

Radio Test Report (For Bluetooth Low Energy)

Report No.: RJCDBM-WTW-P22060902

Test Model: MGM240S22A

Received Date: Jul. 06, 2022

Test Date: Jul. 15 ~ Jul. 29, 2022

Issued Date: Sep. 30, 2022

Applicant: Silicon Laboratories Finland Oy

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ESPOO, FINLAND

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, TAIWAN



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Release Control Record

Issue No.	Description	Date Issued
RJCDBM-WTW-P22060902	Original release	Sep. 30, 2022

1 Certificate of Conformity

Product: Bluetooth Low Energy and 802.15.4 wireless radio module

Brand: SILICON LABS

Test Model: MGM240S22A

Sample Status: Engineering sample fully representing the production modules

Applicant: Silicon Laboratories Finland Oy

Test Date: Jul. 15 ~ Jul. 29, 2022

Standards: ARIB STD-T66 (V3.7), MIC notice 88 Appendix 43
Certification Ordinance Article 2-1-19

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Lena Wang, **Date:** Sep. 30, 2022
Lena Wang / Specialist

Approved by : Jeremy Lin, **Date:** Sep. 30, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

The EUT has been tested according to the following specifications:

Notice 88 Appendix 43 Reference	ARIB STD- T66 Ref.	Report Reference	Parameter	Test Results (Note)
General Provisions				
C	3.2 (4)	4.1	Frequency tolerance	C
D	3.2 (7)	4.2	Occupied bandwidth	C
E	3.2 (6)	4.4	Spurious emissions	C
Transmitting Equipment				
F	3.2 (2)	4.5	Antenna power	C
--	--	--	SAR	NA
Transmitting Antenna				
--	--	3.5	Type, configuration, etc. of transmitting antenna	C
--	--	3.5	Direction pattern of transmitting antenna	C
Receiving Equipment				
G	3.3 (1)	4.6	Spurious emissions of receiver	C
--	--	--	Refer to all articles for transmitting antenna	C
Operating Frequency 2400 to 2483.5MHz				
--	3.7 (1)	3.4	Radio Frequency / modulation section cannot be opened easily	C
--	3.1 (1)	3.1	Communication method	C
--	3.2 (1)a	3.1	Modulation method	C
--	3.2 (1)a	3.1	Spread spectrum method	C
--	3.2 (2)	4.5	Antenna power	C
--	3.6 (2)	4.5	Absolute gain of transmitting antenna	C
--	3.6 (2)	--	Angular width of principal radiation (AWPR)	NA
--	3.2 (10)	--	Number of carriers within 1 MHz bandwidth in OFDM	NA
--	3.2 (8)	4.3	Spreading bandwidth	NA
--	3.2 (9)	4.3	Spreading factor	NA
--	3.2 (11)	--	Frequency retention time (FH employed)	NA
--	3.4.1(1)	4.7	Interference Prevention Function	C

Note:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- C = Conform NC = Not Conform NT = Not Tested NA = Not Applicable

2.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration	Calibration Authority	Cal. Method
Spectrum Analyzer / KEYSIGHT	N9020B	MY60110462	Dec. 21, 2021	Dec. 20, 2022	ETC	c)
Signal Generator / Anritsu	E4438C	MY49071692	Nov. 09, 2021	Nov. 08, 2022	ETC	c)
Power Meter / Anritsu	ML2495A	1232003	Jan. 09, 2022	Jan. 08, 2023	ETC	c)
Power Sensor / Anritsu	MA2411B	1207333	Jan. 09, 2022	Jan. 08, 2023	ETC	c)
Power Splitter / Marvelous Microwave Inc.	MVE8546	20161123081	Jan. 12, 2022	Jan. 11, 2023	BV CPS E&E	d)
DC Power Supply / Keysight	U8002A	MY56330015	Note 3	Note 3	BV CPS E&E	d)
True RMS Clamp Meter / Fluke	325	31130711WS	Jun. 09, 2022	Jun. 08, 2023	ETC	c)

Note:

1. Calibration Method

- a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1) of the Radio Law.
- b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
- c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- d) : Calibration conducted by using other equipment that listed above from a) to c).

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. The power supply no evaluation calibrated, which used the digital multimeter to verify before each testing.

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in TR 100 028-1.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Parameter	Uncertainty
Occupied Bandwidth	$\pm 491.896\text{Hz}$
Spurious emissions	$\pm 2.208\text{dB}$
Output power density	$\pm 2.889\text{dB}$
Out of band radiated power	$\pm 3.93\text{dB}$
Frequency Tolerance	$\pm 6805.18\text{Hz}$

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Bluetooth Low Energy and 802.15.4 wireless radio module
Brand	SILICON LABS
Test Model	MGM240S22A
Status of EUT	Engineering sample fully representing the production modules
Power Supply Rating	1.8Vdc to 3.8Vdc (from host equipment)
Typical Nominal Supply Voltage	3.0Vdc
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	1MBaud with 1Mbps transfer rate 1MBaud with Coded 125kbps transfer rate 1MBaud with Coded 500kbps transfer rate 2MBaud with 2Mbps transfer rate
Operating Frequency	2402 ~ 2480MHz
Number of Channel	1MBaud: 40 2MBaud: 37
Rated RF Output Power	Refer to note
Conducted RF Output Power	Refer to note
Radiated RF Output Power	Refer to note
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. For 1MBaud, after pre-test three transfer rates (125kbps, 500kbps and 1Mbps), 1MBaud with 1Mbps and 125kbps transfer rate were the worse and chosen for final test.
2. The antenna information is listed as below.

Mode	No.	Type	Connector	Gain (dBi)
A	1	Integral antenna	NA	1.48
B	2	External reference dipole antenna**	RP-SMA	2.80

*Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

** The dipole antenna is not sold with the EUT, but is used during testing as a reference antenna for radiated measurements of the parts making use of the RF pin.

3. The power table as below:

Transfer Rate	Rated power (mW)	Conducted RF output power (mW)	Radiated RF output power (mW)
Mode A			
1MBaud with 1Mbps transfer rate	8.50	8.492	11.94
1MBaud with Coded 125kbps transfer rate	8.50	8.433	11.857
2MBaud with 2Mbps transfer rate	8.50	8.395	11.804
Mode B			
1MBaud with 1Mbps transfer rate	8.50	8.492	16.181
1MBaud with Coded 125kbps transfer rate	8.50	8.433	16.069
2MBaud with 2Mbps transfer rate	8.50	8.395	15.996

3.2 Description of Test Modes

1MBaud

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Note:

1. The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report.
2. Physical Channels 0, 12 and 39 are special low-duty-cycle channels used only for BLE advertising mode.

2MBaud

37 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2404	11	2424	21	2444	31	2464
2	2406	-	-	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460		
10	2422	20	2442	30	2462		

Note: The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report. By means of test software (Python 3.10.3 with testing script provided by the manufacturer) the power levels during the tests were set according to the following figures:

Mode A

Channel	Power Setting		
	1MBaud with 1Mbps transfer rate	1MBaud with Coded 125kbps transfer rate	2MBaud with 2Mbps transfer rate
0	86	86	-
1	86	86	86
19	86	86	86
38	86	92	86
39	86	92	-

Mode B

Channel	Power Setting		
	1MBaud with 1Mbps transfer rate	1MBaud with Coded 125kbps transfer rate	2MBaud with 2Mbps transfer rate
0	86	86	-
1	86	86	86
19	86	86	86
38	86	92	86
39	86	92	-

3.3 Test Conditions

Test Conditions	Voltage (Vdc)
Vnormal	3.00
Vmax.	3.80
Vmin.	1.80

Note: After checking the fluctuation of input voltage to the circuit of the radio part (excluding the power supply) of the equipment to be tested, the fluctuation less than $\pm 1\%$ when input voltage from an external supply into the equipment fluctuates $\pm 10\%$, therefore, the test is carried out only at the normal voltage.

Mode	Test Item	Test Conditions	Environmental Conditions	Test Engineer
B	Frequency Tolerance	1MBaud with Coded 125kbps transfer rate	25 deg.C, 60 % RH	Chu Wu
B	Occupied Bandwidth (99% power bandwidth)	1MBaud with 1Mbps transfer rate 1MBaud with Coded 125kbps transfer rate 2MBaud with 2Mbps transfer rate	25 deg.C, 60 % RH	Chu Wu
B	Spurious Emissions for Transmitter	1MBaud with 1Mbps transfer rate 1MBaud with Coded 125kbps transfer rate 2MBaud with 2Mbps transfer rate	25 deg.C, 60 % RH	Chu Wu
A, B	Antenna Power	1MBaud with 1Mbps transfer rate 1MBaud with Coded 125kbps transfer rate 2MBaud with 2Mbps transfer rate	25 deg.C, 60 % RH	Chu Wu
B	Spurious Emissions for Receiver	1MBaud with Coded 125kbps transfer rate	25 deg.C, 60 % RH	Chu Wu

3.4 Assembly

The EUT is constructed as a standalone unit. The modulation section, preamplifier, RF component etc, are shielded under a metal housing, which is soldered to the PCB and cannot be detached easily.

3.5 Antenna Specifications

3.5.1 Antenna Gain

Mode	No.	Type	Connector	Gain (dBi)
A	1	Integral antenna	NA	1.48
B	2	External reference dipole antenna**	RP-SMA	2.80

*Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

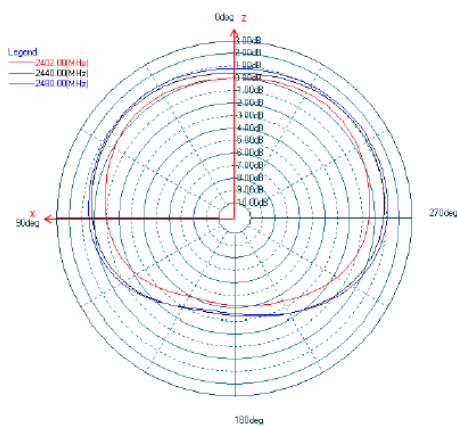
** The dipole antenna is not sold with the EUT, but is used during testing as a reference antenna for radiated measurements of the parts making use of the RF pin.

3.5.2 Antenna Pattern

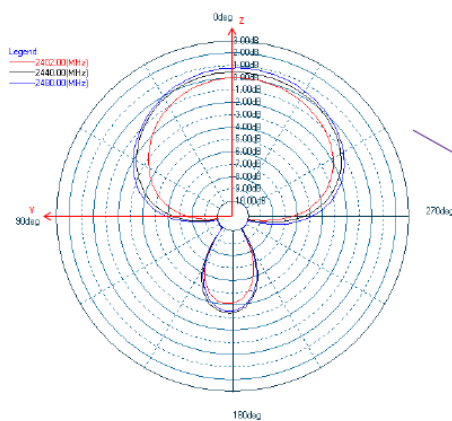
Mode A

Antenna Pattern

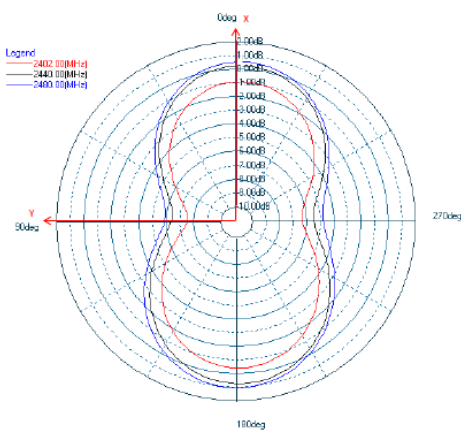
Phi0 Gain cut (dBi)



Phi90 Gain cut

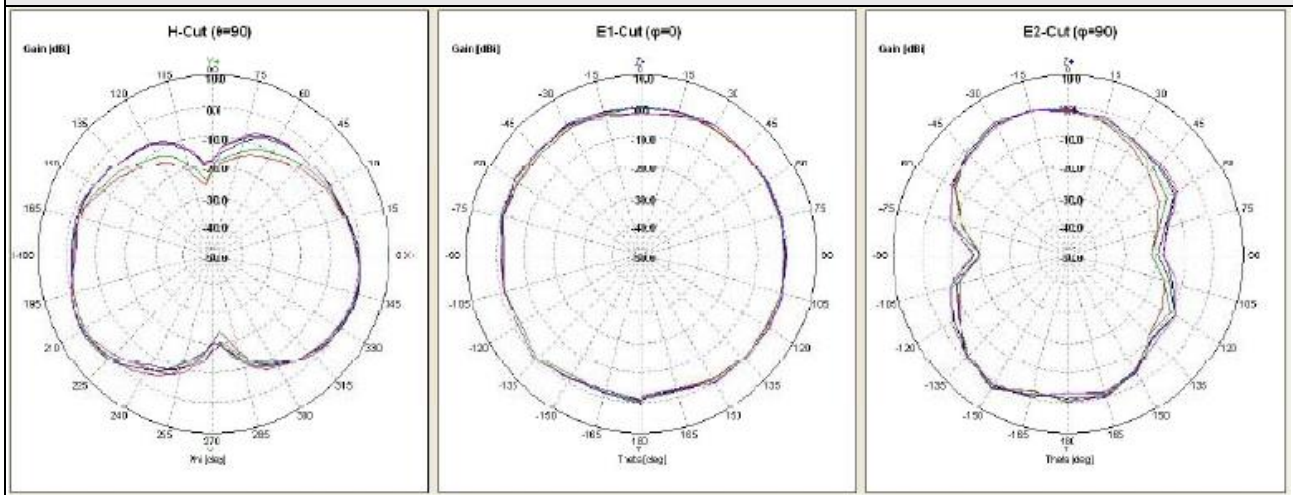


Theta90 Gain cut



Mode B

Antenna Pattern



4 Test Results

4.1 Frequency Tolerance Measurement

4.1.1 Limits of Frequency Tolerance Measurement

Tolerance of frequency shall be +/- 50ppm

4.1.2 Test Setup



4.1.3 Test Results

1MBaud with Coded 125kbps transfer rate

Channel	Frequency (MHz)	V _{normal}		V _{max.}		V _{min.}	
		Carrier Frequency (MHz)	Frequency Tolerance (ppm)	Carrier Frequency (MHz)	Frequency Tolerance (ppm)	Carrier Frequency (MHz)	Frequency Tolerance (ppm)
0	2402	2401.999200	-0.333	2401.999080	-0.383	2401.998880	-0.466
1	2404	2403.997080	-1.214	2403.997200	-1.164	2403.997360	-1.098
19	2440	2439.997800	-0.901	2439.997920	-0.852	2439.998080	-0.786
38	2478	2477.998800	-0.484	2477.998760	-0.500	2477.998880	-0.451
39	2480	2479.997760	-0.903	2479.997840	-0.870	2479.997920	-0.838

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit
Occupied bandwidth	< 26MHz

4.2.2 Test Setup

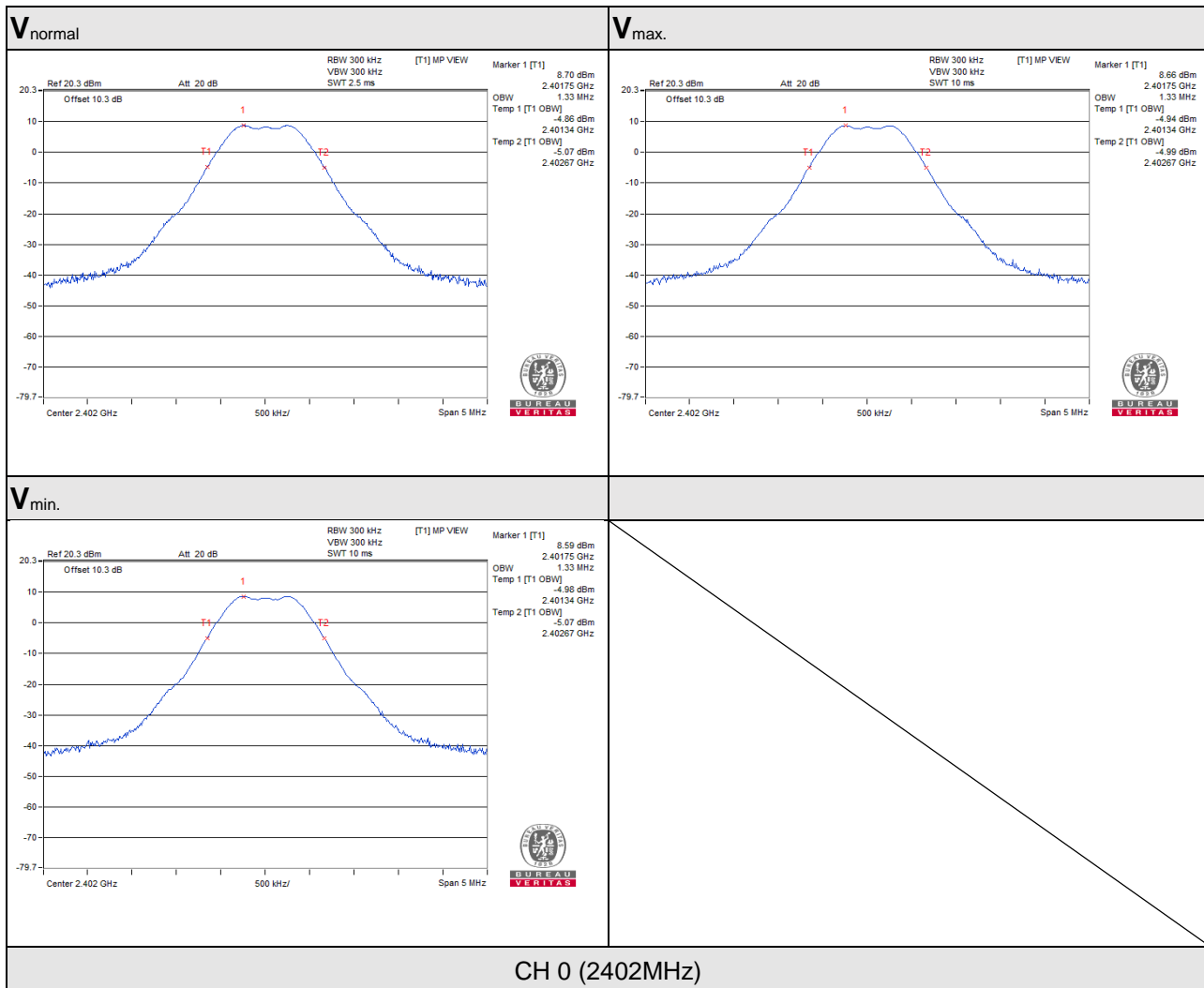


4.2.3 Test Results

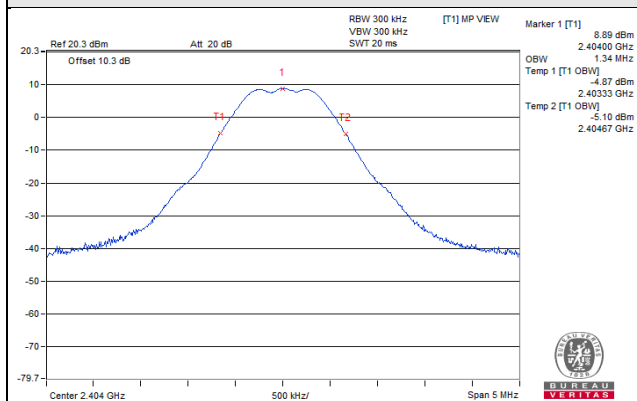
1MBaud with 1Mbps transfer rate

Channel	Frequency (MHz)	V _{normal}	V _{max.}	V _{min.}
		Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
0	2402	1.33	1.33	1.33
1	2404	1.34	1.34	1.34
19	2440	1.34	1.34	1.34
38	2478	1.33	1.34	1.34
78	2480	1.33	1.33	1.33

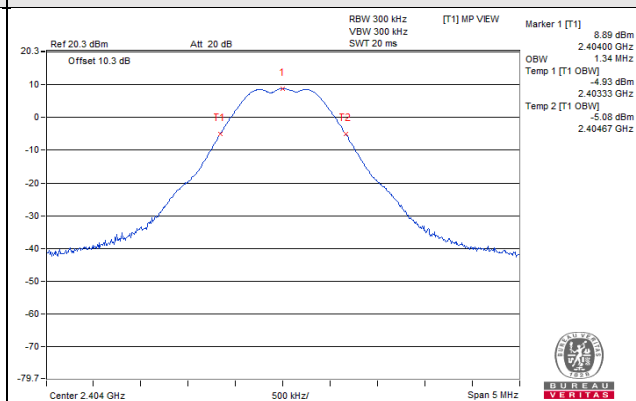
Note: For the test plots please refer to the below pages.



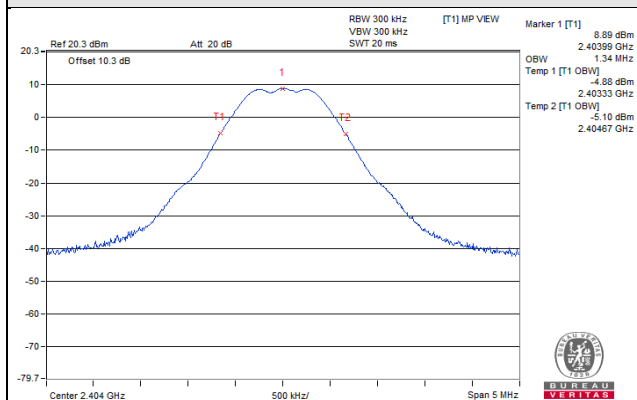
V_{normal}



V_{max.}

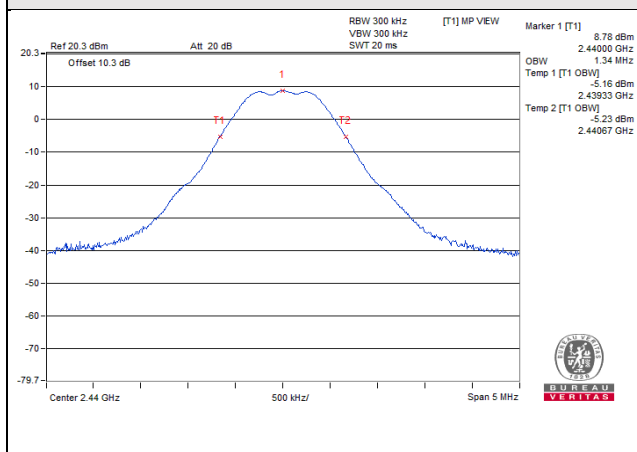


V_{min.}

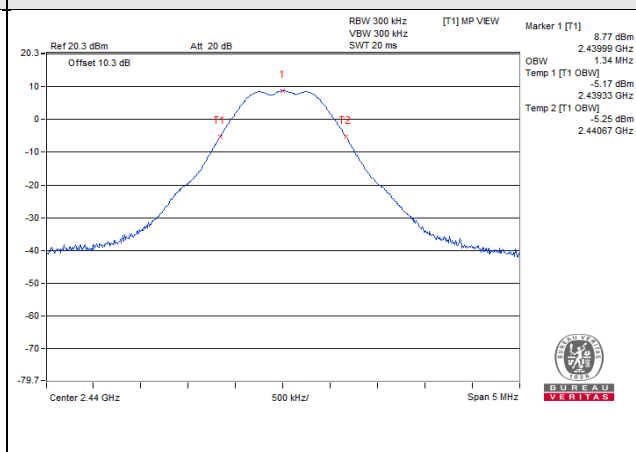


CH 1 (2404MHz)

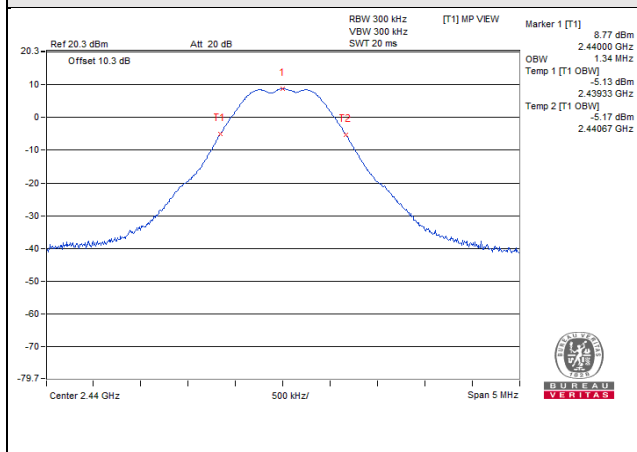
V_{normal}



V_{max.}

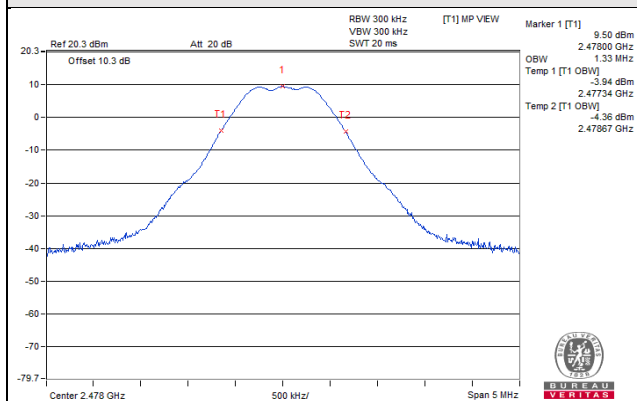


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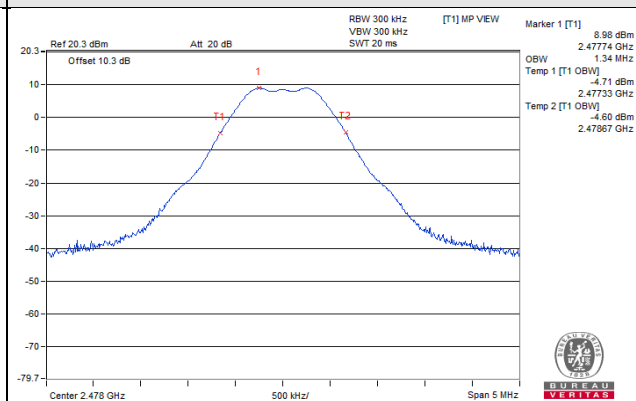


CH 19 (2440MHz)

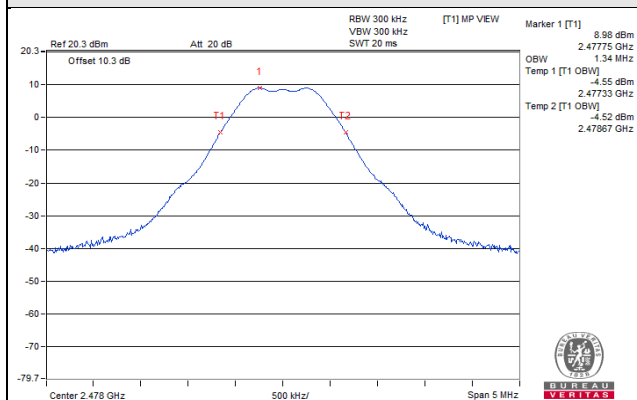
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V_{max.}

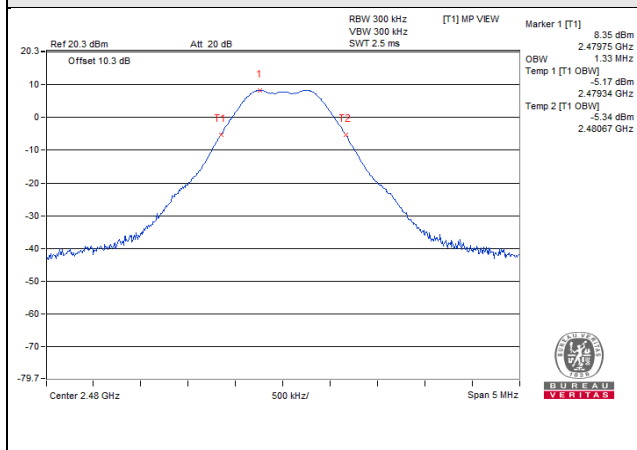


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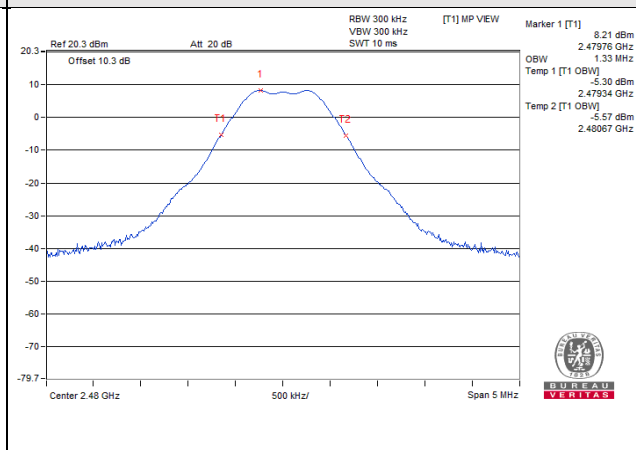


CH 38 (2478MHz)

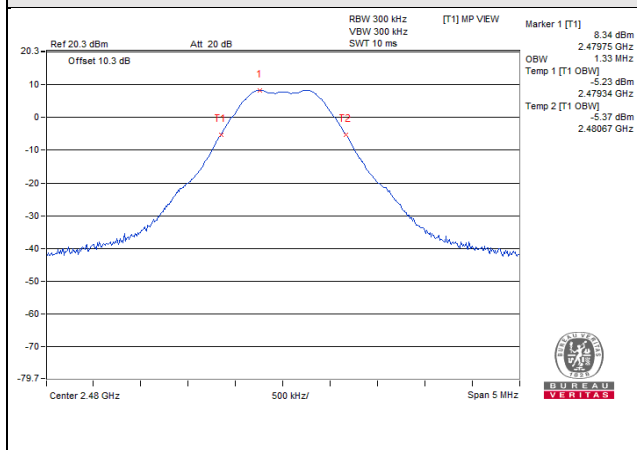
V_{normal}



V_{max.}



V_{min.}

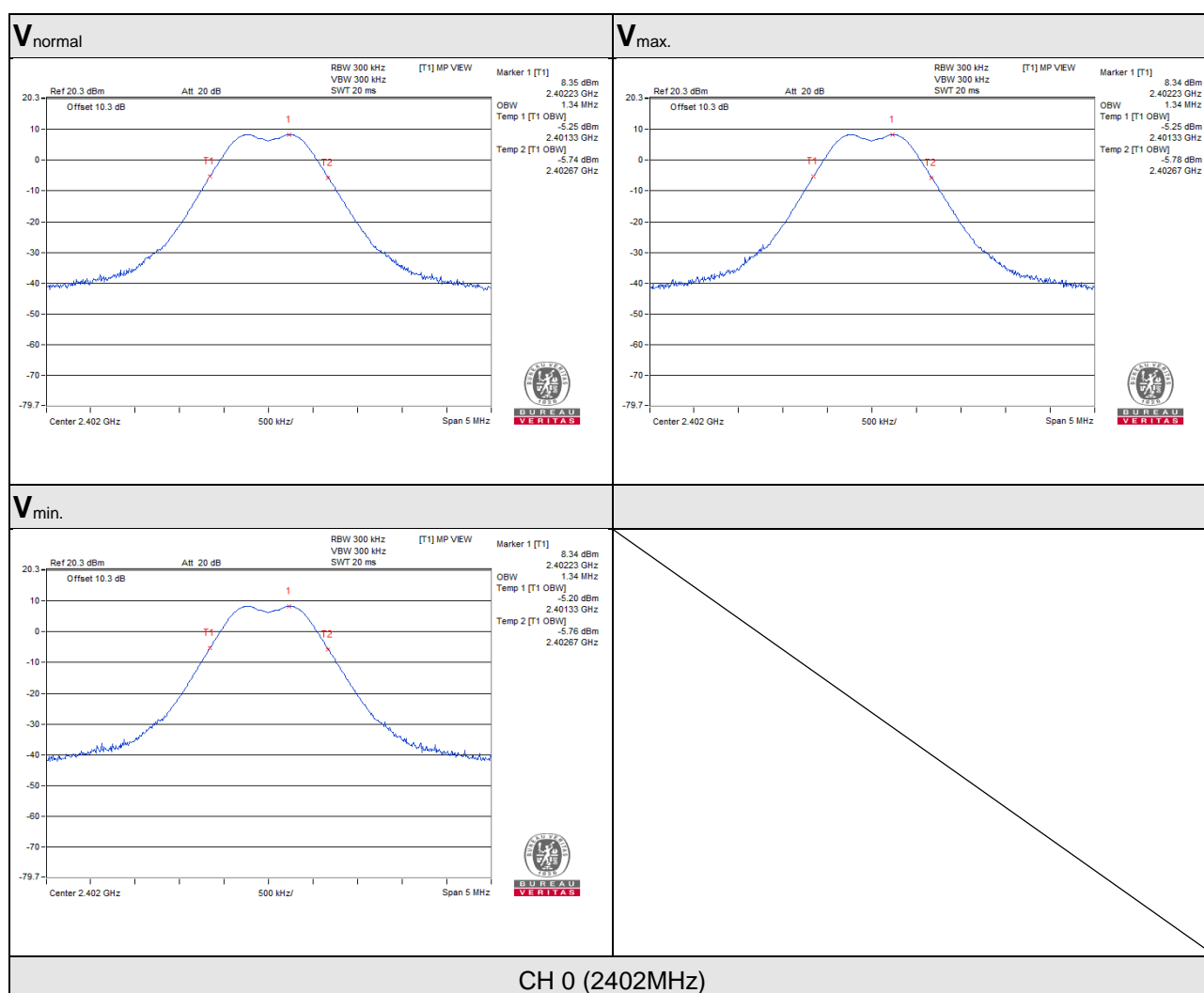


CH 78 (2480MHz)

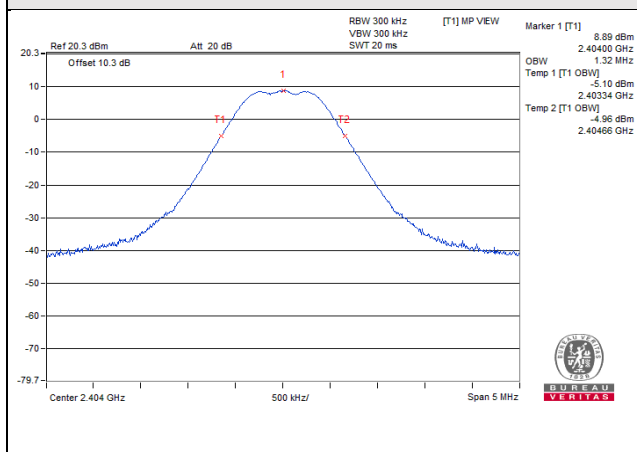
1MBaud with Coded 125kbps transfer rate

Channel	Frequency (MHz)	V _{normal}	V _{max.}	V _{min.}
		Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
0	2402	1.34	1.34	1.34
1	2404	1.32	1.32	1.32
19	2440	1.32	1.32	1.32
38	2478	1.32	1.32	1.32
39	2480	1.34	1.34	1.34

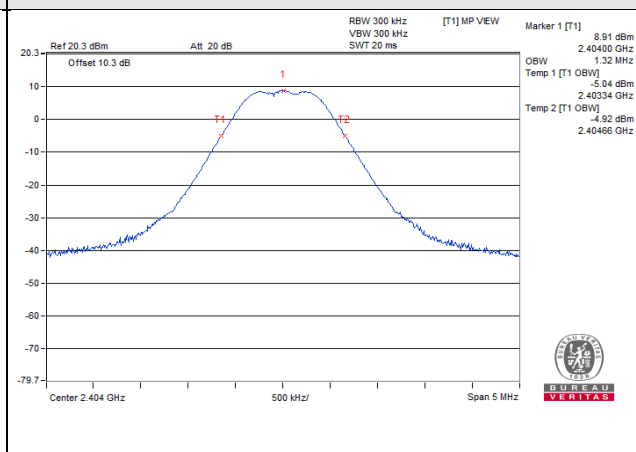
Note: For the test plots please refer to the below pages.



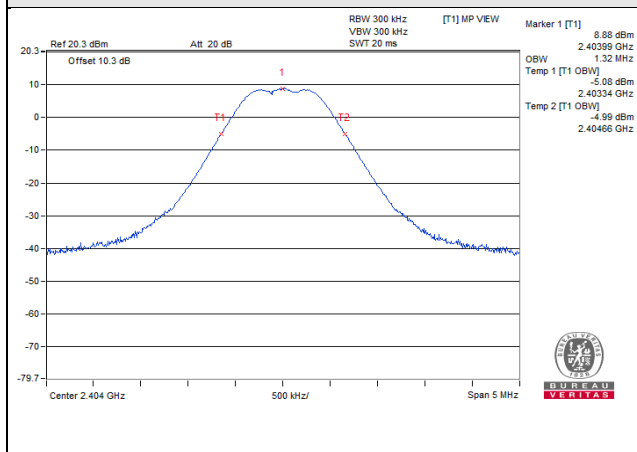
V_{normal}



V_{max.}

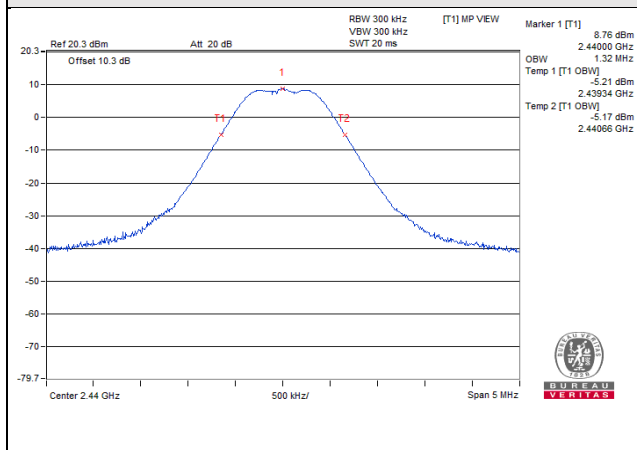


V_{min.}

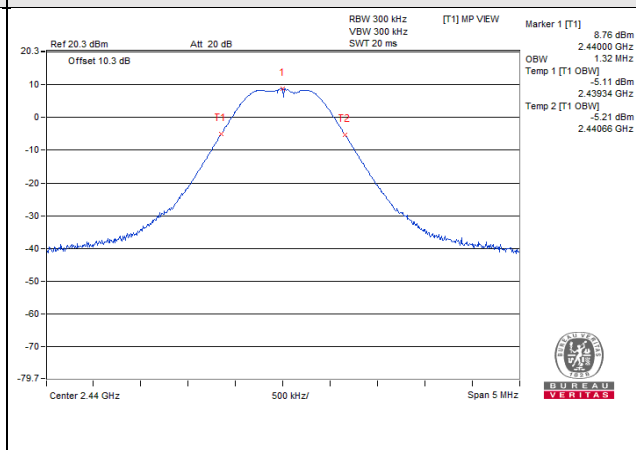


CH 1 (2404MHz)

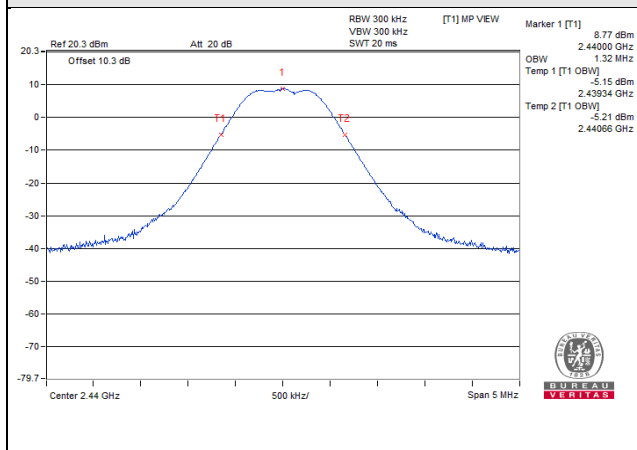
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V_{max.}

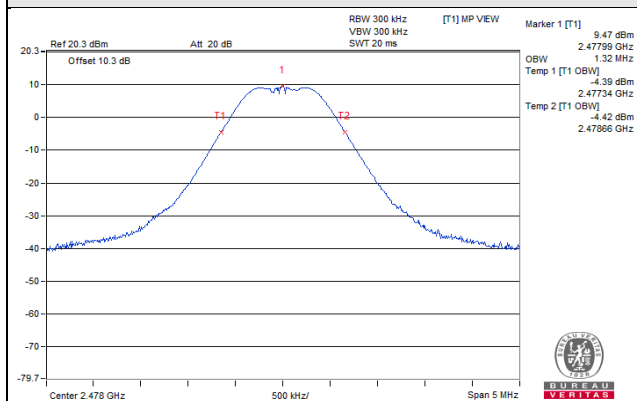


V_{min.}

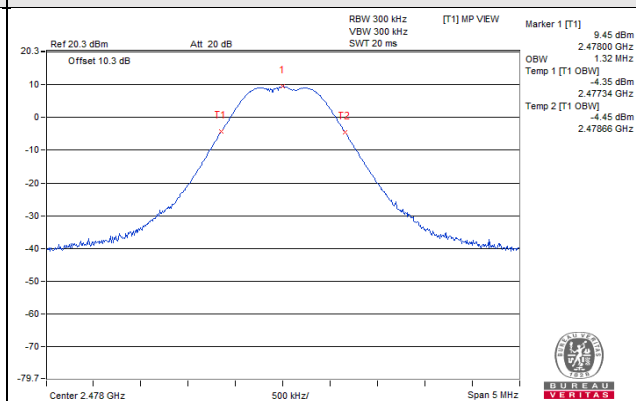


CH 19 (2440MHz)

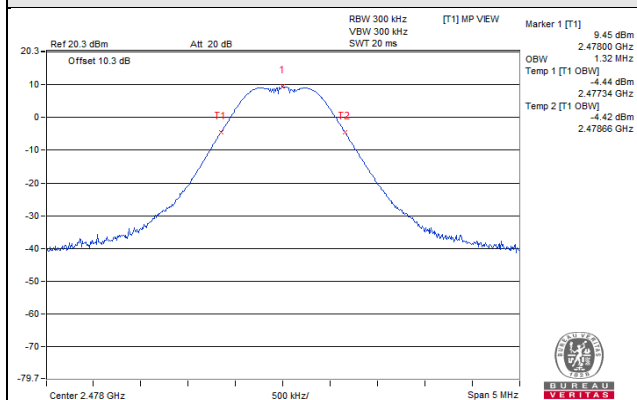
V_{normal}



V_{max.}

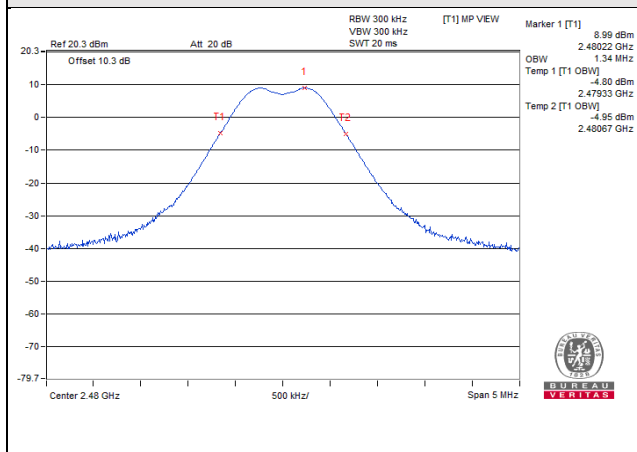


V_{min.}

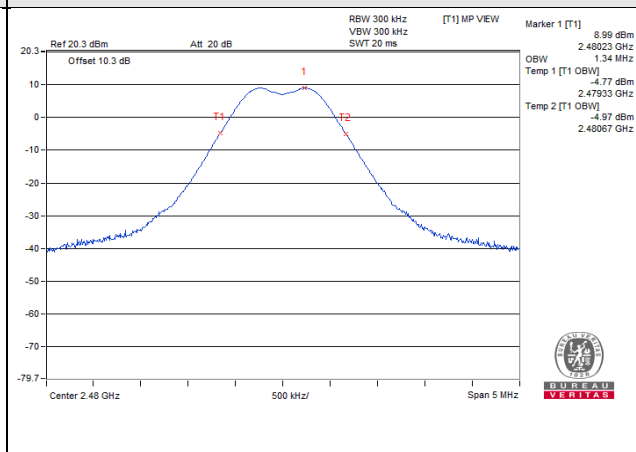


CH 38 (2478MHz)

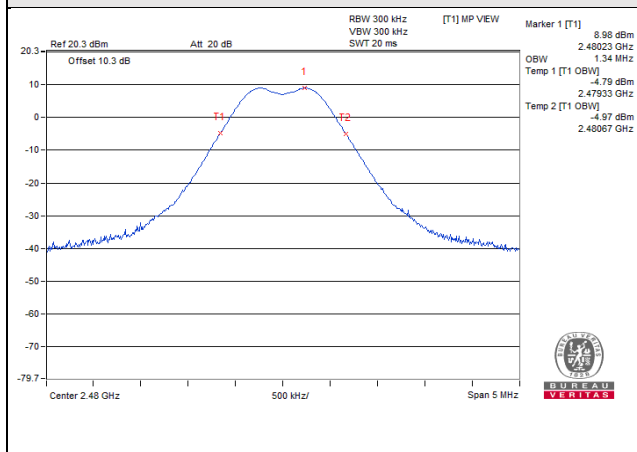
V_{normal}



V_{max.}



V_{min.}



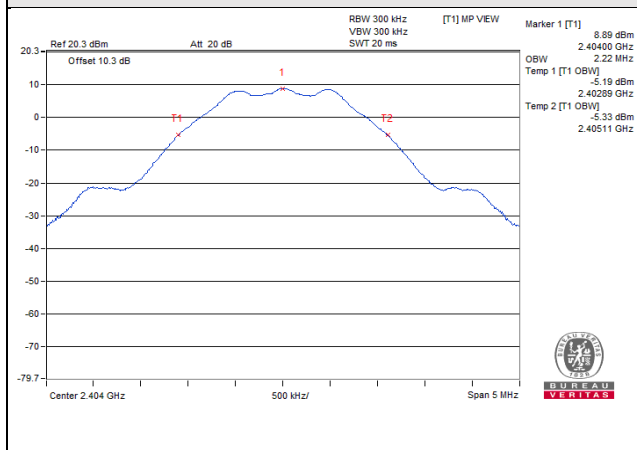
CH 39 (2480MHz)

2MBaud with 2Mbps transfer rate

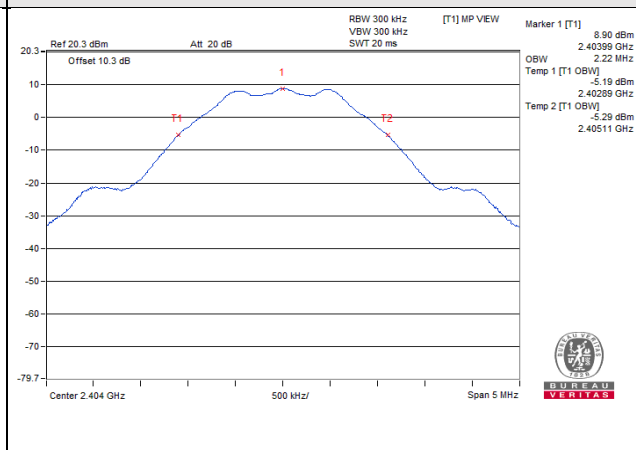
Channel	Frequency (MHz)	V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
		Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
1	2404	2.22	2.22	2.22
19	2440	2.22	2.22	2.22
38	2478	2.22	2.22	2.22

Note: For the test plots please refer to the below pages.

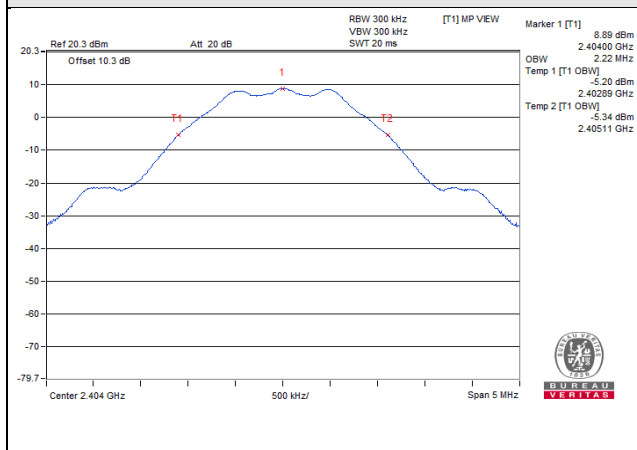
V_{normal}



V_{max.}

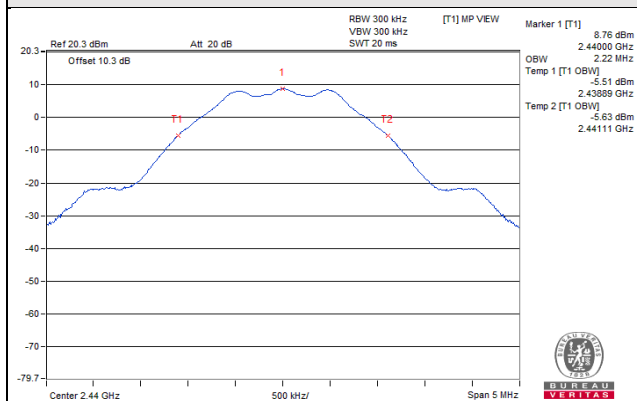


V_{min.}

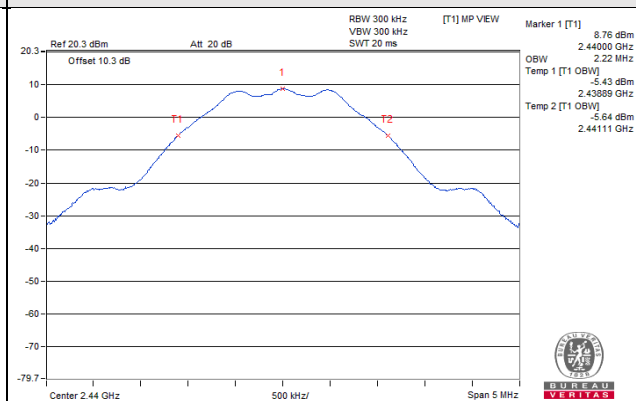


CH 1 (2404MHz)

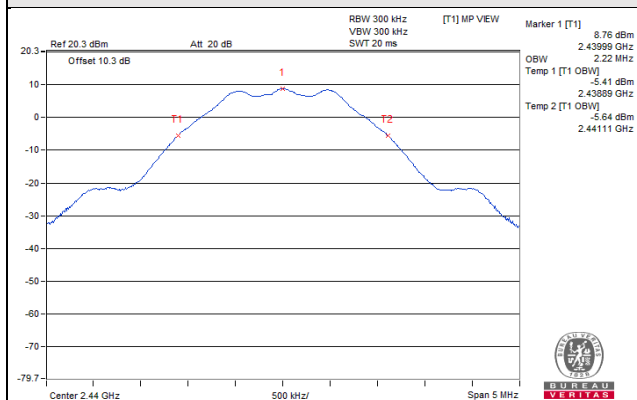
V_{normal}



V_{max.}

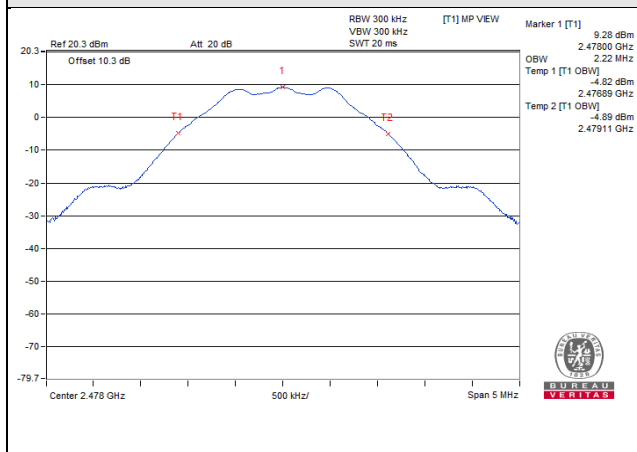


V_{min.}

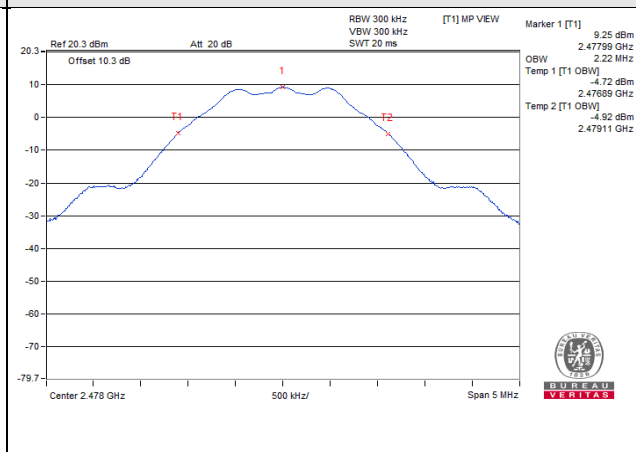


CH 19 (2440MHz)

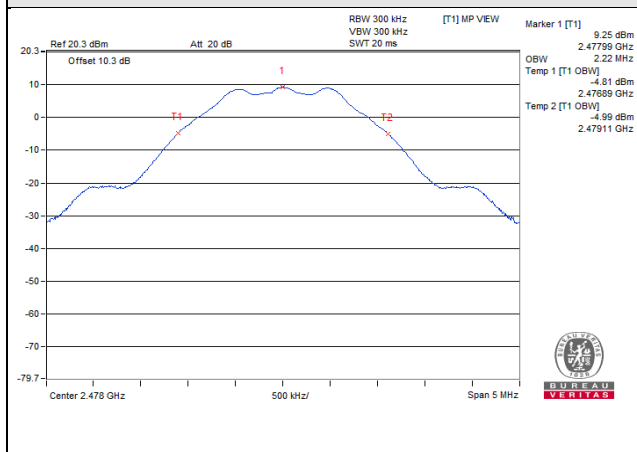
V_{normal}



V_{max.}



V_{min.}



CH 38 (2478MHz)

4.3 Spurious Emissions for Transmitter Measurement

4.3.1 Limits of Spurious Emissions

Frequencies (MHz)	Limit
Operating frequency 2400 to 2483.5MHz	
30.0MHz to 1000.0MHz	$\leq 0.25 \text{ uW}/100\text{kHz}$
1000.0MHz to 2387MHz	$\leq 2.5 \text{ uW}/\text{MHz}$
2387.0MHz to 2400.0MHz	$\leq 25 \text{ uW}/\text{MHz}$
2483.5MHz to 2496.5MHz	$\leq 25 \text{ uW}/\text{MHz}$
2496.5MHz to 12500.0MHz	$\leq 2.5 \text{ uW}/\text{MHz}$

4.3.2 Test Setup



4.3.3 Test Results

1MBaud with 1Mbps transfer rate

Test Channel		CH 0 (2402MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	628.126	0.000333	0.25	PASS
	1000 to 2387	2384.919	0.010280	2.5	PASS
	2387 to 2400	2400.000	17.795341	25	PASS(1)
	2483.5 to 2496.5	2496.376	0.013335	25	PASS
	2496.5 to 12500	3663.158	0.011749	2.5	PASS
V_{max.}	30 to 1000	168.588	0.000374	0.25	PASS
	1000 to 2387	2329.092	0.010447	2.5	PASS
	2387 to 2400	2399.987	16.686519	25	PASS(2)
	2483.5 to 2496.5	2490.271	0.011695	25	PASS
	2496.5 to 12500	4803.557	0.012388	2.5	PASS
V_{min.}	30 to 1000	230.426	0.000360	0.25	PASS
	1000 to 2387	2384.572	0.010740	2.5	PASS
	2387 to 2400	2399.998	17.864376	25	PASS(3)
	2483.5 to 2496.5	2492.159	0.013092	25	PASS
	2496.5 to 12500	12467.487	0.012445	2.5	PASS

Test Channel		CH 1 (2404MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	986.662	0.000155	0.25	Pass
	1000 to 2387	2384.919	0.053580	2.5	Pass
	2387 to 2400	2394.364	0.316957	25	Pass
	2483.5 to 2496.5	2491.548	0.014454	25	Pass
	2496.5 to 12500	7479.493	0.035810	2.5	Pass
V_{max.}	30 to 1000	997.090	0.000163	0.25	Pass
	1000 to 2387	2385.092	0.046989	2.5	Pass
	2387 to 2400	2394.323	0.313329	25	Pass
	2483.5 to 2496.5	2491.607	0.016904	25	Pass
	2496.5 to 12500	7496.999	0.032211	2.5	Pass
V_{min.}	30 to 1000	831.341	0.000153	0.25	Pass
	1000 to 2387	2384.399	0.052602	2.5	Pass
	2387 to 2400	2394.309	0.308319	25	Pass
	2483.5 to 2496.5	2486.457	0.016293	25	Pass
	2496.5 to 12500	7476.992	0.040458	2.5	Pass

Test Channel		CH 19 (2440MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	898.635	0.000160	0.25	Pass
	1000 to 2387	2248.126	0.014223	2.5	Pass
	2387 to 2400	2391.358	0.021577	25	Pass
	2483.5 to 2496.5	2488.485	0.024044	25	Pass
	2496.5 to 12500	7445.731	0.037154	2.5	Pass
V_{max.}	30 to 1000	698.087	0.000148	0.25	Pass
	1000 to 2387	2354.752	0.013274	2.5	Pass
	2387 to 2400	2391.346	0.022029	25	Pass
	2483.5 to 2496.5	2488.633	0.023388	25	Pass
	2496.5 to 12500	7491.997	0.037154	2.5	Pass
V_{min.}	30 to 1000	887.480	0.000189	0.25	Pass
	1000 to 2387	1777.066	0.013335	2.5	Pass
	2387 to 2400	2391.207	0.024044	25	Pass
	2483.5 to 2496.5	2488.443	0.024434	25	Pass
	2496.5 to 12500	6464.138	0.032885	2.5	Pass

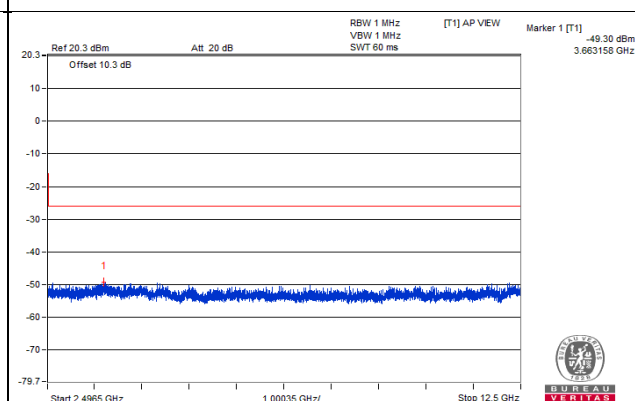
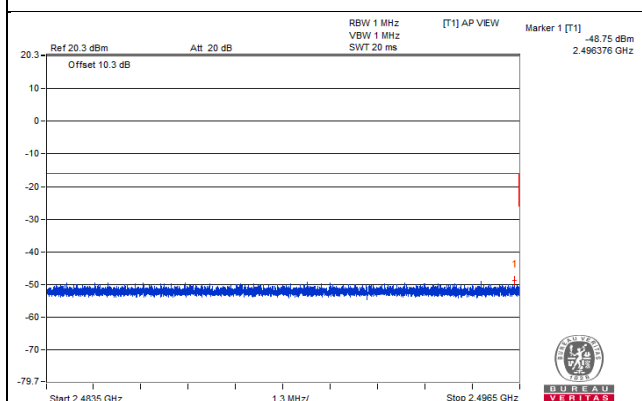
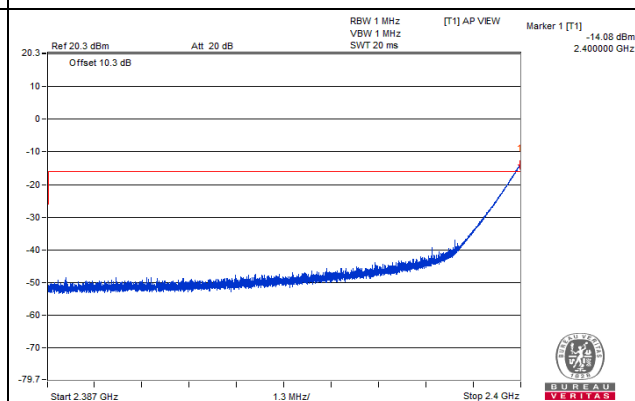
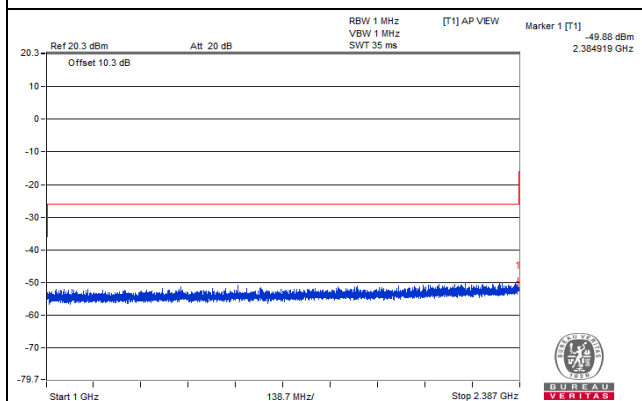
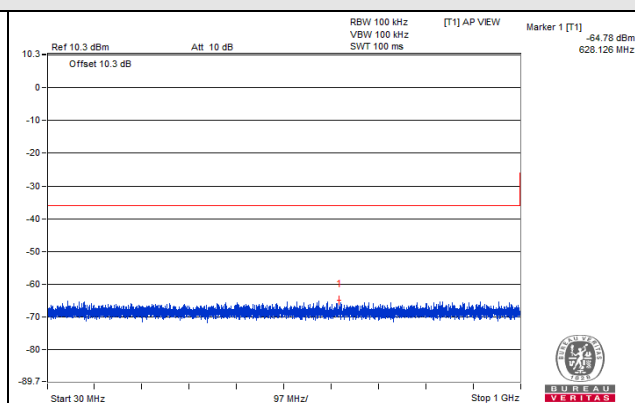
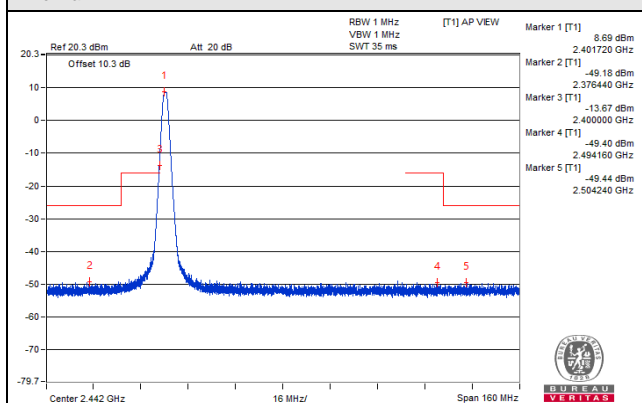
Test Channel		CH 38 (2478MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	99.840	0.000191	0.25	Pass
	1000 to 2387	2019.965	0.014894	2.5	Pass
	2387 to 2400	2389.973	0.013964	25	Pass
	2483.5 to 2496.5	2487.700	0.301301	25	Pass
	2496.5 to 12500	7451.983	0.035318	2.5	Pass
V_{max.}	30 to 1000	777.142	0.000167	0.25	Pass
	1000 to 2387	1867.395	0.013397	2.5	Pass
	2387 to 2400	2399.863	0.016558	25	Pass
	2483.5 to 2496.5	2487.660	0.293089	25	Pass
	2496.5 to 12500	7474.491	0.038637	2.5	Pass
V_{min.}	30 to 1000	969.930	0.000179	0.25	Pass
	1000 to 2387	2223.680	0.014894	2.5	Pass
	2387 to 2400	2390.786	0.016032	25	Pass
	2483.5 to 2496.5	2487.619	0.295121	25	Pass
	2496.5 to 12500	2496.500	0.042462	2.5	Pass

Test Channel		CH 39 (2480MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	738.706	0.000405	0.25	Pass
	1000 to 2387	2304.646	0.010447	2.5	Pass
	2387 to 2400	2394.117	0.010715	25	Pass
	2483.5 to 2496.5	2483.517	0.393550	25	Pass
	2496.5 to 12500	4522.208	0.013274	2.5	Pass
V_{max.}	30 to 1000	945.801	0.000325	0.25	Pass
	1000 to 2387	2325.798	0.010765	2.5	Pass
	2387 to 2400	2389.387	0.012972	25	Pass
	2483.5 to 2496.5	2483.501	0.412098	25	Pass
	2496.5 to 12500	3710.674	0.012303	2.5	Pass
V_{min.}	30 to 1000	455.223	0.000325	0.25	Pass
	1000 to 2387	2319.210	0.009572	2.5	Pass
	2387 to 2400	2387.997	0.012560	25	Pass
	2483.5 to 2496.5	2483.508	0.414000	25	Pass
	2496.5 to 12500	3530.611	0.012134	2.5	Pass

Note:

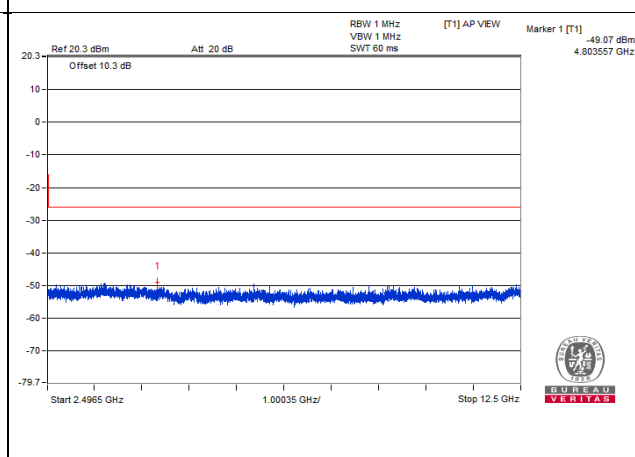
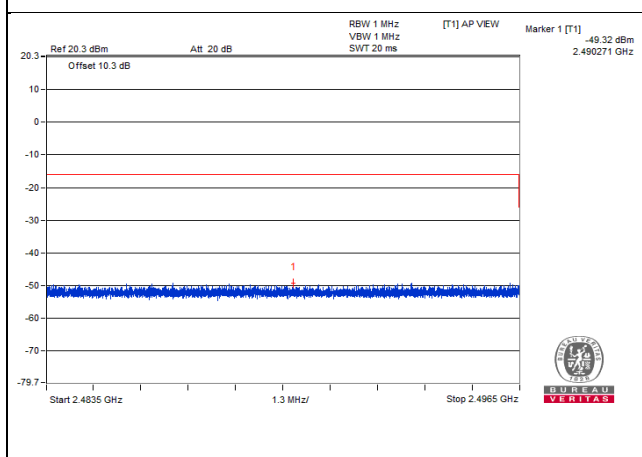
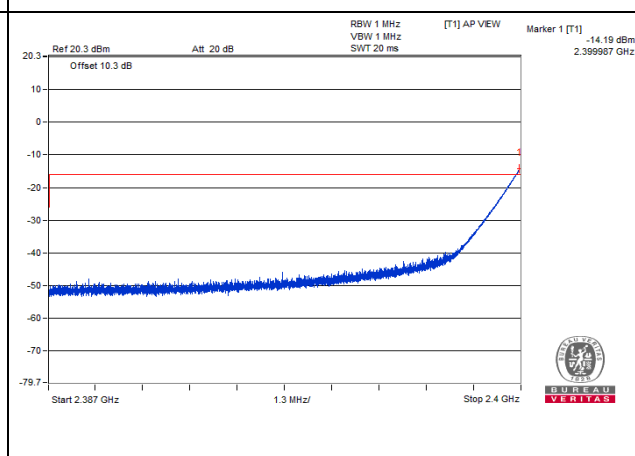
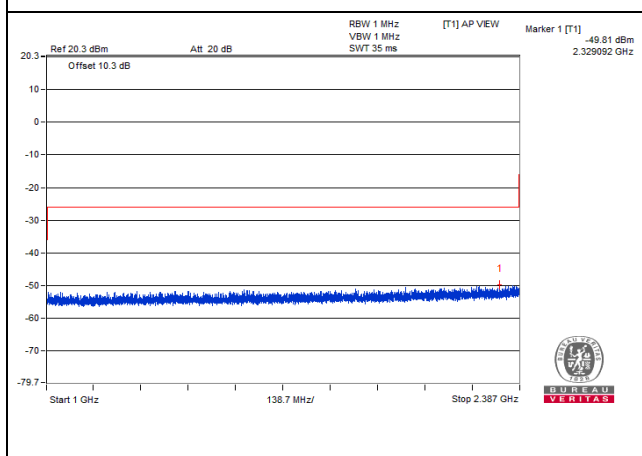
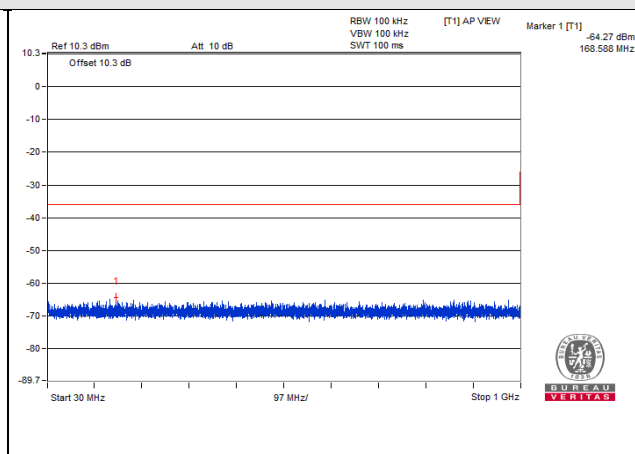
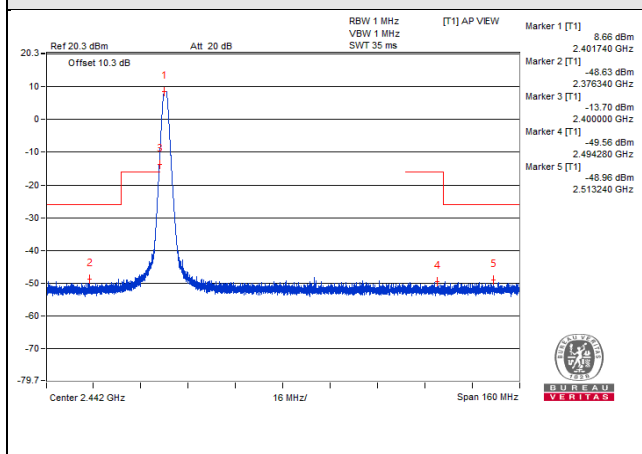
1. The spectrum plots are attached on the following pages.
2. (No.): The value was tested under Measuring Mode *Zero Span.

Vnormal



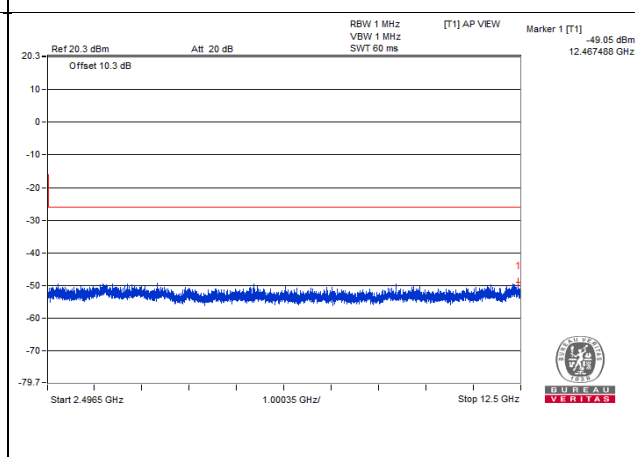
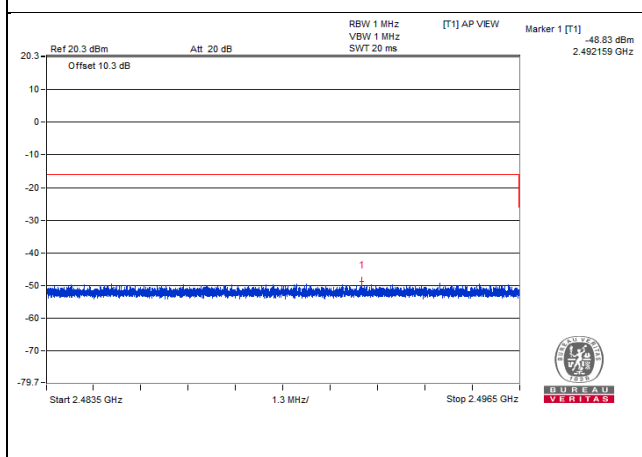
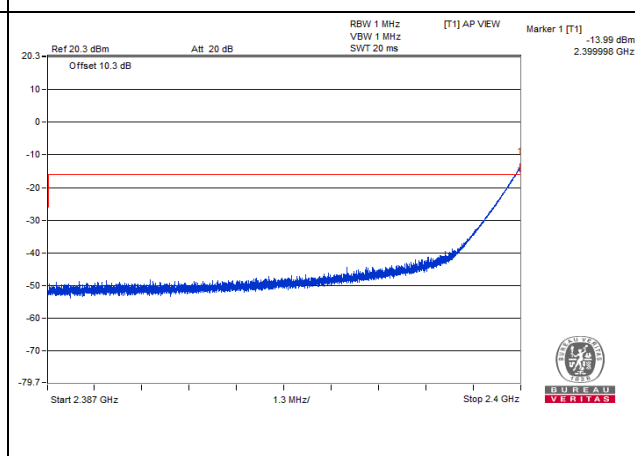
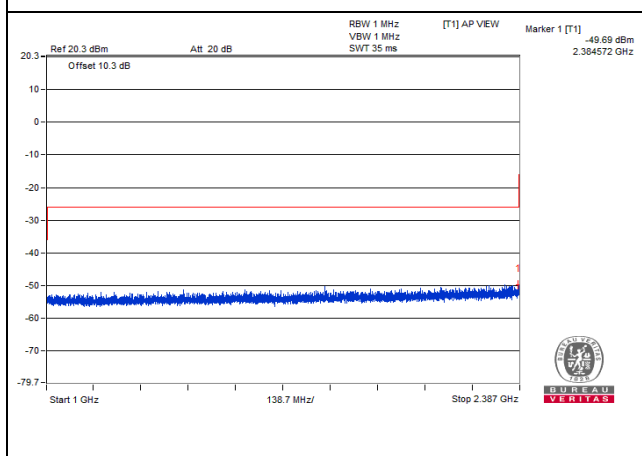
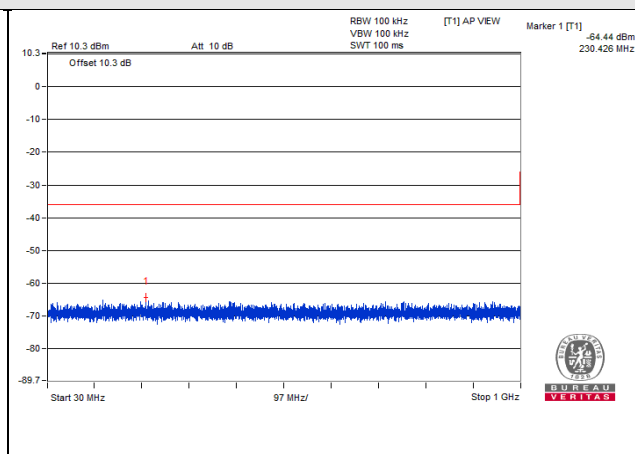
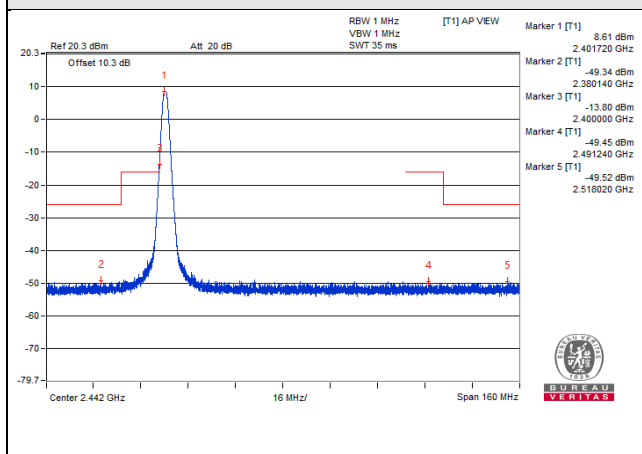
CH 0 (2402MHz)

V_{max}.



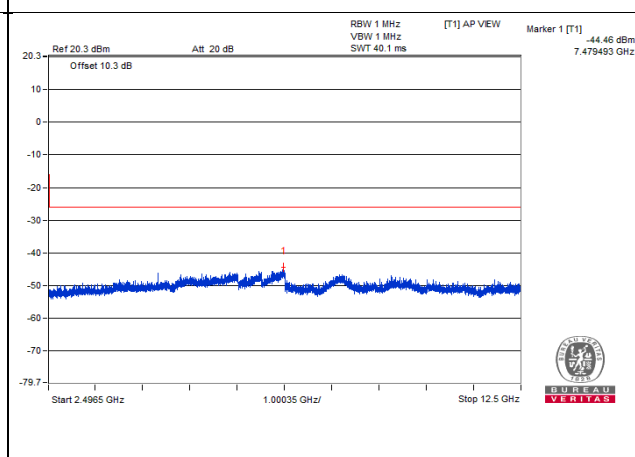
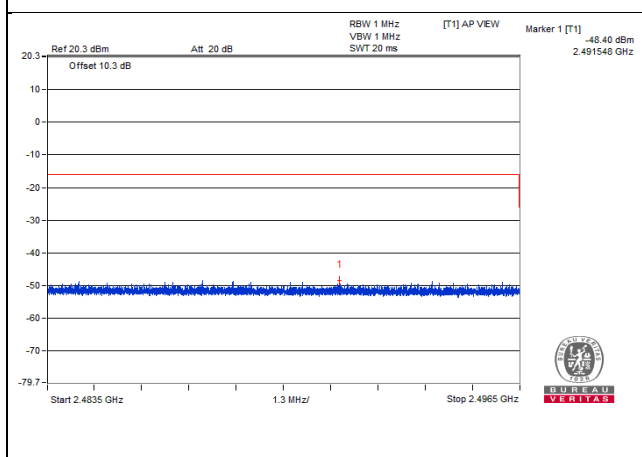
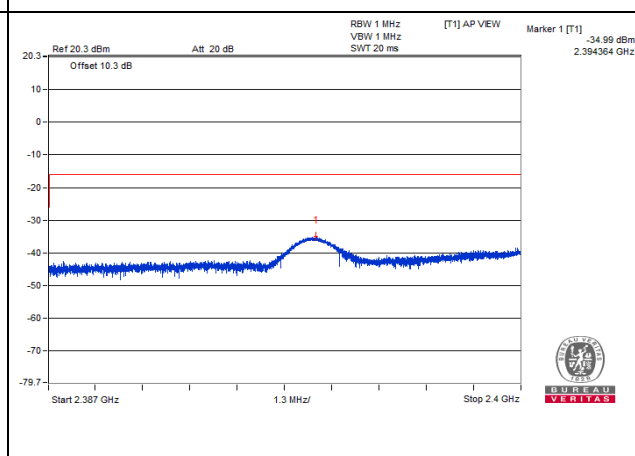
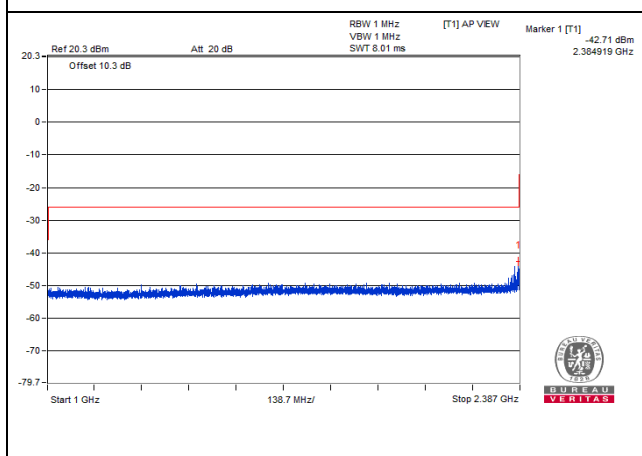
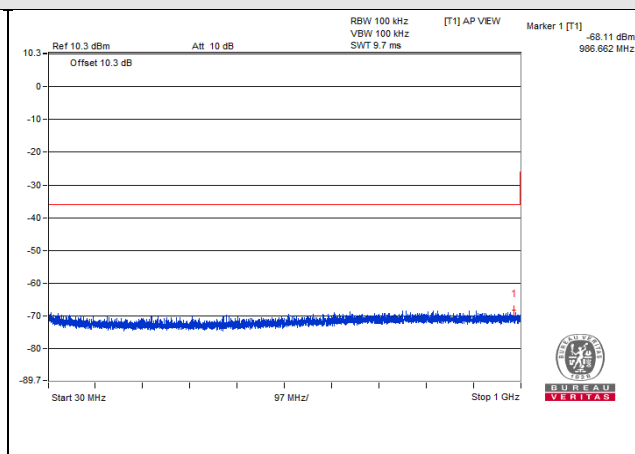
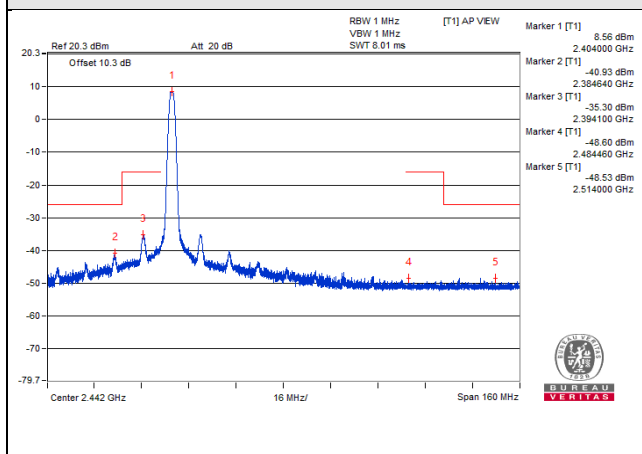
CH 0 (2402MHz)

V_{min}.



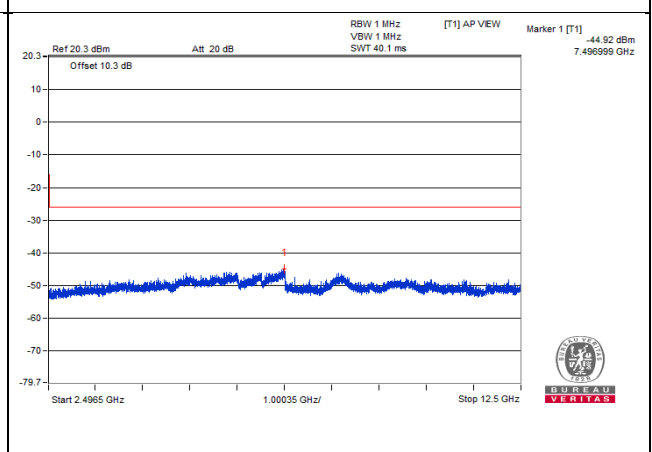
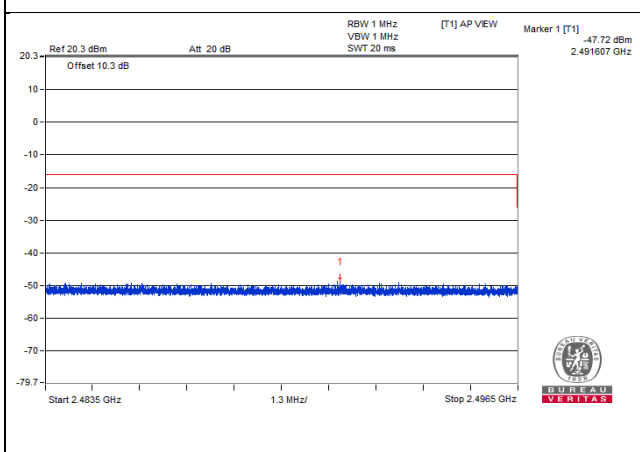
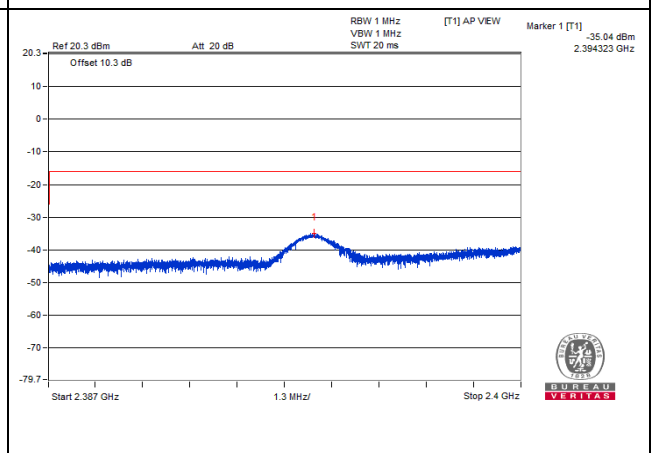
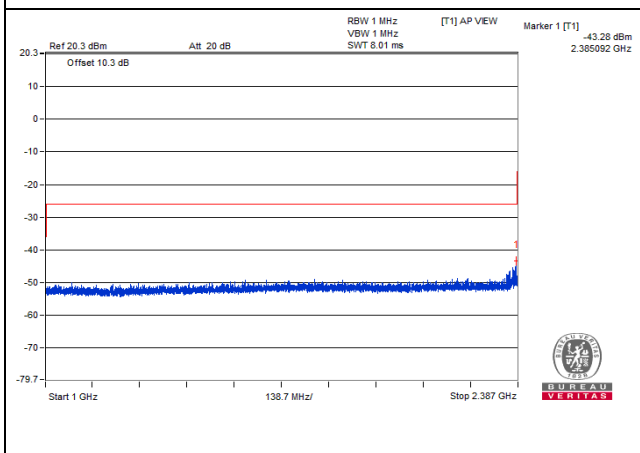
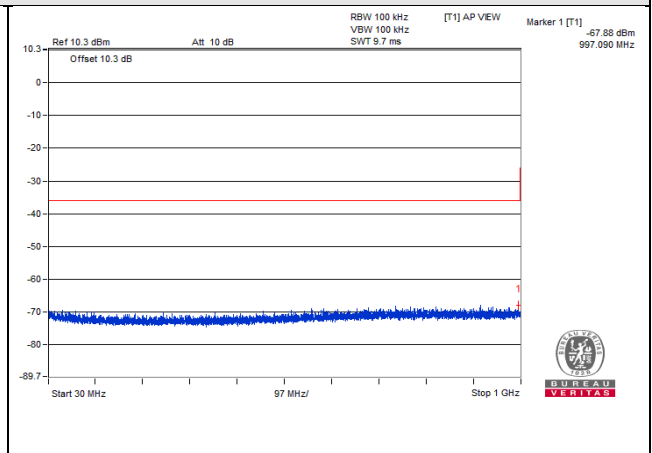
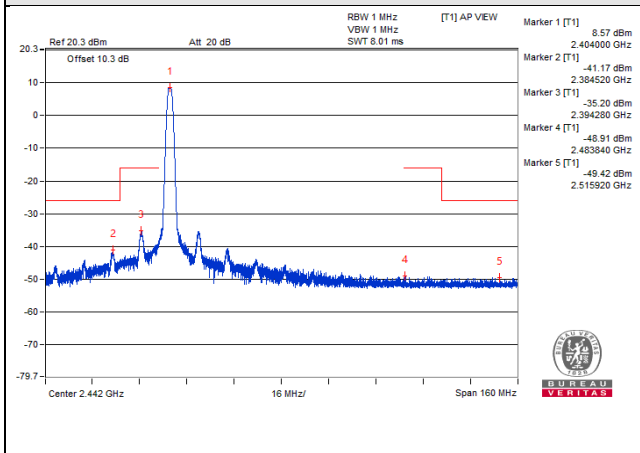
CH 0 (2402MHz)

Vnormal



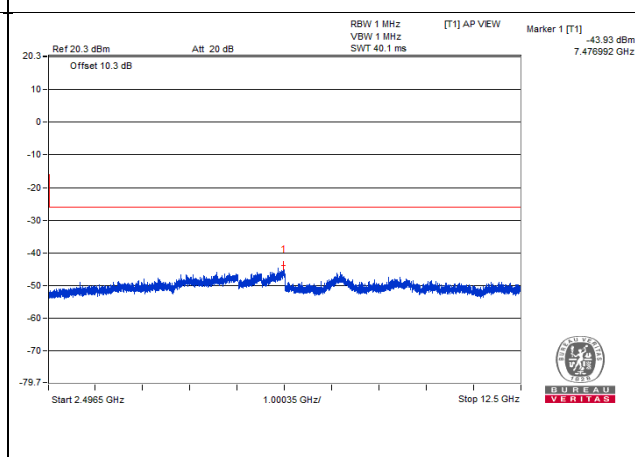
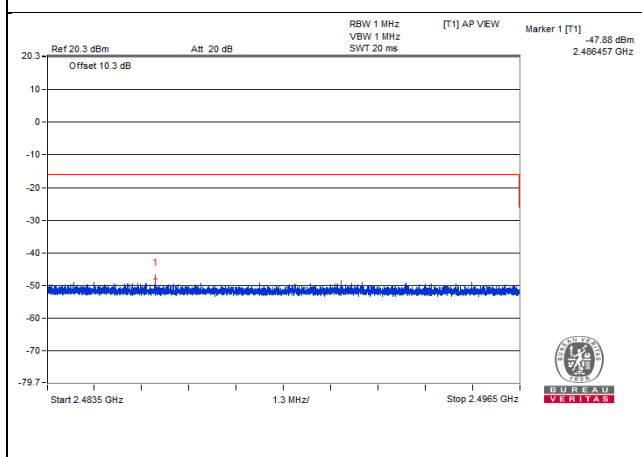
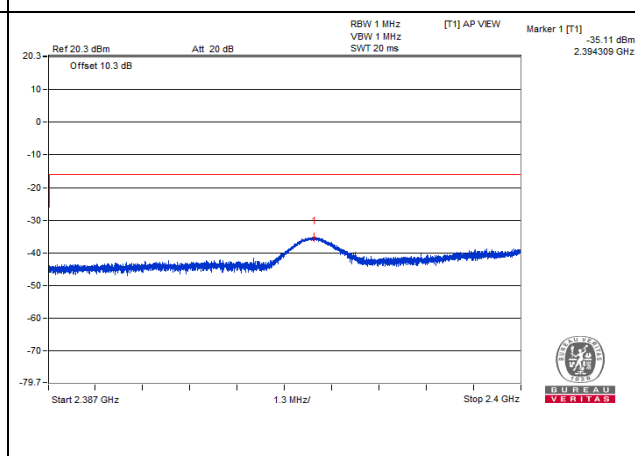
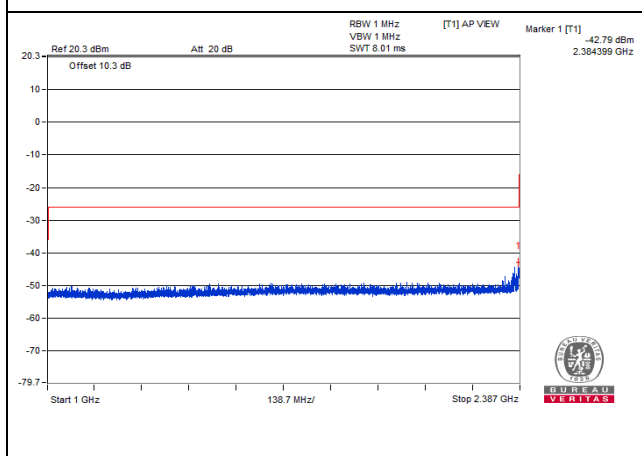
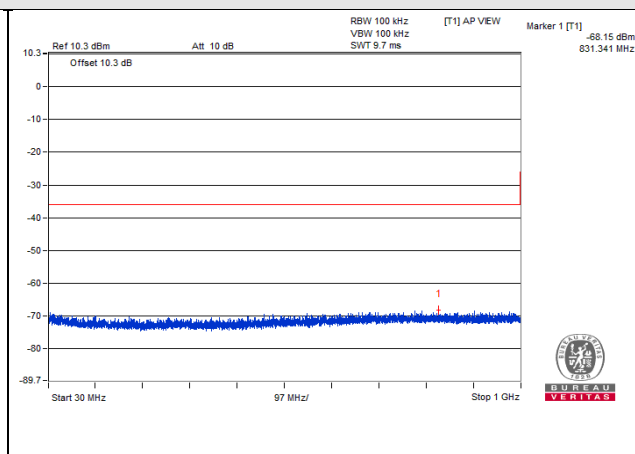
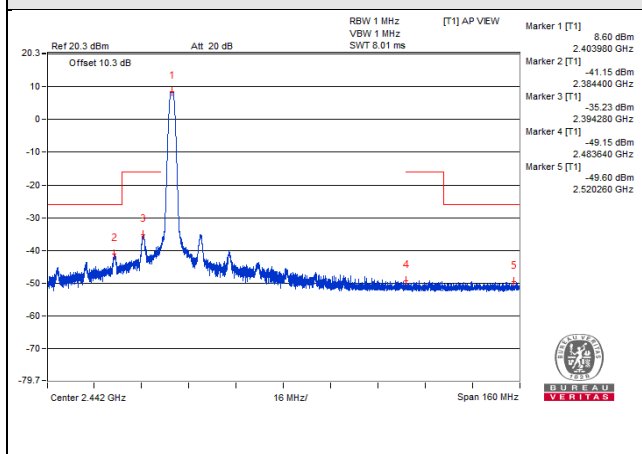
CH 1 (2404MHz)

V_{max}.



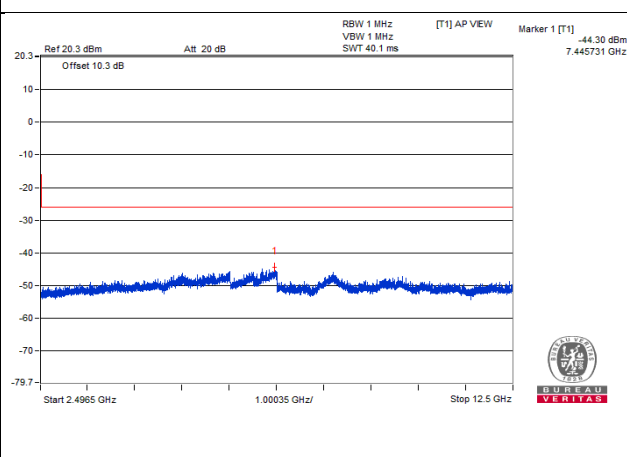
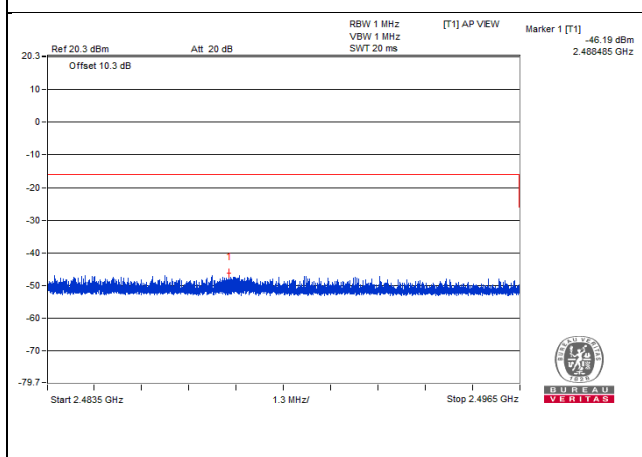
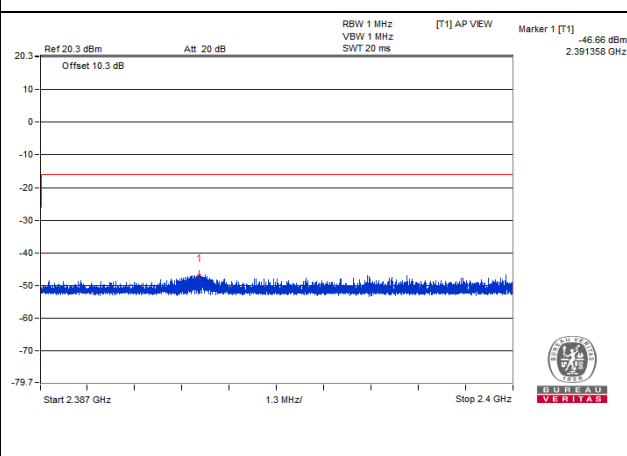
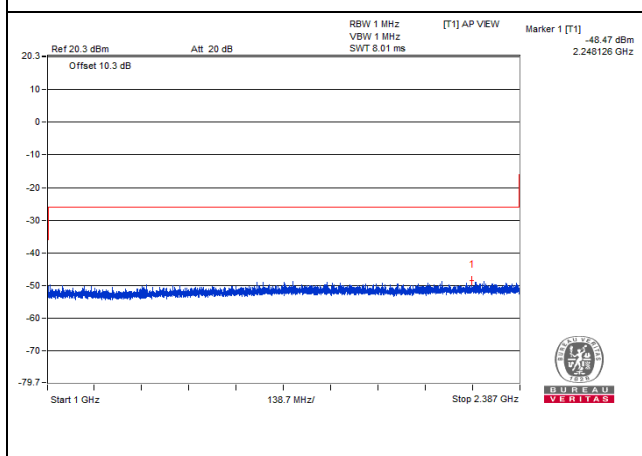
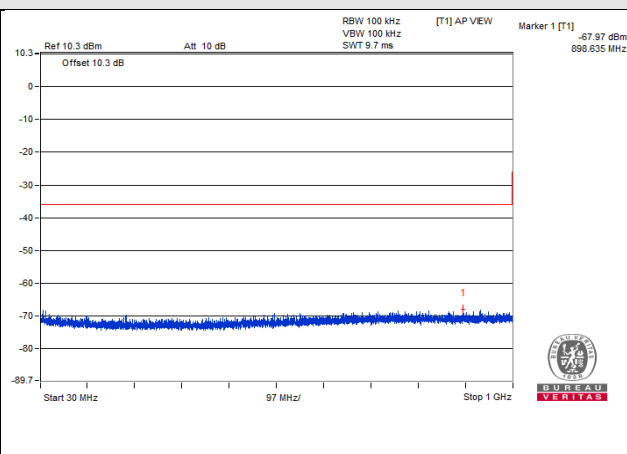
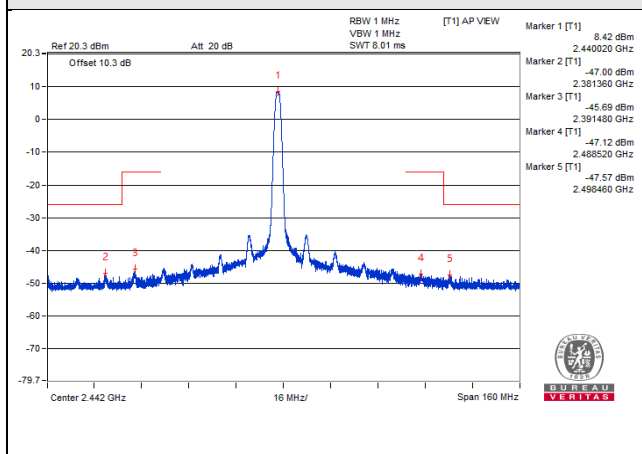
CH 1 (2404MHz)

V_{min}.



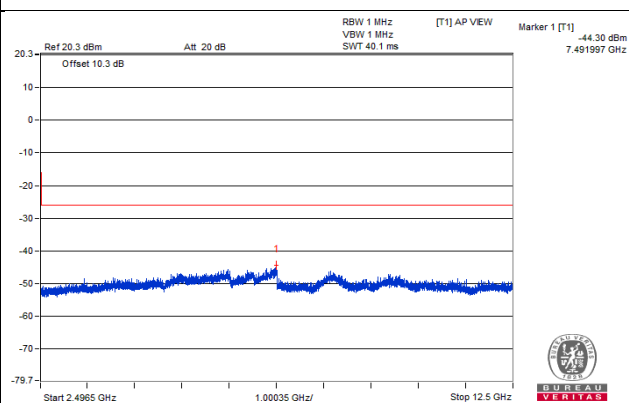
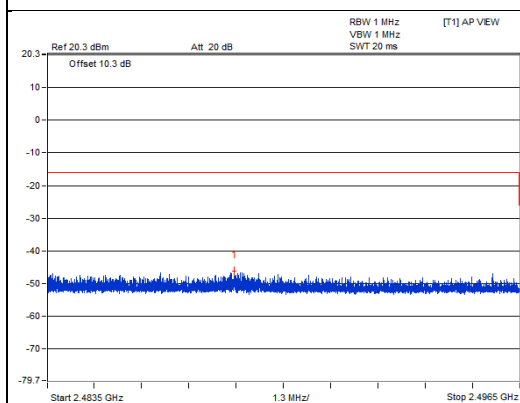
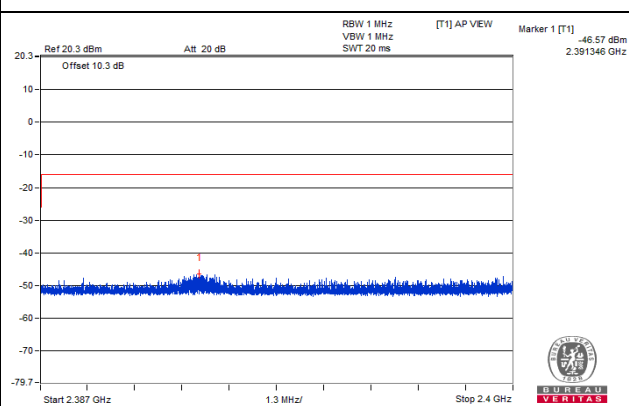
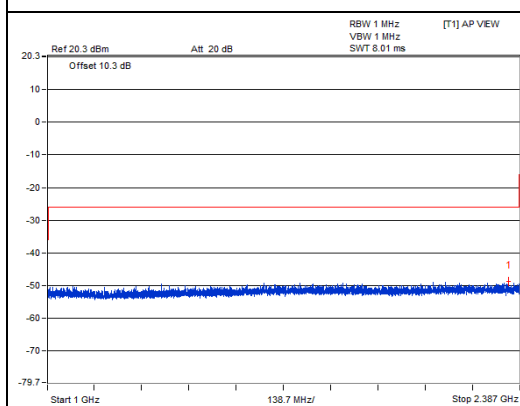
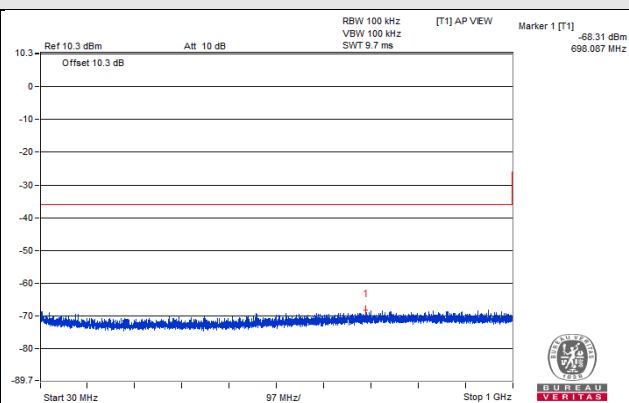
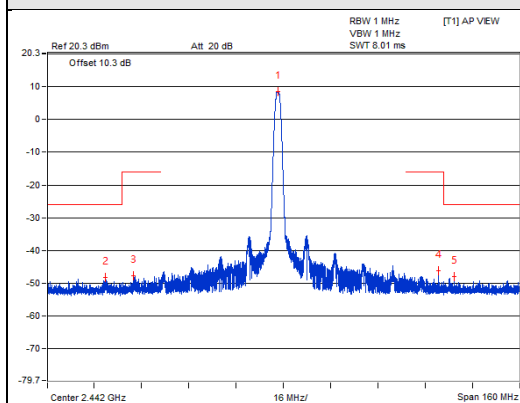
CH 1 (2404MHz)

V_{normal}



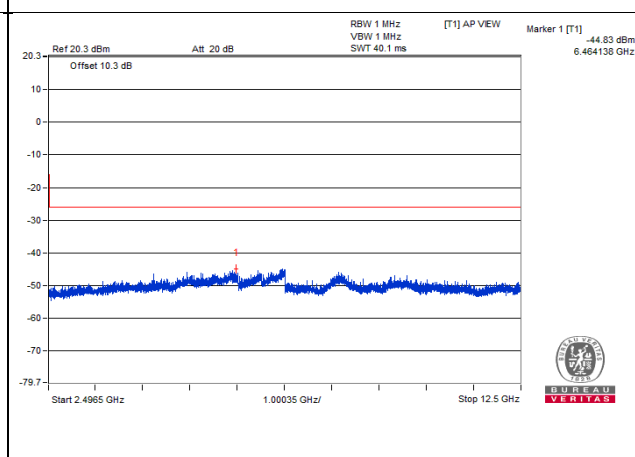
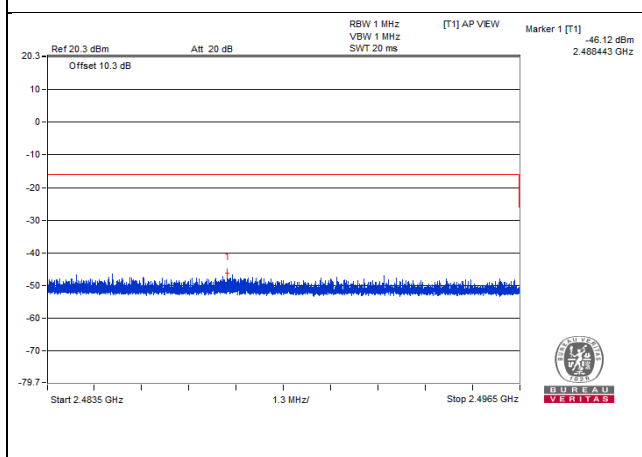
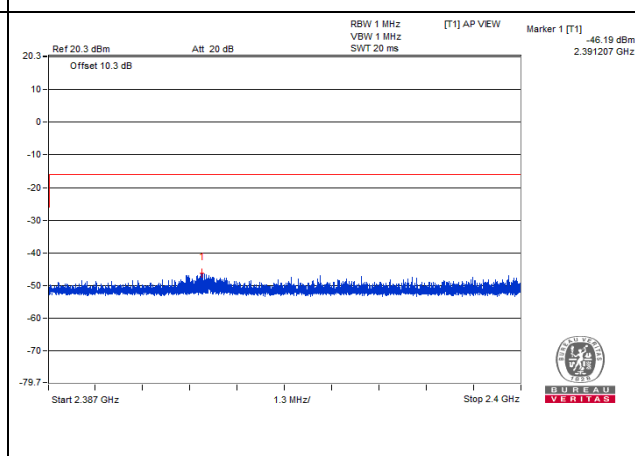
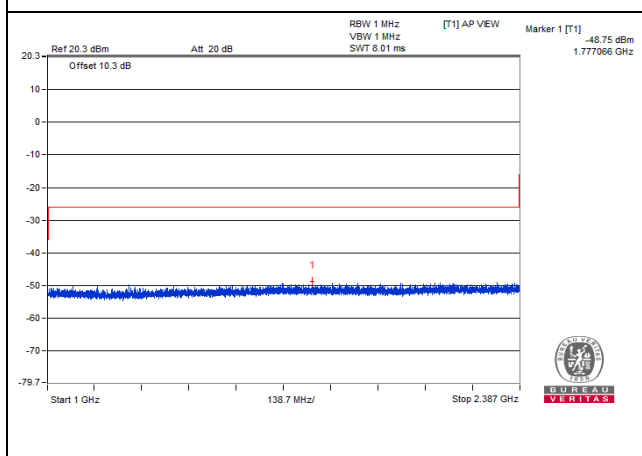
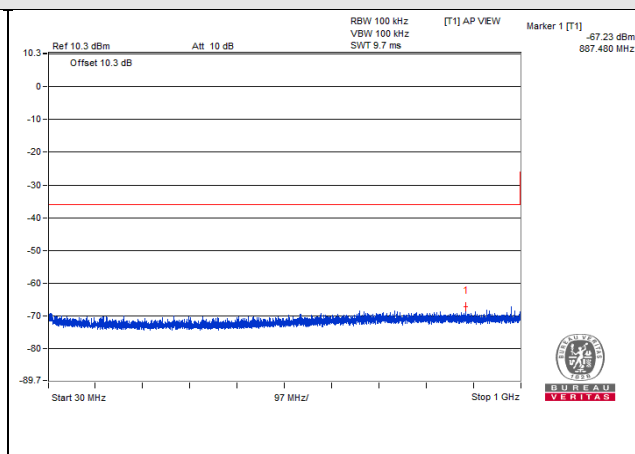
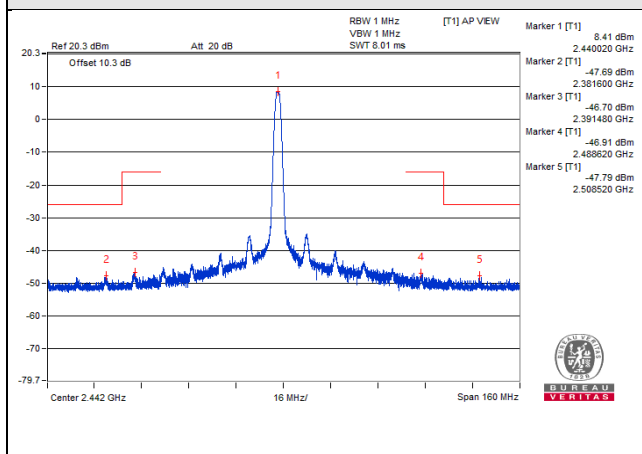
CH 19 (2440MHz)

V_{max}.



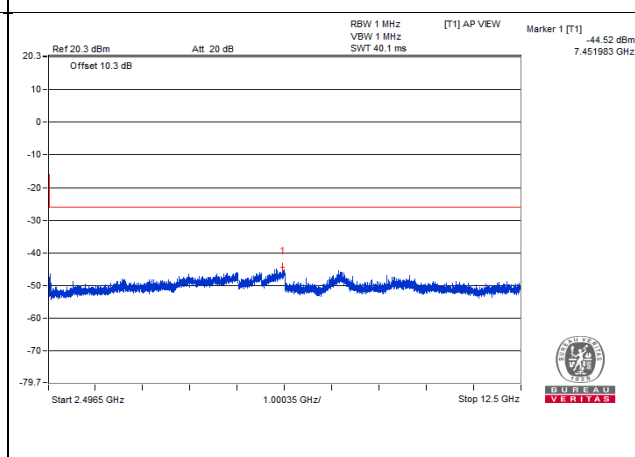
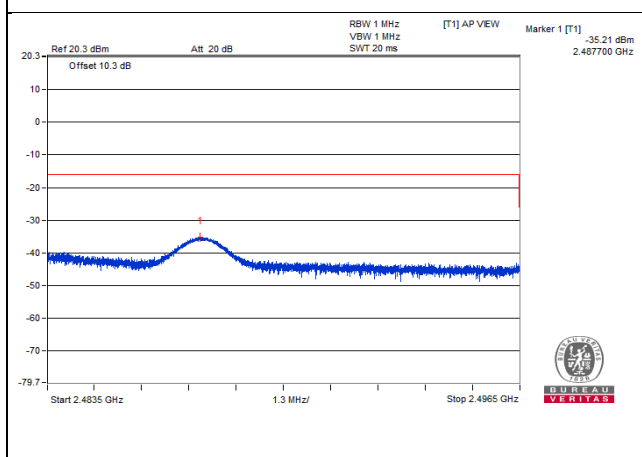
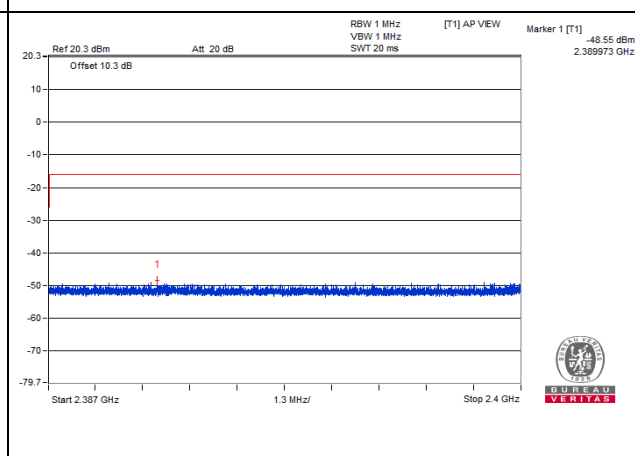
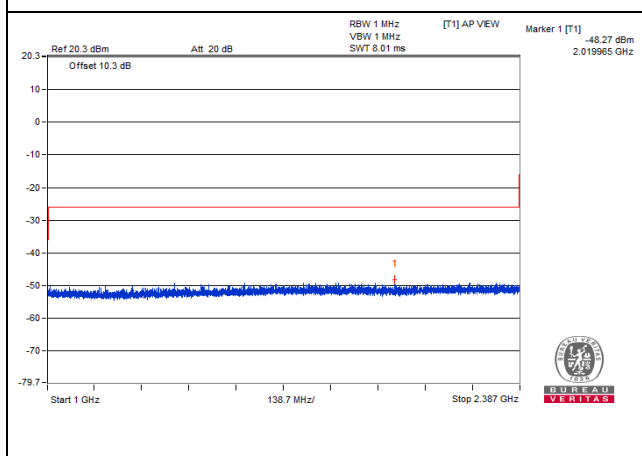
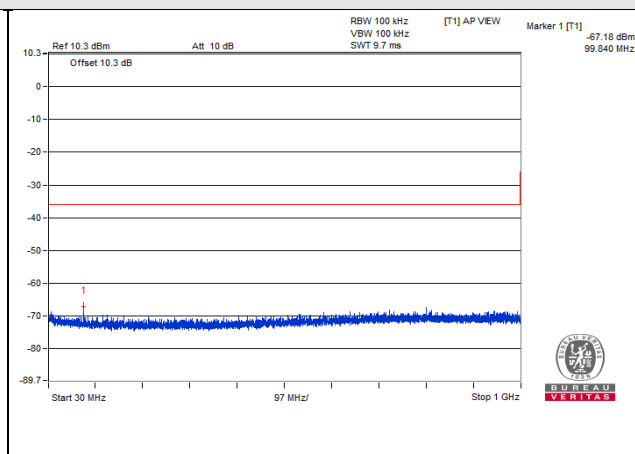
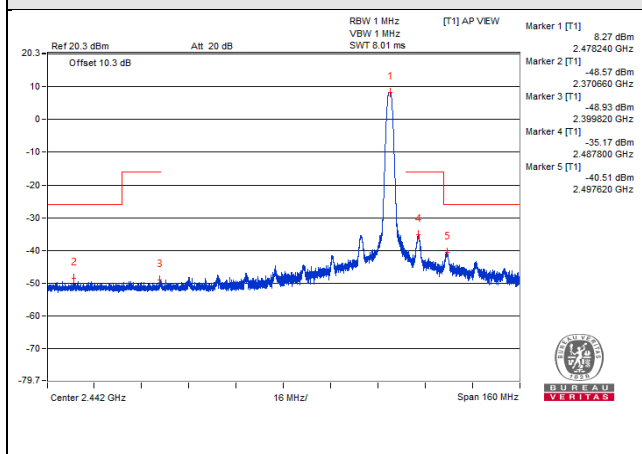
CH 19 (2440MHz)

V_{min}.



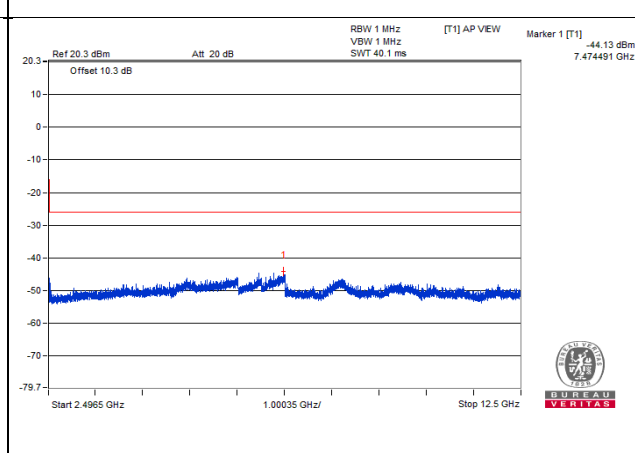
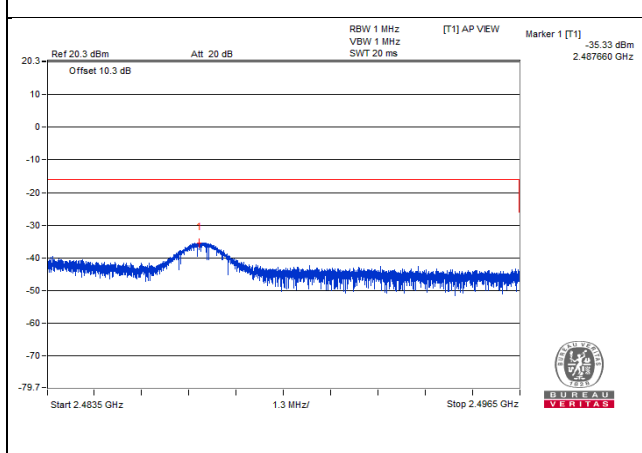
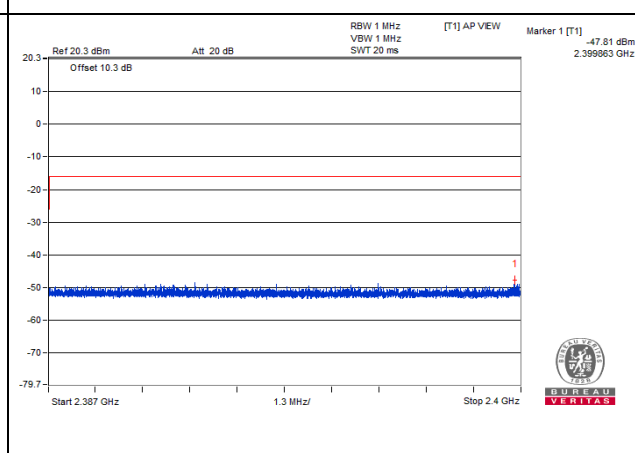
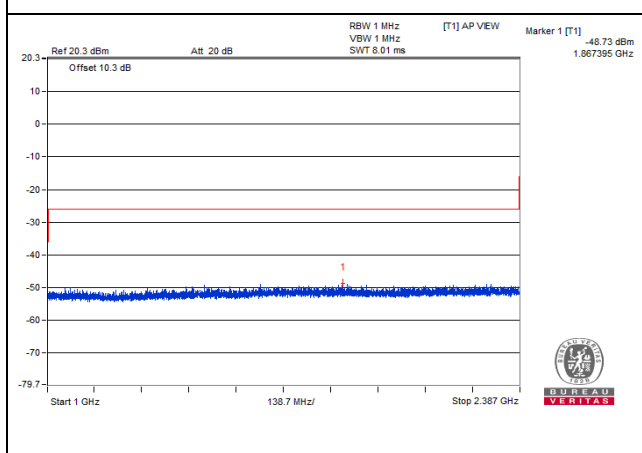
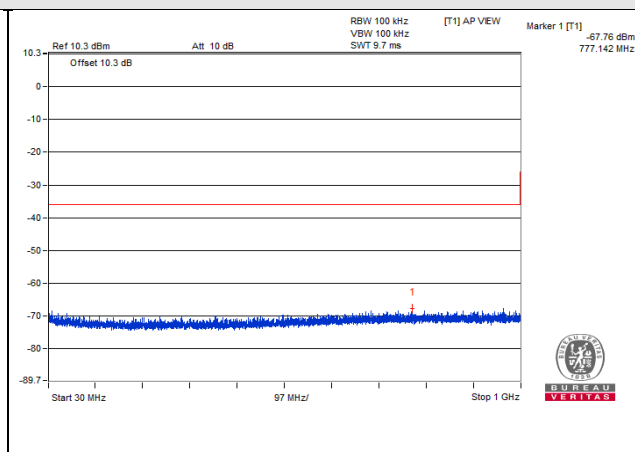
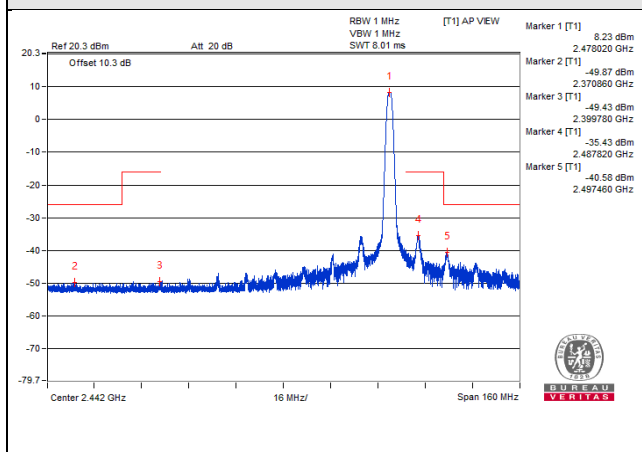
CH 19 (2440MHz)

Vnormal



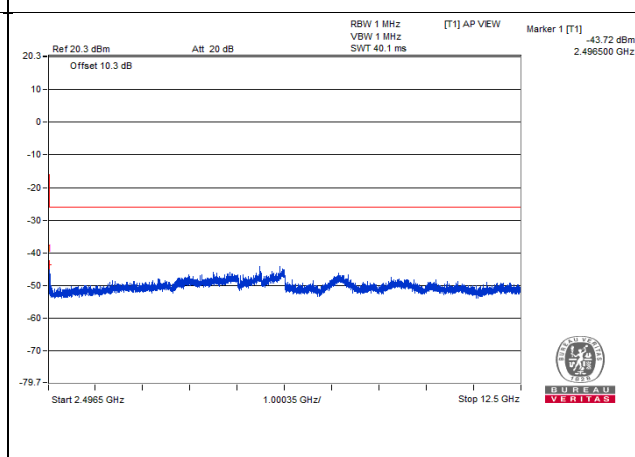
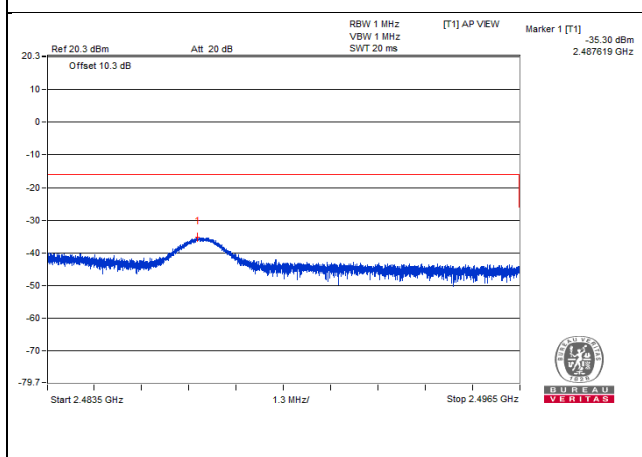
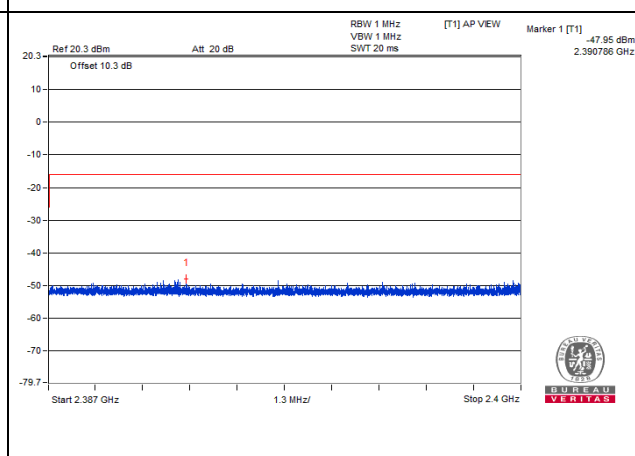
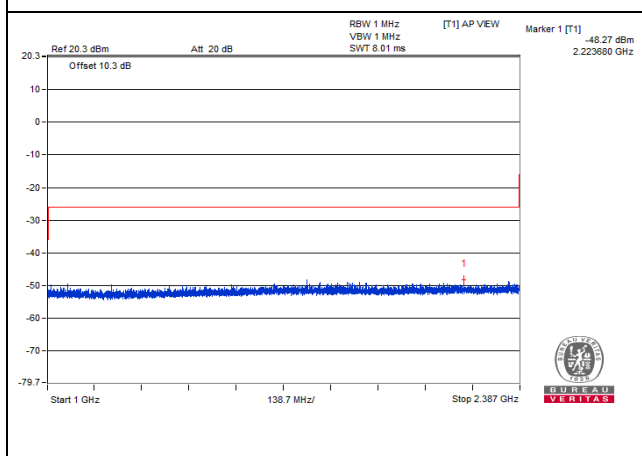
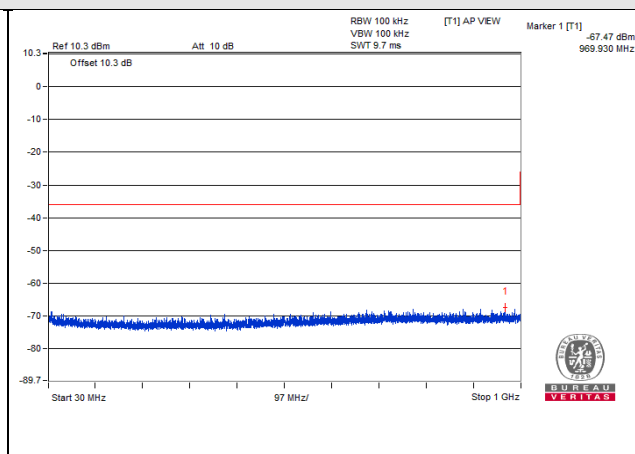
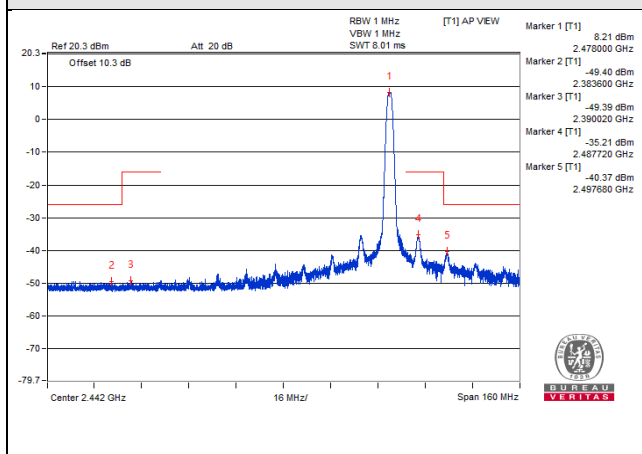
CH 38 (2478MHz)

V_{max}.



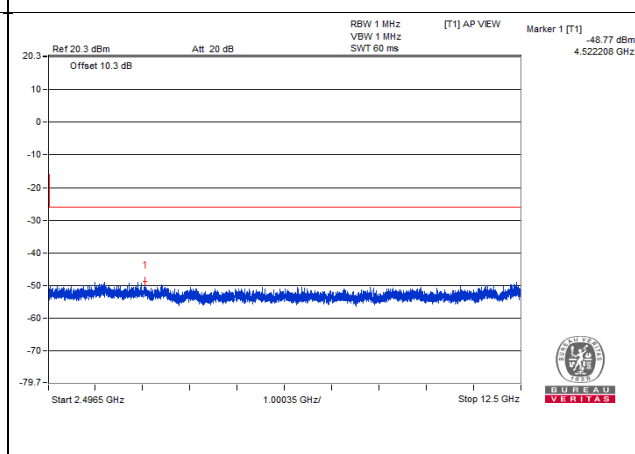
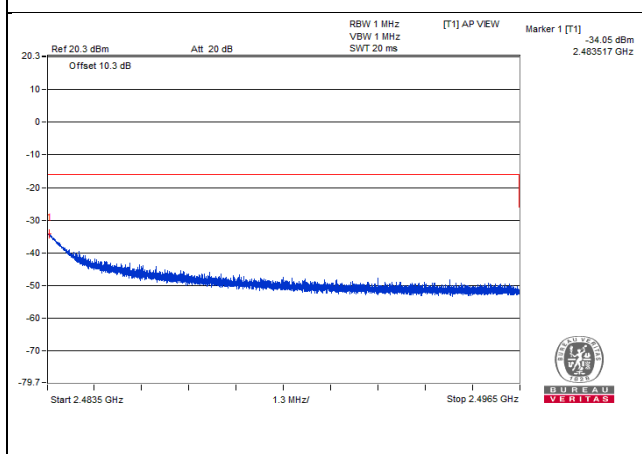
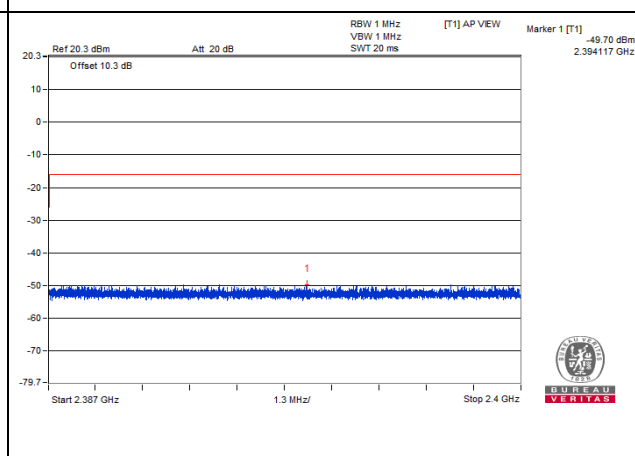
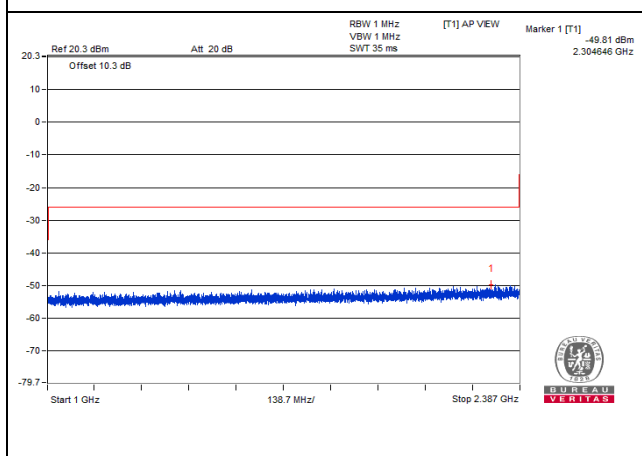
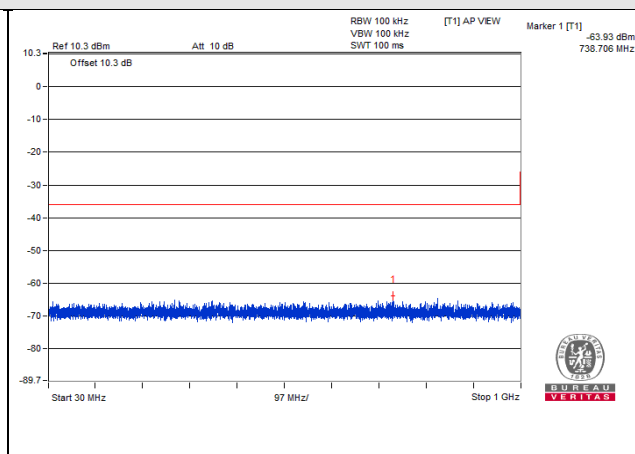
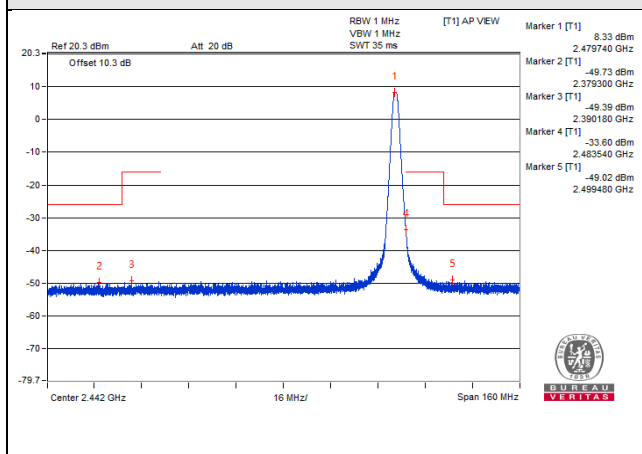
CH 38 (2478MHz)

V_{min}.



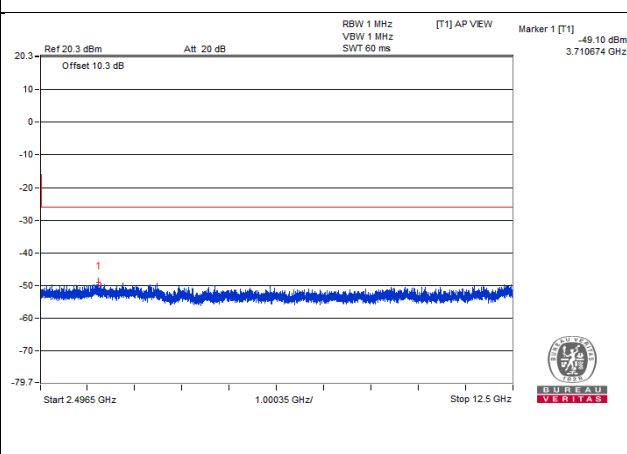
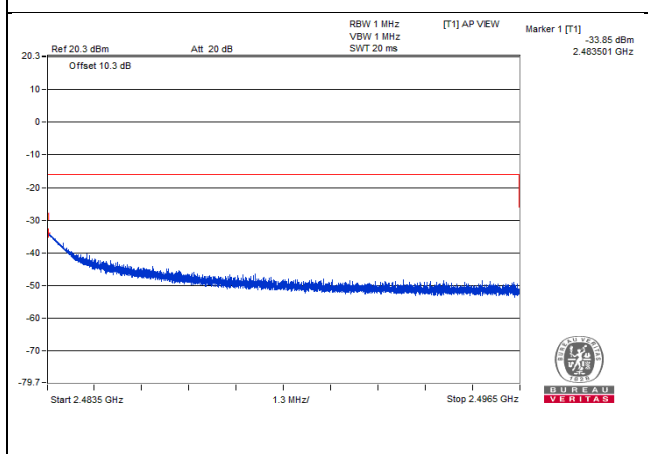
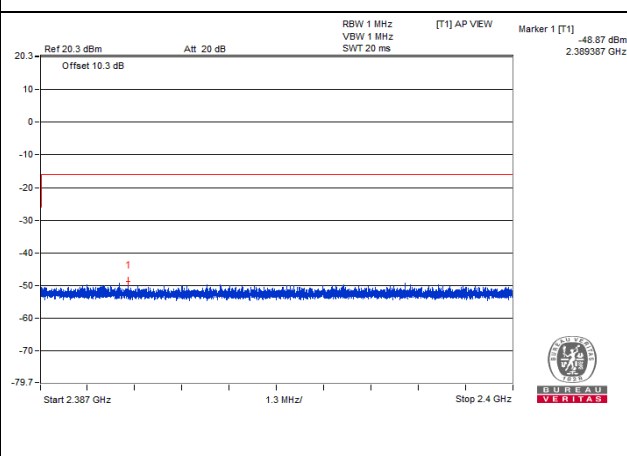
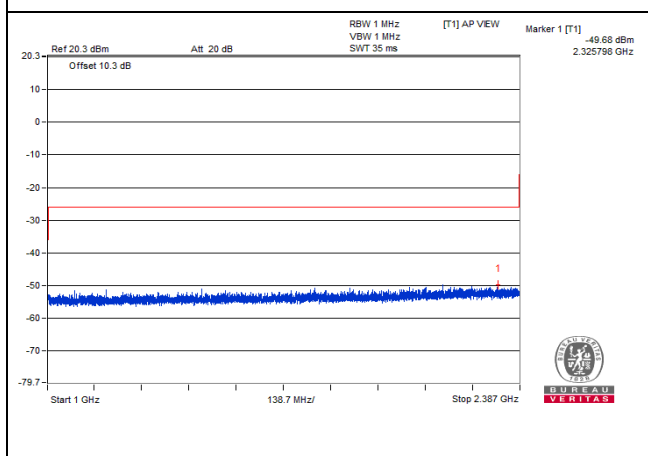
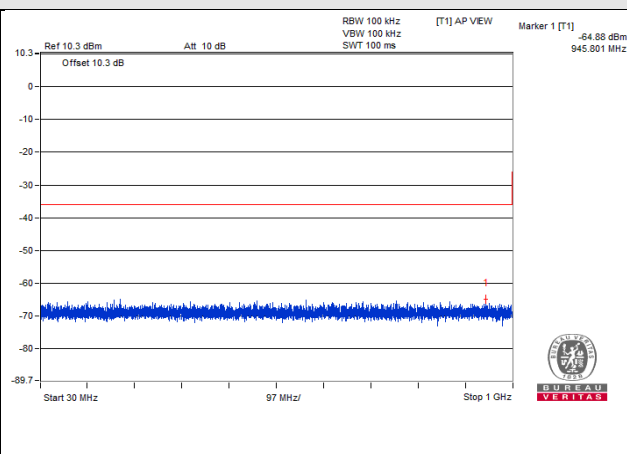
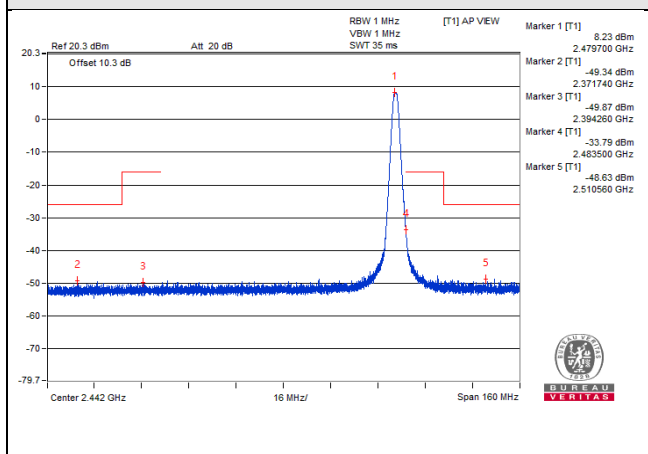
CH 38 (2478MHz)

Vnormal



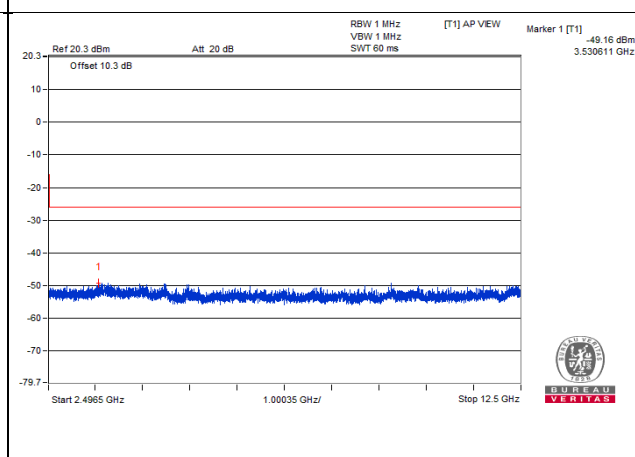
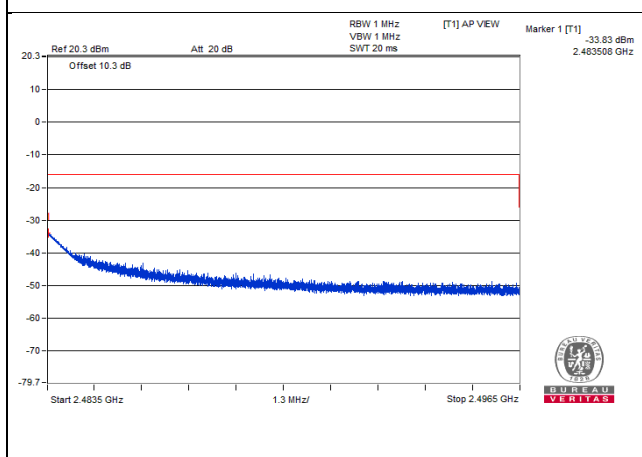
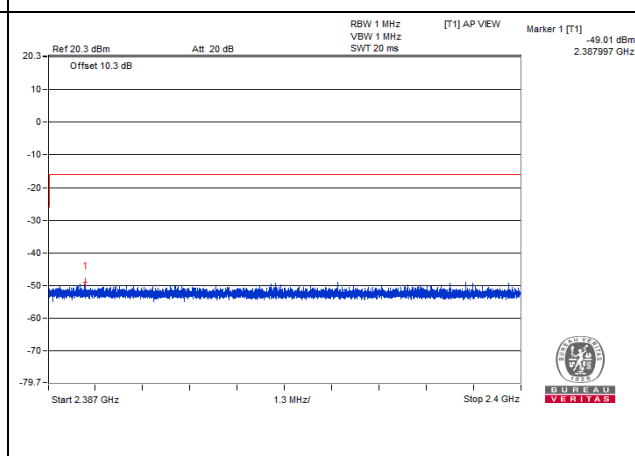
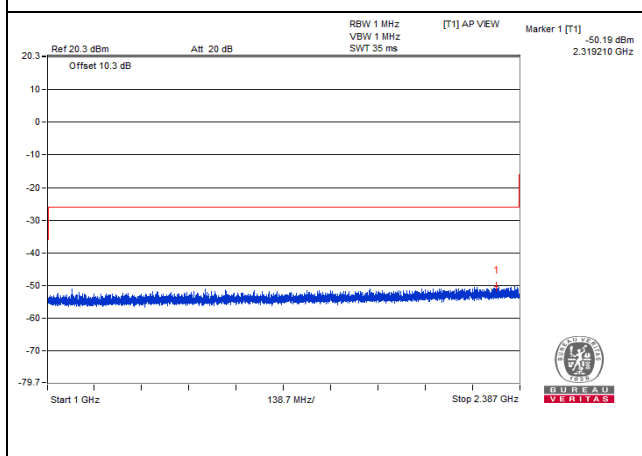
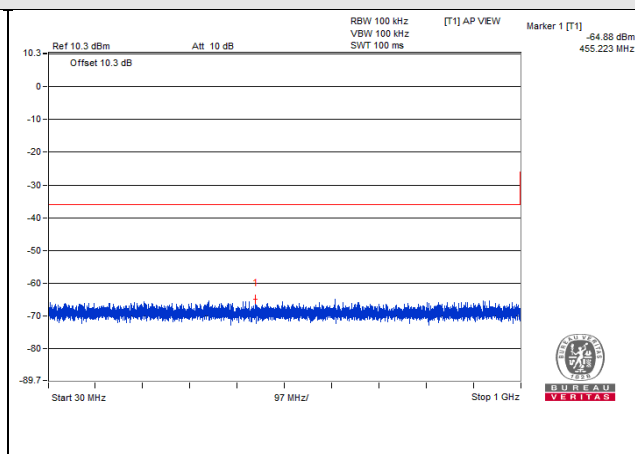
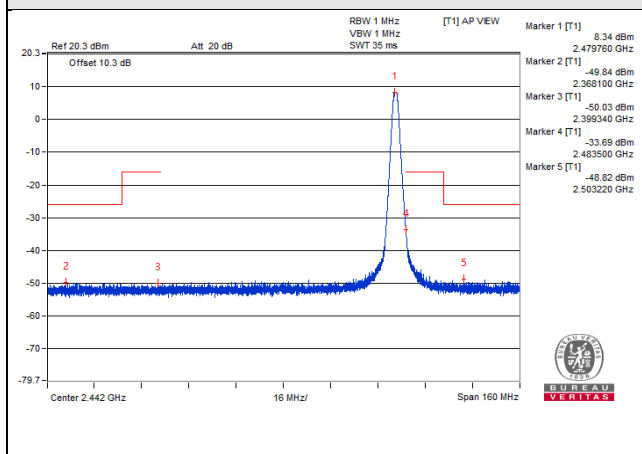
CH 39 (2480MHz)

V_{max}.



CH 39 (2480MHz)

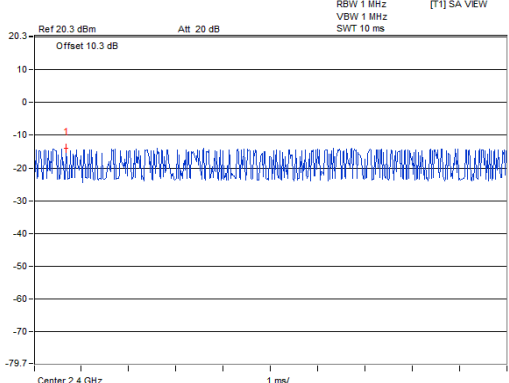
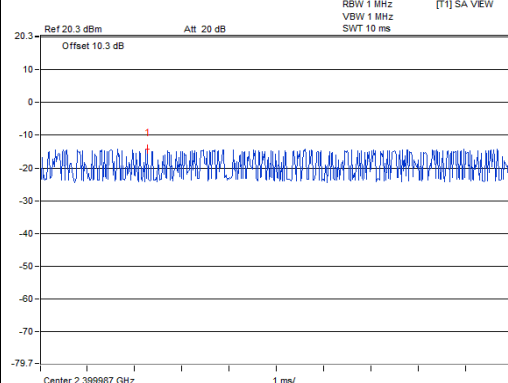
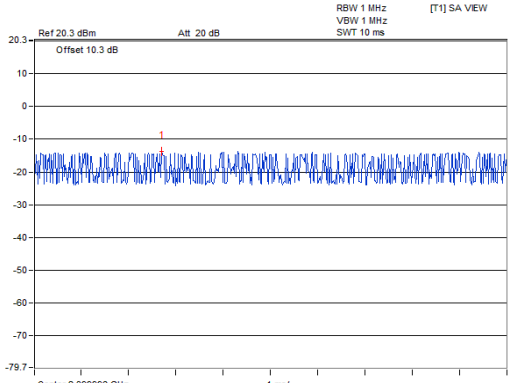
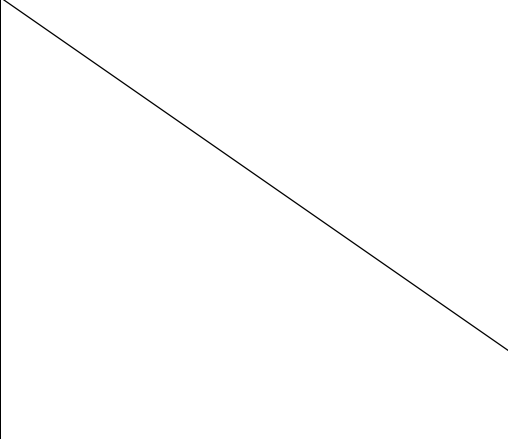
V_{min}.



CH 39 (2480MHz)

Measuring Mode *Zero Span

1. Set the spectrum analyzer as below and it takes in a value of all data point.
2. Regarding the all data value, it transforms the “dBm” value into “uW” value.
3. It adds the all values and calculates a grand total. Define a grand total as “P”.
4. It divides “P” by sample data point (ex.501) and calculates the mean value.
5. It reports the mean value.

					
1	2400.000MHz	P = 17.795341uW	2	2399.987MHz	P = 16.686519uW
					
3	2399.998MHz	P = 17.864376uW			

1MBaud with Coded 125kbps transfer rate

Test Channel		CH 0 (2402MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	588.841	0.000375	0.25	PASS
	1000 to 2387	2363.247	0.012735	2.5	PASS
	2387 to 2400	2399.998	21.056700	25	PASS(1)
	2483.5 to 2496.5	2486.308	0.013335	25	PASS
	2496.5 to 12500	3649.403	0.014825	2.5	PASS
V_{max.}	30 to 1000	87.472	0.017783	0.25	PASS
	1000 to 2387	2385.786	0.010914	2.5	PASS
	2387 to 2400	2399.996	19.773028	25	PASS(2)
	2483.5 to 2496.5	2484.427	0.013183	25	PASS
	2496.5 to 12500	12417.471	0.012677	2.5	PASS
V_{min.}	30 to 1000	700.148	0.000350	0.25	PASS
	1000 to 2387	2280.721	0.011588	2.5	PASS
	2387 to 2400	2399.998	21.584130	25	PASS(3)
	2483.5 to 2496.5	2493.552	0.014093	25	PASS
	2496.5 to 12500	3683.165	0.013213	2.5	PASS

Test Channel		CH 1 (2404MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	773.990	0.000171	0.25	Pass
	1000 to 2387	2373.130	0.017579	2.5	Pass
	2387 to 2400	2394.358	0.278612	25	Pass
	2483.5 to 2496.5	2485.898	0.013772	25	Pass
	2496.5 to 12500	8659.906	0.031842	2.5	Pass
V_{max.}	30 to 1000	889.298	0.000181	0.25	Pass
	1000 to 2387	2385.439	0.025351	2.5	Pass
	2387 to 2400	2394.330	0.279254	25	Pass
	2483.5 to 2496.5	2486.152	0.013964	25	Pass
	2496.5 to 12500	7495.749	0.031117	2.5	Pass
V_{min.}	30 to 1000	788.903	0.000161	0.25	Pass
	1000 to 2387	2384.919	0.054325	2.5	Pass
	2387 to 2400	2394.182	0.272270	25	Pass
	2483.5 to 2496.5	2490.607	0.014997	25	Pass
	2496.5 to 12500	7426.975	0.033651	2.5	Pass

Test Channel		CH 19 (2440MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	847.831	0.000153	0.25	Pass
	1000 to 2387	2101.104	0.013305	2.5	Pass
	2387 to 2400	2391.246	0.023227	25	Pass
	2483.5 to 2496.5	2488.495	0.019815	25	Pass
	2496.5 to 12500	7428.225	0.033266	2.5	Pass
V_{max.}	30 to 1000	941.436	0.000144	0.25	Pass
	1000 to 2387	1882.478	0.015596	2.5	Pass
	2387 to 2400	2391.249	0.026002	25	Pass
	2483.5 to 2496.5	2483.678	0.020230	25	Pass
	2496.5 to 12500	7433.227	0.032359	2.5	Pass
V_{min.}	30 to 1000	796.057	0.000155	0.25	Pass
	1000 to 2387	2225.067	0.013062	2.5	Pass
	2387 to 2400	2391.340	0.022594	25	Pass
	2483.5 to 2496.5	2484.853	0.022646	25	Pass
	2496.5 to 12500	6396.614	0.034119	2.5	Pass

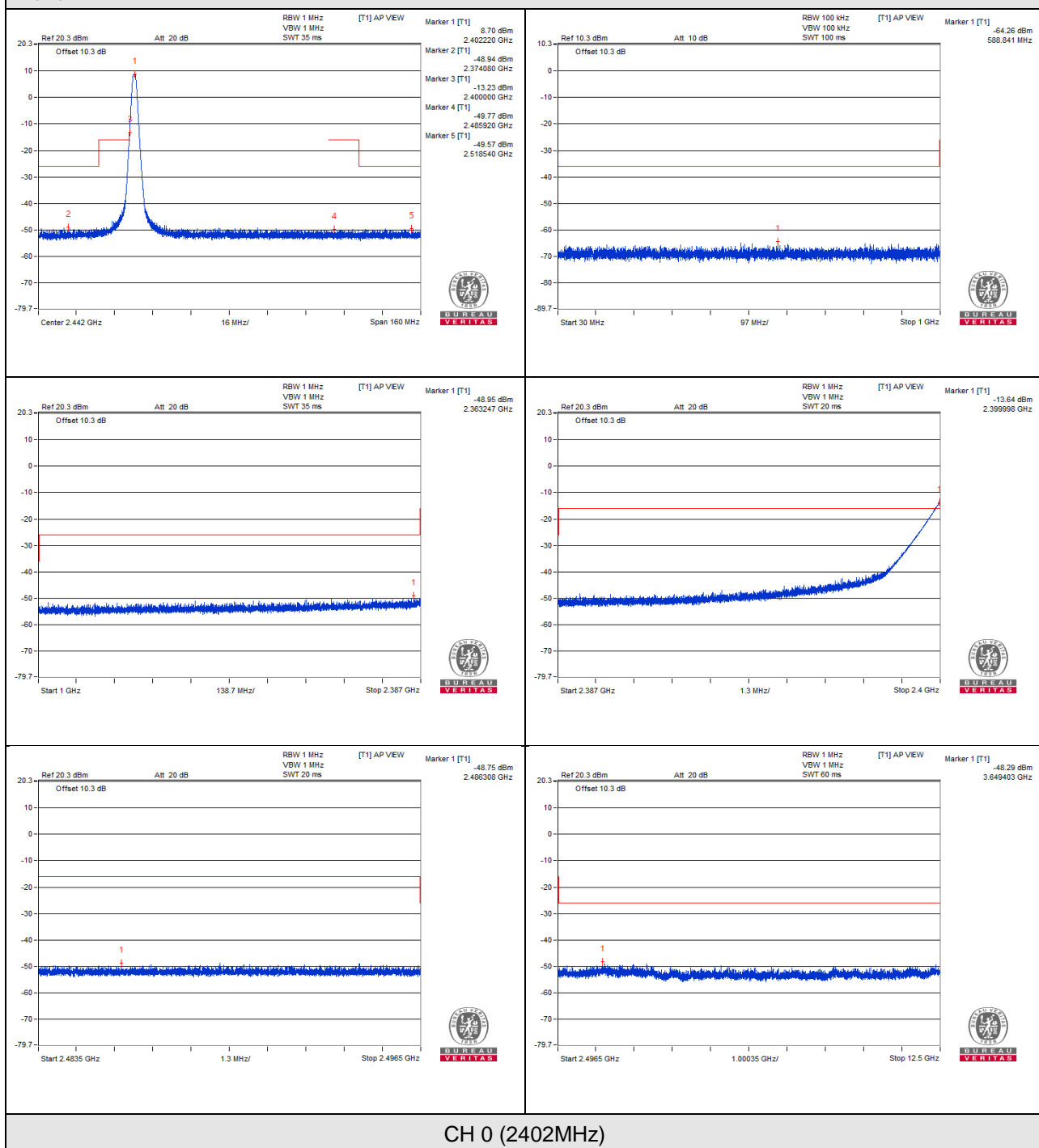
Test Channel		CH 38 (2478MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	854.136	0.000159	0.25	Pass
	1000 to 2387	2244.312	0.014962	2.5	Pass
	2387 to 2400	2390.604	0.012078	25	Pass
	2483.5 to 2496.5	2487.687	0.315500	25	Pass
	2496.5 to 12500	7496.999	0.030479	2.5	Pass
V_{max.}	30 to 1000	913.548	0.000161	0.25	Pass
	1000 to 2387	1631.258	0.014028	2.5	Pass
	2387 to 2400	2390.989	0.013552	25	Pass
	2483.5 to 2496.5	2487.798	0.316957	25	Pass
	2496.5 to 12500	7386.961	0.029923	2.5	Pass
V_{min.}	30 to 1000	756.045	0.000148	0.25	Pass
	1000 to 2387	2263.383	0.013740	2.5	Pass
	2387 to 2400	2388.098	0.014997	25	Pass
	2483.5 to 2496.5	2487.617	0.311172	25	Pass
	2496.5 to 12500	2496.500	0.065766	2.5	Pass

Test Channel		CH 39 (2480MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	709.848	0.000327	0.25	Pass
	1000 to 2387	2370.702	0.010447	2.5	Pass
	2387 to 2400	2391.722	0.013152	25	Pass
	2483.5 to 2496.5	2483.501	0.550808	25	Pass
	2496.5 to 12500	12369.954	0.013243	2.5	Pass
V_{max.}	30 to 1000	859.107	0.000337	0.25	Pass
	1000 to 2387	2366.195	0.010814	2.5	Pass
	2387 to 2400	2398.496	0.011641	25	Pass
	2483.5 to 2496.5	2483.500	0.554626	25	Pass
	2496.5 to 12500	3594.384	0.012303	2.5	Pass
V_{min.}	30 to 1000	667.653	0.000342	0.25	Pass
	1000 to 2387	2368.795	0.011041	2.5	Pass
	2387 to 2400	2394.739	0.011995	25	Pass
	2483.5 to 2496.5	2483.501	0.530884	25	Pass
	2496.5 to 12500	3476.843	0.012503	2.5	Pass

Note:

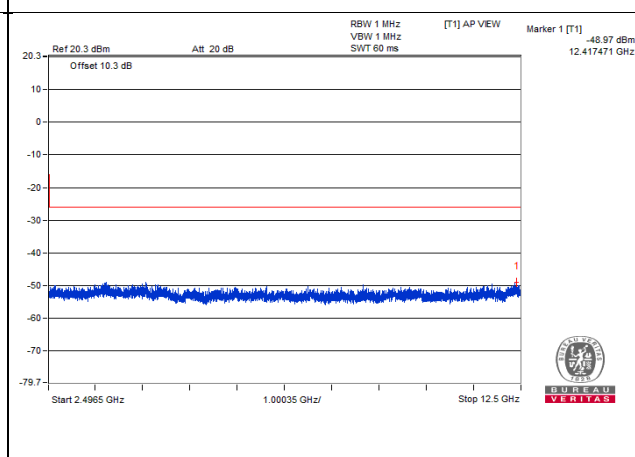
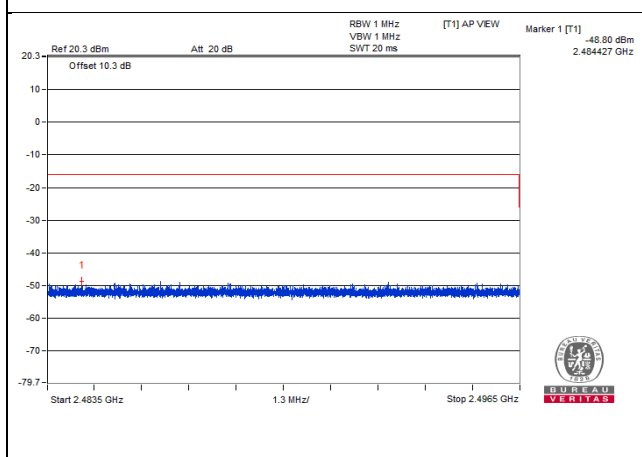
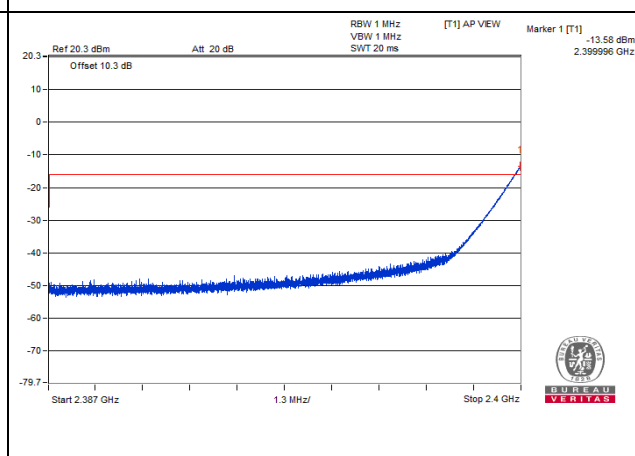
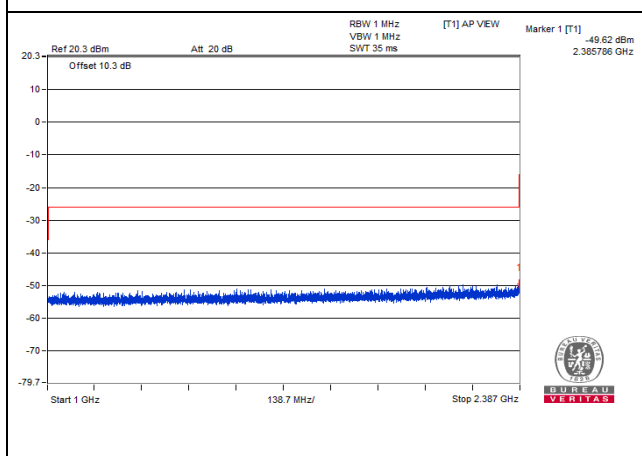
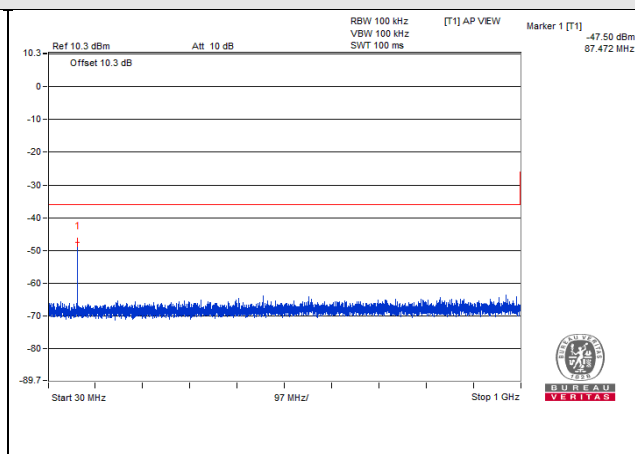
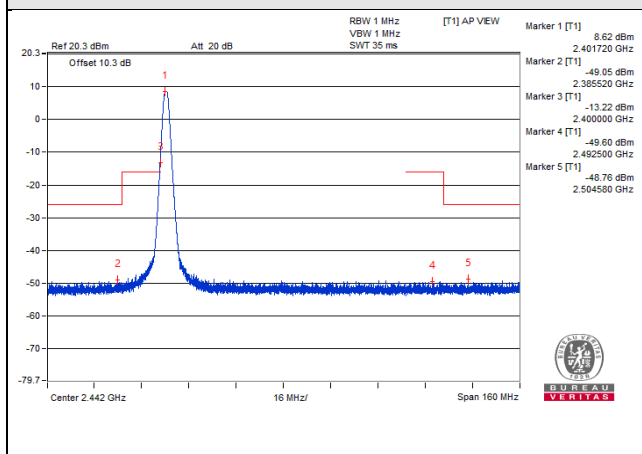
1. The spectrum plots are attached on the following pages.
2. (No.): The value was tested under Measuring Mode *Zero Span.

Vnormal



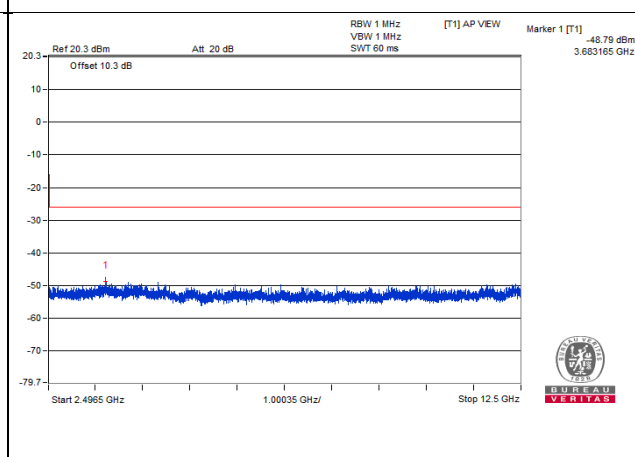
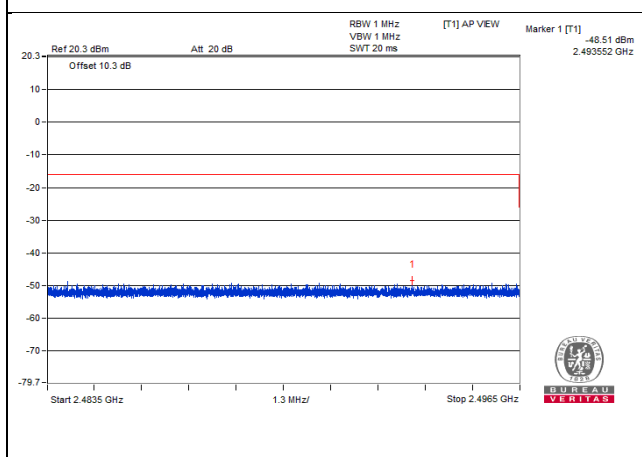
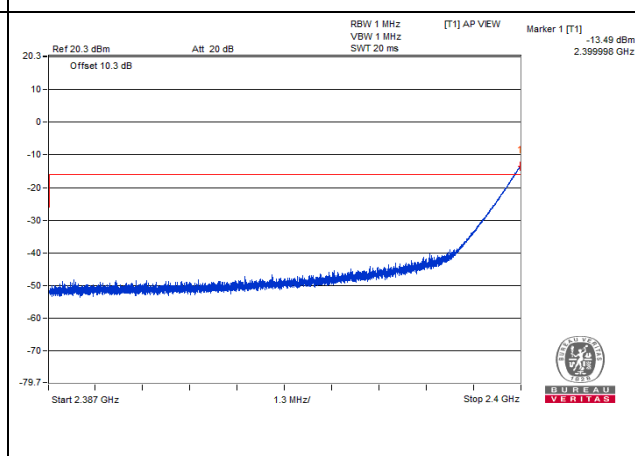
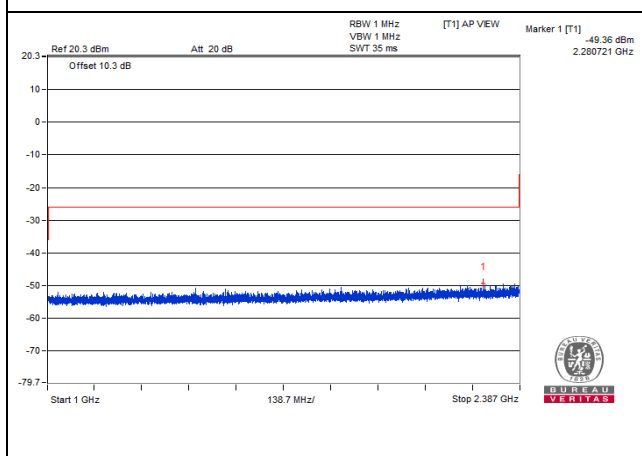
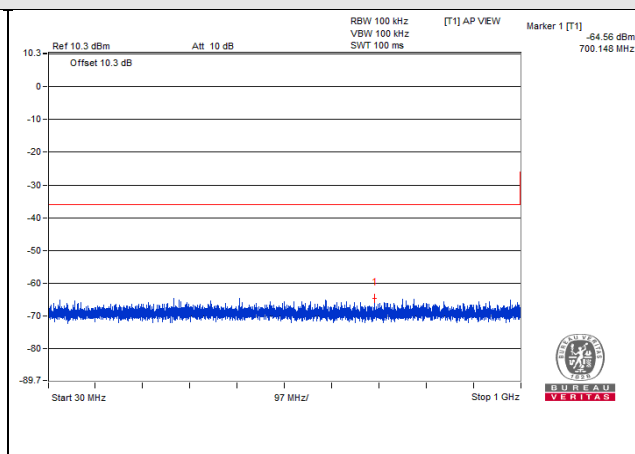
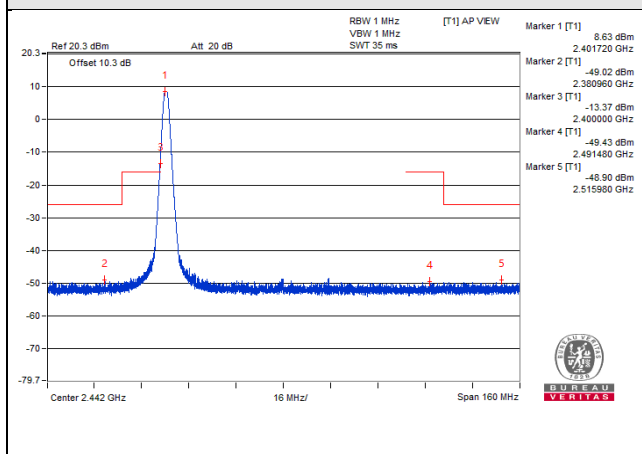
CH 0 (2402MHz)

V_{max}.



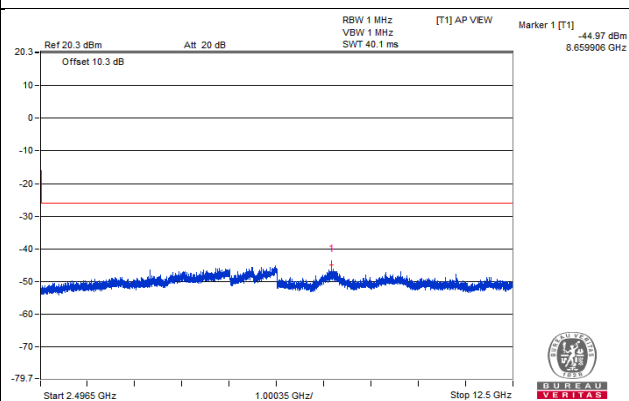
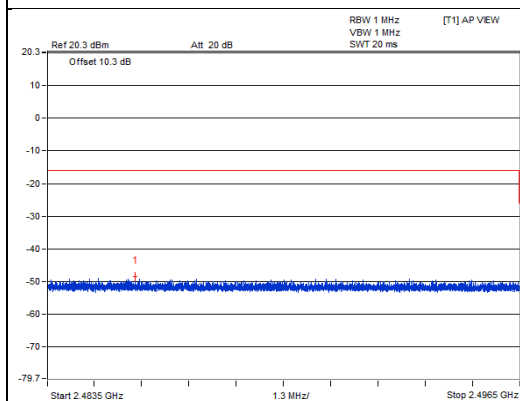
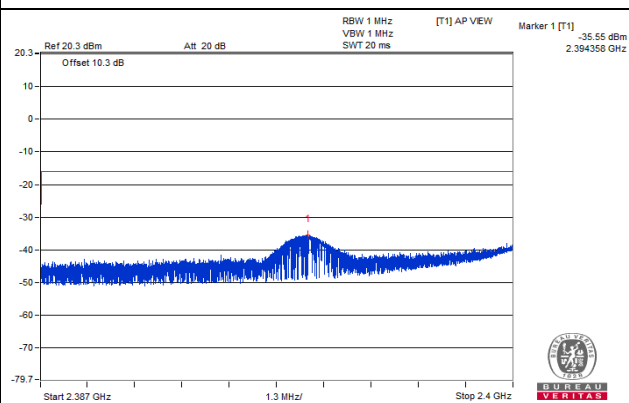
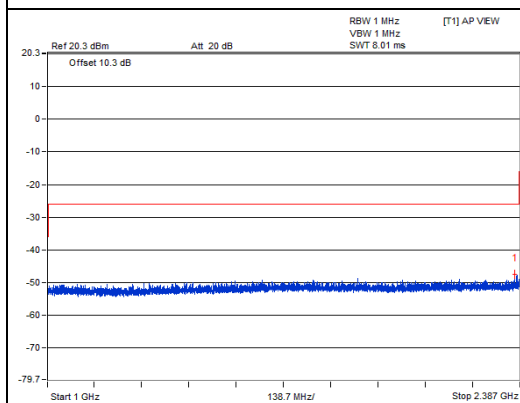
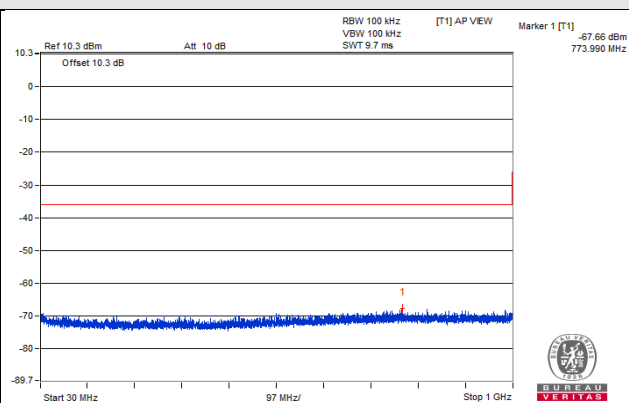
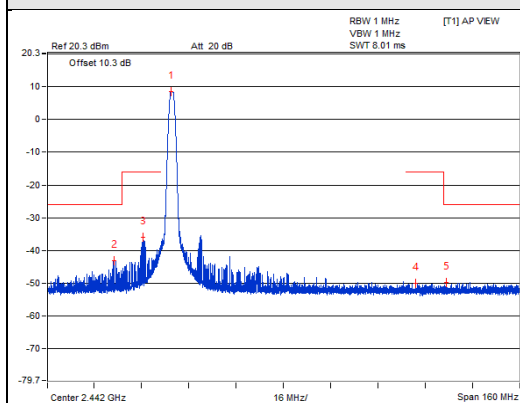
CH 0 (2402MHz)

V_{min}.



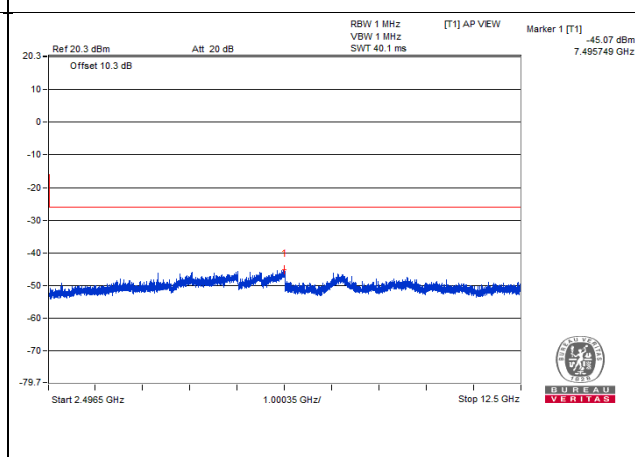
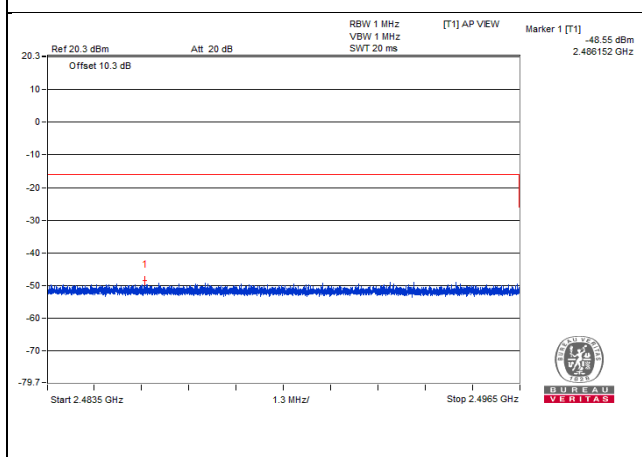
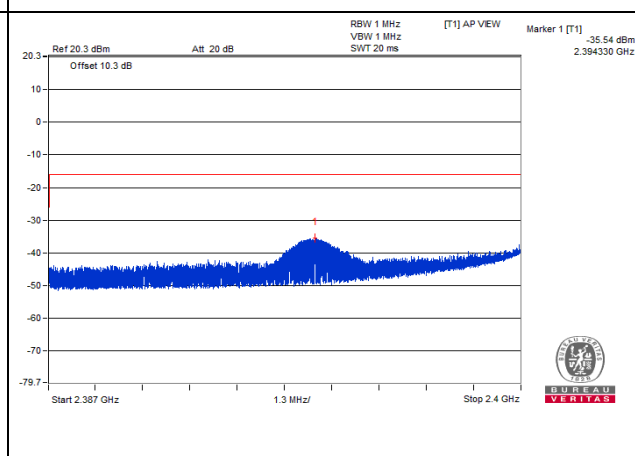
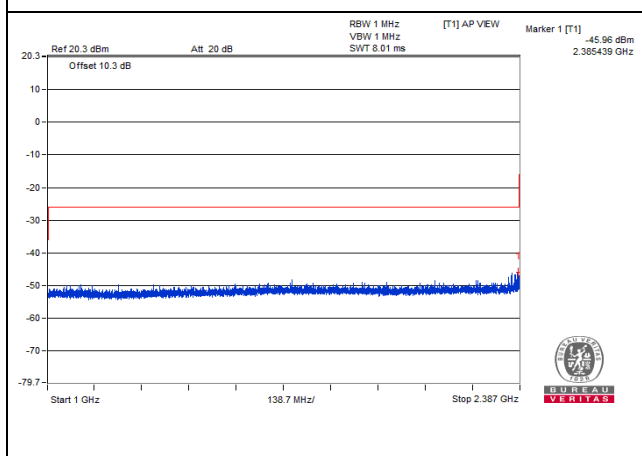
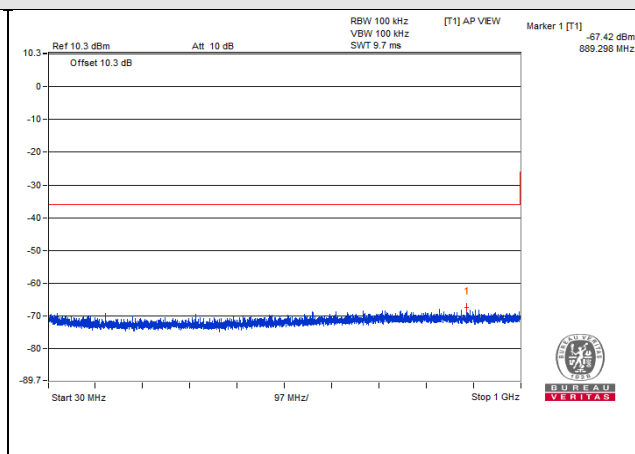
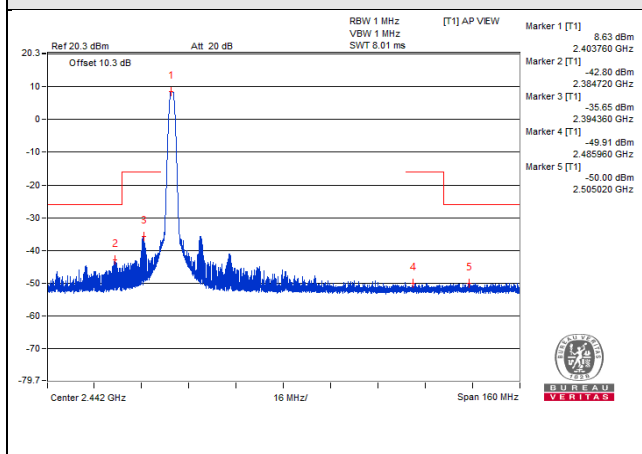
CH 0 (2402MHz)

Vnormal



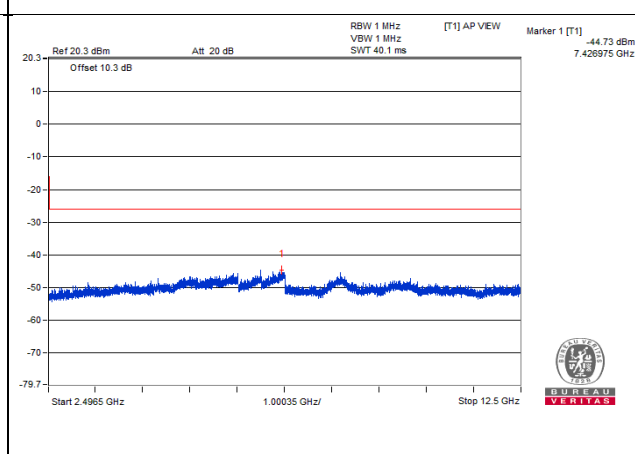
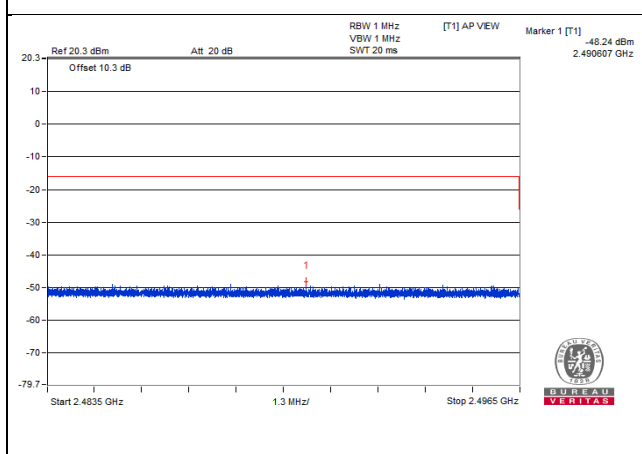
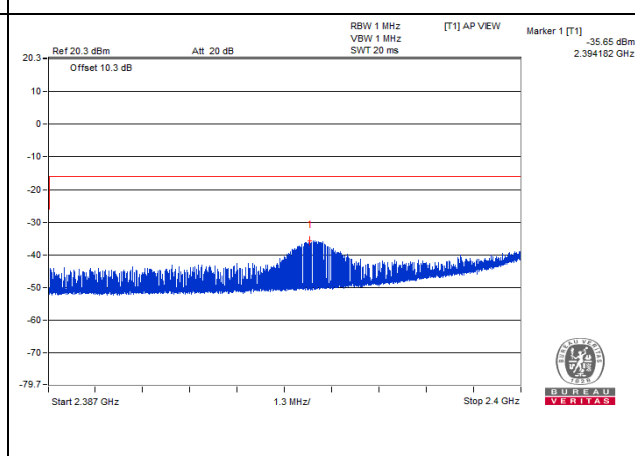
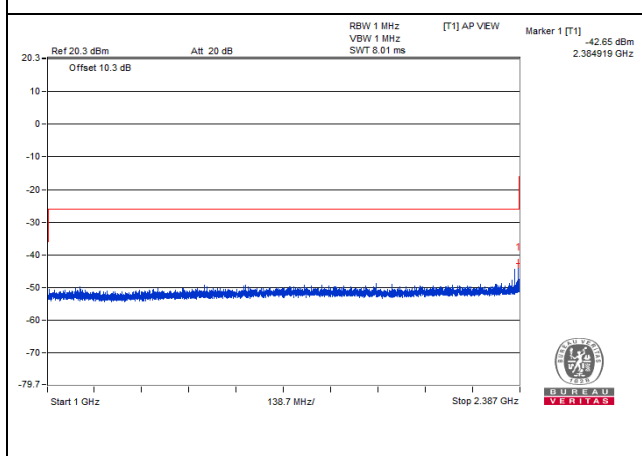
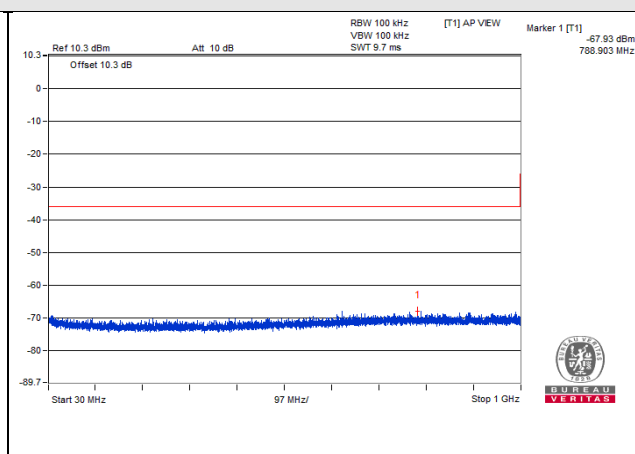
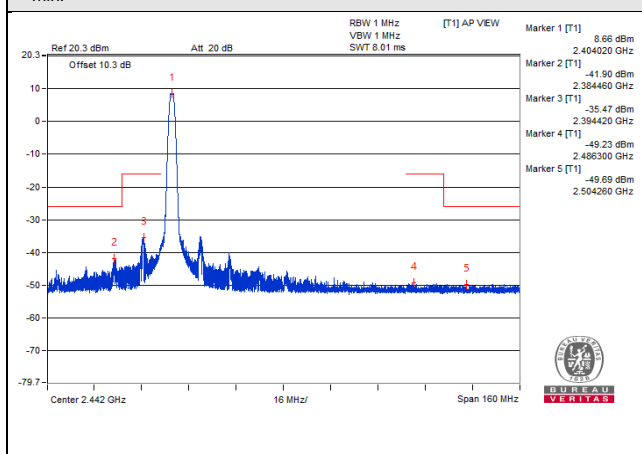
CH 1 (2404MHz)

V_{max}.



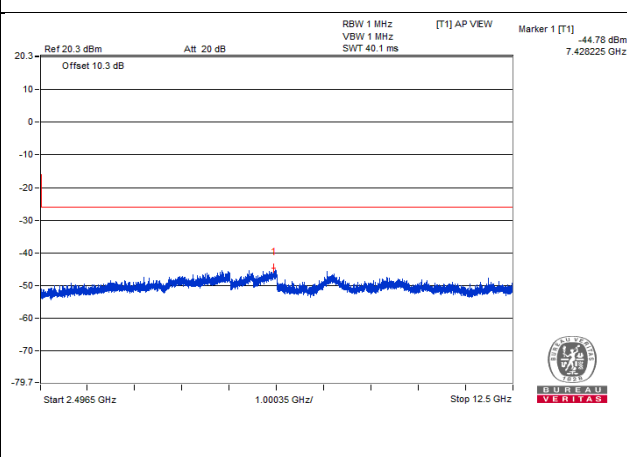
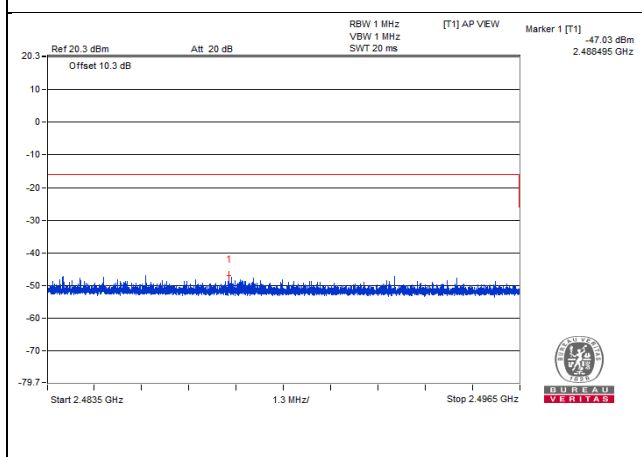
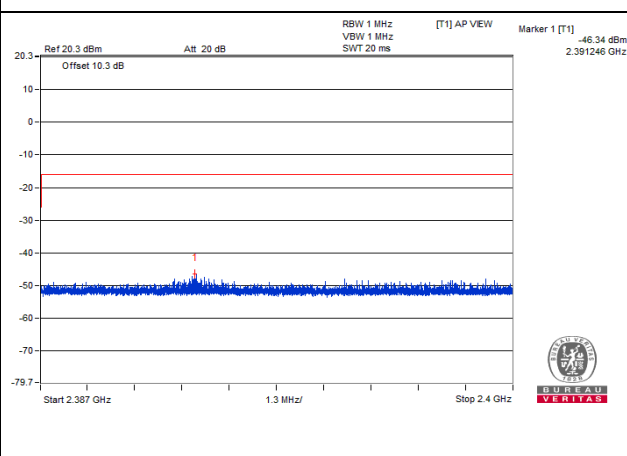
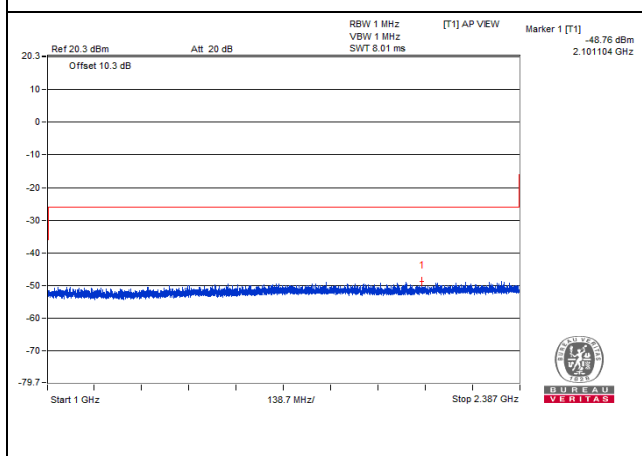
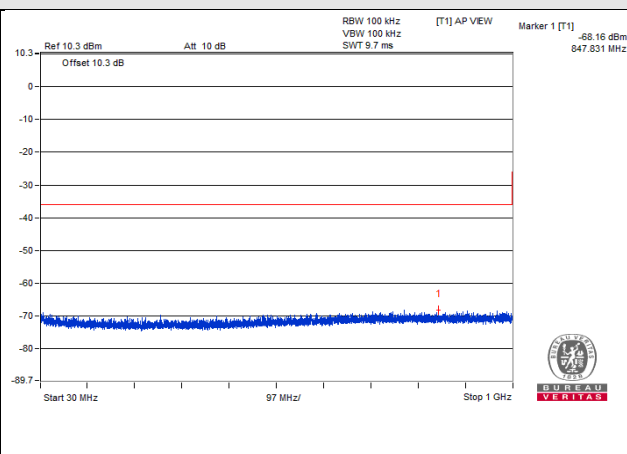
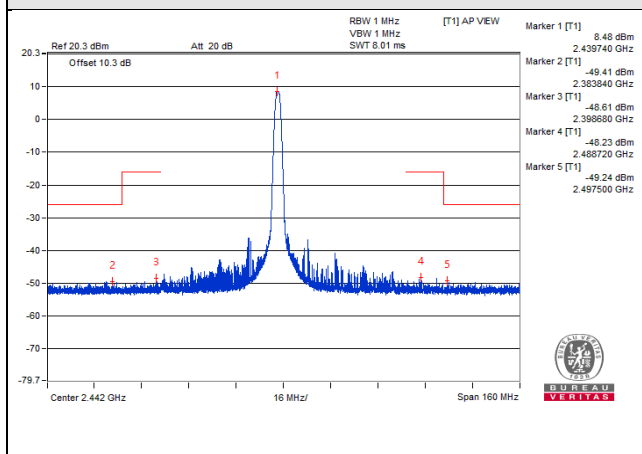
CH 1 (2404MHz)

V_{min}.



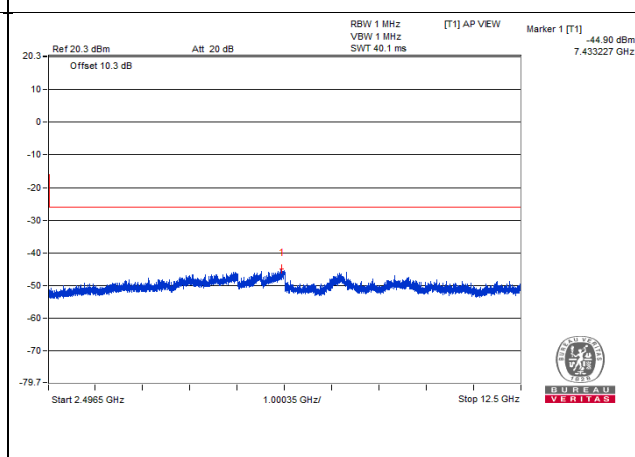
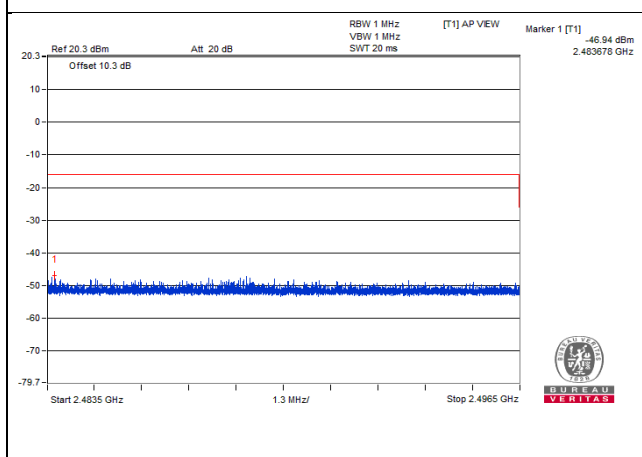
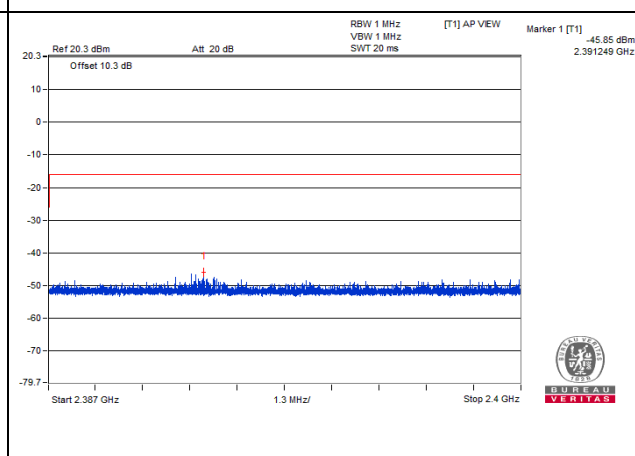
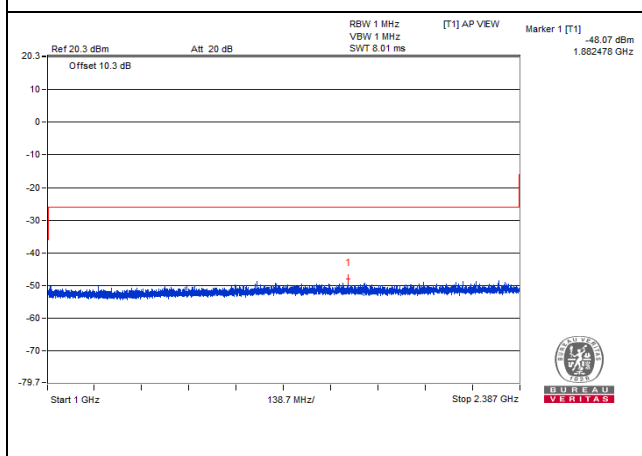
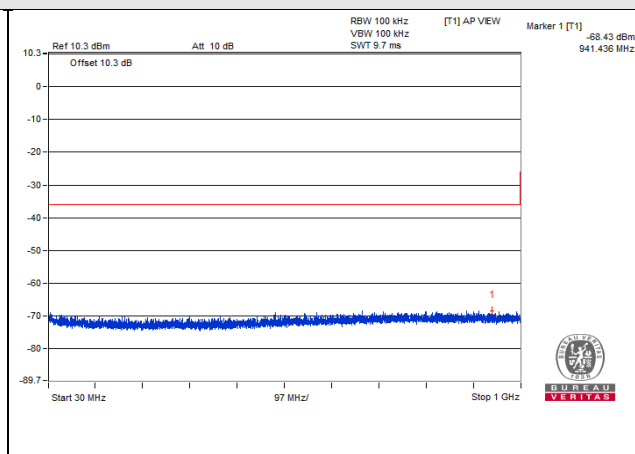
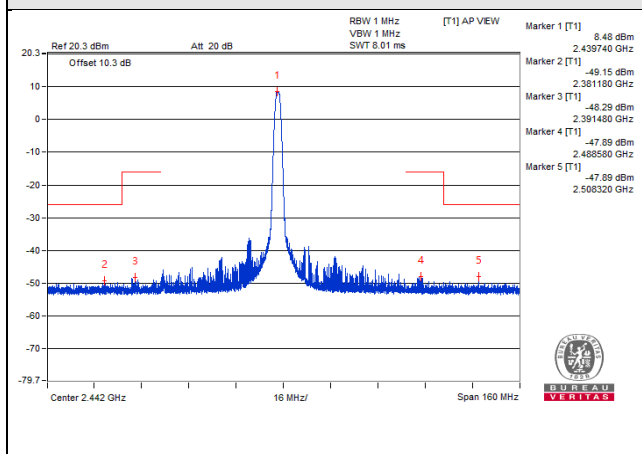
CH 1 (2404MHz)

V_{normal}



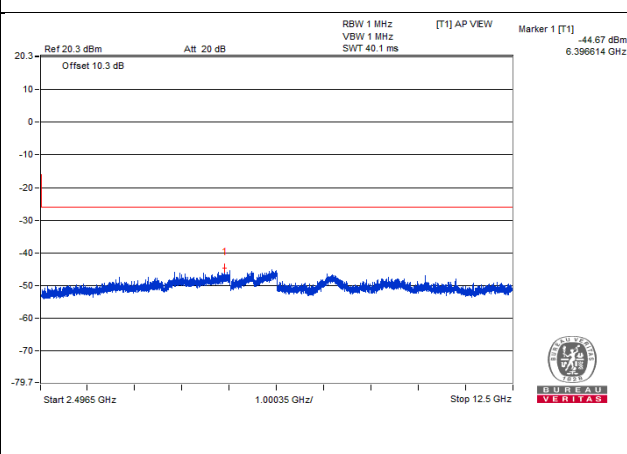
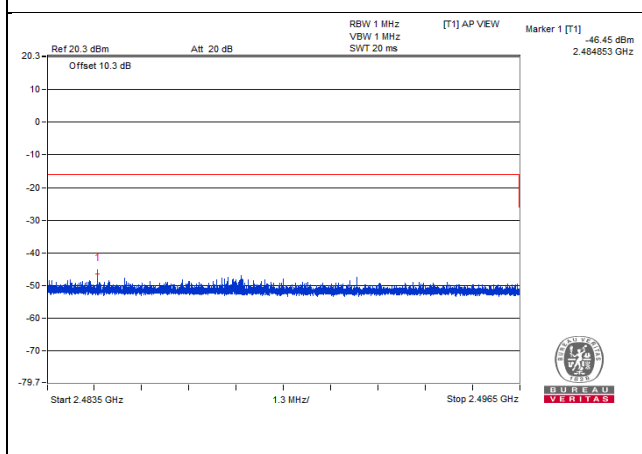
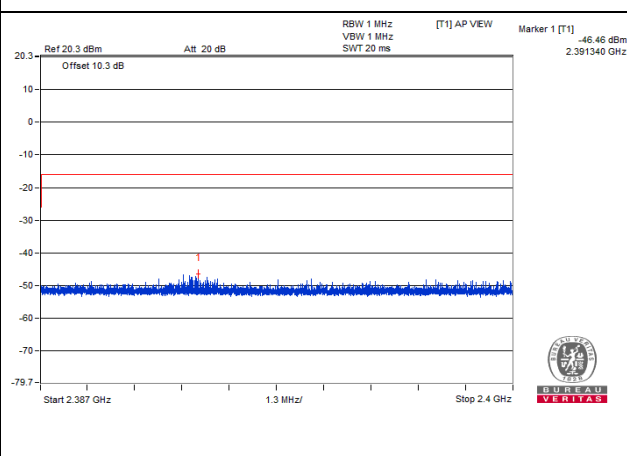
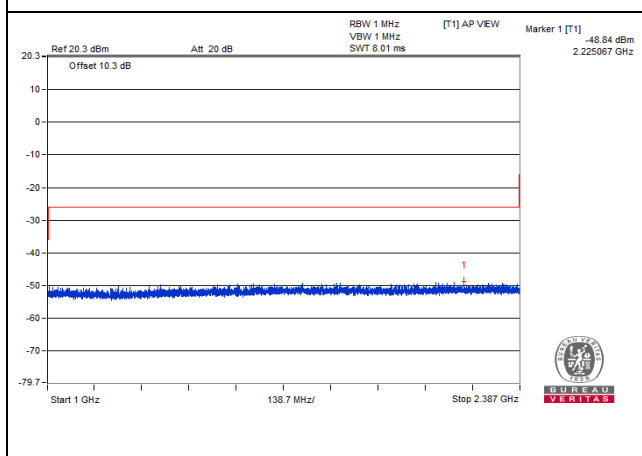
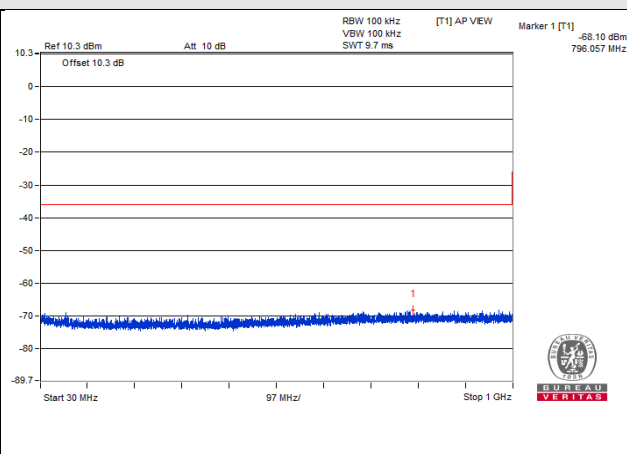
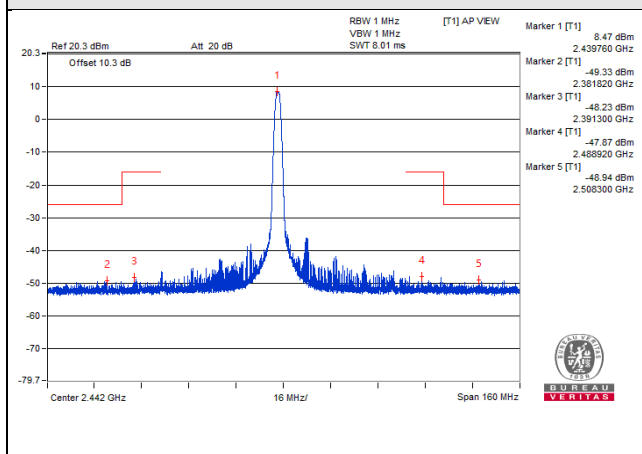
CH 19 (2440MHz)

V_{max}.



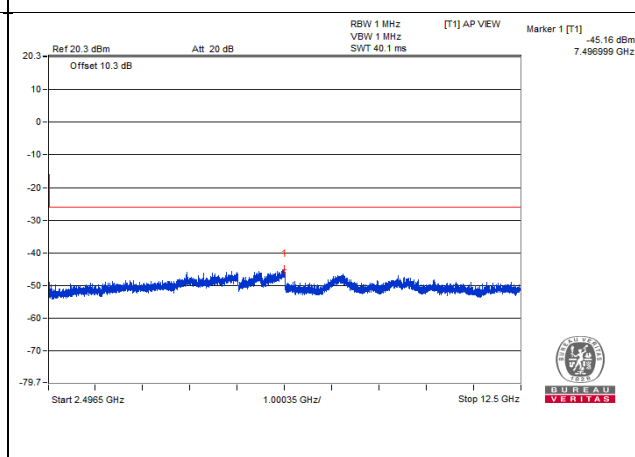
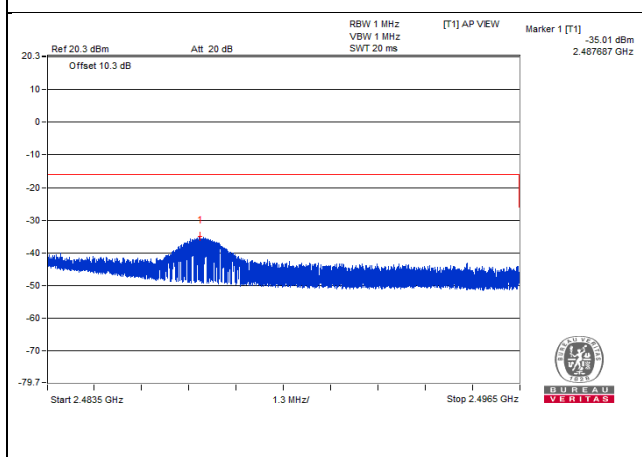
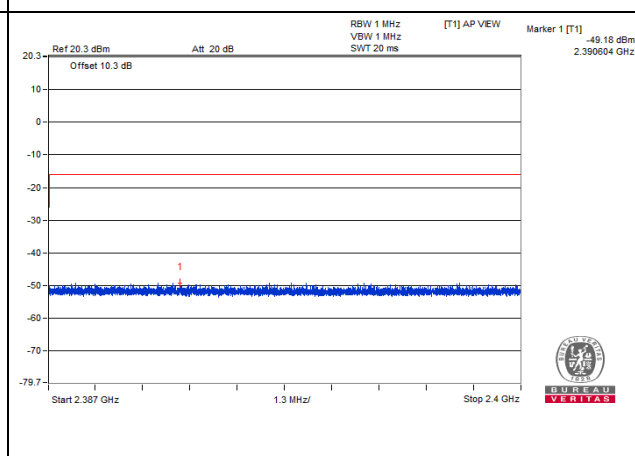
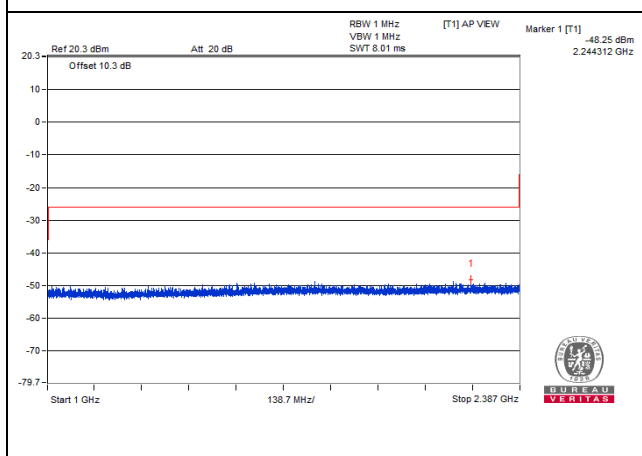
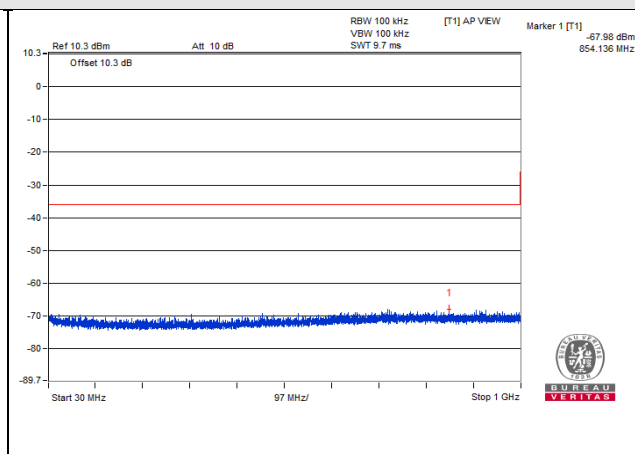
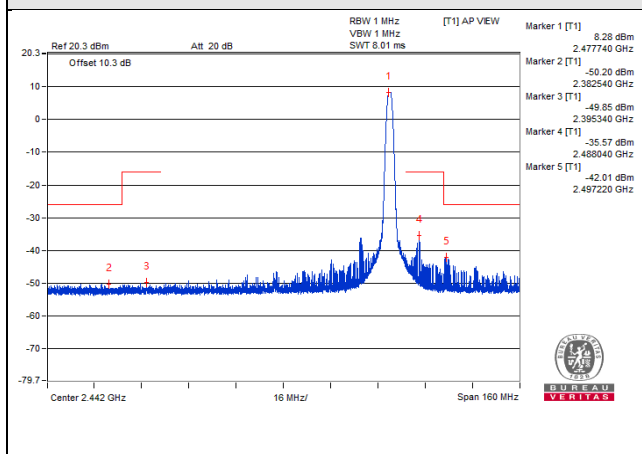
CH 19 (2440MHz)

V_{min}.



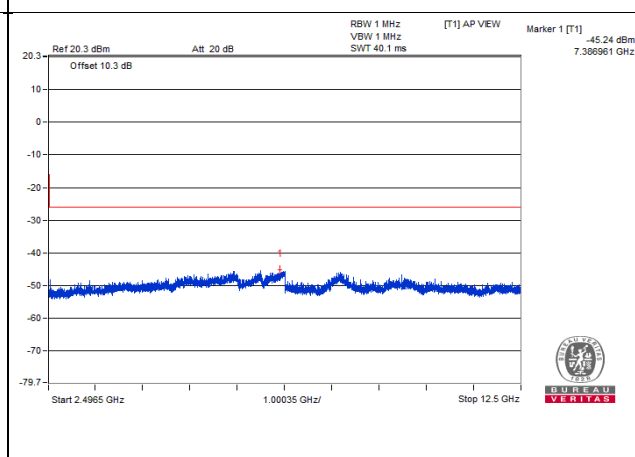
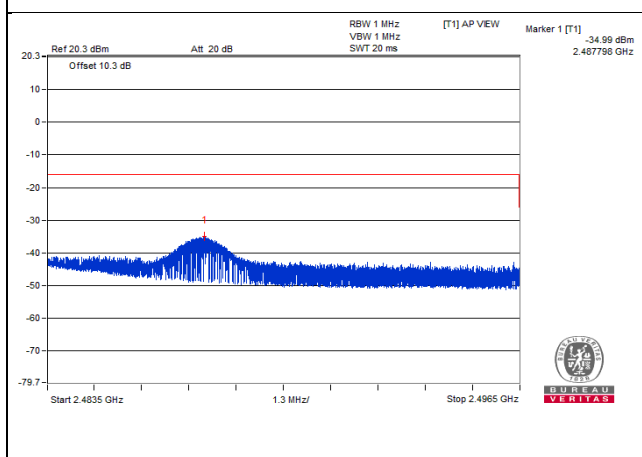
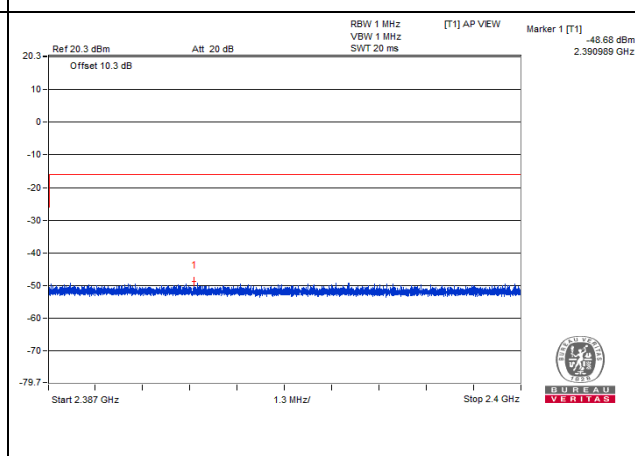
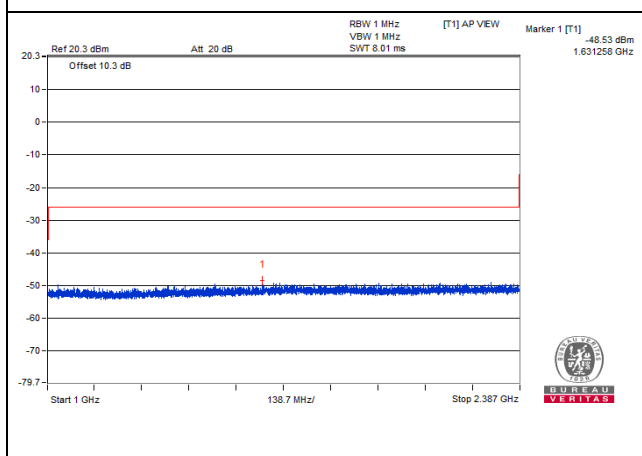
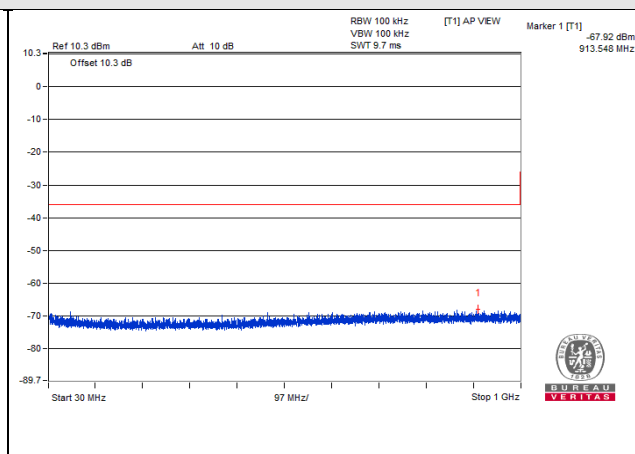
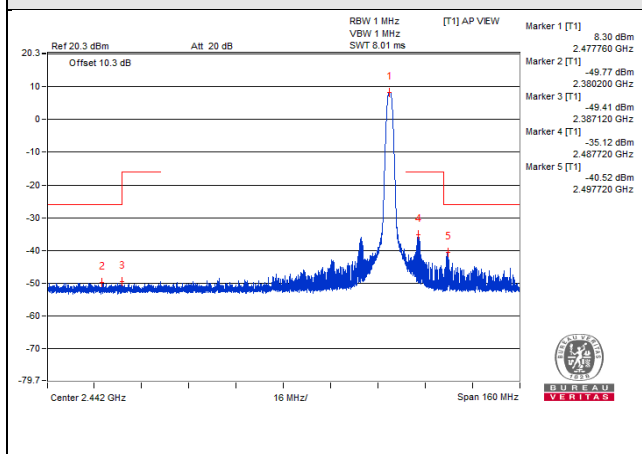
CH 19 (2440MHz)

V_{normal}



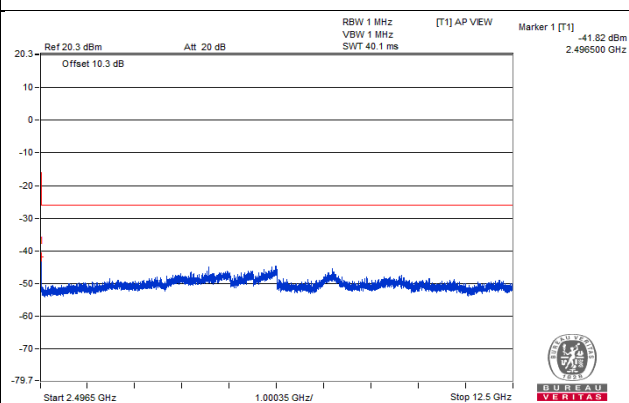
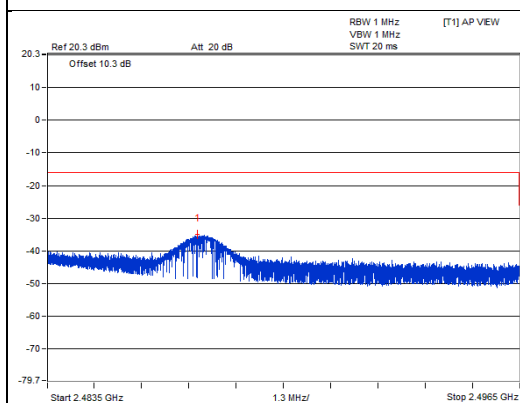
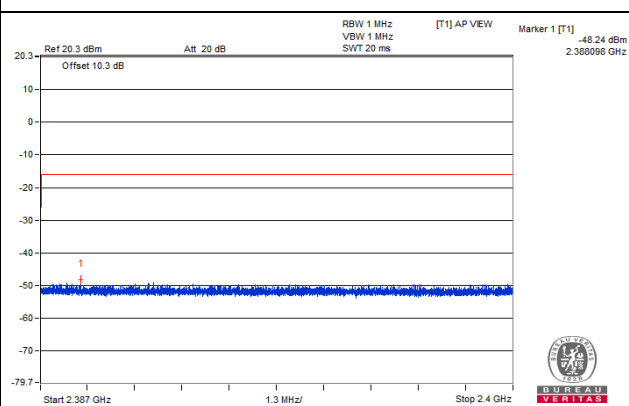
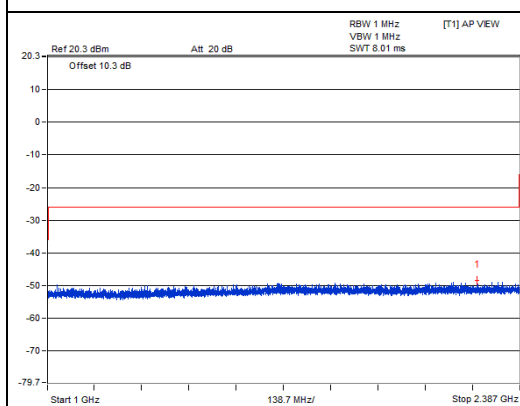
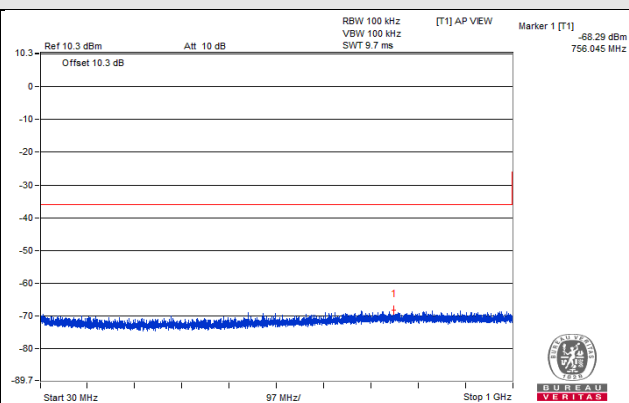
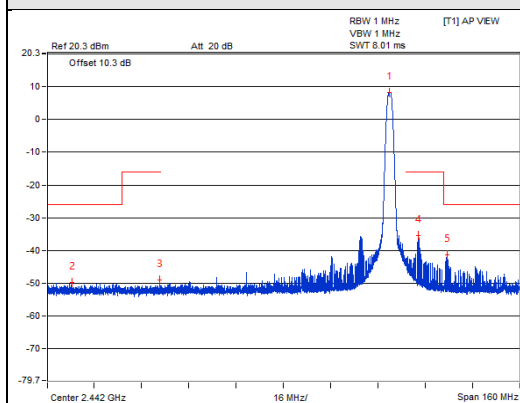
CH 38 (2478MHz)

V_{max}.



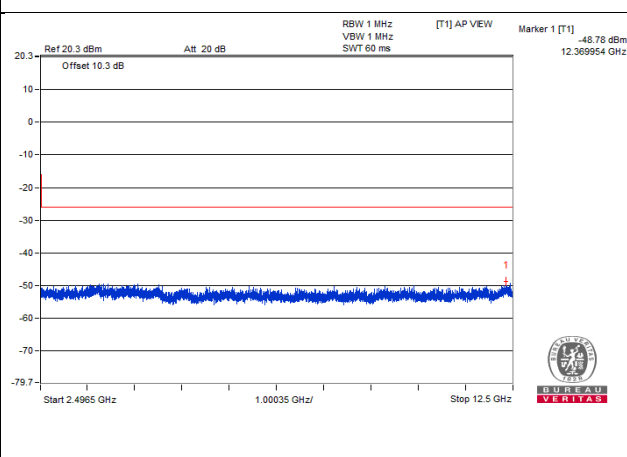
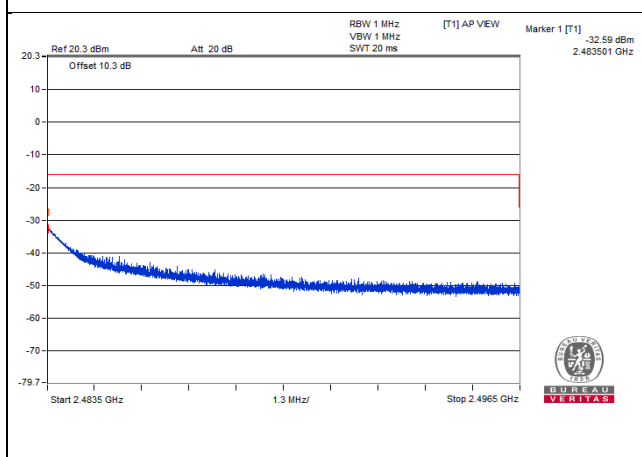
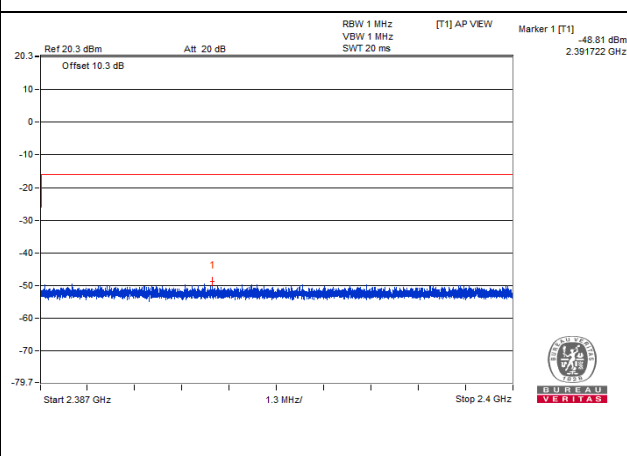
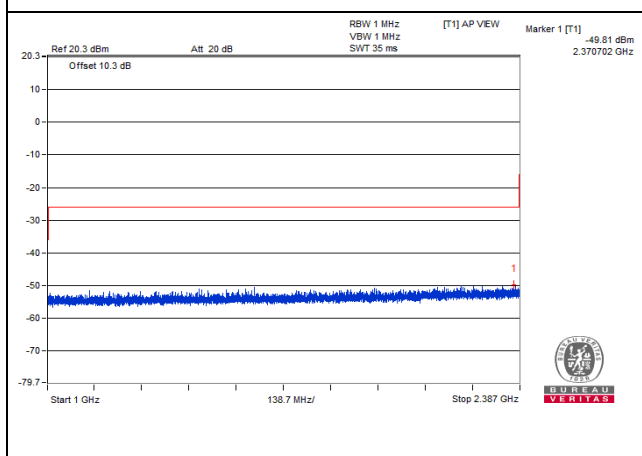
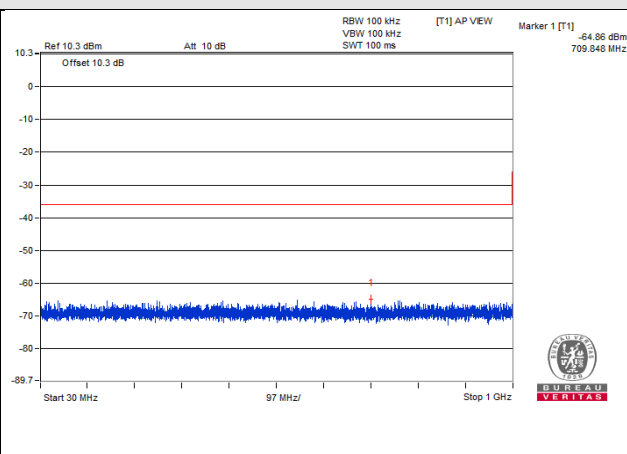
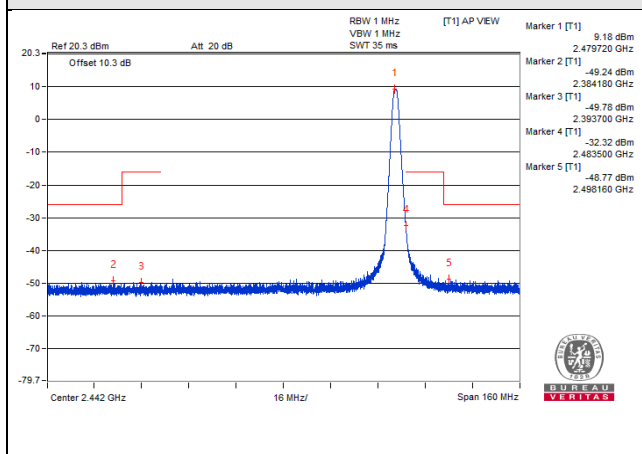
CH 38 (2478MHz)

V_{min}.



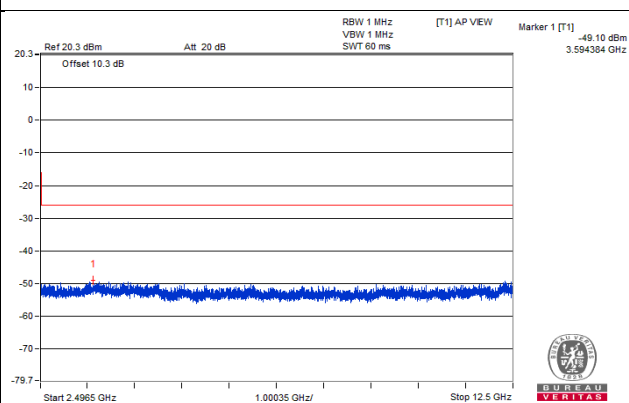
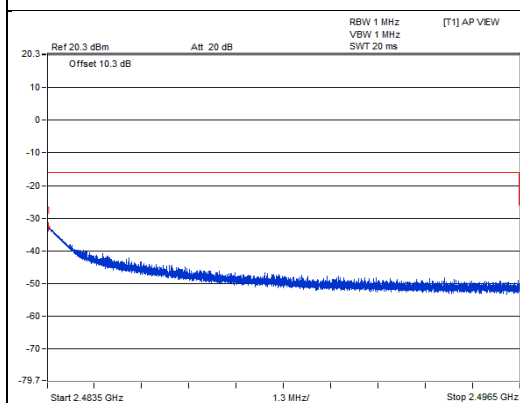
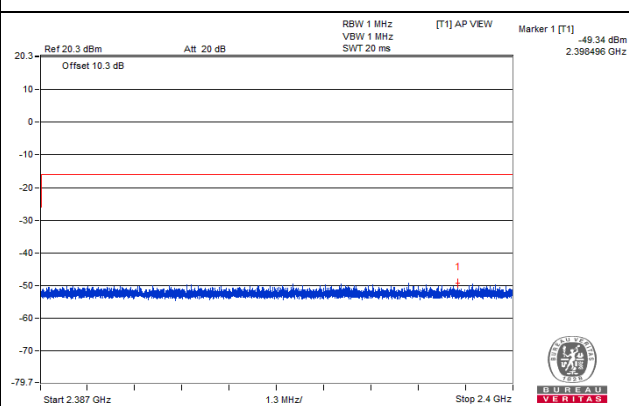
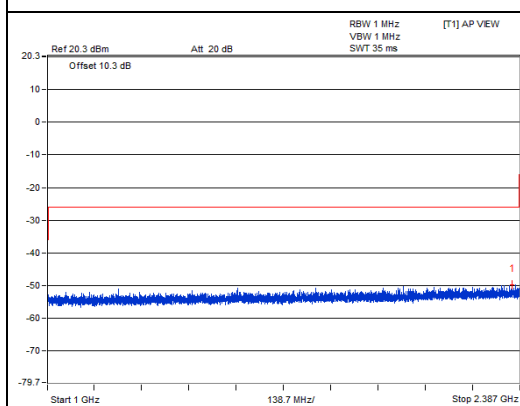
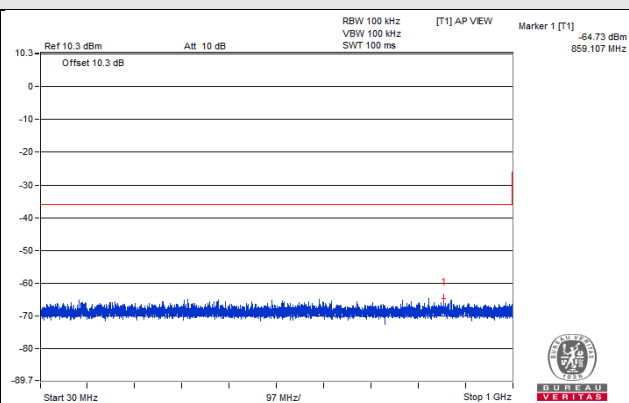
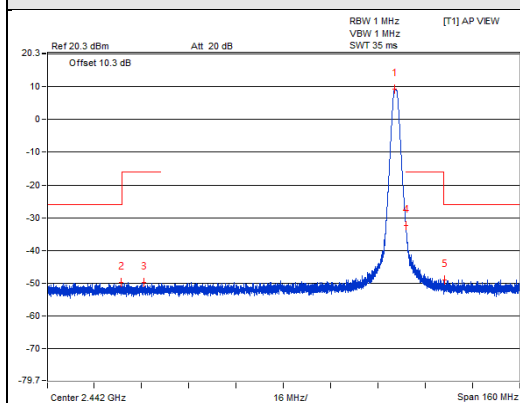
CH 38 (2478MHz)

Vnormal



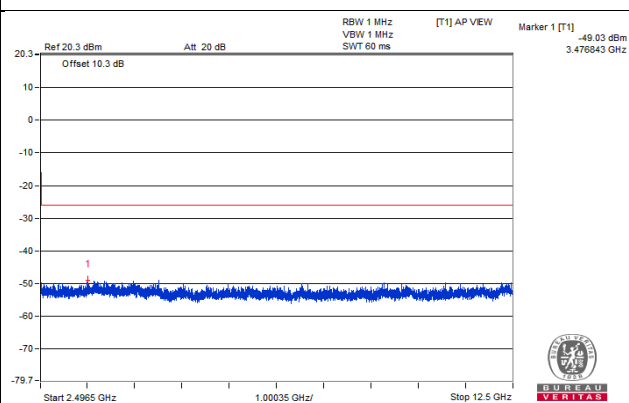
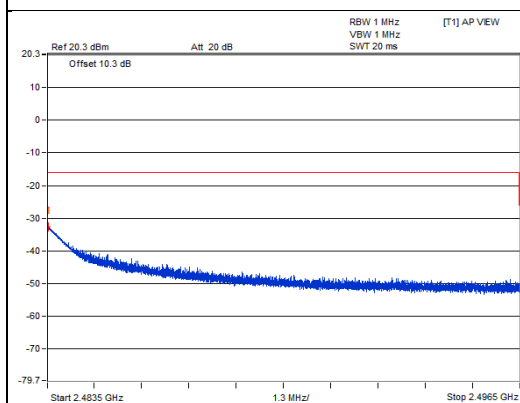
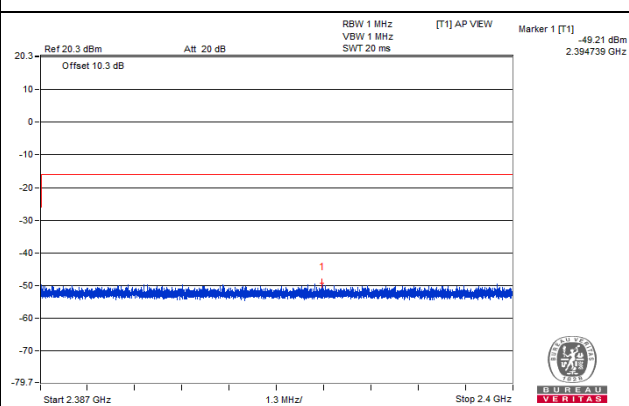
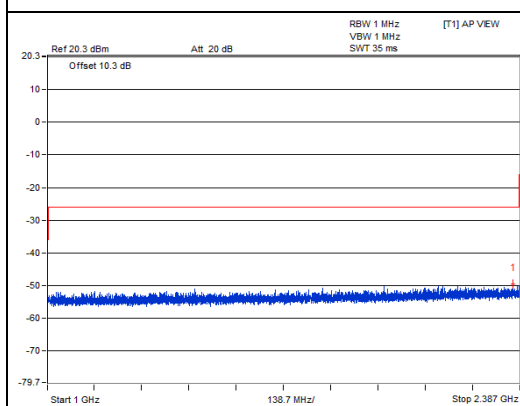
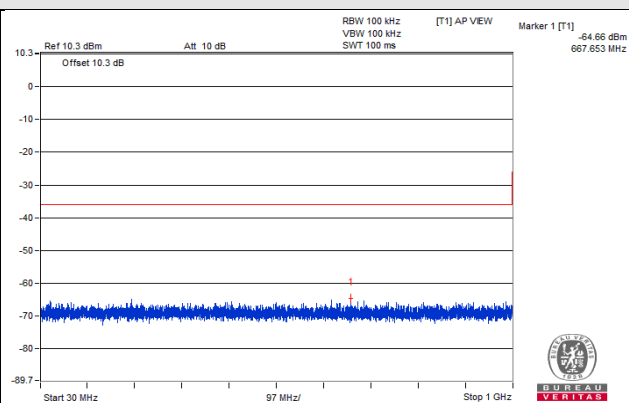
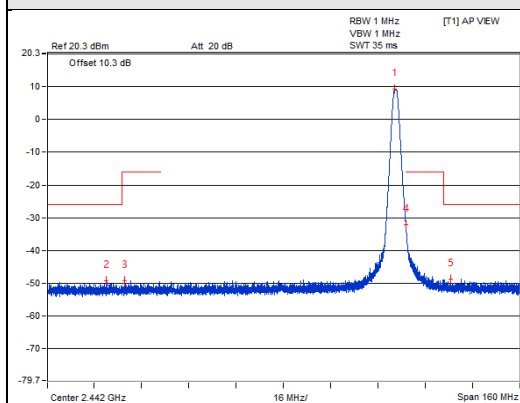
CH 39 (2480MHz)

V_{max}.



CH 39 (2480MHz)

V_{min}.



CH 39 (2480MHz)

Measuring Mode *Zero Span

1. Set the spectrum analyzer as below and it takes in a value of all data point.
2. Regarding the all data value, it transforms the “dBm” value into “uW” value.
3. It adds the all values and calculates a grand total. Define a grand total as “P”.
4. It divides “P” by sample data point (ex.501) and calculates the mean value.
5. It reports the mean value.

					
1	2399.998MHz	P = 21.0567uW	2	2399.996MHz	P = 19.773028uW
					
3	2399.998MHz	P = 21.58413uW			

2MBaud with 2Mbps transfer rate

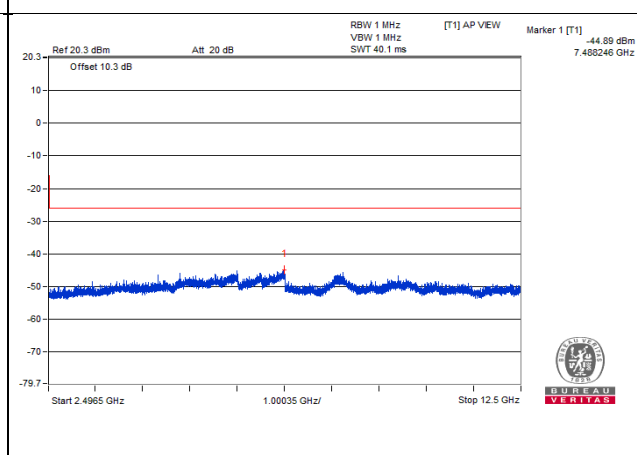
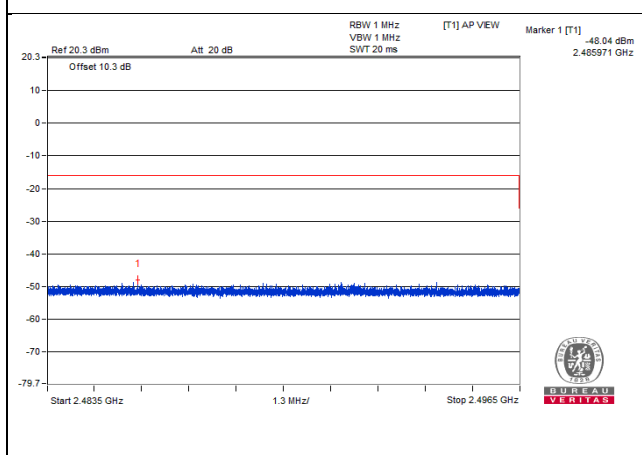
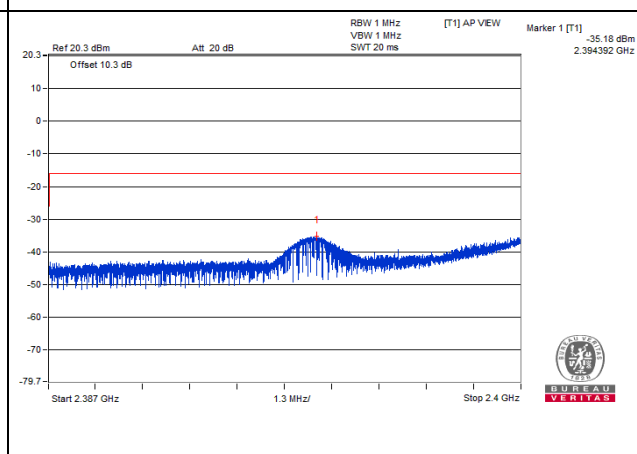
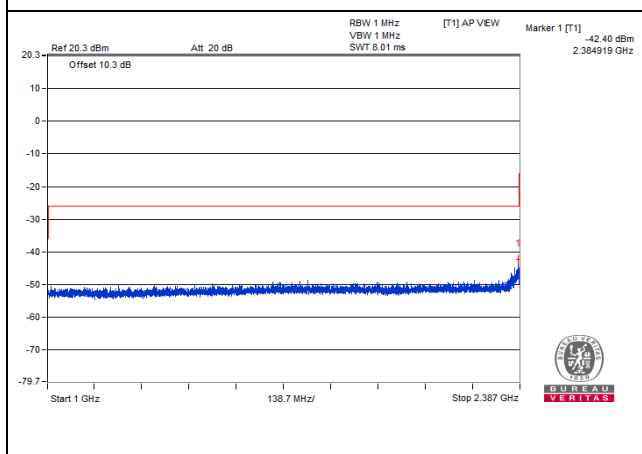
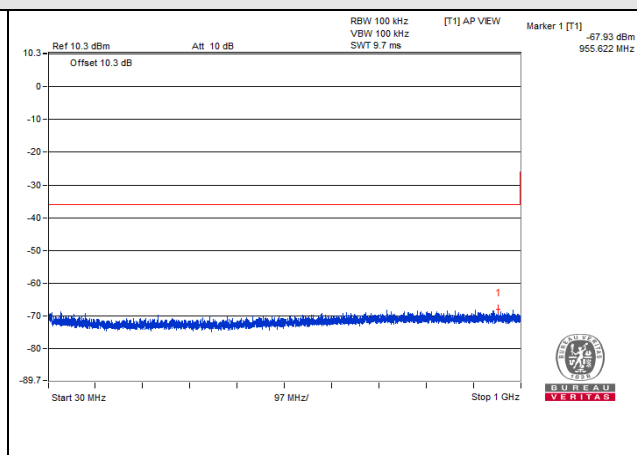
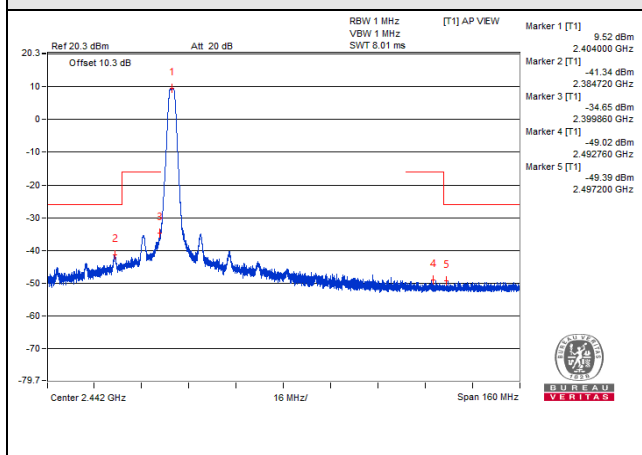
Test Channel		CH 1 (2404MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	955.622	0.000161	0.25	Pass
	1000 to 2387	2384.919	0.057544	2.5	Pass
	2387 to 2400	2394.392	0.303389	25	Pass
	2483.5 to 2496.5	2485.971	0.015704	25	Pass
	2496.5 to 12500	7488.246	0.032434	2.5	Pass
V_{max.}	30 to 1000	788.297	0.000159	0.25	Pass
	1000 to 2387	2384.746	0.068707	2.5	Pass
	2387 to 2400	2399.990	0.341979	25	Pass
	2483.5 to 2496.5	2485.840	0.013677	25	Pass
	2496.5 to 12500	7479.493	0.035481	2.5	Pass
V_{min.}	30 to 1000	739.797	0.000174	0.25	Pass
	1000 to 2387	2384.572	0.056885	2.5	Pass
	2387 to 2400	2399.926	0.325087	25	Pass
	2483.5 to 2496.5	2485.658	0.015136	25	Pass
	2496.5 to 12500	7430.726	0.033651	2.5	Pass

Test Channel		CH 19 (2440MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	903.970	0.000162	0.25	Pass
	1000 to 2387	2385.439	0.017742	2.5	Pass
	2387 to 2400	2391.291	0.028774	25	Pass
	2483.5 to 2496.5	2488.318	0.025061	25	Pass
	2496.5 to 12500	7451.983	0.030761	2.5	Pass
V_{max.}	30 to 1000	702.088	0.000158	0.25	Pass
	1000 to 2387	2381.452	0.014322	2.5	Pass
	2387 to 2400	2391.023	0.023659	25	Pass
	2483.5 to 2496.5	2483.638	0.023550	25	Pass
	2496.5 to 12500	6964.313	0.039811	2.5	Pass
V_{min.}	30 to 1000	793.147	0.000185	0.25	Pass
	1000 to 2387	2182.244	0.013614	2.5	Pass
	2387 to 2400	2391.004	0.023933	25	Pass
	2483.5 to 2496.5	2488.844	0.024044	25	Pass
	2496.5 to 12500	7428.225	0.036898	2.5	Pass

Test Channel		CH 38 (2478MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (uW)	Limit (uW)	Result
V_{normal}	30 to 1000	34.971	0.000184	0.25	Pass
	1000 to 2387	2165.600	0.012972	2.5	Pass
	2387 to 2400	2399.961	0.016368	25	Pass
	2483.5 to 2496.5	2487.630	0.317687	25	Pass
	2496.5 to 12500	2496.500	0.053951	2.5	Pass
V_{max.}	30 to 1000	994.180	0.000180	0.25	Pass
	1000 to 2387	2113.587	0.013490	2.5	Pass
	2387 to 2400	2399.991	0.015171	25	Pass
	2483.5 to 2496.5	2487.783	0.309742	25	Pass
	2496.5 to 12500	7485.745	0.036559	2.5	Pass
V_{min.}	30 to 1000	736.645	0.000176	0.25	Pass
	1000 to 2387	2380.411	0.013709	2.5	Pass
	2387 to 2400	2390.581	0.015346	25	Pass
	2483.5 to 2496.5	2487.640	0.306196	25	Pass
	2496.5 to 12500	2496.500	0.061094	2.5	Pass

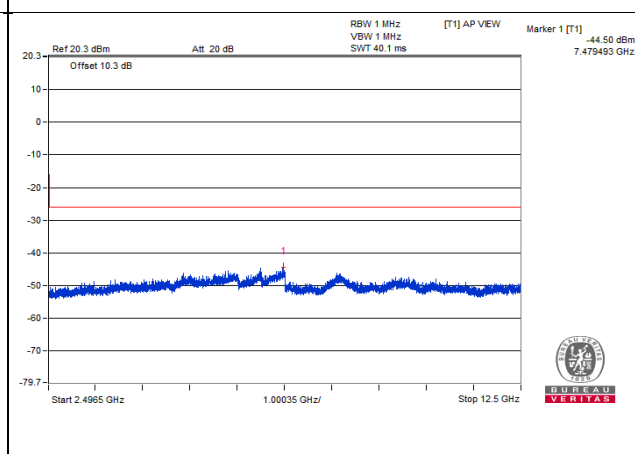
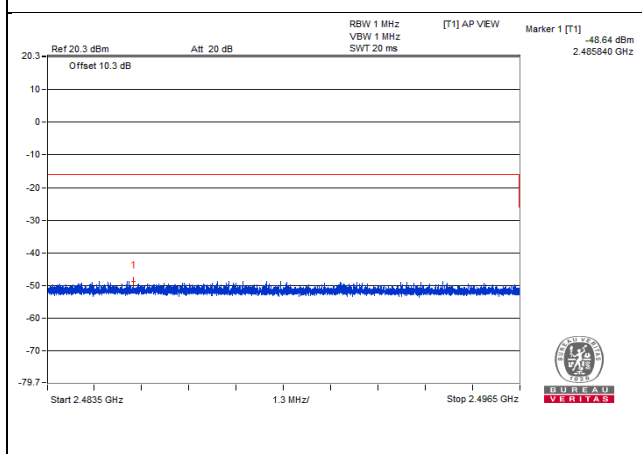
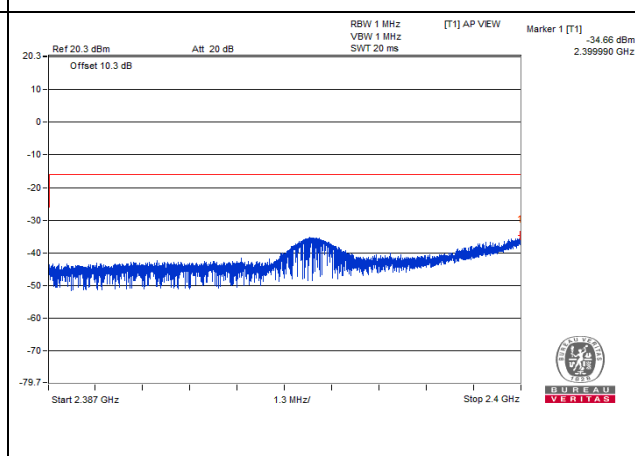
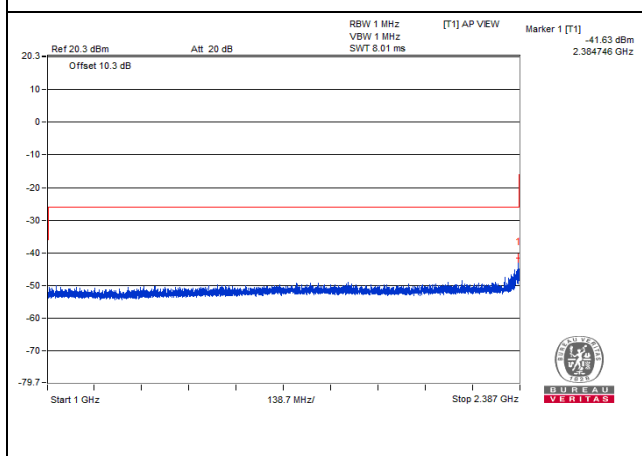
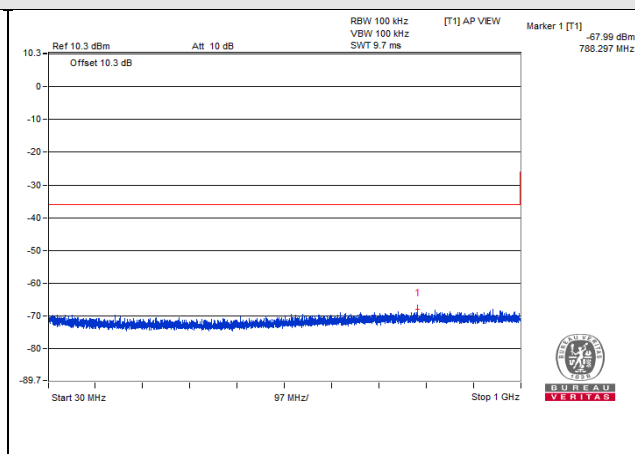
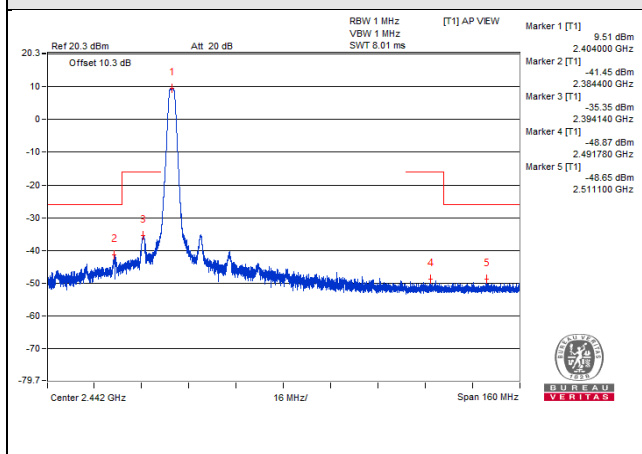
Note: The spectrum plots are attached on the following pages.

Vnormal



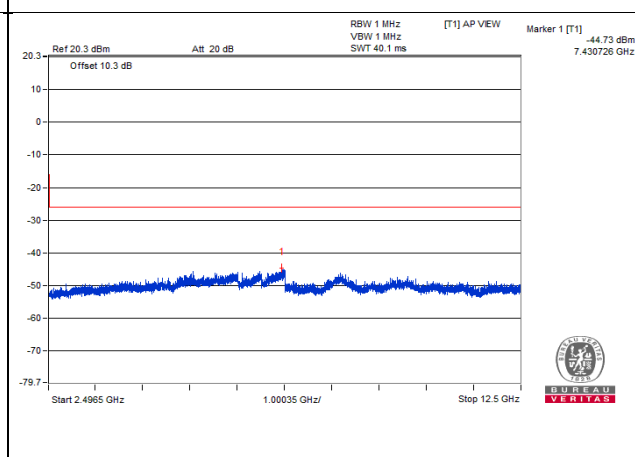
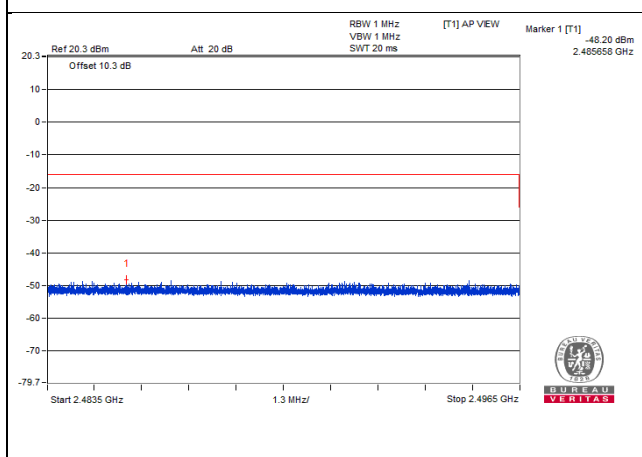
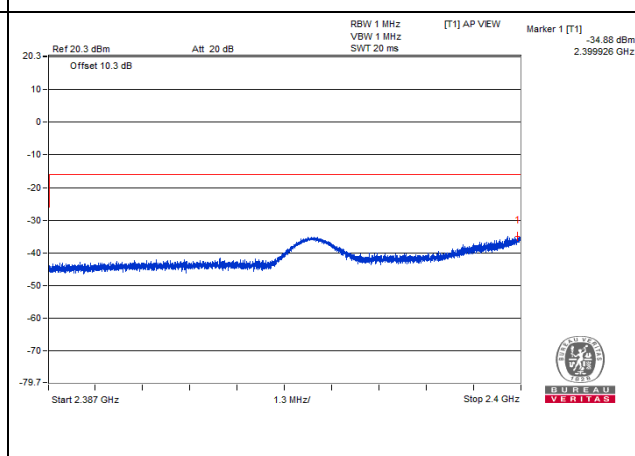
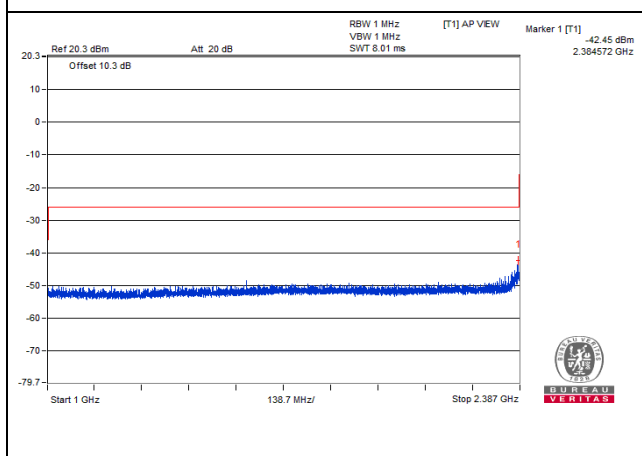
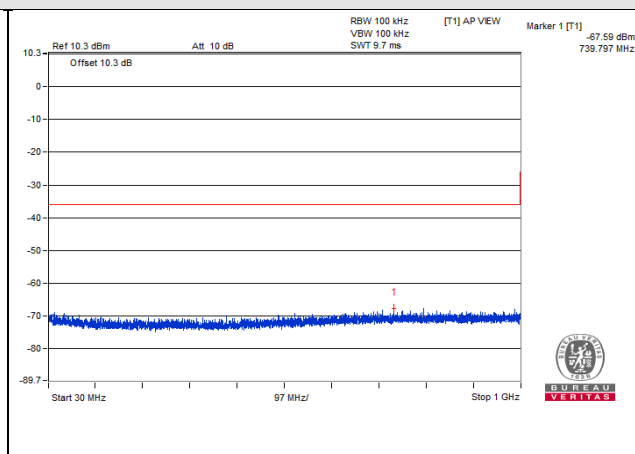
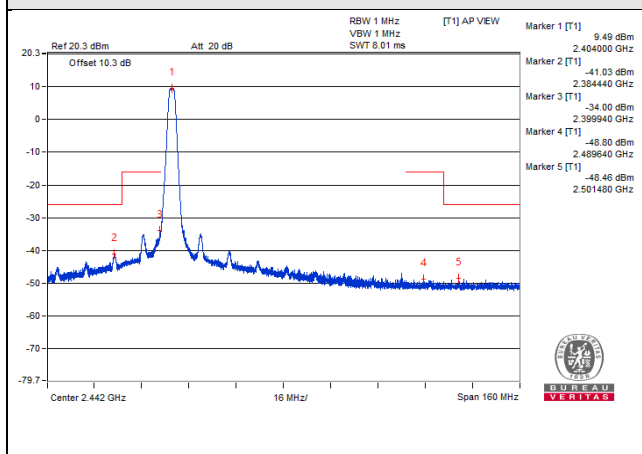
CH 1 (2404MHz)

V_{max}.



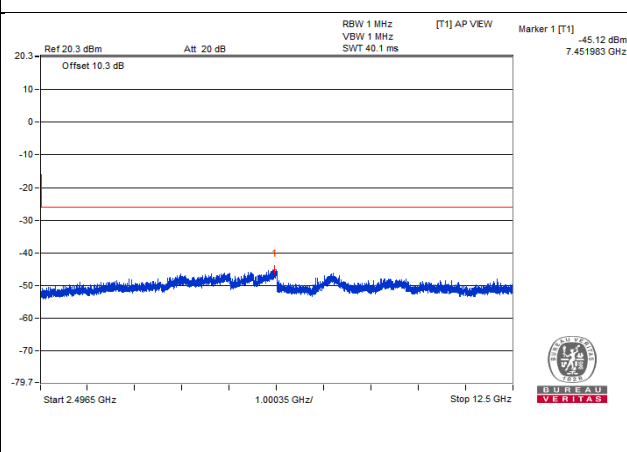
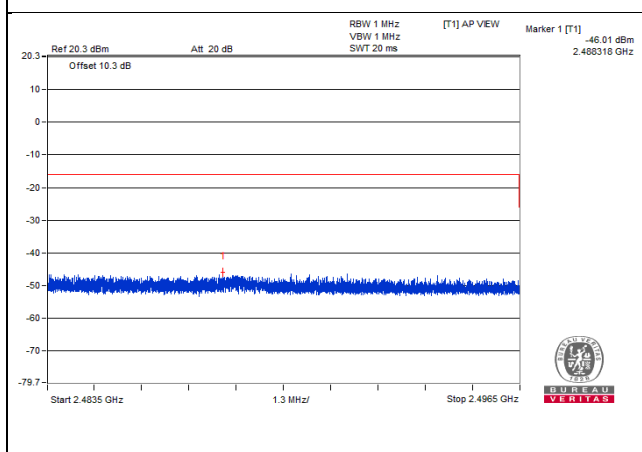
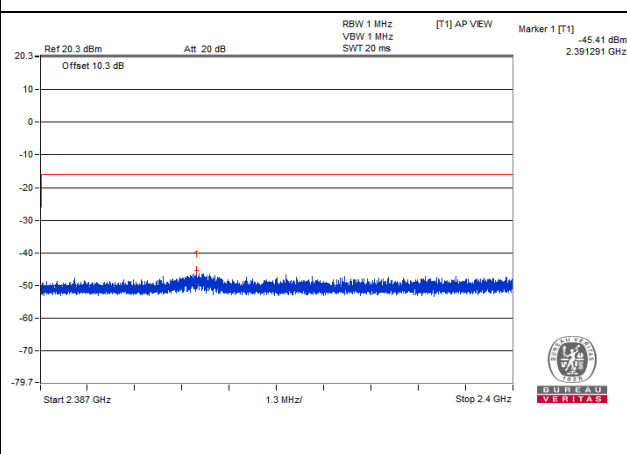
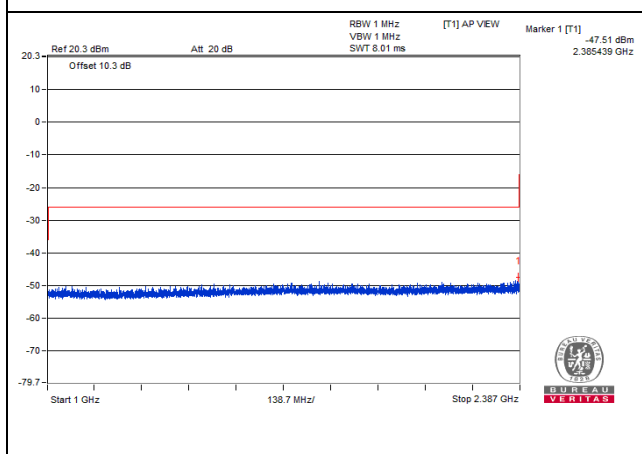
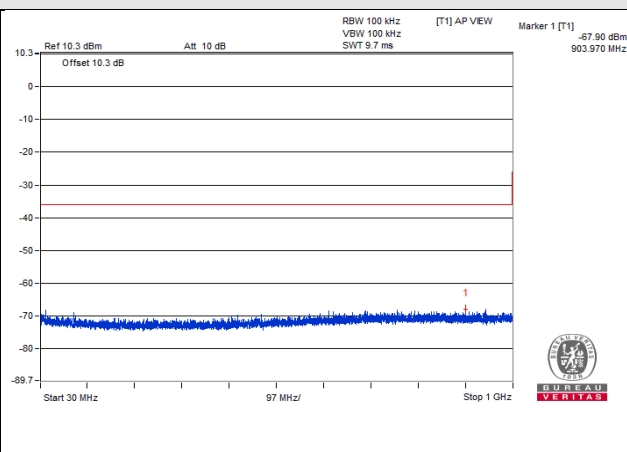
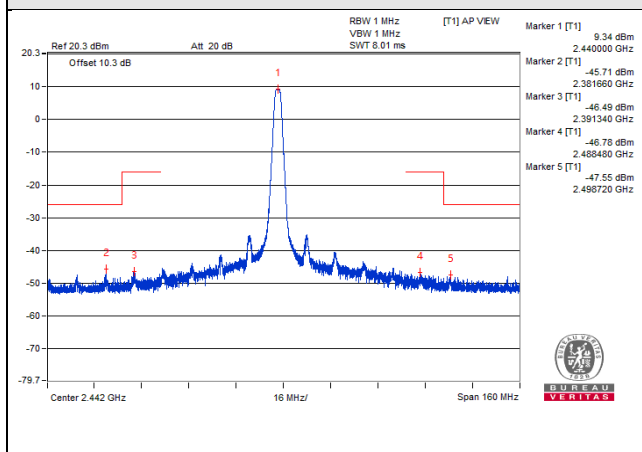
CH 1 (2404MHz)

V_{min}.



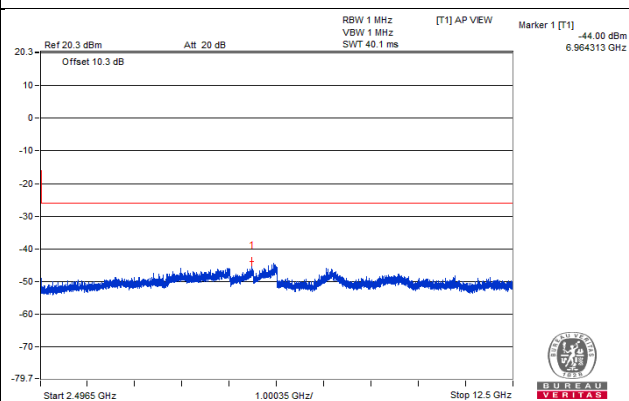
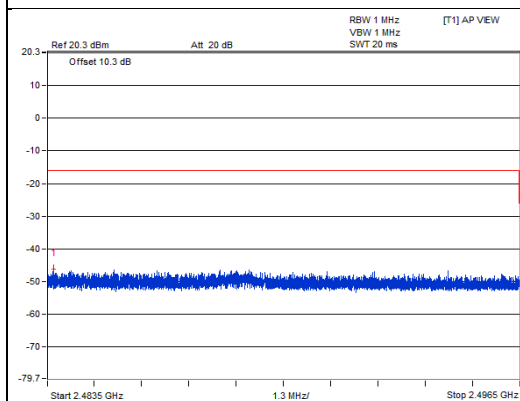
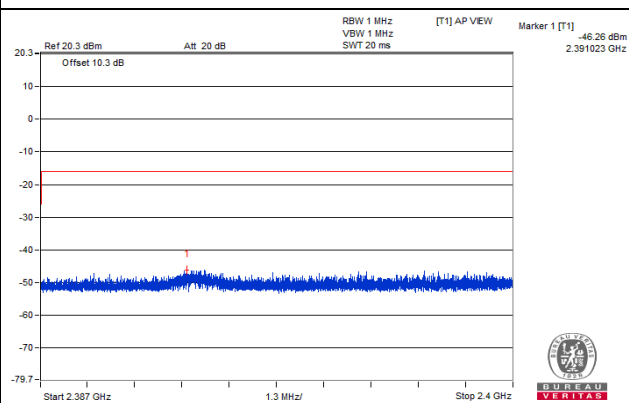
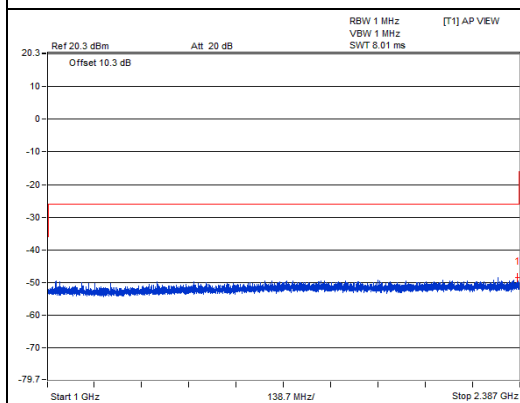
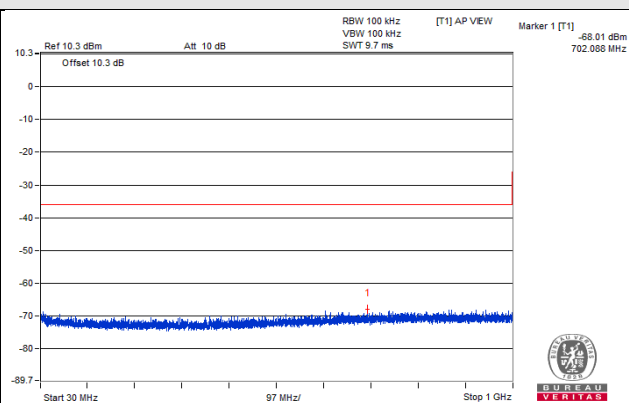
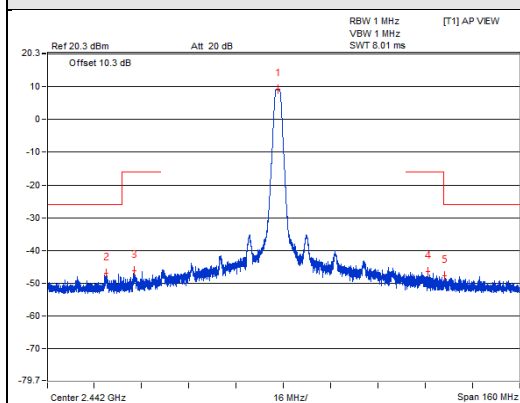
CH 1 (2404MHz)

Vnormal



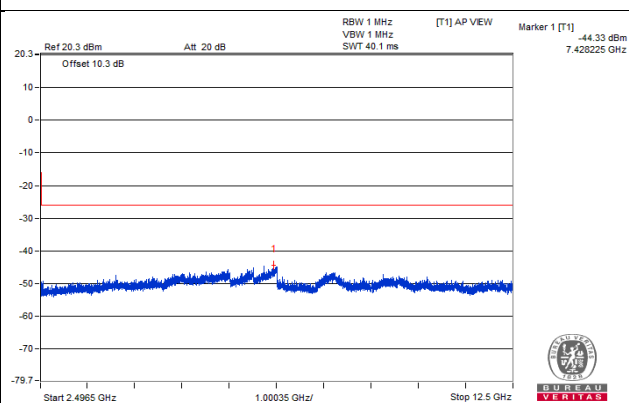
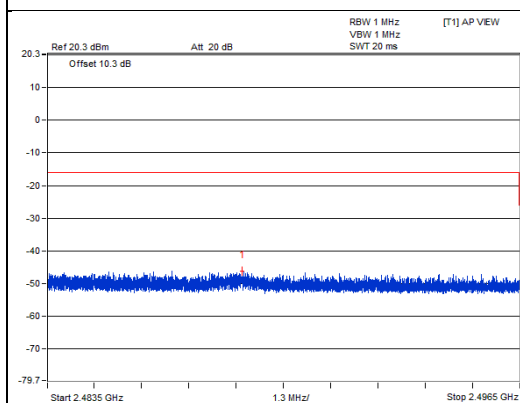
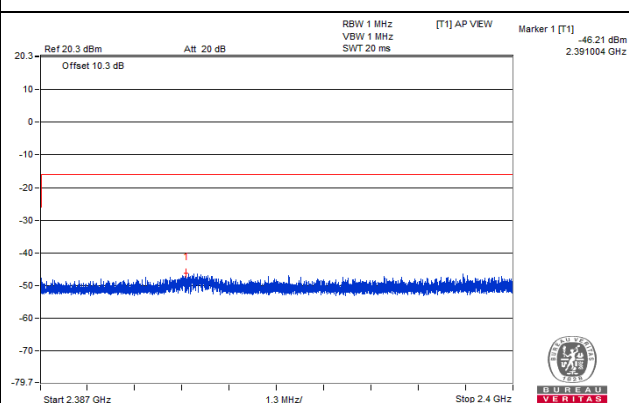
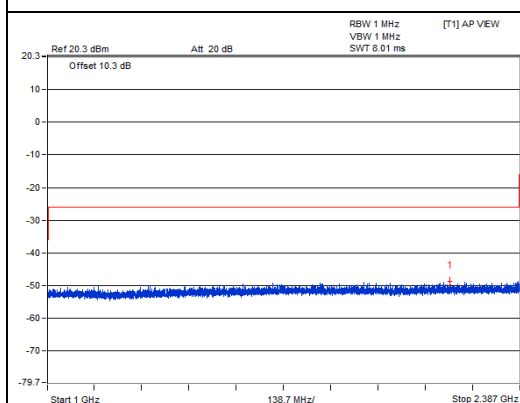
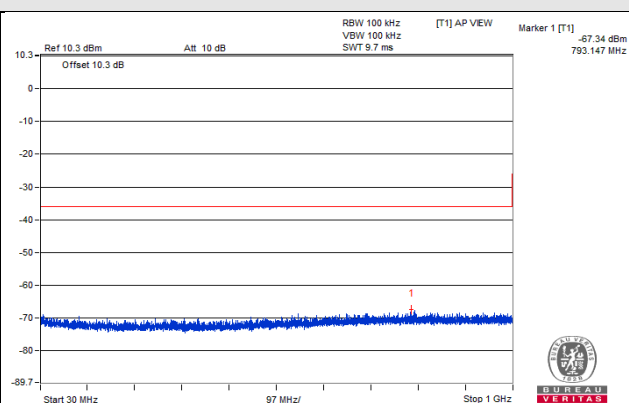
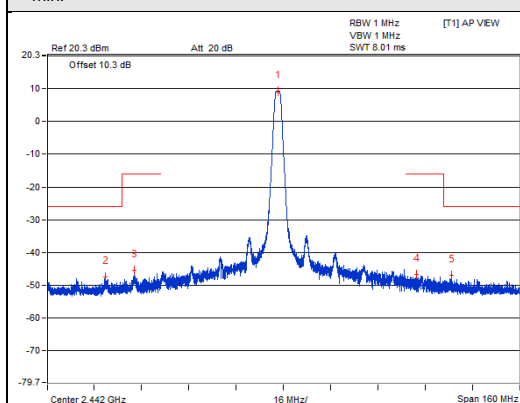
CH 19 (2440MHz)

V_{max}.



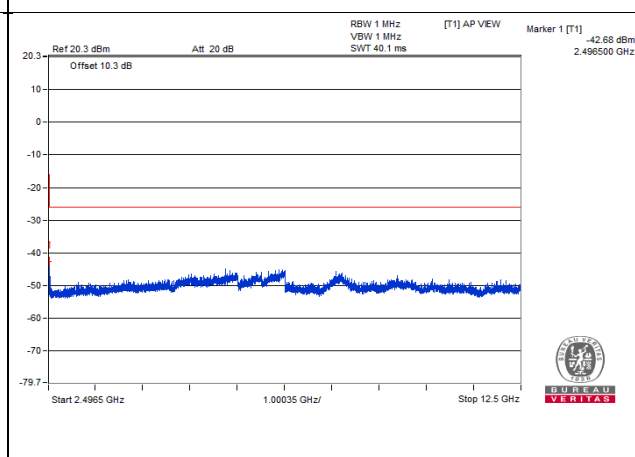
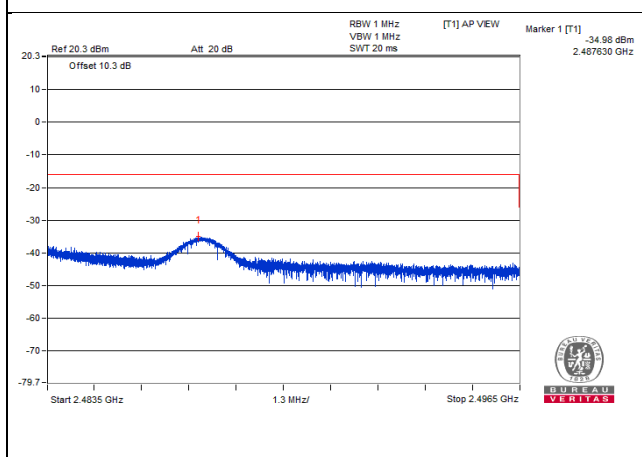
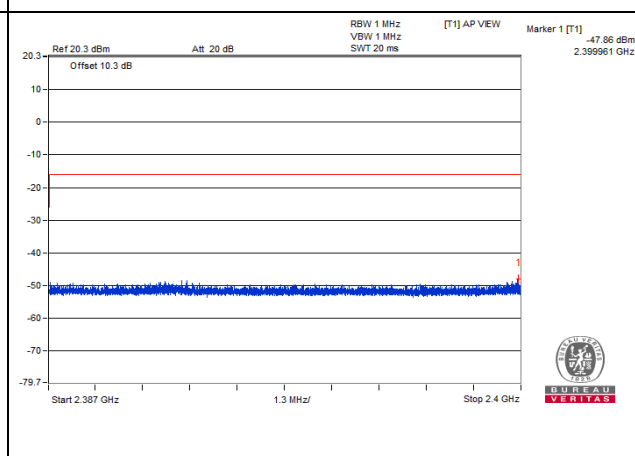
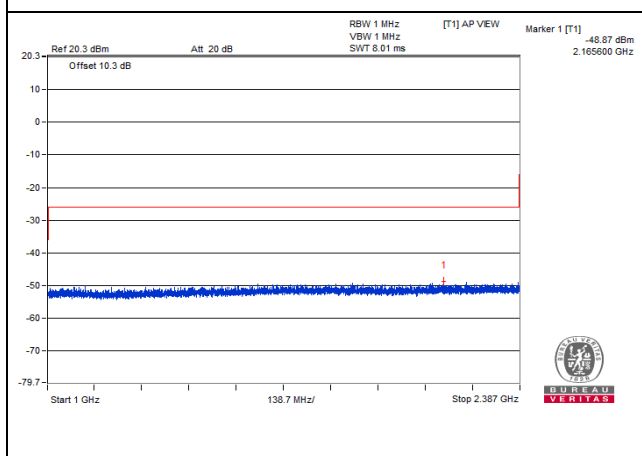
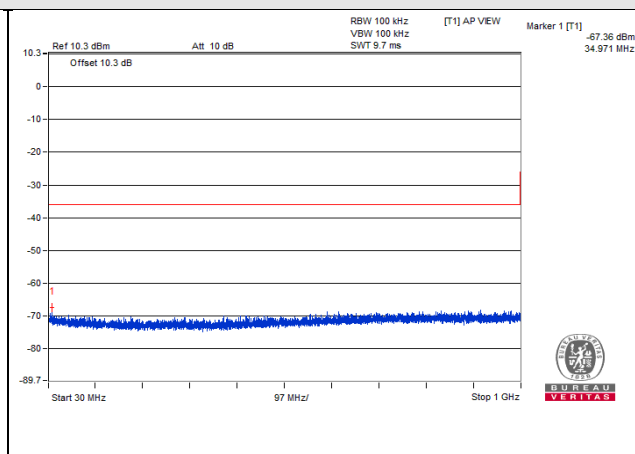
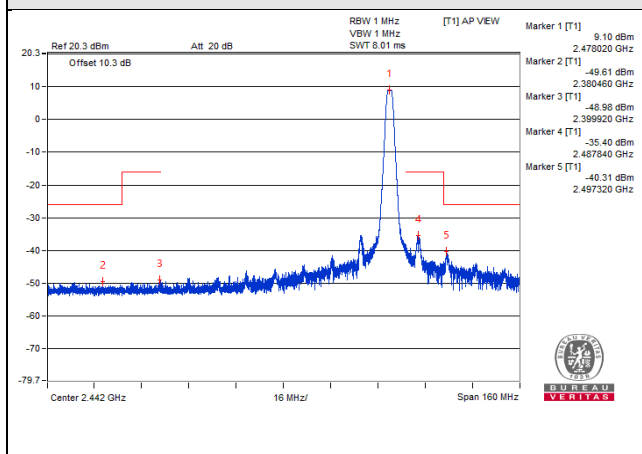
CH 19 (2440MHz)

V_{min}.



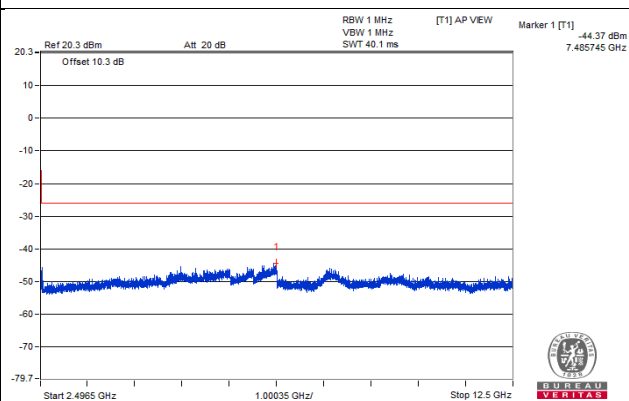
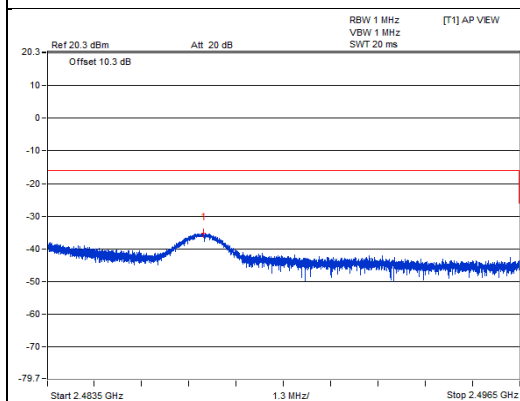
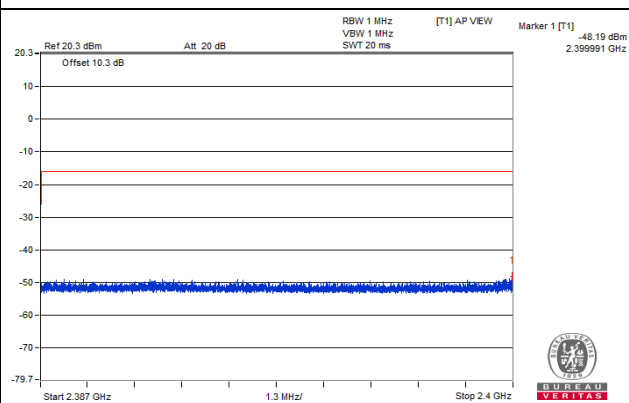
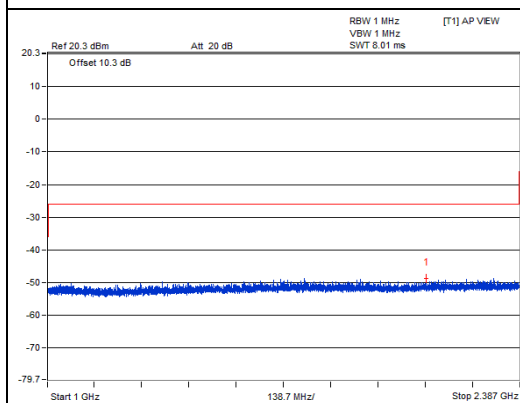
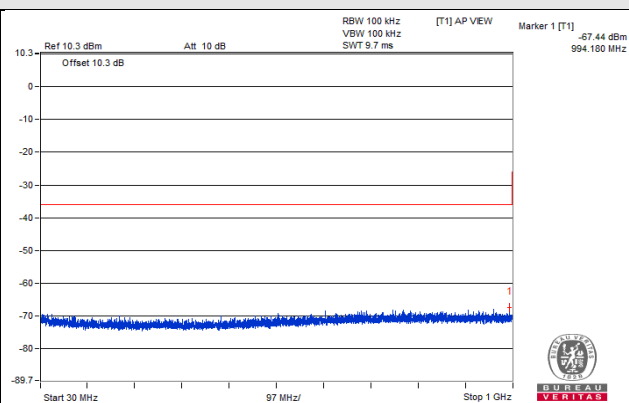
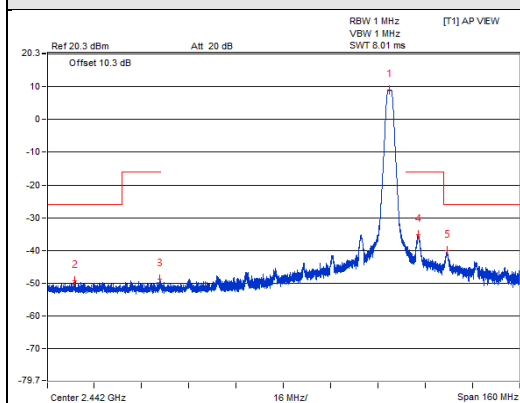
CH 19 (2440MHz)

Vnormal



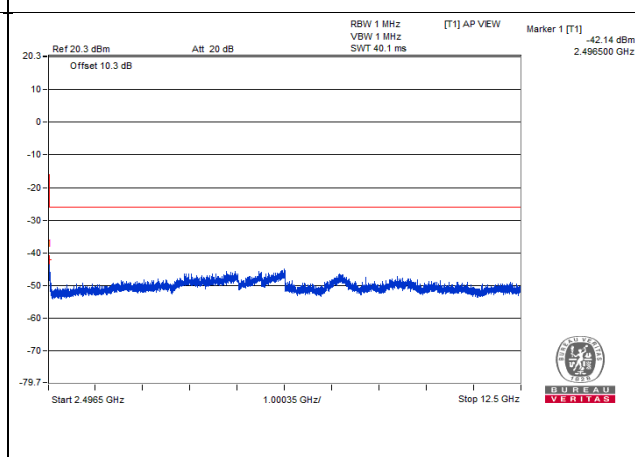
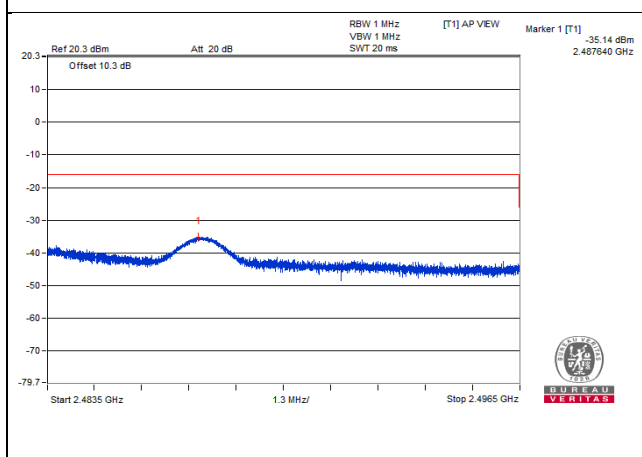
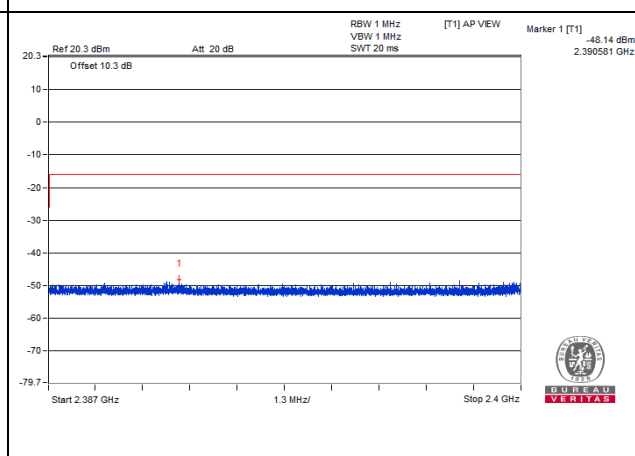
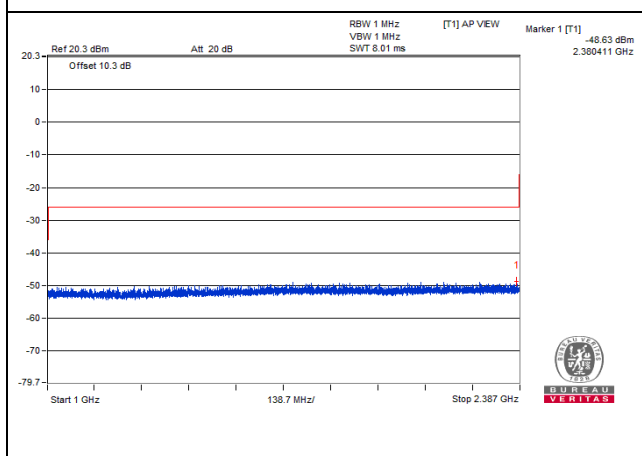
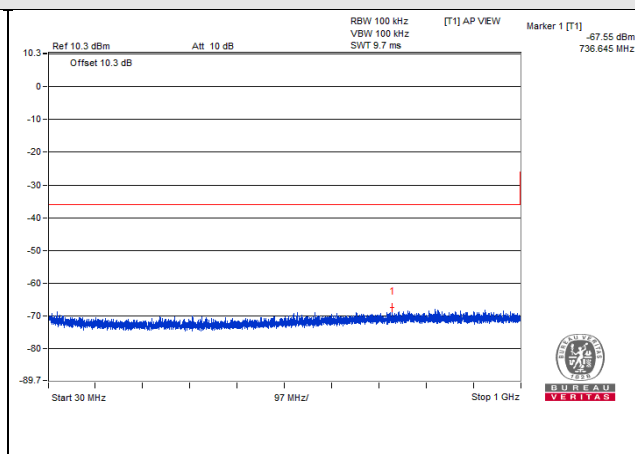
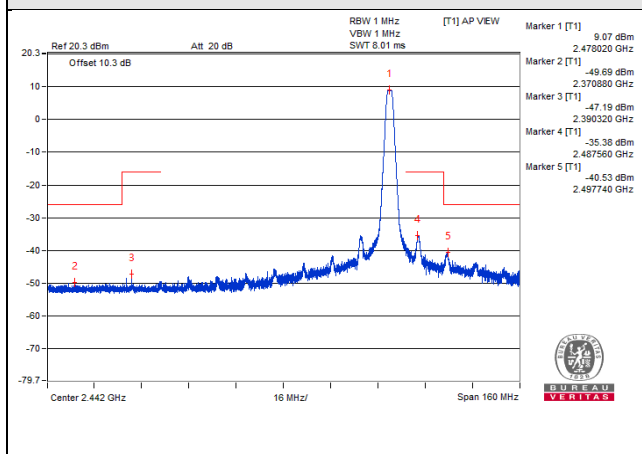
CH 38 (2478MHz)

V_{max}.



CH 38 (2478MHz)

V_{min}.



CH 38 (2478MHz)

4.4 Antenna Power Measurement

4.4.1 Limits of Antenna Power

Modulation Method	Frequency Band Used	Antenna Power (Max.)	EIRP Limit (Note 3)
DSSS	2400 – 2483.5 MHz	10 mW/MHz	12.14 dBm/MHz ~ 22.14 dBm/MHz (16.368 mW/MHz ~ 163.68 mW/MHz)
OFDM (Note 1)	2400 – 2483.5 MHz	10 mW/MHz	12.14 dBm/MHz ~ 22.14 dBm/MHz (16.368 mW/MHz ~ 163.68 mW/MHz)
OFDM (Note 2)	2400 – 2483.5 MHz	5 mW/MHz	9.13 dBm/MHz ~ 19.13 dBm/MHz (8.184 mW/MHz ~ 81.846 mW/MHz)
FH	2400 – 2483.5 MHz	3 mW/MHz	6.91 dBm/MHz ~ 16.91 dBm/MHz (4.91 mW/MHz ~ 49.1 mW/MHz)
Other than the above	2400 – 2483.5 MHz	10 mW	12.14 dBm ~ 22.14 dBm (16.368 mW ~ 163.68 mW)
Modulation System	Frequency Band Used	Antenna Power (Max.)	EIRP Limit
DS	2471 – 2497 MHz	10 mW/MHz	12.14 dBm/MHz (16.368 mW/MHz)

Note:

1. Occupied bandwidth is less than 26MHz
2. Occupied bandwidth is more than 26MHz and less than 40MHz
3. EIRP limit is variable by the HPBA, the HPBA (half-power beam width) of the antenna shall be $360/A$ degrees or less, where $A = \text{EIRP}/(2.14 \text{ dBi} + \text{Antenna Power (limit)})$.
4. Tolerance of antenna power shall be +20% (upper value) and -80% (lower value).

4.4.2 Test Setup



4.4.3 Test Results

Mode A

1MBaud with 1Mbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	0	2402	8.26	11.614
	1	2404	8.299	11.669
	19	2440	8.375	11.776
	38	2478	8.185	11.508
	39	2480	8.241	11.587
V_{max.}	0	2402	8.375	11.776
	1	2404	8.433	11.857
	19	2440	8.492	11.94
	38	2478	8.241	11.587
	39	2480	8.492	11.94
V_{min.}	0	2402	8.017	11.272
	1	2404	7.98	11.22
	19	2440	8.204	11.535
	38	2478	8.017	11.272
	39	2480	7.925	11.143
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 1.48dBi.

2. The radiated RF output power is a "calculated" value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

1MBaud with Coded 125kbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	0	2402	7.211	10.139
	1	2404	7.211	10.139
	19	2440	6.966	9.795
	38	2478	8.054	11.324
	39	2480	8.017	11.272
V_{max.}	0	2402	7.482	10.52
	1	2404	7.727	10.865
	19	2440	7.295	10.257
	38	2478	8.433	11.857
	39	2480	8.241	11.587
V_{min.}	0	2402	6.934	9.75
	1	2404	6.776	9.527
	19	2440	6.714	9.44
	38	2478	7.78	10.939
	39	2480	7.638	10.739
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 1.48dBi.

2. The radiated RF output power is a "calculated" value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

2MBaud with 2Mbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	1	2404	8.241	11.587
	19	2440	8.128	11.428
	38	2478	7.816	10.99
V_{max.}	1	2404	8.395	11.804
	19	2440	8.375	11.776
	38	2478	7.907	11.118
V_{min.}	1	2404	7.943	11.168
	19	2440	7.98	11.22
	38	2478	7.745	10.89
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 1.48dBi.

2. The radiated RF output power is a “calculated” value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

Mode B

1MBaud with 1Mbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	0	2402	8.26	15.739
	1	2404	8.299	15.813
	19	2440	8.375	15.958
	38	2478	8.185	15.596
	39	2480	8.241	15.703
V_{max.}	0	2402	8.375	15.958
	1	2404	8.433	16.069
	19	2440	8.492	16.181
	38	2478	8.241	15.703
	39	2480	8.492	16.181
V_{min.}	0	2402	8.017	15.276
	1	2404	7.98	15.206
	19	2440	8.204	15.632
	38	2478	8.017	15.276
	39	2480	7.925	15.101
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 2.8dBi.

2. The radiated RF output power is a "calculated" value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

1MBaud with Coded 125kbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	0	2402	7.211	13.74
	1	2404	7.211	13.74
	19	2440	6.966	13.273
	38	2478	8.054	15.347
	39	2480	8.017	15.276
V_{max.}	0	2402	7.482	14.257
	1	2404	7.727	14.723
	19	2440	7.295	13.9
	38	2478	8.433	16.069
	39	2480	8.241	15.703
V_{min.}	0	2402	6.934	13.212
	1	2404	6.776	12.911
	19	2440	6.714	12.793
	38	2478	7.78	14.824
	39	2480	7.638	14.554
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 2.8dBi.

2. The radiated RF output power is a "calculated" value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

2MBaud with 2Mbps transfer rate

Test Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	1	2404	8.241	15.703
	19	2440	8.128	15.488
	38	2478	7.816	14.893
V_{max.}	1	2404	8.395	15.996
	19	2440	8.375	15.958
	38	2478	7.907	15.066
V_{min.}	1	2404	7.943	15.135
	19	2440	7.98	15.206
	38	2478	7.745	14.758
Max. Limit (mW):			10	-
Rated Power (mW):			8.5	-
Tolerance of Antenna Power (mW):			1.7 ~ 10.2	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain: 2.8dBi.

2. The radiated RF output power is a “calculated” value derived from the conducted value.

3. Formula: Radiated RF output power = Conducted RF output power + Antenna gain.

4.5 Spurious Emissions for Receiver

4.5.1 Limits of Spurious Emissions For Receiver

Frequencies (MHz)	Limit
Below 1GHz	$\leq 4\text{nW}$ (-54dBm)
Above 1GHz	$\leq 20\text{nW}$ (-47dBm)

4.5.2 Test Setup



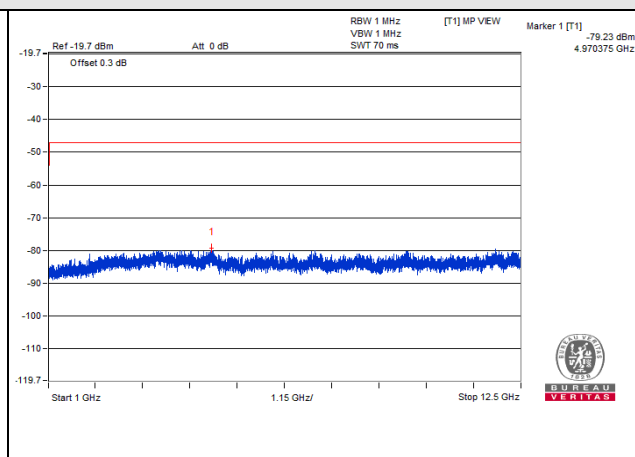
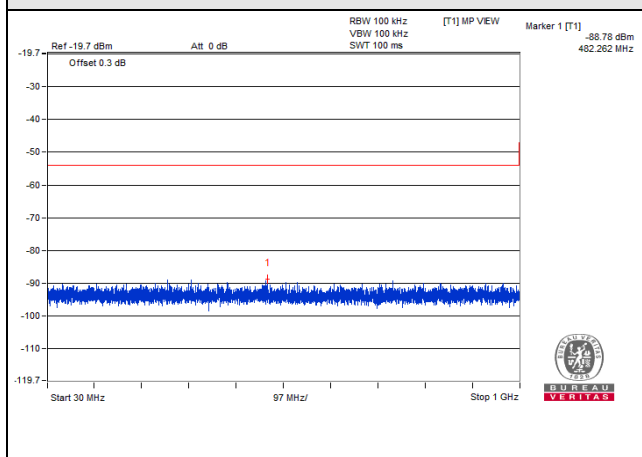
4.5.3 Test Result

1MBaud with Coded 125kbps transfer rate

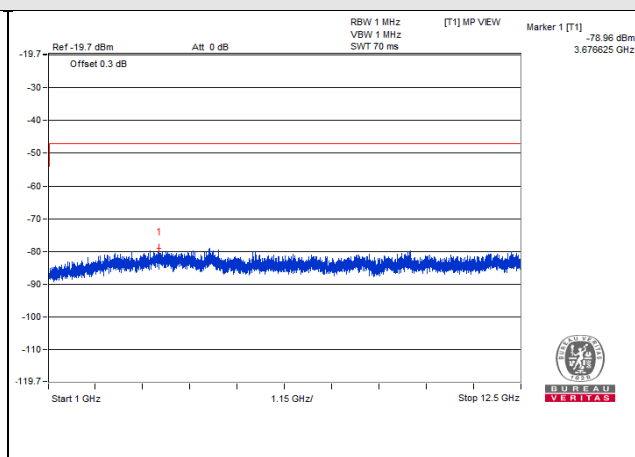
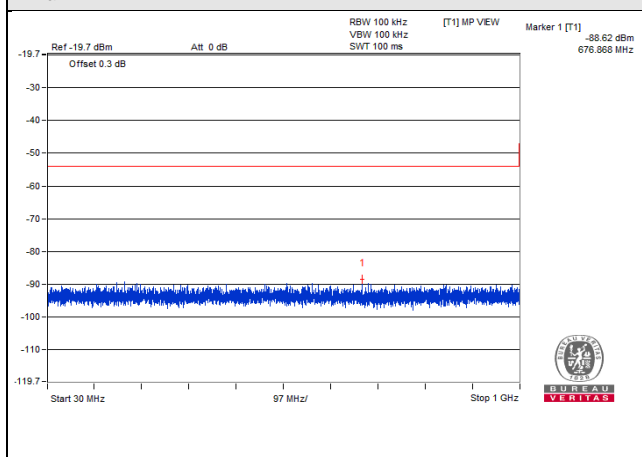
Test Channel		CH 0 (2402MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (nW)	Limit (nW)	Result
V_{normal}	30 to 1000	482.262	0.001324	4.0	Pass
	1000 to 125000	4970.375	0.011940	20.0	Pass
$V_{max.}$	30 to 1000	676.868	0.001374	4.0	Pass
	1000 to 125000	3676.625	0.012706	20.0	Pass
$V_{min.}$	30 to 1000	212.602	0.001276	4.0	Pass
	1000 to 125000	4970.375	0.012359	20.0	Pass
Test Channel		CH 1 (2404MHz)			
V_{normal}	30 to 1000	270.438	0.001122	4.0	Pass
	1000 to 125000	9811.875	0.012162	20.0	Pass
$V_{max.}$	30 to 1000	713.001	0.001377	4.0	Pass
	1000 to 125000	3908.062	0.012388	20.0	Pass
$V_{min.}$	30 to 1000	305.480	0.001268	4.0	Pass
	1000 to 125000	12334.687	0.014859	20.0	Pass
Test Channel		CH 19 (2440MHz)			
V_{normal}	30 to 1000	611.636	0.001300	4.0	Pass
	1000 to 125000	4944.500	0.011535	20.0	Pass
$V_{max.}$	30 to 1000	377.745	0.001107	4.0	Pass
	1000 to 125000	4983.312	0.013366	20.0	Pass
$V_{min.}$	30 to 1000	731.188	0.001462	4.0	Pass
	1000 to 125000	10276.187	0.010990	20.0	Pass
Test Channel		CH 38 (2478MHz)			
V_{normal}	30 to 1000	483.475	0.001466	4.0	Pass
	1000 to 125000	4245.875	0.012106	20.0	Pass
$V_{max.}$	30 to 1000	766.230	0.001256	4.0	Pass
	1000 to 125000	3748.500	0.011220	20.0	Pass
$V_{min.}$	30 to 1000	944.831	0.001156	4.0	Pass
	1000 to 125000	11695.000	0.012274	20.0	Pass

Test Channel		CH 39 (2480MHz)			
Test Condition	Frequency Range (MHz)	Frequency (MHz)	Measured Value (nW)	Limit (nW)	Result
V_{normal}	30 to 1000	229.698	0.001276	4.0	Pass
	1000 to 125000	3676.625	0.012417	20.0	Pass
$V_{\text{max.}}$	30 to 1000	518.031	0.001274	4.0	Pass
	1000 to 125000	3668.000	0.012618	20.0	Pass
$V_{\text{min.}}$	30 to 1000	646.435	0.001334	4.0	Pass
	1000 to 125000	11909.187	0.014723	20.0	Pass

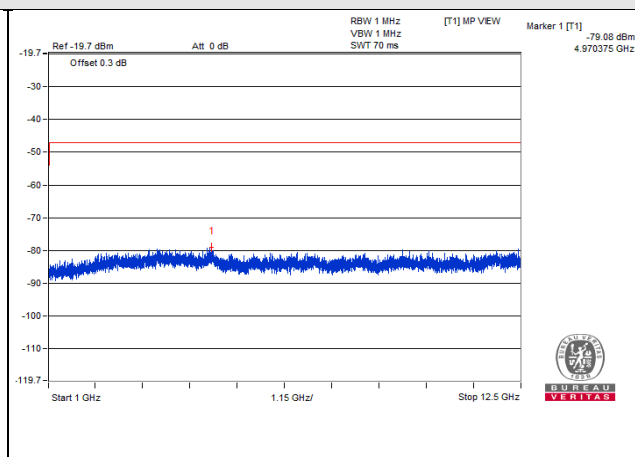
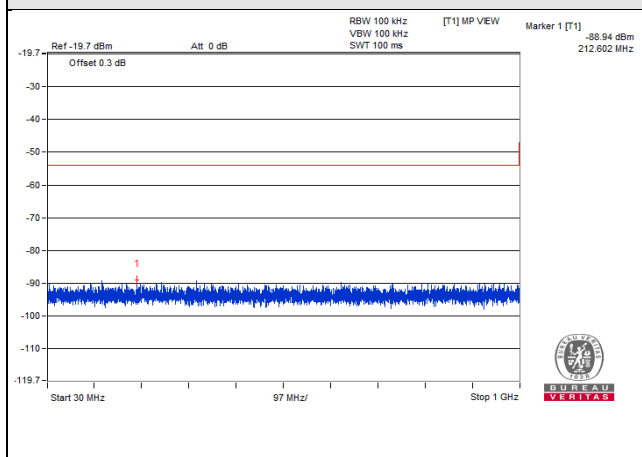
V_{normal}



V_{max}

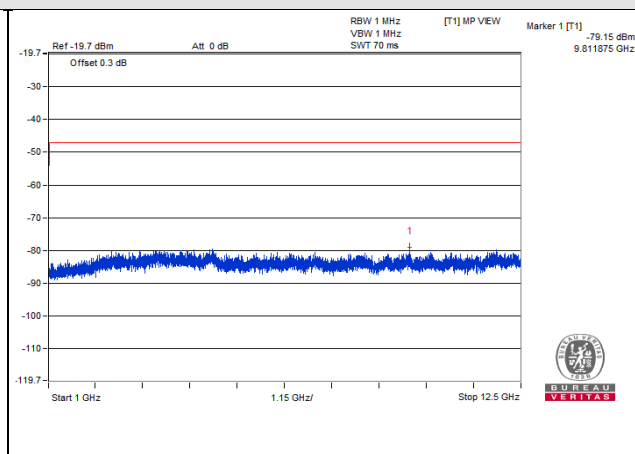
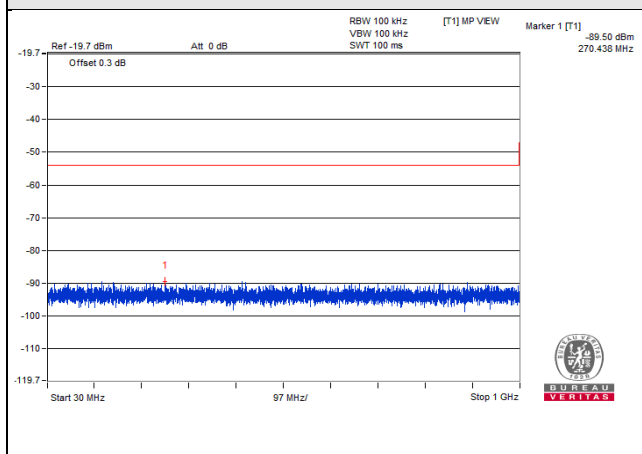


V_{min}

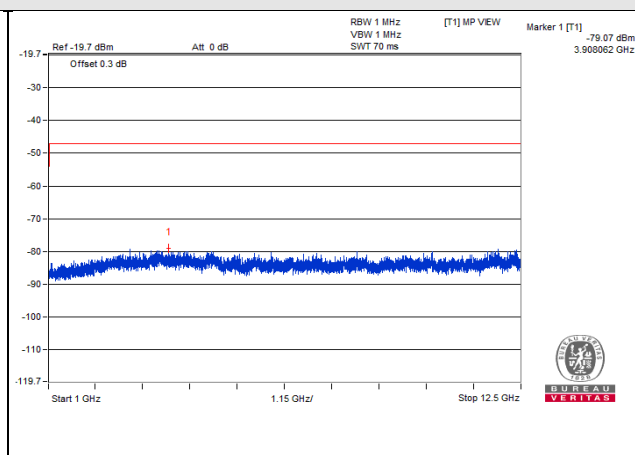
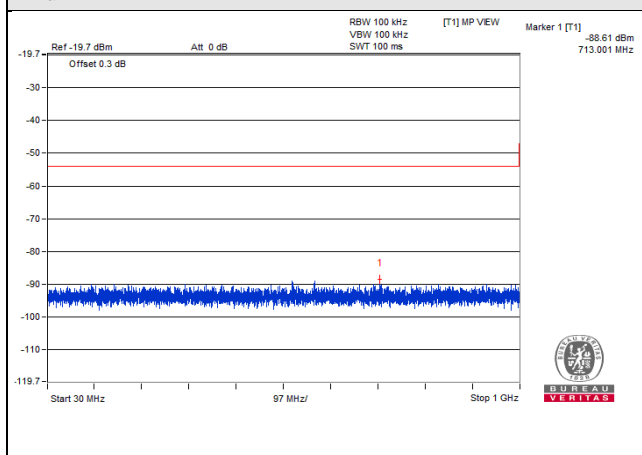


CH 0 (2402MHz)

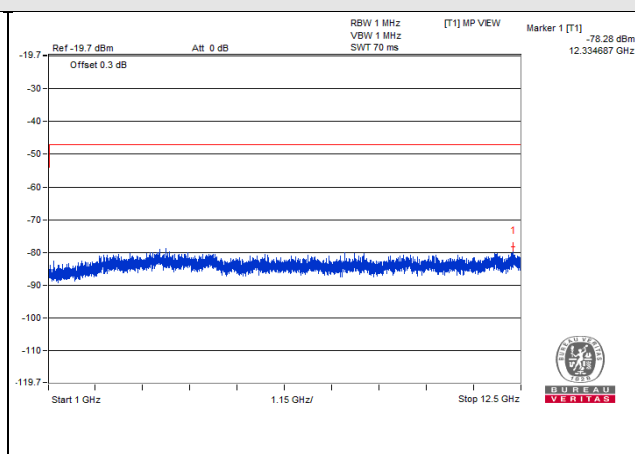
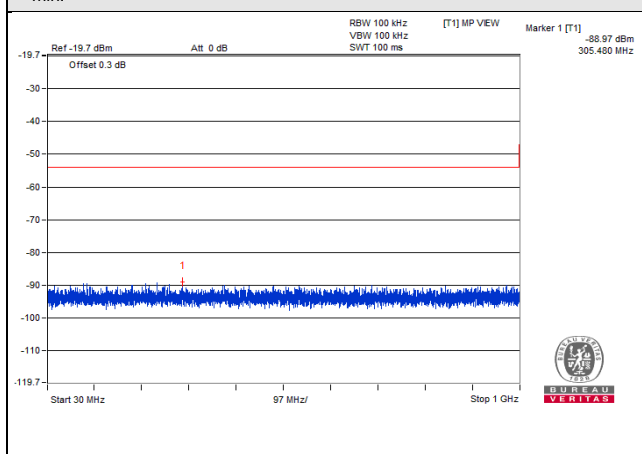
V_{normal}



V_{max.}

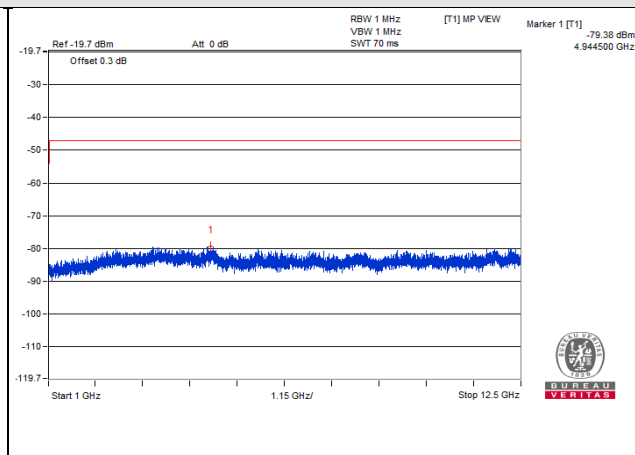
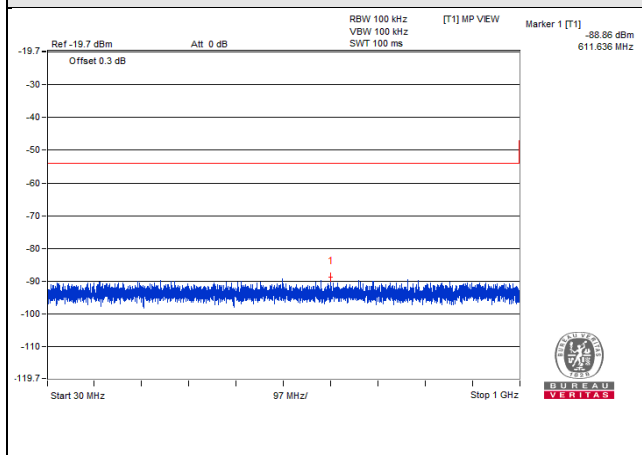


V_{min.}

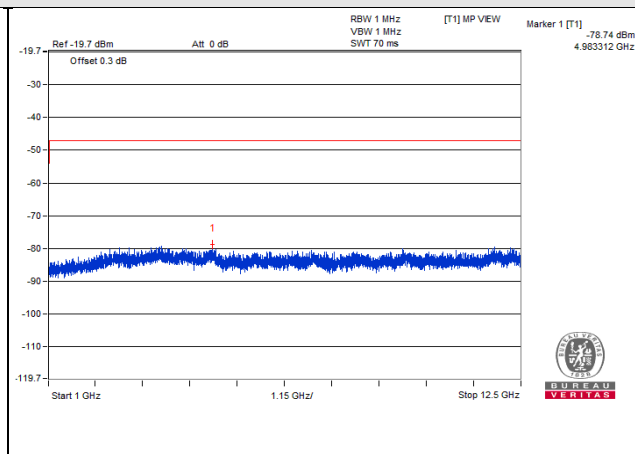
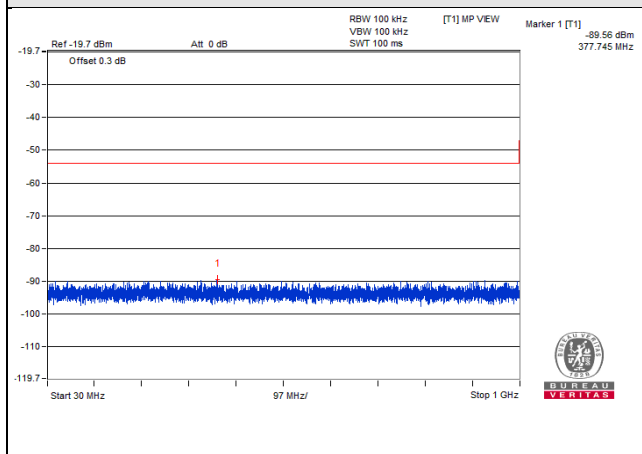


CH 1 (2404MHz)

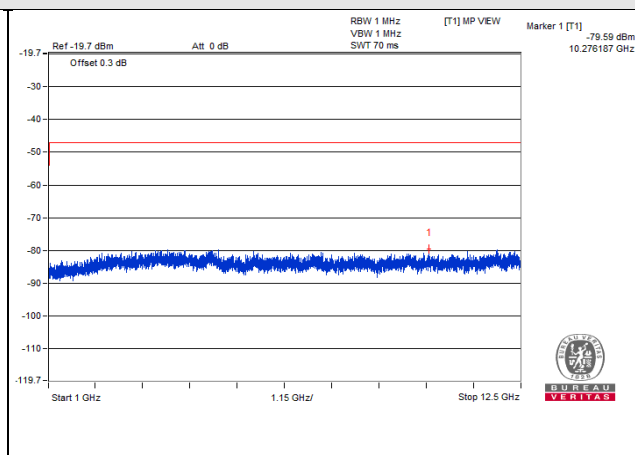
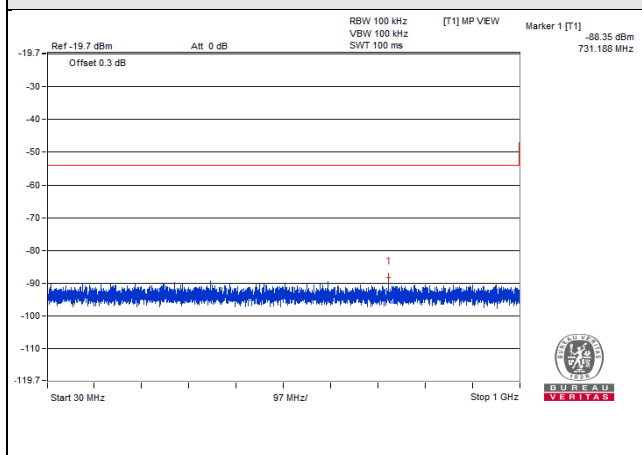
V_{normal}



V_{max.}

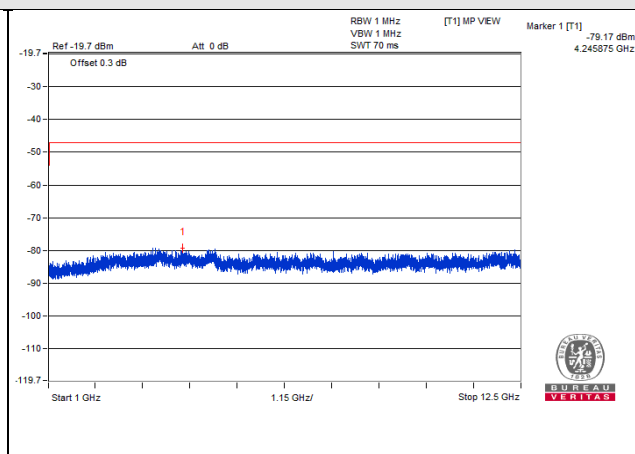
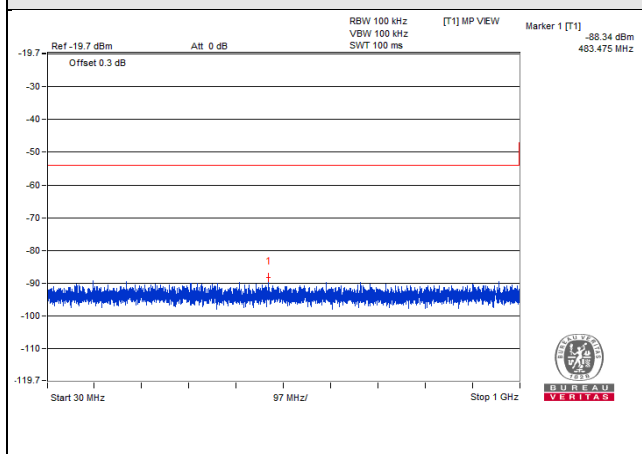


V_{min.}

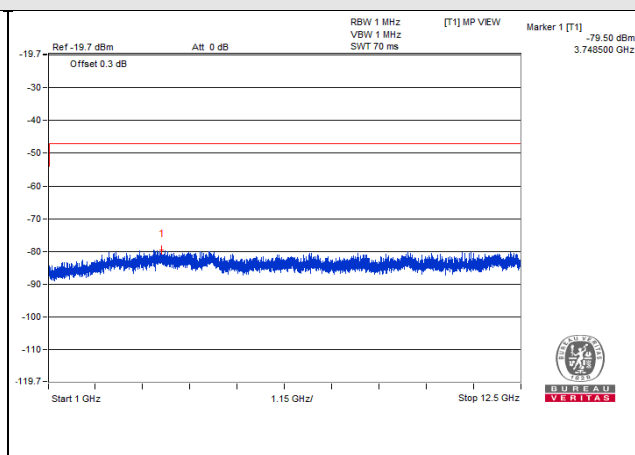
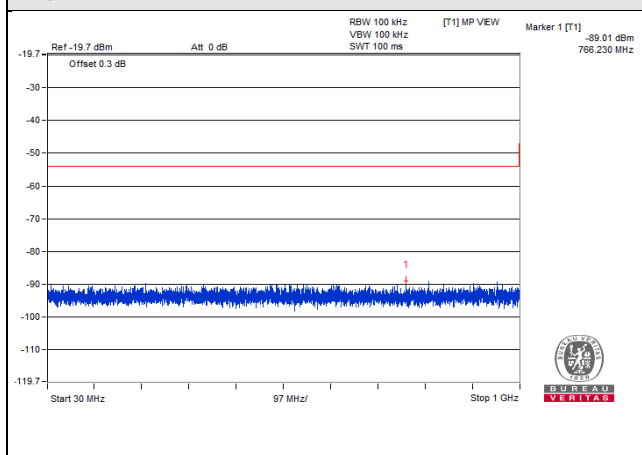


CH 19 (2440MHz)

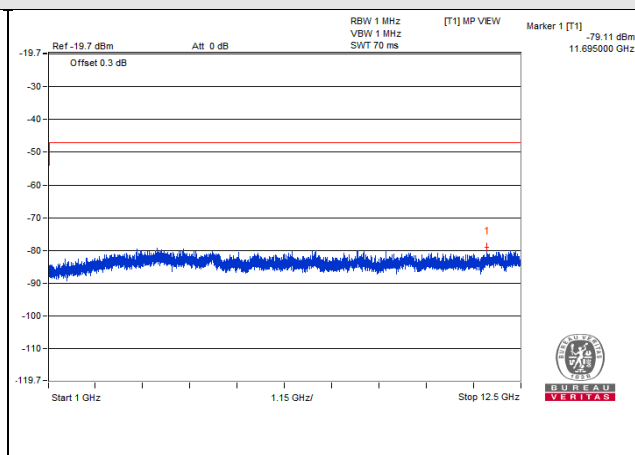
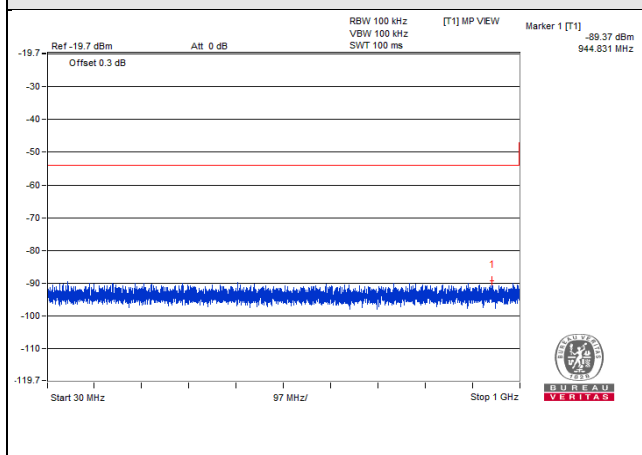
V_{normal}



V_{max.}

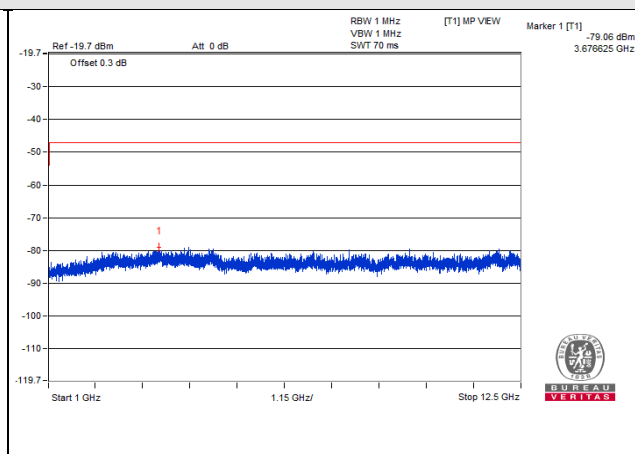
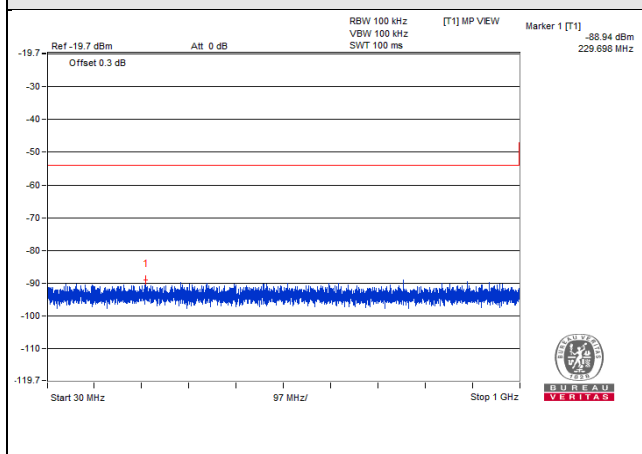


V_{min.}

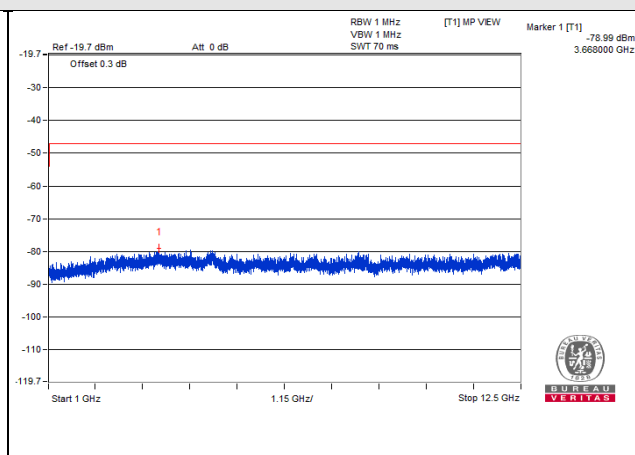
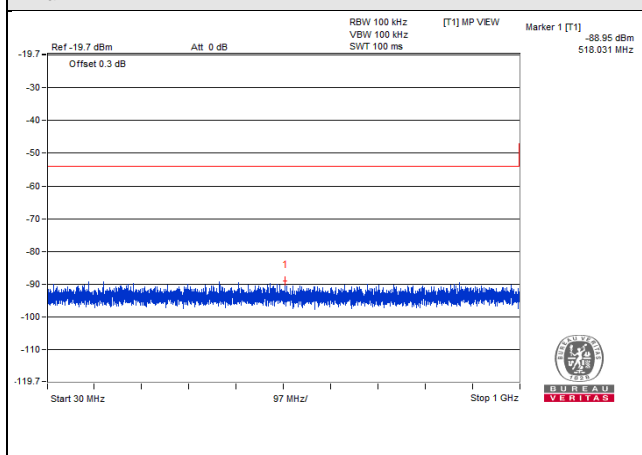


CH 38 (2478MHz)

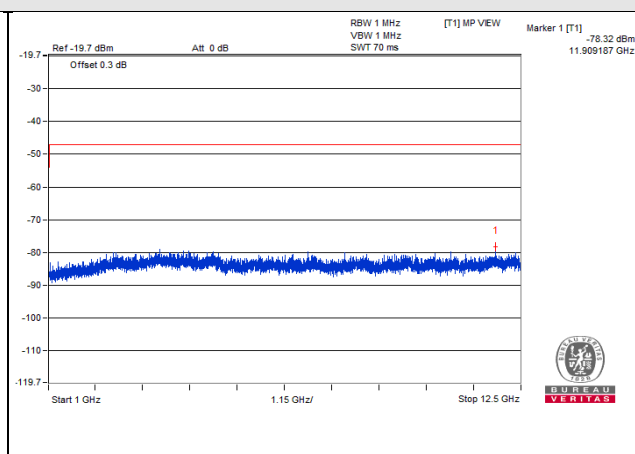
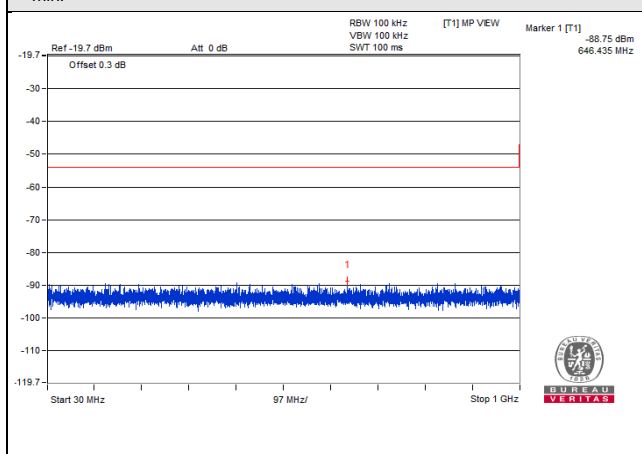
V_{normal}



V_{max.}



V_{min.}



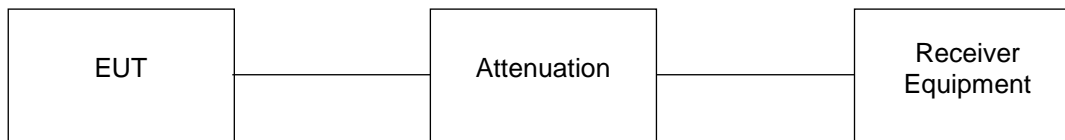
CH 39 (2480MHz)

4.6 Interference Prevention Function

4.6.1 Limits of Interference Prevention Function

NA

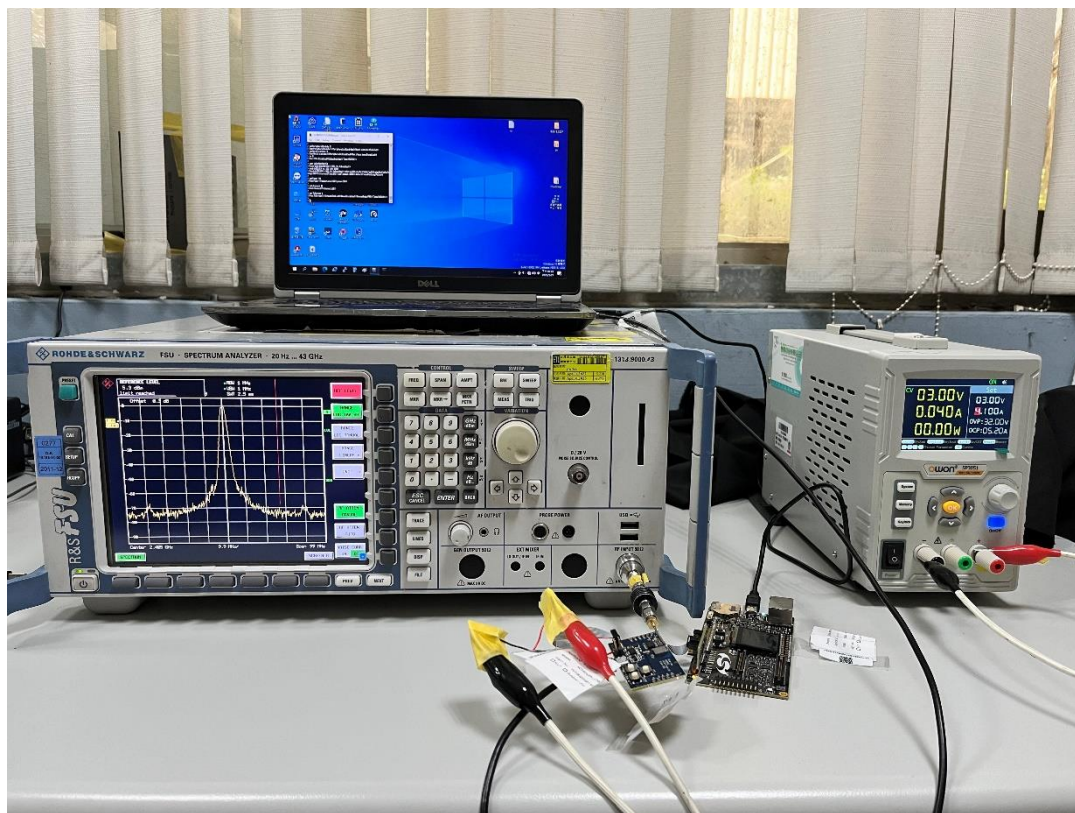
4.6.2 Test Setup



4.6.3 Test Results

Environmental Conditions	25 deg.C, 60% RH
Link Mode	Test Result
1MBaud with 1Mbps transfer rate	Pass
1MBaud with Coded 125kbps transfer rate	Pass
2MBaud with 2Mbps transfer rate	Pass

5 Photographs of the Test Configuration



Appendix - Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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