FCC TEST REPORT

REPORT NO.: RF980924H03

MODEL NO.: AR5BBU12

RECEIVED: Sep. 24, 2009

TESTED: Sep. 30 to Oct. 08, 2009

ISSUED: Oct. 28, 2009

APPLICANT: Atheros Communications, Inc.

ADDRESS: 5480 Great America Parkway, Santa Clara, CA 95054

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB LOCATION: No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

TABLE OF CONTENTS

1 CERTIFICATION

PRODUCT :	Bluetooth v2.1+EDR USB module
BRAND NAME :	Atheros
MODEL NO. :	AR5BBU12
APPLICANT :	Atheros Communications, Inc.
TESTED DATE :	Sep. 30 to Oct. 08, 2009
TEST SAMPLE :	R&D SAMPLE
STANDARDS :	47 CFR Part 15, Subpart C (Section 15.247), ANSI C63.4-2003

The above equipment (Model: AR5BBU12) 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 : Sunny Wen , **DATE:** *Oct. 28, 2009*
(Sunny Wen, Specialist)

TECHNICAL ACCEPTANCE : , **DATE:** *Oct. 28, 2009*
(Hank Chung, Deputy Manager)

APPROVED BY : , **DATE:** *Oct. 28, 2009*
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -16.79dB at 0.209MHz
15.247(a)(1)(I)-(ii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit
15.247(a)(1)(ii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit
15.247(a)(1)(I)-(ii)	Hopping Channel Separation Spec. : Min. 25 kHz or two-thirds of 20 dB bandwidth, which ever is greater	PASS	Meet the requirement of limit
15.247(a)(2)	Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Report reference
15.247(b)	Maximum Peak Output Power Spec.: max. 125mW	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -1.27dB at 84.00MHz
15.247(c)	Conducted Out-Band Emissions Measurement	PASS	Meet the requirement of limit

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.44 dB
Radiated emissions (30MHz-1GHz)	3.94 dB
Radiated emissions (1GHz ~18GHz)	2.49 dB
Radiated emissions (18GHz ~40GHz)	2.70 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth v2.1+EDR USB module
MODEL NO.	AR5BBU12
FCC ID	PPD-AR5BBU12
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	GFSK, 8DPSK, π /4-DQPSK
MODULATION TECHNOLOGY	FHSS
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	2.223mW
ANTENNA TYPE	See item 3.2
DATA CABLE	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT was pre-tested under the following modes:

Test Mode	Description	Antenna Type
Mode A	X-Y plane	**PIFA**
Mode B	X-Z plane	
Mode C	**Y-Z plane**	
Mode D	X-Y plane	**Printed**
Mode E	X-Z plane	
Mode F	**Y-Z plane**	
Mode G	X-Y plane	**Chip**
Mode H	**X-Z plane**	
Mode I	Y-Z plane	

From the above modes, the worst emission levels were found in **Mode C, F & H**. Therefore only the test data of the modes were recorded in this report individually.

2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 ANTENNA SPECIFICATIONS

There are three antennas provided to this EUT, please refer to the following table:

Brand	Model No.	Antenna Connector	Antenna Type	Antenna Gain with cable loss (dBi)	Cable Loss (dB)	Cable Length (mm)
Wistron	81-EBJ15.005 (Aux)	IPEX	PIFA	3.62	1.15	300
Atheros	308-00001-000	NA	Printed	0	NA	NA
fractus	FR05-S1-N-0-001	NA	Chip	2.2	NA	NA

3.3 DESCRIPTION OF TEST MODES

Seventy-nine channels are provided to this EUT.

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

3.4 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	√	√	√	√	PIFA antenna
B		√	√	√	Printed antenna
C		√	√	√	Chip antenna

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz
RE≥1G: Radiated Emission above 1GHz APCM: Antenna Port Conducted Measurement

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.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT Configure Mode
0 to 78	78	FHSS	8DPSK	DH5	A

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.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT Configure Mode
0 to 78	78	FHSS	8DPSK	DH5	A, B, C

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.

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

Conducted Out-Band Measurement:

☒ 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.

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

Antenna Port Conducted Measurement:

☒ 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.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type	EUT Configure Mode
0 to 78	0, 39, 78	FHSS	GFSK	DH5	A, B, C
0 to 78	0, 39, 78	FHSS	8DPSK	DH5	A, B, C
0 to 78	0, 39, 78	FHSS	π/4-DQPSK	DH5	A, B, C

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth v2.1+EDR USB module. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)
ANSI C63.4 : 2003

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

3.6 DESCRIPTION OF SUPPORT UNITS

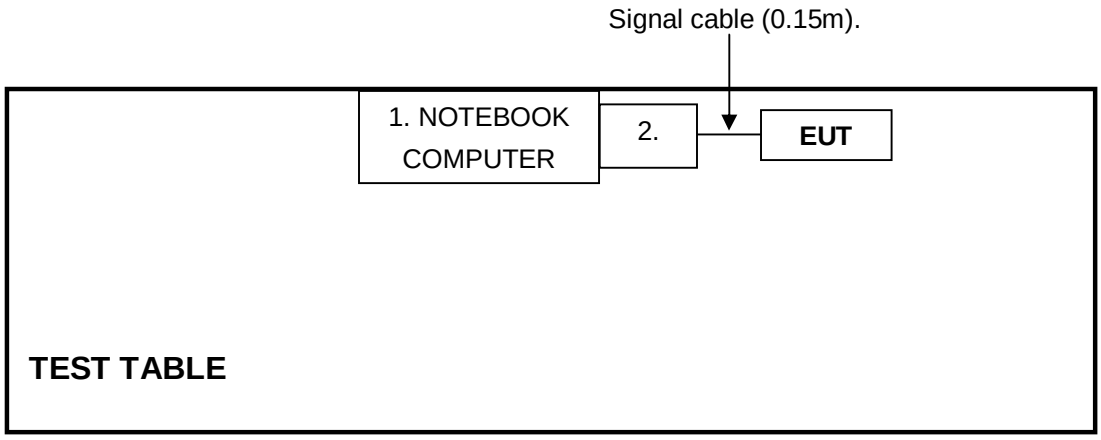
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	LENOVO	0769	NA	NA
2	TEST TOOL	Atheros	NA	NA	NA

No.	Signal cable description
1	NA
2	Signal cable 0.15m.

Note: 1. All power cords of the above support units are unshielded (1.8m).

3.7 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 23, 2009	Mar. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100071	Nov. 26, 2008	Nov. 25, 2009
Line-Impedance Stabilization Network (for EUT)	ESH3-Z5	848773/004	Nov. 05, 2008	Nov. 04, 2009
RF Cable (JYEBAO)	5DFB	COBCAB-001	Aug. 15, 2009	Aug. 14, 2010
50 ohms Terminator	50	3	Nov. 05, 2008	Nov. 04, 2009
Software	BV ADT_Cond_V7.3.7	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 Shielded Room No. B.
3 The VCCI Con B Registration No. is C-2193.

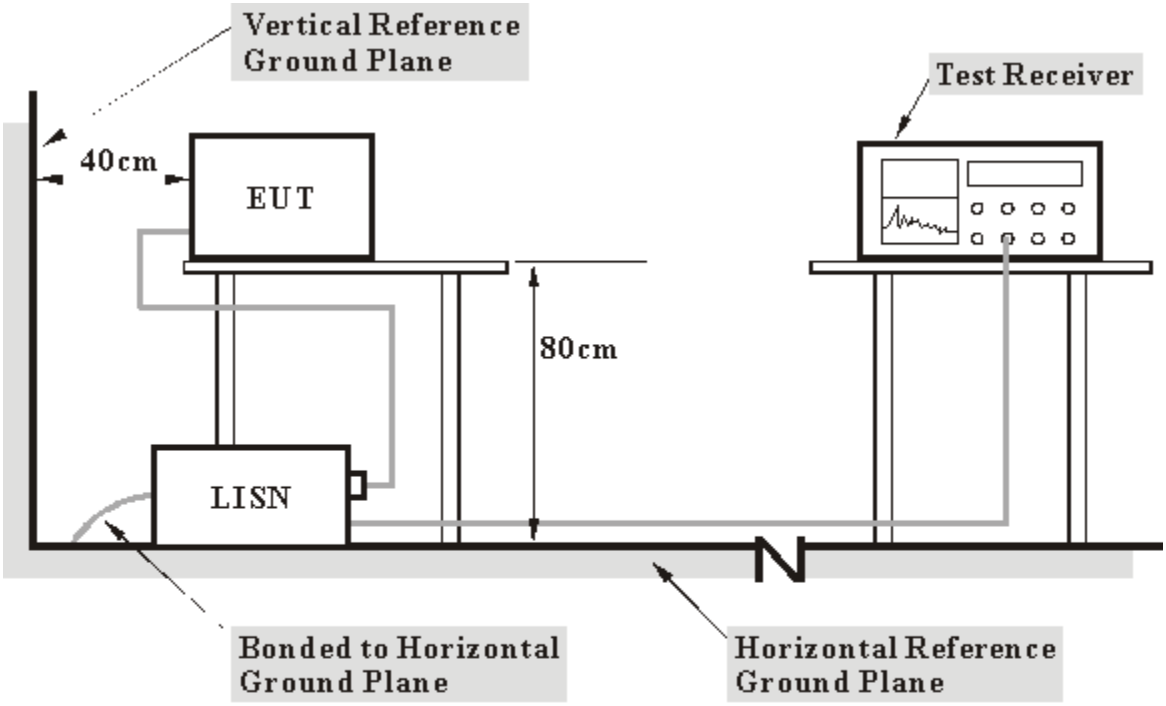
4.1.3 TEST PROCEDURES

a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/ 50uH of coupling impedance for the measuring instrument.

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

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.5 EUT OPERATING CONDITIONS

a. Connect the EUT with the support unit 1 (Notebook computer) which placed on a testing table.

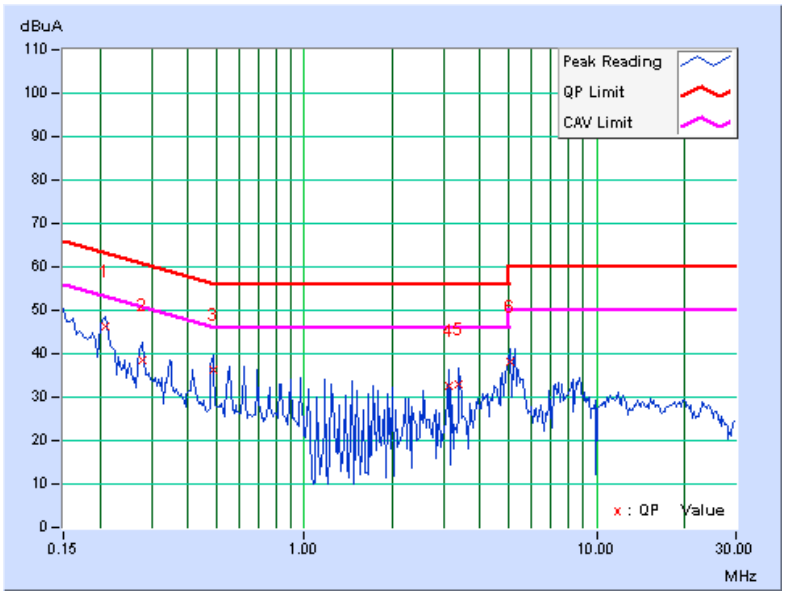
b. The support unit 1 (Notebook computer) ran a test program “BtUSB_V1_0_B7” to enable EUT under transmission condition continuously.

4.1.6 TEST RESULTS

INPUT POWER (SYSTEM)	120Vac, 60 Hz	**6DB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 63%RH, 965 hPa	**PHASE**	Line (L)
TESTED BY	Wen Yu		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.209**	**0.18**	**46.29**	**-**	**46.47**	**-**	**63.26**	**53.26**	**-16.79**	**-**
2	0.279	0.18	38.48	-	38.66	-	60.85	50.85	-22.18	-
3	0.486	0.23	36.13	-	36.36	-	56.24	46.24	-19.88	-
4	3.109	0.58	32.03	-	32.61	-	56.00	46.00	-23.39	-
5	3.384	0.59	32.45	-	33.04	-	56.00	46.00	-22.96	-
6	5.043	0.69	37.48	-	38.17	-	60.00	50.00	-21.83	-

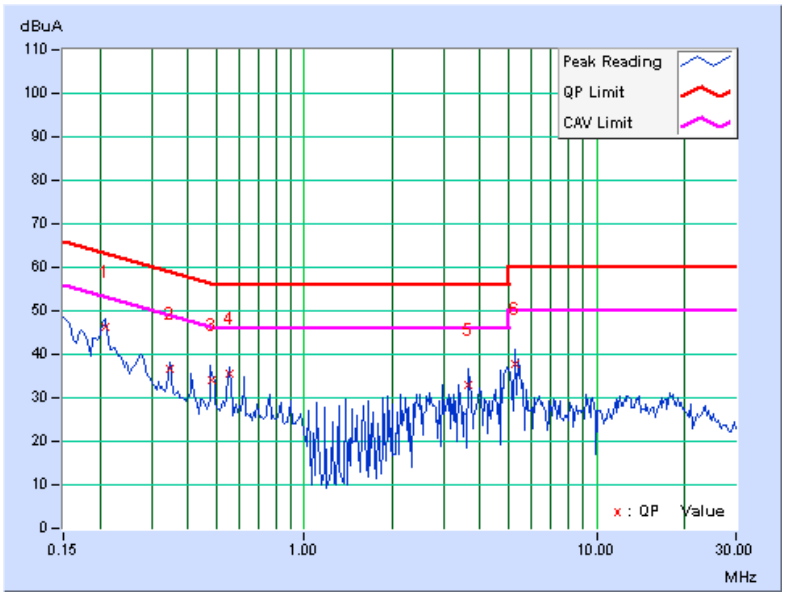
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



INPUT POWER (SYSTEM)	120Vac, 60 Hz	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 63%RH, 965 hPa	**PHASE**	Neutral (N)
TESTED BY	Wen Yu		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.209	0.11	46.03	-	46.14	-	63.26	53.26	-17.12	-
2	0.345	0.12	36.42	-	36.54	-	59.07	49.07	-22.53	-
3	0.485	0.16	34.05	-	34.21	-	56.26	46.26	-22.04	-
4	0.552	0.19	35.24	-	35.43	-	56.00	46.00	-20.57	-
5	3.660	0.53	32.51	-	33.04	-	56.00	46.00	-22.96	-
6	5.250	0.61	37.12	-	37.73	-	60.00	50.00	-22.27	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

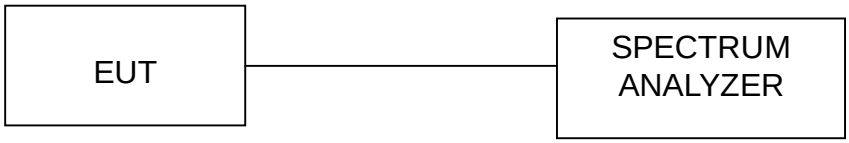
4.2.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

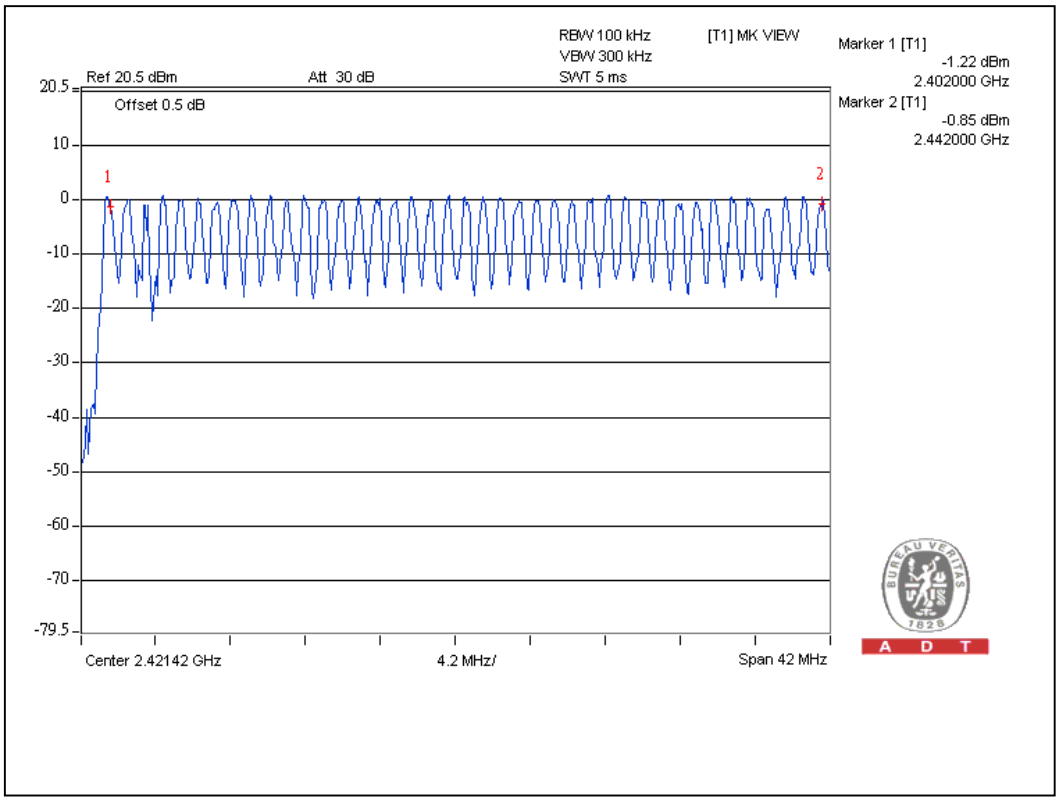
4.2.5 TEST SETUP

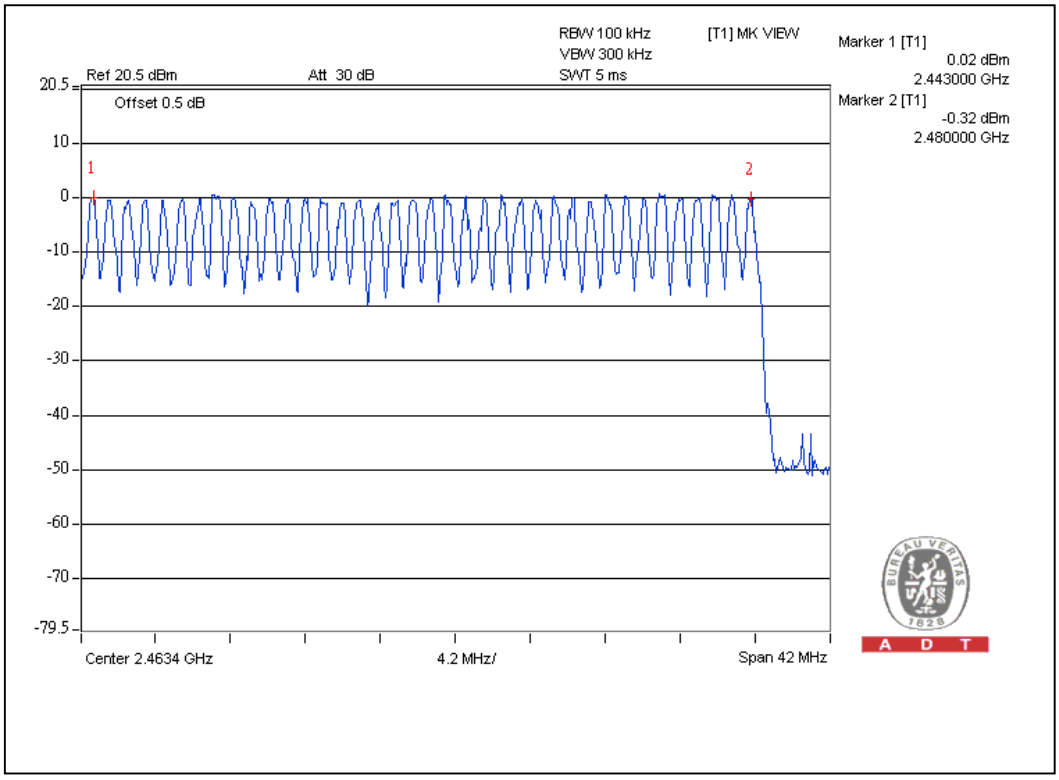


4.2.6 TEST RESULTS

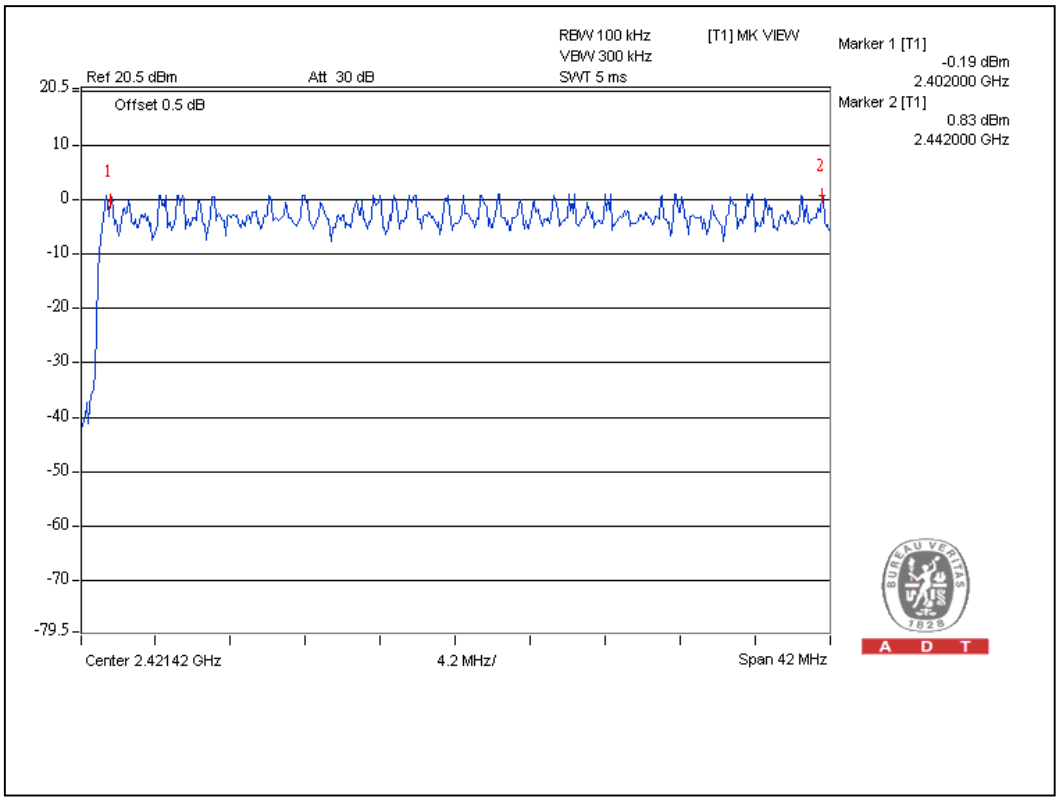
There are 79 hopping frequencies in the hopping mode. Please refer to next pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

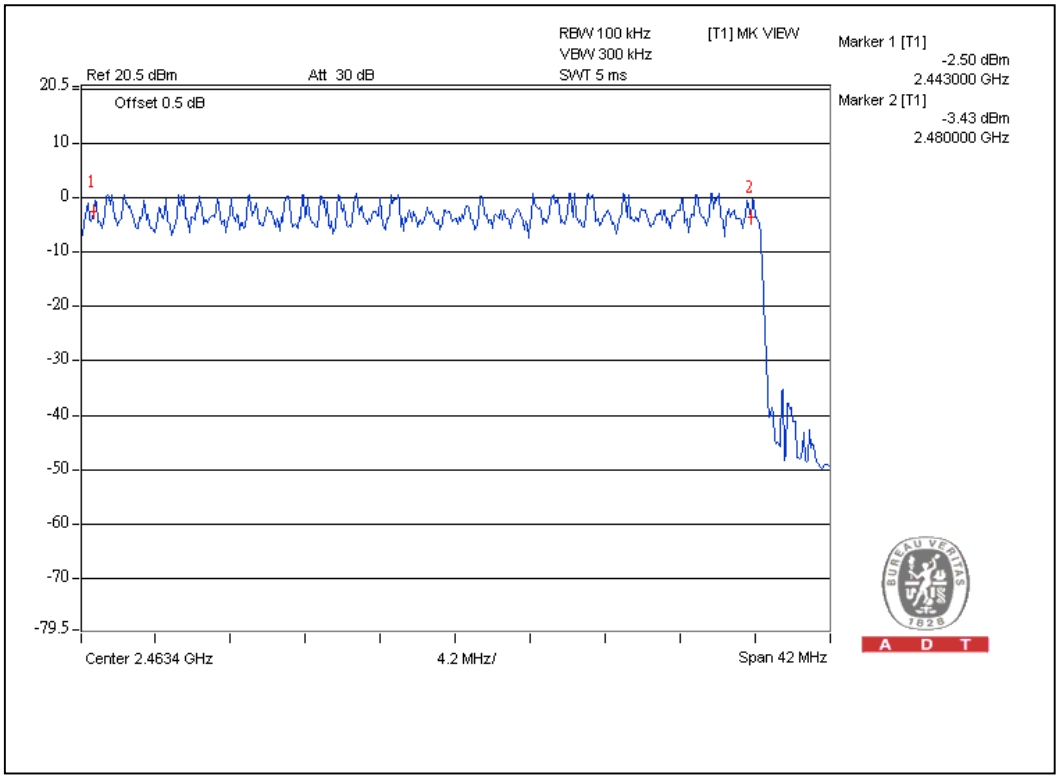
For GFSK :


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-1.22 dBm
2.402000 GHz
Marker 2 [T1]
-0.85 dBm
2.442000 GHz
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz

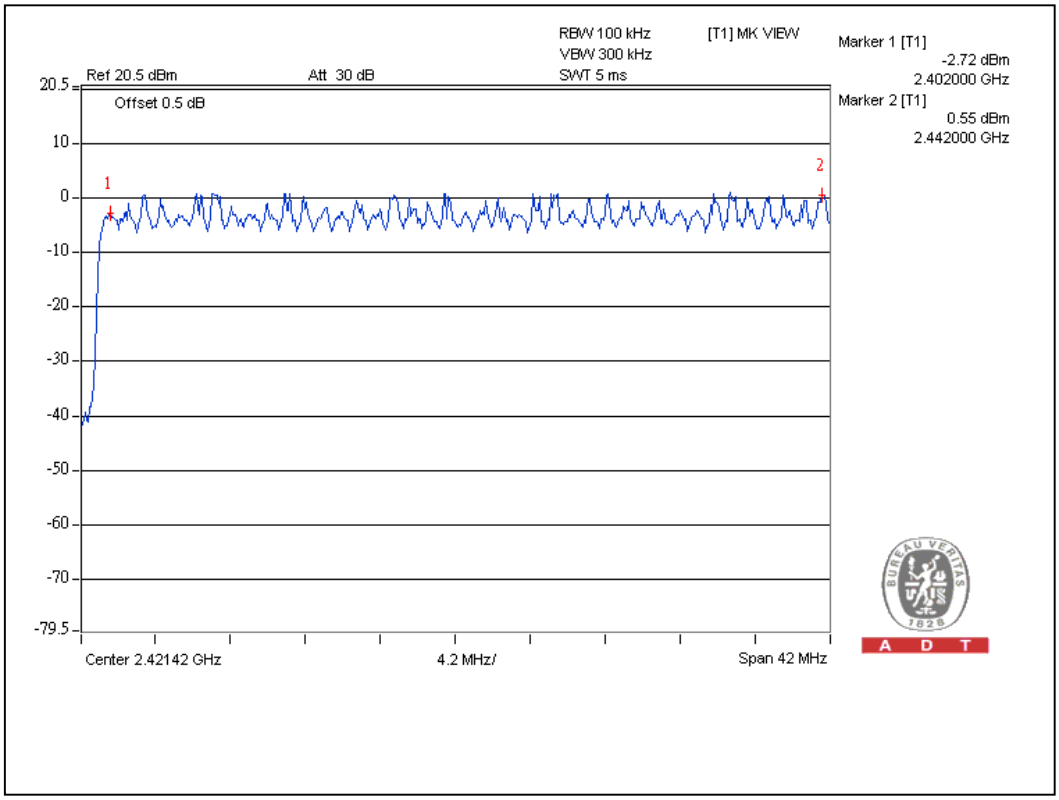

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
0.02 dBm
2.443000 GHz
Marker 2 [T1]
-0.32 dBm
2.480000 GHz
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

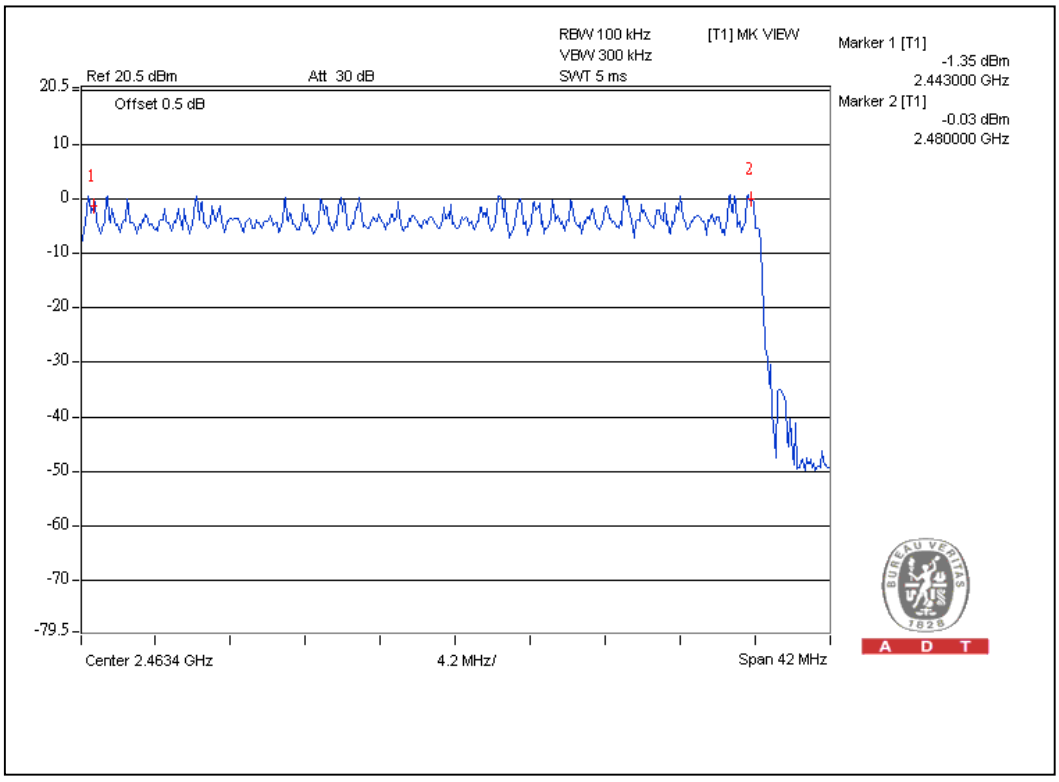
For 8DPSK :


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.19 dBm
2.402000 GHz
Marker 2 [T1]
0.83 dBm
2.442000 GHz
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-2.50 dBm
2.443000 GHz
Marker 2 [T1]
-3.43 dBm
2.480000 GHz
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.4634 GHz
4.2 MHz/
Span 42 MHz

For π /4-DQPSK :





4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

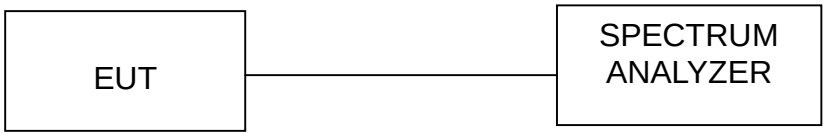
4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP

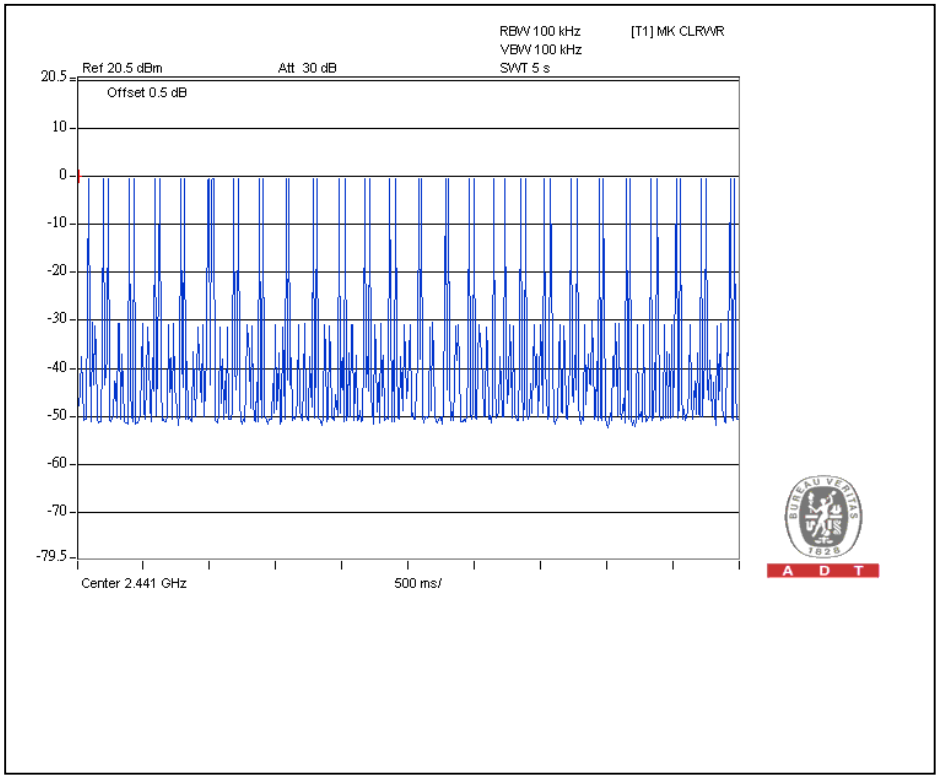


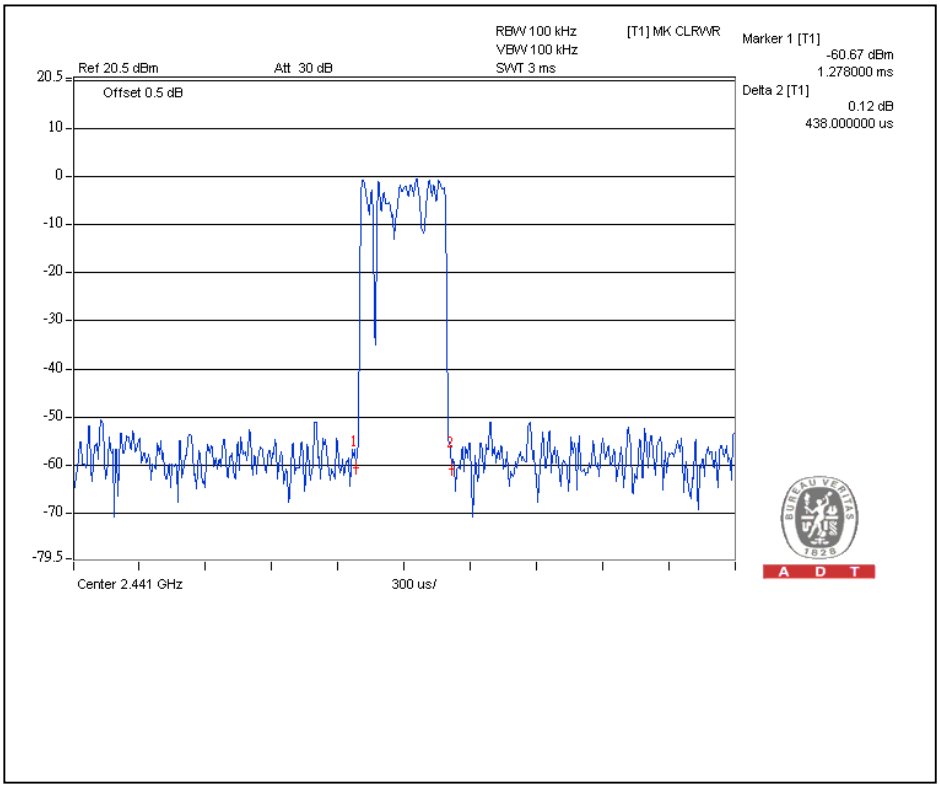
4.3.6 TEST RESULTS

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) *6.32=322.32 times	0.438	141.2	400
DH3	27 (times / 5 sec) *6.32=170.64 times	1.710	291.8	400
DH5	17 (times / 5 sec) *6.32=107.44 times	2.92	313.7	400

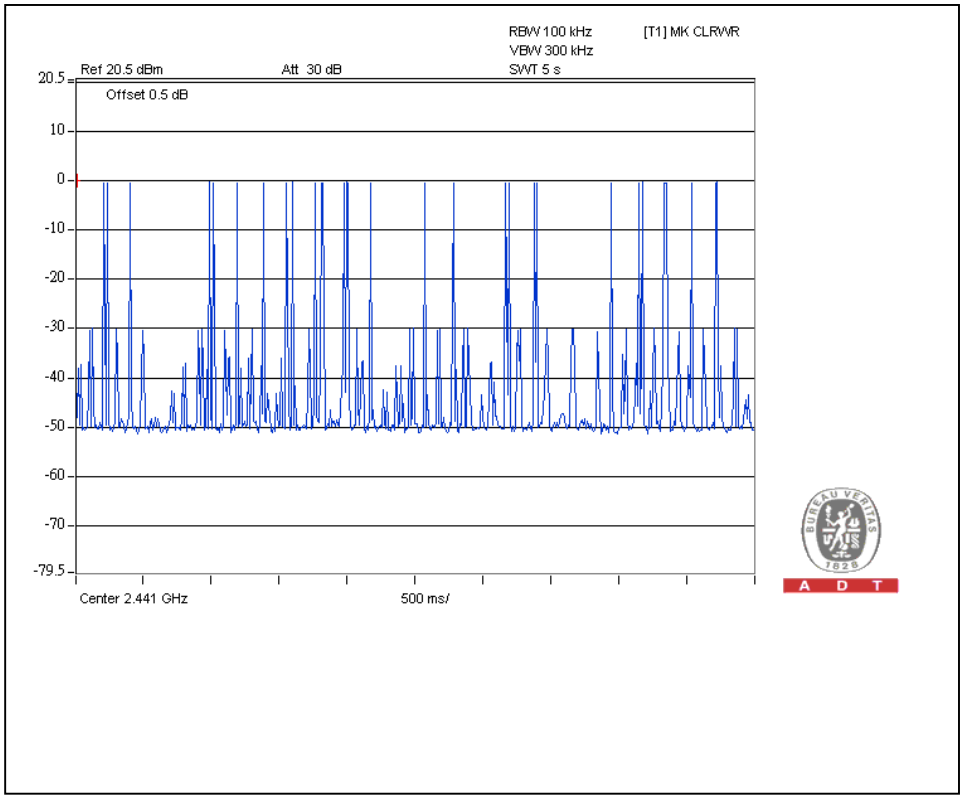
Test plots of the transmitting time slot are shown on next three pages.

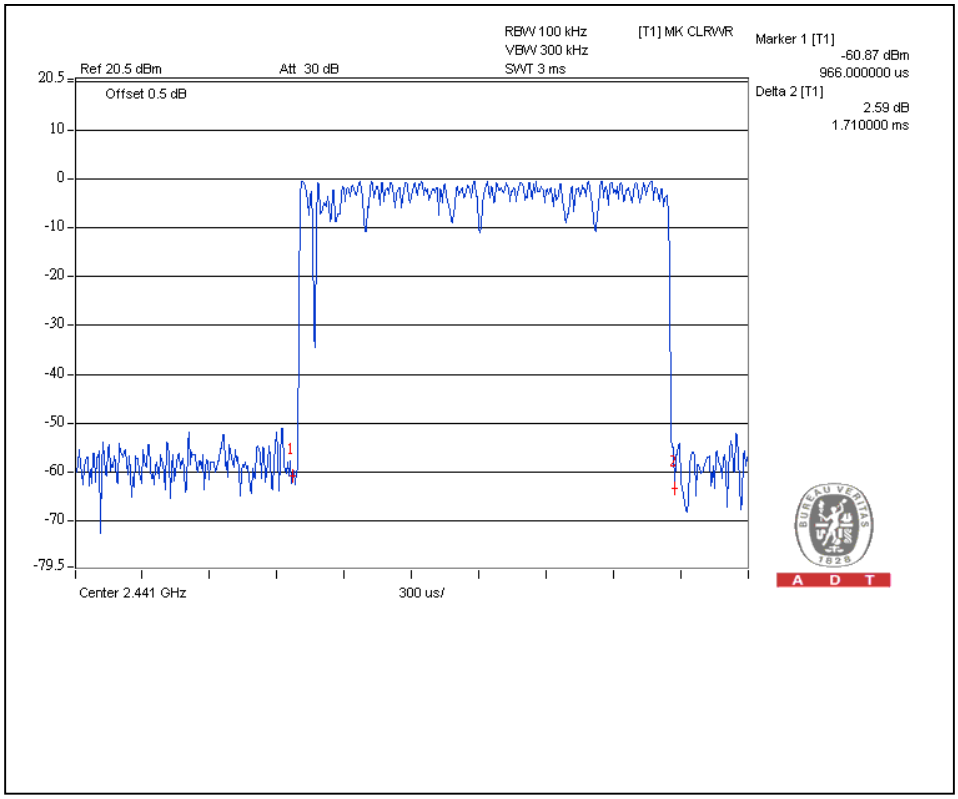
DH1


RBW 100 kHz
VBW 100 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
500 ms/

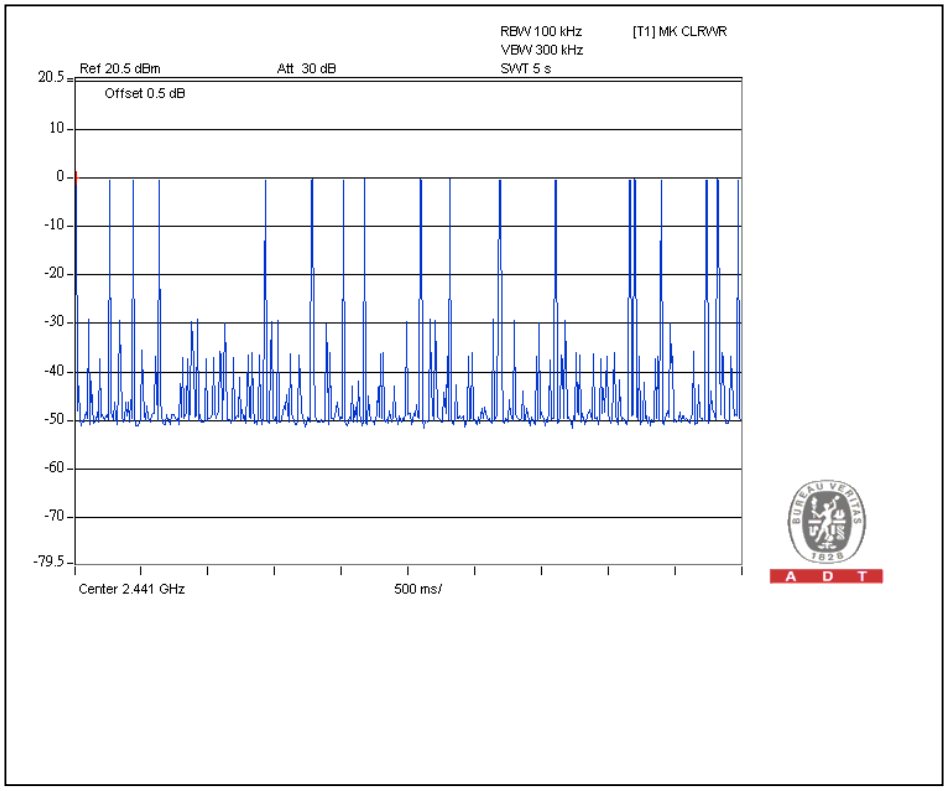

RBW 100 kHz
VBW 100 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-60.67 dBm
1.278000 ms
Delta 2 [T1]
0.12 dB
438.000000 us
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
300 us/

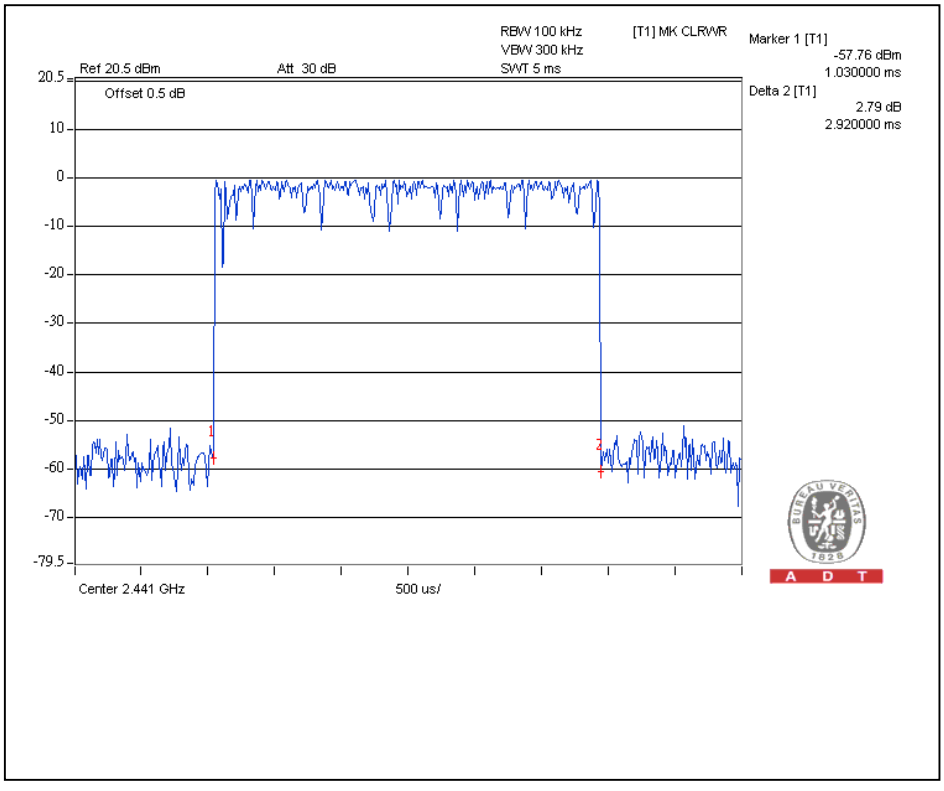
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-60.87 dBm
966.000000 us
Delta 2 [T1]
2.59 dB
1.710000 ms
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-57.76 dBm
1.030000 ms
Delta 2 [T1]
2.79 dB
2.920000 ms
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Center 2.441 GHz
500 us/

4.4 CHANNEL BANDWIDTH

4.4.1 LIMITS OF CHANNEL BANDWIDTH

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

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

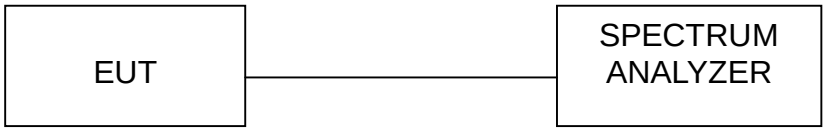
4.4.3 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. 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.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITION

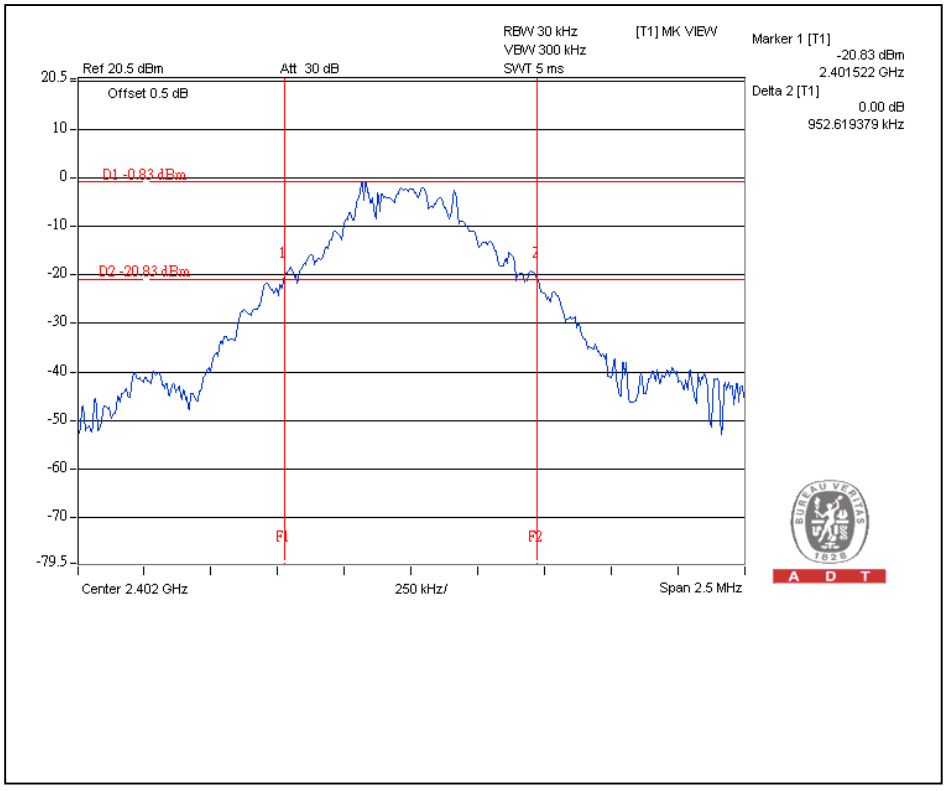
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.4.7 TEST RESULTS

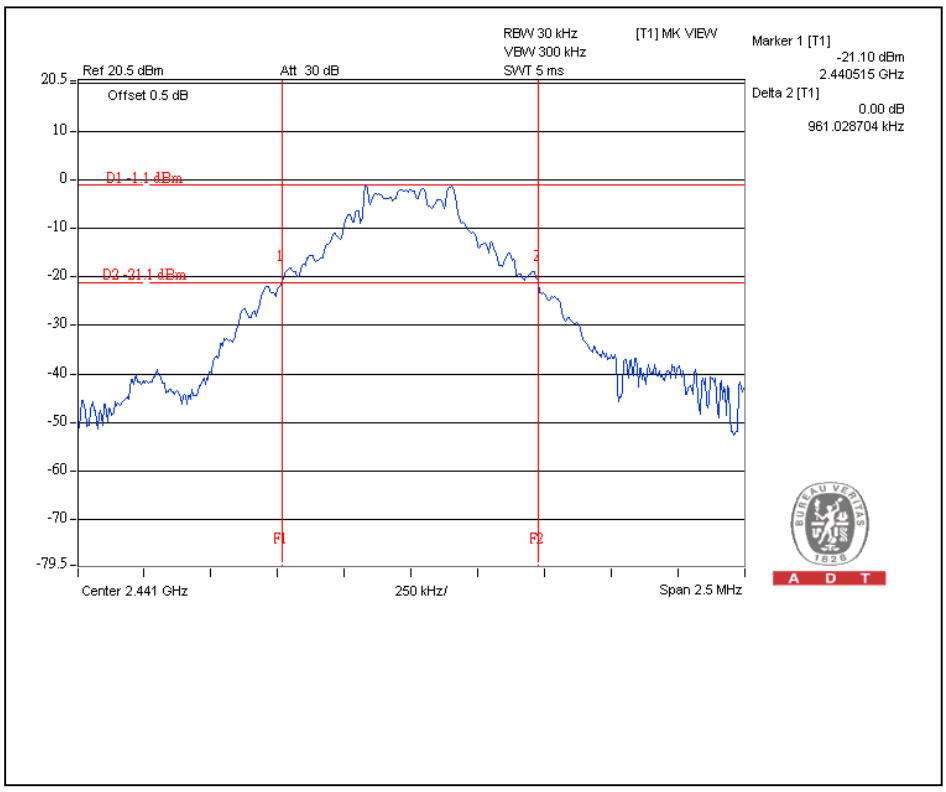
MODULATION TYPE	GFSK	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	TESTED BY	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.95
39	2441	0.96
78	2480	0.95

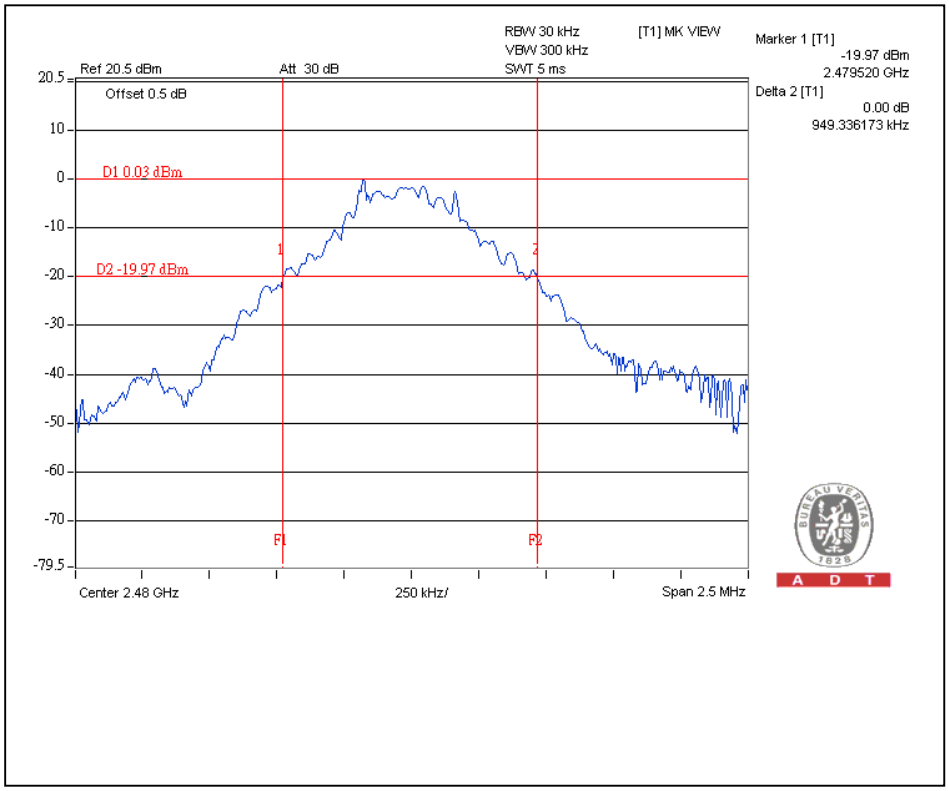
Channel 0



Channel 39



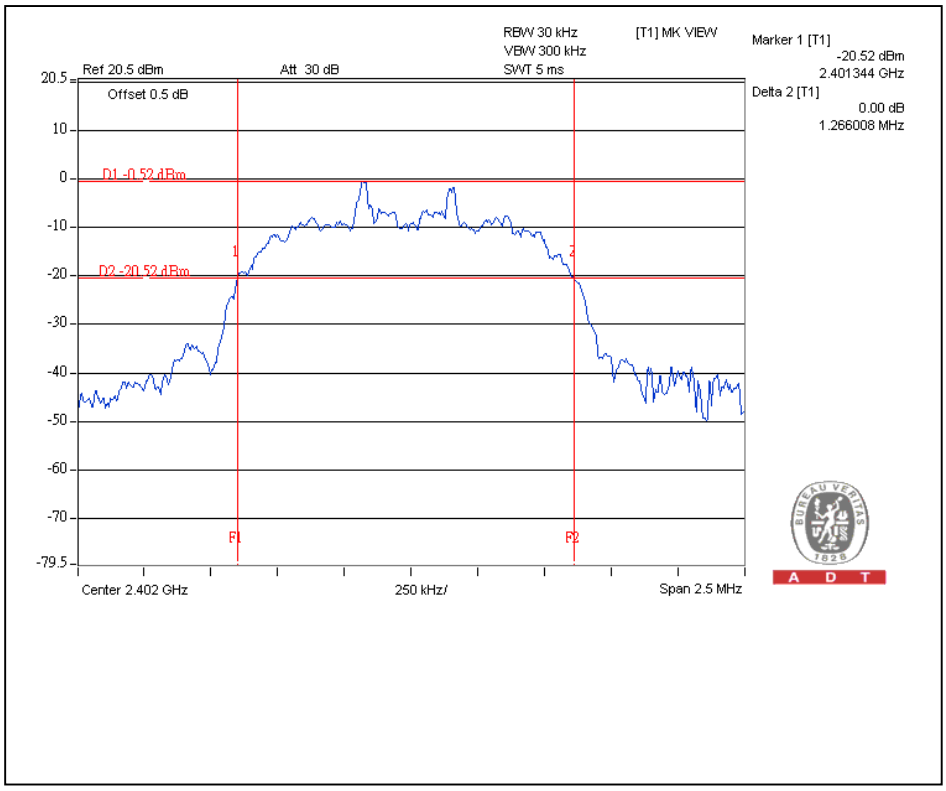
Channel 78



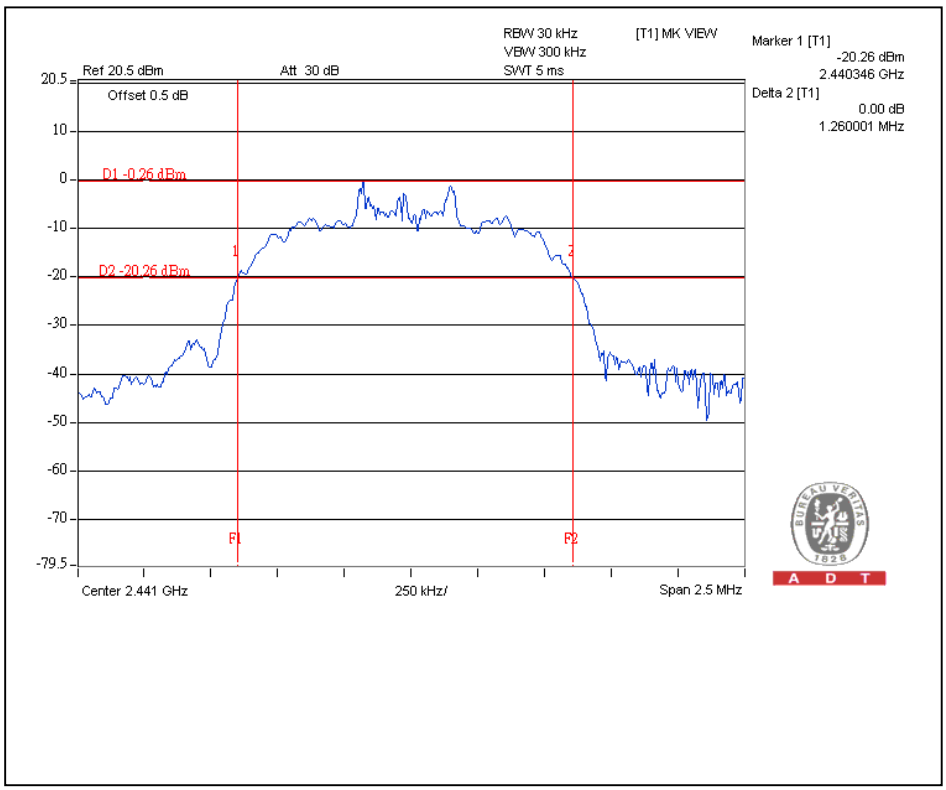
MODULATION TYPE	8DPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.27
39	2441	1.26
78	2480	1.26

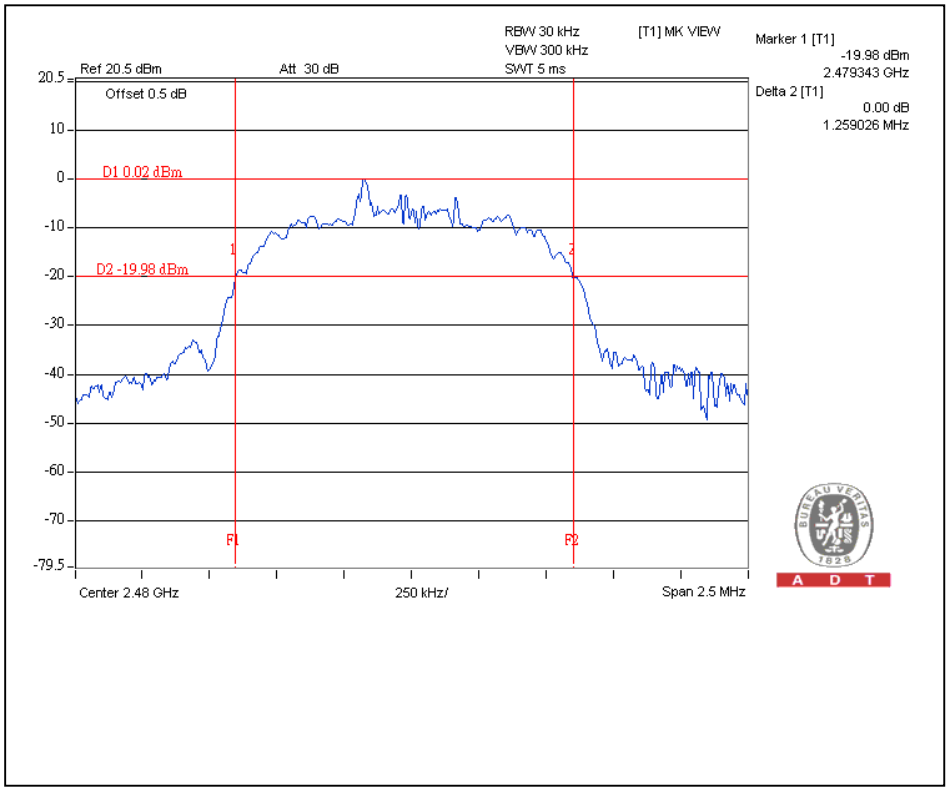
Channel 0



Channel 39



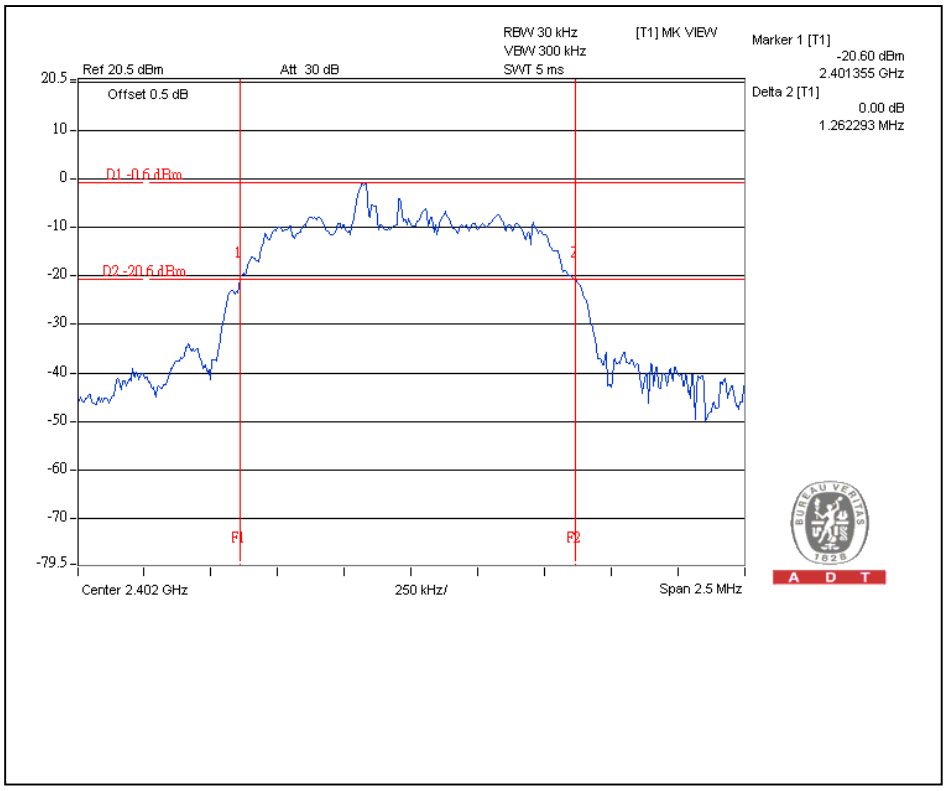
Channel 78



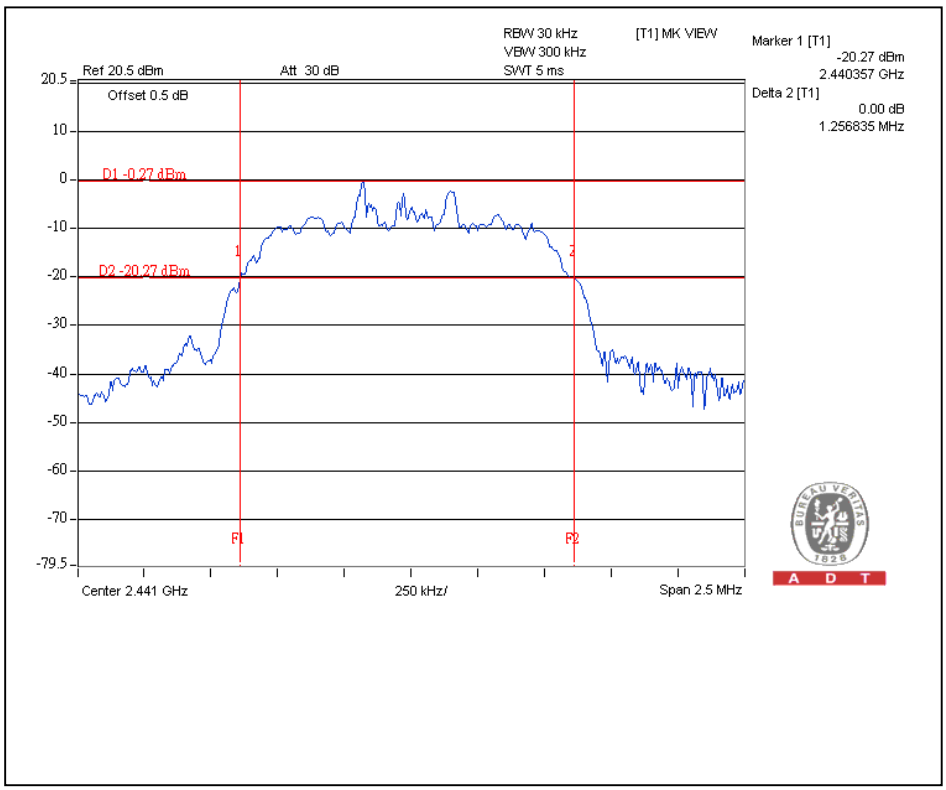
MODULATION TYPE	π /4-DQPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.26
39	2441	1.26
78	2480	1.26

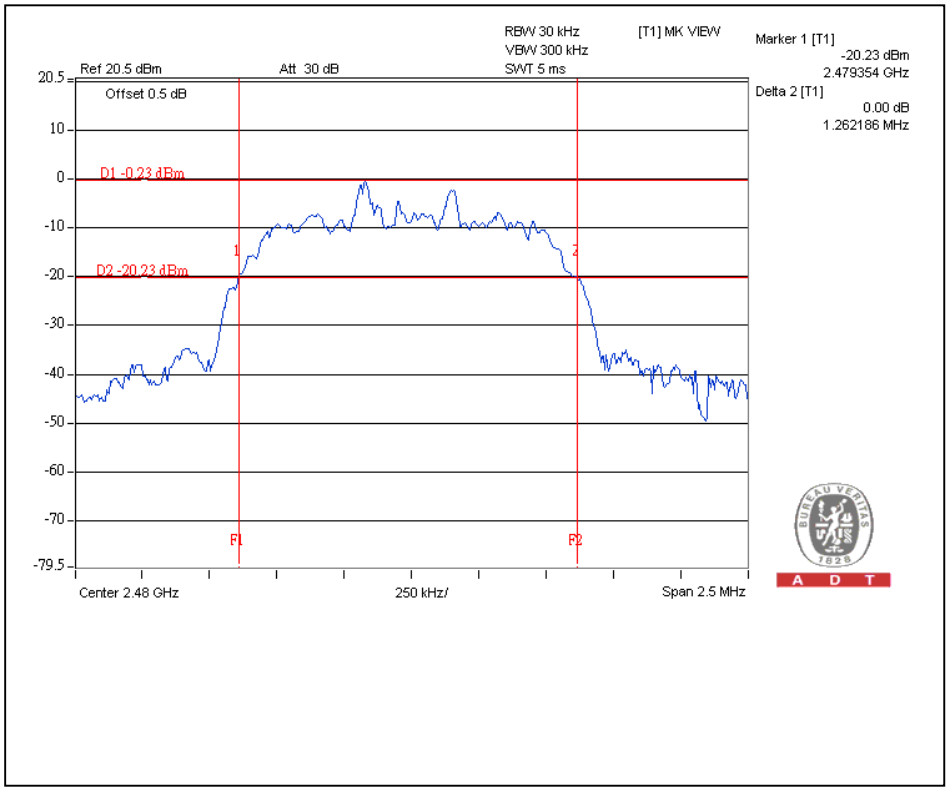
Channel 0



Channel 39



Channel 78



4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

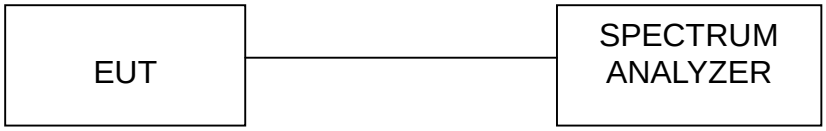
4.5.3 TEST PROCEDURES

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



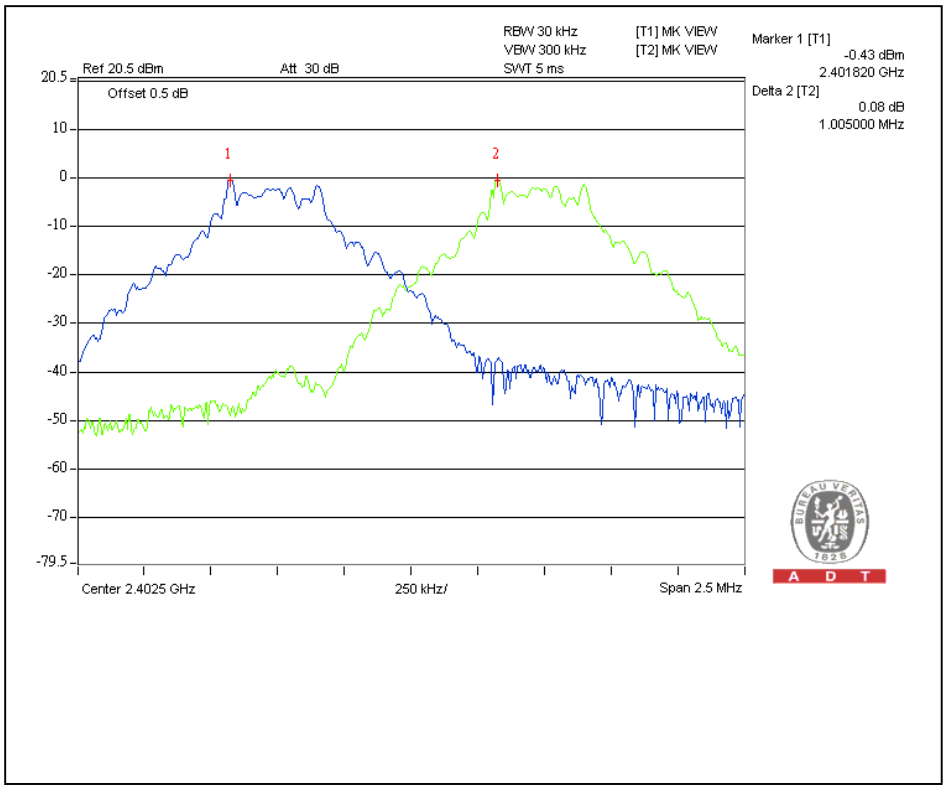
4.5.6 TEST RESULTS

MODULATION TYPE	GFSK	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	TESTED BY	Phoenix Huang

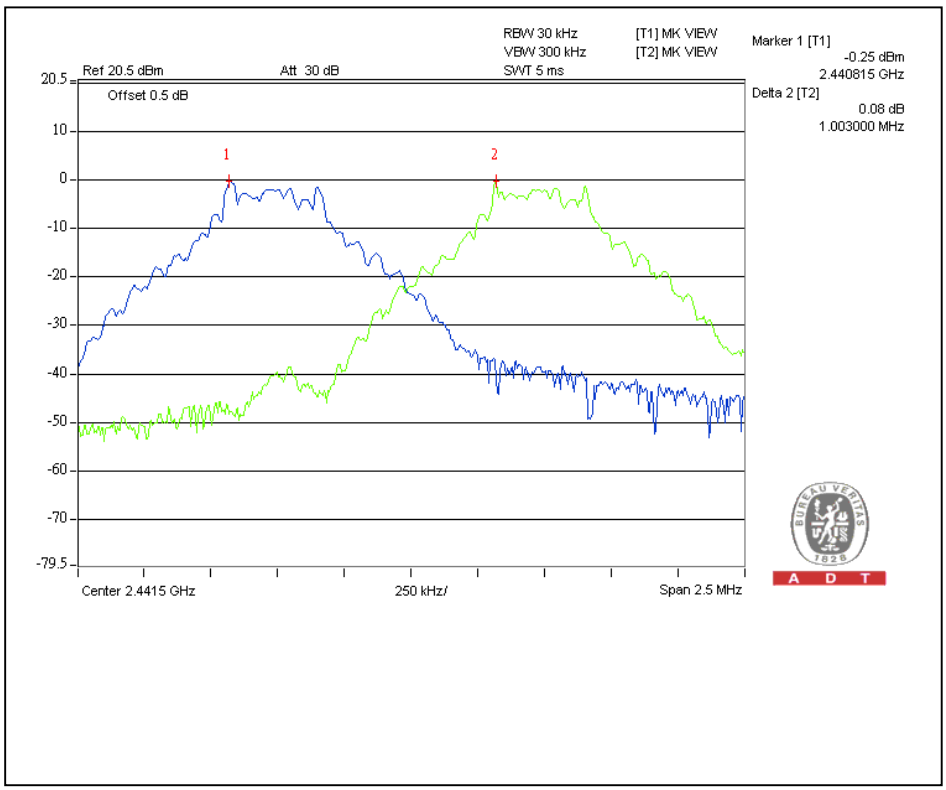
Channel	Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1005	0.63	PASS
39	2441	1003	0.64	PASS
78	2480	1008	0.63	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to next two pages.

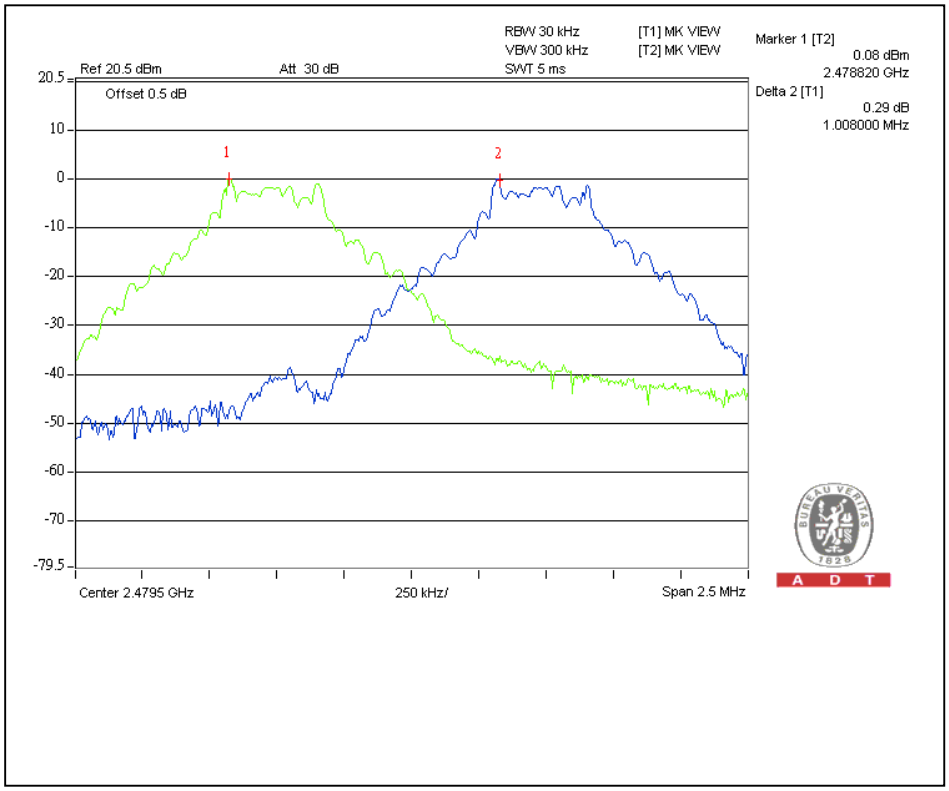
Channel 0



Channel 39



Channel 78

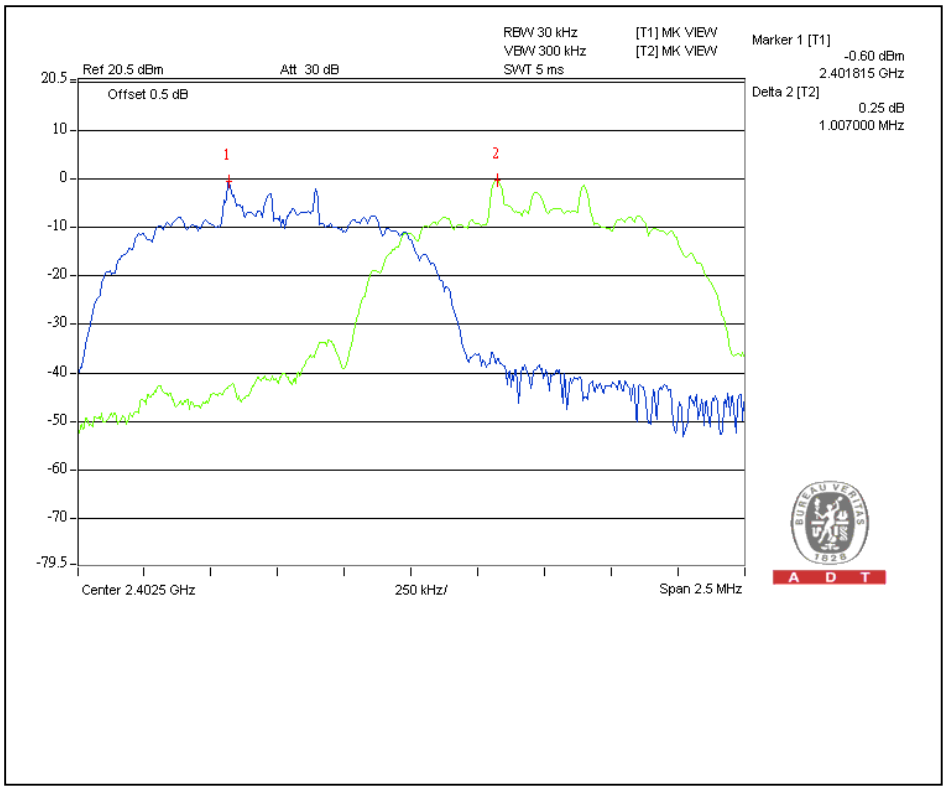


MODULATION TYPE	8DPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

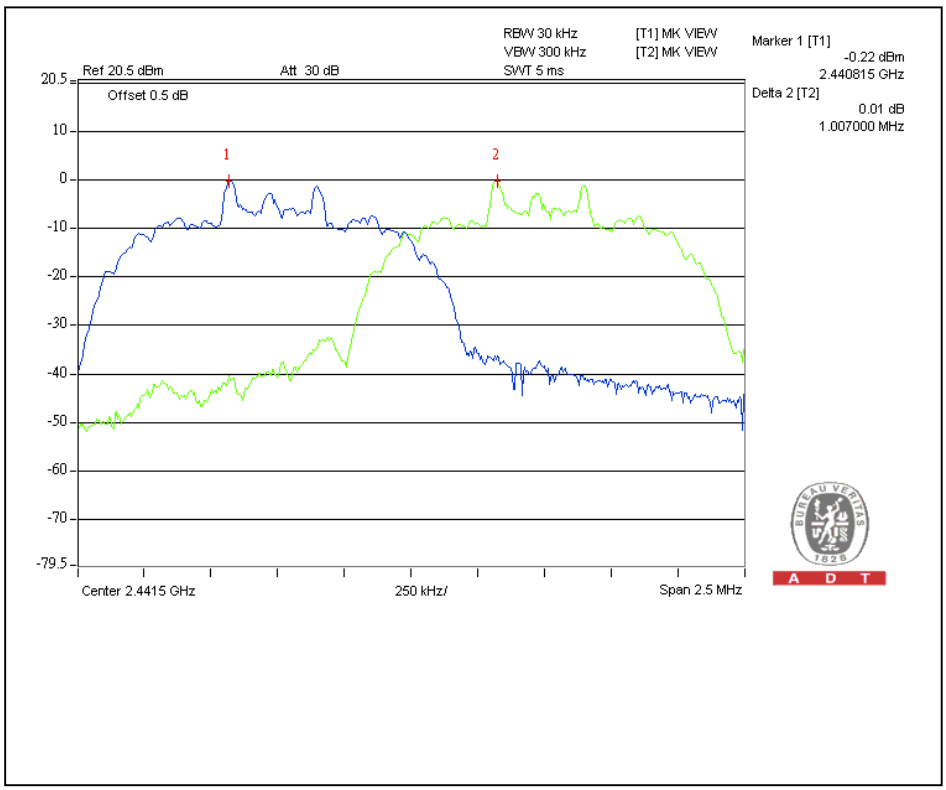
Channel	Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1007	0.85	PASS
39	2441	1007	0.84	PASS
78	2480	1000	0.84	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to next two pages.

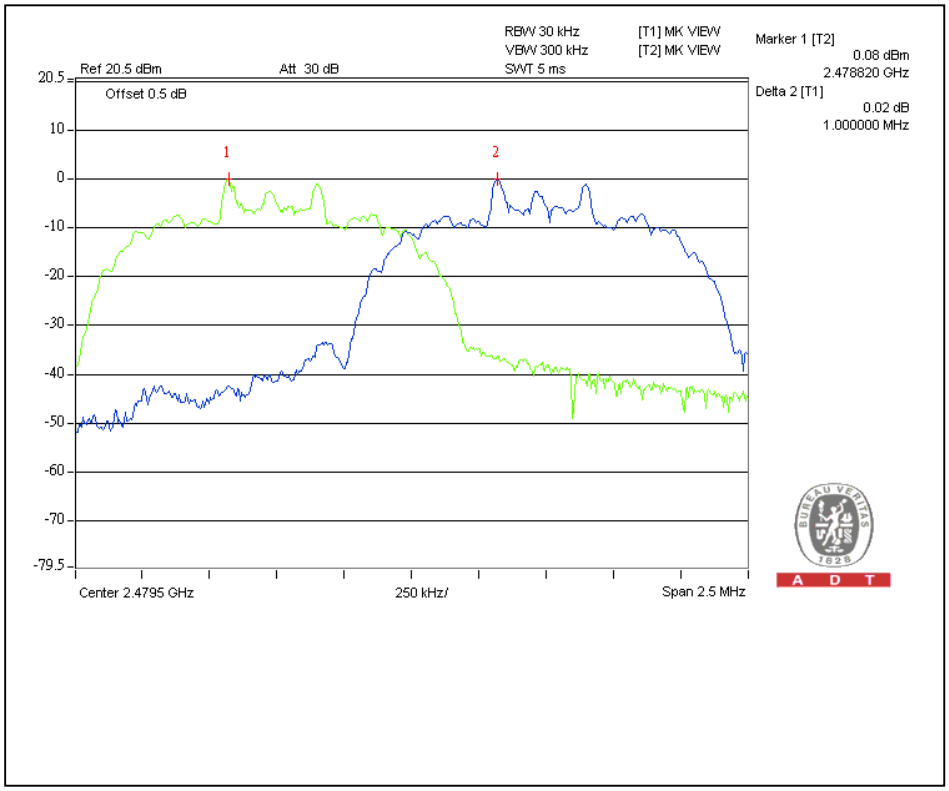
Channel 0



Channel 39



Channel 78

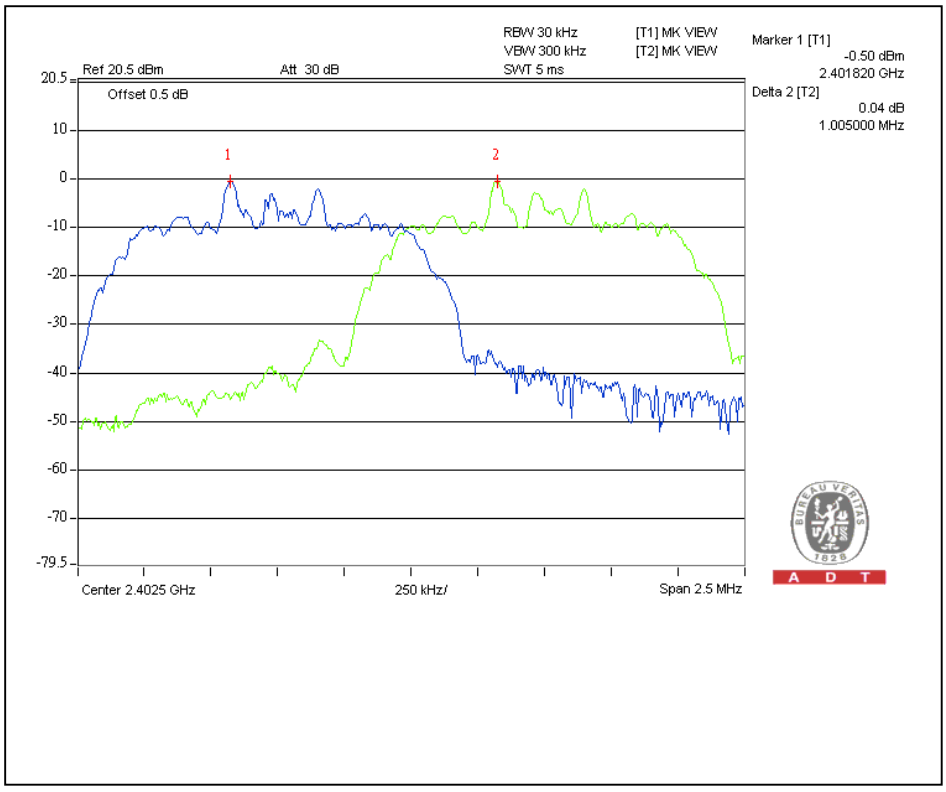


MODULATION TYPE	π /4-DQPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

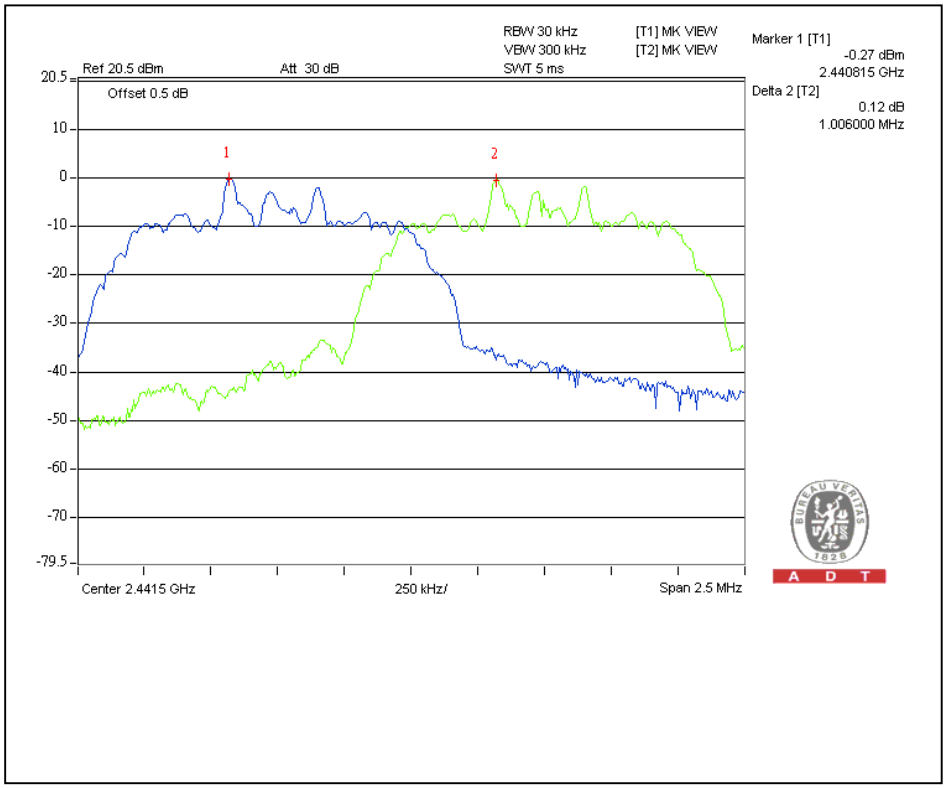
Channel	Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1005	0.84	PASS
39	2441	1006	0.84	PASS
78	2480	1002	0.84	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to next two pages.

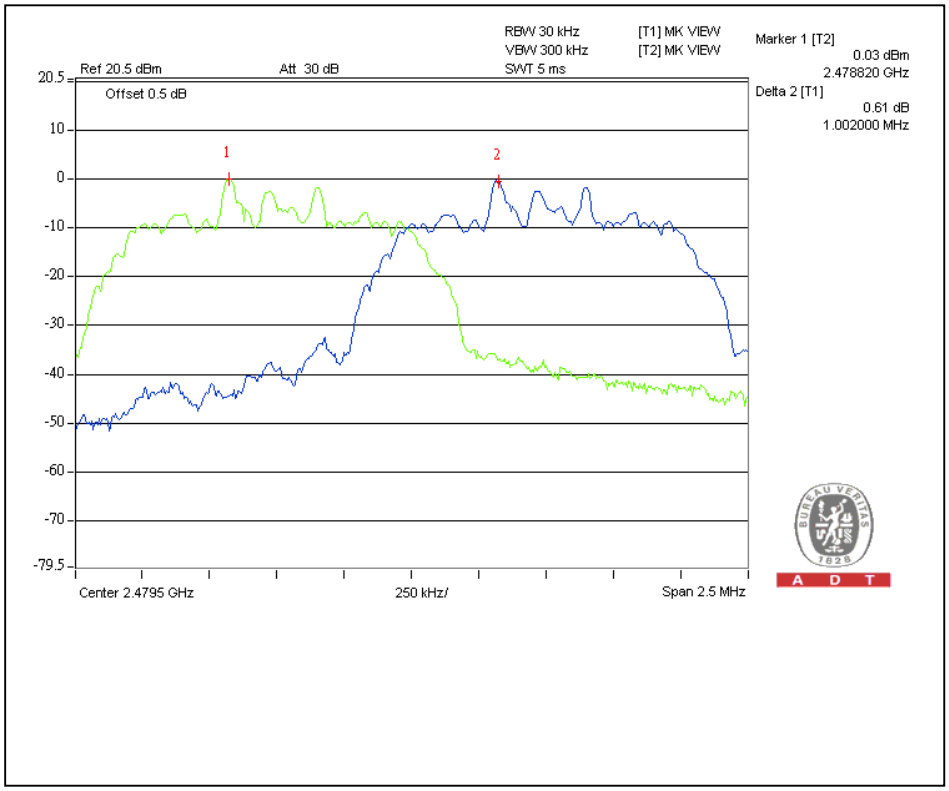
Channel 0



Channel 39



Channel 78



4.6 MAXIMUM PEAK OUTPUT POWER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.6.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

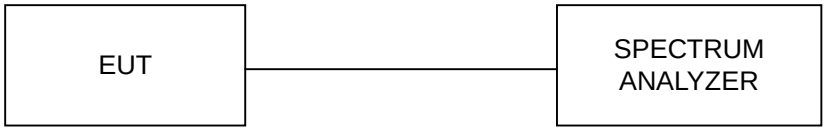
4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. 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.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 3 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies measured were complete.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.6.6 EUT OPERATING CONDITION

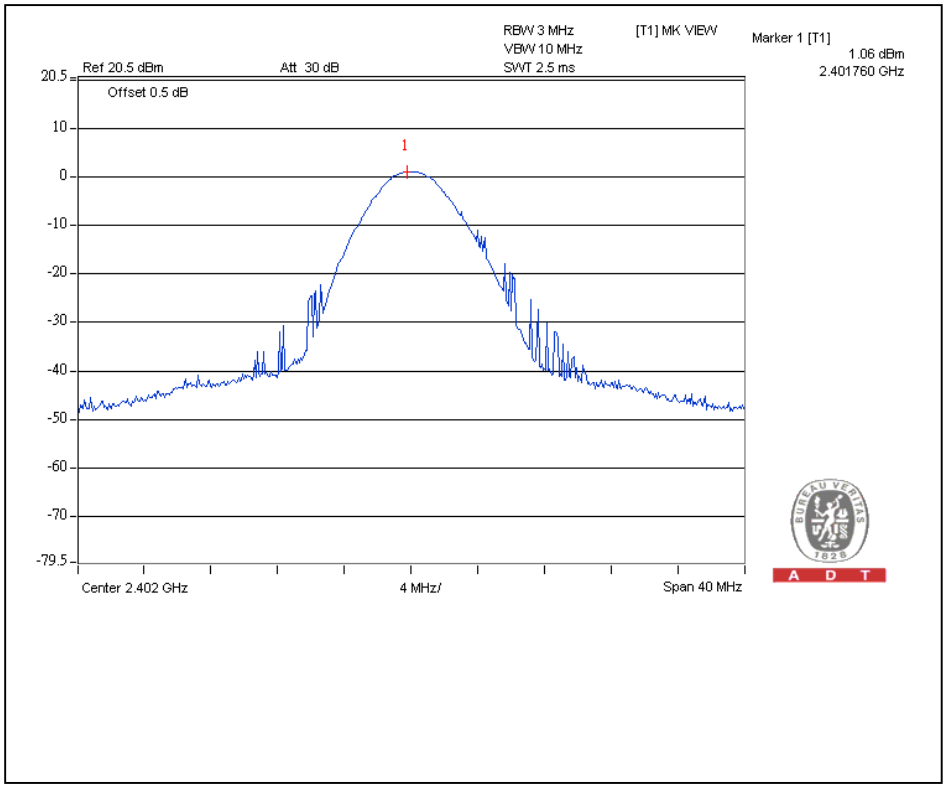
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 TEST RESULTS – PIFA antenna

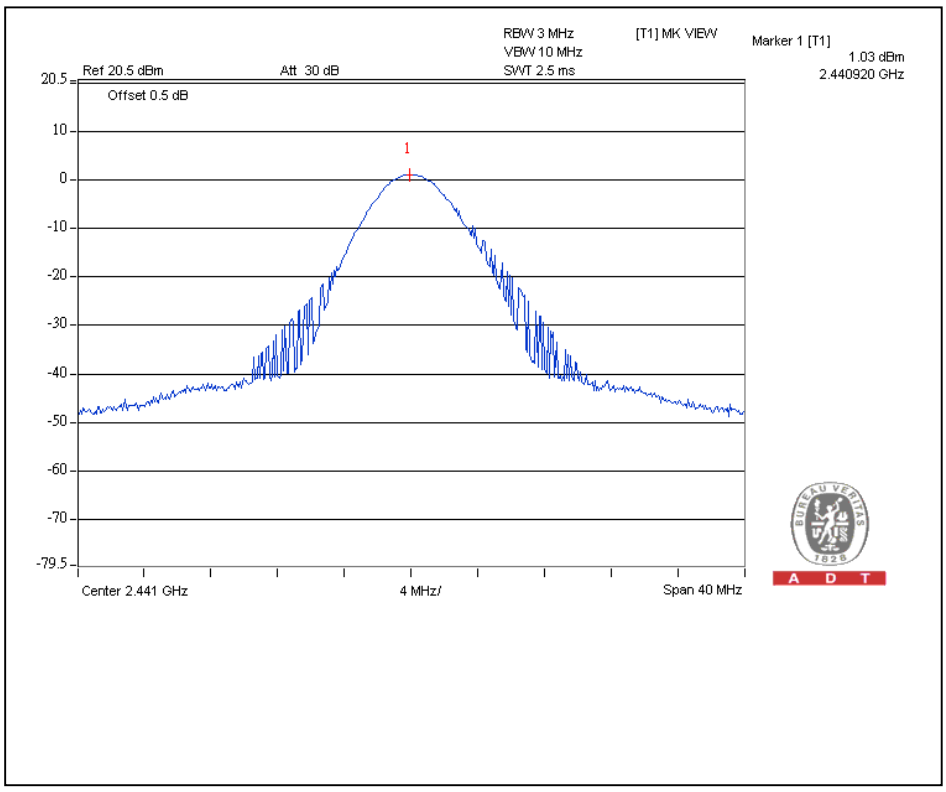
MODULATION TYPE	GFSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.276	1.06	125	PASS
39	2441	1.268	1.03	125	PASS
78	2480	1.340	1.27	125	PASS

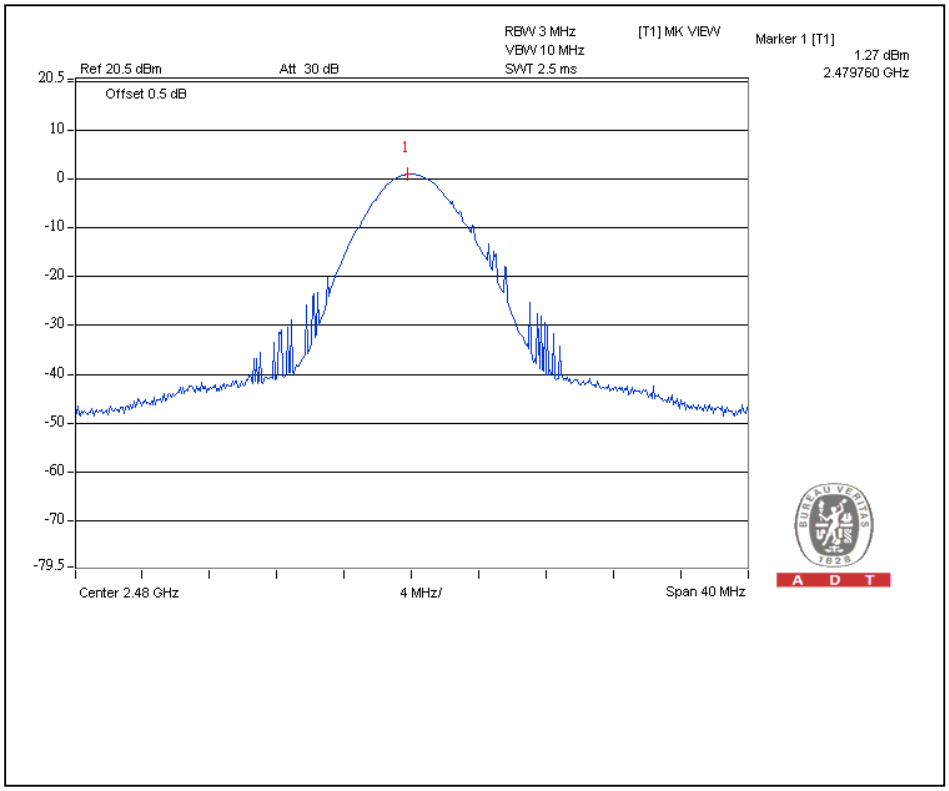
Channel 0



Channel 39



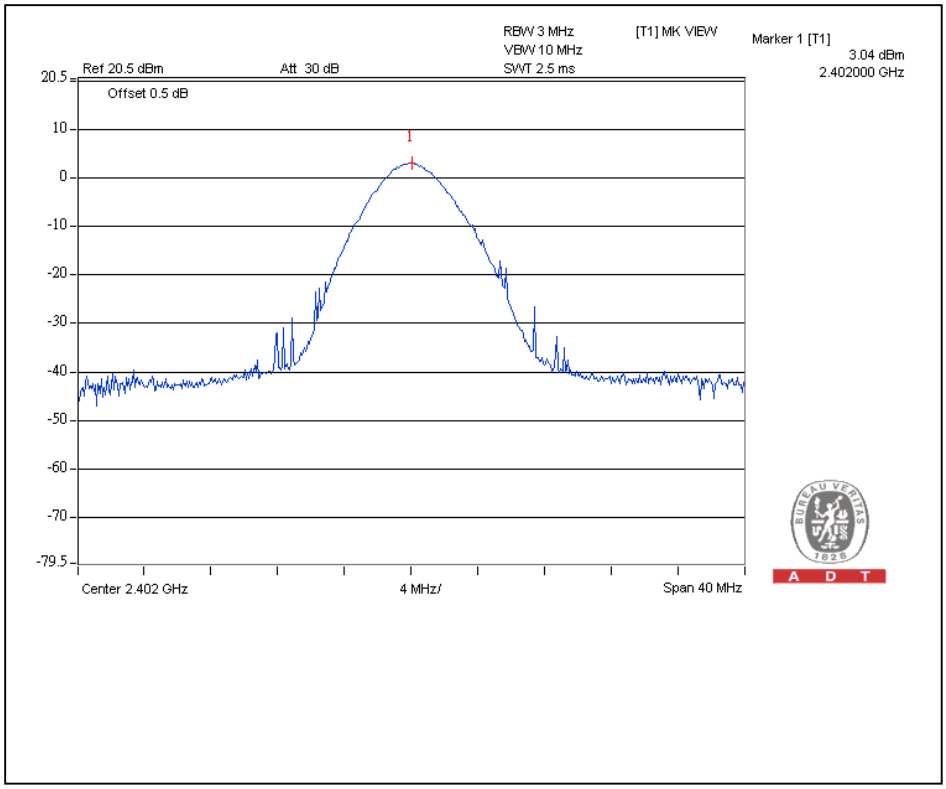
Channel 78



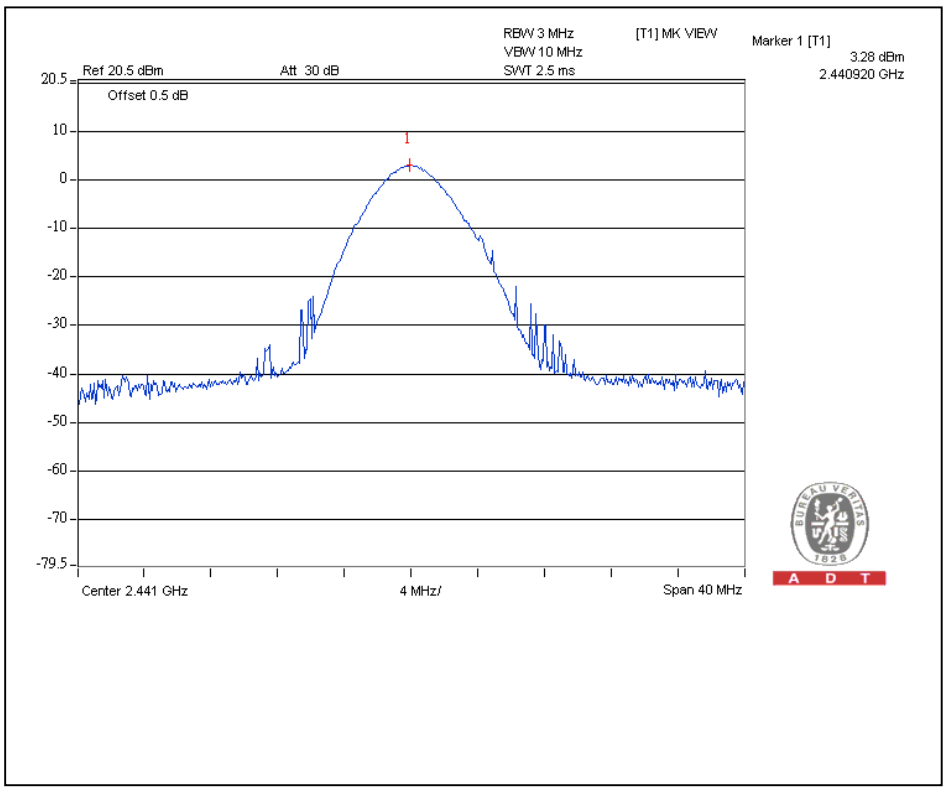
MODULATION TYPE	8DPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	2.014	3.04	125	PASS
39	2441	2.128	3.28	125	PASS
78	2480	2.223	3.47	125	PASS

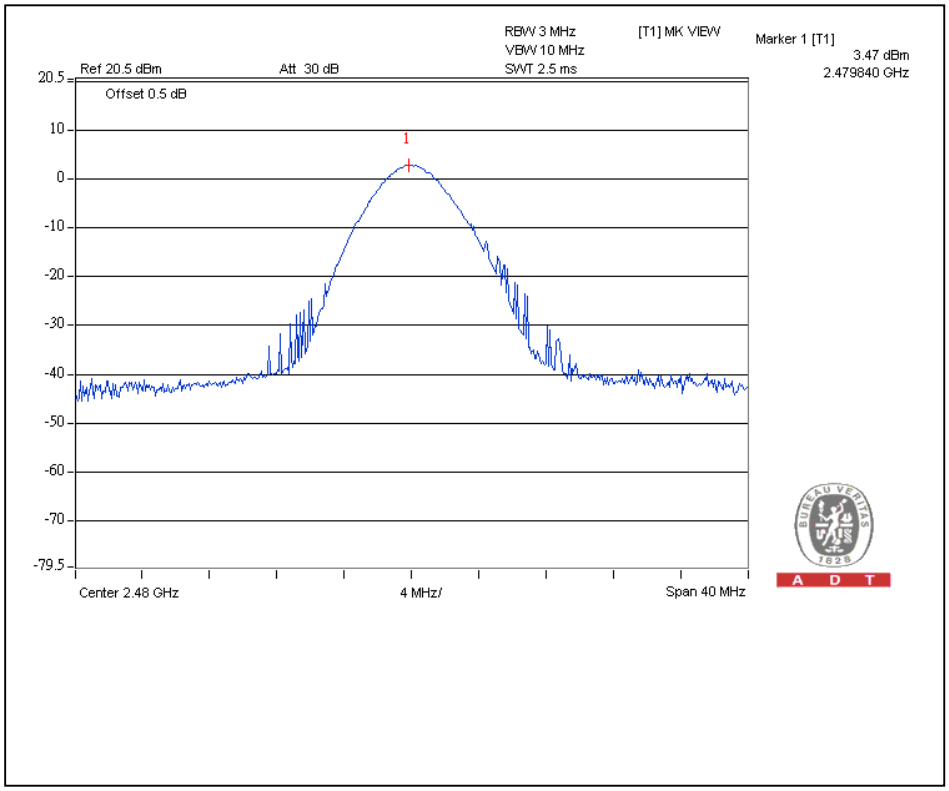
Channel 0



Channel 39



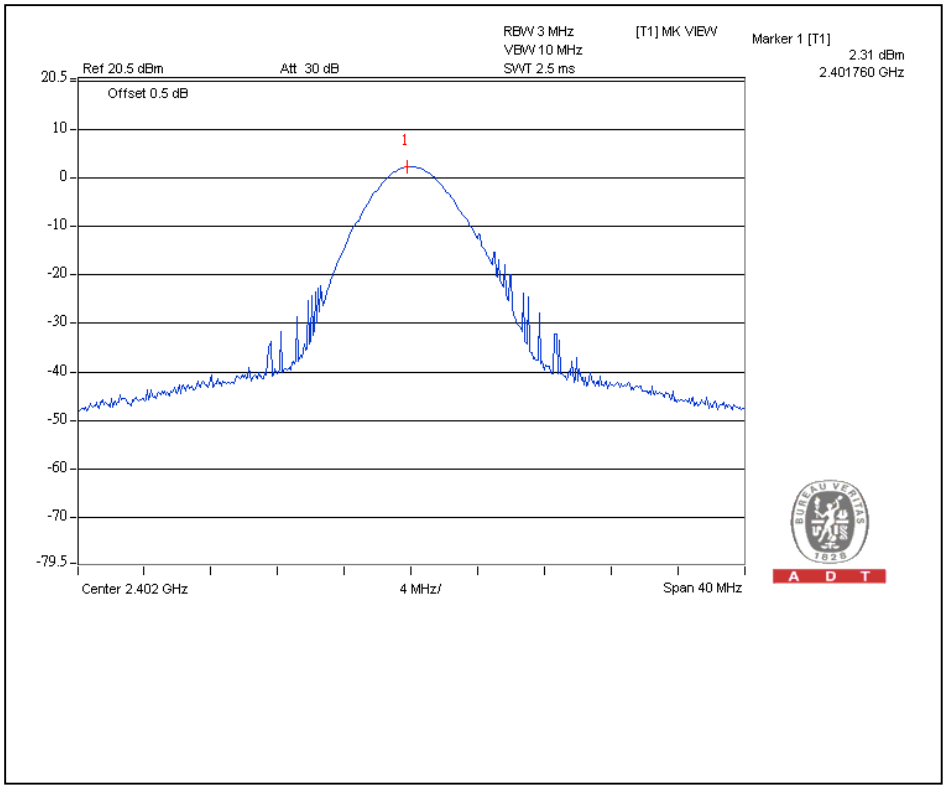
Channel 78



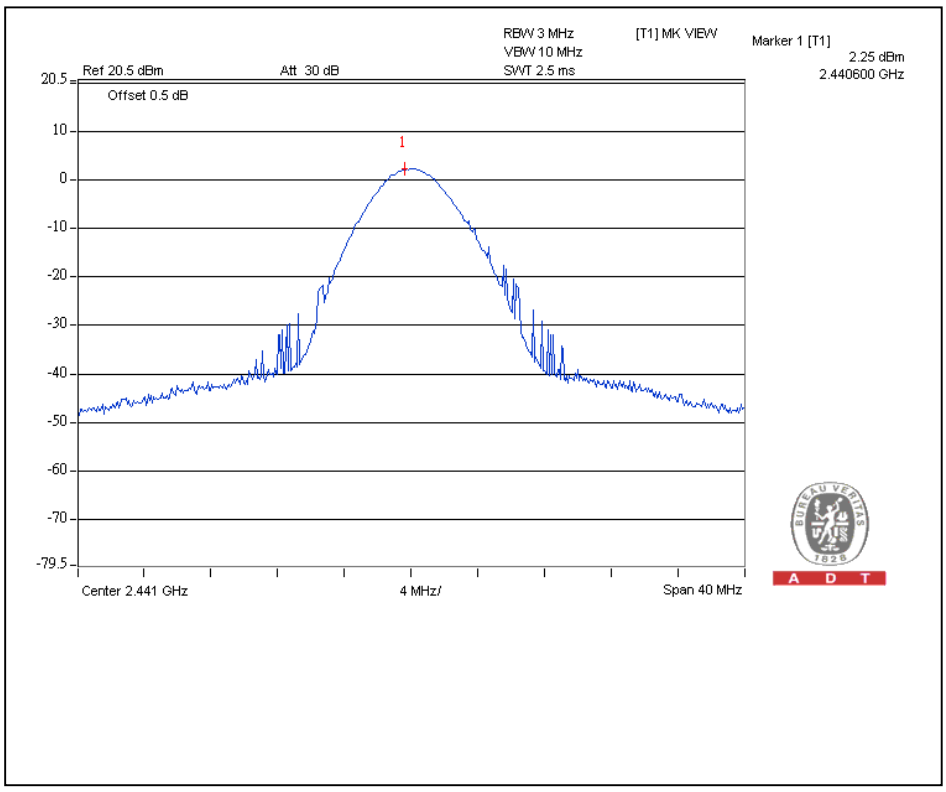
MODULATION TYPE	π /4-DQPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.702	2.31	125	PASS
39	2441	1.679	2.25	125	PASS
78	2480	1.774	2.49	125	PASS

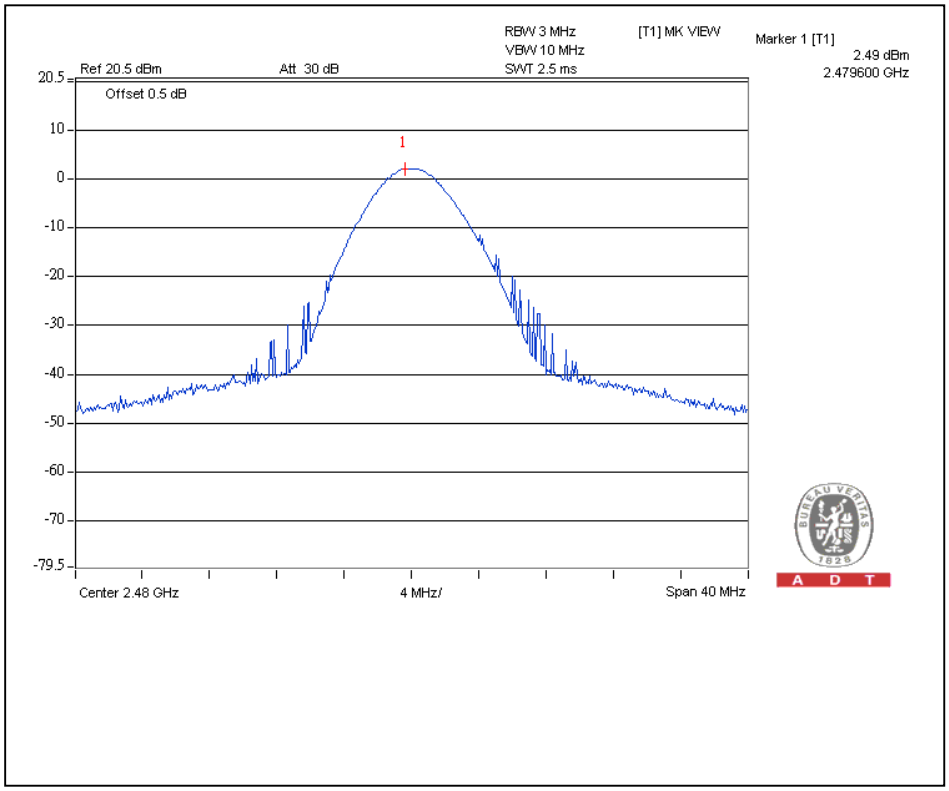
Channel 0



Channel 39



Channel 78

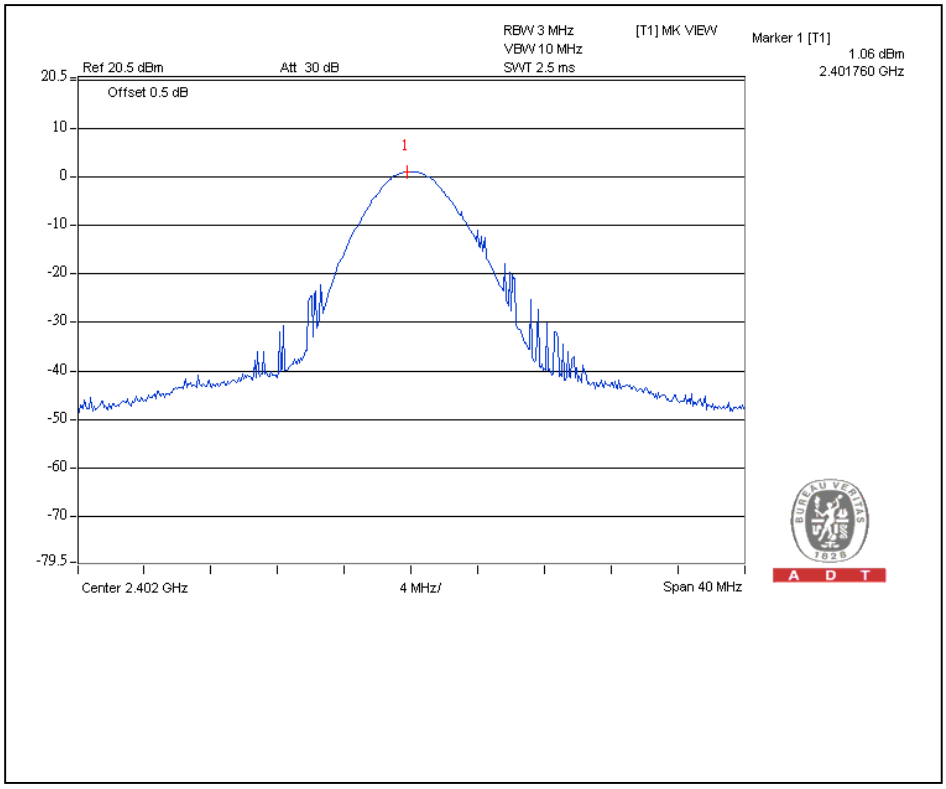


4.6.8 TEST RESULTS – Printed antenna

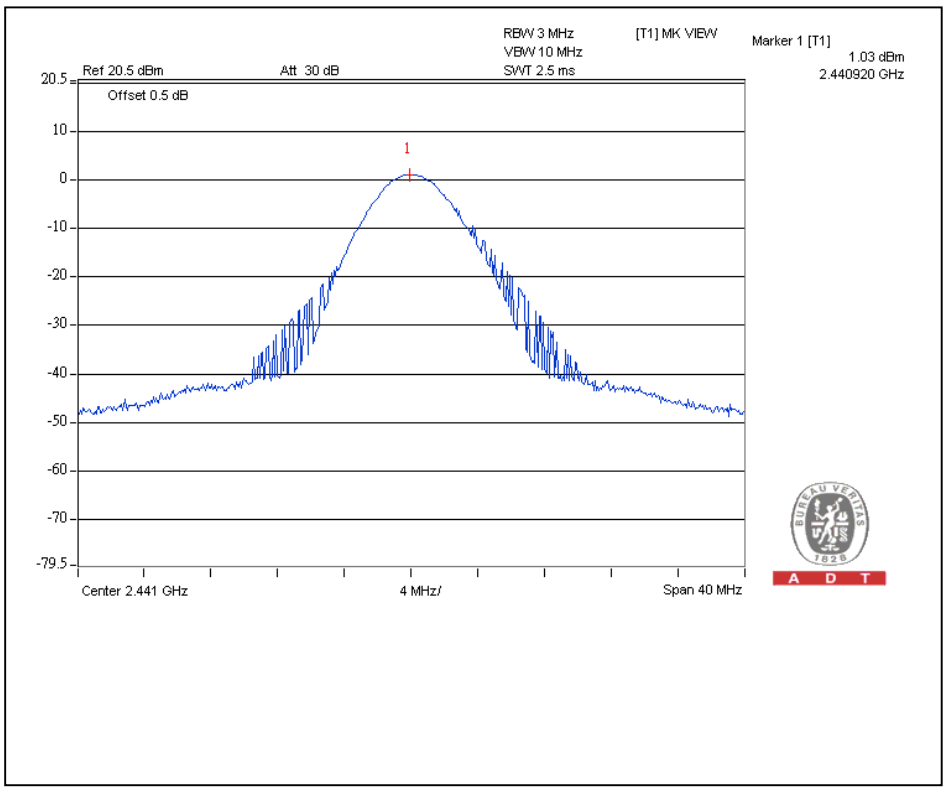
MODULATION TYPE	GFSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.276	1.06	125	PASS
39	2441	1.268	1.03	125	PASS
78	2480	1.340	1.27	125	PASS

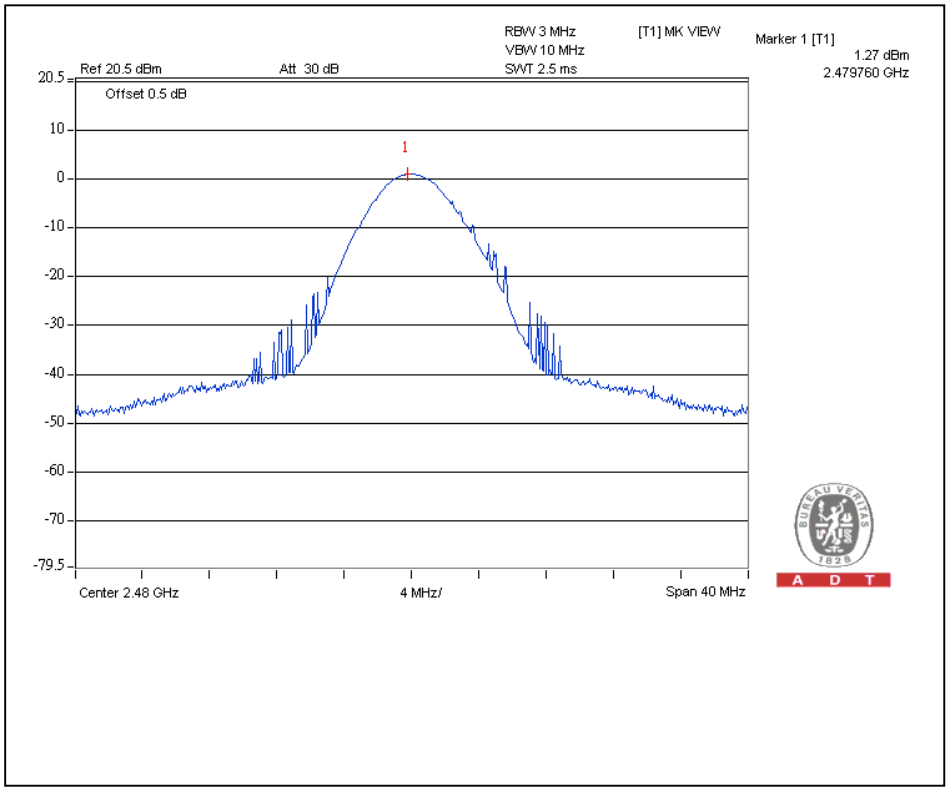
Channel 0



Channel 39



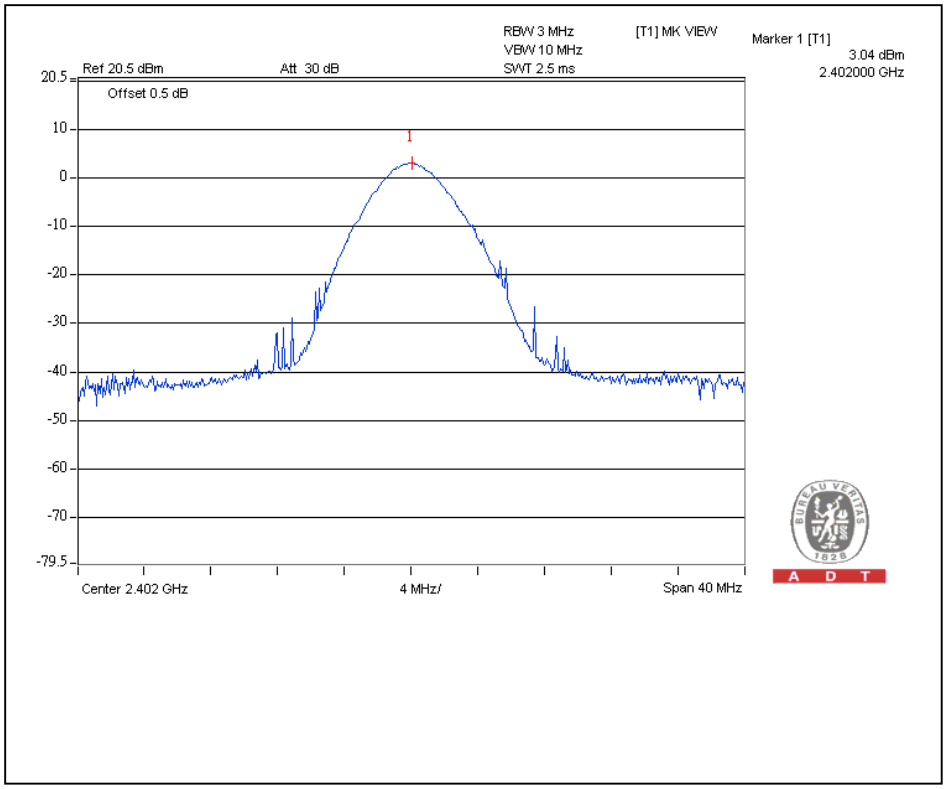
Channel 78



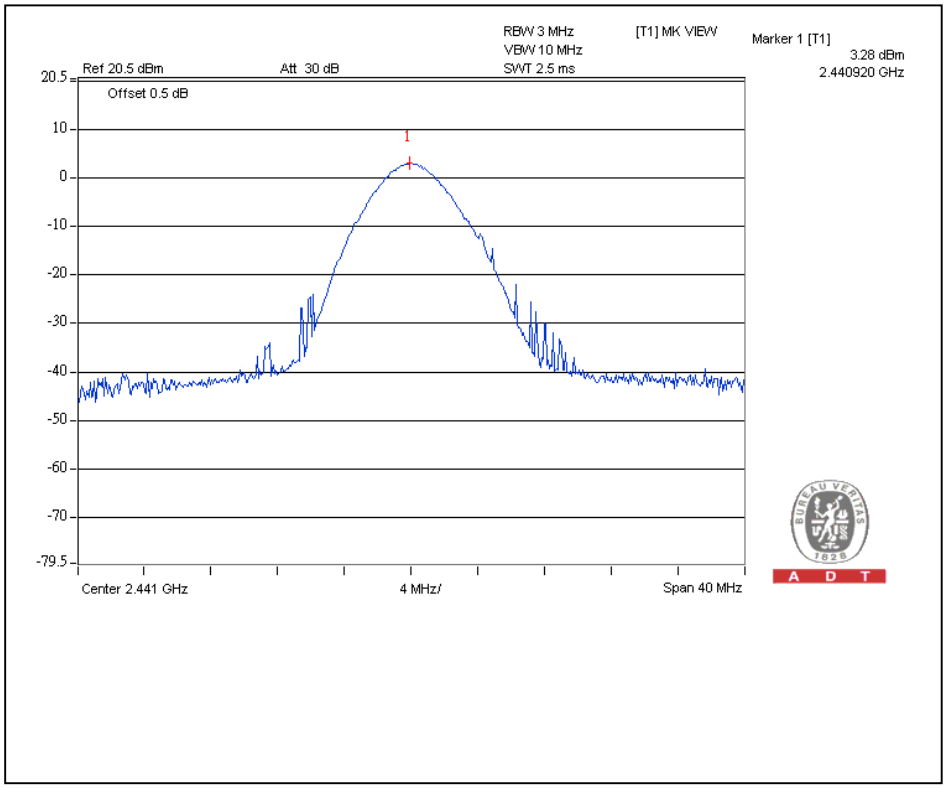
MODULATION TYPE	8DPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	2.014	3.04	125	PASS
39	2441	2.128	3.28	125	PASS
78	2480	2.223	3.47	125	PASS

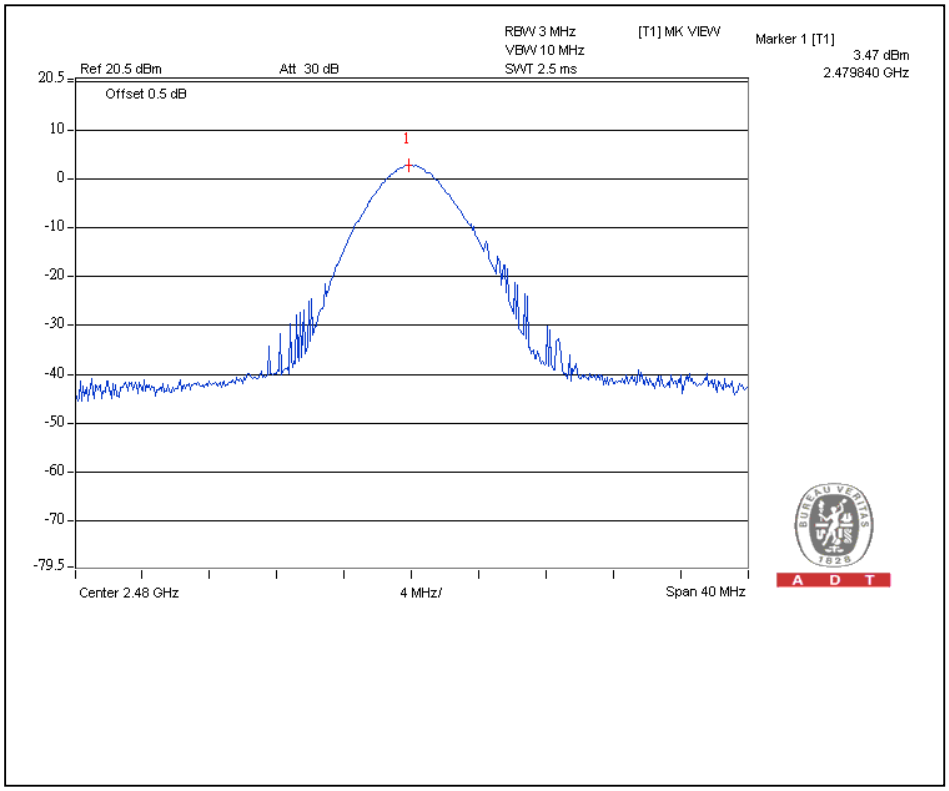
Channel 0



Channel 39



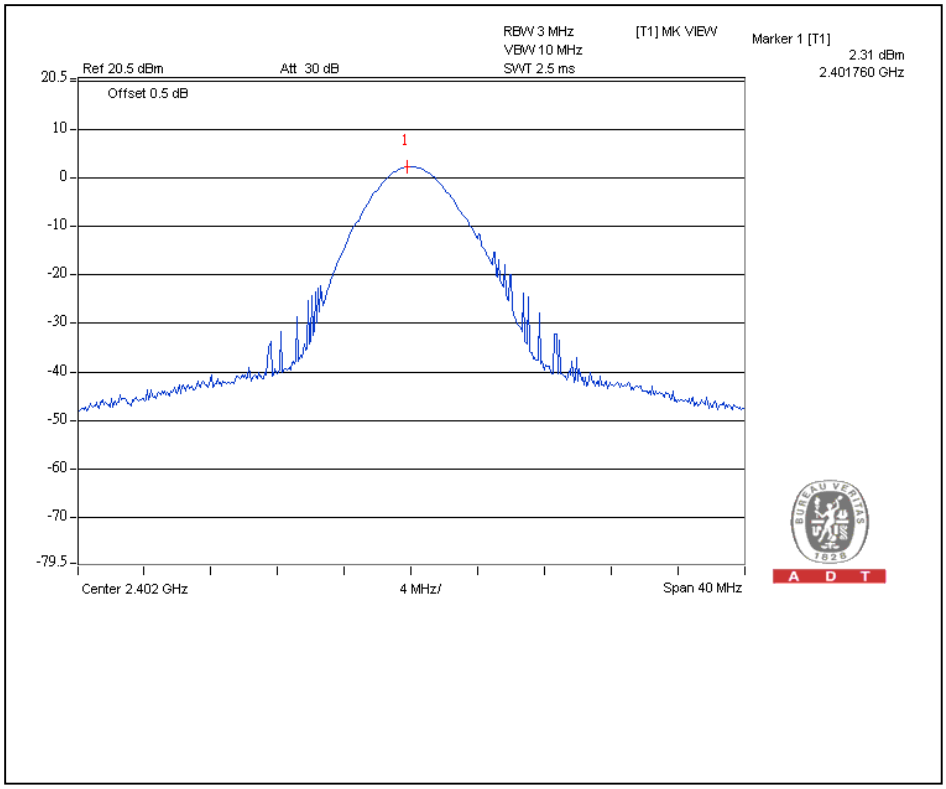
Channel 78



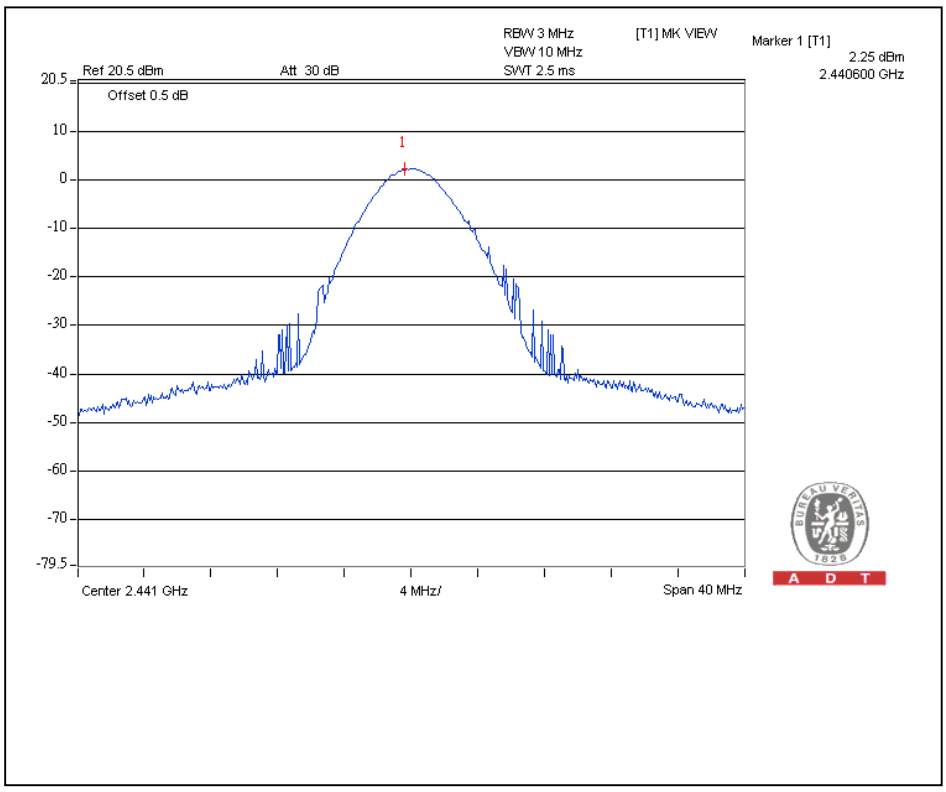
MODULATION TYPE	π /4-DQPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.702	2.31	125	PASS
39	2441	1.679	2.25	125	PASS
78	2480	1.774	2.49	125	PASS

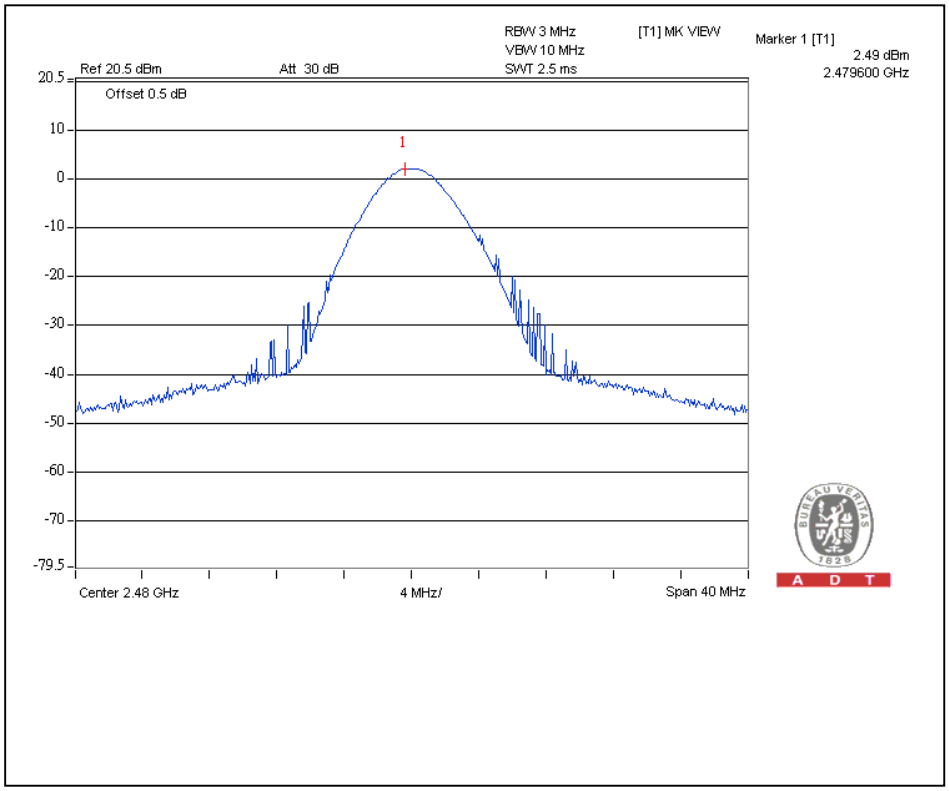
Channel 0



Channel 39



Channel 78

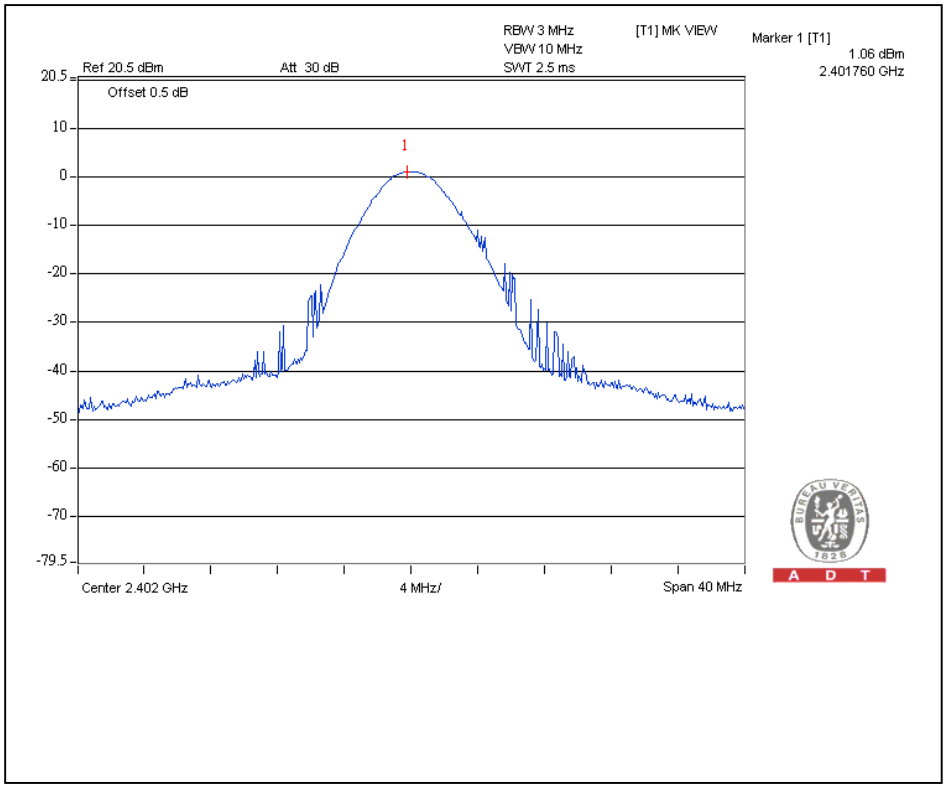


4.6.9 TEST RESULTS – Chip antenna

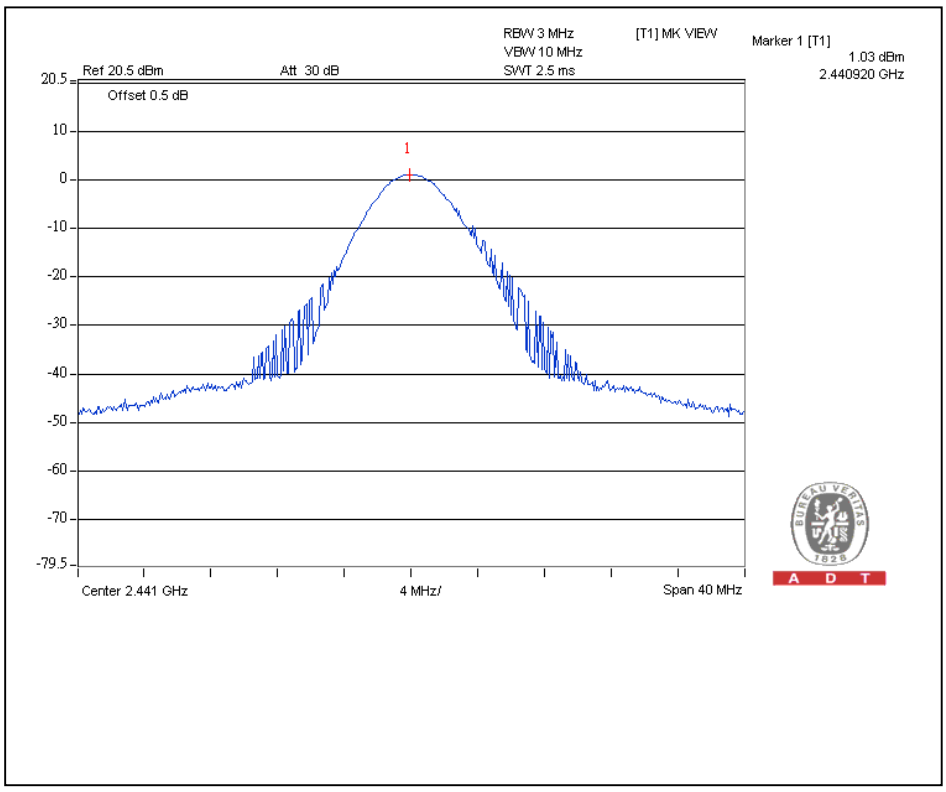
MODULATION TYPE	GFSK	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	TESTED BY	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.276	1.06	125	PASS
39	2441	1.268	1.03	125	PASS
78	2480	1.340	1.27	125	PASS

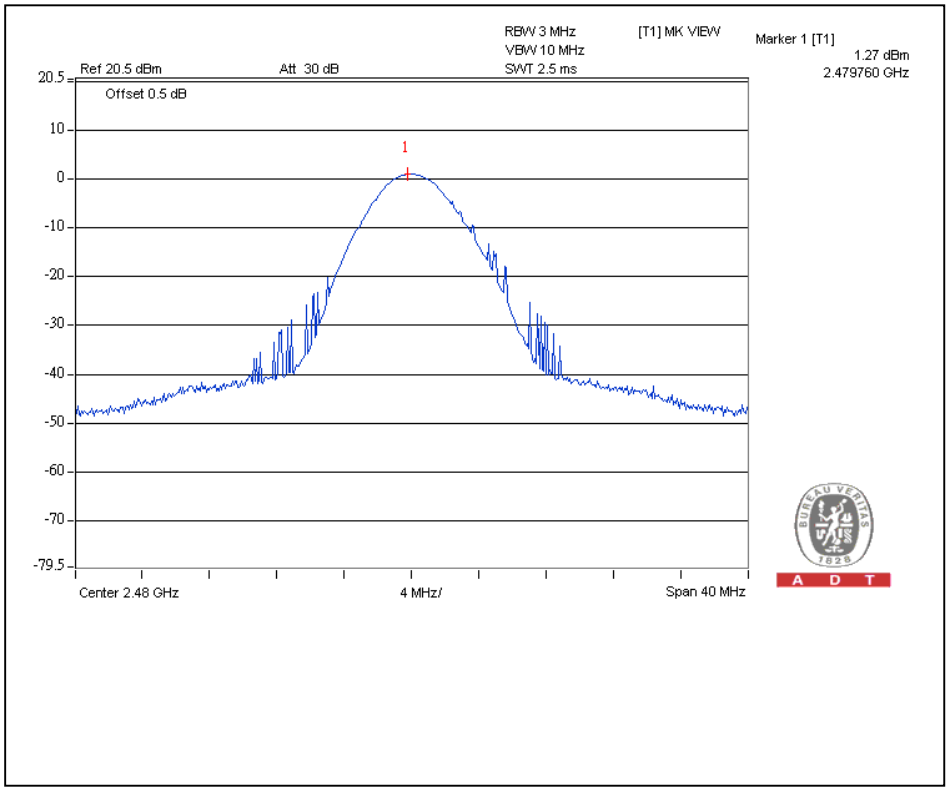
Channel 0



Channel 39



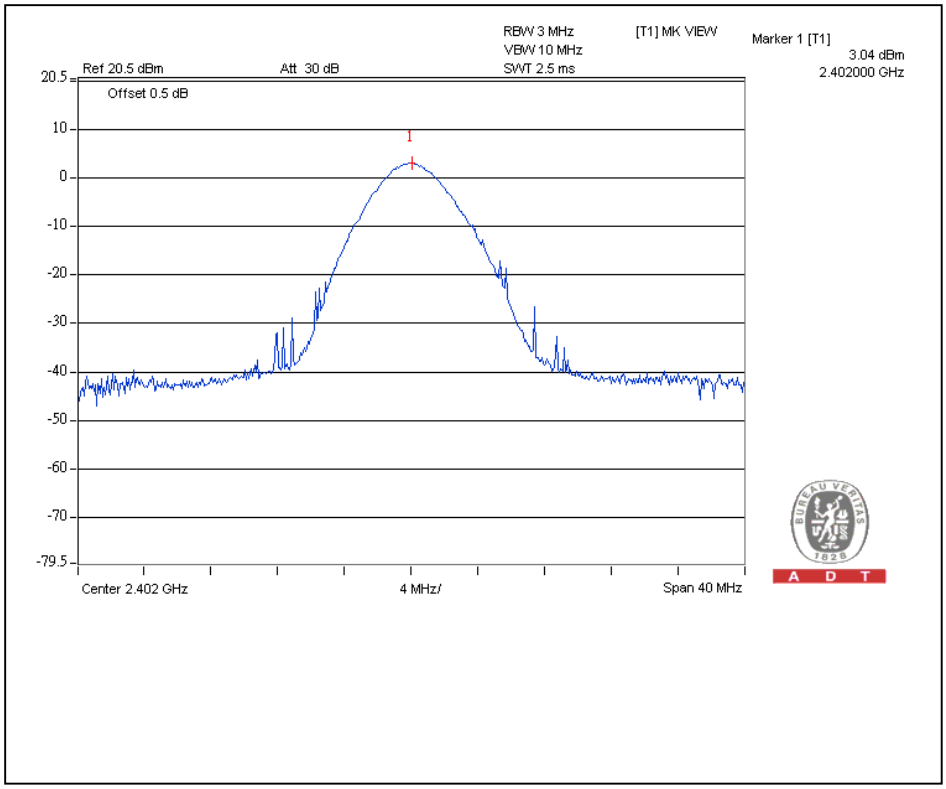
Channel 78



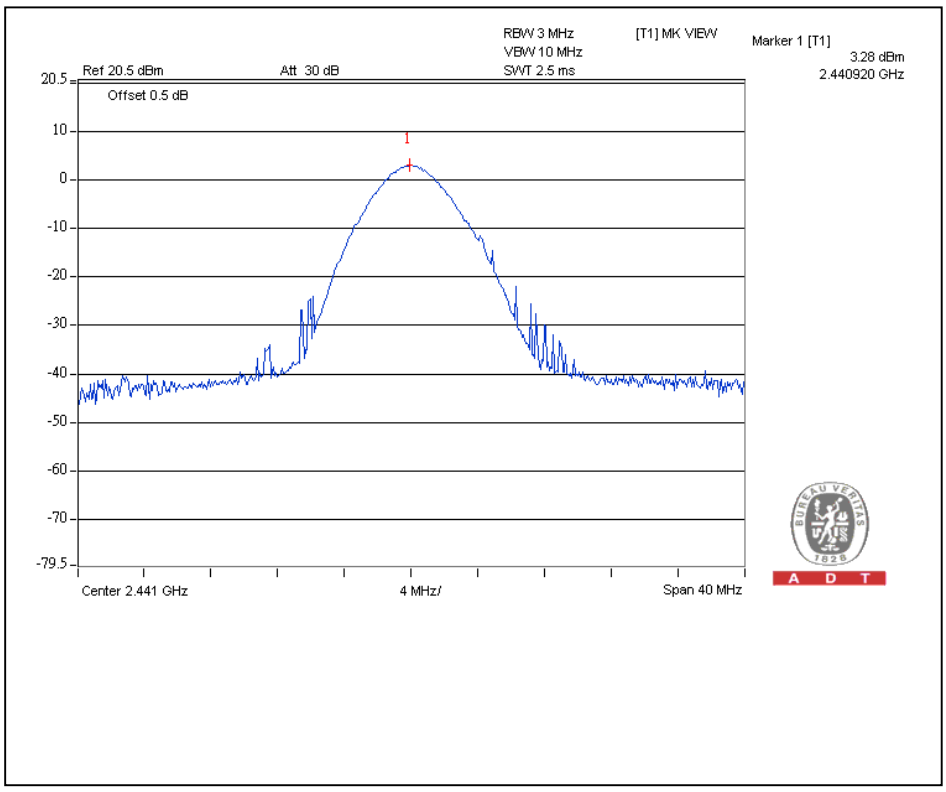
MODULATION TYPE	8DPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	2.014	3.04	125	PASS
39	2441	2.128	3.28	125	PASS
78	2480	2.223	3.47	125	PASS

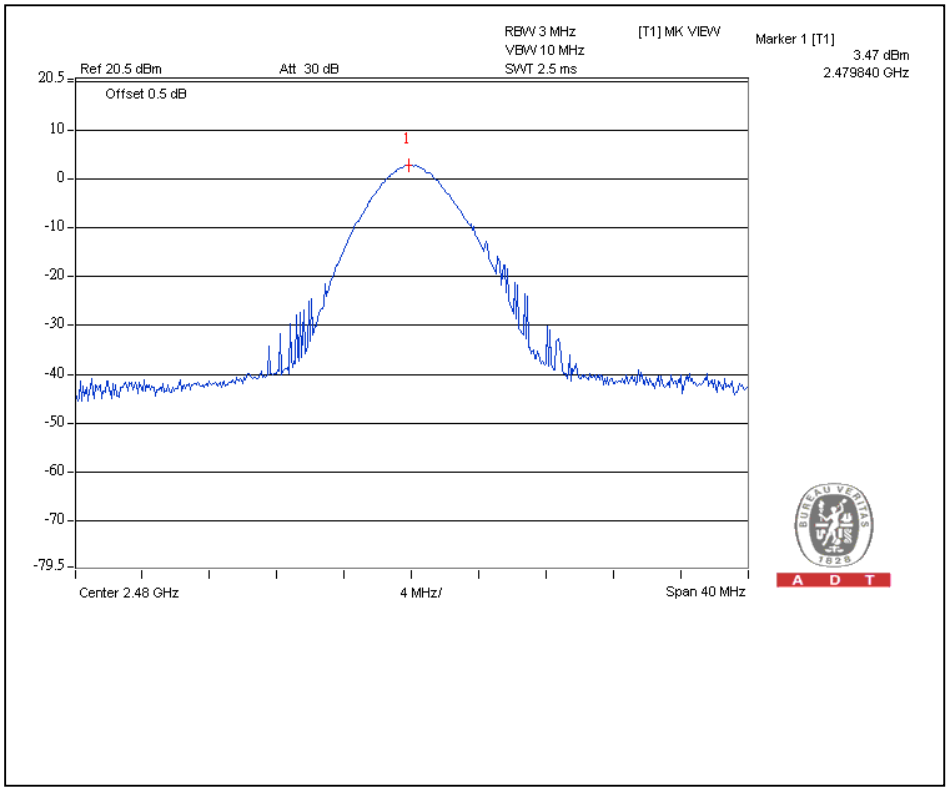
Channel 0



Channel 39



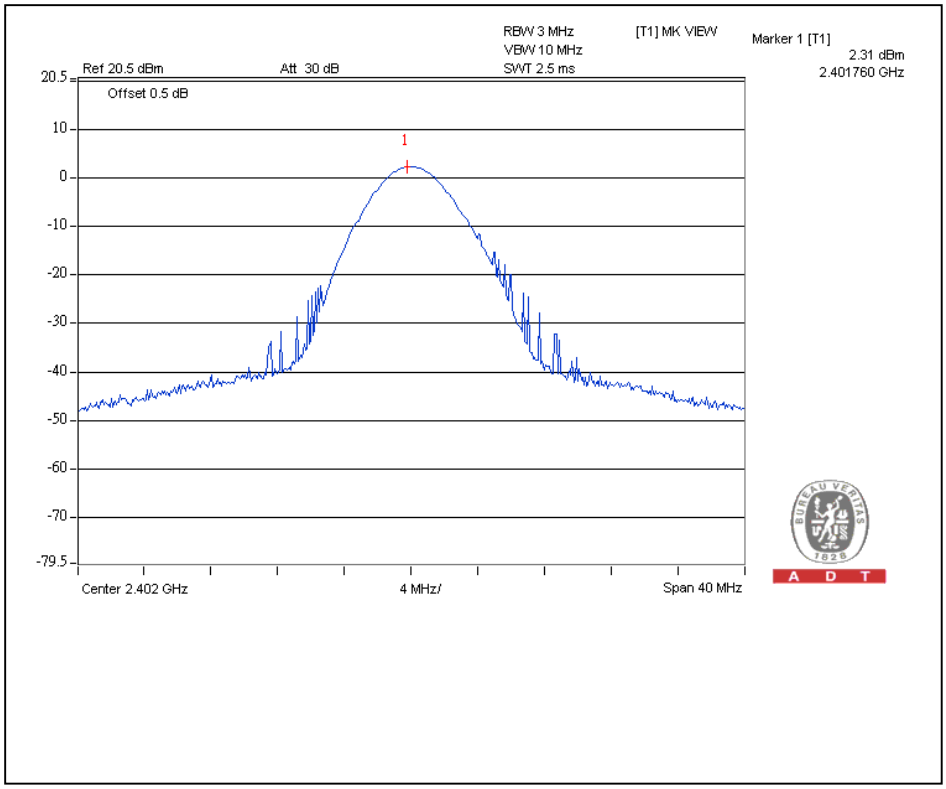
Channel 78



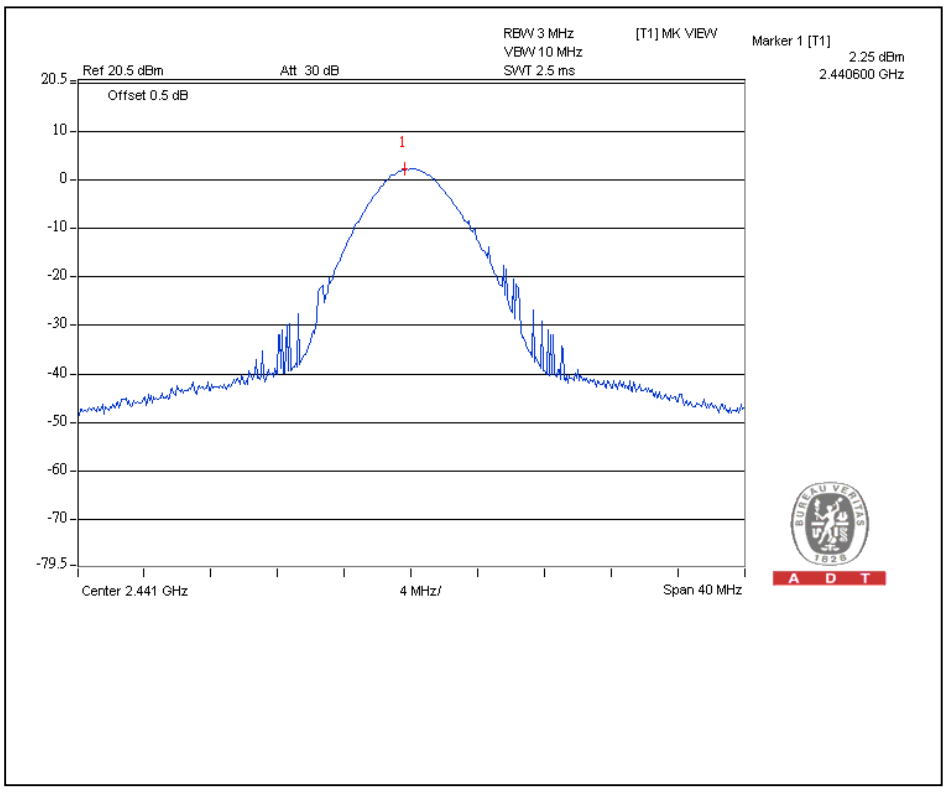
MODULATION TYPE	π /4-DQPSK	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 965 hPa	**TESTED BY**	Phoenix Huang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.702	2.31	125	PASS
39	2441	1.679	2.25	125	PASS
78	2480	1.774	2.49	125	PASS

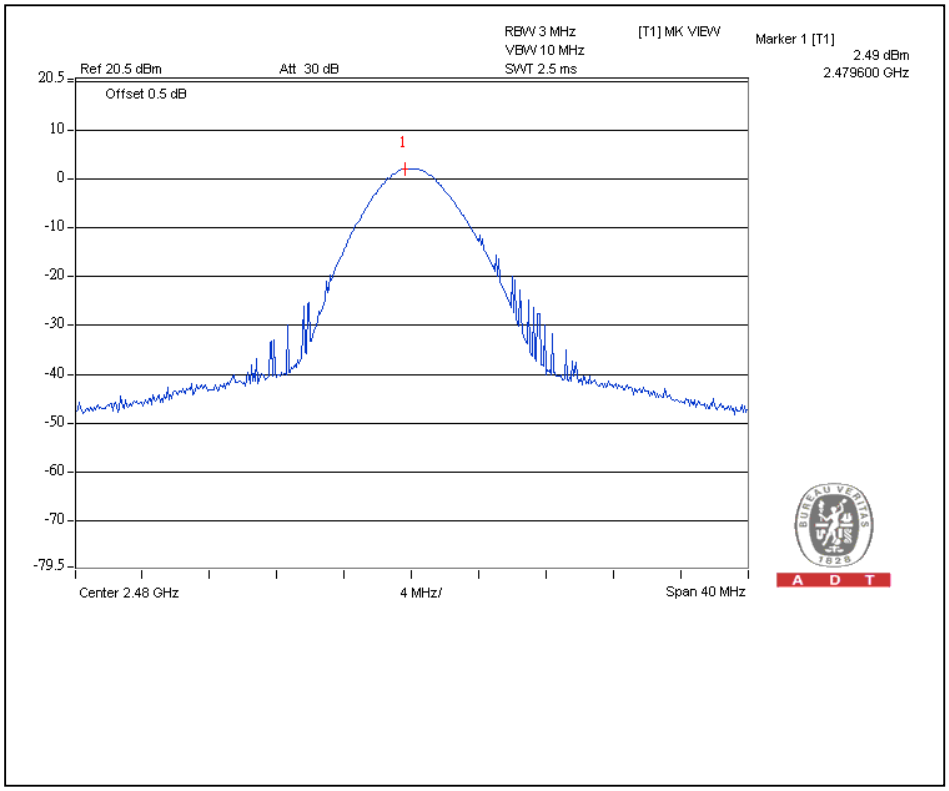
Channel 0



Channel 39



Channel 78



4.7 RADIATED EMISSION MEASUREMENT

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 10, 2008	Nov. 09, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 29, 2009	Apr. 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 09, 2008	Dec. 08, 2009
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

4.7.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 antenna is a broadband antenna, and its height 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 Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

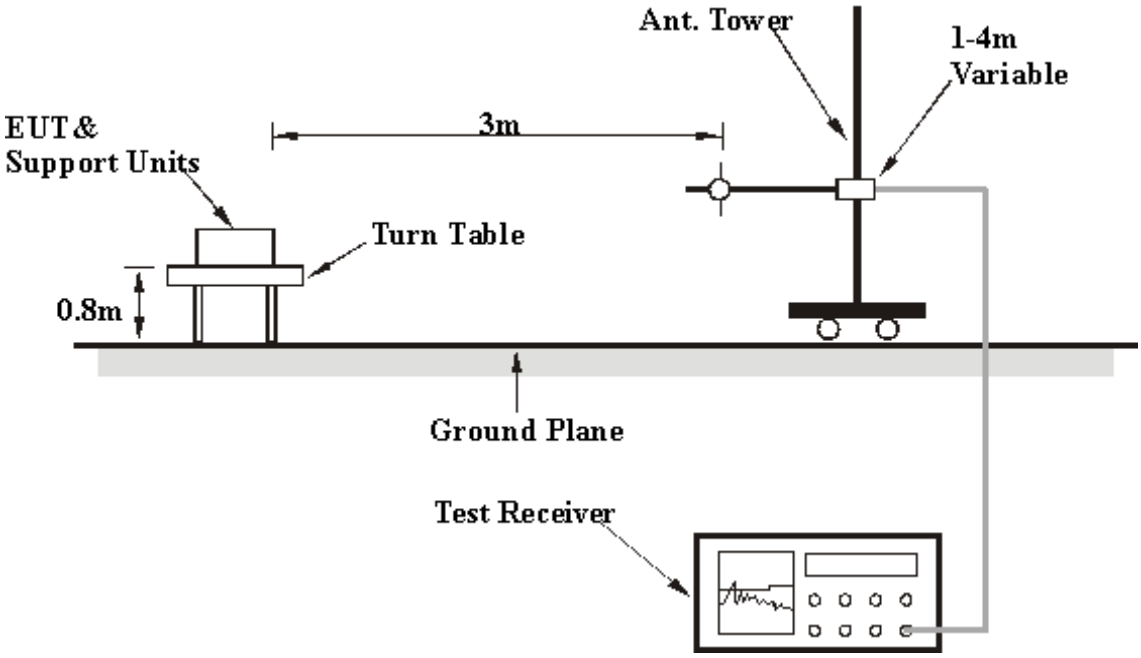
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.7.6 TEST RESULTS

BELOW 1GHz WORST-CASE DATA：8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Phoenix Huang
TEST MODE	PIFA antenna		

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	**84.00**	**38.73 QP**	**40.00**	**-1.27**	**2.37 H**	**233**	**29.04**	**9.69**
2	120.00	24.33 QP	43.50	-19.17	1.43 H	164	12.38	11.95
3	204.00	40.24 QP	43.50	-3.26	1.00 H	188	28.23	12.01
4	216.00	42.07 QP	43.50	-1.43	1.42 H	202	29.62	12.45
5	240.00	42.24 QP	46.00	-3.76	1.18 H	223	28.91	13.33
6	371.10	30.58 QP	46.00	-15.42	1.00 H	86	12.78	17.80
7	415.93	25.86 QP	46.00	-20.14	1.62 H	95	6.89	18.97
8	519.67	26.49 QP	46.00	-19.51	1.58 H	359	4.67	21.82
9	667.90	31.20 QP	46.00	-14.80	1.19 H	57	6.64	24.56
10	742.52	34.33 QP	46.00	-11.67	1.06 H	8	8.74	25.59
11	890.30	29.00 QP	46.00	-17.00	1.03 H	99	0.97	28.03
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	71.99	36.17 QP	40.00	-3.83	1.00 V	330	23.80	12.37
2	120.00	25.34 QP	43.50	-18.16	1.00 V	53	13.39	11.95
3	204.00	30.48 QP	43.50	-13.02	1.35 V	169	18.47	12.01
4	240.00	31.64 QP	46.00	-14.36	1.60 V	174	18.31	13.33
5	415.93	28.61 QP	46.00	-17.39	1.47 V	212	9.64	18.97
6	742.35	28.96 QP	46.00	-17.04	1.65 V	0	3.38	25.58
7	815.63	27.26 QP	46.00	-18.74	1.56 V	67	0.40	26.86

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Phoenix Huang
TEST MODE	Printed antenna		

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	129.95	31.97 QP	43.50	-11.53	1.09 H	237	18.96	13.01
2	144.05	31.60 QP	43.50	-11.90	1.17 H	220	17.04	14.56
3	192.10	28.65 QP	43.50	-14.85	1.00 H	225	16.31	12.34
4	369.82	29.14 QP	46.00	-16.86	1.94 H	276	11.37	17.77
5	480.00	31.30 QP	46.00	-14.70	1.66 H	320	10.56	20.74
6	519.60	30.04 QP	46.00	-15.96	1.56 H	327	8.23	21.81
7	668.25	28.73 QP	46.00	-17.27	1.14 H	259	4.17	24.56
8	742.35	30.56 QP	46.00	-15.44	1.14 H	127	4.98	25.58
9	887.73	28.64 QP	46.00	-17.36	1.00 H	19	0.65	27.99
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	65.79	29.49 QP	40.00	-10.51	1.00 V	173	16.45	13.04
2	125.08	32.21 QP	43.50	-11.29	1.00 V	324	19.72	12.49
3	216.10	28.13 QP	46.00	-17.87	1.00 V	117	15.68	12.45
4	519.60	30.26 QP	46.00	-15.74	1.00 V	194	8.45	21.81
5	665.62	28.49 QP	46.00	-17.51	1.72 V	19	3.96	24.53
6	742.35	29.27 QP	46.00	-16.73	1.73 V	184	3.69	25.58
7	878.40	28.33 QP	46.00	-17.67	1.22 V	43	0.50	27.83

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Phoenix Huang
TEST MODE	Chip antenna		

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	56.55	24.43 QP	40.00	-15.57	1.00 H	241	11.15	13.28
2	144.05	25.05 QP	43.50	-18.45	1.57 H	291	10.49	14.56
3	216.00	31.65 QP	43.50	-11.85	1.52 H	155	19.20	12.45
4	371.15	29.49 QP	46.00	-16.51	1.91 H	279	11.69	17.80
5	480.00	30.52 QP	46.00	-15.48	1.88 H	146	9.78	20.74
6	519.60	32.03 QP	46.00	-13.97	1.54 H	278	10.22	21.81
7	742.35	30.28 QP	46.00	-15.72	1.18 H	128	4.70	25.58
8	890.77	31.41 QP	46.00	-14.59	1.03 H	281	3.37	28.04
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	57.63	27.68 QP	40.00	-12.32	1.00 V	0	14.40	13.28
2	120.27	28.10 QP	43.50	-15.40	1.19 V	267	16.12	11.98
3	215.93	22.44 QP	43.50	-21.06	1.27 V	358	10.00	12.45
4	295.87	30.82 QP	46.00	-15.18	1.87 V	87	15.00	15.82
5	370.70	29.65 QP	46.00	-16.35	1.77 V	77	11.86	17.79
6	479.98	28.50 QP	46.00	-17.50	1.88 V	0	7.76	20.74
7	739.55	27.94 QP	46.00	-18.06	2.33 V	19	2.40	25.54
8	887.97	28.22 QP	46.00	-17.78	2.16 V	177	0.23	27.99

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

ABOVE 1GHz WORST-CASE DATA：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	2389.43	54.69 PK	74.00	-19.31	1.56 H	341	24.63	30.06
2	2389.43	24.69 AV	54.00	-29.31	1.56 H	341	-5.37	30.06
3	*2402.00	94.89 PK			1.56 H	339	64.78	30.11
4	*2402.00	64.89 AV			1.56 H	339	34.78	30.11
5	4804.00	59.29 PK	74.00	-14.71	1.37 H	316	23.86	35.43
6	4804.00	29.29 AV	54.00	-24.71	1.37 H	316	-6.14	35.43
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	2389.62	53.71 PK	74.00	-20.29	1.25 V	95	23.65	30.06
2	2389.62	23.71 AV	54.00	-30.29	1.25 V	95	-6.35	30.06
3	*2402.00	89.97 PK			1.25 V	94	59.86	30.11
4	*2402.00	59.97 AV			1.25 V	94	29.86	30.11
5	4804.00	60.50 PK	74.00	-13.50	1.36 V	343	25.07	35.43
6	4804.00	30.50 AV	54.00	-23.50	1.36 V	343	-4.93	35.43

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	96.50 PK			1.48 H	353	66.24	30.26
2	*2441.00	66.50 AV			1.48 H	353	36.24	30.26
3	4882.00	60.18 PK	74.00	-13.82	1.40 H	322	24.62	35.56
4	4882.00	30.18 AV	54.00	-23.82	1.40 H	322	-5.38	35.56
5	7323.00	51.98 PK	74.00	-22.02	1.28 H	209	9.91	42.07
6	7323.00	21.98 AV	54.00	-32.02	1.28 H	209	-20.09	42.07
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	92.64 PK			1.29 V	100	62.38	30.26
2	*2441.00	62.64 AV			1.29 V	100	32.38	30.26
3	4882.00	61.28 PK	74.00	-12.72	1.33 V	352	25.72	35.56
4	4882.00	31.28 AV	54.00	-22.72	1.33 V	352	-4.28	35.56
5	7323.00	50.61 PK	74.00	-23.39	1.40 V	83	8.54	42.07
6	7323.00	20.61 AV	54.00	-33.39	1.40 V	83	-21.46	42.07

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	96.70 PK			1.44 H	340	66.29	30.41
2	*2480.00	66.70 AV			1.44 H	340	36.29	30.41
3	2483.50	65.87 PK	74.00	-8.13	1.44 H	349	35.44	30.43
4	2483.50	35.87 AV	54.00	-18.13	1.44 H	349	5.44	30.43
5	4960.00	59.11 PK	74.00	-14.89	1.58 H	346	23.42	35.69
6	4960.00	29.11 AV	54.00	-24.89	1.58 H	346	-6.58	35.69
7	7440.00	51.56 PK	74.00	-22.44	1.31 H	214	9.19	42.37
8	7440.00	21.56 AV	54.00	-32.44	1.31 H	214	-20.81	42.37
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	93.29 PK			1.30 V	102	62.88	30.41
2	*2480.00	63.29 AV			1.30 V	102	32.88	30.41
3	2483.50	63.42 PK	74.00	-10.58	1.23 V	109	32.99	30.43
4	2483.50	33.42 AV	54.00	-20.58	1.23 V	109	2.99	30.43
5	4960.00	61.09 PK	74.00	-12.91	1.40 V	89	25.40	35.69
6	4960.00	31.09 AV	54.00	-22.91	1.40 V	89	-4.60	35.69
7	7440.00	50.20 PK	74.00	-23.80	1.33 V	342	7.83	42.37
8	7440.00	20.20 AV	54.00	-33.80	1.33 V	342	-22.17	42.37

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 60%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Printed antenna		

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	54.28 PK	74.00	-19.72	1.94 H	127	24.00	30.28
2	2390.00	24.28 AV	54.00	-29.72	1.94 H	127	-6.00	30.28
3	*2402.00	99.00 PK			1.93 H	130	68.67	30.33
4	*2402.00	69.00 AV			1.93 H	130	38.67	30.33
5	4804.00	61.07 PK	74.00	-12.93	1.27 H	292	24.34	36.73
6	4804.00	31.07 AV	54.00	-22.93	1.27 H	292	-5.66	36.73
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	54.50 PK	74.00	-19.50	1.02 V	40	24.22	30.28
2	2390.00	24.50 AV	54.00	-29.50	1.02 V	40	-5.78	30.28
3	*2402.00	98.00 PK			1.02 V	41	67.67	30.33
4	*2402.00	68.00 AV			1.02 V	41	37.67	30.33
5	4804.00	60.10 PK	74.00	-13.90	1.24 V	101	23.37	36.73
6	4804.00	30.10 AV	54.00	-23.90	1.24 V	101	-6.63	36.73

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Printed antenna		

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	99.20 PK			1.94 H	131	68.94	30.26
2	*2441.00	69.20 AV			1.94 H	131	38.94	30.26
3	4882.00	61.90 PK	74.00	-12.10	1.13 H	294	26.34	35.56
4	4882.00	31.90 AV	54.00	-22.10	1.13 H	294	-3.66	35.56
5	7323.00	50.10 PK	74.00	-23.90	1.44 H	29	8.03	42.07
6	7323.00	20.10 AV	54.00	-33.90	1.44 H	29	-21.97	42.07
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	99.70 PK			1.04 V	69	69.44	30.26
2	*2441.00	69.70 AV			1.04 V	69	39.44	30.26
3	4882.00	60.60 PK	74.00	-13.40	1.28 V	100	25.04	35.56
4	4882.00	30.60 AV	54.00	-23.40	1.28 V	100	-4.96	35.56
5	7323.00	50.10 PK	74.00	-23.90	1.31 V	129	8.03	42.07
6	7323.00	20.10 AV	54.00	-33.90	1.31 V	129	-21.97	42.07

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 60%RH 965 hPa	**TESTED BY**	Frank Liu
TEST MODE	**Printed antenna**		

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	99.30 PK			1.84 H	123	68.68	30.62
2	*2480.00	69.30 AV			1.84 H	123	38.68	30.62
3	2483.50	68.77 PK	74.00	-5.23	1.84 H	126	38.14	30.63
4	2483.50	38.77 AV	54.00	-15.23	1.84 H	126	8.14	30.63
5	4960.00	63.17 PK	74.00	-10.83	1.00 H	315	26.02	37.15
6	4960.00	33.17 AV	54.00	-20.83	1.00 H	315	-3.98	37.15
7	7440.00	50.60 PK	74.00	-23.40	1.44 H	31	7.48	43.12
8	7440.00	20.60 AV	54.00	-33.40	1.44 H	31	-22.52	43.12
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	100.60 PK			1.09 V	164	69.98	30.62
2	*2480.00	70.60 AV			1.09 V	164	39.98	30.62
3	2483.58	69.18 PK	74.00	-4.82	1.08 V	159	38.55	30.63
4	2483.58	39.18 AV	54.00	-14.82	1.08 V	159	8.55	30.63
5	4960.00	61.30 PK	74.00	-12.70	1.24 V	100	24.15	37.15
6	4960.00	31.30 AV	54.00	-22.70	1.24 V	100	-5.85	37.15
7	7440.00	50.60 PK	74.00	-23.40	1.34 V	127	7.48	43.12
8	7440.00	20.60 AV	54.00	-33.40	1.34 V	127	-22.52	43.12

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	55.59 PK	74.00	-18.41	1.33 H	105	25.53	30.06
2	2390.00	25.59 AV	54.00	-28.41	1.33 H	105	-4.47	30.06
3	*2402.00	87.99 PK			1.33 H	107	57.88	30.11
4	*2402.00	57.99 AV			1.33 H	107	27.88	30.11
5	4804.00	54.46 PK	74.00	-19.54	1.00 H	287	19.03	35.43
6	4804.00	24.46 AV	54.00	-29.54	1.00 H	287	-10.97	35.43
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	53.95 PK	74.00	-20.05	1.00 V	81	23.89	30.06
2	2390.00	23.95 AV	54.00	-30.05	1.00 V	81	-6.11	30.06
3	*2402.00	93.74 PK			1.00 V	80	63.63	30.11
4	*2402.00	63.74 AV			1.00 V	80	33.63	30.11
5	4804.00	57.22 PK	74.00	-16.78	1.71 V	25	21.79	35.43
6	4804.00	27.22 AV	54.00	-26.78	1.71 V	25	-8.21	35.43

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	87.00 PK			1.34 H	107	56.74	30.26
2	*2441.00	57.00 AV			1.34 H	107	26.74	30.26
3	4882.00	53.84 PK	74.00	-20.16	1.00 H	293	18.28	35.56
4	4882.00	23.84 AV	54.00	-30.16	1.00 H	293	-11.72	35.56
5	7323.00	50.22 PK	74.00	-23.78	1.00 H	95	8.15	42.07
6	7323.00	20.22 AV	54.00	-33.78	1.00 H	95	-21.85	42.07
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	95.77 PK			1.00 V	80	65.51	30.26
2	*2441.00	65.77 AV			1.00 V	80	35.51	30.26
3	4822.00	58.77 PK	74.00	-15.23	1.70 V	32	23.31	35.46
4	4822.00	28.77 AV	54.00	-25.23	1.70 V	32	-6.69	35.46
5	7323.00	50.63 PK	74.00	-23.37	1.69 V	20	8.56	42.07
6	7323.00	20.63 AV	54.00	-33.37	1.69 V	20	-21.44	42.07

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	83.85 PK			1.31 H	105	53.44	30.41
2	*2480.00	53.85 AV			1.31 H	105	23.44	30.41
3	2483.50	53.26 PK	74.00	-20.74	1.31 H	105	22.83	30.43
4	2483.50	23.26 AV	54.00	-30.74	1.31 H	105	-7.17	30.43
5	4960.00	57.95 PK	74.00	-16.05	1.68 H	61	22.26	35.69
6	4960.00	27.95 AV	54.00	-26.05	1.68 H	61	-7.74	35.69
7	7440.00	50.80 PK	74.00	-23.20	1.66 H	65	8.43	42.37
8	7440.00	20.80 AV	54.00	-33.20	1.66 H	65	-21.57	42.37
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	95.73 PK			1.00 V	98	65.32	30.41
2	*2480.00	65.73 AV			1.00 V	98	35.32	30.41
3	2483.50	65.54 PK	74.00	-8.46	1.00 V	97	35.11	30.43
4	2483.50	35.54 AV	54.00	-18.46	1.00 V	97	5.11	30.43
5	4960.00	58.64 PK	74.00	-15.36	1.28 V	270	22.95	35.69
6	4960.00	28.64 AV	54.00	-25.36	1.28 V	270	-7.05	35.69
7	7440.00	51.00 PK	74.00	-23.00	1.30 V	0	8.63	42.37
8	7440.00	21.00 AV	54.00	-33.00	1.30 V	0	-21.37	42.37

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	2389.62	54.00 PK	74.00	-20.00	1.72 H	160	23.94	30.06
2	2389.62	24.00 AV	54.00	-30.00	1.72 H	160	-6.06	30.06
3	*2402.00	93.89 PK			1.75 H	165	63.78	30.11
4	*2402.00	63.89 AV			1.75 H	165	33.78	30.11
5	4804.00	59.09 PK	74.00	-14.91	1.19 H	63	23.66	35.43
6	4804.00	29.09 AV	54.00	-24.91	1.19 H	63	-6.34	35.43
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	53.11 PK	74.00	-20.89	1.57 V	254	23.05	30.06
2	2390.00	23.11 AV	54.00	-30.89	1.57 V	254	-6.95	30.06
3	*2402.00	90.11 PK			1.57 V	254	60.00	30.11
4	*2402.00	60.11 AV			1.57 V	254	30.00	30.11
5	4804.00	60.89 PK	74.00	-13.11	1.38 V	69	25.46	35.43
6	4804.00	30.89 AV	54.00	-23.11	1.38 V	69	-4.54	35.43

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	95.88 PK			1.59 H	329	65.62	30.26
2	*2441.00	65.88 AV			1.59 H	329	35.62	30.26
3	4882.00	59.94 PK	74.00	-14.06	1.24 H	78	24.38	35.56
4	4882.00	29.94 AV	54.00	-24.06	1.24 H	78	-5.62	35.56
5	7323.00	51.86 PK	74.00	-22.14	1.46 H	58	9.79	42.07
6	7323.00	21.86 AV	54.00	-32.14	1.46 H	58	-20.21	42.07
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	92.88 PK			1.53 V	222	62.62	30.26
2	*2441.00	62.88 AV			1.53 V	222	32.62	30.26
3	4882.00	61.28 PK	74.00	-12.72	1.43 V	55	25.72	35.56
4	4882.00	31.28 AV	54.00	-22.72	1.43 V	55	-4.28	35.56
5	7323.00	50.91 PK	74.00	-23.09	1.47 V	108	8.84	42.07
6	7323.00	20.91 AV	54.00	-33.09	1.47 V	108	-21.16	42.07

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	PIFA antenna		

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	96.39 PK			1.63 H	330	65.98	30.41
2	*2480.00	66.39 AV			1.63 H	330	35.98	30.41
3	2483.50	66.11 PK	74.00	-7.89	1.63 H	331	35.68	30.43
4	2483.50	36.11 AV	54.00	-17.89	1.63 H	331	5.68	30.43
5	4960.00	60.02 PK	74.00	-13.98	1.14 H	67	24.33	35.69
6	4960.00	30.02 AV	54.00	-23.98	1.14 H	67	-5.67	35.69
7	7440.00	51.93 PK	74.00	-22.07	1.55 H	358	9.56	42.37
8	7440.00	21.93 AV	54.00	-32.07	1.55 H	358	-20.44	42.37
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	94.49 PK			1.49 V	254	64.08	30.41
2	*2480.00	64.49 AV			1.49 V	254	34.08	30.41
3	2483.50	63.93 PK	74.00	-10.07	1.49 V	256	33.50	30.43
4	2483.50	33.93 AV	54.00	-20.07	1.49 V	256	3.50	30.43
5	4960.00	61.50 PK	74.00	-12.50	1.37 V	100	25.81	35.69
6	4960.00	31.50 AV	54.00	-22.50	1.37 V	100	-4.19	35.69
7	7440.00	50.82 PK	74.00	-23.18	1.40 V	99	8.45	42.37
8	7440.00	20.82 AV	54.00	-33.18	1.40 V	99	-21.55	42.37

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 60%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	**Printed antenna**		

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	53.63 PK	74.00	-20.37	1.82 H	123	23.35	30.28
2	2390.00	23.63 AV	54.00	-30.37	1.82 H	123	-6.65	30.28
3	*2402.00	98.40 PK			1.81 H	126	68.07	30.33
4	*2402.00	68.40 AV			1.81 H	126	38.07	30.33
5	4804.00	60.84 PK	74.00	-13.16	1.28 H	295	24.11	36.73
6	4804.00	30.84 AV	54.00	-23.16	1.28 H	295	-5.89	36.73
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	54.68 PK	74.00	-19.32	1.04 V	156	24.40	30.28
2	2390.00	24.68 AV	54.00	-29.32	1.04 V	156	-5.60	30.28
3	*2402.00	99.20 PK			1.06 V	159	68.87	30.33
4	*2402.00	69.20 AV			1.06 V	159	38.87	30.33
5	4804.00	58.89 PK	74.00	-15.11	1.23 V	95	22.16	36.73
6	4804.00	28.89 AV	54.00	-25.11	1.23 V	95	-7.84	36.73

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).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.

7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	**TESTED BY**	Frank Liu
TEST MODE	**Printed antenna**		

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	98.60 PK			1.84 H	127	68.34	30.26
2	*2441.00	68.60 AV			1.84 H	127	38.34	30.26
3	4882.00	62.50 PK	74.00	-11.50	1.24 H	293	26.94	35.56
4	4882.00	32.50 AV	54.00	-21.50	1.24 H	293	-3.06	35.56
5	7323.00	50.60 PK	74.00	-23.40	1.45 H	21	8.53	42.07
6	7323.00	20.60 AV	54.00	-33.40	1.45 H	21	-21.47	42.07
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	99.80 PK			1.07 V	154	69.54	30.26
2	*2441.00	69.80 AV			1.07 V	154	39.54	30.26
3	4882.00	59.70 PK	74.00	-14.30	1.24 V	93	24.14	35.56
4	4882.00	29.70 AV	54.00	-24.30	1.24 V	93	-5.86	35.56
5	7323.00	50.20 PK	74.00	-23.80	1.31 V	126	8.13	42.07
6	7323.00	20.20 AV	54.00	-33.80	1.31 V	126	-21.87	42.07

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 60%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Printed antenna		

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	99.30 PK			1.82 H	127	68.68	30.62
2	*2480.00	69.30 AV			1.82 H	127	38.68	30.62
3	2483.50	69.49 PK	74.00	-4.51	1.84 H	126	38.86	30.63
4	2483.50	39.49 AV	54.00	-14.51	1.84 H	126	8.86	30.63
5	4960.00	62.90 PK	74.00	-11.10	1.27 H	294	25.75	37.15
6	4960.00	32.90 AV	54.00	-21.10	1.27 H	294	-4.25	37.15
7	7440.00	50.90 PK	74.00	-23.10	1.45 H	24	7.78	43.12
8	7440.00	20.90 AV	54.00	-33.10	1.45 H	24	-22.22	43.12
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	101.50 PK			1.06 V	163	70.88	30.62
2	*2480.00	71.50 AV			1.06 V	163	40.88	30.62
3	2483.50	70.42 PK	74.00	-3.58	1.07 V	164	39.79	30.63
4	2483.50	40.42 AV	54.00	-13.58	1.07 V	164	9.79	30.63
5	4960.00	60.40 PK	74.00	-13.60	1.26 V	99	23.25	37.15
6	4960.00	30.40 AV	54.00	-23.60	1.26 V	99	-6.75	37.15
7	7440.00	50.40 PK	74.00	-23.60	1.31 V	124	7.28	43.12
8	7440.00	20.40 AV	54.00	-33.60	1.31 V	124	-22.72	43.12

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	2389.64	53.16 PK	74.00	-20.84	1.91 H	16	23.10	30.06
2	2389.64	23.16 AV	54.00	-30.84	1.91 H	16	-6.90	30.06
3	*2402.00	87.33 PK			1.90 H	15	57.22	30.11
4	*2402.00	57.33 AV			1.90 H	15	27.22	30.11
5	4804.00	53.74 PK	74.00	-20.26	1.46 H	83	18.31	35.43
6	4804.00	23.74 AV	54.00	-30.26	1.46 H	83	-11.69	35.43
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	53.57 PK	74.00	-20.43	1.00 V	353	23.51	30.06
2	2390.00	23.57 AV	54.00	-30.43	1.00 V	353	-6.49	30.06
3	*2402.00	92.99 PK			1.00 V	353	62.88	30.11
4	*2402.00	62.99 AV			1.00 V	353	32.88	30.11
5	4804.00	58.09 PK	74.00	-15.91	1.23 V	68	22.66	35.43
6	4804.00	28.09 AV	54.00	-25.91	1.23 V	68	-7.34	35.43

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	87.62 PK			1.89 H	20	57.36	30.26
2	*2441.00	57.62 AV			1.89 H	20	27.36	30.26
3	4882.00	54.58 PK	74.00	-19.42	1.72 H	169	19.02	35.56
4	4882.00	24.58 AV	54.00	-29.42	1.72 H	169	-10.98	35.56
5	7323.00	50.92 PK	74.00	-23.08	1.64 H	33	8.85	42.07
6	7323.00	20.92 AV	54.00	-33.08	1.64 H	33	-21.15	42.07
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	94.90 PK			1.00 V	79	64.64	30.26
2	*2441.00	64.90 AV			1.00 V	79	34.64	30.26
3	4882.00	57.28 PK	74.00	-16.72	1.31 V	79	21.72	35.56
4	4882.00	27.28 AV	54.00	-26.72	1.31 V	79	-8.28	35.56
5	7323.00	51.09 PK	74.00	-22.91	1.11 V	308	9.02	42.07
6	7323.00	21.09 AV	54.00	-32.91	1.11 V	308	-20.98	42.07

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 965 hPa	TESTED BY	Frank Liu
TEST MODE	Chip antenna		

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	88.87 PK			1.90 H	17	58.46	30.41
2	*2480.00	58.87 AV			1.90 H	17	28.46	30.41
3	2483.50	58.85 PK	74.00	-15.15	1.90 H	39	28.42	30.43
4	2483.50	28.85 AV	54.00	-25.15	1.90 H	39	-1.58	30.43
5	4960.00	55.02 PK	74.00	-18.98	1.60 H	5	19.33	35.69
6	4960.00	25.02 AV	54.00	-28.98	1.60 H	5	-10.67	35.69
7	7440.00	51.02 PK	74.00	-22.98	1.58 H	69	8.65	42.37
8	7440.00	21.02 AV	54.00	-32.98	1.58 H	69	-21.35	42.37
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	93.48 PK			1.01 V	349	63.07	30.41
2	*2480.00	63.48 AV			1.01 V	349	33.07	30.41
3	2483.50	61.18 PK	74.00	-12.82	1.01 V	351	30.75	30.43
4	2483.50	31.18 AV	54.00	-22.82	1.01 V	351	0.75	30.43
5	4960.00	57.48 PK	74.00	-16.52	1.18 V	100	21.79	35.69
6	4960.00	27.48 AV	54.00	-26.52	1.18 V	100	-8.21	35.69
7	7440.00	50.87 PK	74.00	-23.13	1.20 V	46	8.50	42.37
8	7440.00	20.87 AV	54.00	-33.13	1.20 V	46	-21.50	42.37

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30 dB.
7. Average value = peak reading + 20log(duty cycle).

4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2009	Aug. 08, 2010

NOTE:

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

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW a of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 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

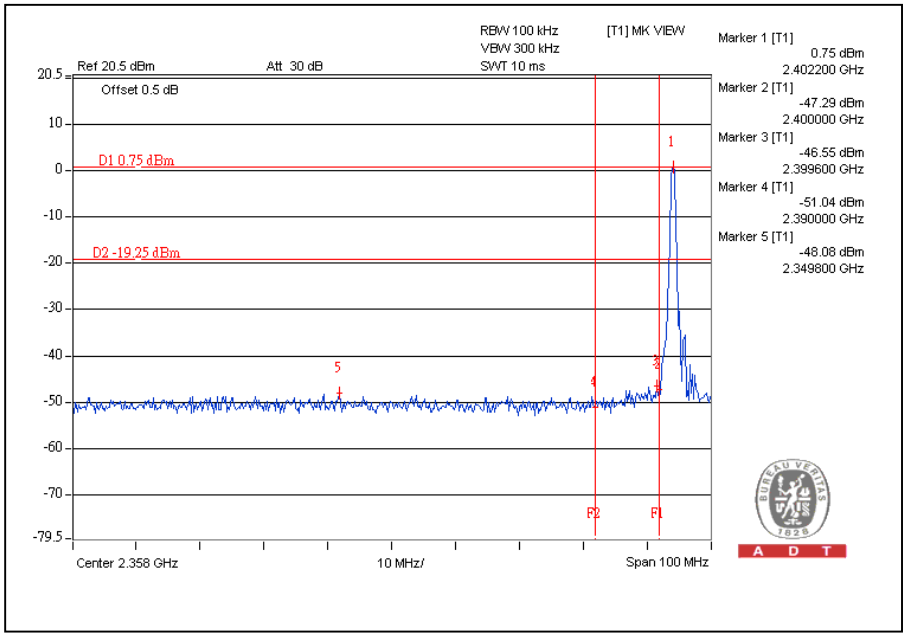
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.6 TEST RESULTS

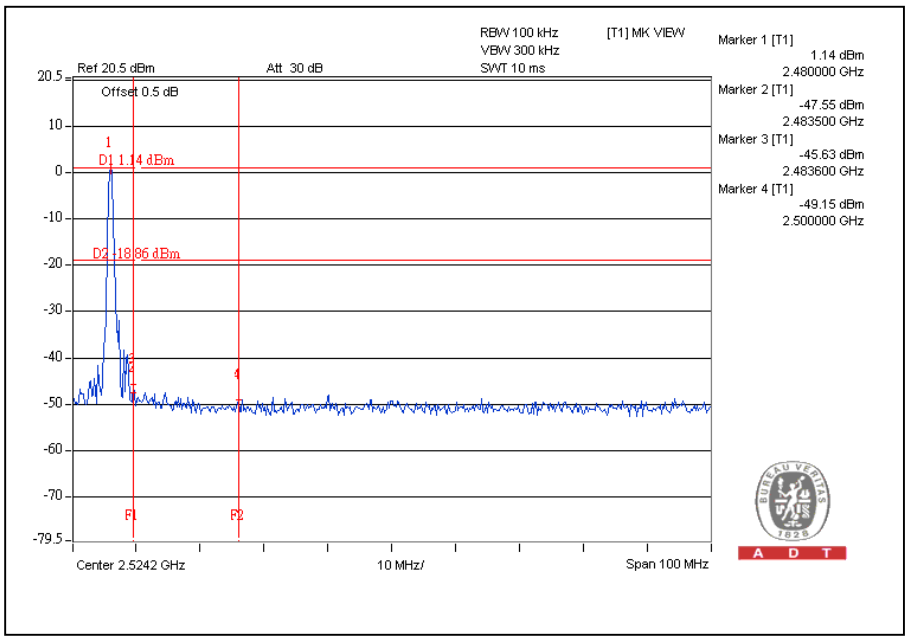
Emissions radiated outside of the specified frequency bands, please refer pages form 72 to 89 for met the requirement of the general radiated emission limits in § 15.209.

For GFSK MODULATION TYPE:

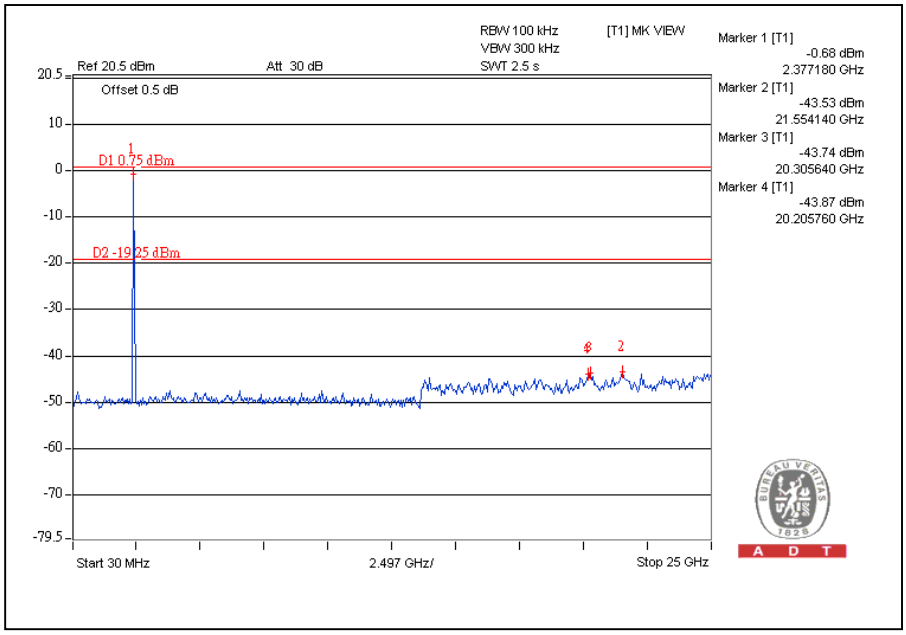
CH0



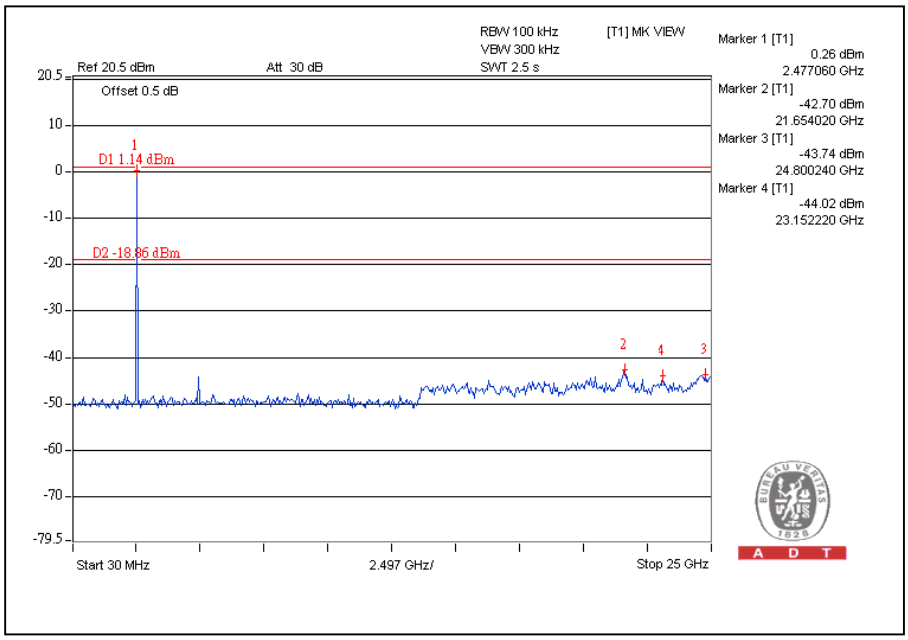
CH78



CH0

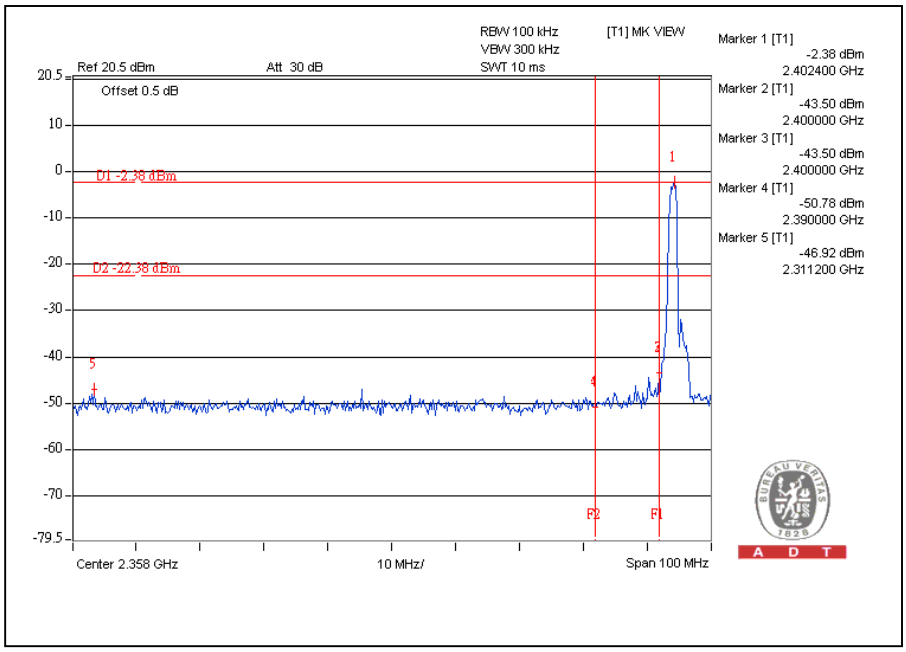

RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
D1 0.75 dBm
D2 -19.25 dBm
Marker 1 [T1]
-0.68 dBm
2.377180 GHz
Marker 2 [T1]
-43.53 dBm
21.554140 GHz
Marker 3 [T1]
-43.74 dBm
20.305640 GHz
Marker 4 [T1]
-43.87 dBm
20.205760 GHz
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Start 30 MHz
2.497 GHz/
Stop 25 GHz

CH78

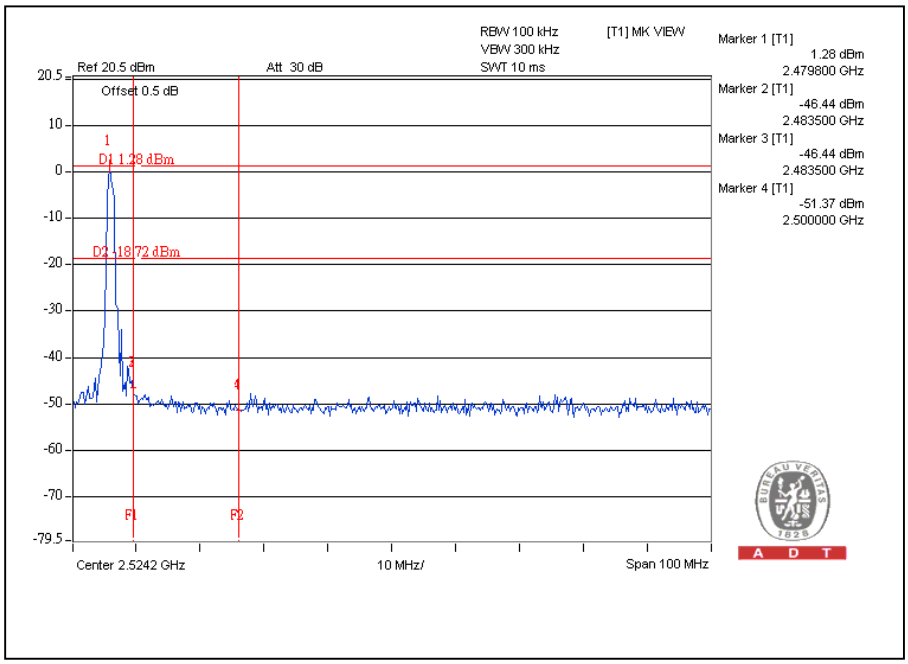

RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
D1 1.14 dBm
D2 -18.86 dBm
Marker 1 [T1]
0.26 dBm
2.477060 GHz
Marker 2 [T1]
-42.70 dBm
21.654020 GHz
Marker 3 [T1]
-43.74 dBm
24.800240 GHz
Marker 4 [T1]
-44.02 dBm
23.152220 GHz
20.5
10
0
-10
-20
-30
-40
-50
-60
-70
-79.5
Start 30 MHz
2.497 GHz/
Stop 25 GHz

FOR 8DPSK MODULATION TYPE:

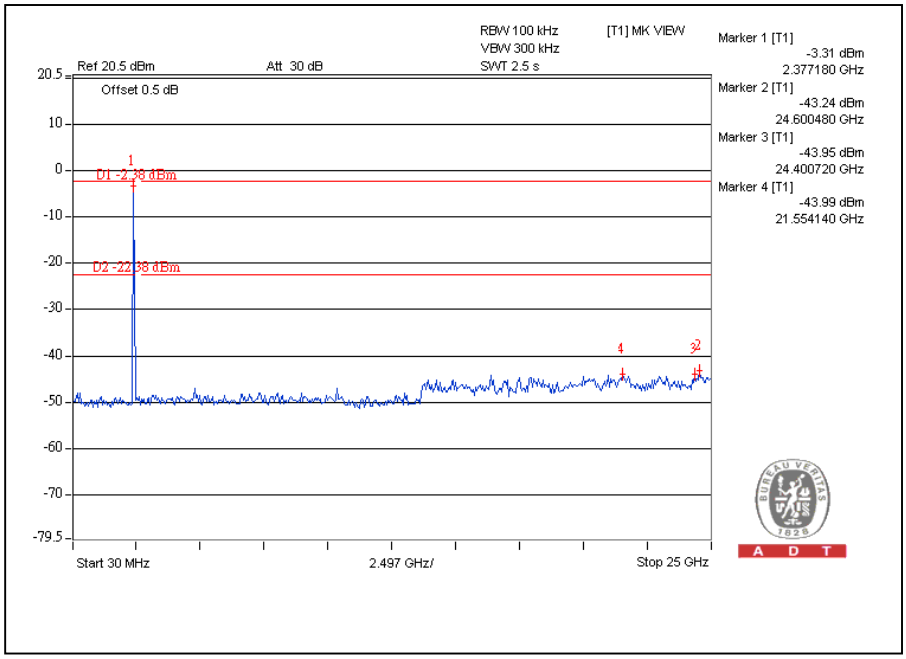
CH0



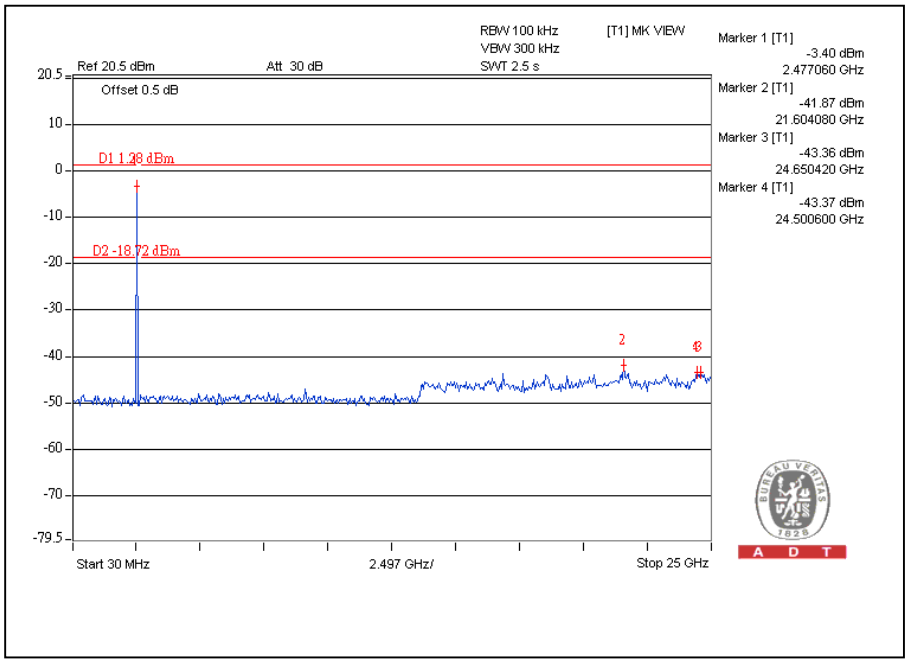
CH78



CH0


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
D1 -2.38 dBm
D2 -22.38 dBm
Marker 1 [T1]
-3.31 dBm
2.377180 GHz
Marker 2 [T1]
-43.24 dBm
24.600480 GHz
Marker 3 [T1]
-43.95 dBm
24.400720 GHz
Marker 4 [T1]
-43.99 dBm
21.554140 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz

CH78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20.5 dBm
Att 30 dB
Offset 0.5 dB
D1 1.48 dBm
D2 -18.72 dBm
Marker 1 [T1]
-3.40 dBm
2.477060 GHz
Marker 2 [T1]
-41.87 dBm
21.604080 GHz
Marker 3 [T1]
-43.36 dBm
24.650420 GHz
Marker 4 [T1]
-43.37 dBm
24.500600 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz

4.9 ANTENNA REQUIREMENT

4.9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.9.2 ANTENNA CONNECTED CONSTRUCTION

There are three antennas provided to this EUT, please refer to the following table:

Brand	Model No.	Antenna Connector	Antenna Type	Antenna Gain with cable loss (dBi)	Cable Loss (dB)	Cable Length (mm)
Wistron	81-EBJ15.005 (Aux)	IPEX	PIFA	3.62	1.15	300
Atheros	308-00001-000	NA	Printed	0	NA	NA
fractus	FR05-S1-N-0-001	NA	Chip	2.2	NA	NA

5 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 by the following approval agencies according to ISO/IEC 17025:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA (MOU)
Russia	CERTIS (MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Email: service@adt.com.tw
Web Site: www.adt.com.tw

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

6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

--- END ---