FCC TEST REPORT (BLUETOOTH)

REPORT NO.:	RF980505L11-3
MODEL NO.:	WHIT100
RECEIVED:	May 05, 2009
TESTED:	Jun. 26 ~ Jul. 03, 2009
ISSUED:	Jul. 13, 2009

APPLICANT:	HTC Corporation
ADDRESS:	No. 23, Xinghua Rd., Taoyuan City, Taiwan, R.O.C.

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

Table of Contents

1. CERTIFICATION....4
2. SUMMARY OF TEST RESULTS....5
2.1 MEASUREMENT UNCERTAINTY....5
3. GENERAL INFORMATION....6
3.1 GENERAL DESCRIPTION OF EUT....6
3.2 DESCRIPTION OF TEST MODES....8
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST....9
3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL....10
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS....11
3.4 DESCRIPTION OF SUPPORT UNITS....12
4. TEST TYPES AND RESULTS....13
4.1 RADIATED EMISSION MEASUREMENT....13
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT....13
4.1.2 TEST INSTRUMENTS....14
4.1.3 TEST PROCEDURES....15
4.1.4 DEVIATION FROM TEST STANDARD....15
4.1.5 TEST SETUP....16
4.1.6 EUT OPERATING CONDITIONS....16
4.1.7 TEST RESULTS....17
4.2 CONDUCTED EMISSION MEASUREMENT....26
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT....26
4.2.2 TEST INSTRUMENTS....26
4.2.3 TEST PROCEDURES....27
4.2.4 DEVIATION FROM TEST STANDARD....27
4.2.5 TEST SETUP....28
4.2.6 EUT OPERATING CONDITIONS....28
4.2.7 TEST RESULTS....29
4.3 NUMBER OF HOPPING FREQUENCY USED....35
4.3.1 LIMIT OF HOPPING FREQUENCY USED....35
4.3.2 TEST INSTRUMENTS....35
4.3.3 TEST PROCEDURES....35
4.3.4 DEVIATION FROM TEST STANDARD....36
4.3.5 TEST SETUP....36
4.3.6 TEST RESULTS....36
4.4 DWELL TIME ON EACH CHANNEL....39
4.4.1 LIMIT OF DWELL TIME USED....39
4.4.2 TEST INSTRUMENTS....39
4.4.3 TEST PROCEDURES....39
4.4.4 DEVIATION FROM TEST STANDARD....39
4.4.5 TEST SETUP....39

4.4.6 TEST RESULTS 40
4.5 CHANNEL BANDWIDTH 48
4.5.1 LIMITS OF CHANNEL BANDWIDTH 48
4.5.2 TEST INSTRUMENTS 48
4.5.3 TEST PROCEDURE 48
4.5.4 DEVIATION FROM TEST STANDARD 48
4.5.5 TEST SETUP 49
4.5.6 EUT OPERATING CONDITION 49
4.5.7 TEST RESULTS 49
4.6 HOPPING CHANNEL SEPARATION 54
4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION 54
4.6.2 TEST INSTRUMENTS 54
4.6.3 TEST PROCEDURES 54
4.6.4 DEVIATION FROM TEST STANDARD 54
4.6.5 TEST SETUP 54
4.6.6 TEST RESULTS 55
4.7 MAXIMUM PEAK OUTPUT POWER 59
4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT 59
4.7.2 TEST INSTRUMENTS 59
4.7.3 TEST PROCEDURES 59
4.7.4 DEVIATION FROM TEST STANDARD 59
4.7.5 TEST SETUP 60
4.7.6 EUT OPERATING CONDITION 60
4.7.7 TEST RESULTS 60
4.8 BAND EDGES MEASUREMENT 65
4.8.1 LIMITS OF BAND EDGES MEASUREMENT 65
4.8.2 TEST INSTRUMENTS 65
4.8.3 TEST PROCEDURE 65
4.8.4 DEVIATION FROM TEST STANDARD 65
4.8.5 EUT OPERATING CONDITION 65
4.8.6 TEST RESULTS 66
4.9 ANTENNA REQUIREMENT 72
4.9.1 STANDARD APPLICABLE 72
4.9.2 ANTENNA CONNECTED CONSTRUCTION 72
5. PHOTOGRAPHS OF THE TEST CONFIGURATION 73
6. INFORMATION ON THE TESTING LABORATORIES 74
7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 75

1. CERTIFICATION

PRODUCT:	Pocket PC Phone
MODEL NO.:	WHIT100
APPLICANT:	HTC Corporation
TESTED:	Jun. 26 ~ Jul. 03, 2009
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247),** ANSI C63.4-2003

The above equipment (Model: WHIT100) 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 : Peggy Chen , **DATE:** Jul. 13, 2009
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jul. 13, 2009
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Jul. 13, 2009
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC 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 –8.07dB at 0.275MHz.
15.247(a)(1) (iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec. : Min. 25 kHz or $\frac{2}{3}$*20 dB bandwidth, whichever is greater 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Spec.: max. 21dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is –4.51dB at 35.73MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Pocket PC Phone
MODEL NO.	WHIT100
FCC ID	NM8WHIT100
POWER SUPPLY	3.7Vdc from rechargeable lithium battery 5.0Vdc from power adapter 5.0Vdc from host equipment
MODULATION TYPE	GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	1/2/3Mbps
OPERATING FREQUENCY	2402 ~ 2480MHz
NUMBER OF CHANNEL	79
CHANNEL SPACING	1MHz
OUTPUT POWER	0.830mW
ANTENNA TYPE	PIFA
MAX. ANTENNA GAIN	-1dBi
DATA CABLE	Refer to NOTE 2
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to NOTE 2

NOTE:

1. The EUT is a Pocket PC Phone. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
CDMA 850	FCC Part 22	RF980505L11
CDMA 1900	FCC Part 24	RF980505L11-1
WLAN 802.11b/g	FCC Part 15, Subpart C (Section 15.247)	RF980505L11-2
BLUETOOTH		RF980505L11-3

2. The EUT has following accessories.

NO.	PRODUCT	BRAND	MODEL	DESCRIPTION
1	Power Adapter	hTC	TC P300	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1A 1.25m non-shielded cable without core Manufacturer: Delta
2				I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1A 1.25m non-shielded cable without core Manufacturer: Foxlink
3	Battery	hTC	RHOD160	Rating: 3.7Vdc, 1500mAh, 5.55Whr P/N: 35H00123-00M Manufacturer: HT
4				Rating: 3.7Vdc, 1500mAh, 5.55Whr P/N: 35H00123-02M Manufacturer: Formosa
5	USB cable	MEC	DC U200	1.25m shielded cable without core
6		Foxlink		
7	Camera	Foxconn	CER968-5M_AF_ASSY	-
8		Liteon	08PM15	
9	LCM	EID	L4F00390T00	-
10		AUO	H361VL01V0	-

* Item 3, 6, 7, 9 were the worst for the final test.

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

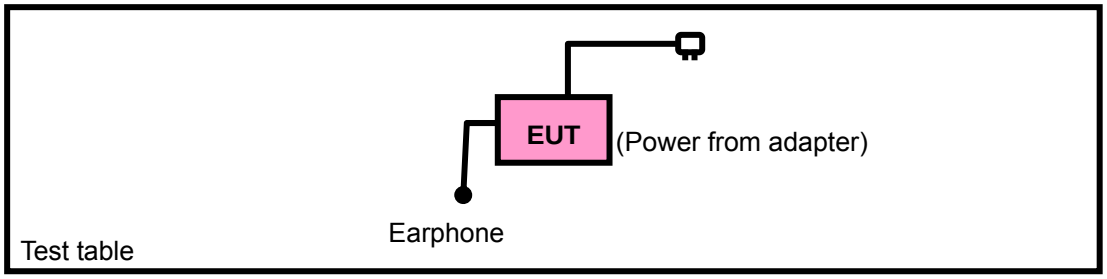
3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

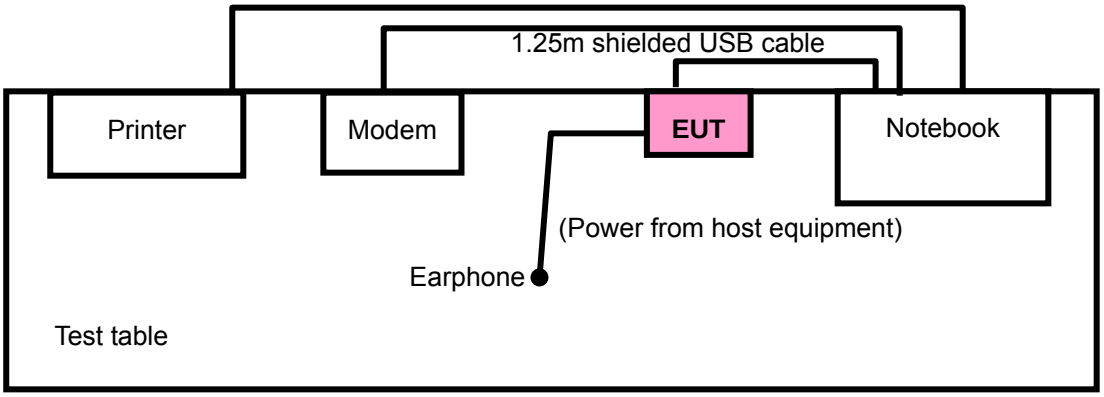
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A, B



TEST MODE C



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	-	√	√	-	Power from Adapter (Manufacturer: Delta)
B	-	√	√	-	Power from Adapter (Manufacturer: Foxlink)
C	√	√	√	√	Power from host equipment

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement
NOTE: "-"means no effect.

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
C	0 to 78	0, 39, 78	FHSS	GFSK	DH5	X
C	0 to 78	0, 39, 78	FHSS	8DPSK	DH5	X

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE	AXIS
A	0 to 78	39	FHSS	8DPSK	DH5	X
B	0 to 78	39	FHSS	8DPSK	DH5	X
C	0 to 78	39	FHSS	8DPSK	DH5	X

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	39	FHSS	8DPSK	DH5
B	0 to 78	39	FHSS	8DPSK	DH5
C	0 to 78	39	FHSS	8DPSK	DH5

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
C	0 to 78	0, 39, 78	FHSS	GFSK	DH5
C	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

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

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	HP	NC6000	CNU411DXNL	NA
2	PRINTER	EPSON	LQ-300+	DCGY054146	FCC DoC Approved
3	MODEM	ACEEX	1414V/3	0401008260	IFAXDM1414
4	EARPHONE	NA	RC E150	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8m braid shielded wire, DB25 connector, w/o core.
3	1.2m braid shielded wire, DB25 & DB9 connector, w/o core.
4	1.3m non-shielded audio cable without core.

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 4 was provided by client.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	100033	Jul. 06, 2008	Jul. 05, 2009
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100076	May. 26, 2009	May. 25, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 27, 2009	Apr. 26, 2010
HORN Antenna SCHWARZBECK	9120D	9120D-209	Jul. 01, 2009	Jun. 30, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 25, 2008	Dec. 24, 2009
Preamplifier Agilent	8447D	2944A10633	Nov. 03, 2008	Nov. 02, 2009
Preamplifier Agilent	8449B	3008A01964	Oct. 23, 2008	Oct. 22, 2009
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	238141/4	May 13, 2009	May 12, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	12738/6	May 13, 2009	May 12, 2010
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100.	TT93021703	NA	NA
Turn Table Controller ADT.	SC100.	SC93021703	NA	NA

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

2. The test was performed in HwaYa Chamber 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC 7450F-3.

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

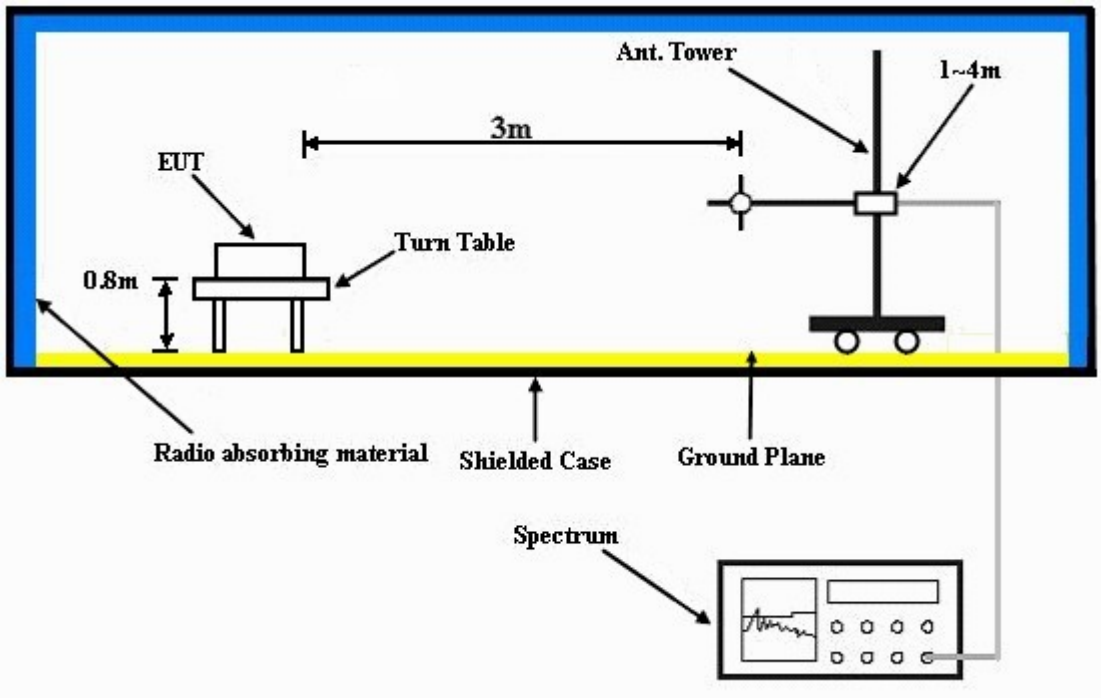
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

TEST MODE A & B

a. Placed the EUT on a testing table.

b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

TEST MODE C

a. Connected the EUT to notebook and placed on a testing table.

b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the system in full functions.

4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	41.73 PK	74.00	-32.27	1.03 H	56	10.98	30.75
2	2390.00	29.97 AV	54.00	-24.03	1.03 H	56	-0.78	30.75
3	#2400.00	55.18 PK	75.18	-20.00	1.08 H	20	24.39	30.79
4	#2400.00	25.08 AV	45.08	-20.00	1.08 H	20	-5.71	30.79
5	*2402.00	95.18 PK			1.08 H	20	64.38	30.80
6	*2402.00	65.08 AV			1.08 H	20	34.28	30.80
7	4804.00	47.69 PK	74.00	-26.31	1.03 H	56	11.06	36.63
8	4804.00	17.59 AV	54.00	-36.41	1.03 H	56	-19.04	36.63
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	40.98 PK	74.00	-33.02	1.00 V	215	10.23	30.75
2	2390.00	29.30 AV	54.00	-24.70	1.00 V	215	-1.45	30.75
3	#2400.00	50.28 PK	70.28	-20.00	1.00 V	218	19.49	30.79
4	#2400.00	20.18 AV	40.18	-20.00	1.00 V	218	-10.61	30.79
5	*2402.00	90.28 PK			1.00 V	218	59.48	30.80
6	*2402.00	60.18 AV			1.00 V	218	29.38	30.80
7	4804.00	48.23 PK	74.00	-25.77	1.12 V	331	11.60	36.63
8	4804.00	18.13 AV	54.00	-35.87	1.12 V	331	-18.50	36.63

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)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).
8. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	94.40 PK			1.05 H	20	63.48	30.92
2	*2441.00	64.30 AV			1.05 H	20	33.38	30.92
3	4882.00	47.73 PK	74.00	-26.27	1.02 H	61	11.00	36.73
4	4882.00	17.63 AV	54.00	-36.37	1.02 H	61	-19.10	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	*2441.00	90.88 PK			1.17 V	215	59.96	30.92
2	*2441.00	60.78 AV			1.17 V	215	29.86	30.92
3	4882.00	48.65 PK	74.00	-25.35	1.15 V	336	11.92	36.73
4	4882.00	18.55 AV	54.00	-35.45	1.15 V	336	-18.18	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)= -30.1 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, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	90.79 PK			1.32 H	19	59.74	31.05
2	*2480.00	60.69 AV			1.32 H	19	29.64	31.05
3	2483.50	34.16 PK	74.00	-39.84	1.32 H	19	3.10	31.06
4	2483.50	4.06 AV	54.00	-49.94	1.32 H	19	-27.00	31.06
5	4960.00	47.52 PK	74.00	-26.48	1.00 H	88	10.52	37.00
6	4960.00	17.42 AV	54.00	-36.58	1.00 H	88	-19.58	37.00
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	85.45 PK			1.14 V	141	54.40	31.05
2	*2480.00	55.35 AV			1.14 V	141	24.30	31.05
3	2483.50	31.73 PK	74.00	-42.27	1.14 V	141	0.67	31.06
4	2483.50	1.63 AV	54.00	-52.37	1.14 V	141	-29.43	31.06
5	4960.00	47.95 PK	74.00	-26.05	1.16 V	287	10.95	37.00
6	4960.00	17.85 AV	54.00	-36.15	1.16 V	287	-19.15	37.00

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)= -30.1 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, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	45.09 PK	74.00	-28.91	1.08 H	25	14.34	30.75
2	2390.00	32.02 AV	54.00	-21.98	1.08 H	25	1.27	30.75
3	#2400.00	55.89 PK	76.89	-21.00	1.08 H	24	25.10	30.79
4	#2400.00	25.79 AV	46.79	-21.00	1.08 H	24	-5.00	30.79
5	*2402.00	96.89 PK			1.08 H	24	66.09	30.80
6	*2402.00	66.79 AV			1.08 H	24	35.99	30.80
7	4804.00	49.86 PK	74.00	-24.14	1.08 H	8	13.23	36.63
8	4804.00	19.76 AV	54.00	-34.24	1.08 H	8	-16.87	36.63
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	44.38 PK	74.00	-29.62	1.15 V	139	13.63	30.75
2	2390.00	31.62 AV	54.00	-22.38	1.15 V	139	0.87	30.75
3	#2400.00	52.63 PK	73.63	-21.00	1.15 V	139	21.84	30.79
4	#2400.00	22.53 AV	43.53	-21.00	1.15 V	139	-8.26	30.79
5	*2402.00	93.63 PK			1.15 V	139	62.83	30.80
6	*2402.00	63.53 AV			1.15 V	139	32.73	30.80
7	4804.00	49.49 PK	74.00	-24.51	1.15 V	108	12.86	36.63
8	4804.00	19.39 AV	54.00	-34.61	1.15 V	108	-17.24	36.63

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)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).
8. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	95.90 PK			1.04 H	13	64.98	30.92
2	*2441.00	65.80 AV			1.04 H	13	34.88	30.92
3	4882.00	49.77 PK	74.00	-24.23	1.09 H	355	13.04	36.73
4	4882.00	19.67 AV	54.00	-34.33	1.09 H	355	-17.06	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	*2441.00	92.55 PK			1.17 V	140	61.63	30.92
2	*2441.00	62.45 AV			1.17 V	140	31.53	30.92
3	4882.00	49.32 PK	74.00	-24.68	1.14 V	95	12.59	36.73
4	4882.00	19.22 AV	54.00	-34.78	1.14 V	95	-17.51	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)= -30.1 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, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1002 hPa	TESTED BY	Kevin Liang

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	92.89 PK			1.05 H	14	61.84	31.05
2	*2480.00	62.79 AV			1.05 H	14	31.74	31.05
3	2483.50	34.62 PK	74.00	-39.38	1.05 H	14	3.56	31.06
4	2483.50	4.52 AV	54.00	-49.48	1.05 H	14	-26.54	31.06
5	4960.00	49.65 PK	74.00	-24.35	1.09 H	2	12.65	37.00
6	4960.00	19.55 AV	54.00	-34.45	1.09 H	2	-17.45	37.00
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	89.29 PK			1.13 V	141	58.24	31.05
2	*2480.00	59.19 AV			1.13 V	141	28.14	31.05
3	2483.50	35.13 PK	74.00	-38.87	1.13 V	141	4.07	31.06
4	2483.50	5.03 AV	54.00	-48.97	1.13 V	141	-26.03	31.06
5	4960.00	50.96 PK	74.00	-23.04	1.17 V	115	13.96	37.00
6	4960.00	20.86 AV	54.00	-33.14	1.17 V	115	-16.14	37.00

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)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).

BELOW 1GHz WORST-CASE DATA：8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000 hPa	TESTED BY	Sun Lin
TEST MODE	A		

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	35.73	20.24 QP	40.00	-19.76	1.00 H	304	7.35	12.88
2	47.40	18.72 QP	40.00	-21.28	1.00 H	319	5.13	13.59
3	119.34	22.31 QP	43.50	-21.19	1.25 H	52	10.92	11.39
4	152.39	21.14 QP	43.50	-22.36	1.00 H	259	6.57	14.57
5	181.55	21.52 QP	43.50	-21.98	1.00 H	94	8.85	12.67
6	216.55	23.63 QP	46.00	-22.37	1.00 H	70	11.55	12.07
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	**35.73**	**35.49 QP**	**40.00**	**-4.51**	**1.00 V**	**289**	**22.61**	**12.88**
2	66.84	30.65 QP	40.00	-9.35	1.25 V	133	17.99	12.65
3	99.89	27.55 QP	43.50	-15.95	1.00 V	10	18.13	9.42
4	119.34	25.98 QP	43.50	-17.52	1.00 V	10	14.59	11.39
5	156.28	20.03 QP	43.50	-23.47	1.00 V	67	5.66	14.37
6	193.22	21.81 QP	43.50	-21.69	1.25 V	67	9.87	11.94

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 39	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000 hPa	TESTED BY	Sun Lin
TEST MODE	B		

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	31.84	21.34 QP	40.00	-18.66	1.25 H	310	8.57	12.78
2	66.84	23.87 QP	40.00	-16.13	1.00 H	244	11.21	12.65
3	88.23	22.99 QP	43.50	-20.51	2.00 H	337	14.27	8.72
4	123.23	20.67 QP	43.50	-22.83	2.00 H	244	8.86	11.82
5	158.22	24.18 QP	43.50	-19.32	2.00 H	277	9.92	14.26
6	201.00	25.42 QP	43.50	-18.08	2.00 H	268	13.87	11.55
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	33.79	33.61 QP	40.00	-6.39	1.25 V	1	20.86	12.74
2	70.73	30.95 QP	40.00	-9.05	1.25 V	103	18.66	12.30
3	99.89	27.94 QP	43.50	-15.56	1.00 V	166	18.53	9.42
4	129.06	21.94 QP	43.50	-21.56	1.25 V	25	9.48	12.46
5	156.28	21.50 QP	43.50	-22.00	1.25 V	232	7.13	14.37
6	191.28	21.72 QP	43.50	-21.78	1.00 V	67	9.66	12.06

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 39	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000 hPa	TESTED BY	Sun Lin
TEST MODE	C		

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	121.28	33.23 QP	43.50	-10.27	2.00 H	79	21.63	11.60
2	138.78	34.15 QP	43.50	-9.35	2.00 H	292	20.62	13.53
3	191.28	30.66 QP	43.50	-12.84	1.25 H	76	18.60	12.06
4	220.44	39.42 QP	46.00	-6.58	2.00 H	58	27.22	12.20
5	267.10	37.34 QP	46.00	-8.66	2.00 H	58	23.36	13.98
6	467.36	34.04 QP	46.00	-11.96	2.00 H	46	14.16	19.89
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	70.73	33.26 QP	40.00	-6.74	1.25 V	88	20.96	12.30
2	331.26	33.26 QP	46.00	-12.74	2.00 V	187	16.96	16.30
3	465.42	33.78 QP	46.00	-12.22	1.00 V	58	13.94	19.84
4	663.74	33.26 QP	46.00	-12.74	2.00 V	10	9.29	23.97
5	860.11	33.17 QP	46.00	-12.83	1.25 V	76	5.64	27.54
6	887.33	34.10 QP	46.00	-11.90	1.50 V	256	6.10	28.00

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.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 22, 2008	Sep. 21, 2009
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 31, 2008	Dec. 30, 2009
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Dec. 29, 2008	Dec. 28, 2009
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jul. 30, 2008	Jul. 29, 2009
Software ADT	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 HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

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

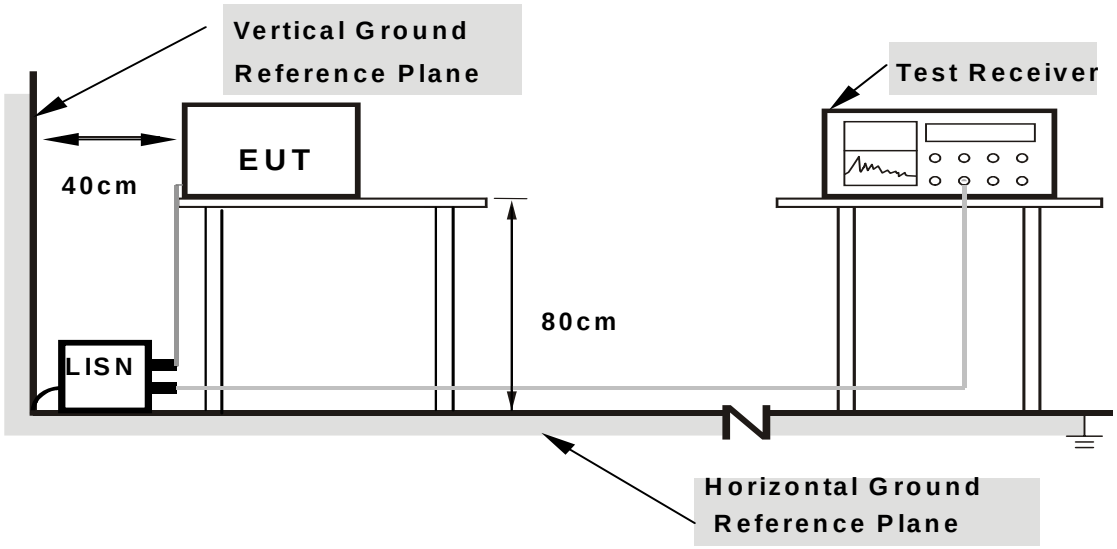
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

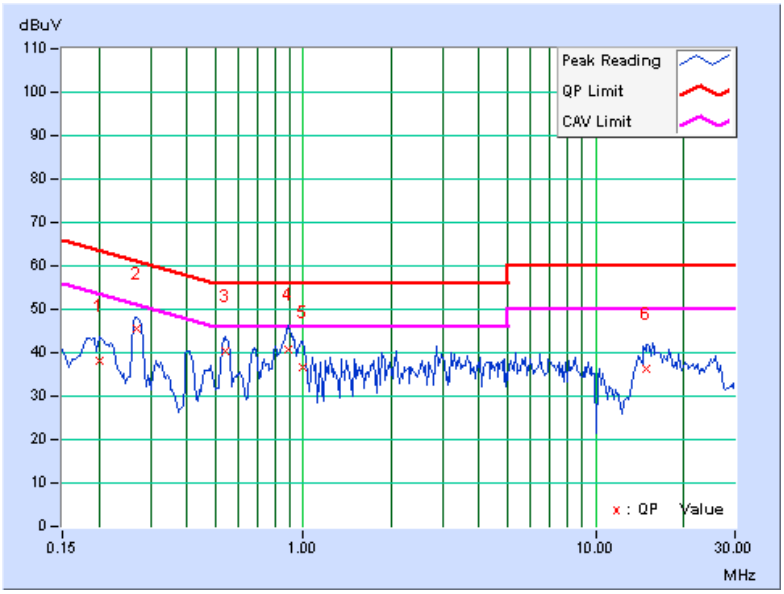
4.2.7 TEST RESULTS

CONDUCTED WORST CASE DATA: 8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	**PHASE**	Line 1
MODULATION TYPE	8DPSK	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TEST MODE	**A**	**TESTED BY**	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.13	37.90	-	38.03	-	63.58	53.58	-25.55	-
2	0.270	0.13	45.35	-	45.48	-	61.11	51.11	-15.63	-
3	0.541	0.15	40.37	-	40.52	-	56.00	46.00	-15.48	-
4	0.884	0.16	40.66	-	40.82	-	56.00	46.00	-15.18	-
5	0.998	0.17	36.35	-	36.52	-	56.00	46.00	-19.48	-
6	14.949	0.55	35.92	-	36.47	-	60.00	50.00	-23.53	-

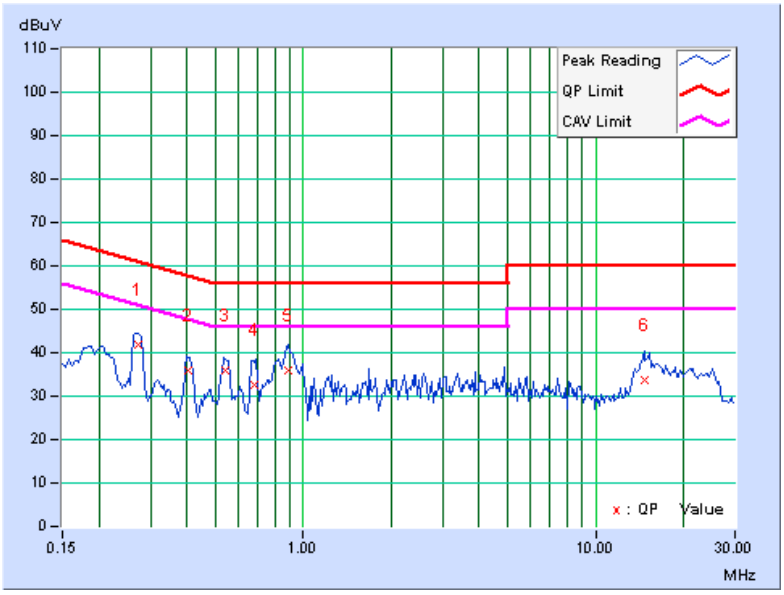
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	8DPSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.271	0.14	41.77	-	41.91	-	61.08	51.08	-19.18	-
2	0.407	0.15	35.87	-	36.02	-	57.72	47.72	-21.70	-
3	0.540	0.15	35.67	-	35.82	-	56.00	46.00	-20.18	-
4	0.683	0.16	32.50	-	32.66	-	56.00	46.00	-23.34	-
5	0.892	0.17	35.85	-	36.02	-	56.00	46.00	-19.98	-
6	14.648	0.65	33.07	-	33.72	-	60.00	50.00	-26.28	-

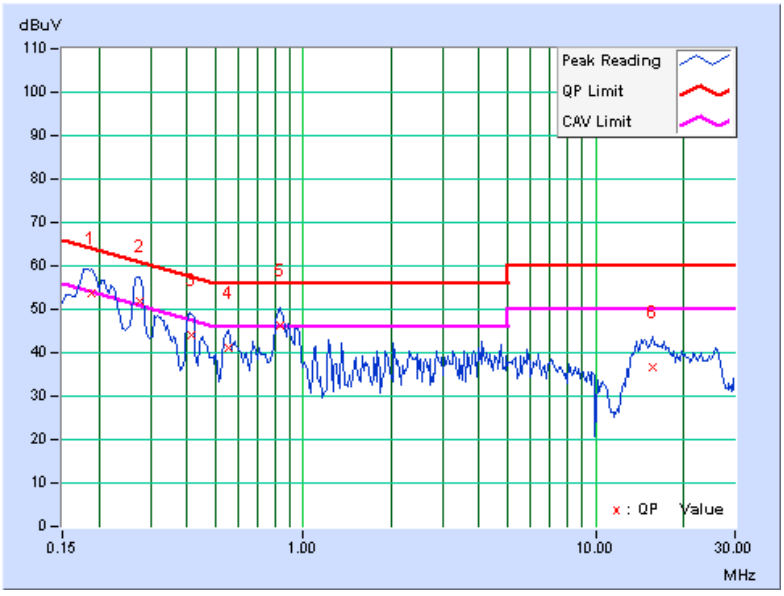
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	8DPSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.188	0.13	53.62	-	53.75	-	64.14	54.14	-10.39	-
2	**0.275**	**0.13**	**51.75**	**42.76**	**51.88**	**42.89**	**60.97**	**50.97**	**-9.08**	**-8.07**
3	0.412	0.14	43.97	-	44.11	-	57.60	47.60	-13.49	-
4	0.552	0.15	41.04	-	41.19	-	56.00	46.00	-14.81	-
5	0.830	0.16	46.31	34.89	46.47	35.05	56.00	46.00	-9.53	-10.95
6	15.742	0.57	36.13	-	36.70	-	60.00	50.00	-23.30	-

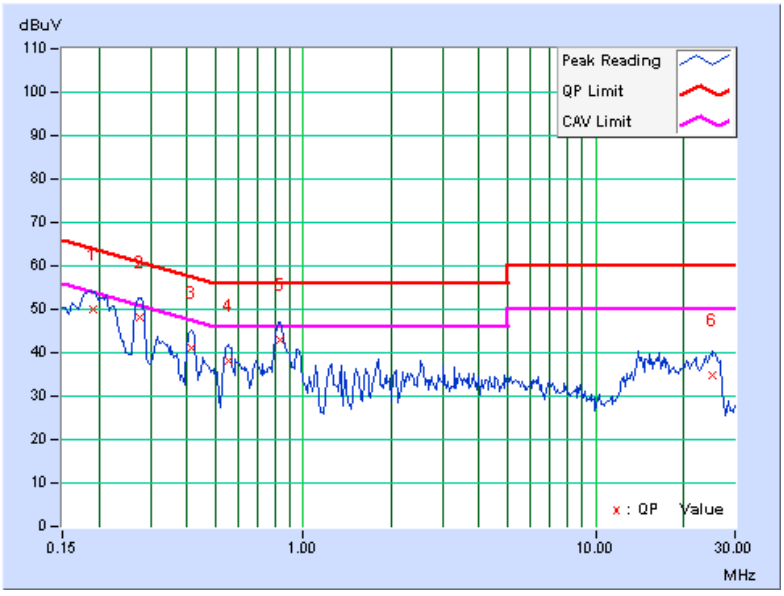
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	8DPSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.190	0.13	49.89	-	50.02	-	64.03	54.03	-14.01	-
2	0.278	0.14	47.87	-	48.01	-	60.89	50.89	-12.88	-
3	0.416	0.15	40.89	-	41.04	-	57.54	47.54	-16.49	-
4	0.554	0.16	37.94	-	38.10	-	56.00	46.00	-17.90	-
5	0.838	0.16	42.62	-	42.78	-	56.00	46.00	-13.22	-
6	25.234	0.78	34.18	-	34.96	-	60.00	50.00	-25.04	-

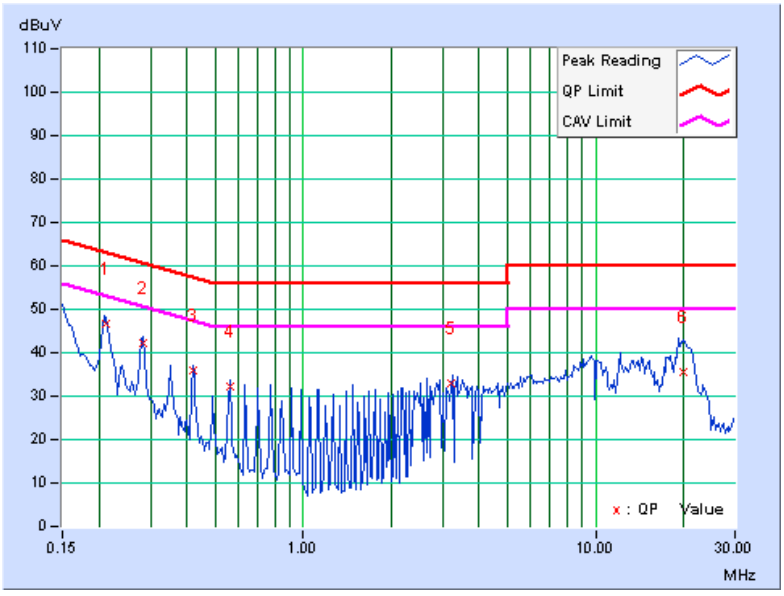
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	8DPSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	C	TESTED BY	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.211	0.13	46.54	-	46.67	-	63.16	53.16	-16.49	-
2	0.282	0.13	41.92	-	42.05	-	60.77	50.77	-18.72	-
3	0.421	0.14	35.97	-	36.11	-	57.43	47.43	-21.32	-
4	0.561	0.15	32.25	-	32.40	-	56.00	46.00	-23.60	-
5	3.225	0.25	32.82	-	33.07	-	56.00	46.00	-22.93	-
6	19.867	0.67	34.74	-	35.41	-	60.00	50.00	-24.59	-

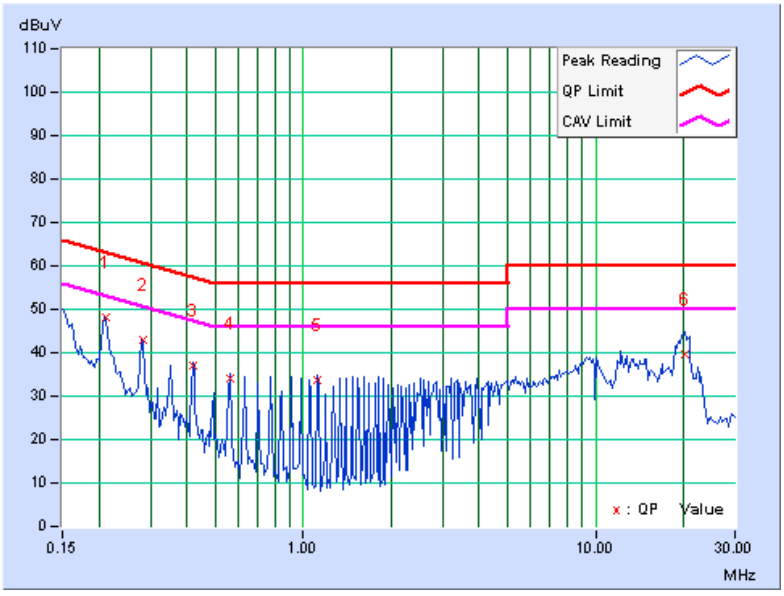
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	8DPSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH, 1017hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	C	TESTED BY	Dean Wang

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.210	0.13	48.17	-	48.30	-	63.19	53.19	-14.89	-
2	0.281	0.14	42.67	-	42.81	-	60.77	50.77	-17.96	-
3	0.420	0.15	37.04	-	37.19	-	57.45	47.45	-20.26	-
4	0.561	0.16	34.05	-	34.21	-	56.00	46.00	-21.79	-
5	1.124	0.17	33.38	-	33.55	-	56.00	46.00	-22.45	-
6	20.320	0.82	38.96	-	39.78	-	60.00	50.00	-20.22	-

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.



4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

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

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

NOTE: 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

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.

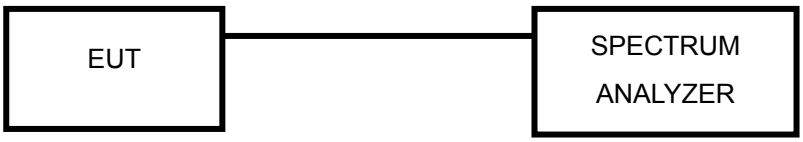
d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

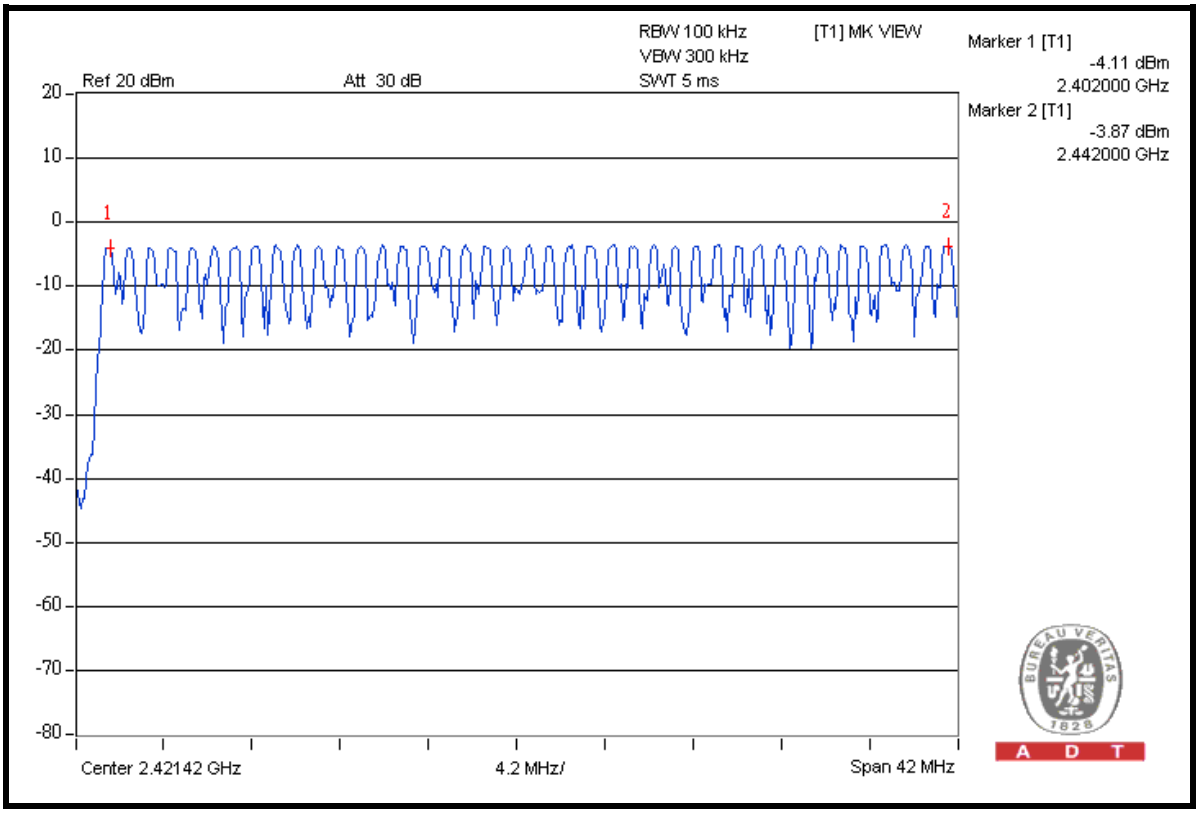
4.3.5 TEST SETUP

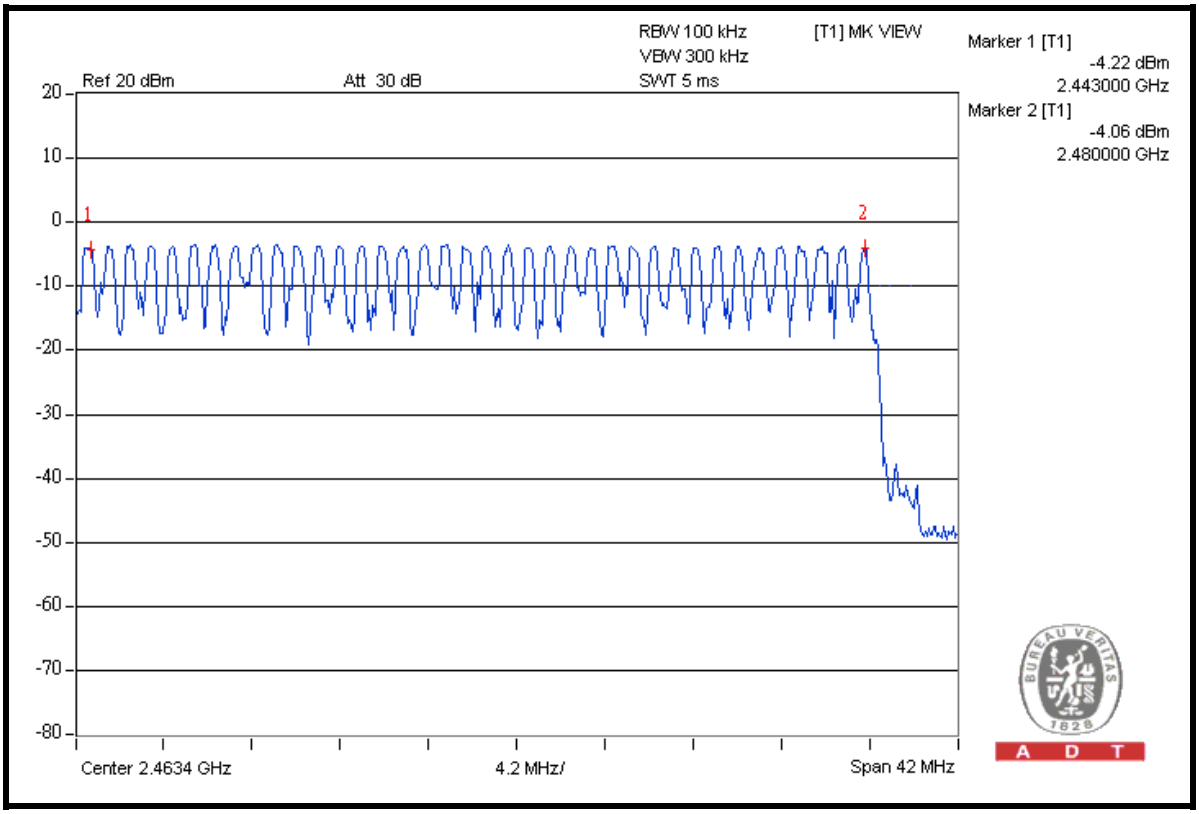


4.3.6 TEST RESULTS

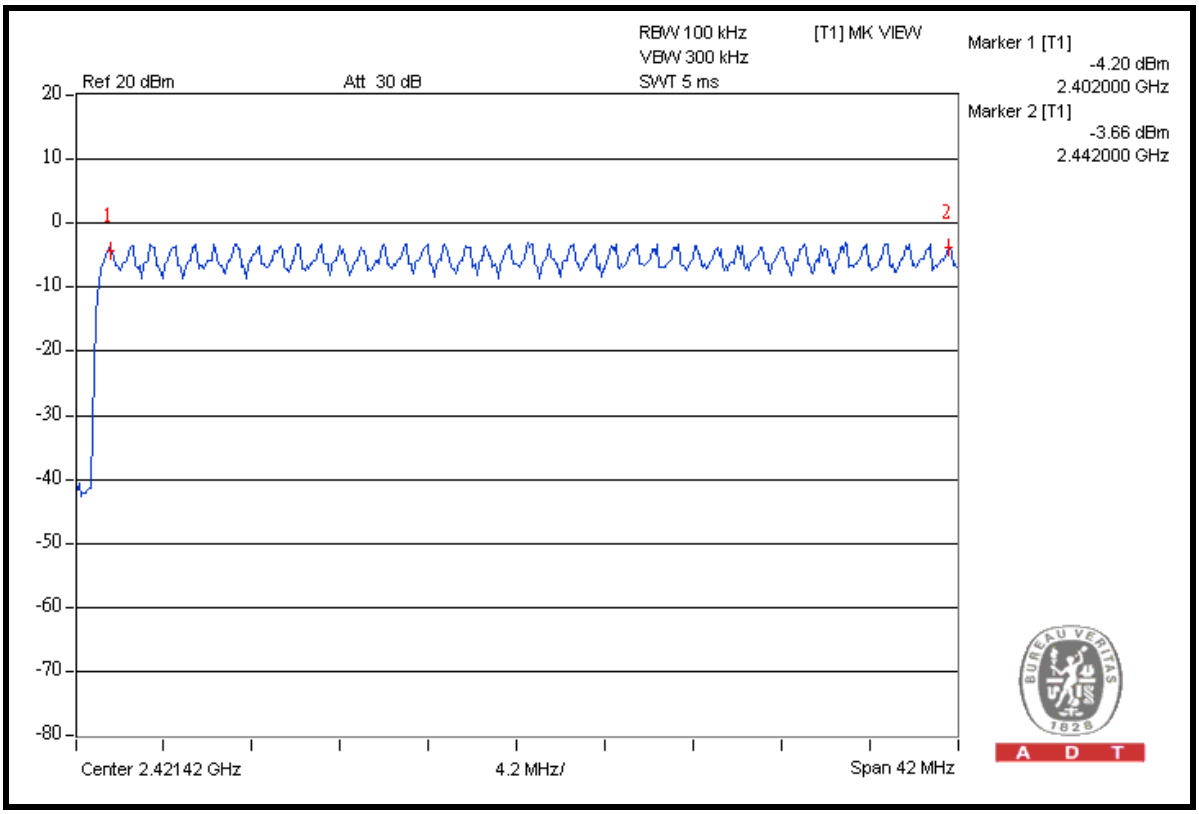
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

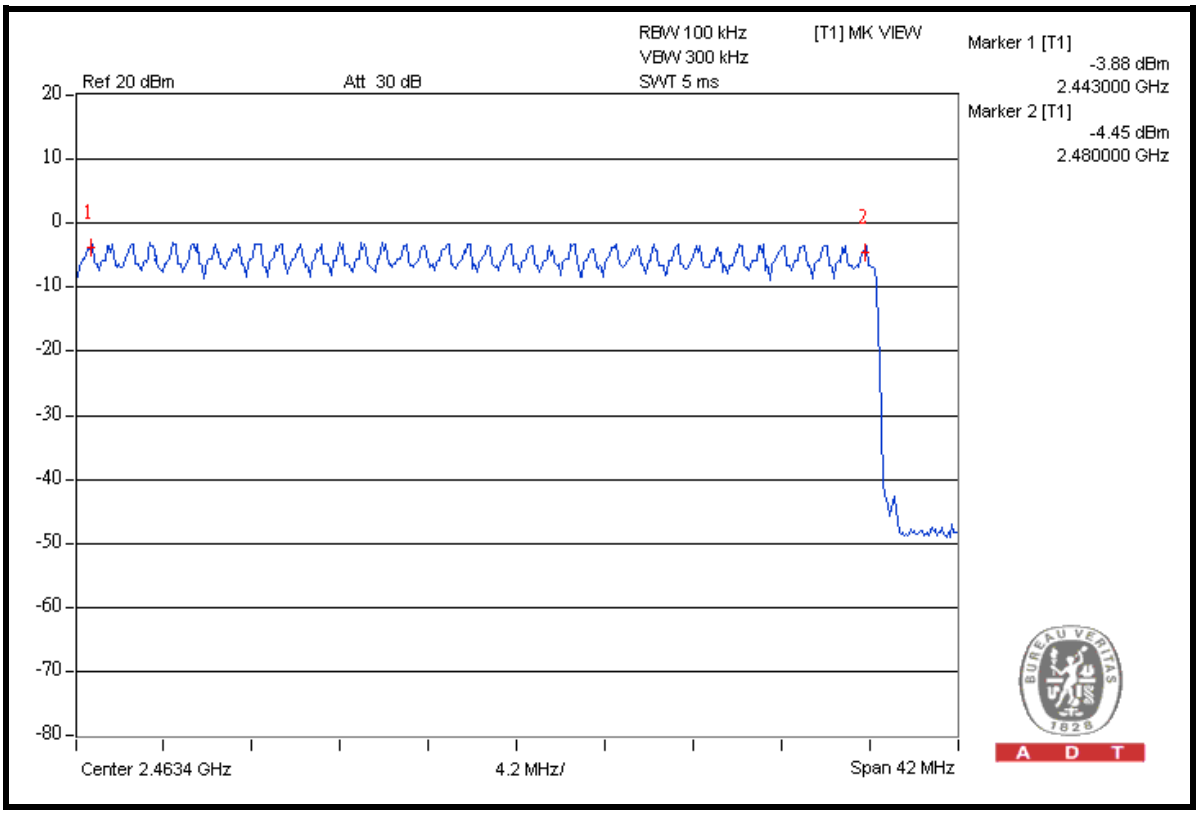
GFSK MODULATION





8DPSK MODULATION





4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

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

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

NOTE: 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 PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.

d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

e. Repeat above procedures until all different time-slot modes have been completed.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

Same as 4.3.5.

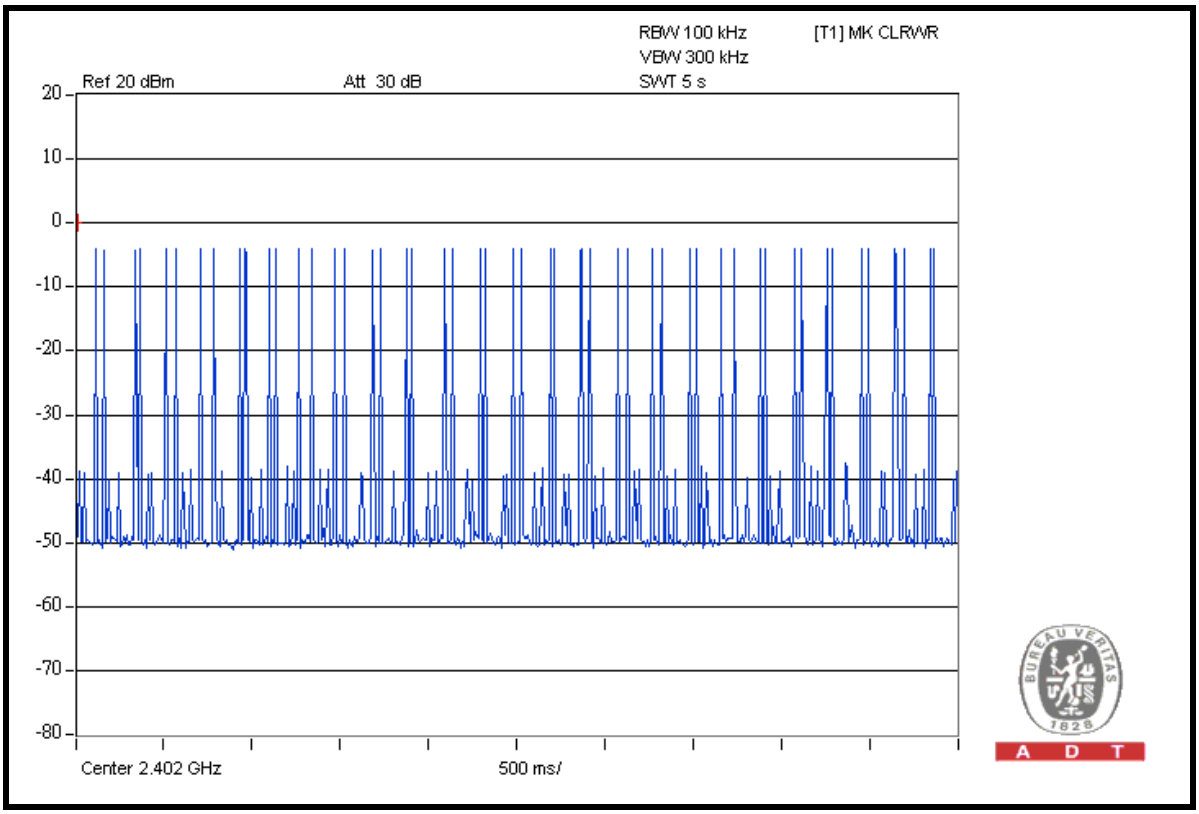
4.4.6 TEST RESULTS

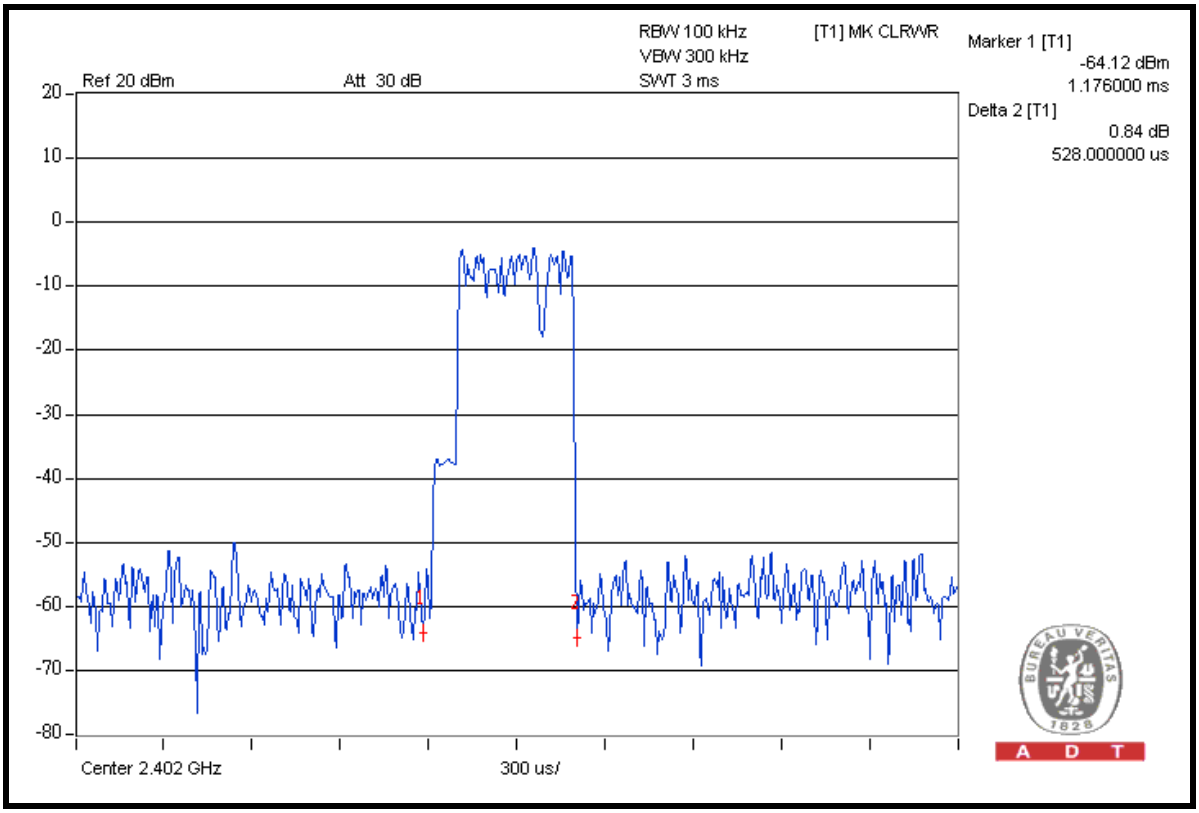
GFSK MODULATION

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.528	166.848	400
DH3	27 (times / 5 sec) * 6.32 = 170.64 times	1.758	299.985	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.110	334.138	400

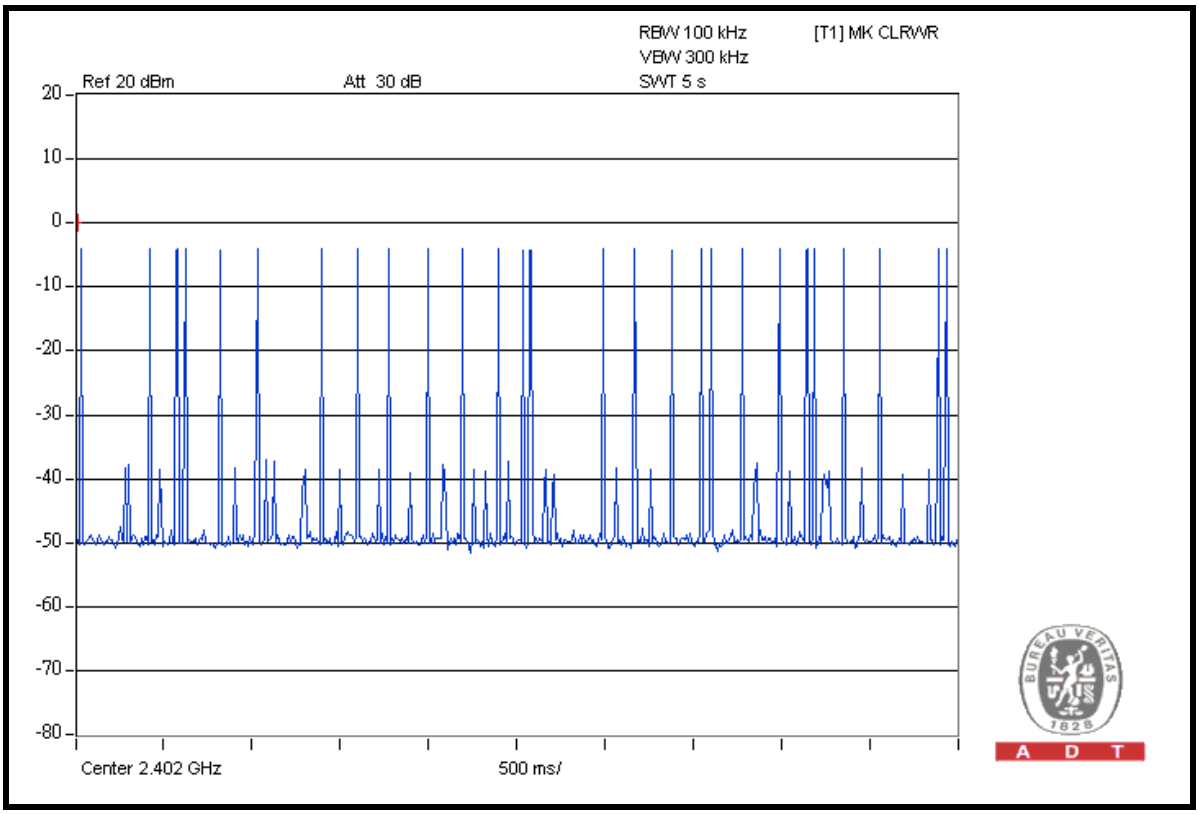
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

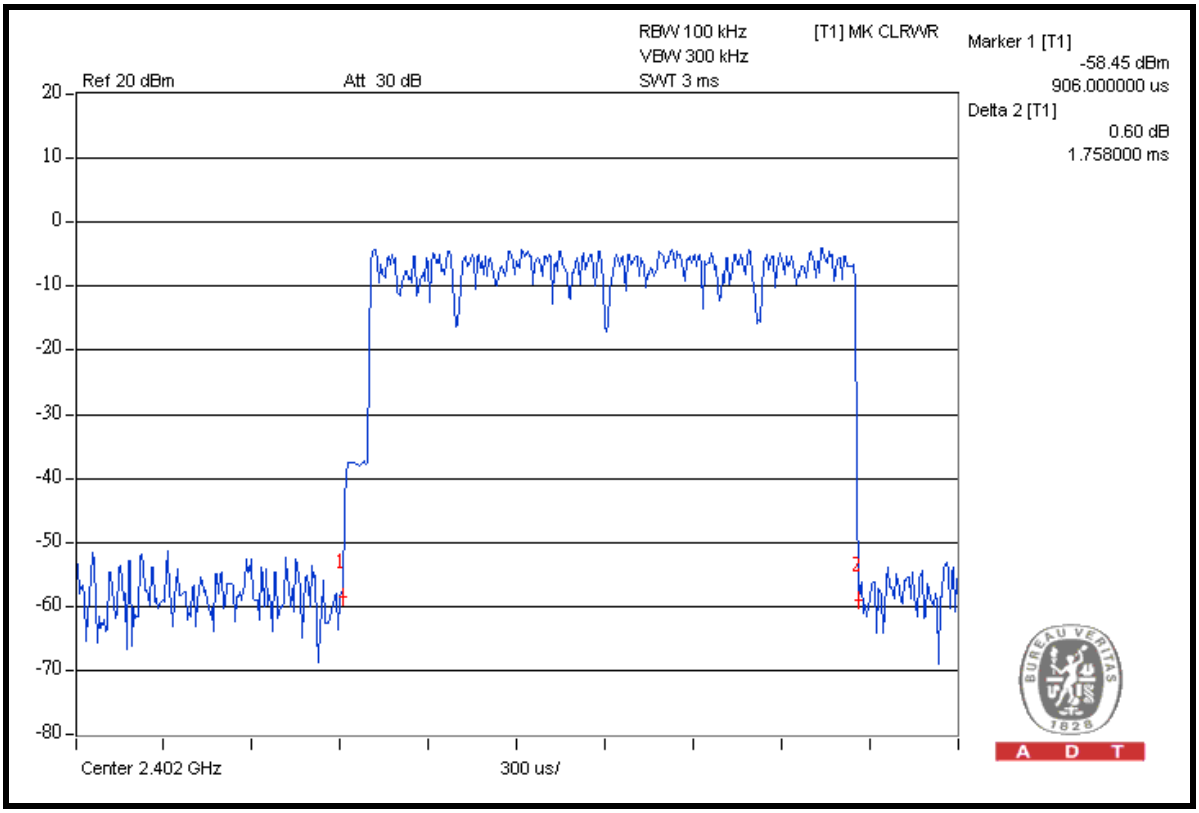
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/

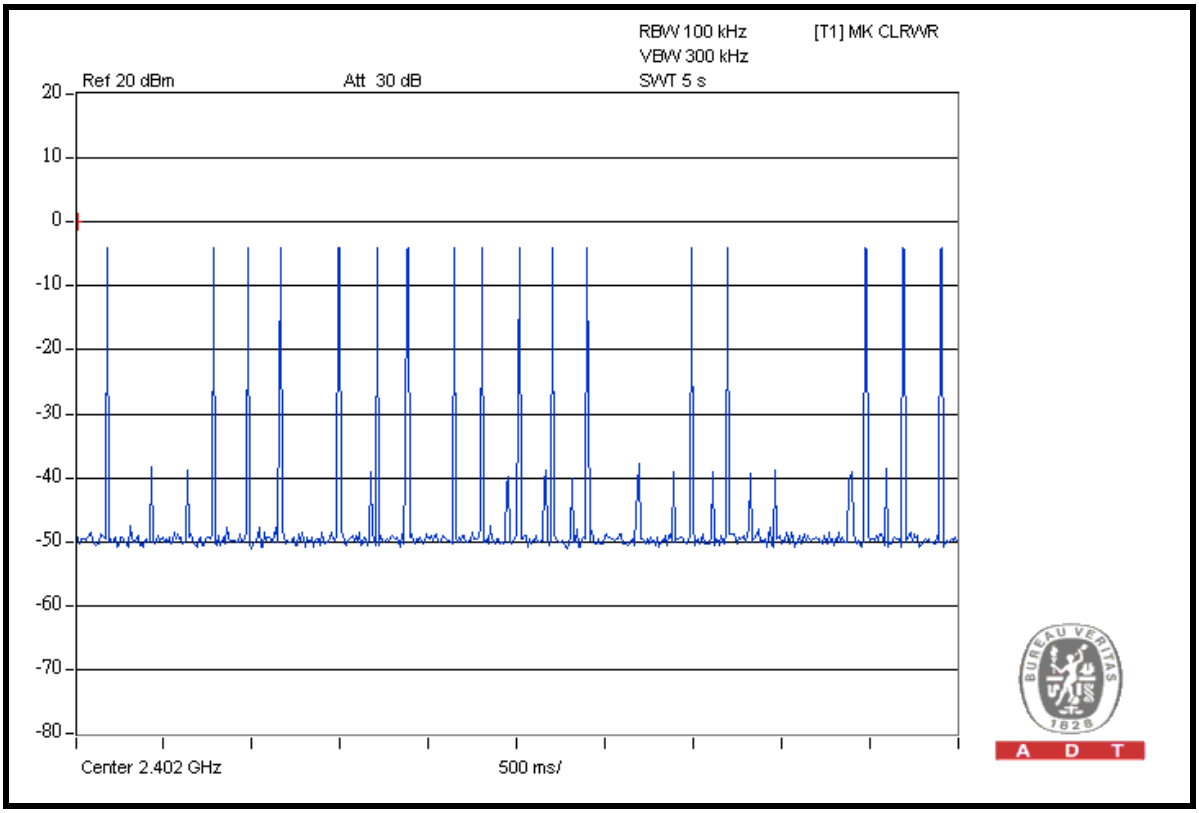

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-64.12 dBm
1.176000 ms
Delta 2 [T1]
0.84 dB
528.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

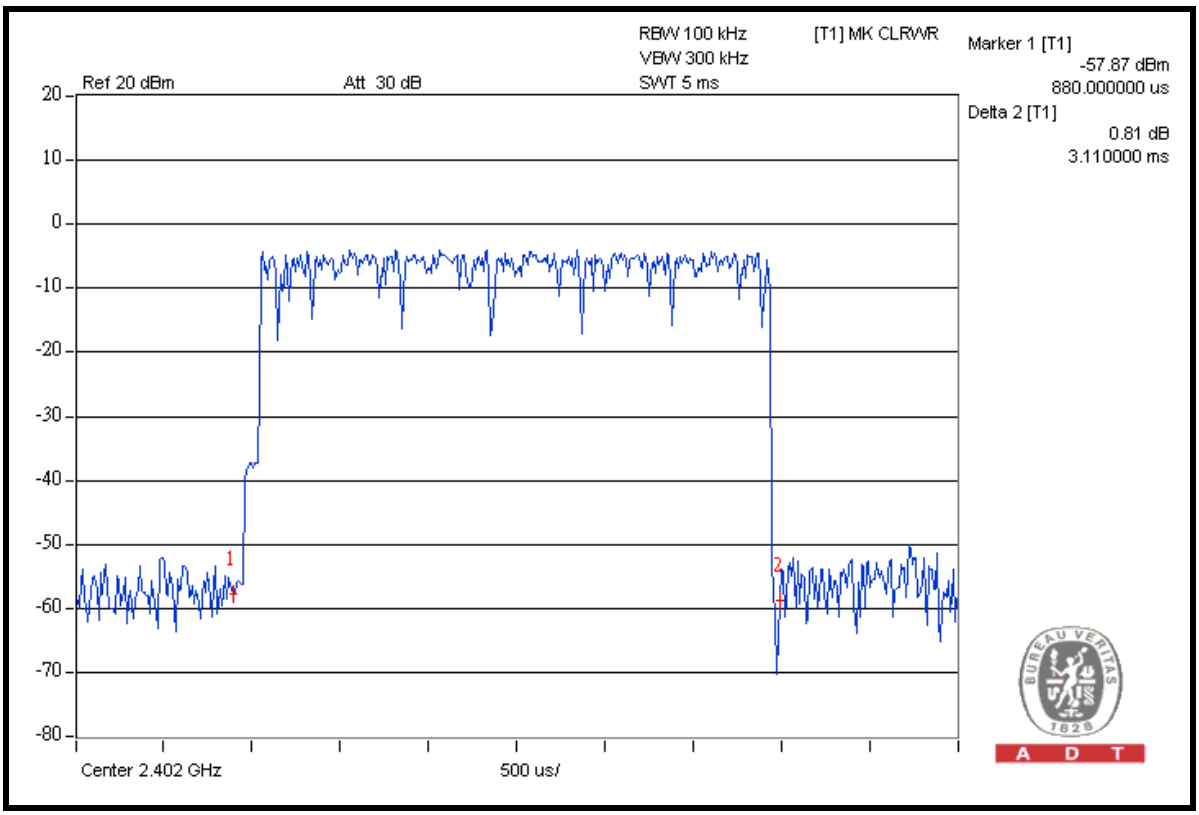
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-58.45 dBm
906.000000 us
Delta 2 [T1]
0.60 dB
1.758000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/

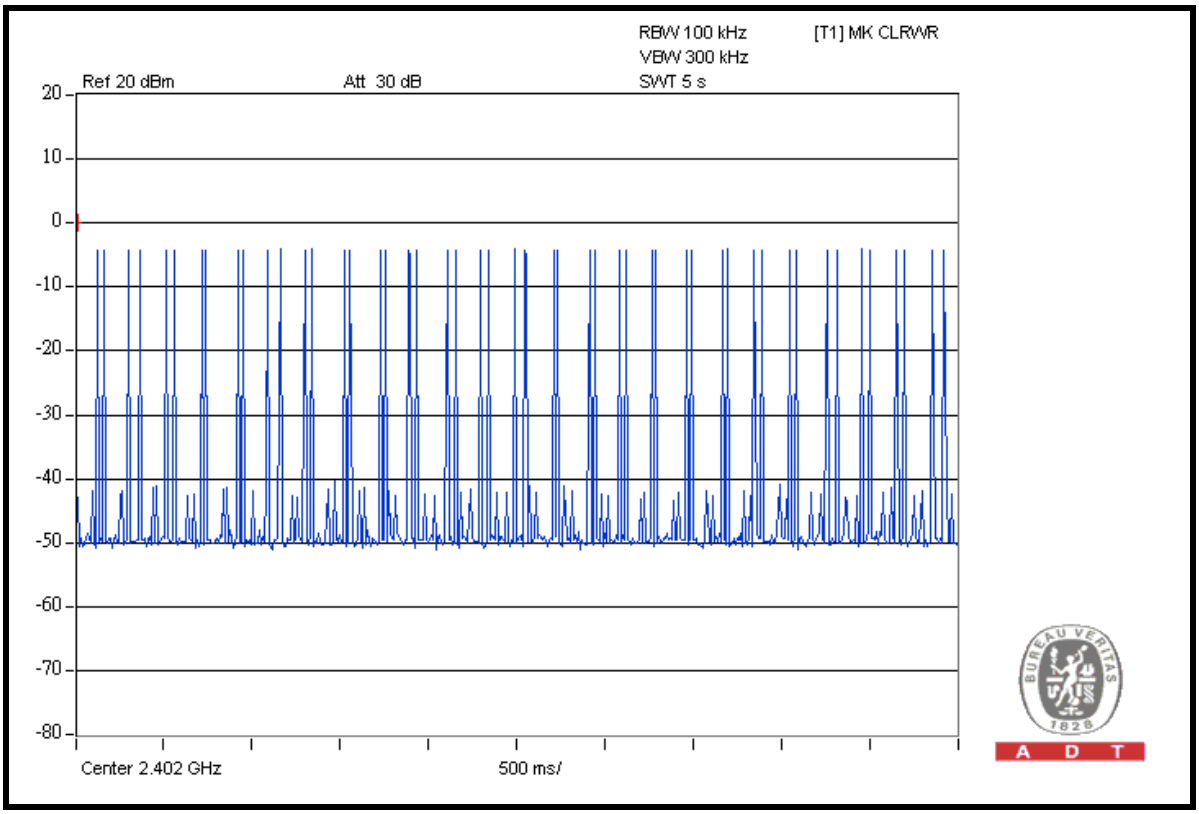

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-57.87 dBm
880.000000 us
Delta 2 [T1]
0.81 dB
3.110000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.402 GHz
500 us/

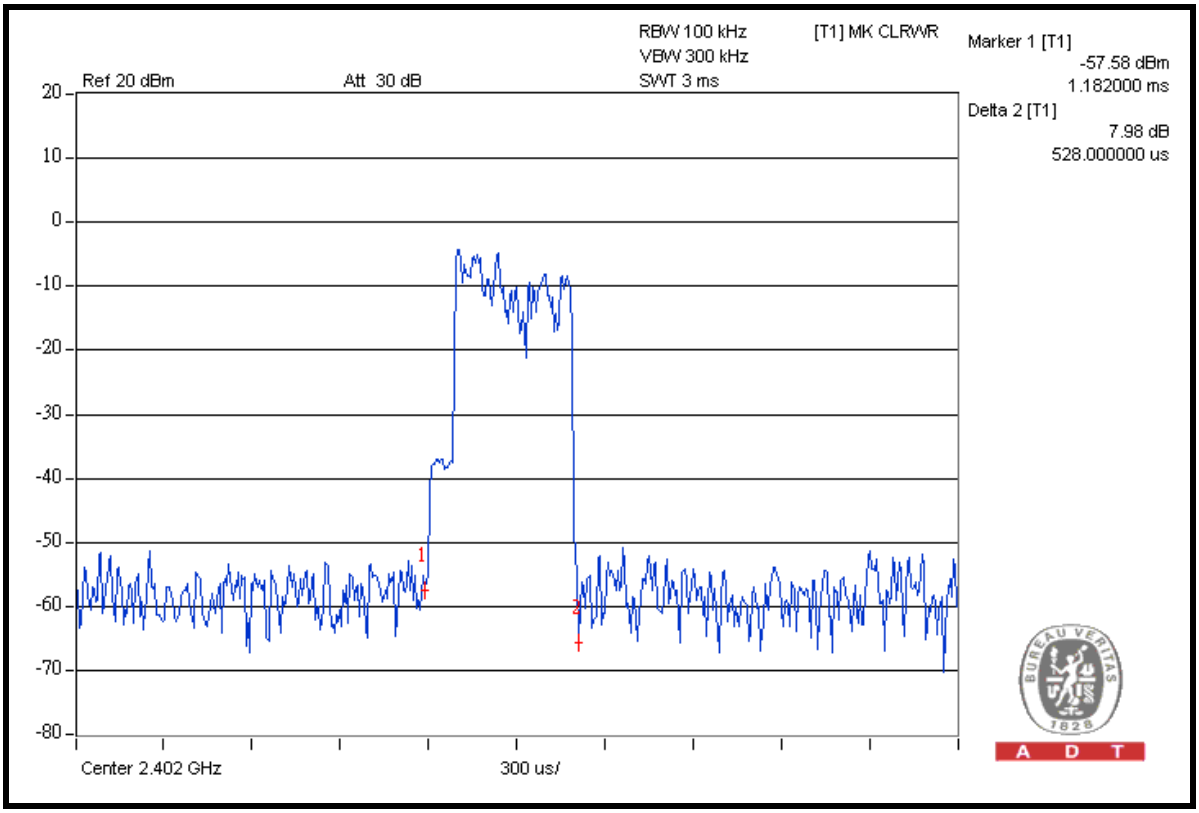
8DPSK MODULATION

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.528	166.848	400
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.770	290.846	400
DH5	16 (times / 5 sec) * 6.32 = 101.12 times	3.040	307.405	400

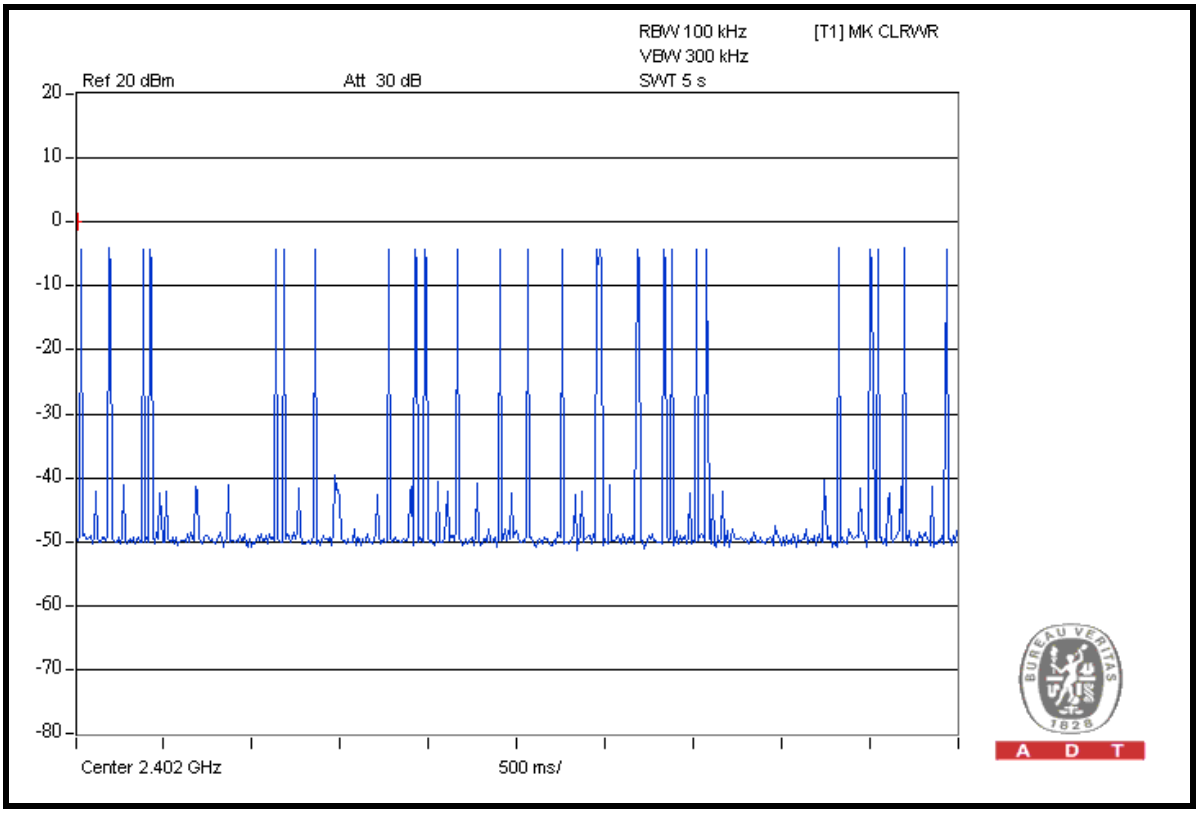
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

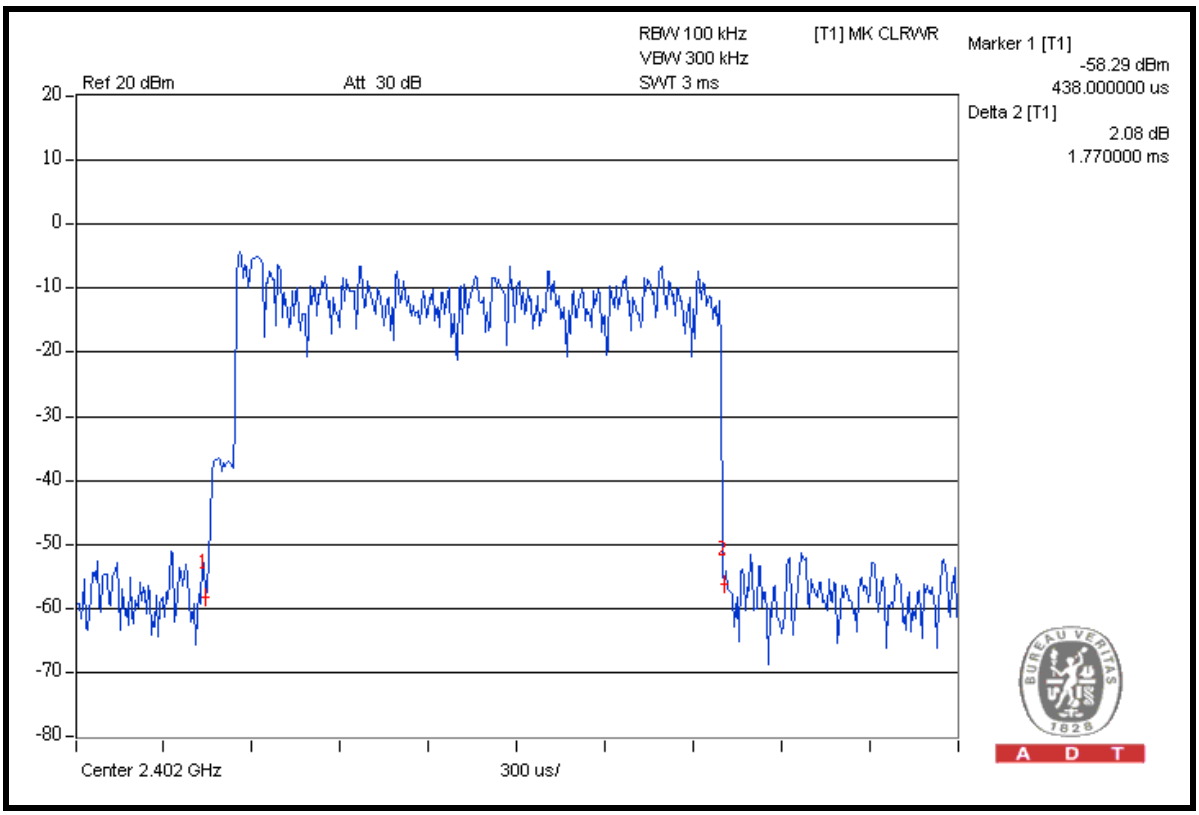
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/

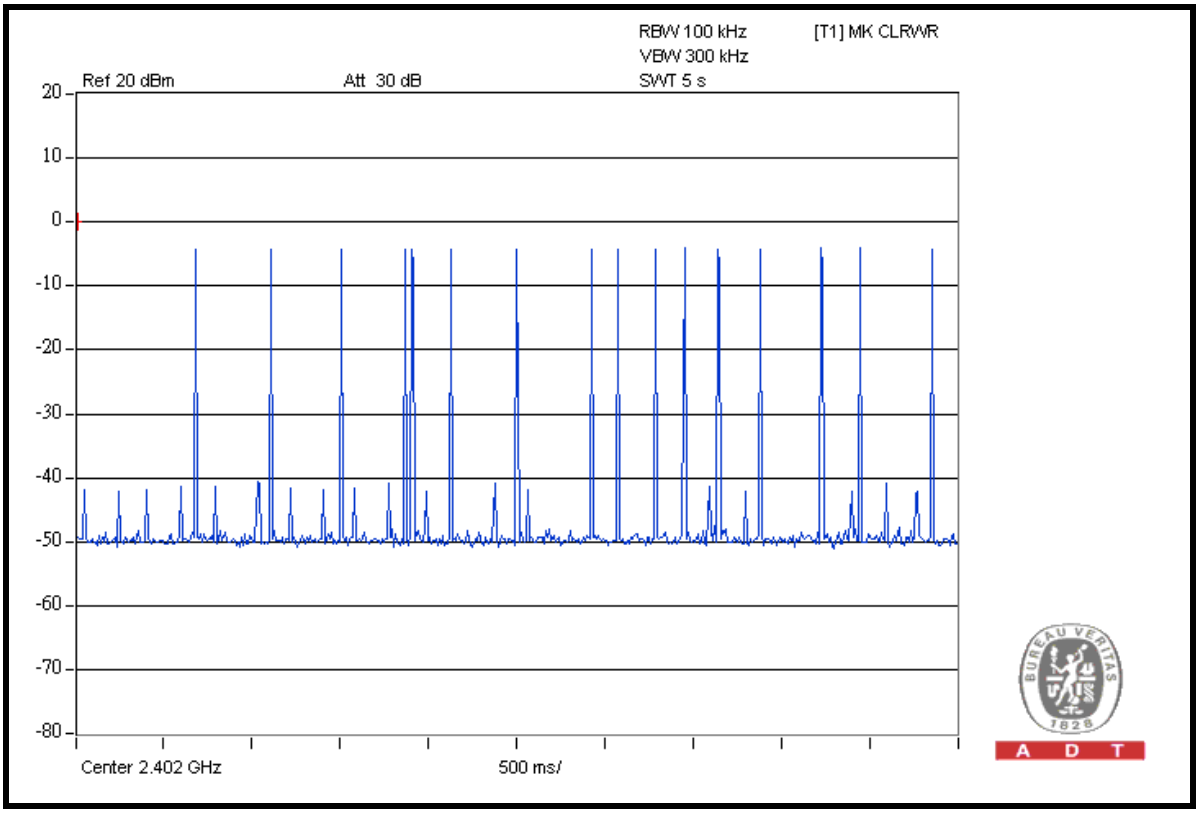

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-57.58 dBm
1.182000 ms
Delta 2 [T1]
7.98 dB
528.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

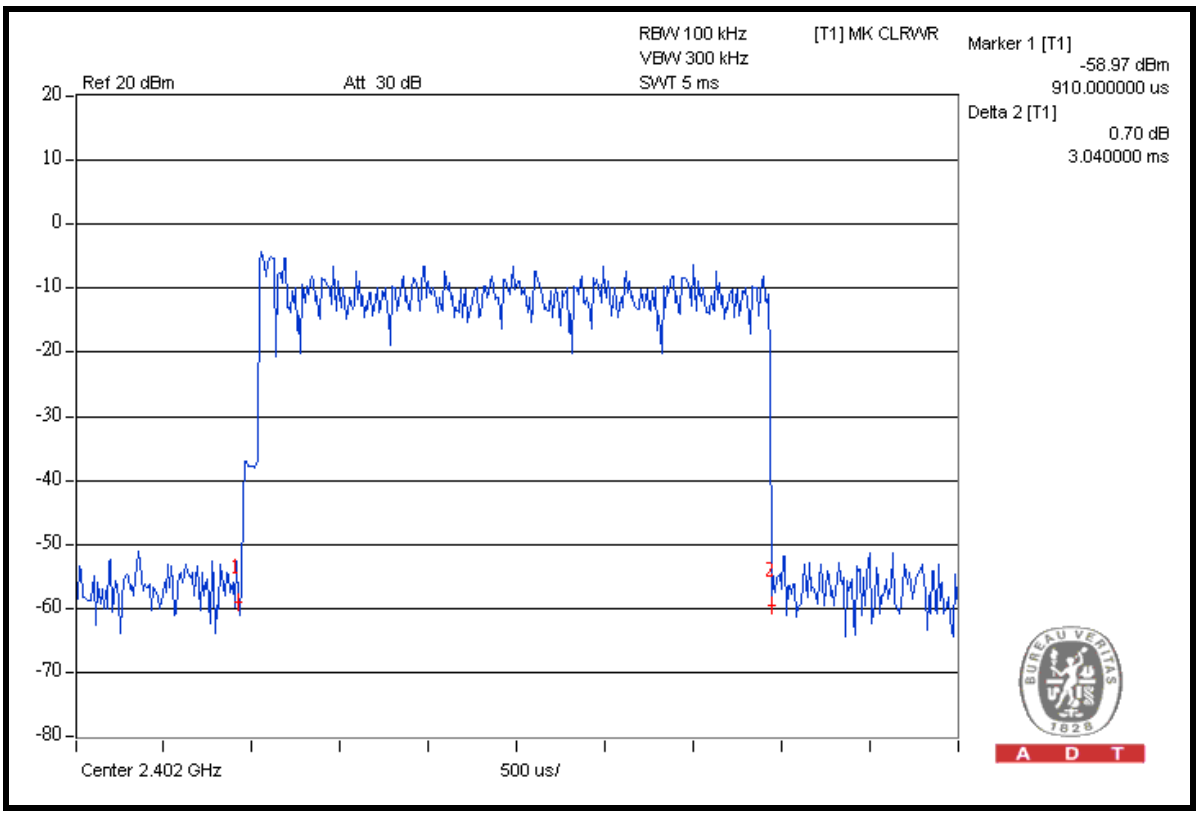
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-58.29 dBm
438.000000 us
Delta 2 [T1]
2.08 dB
1.770000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-58.97 dBm
910.000000 us
Delta 2 [T1]
0.70 dB
3.040000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 us/

4.5 CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

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

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

NOTE: 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 PROCEDURE

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

Same as 4.3.5.

4.5.6 EUT OPERATING CONDITION

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

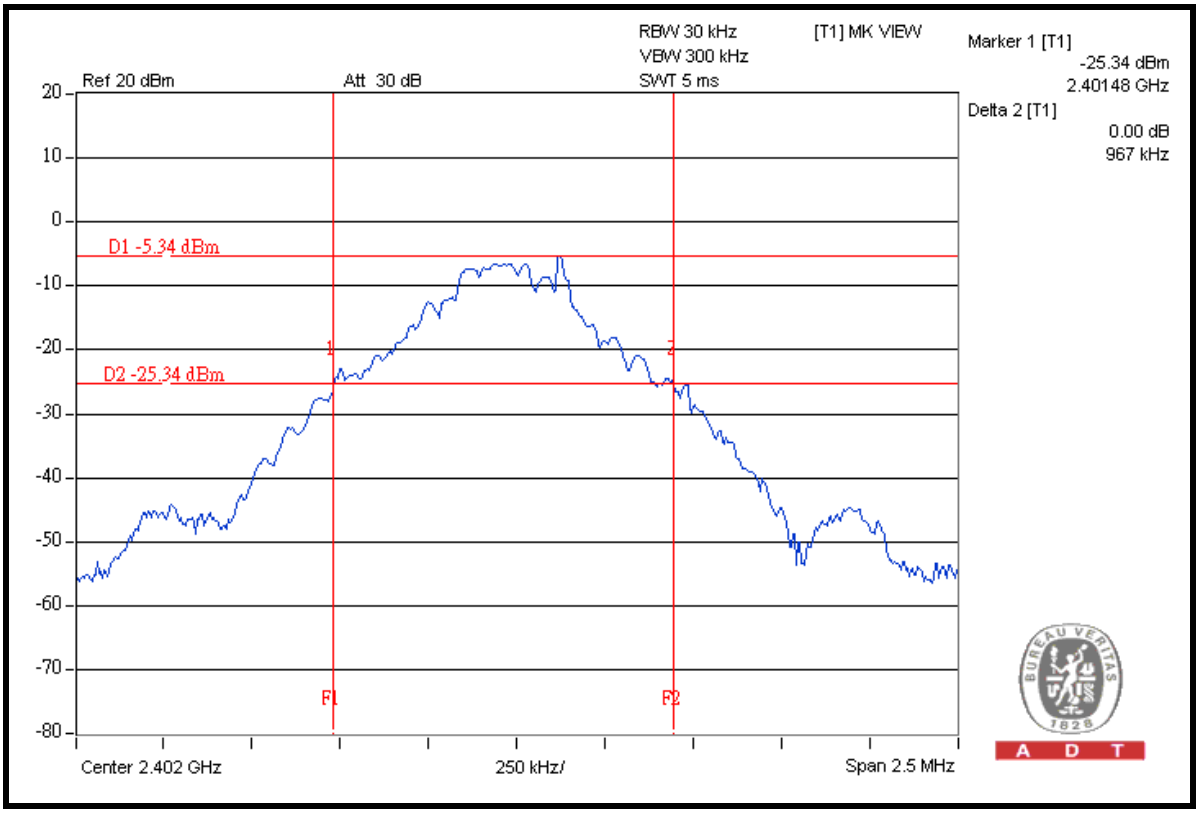
4.5.7 TEST RESULTS

GFSK MODULATION

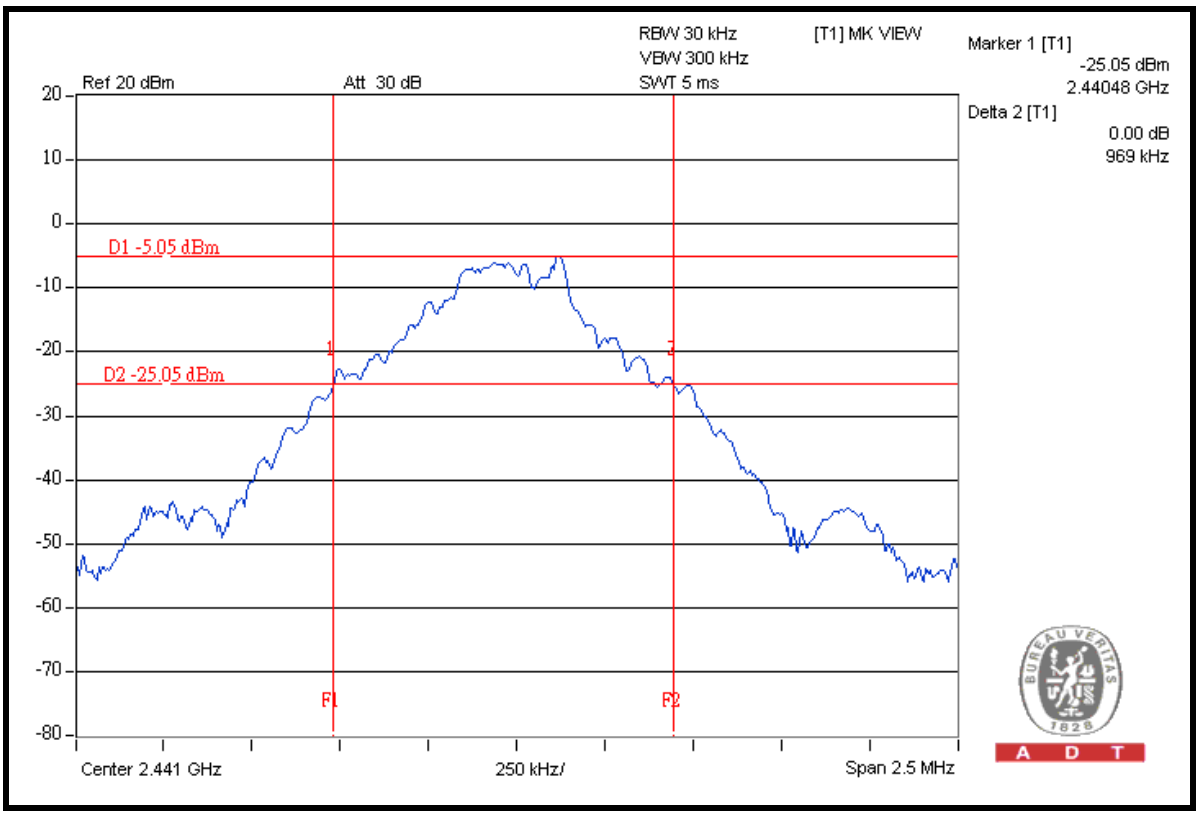
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Kevin Liang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.967
39	2441	0.969
78	2480	1.020

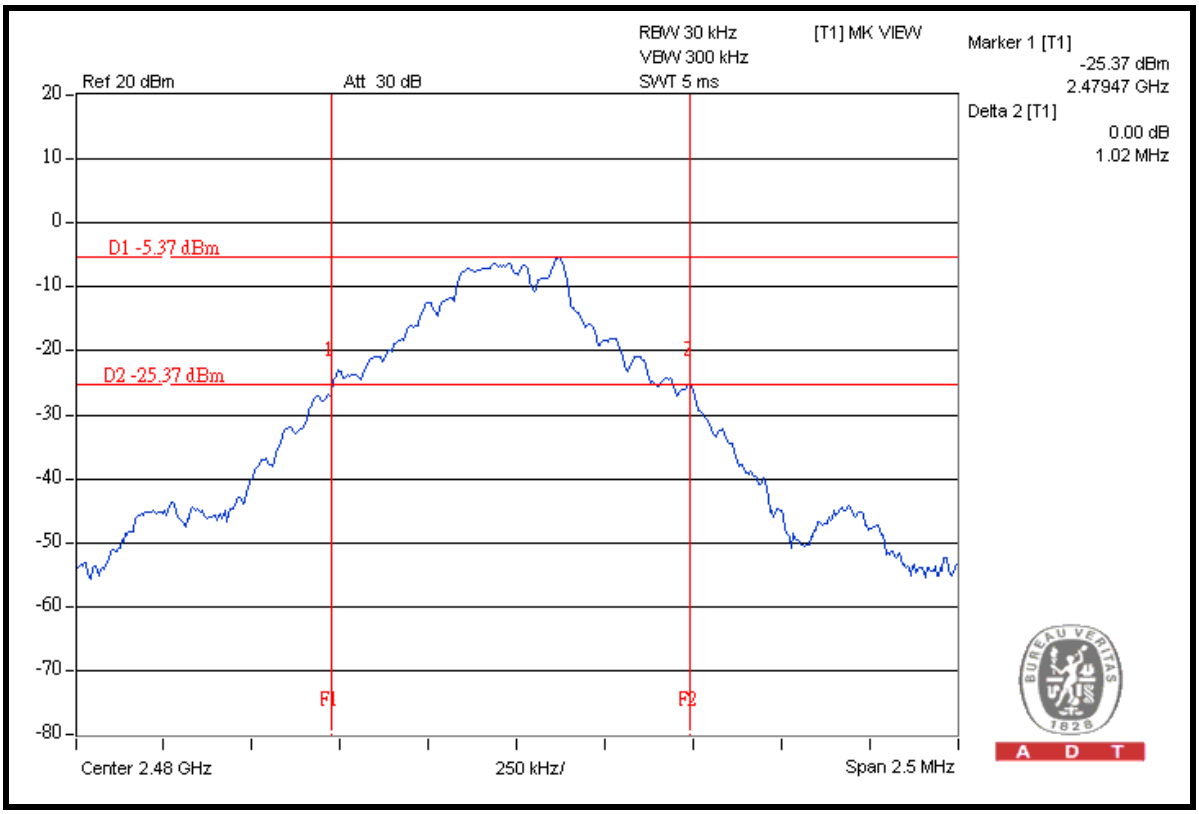
CH 0


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-25.34 dBm
2.40148 GHz
Delta 2 [T1]
0.00 dB
967 kHz
Ref 20 dBm
Att 30 dB
D1 -5.34 dBm
D2 -25.34 dBm
Center 2.402 GHz
250 kHz/
Span 2.5 MHz

CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-25.05 dBm
2.44048 GHz
Delta 2 [T1]
0.00 dB
969 kHz
Ref 20 dBm
Att 30 dB
D1 -5.05 dBm
D2 -25.05 dBm
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

CH 78

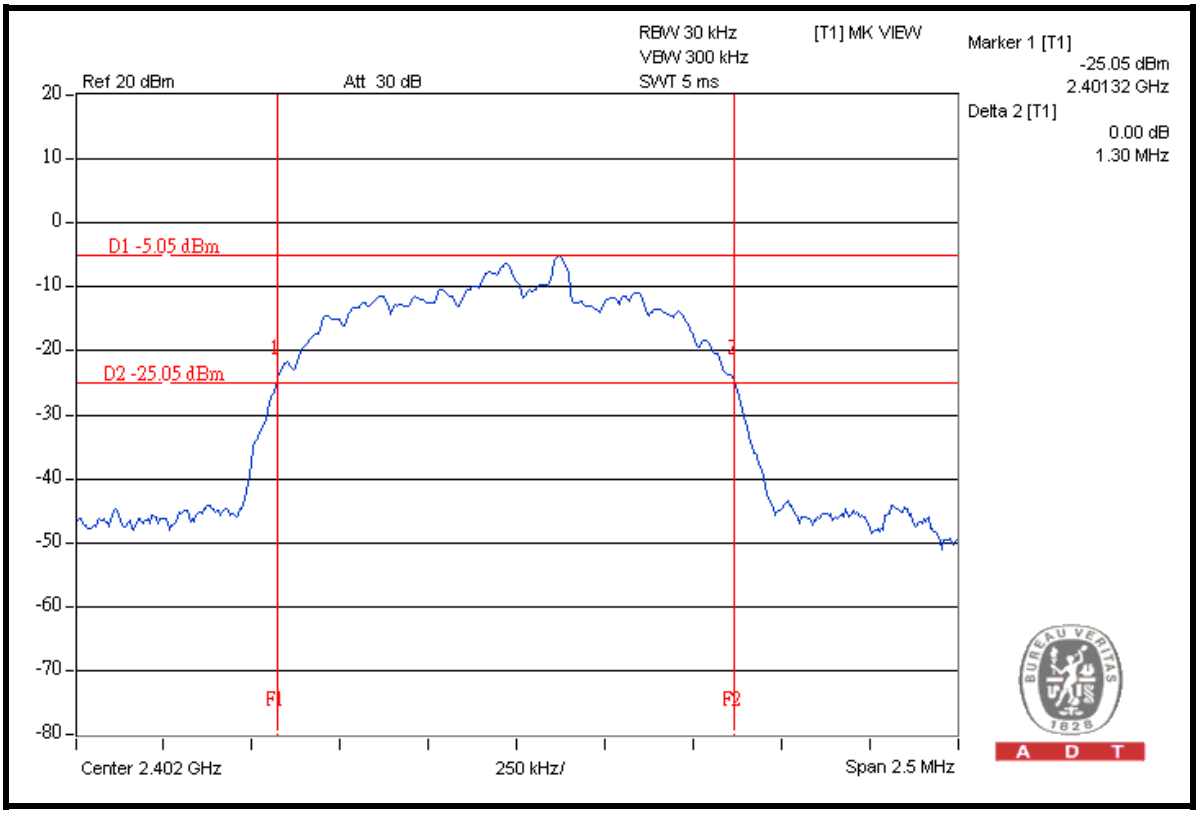

RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-25.37 dBm
2.47947 GHz
Delta 2 [T1]
0.00 dB
1.02 MHz
Ref 20 dBm
Att 30 dB
D1 -5.37 dBm
D2 -25.37 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

8DPSK MODULATION

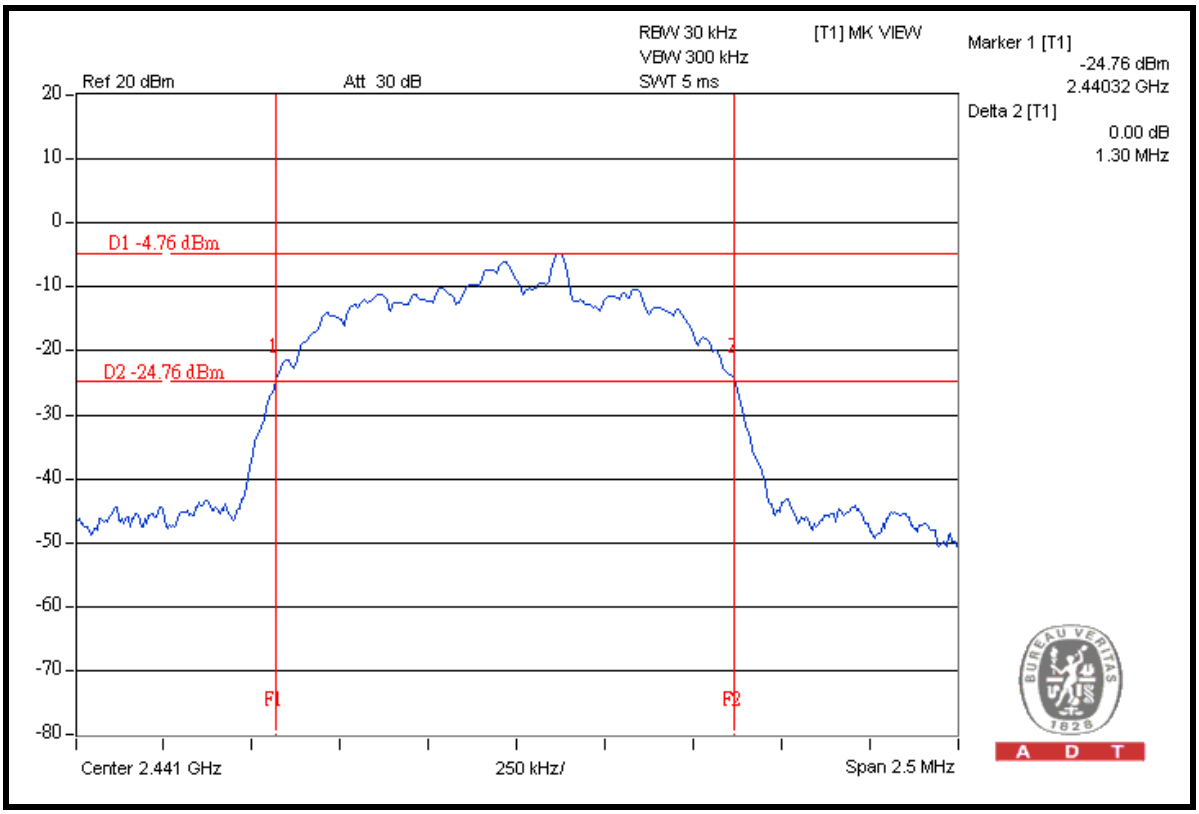
MODULATION TYPE	8DPSK	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Kevin Liang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.300
39	2441	1.300
78	2480	1.300

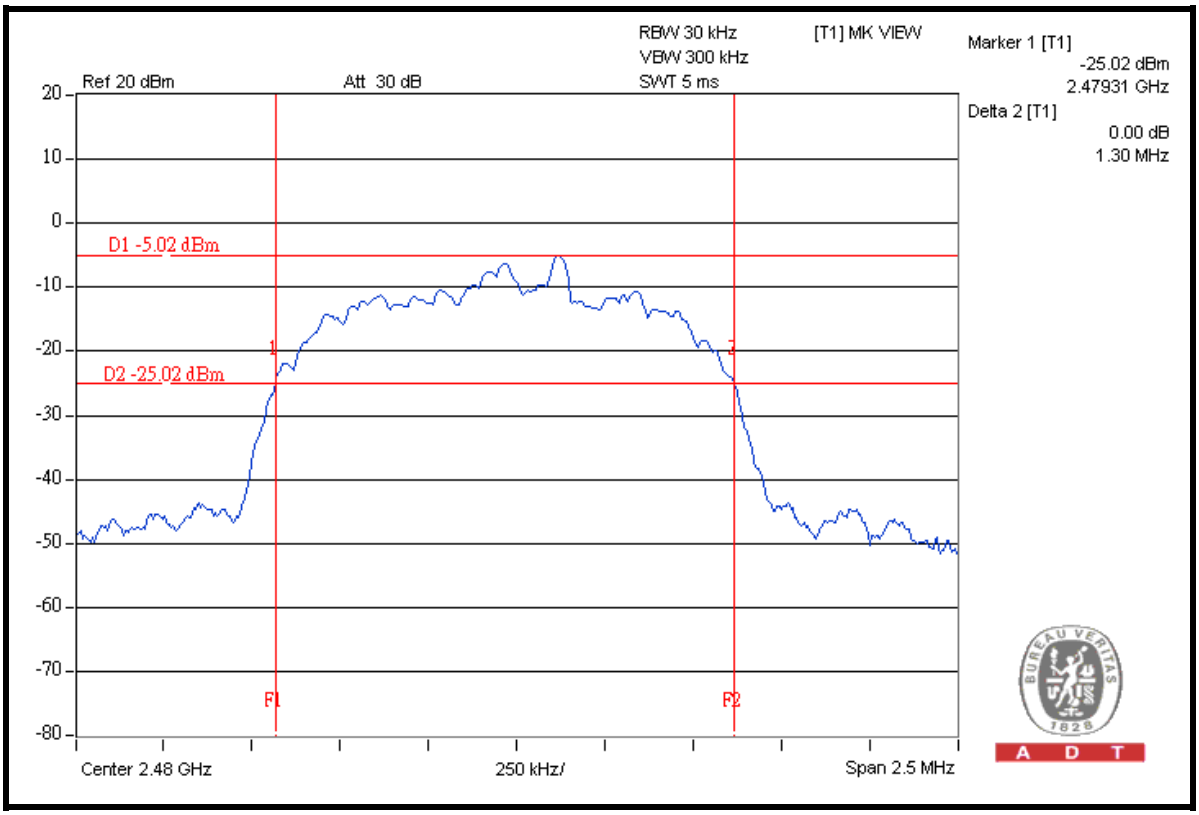
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-24.76 dBm
2.44032 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 20 dBm
Att 30 dB
D1 -4.76 dBm
D2 -24.76 dBm
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

CH 78


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-25.02 dBm
2.47931 GHz
Delta 2 [T1]
0.00 dB
1.30 MHz
Ref 20 dBm
Att 30 dB
D1 -5.02 dBm
D2 -25.02 dBm
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

NOTE: 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.
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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP

Same as 4.3.5

4.6.6 TEST RESULTS

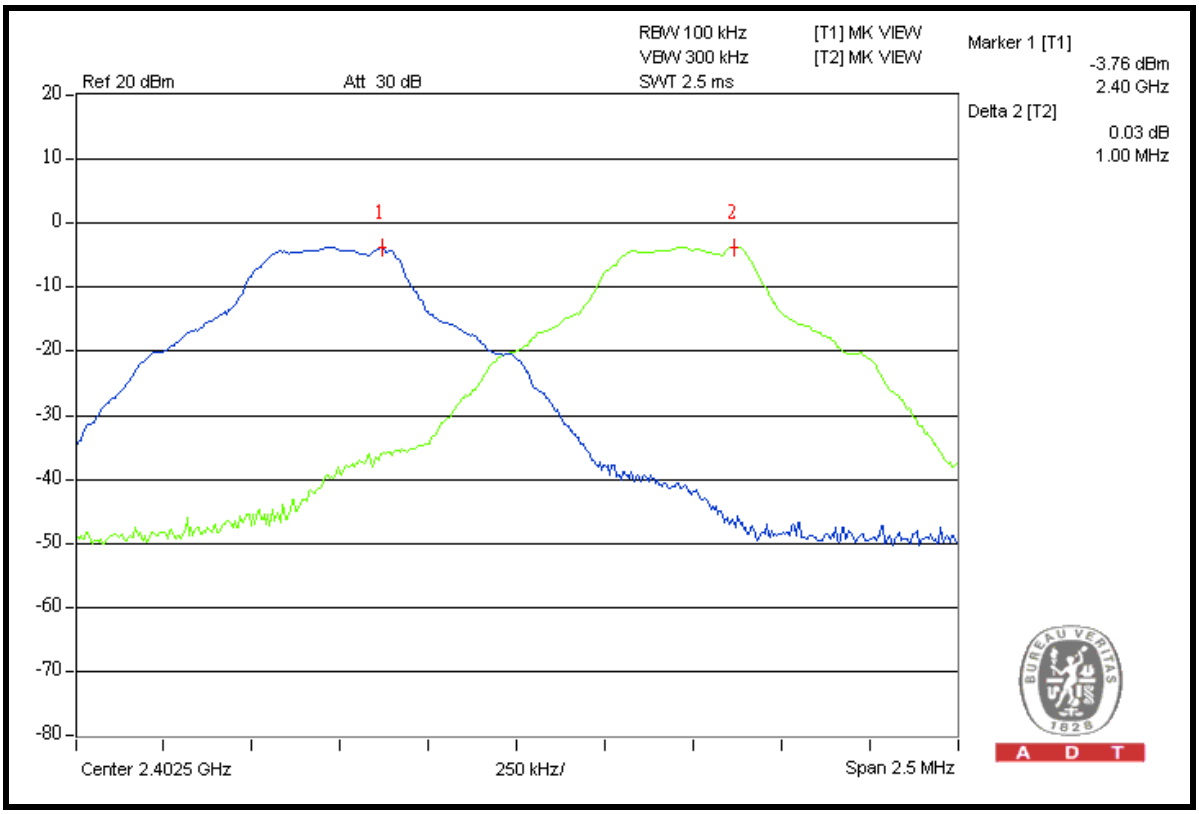
GFSK MODULATION

MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Kevin Liang

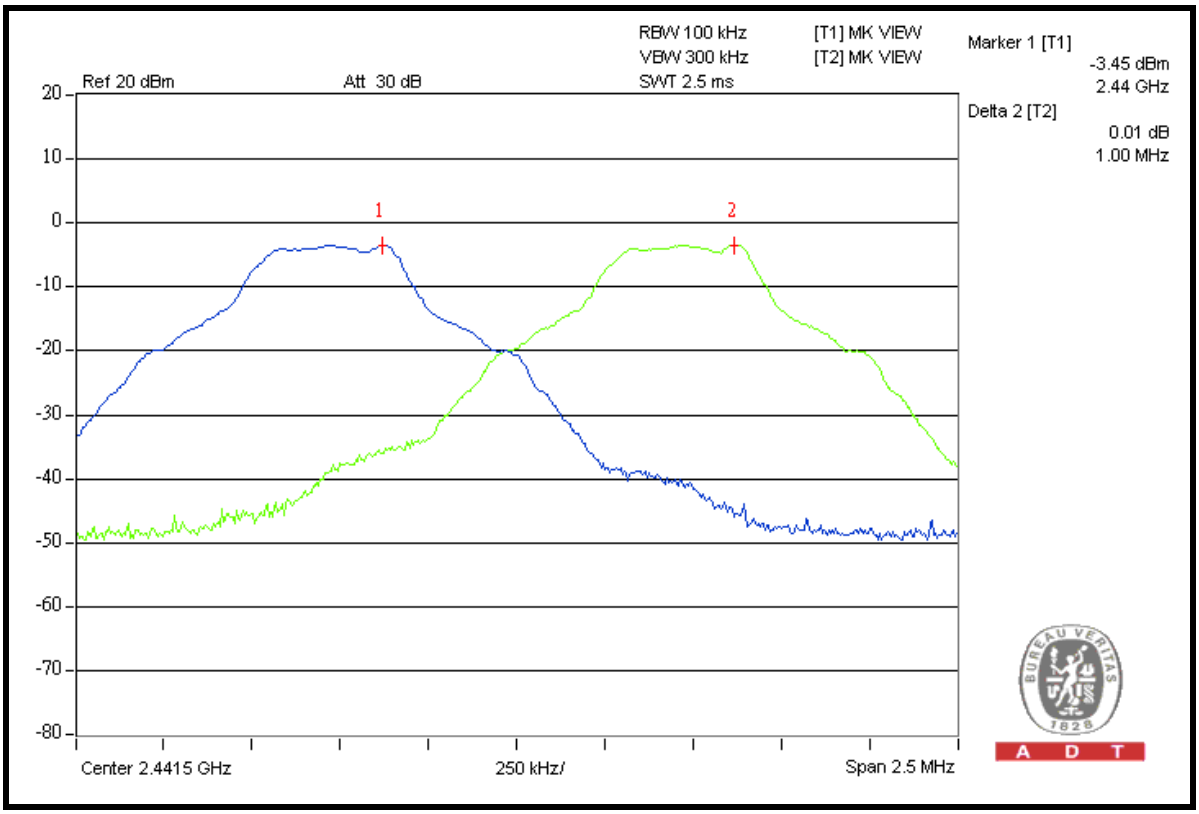
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	0.967	0.645	PASS
39	2441	1.000	0.969	0.646	PASS
78	2480	1.000	1.020	0.680	PASS

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to next two pages.

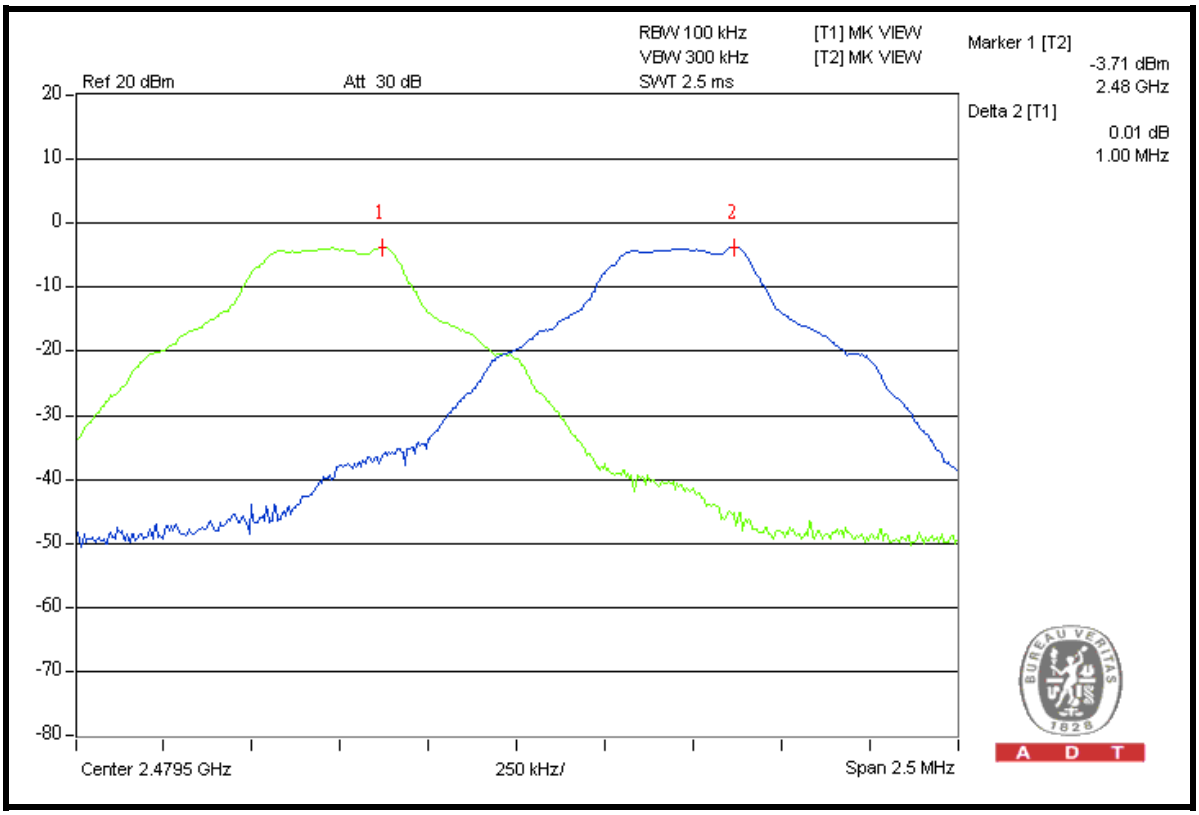
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
-3.45 dBm
2.44 GHz
Delta 2 [T2]
0.01 dB
1.00 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

CH 78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T2]
-3.71 dBm
2.48 GHz
Delta 2 [T1]
0.01 dB
1.00 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz

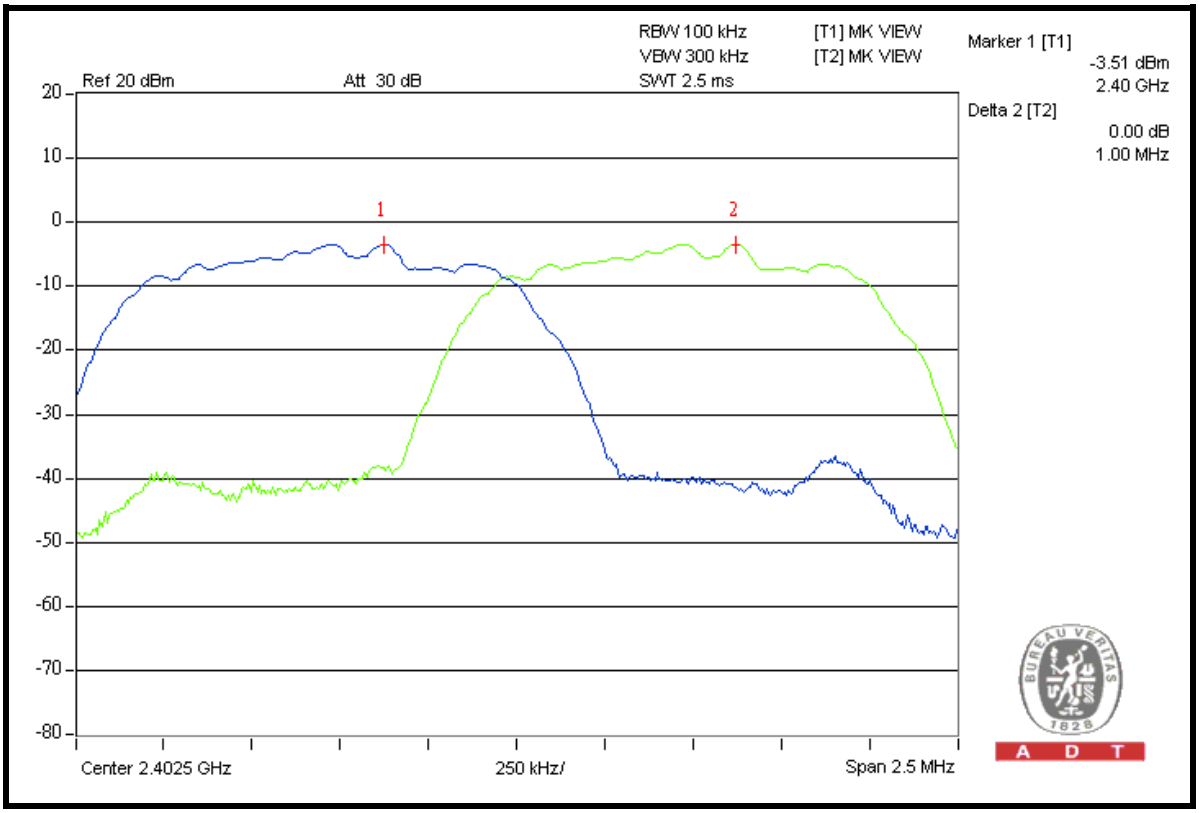
8DPSK MODULATION

MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Kevin Liang

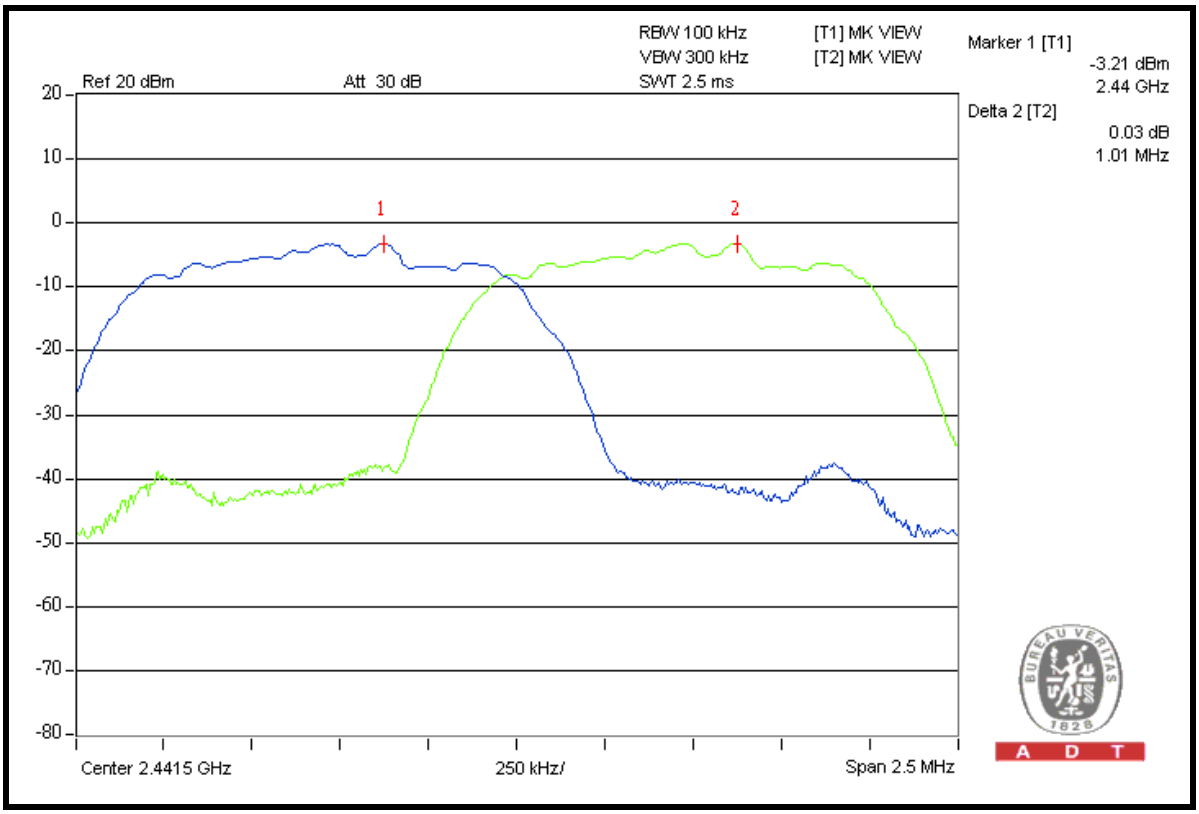
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	1.300	0.867	PASS
39	2441	1.010	1.300	0.867	PASS
78	2480	1.000	1.300	0.867	PASS

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to next two pages.

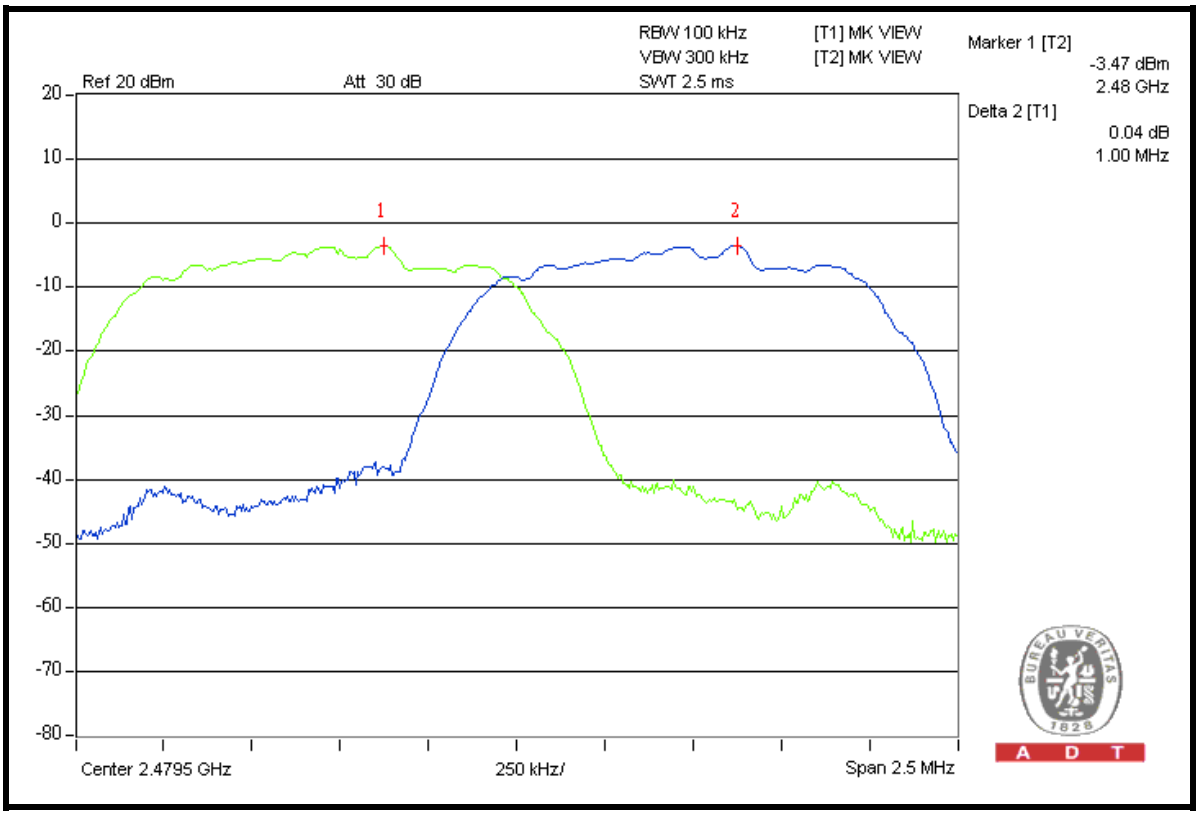
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
-3.21 dBm
2.44 GHz
Delta 2 [T2]
0.03 dB
1.01 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

CH 78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T2]
-3.47 dBm
2.48 GHz
Delta 2 [T1]
0.04 dB
1.00 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz

4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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

4.7.3 TEST PROCEDURES

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.

d. Measure the captured power within the band and recording the plot.

e. Repeat above procedures until all frequencies required were complete.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP

Same as 4.3.5.

4.7.6 EUT OPERATING CONDITION

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

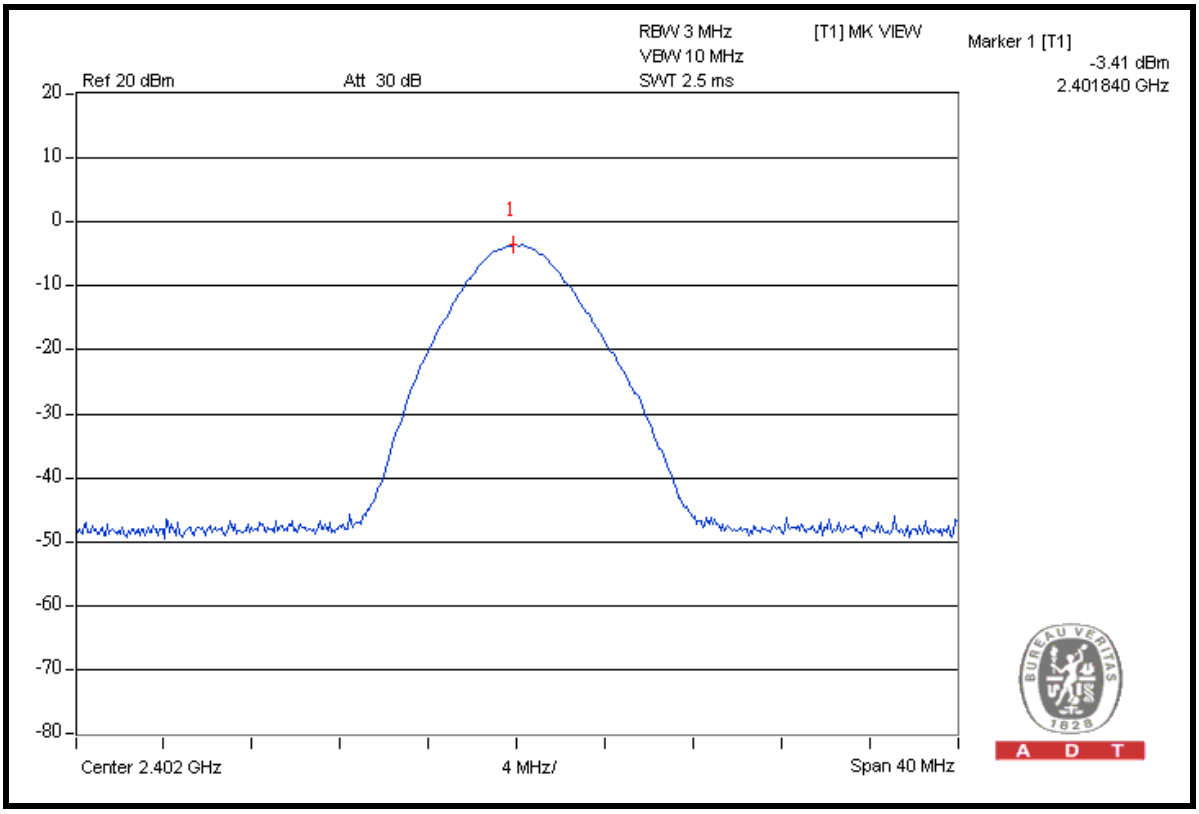
4.7.7 TEST RESULTS

GFSK MODULATION

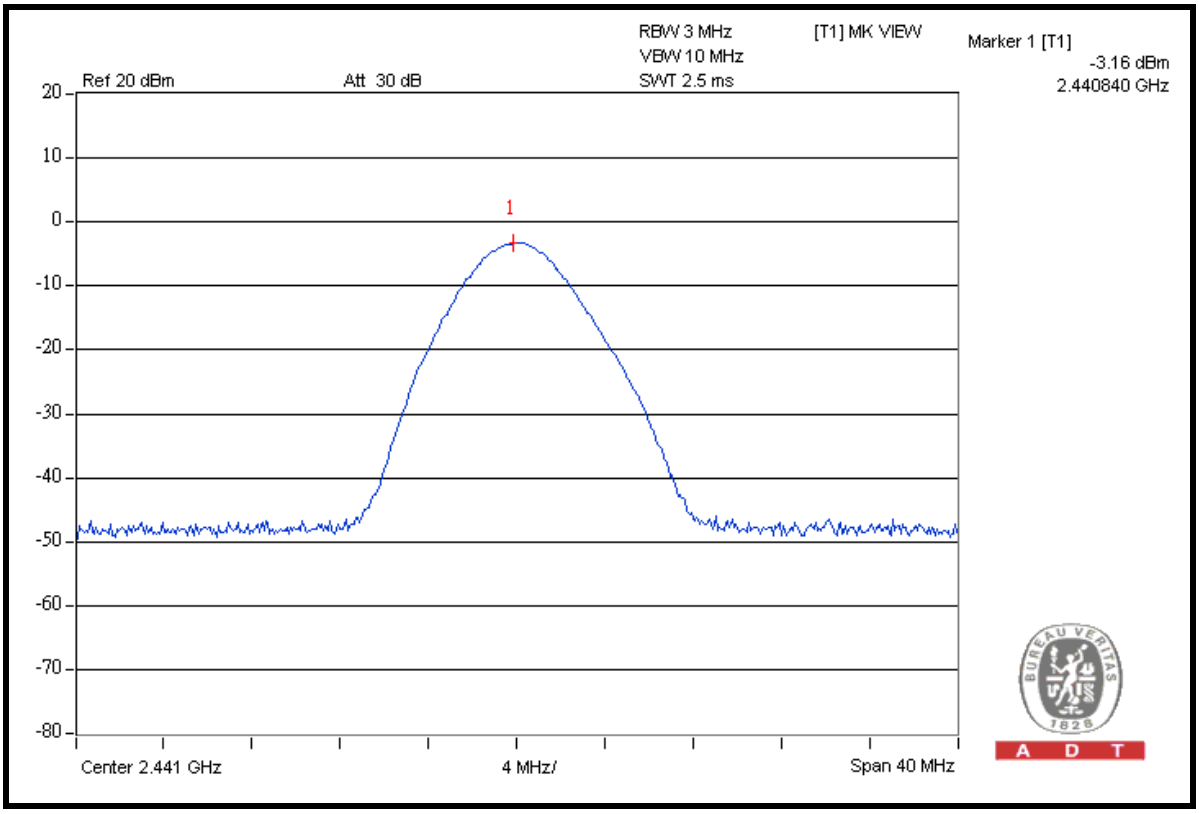
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**TESTED BY**	Kevin Liang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.456	-3.41	125	PASS
39	2441	0.483	-3.16	125	PASS
78	2480	0.450	-3.47	125	PASS

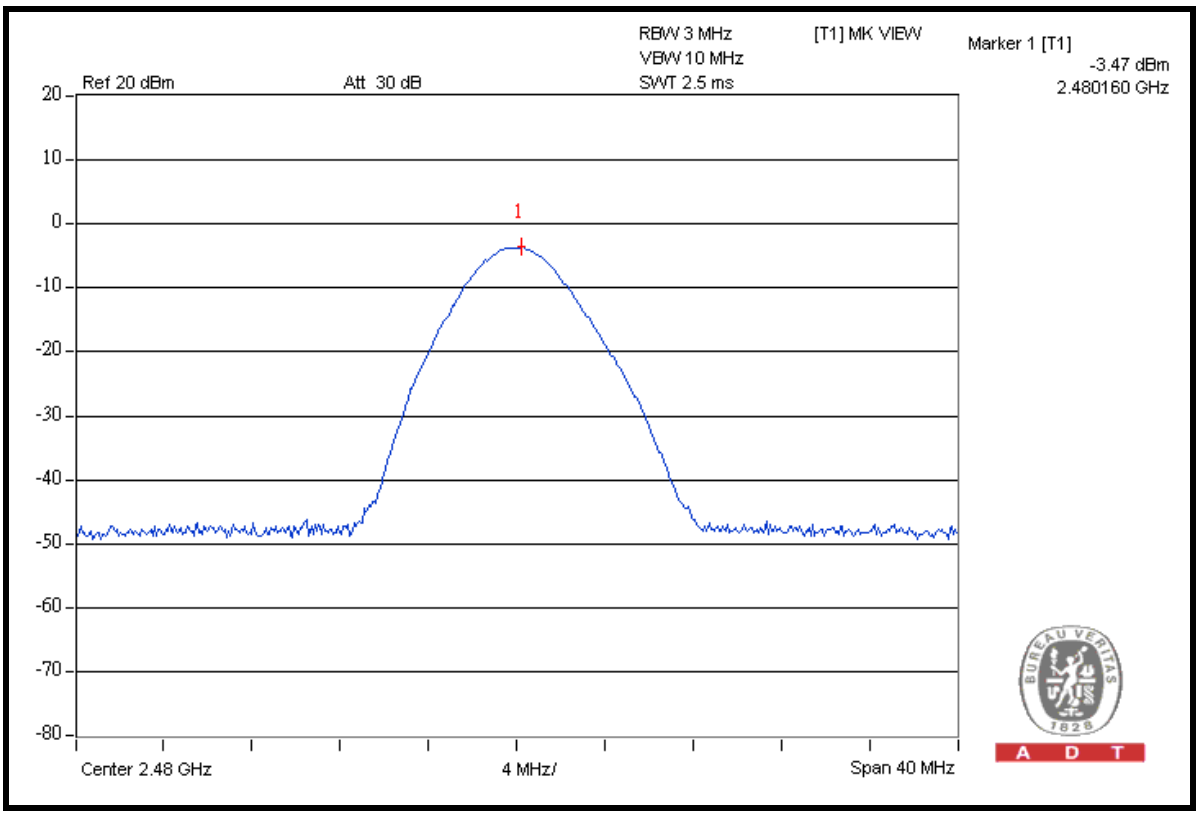
CH 0


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-3.41 dBm
2.401840 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.402 GHz
4 MHz/
Span 40 MHz

CH 39


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-3.16 dBm
2.440840 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH 78

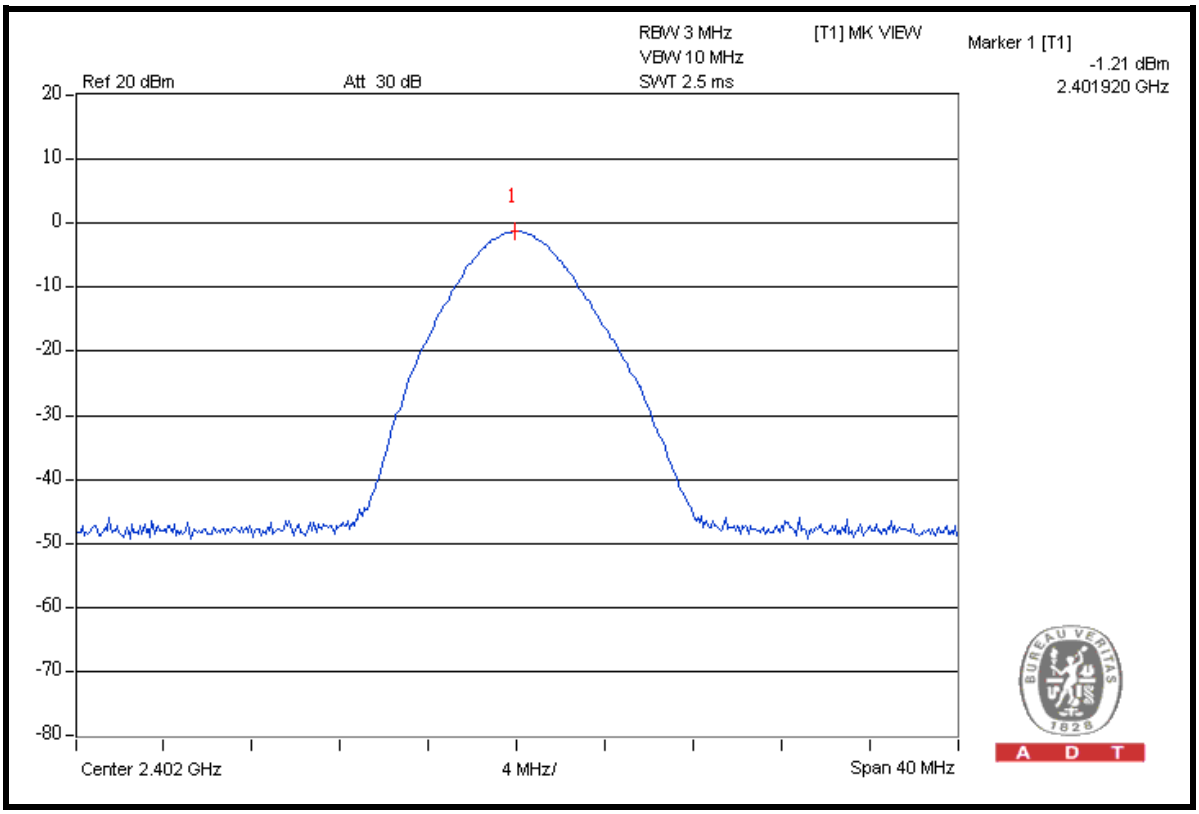

RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-3.47 dBm
2.480160 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.48 GHz
4 MHz/
Span 40 MHz

8DPSK MODULATION

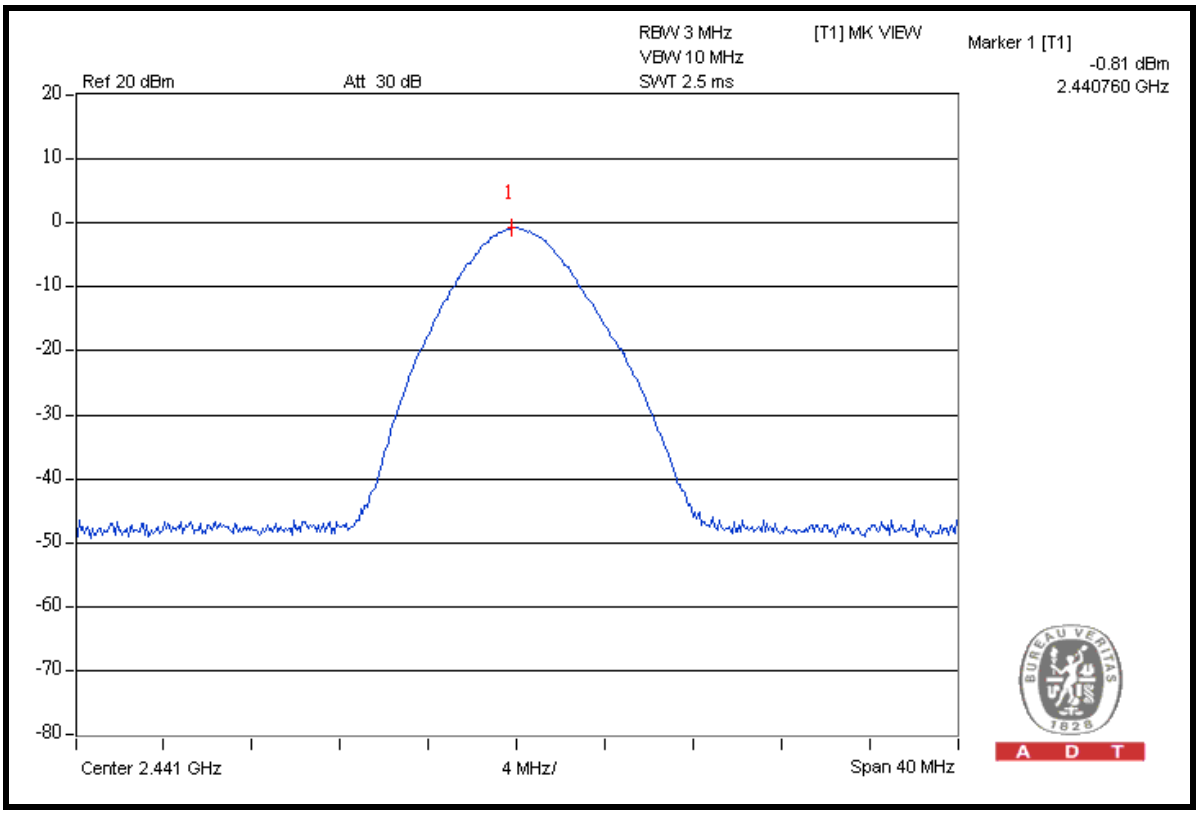
MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1010hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Kevin Liang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.757	-1.21	125	PASS
39	2441	**0.830**	-0.81	125	PASS
78	2480	0.811	-0.91	125	PASS

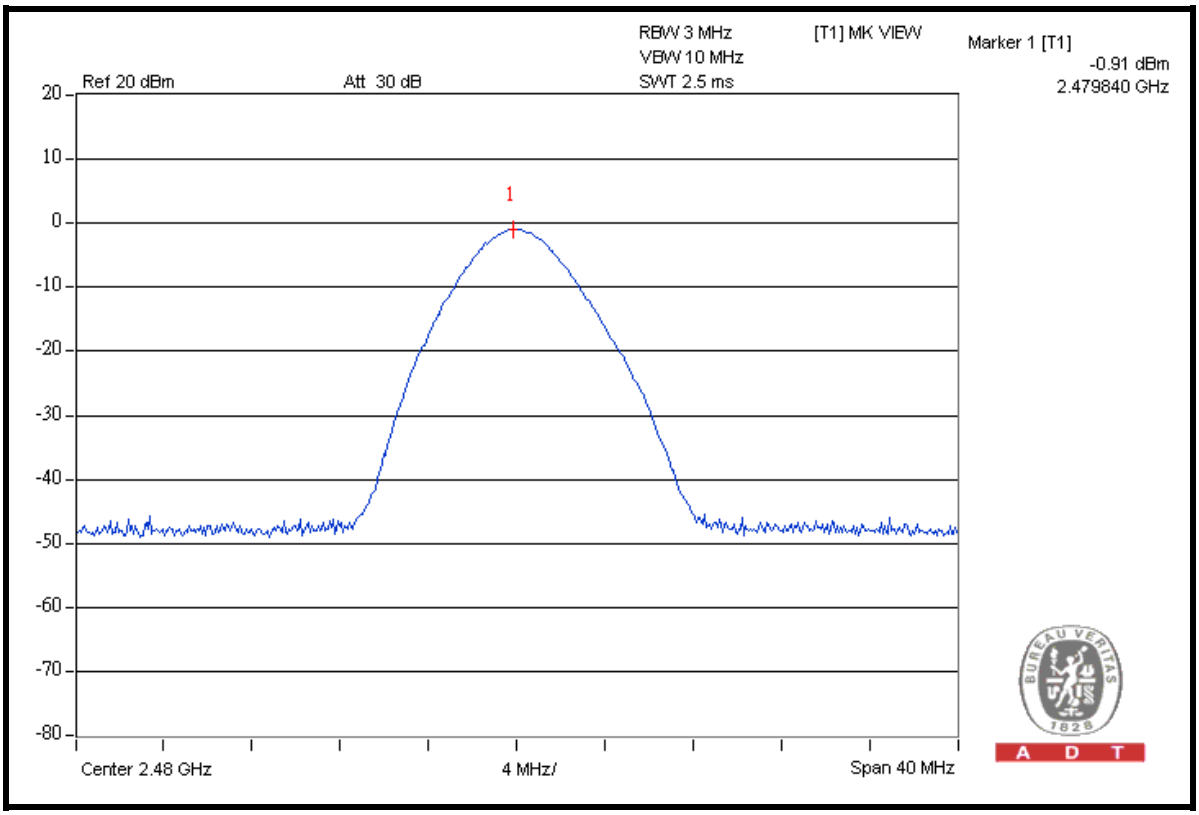
CH 0



CH 39


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.81 dBm
2.440760 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH 78


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.91 dBm
2.479840 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.48 GHz
4 MHz/
Span 40 MHz

4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES 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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

NOTE: 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 both RBW and VBW of spectrum analyzer to 100 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 and highest channel frequencies individually.

4.8.6 TEST RESULTS

The spectrum plots are attached on the following 8 images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

GFSK MODULATION

NOTE 1: The band edge emission plot on the next page shows 43.18dBc between carrier maximum power and local maximum emission in restrict band (2.3508GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.1.7 is 95.18dBuV/m (Peak), so the maximum field strength in restrict band is 95.18 – 43.18 = 52.00dBuV/m, which is under 74dBuV/m limit.

Average value = 52.00 – 30.10 = 21.90dBuV/m, which is under 54dBuV/m limit.

*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 correction factor be equal to: 20log(3.125/100)= -30.1 dB.

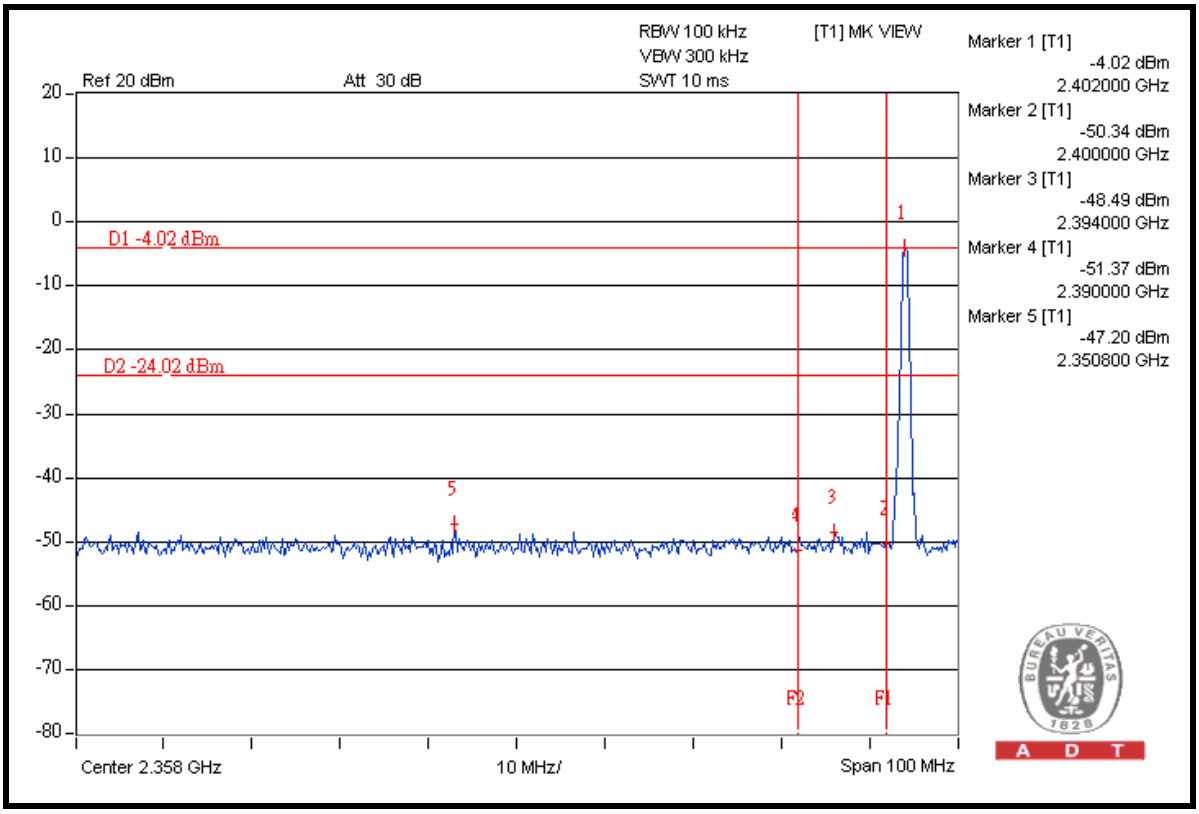
Average value = peak reading – 30.1

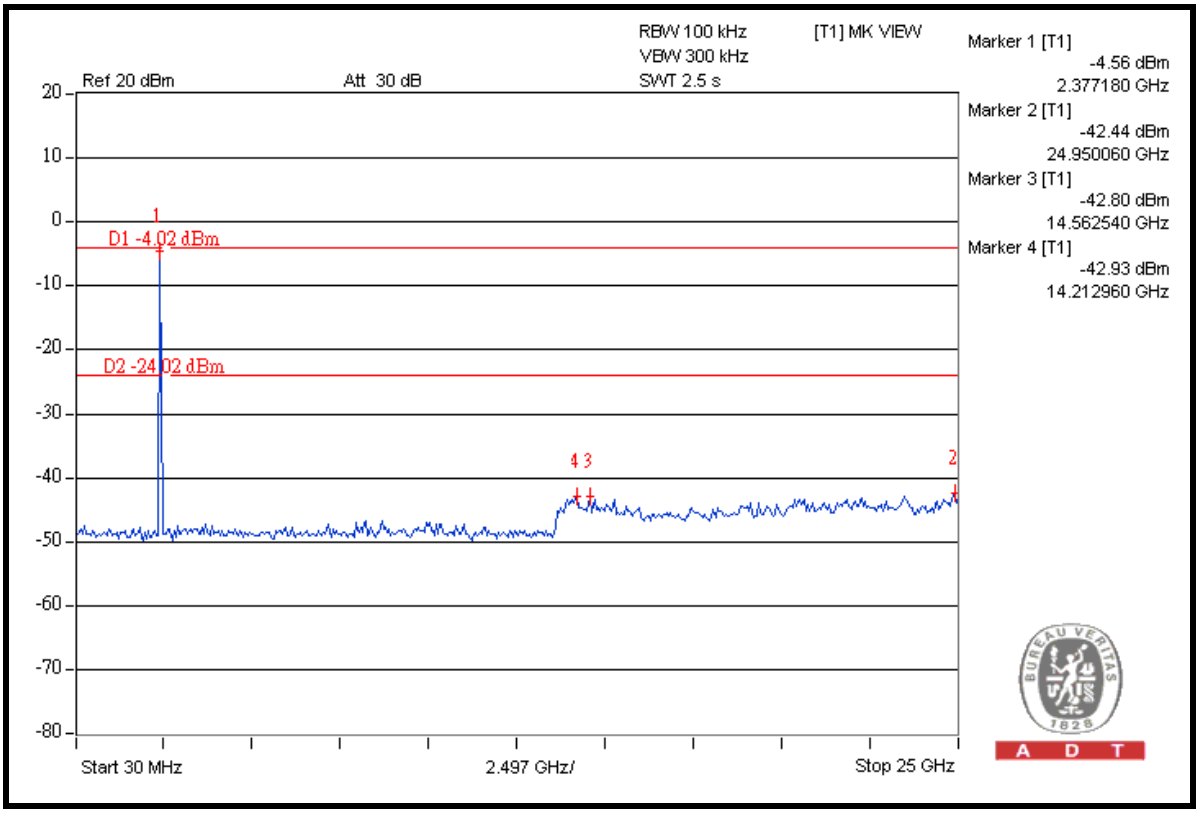
NOTE 2: The band edge emission plot on the next second page shows 44.68dBc between carrier maximum power and local maximum emission in restrict band (2.4800GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.1.7 is 90.79 dBuV/m (Peak), so the maximum field strength in restrict band is 90.79 – 44.68 = 46.11dBuV/m, which is under 74 dBuV/m limit.

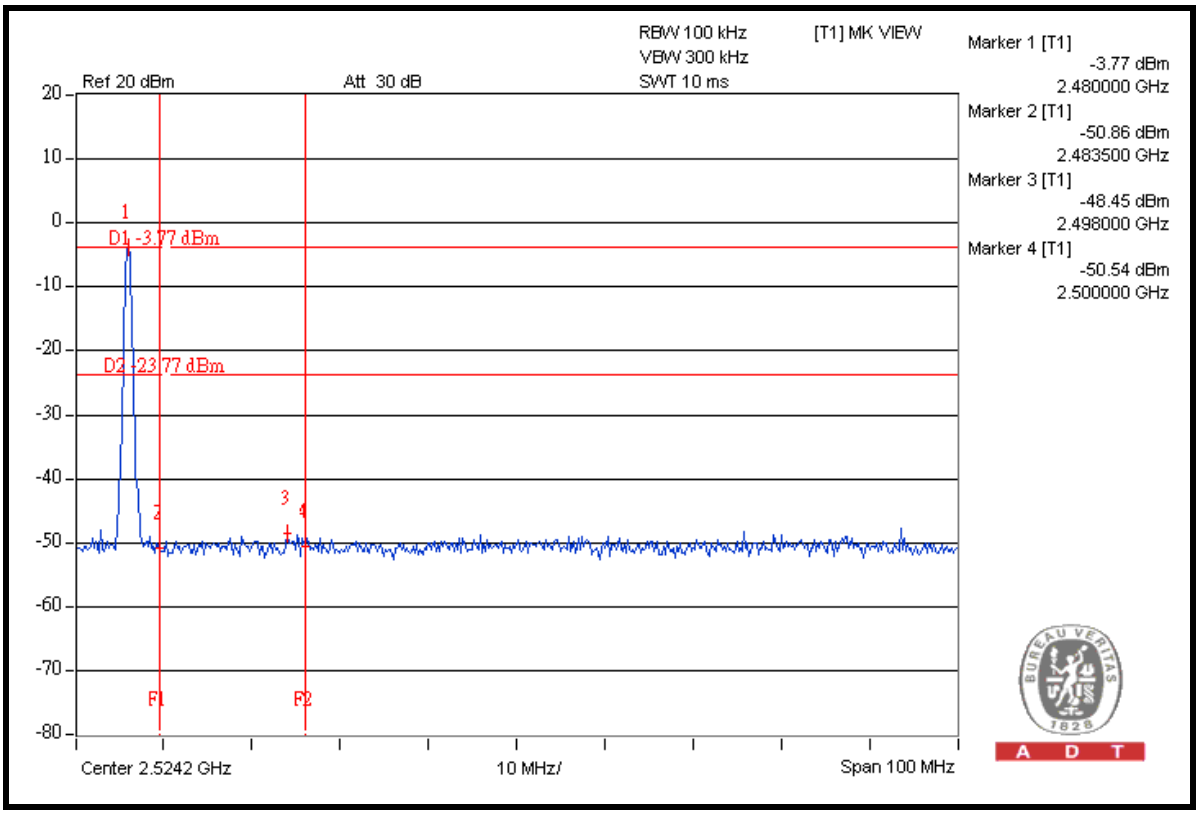
Average value = 46.11 – 30.10 = 16.01dBuV/m, which is under 54dBuV/m limit.

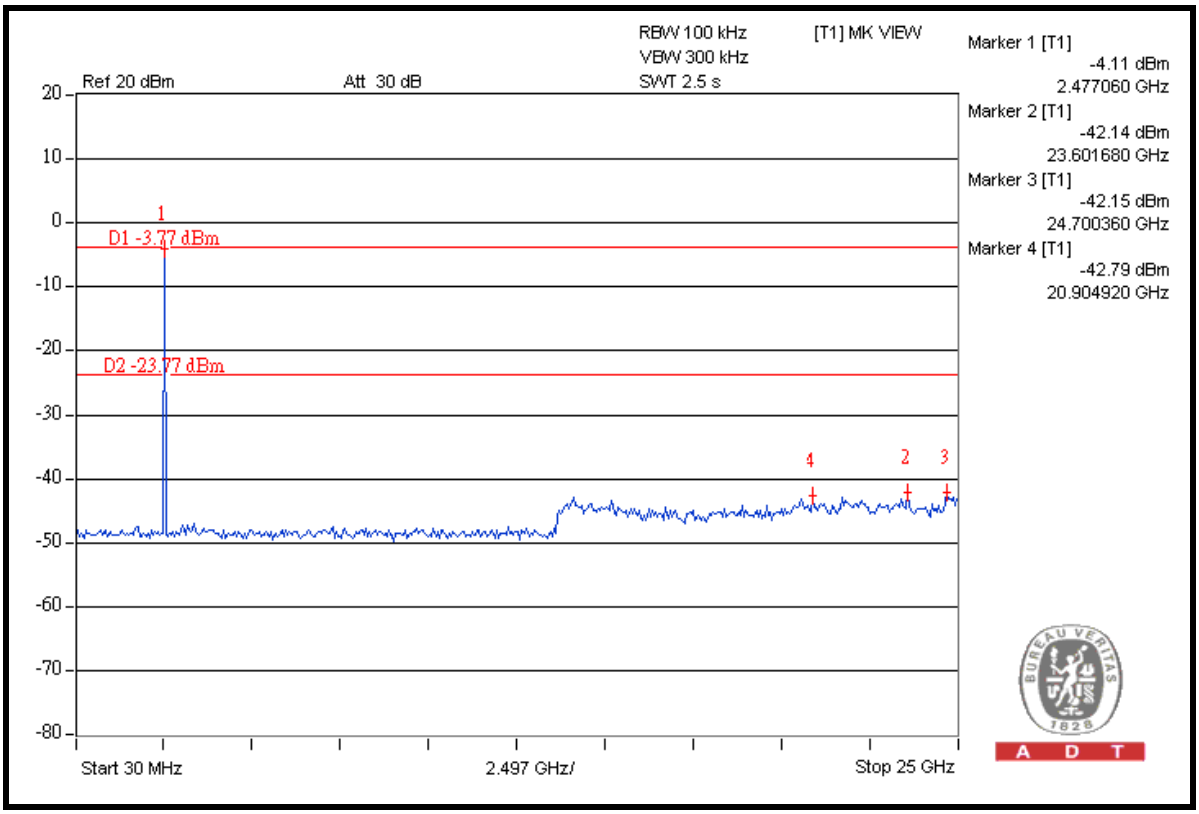
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: 20log(3.125/100)= -30.1 dB.

Average value = peak reading – 30.1


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 -4.02 dBm
D2 -24.02 dBm
Marker 1 [T1]
-4.02 dBm
2.402000 GHz
Marker 2 [T1]
-50.34 dBm
2.400000 GHz
Marker 3 [T1]
-48.49 dBm
2.394000 GHz
Marker 4 [T1]
-51.37 dBm
2.390000 GHz
Marker 5 [T1]
-47.20 dBm
2.350800 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 -4.02 dBm
D2 -24.02 dBm
Marker 1 [T1]
-4.56 dBm
2.377180 GHz
Marker 2 [T1]
-42.44 dBm
24.950060 GHz
Marker 3 [T1]
-42.80 dBm
14.562540 GHz
Marker 4 [T1]
-42.93 dBm
14.212960 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-3.77 dBm
2.480000 GHz
Marker 2 [T1]
-50.86 dBm
2.483500 GHz
Marker 3 [T1]
-48.45 dBm
2.498000 GHz
Marker 4 [T1]
-50.54 dBm
2.500000 GHz
D1 -3.77 dBm
D2 -23.77 dBm
F1
F2
Center 2.5242 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-4.11 dBm
2.477060 GHz
Marker 2 [T1]
-42.14 dBm
23.601680 GHz
Marker 3 [T1]
-42.15 dBm
24.700360 GHz
Marker 4 [T1]
-42.79 dBm
20.904920 GHz
D1 -3.77 dBm
D2 -23.77 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

8DPSK MODULATION

NOTE 1: The band edge emission plot on the next page shows 43.79dBc between carrier maximum power and local maximum emission in restrict band (2.3578GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.1.7 is 96.89dBuV/m (Peak), so the maximum field strength in restrict band is 96.89 – 43.79 = 53.10dBuV/m, which is under 74 dBuV/m limit.

Average value = 53.10 – 30.10 = 23.00dBuV/m, which is under 54dBuV/m limit.

*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 be equal to: 20log(3.125/100)= -30.1 dB.

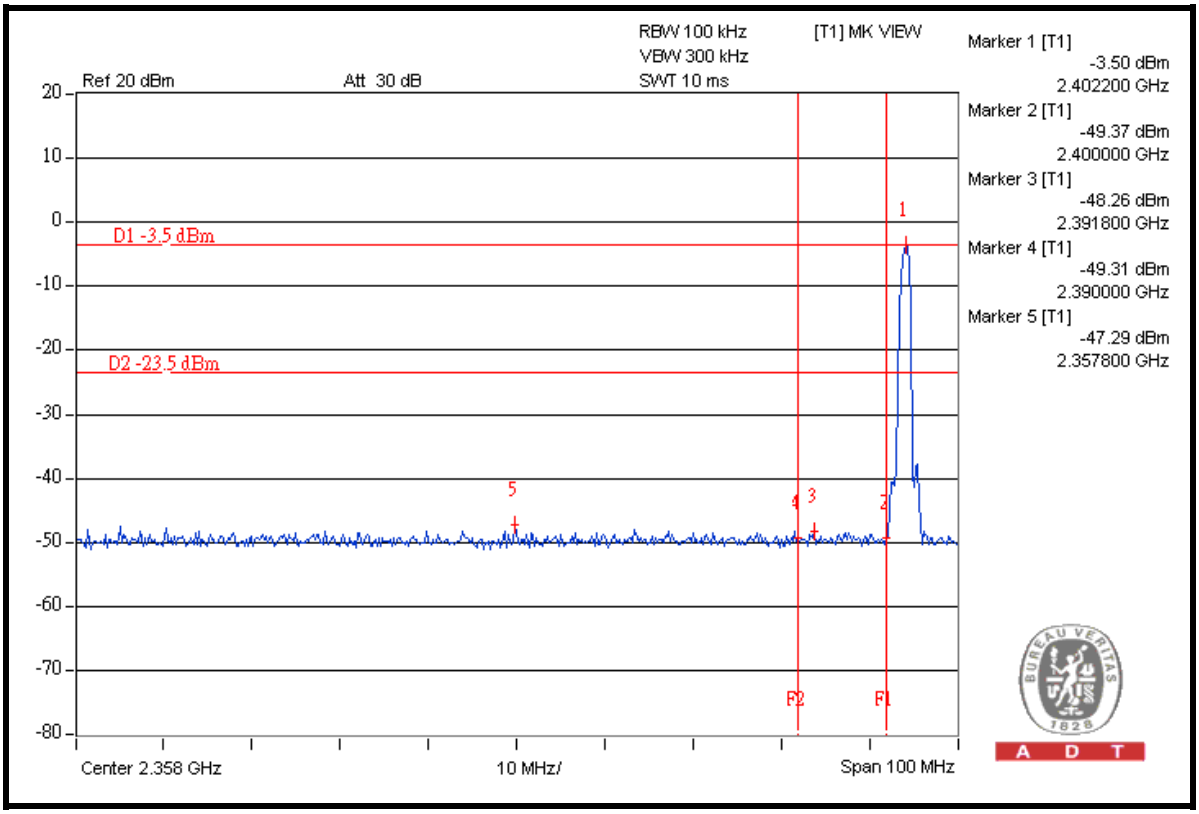
Average value = peak reading – 30.1

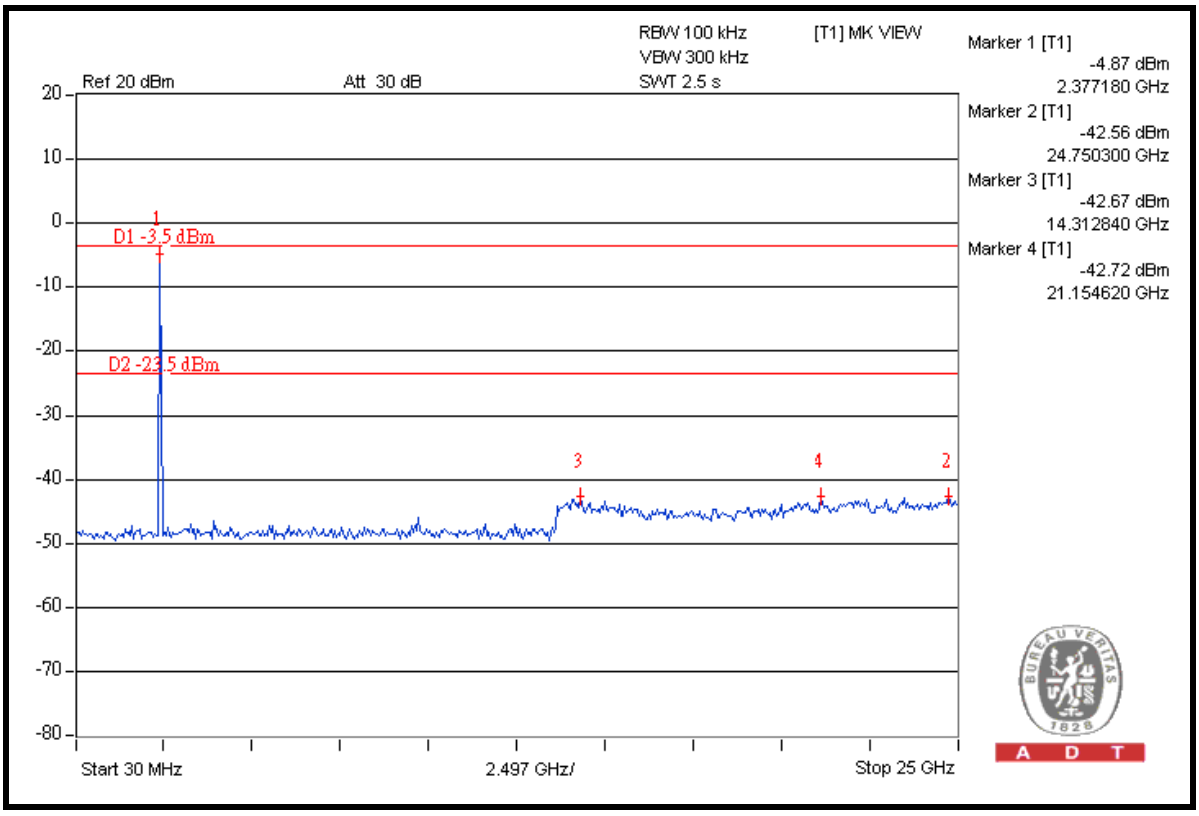
NOTE 2: The band edge emission plot on the next second page shows 44.75dBc between carrier maximum power and local maximum emission in restrict band (2.4902GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.1.7 is 92.89dBuV/m (Peak), so the maximum field strength in restrict band is 92.89 – 44.75 = 48.14dBuV/m, which is under 74 dBuV/m limit.

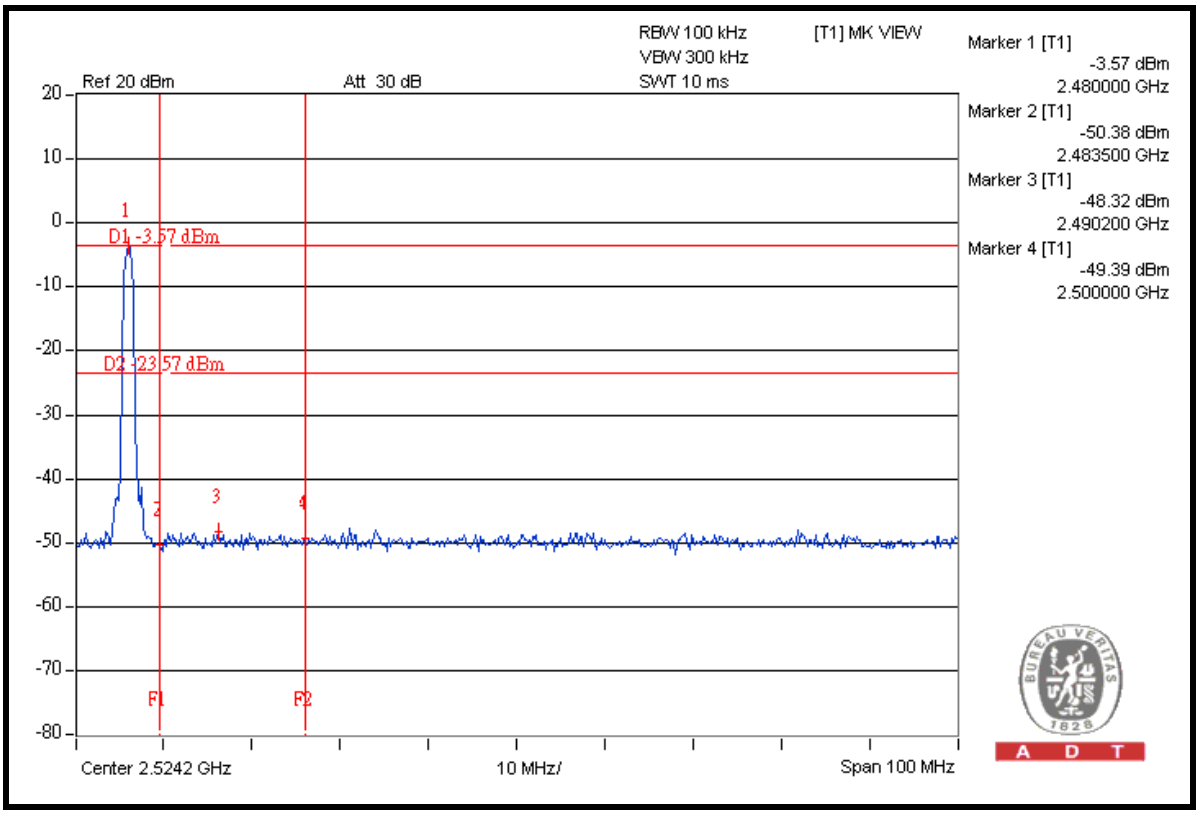
Average value = 48.14 – 30.10 = 18.04dBuV/m, which is under 54dBuV/m limit.

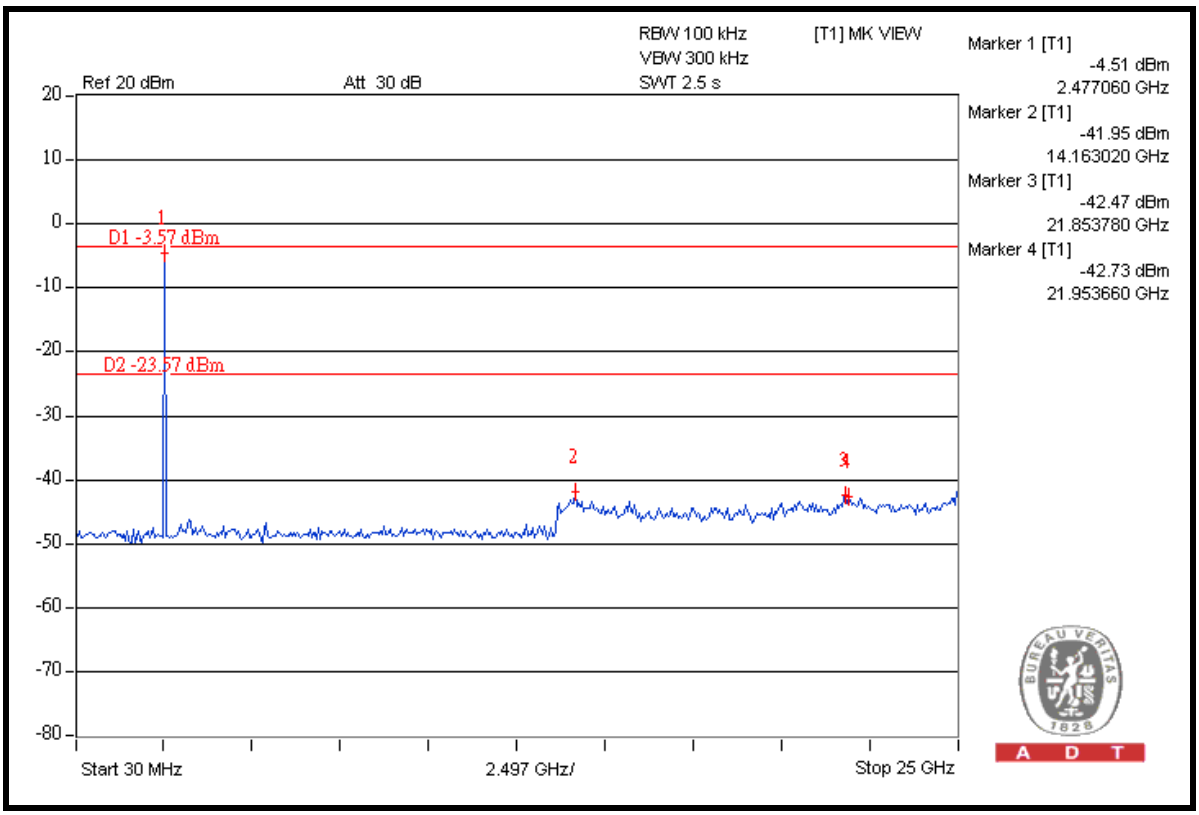
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30.1 dB.

Average value = peak reading – 30.1


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 -3.5 dBm
D2 -23.5 dBm
Marker 1 [T1]
-3.50 dBm
2.402200 GHz
Marker 2 [T1]
-49.37 dBm
2.400000 GHz
Marker 3 [T1]
-48.26 dBm
2.391800 GHz
Marker 4 [T1]
-49.31 dBm
2.390000 GHz
Marker 5 [T1]
-47.29 dBm
2.357800 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 -3.5 dBm
D2 -23.5 dBm
Marker 1 [T1]
-4.87 dBm
2.377180 GHz
Marker 2 [T1]
-42.56 dBm
24.750300 GHz
Marker 3 [T1]
-42.67 dBm
14.312840 GHz
Marker 4 [T1]
-42.72 dBm
21.154620 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-3.57 dBm
2.480000 GHz
Marker 2 [T1]
-50.38 dBm
2.483500 GHz
Marker 3 [T1]
-48.32 dBm
2.490200 GHz
Marker 4 [T1]
-49.39 dBm
2.500000 GHz
D1 -3.57 dBm
D2 -23.57 dBm
Center 2.5242 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-4.51 dBm
2.477060 GHz
Marker 2 [T1]
-41.95 dBm
14.163020 GHz
Marker 3 [T1]
-42.47 dBm
21.853780 GHz
Marker 4 [T1]
-42.73 dBm
21.953660 GHz
D1 -3.57 dBm
D2 -23.57 dBm
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 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PIFA antenna that without antenna connector. The maximum gain of this antenna is -1dBi.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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: 886-2-26051924

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

Web Site: www.adt.com.tw

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

7. 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 ---