

## FCC Test Report

**Report No.:** RF170328C23

**FCC ID:** V65E4750

**Test Model:** E4750

**Received Date:** Mar. 28, 2017

**Test Date:** Apr. 08, 2017 ~ Apr. 21, 2017

**Issued Date:** May 02, 2017

**Applicant:** Kyocera Corporation c/o Kyocera International, Inc.

**Address:** 8611 Balboa Avenue, San Diego, CA 92123

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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( R.O.C )

**Test Location:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan  
Hsien 333, Taiwan, R.O.C.



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### Release Control Record

Issue No.	Description	Date Issued
RF170328C23	Original Release	May 02, 2017

## 1 Certificate of Conformity

**Product:** Feature Phone

**Brand:** KYOCERA

**Test Model:** E4750

**Sample Status:** Identical Prototype

**Applicant:** Kyocera Corporation c/o Kyocera International, Inc.

**Test Date:** Apr. 08, 2017 ~ Apr. 21, 2017

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

ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Evonne Lin, **Date:** May 02, 2017

Evonne Liu / Specialist

**Approved by :** David Huang, **Date:** May 02, 2017

David Huang / Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -11.34 dB at 0.65830 MHz.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -6.8 dB at 55.22 MHz.
15.247(d)	Band Edge Measurement	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

**Note:** 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.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Feature Phone
<b>Brand</b>	KYOCERA
<b>Test Model</b>	E4750
<b>Status of EUT</b>	Identical Prototype
<b>Power Supply Rating</b>	5.0 Vdc (adapter) 3.8 Vdc (Li-ion battery)
<b>Modulation Type</b>	GFSK, $\pi/4$ -DQPSK, 8DPSK
<b>Transfer Rate</b>	1/2/3 Mbps
<b>Operating Frequency</b>	2402 ~ 2480 MHz
<b>Number of Channel</b>	79
<b>Output Power</b>	7.211 mW
<b>Antenna Type</b>	Fixed Internal antenna with 0.6 dBi gain
<b>Antenna Connector</b>	N/A
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	Refer to Note as below

Note:

1. The EUT contains following accessory devices.

<b>Product</b>	<b>Brand</b>	<b>Model</b>	<b>Description</b>
Adapter	KYOCERA	SCP-50ADT	I/P: 100-240 Vac, 50/60 Hz, 0.25 A O/P: 5 Vdc, 1.5 A
Battery	KYOCERA	SCP-71LBPS	3.8 Vdc, 11.02 Wh
USB Cable	KYOCERA	SCP-22SDC	1 m shielded cable w/o 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 Description of Test Modes

79 channels are provided to this EUT:

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

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE $<$ 1G	PLC	APCM	
-	✓	✓	✓	✓	-

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

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

**Note:**

1. For Radiated emission test, pre-tested GFSK,  $\pi/4$ -DQPSK, 8DPSK modulation type and found GFSK was the worse, therefore chosen for the final test and presented in the test report.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

#### Radiated Emission Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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

#### Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	39	FHSS	GFSK	DH5

#### Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	39	FHSS	GFSK	DH5

**Antenna Port Conducted Measurement:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
-	0 to 78	0, 39, 78	FHSS	$\pi/4$ -DQPSK	DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

**Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Bond Tseng
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Bond Tseng
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
APCM	25 deg. C, 65 % RH	3.8 Vdc	Getaz Yang

### 3.3 Description of Support Units

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

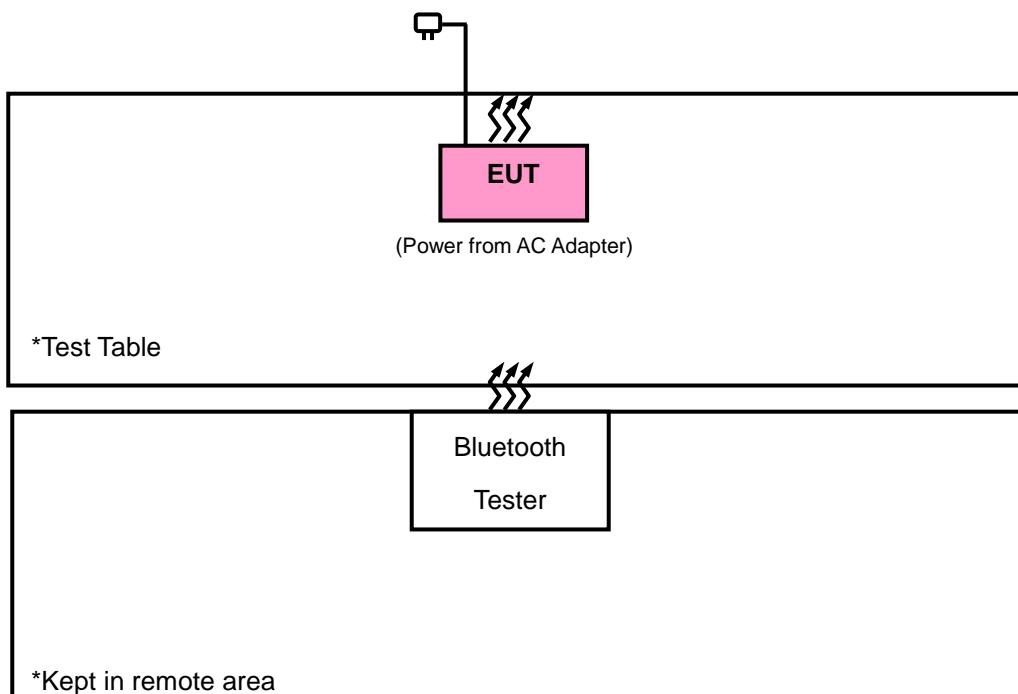
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Bluetooth Tester	R&S	CBT	100980	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items 1 acted as communication partners to transfer data.

#### 3.3.1 Configuration of System under Test



### 3.4 General Description of Applied Standards

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

**FCC Part 15, Subpart C (15.247)**

**FCC Public Notice DA 00-705**

ANSI C63.10-2013

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

**Note:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).  
 The test report has been issued separately.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

**Note:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB<sub>uV</sub>/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.

#### 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 24, 2016	Oct. 23, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 16, 2016	Aug. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Dec. 15, 2016	Dec. 14, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2016	Aug. 08, 2017
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 09, 2016	Aug. 08, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 4.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC7450F-4.

#### 4.1.3 Test Procedures

##### For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### Note:

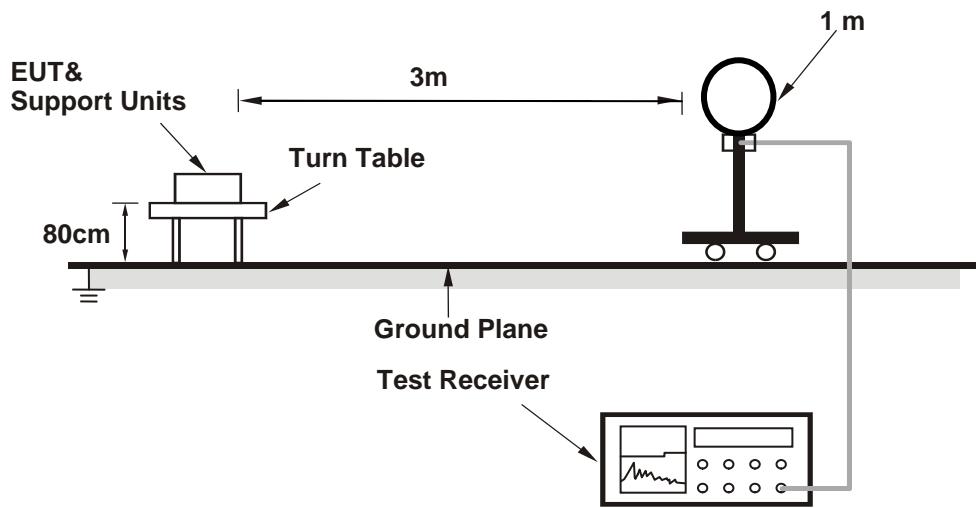
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

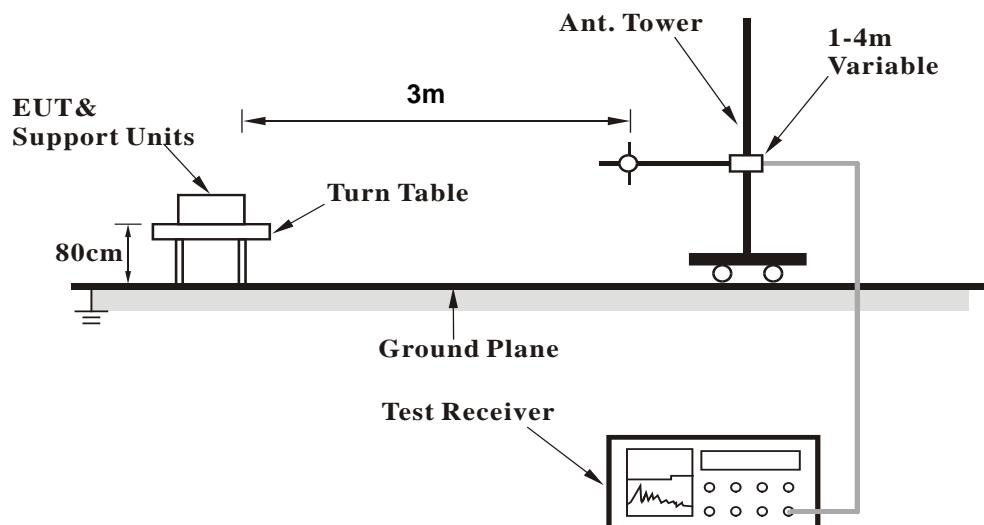
No deviation.

#### 4.1.5 Test Set Up

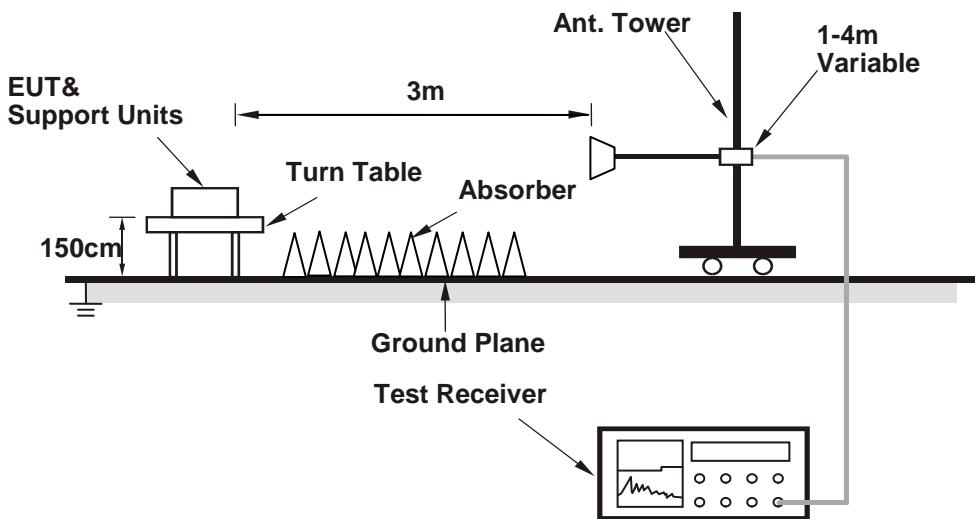
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



**For Radiated emission above 1GHz**



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

**4.1.6 EUT Operating Conditions**

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".
- The necessary accessories enable the system in full functions.

#### 4.1.7 Test Results

##### ABOVE 1 GHz DATA :

###### GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.5 PK	74.0	-19.5	1.08 H	256	22.30	32.20
2	2390.00	44.4 AV	54.0	-9.6	1.08 H	256	12.20	32.20
3	#2400.00	48.9 PK	76.8	-27.9	1.08 H	256	53.50	-4.60
4	#2400.00	18.8 AV	46.7	-27.9	1.08 H	256	23.40	-4.60
5	*2402.00	96.8 PK			1.08 H	256	64.50	32.30
6	*2402.00	66.7 AV			1.08 H	256	34.40	32.30
7	4804.00	45.3 PK	74.0	-28.7	2.24 H	182	43.20	2.10
8	4804.00	15.2 AV	54.0	-38.8	2.24 H	182	13.10	2.10
9	#5760.00	49.0 PK	74.0	-25.0	2.64 H	175	45.30	3.70
10	#5760.00	42.9 AV	54.0	-11.1	2.64 H	175	39.20	3.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.7 PK	74.0	-19.3	1.04 V	269	22.50	32.20
2	2390.00	44.9 AV	54.0	-9.1	1.04 V	269	12.70	32.20
3	#2400.00	52.1 PK	80.0	-27.9	1.04 V	269	56.70	-4.60
4	#2400.00	22.0 AV	49.9	-27.9	1.04 V	269	26.60	-4.60
5	*2402.00	100.0 PK			1.04 V	269	67.70	32.30
6	*2402.00	69.9 AV			1.04 V	269	37.60	32.30
7	4804.00	46.7 PK	74.0	-27.3	1.24 V	114	44.60	2.10
8	4804.00	16.6 AV	54.0	-37.4	1.24 V	114	14.50	2.10
9	#5760.00	54.8 PK	74.0	-19.2	1.24 V	174	51.10	3.70
10	#5760.00	52.1 AV	54.0	-1.9	1.24 V	174	48.40	3.70

###### 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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	96.8 PK			1.12 H	296	64.30	32.50
2	*2441.00	66.7 AV			1.12 H	296	34.20	32.50
3	4882.00	45.8 PK	74.0	-28.2	1.92 H	331	43.60	2.20
4	4882.00	15.7 AV	54.0	-38.3	1.92 H	331	13.50	2.20
5	#5760.00	49.3 PK	74.0	-24.7	2.24 H	128	45.60	3.70
6	#5760.00	43.4 AV	54.0	-10.6	2.24 H	128	39.70	3.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	101.2 PK			2.54 V	282	68.70	32.50
2	*2441.00	71.1 AV			2.54 V	282	38.60	32.50
3	4882.00	46.9 PK	74.0	-27.1	2.24 V	231	44.70	2.20
4	4882.00	16.8 AV	54.0	-37.2	2.24 V	231	14.60	2.20
5	#5760.00	55.0 PK	74.0	-19.0	1.28 V	182	51.30	3.70
6	#5760.00	52.3 AV	54.0	-1.7	1.28 V	182	48.60	3.70

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	95.5 PK			1.16 H	273	62.80	32.70
2	*2480.00	65.4 AV			1.16 H	273	32.70	32.70
3	2483.50	52.1 PK	75.5	-23.4	1.16 H	273	56.30	-4.20
4	2483.50	22.0 AV	45.4	-23.4	1.16 H	273	26.20	-4.20
5	4960.00	46.2 PK	74.0	-27.8	1.52 H	234	43.70	2.50
6	4960.00	16.1 AV	54.0	-37.9	1.52 H	234	13.60	2.50
7	#5760.00	48.7 PK	74.0	-25.3	1.52 H	175	45.00	3.70
8	#5760.00	42.3 AV	54.0	-11.7	1.52 H	175	38.60	3.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	99.0 PK			1.00 V	262	66.30	32.70
2	*2480.00	68.9 AV			1.00 V	262	36.20	32.70
3	2483.50	55.6 PK	79.0	-23.4	1.00 V	262	59.80	-4.20
4	2483.50	25.5 AV	48.9	-23.4	1.00 V	262	29.70	-4.20
5	4960.00	47.0 PK	74.0	-27.0	1.26 V	221	44.50	2.50
6	4960.00	16.9 AV	54.0	-37.1	1.26 V	221	14.40	2.50
7	#5760.00	54.9 PK	74.0	-19.1	1.35 V	193	51.20	3.70
8	#5760.00	52.1 AV	54.0	-1.9	1.35 V	193	48.40	3.70

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

**8DPSK**

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.3 PK	74.0	-17.7	1.08 H	267	24.10	32.20
2	2390.00	44.9 AV	54.0	-9.1	1.08 H	267	12.70	32.20
3	#2400.00	43.4 PK	78.8	-35.4	1.08 H	267	48.00	-4.60
4	#2400.00	13.3 AV	48.7	-35.4	1.08 H	267	17.90	-4.60
5	*2402.00	98.8 PK			1.08 H	267	66.50	32.30
6	*2402.00	68.7 AV			1.08 H	267	36.40	32.30
7	4804.00	45.3 PK	74.0	-28.7	2.14 H	10	43.20	2.10
8	4804.00	15.2 AV	54.0	-38.8	2.14 H	10	13.10	2.10
9	#5760.00	48.3 PK	74.0	-25.7	1.05 H	210	44.60	3.70
10	#5760.00	41.9 AV	54.0	-12.1	1.05 H	210	38.20	3.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.4 PK	74.0	-19.6	1.00 V	268	22.20	32.20
2	2390.00	45.0 AV	54.0	-9.0	1.00 V	268	12.80	32.20
3	#2400.00	44.1 PK	79.5	-35.4	1.00 V	268	48.70	-4.60
4	#2400.00	14.0 AV	49.4	-35.4	1.00 V	268	18.60	-4.60
5	*2402.00	99.5 PK			1.00 V	268	67.20	32.30
6	*2402.00	69.4 AV			1.00 V	268	37.10	32.30
7	4804.00	47.0 PK	74.0	-27.0	2.36 V	127	44.90	2.10
8	4804.00	16.9 AV	54.0	-37.1	2.36 V	127	14.80	2.10
9	#5760.00	55.1 PK	74.0	-18.9	1.07 V	113	51.40	3.70
10	#5760.00	49.2 AV	54.0	-4.8	1.07 V	113	45.50	3.70

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	96.7 PK			1.34 H	114	64.20	32.50
2	*2441.00	66.6 AV			1.34 H	114	34.10	32.50
3	4882.00	45.5 PK	74.0	-28.5	1.54 H	66	43.30	2.20
4	4882.00	15.4 AV	54.0	-38.6	1.54 H	66	13.20	2.20
5	#5760.00	50.3 PK	74.0	-23.7	1.92 H	113	46.60	3.70
6	#5760.00	45.2 AV	54.0	-8.8	1.92 H	113	41.50	3.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	99.2 PK			1.04 V	228	66.70	32.50
2	*2441.00	69.1 AV			1.04 V	228	36.60	32.50
3	4882.00	46.4 PK	74.0	-27.6	1.82 V	196	44.20	2.20
4	4882.00	16.3 AV	54.0	-37.7	1.82 V	196	14.10	2.20
5	#5760.00	54.1 PK	74.0	-19.9	1.13 V	126	50.40	3.70
6	#5760.00	47.3 AV	54.0	-6.7	1.13 V	126	43.60	3.70

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	96.9 PK			1.39 H	94	64.20	32.70
2	*2480.00	66.8 AV			1.39 H	94	34.10	32.70
3	2483.50	42.5 PK	76.9	-34.4	1.39 H	94	46.70	-4.20
4	2483.50	12.4 AV	46.8	-34.4	1.39 H	94	16.60	-4.20
5	4960.00	46.0 PK	74.0	-28.0	1.23 H	88	43.50	2.50
6	4960.00	15.9 AV	54.0	-38.1	1.23 H	88	13.40	2.50
7	#5760.00	49.9 PK	74.0	-24.1	1.53 H	122	46.20	3.70
8	#5760.00	42.8 AV	54.0	-11.2	1.53 H	122	39.10	3.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	100.3 PK			1.31 V	128	67.60	32.70
2	*2480.00	70.2 AV			1.31 V	128	37.50	32.70
3	2483.50	45.9 PK	80.3	-34.4	1.31 V	128	50.10	-4.20
4	2483.50	15.8 AV	50.2	-34.4	1.31 V	128	20.00	-4.20
5	4960.00	46.8 PK	74.0	-27.2	1.82 V	331	44.30	2.50
6	4960.00	16.6 AV	54.0	-37.4	1.82 V	331	14.10	2.50
7	#5760.00	55.9 PK	74.0	-18.1	1.57 V	100	52.20	3.70
8	#5760.00	50.0 AV	54.0	-4.0	1.57 V	100	46.30	3.70

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

**9 kHz ~ 30 MHz DATA:**

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

**30 MHz ~ 1 GHz WORST-CASE DATA:**
**GFSK**

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	30.2 QP	40.0	-9.8	1.50 H	2	46.20	-16.00
2	92.08	25.7 QP	43.5	-17.8	1.50 H	77	44.90	-19.20
3	255.04	26.3 QP	46.0	-19.7	1.50 H	145	39.40	-13.10
4	385.02	24.0 QP	46.0	-22.0	1.01 H	218	33.10	-9.10
5	897.18	33.2 QP	46.0	-12.8	1.01 H	65	30.70	2.50
6	943.74	36.6 QP	46.0	-9.4	1.01 H	11	32.90	3.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	31.1 QP	40.0	-8.9	1.01 V	228	47.10	-16.00
2	<b>55.22</b>	<b>33.2 QP</b>	<b>40.0</b>	<b>-6.8</b>	<b>1.01 V</b>	<b>52</b>	<b>47.20</b>	<b>-14.00</b>
3	216.24	23.6 QP	46.0	-22.4	1.50 V	292	39.00	-15.40
4	450.98	27.2 QP	46.0	-18.8	1.01 V	109	34.70	-7.50
5	833.16	35.9 QP	46.0	-10.1	1.50 V	198	34.60	1.30
6	945.68	36.6 QP	46.0	-9.4	1.25 V	10	32.70	3.90

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.  
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The test was performed in HwaYa Shielded Room 1.  
 3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 Test Procedures

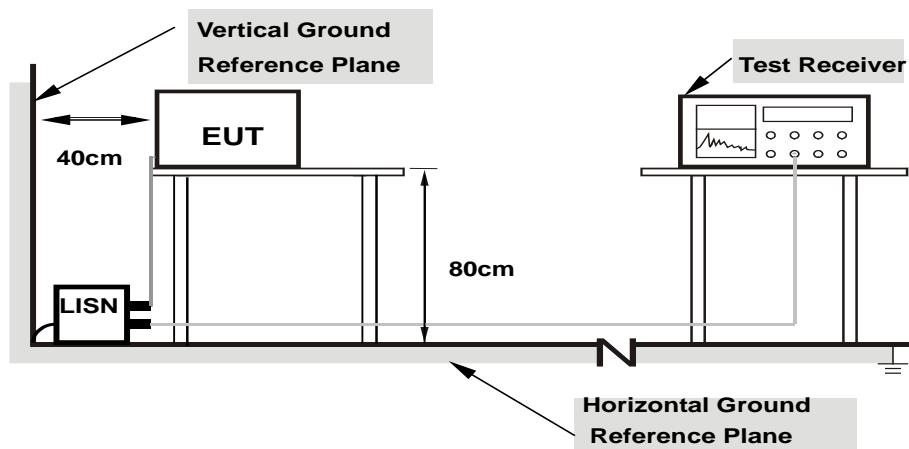
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- 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:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:**

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

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

#### 4.2.6 EUT Operating Condition

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

#### 4.2.7 Test Results

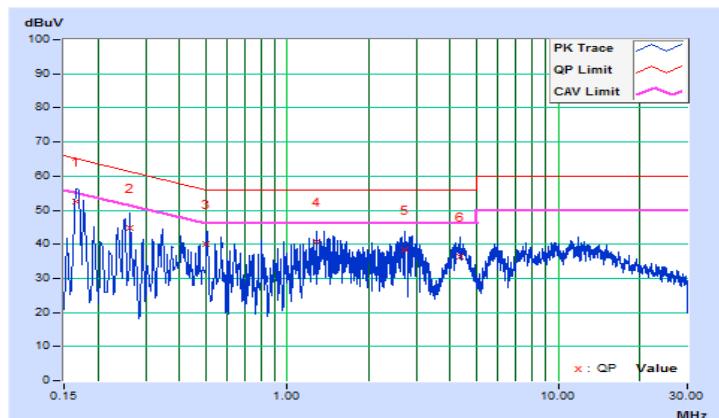
##### CONDUCTED WORST-CASE DATA : GFSK

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/4/21

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	0.16569	10.35	42.31	31.56	52.66	41.91	65.17	55.17	-12.51	-13.26
2	0.26346	10.38	34.53	15.73	44.91	26.11	61.32	51.32	-16.41	-25.21
3	0.50242	10.40	29.52	17.77	39.92	28.17	56.00	46.00	-16.08	-17.83
4	1.28390	10.42	30.19	19.25	40.61	29.67	56.00	46.00	-15.39	-16.33
5	2.73441	10.50	27.73	16.60	38.23	27.10	56.00	46.00	-17.77	-18.90
6	4.35325	10.59	25.68	15.70	36.27	26.29	56.00	46.00	-19.73	-19.71

##### 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

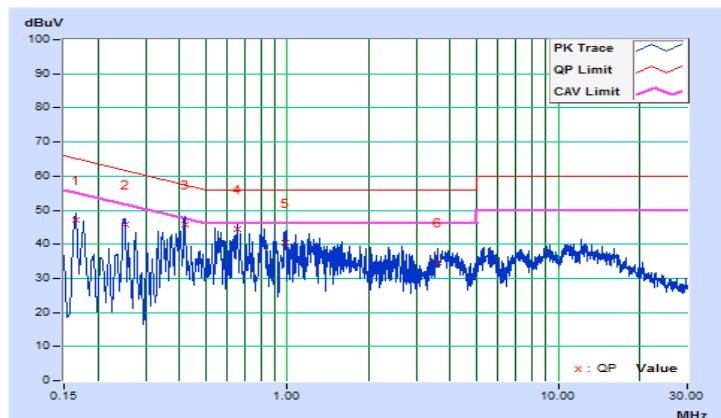


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/4/21

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	0.16569	10.12	36.92	26.24	47.04	36.36	65.17	55.17	-18.13	-18.81
2	0.25125	10.15	35.51	22.77	45.66	32.92	61.72	51.72	-16.06	-18.80
3	0.41979	10.16	35.77	25.81	45.93	35.97	57.45	47.45	-11.52	-11.48
<b>4</b>	<b>0.65830</b>	<b>10.16</b>	<b>34.43</b>	<b>24.50</b>	<b>44.59</b>	<b>34.66</b>	<b>56.00</b>	<b>46.00</b>	<b>-11.41</b>	<b>-11.34</b>
5	0.97854	10.17	30.16	20.60	40.33	30.77	56.00	46.00	-15.67	-15.23
6	3.57907	10.32	24.43	15.35	34.75	25.67	56.00	46.00	-21.25	-20.33

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

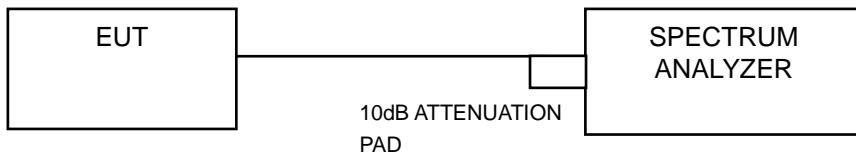


### 4.3 Number of Hopping Frequency Used

#### 4.3.1 Limits of Hopping Frequency Used Measurement

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

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

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

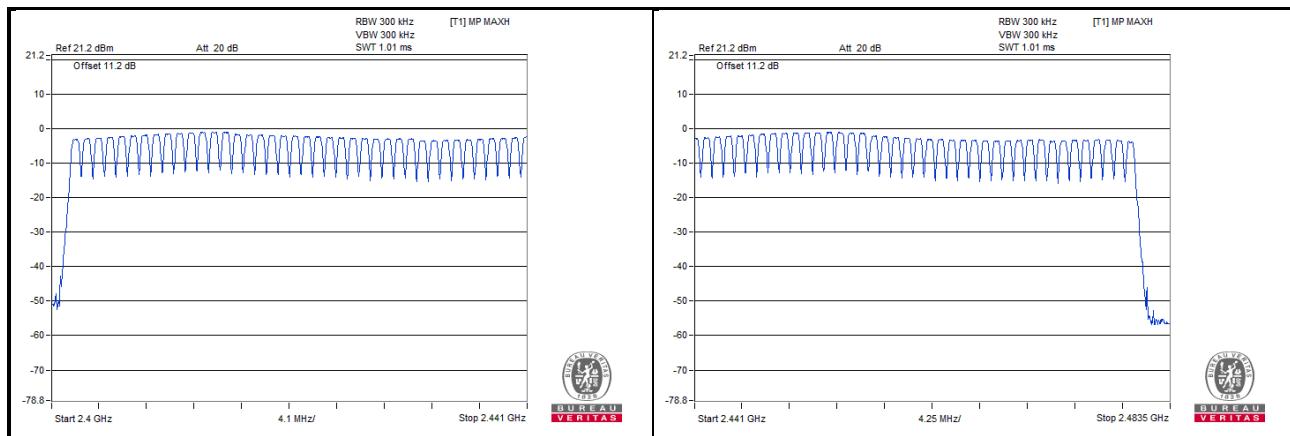
#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 Test Results

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

## GFSK

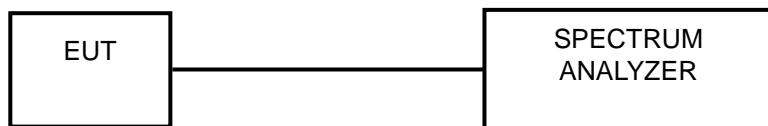


## 4.4 Dwell Time on Each Channel

### 4.4.1 Limits of Dwell Time on Each Channel Measurement

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

### 4.4.2 Test Setup



### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.4 Test Procedures

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency to 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.

.

### 4.4.5 Deviation from Test Standard

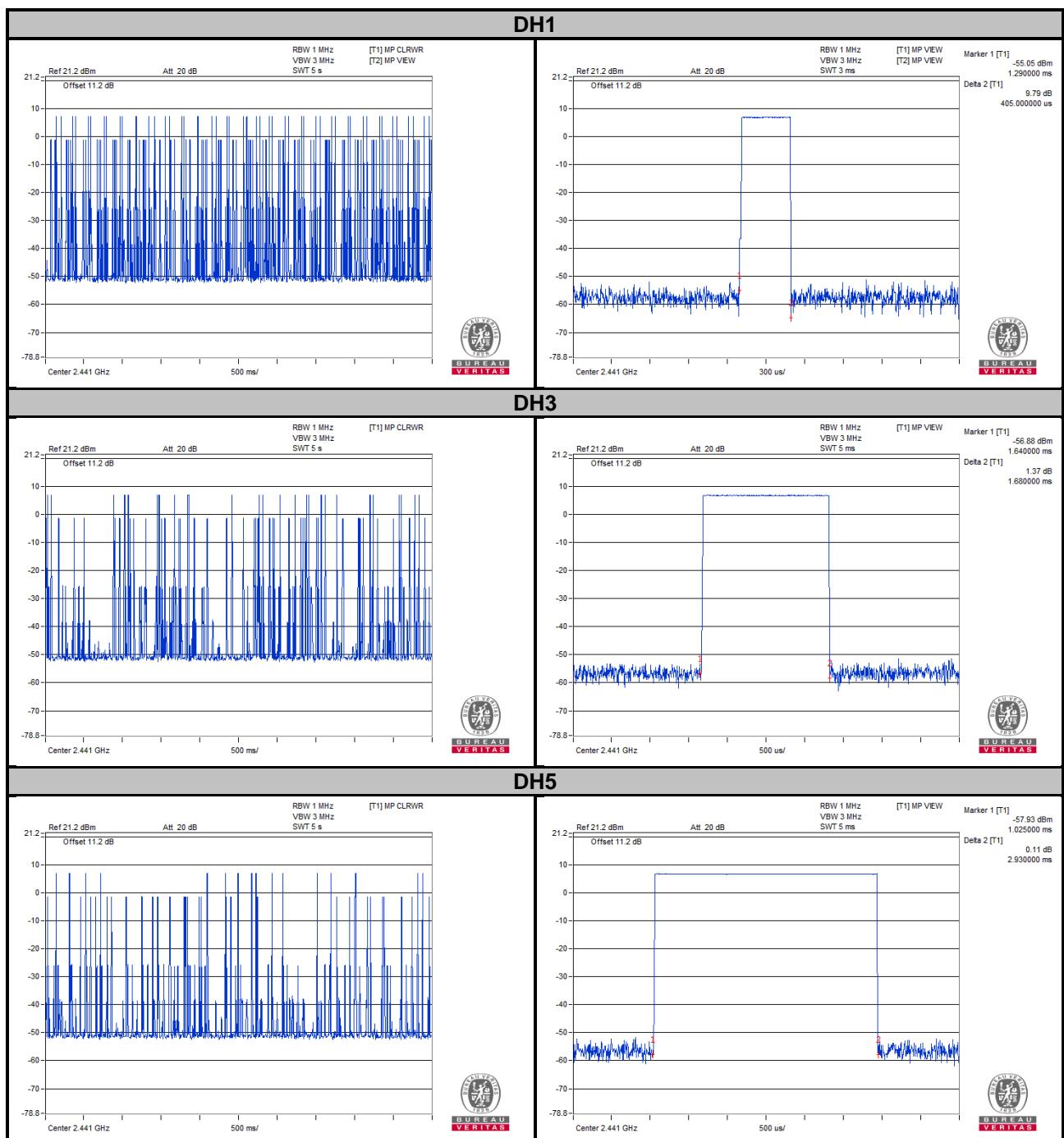
No deviation.

#### 4.4.6 Test Results

##### GFSK

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
DH1	50 (times / 5 sec) * 6.32 = 316 times	0.405	128	0.4
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.68	276.1	0.4
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.93	296.3	0.4

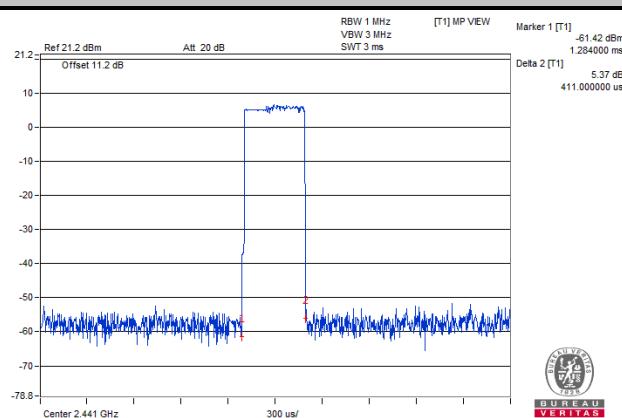
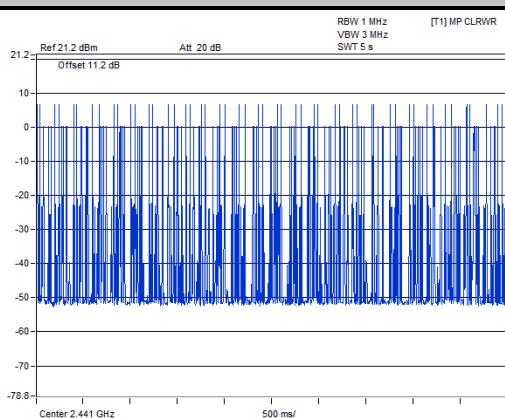
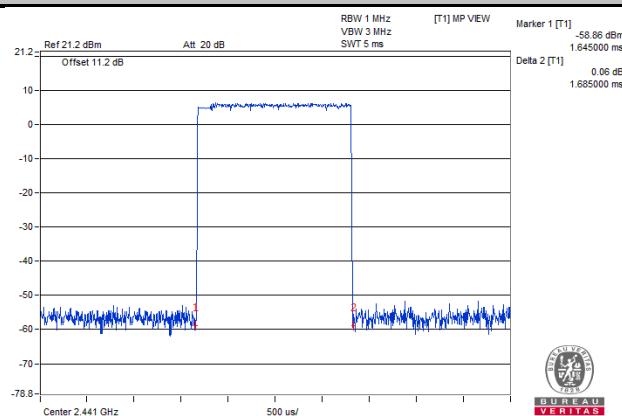
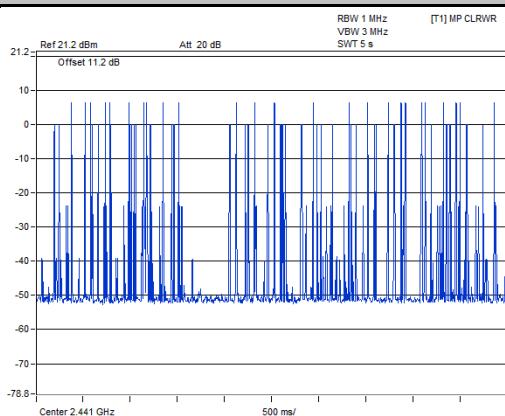
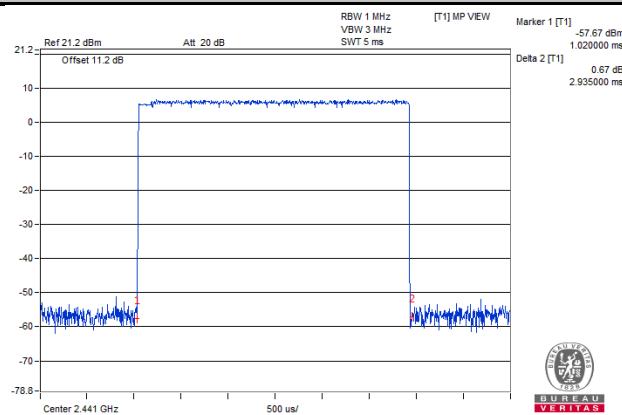
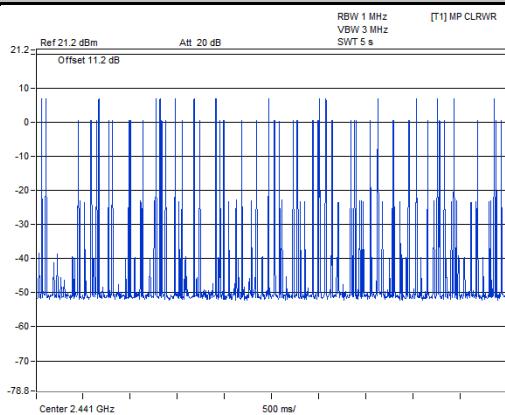
**Note:** Test plots of the transmitting time slot are shown as below.



**Π/4-DQPSK**

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
2DH1	50 (times / 5 sec) * 6.32 = 316 times	0.411	129.9	0.4
2DH3	25 (times / 5 sec) * 6.32 = 158 times	1.685	266.2	0.4
2DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.935	296.8	0.4

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

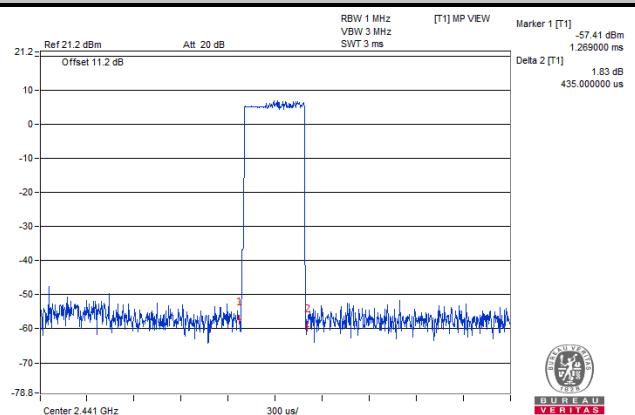
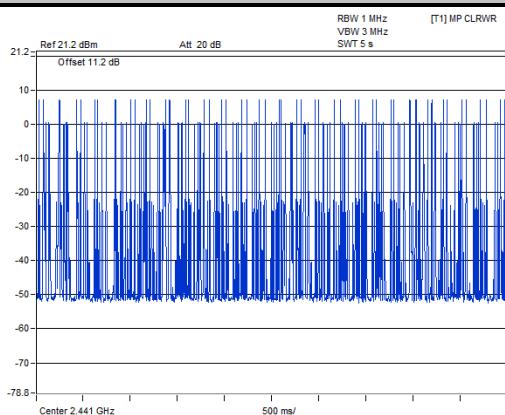
**2DH1**

**2DH3**

**2DH5**


## 8DPSK

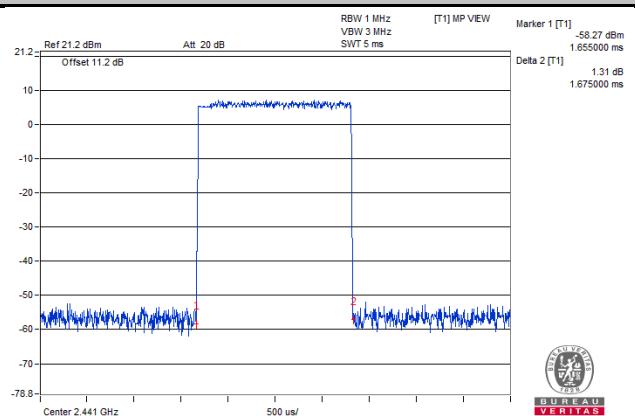
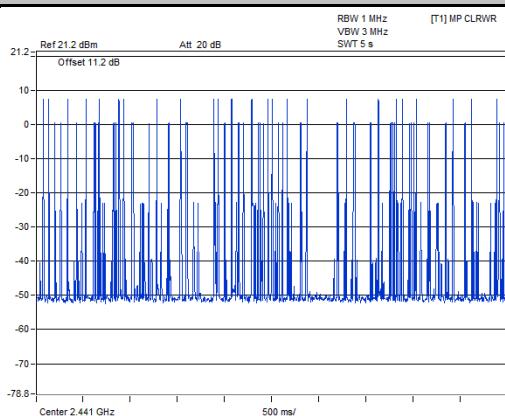
Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
3DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.435	140.2	0.4
3DH3	25 (times / 5 sec) * 6.32 = 158 times	1.675	264.7	0.4
3DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.935	296.8	0.4

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

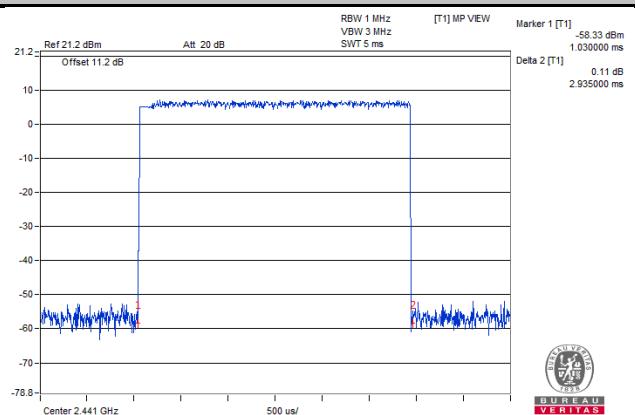
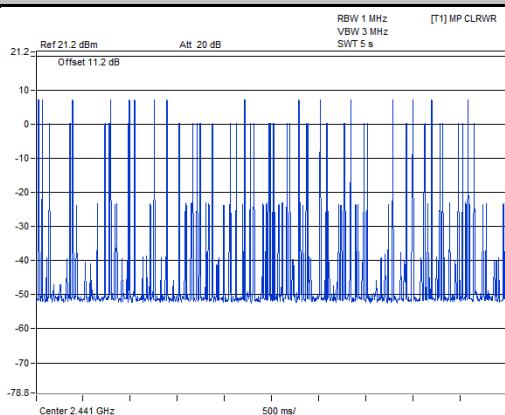
### 3DH1



### 3DH3



### 3DH5

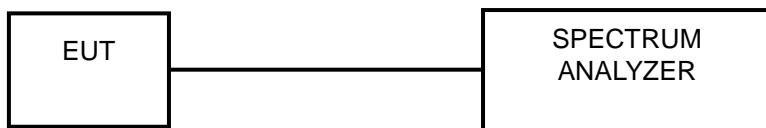


## 4.5 Channel Bandwidth

### 4.5.1 Limits of Channel Bandwidth Measurement

For frequency hopping system operating in the 2400-2483.5 MHz, if the 20 dB bandwidth of hopping channel is greater than 25 kHz, two-thirds 20 dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

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

### 4.5.5 Deviation from Test Standard

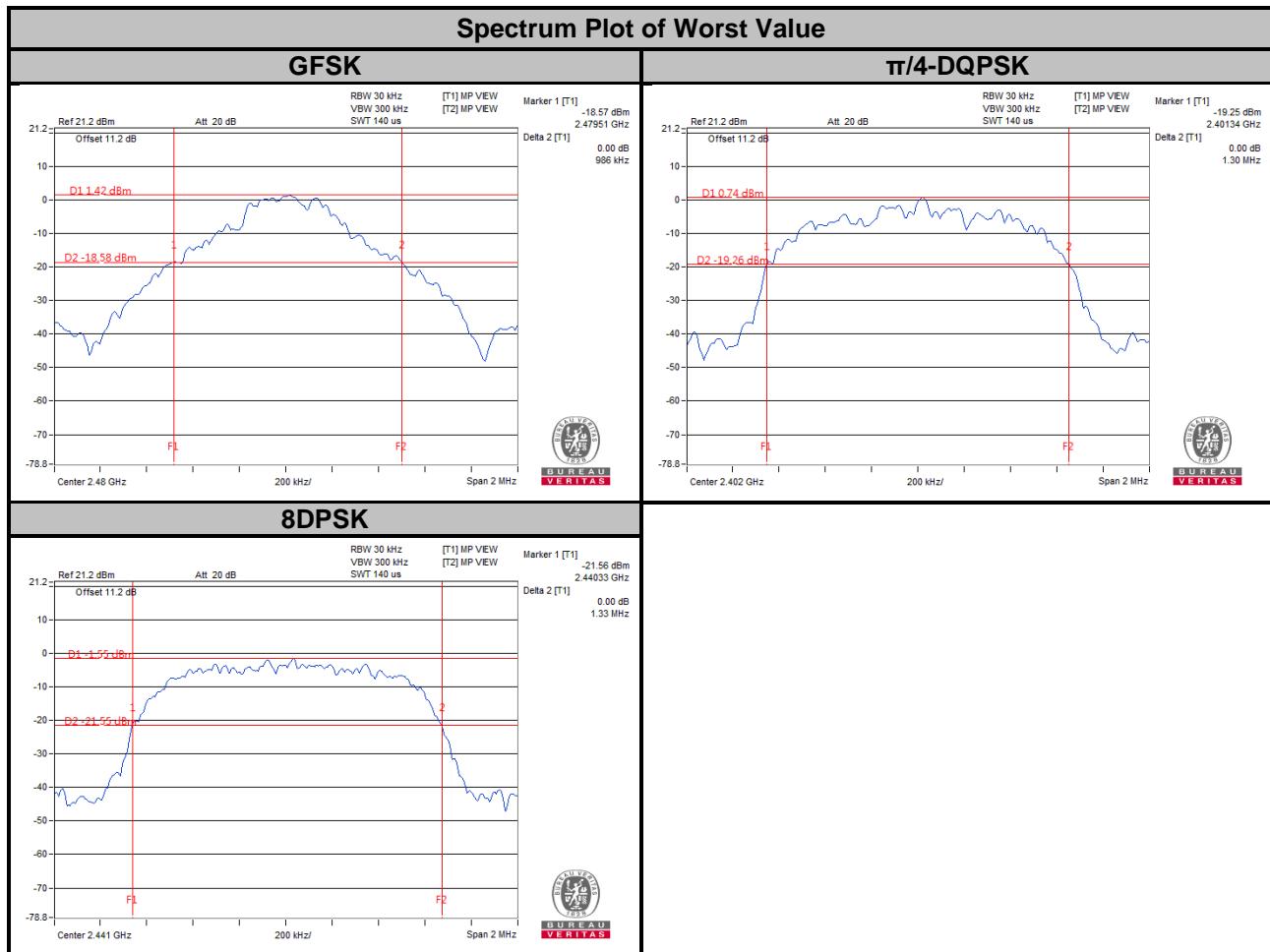
No deviation.

### 4.5.6 EUT Operating Condition

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

#### 4.5.7 Test Results

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)		
		GFSK	$\pi/4$ -DQPSK	8DPSK
0	2402	0.94	1.30	1.29
39	2441	0.94	1.30	1.33
78	2480	0.98	1.30	1.30

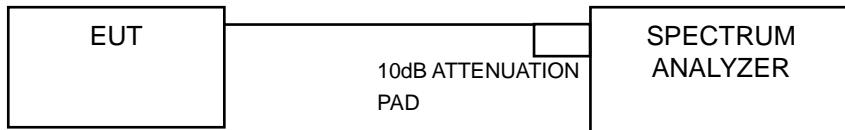


## 4.6 Hopping Channel Separation

### 4.6.1 Limits of Hopping Channel Separation Measurement

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

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

#### Measurement Procedure REF

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

### 4.6.5 Deviation from Test Standard

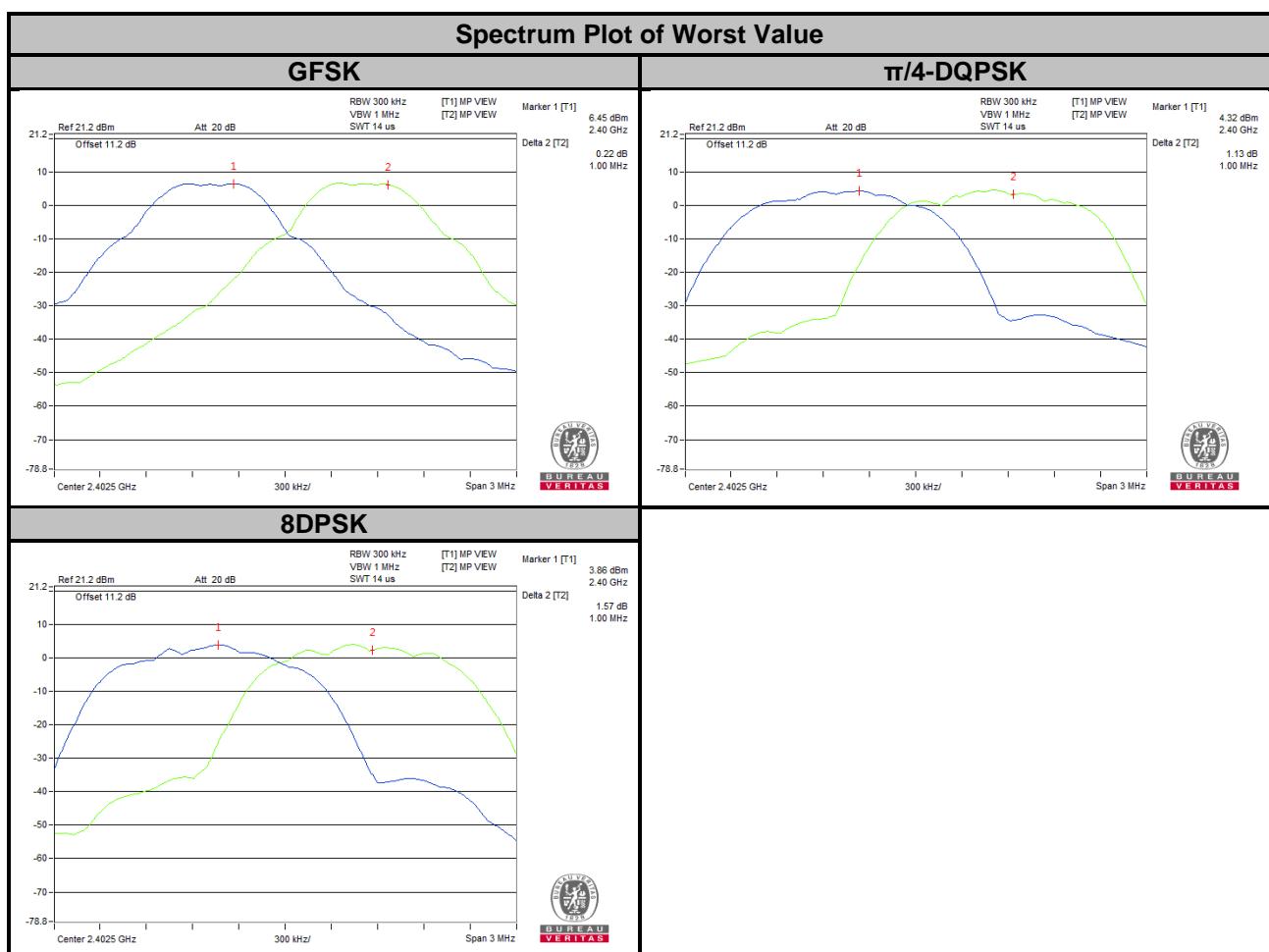
No deviation.

#### 4.6.6 Test Results

Channel	Freq. (MHz)	Adjacent Channel Separation (MHz)			20 dB Bandwidth (MHz)			Minimum Limit (MHz)			Pass / Fail
		GFSK	$\pi/4$ -DQPSK	8DPSK	GFSK	$\pi/4$ -DQPSK	8DPSK	GFSK	$\pi/4$ -DQPSK	8DPSK	
0	2402	1.00	1.00	1.00	0.94	1.30	1.29	0.63	0.87	0.86	Pass
39	2441	1.00	1.00	1.00	0.94	1.30	1.33	0.63	0.87	0.89	Pass
78	2480	1.00	1.00	1.00	0.98	1.30	1.30	0.66	0.87	0.87	Pass

**Note:**

1. The minimum limit is two-third 20 dB bandwidth.

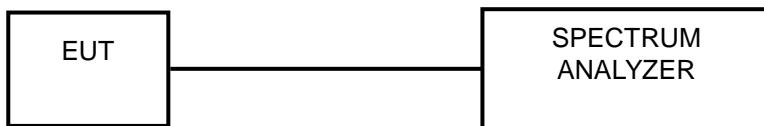


## 4.7 Maximum Output Power

### 4.7.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125 mW.

### 4.7.2 Test Setup



### 4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.7.4 Test Procedure

- 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. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

### 4.7.5 Deviation from Test Standard

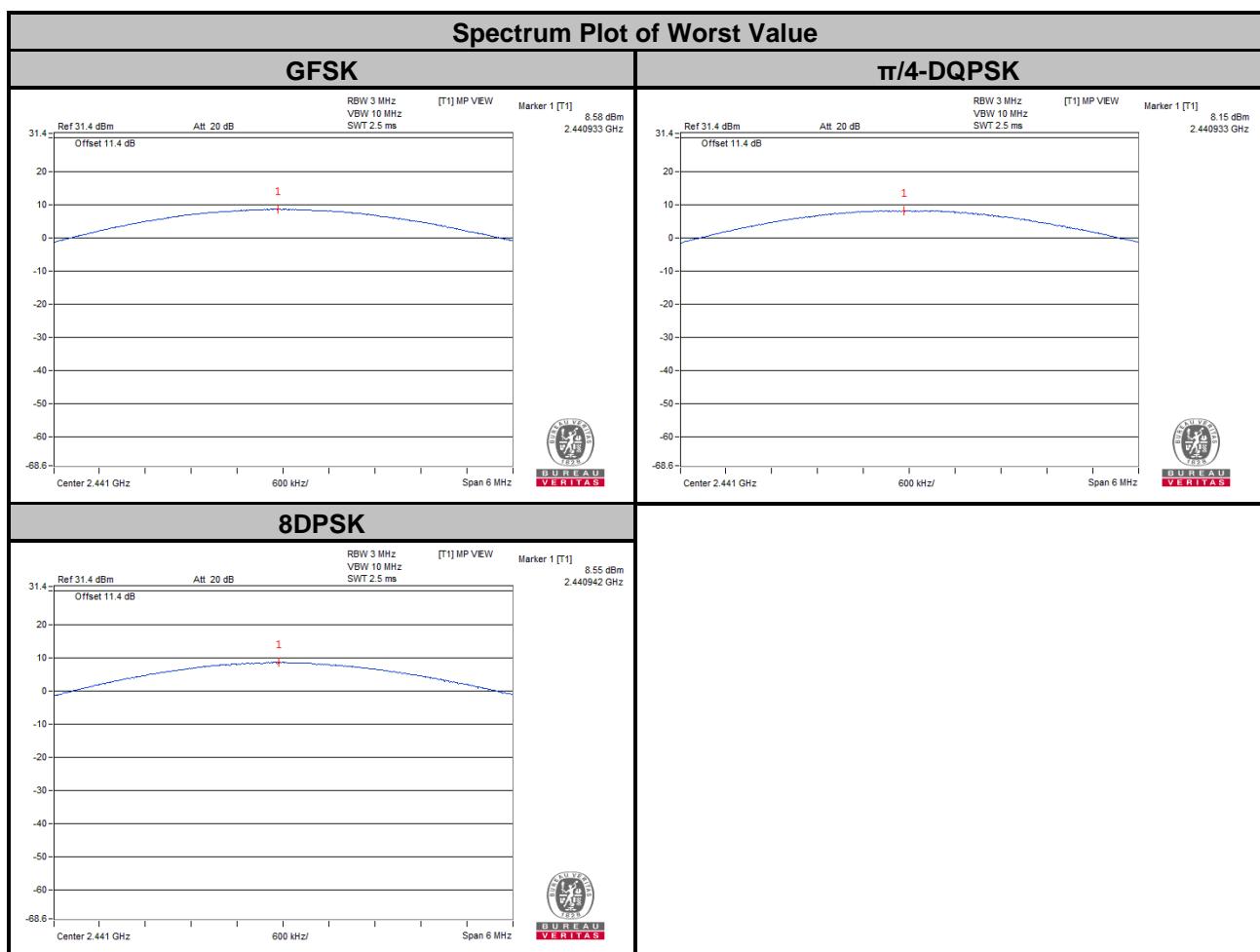
No deviation.

### 4.7.6 EUT Operating Condition

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

#### 4.7.7 Test Results

Channel	Freq. (MHz)	Output Power (mW)			Output Power (dBm)			Power Limit (mW)	Pass / Fail
		GFSK	$\pi/4$ -DQPSK	8DPSK	GFSK	$\pi/4$ -DQPSK	8DPSK		
0	2402	6.095	5.623	6.152	7.85	7.50	7.89	125	Pass
39	2441	<b>7.211</b>	6.531	7.161	8.58	8.15	8.55	125	Pass
78	2480	4.786	4.416	4.819	6.80	6.45	6.83	125	Pass



## 4.8 Conducted Out of Band Emission Measurement

### 4.8.1 Limits Of Conducted Out Of Band Emission Measurement

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

### 4.8.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.8.3 Test Procedure

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

### 4.8.4 Deviation from Test Standard

No deviation.

### 4.8.5 EUT Operating Condition

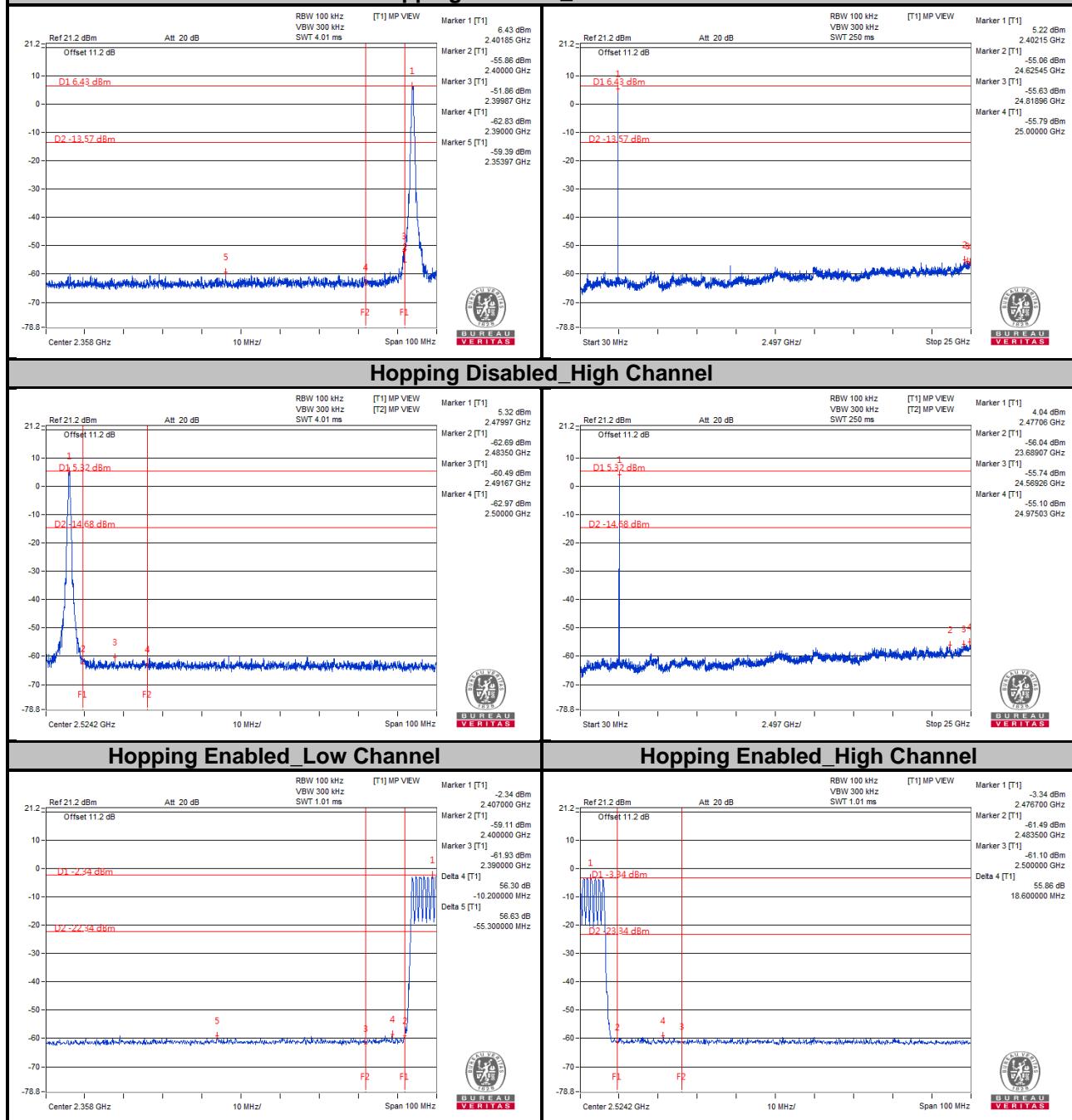
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

### 4.8.6 Test Results

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

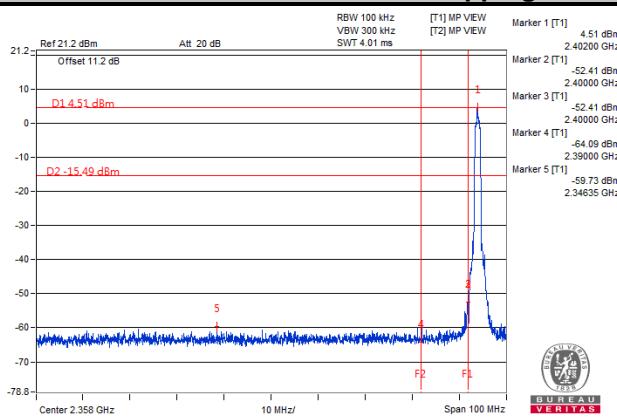
## GFSK

## **Hopping Disabled\_Low Channel**

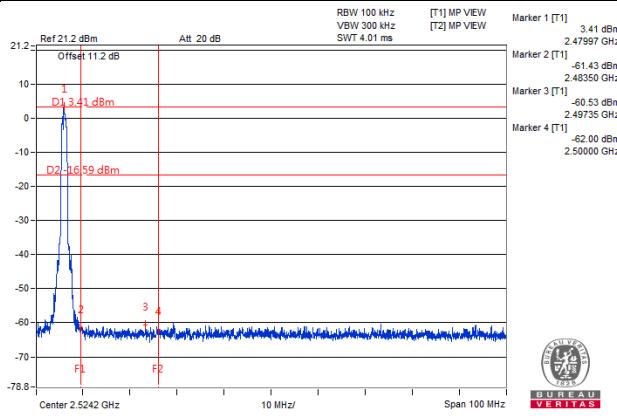


$\pi/4$ -DQPSK

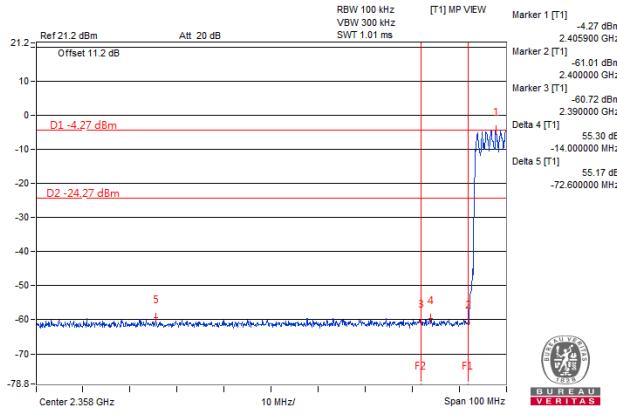
Hopping Disabled\_Low Channel



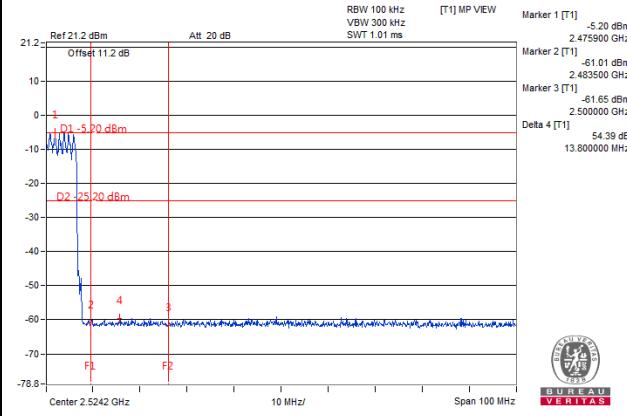
Hopping Disabled\_High Channel



Hopping Enabled\_Low Channel

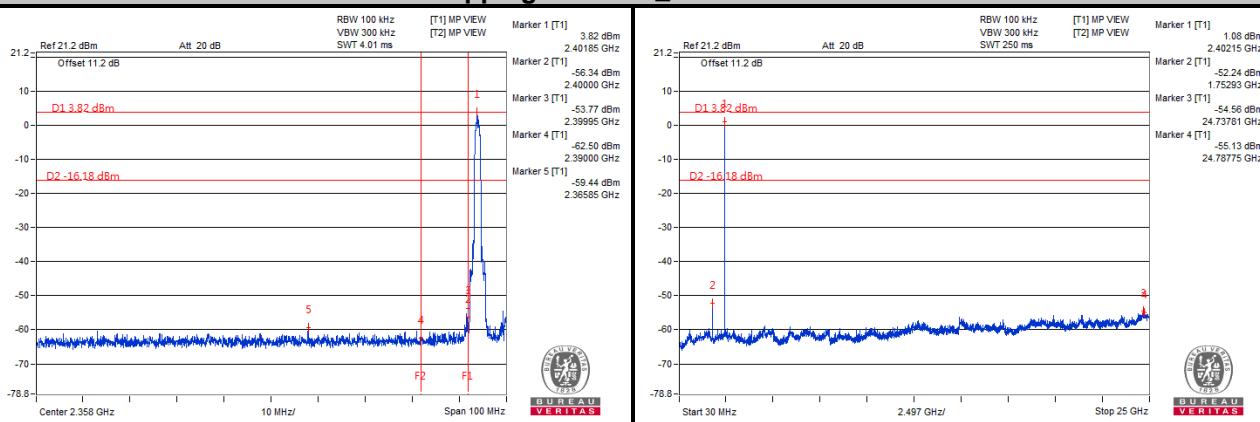


Hopping Enabled\_Low Channel

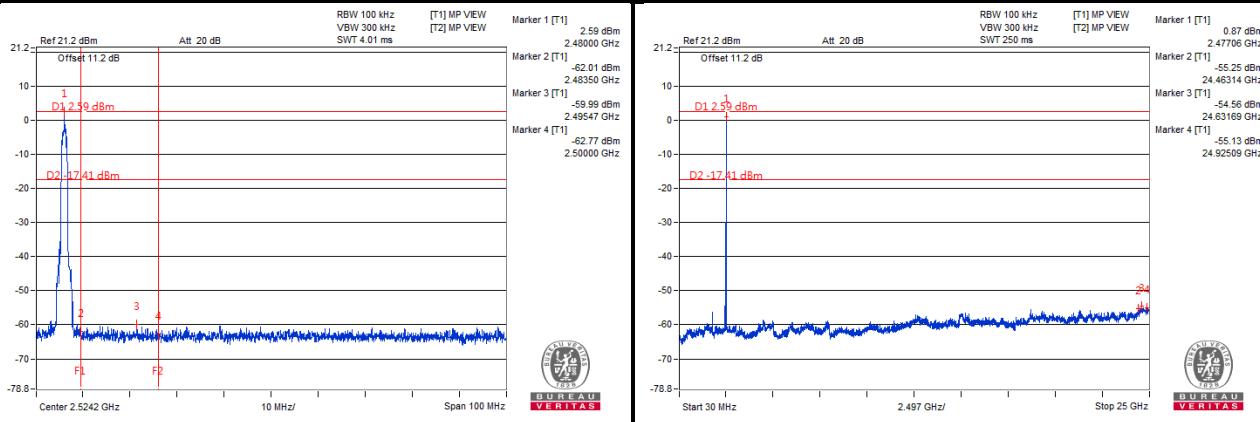


## 8DPSK

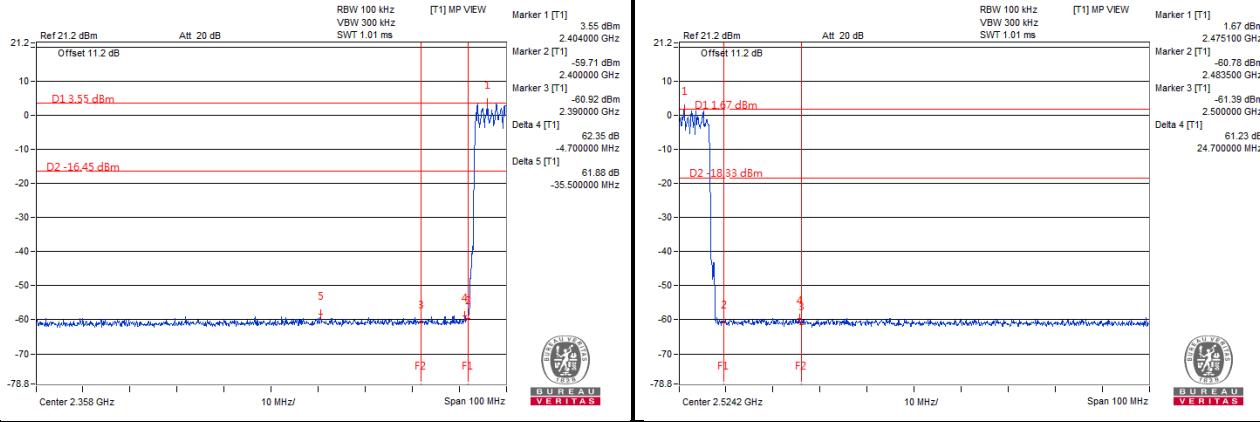
### Hopping Disabled\_Low Channel



### Hopping Disabled\_High Channel



### Hopping Enabled\_Low Channel



## 5 Pictures of Test Arrangements

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

## Appendix – Information on 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 accredited and approved according to ISO/IEC 17025.

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

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

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