Radio Test Report

Report No.:	RJBUUY-WTW-P21061159
Test Model:	BURST PRO AIR DONGLE
Received Date:	2021/7/2
Test Date:	2021/7/21
Issued Date:	2021/10/1
Applicant:	Voyetra Turtle Beach Inc.
Address:	44 South Broadway, 4th Floor White Plains NY 10601 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RJBUUY-WTW-P21061159	Original release.	2021/10/1

1 Certificate of Conformity

Product:	Wireless Dongle
Brand:	ROCCAT
Test Model:	BURST PRO AIR DONGLE
Sample Status:	Engineering sample
Applicant:	Voyetra Turtle Beach Inc.
Test Date:	2021/7/21
Standards:	ARIB STD-T66 (V3.7), MIC notice 88 Appendix 43 Certification Ordinance Article 2-1-19

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

Prepared by : Jessica Cheng , **Date:** **2021/10/1**

Jessica Cheng / Senior Specialist

Approved by : Rex. Lai , **Date:** **2021/10/1**

Rex Lai / Associate 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)	4.4	Spurious emissions	C
Transmitting Equipment				
F	3.2 (2)	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	NA
--	3.2 (2)	4.4	Antenna power	C
--	3.6 (2)	4.4	Absolute gain of transmitting antenna	C
--	3.6 (2)	4.4	Angular width of principal radiation (AWPR)	NA
--	3.2 (10)	--	Number of carriers within 1 MHz bandwidth in OFDM	NA
--	3.2 (8)	--	Diffusion 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	Cal. Method
MIMO Powermeasurement Test set (4X4) KEYSIGHT	U2021XA	U2021XA_001	2021/6/16	2022/6/15	ETC	c)
Spectrum Analyzer R&S	FSV40	101042	2020/9/8	2021/9/7	ETC	c)
Spectrum Analyzer KEYSIGHT	N9030A	MY54490260	2020/7/22	2021/7/21	ETC	c)
Pulse Power Sensor Anritsu	MA2411B	0738404	2021/4/15	2022/4/14	ETC	c)
Peak Power meter Anritsu	ML2495A	0842014	2021/4/15	2022/4/14	ETC	c)
MXG Vector Signal Generator KEYSIGHT	N5182B	MY53052658	2021/5/19	2022/5/18	ETC	c)
Agilent Mobile Comm Dual ps w/Battery Emulation	66319D	MY43005576	2020/10/19	2021/10/18	Agilent	c)
Fluke True RMS Clamp Meter	325	31130711WS	2021/6/2	2022/6/1	ETC	c)

NOTE: 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)～ TELEC EngeneeringCenter, Intertek Japan K.K., Keysight Technologies, Inc～.
b)：Correction conducted pursuant to the provisions of Article 135 or Article 144 of the MeasurementLaw (Law No. 51 of 1992)～Japan Calibration Service Syste～
c)：Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted bythe NICT or a designated calibration agency under Article 102-18 paragraph (1)～ TELEC EngeneeringCenter, Intertek Japan K.K., Keysight Technologies, Inc～.
d)：Calibration conducted by using other equipment that listed above from a) to c)

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	206.50 Hz
Spurious emissions	3.93 dB
Output power density	1.11 dB
Out of band radiated power	3.93 dB
Frequency Tolerance	603.76 Hz

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless Dongle
Brand	ROCCAT
Test Model	BURST PRO AIR DONGLE
Status of EUT	Engineering sample
Nominal Voltage	5Vdc from host equipment
Modulation Type	GFSK
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	40
Rated RF Output Power	0.8mW
Conducted RF Output Power	0.743mW
Radiated RF Output Power	1.321mW
Antenna Type	Chip antenna with 2.5dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

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

2. 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.

3.2 Description of Test Modes

40 channels are provided to this EUT:

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

Note: 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 provided by manufacture, the power levels during the tests were set according to the following codes:

Channel	Power setting
0	0
19	0
39	0

3.3 Test Conditions

Test Conditions		Voltage (Vdc)
V_{normal}	-	5
$V_{max.}$	+10%	5.5 (Note)
$V_{min.}$	-10%	4.5 (Note)

Test modes are presented in the report as below:

Test Item	Environmental Conditions
Frequency Tolerance	25 deg.C, 76% RH
Occupied Bandwidth	25 deg.C, 76% RH
Spurious Emissions for Transmitter	25 deg.C, 76% RH
Antenna Power	25 deg.C, 76% RH
Spurious Emissions for Receiver	25 deg.C, 76% RH
Interference Prevention Function	25 deg.C, 76% RH

3.4 Assembly

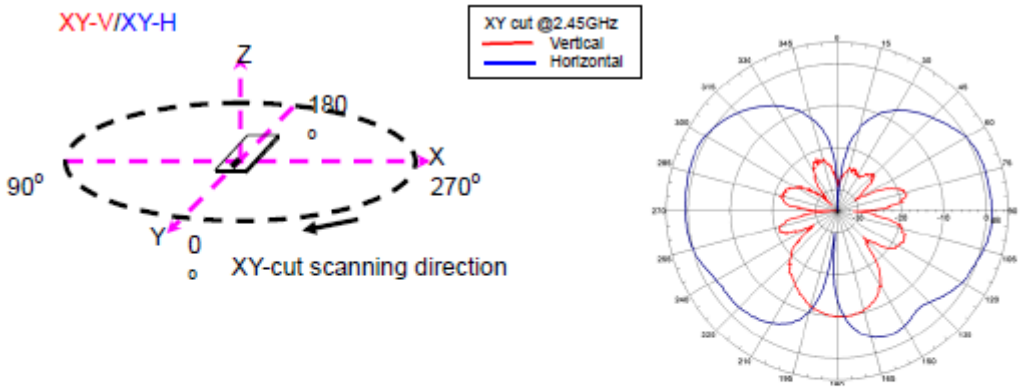
The EUT is constructed as a Wireless Dongle that is constructed as a standalone unit. The housing consists of two plastic parts, affirmed together by means of deforming. Separating the two parts (i.e operating of the housing) was only possible by means of brute force.

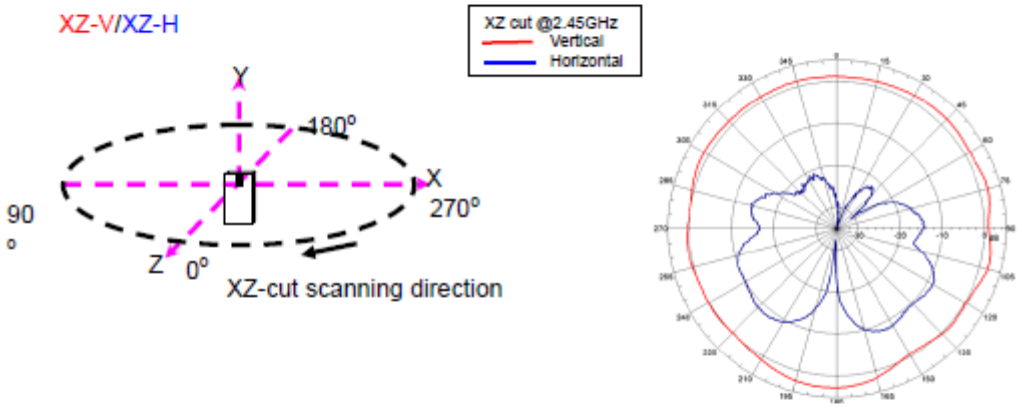
3.5 Antenna Specifications

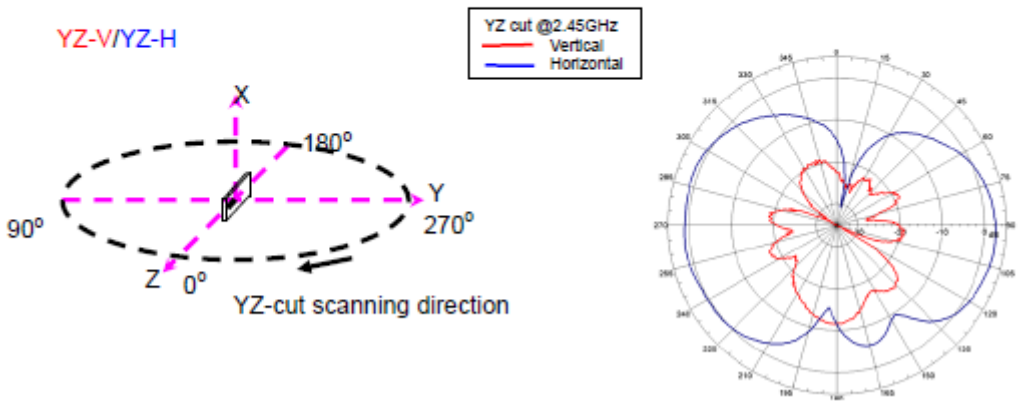
3.5.1 Antenna Gain

Antenna Type	Max. Gain (dBi)
Chip antenna	2.5

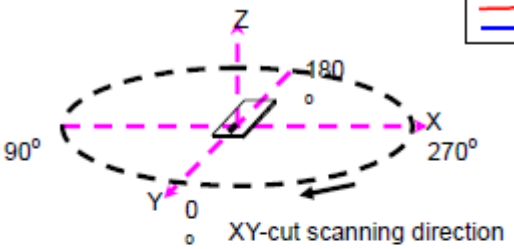
3.5.2 Antenna Pattern

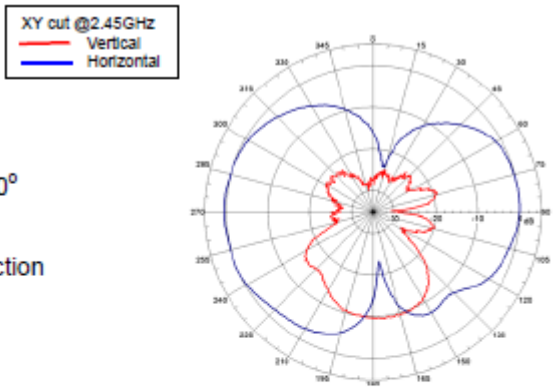




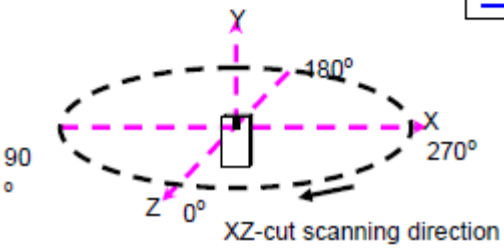


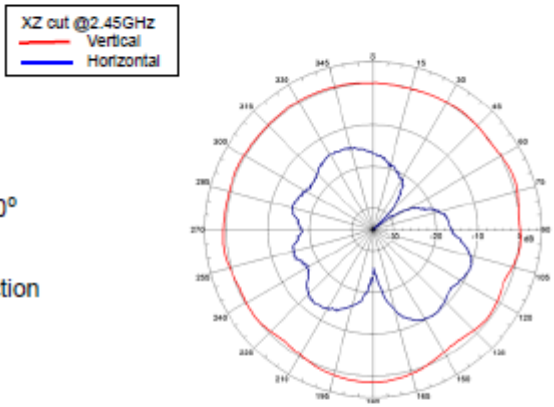
XY-V/XY-H



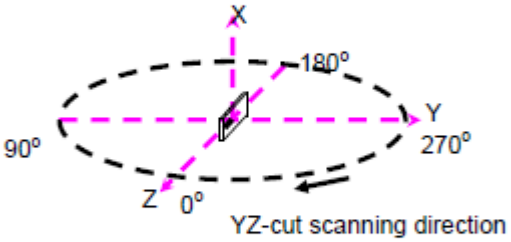


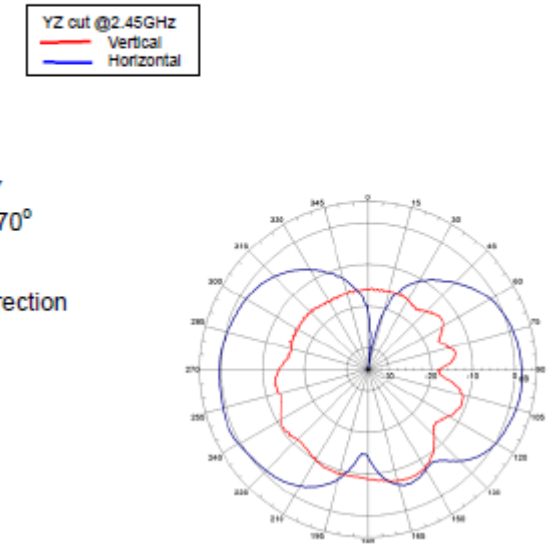
XZ-V/XZ-H





YZ-V/YZ-H





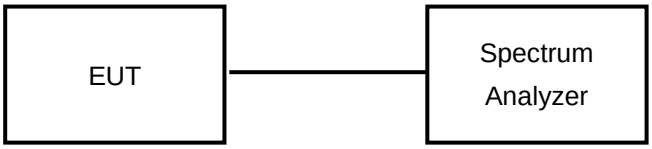
4 Test Results

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

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	2402.008920	3.713	2402.008720	3.630	2402.008560	3.563
19	2440	2440.008560	3.508	2440.008439	3.458	2440.008360	3.426
39	2480	2480.008360	3.370	2480.008240	3.322	2480.008200	3.306

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

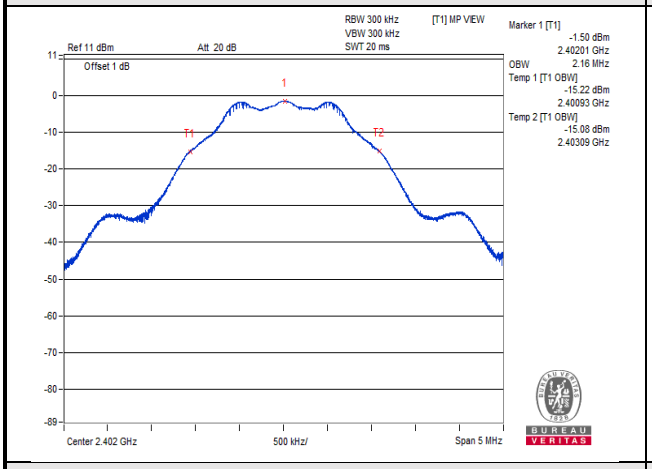
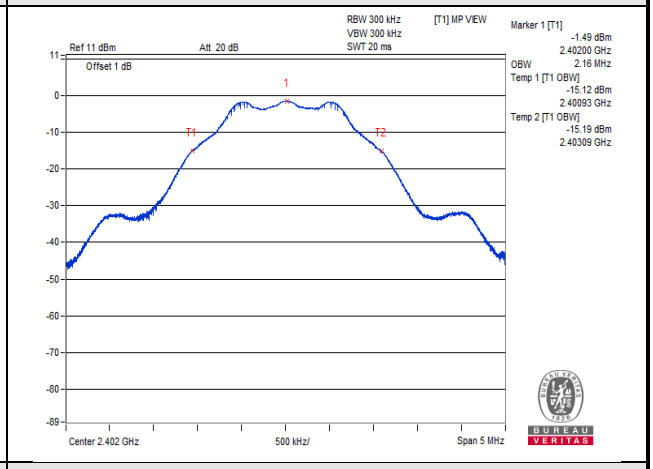
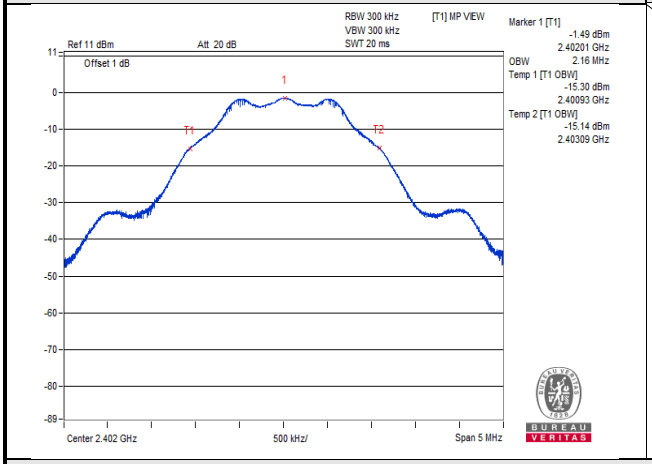
Item	Limit
Occupied bandwidth	<26MHz

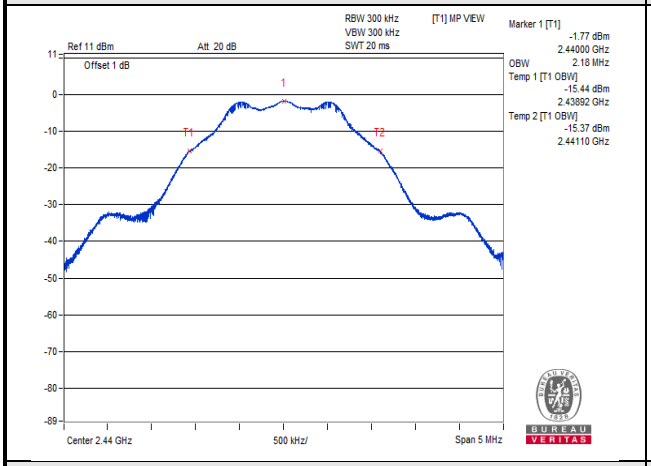
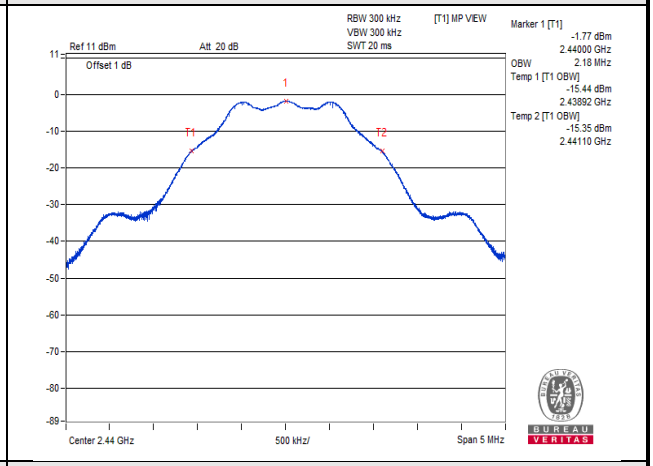
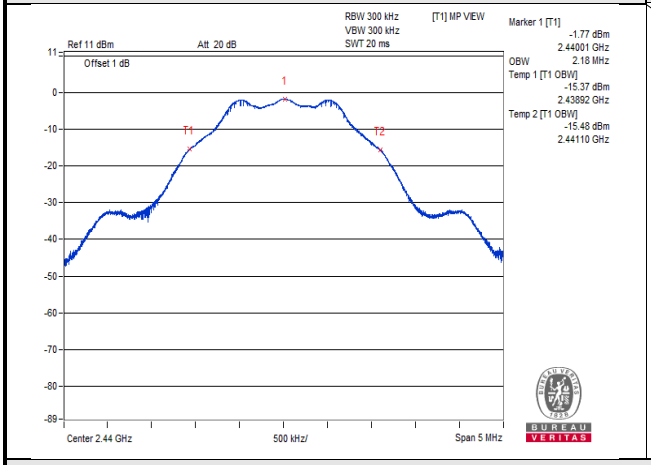
4.2.2 Test Setup

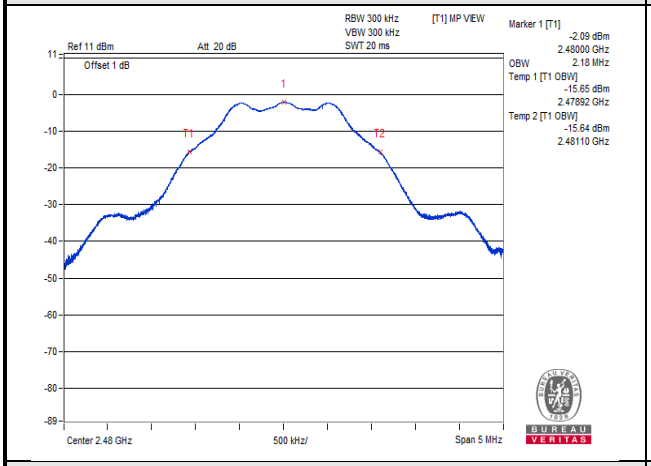
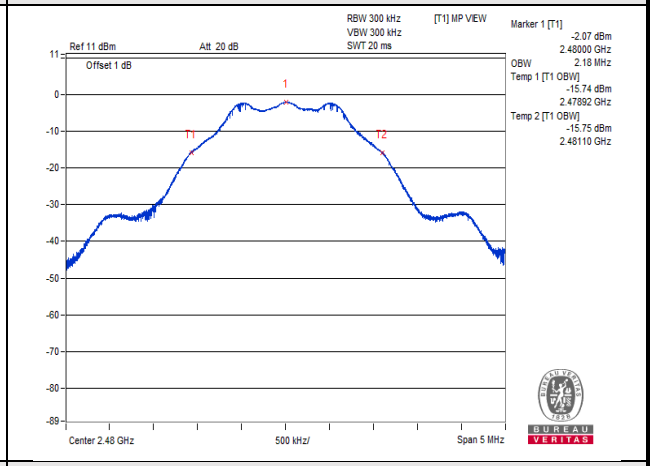
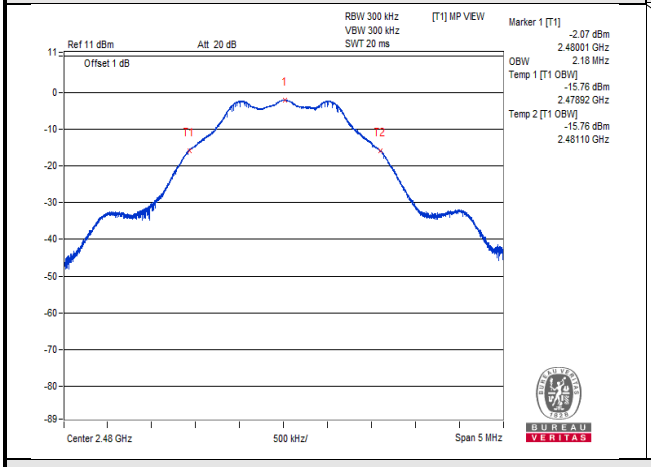
4.2.3 Test Results

Channel	Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
		Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
0	2402	2.16	2.16	2.16
19	2440	2.18	2.18	2.18
39	2480	2.18	2.18	2.18

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

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)	

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

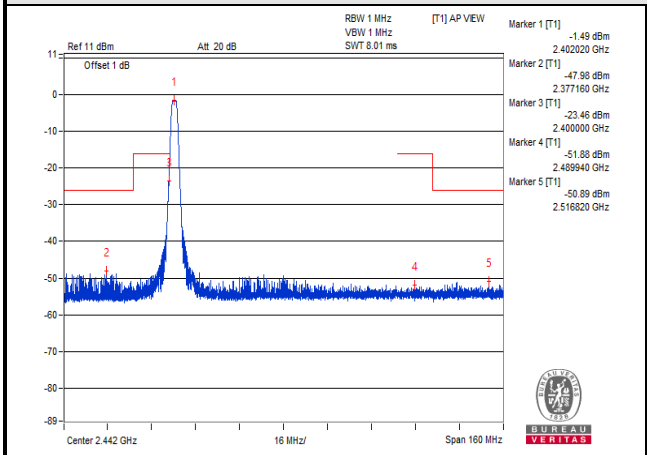
4.3.3 Test Results

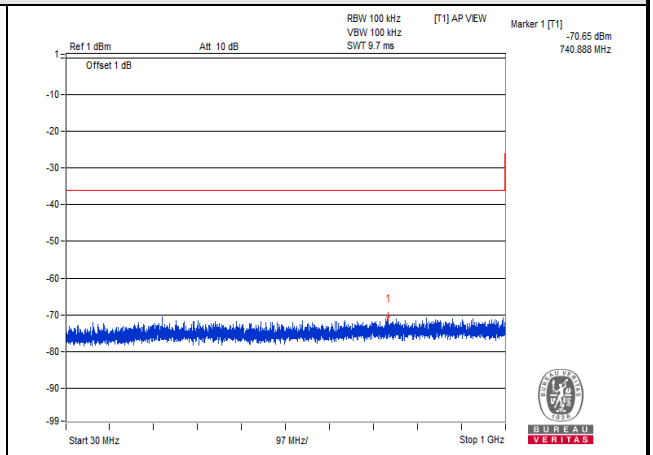
TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	740.888	0.000086	0.25	PASS
	1000MHz to 2387MHz	2384.399	0.010593	2.5	PASS
	2387MHz to 2400MHz	2399.995	4.634469	25	PASS
	2483.5MHz to 2496.5MHz	2489.673	0.007031	25	PASS
	2496.5MHz to 12500MHz	4804.807	0.050234	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	879.720	0.000110	0.25	PASS
	1000MHz to 2387MHz	2364.461	0.008995	2.5	PASS
	2387MHz to 2400MHz	2399.996	4.731513	25	PASS
	2483.5MHz to 2496.5MHz	2493.877	0.007709	25	PASS
	2496.5MHz to 12500MHz	4803.557	0.058210	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	781.265	0.000118	0.25	PASS
	1000MHz to 2387MHz	2366.368	0.012764	2.5	PASS
	2387MHz to 2400MHz	2399.998	4.666594	25	PASS
	2483.5MHz to 2496.5MHz	2486.191	0.007962	25	PASS
	2496.5MHz to 12500MHz	4804.807	0.048417	2.5	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	842.860	0.000092	0.25	PASS
	1000MHz to 2387MHz	2272.399	0.006607	2.5	PASS
	2387MHz to 2400MHz	2398.994	0.012560	25	PASS
	2483.5MHz to 2496.5MHz	2483.751	0.012912	25	PASS
	2496.5MHz to 12500MHz	4881.084	0.046666	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	880.690	0.000093	0.25	PASS
	1000MHz to 2387MHz	1486.663	0.006026	2.5	PASS
	2387MHz to 2400MHz	2392.182	0.009141	25	PASS
	2483.5MHz to 2496.5MHz	2495.094	0.008166	25	PASS
	2496.5MHz to 12500MHz	4879.833	0.036392	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	950.772	0.000093	0.25	PASS
	1000MHz to 2387MHz	2350.764	0.006194	2.5	PASS
	2387MHz to 2400MHz	2396.611	0.013804	25	PASS
	2483.5MHz to 2496.5MHz	2484.663	0.009528	25	PASS
	2496.5MHz to 12500MHz	4878.583	0.042560	2.5	PASS

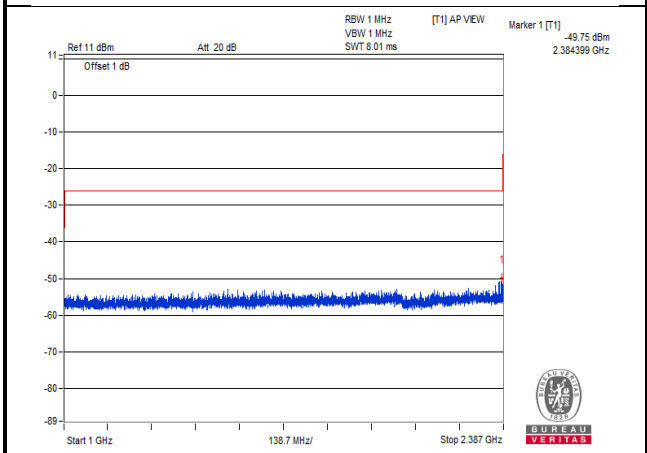
TEST CHANNEL		CH 39 (2480MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	874.991	0.000100	0.25	PASS
	1000MHz to 2387MHz	2223.854	0.005610	2.5	PASS
	2387MHz to 2400MHz	2394.769	0.007674	25	PASS
	2483.5MHz to 2496.5MHz	2483.534	0.118850	25	PASS
	2496.5MHz to 12500MHz	4958.611	0.037239	2.5	PASS
$V_{max.}$	30MHz to 1000MHz	914.276	0.000091	0.25	PASS
	1000MHz to 2387MHz	2068.856	0.005572	2.5	PASS
	2387MHz to 2400MHz	2390.142	0.006223	25	PASS
	2483.5MHz to 2496.5MHz	2483.504	0.115345	25	PASS
	2496.5MHz to 12500MHz	4959.861	0.029648	2.5	PASS
$V_{min.}$	30MHz to 1000MHz	963.140	0.000088	0.25	PASS
	1000MHz to 2387MHz	2010.602	0.006026	2.5	PASS
	2387MHz to 2400MHz	2387.372	0.005943	25	PASS
	2483.5MHz to 2496.5MHz	2483.519	0.120226	25	PASS
	2496.5MHz to 12500MHz	4961.112	0.048306	2.5	PASS

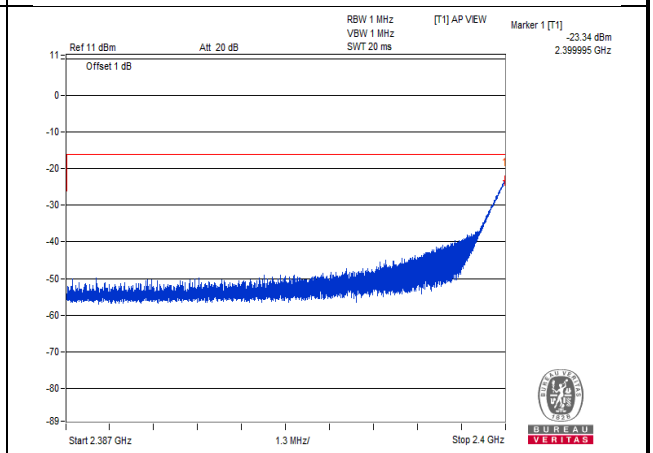
NOTE: 1. The spectrum plots are attached on the following pages.

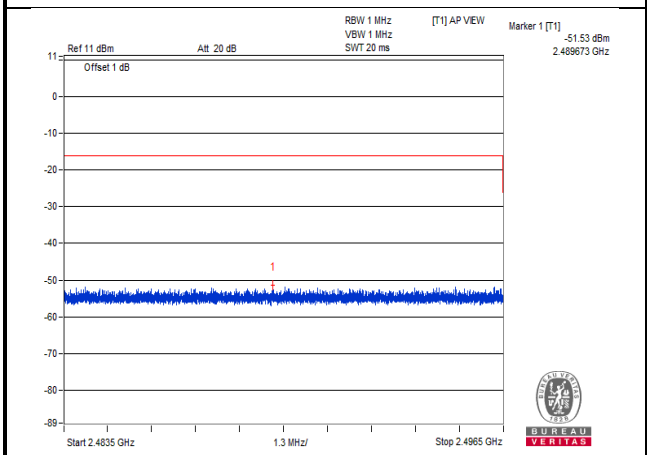
Vnormal

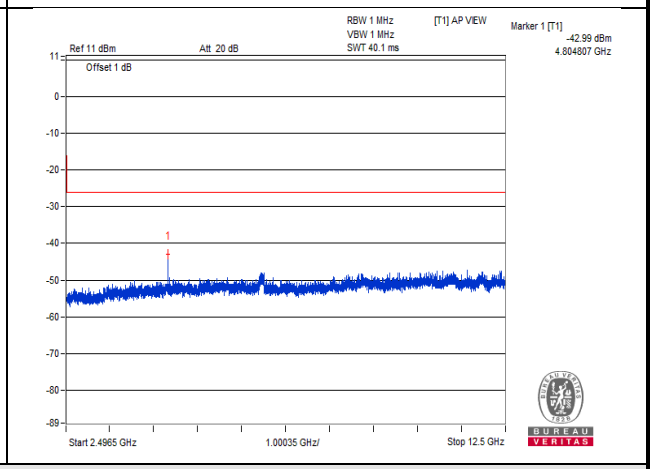






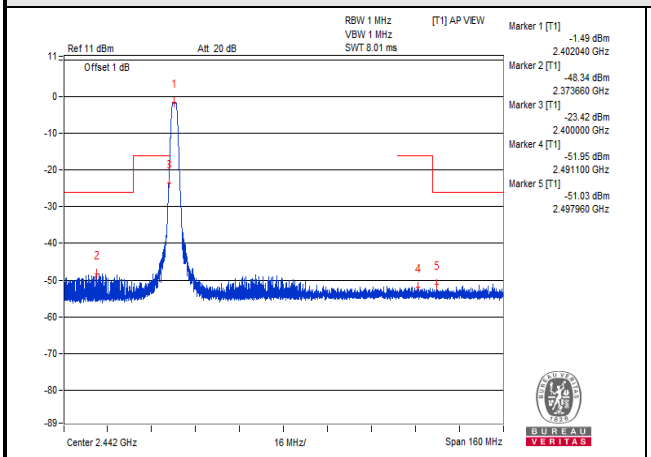


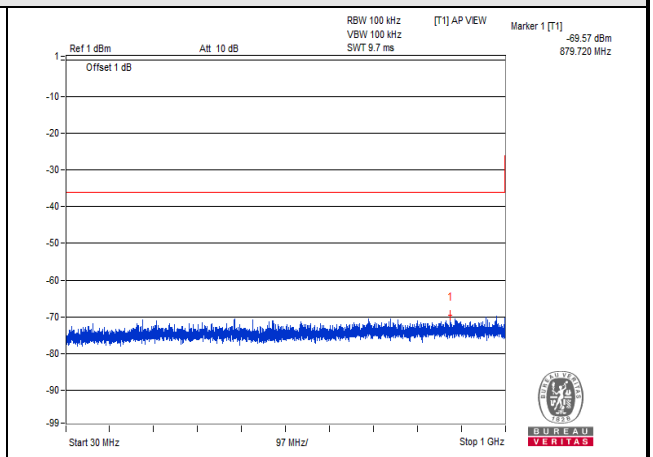


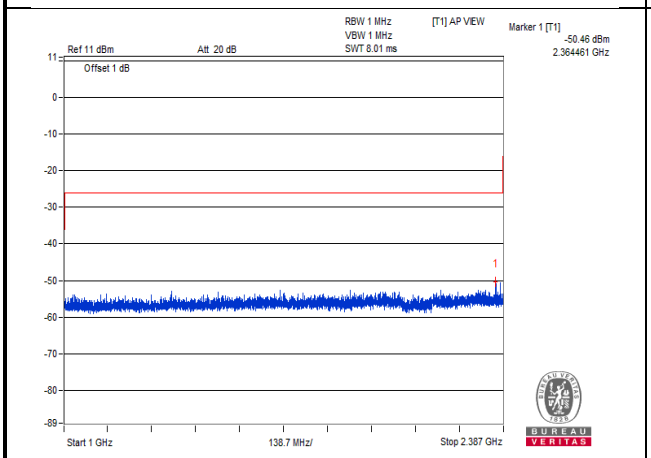


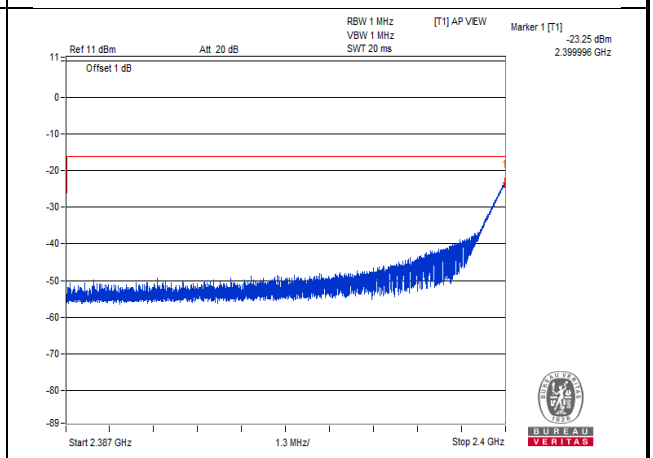
CH 0 (2402MHz)

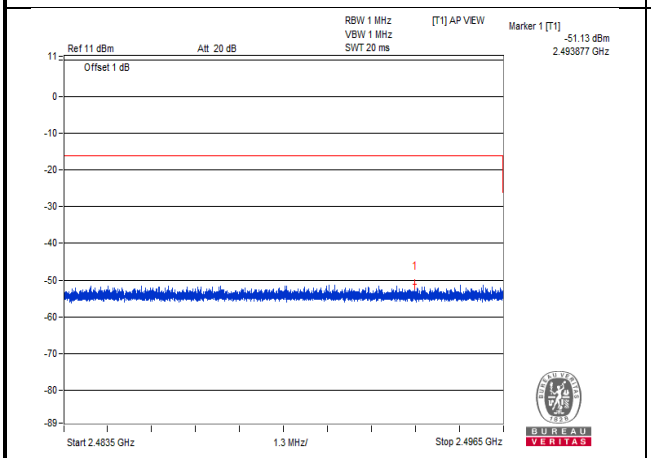
Vmax.

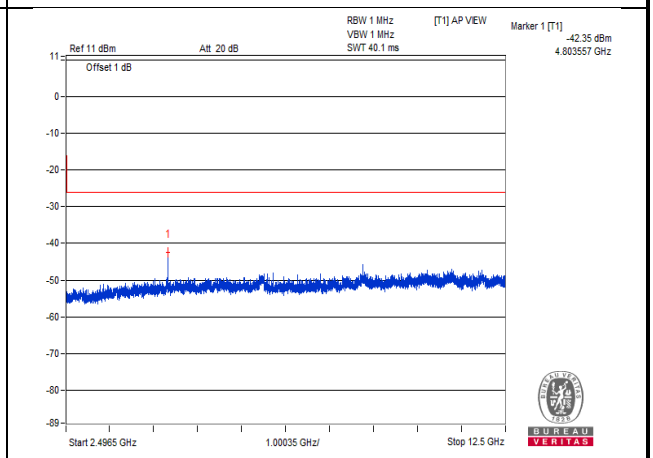






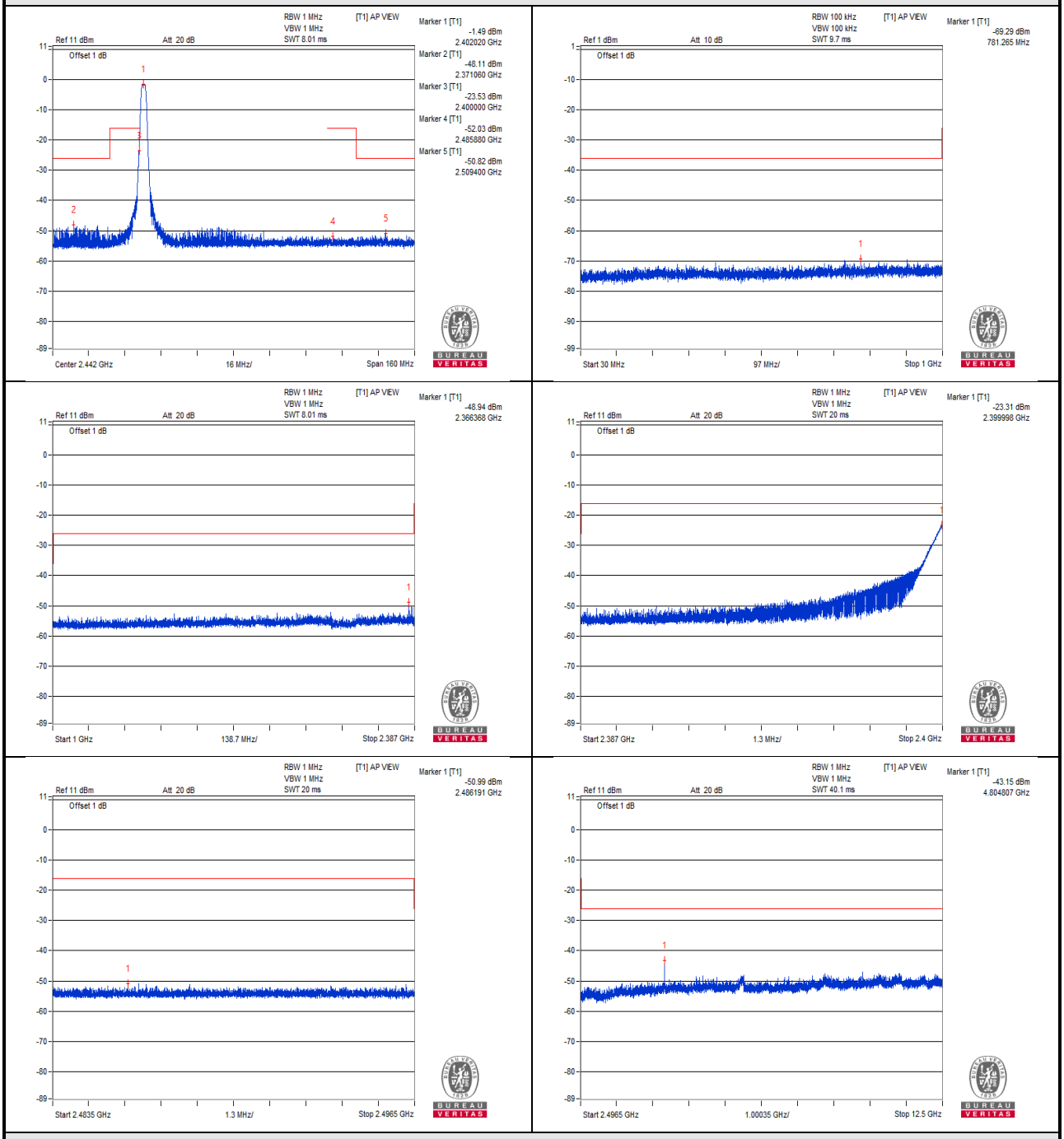






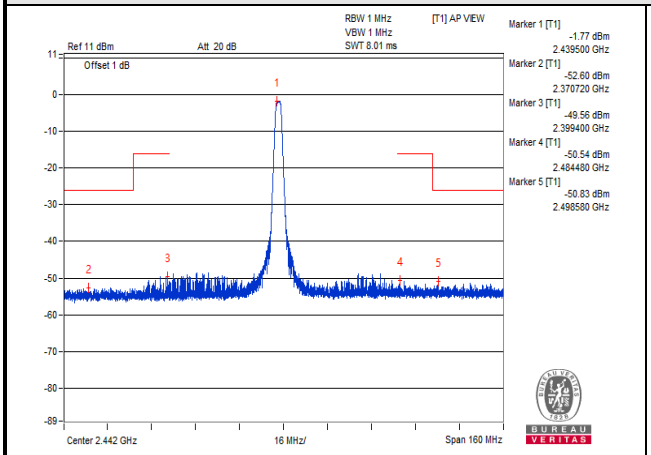
CH 0 (2402MHz)

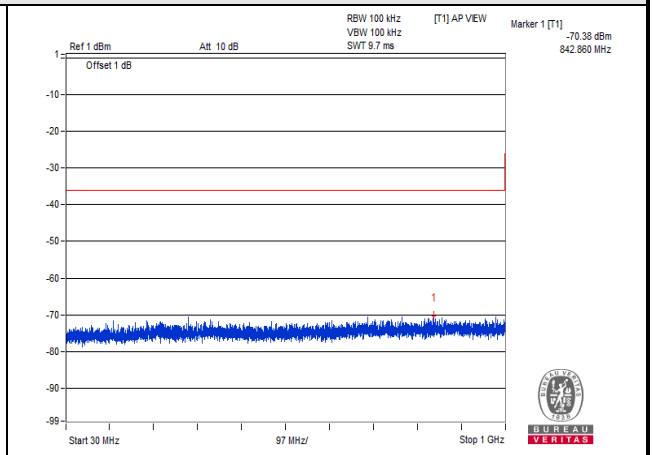
Vmin.

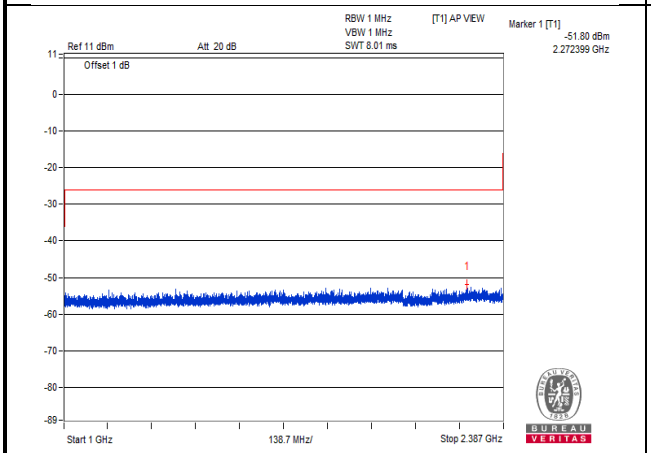


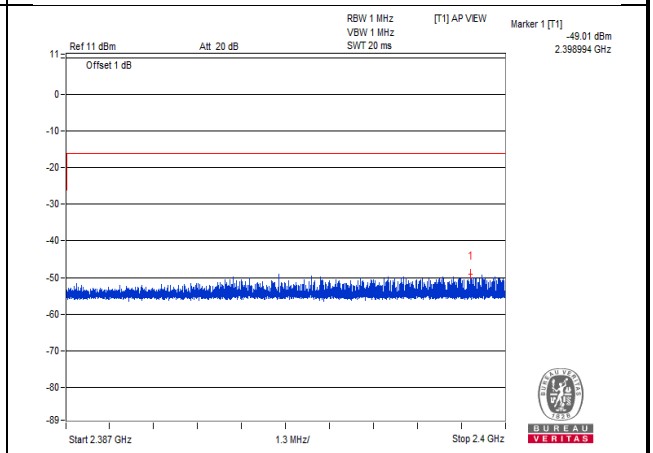
CH 0 (2402MHz)

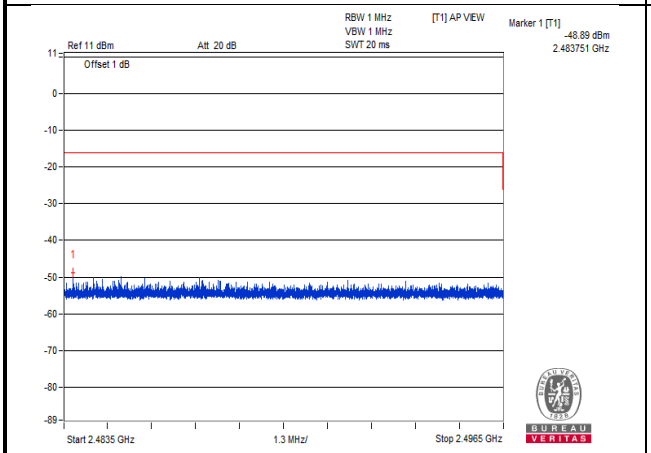
Vnormal

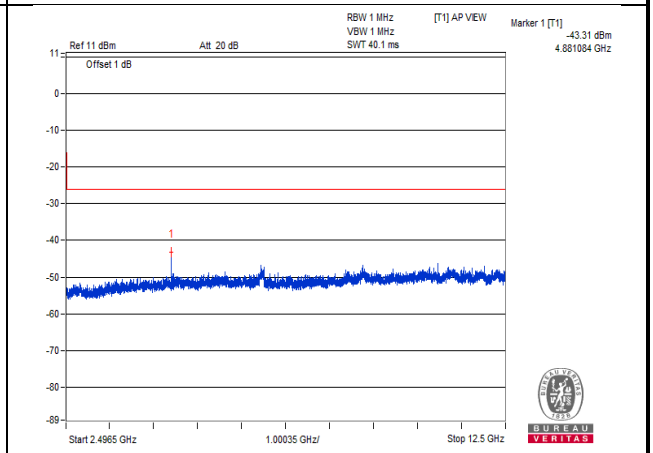






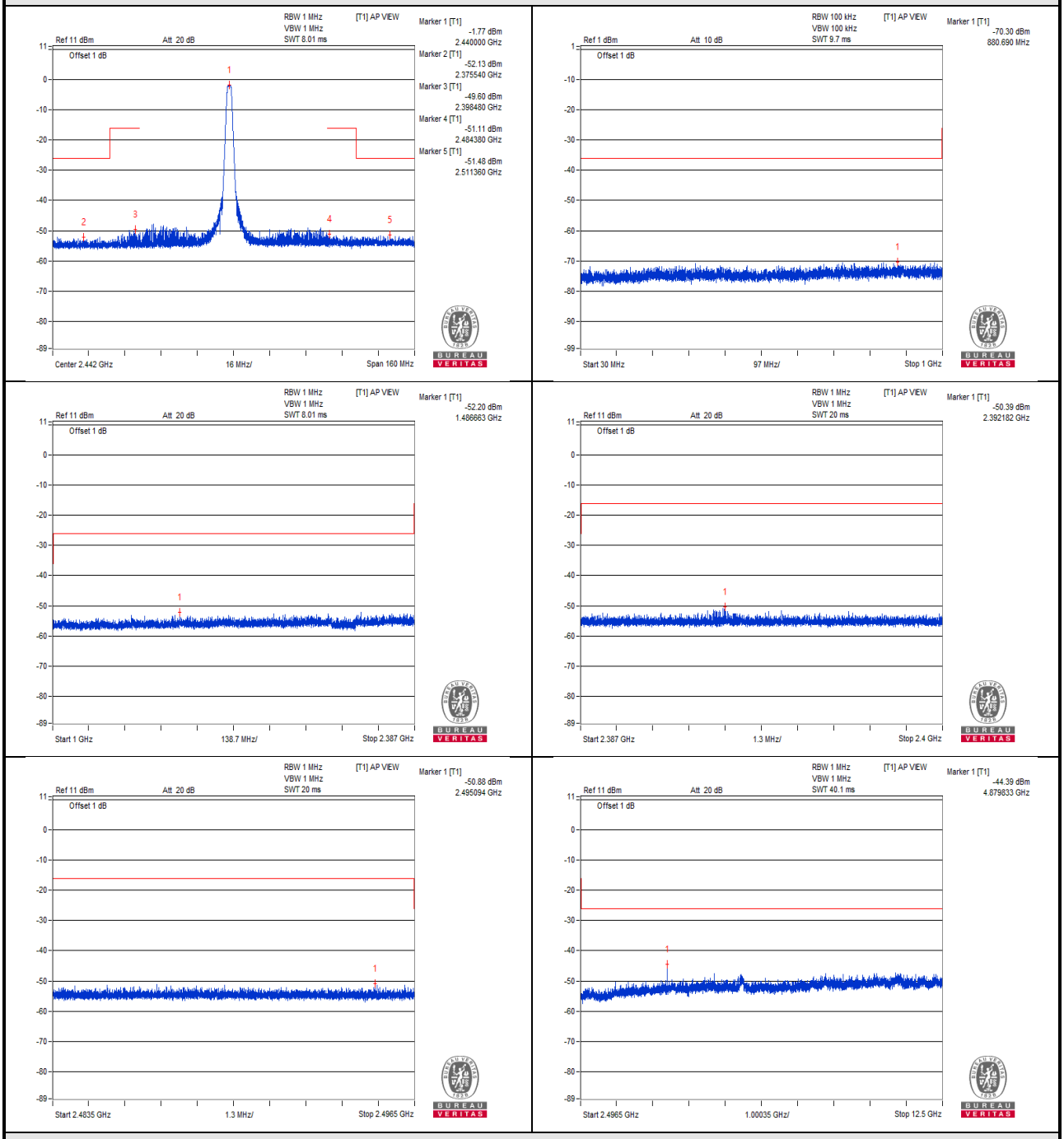






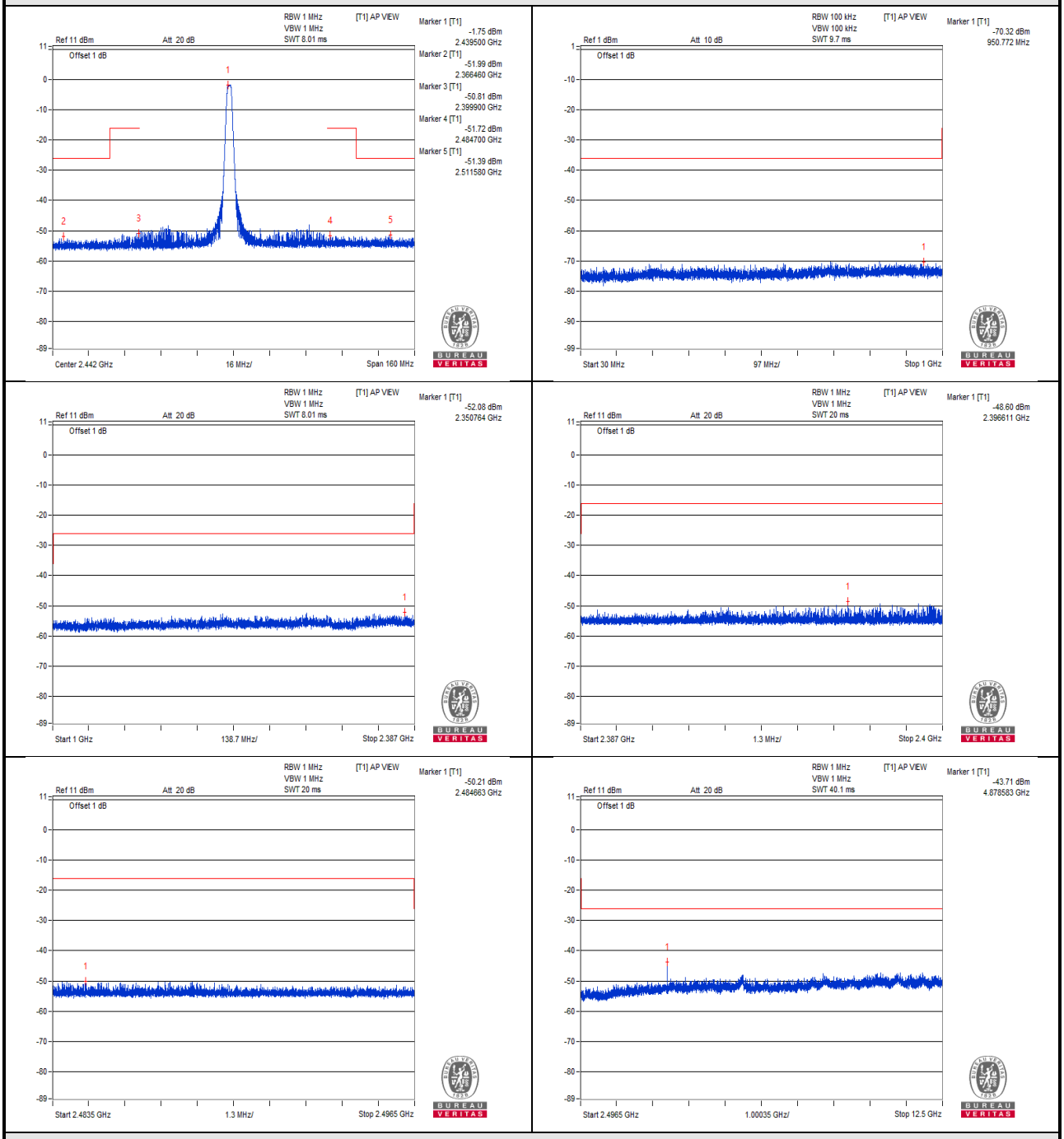
CH 19 (2440MHz)

Vmax.



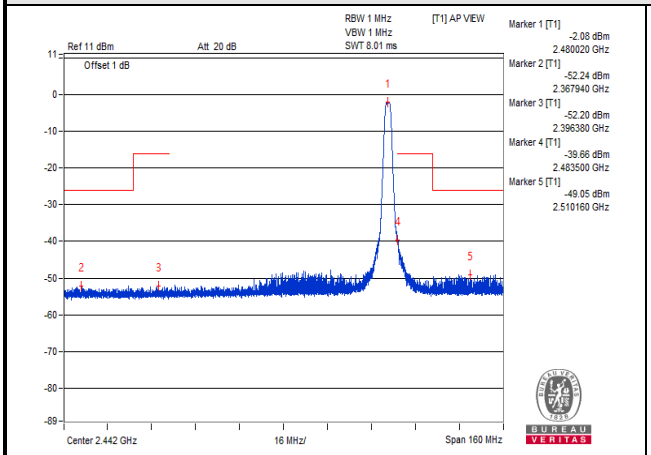
CH 19 (2440MHz)

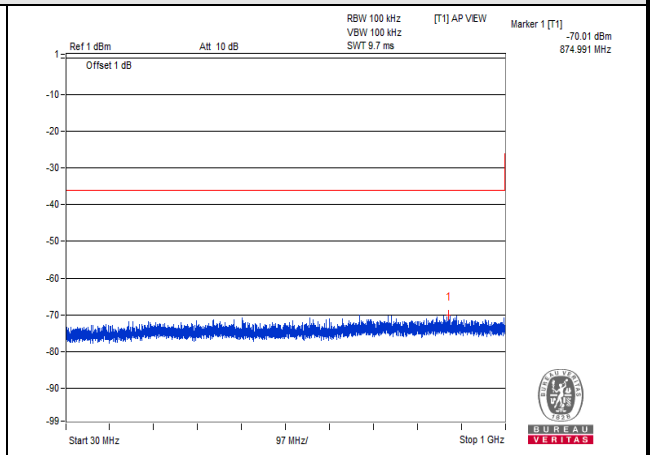
Vmin.

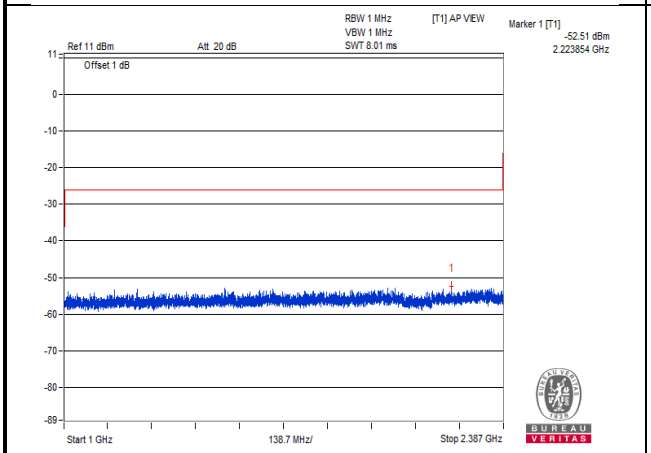


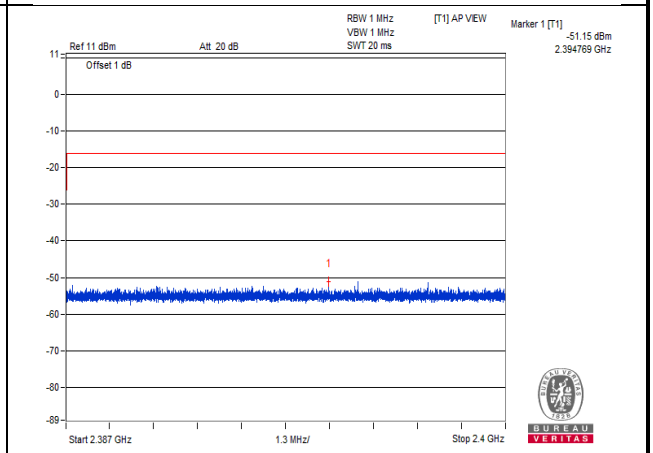
CH 19 (2440MHz)

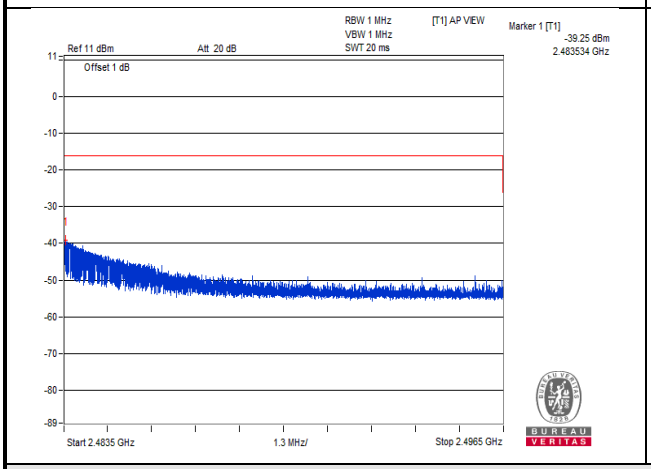
Vnormal

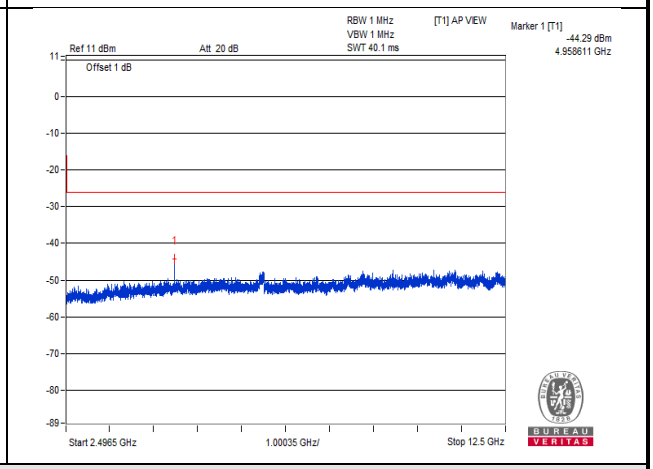






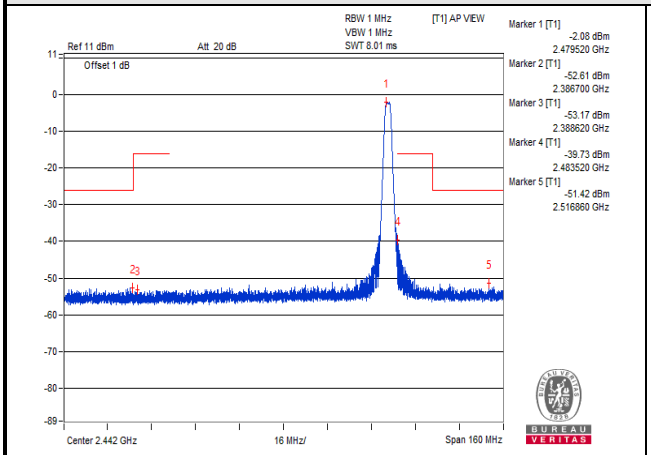


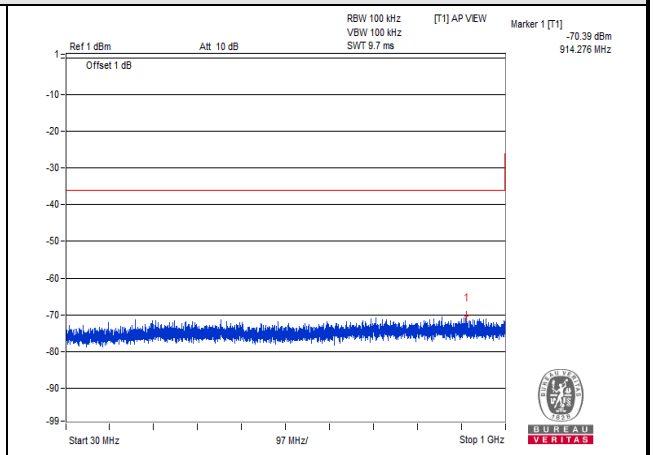


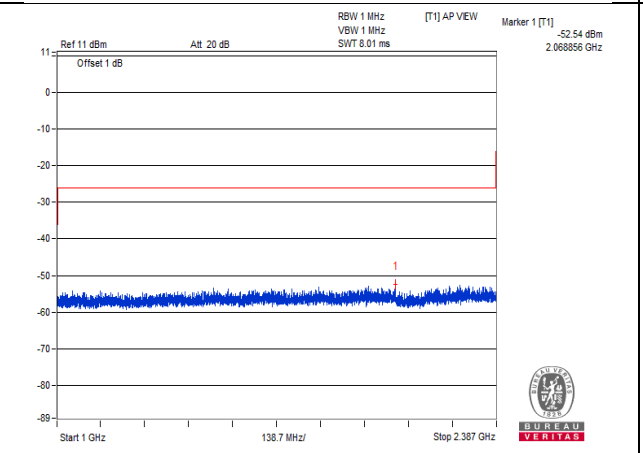


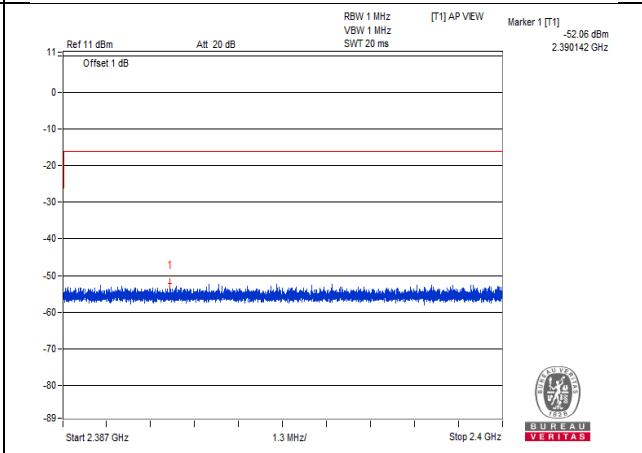
CH 39 (2480MHz)

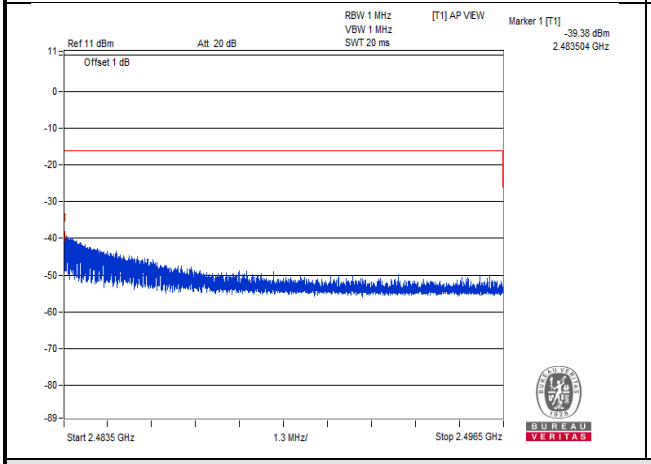
Vmax.

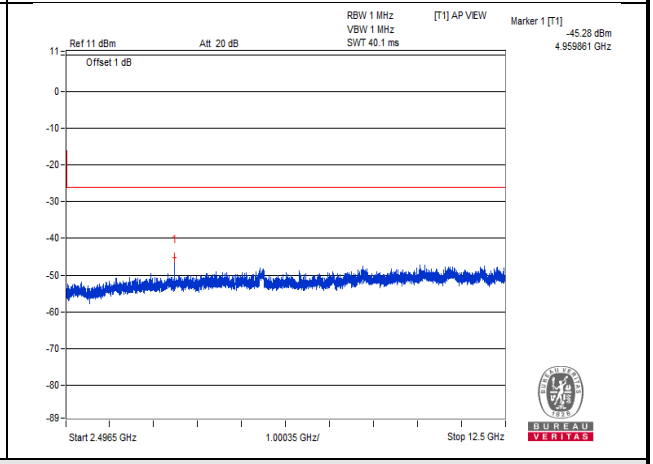






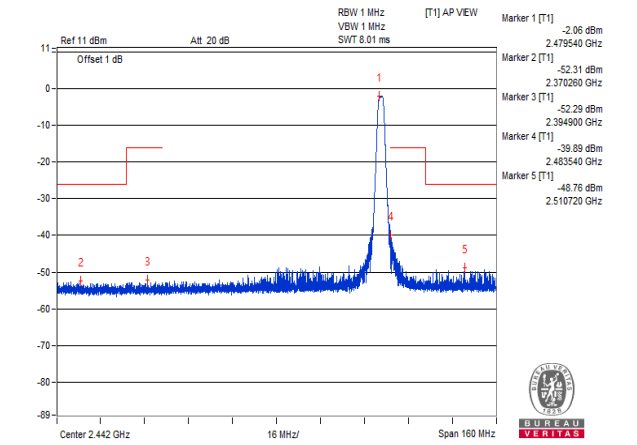


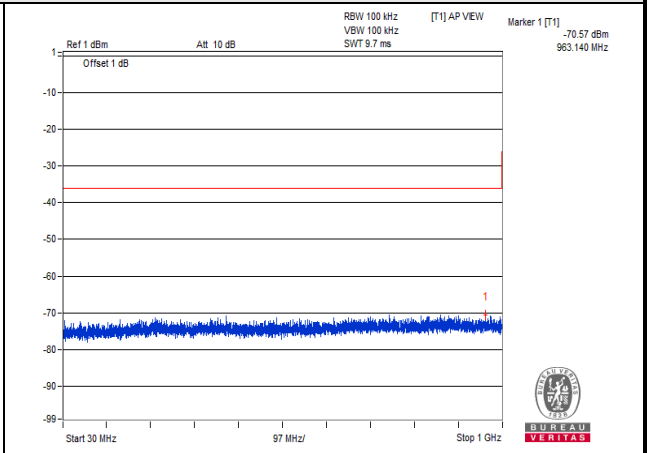


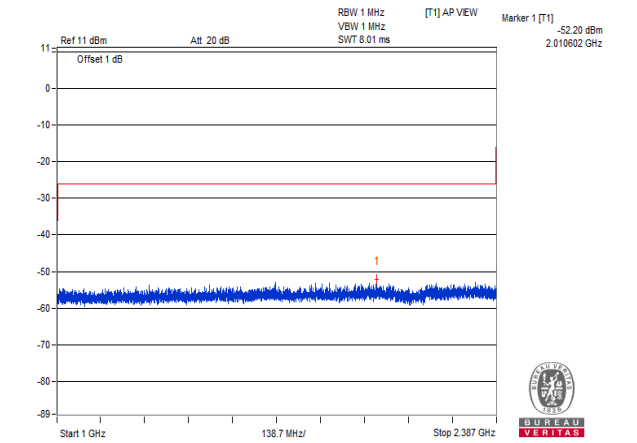


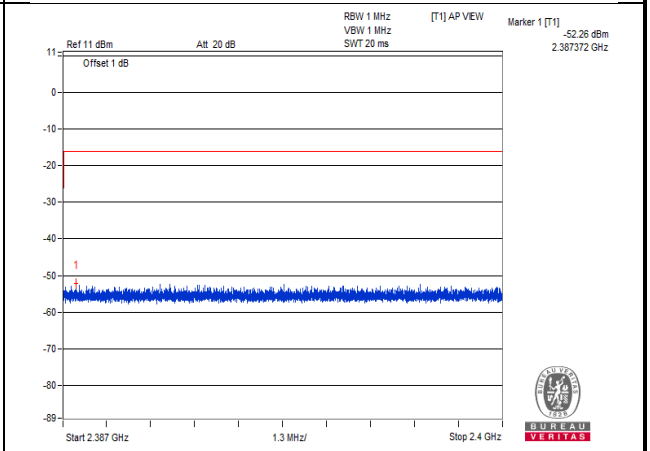
CH 39 (2480MHz)

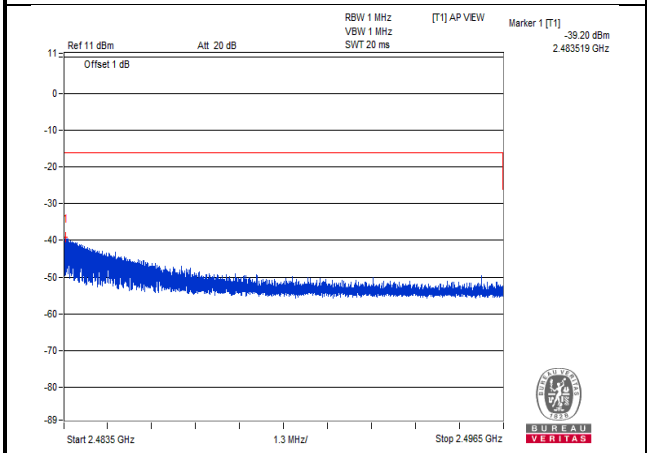
Vmin.

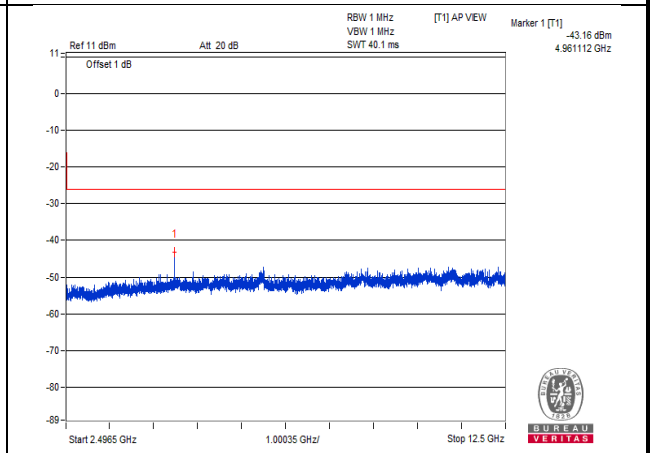












CH 39 (2480MHz)

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	10mW/MHz	12.14 dBm/MHz ~ 22.14 dBm/MHz (16.368 mW/MHz ~ 163.68 mW/MHz)
OFDM (Note 1)	2400 – 2483.5 MHz	10mW/MHz	12.14 dBm/MHz ~ 22.14 dBm/MHz (16.368 mW/MHz ~ 163.68 mW/MHz)
OFDM (Note 2)	2400 – 2483.5 MHz	5mW/MHz	9.13 dBm/MHz ~ 19.13 dBm/MHz (8.185 mW/MHz ~ 81.846 mW/MHz)
Other than the above	2400 – 2483.5 MHz	10mW	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

Voltage	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
V_{normal}	**0**	**2402**	0.726	1.291
	19	**2440**	0.693	1.232
	39	**2480**	0.667	1.186
$V_{max.}$	**0**	**2402**	0.718	1.277
	19	**2440**	0.679	1.207
	39	**2480**	0.643	1.143
$V_{min.}$	**0**	**2402**	**0.743**	**1.321**
	19	**2440**	0.708	1.259
	39	**2480**	0.693	1.232
Max. Limit (mW):			10	
Rated Power (mW):			0.8	-
Tolerance of Antenna Power (mW):			0.16 ~ 0.96	-
Max. EIRP Limit (mW):			-	16.368

Note: 1. Antenna gain is 2.5 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

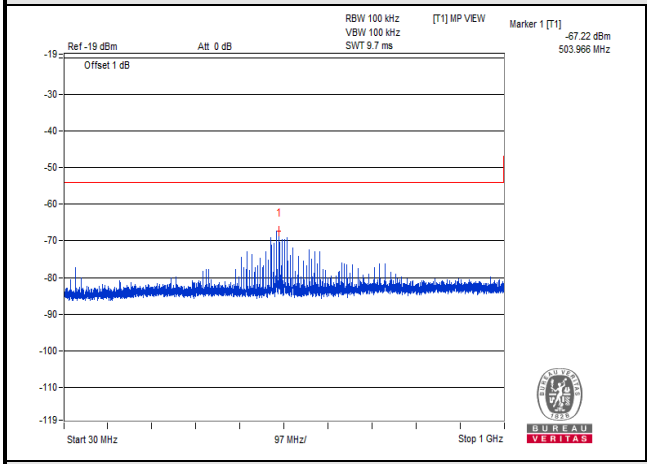
Frequencies (MHz)	Limit
Below 1GHz	≦4nW (-54dBm)
Above 1GHz	≦20nW (-47dBm)

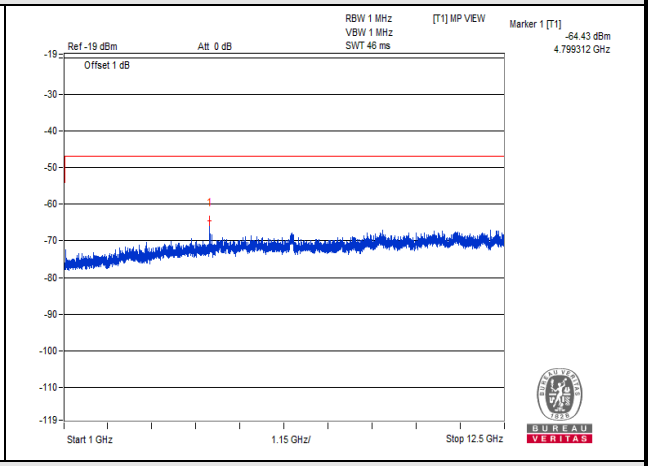
4.5.2 Test Setup

4.5.3 Test Result

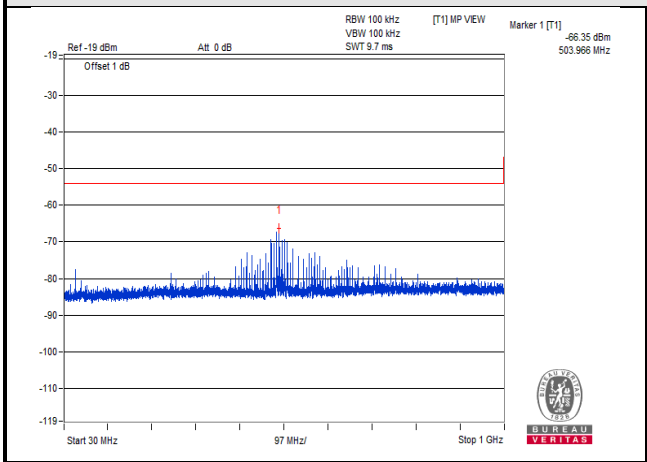
TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	503.966	0.189671	4.0	PASS
	1000MHz to 12500MHz	4799.312	0.360579	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	503.966	0.231739	4.0	PASS
	1000MHz to 12500MHz	4799.312	0.379315	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	498.025	0.202302	4.0	PASS
	1000MHz to 12500MHz	4800.750	0.385478	20.0	PASS
TEST CHANNEL		CH 19 (2440MHz)			
V_{normal}	30MHz to 1000MHz	503.966	0.215774	4.0	PASS
	1000MHz to 12500MHz	4875.500	0.467735	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	503.966	0.185353	4.0	PASS
	1000MHz to 12500MHz	4875.500	0.475335	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	504.087	0.195884	4.0	PASS
	1000MHz to 12500MHz	4875.500	0.449780	20.0	PASS
TEST CHANNEL		CH 39 (2480MHz)			
V_{normal}	30MHz to 1000MHz	504.087	0.194089	4.0	PASS
	1000MHz to 12500MHz	4956.000	0.400867	20.0	PASS
$V_{max.}$	30MHz to 1000MHz	503.966	0.190108	4.0	PASS
	1000MHz to 12500MHz	4956.000	0.382825	20.0	PASS
$V_{min.}$	30MHz to 1000MHz	503.966	0.167494	4.0	PASS
	1000MHz to 12500MHz	4956.000	0.322107	20.0	PASS

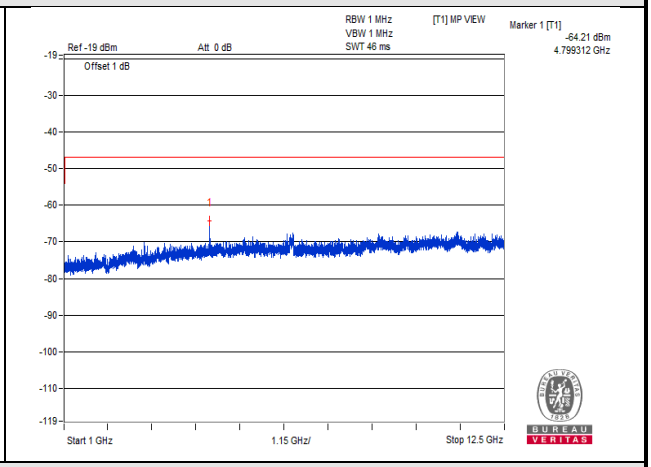
Vnormal



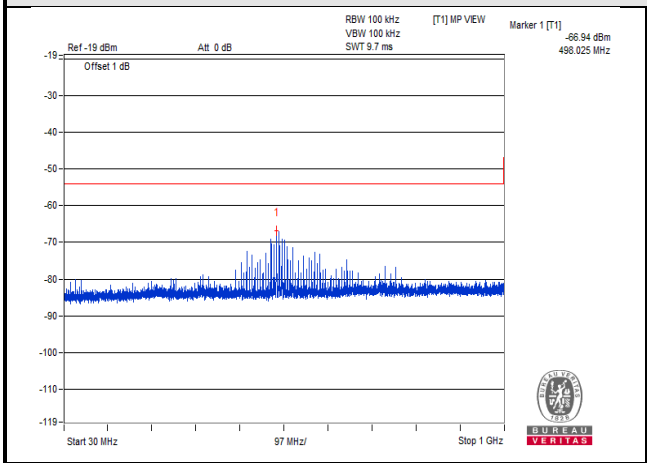


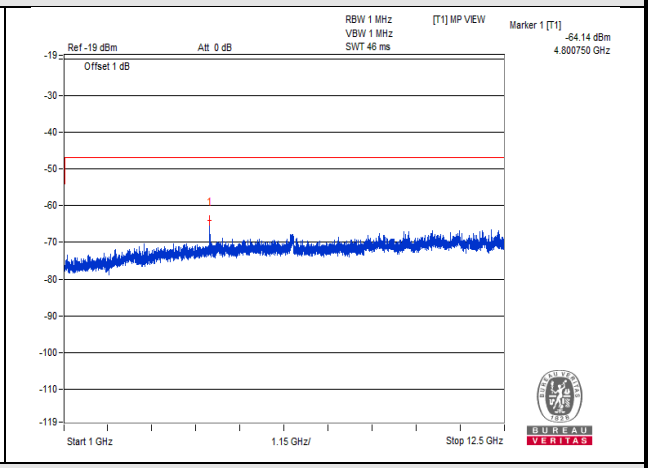
Vmax.





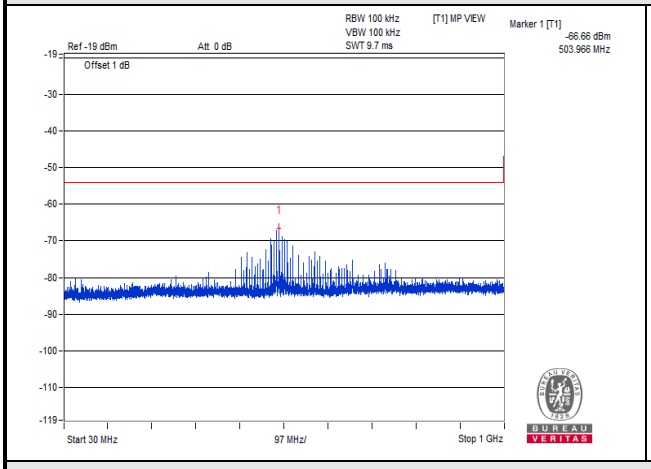
Vmin.

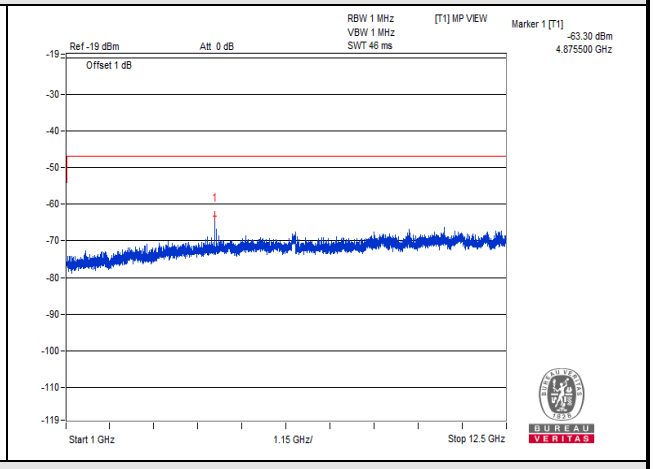




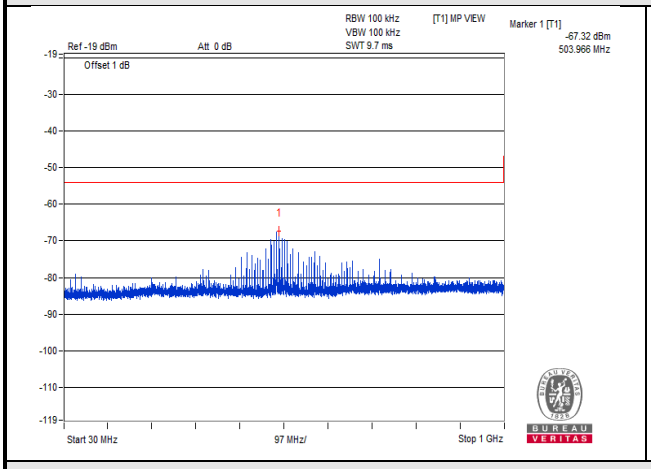
CH 0 (2402MHz)

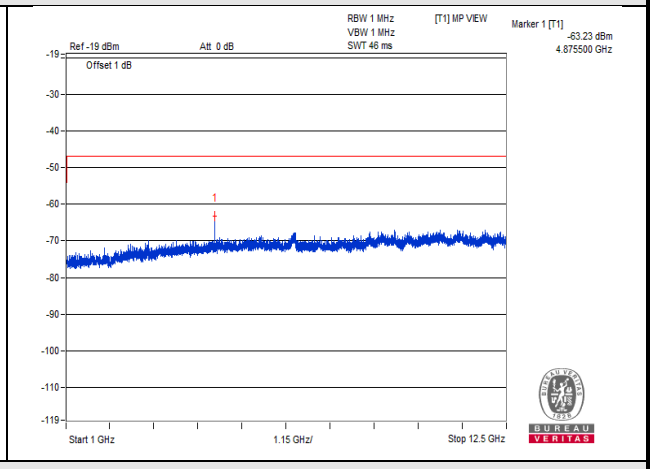
Vnormal



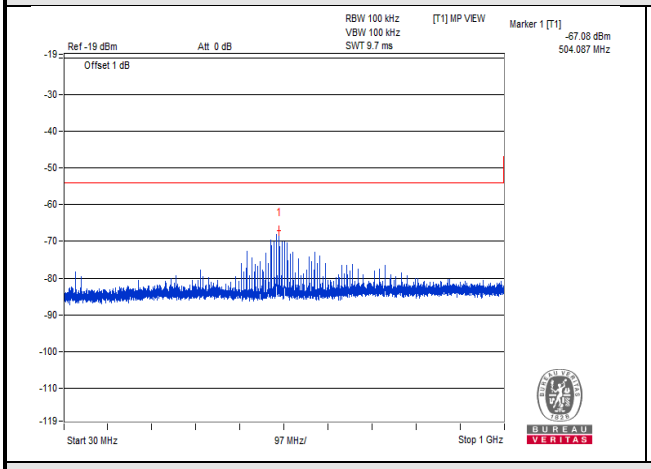


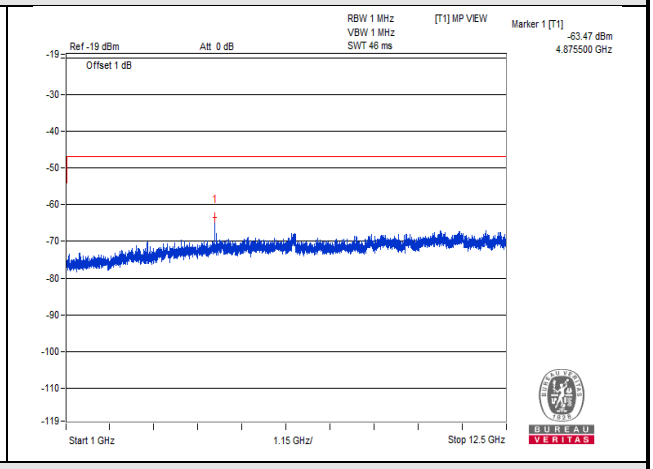
Vmax.





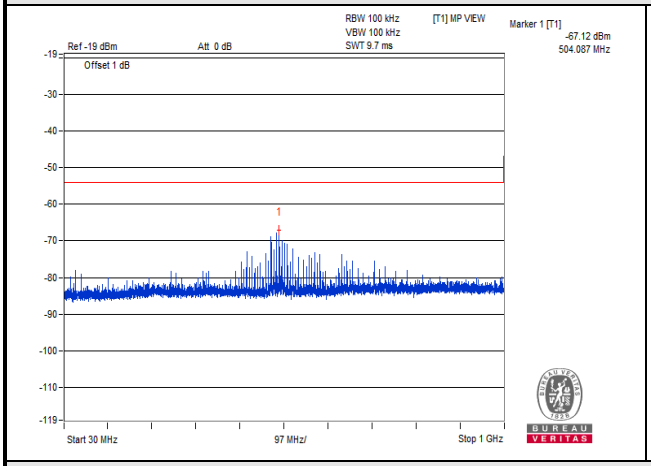
Vmin.

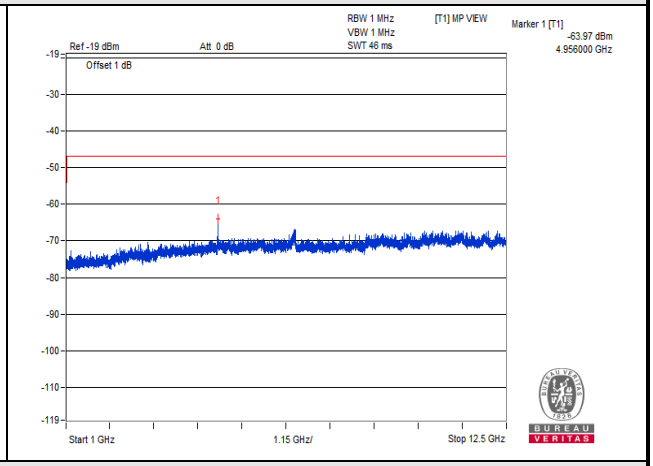




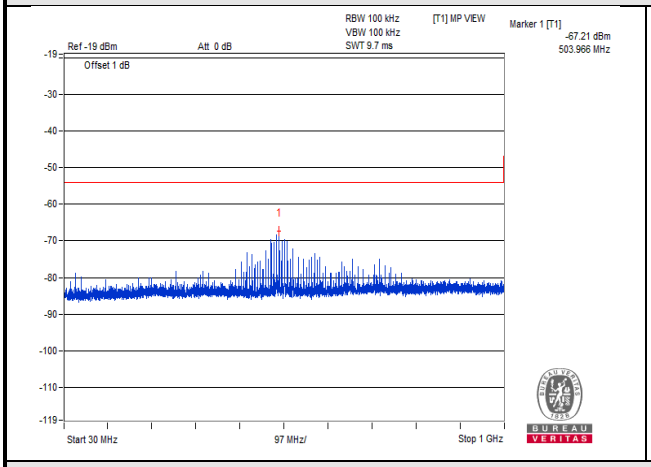
CH 19 (2440MHz)

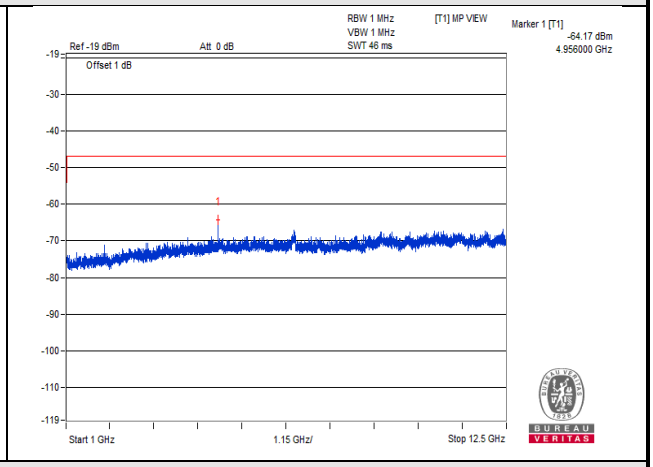
Vnormal



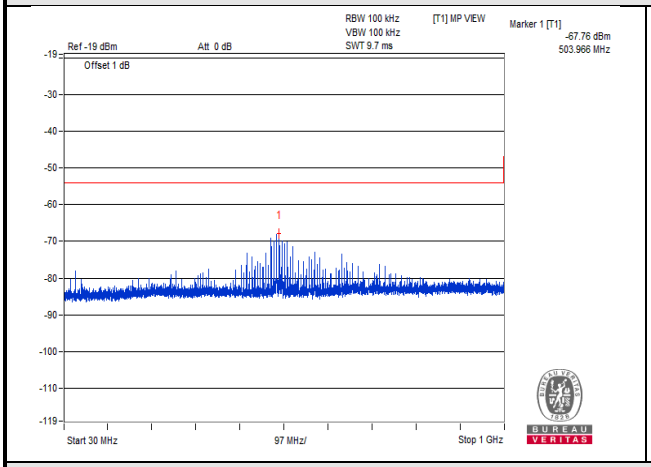


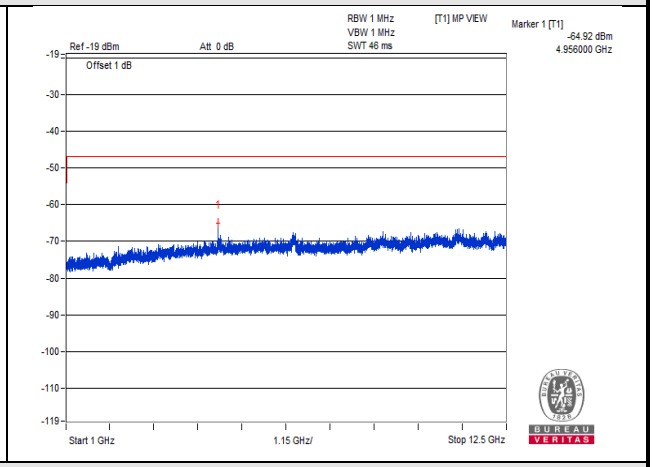
Vmax.





Vmin.





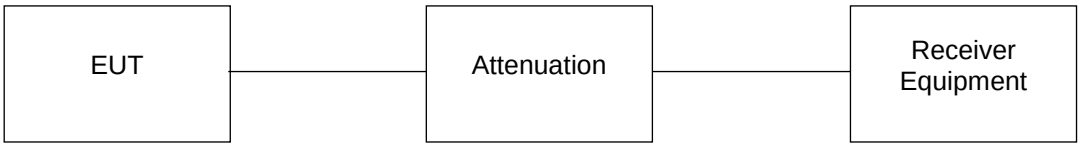
CH 39 (2480MHz)

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.

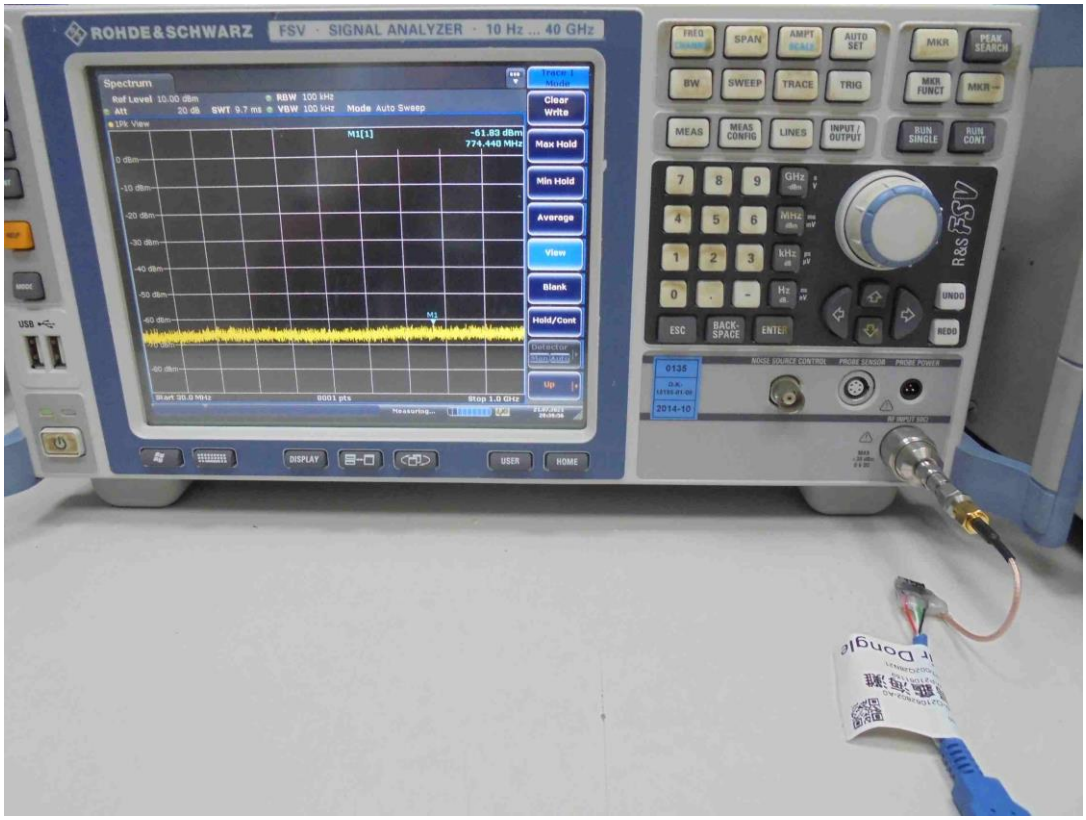
4.6.2 Test Setup



4.6.3 Test Results

Link Mode	Test Result
Normal	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:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---