FCC Test Report

Report No.:	RFBHAT-WTW-P20121068A
FCC ID:	R68OQ845US
Test Model:	Open-Q 845 uSOM
Received Date:	Jul. 14, 2022
Test Date:	Aug. 02 ~ Dec. 16, 2022
Issued Date:	Dec. 22, 2022
Applicant:	Lantronix, Inc.
Address:	48 Discovery, Suite 250 Irvine, CA 92618 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
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
RFBHAT-WTW-P20121068A	Original Release	Dec. 22, 2022

1 Certificate of Conformity

Product:	Open-Q 845 uSOM
Brand:	Lantronix
Test Model:	Open-Q 845 uSOM
Sample Status:	Engineering Sample
Applicant:	Lantronix, Inc.
Test Date:	Aug. 02 ~ Dec. 16, 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 : Lena Wang , **Date:** Dec. 22, 2022

Lena Wang / Specialist

Approved by : Jeremy Lin , **Date:** Dec. 22, 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 -10.22 dB at 0.47000 MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	N/A	Refer to Note 1
15.247(a)(1)(iii)	Dwell Time on Each Channel	N/A	Refer to Note 1
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note 1
15.247(b)(1)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	N/A	Refer to Note 1
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -3.7 dB at 38.73 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note 1
15.247(d)	Antenna Port Emission	N/A	Refer to Note 1
15.203	Antenna Requirement	N/A	Refer to Note 1

Note:

1. This report is a partial report, only test item of AC Power Conducted Emission, Maximum Output Power and Radiated Emissions tests were performed for this report. Other testing data please refer to original report no.: RFBHAT-WTW-P20121068.
2. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
3. For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
4. 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	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Open-Q 845 uSOM
Brand	Lantronix
Test Model	Open-Q 845 uSOM
Status of EUT	Engineering Sample
Power Supply Rating	12 Vdc (Adapter)
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Output Power	25.061 mW
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a supplementary report to BV CPS report no. RFBHAT-WTW-P20121068. The difference compared with original report are adding antenna*2 and changing the applicant's address, therefore only test item of AC Power Conducted Emission, Maximum Output Power and Radiated Emissions tests were performed for this report.
2. The following antennas were provided to the EUT. (Ant. B & C is new)

Ant. A (original)		
Ant. Type	Flexible Dipole Antenna	
Connector Type	U.FL	
Antenna Gain (dBi)		
Item	**2.4~2.5G**	**4.9~5.8G**
Ant 1	3.32	6.11
Ant 2	3.32	6.11
Ant. B (new)		
Brand	Fractus Antennas	
Model	FR05-S1-NO-1-003	
Ant. Type	Chip Monopole	
Connector Type	R-SMA	
Antenna Gain (dBi)		
2.4~2.5G		**4.9~5.8G**
3.9		6
Ant. C (new)		
Brand	Fractus Antennas	
Model	FR05-S1-NO-1-003	
Ant. Type	Chip Monopole	
Connector Type	ipex(MHF)	
Antenna Gain (dBi)		
2.4~2.5G		**4.9~5.8G**
3.9		6

* Antenna B and Antenna C are only different in PCB trace layout.

3. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.
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.
5. BT, 2.4G and 5GHz WLAN can transmit simultaneously. The emission of the simultaneous operation has been evaluated and no non-compliance was found.

3.2 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		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Ant. B
B	√	√	√	-	Ant. C

Where **RE≥1G:** Radiated Emission above 1 GHz **RE<1G:** Radiated Emission below 1 GHz

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

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-axis for Mode A and on Z-axis for Mode B**.
2. "-" means no effect.
3. Radiated emission test (below 1GHz) and power line conducted emission test items chosen the worst fundamental frequency emission level.

Radiated Emission Test (Above 1 GHz):

☒ 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	Packet Type
A, B	0 to 78	0, 39, 78	FHSS	GFSK	DH5
	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Radiated Emission Test (Below 1 GHz):

☒ 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	Packet Type
A, B	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	Packet Type
A, B	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	Packet Type
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

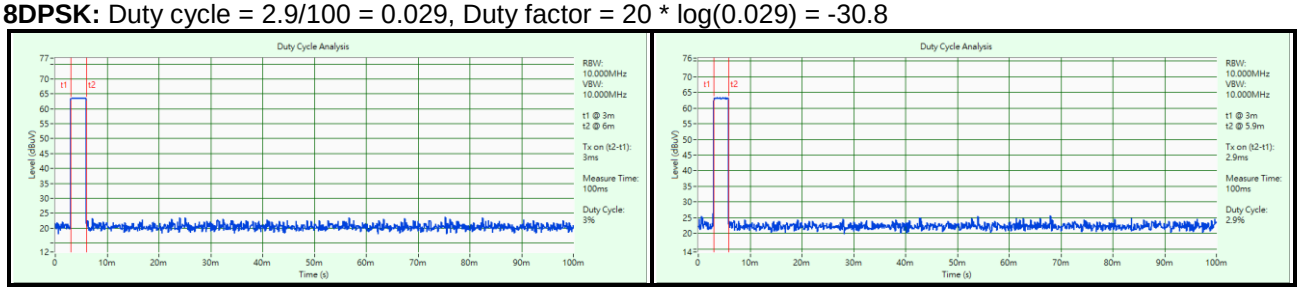
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	23 deg. C, 73 % RH	120 Vac, 60 Hz	Rex Wang
RE<1G	21 deg. C, 68 % RH	120 Vac, 60 Hz	Rex Wang
PLC	25 deg. C, 75 % RH	120 Vac, 60 Hz	Rex Wang
APCM	25 deg. C, 60 % RH	120 Vac, 60 Hz	Jisyong Wang

3.3 Duty Cycle of Test Signal

GFSK: Duty cycle = 3/100 = 0.03, Duty factor = 20 * log(0.03) = -30.5

8DPSK: Duty cycle = 2.9/100 = 0.029, Duty factor = 20 * log(0.029) = -30.8



3.4 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.

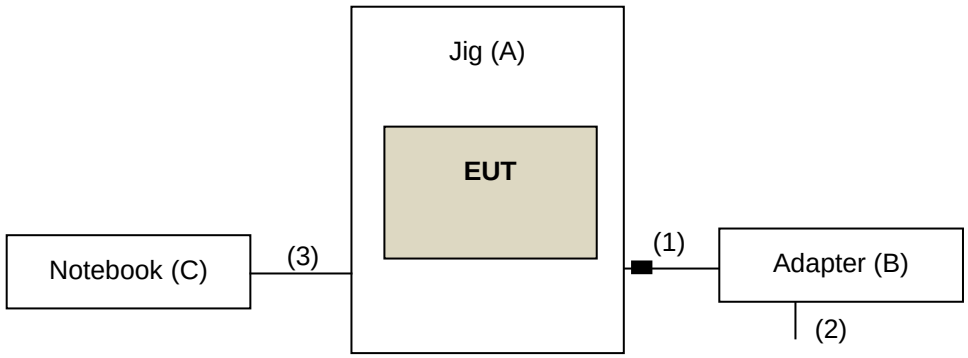
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Jig	N/A	N/A	N/A	N/A	Provided by client
B	Adapter	YINGHUIYUAN	YHY-12003000	N/A	N/A	Provided by client
C	Notebook	Dell	E5420	FHP75S1	N/A	--

Note:

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

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Adapter Cable	1	1.2	Y	1	Provided by client
2.	Power Cable	1	1.15	N	0	Provided by client
3.	USB Type C Cable	1	1	Y	0	--

3.4.1 Configuration of System under Test



3.5 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 20 dB 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:

a. The lower limit shall apply at the transition frequencies.

b. Emission level (dBuV/m) = 20 log Emission level (uV/m).

c. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 27, 2022	Apr. 26, 2023
Spectrum Analyzer R&S	FSW43	101867	Jan. 07, 2022	Jan. 06, 2023
Pre-amplifier EMCI	EMC001340	980201	Sep. 15, 2021	Sep. 14, 2022
			Sep. 23, 2022	Sep. 22, 2023
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	Jan. 15, 2022	Jan. 14, 2023
Preamplifier Agilent	8447D	2944A10638	May 14, 2022	May 13, 2023
Bi_Log Antenna Schwarbeck	VULB9168	9168-160	Oct. 28, 2021	Oct. 27, 2022
			Oct. 20, 2022	Oct. 19, 2023
RF Coaxial Cable WOKEN	8D-FB	Cable-CH9-01	May 14, 2022	May 13, 2023
Horn Antenna Schwarzbeck	9120D	9120D-1169	Nov. 14, 2021	Nov. 13, 2022
			Nov. 13, 2022	Nov. 12, 2023
Preamplifier Agilent	8449B	3008A02367	Feb. 16, 2022	Feb. 15, 2023
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM- SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2022	Jan. 14, 2023
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9- (250795/4)	Jan. 15, 2022	Jan. 14, 2023
RF FLITER MICRO-TRONICS	BRM50716	060	Jan. 10, 2022	Jan. 09, 2023
RF FLITER MICRO-TRONICS	BRM17690	004	Jan. 10, 2022	Jan. 09, 2023
Boresight antenna tower fixture BV	BAF-02	5	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 966 chamber 4.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

a. 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.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. 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. 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 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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. 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.
f. The test-receiver system was set to peak and average detected 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:

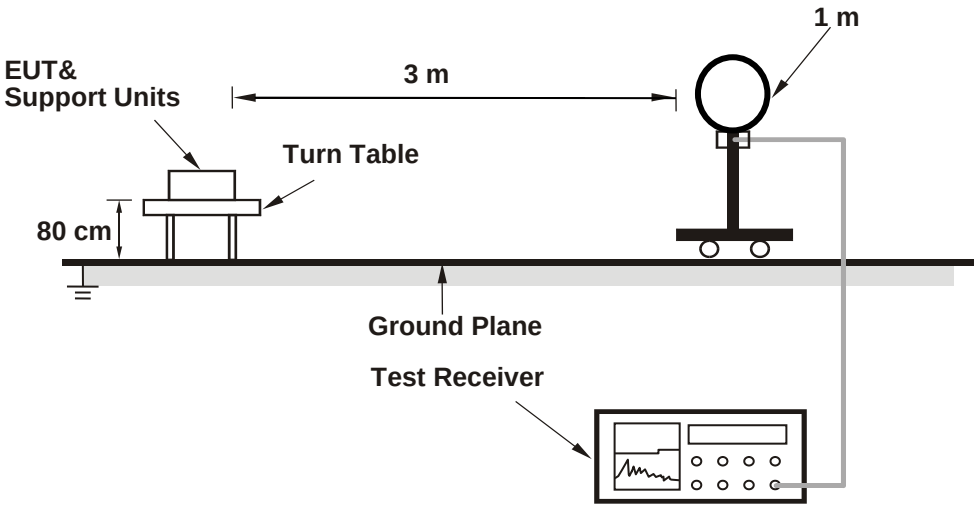
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
3. For Fundamental frequency and band edge & harmonic:
   The average value of fundamental frequency is :average value = peak value + 20*log(Duty cycle) where the duty cycle correction factor is calculated from following formula:
   20*Log(Duty cycle) = 20*log (3ms/100) = -30.5 dB, , please refer to the plotted duty (see section 3.3)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

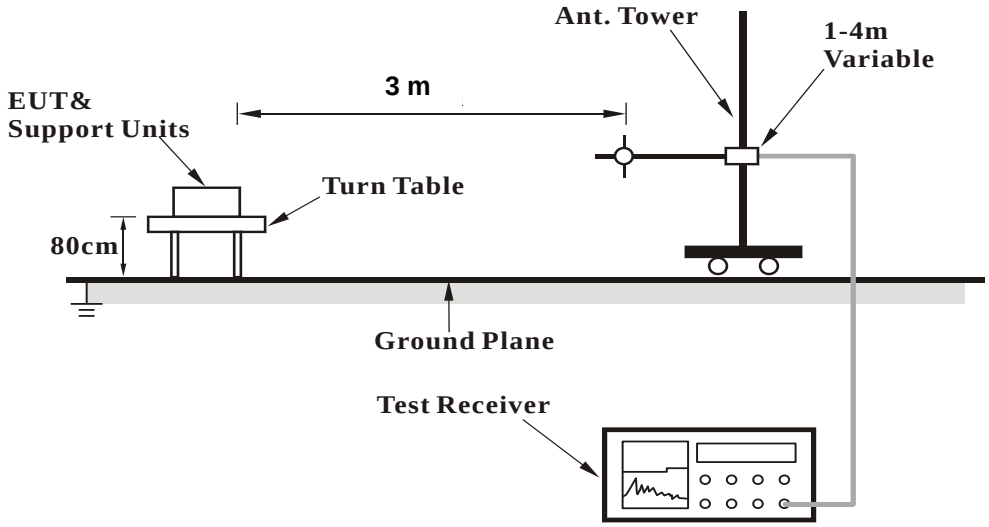
No deviation.

4.1.5 Test Set Up

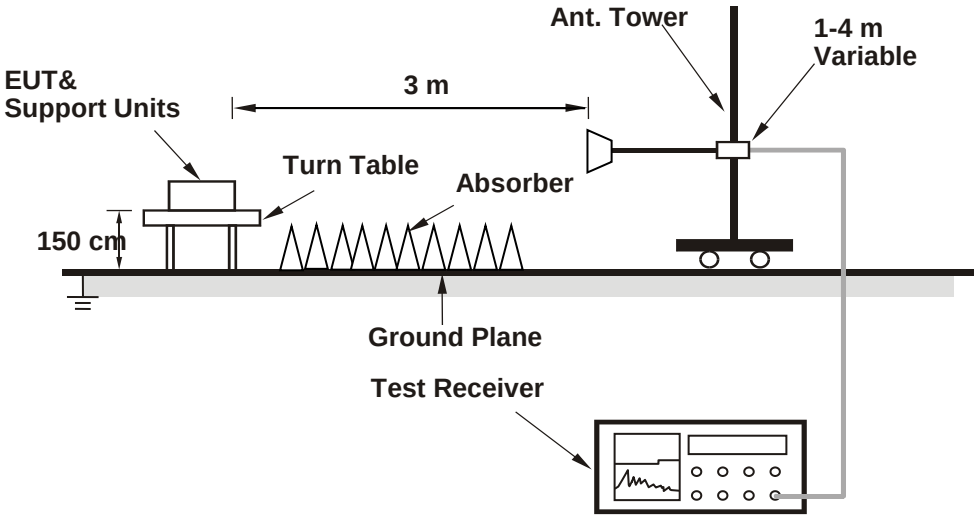
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1 GHz Data:

Mode A

GFSK

RF Mode	TX BT_GFSK	**Channel**	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	**Detector Function**	Peak (PK) Average (AV)

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	2390.00	58.2 PK	74.0	-15.8	1.47 H	300	25.4	32.8
2	2390.00	46.6 AV	54.0	-7.4	1.47 H	300	13.8	32.8
3	*2402.00	109.8 PK			1.47 H	300	77.0	32.8
4	*2402.00	79.3 AV			1.47 H	300	46.5	32.8
5	4804.00	47.4 PK	74.0	-26.6	1.55 H	296	41.6	5.8
6	4804.00	16.9 AV	54.0	-37.1	1.55 H	296	11.1	5.8
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	2390.00	58.0 PK	74.0	-16.0	3.67 V	68	25.2	32.8
2	2390.00	46.5 AV	54.0	-7.5	3.67 V	68	13.7	32.8
3	*2402.00	107.3 PK			3.67 V	68	74.5	32.8
4	*2402.00	76.8 AV			3.67 V	68	44.0	32.8
5	4804.00	47.2 PK	74.0	-26.8	3.60 V	59	41.4	5.8
6	4804.00	16.7 AV	54.0	-37.3	3.60 V	59	10.9	5.8

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.
5. " * ": Fundamental frequency.
4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (3ms*1/100) = -30.5dB please refer to the plotted duty (see section 3.3)

RF Mode	TX BT_GFSK	Channel	CH 39：2441 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2441.00	109.2 PK			1.43 H	302	76.4	32.8
2	*2441.00	78.7 AV			1.43 H	302	45.9	32.8
3	4882.00	47.0 PK	74.0	-27.0	1.50 H	294	41.5	5.5
4	4882.00	16.5 AV	54.0	-37.5	1.50 H	294	11.0	5.5
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	*2441.00	108.1 PK			3.59 V	28	75.3	32.8
2	*2441.00	77.6 AV			3.59 V	28	44.8	32.8
3	4882.00	46.9 PK	74.0	-27.1	3.47 V	64	41.4	5.5
4	4882.00	16.4 AV	54.0	-37.6	3.47 V	64	10.9	5.5

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.
5. " * ": Fundamental frequency.

4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (3ms*1/100) = -30.5dB please refer to the plotted duty (see section 3.3)

RF Mode	TX BT_GFSK	Channel	CH 78：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2480.00	109.7 PK			3.46 H	305	76.8	32.9
2	*2480.00	79.2 AV			3.46 H	305	46.3	32.9
3	2483.50	59.8 PK	74.0	-14.2	3.46 H	305	61.3	-1.5
4	2483.50	29.3 AV	54.0	-24.7	3.46 H	305	30.8	-1.5
5	4960.00	47.2 PK	74.0	-26.8	1.52 H	300	41.5	5.7
6	4960.00	16.7 AV	54.0	-37.3	1.52 H	300	11.0	5.7
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	*2480.00	107.6 PK			3.48 V	212	74.7	32.9
2	*2480.00	77.1 AV			3.48 V	212	44.2	32.9
3	2483.50	55.0 PK	74.0	-19.0	3.48 V	212	56.5	-1.5
4	2483.50	24.5 AV	54.0	-29.5	3.48 V	212	26.0	-1.5
5	4960.00	47.0 PK	74.0	-27.0	3.57 V	65	41.3	5.7
6	4960.00	16.5 AV	54.0	-37.5	3.57 V	65	10.8	5.7

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.
5. " * ": Fundamental frequency.
4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (3ms*1/100) = -30.5dB please refer to the plotted duty (see section 3.3)

8DPSK

RF Mode	TX BT_8DPSK	Channel	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2390.00	58.1 PK	74.0	-15.9	1.88 H	307	25.3	32.8
2	2390.00	46.4 AV	54.0	-7.6	1.88 H	307	13.6	32.8
3	*2402.00	108.3 PK			1.88 H	307	75.5	32.8
4	*2402.00	77.5 AV			1.88 H	307	44.7	32.8
5	4804.00	47.3 PK	74.0	-26.7	1.55 H	303	41.5	5.8
6	4804.00	16.5 AV	54.0	-37.5	1.55 H	303	10.7	5.8
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	2390.00	57.9 PK	74.0	-16.1	3.69 V	68	25.1	32.8
2	2390.00	46.3 AV	54.0	-7.7	3.69 V	68	13.5	32.8
3	*2402.00	106.3 PK			3.69 V	68	73.5	32.8
4	*2402.00	75.5 AV			3.69 V	68	42.7	32.8
5	4804.00	46.6 PK	74.0	-27.4	3.57 V	60	40.8	5.8
6	4804.00	15.8 AV	54.0	-38.2	3.57 V	60	10.0	5.8

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.
5. " * ": Fundamental frequency.

4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (2.9/100) = -30.8dB please refer to the plotted duty (see section 3.3)

RF Mode	TX BT_8DPSK	Channel	CH 39：2441 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2441.00	107.5 PK			1.18 H	308	74.7	32.8
2	*2441.00	76.7 AV			1.18 H	308	43.9	32.8
3	4882.00	47.0 PK	74.0	-27.0	1.48 H	302	41.5	5.5
4	4882.00	16.2 AV	54.0	-37.8	1.48 H	302	10.7	5.5
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	*2441.00	106.6 PK			3.57 V	27	73.8	32.8
2	*2441.00	75.8 AV			3.57 V	27	43.0	32.8
3	4882.00	46.8 PK	74.0	-27.2	3.63 V	55	41.3	5.5
4	4882.00	16.0 AV	54.0	-38.0	3.63 V	55	10.5	5.5

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.
5. " * ": Fundamental frequency.

4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (2.9/100) = -30.8dB please refer to the plotted duty (see section 3.3)

RF Mode	TX BT_8DPSK	Channel	CH 78：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2480.00	108.9 PK			3.47 H	305	76.0	32.9
2	*2480.00	78.1 AV			3.47 H	305	45.2	32.9
3	2483.50	56.7 PK	74.0	-17.3	3.47 H	305	58.2	-1.5
4	2483.50	25.9 AV	54.0	-28.1	3.47 H	305	27.4	-1.5
5	4960.00	47.3 PK	74.0	-26.7	1.58 H	293	41.6	5.7
6	4960.00	16.5 AV	54.0	-37.5	1.58 H	293	10.8	5.7
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	*2480.00	106.9 PK			3.45 V	210	74.0	32.9
2	*2480.00	76.1 AV			3.45 V	210	43.2	32.9
3	2483.50	54.2 PK	74.0	-19.8	3.45 V	210	55.7	-1.5
4	2483.50	23.4 AV	54.0	-30.6	3.45 V	210	24.9	-1.5
5	4960.00	47.2 PK	74.0	-26.8	3.52 V	69	41.5	5.7
6	4960.00	16.4 AV	54.0	-37.6	3.52 V	69	10.7	5.7

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.
5. " * ": Fundamental frequency.
4. for Fundamental frequency and bandedge & harmonic:

The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula:

20Log(Duty cycle) = 20 log (2.9/100) = -30.8dB please refer to the plotted duty (see section 3.3)

Mode B

RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2390.00	58.7 PK	74.0	-15.3	2.10 H	180	24.8	33.9
2	2390.00	47.7 AV	54.0	-6.3	2.10 H	180	13.8	33.9
3	*2402.00	108.3 PK			2.10 H	180	74.5	33.8
4	*2402.00	77.8 AV			2.10 H	180	44.0	33.8
5	4804.00	50.3 PK	74.0	-23.7	2.24 H	196	39.5	10.8
6	4804.00	19.8 AV	54.0	-34.2	2.24 H	196	9.0	10.8
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	2390.00	58.5 PK	74.0	-15.5	1.22 V	105	24.6	33.9
2	2390.00	47.5 AV	54.0	-6.5	1.22 V	105	13.6	33.9
3	*2402.00	107.6 PK			1.22 V	105	73.8	33.8
4	*2402.00	77.1 AV			1.22 V	105	43.3	33.8
5	4804.00	49.5 PK	74.0	-24.5	1.28 V	107	38.7	10.8
6	4804.00	19.0 AV	54.0	-35.0	1.28 V	107	8.2	10.8

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

RF Mode	TX BT_GFSK	Channel	CH 39：2441 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2441.00	107.9 PK			2.36 H	188	74.0	33.9
2	*2441.00	77.4 AV			2.36 H	188	43.5	33.9
3	4882.00	50.6 PK	74.0	-23.4	2.21 H	182	39.4	11.2
4	4882.00	20.1 AV	54.0	-33.9	2.21 H	182	8.9	11.2
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	*2441.00	106.9 PK			1.14 V	106	73.0	33.9
2	*2441.00	76.4 AV			1.14 V	106	42.5	33.9
3	4882.00	50.1 PK	74.0	-23.9	1.22 V	108	38.9	11.2
4	4882.00	19.6 AV	54.0	-34.4	1.22 V	108	8.4	11.2

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

RF Mode	TX BT_GFSK	Channel	CH 78：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2480.00	107.0 PK			2.55 H	187	73.2	33.8
2	*2480.00	76.5 AV			2.55 H	187	42.7	33.8
3	2483.50	58.4 PK	74.0	-15.6	2.55 H	187	46.2	12.2
4	2483.50	27.9 AV	54.0	-26.1	2.55 H	187	15.7	12.2
5	4960.00	50.6 PK	74.0	-23.4	2.16 H	194	39.6	11.0
6	4960.00	20.1 AV	54.0	-33.9	2.16 H	194	9.1	11.0
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	*2480.00	105.3 PK			1.13 V	106	71.5	33.8
2	*2480.00	74.8 AV			1.13 V	106	41.0	33.8
3	2483.50	57.8 PK	74.0	-16.2	1.13 V	106	45.6	12.2
4	2483.50	27.3 AV	54.0	-26.7	1.13 V	106	15.1	12.2
5	4960.00	50.3 PK	74.0	-23.7	1.20 V	112	39.3	11.0
6	4960.00	19.8 AV	54.0	-34.2	1.20 V	112	8.8	11.0

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

RF Mode	TX BT_8DPSK	Channel	CH 0：2402 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	2390.00	58.1 PK	74.0	-15.9	1.88 H	307	25.3	32.8
2	2390.00	46.4 AV	54.0	-7.6	1.88 H	307	13.6	32.8
3	*2402.00	108.3 PK			1.88 H	307	75.5	32.8
4	*2402.00	77.8 AV			1.88 H	307	45.0	32.8
5	4804.00	47.3 PK	74.0	-26.7	1.55 H	303	41.5	5.8
6	4804.00	16.8 AV	54.0	-37.2	1.55 H	303	11.0	5.8
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	2390.00	57.9 PK	74.0	-16.1	3.69 V	68	25.1	32.8
2	2390.00	46.3 AV	54.0	-7.7	3.69 V	68	13.5	32.8
3	*2402.00	106.3 PK			3.69 V	68	73.5	32.8
4	*2402.00	75.8 AV			3.69 V	68	43.0	32.8
5	4804.00	46.6 PK	74.0	-27.4	3.57 V	60	40.8	5.8
6	4804.00	16.1 AV	54.0	-37.9	3.57 V	60	10.3	5.8

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

RF Mode	TX BT_8DPSK	Channel	CH 39：2441 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2441.00	107.5 PK			1.18 H	308	74.7	32.8
2	*2441.00	77.0 AV			1.18 H	308	44.2	32.8
3	4882.00	47.0 PK	74.0	-27.0	1.48 H	302	41.5	5.5
4	4882.00	16.5 AV	54.0	-37.5	1.48 H	302	11.0	5.5
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	*2441.00	106.6 PK			3.57 V	27	73.8	32.8
2	*2441.00	76.1 AV			3.57 V	27	43.3	32.8
3	4882.00	46.8 PK	74.0	-27.2	3.63 V	55	41.3	5.5
4	4882.00	16.3 AV	54.0	-37.7	3.63 V	55	10.8	5.5

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

RF Mode	TX BT_8DPSK	Channel	CH 78：2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

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	*2480.00	108.9 PK			3.47 H	305	76.0	32.9
2	*2480.00	78.4 AV			3.47 H	305	45.5	32.9
3	2483.50	56.7 PK	74.0	-17.3	3.47 H	305	58.2	-1.5
4	2483.50	26.2 AV	54.0	-27.8	3.47 H	305	27.7	-1.5
5	4960.00	47.3 PK	74.0	-26.7	1.58 H	293	41.6	5.7
6	4960.00	16.8 AV	54.0	-37.2	1.58 H	293	11.1	5.7
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	*2480.00	106.9 PK			3.45 V	210	74.0	32.9
2	*2480.00	76.4 AV			3.45 V	210	43.5	32.9
3	2483.50	54.2 PK	74.0	-19.8	3.45 V	210	55.7	-1.5
4	2483.50	23.7 AV	54.0	-30.3	3.45 V	210	25.2	-1.5
5	4960.00	47.2 PK	74.0	-26.8	3.52 V	69	41.5	5.7
6	4960.00	16.7 AV	54.0	-37.3	3.52 V	69	11.0	5.7

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.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(3 ms / 100 ms) = -30.5 dB

9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

Mode A

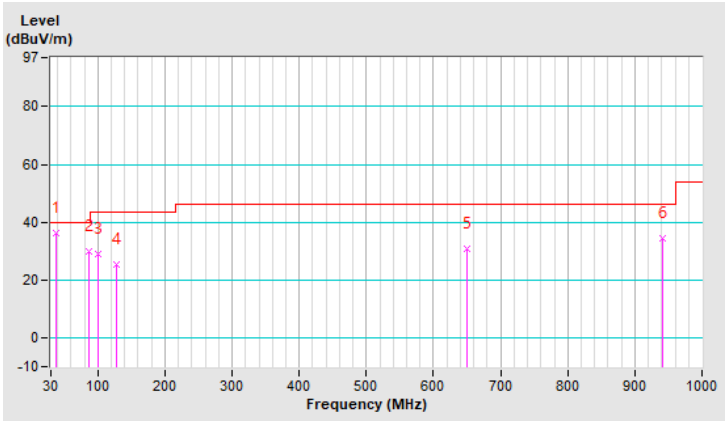
30 MHz ~ 1 GHz Worst-Case Data:

RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	30MHz ~ 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	**38.73**	**36.3 QP**	**40.0**	**-3.7**	**1.00 H**	**13**	**46.2**	**-9.9**
2	87.23	29.9 QP	40.0	-10.1	1.25 H	133	44.6	-14.7
3	100.81	28.8 QP	43.5	-14.7	1.00 H	13	42.2	-13.4
4	127.97	25.4 QP	43.5	-18.1	1.00 H	48	35.8	-10.4
5	649.83	30.7 QP	46.0	-15.3	1.50 H	54	30.4	0.3
6	940.83	34.5 QP	46.0	-11.5	2.00 H	65	28.2	6.3

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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

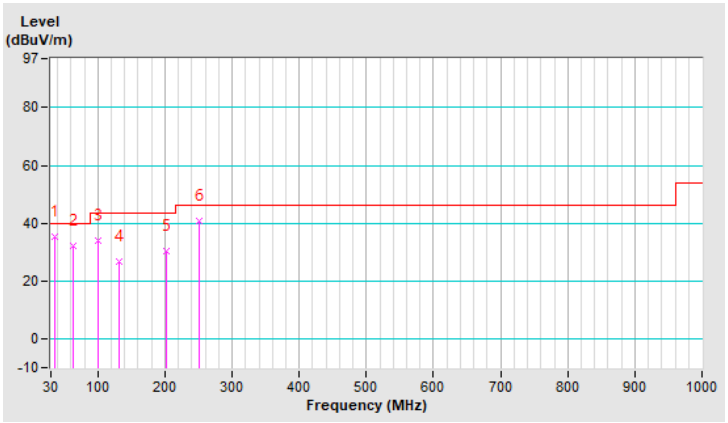


RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	36.79	35.3 QP	40.0	-4.7	1.25 V	222	45.4	-10.1
2	63.95	32.3 QP	40.0	-7.7	2.00 V	78	42.3	-10.0
3	99.84	33.9 QP	43.5	-9.6	1.01 V	259	47.6	-13.7
4	130.88	26.7 QP	43.5	-16.8	1.25 V	267	36.8	-10.1
5	202.66	30.3 QP	43.5	-13.2	1.25 V	270	41.8	-11.5
6	251.16	40.7 QP	46.0	-5.3	2.00 V	114	49.6	-8.9

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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



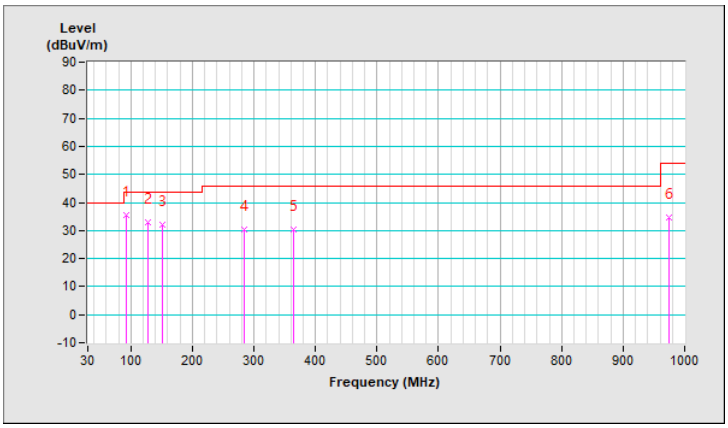
Mode B

RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	30MHz ~ 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	93.05	35.6 QP	43.5	-7.9	1.25 H	259	49.9	-14.3
2	127.97	32.8 QP	43.5	-10.7	1.50 H	33	43.1	-10.3
3	151.25	32.0 QP	43.5	-11.5	1.00 H	300	40.7	-8.7
4	285.11	30.3 QP	46.0	-15.7	2.00 H	194	37.4	-7.1
5	364.65	30.2 QP	46.0	-15.8	1.25 H	16	35.8	-5.6
6	973.81	34.7 QP	54.0	-19.3	1.00 H	282	28.0	6.7

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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

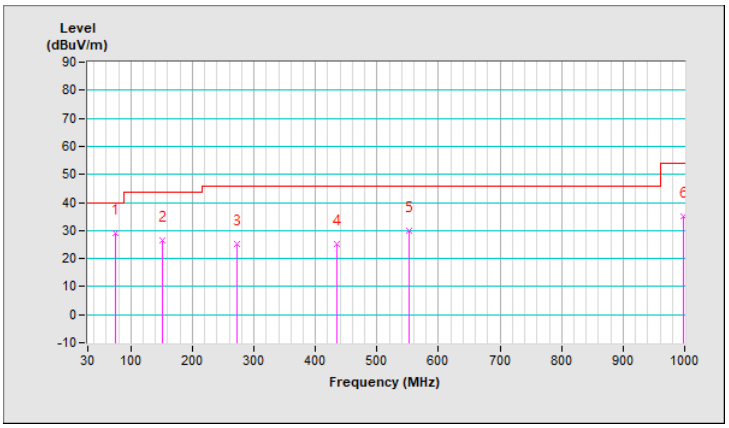


RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	74.62	29.2 QP	40.0	-10.8	1.00 V	101	41.2	-12.0
2	151.25	26.6 QP	43.5	-16.9	1.50 V	53	35.3	-8.7
3	272.50	25.0 QP	46.0	-21.0	1.00 V	9	32.7	-7.7
4	434.49	25.4 QP	46.0	-20.6	1.50 V	147	29.0	-3.6
5	551.86	30.1 QP	46.0	-15.9	2.00 V	339	31.7	-1.6
6	998.06	35.0 QP	54.0	-19.0	1.00 V	77	28.4	6.6

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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
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
			Sep. 03, 2022	Sep. 02, 2023
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Sep. 17, 2021	Sep. 16, 2022
			Sep. 22, 2022	Sep. 21, 2023
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 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.
4. Test Date: 2022/8/3 ~ 2022/11/24

4.2.3 Test Procedures

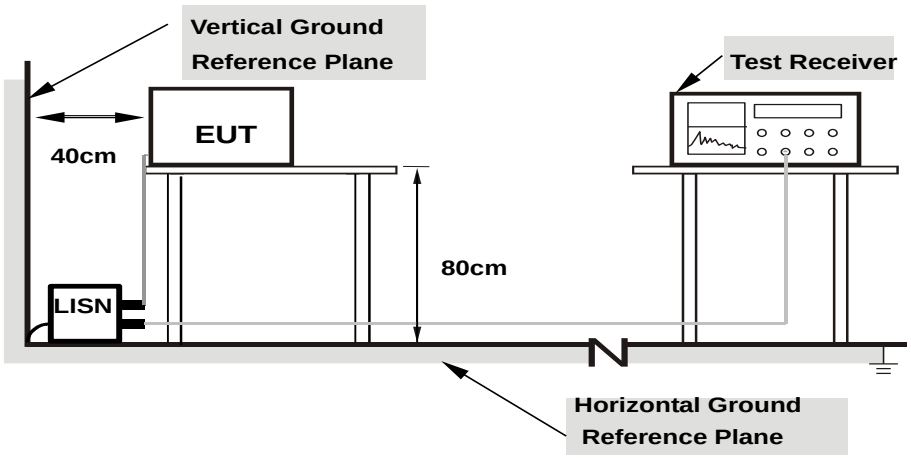
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling 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 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT Operating Condition

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

4.2.7 Test Results

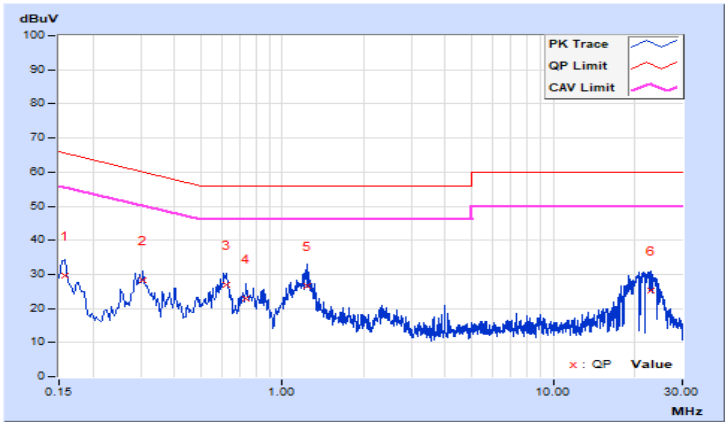
Mode A

RF Mode	TX BT_GFSK	**Channel**	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15687	10.13	19.47	12.89	29.60	23.02	65.63	55.63	-36.03	-32.61
2	0.30600	10.15	18.03	11.65	28.18	21.80	60.08	50.08	-31.90	-28.28
3	0.62057	10.17	16.91	9.90	27.08	20.07	56.00	46.00	-28.92	-25.93
4	0.73800	10.18	12.72	6.28	22.90	16.46	56.00	46.00	-33.10	-29.54
5	1.23400	10.20	16.41	9.60	26.61	19.80	56.00	46.00	-29.39	-26.20
6	22.97400	10.30	14.81	2.67	25.11	12.97	60.00	50.00	-34.89	-37.03

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

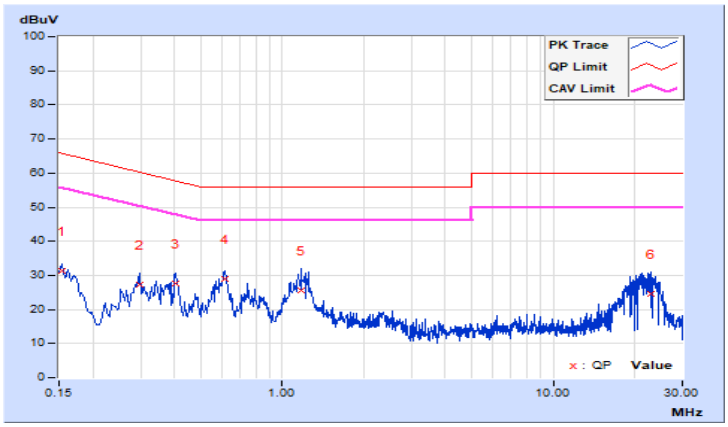


RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	10.14	21.23	16.15	31.37	26.29	65.78	55.78	-34.41	-29.49
2	0.29800	10.16	17.06	11.09	27.22	21.25	60.30	50.30	-33.08	-29.05
3	0.40179	10.17	17.38	4.76	27.55	14.93	57.82	47.82	-30.27	-32.89
4	0.61400	10.18	18.86	11.46	29.04	21.64	56.00	46.00	-26.96	-24.36
5	1.17800	10.21	15.33	8.25	25.54	18.46	56.00	46.00	-30.46	-27.54
6	22.95000	10.44	14.04	3.03	24.48	13.47	60.00	50.00	-35.52	-36.53

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



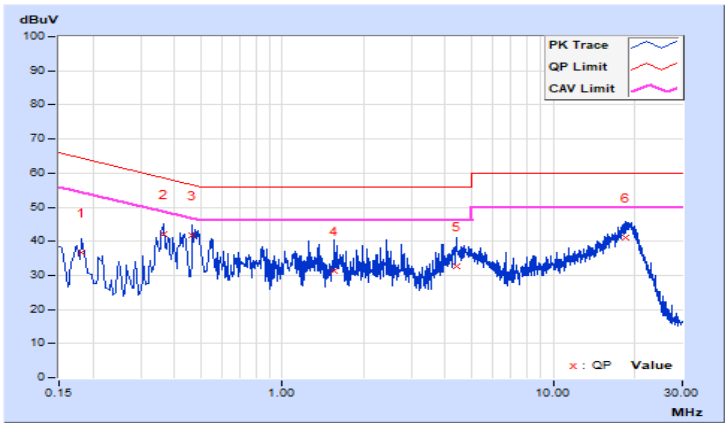
Mode B

RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18200	10.21	26.42	17.10	36.63	27.31	64.39	54.39	-27.76	-27.08
2	0.36545	10.24	31.94	22.56	42.18	32.80	58.60	48.60	-16.42	-15.80
3	0.46600	10.25	31.57	16.00	41.82	26.25	56.58	46.58	-14.76	-20.33
4	1.56200	10.31	21.04	11.32	31.35	21.63	56.00	46.00	-24.65	-24.37
5	4.39400	10.42	22.27	12.94	32.69	23.36	56.00	46.00	-23.31	-22.64
6	18.61800	10.61	30.37	19.14	40.98	29.75	60.00	50.00	-19.02	-20.25

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

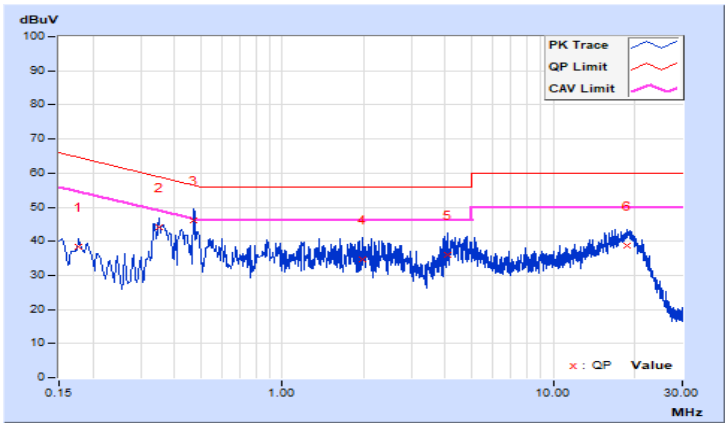


RF Mode	TX BT_GFSK	Channel	CH 0：2402 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17800	10.20	28.04	20.75	38.24	30.95	64.58	54.58	-26.34	-23.63
2	0.35000	10.24	33.79	25.12	44.03	35.36	58.96	48.96	-14.93	-13.60
3	**0.47000**	**10.26**	**36.03**	**23.20**	**46.29**	**33.46**	**56.51**	**46.51**	**-10.22**	**-13.05**
4	1.96600	10.36	24.21	13.14	34.57	23.50	56.00	46.00	-21.43	-22.50
5	4.10600	10.44	25.49	13.42	35.93	23.86	56.00	46.00	-20.07	-22.14
6	18.73000	10.75	28.02	18.63	38.77	29.38	60.00	50.00	-21.23	-20.62

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



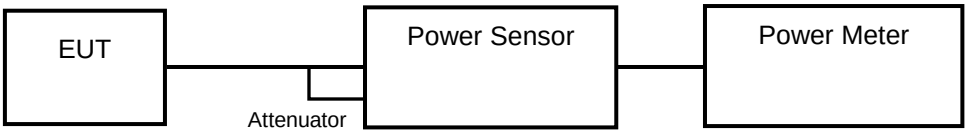
4.3 Maximum Output Power

4.3.1 Limits of Maximum Output Power Measurement

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

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 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.

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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Results

<GFSK>

Channel	Freq. (MHz)	Peak Power		Average Power		Power Limit (mW)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
0	2402	**25.061**	**13.99**	23.174	13.65	125 / 1000 Note	Pass
39	2441	23.335	13.68	22.029	13.43	125 / 1000 Note	Pass
78	2480	20.184	13.05	19.77	12.96	125 / 1000 Note	Pass

Note: RF Output Power limit depends on the operating channel numbers, please refer to section 4.3 of the results.

<8DPSK>

Channel	Freq. (MHz)	Peak Power		Average Power		Power Limit (mW)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
0	2402	14.962	11.75	13.9	11.43	125 / 1000 Note	Pass
39	2441	12.474	10.96	11.83	10.73	125 / 1000 Note	Pass
78	2480	14.723	11.68	13.996	11.46	125 / 1000 Note	Pass

Note: RF Output Power limit depends on the operating channel numbers, please refer to section 4.3 of the results.

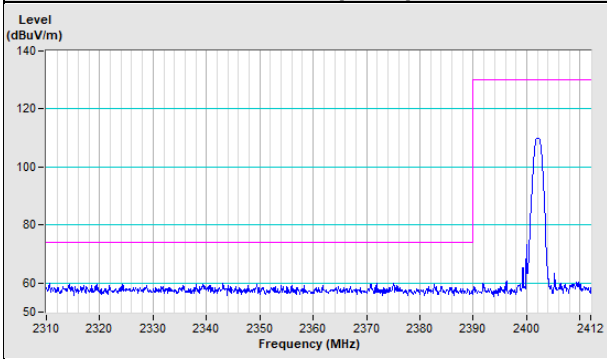
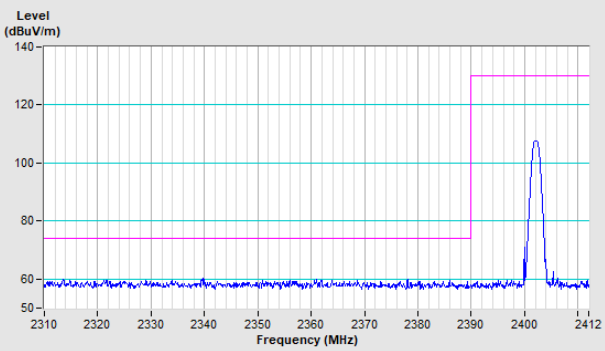
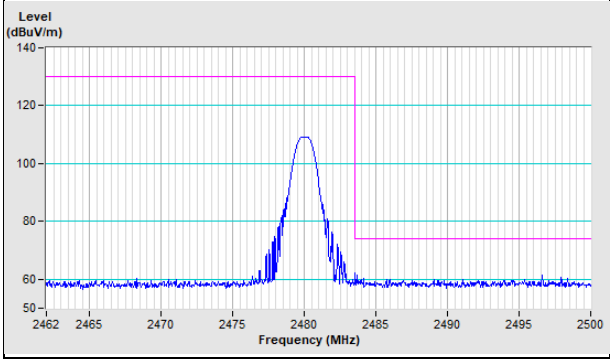
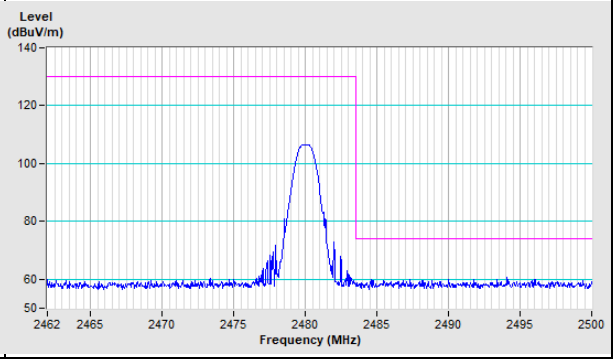
5 Pictures of Test Arrangements

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

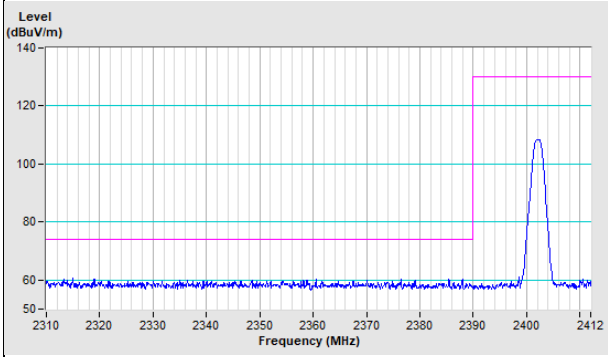
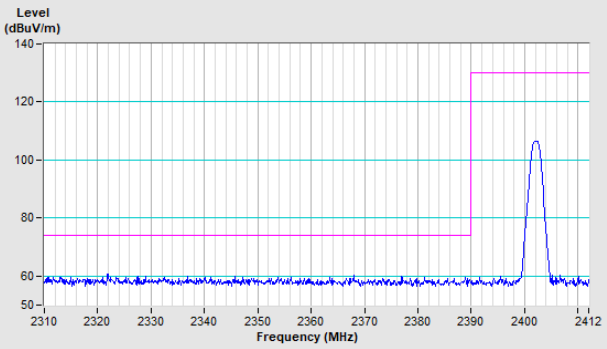
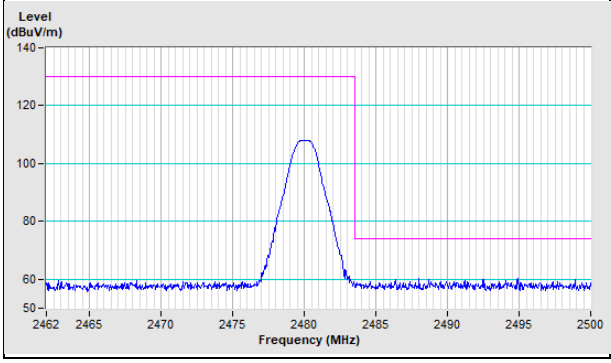
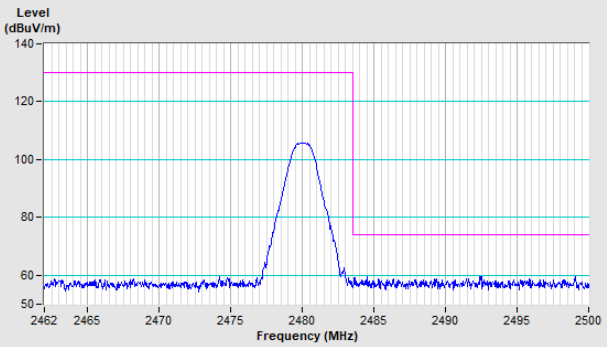
Annex A- Band Edge Measurement

Mode A

GFSK

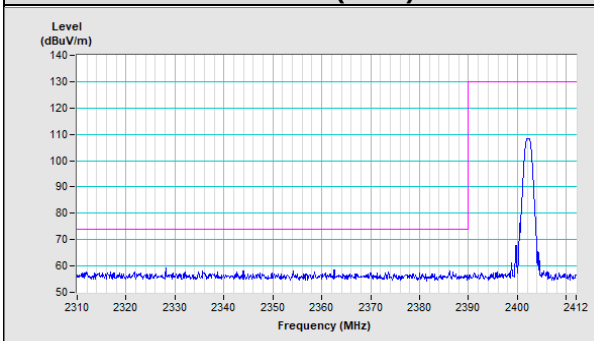
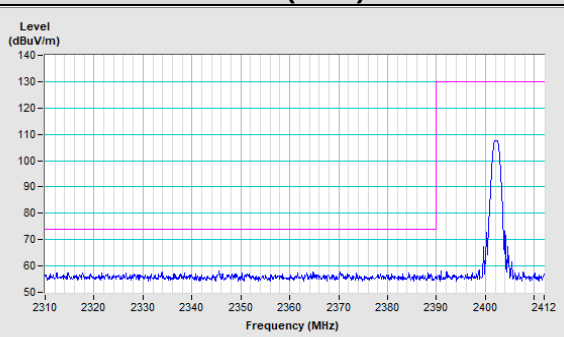
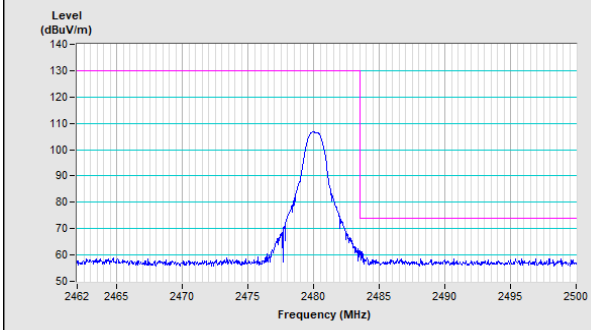
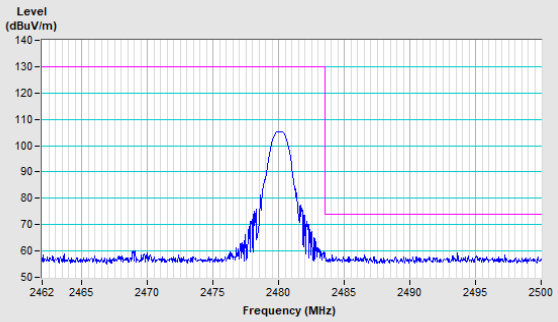
BT_GFSK Channel 0	
Horizontal (Peak)	Vertical (Peak)
	
BT_GFSK Channel 78	
Horizontal (Peak)	Vertical (Peak)
	

8DPSK

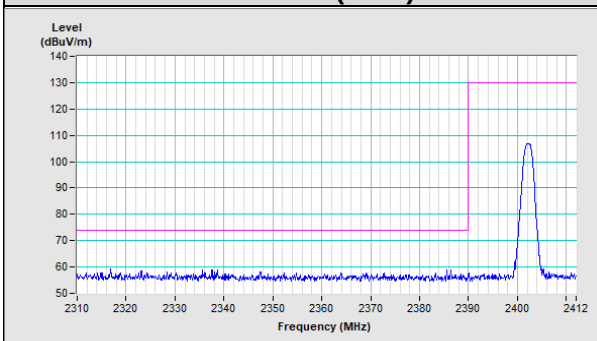
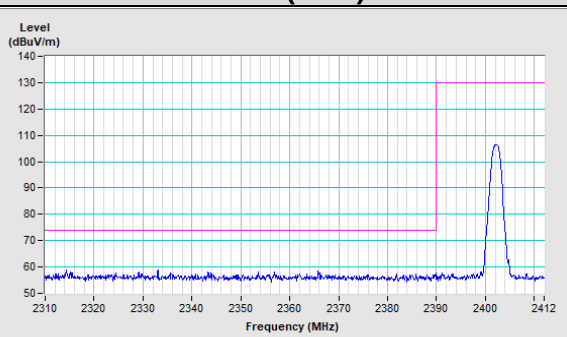
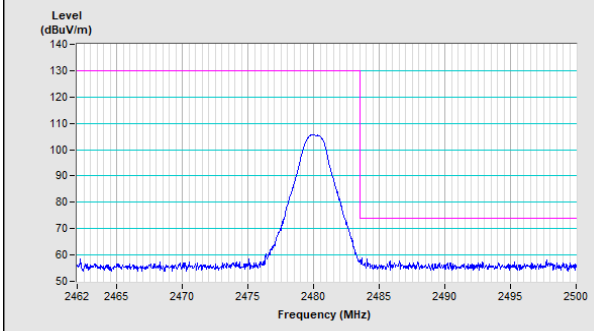
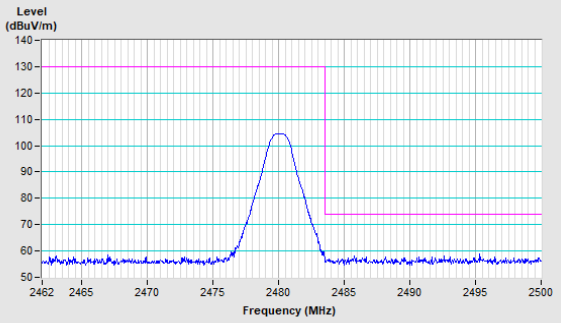
BT_8DPSK Channel 0	
Horizontal (Peak)	Vertical (Peak)
	
BT_8DPSK Channel 78	
Horizontal (Peak)	Vertical (Peak)
	

Mode B

GFSK

BT GFSK Channel 0	
Horizontal (Peak)	**Vertical (Peak)**
	
BT GFSK Channel 78	
Horizontal (Peak)	**Vertical (Peak)**
	

8DPSK

BT 8DPSK Channel 0	
Horizontal (Peak)	**Vertical (Peak)**
	
BT 8DPSK Channel 78	
Horizontal (Peak)	**Vertical (Peak)**
	

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 according to ISO/IEC 17025.

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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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