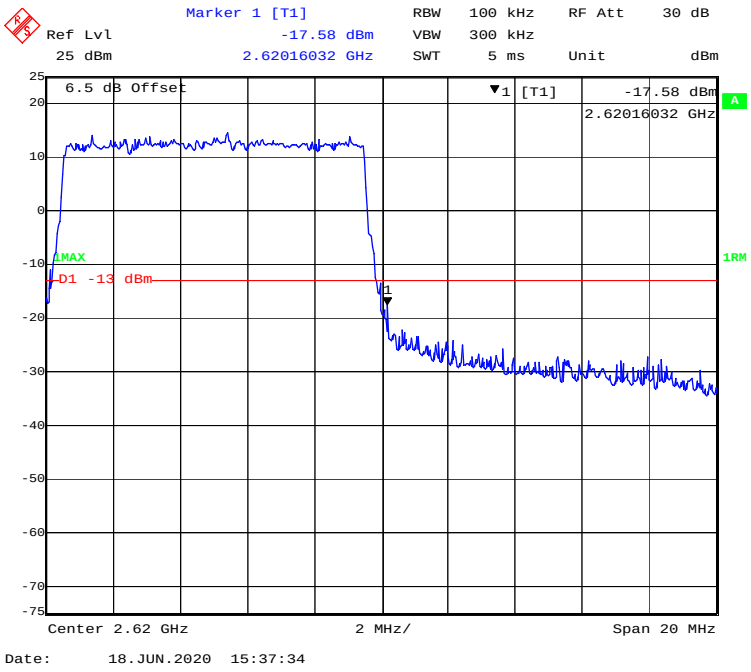
QPSK (5.0 MHz, FULL RB) - Right Band Edge



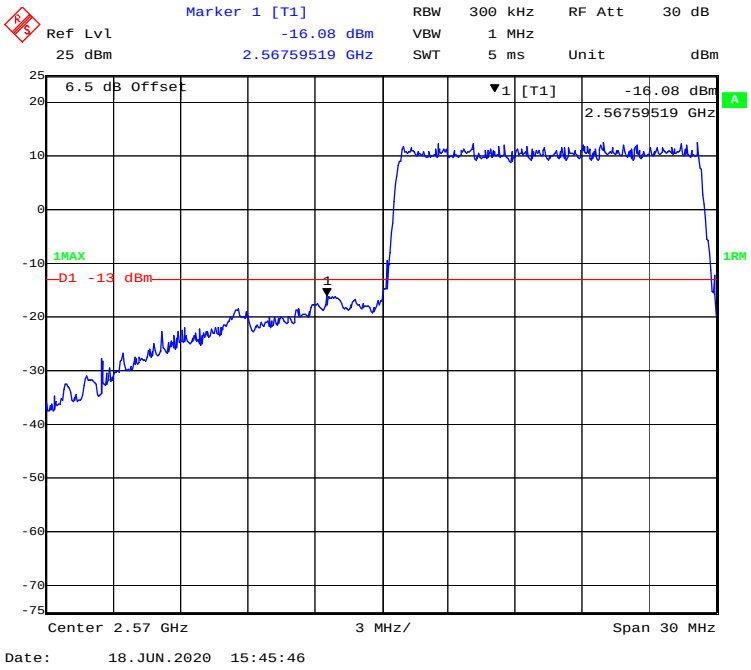
QPSK (10.0 MHz, FULL RB) - Left Band Edge



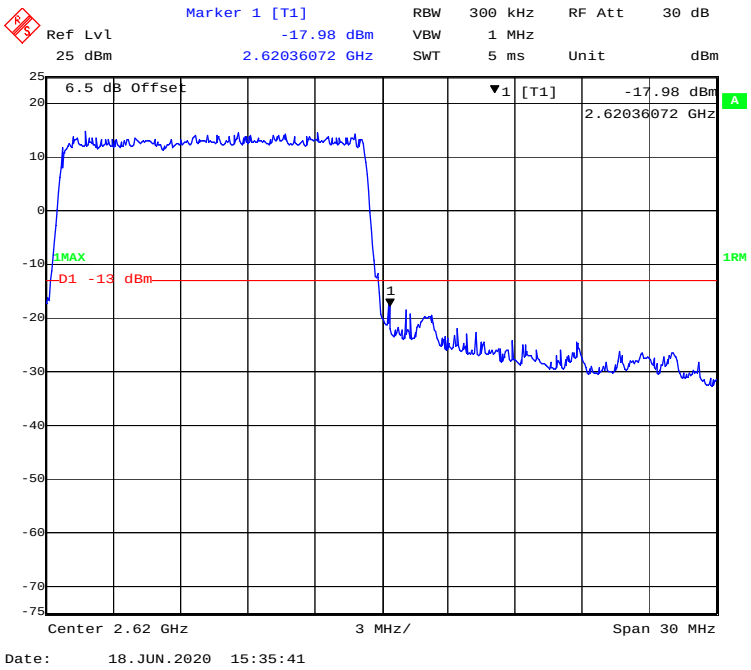
QPSK (10.0 MHz, FULL RB) - Right Band Edge



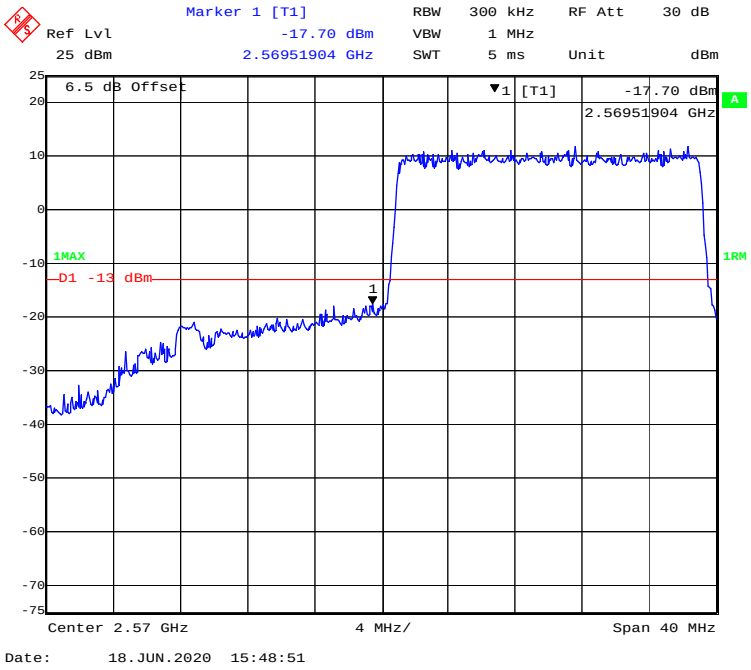
QPSK (15.0 MHz, FULL RB) - Left Band Edge



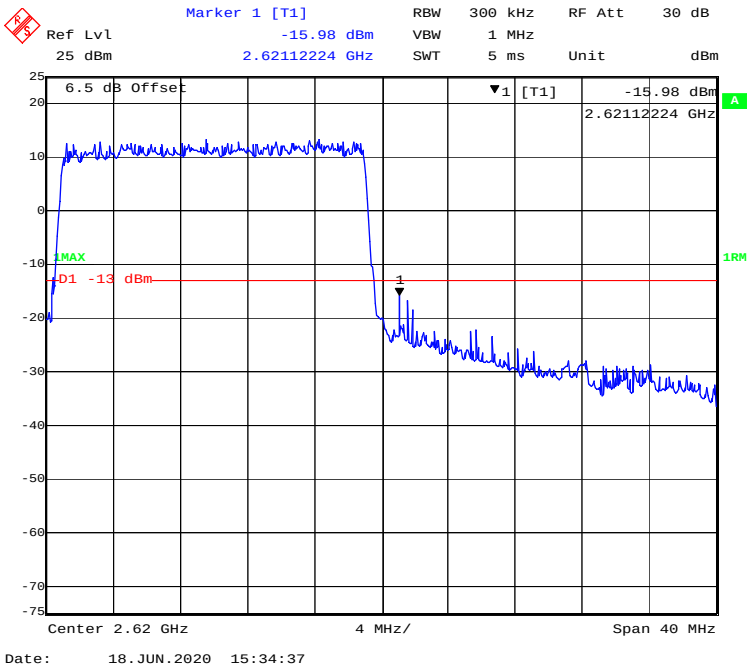
QPSK (15.0 MHz, FULL RB) - Right Band Edge



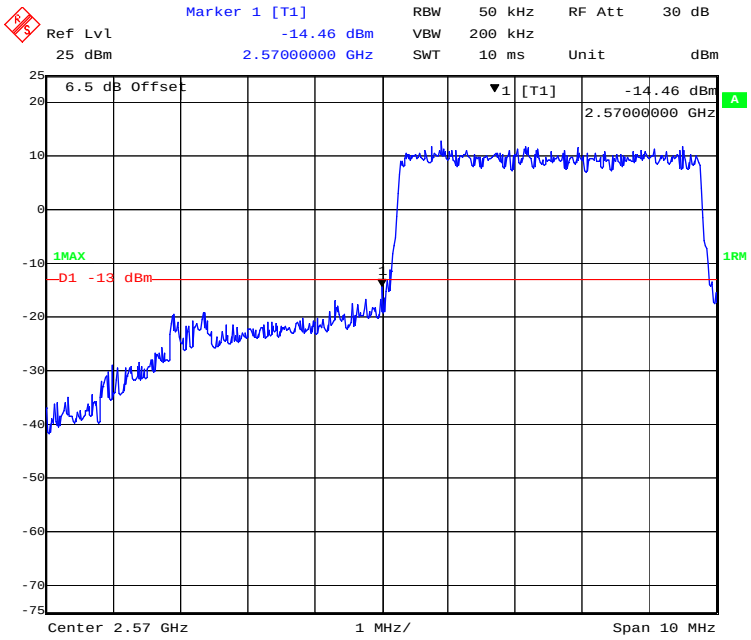
QPSK (20.0 MHz, FULL RB) - Left Band Edge



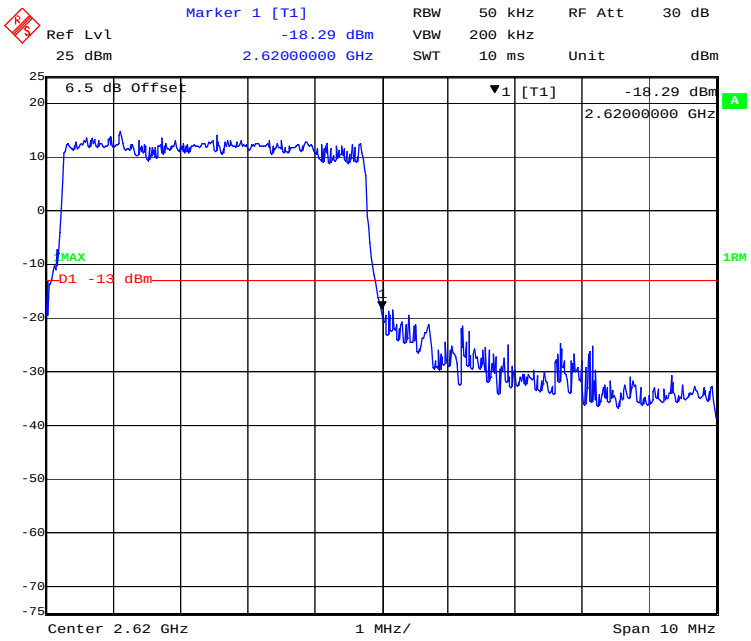
QPSK (20.0 MHz, FULL RB) - Right Band Edge



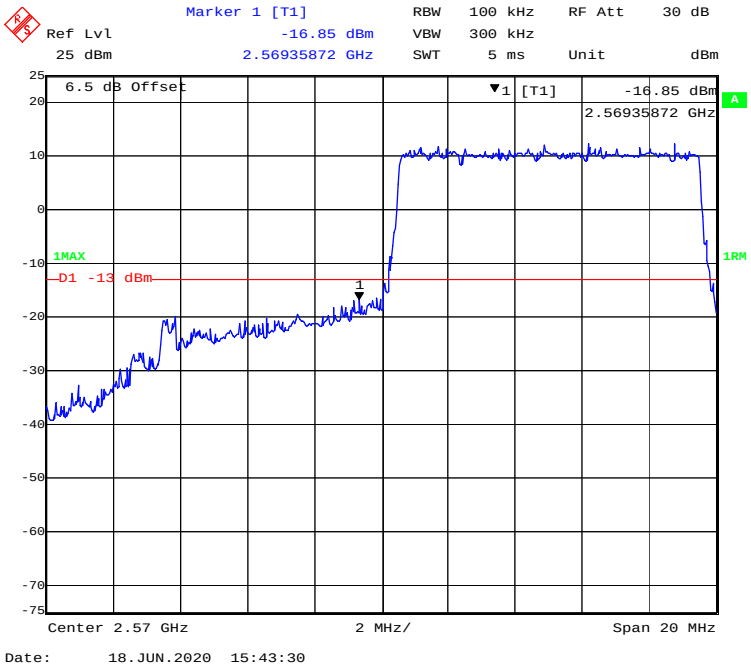
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



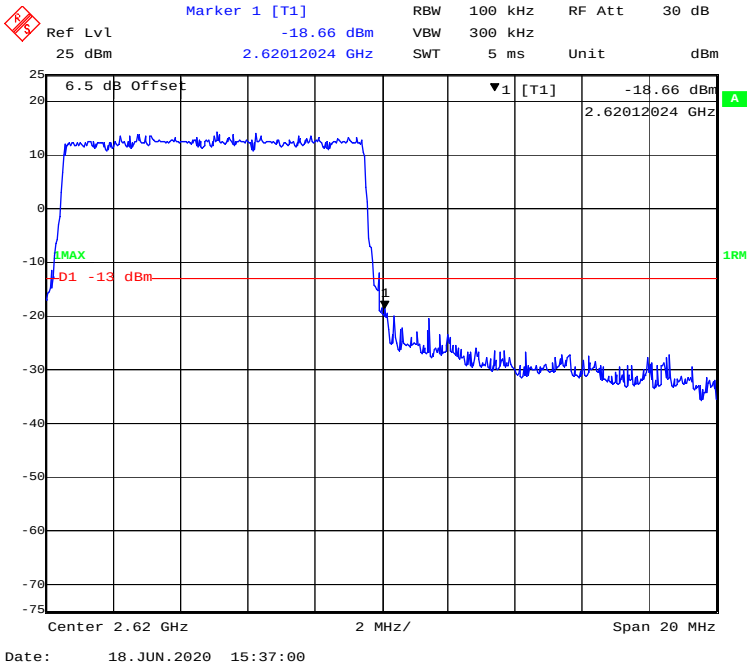
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



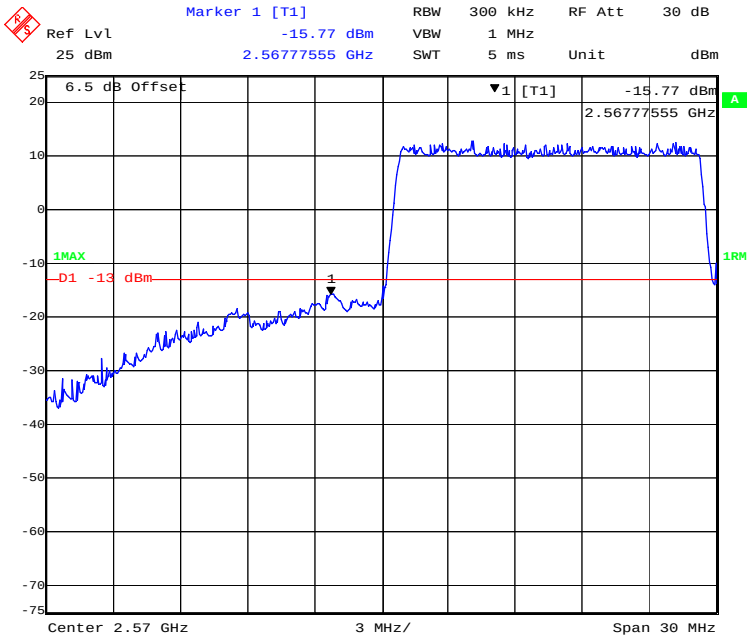
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



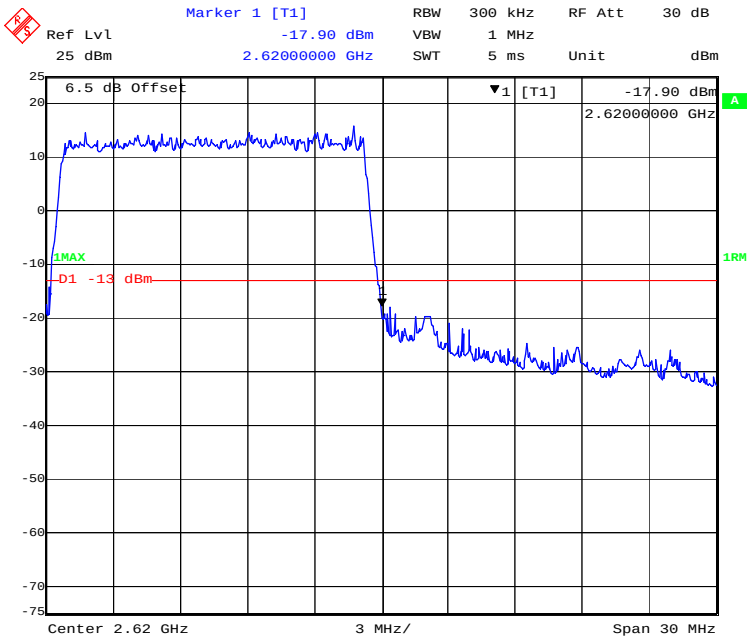
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



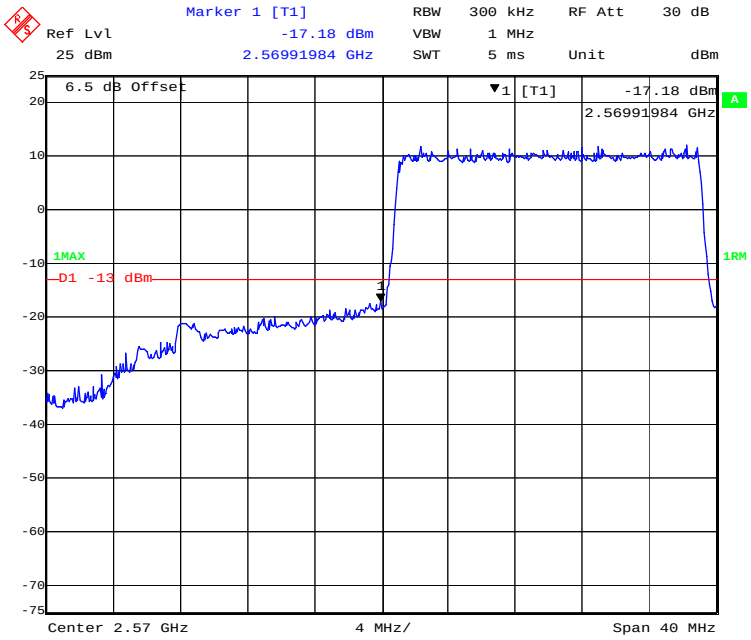
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



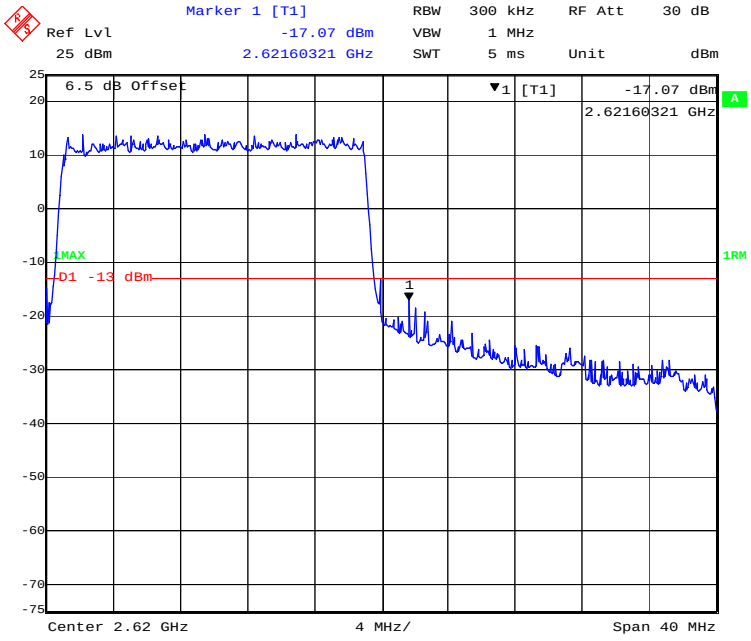
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



16-QAM (20.0 MHz, FULL RB) - Left Band Edge

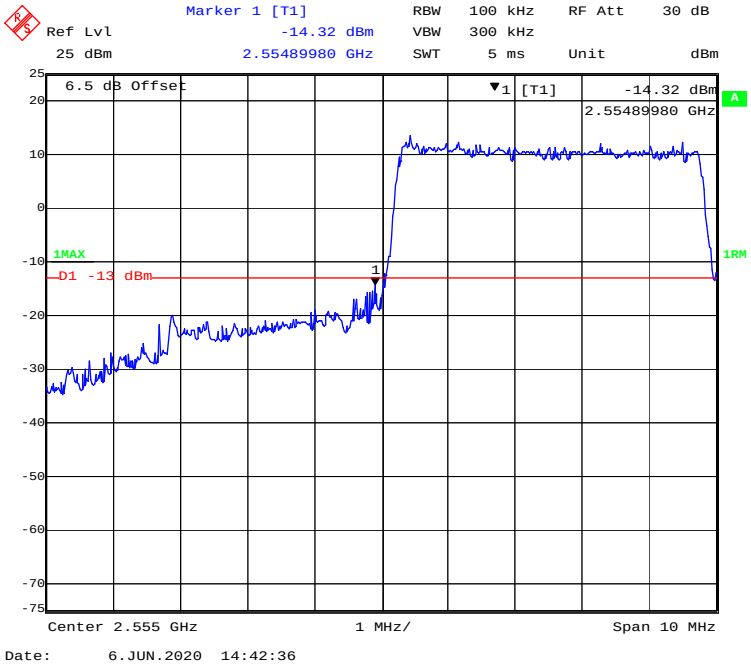


16-QAM (20.0 MHz, FULL RB) - Right Band Edge

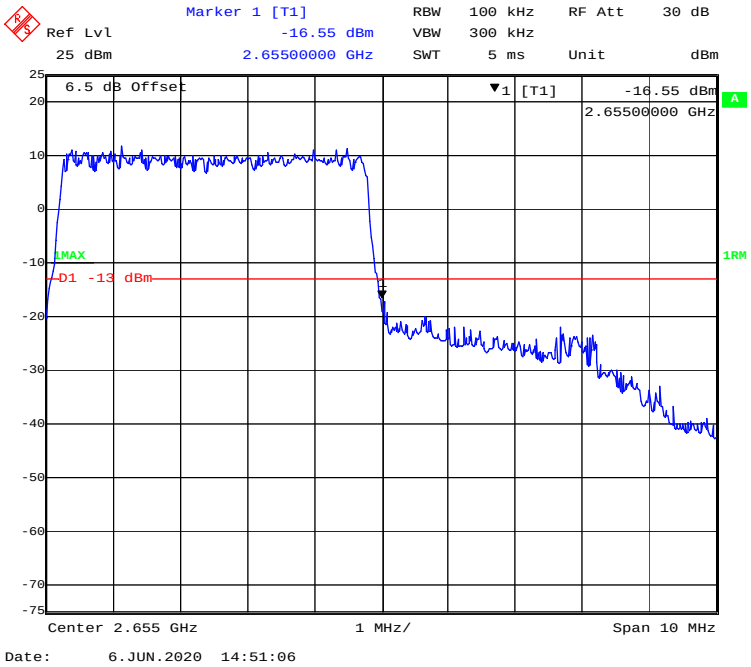


LTE Band 41:

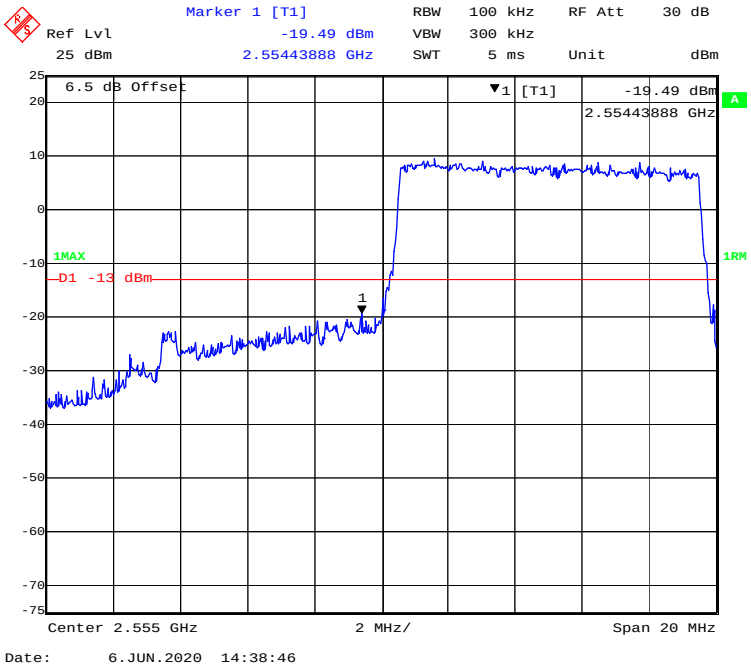
QPSK (5.0 MHz, FULL RB) - Left Band Edge



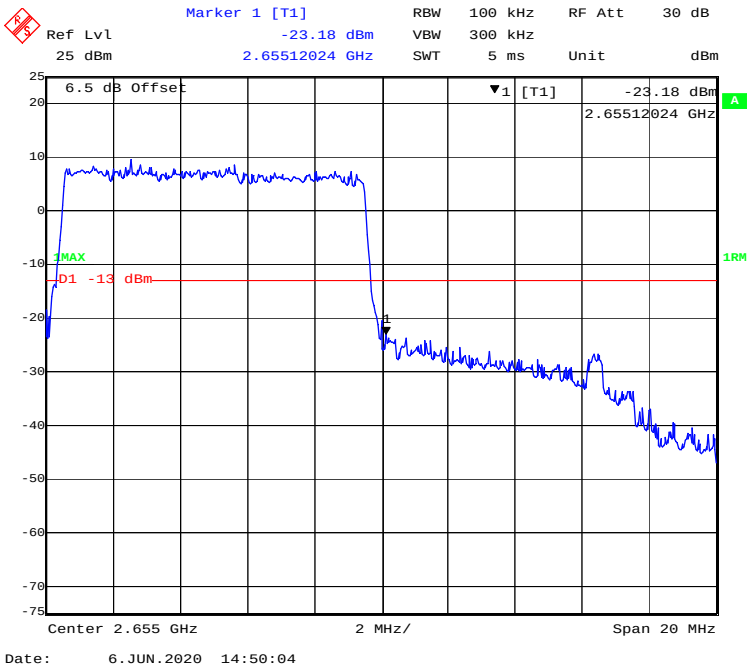
QPSK (5.0 MHz, FULL RB) - Right Band Edge



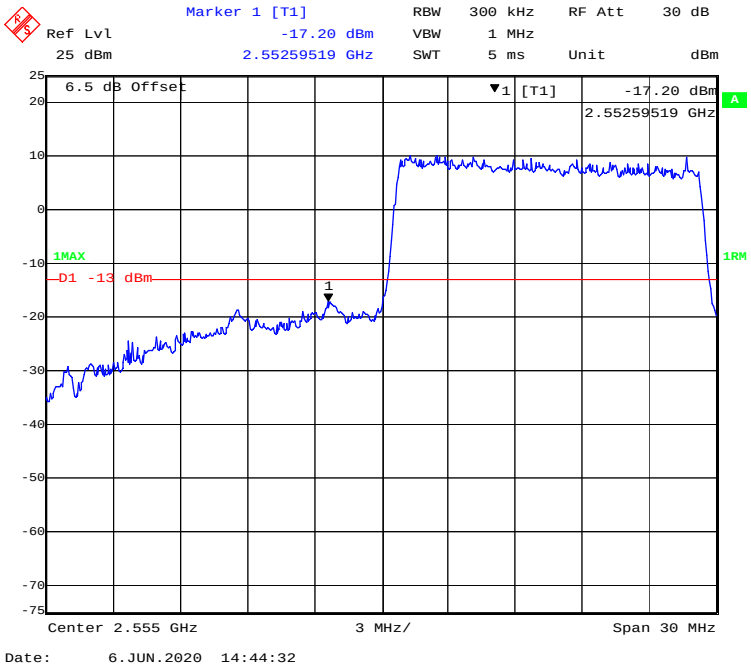
QPSK (10.0 MHz, FULL RB) - Left Band Edge



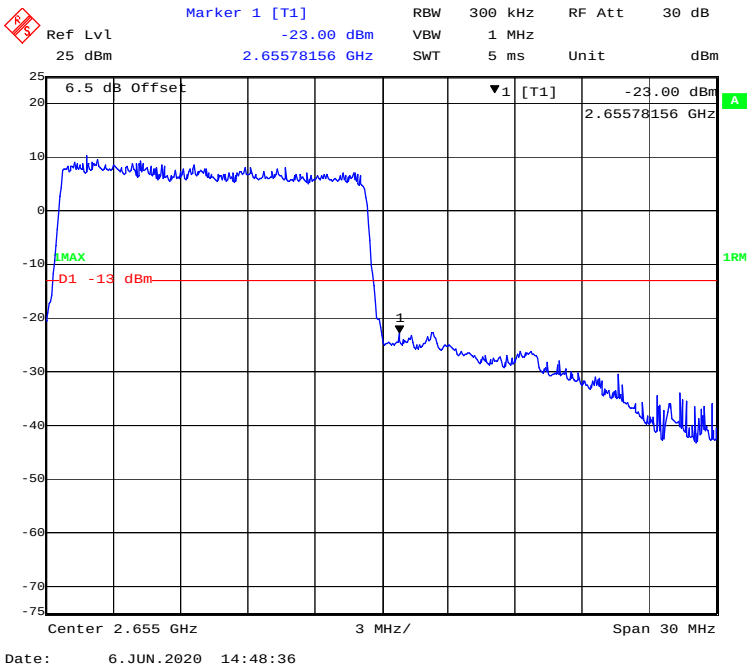
QPSK (10.0 MHz, FULL RB) - Right Band Edge



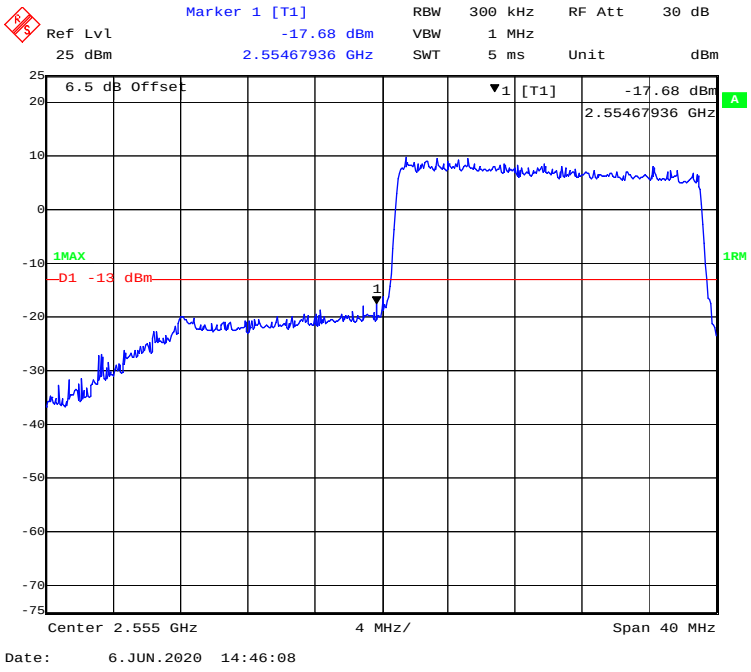
QPSK (15.0 MHz, FULL RB) - Left Band Edge



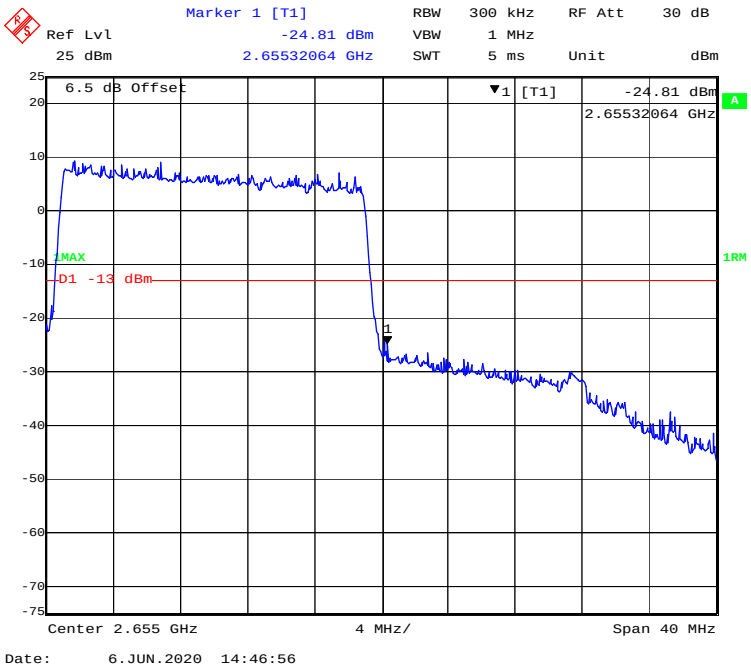
QPSK (15.0 MHz, FULL RB) - Right Band Edge



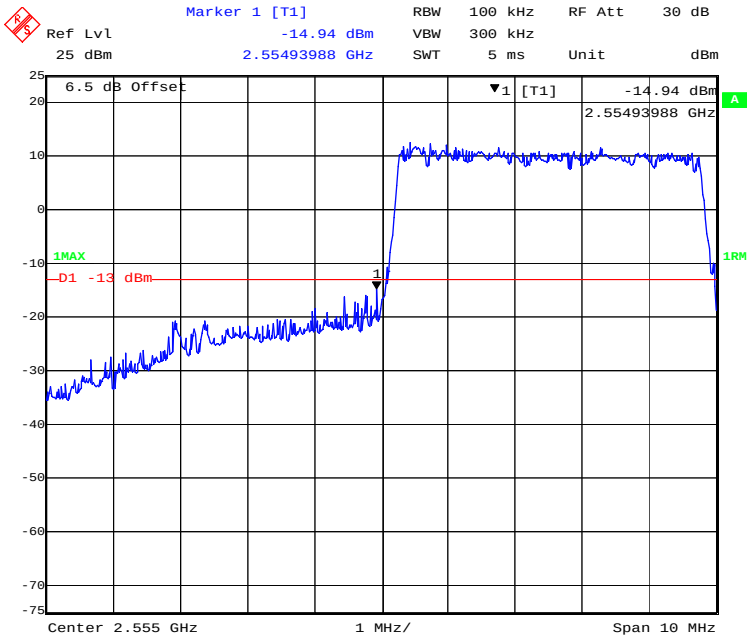
QPSK (20.0 MHz, FULL RB) - Left Band Edge



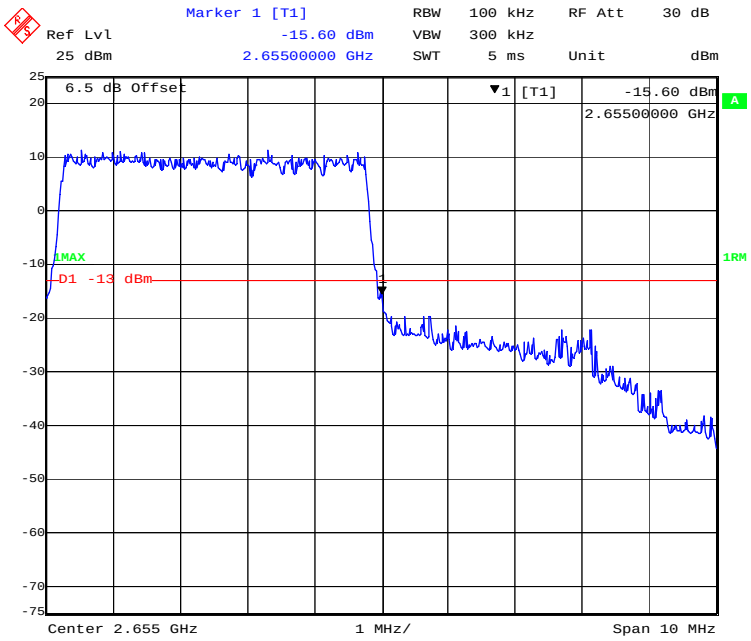
QPSK (20.0 MHz, FULL RB) - Right Band Edge



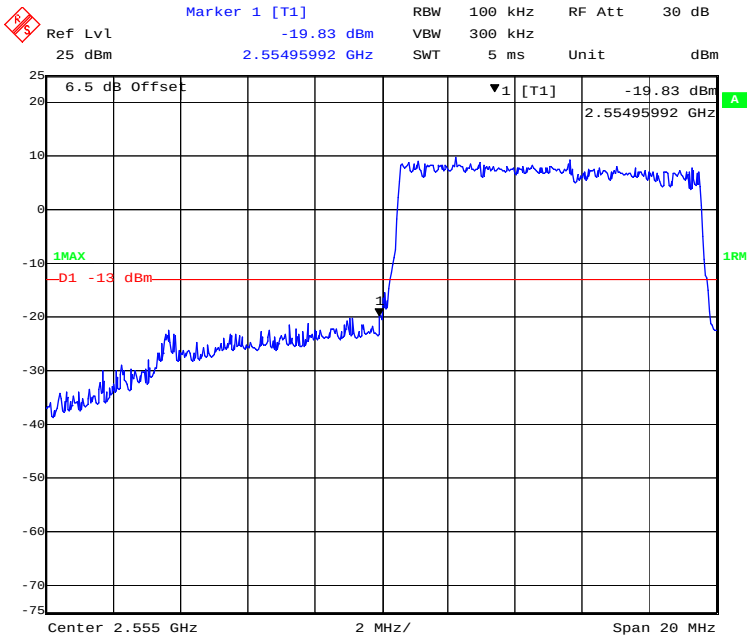
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



16-QAM (5.0 MHz, FULL RB) - Right Band Edge

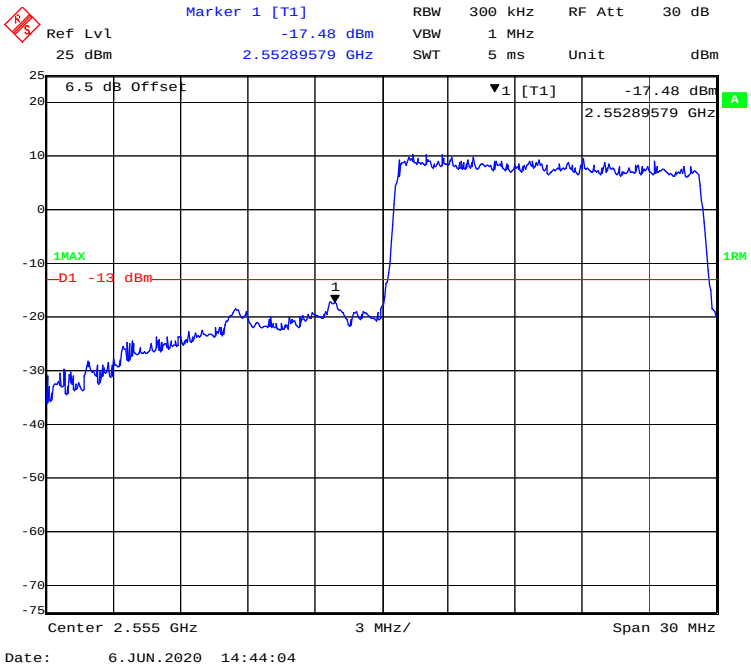


16-QAM (10.0 MHz, FULL RB) - Left Band Edge

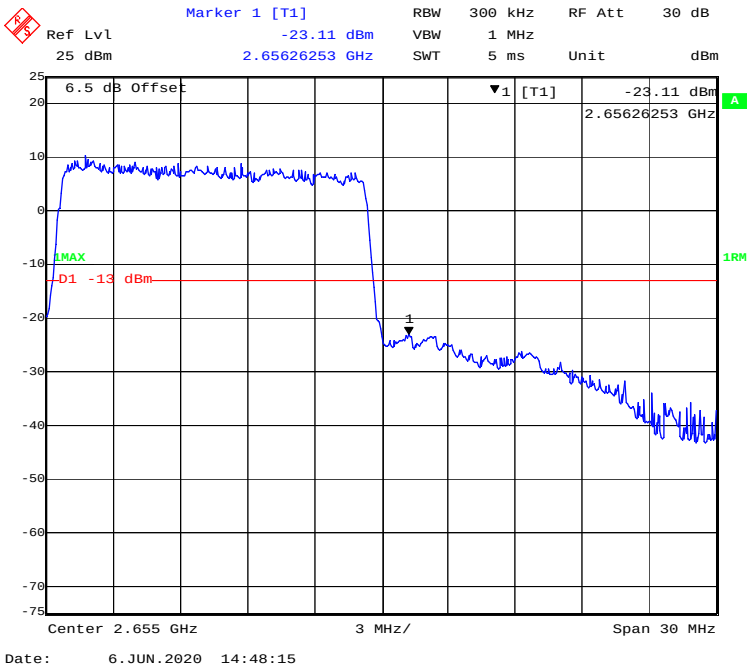


16-QAM (10.0 MHz, FULL RB) - Right Band Edge

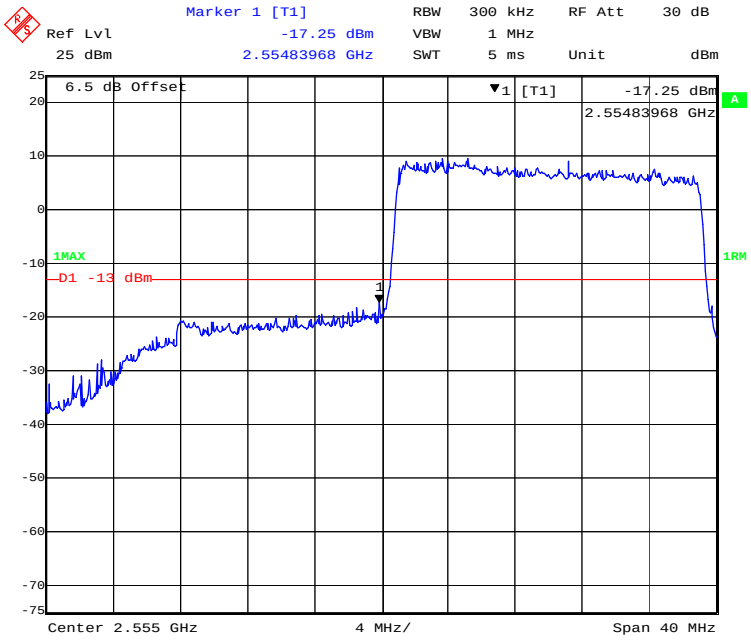
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



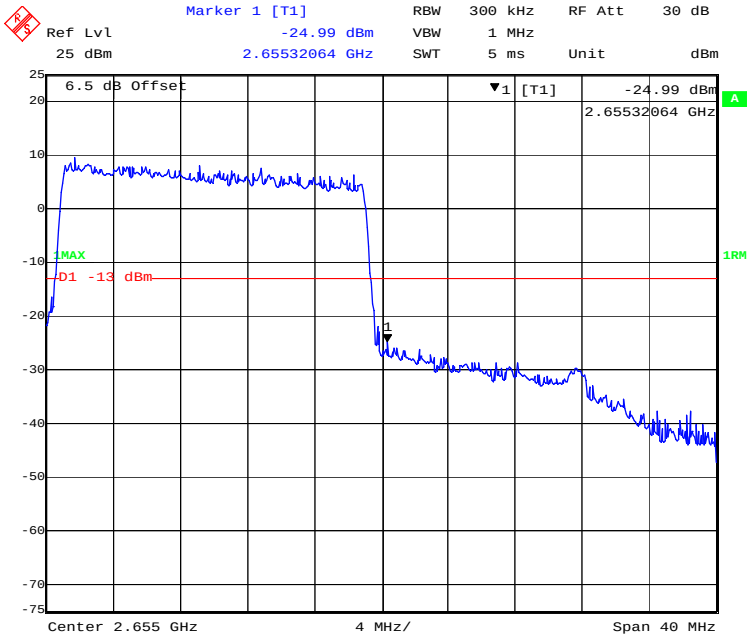
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



16-QAM (20.0 MHz, FULL RB) - Left Band Edge



16-QAM (20.0 MHz, FULL RB) - Right Band Edge



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

Applicable Standards

FCC § 2.1055, §22.355, §24.235 and §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

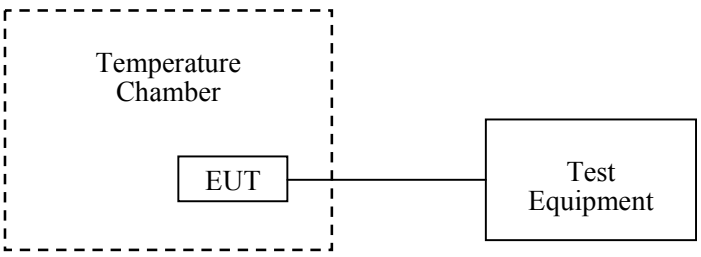
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	24.9 ℃
Relative Humidity:	52 %
ATM Pressure:	101.9 kPa

The testing was performed by Jack Jiao on 2020-06-22.

EUT operation mode: Transmitting

Test Result: Compliance.

GPRS 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	7.4	11	0.013148	2.5
-20		12	0.014344	2.5
-10		9	0.010758	2.5
0		10	0.011953	2.5
10		12	0.014344	2.5
20		11	0.013148	2.5
30		10	0.011953	2.5
40		12	0.014344	2.5
50		11	0.013148	2.5
20	V min.= 7.03	11	0.013148	2.5
20	V max.= 8.14	12	0.014344	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	7.4	14	0.016734	2.5
-20		14	0.016734	2.5
-10		10	0.011953	2.5
0		11	0.013148	2.5
10		17	0.020320	2.5
20		13	0.015539	2.5
30		11	0.013148	2.5
40		14	0.016734	2.5
50		12	0.014344	2.5
20	V min.= 7.03	14	0.016734	2.5
20	V max.= 8.14	14	0.016734	2.5

WCDMA Band V:

WCDMA Mode, Middle Channel, f_o = 836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	7.4	15	0.017930	2.5
-20		14	0.016734	2.5
-10		11	0.013148	2.5
0		8	0.009563	2.5
10		10	0.011953	2.5
20		8	0.009563	2.5
30		11	0.013148	2.5
40		11	0.013148	2.5
50		10	0.011953	2.5
20	V min.= 7.03	15	0.017930	2.5
20	V max.= 8.14	14	0.016734	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	7.4	21	0.011170	pass
-20		10	0.005319	pass
-10		16	0.008511	pass
0		17	0.009043	pass
10		11	0.005851	pass
20		18	0.009574	pass
30		15	0.007979	pass
40		14	0.007447	pass
50		19	0.010106	pass
20	V min.= 7.03	21	0.011170	pass
20	V max.= 8.14	10	0.005319	pass

EGPRS Mode, Middle Channel, f_o=1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	7.4	11	0.005851	pass
-20		12	0.006383	pass
-10		15	0.007979	pass
0		14	0.007447	pass
10		14	0.007447	pass
20		12	0.006383	pass
30		14	0.007447	pass
40		13	0.006915	pass
50		17	0.009043	pass
20	V min.= 7.03	11	0.005851	pass
20	V max.= 8.14	12	0.006383	pass

WCDMA Band II:

WCDMA Mode, Middle Channel, f_o = 1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	7.4	24	0.012766	2.5
-20		23	0.012234	2.5
-10		17	0.009043	2.5
0		10	0.005319	2.5
10		11	0.005851	2.5
20		12	0.006383	2.5
30		12	0.006383	2.5
40		13	0.006915	2.5
50		15	0.007979	2.5
20	V min.= 7.03	24	0.012766	2.5
20	V max.= 8.14	23	0.012234	2.5

LTE Band 5:

Middle Channel, f_o = 836.5 MHz (QPSK)				
Temperature	**Power Supplied**	**Frequency Error**	**Frequency Error**	**Limit**
(℃)	**(V_{DC})**	**(Hz)**	**(ppm)**	**(ppm)**
-30	7.4	17	0.0203	2.5
-20		15	0.0179	2.5
-10		16	0.0191	2.5
0		12	0.0143	2.5
10		11	0.0132	2.5
20		8	0.0096	2.5
30		9	0.0108	2.5
40		10	0.0120	2.5
50		12	0.0143	2.5
20	V min.= 7.03	12	0.0143	2.5
20	V max.= 8.14	13	0.0155	2.5

Middle Channel, f_o = 836.5 MHz (16-QAM)				
Temperature	**Power Supplied**	**Frequency Error**	**Frequency Error**	**Limit**
(℃)	**(V_{DC})**	**(Hz)**	**(ppm)**	**(ppm)**
-30	7.4	19	0.0227	2.5
-20		18	0.0215	2.5
-10		16	0.0191	2.5
0		17	0.0203	2.5
10		10	0.0120	2.5
20		12	0.0143	2.5
30		11	0.0132	2.5
40		9	0.0108	2.5
50		10	0.0120	2.5
20	V min.= 7.03	12	0.0143	2.5
20	V max.= 8.14	15	0.0179	2.5

LTE Band 7:

Low Channel & High Channel (QPSK) /Channel Bandwidth:20MHz					
Temperature	**Power Supplied**	**F_L**	**F_H**	**F_L Limit**	**F_H Limit**
(℃)	**(V_{DC})**	**(MHz)**	**(MHz)**	**(MHz)**	**(MHz)**
-30	7.4	2500.0455	2569.9582	2500	2570
-20		2500.0495	2569.9573	2500	2570
-10		2500.0468	2569.9564	2500	2570
0		2500.0493	2569.9591	2500	2570
10		2500.0442	2569.9551	2500	2570
20		2500.0493	2569.9588	2500	2570
30		2500.0425	2569.9558	2500	2570
40		2500.0433	2569.9506	2500	2570
50		2500.0402	2569.9522	2500	2570
20	V min.= 7.03	2500.0435	2569.9573	2500	2570
20	V max.= 8.14	2500.0436	2569.9570	2500	2570

Low Channel & High Channel (16-QAM) /Channel Bandwidth:20MHz					
Temperature	**Power Supplied**	**F_L**	**F_H**	**F_L Limit**	**F_H Limit**
(℃)	**(V_{DC})**	**(MHz)**	**(MHz)**	**(MHz)**	**(MHz)**
-30	7.4	2500.0472	2569.9592	2500	2570
-20		2500.0452	2569.9559	2500	2570
-10		2500.0428	2569.9584	2500	2570
0		2500.0404	2569.9550	2500	2570
10		2500.0420	2569.9518	2500	2570
20		2500.0457	2569.9543	2500	2570
30		2500.0494	2569.9544	2500	2570
40		2500.0427	2569.9534	2500	2570
50		2500.0483	2569.9508	2500	2570
20	V min.= 7.03	2500.0405	2569.9506	2500	2570
20	V max.= 8.14	2500.0477	2569.9516	2500	2570

LTE Band 38:

Low Channel & High Channel (QPSK) /Channel Bandwidth:20MHz					
Temperature	**Power Supplied**	**F_L**	**F_H**	**F_L Limit**	**F_H Limit**
(℃)	**(V_{DC})**	**(MHz)**	**(MHz)**	**(MHz)**	**(MHz)**
-30	7.4	2570.0482	2619.9604	2570	2620
-20		2570.0487	2619.9646	2570	2620
-10		2570.0457	2619.9669	2570	2620
0		2570.0448	2619.9684	2570	2620
10		2570.0461	2619.9616	2570	2620
20		2570.0462	2619.9623	2570	2620
30		2570.0413	2619.9631	2570	2620
40		2570.0472	2619.9617	2570	2620
50		2570.0418	2619.9690	2570	2620
20	V min.= 7.03	2570.0460	2619.9693	2570	2620
20	V max.= 8.14	2570.0422	2619.9699	2570	2620

Low Channel & High Channel (16-QAM) /Channel Bandwidth:20MHz					
Temperature	**Power Supplied**	**F_L**	**F_H**	**F_L Limit**	**F_H Limit**
(℃)	**(V_{DC})**	**(MHz)**	**(MHz)**	**(MHz)**	**(MHz)**
-30	7.4	2570.0409	2619.9695	2570	2620
-20		2570.0465	2619.9646	2570	2620
-10		2570.0443	2619.9675	2570	2620
0		2570.0447	2619.9655	2570	2620
10		2570.0434	2619.9683	2570	2620
20		2570.0441	2619.9644	2570	2620
30		2570.0479	2619.9604	2570	2620
40		2570.0437	2619.9665	2570	2620
50		2570.0422	2619.9640	2570	2620
20	V min.= 7.03	2570.0407	2619.9624	2570	2620
20	V max.= 8.14	2570.0414	2619.9603	2570	2620

LTE Band 41:

Low Channel & High Channel (QPSK) /Channel Bandwidth:20MHz					
Temperature	Power Supplied	F_L	F_H	F_L Limit	F_H Limit
(℃)	(V_{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	7.4	2555.0583	2654.9599	2555	2655
-20		2555.0514	2654.9538	2555	2655
-10		2555.0554	2654.9543	2555	2655
0		2555.0509	2654.9537	2555	2655
10		2555.0510	2654.9581	2555	2655
20		2555.0534	2654.9517	2555	2655
30		2555.0558	2654.9567	2555	2655
40		2555.0531	2654.9532	2555	2655
50		2555.0526	2654.9564	2555	2655
20	V min.= 7.03	2555.0531	2654.9587	2555	2655
20	V max.= 8.14	2555.0554	2654.9570	2555	2655

Low Channel & High Channel (16-QAM) /Channel Bandwidth:20MHz					
Temperature	Power Supplied	F_L	F_H	F_L Limit	F_H Limit
(℃)	(V_{DC})	(MHz)	(MHz)	(MHz)	(MHz)
-30	7.4	2555.0572	2654.9510	2555	2655
-20		2555.0555	2654.9532	2555	2655
-10		2555.0518	2654.9597	2555	2655
0		2555.0545	2654.9596	2555	2655
10		2555.0573	2654.9518	2555	2655
20		2555.0511	2654.9533	2555	2655
30		2555.0586	2654.9568	2555	2655
40		2555.0594	2654.9561	2555	2655
50		2555.0538	2654.9519	2555	2655
20	V min.= 7.03	2555.0527	2654.9590	2555	2655
20	V max.= 8.14	2555.0543	2654.9539	2555	2655

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