FCC PART 27

FCC PART 22H, PART 24E

TEST REPORT

For

TP-Link Technologies Co., Ltd.

Building 24 (floors 1,3,4,5) and 28 (floors1-4),Central Science and Technology Park,Nanshan,Shenzhen,China

FCC ID: TE7C9SV1

Report Type:	**Product Type:**
Original Report	C9s FDD-LTE Smartphone

Report Number:	RSZ190506006-00D
Report Date:	2019-06-27
Reviewed By:	Hill He 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	C9s FDD-LTE Smartphone
Tested Model	TP7061C
Multiple Model#	TP7061CXYZZ
Frequency Range	Cellular: 824-849 MHz PCS: 1850-1910 MHz WCDMA B2/LTE B2: 1850-1910 MHz WCDMA B5: 824-849 MHz WCDMA B4/LTE B4: 1710- 1755 MHz LTE B7: 2500-2570 MHz
Transmit Power (Conducted)	GSM850: 32.34 dBm, PCS1900: 30.71 dBm WCDMA Band 2: 23.35 dBm; WCDMA Band 4: 23.17 dBm WCDMA Band 5: 22.79 dBm LTE Band 2: 23.06 dBm; LTE Band 4: 22.89 dBm LTE Band 7: 23.93 dBm
Modulation Technique	2G: GMSK,8PSK 3G: BPSK, QPSK, 16QAM 4G: QPSK, 16QAM
Antenna Specification	2G/3G/4G:FPC Antennas
Voltage Range	DC 3.85V from battery
Date of Test	2019-05-21~2019-06-07
Sample serial number	DG7061C940300001
Received date	2019-05-06
Sample/EUT Status	Good condition
Adapter information	Model: A8-501000 Input: AC 100-240V, 50/60Hz, 0.2A Output: DC 5V, 1A

Notes: This series products model: TP7061CXYZZ and TP7061C are identical schematics,Model TP7061C was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

Objective

This test report is prepared on behalf of *TP-Link Technologies Co., Ltd.* 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, Part 15.247 DTS, Part 15.407 NII and Part 15B JBP submissions with FCC ID: TE7C9SV1.

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.

The AUX antenna of this device does not support GSM B5 and WCDMA B5.

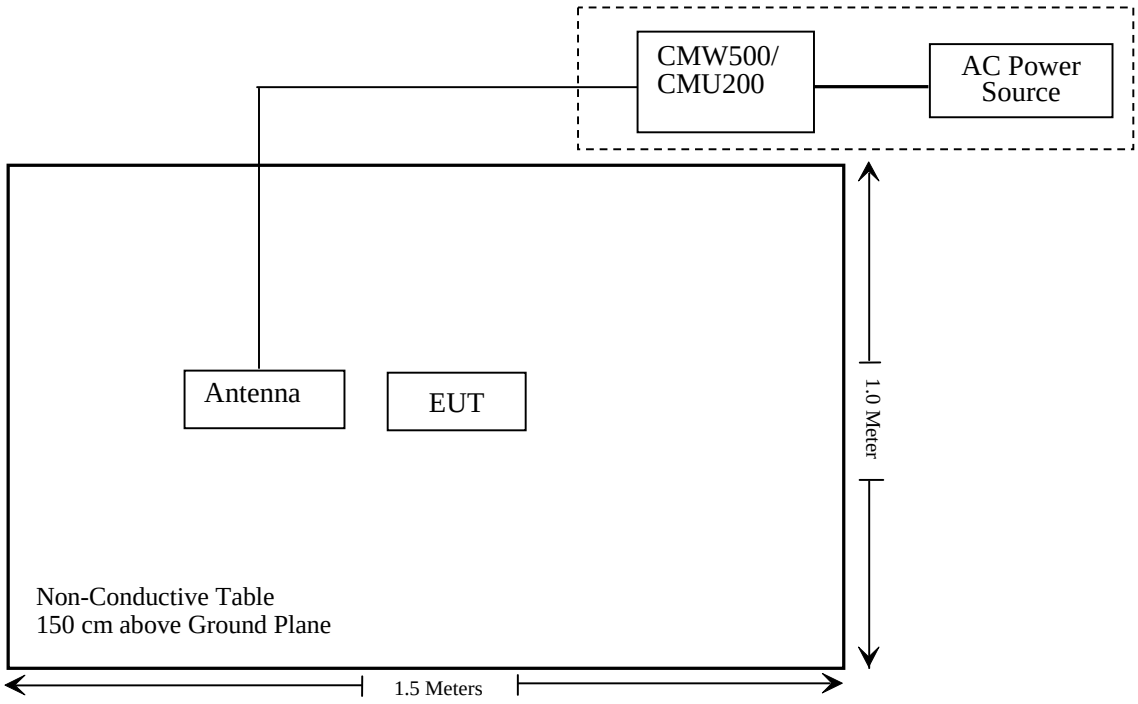
Equipment Modifications

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 (h)(m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	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: RSZ190506006-20.

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	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
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	ESR	1316.3003K03-101746-zn	2018-07-11	2019-07-11
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-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-11-12	2019-11-12

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
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2019-01-15	2020-01-15
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1316.3003K03-101746-zn	2018-08-19	2019-08-19
Ducommun Technologies	RF Cable	RG-214	3	Each Time	
WEINSCHEL	10dB Attenuator	5324	AU 3842	Each Time	
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: RSZ190506006-20.

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.

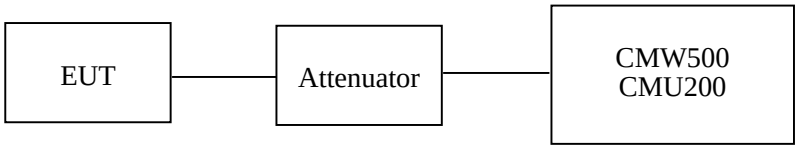
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

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.



Radiated method:

TIA 603-D section 2.2.17

Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	52~55 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by James Fu from 2019-05-28 to 2019-06-07.

Conducted Power

Cellular Band (Part 22H)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.24	38.45
	190	836.6	32.34	38.45
	251	848.8	32.31	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.18	31.49	29.79	28.63	38.45
	190	836.6	32.28	31.61	29.88	28.74	38.45
	251	848.8	32.31	31.58	29.87	28.75	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.91	25.56	22.91	21.43	38.45
	190	836.6	26.70	25.21	22.84	21.22	38.45
	251	848.8	26.61	25.17	22.85	21.28	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		22.77	22.75	22.79
		HSDPA	1	21.73	21.78	21.80
			2	21.75	21.83	21.88
			3	21.83	21.88	21.92
			4	21.86	21.90	22.00
		HSUPA	1	21.31	21.4	21.38
			2	21.38	21.43	21.46
			3	21.45	21.49	21.49
			4	21.52	21.54	21.54
			5	21.54	21.60	21.57
		HSPA+	1	21.37	21.29	21.41

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	30.71	33
	661	1880.0	30.39	33
	810	1909.8	30.11	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	30.33	29.55	27.79	26.65	33
	661	1880.0	30.16	29.37	27.62	26.48	33
	810	1909.8	29.96	29.15	27.50	26.36	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	26.35	24.98	22.89	21.89	33
	661	1880.0	26.10	24.73	22.85	21.91	33
	810	1909.8	26.15	24.70	22.82	21.94	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		23.35	23.05	22.95
		HSDPA	1	22.28	22.03	21.75
			2	22.36	22.09	21.82
			3	22.42	22.14	21.86
			4	22.45	22.17	21.91
		HSUPA	1	21.89	21.61	21.56
			2	21.95	21.68	21.63
			3	22.01	21.73	21.66
			4	22.07	21.80	21.73
			5	22.13	21.87	21.80
		HSPA+	1	21.57	21.49	21.39

AWS Band (Part 27)

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band IV)	Normal	RMC12.2k		22.89	23.17	23.13
		HSDPA	1	21.87	22.05	22.11
			2	21.91	22.12	22.17
			3	21.94	22.16	22.24
			4	22.00	22.20	22.28
		HSUPA	1	21.39	21.65	21.63
			2	21.45	21.71	21.71
			3	21.51	21.74	21.75
			4	21.55	21.78	21.79
			5	21.63	21.81	21.84
		HSPA+	1	21.33	21.53	21.39

Peak-to-average ratio (PAR)

Cellular Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.38	13
	Middle	1.35	13
	High	1.37	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.42	13
	Middle	1.41	13
	High	1.46	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.11	13
	Middle	3.08	13
	High	3.13	13
HSDPA (16QAM)	Low	3.51	13
	Middle	3.42	13
	High	3.55	13
HSUPA (BPSK)	Low	3.64	13
	Middle	3.65	13
	High	3.68	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.43	13
	Middle	1.44	13
	High	1.41	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.45	13
	Middle	1.47	13
	High	1.44	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.89	13
	Middle	2.85	13
	High	2.91	13
HSDPA (16QAM)	Low	3.36	13
	Middle	3.34	13
	High	3.38	13
HSUPA (BPSK)	Low	4.75	13
	Middle	4.74	13
	High	4.79	13

AWS Band

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.31	13
	Middle	3.20	13
	High	3.26	13
HSDPA (16QAM)	Low	4.39	13
	Middle	4.34	13
	High	4.35	13
HSUPA (BPSK)	Low	5.11	13
	Middle	5.10	13
	High	5.14	13

Radiated Power
AUX Antenna:
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 (dBi)			
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	88.07	9	2.3	H	18.4	1.30	9.40	26.50	33	6.5
1880.00	83.77	196	1.7	V	13.9	1.30	9.40	22.00	33	11

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 (dBi)			
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	83.03	160	1.2	H	13.4	1.30	9.40	21.50	33	11.50
1880.00	81.01	275	1.2	V	11.1	1.30	9.40	19.20	33	13.80

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 (dBi)			
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	80.19	229	1.2	H	10.5	1.30	9.40	18.60	33	14.4
1880.00	76.53	7	2.2	V	6.6	1.30	9.40	14.70	33	18.3
EIRP for WCDMA Band IV (Part 27), Middle Channel										
1732.50	85.51	283	1.4	H	12.2	1.30	8.90	18.80	30	11.2
1732.50	81.03	356	1.3	V	8.3	1.30	8.90	15.90	30	14.1

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

Main Antenna:
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 (dBi)			
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	93.02	343	2.2	H	30.6	0.7	0.0	29.90	38.45	8.55
836.6	87.16	164	2.4	V	26.7	0.7	0.0	26.00	38.45	12.45
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	88.96	98	2.4	H	19.3	1.30	9.40	27.40	33	5.6
1880.00	86.02	233	1.6	V	16.1	1.30	9.40	24.20	33	8.8

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 (dBi)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	86.92	195	2.4	H	23.6	0.7	0.0	22.90	38.45	15.55
836.6	80.06	24	2.3	V	19.7	0.7	0.0	19.00	38.45	19.45
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	85.06	302	1.7	H	15.0	1.30	9.40	23.10	33	9.9
1880.00	73.05	20	1.5	V	2.8	1.30	9.40	10.90	33	22.1

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 (dBi)			
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	82.59	137	1.7	H	20.2	0.7	0.0	19.50	38.45	18.95
836.6	76.42	187	1.2	V	16.0	0.7	0.0	15.30	38.45	23.15
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	80.66	207	1.0	H	11.0	1.30	9.40	19.10	33	13.90
1880.00	79.36	1	1.3	V	9.5	1.30	9.40	17.60	33	15.40
EIRP for WCDMA Band IV (Part 27), Middle Channel										
1732.60	85.65	324	2.1	H	12.3	1.30	8.90	19.90	30	10.10
1732.60	81.18	73	1.7	V	8.5	1.30	8.90	16.10	30	13.90

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

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	22.76	22.65	22.67
		RB Size=1, RB Offset=2	22.61	22.62	22.74
		RB Size=1, RB Offset=5	22.37	22.57	22.54
		RB Size=3, RB Offset=0	22.43	22.42	22.44
		RB Size=3, RB Offset=1	22.37	22.31	22.30
		RB Size=3, RB Offset=2	22.20	22.21	22.20
		RB Size=6, RB Offset=0	22.21	22.15	22.26
	16QAM	RB Size=1, RB Offset=0	22.20	22.07	22.14
		RB Size=1, RB Offset=2	22.03	22.00	22.06
		RB Size=1, RB Offset=5	22.05	22.04	23.13
		RB Size=3, RB Offset=0	21.67	21.72	22.98
		RB Size=3, RB Offset=1	21.84	21.79	21.80
		RB Size=3, RB Offset=2	21.86	21.81	21.84
		RB Size=6, RB Offset=0	21.84	21.77	21.81
3.0	QPSK	RB Size=1, RB Offset=0	22.84	22.66	22.87
		RB Size=1, RB Offset=7	22.81	22.64	22.71
		RB Size=1, RB Offset=14	22.64	22.69	22.80
		RB Size=8, RB Offset=0	22.02	21.96	22.00
		RB Size=8, RB Offset=4	21.81	21.66	21.77
		RB Size=8, RB Offset=7	21.59	21.58	21.76
		RB Size=15, RB Offset=0	21.78	21.89	21.85
	16QAM	RB Size=1, RB Offset=0	22.21	22.06	22.03
		RB Size=1, RB Offset=7	22.14	22.14	22.07
		RB Size=1, RB Offset=14	22.22	21.80	22.01
		RB Size=8, RB Offset=0	20.83	20.90	20.90
		RB Size=8, RB Offset=4	20.72	20.76	20.91
		RB Size=8, RB Offset=7	20.47	20.70	20.78
		RB Size=15, RB Offset=0	20.70	20.66	20.69

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	22.96	22.85	23.00
		RB Size=1, RB Offset=12	22.77	22.75	22.77
		RB Size=1, RB Offset=24	22.41	22.85	22.39
		RB Size=12, RB Offset=0	21.93	21.88	21.86
		RB Size=12, RB Offset=6	21.96	21.64	21.69
		RB Size=12, RB Offset=11	21.85	21.59	21.71
		RB Size=25, RB Offset=0	21.70	21.61	21.75
	16QAM	RB Size=1, RB Offset=0	22.13	21.66	21.79
		RB Size=1, RB Offset=12	21.90	21.32	21.64
		RB Size=1, RB Offset=24	21.84	21.51	21.61
		RB Size=12, RB Offset=0	20.94	20.87	20.73
		RB Size=12, RB Offset=6	20.73	20.68	20.77
		RB Size=12, RB Offset=11	20.54	20.46	20.70
		RB Size=25, RB Offset=0	20.88	20.85	20.77
10.0	QPSK	RB Size=1, RB Offset=0	22.85	22.86	22.70
		RB Size=1, RB Offset=24	22.74	22.77	22.65
		RB Size=1, RB Offset=49	22.58	22.73	22.60
		RB Size=25, RB Offset=0	21.80	21.76	21.78
		RB Size=25, RB Offset=12	21.75	21.69	21.55
		RB Size=25, RB Offset=24	21.87	21.65	21.51
		RB Size=50, RB Offset=0	21.65	21.47	21.58
	16QAM	RB Size=1, RB Offset=0	21.83	21.70	21.78
		RB Size=1, RB Offset=24	21.64	21.54	21.57
		RB Size=1, RB Offset=49	21.58	21.38	21.82
		RB Size=25, RB Offset=0	21.65	20.74	20.79
		RB Size=25, RB Offset=12	21.64	20.43	20.47
		RB Size=25, RB Offset=24	21.60	20.36	20.34
		RB Size=50, RB Offset=0	20.63	20.44	20.66

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	22.18	22.04	22.44
		RB Size=1, RB Offset=37	22.07	22.06	22.29
		RB Size=1, RB Offset=74	22.02	22.09	22.34
		RB Size=36, RB Offset=0	22.19	22.05	22.04
		RB Size=36, RB Offset=18	22.07	21.99	21.99
		RB Size=36, RB Offset=37	22.07	21.63	21.59
		RB Size=75, RB Offset=0	21.89	21.98	22.02
	16QAM	RB Size=1, RB Offset=0	21.84	21.93	21.73
		RB Size=1, RB Offset=37	21.92	21.80	21.54
		RB Size=1, RB Offset=74	21.80	21.83	21.56
		RB Size=36, RB Offset=0	21.73	21.74	22.05
		RB Size=36, RB Offset=18	21.76	21.74	22.06
		RB Size=36, RB Offset=37	21.53	21.54	21.91
		RB Size=75, RB Offset=0	21.21	21.18	20.94
20.0	QPSK	RB Size=1, RB Offset=0	22.84	22.94	22.99
		RB Size=1, RB Offset=49	23.06	22.93	22.89
		RB Size=1, RB Offset=99	22.76	22.88	22.72
		RB Size=50, RB Offset=0	21.80	21.92	21.93
		RB Size=50, RB Offset=24	21.91	21.77	21.92
		RB Size=50, RB Offset=49	21.69	21.71	21.70
		RB Size=100, RB Offset=0	21.83	21.85	21.85
	16QAM	RB Size=1, RB Offset=0	22.05	21.96	22.08
		RB Size=1, RB Offset=49	21.93	21.84	21.98
		RB Size=1, RB Offset=99	21.97	21.69	21.85
		RB Size=50, RB Offset=0	20.86	20.86	21.06
		RB Size=50, RB Offset=24	20.93	20.78	20.99
		RB Size=50, RB Offset=49	20.47	20.74	20.86
		RB Size=100, RB Offset=0	20.78	20.81	21.03

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.40	13	Pass
QPSK (100RB Size)	6.36	13	Pass
16QAM (1RB Size)	7.88	13	Pass
16QAM (100RB Size)	7.42	13	Pass

AUX Antenna:

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	81.05	222	1.8	H	11.4	1.30	9.40	19.50	33
1880.00	75.83	284	1.9	V	5.9	1.30	9.40	14.00	33
3 MHz Bandwidth									
1880.00	81.07	227	2.0	H	11.4	1.30	9.40	19.50	33
1880.00	75.03	261	1.5	V	5.1	1.30	9.40	13.20	33
5 MHz Bandwidth									
1880.00	81.51	89	1.6	H	11.8	1.30	9.40	19.90	33
1880.00	75.59	26	1.6	V	5.7	1.30	9.40	13.80	33
10 MHz Bandwidth									
1880.00	81.23	57	1.6	H	11.6	1.30	9.40	19.70	33
1880.00	75.84	43	2.0	V	5.9	1.30	9.40	14.00	33
15 MHz Bandwidth									
1880.00	81.53	28	2.3	H	11.9	1.30	9.40	20.00	33
1880.00	77.03	345	2.2	V	7.1	1.30	9.40	15.20	33
20 MHz Bandwidth									
1880.00	81.32	28	2.3	H	11.7	1.30	9.40	19.80	33
1880.00	77.15	345	2.2	V	7.3	1.30	9.40	15.40	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	81.05	310	2.5	H	11.4	1.30	9.40	19.50	33
1880.00	75.04	202	1.2	V	5.1	1.30	9.40	13.20	33
3 MHz Bandwidth									
1880.00	81.20	344	1.8	H	11.5	1.30	9.40	19.60	33
1880.00	75.12	314	1.5	V	5.2	1.30	9.40	13.30	33
5 MHz Bandwidth									
1880.00	81.52	63	1.2	H	11.8	1.30	9.40	19.90	33
1880.00	75.31	215	1.4	V	5.4	1.30	9.40	13.50	33
10 MHz Bandwidth									
1880.00	81.05	170	1.2	H	11.4	1.30	9.40	19.50	33
1880.00	75.54	229	1.7	V	5.6	1.30	9.40	13.70	33
15 MHz Bandwidth									
1880.00	81.07	28	2.3	H	11.4	1.30	9.40	19.50	33
1880.00	76.77	345	2.2	V	6.9	1.30	9.40	15.00	33
20 MHz Bandwidth									
1880.00	81.56	28	2.3	H	11.9	1.30	9.40	20.00	33
1880.00	77.21	345	2.2	V	7.3	1.30	9.40	15.40	33

Main Antenna:

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	81.24	278	1.6	H	11.6	1.30	9.40	19.70	33
1880.00	75.81	335	2.5	V	5.9	1.30	9.40	14.00	33
3 MHz Bandwidth									
1880.00	81.21	185	2.1	H	11.5	1.30	9.40	19.60	33
1880.00	76.22	200	1.8	V	6.3	1.30	9.40	14.40	33
5 MHz Bandwidth									
1880.00	81.29	74	1.7	H	11.6	1.30	9.40	19.70	33
1880.00	75.98	352	1.8	V	6.1	1.30	9.40	14.20	33
10 MHz Bandwidth									
1880.00	80.93	324	1.4	H	11.3	1.30	9.40	19.40	33
1880.00	75.87	199	2.5	V	6.0	1.30	9.40	14.10	33
15 MHz Bandwidth									
1880.00	81.38	28	2.3	H	11.7	1.30	9.40	19.80	33
1880.00	77.13	345	2.2	V	7.2	1.30	9.40	15.30	33
20 MHz Bandwidth									
1880.00	81.32	28	2.3	H	11.7	1.30	9.40	19.80	33
1880.00	77.15	345	2.2	V	7.3	1.30	9.40	15.40	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	81.24	28	2.3	H	11.6	1.30	9.40	19.70	33
1880.00	76.19	345	2.2	V	6.3	1.30	9.40	14.40	33
3 MHz Bandwidth									
1880.00	81.21	106	1.9	H	11.5	1.30	9.40	19.60	33
1880.00	76.30	8	2.5	V	6.4	1.30	9.40	14.50	33
5 MHz Bandwidth									
1880.00	81.31	193	1.7	H	11.6	1.30	9.40	19.70	33
1880.00	75.82	166	1.3	V	5.9	1.30	9.40	14.00	33
10 MHz Bandwidth									
1880.00	81.11	195	1.8	H	11.4	1.30	9.40	19.50	33
1880.00	76.19	198	1.3	V	6.3	1.30	9.40	14.40	33
15 MHz Bandwidth									
1880.00	81.27	28	2.3	H	11.6	1.30	9.40	19.70	33
1880.00	76.97	345	2.2	V	7.1	1.30	9.40	15.20	33
20 MHz Bandwidth									
1880.00	81.36	28	2.3	H	11.7	1.30	9.40	19.80	33
1880.00	77.41	345	2.2	V	7.5	1.30	9.40	15.60	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	22.48	22.35	22.44
		RB Size=1, RB Offset=2	22.52	22.26	22.49
		RB Size=1, RB Offset=5	22.45	22.09	22.57
		RB Size=3, RB Offset=0	22.71	22.71	22.62
		RB Size=3, RB Offset=1	22.60	22.70	22.66
		RB Size=3, RB Offset=2	22.57	22.56	22.46
		RB Size=6, RB Offset=0	21.48	21.50	21.52
	16QAM	RB Size=1, RB Offset=0	21.83	21.85	21.97
		RB Size=1, RB Offset=2	21.76	21.82	21.80
		RB Size=1, RB Offset=5	21.73	21.91	21.76
		RB Size=3, RB Offset=0	22.89	21.78	21.83
		RB Size=3, RB Offset=1	22.79	21.73	21.92
		RB Size=3, RB Offset=2	22.66	21.69	21.62
		RB Size=6, RB Offset=0	20.77	20.76	20.64
3.0	QPSK	RB Size=1, RB Offset=0	22.59	22.50	22.40
		RB Size=1, RB Offset=7	22.41	22.32	22.32
		RB Size=1, RB Offset=14	22.36	22.36	22.33
		RB Size=8, RB Offset=0	21.58	21.57	21.65
		RB Size=8, RB Offset=4	21.52	21.56	21.70
		RB Size=8, RB Offset=7	21.40	21.28	21.59
		RB Size=15, RB Offset=0	21.63	21.53	21.77
	16QAM	RB Size=1, RB Offset=0	21.76	21.57	21.54
		RB Size=1, RB Offset=7	21.73	21.50	21.39
		RB Size=1, RB Offset=14	21.72	21.57	21.31
		RB Size=8, RB Offset=0	20.75	20.58	20.71
		RB Size=8, RB Offset=4	20.48	20.60	20.77
		RB Size=8, RB Offset=7	20.54	20.67	20.66
		RB Size=15, RB Offset=0	20.67	20.78	20.71

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	22.83	22.56	22.75
		RB Size=1, RB Offset=12	22.70	22.62	22.57
		RB Size=1, RB Offset=24	22.56	22.56	22.58
		RB Size=12, RB Offset=0	21.84	21.71	21.76
		RB Size=12, RB Offset=6	21.76	21.59	21.56
		RB Size=12, RB Offset=11	21.60	21.73	21.76
		RB Size=25, RB Offset=0	21.78	21.62	21.85
	16QAM	RB Size=1, RB Offset=0	22.00	22.02	21.98
		RB Size=1, RB Offset=12	21.76	21.74	21.78
		RB Size=1, RB Offset=24	21.73	21.75	21.77
		RB Size=12, RB Offset=0	20.95	21.07	20.92
		RB Size=12, RB Offset=6	20.74	21.07	20.89
		RB Size=12, RB Offset=11	20.77	20.76	20.74
		RB Size=25, RB Offset=0	20.83	20.61	20.70
10.0	QPSK	RB Size=1, RB Offset=0	22.71	22.79	22.85
		RB Size=1, RB Offset=24	22.82	22.63	22.78
		RB Size=1, RB Offset=49	22.46	22.76	22.68
		RB Size=25, RB Offset=0	21.90	21.78	21.76
		RB Size=25, RB Offset=12	21.59	21.76	21.78
		RB Size=25, RB Offset=24	21.68	21.60	21.73
		RB Size=50, RB Offset=0	21.87	21.68	21.70
	16QAM	RB Size=1, RB Offset=0	22.18	22.11	22.26
		RB Size=1, RB Offset=24	22.19	22.11	22.33
		RB Size=1, RB Offset=49	22.34	22.04	22.07
		RB Size=25, RB Offset=0	20.98	20.80	20.84
		RB Size=25, RB Offset=12	20.64	20.77	20.89
		RB Size=25, RB Offset=24	20.59	20.79	20.75
		RB Size=50, RB Offset=0	20.99	20.93	20.87

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	22.57	22.51	22.55
		RB Size=1, RB Offset=37	22.66	22.46	22.49
		RB Size=1, RB Offset=74	22.55	22.39	22.51
		RB Size=36, RB Offset=0	21.96	21.97	21.89
		RB Size=36, RB Offset=18	21.98	21.70	21.81
		RB Size=36, RB Offset=37	21.97	21.74	21.70
		RB Size=75, RB Offset=0	21.82	21.66	21.61
	16QAM	RB Size=1, RB Offset=0	21.81	21.61	21.63
		RB Size=1, RB Offset=37	21.58	21.47	21.64
		RB Size=1, RB Offset=74	21.42	21.32	21.41
		RB Size=36, RB Offset=0	20.74	20.82	20.73
		RB Size=36, RB Offset=18	20.80	20.52	20.68
		RB Size=36, RB Offset=37	20.53	20.60	20.55
		RB Size=75, RB Offset=0	20.78	20.68	20.75
20.0	QPSK	RB Size=1, RB Offset=0	22.68	22.49	22.46
		RB Size=1, RB Offset=49	22.73	22.23	22.54
		RB Size=1, RB Offset=99	22.70	22.34	22.10
		RB Size=50, RB Offset=0	21.80	21.97	21.91
		RB Size=50, RB Offset=24	21.77	21.96	21.87
		RB Size=50, RB Offset=49	21.85	21.71	21.84
		RB Size=100, RB Offset=0	21.85	21.55	21.47
	16QAM	RB Size=1, RB Offset=0	22.38	22.34	22.32
		RB Size=1, RB Offset=49	22.17	22.24	22.40
		RB Size=1, RB Offset=99	21.98	22.26	22.33
		RB Size=50, RB Offset=0	20.97	20.94	21.04
		RB Size=50, RB Offset=24	20.89	21.02	21.15
		RB Size=50, RB Offset=49	20.79	20.99	21.00
		RB Size=100, RB Offset=0	20.90	20.67	20.81

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.55	13	Pass
QPSK (100RB Size)	6.57	13	Pass
16QAM (1RB Size)	7.85	13	Pass
16QAM (100RB Size)	7.63	13	Pass

AUX Antenna:

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	85.10	59	1.6	H	11.8	1.30	8.90	19.40	30
1732.50	79.58	47	1.4	V	6.9	1.30	8.90	14.50	30
3 MHz Bandwidth									
1732.50	84.57	184	1.3	H	11.2	1.30	8.90	18.80	30
1732.50	79.82	355	1.2	V	7.1	1.30	8.90	14.70	30
5 MHz Bandwidth									
1732.50	84.08	244	1.2	H	10.7	1.30	8.90	18.30	30
1732.50	79.81	239	1.7	V	7.1	1.30	8.90	14.70	30
10 MHz Bandwidth									
1732.50	85.03	258	2.2	H	11.7	1.30	8.90	19.30	30
1732.50	79.31	47	2.0	V	6.6	1.30	8.90	14.20	30
15 MHz Bandwidth									
1732.50	84.15	304	2.4	H	10.8	1.30	8.90	18.40	30
1732.50	79.49	105	1.2	V	6.8	1.30	8.90	14.40	30
20 MHz Bandwidth									
1732.50	84.69	150	1.4	H	11.4	1.30	8.90	19.00	30
1732.50	79.06	85	1.7	V	6.3	1.30	8.90	13.90	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	84.40	194	1.9	H	11.1	1.30	8.90	18.70	30
1732.50	79.94	212	1.6	V	7.2	1.30	8.90	14.80	30
3 MHz Bandwidth									
1732.50	85.36	156	2.1	H	12.0	1.30	8.90	19.60	30
1732.50	79.17	35	1.7	V	6.4	1.30	8.90	14.00	30
5 MHz Bandwidth									
1732.50	84.72	158	2.2	H	11.4	1.30	8.90	19.00	30
1732.50	79.80	328	1.6	V	7.1	1.30	8.90	14.70	30
10 MHz Bandwidth									
1732.50	85.43	46	2.5	H	12.1	1.30	8.90	19.70	30
1732.50	79.59	286	2.2	V	6.9	1.30	8.90	14.50	30
15 MHz Bandwidth									
1732.50	85.24	232	1.3	H	11.9	1.30	8.90	19.50	30
1732.50	79.89	84	2.2	V	7.2	1.30	8.90	14.80	30
20 MHz Bandwidth									
1732.50	85.17	226	1.0	H	11.8	1.30	8.90	19.40	30
1732.50	79.85	67	1.2	V	7.1	1.30	8.90	14.70	30

Main Antenna:

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	85.21	269	2.1	H	11.9	1.30	8.90	19.50	30
1732.50	80.17	102	1.7	V	7.4	1.30	8.90	15.00	30
3 MHz Bandwidth									
1732.50	84.91	38	1.6	H	11.6	1.30	8.90	19.20	30
1732.50	80.12	302	1.5	V	7.4	1.30	8.90	15.00	30
5 MHz Bandwidth									
1732.50	85.13	86	1.6	H	11.8	1.30	8.90	19.40	30
1732.50	80.23	39	2.3	V	7.5	1.30	8.90	15.10	30
10 MHz Bandwidth									
1732.50	84.96	42	1.7	H	11.6	1.30	8.90	19.20	30
1732.50	80.20	252	1.4	V	7.5	1.30	8.90	15.10	30
15 MHz Bandwidth									
1732.50	85.02	297	1.4	H	11.7	1.30	8.90	19.30	30
1732.50	80.07	268	2.4	V	7.3	1.30	8.90	14.90	30
20 MHz Bandwidth									
1732.50	85.37	73	2.3	H	12.0	1.30	8.90	19.60	30
1732.50	80.09	80	2.0	V	7.4	1.30	8.90	15.00	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	85.13	40	1.3	H	11.8	1.30	8.90	19.40	30
1732.50	80.28	45	1.1	V	7.6	1.30	8.90	15.20	30
3 MHz Bandwidth									
1732.50	85.33	189	2.0	H	12.0	1.30	8.90	19.60	30
1732.50	79.95	94	1.8	V	7.2	1.30	8.90	14.80	30
5 MHz Bandwidth									
1732.50	85.26	276	1.6	H	11.9	1.30	8.90	19.50	30
1732.50	80.20	334	1.1	V	7.5	1.30	8.90	15.10	30
10 MHz Bandwidth									
1732.50	85.18	8	2.5	H	11.8	1.30	8.90	19.40	30
1732.50	79.88	187	2.3	V	7.1	1.30	8.90	14.70	30
15 MHz Bandwidth									
1732.50	85.21	88	2.5	H	11.9	1.30	8.90	19.50	30
1732.50	80.17	88	1.8	V	7.4	1.30	8.90	15.00	30
20 MHz Bandwidth									
1732.50	85.04	339	2.0	H	11.7	1.30	8.90	19.30	30
1732.50	80.14	269	1.9	V	7.4	1.30	8.90	15.00	30

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	23.16	23.04	22.56
		RB Size=1, RB Offset=12	22.81	22.52	22.39
		RB Size=1, RB Offset=24	23.45	22.94	22.93
		RB Size=12, RB Offset=0	22.02	21.56	21.34
		RB Size=12, RB Offset=6	22.00	21.51	21.36
		RB Size=12, RB Offset=11	22.05	21.61	21.51
		RB Size=25, RB Offset=0	21.94	21.45	22.26
	16QAM	RB Size=1, RB Offset=0	22.51	21.93	22.04
		RB Size=1, RB Offset=12	22.52	21.74	22.15
		RB Size=1, RB Offset=24	22.66	21.99	22.27
		RB Size=12, RB Offset=0	21.76	20.94	21.42
		RB Size=12, RB Offset=6	21.71	21.07	21.41
		RB Size=12, RB Offset=11	21.65	20.94	21.47
		RB Size=25, RB Offset=0	20.96	20.76	20.60
10	QPSK	RB Size=1, RB Offset=0	22.74	22.46	22.84
		RB Size=1, RB Offset=24	22.76	22.30	22.62
		RB Size=1, RB Offset=49	22.53	22.31	22.82
		RB Size=25, RB Offset=0	21.89	21.63	22.19
		RB Size=25, RB Offset=12	21.83	21.77	22.08
		RB Size=25, RB Offset=24	21.80	21.71	22.03
		RB Size=50, RB Offset=0	21.17	21.39	21.56
	16QAM	RB Size=1, RB Offset=0	21.93	22.06	21.93
		RB Size=1, RB Offset=24	21.68	22.26	22.05
		RB Size=1, RB Offset=49	21.75	22.18	21.99
		RB Size=25, RB Offset=0	21.07	21.21	21.13
		RB Size=25, RB Offset=12	21.05	21.15	21.04
		RB Size=25, RB Offset=24	21.14	21.36	21.23
		RB Size=50, RB Offset=0	21.20	20.49	20.69

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15	QPSK	RB Size=1, RB Offset=0	22.69	22.63	23.93
		RB Size=1, RB Offset=37	22.69	22.77	23.52
		RB Size=1, RB Offset=74	22.69	22.74	23.94
		RB Size=36, RB Offset=0	22.12	22.01	22.85
		RB Size=36, RB Offset=18	21.97	21.60	23.17
		RB Size=36, RB Offset=37	22.00	21.87	23.00
		RB Size=75, RB Offset=0	22.09	21.30	22.18
	16QAM	RB Size=1, RB Offset=0	22.08	21.81	22.59
		RB Size=1, RB Offset=37	22.01	21.60	22.74
		RB Size=1, RB Offset=74	22.04	21.72	22.80
		RB Size=36, RB Offset=0	21.12	20.91	21.89
		RB Size=36, RB Offset=18	21.32	21.04	21.78
		RB Size=36, RB Offset=37	21.15	20.93	21.91
		RB Size=75, RB Offset=0	20.65	20.62	21.31
20	QPSK	RB Size=1, RB Offset=0	22.86	23.02	23.60
		RB Size=1, RB Offset=49	22.62	22.99	23.36
		RB Size=1, RB Offset=99	23.11	23.04	23.67
		RB Size=50, RB Offset=0	22.09	22.26	22.80
		RB Size=50, RB Offset=24	22.01	22.21	22.78
		RB Size=50, RB Offset=49	22.13	22.10	22.73
		RB Size=100, RB Offset=0	22.23	21.63	22.55
	16QAM	RB Size=1, RB Offset=0	22.06	22.24	22.81
		RB Size=1, RB Offset=49	21.86	22.38	22.59
		RB Size=1, RB Offset=99	22.07	22.39	22.82
		RB Size=50, RB Offset=0	21.44	21.23	22.06
		RB Size=50, RB Offset=24	21.32	21.63	22.13
		RB Size=50, RB Offset=49	21.27	21.48	22.03
		RB Size=100, RB Offset=0	21.29	20.85	21.55

EIRP:

AUX Antenna:
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	81.81	299	2.3	H	11.6	2.60	10.20	19.20	33
2535.00	75.17	306	1.5	V	5.6	2.60	10.20	13.20	33
10 MHz Bandwidth									
2535.00	82.23	136	2.3	H	12.1	2.60	10.20	19.70	33
2535.00	75.12	39	2.2	V	5.6	2.60	10.20	13.20	33
15 MHz Bandwidth									
2535.00	82.45	36	2.1	H	12.3	2.60	10.20	19.90	33
2535.00	75.58	136	1.9	V	6.0	2.60	10.20	13.60	33
20 MHz Bandwidth									
2535.00	82.56	191	2.0	H	12.4	2.60	10.20	20.00	33
2535.00	75.55	41	1.7	V	6.0	2.60	10.20	13.60	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	81.86	175	1.6	H	11.7	2.60	10.20	19.30	33
2535.00	75.76	325	1.1	V	6.2	2.60	10.20	13.80	33
10 MHz Bandwidth									
2535.00	82.12	336	2.0	H	11.9	2.60	10.20	19.50	33
2535.00	75.27	211	2.4	V	5.7	2.60	10.20	13.30	33
15 MHz Bandwidth									
2535.00	82.53	220	1.4	H	12.4	2.60	10.20	20.00	33
2535.00	75.69	213	1.4	V	6.1	2.60	10.20	13.70	33
20 MHz Bandwidth									
2535.00	82.03	229	1.5	H	11.9	2.60	10.20	19.50	33
2535.00	75.36	199	1.4	V	5.8	2.60	10.20	13.40	33

Main Antenna:
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	81.73	205	1.7	H	11.6	2.60	10.20	19.20	33
2535.00	74.91	213	1.3	V	5.3	2.60	10.20	12.90	33
10 MHz Bandwidth									
2535.00	83.27	326	2.0	H	13.1	2.60	10.20	20.70	33
2535.00	78.10	162	2.3	V	8.5	2.60	10.20	16.10	33
15 MHz Bandwidth									
2535.00	83.28	54	2.2	H	13.1	2.60	10.20	20.70	33
2535.00	78.25	35	2.1	V	8.7	2.60	10.20	16.30	33
20 MHz Bandwidth									
2535.00	83.12	182	1.2	H	12.9	2.60	10.20	20.50	33
2535.00	77.91	168	1.2	V	8.3	2.60	10.20	15.90	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	83.21	157	1.5	H	13.0	2.60	10.20	20.60	33
2535.00	78.00	166	1.3	V	8.4	2.60	10.20	16.00	33
10 MHz Bandwidth									
2535.00	83.01	40	2.5	H	12.8	2.60	10.20	20.40	33
2535.00	77.83	138	1.8	V	8.3	2.60	10.20	15.90	33
15 MHz Bandwidth									
2535.00	83.05	273	2.1	H	12.9	2.60	10.20	20.50	33
2535.00	78.27	315	1.1	V	8.7	2.60	10.20	16.30	33
20 MHz Bandwidth									
2535.00	83.09	123	1.5	H	12.9	2.60	10.20	20.50	33
2535.00	78.25	12	2.2	V	8.7	2.60	10.20	16.30	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

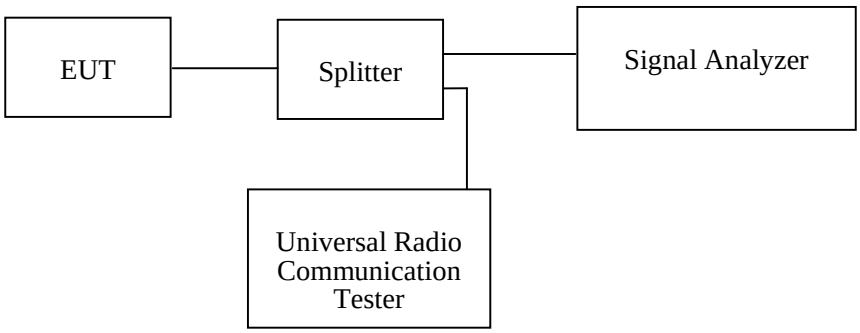
Applicable Standard

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.



Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	50~55 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by James Fu on 2019-05-21 to 2019-05-28.

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	245.19	315.71
EGPRS(8PSK)	836.6	251.60	312.50

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.17	4.73
HSUPA (BPSK)	836.6	4.18	4.94
HSDPA (16QAM)	836.6	4.21	4.94

PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	245.19	318.91
EGPRS(8PSK)	1880.0	250.00	309.29

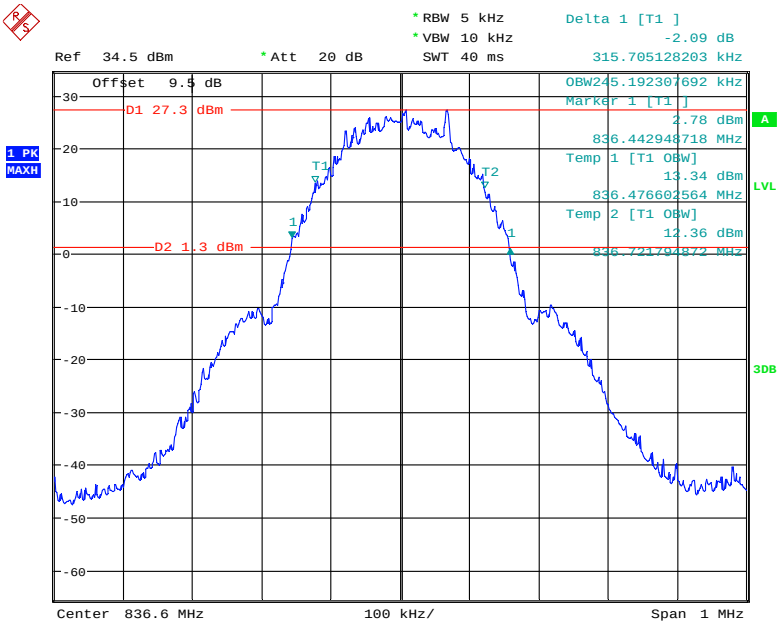
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.18	4.74
HSUPA (BPSK)	1880.0	4.20	4.74
HSDPA (16QAM)	1880.0	4.20	4.74

AWS Band (Part 27)

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1732.6	4.17	4.73
HSUPA (BPSK)	1732.6	4.18	4.73
HSDPA (16QAM)	1732.6	4.17	4.71

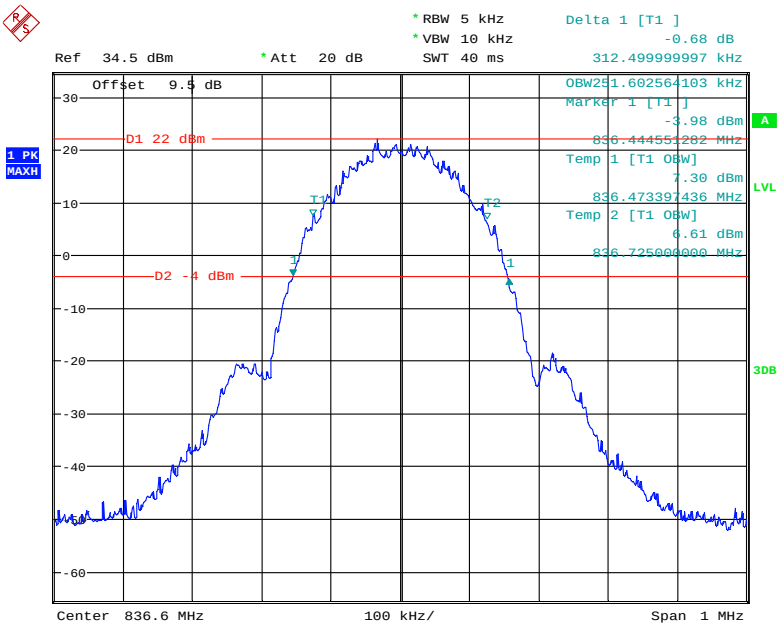
Cellular Band (Part 22H)

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



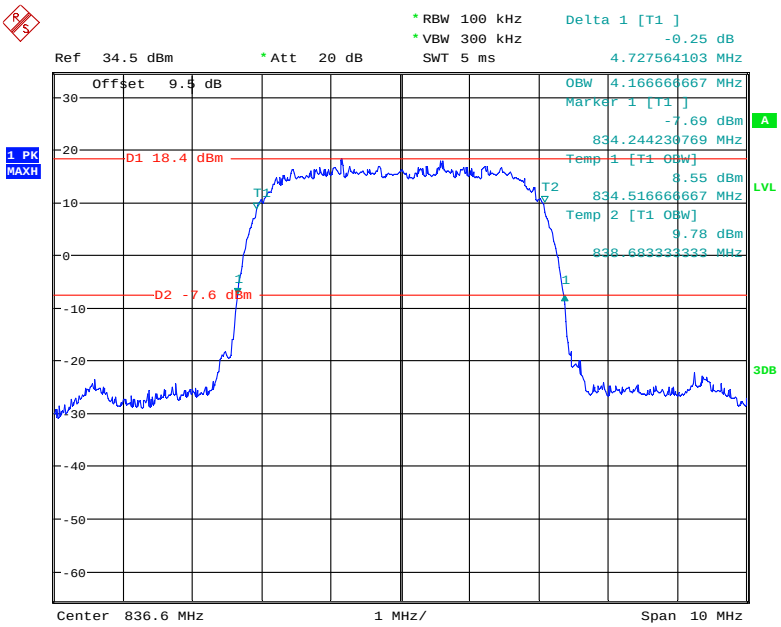
Date: 21.MAY.2019 20:17:27

26 dB Emissions &99% Occupied Bandwidth for EDGE Mode



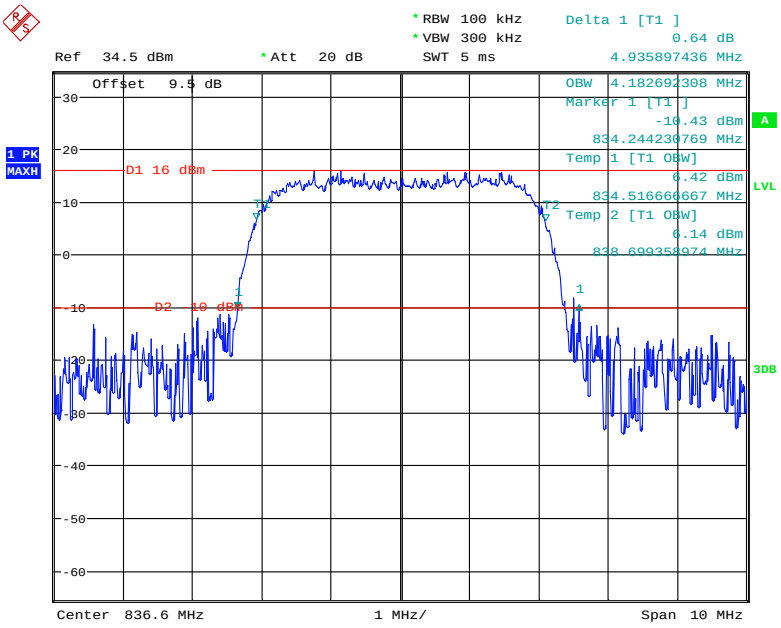
Date: 21.MAY.2019 20:28:58

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



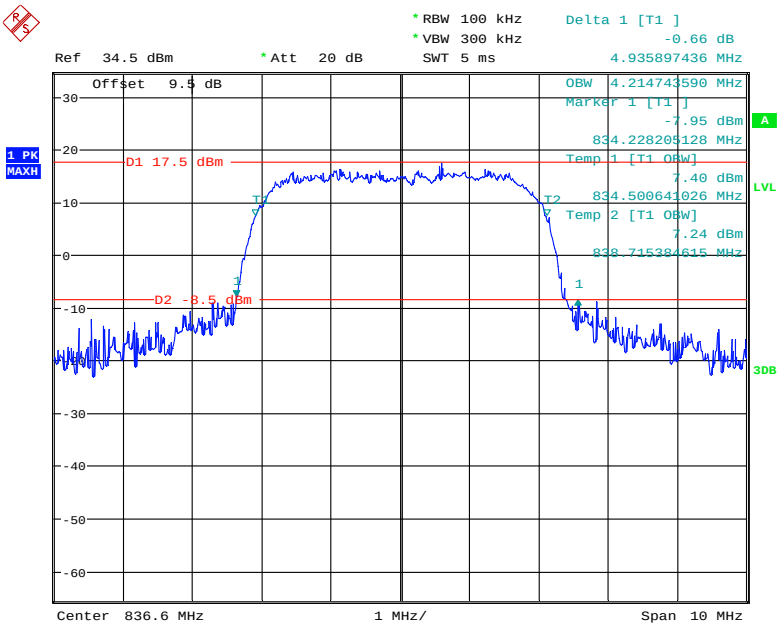
Date: 21.MAY.2019 21:03:47

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



Date: 21.MAY.2019 21:05:30

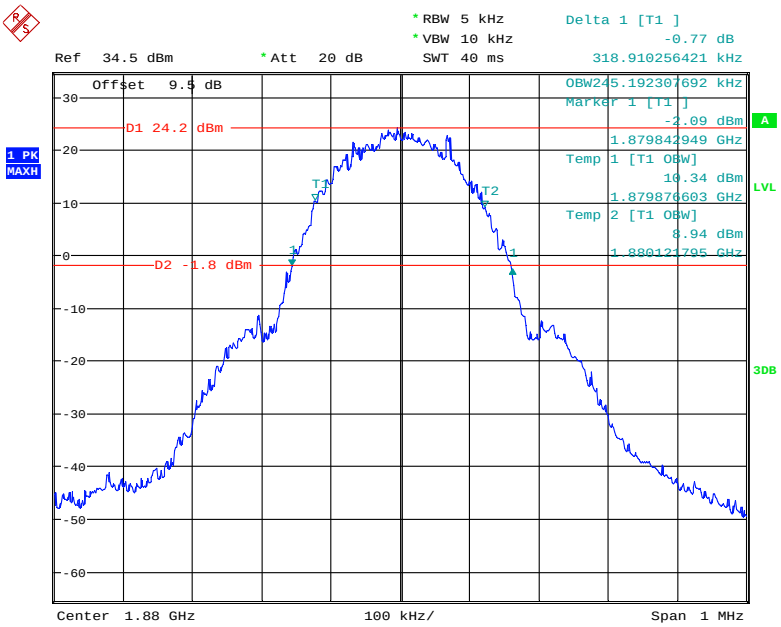
26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 21.MAY.2019 21:07:45

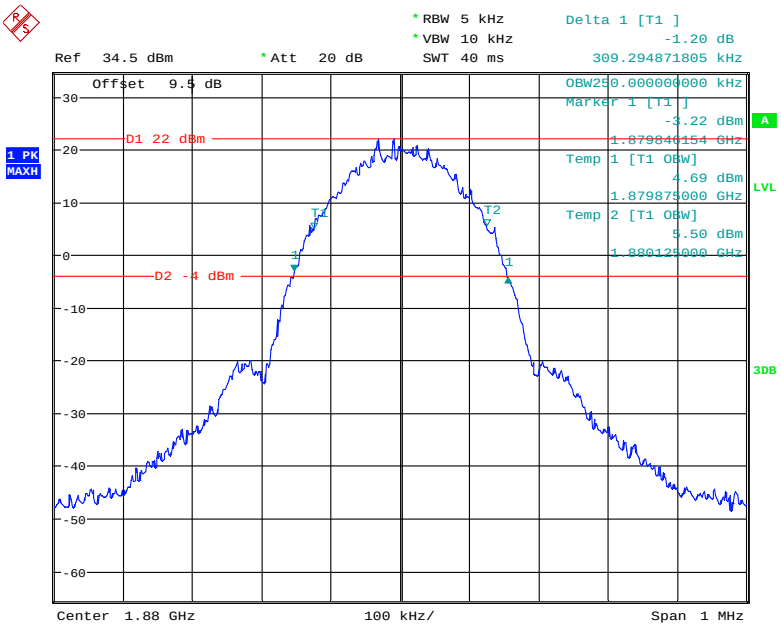
PCS Band (Part 24E)

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



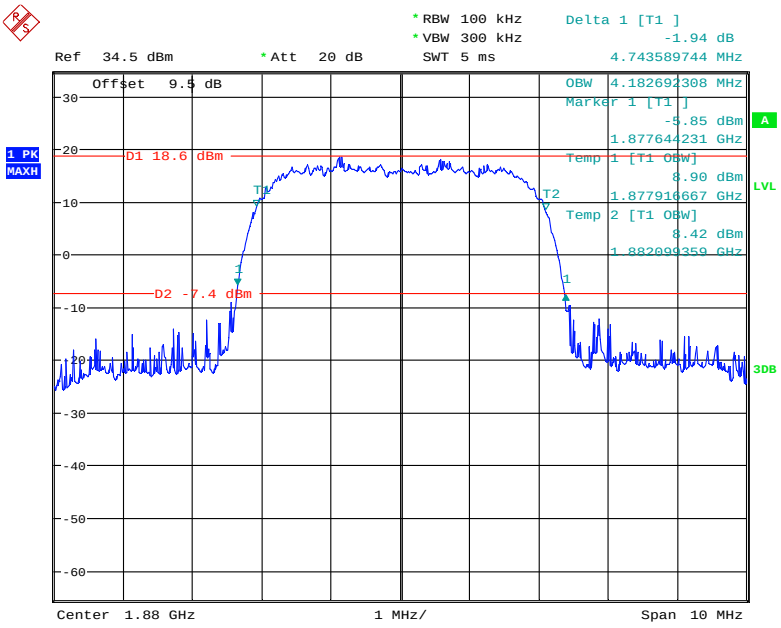
Date: 21.MAY.2019 20:33:15

26 dB Emissions &99% Occupied Bandwidth for EDGE Mode



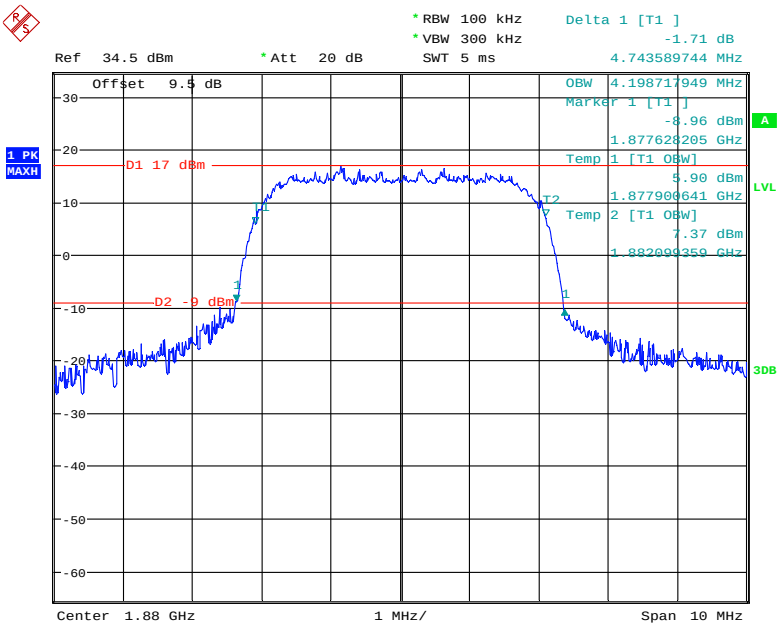
Date: 21.MAY.2019 20:43:28

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



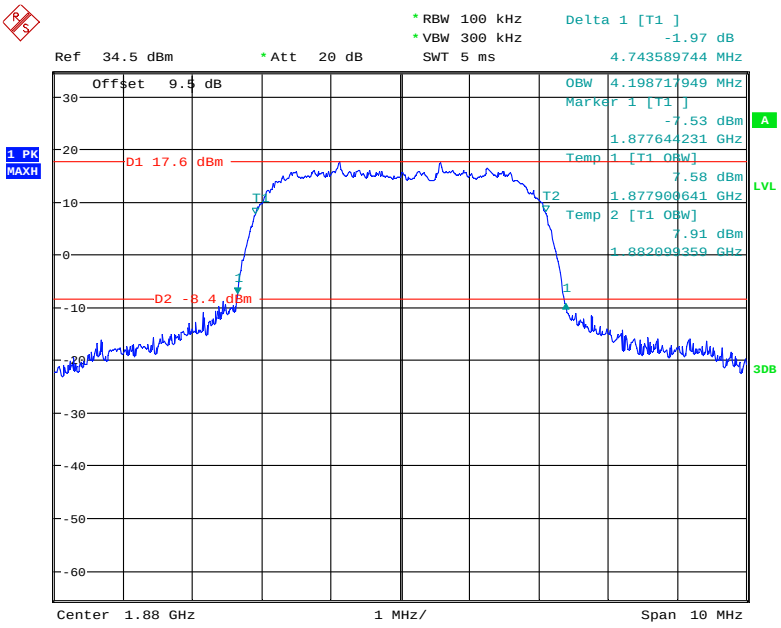
Date: 21.MAY.2019 21:25:46

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



Date: 21.MAY.2019 21:26:53

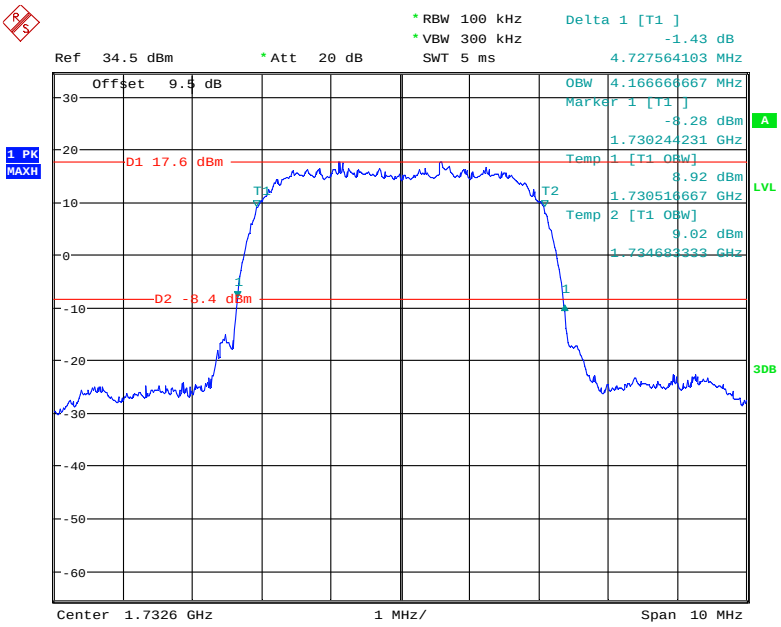
26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 21.MAY.2019 21:29:15

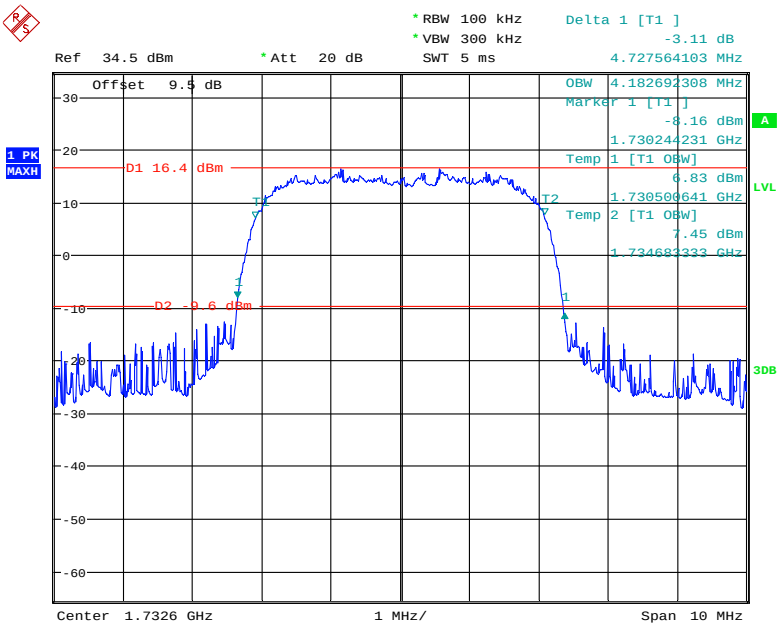
AWS Band (Part 27)

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



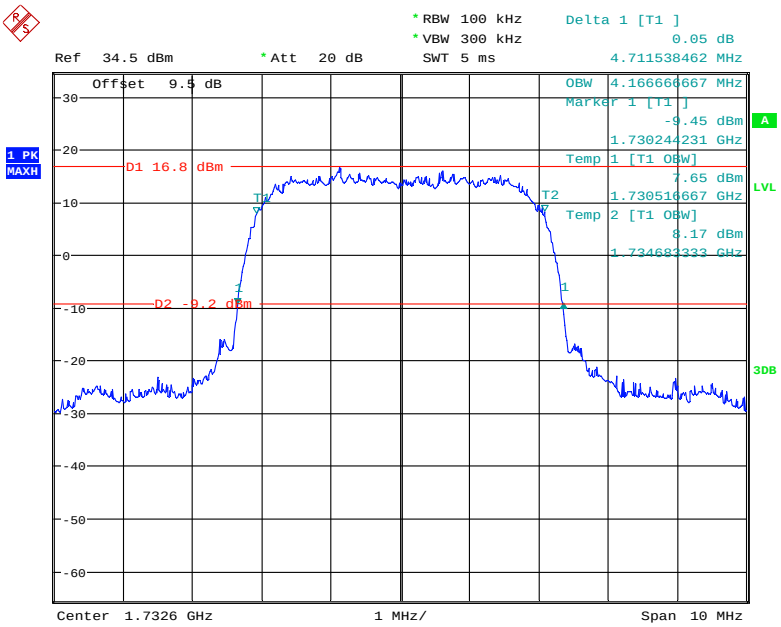
Date: 21.MAY.2019 21:57:31

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



Date: 21.MAY.2019 21:55:11

26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode

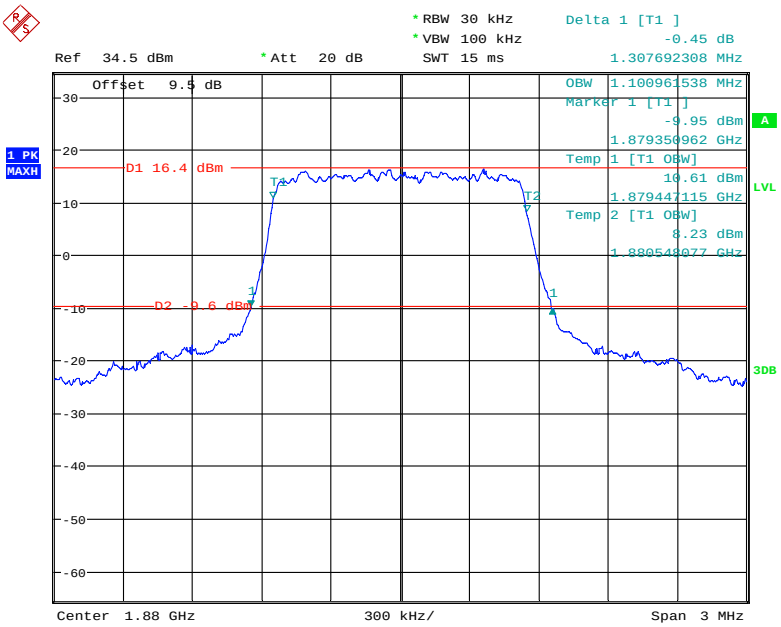


Date: 21.MAY.2019 21:49:37

LTE Band 2: (Middle Channel)

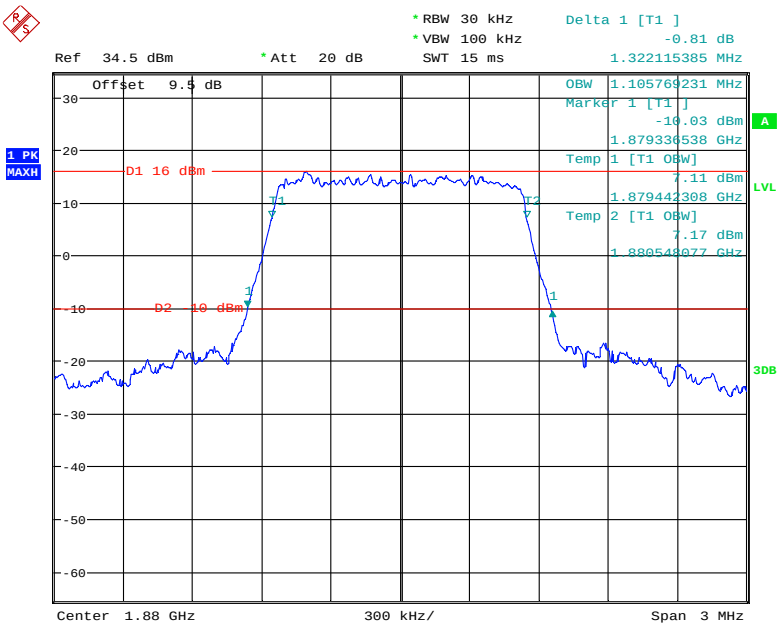
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.101	1.308
	16QAM	1.106	1.322
3.0	QPSK	2.683	2.894
	16QAM	2.683	2.894
5.0	QPSK	4.519	4.952
	16QAM	4.503	4.952
10.0	QPSK	8.974	9.712
	16QAM	8.974	9.551
15.0	QPSK	13.510	14.615
	16QAM	13.462	14.567
20.0	QPSK	17.885	18.974
	16QAM	17.949	19.167

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



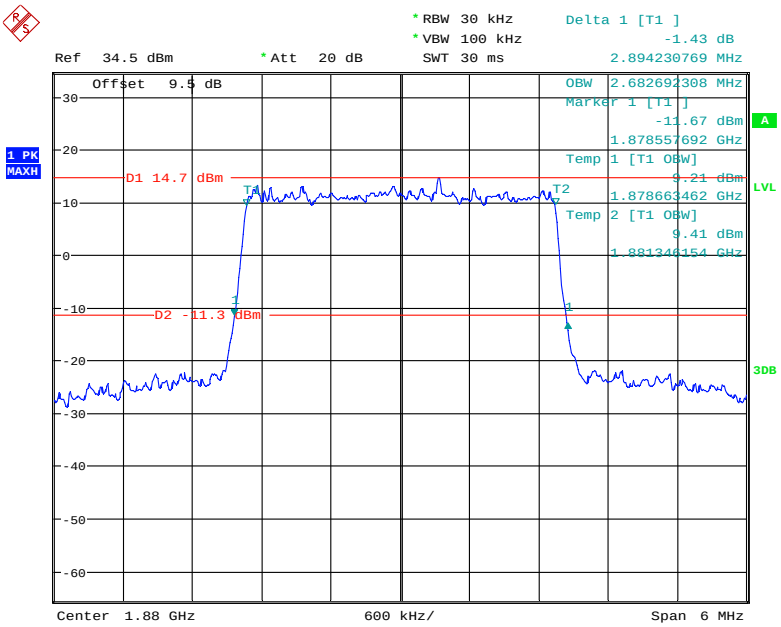
Date: 21.MAY.2019 23:17:58

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



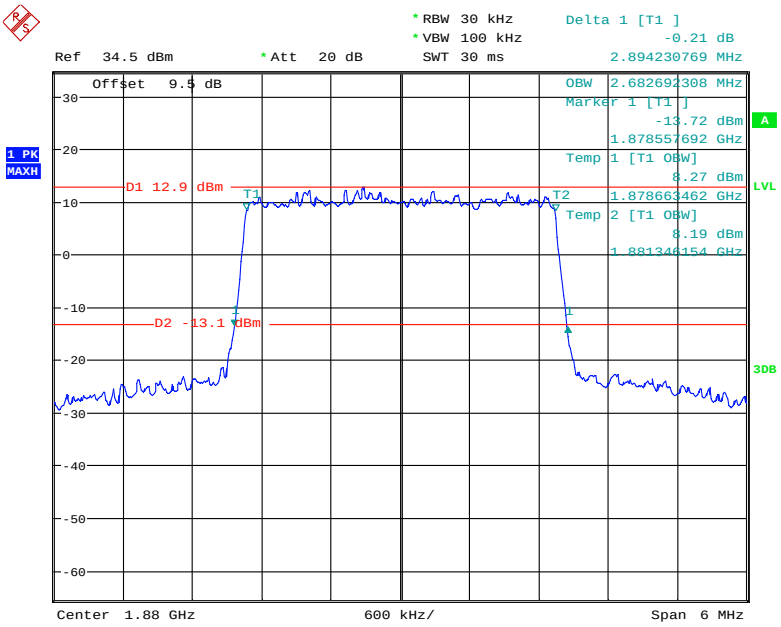
Date: 21.MAY.2019 23:19:00

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



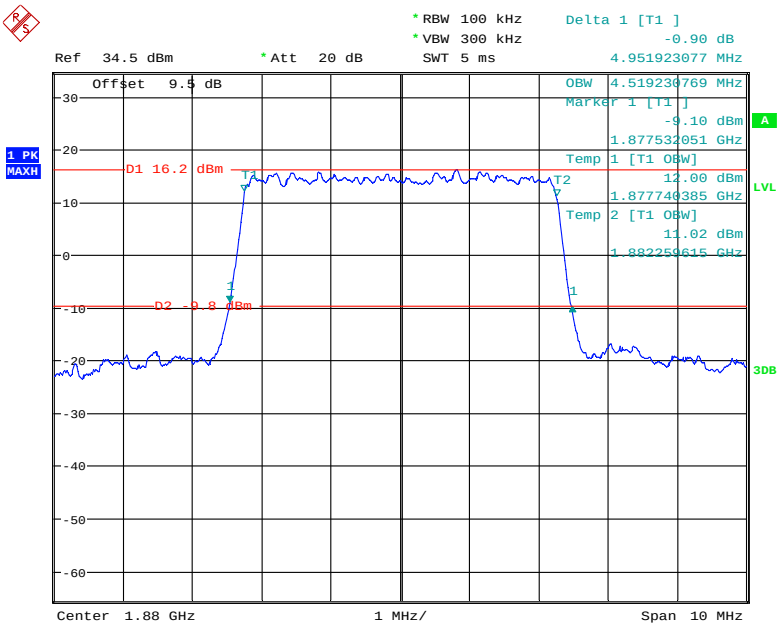
Date: 21.MAY.2019 23:20:59

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



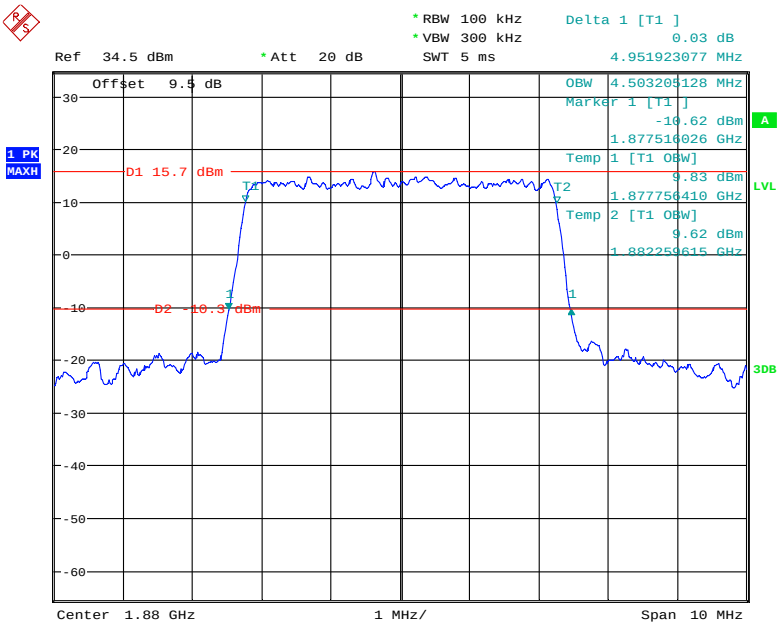
Date: 21.MAY.2019 23:22:32

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



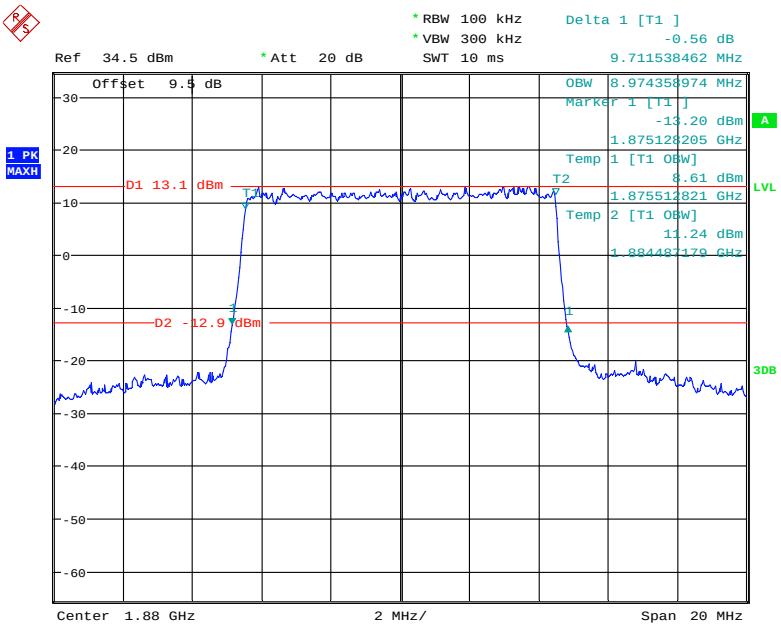
Date: 21.MAY.2019 23:26:07

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



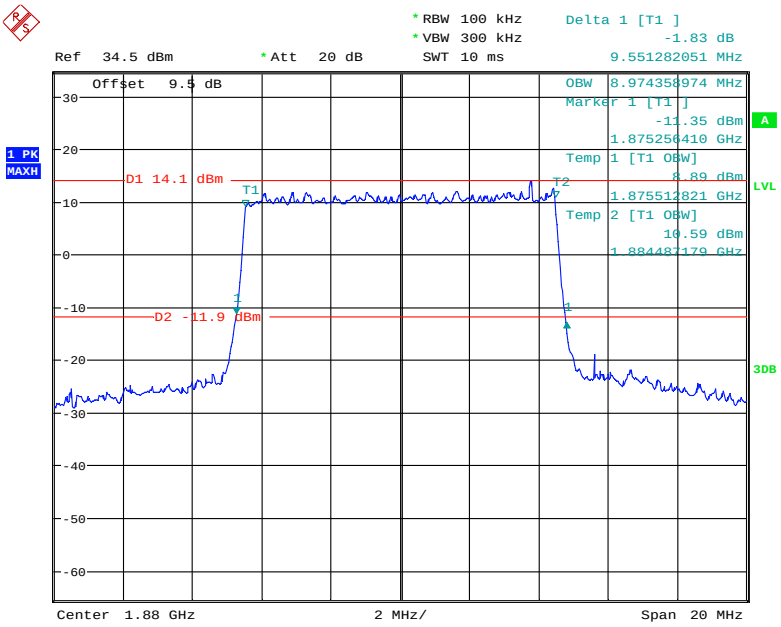
Date: 21.MAY.2019 23:24:29

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



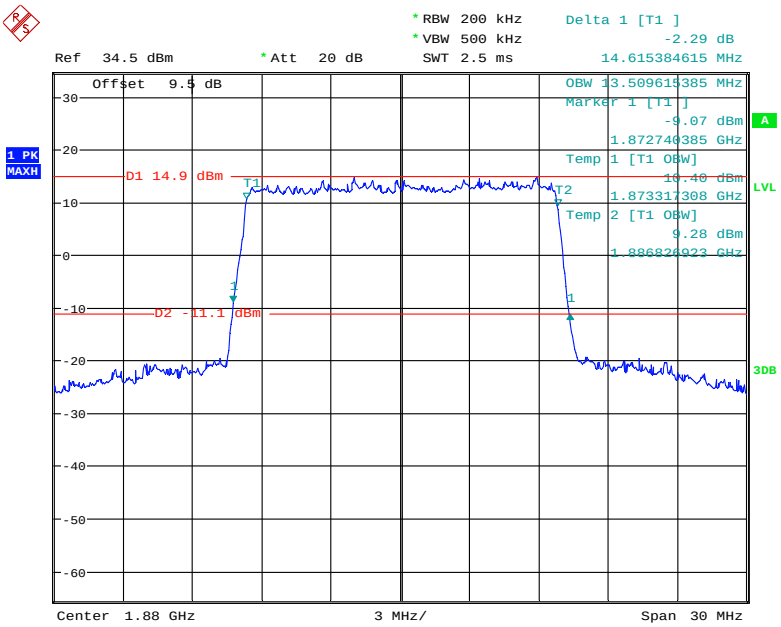
Date: 21.MAY.2019 23:29:55

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



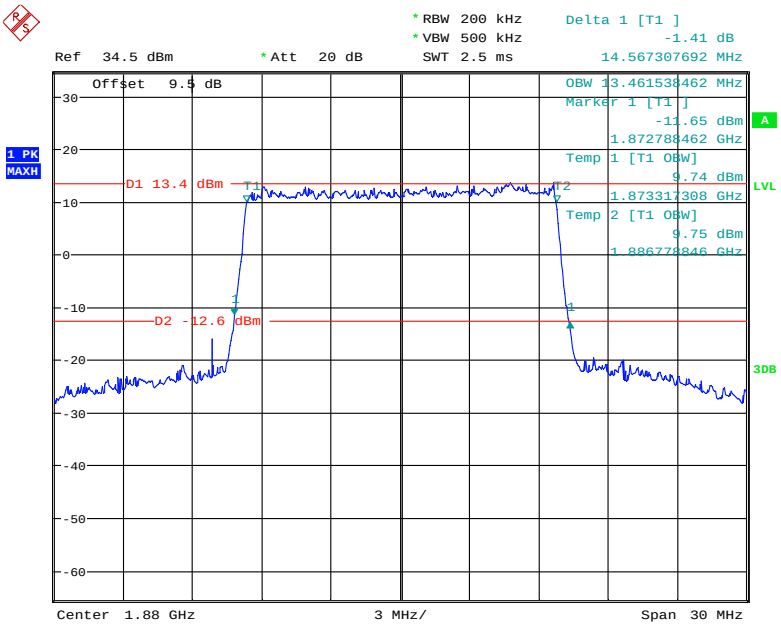
Date: 21.MAY.2019 23:28:14

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



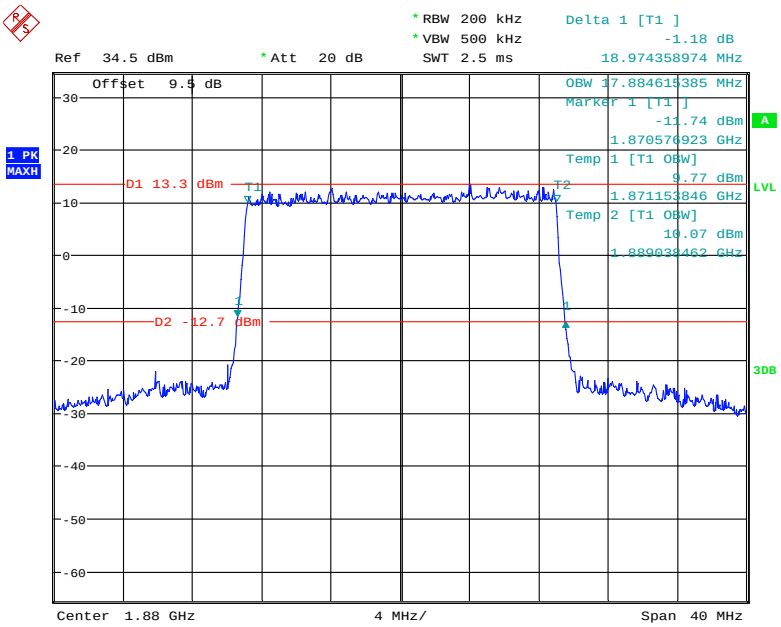
Date: 21.MAY.2019 23:31:38

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



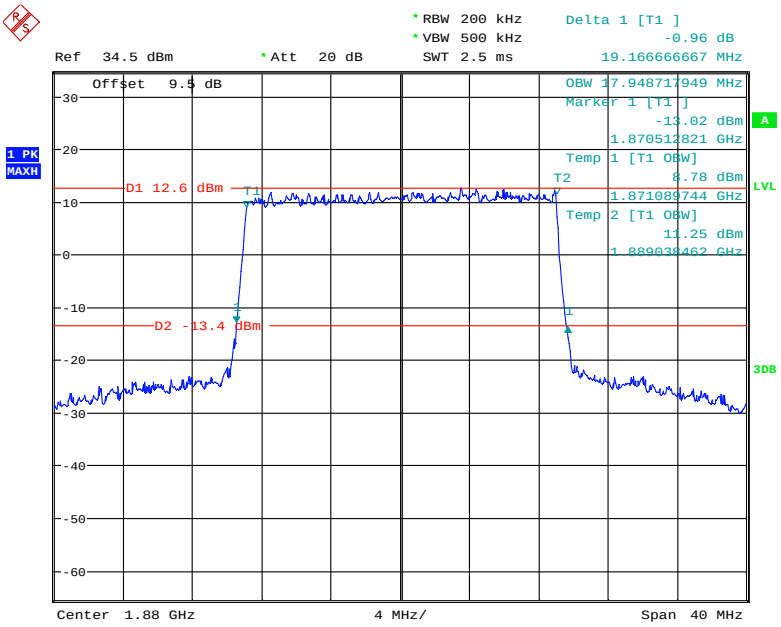
Date: 21.MAY.2019 23:33:48

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



Date: 21.MAY.2019 23:37:46

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

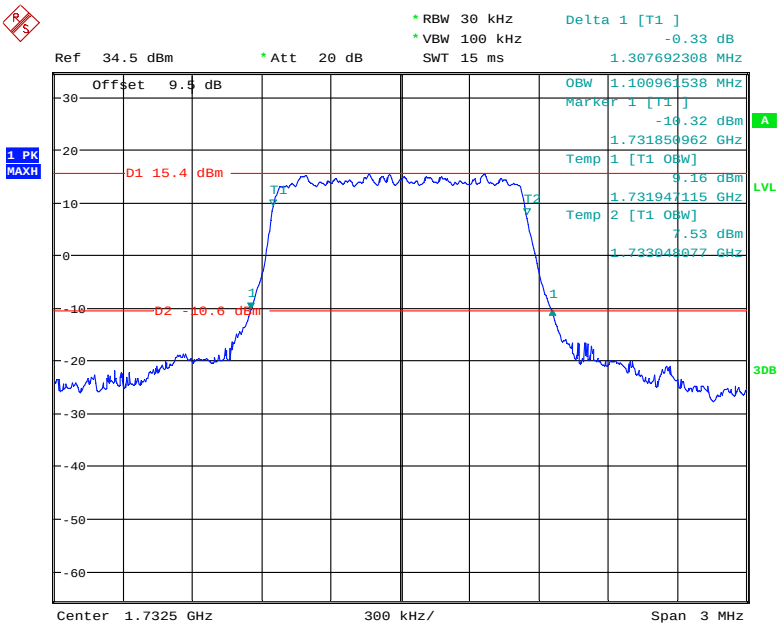


Date: 21.MAY.2019 23:36:57

LTE Band 4: (Middle Channel)

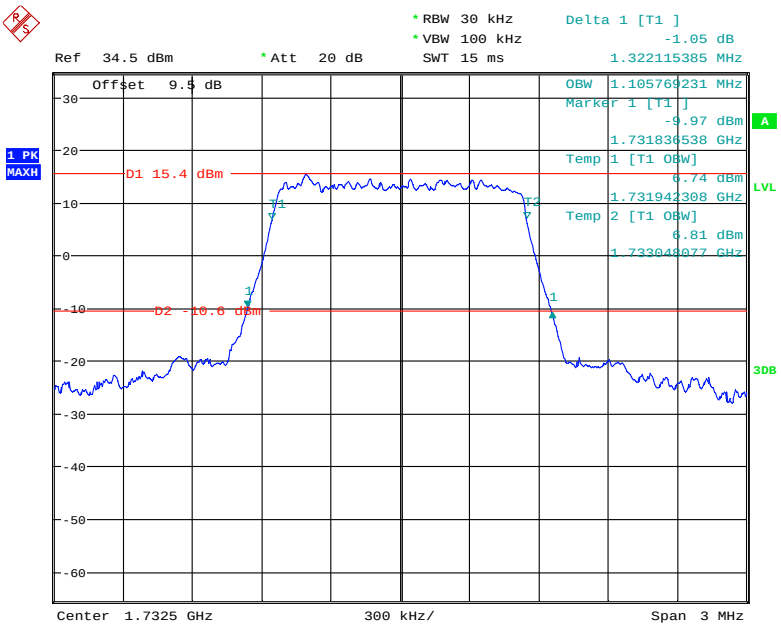
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.101	1.308
	16QAM	1.106	1.322
3.0	QPSK	2.683	2.875
	16QAM	2.683	2.885
5.0	QPSK	4.519	4.968
	16QAM	4.487	4.952
10.0	QPSK	8.974	9.679
	16QAM	8.974	9.615
15.0	QPSK	13.510	14.663
	16QAM	13.462	14.615
20.0	QPSK	17.949	19.103
	16QAM	17.949	19.167

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



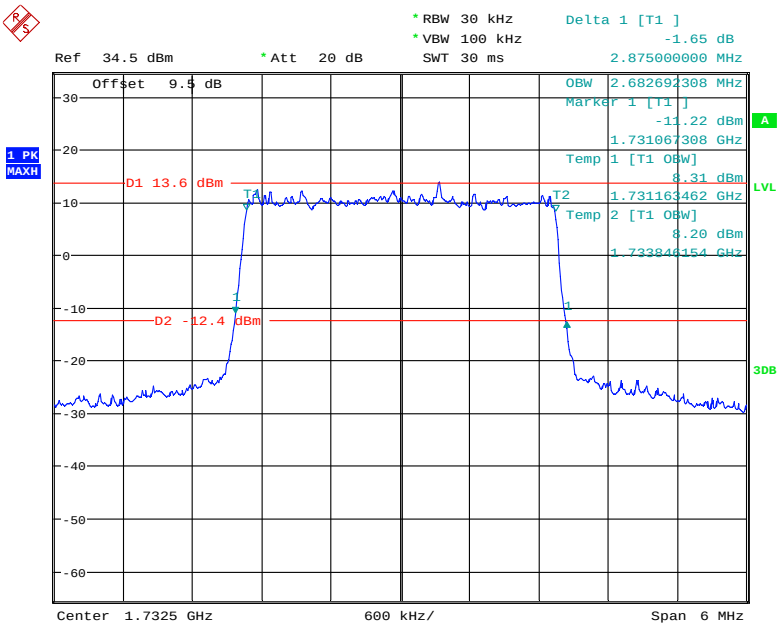
Date: 21.MAY.2019 23:42:10

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



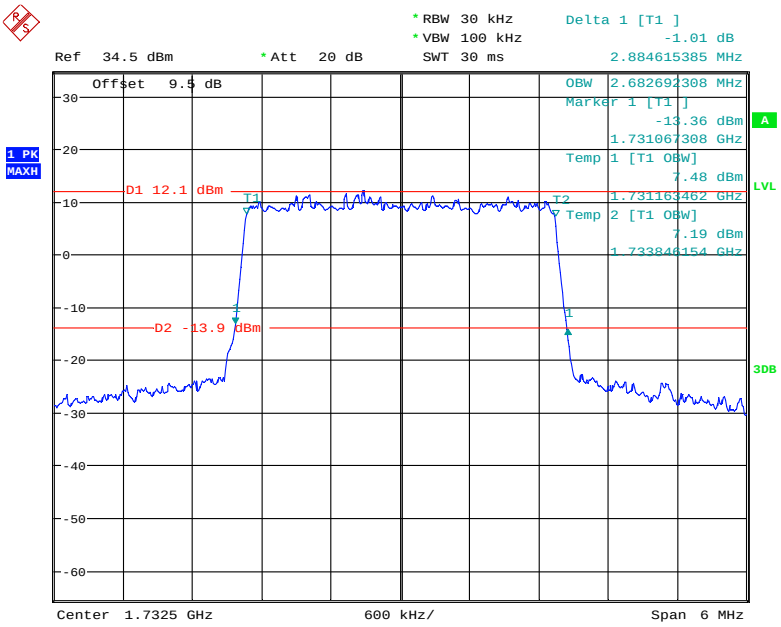
Date: 21.MAY.2019 23:40:44

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



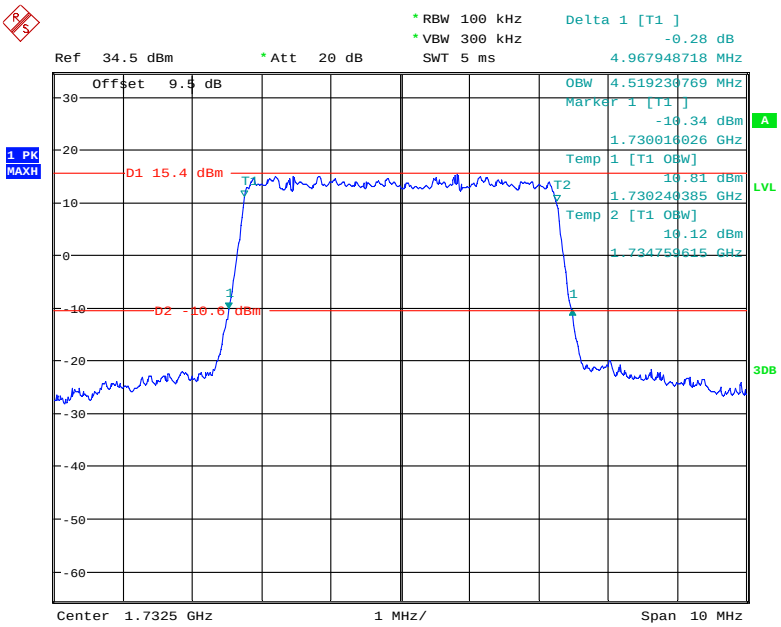
Date: 21.MAY.2019 23:44:36

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



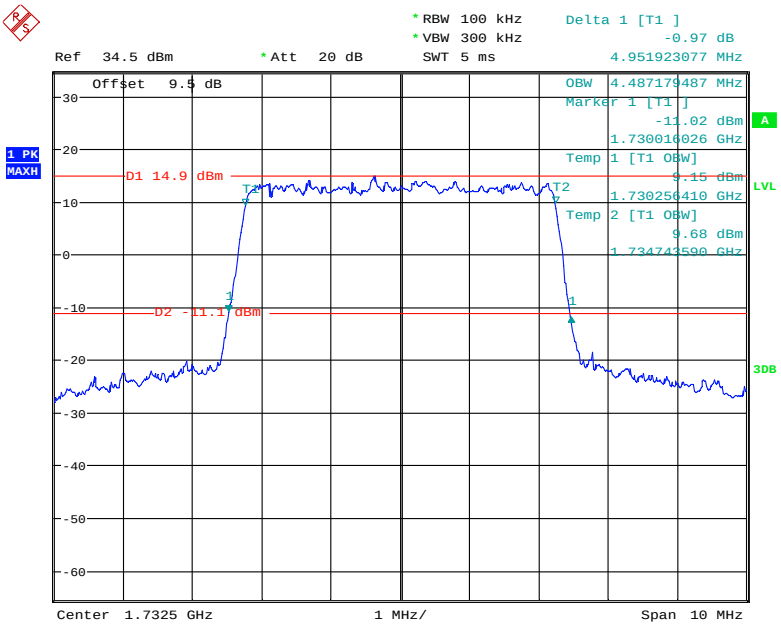
Date: 21.MAY.2019 23:43:22

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



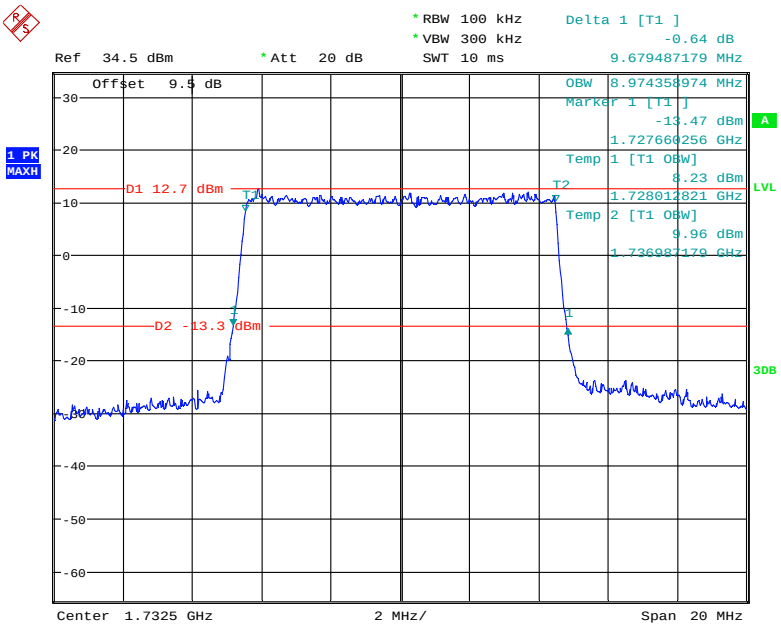
Date: 21.MAY.2019 23:45:51

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



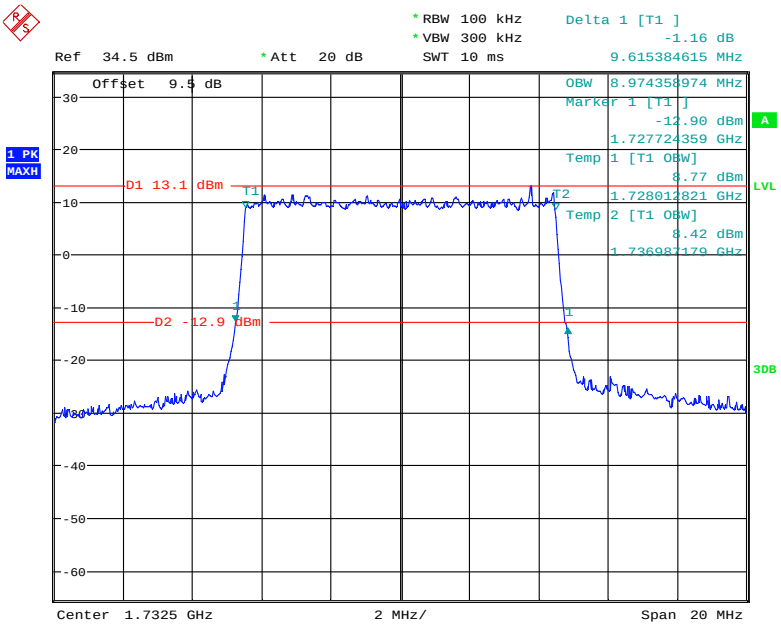
Date: 21.MAY.2019 23:47:04

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



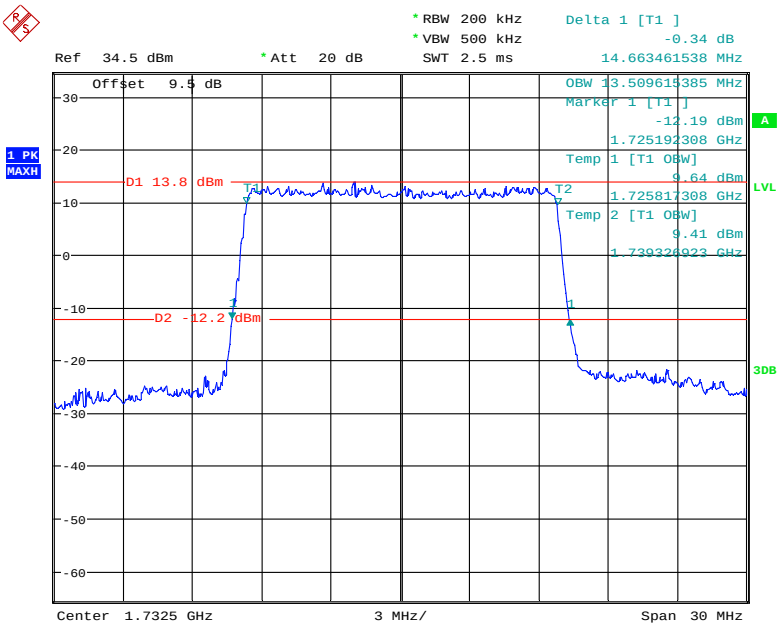
Date: 21.MAY.2019 23:48:24

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



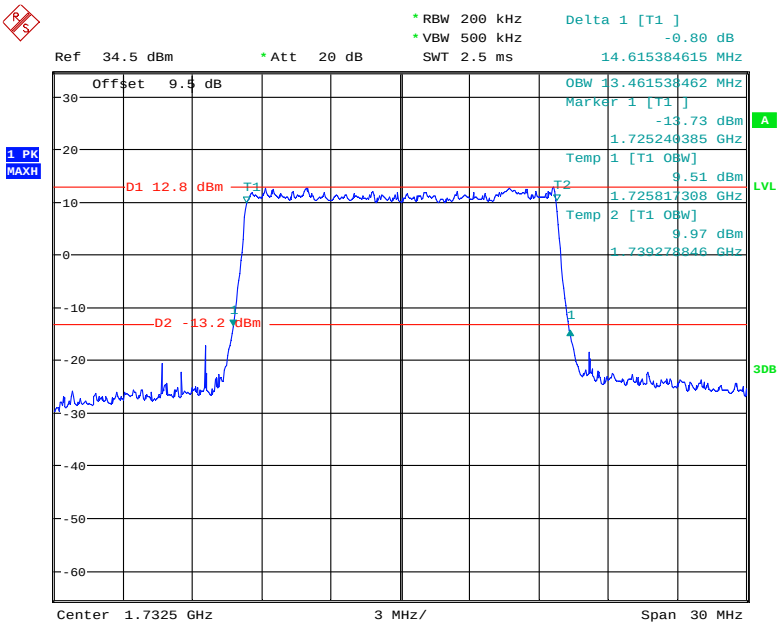
Date: 21.MAY.2019 23:49:30

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



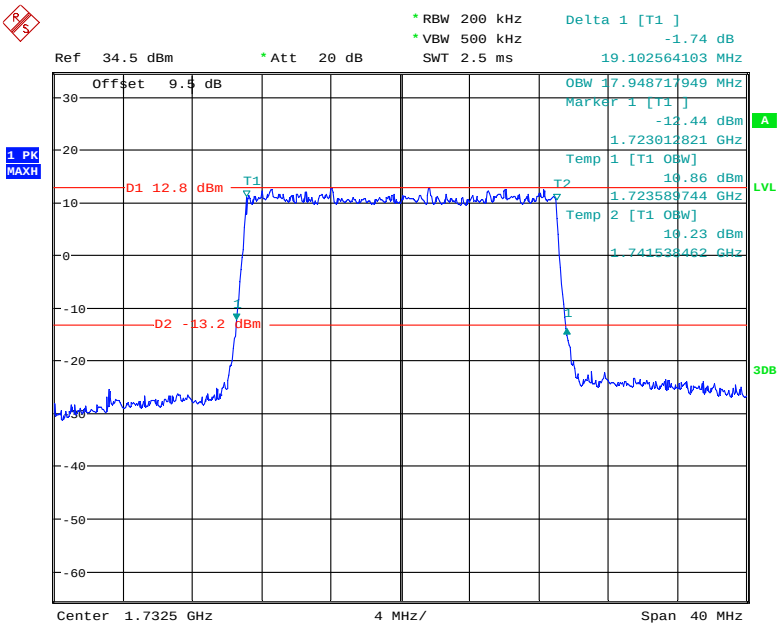
Date: 21.MAY.2019 23:52:40

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



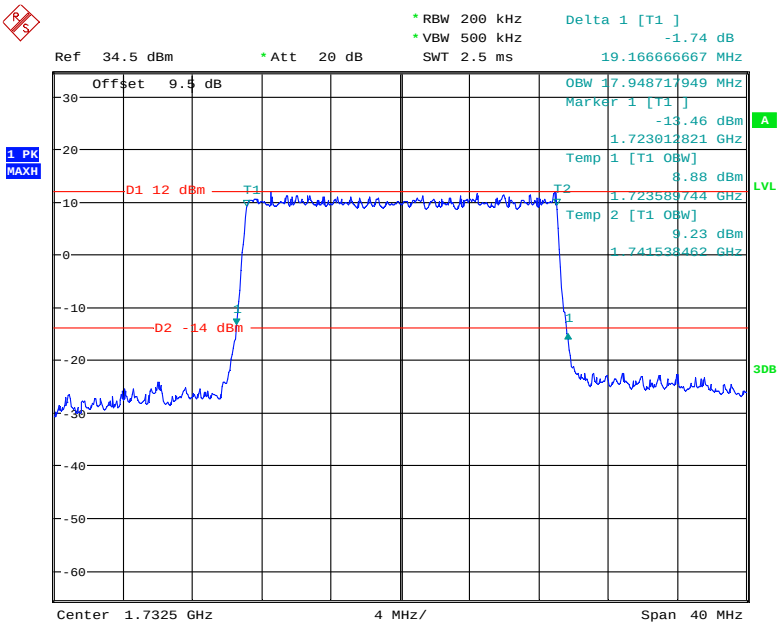
Date: 21.MAY.2019 23:51:16

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



Date: 21.MAY.2019 23:53:59

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

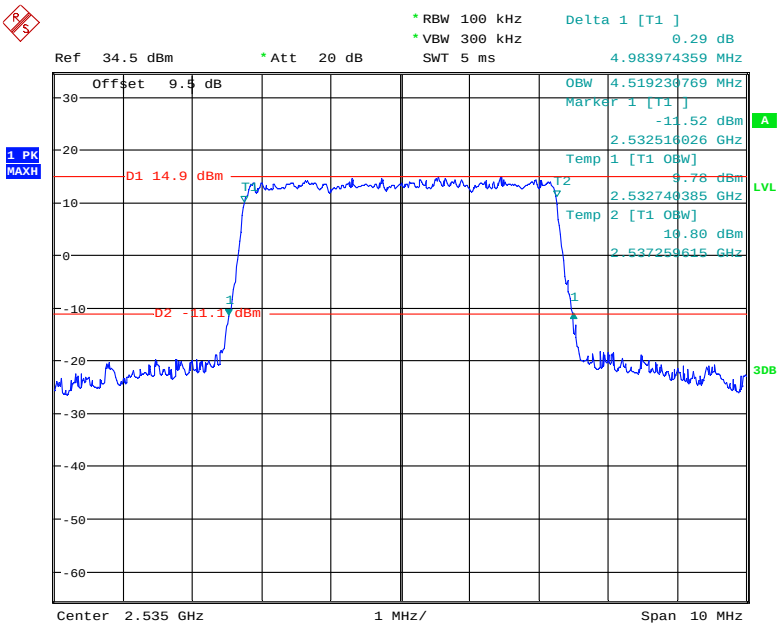


Date: 21.MAY.2019 23:55:25

LTE Band 7: (Middle Channel)

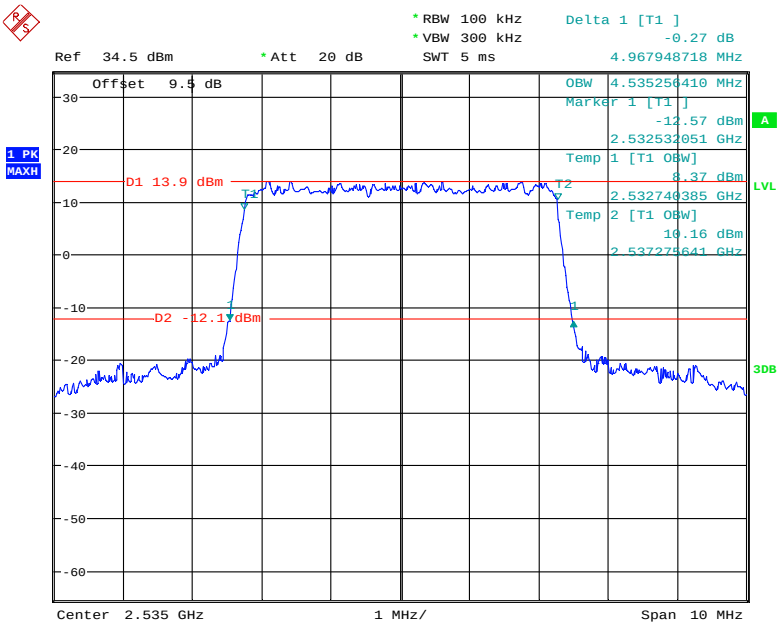
Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.519	4.984
	16QAM	4.535	4.968
10.0	QPSK	8.974	9.808
	16QAM	8.942	9.551
15.0	QPSK	13.510	14.663
	16QAM	13.462	14.615
20.0	QPSK	17.949	19.038
	16QAM	17.949	19.103

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



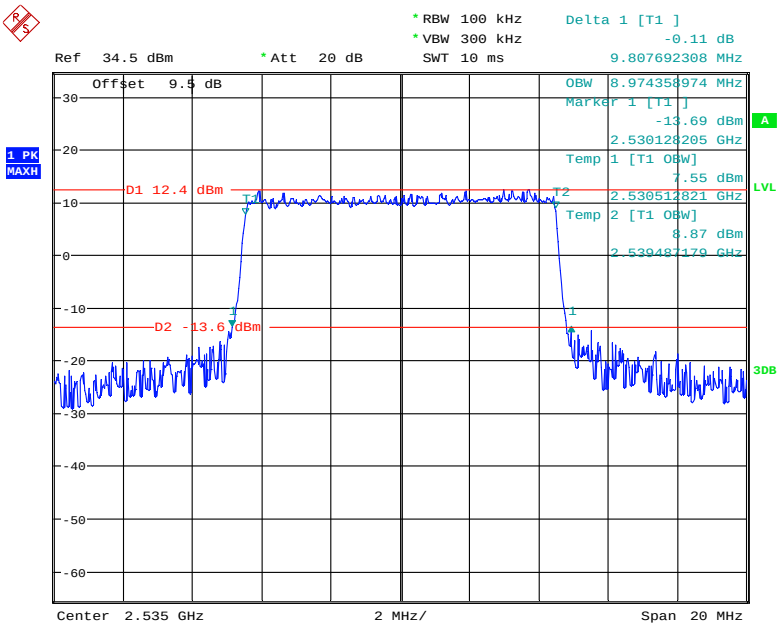
Date: 21.MAY.2019 23:59:14

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



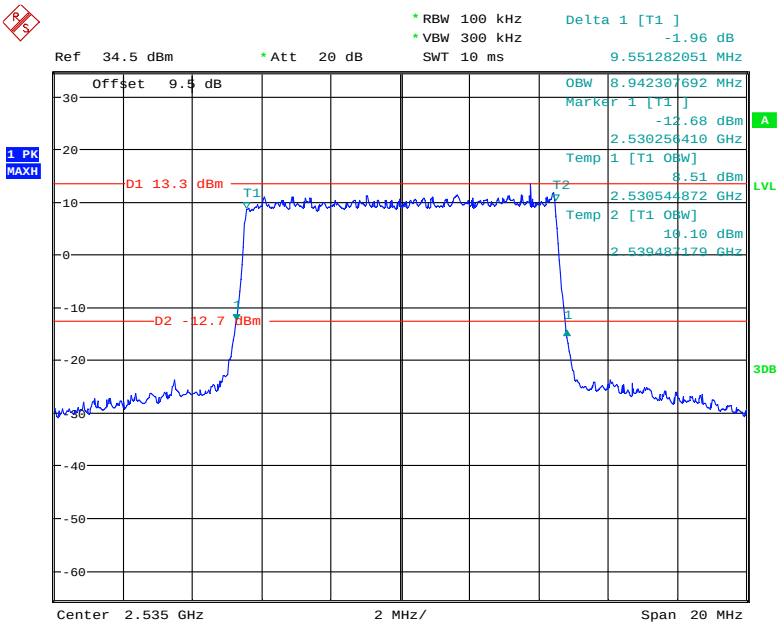
Date: 21.MAY.2019 23:58:07

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



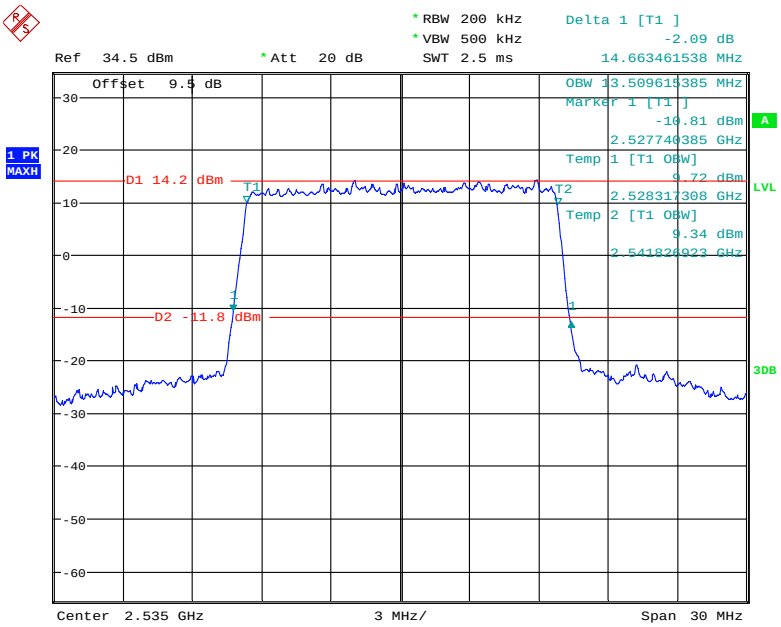
Date: 22.MAY.2019 00:02:29

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



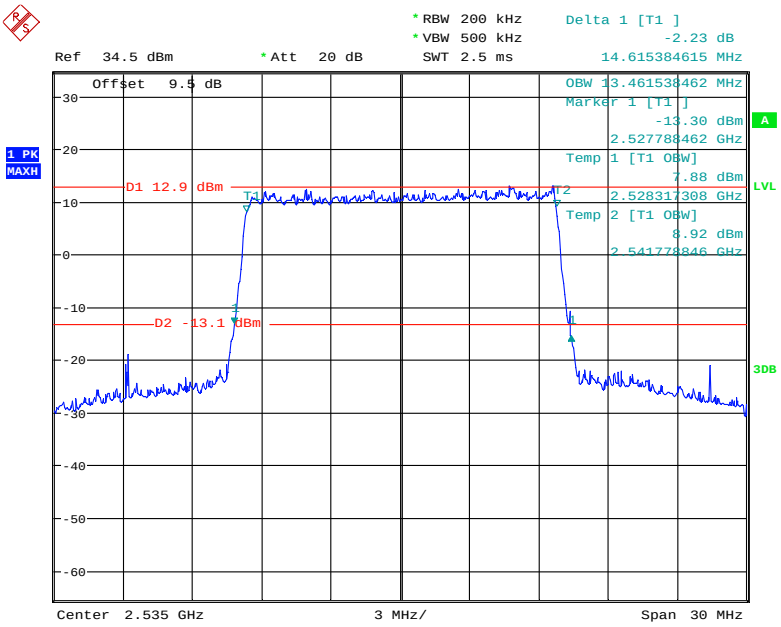
Date: 22.MAY.2019 00:00:55

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



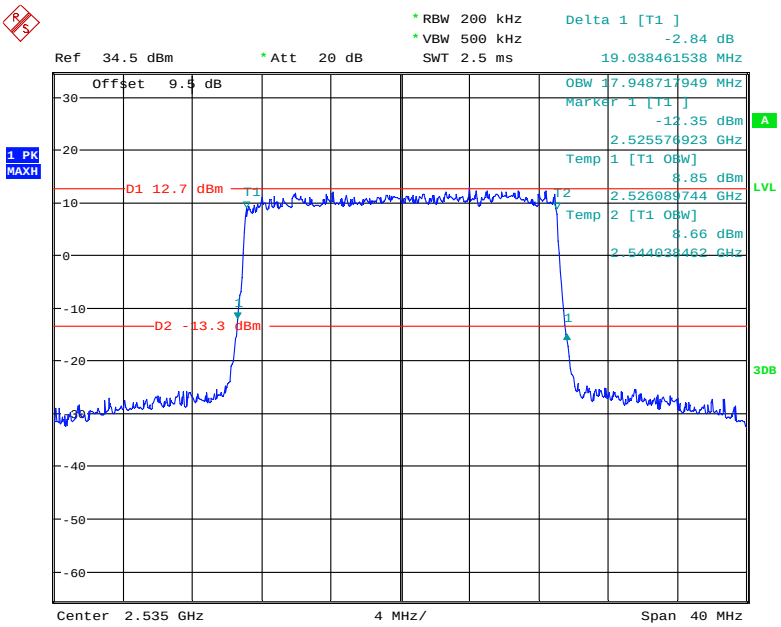
Date: 22.MAY.2019 00:13:57

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



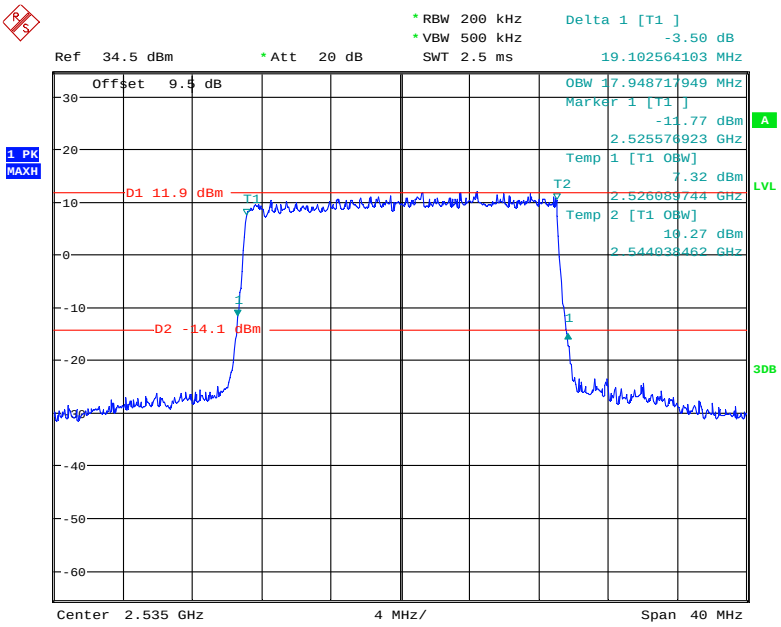
Date: 22.MAY.2019 00:15:16

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



Date: 22.MAY.2019 00:18:13

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



Date: 22.MAY.2019 00:16:54

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

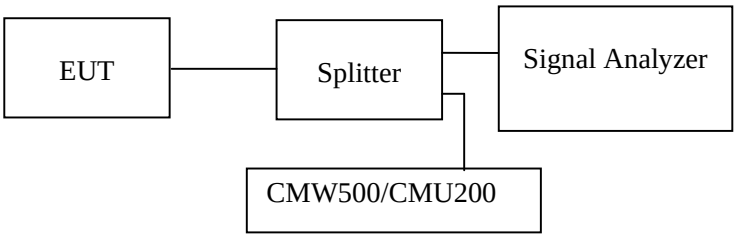
Applicable Standard

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

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 10^{th} harmonic.



Test Data

Environmental Conditions

Temperature:	24~25 ℃
Relative Humidity:	50~55 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by James Fu from 2019-05-21 to 2019-05-23.

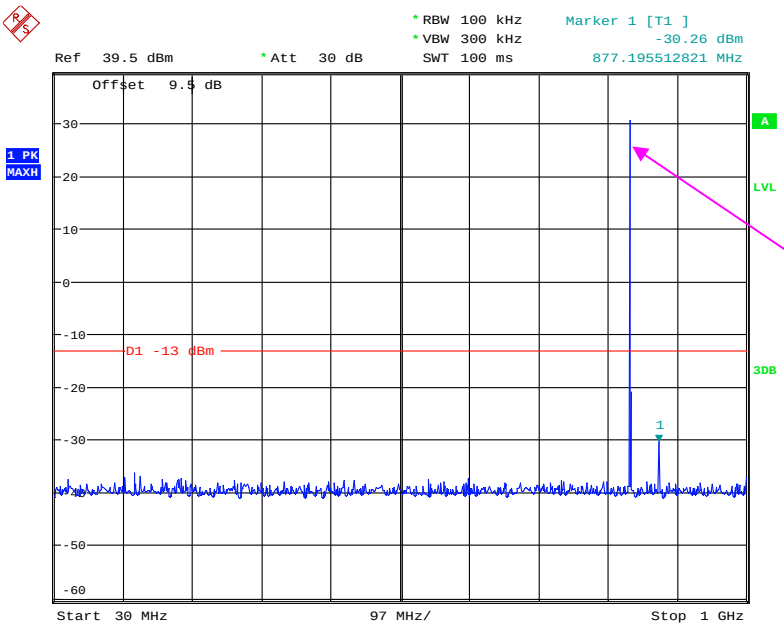
Test result: Compliance.

EUT operation mode: transmitting

Please refer to the following plots.

Cellular Band (Part 22H)

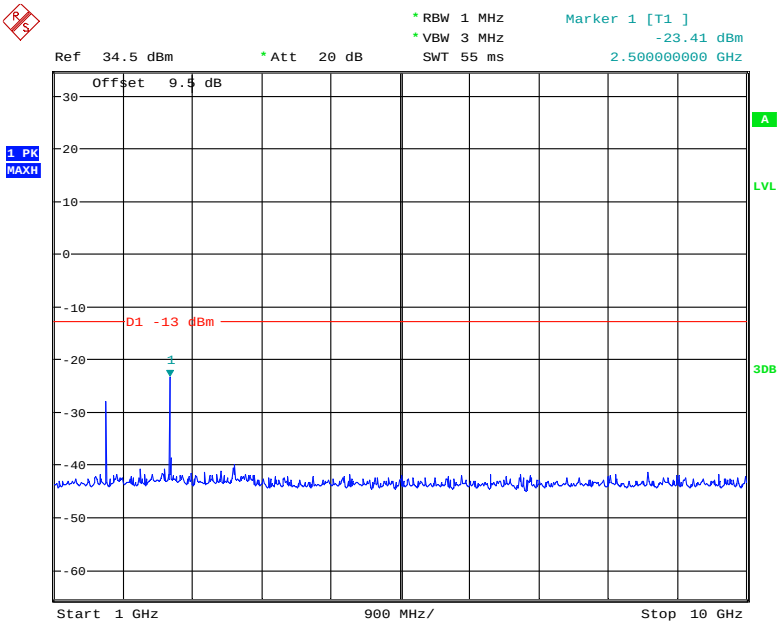
30 MHz – 1 GHz (GSM Mode)



Fundamental test

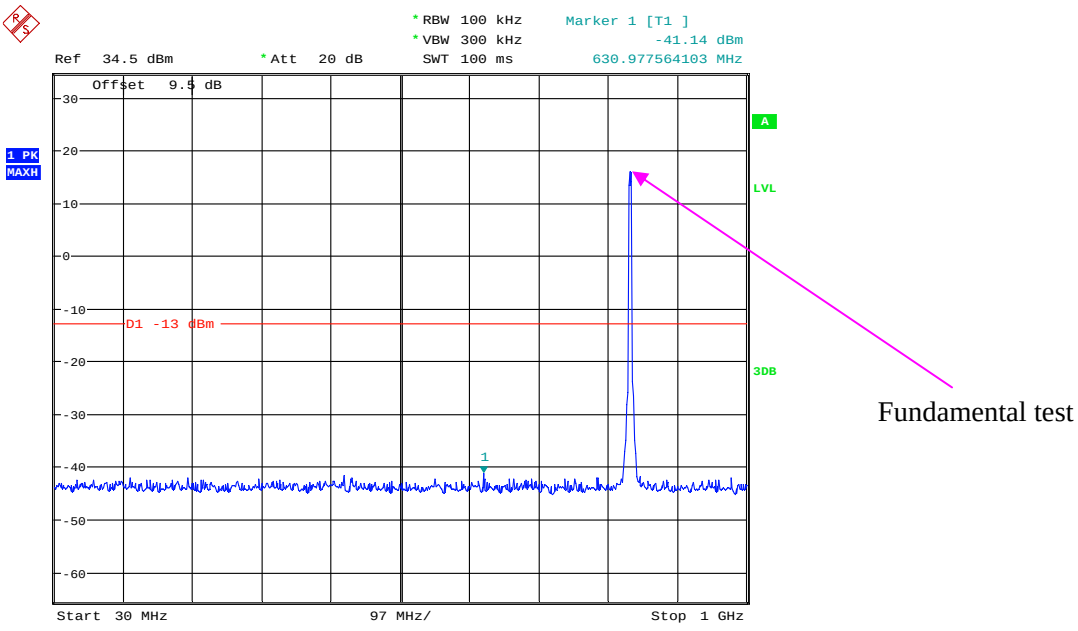
Date: 21.MAY.2019 20:20:58

1 GHz – 10 GHz (GSM Mode)



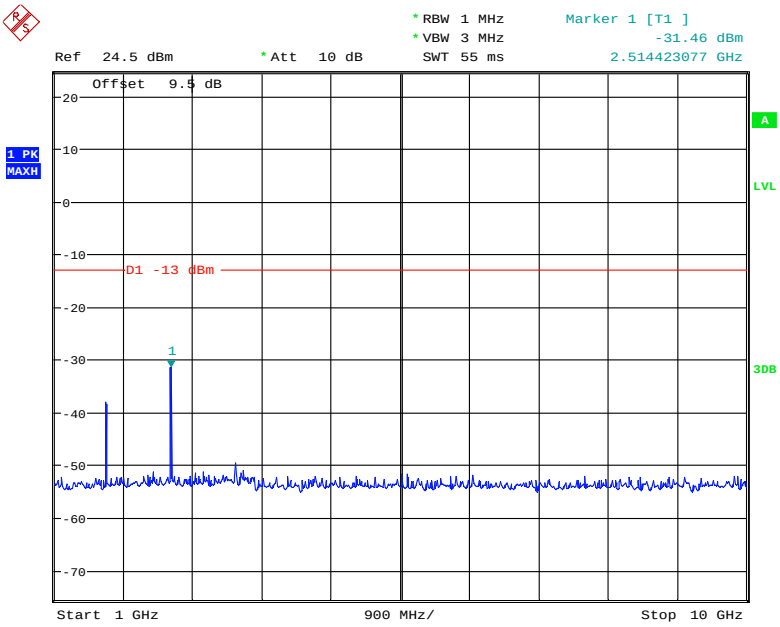
Date: 21.MAY.2019 20:21:29

30 MHz – 1 GHz (WCDMA Mode)



Date: 21.MAY.2019 21:16:42

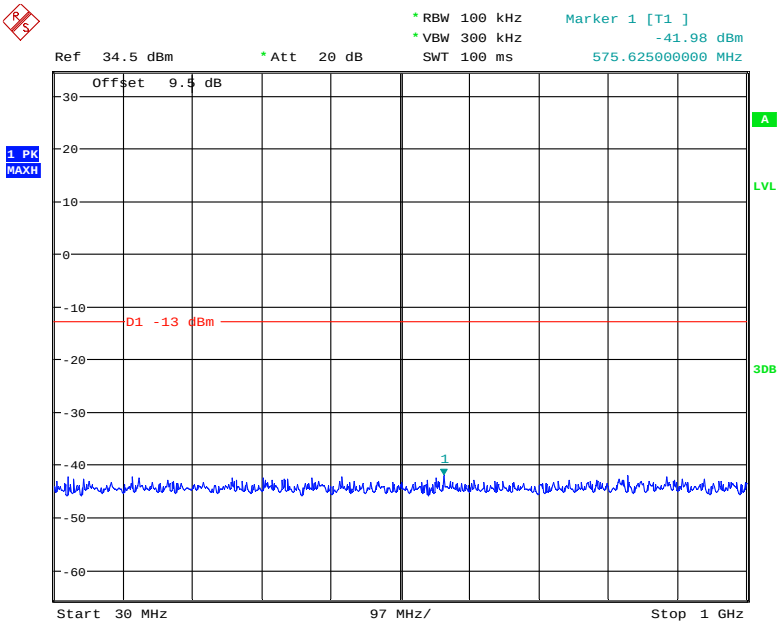
1 GHz – 10 GHz (WCDMA Mode)



Date: 21.MAY.2019 21:17:03

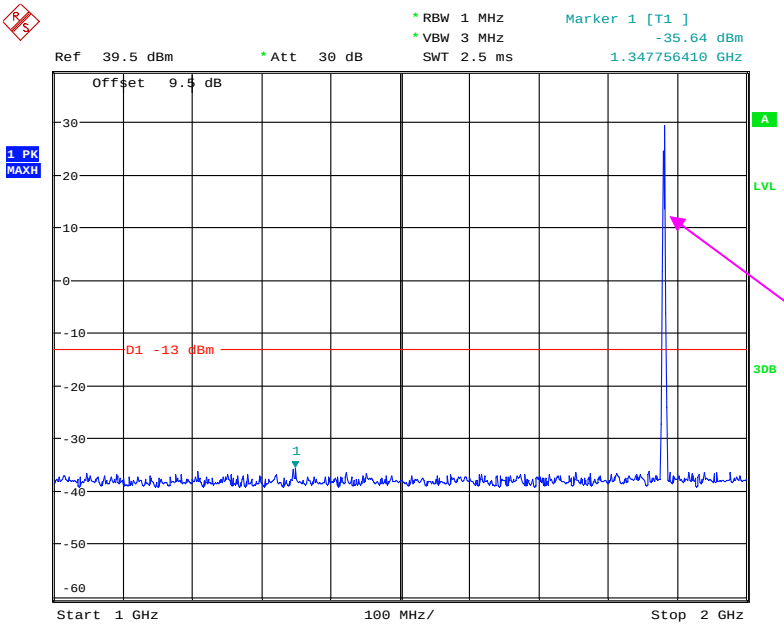
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



Date: 21.MAY.2019 20:37:32

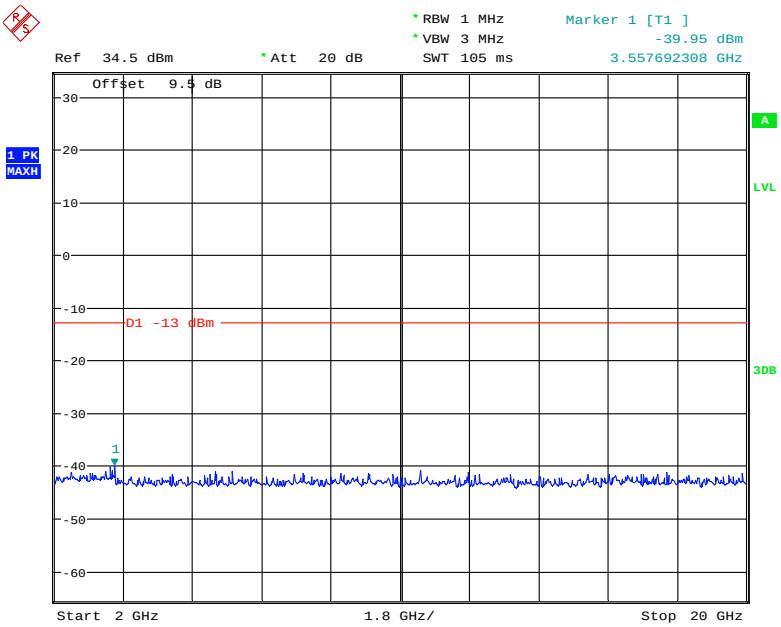
1 GHz – 2 GHz (GSM Mode)



Fundamental test

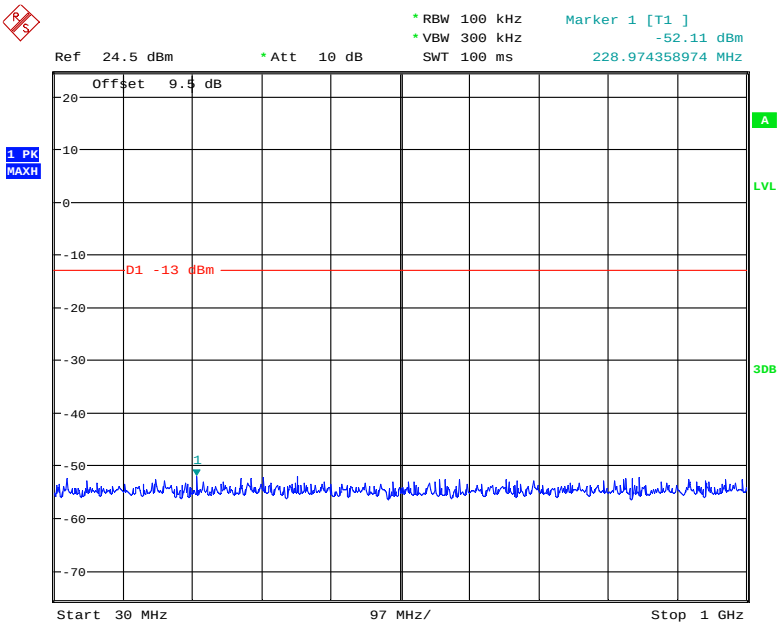
Date: 21.MAY.2019 20:38:07

2 GHz – 20 GHz (GSM Mode)



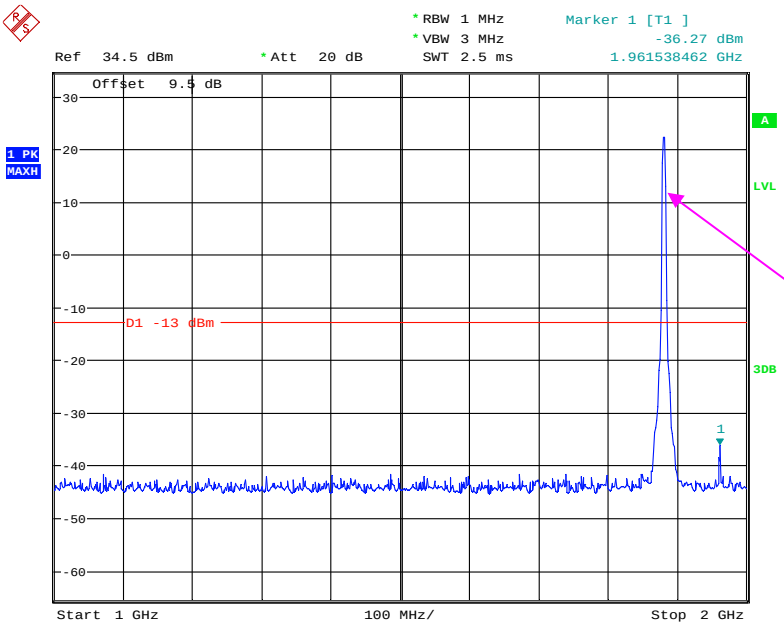
Date: 21.MAY.2019 20:38:34

30 MHz – 1 GHz (WCDMA Mode)



Date: 21.MAY.2019 21:23:06

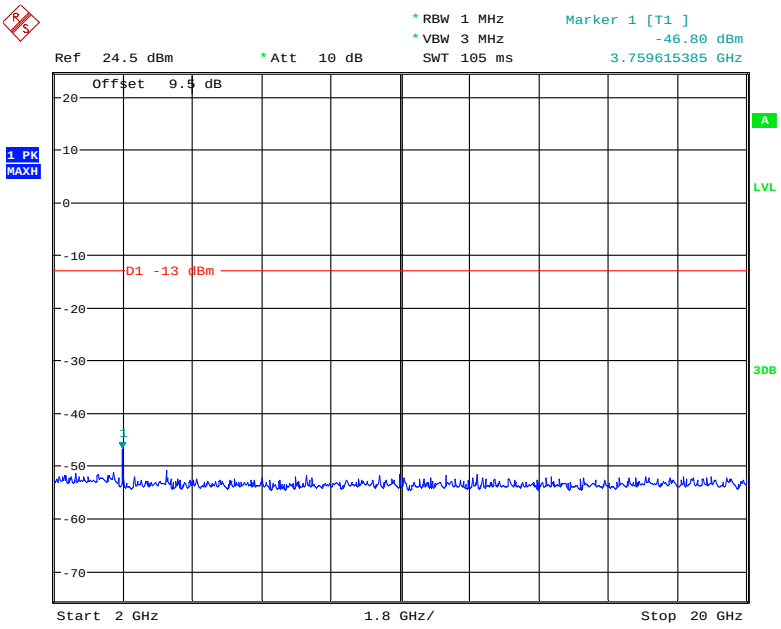
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 21.MAY.2019 21:23:47

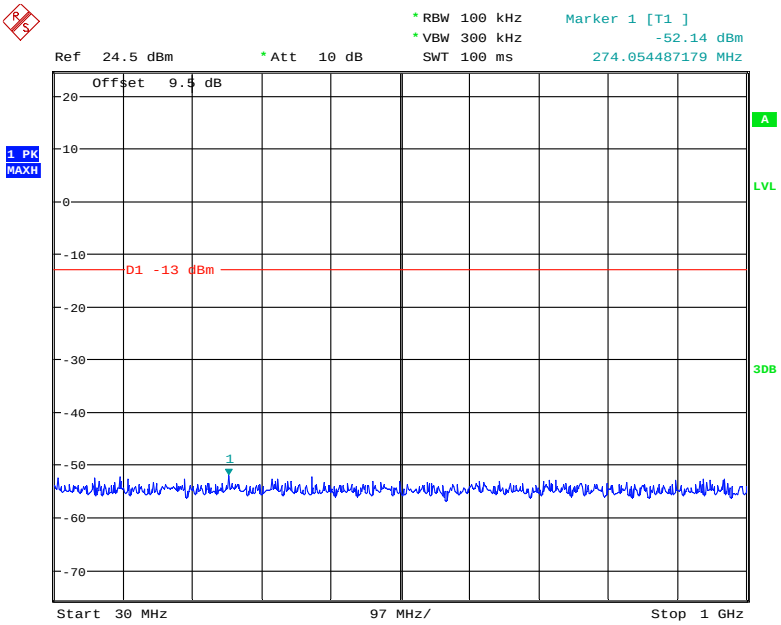
2 GHz – 20 GHz (WCDMA Mode)



Date: 21.MAY.2019 21:24:10

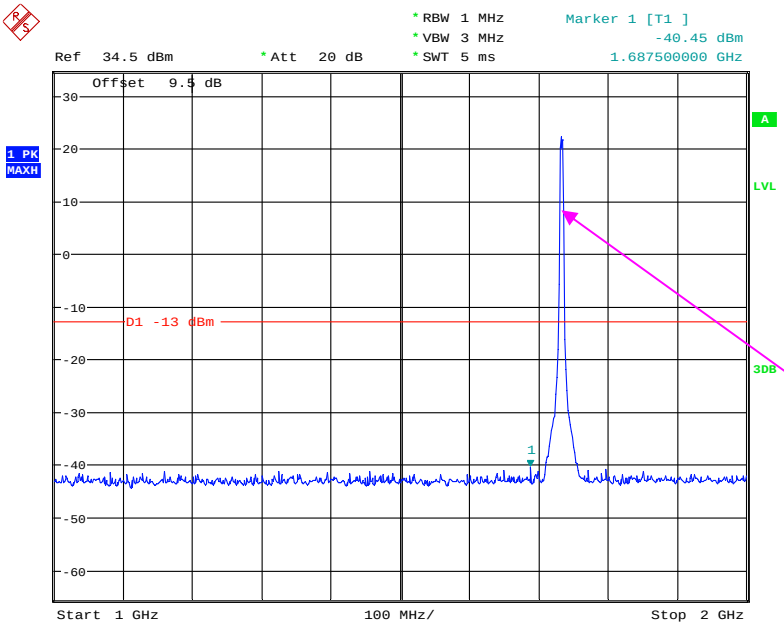
AWS Band (Part 27)

30 MHz – 1 GHz (WCDMA Mode)



Date: 21.MAY.2019 21:59:01

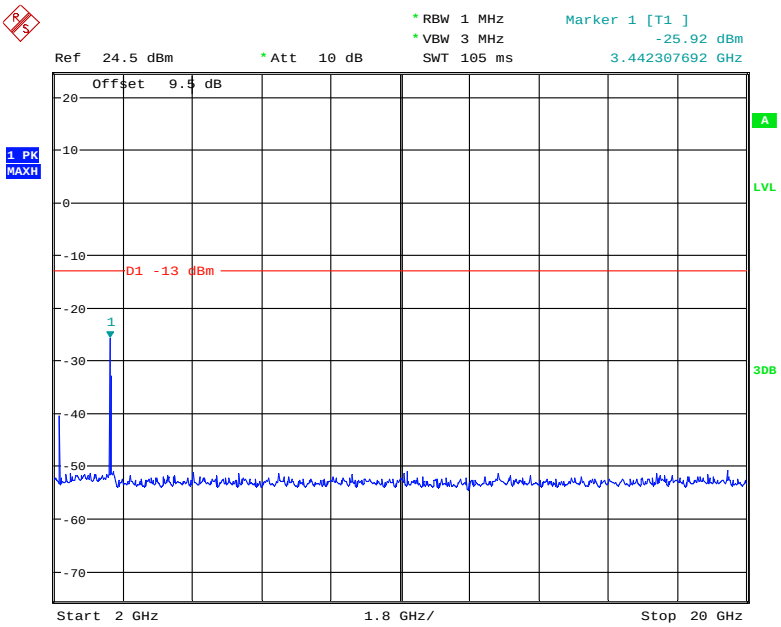
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 21.MAY.2019 21:59:40

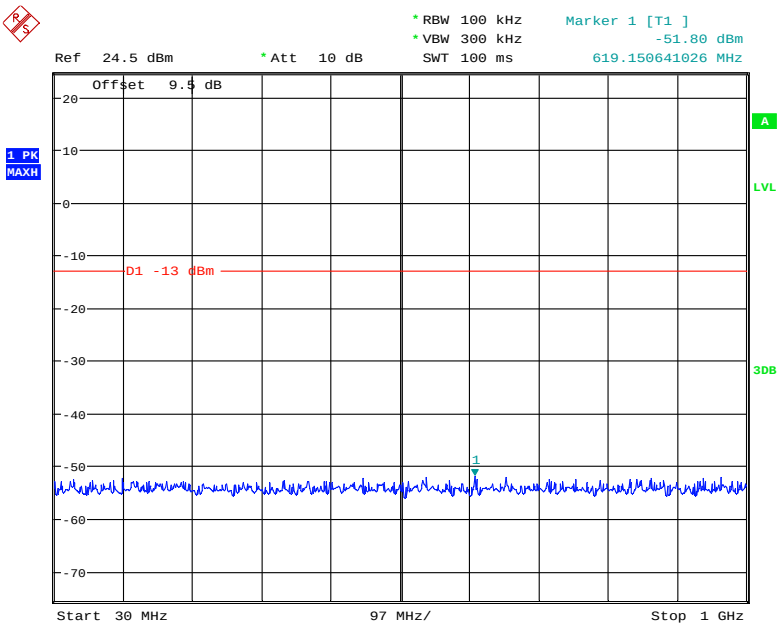
2 GHz – 20 GHz (WCDMA Mode)



Date: 21.MAY.2019 22:00:22

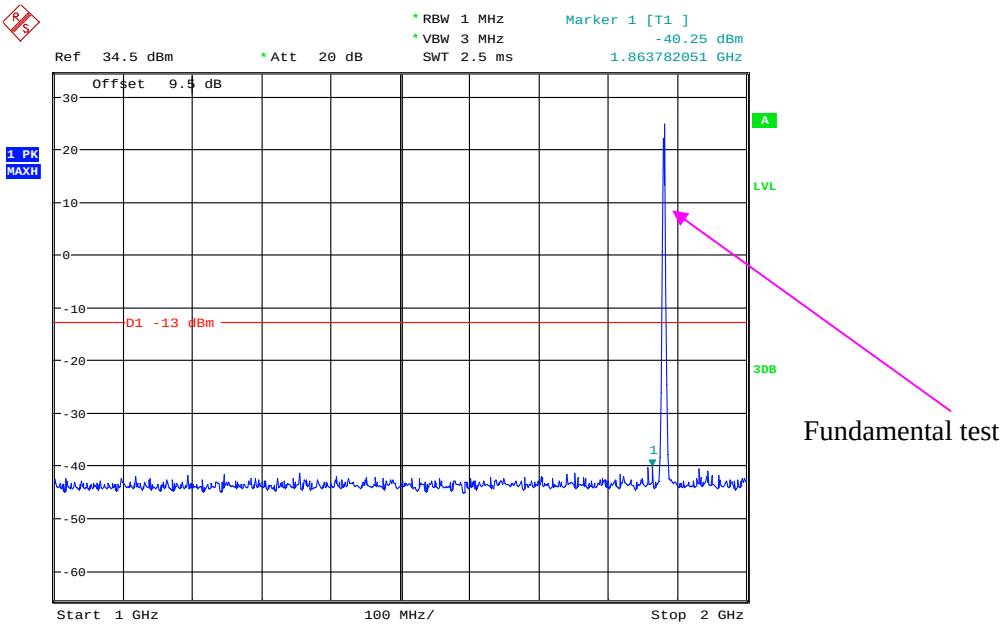
LTE Band 2:

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



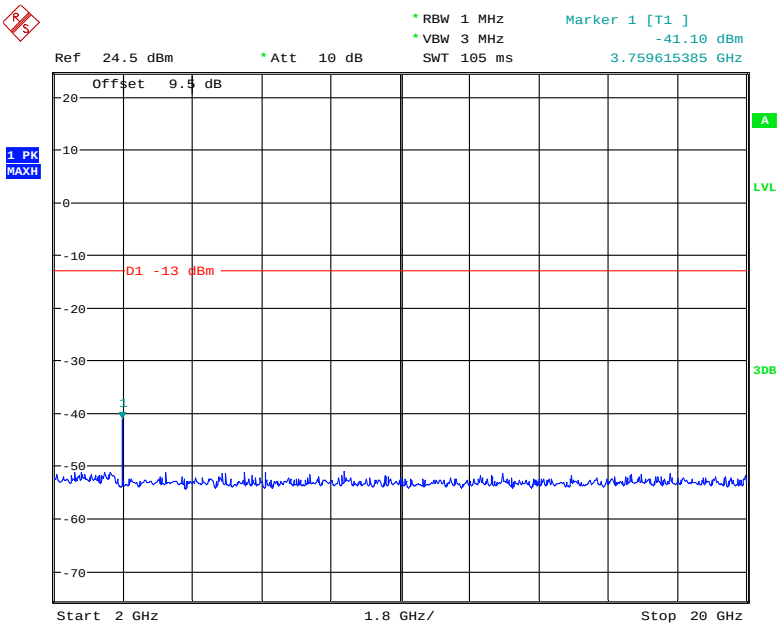
Date: 22.MAY.2019 00:33:20

1 GHz – 2 GHz (1.4 MHz, Middle Channel)



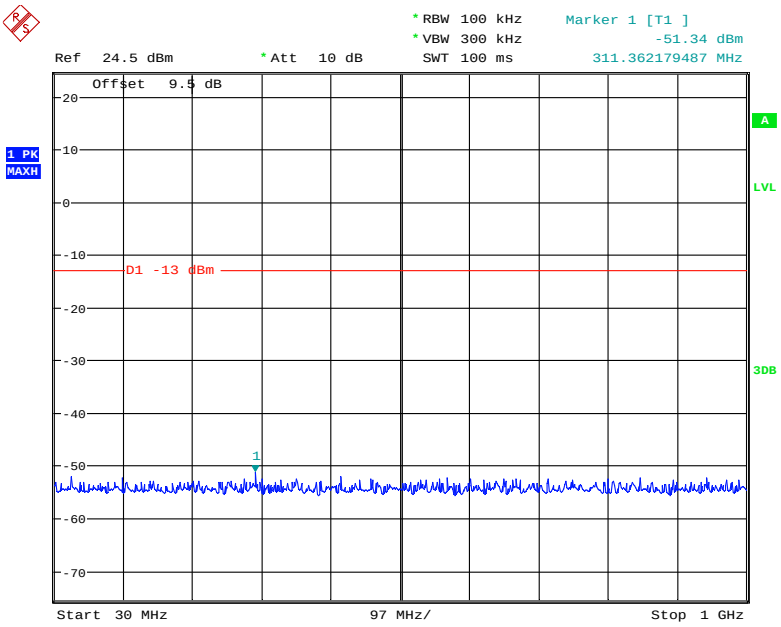
Date: 22.MAY.2019 00:42:36

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



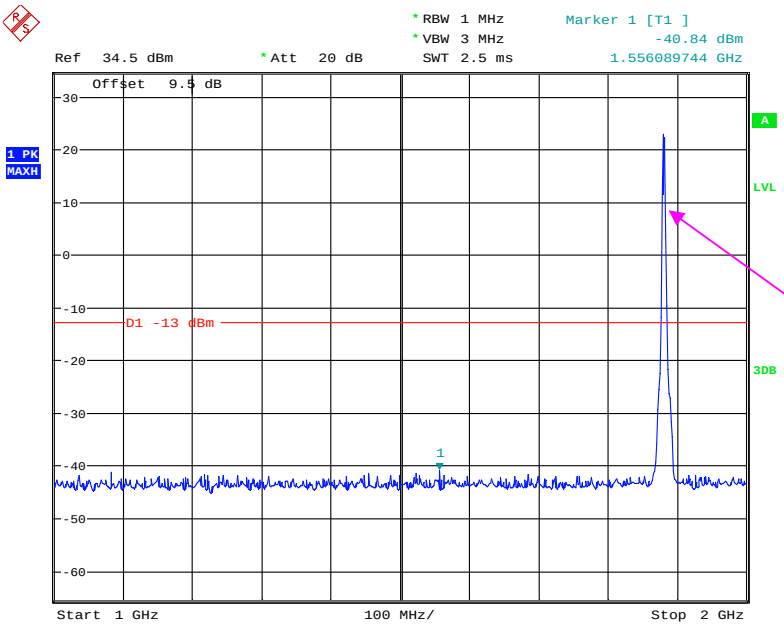
Date: 22.MAY.2019 00:47:15

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



Date: 22.MAY.2019 00:34:25

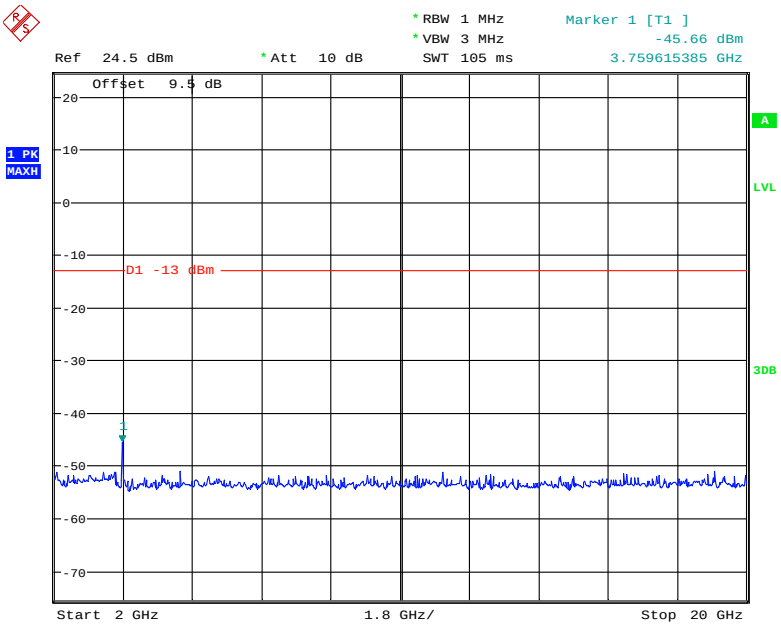
1 GHz – 2 GHz (3.0 MHz, Middle Channel)



Fundamental test

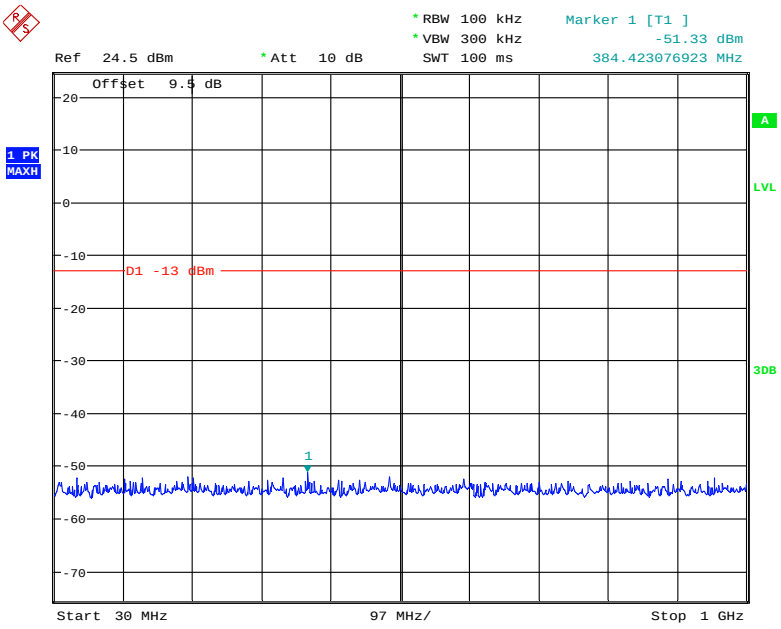
Date: 22.MAY.2019 00:42:18

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



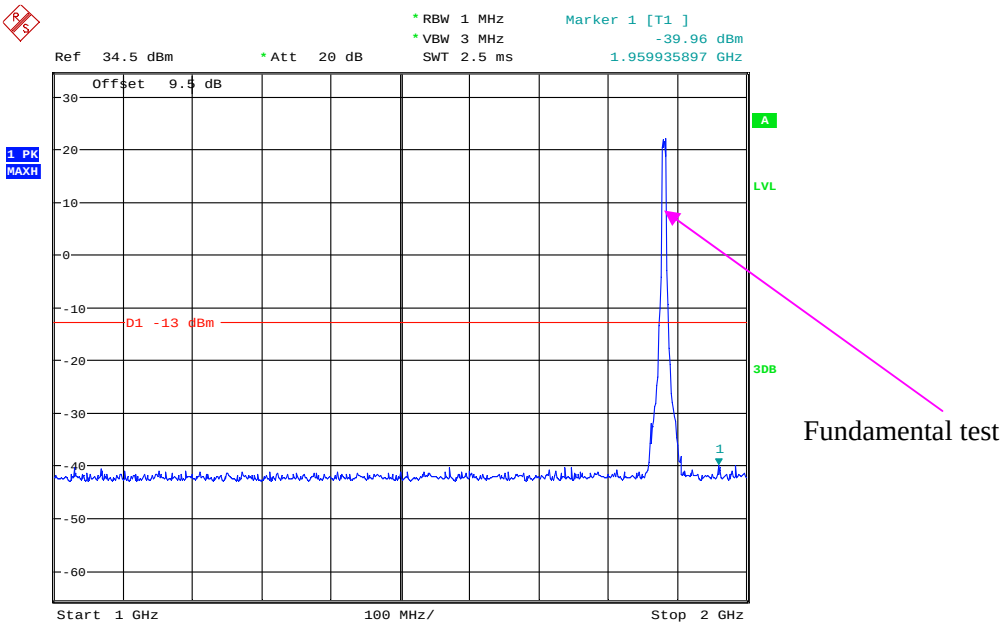
Date: 22.MAY.2019 00:47:30

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



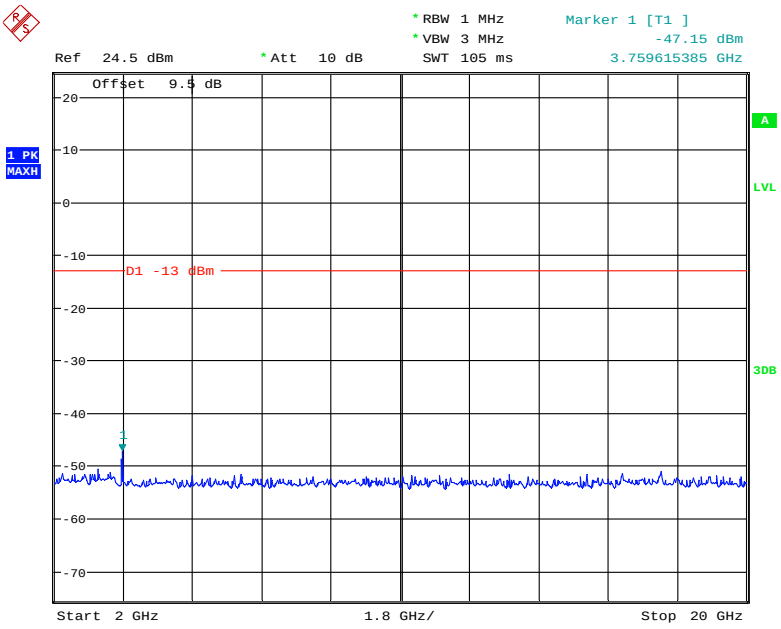
Date: 22.MAY.2019 00:36:04

1 GHz – 2 GHz (5.0 MHz, Middle Channel)



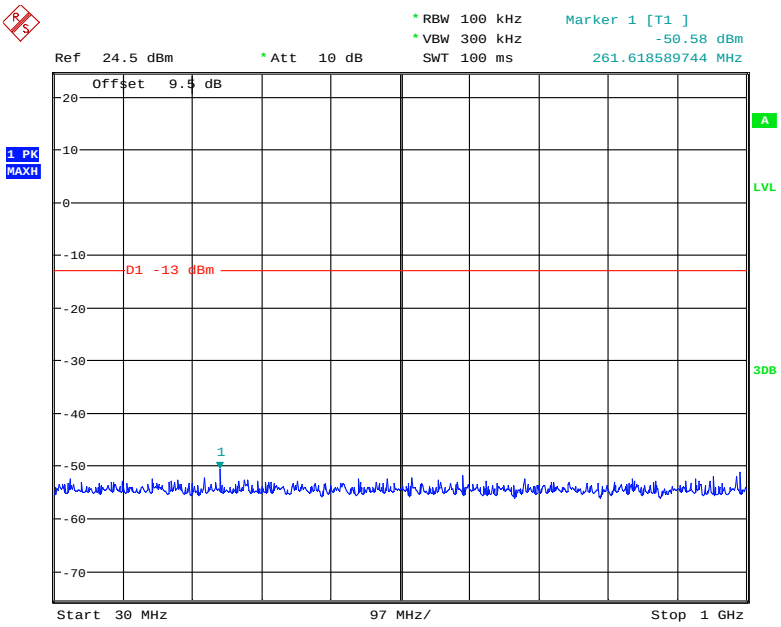
Date: 22.MAY.2019 00:41:43

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



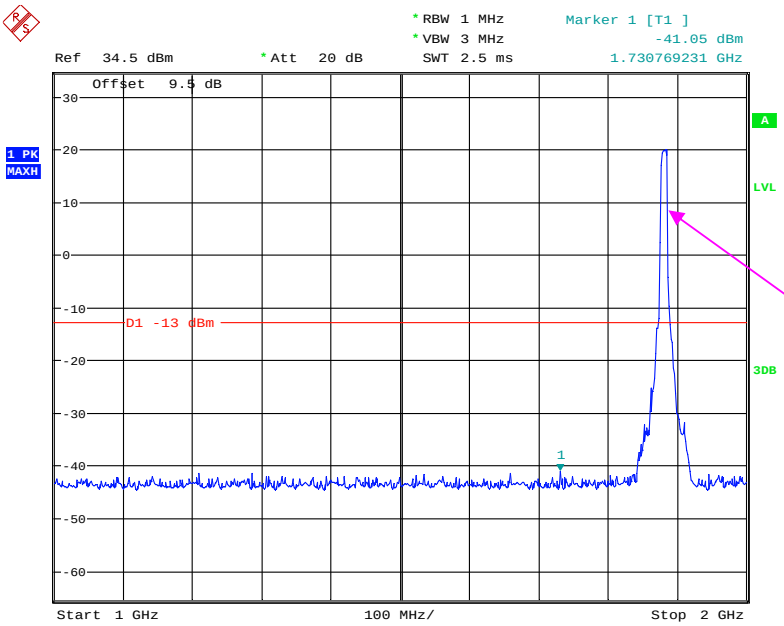
Date: 22.MAY.2019 00:47:43

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



Date: 22.MAY.2019 00:36:17

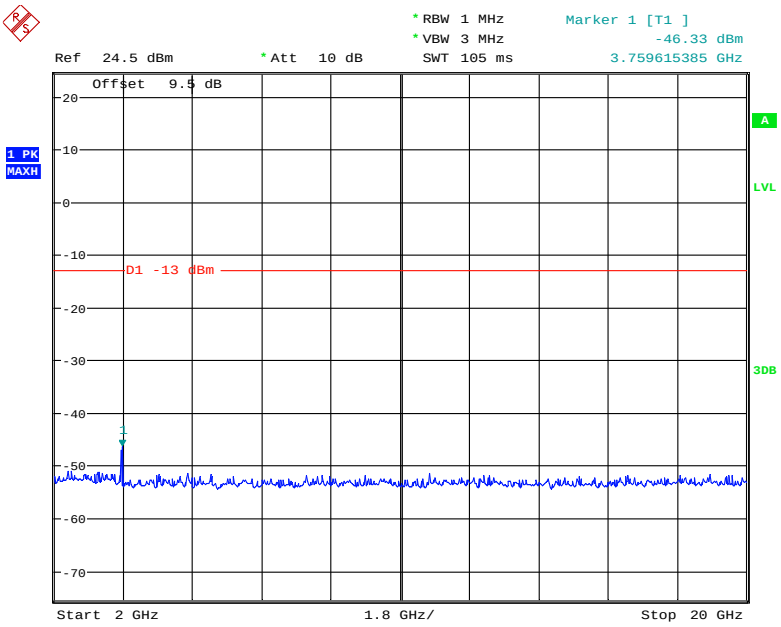
1 GHz – 2 GHz (10.0 MHz, Middle Channel)



Fundamental test

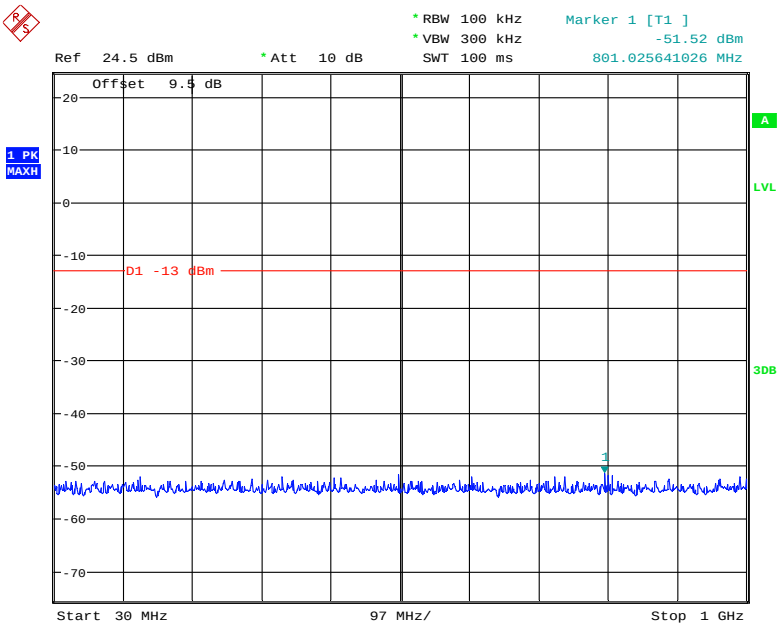
Date: 22.MAY.2019 00:38:48

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



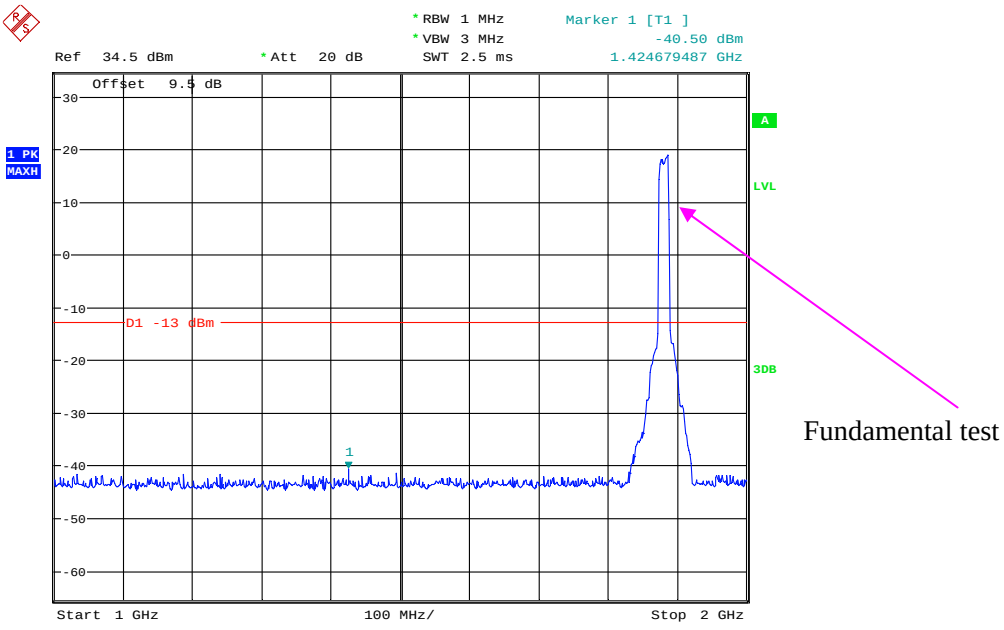
Date: 22.MAY.2019 00:47:56

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



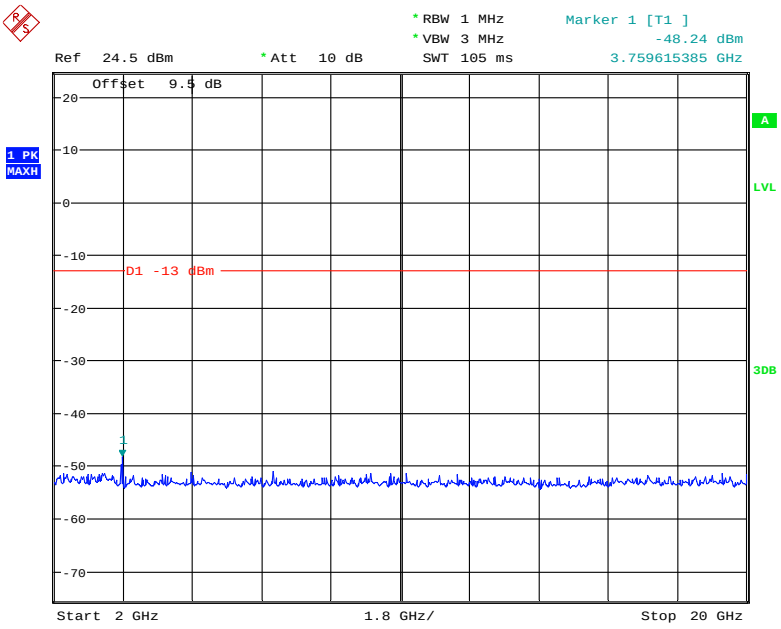
Date: 22.MAY.2019 00:36:30

1 GHz – 2 GHz (15.0 MHz, Middle Channel)



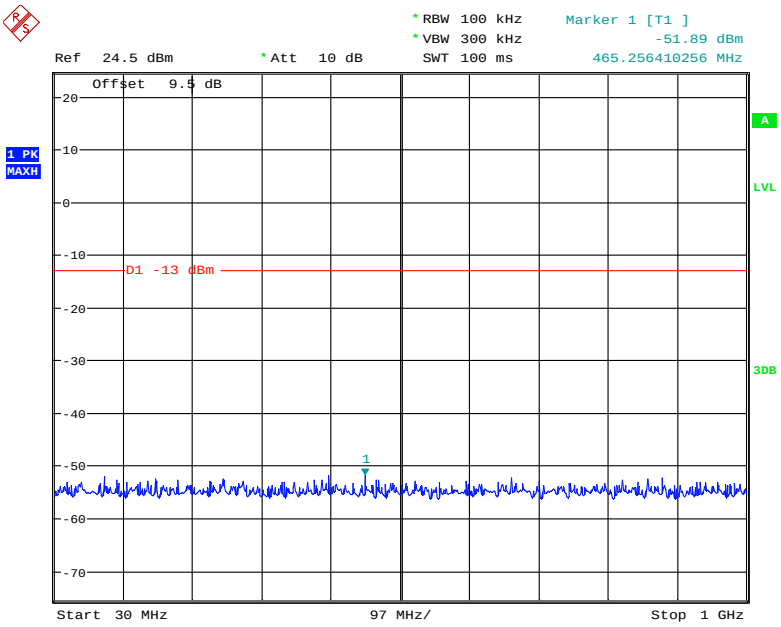
Date: 22.MAY.2019 00:38:27

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



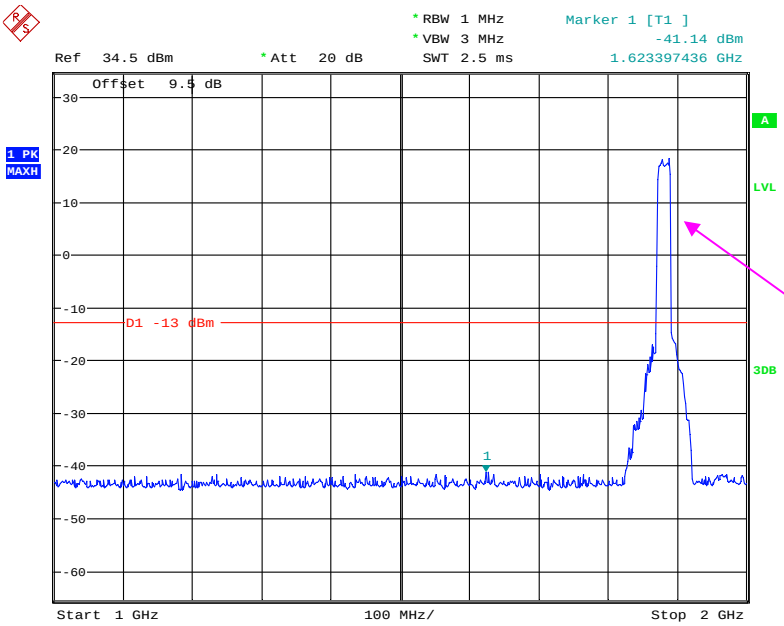
Date: 22.MAY.2019 00:48:11

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



Date: 22.MAY.2019 00:37:33

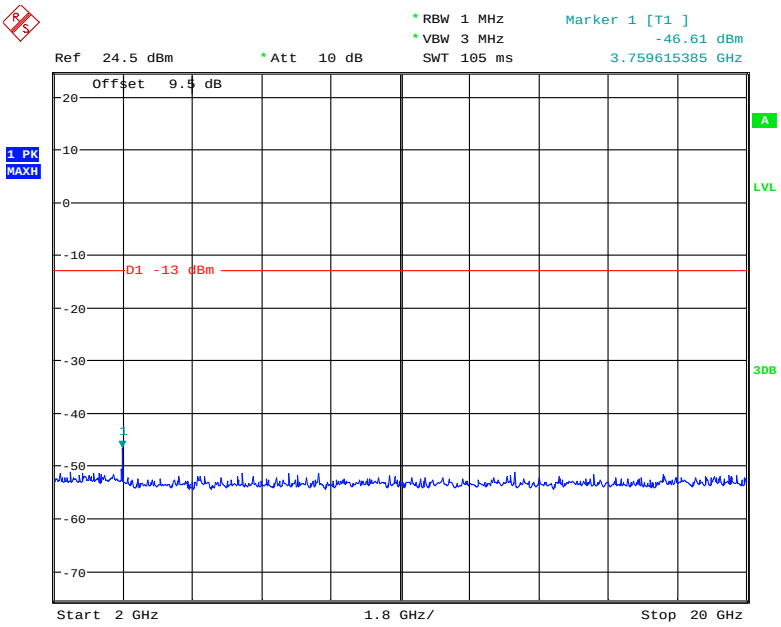
1 GHz – 2 GHz (20.0 MHz, Middle Channel)



Fundamental test

Date: 22.MAY.2019 00:38:05

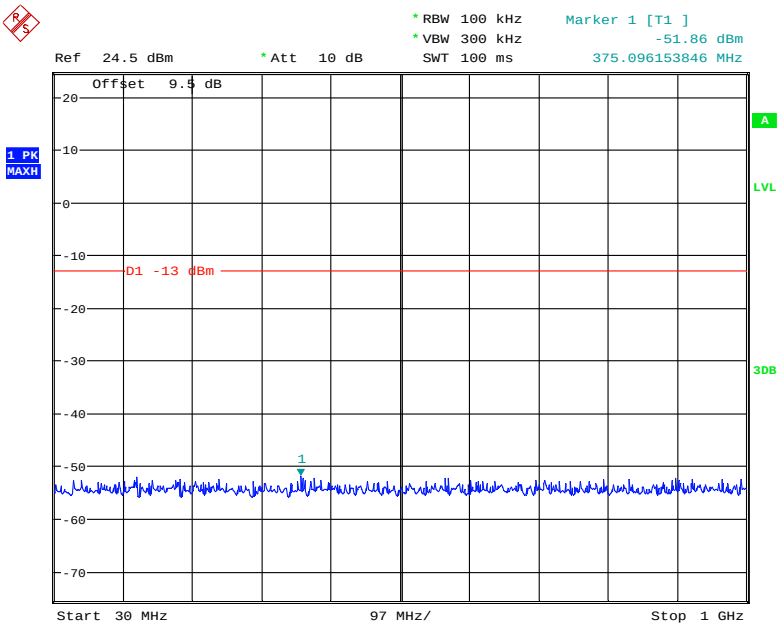
2 GHz - 20 GHz (20.0 MHz, Middle Channel)



Date: 22.MAY.2019 00:48:25

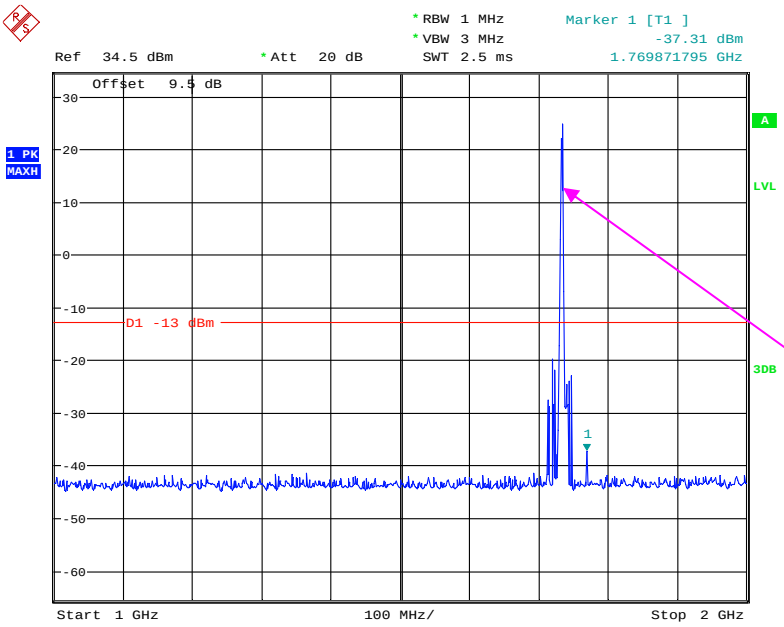
LTE Band 4:

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



Date: 22.MAY.2019 00:24:22

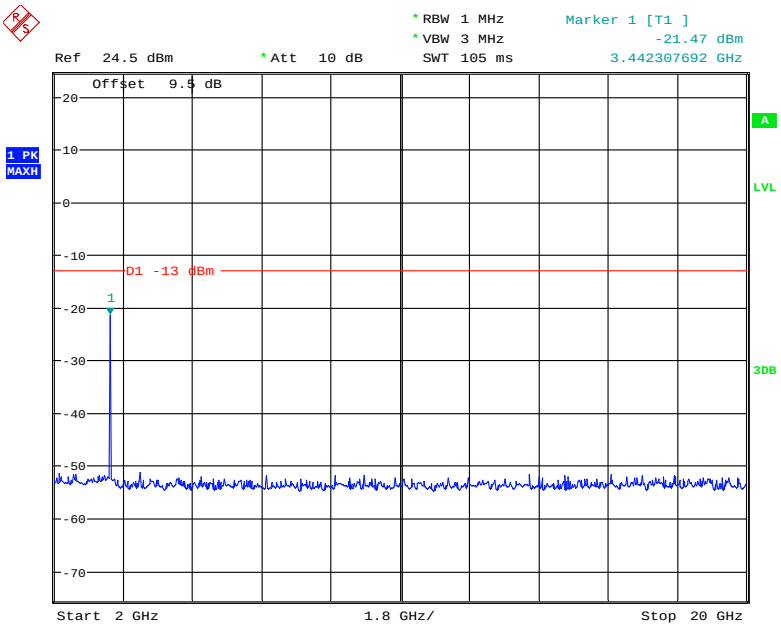
1 GHz – 2 GHz (1.4 MHz, Middle Channel)



Fundamental test

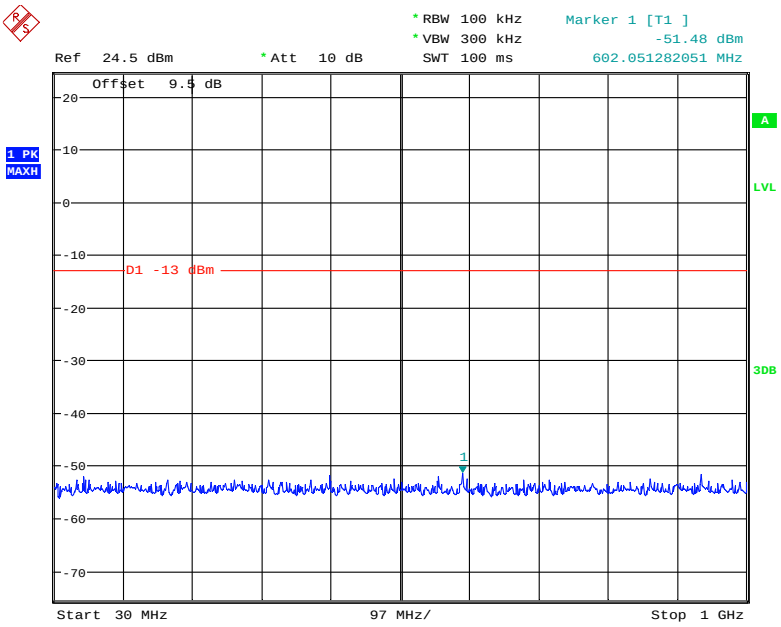
Date: 22.MAY.2019 00:28:43

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



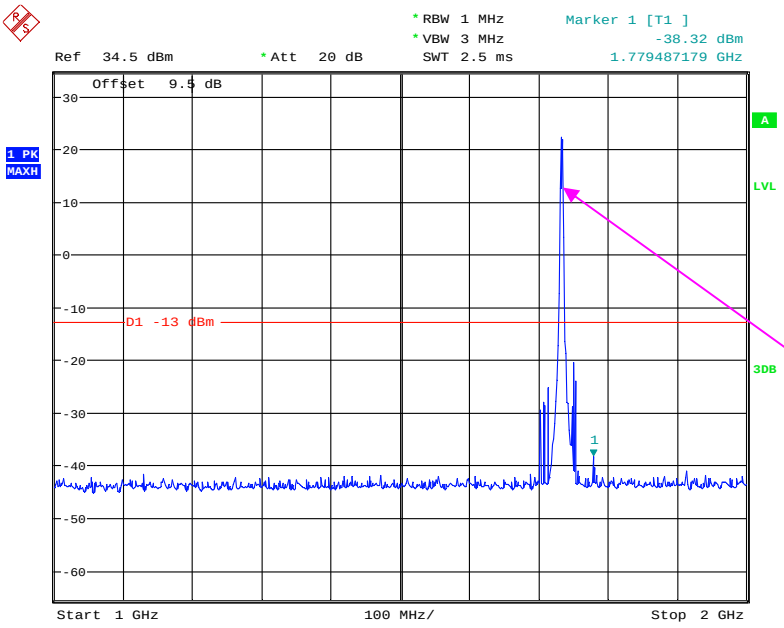
Date: 22.MAY.2019 00:29:01

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



Date: 22.MAY.2019 00:24:43

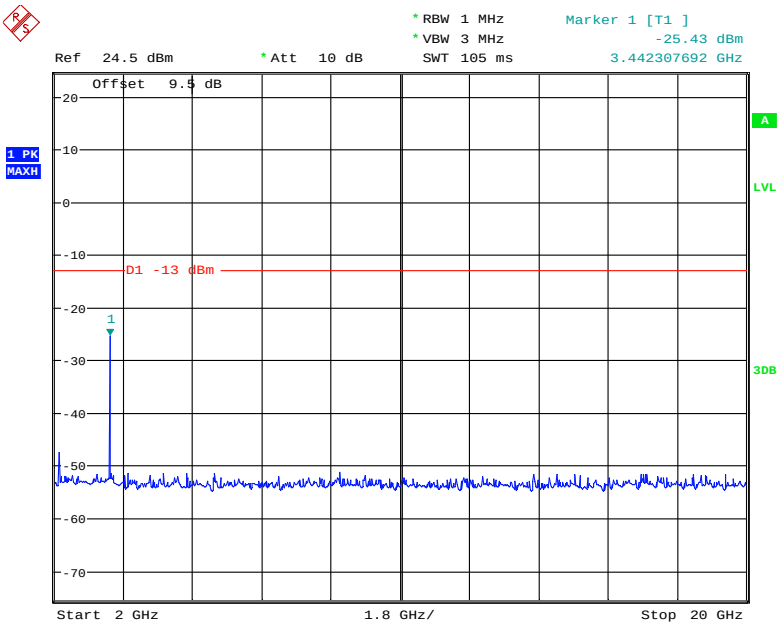
1 GHz – 2 GHz (3.0 MHz, Middle Channel)



Fundamental test

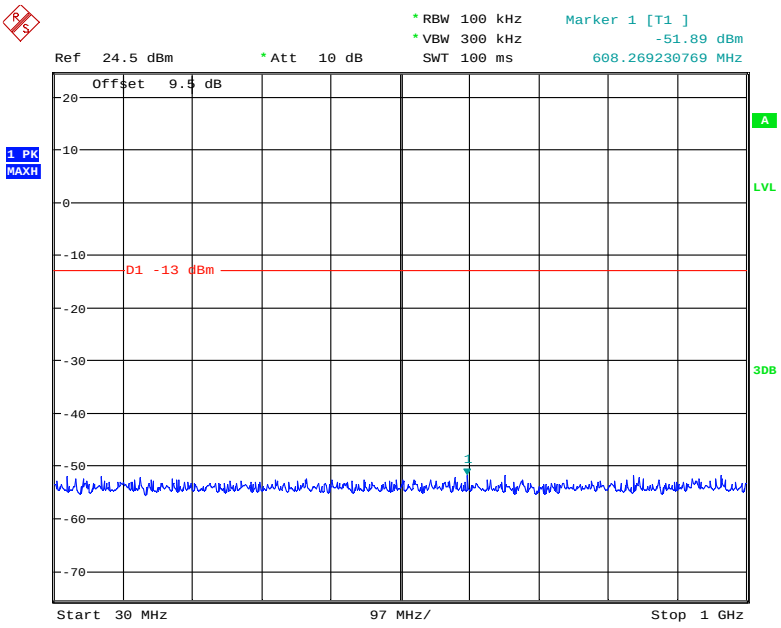
Date: 22.MAY.2019 00:28:26

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



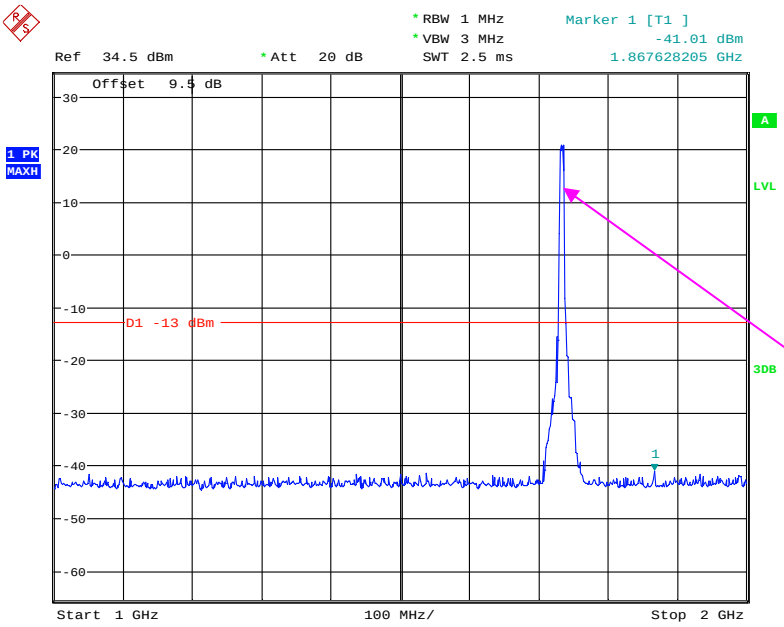
Date: 22.MAY.2019 00:31:57

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



Date: 22.MAY.2019 00:24:58

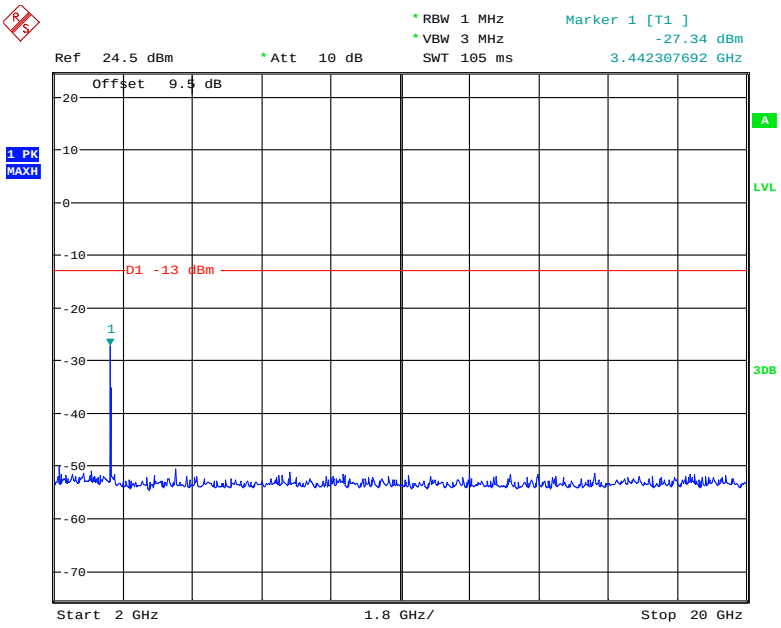
1 GHz – 2 GHz (5.0 MHz, Middle Channel)



Fundamental test

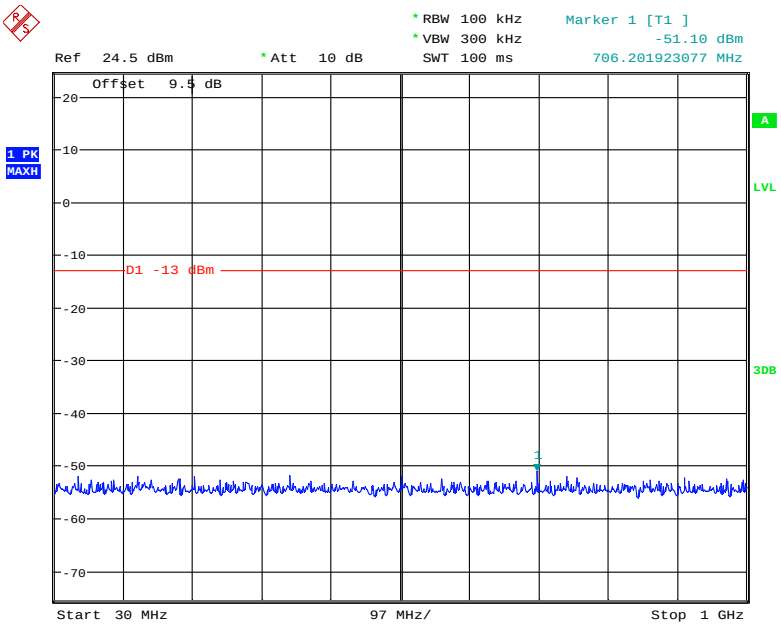
Date: 22.MAY.2019 00:27:43

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



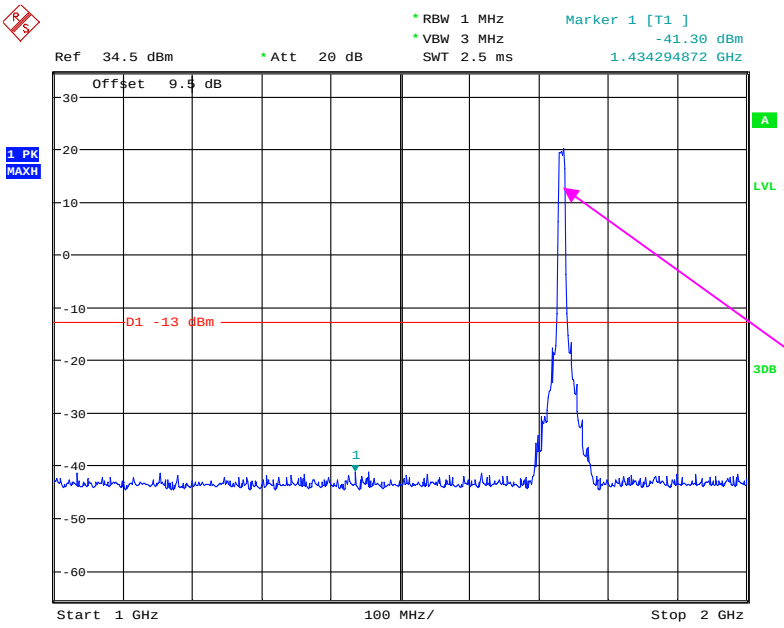
Date: 22.MAY.2019 00:32:09

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



Date: 22.MAY.2019 00:25:11

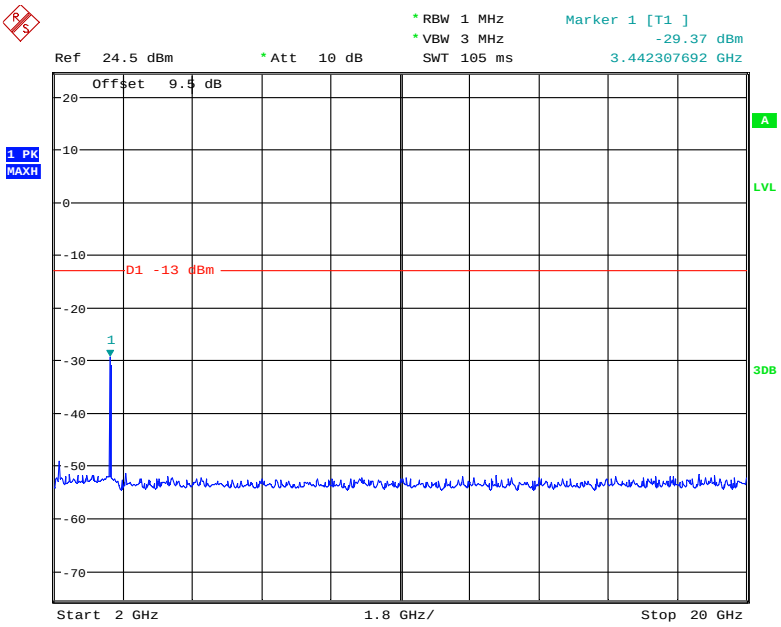
1 GHz – 2 GHz (10.0 MHz, Middle Channel)



Fundamental test

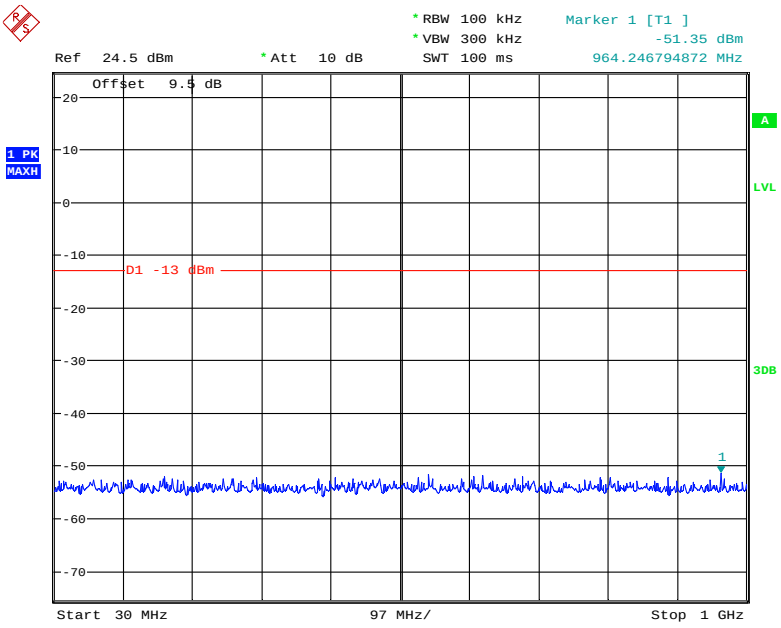
Date: 22.MAY.2019 00:27:18

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



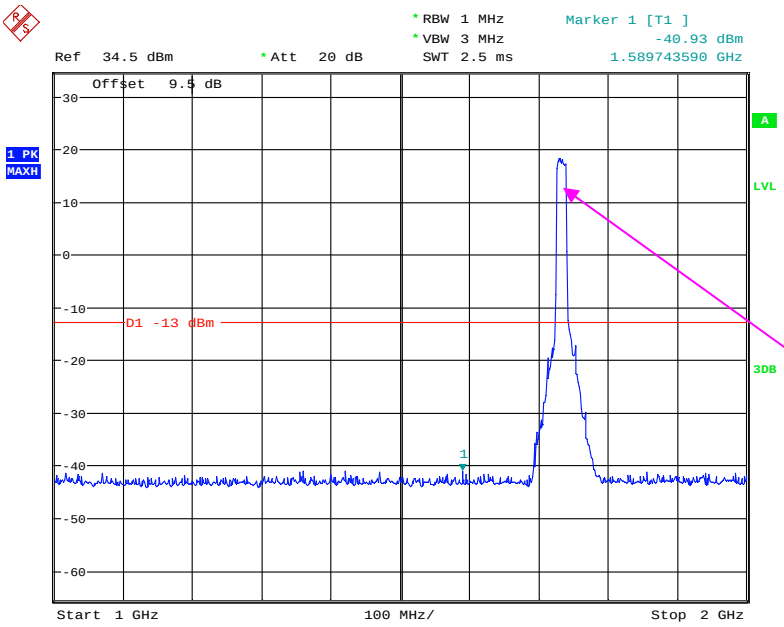
Date: 22.MAY.2019 00:32:20

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



Date: 22.MAY.2019 00:25:28

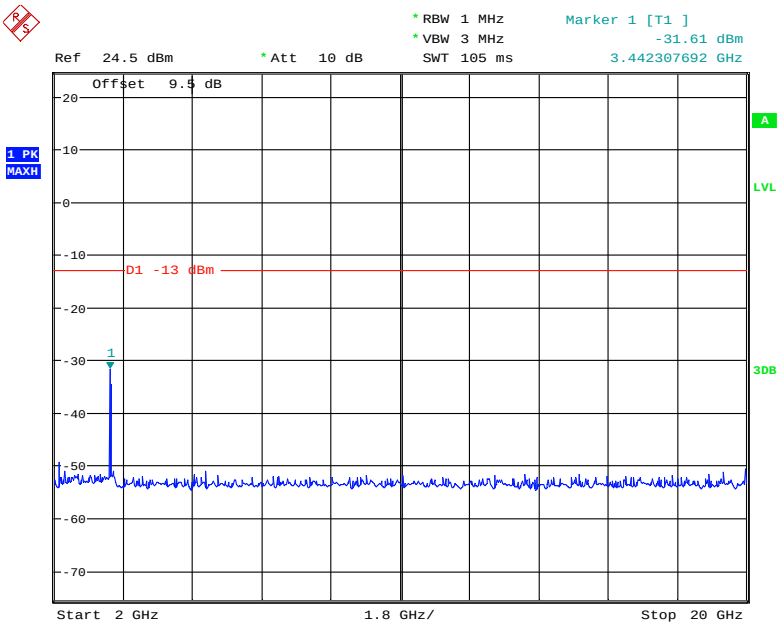
1 GHz – 2 GHz (15.0 MHz, Middle Channel)



Fundamental test

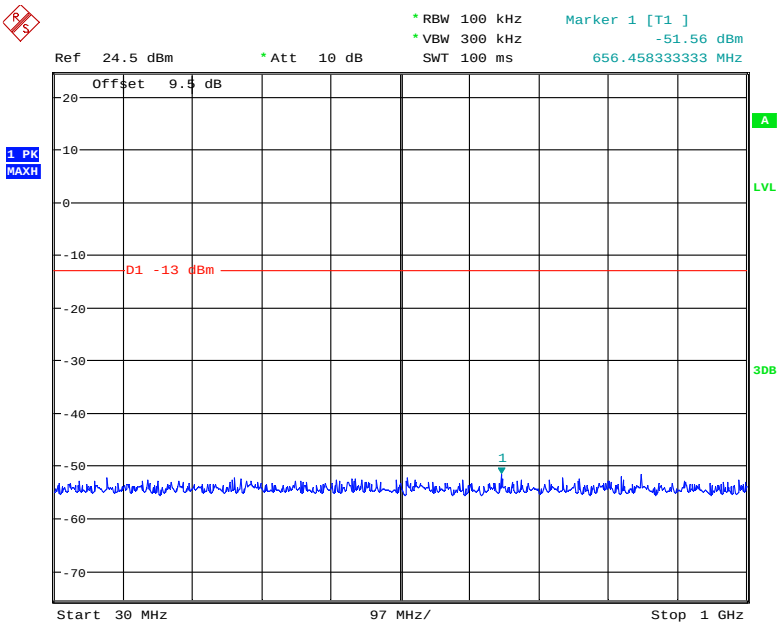
Date: 22.MAY.2019 00:26:53

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



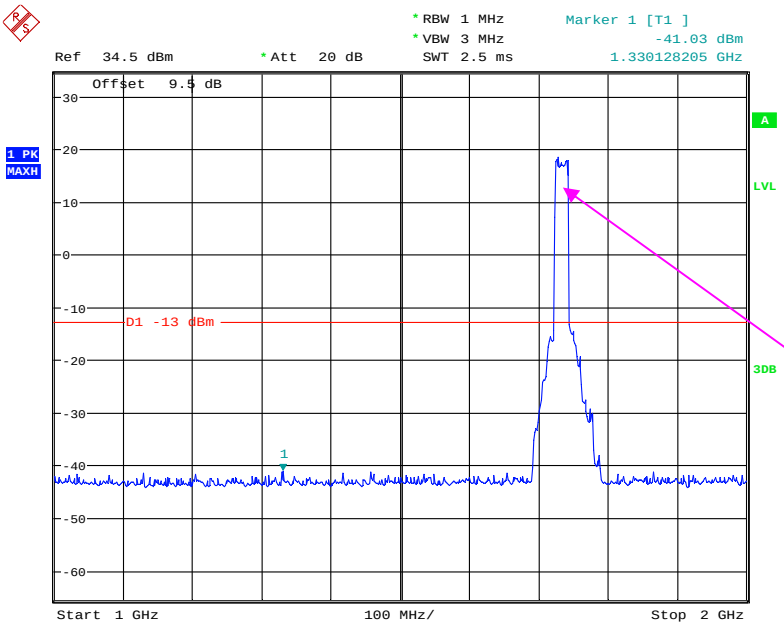
Date: 22.MAY.2019 00:32:32

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



Date: 22.MAY.2019 00:25:41

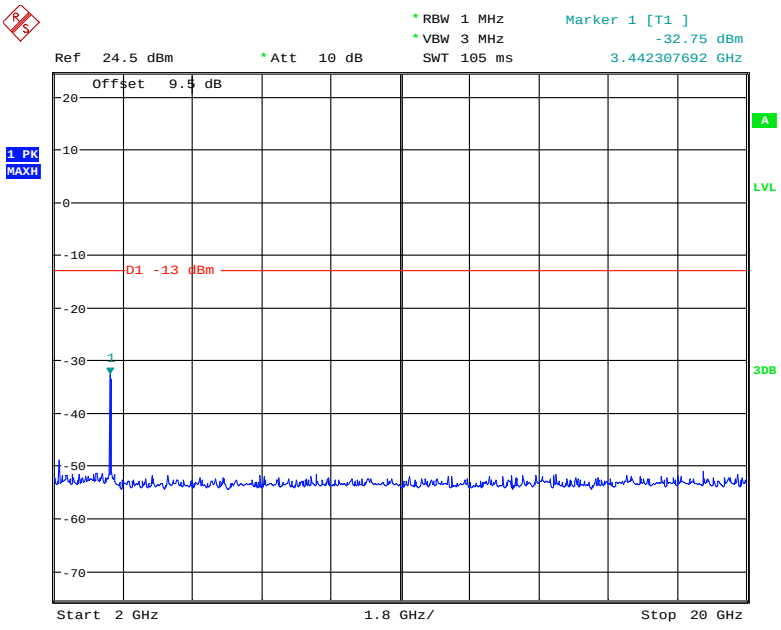
1 GHz – 2 GHz (20.0 MHz, Middle Channel)



Fundamental test

Date: 22.MAY.2019 00:26:22

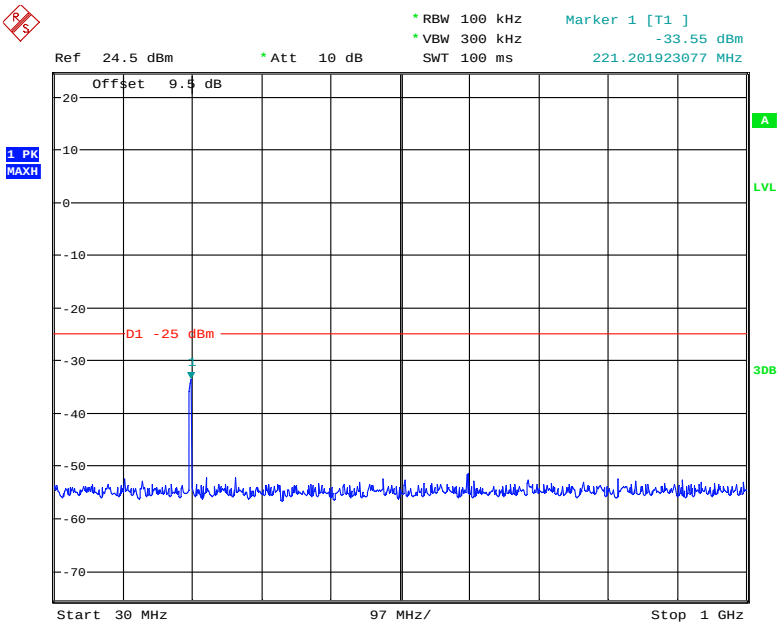
2 GHz – 20 GHz (20.0 MHz, Middle Channel)



Date: 22.MAY.2019 00:32:44

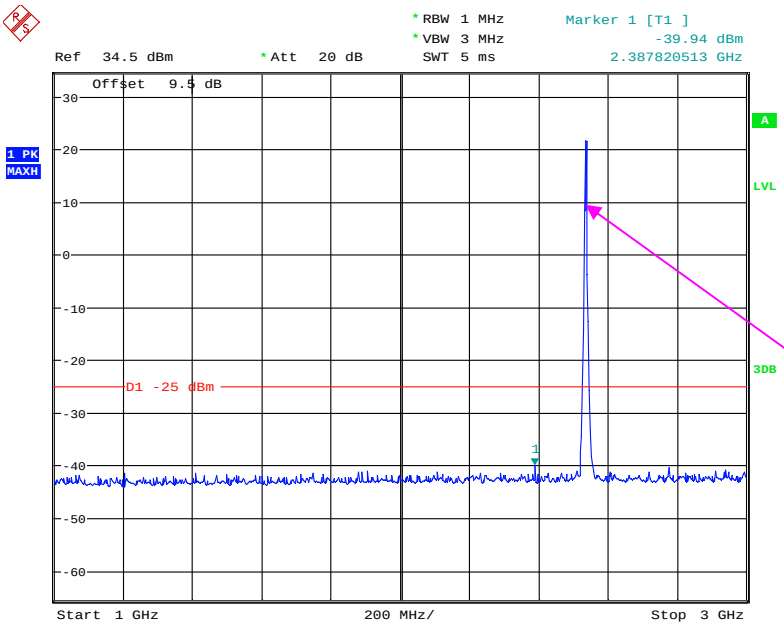
LTE Band 7:

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



Date: 23.MAY.2019 00:11:04

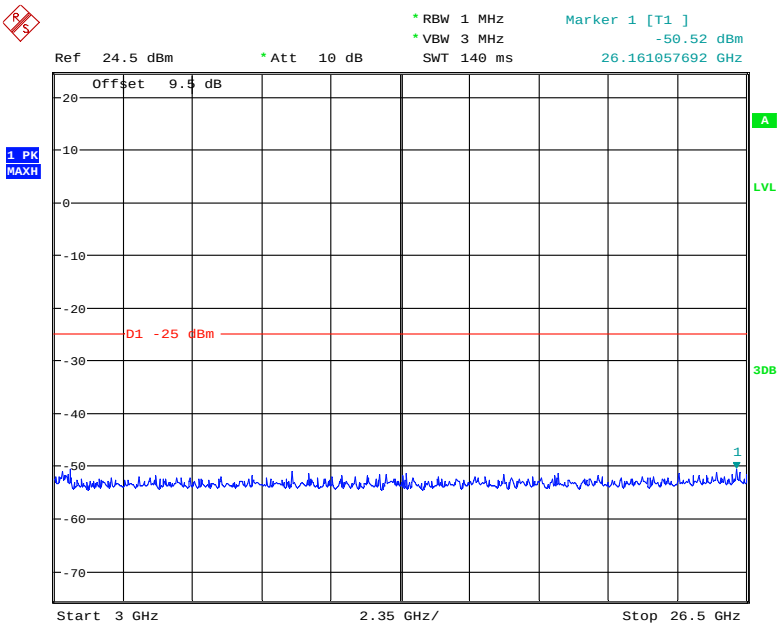
1 GHz – 3.0 GHz (5.0 MHz, Middle Channel)



Fundamental test

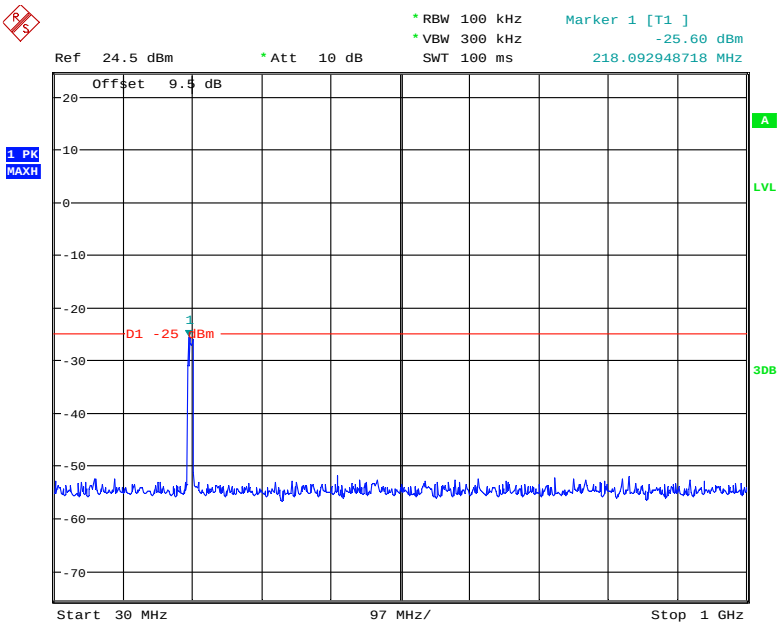
Date: 23.MAY.2019 00:16:33

3.0 GHz – 26.5 GHz (5.0 MHz, Middle Channel)



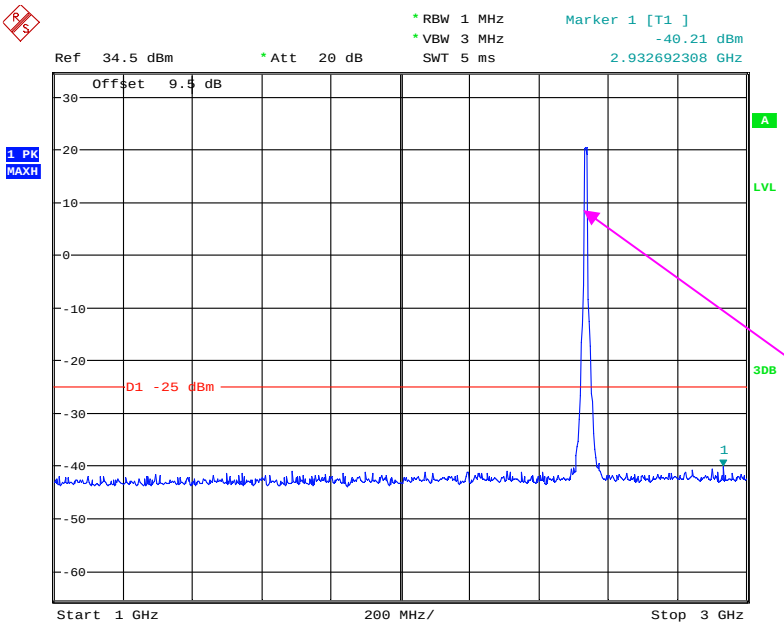
Date: 23.MAY.2019 00:16:52

30 MHz – 1.0 GHz (10.0 MHz, Middle Channel)



Date: 23.MAY.2019 00:09:21

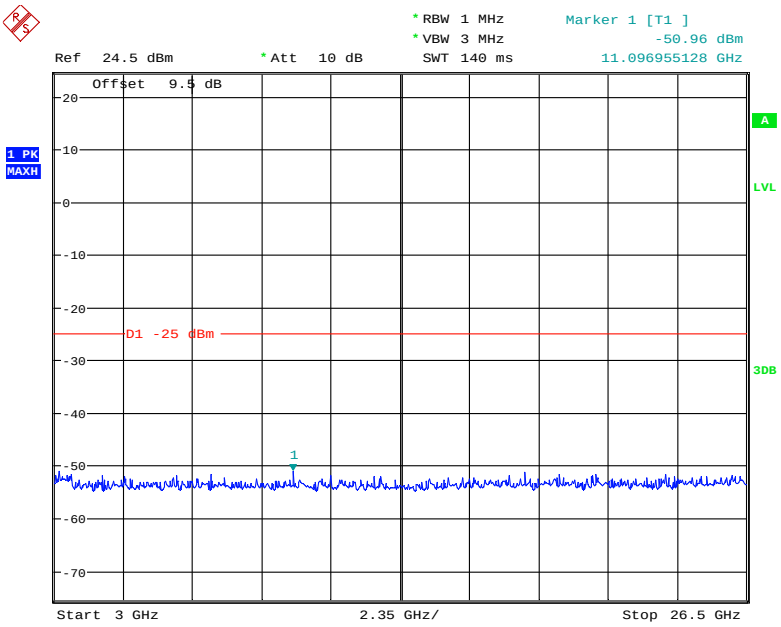
1 GHz – 3 GHz (10.0 MHz, Middle Channel)



Fundamental test

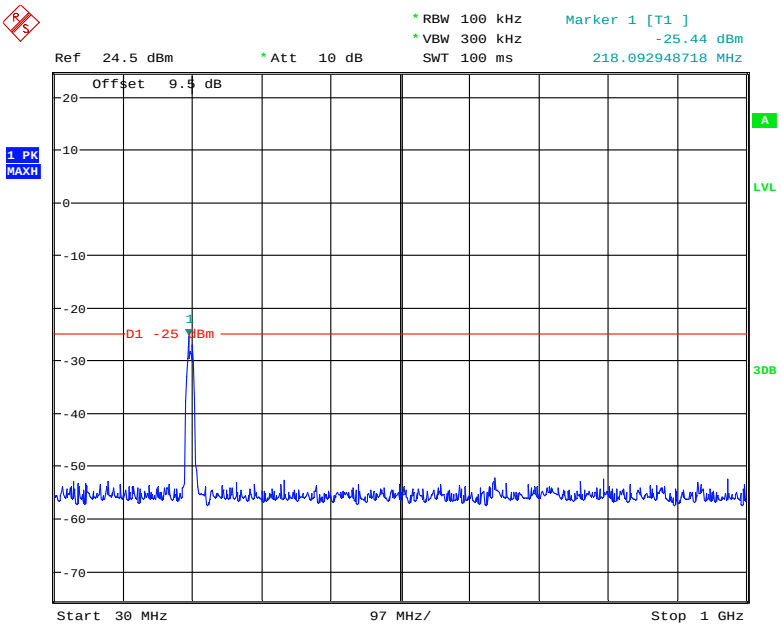
Date: 23.MAY.2019 00:16:10

3 GHz – 26.5 GHz (10.0 MHz, Middle Channel)



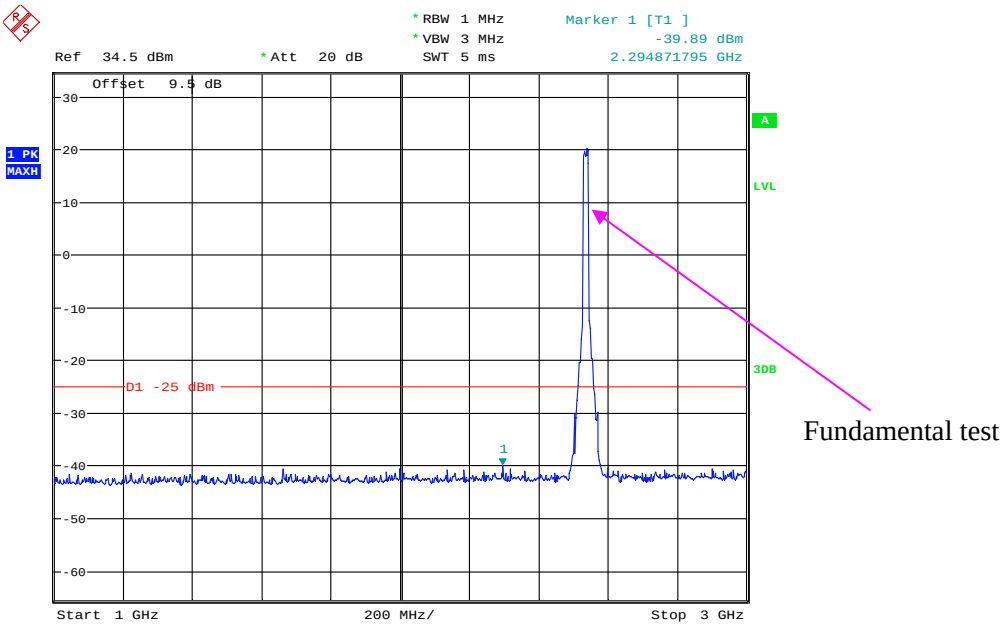
Date: 23.MAY.2019 00:17:09

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



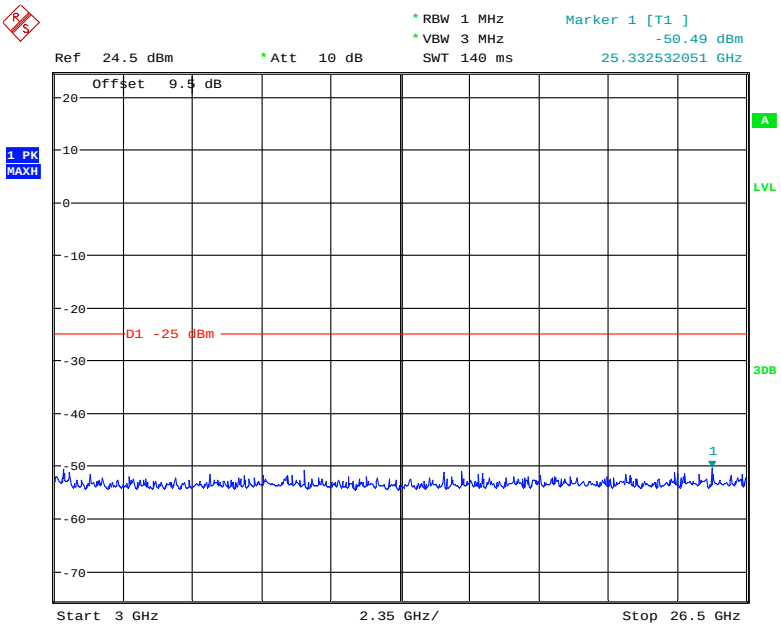
Date: 22.MAY.2019 23:44:41

1 GHz – 3 GHz (15.0 MHz, Middle Channel)



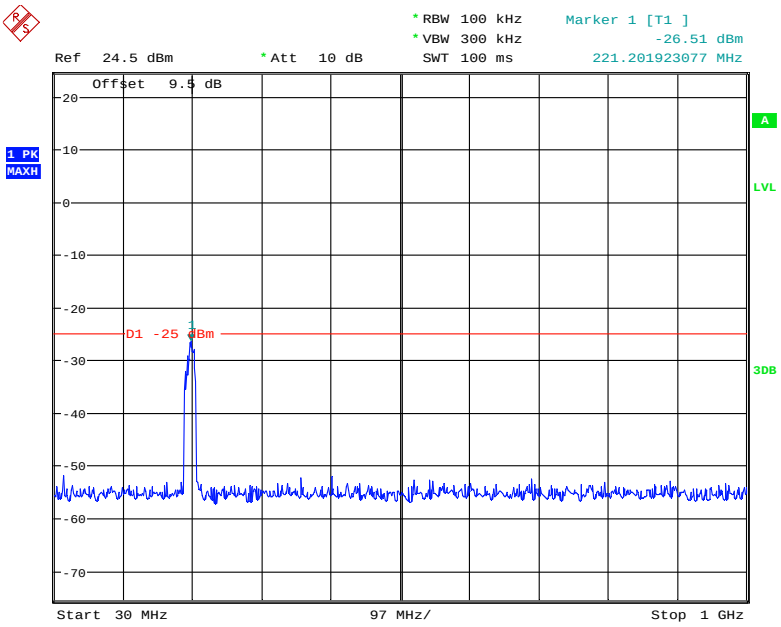
Date: 23.MAY.2019 00:15:48

3 GHz – 26.5 GHz (15.0 MHz, Middle Channel)



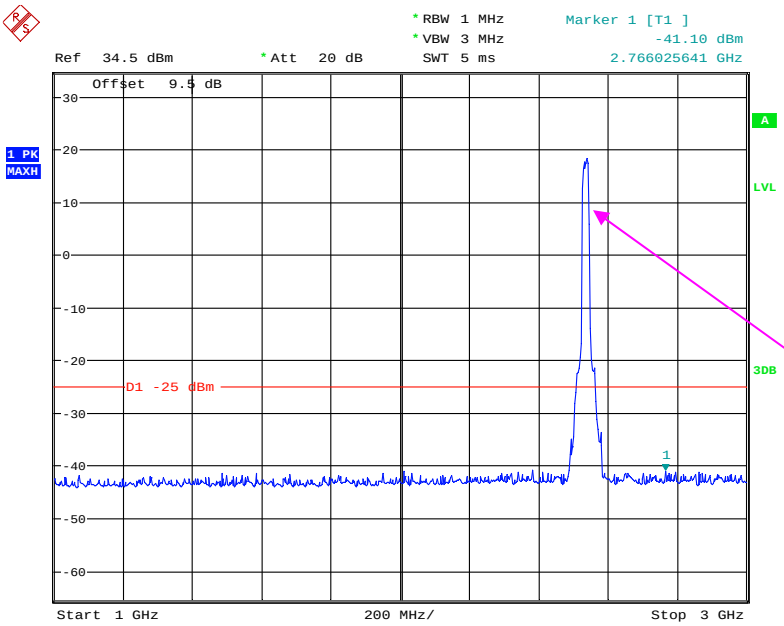
Date: 23.MAY.2019 00:17:24

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



Date: 22.MAY.2019 23:44:01

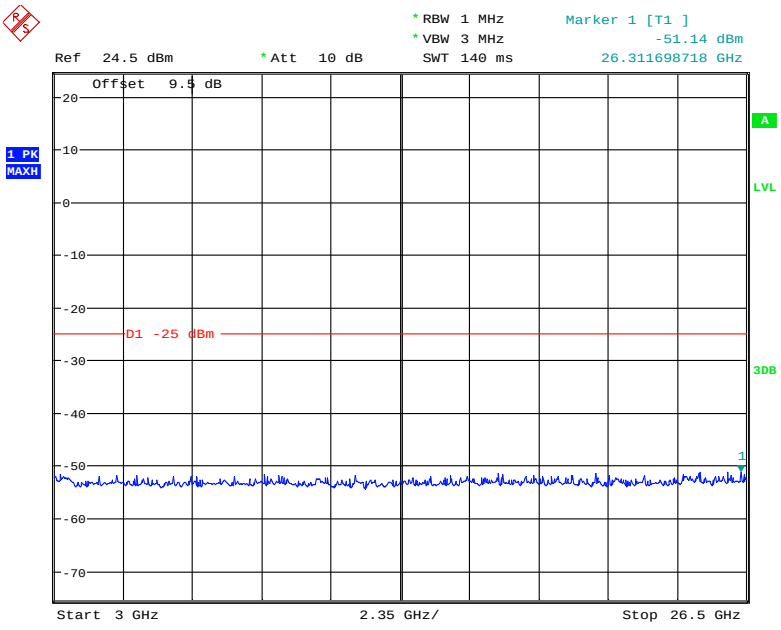
1 GHz – 3 GHz (20.0 MHz, Middle Channel)



Fundamental test

Date: 23.MAY.2019 00:15:04

3 GHz – 26.5 GHz (20.0 MHz, Middle Channel)



Date: 23.MAY.2019 00:17:36

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

Applicable Standard

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

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:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2019-05-23.

EUT operation mode: Transmitting

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

AUX Antenna:

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 (dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
231.26	28.05	311	2.4	H	-68.9	0.31	0	-69.21	-13	56.21
231.26	27.22	91	1.3	V	-69.8	0.31	0	-70.11	-13	57.11
3760.00	45.38	181	1.9	H	-56.7	1.50	11.80	-46.40	-13	33.40
3760.00	44.57	131	2.0	V	-57.0	1.50	11.80	-46.70	-13	33.70
WCDMA Mode Band II, Middle channel										
231.26	28.46	12	2.1	H	-68.5	0.31	0	-68.81	-13	55.81
231.26	27.29	303	1.8	V	-69.7	0.31	0	-70.01	-13	57.01
3760.00	44.75	289	2.3	H	-57.3	1.50	11.80	-47.00	-13	34.00
3760.00	44.65	121	2.3	V	-56.9	1.50	11.80	-46.60	-13	33.60

30 MHz ~ 20 GHz:

AWS Band (Part 27)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 27	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
WCDMA Mode Band IV, Middle channel										
231.26	28.24	141	1.7	H	-68.8	0.31	0	-69.11	-13	56.11
231.26	28.71	353	2.4	V	-68.3	0.31	0	-68.61	-13	55.61
3464.12	43.42	5	1.1	H	-57.5	1.50	12.00	-47.00	-13	34.00
3464.12	44.05	2	2.0	V	-57.6	1.50	12.00	-47.10	-13	34.10

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

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)			
Band 2										
Test frequency range:30 MHz ~ 20 GHz										
231.26	28.23	230	2.0	H	-68.8	0.31	0	-69.11	-13	56.11
231.26	28.39	265	1.1	V	-68.6	0.31	0	-68.91	-13	55.91
3760.00	46.08	330	2.2	H	-56.0	1.50	11.80	-45.70	-13	32.70
3760.00	45.69	168	1.6	V	-55.9	1.50	11.80	-45.60	-13	32.60
Band 4										
Test frequency range:30 MHz ~ 18 GHz										
231.26	28.61	97	2.2	H	-68.4	0.31	0	-68.71	-13	55.71
231.26	28.01	14	2.4	V	-69.0	0.31	0	-69.31	-13	56.31
3465.00	43.94	128	2.0	H	-56.8	1.50	12.00	-46.30	-13	33.30
3465.00	44.38	30	1.1	V	-57.1	1.50	12.00	-46.60	-13	33.60
Band 7										
Test frequency range: 30 MHz ~ 26GHz										
231.26	28.64	166	1.5	H	-68.4	0.31	0	-68.71	-25	43.71
231.26	27.76	68	1.5	V	-69.2	0.31	0	-69.51	-25	44.51
5070.00	44.02	95	1.1	H	-56.0	1.60	12.10	-45.50	-25	20.50
5070.00	44.29	199	2.1	V	-55.7	1.60	12.10	-45.20	-25	20.20

Main Antenna:
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 (dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
235.07	27.30	318	2.3	H	-69.7	0.31	0	-70.01	-13	57.01
235.07	28.82	333	2.5	V	-68.2	0.31	0	-68.51	-13	55.51
1673.20	45.30	124	2.1	H	-61.0	1.30	8.90	-53.40	-13	40.40
1673.20	44.53	137	1.3	V	-61.2	1.30	8.90	-53.60	-13	40.60
2509.80	52.39	24	2.0	H	-51.0	2.60	10.20	-43.40	-13	30.40
2509.80	52.97	201	2.0	V	-49.8	2.60	10.20	-42.20	-13	29.20
3346.40	45.47	228	1.0	H	-55.4	1.50	11.70	-45.20	-13	32.20
3346.40	46.03	157	2.4	V	-54.9	1.50	11.70	-44.70	-13	31.70
WCDMA Mode, Middle channel										
235.07	27.83	35	2.2	H	-69.2	0.31	0	-69.51	-13	56.51
235.07	27.88	28	1.8	V	-69.1	0.31	0	-69.41	-13	56.41
1673.20	43.13	206	1.7	H	-63.2	1.30	8.90	-55.60	-13	42.60
1673.20	43.37	291	2.3	V	-62.4	1.30	8.90	-54.80	-13	41.80
2509.80	46.99	237	1.8	H	-56.4	2.60	10.20	-48.80	-13	35.80
2509.80	46.70	328	1.5	V	-56.0	2.60	10.20	-48.40	-13	35.40
3346.40	43.37	169	1.9	H	-57.5	1.50	11.70	-47.30	-13	34.30
3346.40	43.33	103	1.1	V	-57.6	1.50	11.70	-47.40	-13	34.40

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 (dBi)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
235.07	27.98	90	1.8	H	-69.0	0.31	0	-69.31	-13	56.31
235.07	28.41	4	1.1	V	-68.6	0.31	0	-68.91	-13	55.91
3760.00	53.21	145	1.0	H	-48.8	1.50	11.80	-38.50	-13	25.50
3760.00	53.44	44	2.4	V	-48.1	1.50	11.80	-37.80	-13	24.80
7520.00	53.85	111	1.7	H	-42.1	1.90	10.70	-33.30	-13	20.30
7520.00	56.81	92	1.5	V	-38.7	1.90	10.70	-29.90	-13	16.90
WCDMA Mode Band II, Middle channel										
235.07	28.62	111	1.9	H	-68.4	0.31	0	-68.71	-13	55.71
235.07	27.05	159	2.1	V	-69.9	0.31	0	-70.21	-13	57.21
3760.00	44.47	159	1.4	H	-57.6	1.50	11.80	-47.30	-13	34.30
3760.00	44.68	106	2.3	V	-56.9	1.50	11.80	-46.60	-13	33.60

30 MHz ~ 20 GHz:

AWS Band (Part 27)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 27	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
WCDMA Mode Band IV, Middle channel										
235.07	27.04	29	1.1	H	-70.0	0.31	0	-70.31	-13	57.31
235.07	28.04	118	1.0	V	-69.0	0.31	0	-69.31	-13	56.31
3465.20	43.13	214	1.3	H	-57.6	1.50	12.00	-47.10	-13	34.10
3465.20	43.43	116	2.1	V	-58.1	1.50	12.00	-47.60	-13	34.60

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

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)			
Band 2										
Test frequency range:30 MHz ~ 20 GHz										
235.07	27.26	17	1.5	H	-69.7	0.31	0	-70.01	-13	57.01
235.07	27.68	252	2.0	V	-69.3	0.31	0	-69.61	-13	56.61
3760.00	44.42	148	1.9	H	-57.6	1.50	11.80	-47.30	-13	34.30
3760.00	43.90	246	1.1	V	-57.7	1.50	11.80	-47.40	-13	34.40
Band 4										
Test frequency range:30 MHz ~ 18 GHz										
235.07	27.11	109	1.7	H	-69.9	0.31	0	-70.21	-13	57.21
235.07	28.80	247	1.3	V	-68.2	0.31	0	-68.51	-13	55.51
3465.00	43.67	135	1.7	H	-57.1	1.50	12.00	-46.60	-13	33.60
3465.00	43.64	35	1.9	V	-57.9	1.50	12.00	-47.40	-13	34.40
Band 7										
Test frequency range: 30 MHz ~ 26GHz										
235.07	28.92	245	2.5	H	-68.1	0.31	0	-68.41	-25	43.41
235.07	28.07	184	2.2	V	-68.9	0.31	0	-69.21	-25	44.21
5070.00	44.36	287	1.7	H	-55.6	1.60	12.10	-45.10	-25	20.10
5070.00	45.03	154	1.7	V	-55.0	1.60	12.10	-44.50	-25	19.50

Note:
1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
2) Margin = Limit- Absolute Level

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.

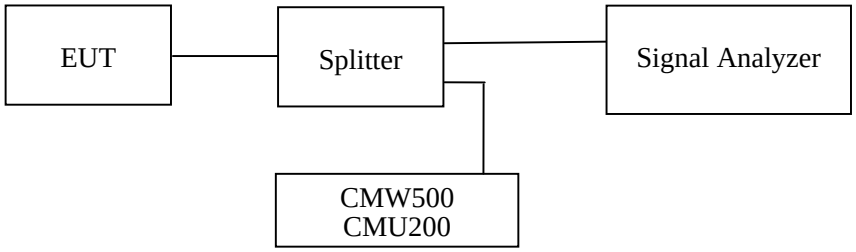
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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



Test Data

Environmental Conditions

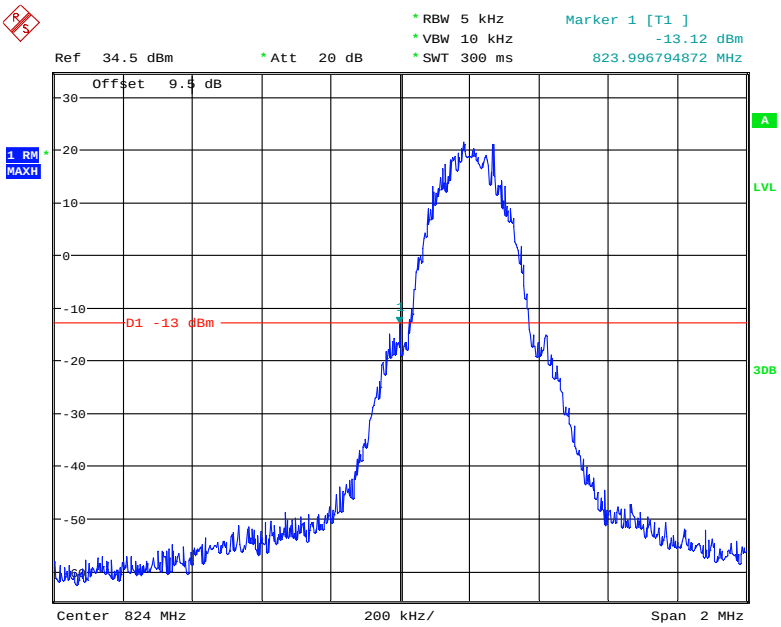
Temperature:	24~25 ℃
Relative Humidity:	52~56 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by James Fu on 2019-05-21 to 2019-05-22.

EUT operation mode: Transmitting

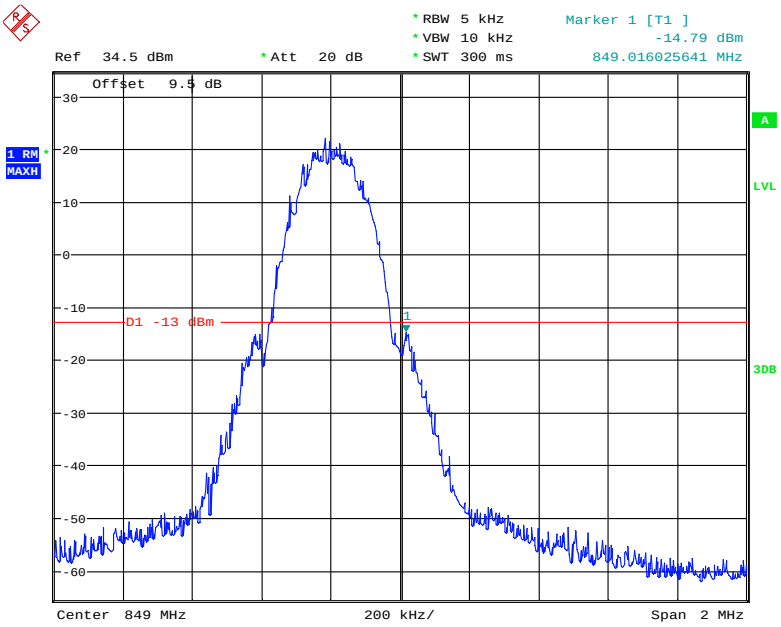
Test Result: Compliance. Please refer to the following plots.

Cellular Band, Left Band Edge for GSM (GMSK) Mode



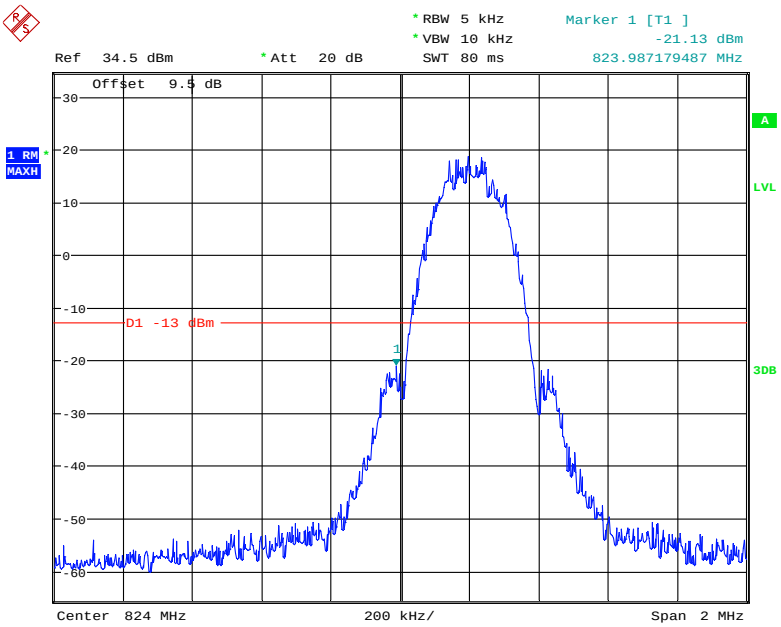
Date: 21.MAY.2019 20:18:56

Cellular Band, Right Band Edge for GSM (GMSK) Mode



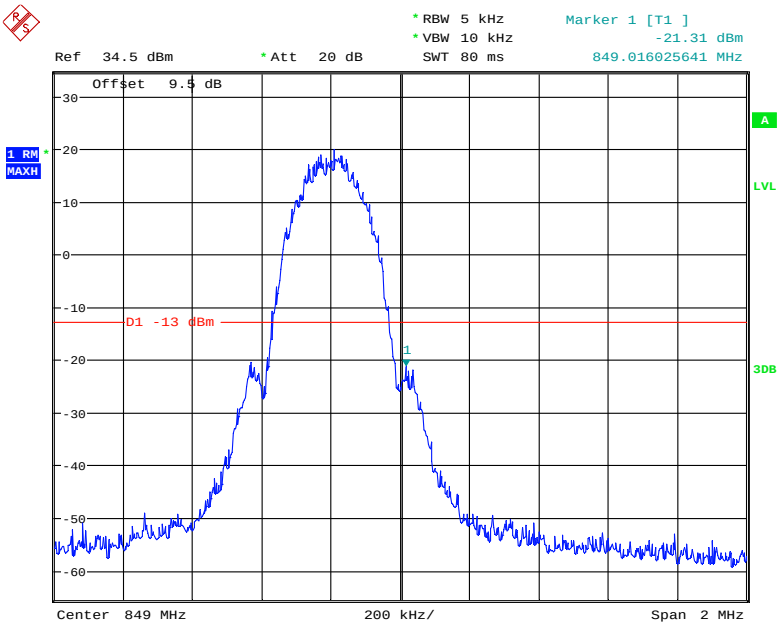
Date: 21.MAY.2019 20:19:39

Cellular Band, Left Band Edge for EDGE Mode



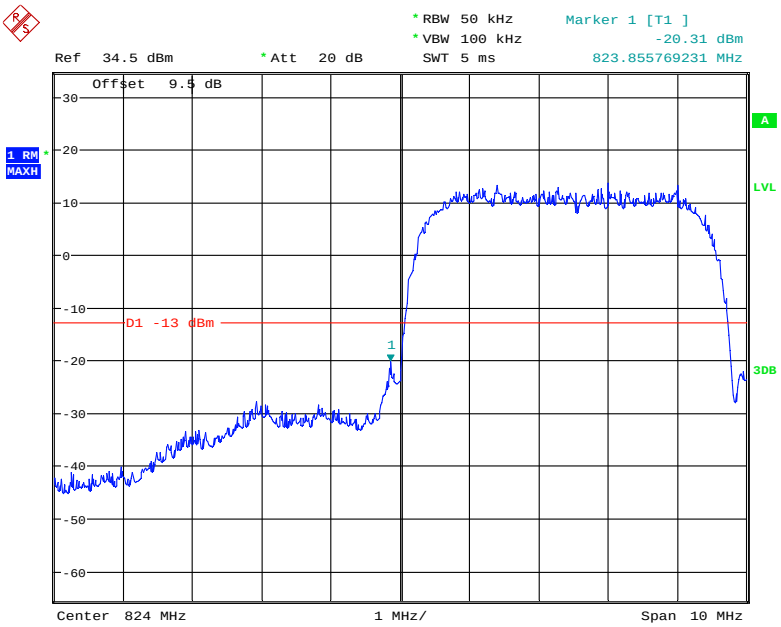
Date: 21.MAY.2019 20:29:47

Cellular Band, Right Band Edge for EDGE Mode



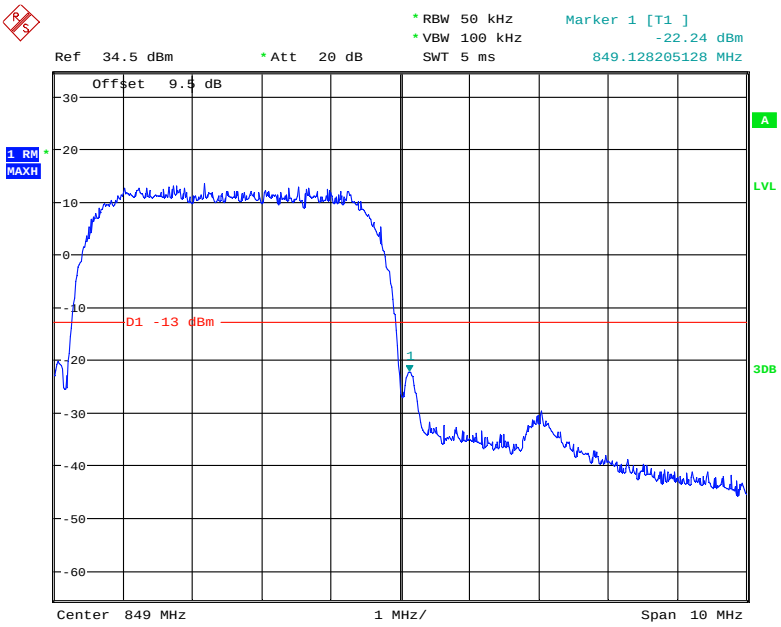
Date: 21.MAY.2019 20:30:44

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



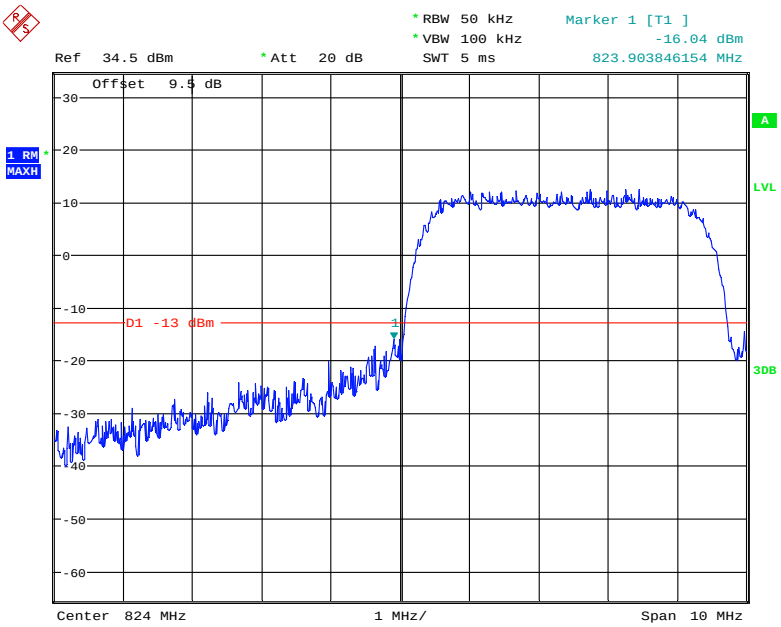
Date: 21.MAY.2019 21:14:11

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



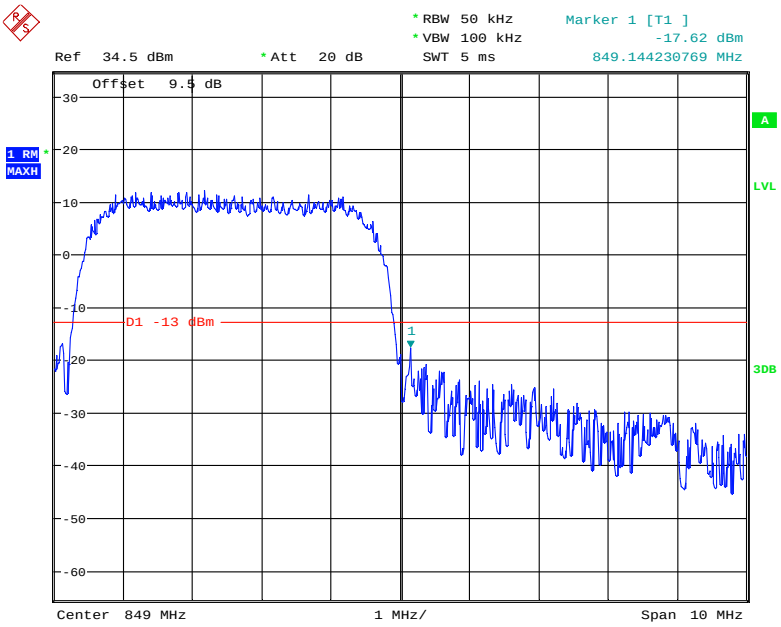
Date: 21.MAY.2019 21:14:38

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



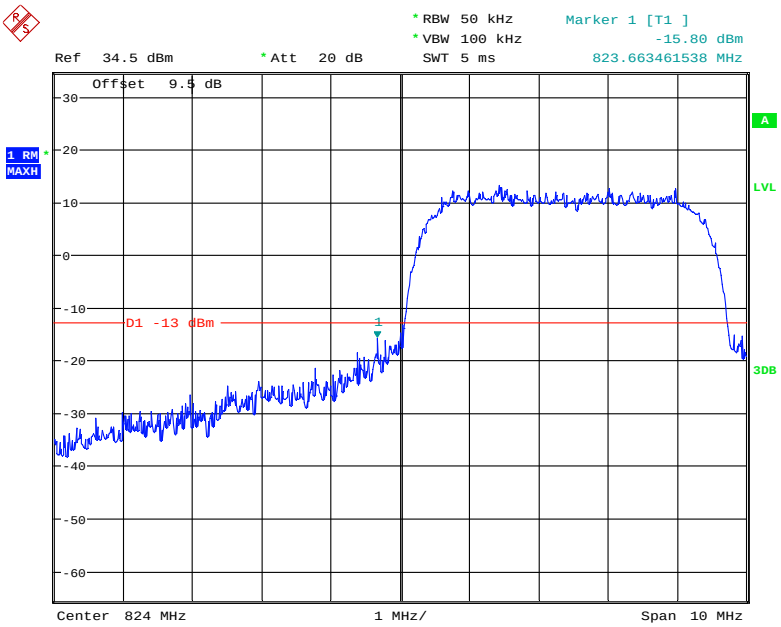
Date: 21.MAY.2019 21:08:51

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



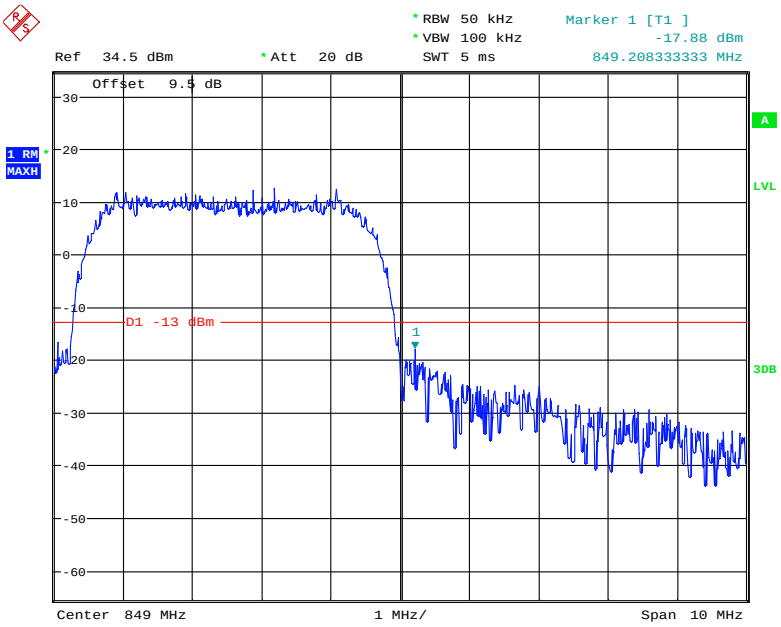
Date: 21.MAY.2019 21:09:28

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



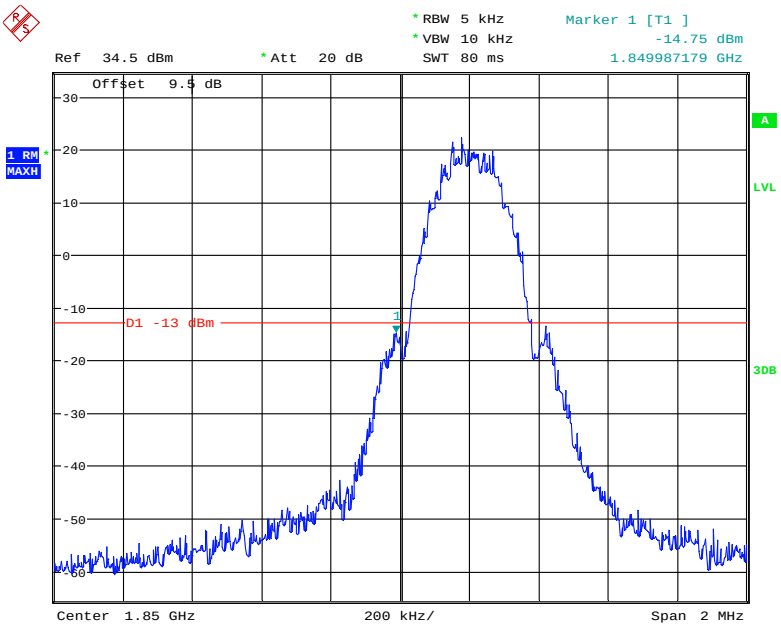
Date: 21.MAY.2019 21:12:45

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



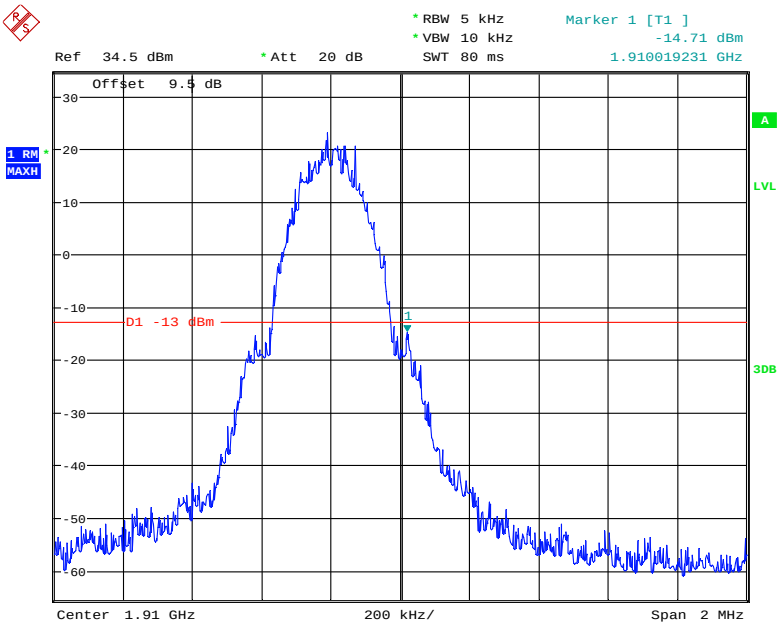
Date: 21.MAY.2019 21:12:00

PCS Band, Left Band Edge for GSM (GMSK) Mode



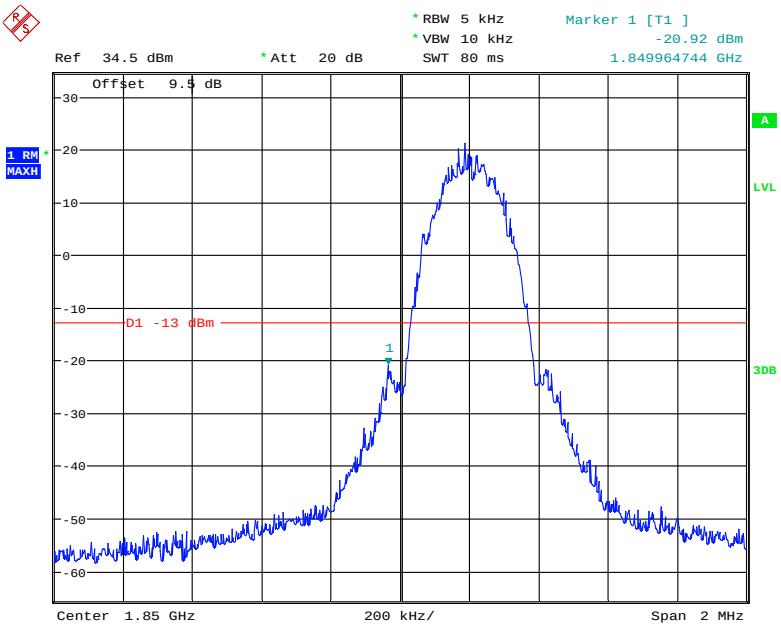
Date: 21.MAY.2019 20:34:04

PCS Band, Right Band Edge for GSM (GMSK) Mode



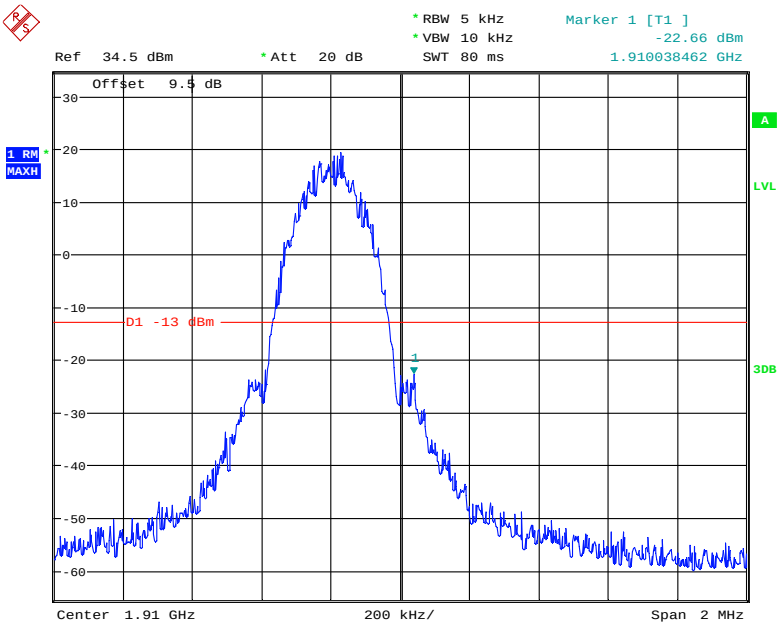
Date: 21.MAY.2019 20:36:58

PCS Band, Left Band Edge for EDGE Mode



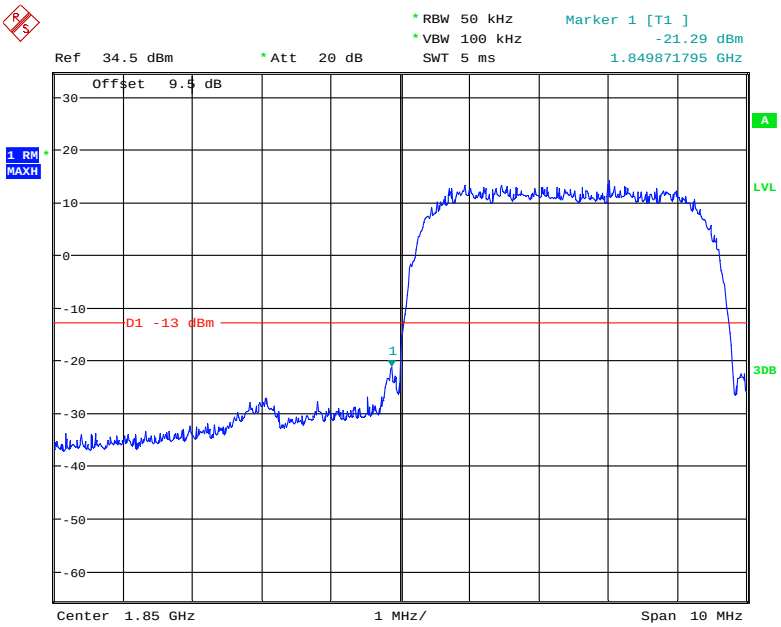
Date: 21.MAY.2019 20:44:44

PCS Band, Right Band Edge for EDGE Mode



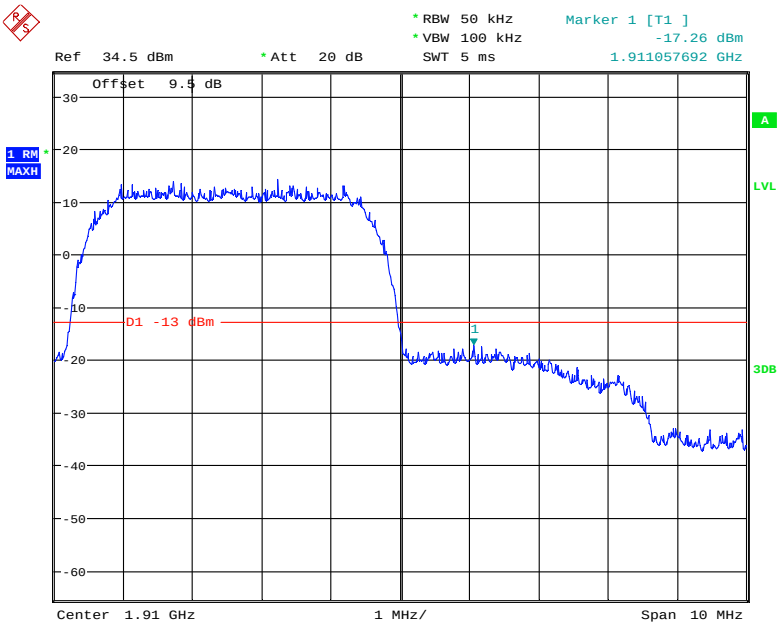
Date: 21.MAY.2019 20:45:32

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



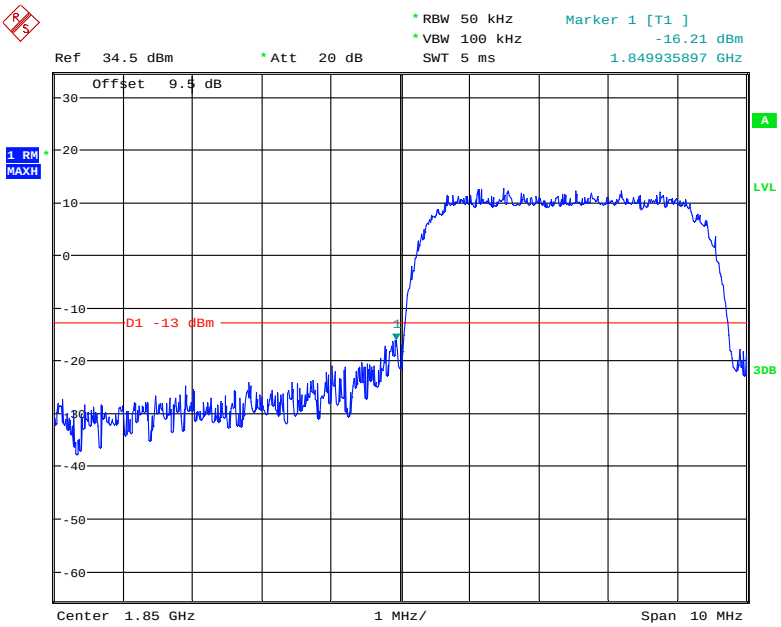
Date: 21.MAY.2019 21:34:30

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



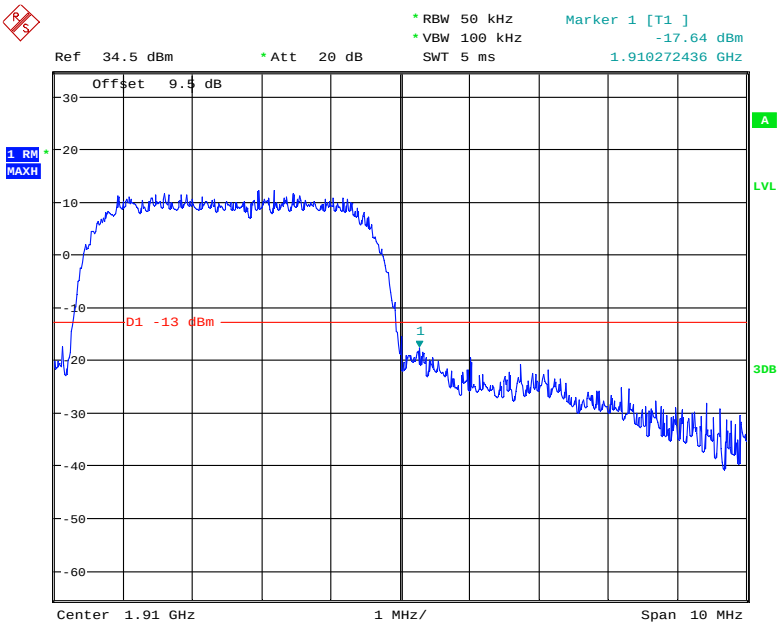
Date: 21.MAY.2019 21:35:06

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



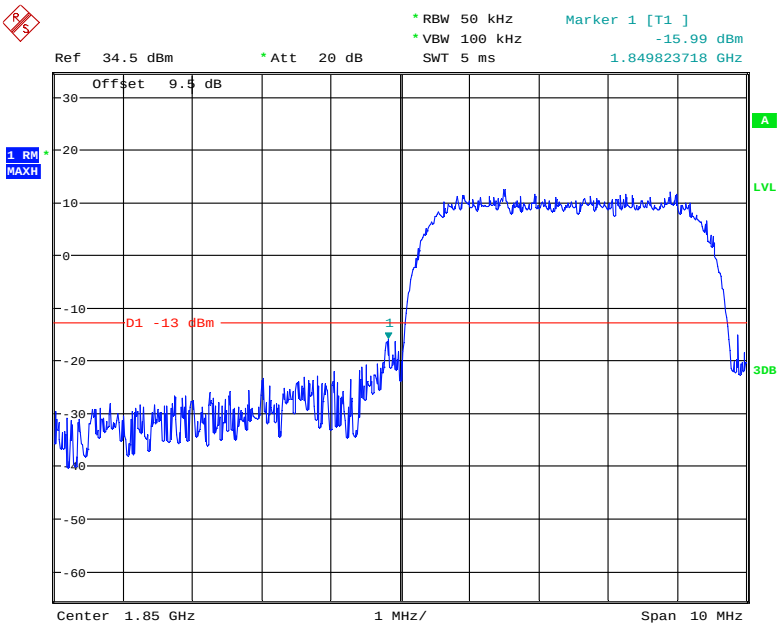
Date: 21.MAY.2019 21:30:56

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



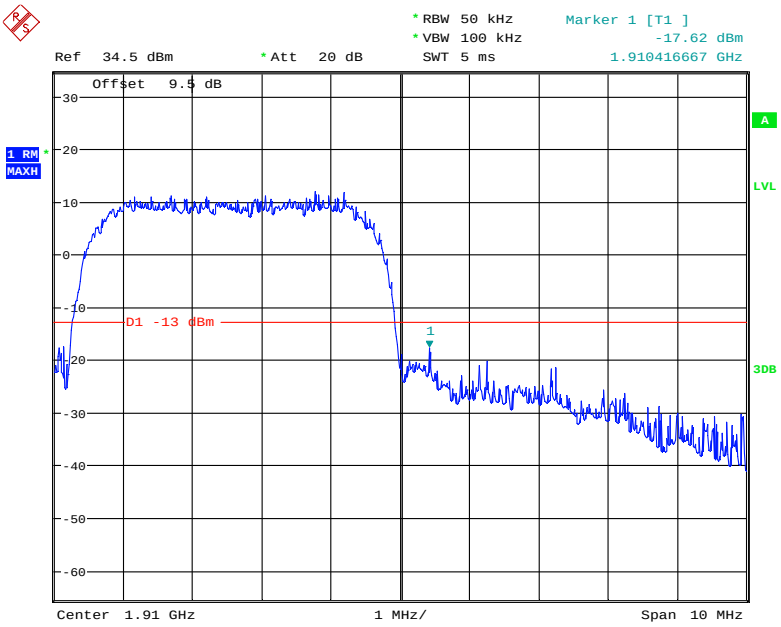
Date: 21.MAY.2019 21:31:35

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



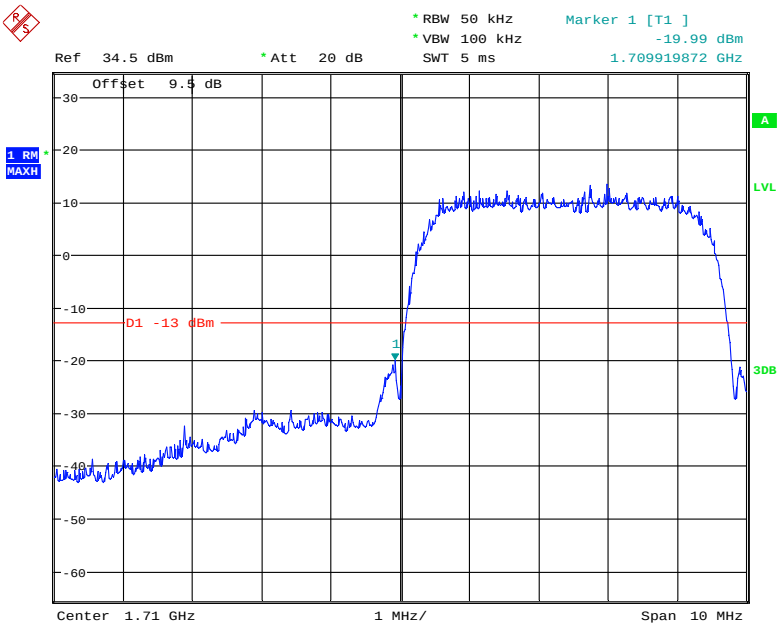
Date: 21.MAY.2019 21:33:28

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



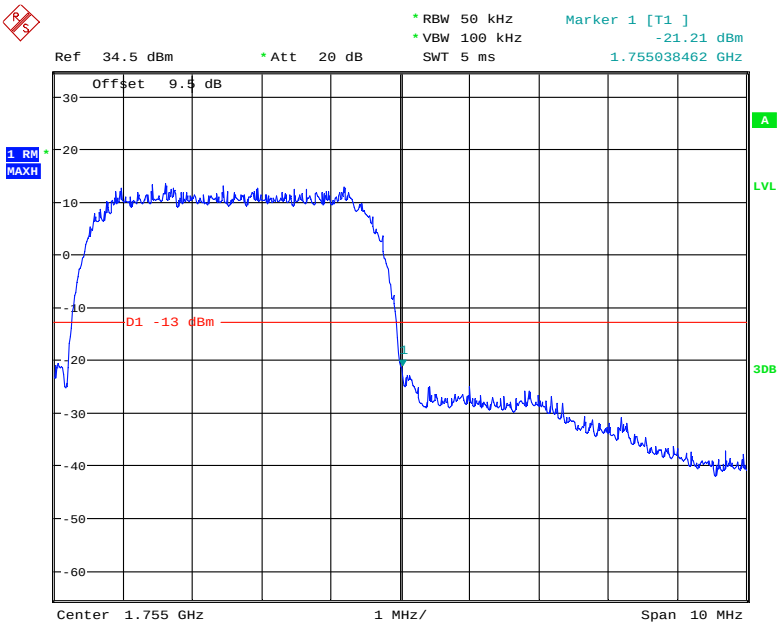
Date: 21.MAY.2019 21:33:05

AWS Band, Left Band Edge for WCDMA (BPSK) Mode



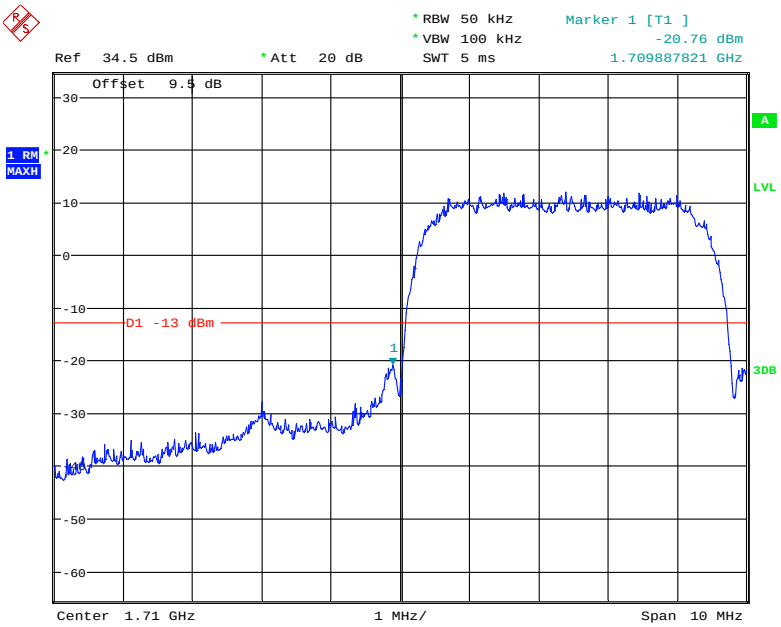
Date: 21.MAY.2019 21:41:05

AWS Band, Right Band Edge for WCDMA (BPSK) Mode



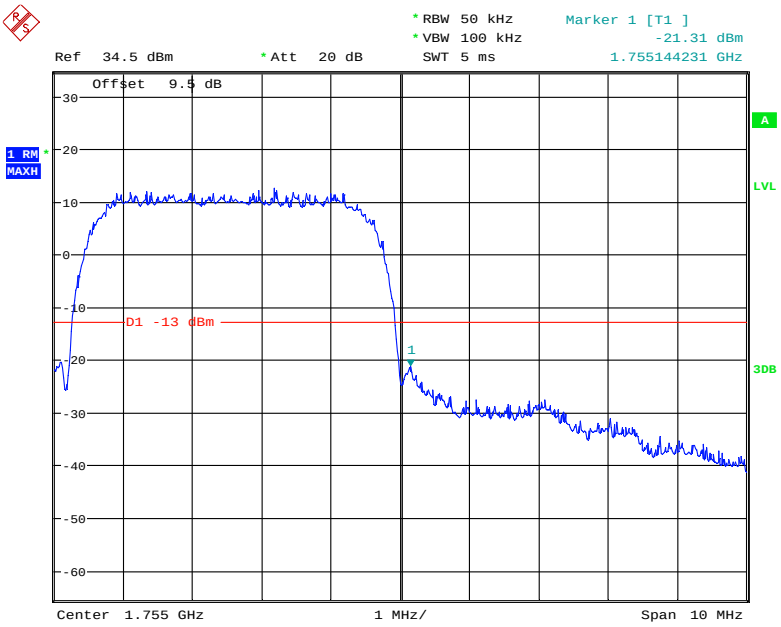
Date: 21.MAY.2019 21:41:51

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



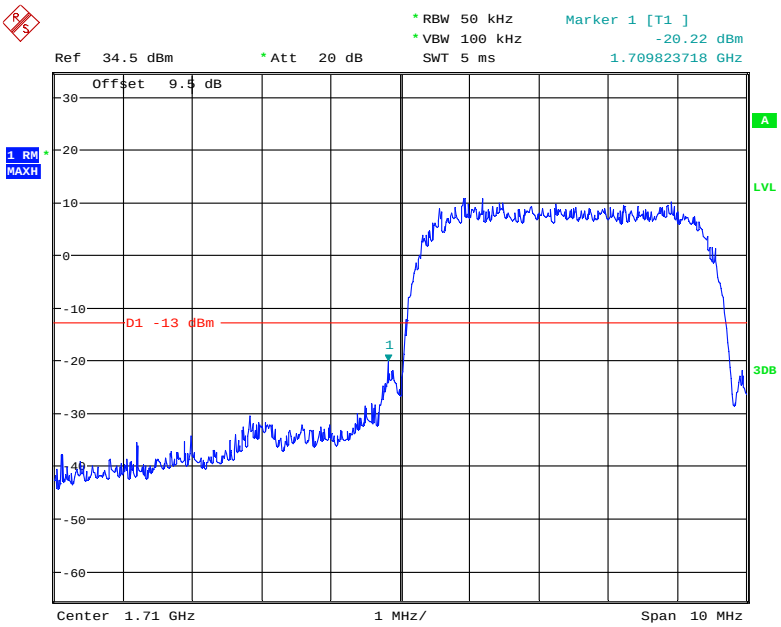
Date: 21.MAY.2019 21:46:04

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



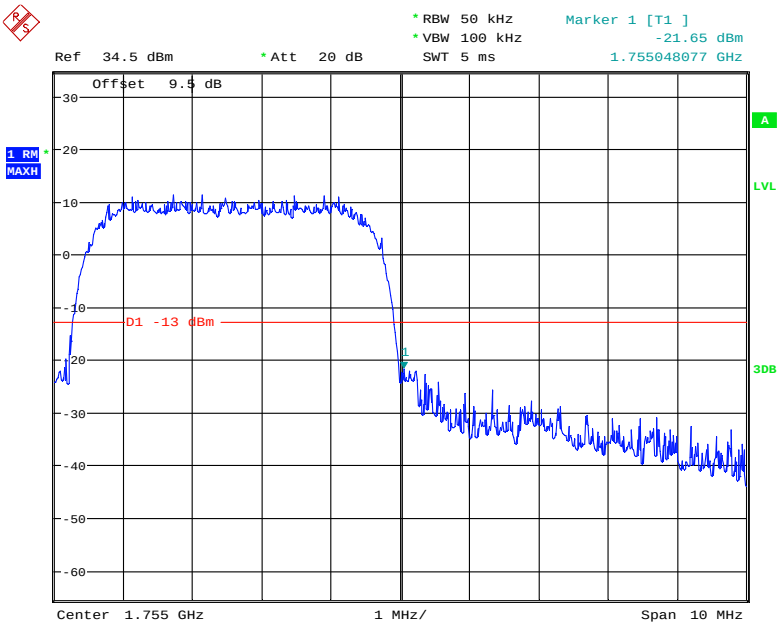
Date: 21.MAY.2019 21:47:24

AWS Band, Left Band Edge for HSUPA (BPSK) Mode



Date: 21.MAY.2019 21:44:04

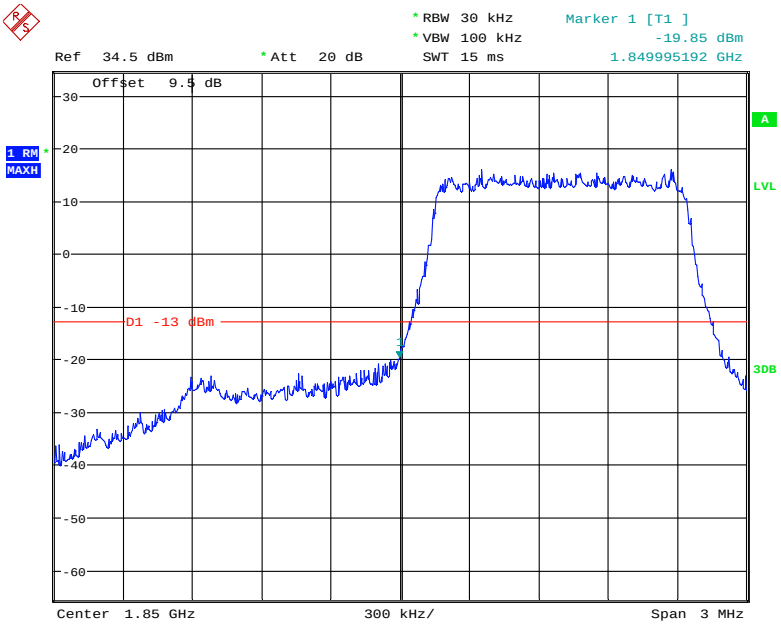
AWS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 21.MAY.2019 21:43:18

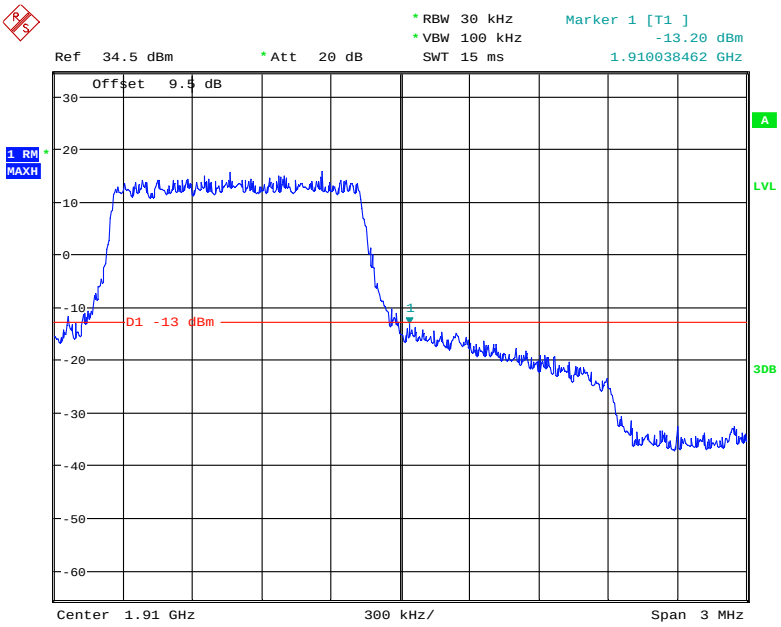
Band 2:

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



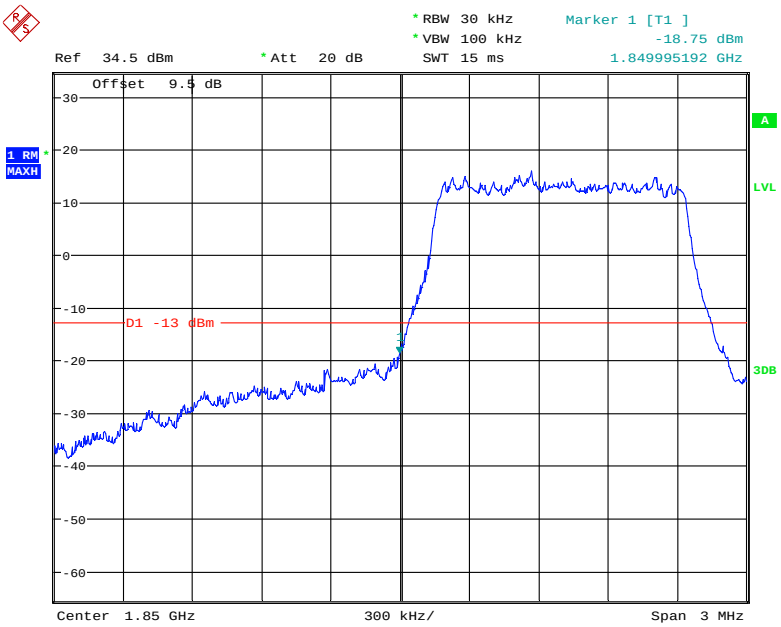
Date: 22.MAY.2019 22:56:43

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



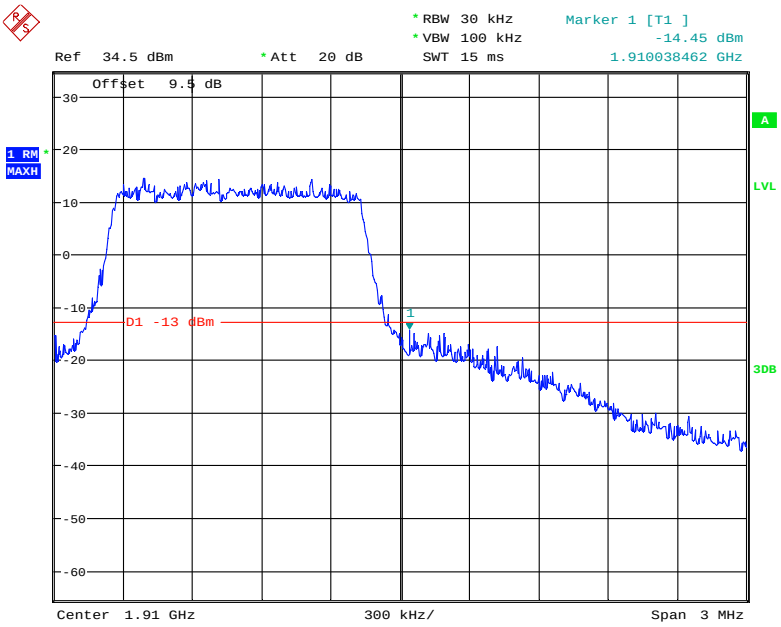
Date: 22.MAY.2019 22:57:07

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



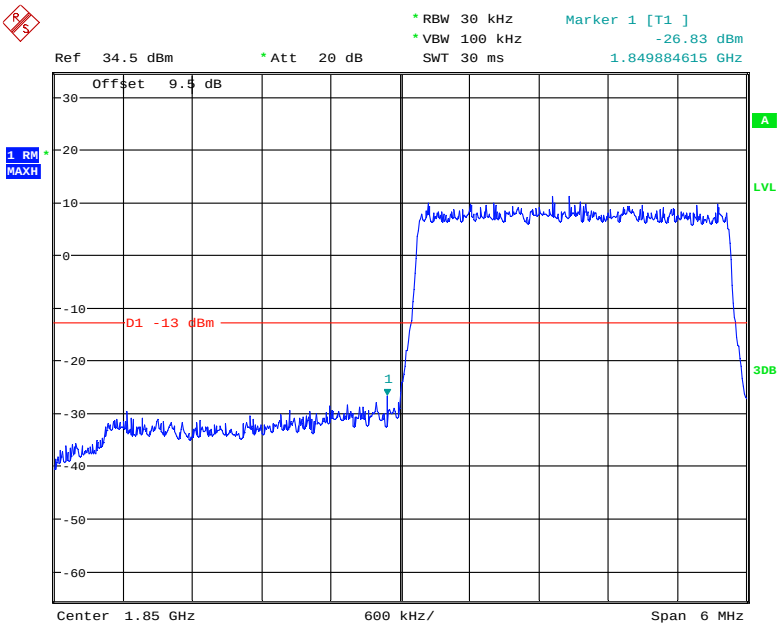
Date: 22.MAY.2019 22:55:50

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



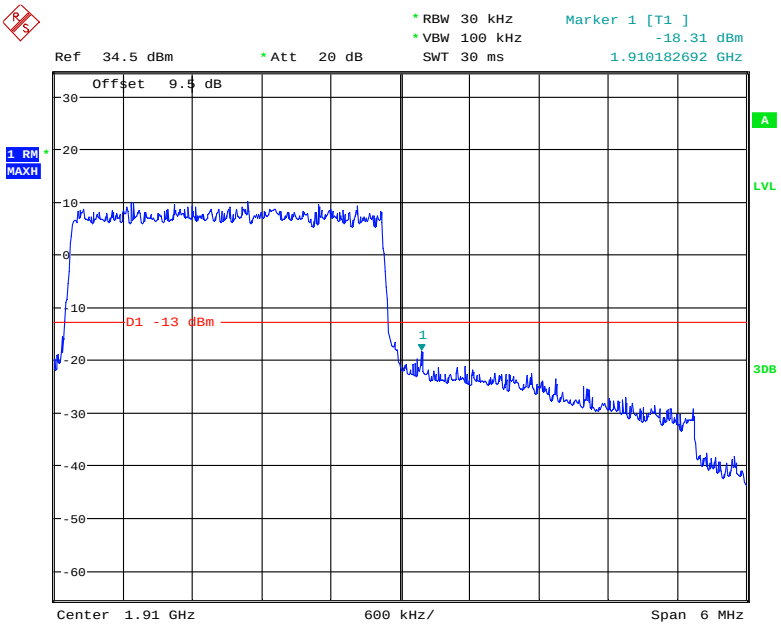
Date: 22.MAY.2019 22:57:30

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



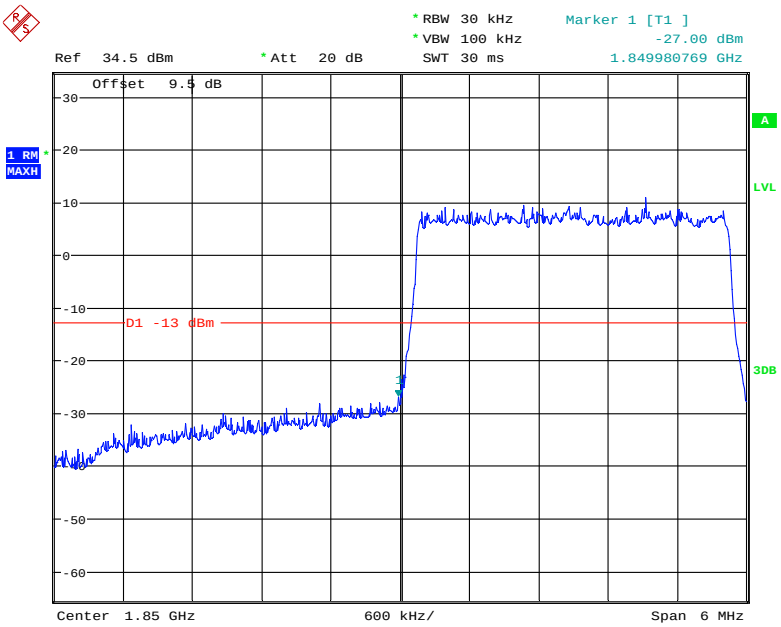
Date: 22.MAY.2019 23:00:26

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



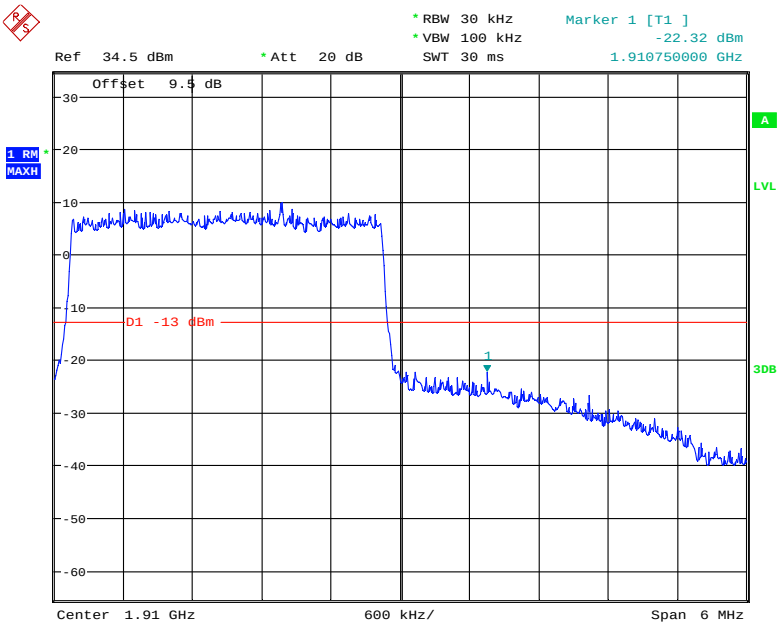
Date: 22.MAY.2019 22:59:03

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



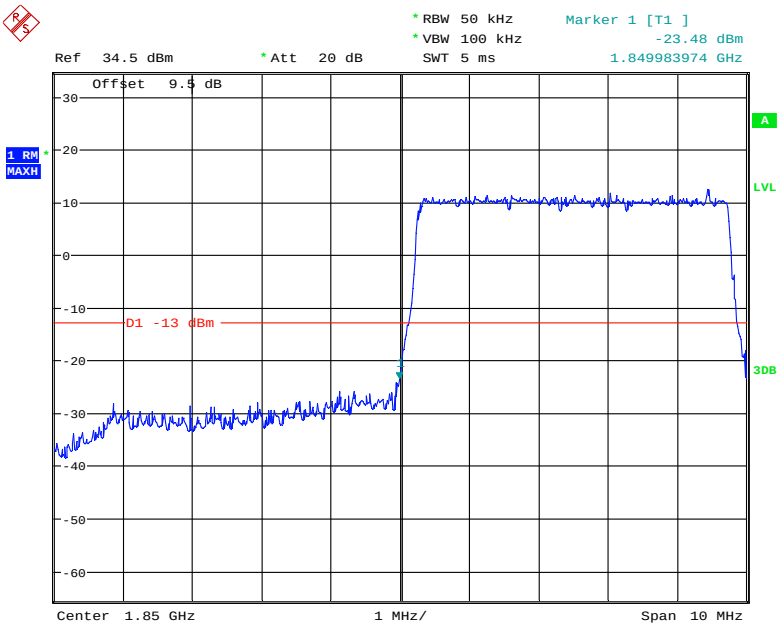
Date: 22.MAY.2019 23:00:09

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



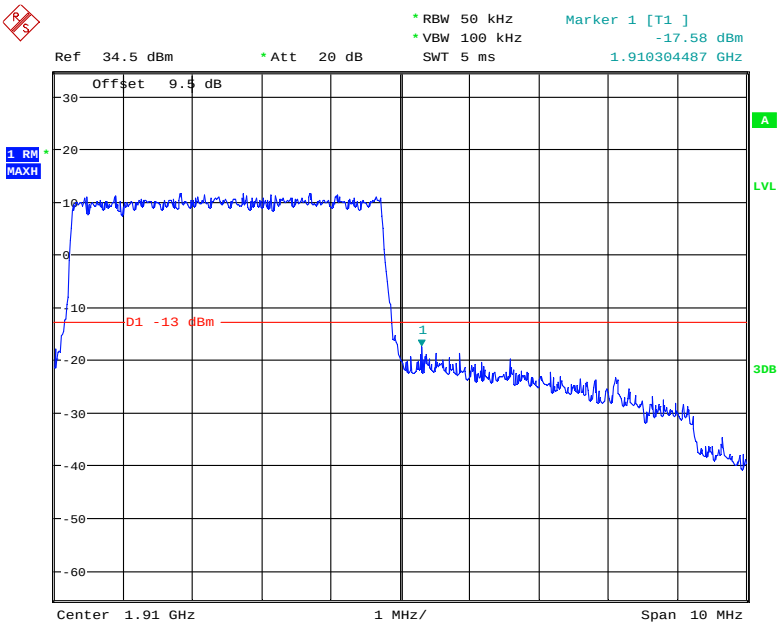
Date: 22.MAY.2019 22:59:31

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



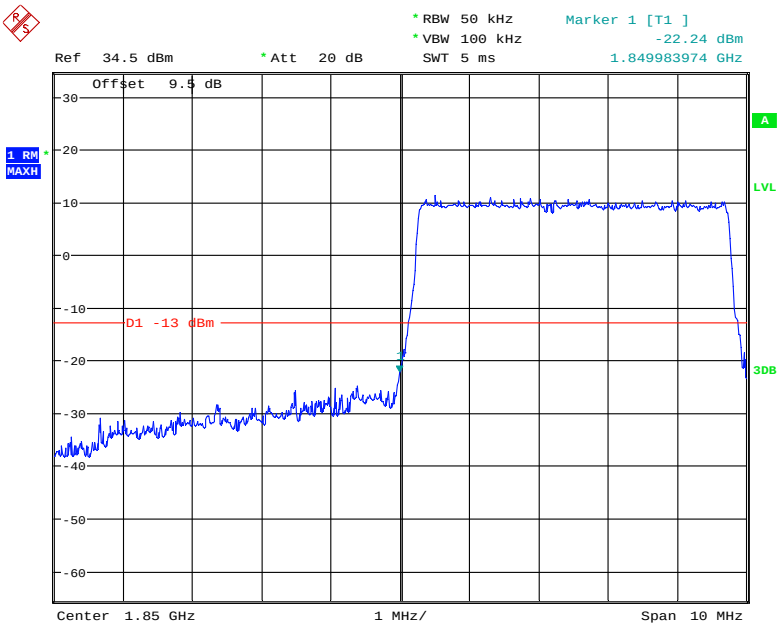
Date: 22.MAY.2019 23:01:19

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



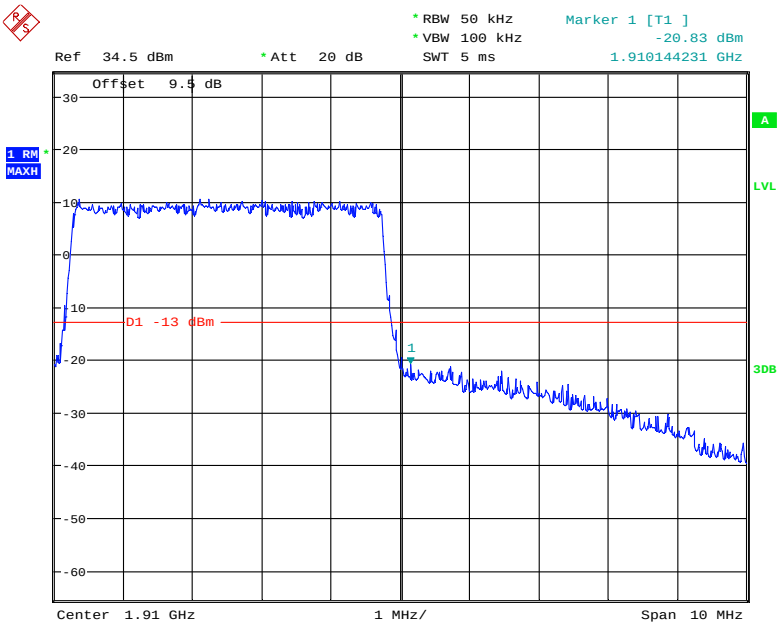
Date: 22.MAY.2019 23:02:51

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



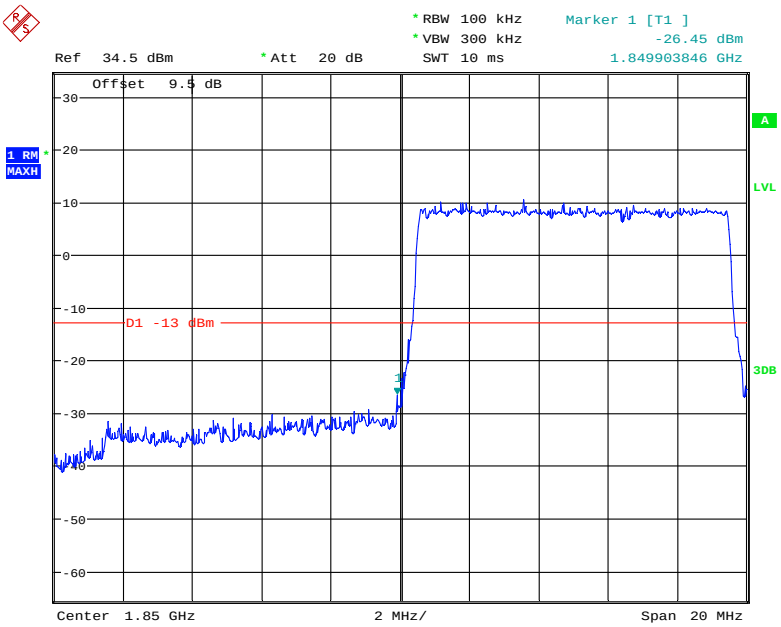
Date: 22.MAY.2019 23:01:48

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



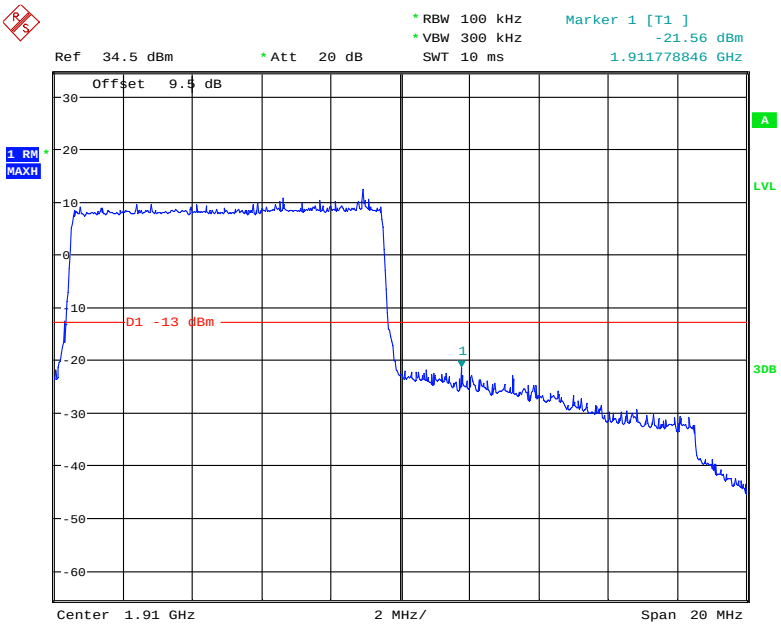
Date: 22.MAY.2019 23:02:17

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



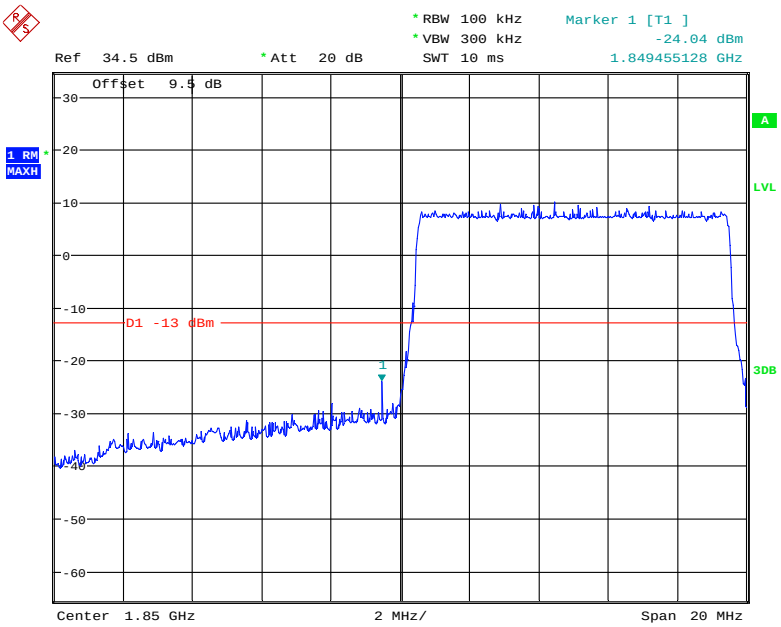
Date: 22.MAY.2019 23:05:39

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



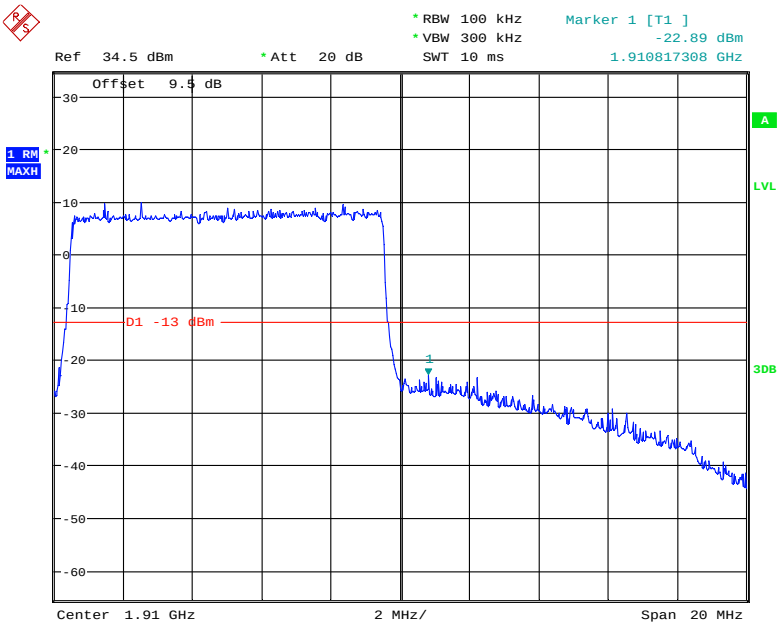
Date: 22.MAY.2019 23:04:00

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



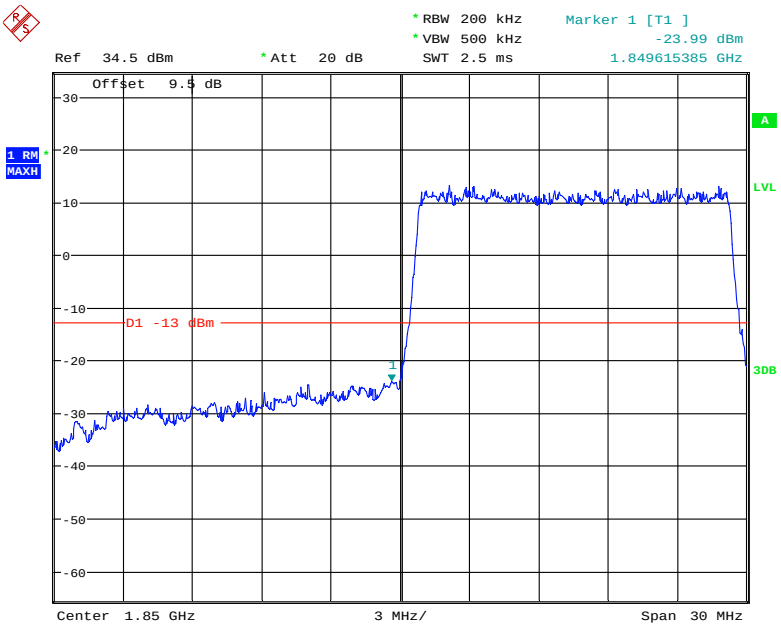
Date: 22.MAY.2019 23:05:19

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



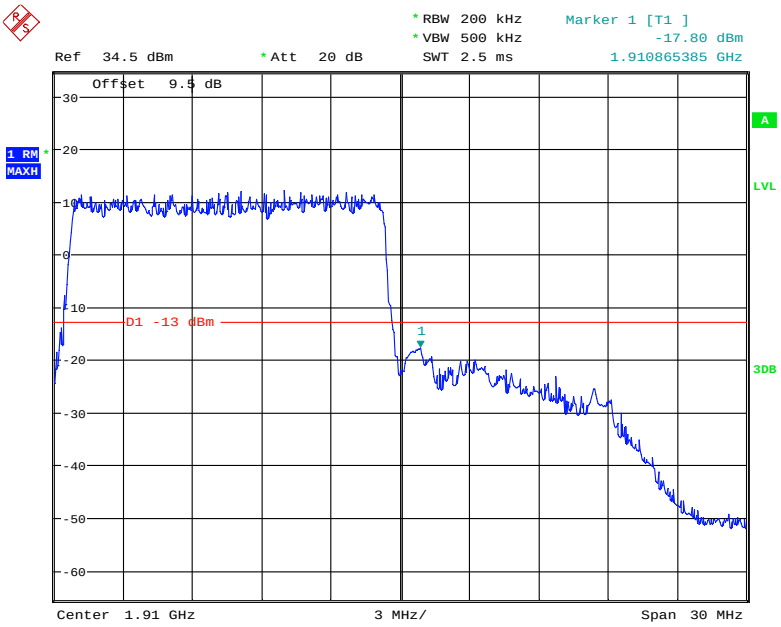
Date: 22.MAY.2019 23:04:35

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



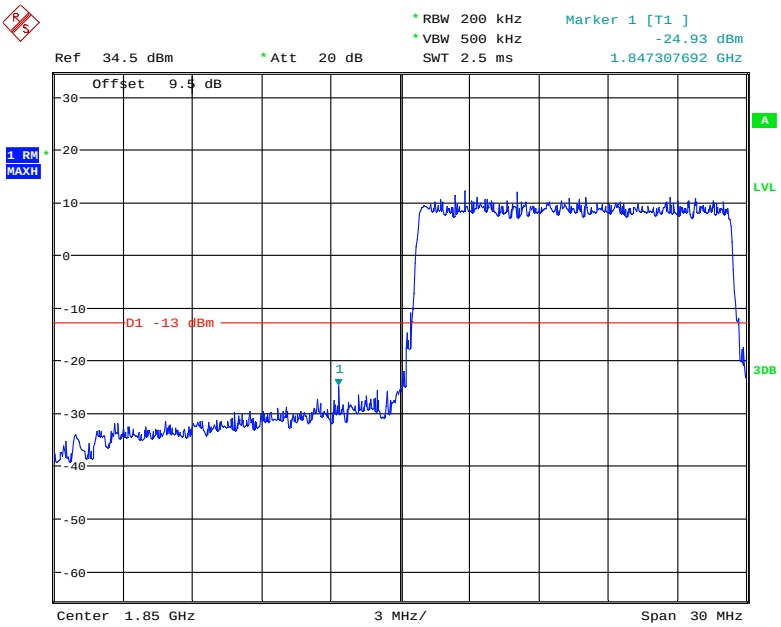
Date: 22.MAY.2019 23:08:09

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



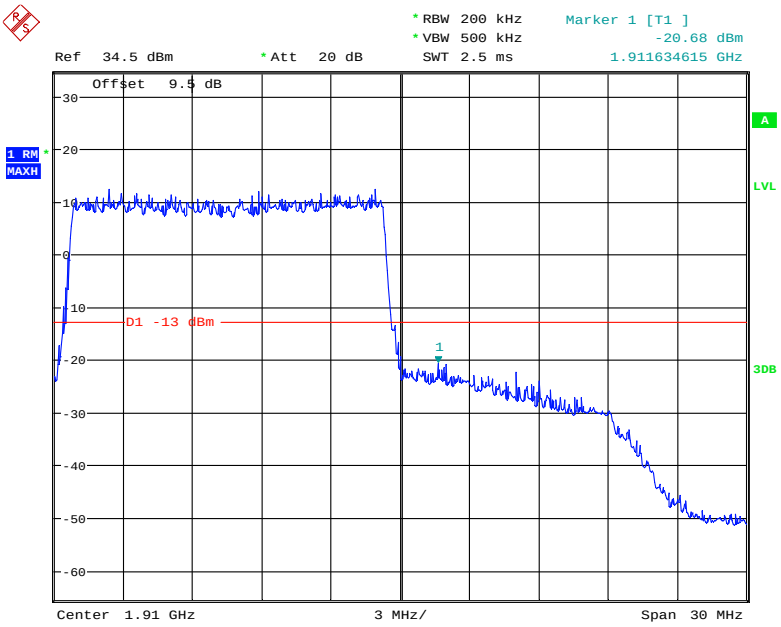
Date: 22.MAY.2019 23:10:29

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



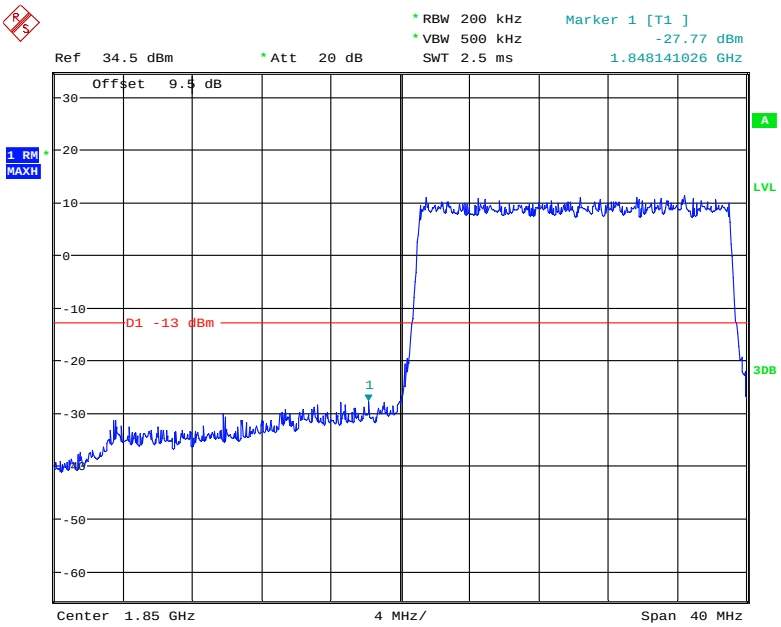
Date: 22.MAY.2019 23:06:31

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



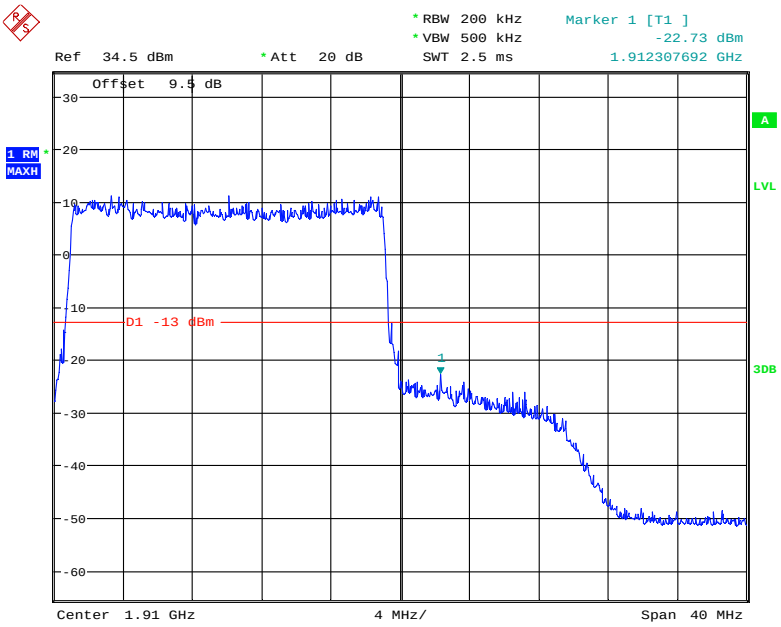
Date: 22.MAY.2019 23:10:04

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



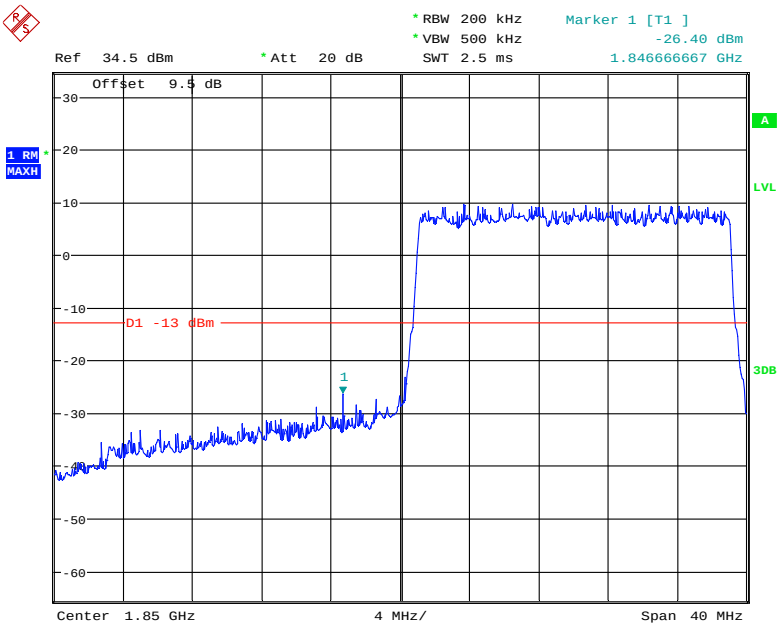
Date: 22.MAY.2019 23:11:31

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



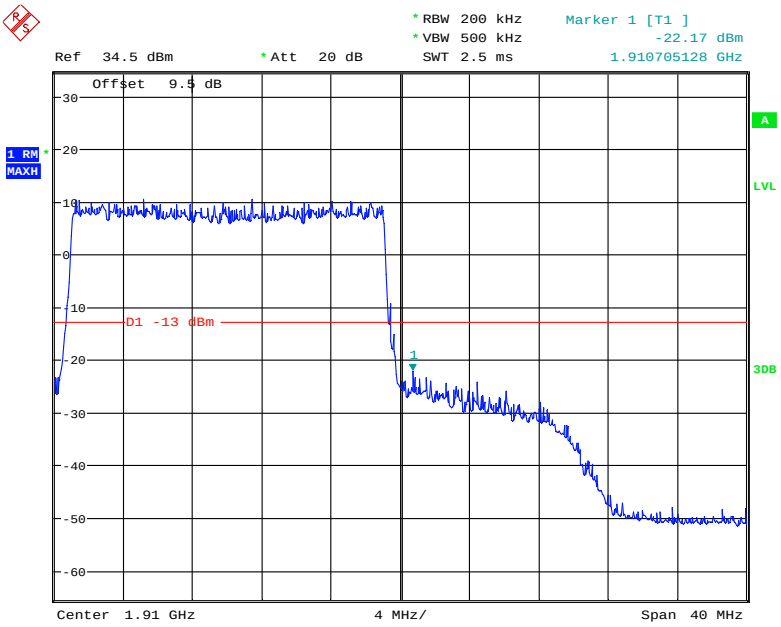
Date: 22.MAY.2019 23:13:54

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



Date: 22.MAY.2019 23:12:22

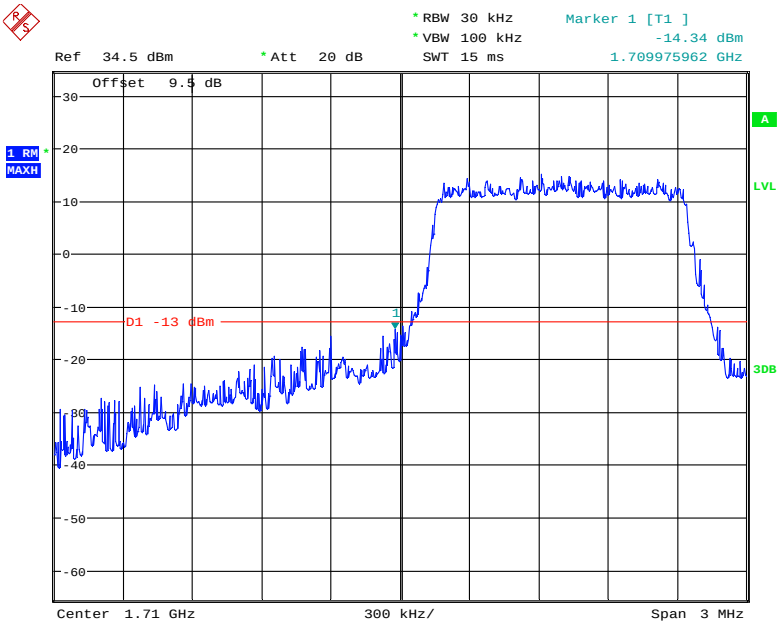
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 22.MAY.2019 23:13:29

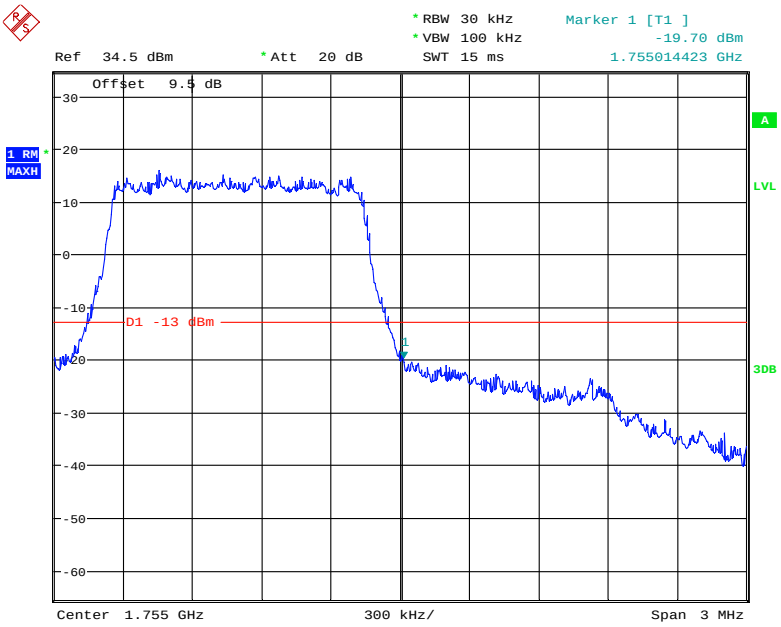
Band 4:

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



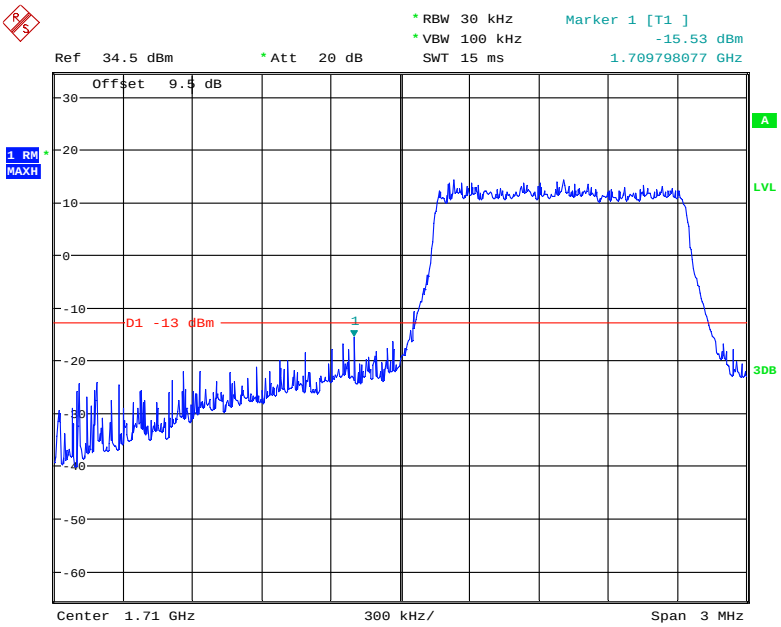
Date: 22.MAY.2019 23:30:23

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



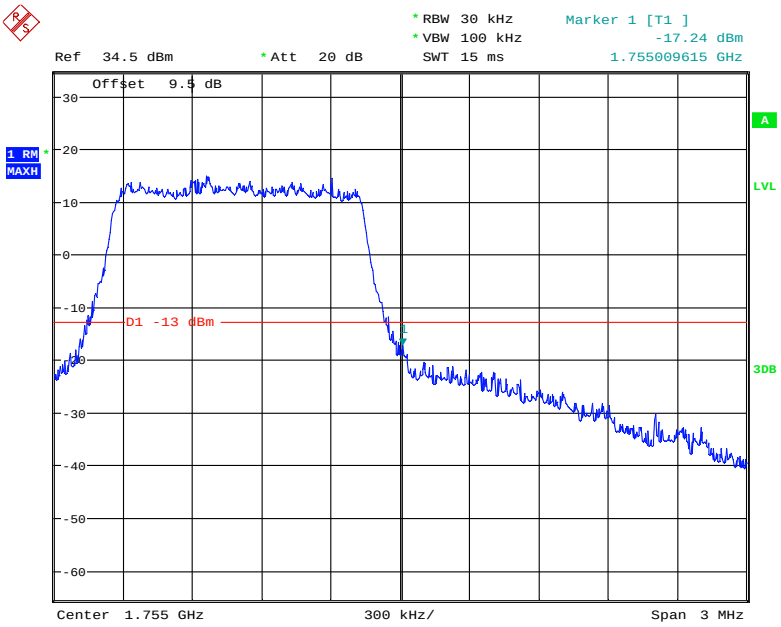
Date: 22.MAY.2019 23:30:58

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



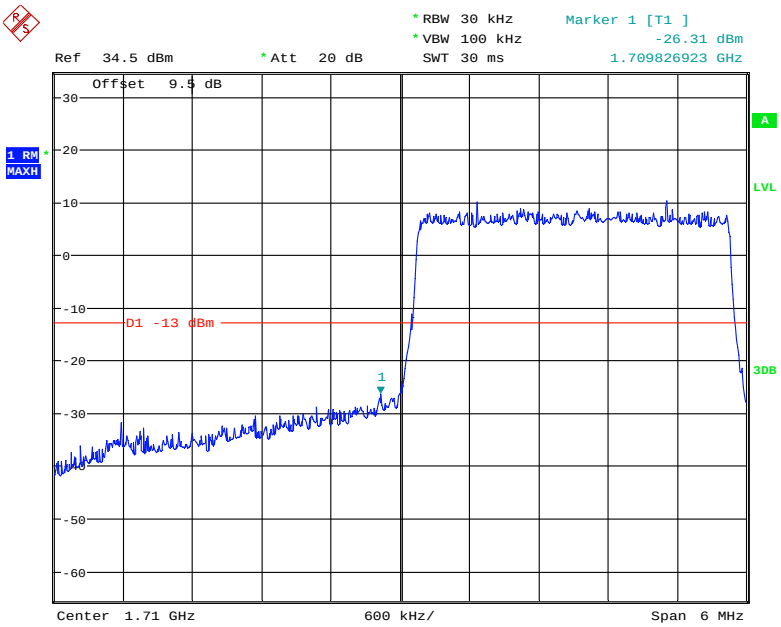
Date: 22.MAY.2019 23:29:56

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



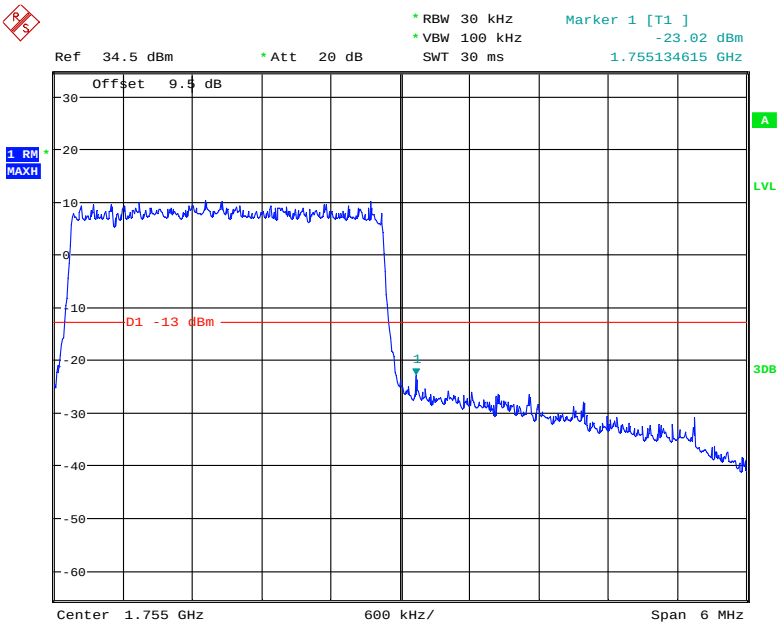
Date: 22.MAY.2019 23:31:24

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



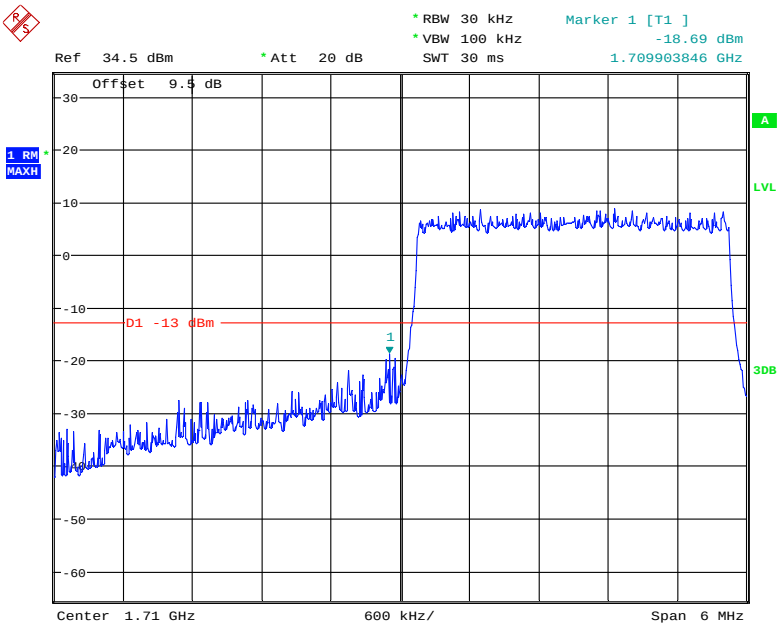
Date: 22.MAY.2019 23:27:33

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



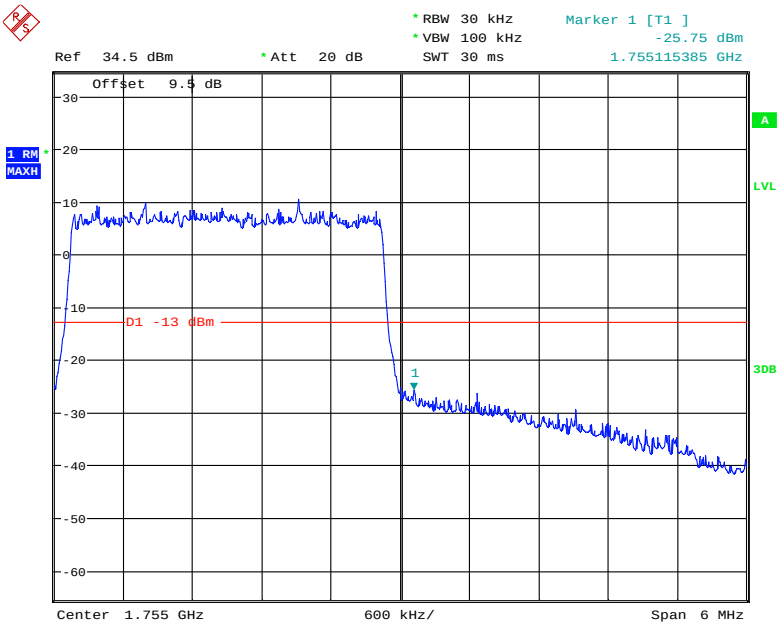
Date: 22.MAY.2019 23:29:07

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



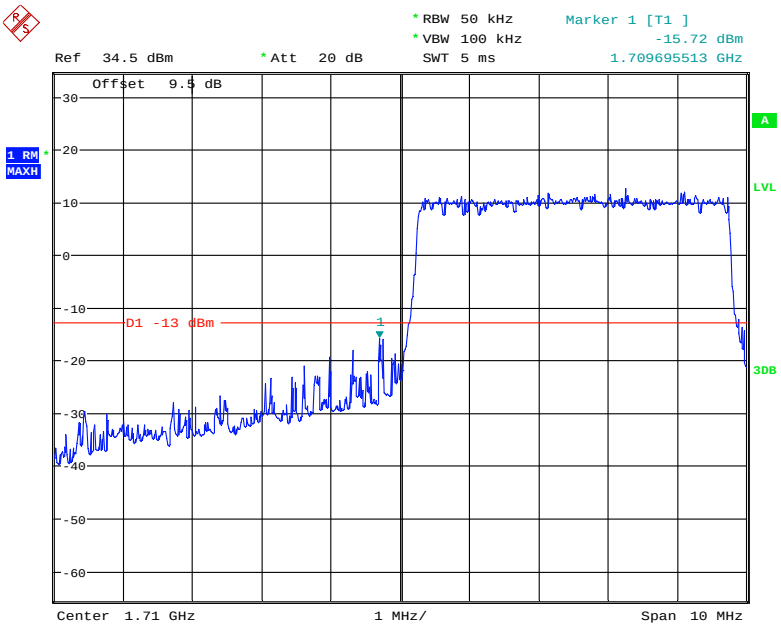
Date: 22.MAY.2019 23:28:10

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



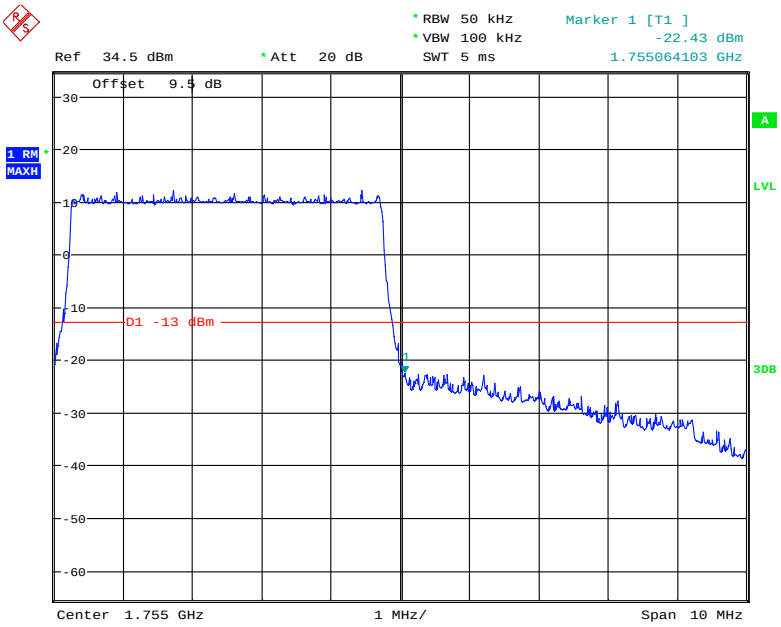
Date: 22.MAY.2019 23:28:41

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



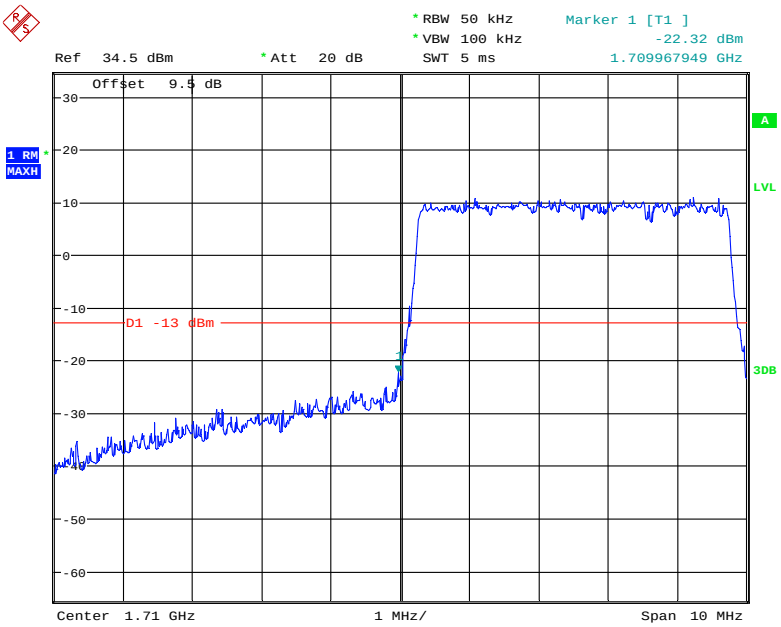
Date: 22.MAY.2019 23:25:26

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



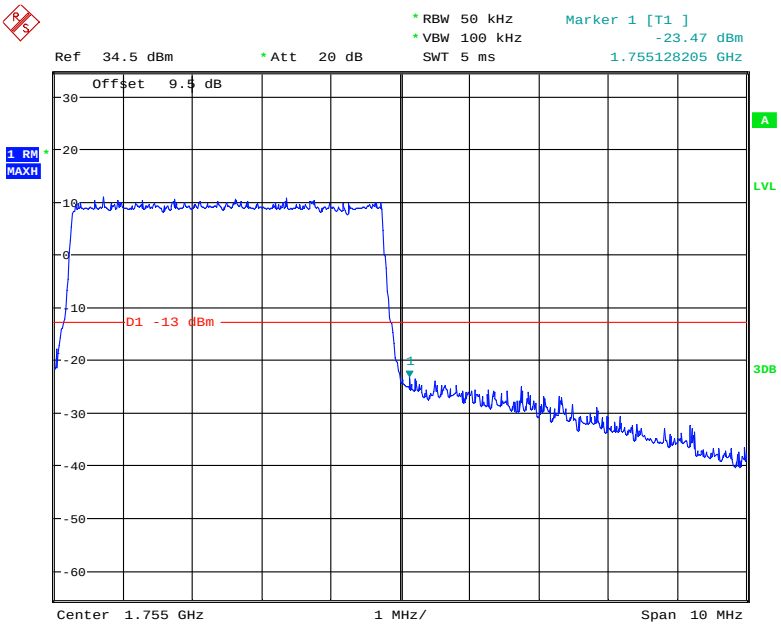
Date: 22.MAY.2019 23:23:51

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



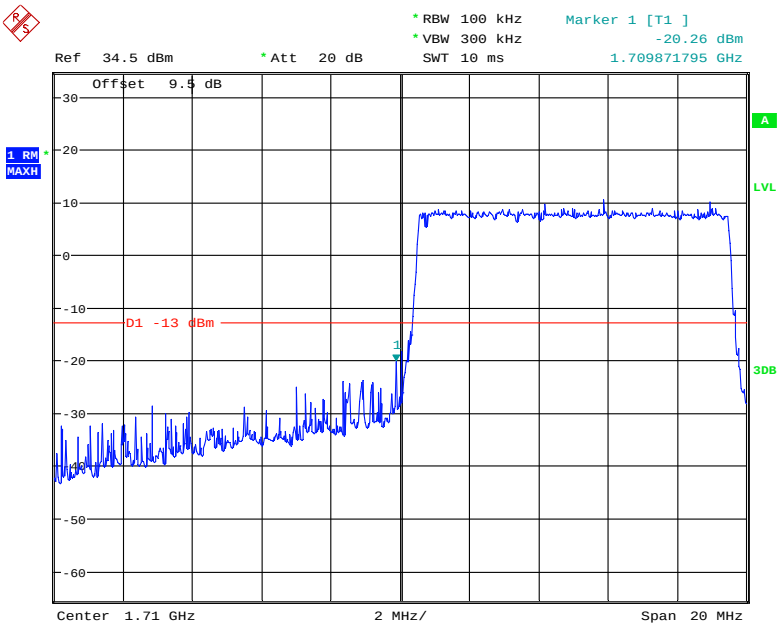
Date: 22.MAY.2019 23:25:07

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



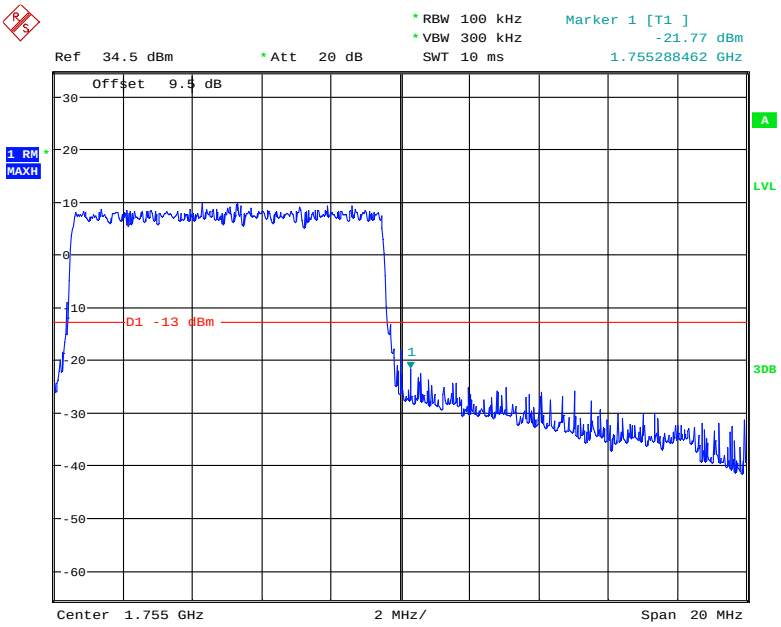
Date: 22.MAY.2019 23:24:31

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



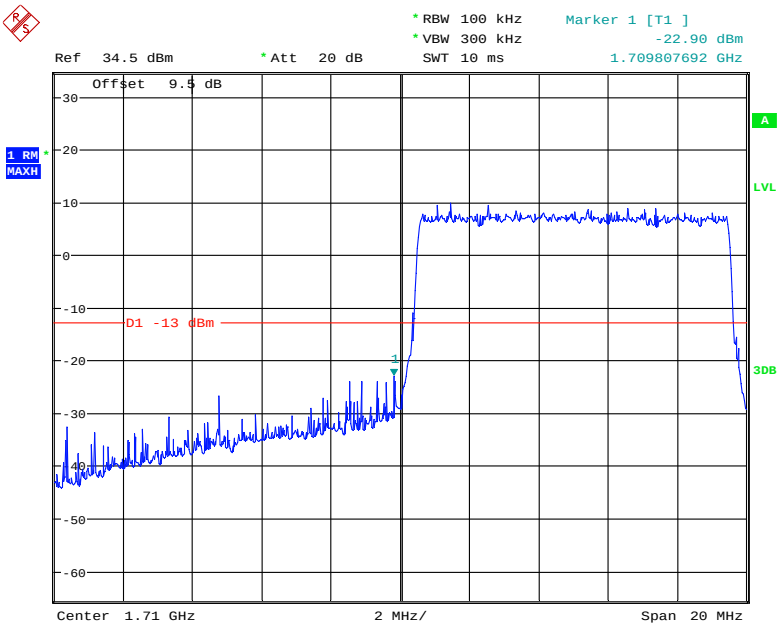
Date: 22.MAY.2019 23:21:02

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



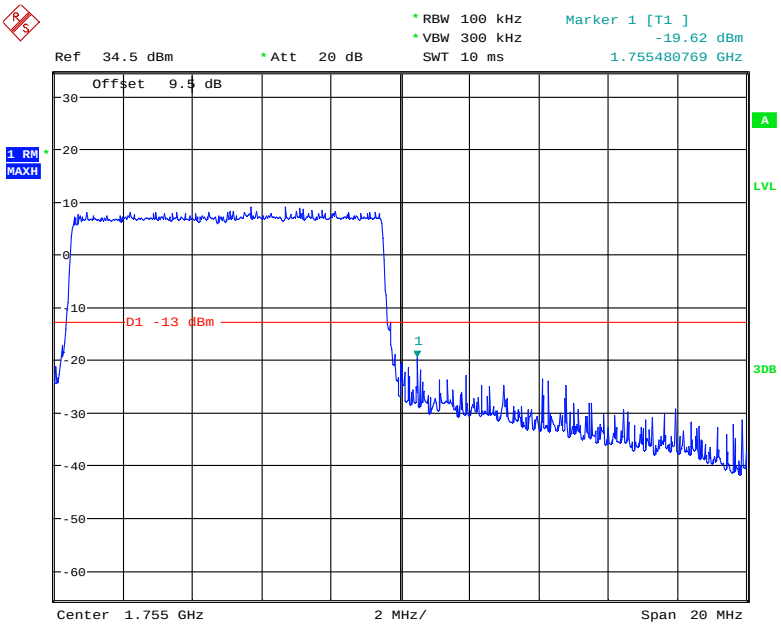
Date: 22.MAY.2019 23:22:36

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



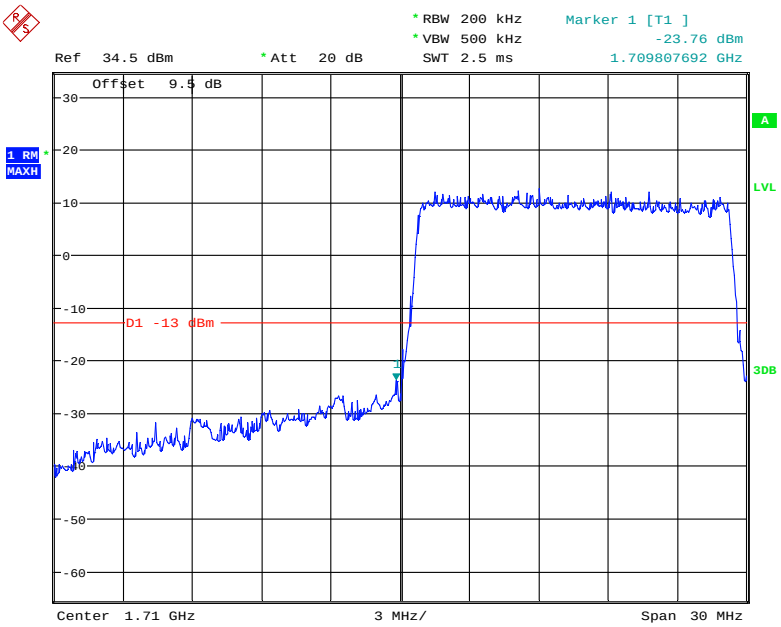
Date: 22.MAY.2019 23:21:38

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



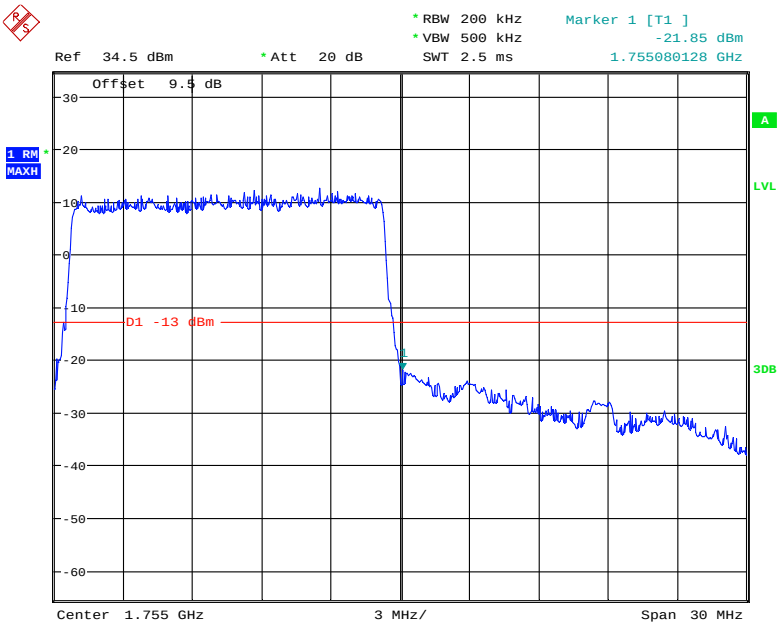
Date: 22.MAY.2019 23:22:15

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



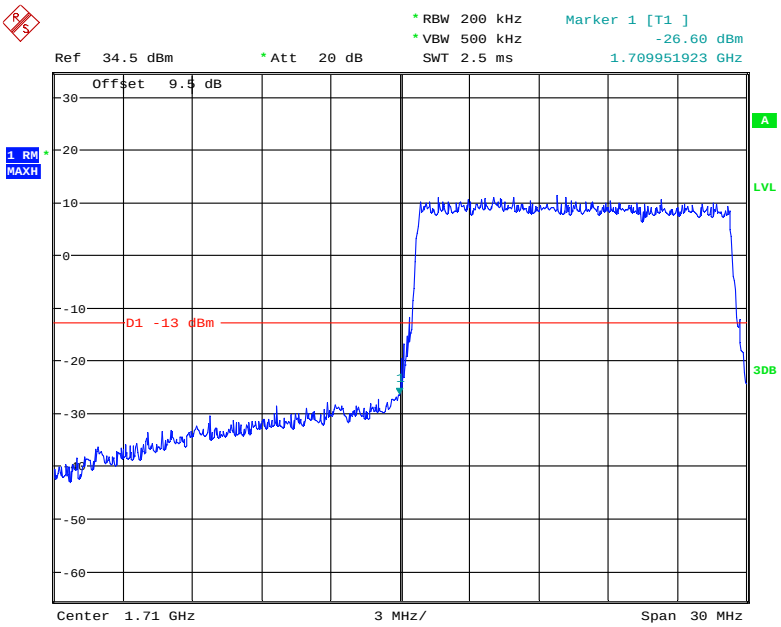
Date: 22.MAY.2019 23:20:10

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



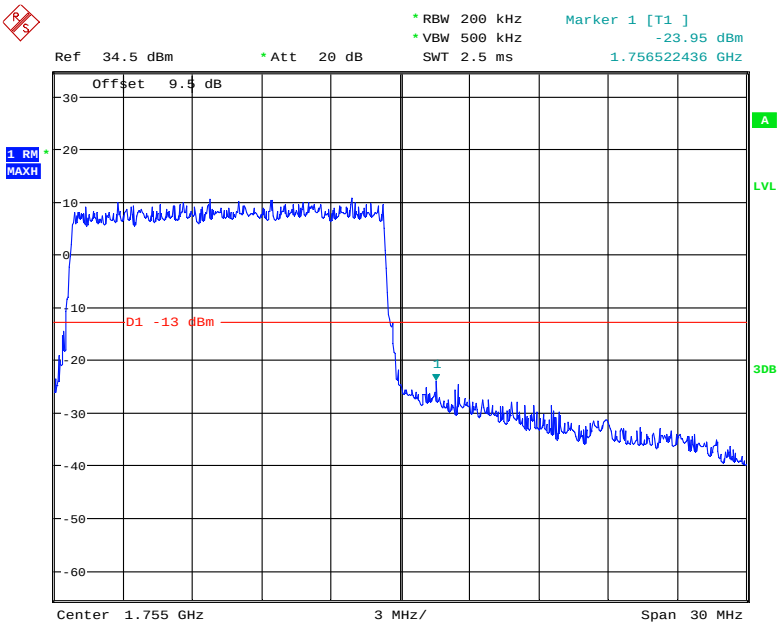
Date: 22.MAY.2019 23:18:29

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



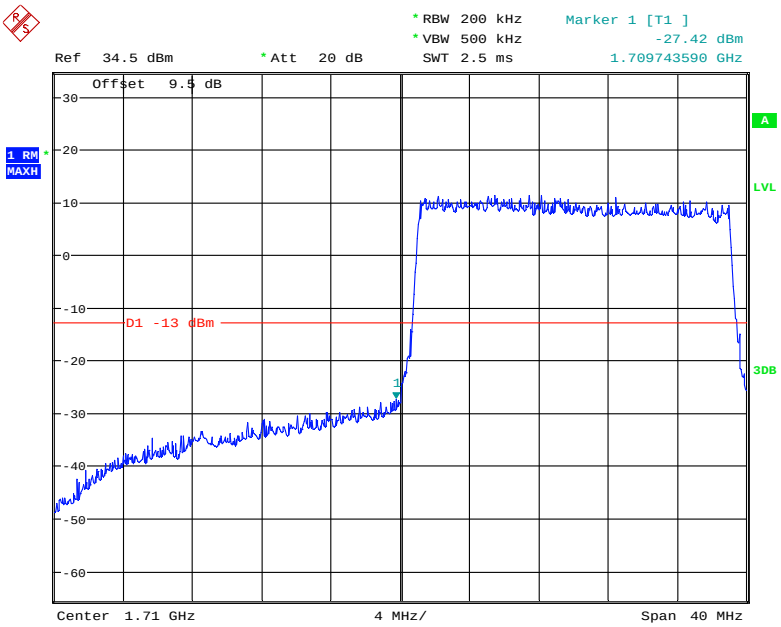
Date: 22.MAY.2019 23:19:36

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



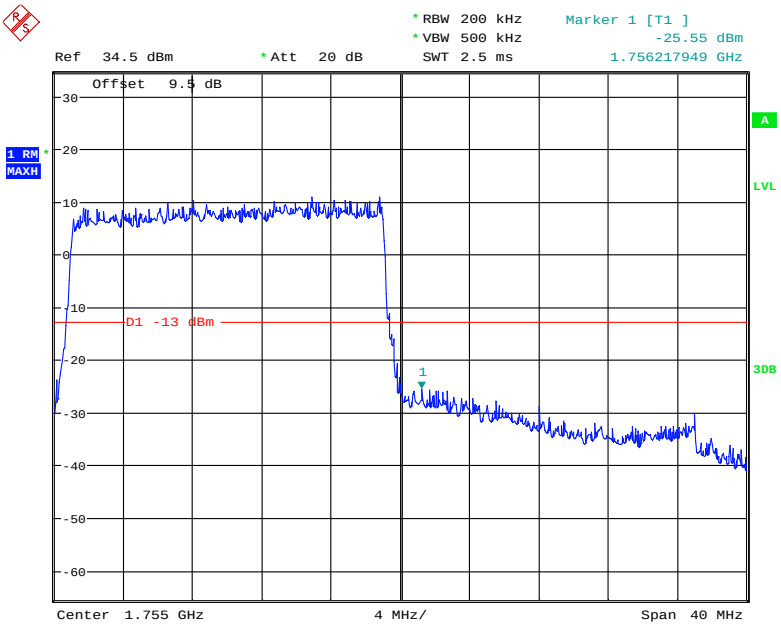
Date: 22.MAY.2019 23:18:56

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



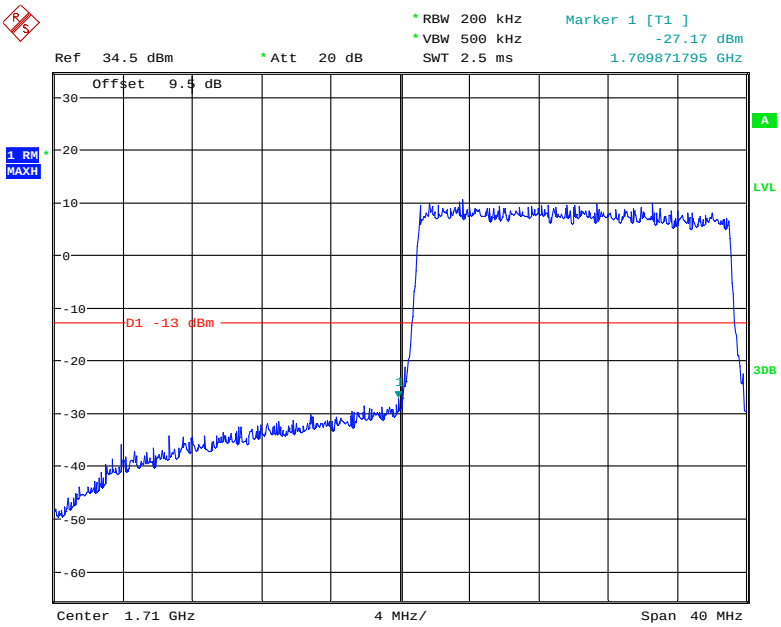
Date: 22.MAY.2019 23:16:08

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



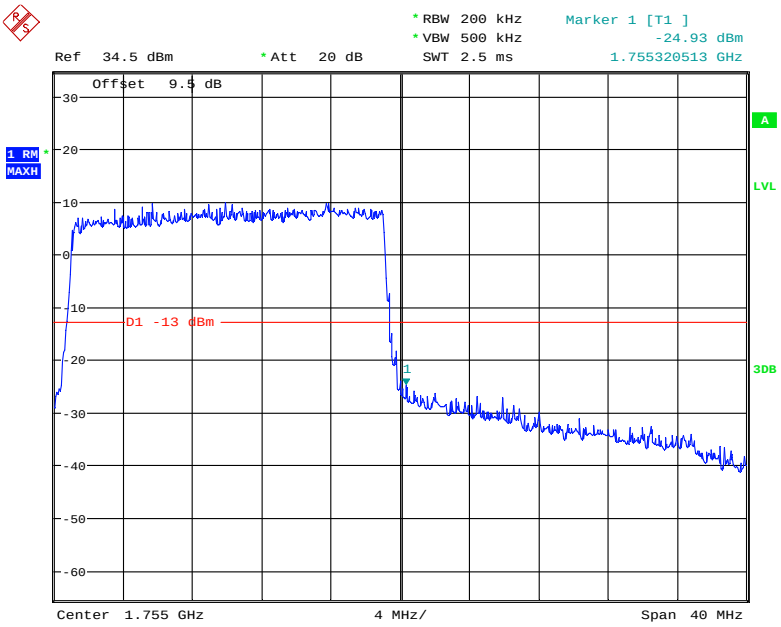
Date: 22.MAY.2019 23:17:40

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



Date: 22.MAY.2019 23:16:38

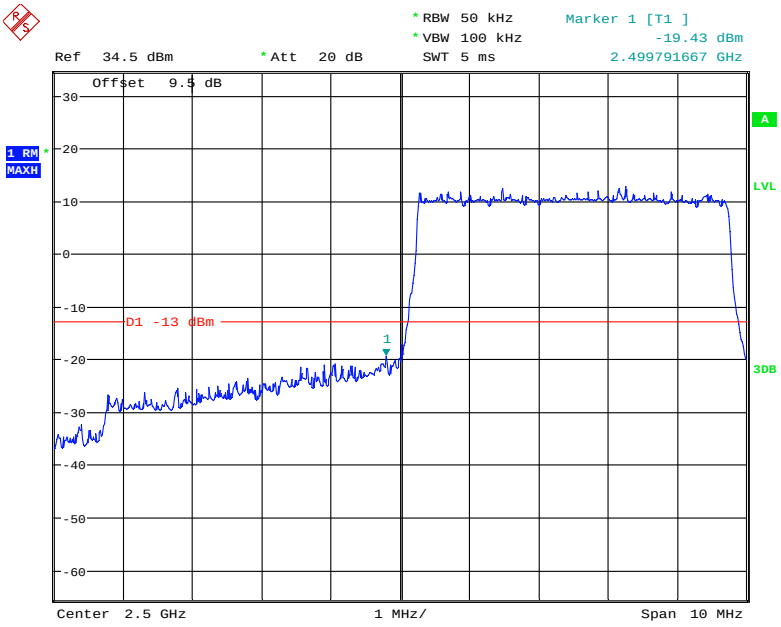
16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 22.MAY.2019 23:17:15

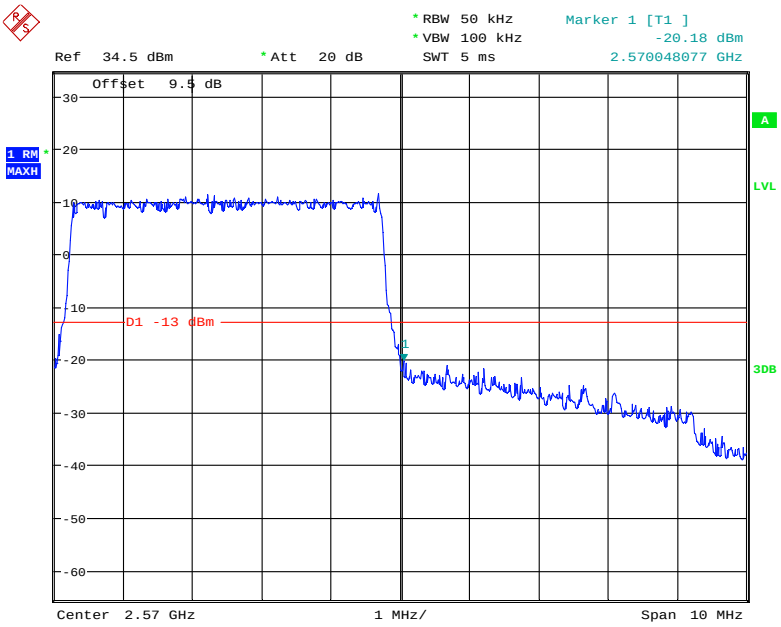
Band 7:

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



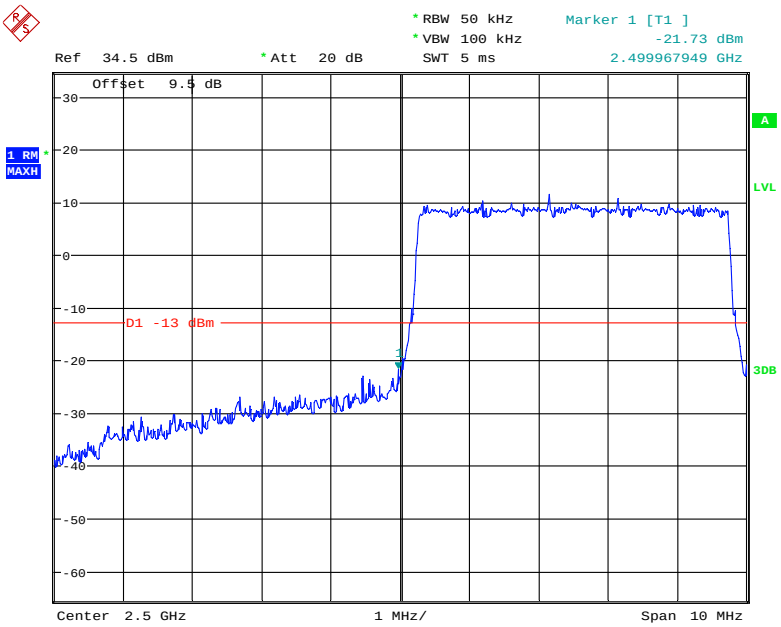
Date: 22.MAY.2019 23:33:59

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



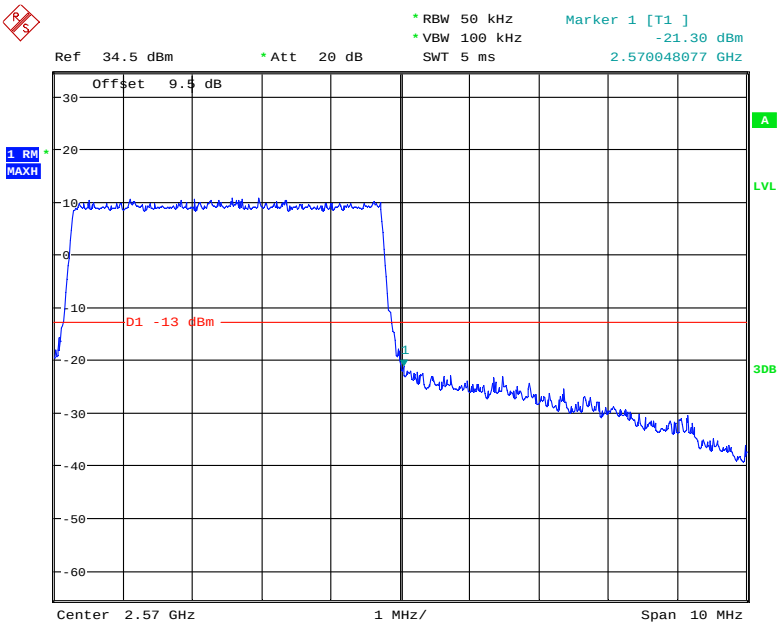
Date: 22.MAY.2019 23:35:37

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



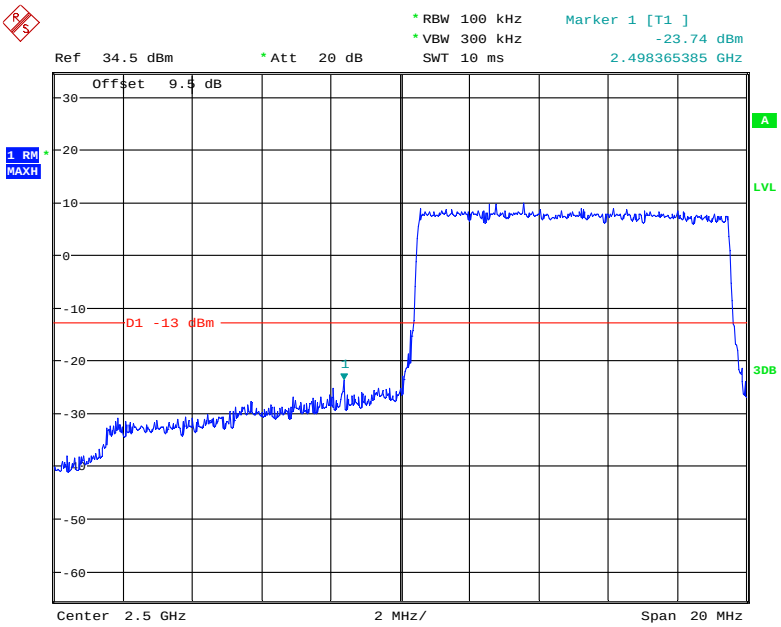
Date: 22.MAY.2019 23:34:28

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



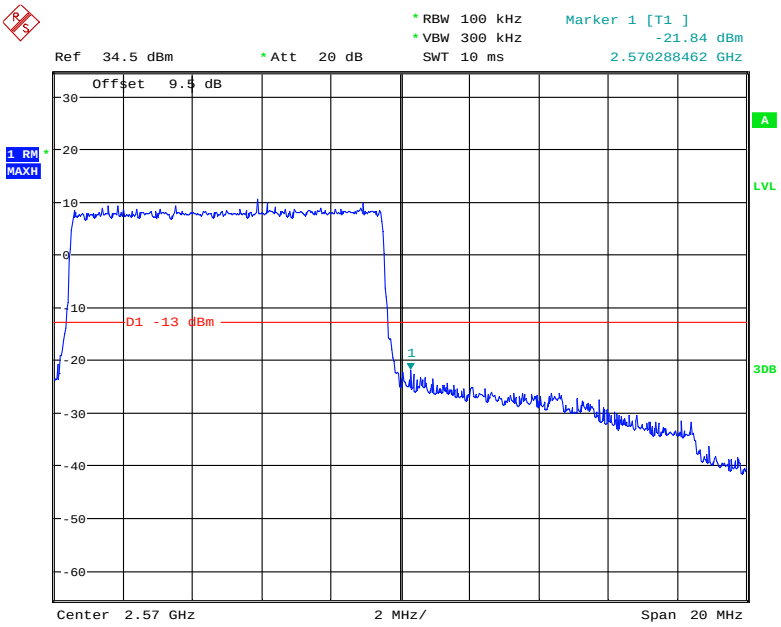
Date: 22.MAY.2019 23:35:11

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



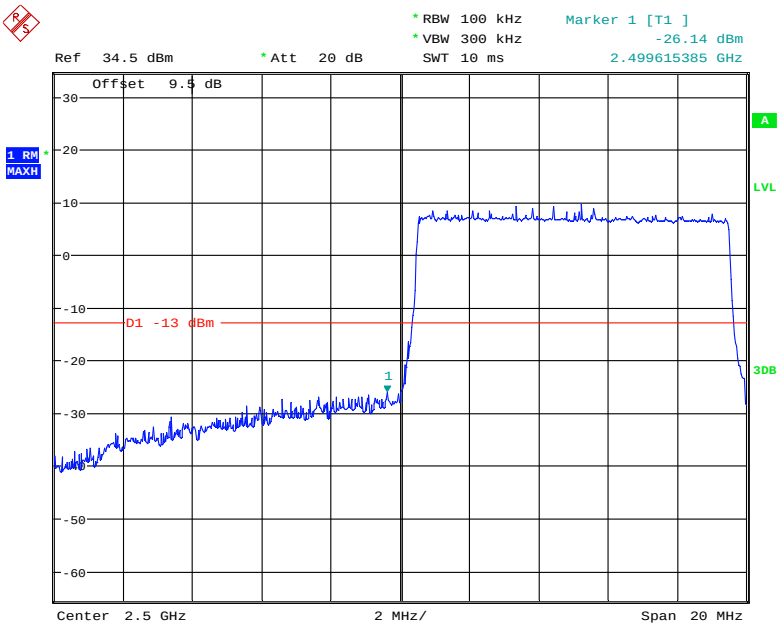
Date: 22.MAY.2019 23:37:43

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



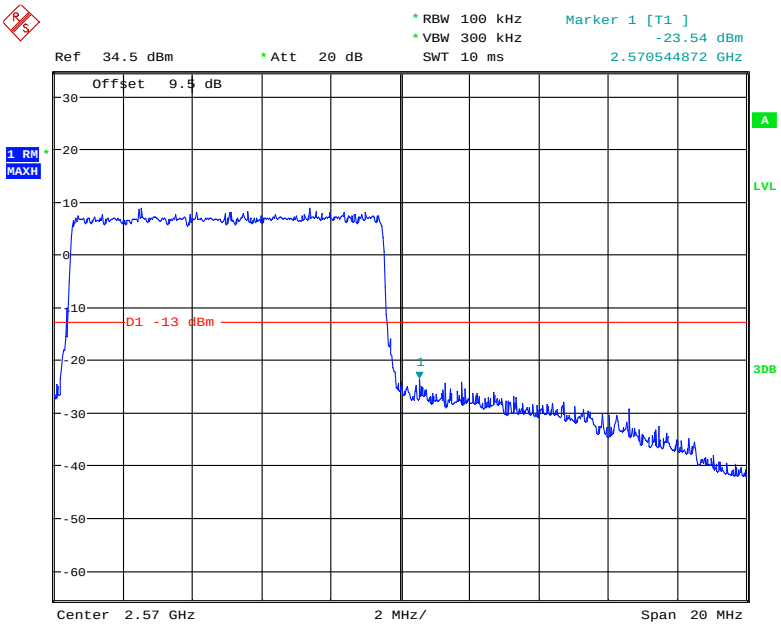
Date: 22.MAY.2019 23:36:16

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



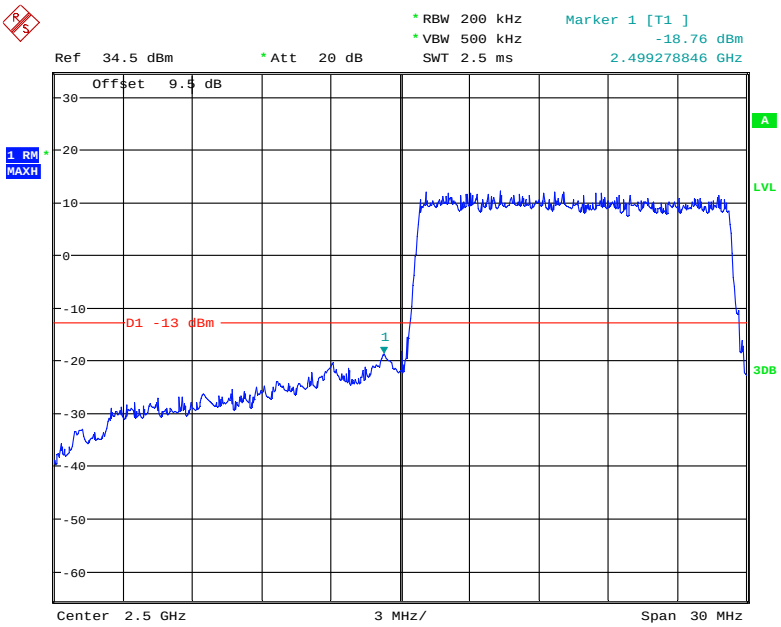
Date: 22.MAY.2019 23:37:12

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



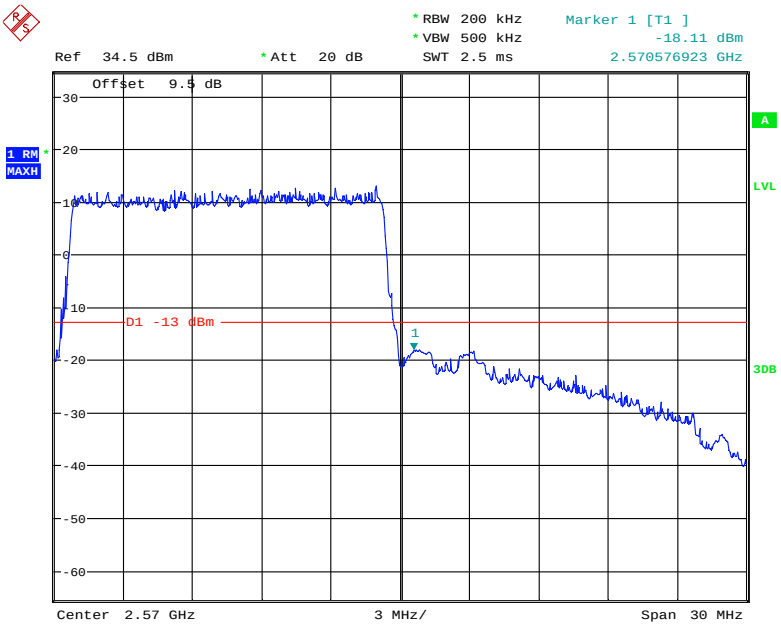
Date: 22.MAY.2019 23:36:36

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



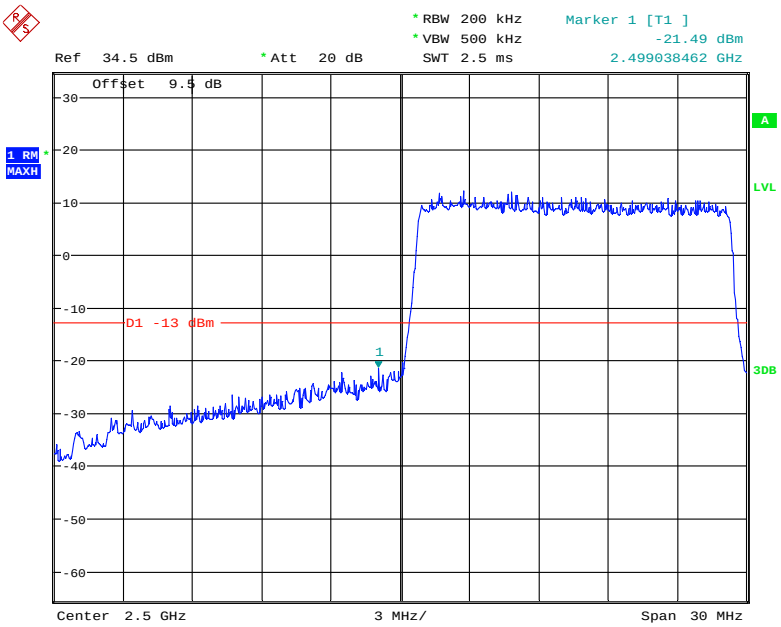
Date: 22.MAY.2019 23:38:35

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



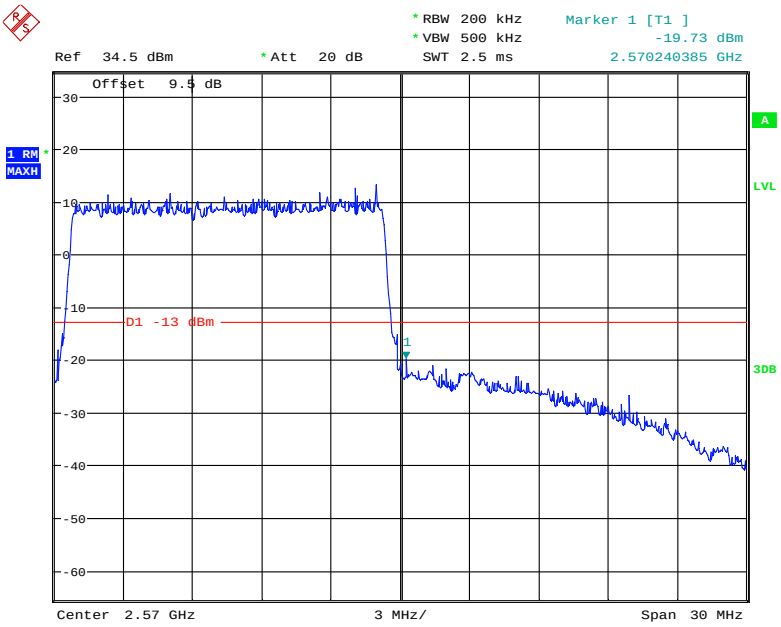
Date: 22.MAY.2019 23:40:27

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



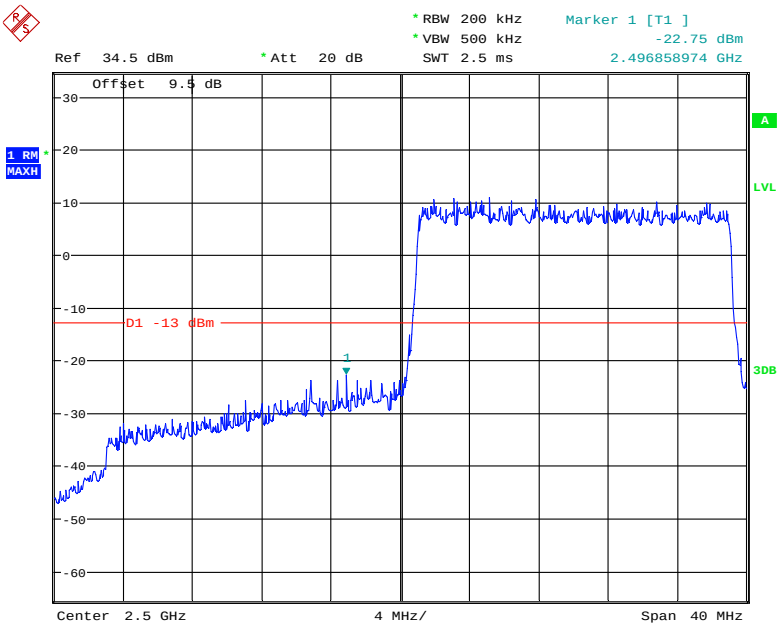
Date: 22.MAY.2019 23:39:10

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



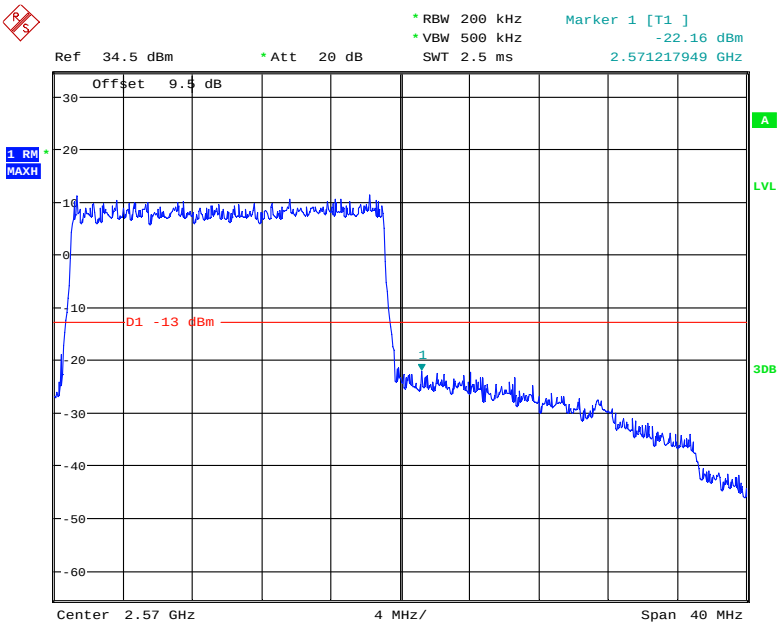
Date: 22.MAY.2019 23:39:52

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



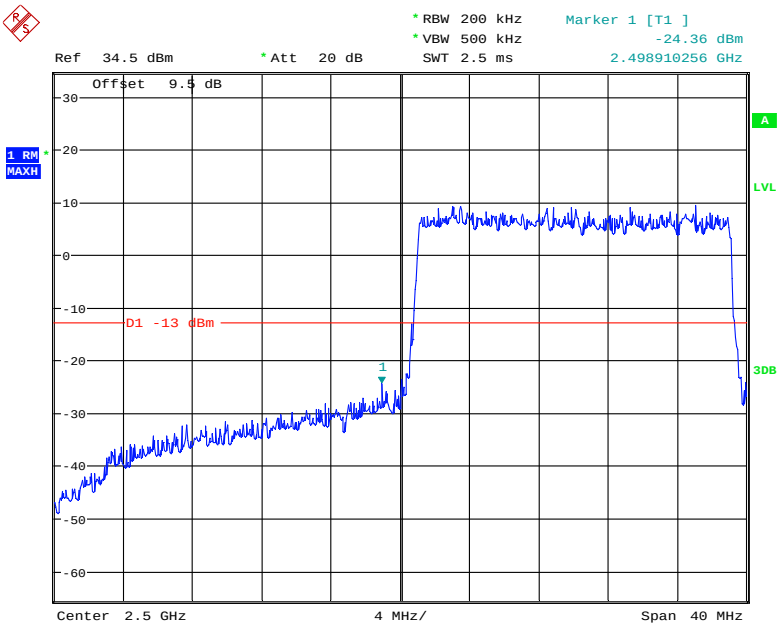
Date: 22.MAY.2019 23:42:20

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



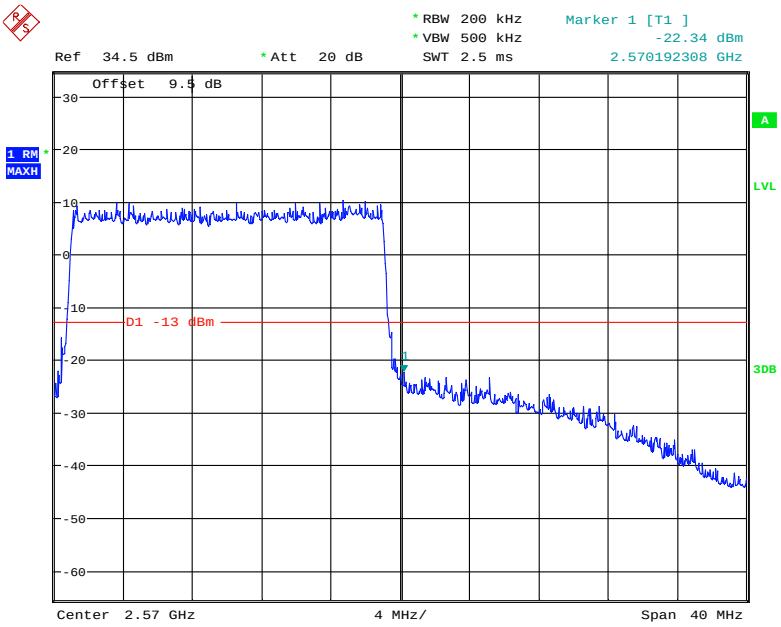
Date: 22.MAY.2019 23:41:07

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



Date: 22.MAY.2019 23:41:59

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



Date: 22.MAY.2019 23:41:32

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

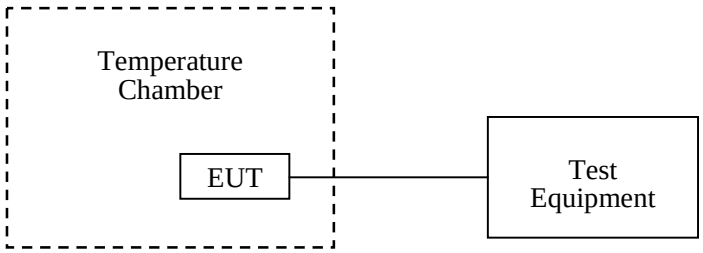
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	24~25 ℃
Relative Humidity:	50~55 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by James Fu from 2019-05-21 to 2019-05-29.

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	3.85	-4	-0.0048	2.5
-20		-2	-0.0024	2.5
-10		-1	-0.0012	2.5
0		2	0.0024	2.5
10		4	0.0048	2.5
20		5	0.0060	2.5
30		7	0.0084	2.5
40		8	0.0096	2.5
50		10	0.0120	2.5
20	V min.= 3.3	12	0.0143	2.5
	V max.= 4.4	13	0.0155	2.5

EDGE Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.85	-7	-0.0084	2.5
-20		-6	-0.0072	2.5
-10		-5	-0.0060	2.5
0		-2	-0.0024	2.5
10		2	0.0024	2.5
20		3	0.0036	2.5
30		4	0.0048	2.5
40		7	0.0084	2.5
50		9	0.0108	2.5
20	V min.= 3.3	11	0.0131	2.5
	V max.= 4.4	14	0.0167	2.5

WCDMA Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.85	-16	-0.0191	2.5
-20		-13	-0.0155	2.5
-10		-10	-0.0120	2.5
0		-11	-0.0131	2.5
10		9	0.0108	2.5
20		-7	-0.0084	2.5
30		5	0.0060	2.5
40		-4	-0.0048	2.5
50		-2	-0.0024	2.5
20	V min.= 3.3	-1	-0.0012	2.5
	V max.= 4.4	3	0.0036	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	3.85	15	0.0080	pass
-20		17	0.0090	pass
-10		18	0.0096	pass
0		19	0.0101	pass
10		22	0.0117	pass
20		24	0.0128	pass
30		28	0.0149	pass
40		26	0.0138	pass
50		29	0.0154	pass
20	V min.= 3.3	31	0.0165	pass
	V max.= 4.4	33	0.0176	pass

EDGE Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.85	6	0.0032	pass
-20		9	0.0048	pass
-10		11	0.0059	pass
0		14	0.0074	pass
10		15	0.0080	pass
20		17	0.0090	pass
30		19	0.0101	pass
40		21	0.0112	pass
50		24	0.0128	pass
20	V min.= 3.3	27	0.0144	pass
	V max.= 4.4	29	0.0154	pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.85	-26	-0.0138	pass
-20		-24	-0.0128	pass
-10		23	0.0122	pass
0		-21	-0.0112	pass
10		19	0.0101	pass
20		-16	-0.0085	pass
30		-13	-0.0069	pass
40		-11	-0.0059	pass
50		-9	-0.0048	pass
20	V min.= 3.3	-7	-0.0037	pass
	V max.= 4.4	-6	-0.0032	pass

AWS Band (Part 27)

Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	3.85	1710.4645	1754.6239	1710.0000	1755.0000
-20		1710.4639	1754.6271	1710.0000	1755.0000
-10		1710.4625	1754.6269	1710.0000	1755.0000
0		1710.4621	1754.6259	1710.0000	1755.0000
10		1710.4642	1754.6251	1710.0000	1755.0000
20		1710.4610	1754.6231	1710.0000	1755.0000
30		1710.4608	1754.6227	1710.0000	1755.0000
40		1710.4643	1754.6231	1710.0000	1755.0000
50		1710.4701	1754.6251	1710.0000	1755.0000
20	V min.= 3.3	1710.4616	1754.6232	1710.0000	1755.0000
	V max.= 4.4	1710.4627	1754.6228	1710.0000	1755.0000

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	3.85	-13	-0.0069	pass
-20		-9	-0.0048	pass
-10		-11	-0.0059	pass
0		-8	-0.0043	pass
10		-5	-0.0027	pass
20		-4.37	-0.0023	pass
30		-2	-0.0011	pass
40		1	0.0005	pass
50		3	0.0016	pass
20	V min.= 3.3	5	0.0027	pass
	V max.= 4.4	8	0.0043	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	3.85	1710.4643	1754.6256	1710	1755
-20		1710.4636	1754.6234	1710	1755
-10		1710.4621	1754.6254	1710	1755
0		1710.4630	1754.6266	1710	1755
10		1710.4642	1754.6252	1710	1755
20		1710.4618	1754.6259	1710	1755
30		1710.4668	1754.6242	1710	1755
40		1710.4641	1754.6247	1710	1755
50		1710.4644	1754.6255	1710	1755
20	V min.= 3.3	1710.4646	1754.6231	1710	1755
	V max.= 4.4	1710.4654	1754.6226	1710	1755

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	3.85	2500.4737	2569.6953	2500	2570
-20		2500.4768	2569.6992	2500	2570
-10		2500.4747	2569.6941	2500	2570
0		2500.4759	2569.6964	2500	2570
10		2500.4746	2569.6958	2500	2570
20		2500.4749	2569.6963	2500	2570
30		2500.4752	2569.6958	2500	2570
40		2500.4758	2569.6961	2500	2570
50		2500.4743	2569.6973	2500	2570
20	V min.= 3.3	2500.4767	2569.6970	2500	2570
	V max.= 4.4	2500.4745	2569.6968	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	3.85	-14	-0.0074	pass
-20		-11	-0.0059	pass
-10		-9	-0.0048	pass
0		-6	-0.0032	pass
10		-4	-0.0021	pass
20		-3.69	-0.0020	pass
30		-1	-0.0005	pass
40		2	0.0011	pass
50		4	0.0021	pass
20	V min.= 3.3	7	0.0037	pass
	V max.= 4.4	8	0.0043	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	3.85	1710.4665	1754.6241	1710	1755
-20		1710.4650	1754.6264	1710	1755
-10		1710.4672	1754.6255	1710	1755
0		1710.4658	1754.6275	1710	1755
10		1710.4672	1754.6246	1710	1755
20		1710.4684	1754.6256	1710	1755
30		1710.4653	1754.6239	1710	1755
40		1710.4678	1754.6243	1710	1755
50		1710.4688	1754.6262	1710	1755
20	V min.= 3.3	1710.4667	1754.6245	1710	1755
	V max.= 4.4	1710.4691	1754.6271	1710	1755

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	3.85	2500.4763	2569.6950	2500	2570
-20		2500.4776	2569.6934	2500	2570
-10		2500.4789	2569.6929	2500	2570
0		2500.4762	2569.6968	2500	2570
10		2500.4766	2569.6942	2500	2570
20		2500.4788	2569.6972	2500	2570
30		2500.4764	2569.6970	2500	2570
40		2500.4755	2569.6939	2500	2570
50		2500.4792	2569.6961	2500	2570
20	V min.= 3.3	2500.4751	2569.6942	2500	2570
	V max.= 4.4	2500.4792	2569.6952	2500	2570

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