

Variant FCC Test Report (BT)

Report No.: RFBHAA-WTW-P22060836

FCC ID: EW4C95

Test Model: WML-C95

Received Date: Jun. 22, 2022

Test Date: Jul. 04 ~ Jul. 06, 2022

Issued Date: Oct. 24, 2022

Applicant: Mitsumi Electric Co., Ltd.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number(1):** 788550 / TW0003

Test Location(2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

**FCC Registration /
Designation Number(2):** 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBHAA-WTW-P22060836	Original release.	Oct. 24, 2022

1 Certificate of Conformity

Product: Bluetooth HCI module

Brand: Mitsumi

Test Model: WML-C95

Sample Status: Engineering sample

Applicant: Mitsumi Electric Co., Ltd.

Test Date: Jul. 04 ~ Jul. 06, 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 EMC characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Oct. 24, 2022
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** Oct. 24, 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	N/A	EUT is powered from DC
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)	Maximum Peak Output Power	N/A	Refer to Note 1
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -4.6dB at 117.16MHz.
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. Therefore, only radiated emissions was verified and recorded in this report. Other testing data please refer to the original BV CPS report no.: RF150409C03.
2. 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.
3. 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.
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) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~ 1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Bluetooth HCI module
Brand	Mitsumi
Test Model	WML-C95
Status of EUT	Engineering sample
Power Supply Rating	3.3Vdc
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	79
Output Power	1.820mW
Antenna Type	PCB antenna with -5.68dBi gain
Antenna Connector	NA
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of BV CPS report no.: RF150409C03. The difference from the original report is the changing IC model (Change from BCM20713A1KUFBXG to CYW20713A1KUFBXG) and Manufacturer (Change from Broadcom to Cypress). Only radiated emissions for EUT with new IC was verified and recorded in this report. Other testing data please refer to the original BV CPS report no.: RF150409C03.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
3. The above Antenna information please refers to the manufacturer's antenna specifications, the laboratory shall not be held responsible.
4. Power Setting as below.

	GFSK	8DPSK
CH 0	2	2
CH 39	2	2
CH 78	2	2

3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO		DESCRIPTION
	RE \geq 1G	RE<1G	
-	√	√	-

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

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	PACKET TYPE
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

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.

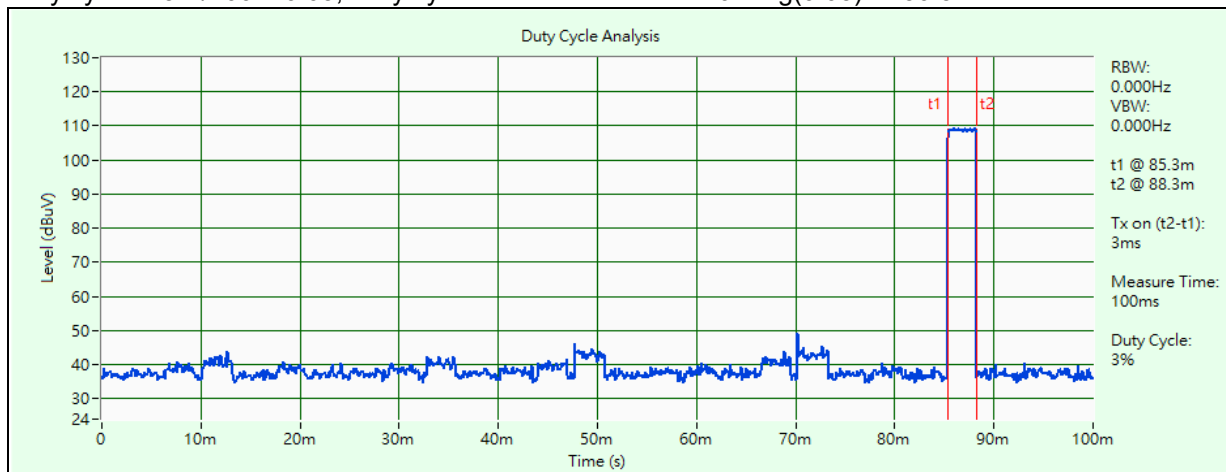
EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
-	0 to 78	0	FHSS	8DPSK	DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	23deg. C, 68%RH	3.3Vdc	Edison Lee
RE<1G	23deg. C, 68%RH	3.3Vdc	Edison Lee

3.3 Duty Cycle of Test Signal

Duty cycle = $3 \times 1 / 100 = 0.03$, Duty cycle correction factor = $20 \times \log(0.03) = -30.5$



Note: Duty cycle measurement is using normal mode

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.	3 -channel DC Power supply	JIN YIH	ODP3033	ODP30332128138	NA	-
B.	USB to UART Convert Board	NA	NA	NA	NA	Provided by client

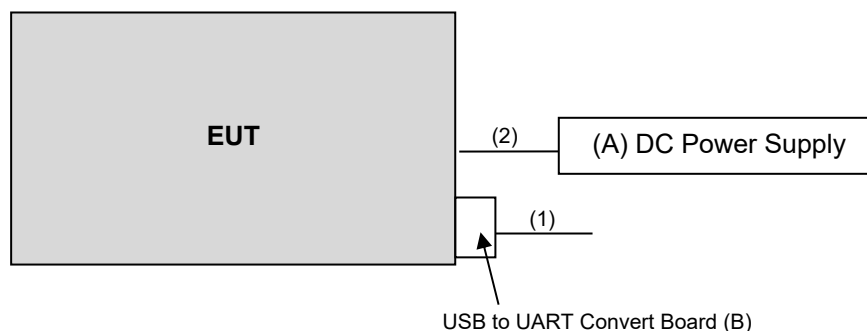
Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB	1	1	Y	0	Provided by client
2.	DC	1	1.8	-	0	-

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

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.	Date of Calibration	Due Date of Calibration
Test Receiver Rohde & Schwarz	N9038B	MY60180018	Feb. 18, 2022	Feb. 17, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110462	Dec. 21, 2021	Dec. 20, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-995	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna RF SPIN	DRH18-E	210104A18E	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	9170-995	Nov. 14, 2021	Nov. 13, 2022
Preamplifier EMCI	EMC330N	980783	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980810	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980787	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+3000+2000+1000)	201230+ 201242+201238+ 210101	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+3000+500+500)	201252+ 201250+ 201247+201245	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201259+201256+201253	Jan. 17, 2022	Jan. 16, 2023
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	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 WM Chamber 7.

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:

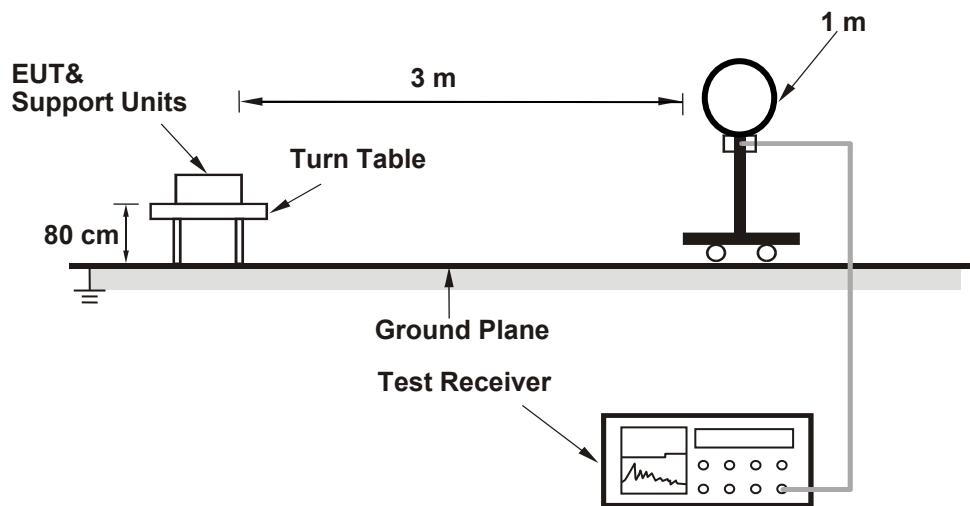
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
3. According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

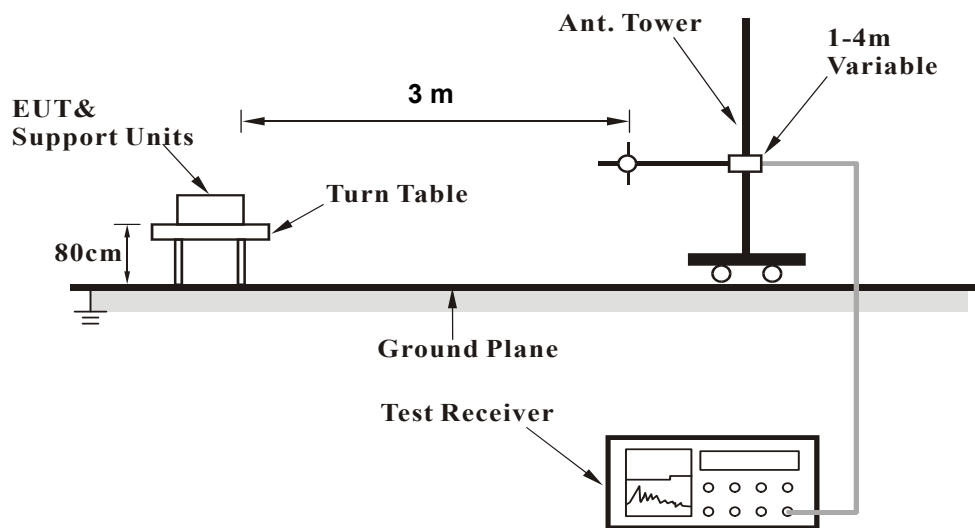
No deviation.

4.1.5 Test Set Up

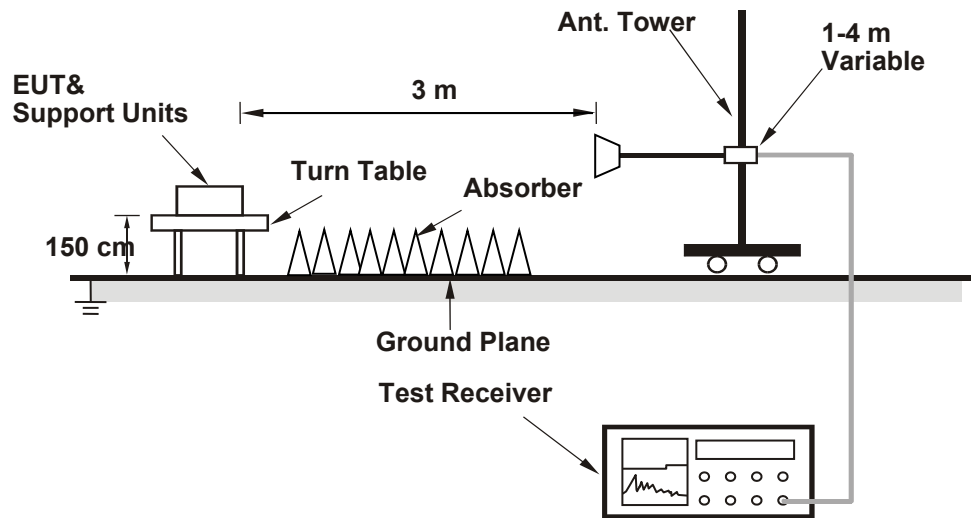
<Radiated Emission below 30 MHz>



<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 1GHz DATA :

BT_GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	56.9 PK	74.0	-17.1	2.43 H	315	25.5	31.4
2	2390.00	45.7 AV	54.0	-8.3	2.43 H	315	14.3	31.4
3	*2402.00	92.5 PK			2.43 H	315	61.0	31.5
4	*2402.00	62.0 AV			2.43 H	315	30.5	31.5
5	4804.00	51.4 PK	74.0	-22.6	1.50 H	299	50.0	1.4
6	4804.00	20.9 AV	54.0	-33.1	1.50 H	299	19.5	1.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	56.4 PK	74.0	-17.6	2.25 V	298	25.0	31.4
2	2390.00	45.4 AV	54.0	-8.6	2.25 V	298	14.0	31.4
3	*2402.00	87.5 PK			2.25 V	298	56.0	31.5
4	*2402.00	57.0 AV			2.25 V	298	25.5	31.5
5	4804.00	55.3 PK	74.0	-18.7	2.18 V	200	53.9	1.4
6	4804.00	24.8 AV	54.0	-29.2	2.18 V	200	23.4	1.4

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency.
- for Fundamental frequency and bandedge & harmonic:
The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
(see section 3.3)

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	90.1 PK			2.36 H	312	58.8	31.3
2	*2441.00	59.6 AV			2.36 H	312	28.3	31.3
3	4882.00	54.1 PK	74.0	-19.9	1.47 H	299	52.7	1.4
4	4882.00	23.6 AV	54.0	-30.4	1.47 H	299	22.2	1.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	85.6 PK			2.25 V	295	54.3	31.3
2	*2441.00	55.1 AV			2.25 V	295	23.8	31.3
3	4882.00	56.5 PK	74.0	-17.5	2.21 V	205	55.1	1.4
4	4882.00	26.0 AV	54.0	-28.0	2.21 V	205	24.6	1.4

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency.
- for Fundamental frequency and bandedge & harmonic:
 The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
 where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
 (see section 3.3)

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	89.0 PK			2.30 H	312	57.7	31.3
2	*2480.00	58.5 AV			2.30 H	312	27.2	31.3
3	2483.50	39.7 PK	74.0	-34.3	2.30 H	312	45.5	-5.8
4	2483.50	9.2 AV	54.0	-44.8	2.30 H	312	15.0	-5.8
5	4960.00	54.0 PK	74.0	-20.0	1.44 H	299	52.3	1.7
6	4960.00	23.5 AV	54.0	-30.5	1.44 H	299	21.8	1.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	84.3 PK			2.14 V	283	53.0	31.3
2	*2480.00	53.8 AV			2.14 V	283	22.5	31.3
3	2483.50	39.3 PK	74.0	-34.7	2.14 V	283	45.1	-5.8
4	2483.50	8.8 AV	54.0	-45.2	2.14 V	283	14.6	-5.8
5	4960.00	55.4 PK	74.0	-18.6	2.65 V	163	53.7	1.7
6	4960.00	24.9 AV	54.0	-29.1	2.65 V	163	23.2	1.7

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency.
- for Fundamental frequency and bandedge & harmonic:
 The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
 where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
 (see section 3.3)

BT_8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	57.3 PK	74.0	-16.7	2.44 H	309	25.9	31.4
2	2390.00	46.2 AV	54.0	-7.8	2.44 H	309	14.8	31.4
3	*2402.00	94.5 PK			2.44 H	309	63.0	31.5
4	*2402.00	64.0 AV			2.44 H	309	32.5	31.5
5	4804.00	52.1 PK	74.0	-21.9	1.48 H	303	50.7	1.4
6	4804.00	21.6 AV	54.0	-32.4	1.48 H	303	20.2	1.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (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	57.1 PK	74.0	-16.9	2.25 V	303	25.7	31.4
2	2390.00	45.5 AV	54.0	-8.5	2.25 V	303	14.1	31.4
3	*2402.00	85.0 PK			2.25 V	303	53.5	31.5
4	*2402.00	54.5 AV			2.25 V	303	23.0	31.5
5	4804.00	57.1 PK	74.0	-16.9	2.52 V	200	55.7	1.4
6	4804.00	26.6 AV	54.0	-27.4	2.52 V	200	25.2	1.4

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency.
- for Fundamental frequency and bandedge & harmonic:
 The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
 where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
 (see section 3.3)

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	92.2 PK			2.34 H	313	60.9	31.3
2	*2441.00	61.7 AV			2.34 H	313	30.4	31.3
3	4882.00	55.0 PK	74.0	-19.0	1.49 H	300	53.6	1.4
4	4882.00	24.5 AV	54.0	-29.5	1.49 H	300	23.1	1.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (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	87.0 PK			2.01 V	309	55.7	31.3
2	*2441.00	56.5 AV			2.01 V	309	25.2	31.3
3	4882.00	60.1 PK	74.0	-13.9	2.55 V	206	58.7	1.4
4	4882.00	29.6 AV	54.0	-24.4	2.55 V	206	28.2	1.4

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.
6. for Fundamental frequency and bandedge & harmonic:
 The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
 where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
 (see section 3.3)

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	91.3 PK			2.30 H	310	60.0	31.3
2	*2480.00	60.8 AV			2.30 H	310	29.5	31.3
3	2483.50	40.2 PK	74.0	-33.8	2.30 H	310	46.0	-5.8
4	2483.50	9.7 AV	54.0	-44.3	2.30 H	310	15.5	-5.8
5	4960.00	55.6 PK	74.0	-18.4	1.47 H	306	53.9	1.7
6	4960.00	25.1 AV	54.0	-28.9	1.47 H	306	23.4	1.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	87.0 PK			1.93 V	311	55.7	31.3
2	*2480.00	56.5 AV			1.93 V	311	25.2	31.3
3	2483.50	39.5 PK	74.0	-34.5	1.93 V	311	45.3	-5.8
4	2483.50	9.0 AV	54.0	-45.0	1.93 V	311	14.8	-5.8
5	4960.00	58.9 PK	74.0	-15.1	2.56 V	211	57.2	1.7
6	4960.00	28.4 AV	54.0	-25.6	2.56 V	211	26.7	1.7

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency.
- for Fundamental frequency and bandedge & harmonic:
 The average value of fundamental frequency is average = peak value + 20log(Duty cycle)
 where the duty cycle correction factor is calculated from following formula:
 $20\text{Log}(\text{Duty cycle}) = 20 \log (3\text{ms} \cdot 1/100) = -30.5\text{dB}$ please refer to the plotted duty
 (see section 3.3)

BELOW 1GHz WORST-CASE DATA

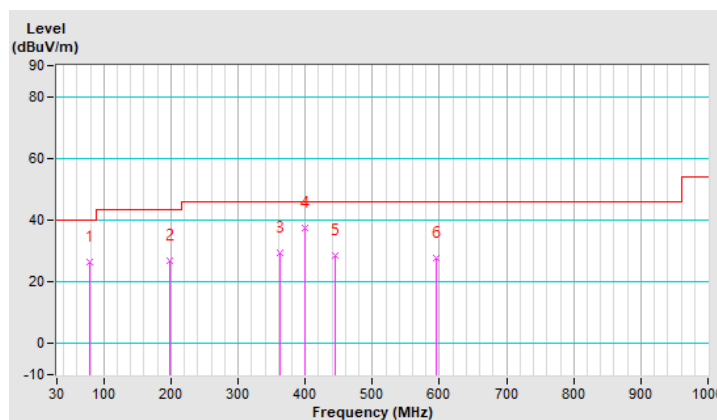
BT_8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	79.20	26.3 QP	40.0	-13.7	1.50 H	12	44.2	-17.9
2	197.29	27.0 QP	43.5	-16.5	1.00 H	37	43.7	-16.7
3	361.77	29.6 QP	46.0	-16.4	2.00 H	174	40.9	-11.3
4	399.72	37.6 QP	46.0	-8.4	2.00 H	153	47.7	-10.1
5	444.71	28.7 QP	46.0	-17.3	1.50 H	177	37.4	-8.7
6	595.13	27.9 QP	46.0	-18.1	3.21 H	0	33.3	-5.4

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.

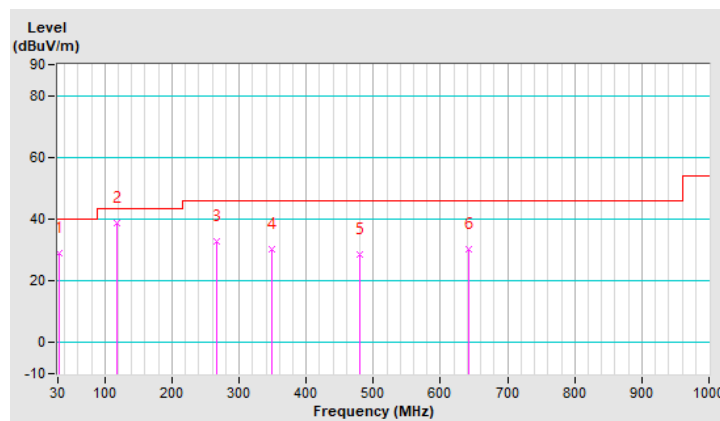


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	32.81	28.8 QP	40.0	-11.2	1.00 V	156	43.3	-14.5
2	117.16	38.9 QP	43.5	-4.6	1.50 V	111	54.5	-15.6
3	266.17	32.6 QP	46.0	-13.4	2.00 V	143	46.4	-13.8
4	349.12	30.3 QP	46.0	-15.7	1.00 V	44	41.9	-11.6
5	479.86	28.6 QP	46.0	-17.4	1.50 V	322	36.7	-8.1
6	642.93	30.3 QP	46.0	-15.7	1.50 V	30	34.9	-4.6

Remarks:

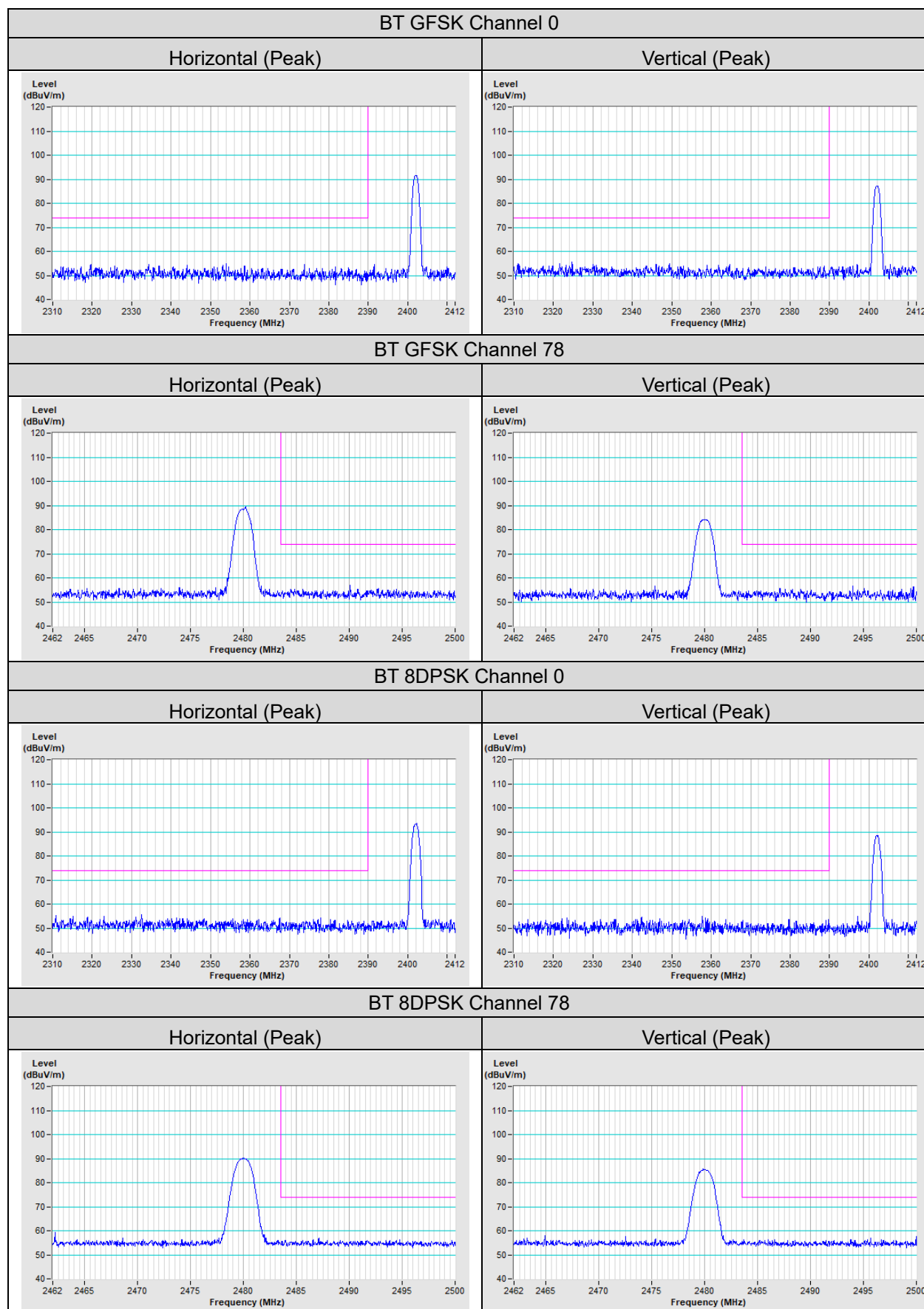
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 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.



5 Pictures of Test Arrangements

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

Annex A - Band Edge Measurement



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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Web Site: www.bureauveritas-adt.com

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

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