



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 22H, PART 24E
FCC PART 27
MEASUREMENT AND TEST REPORT

For

TekConnec Inc

39H, LA ROSSA A, 12 TUNG CHUNG WATERFRONT ROAD TUNG CHUNG, LANTAU, NT
Hong Kong

FCC ID: 2AMVHBO-F16V

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Reviewed By: Jerry Zhang EMC Manager <i>Jerry Zhang</i>	
Test Laboratory: Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn	

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		BOLTE
EUT Model:		BO-F16V
Operation modes:		GSM Voice, GPRS/EDGE Data, WCDMA(R99 (Voice+Data), HSDPA/HSUPA/HSPA+), FDD-LTE
Operation Frequency:		GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX)
Maximum Output Power: (Conducted)		GSM 850 : 31.0 dBm; PCS 1900: 29.61 dBm WCDMA Band 5: 22.92 dBm LTE Band 2: 23.67 dBm LTE Band 12: 23.65 dBm
Modulation Type:		GMSK, 8PSK, QPSK, 16QAM
Rated Input Voltage:		DC3.8V from Battery or DC5V from adapter
Adapter Information	Model:	TPA-46B050100UU
	Input:	AC 100-240V, 50/60Hz, 0.2A
	Output:	DC5V, 1000mA
External Dimension:		143mm(L)*70mm(W)*9.2mm(H)
Serial Number:		190328001
EUT Received Date:		2019.03.29

Objective

This report is prepared on behalf of **TekConnec Inc** in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E Part 27 of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AMVHBO-F16V.
FCC Part 15C DSS submissions with FCC ID: 2AMVHBO-F16V.
FCC Part 15B JBP submissions with FCC ID: 2AMVHBO-F16V.

Test Methodology

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

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

Applicable Standards: TIA/EIA 603-D-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz: 5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

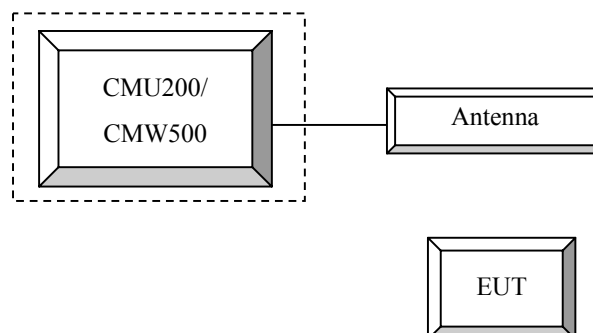
Equipment Modifications

No modification was made to the EUT.

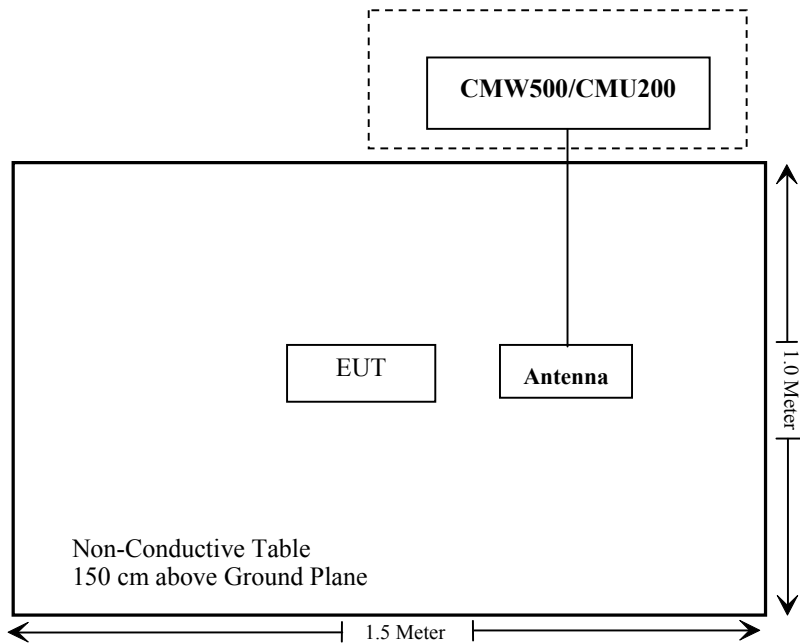
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	110 822
R&S	Wideband Radio Communication Tester	CMW500	147473
Un-known	ANTENNA	/	/

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a); §27.53	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235; §27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG190328001-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(h),(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850

> 30 dBm for GPRS 1900

> 27 dBm for EGPRS 850

> 26 dBm for EGPRS 1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0 > 4 dB

Slot Config > Unchanged (if already set under MS signal)

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3

Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream

AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal on to turn on the signal and change settings

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c / β_d	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c / β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs} / \beta_c$	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	$A_{hs}=\beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCI	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note 3)	β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105
Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default. Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value. Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.											

DC-HSDPA

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2017-01-05	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2017-01-05	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2017-01-05	2020-01-04
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2020-02-28
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	110 822	2018-12-14	2019-12-14
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	21~25.3°C
Relative Humidity:	37~44 %
ATM Pressure:	100.2~101.3 kPa

* The testing was performed by Vern Shen, Carrie He and Vito Chen on 2019-04-08 & 2019-04-11

Conducted Output Power**Cellular Band & PCS Band**

Band	Channel No.	Conducted Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	30.9	30.89	30.75	30.65	30.58	25.61	25.54	25.22	24.49
	190	31.0	30.87	30.81	30.61	30.45	25.83	25.61	25.46	24.63
	251	30.9	30.91	30.84	30.69	30.52	25.76	25.56	25.35	24.49
PCS	512	29.1	29.07	28.81	28.54	27.16	24.39	24.18	24.01	23.69
	661	29.2	29.27	29.03	28.63	28.46	24.44	24.32	24.11	23.78
	810	29.6	29.61	29.34	29.03	28.75	24.94	24.75	24.46	24.14

WCDMA Band V

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.64	3.14	22.78	3.11	22.92	3.11
HSDPA	1	21.70	4.04	21.72	3.37	21.90	3.30
	2	21.40	3.65	21.67	4.78	21.57	4.70
	3	21.66	4.81	21.04	3.83	21.18	4.38
	4	21.00	3.90	21.19	4.13	20.93	4.01
HSUPA	1	21.41	3.81	21.41	3.46	21.87	3.85
	2	21.39	4.44	21.33	3.77	20.91	4.04
	3	20.69	3.93	21.03	4.25	20.94	4.65
	4	20.86	4.45	21.38	4.72	20.82	3.76
	5	20.68	4.04	20.96	3.87	21.29	3.94
HSPA+ (16QAM)	1	21.16	4.76	21.02	4.49	21.53	4.79

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.36	23.13	22.19
		RB1#3	23.30	23.14	21.93
		RB1#5	23.42	23.17	21.75
		RB3#0	23.31	23.36	22.03
		RB3#3	23.36	23.26	21.82
		RB6#0	22.64	22.38	21.90
	16QAM	RB1#0	22.32	21.77	21.21
		RB1#3	22.55	21.59	21.03
		RB1#5	22.55	21.63	20.88
		RB3#0	22.30	21.90	21.28
		RB3#3	22.36	22.43	21.11
		RB6#0	21.64	21.57	21.05
3MHz	QPSK	RB1#0	23.37	23.31	22.90
		RB1#8	23.28	23.18	22.21
		RB1#14	23.40	23.35	21.82
		RB6#0	22.42	22.35	22.58
		RB6#9	22.49	22.40	21.96
		RB15#0	22.61	22.34	22.29
	16QAM	RB1#0	22.56	22.51	22.03
		RB1#8	22.46	22.25	21.32
		RB1#14	22.80	22.37	20.95
		RB6#0	21.52	21.31	21.70
		RB6#9	21.36	21.41	21.05
		RB15#0	21.49	21.52	21.48
5MHz	QPSK	RB1#0	23.18	23.13	23.14
		RB1#13	23.35	22.96	22.69
		RB1#24	23.28	22.96	22.10
		RB15#0	22.43	22.36	22.28
		RB15#10	22.46	22.31	22.17
		RB25#0	22.51	22.34	22.35
	16QAM	RB1#0	22.13	22.11	22.44
		RB1#13	22.13	21.21	22.08
		RB1#24	21.95	21.37	21.46
		RB15#0	21.42	21.19	21.23
		RB15#10	21.48	21.18	20.93
		RB25#0	21.31	21.30	21.21

10MHz	QPSK	RB1#0	22.94	23.38	23.32
		RB1#25	23.54	23.55	23.60
		RB1#49	23.35	23.19	21.55
		RB25#0	22.62	22.41	22.36
		RB25#25	22.54	22.34	22.19
		RB50#0	22.60	22.37	22.34
	16QAM	RB1#0	22.39	22.91	22.53
		RB1#25	23.08	23.18	22.33
		RB1#49	22.60	22.56	20.75
		RB25#0	21.41	21.47	21.46
		RB25#25	21.45	21.40	21.27
		RB50#0	21.44	21.34	21.32
15MHz	QPSK	RB1#0	23.43	23.41	23.57
		RB1#38	23.17	23.26	23.29
		RB1#74	23.36	23.33	22.28
		RB36#0	22.55	22.38	22.48
		RB36#39	22.32	22.29	22.20
		RB75#0	22.44	22.39	22.26
	16QAM	RB1#0	22.74	22.55	22.58
		RB1#38	22.57	22.27	23.11
		RB1#74	22.73	22.24	21.53
		RB36#0	21.53	21.31	21.43
		RB36#39	21.27	21.26	21.17
		RB75#0	21.49	21.24	21.21
20MHz	QPSK	RB1#0	22.47	23.50	23.08
		RB1#50	23.61	23.62	23.67
		RB1#99	23.59	23.33	22.08
		RB50#0	22.61	22.44	22.48
		RB50#50	22.37	22.21	22.24
		RB100#0	22.46	22.35	22.22
	16QAM	RB1#0	22.44	23.19	22.33
		RB1#50	23.08	23.08	22.23
		RB1#99	22.91	22.79	21.50
		RB50#0	21.63	21.41	21.52
		RB50#50	21.41	21.10	21.42
		RB100#0	21.46	21.32	21.30

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.21	23.19	23.31
		RB1#3	23.28	23.42	23.17
		RB1#5	23.25	23.43	23.01
		RB3#0	23.31	23.35	23.33
		RB3#3	23.32	23.32	23.22
		RB6#0	22.44	22.50	22.31
	16QAM	RB1#0	22.71	22.37	22.34
		RB1#3	22.68	22.33	22.23
		RB1#5	22.97	21.96	22.57
		RB3#0	22.47	22.04	22.02
		RB3#3	22.51	22.09	22.08
		RB6#0	21.67	21.31	21.57
3MHz	QPSK	RB1#0	23.37	23.52	23.19
		RB1#8	23.32	23.36	23.12
		RB1#14	23.45	23.34	23.09
		RB6#0	22.46	22.38	22.38
		RB6#9	22.44	22.45	22.41
		RB15#0	22.39	22.42	22.39
	16QAM	RB1#0	22.47	22.52	22.22
		RB1#8	22.22	22.40	22.06
		RB1#14	22.27	22.46	21.88
		RB6#0	21.24	21.30	21.26
		RB6#9	21.39	21.50	21.29
		RB15#0	21.45	21.29	21.38
5MHz	QPSK	RB1#0	23.21	23.41	23.31
		RB1#13	23.35	23.24	23.17
		RB1#24	23.45	23.35	23.15
		RB15#0	22.35	22.41	22.42
		RB15#10	22.44	22.46	22.31
		RB25#0	22.41	22.48	22.36
	16QAM	RB1#0	21.66	22.48	22.36
		RB1#13	21.52	22.43	22.24
		RB1#24	21.69	22.42	22.25
		RB15#0	21.16	21.20	21.24
		RB15#10	21.48	21.20	21.36
		RB25#0	21.38	21.25	21.21
10MHz	QPSK	RB1#0	23.36	23.19	23.56
		RB1#25	23.37	23.65	23.39
		RB1#49	23.33	23.41	23.22
		RB25#0	22.34	22.35	22.58
		RB25#25	22.46	22.47	22.36
		RB50#0	22.40	22.42	22.56
	16QAM	RB1#0	22.65	22.66	22.10
		RB1#25	22.41	22.50	22.19
		RB1#49	22.59	22.32	21.53
		RB25#0	21.31	21.50	21.53
		RB25#25	21.36	21.37	21.47
		RB50#0	21.39	21.33	21.42

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.58	4.39	4.23	13
	100 RB		6.41	6.31	6.63	13
16QAM	1 RB	20 MHz	5.38	5.32	4.97	13
	100 RB		7.18	7.08	7.37	13

Note: peak-to-average ratio (PAR) <13 dB.

PAR, Band 12

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.22	3.11	3.22	13
	50 RB		6.32	6.25	6.28	13
16QAM	1 RB	10 MHz	5.36	5.12	3.23	13
	50 RB		6.12	6.58	6.37	13

Note: peak-to-average ratio (PAR) <13 dB.

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.60	H	91.95	17.03	0.00	0.97	16.06	38.45	22.39
836.60	V	101.10	29.31	0.00	0.97	28.34	38.45	10.11
EDGE 850 Middle Channel								
836.60	H	87.67	12.75	0.00	0.97	11.78	38.45	26.67
836.60	V	96.44	24.65	0.00	0.97	23.68	38.45	14.77
WCDMA Band V Middle Channel								
836.60	H	84.01	9.09	0.00	0.97	8.12	38.45	30.33
836.60	V	92.93	21.14	0.00	0.97	20.17	38.45	18.28

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 Middle Channel								
1880.00	H	92.67	20.06	11.66	2.66	29.06	33.00	3.94
1880.00	V	85.30	12.83	11.66	2.66	21.83	33.00	11.17
EDGE 1900 Middle Channel								
1880.00	H	88.97	16.36	11.66	2.66	25.36	33.00	7.64
1880.00	V	82.34	9.87	11.66	2.66	18.87	33.00	14.13

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

LTE Band 2

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1880.00	1.40	QPSK	H	82.78	10.17	11.66	2.66	19.17	33	13.83
1880.00			V	76.81	4.34	11.66	2.66	13.34	33	19.66
1880.00	3.00		H	81.86	9.25	11.66	2.66	18.25	33	14.75
1880.00			V	75.92	3.45	11.66	2.66	12.45	33	20.55
1880.00	5.00		H	82.6	9.99	11.66	2.66	18.99	33	14.01
1880.00			V	76.14	3.67	11.66	2.66	12.67	33	20.33
1880.00	10.00		H	81.99	9.38	11.66	2.66	18.38	33	14.62
1880.00			V	75.99	3.52	11.66	2.66	12.52	33	20.48
1880.00	15.00		H	81.48	8.87	11.66	2.66	17.87	33	15.13
1880.00			V	75.65	3.18	11.66	2.66	12.18	33	20.82
1880.00	20.00		H	81.55	8.94	11.66	2.66	17.94	33	15.06
1880.00			V	75.67	3.2	11.66	2.66	12.2	33	20.8
1880.00	1.40	16QAM	H	81.79	9.18	11.66	2.66	18.18	33	14.82
1880.00			V	77.53	5.06	11.66	2.66	14.06	33	18.94
1880.00	3.00		H	81.09	8.48	11.66	2.66	17.48	33	15.52
1880.00			V	76.34	3.87	11.66	2.66	12.87	33	20.13
1880.00	5.00		H	81.23	8.62	11.66	2.66	17.62	33	15.38
1880.00			V	76.64	3.17	11.66	2.66	12.17	33	20.83
1880.00	10.00		H	81.3	8.69	11.66	2.66	17.69	33	15.31
1880.00			V	75.82	3.35	11.66	2.66	12.35	33	20.65
1880.00	15.00		H	81.59	8.98	11.66	2.66	17.98	33	15.02
1880.00			V	74.62	2.15	11.66	2.66	11.15	33	21.85
1880.00	20.00		H	81.53	8.92	11.66	2.66	17.92	33	15.08
1880.00			V	76.74	4.27	11.66	2.66	13.27	33	19.73

LTE Band 12

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
707.50	1.40	QPSK	H	84.26	7.4	0	0.94	6.46	34.77	28.31
707.50			V	91.73	17.31	0	0.94	16.37	34.77	18.4
707.50	3.00		H	84.33	7.47	0	0.94	6.53	34.77	28.24
707.50			V	91.71	17.29	0	0.94	16.35	34.77	18.42
707.50	5.00		H	83.94	7.08	0	0.94	6.14	34.77	28.63
707.50			V	91.65	17.23	0	0.94	16.29	34.77	18.48
707.50	10.00		H	83.36	6.5	0	0.94	5.56	34.77	29.21
707.50			V	91.13	16.71	0	0.94	15.77	34.77	19
707.50	1.40	16QAM	H	83.26	6.4	0	0.94	5.46	34.77	29.31
707.50			V	91.71	17.29	0	0.94	16.35	34.77	18.42
707.50	3.00		H	82.15	5.29	0	0.94	4.35	34.77	30.42
707.50			V	90.13	15.71	0	0.94	14.77	34.77	20
707.50	5.00		H	84.26	7.4	0	0.94	6.46	34.77	28.31
707.50			V	90.94	16.52	0	0.94	15.58	34.77	19.19
707.50	10.00		H	84.33	7.47	0	0.94	6.53	34.77	28.24
707.50			V	91.73	17.31	0	0.94	16.37	34.77	18.4

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

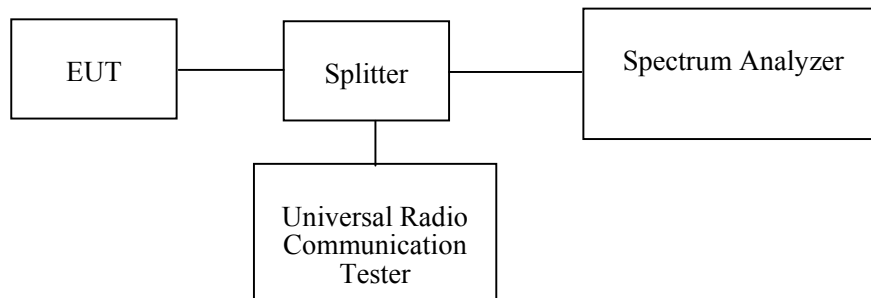
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH**Applicable Standard**

FCC §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 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	26.4~27.4 °C
Relative Humidity:	54~60%
ATM Pressure:	100.6~ 101.1kPa

* The testing was performed by Neil Liao & Tyler Pan on 2019-04-08 & 2019-04-11

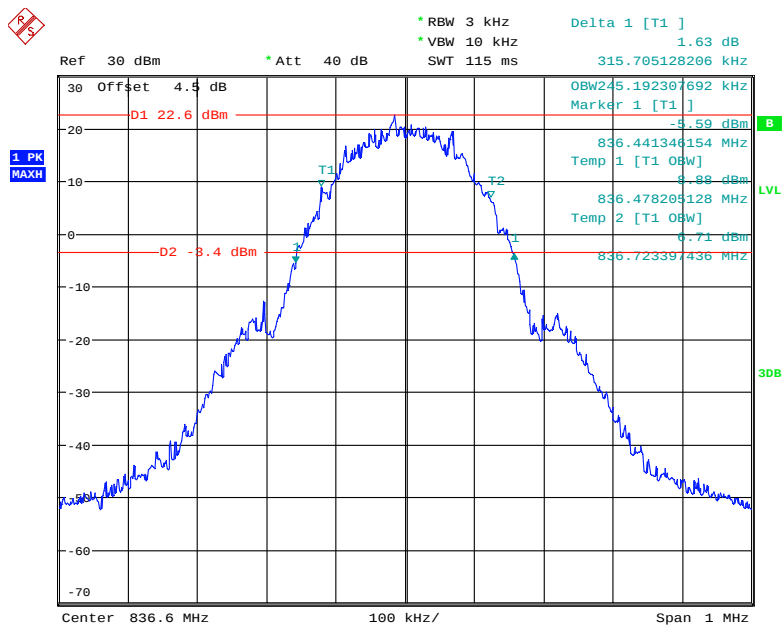
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.245	0.316
		EDGE	0.244	0.314
PCS		GSM	0.244	0.316
		EDGE	0.248	0.317
WCDMA Band V		Rel 99	4.151	4.744
		HSDPA	4.151	4.712
		HSUPA	4.135	4.712

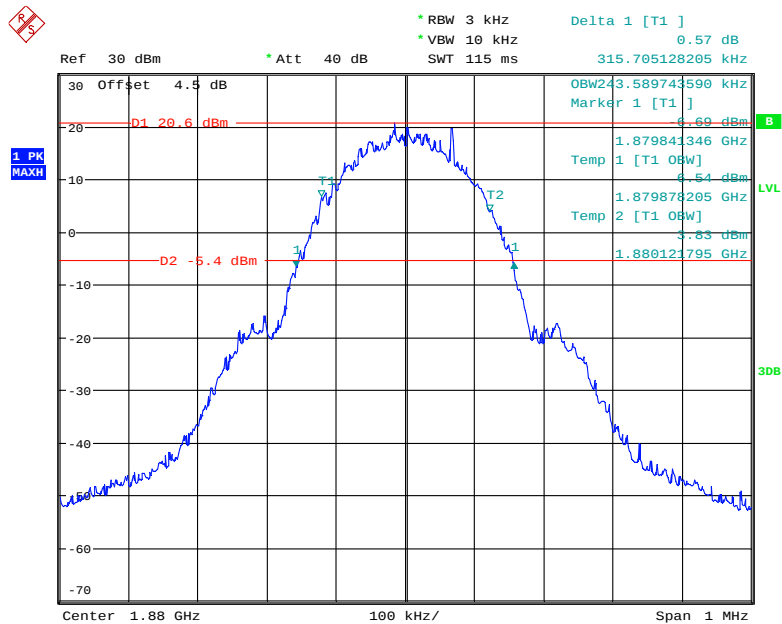
Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.104	1.311
		16QAM	1.104	1.281
	3 MHz	QPSK	2.700	2.922
		16QAM	2.700	2.982
	5 MHz	QPSK	4.540	5.010
		16QAM	4.520	4.990
	10 MHz	QPSK	8.960	9.739
		16QAM	8.960	9.619
	15 MHz	QPSK	13.500	14.850
		16QAM	13.500	14.790
LTE Band 12	1.4 MHz	QPSK	17.920	19.078
		16QAM	17.920	19.319
	1.4 MHz	QPSK	1.104	1.293
		16QAM	1.110	1.311
	3 MHz	QPSK	2.700	2.922
		16QAM	2.700	2.946
	5 MHz	QPSK	4.540	5.030
		16QAM	4.520	4.990
	10 MHz	QPSK	8.960	9.699
		16QAM	8.960	9.619

GSM 850 Cellular Band



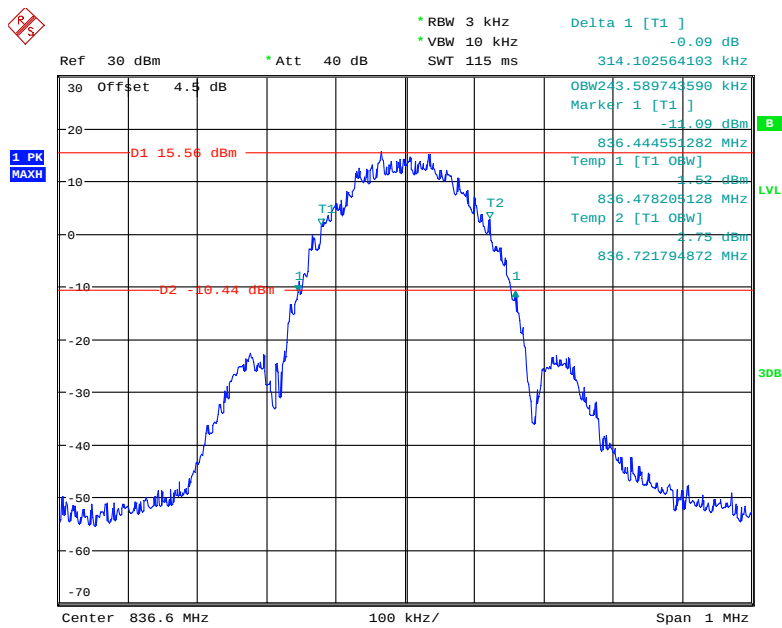
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GSM PCS1900 Cellular Band



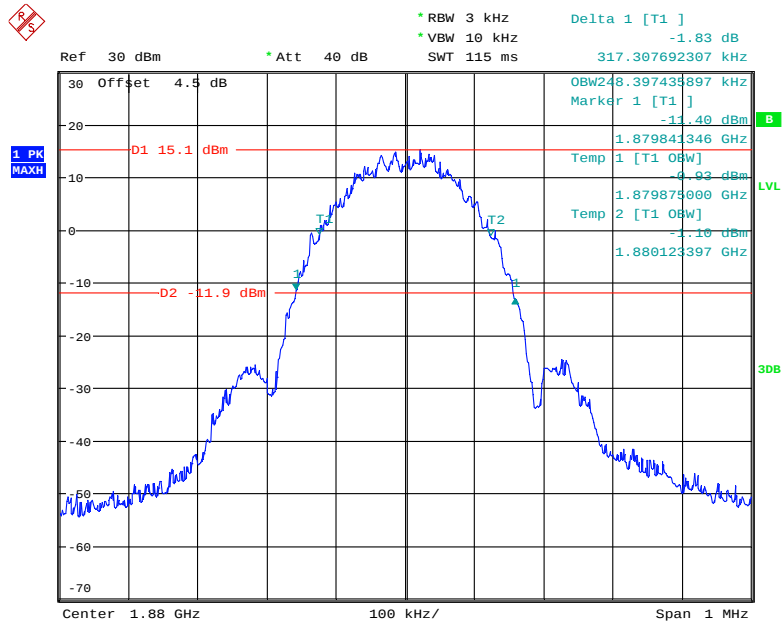
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EDGE 850 Cellular Band



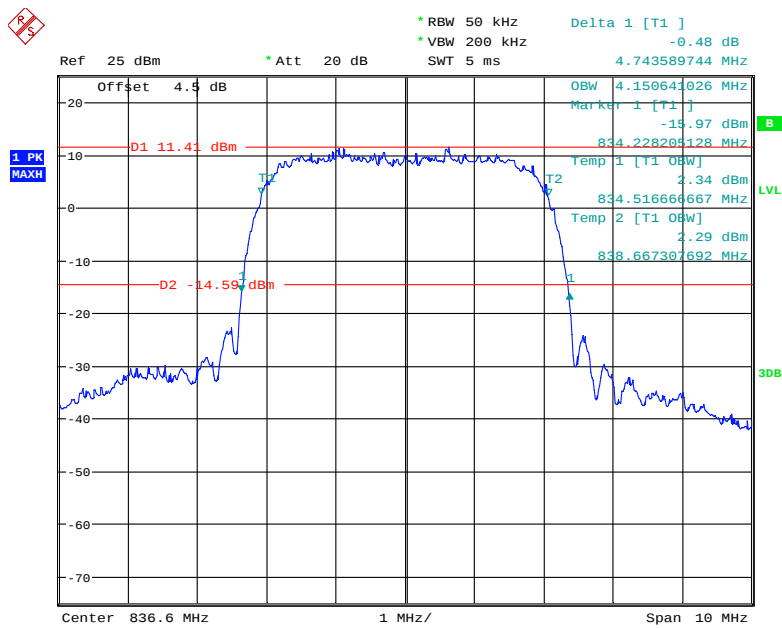
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EDGE PCS1900 Cellular Band



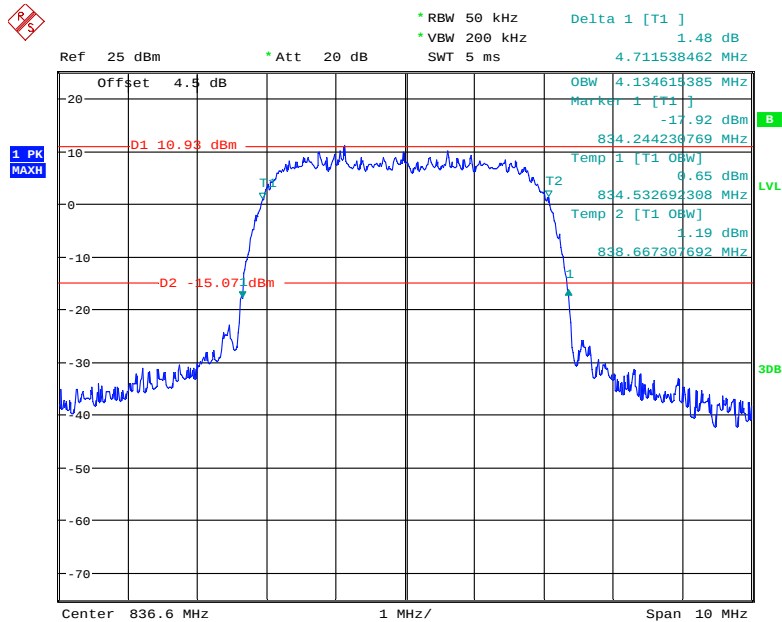
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WCDMA Band V, Rel 99



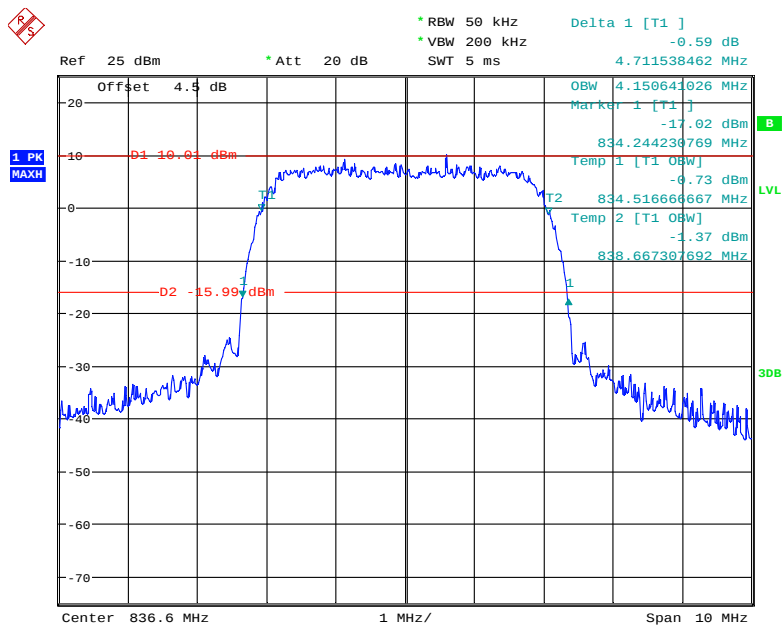
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WCDMA Band V, HSUPA



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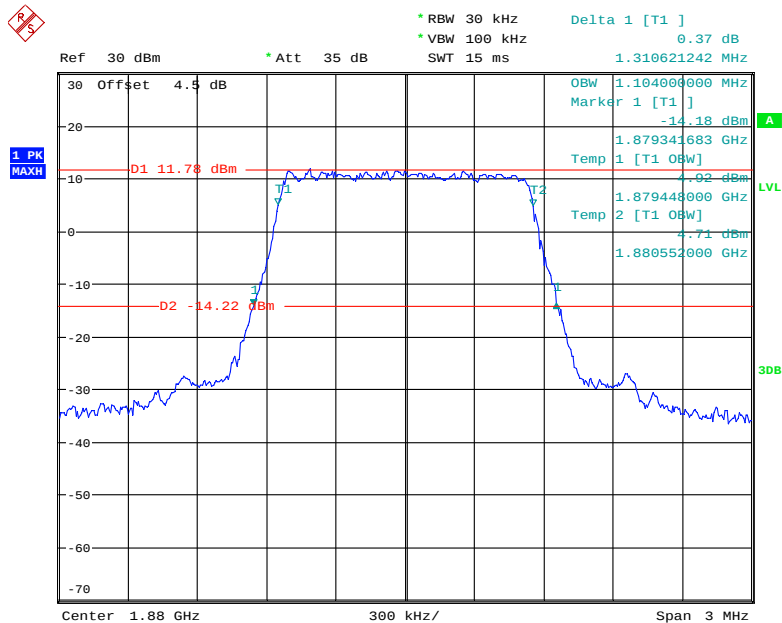
WCDMA Band V, HSDPA



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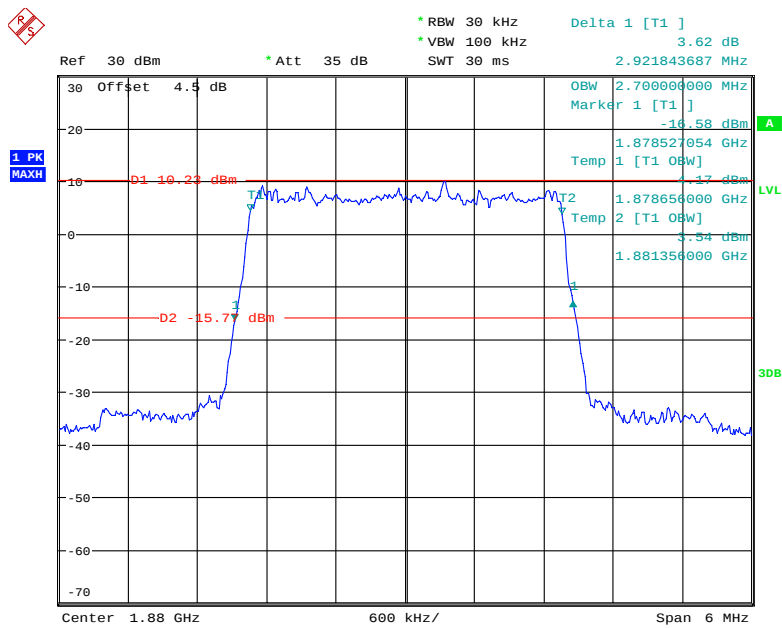
LTE Band 2

QPSK_1.4 MHz



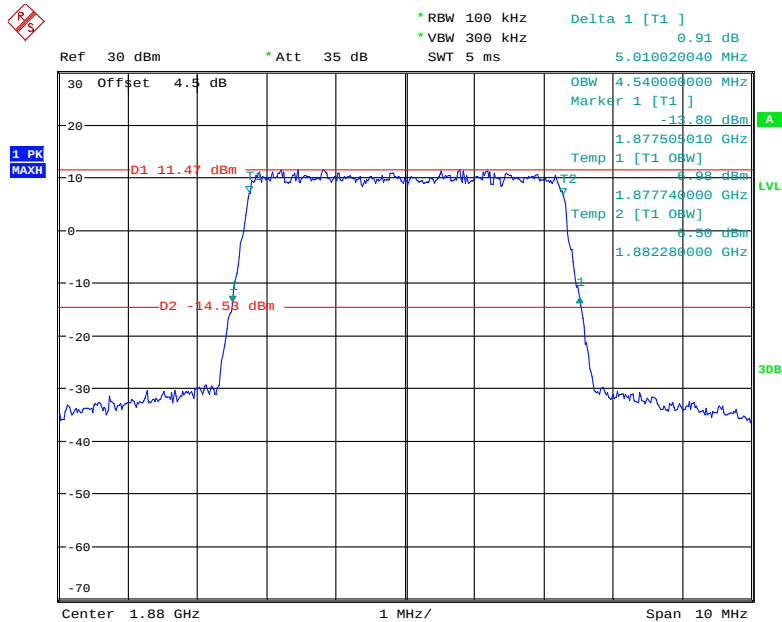
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QPSK_3 MHz



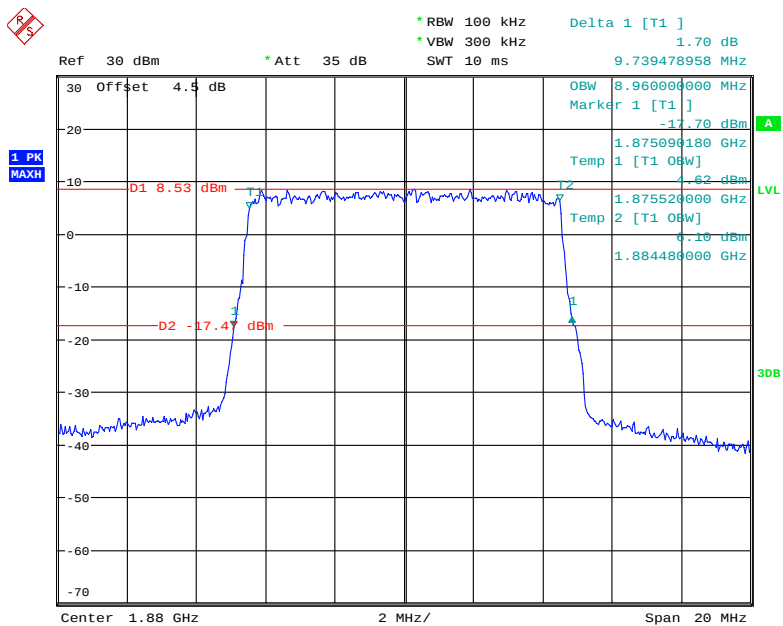
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QPSK_5 MHz



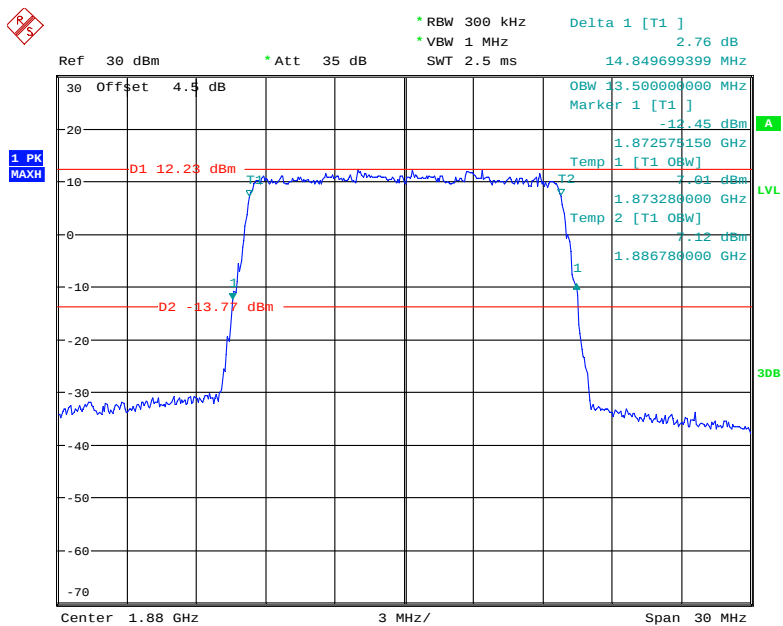
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QPSK_10 MHz



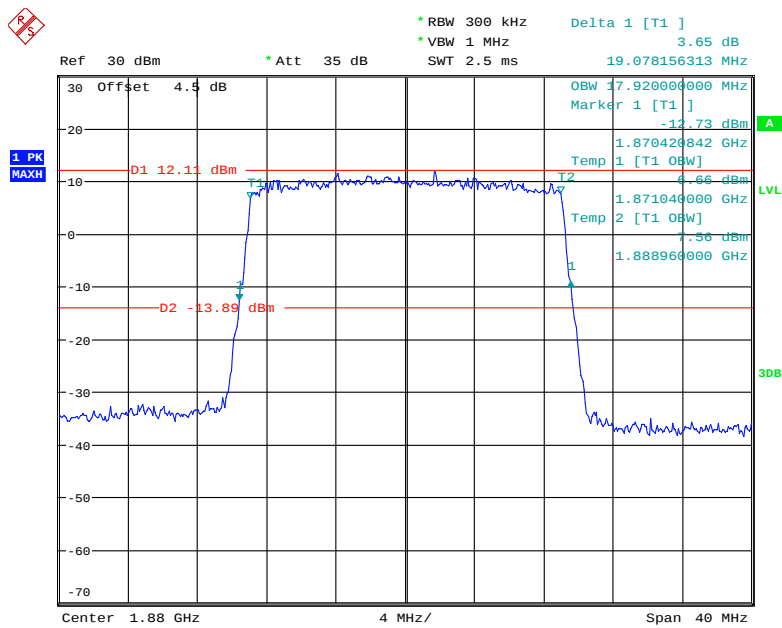
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QPSK_15 MHz



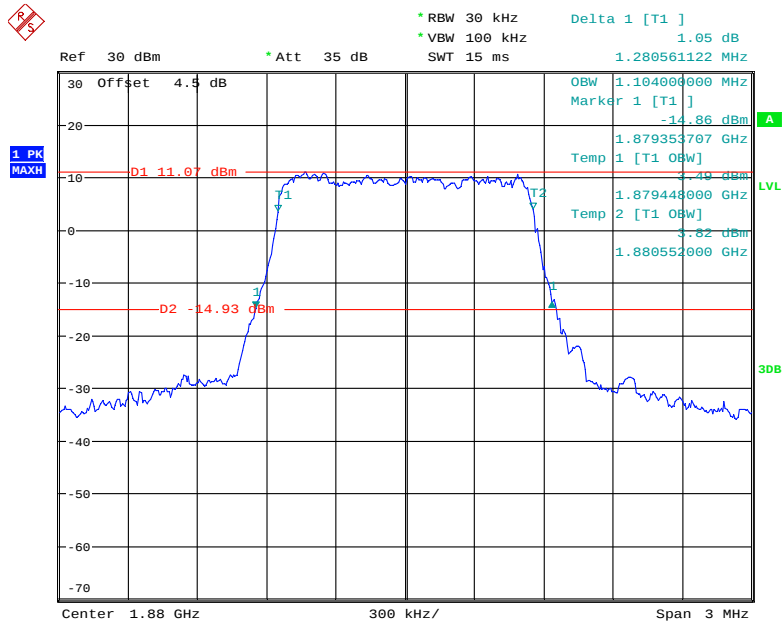
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QPSK_20 MHz



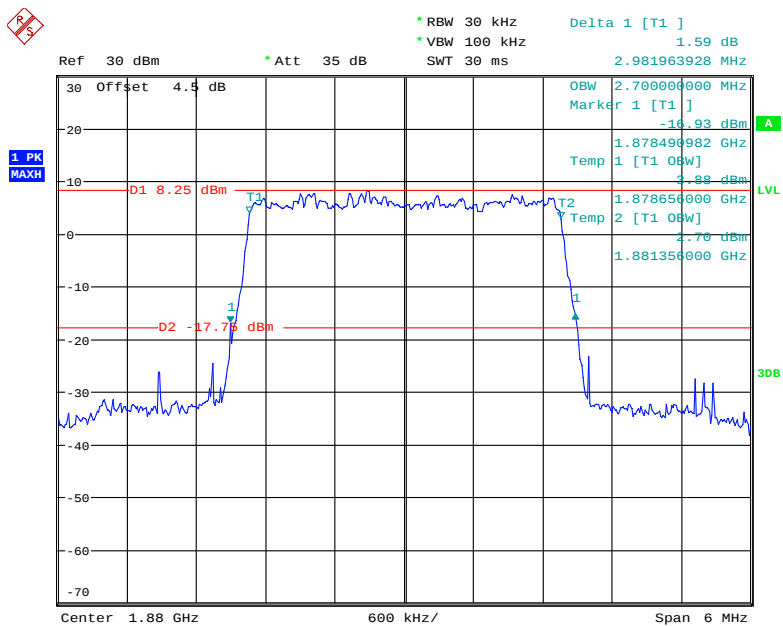
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16QAM_1.4 MHz



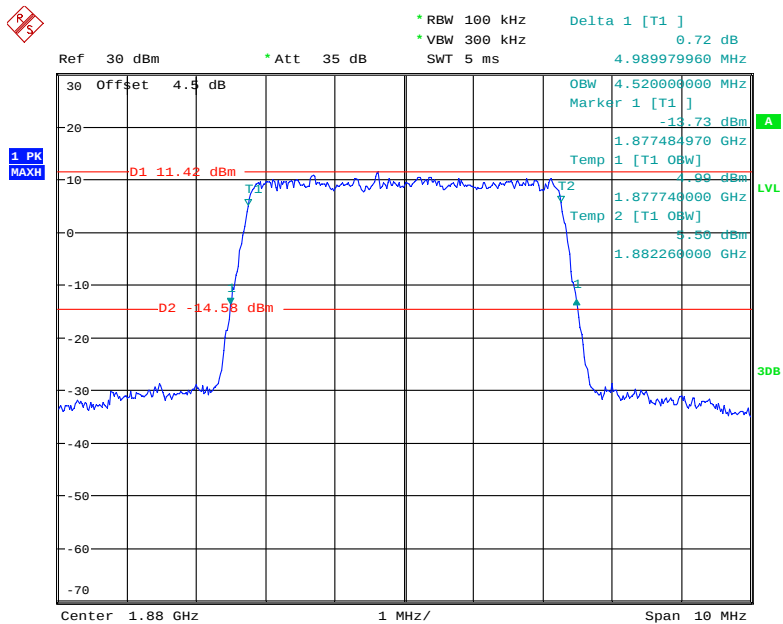
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16QAM_3 MHz



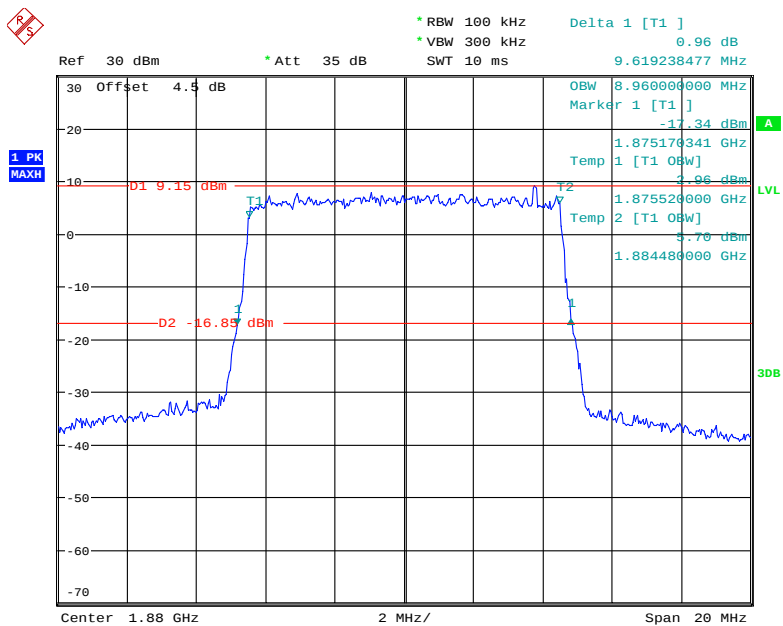
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16QAM_5 MHz



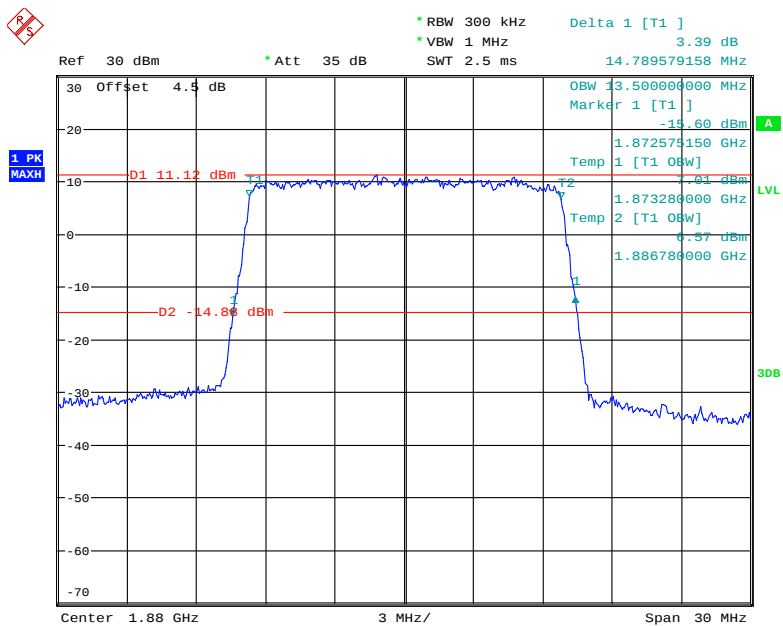
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16QAM_10 MHz



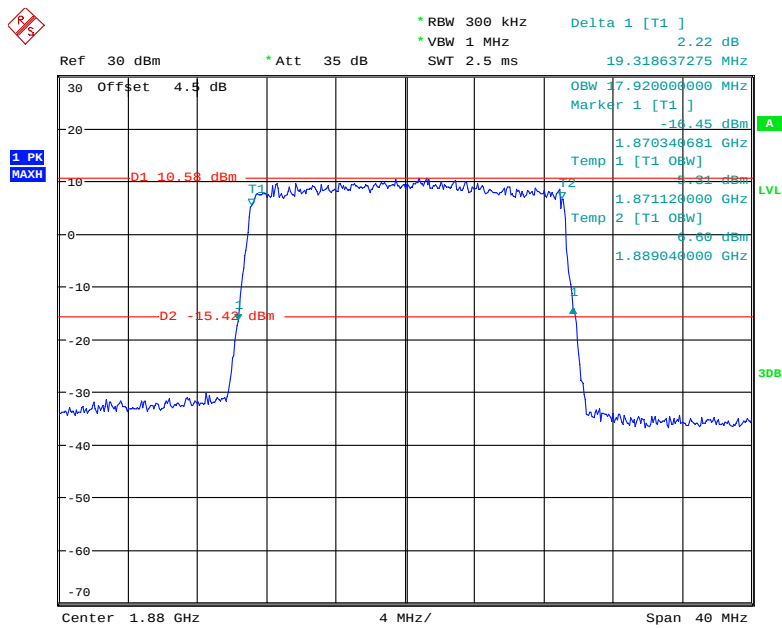
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16QAM_15 MHz



Date: 9.APR.2019 00:24:25

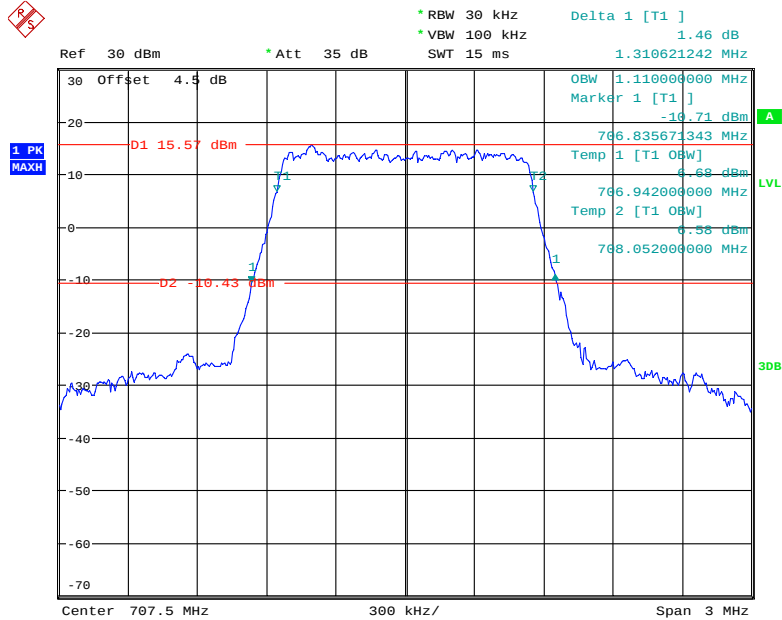
16QAM_20 MHz



Date: 9.APR.2019 00:25:46

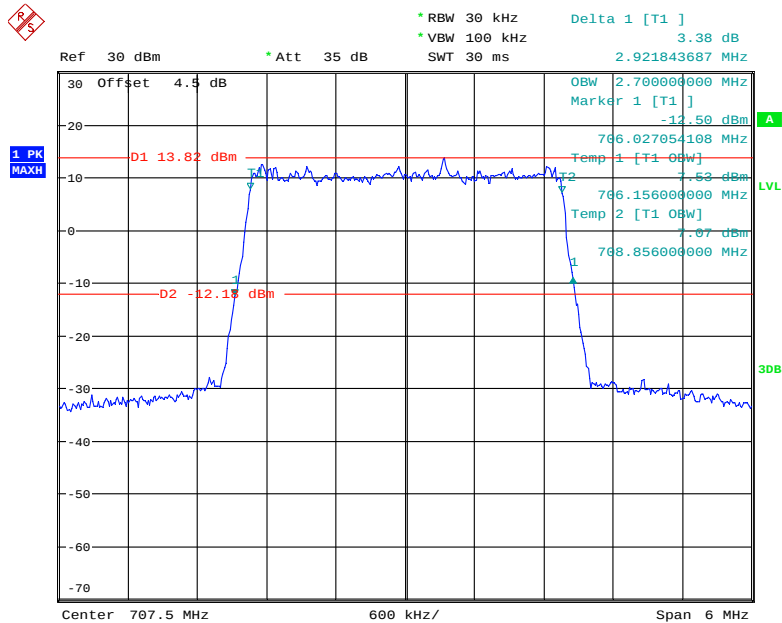
LTE Band 12

QPSK_1.4 MHz



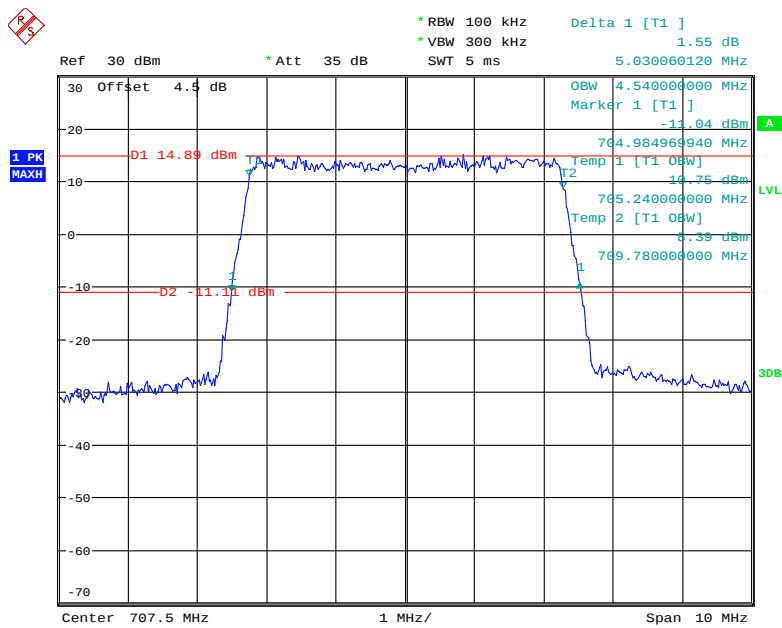
Date: 9.APR.2019 00:27:01

QPSK_3 MHz



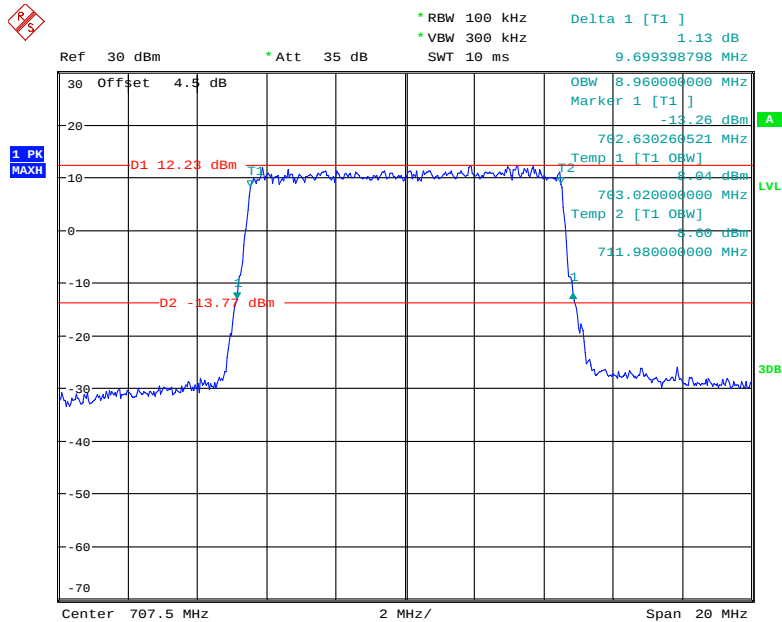
Date: 9.APR.2019 00:27:35

QPSK_5 MHz



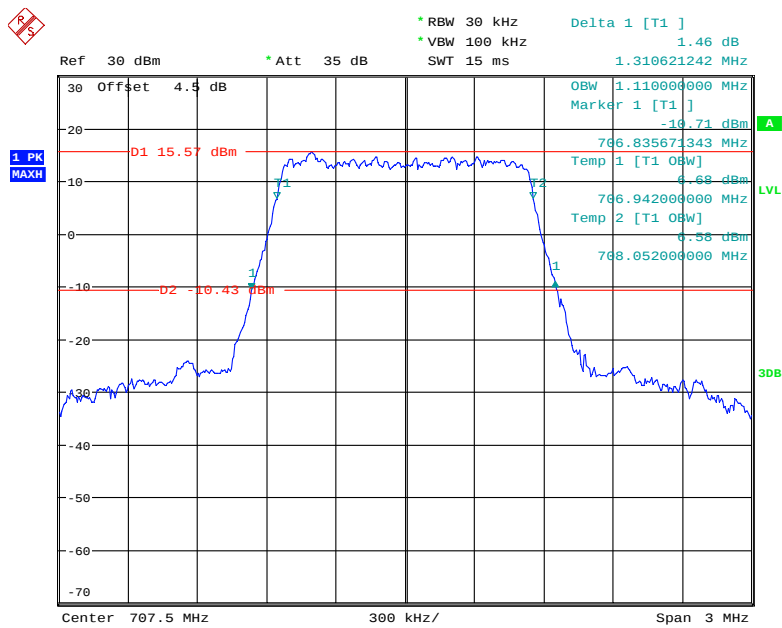
Date: 9.APR.2019 00:28:39

QPSK_10 MHz



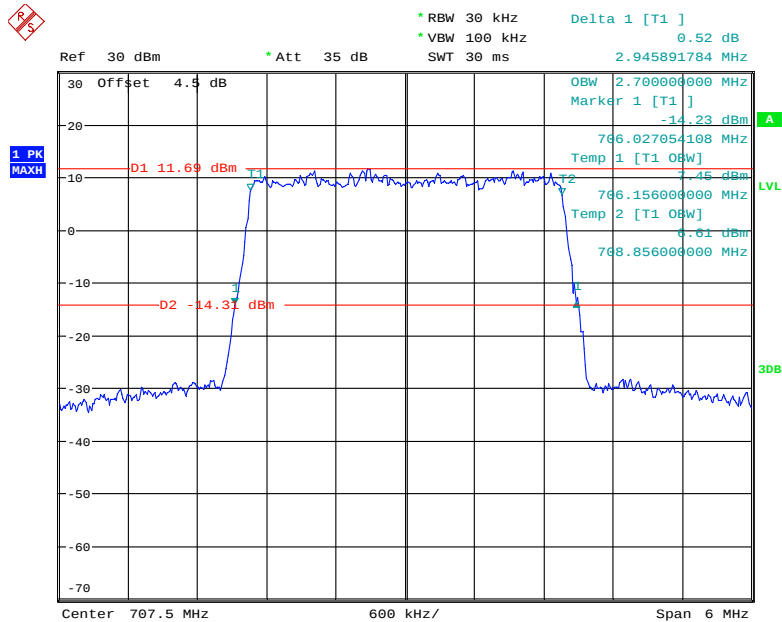
Date: 9.APR.2019 00:29:59

16QAM_1.4 MHz



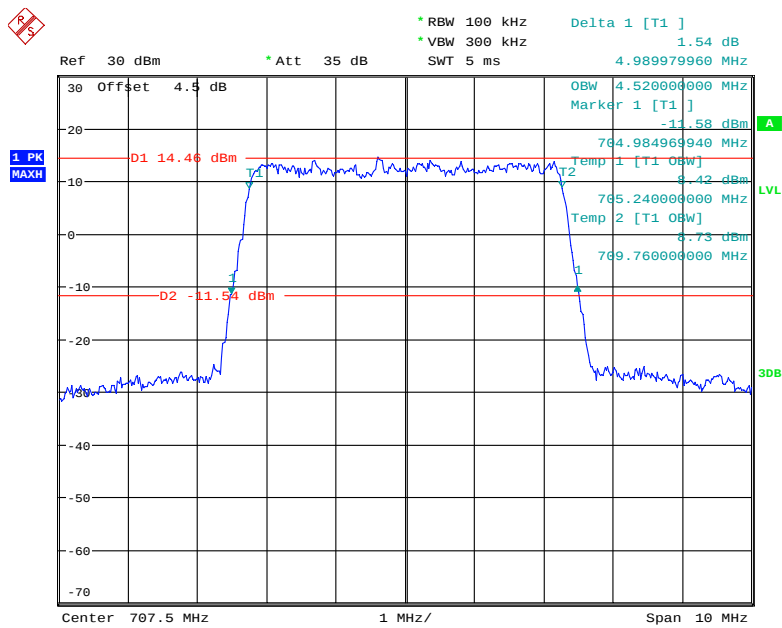
Date: 9.APR.2019 00:27:01

16QAM_3 MHz



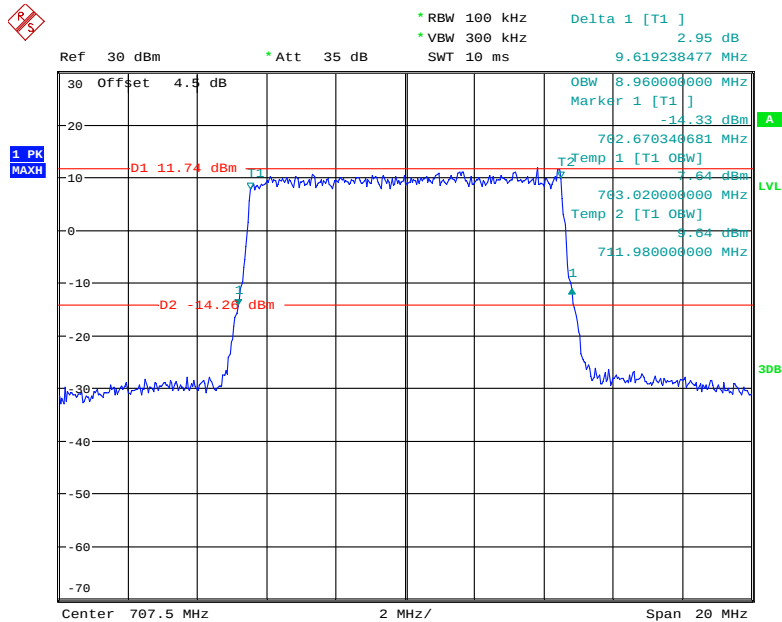
Date: 9.APR.2019 00:28:05

16QAM_5 MHz



Date: 9.APR.2019 00:29:17

16QAM_10 MHz



Date: 9.APR.2019 00:30:34

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

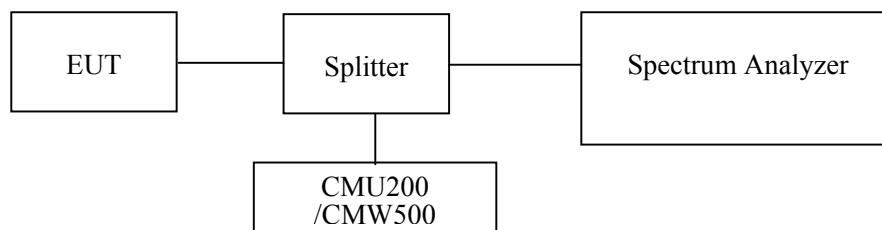
Applicable Standard

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

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

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

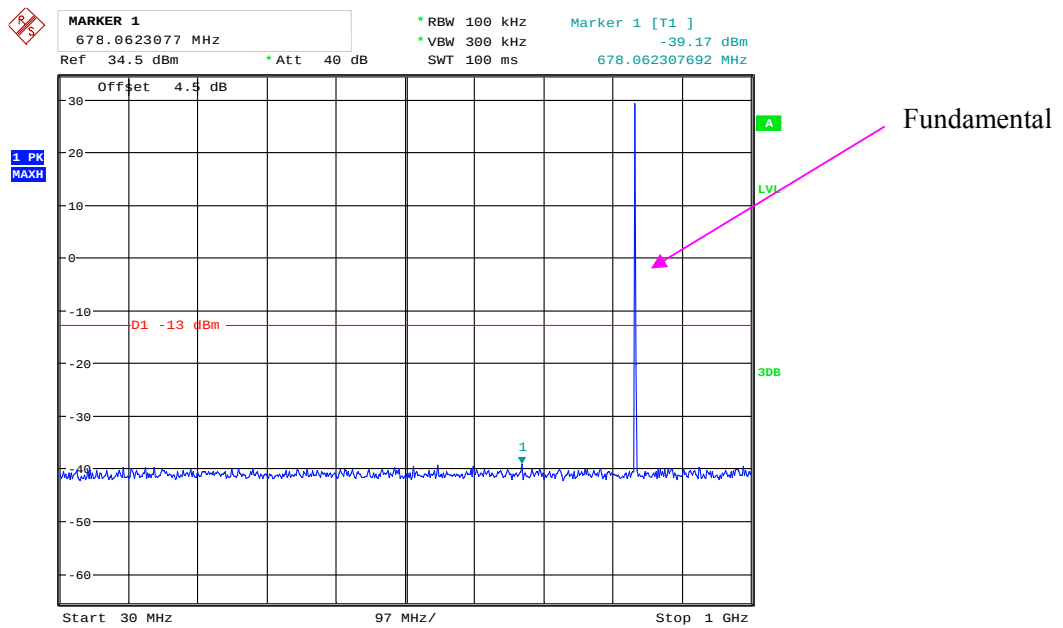
Environmental Conditions

Temperature:	26.4~27.4 °C
Relative Humidity:	54~60%
ATM Pressure:	100.6~ 101.1kPa

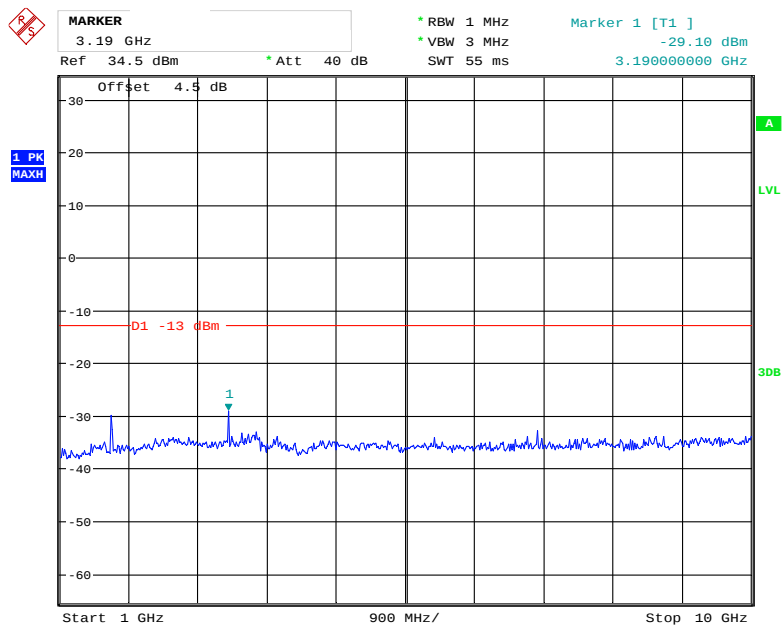
* The testing was performed by Neil Liao & Tyler Pan on 2019-04-08 & 2019-04-11

Please refer to the following plots.

GSM850_Middle Channel

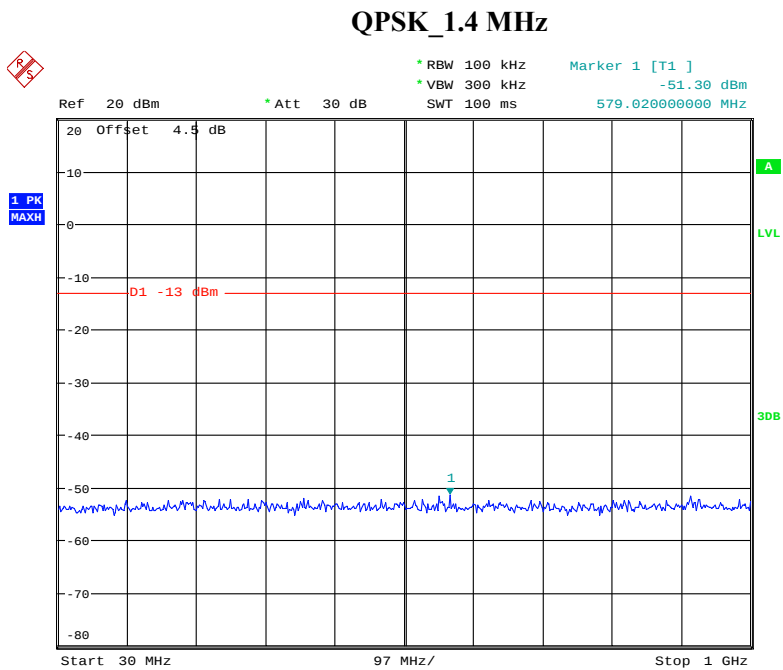


Date: 8.APR.2019 21:55:28

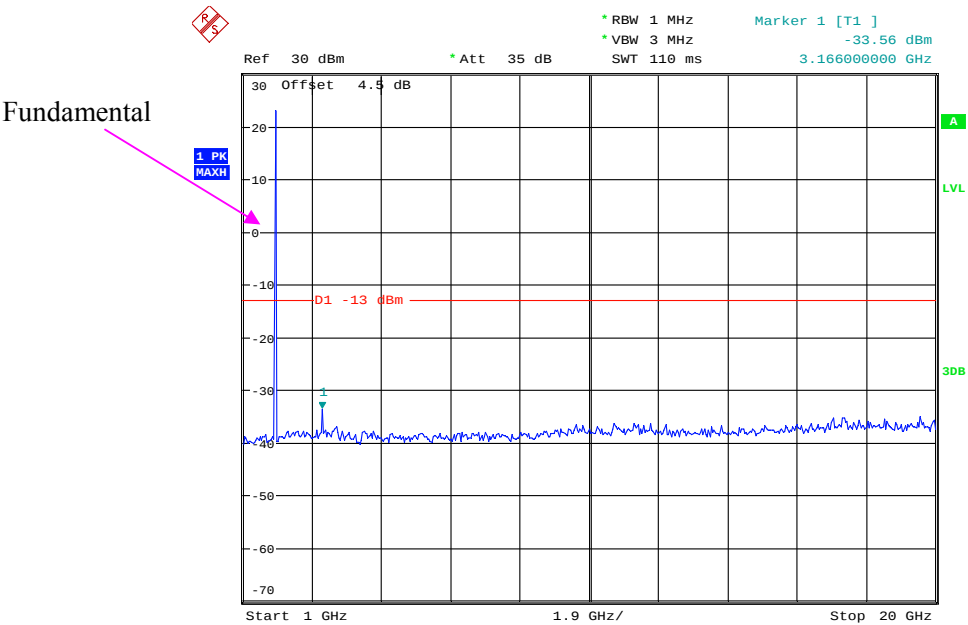


Date: 8.APR.2019 21:55:53

LTE Band 2 (Middle Channel)

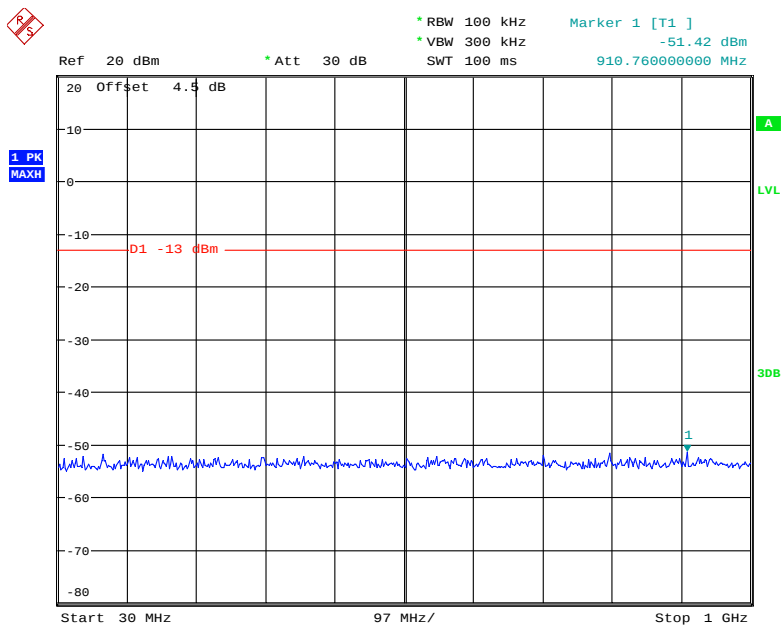


Date: 9.APR.2019 01:16:16



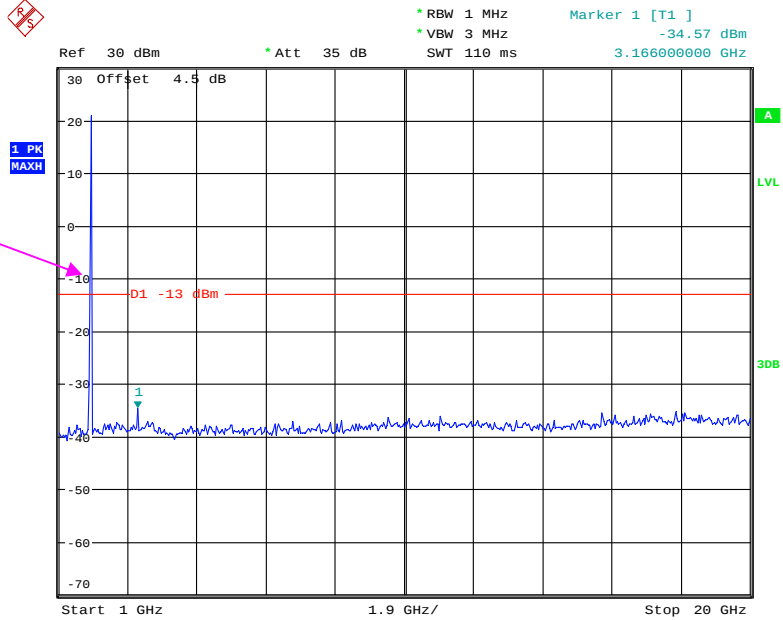
Date: 9.APR.2019 01:16:26

QPSK_3 MHz



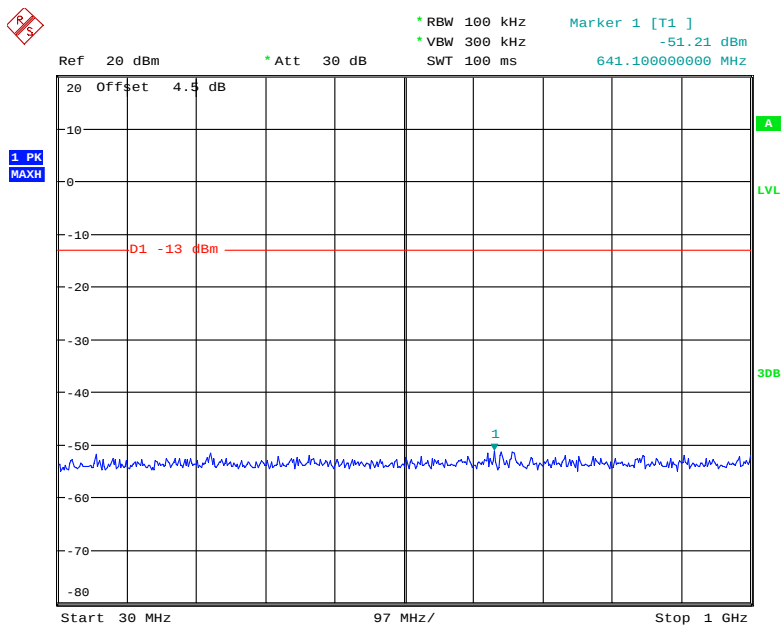
Date: 9.APR.2019 01:16:47

Fundamental



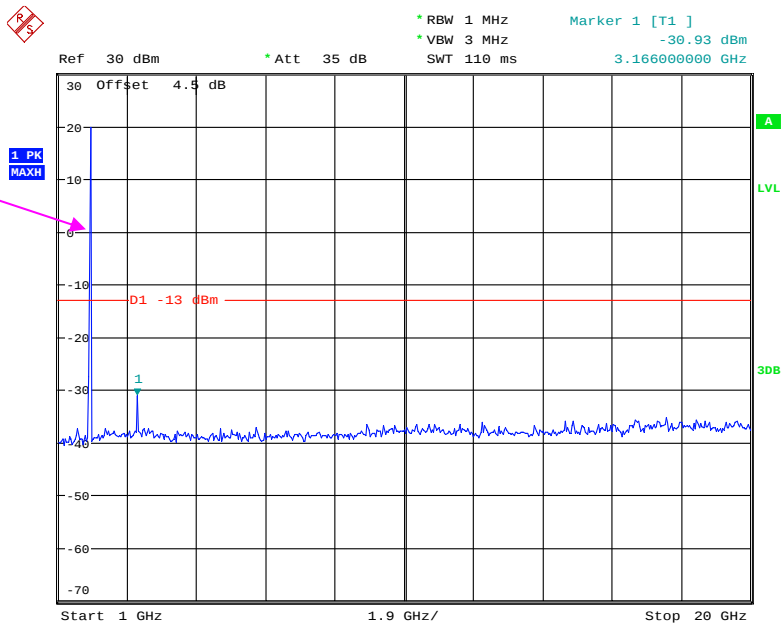
Date: 9.APR.2019 01:16:58

QPSK_5 MHz



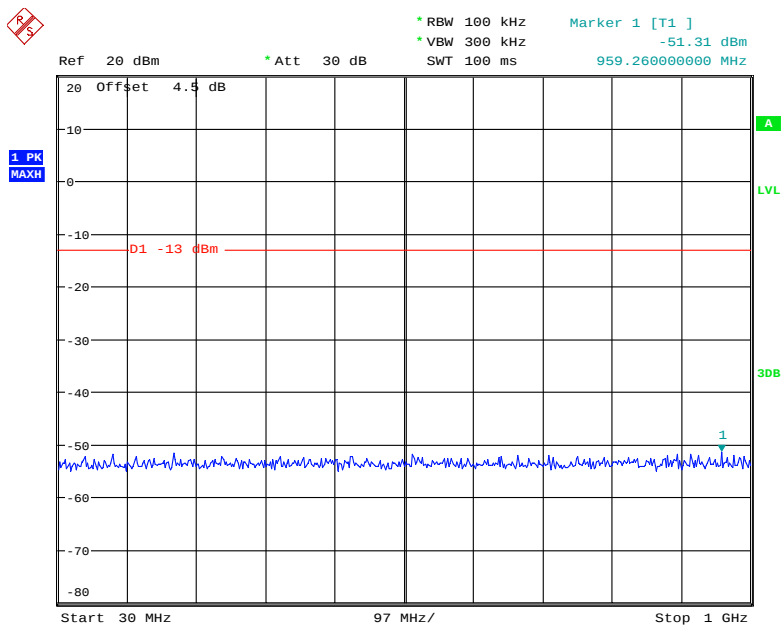
Date: 9.APR.2019 01:17:19

Fundamental



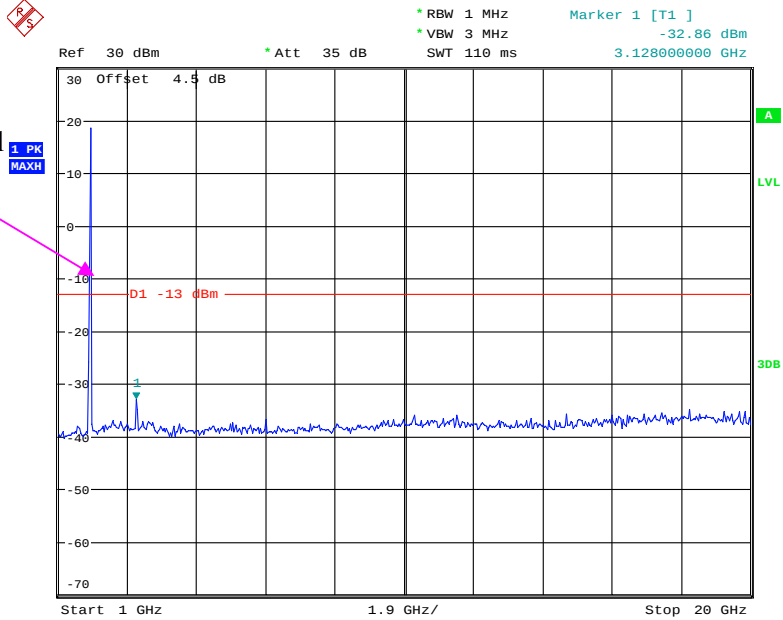
Date: 9.APR.2019 01:17:30

QPSK_10 MHz



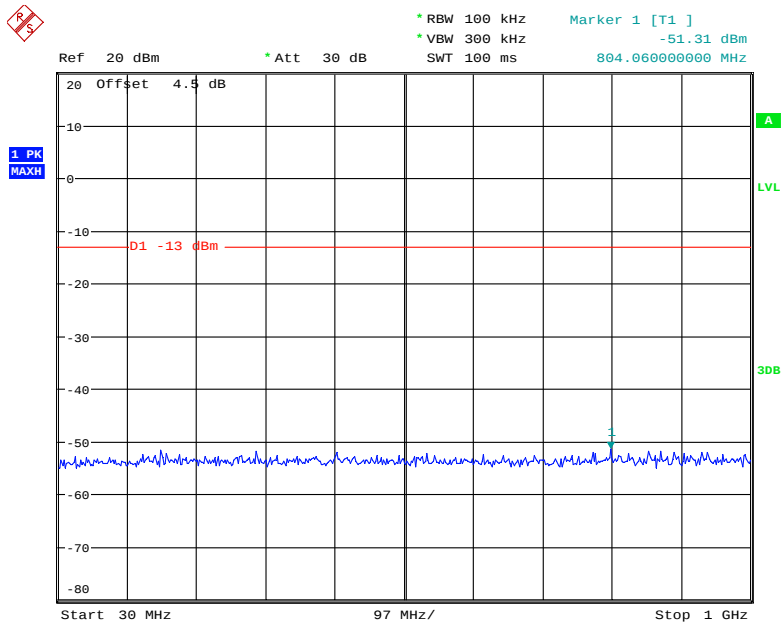
Date: 9.APR.2019 01:17:52

Fundamental

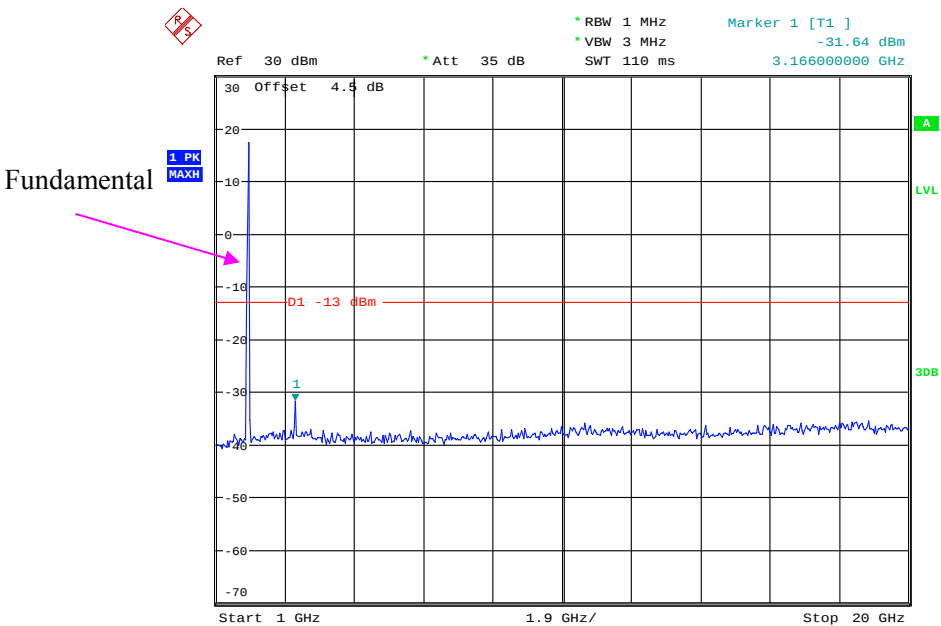


Date: 9.APR.2019 01:18:07

QPSK_15 MHz

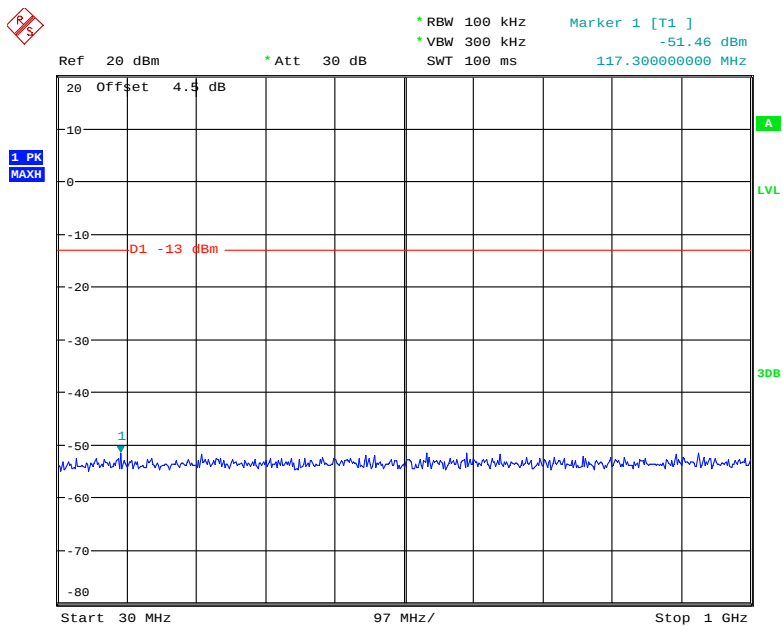


Date: 9.APR.2019 01:18:31



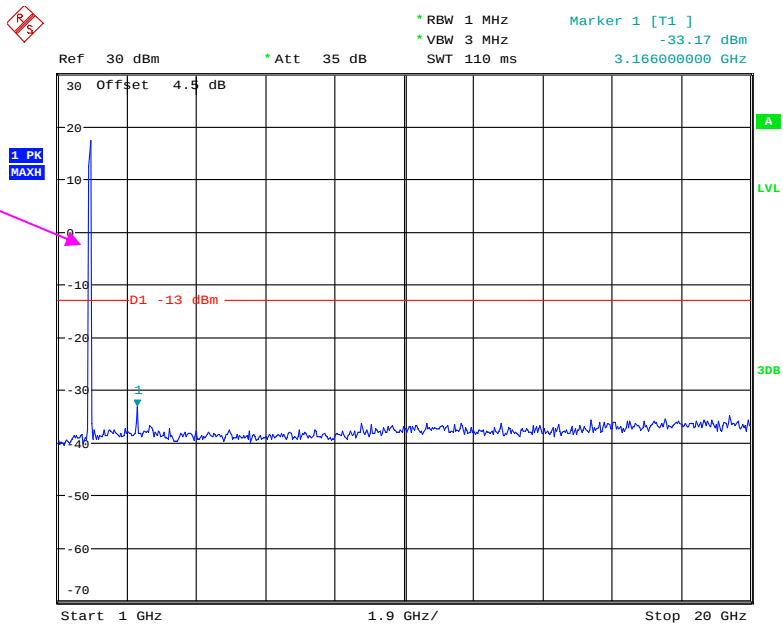
Date: 9.APR.2019 01:18:42

QPSK_20 MHz



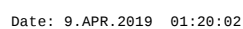
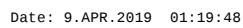
Date: 9.APR.2019 01:19:06

Fundamental

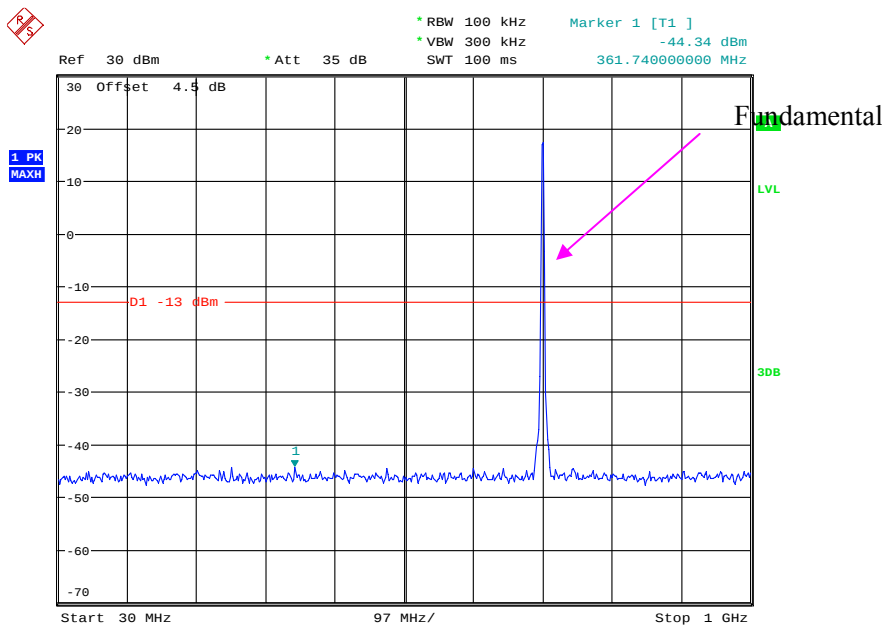


Date: 9.APR.2019 01:19:21

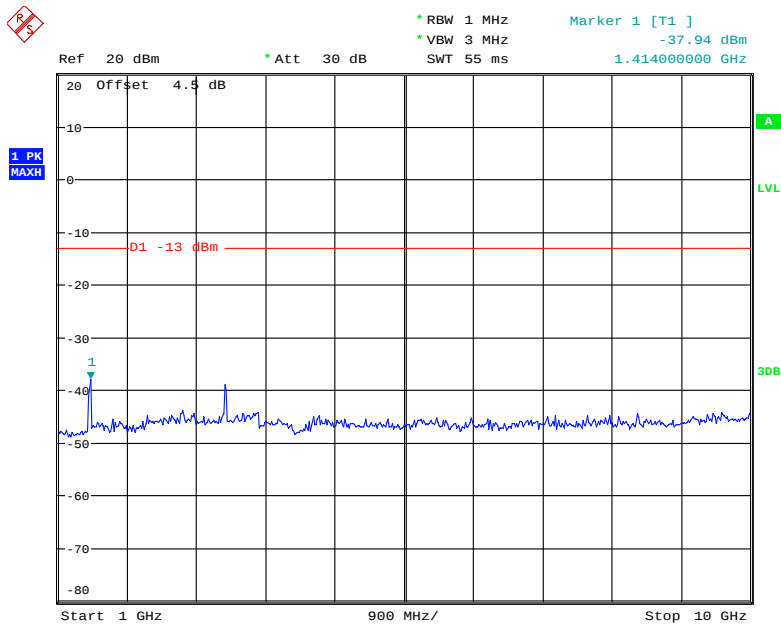
QPSK_1.4 MHz



QPSK_3 MHz

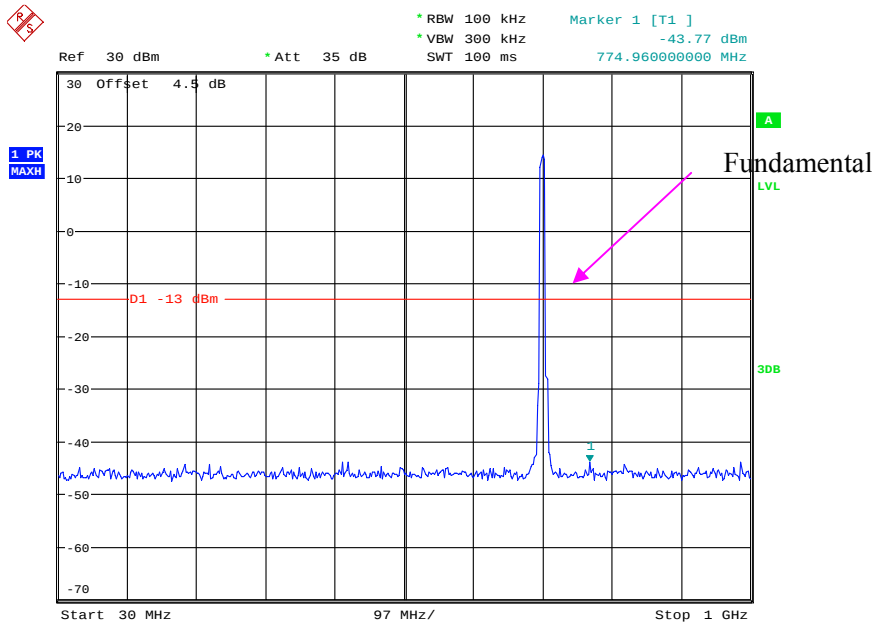


Date: 9.APR.2019 01:20:23

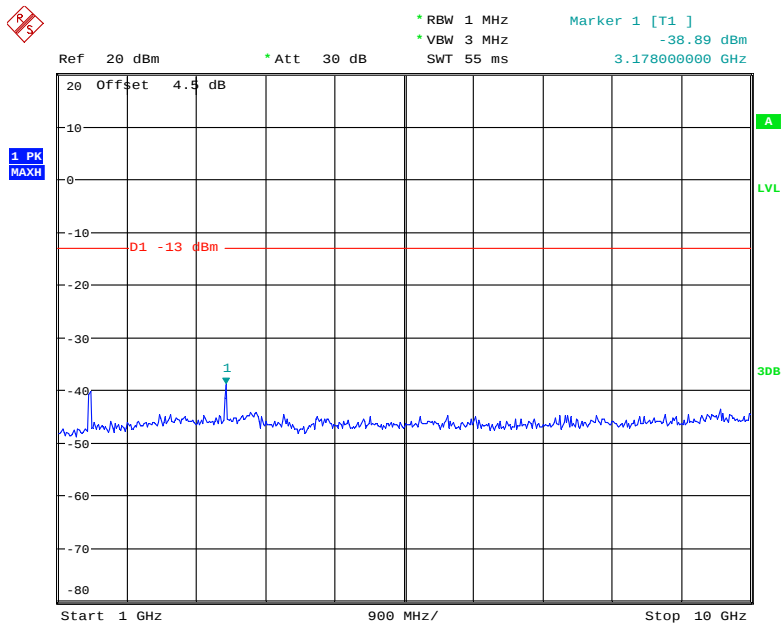


Date: 9.APR.2019 01:20:34

QPSK_5 MHz



Date: 9.APR.2019 01:20:55



Date: 9.APR.2019 01:21:06

Ref 30 dBm Att 35 dB RBW 100 kHz VBW 300 kHz SWT 100 ms Marker 1 [T1] -44.30 dBm 631.400000000 MHz

30 Offset 4.5 dB

1 PK MAXH

D1 -13 dBm

Fundamental

LVL

3dB

1

Start 30 MHz 97 MHz/ Stop 1 GHz

* RBW 1 MHz
 * VBW 3 MHz
 * Att 30 dB
 SWT 55 ms

Marker 1 [T1]
 -36.30 dBm
 3.160000000 GHz

Ref 20 dBm
 Offset 4.5 dB

1 PK
 MAXH

D1 -13 dBm

1

Start 1 GHz
 900 MHz/
 Stop 10 GHz

Page 54 of 93

FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

Test Procedure

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

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

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

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Sonoma	Amplifier	310N	185914	2018-10-13	2019-10-13
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2017-01-15	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2017-01-15	2020-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	26.4~27.4 °C
Relative Humidity:	54~60%
ATM Pressure:	100.6~ 101.1kPa

* The testing was performed by Neil Liao & Tyler Pan on 2019-04-08 & 2019-04-11

Operation Mode: Transmitting

30 MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	61.29	-52.92	10.6	0.73	-43.0	-13.0	30.0
1673.200	V	58.42	-56.39	10.6	0.73	-46.5	-13.0	33.5
2509.800	H	51.02	-62	13.1	1.25	-50.1	-13.0	37.1
2509.800	V	48.63	-64.42	13.1	1.25	-52.6	-13.0	39.6
3346.400	H	45.61	-65.05	13.8	1.61	-52.8	-13.0	39.8
3346.400	V	46.37	-64.34	13.8	1.61	-52.1	-13.0	39.1
897.180	H	40.63	-68.29	0.0	0.5	-68.8	-13.0	55.8
732.280	V	41.66	-69.98	0.0	0.51	-70.5	-13.0	57.5
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	44.93	-69.28	10.6	0.73	-59.4	-13.0	46.4
1673.200	V	44.69	-70.12	10.6	0.73	-60.2	-13.0	47.2
2509.800	H	45.68	-67.34	13.1	1.25	-55.5	-13.0	42.5
2509.800	V	47.92	-65.13	13.1	1.25	-53.3	-13.0	40.3
3346.400	H	49.07	-61.59	13.8	1.61	-49.4	-13.0	36.4
3346.400	V	49.75	-60.96	13.8	1.61	-48.7	-13.0	35.7
897.180	H	40.63	-68.29	0.0	0.5	-68.8	-13.0	55.8
887.480	V	38.69	-72.95	0.0	0.51	-73.5	-13.0	60.5

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	47.51	-61.29	13.8	1.63	-49.2	-13.0	36.2
3760.000	V	48.65	-60.02	13.8	1.63	-47.9	-13.0	34.9
5640.000	H	47.64	-58.39	14.0	1.31	-45.7	-13.0	32.7
5640.000	V	47.23	-58.68	14.0	1.31	-46.0	-13.0	33.0
223.000	H	39.65	-69.27	0.0	0.5	-69.8	-13.0	56.8
269.000	V	41.65	-69.99	0.0	0.51	-70.5	-13.0	57.5

LTE Band 2 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1880.000 MHz								
3760.00	H	44.44	-64.36	13.76	1.63	-52.23	-13.00	39.23
3760.00	V	44.29	-64.38	13.76	1.63	-52.25	-13.00	39.25
5640.00	H	44.46	-61.57	14.02	1.31	-48.86	-13.00	35.86
5640.00	V	44.63	-61.28	14.02	1.31	-48.57	-13.00	35.57
693.14	H	41.06	-66.33	0.00	0.55	-66.88	-13.00	53.88
832.82	V	39.63	-69.76	0.00	0.55	-70.31	-13.00	57.31

LTE Band 12 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 707.500 MHz								
1415.00	H	42.30	-71.20	9.08	1.22	-63.34	-13.00	50.34
1415.00	V	41.65	-72.38	9.08	1.22	-64.52	-13.00	51.52
2122.50	H	42.44	-70.35	11.27	1.11	-60.19	-13.00	47.19
2122.50	V	42.61	-70.16	11.27	1.11	-60.00	-13.00	47.00
2830.00	H	41.68	-70.40	13.34	1.36	-58.42	-13.00	45.42
2830.00	V	41.49	-70.82	13.34	1.36	-58.84	-13.00	45.84
332.64	H	41.20	-66.19	0.00	0.55	-66.74	-13.00	53.74
332.64	V	40.36	-69.03	0.00	0.55	-69.58	-13.00	56.58

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES

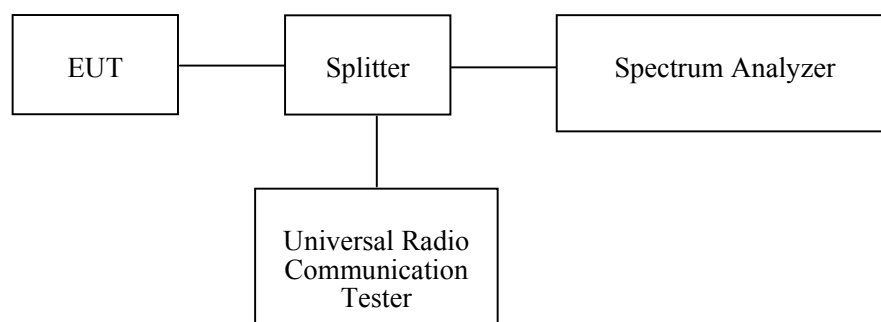
Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

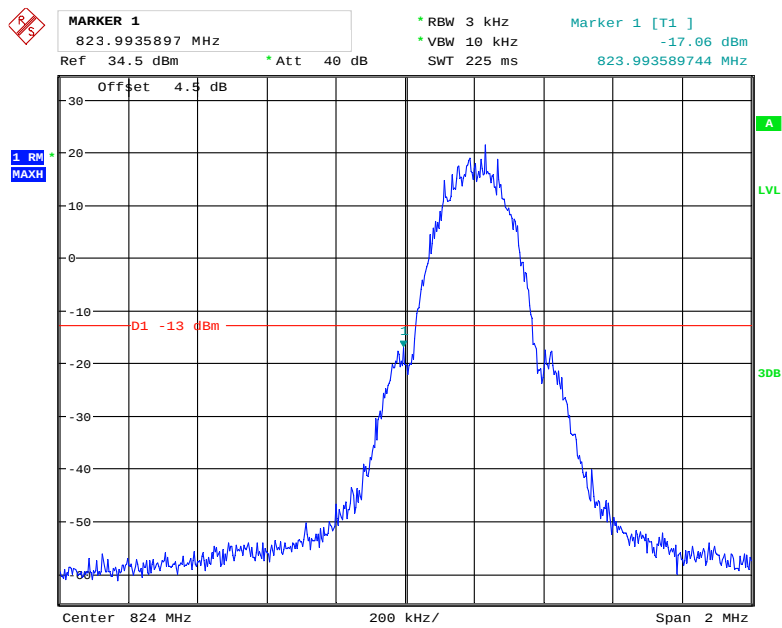
Temperature:	26.4~27.4 °C
Relative Humidity:	54~60%
ATM Pressure:	100.6~ 101.1kPa

* The testing was performed by Neil Liao & Tyler Pan on 2019-04-08 & 2019-04-11

Test Mode: Transmitting

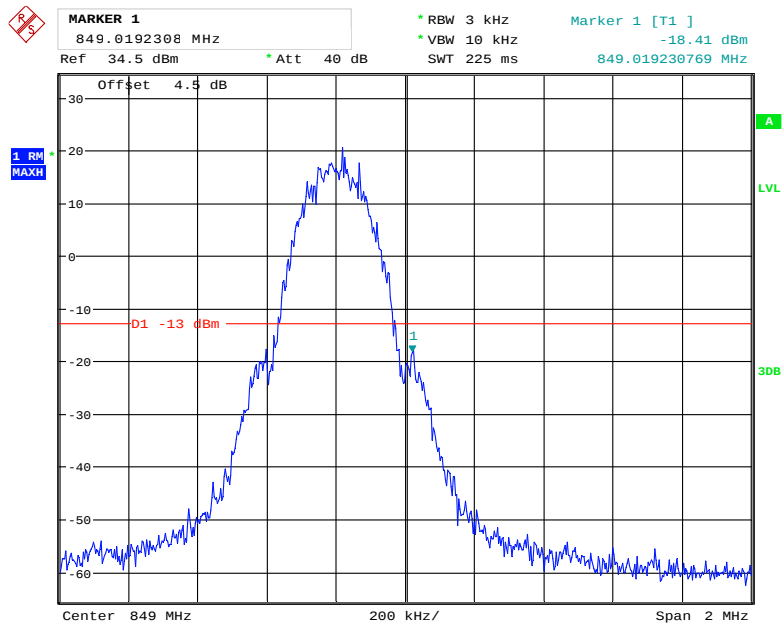
Test Result: Compliant. Please refer to the following plots.

GSM 850, Left Band Edge



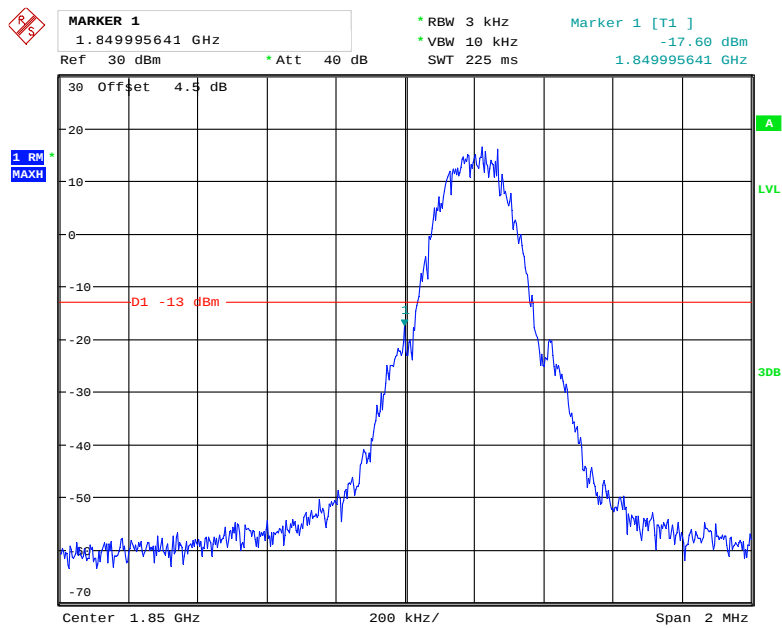
Date: 8.APR.2019 21:58:42

GSM 850, Right Band Edge



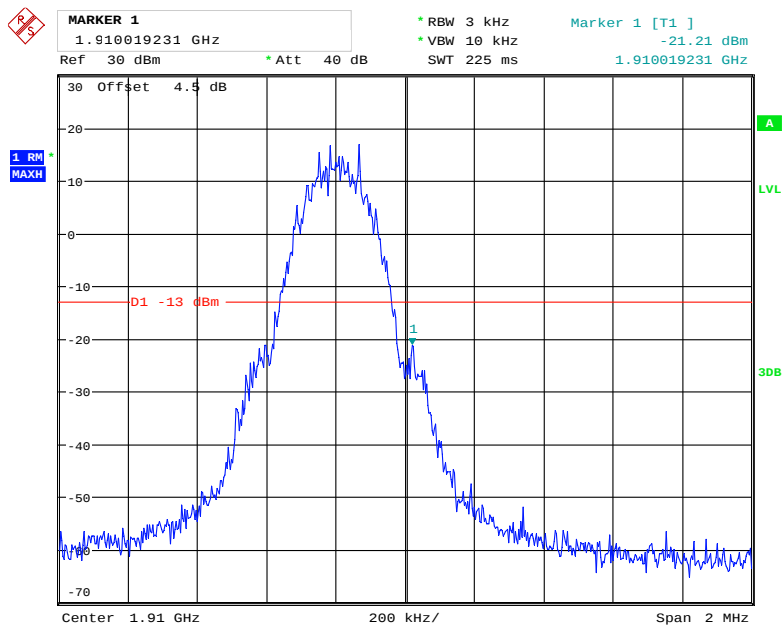
Date: 8.APR.2019 22:01:42

PCS 1900, Left Band Edge



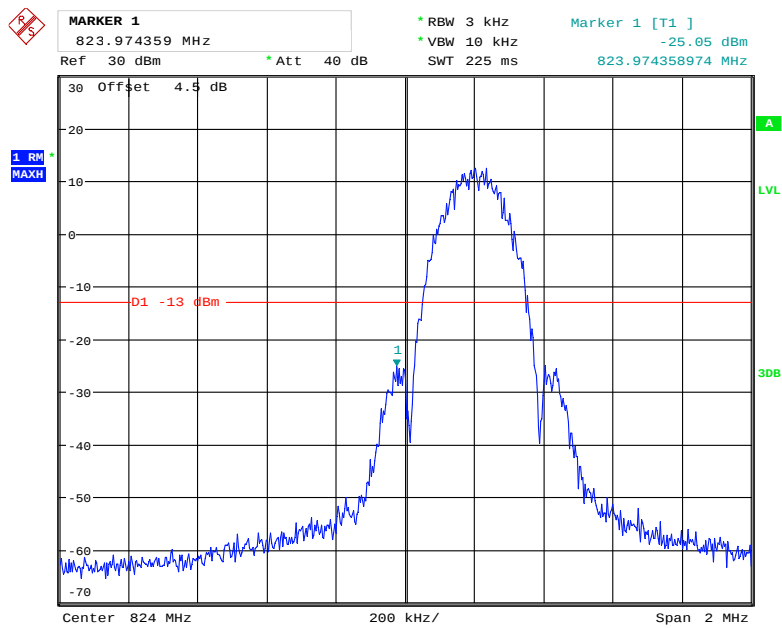
Date: 8.APR.2019 22:12:34

PCS 1900, Right Band Edge



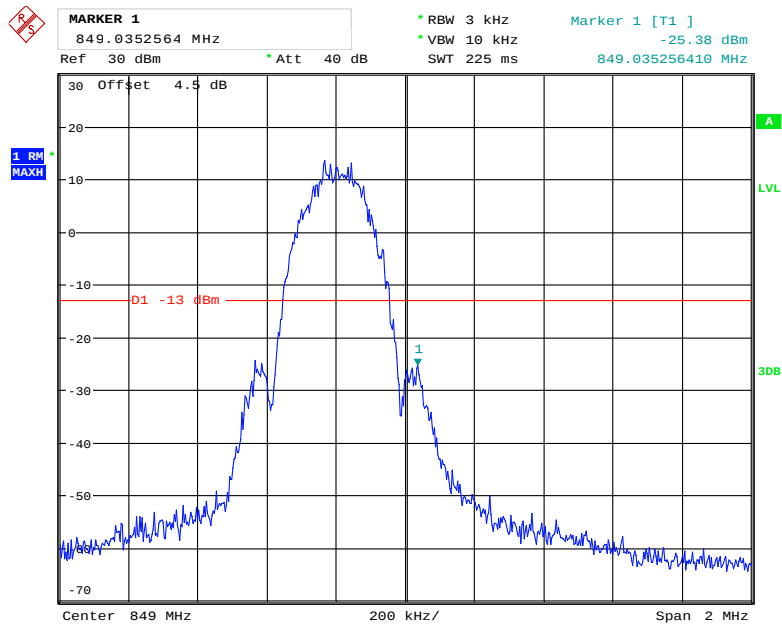
Date: 8.APR.2019 22:13:15

EDGE 850, Left Band Edge



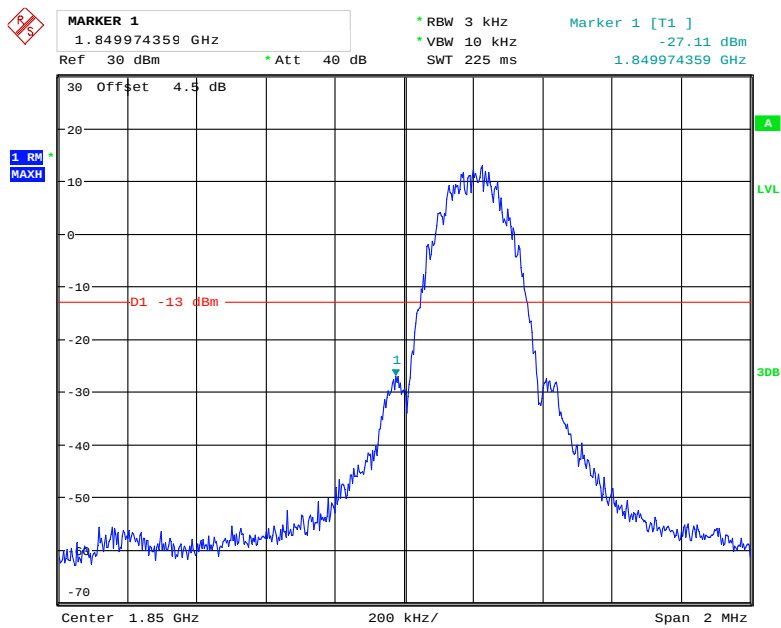
Date: 8.APR.2019 22:24:03

EDGE 850, Right Band Edge



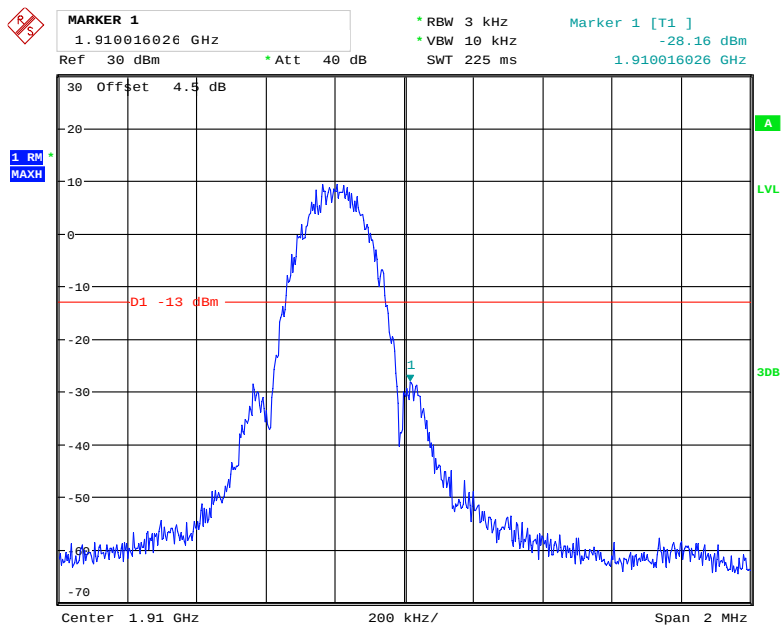
Date: 8.APR.2019 22:22:11

EDGE 1900, Left Band Edge



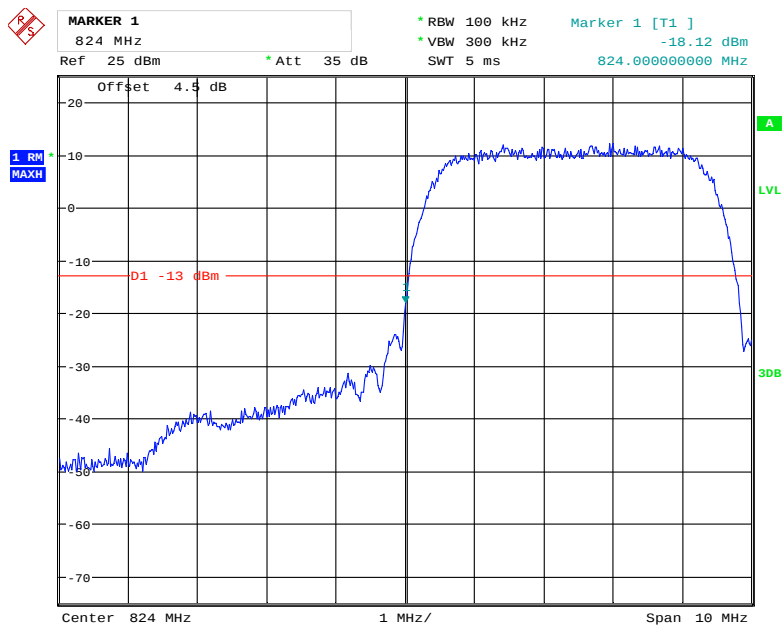
Date: 8.APR.2019 22:30:44

EDGE 1900, Right Band Edge



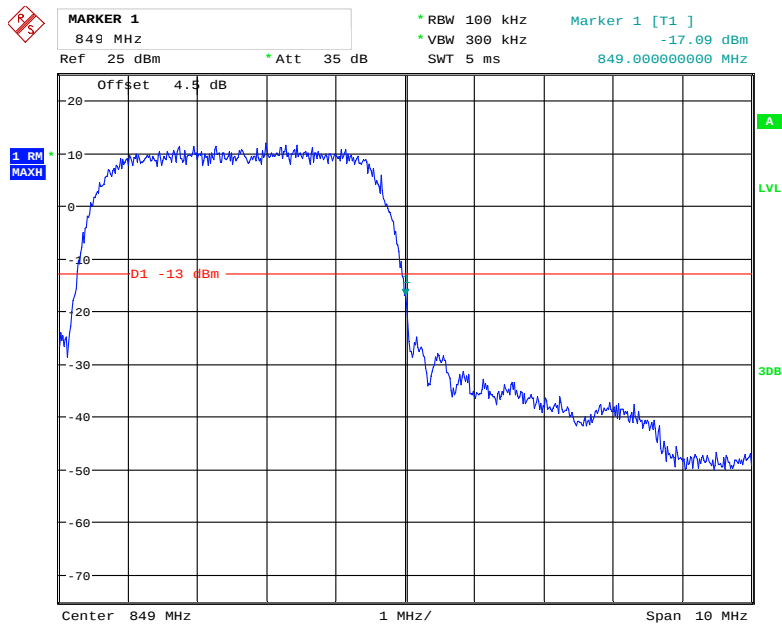
Date: 8.APR.2019 22:31:26

WCDMA Band V Rel 99, Left Band Edge



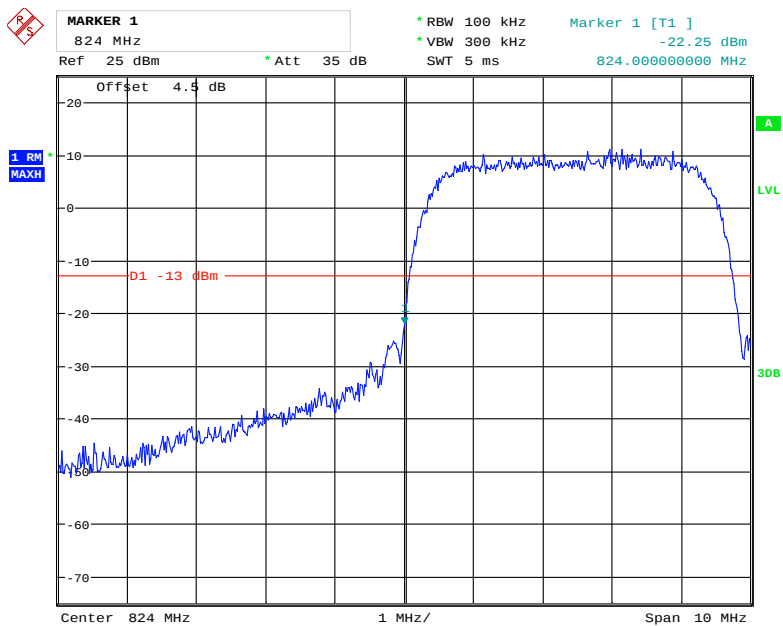
Date: 8.APR.2019 21:07:32

WCDMA Band V Rel 99, Right Band Edge



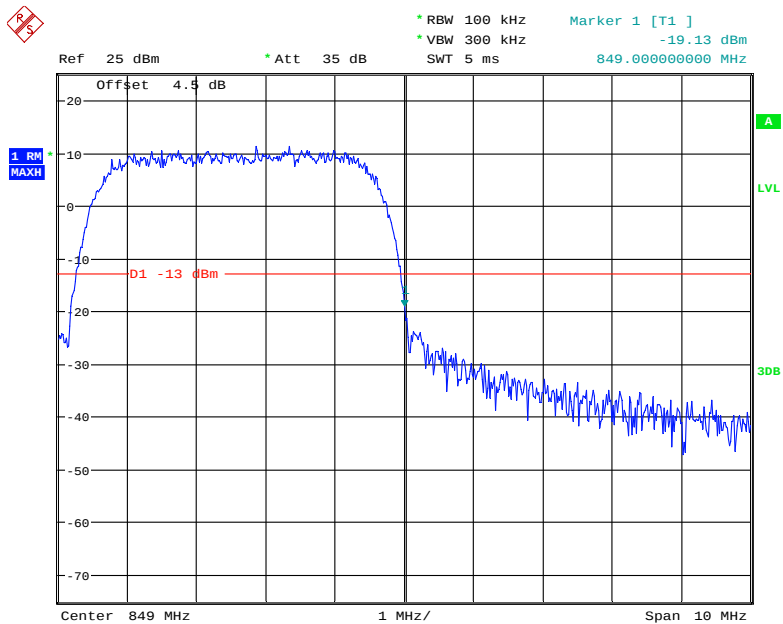
Date: 8.APR.2019 21:08:26

WCDMA Band V HSDPA, Left Band Edge



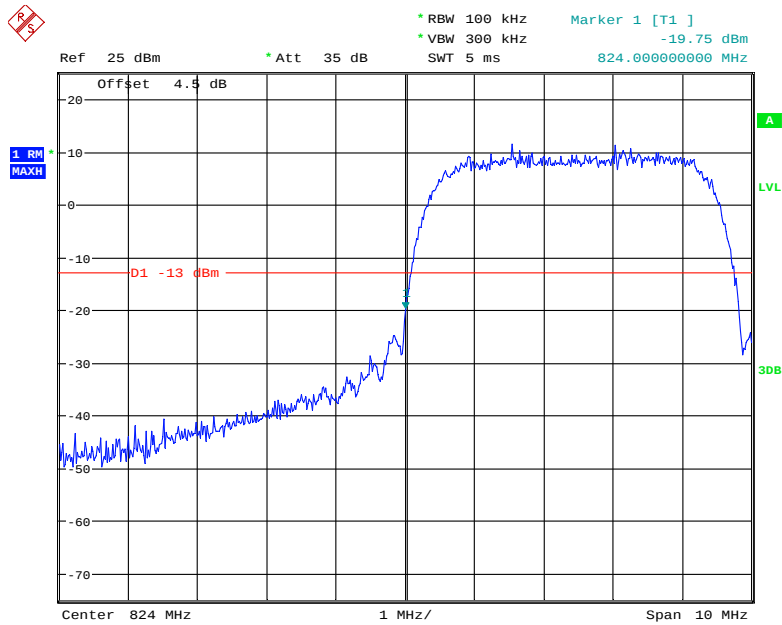
Date: 8.APR.2019 21:17:18

WCDMA Band V HSDPA, Right Band Edge



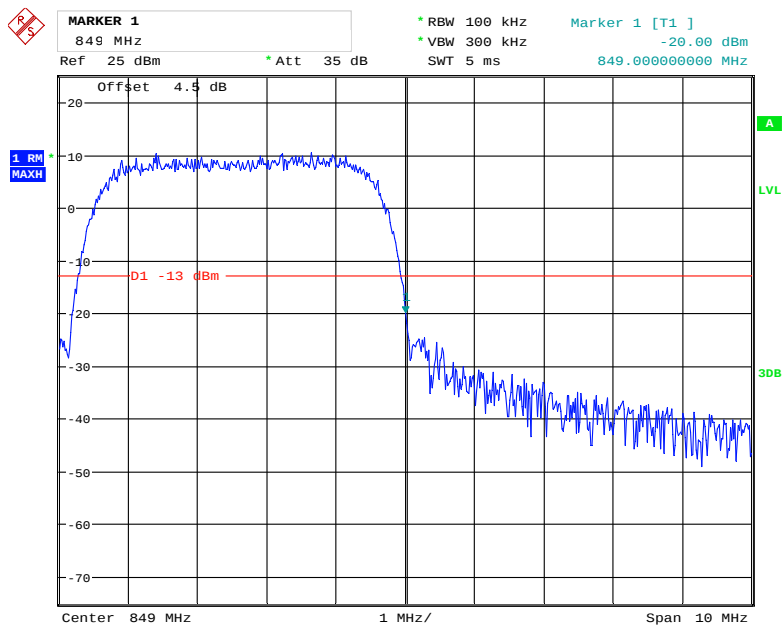
Date: 8.APR.2019 21:16:26

WCDMA Band V HSUPA, Left Band Edge



Date: 8.APR.2019 21:20:56

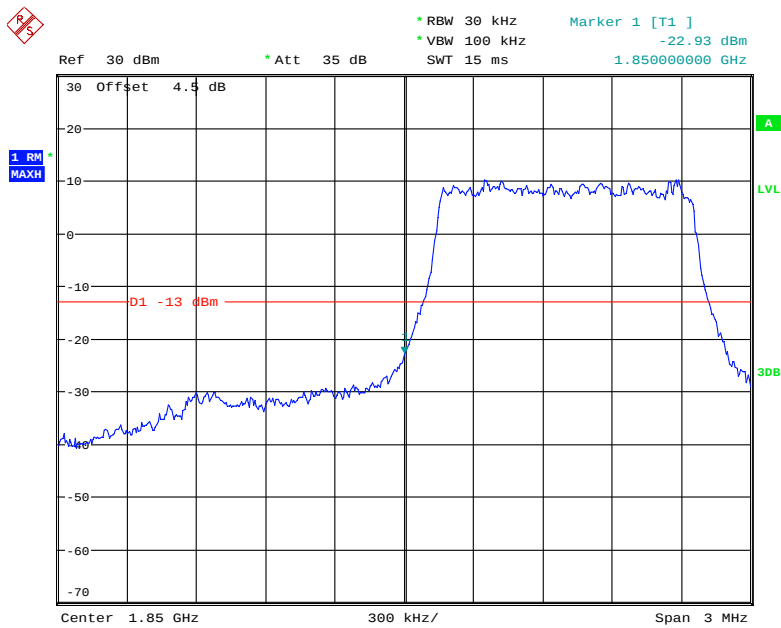
WCDMA Band V HSUPA, Right Band Edge



Date: 8.APR.2019 21:22:03

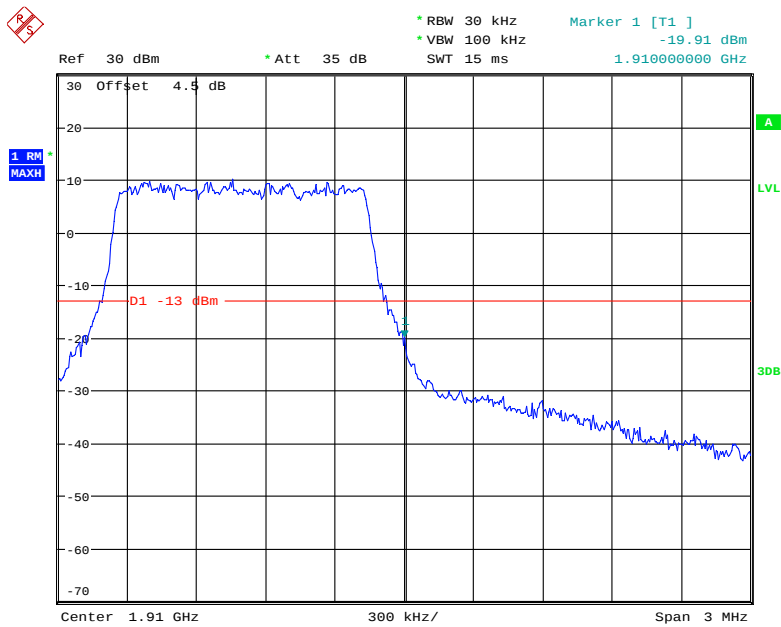
LTE Band 2

QPSK_1.4MHz_6 RB_ Left



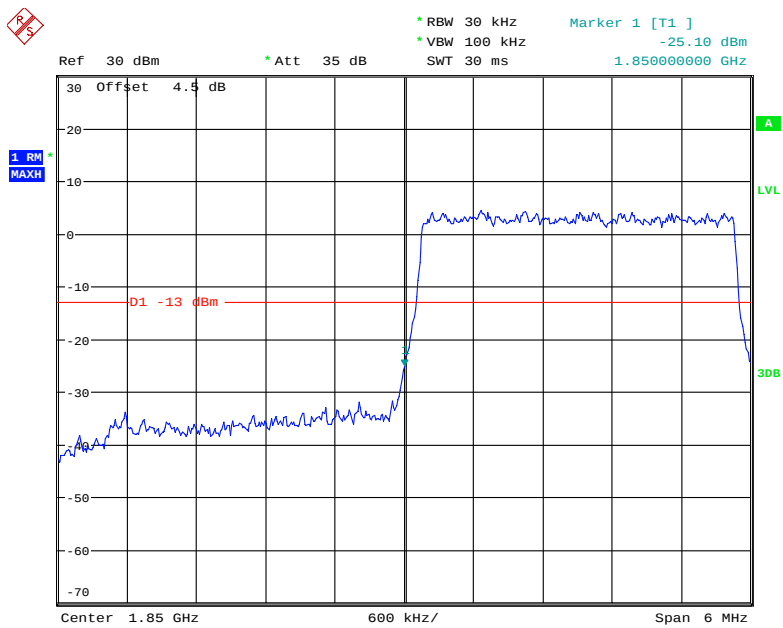
Date: 9.APR.2019 00:31:31

QPSK_1.4MHz_6 RB_ Right



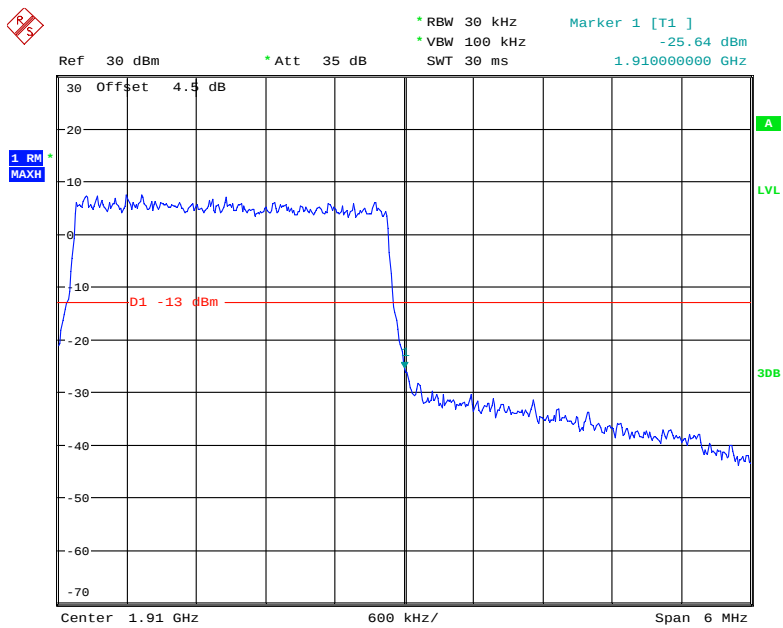
Date: 9.APR.2019 00:32:46

QPSK_3MHz_15 RB_ Left



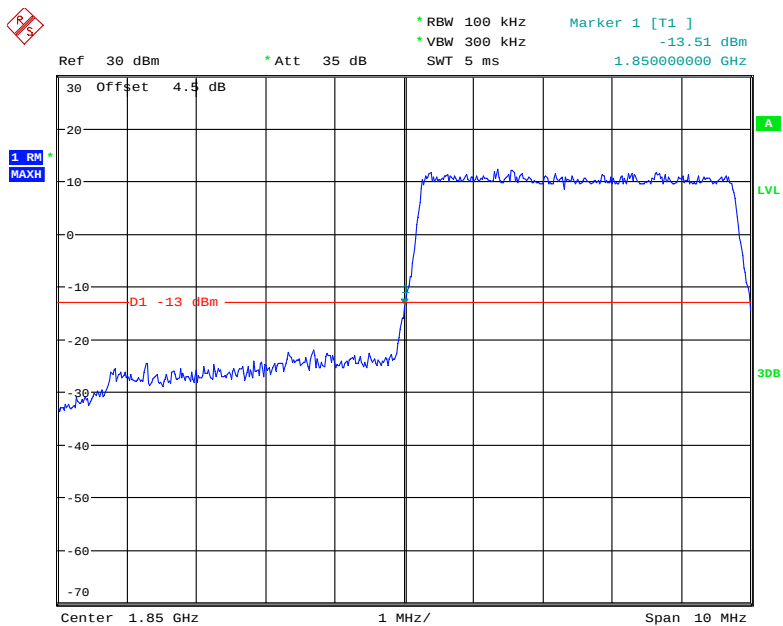
Date: 9.APR.2019 00:35:46

QPSK_3MHz_15 RB_ Right



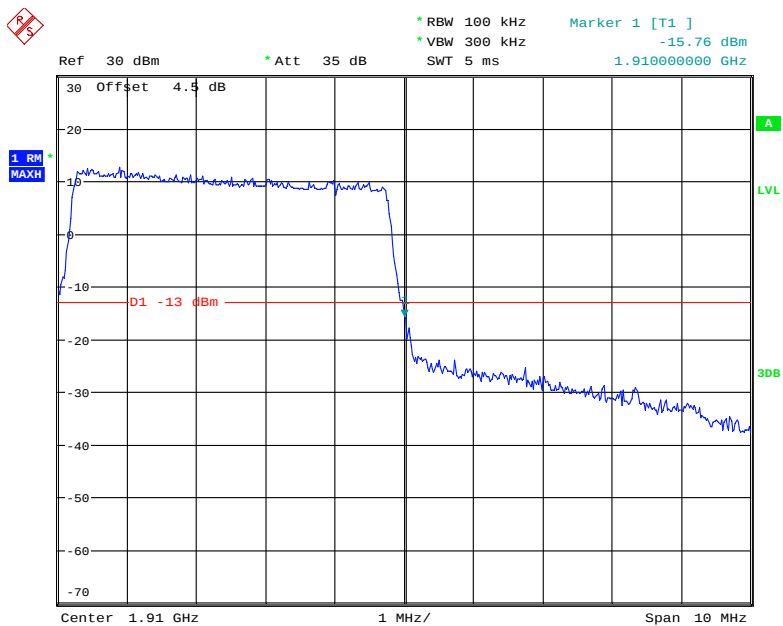
Date: 9.APR.2019 00:41:45

QPSK_5MHz_25 RB_ Left



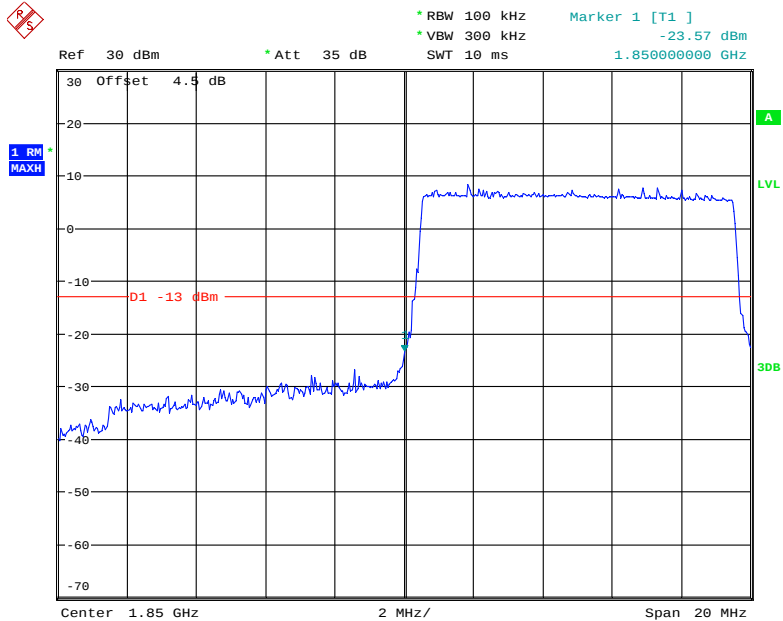
Date: 9.APR.2019 00:44:30

QPSK_5MHz_25 RB_ Right



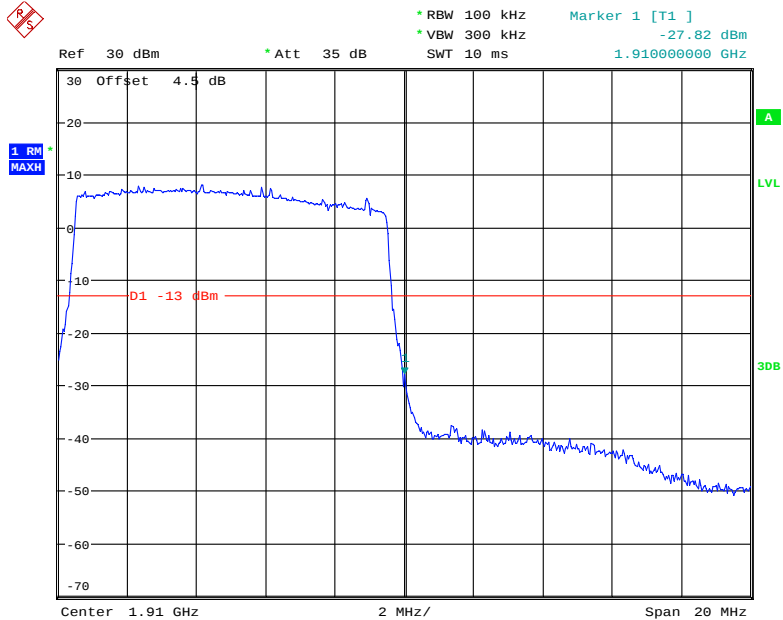
Date: 9.APR.2019 00:45:55

QPSK_10MHz_50 RB_ Left



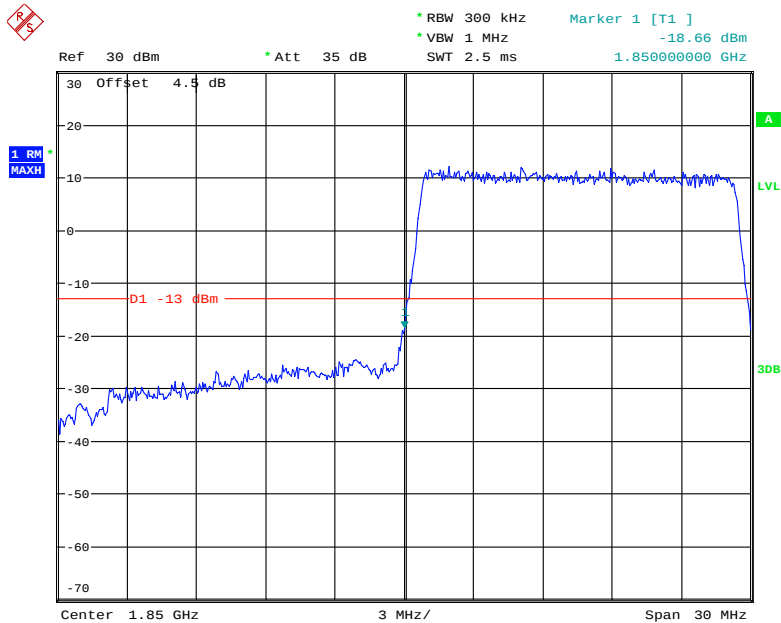
Date: 9.APR.2019 00:49:52

QPSK_10MHz_50 RB_ Right



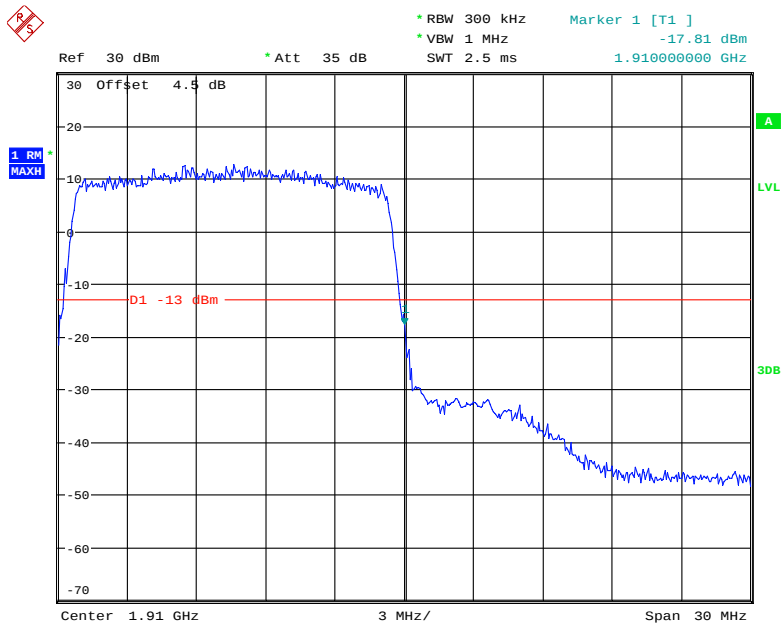
Date: 9.APR.2019 00:51:04

QPSK_15MHz_75 RB_ Left



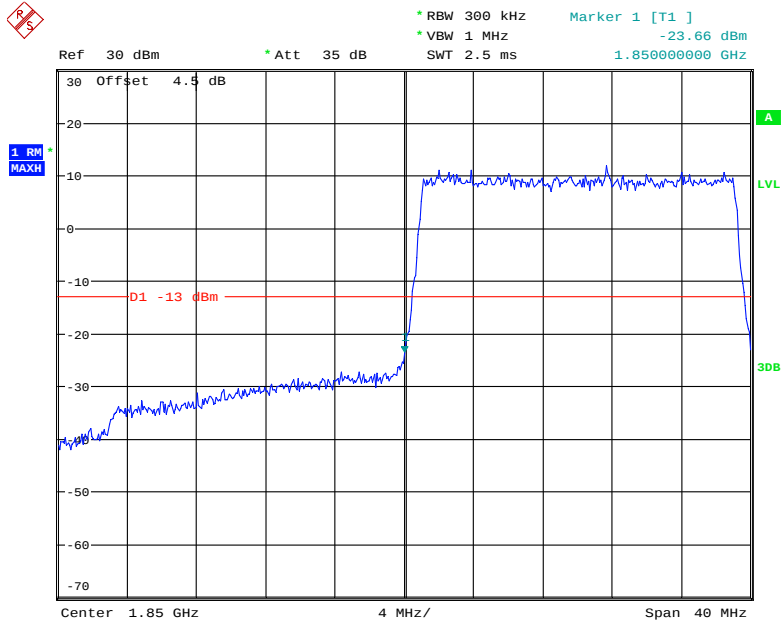
Date: 9.APR.2019 00:55:04

QPSK_15MHz_75 RB_ Right



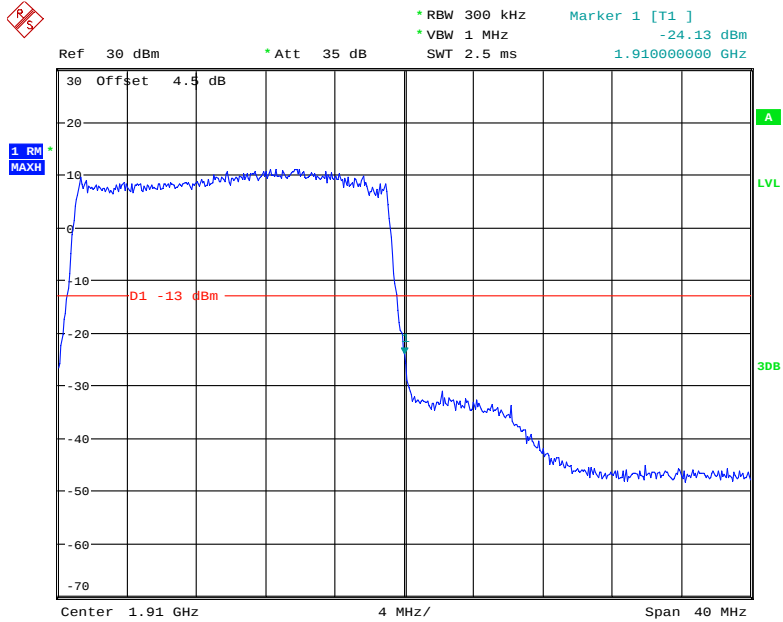
Date: 9.APR.2019 00:56:35

QPSK_20MHz_FULL RB_Left

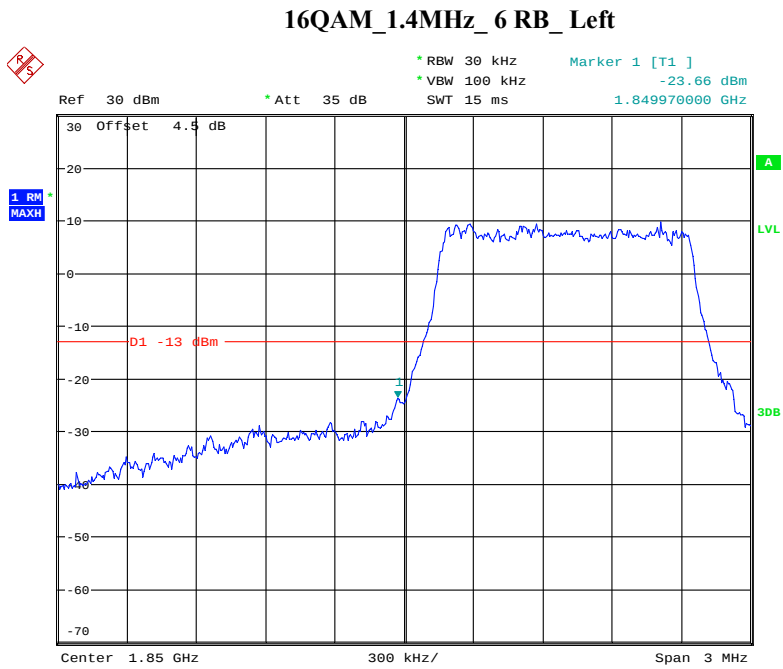


Date: 9.APR.2019 00:58:00

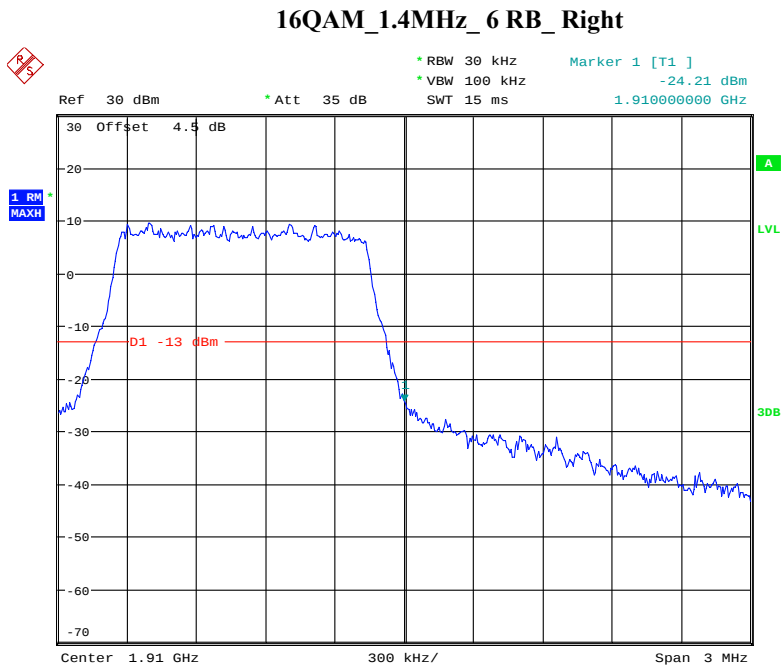
QPSK_20MHz_FULL RB_Right



Date: 9.APR.2019 00:59:20

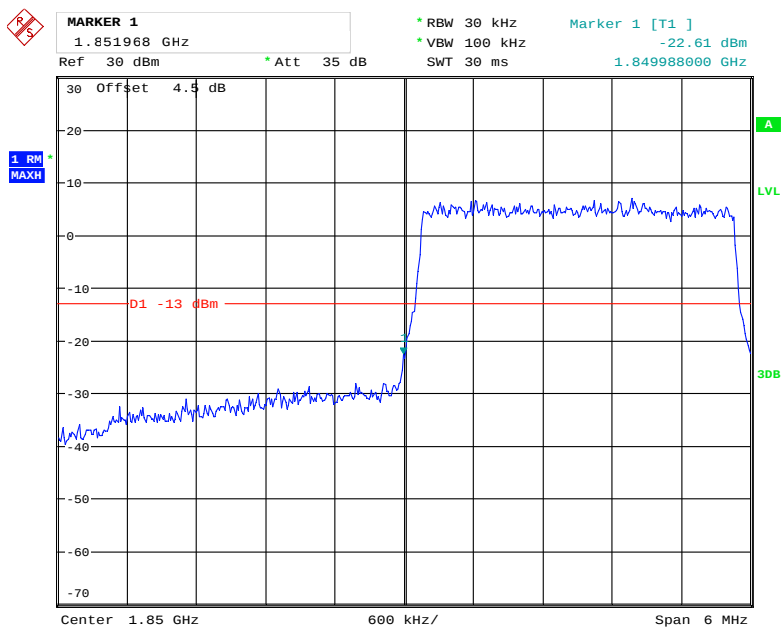


Date: 9.APR.2019 00:32:15



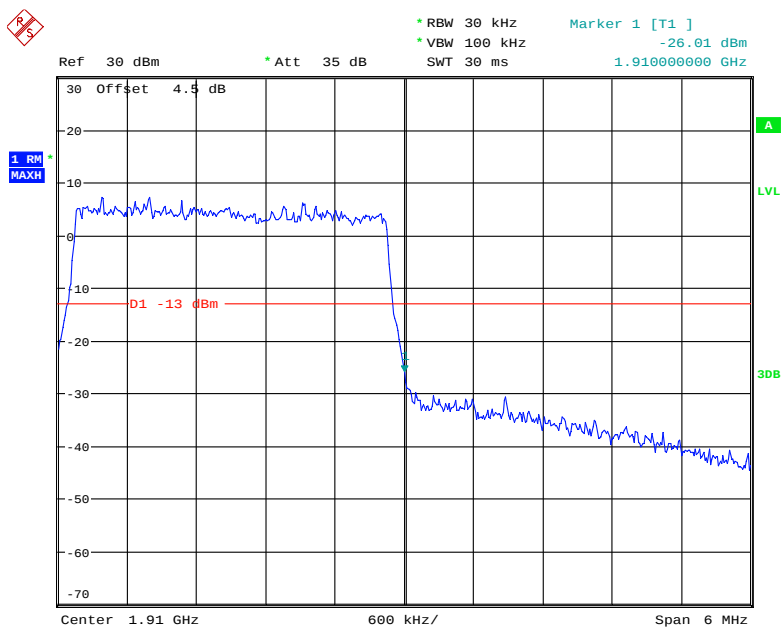
Date: 9.APR.2019 00:33:29

16QAM_3MHz_15 RB_ Left



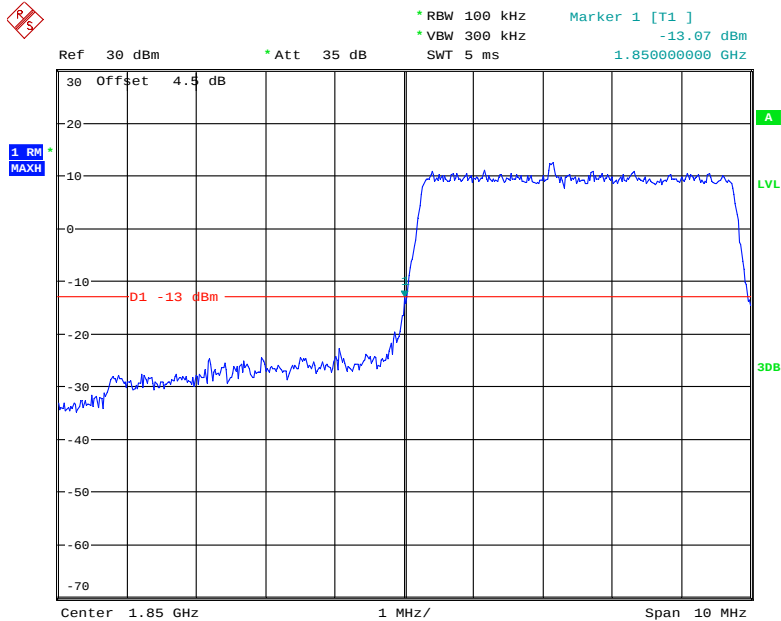
Date: 9.APR.2019 00:41:07

16QAM_3MHz_15 RB_ Right



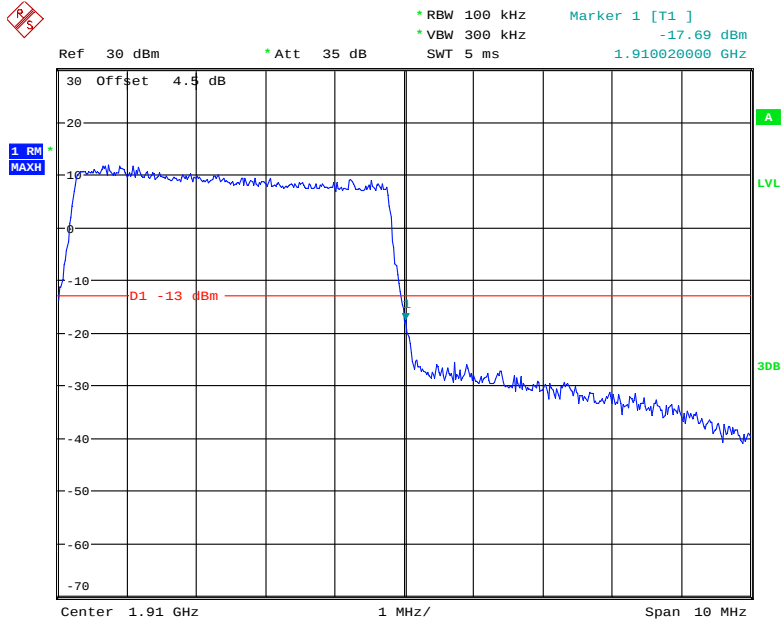
Date: 9.APR.2019 00:42:14

16QAM_5MHz_25 RB_ Left

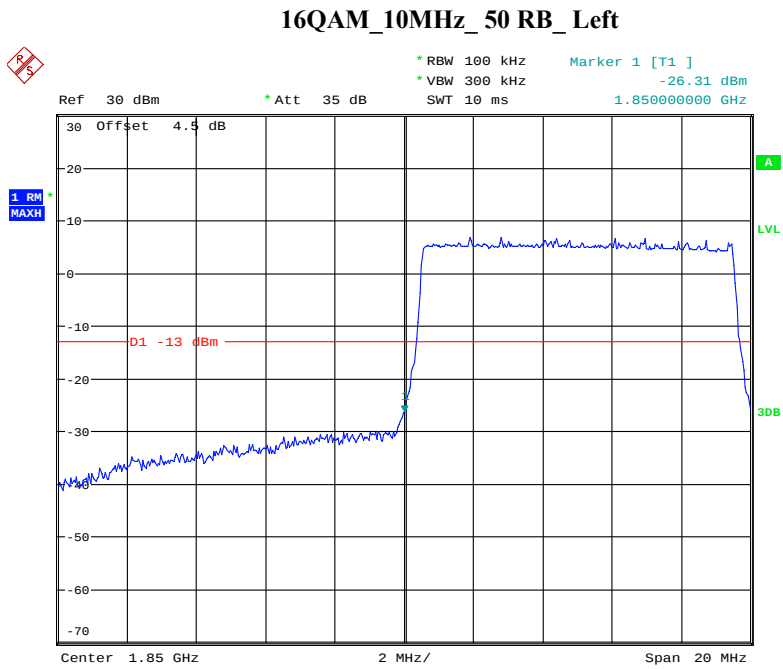


Date: 9.APR.2019 00:45:11

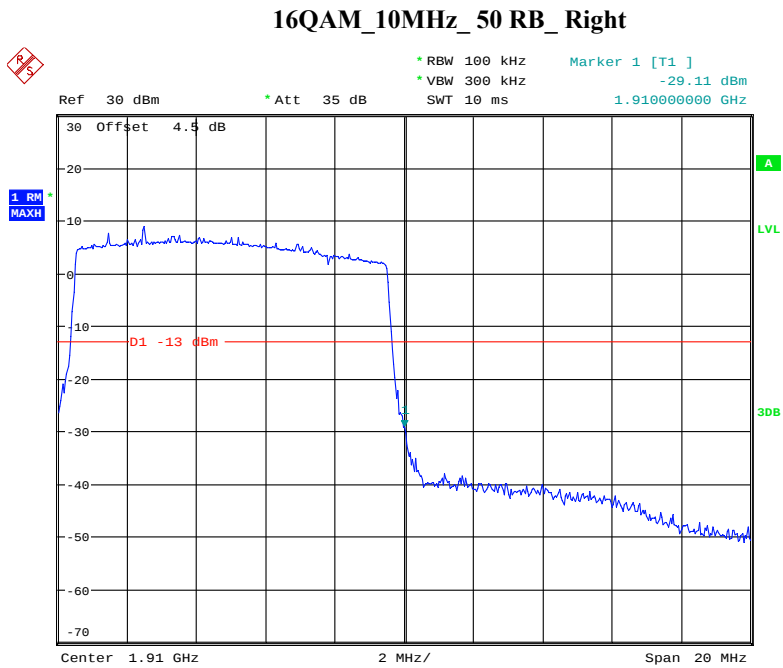
16QAM_5MHz_25 RB_ Right



Date: 9.APR.2019 00:46:35

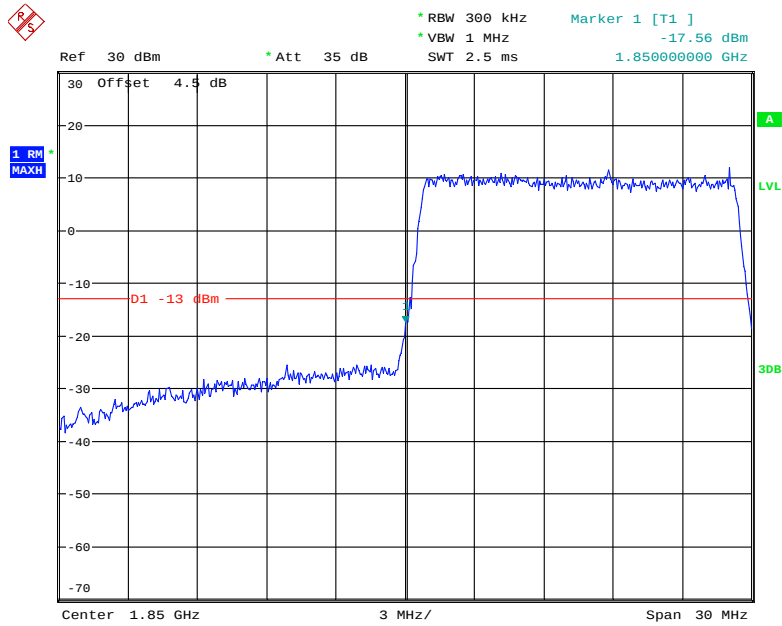


Date: 9.APR.2019 00:50:26



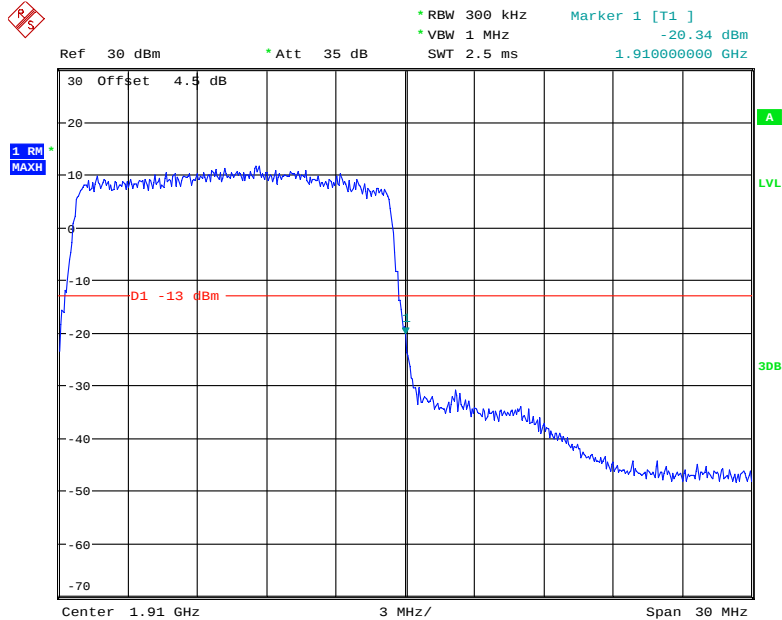
Date: 9.APR.2019 00:51:42

16QAM_15MHz_ 75 RB_ Left



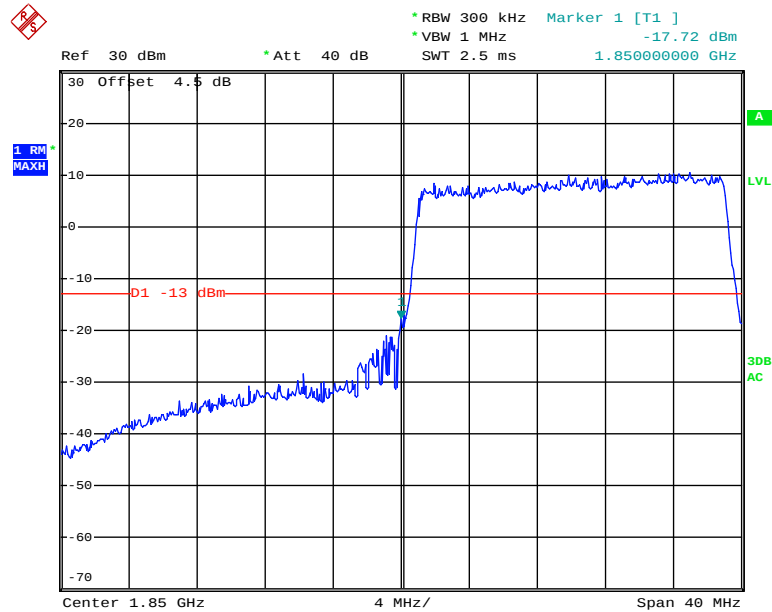
Date: 9.APR.2019 00:55:47

16QAM_15MHz_ 75 RB_ Right



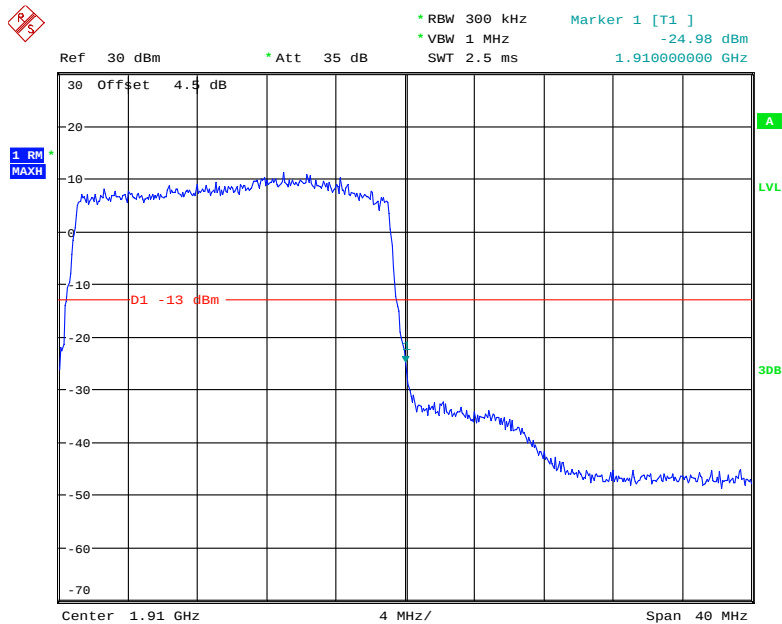
Date: 9.APR.2019 00:57:12

16QAM_20MHz_FULL RB_Left



Date: 27.DEC.2018 14:02:27

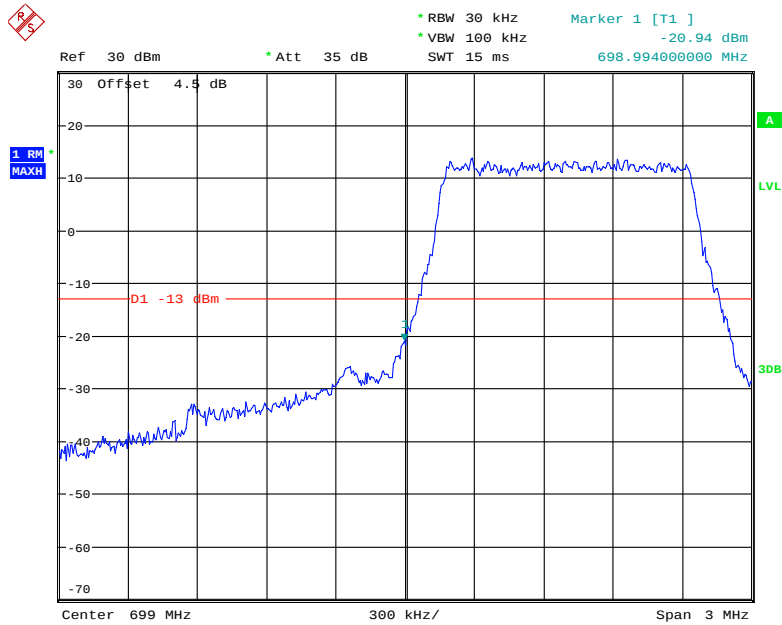
16QAM_20MHz_FULL RB_Right



Date: 9.APR.2019 01:00:04

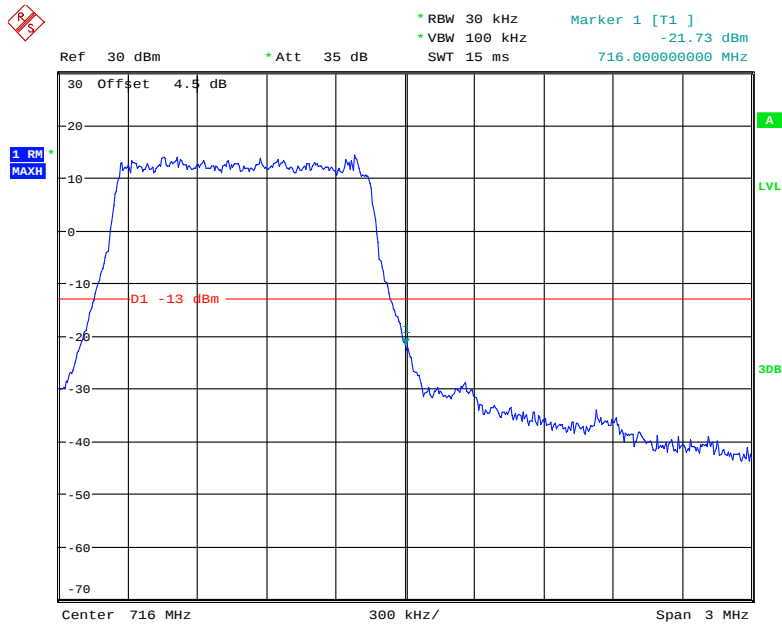
LTE Band 12

QPSK_1.4MHz_6 RB_ Left



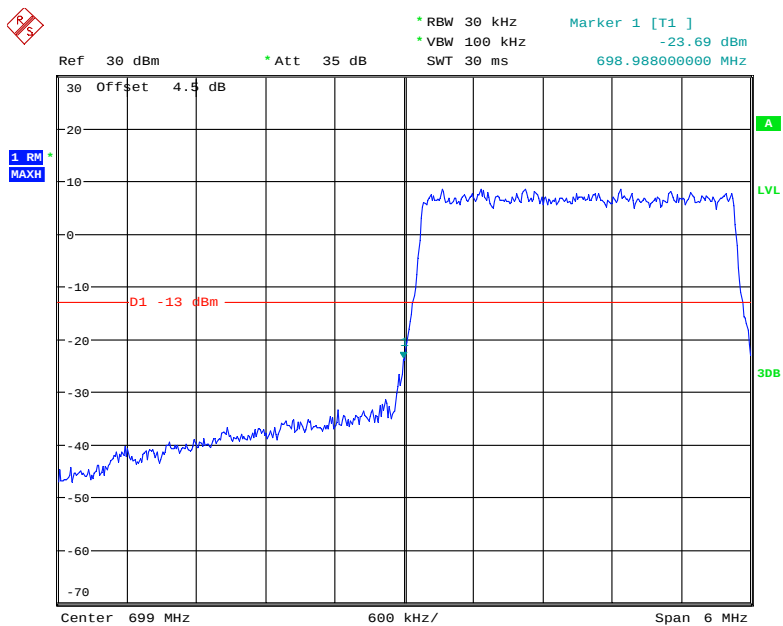
Date: 9.APR.2019 01:02:04

QPSK_1.4MHz_6 RB_ Right



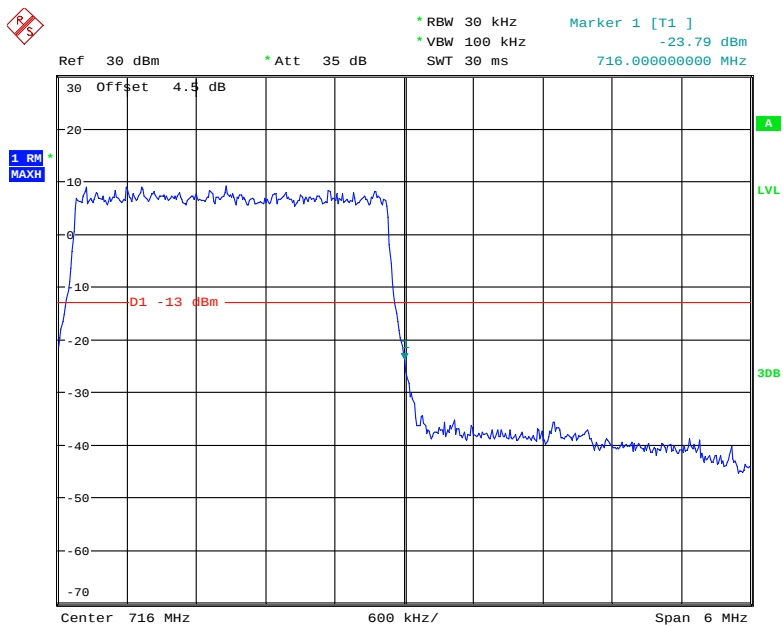
Date: 9.APR.2019 01:03:34

QPSK_3MHz_15 RB_ Left



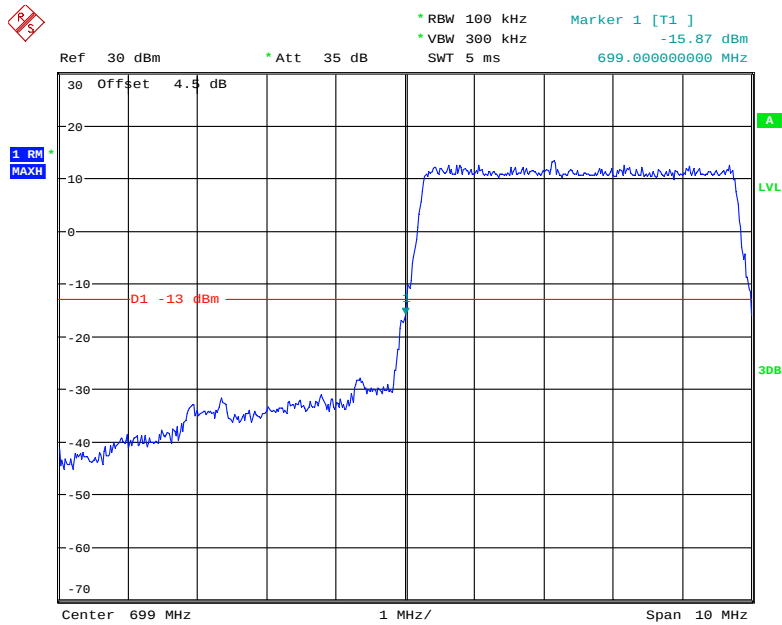
Date: 9.APR.2019 01:06:02

QPSK_3MHz_15 RB_ Right



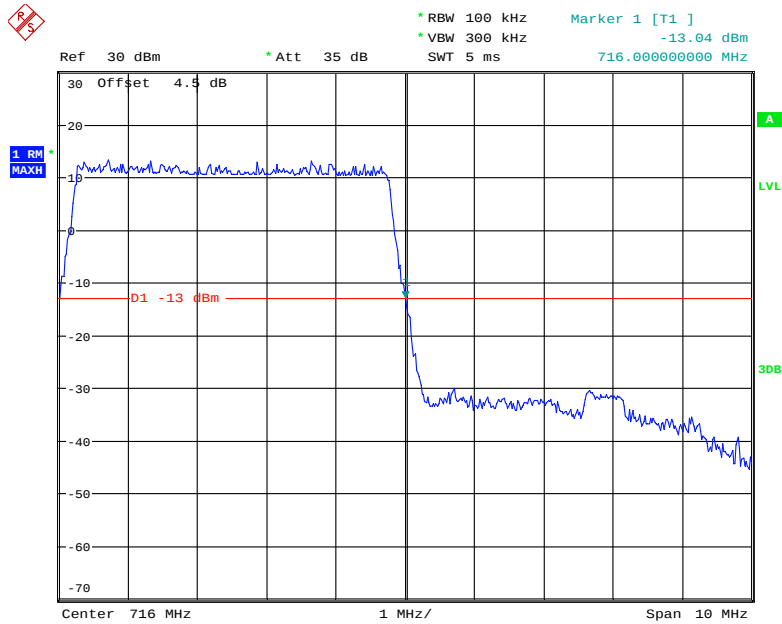
Date: 9.APR.2019 01:07:08

QPSK_5MHz_25 RB_ Left



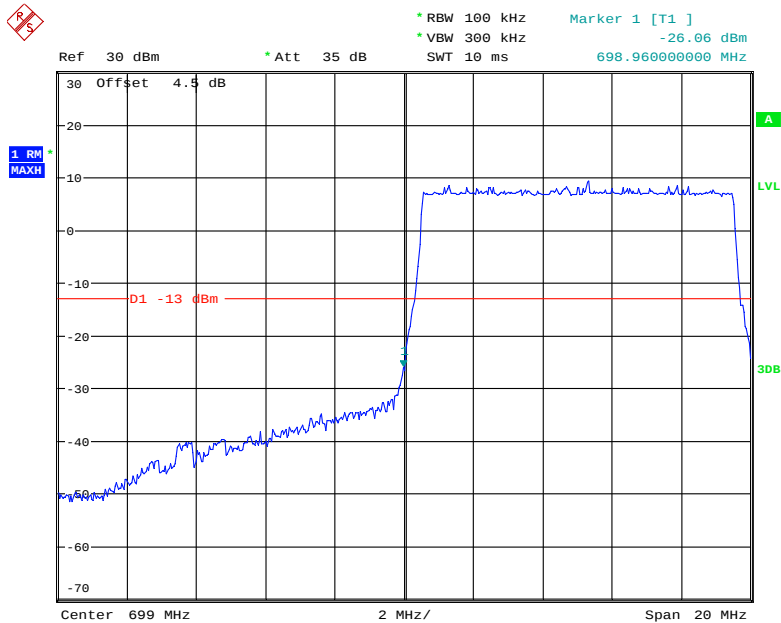
Date: 9.APR.2019 01:09:40

QPSK_5MHz_25 RB_ Right



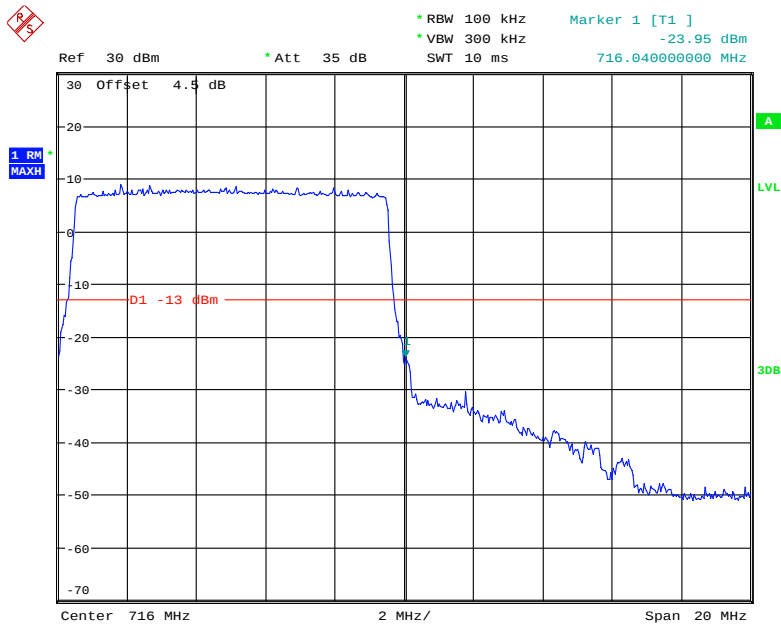
Date: 9.APR.2019 01:10:40

QPSK_10MHz_50 RB_ Left

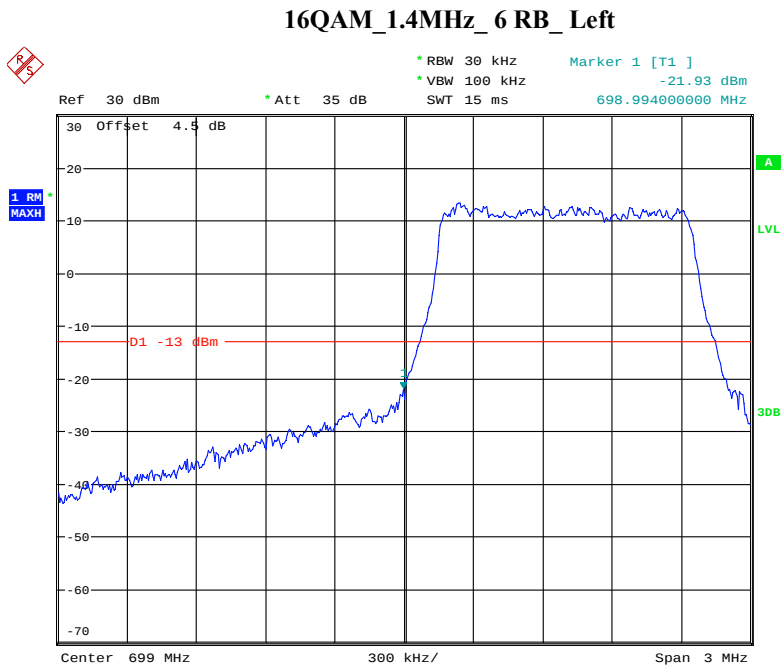


Date: 9.APR.2019 01:13:49

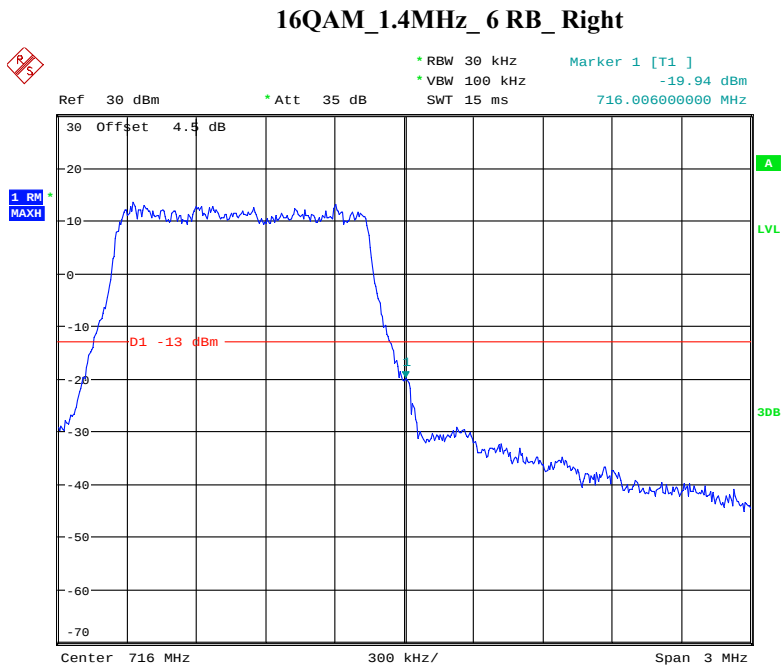
QPSK_10MHz_50 RB_ Right



Date: 9.APR.2019 01:14:54

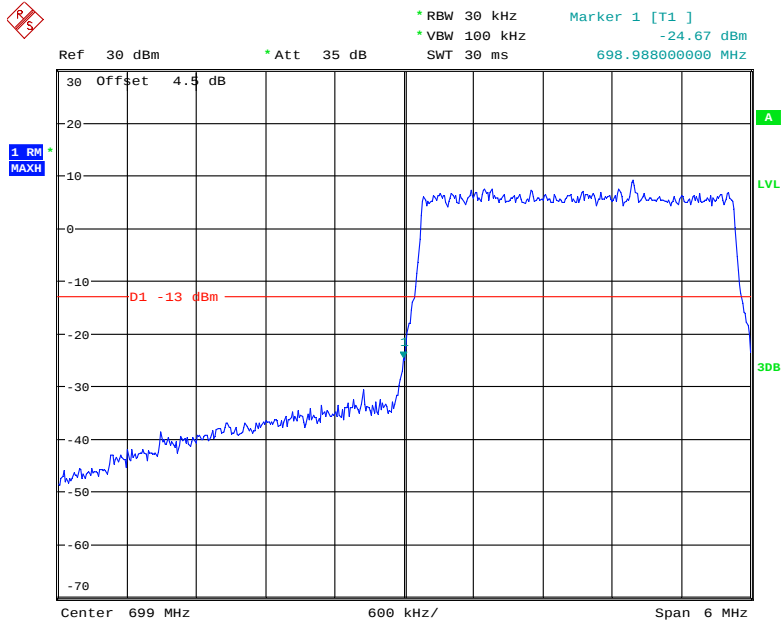


Date: 9.APR.2019 01:02:59



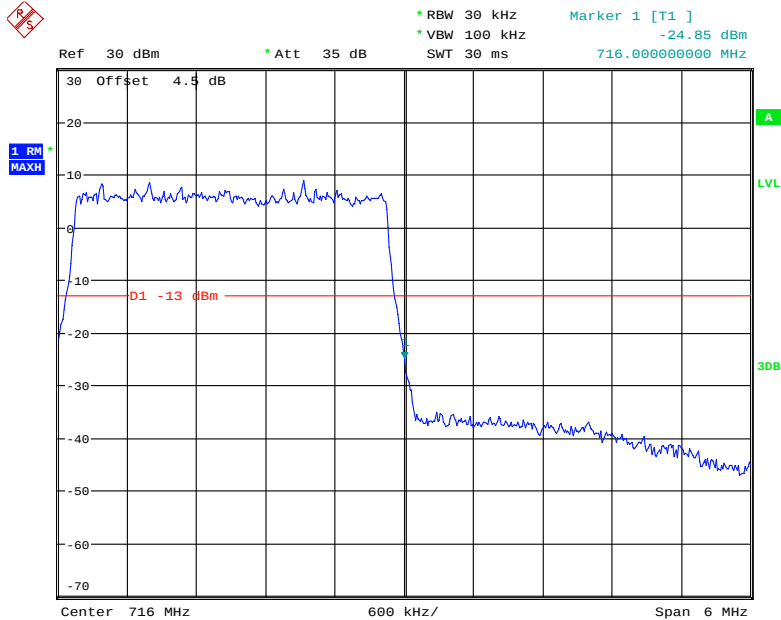
Date: 9.APR.2019 01:04:00

16QAM_3MHz_15 RB_ Left



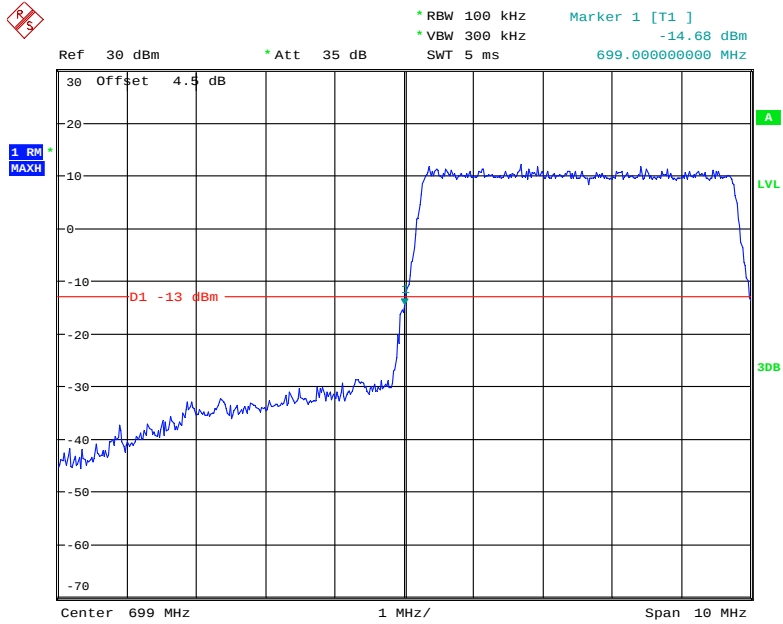
Date: 9.APR.2019 01:06:38

16QAM_3MHz_15 RB_ Right



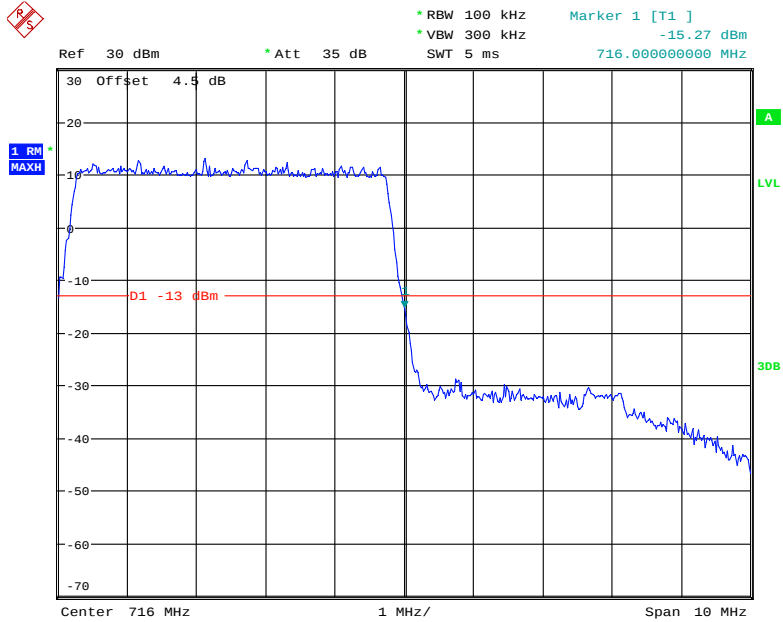
Date: 9.APR.2019 01:07:38

16QAM_5MHz_25 RB_ Left



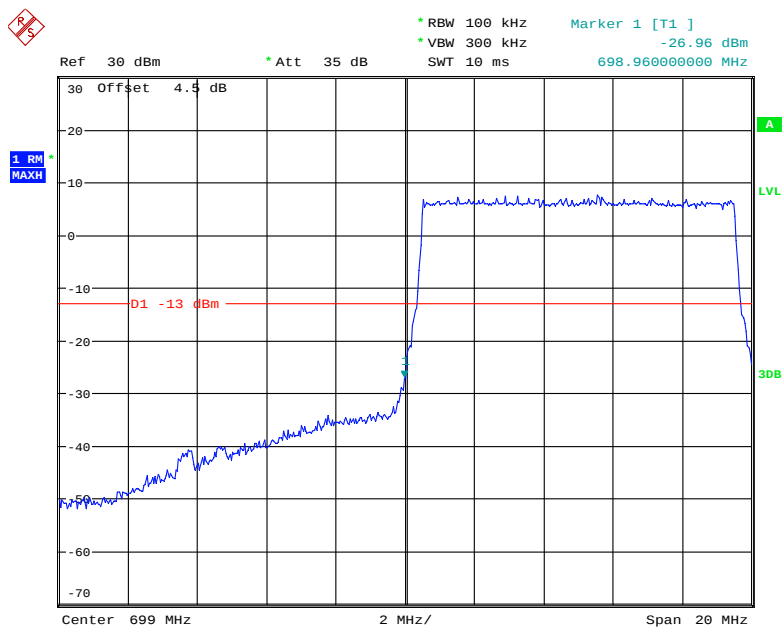
Date: 9.APR.2019 01:10:13

16QAM_5MHz_25 RB_ Right



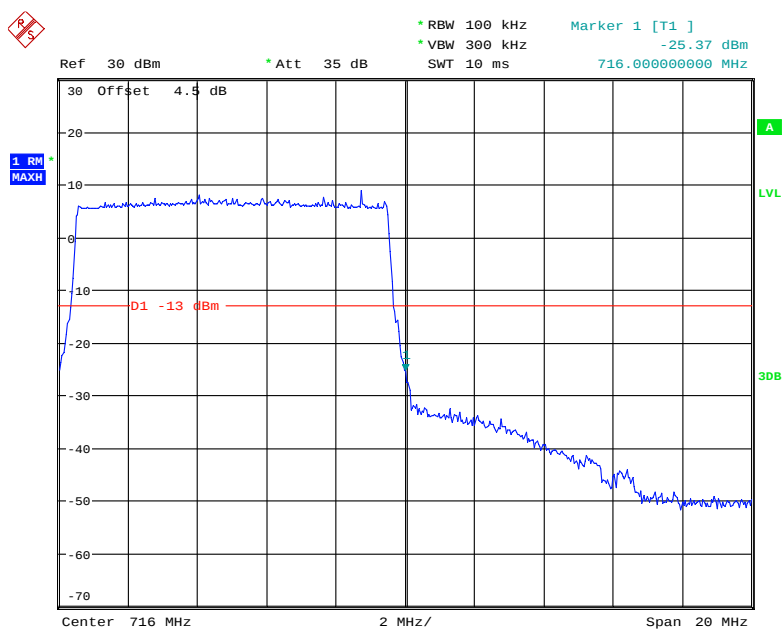
Date: 9.APR.2019 01:11:16

16QAM_10MHz_ 50 RB_ Left



Date: 9.APR.2019 01:14:19

16QAM_10MHz_ 50 RB_ Right



Date: 9.APR.2019 01:15:25

FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY**Applicable Standard**

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235, §27.54

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

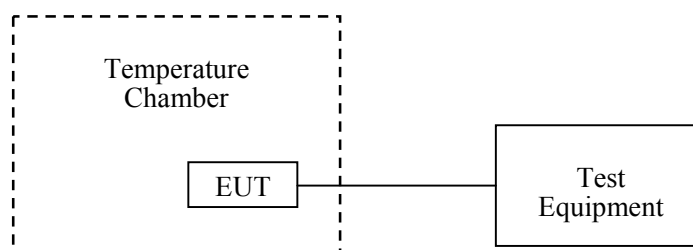
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC 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 AC 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: An external variable AC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	110479	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	26.4°C
Relative Humidity:	60 %
ATM Pressure:	101.1 kPa

The testing was performed by Tiago Huang on 2019-04-10

Cellular Band (Part 22H)

GSM850, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	-6	0.00359	2.5
-20		-7	0.01315	
-10		-5	0.01434	
0		1	-0.00359	
10		0	0.01195	
20		-5	0.00956	
30		-1	-0.00120	
40		-1	-0.02152	
50		5	-0.01673	
20	3.6	1	-0.02152	
20	4.3	-5	0.00956	

EGPRS850, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	-3	-0.01793	2.5
-20		-2	0.01554	
-10		-3	-0.01195	
0		-1	-0.02152	
10		-4	0.00598	
20		-1	-0.02032	
30		-2	-0.00239	
40		-4	-0.00598	
50		-3	-0.00837	
20	3.6	-4	-0.00717	
20	4.3	-5	0.00359	

PCS Band (Part 24E)

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V_{DC}	Hz	ppm	
-30	3.8	-5	-0.01117	Pass
-20		1	-0.00904	
-10		-9	0.00479	
0		-4	0.00745	
10		-9	0.00904	
20		-5	-0.00904	
30		-11	-0.01064	
40		-8	0.00213	
50		-7	0.00532	
20	3.6	-2	0.00585	
20	4.3	-1	0.00479	

EGPRS, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V_{DC}	Hz	ppm	
-30	3.8	-20	0.00000	Pass
-20		-11	0.00000	
-10		-11	-0.00319	
0		-23	0.00053	
10		-18	-0.00957	
20		-10	-0.00532	
30		-19	-0.00798	
40		-17	-0.00213	
50		-19	-0.00691	
20	3.6	-20	-0.00638	
20	4.3	-10	-0.00319	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	0	0.01554	2.5
-20		-3	-0.00359	
-10		1	0.00956	
0		3	0.01315	
10		-2	0.01673	
20		4	0.00598	
30		1	0.01554	
40		-3	-0.00837	
50		-1	0.01673	
20	3.6	0	-0.00478	
20	4.3	-4	0.00956	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	11.51	0.00612	Pass
-20		13.39	0.00712	
-10		15.30	0.00814	
0		-2.01	-0.00107	
10		14.10	0.00750	
20		17.11	0.00910	
30		-3.49	-0.00186	
40		12.84	0.00683	
50		11.05	0.00588	
20	3.6	-9.31	-0.00495	
20	4.3	7.76	0.00413	

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	-0.97	-0.0005	Pass
-20		-8.46	-0.0045	
-10		-8.39	-0.0045	
0		-13.71	-0.0073	
10		6.35	0.0034	
20		-11.14	-0.0059	
30		2.80	0.0015	
40		-6.58	-0.0035	
50		3.82	0.0020	
20	3.6	-10.53	-0.0056	
20	4.3	-0.48	-0.0003	

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	699.440000	715.610000	699	716
-20		699.290000	715.570000	699	716
-10		699.710000	715.600000	699	716
0		699.710000	715.600000	699	716
10		699.640000	715.430000	699	716
20		699.520000	715.480000	699	716
30		699.390000	715.360000	699	716
40		699.370000	715.300000	699	716
50		699.380000	715.370000	699	716
20	3.6	699.460000	715.500000	699	716
20	4.3	699.510000	715.320000	699	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	699.550000	715.500000	699	716
-20		699.490000	715.380000	699	716
-10		699.500000	715.480000	699	716
0		699.400000	715.490000	699	716
10		699.390000	715.680000	699	716
20		699.520000	715.480000	699	716
30		699.390000	715.360000	699	716
40		699.300000	715.700000	699	716
50		699.740000	715.440000	699	716
20	3.6	699.430000	715.300000	699	716
20	4.3	699.710000	715.720000	699	716

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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