

[Radio Test Report (BT-EDR)]

Report No.: RJBEOP-WTW-P21090934-1

Test Model: CM-3/J

Received Date: 2021/9/24

Test Date: 2021/11/13

Issued Date: 2022/1/26

Applicant: Informetis Co.,Ltd.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
RJBEO-P-WTW-P21090934-1	Original release.	2022/1/26

1 Certificate of Conformity

Product: Circuit Meter

Brand: Informetis

Test Model: CM-3/J

Sample Status: Engineering sample

Applicant: Informetis Co.,Ltd.

Test Date: 2021/11/13

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 : Vivian Huang , **Date:** 2022/1/26
Vivian Huang / Specialist

Approved by : Clark Lin , **Date:** 2022/1/26
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)	4.4	Spurious emissions	C
Transmitting Equipment				
F	--	4.5	Antenna power	C
--	--	--	SAR	NA
Transmitting Antenna				
--	--	3.5	Type, configuration, etc. of transmitting antenna	C
--	--	3.5	Direction pattern of transmitting antenna	C
Receiving Equipment				
G	3.3 (1)	4.6	Spurious emissions of receiver	C
--	--	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)	4.5	Antenna power	C
--	3.6 (2)	4.5	Absolute gain of transmitting antenna	C
--	3.6 (2)	--	Angular width of principal radiation (AWPR)	NA
--	3.2 (10)	--	Number of carriers within 1 MHz bandwidth in OFDM	NA
--	3.2 (8)	4.3	Spreading bandwidth	C
--	3.2 (9)	4.3	Spreading factor	C
--	3.2 (11)	4.7	Frequency retention time (FH employed)	C
--	3.4.1 (1)	4.8	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	101516	2021/3/8	2022/3/7	ETC	(c)
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	2020/11/18	2021/11/17	ETC	(c)
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20	ETC	(c)
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30	ETC	(c)
DC POWER SUPPLY Topward	6603D	795558	Note 3	Note 3	BV CPS E&E	(d)
AC Power Source GOOD WILL	6905S	1991551	Note 3	Note 3	BV CPS E&E	(d)
True RMS Clamp Meter Fluke	325	31130711WS	2021/6/2	2022/6/1	ETC	(c)

- 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 before each.
 4. Tested Date: 2021/11/13

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-EDR)

Product	Circuit Meter
Brand	Informetis
Test Model	CM-3/J
Status of EUT	Engineering sample
Nominal Voltage	AC 100-240V
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3 Mbps
Operating Frequency	2.402 ~ 2.480 GHz
Number of Channel	79
Rated RF Output Power Density	Refer to Note
Conducted RF Output Power Density	Refer to Note
Radiated RF Output Power Density	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. There are WLAN and Bluetooth technology used for the EUT.
2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	Bluetooth

3. The power table as below table:

	Rated output power density (mW/MHz)	Conducted RF output power density (mW/MHz)	Radiated RF output power density (mW/MHz)
Normal mode			
GFSK	0.2	0.128291	0.143945
$\pi/4$-DQPSK	0.2	0.063303	0.071027
8DPSK	0.2	0.06363	0.071394
Enable AFH function			
GFSK	0.5	0.500129	0.561154
$\pi/4$-DQPSK	0.5	0.244999	0.274893
8DPSK	0.5	0.245565	0.275528

4. 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.

3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

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.

NOTE 1: By means of test software (BLUE TOOL) provided by manufacturer, the power levels during the tests were set according to the following codes:

Modulation type: GFSK		Modulation type: $\pi/4$ -DQPSK		Modulation type: 8DPSK	
Channel	Power setting	Channel	Power setting	Channel	Power setting
0	0	0	0	0	0
39	0	39	0	39	0
78	0	78	0	78	0

NOTE 2: The EUT was tested under following test modes, and the test data was recorded in this report:

Normal mode	Enable AFH function
GFSK	GFSK
$\pi/4$ -DQPSK	$\pi/4$ -DQPSK
8DPSK	8DPSK

* For AFH function only tested occupied bandwidth, spreading bandwidth, Antenna power and dwell time.

3.3 Test Conditions

Test Conditions		Voltage (Vac)
V_{normal}		100
$V_{max.}$	+10%	110
$V_{min.}$	-10%	90

Test mode is presented in the report as below:

Test Item	Environmental Conditions
Frequency Tolerance	25 deg.C, 60 % RH
Occupied Bandwidth / Spreading Bandwidth	25 deg.C, 60 % RH
Spurious Emissions for Transmitter	25 deg.C, 60 % RH
Antenna Power	25 deg.C, 60 % RH
Spurious Emissions for Receiver	25 deg.C, 60 % RH
Dwell Time	25 deg.C, 60 % RH

3.4 Assembly

The RF circuit is located inside EUT. The plastic enclosure is assembled by two special screws and won't be easy to be opened.

3.5 Antenna Specifications

3.5.1 Antenna Gain

Antenna No.	Brand	Model	Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
1	WNC	NA	0.5	2.4~2.4835	PCB	none

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

Modulation: GFSK

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	2401.993636	-2.649	2401.993640	-2.647	2401.993640	-2.647
39	2441	2440.997883	-0.867	2440.997877	-0.869	2440.997790	-0.905
78	2480	2480.002112	0.851	2480.002111	0.851	2480.002083	0.839

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit
Occupied bandwidth	<83.5 MHz

4.2.2 Test Setup



4.2.3 Test Results

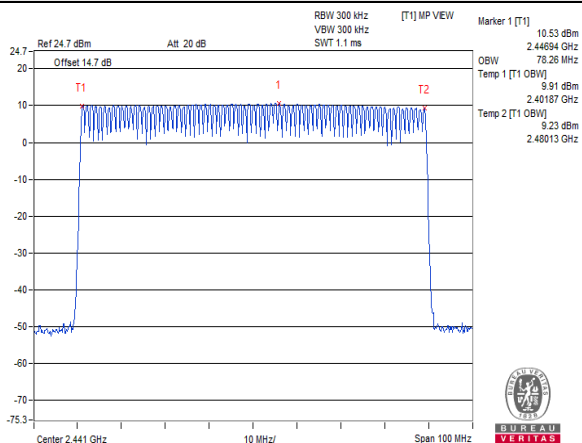
Modulation: GFSK

Normal Mode:

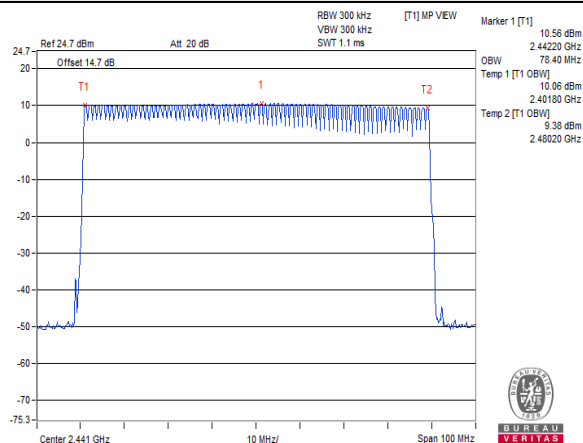
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
78.26	78.40	78.40

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

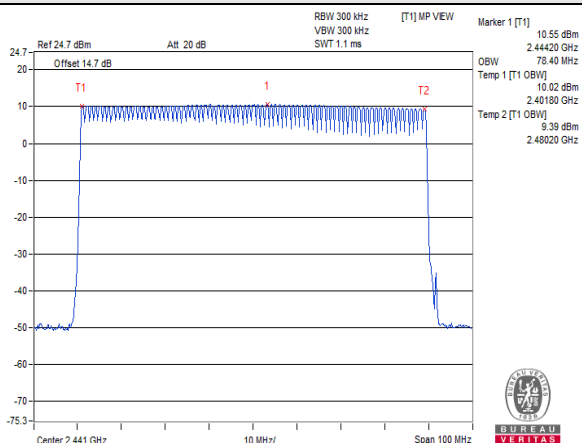
V_{normal}



V_{max.}



V_{min.}

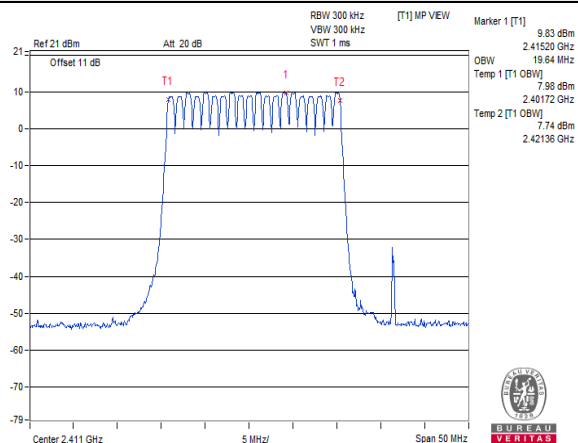


AFH Mode:

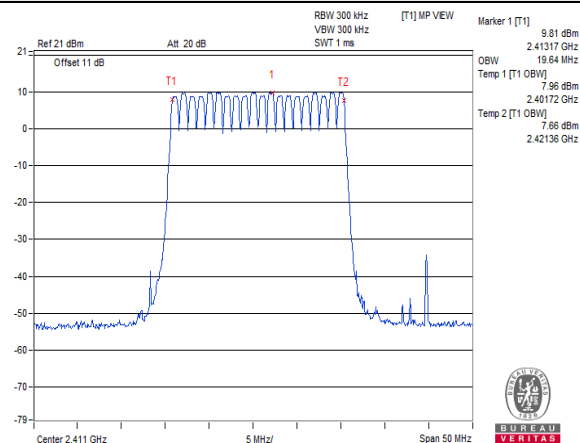
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
19.64	19.64	19.64

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

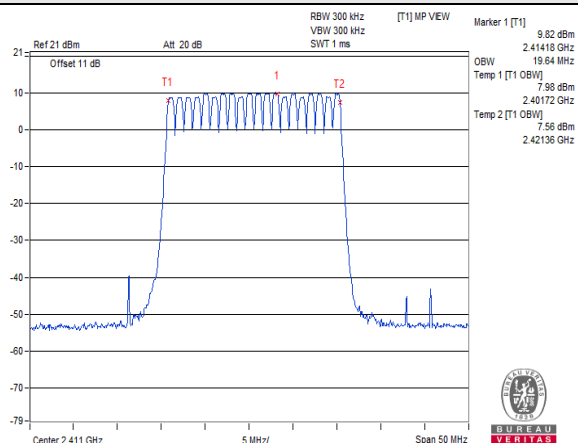
V_{normal}



V_{max.}



V_{min.}



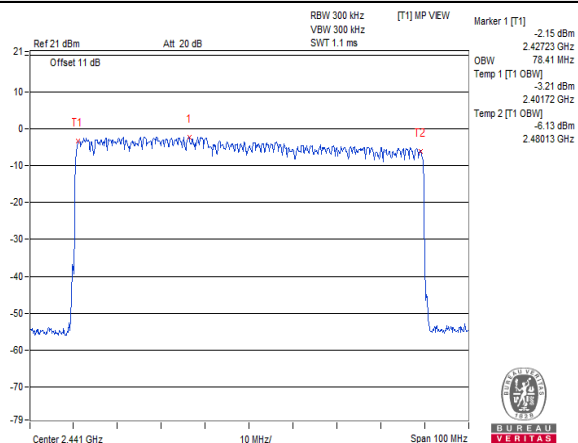
Modulation: $\pi/4$ -DQPSK

Normal Mode:

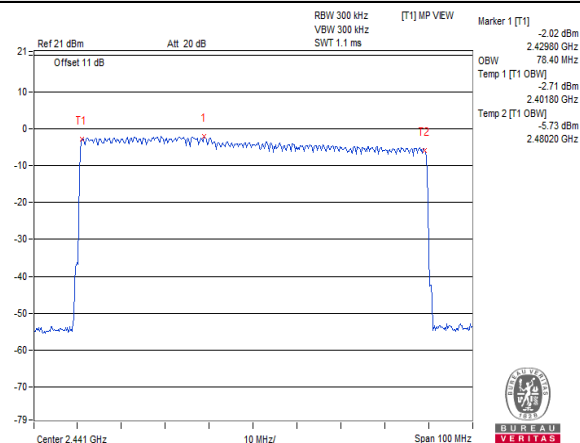
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
78.41	78.40	78.40

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

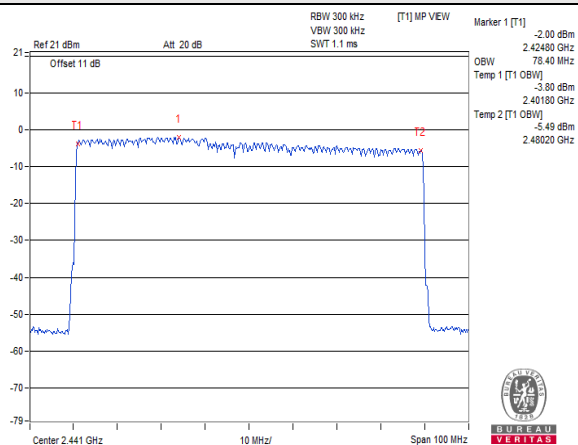
V_{normal}



V_{max.}



V_{min.}

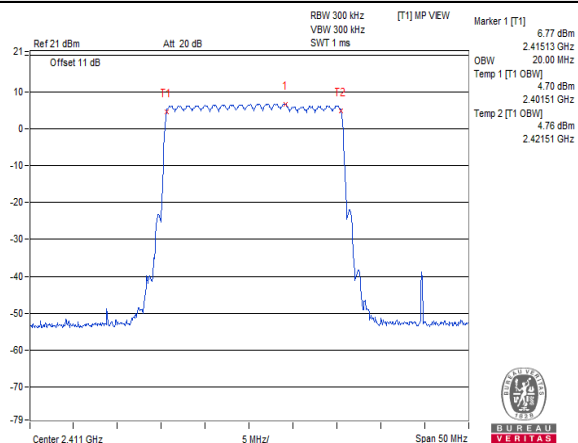


AFH Mode:

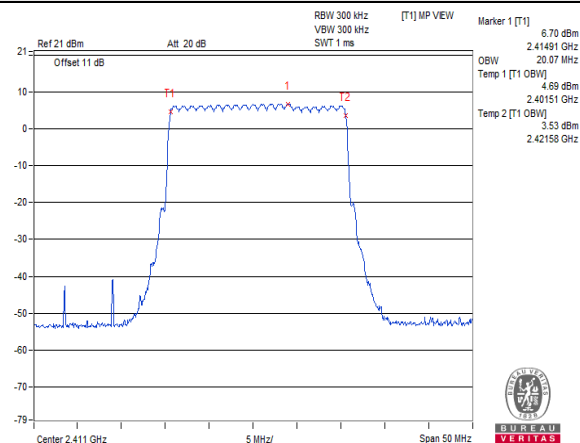
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
20.00	20.07	20.00

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

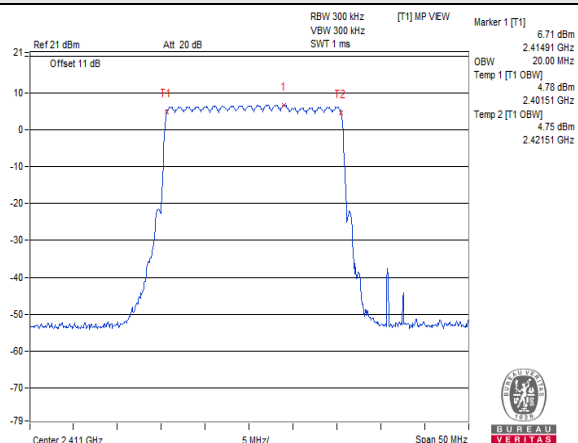
V_{normal}



V_{max.}



V_{min.}



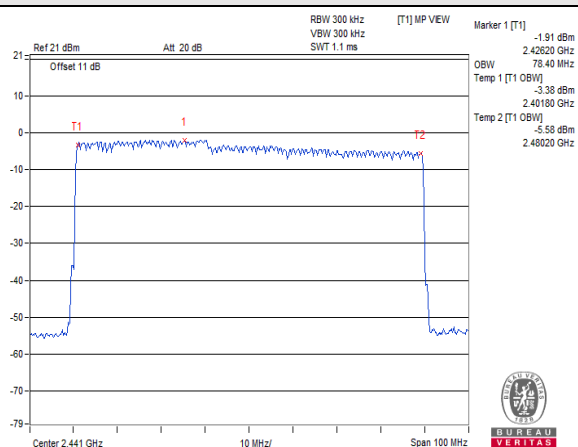
Modulation: 8DPSK

Normal Mode:

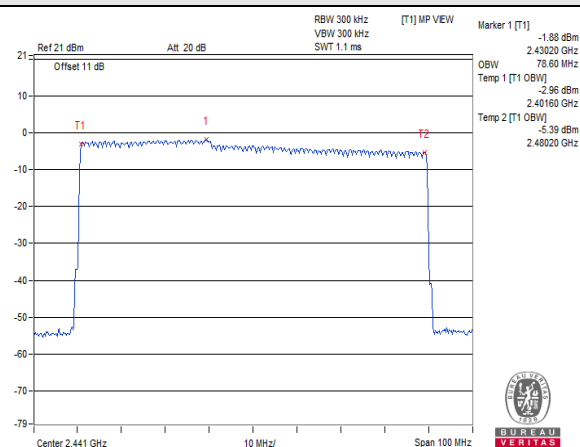
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
78.40	78.60	78.60

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

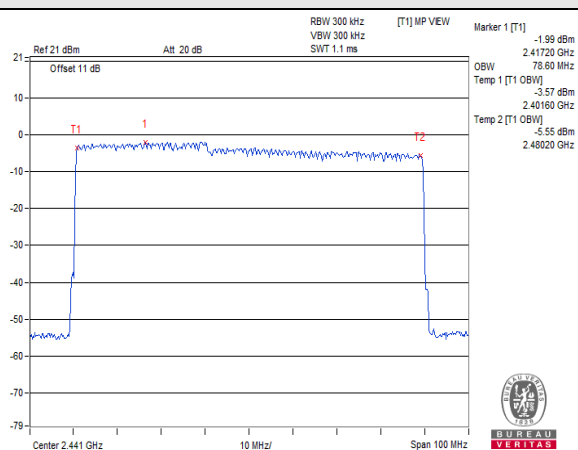
V_{normal}



V_{max.}



V_{min.}

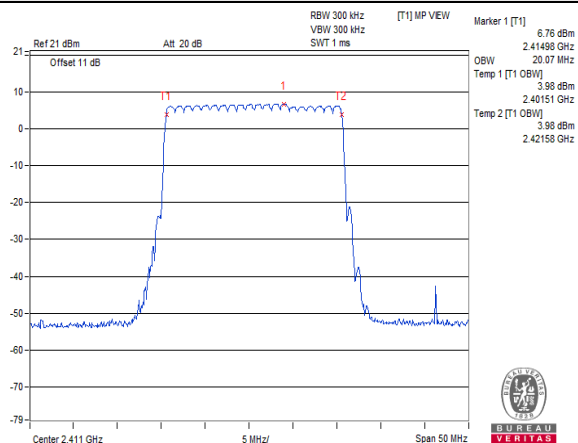


AFH Mode:

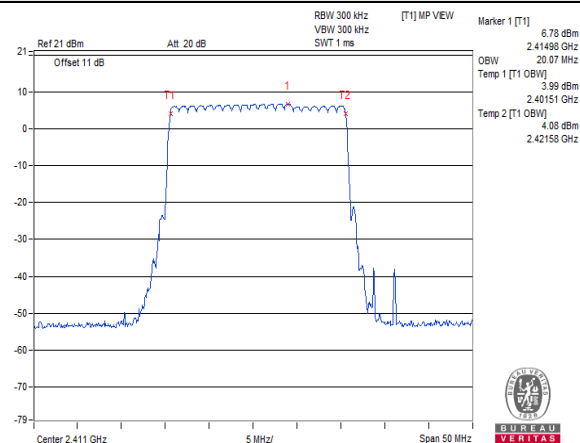
V_{normal}	$V_{\text{max.}}$	$V_{\text{min.}}$
Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
20.07	20.07	20.07

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

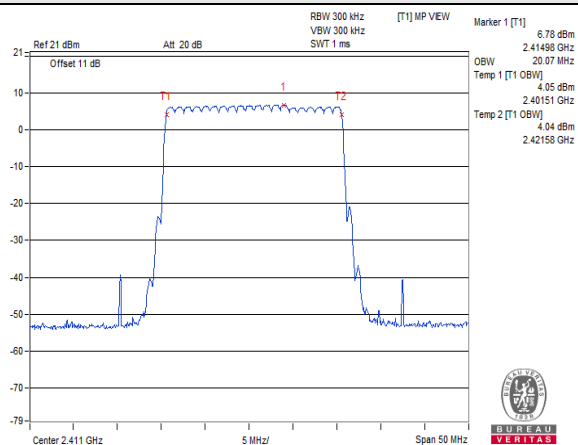
V_{normal}



V_{max.}



V_{min.}



4.3 Spreading Bandwidth Measurement (90% power bandwidth)

4.3.1 Limits of Spreading Bandwidth and Spreading Factor Measurement

Item	Limit	Remark
Spreading Bandwidth	$\geq 500\text{kHz}$	(For DSSS, FHSS)
Spreading Factor	≥ 5	Operating frequency 2400 to 2483.5MHz

4.3.2 Test Setup



4.3.3 Test Results

Modulation: GFSK

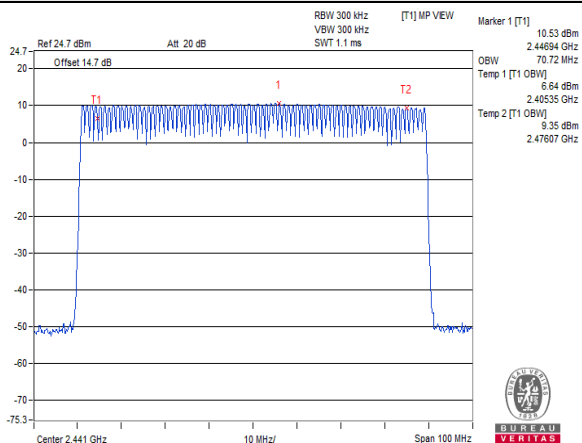
Normal Mode:

V_{normal}		$V_{\text{max.}}$		$V_{\text{min.}}$	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
70.72	70.72	70.60	70.60	70.60	70.60

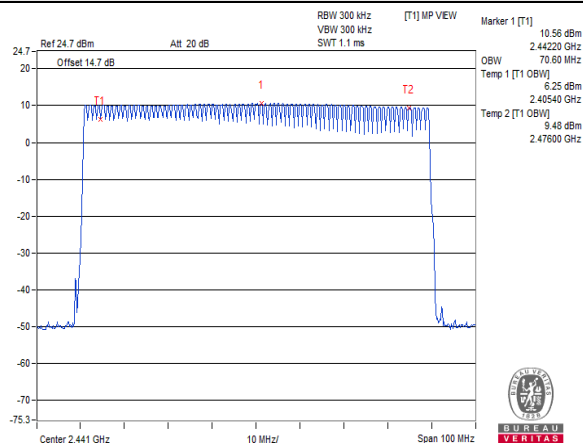
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

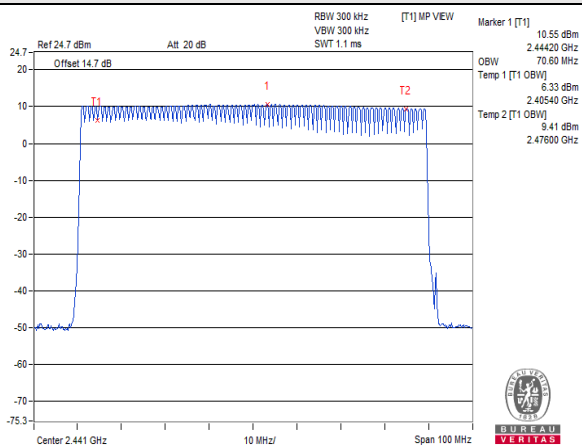
V_{normal}



V_{max.}



V_{min.}



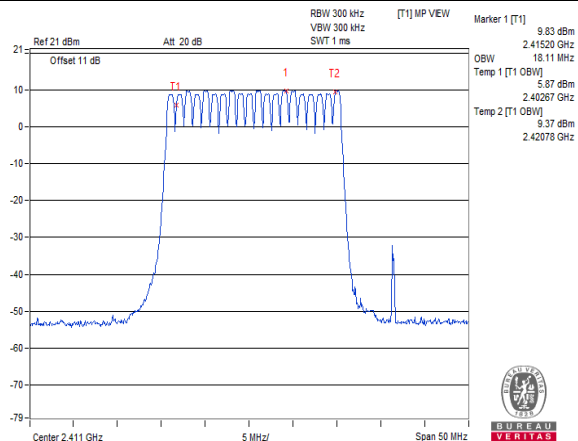
AFH Mode:

V_{normal}		V_{max.}		V_{min.}	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
18.11	18.11	18.11	18.11	17.97	17.97

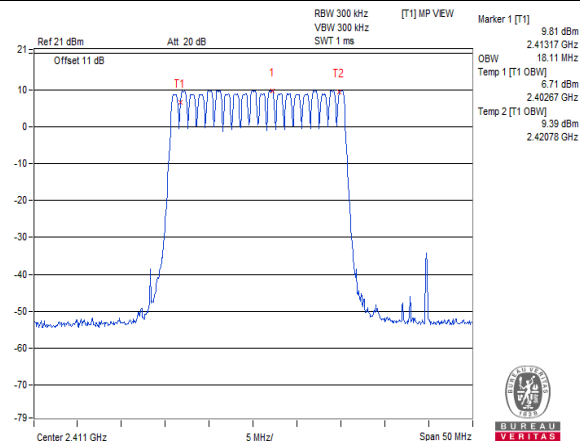
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

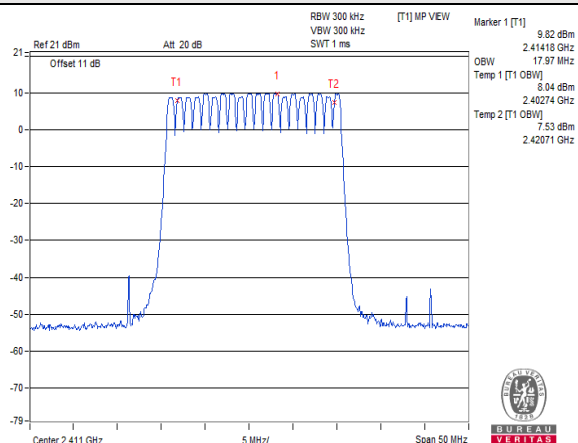
V_{normal}



V_{max.}



V_{min.}



Modulation: $\pi/4$ -DQPSK

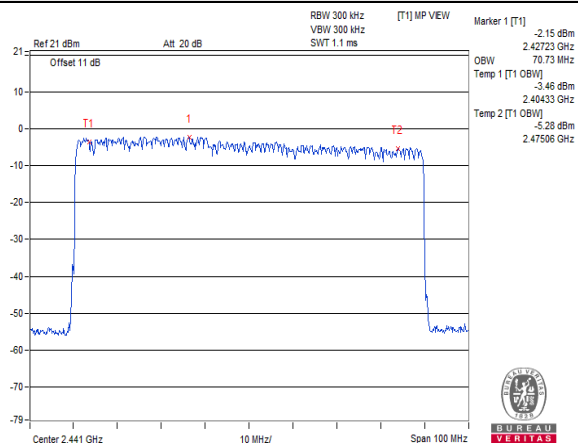
Normal Mode:

V_{normal}		$V_{\text{max.}}$		$V_{\text{min.}}$	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
70.73	70.73	70.60	70.60	70.40	70.40

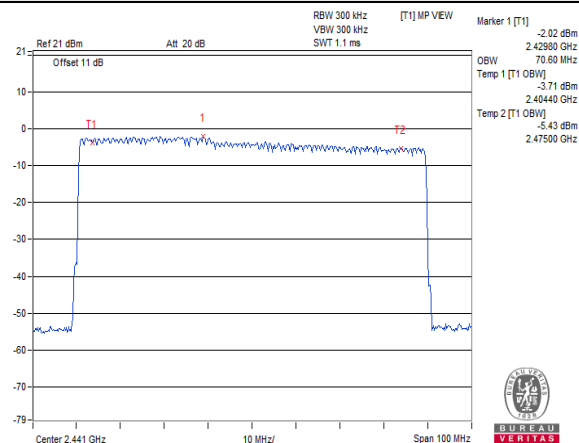
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

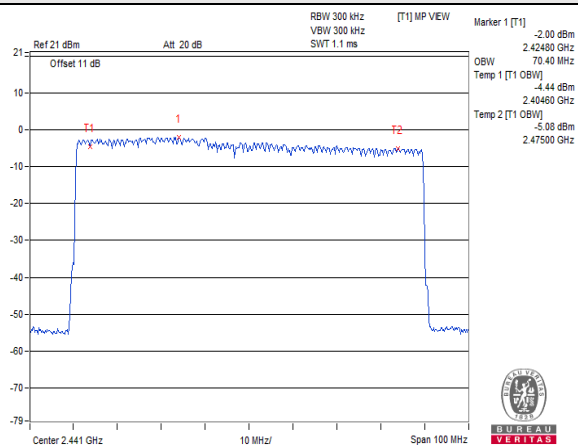
V_{normal}



V_{max.}



V_{min.}



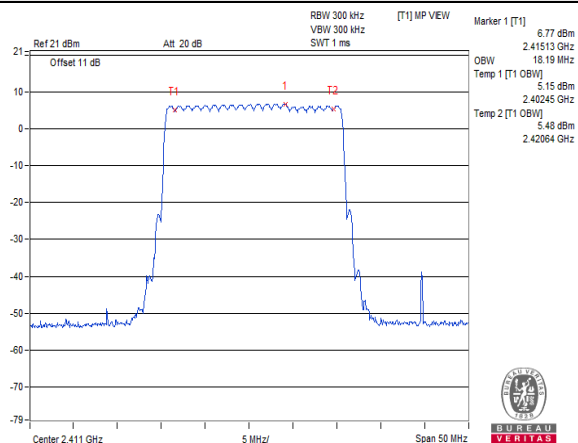
AFH Mode:

V_{normal}		V_{max.}		V_{min.}	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
18.19	18.19	18.19	18.19	18.19	18.19

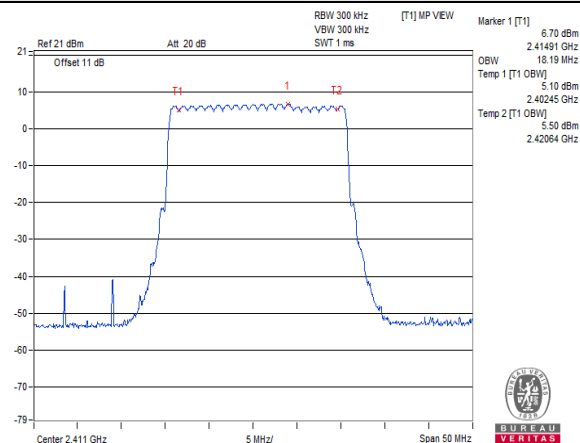
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

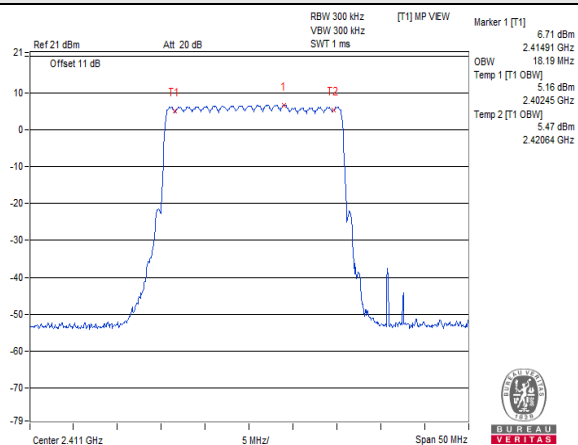
V_{normal}



V_{max.}



V_{min.}



Modulation: 8DPSK

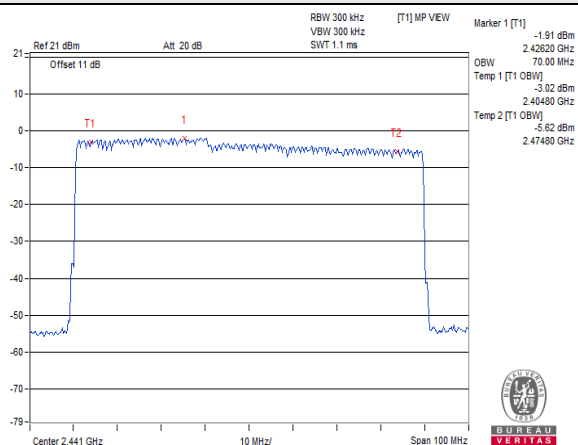
Normal Mode:

V_{normal}		V_{max.}		V_{min.}	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
70.00	70.00	70.20	70.20	70.40	70.40

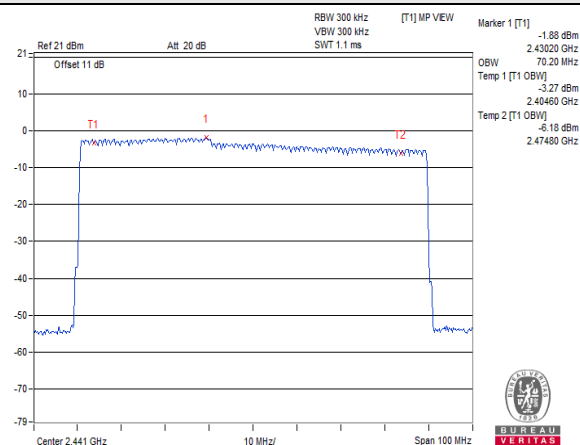
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

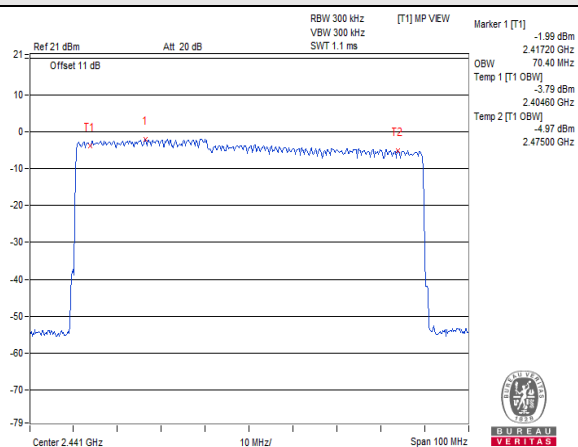
V_{normal}



V_{max.}



V_{min.}



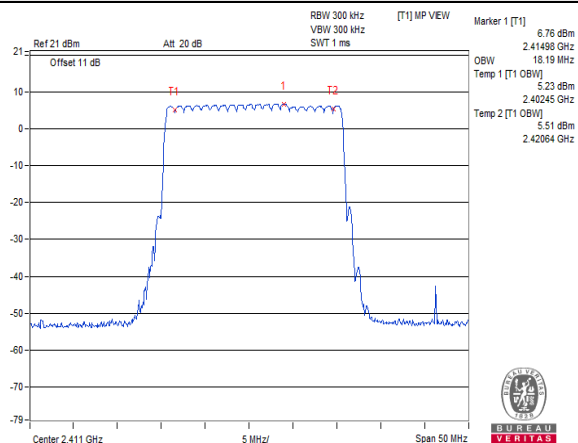
AFH Mode:

V_{normal}		$V_{\text{max.}}$		$V_{\text{min.}}$	
Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor	Occupied bandwidth (MHz)	Spreading factor
18.19	18.19	18.19	18.19	18.19	18.19

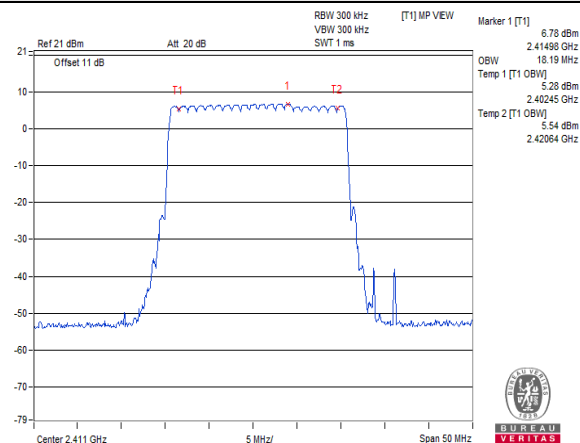
NOTE: For the test plots please refer to the below pages.

Spreading Factor: 90% channel power bandwidth / 1

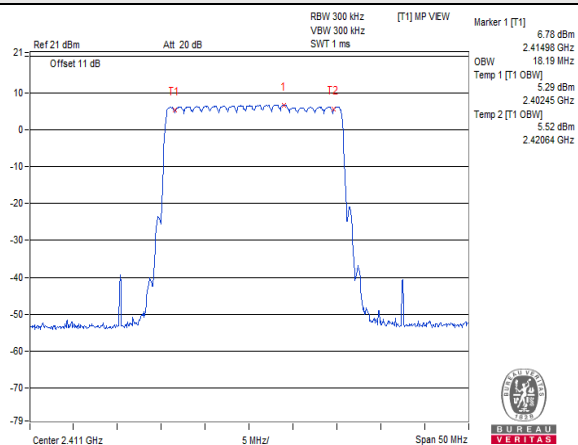
V_{normal}



V_{max.}



V_{min.}



4.4 Spurious Emissions for Transmitter Measurement

4.4.1 Limits of Spurious Emissions

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

4.4.2 Test Setup



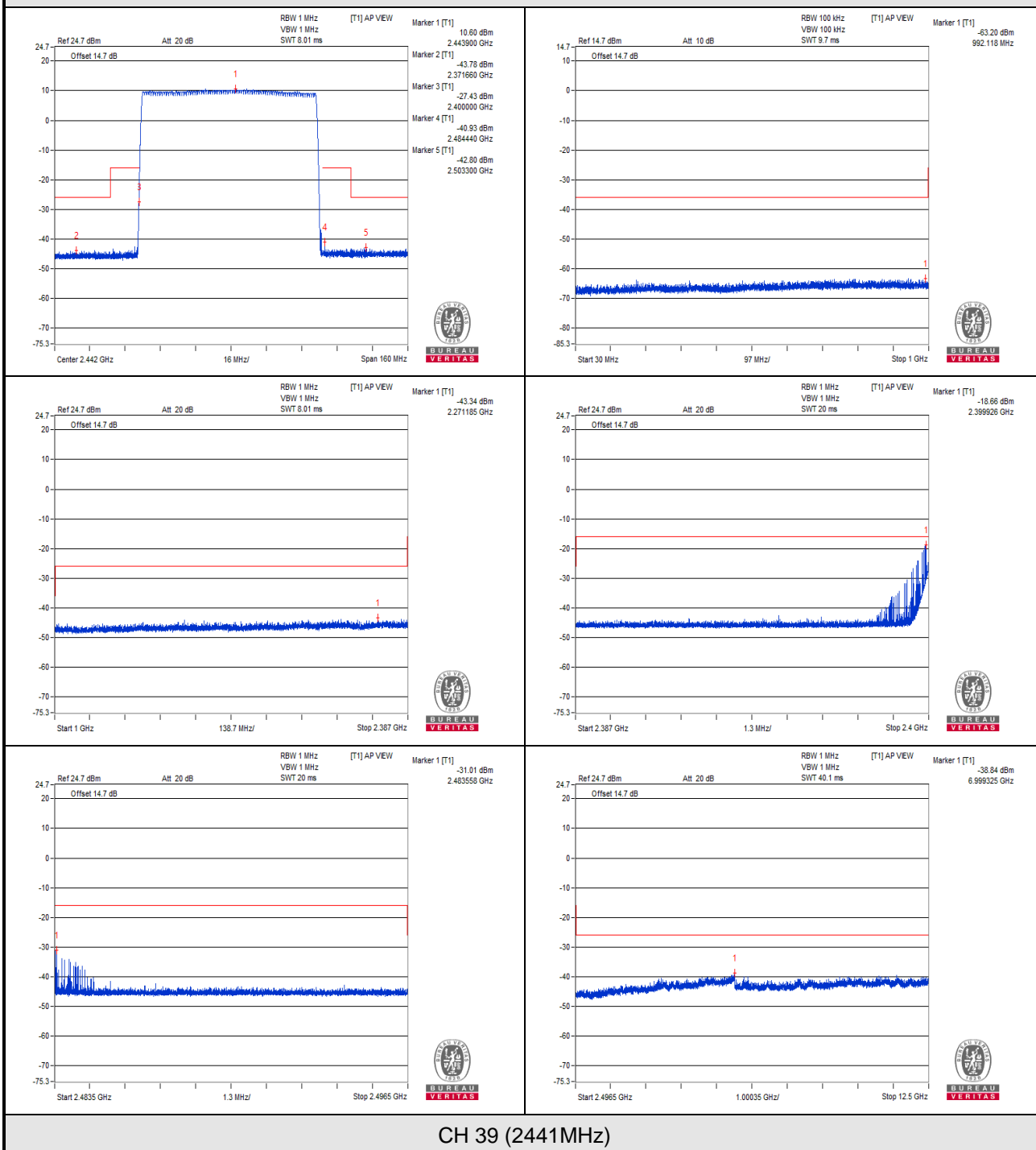
4.4.3 Test Results

Modulation: GFSK

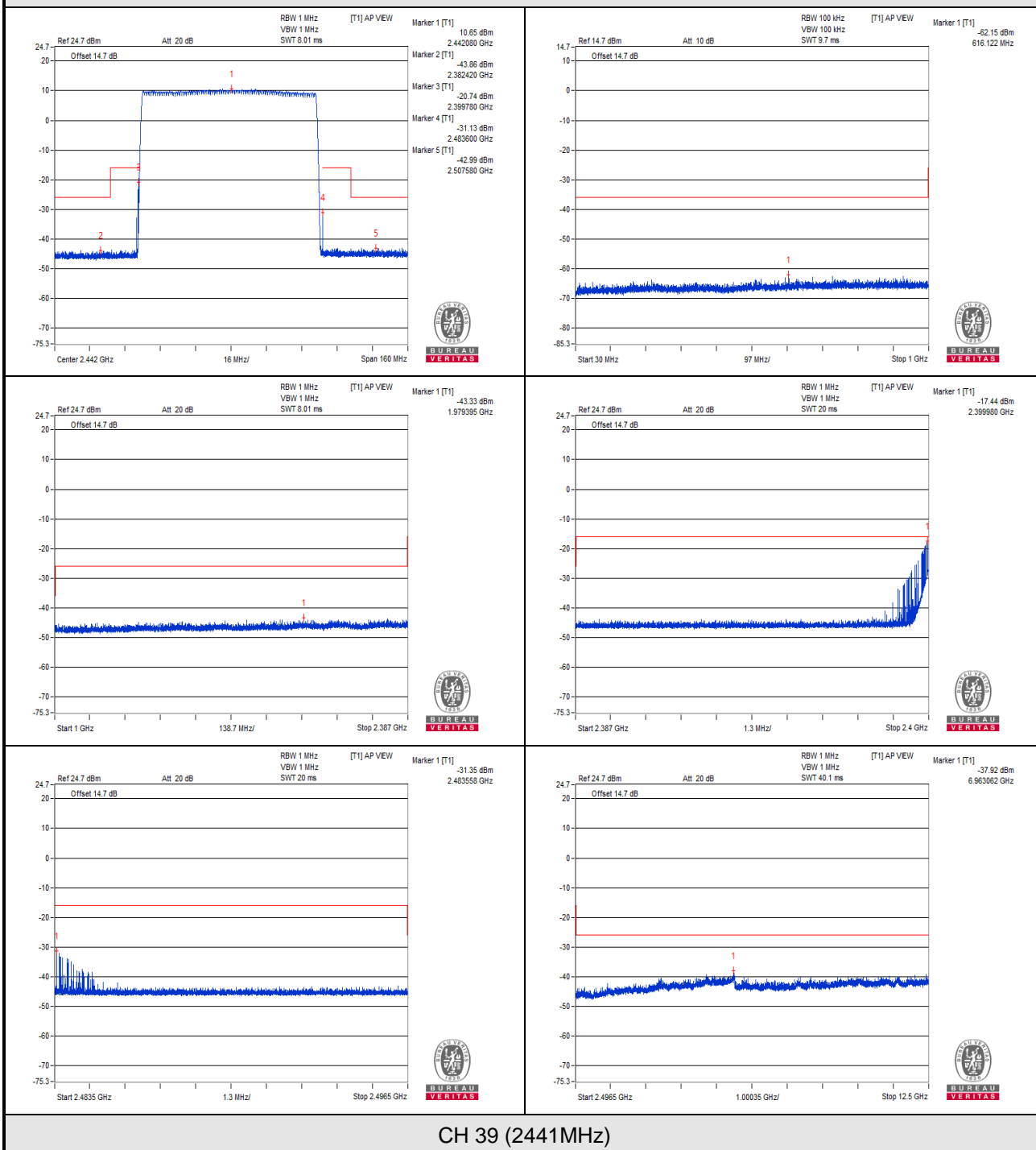
TEST CHANNEL		CH 39 (2441MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(uW)	LIMIT (uW)	RESULT
V_{normal}	30MHz to 1000MHz	992.118	0.000479	0.25	PASS
	1000MHz to 2387MHz	2271.185	0.046345	2.5	PASS
	2387MHz to 2400MHz	2399.926	13.614447	25	PASS
	2483.5MHz to 2496.5MHz	2483.558	0.792501	25	PASS
	2496.5MHz to 12500MHz	6999.325	0.130617	2.5	PASS
V_{max.}	30MHz to 1000MHz	616.122	0.000610	0.25	PASS
	1000MHz to 2387MHz	1979.395	0.046452	2.5	PASS
	2387MHz to 2400MHz	2399.980	18.030177	25	PASS
	2483.5MHz to 2496.5MHz	2483.558	0.732825	25	PASS
	2496.5MHz to 12500MHz	6963.062	0.161436	2.5	PASS
V_{min.}	30MHz to 1000MHz	898.513	0.000538	0.25	PASS
	1000MHz to 2387MHz	2125.550	0.044668	2.5	PASS
	2387MHz to 2400MHz	2399.988	18.155157	25	PASS
	2483.5MHz to 2496.5MHz	2483.597	0.695024	25	PASS
	2496.5MHz to 12500MHz	6966.814	0.125314	2.5	PASS

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

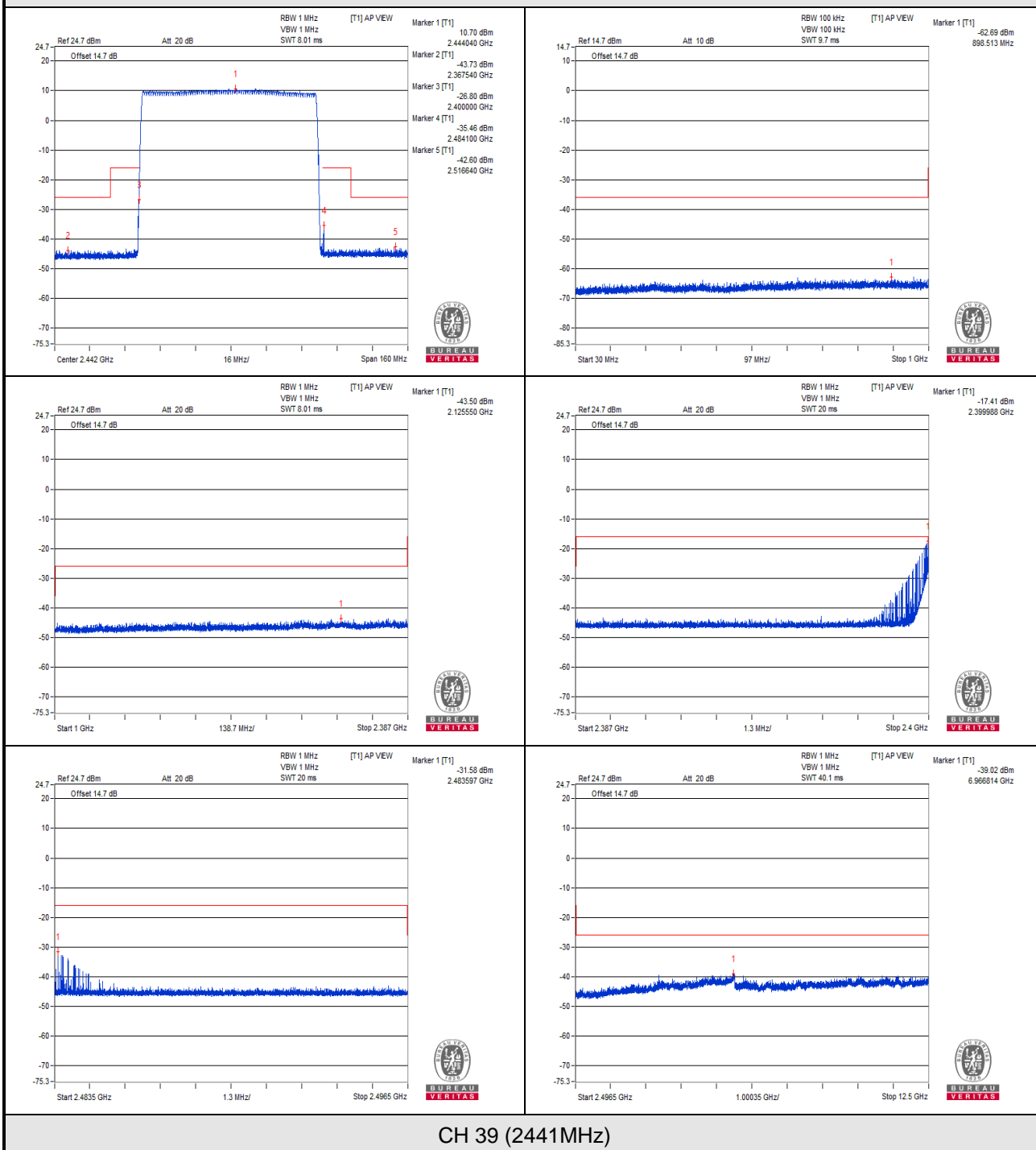
Vnormal



V_{max}.



V_{min}.

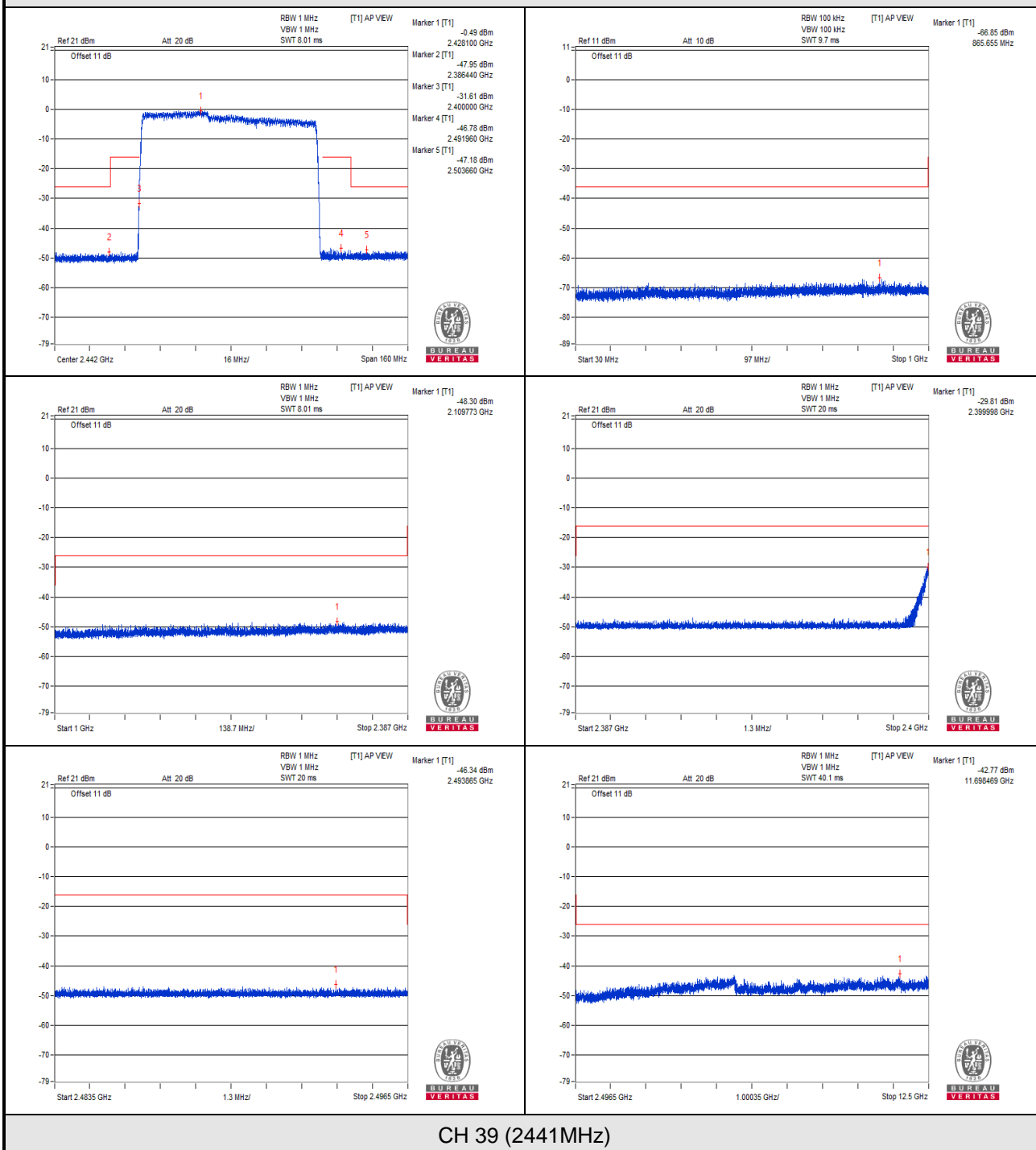


Modulation: $\pi/4$ -DQPSK

TEST CHANNEL		CH 39 (2441MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(μ W)	LIMIT (μ W)	RESULT
V_{normal}	30MHz to 1000MHz	865.655	0.000207	0.25	PASS
	1000MHz to 2387MHz	2109.773	0.014791	2.5	PASS
	2387MHz to 2400MHz	2399.998	1.044720	25	PASS
	2483.5MHz to 2496.5MHz	2493.865	0.023227	25	PASS
	2496.5MHz to 12500MHz	11698.468	0.052845	2.5	PASS
V_{max.}	30MHz to 1000MHz	999.393	0.000193	0.25	PASS
	1000MHz to 2387MHz	2313.835	0.014825	2.5	PASS
	2387MHz to 2400MHz	2399.996	1.158777	25	PASS
	2483.5MHz to 2496.5MHz	2495.781	0.022233	25	PASS
	2496.5MHz to 12500MHz	6501.651	0.044463	2.5	PASS
V_{min.}	30MHz to 1000MHz	771.928	0.000166	0.25	PASS
	1000MHz to 2387MHz	2257.488	0.018450	2.5	PASS
	2387MHz to 2400MHz	2399.991	0.957194	25	PASS
	2483.5MHz to 2496.5MHz	2486.842	0.022387	25	PASS
	2496.5MHz to 12500MHz	6999.325	0.070632	2.5	PASS

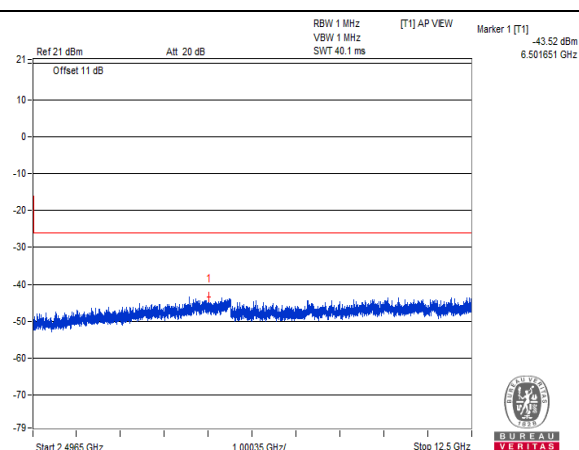
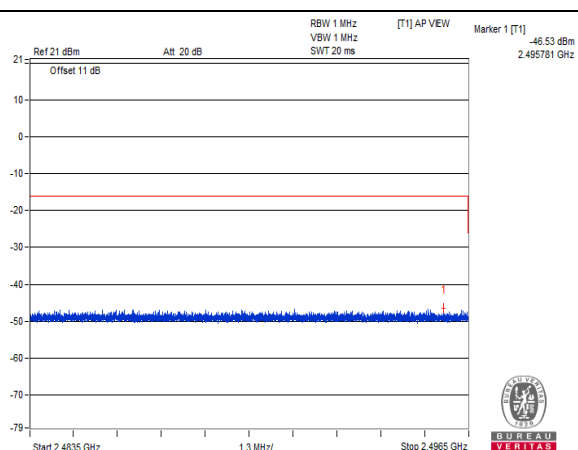
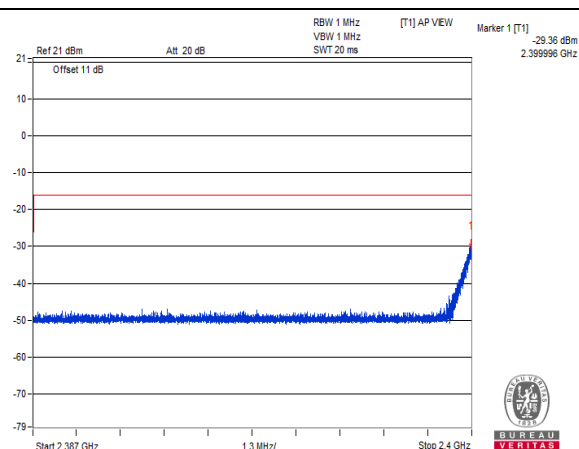
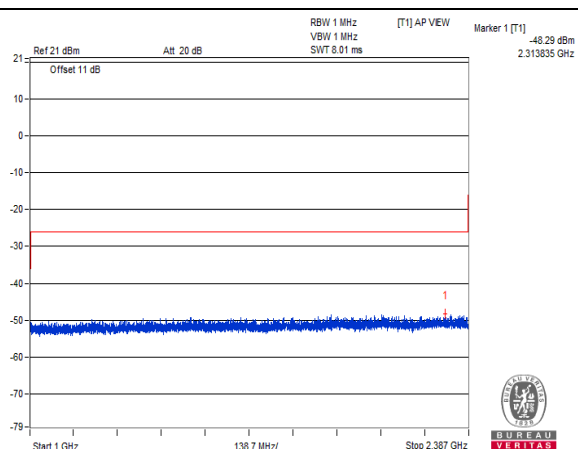
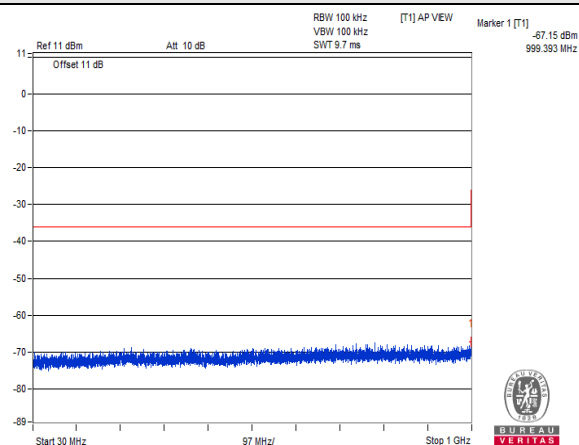
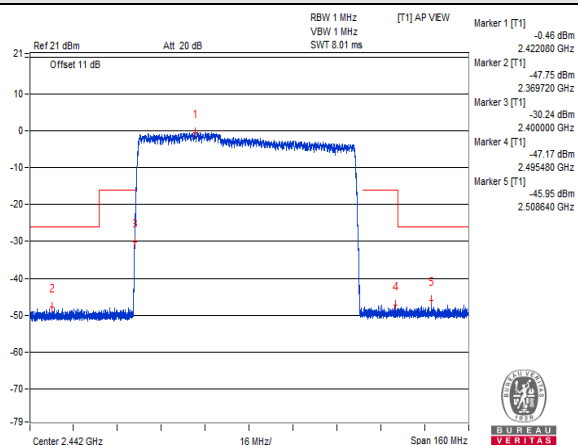
NOTE: 1. The spectrum plots are attached on the following pages.

Vnormal



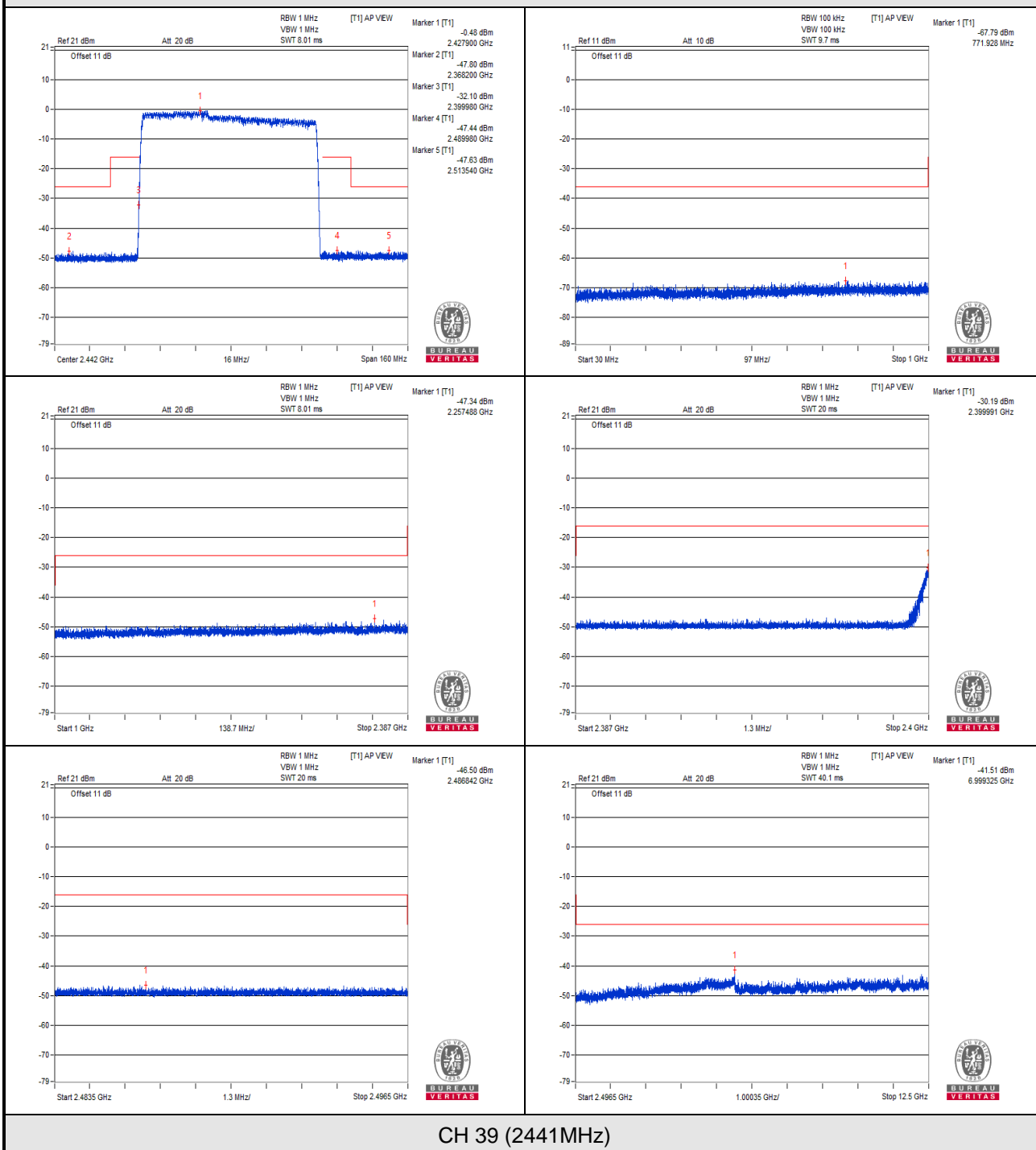
CH 39 (2441MHz)

V_{max}.



CH 39 (2441MHz)

V_{min}.

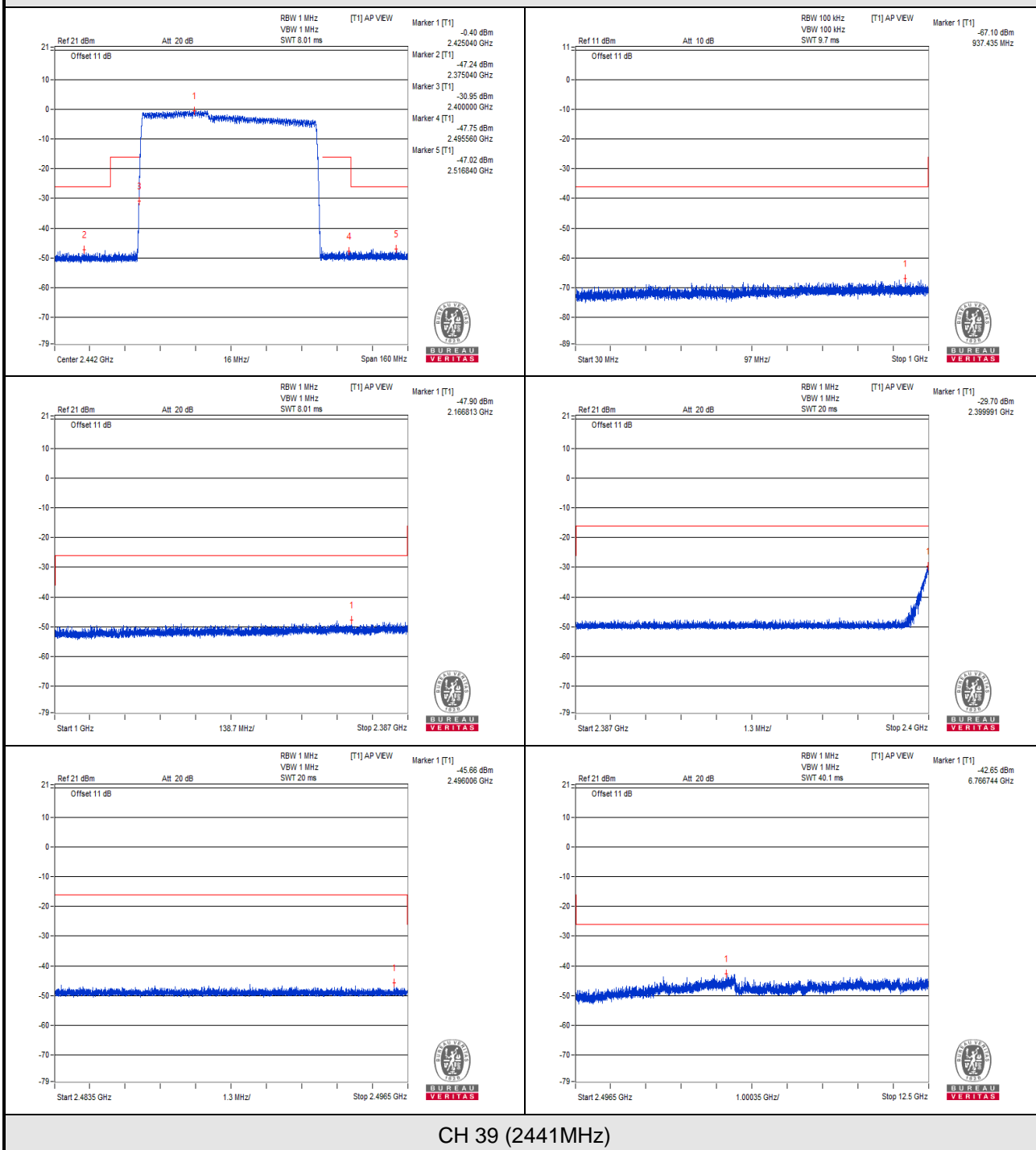


Modulation: 8DPSK

TEST CHANNEL		CH 39 (2441MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(μ W)	LIMIT (μ W)	RESULT
V_{normal}	30MHz to 1000MHz	937.435	0.000195	0.25	PASS
	1000MHz to 2387MHz	2166.813	0.016218	2.5	PASS
	2387MHz to 2400MHz	2399.991	1.071519	25	PASS
	2483.5MHz to 2496.5MHz	2496.006	0.027164	25	PASS
	2496.5MHz to 12500MHz	6766.744	0.054325	2.5	PASS
V_{max.}	30MHz to 1000MHz	833.160	0.000173	0.25	PASS
	1000MHz to 2387MHz	1296.471	0.014859	2.5	PASS
	2387MHz to 2400MHz	2399.990	1.009253	25	PASS
	2483.5MHz to 2496.5MHz	2491.410	0.024099	25	PASS
	2496.5MHz to 12500MHz	6968.064	0.075509	2.5	PASS
V_{min.}	30MHz to 1000MHz	897.058	0.000187	0.25	PASS
	1000MHz to 2387MHz	2332.386	0.015101	2.5	PASS
	2387MHz to 2400MHz	2399.998	1.093956	25	PASS
	2483.5MHz to 2496.5MHz	2484.697	0.023550	25	PASS
	2496.5MHz to 12500MHz	6965.563	0.049659	2.5	PASS

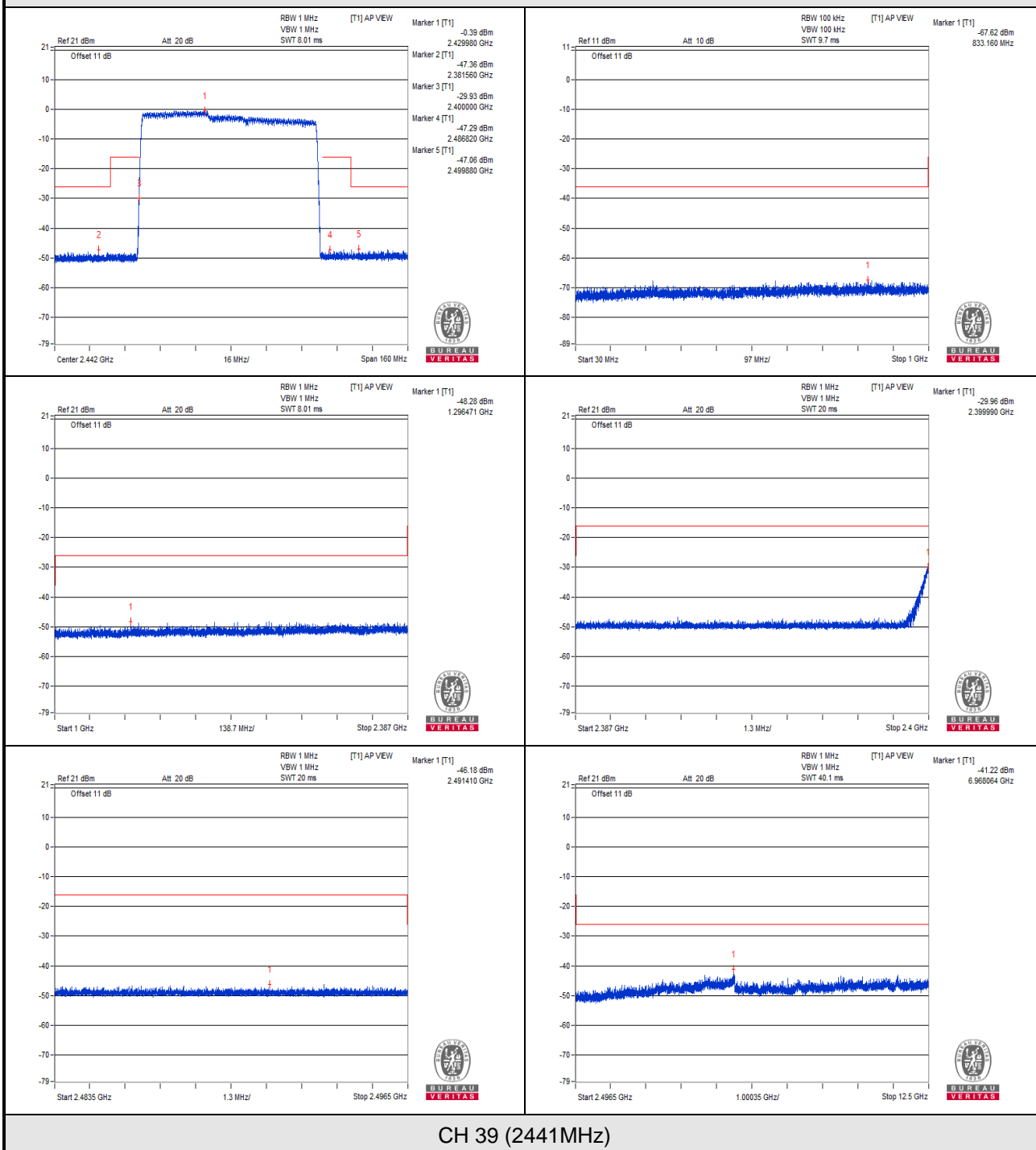
NOTE: 1. The spectrum plots are attached on the following pages.

Vnormal



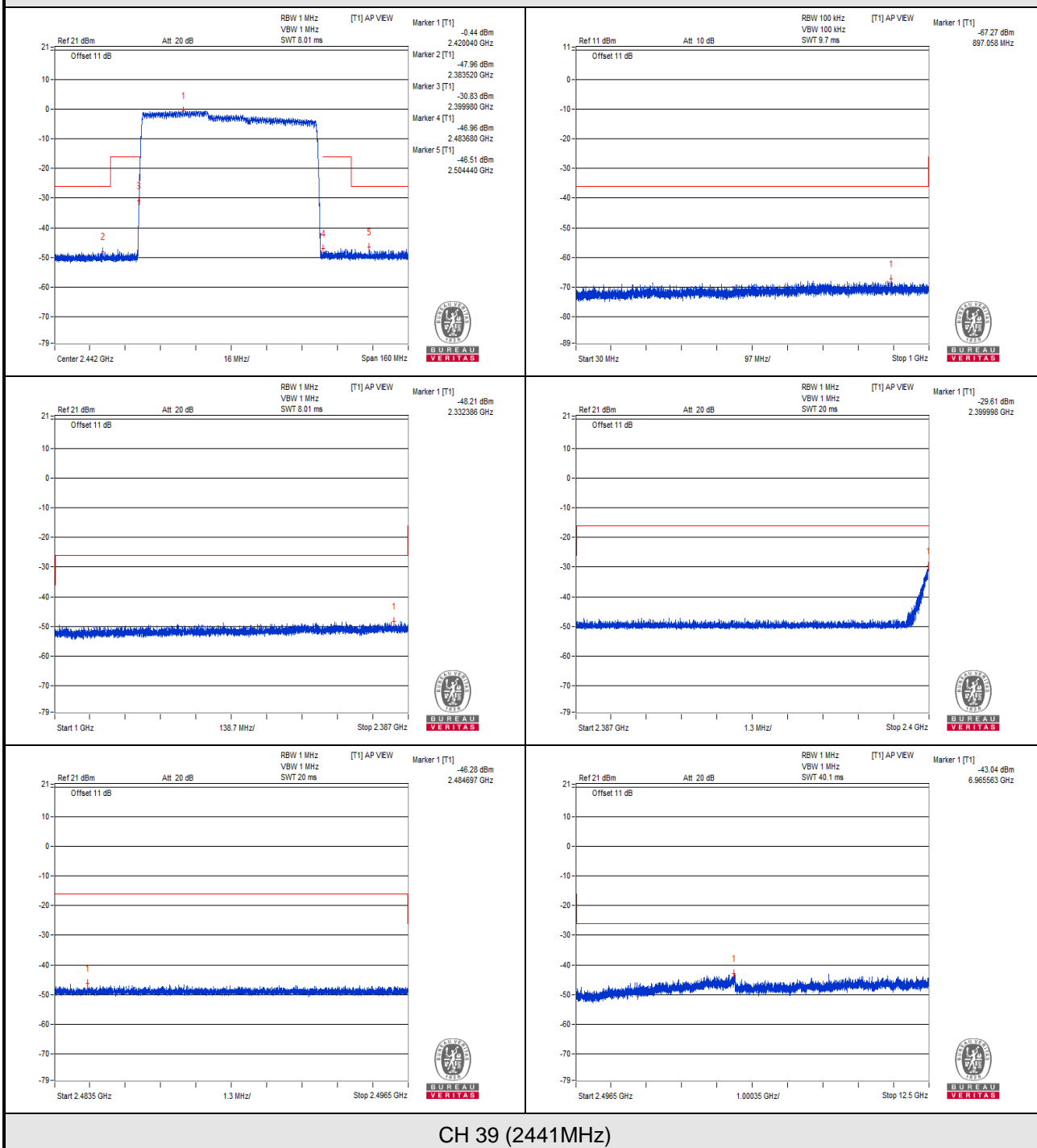
CH 39 (2441MHz)

V_{max}.



CH 39 (2441MHz)

V_{min}.



4.5 Antenna Power Measurement

4.5.1 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)
FH	2400 – 2483.5 MHz	3 mW/MHz	6.91 dBm/MHz ~ 16.91 dBm/MHz (4.91 mW/MHz ~ 49.10 mW/MHz)

Note:

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

4.5.2 Test Setup



Output Power Density (mW/MHz) = Total Output Power (mW) / Spread Bandwidth (MHz)

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.3 Test Results

Normal Mode:

Voltage (Vac)	Modulation	Data Rate	Conducted RF Output Power Density (mW/MHz)	Radiated RF Output Power Density (mW/MHz)
100	GFSK	DH5	0.12487	0.140106
	$\pi/4$ -DQPSK	2DH5	0.060729	0.068139
	8DPSK	3DH5	0.061504	0.069009
110	GFSK	DH5	0.128291	0.143945
	$\pi/4$ -DQPSK	2DH5	0.061829	0.069373
	8DPSK	3DH5	0.06363	0.071394
90	GFSK	DH5	0.127115	0.142625
	$\pi/4$ -DQPSK	2DH5	0.063303	0.071027
	8DPSK	3DH5	0.059488	0.066747
Max. Limit (mW/MHz):			3	-
Rated Power (mW/MHz):			0.2	-
Tolerance of Antenna Power (mW/MHz):			0.04 ~ 0.24	-
Max. EIRP Limit (mW/MHz):			-	4.91

Note: 1. Antenna gain is 0.5 dBi.

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

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

AFH Mode:

Voltage (Vac)	Modulation	Data Rate	Conducted RF Output Power Density (mW/MHz)	Radiated RF Output Power Density (mW/MHz)
100	GFSK	DH5	0.48762	0.547119
	$\pi/4$ -DQPSK	2DH5	0.236139	0.264952
	8DPSK	3DH5	0.236684	0.265564
110	GFSK	DH5	0.500129	0.561154
	$\pi/4$ -DQPSK	2DH5	0.239974	0.269255
	8DPSK	3DH5	0.245565	0.275528
90	GFSK	DH5	0.499406	0.560343
	$\pi/4$ -DQPSK	2DH5	0.244999	0.274893
	8DPSK	3DH5	0.230234	0.258327
Max. Limit (mW/MHz):			3	-
Rated Power (mW/MHz):			0.5	-
Tolerance of Antenna Power (mW/MHz):			0.1 ~ 0.6	-
Max. EIRP Limit (mW/MHz):			-	4.91

Note: 1. Antenna gain is 0.5 dBi.

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

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

4.6 Spurious Emissions for Receiver

4.6.1 Limits of Spurious Emissions for Receiver

Frequencies (MHz)	Limit
Below 1GHz	$\leq 4\text{nW}/100\text{kHz}$ (-54dBm)
Above 1GHz	$\leq 20\text{nW}/\text{MHz}$ (-47dBm)

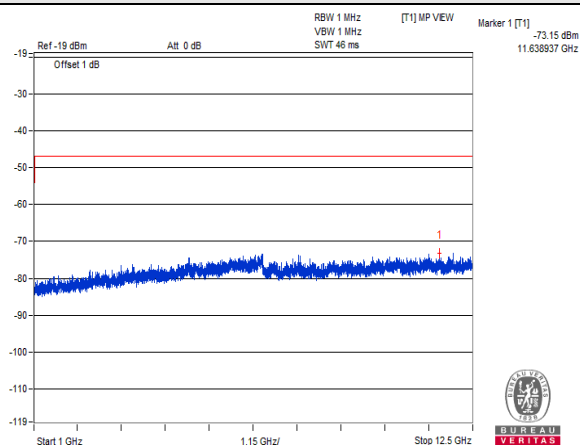
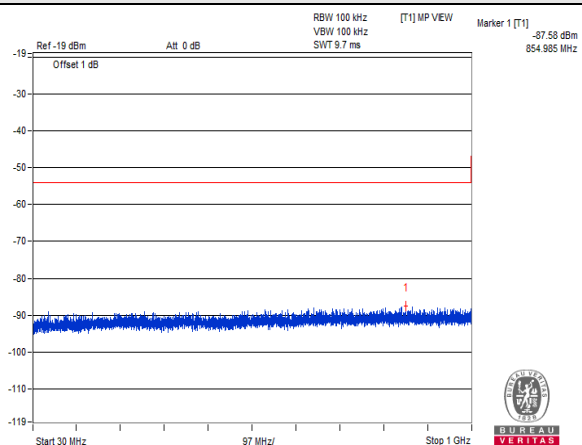
4.6.2 Test Setup



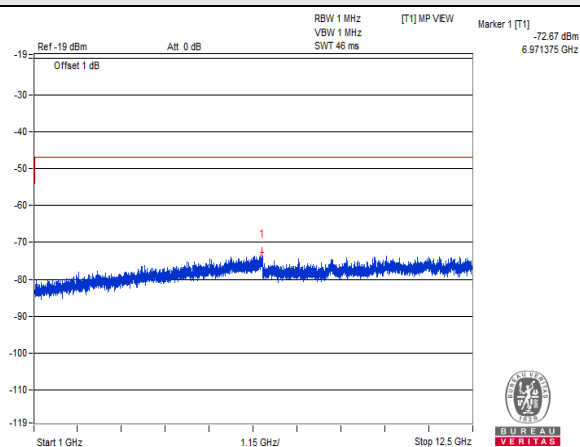
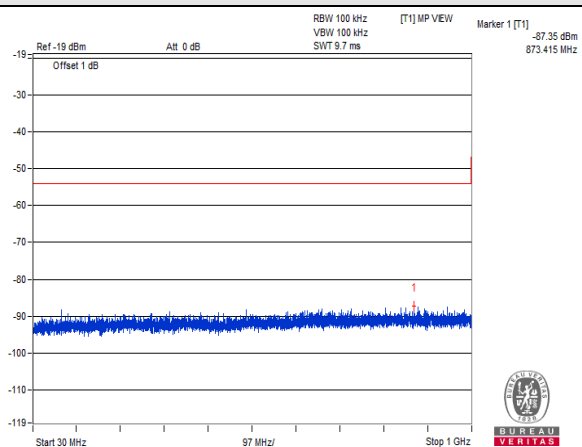
4.6.3 Test Result

TEST CHANNEL		CH 0 (2402MHz)			
TEST CONDITION	FREQUENCY RANGE(MHz)	FREQUENCY (MHz)	MEASURE. VALUE(nW)	LIMIT (nW)	RESULT
V_{normal}	30MHz to 1000MHz	854.985	0.001746	4.0	PASS
	1000MHz to 12500MHz	11638.937	0.048417	20.0	PASS
V_{max.}	30MHz to 1000MHz	873.415	0.001841	4.0	PASS
	1000MHz to 12500MHz	6971.375	0.054075	20.0	PASS
V_{min.}	30MHz to 1000MHz	715.183	0.001828	4.0	PASS
	1000MHz to 12500MHz	11598.687	0.050234	20.0	PASS
TEST CHANNEL		CH 39 (2441MHz)			
V_{normal}	30MHz to 1000MHz	640.251	0.001897	4.0	PASS
	1000MHz to 12500MHz	6985.750	0.057280	20.0	PASS
V_{max.}	30MHz to 1000MHz	522.275	0.001954	4.0	PASS
	1000MHz to 12500MHz	6991.500	0.046559	20.0	PASS
V_{min.}	30MHz to 1000MHz	860.320	0.001778	4.0	PASS
	1000MHz to 12500MHz	6961.312	0.058614	20.0	PASS
TEST CHANNEL		CH 78 (2480MHz)			
V_{normal}	30MHz to 1000MHz	516.091	0.001807	4.0	PASS
	1000MHz to 12500MHz	6913.875	0.055335	20.0	PASS
V_{max.}	30MHz to 1000MHz	800.543	0.001629	4.0	PASS
	1000MHz to 12500MHz	6998.687	0.051642	20.0	PASS
V_{min.}	30MHz to 1000MHz	833.038	0.001614	4.0	PASS
	1000MHz to 12500MHz	6617.750	0.053333	20.0	PASS

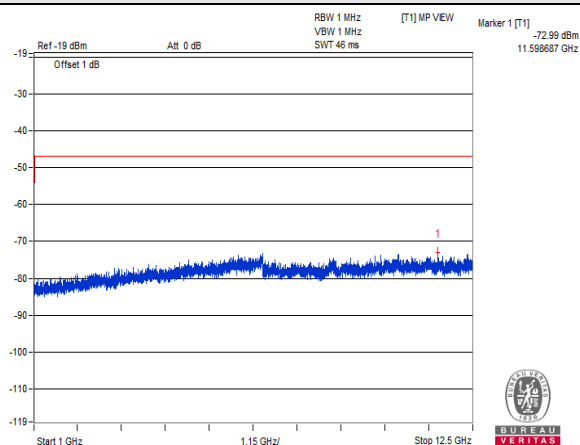
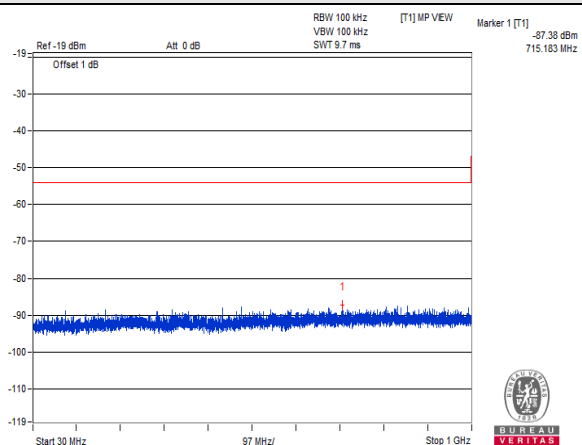
V_{normal}



V_{max.}

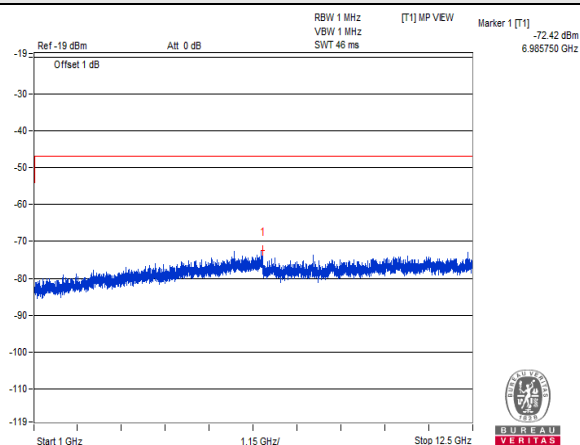
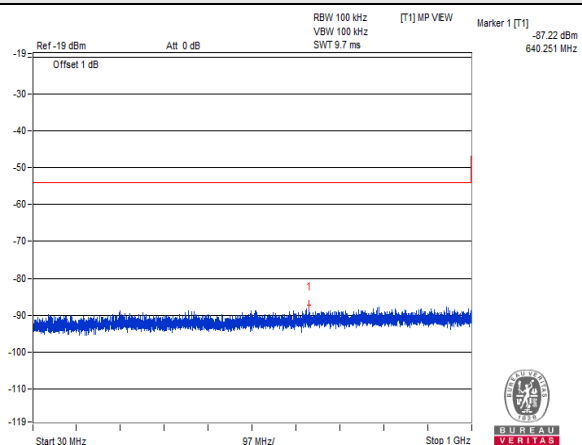


V_{min.}

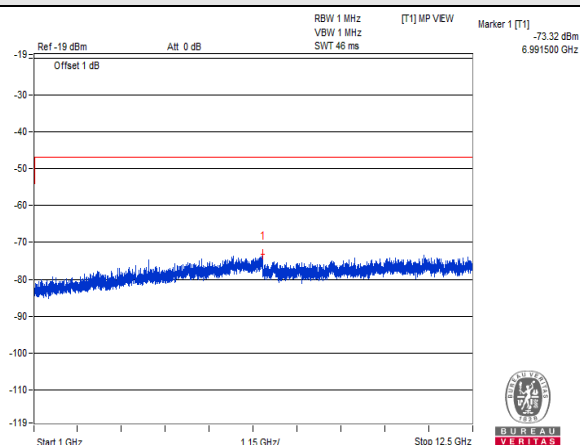
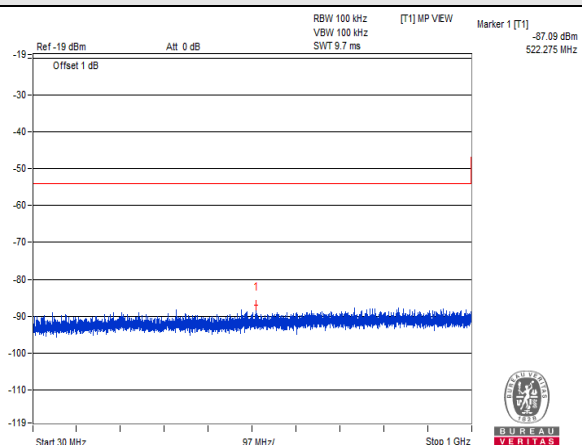


CH 0 (2402MHz)

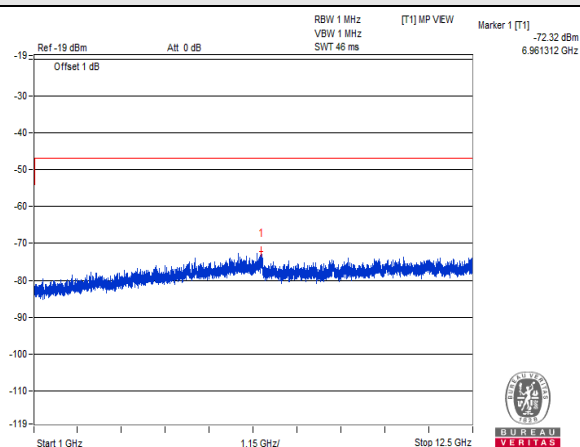
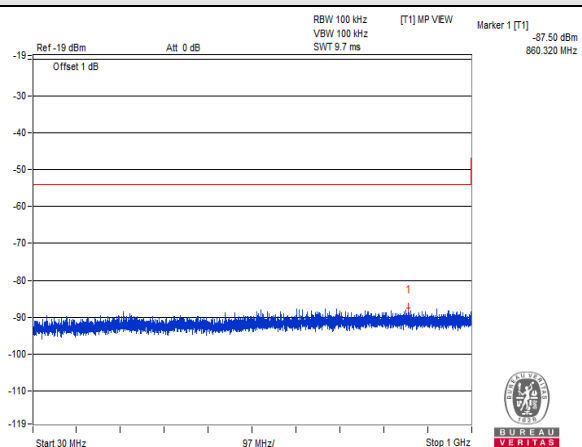
V_{normal}



V_{max.}

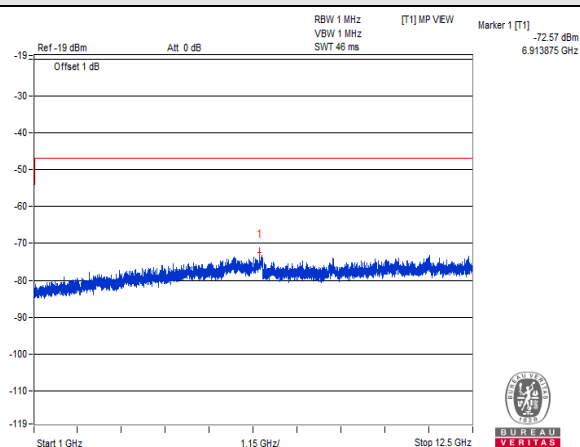
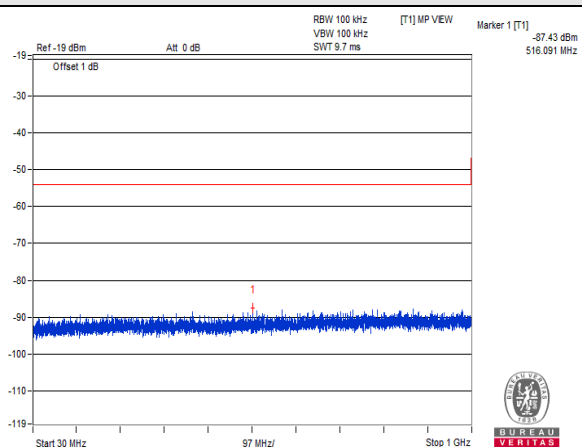


V_{min.}

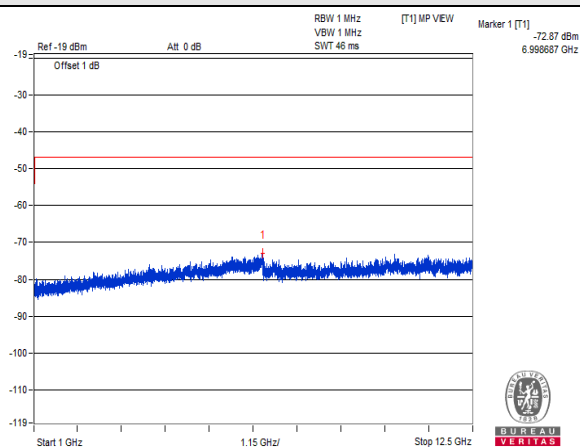
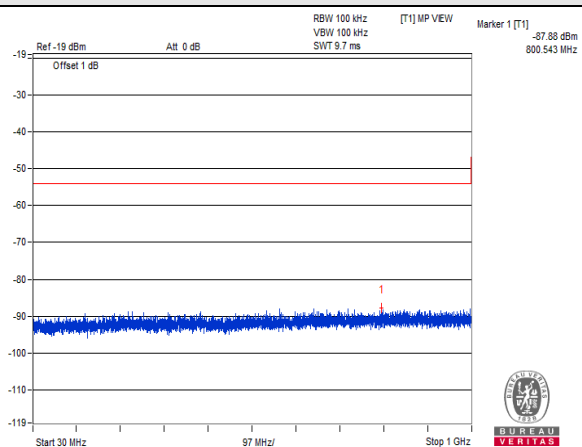


CH 39 (2441MHz)

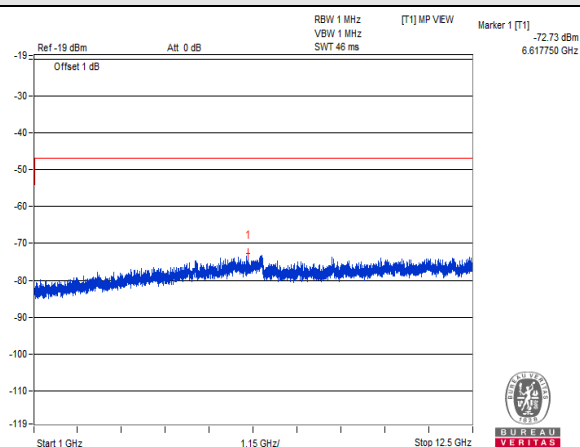
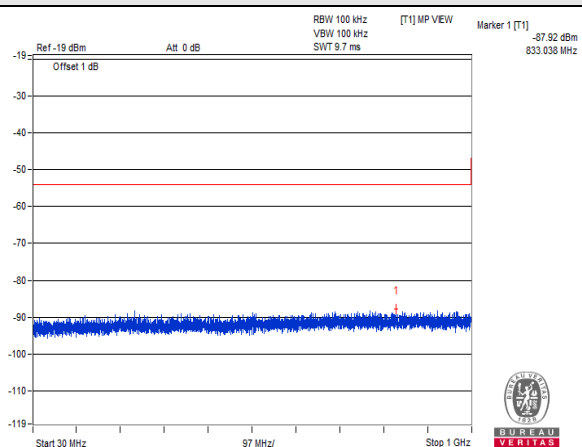
V_{normal}



V_{max}



V_{min}



CH 78 (2480MHz)

4.7 Dwell Time

4.7.1 Limits of Dwell Time

The frequency retention time in the frequency hopping method shall be 0.4 second or less. The total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter.

Formula:

(Normal mode) dwell time = [diffusion rate/ 79] x duty-cycle x 0.4 second

(AFH mode) dwell time = [diffusion rate/20] x duty-cycle x 0.4 second

4.7.2 Test Setup



4.7.3 Test Result

Modulation: GFSK

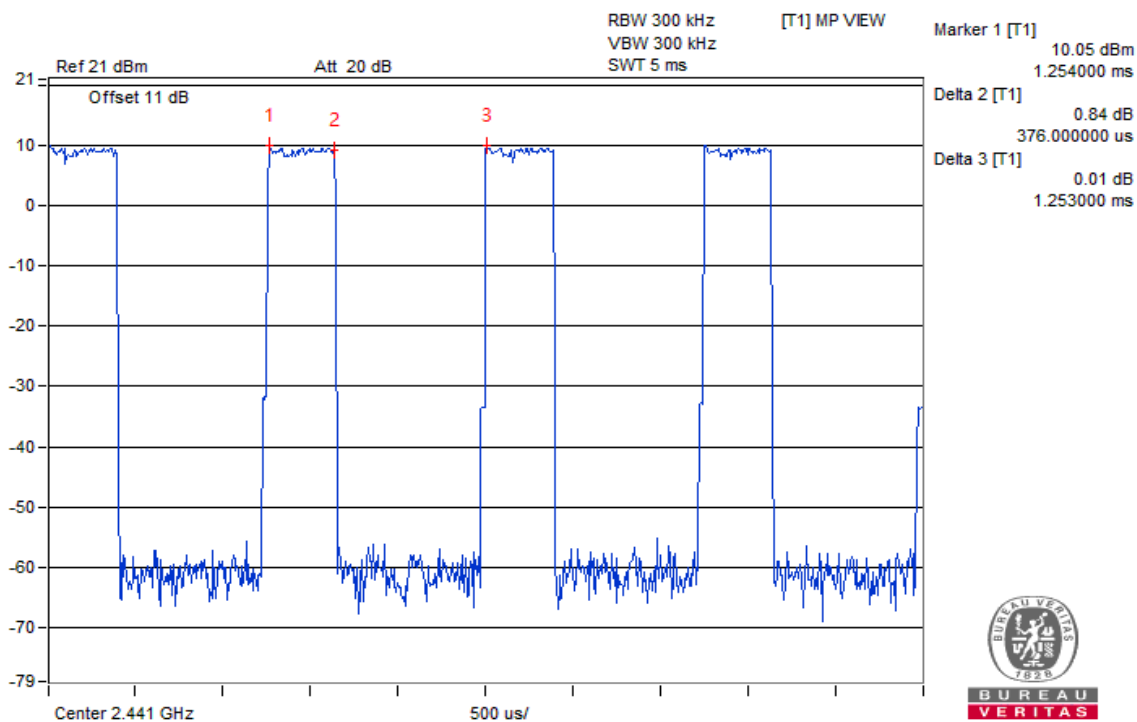
Normal Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	70.72	0.358	0.300	107.400	400
	DH3	70.72	0.358	0.647	231.626	400
	DH5	70.72	0.358	0.764	273.512	400
V_{max.}	DH1	70.60	0.357	0.300	107.100	400
	DH3	70.60	0.357	0.647	230.979	400
	DH5	70.60	0.357	0.764	272.748	400
V_{min.}	DH1	70.60	0.357	0.300	107.100	400
	DH3	70.60	0.357	0.647	230.979	400
	DH5	70.60	0.357	0.764	272.748	400

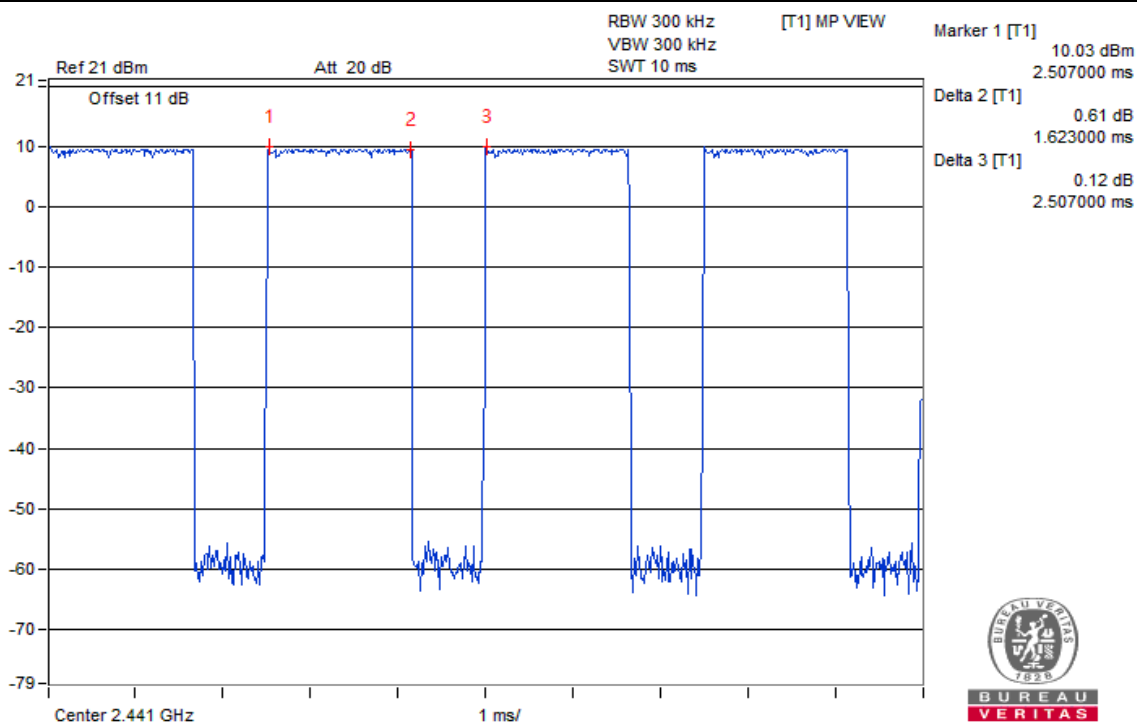
AFH Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	18.11	0.362	0.300	108.600	400
	DH3	18.11	0.362	0.647	234.214	400
	DH5	18.11	0.362	0.764	276.568	400
V_{max.}	DH1	18.11	0.362	0.300	108.600	400
	DH3	18.11	0.362	0.647	234.214	400
	DH5	18.11	0.362	0.764	276.568	400
V_{min.}	DH1	17.97	0.359	0.300	107.700	400
	DH3	17.97	0.359	0.647	232.273	400
	DH5	17.97	0.359	0.764	274.276	400

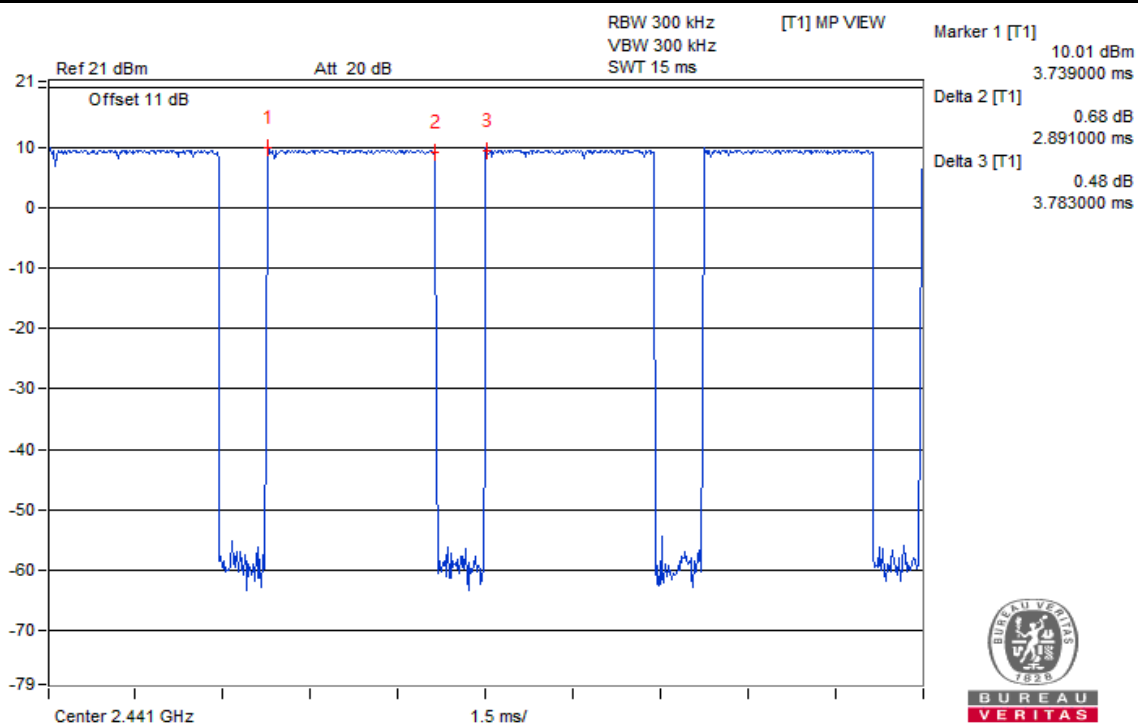
V_{normal}



DH1

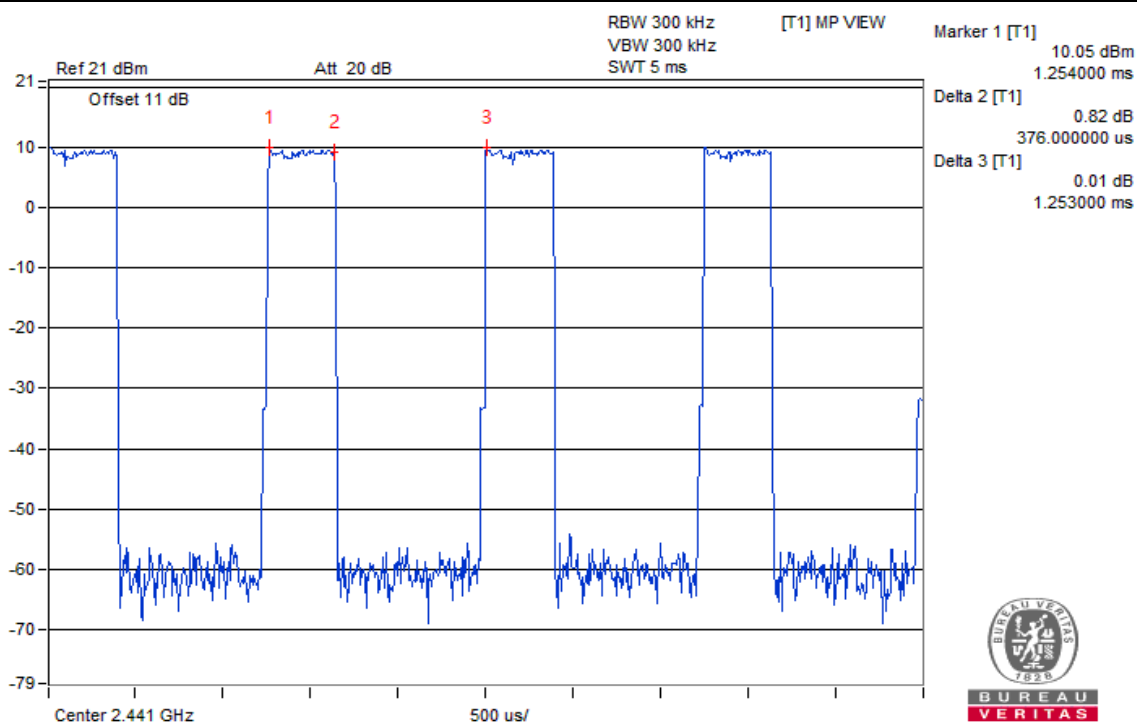


DH3

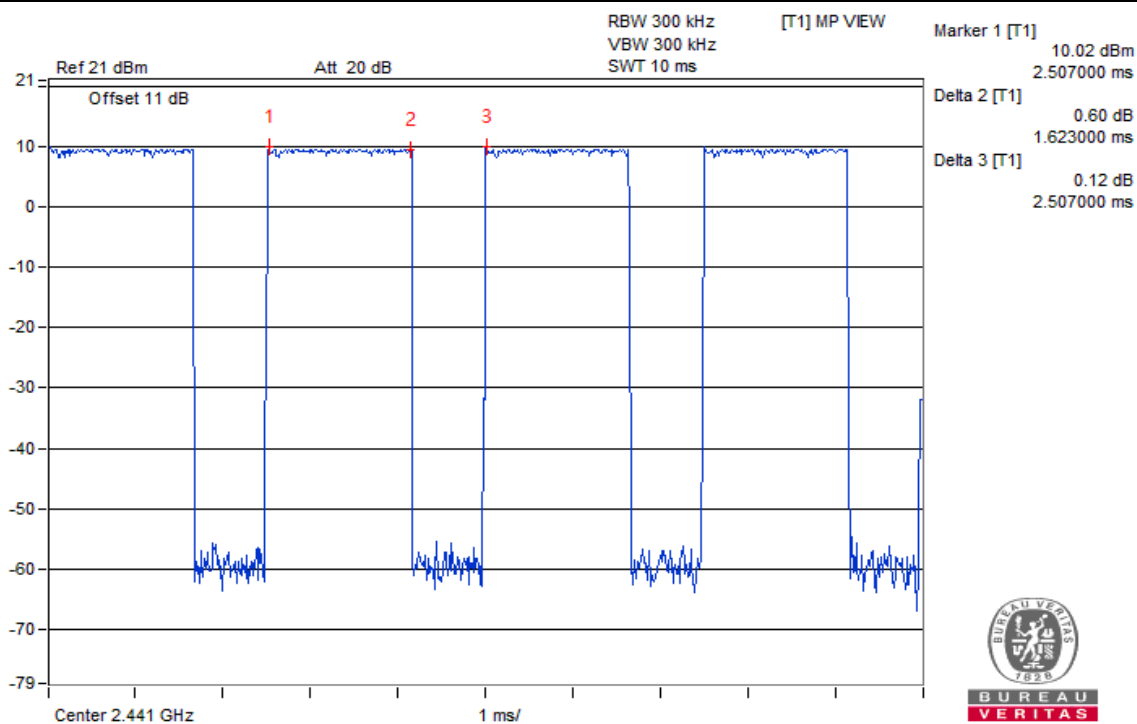


DH5

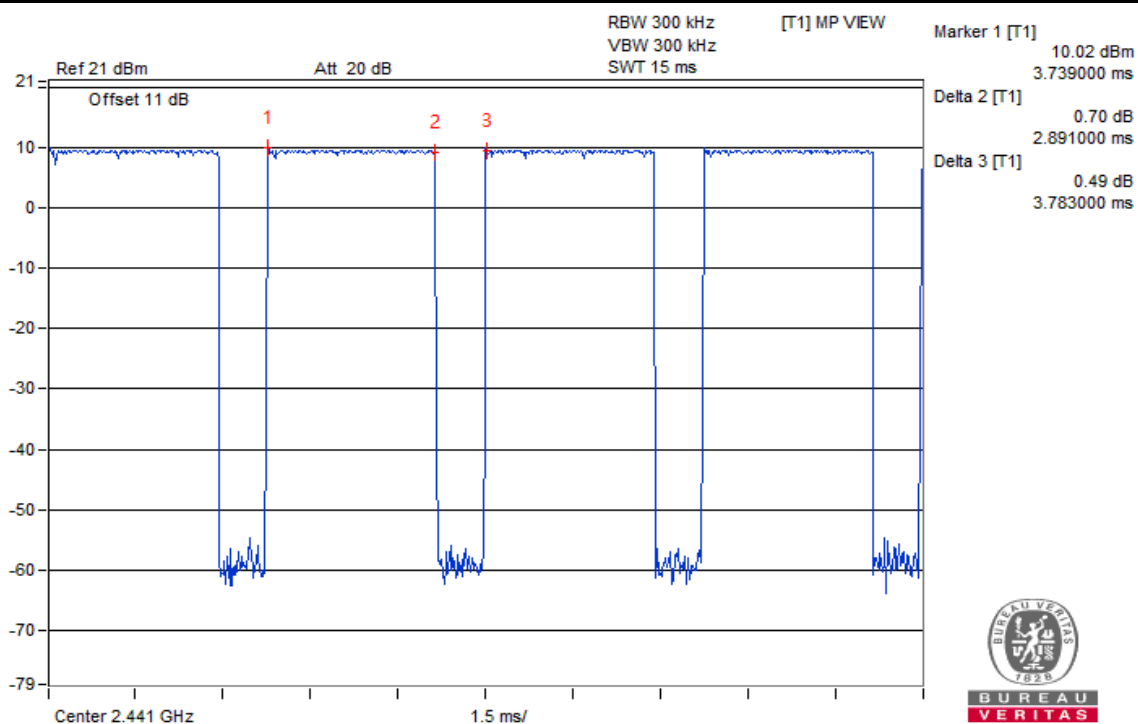
V_{max}.



DH1

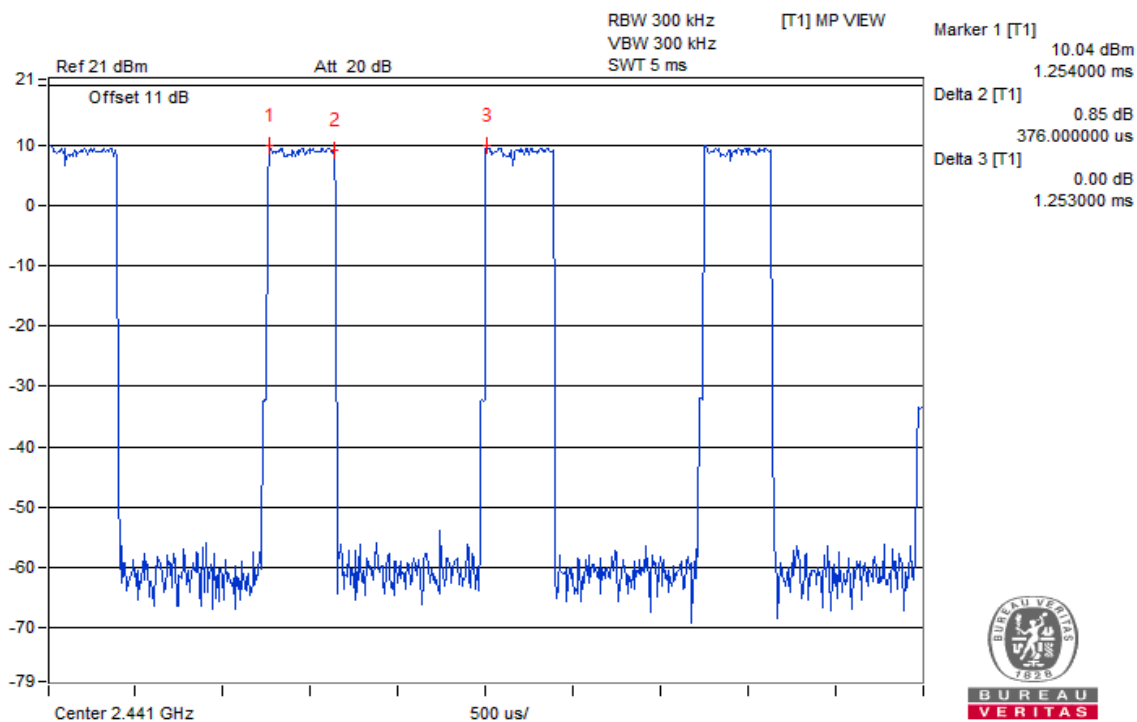


DH3

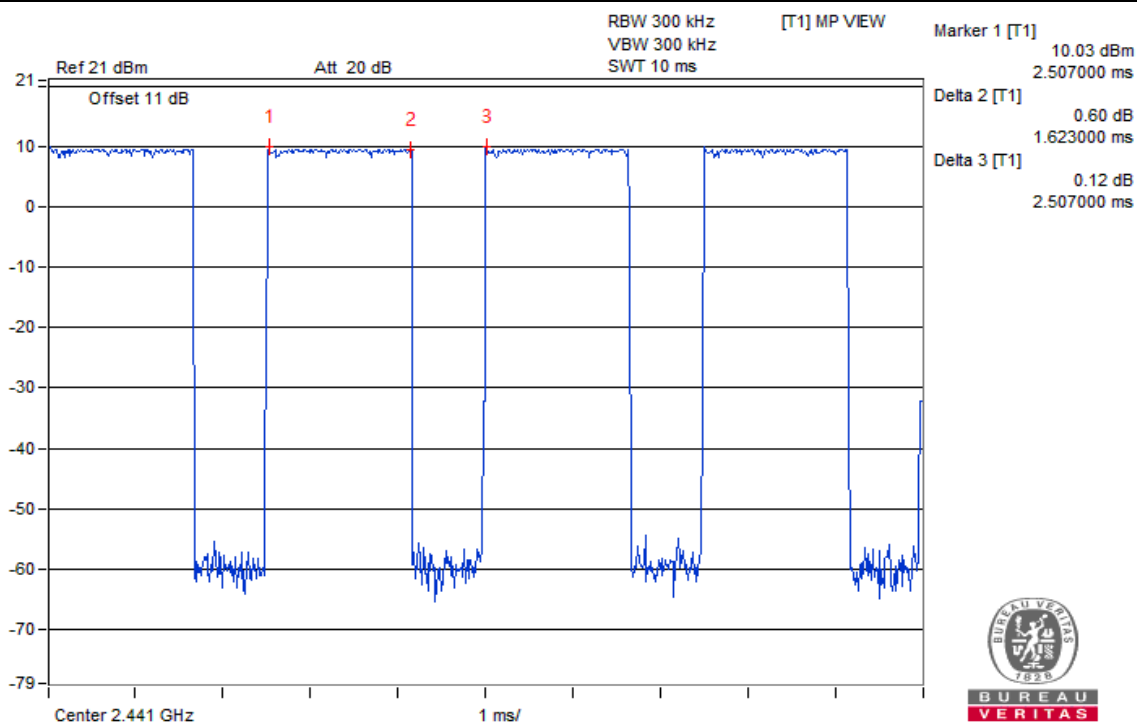


DH5

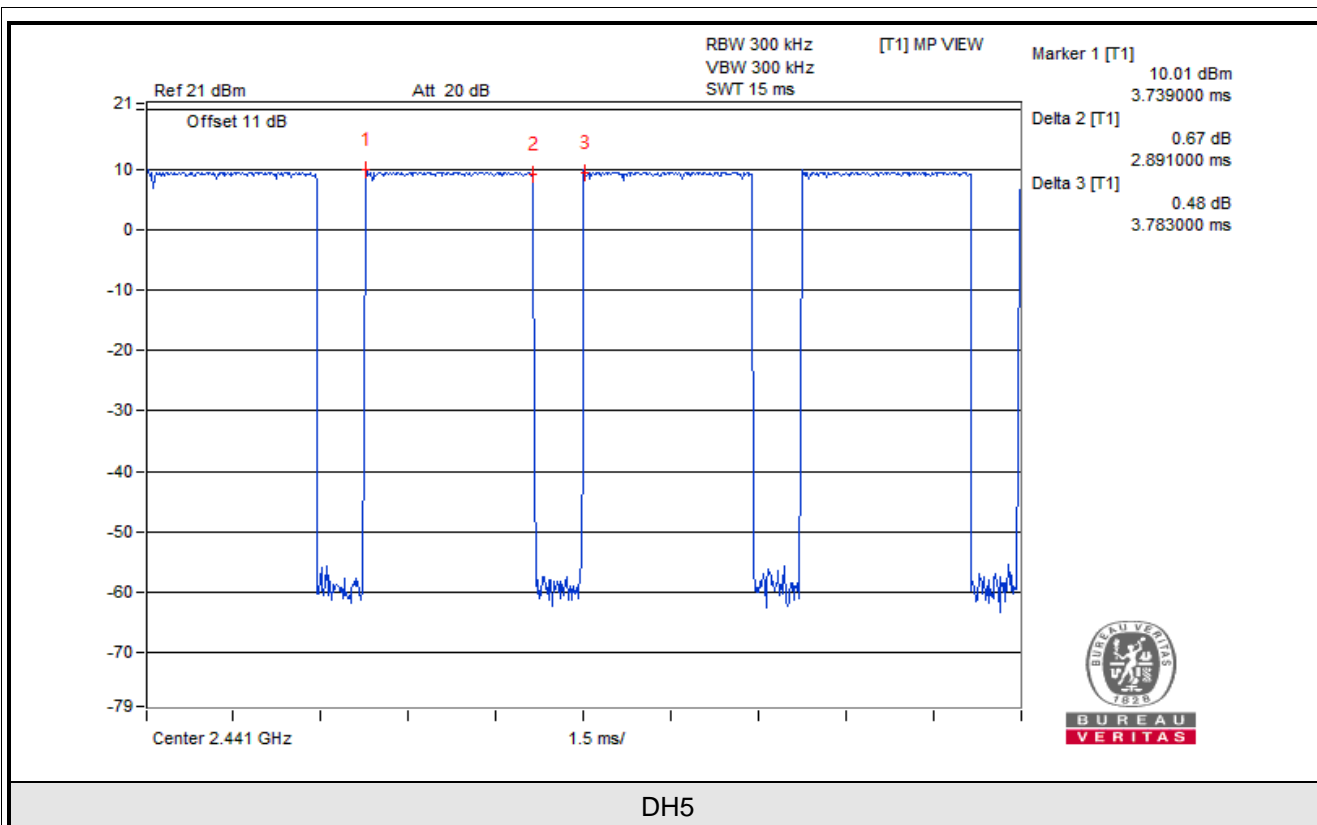
V_{min}.



DH1



DH3



Modulation: $\pi/4$ -DQPSK

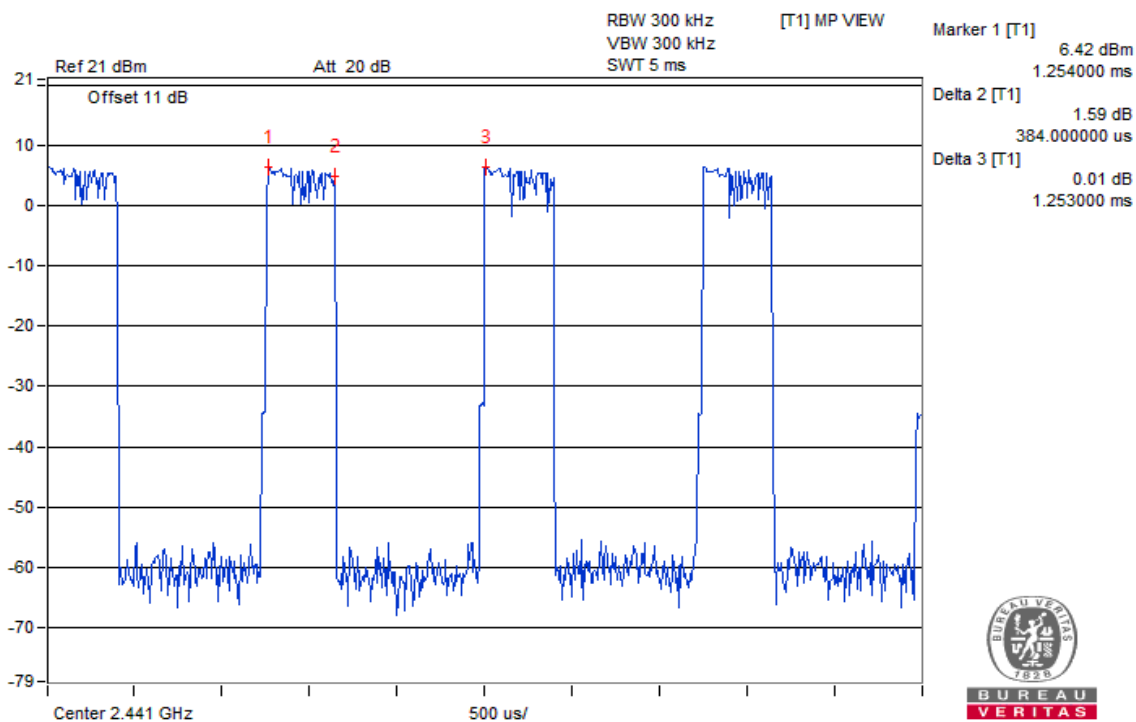
Normal Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	2DH1	70.73	0.358	0.306	109.548	400
	2DH3	70.73	0.358	0.647	231.626	400
	2DH5	70.73	0.358	0.764	273.512	400
V_{max.}	2DH1	70.60	0.357	0.306	109.242	400
	2DH3	70.60	0.357	0.647	230.979	400
	2DH5	70.60	0.357	0.764	272.748	400
V_{min.}	2DH1	70.40	0.356	0.306	108.936	400
	2DH3	70.40	0.356	0.647	230.332	400
	2DH5	70.40	0.356	0.764	271.984	400

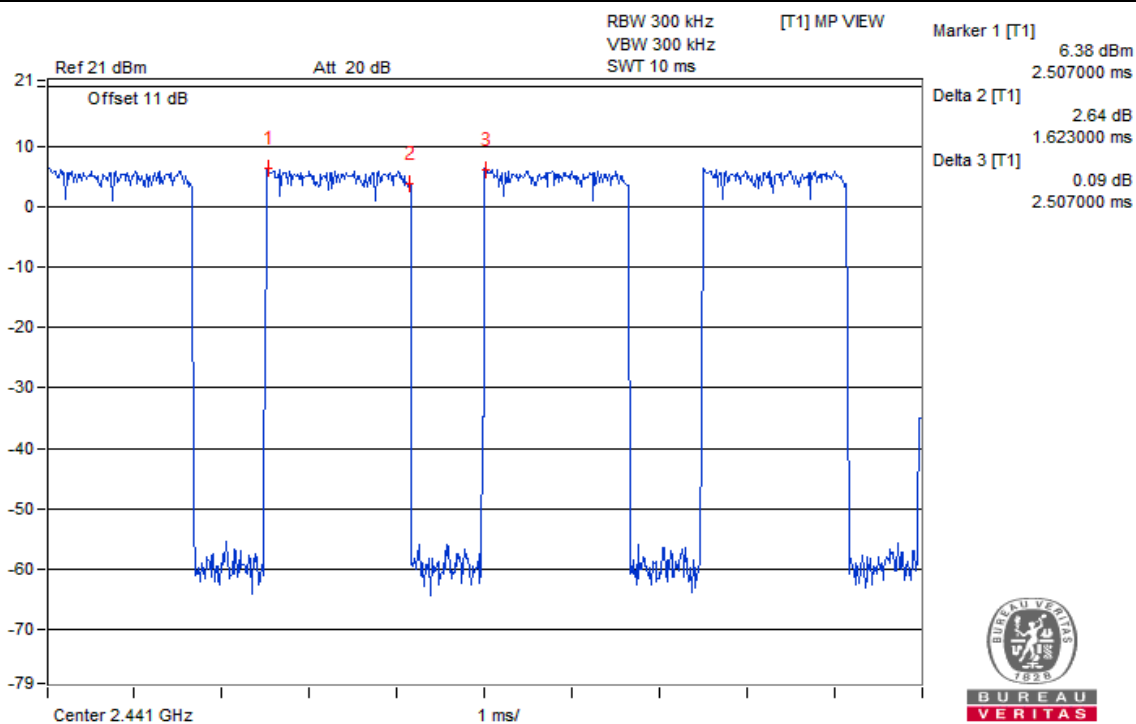
AFH Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	2DH1	18.19	0.363	0.306	111.078	400
	2DH3	18.19	0.363	0.647	234.861	400
	2DH5	18.19	0.363	0.764	277.332	400
V_{max.}	2DH1	18.19	0.363	0.306	111.078	400
	2DH3	18.19	0.363	0.647	234.861	400
	2DH5	18.19	0.363	0.764	277.332	400
V_{min.}	2DH1	18.19	0.363	0.306	111.078	400
	2DH3	18.19	0.363	0.647	234.861	400
	2DH5	18.19	0.363	0.764	277.332	400

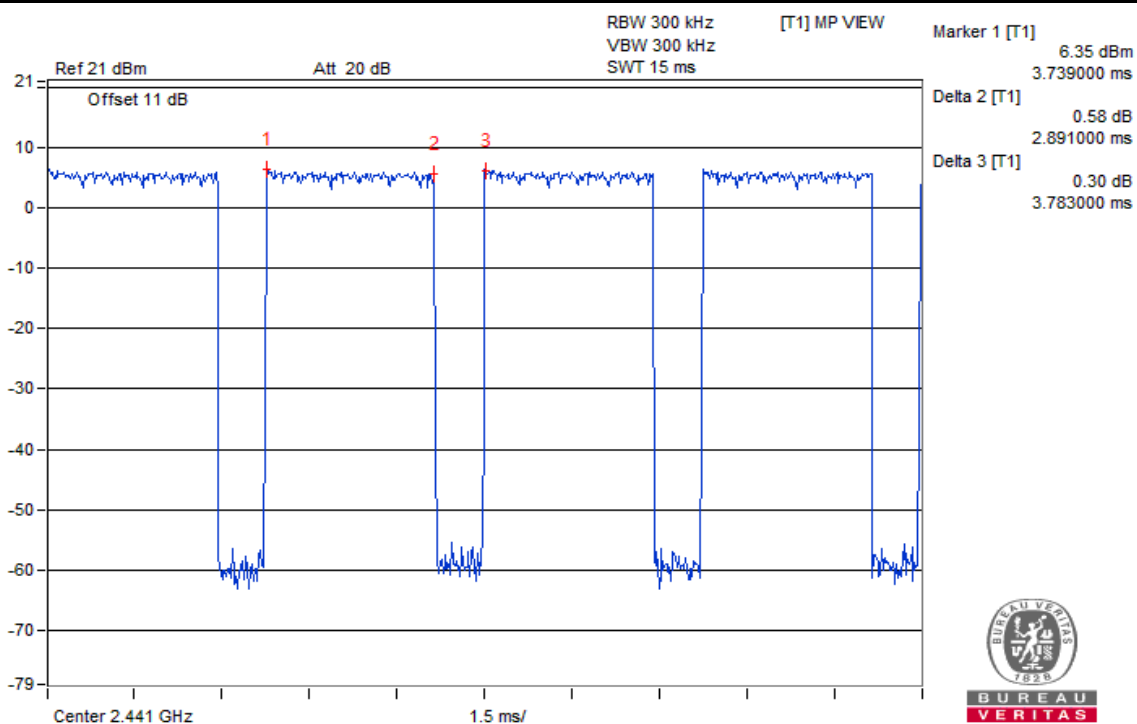
V_{normal}



2DH1

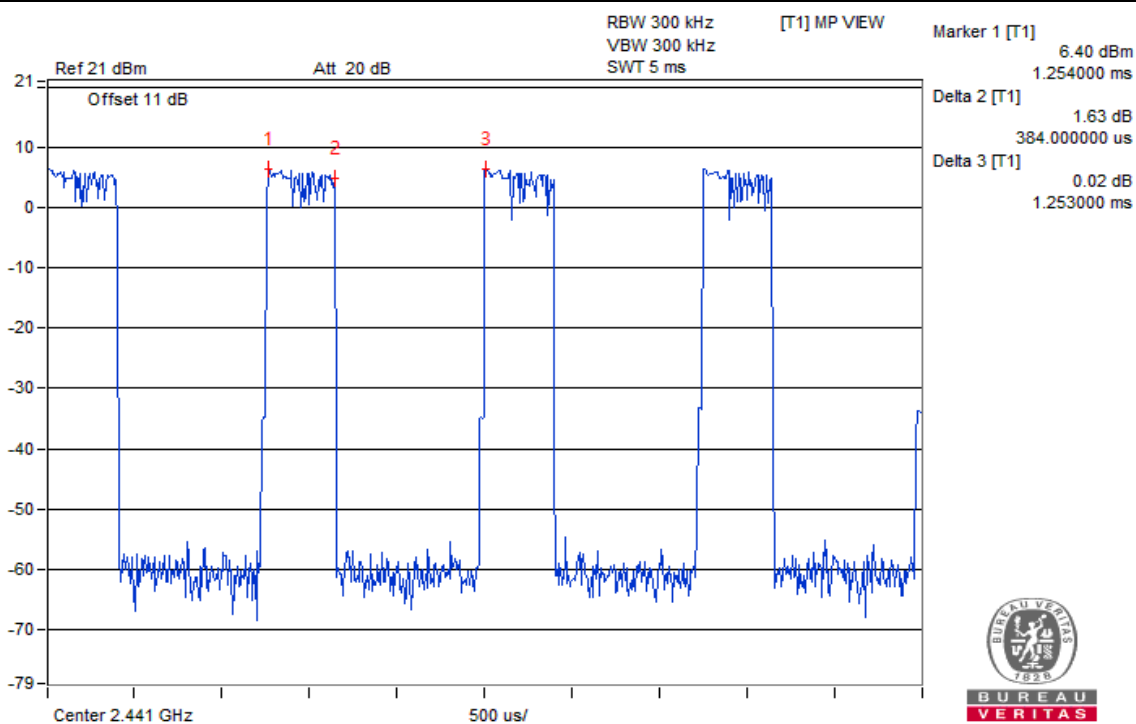


2DH3

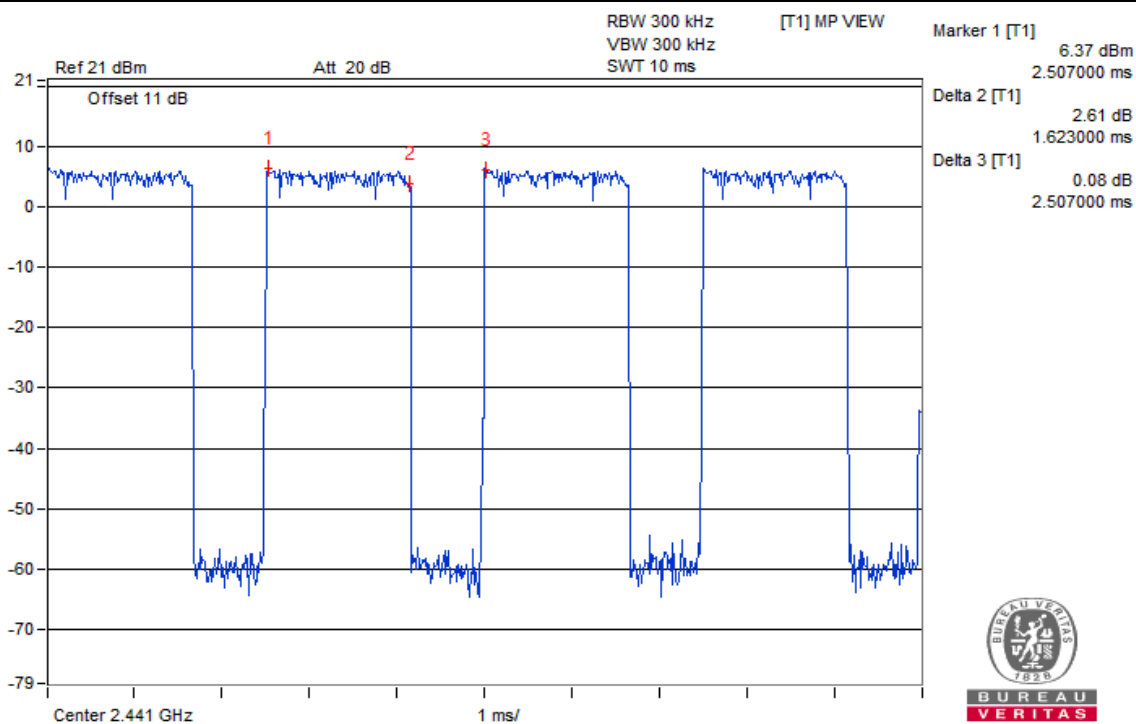


2DH5

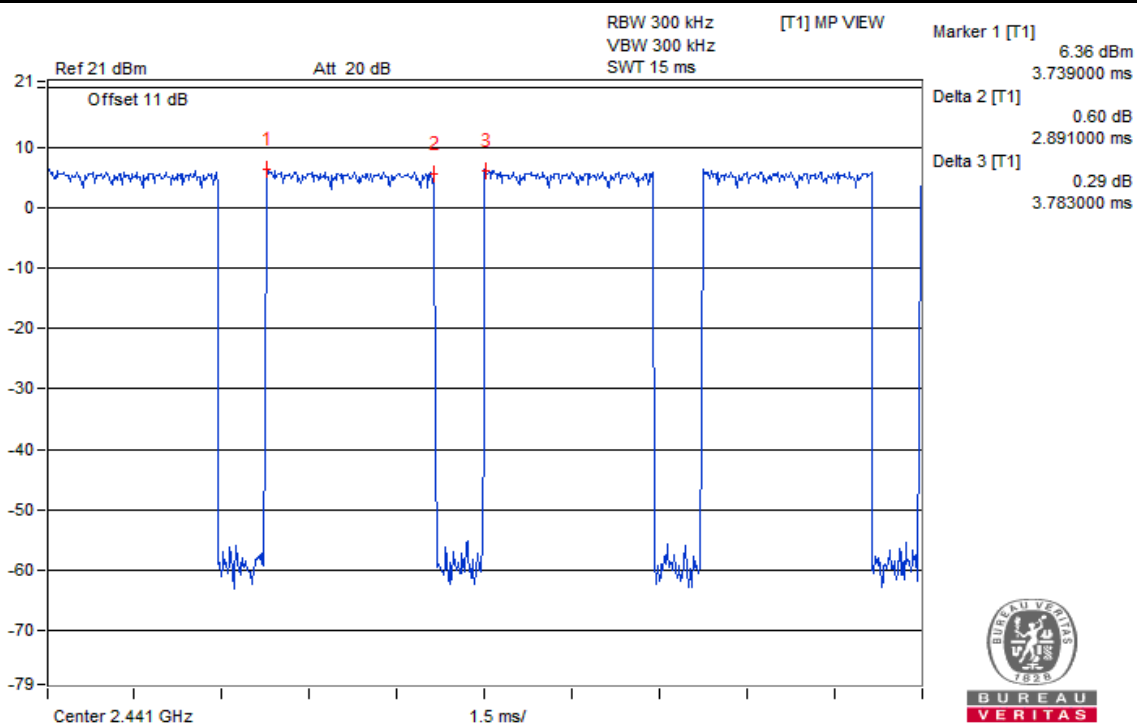
V_{max}.



2DH1

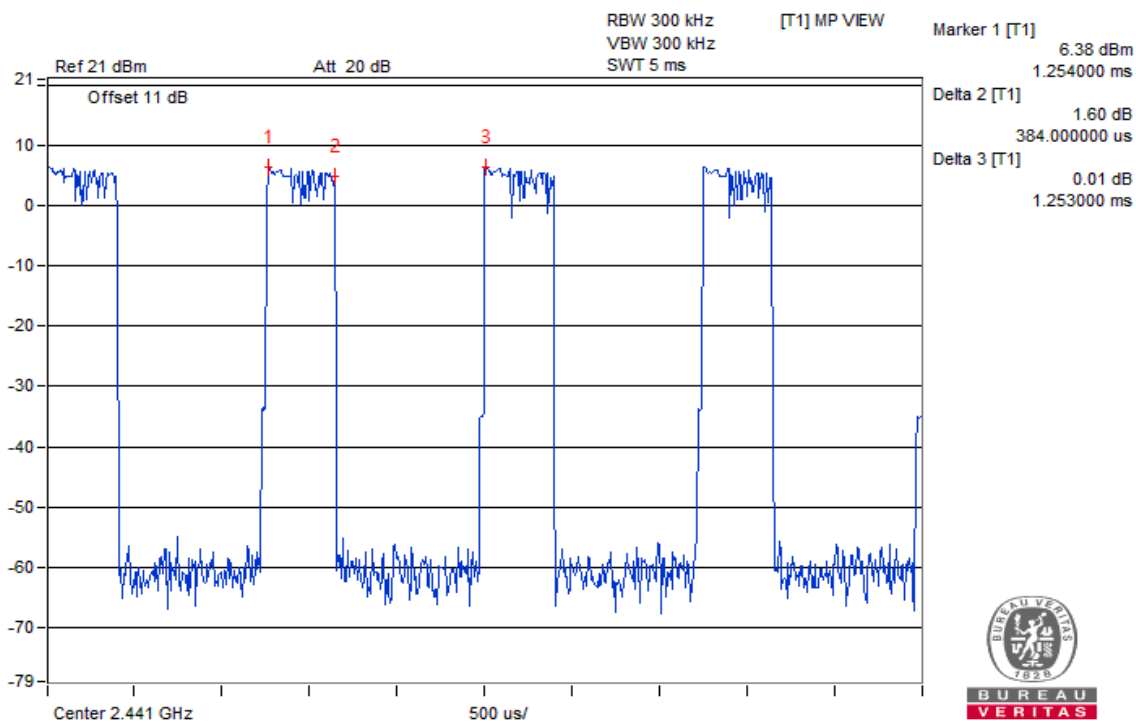


2DH3

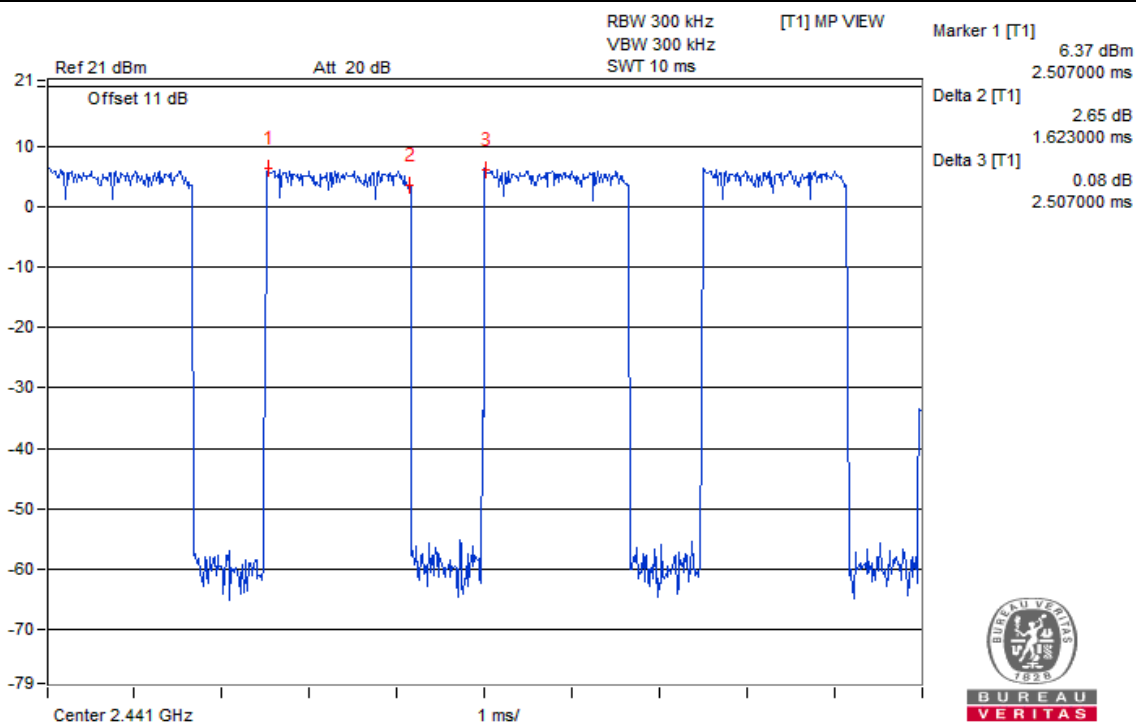


2DH5

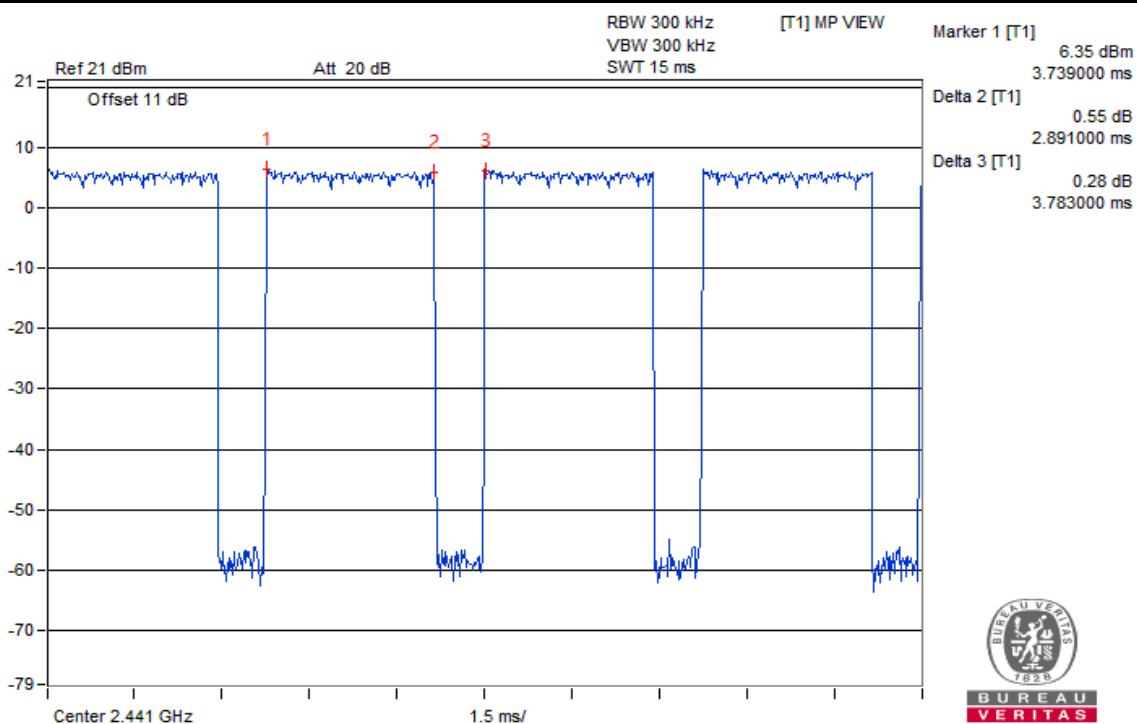
V_{min}.



2DH1



2DH3



2DH5

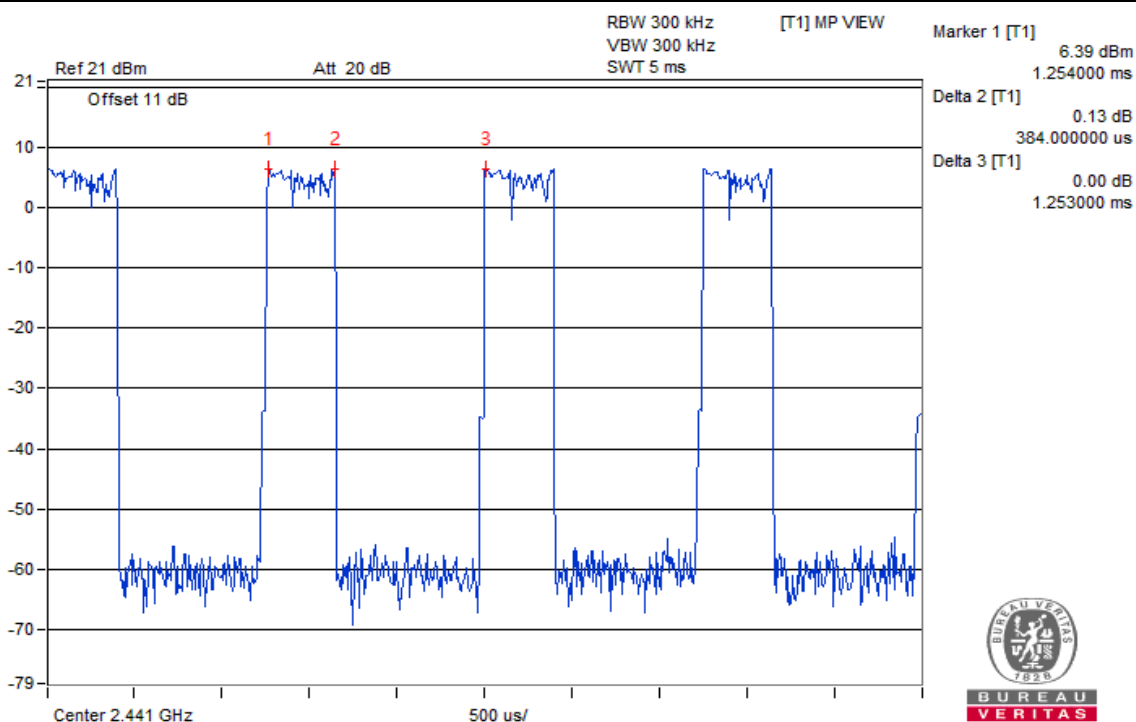
Modulation: 8DPSK
Normal Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	3DH1	70.00	0.354	0.306	108.324	400
	3DH3	70.00	0.354	0.652	230.808	400
	3DH5	70.00	0.354	0.768	271.872	400
V_{max.}	3DH1	70.20	0.355	0.306	108.630	400
	3DH3	70.20	0.355	0.652	231.460	400
	3DH5	70.20	0.355	0.768	272.640	400
V_{min.}	3DH1	70.40	0.356	0.306	108.936	400
	3DH3	70.40	0.356	0.652	232.112	400
	3DH5	70.40	0.356	0.764	271.984	400

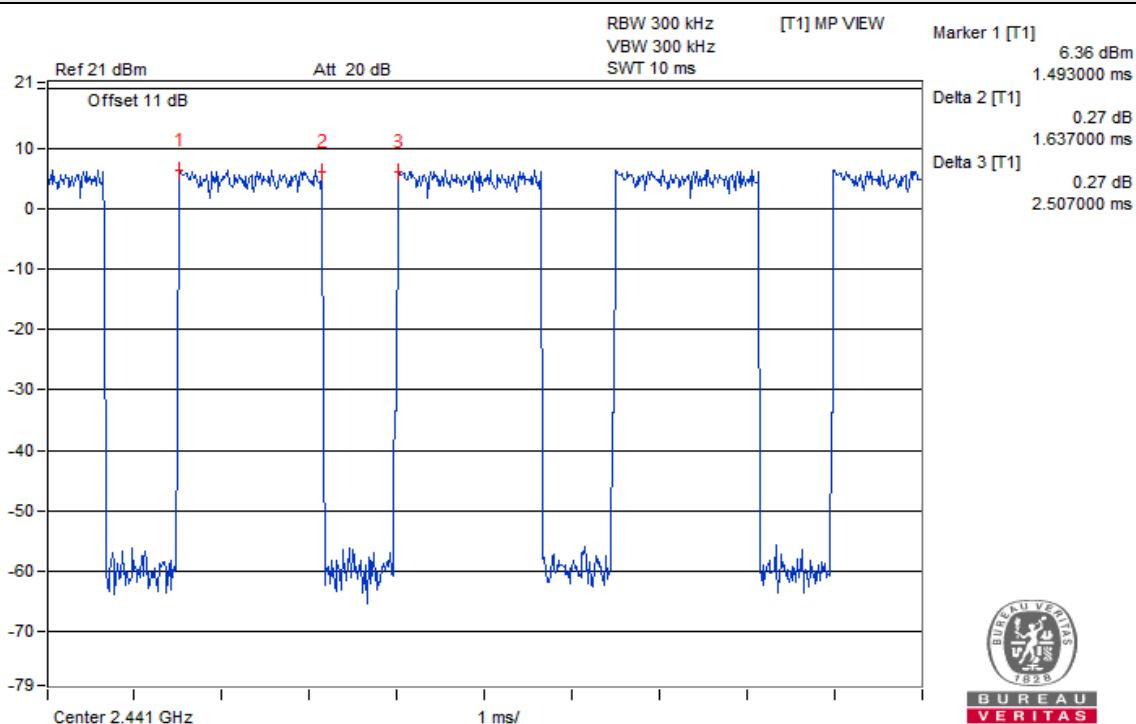
AFH Mode:

Test Condition	Mode	Diffusion Rate	[Diffusion Rate/79]*0.4 sec	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	3DH1	18.19	0.363	0.306	111.078	400
	3DH3	18.19	0.363	0.652	236.676	400
	3DH5	18.19	0.363	0.768	278.784	400
V_{max.}	3DH1	18.19	0.363	0.306	111.078	400
	3DH3	18.19	0.363	0.652	236.676	400
	3DH5	18.19	0.363	0.768	278.784	400
V_{min.}	3DH1	18.19	0.363	0.306	111.078	400
	3DH3	18.19	0.363	0.652	236.676	400
	3DH5	18.19	0.363	0.764	277.332	400

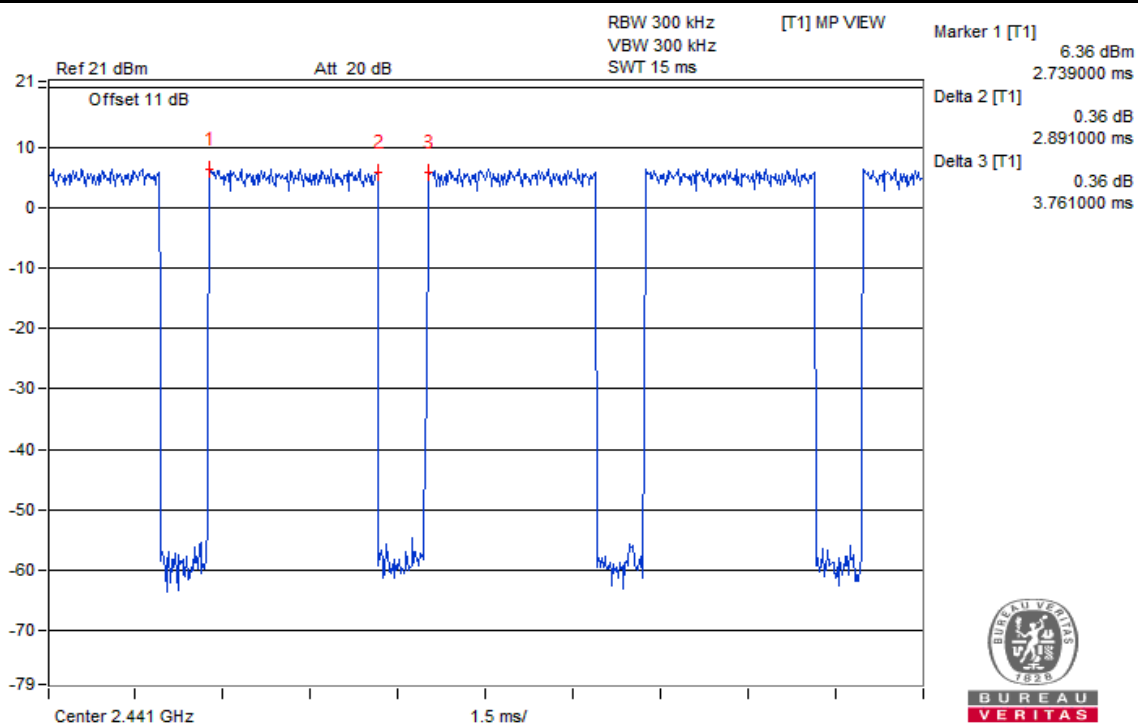
V_{normal}



3DH1

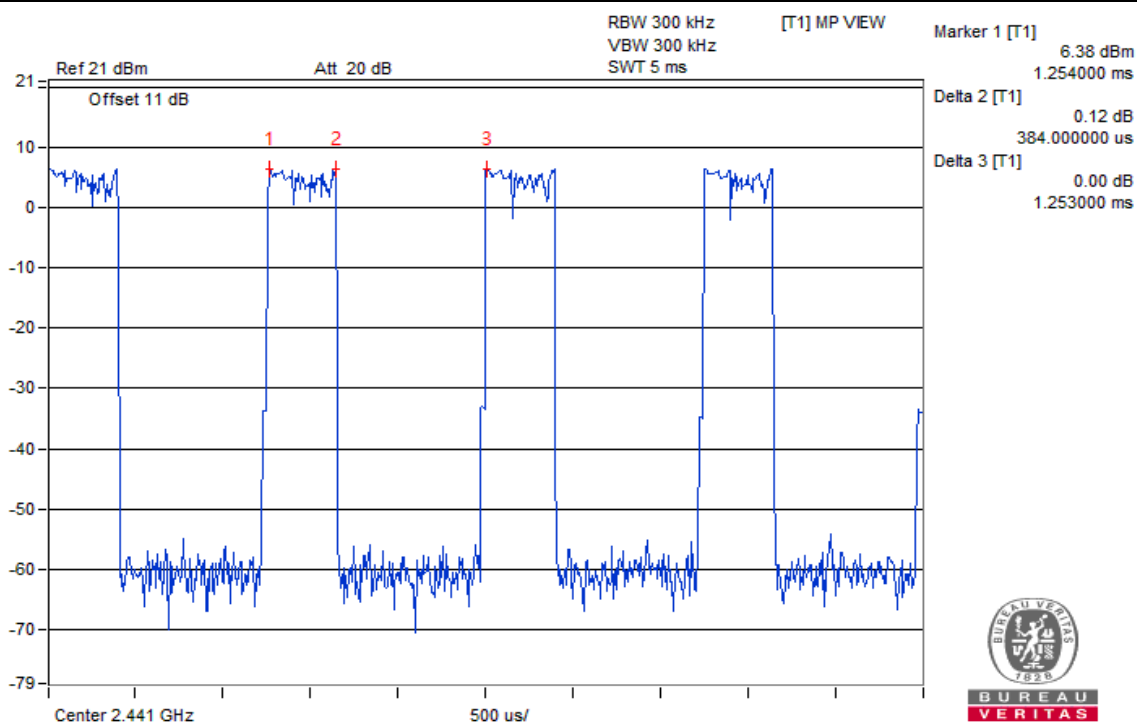


3DH3

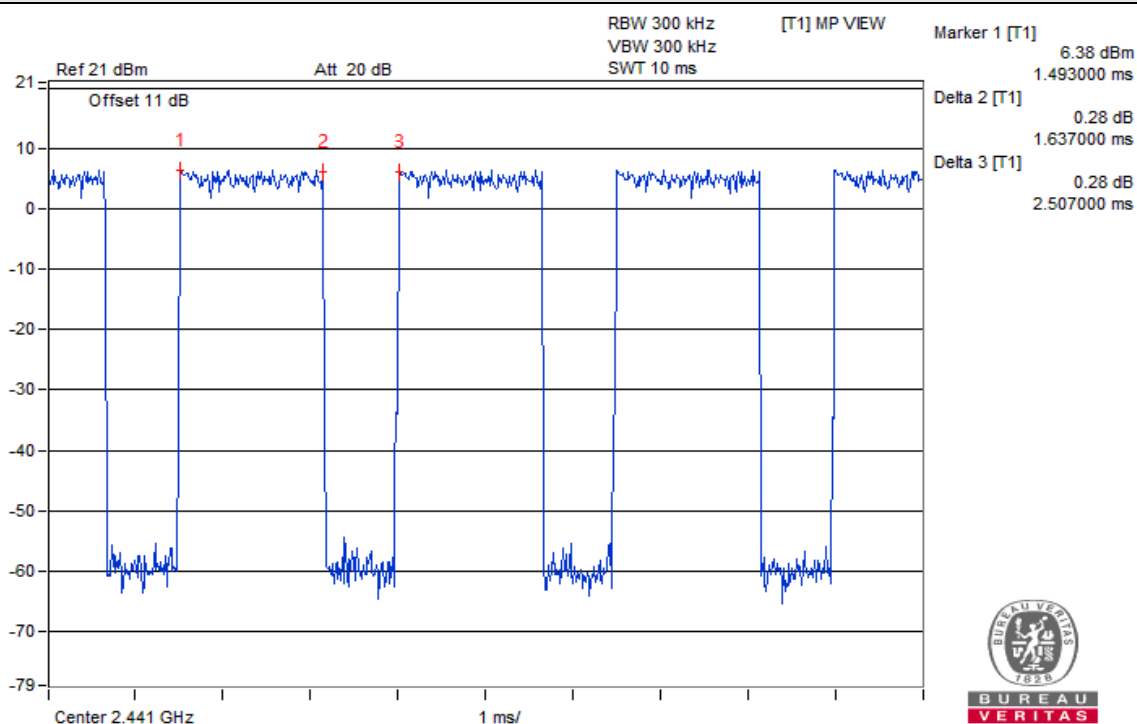


3DH5

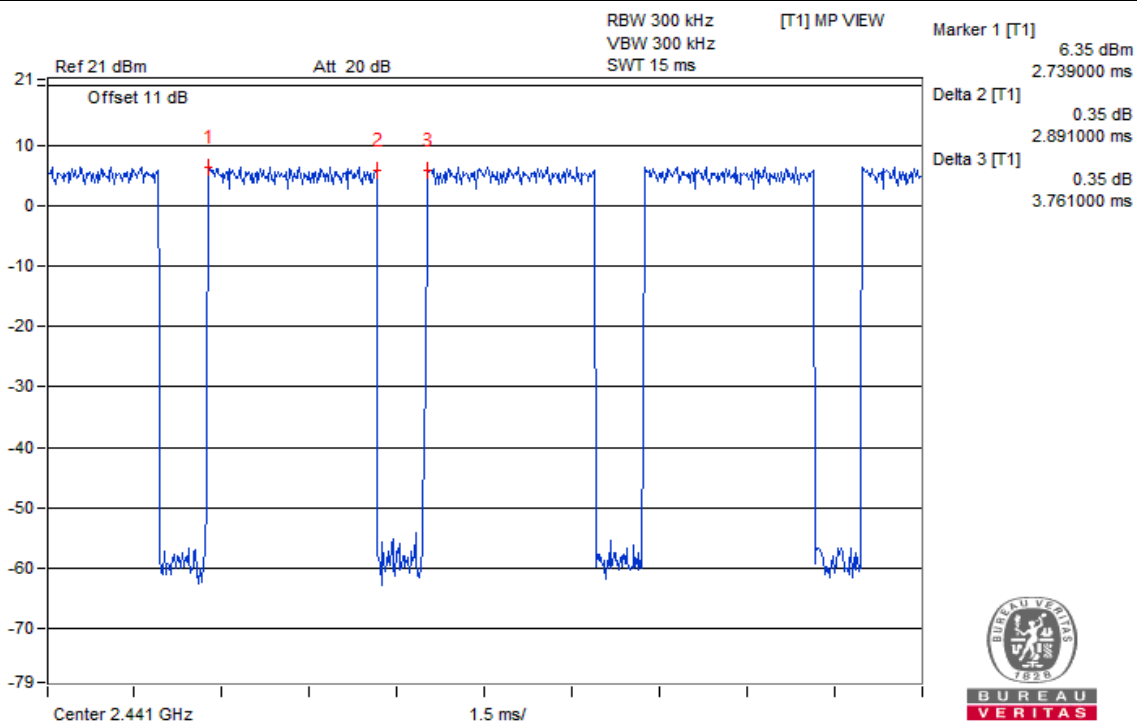
V_{max}.



3DH1

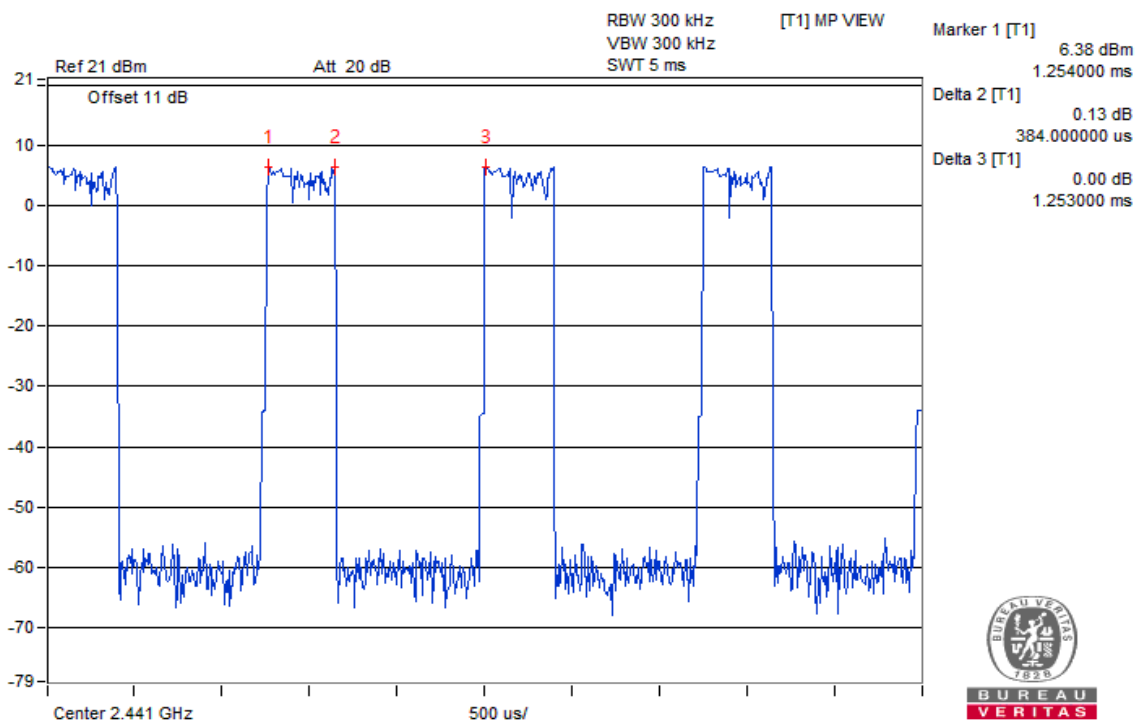


3DH3

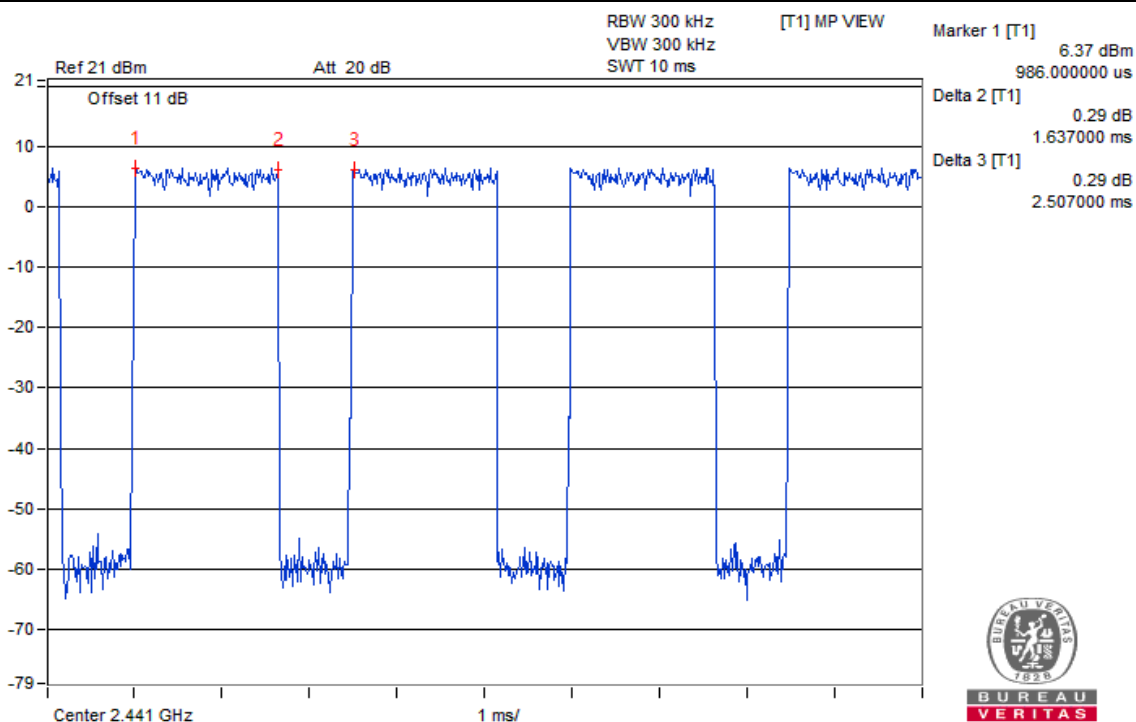


3DH5

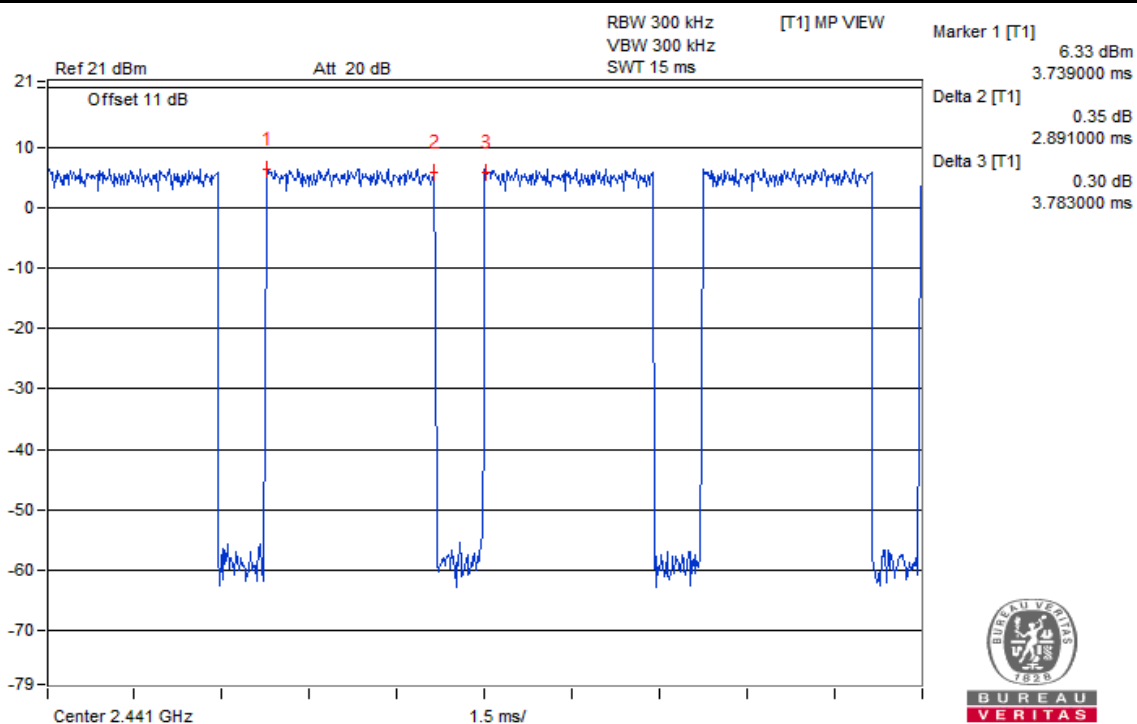
V_{min}.



3DH1



3DH3



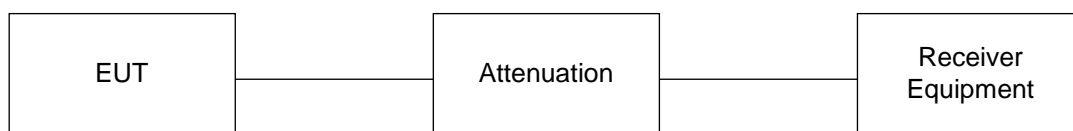
3DH5

4.8 Interference Prevention Function

4.8.1 Limits of Interference Prevention Function

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

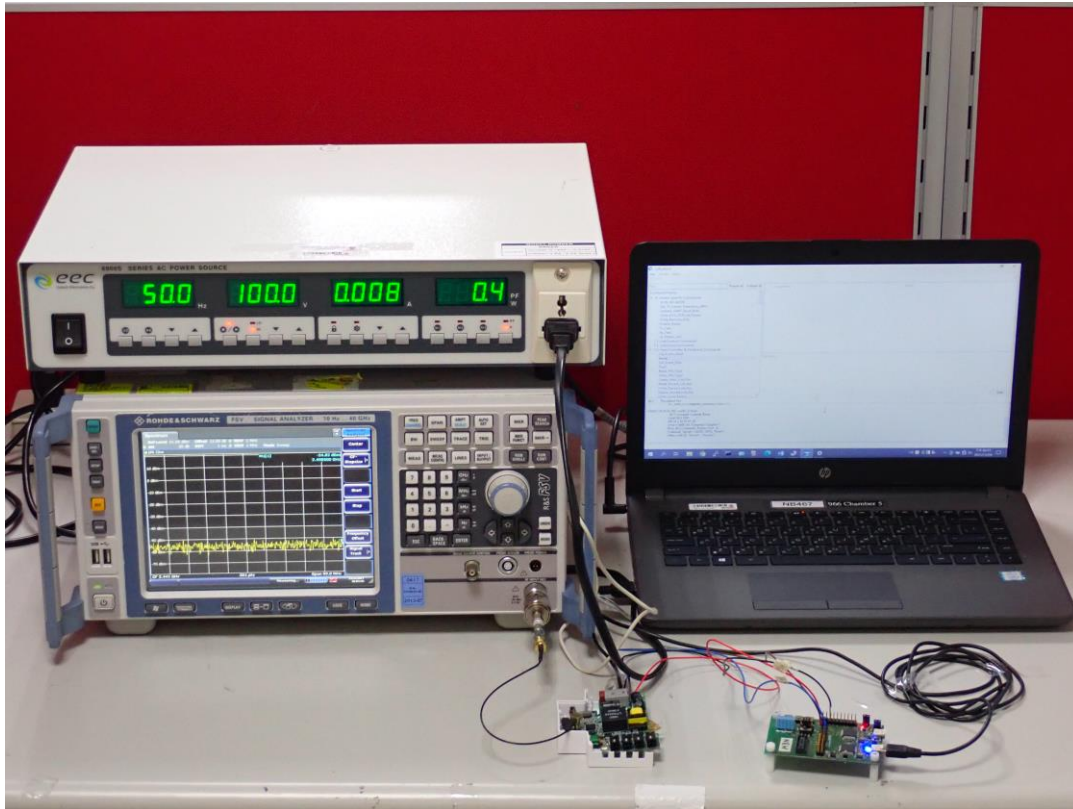
4.8.2 Test Setup



4.8.3 Test Results

Link Mode	Test Result
BT-EDR	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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