

Appendix B.7

E-UTRA Band 13

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1. Main Test Instruments

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (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	2019/3/2	2020/3/1
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	2019/3/2	2020/3/1
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	2019/4/3	2020/4/3
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	W005-02	2019/1/13	2020/1/12
RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
Dual Output Mobile Communication DC Source	Agilent Technologies Inc	66311B	W009-09	2018/11/2	2019/11/1
Signal Analyzer	Rohde & Schwarz	FSV	W005-02	2019/3/2	2020/3/1
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	2018/11/2	2019/11/1
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2018/11/2	2019/11/1
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/2	2019/11/1
Wideband Radio Communication Tester	Anritsu	MT8821C	6201462742	2019/3/2	2020/3/1
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	W005-02	2018/11/2	2019/11/1

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	Conducted Power(dBm)	ERP (dBm)	Limit (dBm)	Verdict
Band13	5MHz	QPSK	23205	1RB#0	22.83	24.68	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#12	22.92	24.77	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#24	22.75	24.60	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#0	22.1	23.95	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#6	22.02	23.87	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#13	21.79	23.64	34.77	PASS
Band13	5MHz	QPSK	23205	25RB#0	22.28	24.13	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#0	23.42	25.27	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#12	23.07	24.92	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#24	23.28	25.13	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#0	22.11	23.96	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#6	22.15	24.00	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#13	22.14	23.99	34.77	PASS
Band13	5MHz	QPSK	23230	25RB#0	22.13	23.98	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#0	23.21	25.06	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#12	23.39	25.24	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#24	23.18	25.03	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#0	22.42	24.27	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#6	22.35	24.20	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#13	22.14	23.99	34.77	PASS
Band13	5MHz	QPSK	23255	25RB#0	22.28	24.13	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#0	22.46	24.31	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#12	22.47	24.32	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#24	22.22	24.07	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#0	21.1	22.95	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#6	21.13	22.98	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#13	21.1	22.95	34.77	PASS
Band13	5MHz	16QAM	23205	25RB#0	21.08	22.93	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#0	22.3	24.15	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#12	22.15	24.00	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#24	22.38	24.23	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#0	21.26	23.11	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#6	21.19	23.04	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#13	21.23	23.08	34.77	PASS
Band13	5MHz	16QAM	23230	25RB#0	21.3	23.15	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#0	22.47	24.32	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#12	22.59	24.44	34.77	PASS

Band13	5MHz	16QAM	23255	1RB#24	22.4	24.25	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#0	21.45	23.30	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#6	21.32	23.17	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#13	21.37	23.22	34.77	PASS
Band13	5MHz	16QAM	23255	25RB#0	21.2	23.05	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#0	23.02	24.87	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#24	23.09	24.94	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#49	23.22	25.07	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#0	22.39	24.24	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#12	22.14	23.99	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#25	22.17	24.02	34.77	PASS
Band13	10MHz	QPSK	23230	50RB#0	22.41	24.26	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#0	22.69	24.54	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#24	22.26	24.11	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#49	22.26	24.11	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#0	21.24	23.09	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#12	21.32	23.17	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#25	21.23	23.08	34.77	PASS
Band13	10MHz	16QAM	23230	50RB#0	21.32	23.17	34.77	PASS

Remark:

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

ERP [dBm] = Conducted Power [dBm] + Gain [dBd]

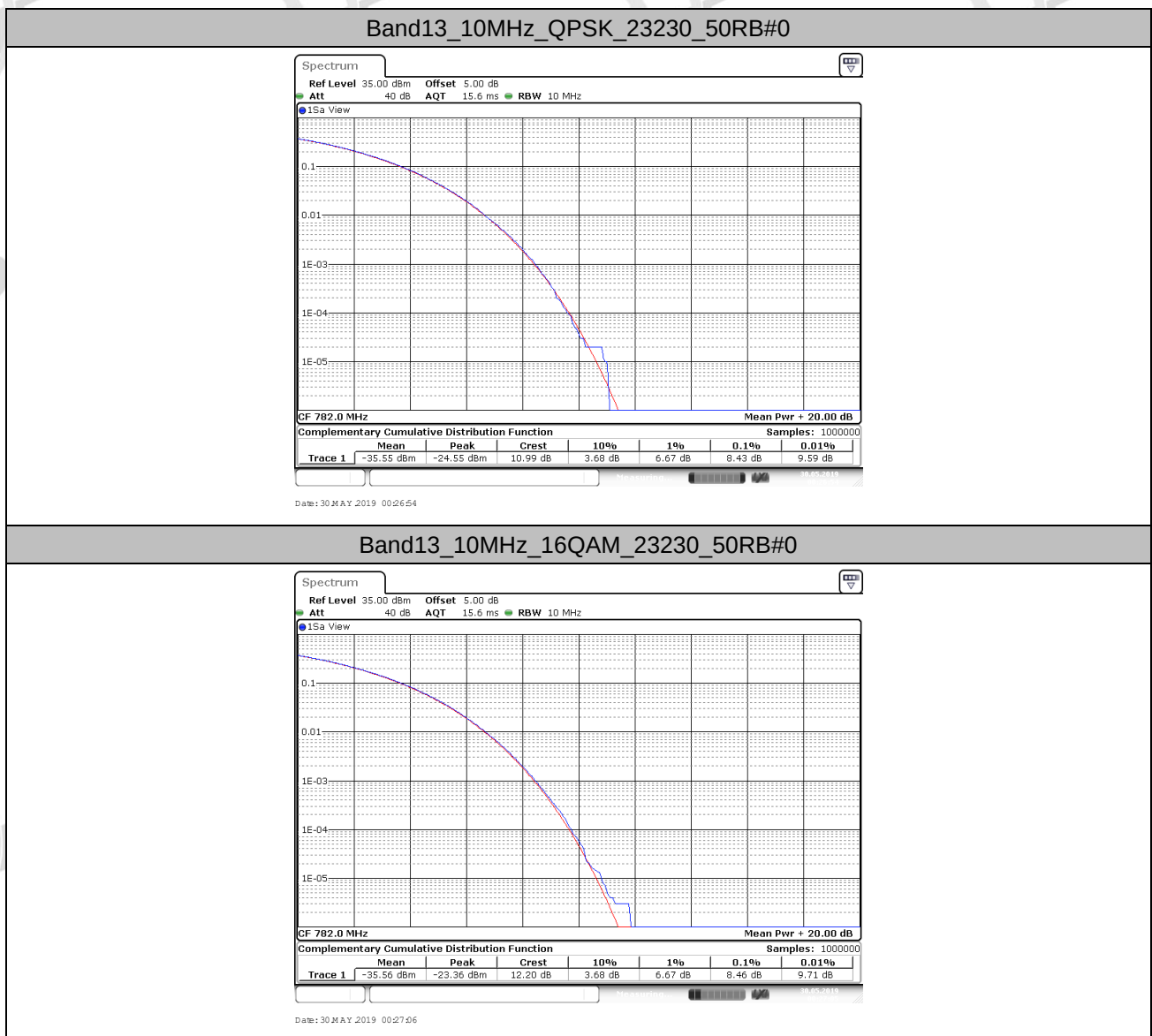
EIRP [dBm] = Conducted Power [dBm] + Gain [dBi]

4. Peak-to-Average Ratio(CCDF)

4.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Result(dB)	Limit(dB)	Verdict
Band13	10MHz	QPSK	23230	50RB#0	8.43	13	PASS
Band13	10MHz	16QAM	23230	50RB#0	8.46	13	PASS

4.2. Test Plots

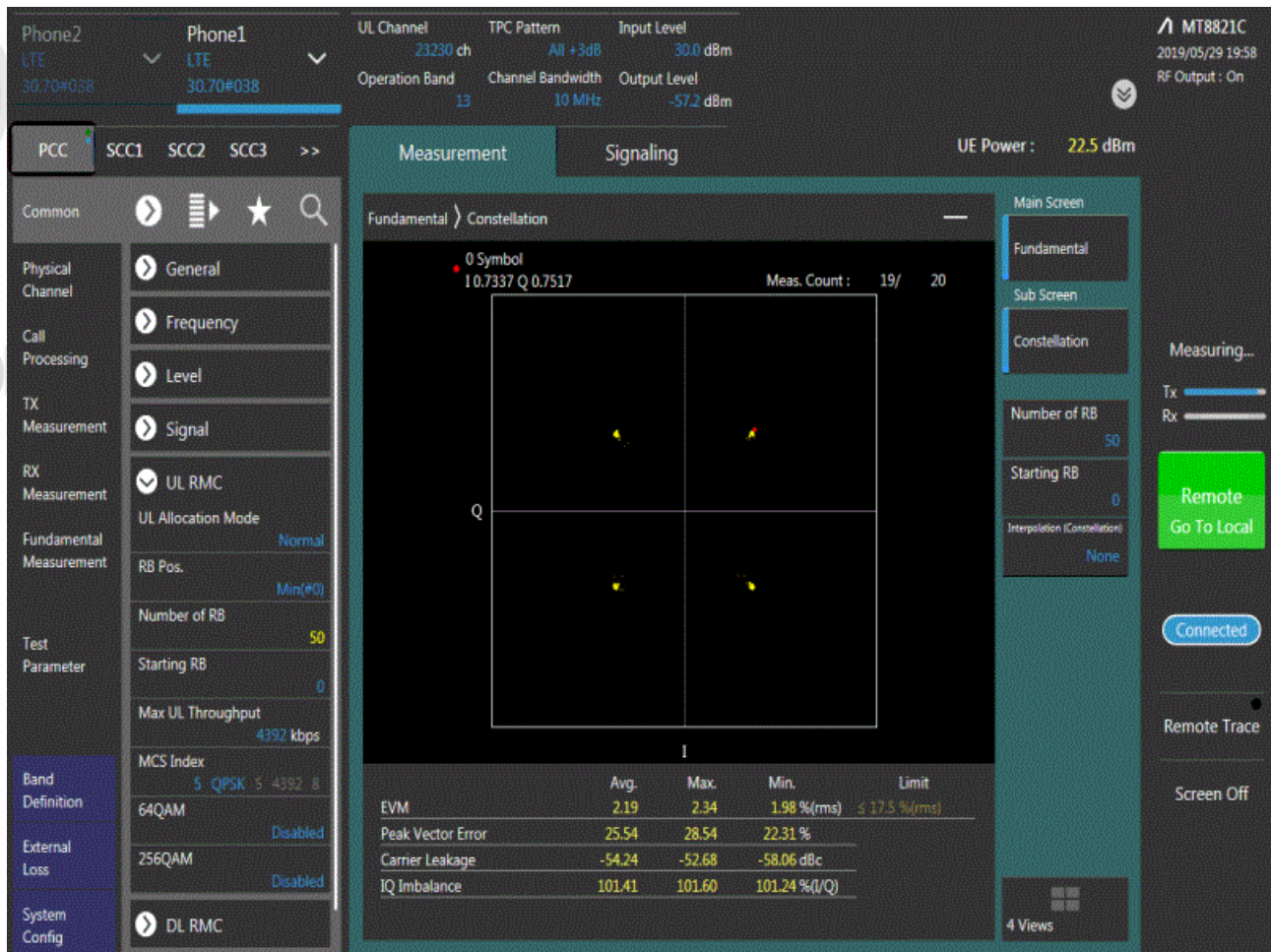


5. Modulation Characteristics

5.1. Test BAND = LTE Band 13

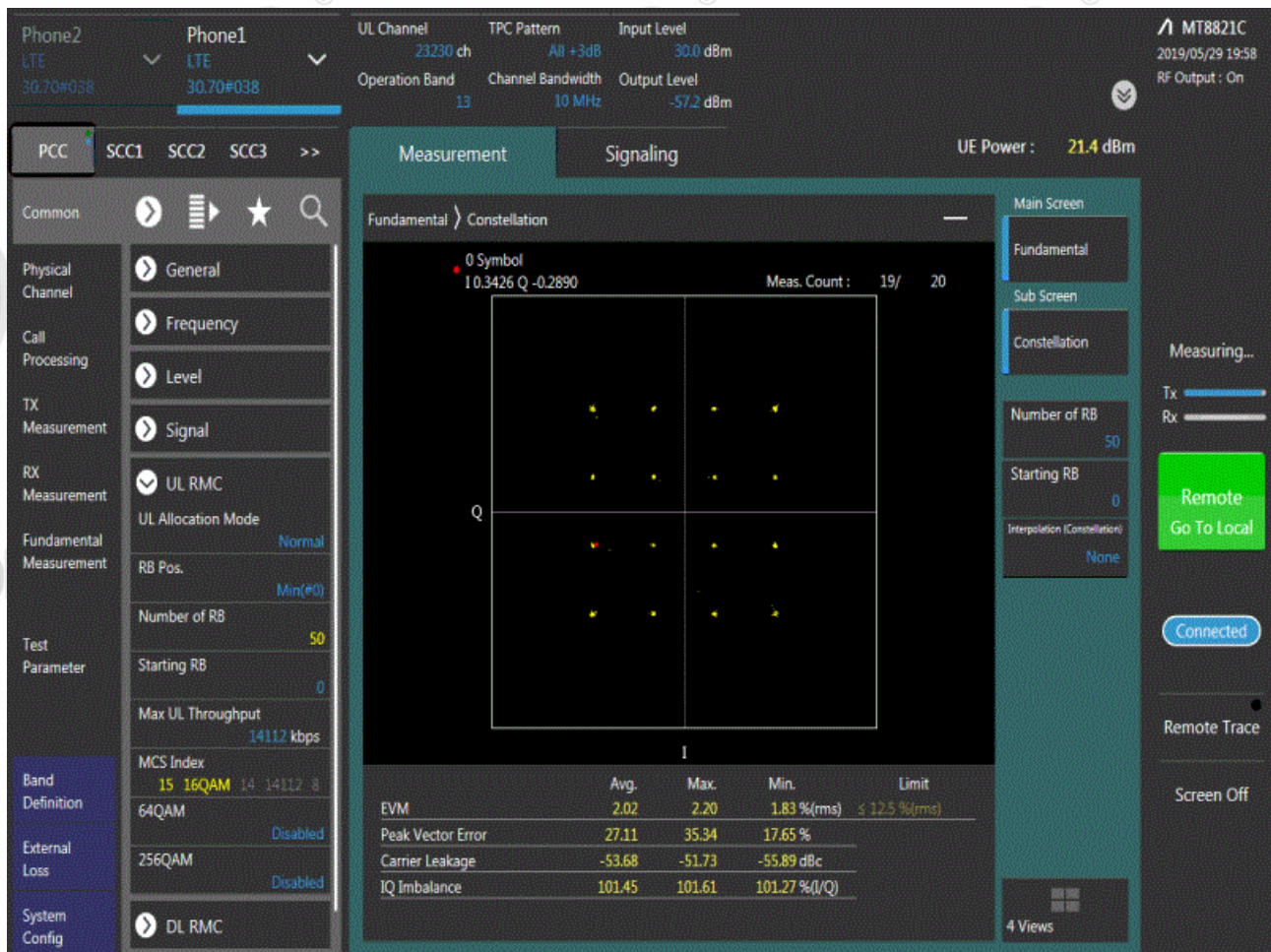
5.2. Test Mode = LTE /TM1 10MHz

5.2.1. Test Channel = MCH



5.3. Test Mode = LTE /TM2 10MHz

5.3.1. Test Channel = MCH

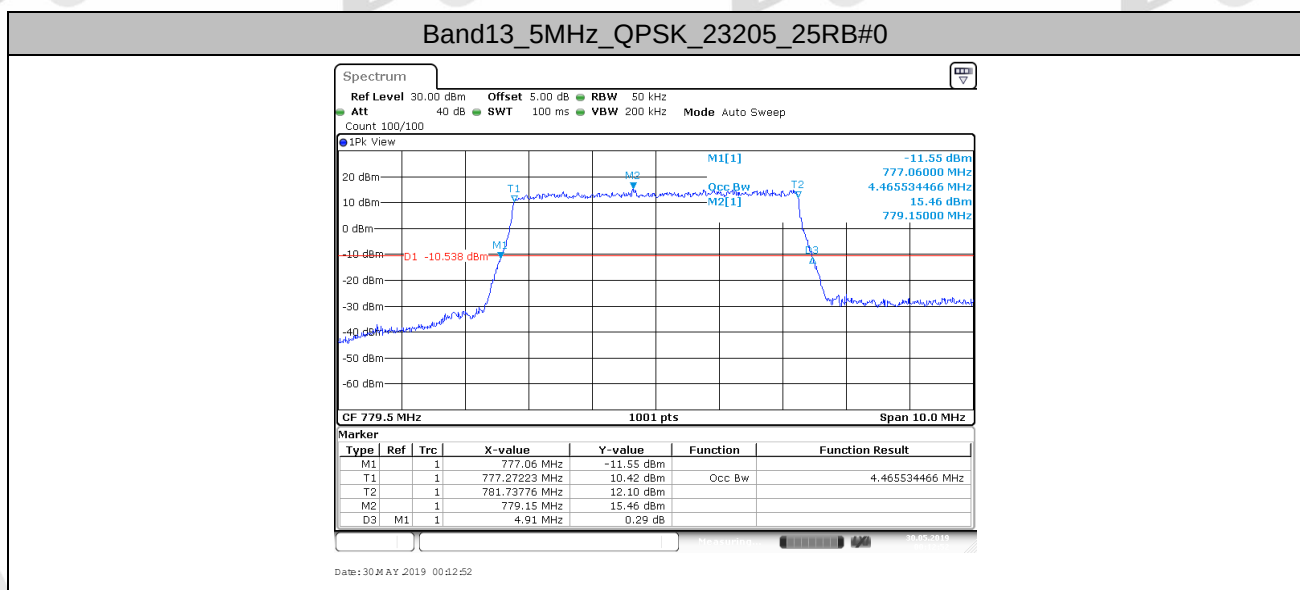


6. 26dB Bandwidth and Occupied Bandwidth

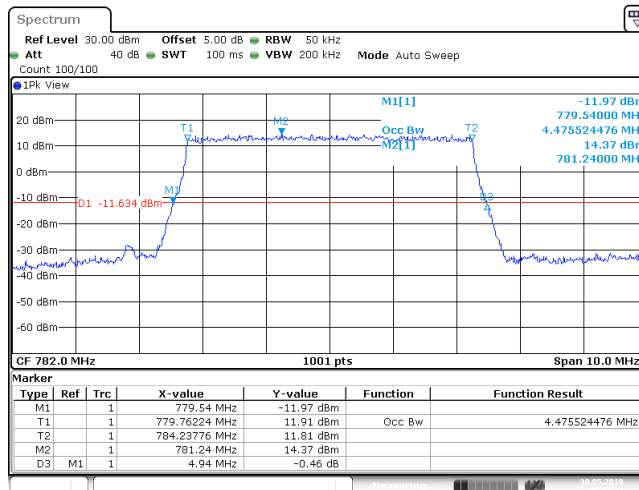
6.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band13	5MHz	QPSK	23205	25RB#0	4.466	4.910	PASS
Band13	5MHz	QPSK	23230	25RB#0	4.476	4.940	PASS
Band13	5MHz	QPSK	23255	25RB#0	4.476	4.970	PASS
Band13	5MHz	16QAM	23205	25RB#0	4.476	4.950	PASS
Band13	5MHz	16QAM	23230	25RB#0	4.486	4.950	PASS
Band13	5MHz	16QAM	23255	25RB#0	4.476	4.910	PASS
Band13	10MHz	QPSK	23230	50RB#0	8.911	9.700	PASS
Band13	10MHz	16QAM	23230	50RB#0	8.911	9.680	PASS

6.2. Test Plots

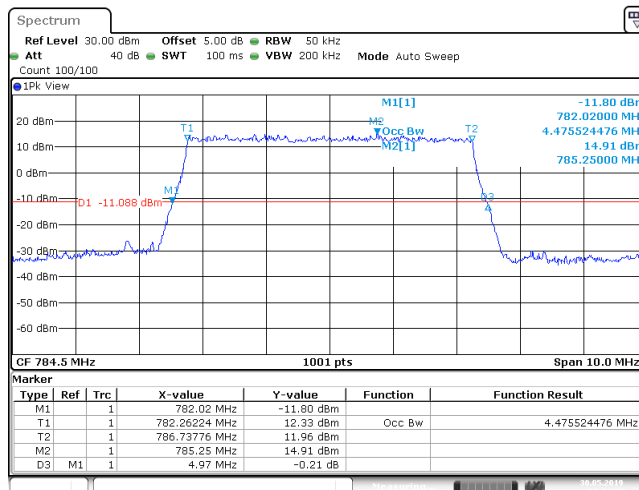


Band13_5MHz_QPSK_23230_25RB#0



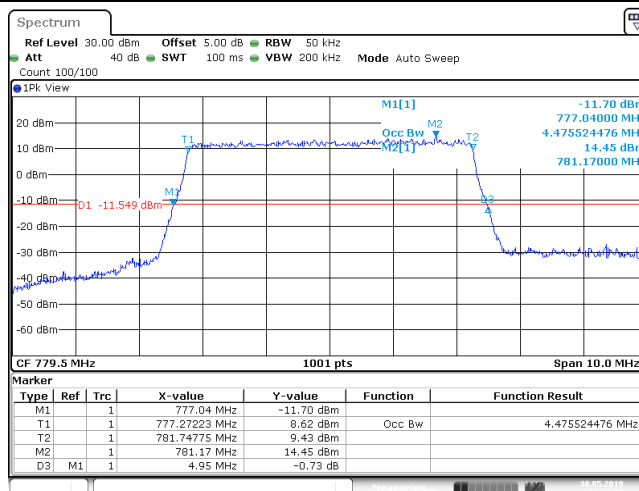
Date: 30 MAY 2019 00:13:35

Band13_5MHz_QPSK_23255_25RB#0



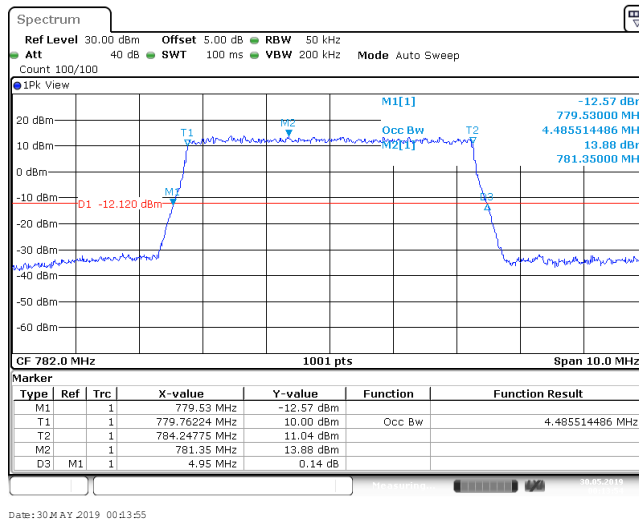
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Band13_5MHz_16QAM_23205_25RB#0

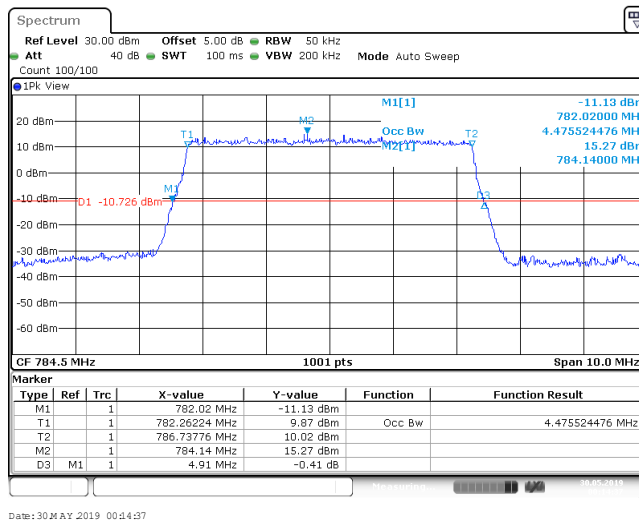


Date: 30 MAY 2019 00:13:12

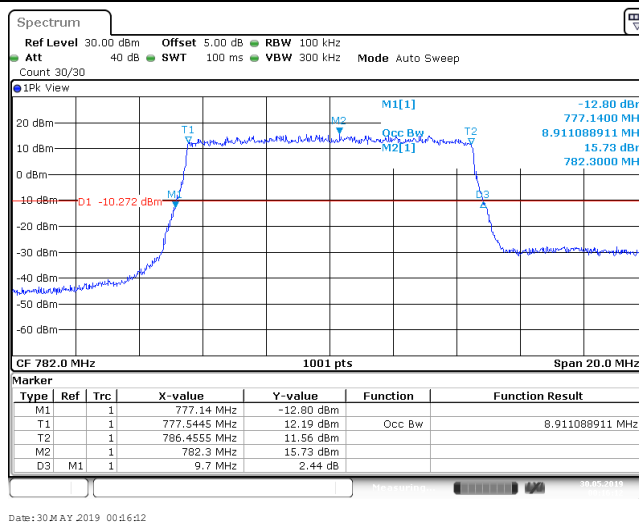
Band13_5MHz_16QAM_23230_25RB#0



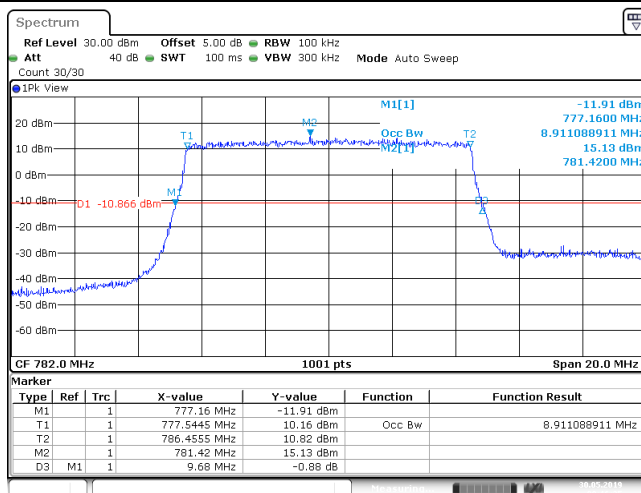
Band13_5MHz_16QAM_23255_25RB#0



Band13_10MHz_QPSK_23230_50RB#0



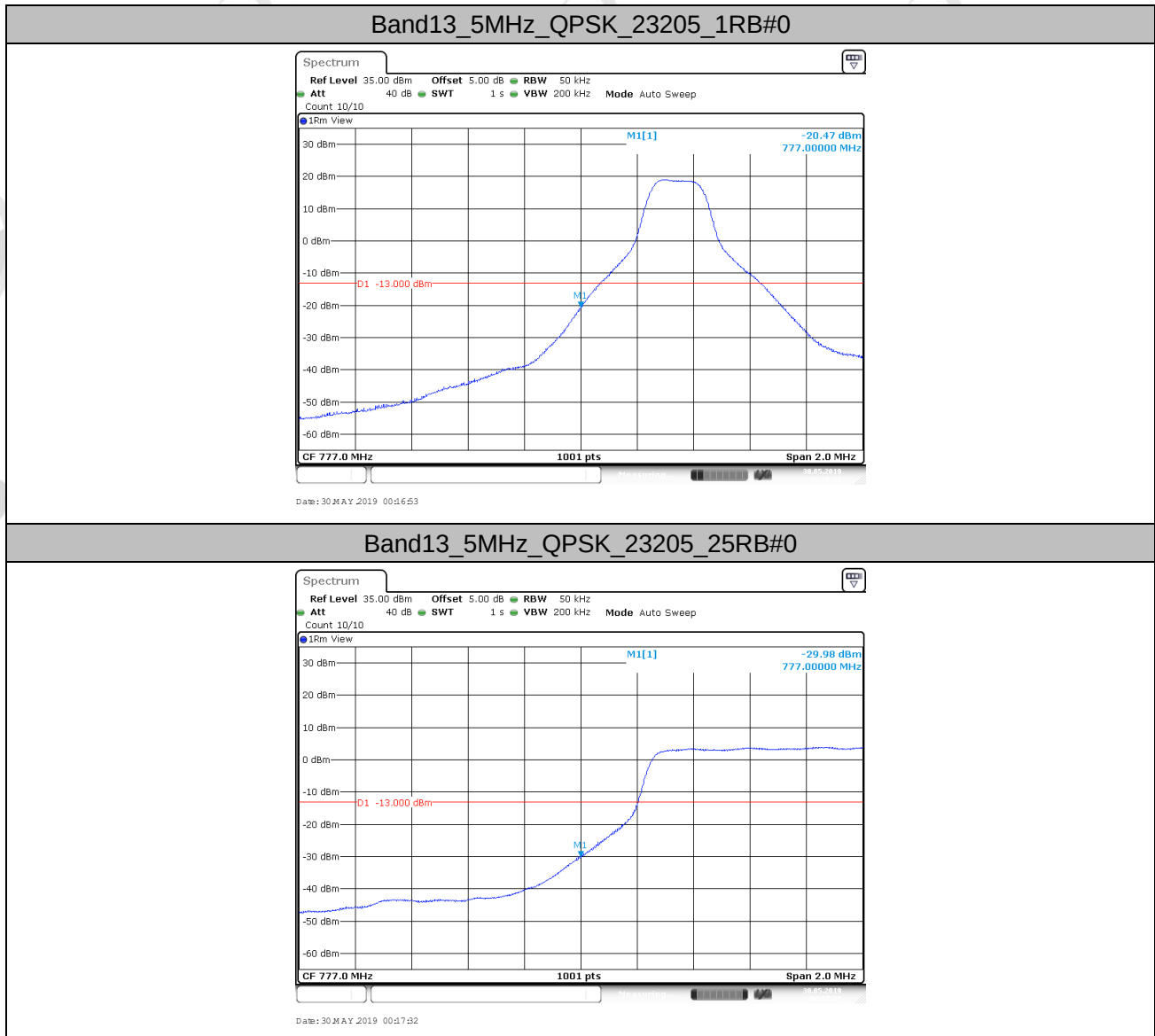
Band13_10MHz_16QAM_23230_50RB#0



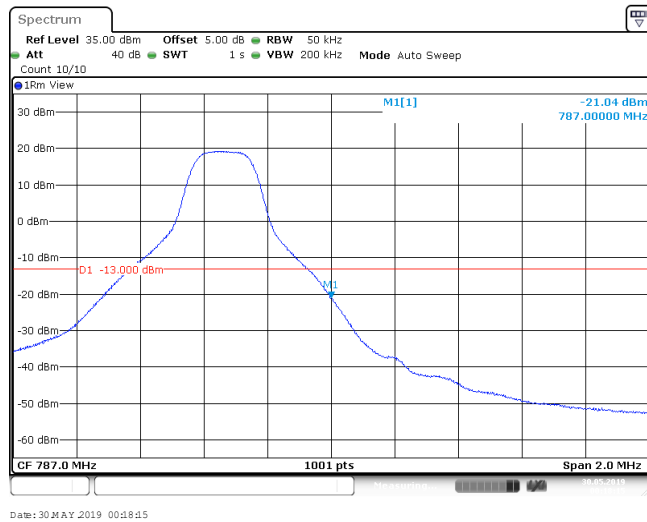
Date: 30 MAY 2019 00:16:26

7. Band Edge Compliance

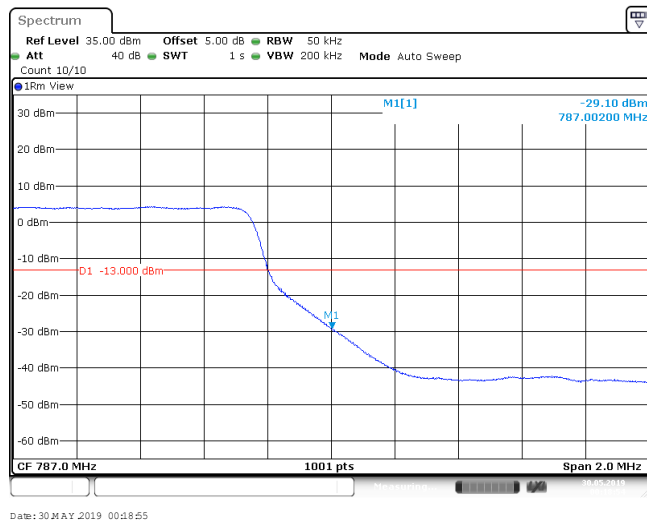
7.1. Test Plots



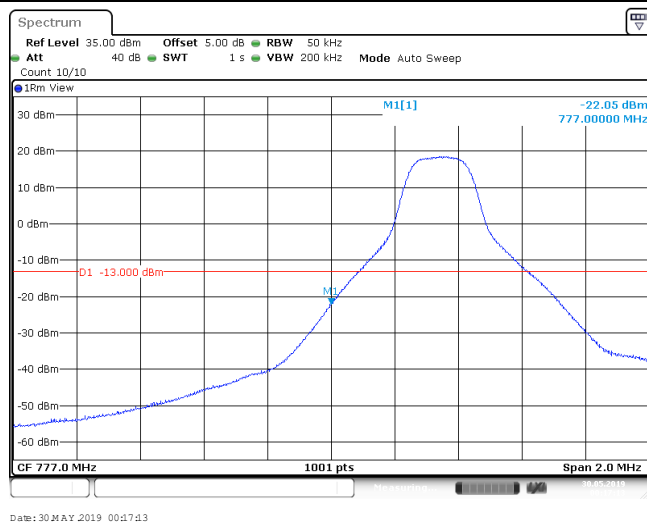
Band13_5MHz_QPSK_23255_1RB#24



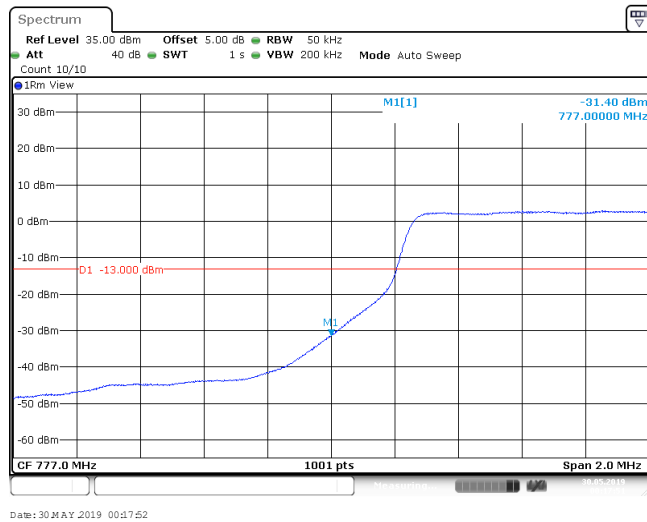
Band13_5MHz_QPSK_23255_25RB#0



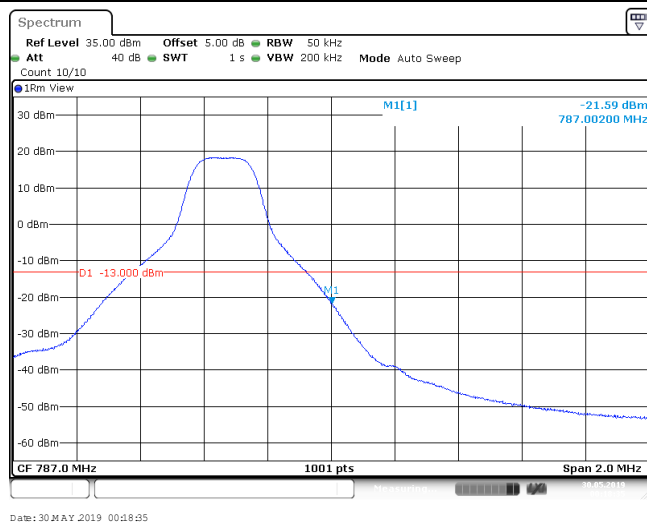
Band13_5MHz_16QAM_23205_1RB#0



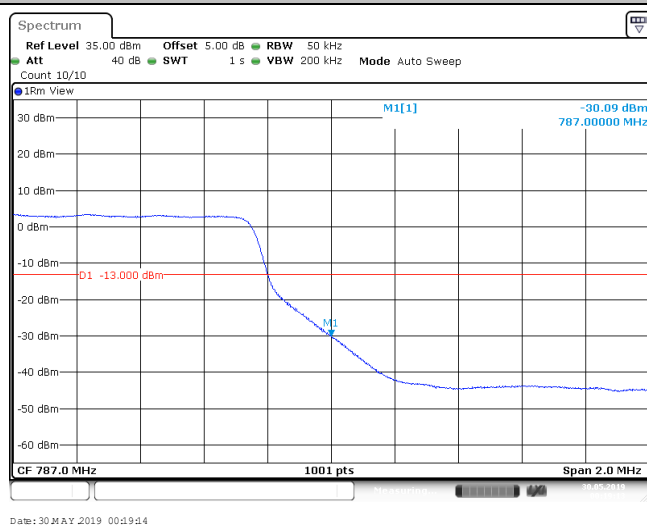
Band13_5MHz_16QAM_23205_25RB#0



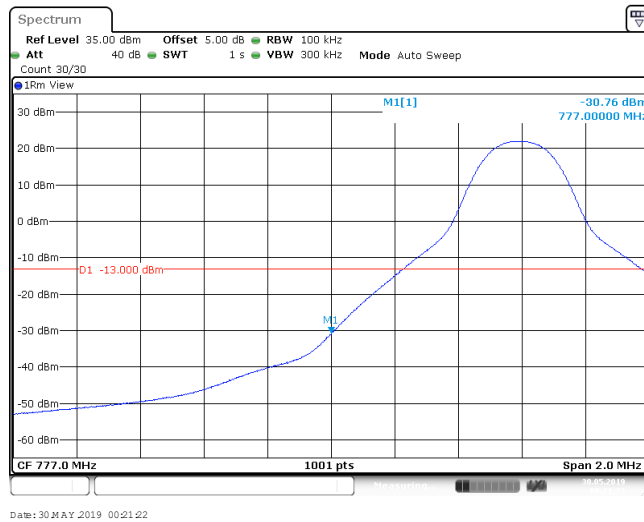
Band13_5MHz_16QAM_23255_1RB#24



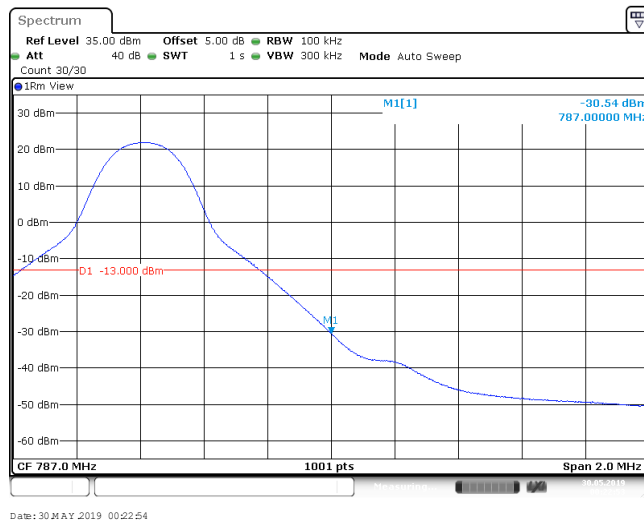
Band13_5MHz_16QAM_23255_25RB#0



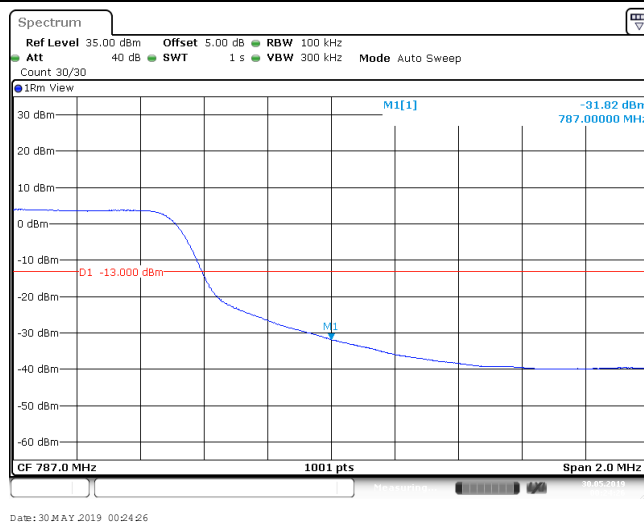
Band13_10MHz_QPSK_23230_Left_1RB#0



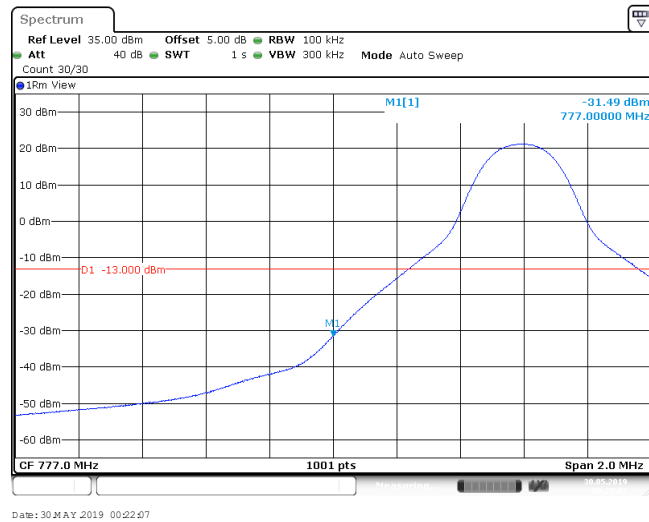
Band13_10MHz_QPSK_23230_Right_1RB#49



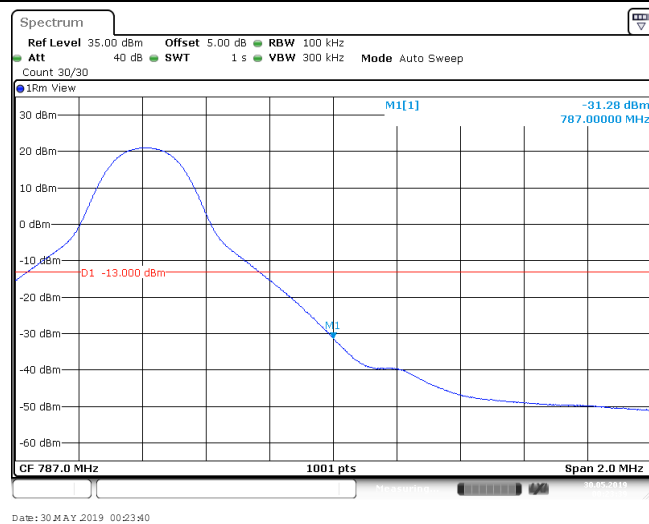
Band13_10MHz_QPSK_23230_Right_50RB#0



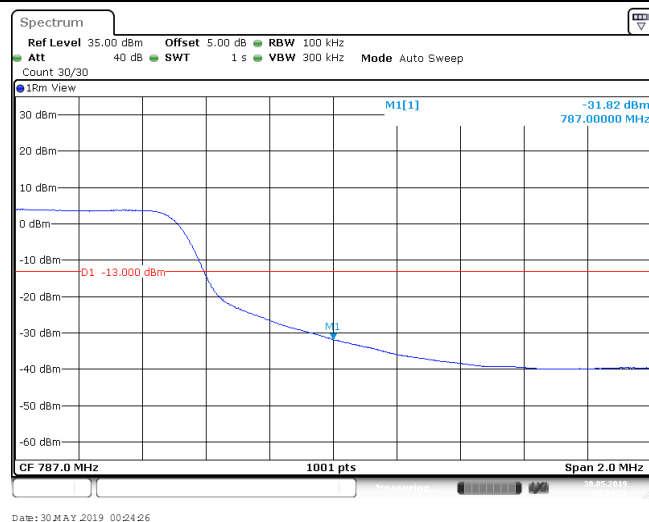
Band13_10MHz_16QAM_23230_Left_1RB#0



Band13_10MHz_16QAM_23230_Right_1RB#49



Band13_10MHz_16QAM_23230_Right_50RB#0



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	0.80	0.001023	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VN	NT	-0.30	-0.000384	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VH	NT	-1.70	-0.002174	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VL	NT	-2.30	-0.002941	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VN	NT	-2.40	-0.003069	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VH	NT	-2.20	-0.002813	±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	1.20	0.001535	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	-20	-0.30	-0.000384	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	0	-1.70	-0.002174	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	10	-0.50	-0.000639	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	20	-2.00	-0.002558	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	30	0.50	0.000639	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	40	-1.70	-0.002174	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	50	-2.10	-0.002685	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-30	-0.40	-0.000512	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-20	-1.80	-0.002302	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	0	-1.60	-0.002046	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	10	1.30	0.001662	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	20	-1.10	-0.001407	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	30	2.20	0.002813	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	40	1.30	0.001662	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	50	0.00	0.000000	±2.5	PASS

The End