TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.247)**
Report No.:	RFCICG-WTW-P24080537
FCC ID:	B94-HXHS243
Product:	Wireless Headset
Brand:	HYPERX
Model No.:	HXHS243
Received Date:	2024/8/21
Test Date:	2024/9/13 ~ 2024/9/24
Issued Date:	2024/10/25
Applicant:	HP Inc.
Address:	3390 East Harmony Road, Fort Collins, Colorado United States 80528
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(1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan
Test Location(2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003 for Test Location(1) 281270 / TW0032 for Test Location(2)

Approved by: Jeremy Lin , **Date:** 2024/10/25

Jeremy Lin / Project Engineer

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Prepared by : Celine Chou / Senior Specialist

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFCICG-WTW-P24080537	Original release.	2024/10/25

1 Certificate

Product:	Wireless Headset
Brand:	HYPERX
Test Model:	HXHS243
Sample Status:	Engineering sample
Applicant:	HP Inc.
Test Date:	2024/9/13 ~ 2024/9/24
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247)
Measurement procedure:	ANSI C63.10-2013 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	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	Hopping Channel Separation	Pass	Meet the requirement of limit.
15.247(a)(1)	20 dB Bandwidth	-	Refer to Note 1
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -12.25 dB at 0.62200 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -9.0 dB at 32.91 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -7.7 dB at 2390.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

Notes:

1. 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.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Parameter	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.371 dB
Dwell Time on Each Channel	-	0.0218
Hopping Channel Separation	-	390 Hz
20 dB Bandwidth	-	206.5 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.79 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.90 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.00 dB
	30 MHz ~ 1 GHz	2.93 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 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	Wireless Headset
Brand	HYPERX
Test Model	HXHS243
Status of EUT	Engineering sample
Power Supply Rating	3.7 Vdc from battery 5 Vdc from host equipment or adapter
Modulation Type	GFSK, π/4-DQPSK
Modulation Technology	FHSS
Transfer Rate	Up to 2 Mbps
Operating Frequency	2.402 GHz ~ 2.48 GHz
Number of Channel	79
Output Power	6.124 mW (7.87 dBm)

Note:

1. The EUT uses following accessories.

Item	Brand	Model	Specification
Battery	Hangzhou Future Power Technology Co., Ltd.	FT802518P	3.7 Vdc, 300 mAh
USB Wireless Dongle	HYPERX	HXWD244	-
Type C Cable	Dong Guan Yue-Yang Wire ELECTRIC CABLE CO., LTD.	99023463A0	1.5 m cable without core

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.

3.2 Antenna Description of EUT

Antenna Type	Brand/Manufacturer	Model	Antenna Connector	Freq. (MHz)	Gain (dBi)
PIFA	Primax	BAZA Headset	NA	2402-2480	3.66

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

3.3 Channel List

79 channels are provided for this EUT:

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

3.4 Test Mode Applicability and Tested Channel Detail

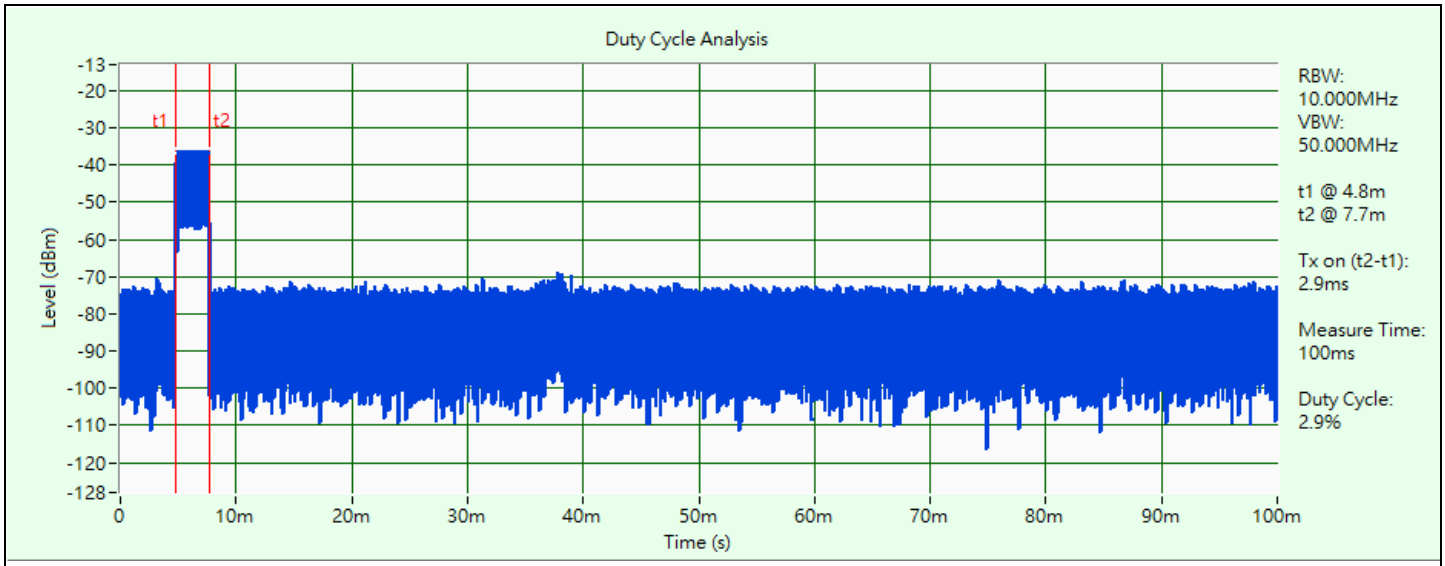
Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. 2. EUT can be used in the notebook and adapter mode. Pre-scan these modes and find the worst case as a representative test condition. 3. Pre-Scan 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).
Worst Case:	1. X-axis/ Y-axis/ Z-axis Worst Condition: Z-axis 2. Notebook and adapter mode Worst Condition: Adapter Mode

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

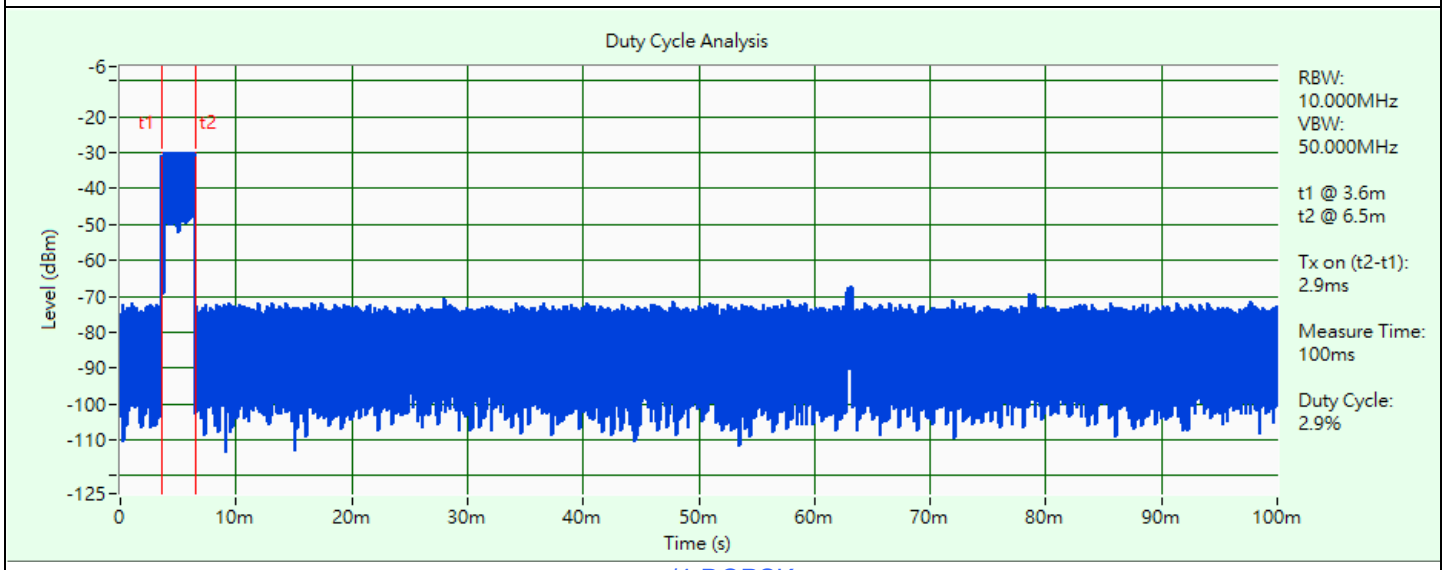
Test Item	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	0, 39, 78	GFSK	DH5
		π/4-DQPSK	2DH5
Number of Hopping Frequency Used	Hopping	GFSK	DH5
		π/4-DQPSK	2DH5
Dwell Time on Each Channel	Hopping	GFSK	DH1/DH3/DH5
		π/4-DQPSK	2DH1/2DH3/2DH5
Hopping Channel Separation / 20 dB Bandwidth	0, 39, 78	GFSK	DH5
		π/4-DQPSK	2DH5
Conducted Out of Band Emissions	Hopping 0, 78	GFSK	DH5
		π/4-DQPSK	2DH5
AC Power Conducted Emissions	0	π/4-DQPSK	2DH5
Unwanted Emissions below 1 GHz	0	π/4-DQPSK	2DH5
Unwanted Emissions above 1 GHz	0, 39, 78	GFSK	DH5
		π/4-DQPSK	2DH5

3.5 Duty Cycle of Test Signal

GFSK: Duty cycle = 2.9 ms / 100 ms x 100% = 2.9%
π/4-DQPSK: Duty cycle = 2.9 ms / 100 ms x 100% = 2.9%



GFSK

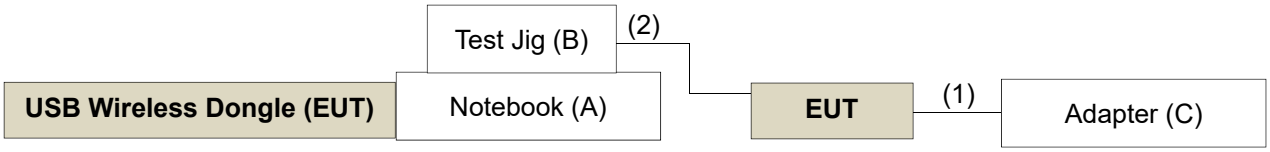


π/4-DQPSK

3.6 Test Program Used and Operation Descriptions

Controlling software RTLBTAPP Version 5.2.3.55 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	Lenovo	20J4 MD A003TW	PF-11H9AK	NA	Provided by Lab
B	Test Jig	N/A	FT232RL	NA	NA	Supplied by applicant (for RF Setup)
C	Adapter	Verifone	S010CCU0500200	NA	NA	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Type C Cable	1	1.5	Yes	0	Accessory of EUT
2	Console Cable	1	0.2	No	0	Supplied by applicant (for RF Setup)

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	2024/1/21	2025/1/20
Wideband Power Sensor Keysight	N1923A	MY58020002	2024/1/18	2025/1/17
		MY58140009	2024/1/18	2025/1/17

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/9/24

4.2 Number of Hopping Frequency Used

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXA Signal Analyzer Keysight	N9020B	MY60110462	2024/4/22	2025/4/21
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/9/24

4.3 Dwell Time on Each Channel

Refer to section 4.2 to get the tested date and information of the instruments.

4.4 Hopping Channel Separation

Refer to section 4.2 to get the tested date and information of the instruments.

4.5 20 dB Bandwidth

Refer to section 4.2 to get the tested date and information of the instruments.

4.6 Conducted Out of Band Emissions

Refer to section 4.2 to get the tested date and information of the instruments.

4.7 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance HUBER+SUHNER	E1-011315	13	2023/11/22	2024/11/21
50 ohm terminal resistance	E1-011279	04	2023/11/22	2024/11/21
	E1-011280	05	2023/11/22	2024/11/21
DC-LISN Schwarzbeck	NNBM 8126G	8126G-069	2023/11/7	2024/11/6
EMI Test Receiver R&S	ESCI	100613	2023/12/4	2024/12/3
Fixed Attenuator Mini-Circuits	HAT-10+	PAD-COND1-01	2024/1/6	2025/1/5
LISN R&S	ENV216	101826	2024/3/25	2025/3/24
	ESH3-Z5	100116	2024/2/21	2025/2/20
RF Coaxial Cable Woken	5D-FB	Cable-cond1-01	2024/1/6	2025/1/5
Software BVADT	BVADT_Cond_ V7.4.1.0	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2024/8/28	2025/8/27

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2024/9/23

4.8 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFA-515BSN	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1214	2023/10/17	2024/10/16
EXA Signal Analyzer Agilent	N9010A	MY52220207	2023/12/28	2024/12/27
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2024/8/21	2025/8/20
MXE EMI Receiver Agilent	N9038A	MY52260177	2024/9/19	2025/9/18
Preamplifier EMCI	EMC330N	980798	2024/1/15	2025/1/14
	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201248	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-3000	201249	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-9000	201251(with PAD)	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208676	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 9.
2. Tested Date: 2024/9/19

4.9 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFA-515BSN	N/A	N/A	N/A
EXA Signal Analyzer Agilent	N9010A	MY52220207	2023/12/28	2024/12/27
Horn Antenna RFSPIN	DRH18-E	210104A18E	2023/11/12	2024/11/11
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2023/11/12	2024/11/11
MXE EMI Receiver Agilent	N9038A	MY52260177	2023/9/15	2024/9/14
Preamplifier Agilent	83017A	MY39501357	2024/6/12	2025/6/11
Preamplifier EMCI	EMC184045SE	980788	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2024/1/15	2025/1/14
	EMC101G-KM-KM-3000	201258	2024/1/15	2025/1/14
	EMC101G-KM-KM-5000	201261	2024/1/15	2025/1/14
	EMC104-SM-SM-1000	210103	2024/1/15	2025/1/14
	EMC104-SM-SM-3000	201241	2024/1/15	2025/1/14
	EMC104-SM-SM-9000	201244	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208676	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 9.
2. Tested Date: 2024/9/13

5 Limits of Test Items

5.1 RF Output Power

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

5.2 Number of Hopping Frequency Used

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

5.3 Dwell Time on Each Channel

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

5.4 Hopping Channel Separation

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

5.5 20 dB Bandwidth

Maximum bandwidth is not specified.

5.6 Conducted Out of Band Emissions

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

5.7 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.

5.8 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).

5.9 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

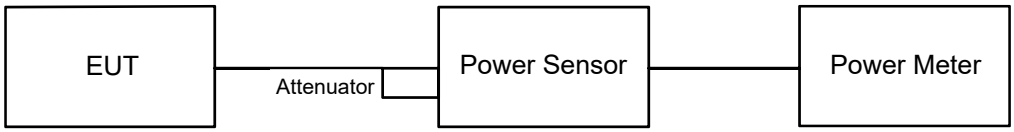
Notes:

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



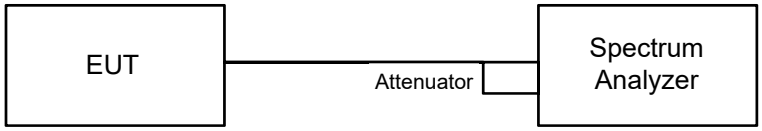
6.1.2 Test Procedure

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 Number of Hopping Frequency Used

6.2.1 Test Setup

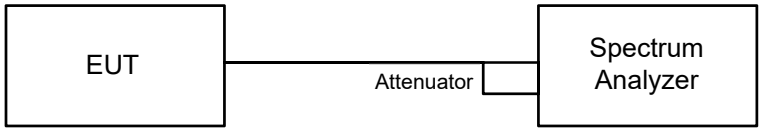


6.2.2 Test Procedure

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

6.3 Dwell Time on Each Channel

6.3.1 Test Setup

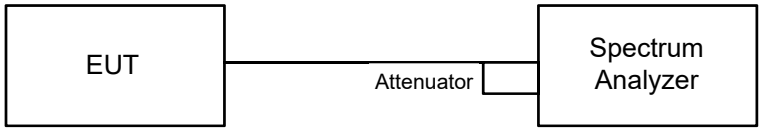


6.3.2 Test Procedure

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

6.4 Hopping Channel Separation

6.4.1 Test Setup

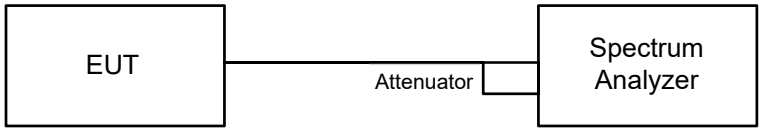


6.4.2 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
c. Set the SA Sweep time = Auto, Detector function = Peak.
d. Set the SA trace on Max hold mode and record the separation of two adjacent channels.
e. Measure the frequency difference of these two adjacent channels by SA marker-delta function. And then plot the result on SA screen.
f. Repeat above procedures until all frequencies measured were complete.

6.5 20 dB Bandwidth

6.5.1 Test Setup

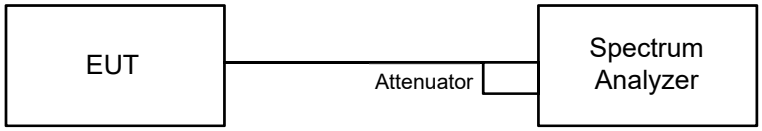


6.5.2 Test Procedure

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

6.6 Conducted Out of Band Emissions

6.6.1 Test Setup



6.6.2 Test Procedure

MEASUREMENT PROCEDURE REF

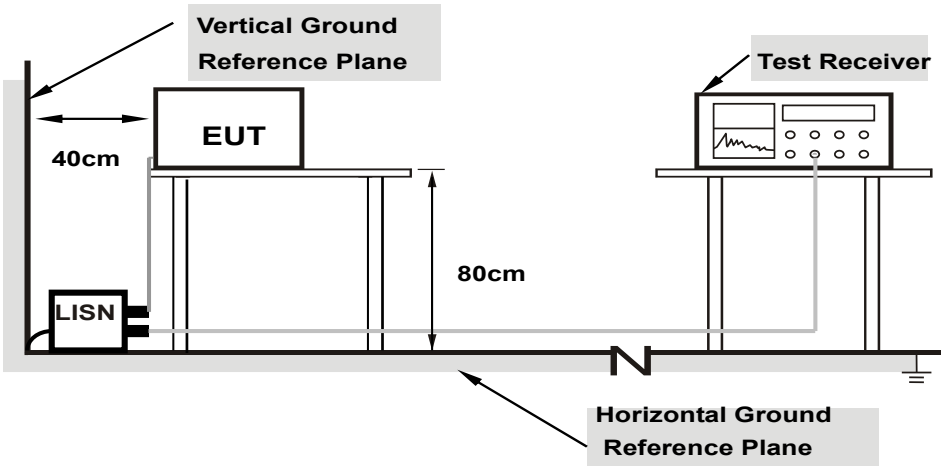
a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

6.7 AC Power Conducted Emissions

6.7.1 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).

6.7.2 Test Procedure

a. 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.

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

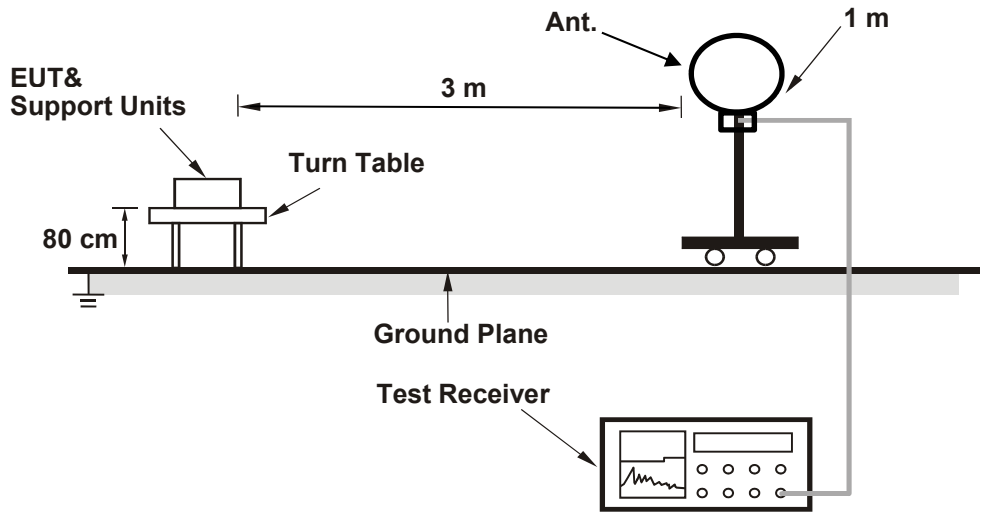
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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.

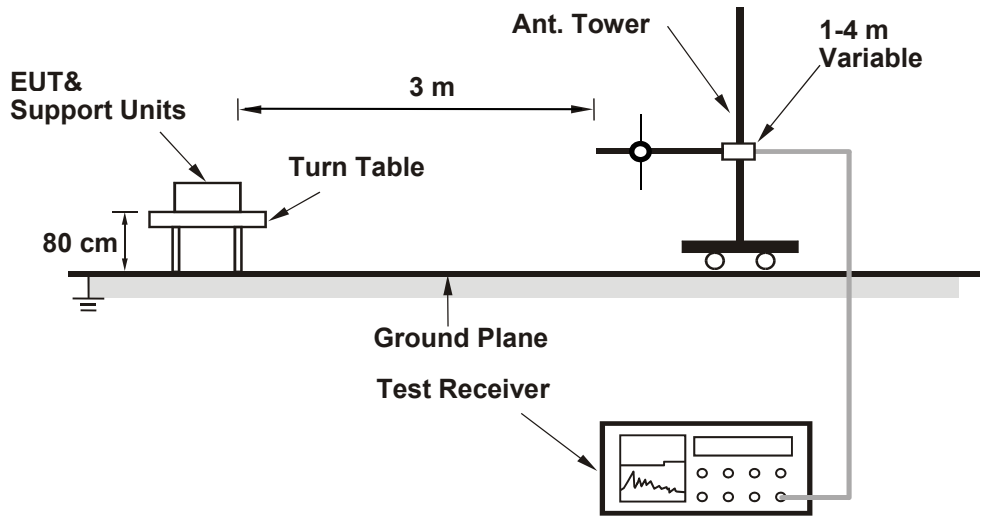
6.8 Unwanted Emissions below 1 GHz

6.8.1 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).

6.8.2 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.

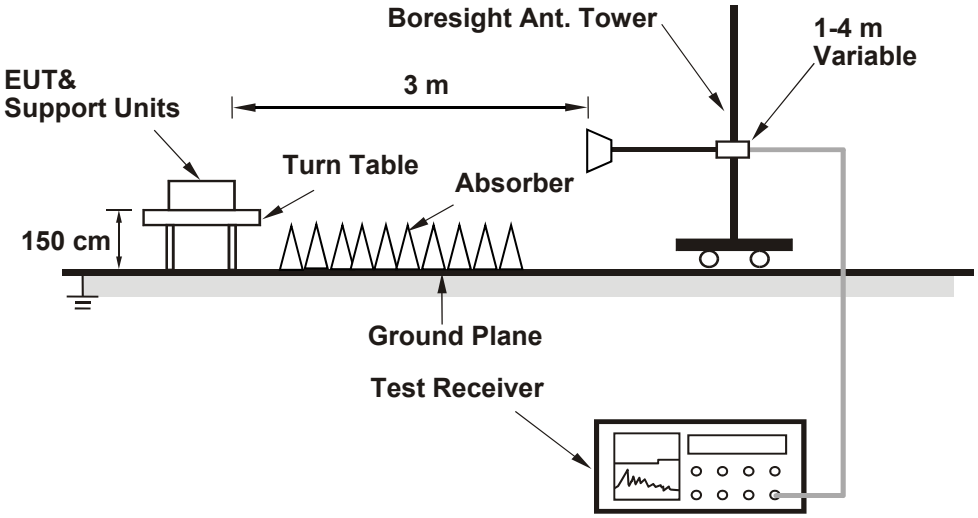
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

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.

6.9 Unwanted Emissions above 1 GHz

6.9.1 Test Setup



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

6.9.2 Test Procedure

a. 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.

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 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:

1. 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.
2. 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.
3. 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:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

For Peak Power

GFSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	3.890	5.90	21	Pass
39	2441	3.917	5.93	21	Pass
78	2480	3.908	5.92	21	Pass

Note: The antenna gain is 3.66 dBi < 6 dBi, so the output power limit shall not be reduced.

π/4-DQPSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	6.124	7.87	21	Pass
39	2441	6.067	7.83	21	Pass
78	2480	5.957	7.75	21	Pass

Note: The antenna gain is 3.66 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	3.802	5.80
39	2441	3.837	5.84
78	2480	3.819	5.82

π/4-DQPSK

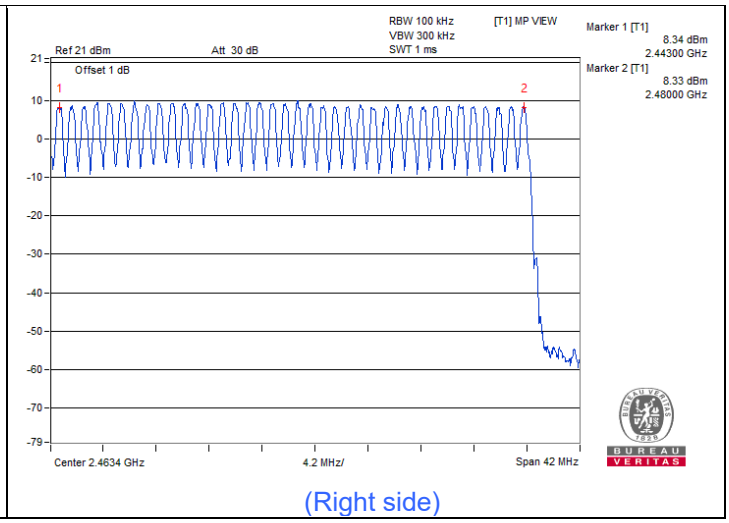
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	3.936	5.95
39	2441	3.917	5.93
78	2480	3.882	5.89

7.2 Number of Hopping Frequency Used

Input Power:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

GFSK

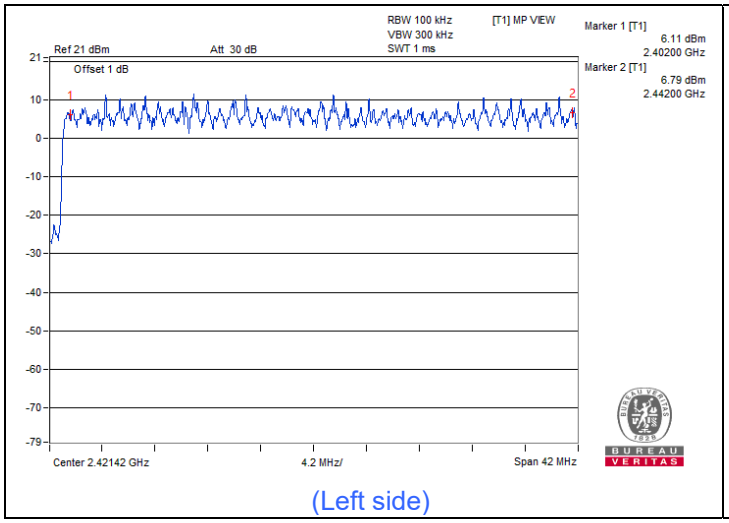
(Left side)



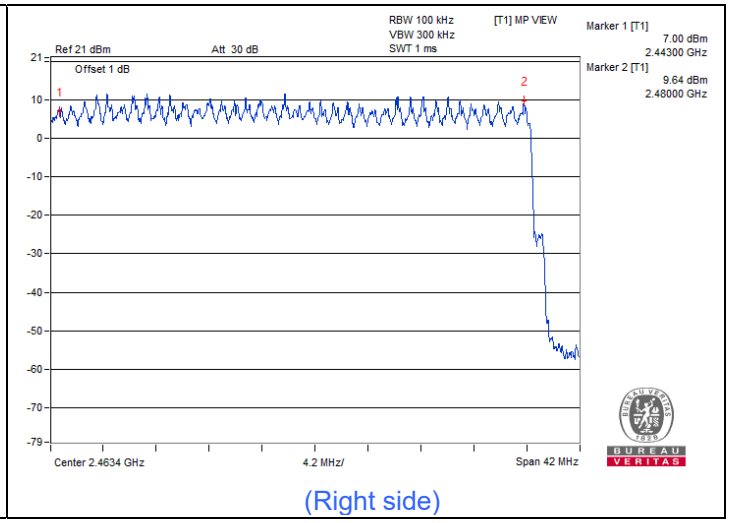
(Right side)

Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

π/4-DQPSK



(Left side)



(Right side)

Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

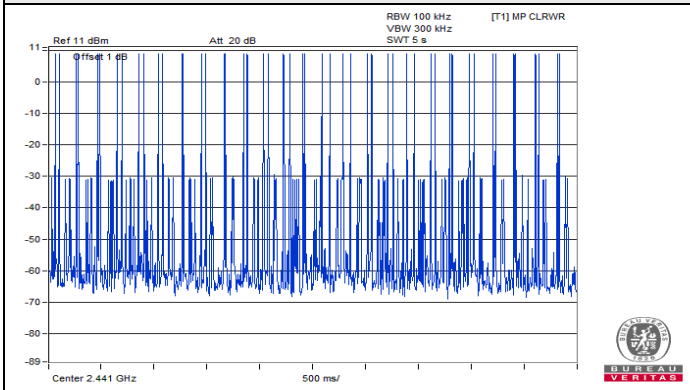
7.3 Dwell Time on Each Channel

Input Power:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

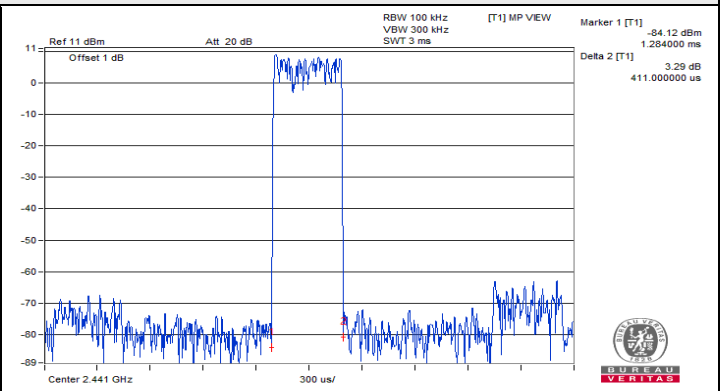
GFSK

Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
DH1	50 (times / 5 sec) * 6.32 = 316 times	0.411	129.88	400	Pass
DH3	27 (times / 5 sec) * 6.32 = 171 times	1.685	288.14	400	Pass
DH5	12 (times / 5 sec) * 6.32 = 76 times	2.920	221.92	400	Pass

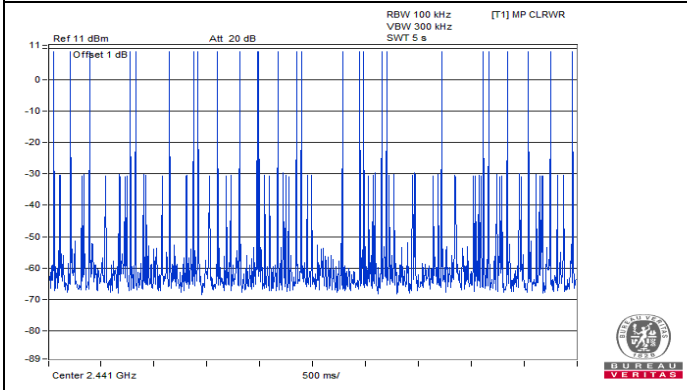
Spectrum plots of Dwell Time



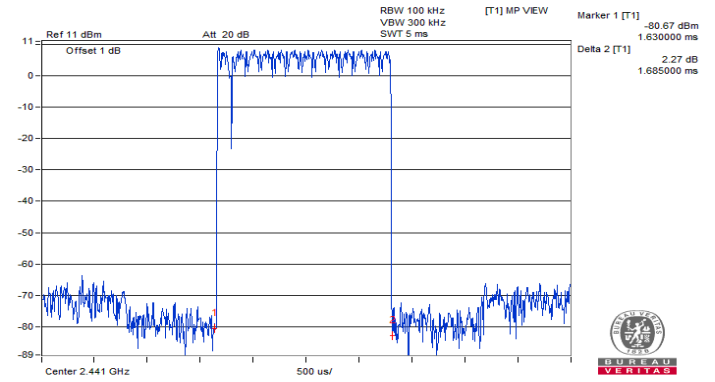
GFSK DH1



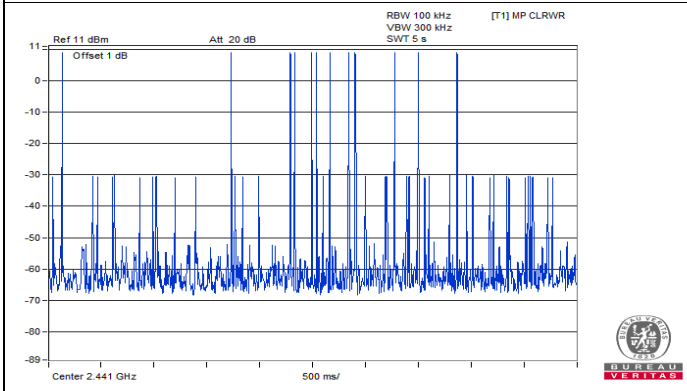
GFSK DH1



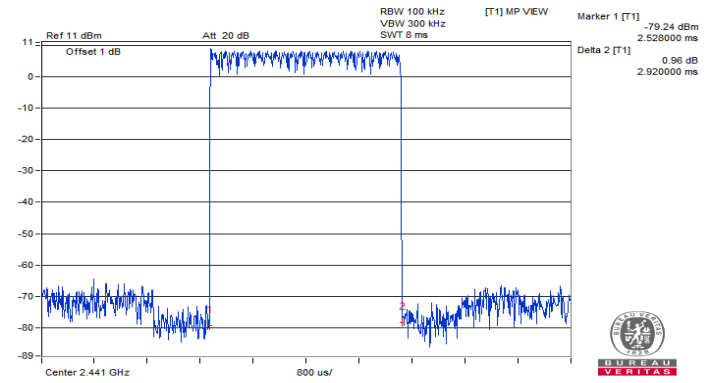
GFSK DH3



GFSK DH3



GFSK DH5

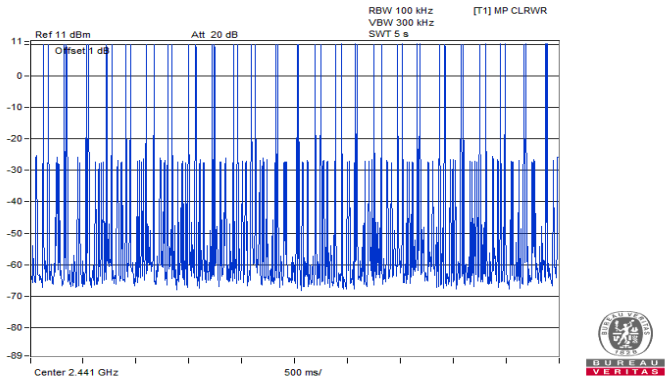


GFSK DH5

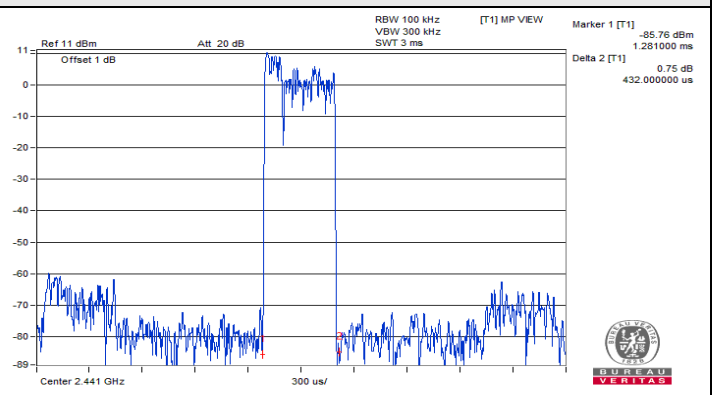
π/4-DQPSK

Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
2DH1	50 (times / 5 sec) * 6.32 = 316 times	0.432	136.51	400	Pass
2DH3	27 (times / 5 sec) * 6.32 = 171 times	1.695	289.85	400	Pass
2DH5	18 (times / 5 sec) * 6.32 = 114 times	2.944	335.62	400	Pass

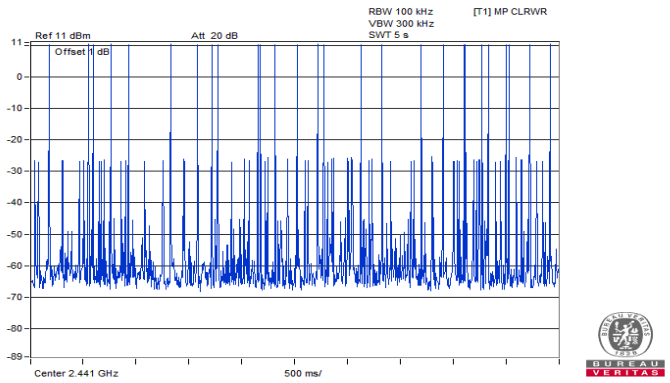
Spectrum plots of Dwell Time



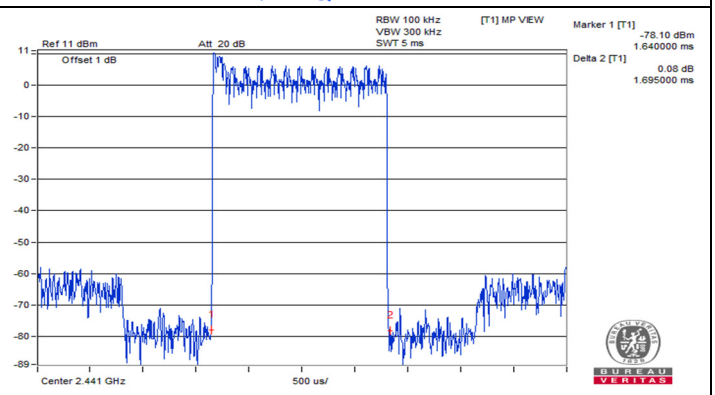
π/4-DQPSK 2DH1



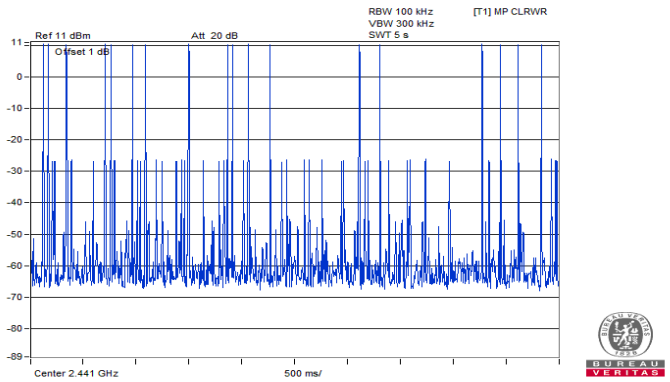
π/4-DQPSK 2DH1



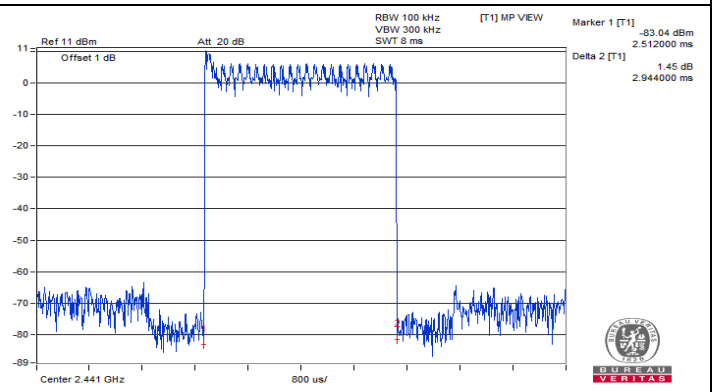
π/4-DQPSK 2DH3



π/4-DQPSK 2DH3



π/4-DQPSK 2DH5



π/4-DQPSK 2DH5

7.4 Hopping Channel Separation

Input Power:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

GFSK

Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1.00	0.66	Pass
39	2441	1.01	0.71	Pass
78	2480	1.00	0.69	Pass

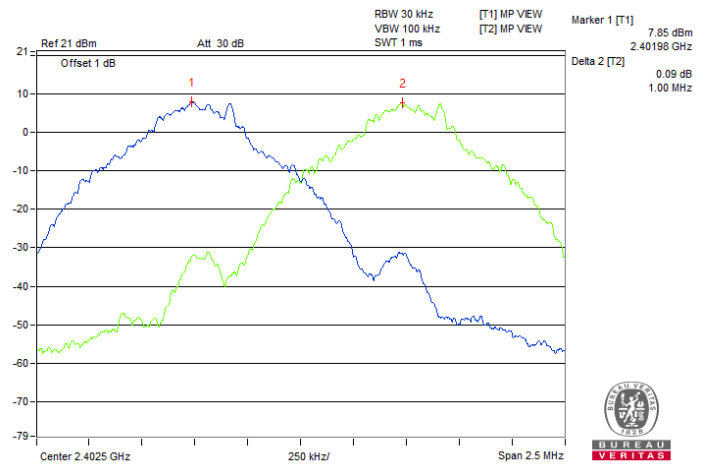
Note: The minimum limit is two-third 20dB bandwidth.

π/4-DQPSK

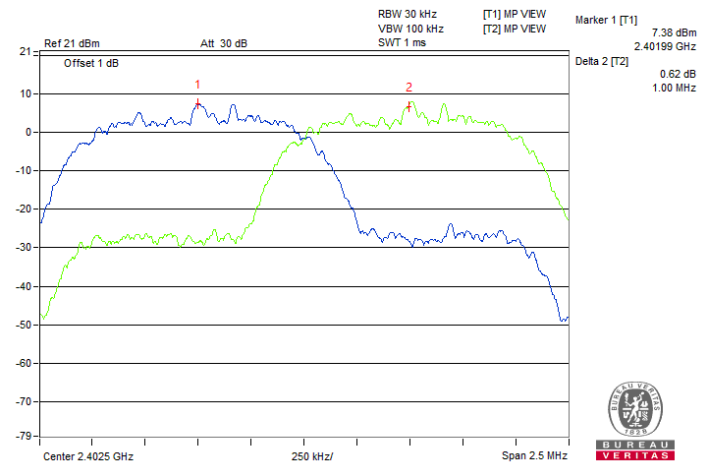
Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1.00	0.88	Pass
39	2441	1.00	0.88	Pass
78	2480	1.01	0.88	Pass

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

Spectrum Plot of Minimum Value



GFSK : CH 0



π/4-DQPSK : CH 0

7.5 20 dB Bandwidth

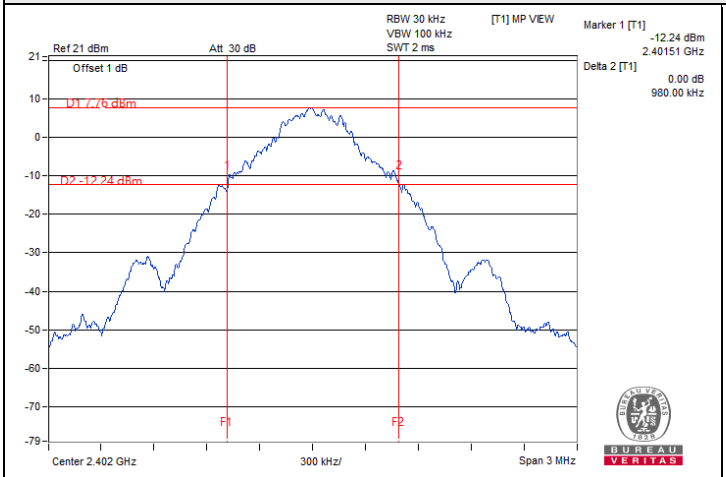
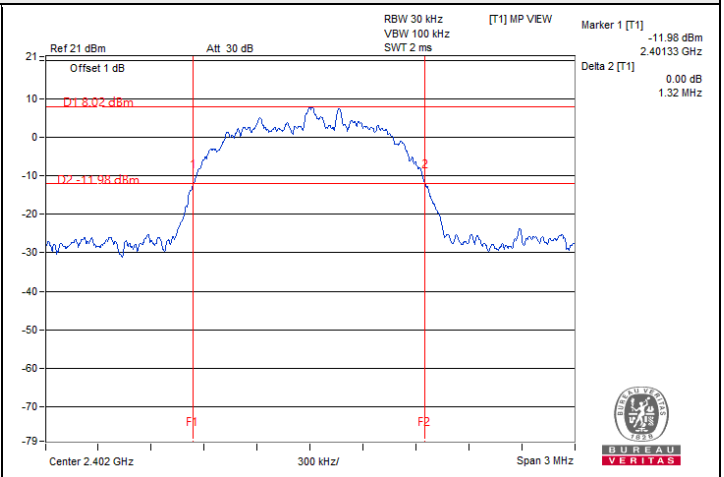
Input Power:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

GFSK

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	0.98
39	2441	1.06
78	2480	1.03

π/4-DQPSK

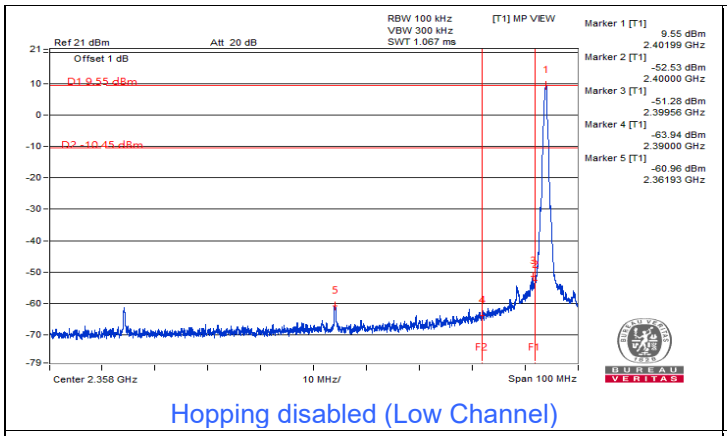
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.32
39	2441	1.32
78	2480	1.32

Spectrum Plot of Minimum Value	
	
GFSK : CH 0	π/4-DQPSK : CH 0

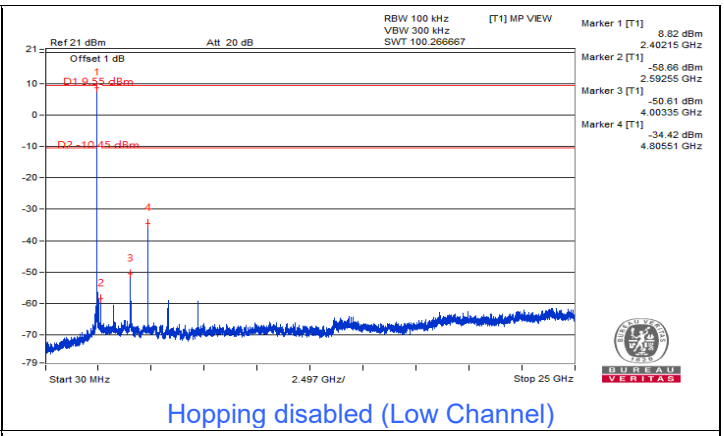
7.6 Conducted Out of Band Emissions

Input Power:	3.7 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Kevin Kuo

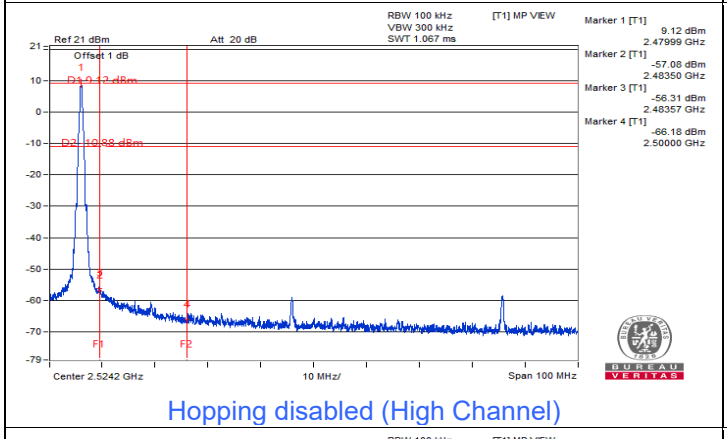
GFSK



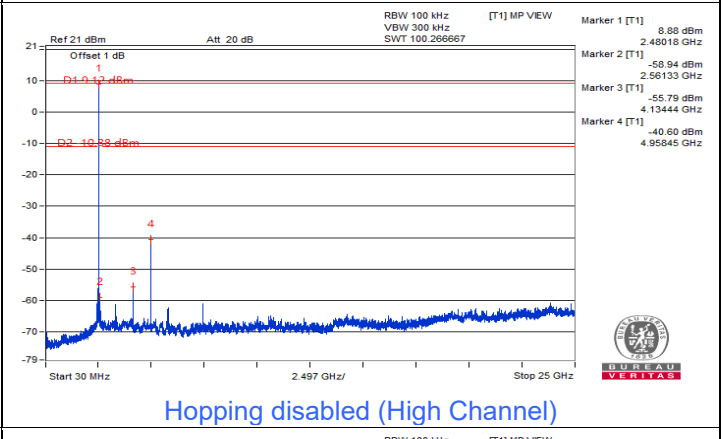
Hopping disabled (Low Channel)



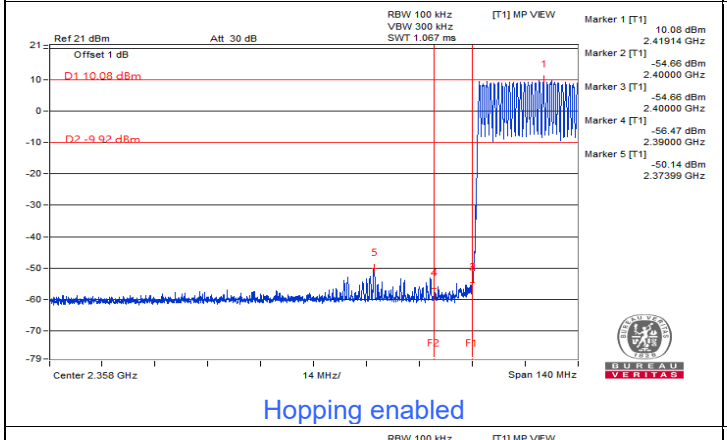
Hopping disabled (Low Channel)



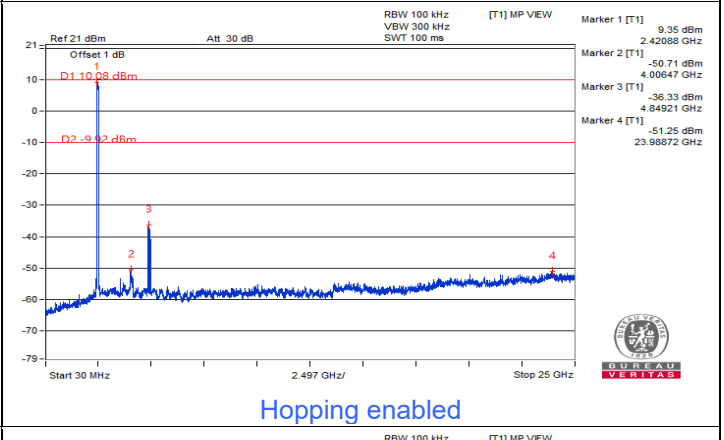
Hopping disabled (High Channel)



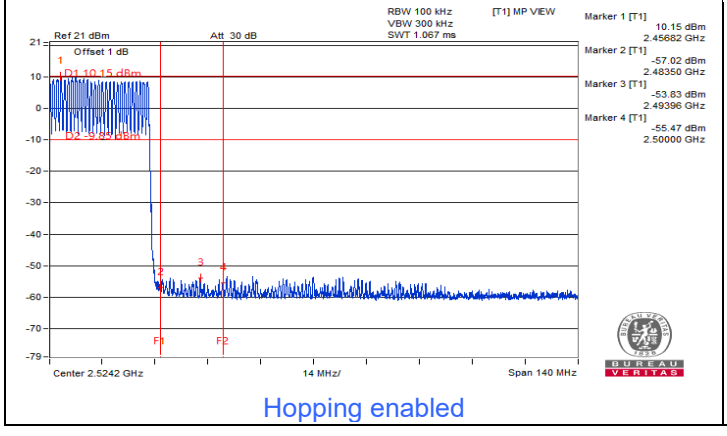
Hopping disabled (High Channel)



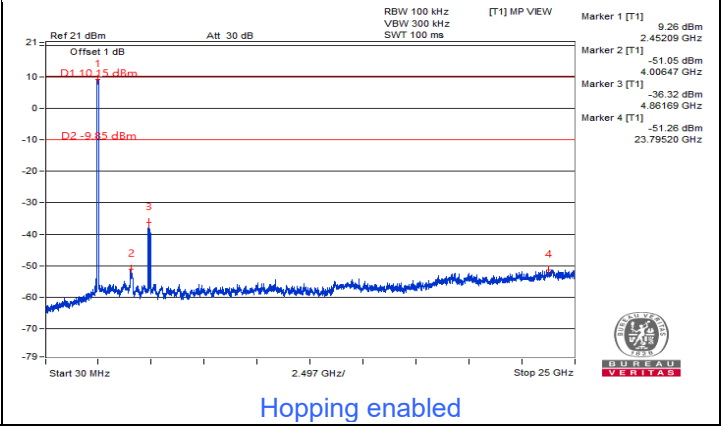
Hopping enabled



Hopping enabled

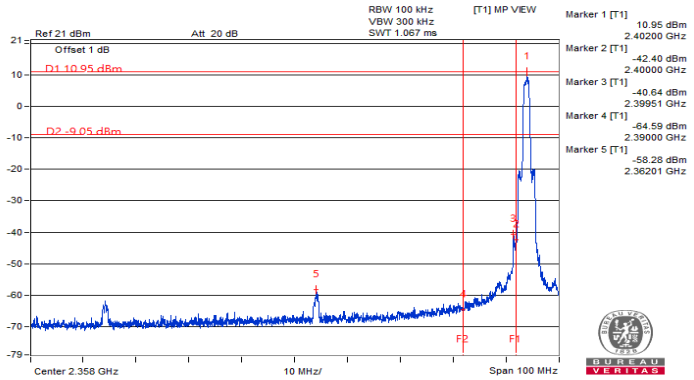


Hopping enabled

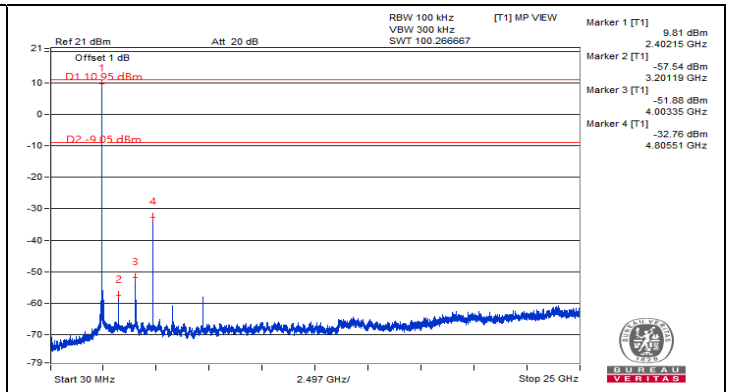


Hopping enabled

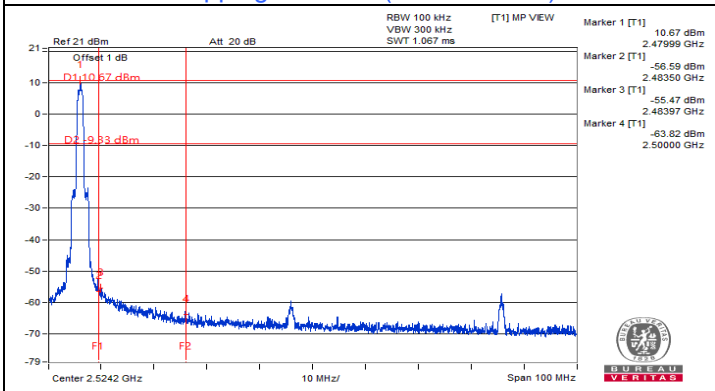
π/4-DQPSK



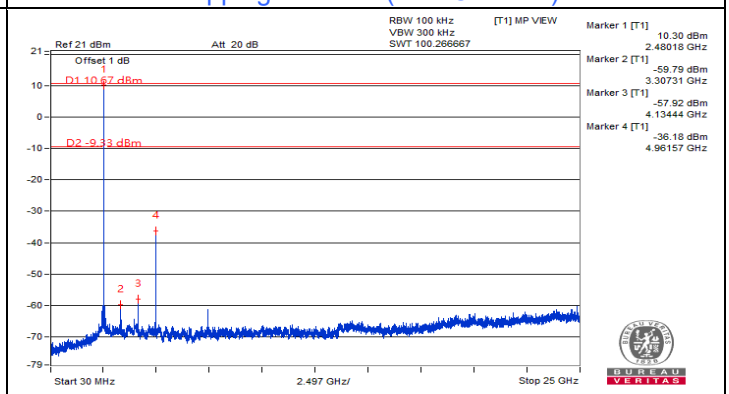
Hopping disabled (Low Channel)



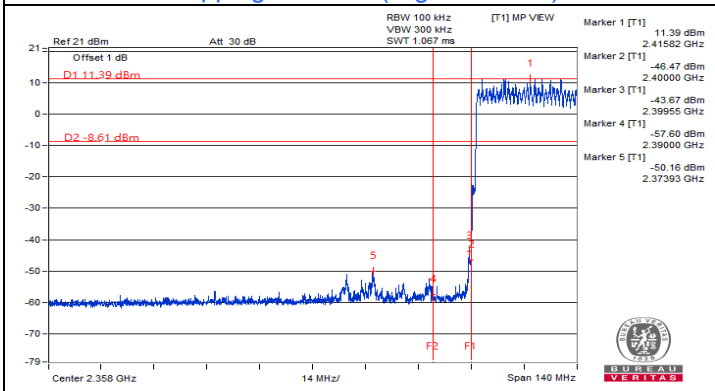
Hopping disabled (Low Channel)



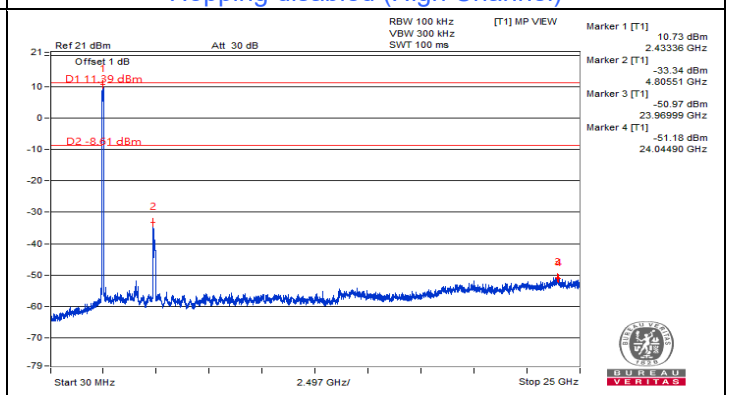
Hopping disabled (High Channel)



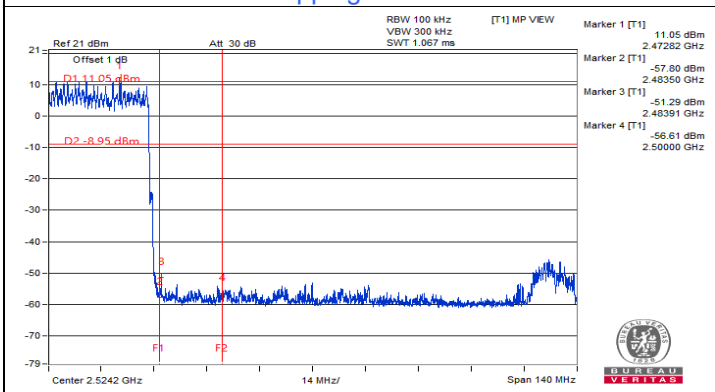
Hopping disabled (High Channel)



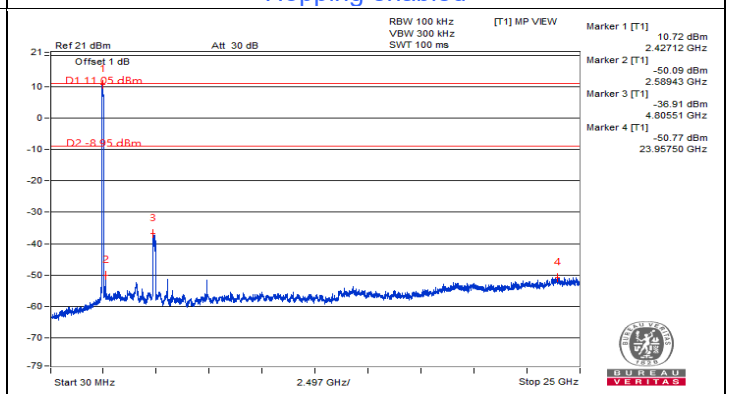
Hopping enabled



Hopping enabled



Hopping enabled



Hopping enabled

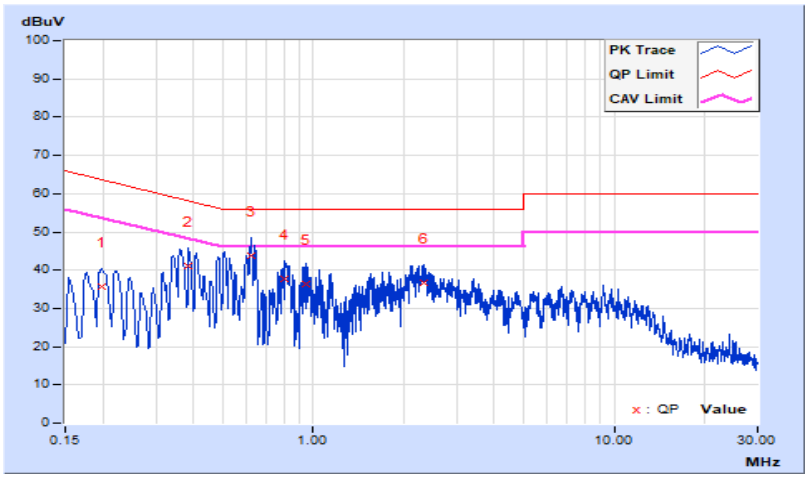
7.7 AC Power Conducted Emissions

RF Mode	SRD π/4-DQPSK	**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**	25 °C, 75 % RH
Tested By	Greg Lin		

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	0.19800	9.72	25.87	11.41	35.59	21.13	63.69	53.69	-28.10	-32.56
2	0.38600	9.82	31.11	14.93	40.93	24.75	58.15	48.15	-17.22	-23.40
3	**0.62200**	**9.85**	**33.90**	**19.66**	**43.75**	**29.51**	**56.00**	**46.00**	**-12.25**	**-16.49**
4	0.80600	9.86	27.76	13.42	37.62	23.28	56.00	46.00	-18.38	-22.72
5	0.95000	9.88	26.40	13.10	36.28	22.98	56.00	46.00	-19.72	-23.02
6	2.33400	9.97	26.78	18.70	36.75	28.67	56.00	46.00	-19.25	-17.33

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

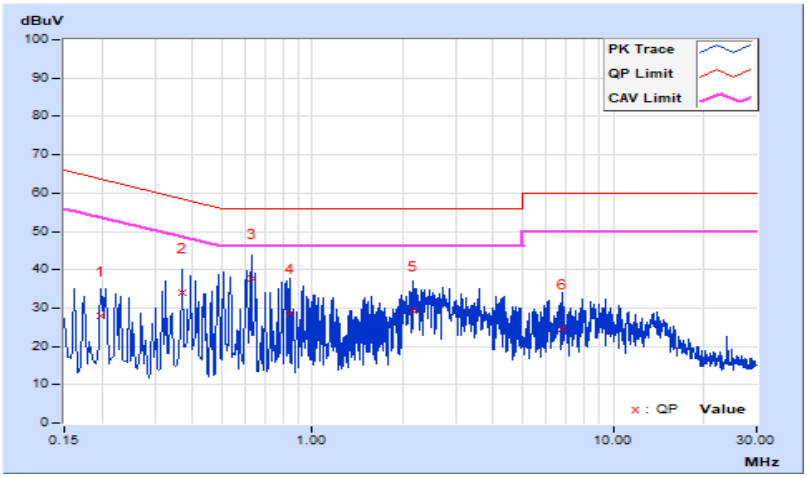


RF Mode	SRD π/4-DQPSK	Channel	CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75 % RH
Tested By	Greg Lin		

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	0.19800	9.71	18.21	9.33	27.92	19.04	63.69	53.69	-35.77	-34.65
2	0.37000	9.85	24.20	12.16	34.05	22.01	58.50	48.50	-24.45	-26.49
3	0.63000	9.89	27.98	15.13	37.87	25.02	56.00	46.00	-18.13	-20.98
4	0.84200	9.91	18.79	9.59	28.70	19.50	56.00	46.00	-27.30	-26.50
5	2.15000	9.98	19.24	5.97	29.22	15.95	56.00	46.00	-26.78	-30.05
6	6.78600	10.13	14.43	3.11	24.56	13.24	60.00	50.00	-35.44	-36.76

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



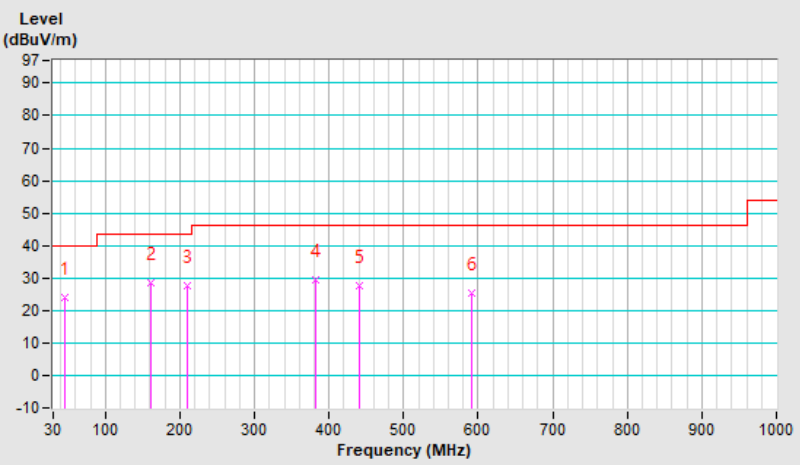
7.8 Unwanted Emissions below 1 GHz

RF Mode	SRD π/4-DQPSK	**Channel**	CH 0：2402 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	24 °C, 65 % RH
Tested By	Edison 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	45.52	24.2 QP	40.0	-15.8	1.49 H	110	37.3	-13.1
2	160.95	28.4 QP	43.5	-15.1	1.49 H	124	41.5	-13.1
3	209.45	27.6 QP	43.5	-15.9	1.00 H	181	43.9	-16.3
4	382.11	29.3 QP	46.0	-16.7	1.00 H	134	39.6	-10.3
5	440.31	27.8 QP	46.0	-18.2	1.00 H	112	36.5	-8.7
6	591.63	25.3 QP	46.0	-20.7	1.49 H	332	30.8	-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 of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

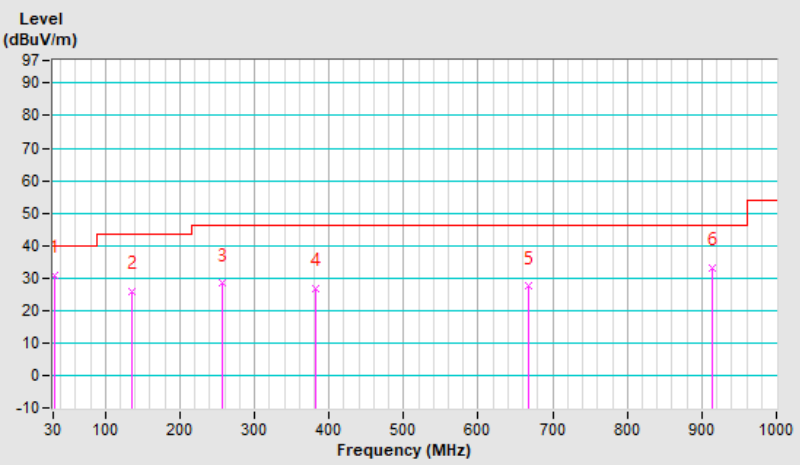


RF Mode	SRD π/4-DQPSK	**Channel**	CH 0：2402 MHz
Frequency Range	30 MHz ~ 1 GHz	**Detector Function & Bandwidth**	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	24 °C, 65 % RH
Tested By	Edison Lee		

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	**32.91**	**31.0 QP**	**40.0**	**-9.0**	**1.01 V**	**237**	**45.5**	**-14.5**
2	134.76	25.6 QP	43.5	-17.9	1.01 V	148	39.5	-13.9
3	256.01	28.3 QP	46.0	-17.7	1.50 V	191	42.3	-14.0
4	382.11	26.9 QP	46.0	-19.1	1.50 V	173	37.2	-10.3
5	668.26	27.4 QP	46.0	-18.6	1.50 V	327	31.8	-4.4
6	913.67	33.0 QP	46.0	-13.0	1.01 V	54	33.8	-0.8

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 of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



7.9 Unwanted Emissions above 1 GHz

RF Mode	SRD GFSK	**Channel**	CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	24 °C, 65 % RH
Tested By	Edison 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	57.8 PK	74.0	-16.2	2.66 H	248	25.5	32.3
2	2390.00	45.1 AV	54.0	-8.9	2.66 H	248	12.8	32.3
3	*2402.00	106.2 PK			2.66 H	248	73.8	32.4
4	*2402.00	75.4 AV			2.66 H	248	43.0	32.4
5	4804.00	58.1 PK	74.0	-15.9	2.00 H	247	54.9	3.2
6	4804.00	27.3 AV	54.0	-26.7	2.00 H	247	24.1	3.2
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	2390.00	58.3 PK	74.0	-15.7	1.49 V	253	26.0	32.3
2	2390.00	45.6 AV	54.0	-8.4	1.49 V	253	13.3	32.3
3	*2402.00	110.4 PK			1.49 V	253	78.0	32.4
4	*2402.00	79.6 AV			1.49 V	253	47.2	32.4
5	4804.00	56.4 PK	74.0	-17.6	1.03 V	300	53.2	3.2
6	4804.00	25.6 AV	54.0	-28.4	1.03 V	300	22.4	3.2

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(2.9 ms / 100 ms) = -30.8 dB

RF Mode	SRD GFSK	Channel	CH 39：2441 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison 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	*2441.00	107.4 PK			2.67 H	250	74.9	32.5
2	*2441.00	76.6 AV			2.67 H	250	44.1	32.5
3	4882.00	58.8 PK	74.0	-15.2	2.20 H	249	55.3	3.5
4	4882.00	28.0 AV	54.0	-26.0	2.20 H	249	24.5	3.5
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	110.7 PK			1.55 V	263	78.2	32.5
2	*2441.00	79.9 AV			1.55 V	263	47.4	32.5
3	4882.00	57.5 PK	74.0	-16.5	1.03 V	287	54.0	3.5
4	4882.00	26.7 AV	54.0	-27.3	1.03 V	287	23.2	3.5

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(2.9 ms / 100 ms) = -30.8 dB

RF Mode	SRD GFSK	Channel	CH 78：2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison 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	*2480.00	107.1 PK			2.51 H	245	74.5	32.6
2	*2480.00	76.3 AV			2.51 H	245	43.7	32.6
3	2483.50	51.1 PK	74.0	-22.9	2.51 H	245	55.0	-3.9
4	2483.50	20.3 AV	54.0	-33.7	2.51 H	245	24.2	-3.9
5	4960.00	56.6 PK	74.0	-17.4	2.11 H	248	53.0	3.6
6	4960.00	25.8 AV	54.0	-28.2	2.11 H	248	22.2	3.6
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	*2480.00	110.2 PK			1.53 V	251	77.6	32.6
2	*2480.00	79.4 AV			1.53 V	251	46.8	32.6
3	2483.50	53.1 PK	74.0	-20.9	1.53 V	251	57.0	-3.9
4	2483.50	22.3 AV	54.0	-31.7	1.53 V	251	26.2	-3.9
5	4960.00	53.9 PK	74.0	-20.1	1.06 V	293	50.3	3.6
6	4960.00	23.1 AV	54.0	-30.9	1.06 V	293	19.5	3.6

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(Duty cycle) = 20 log(2.9 ms / 100 ms) = -30.8 dB

RF Mode	SRD π/4-DQPSK	Channel	CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison 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	57.3 PK	74.0	-16.7	2.41 H	252	25.0	32.3
2	2390.00	45.8 AV	54.0	-8.2	2.41 H	252	13.5	32.3
3	*2402.00	107.0 PK			2.41 H	252	74.6	32.4
4	*2402.00	76.2 AV			2.41 H	252	43.8	32.4
5	4804.00	58.4 PK	74.0	-15.6	2.15 H	262	55.2	3.2
6	4804.00	27.6 AV	54.0	-26.4	2.15 H	262	24.4	3.2
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	2390.00	57.7 PK	74.0	-16.3	1.50 V	270	25.4	32.3
2	**2390.00**	**46.3 AV**	**54.0**	**-7.7**	**1.50 V**	**270**	**14.0**	**32.3**
3	*2402.00	112.4 PK			1.50 V	270	80.0	32.4
4	*2402.00	81.6 AV			1.50 V	270	49.2	32.4
5	4804.00	58.6 PK	74.0	-15.4	1.00 V	304	55.4	3.2
6	4804.00	27.8 AV	54.0	-26.2	1.00 V	304	24.6	3.2

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(2.9 ms / 100 ms) = -30.8 dB

RF Mode	SRD π/4-DQPSK	**Channel**	CH 39：2441 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	24 °C, 65 % RH
Tested By	Edison 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	*2441.00	107.8 PK			2.47 H	253	75.3	32.5
2	*2441.00	77.0 AV			2.47 H	253	44.5	32.5
3	4882.00	59.5 PK	74.0	-14.5	2.11 H	260	56.0	3.5
4	4882.00	28.7 AV	54.0	-25.3	2.11 H	260	25.2	3.5
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	113.1 PK			1.51 V	266	80.6	32.5
2	*2441.00	82.3 AV			1.51 V	266	49.8	32.5
3	4882.00	59.5 PK	74.0	-14.5	1.00 V	299	56.0	3.5
4	4882.00	28.7 AV	54.0	-25.3	1.00 V	299	25.2	3.5

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(2.9 ms / 100 ms) = -30.8 dB

RF Mode	SRD π/4-DQPSK	Channel	CH 78：2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 65 % RH
Tested By	Edison Lee		

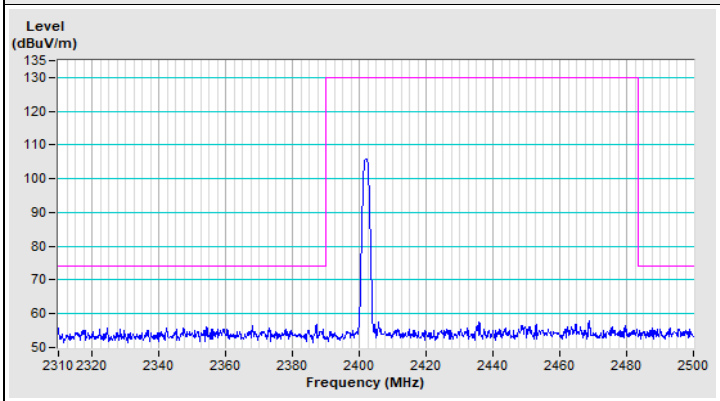
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	109.5 PK			2.50 H	243	76.9	32.6
2	*2480.00	78.7 AV			2.50 H	243	46.1	32.6
3	2483.50	57.1 PK	74.0	-16.9	2.50 H	243	61.0	-3.9
4	2483.50	26.3 AV	54.0	-27.7	2.50 H	243	30.2	-3.9
5	4960.00	59.1 PK	74.0	-14.9	2.22 H	261	55.5	3.6
6	4960.00	28.3 AV	54.0	-25.7	2.22 H	261	24.7	3.6
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	*2480.00	111.8 PK			1.55 V	266	79.2	32.6
2	*2480.00	81.0 AV			1.55 V	266	48.4	32.6
3	2483.50	60.1 PK	74.0	-13.9	1.55 V	266	64.0	-3.9
4	2483.50	29.3 AV	54.0	-24.7	1.55 V	266	33.2	-3.9
5	4960.00	59.4 PK	74.0	-14.6	1.00 V	300	55.8	3.6
6	4960.00	28.6 AV	54.0	-25.4	1.00 V	300	25.0	3.6

Remarks:

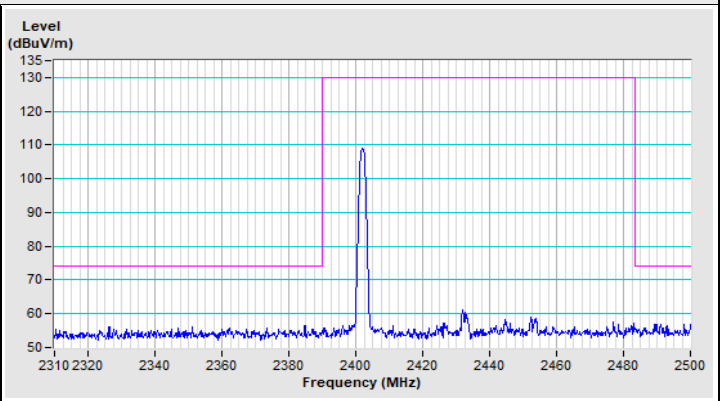
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, 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(Duty cycle) = 20 log(2.9 ms / 100 ms) = -30.8 dB

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak

SRD GFSK Channel 0

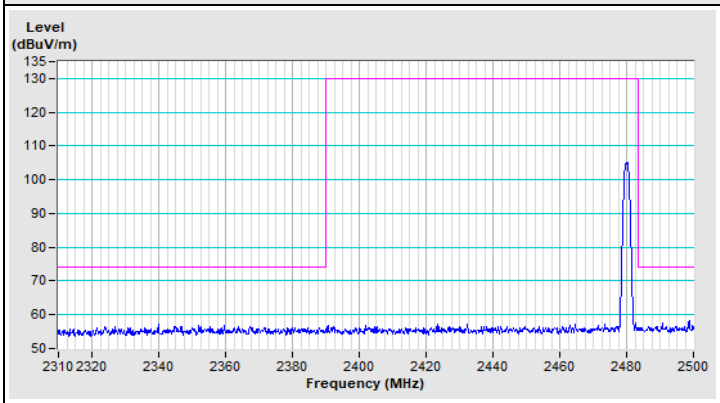


Horizontal (Peak)

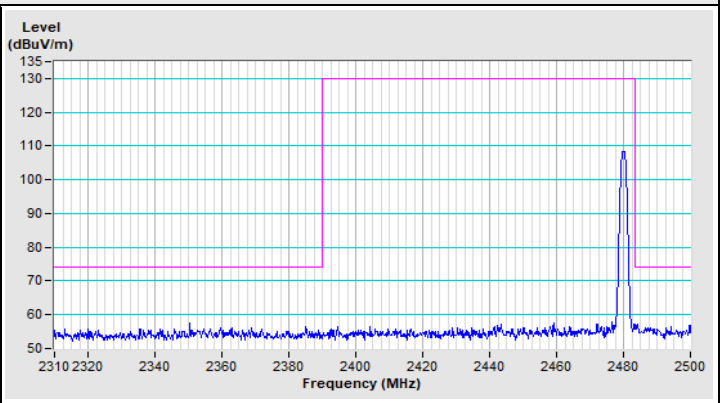


Vertical (Peak)

SRD GFSK Channel 78



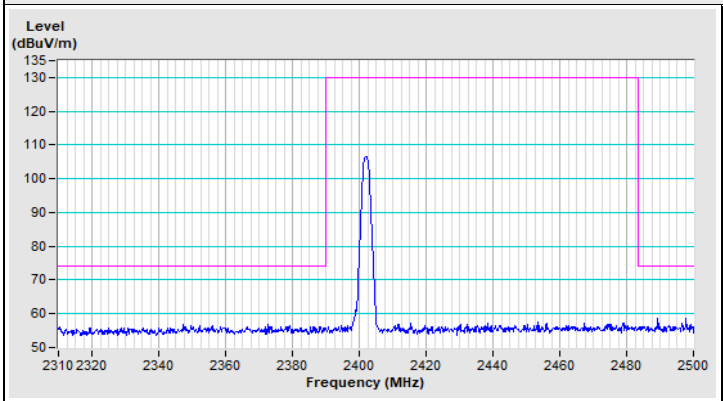
Horizontal (Peak)



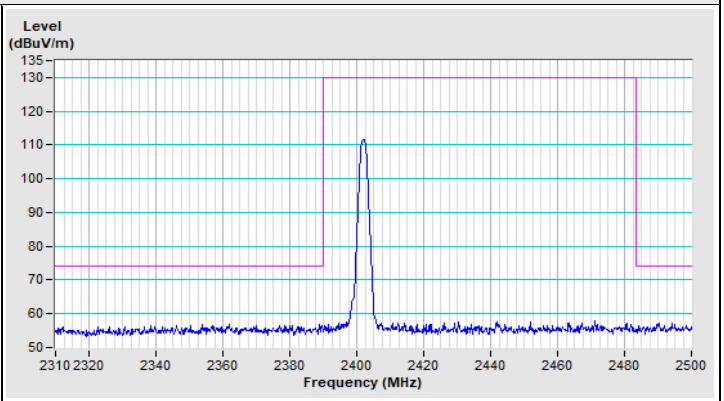
Vertical (Peak)

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak

SRD π/4-DQPSK Channel 0

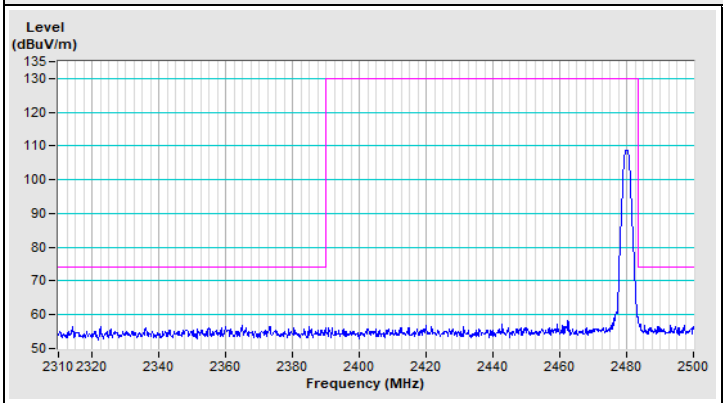


Horizontal (Peak)

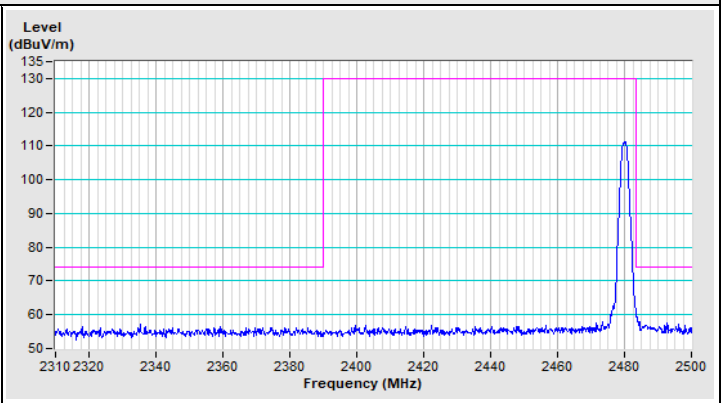


Vertical (Peak)

SRD π/4-DQPSK Channel 78



Horizontal (Peak)



Vertical (Peak)

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.

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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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