

Appendix B.2

E-UTRA BAND 13

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	2019/3/2	2020/3/1
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017/6/27	2020/6/26
Hom Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12
Hom 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	2018/5/2	2019/5/1
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	Cal.Due date
				(yyyy-mm-dd)	(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

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]	$U = \pm 0.24 \text{ ppm}$

1. Effective (Isotropic) Radiated Power

1.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Conducted Power (dBm)	ERP (dBm)	Limit (dBm)	Verdict
Band13	5MHz	QPSK	23205	1RB#0	24.60	22.32	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#12	24.50	22.22	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#24	24.90	22.62	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#0	23.88	21.60	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#6	23.04	20.76	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#13	23.65	21.37	34.77	PASS
Band13	5MHz	QPSK	23205	25RB#0	23.64	21.36	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#0	24.42	22.14	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#12	24.49	22.21	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#24	24.78	22.50	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#0	23.66	21.38	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#6	23.76	21.48	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#13	23.66	21.38	34.77	PASS
Band13	5MHz	QPSK	23230	25RB#0	23.54	21.26	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#0	24.59	22.31	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#12	24.63	22.35	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#24	24.61	22.33	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#0	23.50	21.22	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#6	23.47	21.19	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#13	23.67	21.39	34.77	PASS
Band13	5MHz	QPSK	23255	25RB#0	23.58	21.30	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#0	23.70	21.42	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#12	23.17	20.89	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#24	23.54	21.26	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#0	22.43	20.15	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#6	22.40	20.12	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#13	22.61	20.33	34.77	PASS
Band13	5MHz	16QAM	23205	25RB#0	22.86	20.58	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#0	23.42	21.14	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#12	23.65	21.37	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#24	23.35	21.07	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#0	22.56	20.28	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#6	22.53	20.25	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#13	22.51	20.23	34.77	PASS
Band13	5MHz	16QAM	23230	25RB#0	22.69	20.41	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#0	23.66	21.38	34.77	PASS

Band13	5MHz	16QAM	23255	1RB#12	23.58	21.30	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#24	23.04	20.76	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#0	22.69	20.41	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#6	22.54	20.26	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#13	22.53	20.25	34.77	PASS
Band13	5MHz	16QAM	23255	25RB#0	22.72	20.44	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#0	23.95	21.67	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#24	23.59	21.31	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#49	24.55	22.27	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#0	23.74	21.46	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#12	23.64	21.36	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#25	23.56	21.28	34.77	PASS
Band13	10MHz	QPSK	23230	50RB#0	23.60	21.32	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#0	23.15	20.87	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#24	23.21	20.93	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#49	23.23	20.95	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#0	22.82	20.54	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#12	22.80	20.52	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#25	22.70	20.42	34.77	PASS
Band13	10MHz	16QAM	23230	50RB#0	22.82	20.54	34.77	PASS

Remark:

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

$$\text{ERP [dBm]} = \text{Conducted Power [dBm]} + \text{Gain [dBd]}$$

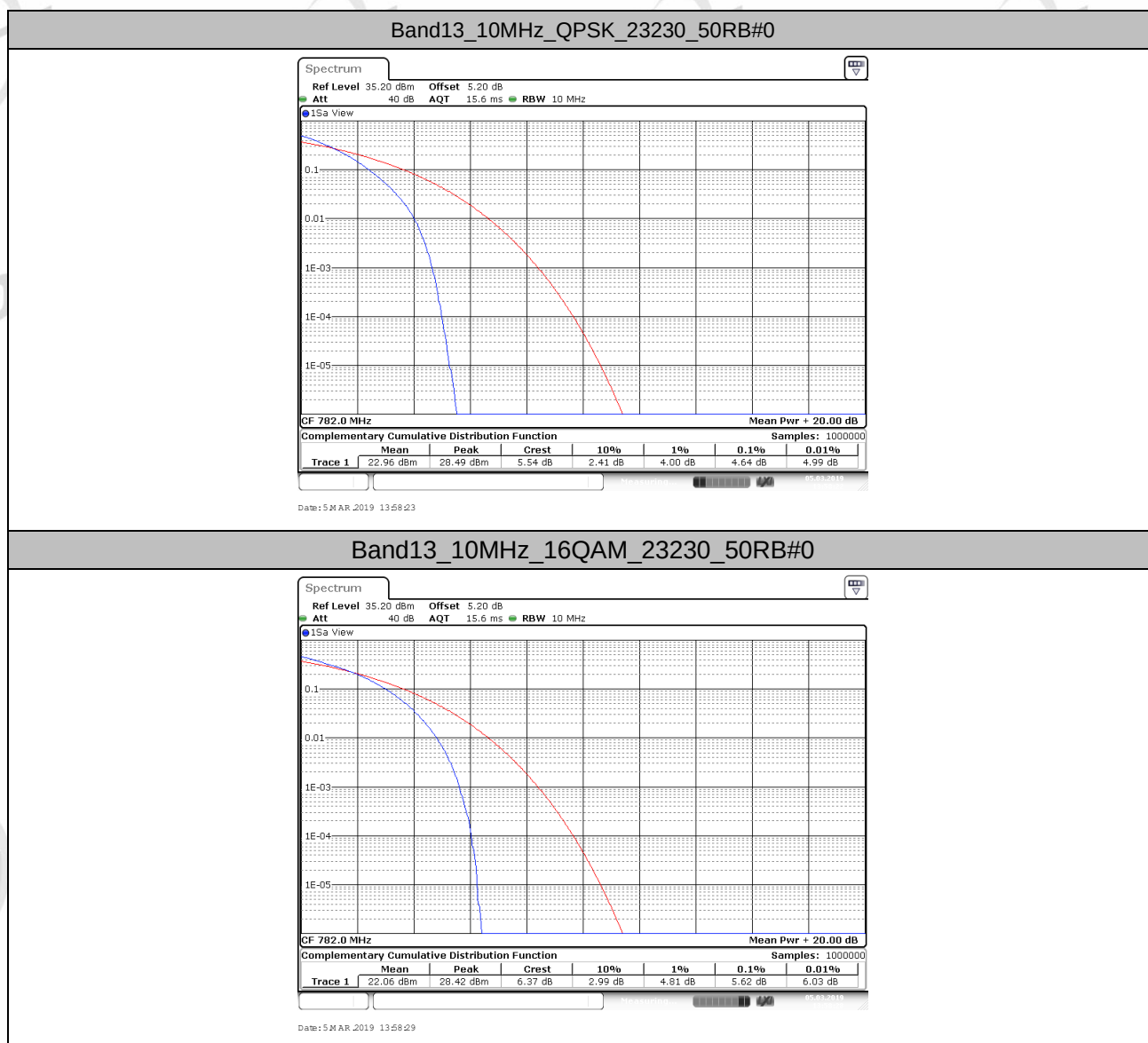
$$\text{EIRP [dBm]} = \text{Conducted Power [dBm]} + \text{Gain [dBi]}$$

2. Peak-to-Average Ratio(CCDF)

2.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Result(dB)	Limit(dB)	Verdict
Band13	10MHz	QPSK	23230	50RB#0	4.64	13	PASS
Band13	10MHz	16QAM	23230	50RB#0	5.62	13	PASS

2.2. Test Plots

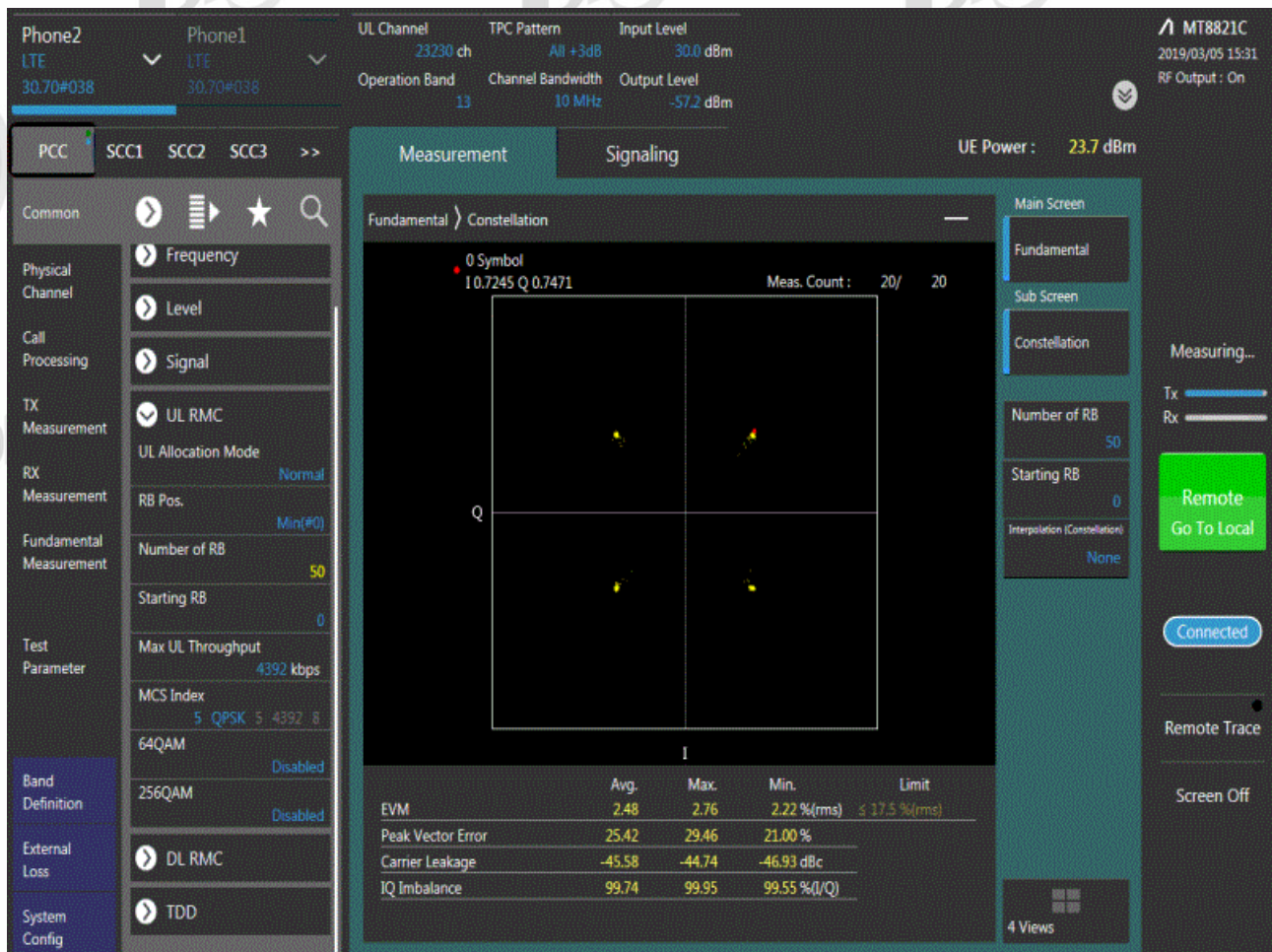


3. Modulation Characteristics

3.1. Test BAND = LTE BAND13

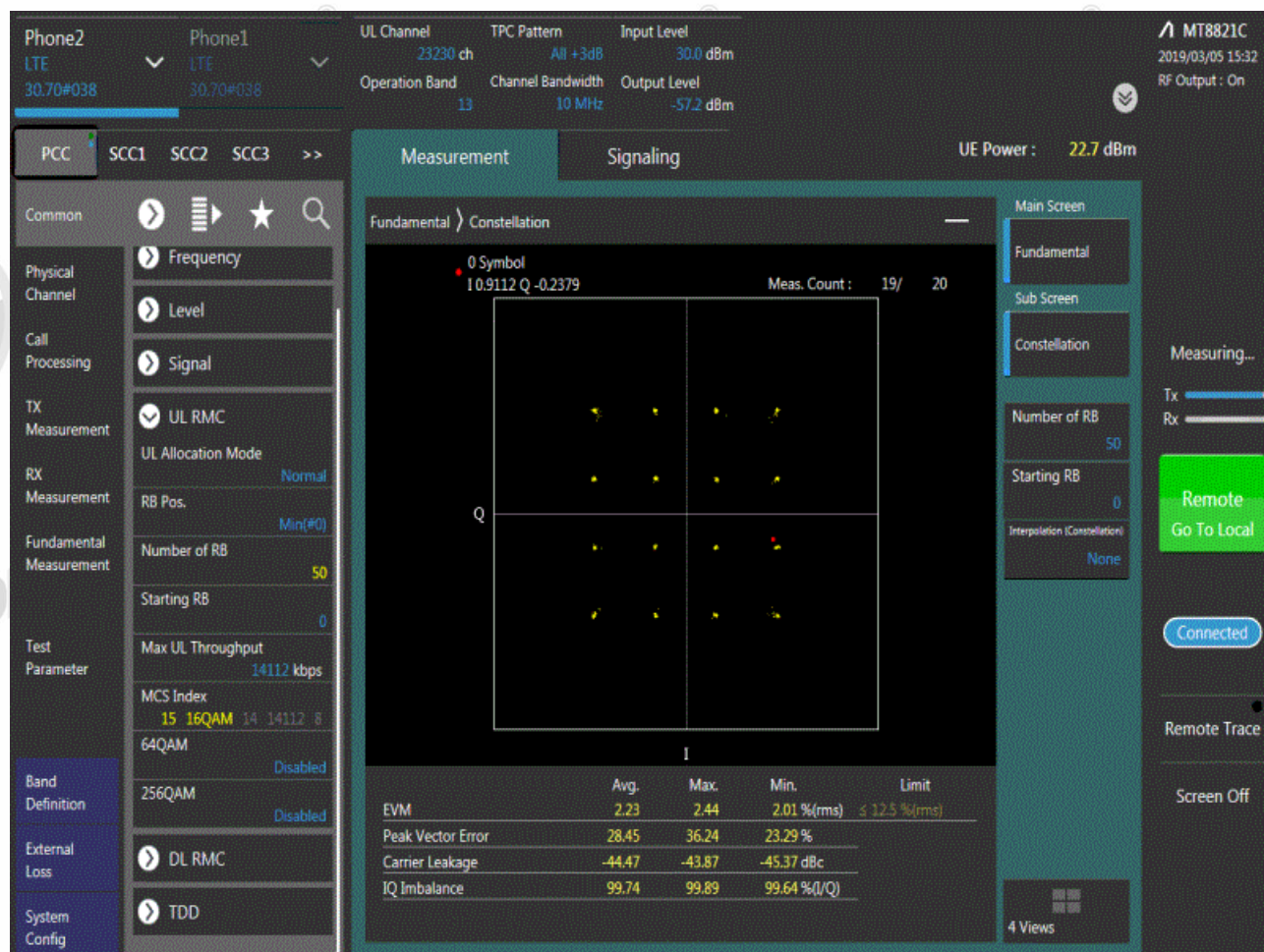
3.1.1. Test Mode = LTE /TM1 10MHz

3.1.1.1. Test Channel = MCH



3.1.2. Test Mode = LTE /TM2 10MHz

3.1.2.1. Test Channel = MCH

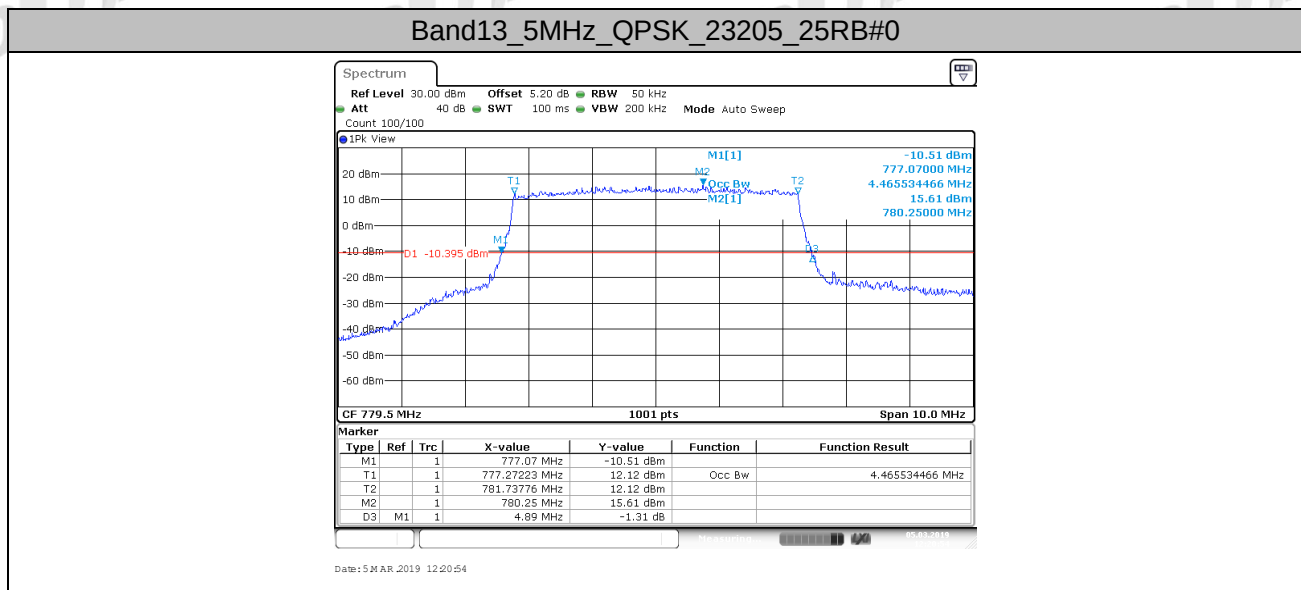


4. 26dB Bandwidth and Occupied Bandwidth

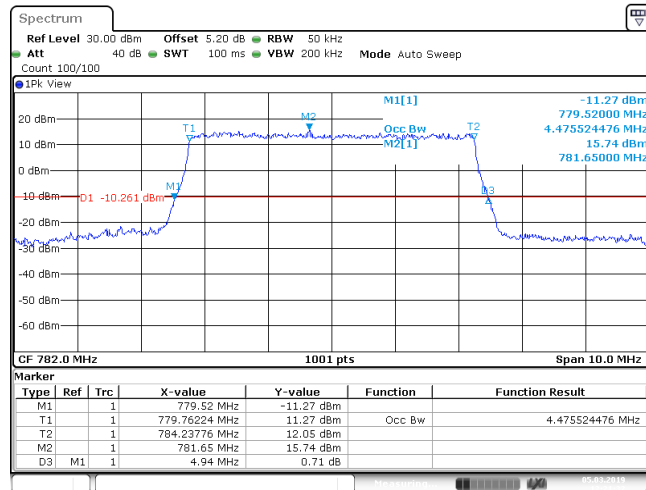
4.1. Test Result

BAND	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band13	5MHz	QPSK	23205	25RB#0	4.466	4.890	PASS
Band13	5MHz	QPSK	23230	25RB#0	4.476	4.940	PASS
Band13	5MHz	QPSK	23255	25RB#0	4.476	4.950	PASS
Band13	5MHz	16QAM	23205	25RB#0	4.446	4.840	PASS
Band13	5MHz	16QAM	23230	25RB#0	4.486	4.990	PASS
Band13	5MHz	16QAM	23255	25RB#0	4.486	4.950	PASS
Band13	10MHz	QPSK	23230	50RB#0	8.931	9.660	PASS
Band13	10MHz	16QAM	23230	50RB#0	8.911	9.660	PASS

4.2. Test Plots

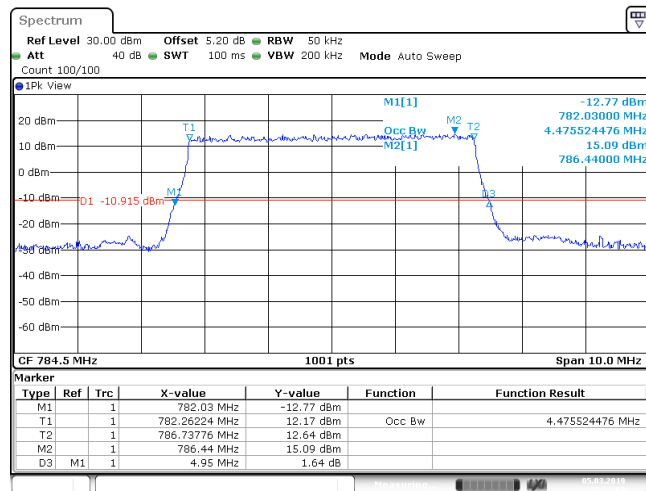


Band13_5MHz_QPSK_23230_25RB#0



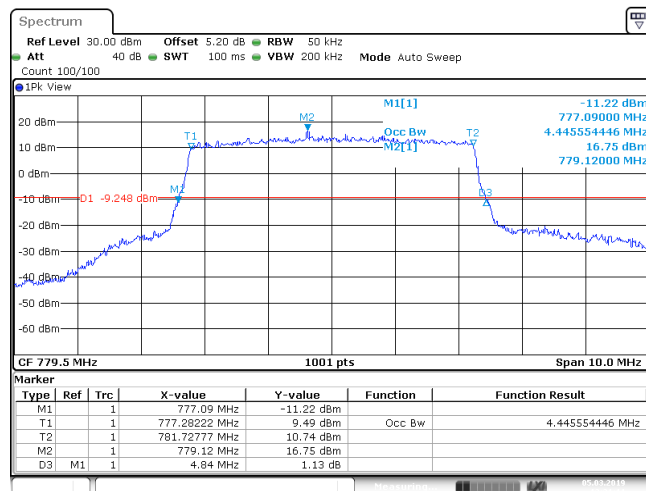
Date: 5 MAR 2019 12:21:32

Band13_5MHz_QPSK_23255_25RB#0



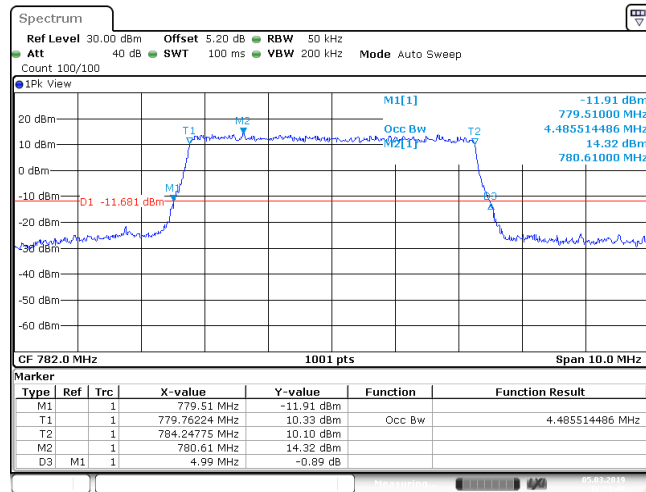
Date: 5 MAR 2019 12:22:09

Band13_5MHz_16QAM_23205_25RB#0



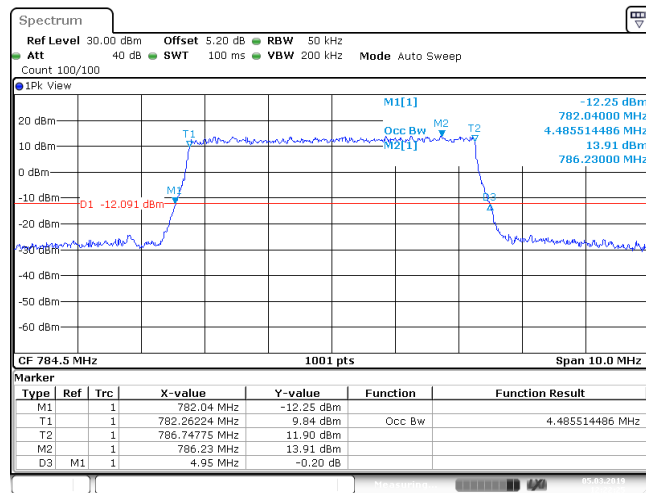
Date: 5 MAR 2019 12:21:12

Band13_5MHz_16QAM_23230_25RB#0



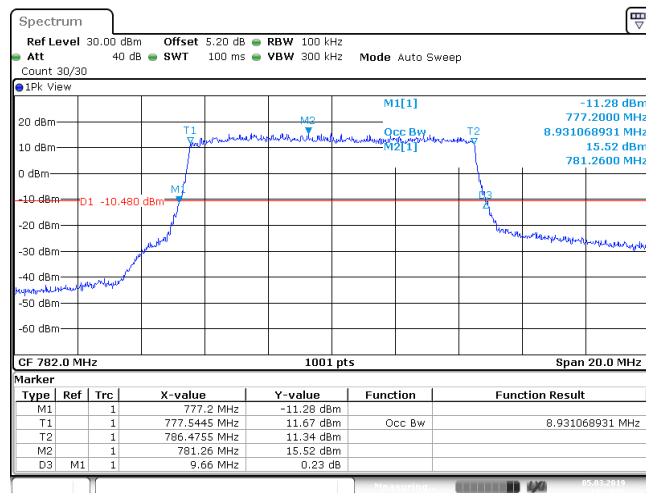
Date: 5 MAR 2019 12:21:49

Band13_5MHz_16QAM_23255_25RB#0



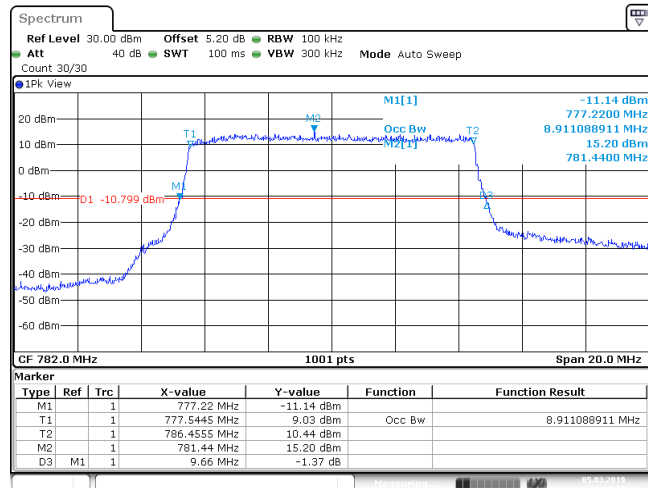
Date: 5 MAR 2019 12:22:26

Band13_10MHz_QPSK_23230_50RB#0



Date: 5 MAR 2019 12:24:06

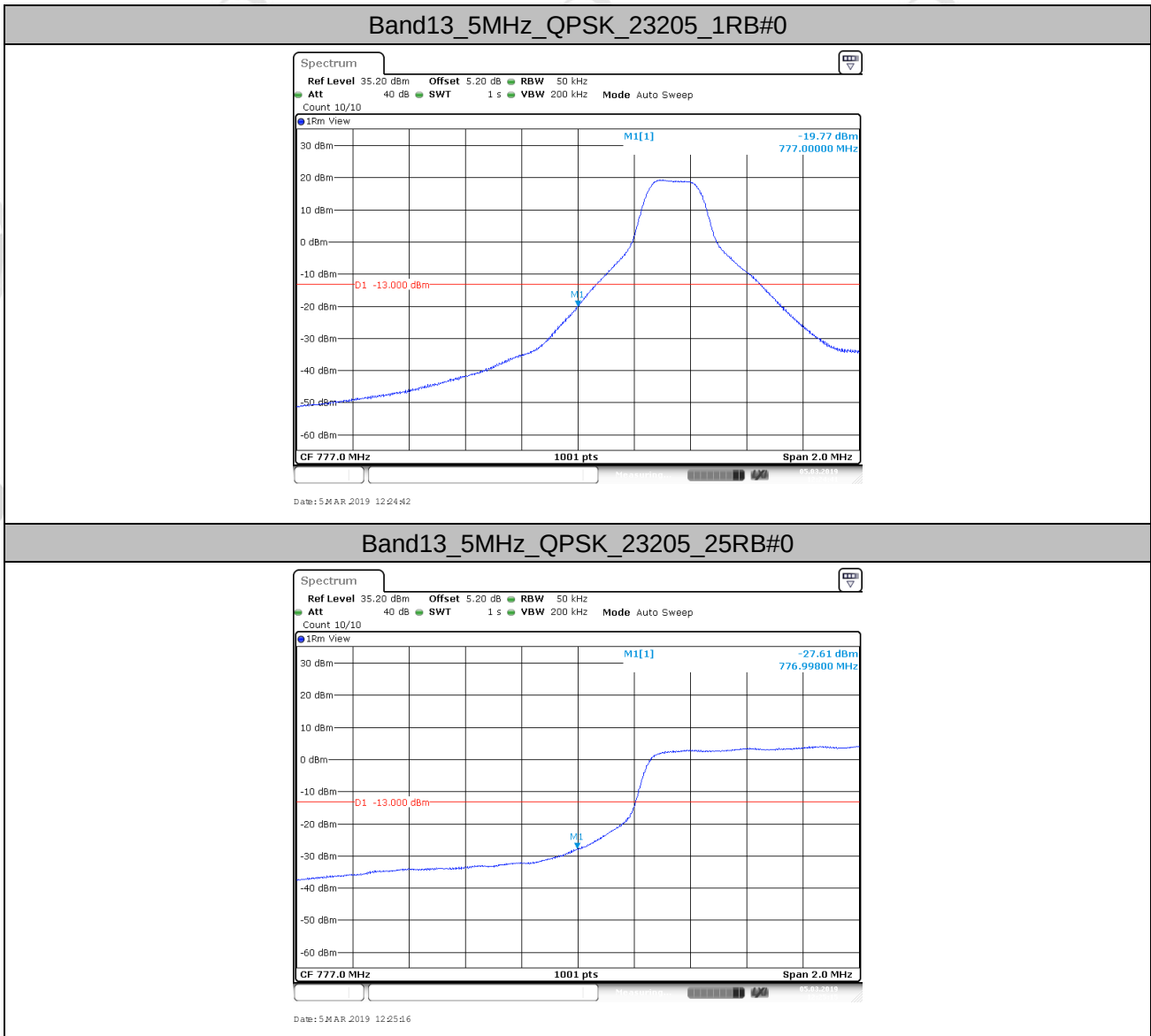
Band13_10MHz_16QAM_23230_50RB#0



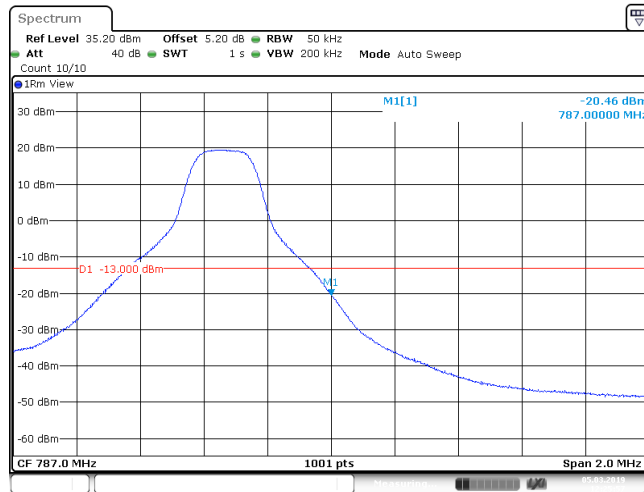
Date: 5 MAR 2019 12:24:16

5. Band Edge Compliance

5.1. Test Plots

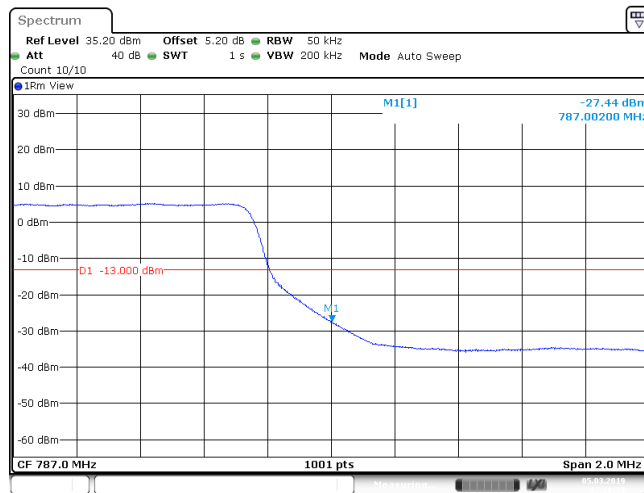


Band13_5MHz_QPSK_23255_1RB#24



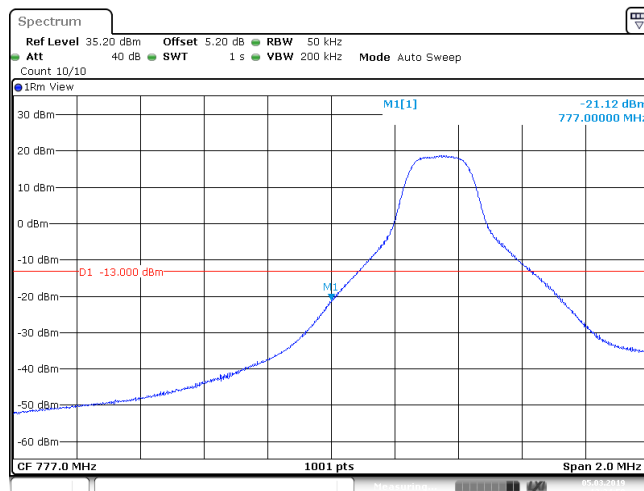
Date: 5 MAR 2019 12:25:57

Band13_5MHz_QPSK_23255_25RB#0



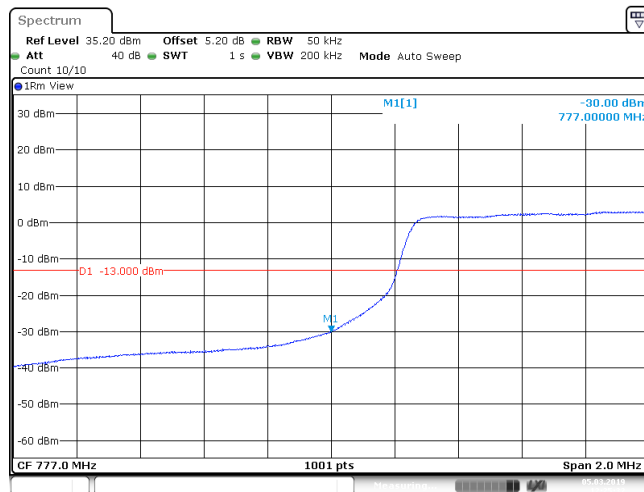
Date: 5 MAR 2019 12:26:32

Band13_5MHz_16QAM_23205_1RB#0



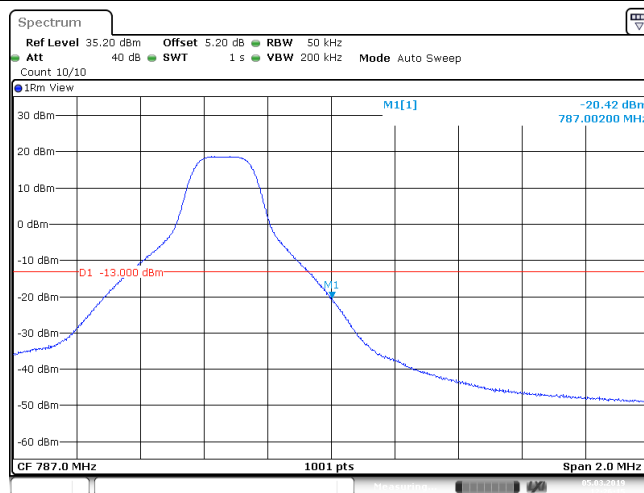
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Band13_5MHz_16QAM_23205_25RB#0



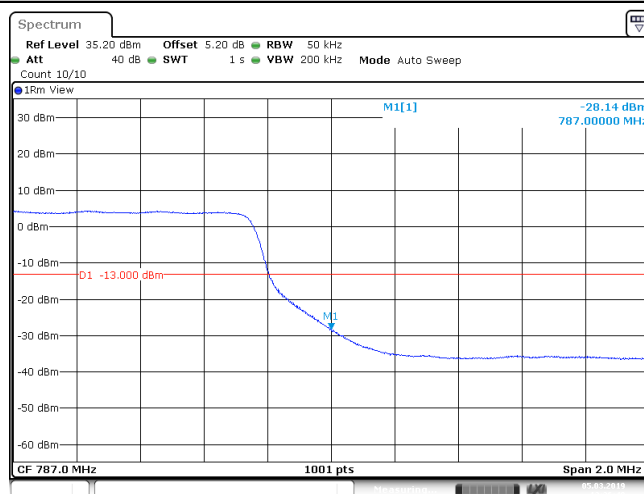
Date: 5 MAR 2019 12:25:33

Band13_5MHz_16QAM_23255_1RB#24



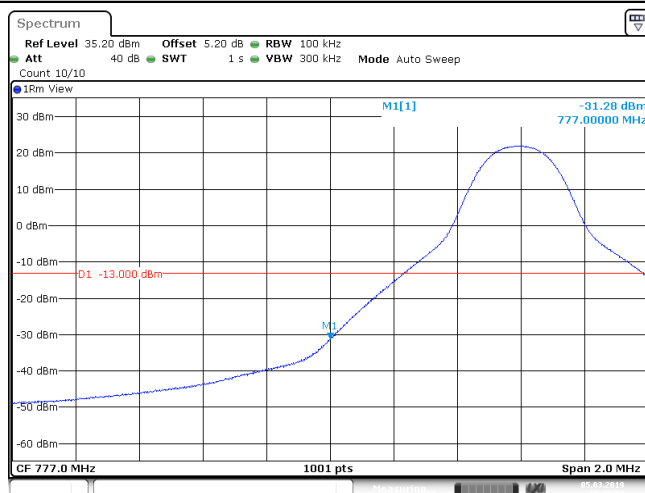
Date: 5 MAR 2019 12:26:15

Band13_5MHz_16QAM_23255_25RB#0



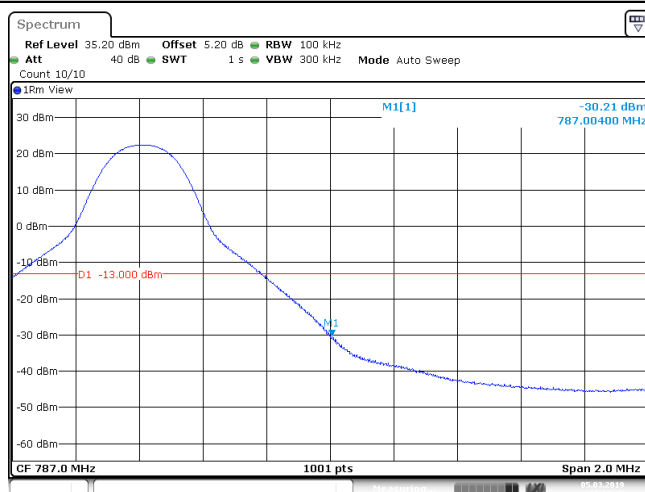
Date: 5 MAR 2019 12:26:49

Band13_10MHz_QPSK_23230_Left_1RB#0



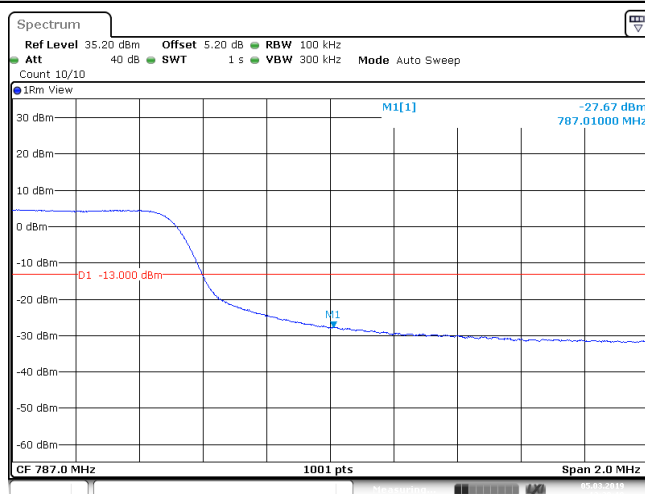
Date: 5 MAR 2019 12:28:05

Band13_10MHz_QPSK_23230_Right_1RB#49



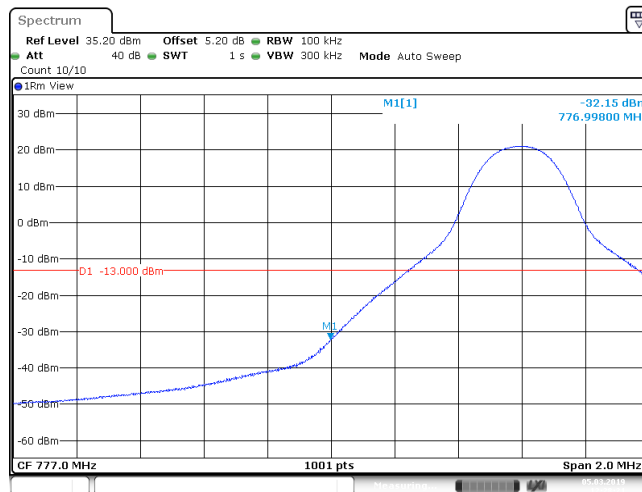
Date: 5 MAR 2019 12:28:13

Band13_10MHz_QPSK_23230_Right_50RB#0



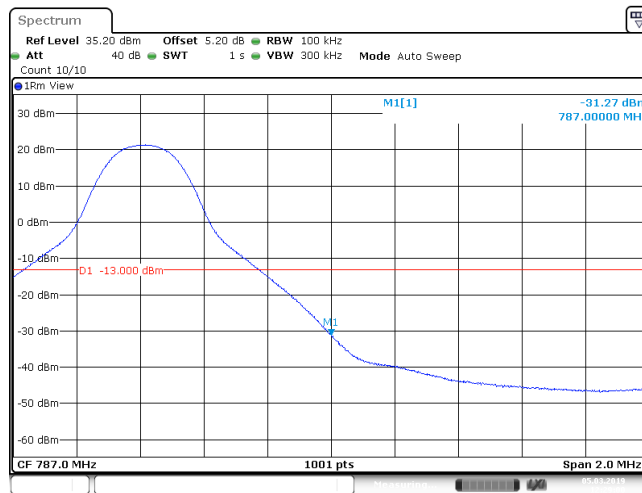
Date: 5 MAR 2019 12:29:18

Band13_10MHz_16QAM_23230_Left_1RB#0



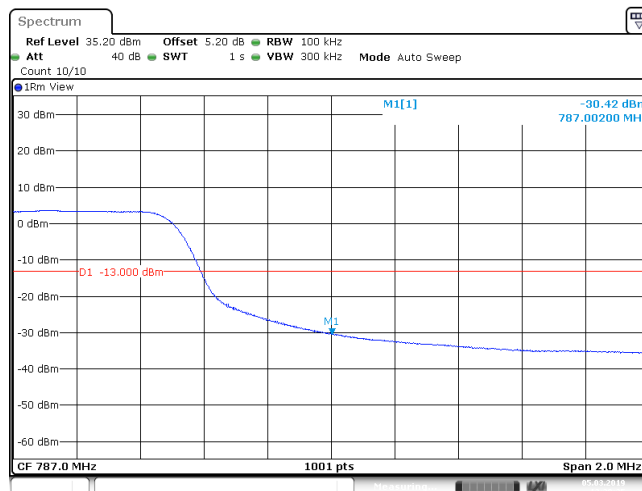
Date: 5 MAR 2019 12:28:22

Band13_10MHz_16QAM_23230_Right_1RB#49



Date: 5 MAR 2019 12:29:01

Band13_10MHz_16QAM_23230_Right_50RB#0



Date: 5 MAR 2019 12:29:36

6. 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 = $k * (\text{Span} / \text{RBW})$ " 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.

6.1. Test Plots



7. Frequency Stability

7.1.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	0.00	0.000000	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VN	NT	0.40	0.000512	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	VH	NT	-0.70	-0.000895	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VL	NT	1.00	0.001279	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VN	NT	-0.90	-0.001151	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	VH	NT	0.20	0.000256	±2.5	PASS

7.2.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	1.80	0.002302	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	-20	0.40	0.000512	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	0	1.20	0.001535	±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	0.40	0.000512	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	30	0.60	0.000767	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	40	0.80	0.001023	±2.5	PASS
Band13	10MHz	QPSK	23230	50RB#0	NV	50	1.20	0.001535	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-30	1.60	0.002046	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	-20	1.20	0.001535	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	0	1.00	0.001279	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	10	1.50	0.001918	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	20	0.90	0.001151	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	30	-0.30	-0.000384	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	40	0.70	0.000895	±2.5	PASS
Band13	10MHz	16QAM	23230	50RB#0	NV	50	1.10	0.001407	±2.5	PASS

The End