FCC Test Report

Report No.:	RFBHQC-WTW-P22030336-2
FCC ID:	2AQ68RLP0003
Test Model:	RLP0003
Received Date:	Mar. 08, 2022
Test Date:	May 09, 2022 ~ Jun. 23, 2022
Issued Date:	Jun. 23, 2022
Applicant:	Hon Lin Technology Co., Ltd.
Address:	11F, No. 32, Jihu Rd., Neihu Dist., Taipei City 114, Taiwan R.O.C.
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
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBHQC-WTW-P22030336-2	Original Release	Jun. 23, 2022

1 Certificate of Conformity

Product:	Wi-Fi 6E BT5.2 WLAN Module
Brand:	Foxconn
Test Model:	RLP0003
Sample Status:	Engineering Sample
Applicant:	Hon Lin Technology Co., Ltd.
Test Date:	May 09, 2022 ~ Jun. 23, 2022
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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 : Vera Huang , **Date:** Jun. 23, 2022

Vera Huang / Specialist

Approved by : Jeremy Lin , **Date:** Jun. 23, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -4.65dB at 0.27350MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(a)(1)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.31dB at 2223.43MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is i-pex (MHF 4L) not a standard connector.

Note:

1. If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wi-Fi 6E BT5.2 WLAN Module
Brand	Foxconn
Test Model	RLP0003
Sample Status	Engineering Sample
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402~2480MHz
Number of Channel	79
Output Power	27.861mW
Antenna Type	Refer to section 3.2
Antenna Connector	Refer to section 3.2
Accessory Device	NA
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the original report (BV CPS report no.: RF201119E01-2) are changed FCC ID, applicant, brand name, model name and added antenna. Therefore, the EUT with new antenna is re-tested and recorded in this report.
2. This device of WLAN (2.4GHz & 5GHz U-NII-1 Band) can support hotspot mode.
3. Simultaneously transmission condition.

Condition	Technology	
1	WLAN(2.4GHz)	WLAN(6GHz)
2	WLAN(2.4GHz)	WLAN(5GHz)
3	WLAN(6GHz)	Bluetooth
4	WLAN(5GHz)	Bluetooth
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

4. The device of WLAN (2.4GHz) and Bluetooth technology can't transmit simultaneously, it was used timely shared coexistence technology.
5. The module has two variant designs as following table:

SKU No.	Description
SKU #1	M.2 2230 E-key
SKU #2	M.2 2230 AE-key
From the above variants designs, the worst case was found in SKU #1. Therefore only the test data of the mode was recorded in this report.	

6. The product provides option to depopulate external LNA (Low-Noise amplifier) from 5GHz/6GHz receive path. This test report covers variation of with/without external LNA and test was conducted to confirm not change in RF compliance and EMC. And worst case was found in without external LNA.
7. 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 Antenna

The antenna gain was declared by client; please refer to the following table:

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length
1	Chain0/1	HONGBO	260-25094	3.53 3.06 3.07 4.81 4.20	2.40~2.4835 5.150~5.250 5.250~5.350 5.470~5.725 5.725~5.850	0.76 1.16 1.18 1.2 1.27	PIFA	i-pex (MHF 4L)	300mm
2	Chain0/1	HONGBO	260-25083	5.09 5.14 5.09 5.16 5.12	5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	1.29 1.32 1.35 1.4 1.45	PIFA	i-pex (MHF 4L)	300mm
3	Chain0/1	HONGBO	260-25084	3.22 3.35 3.42 4.77 4.72 4.71 4.75 4.29 4.81 4.74	2.40~2.4835 5.150~5.250 5.250~5.350 5.470~5.725 5.725~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	0.5 0.76 0.78 0.81 0.85 0.86 0.87 0.91 0.96 0.98	Monopole	i-pex (MHF 4L)	200mm
4	**Chain0/1**	**Auden**	**ANTRG6U123-1801 / ANTRG6U123-1802**	**5.13 / 4.64** **2.70 / 3.36** **2.70 / 3.07** **2.50 / 1.08** **2.68 / 0.42** **2.18 / 1.20** **1.98 / 0.59** **2.42 / 1.72** **1.48 / 0.62**	**2.40~2.4835** **5.150~5.250** **5.250~5.350** **5.470~5.725** **5.725~5.850** **5.925~6.425** **6.425~6.525** **6.525~6.875** **6.875~7.125**	**-**	**PIFA (Slot)**	i-pex (MHF 4L)	**460mm / 740mm**

Note:

1. Antenna Set 4 is the new antenna to be applied for this time.
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.

3.3 Description of Test Modes

79 channels are provided to this EUT:

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		

3.3.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

Note: Radiated emission test (below 1GHz) and power line conducted emission test items chosen the worst maximum power.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Pakcet Type
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Pakcet Type
-	0 to 78	0	FHSS	GFSK	DH5

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Pakcet Type
-	0 to 78	0	FHSS	GFSK	DH5

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

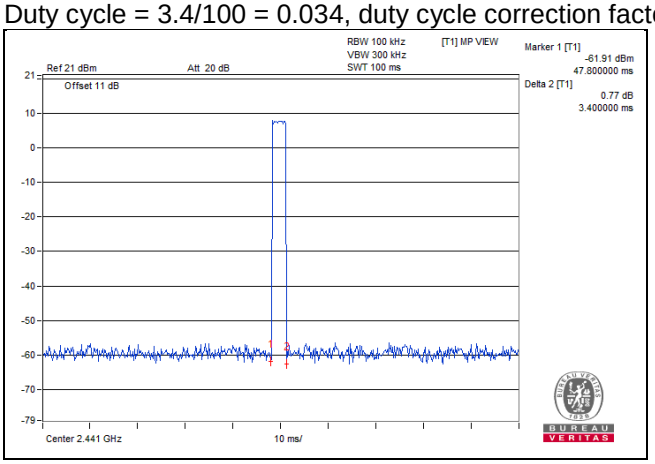
EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Pakcet Type
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	19 deg. C, 68% RH	120Vac, 60Hz	Thomas Cheng
RE<1G	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang
	23 deg. C, 64% RH	120Vac, 60Hz	Thomas Cheng
PLC	25 deg. C, 75 RH	120Vac, 60Hz	Rex Wang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.4 Duty Cycle of Test Signal

Duty cycle = 3.4/100 = 0.034, duty cycle correction factor = 20 * log(0.034) = -29.37



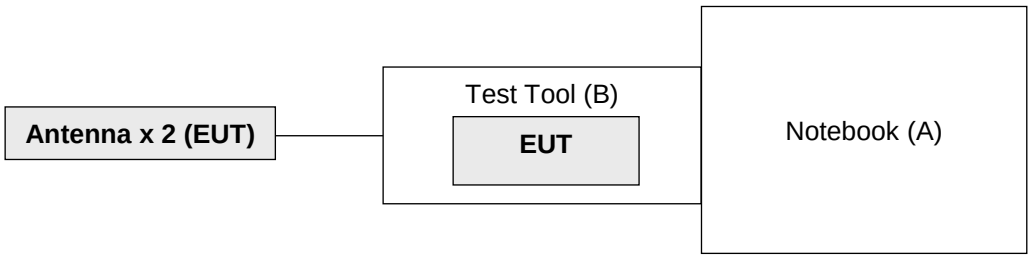
3.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Tongfang	GK5NPFO	NA	FCC DoC Approved	Provided by client
B.	Test Tool	Foxconn	N/A	N/A	N/A	Provided by client

Note: All power cords of the above support units are non-shielded (1.8m).

3.5.1 Configuration of System under Test



3.6 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:
FCC Part 15, Subpart C (15.247)
ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:
KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 03, 2021	Dec. 02, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 11, 2022	Apr. 10, 2023
Broadband Horn Antenna SCHWARZBECK	BBHA 9170	148	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 14, 2021	Nov. 13, 2022
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Oct. 28, 2021	Oct. 27, 2022
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 05, 2022	Apr. 04, 2023
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2021	Nov. 24, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC001340	980201	Sep. 15, 2021	Sep. 14, 2022
Preamplifier EMCI	EMC 012645	980115	Oct. 05, 2021	Oct. 04, 2022
Preamplifier EMCI	EMC 184045	980116	Oct. 05, 2021	Oct. 04, 2022
Preamplifier EMCI	EMC 330H	980112	Oct. 05, 2021	Oct. 04, 2022
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 18, 2022	Jan. 17, 2023
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 17, 2022	Jan. 16, 2023
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000 (140807)	Oct. 05, 2021	Oct. 04, 2022
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 05, 2021	Oct. 04, 2022
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

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. The test was performed in HwaYa Chamber 10.

4.1.3 Test Procedures

Following FCC KDB 558074 D01 DTS Meas. Guidance:
Radiated versus Conducted Measurements.
The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.
The following steps was performed:

a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.

b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT

c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)

e. For all of Radiation emission test

For Radiated emission below 30MHz

e-1.1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

e-1.2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

e-1.3. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

e-1.4. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e-1.5. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.
2. KDB 414788 OATS and Chamber Correlation Justification
   - Based on FCC 15.31(f)(2) : measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field.
   - OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

For Radiated emission above 30MHz

e-2.1. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

e-2.2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

e-2.3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e-2.4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e-2.5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

e-2.6. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detector (AV) at frequency above 1GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of this report.
3. All modes of operation were investigated and the worst-case emissions are reported.

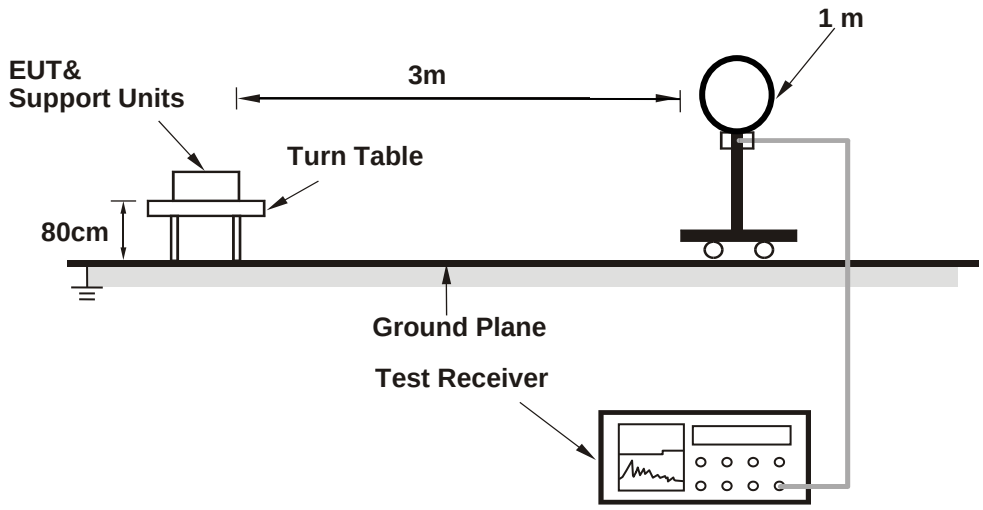
4.1.4 Deviation from Test Standard

No deviation.

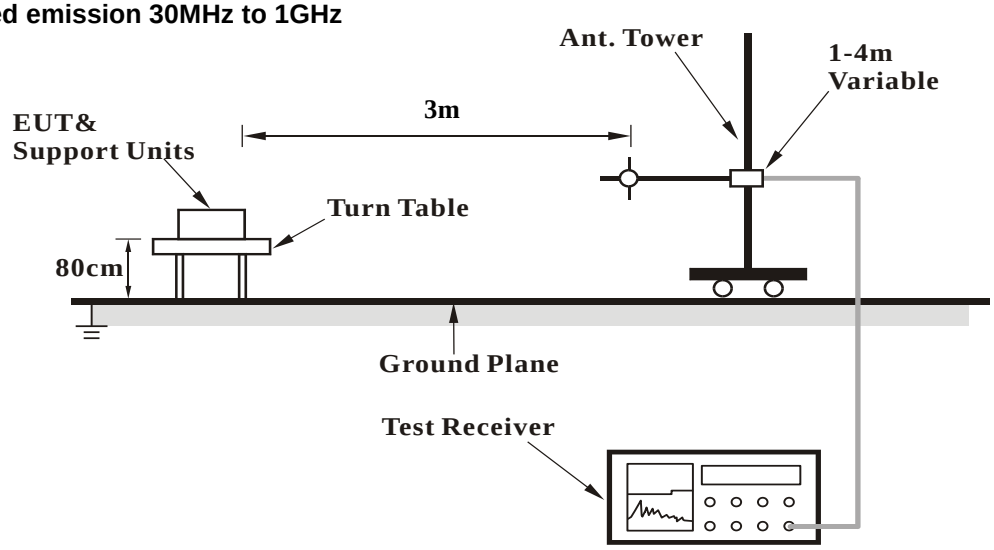
4.1.5 Test Setup

For Radiated Configuration:

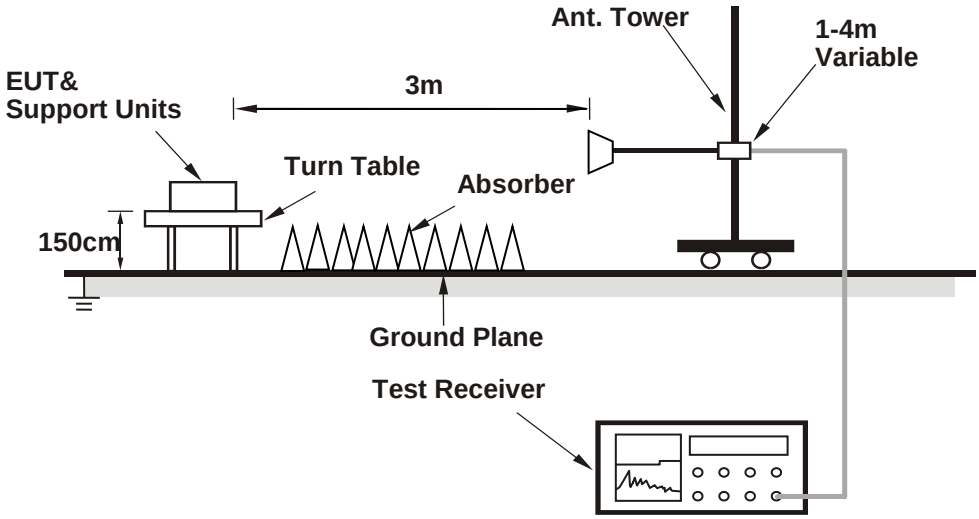
For Radiated emission below 30MHz



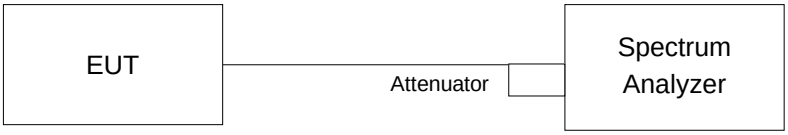
For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For Conducted Configuration:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results (Radiated Measurement)

Radiated versus Conducted Measurement	
☐ Conducted measurement	☒ Radiated measurement
For Radiated measurement: The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) For Conducted measurement: The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

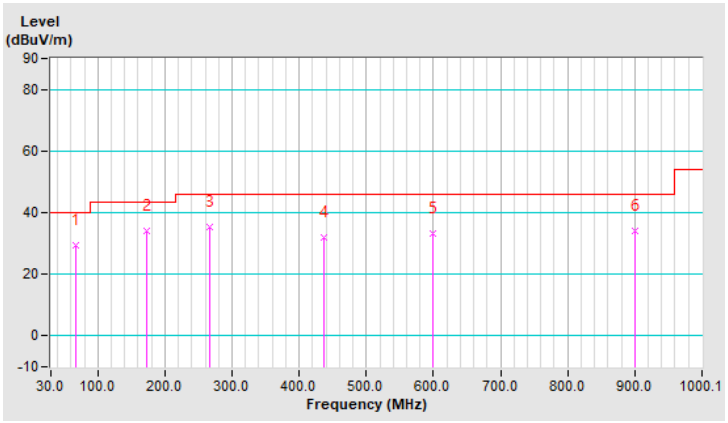
Below 1GHz worst-case data:

RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	67.83	29.5 QP	40.0	-10.5	1.85 H	50	44.1	-14.6
2	173.57	33.9 QP	43.5	-9.6	1.64 H	337	47.3	-13.4
3	266.70	35.4 QP	46.0	-10.6	1.18 H	266	49.0	-13.6
4	436.47	31.8 QP	46.0	-14.2	1.24 H	336	39.4	-7.6
5	599.45	33.1 QP	46.0	-12.9	3.94 H	135	36.7	-3.6
6	900.18	33.9 QP	46.0	-12.1	1.61 H	271	32.3	1.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

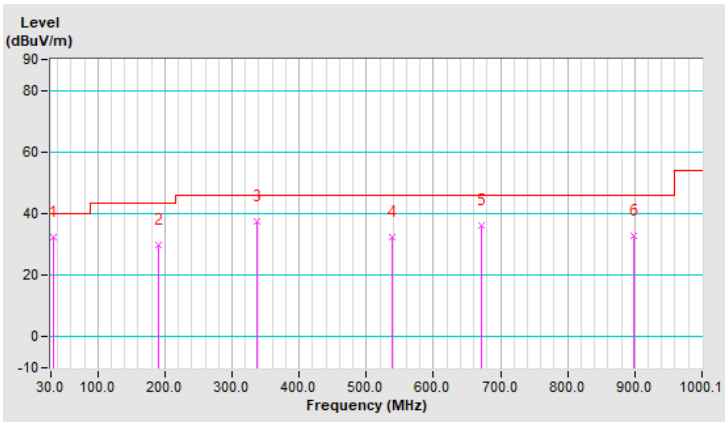


RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	34.85	32.5 QP	40.0	-7.5	1.42 V	323	46.2	-13.7
2	190.07	29.7 QP	43.5	-13.8	2.57 V	275	45.2	-15.5
3	336.55	37.6 QP	46.0	-8.4	3.38 V	182	48.3	-10.7
4	539.30	32.4 QP	46.0	-13.6	2.45 V	206	37.8	-5.4
5	671.24	36.1 QP	46.0	-9.9	1.70 V	343	38.2	-2.1
6	898.24	32.8 QP	46.0	-13.2	3.45 V	289	31.2	1.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.1.8 Test Results (Conducted Measurement)

Radiated versus Conducted Measurement	
☒ Conducted measurement	☐ Radiated measurement

For Radiated measurement:
The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)
For Conducted measurement:
The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).

Conducted Measurement Factor
a. The composite gain will be used when signal support the correlated signal. b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands. c. For the band edge the gain for the specific band may have been used. d. In restricted bands below 1000 MHz, add upper bound on ground plane reflection: For f = 30 – 1000 MHz, add 4.7 dB. Note: The conducted emission test was considered some factor to compute test result.

Above 1GHz data:

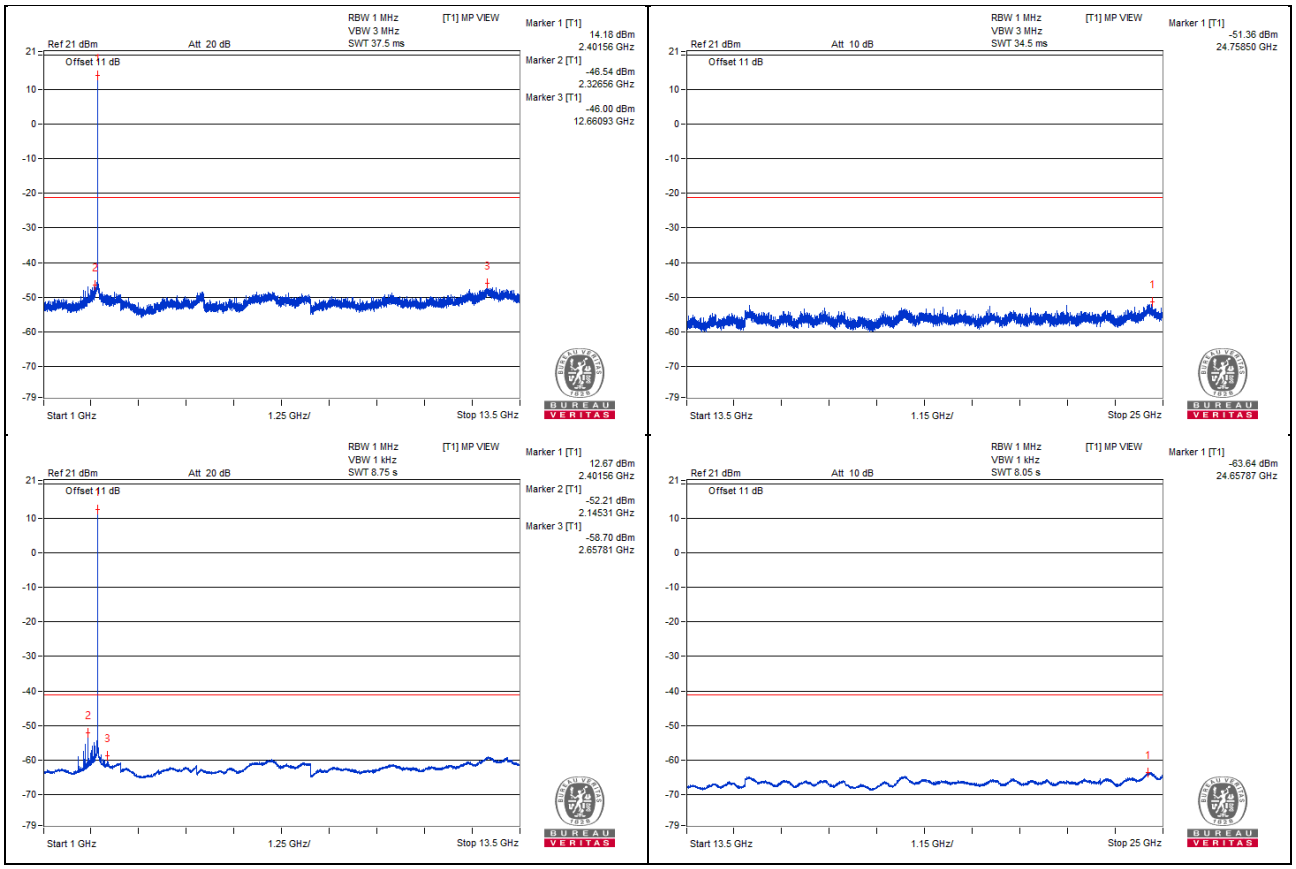
GFSK - Channel 0

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4800	49.91 PK	74	-24.09	-50.48	5.13	-45.35
2	4804.68	38.01 AV	54	-15.99	-62.38	5.13	-57.25

Note :

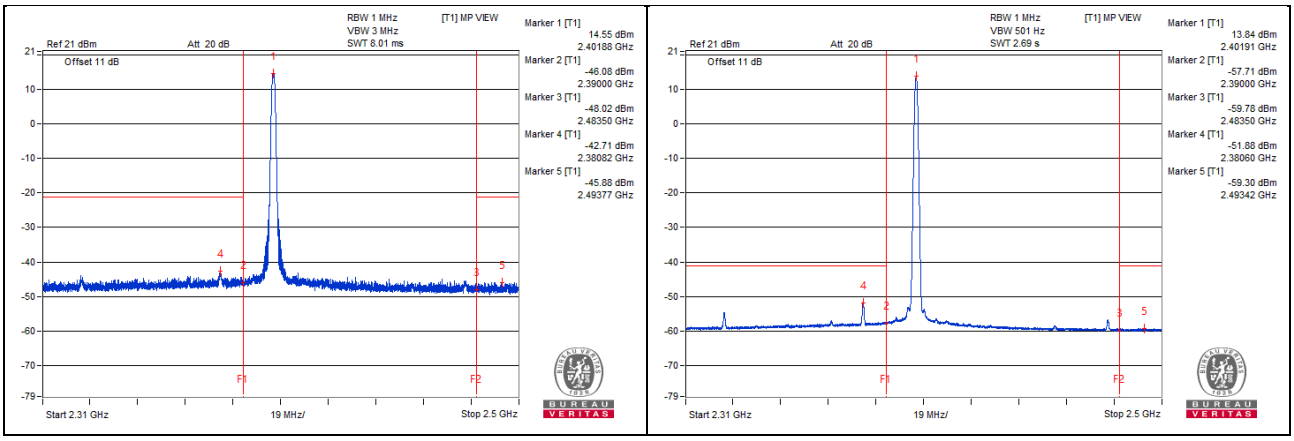
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2380.82	57.68 PK	74	-16.32	-42.71	5.13	-37.58
2	2380.6	48.51 AV	54	-5.49	-51.88	5.13	-46.75
3	2493.77	54.51 PK	74	-19.49	-45.88	5.13	-40.75
4	2483.73	41.09 AV	54	-12.91	-59.3	5.13	-54.17

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.

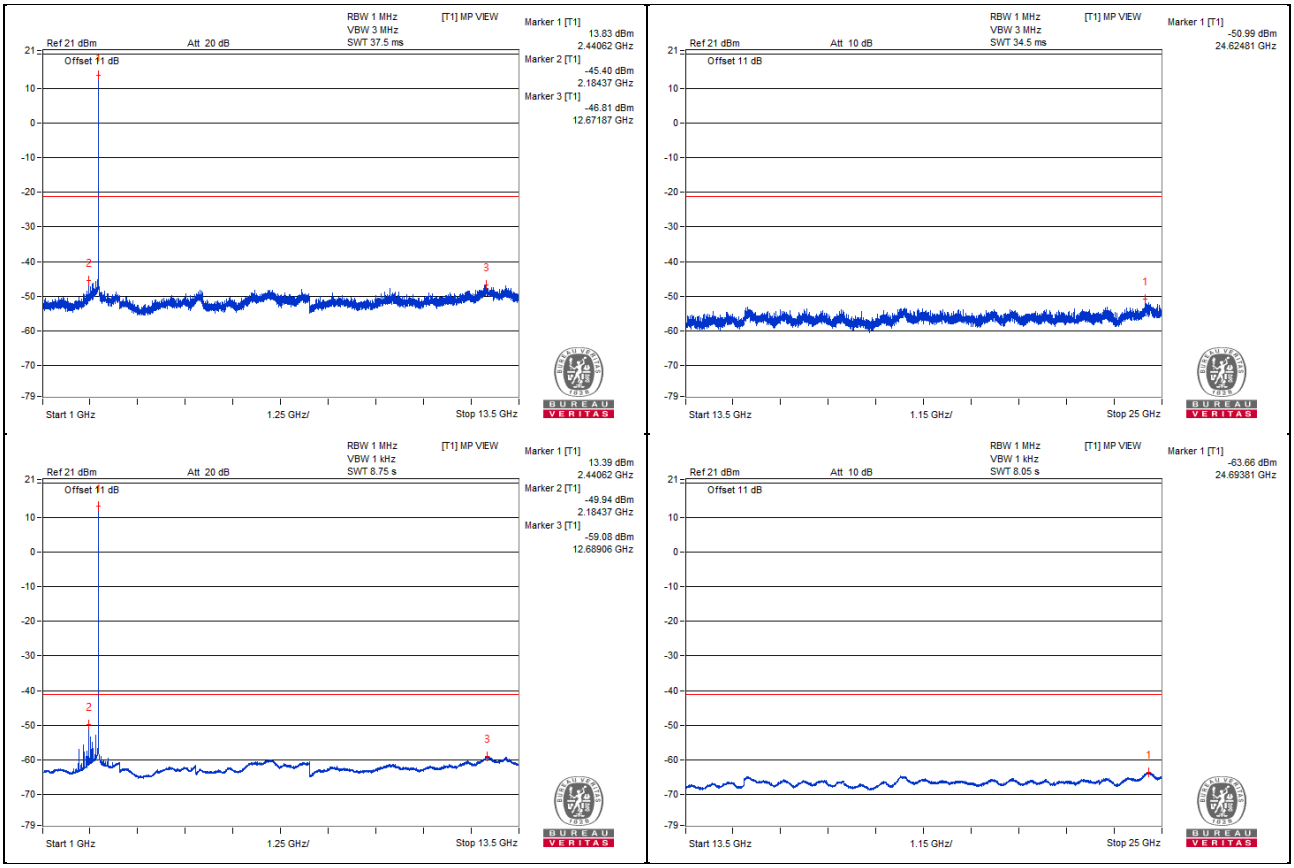


GFSK - Channel 39

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4885.93	49.61 PK	74	-24.39	-50.78	5.13	-45.65
2	4881.25	37.92 AV	54	-16.08	-62.47	5.13	-57.34
3	7323.43	50.61 PK	74	-23.39	-49.78	5.13	-44.65
4	7323.43	39.31 AV	54	-14.69	-61.08	5.13	-55.95

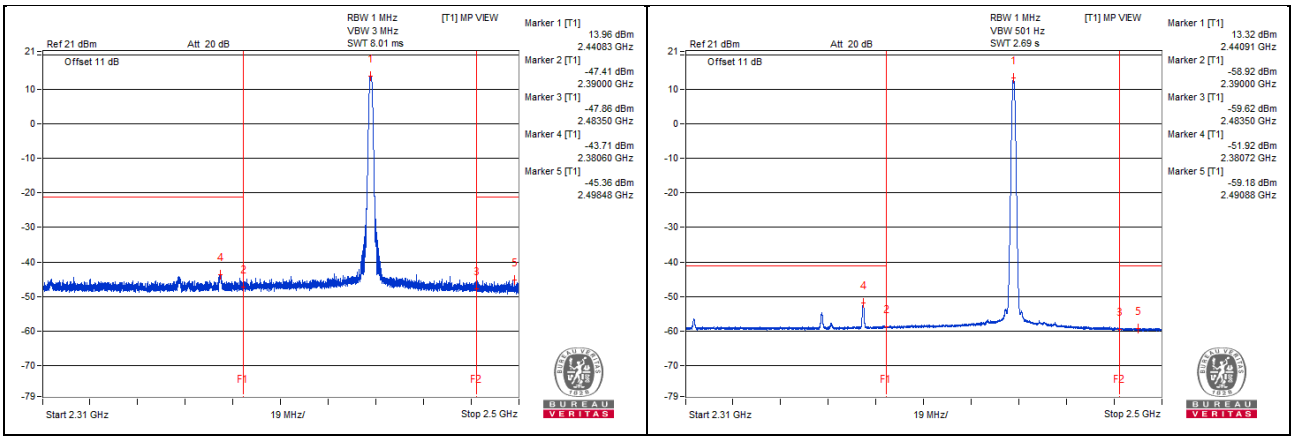
Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2380.6	56.68 PK	74	-17.32	-43.71	5.13	-38.58
2	2380.72	48.47 AV	54	-5.53	-51.92	5.13	-46.79
3	2498.48	55.03 PK	74	-18.97	-45.36	5.13	-40.23
4	2490.88	41.21 AV	54	-12.79	-59.18	5.13	-54.05

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.

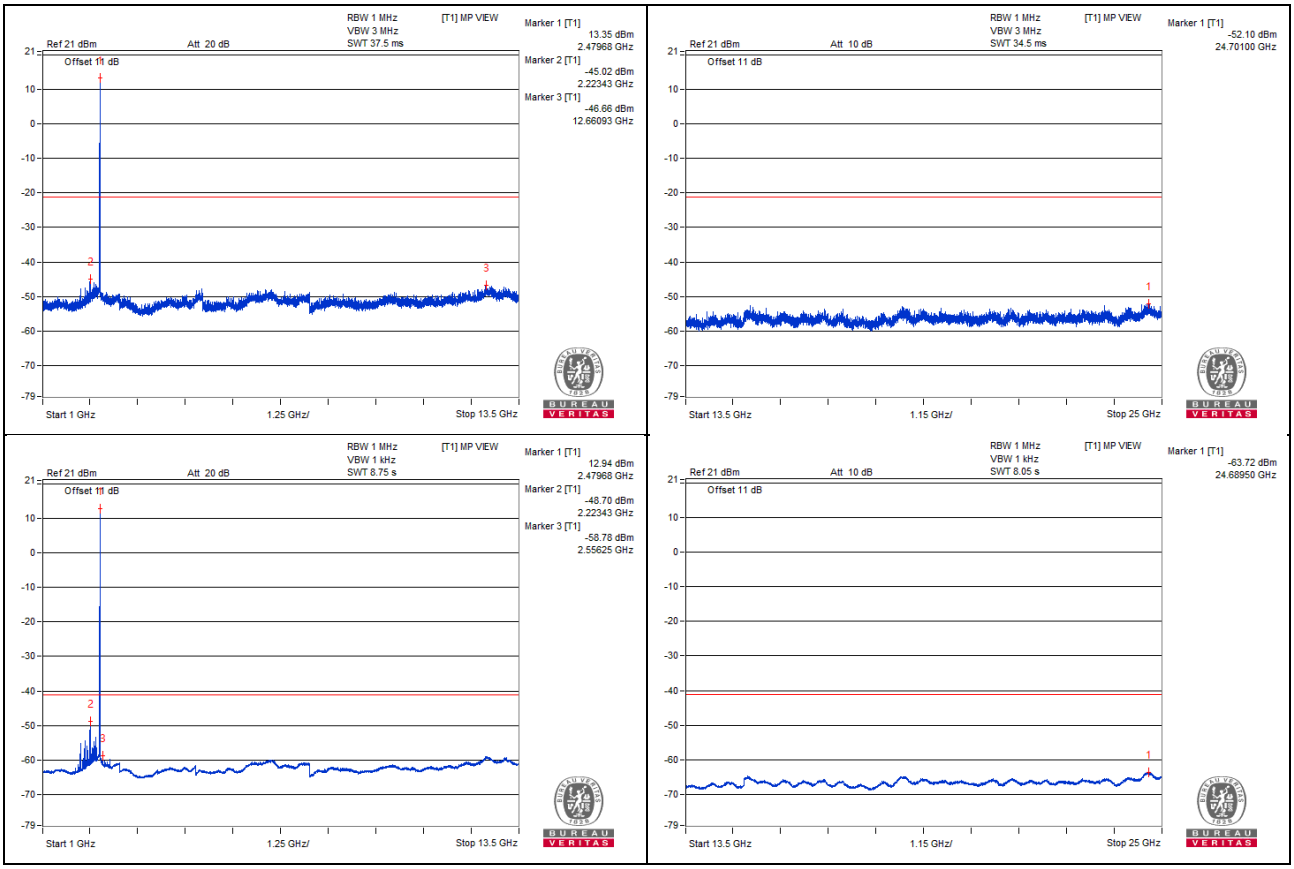


GFSK - Channel 78

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4960.93	49.75 PK	74	-24.25	-50.64	5.13	-45.51
2	4967.18	38.13 AV	54	-15.87	-62.26	5.13	-57.13
3	7435.93	50.44 PK	74	-23.56	-49.95	5.13	-44.82
4	7439.06	39.14 AV	54	-14.86	-61.25	5.13	-56.12
5	2223.43	55.37 PK	74	-18.63	-45.02	5.13	-39.89
6	**2223.43**	**51.69 AV**	**54**	**-2.31**	**-48.7**	**5.13**	**-43.57**

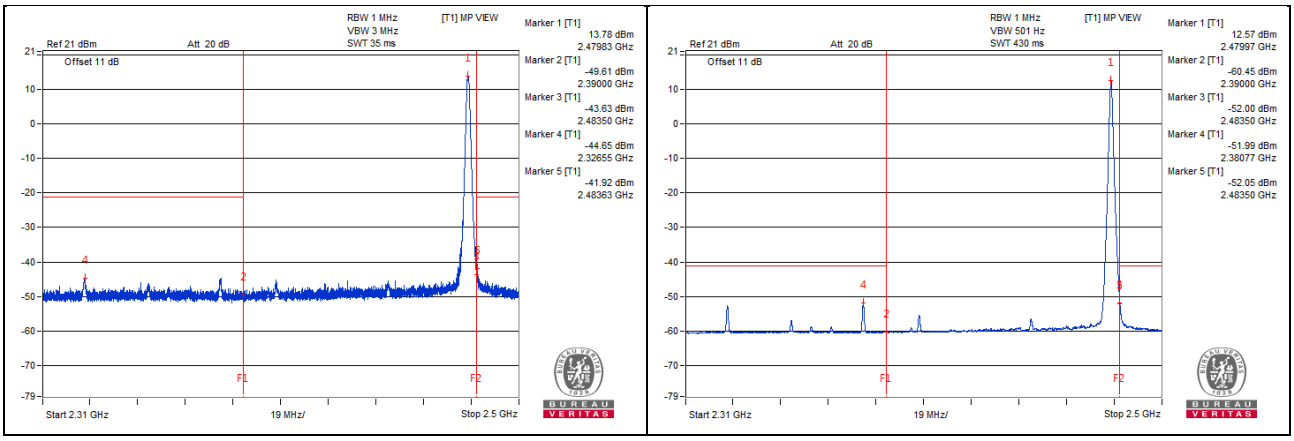
Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2326.55	55.74 PK	74	-18.26	-44.65	5.13	-39.52
2	2380.77	48.4 AV	54	-5.6	-51.99	5.13	-46.86
3	2483.63	58.47 PK	74	-15.53	-41.92	5.13	-36.79
4	2483.51	48.17 AV	54	-5.83	-52.22	5.13	-47.09

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.

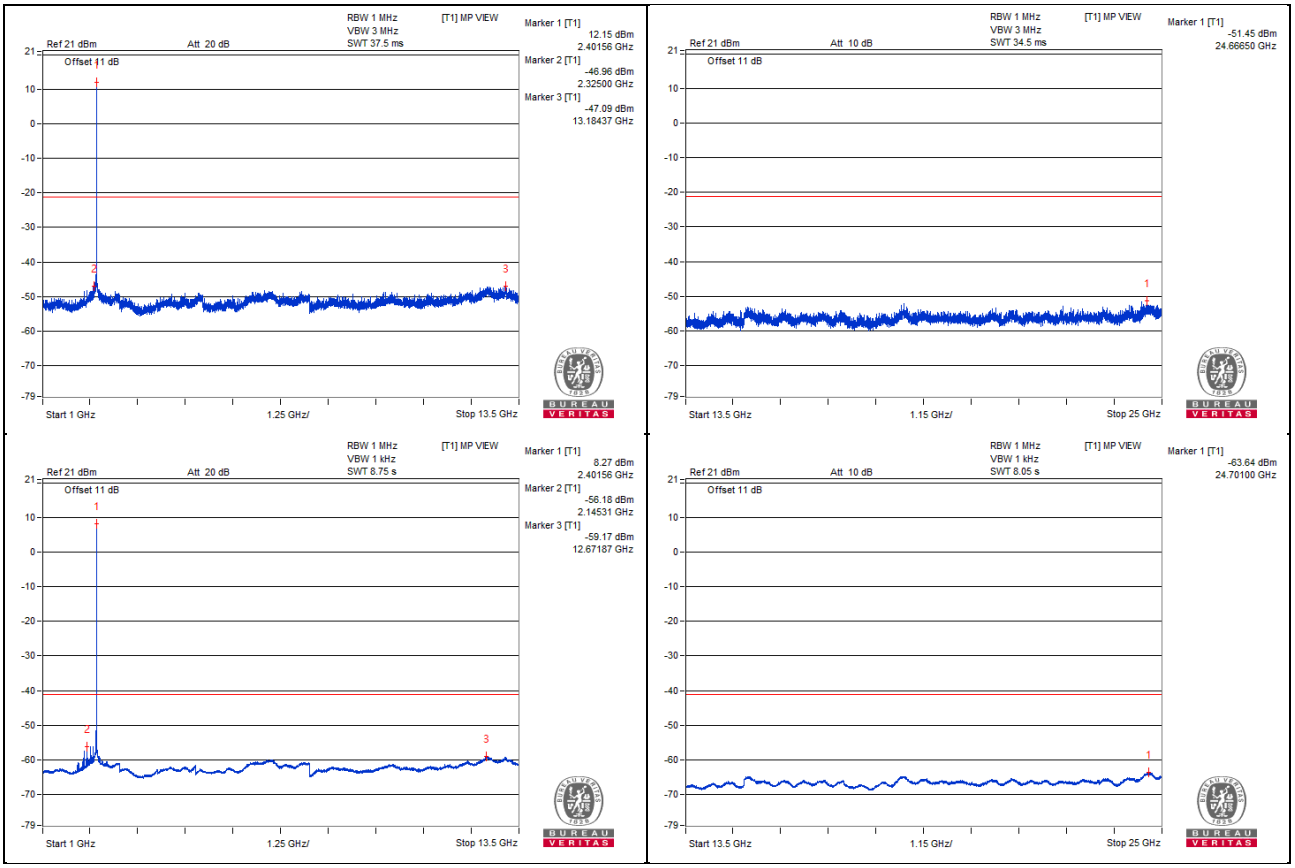


8DPSK - Channel 0

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4795.31	49.5 PK	74	-24.5	-50.89	5.13	-45.76
2	4803.12	37.77 AV	54	-16.23	-62.62	5.13	-57.49

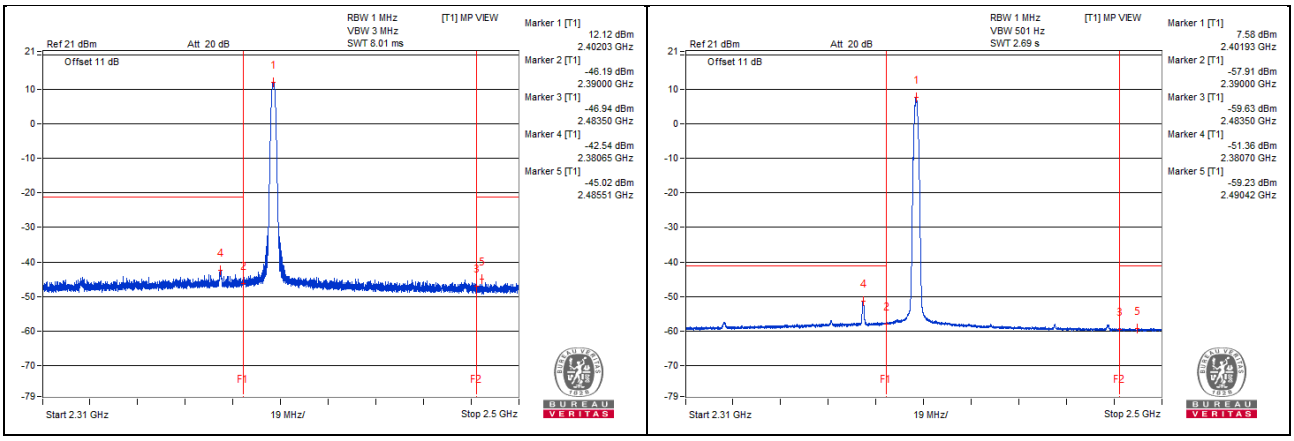
Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2380.65	57.85 PK	74	-16.15	-42.54	5.13	-37.41
2	2380.7	49.03 AV	54	-4.97	-51.36	5.13	-46.23
3	2485.51	55.37 PK	74	-18.63	-45.02	5.13	-39.89
4	2485.29	41.16 AV	54	-12.84	-59.23	5.13	-54.10

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.

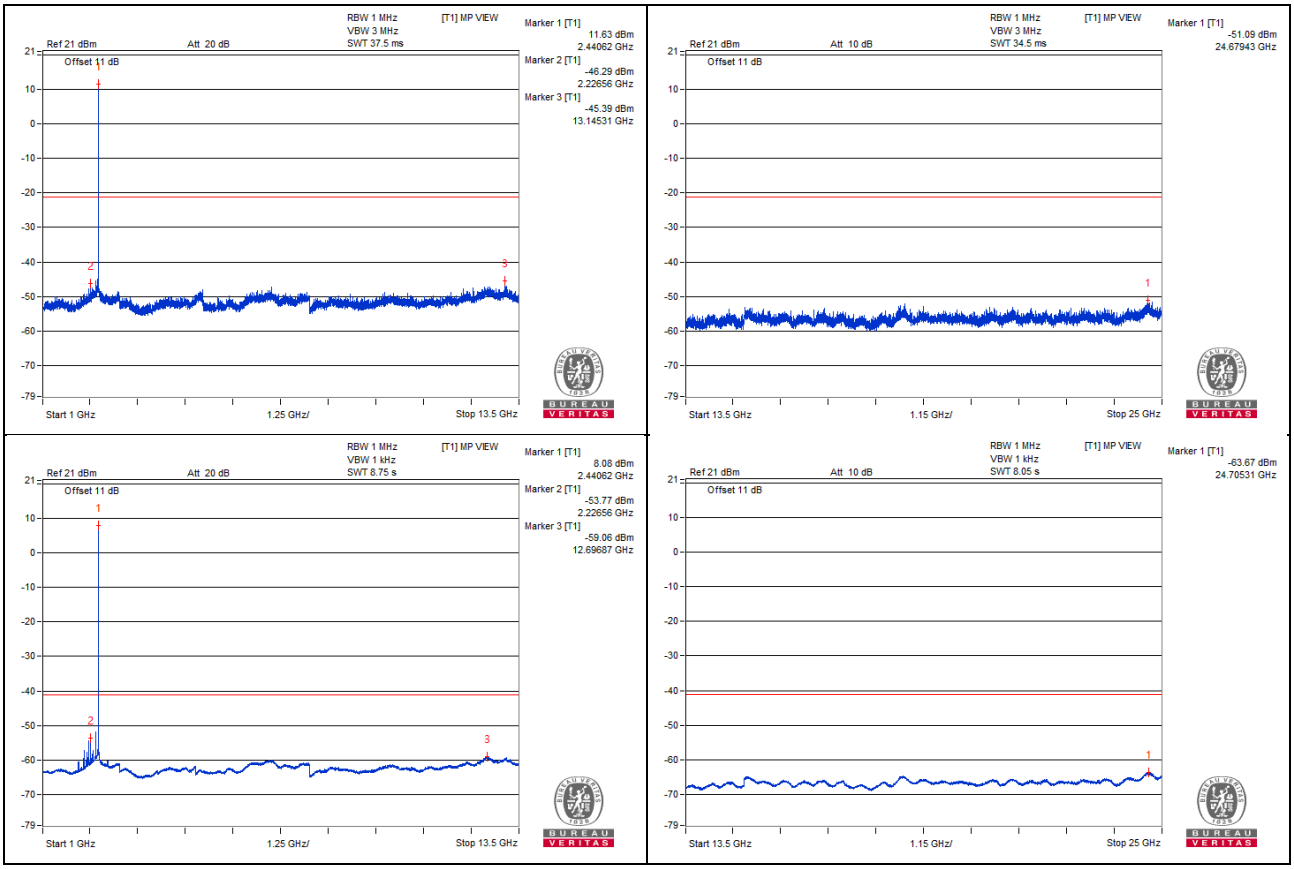


8DPSK - Channel 39

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4879.68	48.74 PK	74	-25.26	-51.65	5.13	-46.52
2	4884.37	37.31 AV	54	-16.69	-63.08	5.13	-57.95
3	7326.56	50.26 PK	74	-23.74	-50.13	5.13	-45.00
4	7332.81	39.02 AV	54	-14.98	-61.37	5.13	-56.24
5	2226.56	54.1 PK	74	-19.9	-46.29	5.13	-41.16
6	2226.56	46.62 AV	54	-7.38	-53.77	5.13	-48.64

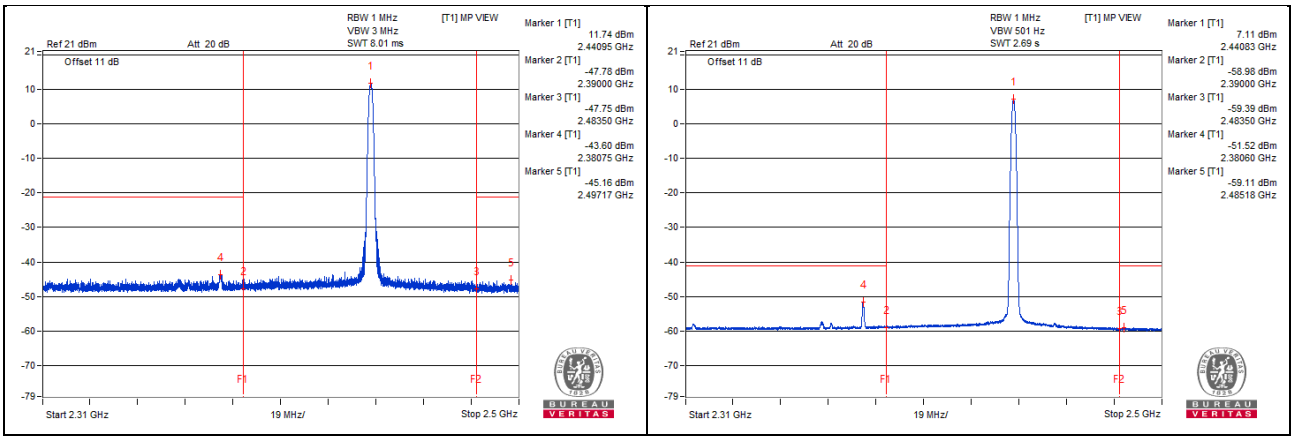
Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2380.75	56.79 PK	74	-17.21	-43.6	5.13	-38.47
2	2380.6	48.87 AV	54	-5.13	-51.52	5.13	-46.39
3	2497.17	55.23 PK	74	-18.77	-45.16	5.13	-40.03
4	2485.18	41.28 AV	54	-12.72	-59.11	5.13	-53.98

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.

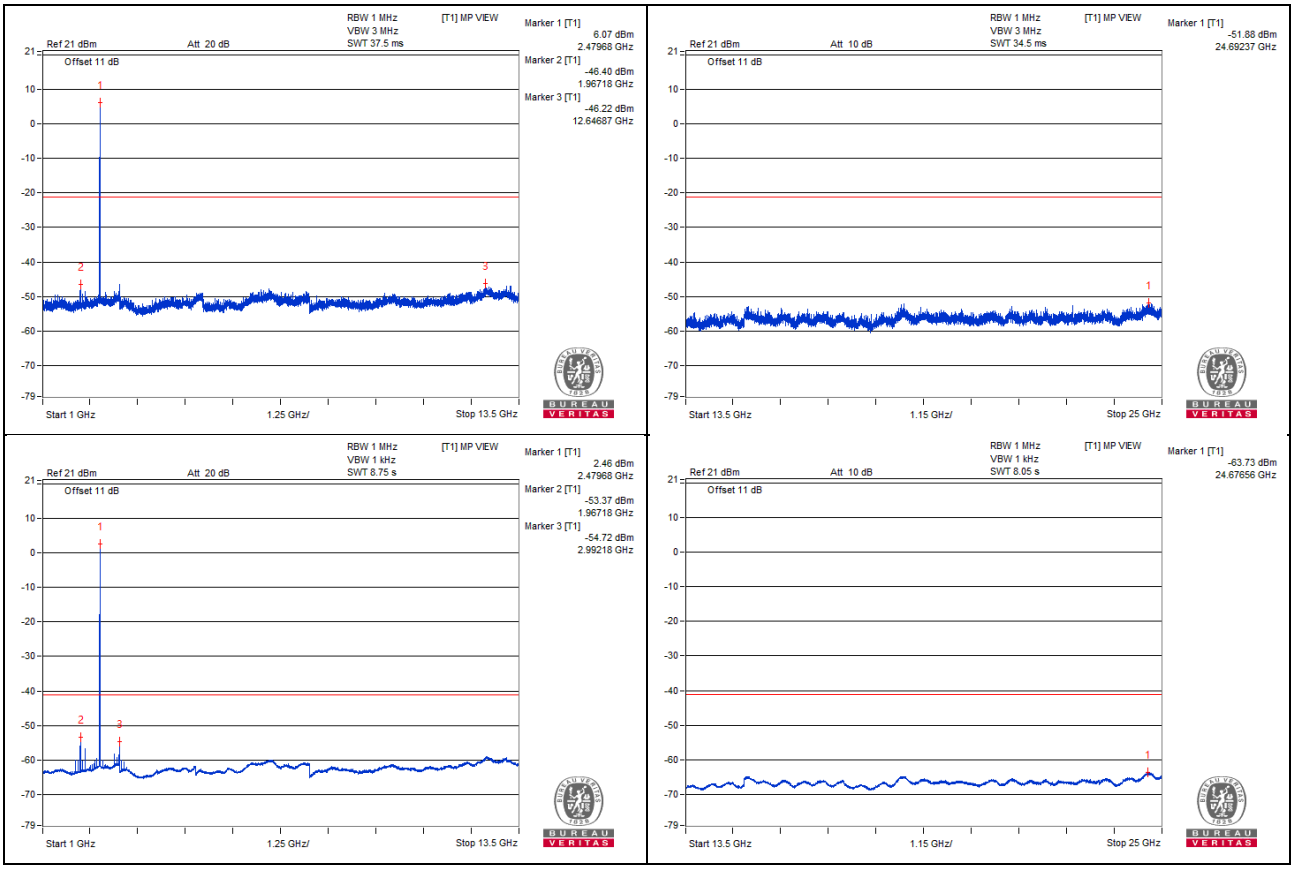


8DPSK - Channel 78

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4962.5	50.18 PK	74	-23.82	-50.21	5.13	-45.08
2	4959.37	38.42 AV	54	-15.58	-61.97	5.13	-56.84
3	7448.43	51 PK	74	-23	-49.39	5.13	-44.26
4	7439.06	39.21 AV	54	-14.79	-61.18	5.13	-56.05
5	1967.18	53.99 PK	74	-20.01	-46.4	5.13	-41.27
6	1967.18	47.02 AV	54	-6.98	-53.37	5.13	-48.24

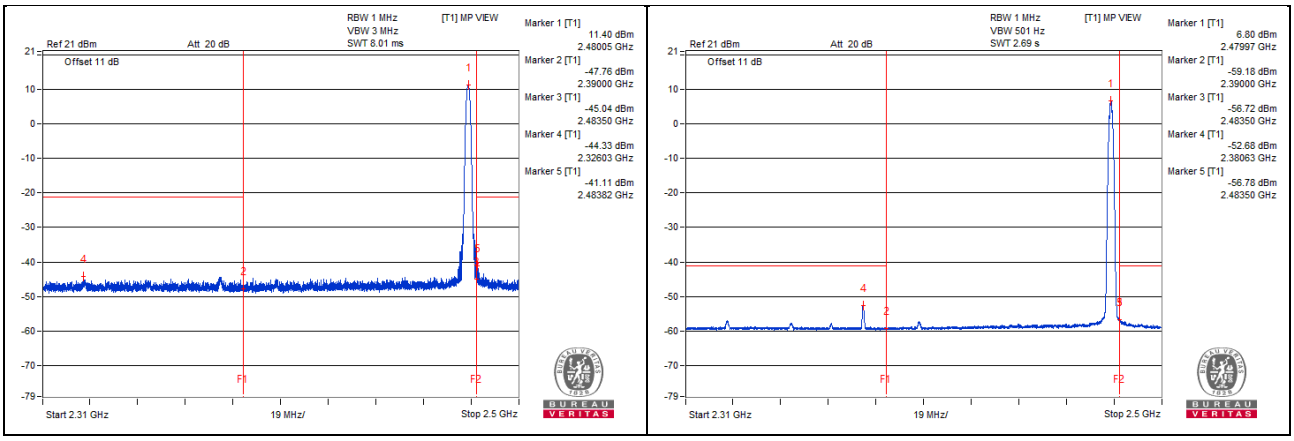
Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2326.03	56.06 PK	74	-17.94	-44.33	5.13	-39.20
2	2380.63	47.71 AV	54	-6.29	-52.68	5.13	-47.55
3	2483.82	59.28 PK	74	-14.72	-41.11	5.13	-35.98
4	2483.51	43.44 AV	54	-10.56	-56.95	5.13	-51.82

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.



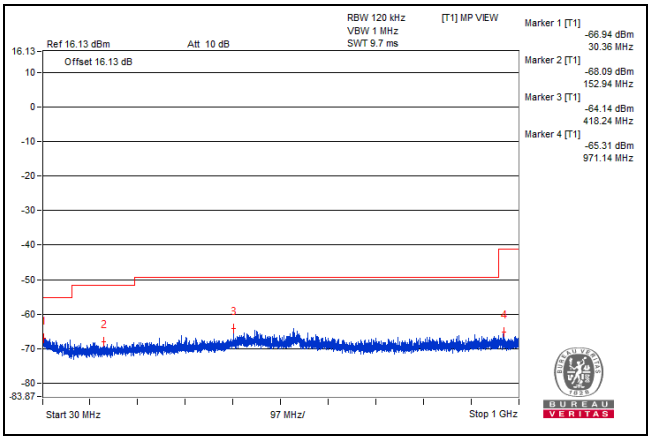
Below 1GHz worst-case data:

GFSK - Channel 0

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	30.36	33.45	40	-6.55	-66.94	5.13	-61.81
2	152.94	32.3	43.5	-11.2	-68.09	5.13	-62.96
3	311.66	34.27	46	-11.73	-66.12	5.13	-60.99
4	418.24	36.25	46	-9.75	-64.14	5.13	-59.01
5	754.59	33.73	46	-12.27	-66.66	5.13	-61.53
6	971.14	35.08	54	-18.92	-65.31	5.13	-60.18

Note :
1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
   d = measurement distance in 3 meters.
2. Non-restricted frequency, the limit was restricted at the conducted out of band emission.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 20, 2021	Dec. 19, 2022
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2021	Sep. 03, 2022
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Sep. 17, 2021	Sep. 16, 2022
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

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. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

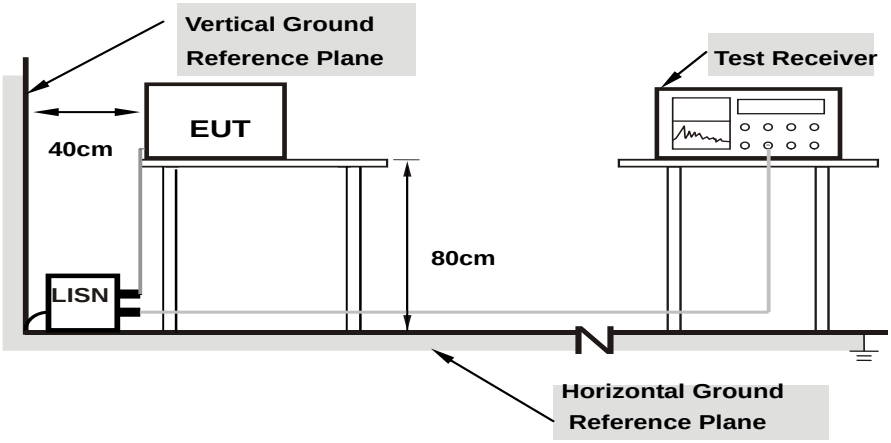
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

Worst-case data:

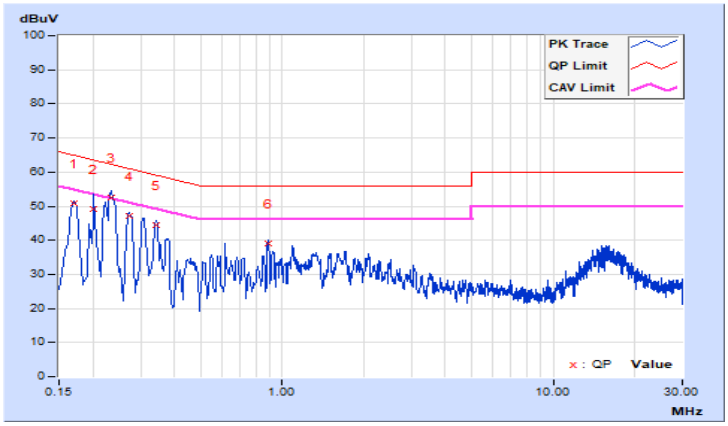
GFSK - Channel 0

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17000	10.13	40.84	39.28	50.97	49.41	64.96	54.96	-13.99	-5.55
2	0.20200	10.14	39.06	27.14	49.20	37.28	63.53	53.53	-14.33	-16.25
3	0.23351	10.14	42.43	35.49	52.57	45.63	62.32	52.32	-9.75	-6.69
4	**0.27350**	**10.15**	**36.97**	**36.21**	**47.12**	**46.36**	**61.01**	**51.01**	**-13.89**	**-4.65**
5	0.34200	10.15	34.33	31.80	44.48	41.95	59.15	49.15	-14.67	-7.20
6	0.88331	10.18	28.87	23.12	39.05	33.30	56.00	46.00	-16.95	-12.70

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

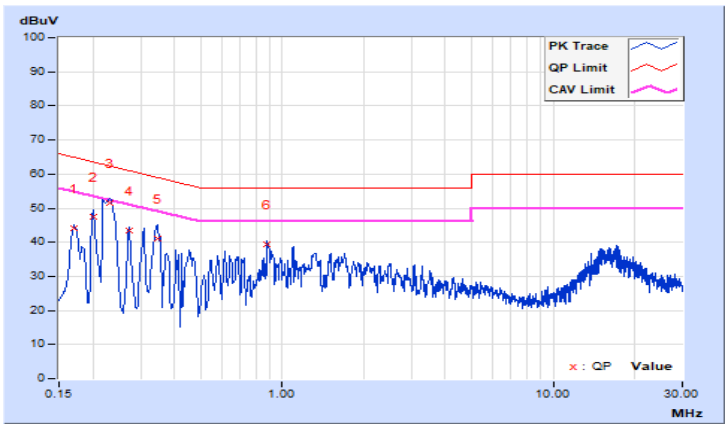


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17000	10.14	34.12	31.90	44.26	42.04	64.96	54.96	-20.70	-12.92
2	0.20200	10.15	37.22	26.93	47.37	37.08	63.53	53.53	-16.16	-16.45
3	0.22985	10.15	41.44	34.92	51.59	45.07	62.46	52.46	-10.87	-7.39
4	0.27350	10.16	33.16	30.41	43.32	40.57	61.01	51.01	-17.69	-10.44
5	0.34577	10.16	30.96	25.10	41.12	35.26	59.06	49.06	-17.94	-13.80
6	0.88200	10.19	29.13	23.59	39.32	33.78	56.00	46.00	-16.68	-12.22

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

At least 15 channels frequencies, and should be equally spaced.

4.3.2 Test Setup

4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
d. Set the SA on View mode and then plot the result on SA screen.
e. Repeat above procedures until all frequencies measured were complete.

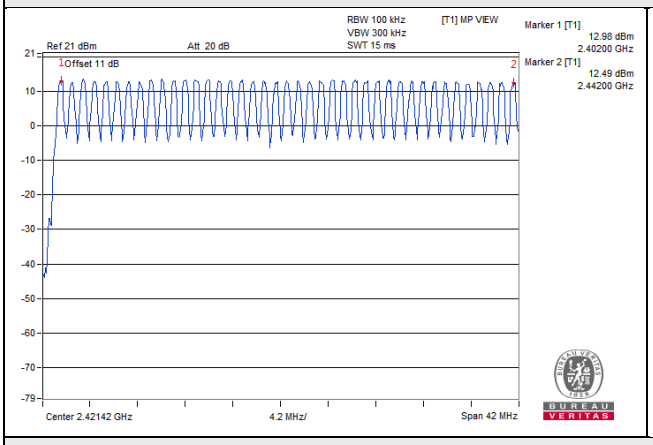
4.3.5 Deviation fromTest Standard

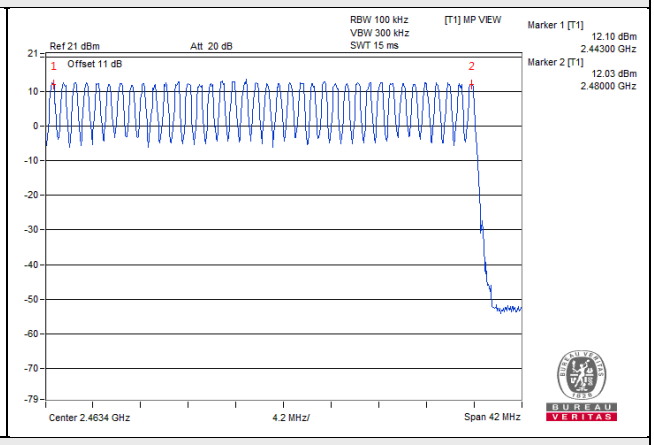
No deviation.

4.3.6 Test Results

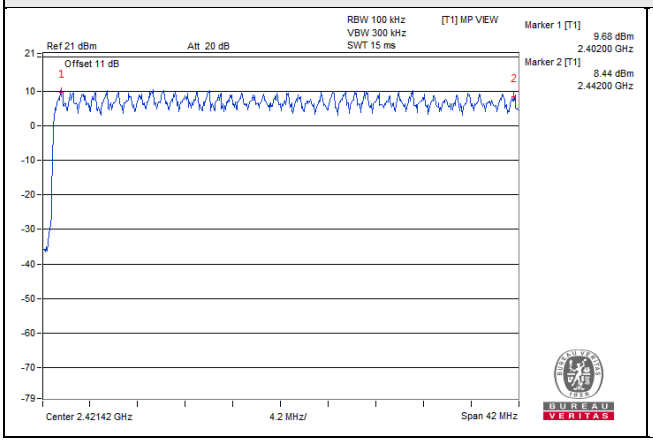
There are 79 hopping frequencies in the hopping mode. Please refer to the test result. On the plots, it shows that the hopping frequencies are equally spaced.

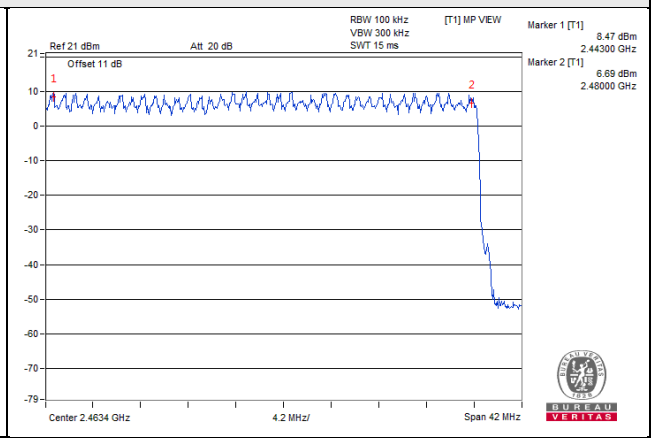
GFSK





8DPSK





4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.4.2 Test Setup

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with ime difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

4.4.5 Deviation from Test Standard

No deviation.

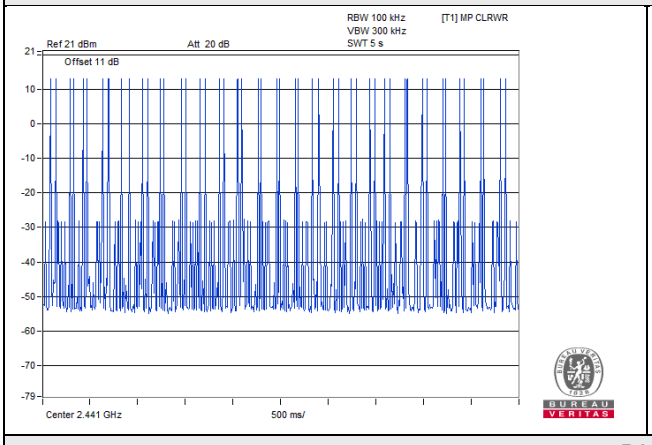
4.4.6 Test Results

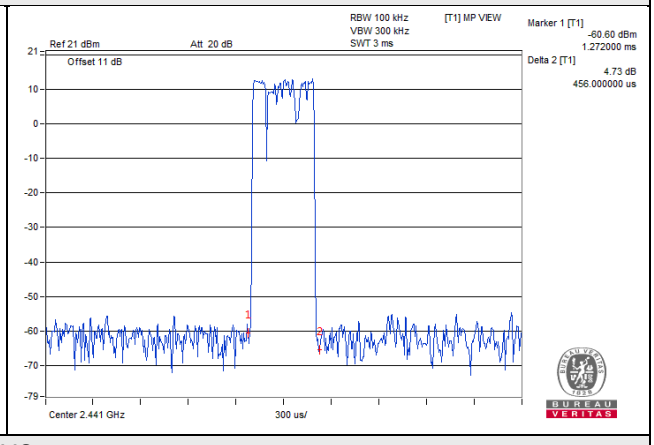
GFSK

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.456	144.1	400
DH3	27 (times / 5 sec) * 6.32 = 171.00 times	1.75	299.25	400
DH5	16 (times / 5 sec) * 6.32 = 102.00 times	3.008	306.82	400

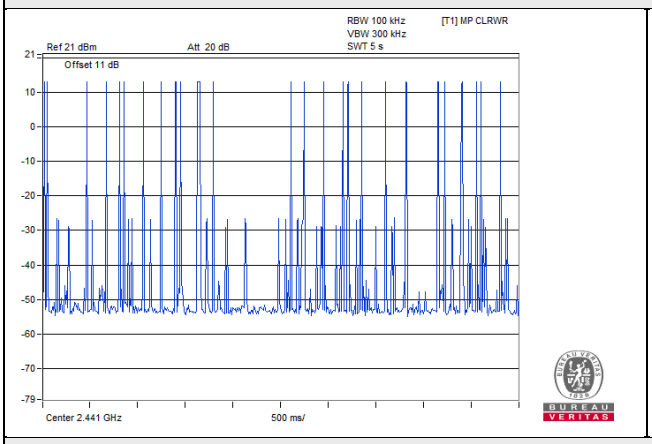
Note: Test plots of the transmitting time slot are shown as below.

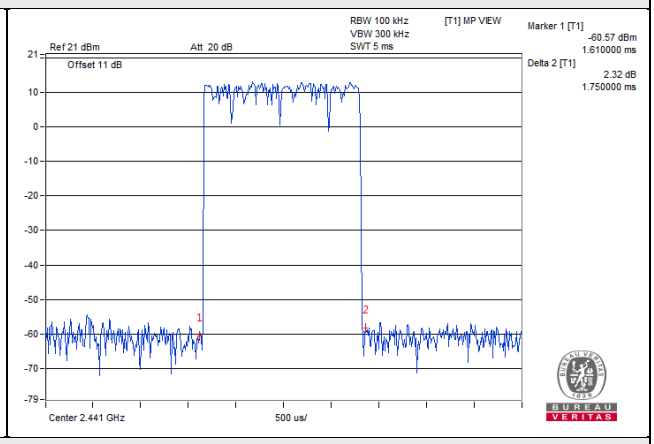
DH1



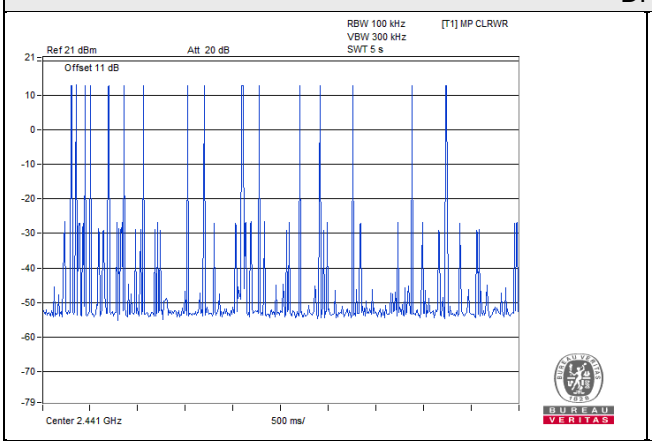


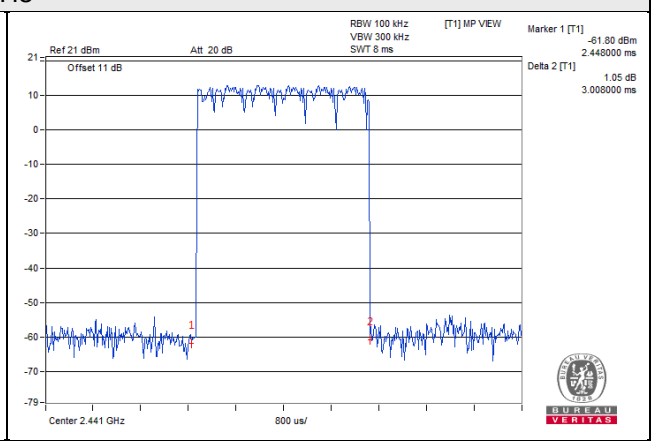
DH3





DH5



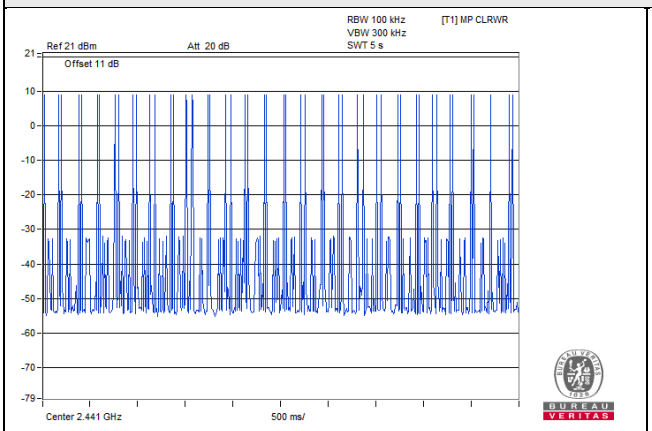


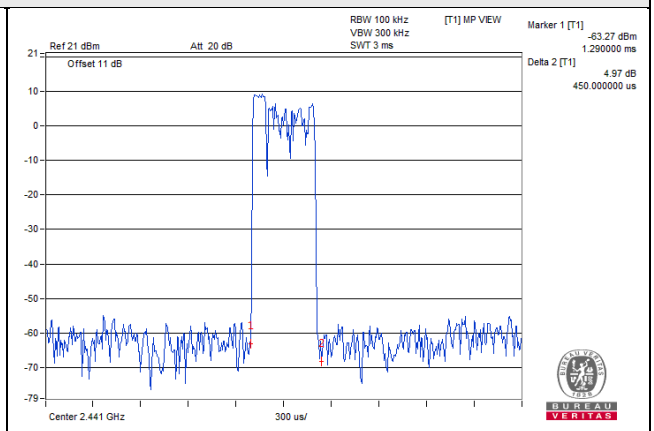
8DPSK

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
3DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.45	142.2	400
3DH3	26 (times / 5 sec) * 6.32 = 165.00 times	1.69	278.85	400
3DH5	18 (times / 5 sec) * 6.32 = 114.00 times	2.976	339.26	400

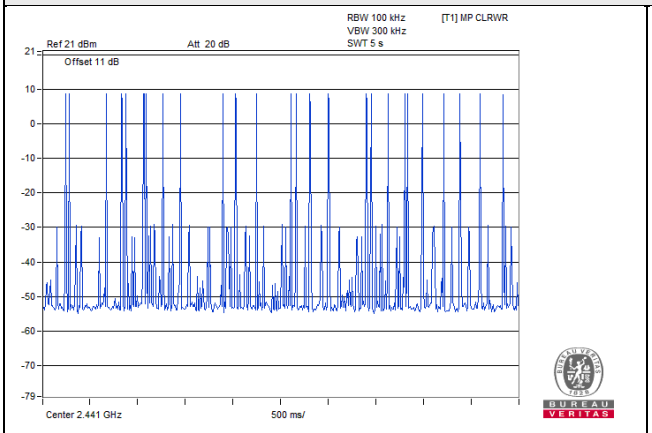
Note: Test plots of the transmitting time slot are shown as below.

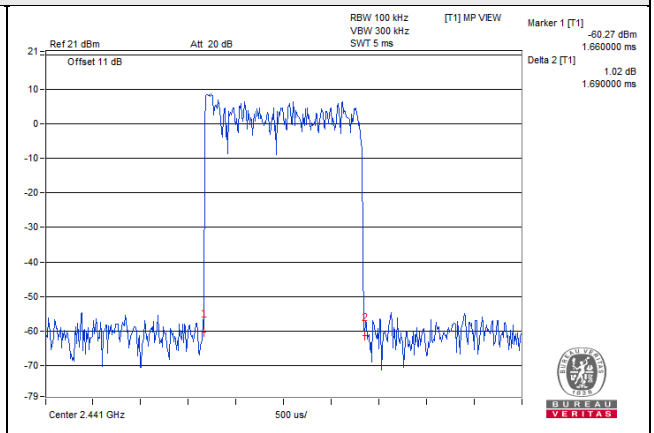
3DH1



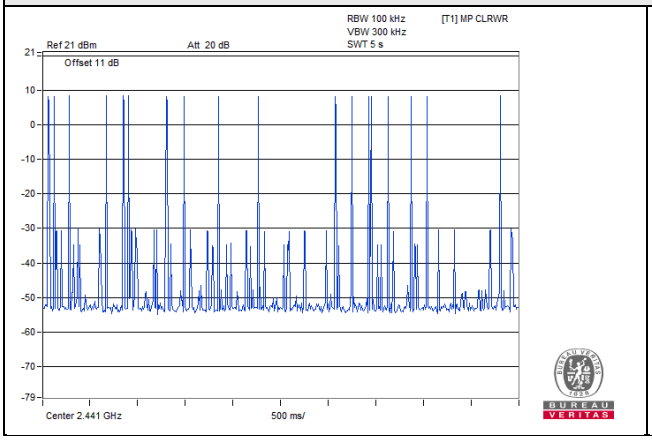


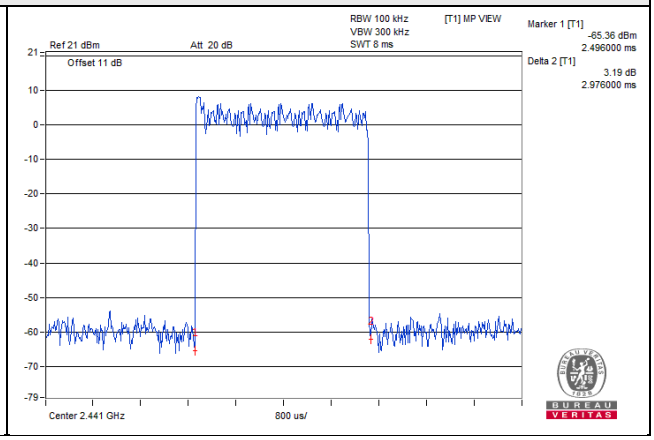
3DH3





3DH5





4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

The 20 dB bandwidth test value is the reference value for the measurement of the frequency hopping channel interval.

4.5.2 Test Setup

4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

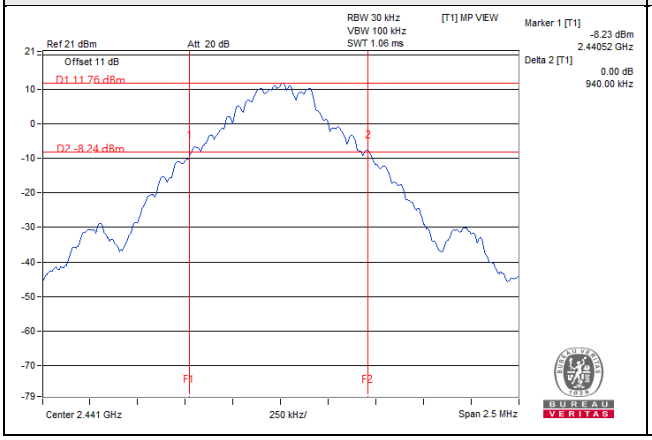
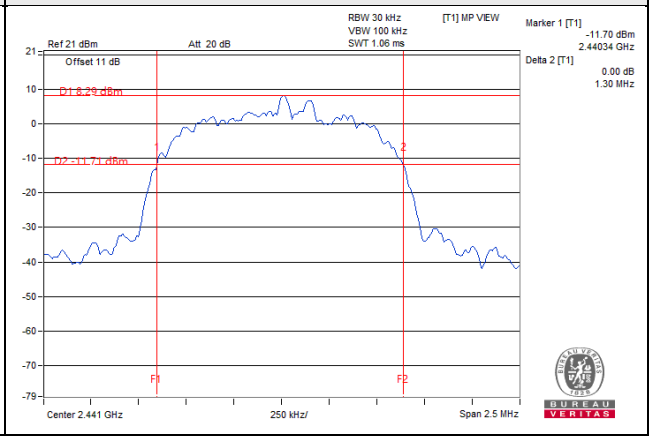
No deviation.

4.5.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	8DPSK
0	2402	0.93	1.29
39	2441	0.94	1.30
78	2480	0.94	1.30

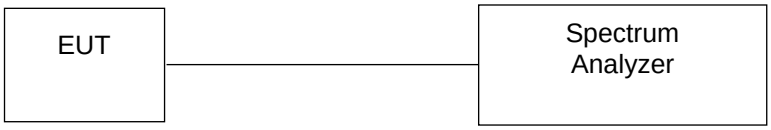
Spectrum Plot of Worst Value	
GFSK	8DPSK
	

4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

Measurement Procedure REF

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
c. By using the MaxHold function record the separation of two adjacent channels.
d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
e. Repeat above procedures until all frequencies measured were complete.

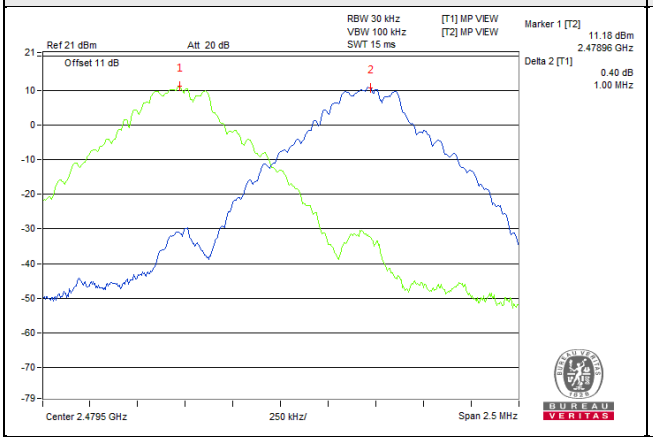
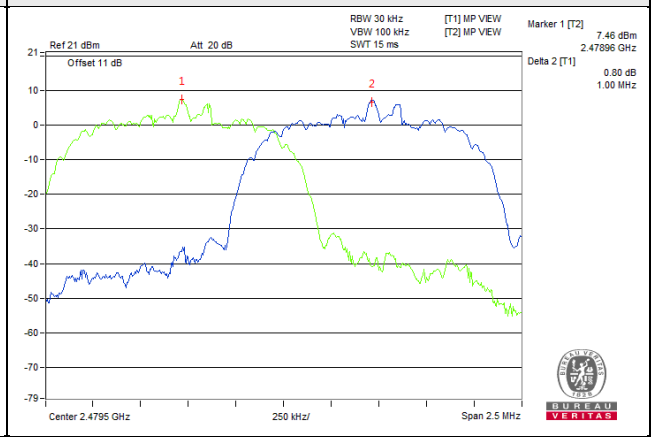
4.6.5 Deviation from Test Standard

No deviation.

4.6.6 Test Results

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)		20dB Bandwidth (MHz)		Minimum Limit (MHz)		Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK	GFSK	8DPSK	
0	2402	1.00	1.00	0.93	1.29	0.62	0.86	Pass
39	2441	1.00	1.00	0.94	1.30	0.63	0.87	Pass
78	2480	1.00	1.00	0.94	1.30	0.63	0.87	Pass

Note: The minimum limit is two-third 20dB bandwidth.

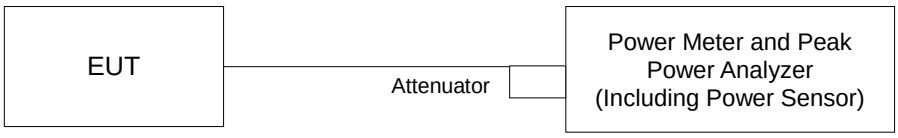
Spectrum Plot of Worst Value	
GFSK	8DPSK
	

4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

Refer to Regulation 15.247 (a)(1), the Maximum Output Power Measurement is 125 mW.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

For Peak Power
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

For Average Power
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.

4.7.5 Deviation fromTest Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

For Peak Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)		Power Limit (mW)	Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	**27.861**	20.559	14.45	13.13	125	Pass
39	2441	27.29	19.953	14.36	13.00	125	Pass
78	2480	23.55	16.904	13.72	12.28	125	Pass

For Average Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)	
		GFSK	8DPSK	GFSK	8DPSK
0	2402	26.182	10.617	14.18	10.26
39	2441	25.823	10.186	14.12	10.08
78	2480	22.542	9.036	13.53	9.56

4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits Of Conducted Out Of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz RBW).

4.8.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.8.3 Test Procedure

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 Deviation from Test Standard

No deviation.

4.8.5 EUT Operating Condition

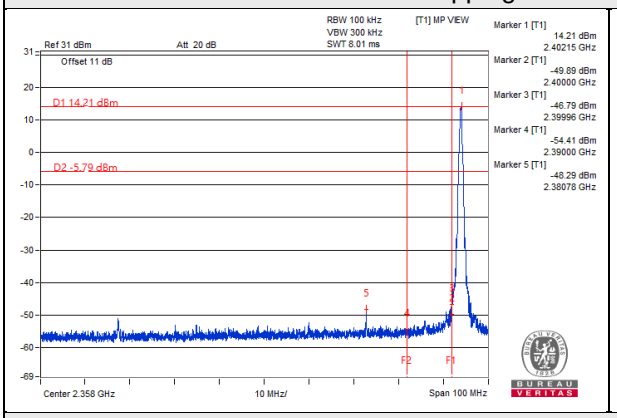
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

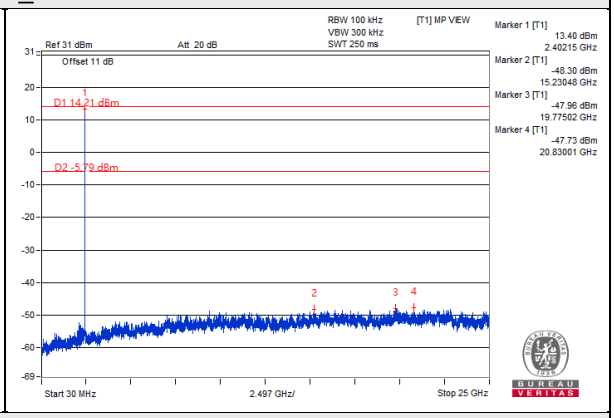
4.8.6 Test Results

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

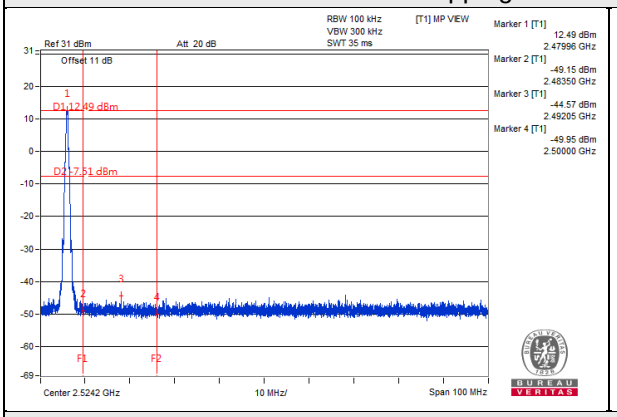
GFSK

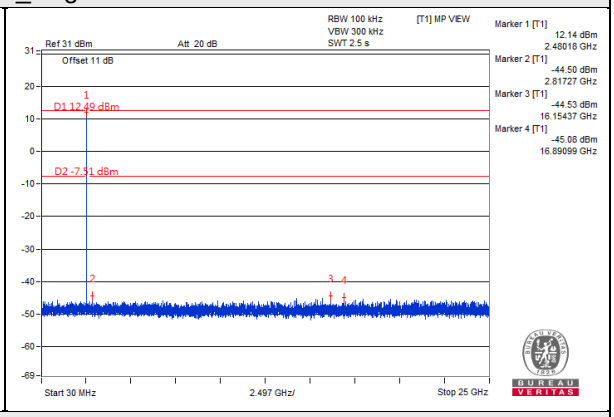
Hopping disabled_ Low Channel



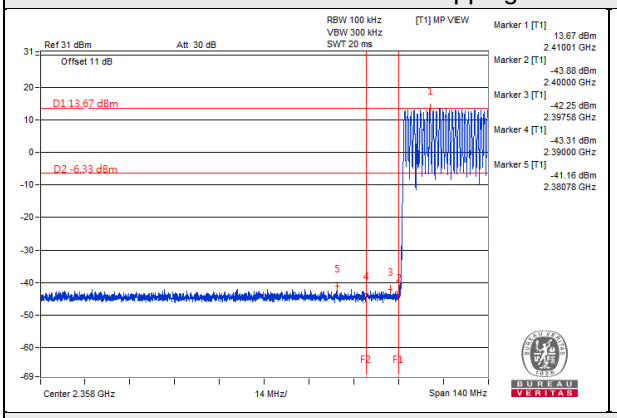


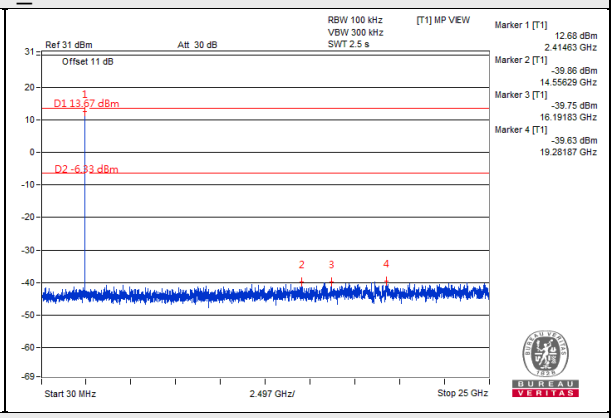
Hopping disabled_ High Channel



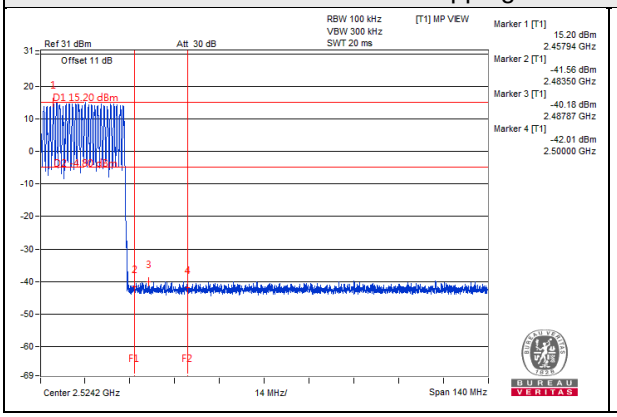


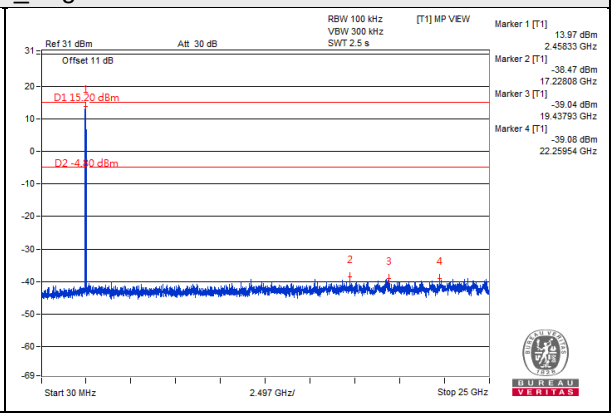
Hopping enabled_ Low Channel





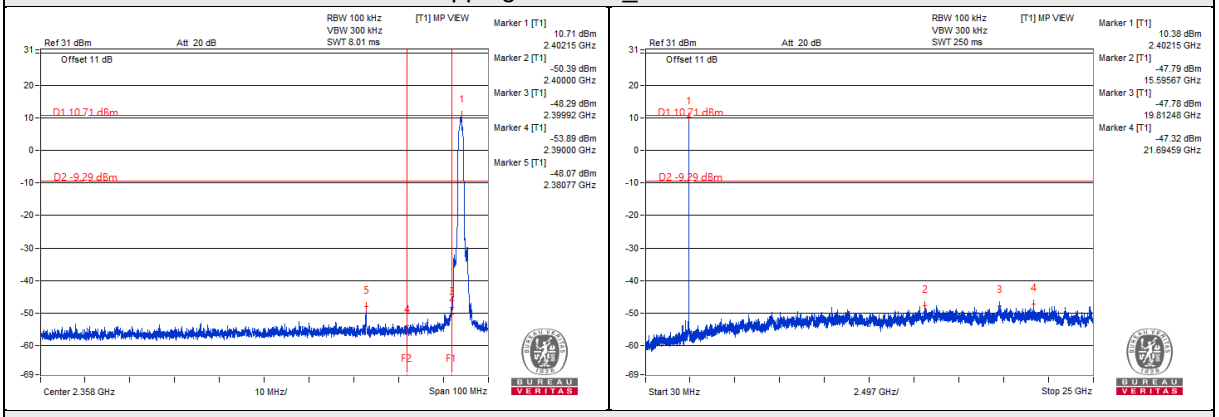
Hopping enabled_ High Channel



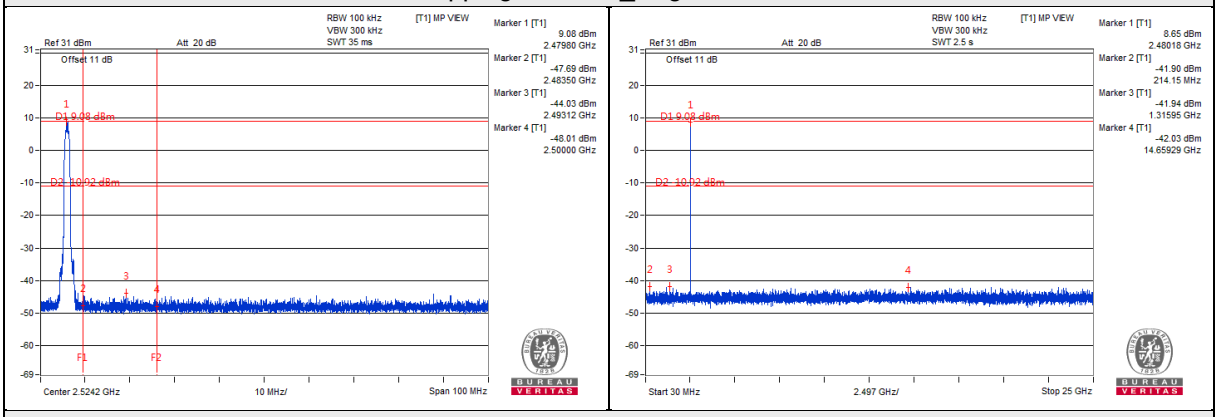


8DPSK

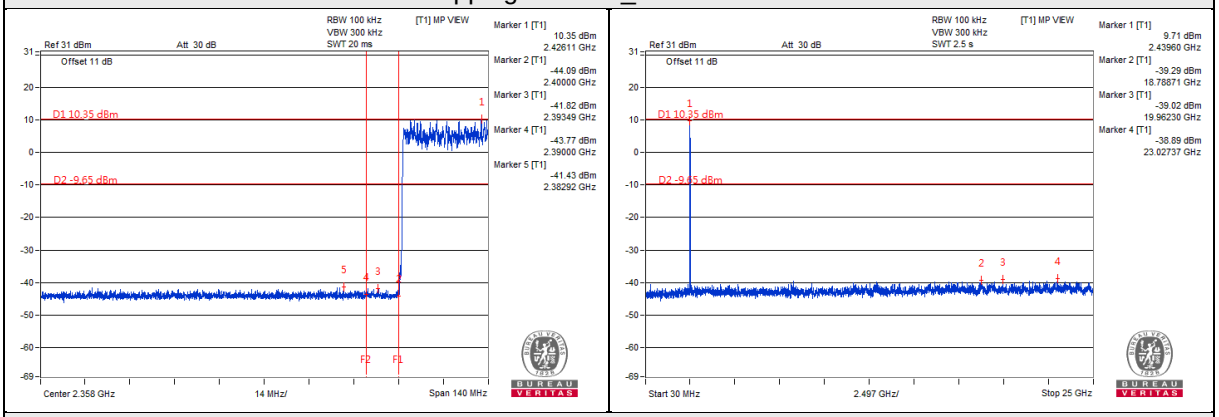
Hopping disabled_ Low Channel



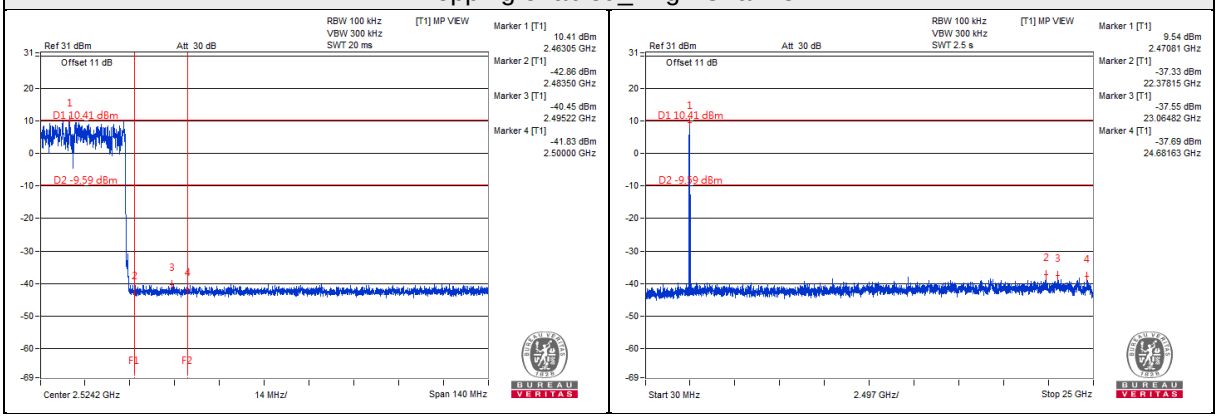
Hopping disabled_ High Channel



Hopping enabled_ Low Channel



Hopping enabled_ High Channel



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

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

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

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Email: service.adt@tw.bureauveritas.com
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The address and road map of all our labs can be found in our web site also.

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