Radio Test Report (BT-LE)

Report No.:	RJBBUI-WTW-P21040655-3
Test Model:	RTL8852BE
Received Date:	Apr. 20, 2021
Test Date:	May 06, 2021
Issued Date:	July 15, 2021
Applicant:	Realtek Semiconductor Corp.
Address:	No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan

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Release Control Record

Issue No.	Description	Date Issued
RJBBUI-WTW-P21040655-3	Original release.	July 15, 2021

1 Certificate of Conformity

Product:	11ax RTL8852BE Combo module
Brand:	REALTEK
Test Model:	RTL8852BE
Sample Status:	Engineering sample
Applicant:	Realtek Semiconductor Corp.
Test Date:	May 06, 2021
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 EMC characteristics under the conditions specified in this report.

Prepared by : Phoenix Huang , **Date:** July 15, 2021

Phoenix Huang / Specialist

Approved by : , **Date:** July 15, 2021

Clark Lin / Technical Manager

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)	4.3	Spurious emissions	C
Transmitting Equipment				
F	--	4.4	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)	4.5	Spurious emissions of receiver	C
--	--	3.5	Refer to all articles for transmitting antenna	C
Operating Frequency 2400 to 2483.5MHz				
--	3.7-1	3.4	High 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)	4.4	Antenna power	C
--	3.6 (2)	4.4	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)	--	Spreading bandwidth	NA
--	3.2 (9)	--	Spreading factor	NA
--	3.2 (11)	--	Frequency retention time (FH employed)	NA
--	3.4.1 (1)	4.6	Interference Prevention Function	C
--	3.4.1 (3)	--	Carrier Sense Capability	NA

Note: 1. C = Conform NC = Not Conform NT = Not Tested NA = Not Applicable
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021	ETC	(c)
ESG Vector signal generator Agilent	E4438C	MY45094468	Nov. 18, 2020	Nov. 17, 2021	ETC	(c)
Power Meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021	ETC	(c)
Power Sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021	ETC	(c)
DC Power Supply Topward	6603D	795558	NA	NA	NA	NA
AC Power Source Extech Electronics	6905S	1991551	NA	NA	NA	NA
True RMS Clamp Meter FLUKE	325	31130711WS	June 06, 2020	June 05, 2021	ETC	(c)
Power Combiner Mini-circuits	ZFRSC-123-S+	F698501347_02	Dec. 23, 2020	Dec. 22, 2021	BV CPS E&E	(d)
Power Divide Warison	WDIV-4R4029	0001	Jan. 11, 2021	Jan. 10, 2022	BV CPS E&E	(d)

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. 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).

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).

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

4. Tested Date: May 06, 2021

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	±960 Hz
Spurious emissions	±2.5 dB
Output power density	±1.2 dB
Out of band radiated power	±2.5 dB
Frequency Tolerance	±960 Hz

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (BT-LE)

Product	11ax RTL8852BE Combo module
Brand	REALTEK
Test Model	RTL8852BE
Status of EUT	Engineering sample
Nominal Voltage	3.3 Vdc from host equipment
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 2 Mbps
Operating Frequency	2.402 ~ 2.480 GHz
Number of Channel	40
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 section 3.5
Antenna Connector	Refer to section 3.5
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has below HW SKU configuration, as below table:

SKU No.	Interface	Description
1	PCIe + USB	Single antenna port
2	PCIe + USB	Dual antenna port
3	PCIe + UART	Dual antenna port
Note: From the above HW SKUs, the worse case was found in **SKU No.: 2**. Therefore only the test data of the SKU was recorded in this report.		

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 5GHz	Bluetooth

3. The power table as below table:

High Power				**Low Power**			
Technology Mode	Rated output power (mW)	Conducted RF output power (mW)	Radiated RF output power (mW)	Technology Mode	Rated output power (mW)	Conducted RF output power (mW)	Radiated RF output power (mW)
BT-LE 1M	7.3	7.261	16.255	**BT-LE 1M**	5	4.385	9.817
BT-LE 2M	7.3	7.211	16.143	**BT-LE 2M**	5	4.406	9.864

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

BT-LE channels:

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

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 (Bluetooth RF test tool (5.2.3.1)) provided by manufacturer, the power levels during the tests were set according to the following codes:

High power				Low power			
BT-LE 1M		BT-LE 2M		BT-LE 1M		BT-LE 2M	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
0	0xFB	1	0xFB	0	0x07	1	0x07
19	0xFB	19	0xFB	19	0x08	19	0x08
39	0xFC	38	0xFC	39	0x09	38	0x09

3.3 Test Conditions

Test Conditions		Voltage (Vdc)
V_{normal}		3.3
$V_{max.}$	+10%	3.63
$V_{min.}$	-10%	2.97

Test mode is presented in the report as below:

Test Item	Test Conditions	Environmental Conditions
Frequency Tolerance	Mode 1: High Power Mode 2: Low Power	25 deg.C, 60 % RH
Occupied Bandwidth	Mode 1: High Power Mode 2: Low Power	25 deg.C, 60 % RH
Spurious Emissions for Transmitter	Mode 1: High Power Mode 2: Low Power	25 deg.C, 60 % RH
Antenna Power	Mode 1: High Power Mode 2: Low Power	25 deg.C, 60 % RH
Spurious Emissions for Receiver	Mode 1: High Power Mode 2: Low Power	25 deg.C, 60 % RH

3.4 Assembly

The EUT is constructed as an 11ax RTL8852BE Combo module. The RF circuit was covered by metal shielding case, and the metal shielding case won't be easy to be opened.

3.5 Antenna Specifications

3.5.1 Antenna Gain

Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Frequency Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1	Chain 1	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			300
				5	5.875~7.125			300
	Chain 2	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			300
				5	5.875~7.125			300
2	Chain 1	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			300
				5	5.875~7.125			300
	Chain 2	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			300
				5	5.875~7.125			300

Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.5.2 Antenna Pattern

Please refer to the attached file (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 (Mode 1)

BT-LE 1M

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	2401.998080	-0.799	2401.997839	-0.899	2401.997720	-0.949
19	2440	2439.997440	-1.049	2439.997360	-1.081	2439.997159	-1.164
39	2480	2479.996999	-1.210	2479.996920	-1.241	2479.996840	-1.274

BT-LE 2M

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)
1	2404	2403.997965	-0.846	2403.997906	-0.871	2403.997819	-0.907
19	2440	2439.997762	-0.917	2439.997564	-0.998	2439.997501	-1.024
38	2478	2477.997245	-1.111	2477.997163	-1.144	2477.997120	-1.162

4.1.4 Test Results (Mode 2)

BT-LE 1M

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	2401.997880	-0.882	2401.997800	-0.915	2401.997640	-0.982
19	2440	2439.997680	-0.950	2439.997480	-1.032	2439.997400	-1.065
39	2480	2479.997080	-1.177	2479.997200	-1.129	2479.997120	-1.161

BT-LE 2M

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)
1	2404	2403.997000	-1.247	2403.996800	-1.331	2403.996679	-1.381
19	2440	2439.996520	-1.426	2439.996320	-1.508	2439.996199	-1.557
38	2478	2477.996040	-1.598	2477.996079	-1.582	2477.996000	-1.614

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit
Occupied bandwidth	<26MHz

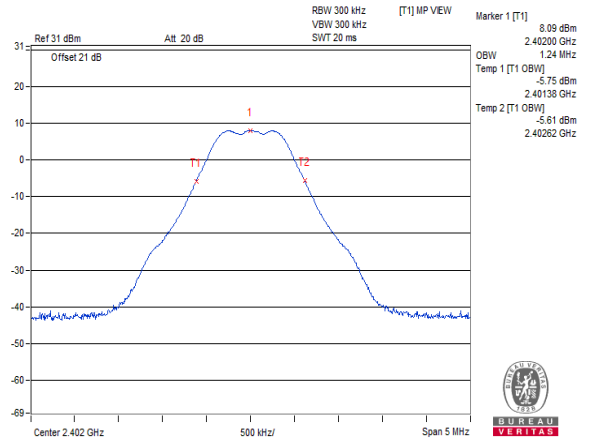
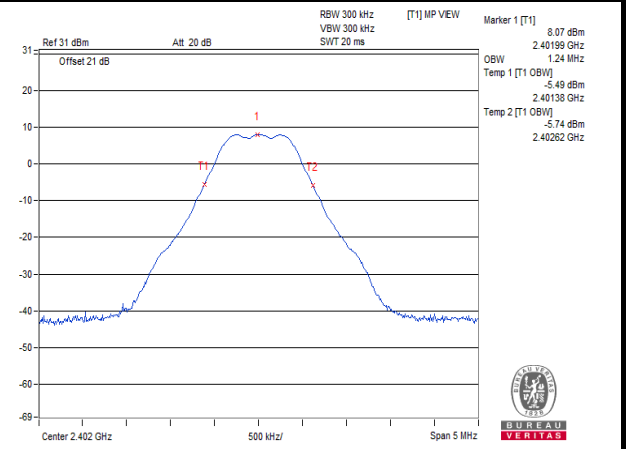
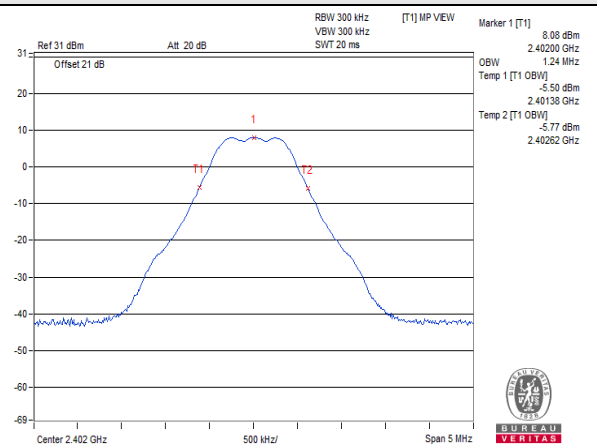
4.2.2 Test Setup

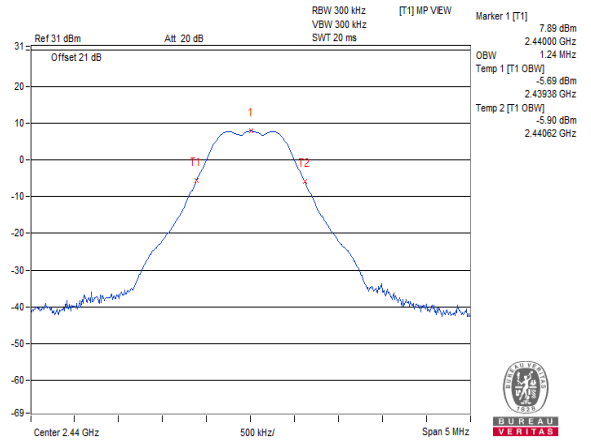
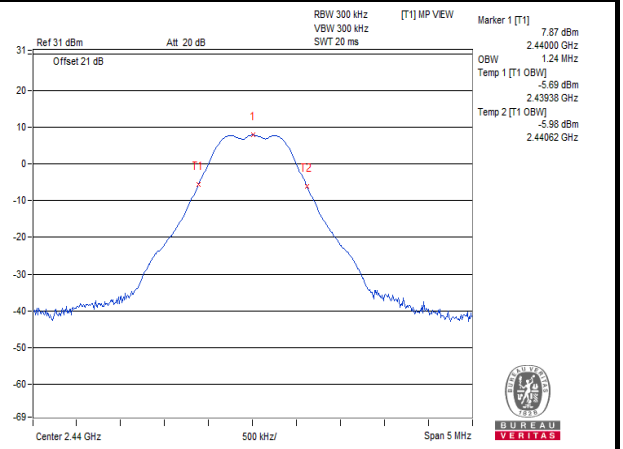
4.2.3 Test Results (Mode 1)

BT-LE 1M

Channel	Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
		Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
0	2402	1.24	1.24	1.24
19	2440	1.24	1.24	1.24
39	2480	1.24	1.24	1.24

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

V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 0 (2402MHz)	

V_{normal}	$V_{max.}$
	
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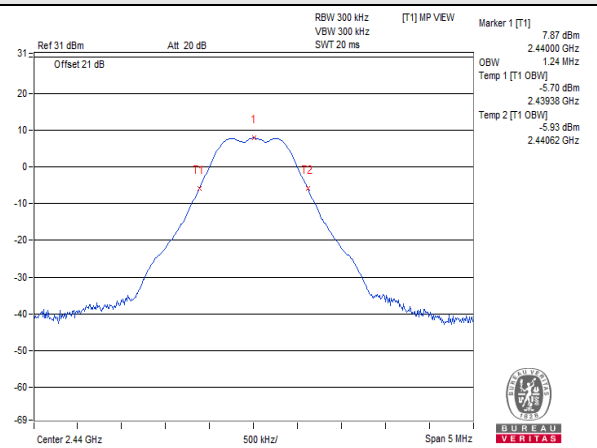
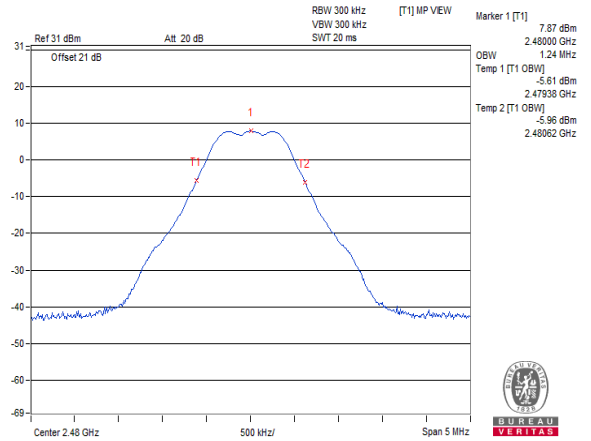
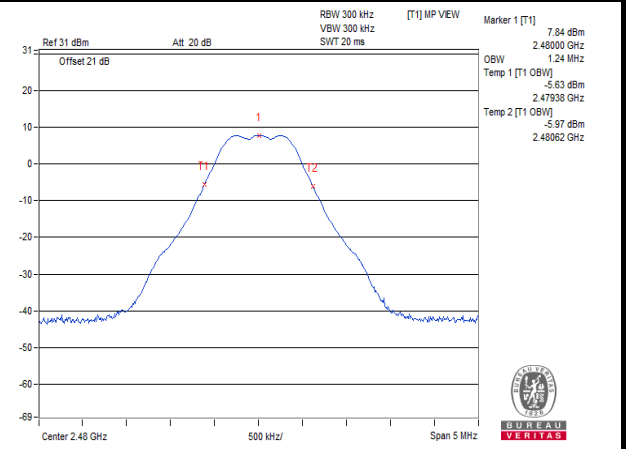
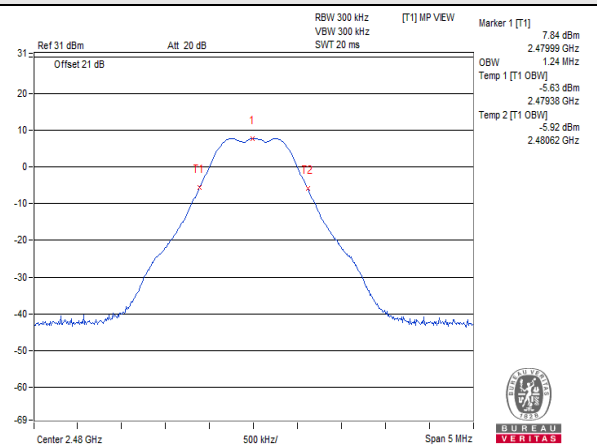
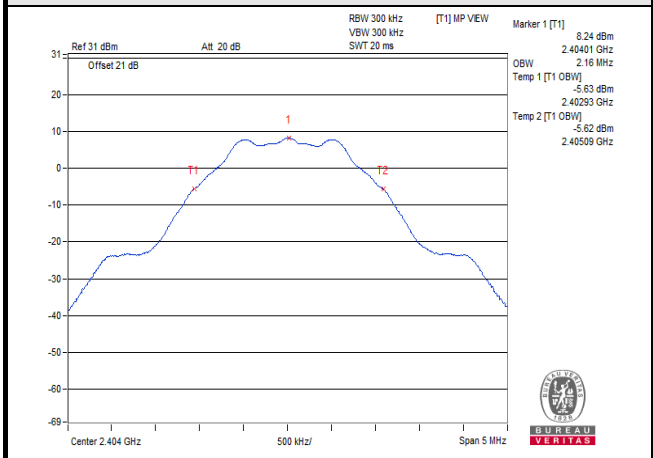
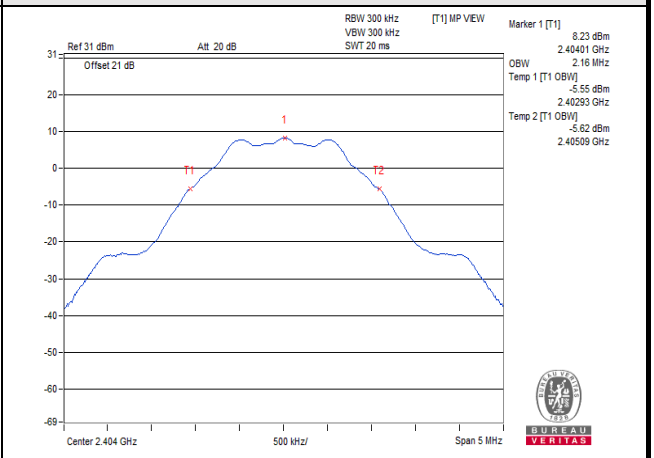
	
CH 19 (2440MHz)	

V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 39 (2480MHz)	

BT-LE 2M

Channel	Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
		Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
1	2404	2.16	2.16	2.16
19	2440	2.16	2.16	2.16
38	2478	2.16	2.17	2.17

V_{normal}	$V_{max.}$
	
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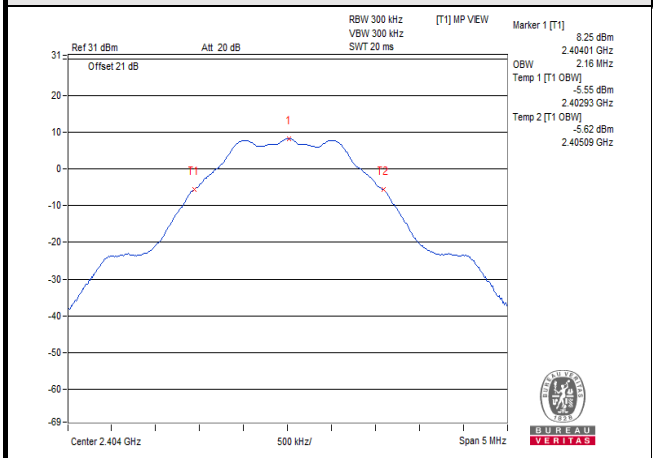
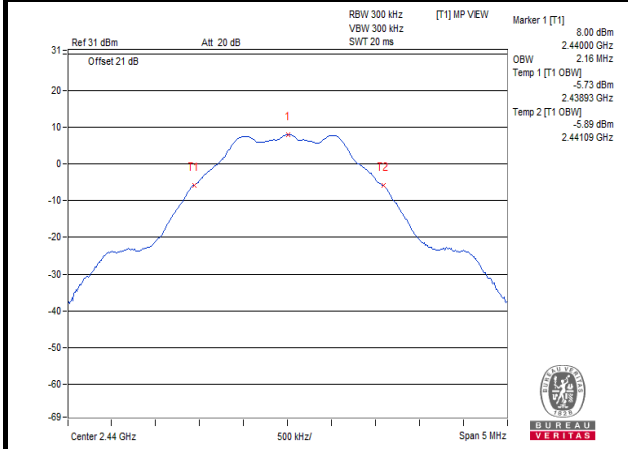
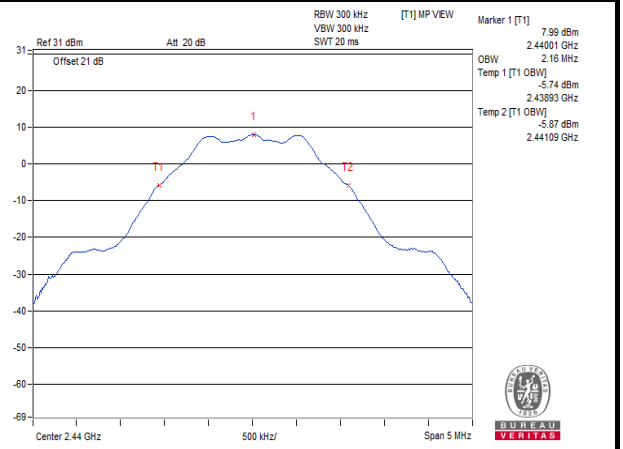
	

CH 1 (2404MHz)

V_{normal}	$V_{max.}$
	
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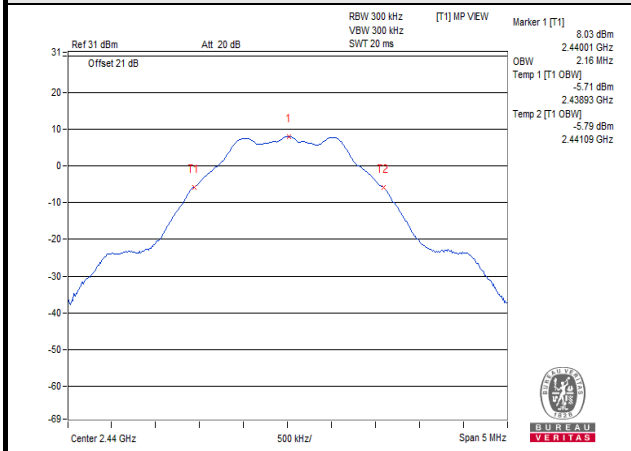
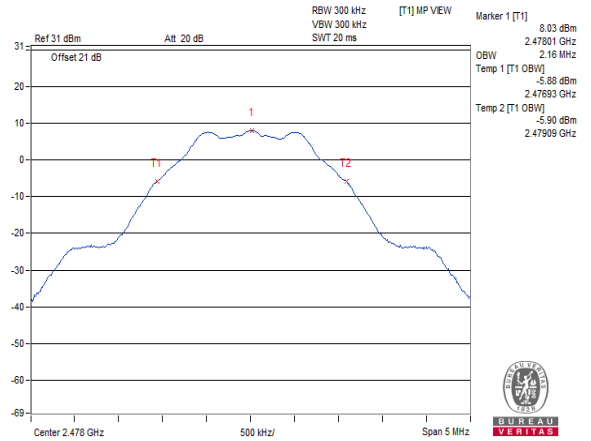
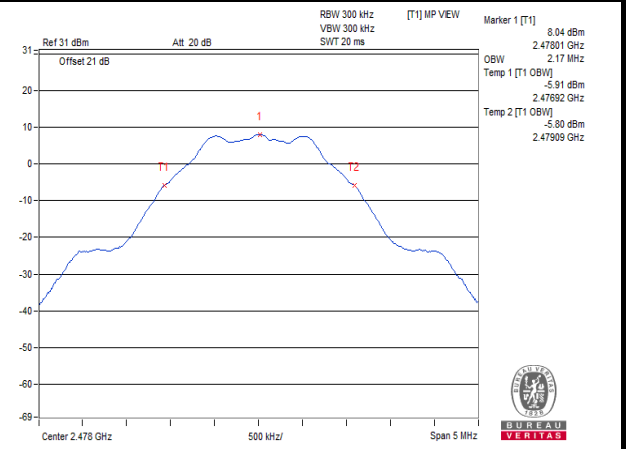
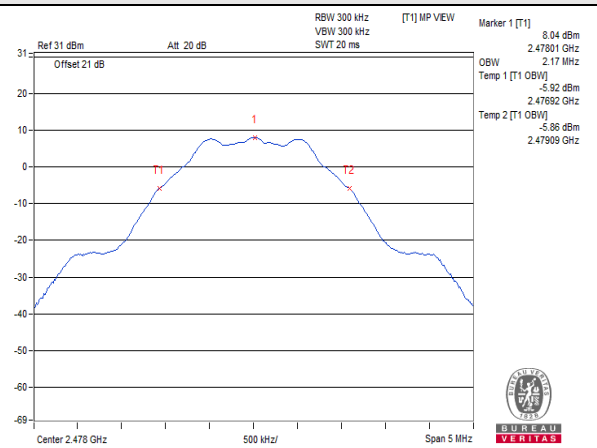
	
CH 19 (2440MHz)	

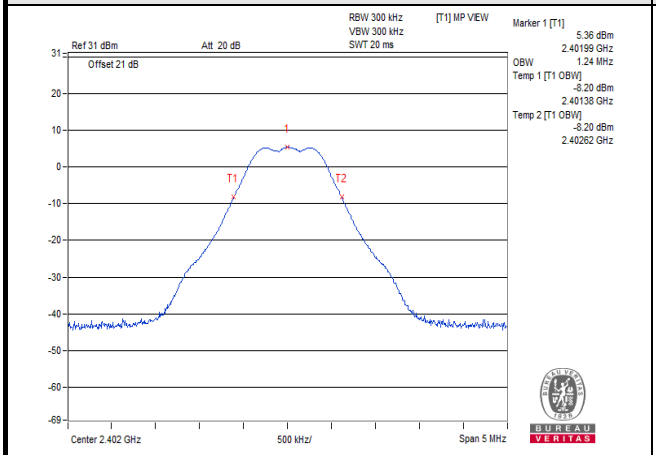
V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 38 (2478MHz)	

4.2.4 Test Results (Mode 2)

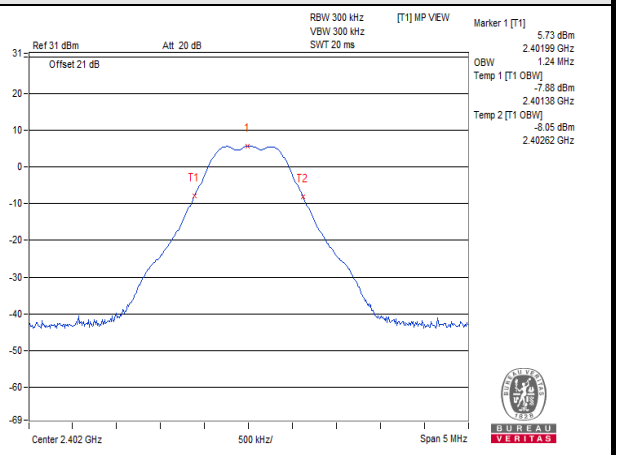
BT-LE 1M

Channel	Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
		Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
0	2402	1.24	1.24	1.24
19	2440	1.24	1.24	1.24
39	2480	1.24	1.24	1.24

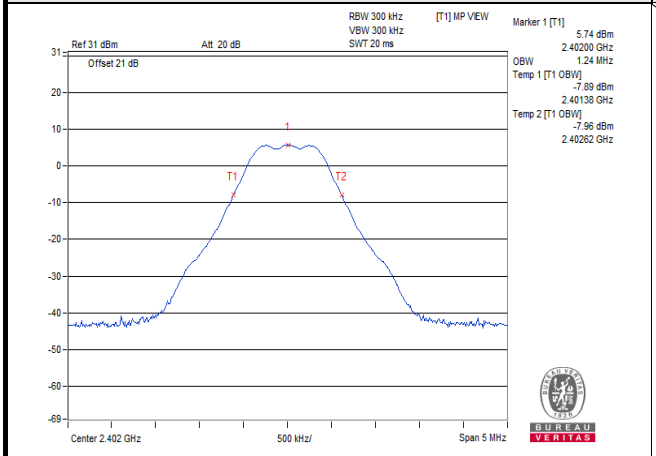
V_{normal}



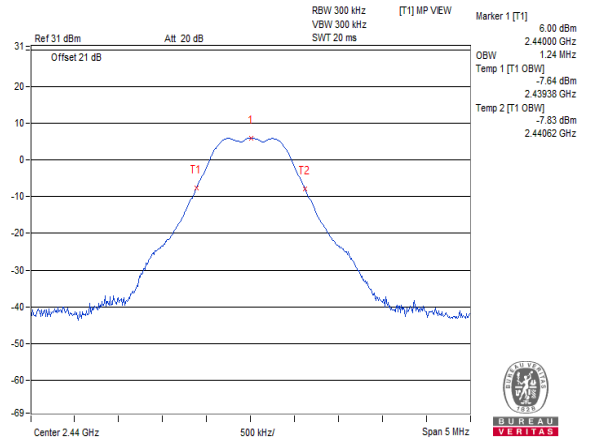
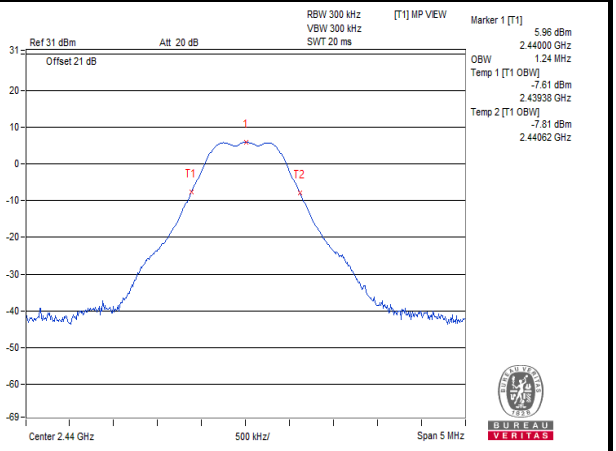
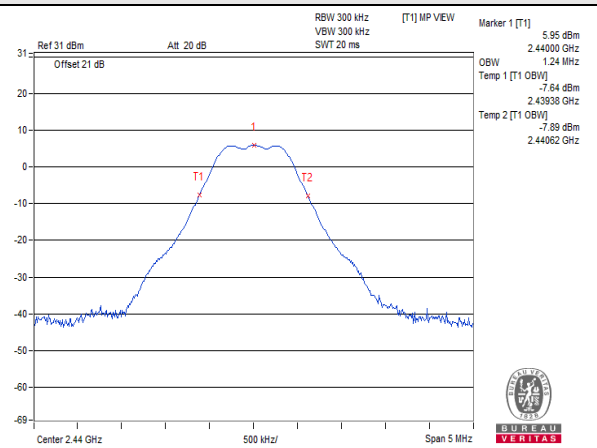
$V_{max.}$

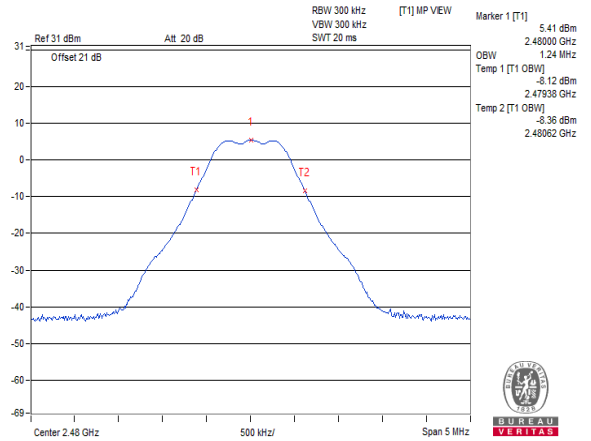
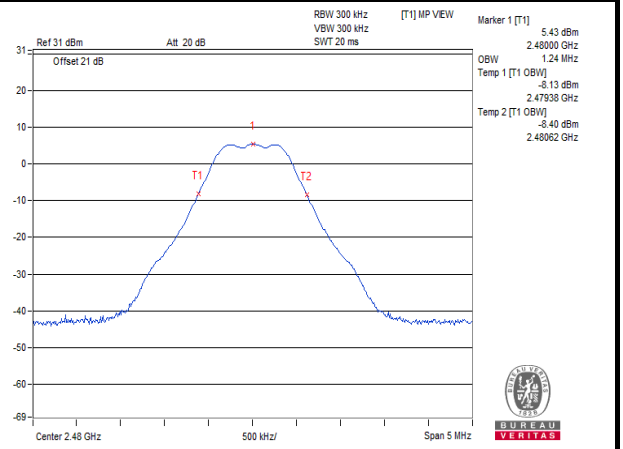
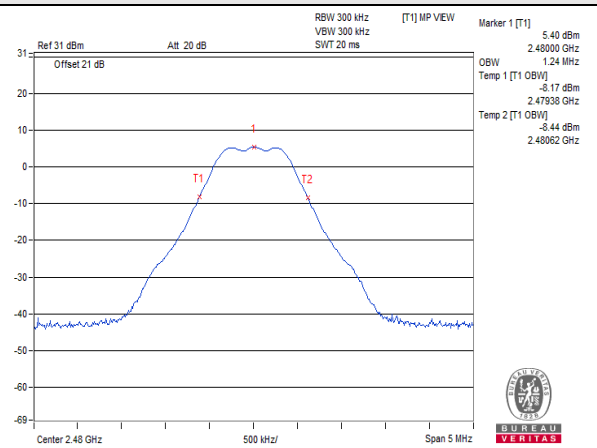


$V_{min.}$



CH 0 (2402MHz)

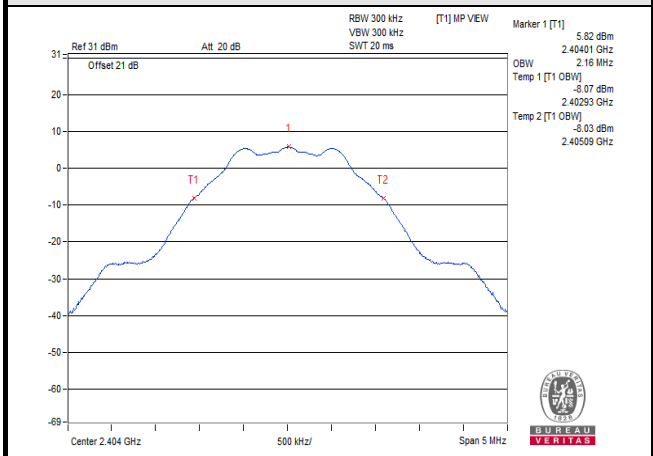
V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 19 (2440MHz)	

V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 39 (2480MHz)	

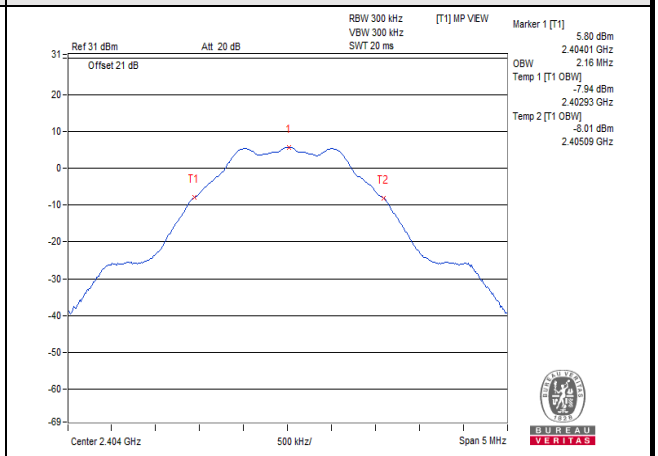
BT-LE 2M

Channel	Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
		Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
1	2404	2.16	2.16	2.16
19	2440	2.17	2.17	2.17
38	2478	2.17	2.17	2.17

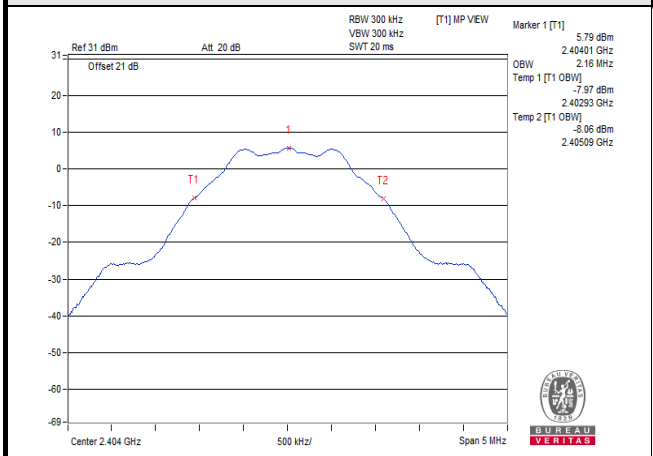
V_{normal}



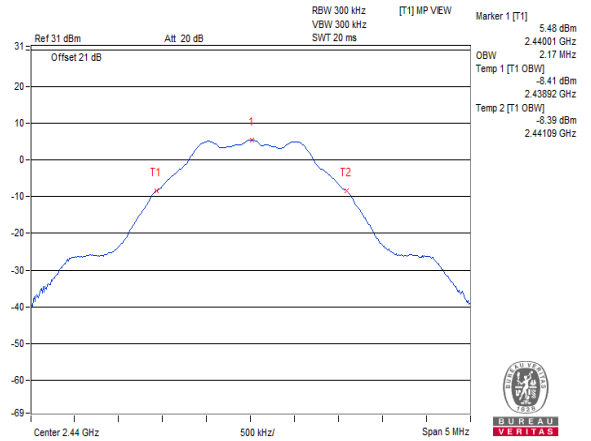
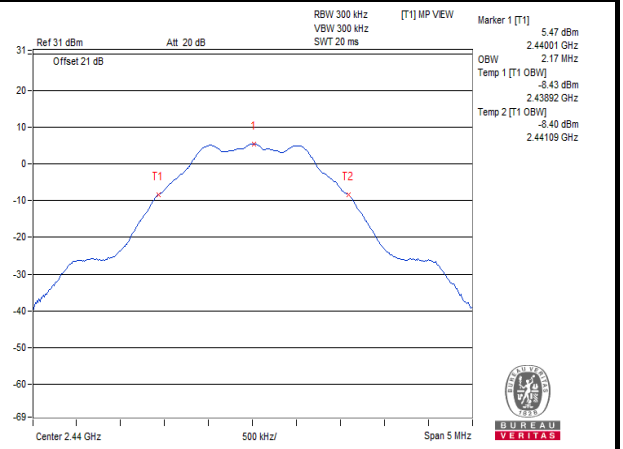
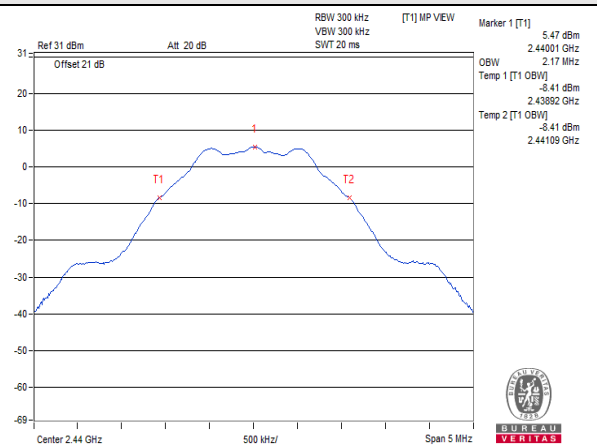
$V_{max.}$

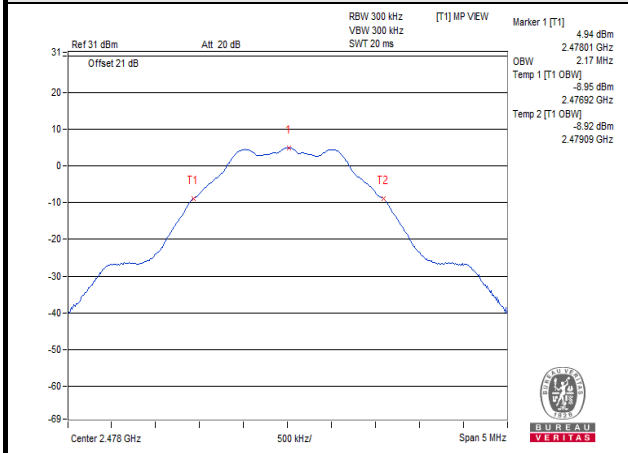
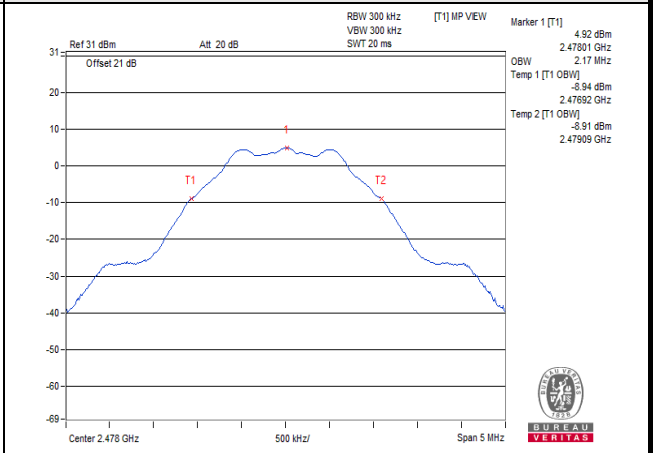
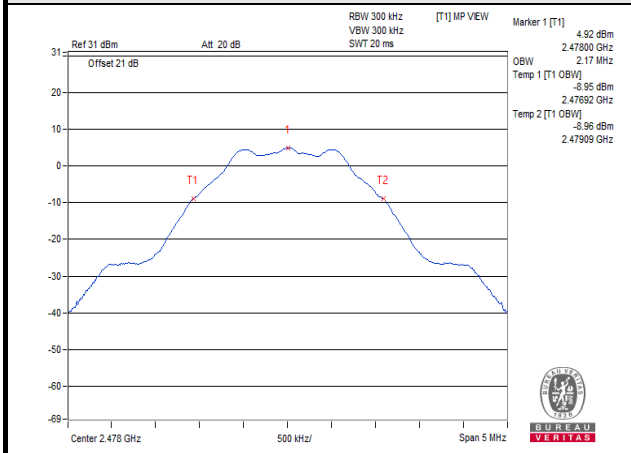


$V_{min.}$



CH 1 (2404MHz)

V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 19 (2440MHz)	

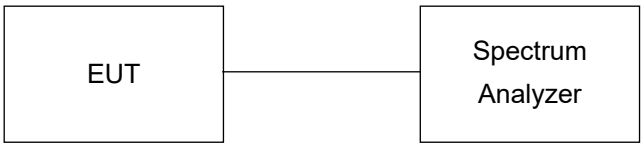
V_{normal}	$V_{max.}$
	
$V_{min.}$	
	
CH 38 (2478MHz)	

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	≦ 0.25 uW/100kHz
1000.0MHz to 2387MHz	≦ 2.5 uW/MHz
2387.0MHz to 2400.0MHz	≦ 25 uW/MHz
2483.5MHz to 2496.5MHz	≦ 25 uW/MHz
2496.5MHz to 12500.0MHz	≦ 2.5 uW/MHz

4.3.2 Test Setup



4.3.3 Test Results (Mode 1)

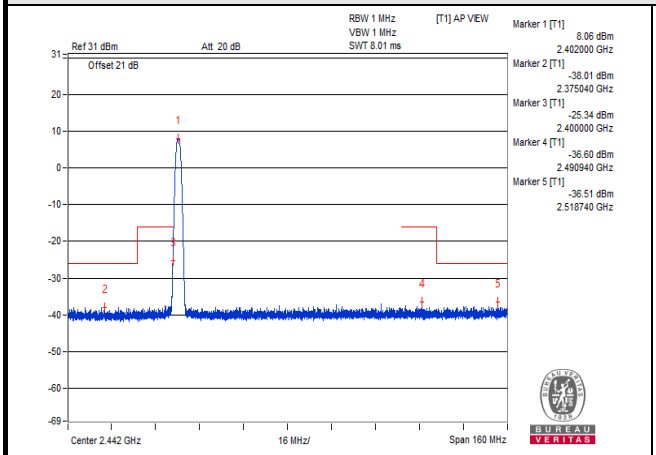
BT-LE 1M

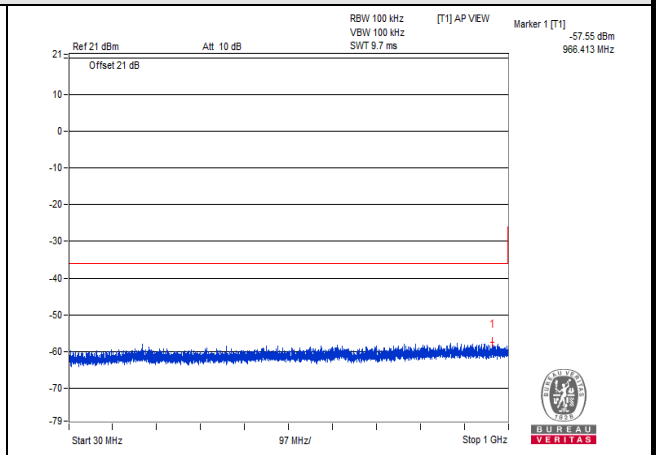
TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	966.413	0.001758	0.25	PASS
	1000MHz to 2387MHz	1334.093	0.174181	2.5	PASS
	2387MHz to 2400MHz	2400.000	2.831392	25	PASS
	2483.5MHz to 2496.5MHz	2495.351	0.192309	25	PASS
	2496.5MHz to 12500MHz	5802.656	0.562341	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	946.650	0.001726	0.25	PASS
	1000MHz to 2387MHz	1691.939	0.157036	2.5	PASS
	2387MHz to 2400MHz	2400.000	2.877398	25	PASS
	2483.5MHz to 2496.5MHz	2488.163	0.202768	25	PASS
	2496.5MHz to 12500MHz	5948.957	0.472063	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	870.868	0.001858	0.25	PASS
	1000MHz to 2387MHz	2200.795	0.190546	2.5	PASS
	2387MHz to 2400MHz	2400.000	2.773320	25	PASS
	2483.5MHz to 2496.5MHz	2491.694	0.206063	25	PASS
	2496.5MHz to 12500MHz	5876.432	0.430527	2.5	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	896.088	0.001791	0.25	PASS
	1000MHz to 2387MHz	2113.761	0.172187	2.5	PASS
	2387MHz to 2400MHz	2389.951	0.207491	25	PASS
	2483.5MHz to 2496.5MHz	2493.043	0.192309	25	PASS
	2496.5MHz to 12500MHz	5923.949	0.424620	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	755.196	0.001862	0.25	PASS
	1000MHz to 2387MHz	2326.318	0.190546	2.5	PASS
	2387MHz to 2400MHz	2394.299	0.202302	25	PASS
	2483.5MHz to 2496.5MHz	2488.222	0.194089	25	PASS
	2496.5MHz to 12500MHz	5867.679	0.492040	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	928.220	0.001845	0.25	PASS
	1000MHz to 2387MHz	2385.959	0.167880	2.5	PASS
	2387MHz to 2400MHz	2398.144	0.184927	25	PASS
	2483.5MHz to 2496.5MHz	2489.081	0.205589	25	PASS
	2496.5MHz to 12500MHz	5946.457	0.418794	2.5	PASS

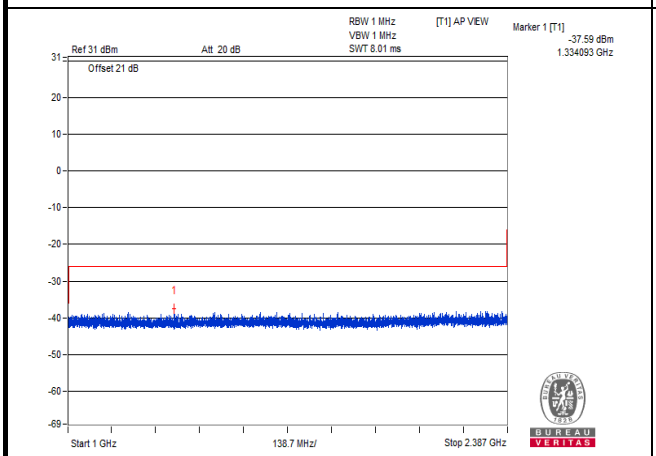
TEST CHANNEL		CH 39 (2480MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	946.892	0.001774	0.25	PASS
	1000MHz to 2387MHz	1646.342	0.153815	2.5	PASS
	2387MHz to 2400MHz	2399.267	0.190108	25	PASS
	2483.5MHz to 2496.5MHz	2495.021	0.226464	25	PASS
	2496.5MHz to 12500MHz	6007.728	0.443609	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	978.053	0.001738	0.25	PASS
	1000MHz to 2387MHz	1492.385	0.163682	2.5	PASS
	2387MHz to 2400MHz	2392.424	0.217270	25	PASS
	2483.5MHz to 2496.5MHz	2489.770	0.228560	25	PASS
	2496.5MHz to 12500MHz	6983.069	0.465586	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	981.570	0.001803	0.25	PASS
	1000MHz to 2387MHz	2379.718	0.176198	2.5	PASS
	2387MHz to 2400MHz	2395.835	0.212324	25	PASS
	2483.5MHz to 2496.5MHz	2493.839	0.243781	25	PASS
	2496.5MHz to 12500MHz	5848.922	0.444631	2.5	PASS

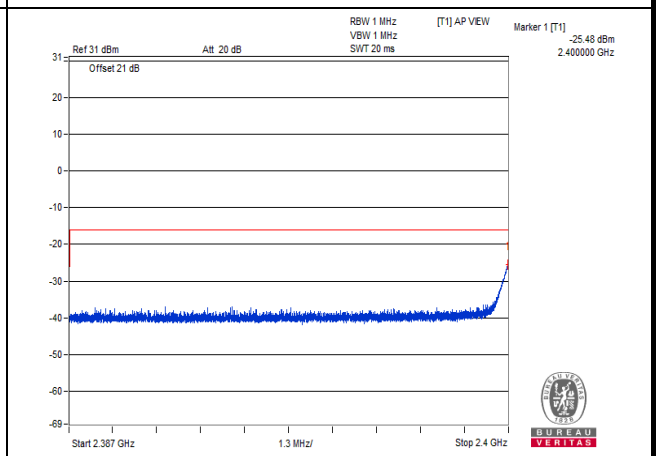
NOTE: 1. The spectrum plots are attached on the following pages.

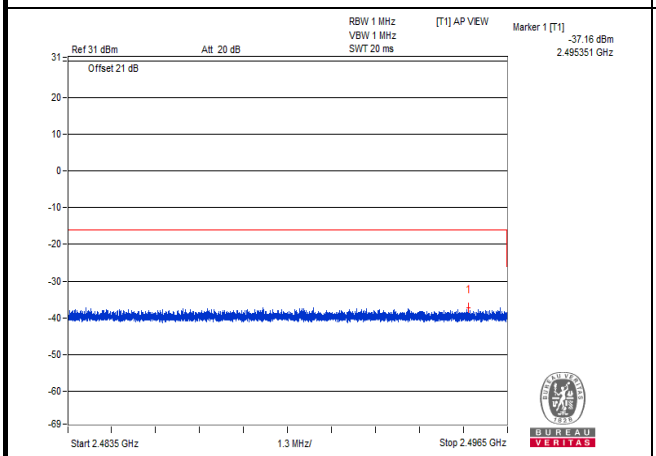
Vnormal

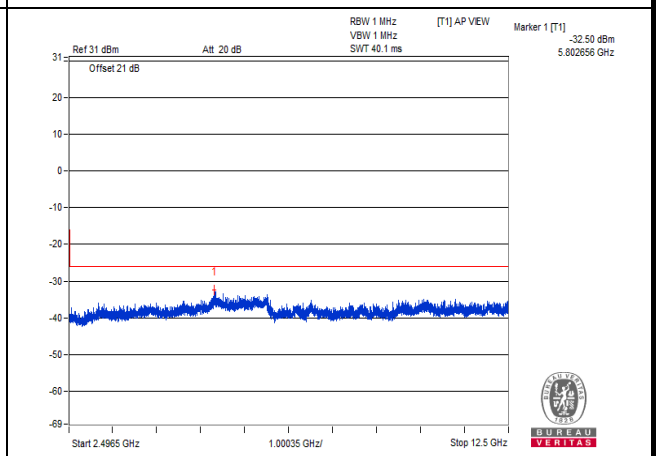






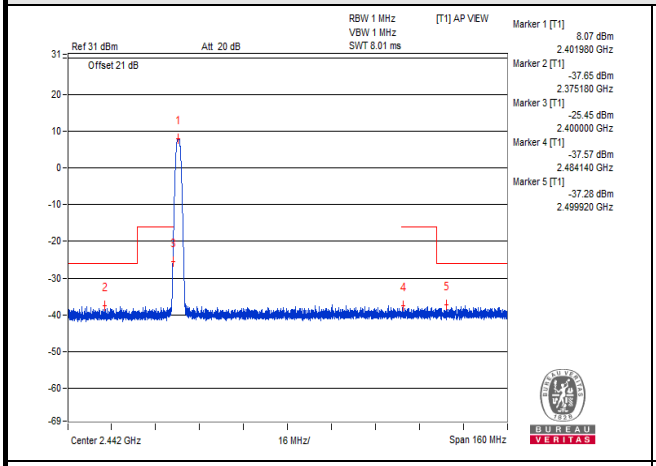


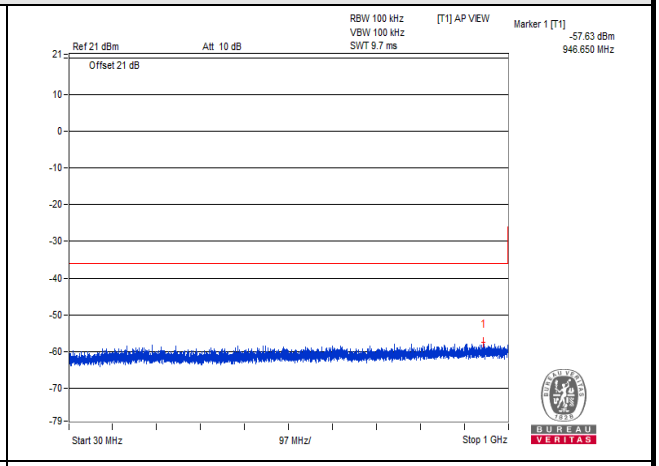


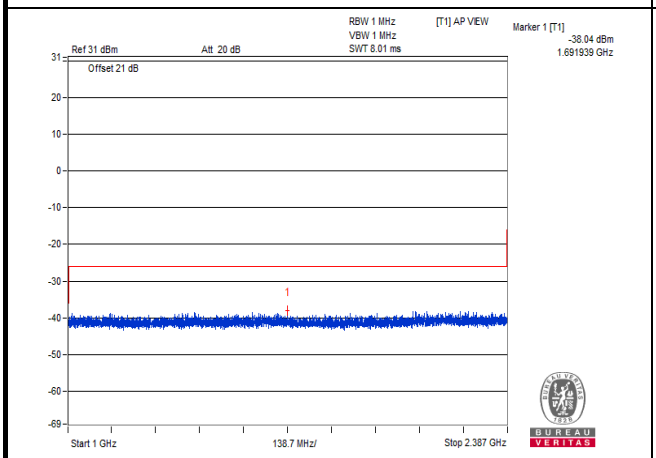


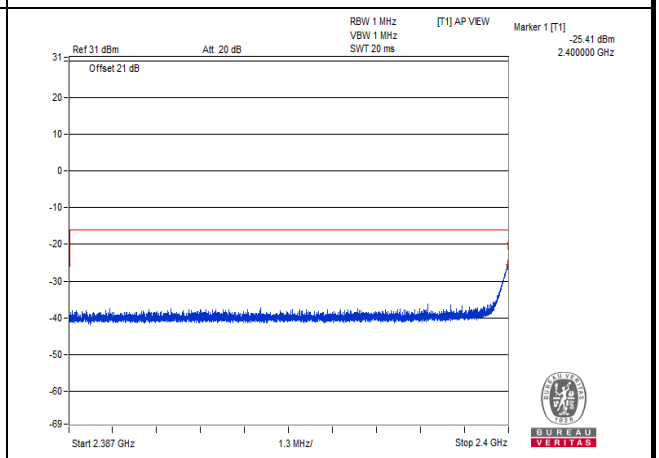
CH 0 (2402MHz)

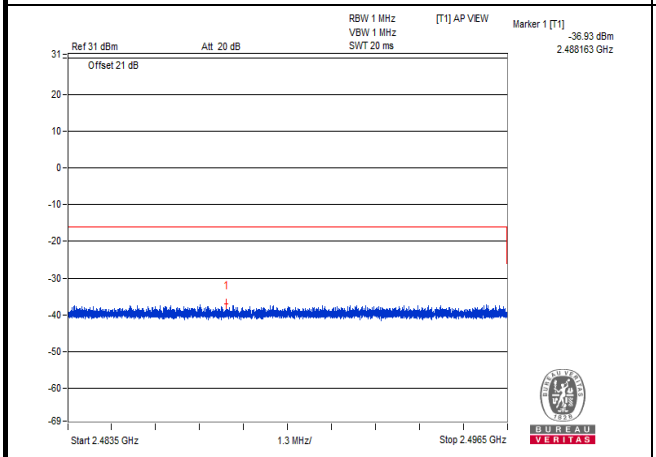
Vmax.

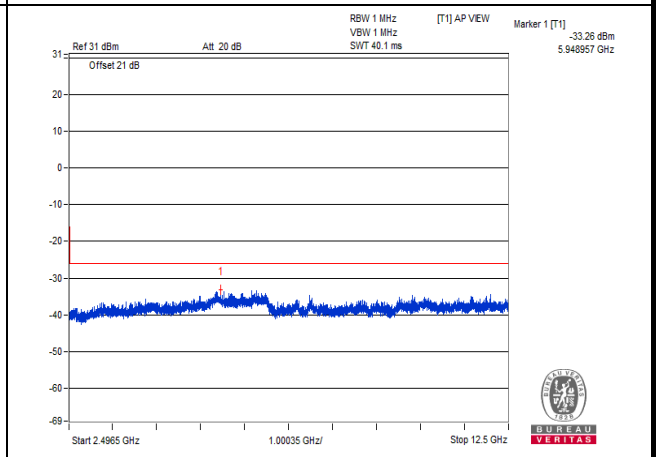






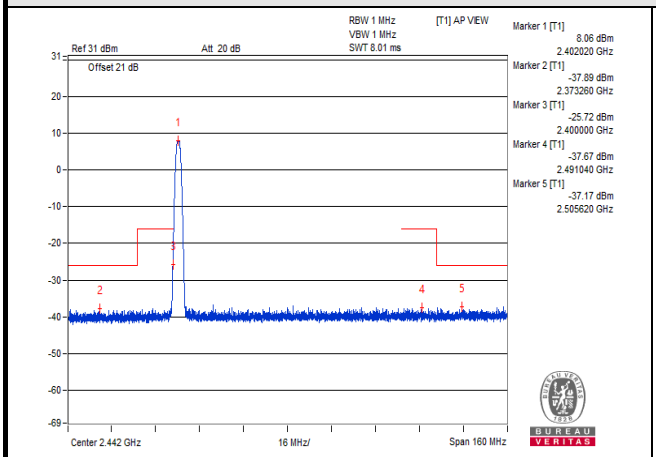


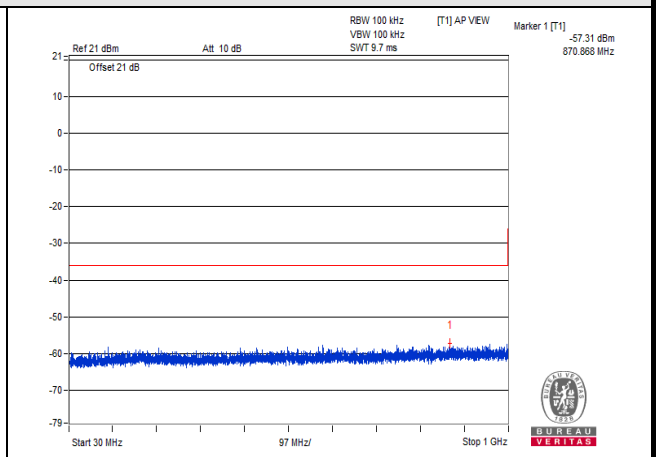


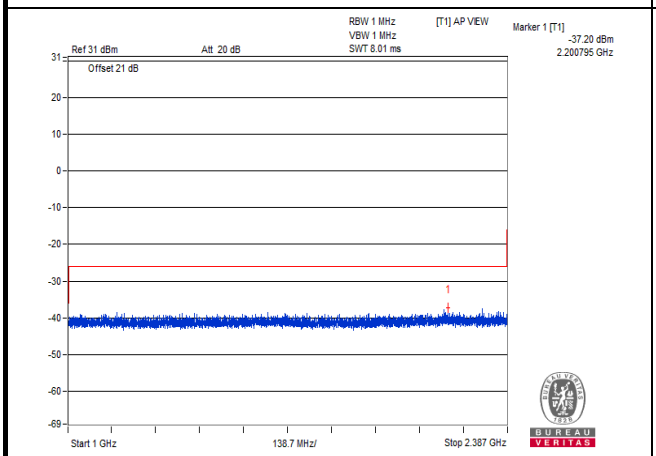


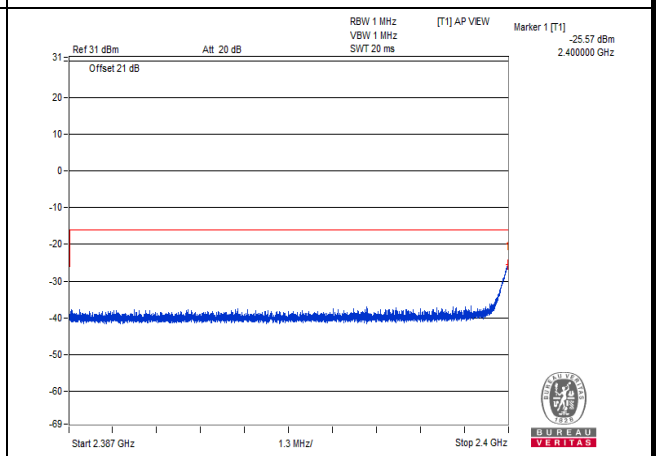
CH 0 (2402MHz)

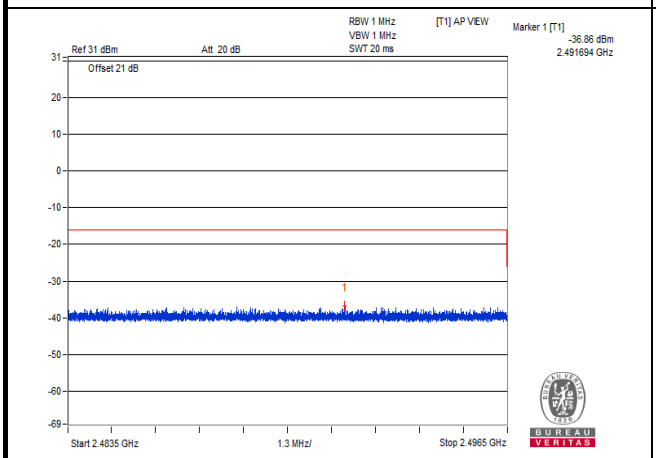
Vmin.

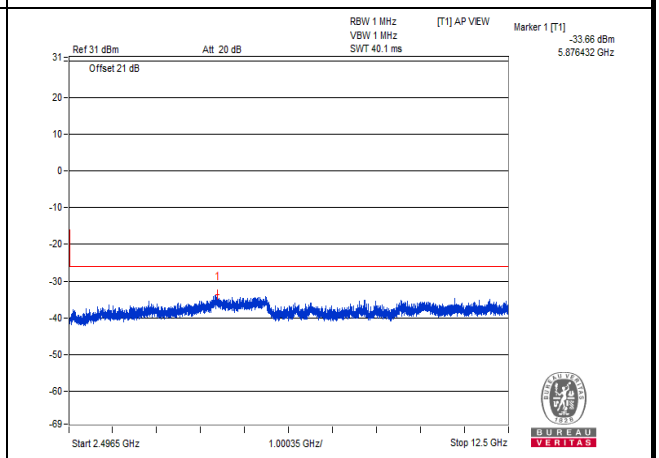






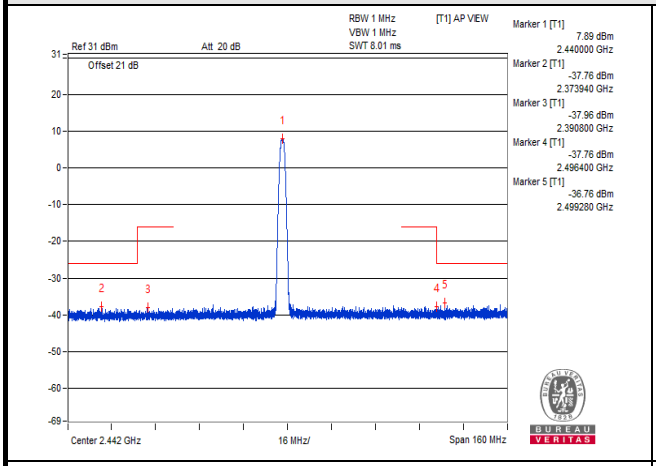


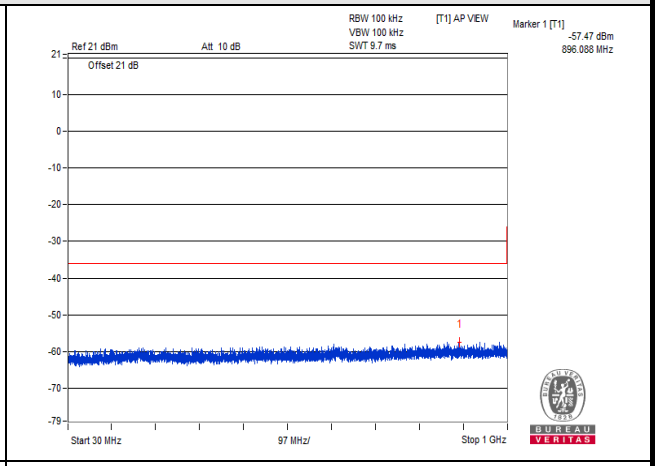


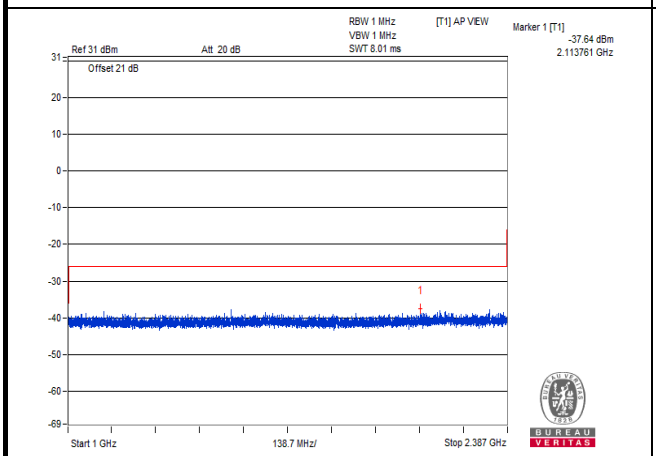


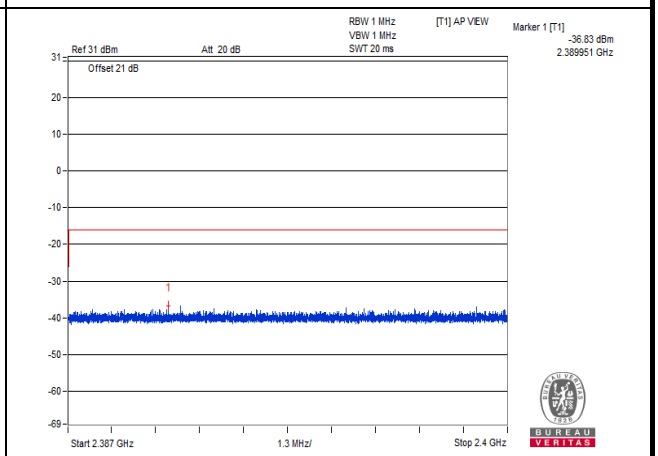
CH 0 (2402MHz)

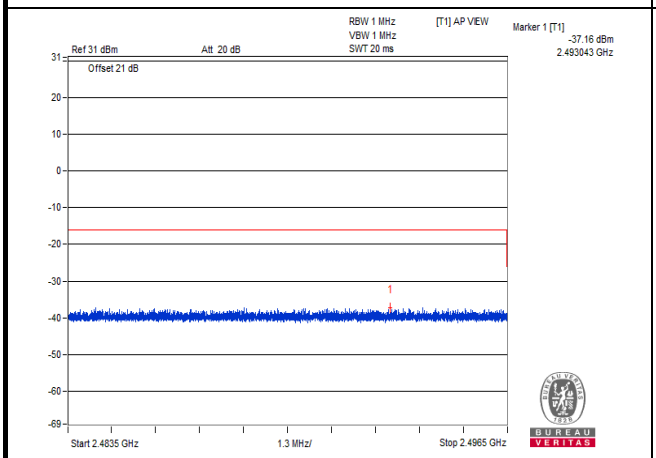
Vnormal

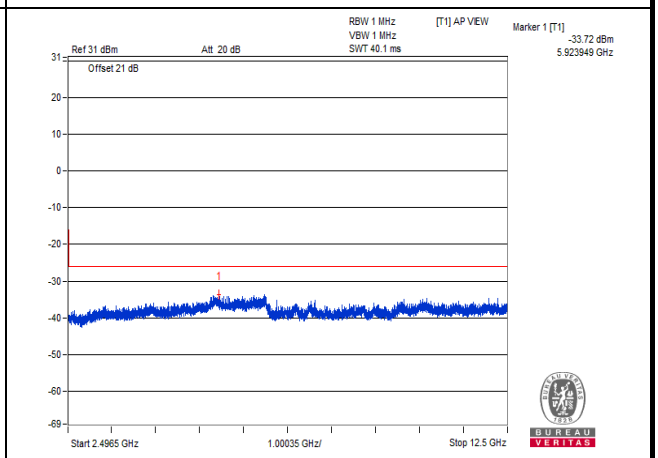






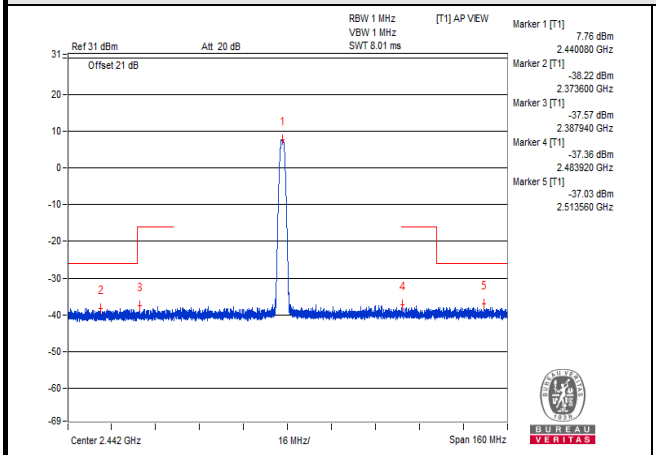


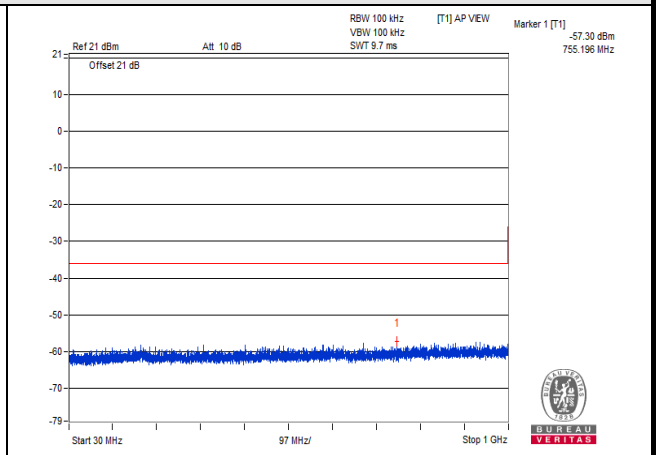


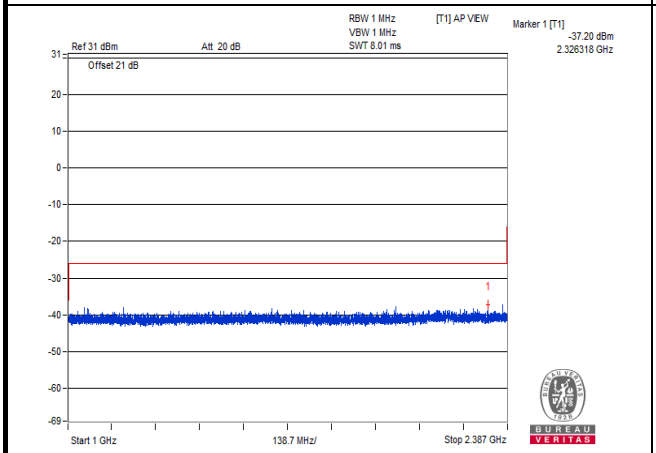


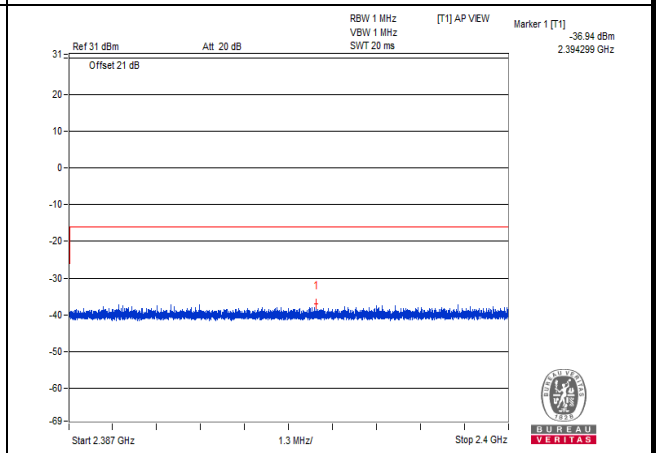
CH 19 (2440MHz)

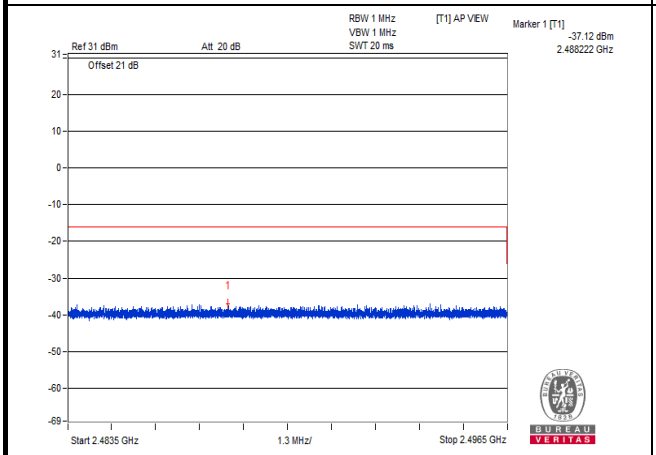
Vmax.

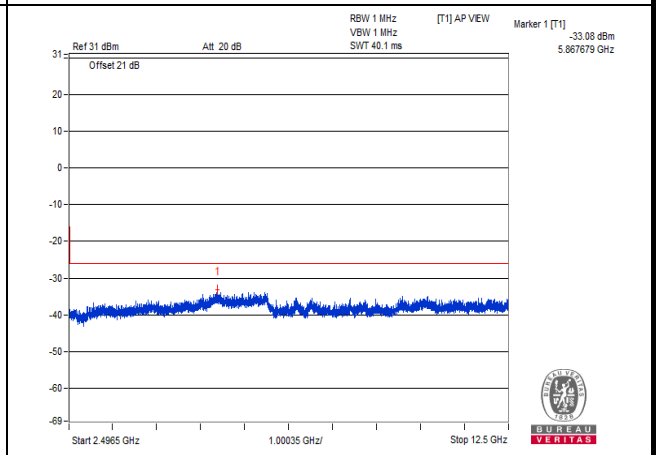






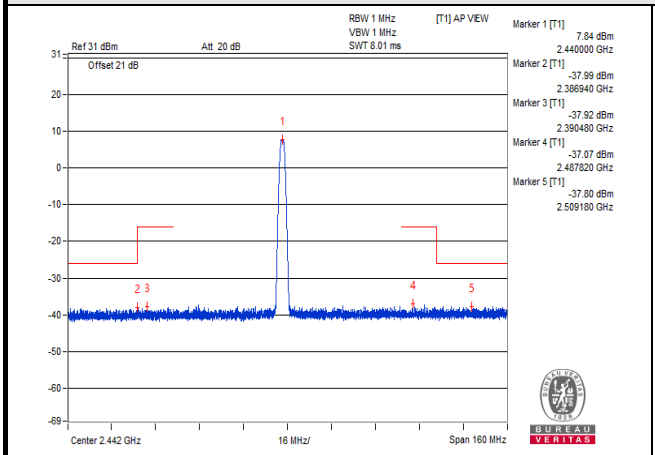


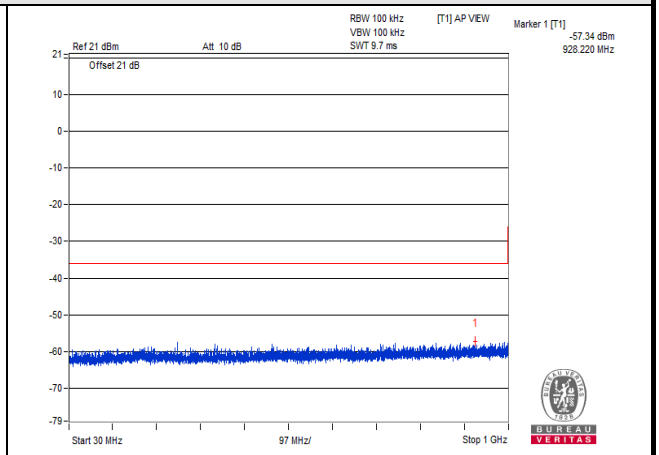


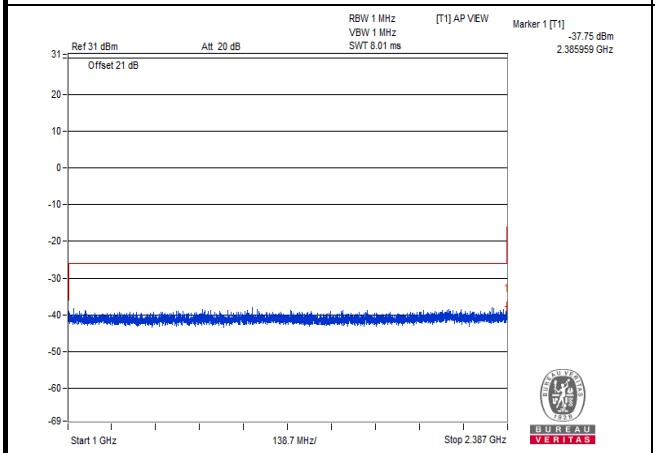


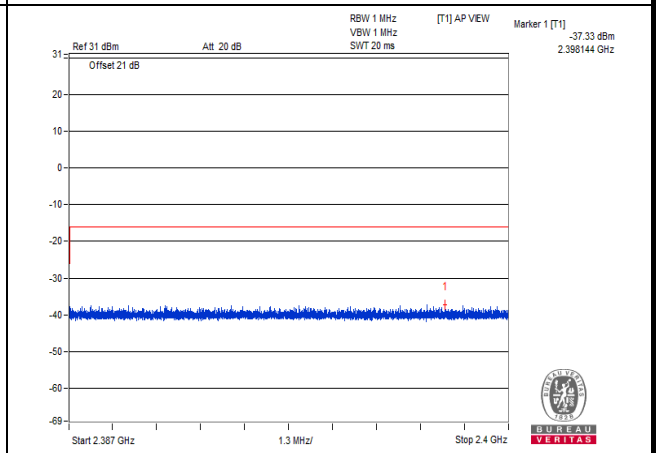
CH 19 (2440MHz)

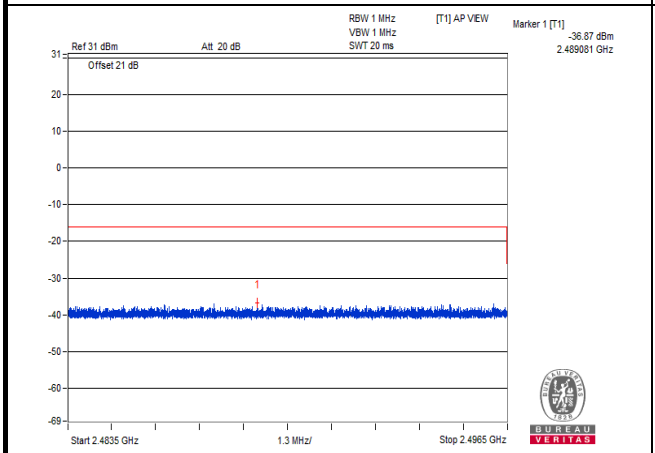
Vmin.

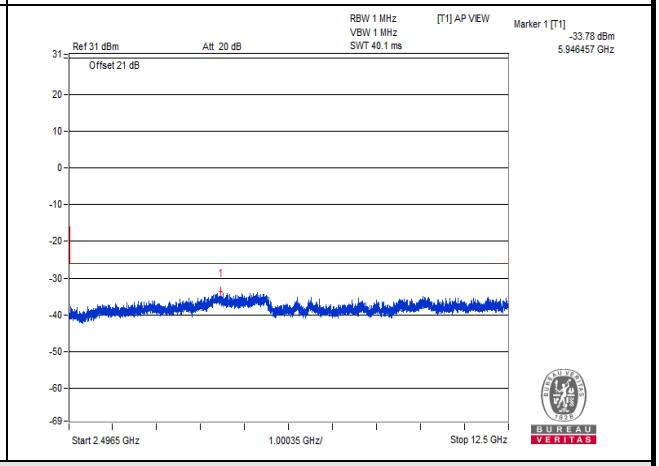






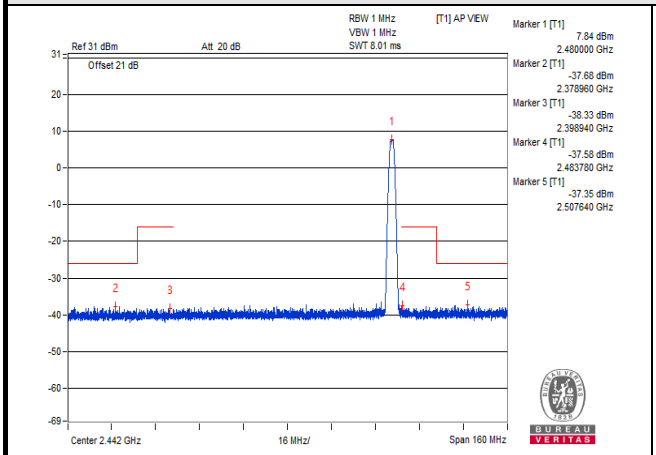


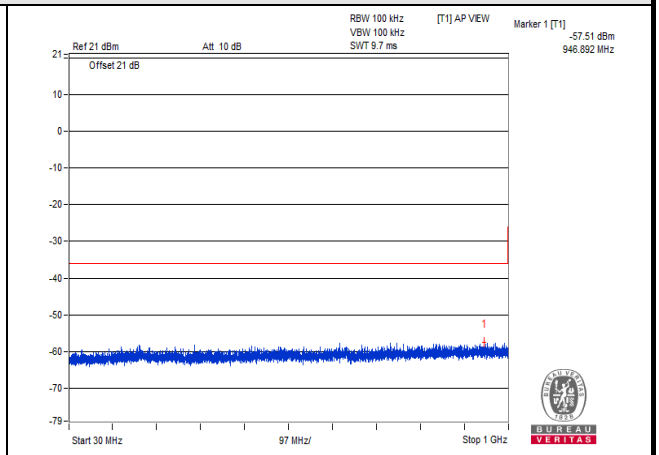


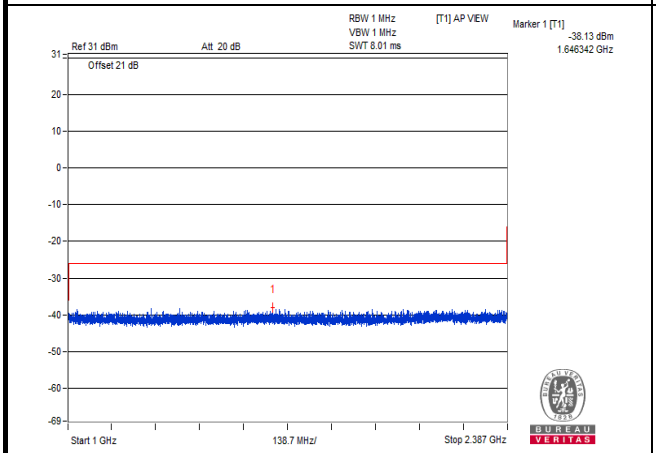


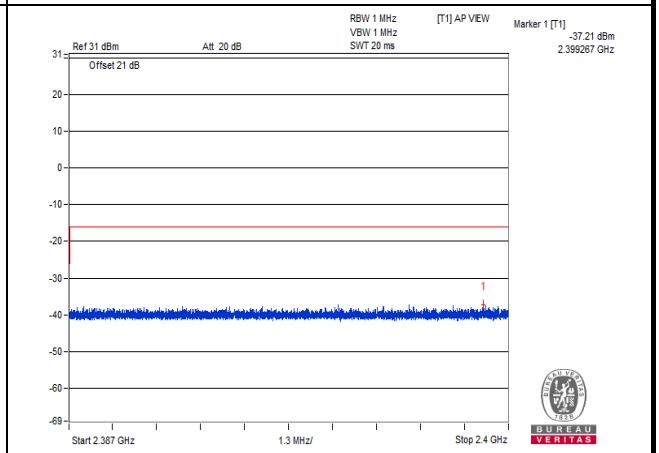
CH 19 (2440MHz)

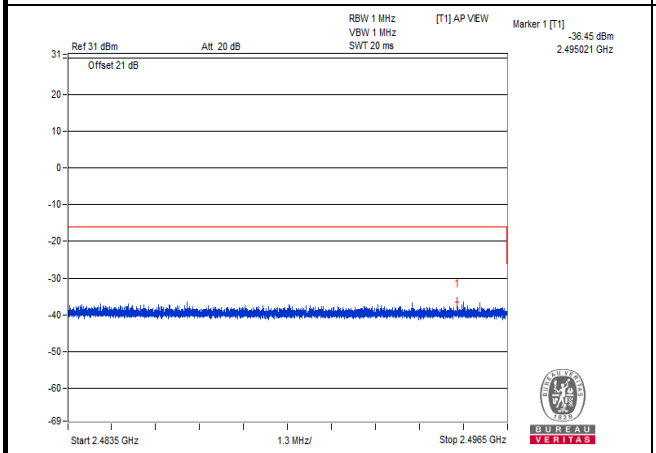
Vnormal

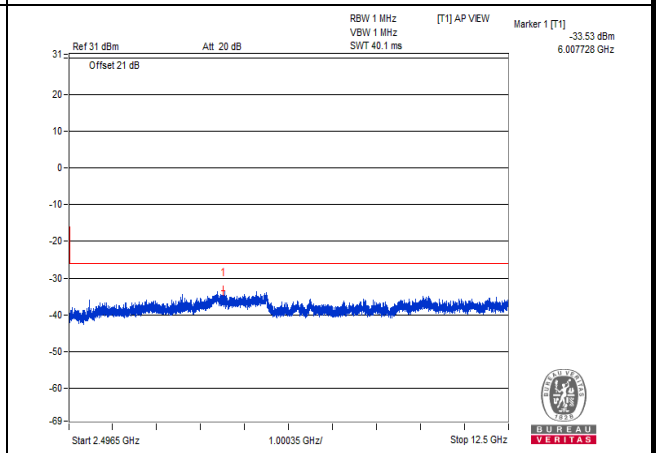






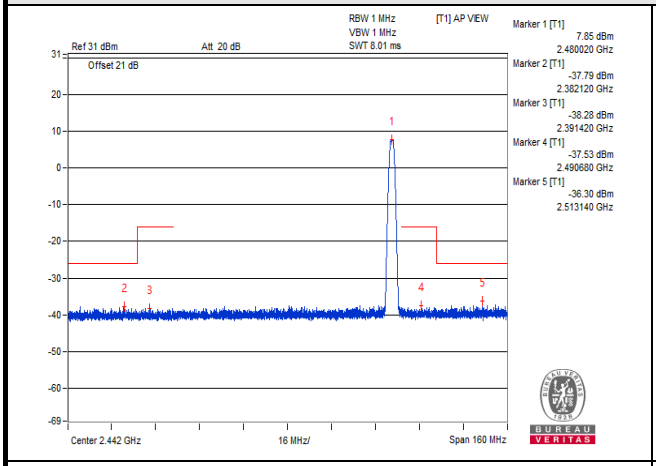


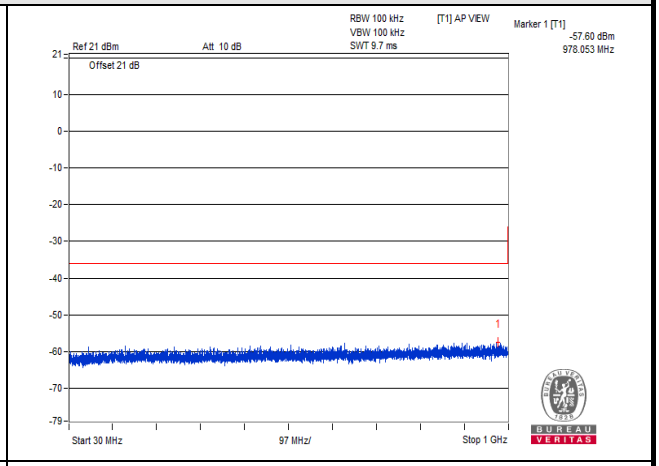


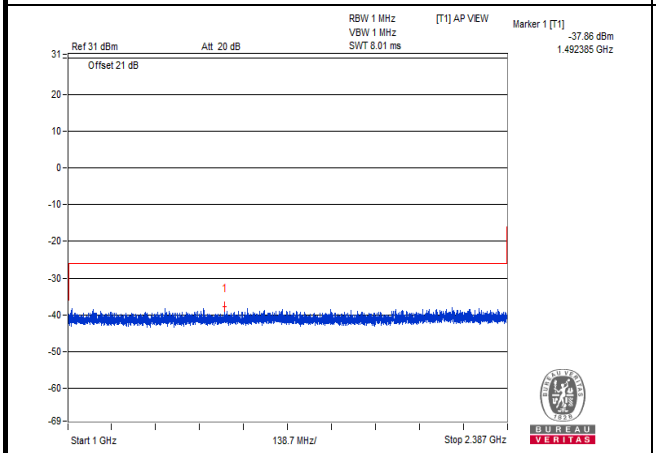


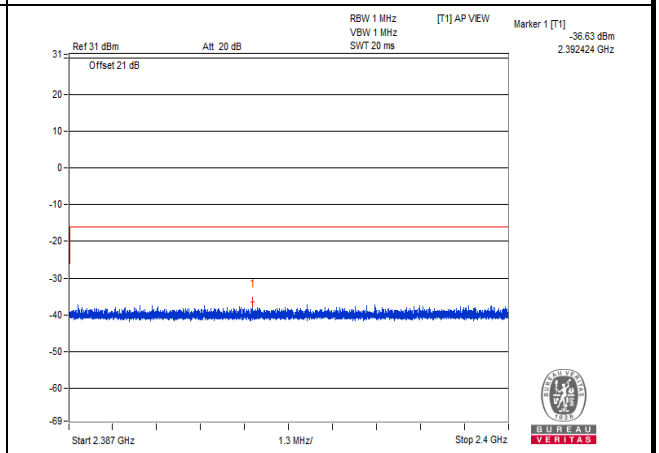
CH 39 (2480MHz)

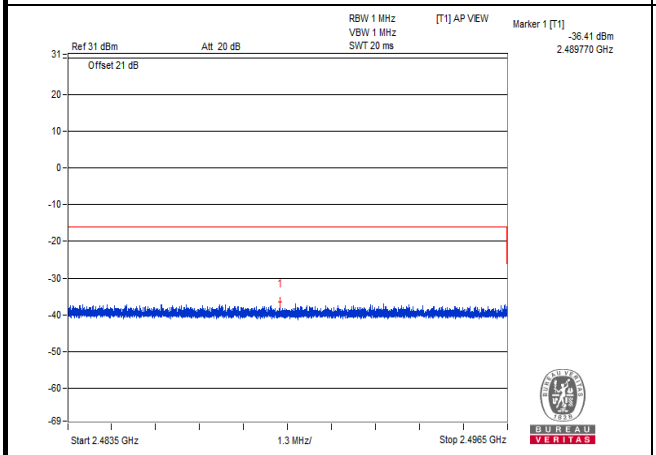
Vmax.

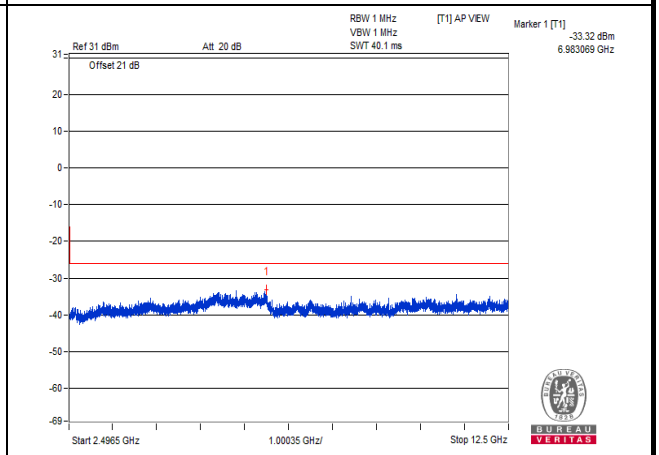






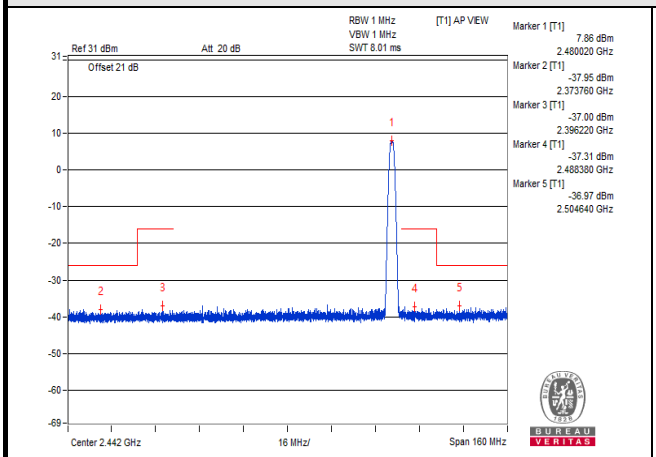


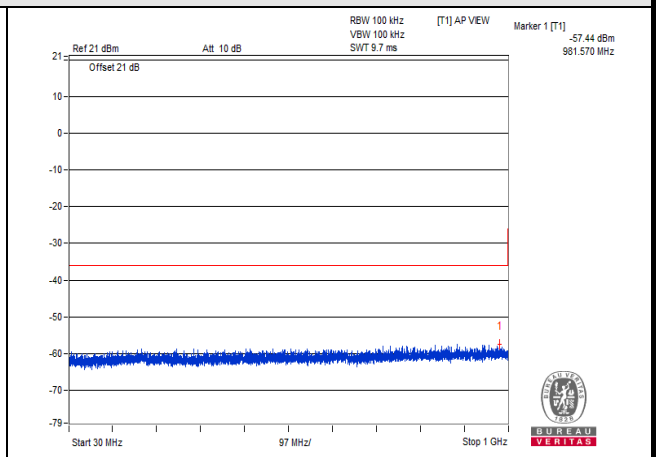


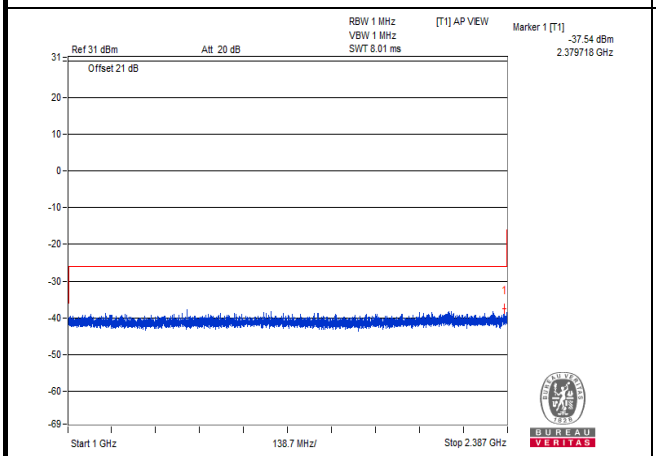


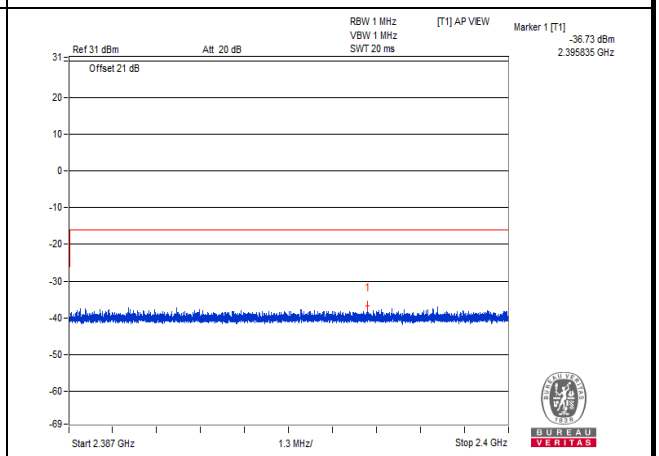
CH 39 (2480MHz)

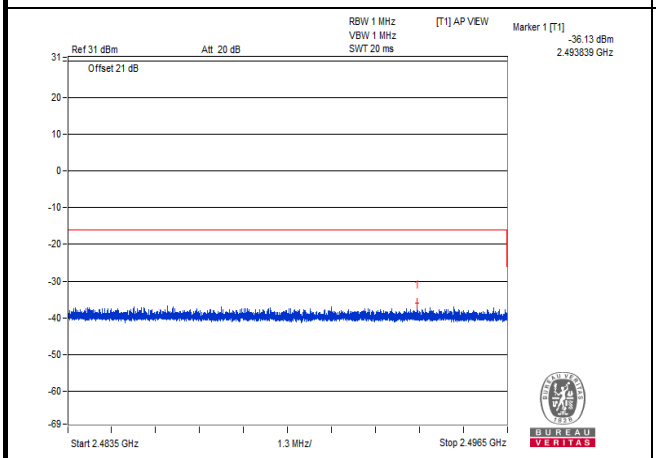
Vmin.

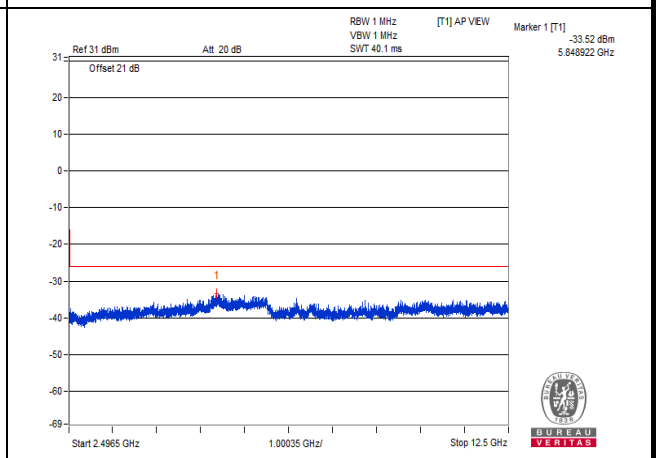












CH 39 (2480MHz)

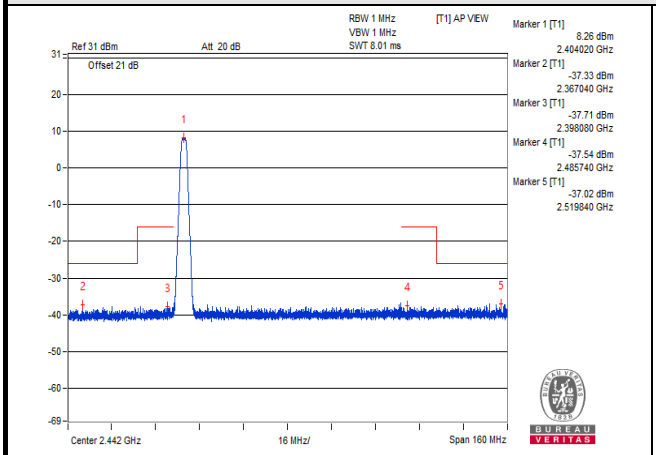
BT-LE 2M

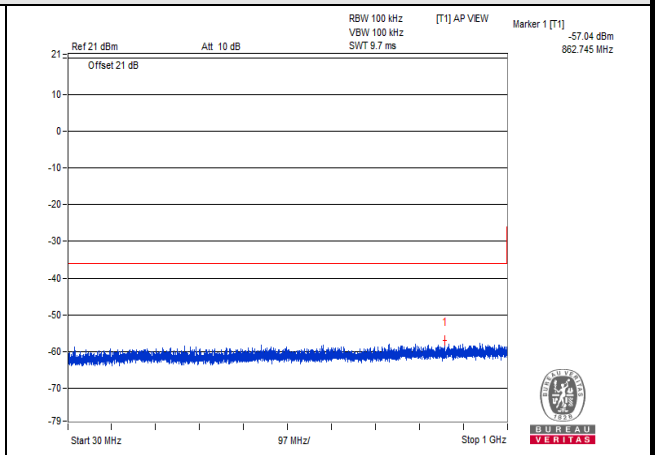
TEST CHANNEL		CH 1 (2404MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	862.745	0.001977	0.25	PASS
	1000MHz to 2387MHz	2344.349	0.175388	2.5	PASS
	2387MHz to 2400MHz	2393.236	0.205116	25	PASS
	2483.5MHz to 2496.5MHz	2484.200	0.249459	25	PASS
	2496.5MHz to 12500MHz	5860.176	0.423643	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	924.946	0.001832	0.25	PASS
	1000MHz to 2387MHz	1489.784	0.181134	2.5	PASS
	2387MHz to 2400MHz	2395.320	0.202302	25	PASS
	2483.5MHz to 2496.5MHz	2495.898	0.234963	25	PASS
	2496.5MHz to 12500MHz	6885.535	0.500035	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	872.202	0.001892	0.25	PASS
	1000MHz to 2387MHz	2372.609	0.161436	2.5	PASS
	2387MHz to 2400MHz	2396.743	0.213796	25	PASS
	2483.5MHz to 2496.5MHz	2494.082	0.205589	25	PASS
	2496.5MHz to 12500MHz	6800.505	0.518800	2.5	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	783.326	0.001858	0.25	PASS
	1000MHz to 2387MHz	2177.909	0.165577	2.5	PASS
	2387MHz to 2400MHz	2390.251	0.200447	25	PASS
	2483.5MHz to 2496.5MHz	2486.858	0.211836	25	PASS
	2496.5MHz to 12500MHz	6784.250	0.462381	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	888.450	0.002046	0.25	PASS
	1000MHz to 2387MHz	2267.024	0.176604	2.5	PASS
	2387MHz to 2400MHz	2389.353	0.179061	25	PASS
	2483.5MHz to 2496.5MHz	2494.251	0.200909	25	PASS
	2496.5MHz to 12500MHz	6809.258	0.543250	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	955.380	0.001786	0.25	PASS
	1000MHz to 2387MHz	1715.345	0.165196	2.5	PASS
	2387MHz to 2400MHz	2388.488	0.199526	25	PASS
	2483.5MHz to 2496.5MHz	2485.750	0.209411	25	PASS
	2496.5MHz to 12500MHz	5895.189	0.456037	2.5	PASS

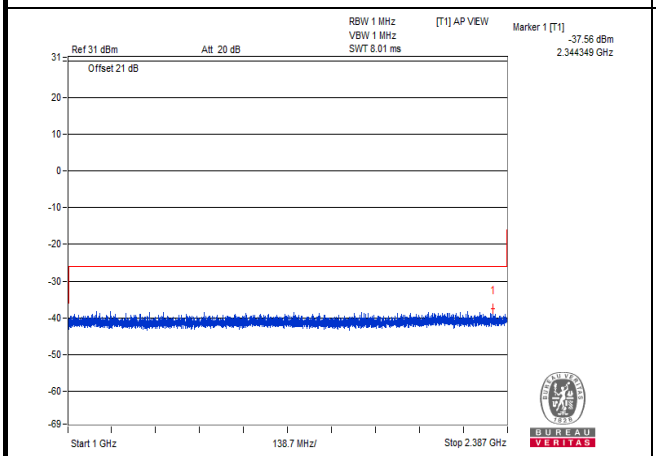
TEST CHANNEL		CH 38 (2478MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	970.415	0.001919	0.25	PASS
	1000MHz to 2387MHz	1526.193	0.169044	2.5	PASS
	2387MHz to 2400MHz	2394.488	0.194536	25	PASS
	2483.5MHz to 2496.5MHz	2483.600	0.211349	25	PASS
	2496.5MHz to 12500MHz	6682.964	0.462381	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	766.593	0.001820	0.25	PASS
	1000MHz to 2387MHz	2053.946	0.147911	2.5	PASS
	2387MHz to 2400MHz	2395.245	0.218776	25	PASS
	2483.5MHz to 2496.5MHz	2493.277	0.206538	25	PASS
	2496.5MHz to 12500MHz	6995.574	0.562341	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	718.821	0.002203	0.25	PASS
	1000MHz to 2387MHz	2195.767	0.167880	2.5	PASS
	2387MHz to 2400MHz	2391.200	0.187499	25	PASS
	2483.5MHz to 2496.5MHz	2493.289	0.206063	25	PASS
	2496.5MHz to 12500MHz	5757.641	0.451856	2.5	PASS

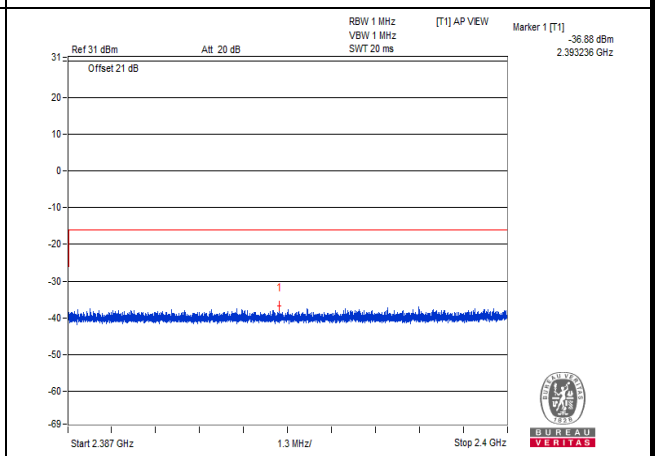
NOTE: 1. The spectrum plots are attached on the following pages.

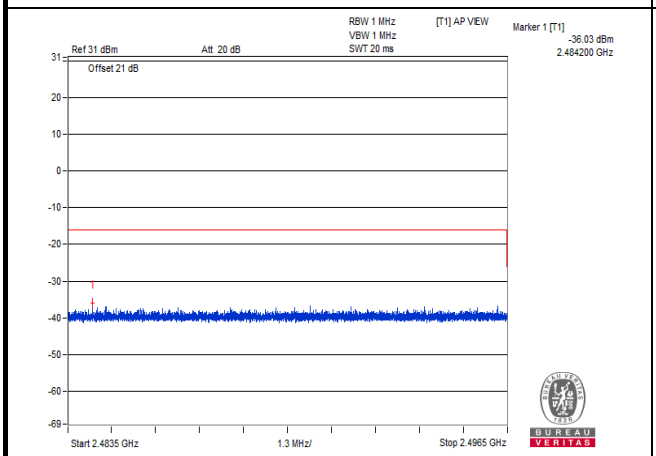
Vnormal

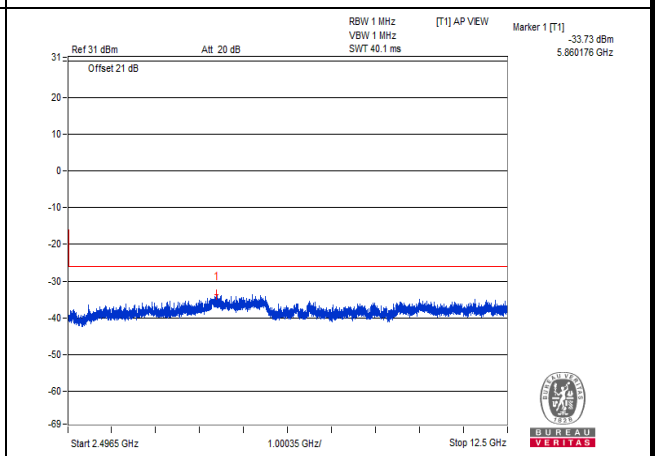






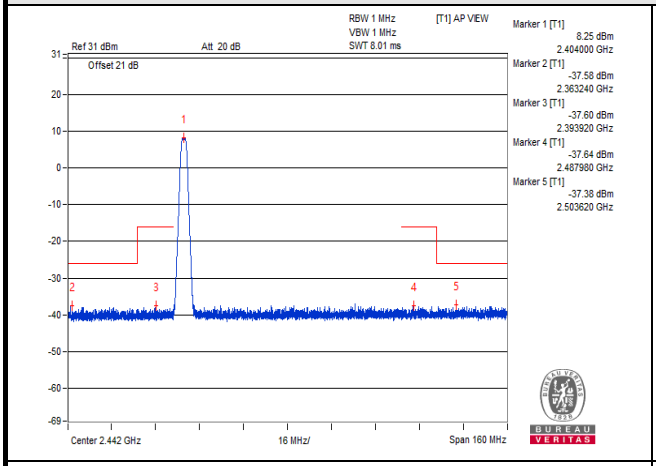


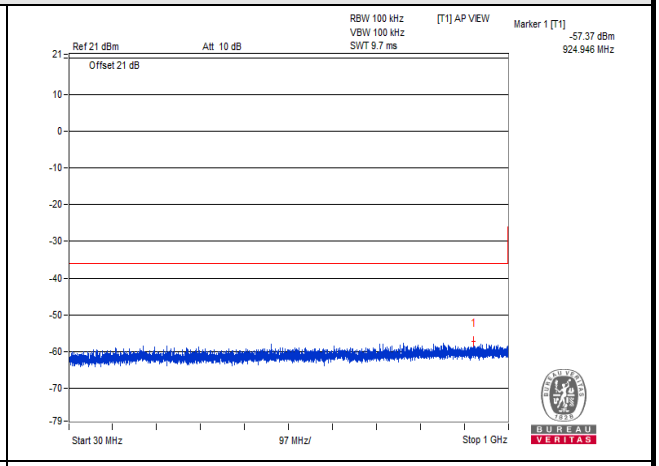


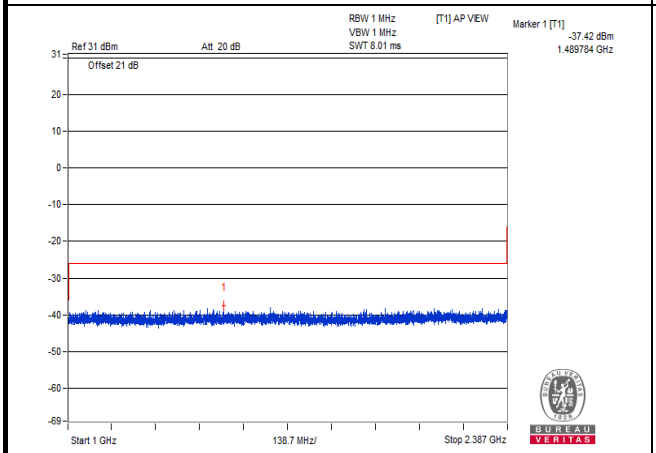


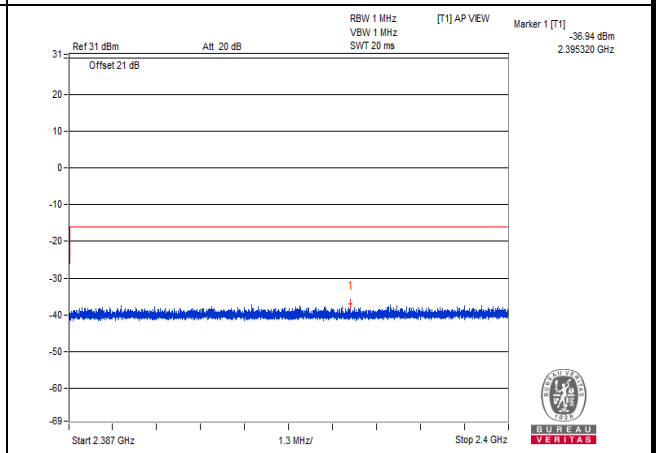
CH 1 (2404MHz)

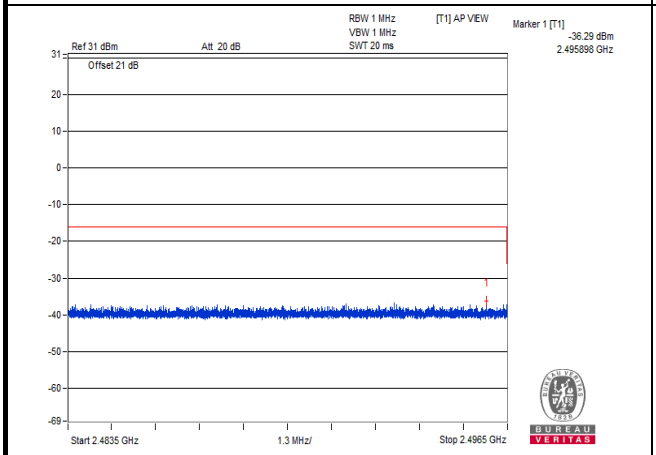
Vmax.

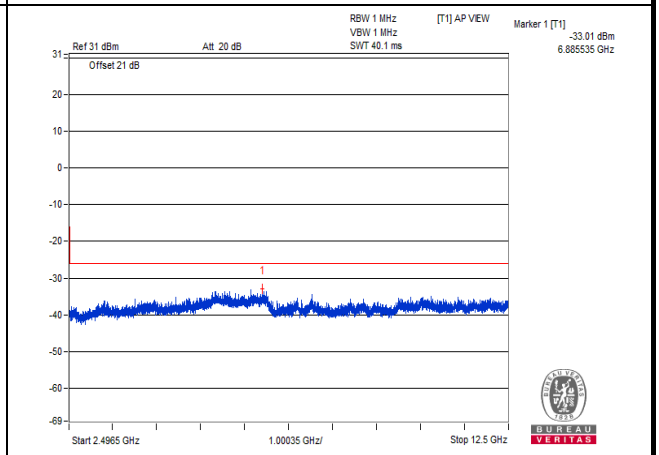






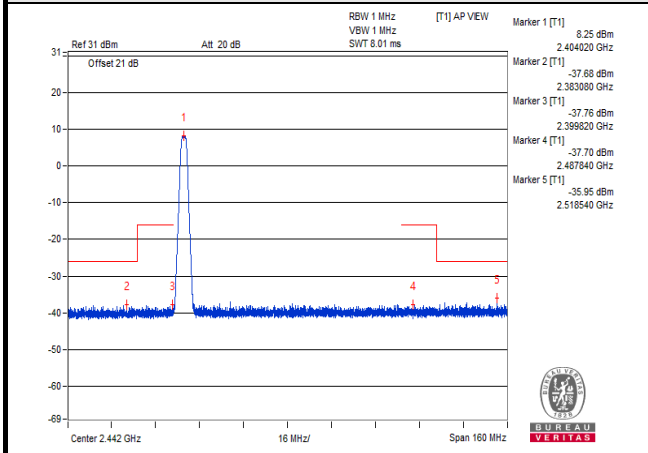


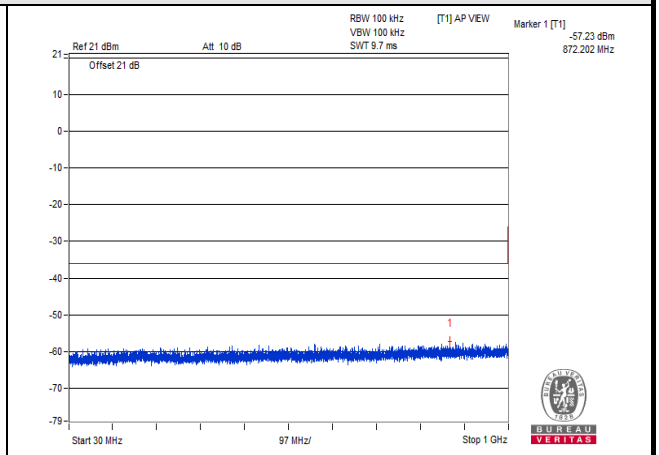


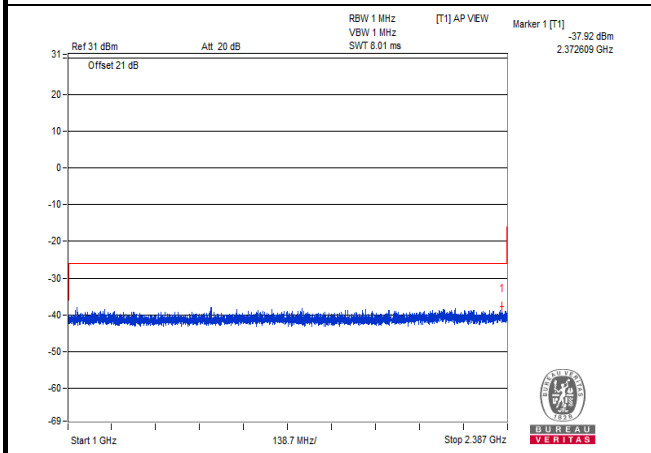


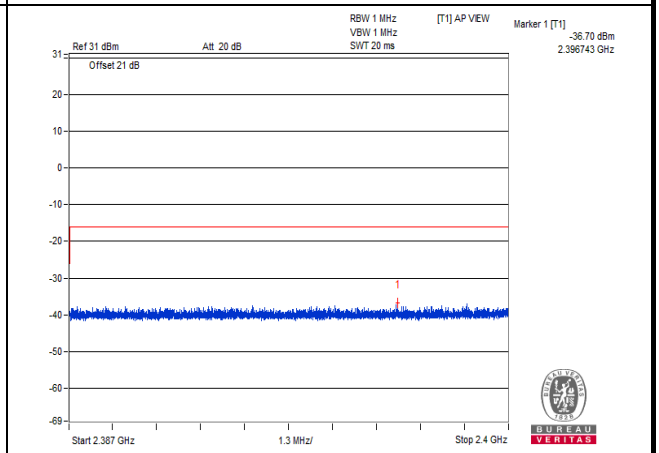
CH 1 (2404MHz)

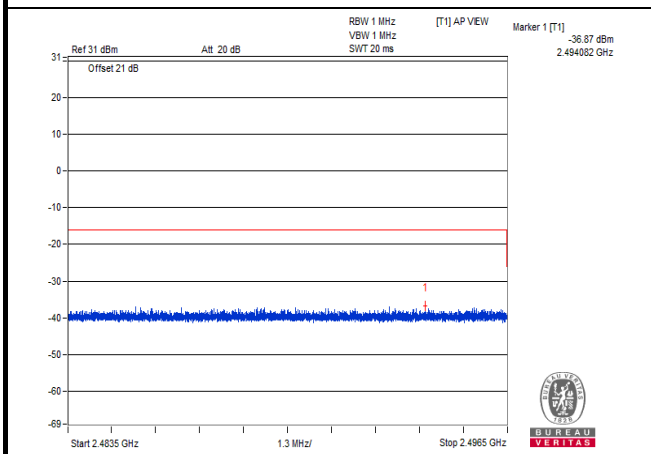
Vmin.

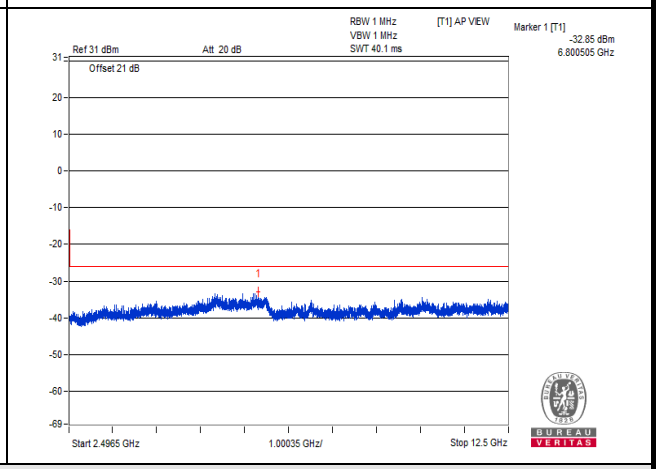






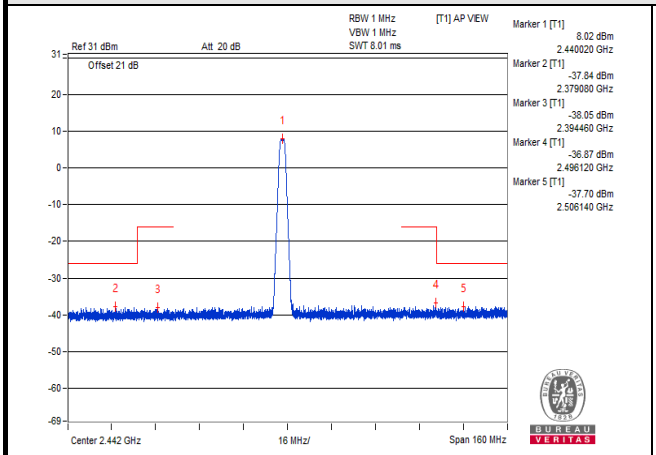


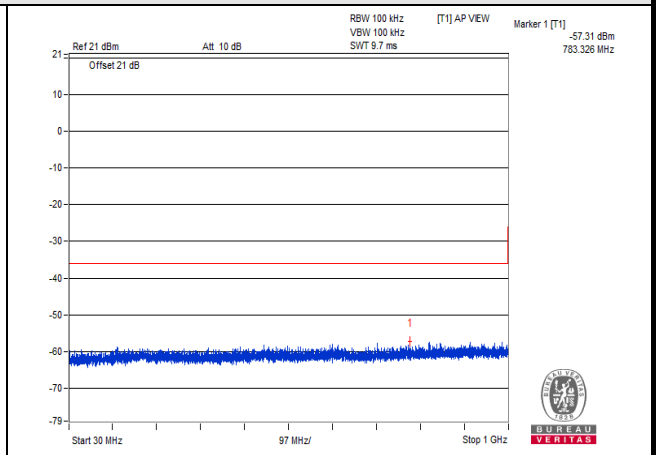


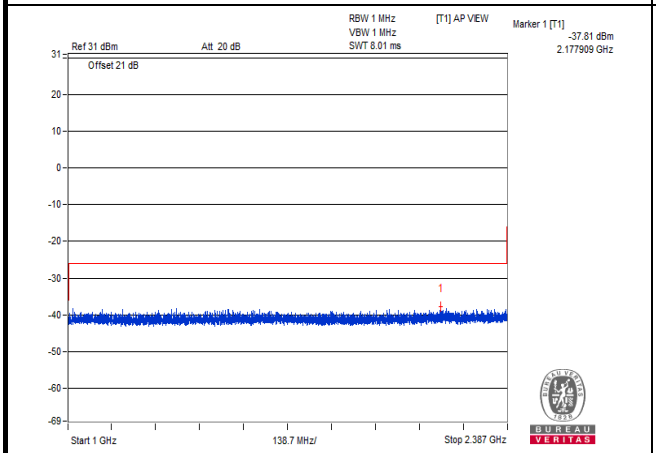


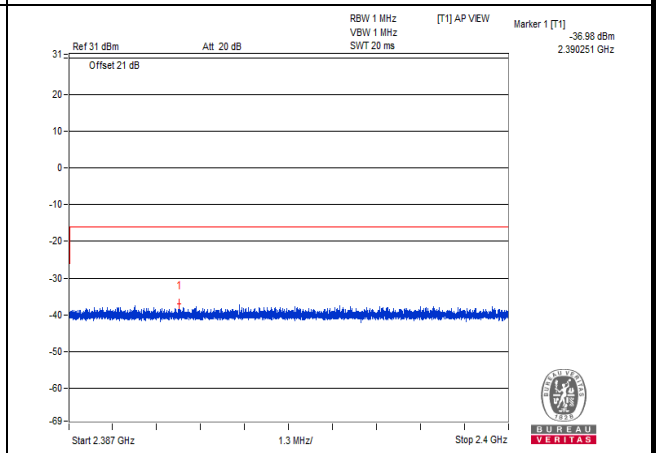
CH 1 (2404MHz)

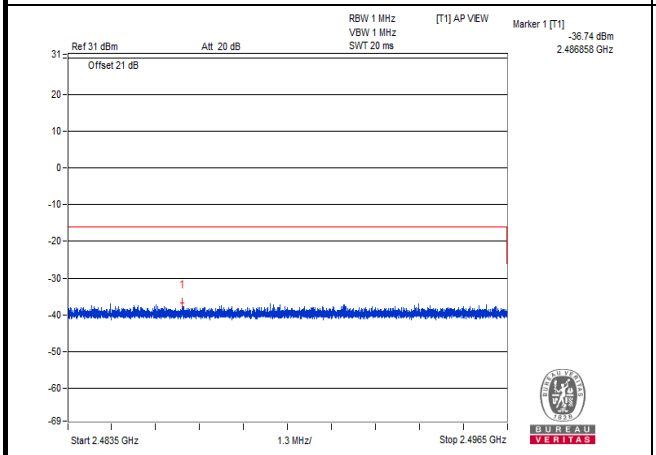
Vnormal

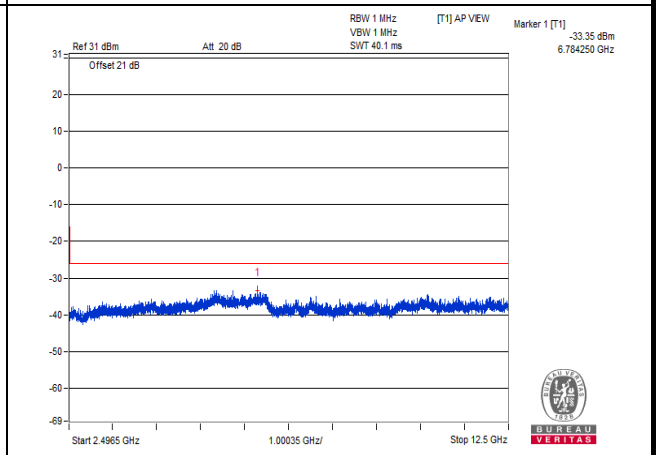






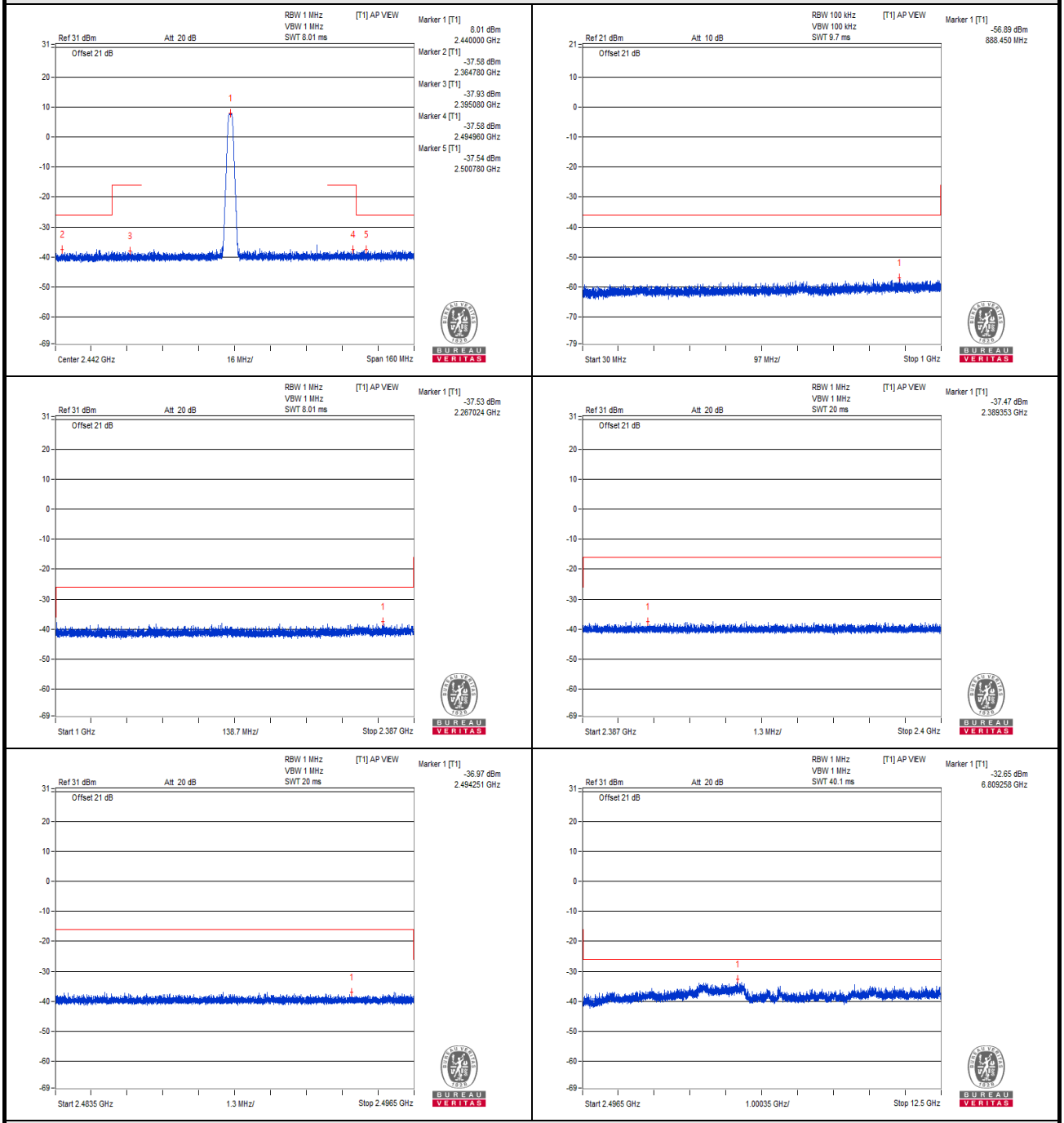






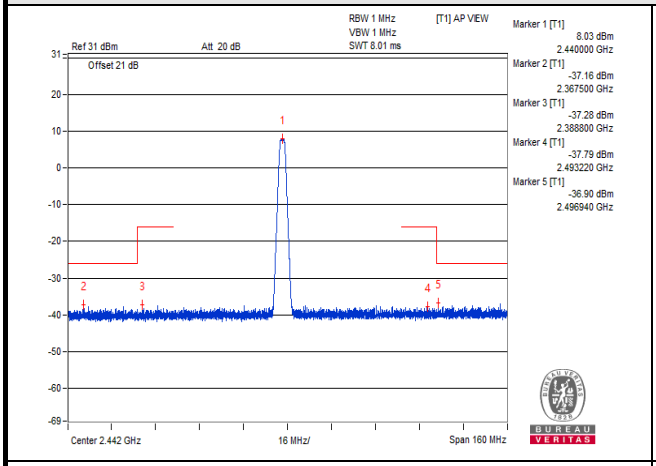
CH 19 (2440MHz)

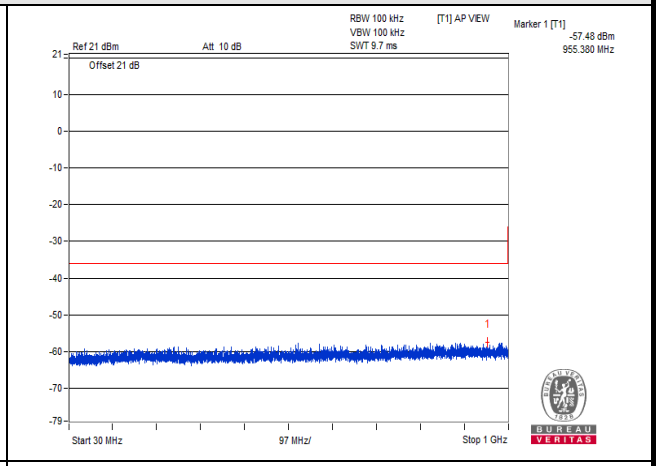
Vmax.

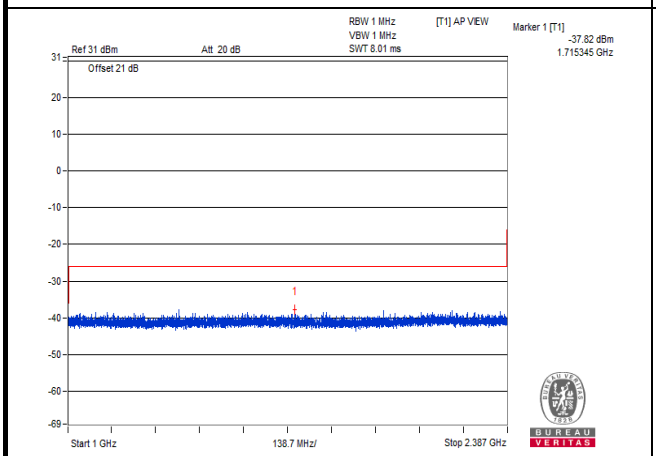


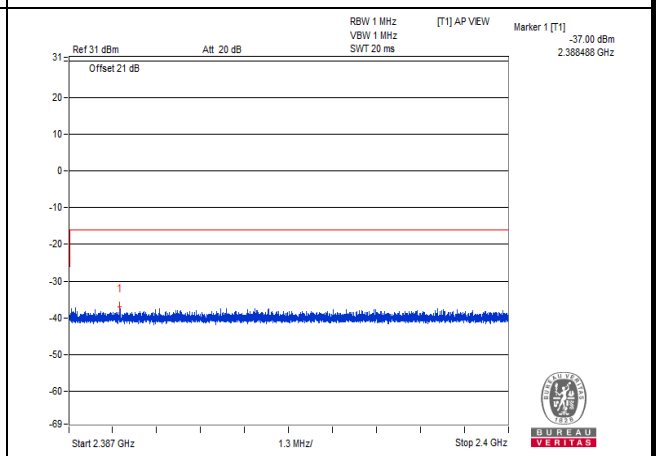
CH 19 (2440MHz)

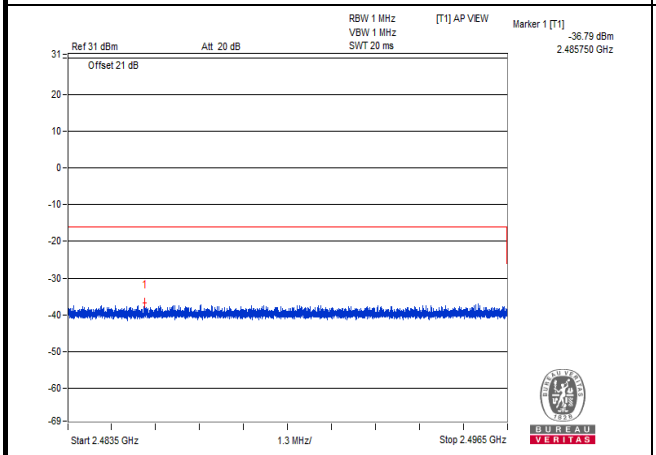
Vmin.

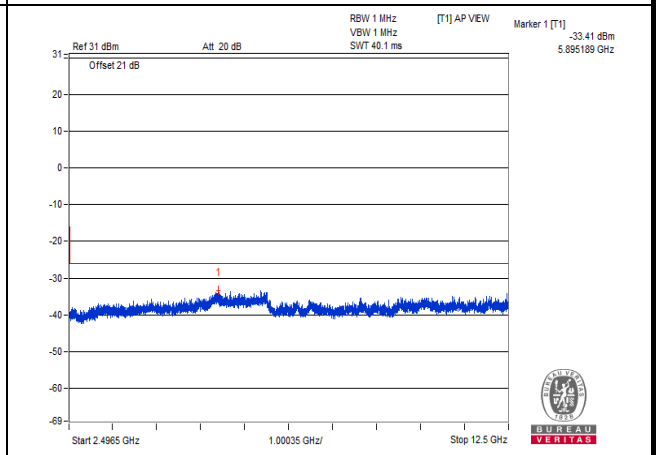






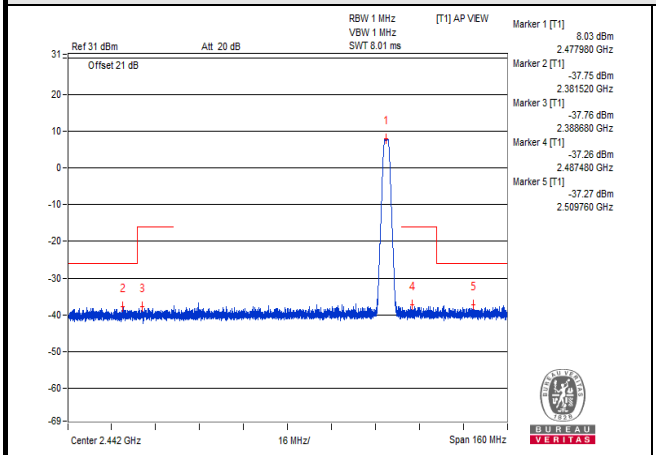


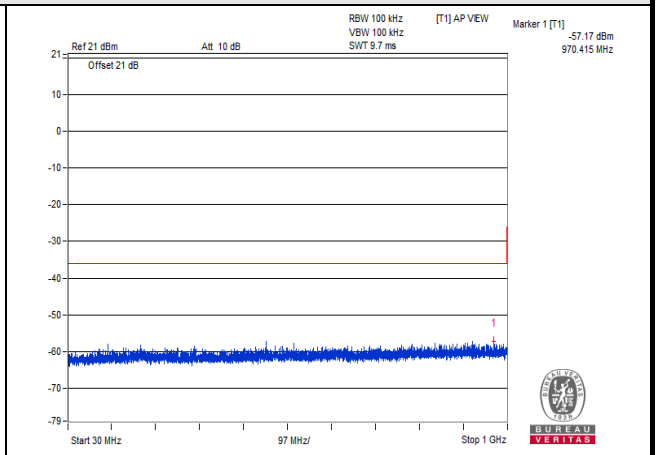


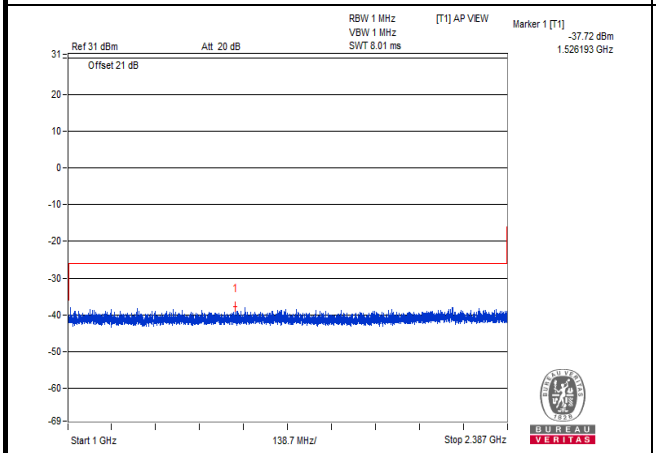


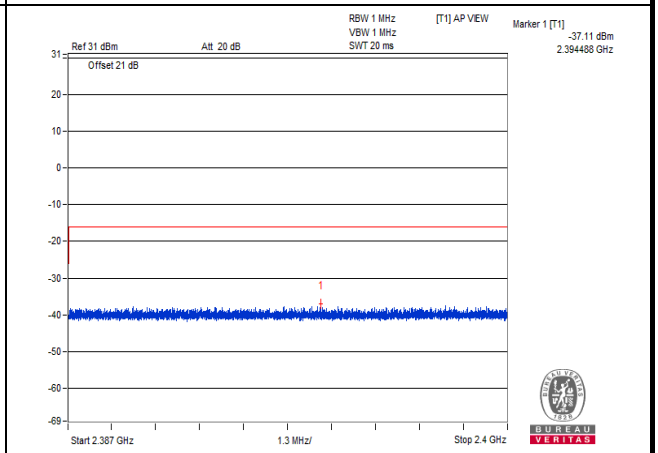
CH 19 (2440MHz)

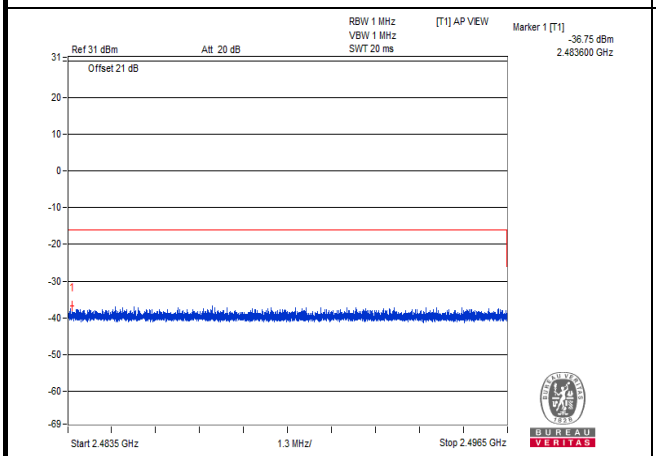
Vnormal

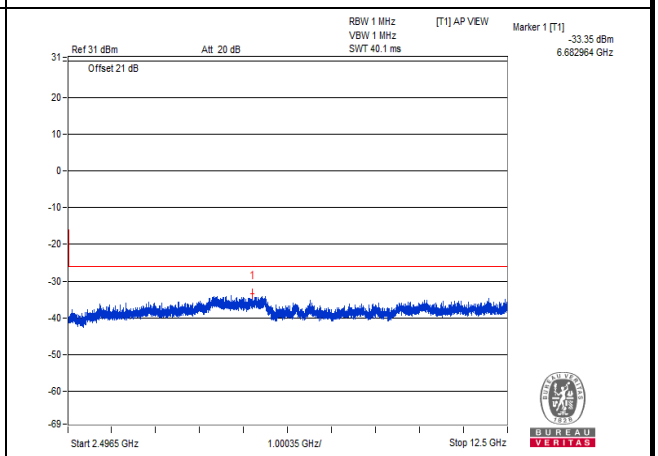






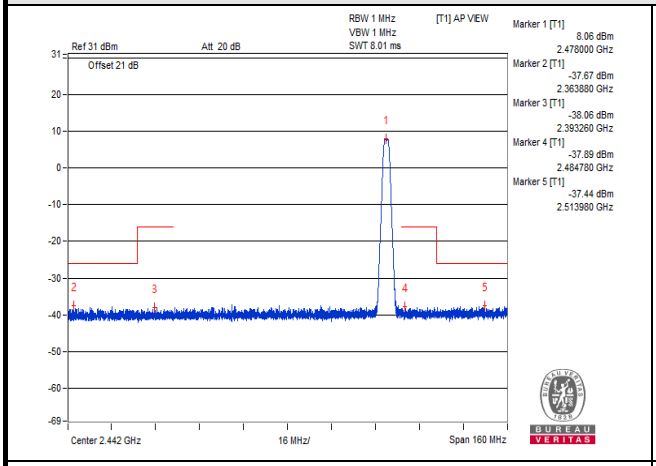


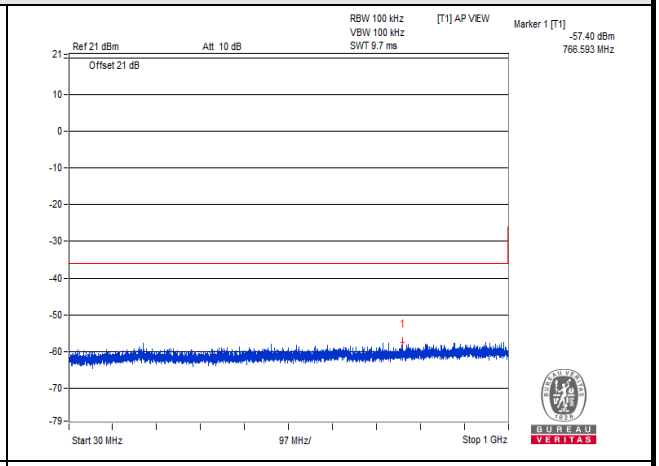


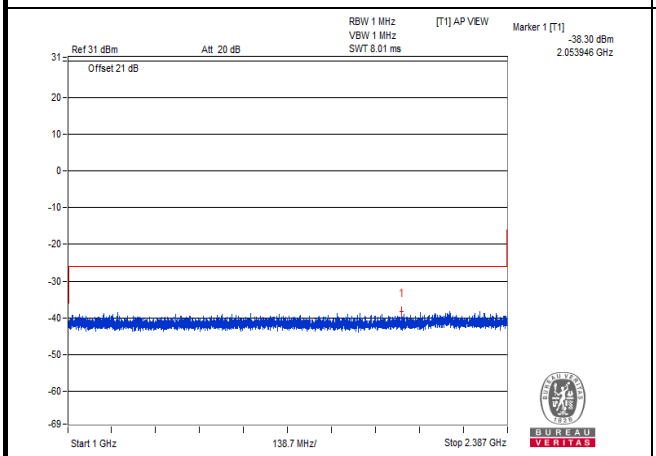


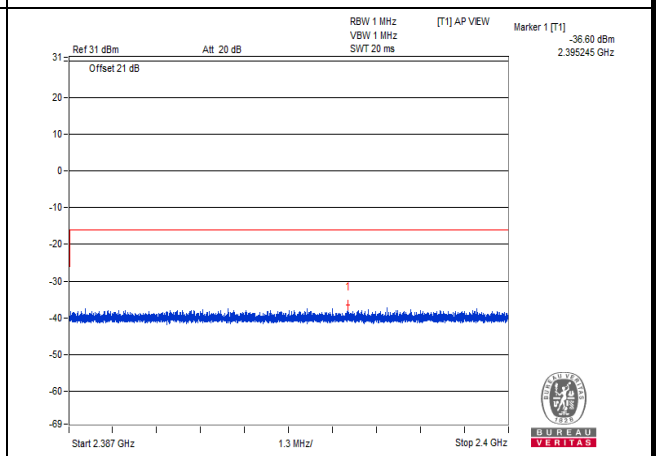
CH 38 (2478MHz)

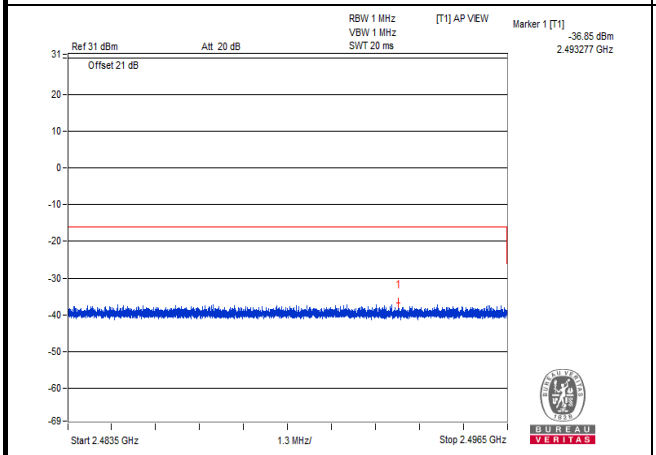
Vmax.

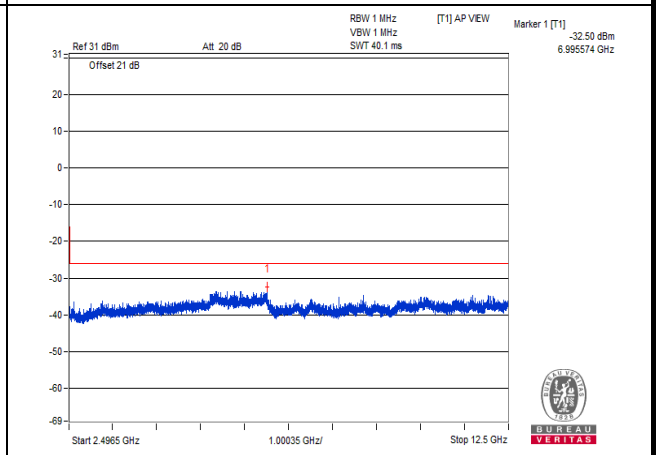






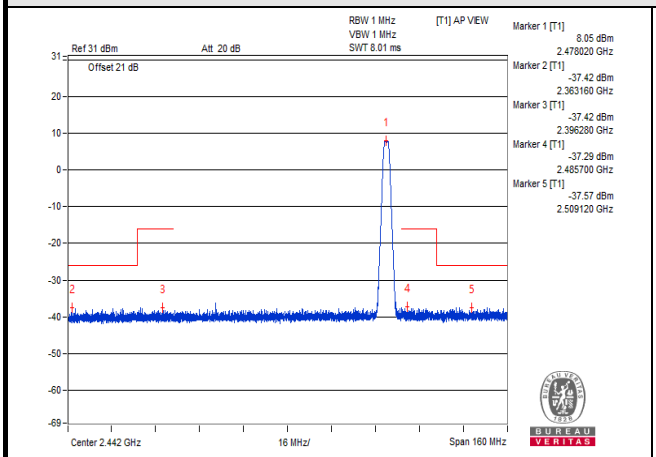


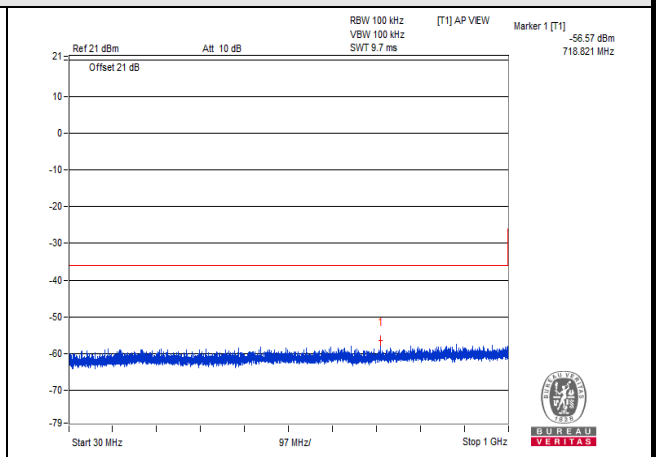


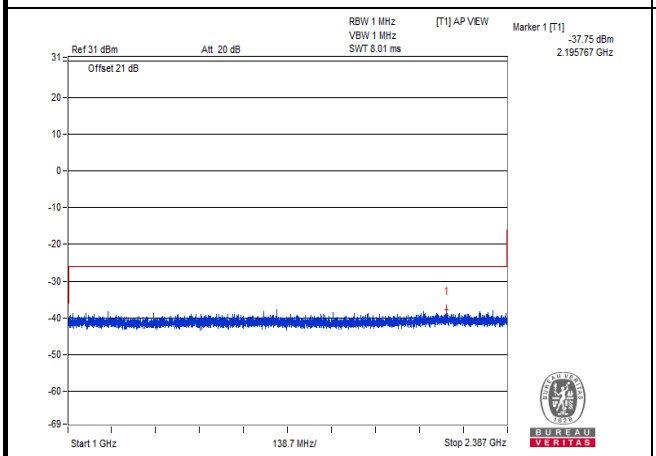


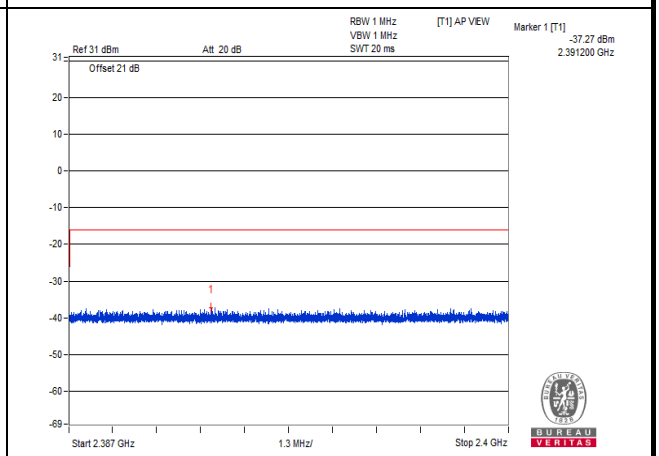
CH 38 (2478MHz)

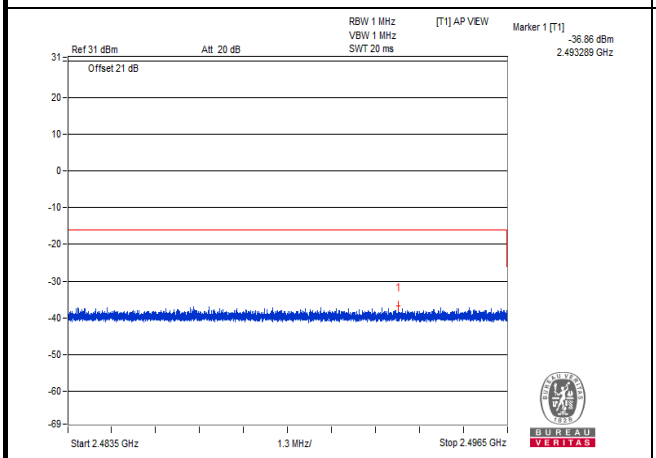
Vmin.

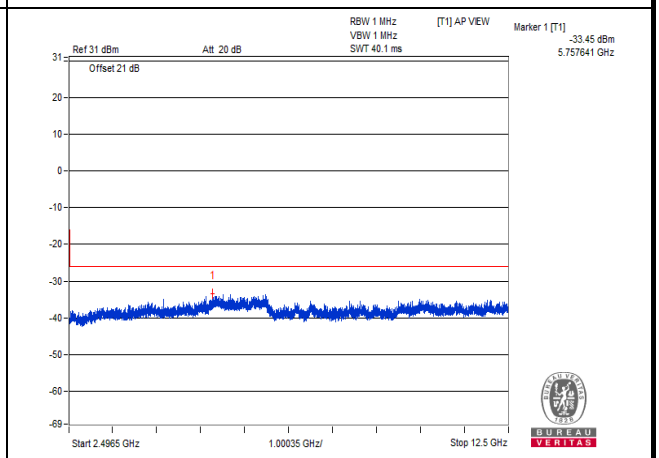












CH 38 (2478MHz)

4.3.4 Test Results (Mode 2)

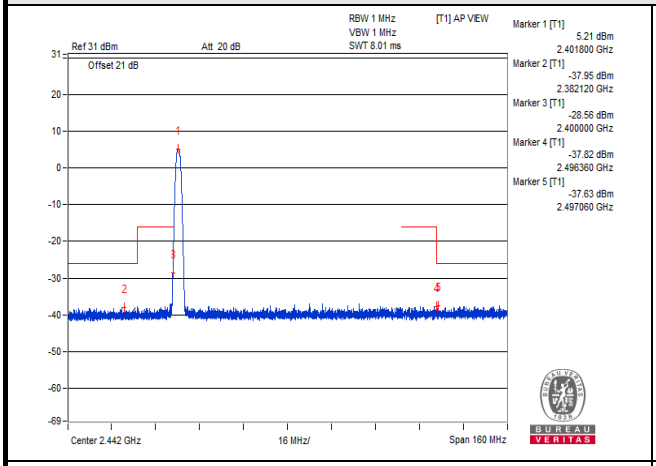
BT-LE 1M

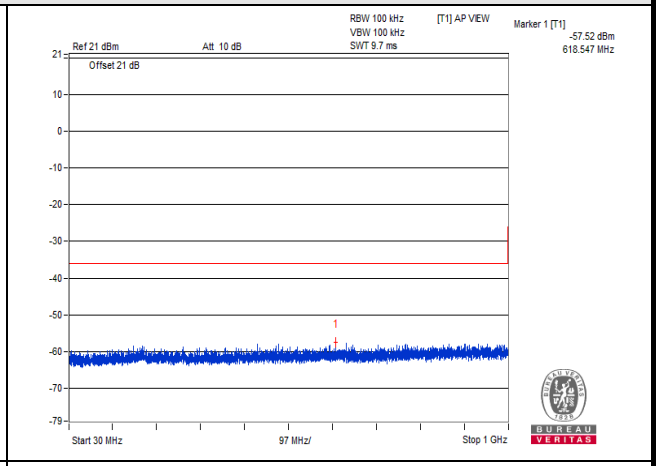
TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	618.547	0.001770	0.25	PASS
	1000MHz to 2387MHz	2177.563	0.181134	2.5	PASS
	2387MHz to 2400MHz	2400.000	1.686553	25	PASS
	2483.5MHz to 2496.5MHz	2486.031	0.198153	25	PASS
	2496.5MHz to 12500MHz	6843.020	0.524807	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	942.891	0.002388	0.25	PASS
	1000MHz to 2387MHz	1602.998	0.167880	2.5	PASS
	2387MHz to 2400MHz	2399.998	1.717908	25	PASS
	2483.5MHz to 2496.5MHz	2493.222	0.237684	25	PASS
	2496.5MHz to 12500MHz	5830.166	0.521195	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	777.991	0.001977	0.25	PASS
	1000MHz to 2387MHz	1861.153	0.153462	2.5	PASS
	2387MHz to 2400MHz	2400.000	1.803018	25	PASS
	2483.5MHz to 2496.5MHz	2494.855	0.224388	25	PASS
	2496.5MHz to 12500MHz	5806.408	0.481948	2.5	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	779.810	0.001746	0.25	PASS
	1000MHz to 2387MHz	2380.238	0.159588	2.5	PASS
	2387MHz to 2400MHz	2398.375	0.190985	25	PASS
	2483.5MHz to 2496.5MHz	2493.123	0.218273	25	PASS
	2496.5MHz to 12500MHz	5836.418	0.501187	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	940.830	0.001936	0.25	PASS
	1000MHz to 2387MHz	2206.169	0.153815	2.5	PASS
	2387MHz to 2400MHz	2390.562	0.191426	25	PASS
	2483.5MHz to 2496.5MHz	2488.514	0.230144	25	PASS
	2496.5MHz to 12500MHz	5902.691	0.423643	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	632.491	0.001866	0.25	PASS
	1000MHz to 2387MHz	1020.111	0.168655	2.5	PASS
	2387MHz to 2400MHz	2392.648	0.202302	25	PASS
	2483.5MHz to 2496.5MHz	2489.922	0.211349	25	PASS
	2496.5MHz to 12500MHz	5837.669	0.452898	2.5	PASS

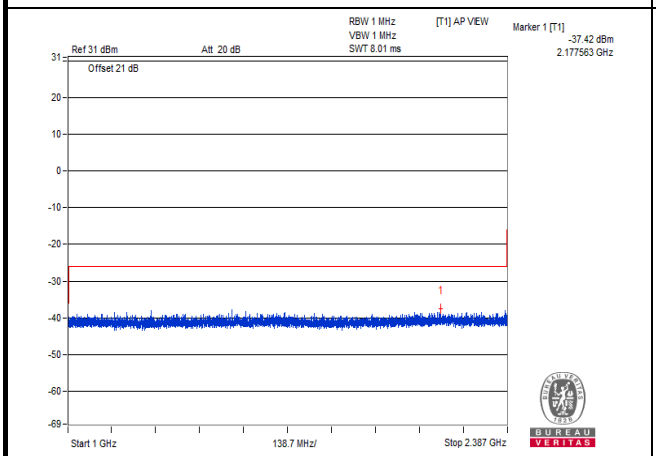
TEST CHANNEL		CH 39 (2480MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	901.545	0.001972	0.25	PASS
	1000MHz to 2387MHz	2235.990	0.147911	2.5	PASS
	2387MHz to 2400MHz	2394.819	0.199067	25	PASS
	2483.5MHz to 2496.5MHz	2496.295	0.205116	25	PASS
	2496.5MHz to 12500MHz	6973.066	0.500035	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	934.403	0.001734	0.25	PASS
	1000MHz to 2387MHz	2363.594	0.172187	2.5	PASS
	2387MHz to 2400MHz	2394.390	0.215278	25	PASS
	2483.5MHz to 2496.5MHz	2484.106	0.206063	25	PASS
	2496.5MHz to 12500MHz	6984.320	0.591562	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	612.606	0.002065	0.25	PASS
	1000MHz to 2387MHz	2127.284	0.148594	2.5	PASS
	2387MHz to 2400MHz	2397.114	0.192752	25	PASS
	2483.5MHz to 2496.5MHz	2494.977	0.244906	25	PASS
	2496.5MHz to 12500MHz	6948.057	0.452898	2.5	PASS

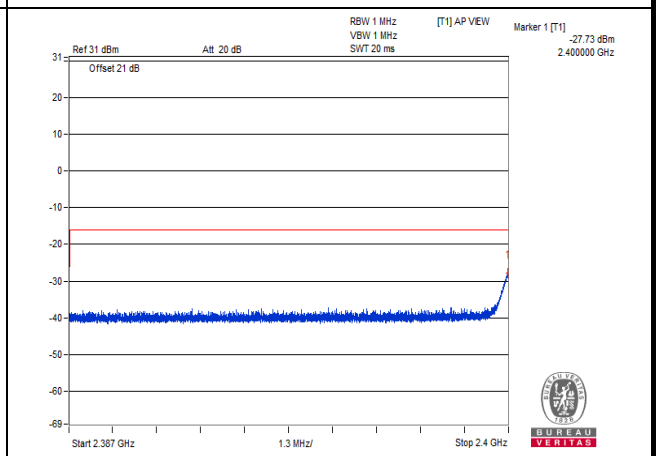
NOTE: 1. The spectrum plots are attached on the following pages.

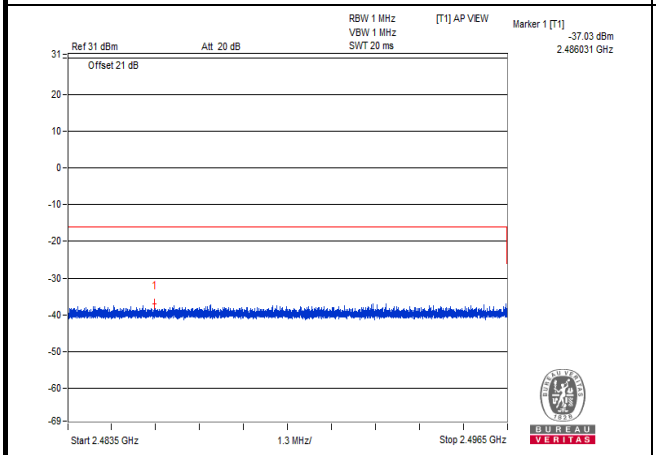
Vnormal

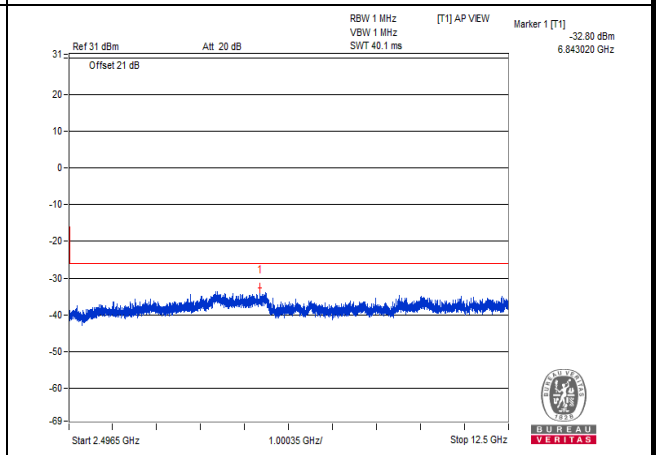






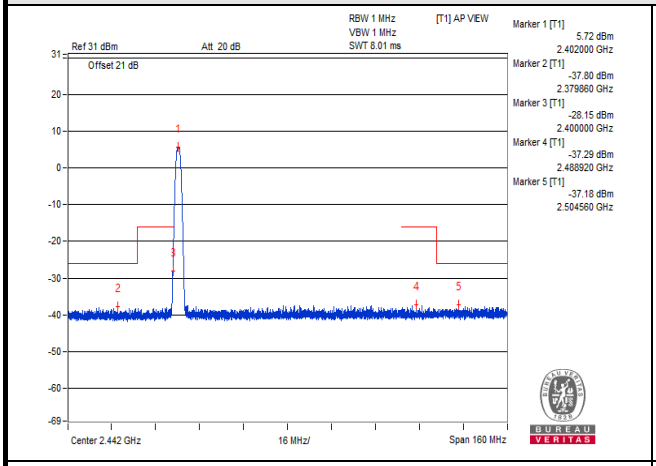


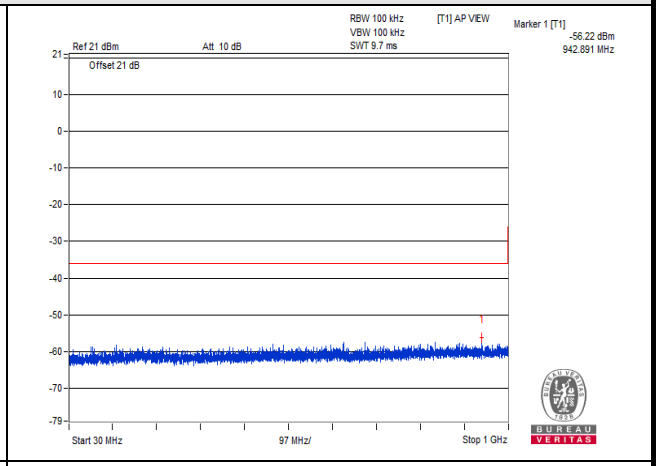


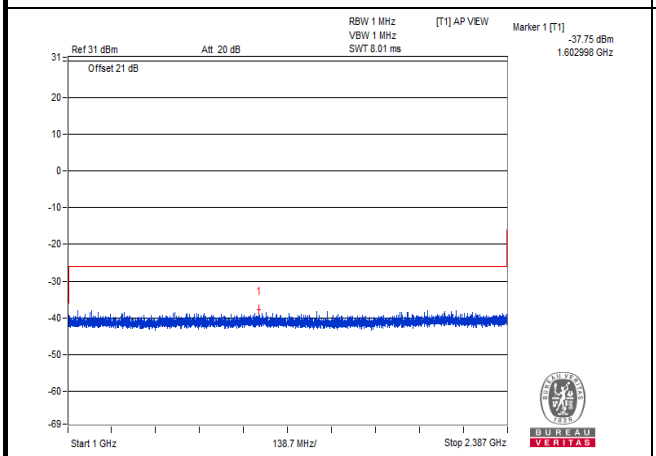


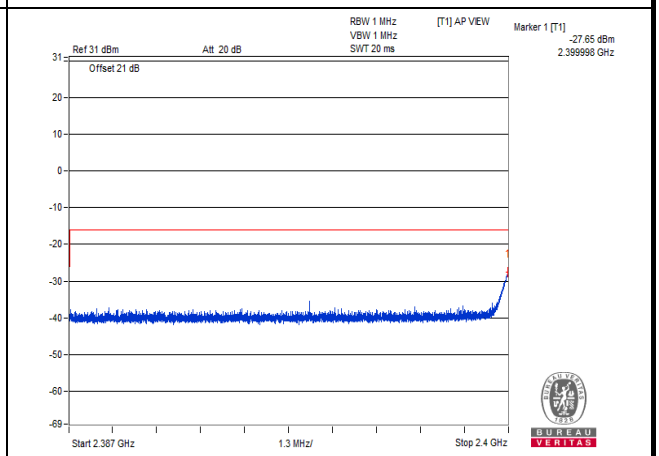
CH 0 (2402MHz)

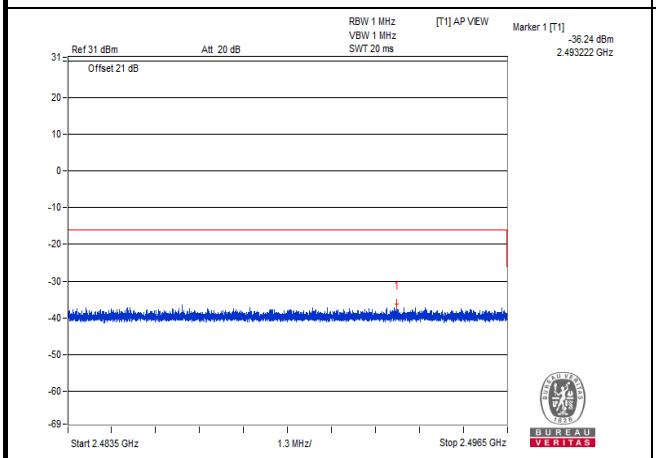
Vmax.

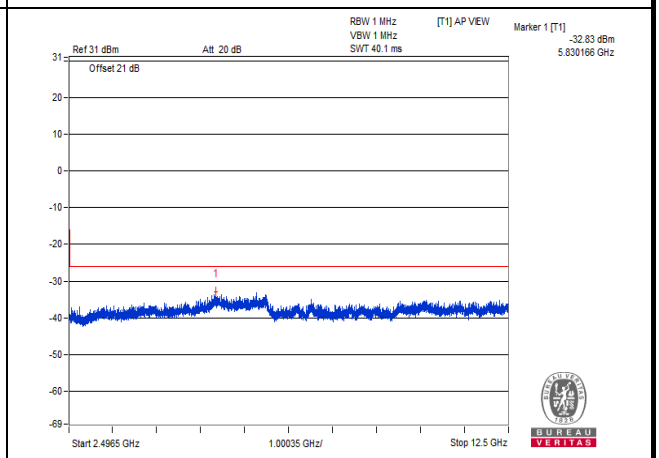






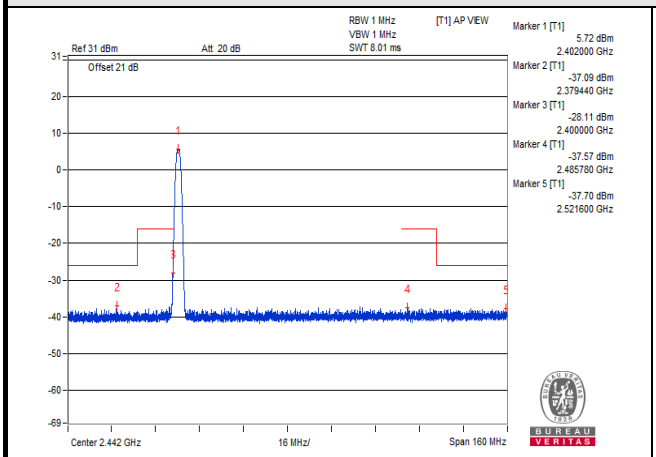


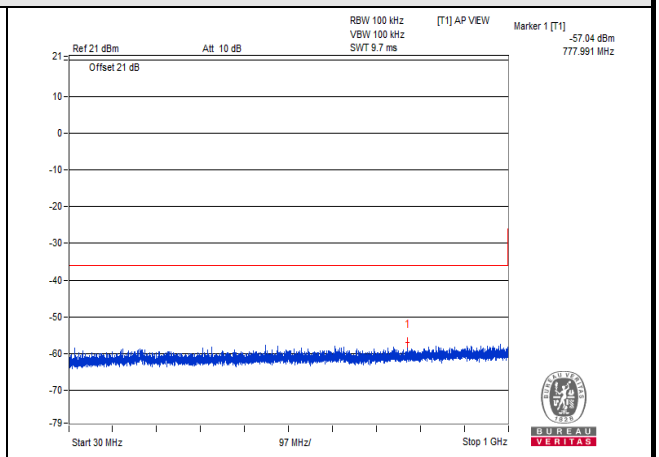


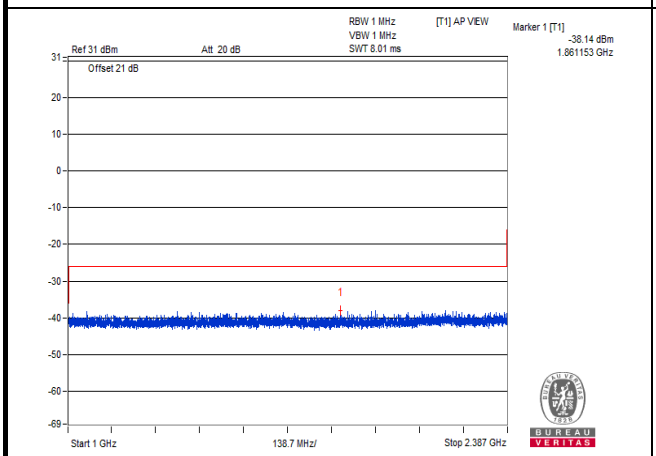


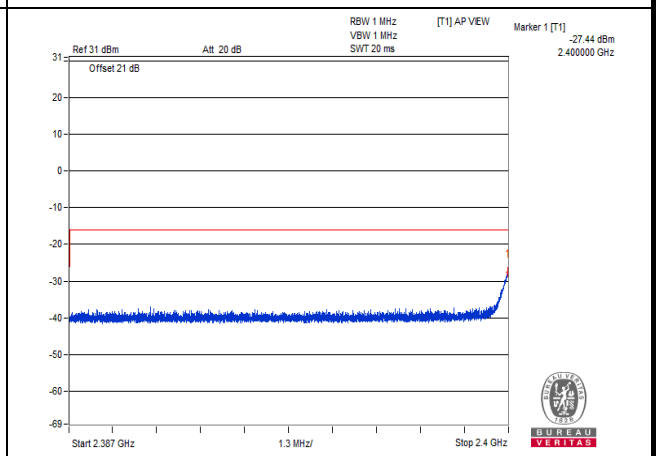
CH 0 (2402MHz)

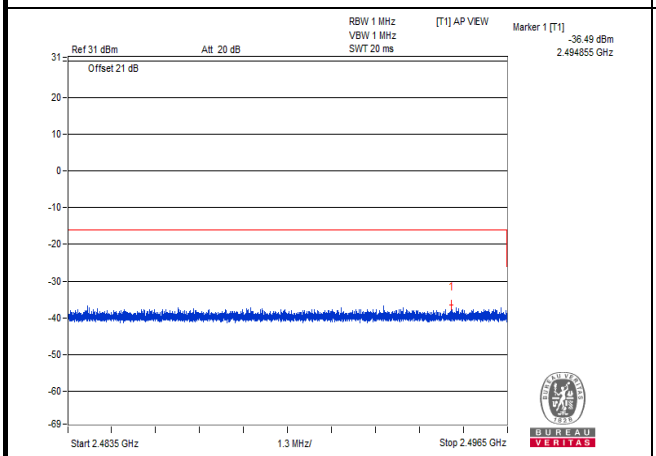
Vmin.

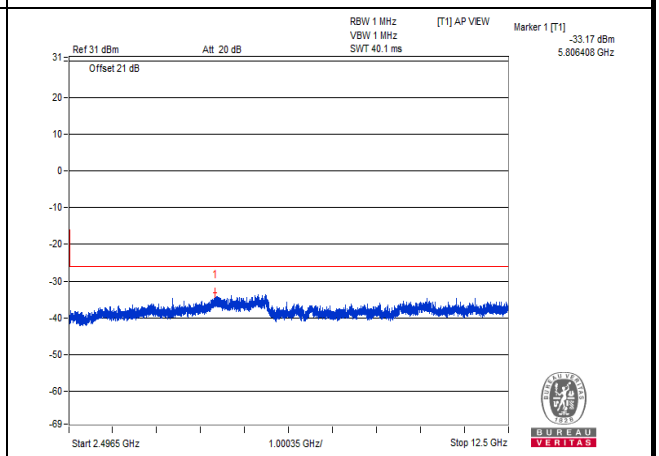






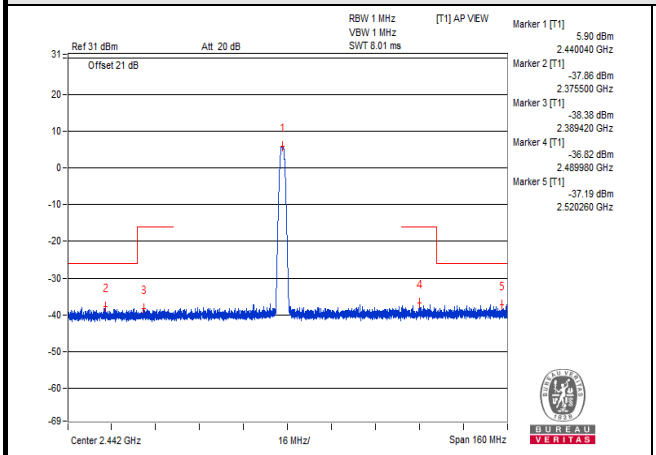


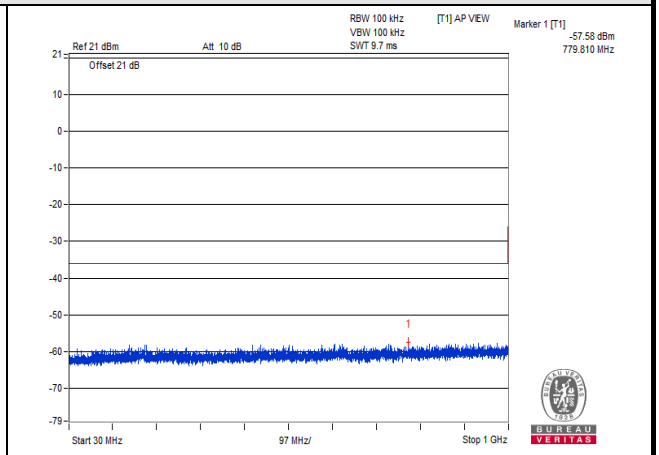


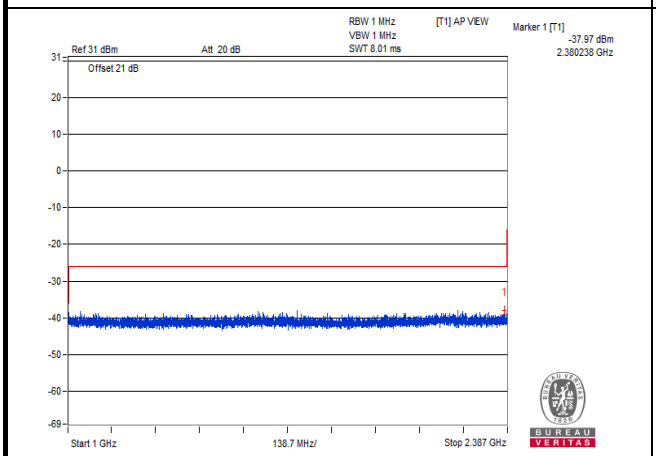


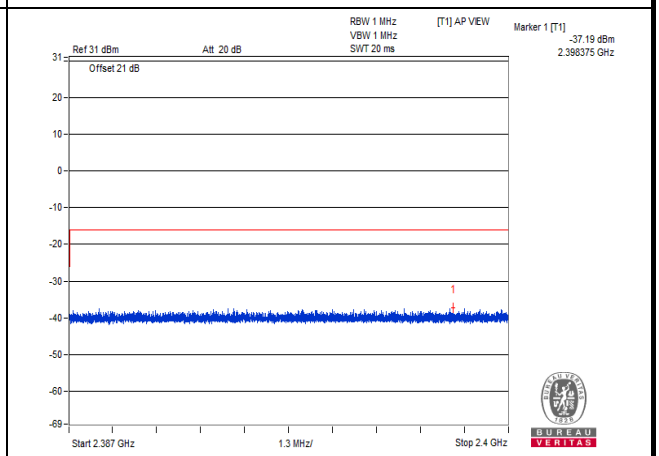
CH 0 (2402MHz)

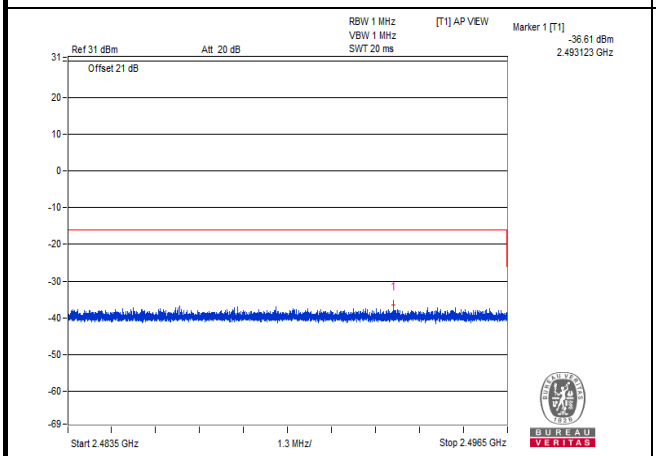
Vnormal

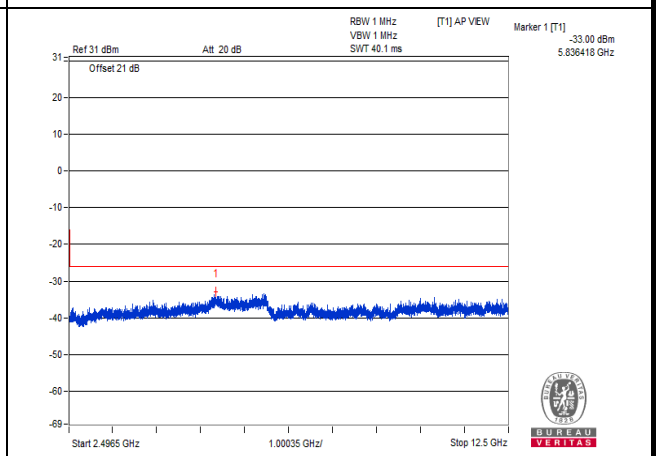






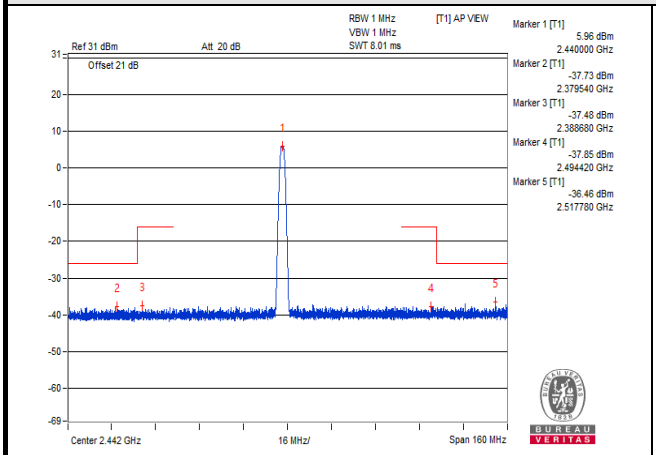


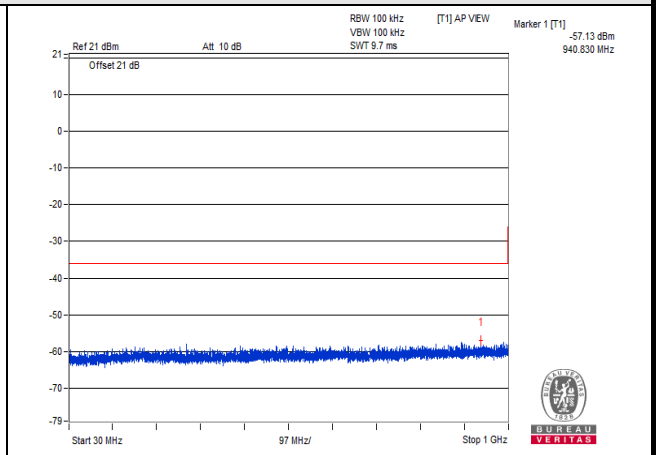


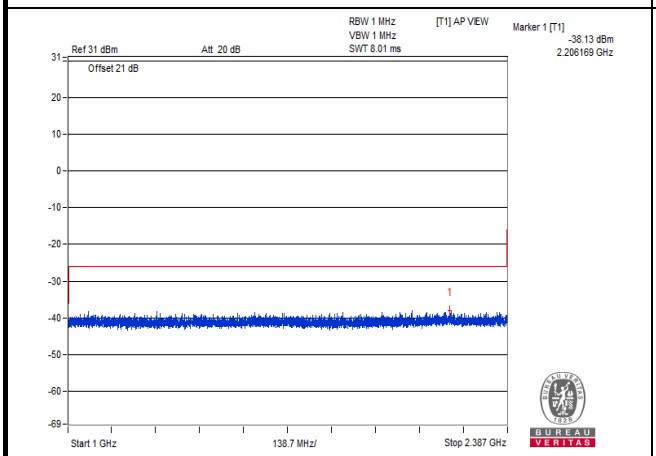


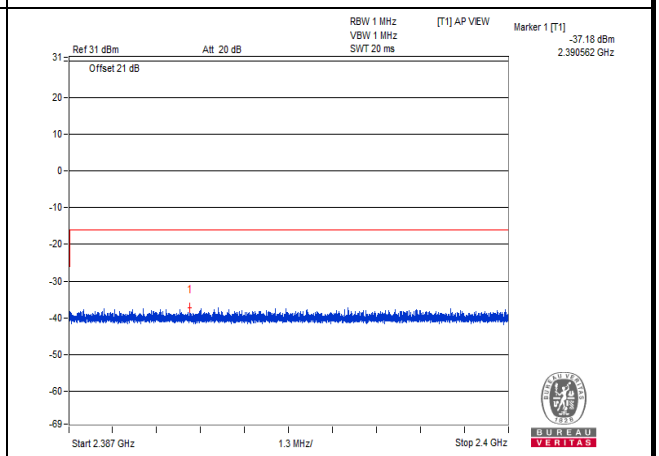
CH 19 (2440MHz)

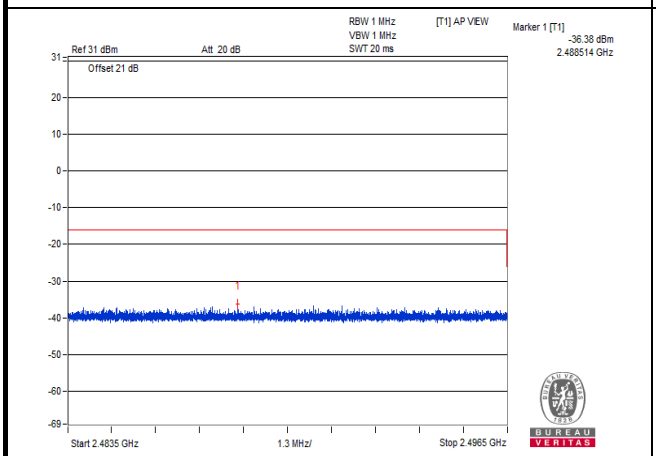
Vmax.

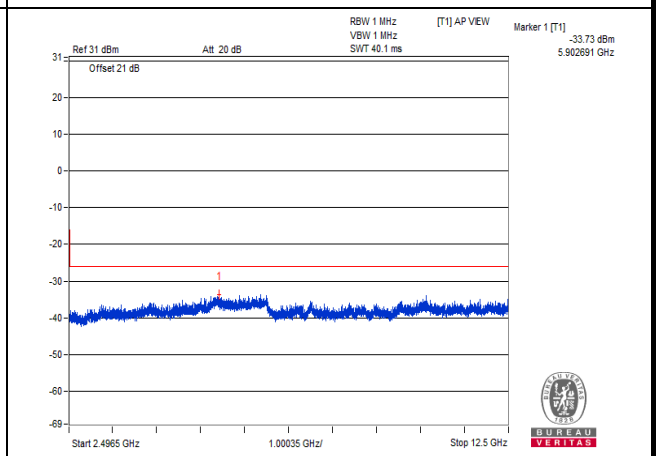






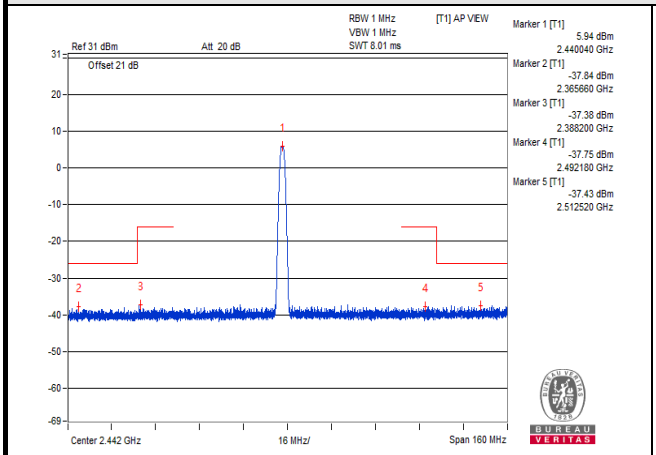


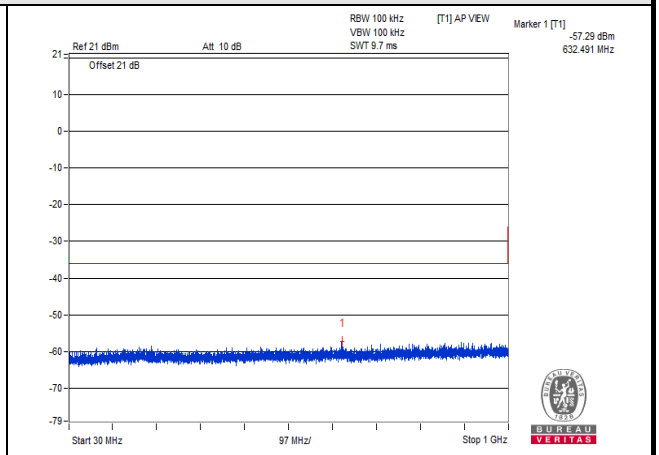


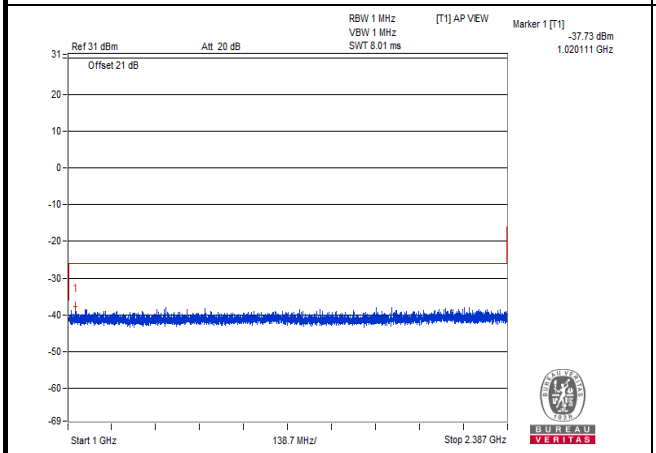


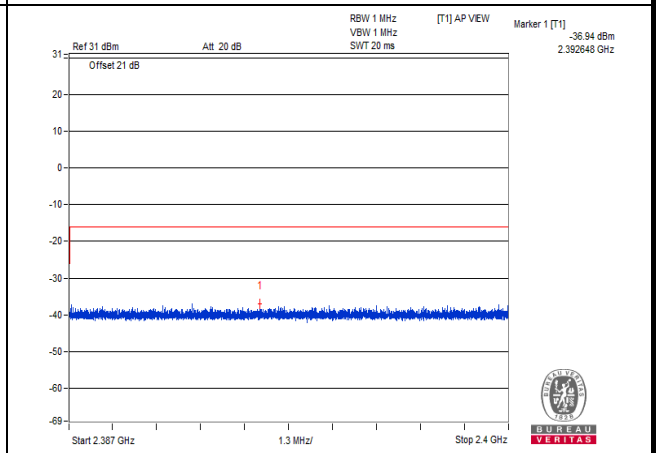
CH 19 (2440MHz)

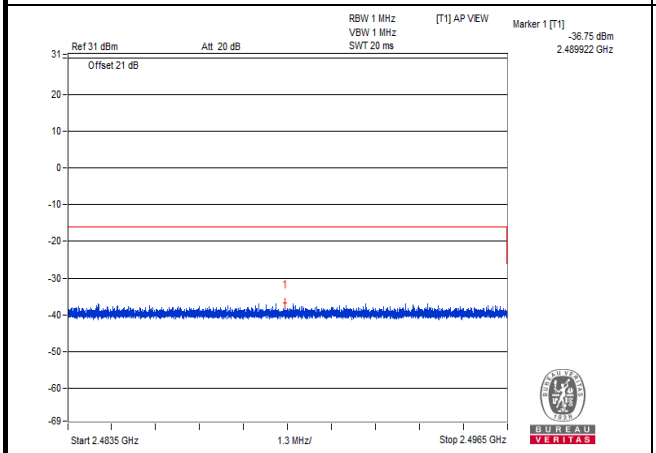
Vmin.

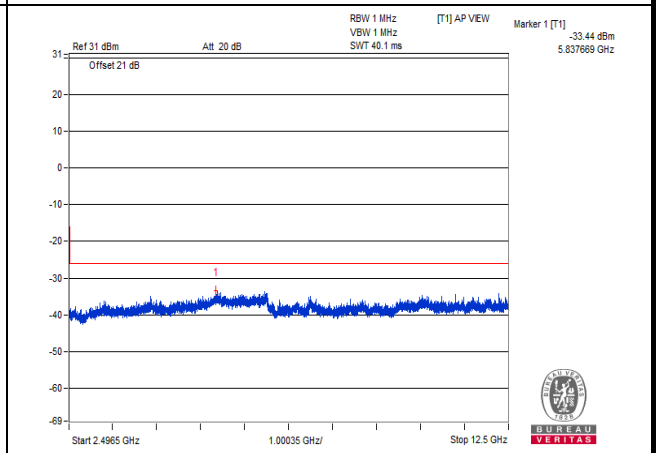






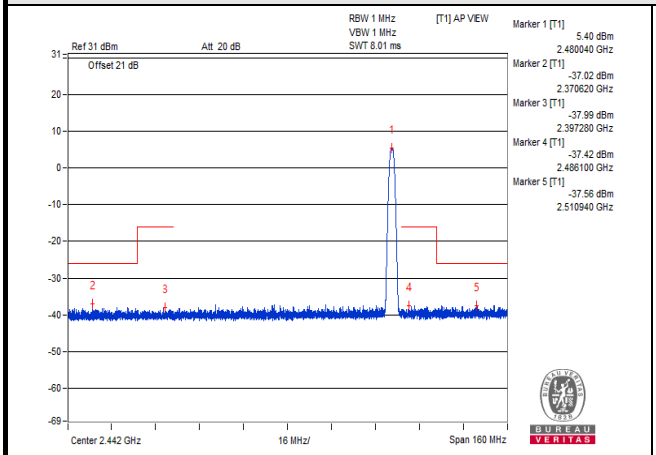


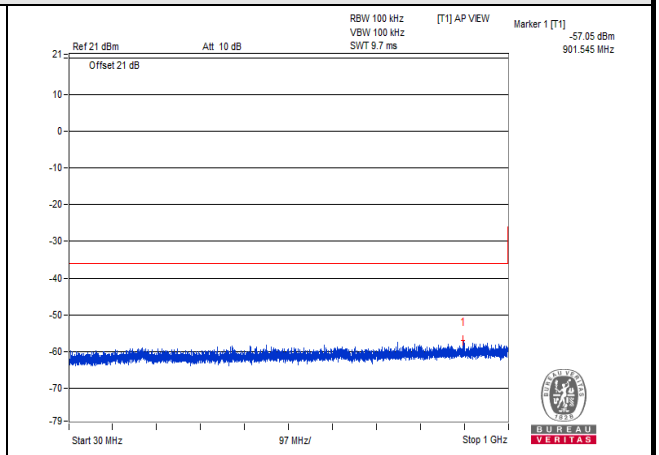


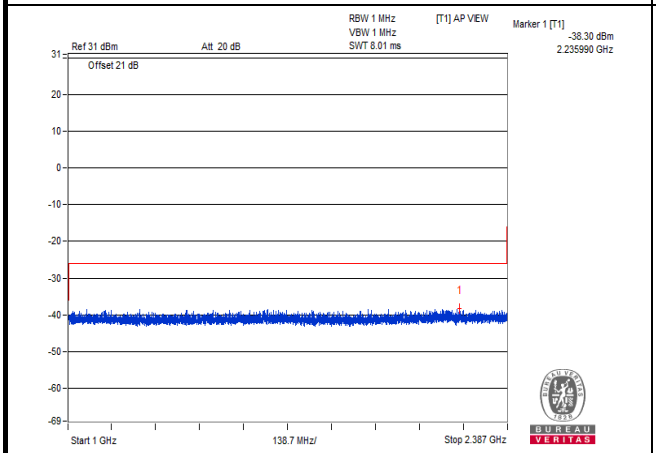


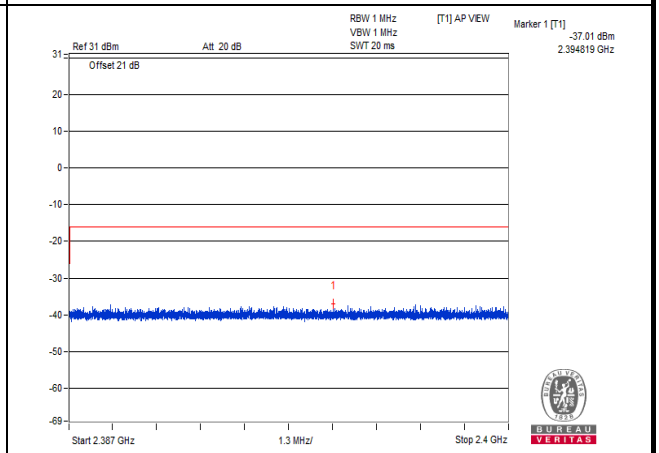
CH 19 (2440MHz)

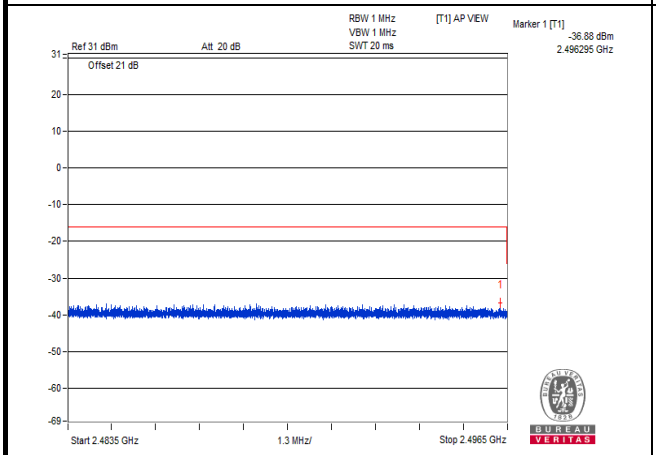
Vnormal

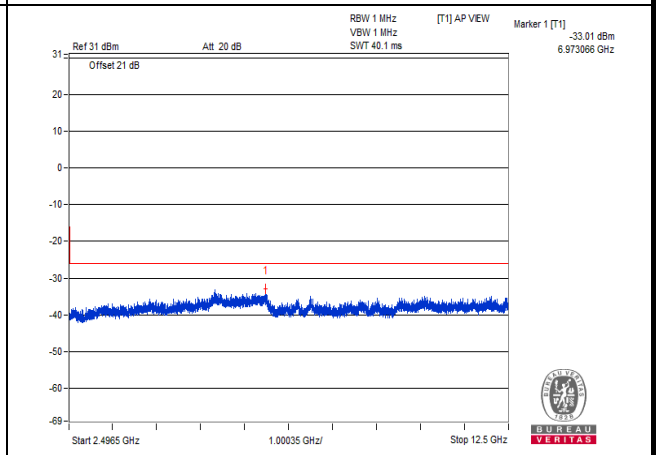






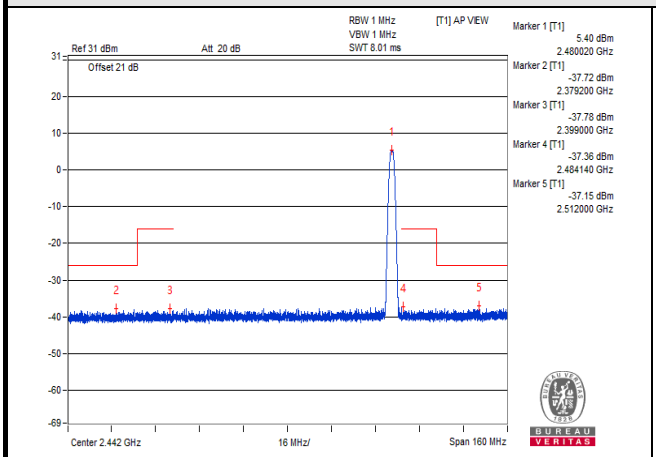


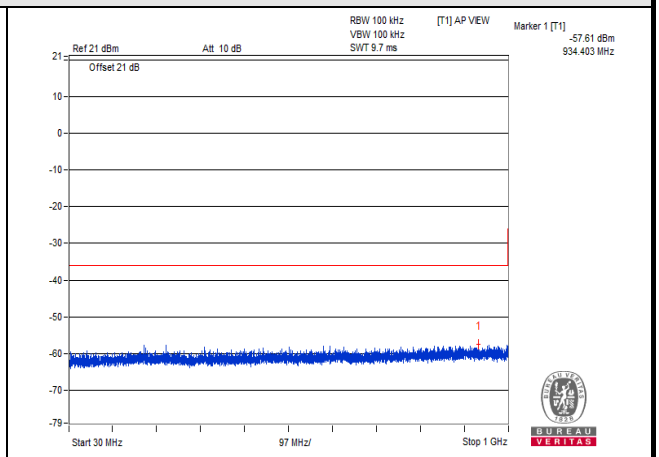


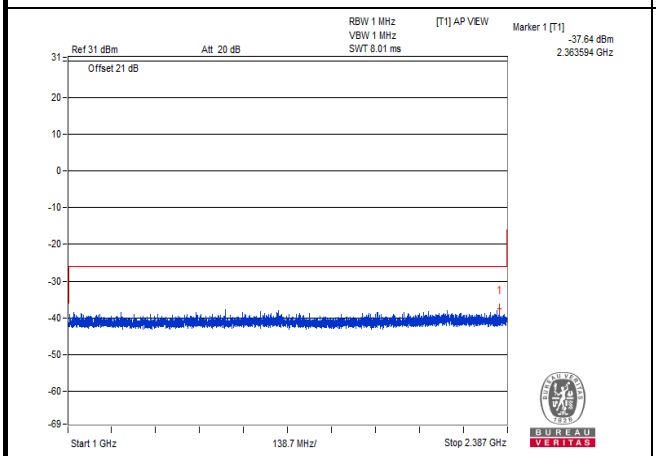


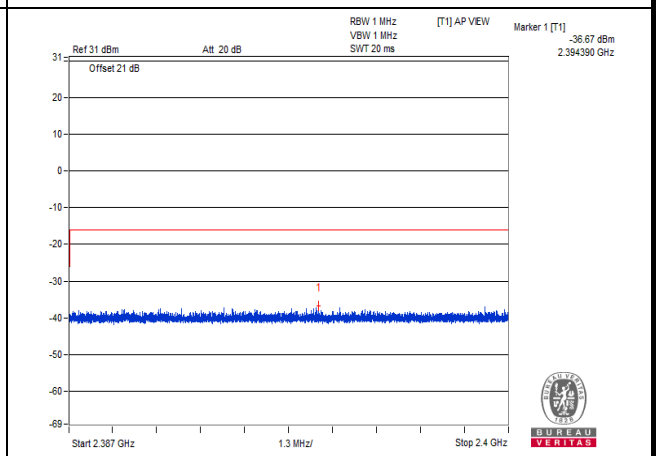
CH 39 (2480MHz)

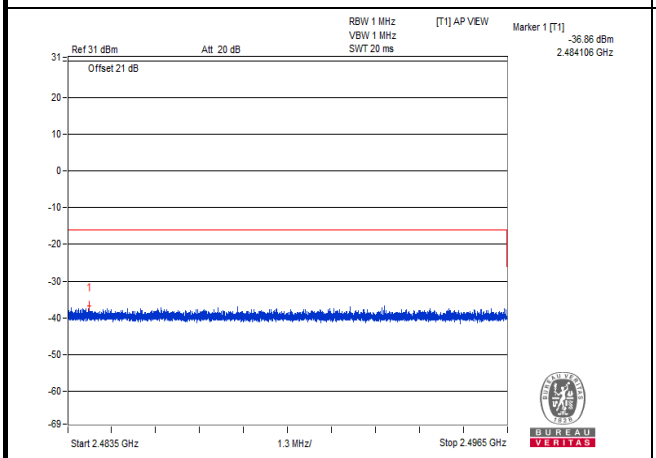
Vmax.

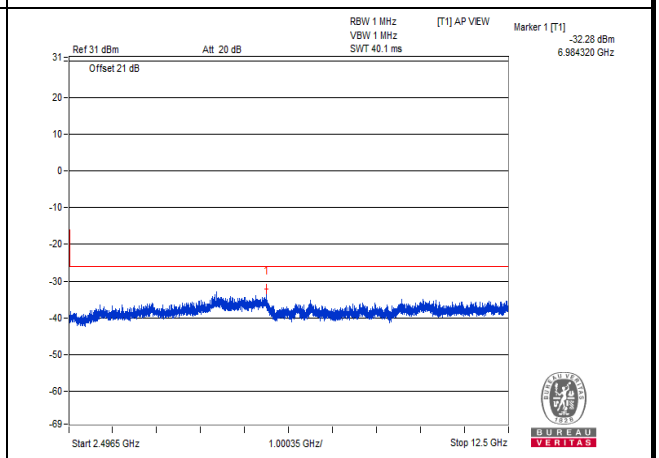






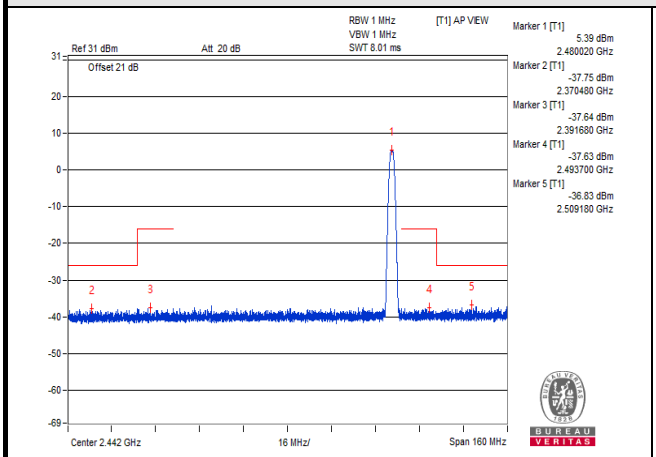


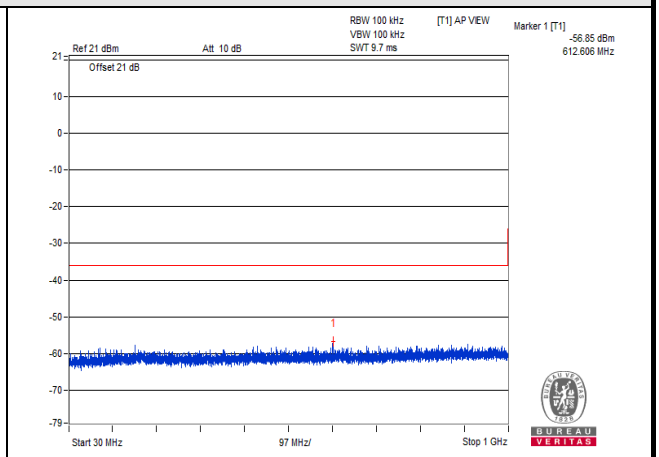


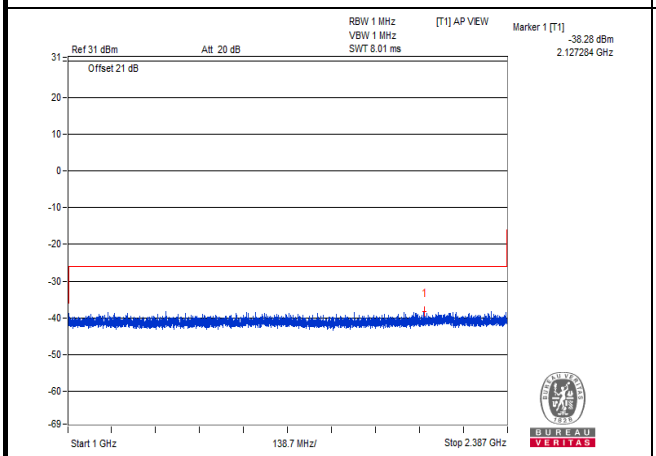


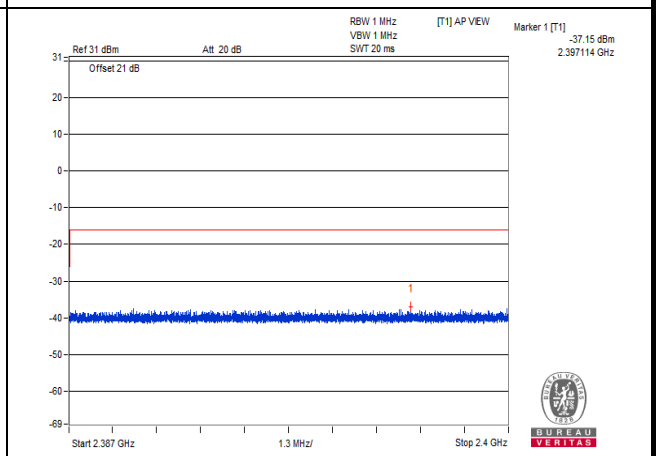
CH 39 (2480MHz)

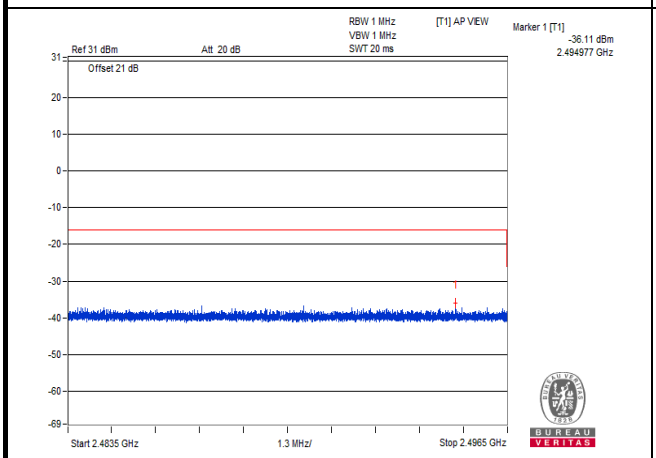
Vmin.

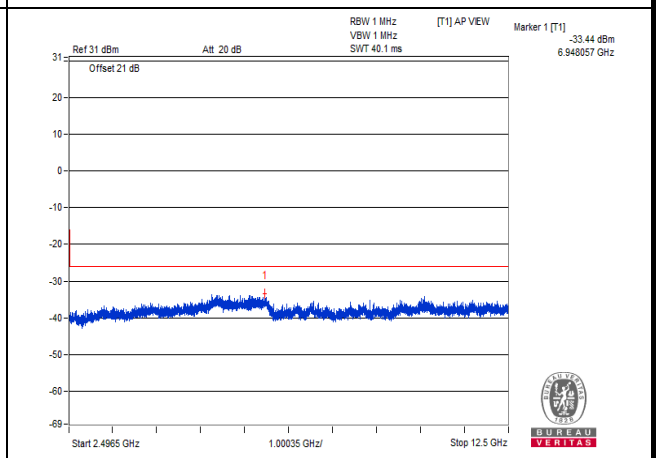












CH 39 (2480MHz)

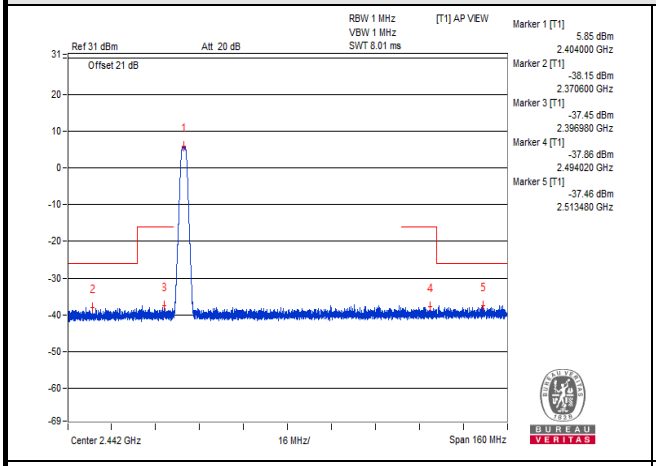
BT-LE 2M

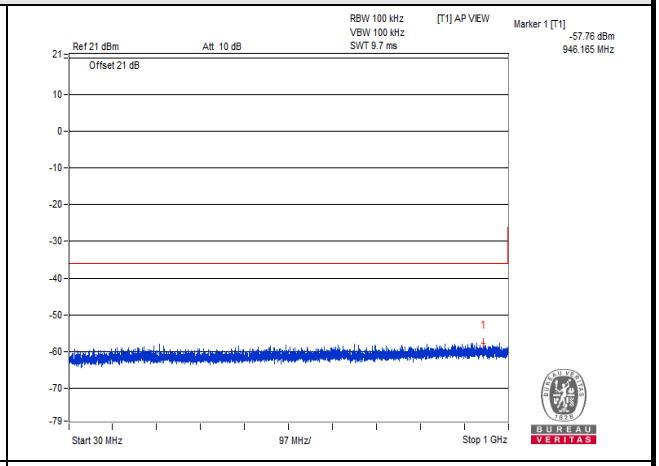
TEST CHANNEL		CH 1 (2404MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	946.165	0.001675	0.25	PASS
	1000MHz to 2387MHz	2208.250	0.171396	2.5	PASS
	2387MHz to 2400MHz	2399.263	0.197697	25	PASS
	2483.5MHz to 2496.5MHz	2490.336	0.247742	25	PASS
	2496.5MHz to 12500MHz	6714.225	0.651628	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	715.790	0.002000	0.25	PASS
	1000MHz to 2387MHz	1873.116	0.153815	2.5	PASS
	2387MHz to 2400MHz	2399.003	0.196336	25	PASS
	2483.5MHz to 2496.5MHz	2490.841	0.208449	25	PASS
	2496.5MHz to 12500MHz	6953.059	0.468813	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	851.226	0.001837	0.25	PASS
	1000MHz to 2387MHz	2120.349	0.176198	2.5	PASS
	2387MHz to 2400MHz	2387.794	0.210378	25	PASS
	2483.5MHz to 2496.5MHz	2492.042	0.204174	25	PASS
	2496.5MHz to 12500MHz	6955.560	0.479733	2.5	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	486.385	0.001803	0.25	PASS
	1000MHz to 2387MHz	2204.609	0.155597	2.5	PASS
	2387MHz to 2400MHz	2389.522	0.205589	25	PASS
	2483.5MHz to 2496.5MHz	2487.950	0.193197	25	PASS
	2496.5MHz to 12500MHz	6831.766	0.498884	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	917.671	0.001977	0.25	PASS
	1000MHz to 2387MHz	2357.699	0.158855	2.5	PASS
	2387MHz to 2400MHz	2392.209	0.199986	25	PASS
	2483.5MHz to 2496.5MHz	2486.054	0.247742	25	PASS
	2496.5MHz to 12500MHz	5861.427	0.464515	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	985.207	0.001710	0.25	PASS
	1000MHz to 2387MHz	2209.810	0.151705	2.5	PASS
	2387MHz to 2400MHz	2397.991	0.216272	25	PASS
	2483.5MHz to 2496.5MHz	2485.701	0.209411	25	PASS
	2496.5MHz to 12500MHz	6674.211	0.433511	2.5	PASS

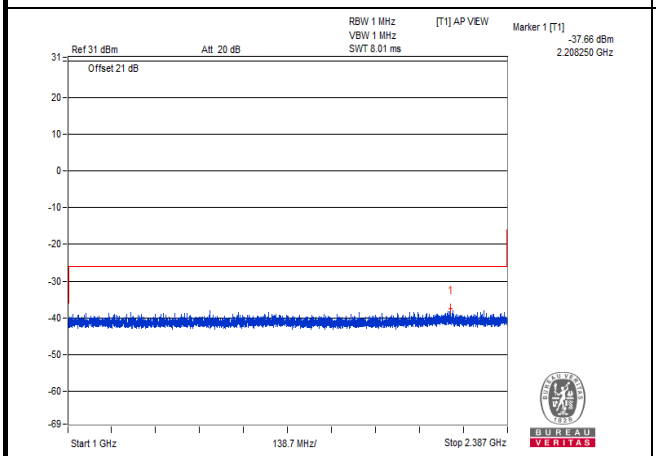
TEST CHANNEL		CH 38 (2478MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	932.585	0.002000	0.25	PASS
	1000MHz to 2387MHz	1022.885	0.147571	2.5	PASS
	2387MHz to 2400MHz	2397.578	0.219786	25	PASS
	2483.5MHz to 2496.5MHz	2495.516	0.197242	25	PASS
	2496.5MHz to 12500MHz	5810.159	0.477529	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	902.878	0.001762	0.25	PASS
	1000MHz to 2387MHz	2125.897	0.197242	2.5	PASS
	2387MHz to 2400MHz	2397.141	0.212324	25	PASS
	2483.5MHz to 2496.5MHz	2483.592	0.239332	25	PASS
	2496.5MHz to 12500MHz	6915.546	0.407380	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	931.615	0.001919	0.25	PASS
	1000MHz to 2387MHz	2243.098	0.147231	2.5	PASS
	2387MHz to 2400MHz	2392.232	0.202302	25	PASS
	2483.5MHz to 2496.5MHz	2493.131	0.198609	25	PASS
	2496.5MHz to 12500MHz	5783.900	0.445656	2.5	PASS

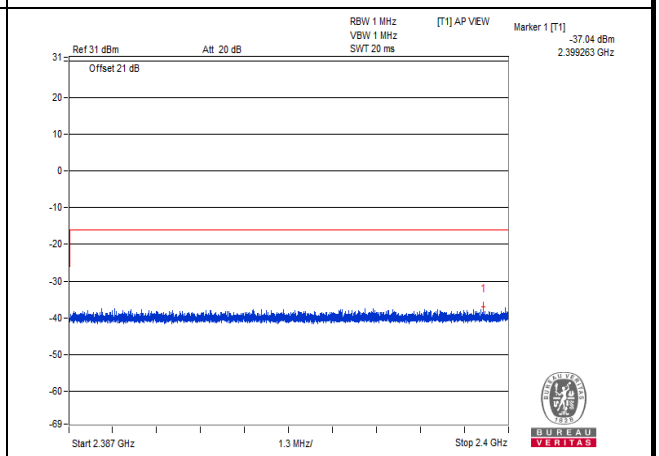
NOTE: 1. The spectrum plots are attached on the following pages.

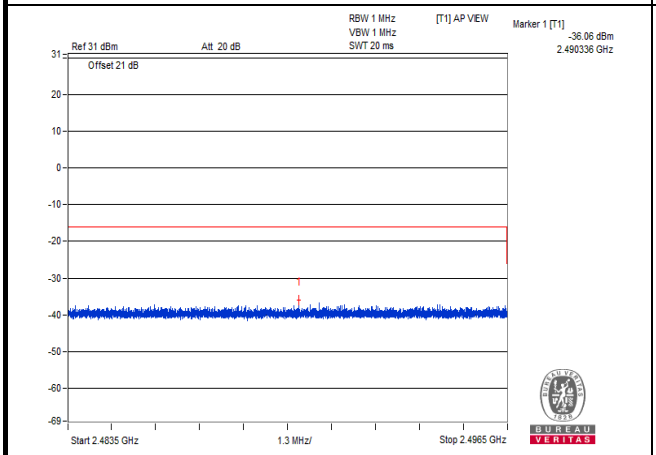
Vnormal

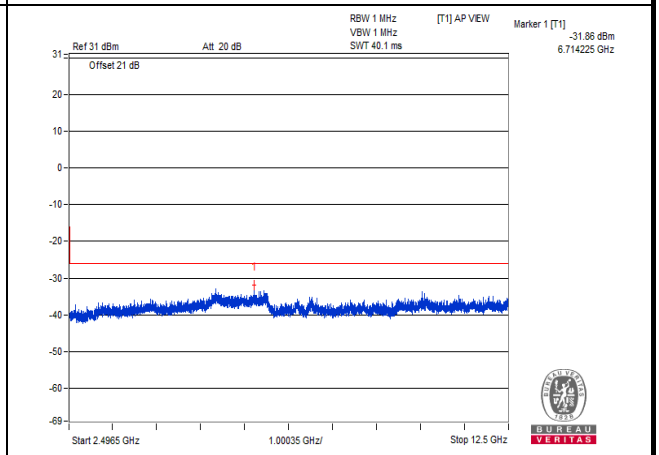






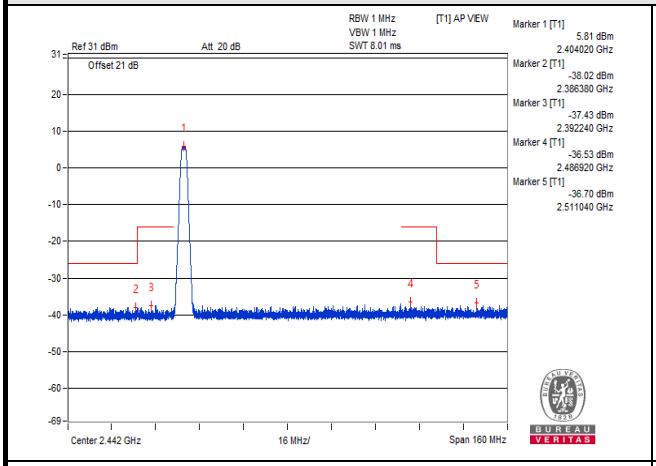


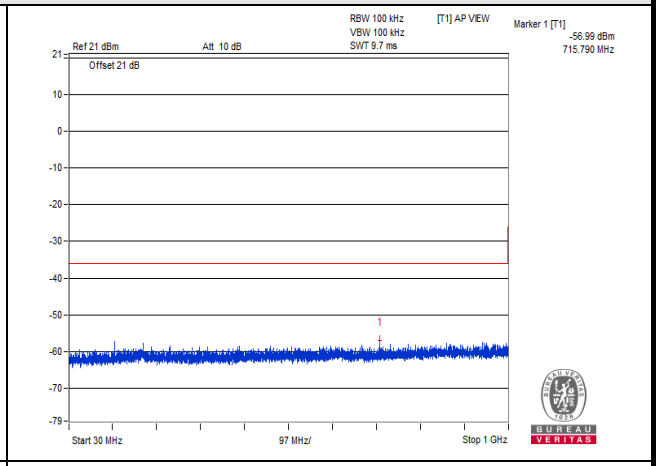


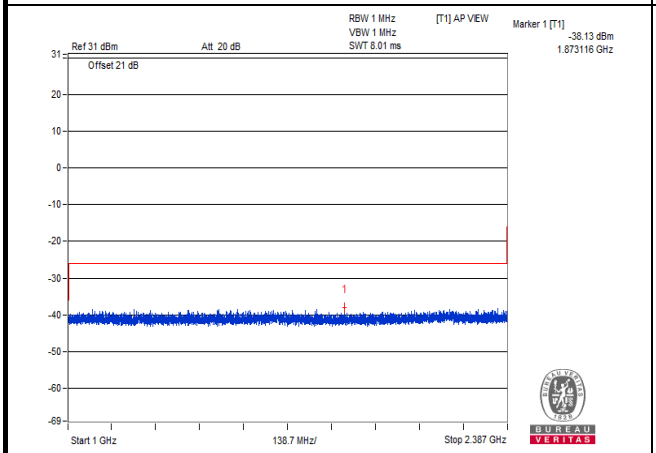


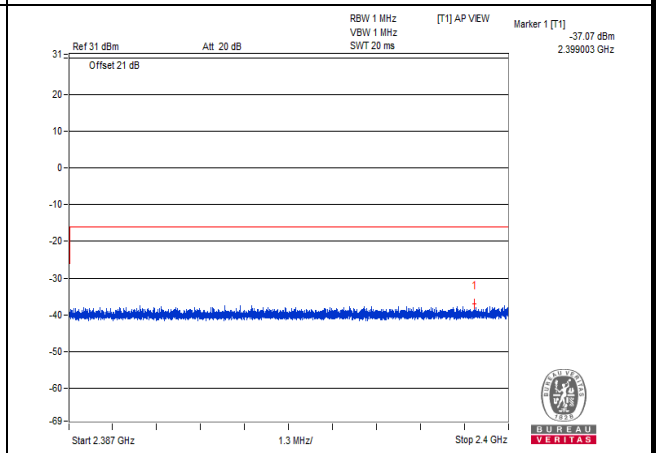
CH 1 (2404MHz)

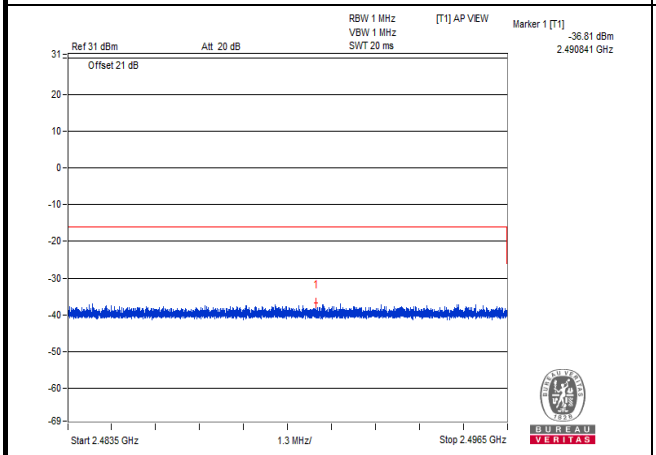
Vmax.

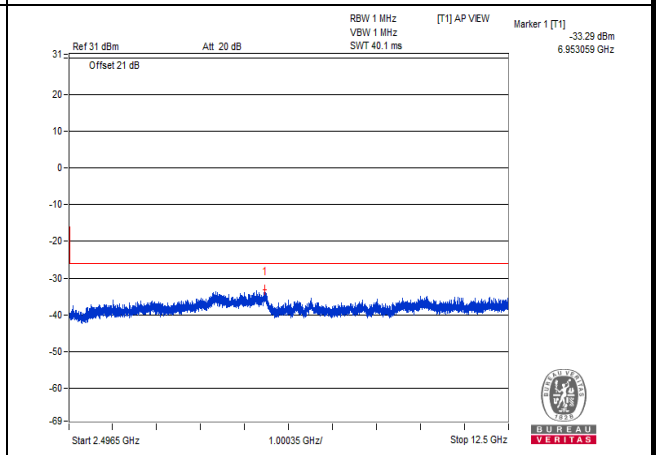






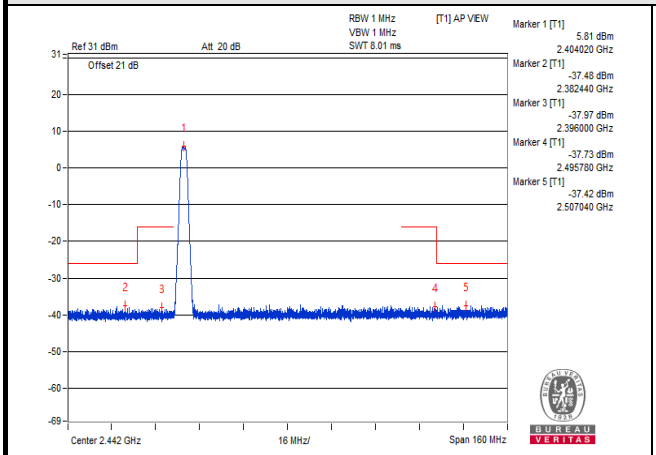


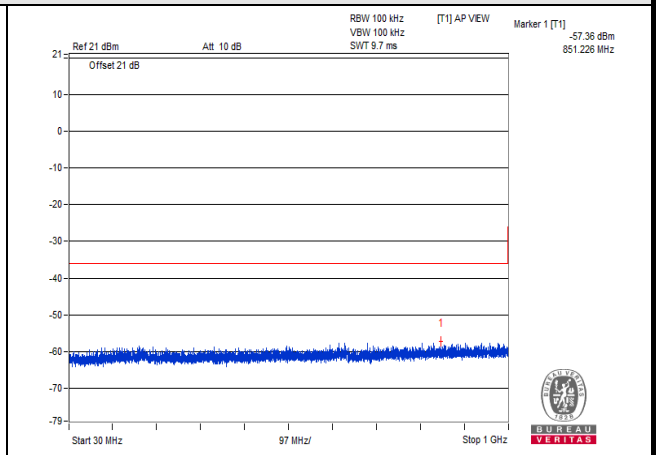


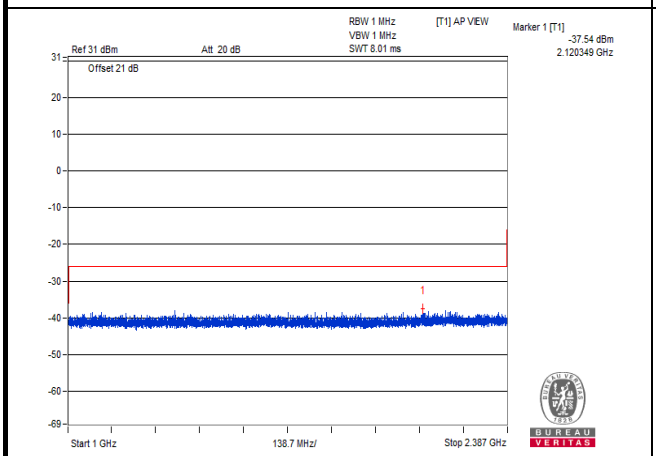


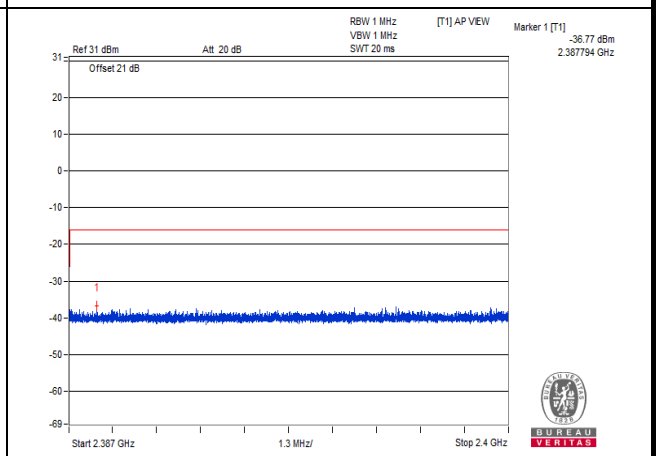
CH 1 (2404MHz)

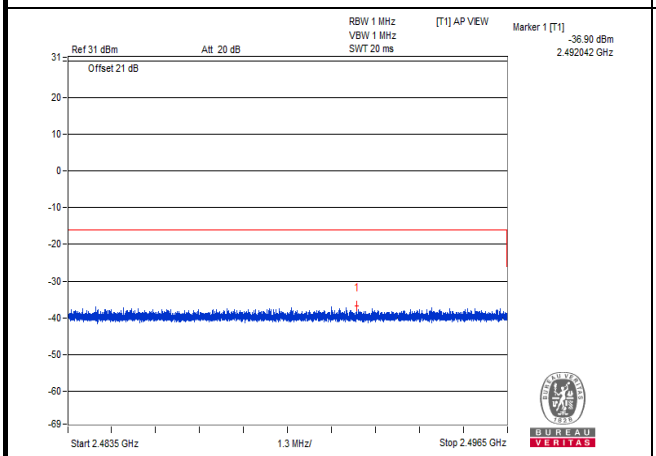
Vmin.

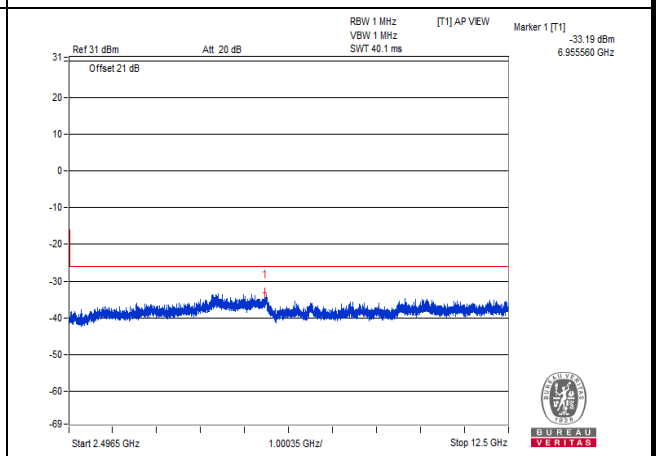






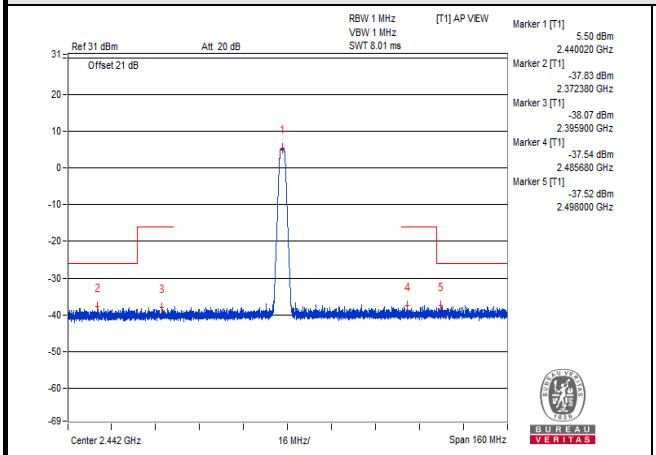


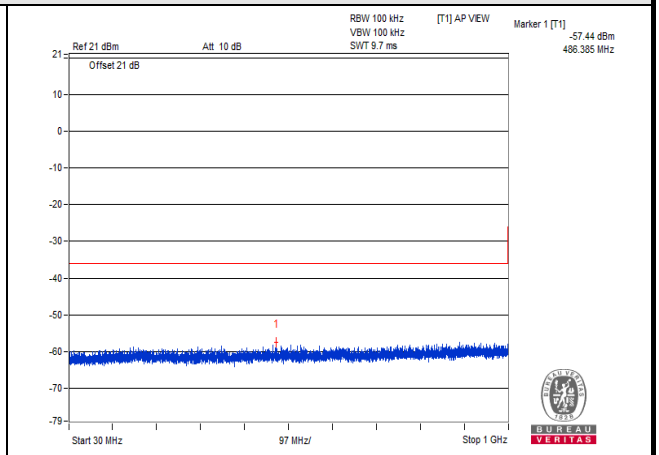


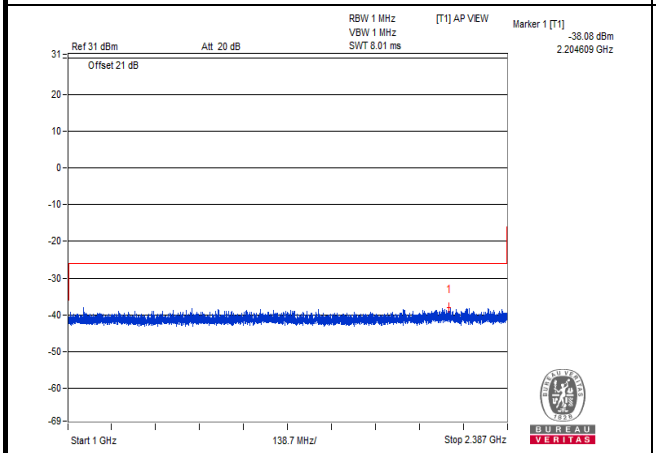


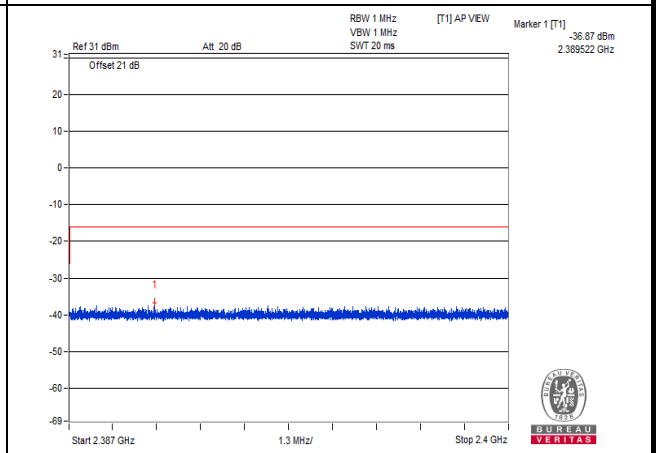
CH 1 (2404MHz)

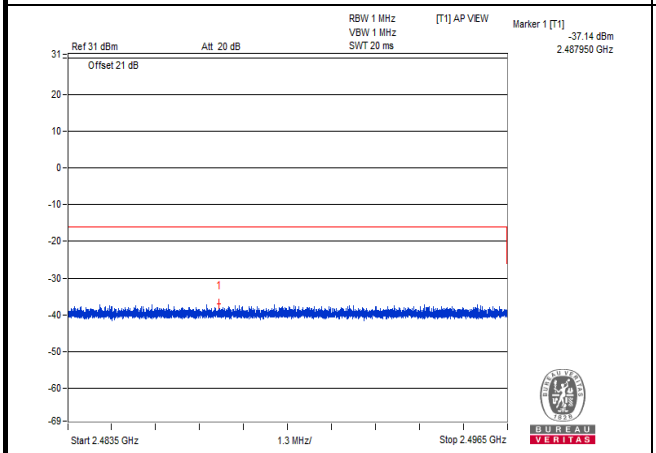
Vnormal

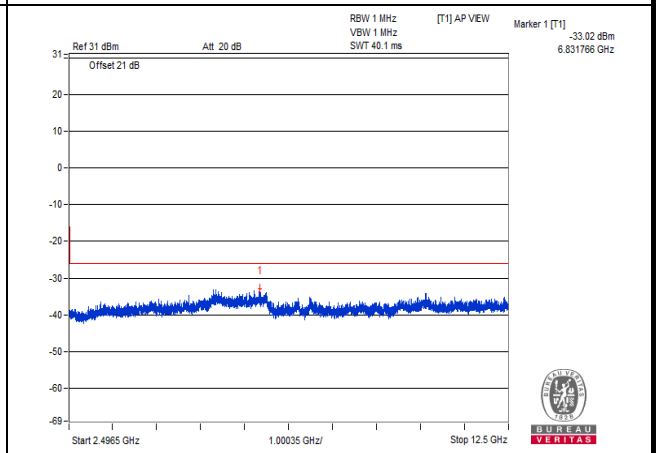






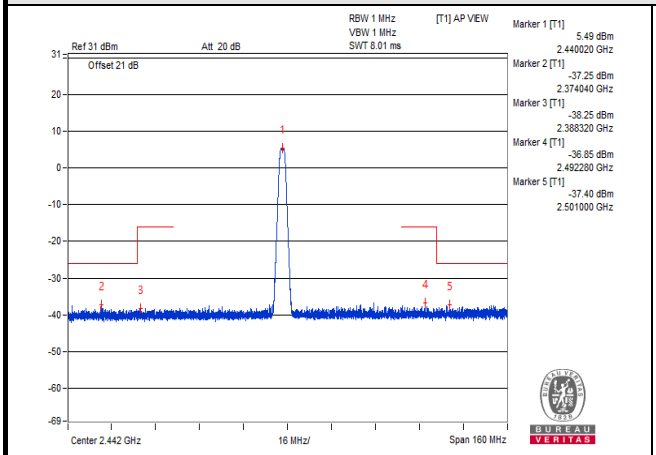


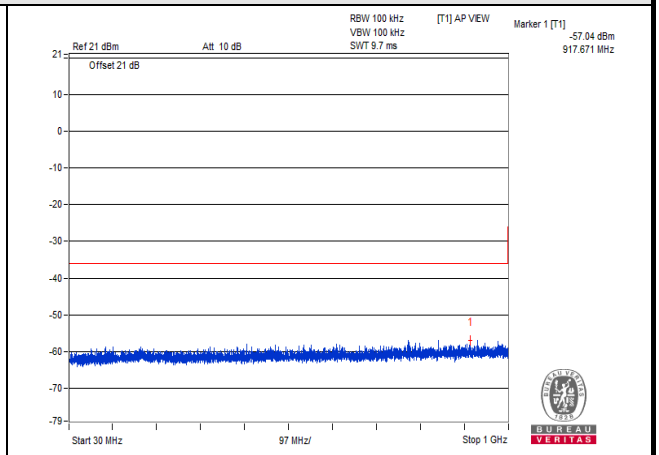


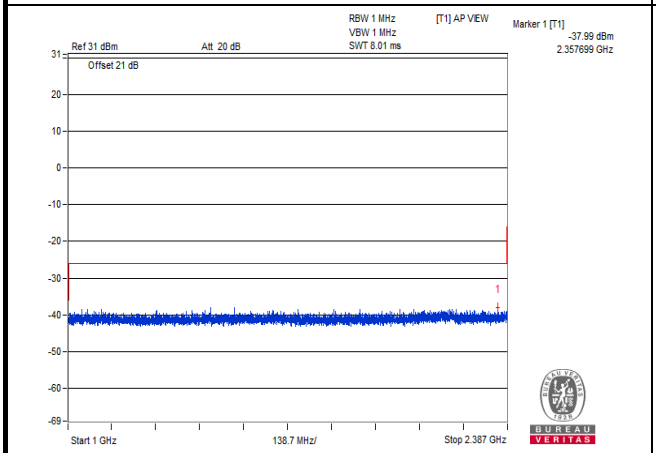


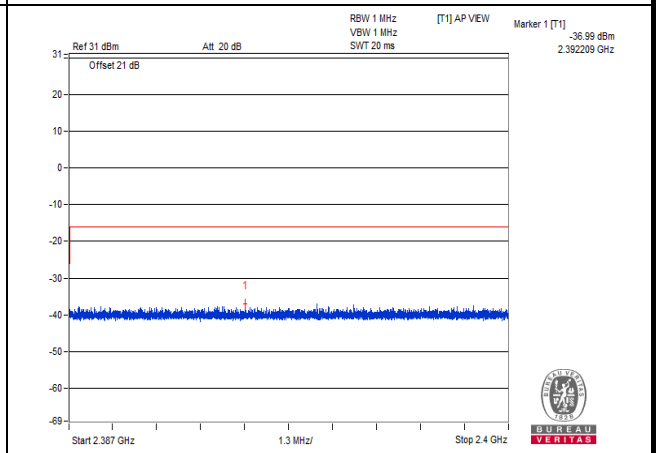
CH 19 (2440MHz)

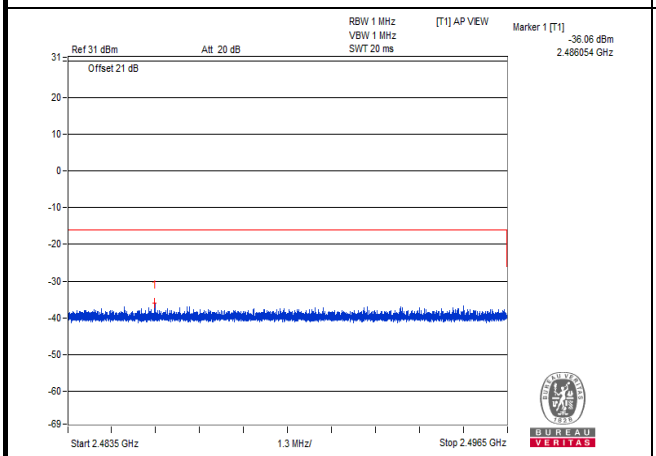
Vmax.

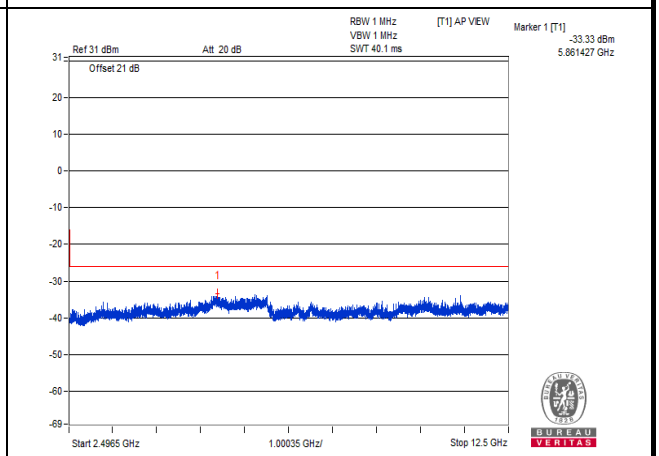






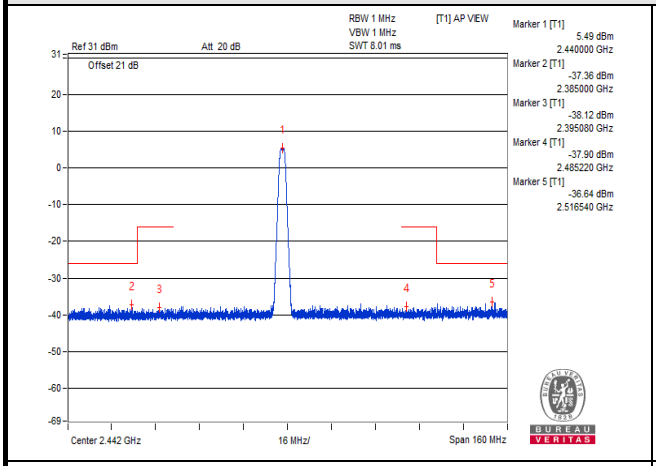


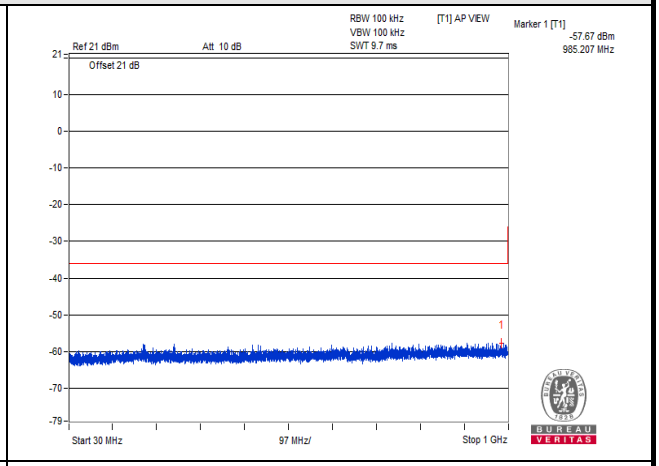


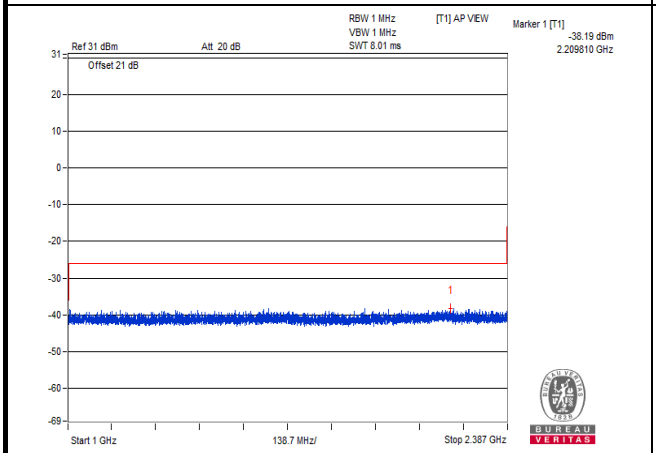


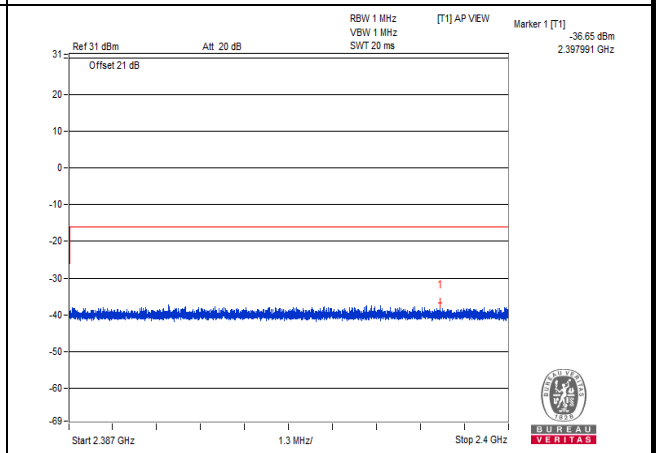
CH 19 (2440MHz)

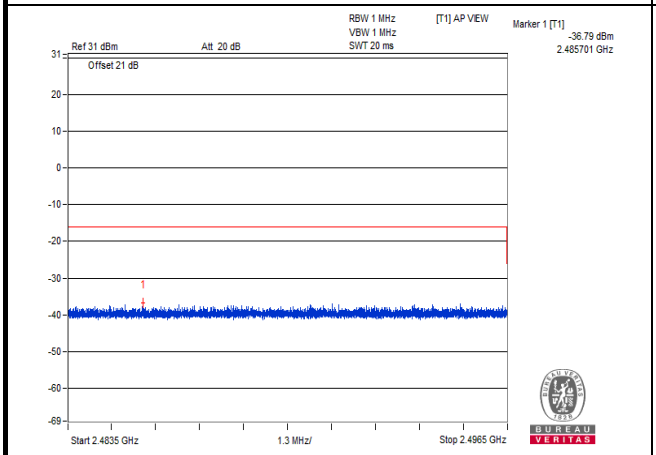
Vmin.

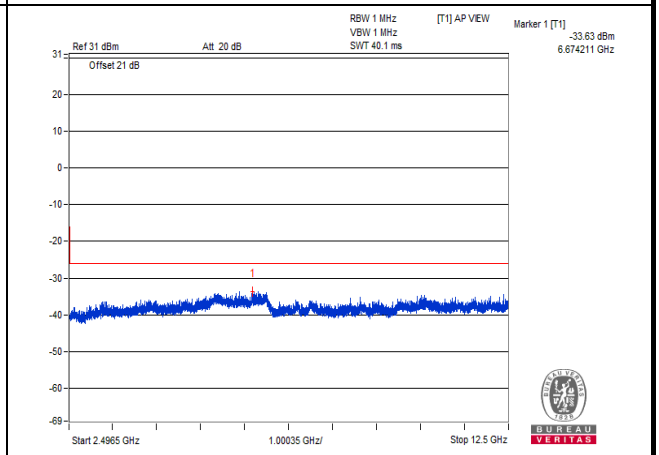






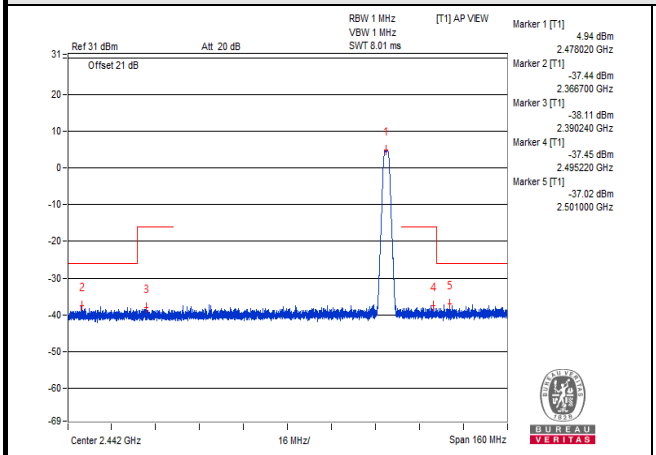


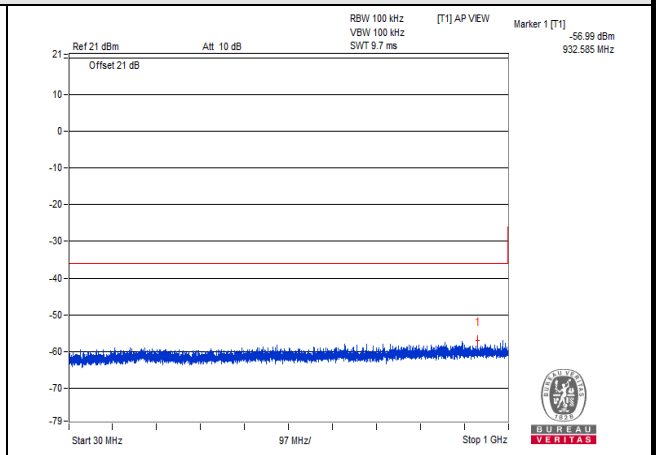


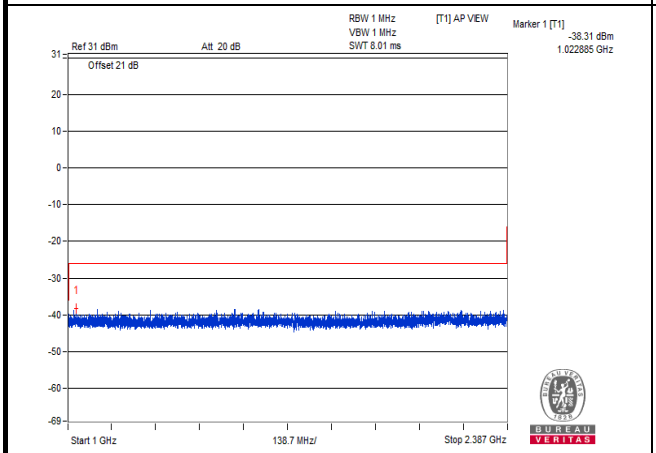


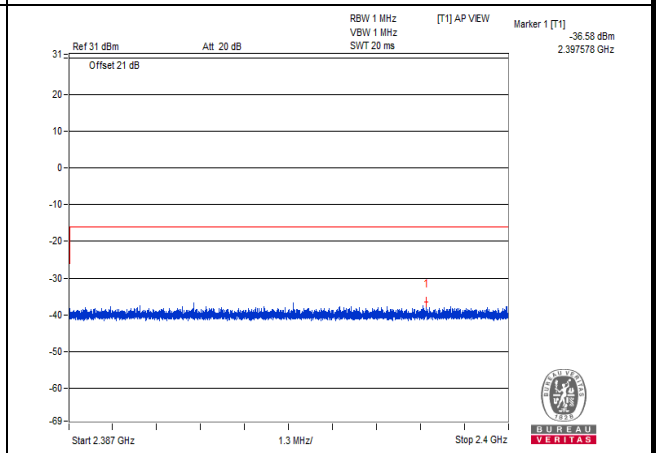
CH 19 (2440MHz)

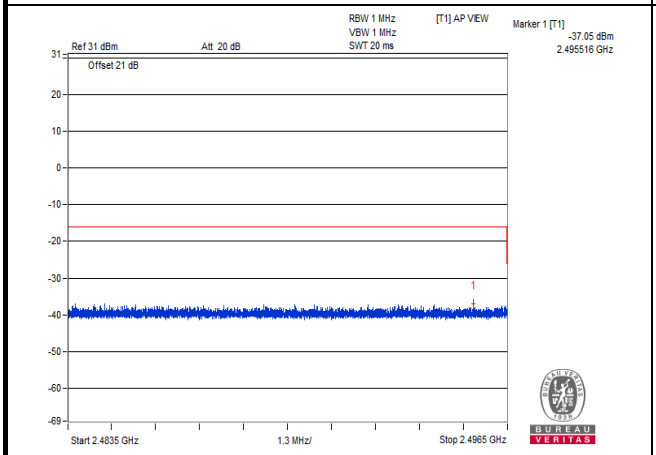
Vnormal

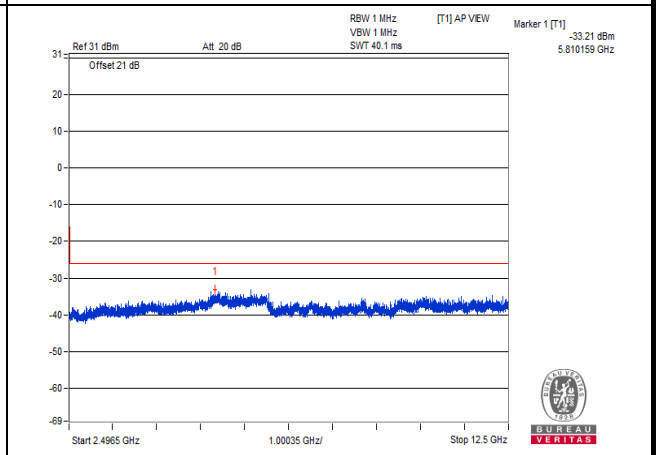






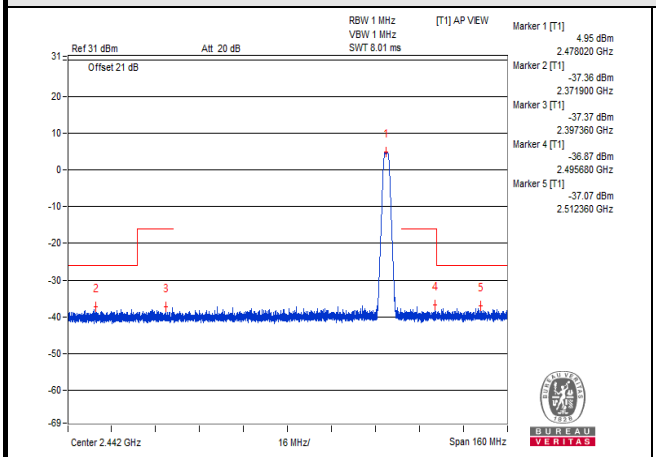


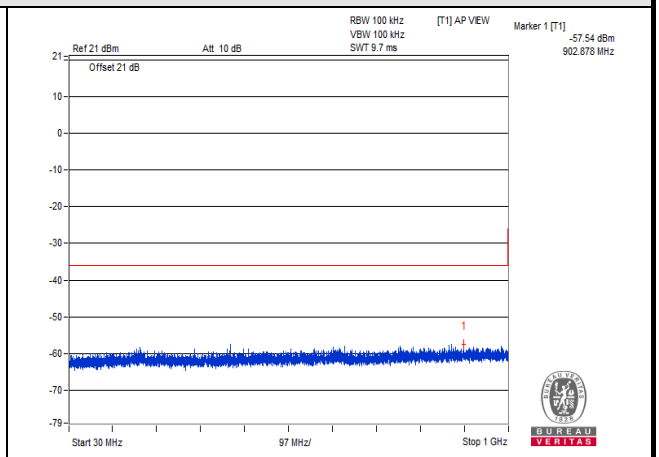


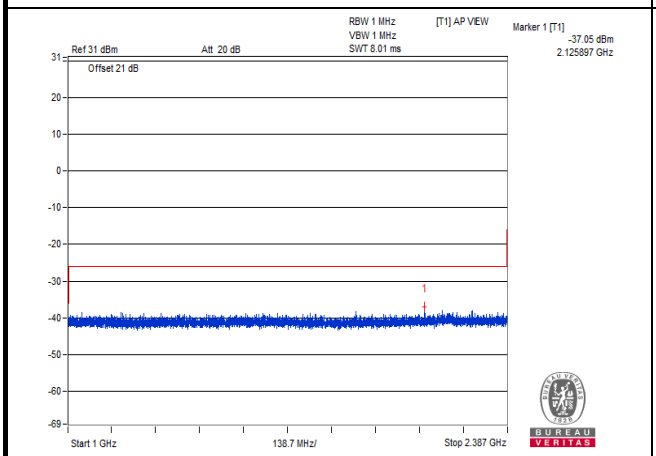


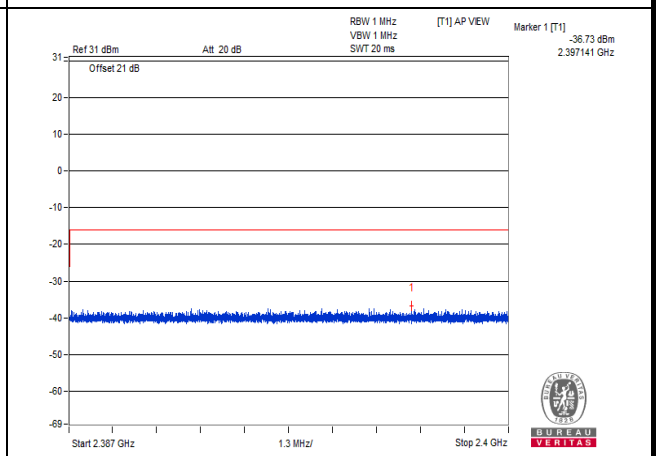
CH 38 (2478MHz)

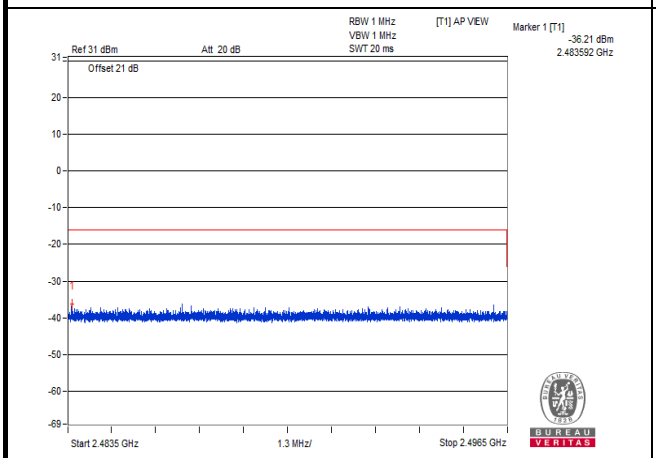
Vmax.

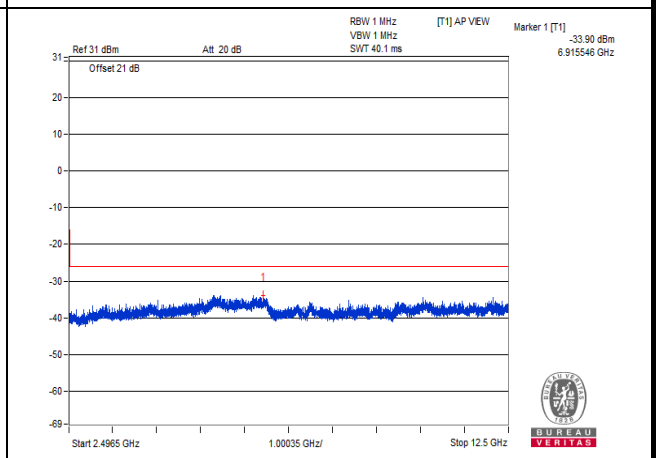






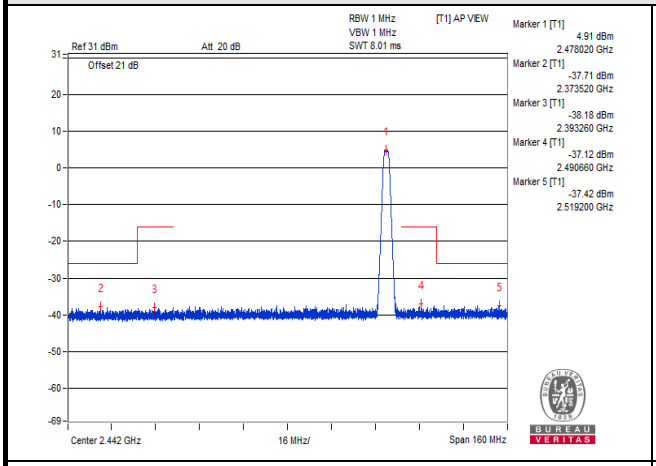


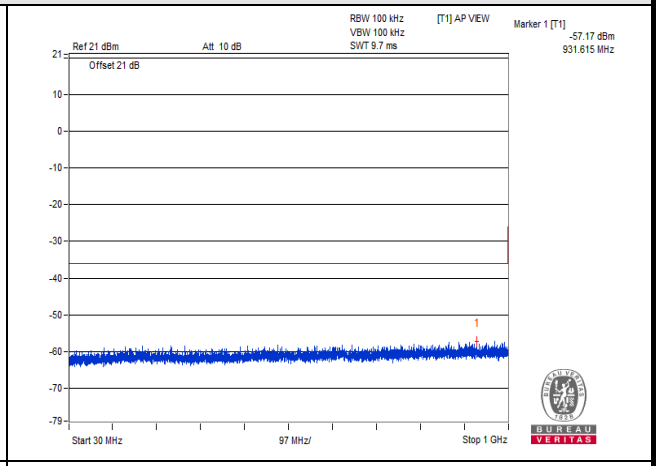


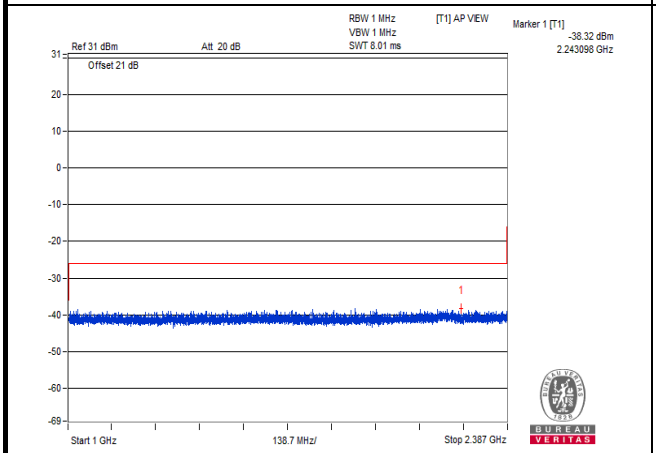


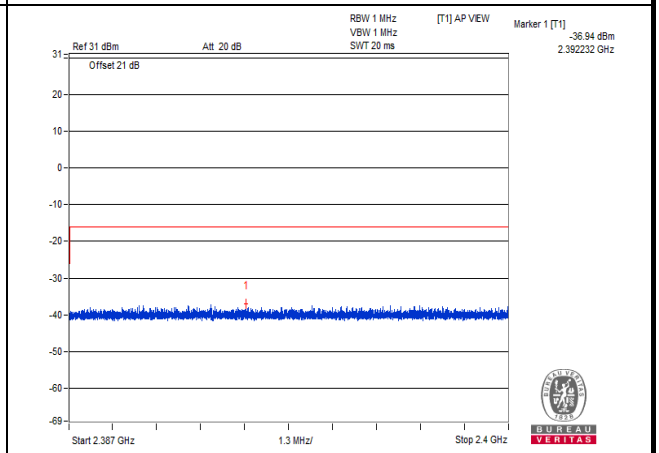
CH 38 (2478MHz)

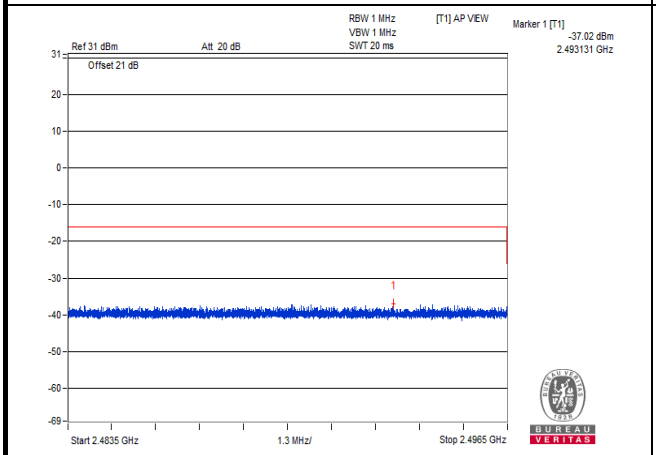
Vmin.

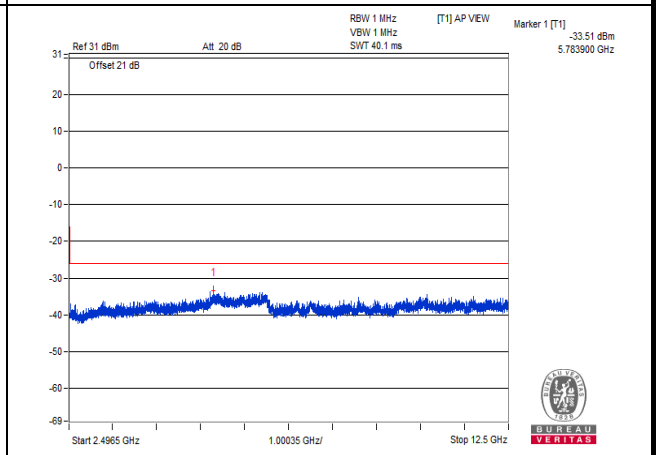












CH 38 (2478MHz)

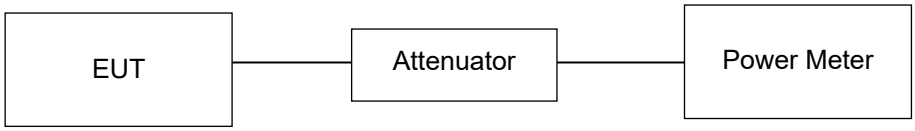
4.4 Antenna Power Measurement

4.4.1 Limits of Antenna Power

Modulation System	Frequency Band Used	Antenna Power (Max.)	EIRP Limit (Note 3)
DS	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 ~ 81.84 mW/MHz)
Other than the above	2400 – 2483.5 MHz	10 mW	12.14 dBm ~ 22.14 dBm (16.368 mW ~ 163.68 mW)

Note:
1. Occupied bandwidth is less than 26MHz
2. Occupied bandwidth is more that 26MHz and less than 38MHz
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 = EIRP/(2.14 dBi + “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 1)

BT-LE 1M

Voltage (Vdc)	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
3.3	0	2402	7.047	15.776
	19	2440	6.745	15.1
	39	2480	6.607	14.791
3.63	0	2402	6.95	15.559
	19	2440	6.592	14.758
	39	2480	6.31	14.126
2.97	0	2402	7.261	16.255
	19	2440	6.577	14.724
	39	2480	6.383	14.29
Max. Limit (mW):			10	-
Rated Power (mW):			7.3	-
Tolerance of Antenna Power (mW):			1.46 ~ 8.76	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain is 3.5 dBi.

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

BT-LE 2M

Voltage (Vdc)	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
3.3	1	2404	7.211	16.143
	19	2440	6.808	15.241
	38	2478	6.683	14.961
3.63	1	2404	7.063	15.812
	19	2440	6.501	14.554
	38	2478	6.607	14.791
2.97	1	2404	7.211	16.143
	19	2440	6.855	15.346
	38	2478	6.887	15.418
Max. Limit (mW):			10	-
Rated Power (mW):			7.3	-
Tolerance of Antenna Power (mW):			1.46 ~ 8.76	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain is 3.5 dBi.

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

4.4.4 Test Results (Mode 2)

BT-LE 1M

Voltage (Vdc)	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
3.3	0	2402	4.083	9.141
	19	2440	4.385	9.817
	39	2480	4.325	9.682
3.63	0	2402	4.027	9.015
	19	2440	4.285	9.593
	39	2480	4.13	9.246
2.97	0	2402	4.207	9.418
	19	2440	4.276	9.573
	39	2480	4.178	9.353
Max. Limit (mW):			10	-
Rated Power (mW):			5	-
Tolerance of Antenna Power (mW):			1 ~ 6	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain is 3.5 dBi.

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

BT-LE 2M

Voltage (Vdc)	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
3.3	1	2404	4.074	9.121
	19	2440	4.295	9.615
	38	2478	4.276	9.573
3.63	1	2404	3.99	8.932
	19	2440	4.102	9.183
	38	2478	4.227	9.463
2.97	1	2404	4.074	9.121
	19	2440	4.325	9.682
	38	2478	4.406	9.864
Max. Limit (mW):			10	-
Rated Power (mW):			5	-
Tolerance of Antenna Power (mW):			1 ~ 6	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain is 3.5 dBi.

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	≦4nW/100kHz (-54dBm)
Above 1GHz	≦20nW/MHz (-47dBm)

4.5.2 Test Setup

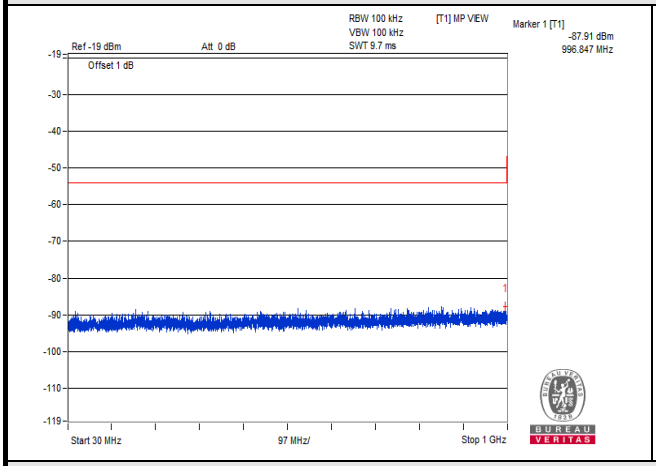
4.5.3 Test Results (Mode 1)

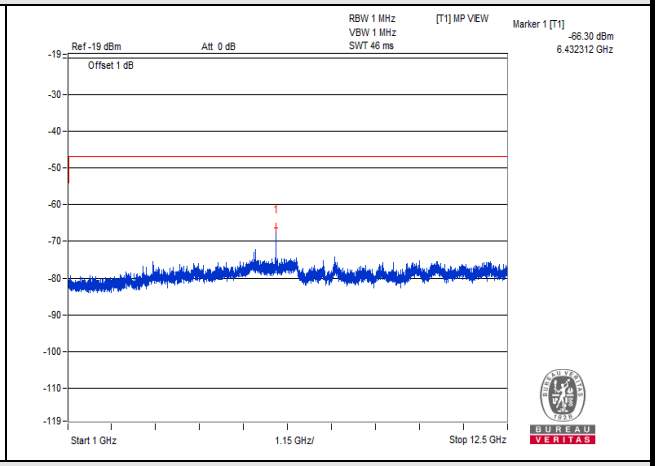
BT-LE 1M

TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	996.847	0.001618	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.234423	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	717.245	0.002032	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.217270	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	850.620	0.001660	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.221309	20.0	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	793.753	0.001936	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.225424	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	896.210	0.002037	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.197697	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	951.136	0.002128	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.232274	20.0	PASS
TEST CHANNEL		CH 39 (2480MHz)			
V_{normal}	30MHz to 1000MHz	928.947	0.001750	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.217270	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	862.745	0.001679	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.222844	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	579.747	0.001841	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.250035	20.0	PASS

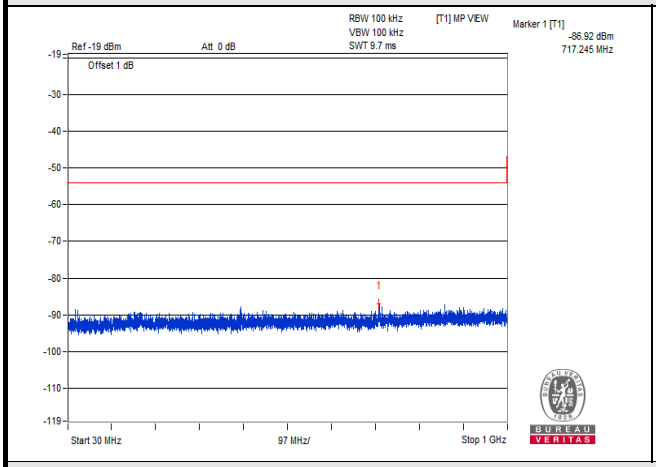
NOTE: 1. The spectrum plots are attached on the following pages.

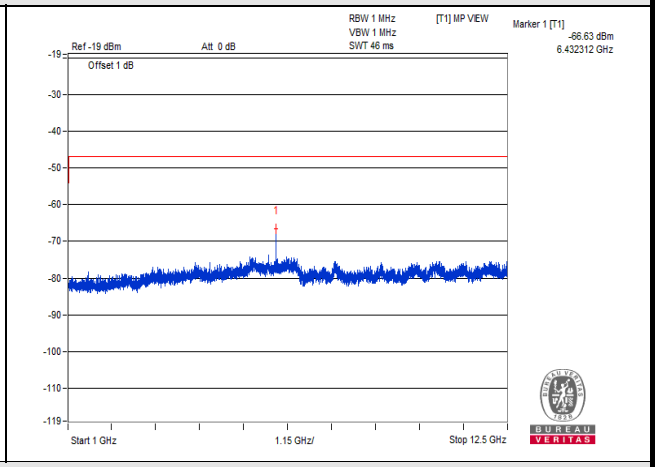
Vnormal



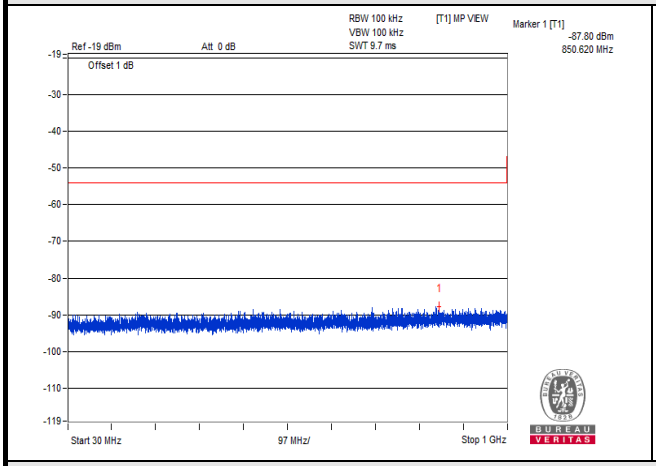


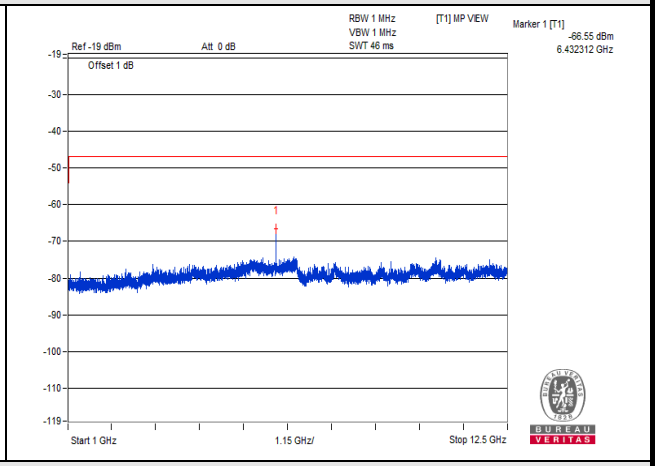
Vmax.





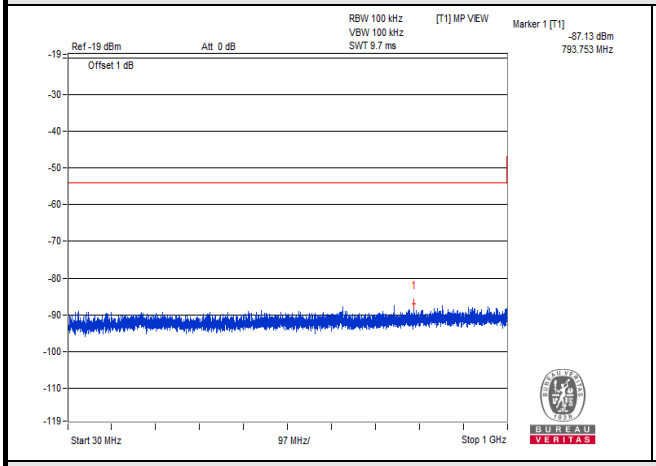
Vmin.

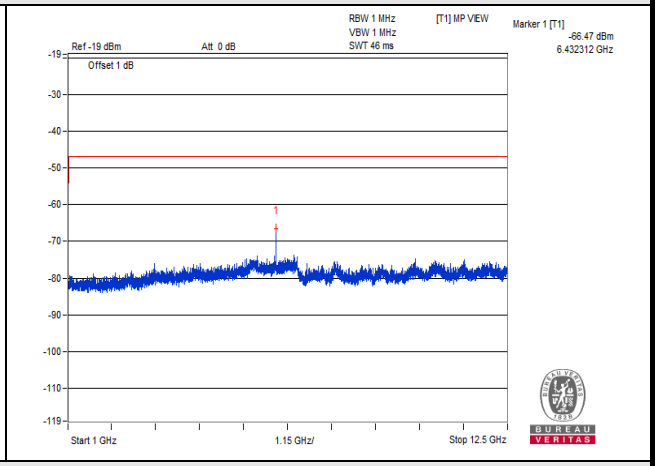




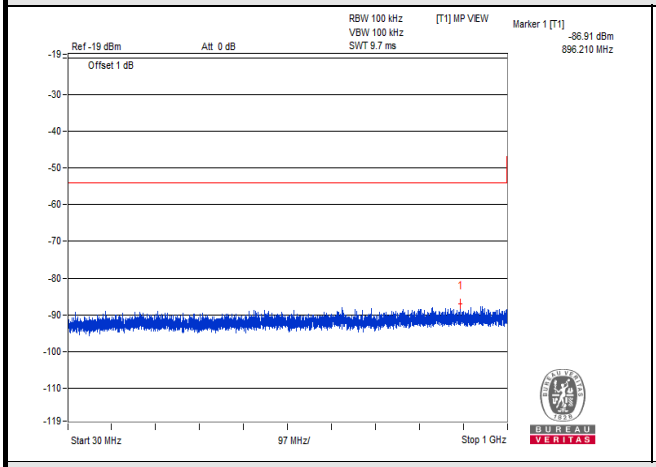
CH 0 (2402MHz)

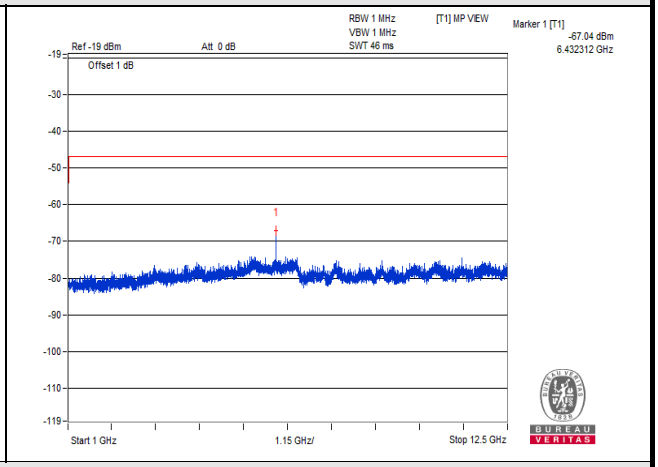
Vnormal



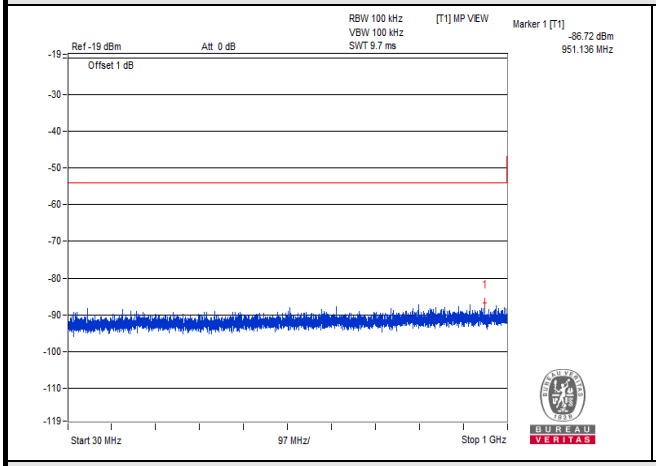


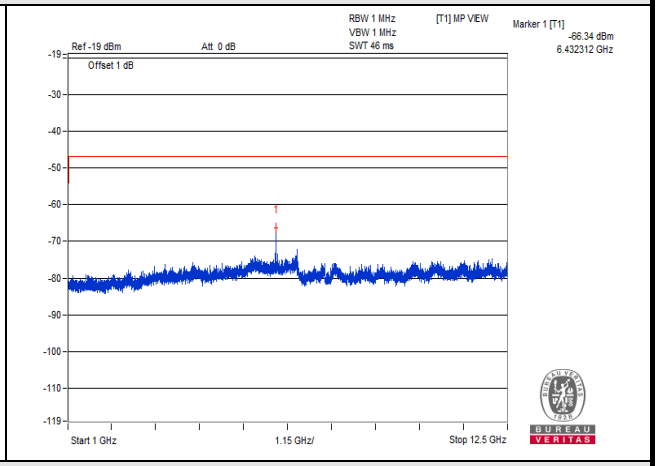
Vmax.





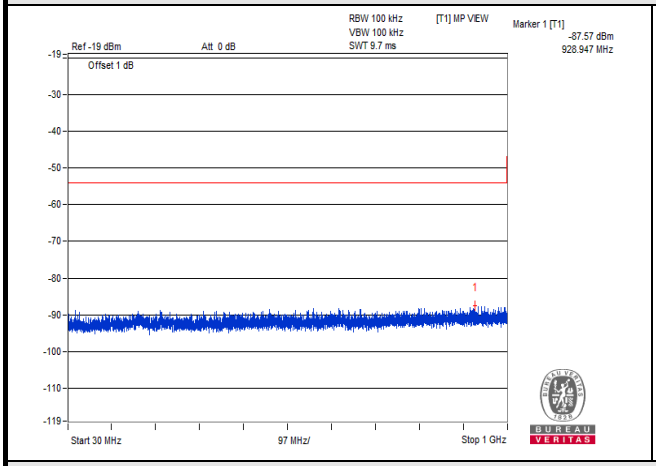
Vmin.

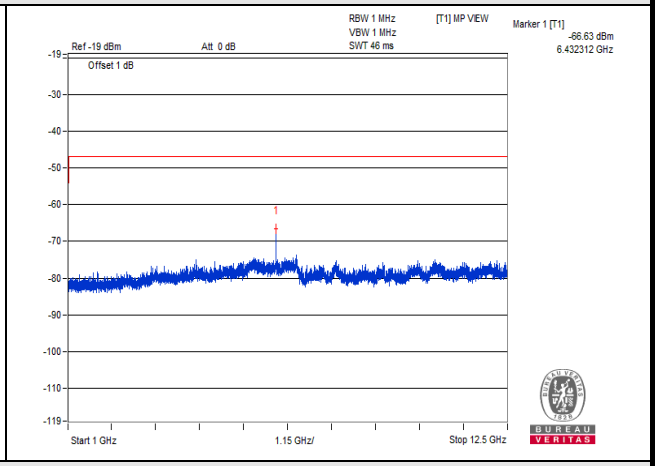




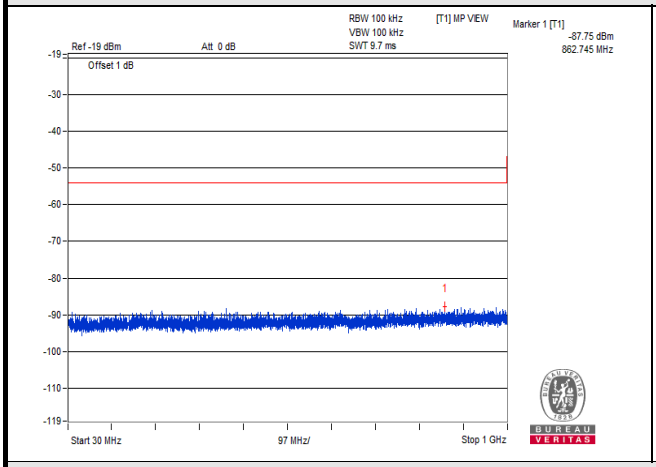
CH 19 (2440MHz)

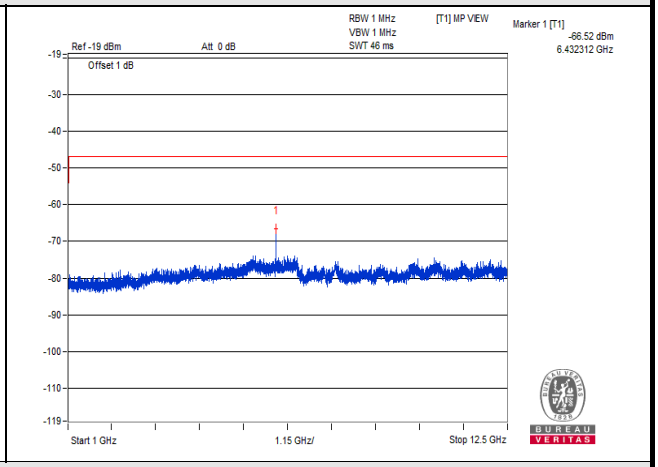
Vnormal



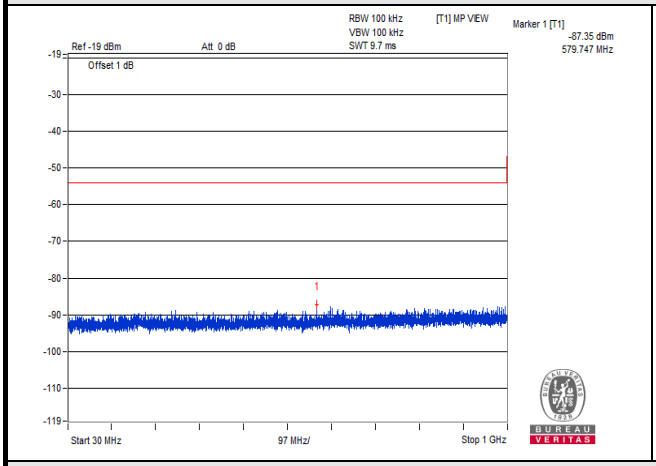


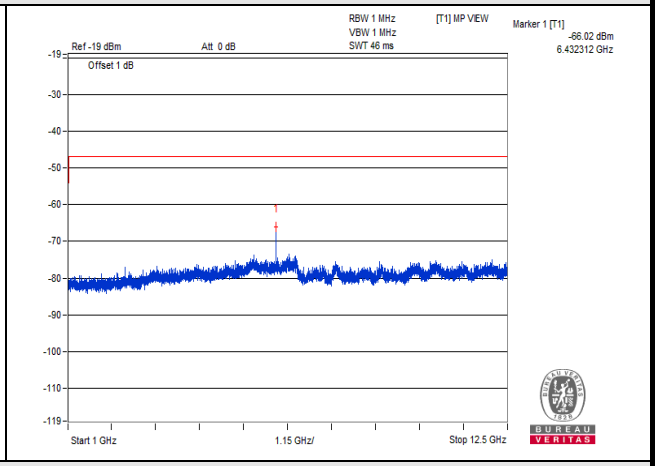
Vmax.





Vmin.





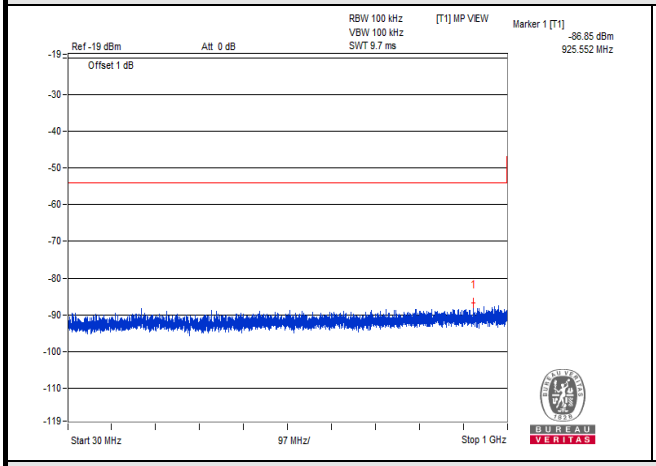
CH 39 (2480MHz)

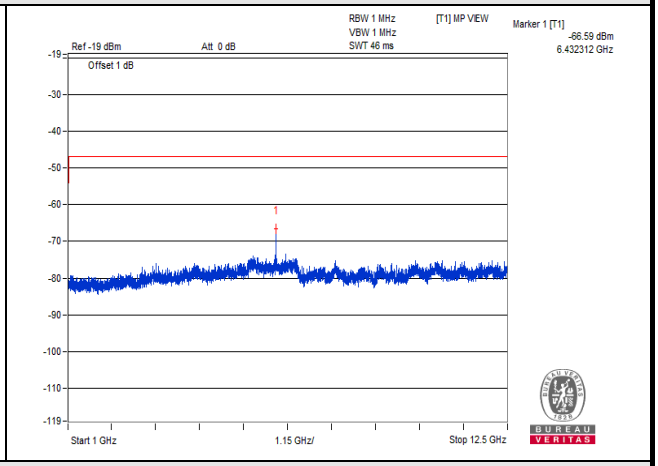
BT-LE 2M

TEST CHANNEL		CH 1 (2404MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	925.552	0.002065	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.219280	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	960.472	0.002065	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.236048	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	968.596	0.001738	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.205116	20.0	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	885.055	0.001901	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.243781	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	803.453	0.001742	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.237684	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	907.243	0.001791	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.232809	20.0	PASS
TEST CHANNEL		CH 38 (2478MHz)			
V_{normal}	30MHz to 1000MHz	912.700	0.001585	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.211836	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	876.082	0.002028	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.232809	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	874.506	0.001837	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.232809	20.0	PASS

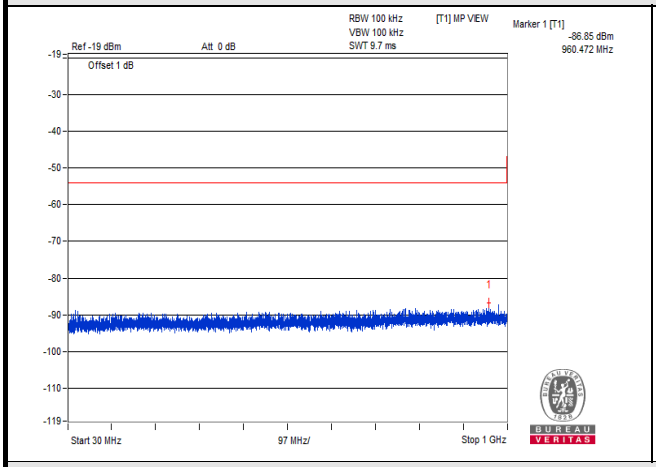
NOTE: 1. The spectrum plots are attached on the following pages.

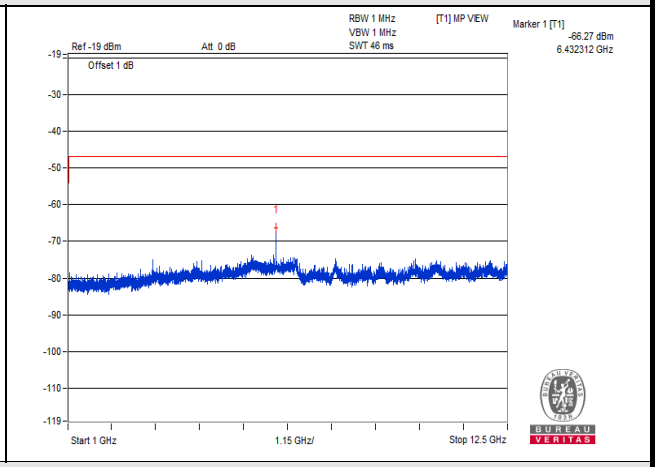
Vnormal



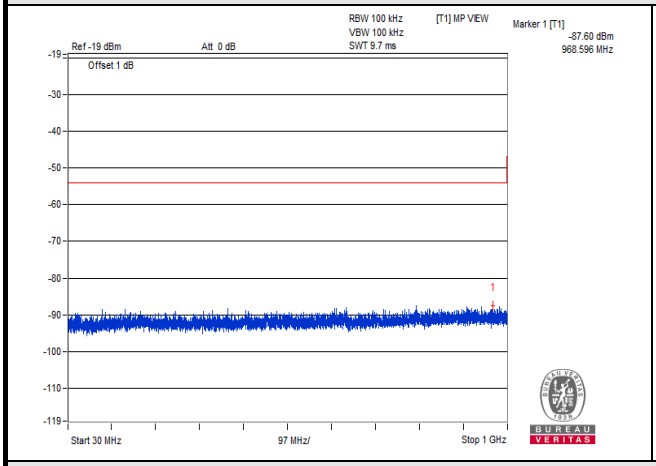


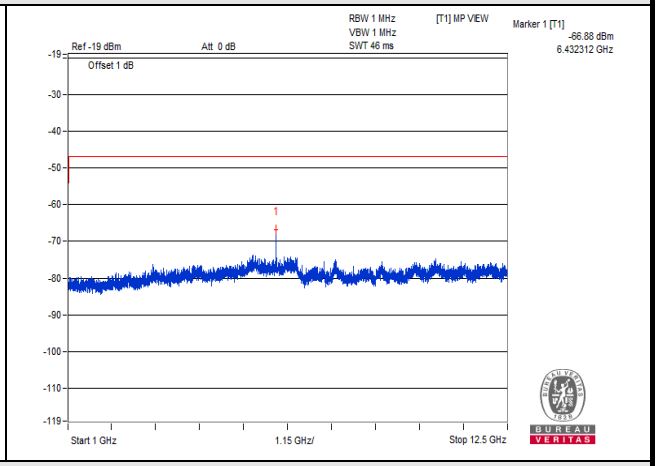
Vmax.





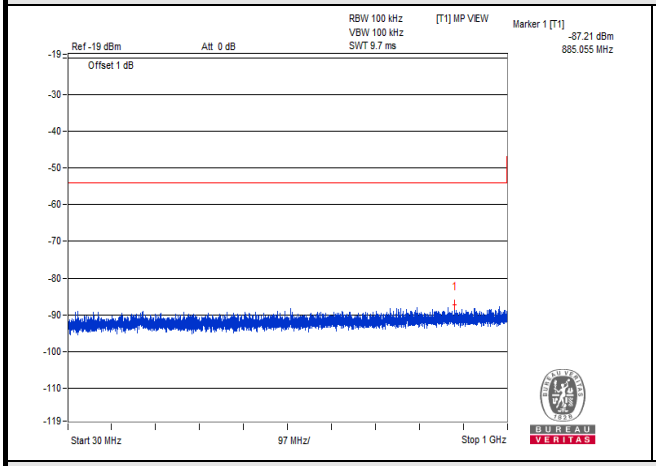
Vmin.

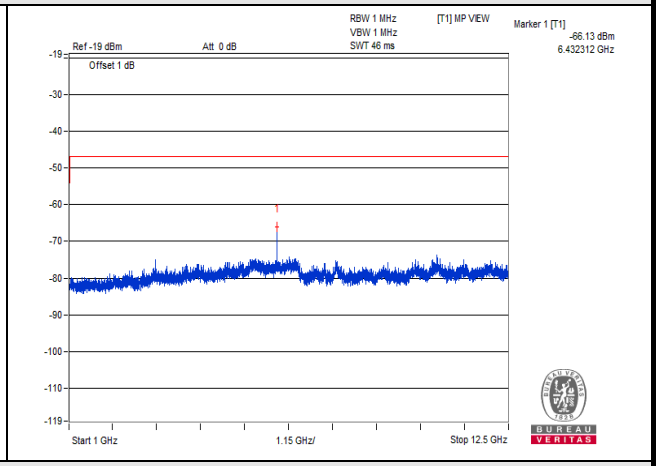




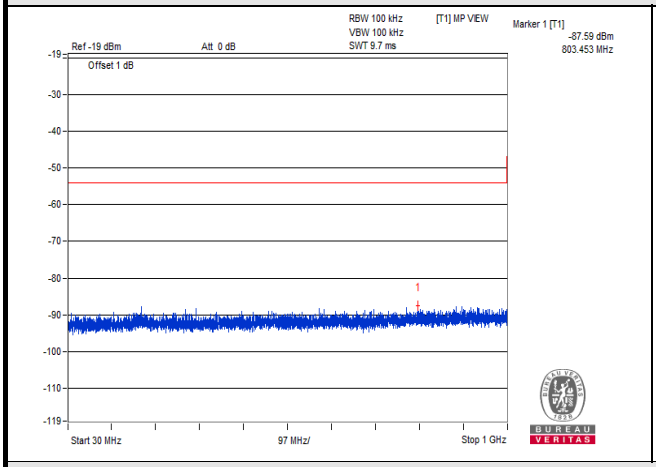
CH 1 (2404MHz)

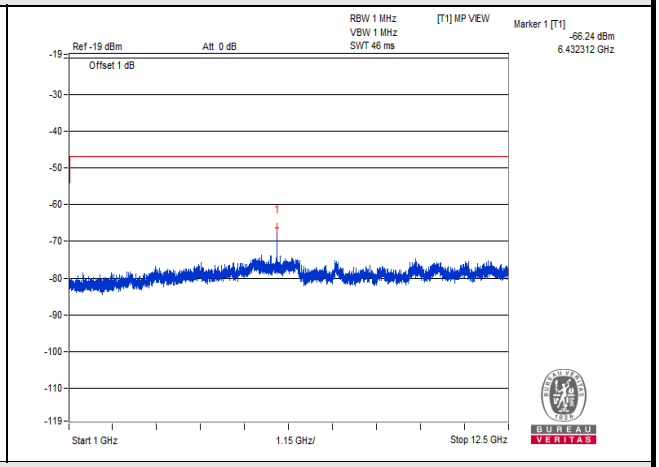
Vnormal



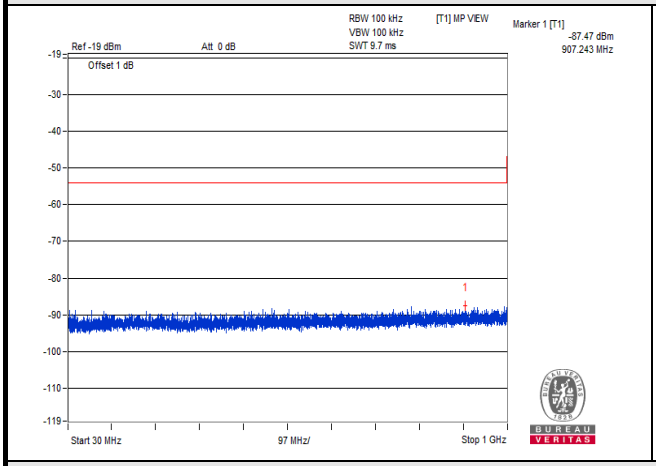


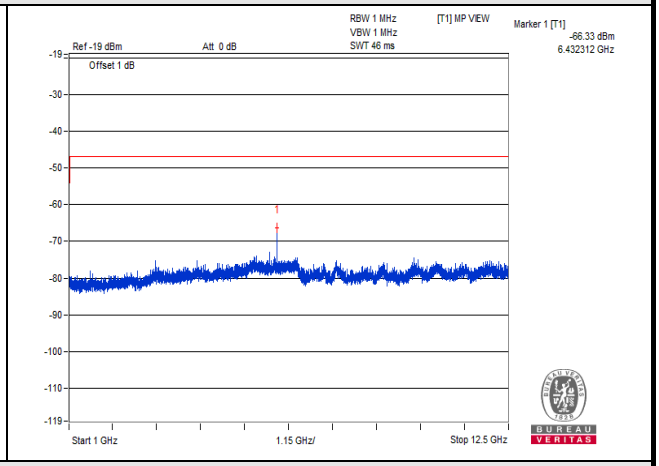
Vmax.





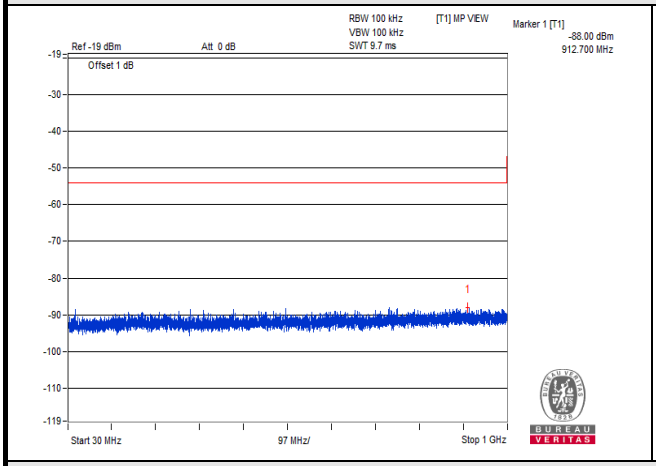
Vmin.

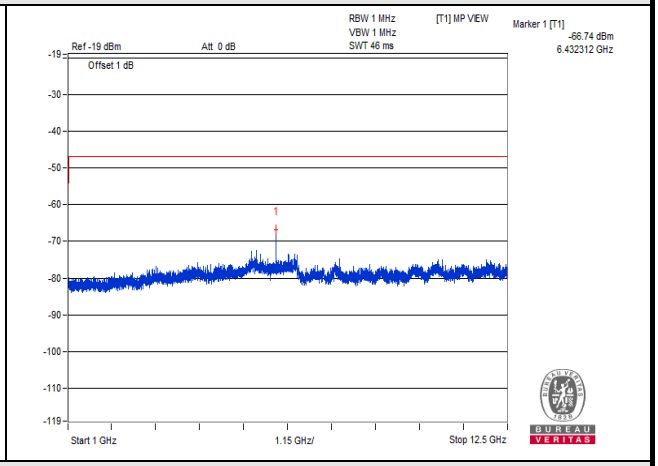




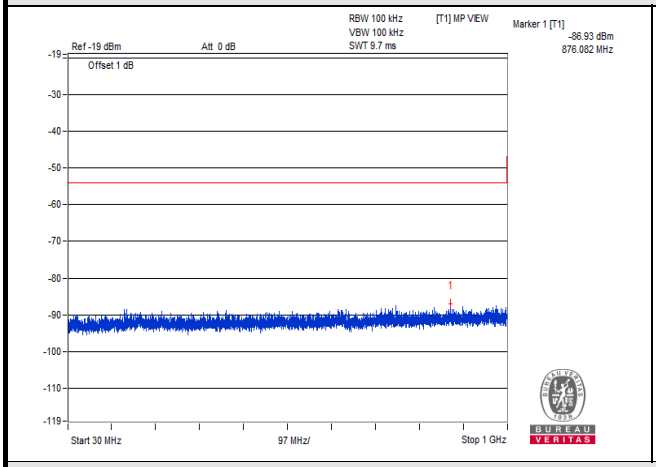
CH 19 (2440MHz)

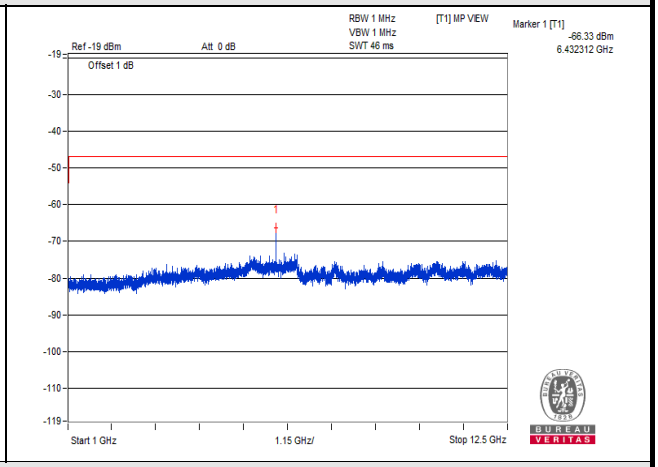
Vnormal



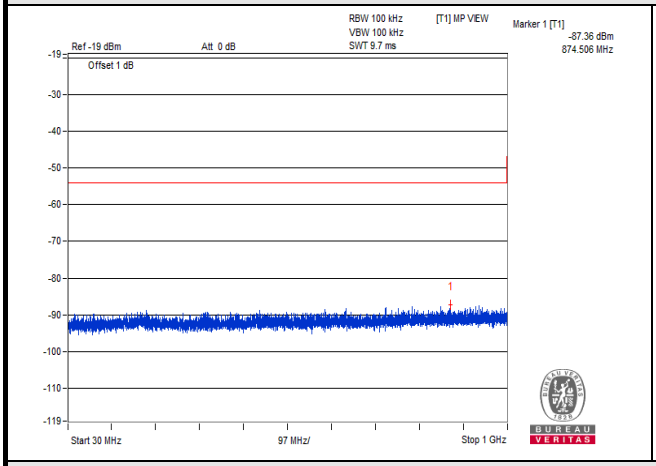


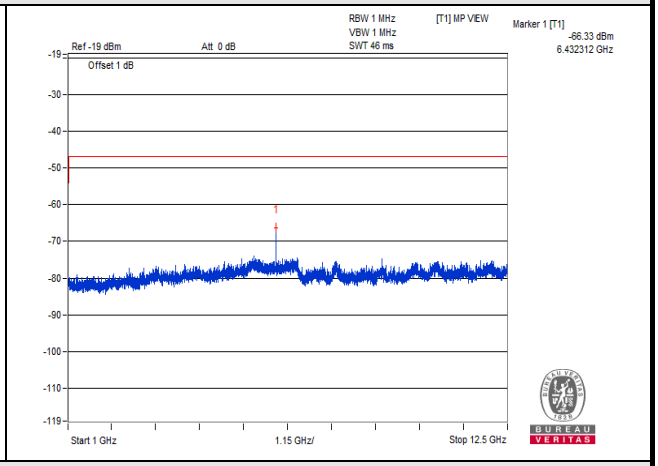
Vmax.





Vmin.





CH 38 (2478MHz)

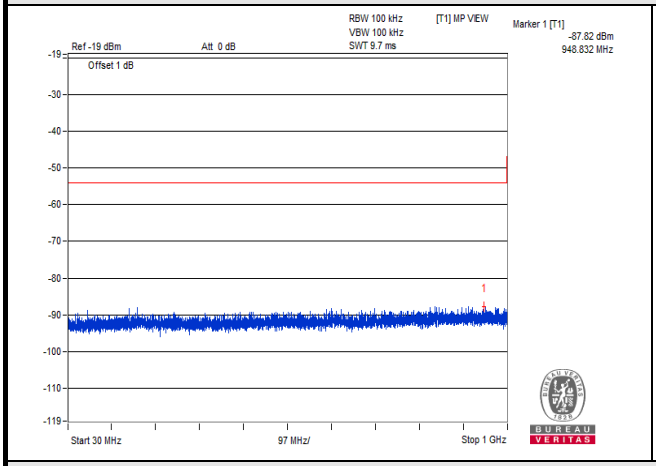
4.5.4 Test Results (Mode 2)

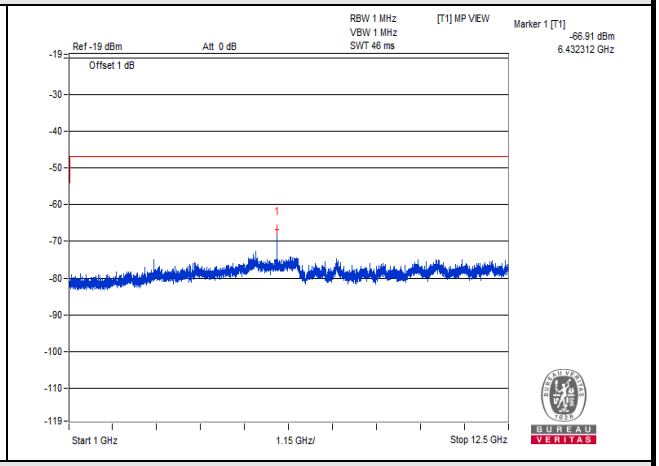
BT-LE 1M

TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	948.832	0.001652	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.203704	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	927.250	0.001730	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.246037	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	786.478	0.001758	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.247172	20.0	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	982.418	0.001607	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.214289	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	995.028	0.002099	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.225944	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	809.880	0.002239	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.199526	20.0	PASS
TEST CHANNEL		CH 39 (2480MHz)			
V_{normal}	30MHz to 1000MHz	758.955	0.001849	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.232274	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	684.022	0.001866	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.199526	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	958.653	0.001710	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.227510	20.0	PASS

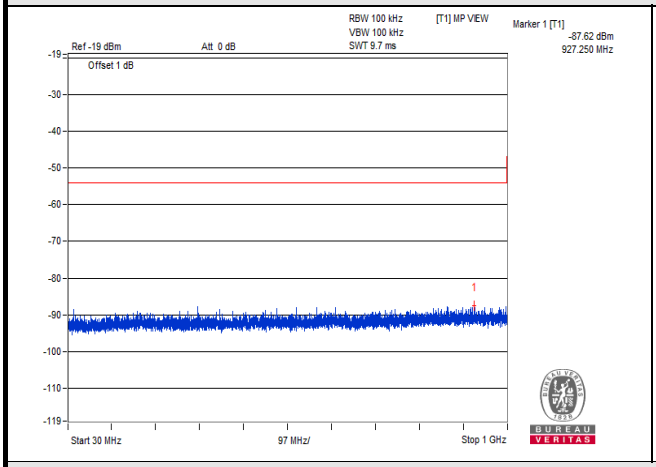
NOTE: 1. The spectrum plots are attached on the following pages.

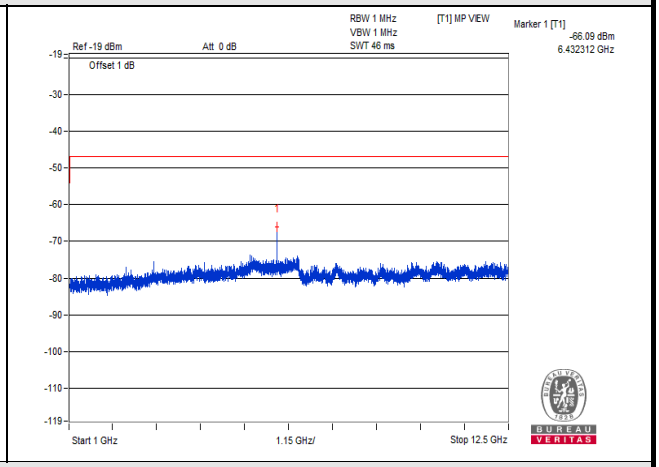
Vnormal



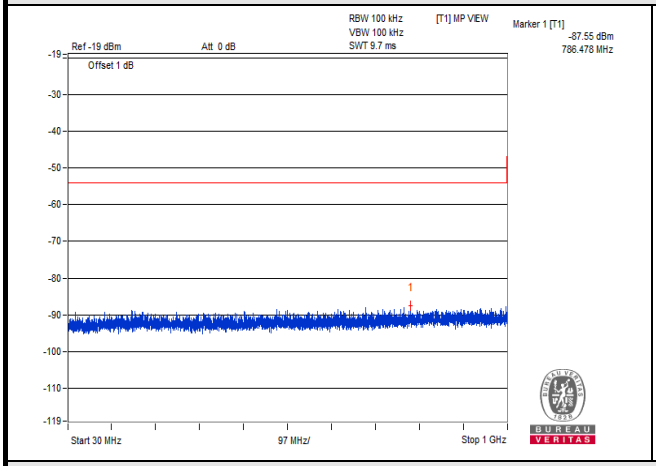


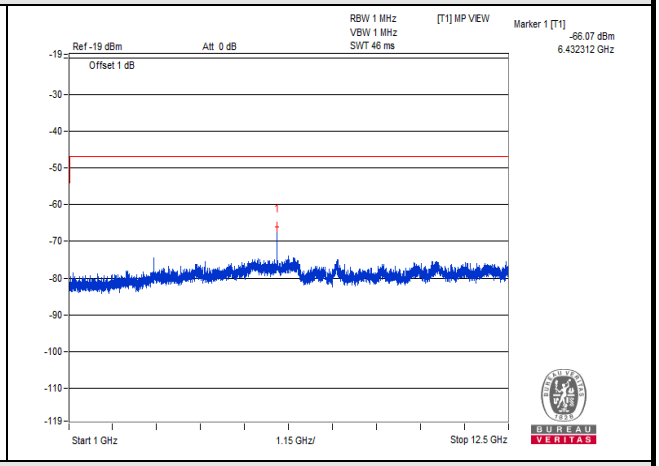
Vmax.





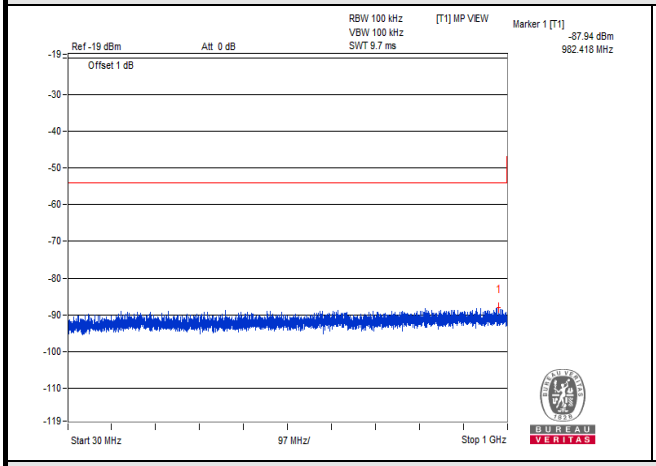
Vmin.

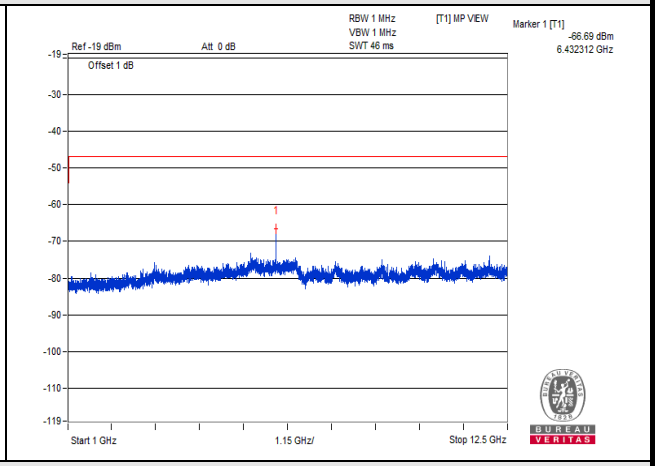




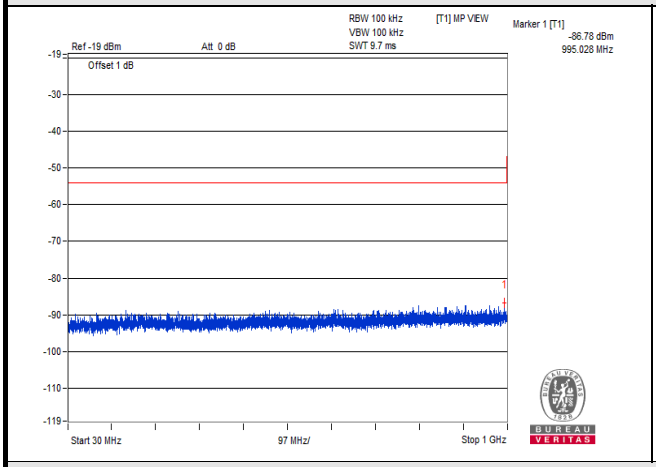
CH 0 (2402MHz)

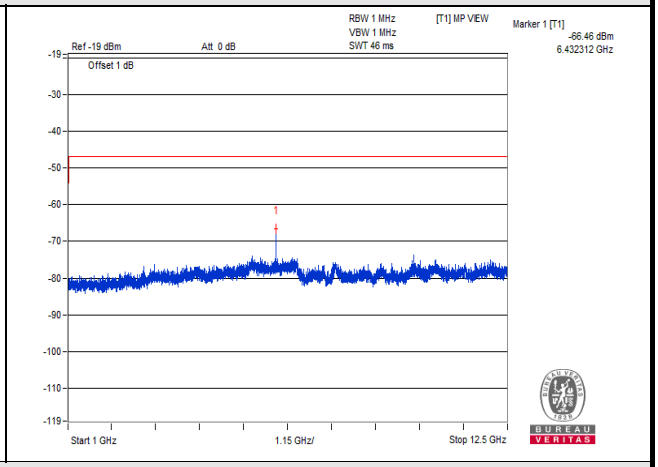
Vnormal



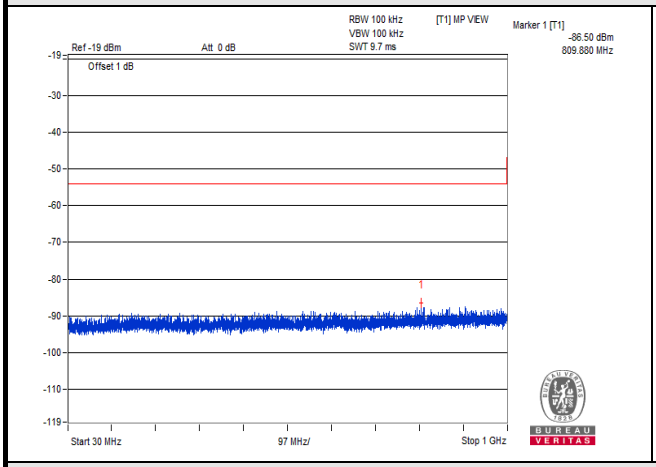


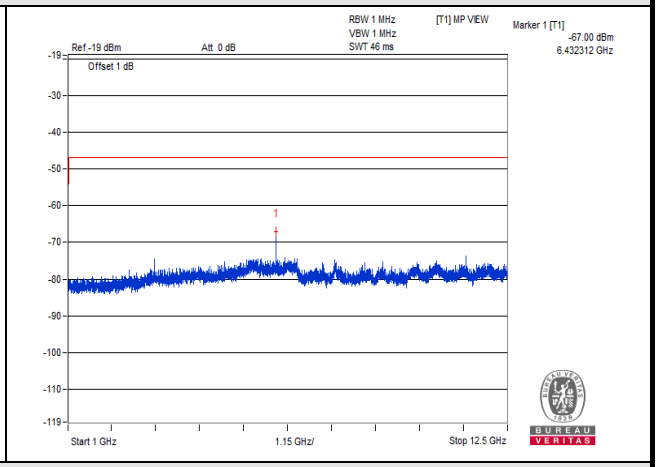
Vmax.





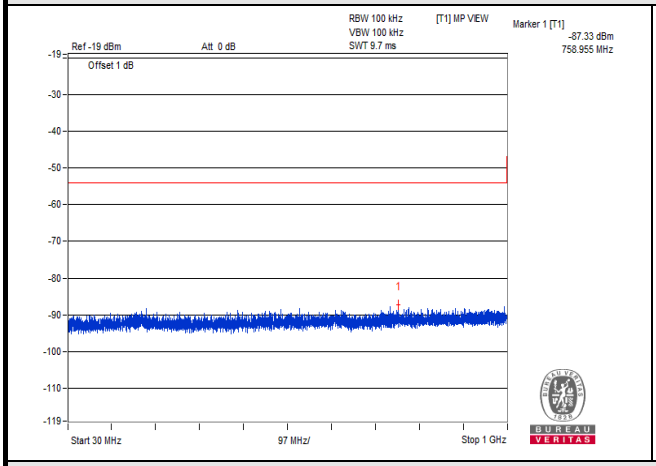
Vmin.

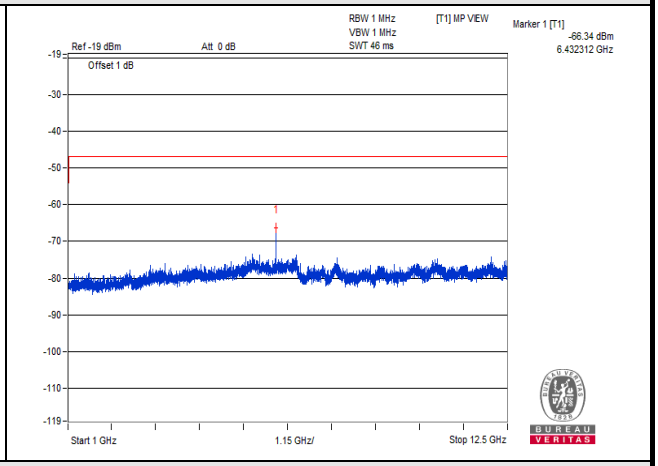




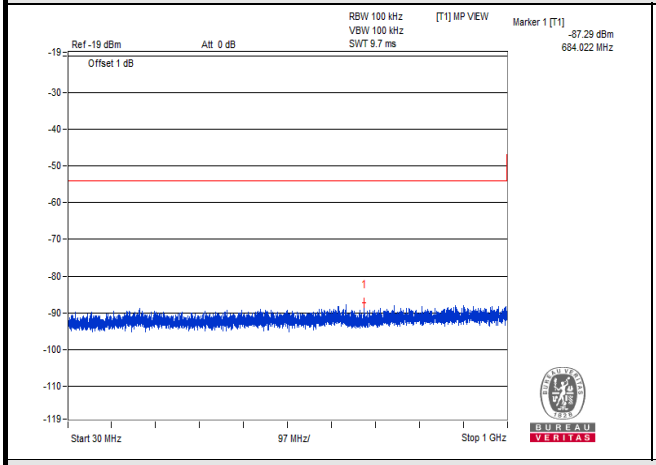
CH 19 (2440MHz)

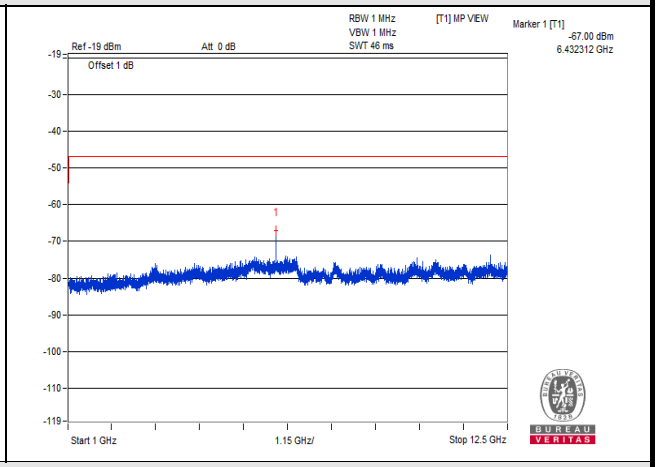
Vnormal



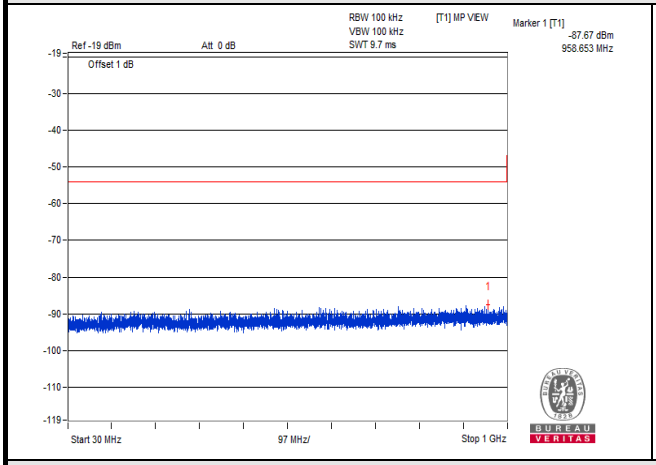


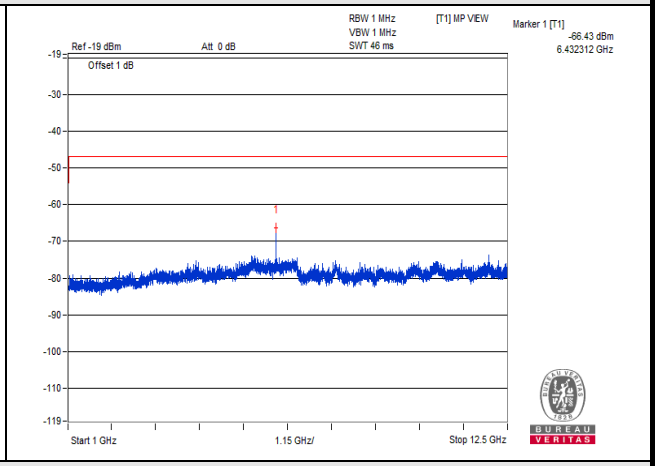
Vmax.





Vmin.





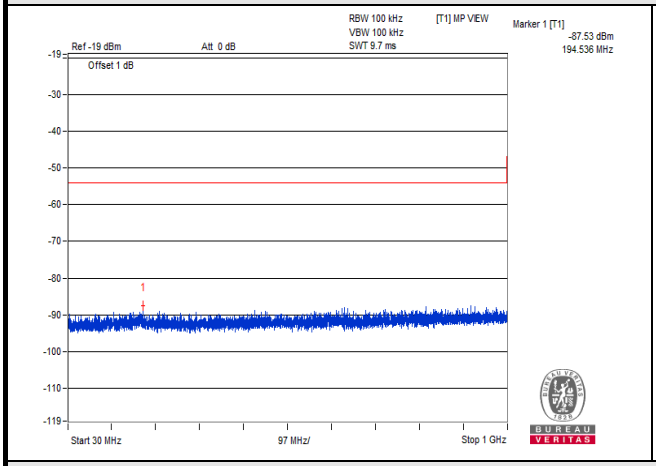
CH 39 (2480MHz)

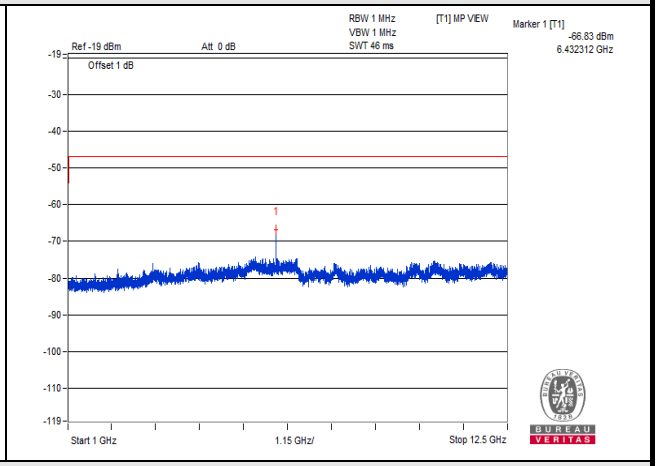
BT-LE 2M

TEST CHANNEL		CH 1 (2404MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	194.536	0.001766	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.207491	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	944.710	0.002004	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.215774	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	894.027	0.001683	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.221820	20.0	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	931.008	0.001722	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.231206	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	889.783	0.001884	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.253513	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	885.540	0.001742	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.225424	20.0	PASS
TEST CHANNEL		CH 38 (2478MHz)			
V_{normal}	30MHz to 1000MHz	965.443	0.002133	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.188365	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	940.223	0.001941	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.208930	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	638.432	0.001866	4.0	PASS
	1000MHz to 12500MHz	6432.312	0.227510	20.0	PASS

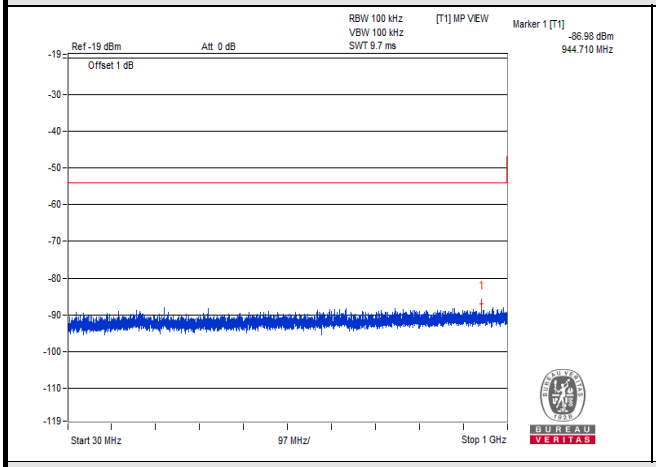
NOTE: 1. The spectrum plots are attached on the following pages.

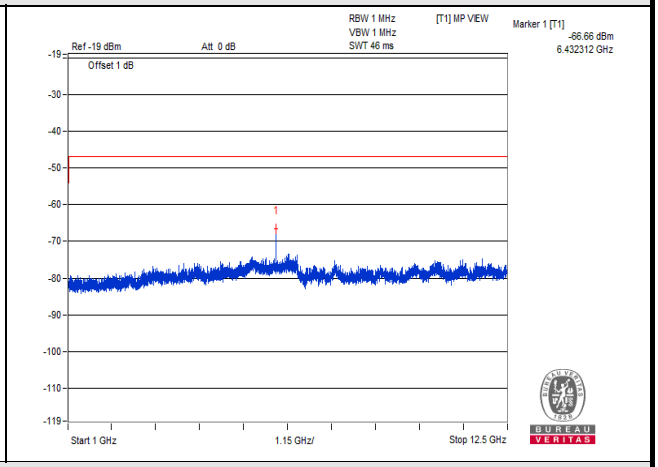
Vnormal



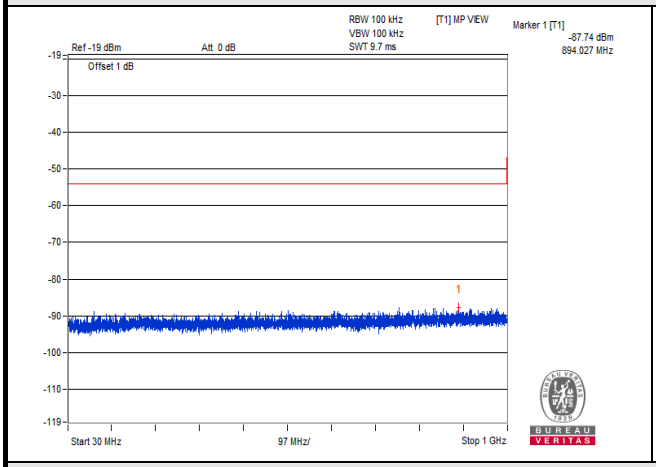


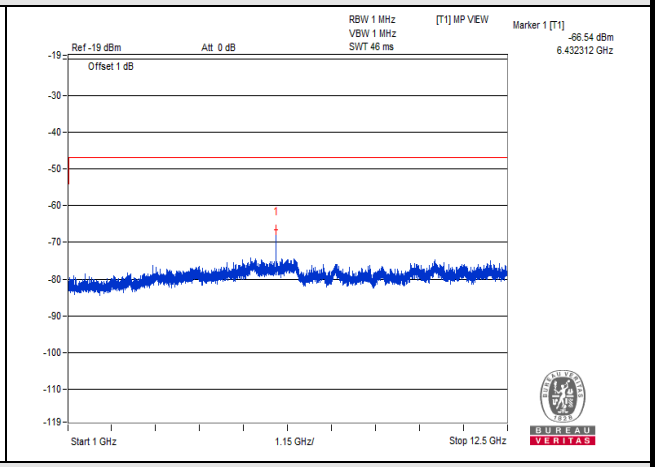
Vmax.





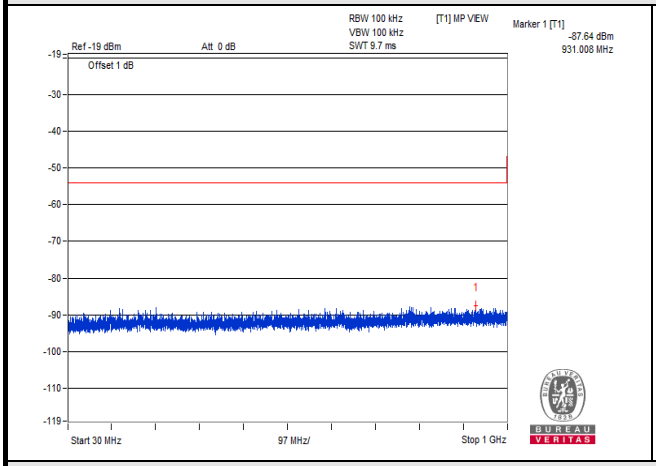
Vmin.

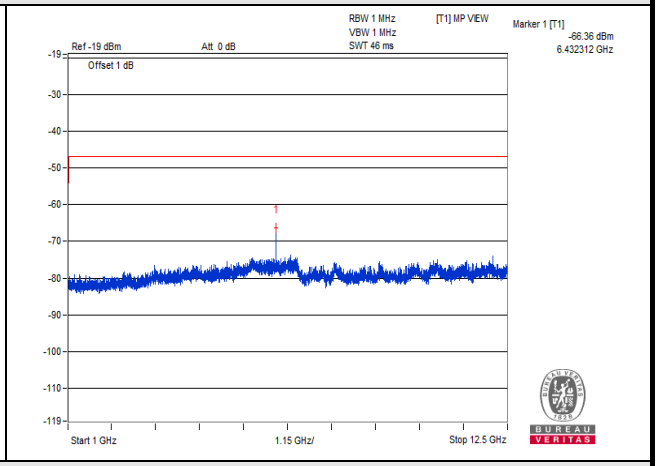




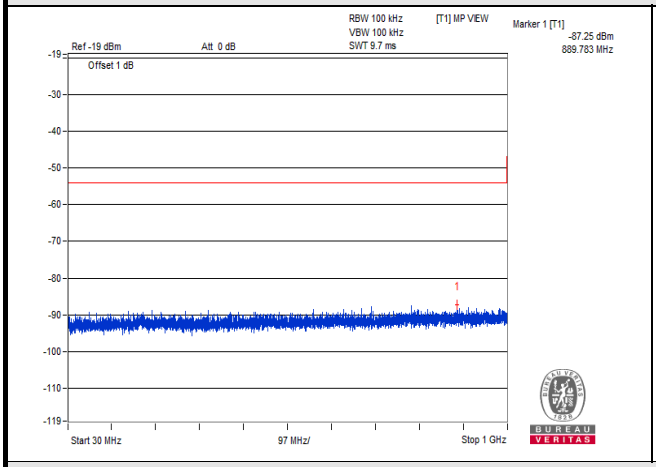
CH 1 (2404MHz)

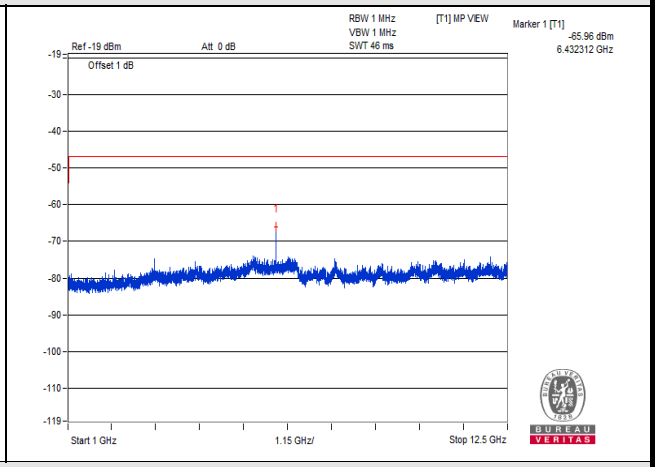
Vnormal



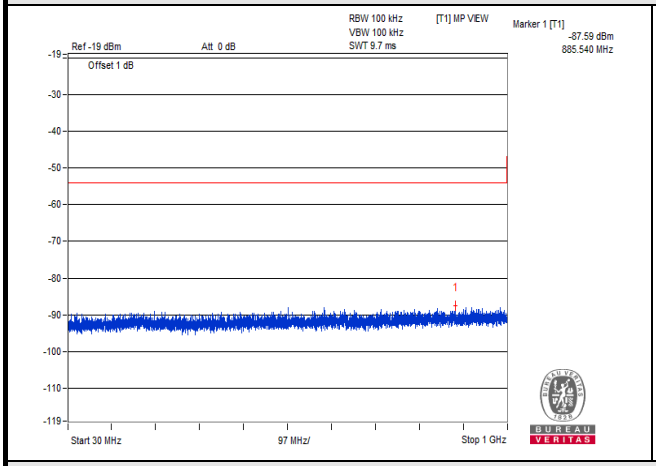


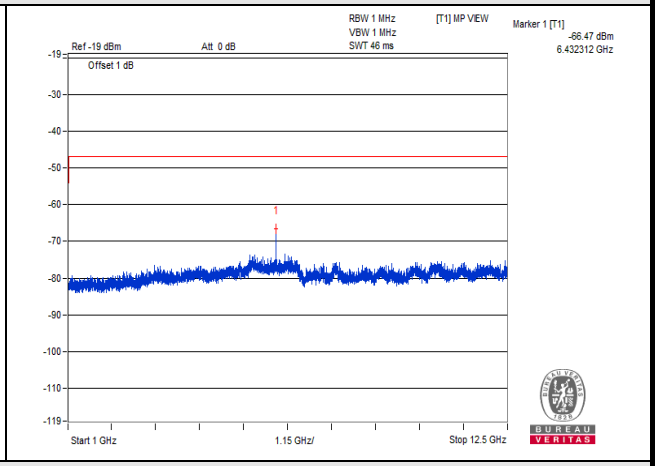
Vmax.





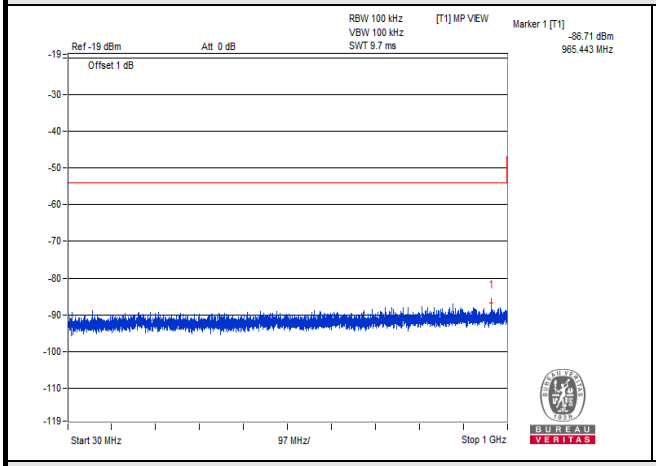
Vmin.

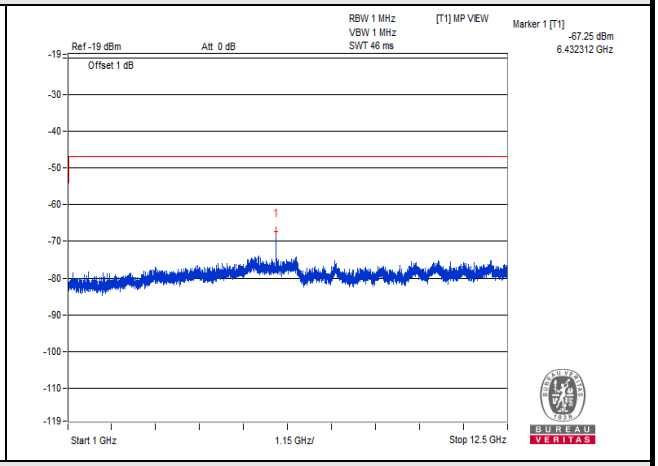




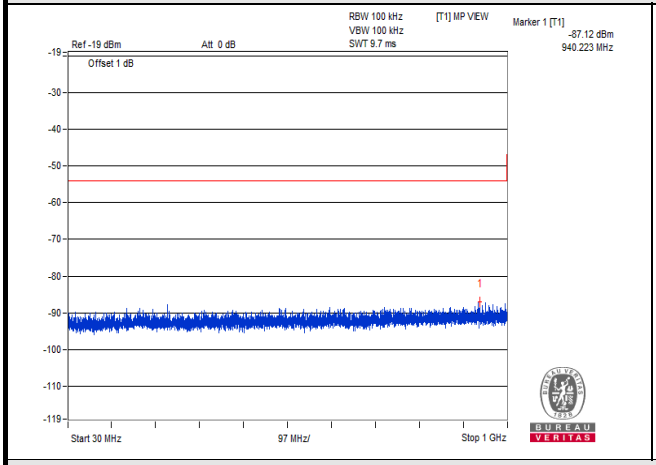
CH 19 (2440MHz)

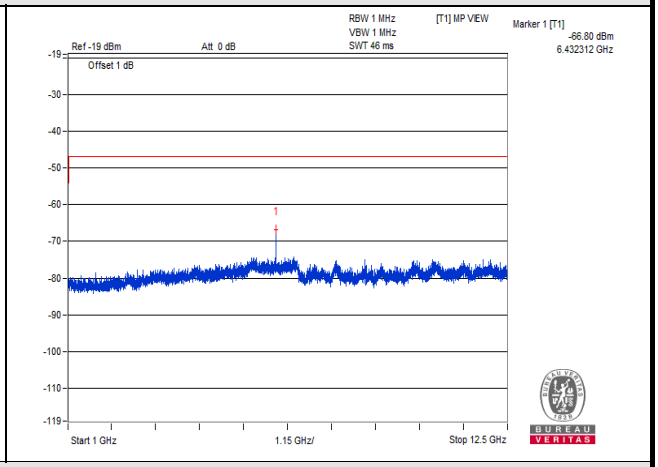
Vnormal



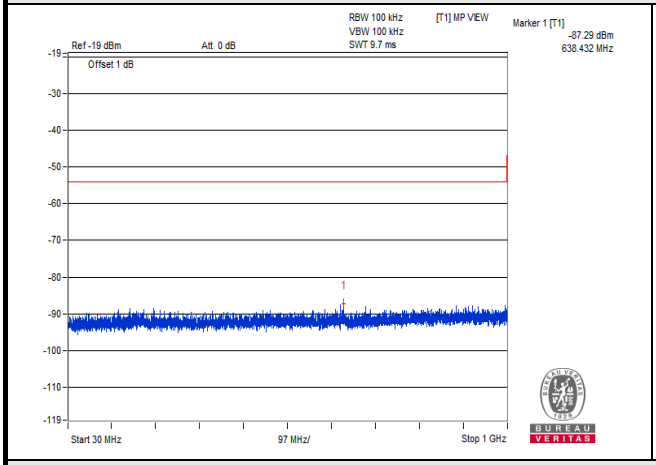


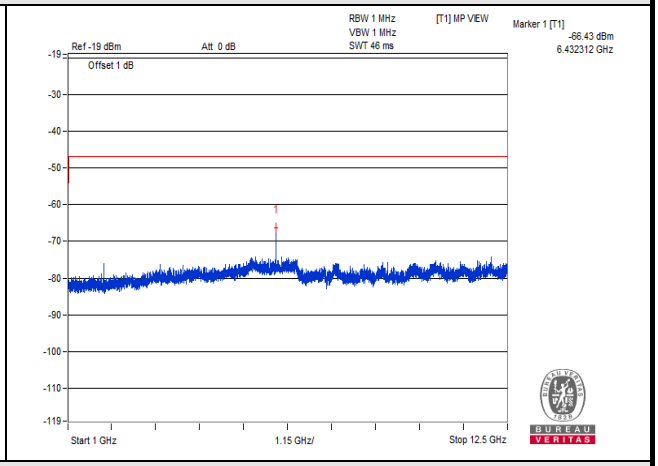
Vmax.





Vmin.





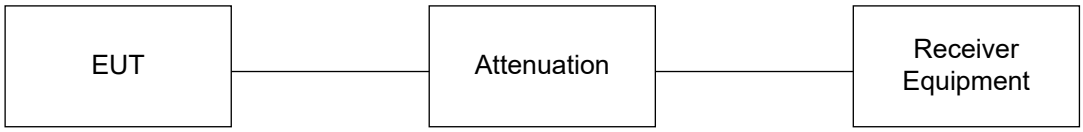
CH 38 (2478MHz)

4.6 Interference Prevention Function

4.6.1 Limits of Interference Prevention Function

Radio equipment used mainly on the same premises and automatically transmits or receives identification code.

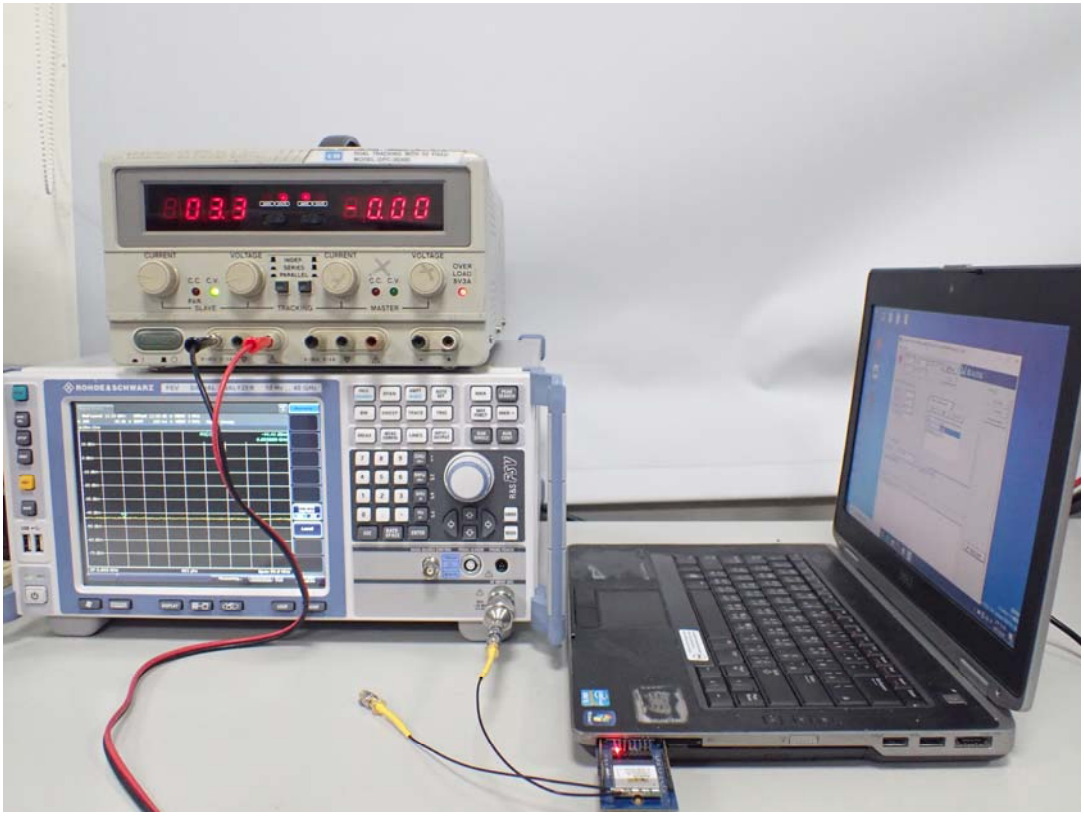
4.6.2 Test Setup



4.6.3 Test Results

Environmental Conditions	25 deg.C, 60 % RH
Link Mode	**Test Result**
BT-LE	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 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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Web Site: www.bureauveritas-adt.com

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

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