

Appendix B

E-UTRA Band 13

TABLE OF CONTENTS

1	MAIN TEST INSTRUMENTS.....	3
2	MEASUREMENT UNCERTAINTY	3
3.	EFFECTIVE (ISOTROPIC) RADIATED POWER	4
3.1.	Test Result	4
4.	PEAK-TO-AVERAGE RATIO(CCDF).....	6
4.1.	Test Result	6
4.2.	Test Plots.....	6
5.	MODULATION CHARACTERISTICS	7
5.1.	Test BAND = LTE Band 13.....	7
5.1.1.	Test Mode = LTE /TM1 10MHz.....	7
5.1.1.1.	Test Channel = MCH.....	7
5.1.2.	Test Mode = LTE /TM2 10MHz.....	8
5.1.2.1.	Test Channel = MCH.....	8
6.	26dB BANDWIDTH AND OCCUPIED BANDWIDTH	9
6.1.	Test Result	9
6.2.	Test Plots.....	9
7.	BAND EDGE COMPLIANCE.....	13
7.1.	Test Plots.....	13
8.	SPURIOUS EMISSION AT ANTENNA TERMINAL	19
8.1.	Test Plots.....	19
9.	FREQUENCY STABILITY.....	20
9.1.	Frequency Vs Voltage	20
9.2.	Frequency Vs Temperature	20

1 Main Test Instruments

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2018/4/2	2019/4/1
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017/6/27	2020/6/26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017/10/17	2020/10/16
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018/9/2	2019/9/2
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2018/9/2	2019/9/2
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	EMC2063	2018/10/20	2019/10/19
Pre-amplifier (26-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018/4/2	2019/4/1
Band filter	N/A	N/A	N/A	N/A	N/A
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2018/7/12	2019/7/11
Wideband Radio Communication Tester	Anritsu	MT8821C	6201462742	2018/5/2	2019/5/1
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	W005-02	2018/3/13	2019/3/12

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
Dual Output Mobile Communication DC Source	Agilent Technologies Inc	66311B	W009-09	2018/9/15	2019/9/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2018/3/13	2019/3/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/12	2019/7/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2018/9/10	2019/9/10
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Wideband Radio Communication Tester	Anritsu	MT8821C	6201462742	2018/5/2	2019/5/1
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	W005-02	2018/3/13	2019/3/12

2 Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item	Extended Uncertainty	Data
Transmit Output Power Data	Power [dBm]	$U = \pm 0.37 \text{ dB}$
Bandwidth	Magnitude [%]	$U = \pm 0.2\%$
Band Edge Compliance	Disturbance Power [dBm]	$U = \pm 2.0 \text{ dB}$
Spurious Emissions, Conducted	Disturbance Power [dBm]	$U = \pm 2.0 \text{ dB}$
Frequency Stability	Frequency Accuracy [ppm]	$U = \pm 0.24 \text{ ppm}$

3. Effective (Isotropic) Radiated Power

3.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	ERP (dBm)	Limit (dBm)	Verdict
Band13	5MHz	QPSK	23205	1RB#0	24.17	20.92	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#12	23.99	20.74	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#24	24.00	20.75	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#0	23.14	19.89	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#6	23.06	19.81	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#13	23.07	19.82	34.77	PASS
Band13	5MHz	QPSK	23205	25RB#0	23.01	19.76	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#0	24.00	20.75	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#12	24.16	20.91	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#24	24.08	20.83	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#0	23.32	20.07	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#6	23.41	20.16	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#13	23.24	19.99	34.77	PASS
Band13	5MHz	QPSK	23230	25RB#0	23.30	20.05	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#0	23.97	20.72	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#12	24.03	20.78	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#24	24.26	21.01	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#0	23.29	20.04	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#6	23.31	20.06	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#13	23.21	19.96	34.77	PASS
Band13	5MHz	QPSK	23255	25RB#0	23.24	19.99	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#0	22.72	19.47	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#12	22.18	18.93	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#24	22.34	19.09	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#0	22.21	18.96	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#6	22.06	18.81	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#13	22.07	18.82	34.77	PASS
Band13	5MHz	16QAM	23205	25RB#0	22.13	18.88	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#0	22.59	19.34	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#12	23.20	19.95	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#24	22.71	19.46	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#0	22.20	18.95	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#6	22.33	19.08	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#13	22.37	19.12	34.77	PASS
Band13	5MHz	16QAM	23230	25RB#0	22.38	19.13	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#0	22.30	19.05	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#12	23.34	20.09	34.77	PASS

JianYan Testing Group Shenzhen Co., Ltd.

Report No: JYTSZB-R12-2102967

Band13	5MHz	16QAM	23255	1RB#24	22.68	19.43	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#0	21.94	18.69	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#6	22.10	18.85	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#13	22.17	18.92	34.77	PASS
Band13	5MHz	16QAM	23255	25RB#0	21.86	18.61	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#0	23.84	20.59	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#24	24.09	20.84	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#49	24.09	20.84	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#0	23.19	19.94	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#12	23.27	20.02	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#25	23.14	19.89	34.77	PASS
Band13	10MHz	QPSK	23230	50RB#0	23.21	19.96	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#0	22.53	19.28	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#24	22.59	19.34	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#49	22.75	19.50	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#0	22.23	18.98	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#12	22.38	19.13	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#25	22.1	18.85	34.77	PASS
Band13	10MHz	16QAM	23230	50RB#0	22.28	19.03	34.77	PASS

Remark:

a: For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$ERP [dBm] = SGP [dBm] - \text{Cable Loss [dB]} + \text{Gain [dBd]}$

$EIRP [dBm] = SGP [dBm] - \text{Cable Loss [dB]} + \text{Gain [dBi]}$

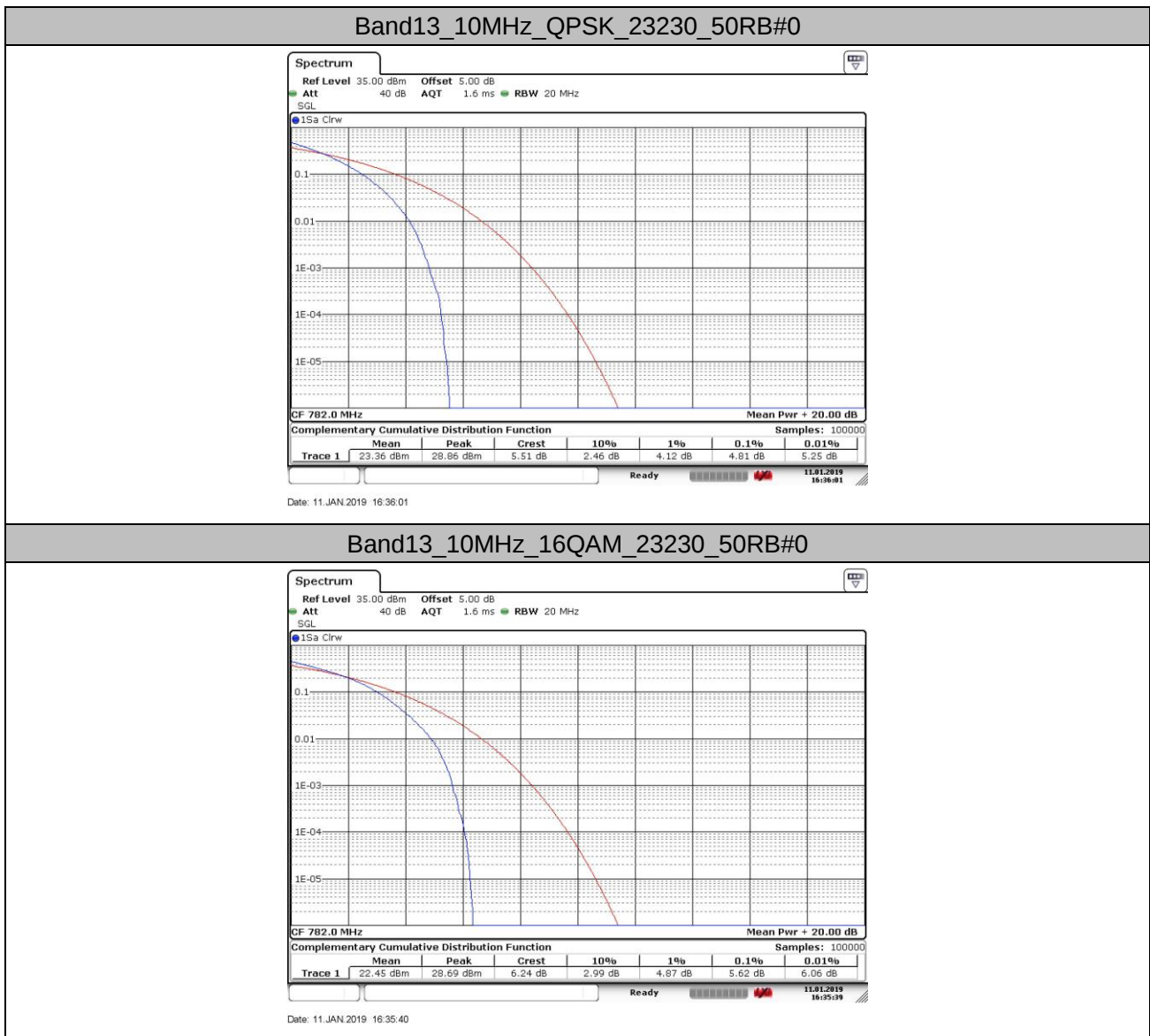
b: SGP=Signal Generator Level

4. Peak-to-Average Ratio(CCDFF)

4.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Result(dB)	Limit(dB)	Verdict
Band13	10MHz	QPSK	23230	50RB#0	4.81	13	PASS
Band13	10MHz	16QAM	23230	50RB#0	5.62	13	PASS

4.2. Test Plots

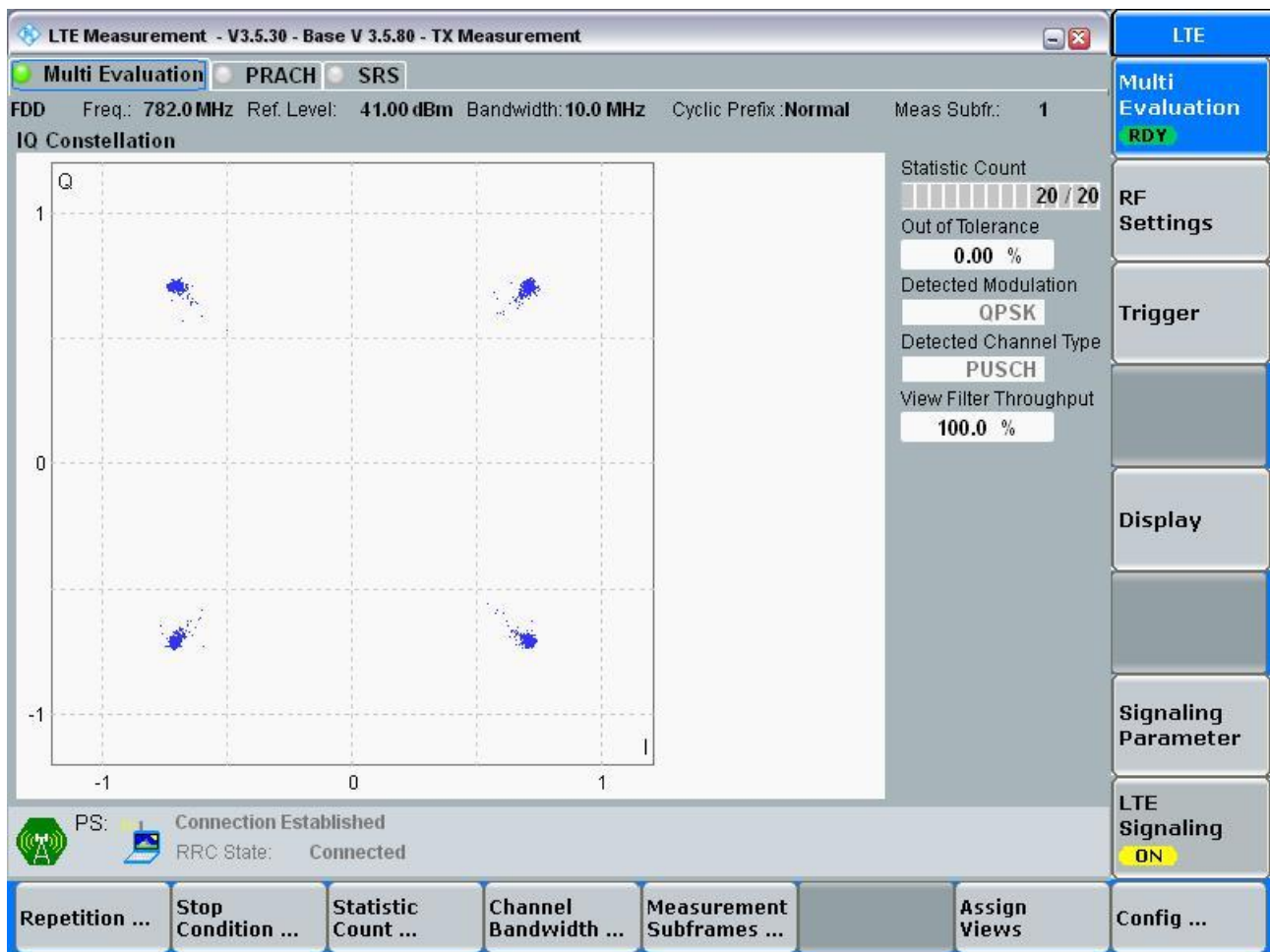


5. Modulation Characteristics

5.1. Test BAND = LTE Band 13

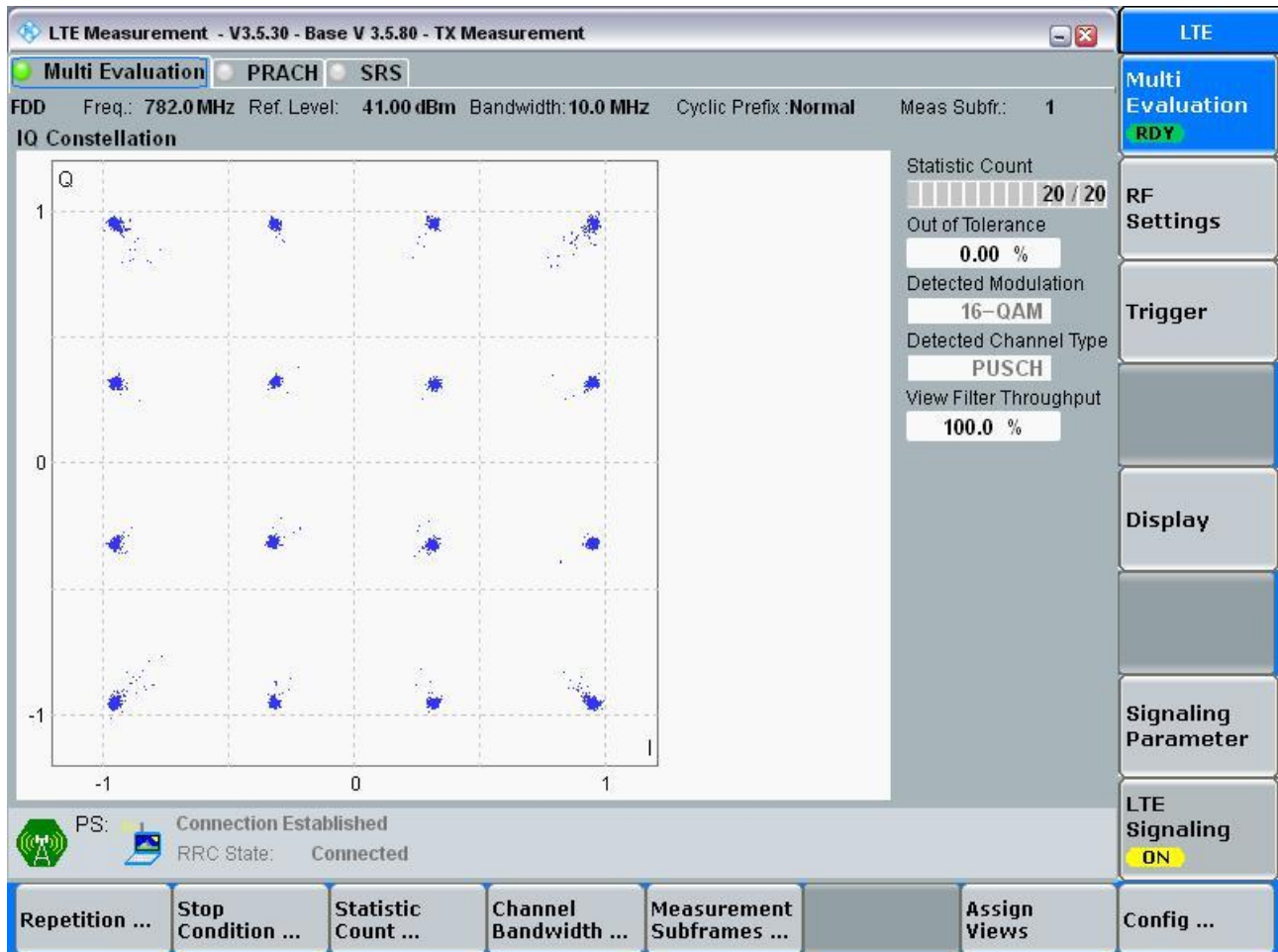
5.1.1. Test Mode = LTE /TM1 10MHz

5.1.1.1. Test Channel = MCH



5.1.2. Test Mode = LTE /TM2 10MHz

5.1.2.1. Test Channel = MCH

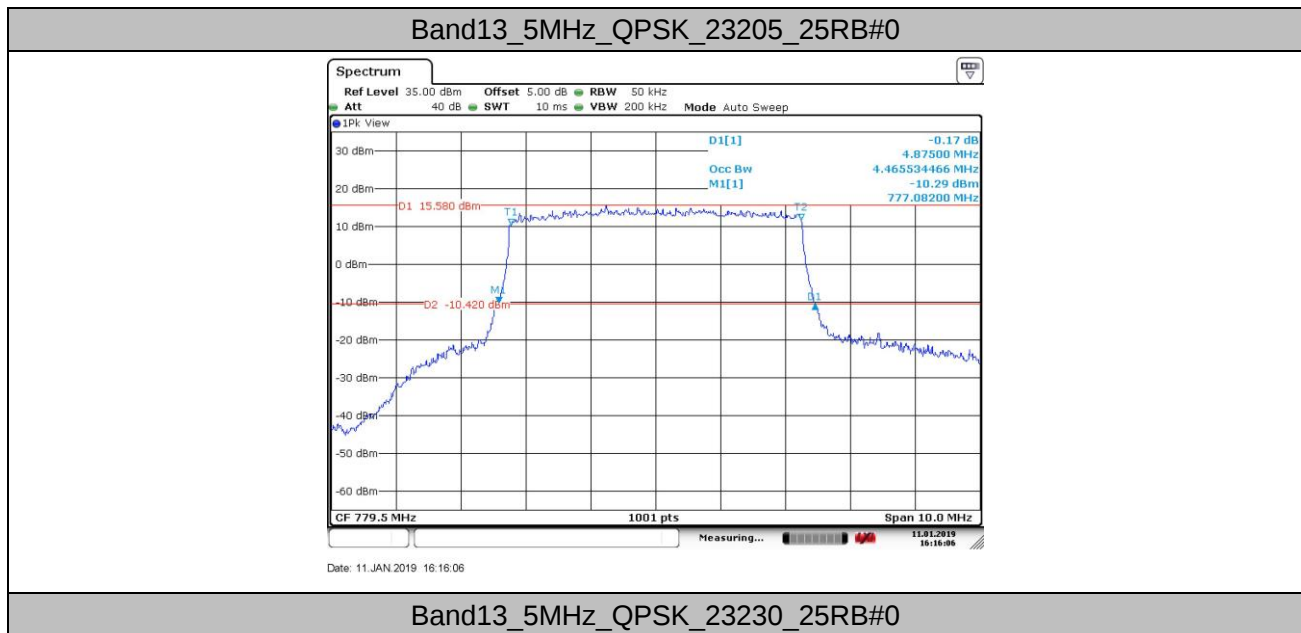


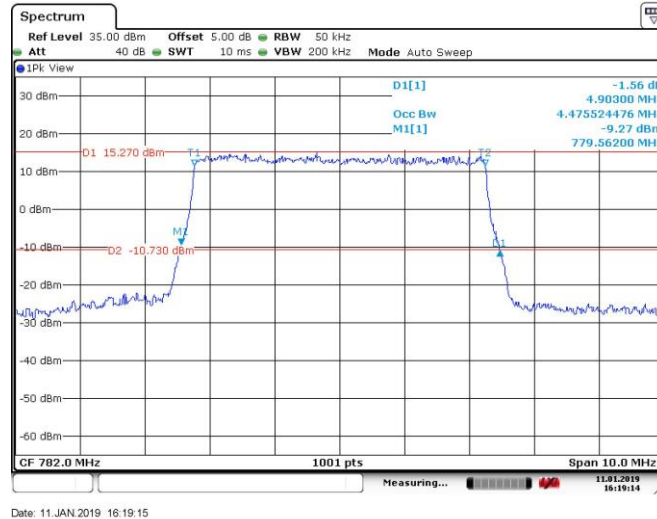
6. 26dB Bandwidth and Occupied Bandwidth

6.1. Test Result

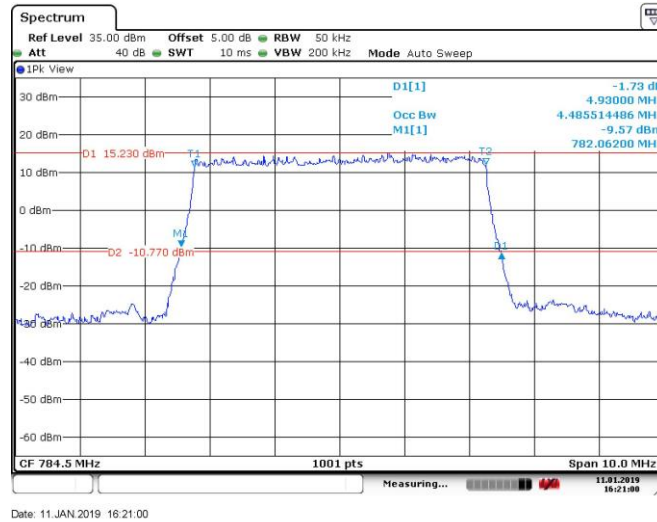
BAND	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band13	5MHz	QPSK	23205	25RB#0	4.466	4.875	PASS
Band13	5MHz	QPSK	23230	25RB#0	4.476	4.903	PASS
Band13	5MHz	QPSK	23255	25RB#0	4.486	4.930	PASS
Band13	5MHz	16QAM	23205	25RB#0	4.466	4.885	PASS
Band13	5MHz	16QAM	23230	25RB#0	4.476	4.933	PASS
Band13	5MHz	16QAM	23255	25RB#0	4.476	4.860	PASS
Band13	10MHz	QPSK	23230	50RB#0	8.931	9.715	PASS
Band13	10MHz	16QAM	23230	50RB#0	8.931	9.556	PASS

6.2. Test Plots

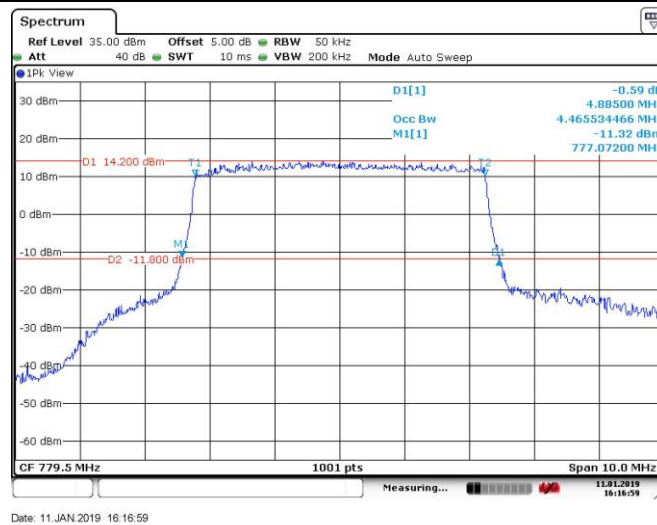




Band13_5MHz_QPSK_23255_25RB#0



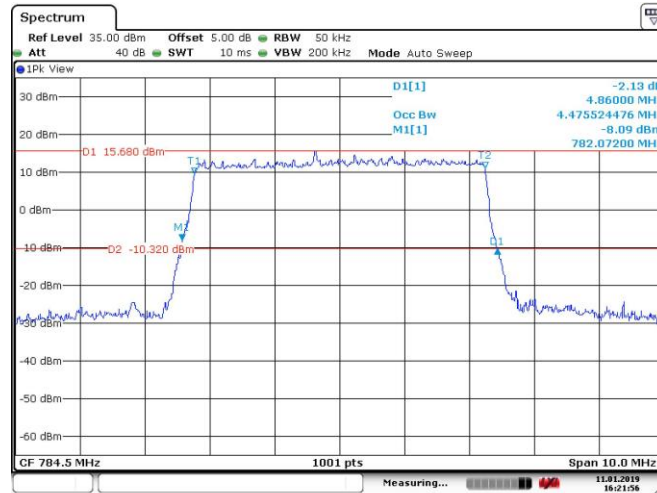
Band13_5MHz_16QAM_23205_25RB#0



Band13_5MHz_16QAM_23230_25RB#0

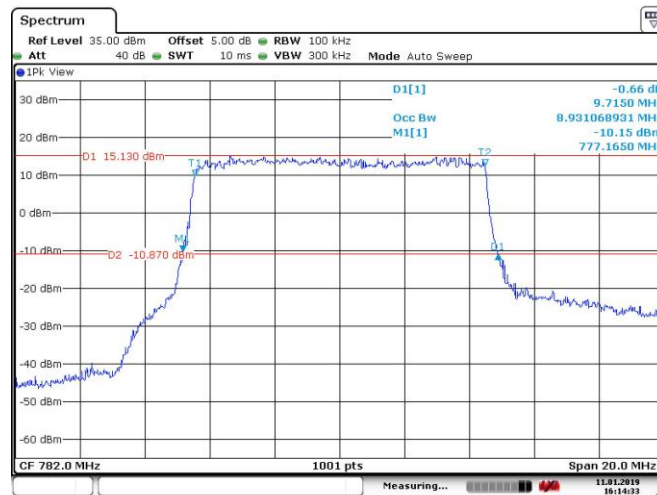


Band13_5MHz_16QAM_23255_25RB#0



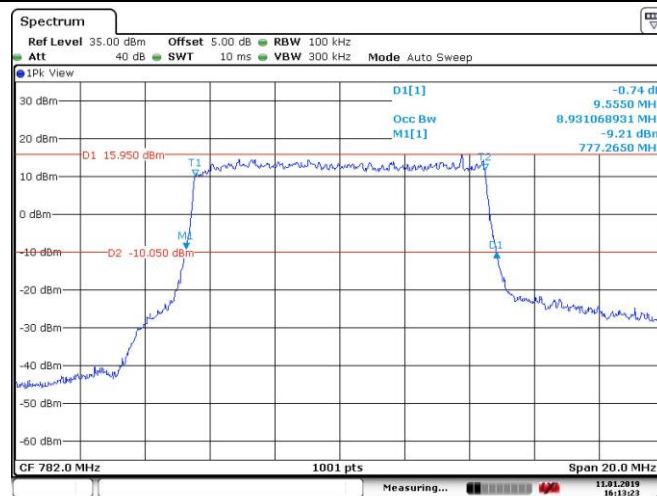
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Band13_10MHz_QPSK_23230_50RB#0



Date: 11.JAN.2019 16:14:33

Band13_10MHz_16QAM_23230_50RB#0

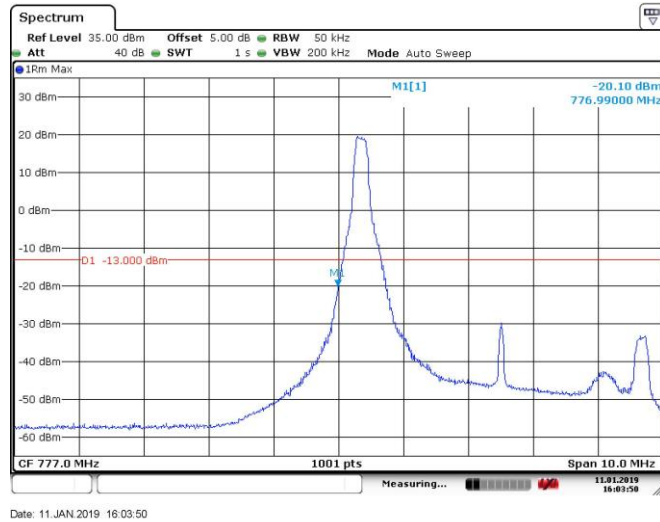


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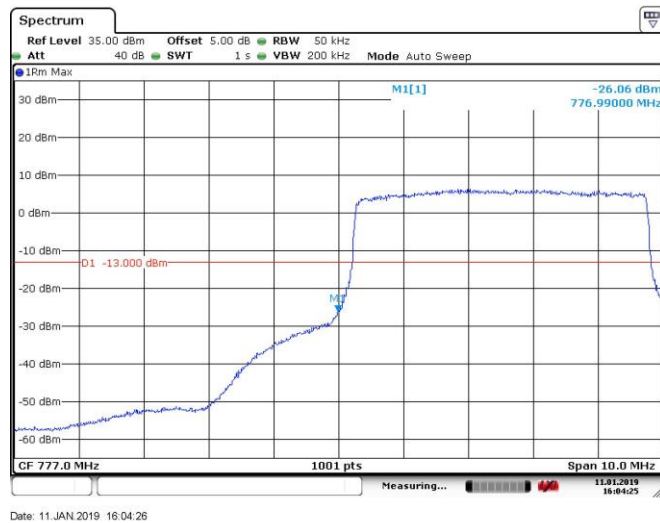
7. Band Edge Compliance

7.1. Test Plots

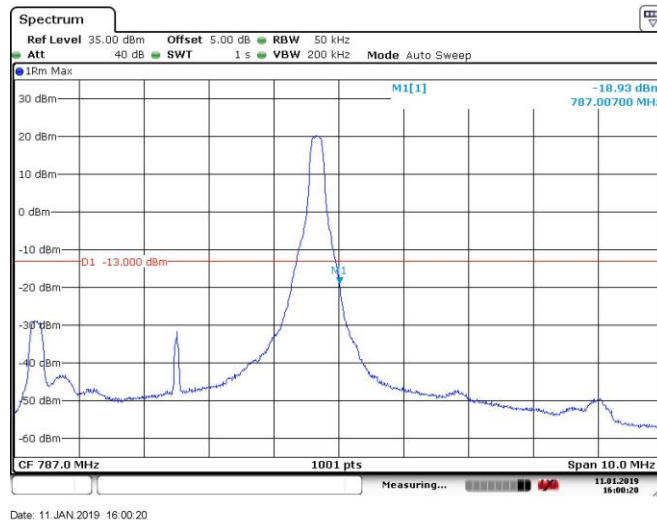
Band13_5MHz_QPSK_23025_1RB#0



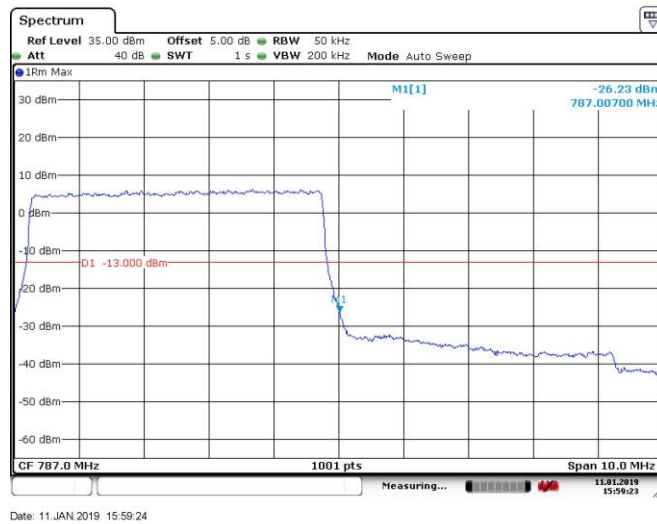
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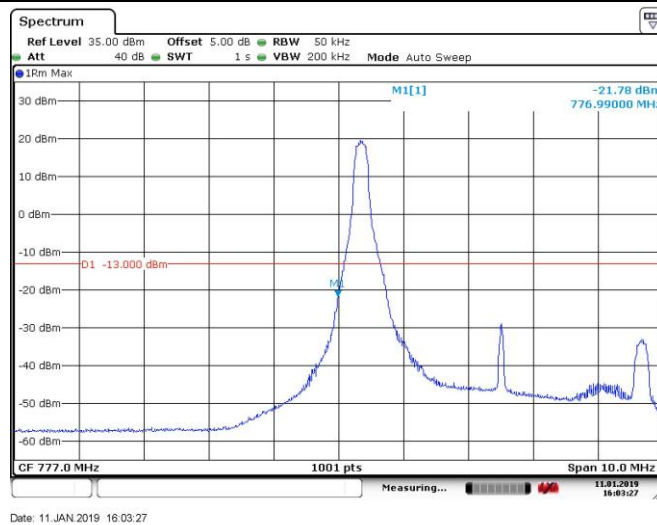
Band13_5MHz_QPSK_23255_1RB#24



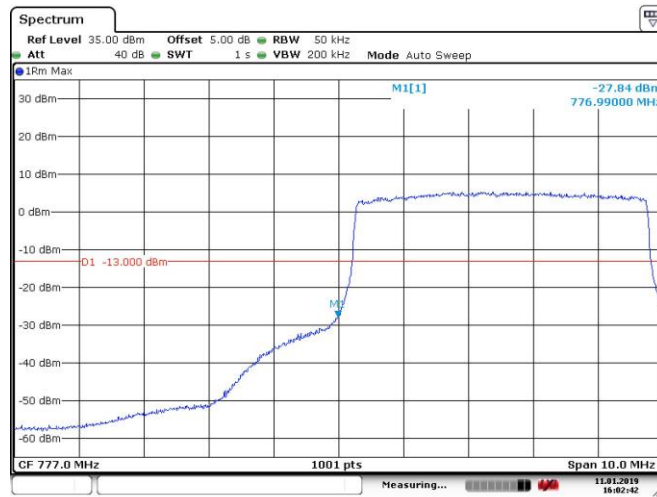
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Band13_5MHz_16QAM_23025_1RB#0

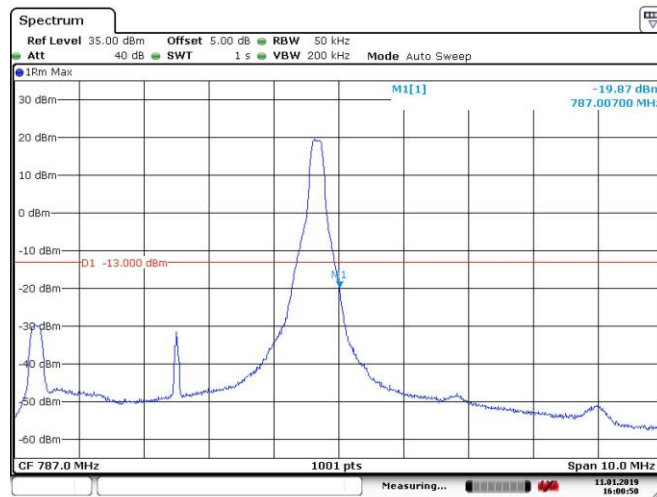


Band13_5MHz_16QAM_23025_25RB#0



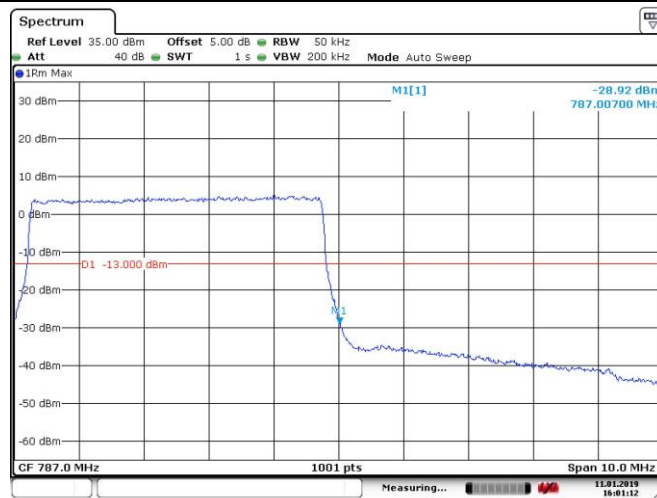
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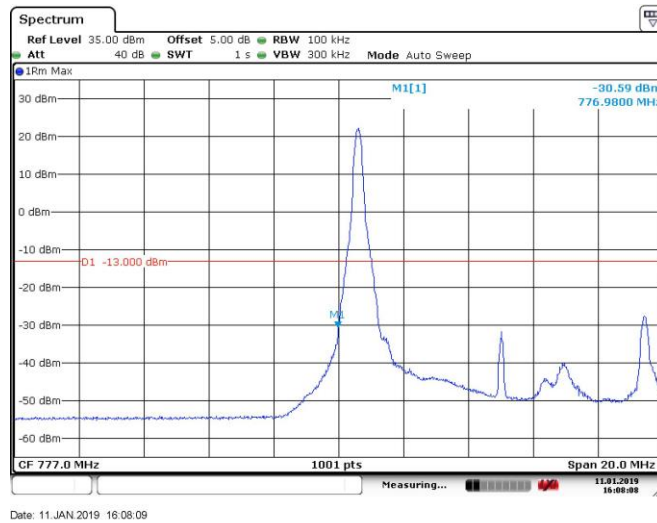
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Band13_5MHz_16QAM_23255_50RB#0



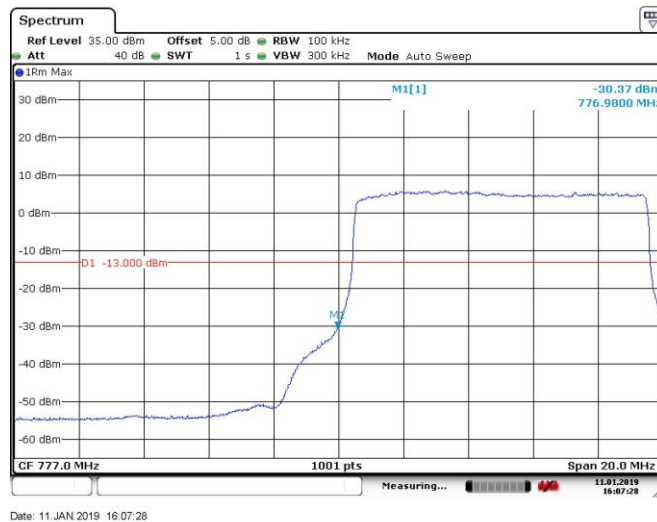
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Band13_10MHz_QPSK_23230_Left_1RB#0



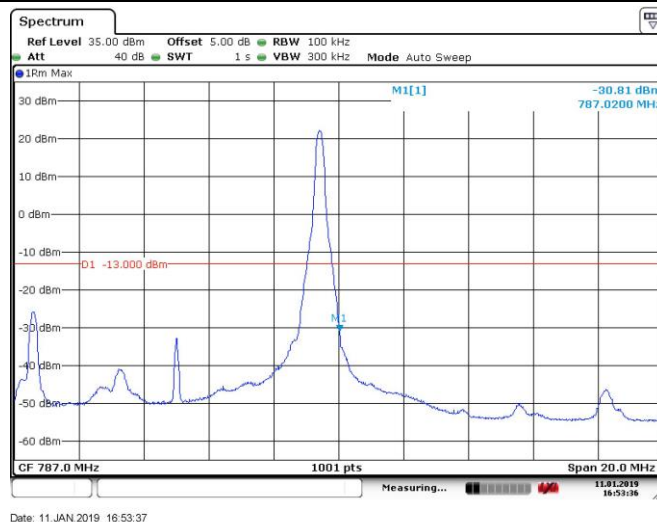
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Band13_10MHz_QPSK_23230_Left_50RB#0



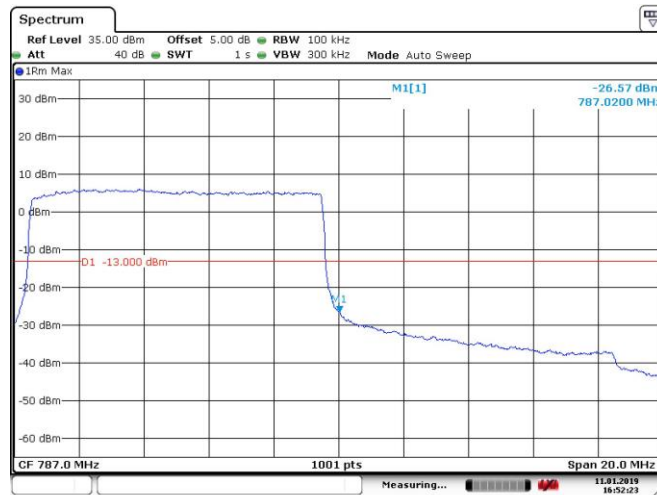
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Band13_10MHz_QPSK_23230_Right_1RB#49



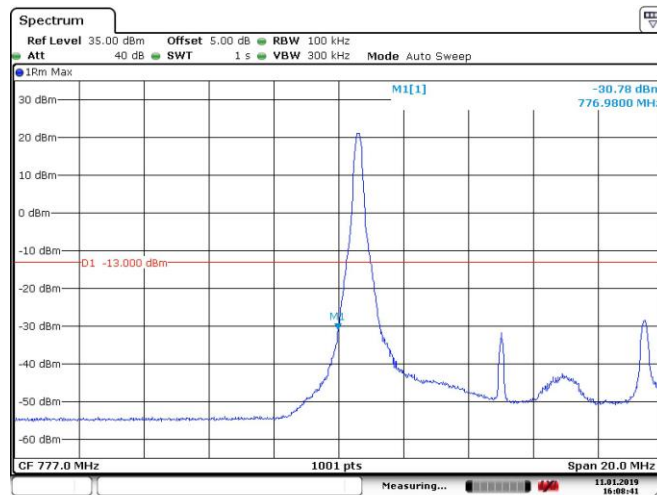
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Band13_10MHz_QPSK_23230_Right_50RB#0



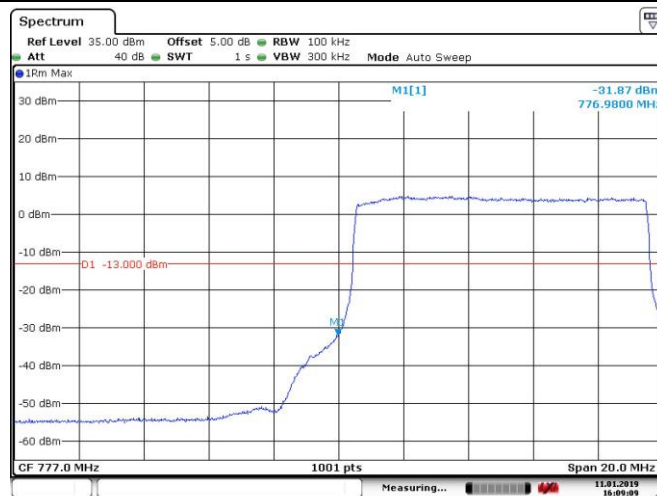
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Band13_10MHz_16QAM_23230_Left_1RB#0



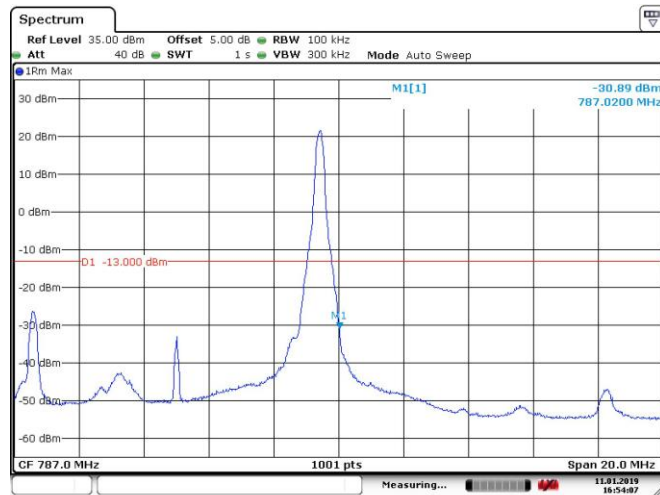
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Band13_10MHz_16QAM_23230_Left_50RB#0



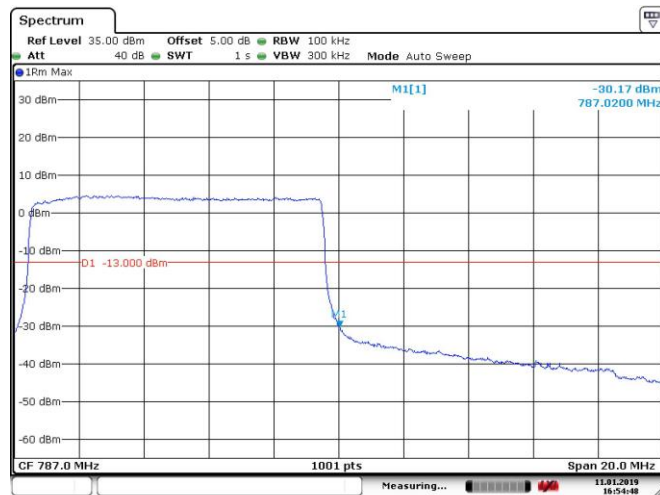
Date: 11.JAN.2019 16:09:09

Band13_10MHz_16QAM_23230_Right_1RB#49



Date: 11.JAN.2019 16:54:07

Band13_10MHz_16QAM_23230_Right_50RB#0



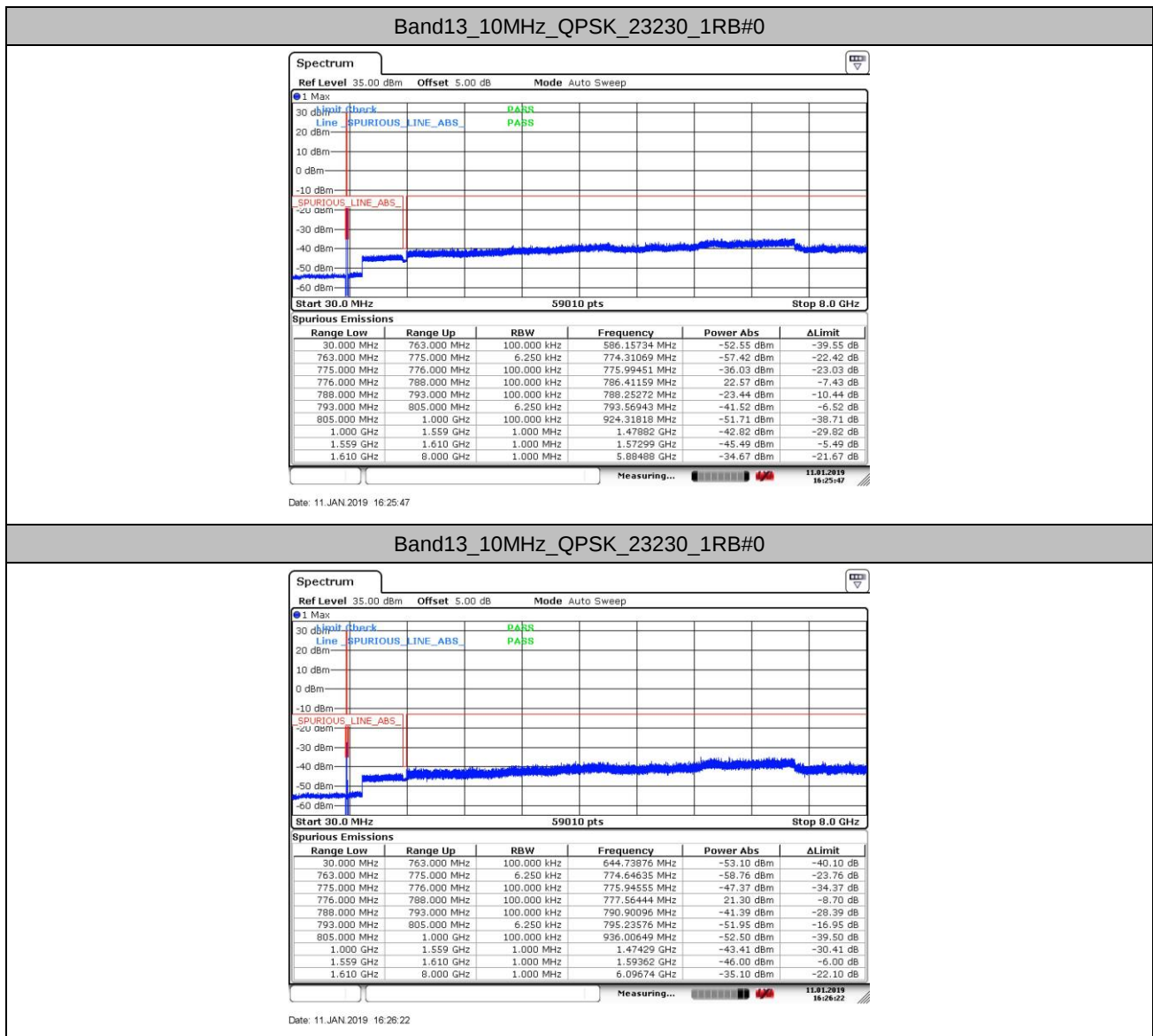
Date: 11.JAN.2019 16:54:48

8. Spurious Emission at Antenna Terminal

Remark1: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k * (\text{Span} / RBW)$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

Remark2: only the worst case data displayed in this report.

8.1. Test Plots



9. Frequency Stability

9.1.Frequency Vs Voltage

Voltage										
BAND	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band13	10MHz	QPSK	23230	50RB#0	VL	NT	6.18	0.007909	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VN	NT	13.28	0.016983	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VH	NT	7.02	0.008977	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VL	NT	14.73	0.018843	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VN	NT	-6.27	-0.008023	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VH	NT	-8.88	-0.011351	±2.5	PASS

9.2.Frequency Vs Temperature

Temperature										
BAND	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band13	10MHz	QPSK	23230	50RB#0	NV	-30	11.01	0.014083	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	-20	8.64	0.011046	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	0	10.39	0.013288	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	10	-4.99	-0.006381	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	20	-1.89	-0.002415	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	30	-7.22	-0.009228	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	40	-6.61	-0.008455	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	50	-9.96	-0.012734	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-30	-7.24	-0.009254	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-20	-11.72	-0.014991	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	0	9.14	0.011682	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	10	11.36	0.014531	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	20	10.89	0.013929	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	30	-6.61	-0.008453	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	40	-5.26	-0.006721	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	50	1.18	0.001506	±2.5	PASS

The End