FCC PART 27

FCC PART 22H, PART 24E

TEST REPORT

For

Epik One America Corporation

801 Brickell Ave. #900, Miami, FL, United States 33131

FCC ID: 2AO6ZTX800

Report Type:	Product Type:
Original Report	4G LTE Tablet

Report Number:	RSZ190827005-00D
Report Date:	2019-09-10
Reviewed By:	Nancy Wang RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	4G LTE Tablet
Model	TX800
Frequency Range	Cellular: 824-849 MHz PCS: 1850-1910 MHz WCDMA B2/LTE B2: 1850-1910 MHz WCDMA B5/LTE B5: 824-849 MHz LTE B4: 1710- 1755 MHz LTE B7: 2500-2570 MHz
Transmit Power	GSM850: 32.68dBm(GMSK), 27.62dBm(8PSK) PCS1900: 29.45dBm(GMSK), 26.56dBm(8PSK) WCDMA Band 2: 22.45dBm WCDMA Band 5: 22.62dBm LTE Band 2: 22.65dBm LTE Band 4: 22.65dBm LTE Band 5: 22.67dBm LTE Band 7: 22.59dBm
Modulation Technique	2G: GMSK,8PSK 3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM
Antenna Specification	2G/3G/4G: FPC Antennas
Voltage Range	DC 3.7V from battery or DC 5.0V from Adapter
Date of Test	2019-08-29 to 2019-09-05
Sample serial number	190827005
Received date	2019-08-27
Sample/EUT Status	Good condition
Adapter information	Model:GLY-G19UA-050150-540A Input: AC 100-240V, 50/60Hz,0.3A Output: DC 5.0V, 1500mA

Objective

This test report is prepared on behalf of *Epik One America Corporation* in accordance with Part 2-Subpart J, Part 22-Subpart H and Part 24-Subpart E and Subpart 27 of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS and Part 15.247 DTS submissions with FCC ID: 2AO6ZTX800**.**

Test Methodology

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

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±0.73dB
Unwanted Emission, conducted		±1.6dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing according to TIA/EIA-603-D.

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

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605

Block Diagram of Test Setup
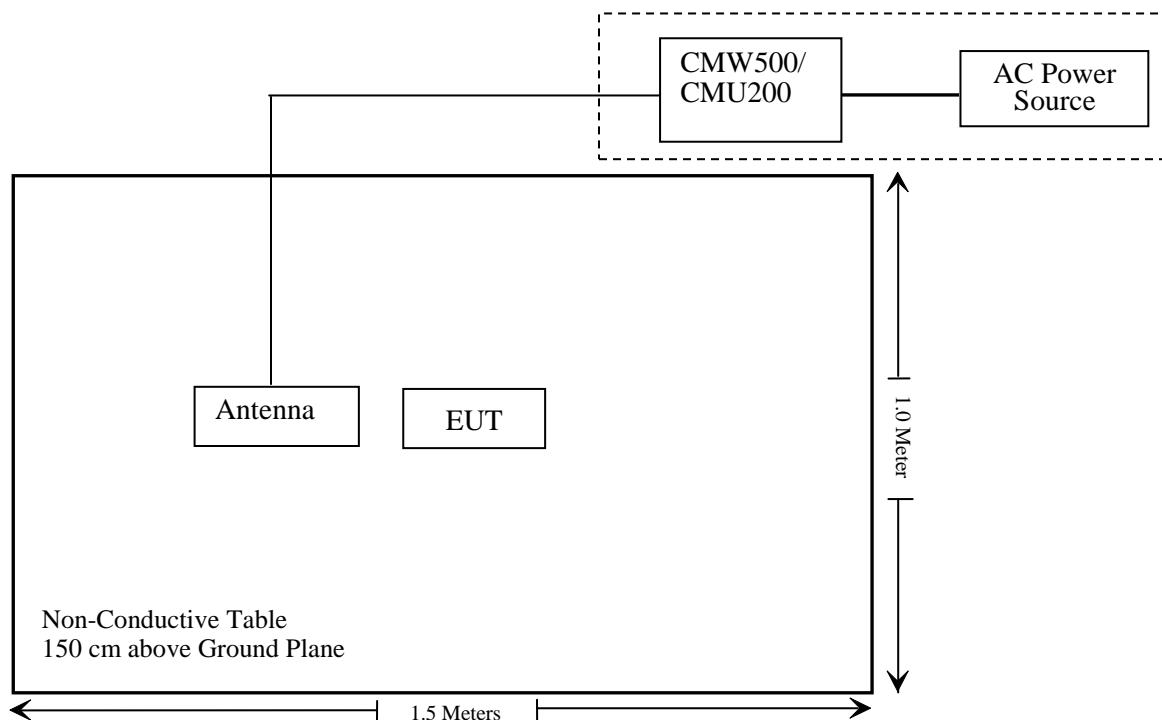
SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 1.1307 , §2.1093	RF Exposure (SAR)	Compliance*
§2.1046; §22.913 (a); §24.232 (c); §27.50 (d) (h)	RF Output Power	Compliance
§2.1047	Modulation Characteristics	Not Applicable
§2.1049; §22.905; §22.917; §24.238; §27.53	Occupied Bandwidth	Compliance
§2.1051; §22.917 (a); §24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
§2.1053; §22.917 (a); §24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
§22.917 (a); §24.238 (a); §27.53(h) (m)	Band Edge	Compliance
§2.1055; §22.355; §24.235; §27.54;	Frequency stability	Compliance

Note: * Please refer to SAR report released by BACL, report number: RSZ190827005-SA.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019-07-22	2020-07-21
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
Sonoma Instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Agilent	Signal Generator	N5183A	MY51040755	2018-12-03	2019-12-03
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2019-07-09	2020-07-08
COM-POWER	Dipole Antenna	AD-100	41000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-11-12	2019-11-12
Ducommun Technologies	RF Cable	104PEA	218124002	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	1	2019-05-21	2019-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-03	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Unknown	High Pass filter	2.8GHz	Unknown	2019-04-20	2020-04-20
Unknown	High Pass filter	1.3GHz	Unknown	2019-04-20	2020-04-20

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2019-03-02	2020-03-01
ESPEC	Temperature & Humidity Chamber	EL-10KA	9107726	2019-01-05	2020-01-05
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2019-04-12	2020-04-12
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2019-01-15	2020-01-15
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2019-07-09	2020-07-09
Wainwright Germany	Band Reject Filter	WRCG1850/1910-1835/1925-40/8SS	22	2019-03-02	2020-03-01
Wainwright Germany	Band Reject Filter	WRCG1786-1689/1806	2	2019-03-02	2020-03-01
Chengdu Oulitong	Band Reject Filter	OBSF-2500-2570-S	OE01601523	2019-03-02	2020-03-01
Unknown	High Pass filter	1.3GHz	Unknown	2019-04-20	2020-04-20
Ducommun Technologies	RF Cable	RG-214	3	Each Time	
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2018-11-12	2019-11-12
WEINSCHEL	3dB Attenuator	6231	666	Each Time	
Unknown	Power Splitter	1620	129	Each Time	

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) 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§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ190827005-SA.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

FCC §2.1046, §22.913 (a) & §24.232 (c); §27.50 (d) (h) - RF OUTPUT POWER

Applicable Standard

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

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

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

According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

Test Procedure

Conducted method:

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

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┌──────────┐        ┌──────────────┐        ┌──────────────┐
│          │        │              │        │   CMW500     │
│   EUT    │────────│  Attenuator  │────────│   CMU200     │
│          │        │              │        │              │
└──────────┘        └──────────────┘        └──────────────┘
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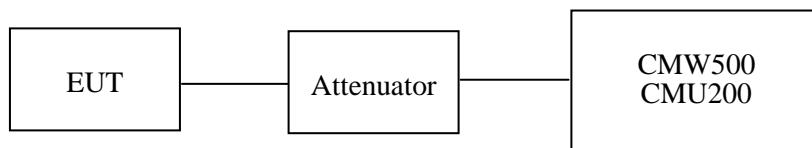
Radiated method:

TIA 603-D section 2.2.17

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Kieron Luo on 2019-09-05.

Conducted Power

Cellular Band (Part 22H)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.56	38.45
	190	836.6	32.51	38.45
	251	848.8	32.48	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.57	29.67	28.16	26.89	38.45
	190	836.6	32.68	29.49	28.21	26.84	38.45
	251	848.8	32.49	29.57	28.13	26.94	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	27.36	25.12	23.86	21.85	38.45
	190	836.6	27.34	25.26	23.89	21.89	38.45
	251	848.8	27.62	25.10	23.96	21.92	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2k		22.62	22.43	22.51
		HSDPA	1	21.48	21.53	21.57
			2	21.37	21.52	21.53
			3	21.29	21.59	21.49
			4	21.37	21.67	21.62
			5	21.56	21.58	21.54
		HSUPA	1	21.42	21.24	21.41
			2	21.51	21.38	21.28
			3	21.49	21.23	21.51
			4	21.61	21.30	21.43
			5	21.47	21.37	21.52

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	29.38	33
	661	1880.0	29.42	33
	810	1909.8	29.45	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.12	27.13	25.87	23.86	33
	661	1880.0	29.02	27.28	25.91	23.89	33
	810	1909.8	29.05	27.16	25.96	23.79	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	26.48	24.52	22.15	20.89	33
	661	1880.0	26.54	24.48	22.34	20.92	33
	810	1909.8	26.56	24.67	22.21	20.85	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC12.2k		22.34	22.45	22.39
		HSDPA	1	21.54	21.62	21.58
			2	21.52	21.52	21.62
			3	21.48	21.34	21.74
			4	21.62	21.59	21.84
			5	21.58	21.48	21.59
		HSUPA	1	21.48	21.62	21.53
			2	21.52	21.62	21.49
			3	21.53	21.46	21.52
			4	21.42	21.52	21.49
			5	21.39	21.51	21.46

Peak-to-average ratio (PAR)

Cellular Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.39	13
	Middle	1.46	13
	High	1.34	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.34	13
	Middle	1.52	13
	High	1.41	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.62	13
	Middle	3.43	13
	High	3.34	13
HSDPA (16QAM)	Low	3.84	13
	Middle	3.62	13
	High	3.45	13
HSUPA (BPSK)	Low	2.96	13
	Middle	3.26	13
	High	3.19	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.62	13
	Middle	1.41	13
	High	1.52	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.24	13
	Middle	1.37	13
	High	1.53	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.63	13
	Middle	3.38	13
	High	3.45	13
HSDPA (16QAM)	Low	3.48	13
	Middle	3.68	13
	High	3.82	13
HSUPA (BPSK)	Low	3.76	13
	Middle	3.91	13
	High	3.86	13

Radiated Power
GSM Mode:

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	85.07	7	1.6	H	23.1	0.28	0.0	22.82	38.45	15.63
836.6	80.57	315	2.5	V	20.6	0.28	0.0	20.32	38.45	18.13
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	82.32	289	1.8	H	12.6	1.30	9.40	20.70	33	12.30
1880.00	80.18	69	2.3	V	10.3	1.30	9.40	18.40	33	14.60

EDGE Mode:

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	80.58	115	1.5	H	18.6	0.28	0.0	18.32	38.45	20.13
836.6	76.41	356	2.4	V	16.4	0.28	0.0	16.12	38.45	22.33
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	80.34	116	1.3	H	10.7	1.30	9.40	18.80	33	14.20
1880.00	75.52	26	1.8	V	5.6	1.30	9.40	13.70	33	19.30

WCDMA Mode:

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	78.75	262	2.4	H	16.8	0.28	0.0	16.52	38.45	16.93
836.6	73.53	250	2.2	V	13.5	0.28	0.0	13.22	38.45	19.23
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	77.24	197	1.5	H	7.6	1.30	9.40	15.70	33	13.30
1880.00	74.34	232	1.3	V	4.4	1.30	9.40	12.50	33	15.70

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level
dBd is for the ERP, dBi is for EIRP.

LTE Band 2:

Maximum Output Power

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	21.93	22.16	21.68
		RB Size=1, RB Offset=2	22.02	21.78	22.12
		RB Size=1, RB Offset=5	21.62	22.02	21.31
		RB Size=3, RB Offset=0	21.29	21.55	21.7
		RB Size=3, RB Offset=1	21.64	22.11	21.86
		RB Size=3, RB Offset=2	21.78	21.57	22.14
		RB Size=6, RB Offset=0	21.12	21.41	21.21
	16QAM	RB Size=1, RB Offset=0	21.91	22.21	22.35
		RB Size=1, RB Offset=2	21.68	21.63	21.86
		RB Size=1, RB Offset=5	22.27	21.74	21.69
		RB Size=3, RB Offset=0	21.73	21.41	21.48
		RB Size=3, RB Offset=1	21.64	22.45	22.45
		RB Size=3, RB Offset=2	22.33	21.79	22.30
		RB Size=6, RB Offset=0	22.24	21.67	22.22
3.0	QPSK	RB Size=1, RB Offset=0	21.89	21.59	21.62
		RB Size=1, RB Offset=7	21.63	22.04	22.04
		RB Size=1, RB Offset=14	22.15	21.78	22.41
		RB Size=8, RB Offset=0	22.21	22.21	22.03
		RB Size=8, RB Offset=4	21.95	21.35	22.03
		RB Size=8, RB Offset=7	21.60	21.68	22.32
		RB Size=15, RB Offset=0	22.44	22.04	21.62
	16QAM	RB Size=1, RB Offset=0	22.65	22.51	21.95
		RB Size=1, RB Offset=7	22.36	22.45	21.82
		RB Size=1, RB Offset=14	22.14	21.87	21.9
		RB Size=8, RB Offset=0	21.54	21.42	21.86
		RB Size=8, RB Offset=4	21.70	22.22	21.84
		RB Size=8, RB Offset=7	21.49	21.7	22.02
		RB Size=15, RB Offset=0	21.70	22.17	22.16

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	21.88	21.73	21.92
		RB Size=1, RB Offset=12	22.02	22.31	22.16
		RB Size=1, RB Offset=24	21.29	21.19	21.62
		RB Size=12, RB Offset=0	21.26	21.77	22.07
		RB Size=12, RB Offset=6	22.16	22.47	22.07
		RB Size=12, RB Offset=11	21.84	22.43	22.32
		RB Size=25, RB Offset=0	22.03	21.36	22.09
	16QAM	RB Size=1, RB Offset=0	22.20	21.59	21.60
		RB Size=1, RB Offset=12	21.66	22.04	21.85
		RB Size=1, RB Offset=24	22.21	21.52	21.99
		RB Size=12, RB Offset=0	21.52	22.01	22.07
		RB Size=12, RB Offset=6	22.04	21.69	21.50
		RB Size=12, RB Offset=11	21.99	22.39	22.19
		RB Size=25, RB Offset=0	21.65	21.47	21.64
10.0	QPSK	RB Size=1, RB Offset=0	22.05	21.86	21.48
		RB Size=1, RB Offset=24	22.15	21.72	22.28
		RB Size=1, RB Offset=49	22.12	22.45	22.04
		RB Size=25, RB Offset=0	22.35	22.4	22.16
		RB Size=25, RB Offset=12	21.50	21.32	21.88
		RB Size=25, RB Offset=24	22.19	21.85	21.81
		RB Size=50, RB Offset=0	21.63	22.25	22.23
	16QAM	RB Size=1, RB Offset=0	22.61	21.82	22.47
		RB Size=1, RB Offset=24	22.50	21.91	22.51
		RB Size=1, RB Offset=49	21.74	21.68	21.99
		RB Size=25, RB Offset=0	21.74	21.55	22.27
		RB Size=25, RB Offset=12	22.42	21.92	22.04
		RB Size=25, RB Offset=24	22.13	21.55	21.72
		RB Size=50, RB Offset=0	22.05	21.30	21.29

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	21.64	21.62	21.59
		RB Size=1, RB Offset=37	22.17	21.56	21.6
		RB Size=1, RB Offset=74	21.73	21.18	21.32
		RB Size=36, RB Offset=0	21.14	21.34	21.39
		RB Size=36, RB Offset=18	22.04	21.75	21.67
		RB Size=36, RB Offset=37	22.09	21.71	21.75
		RB Size=75, RB Offset=0	21.50	21.36	21.35
	16QAM	RB Size=1, RB Offset=0	22.43	21.70	21.79
		RB Size=1, RB Offset=37	21.40	21.48	21.32
		RB Size=1, RB Offset=74	22.36	21.67	21.48
		RB Size=36, RB Offset=0	21.65	21.37	21.31
		RB Size=36, RB Offset=18	21.8	21.66	21.58
		RB Size=36, RB Offset=37	21.99	21.62	21.64
		RB Size=75, RB Offset=0	21.84	21.57	21.33
20.0	QPSK	RB Size=1, RB Offset=0	21.57	21.42	21.58
		RB Size=1, RB Offset=49	21.72	21.64	21.76
		RB Size=1, RB Offset=99	22.35	21.68	21.81
		RB Size=50, RB Offset=0	22.60	21.74	21.85
		RB Size=50, RB Offset=24	21.67	21.42	21.46
		RB Size=50, RB Offset=49	22.23	21.39	21.62
		RB Size=100, RB Offset=0	21.61	21.69	21.46
	16QAM	RB Size=1, RB Offset=0	22.10	21.94	21.84
		RB Size=1, RB Offset=49	22.37	21.72	21.92
		RB Size=1, RB Offset=99	22.04	21.95	21.71
		RB Size=50, RB Offset=0	21.46	21.6	21.42
		RB Size=50, RB Offset=24	21.84	21.88	21.85
		RB Size=50, RB Offset=49	21.31	21.29	21.5
		RB Size=100, RB Offset=0	21.86	21.29	21.44

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.73	13	Pass
QPSK (100RB Size)	4.44	13	Pass
16QAM (1RB Size)	4.79	13	Pass
16QAM (100RB Size)	4.52	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	77.52	94	2.3	H	7.8	1.30	9.40	15.90	33
1880.00	74.16	162	2.1	V	4.3	1.30	9.40	12.40	33
3 MHz Bandwidth									
1880.00	77.12	57	1.4	H	7.4	1.30	9.40	15.50	33
1880.00	74.03	173	2.2	V	4.1	1.30	9.40	12.20	33
5 MHz Bandwidth									
1880.00	76.72	32	2.2	H	7.0	1.30	9.40	15.10	33
1880.00	73.76	28	1.1	V	3.9	1.30	9.40	12.00	33
10 MHz Bandwidth									
1880.00	76.51	93	2.0	H	6.8	1.30	9.40	14.90	33
1880.00	73.43	72	1.7	V	3.5	1.30	9.40	11.60	33
15 MHz Bandwidth									
1880.00	76.24	312	1.7	H	6.6	1.30	9.40	14.70	33
1880.00	73.23	34	1.3	V	3.3	1.30	9.40	11.40	33
20 MHz Bandwidth									
1880.00	76.02	265	1.9	H	6.3	1.30	9.40	14.40	33
1880.00	73.03	9	2.5	V	3.1	1.30	9.40	11.20	33

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1880.00	77.68	269	1.9	H	8.0	1.30	9.40	16.10	33
1880.00	74.78	323	1.9	V	4.9	1.30	9.40	13.00	33
3 MHz Bandwidth									
1880.00	77.25	52	1.9	H	7.6	1.30	9.40	15.70	33
1880.00	74.13	171	1.8	V	4.2	1.30	9.40	12.30	33
5 MHz Bandwidth									
1880.00	76.93	34	1.7	H	7.3	1.30	9.40	15.40	33
1880.00	73.86	28	1.9	V	4.0	1.30	9.40	12.10	33
10 MHz Bandwidth									
1880.00	76.72	208	1.4	H	7.0	1.30	9.40	15.10	33
1880.00	73.68	280	2.2	V	3.8	1.30	9.40	11.90	33
15 MHz Bandwidth									
1880.00	76.46	184	1.4	H	6.8	1.30	9.40	14.90	33
1880.00	73.43	251	1.7	V	3.5	1.30	9.40	11.60	33
20 MHz Bandwidth									
1880.00	76.17	145	2.3	H	6.5	1.30	9.40	14.60	33
1880.00	73.13	191	1.5	V	3.2	1.30	9.40	11.30	33

LTE Band 4:

Maximum Output Power

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	21.53	21.51	21.64
		RB Size=1, RB Offset=2	21.99	21.72	21.56
		RB Size=1, RB Offset=5	21.67	21.34	21.30
		RB Size=3, RB Offset=0	21.52	21.42	21.32
		RB Size=3, RB Offset=1	22.51	21.82	21.75
		RB Size=3, RB Offset=2	22.03	21.64	21.66
		RB Size=6, RB Offset=0	22.01	21.14	21.25
	16QAM	RB Size=1, RB Offset=0	21.71	21.68	21.70
		RB Size=1, RB Offset=2	21.82	21.50	21.31
		RB Size=1, RB Offset=5	22.08	21.70	21.64
		RB Size=3, RB Offset=0	21.54	21.37	21.15
		RB Size=3, RB Offset=1	21.95	21.72	21.47
		RB Size=3, RB Offset=2	22.02	21.76	21.62
		RB Size=6, RB Offset=0	21.46	21.45	21.33
3.0	QPSK	RB Size=1, RB Offset=0	22.04	21.51	21.58
		RB Size=1, RB Offset=7	21.94	21.86	21.82
		RB Size=1, RB Offset=14	22.41	21.88	21.66
		RB Size=8, RB Offset=0	21.69	21.83	21.93
		RB Size=8, RB Offset=4	21.45	21.46	21.42
		RB Size=8, RB Offset=7	21.53	21.60	21.56
		RB Size=15, RB Offset=0	22.28	21.46	21.55
	16QAM	RB Size=1, RB Offset=0	22.39	21.85	21.73
		RB Size=1, RB Offset=7	22.32	21.85	21.94
		RB Size=1, RB Offset=14	22.30	21.91	21.96
		RB Size=8, RB Offset=0	21.50	21.48	21.59
		RB Size=8, RB Offset=4	22.08	21.69	21.69
		RB Size=8, RB Offset=7	21.22	21.29	21.39
		RB Size=15, RB Offset=0	21.85	21.42	21.47

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	21.59	21.45	21.55
		RB Size=1, RB Offset=12	22.21	21.51	21.73
		RB Size=1, RB Offset=24	21.98	21.31	21.41
		RB Size=12, RB Offset=0	21.68	21.32	21.29
		RB Size=12, RB Offset=6	21.72	21.83	21.74
		RB Size=12, RB Offset=11	21.56	21.57	21.52
		RB Size=25, RB Offset=0	21.89	21.19	21.36
	16QAM	RB Size=1, RB Offset=0	22.18	21.55	21.57
		RB Size=1, RB Offset=12	21.29	21.23	21.31
		RB Size=1, RB Offset=24	21.72	21.76	21.7
		RB Size=12, RB Offset=0	21.93	21.20	21.35
		RB Size=12, RB Offset=6	21.54	21.64	21.73
		RB Size=12, RB Offset=11	22.09	21.53	21.64
		RB Size=25, RB Offset=0	22.27	21.45	21.46
10.0	QPSK	RB Size=1, RB Offset=0	21.78	21.44	21.69
		RB Size=1, RB Offset=24	21.85	21.65	21.86
		RB Size=1, RB Offset=49	22.05	21.9	21.82
		RB Size=25, RB Offset=0	22.65	21.95	21.79
		RB Size=25, RB Offset=12	21.66	21.48	21.52
		RB Size=25, RB Offset=24	21.87	21.54	21.5
		RB Size=50, RB Offset=0	22.14	21.58	21.65
	16QAM	RB Size=1, RB Offset=0	21.79	21.85	21.89
		RB Size=1, RB Offset=24	22.62	21.98	21.90
		RB Size=1, RB Offset=49	22.08	21.71	21.82
		RB Size=25, RB Offset=0	22.31	21.51	21.40
		RB Size=25, RB Offset=12	22.14	21.89	21.63
		RB Size=25, RB Offset=24	21.25	21.22	21.46
		RB Size=50, RB Offset=0	22.21	21.29	21.27

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	21.45	21.43	21.50
		RB Size=1, RB Offset=37	22.28	21.75	21.58
		RB Size=1, RB Offset=74	21.29	21.37	21.25
		RB Size=36, RB Offset=0	22.08	21.36	21.13
		RB Size=36, RB Offset=18	21.83	21.71	21.87
		RB Size=36, RB Offset=37	21.74	21.51	21.75
		RB Size=75, RB Offset=0	21.63	21.19	21.18
	16QAM	RB Size=1, RB Offset=0	22.49	21.60	21.66
		RB Size=1, RB Offset=37	21.49	21.35	21.36
		RB Size=1, RB Offset=74	21.89	21.70	21.58
		RB Size=36, RB Offset=0	21.34	21.23	21.39
		RB Size=36, RB Offset=18	22.37	21.49	21.67
		RB Size=36, RB Offset=37	21.86	21.65	21.75
		RB Size=75, RB Offset=0	21.42	21.45	21.52
20.0	QPSK	RB Size=1, RB Offset=0	22.03	21.63	21.49
		RB Size=1, RB Offset=49	21.66	21.74	21.78
		RB Size=1, RB Offset=99	22.06	21.81	21.75
		RB Size=50, RB Offset=0	22.31	21.77	21.69
		RB Size=50, RB Offset=24	21.96	21.46	21.57
		RB Size=50, RB Offset=49	21.85	21.60	21.54
		RB Size=100, RB Offset=0	21.81	21.65	21.47
	16QAM	RB Size=1, RB Offset=0	21.93	21.67	21.87
		RB Size=1, RB Offset=49	22.45	21.72	21.88
		RB Size=1, RB Offset=99	22.01	21.95	21.78
		RB Size=50, RB Offset=0	21.91	21.41	21.63
		RB Size=50, RB Offset=24	22.40	21.90	21.73
		RB Size=50, RB Offset=49	21.74	21.44	21.26
		RB Size=100, RB Offset=0	22.05	21.28	21.31

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.43	13	Pass
QPSK (100RB Size)	4.37	13	Pass
16QAM (1RB Size)	4.44	13	Pass
16QAM (100RB Size)	4.69	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	80.76	233	2.5	H	7.4	1.30	8.90	15.00	30
1732.50	76.58	246	2.4	V	3.9	1.30	8.90	11.50	30
3 MHz Bandwidth									
1732.50	80.32	241	1.8	H	7.0	1.30	8.90	14.60	30
1732.50	76.39	357	1.8	V	3.7	1.30	8.90	11.30	30
5 MHz Bandwidth									
1732.50	80.13	102	1.8	H	6.8	1.30	8.90	14.40	30
1732.50	76.06	237	1.8	V	3.3	1.30	8.90	10.90	30
10 MHz Bandwidth									
1732.50	79.84	199	2.1	H	6.5	1.30	8.90	14.10	30
1732.50	75.67	136	1.4	V	2.9	1.30	8.90	10.50	30
15 MHz Bandwidth									
1732.50	79.62	177	2.2	H	6.3	1.30	8.90	13.90	30
1732.50	75.42	166	1.5	V	2.7	1.30	8.90	10.30	30
20 MHz Bandwidth									
1732.50	79.24	49	2.4	H	5.9	1.30	8.90	13.50	30
1732.50	75.16	123	1.4	V	2.4	1.30	8.90	10.00	30

16QAM:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	80.95	26	1.6	H	7.6	1.30	8.90	15.20	30
1732.50	76.53	46	2.4	V	3.8	1.30	8.90	11.10	30
3 MHz Bandwidth									
1732.50	80.50	138	1.4	H	7.2	1.30	8.90	14.80	30
1732.50	76.31	156	1.0	V	3.6	1.30	8.90	11.20	30
5 MHz Bandwidth									
1732.50	80.10	353	2.3	H	6.8	1.30	8.90	14.40	30
1732.50	75.81	46	2.0	V	3.1	1.30	8.90	10.70	30
10 MHz Bandwidth									
1732.50	79.96	311	2.1	H	6.4	1.50	8.90	14.20	30
1732.50	75.89	232	2.4	V	3.0	1.50	8.90	10.80	30
15 MHz Bandwidth									
1732.50	79.65	150	1.5	H	6.3	1.30	8.90	13.90	30
1732.50	75.34	77	2.2	V	2.6	1.30	8.90	10.20	30
20 MHz Bandwidth									
1732.50	79.35	155	1.2	H	6.0	1.30	8.90	13.60	30
1732.50	75.12	85	1.4	V	2.4	1.30	8.90	10.00	30

LTE Band 5:

Maximum Output Power

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	21.42	21.63	21.62
		RB Size=1, RB Offset=2	21.68	21.51	21.66
		RB Size=1, RB Offset=5	21.72	21.24	21.37
		RB Size=3, RB Offset=0	22.02	21.25	21.27
		RB Size=3, RB Offset=1	22.09	21.78	21.74
		RB Size=3, RB Offset=2	21.96	21.67	21.79
		RB Size=6, RB Offset=0	21.82	21.23	21.16
	16QAM	RB Size=1, RB Offset=0	22.40	21.78	21.55
		RB Size=1, RB Offset=2	21.60	21.28	21.47
		RB Size=1, RB Offset=5	21.49	21.58	21.71
		RB Size=3, RB Offset=0	21.98	21.13	21.11
		RB Size=3, RB Offset=1	21.53	21.58	21.62
		RB Size=3, RB Offset=2	22.13	21.63	21.53
		RB Size=6, RB Offset=0	21.98	21.34	21.37
3.0	QPSK	RB Size=1, RB Offset=0	21.59	21.69	21.45
		RB Size=1, RB Offset=7	21.73	21.65	21.85
		RB Size=1, RB Offset=14	21.83	21.72	21.85
		RB Size=8, RB Offset=0	22.34	21.75	21.76
		RB Size=8, RB Offset=4	21.32	21.4	21.39
		RB Size=8, RB Offset=7	21.83	21.66	21.46
		RB Size=15, RB Offset=0	21.54	21.71	21.46
	16QAM	RB Size=1, RB Offset=0	22.03	21.84	21.87
		RB Size=1, RB Offset=7	22.67	21.94	21.85
		RB Size=1, RB Offset=14	21.80	21.89	21.79
		RB Size=8, RB Offset=0	21.95	21.42	21.43
		RB Size=8, RB Offset=4	22.31	21.64	21.65
		RB Size=8, RB Offset=7	21.65	21.5	21.28
		RB Size=15, RB Offset=0	21.84	21.39	21.31

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	21.41	21.54	21.62
		RB Size=1, RB Offset=12	22.28	21.69	21.65
		RB Size=1, RB Offset=24	21.16	21.39	21.33
		RB Size=12, RB Offset=0	22.02	21.25	21.26
		RB Size=12, RB Offset=6	22.28	21.76	21.85
		RB Size=12, RB Offset=11	22.16	21.65	21.78
		RB Size=25, RB Offset=0	21.32	21.32	21.19
	16QAM	RB Size=1, RB Offset=0	22.13	21.68	21.55
		RB Size=1, RB Offset=12	21.37	21.28	21.34
		RB Size=1, RB Offset=24	22.45	21.54	21.55
		RB Size=12, RB Offset=0	21.78	21.27	21.17
		RB Size=12, RB Offset=6	22.21	21.58	21.75
		RB Size=12, RB Offset=11	22.35	21.61	21.53
		RB Size=25, RB Offset=0	21.48	21.48	21.33
10.0	QPSK	RB Size=1, RB Offset=0	21.75	21.49	21.56
		RB Size=1, RB Offset=24	22.23	21.58	21.71
		RB Size=1, RB Offset=49	22.10	21.67	21.69
		RB Size=25, RB Offset=0	21.88	21.91	21.85
		RB Size=25, RB Offset=12	21.87	21.51	21.37
		RB Size=25, RB Offset=24	21.42	21.44	21.45
		RB Size=50, RB Offset=0	21.76	21.71	21.62
	16QAM	RB Size=1, RB Offset=0	21.75	21.87	21.78
		RB Size=1, RB Offset=24	21.81	21.78	21.72
		RB Size=1, RB Offset=49	22.44	21.75	21.77
		RB Size=25, RB Offset=0	21.95	21.61	21.62
		RB Size=25, RB Offset=12	21.93	21.89	21.63
		RB Size=25, RB Offset=24	21.59	21.26	21.48
		RB Size=50, RB Offset=0	21.97	21.24	21.39

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.37	13	Pass
QPSK (50RB Size)	4.89	13	Pass
16QAM (1RB Size)	4.47	13	Pass
16QAM (50RB Size)	4.45	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
836.6	78.52	252	2.0	H	16.5	0.28	0.0	16.22	38.45
836.6	73.42	231	1.1	V	13.4	0.28	0.0	13.12	38.45
3 MHz Bandwidth									
836.6	78.24	32	1.8	H	16.2	0.28	0.0	15.92	38.45
836.6	73.23	121	2.3	V	13.2	0.28	0.0	12.92	38.45
5 MHz Bandwidth									
836.6	78.05	10	2.0	H	16.1	0.28	0.0	15.82	38.45
836.6	73.03	227	1.7	V	13.0	0.28	0.0	12.72	38.45
10 MHz Bandwidth									
836.6	77.65	40	1.6	H	15.7	0.28	0.0	15.42	38.45
836.6	72.68	32	1.7	V	12.7	0.28	0.0	12.42	38.45

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
1.4 MHz Bandwidth									
836.6	77.61	329	2.5	H	15.6	0.28	0.0	15.32	38.45
836.6	72.62	53	2.4	V	12.6	0.28	0.0	12.32	38.45
3 MHz Bandwidth									
836.6	77.43	22	1.6	H	15.4	0.28	0.0	15.12	38.45
836.6	72.32	137	1.2	V	12.3	0.28	0.0	12.02	38.45
5 MHz Bandwidth									
836.6	77.15	181	1.9	H	15.2	0.28	0.0	14.92	38.45
836.6	72.03	155	2.5	V	12.0	0.28	0.0	11.72	38.45
10 MHz Bandwidth									
836.6	76.87	215	2.4	H	14.9	0.28	0.0	14.62	38.45
836.6	71.65	146	1.5	V	11.7	0.28	0.0	11.42	38.45

LTE Band 7:

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5	QPSK	RB Size=1, RB Offset=0	21.60	21.67	21.54
		RB Size=1, RB Offset=12	22.47	21.53	21.60
		RB Size=1, RB Offset=24	21.25	21.32	21.38
		RB Size=12, RB Offset=0	21.68	21.32	21.19
		RB Size=12, RB Offset=6	21.98	21.84	21.83
		RB Size=12, RB Offset=11	22.39	21.74	21.77
		RB Size=25, RB Offset=0	22.08	21.13	21.40
	16QAM	RB Size=1, RB Offset=0	21.64	21.61	21.80
		RB Size=1, RB Offset=12	21.83	21.5	21.26
		RB Size=1, RB Offset=24	22.45	21.58	21.56
		RB Size=12, RB Offset=0	22.03	21.13	21.15
		RB Size=12, RB Offset=6	21.59	21.63	21.51
		RB Size=12, RB Offset=11	22.18	21.63	21.48
		RB Size=25, RB Offset=0	21.89	21.54	21.39
10	QPSK	RB Size=1, RB Offset=0	22.12	21.68	21.68
		RB Size=1, RB Offset=24	22.02	21.82	21.67
		RB Size=1, RB Offset=49	22.23	21.81	21.74
		RB Size=25, RB Offset=0	21.97	21.90	21.89
		RB Size=25, RB Offset=12	22.02	21.38	21.53
		RB Size=25, RB Offset=24	21.80	21.41	21.60
		RB Size=50, RB Offset=0	22.16	21.69	21.55
	16QAM	RB Size=1, RB Offset=0	22.29	21.91	21.78
		RB Size=1, RB Offset=24	22.54	21.85	21.74
		RB Size=1, RB Offset=49	22.59	21.77	21.71
		RB Size=25, RB Offset=0	21.91	21.48	21.66
		RB Size=25, RB Offset=12	21.67	21.63	21.86
		RB Size=25, RB Offset=24	22.12	21.26	21.33
		RB Size=50, RB Offset=0	21.66	21.46	21.30

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15	QPSK	RB Size=1, RB Offset=0	21.46	21.58	21.67
		RB Size=1, RB Offset=37	22.31	21.66	21.70
		RB Size=1, RB Offset=74	22.06	21.30	21.26
		RB Size=36, RB Offset=0	21.82	21.42	21.37
		RB Size=36, RB Offset=18	22.25	21.76	21.62
		RB Size=36, RB Offset=37	22.03	21.68	21.7
		RB Size=75, RB Offset=0	22.09	21.14	21.39
	16QAM	RB Size=1, RB Offset=0	22.13	21.54	21.53
		RB Size=1, RB Offset=37	22.02	21.50	21.23
		RB Size=1, RB Offset=74	21.52	21.49	21.67
		RB Size=36, RB Offset=0	21.61	21.15	21.36
		RB Size=36, RB Offset=18	22.04	21.68	21.67
		RB Size=36, RB Offset=37	21.57	21.62	21.74
		RB Size=75, RB Offset=0	22.15	21.45	21.54
20	QPSK	RB Size=1, RB Offset=0	21.85	21.54	21.56
		RB Size=1, RB Offset=49	22.46	21.88	21.68
		RB Size=1, RB Offset=99	21.61	21.72	21.72
		RB Size=50, RB Offset=0	22.17	21.69	21.81
		RB Size=50, RB Offset=24	21.83	21.49	21.39
		RB Size=50, RB Offset=49	21.70	21.47	21.54
		RB Size=100, RB Offset=0	22.37	21.60	21.53
	16QAM	RB Size=1, RB Offset=0	21.85	21.92	21.88
		RB Size=1, RB Offset=49	22.35	21.79	21.81
		RB Size=1, RB Offset=99	22.37	21.86	21.74
		RB Size=50, RB Offset=0	21.55	21.39	21.54
		RB Size=50, RB Offset=24	21.84	21.66	21.8
		RB Size=50, RB Offset=49	21.58	21.21	21.21
		RB Size=100, RB Offset=0	21.50	21.52	21.3

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.92	13	Pass
QPSK (50RB Size)	4.91	13	Pass
16QAM (1RB Size)	4.78	13	Pass
16QAM (50RB Size)	4.64	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
2535.00	77.24	39	2.3	H	7.1	2.60	10.20	14.70	33
2535.00	74.43	224	2.3	V	4.9	2.60	10.20	12.50	33
10 MHz Bandwidth									
2535.00	77.03	266	1.3	H	6.9	2.60	10.20	14.50	33
2535.00	74.13	331	1.5	V	4.6	2.60	10.20	12.20	33
15 MHz Bandwidth									
2535.00	76.78	158	2.0	H	6.6	2.60	10.20	14.20	33
2535.00	73.87	183	1.9	V	4.3	2.60	10.20	11.90	33
20 MHz Bandwidth									
2535.00	76.54	244	2.2	H	6.4	2.60	10.20	14.00	33
2535.00	73.62	75	2.3	V	4.1	2.60	10.20	11.70	33

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		
Middle Channel									
5 MHz Bandwidth									
2535.00	77.76	57	1.9	H	7.6	2.60	10.20	15.20	33
2535.00	74.58	23	1.4	V	5.0	2.60	10.20	12.60	33
10 MHz Bandwidth									
2535.00	77.21	202	1.5	H	7.0	2.60	10.20	14.60	33
2535.00	74.32	357	1.6	V	4.8	2.60	10.20	12.40	33
15 MHz Bandwidth									
2535.00	76.84	168	2.2	H	6.7	2.60	10.20	14.30	33
2535.00	73.95	65	2.0	V	4.4	2.60	10.20	12.00	33
20 MHz Bandwidth									
2535.00	76.62	236	2.0	H	6.5	2.60	10.20	14.10	33
2535.00	73.74	218	1.5	V	4.2	2.60	10.20	11.80	33

Note:
All above data were tested with no amplifier
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

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

Applicable Standard

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

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.
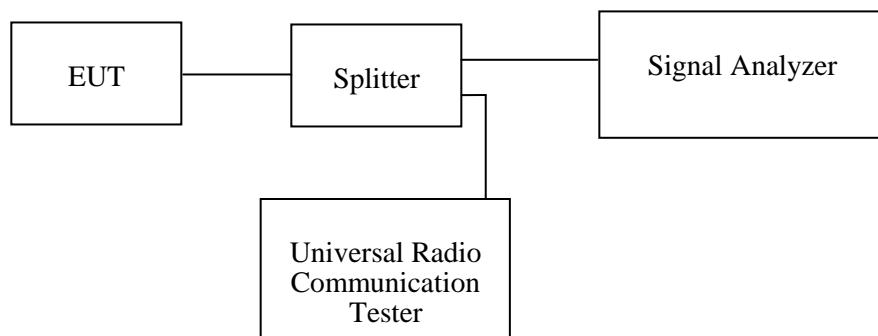
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┌─────────┐      ┌──────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter │──────│  Signal Analyzer │
└─────────┘      └──────────┘      └──────────────────┘
                      │
                 ┌──────────────┐
                 │ Universal Radio │
                 │ Communication   │
                 │ Tester          │
                 └──────────────┘
```

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo and Kieron Luo from 2019-08-29 to 2019-08-30.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	241.99	315.39
EGPRS(8PSK)	836.6	245.19	308.33

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.15	4.68
HSUPA (BPSK)	836.6	4.15	4.67
HSDPA (16QAM)	836.6	4.15	4.69

PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	245.19	318.27
EGPRS(8PSK)	1880.0	245.19	308.33

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.15	4.70
HSUPA (BPSK)	1880.0	4.17	4.70
HSDPA (16QAM)	1880.0	4.15	4.68

Cellular Band (Part 22H)

26 dB Emissions &99% Occupied Bandwidth for GSM (GMSK) Mode
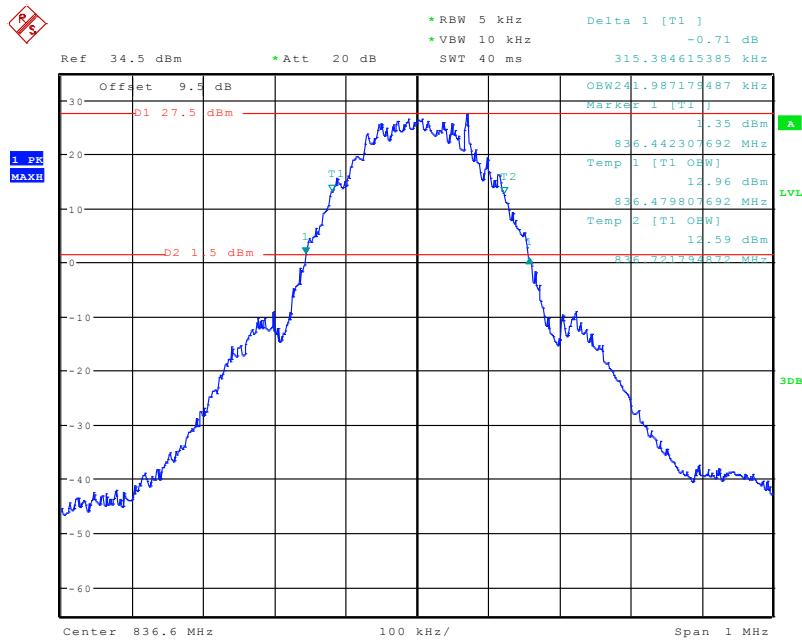
Date: 29.AUG.2019 22:40:24

26 dB Emissions &99% Occupied Bandwidth for EDGE Mode
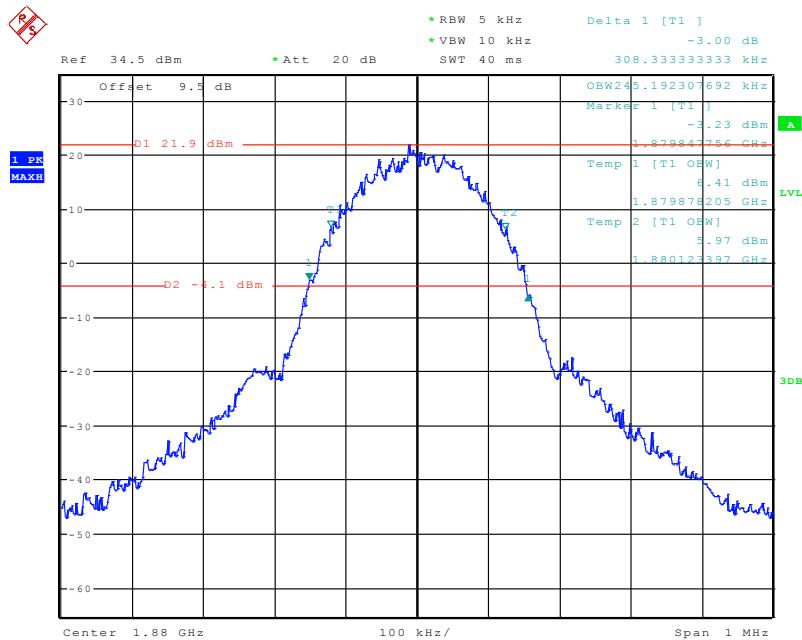
Date: 29.AUG.2019 22:53:04

26 dB Emissions &99% Occupied Bandwidth for RMC (BPSK) Mode
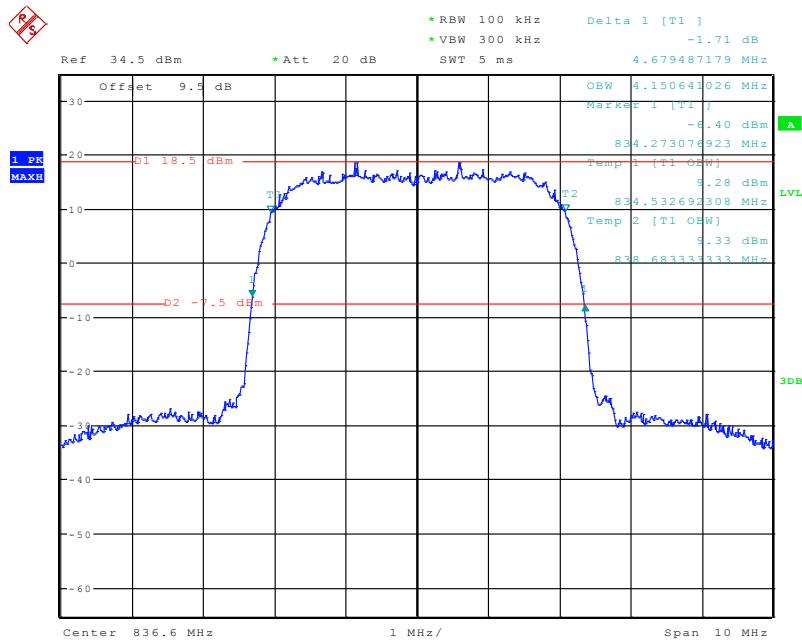
Date: 29.AUG.2019 23:21:23

26 dB Emissions &99% Occupied Bandwidth for HSUPA (BPSK) Mode
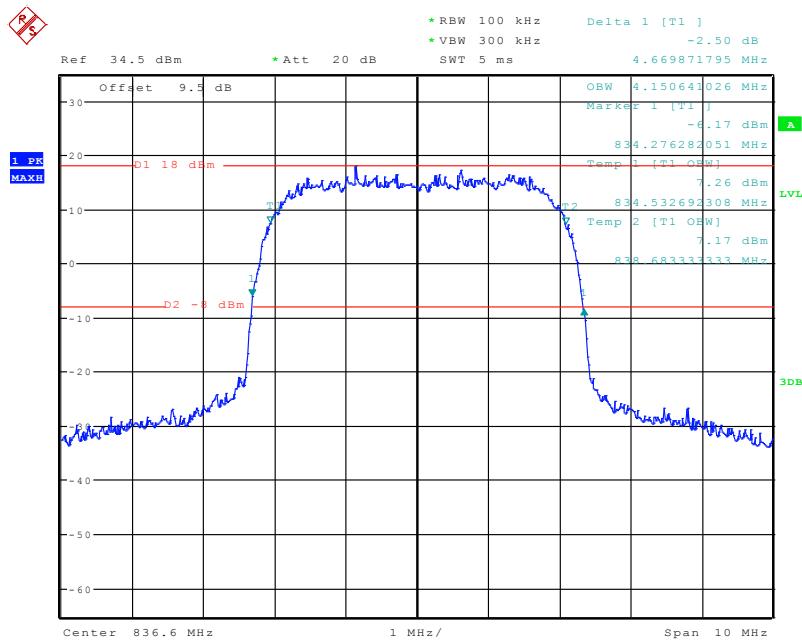
Date: 29.AUG.2019 23:24:31

26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode
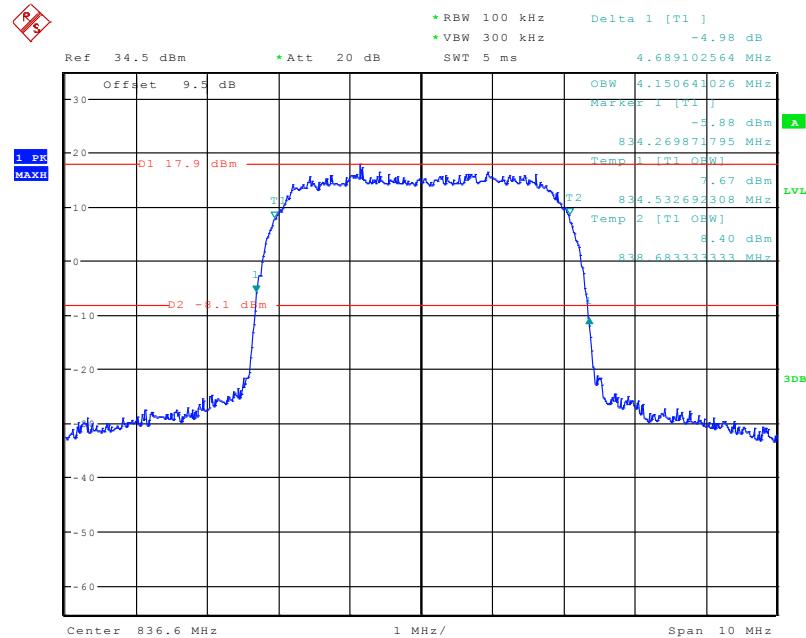
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PCS Band (Part 24E)

26 dB Emissions &99% Occupied Bandwidth for GSM (GMSK) Mode
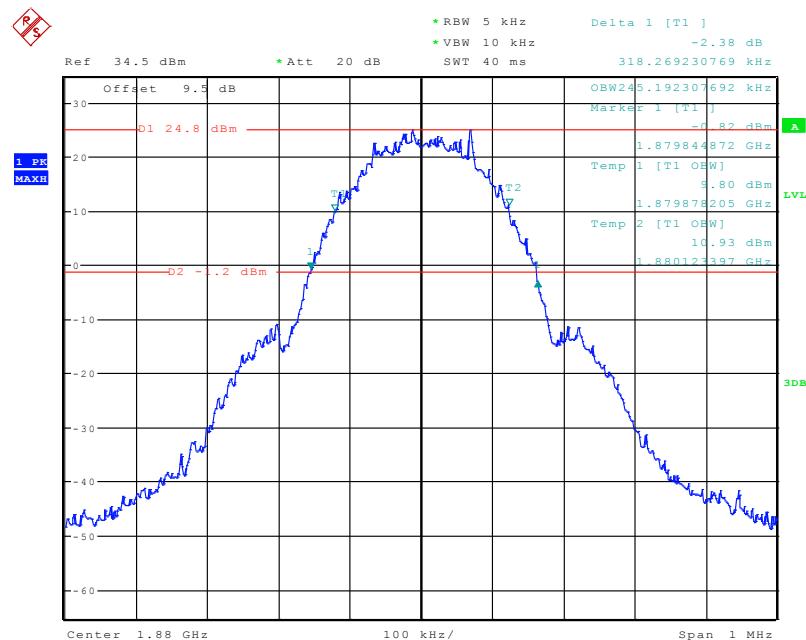
Date: 29.AUG.2019 22:49:44

26 dB Emissions &99% Occupied Bandwidth for EDGE Mode
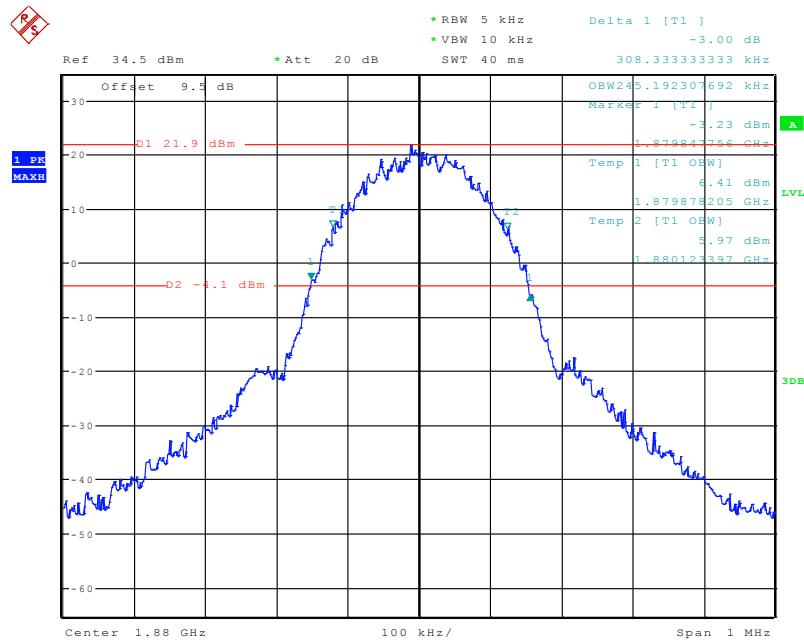
Date: 29.AUG.2019 22:53:04

26 dB Emissions &99% Occupied Bandwidth for RMC (BPSK) Mode
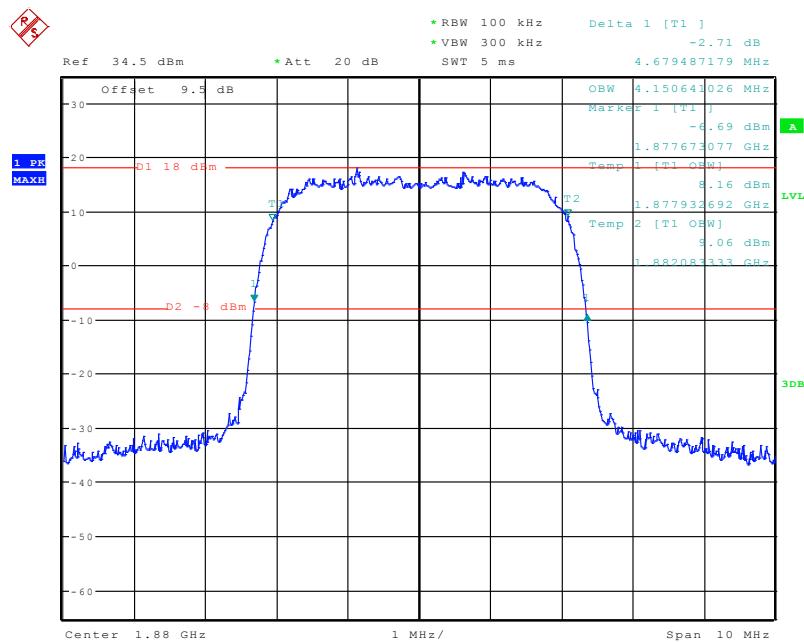
Date: 29.AUG.2019 23:02:49

26 dB Emissions &99% Occupied Bandwidth for HSUPA (BPSK) Mode
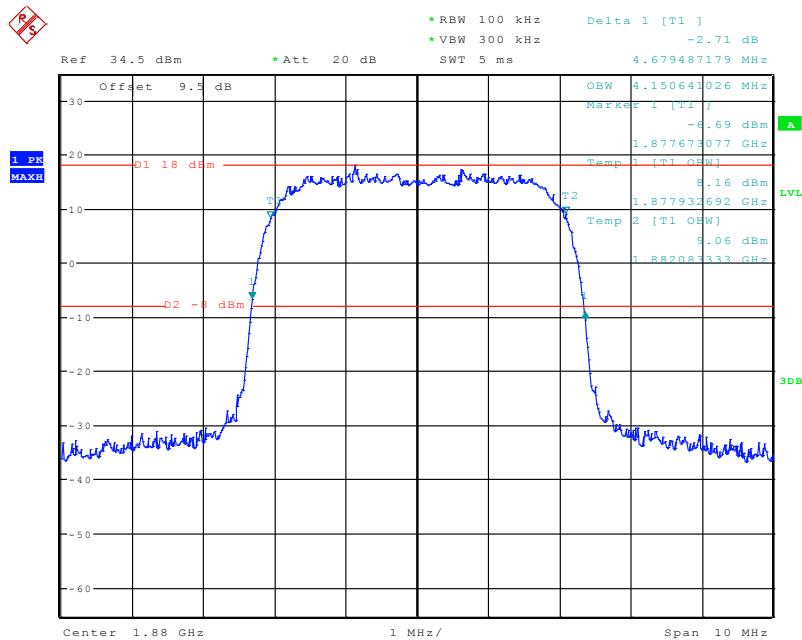
Date: 29.AUG.2019 23:02:49

26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode
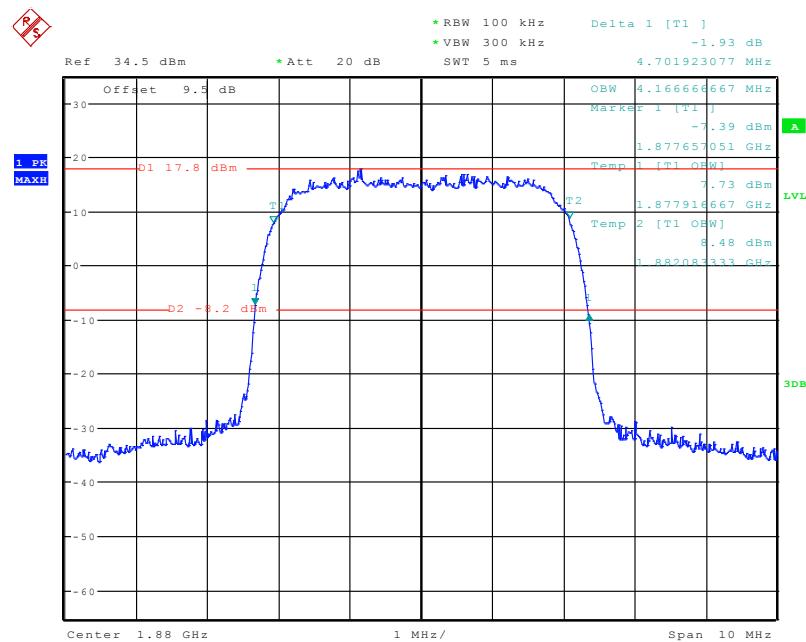
Date: 29.AUG.2019 23:09:03

LTE Band 2: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.12	1.33
	16QAM	1.12	1.36
3.0	QPSK	2.71	3.01
	16QAM	2.71	3.02
5.0	QPSK	4.56	5.35
	16QAM	4.54	5.29
10.0	QPSK	8.96	9.74
	16QAM	8.96	9.70
15.0	QPSK	13.62	15.45
	16QAM	13.62	14.97
20.0	QPSK	18.00	20.04
	16QAM	18.08	20.12

QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
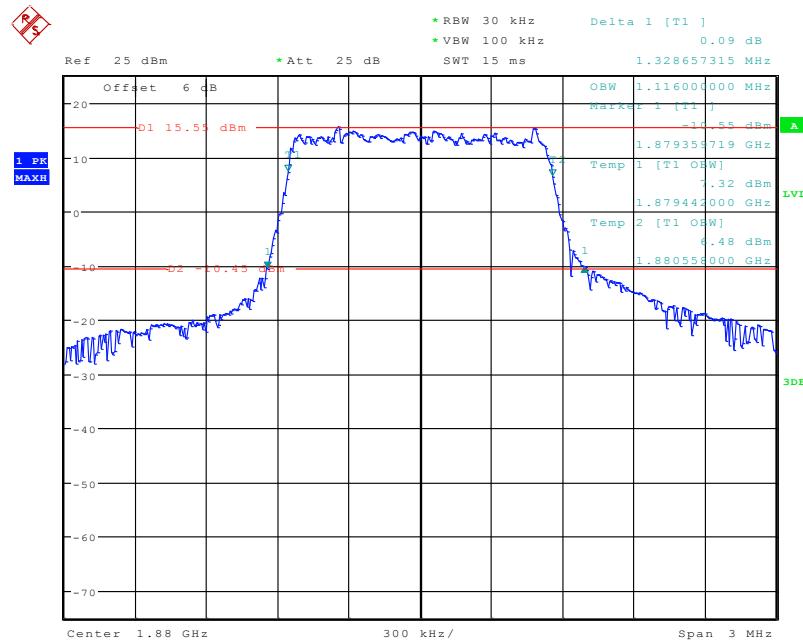
Date: 30.AUG.2019 21:25:00

## 16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
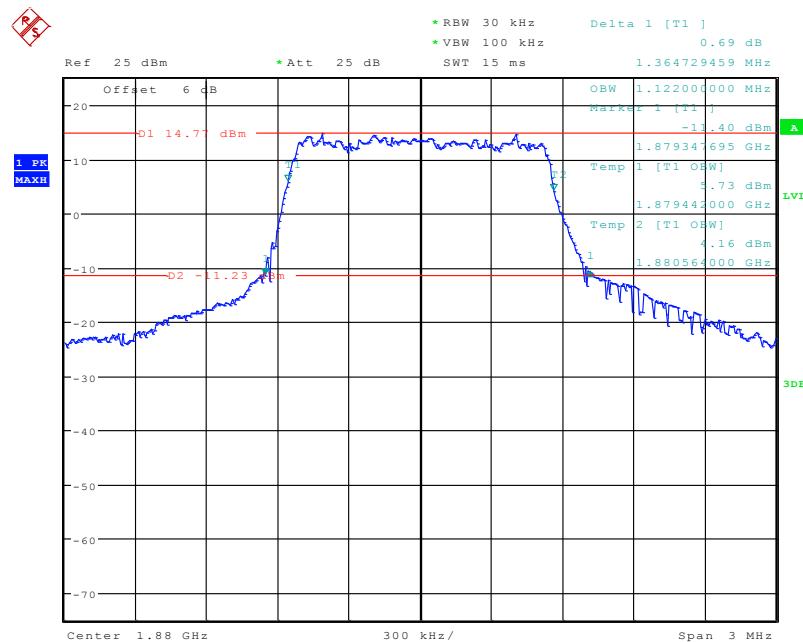
Date: 30.AUG.2019 21:25:30

QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
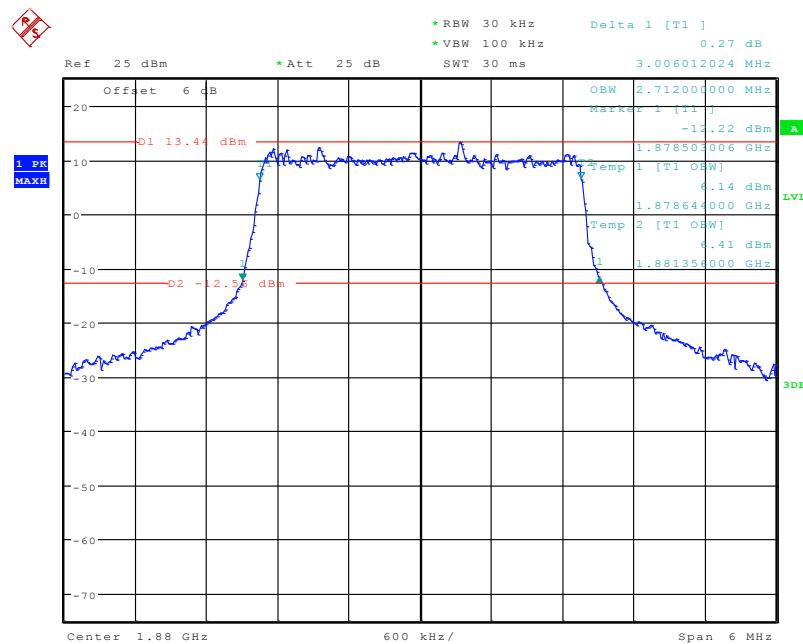
Date: 30.AUG.2019 21:25:56

16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
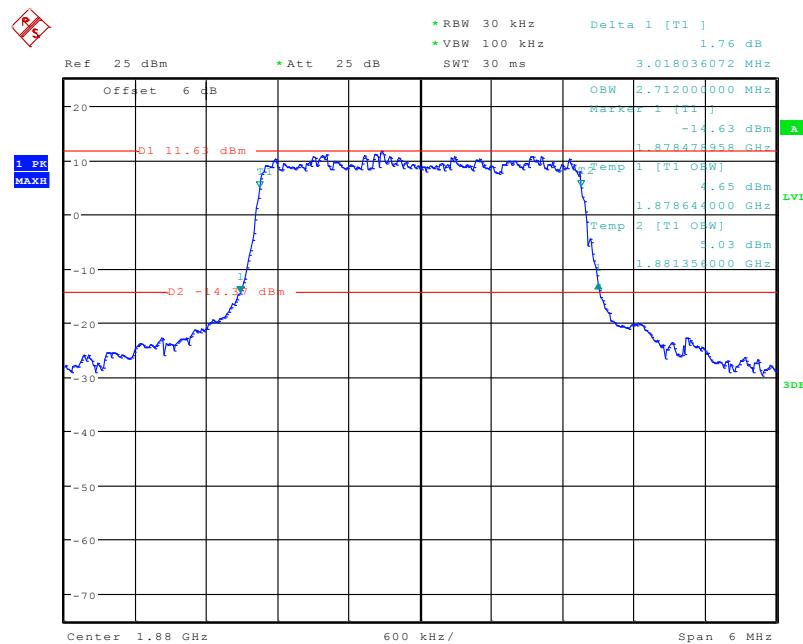
Date: 30.AUG.2019 21:26:20

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
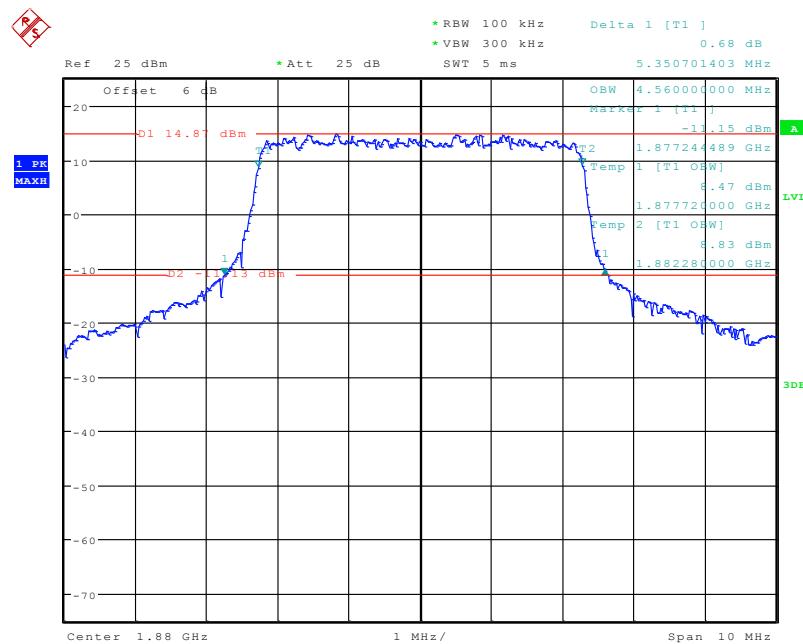
Date: 30.AUG.2019 21:26:59

16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
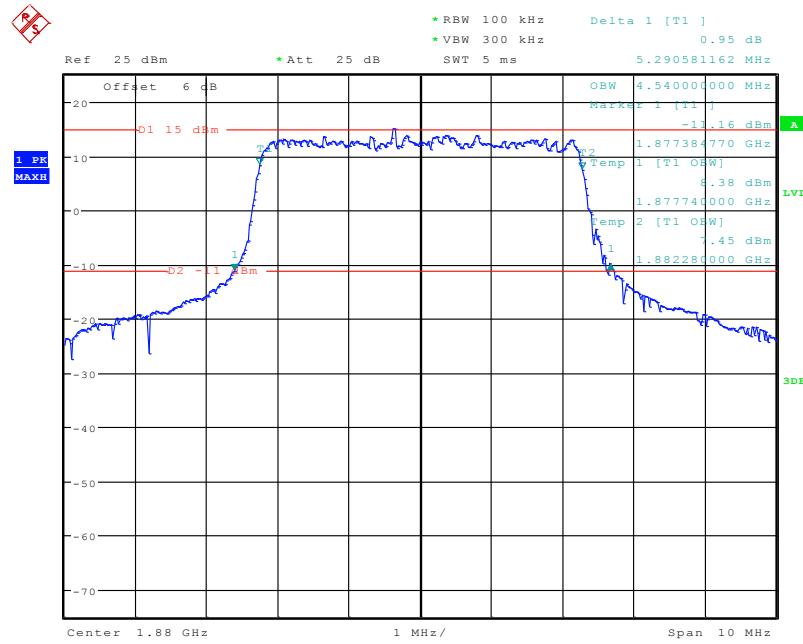
Date: 30.AUG.2019 21:27:38

QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
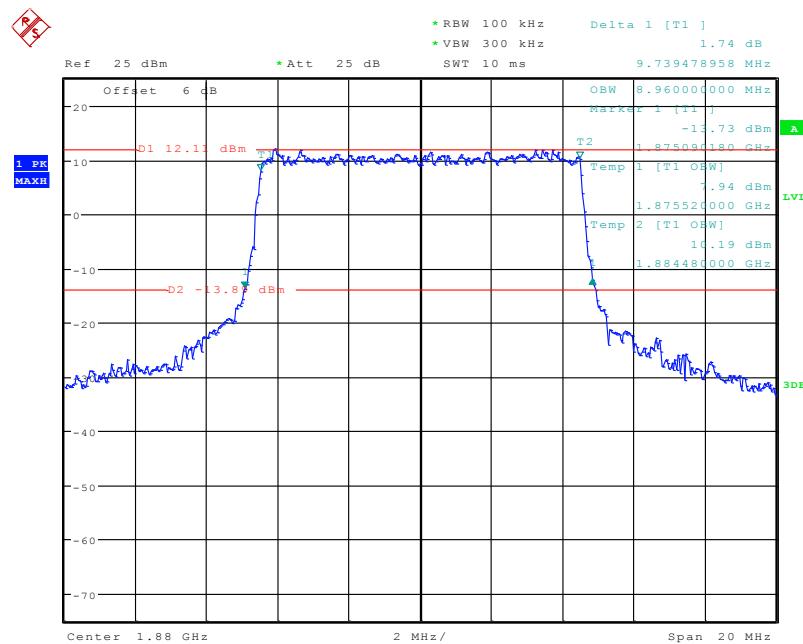
Date: 30.AUG.2019 21:28:15

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

Date: 30.AUG.2019 21:28:46
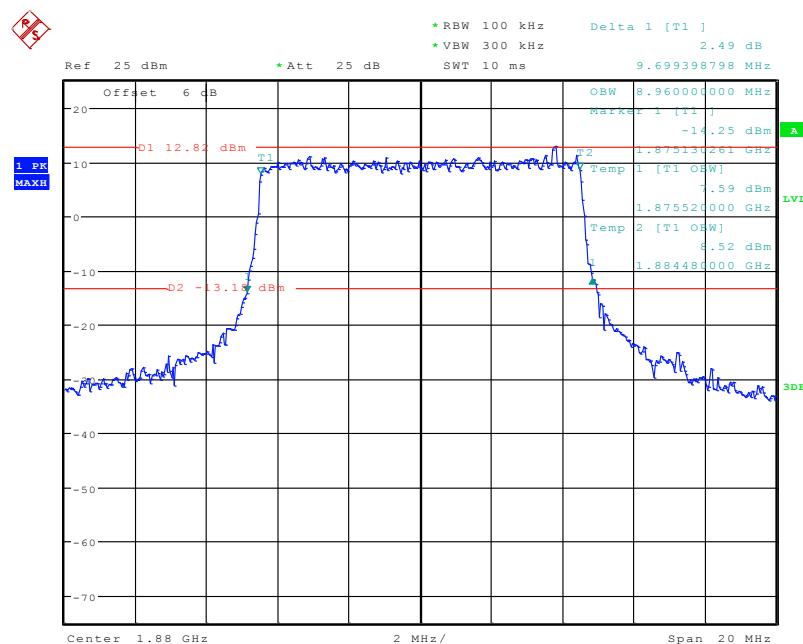
QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
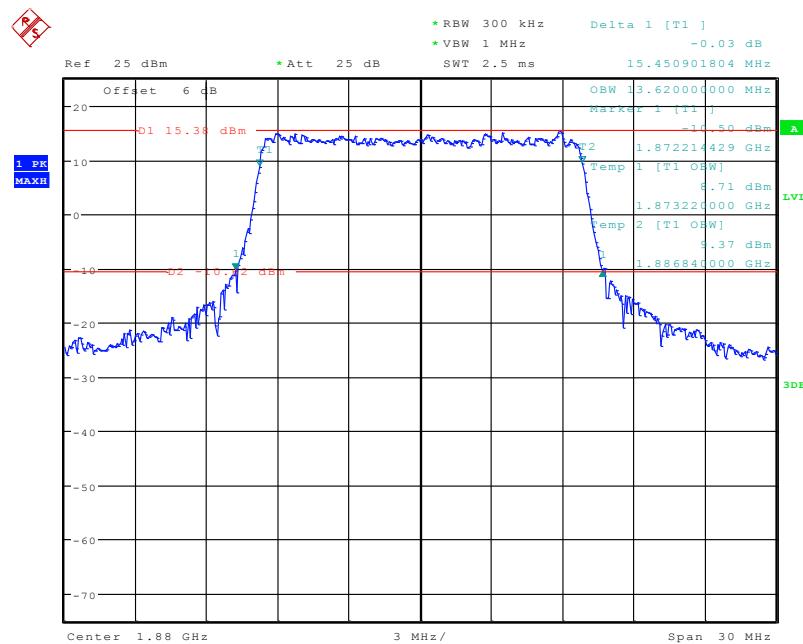

Date: 30.AUG.2019 21:29:31

16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
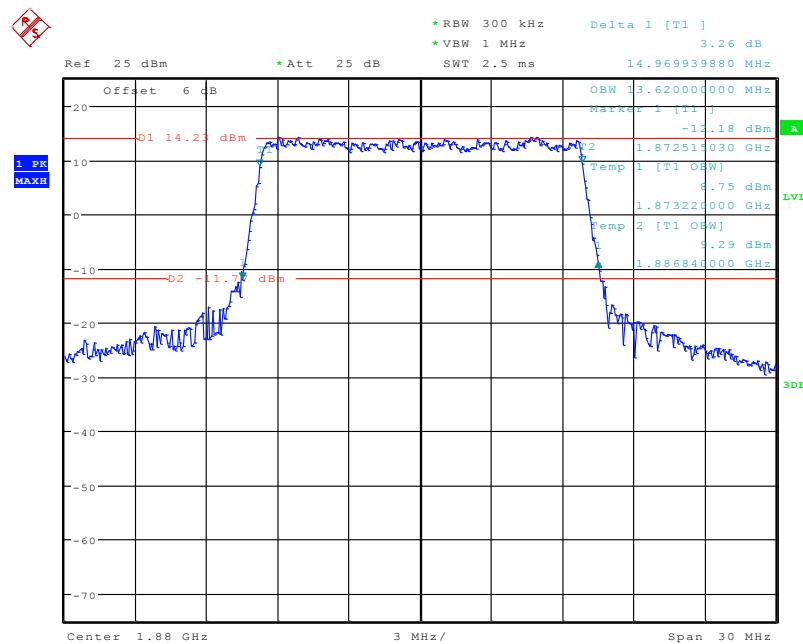
Date: 30.AUG.2019 21:30:07

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
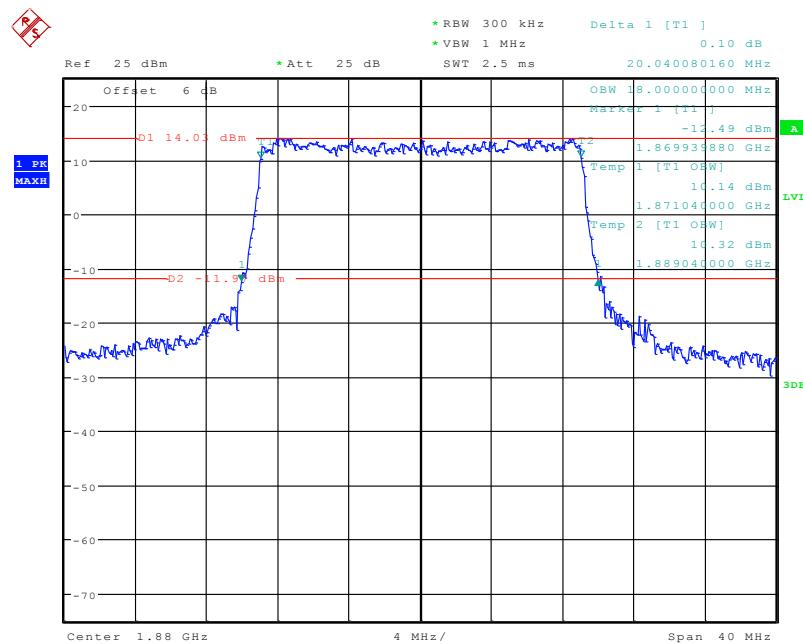
Date: 30.AUG.2019 21:30:43

## 16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
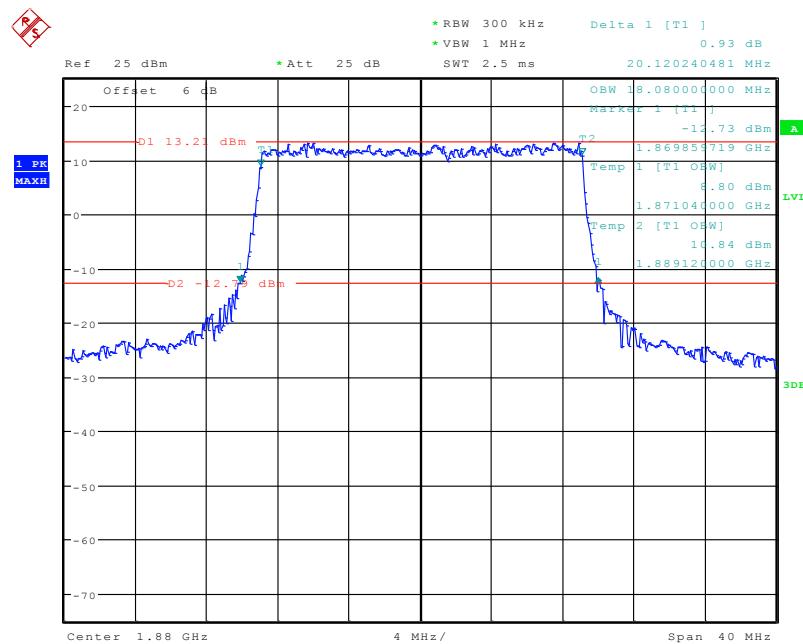
Date: 30.AUG.2019 21:31:26

LTE Band 4: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.11	1.34
	16QAM	1.12	1.33
3.0	QPSK	2.71	3.02
	16QAM	2.70	3.01
5.0	QPSK	4.56	5.27
	16QAM	4.54	5.25
10.0	QPSK	9.00	9.74
	16QAM	8.96	9.66
15.0	QPSK	13.56	15.33
	16QAM	13.56	14.97
20.0	QPSK	18.00	19.56
	16QAM	18.00	19.72

QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
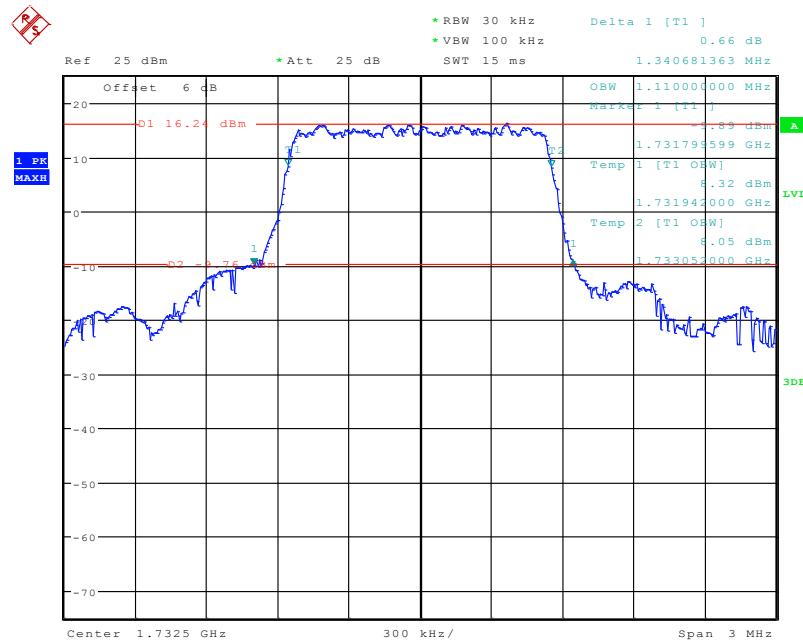
Date: 30.AUG.2019 21:31:58

## 16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
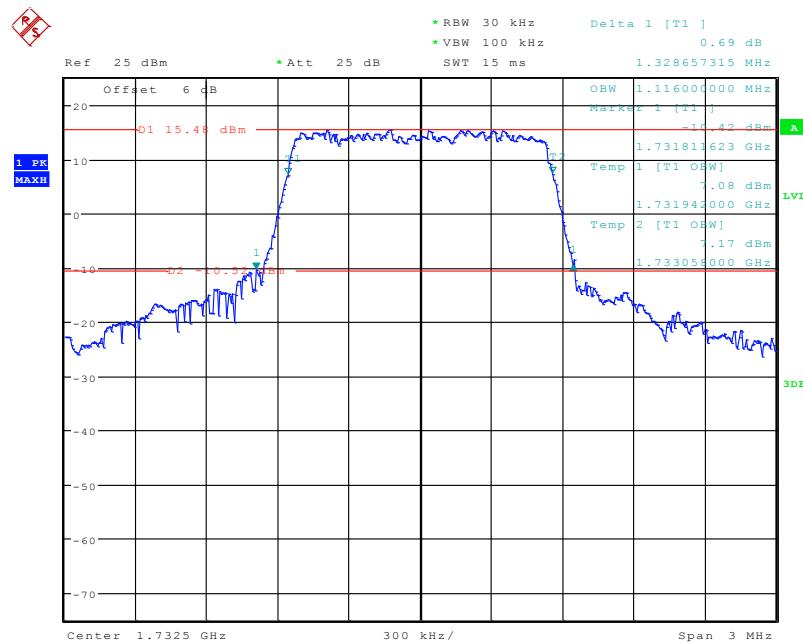
Date: 30.AUG.2019 21:32:28

QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
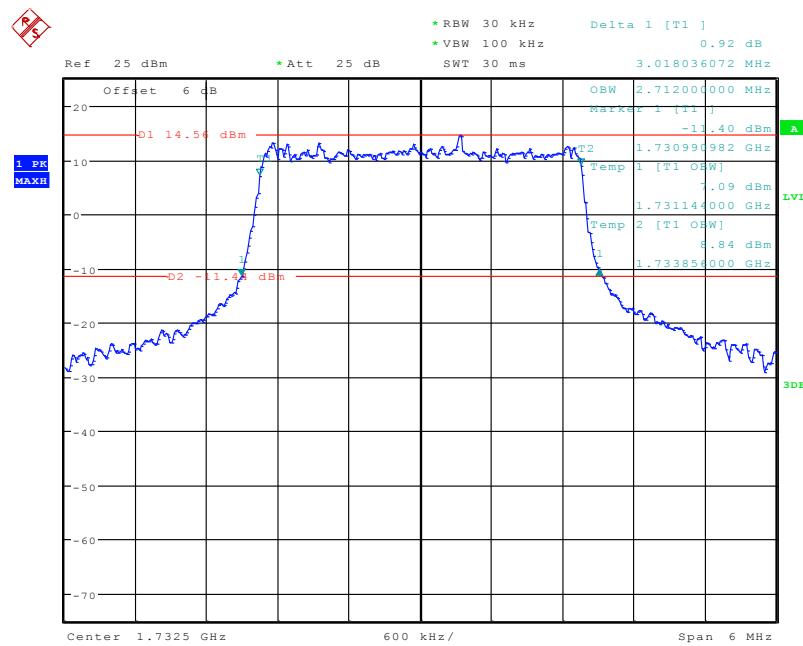
Date: 30.AUG.2019 21:33:01

16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
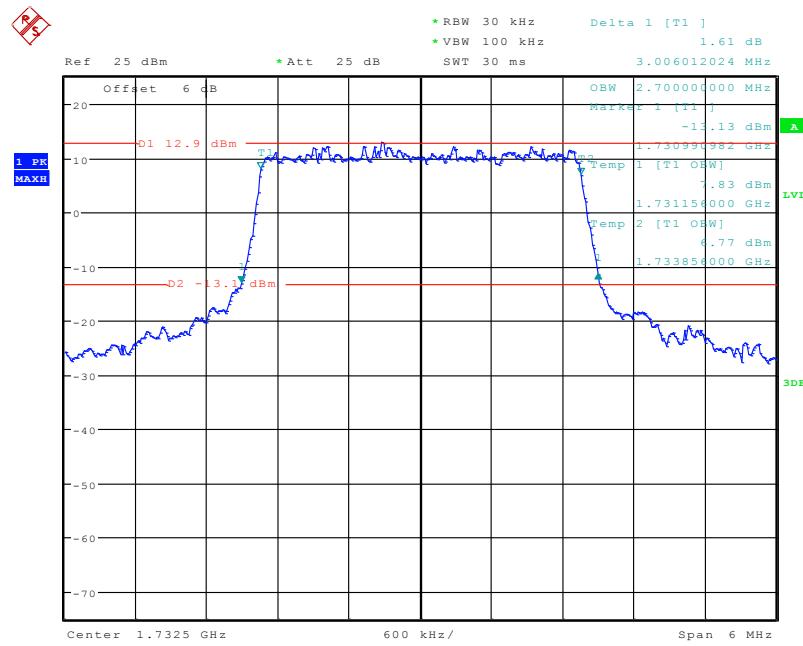
Date: 30.AUG.2019 21:33:24

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
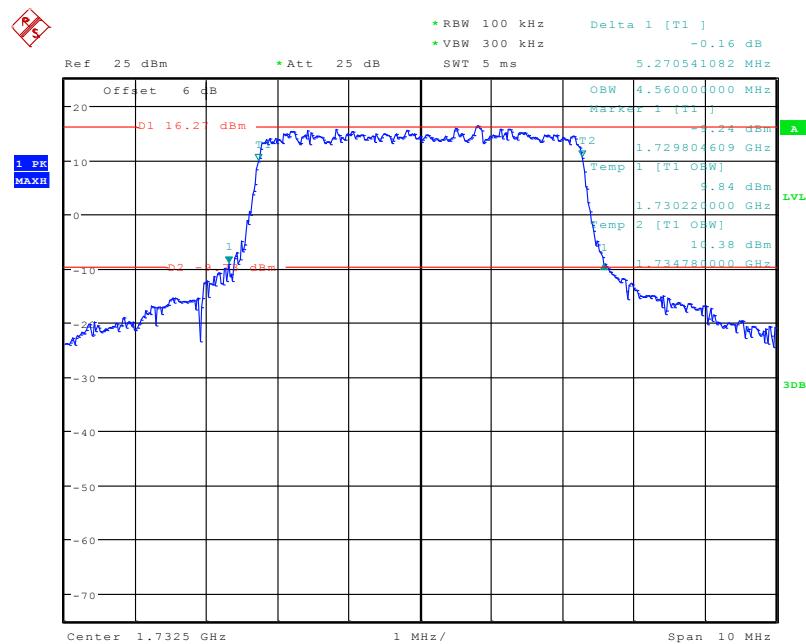
Date: 30.AUG.2019 21:34:03

## 16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
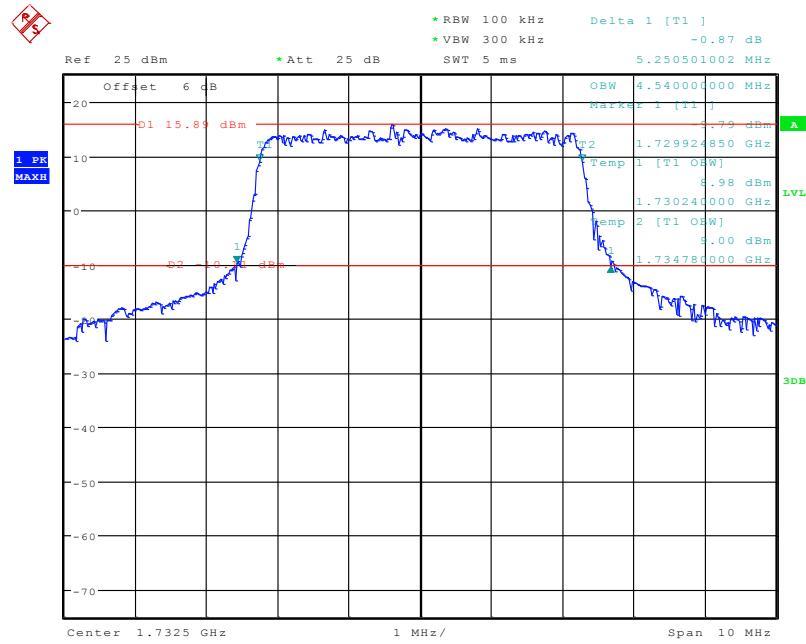
Date: 30.AUG.2019 21:34:36

QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
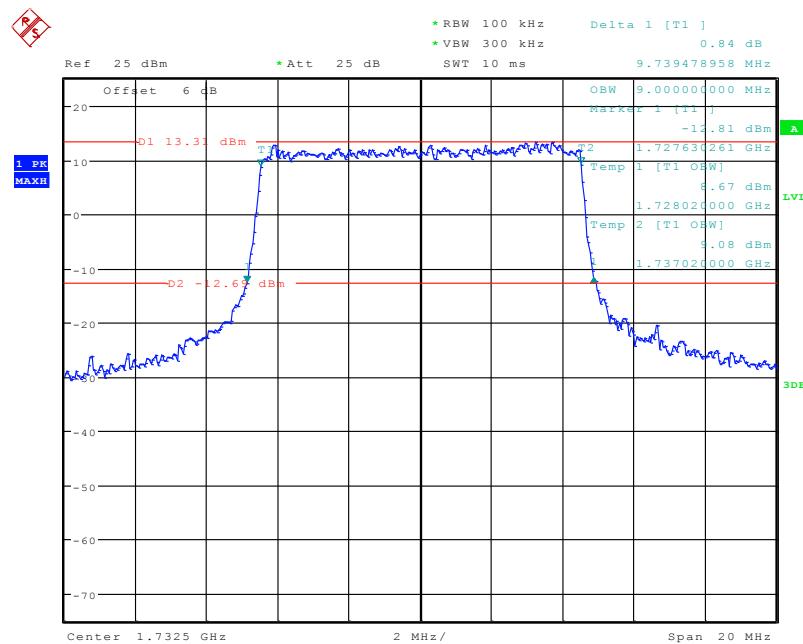
Date: 30.AUG.2019 21:35:16

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
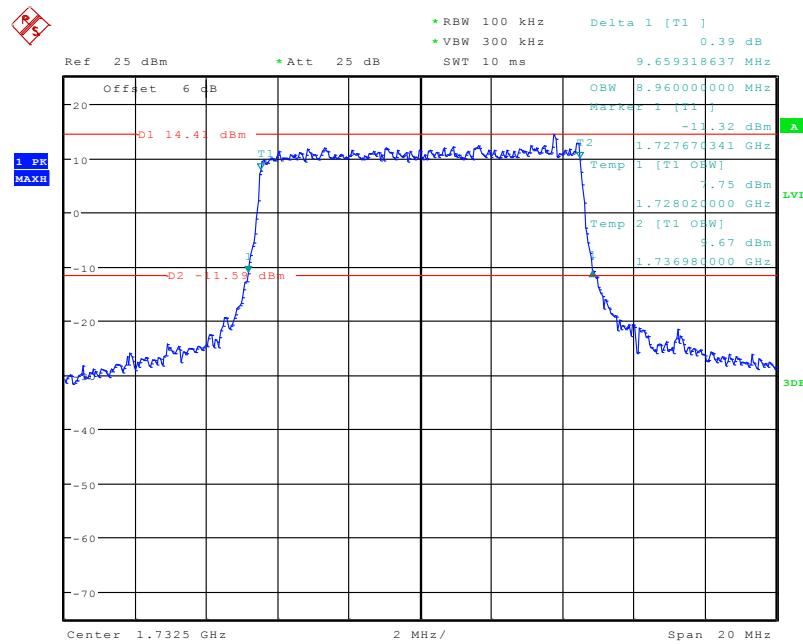
Date: 30.AUG.2019 21:35:47

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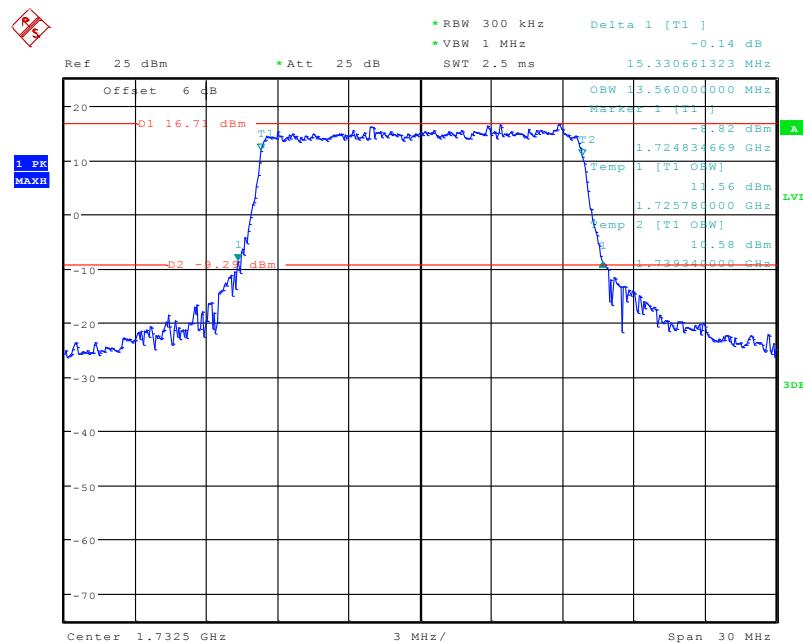

Date: 30.AUG.2019 21:36:26

16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
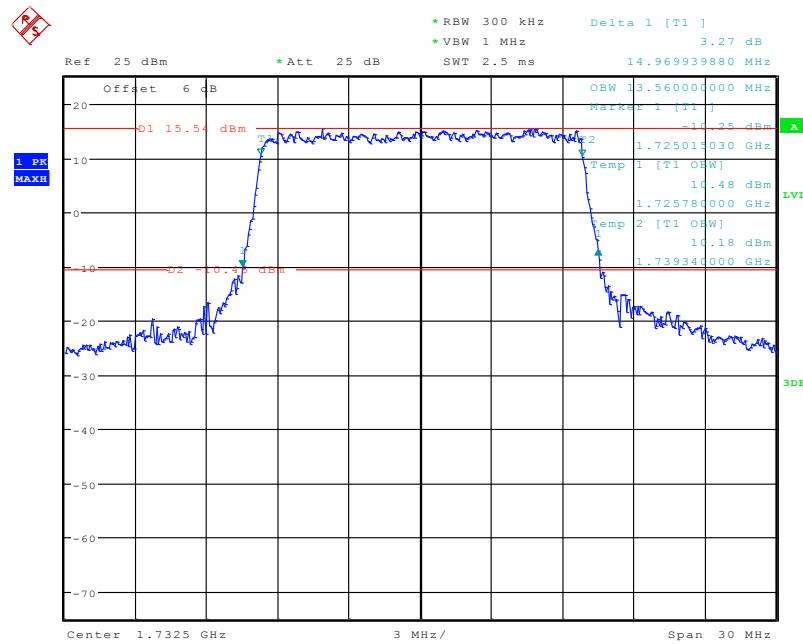
Date: 30.AUG.2019 21:37:02

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
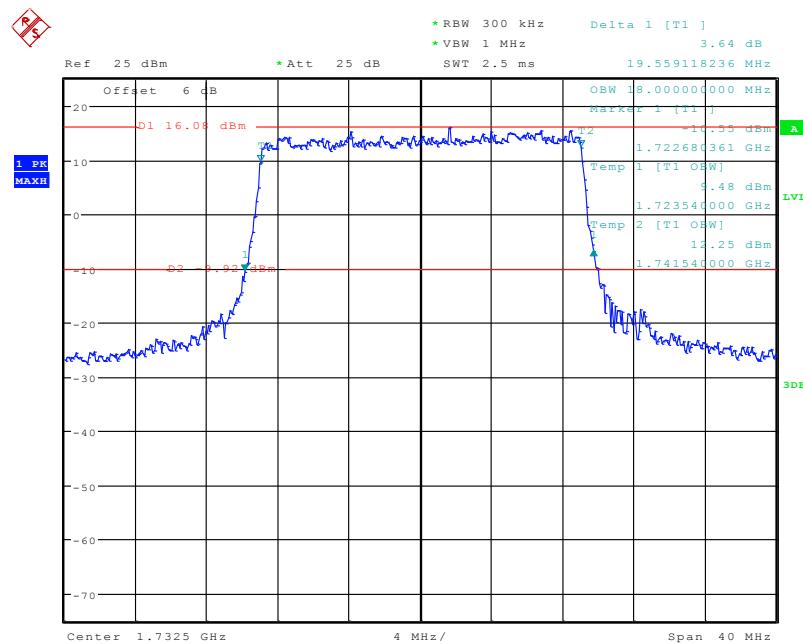
Date: 30.AUG.2019 21:37:38

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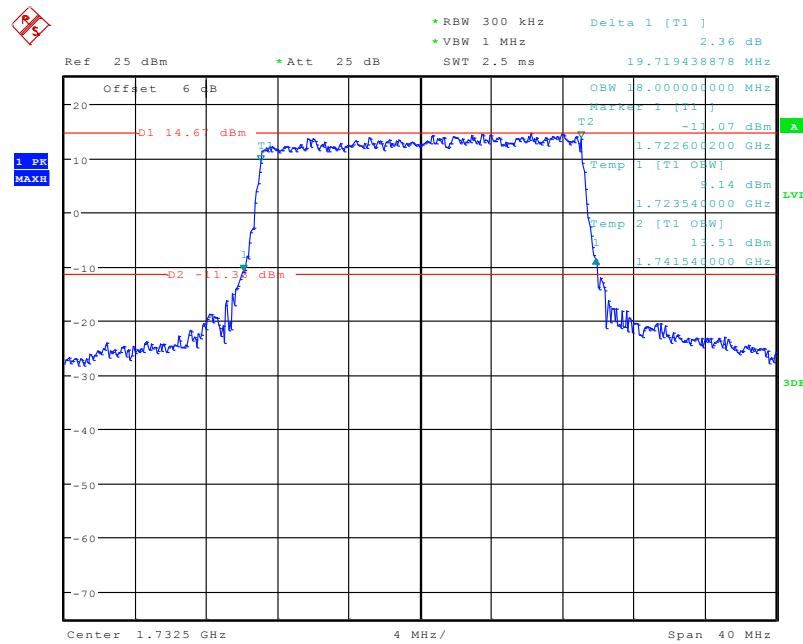

Date: 30.AUG.2019 21:38:14

LTE Band 5: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.11	1.32
	16QAM	1.12	1.31
3.0	QPSK	2.70	3.02
	16QAM	2.71	3.03
5.0	QPSK	4.56	5.45
	16QAM	4.56	5.39
10.0	QPSK	9.00	9.82
	16QAM	9.00	9.74

QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
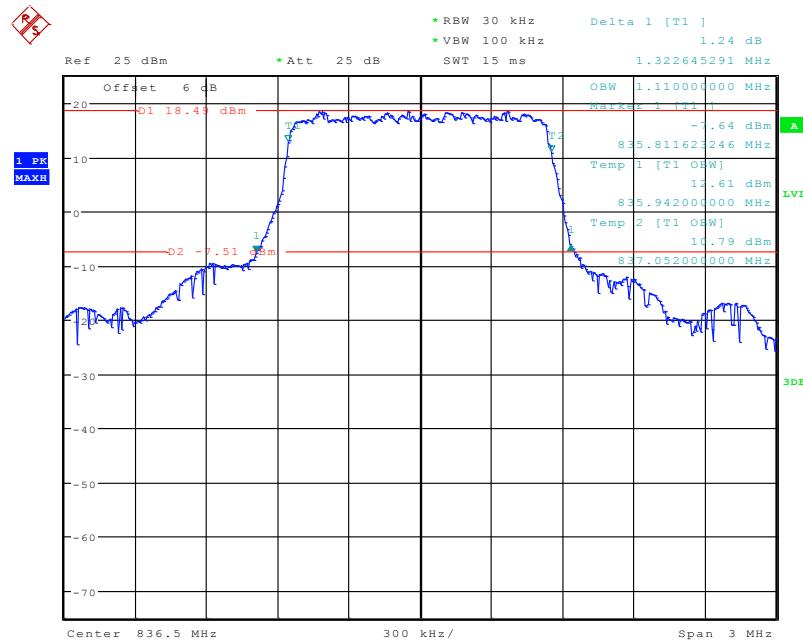
Date: 30.AUG.2019 21:38:52

16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
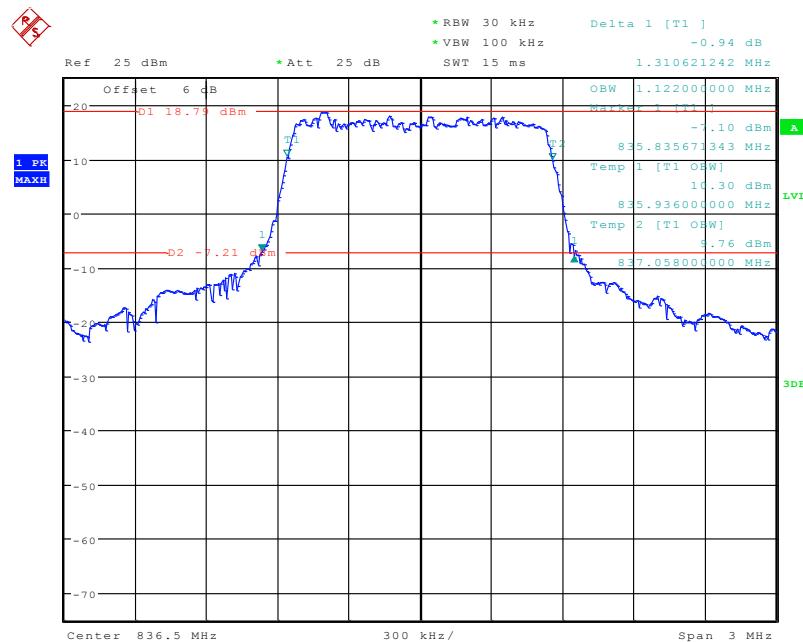
Date: 30.AUG.2019 21:39:34

## QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
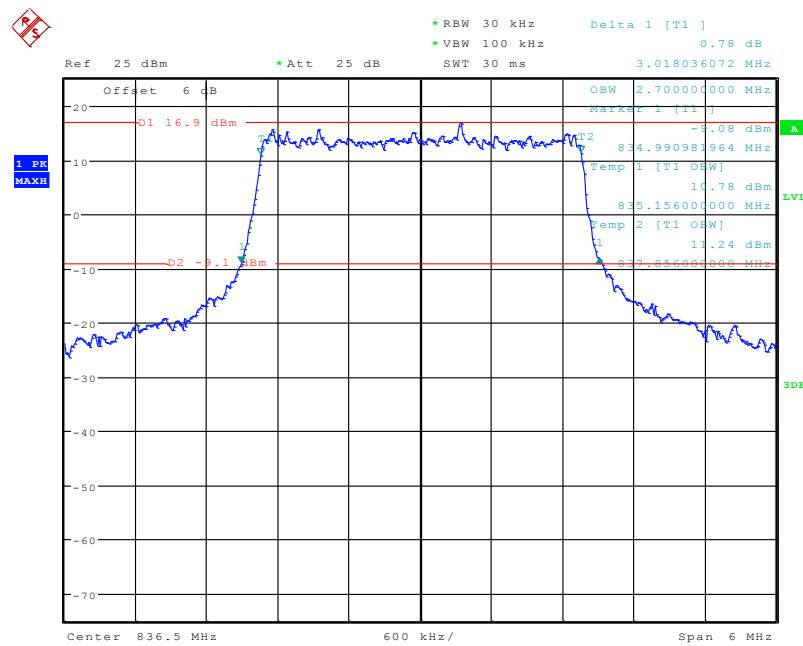
Date: 30.AUG.2019 21:40:06

## 16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
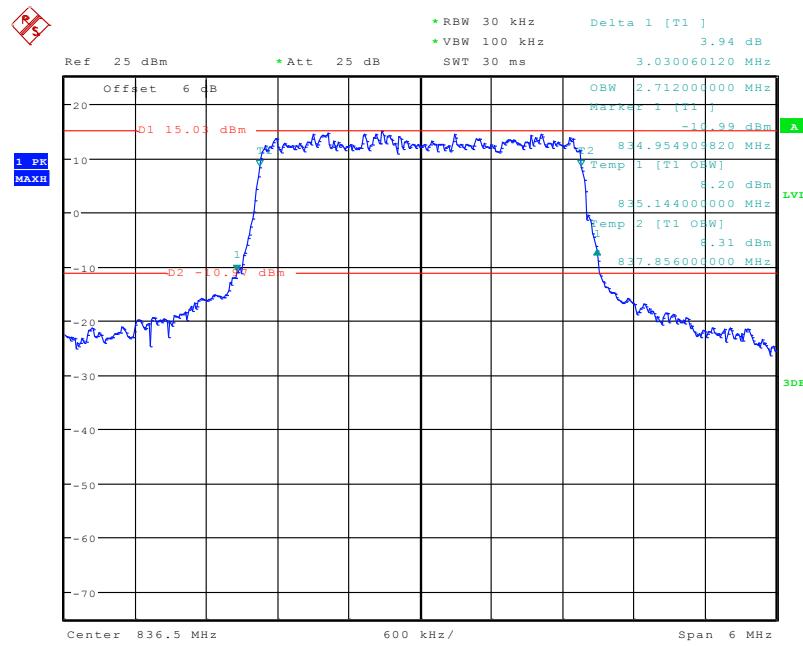
Date: 30.AUG.2019 21:40:33

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
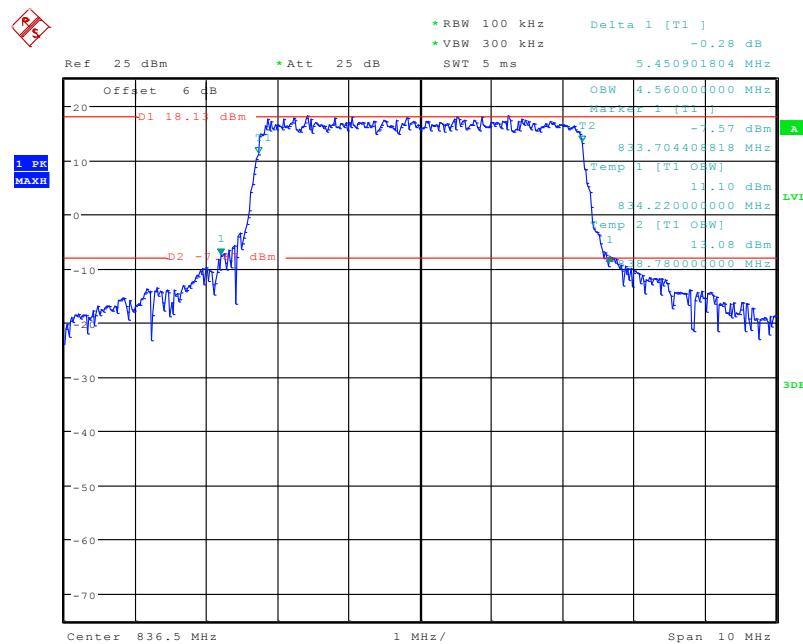
Date: 30.AUG.2019 21:41:24

16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
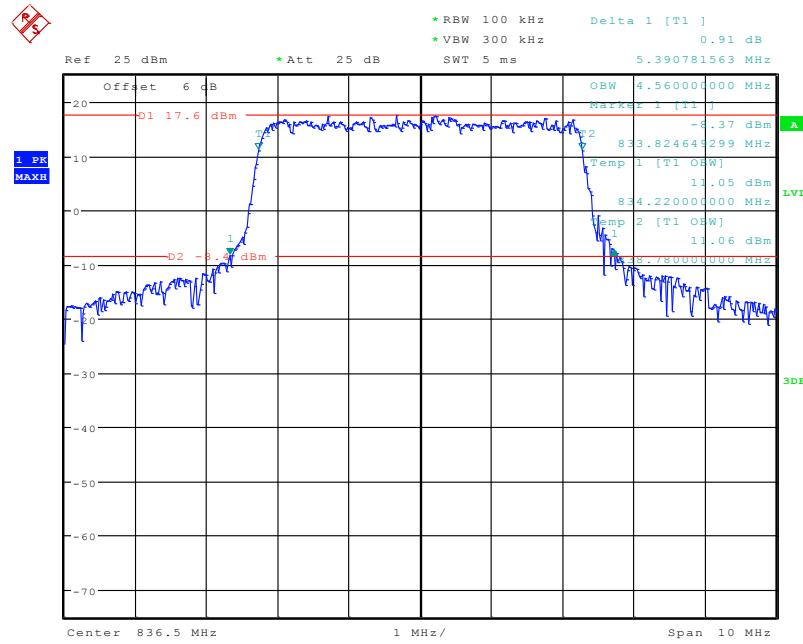
Date: 30.AUG.2019 21:42:12

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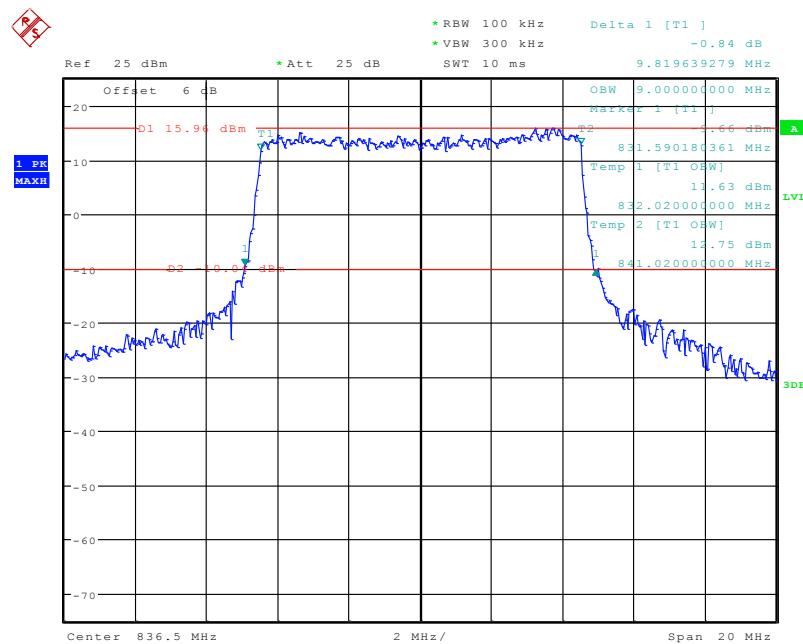

Date: 30.AUG.2019 21:42:51

## 16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
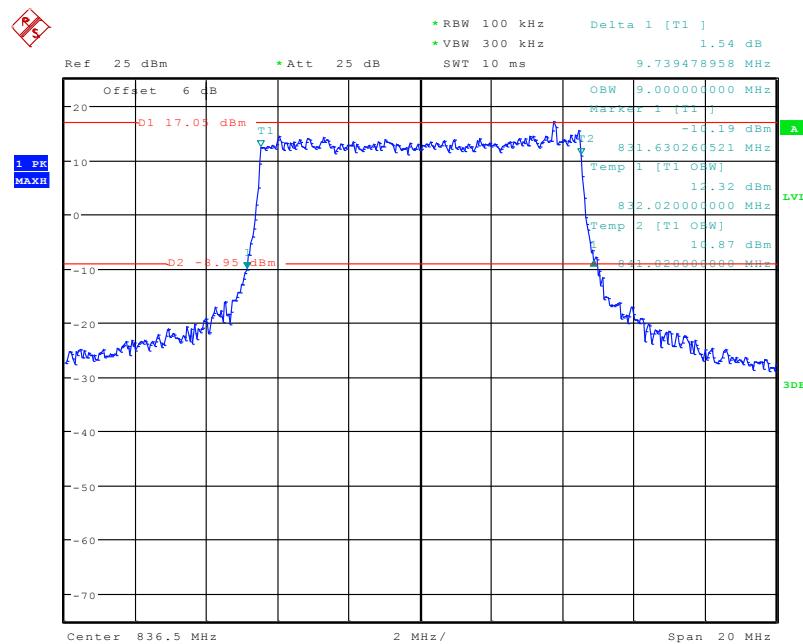
Date: 30.AUG.2019 21:43:37

LTE Band 7: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.56	5.31
	16QAM	4.52	5.19
10.0	QPSK	9.00	9.82
	16QAM	8.96	9.82
15.0	QPSK	13.62	15.39
	16QAM	13.62	14.85
20.0	QPSK	18.00	19.64
	16QAM	18.00	19.88

QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
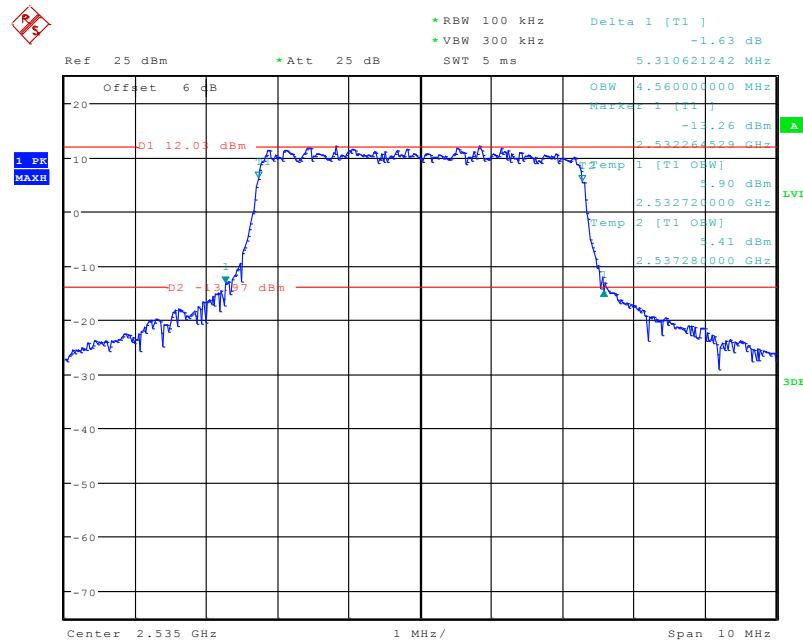
Date: 30.AUG.2019 21:44:28

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

Date: 30.AUG.2019 21:45:07
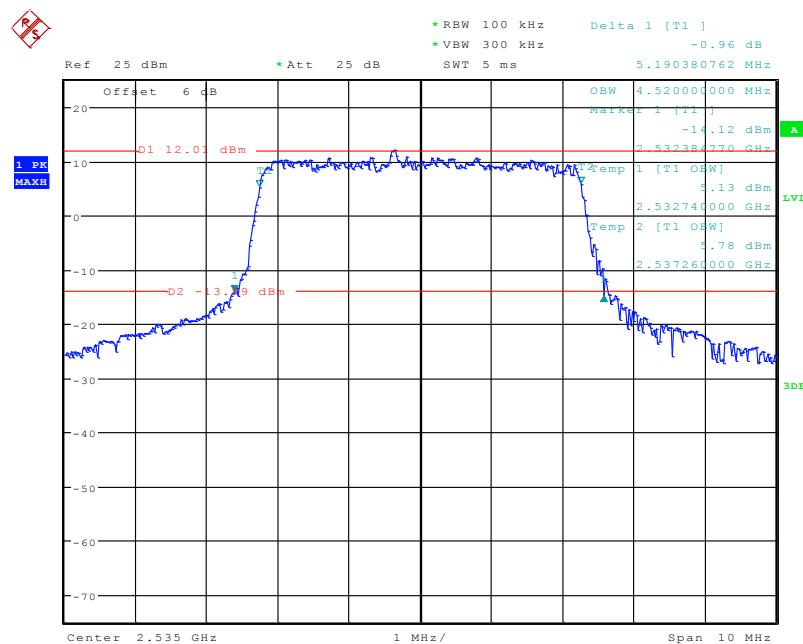
QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
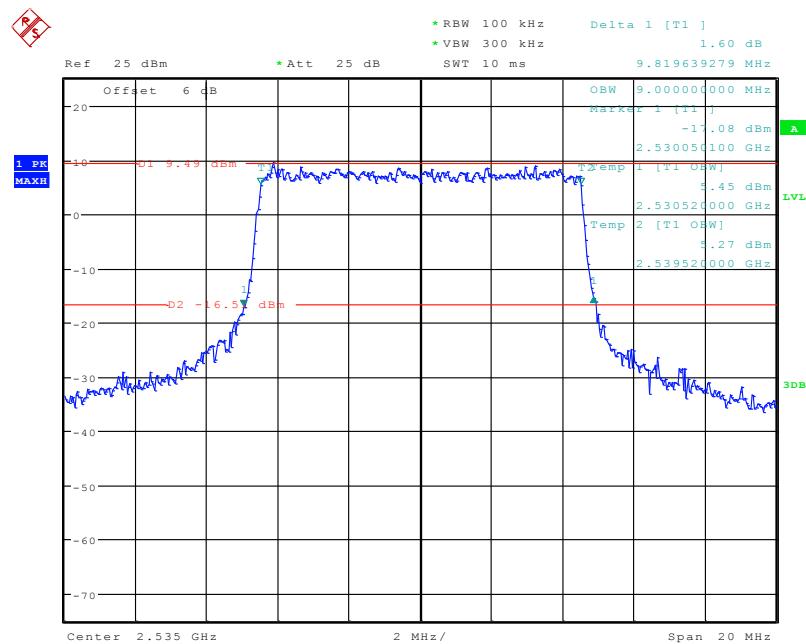
Date: 30.AUG.2019 21:45:40

16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
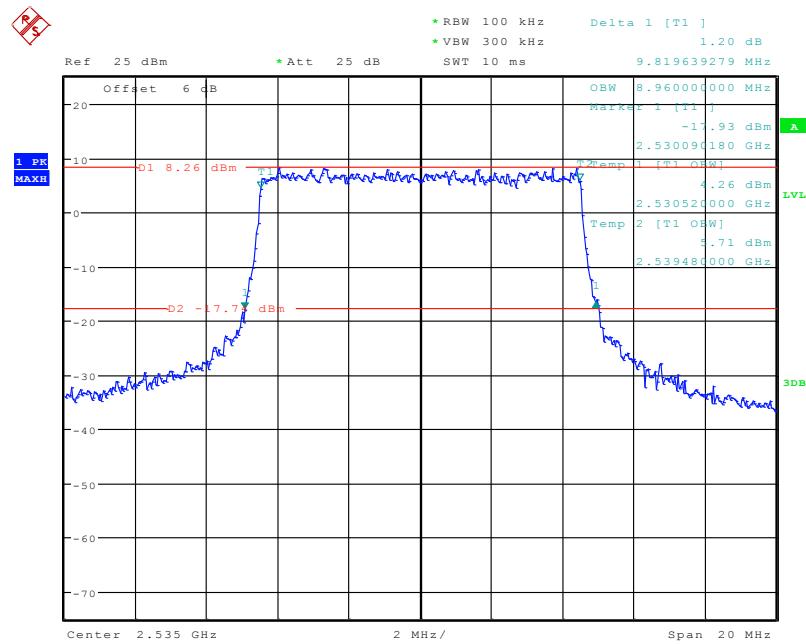
Date: 30.AUG.2019 21:46:08

QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
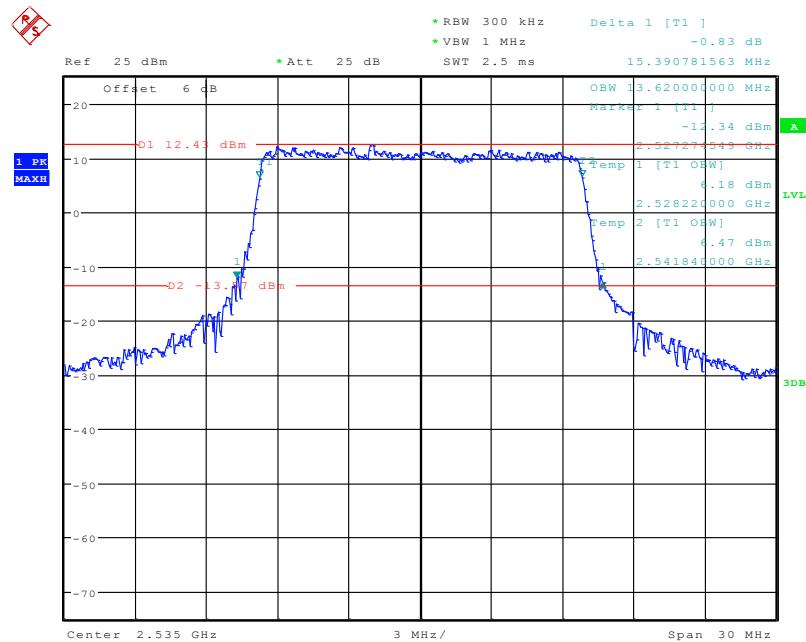
Date: 30.AUG.2019 21:46:47

16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
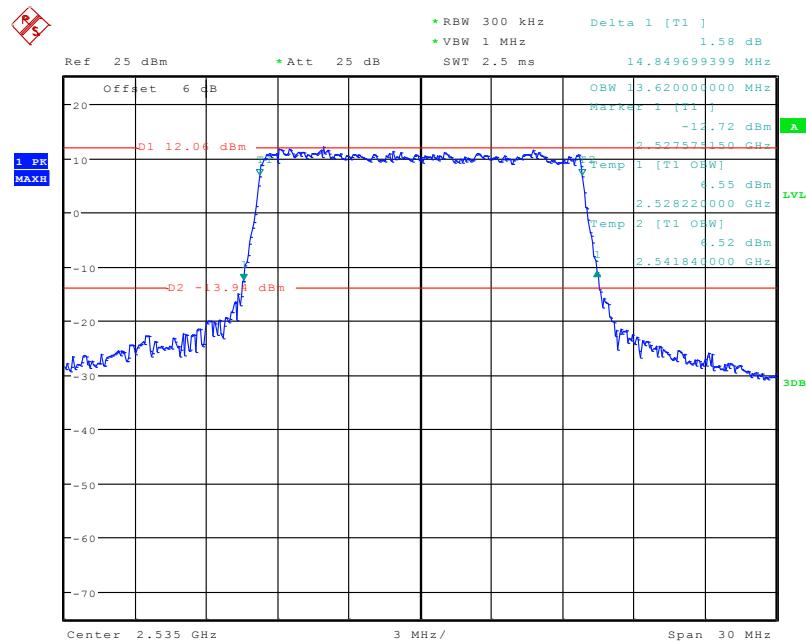
Date: 30.AUG.2019 21:47:32

QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
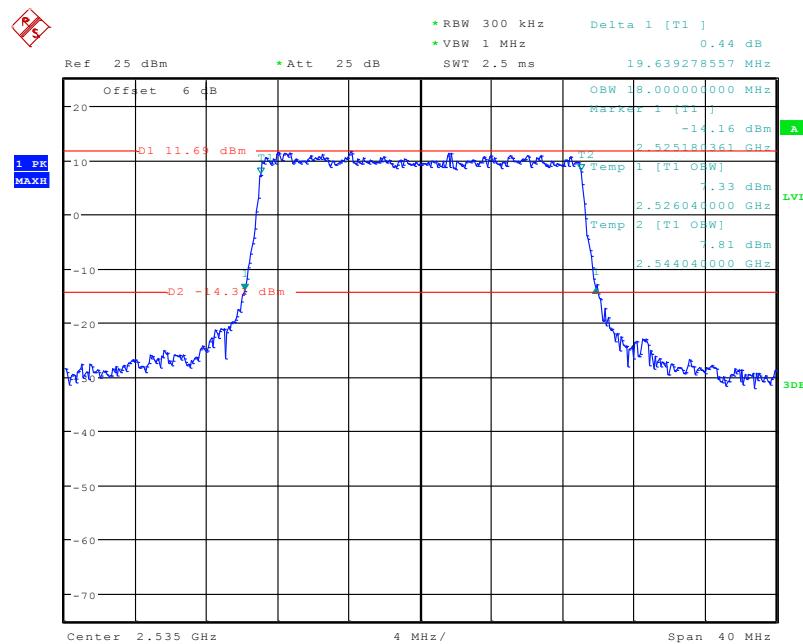
Date: 30.AUG.2019 21:48:21

16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel
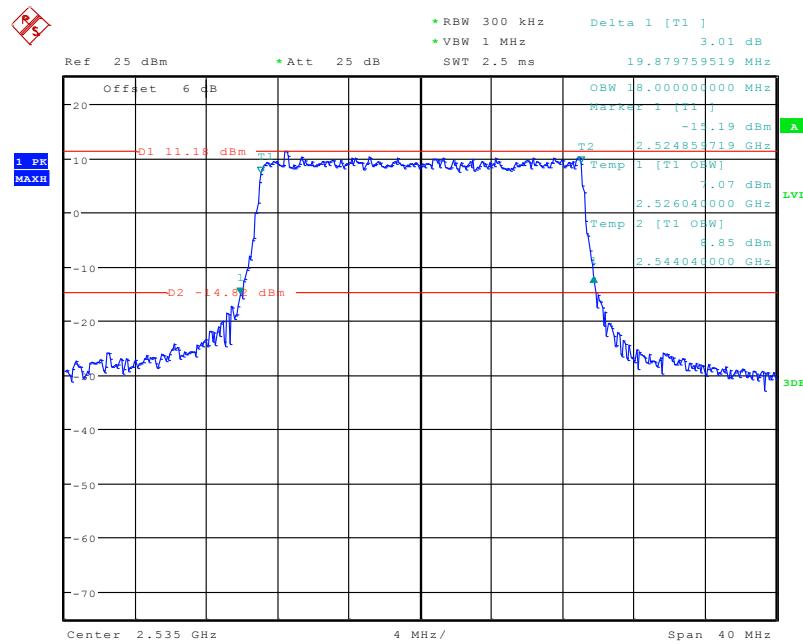
Date: 30.AUG.2019 21:49:00

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

Applicable Standard

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

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

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.
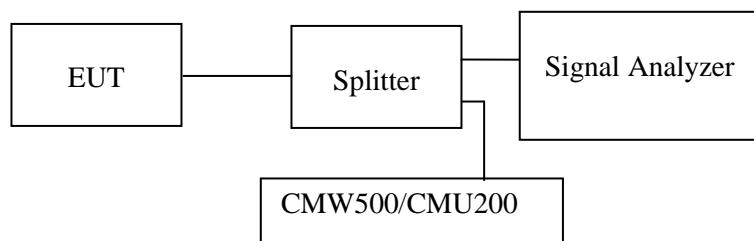
```
  ┌─────────┐        ┌──────────┐        ┌──────────────────┐
  │   EUT   │────────│ Splitter │────────│  Signal Analyzer │
  └─────────┘        └────┬─────┘        └──────────────────┘
                          │
                   ┌──────────────┐
                   │ CMW500/CMU200│
                   └──────────────┘
```

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by George Zhong from 2019-08-29 to 2019-09-05.

Test result: Compliance.

EUT operation mode: transmitting

*Please refer to the following plots.*

**Cellular Band (Part 22H)**

30 MHz – 1 GHz (GSM Mode)

```
                                        *RBW 100 kHz    Marker 1 [T1 ]
                                        *VBW 300 kHz           -40.25 dBm
         Ref  34.5 dBm      *Att  20 dB  SWT 100 ms     760.608974359 MHz
```

Fundamental test
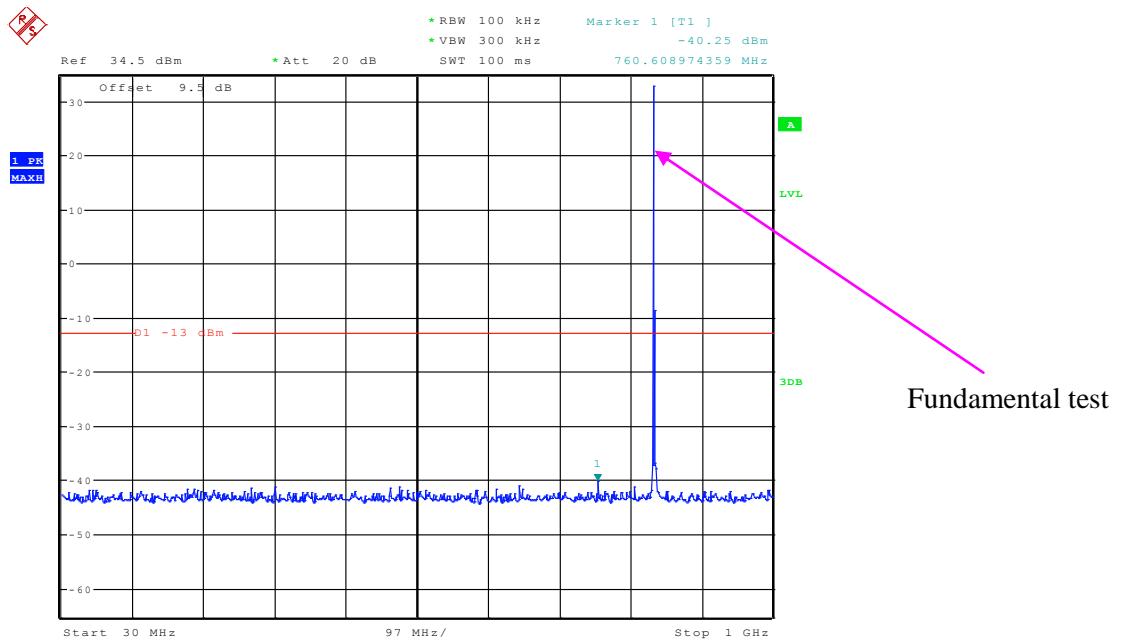
```
Date: 29.AUG.2019  22:42:14
```

1 GHz – 10 GHz (GSM Mode)

```
                                        *RBW 1 MHz      Marker 1 [T1 ]
                                        *VBW 3 MHz             -18.05 dBm
         Ref  34.5 dBm      *Att  20 dB  SWT 55 ms       2.500000000 GHz
```
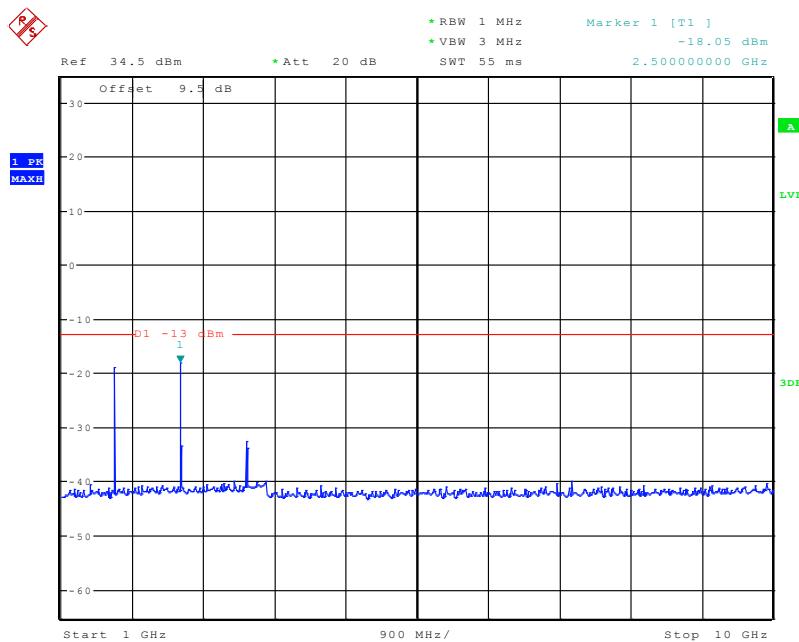
```
Date: 29.AUG.2019  22:41:38
```

30 MHz – 1 GHz (WCDMA Mode)

```
                                  * RBW 100 kHz      Marker 1 [T1 ]
                                  * VBW 300 kHz              -41.11 dBm
  Ref  34.5 dBm      * Att  20 dB   SWT 100 ms      658.012820513 MHz

      Offset  9.5 dB
   -30

   -20

   -10

    10

     0

   --10      D1 -13 dBm

   --20

   --30

   --40                                    1

   --50

   --60

  Start  30 MHz              97 MHz/              Stop  1 GHz
```
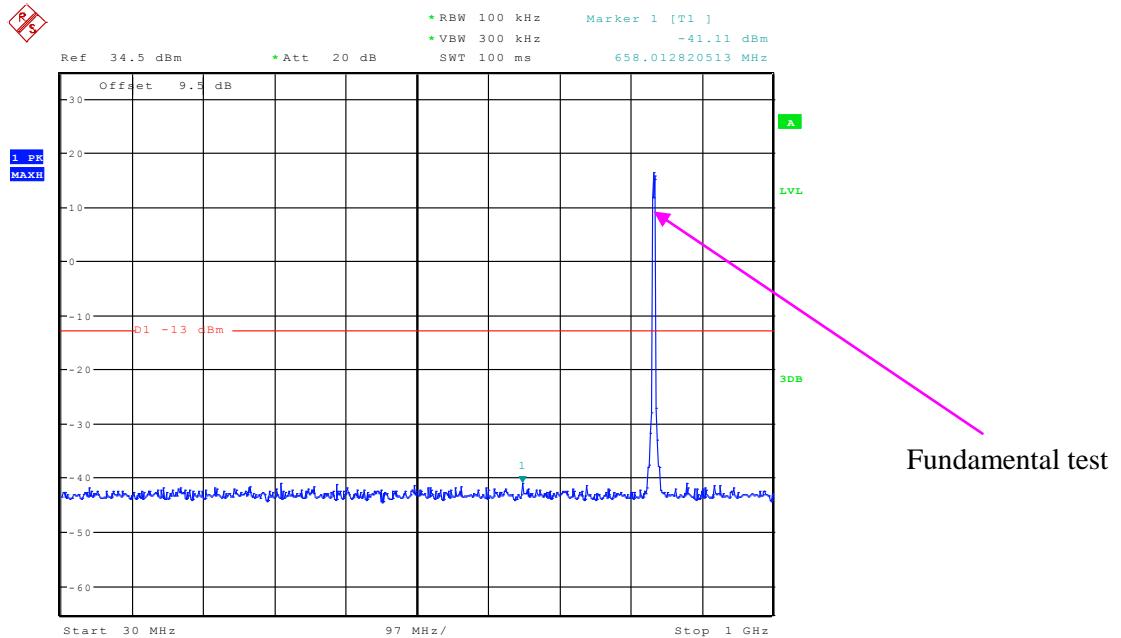
Fundamental test

Date: 29.AUG.2019 23:18:28

1 GHz – 10 GHz (WCDMA Mode)

```
                                  * RBW 1 MHz       Marker 1 [T1 ]
                                  * VBW 3 MHz               -37.08 dBm
  Ref  34.5 dBm      * Att  20 dB   SWT 55 ms      1.663461538 GHz

      Offset  9.5 dB
   -30

   -20

   -10

    0

   --10      D1 -13 dBm

   --20

   --30
            1
   --40

   --50

   --60

  Start  1 GHz               900 MHz/             Stop  10 GHz
```
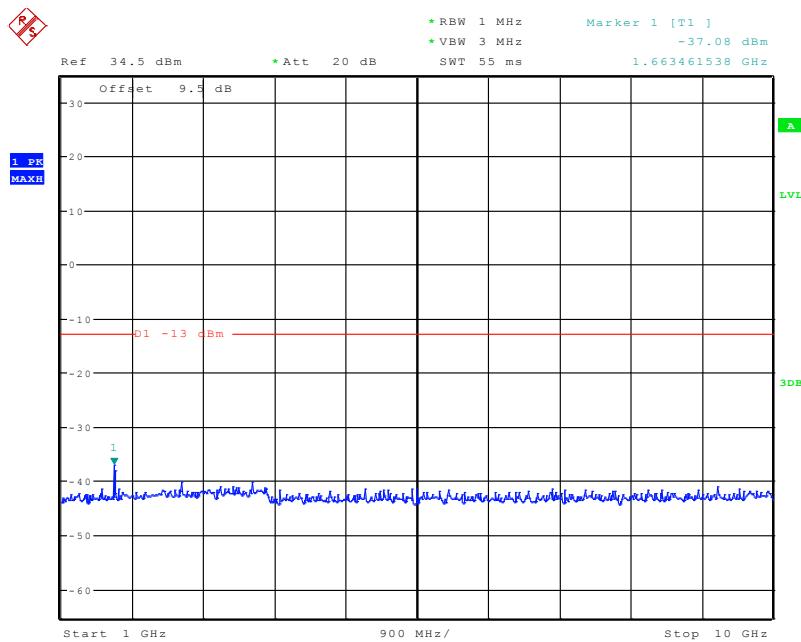
Date: 29.AUG.2019 23:18:56

PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)
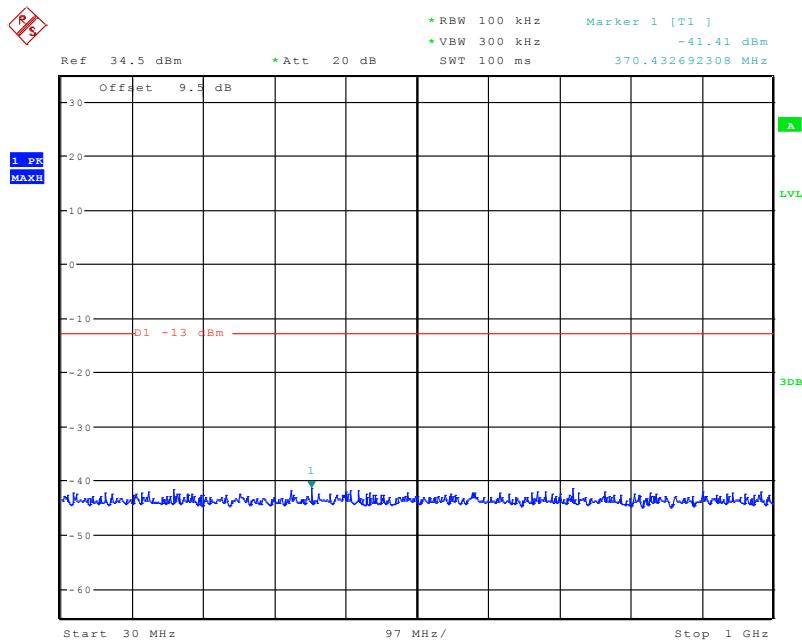
Date: 29.AUG.2019 22:45:19

## 1 GHz – 2 GHz (GSM Mode)
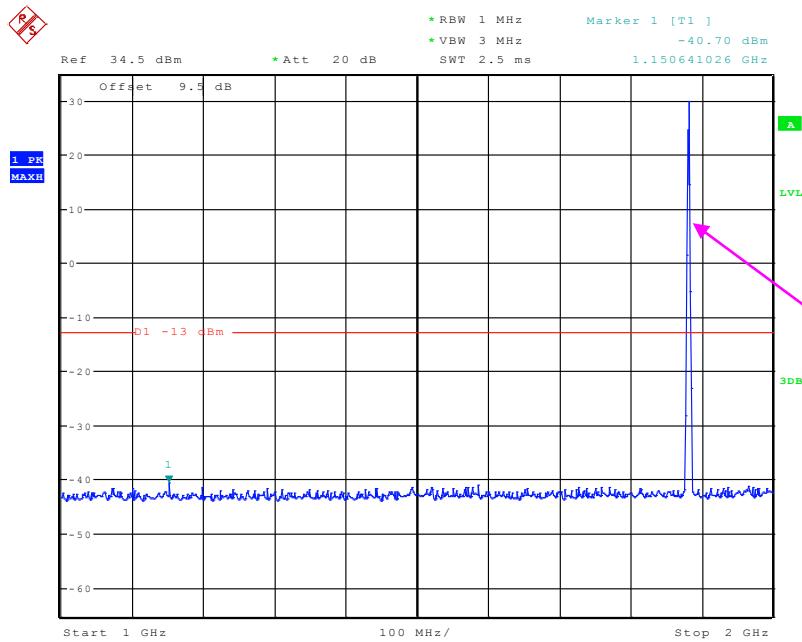
Fundamental test

Date: 29.AUG.2019 22:46:05

2 GHz – 20 GHz (GSM Mode)

```
                                        * RBW  1 MHz        Marker 1 [T1 ]
                                        * VBW  3 MHz                    -33.87 dBm
        Ref  34.5 dBm      * Att  20 dB   SWT 105 ms         7.509615385 GHz
          Offset   9.5 dB
```

1 PK
MAXH

```
   D1 -13 dBm
```

```
Start 2 GHz            1.8 GHz/              Stop 20 GHz
```
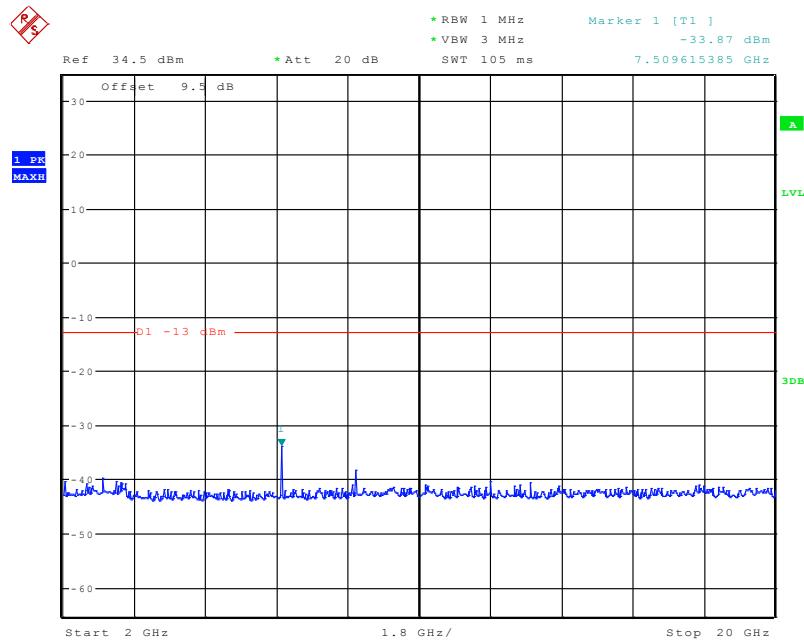
Date: 29.AUG.2019 22:46:22

30 MHz – 1 GHz (WCDMA Mode)

```
                                        * RBW  100 kHz      Marker 1 [T1 ]
                                        * VBW  300 kHz                  -41.18 dBm
        Ref  34.5 dBm      * Att  20 dB   SWT 100 ms       930.048076923 MHz
          Offset   9.5 dB
```

1 PK
MAXH

```
   D1 -13 dBm
```

```
Start 30 MHz           97 MHz/               Stop 1 GHz
```
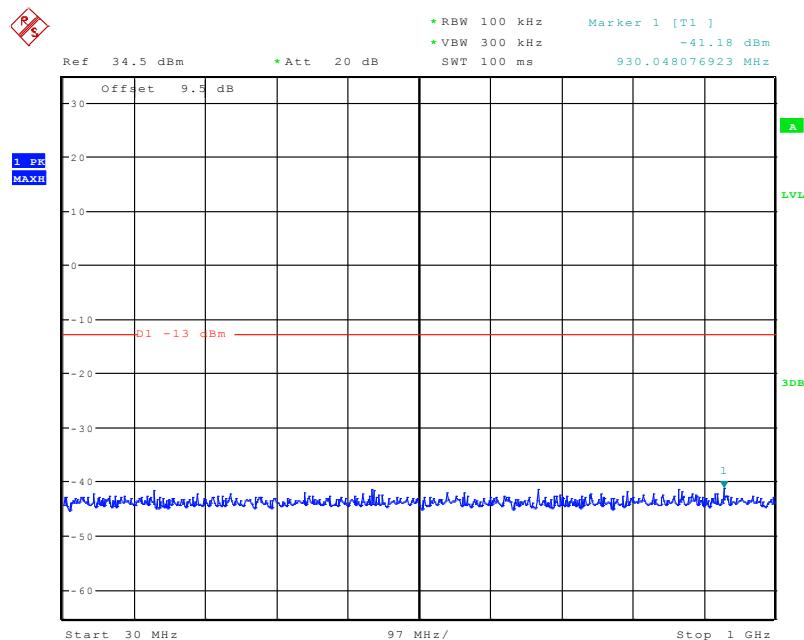
Date: 29.AUG.2019 23:16:14

1 GHz – 2 GHz (WCDMA Mode)

Fundamental test
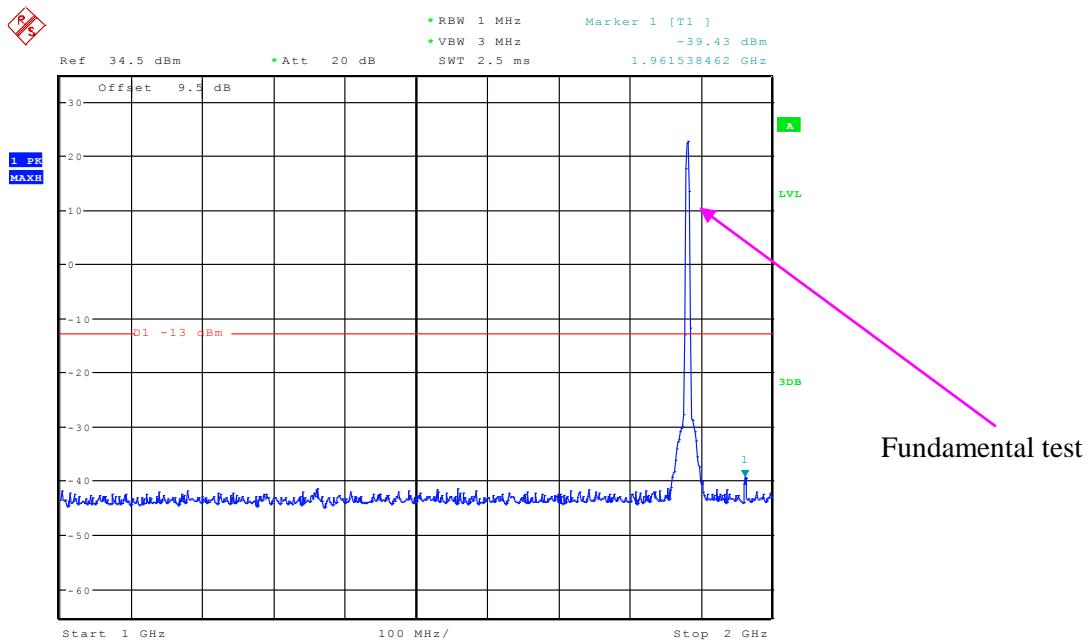
2 GHz – 20 GHz (WCDMA Mode)
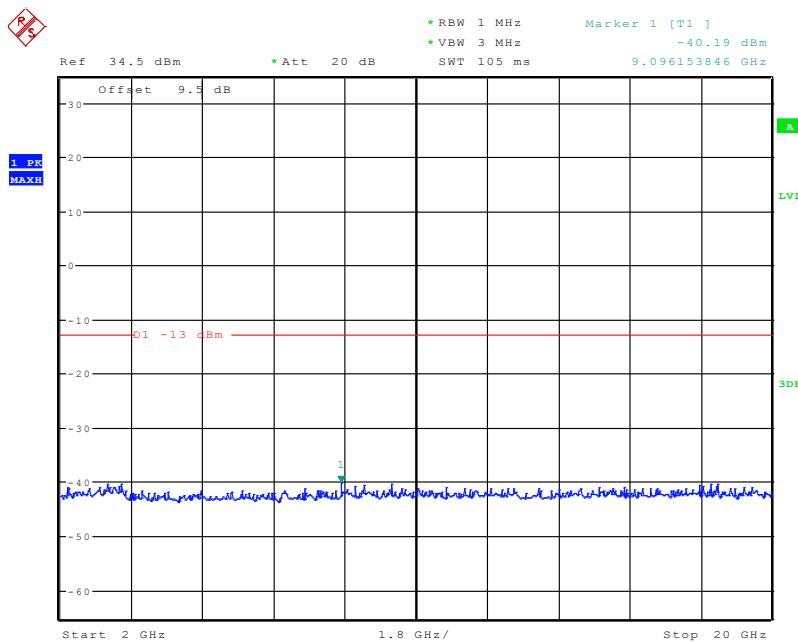
LTE Band 2:

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

```
                                    *RBW 100 kHz      Marker 1 [T1 ]
                                    *VBW 300 kHz              -49.98 dBm
         Ref  20 dBm      *Att  30 dB   SWT 100 ms     222.060000000 MHz

         20  Offset   6 dB                                              A
          10

           0                                                          LVL

         -10
            D1 -13 dBm
         -20

         -30

         -40                                                          3DB

         -50

         -60

         -70

         -80
         Start  30 MHz              97 MHz/              Stop  1 GHz
```
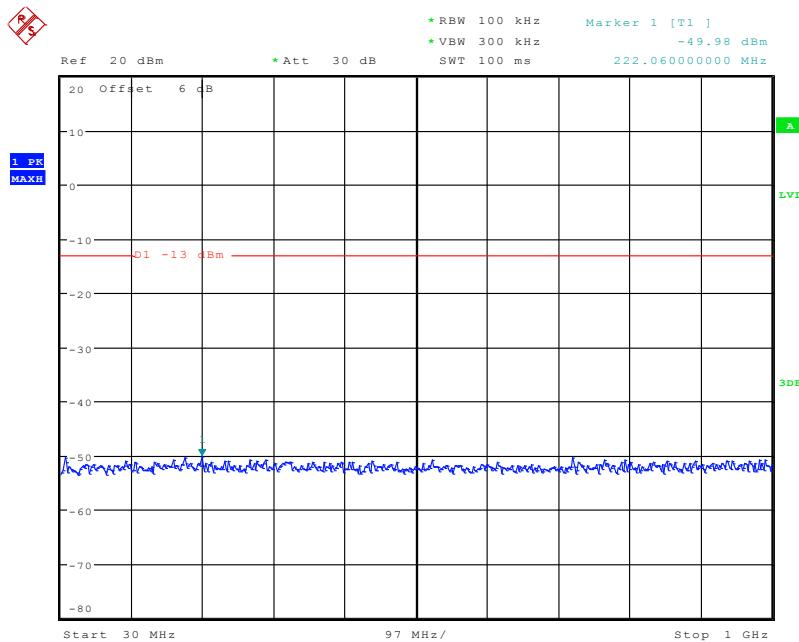
Date: 30.AUG.2019 22:39:03

1 GHz – 20 GHz (1.4 MHz, Middle Channel)

```
                                    *RBW 1 MHz        Marker 1 [T1 ]
                                    *VBW 3 MHz                -44.20 dBm
         Ref  25 dBm      *Att  25 dB   SWT 110 ms     18.024000000 GHz

            Offset  6 dB                                                A
          20

          10

           0                                                          LVL

         -10
            D1 -13 dBm
         -20

         -30                                                          3DB

         -40

         -50

         -60

         -70
         Start  1 GHz               1.9 GHz/            Stop  20 GHz
```

Fundamental test
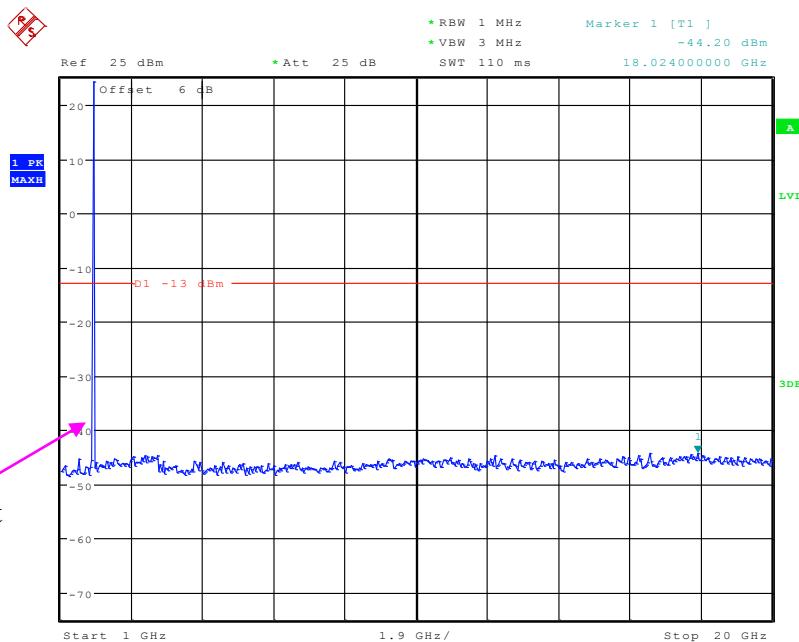
Date: 30.AUG.2019 22:39:12

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

```
                                    *RBW 100 kHz      Marker 1 [T1 ]
                                    *VBW 300 kHz              -49.74 dBm
        Ref  20 dBm      *Att 30 dB  SWT 100 ms       866.140000000 MHz
   20 Offset  6 dB
   10
    0
  -10
  D1 -13 dBm
  -20
  -30
  -40
  -50                                                      1
  -60
  -70
  -80
   Start 30 MHz              97 MHz/                 Stop 1 GHz
```
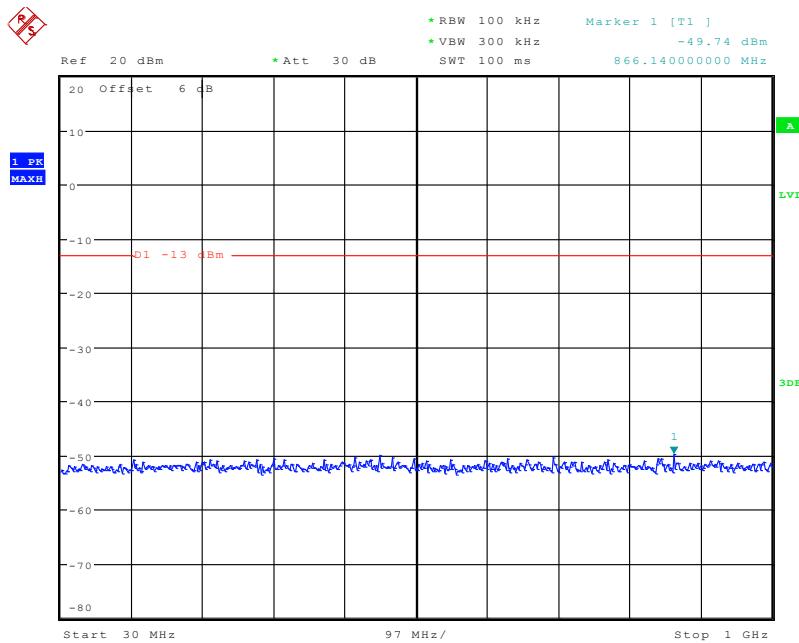
Date: 30.AUG.2019 22:39:32

1 GHz – 20 GHz (3.0 MHz, Middle Channel)

```
                                    *RBW 1 MHz        Marker 1 [T1 ]
                                    *VBW 3 MHz                -43.99 dBm
        Ref  25 dBm      *Att 25 dB  SWT 110 ms       19.544000000 GHz
      Offset  6 dB
   20
   10
    0
  -10
  D1 -13 dBm
  -20
  -30
  -40                                                         1
  -50
  -60
  -70
   Start 1 GHz              1.9 GHz/                 Stop 20 GHz
```
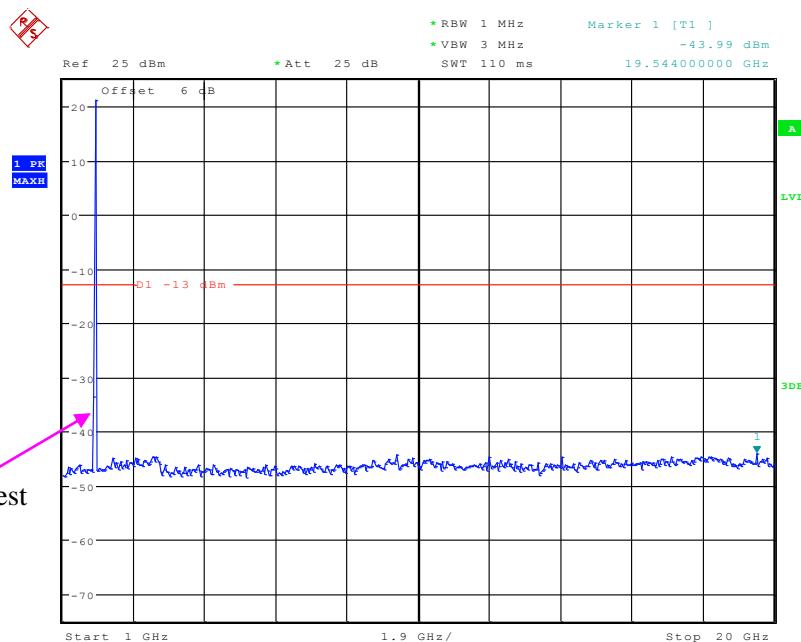
Fundamental test

Date: 30.AUG.2019 22:39:41

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

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz               -50.02 dBm
        Ref   20 dBm      *Att  30 dB    SWT 100 ms     738.100000000 MHz
    20  Offset   6 dB                                                    A

    10

     0                                                                  LVL

   -10
        D1 -13 dBm
   -20

   -30

   -40                                                                  3DB

                                              1
   -50

   -60

   -70

   -80
        Start  30 MHz           97 MHz/              Stop  1 GHz
```
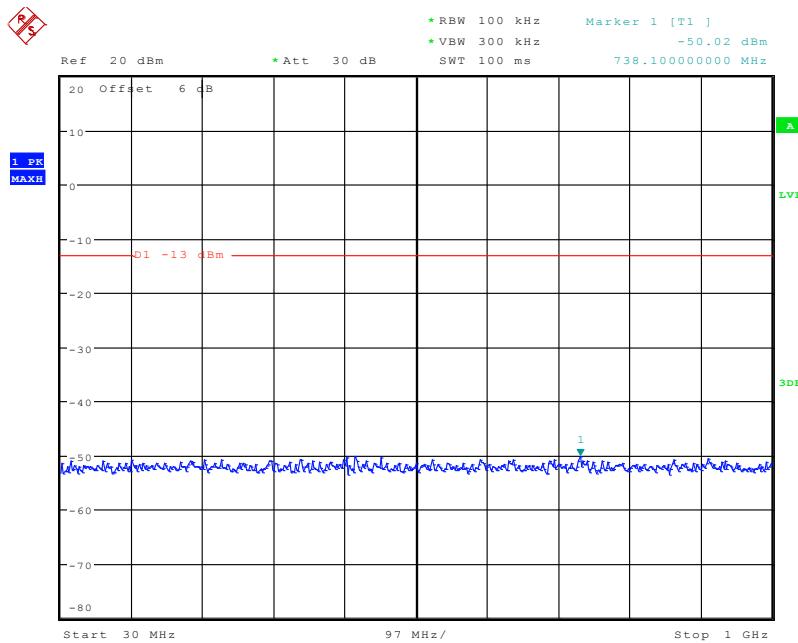
Date: 30.AUG.2019 22:39:59

1 GHz – 20 GHz (5.0 MHz, Middle Channel)

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz                -43.75 dBm
        Ref   25 dBm      *Att  25 dB    SWT 110 ms    19.658000000 GHz
        Offset   6 dB
    20                                                                  A

    10

     0                                                                  LVL

   -10
        D1 -13 dBm
   -20

   -30                                                                  3DB

   -40                                                              1
   -50

   -60

   -70
        Start  1 GHz            1.9 GHz/             Stop  20 GHz
```
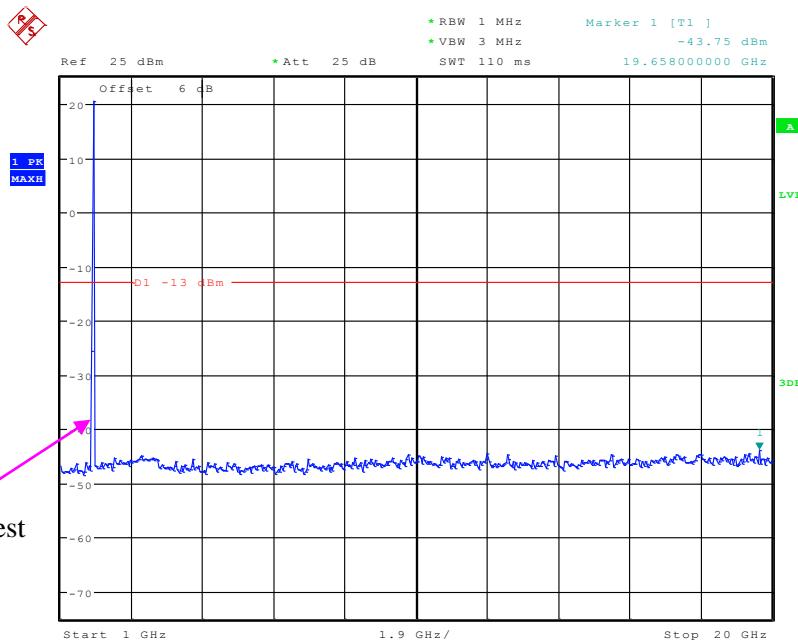
Fundamental test

Date: 30.AUG.2019 22:40:09

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

```
                              *RBW 100 kHz      Marker 1 [T1 ]
                              *VBW 300 kHz              -49.10 dBm
        Ref  20 dBm          *Att  30 dB      SWT 100 ms    972.840000000 MHz
    20  Offset   6 dB                                                   A
   10
 1 PK   0                                                              LVL
 MAXH
  -10          D1 -13 dBm
  -20
  -30
  -40                                                                  3DB
  -50                                                           1
  -60
  -70
  -80
    Start  30 MHz             97 MHz/              Stop  1 GHz
```
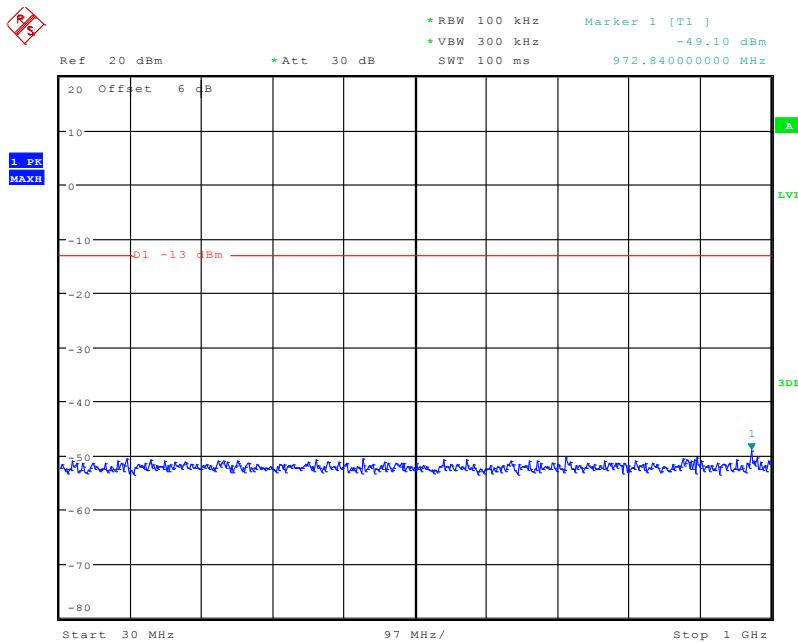
Date: 30.AUG.2019 22:40:28

1 GHz – 20 GHz (10.0 MHz, Middle Channel)

```
                              *RBW 1 MHz        Marker 1 [T1 ]
                              *VBW 3 MHz               -44.14 dBm
        Ref  25 dBm          *Att  25 dB      SWT 110 ms    10.386000000 GHz
     20  Offset   6 dB                                                  A
   10
 1 PK   0                                                              LVL
 MAXH
  -10          D1 -13 dBm
  -20
  -30                                                                  3DB
  -40
  -50
  -60
  -70
    Start  1 GHz             1.9 GHz/              Stop  20 GHz
```
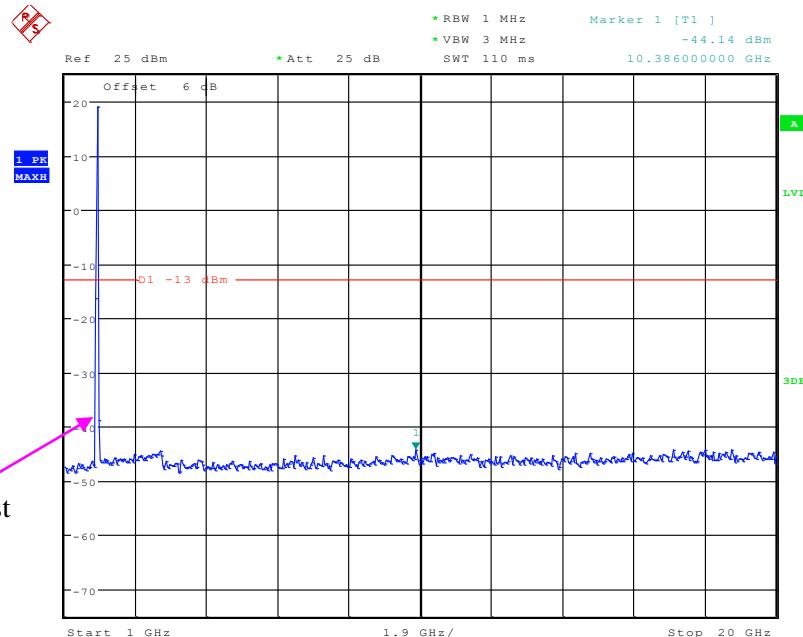
Fundamental test

Date: 30.AUG.2019 22:40:38

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

```
                                    * RBW  100 kHz      Marker 1 [T1 ]
                                    * VBW  300 kHz            -49.67 dBm
        Ref  20 dBm        * Att  30 dB    SWT  100 ms      491.720000000 MHz
```
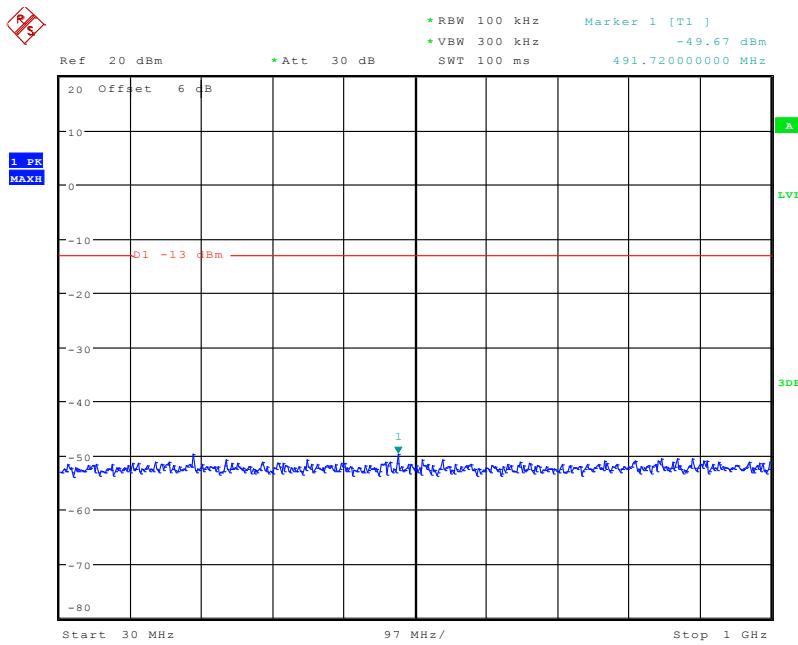


```
Date: 30.AUG.2019  22:40:57
```

1 GHz – 20 GHz (15.0 MHz, Middle Channel)

```
                                    * RBW  1 MHz       Marker 1 [T1 ]
                                    * VBW  3 MHz            -43.73 dBm
        Ref  25 dBm        * Att  25 dB    SWT  110 ms      17.454000000 GHz
```

Fundamental test
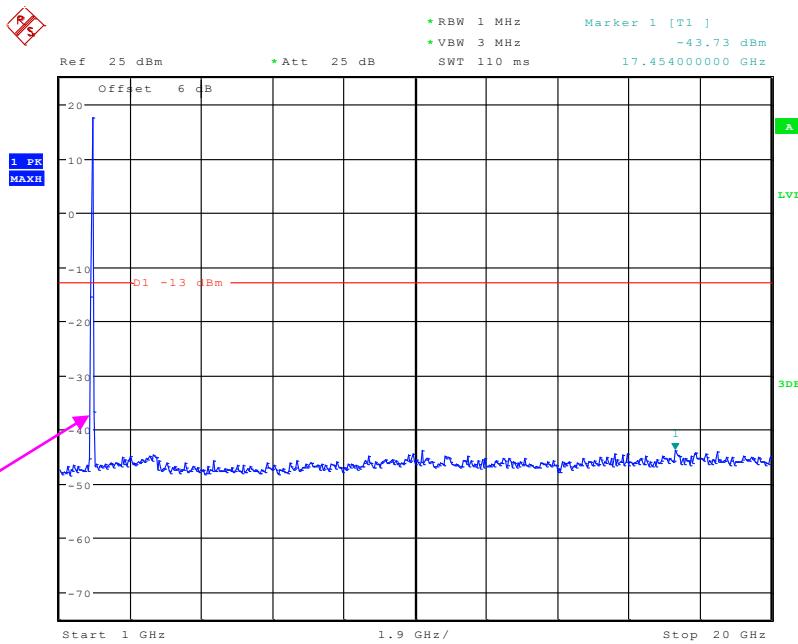

```
Date: 30.AUG.2019  22:41:06
```

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

```
                                        *RBW 100 kHz      Marker 1 [T1 ]
                                        *VBW 300 kHz            -49.97 dBm
            Ref  20 dBm      *Att  30 dB    SWT 100 ms    613.940000000 MHz

            20  Offset   6 dB                                          A
            10
      1 PK
      MAXH   0                                                        LVL

           -10
               D1 -13 dBm
           -20
           -30
                                                                     3DB
           -40
           -50
           -60
           -70
           -80
            Start  30 MHz          97 MHz/               Stop  1 GHz
```
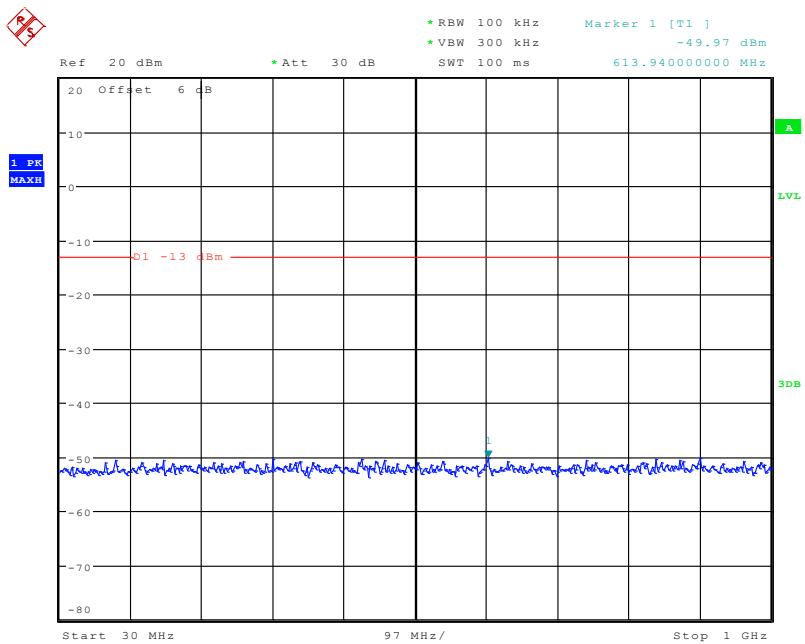
Date: 30.AUG.2019 22:41:28

1 GHz – 20 GHz (20.0 MHz, Middle Channel)

```
                                        *RBW  1 MHz       Marker 1 [T1 ]
                                        *VBW  3 MHz            -44.01 dBm
            Ref  25 dBm      *Att  25 dB    SWT 110 ms    15.402000000 GHz

                Offset   6 dB
            20                                                         A
            10
      1 PK
      MAXH   0                                                        LVL
           -10
               D1 -13 dBm
           -20
           -30
                                                                     3DB
           -40
           -50
           -60
           -70
            Start  1 GHz           1.9 GHz/              Stop  20 GHz
```
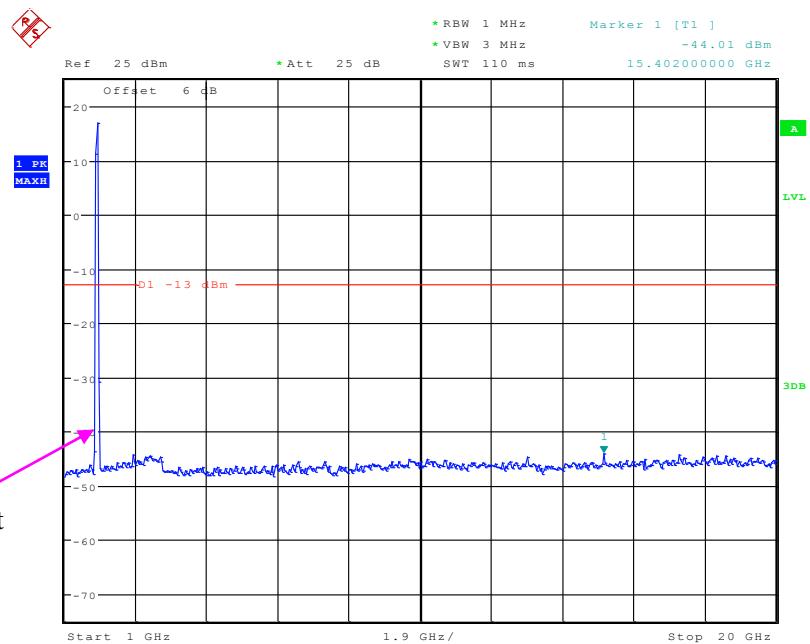
Fundamental test

Date: 30.AUG.2019 22:41:37

LTE Band 4:

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

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz            -49.44 dBm
        Ref  20 dBm      *Att 30 dB  SWT 100 ms    383.080000000 MHz
```
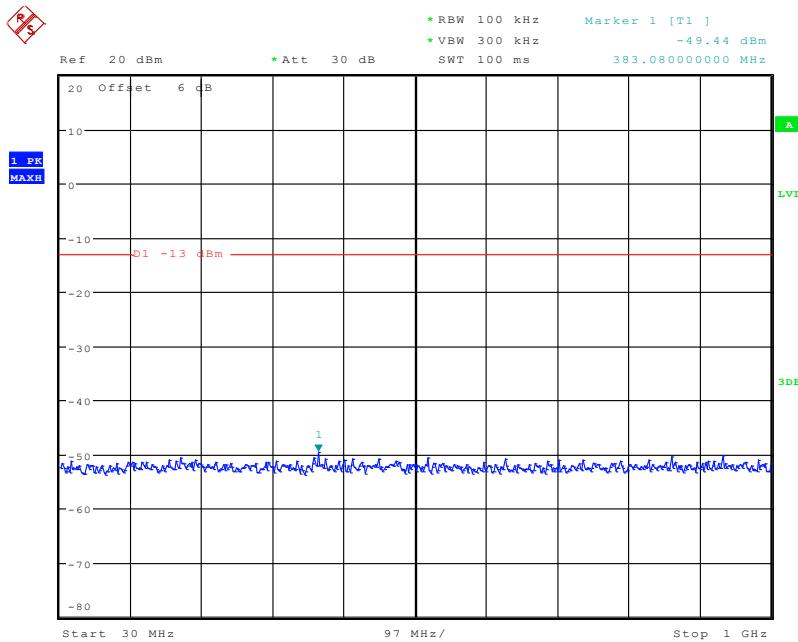
Date: 30.AUG.2019 22:41:52

1 GHz – 20 GHz (1.4 MHz, Middle Channel)

```
                                    *RBW 1 MHz      Marker 1 [T1 ]
                                    *VBW 3 MHz              -29.91 dBm
        Ref  25 dBm      *Att 25 dB  SWT 110 ms      3.470000000 GHz
```
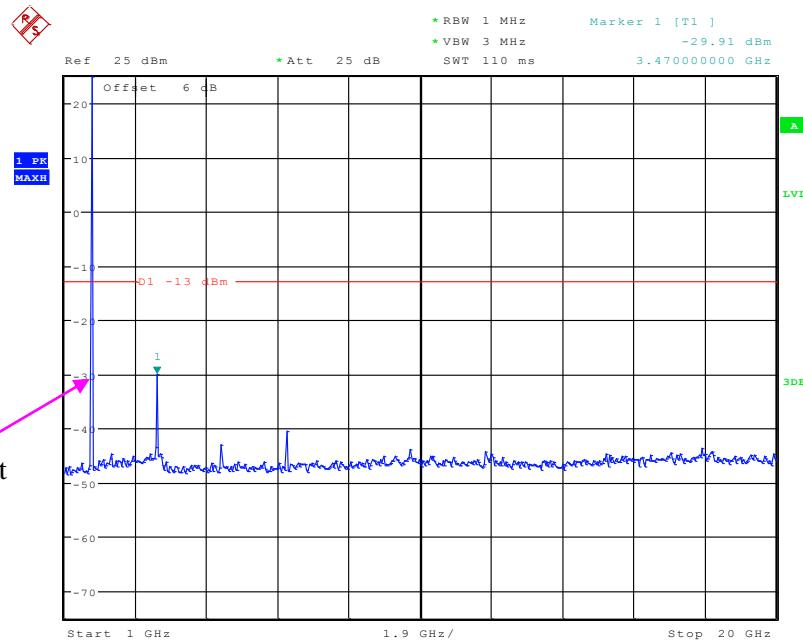
Fundamental test

Date: 30.AUG.2019 22:42:02

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

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz              -49.92 dBm
           Ref  20 dBm      *Att  30 dB   SWT 100 ms      270.560000000 MHz

            20  Offset   6 dB                                      A
            10

             0                                                   LVL

           -10
                 D1 -13 dBm
           -20

           -30

           -40                                                   3DB

           -50          1

           -60

           -70

           -80
           Start  30 MHz              97 MHz/           Stop  1 GHz

           1 PK
           MAXH
```
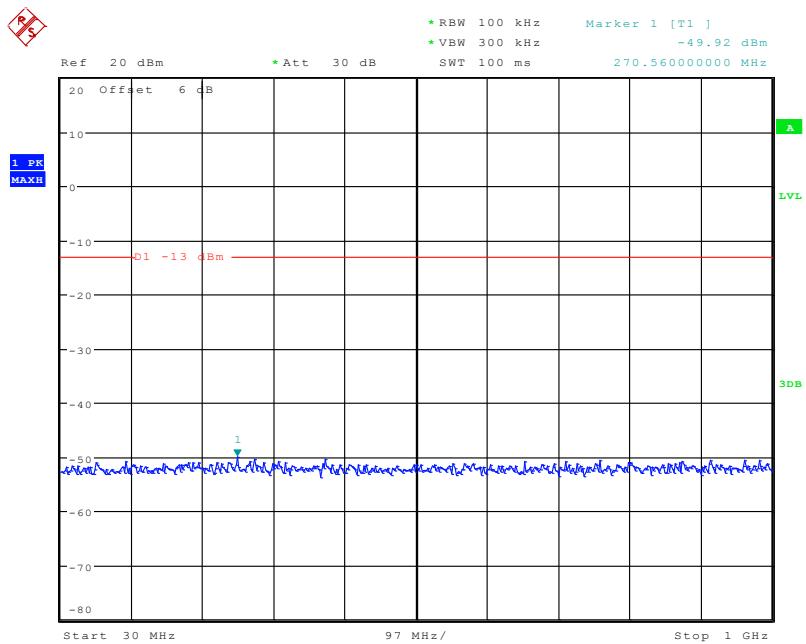
Date: 30.AUG.2019 22:42:20

1 GHz – 20 GHz (3.0 MHz, Middle Channel)

```
                                    *RBW 1 MHz     Marker 1 [T1 ]
                                    *VBW 3 MHz               -32.05 dBm
           Ref  25 dBm      *Att  25 dB   SWT 110 ms      3.470000000 GHz

            20  Offset   6 dB                                      A
            10

             0                                                   LVL

           -10
                 D1 -13 dBm
           -20

           -30          1                                        3DB

           -40

           -50

           -60

           -70
           Start  1 GHz               1.9 GHz/           Stop  20 GHz

           1 PK
           MAXH
```
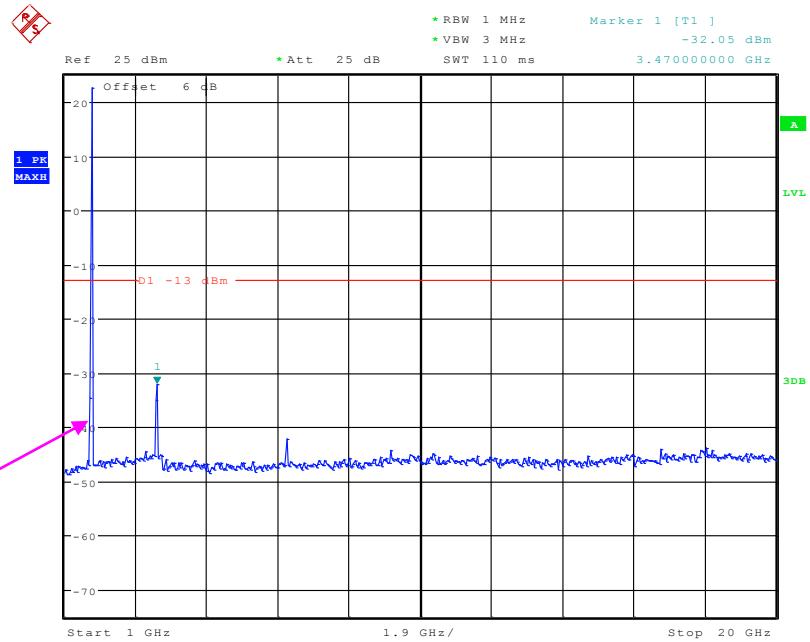
Fundamental test

Date: 30.AUG.2019 22:42:29

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

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz              -49.34 dBm
        Ref  20 dBm      *Att  30 dB   SWT  100 ms      945.680000000 MHz
        20 Offset  6 dB                                              A
        10
        0                                                            LVL
       -10
        D1 -13 dBm
       -20
       -30
       -40                                                          3DB
       -50                                              1
       -60
       -70
       -80
        Start  30 MHz           97 MHz/              Stop  1 GHz
```
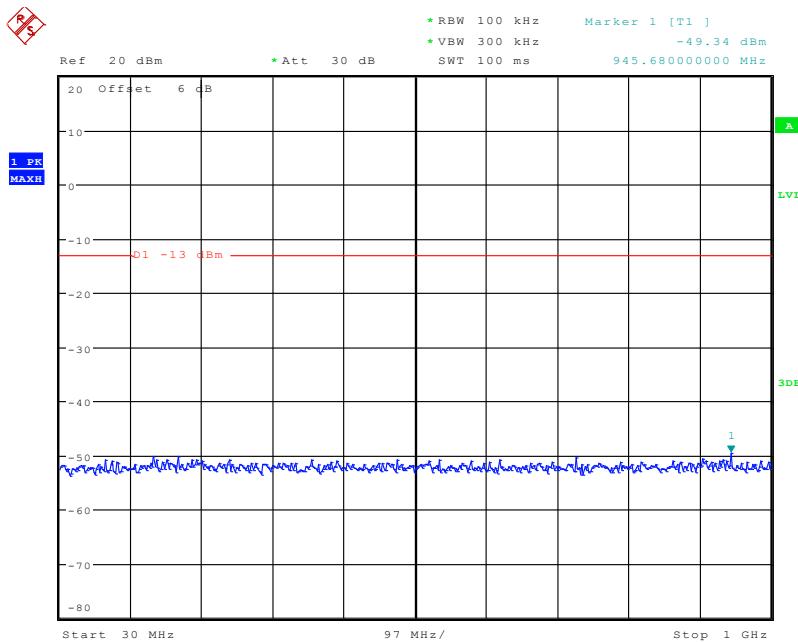
Date: 30.AUG.2019 22:42:47

1 GHz – 20 GHz (5.0 MHz, Middle Channel)

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz              -35.63 dBm
        Ref  25 dBm      *Att  25 dB   SWT  110 ms      3.470000000 GHz
         Offset  6 dB
        20                                                           A
        10
        0                                                            LVL
       -10
        D1 -13 dBm
       -20
       -30                                                          3DB
       -40        1
       -50
       -60
       -70
        Start  1 GHz           1.9 GHz/              Stop  20 GHz
```
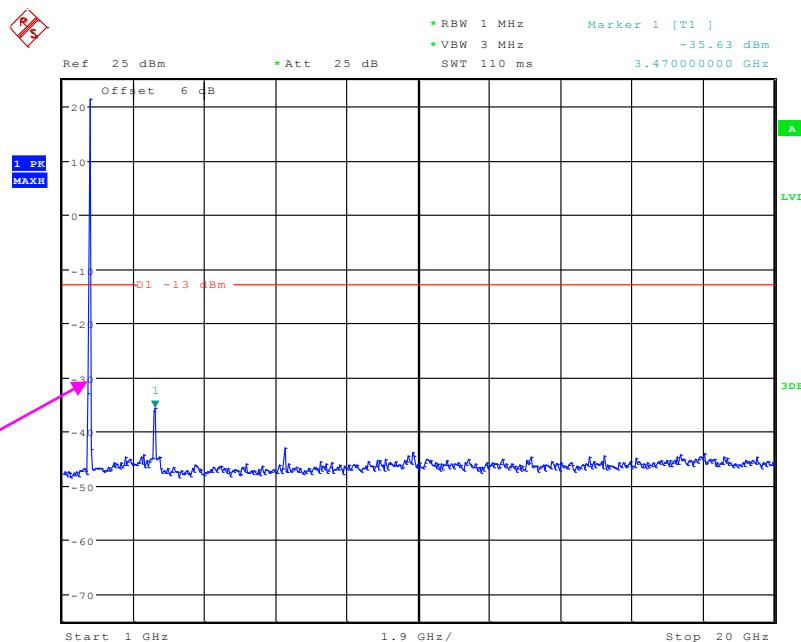
Fundamental test

Date: 30.AUG.2019 22:42:56

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

```
                                    *RBW  100 kHz     Marker 1 [T1 ]
                                    *VBW  300 kHz              -50.35 dBm
        Ref   20 dBm        *Att  30 dB    SWT  100 ms     980.600000000 MHz
    20  Offset    6 dB                                                         A

  10

   0                                                                          LVL

 -10
        D1 -13 dBm
 -20

 -30

 -40                                                                          3DB

 -50                                                                    1

 -60

 -70

 -80
        Start  30 MHz              97 MHz/                   Stop  1 GHz
```
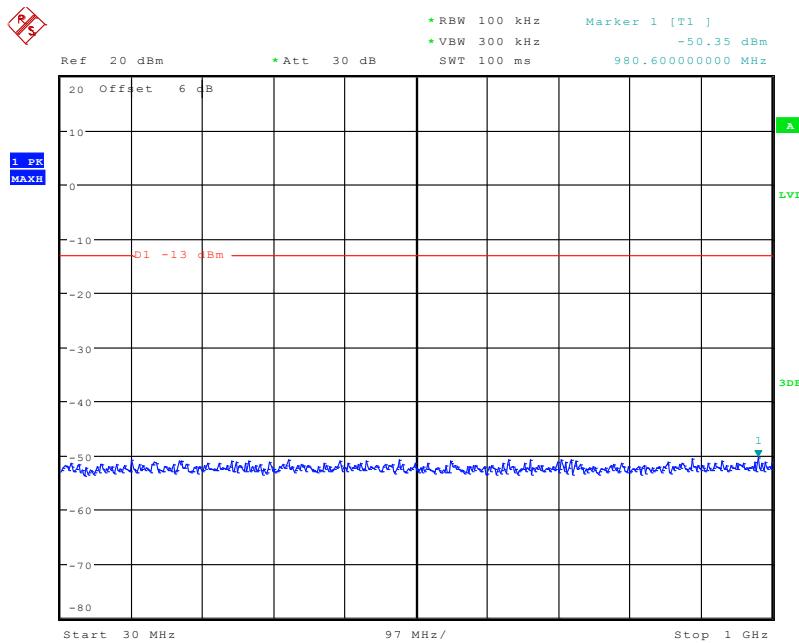
Date: 30.AUG.2019 22:43:13

1 GHz – 20 GHz (10.0 MHz, Middle Channel)

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz               -37.70 dBm
        Ref   25 dBm        *Att  25 dB    SWT  110 ms     3.470000000 GHz
        Offset    6 dB
  20                                                                           A

  10

   0                                                                          LVL

 -10
        D1 -13 dBm
 -20

 -30                                                                          3DB

 -40              1

 -50

 -60

 -70
        Start  1 GHz               1.9 GHz/                   Stop  20 GHz
```
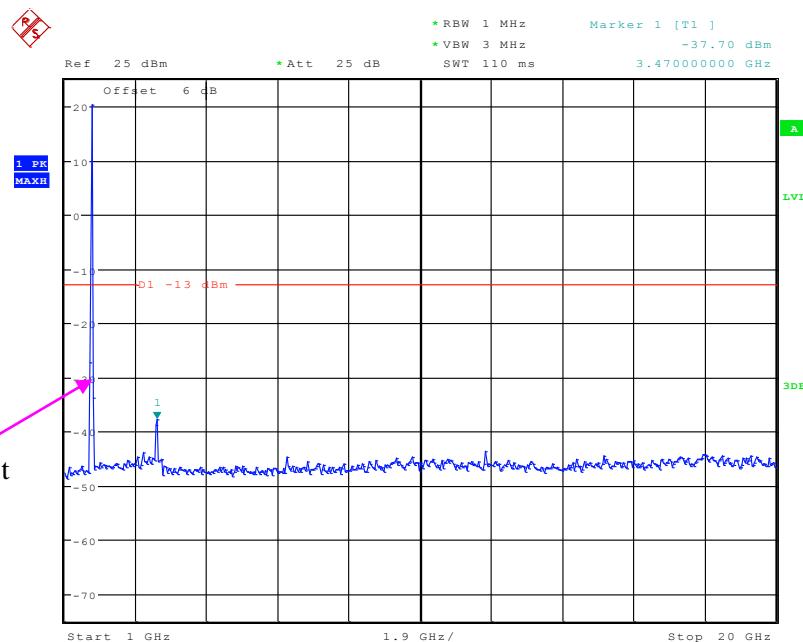
Fundamental test

Date: 30.AUG.2019 22:43:22

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

```
                                    *RBW  100 kHz     Marker 1 [T1 ]
                                    *VBW  300 kHz            -50.23 dBm
          Ref  20 dBm      *Att  30 dB   SWT  100 ms    185.200000000 MHz

          20  Offset   6 dB                                              A

  1 PK
  MAXH                                                                  LVL

                      D1 -13 dBm

                                                                       3DB


                        1

  Start  30 MHz                  97 MHz/                    Stop  1 GHz
```
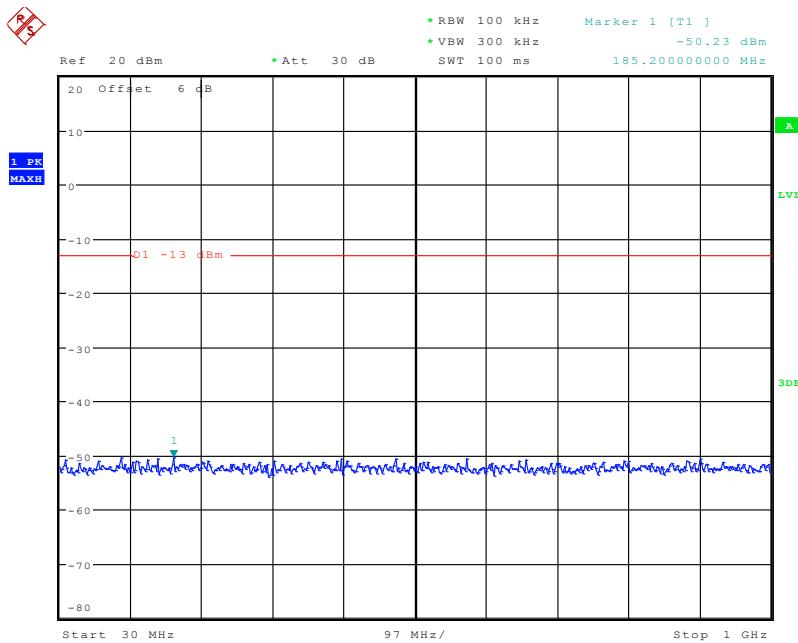
Date: 30.AUG.2019 22:43:41

1 GHz – 20 GHz (15.0 MHz, Middle Channel)

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz             -38.45 dBm
          Ref  25 dBm      *Att  25 dB   SWT  110 ms    3.470000000 GHz

              Offset   6 dB                                              A

  1 PK
  MAXH                                                                  LVL

                      D1 -13 dBm

                                                                       3DB

                        1

  Start  1 GHz                   1.9 GHz/                    Stop  20 GHz
```
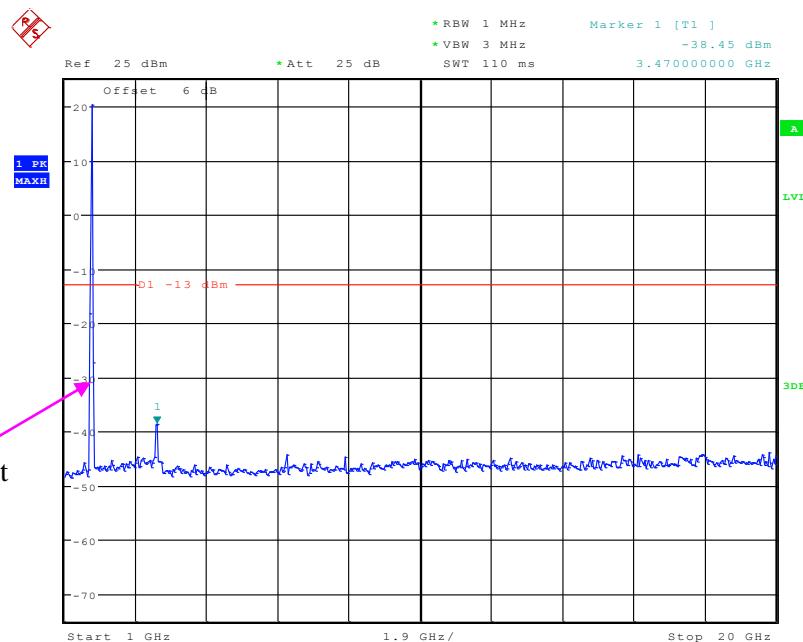
Fundamental test

Date: 30.AUG.2019 22:43:50

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

```
                                    * RBW  100 kHz      Marker 1 [T1 ]
                                    * VBW  300 kHz                -50.17 dBm
        Ref  20 dBm      * Att  30 dB    SWT 100 ms      319.060000000 MHz
        20  Offset   6 dB                                                    A
         10
          0                                                                 LVL
        -10
                D1 -13 dBm
        -20
        -30
        -40                                                                 3DB
        -50
        -60
        -70
        -80
        Start  30 MHz              97 MHz/              Stop  1 GHz
```
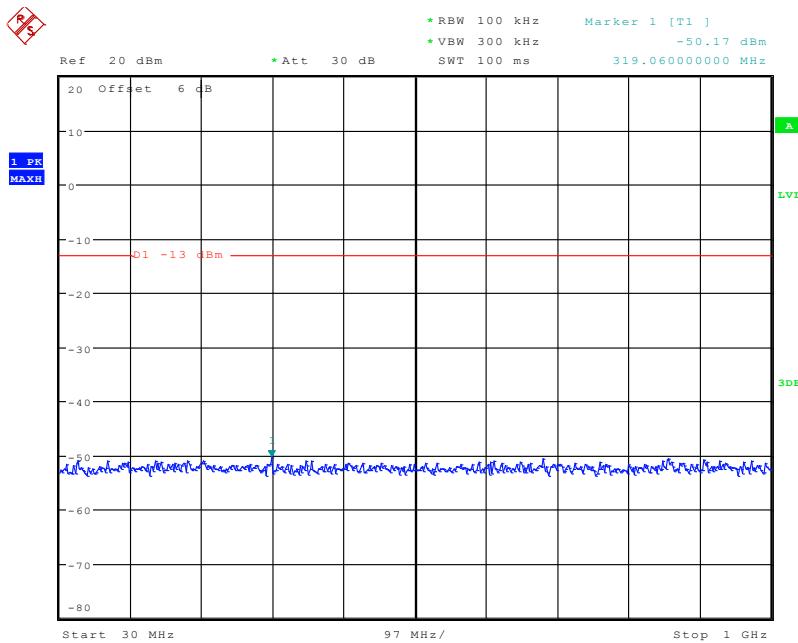
Date: 30.AUG.2019 22:44:09

1 GHz – 20 GHz (20.0 MHz, Middle Channel)

```
                                    * RBW  1 MHz       Marker 1 [T1 ]
                                    * VBW  3 MHz                 -39.15 dBm
        Ref  25 dBm      * Att  25 dB    SWT 110 ms      3.470000000 GHz
             Offset   6 dB                                                   A
         20
         10
          0                                                                 LVL
        -10
                D1 -13 dBm
        -20
        -30                                                                 3DB
        -40
        -50
        -60
        -70
        Start  1 GHz               1.9 GHz/             Stop  20 GHz
```
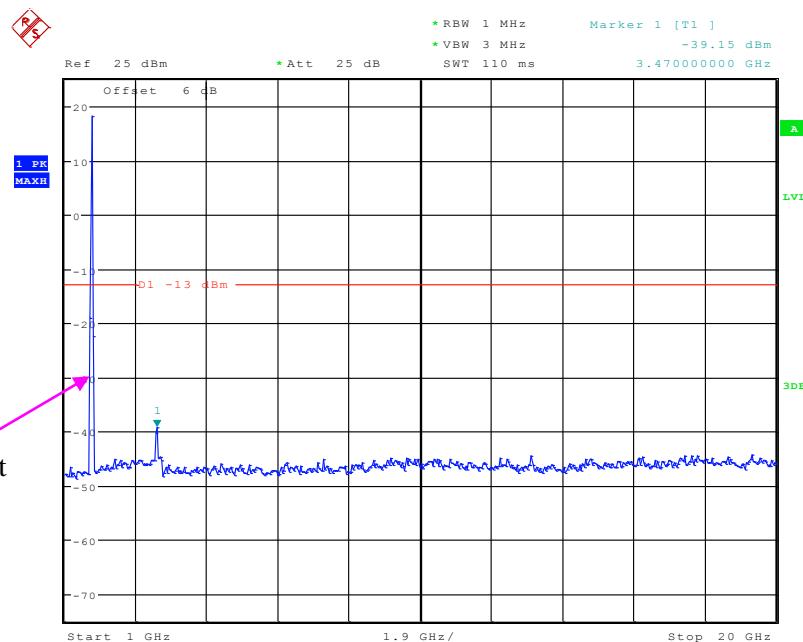
Fundamental test

Date: 30.AUG.2019 22:44:18

LTE Band 5:

30 MHz - 1 GHz (1.4 MHz, Middle Channel)
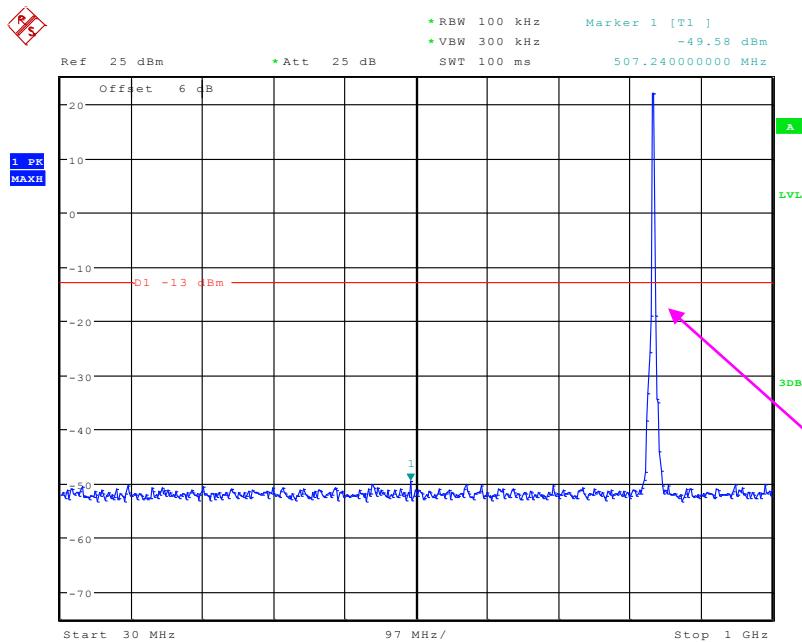
Fundamental test

Date: 30.AUG.2019 22:44:37

1 GHz – 10 GHz (1.4 MHz, Middle Channel)
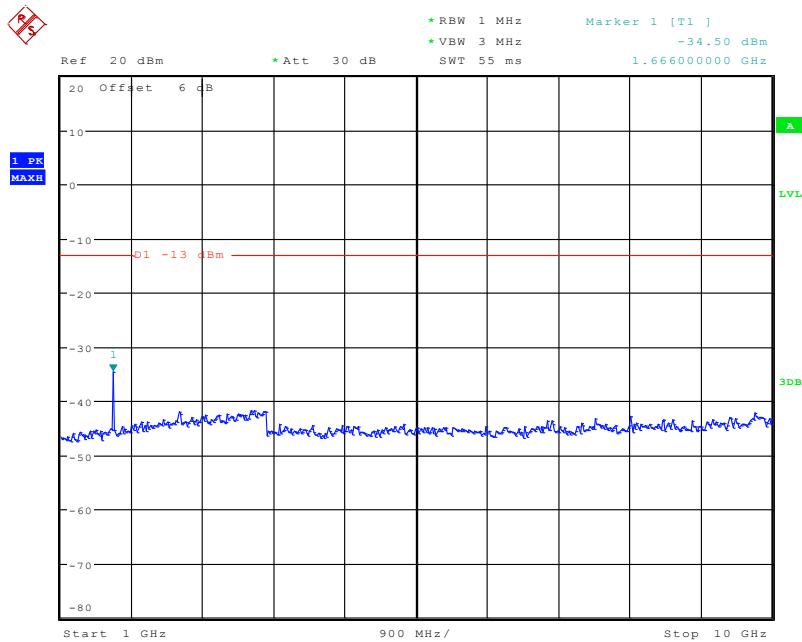
Date: 30.AUG.2019 22:44:46

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

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz              -49.64 dBm
        Ref  25 dBm        *Att  25 dB     SWT  100 ms    685.720000000 MHz
           Offset   6 dB
```

Fundamental test
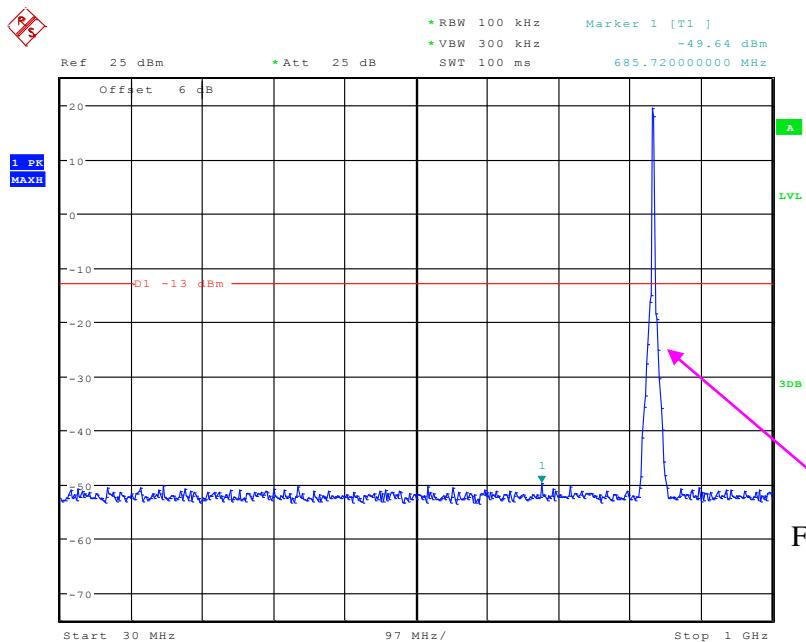
Date: 30.AUG.2019 22:45:01

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

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz               -39.49 dBm
        Ref  20 dBm        *Att  30 dB     SWT  55 ms     1.666000000 GHz
        20 Offset   6 dB
```
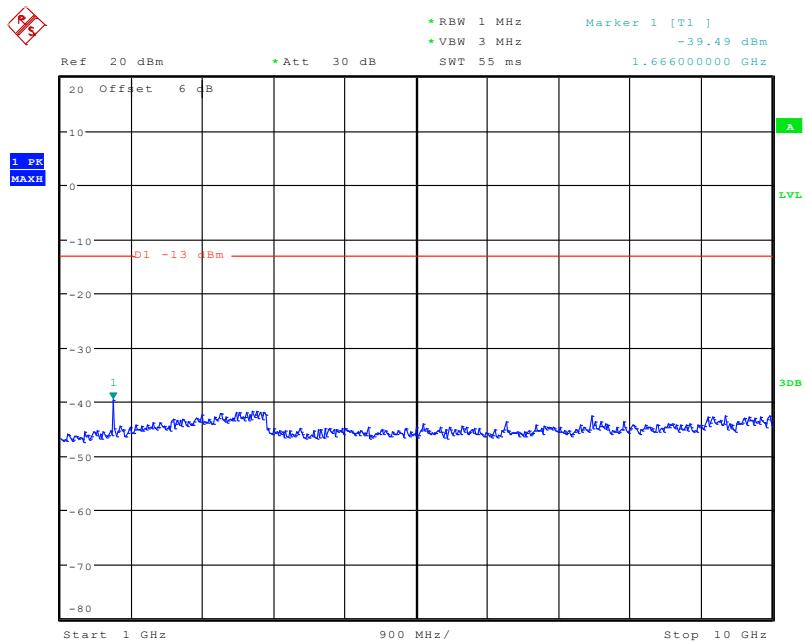
Date: 30.AUG.2019 22:45:10

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

Fundamental test
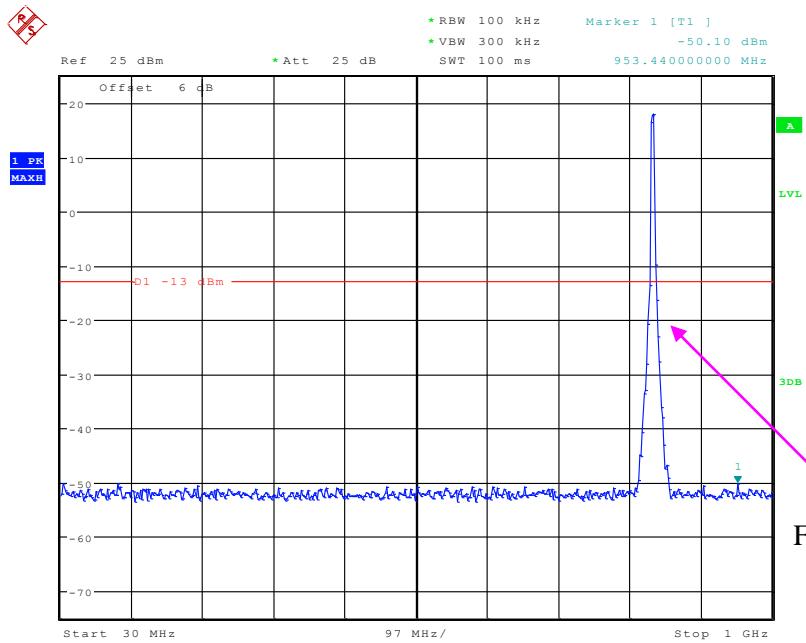
Date: 30.AUG.2019 22:45:26

1 GHz – 10 GHz (5.0 MHz, Middle Channel)
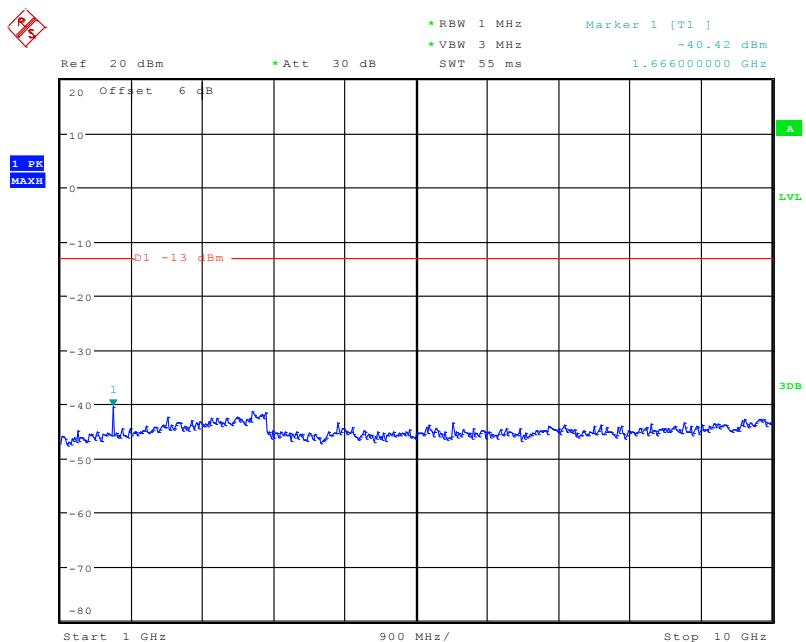
Date: 30.AUG.2019 22:45:35

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

```
                                    *RBW 100 kHz     Marker 1 [T1 ]
                                    *VBW 300 kHz              -49.60 dBm
        Ref  25 dBm      *Att  25 dB   SWT 100 ms     280.260000000 MHz
          Offset  6 dB
```

Fundamental test

```
Start  30 MHz                 97 MHz/                 Stop  1 GHz
```
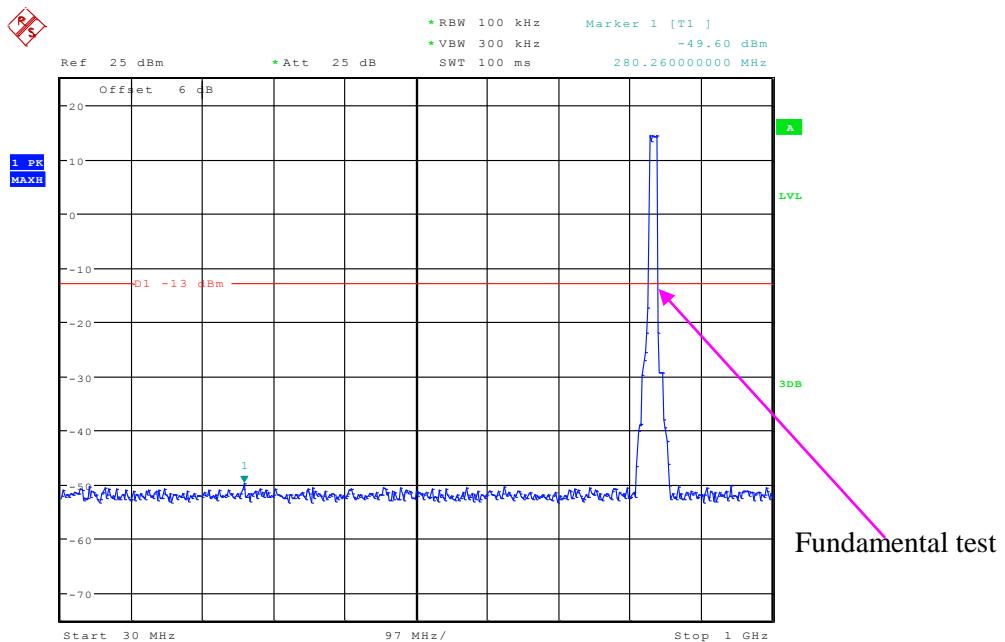
Date: 30.AUG.2019 22:45:55

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

```
                                    *RBW  1 MHz      Marker 1 [T1 ]
                                    *VBW  3 MHz              -40.82 dBm
        Ref  20 dBm      *Att  30 dB   SWT  55 ms      3.466000000 GHz
        20 Offset  6 dB
```

```
Start  1 GHz                 900 MHz/                Stop  10 GHz
```
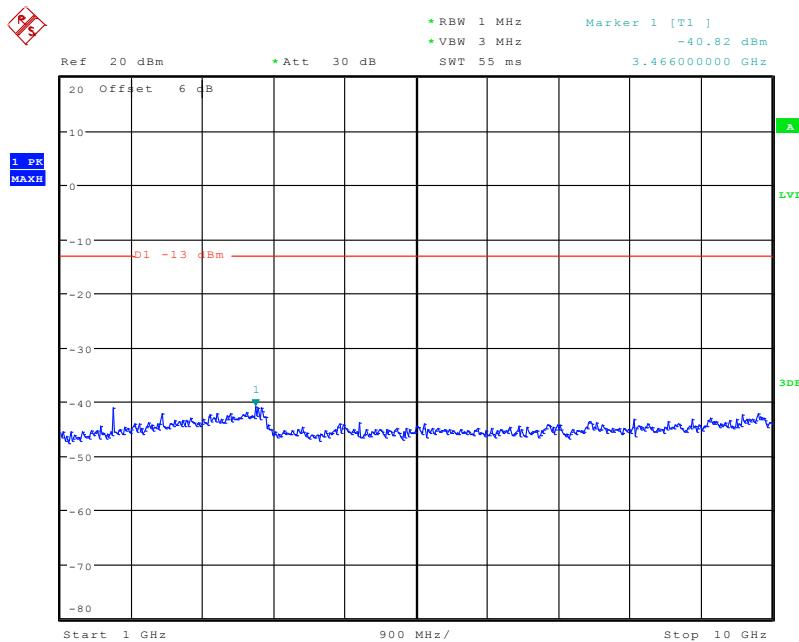
Date: 30.AUG.2019 22:46:04

LTE Band 7:

30 MHz - 1 GHz (5 MHz, Middle Channel)

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz             -38.14 dBm
        Ref  30 dBm      *Att  30 dB   SWT  100 ms      219.647435897 MHz

        30  Offset   6 dB                                              A
    -20

1 PK
MAXH  -10                                                            LVL

      -0

     --10

     --20
                                                                     3DB
         D1 -25 dBm
     --30
               1
     --40

     --50

     --60

     --70
        Start  30 MHz              97 MHz/              Stop  1 GHz
```
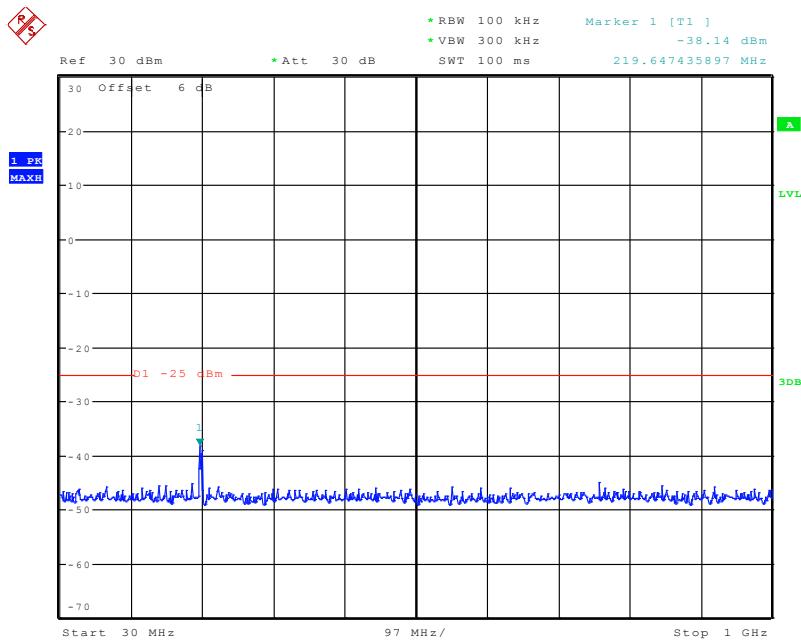
Date: 5.SEP.2019 23:25:13

1 GHz – 26.5 GHz (5 MHz, Middle Channel)

```
                                    *RBW  1 MHz       Marker 1 [T1 ]
                                    *VBW  3 MHz              -36.90 dBm
        Ref  30 dBm      *Att  30 dB   SWT  150 ms      24.824519231 GHz

        30  Offset   6 dB                                              A
    -20

1 PK
MAXH  -10                                                            LVL

      -0

     --10

     --20
                                                                     3DB
         D1 -25 dBm
     --30
                                                        1
Fundamental test
     --40

     --50

     --60

     --70
        Start  1 GHz               2.55 GHz/            Stop  26.5 GHz
```
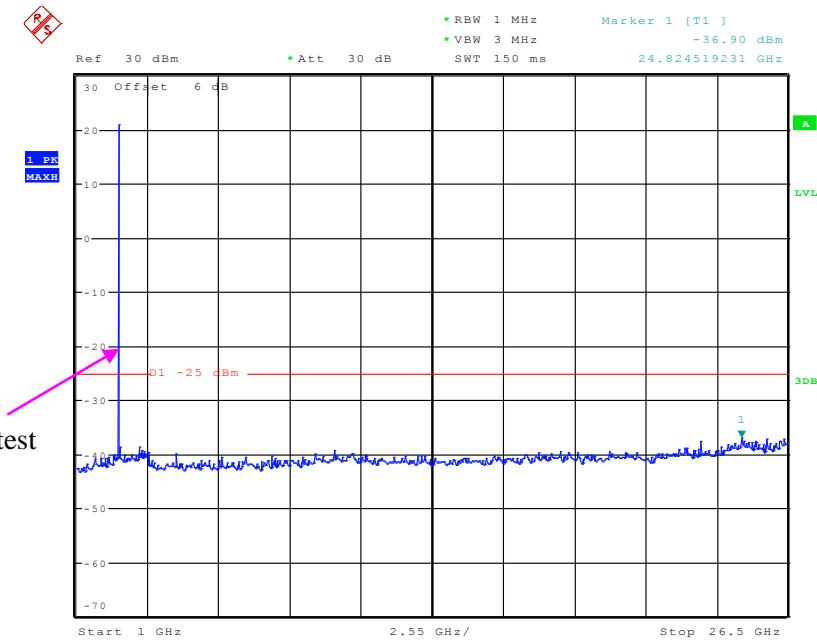
Date: 5.SEP.2019 23:21:49

30 MHz - 1 GHz (10 MHz, Middle Channel)
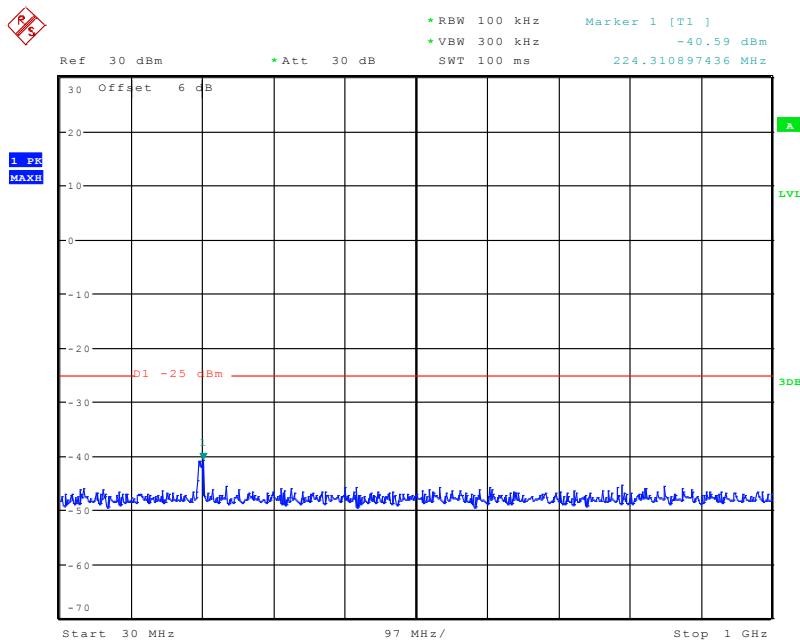
Date: 5.SEP.2019 23:24:59

1 GHz – 26.5 GHz (10 MHz, Middle Channel)
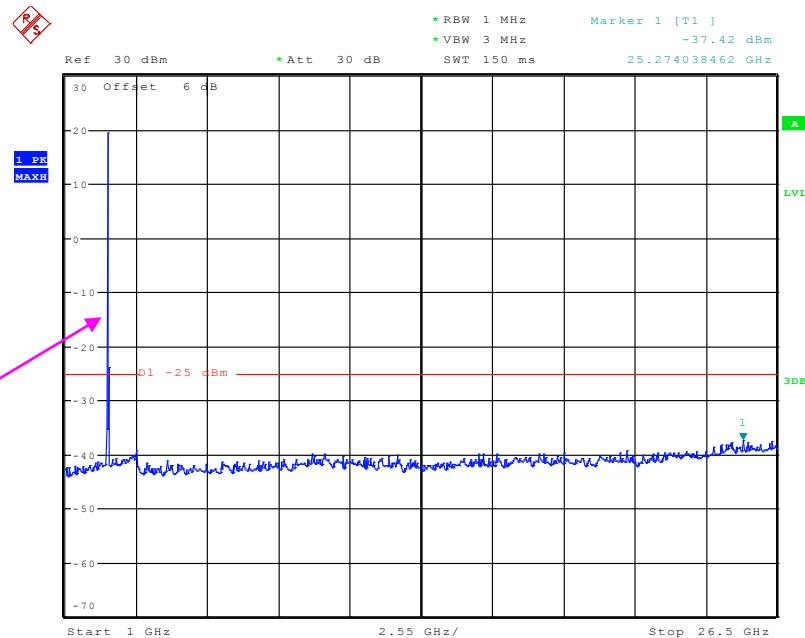
Fundamental test

Date: 5.SEP.2019 23:22:09

30 MHz - 1 GHz (15 MHz, Middle Channel)
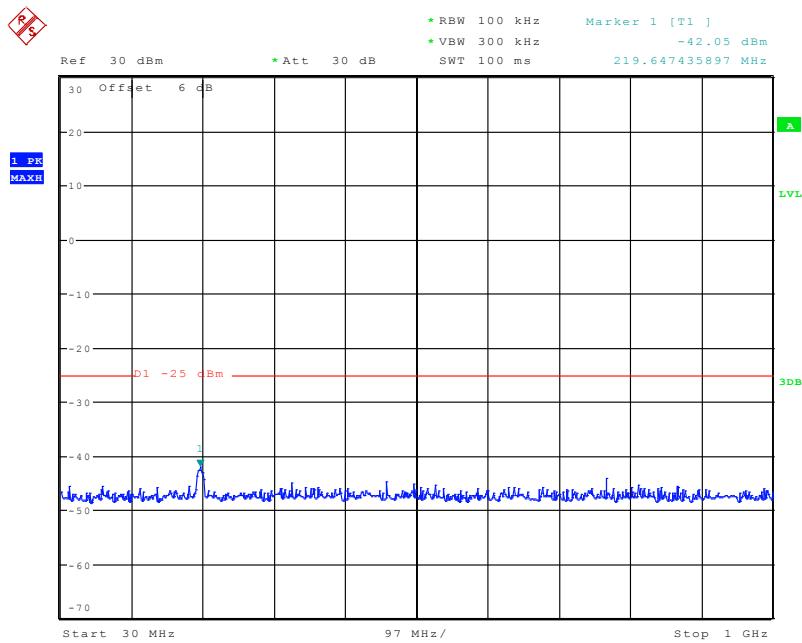
Date: 5.SEP.2019 23:24:41

1 GHz – 26.5 GHz (15 MHz, Middle Channel)
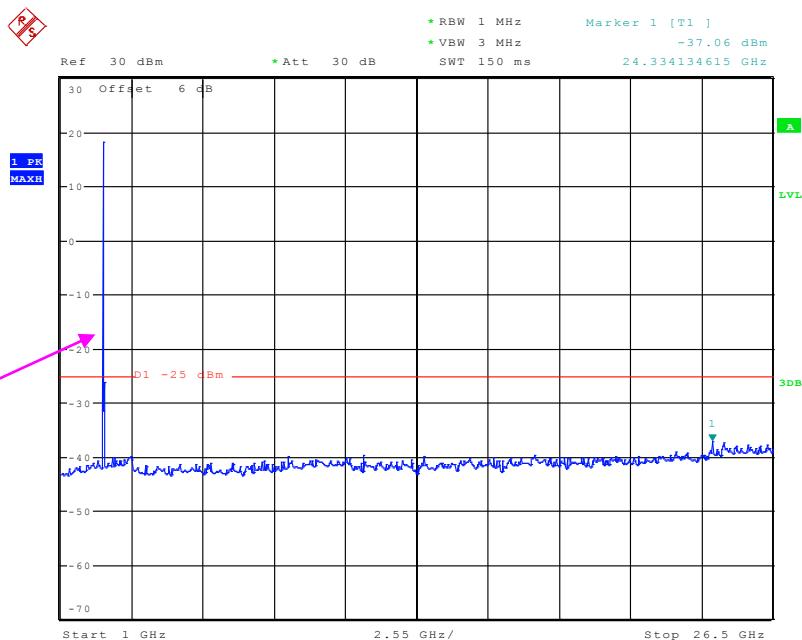
Fundamental test

Date: 5.SEP.2019 23:22:28

30 MHz - 1 GHz (20 MHz, Middle Channel)

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz            -41.79 dBm
     Ref   30 dBm         *Att   30 dB    SWT  100 ms   222.756410256 MHz
```
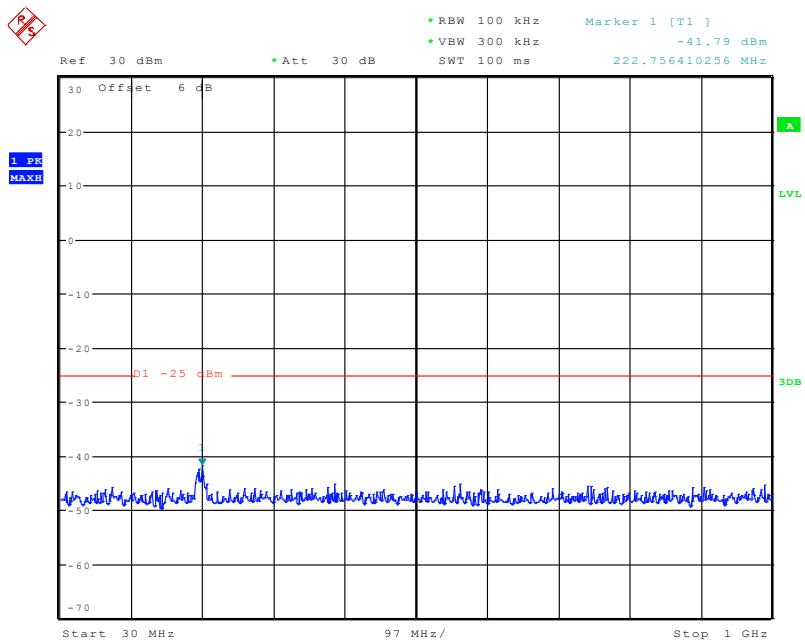
Date: 5.SEP.2019 23:24:09

1 GHz – 26.5 GHz (20 MHz, Middle Channel)

```
                                    *RBW  1 MHz        Marker 1 [T1 ]
                                    *VBW  3 MHz              -37.12 dBm
     Ref   30 dBm         *Att   30 dB    SWT  150 ms   24.906250000 GHz
```
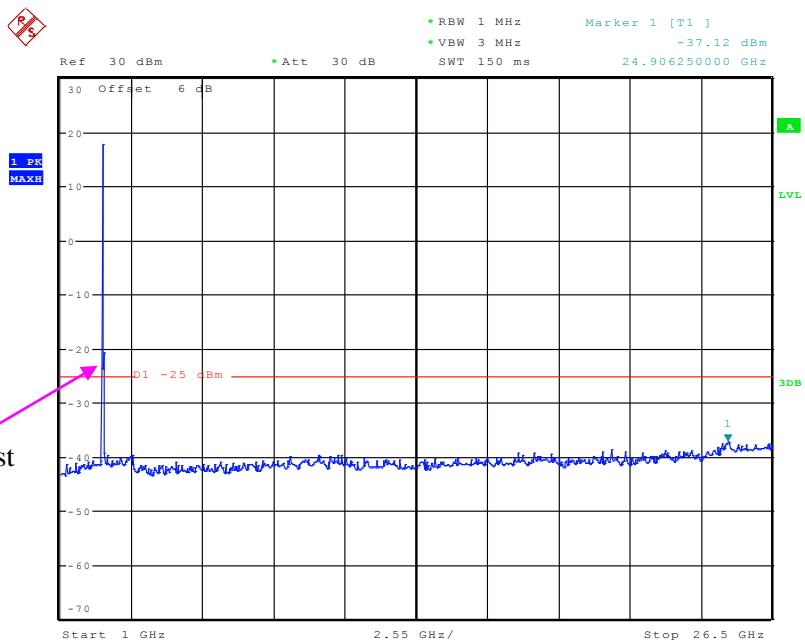
Fundamental test

Date: 5.SEP.2019 23:22:53

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

Applicable Standard

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

Test Procedure

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

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

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

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Curry Xiang on 2019-08-29.

EUT operation mode: Transmitting

Pre-scan with Low, Middle and High channel, the worst case as below:

30 MHz ~ 10 GHz:

Cellular Band (Part 22H)

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
245.12	35.12	304	2.1	H	-61.90	0.31	0	-62.21	-13	49.21
245.12	32.16	338	2.2	V	-64.80	0.31	0	-65.11	-13	52.11
1673.00	75.70	168	1.4	H	-30.6	1.30	8.90	-23.00	-13	10.00
1673.00	75.04	60	1.0	V	-30.7	1.30	8.90	-23.10	-13	10.10
2509.50	59.94	288	1.0	H	-43.4	2.60	10.20	-35.80	-13	22.80
2509.50	59.13	145	1.4	V	-43.6	2.60	10.20	-36.00	-13	23.00
3346.00	59.78	291	1.9	H	-41.1	1.50	11.70	-30.90	-13	17.90
3346.00	56.33	207	1.3	V	-44.6	1.50	11.70	-34.40	-13	21.40
WCDMA Mode, Middle channel										
245.12	35.64	201	2.0	H	-61.40	0.31	0	-61.71	-13	48.71
245.12	32.27	347	2.0	V	-64.70	0.31	0	-65.01	-13	52.01
1673.20	51.65	98	1.1	H	-54.7	1.30	8.90	-47.10	-13	34.10
1673.20	50.28	282	1.2	V	-55.5	1.30	8.90	-47.90	-13	34.90
2509.80	46.66	298	2.2	H	-56.7	2.60	10.20	-49.10	-13	36.10
2509.80	46.85	169	2.3	V	-55.9	2.60	10.20	-48.30	-13	35.30
3346.40	47.93	284	1.8	H	-53.0	1.50	11.70	-42.80	-13	29.80
3346.40	44.87	49	2.2	V	-56.1	1.50	11.70	-45.90	-13	32.90

30 MHz ~ 20 GHz:

PCS Band (Part 24E)

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
245.12	35.76	33	2.4	H	-61.20	0.31	0	-61.51	-13	48.51
245.12	32.73	359	1.9	V	-64.30	0.31	0	-64.61	-13	51.61
3760.00	57.76	9	1.6	H	-44.3	1.50	11.80	-34.00	-13	21.00
3760.00	52.81	223	2.0	V	-48.8	1.50	11.80	-38.50	-13	25.50
WCDMA Mode Band II, Middle channel										
245.12	35.76	78	2.3	H	-61.20	0.31	0	-61.51	-13	48.51
245.12	32.07	268	1.7	V	-64.90	0.31	0	-65.21	-13	52.21
3760.00	52.30	144	1.1	H	-49.8	1.50	11.80	-39.50	-13	26.50
3760.00	47.23	88	1.9	V	-54.4	1.50	11.80	-44.10	-13	31.10
5640.00	54.22	16	2.5	H	-45.5	1.70	12.40	-34.80	-13	21.80
5640.00	51.65	270	2.0	V	-47.7	1.70	12.40	-37.00	-13	24.00

LTE Band: *(Pre-scan with all the bandwidth, and worse case as below)*

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level	Limit	Margin
(MHz)	Reading (dBµV)	Angle Degree	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)	(dBm)	(dBm)	(dB)
Band 2 (1.4 MHz, Middle Channel)										
Test frequency range:30 MHz ~ 20 GHz										
245.12	35.34	285	2.4	H	-61.70	0.31	0	-62.01	-13	49.01
245.12	32.26	249	1.0	V	-64.70	0.31	0	-65.01	-13	52.01
3760.00	47.62	17	1.1	H	-54.4	1.50	11.80	-44.10	-13	31.10
3760.00	45.90	181	2.2	V	-55.7	1.50	11.80	-45.40	-13	32.40
Band 4 (1.4 MHz, Middle Channel)										
Test frequency range:30 MHz ~ 20 GHz										
245.12	35.81	6	1.6	H	-61.20	0.31	0	-61.51	-13	48.51
245.12	32.62	197	2.2	V	-64.40	0.31	0	-64.71	-13	51.71
3465.00	50.10	90	1.4	H	-50.6	1.50	12.00	-40.10	-13	27.10
3465.00	47.60	71	2.4	V	-53.9	1.50	12.00	-43.40	-13	30.40
Band 7 (5 MHz, Middle Channel)										
Test frequency range: 30 MHz ~ 26.5GHz										
245.12	35.62	1	2.5	H	-61.40	0.31	0	-61.71	-25	36.71
245.12	32.42	33	2.0	V	-64.60	0.31	0	-64.91	-25	39.91
5070.00	61.05	266	1.7	H	-39.0	1.60	12.10	-28.50	-25	3.50
5070.00	55.39	214	2.1	V	-44.6	1.60	12.10	-34.10	-25	9.10
Band 5(1.4 MHz, Middle Channel)										
Test frequency range: 30 MHz ~ 10GHz										
245.12	35.98	172	1.3	H	-61.00	0.31	0	-61.31	-13	48.31
245.12	32.13	127	1.2	V	-64.90	0.31	0	-65.21	-13	52.21
1673.00	47.34	246	1.9	H	-59.0	1.30	8.90	-51.40	-13	38.40
1673.00	47.86	172	2.2	V	-57.9	1.30	8.90	-50.30	-13	37.30
2509.50	46.67	274	1.2	H	-56.7	2.60	10.20	-49.10	-13	36.10
2509.50	45.47	43	1.8	V	-57.3	2.60	10.20	-49.70	-13	36.70
3346.00	45.90	87	2.0	H	-55.0	1.50	11.70	-44.80	-13	31.80
3346.00	44.03	164	1.3	V	-56.9	1.50	11.70	-46.70	-13	33.70

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level
dBd is for the ERP, dBi is for EIRP.

FCC §22.917 (a); §24.238 (a); §27.53 (h)(m) - BAND EDGES

Applicable Standard

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

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

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

Test Procedure

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

The center of the spectrum analyzer was set to block edge frequency
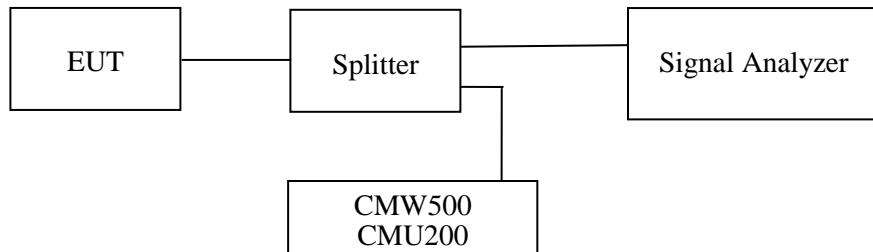
```
┌─────────┐      ┌──────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter │──────│  Signal Analyzer │
└─────────┘      └──────────┘      └──────────────────┘
                      │
                 ┌──────────┐
                 │  CMW500  │
                 │  CMU200  │
                 └──────────┘
```

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by George Zhong from 2019-08-29 to 2019-09-05.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following plots.

Cellular Band, Left Band Edge for GSM (GMSK) Mode
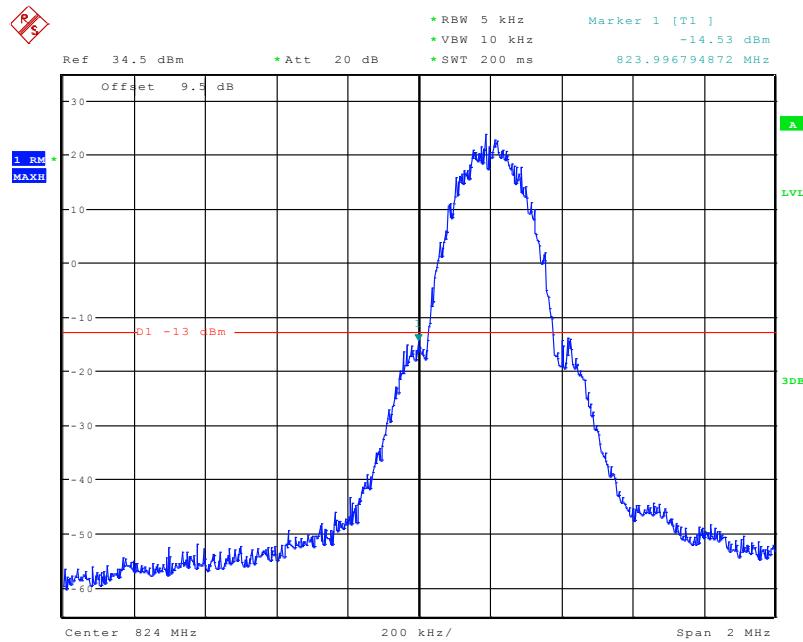
Date: 29.AUG.2019 22:27:08

Cellular Band, Right Band Edge for GSM (GMSK) Mode
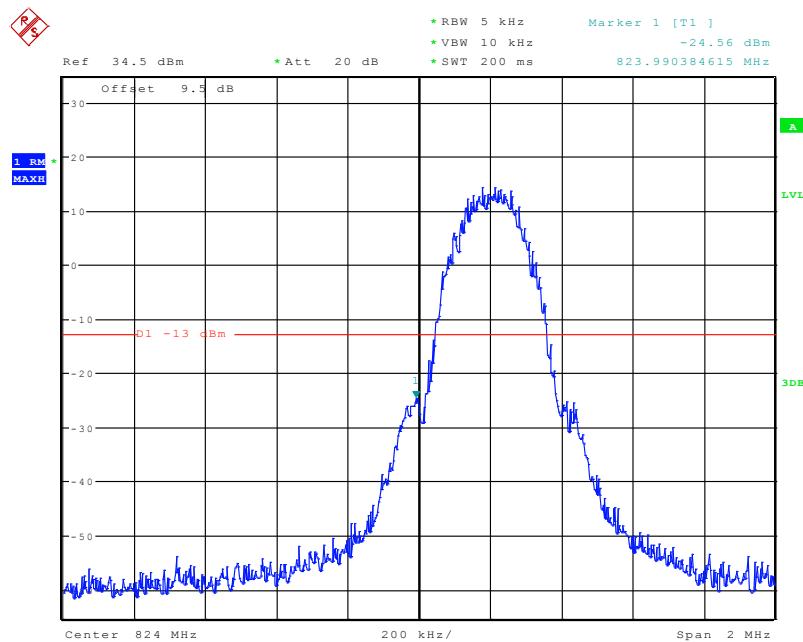
Date: 29.AUG.2019 22:36:40

Cellular Band, Left Band Edge for EDGE Mode
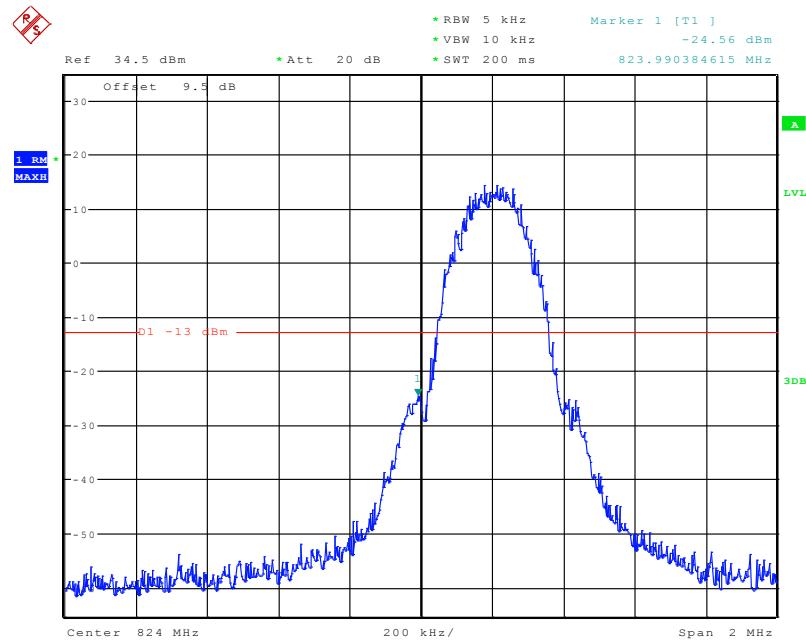
Date: 29.AUG.2019 22:36:40

Cellular Band, Right Band Edge for EDGE Mode
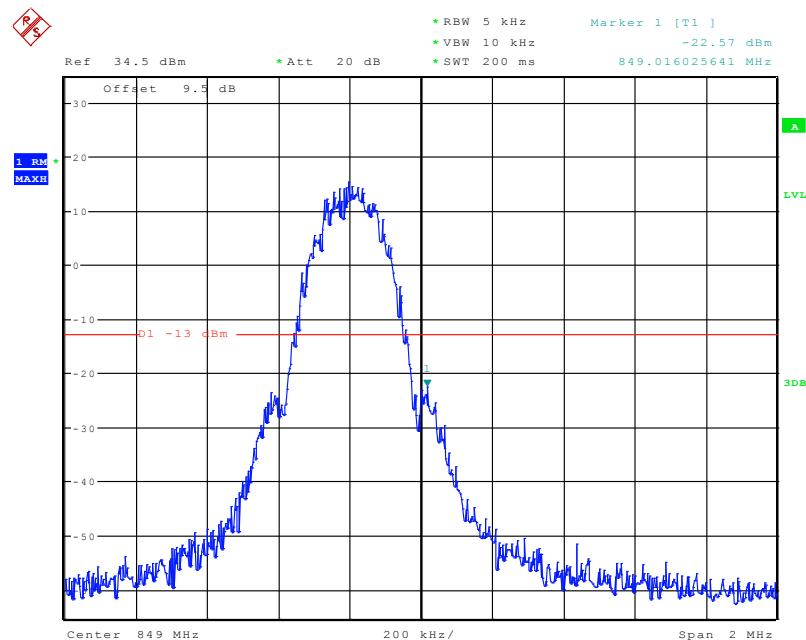
Date: 29.AUG.2019 22:37:20

Cellular Band, Left Band Edge for WCDMA (BPSK) Mode
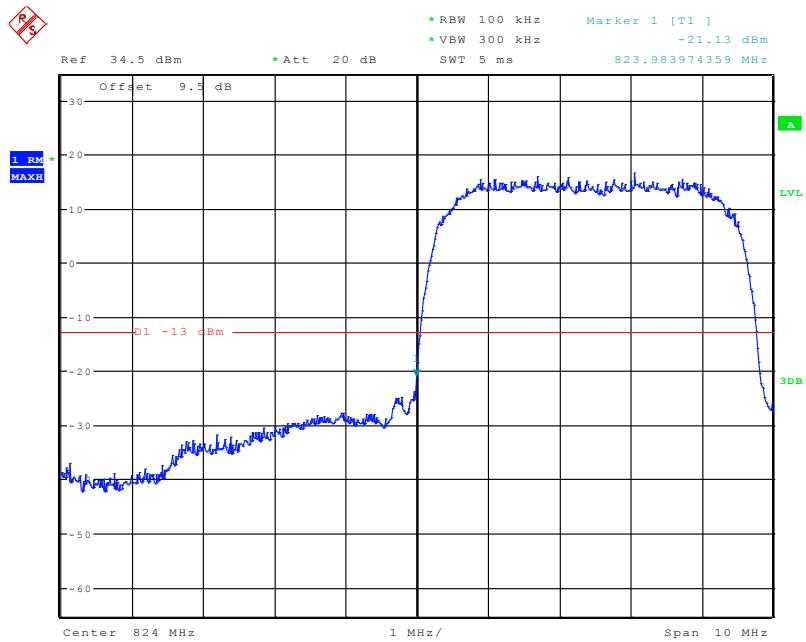
Date: 29.AUG.2019 23:30:13

Cellular Band, Right Band Edge for WCDMA (BPSK) Mode
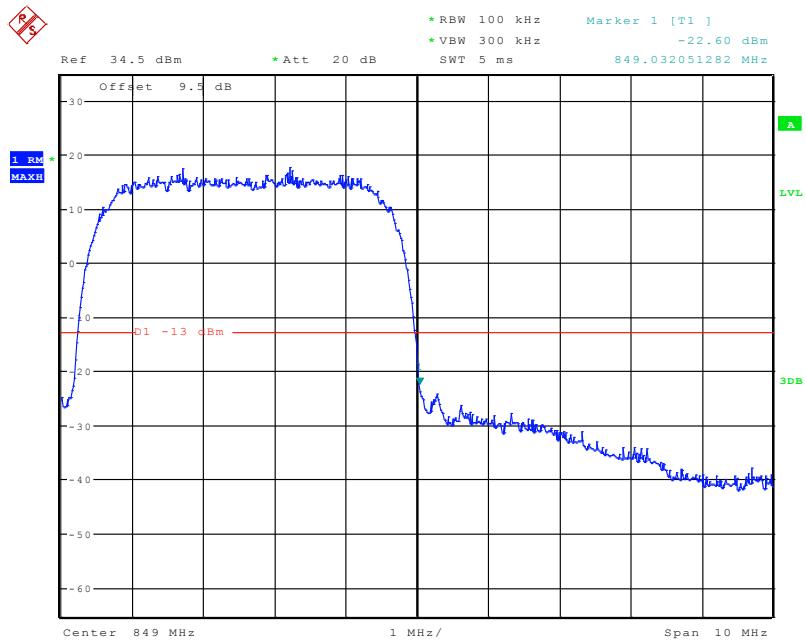
Date: 29.AUG.2019 23:31:41

Cellular Band, Left Band Edge for HSDPA (16QAM) Mode
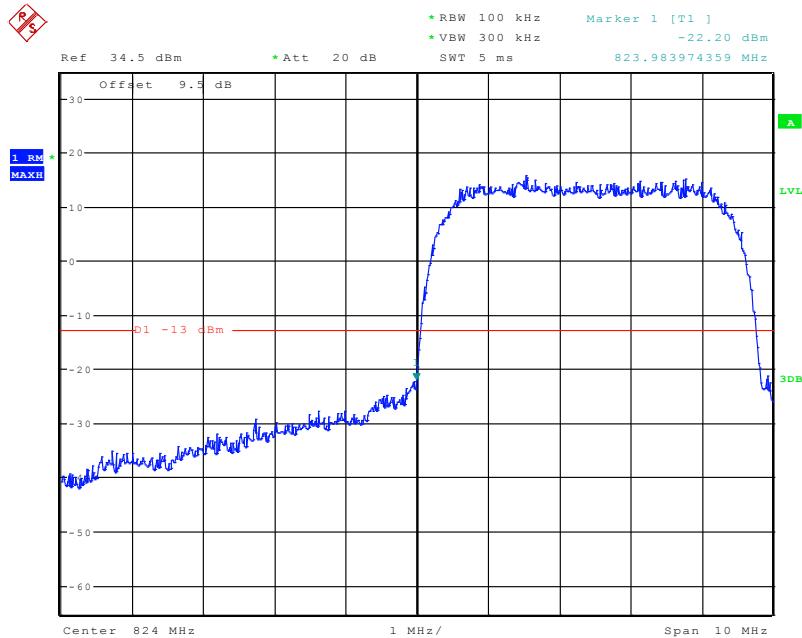
Date: 29.AUG.2019 23:28:41

Cellular Band, Right Band Edge for HSDPA (16QAM) Mode
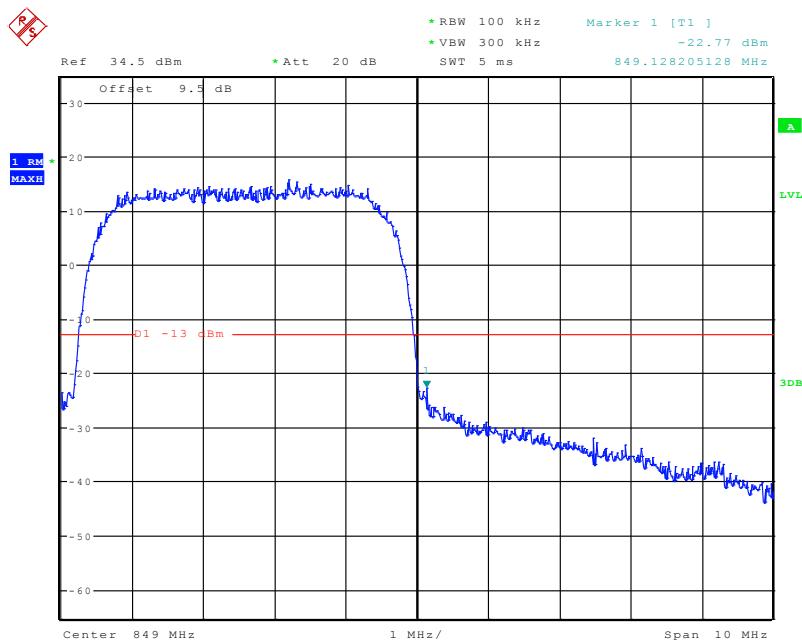
Date: 29.AUG.2019 23:27:41

Cellular Band, Left Band Edge for HSUPA (BPSK) Mode
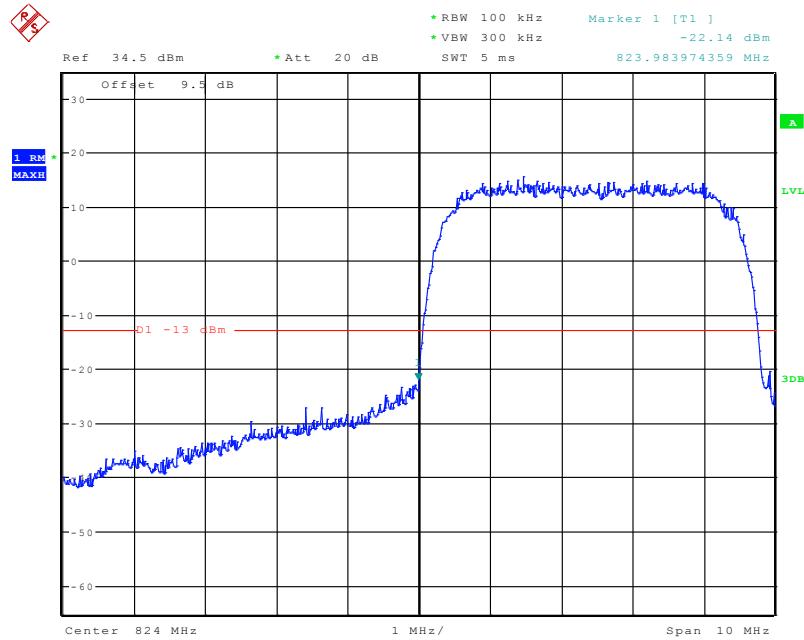
Date: 29.AUG.2019 23:25:34

Cellular Band, Right Band Edge for HSUPA (BPSK) Mode
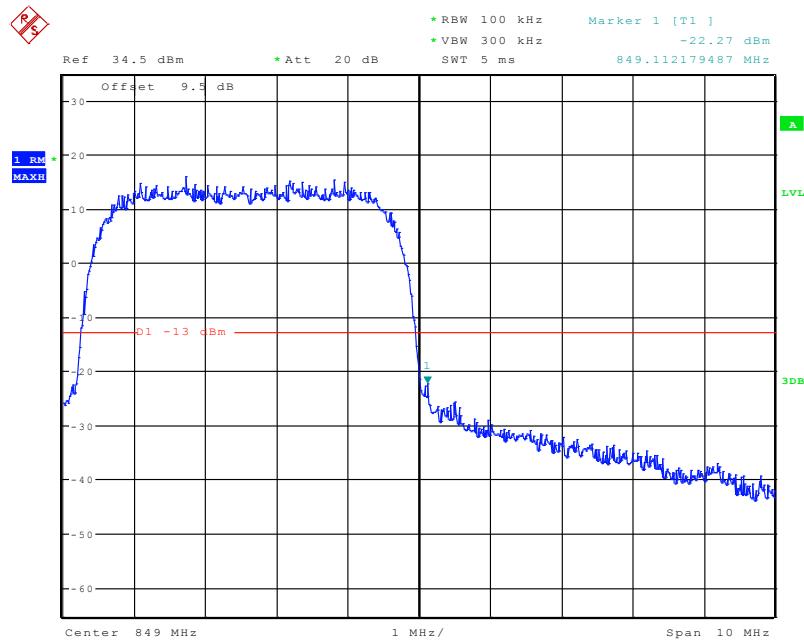
Date: 29.AUG.2019 23:26:12

PCS Band, Left Band Edge for GSM (GMSK) Mode
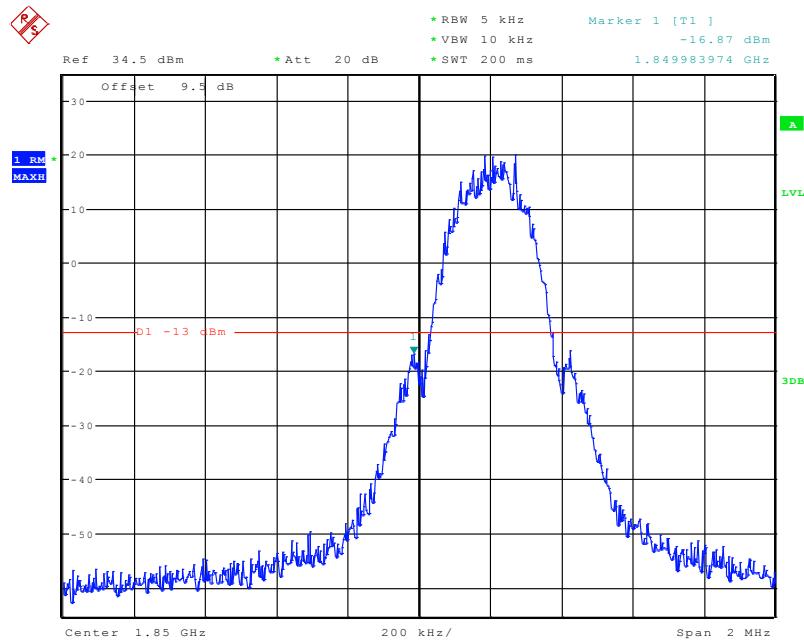
Date: 29.AUG.2019 22:47:41

PCS Band, Right Band Edge for GSM (GMSK) Mode
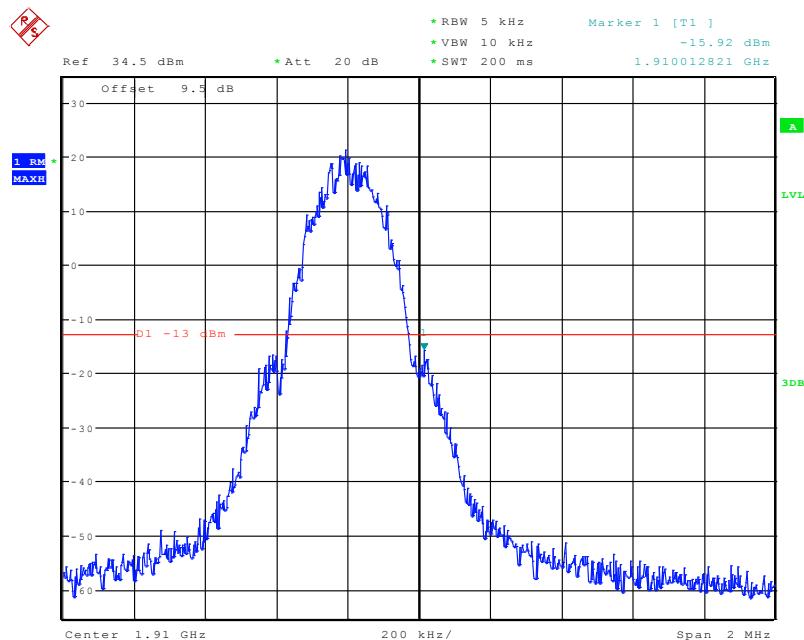
Date: 29.AUG.2019 22:48:19

PCS Band, Left Band Edge for EDGE Mode
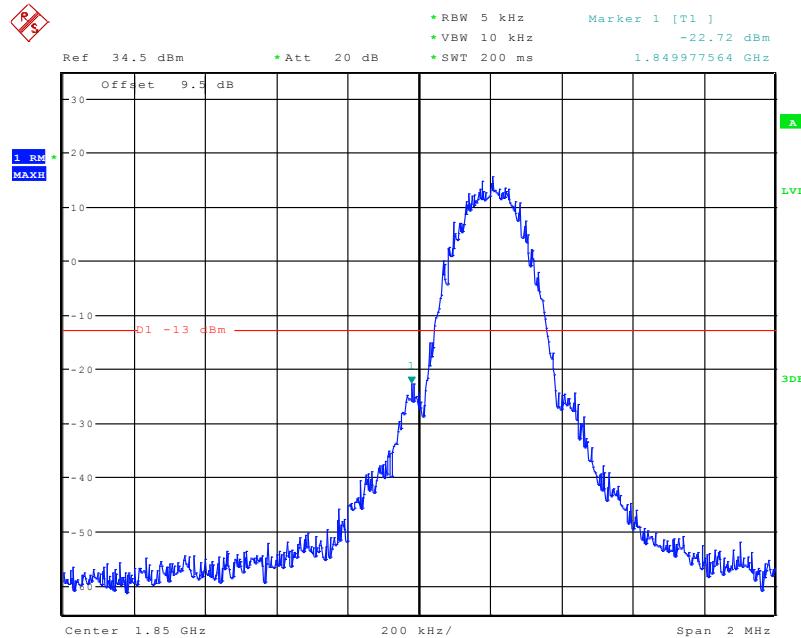
Date: 29.AUG.2019 22:54:10

PCS Band, Right Band Edge for EDGE Mode
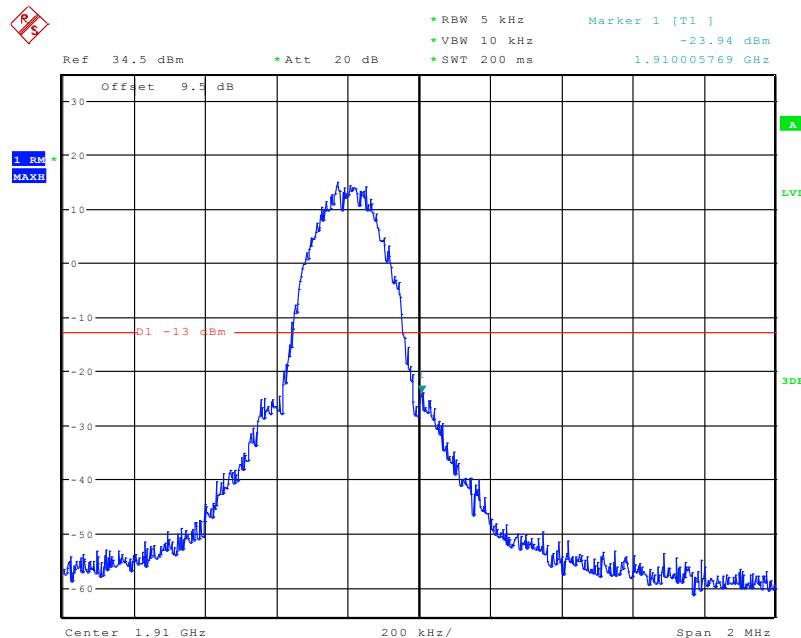
Date: 29.AUG.2019 22:54:48

PCS Band, Left Band Edge for WCDMA (BPSK) Mode
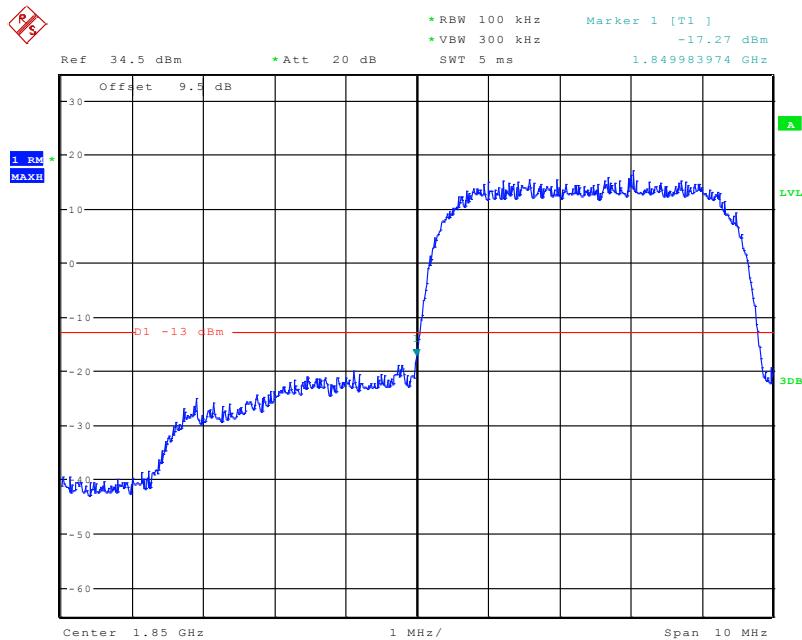
Date: 29.AUG.2019 23:11:32

PCS Band, Right Band Edge for WCDMA (BPSK) Mode
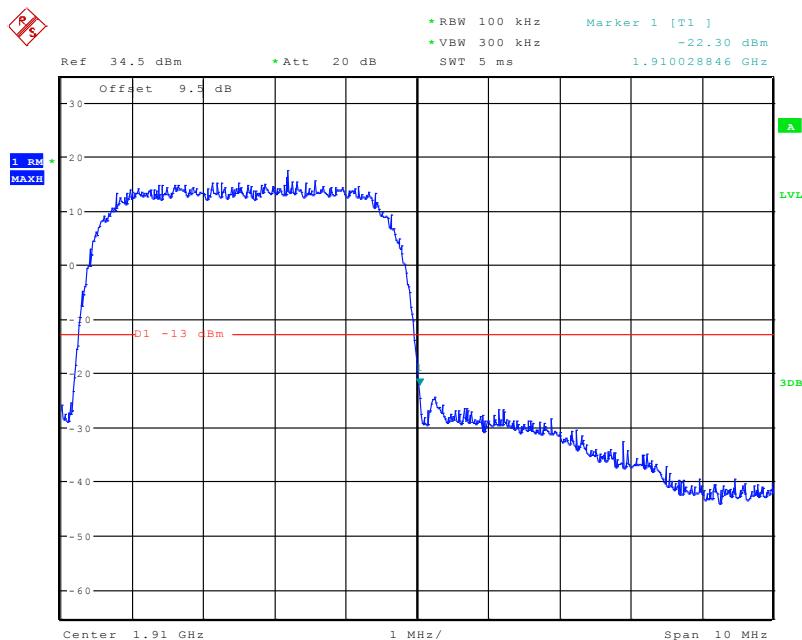
Date: 29.AUG.2019 23:12:13

PCS Band, Left Band Edge for HSDPA (16QAM) Mode
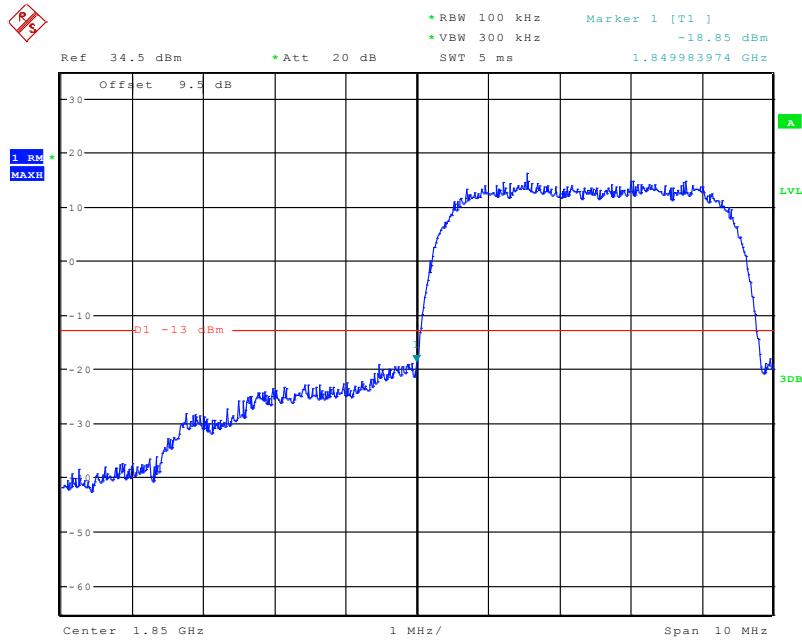
Date: 29.AUG.2019 23:06:51

PCS Band, Right Band Edge for HSDPA (16QAM) Mode
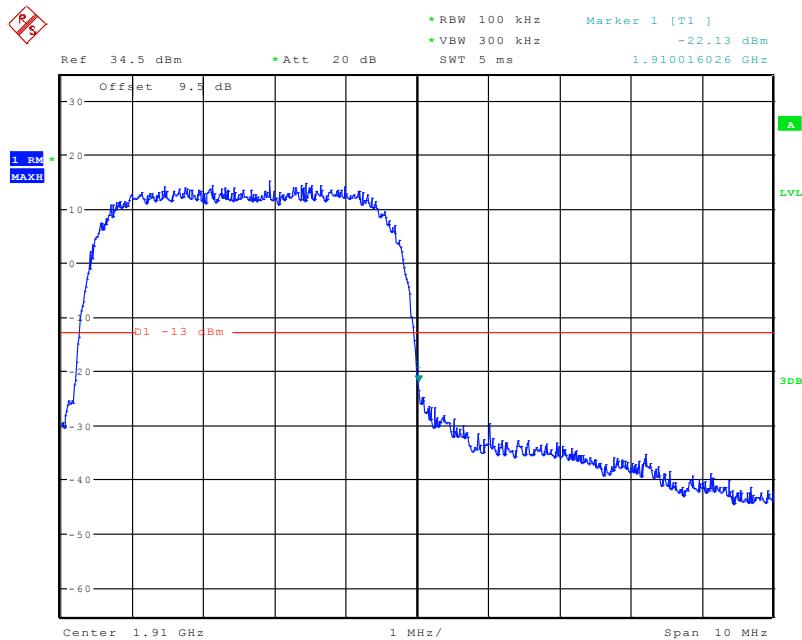
Date: 29.AUG.2019 23:06:11

PCS Band, Left Band Edge for HSUPA (BPSK) Mode
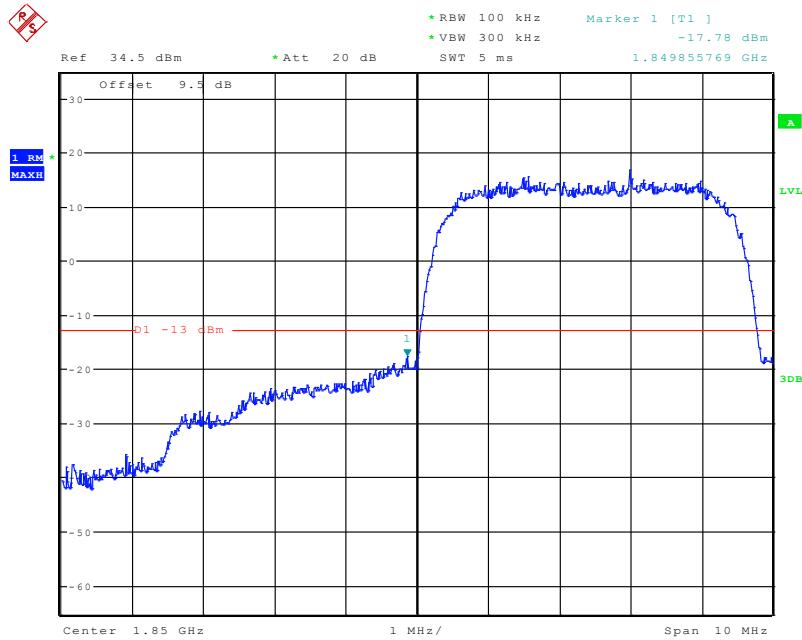
Date: 29.AUG.2019 23:04:20

PCS Band, Right Band Edge for HSUPA (BPSK) Mode
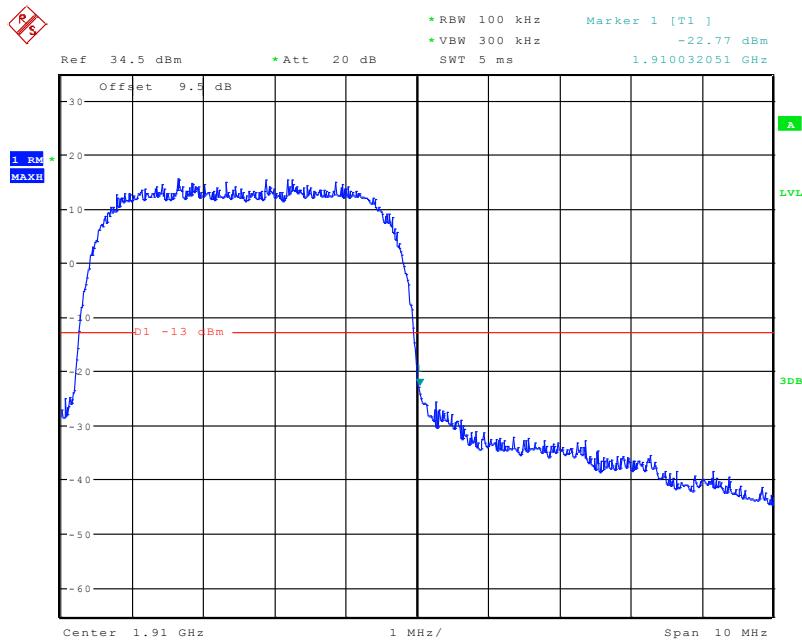
Date: 29.AUG.2019 23:05:14

Band 2:

QPSK (1.4 MHz, FULL RB) - Left Band Edge
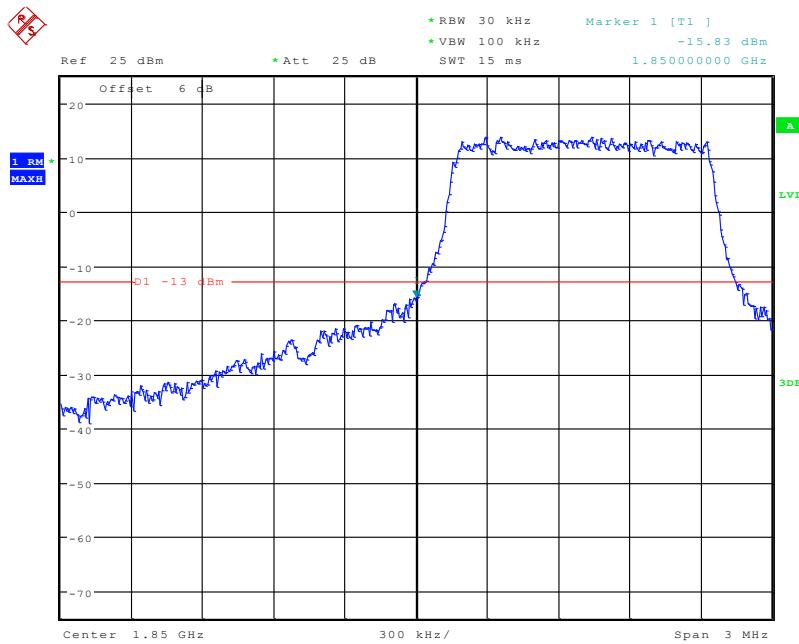
Date: 30.AUG.2019 21:49:43

QPSK (1.4 MHz, FULL RB) - Right Band Edge
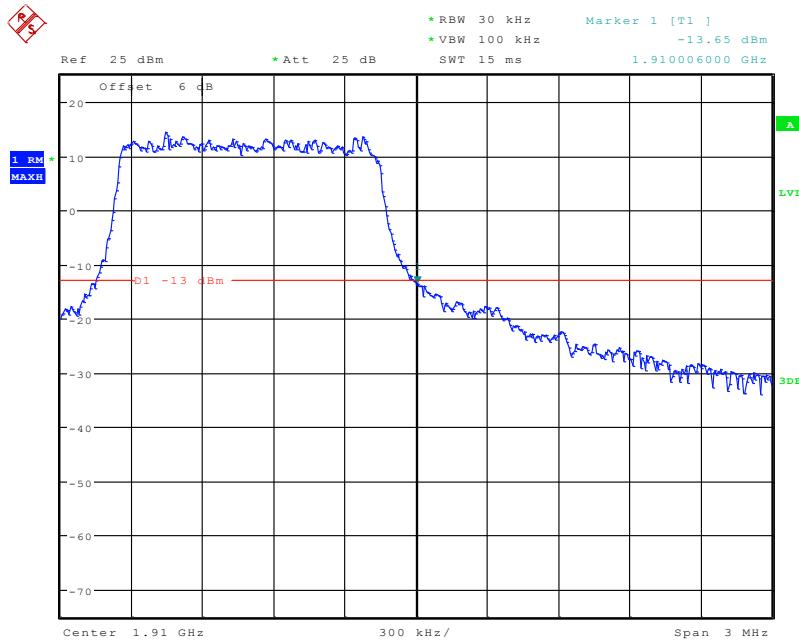
Date: 30.AUG.2019 21:51:00

## 16-QAM (1.4 MHz, FULL RB) - Left Band Edge
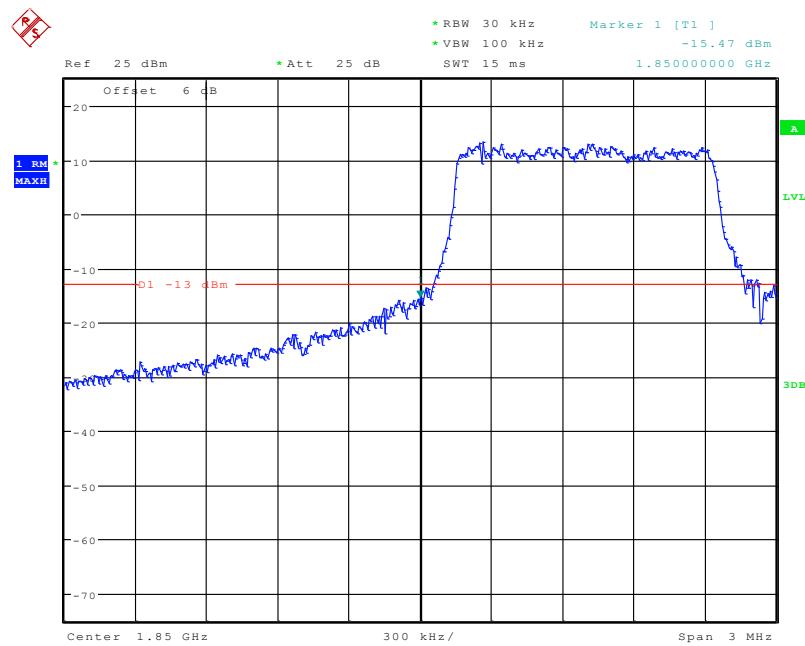
Date: 30.AUG.2019 21:50:12

## 16-QAM (1.4 MHz, FULL RB) - Right Band Edge
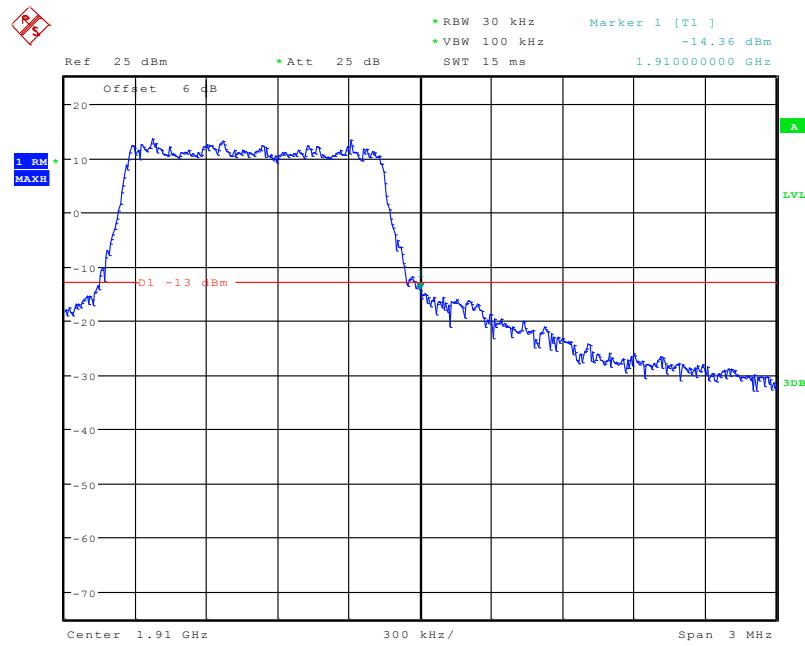
Date: 30.AUG.2019 21:51:34

QPSK (3.0 MHz, FULL RB) - Left Band Edge
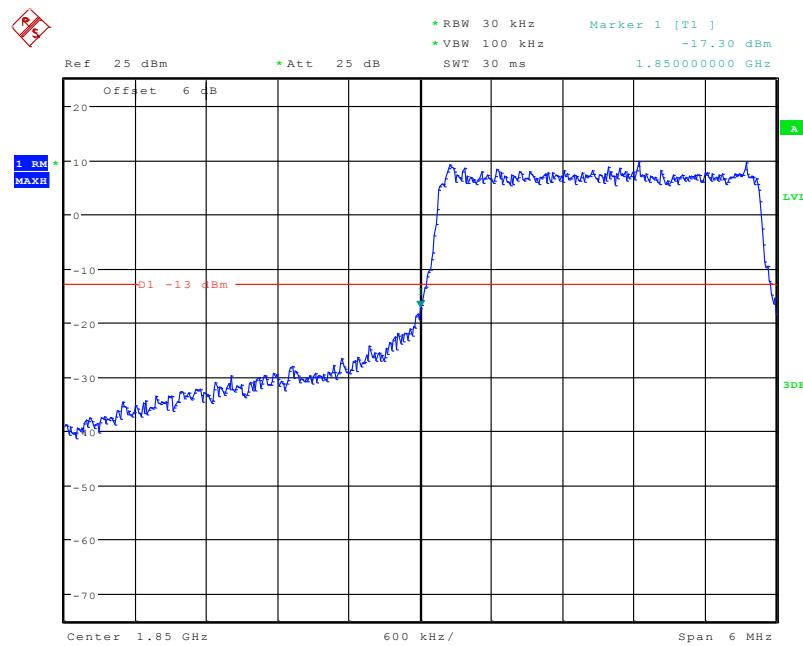
Date: 30.AUG.2019 21:52:06

QPSK (3.0 MHz, FULL RB) - Right Band Edge
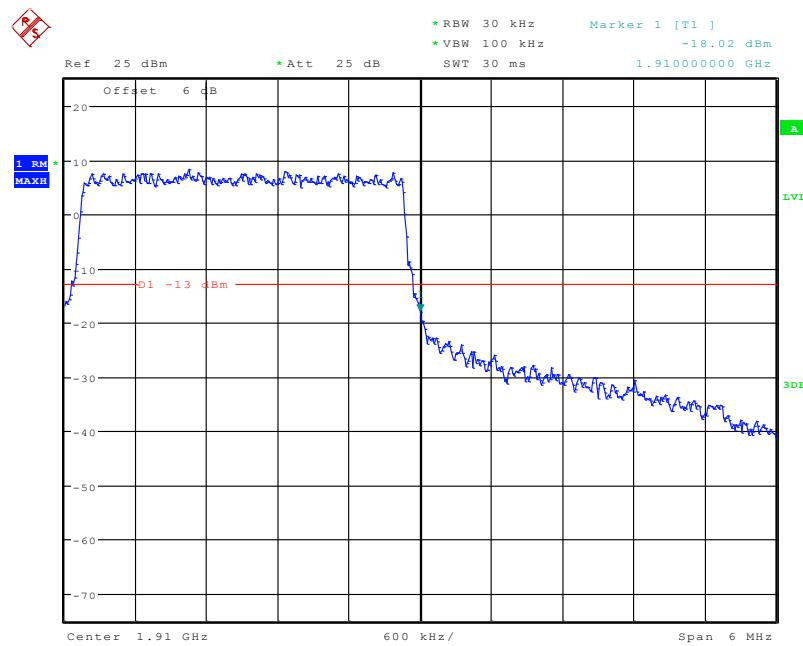
Date: 30.AUG.2019 21:52:58

16-QAM (3.0 MHz, FULL RB) - Left Band Edge
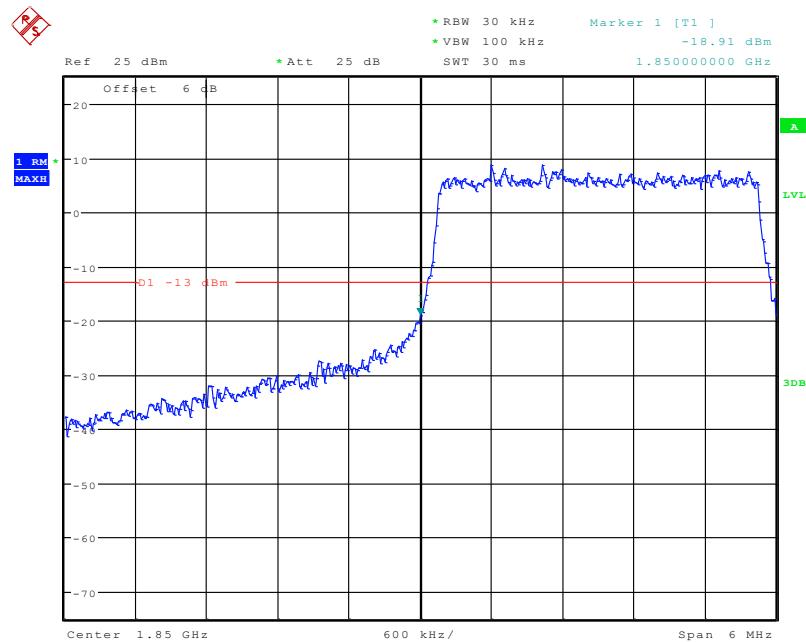
Date: 30.AUG.2019 21:52:28

16-QAM (3.0 MHz, FULL RB) - Right Band Edge
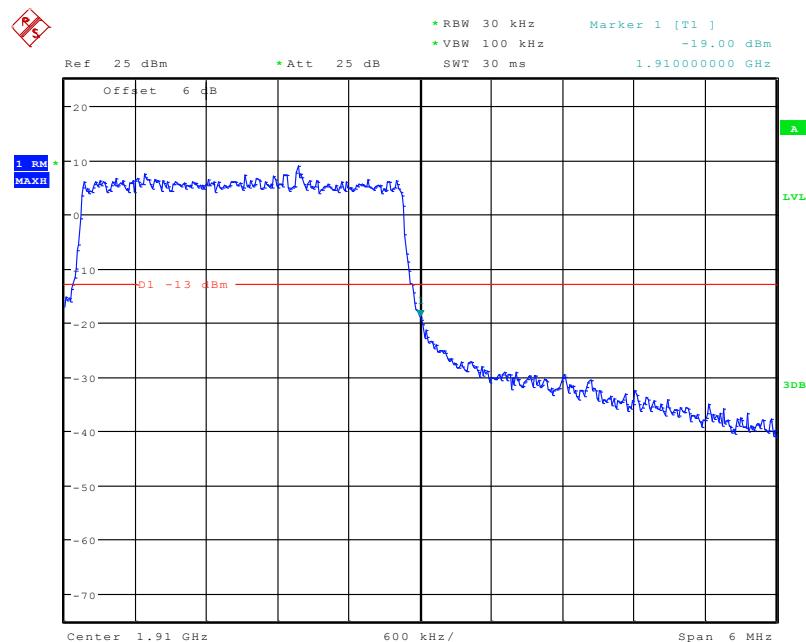
Date: 30.AUG.2019 21:53:27

QPSK (5.0 MHz, FULL RB) - Left Band Edge
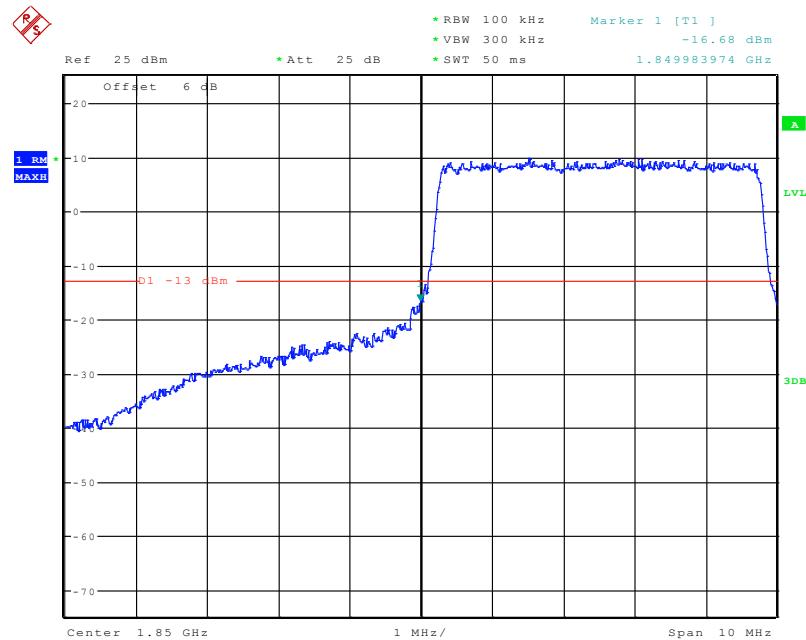
Date: 5.SEP.2019 23:30:43

QPSK (5.0 MHz, FULL RB) - Right Band Edge
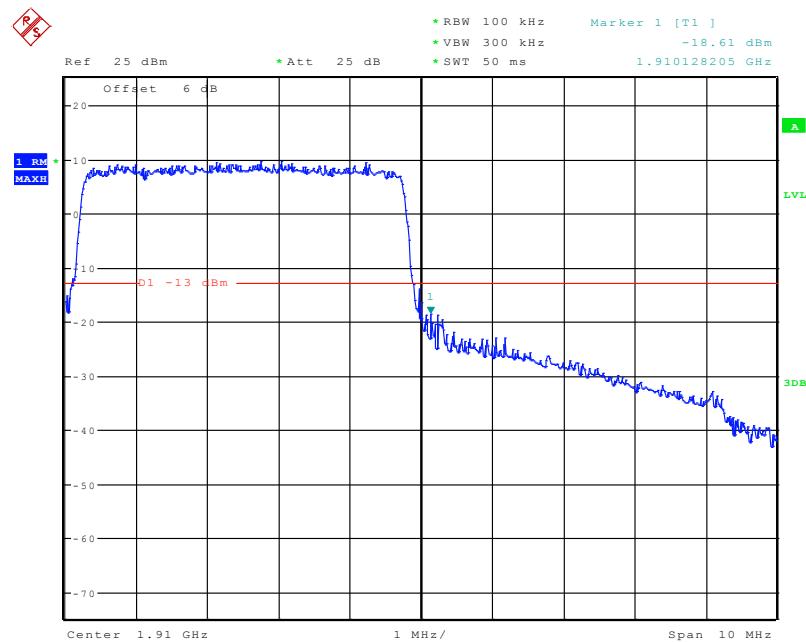
Date: 5.SEP.2019 23:33:51

16-QAM (5.0 MHz, FULL RB) - Left Band Edge
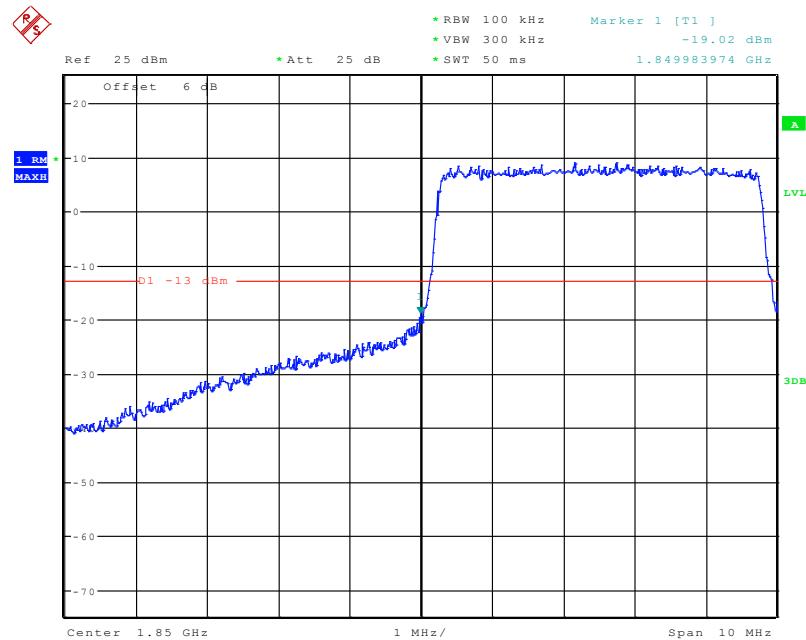
Date: 5.SEP.2019 23:31:55

## 16-QAM (5.0 MHz, FULL RB) - Right Band Edge
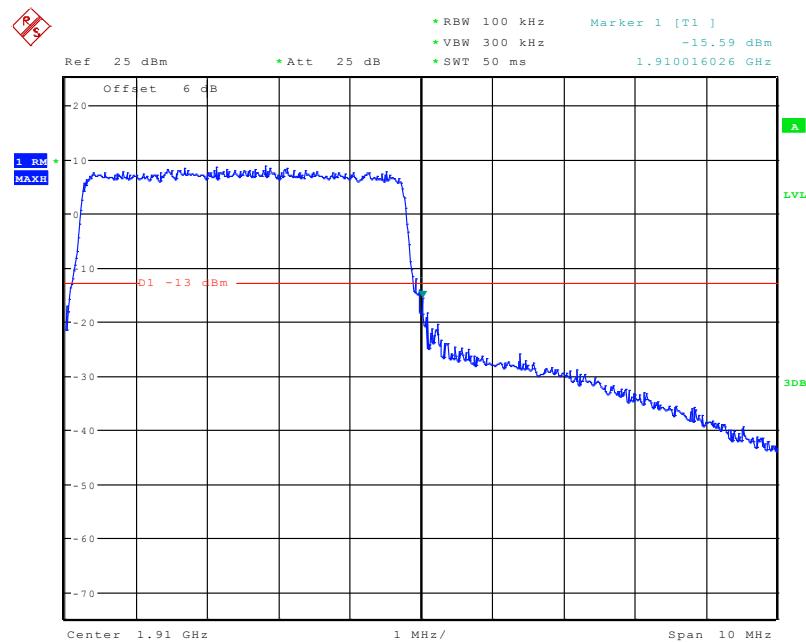
Date: 5.SEP.2019 23:33:26

## QPSK (10.0 MHz, FULL RB) - Left Band Edge
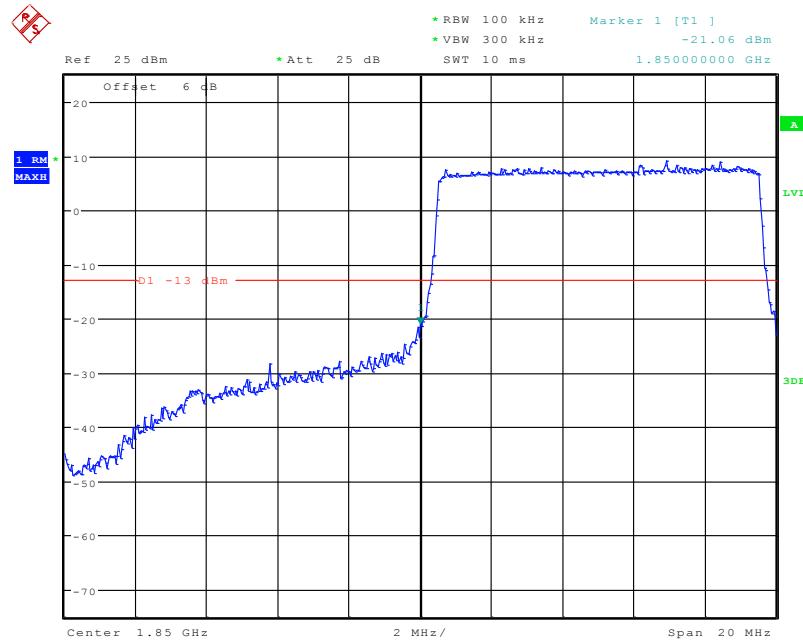
Date: 30.AUG.2019 21:56:17

## QPSK (10.0 MHz, FULL RB) - Right Band Edge
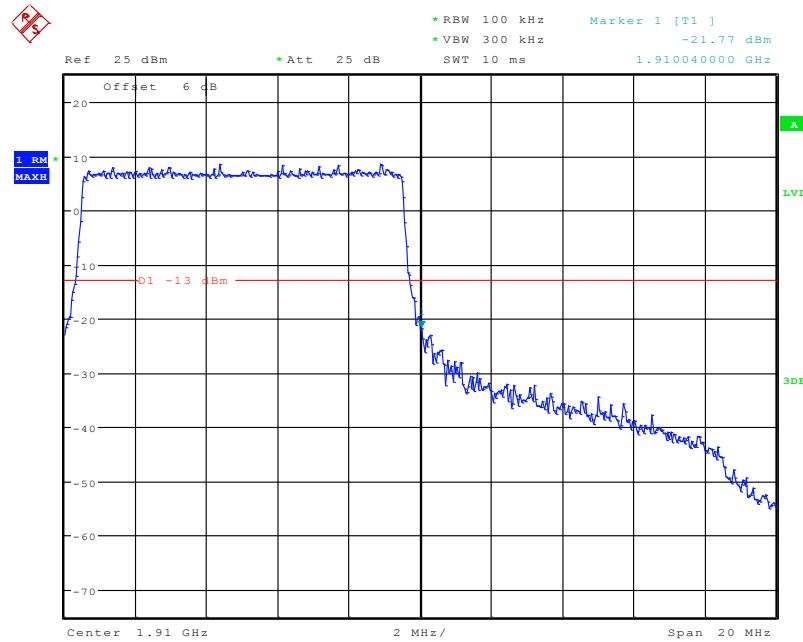
Date: 30.AUG.2019 21:57:20

16-QAM (10.0 MHz, FULL RB) - Left Band Edge
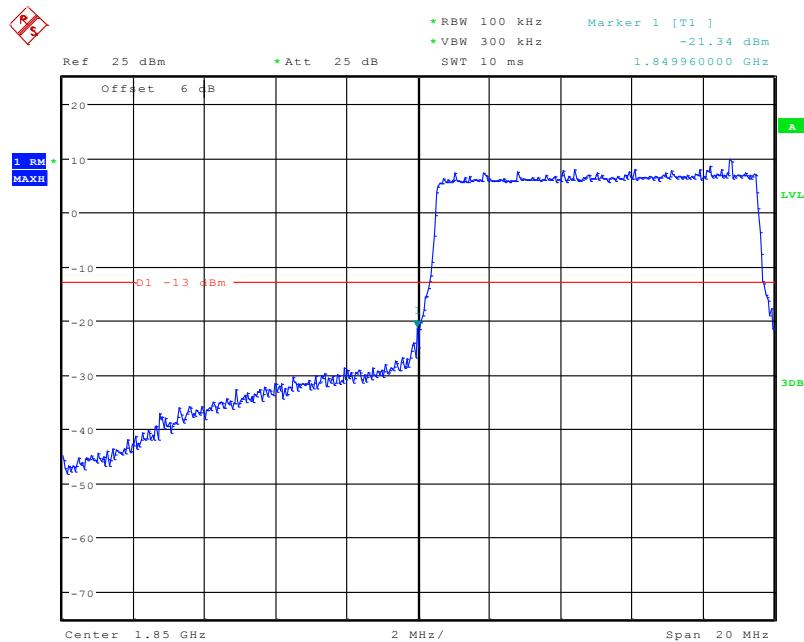
Date: 30.AUG.2019 21:56:47

16-QAM (10.0 MHz, FULL RB) - Right Band Edge
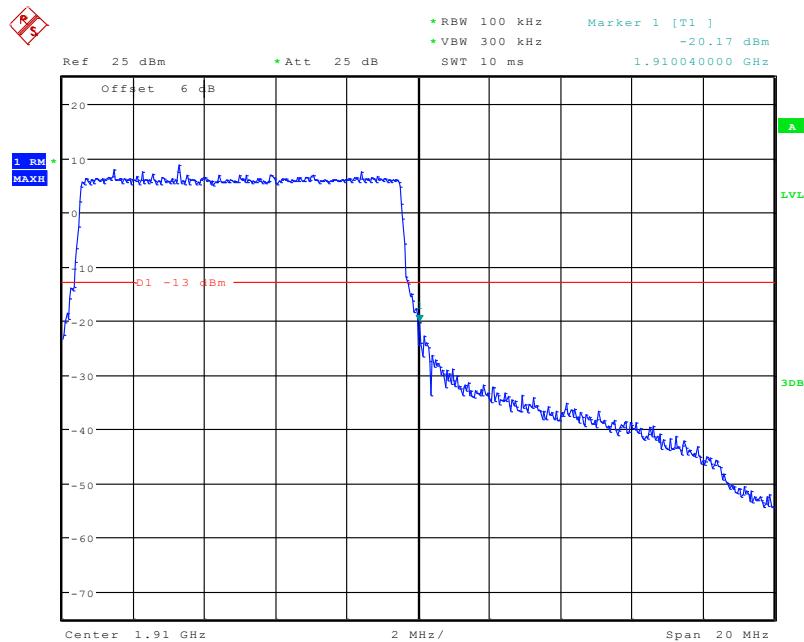
Date: 30.AUG.2019 21:57:50

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

```
                                    *RBW 300 kHz      Marker 1 [T1 ]
                                    *VBW 1 MHz                 -17.29 dBm
        Ref  25 dBm      *Att  25 dB  *SWT 10 ms       1.849951923 GHz
          Offset   6 dB
```
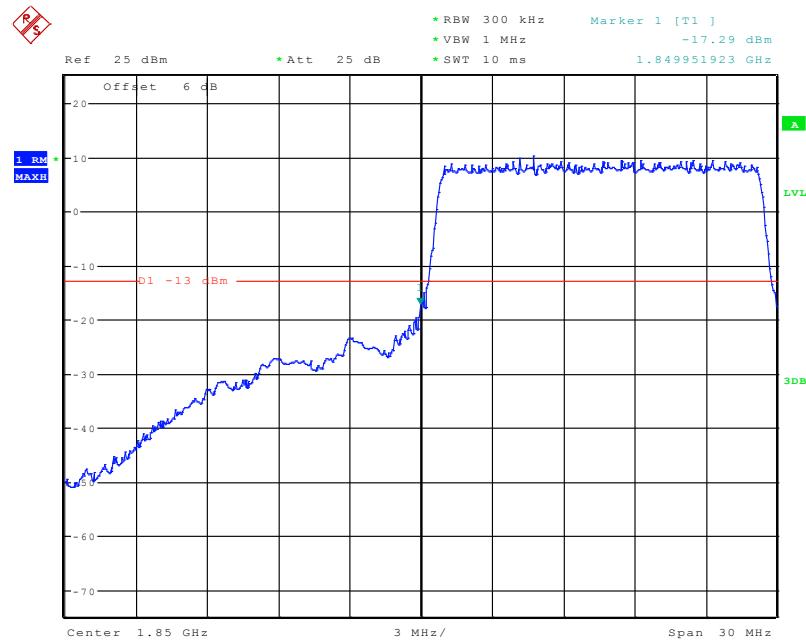
Date: 1.SEP.2019 14:43:17

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

```
                                    *RBW 300 kHz      Marker 1 [T1 ]
                                    *VBW 1 MHz                 -17.77 dBm
        Ref  25 dBm      *Att  25 dB  *SWT 10 ms       1.910048077 GHz
          Offset   6 dB
```
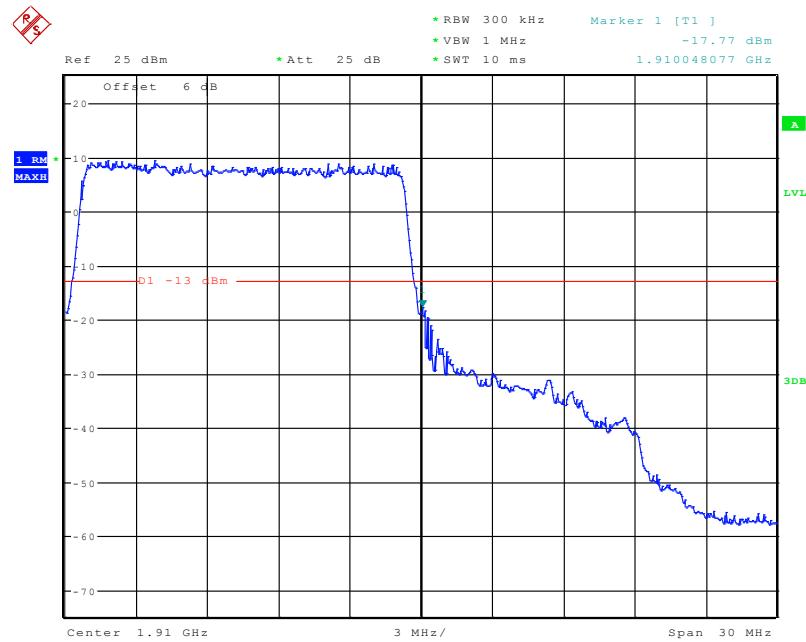
Date: 1.SEP.2019 14:41:18

16-QAM (15.0 MHz, FULL RB) - Left Band Edge
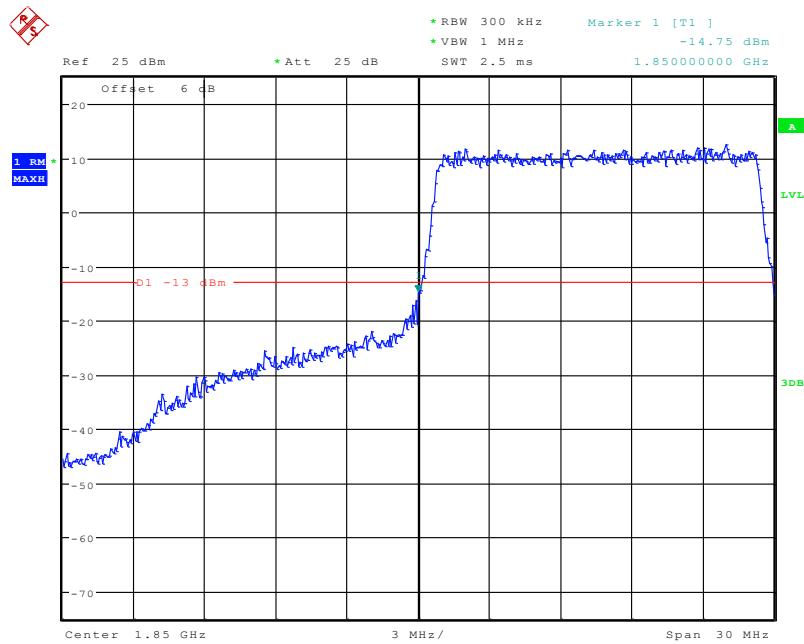
Date: 30.AUG.2019 21:59:07

16-QAM (15.0 MHz, FULL RB) - Right Band Edge
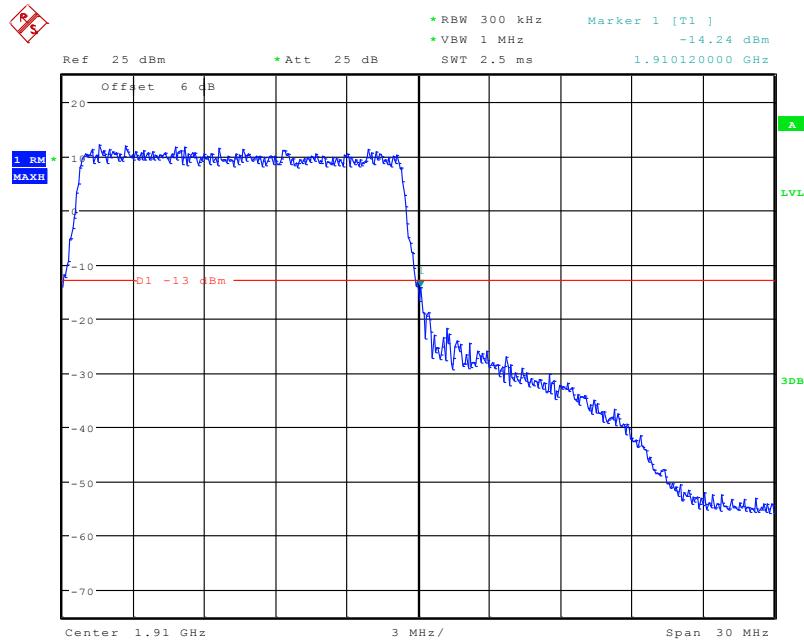
Date: 30.AUG.2019 22:00:24

QPSK (20.0 MHz, FULL RB) - Left Band Edge
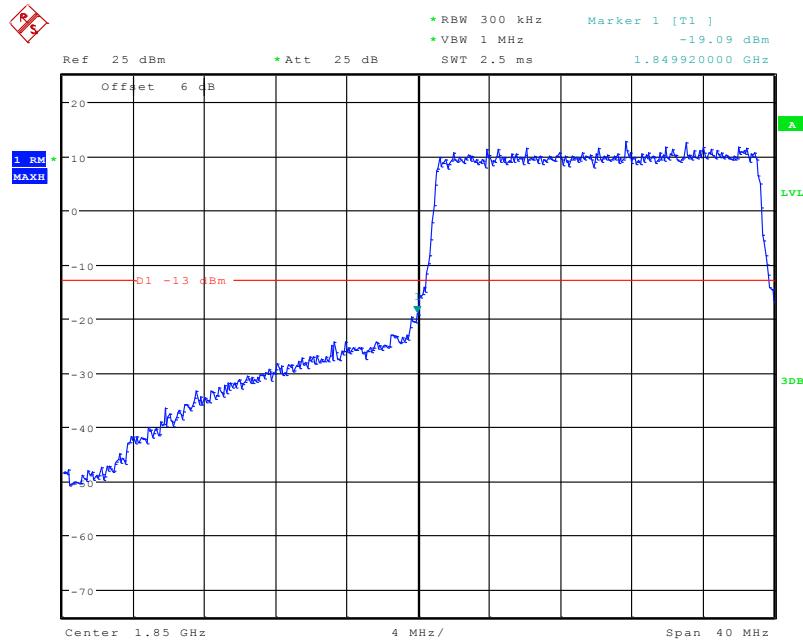
Date: 30.AUG.2019 22:01:06

QPSK (20.0 MHz, FULL RB) - Right Band Edge
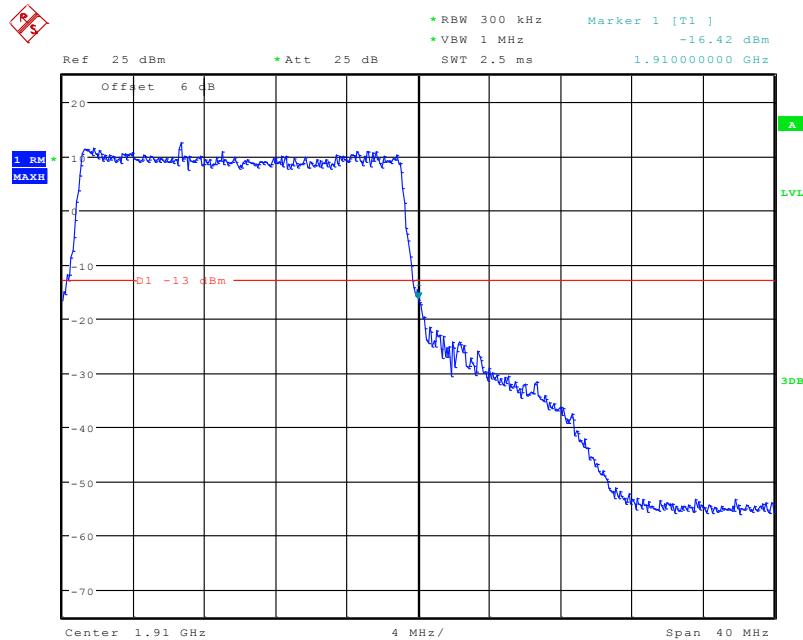
Date: 30.AUG.2019 22:02:17

16-QAM (20.0 MHz, FULL RB) - Left Band Edge
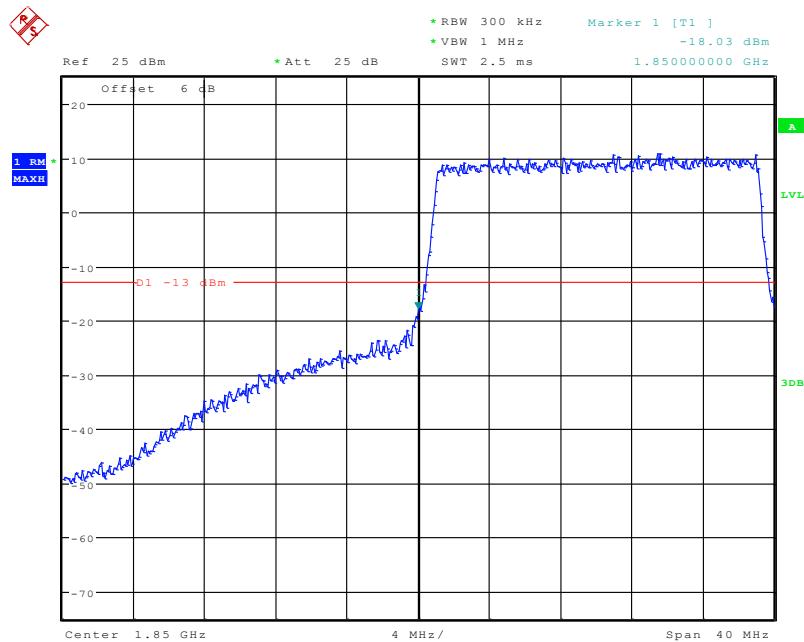
Date: 30.AUG.2019 22:01:44

16-QAM (20.0 MHz, FULL RB) - Right Band Edge
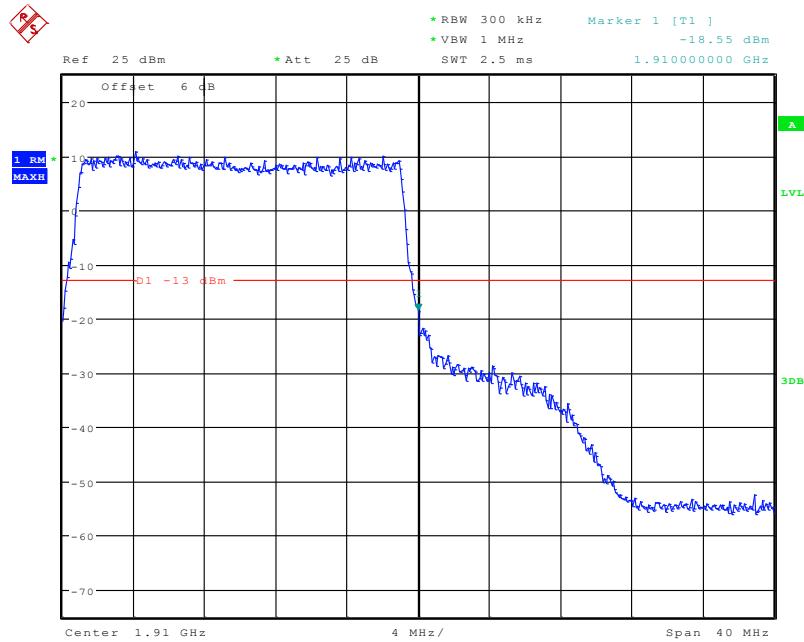
Date: 30.AUG.2019 22:02:49

Band 4:

QPSK (1.4 MHz, FULL RB) - Left Band Edge
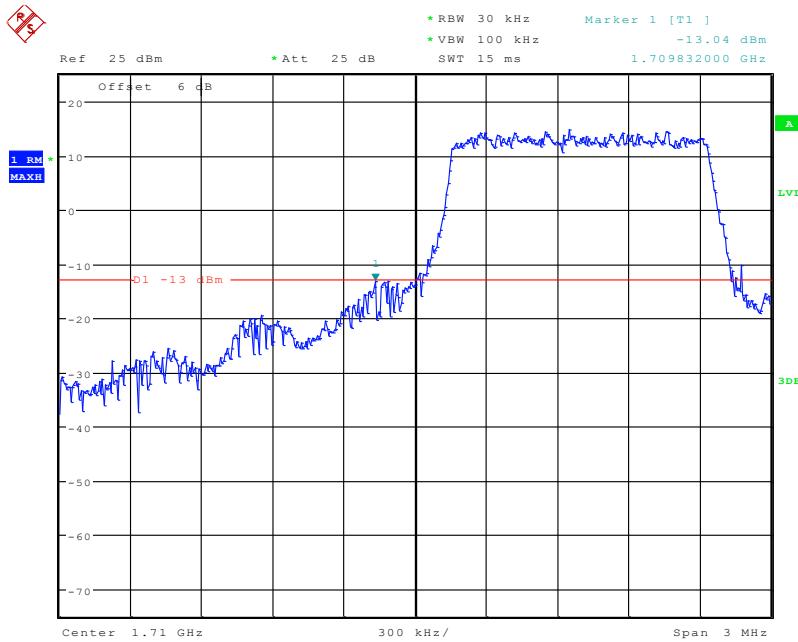
Date: 30.AUG.2019 22:03:24

QPSK (1.4 MHz, FULL RB) - Right Band Edge
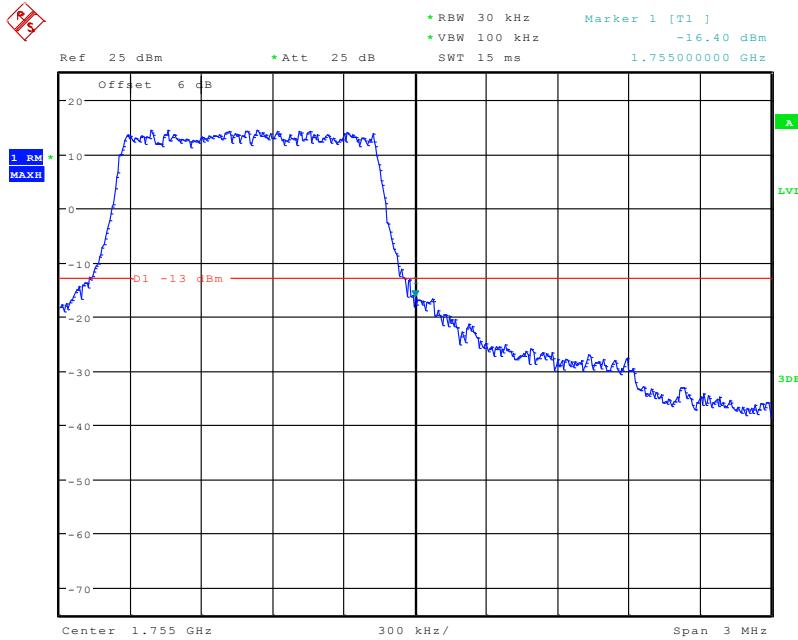
Date: 30.AUG.2019 22:04:29

16-QAM (1.4 MHz, FULL RB) - Left Band Edge
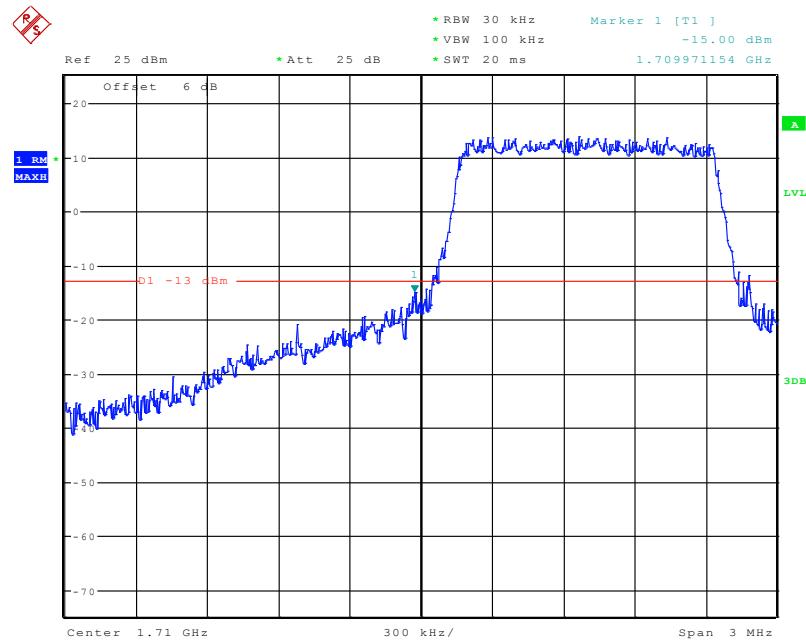
Date: 1.SEP.2019 14:47:30

## 16-QAM (1.4 MHz, FULL RB) - Right Band Edge
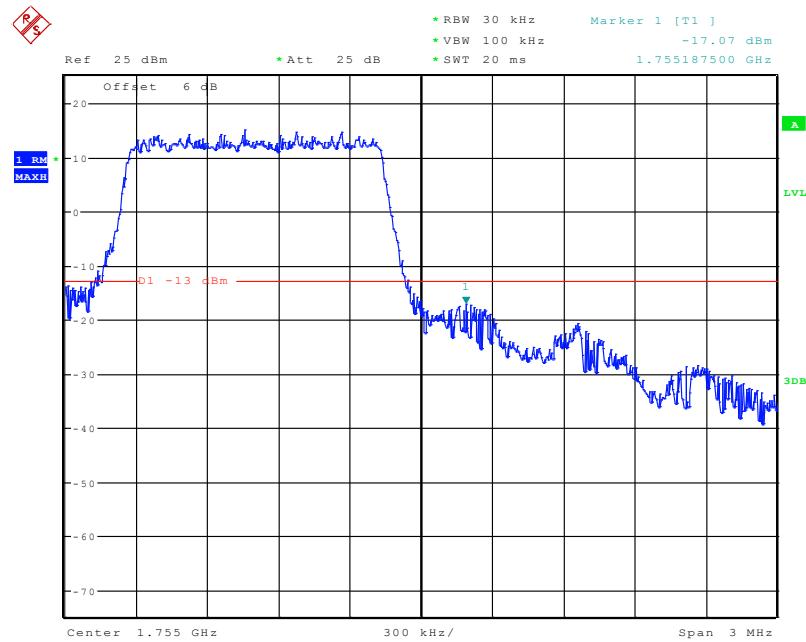
Date: 1.SEP.2019 14:49:51

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


```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW  100 kHz              -16.46 dBm
         Ref   25 dBm      *Att  25 dB     SWT  30 ms        1.710000000 GHz
             Offset   6 dB
```
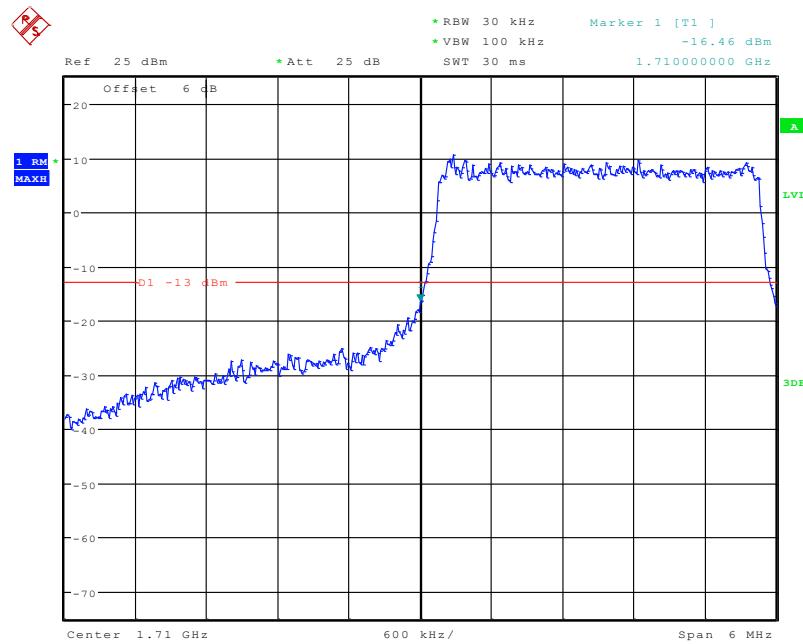
Date: 30.AUG.2019 22:05:32

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


```
                                          *RBW  30 kHz      Marker 1 [T1 ]
                                          *VBW  100 kHz              -18.63 dBm
         Ref   25 dBm      *Att  25 dB     SWT  30 ms        1.755000000 GHz
             Offset   6 dB
```
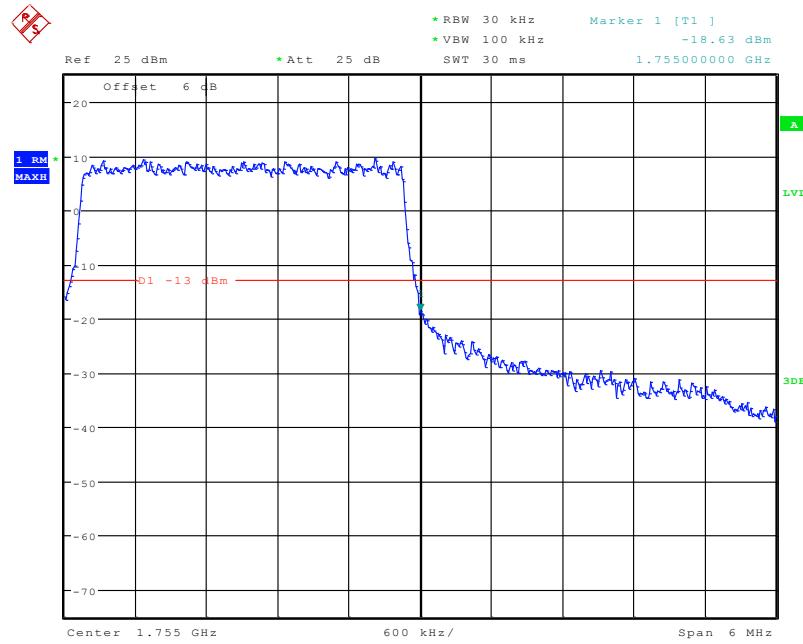
Date: 30.AUG.2019 22:06:21

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

```
                                    *RBW 30 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -17.53 dBm
          Ref  25 dBm   *Att  25 dB  SWT 30 ms      1.710000000 GHz
             Offset  6 dB
```
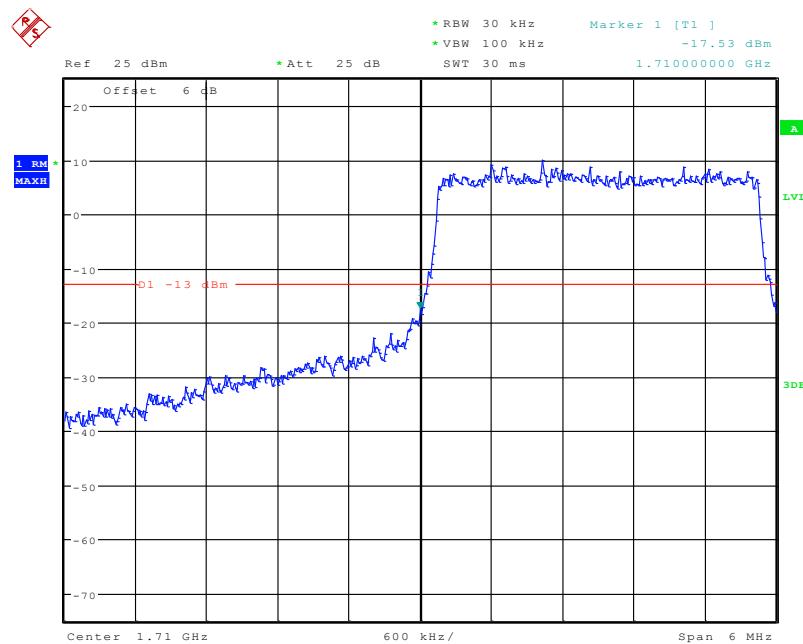
Date: 30.AUG.2019 22:05:58

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

```
                                    *RBW 30 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -18.07 dBm
          Ref  25 dBm   *Att  25 dB  SWT 30 ms      1.755000000 GHz
             Offset  6 dB
```
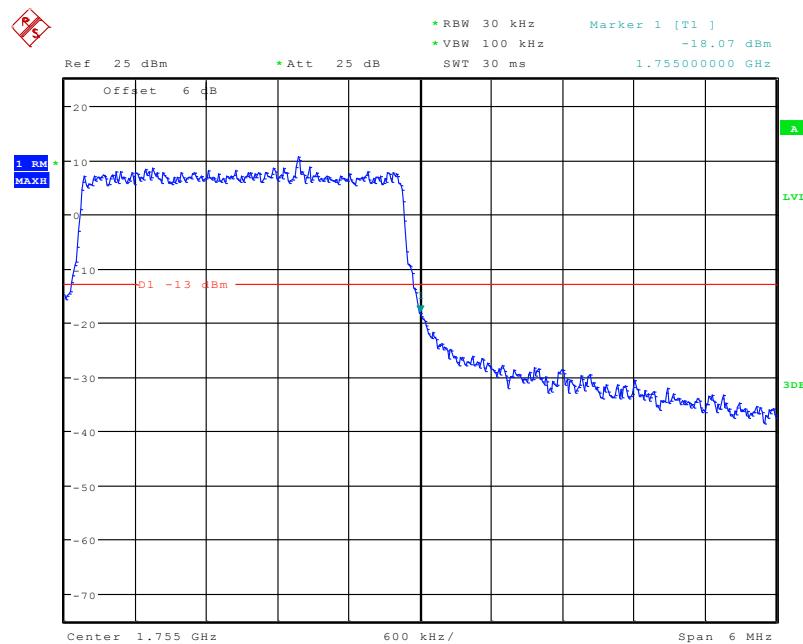
Date: 30.AUG.2019 22:06:44

QPSK (5.0 MHz, FULL RB) - Left Band Edge
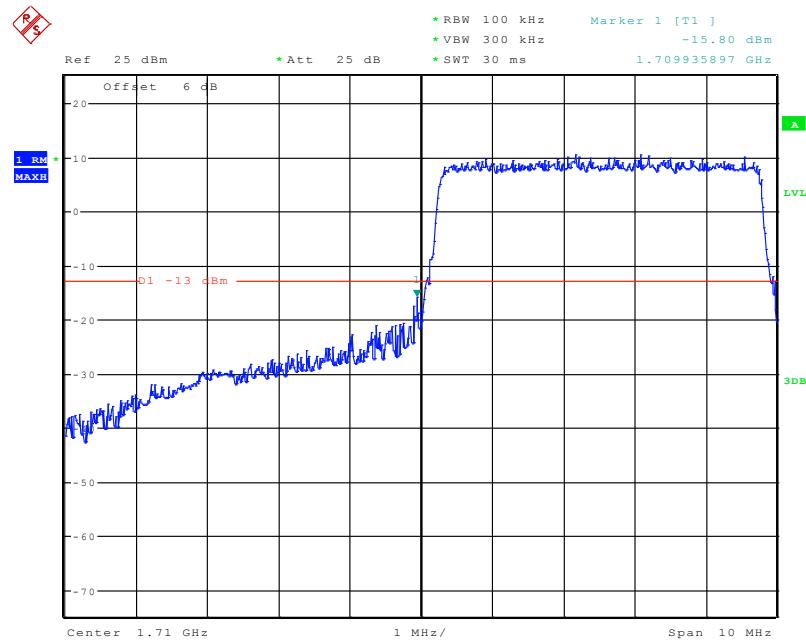
Date: 1.SEP.2019 15:00:40

QPSK (5.0 MHz, FULL RB) - Right Band Edge
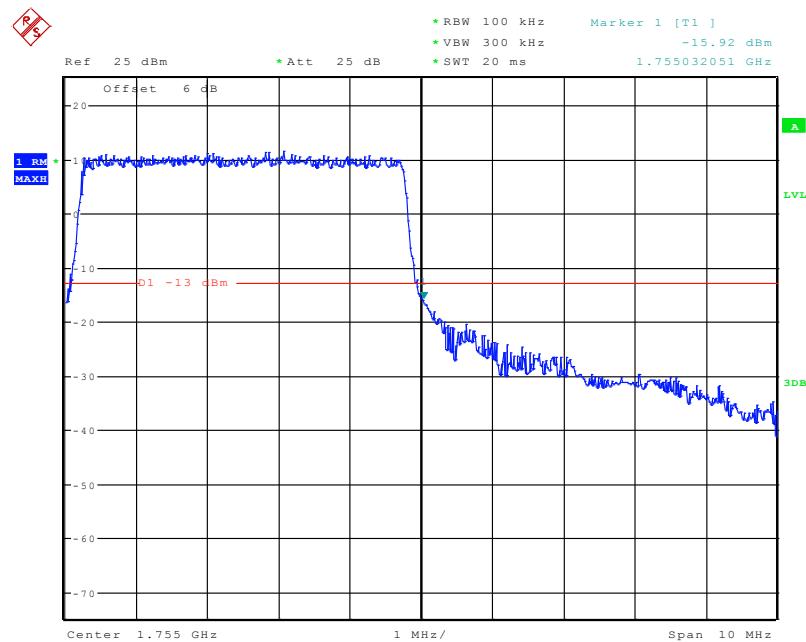
Date: 5.SEP.2019 23:35:24

16-QAM (5.0 MHz, FULL RB) - Left Band Edge
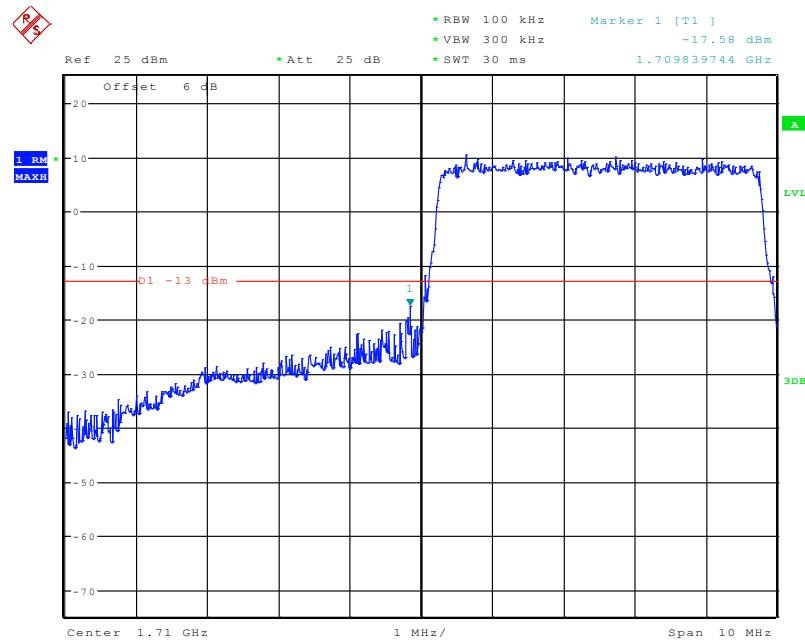
Date: 1.SEP.2019 15:00:04

16-QAM (5.0 MHz, FULL RB) - Right Band Edge
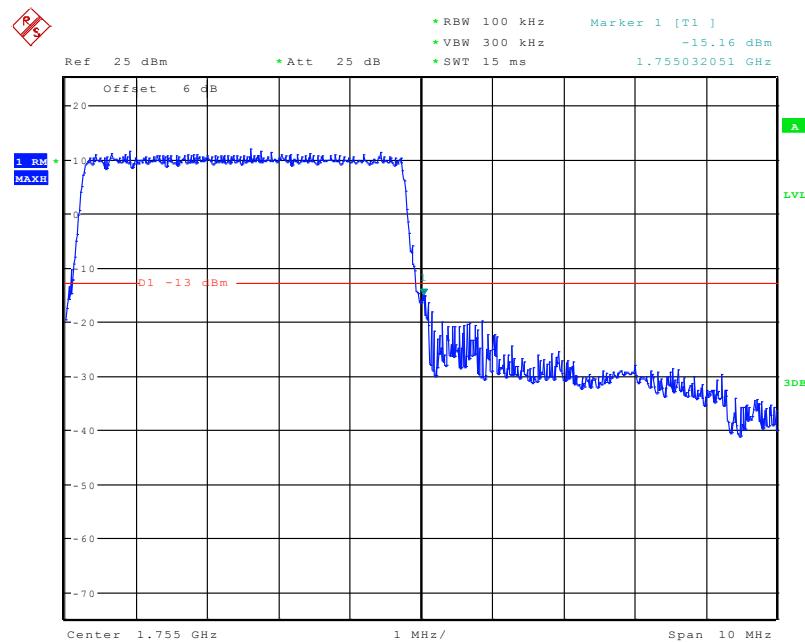
Date: 1.SEP.2019 14:58:29

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

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz           -19.69 dBm
Ref  25 dBm        *Att  25 dB    SWT 10 ms         1.709960000 GHz
     Offset  6 dB
```
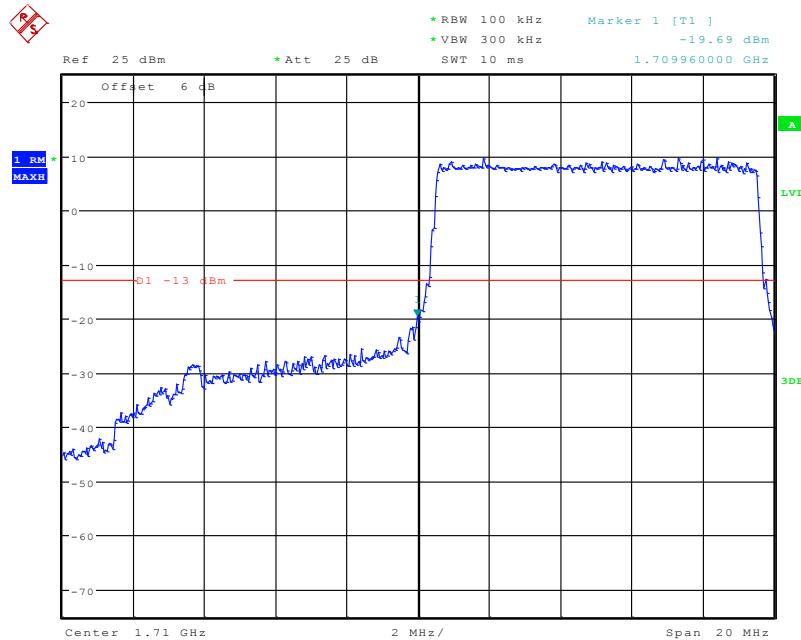
Date: 30.AUG.2019 22:09:59

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

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz           -18.40 dBm
Ref  25 dBm        *Att  25 dB    SWT 10 ms         1.755000000 GHz
     Offset  6 dB
```
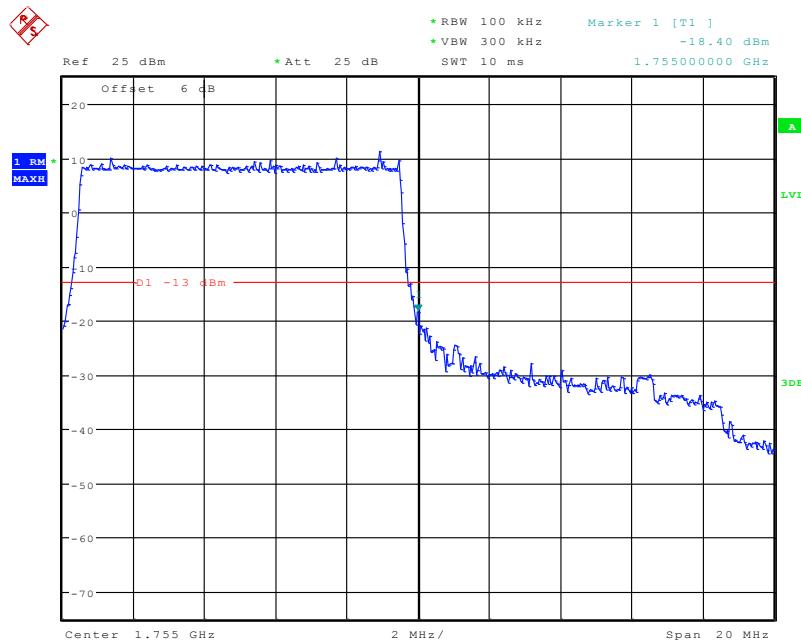
Date: 30.AUG.2019 22:11:05

16-QAM (10.0 MHz, FULL RB) - Left Band Edge
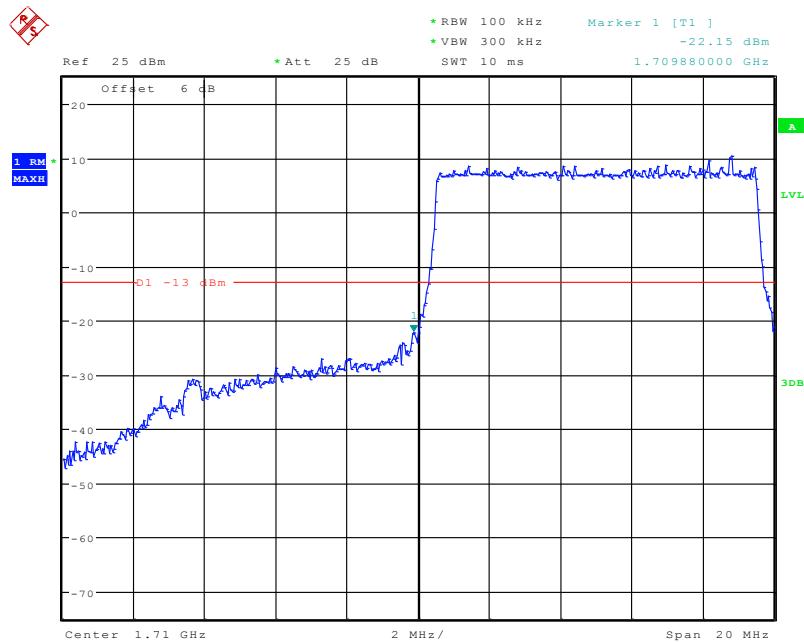
Date: 30.AUG.2019 22:10:32

16-QAM (10.0 MHz, FULL RB) - Right Band Edge
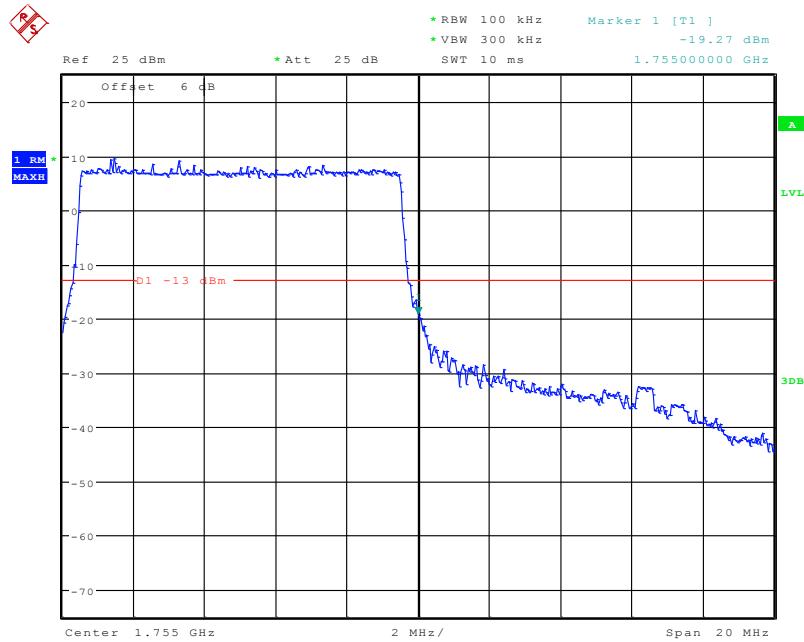
Date: 30.AUG.2019 22:11:32

QPSK (15.0 MHz, FULL RB) - Left Band Edge
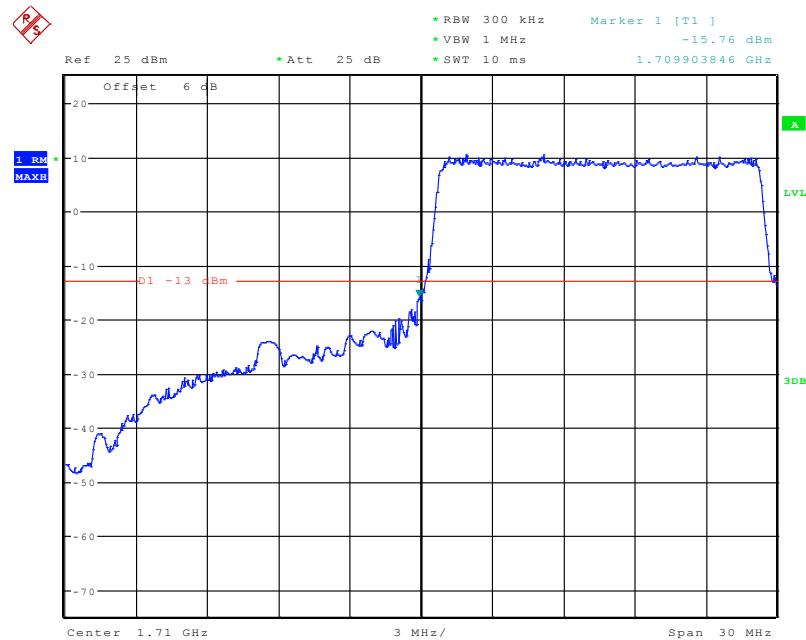
Date: 1.SEP.2019 15:10:41

## QPSK (15.0 MHz, FULL RB) - Right Band Edge
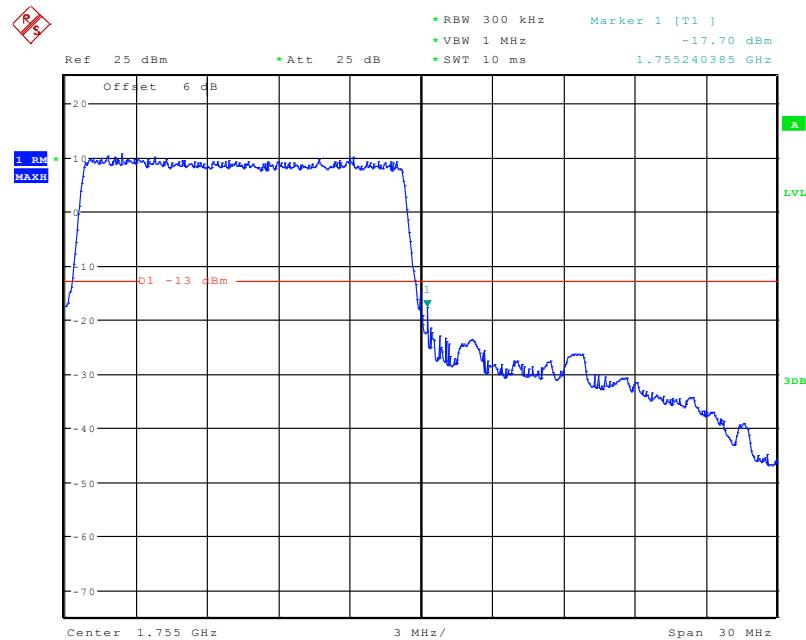
Date: 1.SEP.2019 15:04:59

16-QAM (15.0 MHz, FULL RB) - Left Band Edge
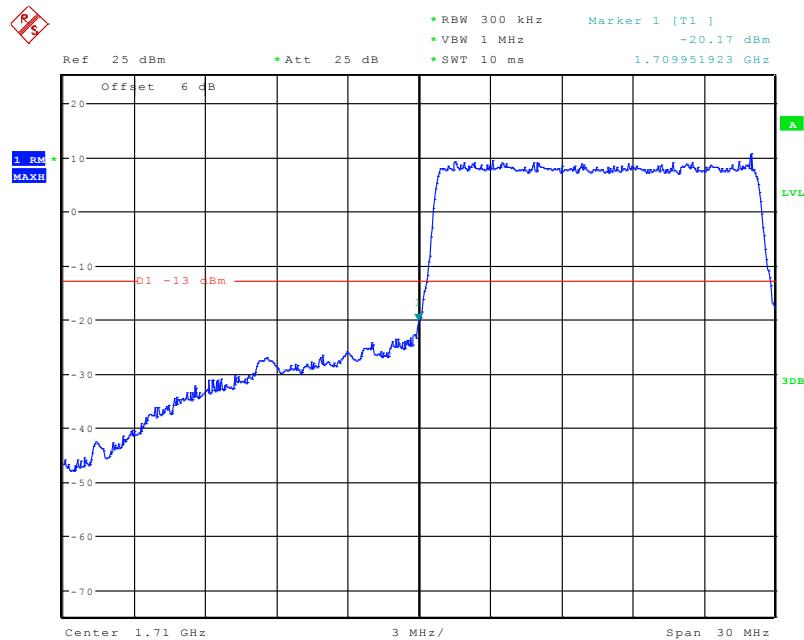
Date: 1.SEP.2019 15:11:26

## 16-QAM (15.0 MHz, FULL RB) - Right Band Edge
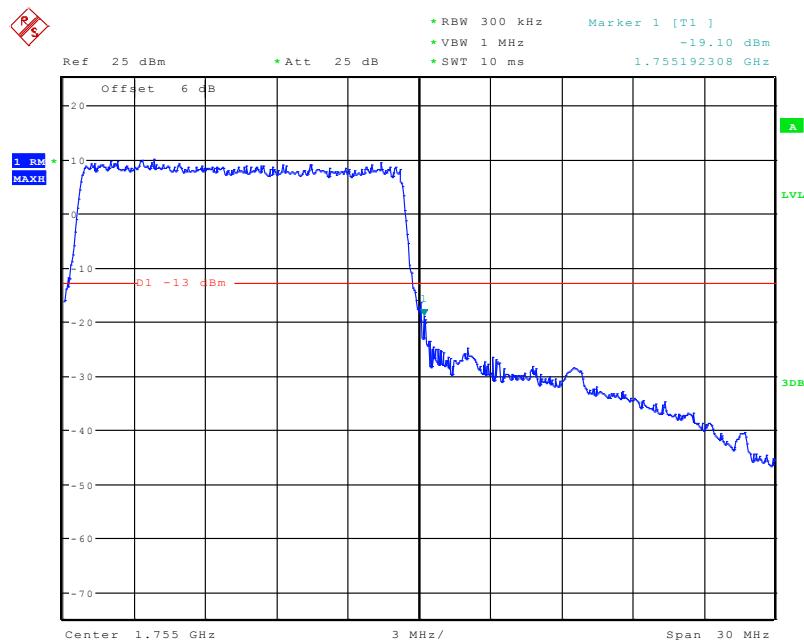
Date: 1.SEP.2019 15:08:25

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

```
                                    *RBW  300 kHz      Marker 1 [T1 ]
                                    *VBW  1 MHz                -17.16 dBm
     Ref   25 dBm        *Att   25 dB    SWT  2.5 ms      1.710000000 GHz
       Offset   6 dB
```
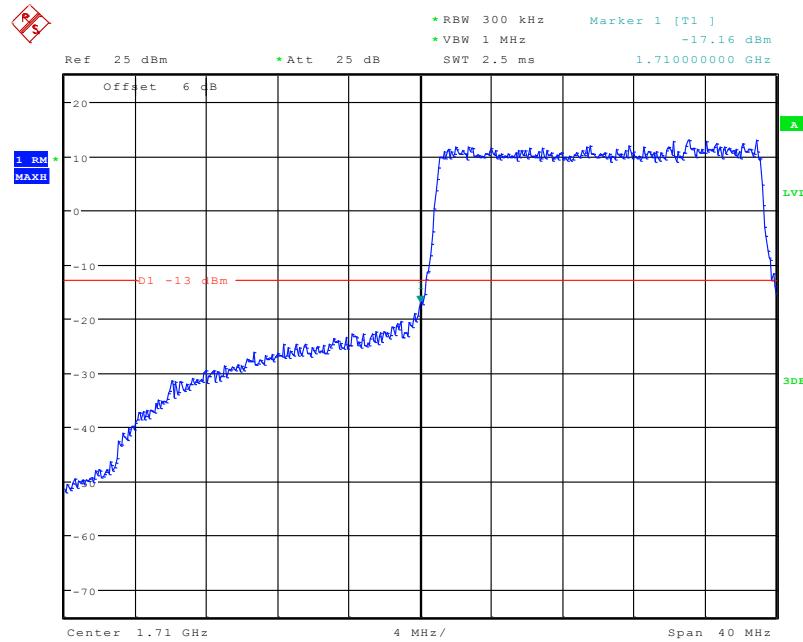
Date: 30.AUG.2019 22:14:23

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

```
                                    *RBW  300 kHz      Marker 1 [T1 ]
                                    *VBW  1 MHz                -14.53 dBm
     Ref   25 dBm        *Att   25 dB    SWT  2.5 ms      1.755080000 GHz
       Offset   6 dB
```
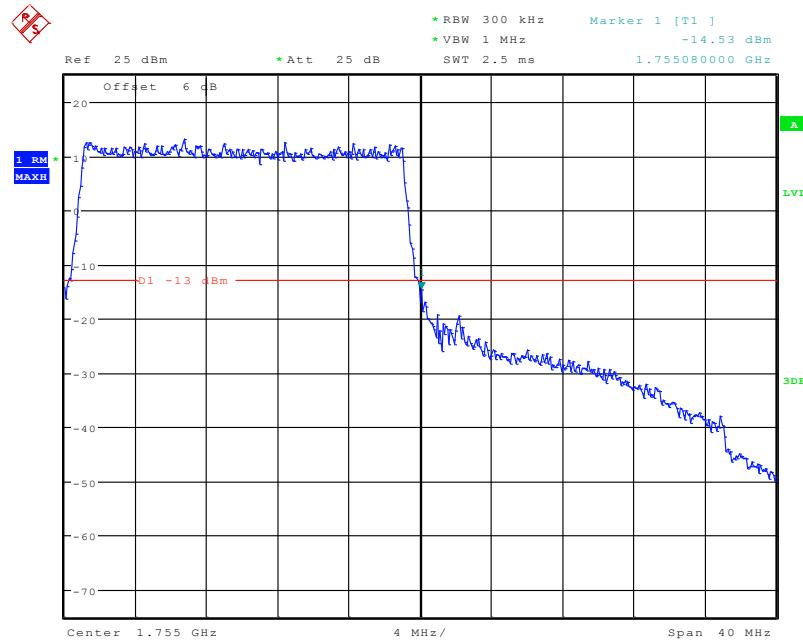
Date: 30.AUG.2019 22:15:34

16-QAM (20.0 MHz, FULL RB) - Left Band Edge
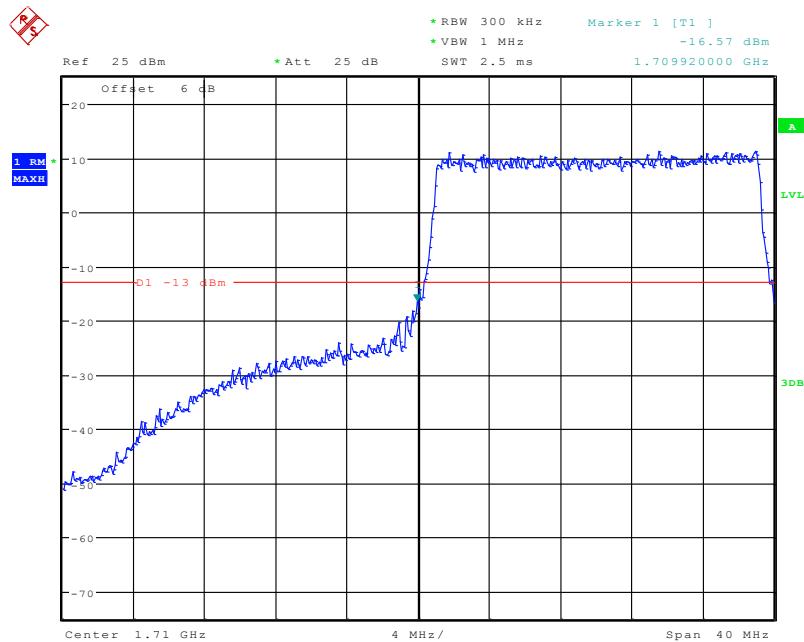
Date: 30.AUG.2019 22:14:55

16-QAM (20.0 MHz, FULL RB) - Right Band Edge
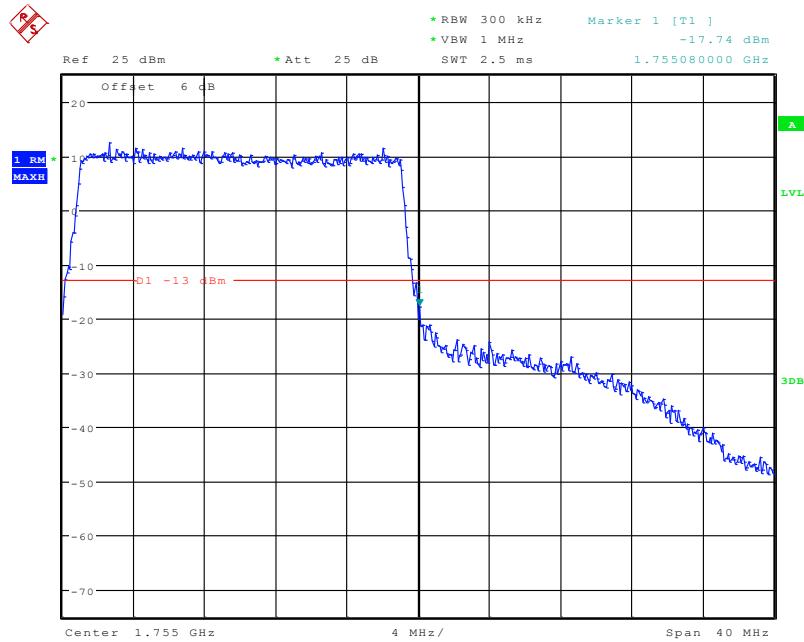
Date: 30.AUG.2019 22:16:09

Band 5:

QPSK (1.4 MHz, FULL RB) - Left Band Edge
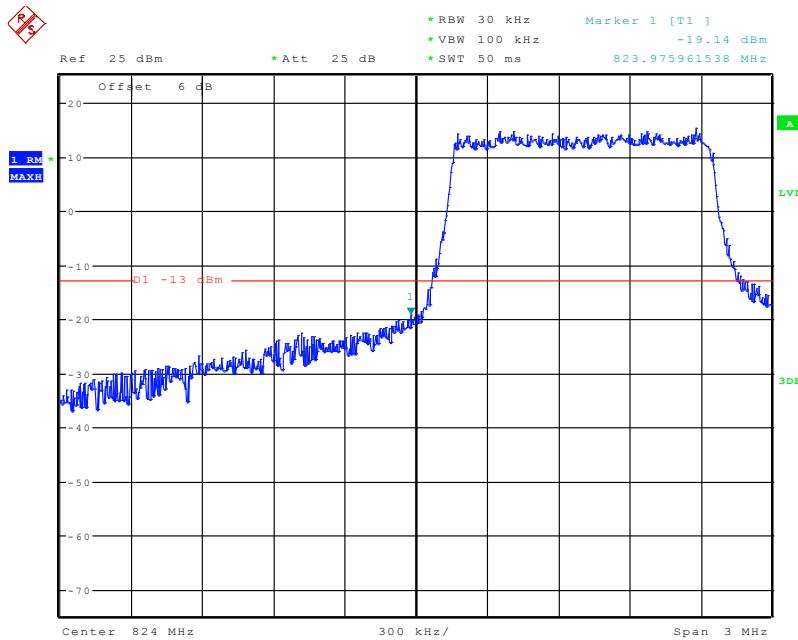
Date: 1.SEP.2019 15:16:39

QPSK (1.4 MHz, FULL RB) - Right Band Edge
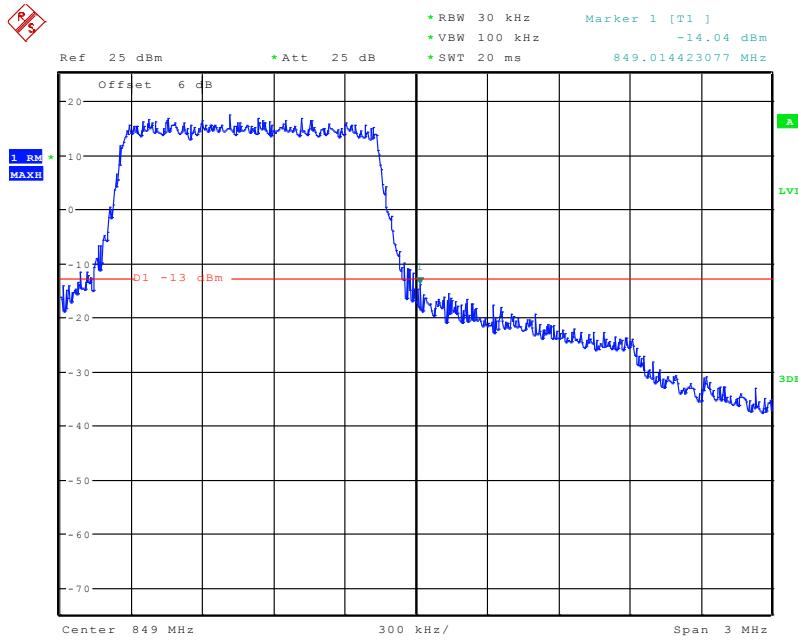
Date: 1.SEP.2019 15:13:37

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

```
          R                              *RBW  30 kHz      Marker 1 [T1 ]
          S                              *VBW 100 kHz            -16.43 dBm
       Ref  25 dBm         *Att  25 dB   *SWT  50 ms       823.990384615 MHz
            Offset   6 dB
```
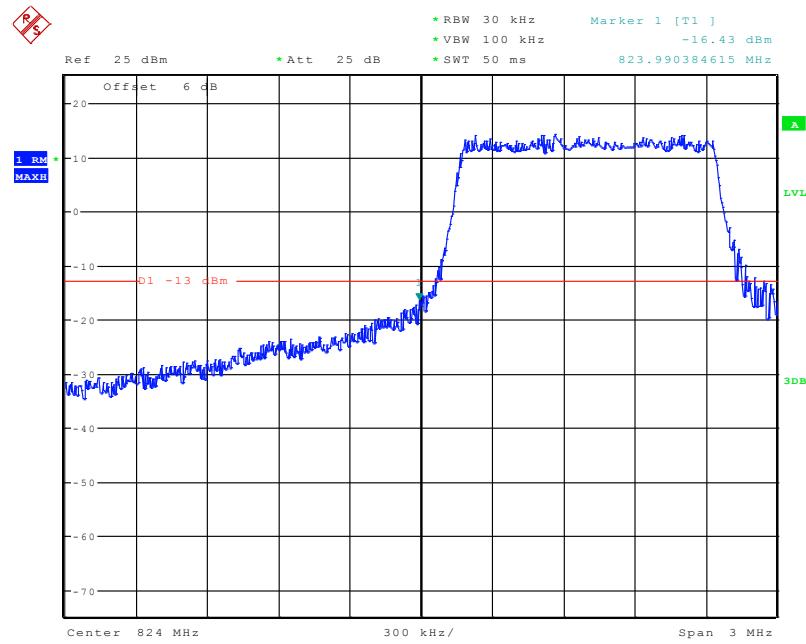
Date: 1.SEP.2019 15:16:00

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

```
          R                              *RBW  30 kHz      Marker 1 [T1 ]
          S                              *VBW 100 kHz            -14.12 dBm
       Ref  25 dBm         *Att  25 dB   *SWT  50 ms       849.024038462 MHz
            Offset   6 dB
```
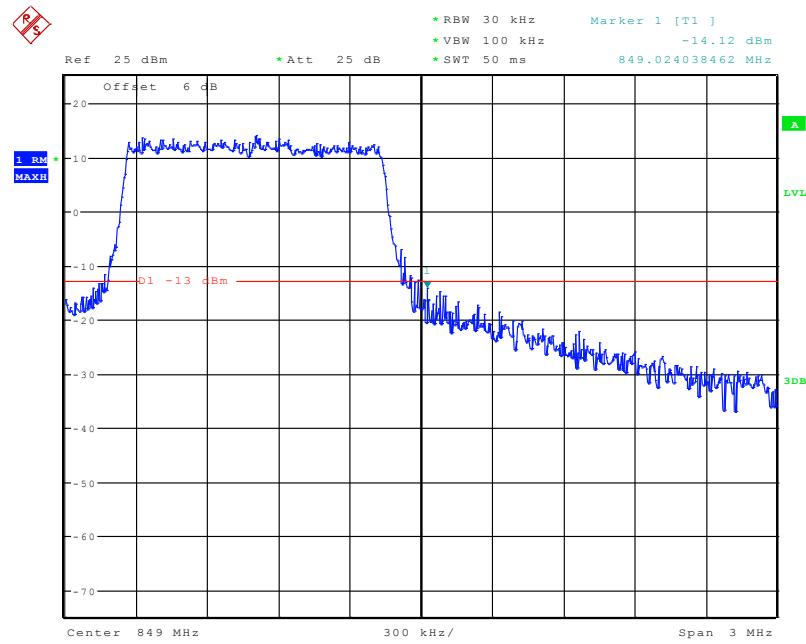
Date: 1.SEP.2019 15:14:52

QPSK (3.0 MHz, FULL RB) - Left Band Edge
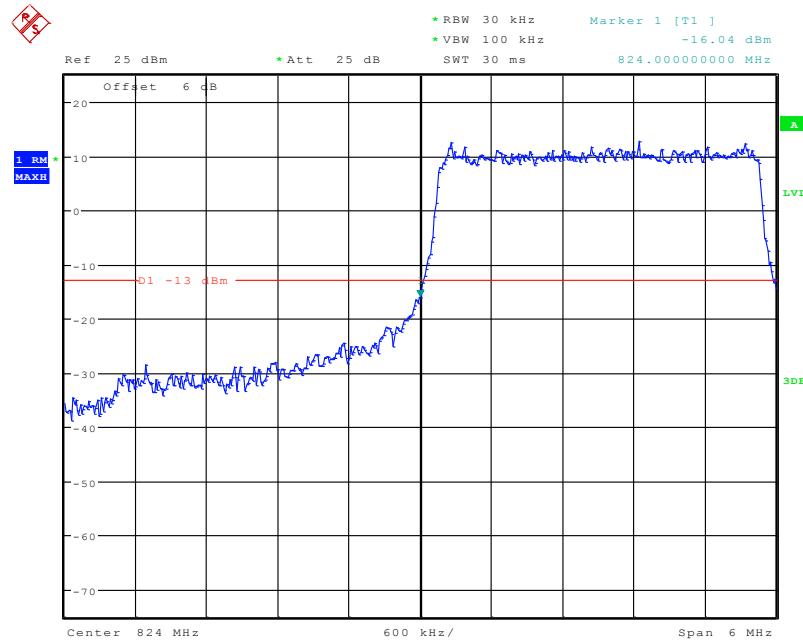
Date: 30.AUG.2019 22:18:40

QPSK (3.0 MHz, FULL RB) - Right Band Edge
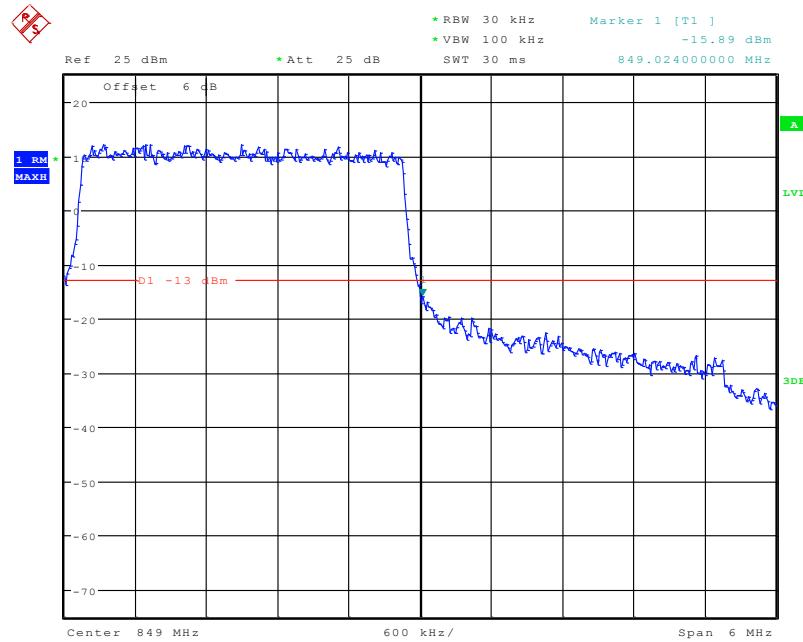
Date: 30.AUG.2019 22:19:38

16-QAM (3.0 MHz, FULL RB) - Left Band Edge
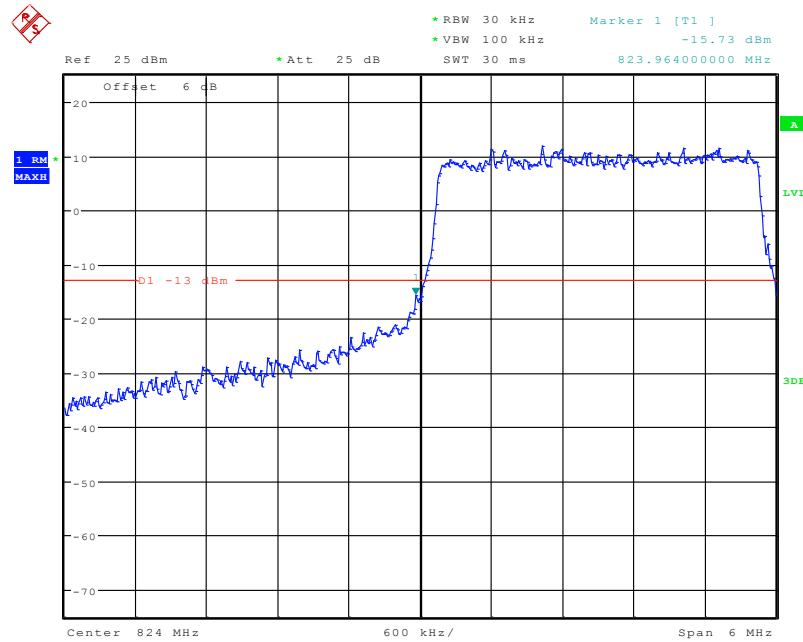
Date: 30.AUG.2019 22:19:09

16-QAM (3.0 MHz, FULL RB) - Right Band Edge
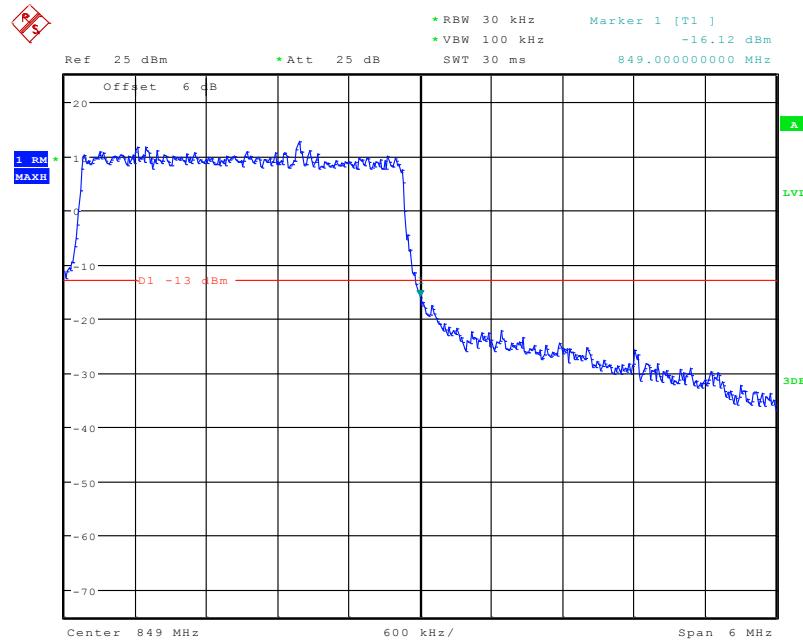
Date: 30.AUG.2019 22:20:04

QPSK (5.0 MHz, FULL RB) - Left Band Edge
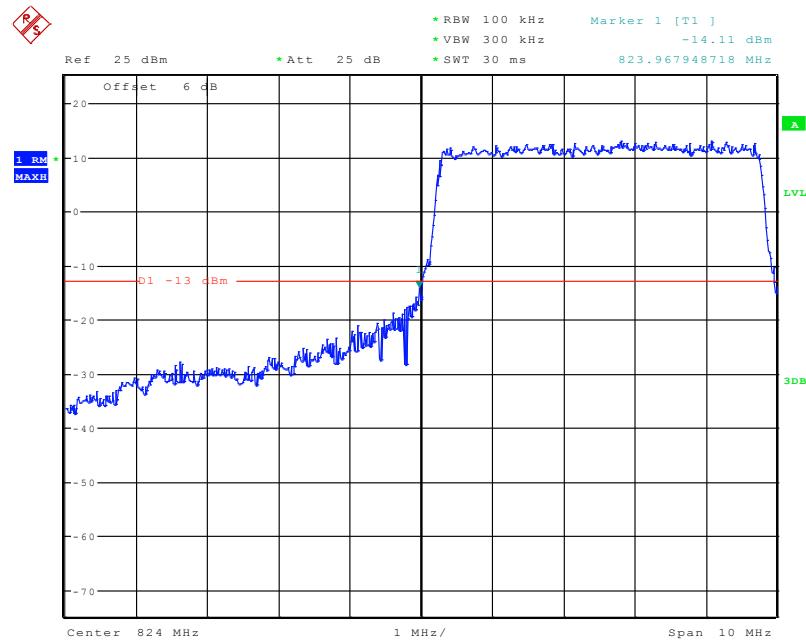
Date: 1.SEP.2019 15:21:47

QPSK (5.0 MHz, FULL RB) - Right Band Edge
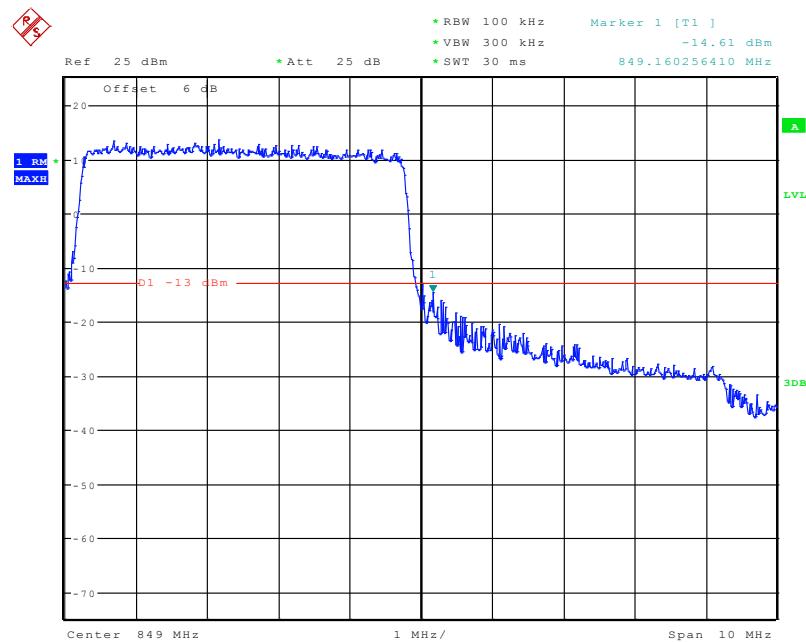
Date: 1.SEP.2019 15:19:41

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

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz           -14.11 dBm
  Ref  25 dBm          *Att  25 dB  *SWT  30 ms       823.967948718 MHz
     Offset   6 dB
```
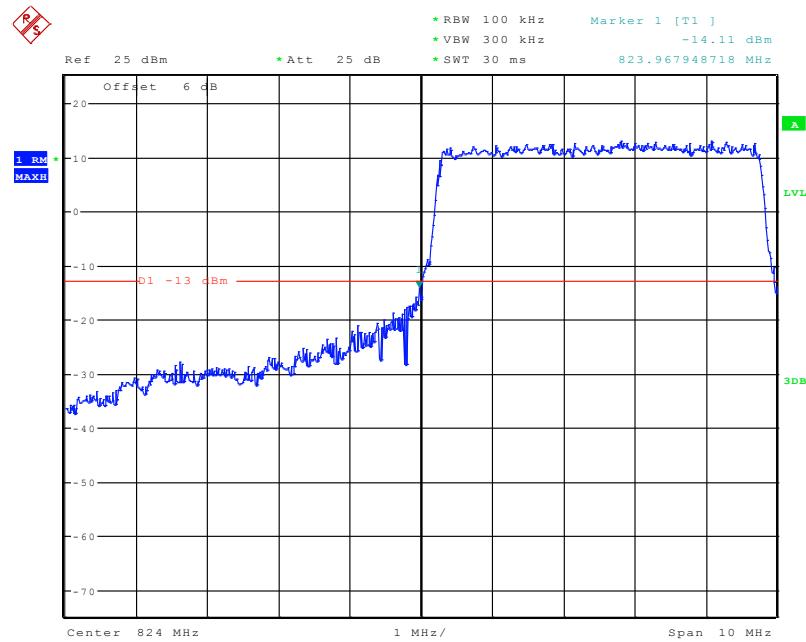
Date: 1.SEP.2019 15:21:47

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

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz           -14.64 dBm
  Ref  25 dBm          *Att  25 dB  *SWT  30 ms       849.096153846 MHz
     Offset   6 dB
```
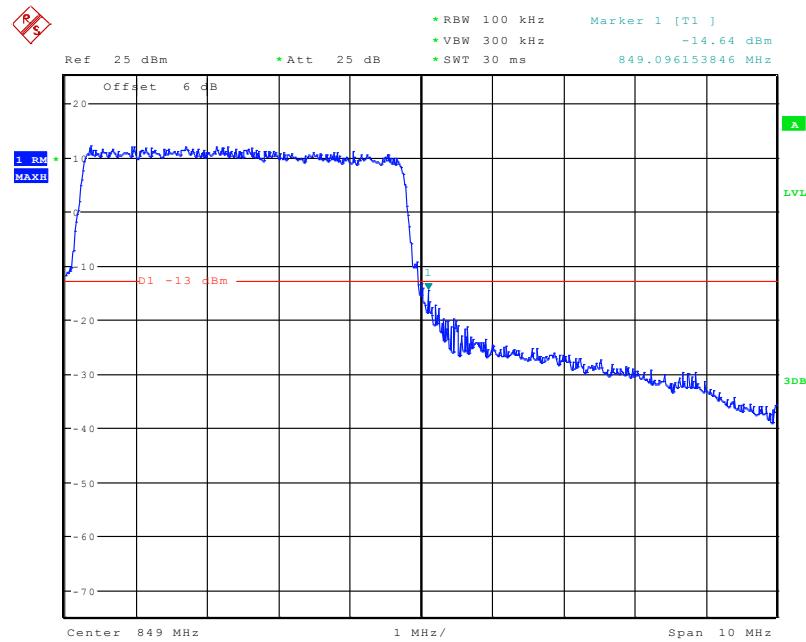
Date: 1.SEP.2019 15:20:24

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

```
                                    *RBW 100 kHz      Marker 1 [T1 ]
                                    *VBW 300 kHz            -18.96 dBm
  Ref   25 dBm        *Att  25 dB   SWT 10 ms     823.960000000 MHz
        Offset   6 dB
```
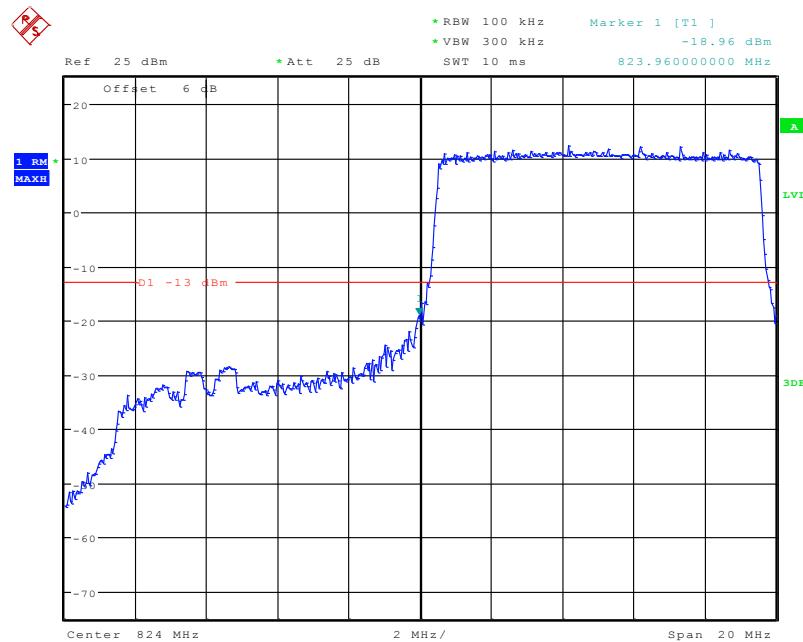
Date: 30.AUG.2019 22:23:07

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

```
                                    *RBW 100 kHz      Marker 1 [T1 ]
                                    *VBW 300 kHz            -19.92 dBm
  Ref   25 dBm        *Att  25 dB   SWT 10 ms     849.040000000 MHz
        Offset   6 dB
```
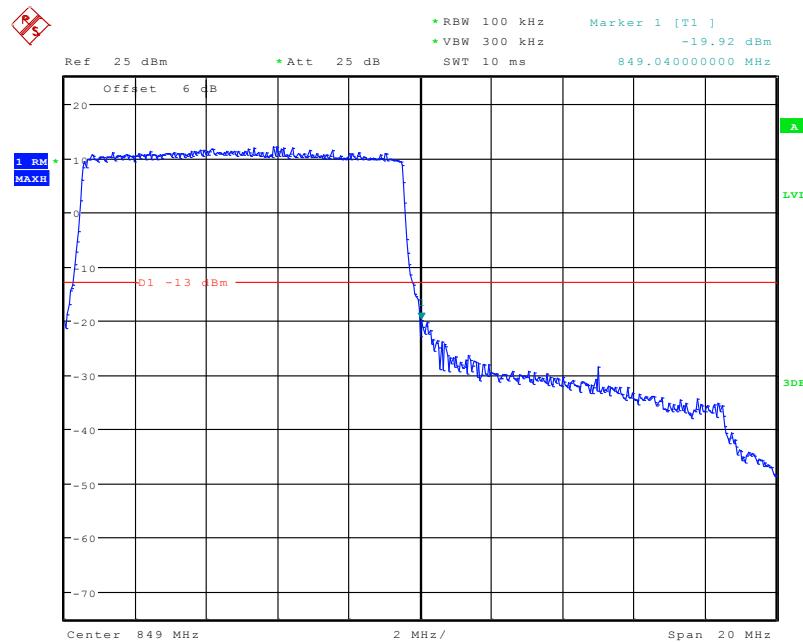
Date: 30.AUG.2019 22:23:59

16-QAM (10.0 MHz, FULL RB) - Left Band Edge
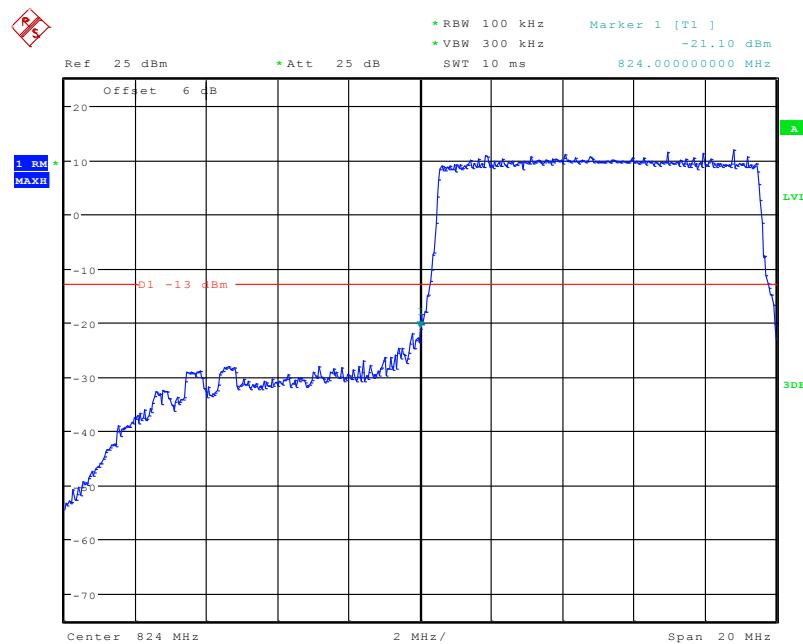
Date: 30.AUG.2019 22:23:31

## 16-QAM (10.0 MHz, FULL RB) - Right Band Edge
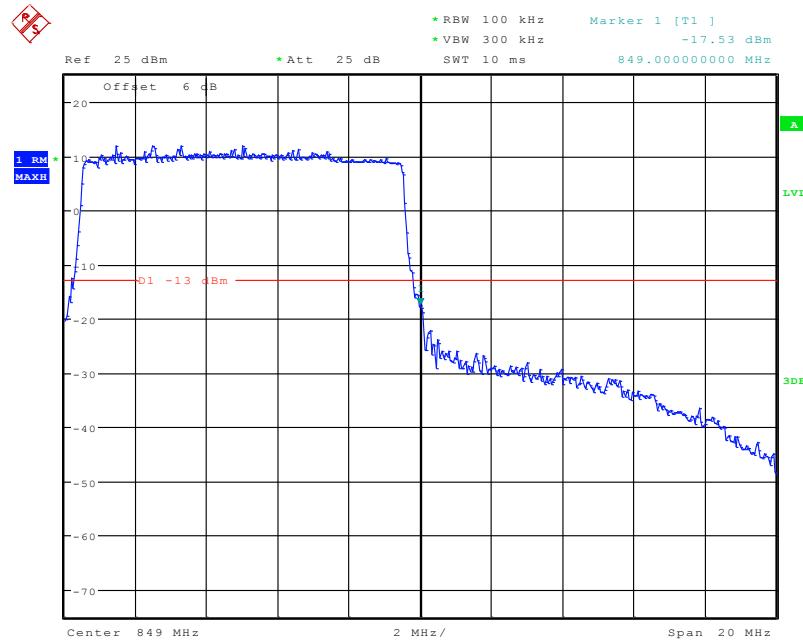
Date: 30.AUG.2019 22:24:31

Band 7:

### QPSK (5.0 MHz, FULL RB) - Left Band Edge
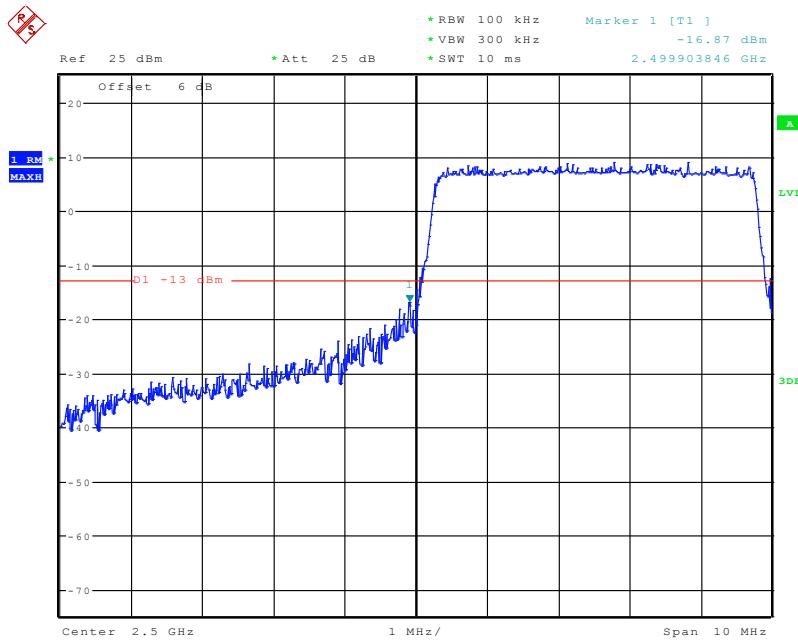
Date: 1.SEP.2019 15:27:41

### QPSK (5.0 MHz, FULL RB) - Right Band Edge
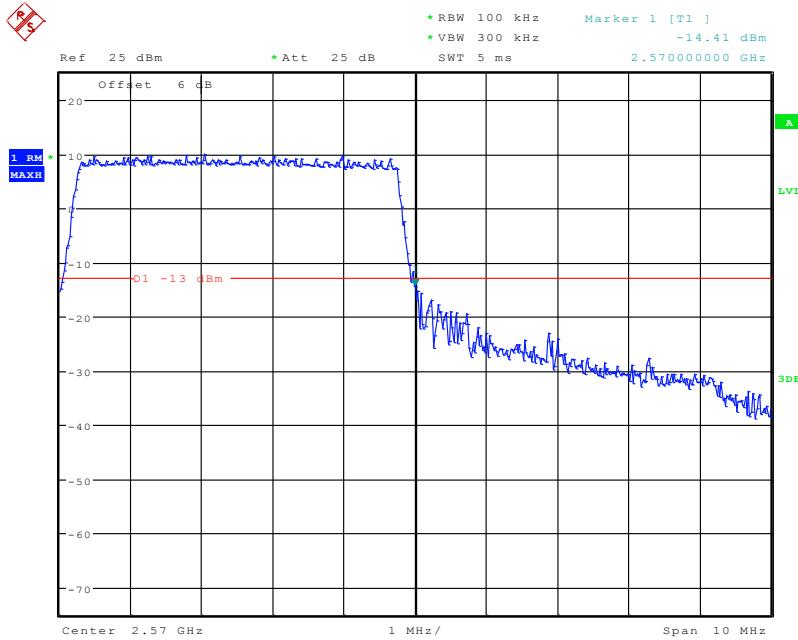
Date: 30.AUG.2019 22:26:05

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

Date: 30.AUG.2019 22:25:44

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

Date: 1.SEP.2019 15:25:34
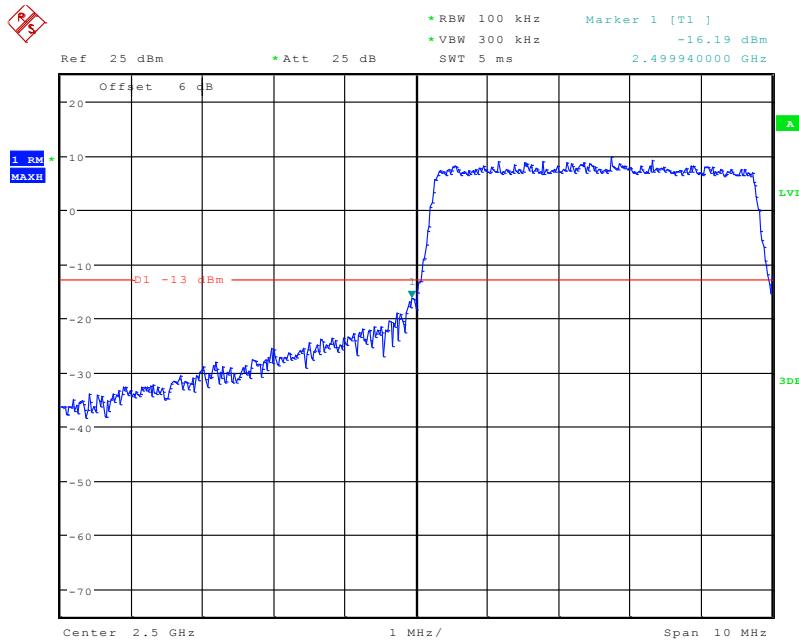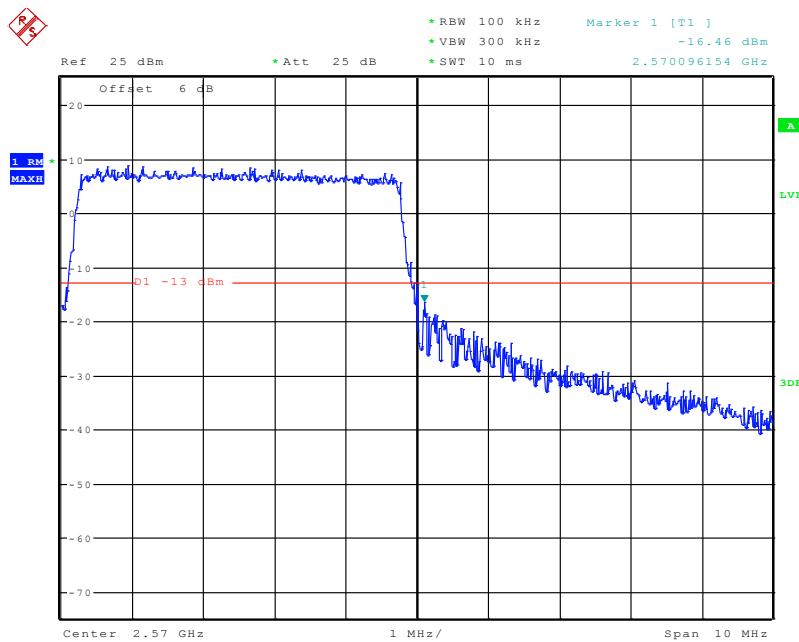
## QPSK (10.0 MHz, FULL RB) - Left Band Edge
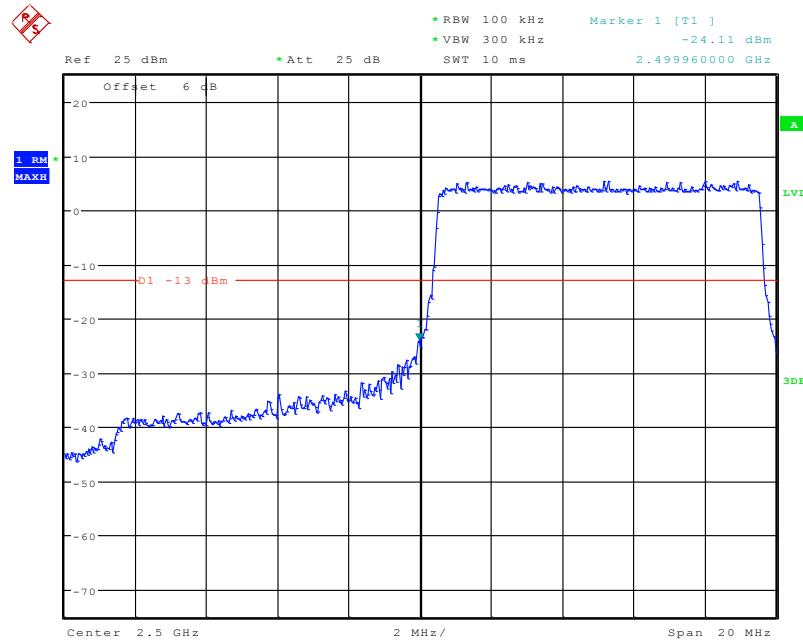
Date: 30.AUG.2019 22:27:10

QPSK (10.0 MHz, FULL RB) - Right Band Edge
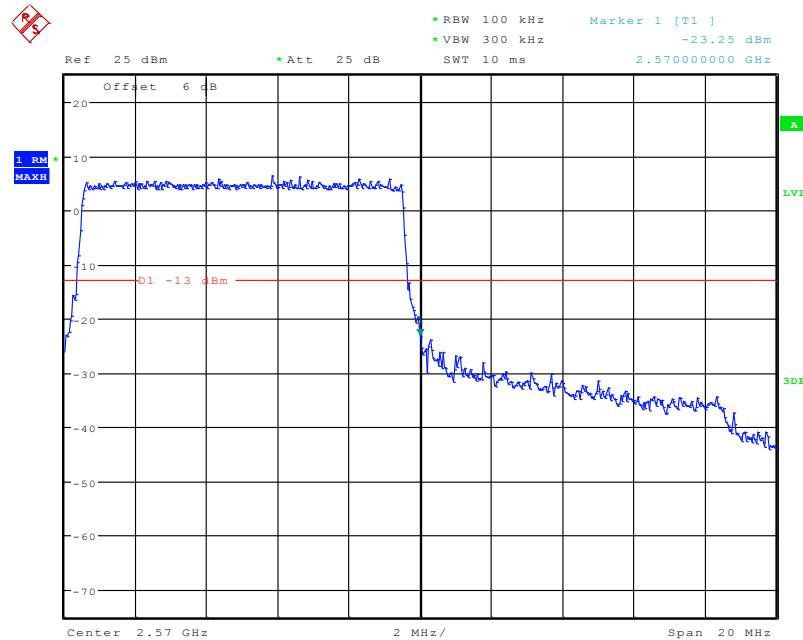
Date: 30.AUG.2019 22:28:20

16-QAM (10.0 MHz, FULL RB) - Left Band Edge
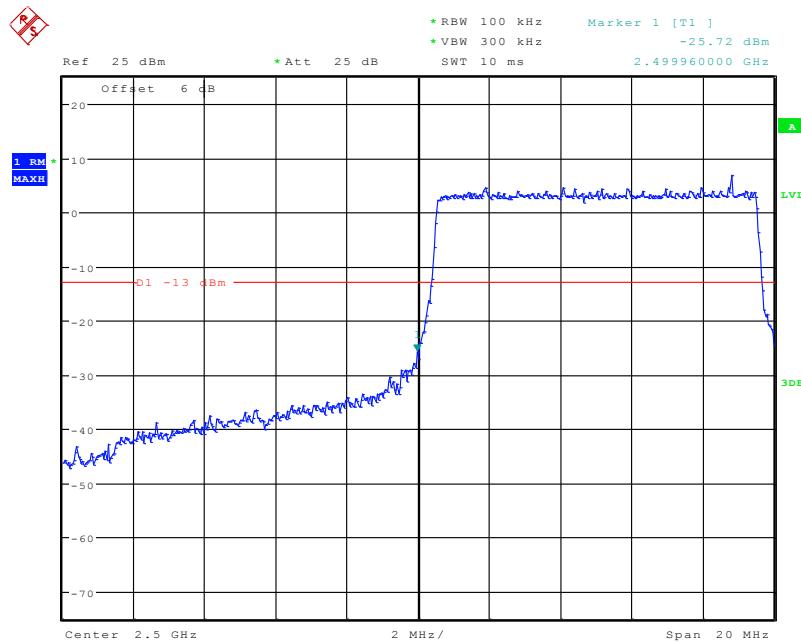
Date: 30.AUG.2019 22:27:43

16-QAM (10.0 MHz, FULL RB) - Right Band Edge
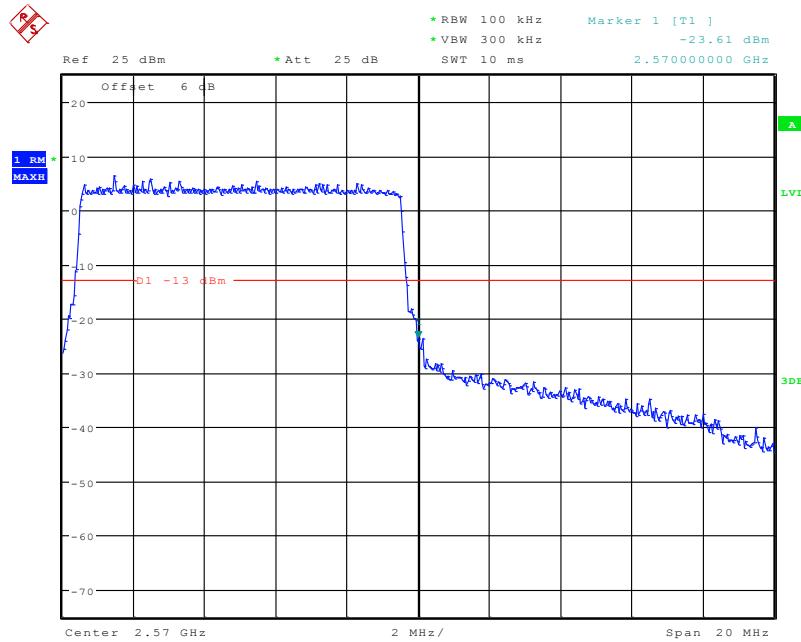
Date: 30.AUG.2019 22:28:46

QPSK (15.0 MHz, FULL RB) - Left Band Edge
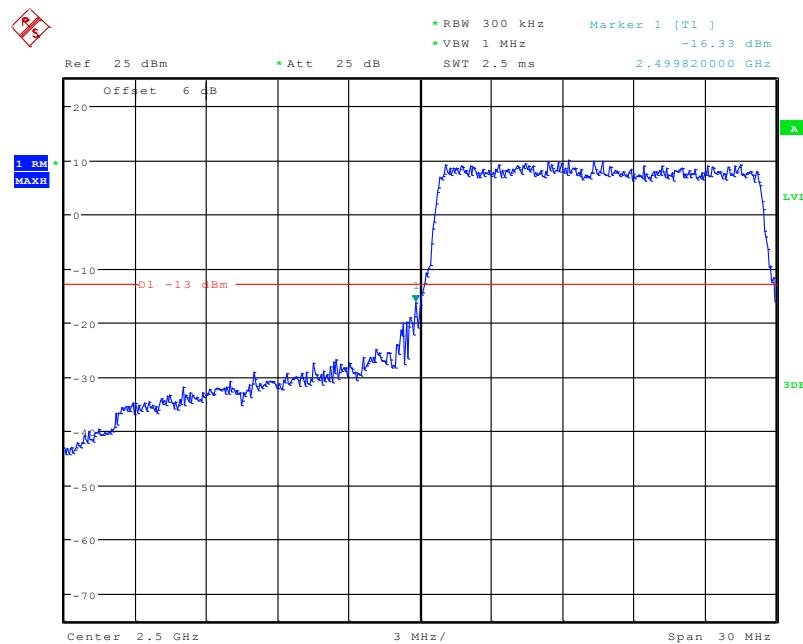
Date: 30.AUG.2019 22:29:28

QPSK (15.0 MHz, FULL RB) - Right Band Edge
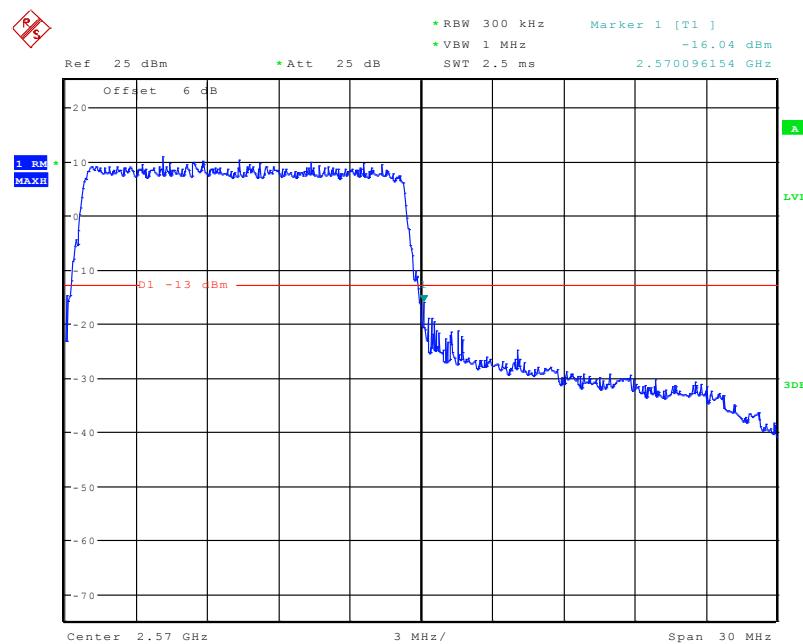
Date: 1.SEP.2019 15:30:05

16-QAM (15.0 MHz, FULL RB) - Left Band Edge
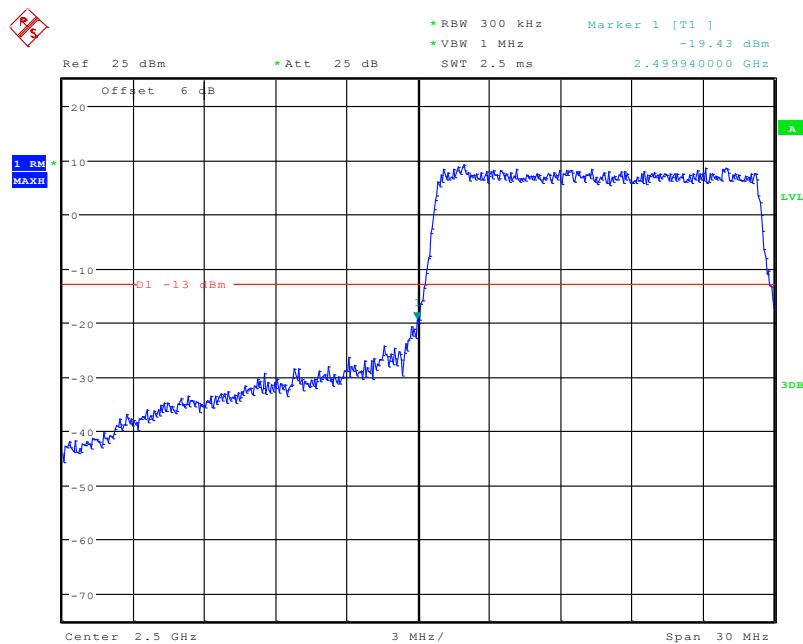
Date: 30.AUG.2019 22:30:12

16-QAM (15.0 MHz, FULL RB) - Right Band Edge
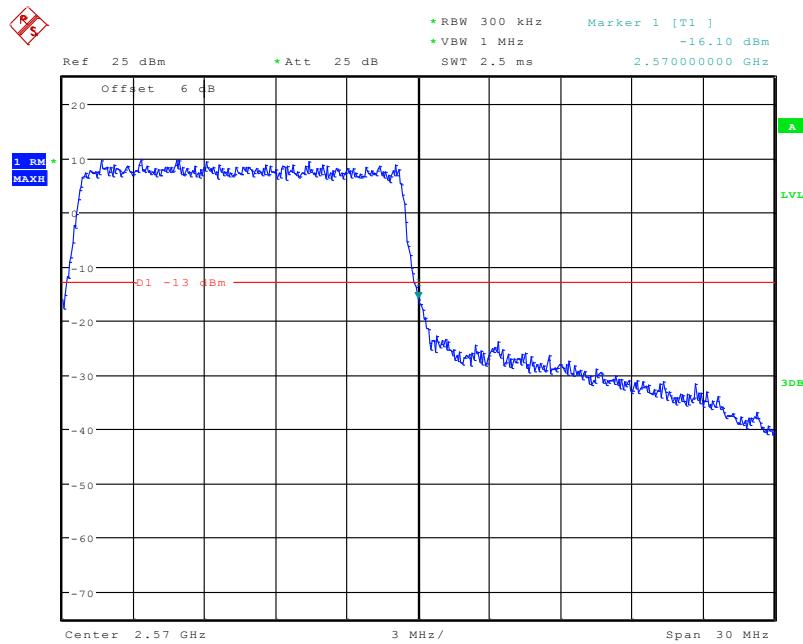
Date: 30.AUG.2019 22:31:33

QPSK (20.0 MHz, FULL RB) - Left Band Edge
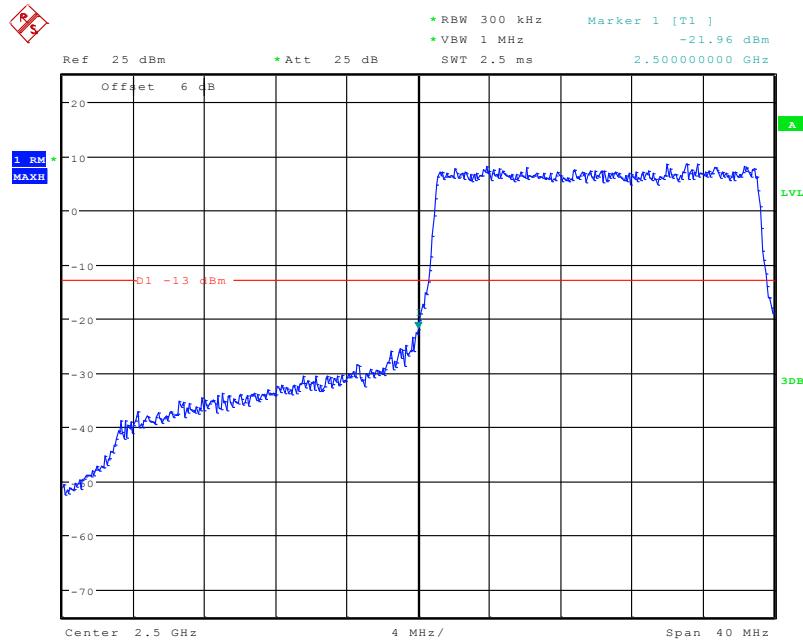
Date: 30.AUG.2019 22:32:11

## QPSK (20.0 MHz, FULL RB) - Right Band Edge
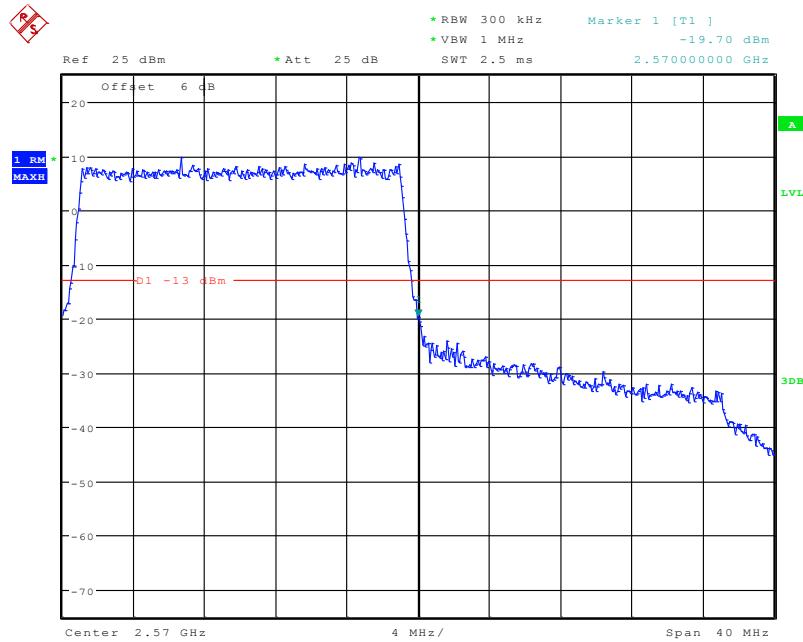
Date: 30.AUG.2019 22:33:23

16-QAM (20.0 MHz, FULL RB) - Left Band Edge
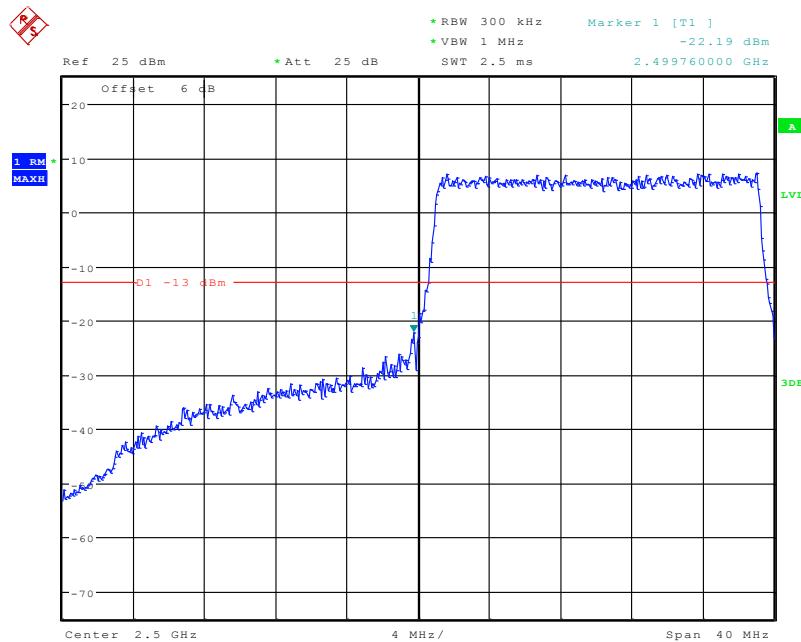
Date: 30.AUG.2019 22:32:47

## 16-QAM (20.0 MHz, FULL RB) - Right Band Edge
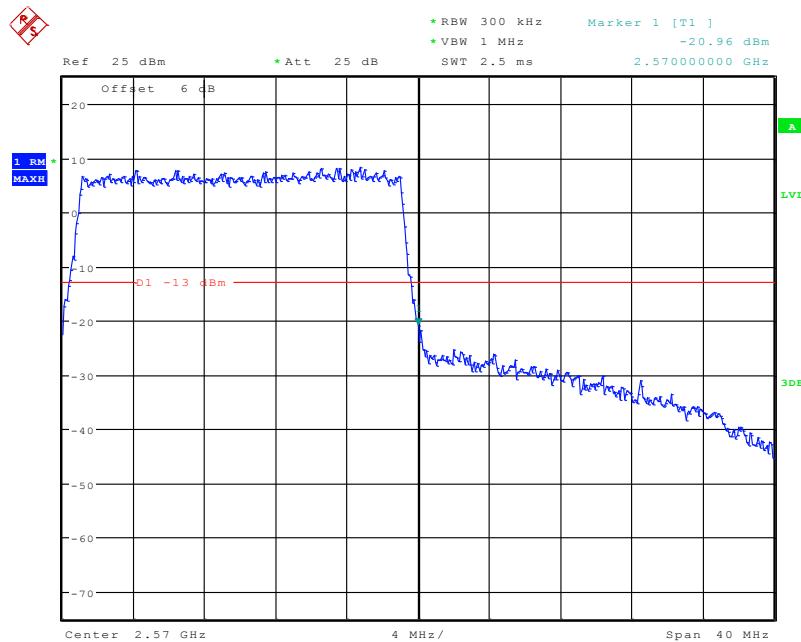
Date: 30.AUG.2019 22:34:07

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

Applicable Standard

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.
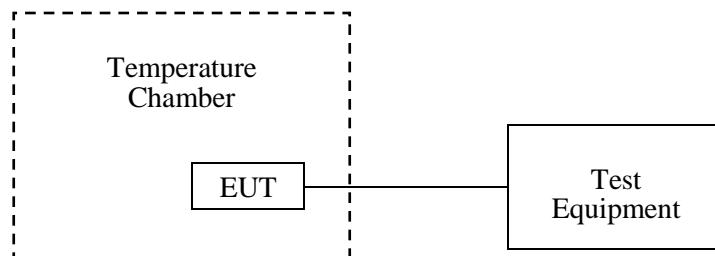
Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by George Zhong on 2019-09-04.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

Cellular Band (Part 22H)

GSM Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30		5	0.005977	2.5
-20		2	0.002391	2.5
-10		-1	-0.001195	2.5
0		4	0.004781	2.5
10	3.7	-3	-0.003586	2.5
20		1	0.001195	2.5
30		5	0.005977	2.5
40		1	0.001195	2.5
50		-2	-0.002391	2.5
20	V min.= 3.5	5	0.005977	2.5
	V max.= 4.2	3	0.003586	2.5

EDGE Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	3	0.003586	2.5
-20		-2	-0.002391	2.5
-10		5	0.005977	2.5
0		-6	-0.007172	2.5
10		1	0.001195	2.5
20		-4	-0.004781	2.5
30		1	0.001195	2.5
40		-5	-0.005977	2.5
50		2	0.002391	2.5
20	V min.= 3.5	4	0.004781	2.5
	V max.= 4.2	3	0.003586	2.5

WCDMA Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	4	0.004781	2.5
-20		2	0.002391	2.5
-10		-5	-0.005977	2.5
0		-8	-0.009563	2.5
10		4	0.004781	2.5
20		7	0.008367	2.5
30		-3	-0.003586	2.5
40		5	0.005977	2.5
50		6	0.007172	2.5
20	V min.= 3.5	5	0.005977	2.5
	V max.= 4.2	-2	-0.002391	2.5

PCS Band (Part 24E)

GSM Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	3	0.001596	pass
-20		-2	-0.001064	pass
-10		5	0.002660	pass
0		1	0.000532	pass
10		-4	-0.002128	pass
20		6	0.003191	pass
30		-5	-0.002660	pass
40		3	0.001596	pass
50		2	0.001064	pass
20	V min.= 3.5	-4	-0.002128	pass
	V max.= 4.2	2	0.001064	pass

EDGE Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	-5	-0.002660	pass
-20		2	0.001064	pass
-10		-6	-0.003191	pass
0		-1	-0.000532	pass
10		2	0.001064	pass
20		5	0.002660	pass
30		7	0.003723	pass
40		9	0.004787	pass
50		-3	-0.001596	pass
20	V min.= 3.5	5	0.002660	pass
	V max.= 4.2	1	0.000532	pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	6	0.003191	pass
-20		2	0.001064	pass
-10		3	0.001596	pass
0		-5	-0.002660	pass
10		6	0.003191	pass
20		-4	-0.002128	pass
30		-8	-0.004255	pass
40		2	0.001064	pass
50		5	0.002660	pass
20	V min.= 3.5	1	0.000532	pass
	V max.= 4.2	-3	-0.001596	pass

LTE:
QPSK:

Band 2:

10.0 MHz Middle Channel, f_o =1880MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-7	-0.003723	pass
-20		-6	-0.003191	pass
-10		-4	-0.002128	pass
0		-8	-0.004255	pass
10		-6	-0.003191	pass
20		-5	-0.002660	pass
30		-6	-0.003191	pass
40		-3	-0.001596	pass
50		-4	-0.002128	pass
20	V min.= 3.5	-7	-0.003723	pass
	V max.= 4.2	-5	-0.002660	pass

Band 4:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.7	1710.5262	1754.7568	1710	1755
-20		1710.5254	1754.7571	1710	1755
-10		1710.5257	1754.7574	1710	1755
0		1710.5275	1754.7564	1710	1755
10		1710.5249	1754.7575	1710	1755
20		1710.5263	1754.7568	1710	1755
30		1710.5247	1754.7574	1710	1755
40		1710.5247	1754.7593	1710	1755
50		1710.5254	1754.7569	1710	1755
20	V min.= 3.5	1710.5259	1754.7585	1710	1755
	V max.= 4.2	1710.5246	1754.7581	1710	1755

Band 5:

10.0 MHz Middle Channel, f_o =836.5MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-4	-0.004781	2.5
-20		-3	-0.003586	2.5
-10		-4	-0.004781	2.5
0		-3	-0.003586	2.5
10		-5	-0.005977	2.5
20		-3	-0.003586	2.5
30		-2	-0.002391	2.5
40		-1	-0.001195	2.5
50		-3	-0.003586	2.5
20	V min.= 3.5	-3	-0.003586	2.5
	V max.= 4.2	-5	-0.005977	2.5

Band 7:

10 MHz Bandwidth					
Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.7	2500.4534	2569.7024	2500	2570
-20		2500.4546	2569.7031	2500	2570
-10		2500.4552	2569.7018	2500	2570
0		2500.4534	2569.7042	2500	2570
10		2500.4551	2569.7042	2500	2570
20		2500.4542	2569.7029	2500	2570
30		2500.4547	2569.7041	2500	2570
40		2500.4546	2569.7034	2500	2570
50		2500.4538	2569.7026	2500	2570
20	V min.= 3.5	2500.4536	2569.7045	2500	2570
	V max.= 4.2	2500.4536	2569.7020	2500	2570

16QAM:

Band 2:

10.0 MHz Middle Channel, f_o =1880MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	-2	-0.001064	pass
-20		-5	-0.002660	pass
-10		-4	-0.002128	pass
0		-8	-0.004255	pass
10		-5	-0.002660	pass
20		-4	-0.002128	pass
30		-2	-0.001064	pass
40		-4	-0.002128	pass
50		-2	-0.001064	pass
20	V min.= 3.5	-2	-0.001064	pass
	V max.= 4.2	-4	-0.002128	pass

Band 4:

10 MHz Bandwidth					
Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	3.7	1710.4362	1754.7826	1710	1755
-20		1710.4387	1754.7831	1710	1755
-10		1710.4368	1754.7811	1710	1755
0		1710.4375	1754.7805	1710	1755
10		1710.4387	1754.7824	1710	1755
20		1710.4396	1754.7821	1710	1755
30		1710.4387	1754.7827	1710	1755
40		1710.4392	1754.7812	1710	1755
50		1710.4383	1754.7817	1710	1755
20	V min.= 3.5	1710.4385	1754.7816	1710	1755
	V max.= 4.2	1710.4396	1754.7830	1710	1755

Band 5:

10.0 MHz Middle Channel, f_o =836.5MHz				
Temperature (℃)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30		-6	-0.007172	2.5
-20		-1	-0.001195	2.5
-10		-2	-0.002391	2.5
0		-6	-0.007172	2.5
10	3.7	-1	-0.001195	2.5
20		-2	-0.002391	2.5
30		-2	-0.002391	2.5
40		-3	-0.003586	2.5
50		-1	-0.001195	2.5
20	V min.= 3.5	-2	-0.002391	2.5
	V max.= 4.2	-1	-0.001195	2.5

Band 7:

10 MHz Bandwidth					
Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30		2500.4524	2569.7031	2500	2570
-20		2500.4535	2569.7042	2500	2570
-10		2500.4541	2569.7019	2500	2570
0		2500.4551	2569.7061	2500	2570
10	3.7	2500.4529	2569.7074	2500	2570
20		2500.4537	2569.7034	2500	2570
30		2500.4544	2569.7024	2500	2570
40		2500.4534	2569.7019	2500	2570
50		2500.455	2569.7051	2500	2570
20	V min.= 3.5	2500.4534	2569.7047	2500	2570
	V max.= 4.2	2500.4562	2569.7061	2500	2570

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