

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Report No.: RFBGTL-WTW-P22050889A

FCC ID: APYHRO00320

Received Date: 2022/7/21

Test Date: 2022/9/1 ~ 2022/9/19

Issued Date: 2022/10/6

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FCC Registration / 788550 / TW0003

Designation Number: 427177 / TW0011

Approved by: _____

Jeremy Lin

, **Date:** _____

2022/10/6

Jeremy Lin / Project Engineer

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Prepared by : Lena Wang / Specialist

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Table of Contents

Release Control Record	3
1 Certificate.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Supplementary Information	5
3 General Information	6
3.1 General Description	6
3.2 Antenna Description of EUT	6
3.3 Channel List	7
3.4 Test Mode Applicability and Tested Channel Detail	8
3.5 Duty Cycle of Test Signal	8
3.6 Test Program Used and Operation Descriptions	9
3.7 Connection Diagram of EUT and Peripheral Devices	9
3.8 Configuration of Peripheral Devices and Cable Connections	10
4 Test Instruments	11
4.1 RF Output Power	11
4.2 AC Power Conducted Emissions	11
4.3 Unwanted Emissions below 1 GHz	12
4.4 Unwanted Emissions above 1 GHz	13
5 Limits of Test Items.....	14
5.1 RF Output Power	14
5.2 AC Power Conducted Emissions	14
5.3 Unwanted Emissions below 1 GHz	14
5.4 Unwanted Emissions above 1 GHz	14
6 Test Arrangements	15
6.1 RF Output Power	15
6.1.1 Test Setup	15
6.1.2 Test Procedure	15
6.2 AC Power Conducted Emissions	15
6.2.1 Test Setup	15
6.2.2 Test Procedure	15
6.3 Unwanted Emissions below 1 GHz	16
6.3.1 Test Setup	16
6.3.2 Test Procedure	17
6.4 Unwanted Emissions above 1 GHz	18
6.4.1 Test Setup	18
6.4.2 Test Procedure	18
7 Test Results of Test Item	19
7.1 RF Output Power	19
7.2 AC Power Conducted Emissions	20
7.3 Unwanted Emissions below 1 GHz	24
7.4 Unwanted Emissions above 1 GHz	28
8 Pictures of Test Arrangements	31
9 Information of the Testing Laboratories	32

Release Control Record

Issue No.	Description	Date Issued
RFBGTL-WTW-P22050889A	Original Release	2022/10/6

1 Certificate

Product: Cellular Phone

Brand: SHARP

Sample Status: Engineering Sample

Applicant: SHARP Corporation Mobile Communication BU

Test Date: 2022/9/1 ~ 2022/9/19

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Measurement ANSI C63.10-2013

procedure: KDB 558074 D01 15.247 Meas Guidance v05r02

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.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247 (a)(1)	RF Output Power	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	N/A	Refer to note
15.247(a)(1) (iii)	Dwell Time on Each Channel	N/A	Refer to note
15.247(a)(1)	Hopping Channel Separation	N/A	Refer to note
15.247(a)(1)	20 dB Bandwidth	N/A	Refer to note
15.247(d)	Conducted Out of Band Emissions	N/A	Refer to note
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -9.76 dB at 3.85400 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -12.9 dB at 54.03 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -12.2 dB at 2390.00 MHz
15.203	Antenna Requirement	N/A	Refer to note

Notes:

1. This report is a partial report, only test item of AC Power Conducted Emission, RF Output Power and Unwanted Emissions tests were performed for this report. Other testing data please refer to original report no.: RFBGTL-WTW-P22050889.
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. 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	Specification	Expanded Uncertainty (k=2) (±)
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.79 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.79 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.02 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	1.01 dB
	18 GHz ~ 40 GHz	1.15 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	Cellular Phone
Brand	SHARP
Status of EUT	Engineering Sample
Power Supply Rating	5.0 Vdc (adapter) 3.8 Vdc (battery)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Output Power	11.376 mW (10.56 dBm)

Note:

1. The purpose of this test report is to apply for Class II Permissive Change with new SKU based on the BV CPS report no.: RFBGTL-WTW-P22050889. The new SKU compared with original report are minor HW components differences and added one more new accessory. Please refer to the operational description for detailed differences information.
2. Measurement results in the original test report BV CPS report no.: RFBGTL-WTW-P22050889 are partially leveraged in the test report with new evaluation on AC Power Conducted Emission, RF Output Power and Unwanted Emissions test to demonstrate compliance.
3. The EUT uses following accessories.

Battery		
Brand	Model	Specification
Supplier A	Supplier A	3.8Vdc, 1680mAh
Cradle		
Brand	Model	Specification
Supplier A	Supplier A	-

4. The EUT Configuration are list as below.

Config.	Description
1	Main Source (EUT with LCD 1)
2	2nd Source (EUT with LCD 2)

*From the above samples the worst cases were found in Main source. Therefore only the test of the mode was recorded in the report.

5. 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.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna No.	Gain (dBi)	Antenna Type	Connector Type
	2400~2483.5 MHz		
1	0.5	Inverted-L Type Antenna	N/A

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.3 Channel List

79 channels are provided for BT-EDR:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (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		

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis / Y-axis / Z-axis. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	The worst case was found when positioned on X-axis.
EUT Configure Mode:	Mode A: EUT + Adapter Mode B: EUT + Adapter + Cradle

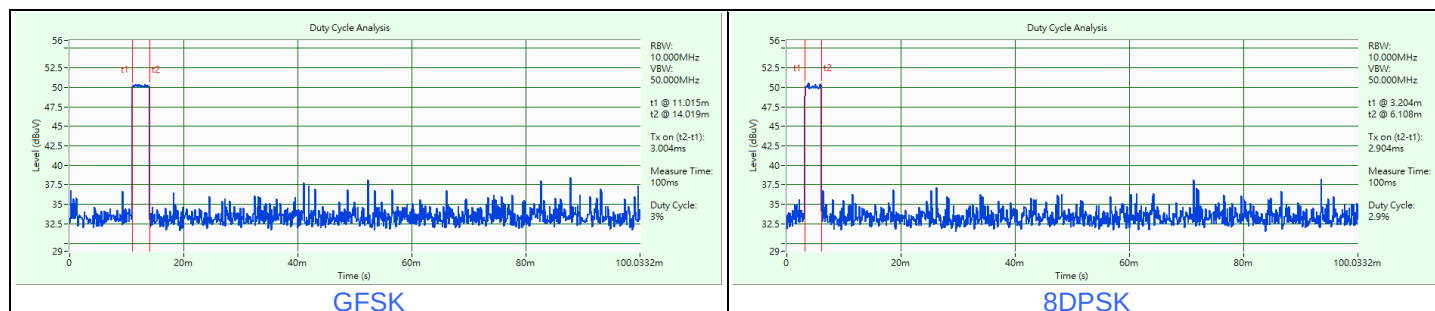
Following channel(s) was (were) selected for the final test as listed below:

Test Item	EUT Configure Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	A	0, 39, 78	GFSK	DH5
			8DPSK	3DH5
AC Power Conducted Emissions	A, B	0	GFSK	DH5
Unwanted Emissions below 1 GHz	A,B	0	GFSK	DH5
Unwanted Emissions above 1 GHz	A	0	GFSK	DH5
			8DPSK	3DH5

3.5 Duty Cycle of Test Signal

GFSK: Duty cycle = 3.004 ms / 100 ms x 100% = 3.0%

8DPSK: Duty cycle = 2.904 ms / 100 ms x 100% = 2.9%

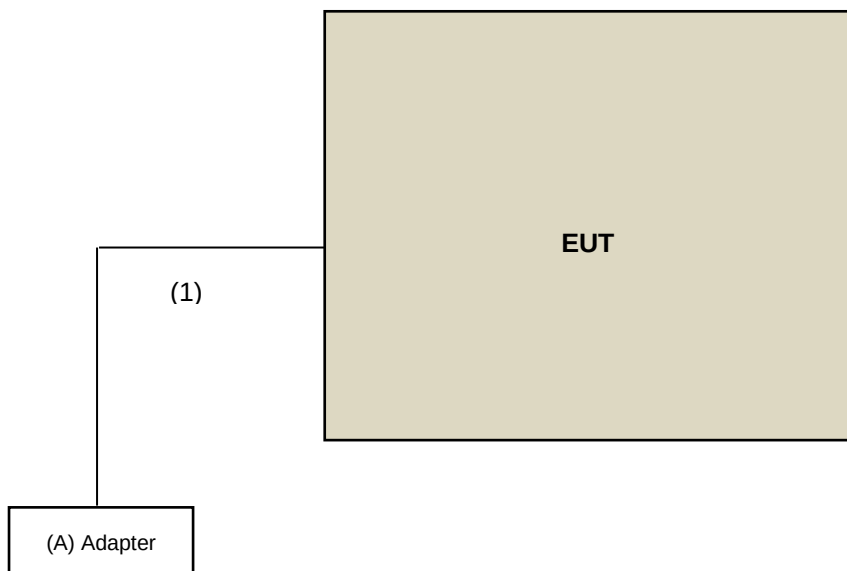


3.6 Test Program Used and Operation Descriptions

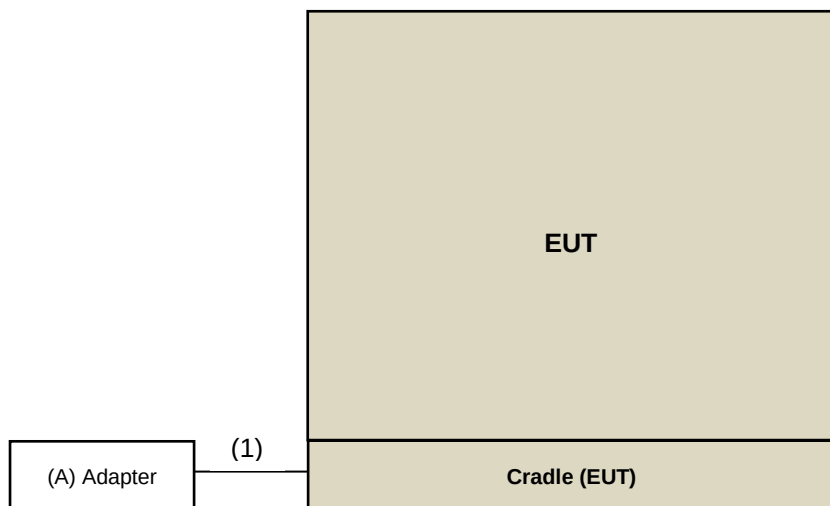
Controlling software Tera Term _4.98 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices

Mode A



Mode B



Under Table

Remote Site

3.8 Configuration of Peripheral Devices and Cable Connections

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Adapter	Salom	XN-2QC25	N/A	N/A	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	0.95	Y	0	Supplied by applicant

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	2022/1/18	2023/1/17
Power sensor Keysight	U2021XA	MY55380009	2022/3/23	2023/3/22
Wideband Power Sensor(N1923A) KEYSIGHT	N1923A	MY58020002	2022/1/17	2023/1/16

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2022/9/19

4.2 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
DC-LISN SCHWARZBECK MESS- ELETRONIK	NNBM 8126G	8126G-069	2021/11/10	2022/11/9
LISN R&S	ESH2-Z5	100100	2022/2/17	2023/2/16
	ESH3-Z5	100312	2021/9/17	2022/9/16
RF Coaxial Cable WORKEN	5D-FB	Cable-cond2-01	2021/9/4	2022/9/3
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102783	2021/12/20	2022/12/19

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2022/9/1

4.3 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-616	2021/10/27	2022/10/26
Loop Antenna EMCI	EM-6879	269	2021/9/16	2022/9/15
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-amplifier EMCI	EMC001340	980201	2021/9/15	2022/9/14
Preamplifier Agilent	310N	187226	2022/6/14	2023/6/13
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2022/1/15	2023/1/14
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
Software BV ADT	ADT_Radiated_V7.6.15.9.5	N/A	N/A	N/A
Test Receiver KEYSIGHT	N9038A	MY55420137	2022/4/27	2023/4/26
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2022/9/7

4.4 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	8	N/A	N/A
Horn Antenna ETS-Lindgren	3117	00143293	2021/11/14	2022/11/13
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170241	2021/10/26	2022/10/25
Pre-Amplifier EMCI	EMC 184045	980116	2021/10/5	2022/10/4
Preamplifier Agilent	83017A	MY39501373	2022/6/14	2023/6/13
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2022/1/15	2023/1/14
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2022/1/15	2023/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver KEYSIGHT	N9038A	MY55420137	2022/4/27	2023/4/26
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2022/9/7

5 Limits of Test Items

5.1 RF Output Power

The Maximum Output Power Measurement is 125 mW (21 dBm).

5.2 AC Power Conducted Emissions

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

Notes:

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.

5.3 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz 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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.4 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz 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)
Above 960	500	3

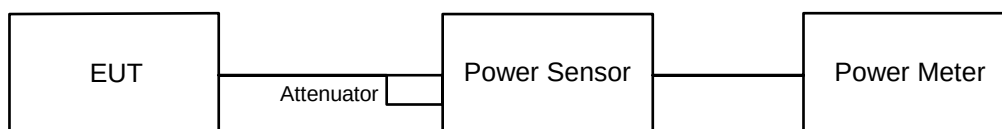
Notes:

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 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.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



6.1.2 Test Procedure

Peak Power:

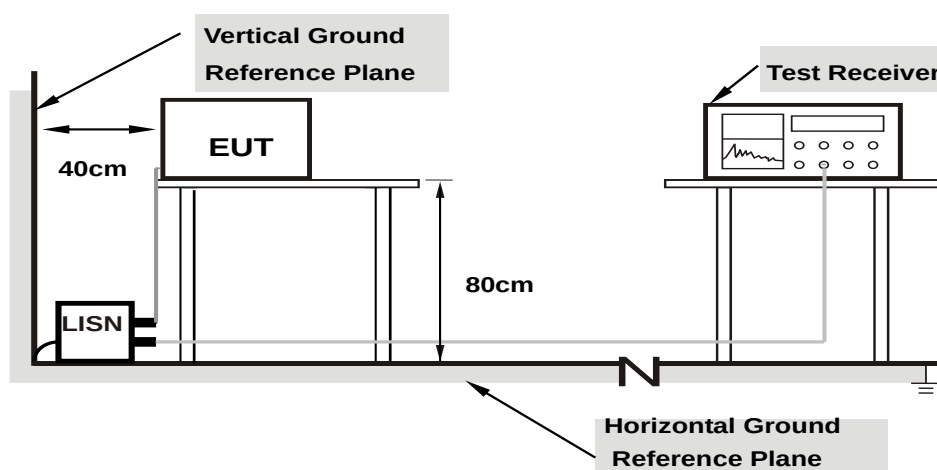
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

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.

6.2 AC Power Conducted Emissions

6.2.1 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).

6.2.2 Test Procedure

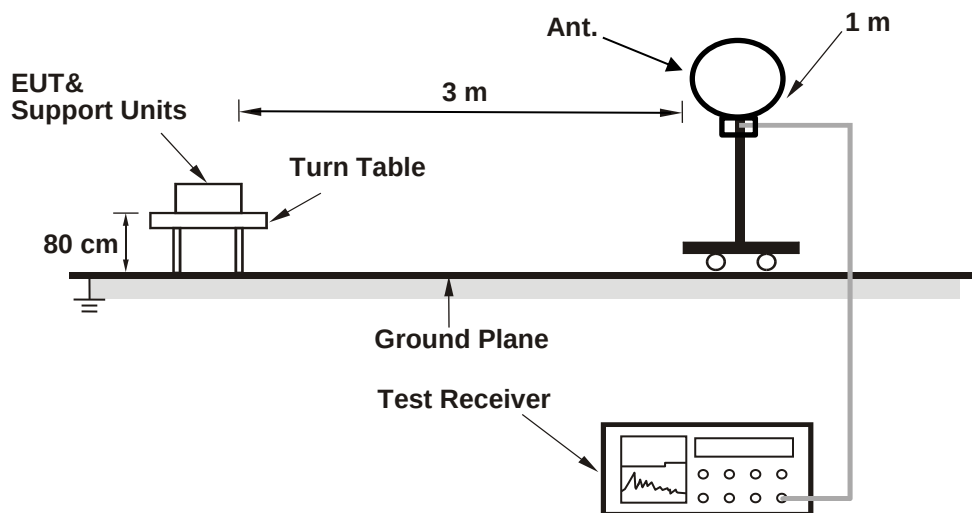
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

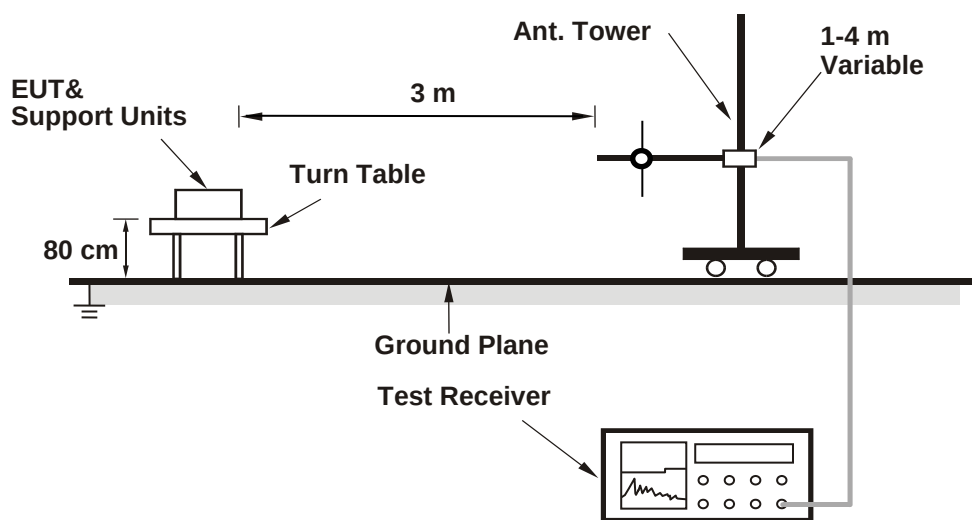
6.3 Unwanted Emissions below 1 GHz

6.3.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



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

6.3.2 Test Procedure

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 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters 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.

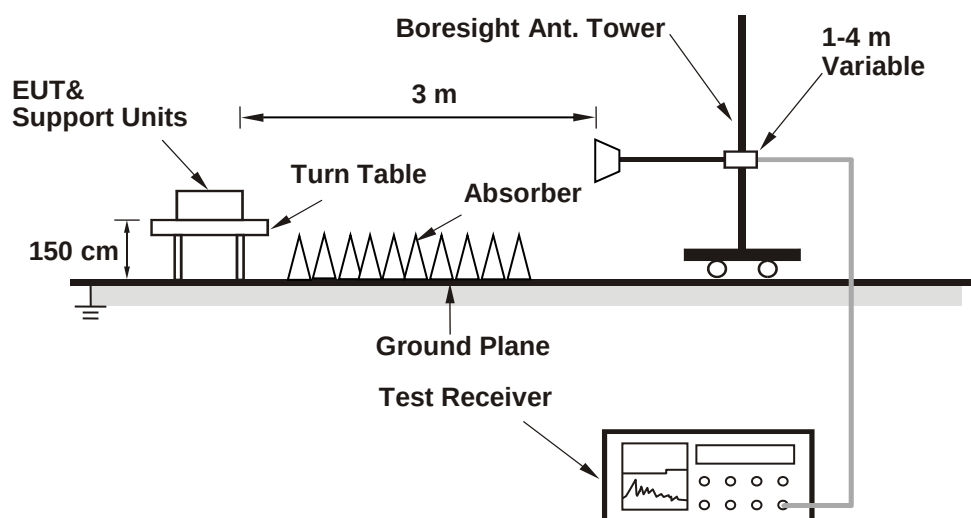
Notes:

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. All modes of operation were investigated and the worst-case emissions are reported.

6.4 Unwanted Emissions above 1 GHz

6.4.1 Test Setup

For Radiated emission above 1 GHz



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

6.4.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.

Notes:

- 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.
- 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.
- All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Jisyong Wang
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For Peak Power

GFSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	11.376	10.56	21	Pass
39	2441	11.272	10.52	21	Pass
78	2480	9.908	9.96	21	Pass

Note: The antenna gain is 0.5 dBi < 6 dBi, so the output power limit shall not be reduced.

8DPSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	9.183	9.63	21	Pass
39	2441	9.078	9.58	21	Pass
78	2480	8.128	9.10	21	Pass

Note: The antenna gain is 0.5 dBi < 6 dBi, so the output power limit shall not be reduced.

For Average Power

GFSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	10.691	10.29
39	2441	10.617	10.26
78	2480	9.333	9.70

8DPSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	8.73	9.41
39	2441	8.337	9.21
78	2480	6.501	8.13

7.2 AC Power Conducted Emissions

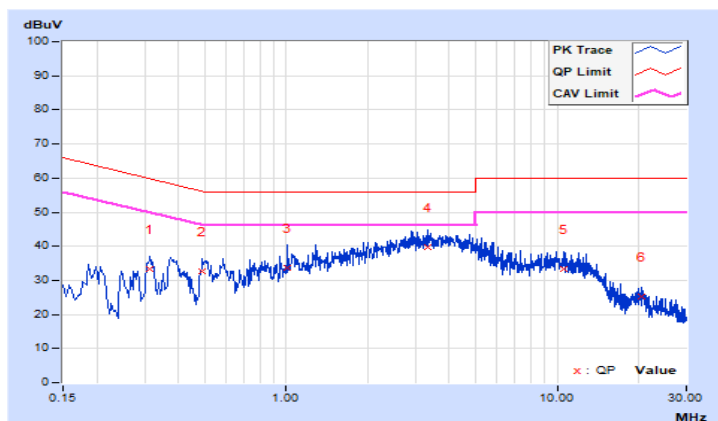
Mode A

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.8°C, 69.7% RH
Tested By	Thomas Cheng		

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	0.31400	10.21	23.03	13.18	33.24	23.39	59.86	49.86	-26.62	-26.47
2	0.49000	10.25	22.30	11.70	32.55	21.95	56.17	46.17	-23.62	-24.22
3	1.01400	10.30	23.38	11.64	33.68	21.94	56.00	46.00	-22.32	-24.06
4	3.34600	10.39	29.32	18.84	39.71	29.23	56.00	46.00	-16.29	-16.77
5	10.63000	10.47	22.82	11.62	33.29	22.09	60.00	50.00	-26.71	-27.91
6	20.51800	10.59	14.73	4.42	25.32	15.01	60.00	50.00	-34.68	-34.99

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

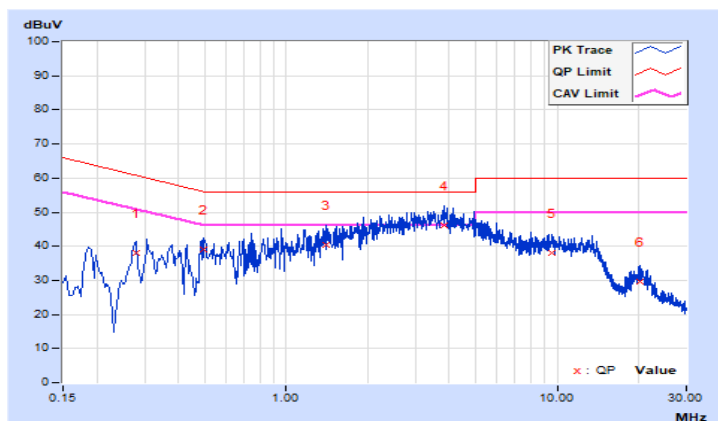


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.8°C, 69.7% RH
Tested By	Thomas Cheng		

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	0.27800	10.22	27.96	13.19	38.18	23.41	60.88	50.88	-22.70	-27.47
2	0.49800	10.27	28.66	15.08	38.93	25.35	56.03	46.03	-17.10	-20.68
3	1.41000	10.33	30.03	16.85	40.36	27.18	56.00	46.00	-15.64	-18.82
4	3.85400	10.40	35.84	23.93	46.24	34.33	56.00	46.00	-9.76	-11.67
5	9.61000	10.50	27.57	16.00	38.07	26.50	60.00	50.00	-21.93	-23.50
6	20.35800	10.74	18.98	-1.21	29.72	9.53	60.00	50.00	-30.28	-40.47

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



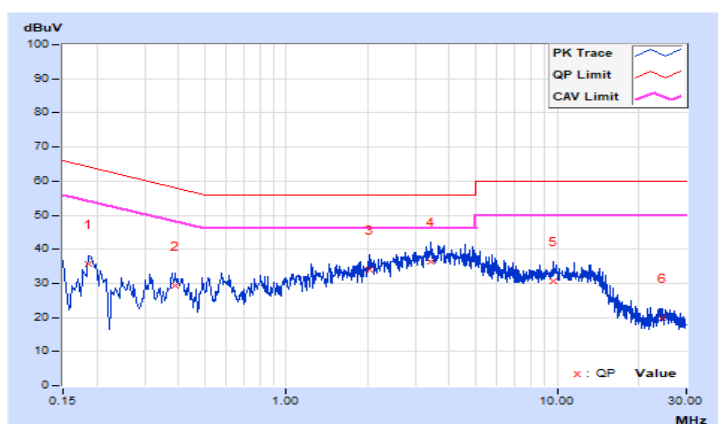
Mode B

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.8°C, 69.7% RH
Tested By	Thomas Cheng		

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	0.18600	10.15	25.49	11.96	35.64	22.11	64.21	54.21	-28.57	-32.10
2	0.39000	10.24	18.94	11.31	29.18	21.55	58.06	48.06	-28.88	-26.51
3	2.03000	10.37	23.57	13.36	33.94	23.73	56.00	46.00	-22.06	-22.27
4	3.43400	10.39	25.81	16.04	36.20	26.43	56.00	46.00	-19.80	-19.57
5	9.68200	10.46	20.33	10.76	30.79	21.22	60.00	50.00	-29.21	-28.78
6	24.52600	10.47	9.28	3.82	19.75	14.29	60.00	50.00	-40.25	-35.71

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

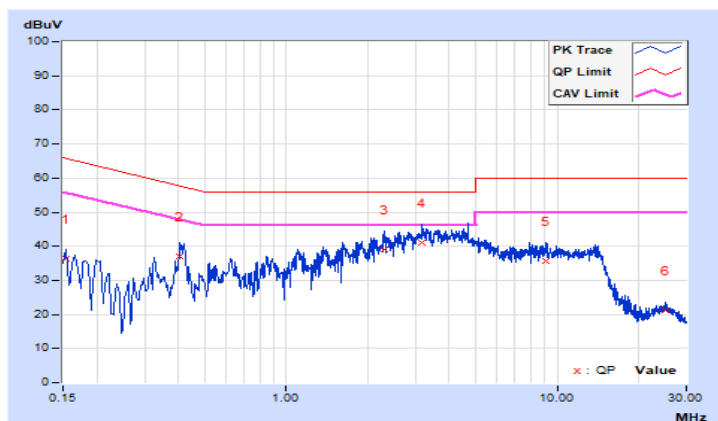


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21.8°C, 69.7% RH
Tested By	Thomas Cheng		

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	26.11	14.28	36.25	24.42	65.78	55.78	-29.53	-31.36
2	0.40600	10.26	26.77	17.55	37.03	27.81	57.73	47.73	-20.70	-19.92
3	2.31000	10.37	28.81	18.47	39.18	28.84	56.00	46.00	-16.82	-17.16
4	3.17800	10.38	30.71	19.94	41.09	30.32	56.00	46.00	-14.91	-15.68
5	9.06600	10.49	25.20	14.76	35.69	25.25	60.00	50.00	-24.31	-24.75
6	25.10200	10.60	10.53	3.63	21.13	14.23	60.00	50.00	-38.87	-35.77

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



7.3 Unwanted Emissions below 1 GHz

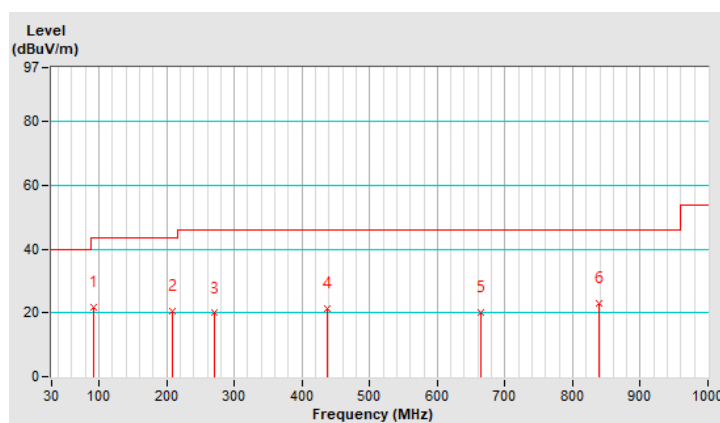
Mode A

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 61% RH
Tested By	Karl Lee		

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	92.37	21.8 QP	43.5	-21.7	1.24 H	18	45.0	-23.2
2	209.01	20.6 QP	43.5	-22.9	1.59 H	206	41.5	-20.9
3	270.84	19.9 QP	46.0	-26.1	1.15 H	104	38.0	-18.1
4	437.20	21.4 QP	46.0	-24.6	2.20 H	147	35.1	-13.7
5	664.00	20.3 QP	46.0	-25.7	1.94 H	226	30.0	-9.7
6	839.70	23.2 QP	46.0	-22.8	1.64 H	26	30.2	-7.0

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 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.

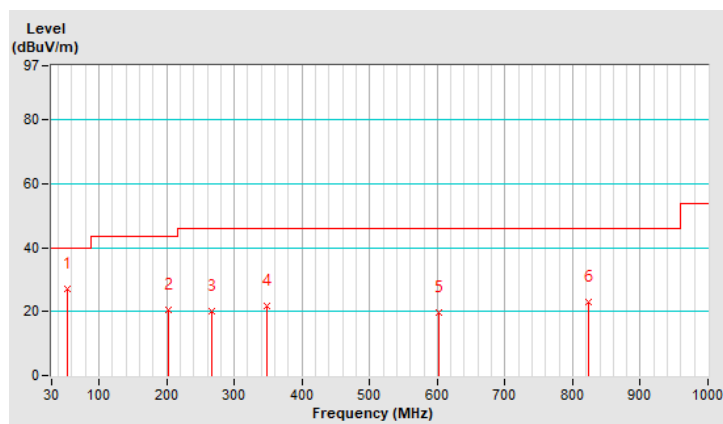


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 61% RH
Tested By	Karl Lee		

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	54.03	27.1 QP	40.0	-12.9	1.45 V	206	45.1	-18.0
2	201.99	20.7 QP	43.5	-22.8	1.48 V	74	41.7	-21.0
3	267.30	20.2 QP	46.0	-25.8	1.95 V	21	38.4	-18.2
4	347.60	21.6 QP	46.0	-24.4	2.53 V	171	37.7	-16.1
5	603.10	19.9 QP	46.0	-26.1	1.88 V	104	30.2	-10.3
6	822.90	22.9 QP	46.0	-23.1	1.46 V	243	30.2	-7.3

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 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.



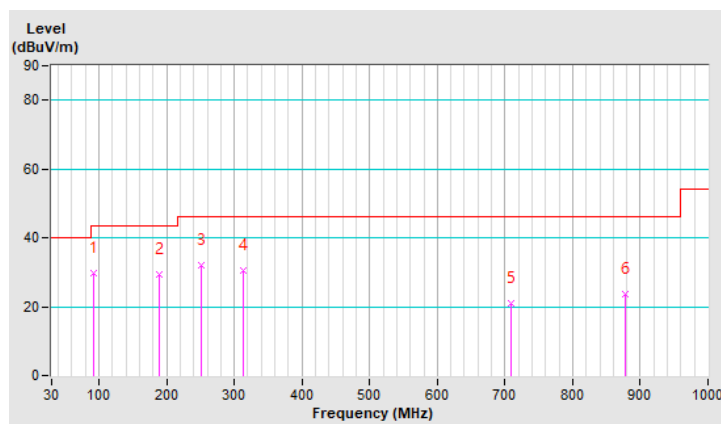
Mode B

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 60% RH
Tested By	Charles Hsiao		

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	92.37	29.6 QP	43.5	-13.9	1.32 H	222	52.8	-23.2
2	188.22	29.5 QP	43.5	-14.0	1.05 H	113	49.8	-20.3
3	250.80	32.0 QP	46.0	-14.0	1.45 H	111	51.0	-19.0
4	312.61	30.4 QP	46.0	-15.6	1.67 H	147	47.1	-16.7
5	708.14	20.9 QP	46.0	-25.1	1.89 H	268	29.8	-8.9
6	878.40	23.8 QP	46.0	-22.2	1.56 H	36	30.4	-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 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.

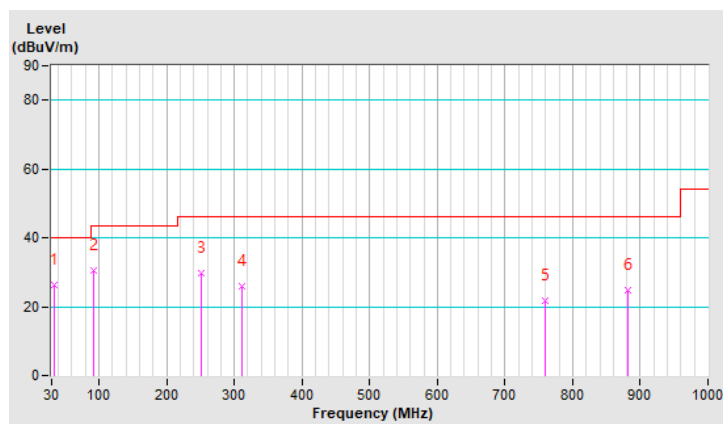


RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 60% RH
Tested By	Charles Hsiao		

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	34.32	26.4 QP	40.0	-13.6	1.90 V	127	45.4	-19.0
2	92.10	30.5 QP	43.5	-13.0	2.32 V	184	53.7	-23.2
3	250.86	29.7 QP	46.0	-16.3	1.54 V	177	48.7	-19.0
4	312.22	25.8 QP	46.0	-20.2	2.04 V	111	42.5	-16.7
5	759.99	21.7 QP	46.0	-24.3	1.08 V	241	29.7	-8.0
6	881.70	24.8 QP	46.0	-21.2	1.35 V	295	31.3	-6.5

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 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.



7.4 Unwanted Emissions above 1 GHz

RF Mode	TX BT GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz (RMS)
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 60% RH
Tested By	Karl Lee		

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	52.8 PK	74.0	-21.2	1.61 H	226	46.2	6.6
2	2390.00	41.8 AV	54.0	-12.2	1.61 H	226	35.2	6.6
3	*2402.00	107.7 PK			1.61 H	226	69.6	38.1
4	*2402.00	77.2 AV			1.61 H	226	39.1	38.1
5	4804.00	48.8 PK	74.0	-25.2	1.64 H	152	37.2	11.6
6	4804.00	18.3 AV	54.0	-35.7	1.64 H	152	6.7	11.6
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	52.4 PK	74.0	-21.6	2.00 V	268	45.8	6.6
2	2390.00	41.7 AV	54.0	-12.3	2.00 V	268	35.1	6.6
3	*2402.00	107.1 PK			2.00 V	268	69.0	38.1
4	*2402.00	76.6 AV			2.00 V	268	38.5	38.1
5	4804.00	48.5 PK	74.0	-25.5	1.32 V	206	36.9	11.6
6	4804.00	18.0 AV	54.0	-36.0	1.32 V	206	6.4	11.6

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, the limit was restricted at the RF Output Power.
- 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:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$

RF Mode	TX BT 8DPSK	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 3 MHz (RMS)
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 60% RH
Tested By	Karl Lee		

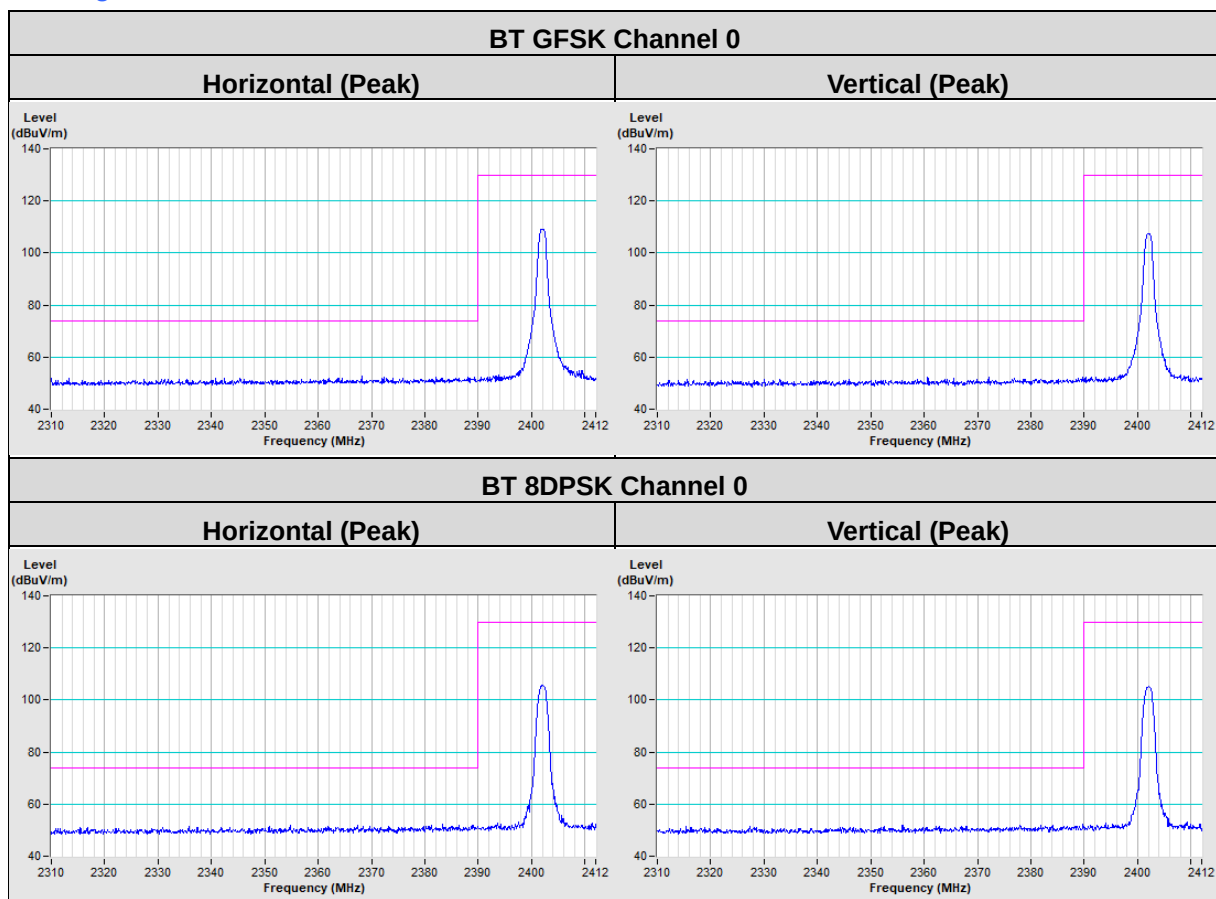
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	52.1 PK	74.0	-21.9	1.24 H	230	45.5	6.6
2	2390.00	41.6 AV	54.0	-12.4	1.24 H	230	35.0	6.6
3	*2402.00	105.1 PK			1.24 H	230	67.0	38.1
4	*2402.00	74.6 AV			1.24 H	230	36.5	38.1
5	4804.00	48.4 PK	74.0	-25.6	1.11 H	174	36.8	11.6
6	4804.00	17.9 AV	54.0	-36.1	1.11 H	174	6.3	11.6
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	52.2 PK	74.0	-21.8	2.00 V	268	45.6	6.6
2	2390.00	41.7 AV	54.0	-12.3	2.00 V	268	35.1	6.6
3	*2402.00	104.4 PK			2.00 V	268	66.3	38.1
4	*2402.00	73.9 AV			2.00 V	268	35.8	38.1
5	4804.00	48.3 PK	74.0	-25.7	1.74 V	164	36.7	11.6
6	4804.00	17.8 AV	54.0	-36.2	1.74 V	164	6.2	11.6

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.
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:

$$20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$$

Plot of Band Edge



8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 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.

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

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Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

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

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