FCC TEST REPORT

REPORT NO.: RF970909A08
MODEL NO.: HS-129W
VERSION: HW: 0.3, SW:0.2, MV:0.3, PROTO: B4.0a
RECEIVED: Sep. 9, 2008
TESTED: Sep. 11 ~ 12, 2008
ISSUED: Sep. 18, 2008

APPLICANT: NOKIA CORPORATION

ADDRESS: Elektroniikkatie 10, 90571, Oulu, Finland

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

Testing Laboratory
0528

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1. CERTIFICATION

PRODUCT:	Bluetooth Headset
BRAND NAME:	Nokia
MODEL NO.:	HS-129W
APPLICANT:	NOKIA CORPORATION
TESTED:	Sep. 11 ~ 12, 2008
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	FCC Part 15, Subpart C (Section 15.247), ANSI C63.4-2003

The above equipment has been tested by **Advance Data Technology Corporation**, 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 : Annie Chang , **DATE:** Sep. 18, 2008
(Annie Chang / Senior Specialist)

TECHNICAL ACCEPTANCE : Jamison Chan , **DATE:** Sep. 18, 2008
Responsible for RF
(Jamison Chan / Supervisor)

APPROVED BY : Ken Liu , **DATE:** Sep. 18, 2008
(Ken Liu / Deputy 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 –23.43dB at 0.474MHz.
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 20 dB bandwidth, whichever is greater (see Note) 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 (see Note)	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 –6.04dB at 2483.500MHz.
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:

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz ~ 30MHz	2.44 dB
Radiated emissions	30MHz ~ 1GHz	3.72 dB
	1GHz ~ 40GHz	2.89 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth Headset
MODEL NO.	HS-129W
FCC ID	PYAHS-129W
POWER SUPPLY	3.7Vdc from battery, 5Vdc from AC adapter
MODULATION TYPE	GFSK, π /4-DQPSK, 8DPSK
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	1/2/3Mbps
OPERATING FREQUENCY	2402 ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	4.188mW
ANTENNA TYPE	Printed antenna with 1dBi gain
DATA CABLE	N/A
I/O PORTS	N/A

NOTE:

1. The EUT is a wireless headset, with Bluetooth technology.

2. The EUT was power supplied from the following power adapters or battery:

Item	Brand	Model	Rating
Battery	-	-	3.7Vdc
Adapter1	NOKIA	AC-3U	AC I/P: 100-240V, 50-60Hz, 65mA DC O/P: 5V, 350mA
Adapter2	NOKIA	AC-4U	AC I/P: 100-240V, 50-60Hz, 125mA DC O/P: 5V, 890mA
Adapter3	NOKIA	AC-5U	AC I/P: 100-240V, 50-60Hz, 180mA DC O/P: 5V, 800mA

After pre-tested above three adapters, the AC-5U adapter was the worst case, therefore, only its test data was recorded in this report.

3. 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.

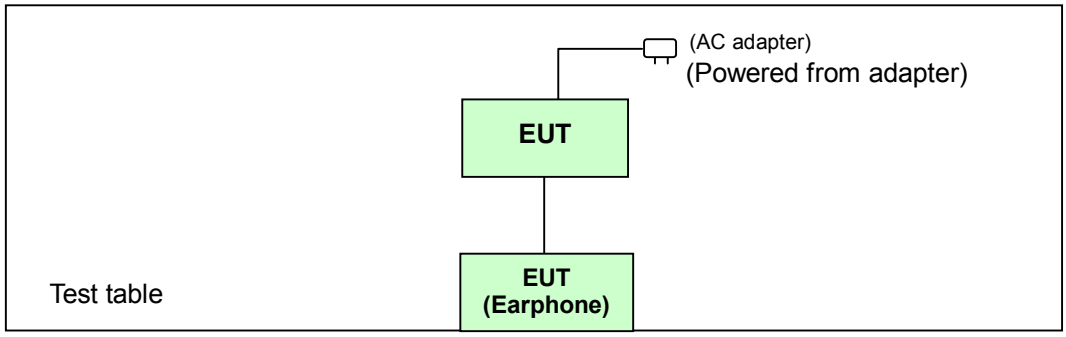
3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

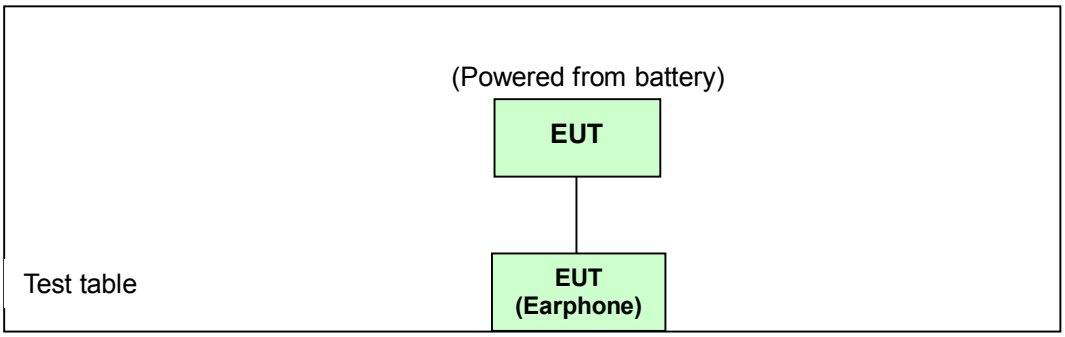
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	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

FOR MODE A~C (EUT w. adapter):



FOR MODE D (EUT stand-alone):



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
A	√	√	√	√	Operating Mode (EUT w. AC-5U adapter)
B	√	-	-	-	Operating Mode (EUT w. AC-4U adapter)
C	√	-	-	-	Operating Mode (EUT w. AC-3U adapter)
D	-	√	-	-	Operating Mode (EUT stand-alone)

Where **PLC:** Power Line Conducted Emission **RE<1G:** 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 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	DATA RATE (Mbps)	PACKET TYPE
A	0 to 78	78	FHSS	GFSK	1.0	DH5
B	0 to 78	78	FHSS	GFSK	1.0	DH5
C	0 to 78	78	FHSS	GFSK	1.0	DH5

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	PACKET TYPE	AXIS
A	0 to 78	78	FHSS	GFSK	1.0	DH5	X
D	0 to 78	78	FHSS	GFSK	1.0	DH5	X

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, X,Y,Z Axis and antenna ports (if EUT with antenna diversity architecture).

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	PACKET TYPE	AXIS
A	0 to 78	0, 39, 78	FHSS	GFSK	1.0	DH5	X
A	0 to 78	0, 39, 78	FHSS	8DPSK	3.0	DH5	X

BANDEDGE MEASUREMENT:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	PACKET TYPE
A	0 to 78	0, 78	FHSS	GFSK	1.0	DH5
A	0 to 78	0, 78	FHSS	8DPSK	3.0	DH5

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	PACKET TYPE
A	0 to 78	0, 39, 78	FHSS	GFSK	1.0	DH5
A	0 to 78	0, 39, 78	FHSS	8DPSK	3.0	DH5

3.2.3 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.

3.2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any necessary accessory or support unit.

4. TEST TYPES 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	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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Dec. 20, 2007	Dec. 19, 2008
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100218	Nov. 21, 2007	Nov. 20, 2008
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 22, 2007	Nov. 21, 2008
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100219	Nov. 09, 2007	Nov. 08, 2008
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100220	Oct. 26, 2007	Oct. 25, 2008
Software	ADT_Cond_V7.3.5	NA	NA	NA
Software	ADT_ISN_V7.3.5	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 27, 2008	Feb. 26, 2009
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 14, 2008	Feb. 13, 2009

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. 10.

3. The VCCI Site Registration No. C-1852.

4.1.3 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.

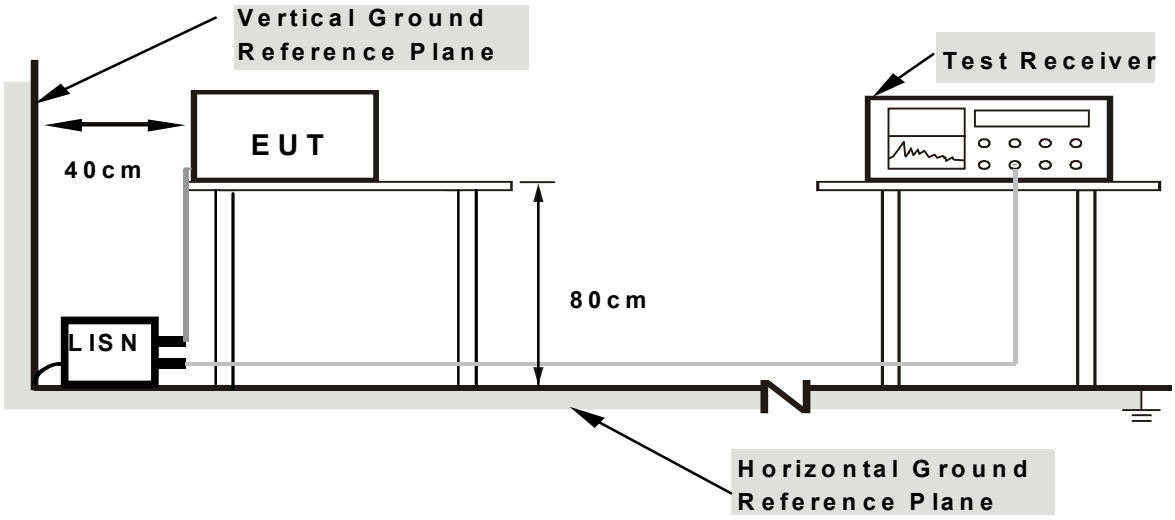
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

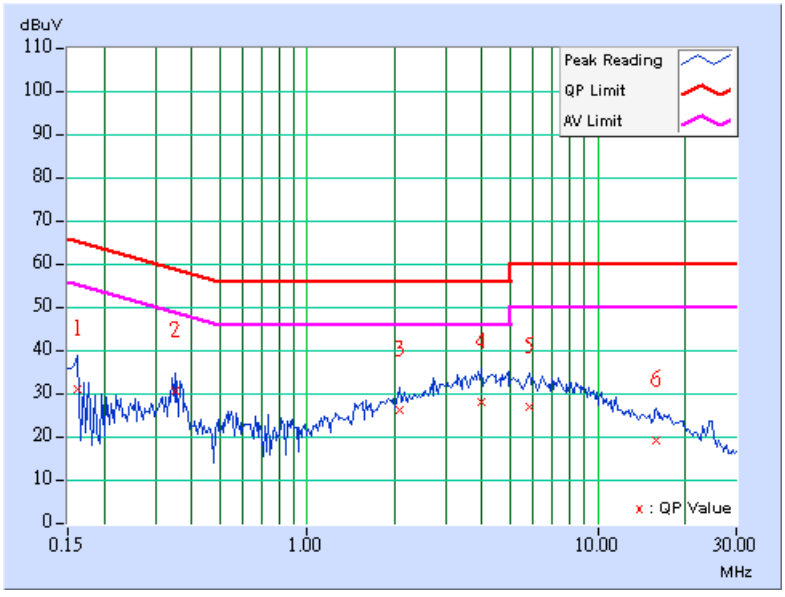
a. Connected the EUT with AC adapter placed on testing table.
b. Set the EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 TEST RESULTS (1)

TEST MODE	A		
INPUT POWER	120Vac, 60Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	PHASE	Line (L)
TESTED BY	ED. Lin		

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	0.162	0.27	29.94	-	30.21	-	65.38	55.38	-35.16	-
2	0.353	0.31	29.64	-	29.95	-	58.89	48.89	-28.94	-
3	2.086	0.42	25.33	-	25.75	-	56.00	46.00	-30.25	-
4	3.973	0.51	27.19	-	27.70	-	56.00	46.00	-28.30	-
5	5.797	0.58	25.93	-	26.51	-	60.00	50.00	-33.49	-
6	15.992	1.03	18.20	-	19.23	-	60.00	50.00	-40.77	-

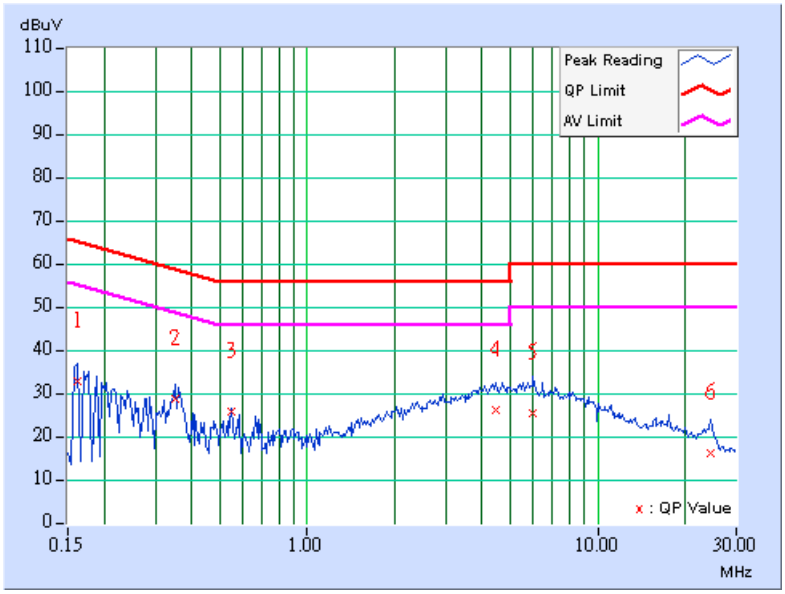
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST MODE	A		
INPUT POWER	120Vac, 60Hz	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	**PHASE**	Neutral (N)
TESTED BY	ED. Lin		

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	0.162	0.16	31.44	-	31.60	-	65.38	55.38	-33.77	-
2	0.349	0.21	27.45	-	27.66	-	58.98	48.98	-31.32	-
3	0.548	0.22	24.53	-	24.75	-	56.00	46.00	-31.25	-
4	4.461	0.42	24.86	-	25.28	-	56.00	46.00	-30.72	-
5	6.012	0.49	24.23	-	24.72	-	60.00	50.00	-35.28	-
6	24.430	1.39	14.99	-	16.38	-	60.00	50.00	-43.62	-

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.

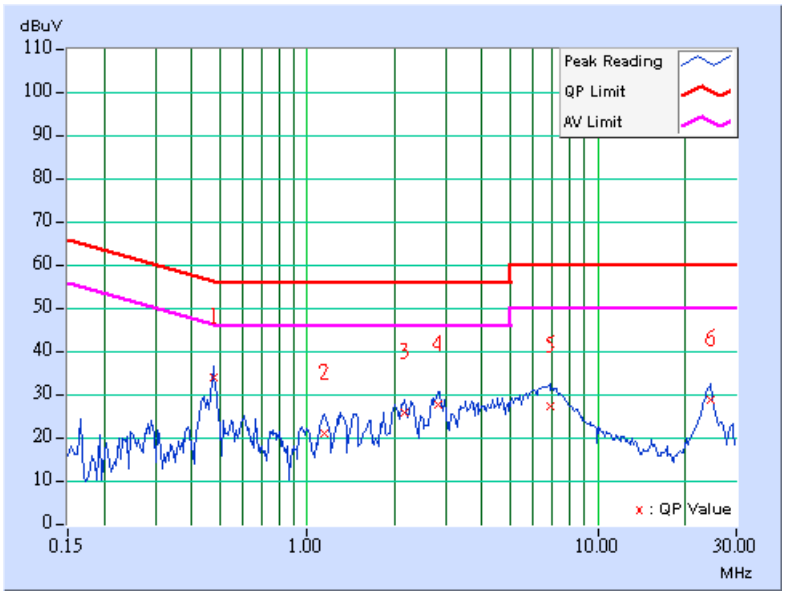


4.1.7 TEST RESULTS (2)

TEST MODE	B		
INPUT POWER	120Vac, 60Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	PHASE	Line (L)
TESTED BY	ED. Lin		

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	**0.474**	**0.32**	**32.69**	**-**	**33.01**	**-**	**56.44**	**46.44**	**-23.43**	**-**
2	1.141	0.37	19.60	-	19.97	-	56.00	46.00	-36.03	-
3	2.168	0.43	24.66	-	25.09	-	56.00	46.00	-30.91	-
4	2.824	0.46	26.42	-	26.88	-	56.00	46.00	-29.12	-
5	6.879	0.62	26.00	-	26.62	-	60.00	50.00	-33.38	-
6	24.602	1.44	27.40	-	28.84	-	60.00	50.00	-31.16	-

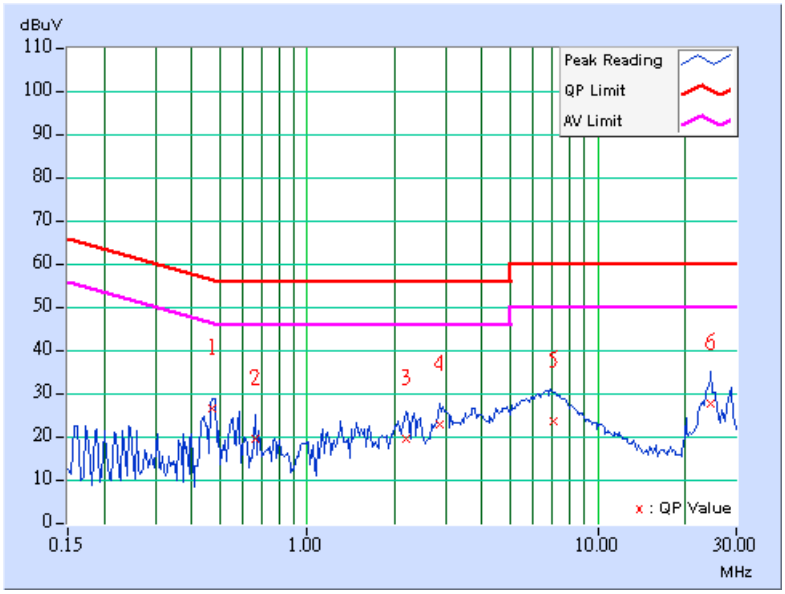
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST MODE	B		
INPUT POWER	120Vac, 60Hz	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	**PHASE**	Neutral (N)
TESTED BY	ED. Lin		

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	0.470	0.21	25.31	-	25.52	-	56.51	46.51	-30.98	-
2	0.662	0.23	18.38	-	18.61	-	56.00	46.00	-37.39	-
3	2.188	0.31	18.37	-	18.68	-	56.00	46.00	-37.32	-
4	2.867	0.34	21.71	-	22.05	-	56.00	46.00	-33.95	-
5	7.008	0.53	22.37	-	22.90	-	60.00	50.00	-37.10	-
6	24.605	1.40	26.26	-	27.66	-	60.00	50.00	-32.34	-

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.

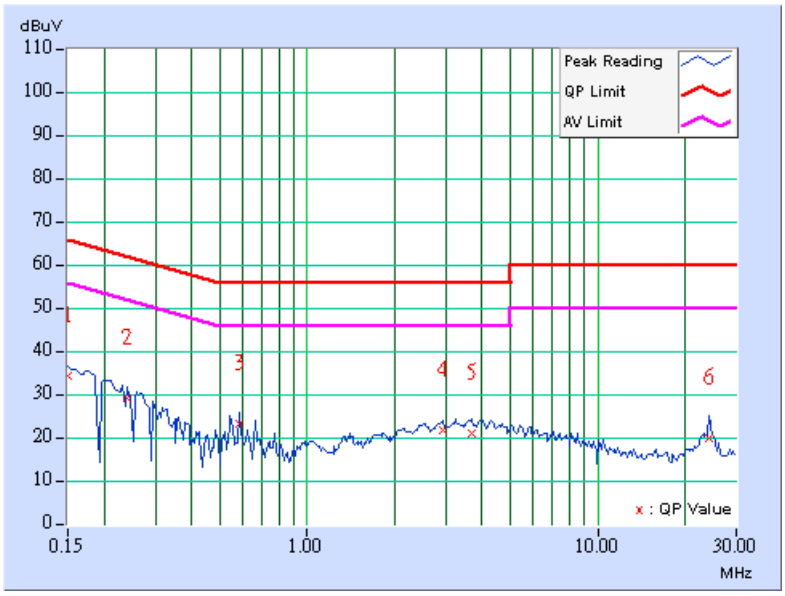


4.1.8 TEST RESULTS (3)

TEST MODE	C		
INPUT POWER	120Vac, 60Hz	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	**PHASE**	Line (L)
TESTED BY	ED. Lin		

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	0.150	0.26	32.95	-	33.21	-	66.00	56.00	-32.79	-
2	0.240	0.31	27.79	-	28.10	-	62.10	52.10	-34.00	-
3	0.584	0.33	21.84	-	22.17	-	56.00	46.00	-33.83	-
4	2.941	0.46	20.42	-	20.88	-	56.00	46.00	-35.12	-
5	3.684	0.49	19.53	-	20.02	-	56.00	46.00	-35.98	-
6	24.266	1.42	18.42	-	19.84	-	60.00	50.00	-40.16	-

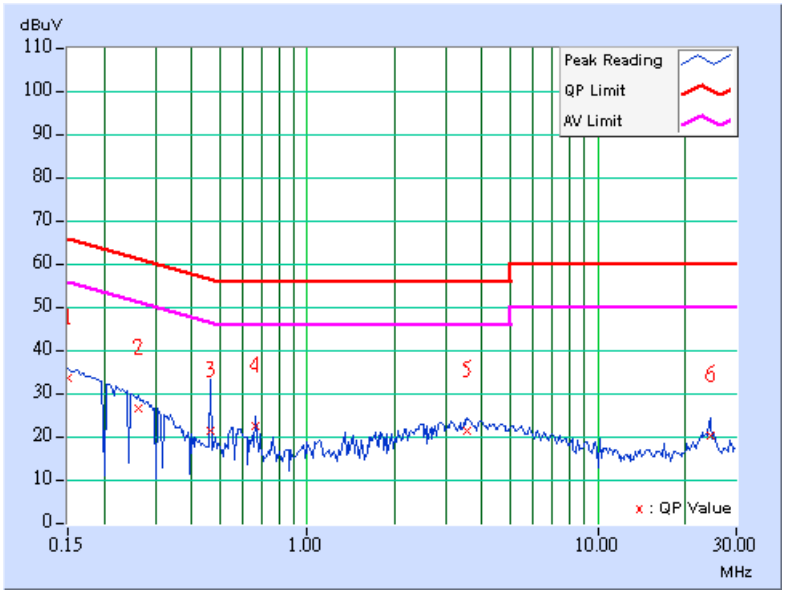
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



TEST MODE	C		
INPUT POWER	120Vac, 60Hz	**6dB BANDWIDTH**	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 52% RH, 1000hPa	**PHASE**	Neutral (N)
TESTED BY	ED. Lin		

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	0.150	0.15	32.30	-	32.45	-	66.00	56.00	-33.55	-
2	0.263	0.20	25.45	-	25.65	-	61.33	51.33	-35.67	-
3	0.463	0.21	20.13	-	20.34	-	56.65	46.65	-36.30	-
4	0.666	0.23	21.13	-	21.36	-	56.00	46.00	-34.64	-
5	3.559	0.38	20.10	-	20.48	-	56.00	46.00	-35.52	-
6	24.531	1.40	19.14	-	20.54	-	60.00	50.00	-39.46	-

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 RADIATED EMISSION MEASUREMENT

4.2.1 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.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	May 09, 2008	May 08, 2009
HP Preamplifier	8449B	3008A01201	Oct. 02, 2007	Oct. 01, 2008
HP Preamplifier	8449B	3008A01292	Aug. 06, 2008	Aug. 05, 2009
ROHDE & SCHWARZ TEST RECEIVER	ESI7	836697/012	Dec. 06, 2007	Dec. 05, 2008
Schwarzbeck Antenna	VULB 9168	137	May 02, 2008	May 01, 2009
Schwarzbeck Antenna	VHBA 9123	480	Apr. 23, 2008	Apr. 22, 2009
EMCO Horn Antenna	3115	6714	Oct. 19, 2007	Oct. 18, 2008
EMCO Horn Antenna	3115	9312-4192	Apr. 21, 2008	Apr. 20, 2009
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15	NA	NA	NA
SUHNER RF cable	SF104-26.5	CABLE-CH6-17m -01	Nov. 05, 2007	Nov. 04, 2008
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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 and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 3789-6.
5. The FCC Site Registration No. is 447212.

4.2.3 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.

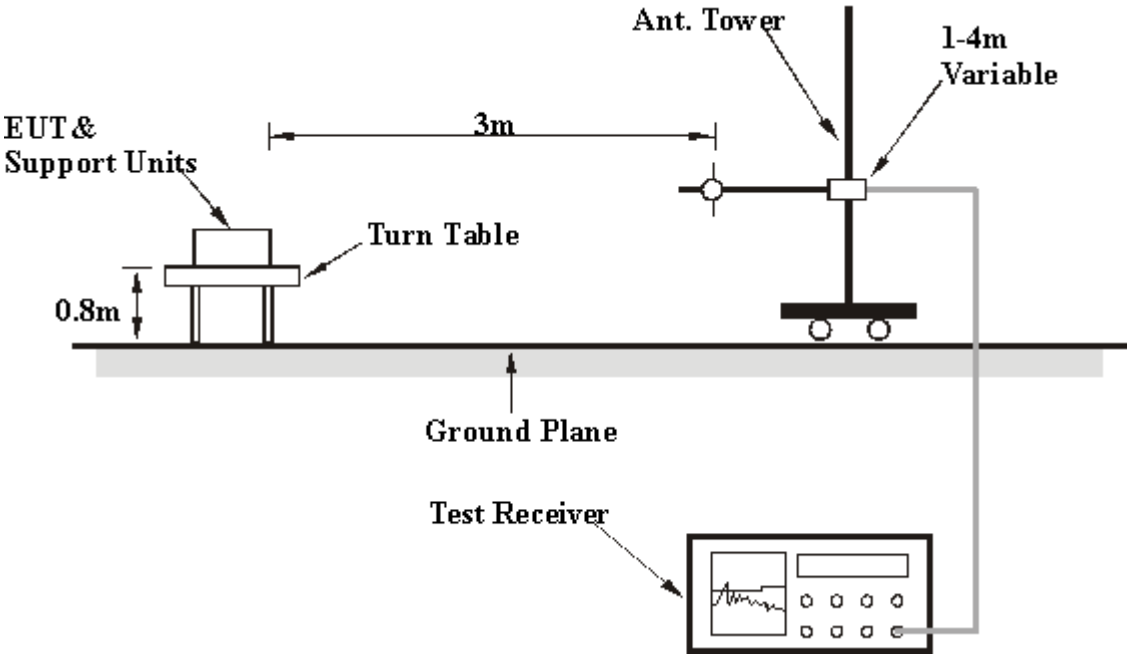
NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection 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. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference-receiving antenna.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Mode A:

a. Connected the EUT with AC adapter placed on testing table.
b. Set the EUT under transmission/receiving condition continuously at specific channel frequency.

Mode B:

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

4.2.7 TEST RESULTS

RADIATED WORST CASE DATA: FOR GFSK (BELOW 1GHz)

TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	78
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	Chad Lee		

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	442.104	32.83 QP	46.00	-13.17	1.08 H	12	7.40	25.43
2	486.814	35.41 QP	46.00	-10.59	1.37 H	124	8.73	26.68
3	517.916	38.05 QP	46.00	-7.95	1.00 H	181	10.56	27.49
4	558.737	36.13 QP	46.00	-9.87	1.00 H	199	7.64	28.49
5	669.539	32.22 QP	46.00	-13.78	1.59 H	256	2.06	30.16
6	871.703	32.15 QP	46.00	-13.85	1.33 H	10	-1.91	34.06

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	490.701	33.95 QP	46.00	-12.05	1.22 V	175	7.15	26.80
2	508.196	37.84 QP	46.00	-8.16	1.03 V	190	10.58	27.26
3	543.186	37.79 QP	46.00	-8.21	1.00 V	154	9.71	28.08
4	560.681	36.52 QP	46.00	-9.48	1.00 V	166	7.98	28.54
5	846.433	32.97 QP	46.00	-13.03	1.54 V	166	-0.67	33.64
6	879.479	32.78 QP	46.00	-13.22	1.06 V	10	-1.42	34.20

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.

TEST MODE	B		
MODULATION TYPE	GFSK	**CHANNEL**	78
INPUT POWER	3.7Vdc	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 999hPa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	Chad Lee		

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	751.182	29.49 QP	46.00	-16.51	1.65 H	10	-2.31	31.80
2	768.677	30.54 QP	46.00	-15.46	1.23 H	79	-1.74	32.28
3	795.892	30.62 QP	46.00	-15.38	1.55 H	13	-2.40	33.02
4	828.938	32.02 QP	46.00	-13.98	1.00 H	283	-1.43	33.45
5	867.816	31.60 QP	46.00	-14.40	1.00 H	292	-2.39	33.99
6	931.964	33.36 QP	46.00	-12.64	1.00 H	113	-1.83	35.19
7	945.571	33.83 QP	46.00	-12.17	1.00 H	34	-1.62	35.45

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	131.944	25.23 QP	43.50	-18.27	1.00 V	133	5.73	19.50
2	749.238	29.19 QP	46.00	-16.81	1.22 V	7	-2.56	31.75
3	786.172	31.50 QP	46.00	-14.50	1.35 V	181	-1.25	32.75
4	819.218	31.34 QP	46.00	-14.66	1.00 V	85	-2.00	33.34
5	863.928	31.80 QP	46.00	-14.20	1.08 V	172	-2.12	33.92
6	898.918	32.83 QP	46.00	-13.17	1.00 V	85	-1.71	34.54

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.

RADIATED DATA: FOR GFSK (ABOVE 1GHz)

TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	0
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1602.000	43.36 PK	74.00	-30.64	1.00 H	119	12.08	31.27
2	1602.000	37.17 AV	54.00	-16.83	1.00 H	119	5.89	31.27
3	2390.000	57.74 PK	74.00	-16.26	1.37 H	69	24.44	33.30
4	2390.000	27.64 AV	54.00	-26.36	1.37 H	69	-5.66	33.30
5	*2402.000	108.90 PK			1.37 H	69	75.55	33.35
6	*2402.000	78.80 AV			1.37 H	69	45.45	33.35
7	4804.000	51.94 PK	74.00	-22.06	1.00 H	354	11.55	40.39
8	4804.000	21.84 AV	54.00	-32.16	1.00 H	354	-18.55	40.39

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	1602.000	40.23 PK	74.00	-33.77	1.31 V	291	8.95	31.27
2	1602.000	28.34 AV	54.00	-25.66	1.31 V	291	-2.94	31.27
3	2390.000	56.82 PK	74.00	-17.18	1.30 V	335	23.52	33.30
4	2390.000	26.72 AV	54.00	-27.28	1.30 V	335	-6.58	33.30
5	*2402.000	98.86 PK			1.30 V	335	65.51	33.35
6	*2402.000	68.76 AV			1.30 V	335	35.41	33.35
7	4804.000	53.79 PK	74.00	-20.21	1.00 V	14	13.40	40.39
8	4804.000	23.69 AV	54.00	-30.31	1.00 V	14	-16.70	40.39

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

TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	39
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1626.000	44.26 PK	74.00	-29.74	1.00 H	117	12.97	31.29
2	1626.000	39.10 AV	54.00	-14.90	1.00 H	117	7.81	31.29
3	*2441.000	107.66 PK			1.05 H	273	74.13	33.53
4	*2441.000	77.56 AV			1.05 H	273	44.03	33.53
5	4882.000	49.16 PK	74.00	-24.84	1.00 H	166	8.59	40.57
6	4882.000	19.06 AV	54.00	-34.94	1.00 H	166	-21.51	40.57

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	1626.000	42.06 PK	74.00	-31.94	1.00 V	126	10.77	31.29
2	1626.000	33.16 AV	54.00	-20.84	1.00 V	126	1.87	31.29
3	*2441.000	99.24 PK			1.00 V	299	65.71	33.53
4	*2441.000	69.14 AV			1.00 V	299	35.61	33.53
5	4882.000	52.60 PK	74.00	-21.40	1.02 V	80	12.03	40.57
6	4882.000	22.50 AV	54.00	-31.50	1.02 V	80	-18.07	40.57

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

TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	78
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1652.000	42.92 PK	74.00	-31.08	1.00 H	296	11.61	31.31
2	1652.000	35.78 AV	54.00	-18.22	1.00 H	296	4.47	31.31
3	*2480.000	107.64 PK			1.00 H	278	73.94	33.70
4	*2480.000	77.54 AV			1.00 H	278	43.84	33.70
5	**2483.500**	**67.96 PK**	**74.00**	**-6.04**	**1.00 H**	**278**	**34.24**	**33.72**
6	2483.500	37.86 AV	54.00	-16.14	1.00 H	278	4.14	33.72
7	4960.000	53.98 PK	74.00	-20.02	1.06 H	139	13.22	40.76
8	4960.000	23.88 AV	54.00	-30.12	1.06 H	139	-16.88	40.76

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	1652.000	41.81 PK	74.00	-32.19	1.00 V	129	10.50	31.31
2	1652.000	31.91 AV	54.00	-22.09	1.00 V	129	0.60	31.31
3	*2480.000	98.39 PK			1.00 V	48	64.69	33.70
4	*2480.000	68.29 AV			1.00 V	48	34.59	33.70
5	2483.500	61.39 PK	74.00	-12.61	1.00 V	48	27.67	33.72
6	2483.500	31.29 AV	54.00	-22.71	1.00 V	48	-2.43	33.72
7	4960.000	56.76 PK	74.00	-17.24	1.00 V	279	16.00	40.76
8	4960.000	26.66 AV	54.00	-27.34	1.00 V	279	-14.10	40.76

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

RADIATED DATA: FOR 8DPSK (ABOVE 1GHz)

TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	0
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1602.000	48.13 PK	74.00	-25.87	1.00 H	245	16.85	31.27
2	1602.000	45.00 AV	54.00	-9.00	1.00 H	245	13.72	31.27
3	2390.000	56.48 PK	74.00	-17.52	1.12 H	109	23.18	33.30
4	2390.000	26.38 AV	54.00	-27.62	1.12 H	109	-6.92	33.30
5	*2402.000	106.61 PK			1.12 H	109	73.26	33.35
6	*2402.000	76.51 AV			1.12 H	109	43.16	33.35
7	4804.000	46.16 PK	74.00	-27.84	1.00 H	17	5.77	40.39
8	4804.000	16.06 AV	54.00	-37.94	1.00 H	17	-24.33	40.39

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	1602.000	43.02 PK	74.00	-30.98	1.03 V	229	11.74	31.27
2	1602.000	35.87 AV	54.00	-18.13	1.03 V	229	4.60	31.27
3	2390.000	56.85 PK	74.00	-17.15	1.00 V	278	23.55	33.30
4	2390.000	26.75 AV	54.00	-27.25	1.00 V	278	-6.55	33.30
5	*2402.000	98.63 PK			1.00 V	278	65.28	33.35
6	*2402.000	68.53 AV			1.00 V	278	35.18	33.35
7	4804.000	45.35 PK	74.00	-28.65	1.21 V	168	4.96	40.39
8	4804.000	15.25 AV	54.00	-38.75	1.21 V	168	-25.14	40.39

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

TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	39
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1628.000	44.95 PK	74.00	-29.05	1.00 H	114	13.66	31.29
2	1628.000	39.79 AV	54.00	-14.21	1.00 H	114	8.50	31.29
3	*2441.000	105.97 PK			1.06 H	68	72.44	33.53
4	*2441.000	75.87 AV			1.06 H	68	42.34	33.53
5	4882.000	49.62 PK	74.00	-24.38	1.00 H	285	9.05	40.57
6	4882.000	19.52 AV	54.00	-34.48	1.00 H	285	-21.05	40.57

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	1626.000	41.11 PK	74.00	-32.89	1.00 V	230	9.82	31.29
2	1626.000	34.27 AV	54.00	-19.73	1.00 V	230	2.98	31.29
3	*2441.000	96.16 PK			1.00 V	298	62.63	33.53
4	*2441.000	66.06 AV			1.00 V	298	32.53	33.53
5	4882.000	48.38 PK	74.00	-25.62	1.01 V	82	7.81	40.57
6	4882.000	18.28 AV	54.00	-35.72	1.01 V	82	-22.29	40.57

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

TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	78
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	26deg. C, 68% RH, 995hPa	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
TESTED BY	Chad Lee		

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	1652.000	49.43 PK	74.00	-24.57	1.00 H	267	18.12	31.31
2	1652.000	46.46 AV	54.00	-7.54	1.00 H	267	15.15	31.31
3	*2480.000	104.82 PK			1.04 H	70	71.12	33.70
4	*2480.000	74.72 AV			1.04 H	70	41.02	33.70
5	2483.500	66.67 PK	74.00	-7.33	1.04 H	70	32.95	33.72
6	2483.500	36.57 AV	54.00	-17.43	1.04 H	70	2.85	33.72
7	4960.000	50.60 PK	74.00	-23.40	1.05 H	116	9.84	40.76
8	4960.000	20.50 AV	54.00	-33.50	1.05 H	116	-20.26	40.76

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	1652.000	44.14 PK	74.00	-29.86	1.11 V	234	12.83	31.31
2	1652.000	38.57 AV	54.00	-15.43	1.11 V	234	7.26	31.31
3	*2480.000	99.37 PK			1.00 V	330	65.67	33.70
4	*2480.000	69.27 AV			1.00 V	330	35.57	33.70
5	2483.500	62.49 PK	74.00	-11.51	1.00 V	330	28.77	33.72
6	2483.500	32.39 AV	54.00	-21.61	1.00 V	330	-1.33	33.72
7	4960.000	48.10 PK	74.00	-25.90	1.00 V	58	7.34	40.76
8	4960.000	18.00 AV	54.00	-36.00	1.00 V	58	-22.76	40.76

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

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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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.

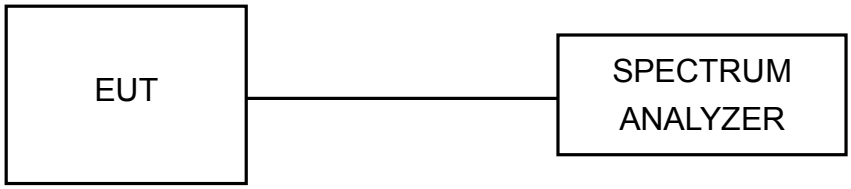
d. Set the SA on View mode and then plot the result on SA screen.

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

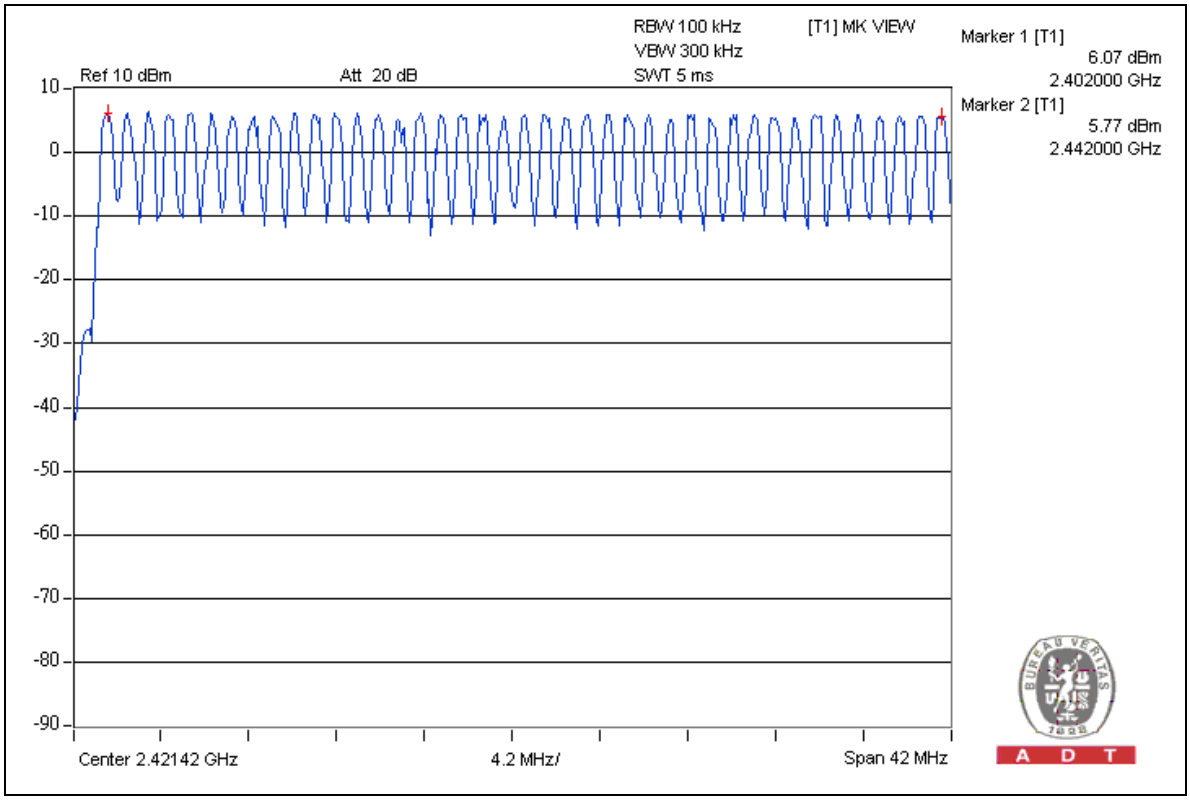
4.3.5 TEST SETUP

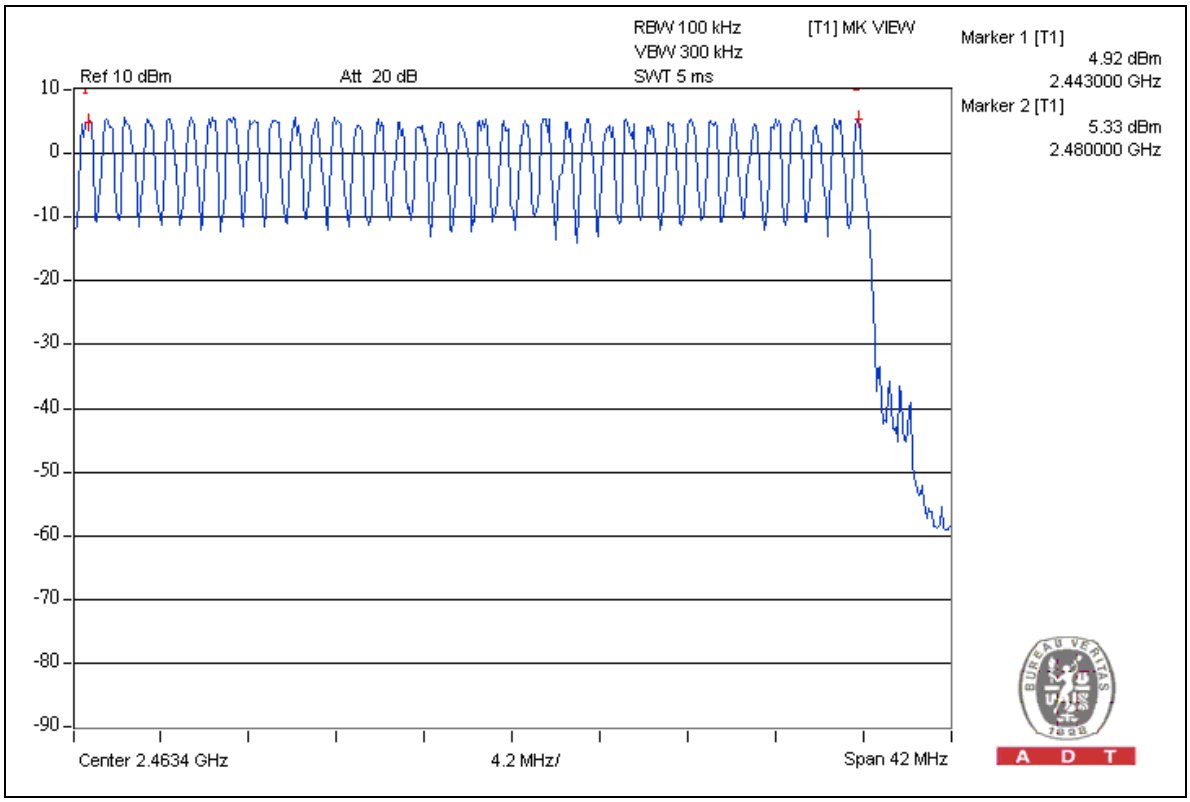


4.3.6 TEST RESULTS

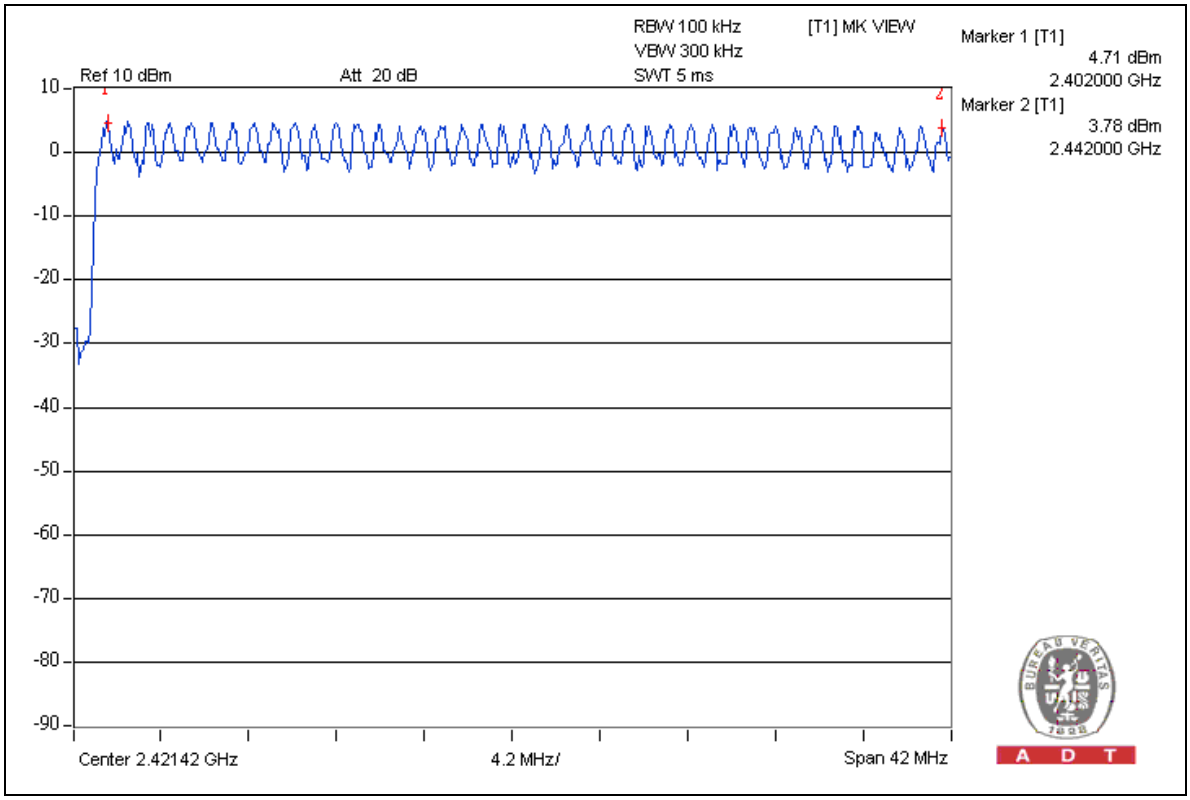
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

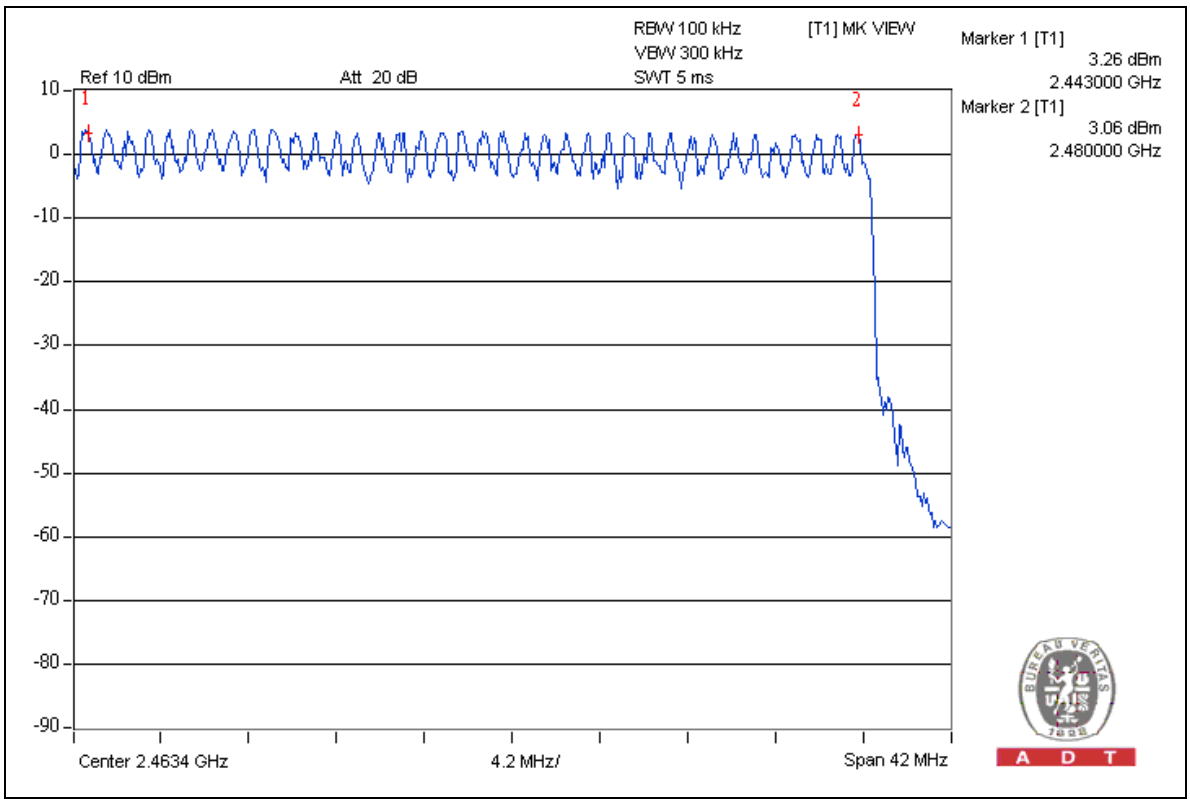
MODE A: FOR GFSK MODULATION





MODE A: FOR 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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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.

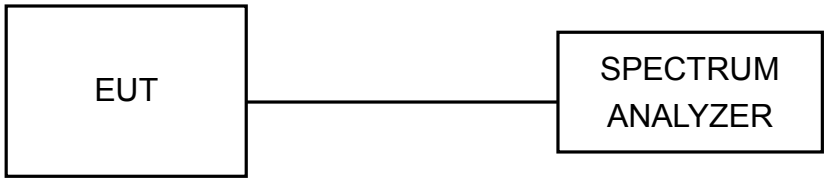
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

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



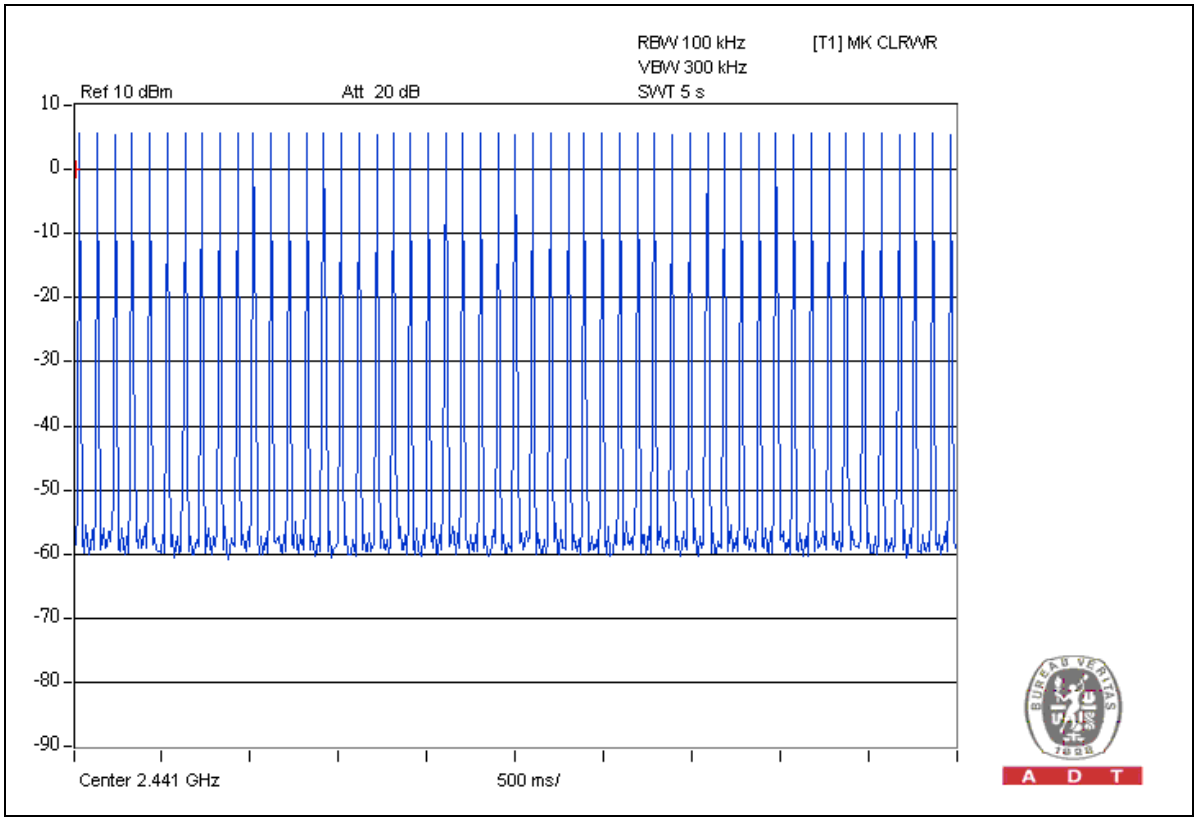
4.4.6 TEST RESULTS

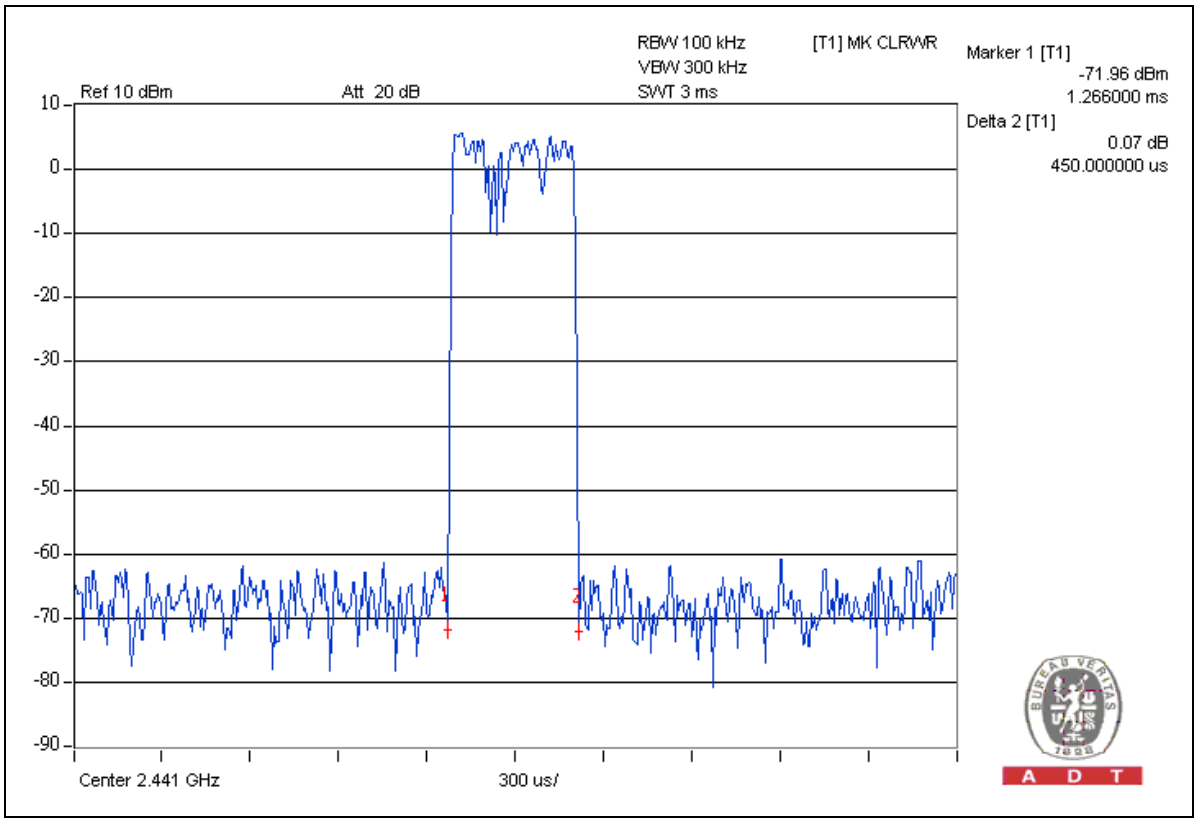
MODE A: FOR GFSK MODULATION

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	0.450	145.0440	400
DH3	25 (times / 5 sec) *6.32=158.00 times	1.728	273.0240	400
DH5	17 (times / 5 sec) *6.32=107.44 times	3.040	326.6176	400

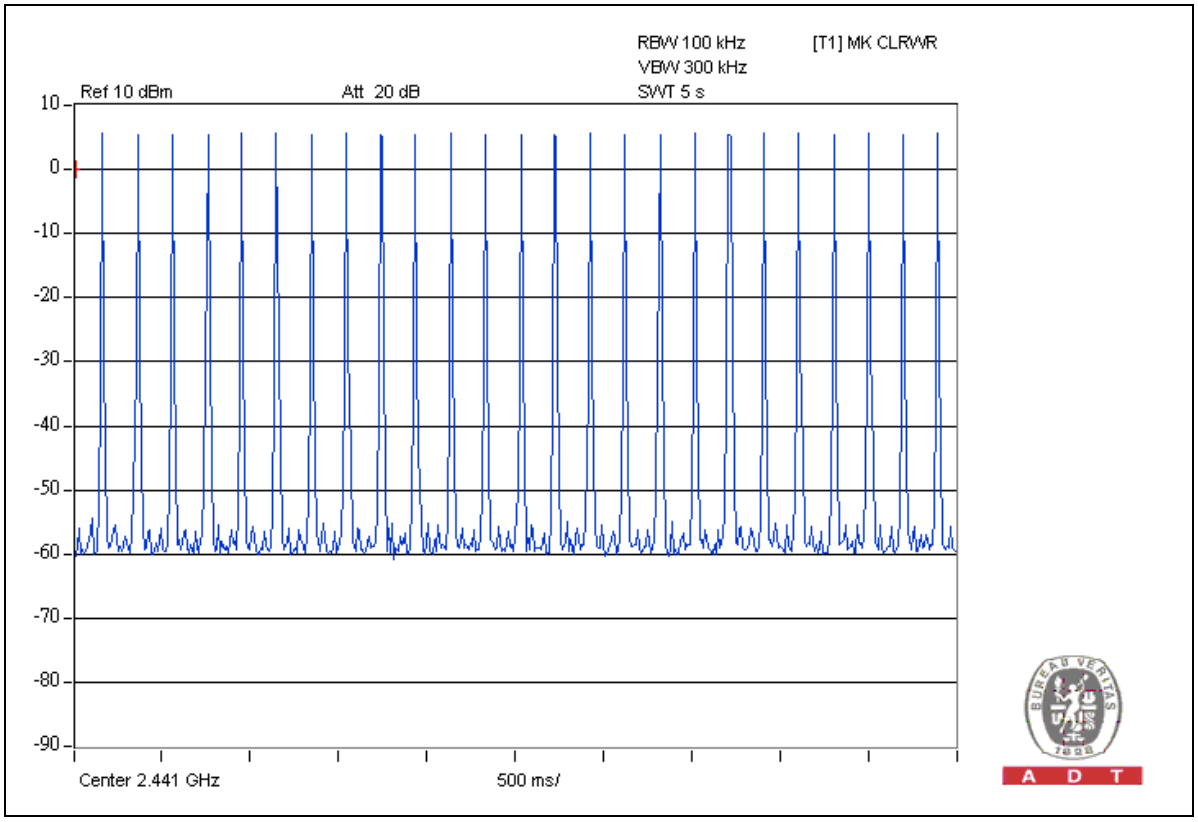
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

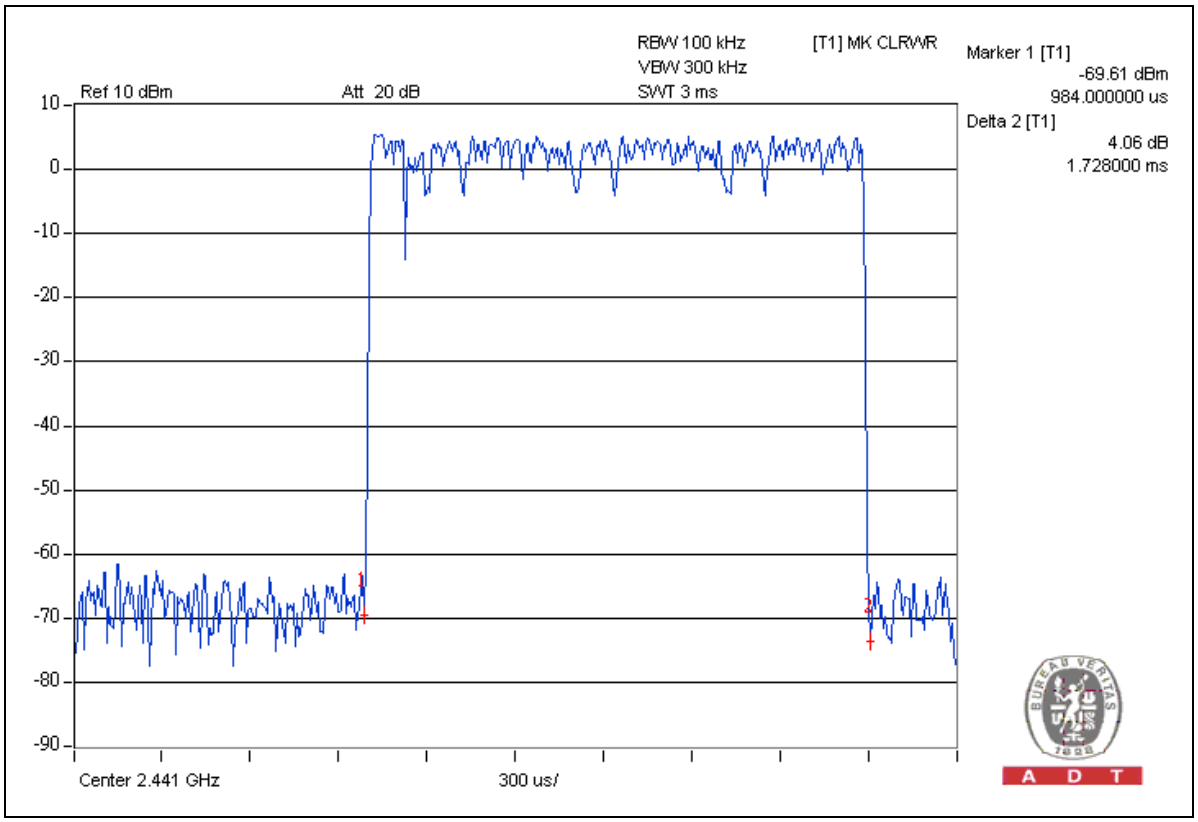
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/

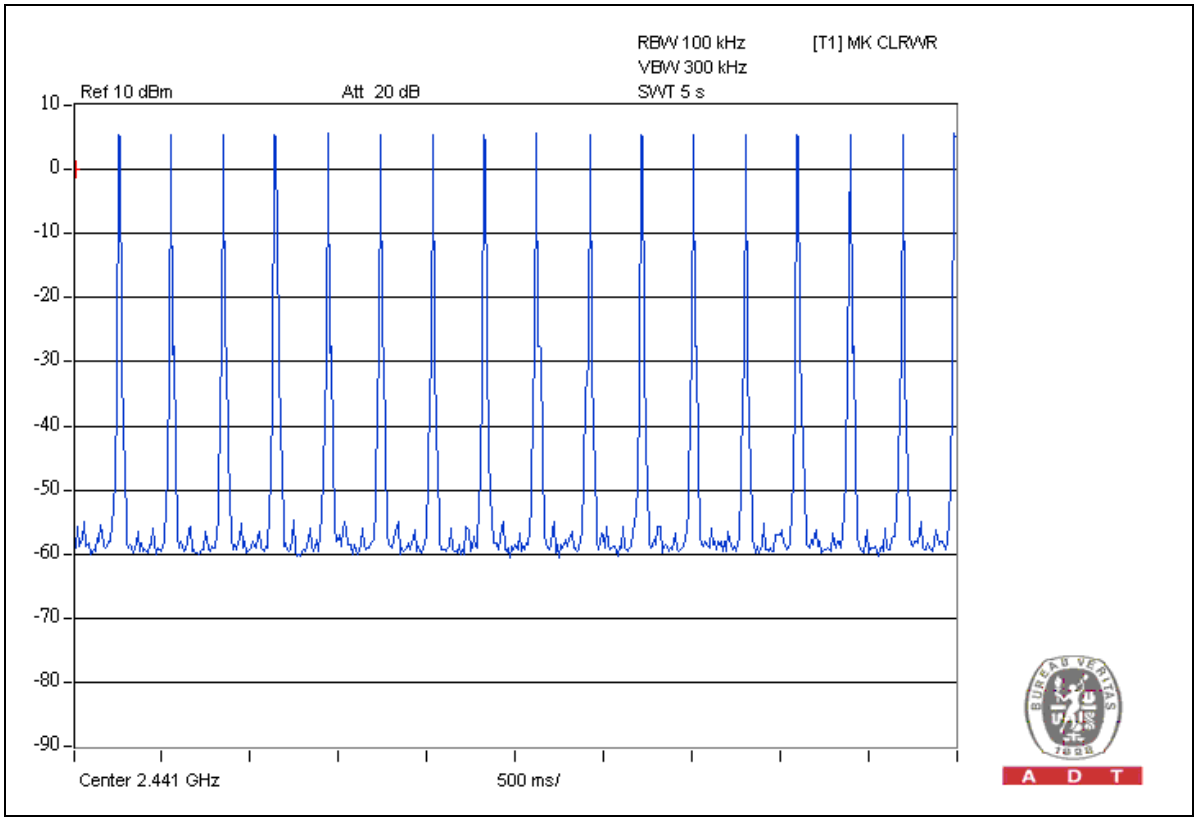

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-71.96 dBm
1.266000 ms
Delta 2 [T1]
0.07 dB
450.000000 us
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
300 us/

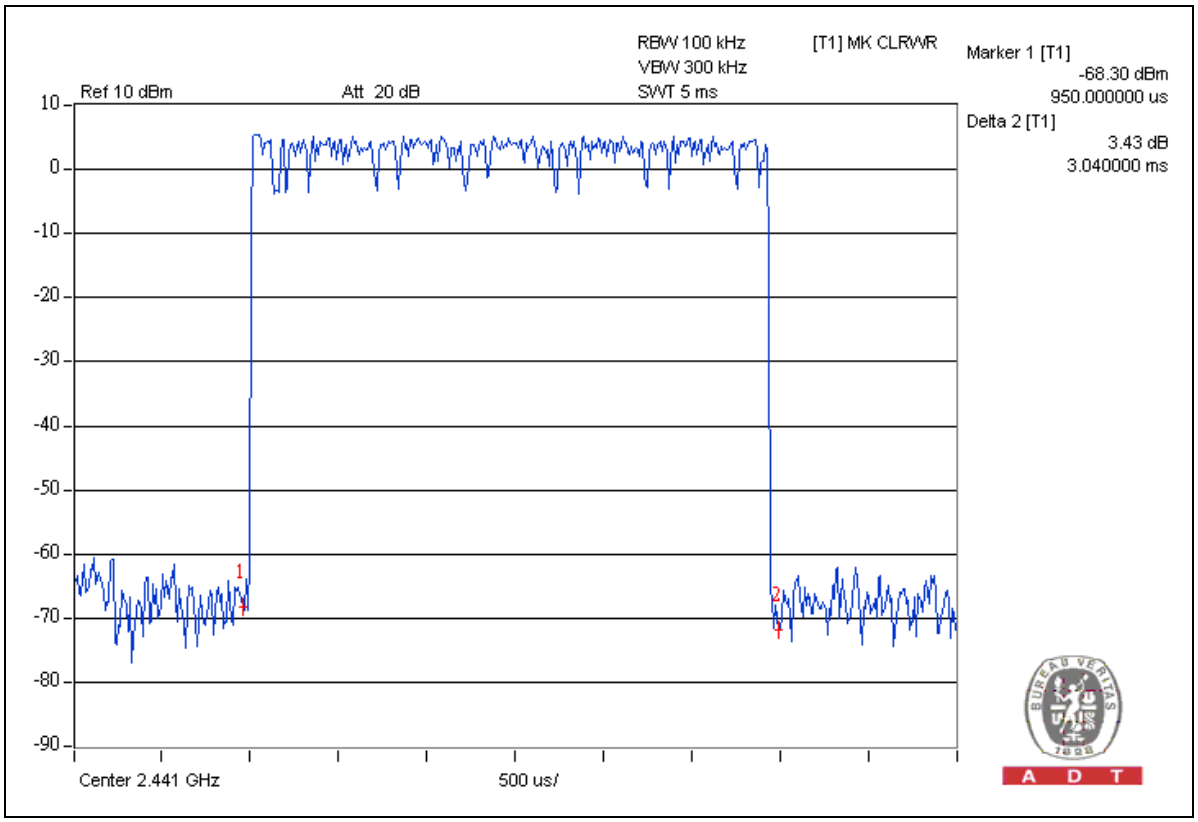
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-69.61 dBm
984.000000 us
Delta 2 [T1]
4.06 dB
1.728000 ms
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/

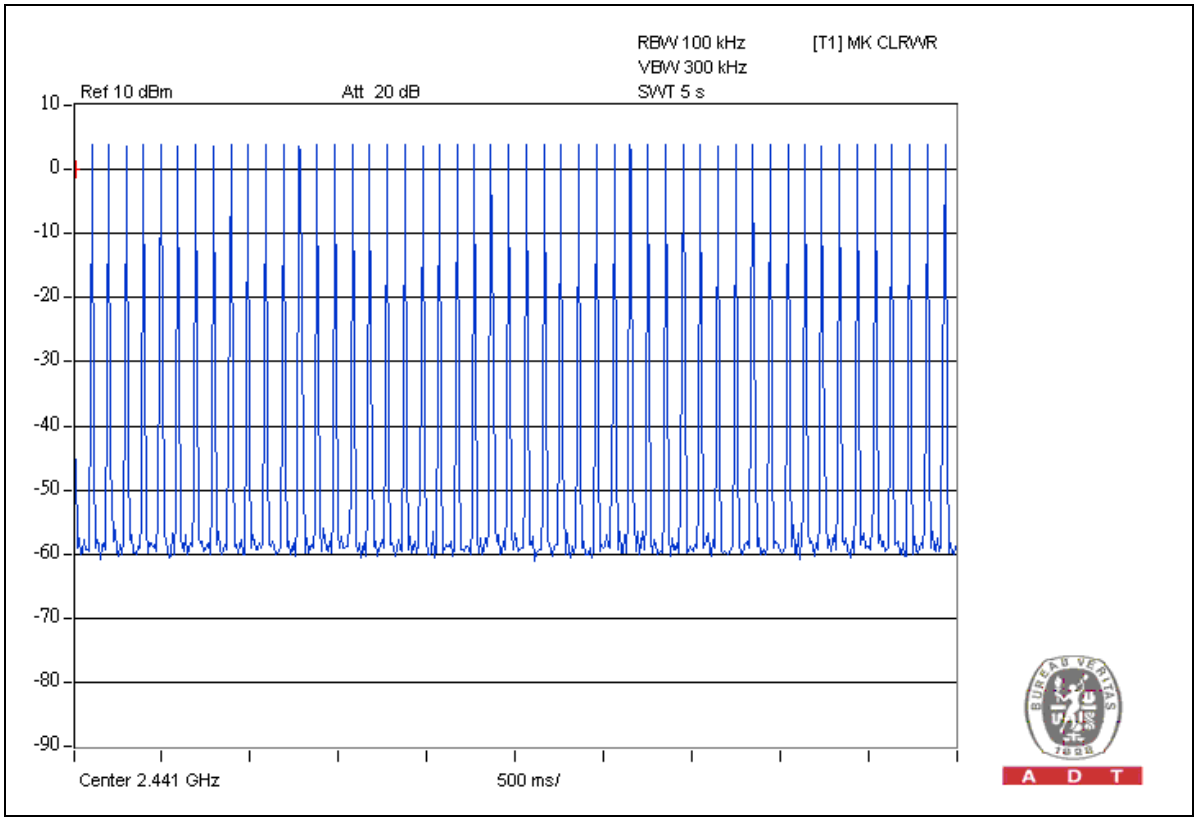

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-68.30 dBm
950.000000 us
Delta 2 [T1]
3.43 dB
3.040000 ms
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 us/

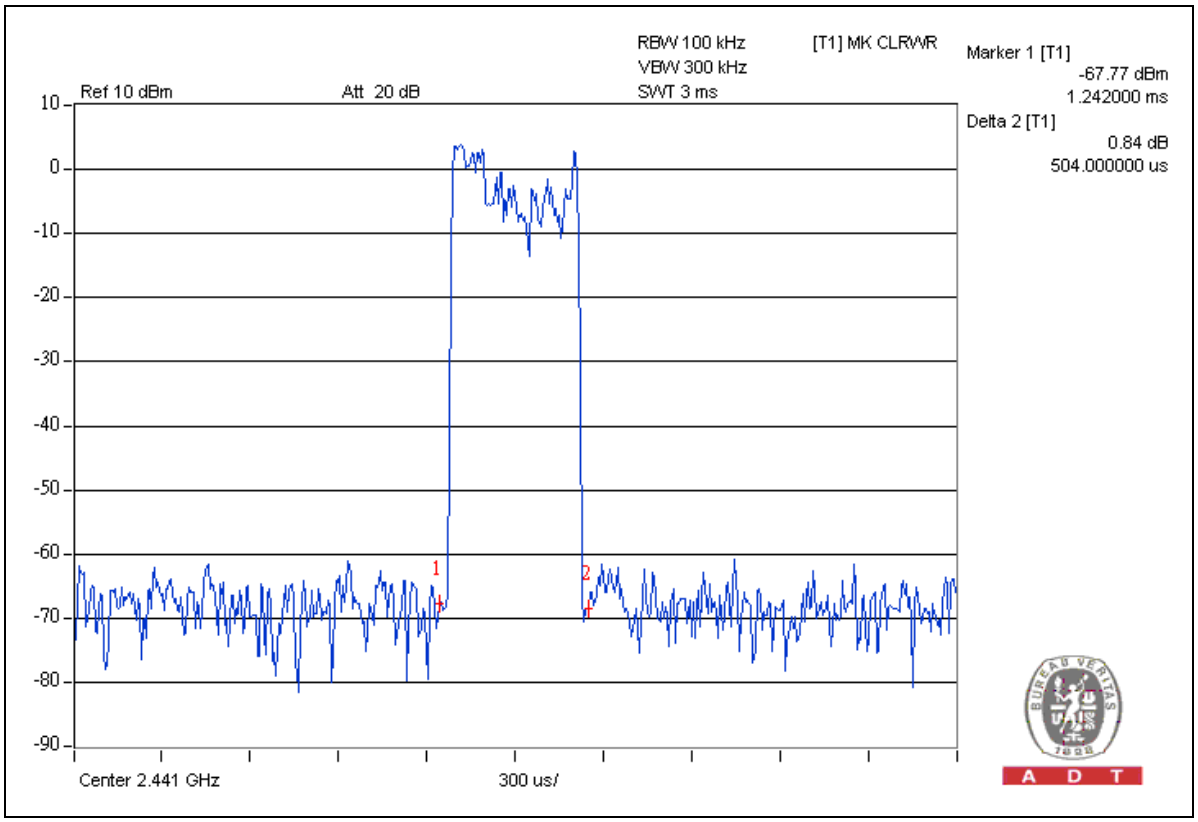
MODE A: FOR 8DPSK MODULATION

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	0.504	159.2640	400
DH3	25 (times / 5 sec) *6.32=158.00 times	1.728	273.0240	400
DH5	17 (times / 5 sec) *6.32=107.44 times	2.980	320.1712	400

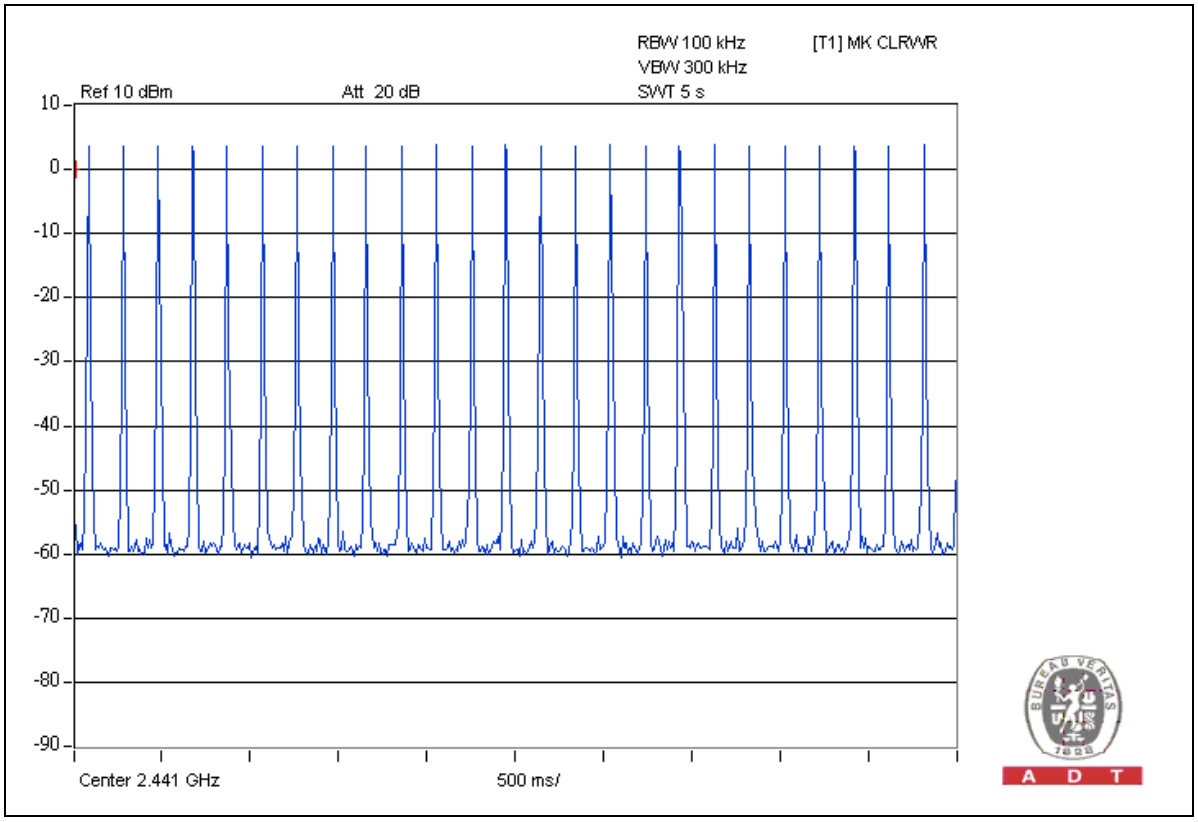
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

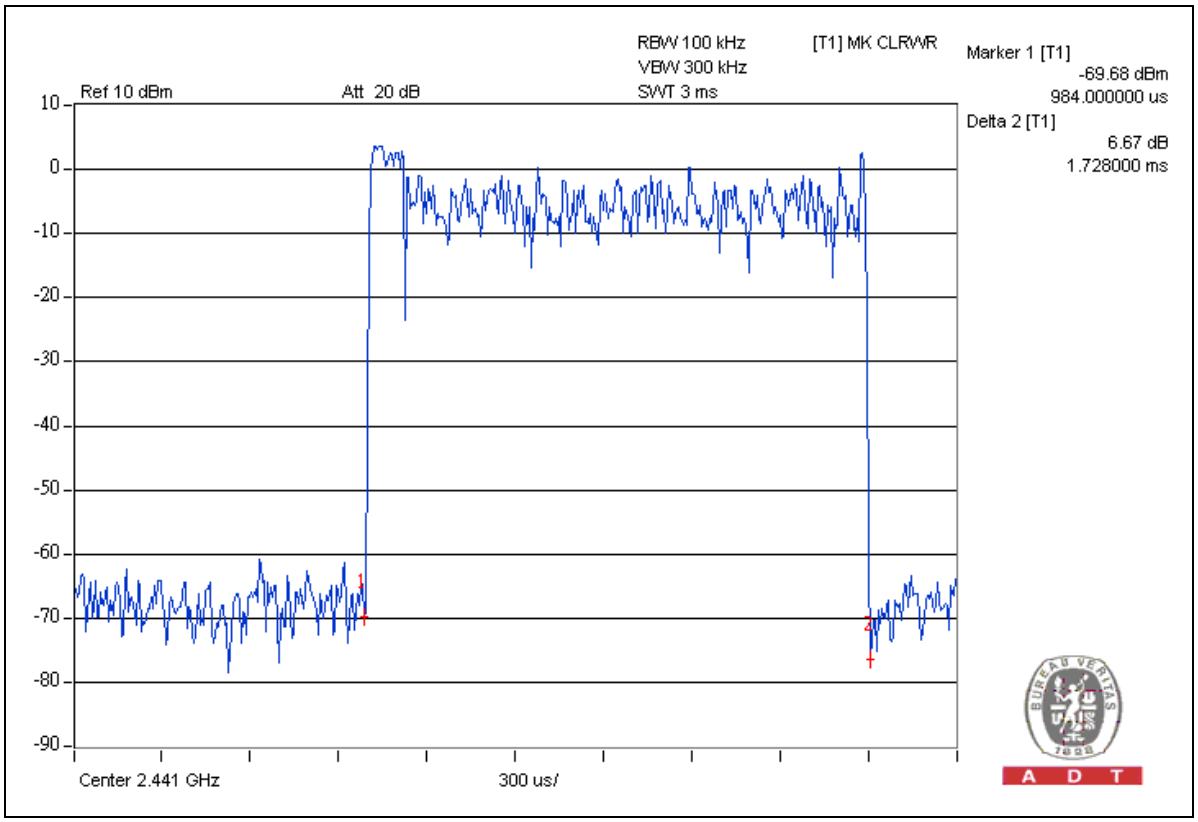
DH1


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/

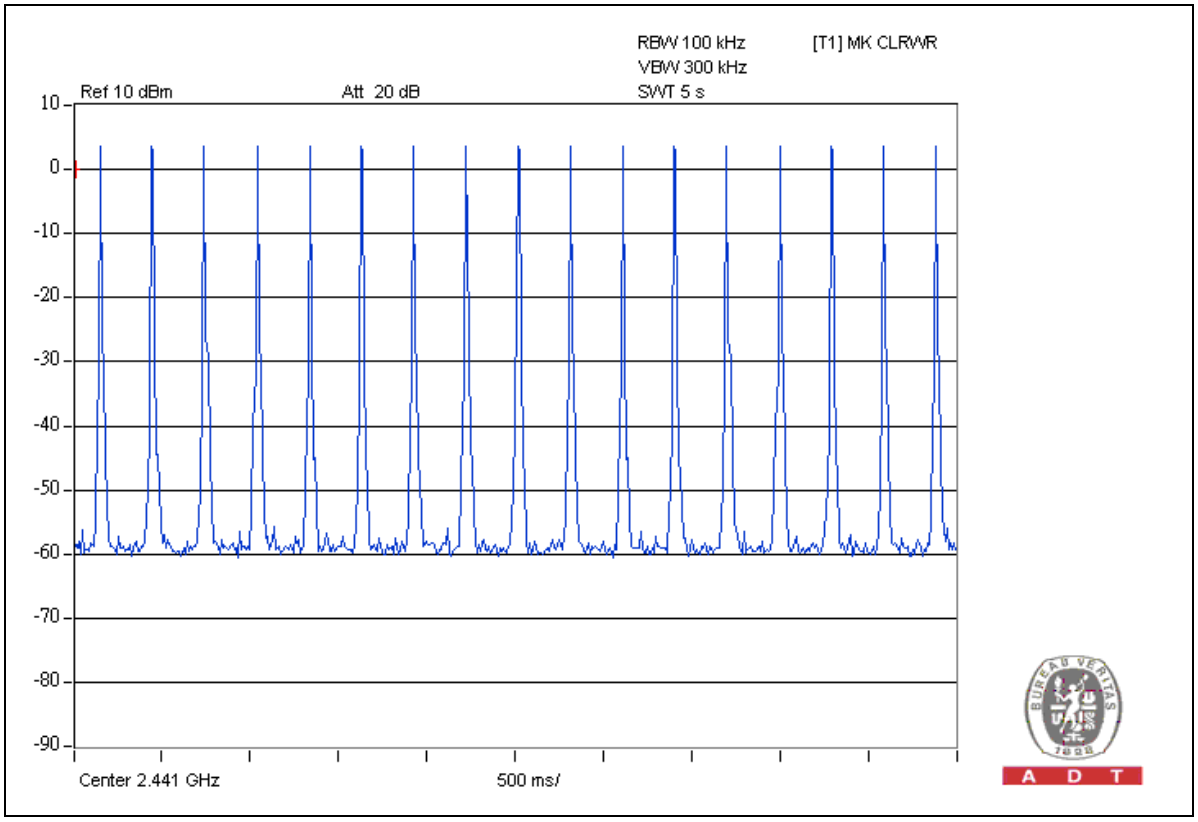

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-67.77 dBm
1.242000 ms
Delta 2 [T1]
0.84 dB
504.000000 us
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
300 us/

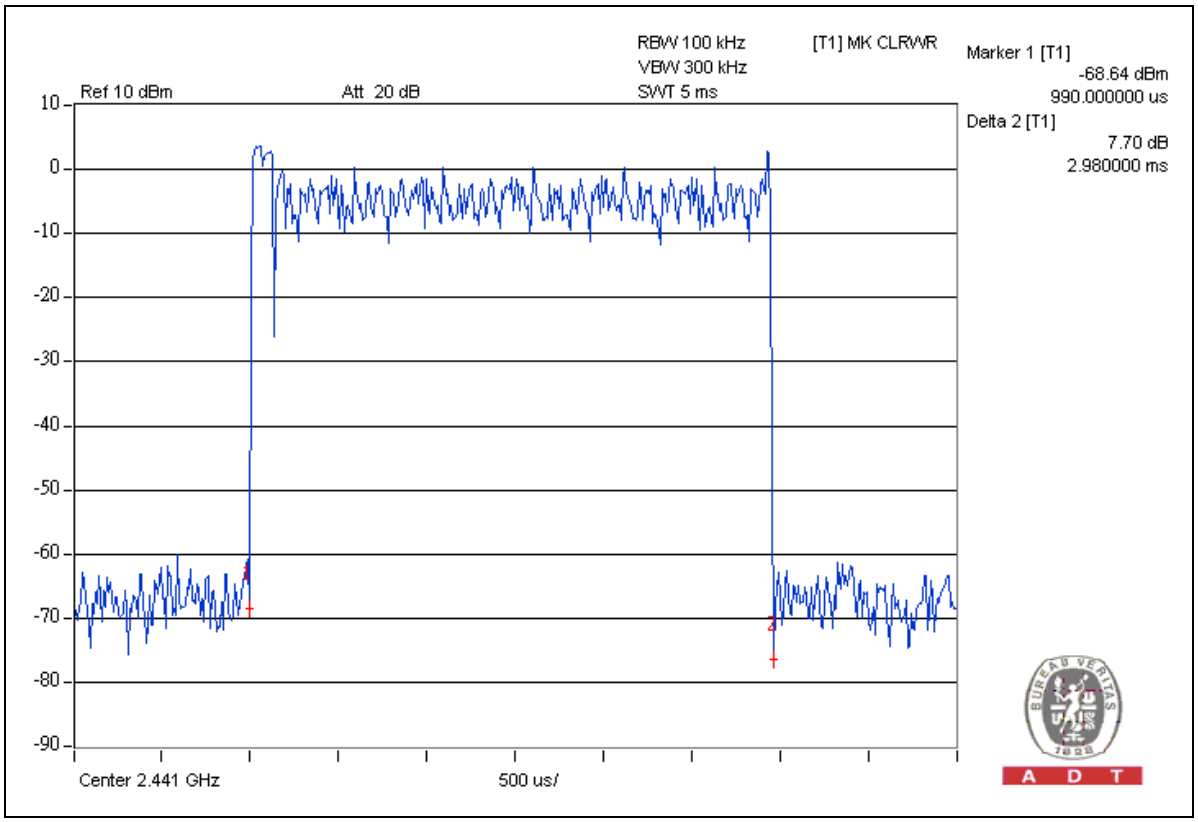
DH3


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-69.68 dBm
984.000000 us
Delta 2 [T1]
6.67 dB
1.728000 ms
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
300 us/

DH5


RBW 100 kHz
VBW 300 kHz
SWT 5 s
[T1] MK CLRWR
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 ms/
A D T


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-68.64 dBm
990.000000 us
Delta 2 [T1]
7.70 dB
2.980000 ms
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
500 us/
A D T

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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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.

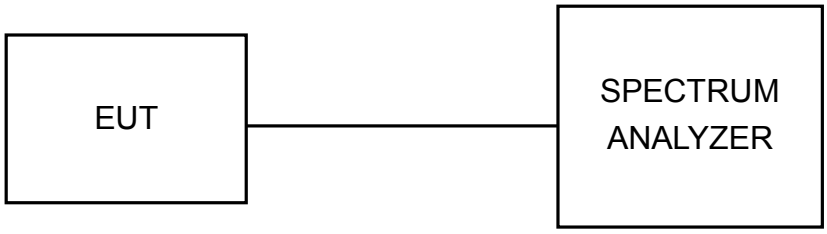
c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



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.

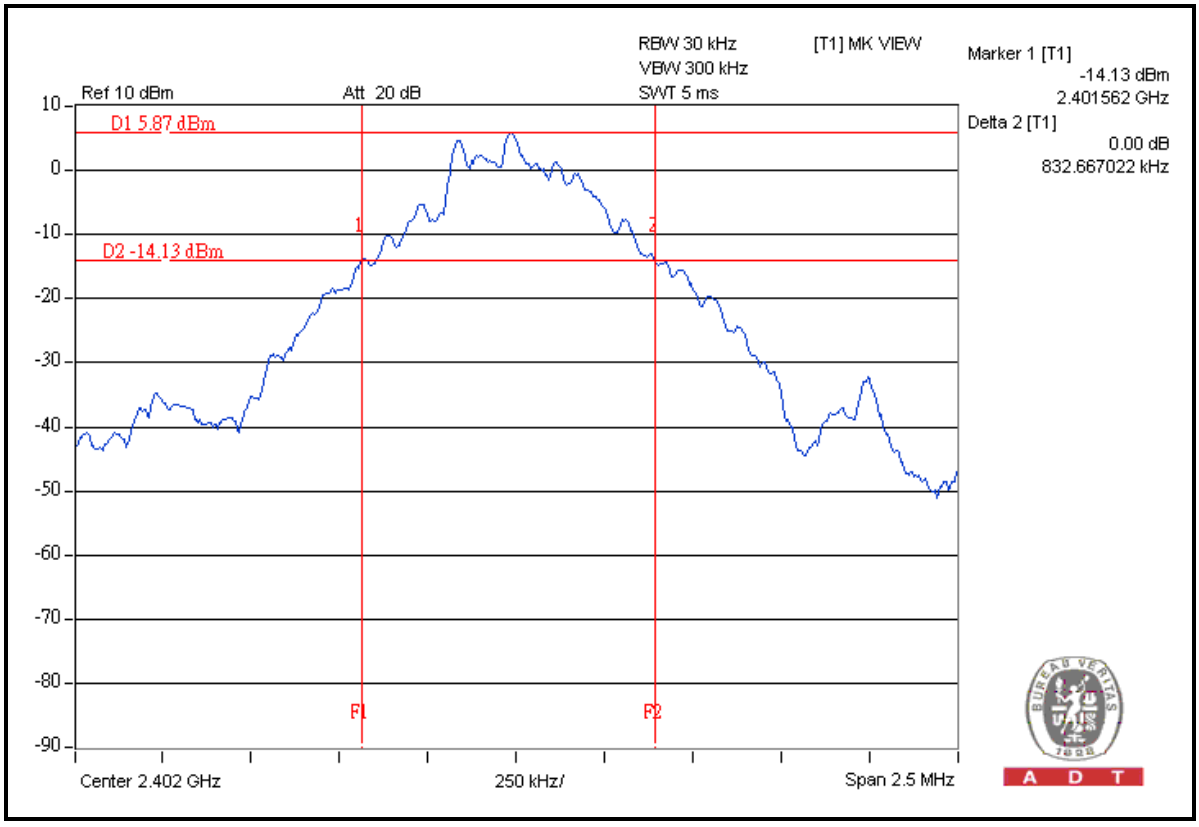
4.5.7 TEST RESULTS

FOR GFSK MODULATION

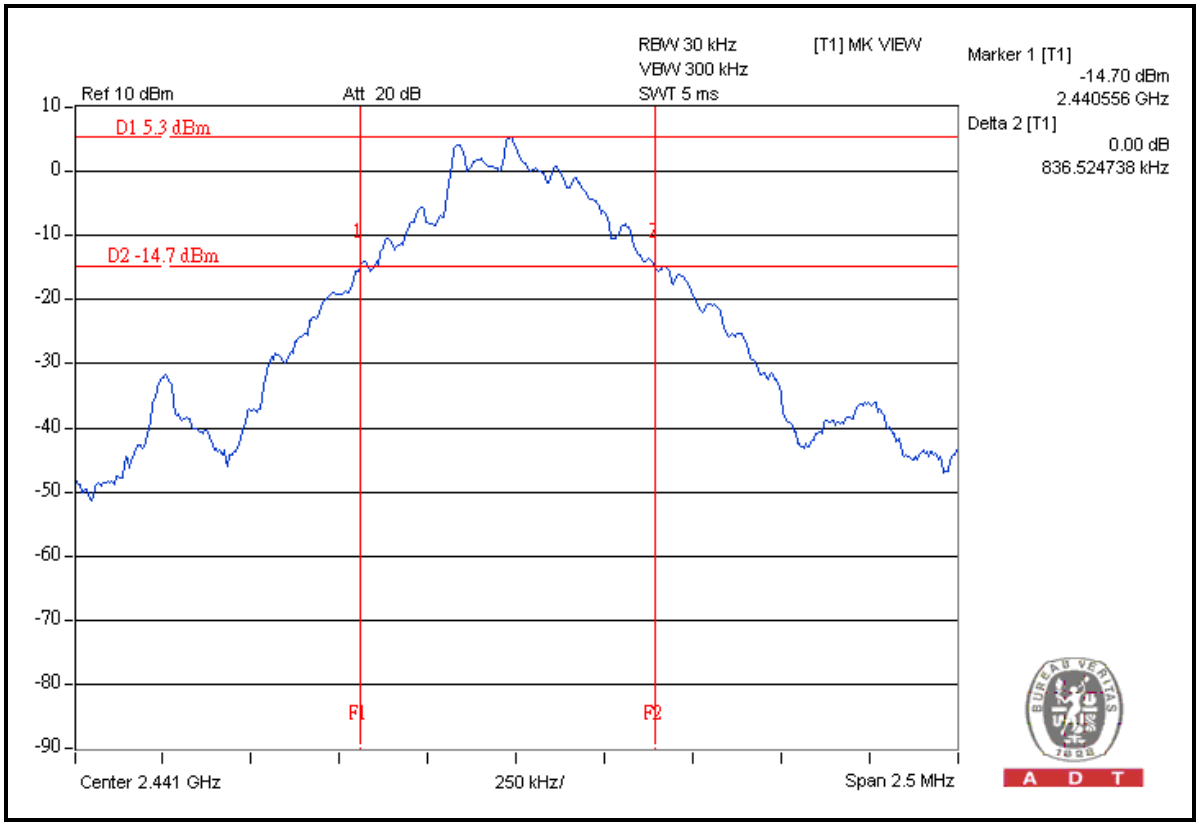
TEST MODE	A		
MODULATION TYPE	GFSK	CHANNEL	0, 39, 78
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.833
39	2441	0.837
78	2480	0.836

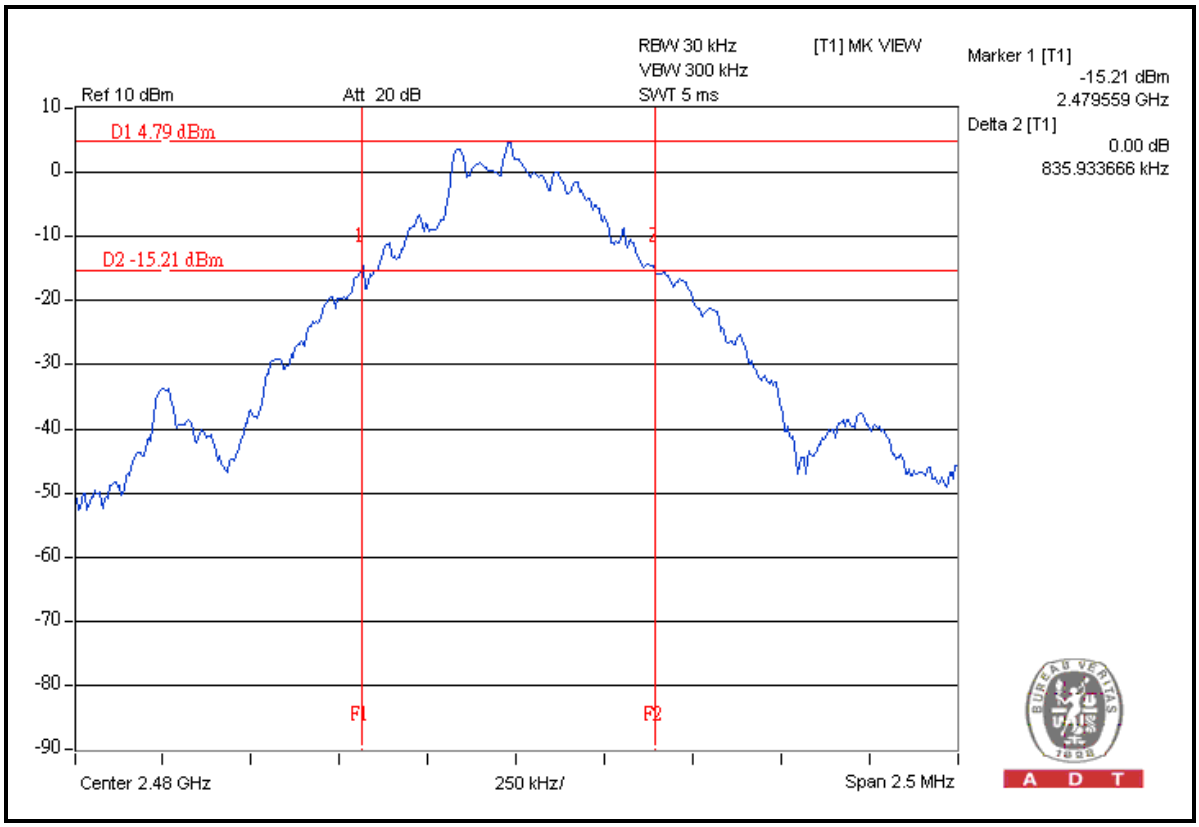
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-14.70 dBm
2.440556 GHz
Delta 2 [T1]
0.00 dB
836.524738 kHz
Ref 10 dBm
Att 20 dB
D1 5.3 dBm
D2 -14.7 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

CH 78

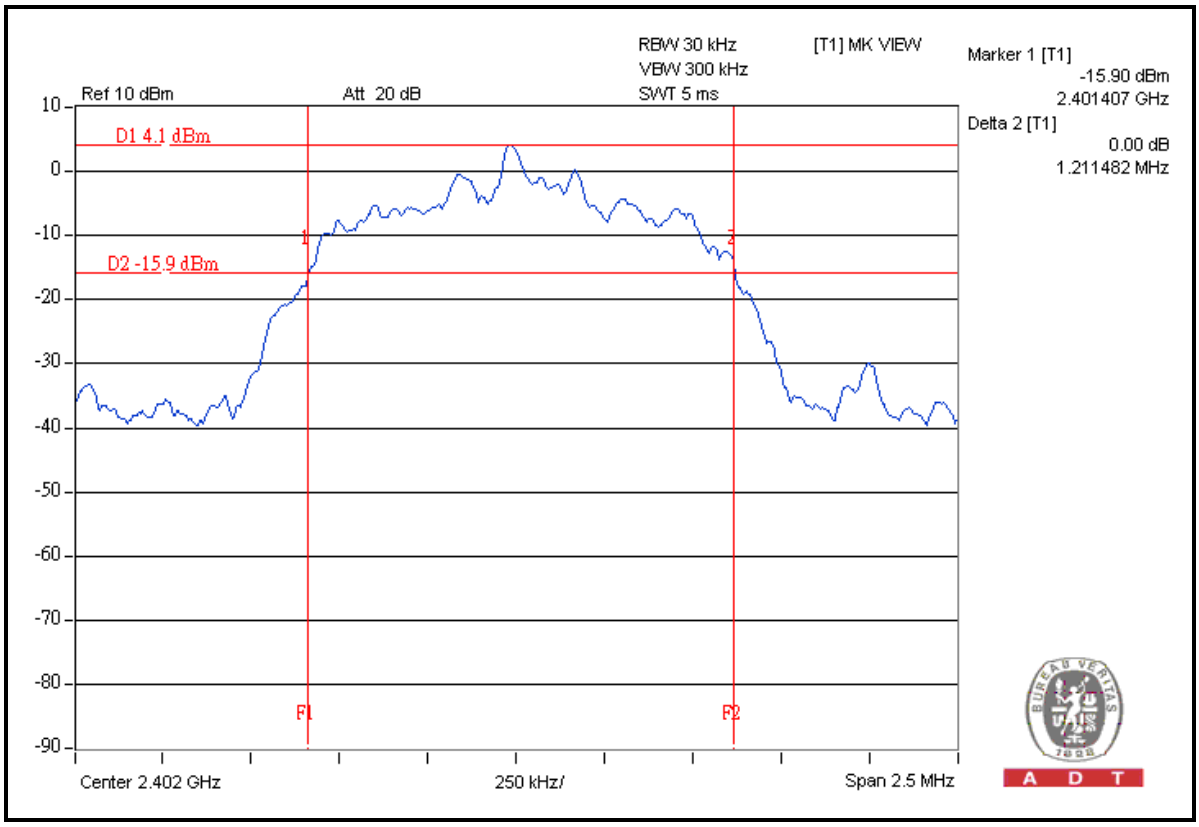

RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-15.21 dBm
2.479559 GHz
Delta 2 [T1]
0.00 dB
835.933666 kHz
Ref 10 dBm
Att 20 dB
D1 4.79 dBm
D2 -15.21 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

FOR 8DPSK MODULATION

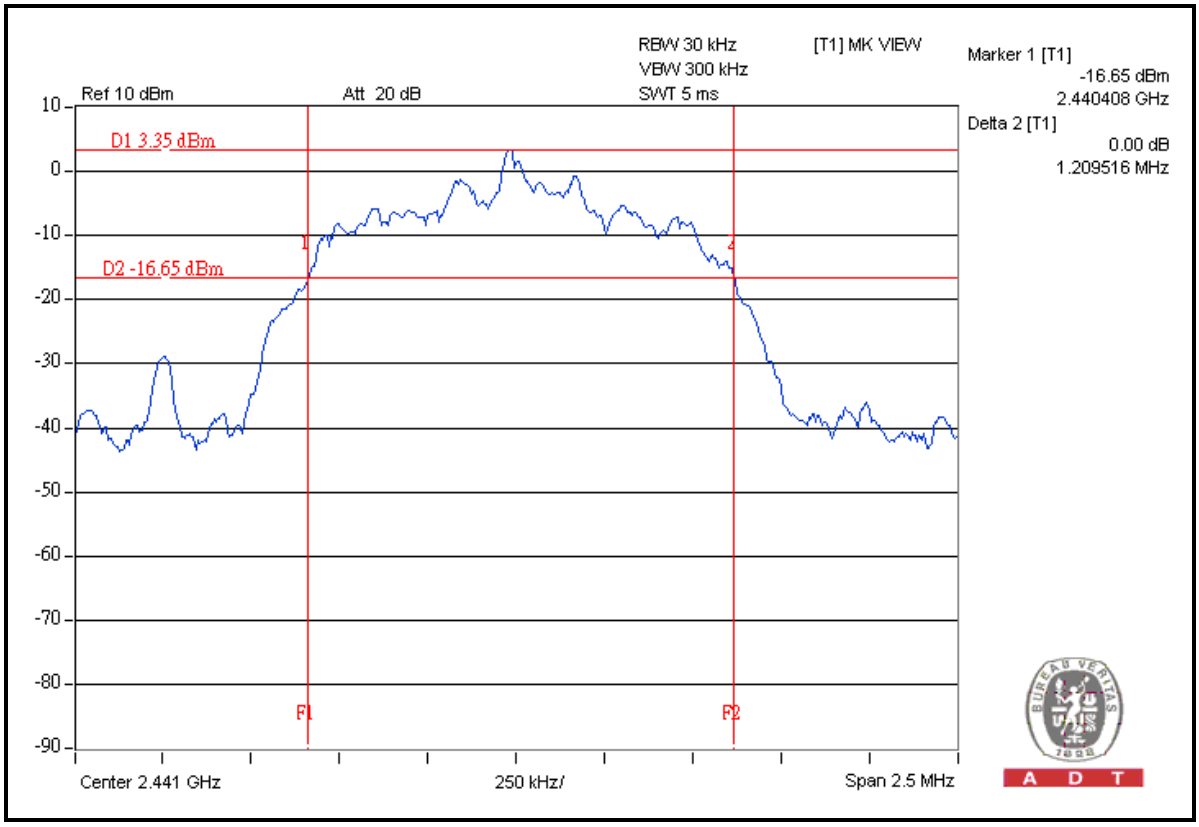
TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	0, 39, 78
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.211
39	2441	1.210
78	2480	1.211

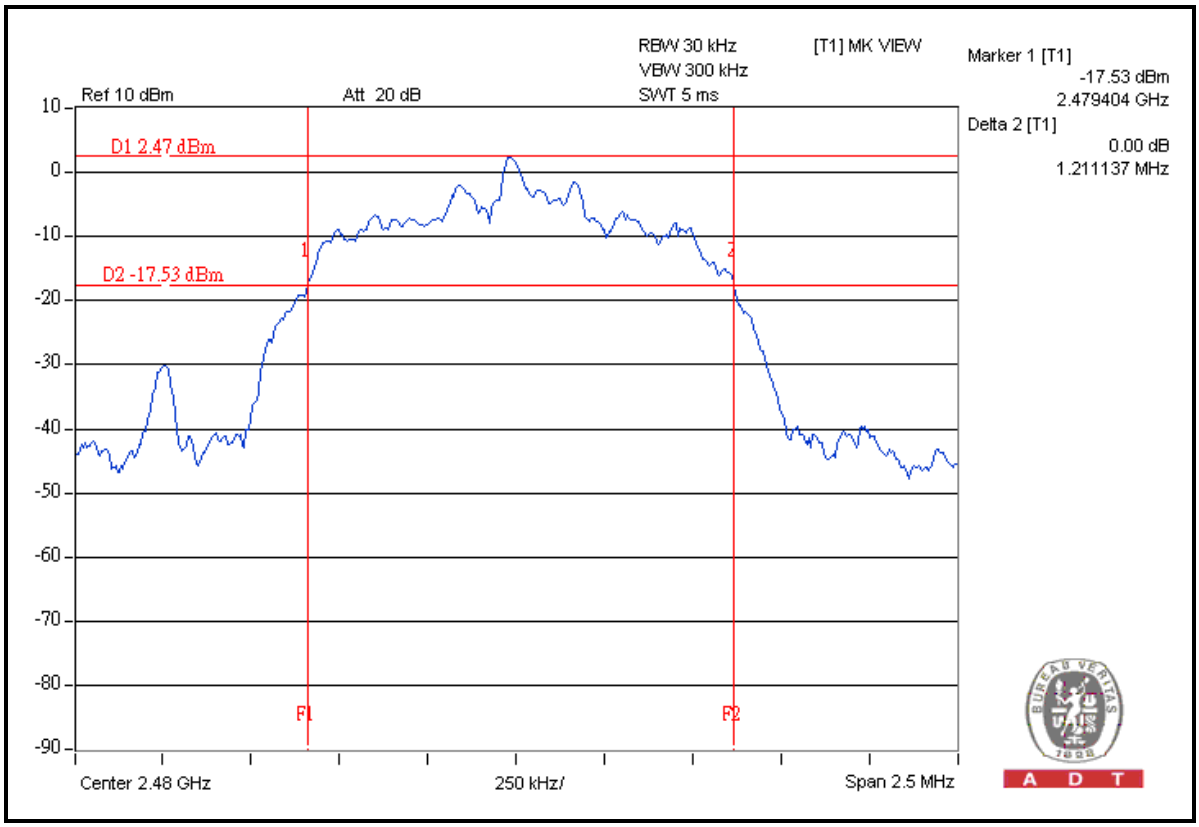
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-16.65 dBm
2.440408 GHz
Delta 2 [T1]
0.00 dB
1.209516 MHz
Ref 10 dBm
Att 20 dB
D1 3.35 dBm
D2 -16.65 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz
A D T

CH 78


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-17.53 dBm
2.479404 GHz
Delta 2 [T1]
0.00 dB
1.211137 MHz
Ref 10 dBm
Att 20 dB
D1 2.47 dBm
D2 -17.53 dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz
A D T

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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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

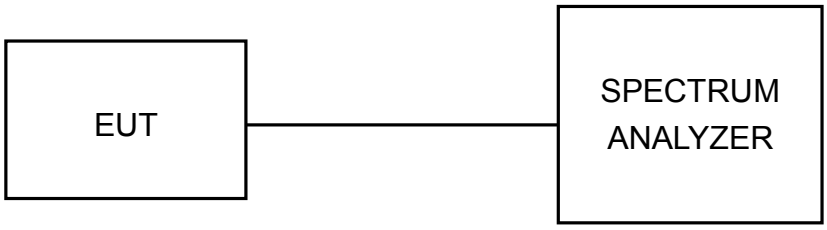
4.6.3 TEST PROCEDURES

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



4.6.6 TEST RESULTS

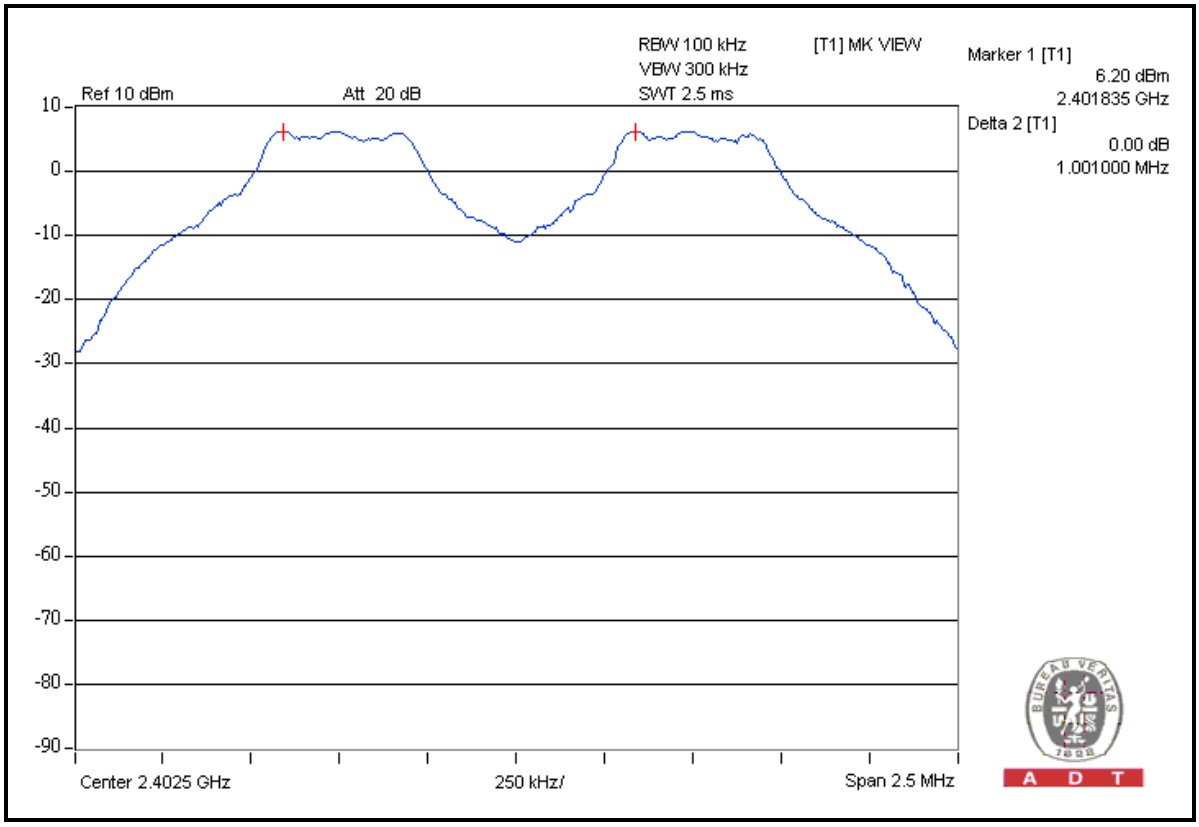
FOR GFSK MODULATION

TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	0, 39, 78
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

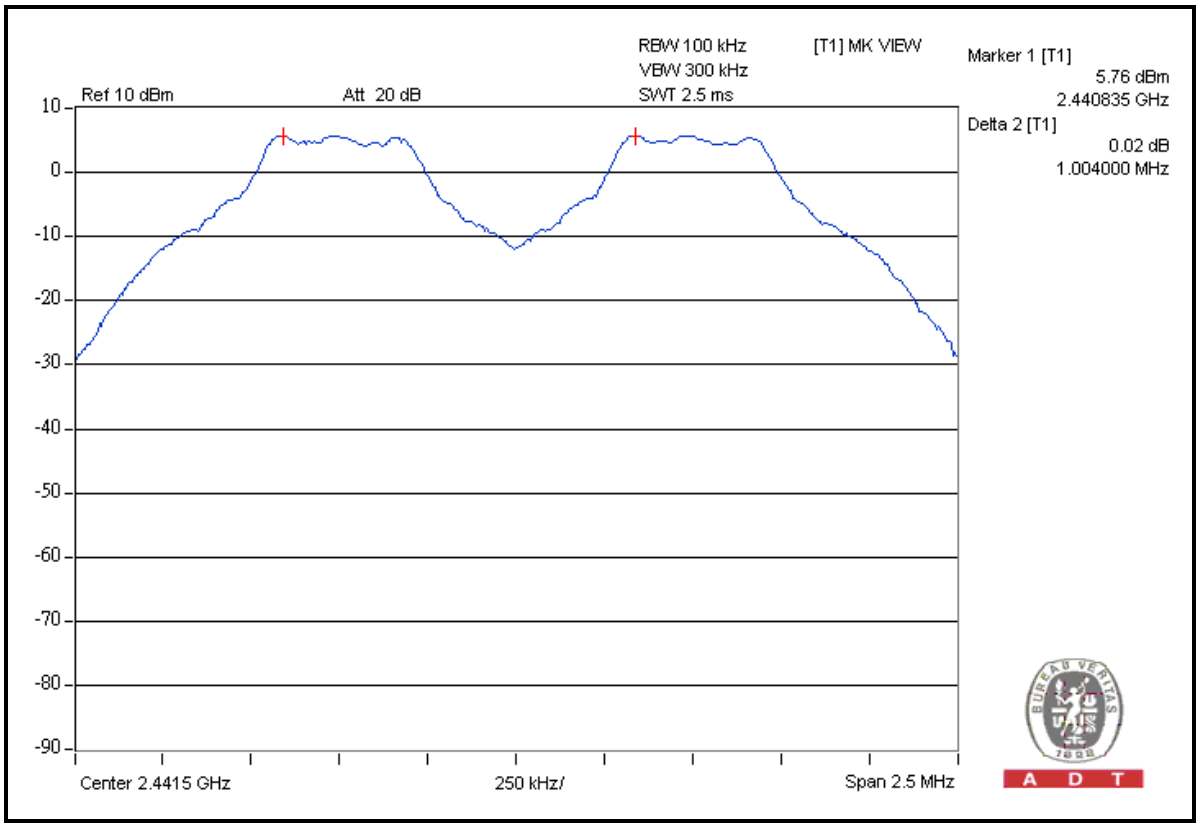
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.001	0.833	0.555	PASS
39	2441	1.004	0.837	0.558	PASS
78	2480	1.003	0.836	0.557	PASS

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to following three plots.

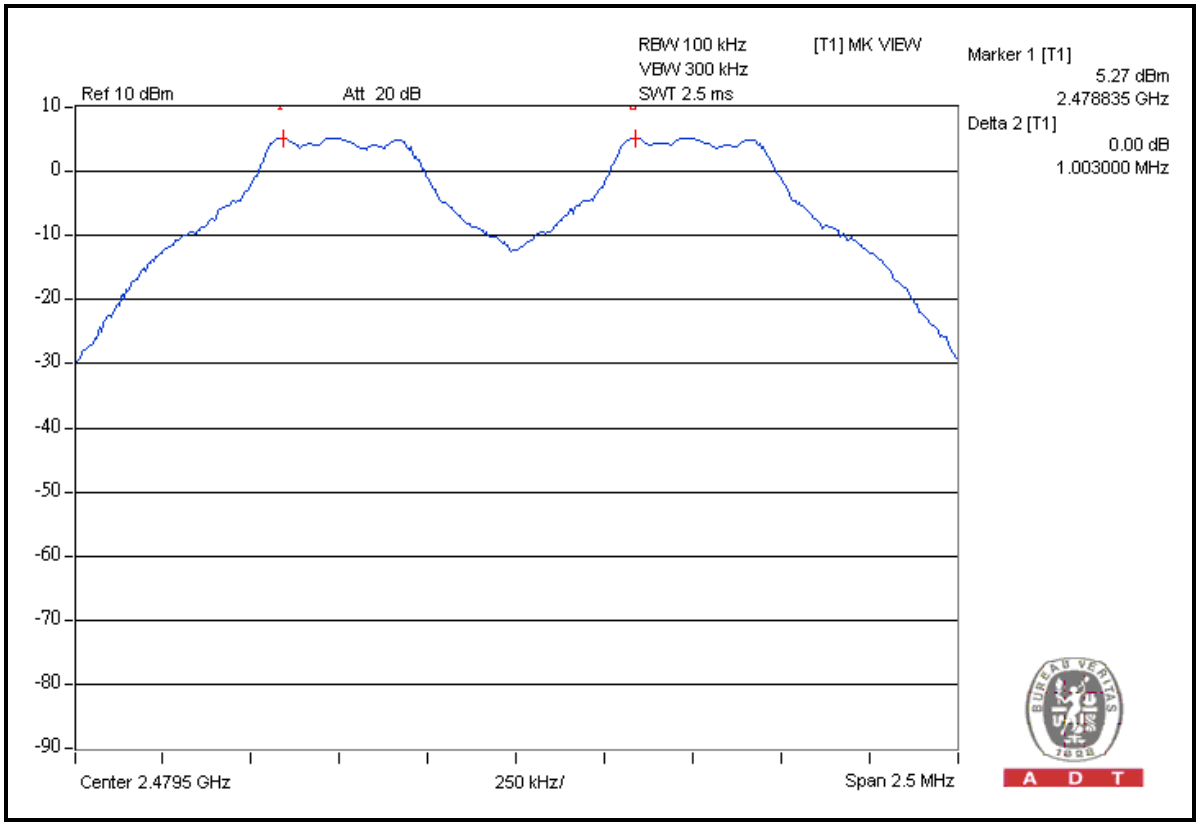
CH 0


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
6.20 dBm
2.401835 GHz
Delta 2 [T1]
0.00 dB
1.001000 MHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.4025 GHz
250 kHz/
Span 2.5 MHz

CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
5.76 dBm
2.440835 GHz
Delta 2 [T1]
0.02 dB
1.004000 MHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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
Marker 1 [T1]
5.27 dBm
2.478835 GHz
Delta 2 [T1]
0.00 dB
1.003000 MHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz
A D T

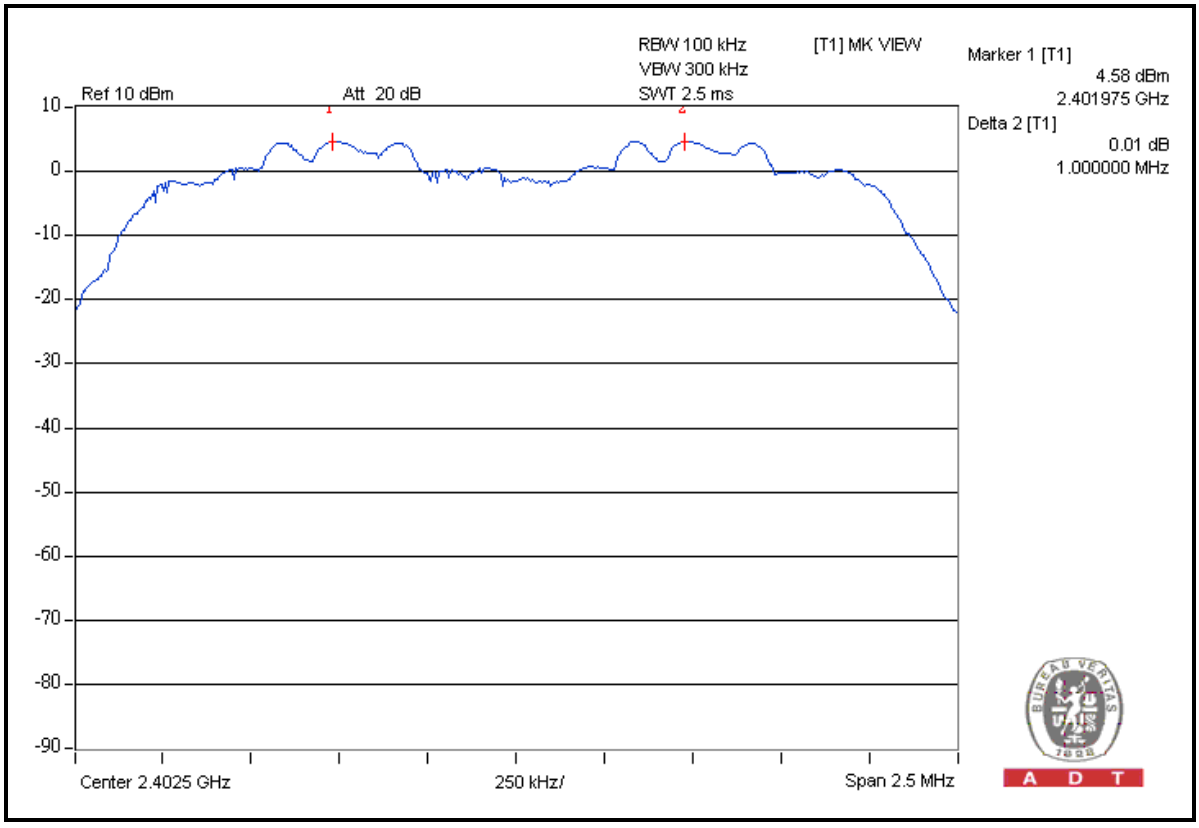
FOR 8DPSK MODULATION

TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	0, 39, 78
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

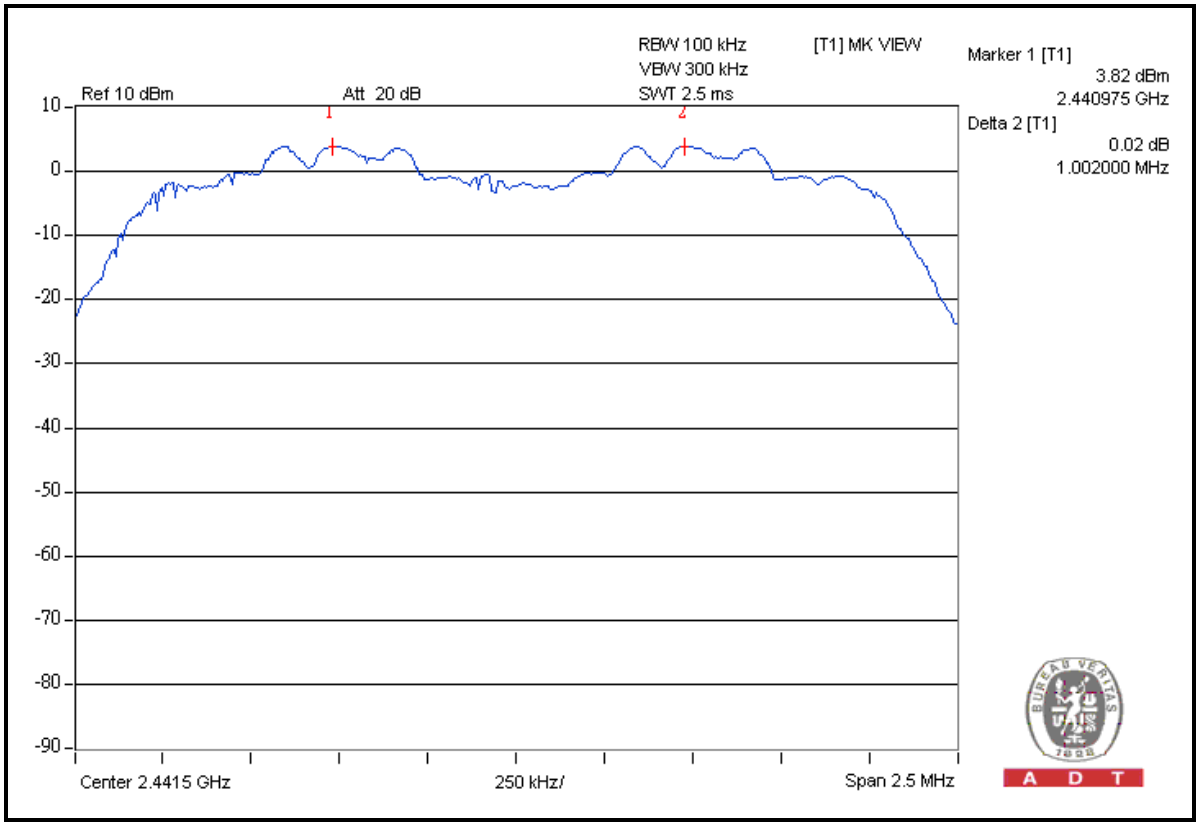
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	1.211	0.807	PASS
39	2441	1.002	1.210	0.807	PASS
78	2480	1.007	1.211	0.807	PASS

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to following three plots.

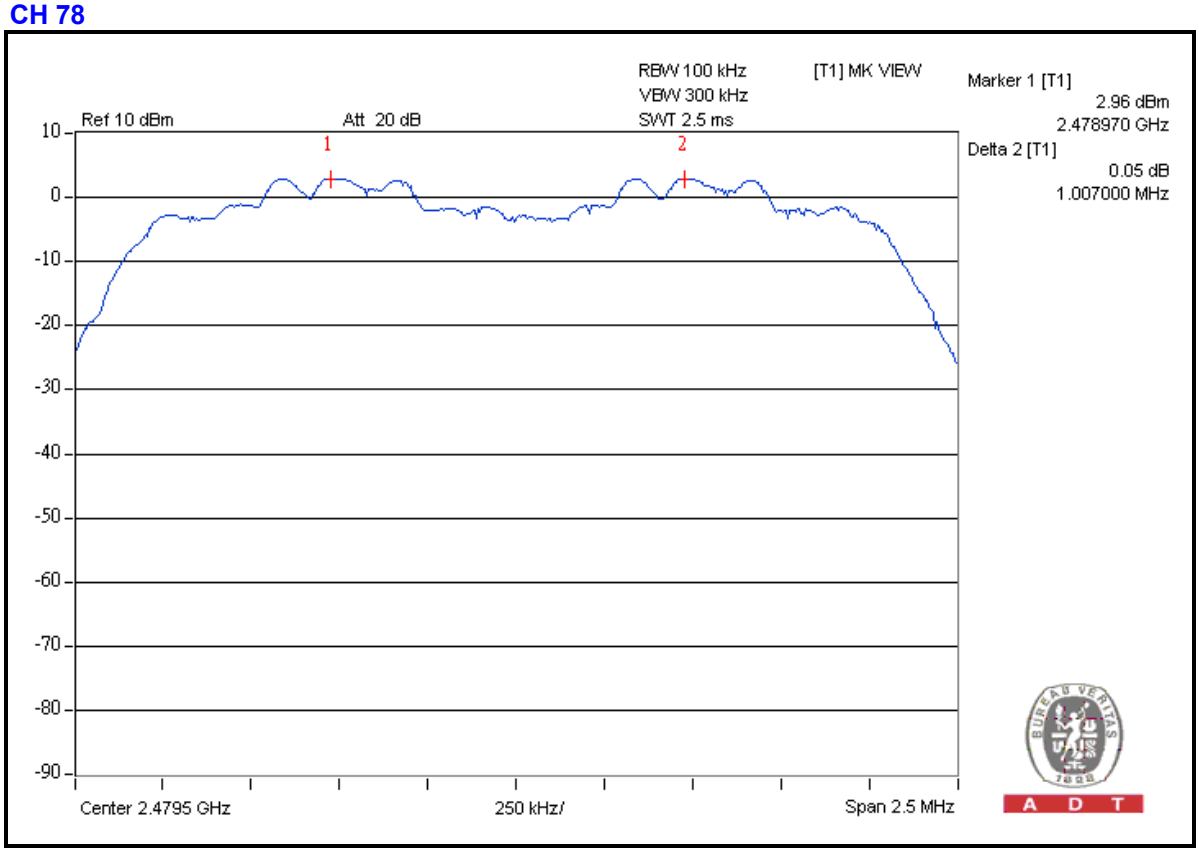
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
3.82 dBm
2.440975 GHz
Delta 2 [T1]
0.02 dB
1.002000 MHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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
Marker 1 [T1]
2.96 dBm
2.478970 GHz
Delta 2 [T1]
0.05 dB
1.007000 MHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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.

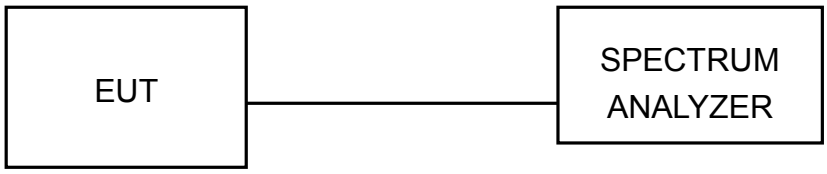
d. Measure the captured power within the band and recording the plot.

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



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

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.

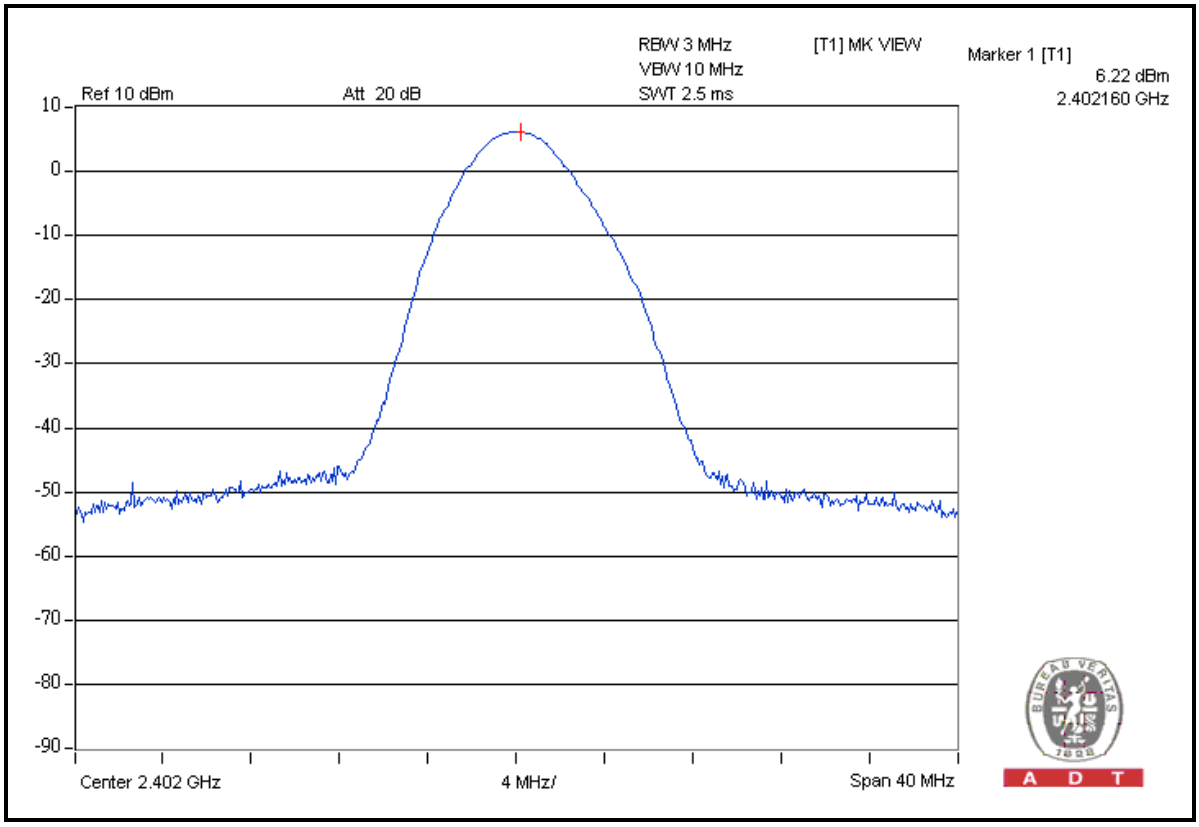
4.7.7 TEST RESULTS

FOR GFSK MODULATION

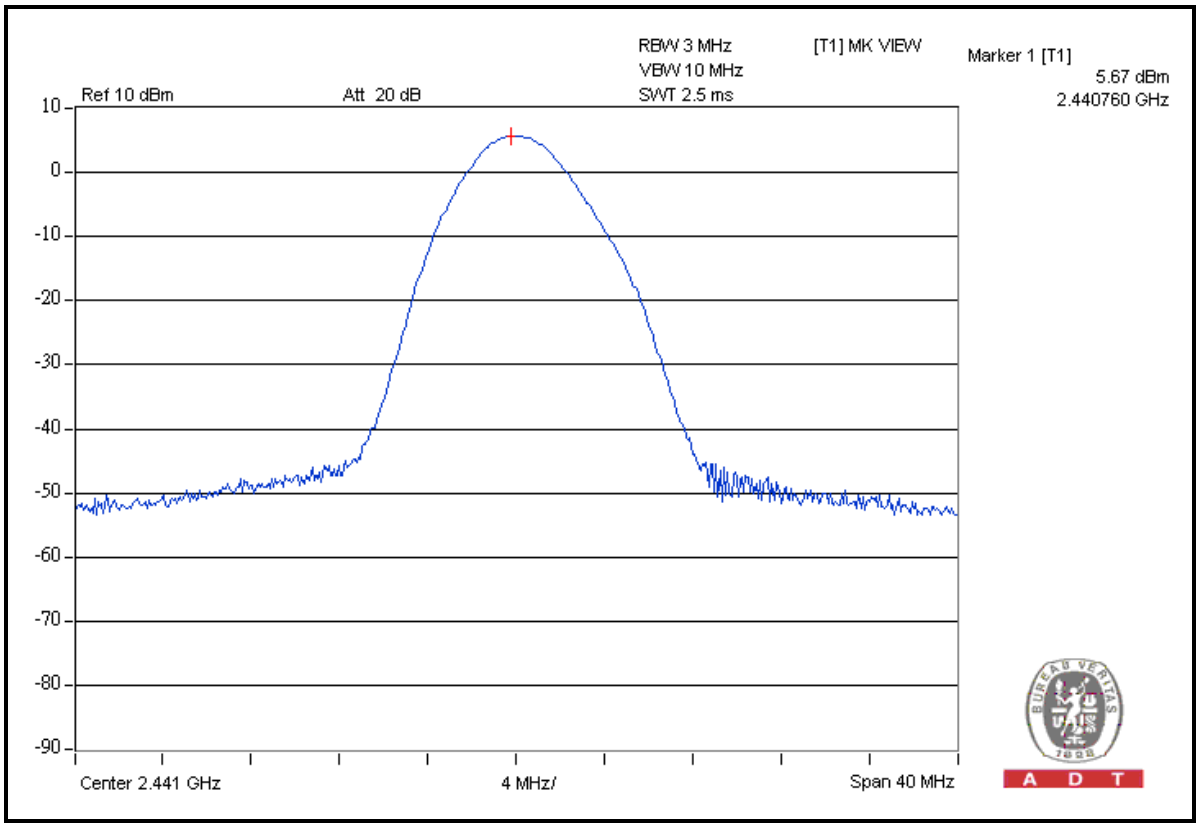
TEST MODE	A		
MODULATION TYPE	GFSK	**CHANNEL**	0, 39, 78
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	4.188	6.22	125	PASS
39	2441	3.690	5.67	125	PASS
78	2480	3.296	5.18	125	PASS

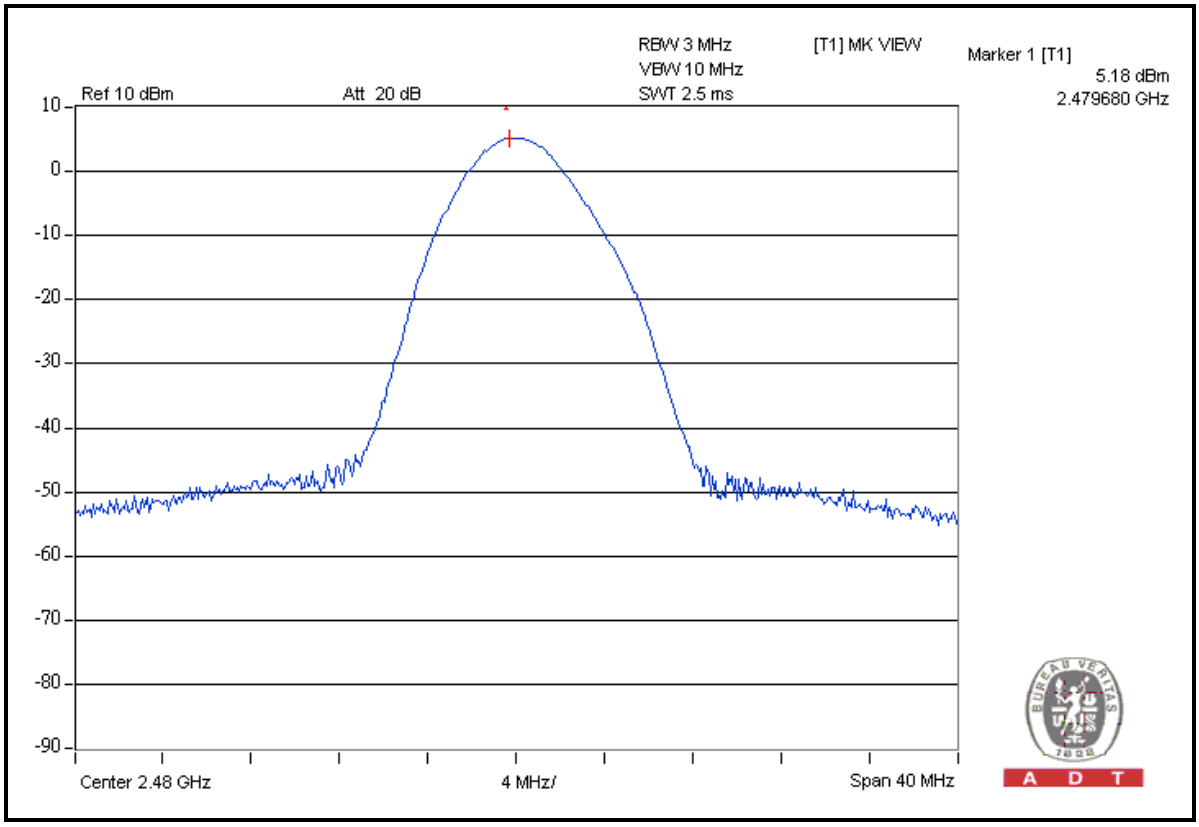
CH 0


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
6.22 dBm
2.402160 GHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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]
5.67 dBm
2.440760 GHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH 78

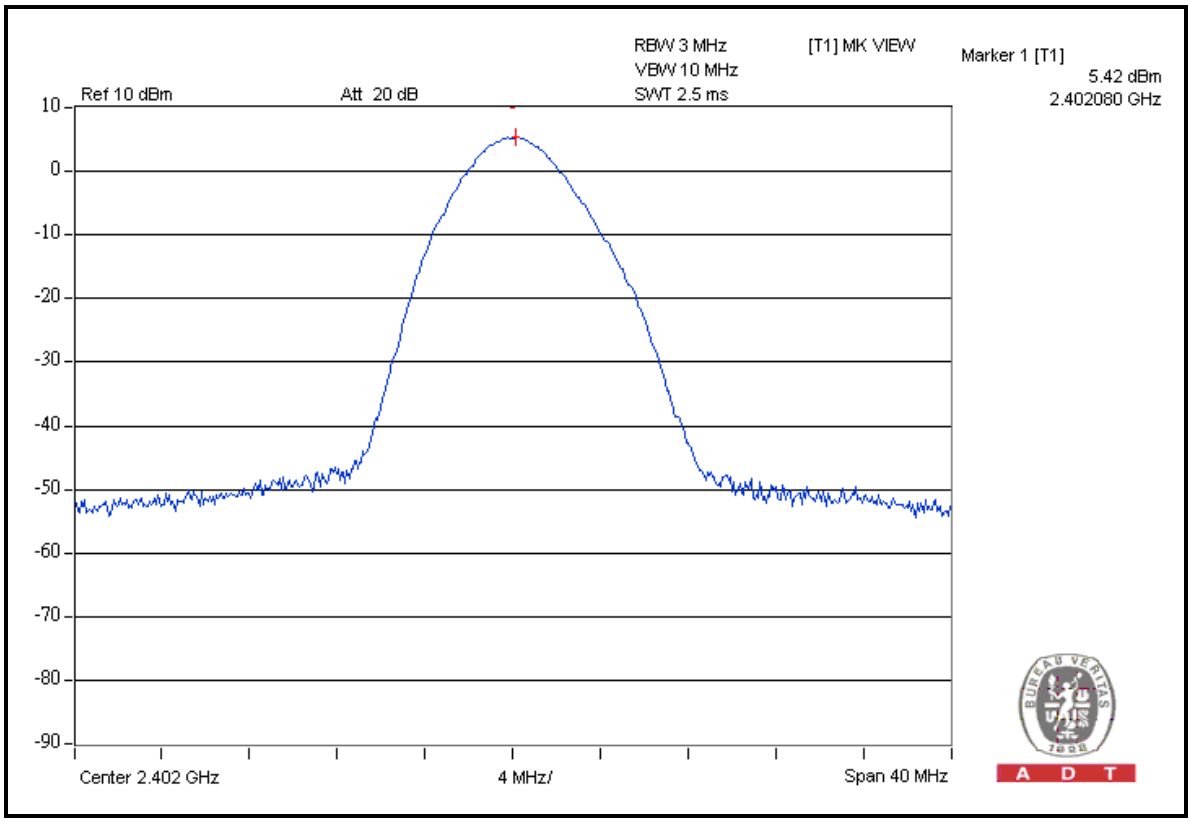

RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
5.18 dBm
2.479680 GHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.48 GHz
4 MHz/
Span 40 MHz
A D T

FOR 8DPSK MODULATION

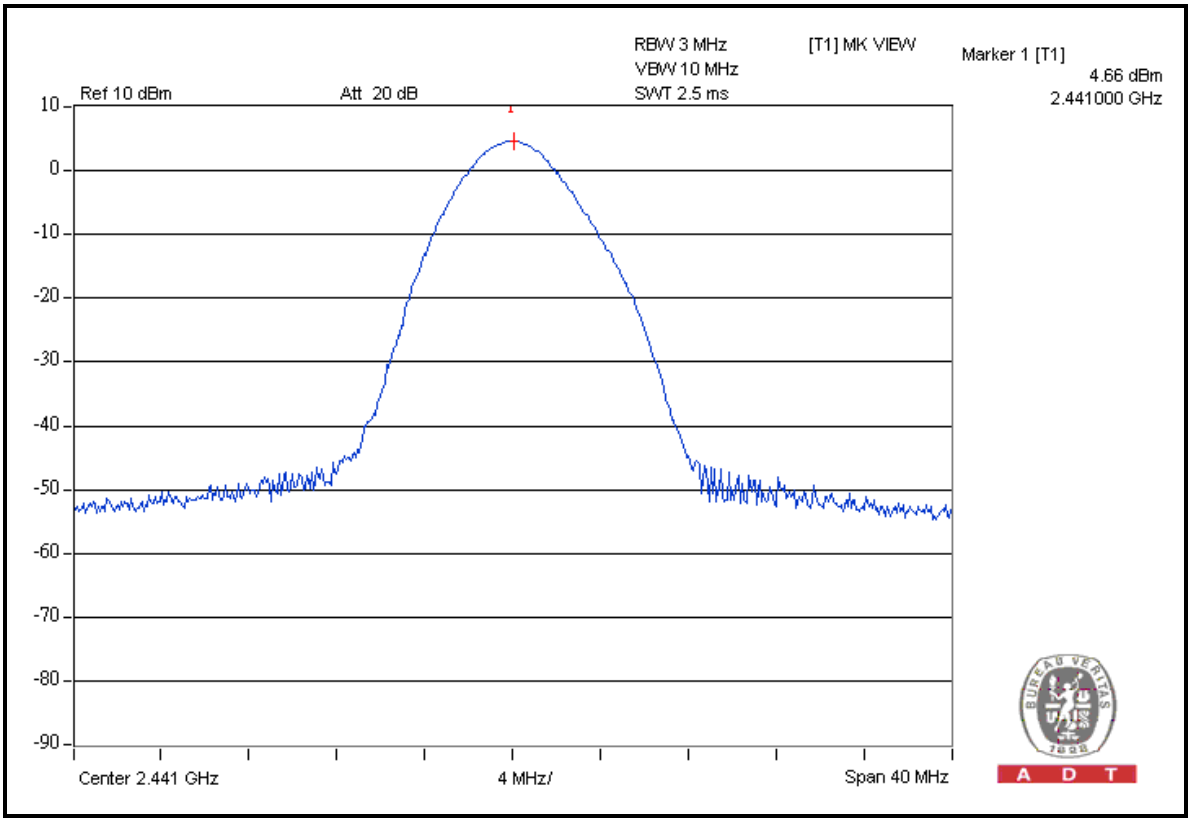
TEST MODE	A		
MODULATION TYPE	8DPSK	**CHANNEL**	0, 39, 78
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 75% RH, 996hPa
TESTED BY	Chad Lee		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	3.483	5.42	125	PASS
39	2441	2.924	4.66	125	PASS
78	2480	2.541	4.05	125	PASS

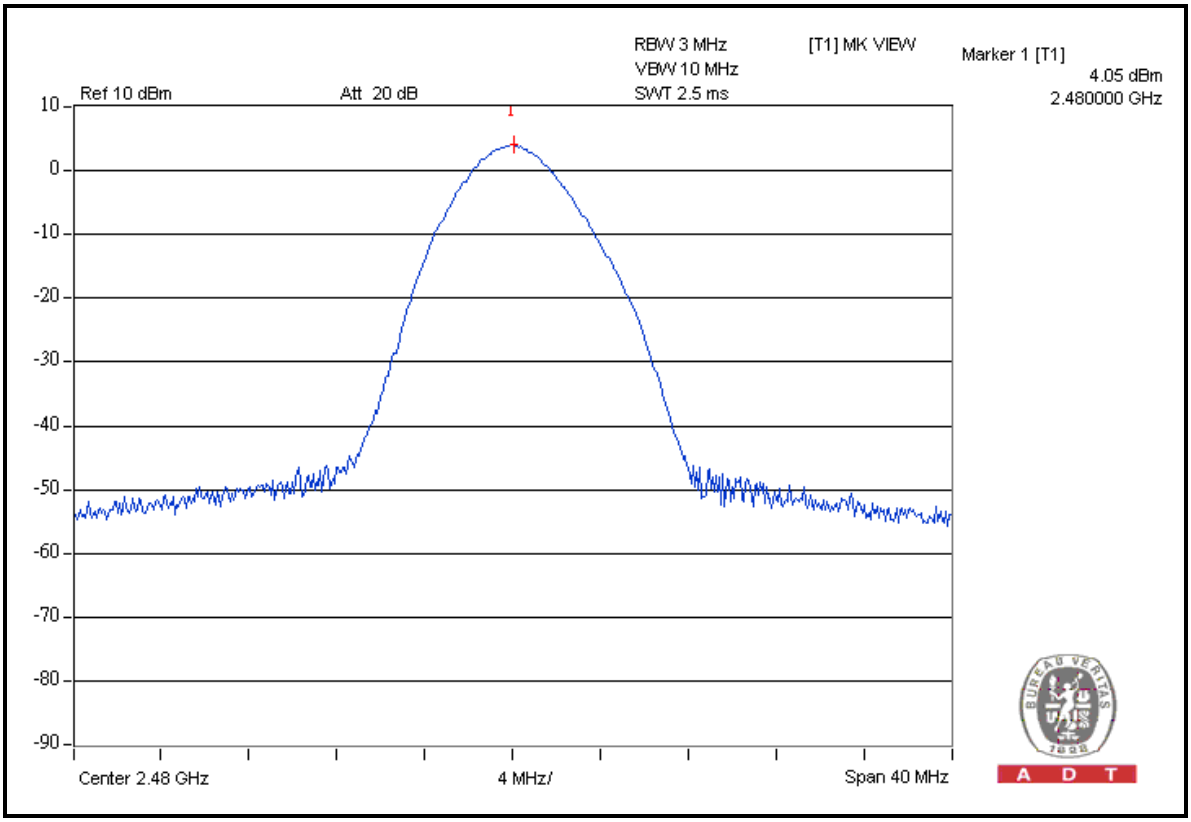
CH 0



CH 39


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
4.66 dBm
2.441000 GHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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]
4.05 dBm
2.480000 GHz
Ref 10 dBm
Att 20 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
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.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP 40	100035	Mar. 26, 2008	Mar. 25, 2009

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 and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.
The spectrum plots are attached on the following pages.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

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

4.8.6 TEST RESULTS

The spectrum plots are attached on the following 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).

MODE A: FOR GFSK MODULATION

NOTE 1:
The band edge emission plot on the next page shows 60.54dBc between carrier maximum power and local maximum emission in restrict band (2.3504GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 108.90dBuV/m (Peak), so the maximum field strength in restrict band is 108.90 – 60.54= 48.36dBuV/m, which is under 74 dBuV/m limit.

Average value = 48.36- 30.10= 18.26dBuV/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.

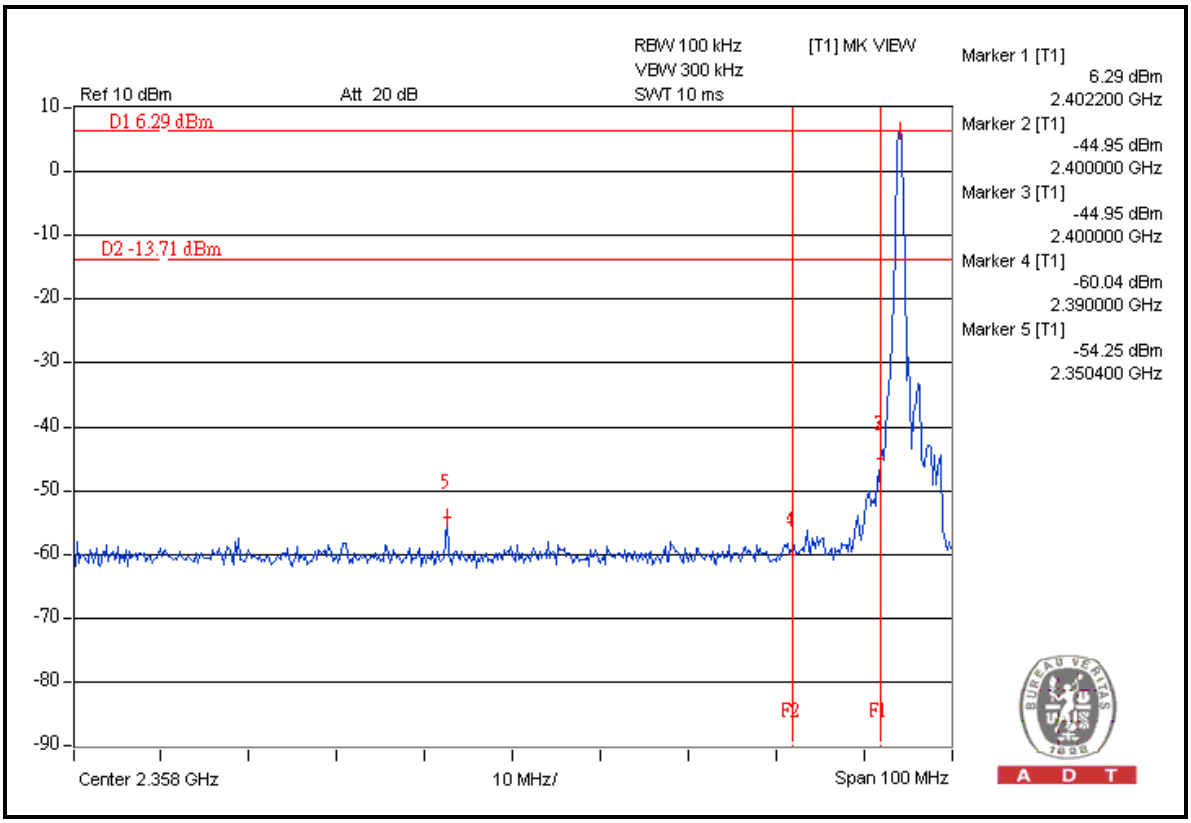
Average value = peak reading –30.10.

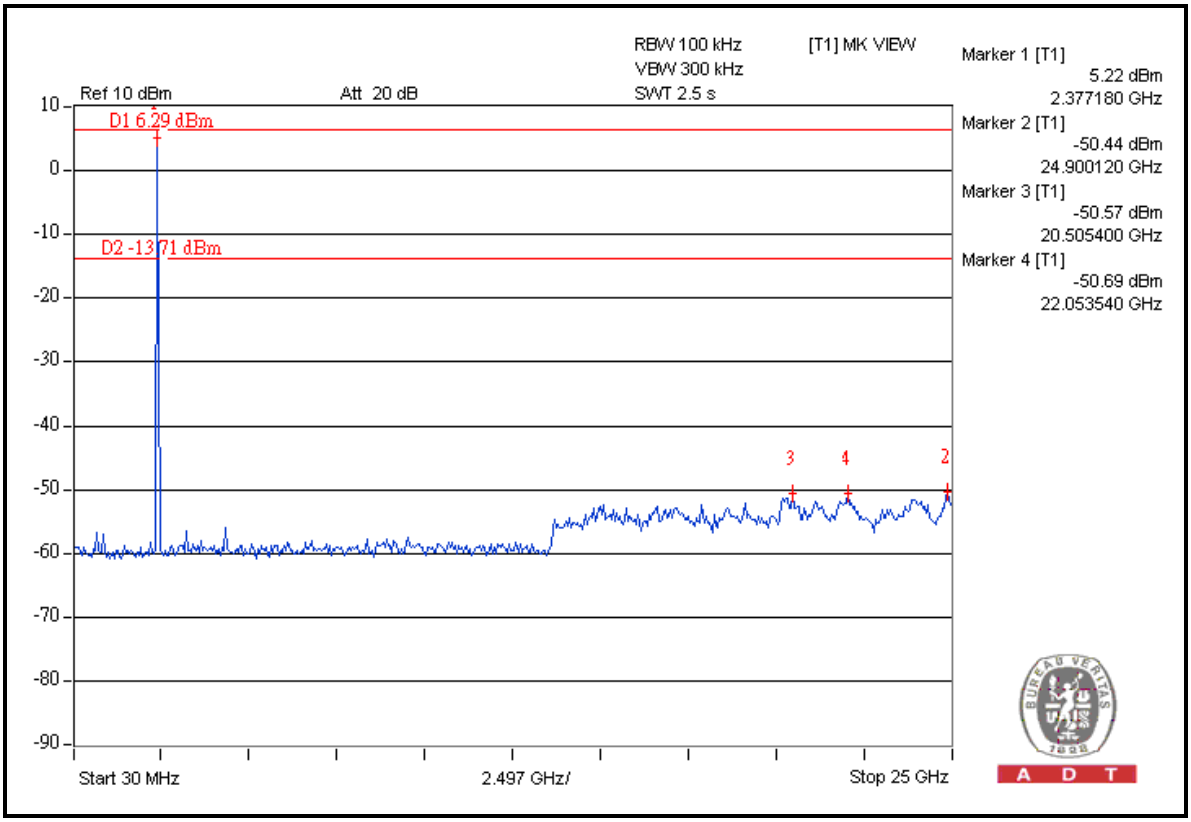
NOTE 2:
The band edge emission plot on the next second page shows 60.71dBc between carrier maximum power and local maximum emission in restrict band (2.4836GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 107.64dBuV/m (Peak), so the maximum field strength in restrict band is 107.64 – 60.71 = 46.93dBuV/m, which is under 74 dBuV/m limit.

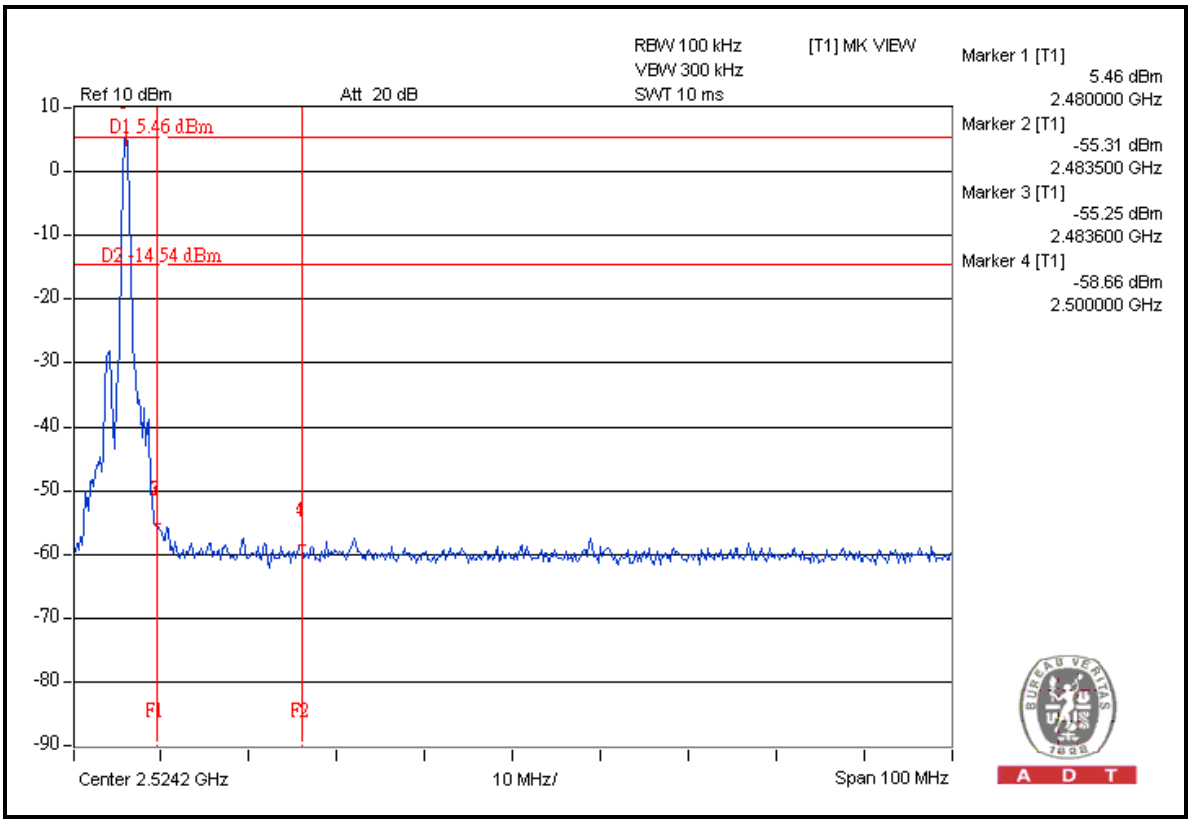
Average value = 46.93 - 30.10= 16.83dBuV/m, which is under 54dBuV/m limit.

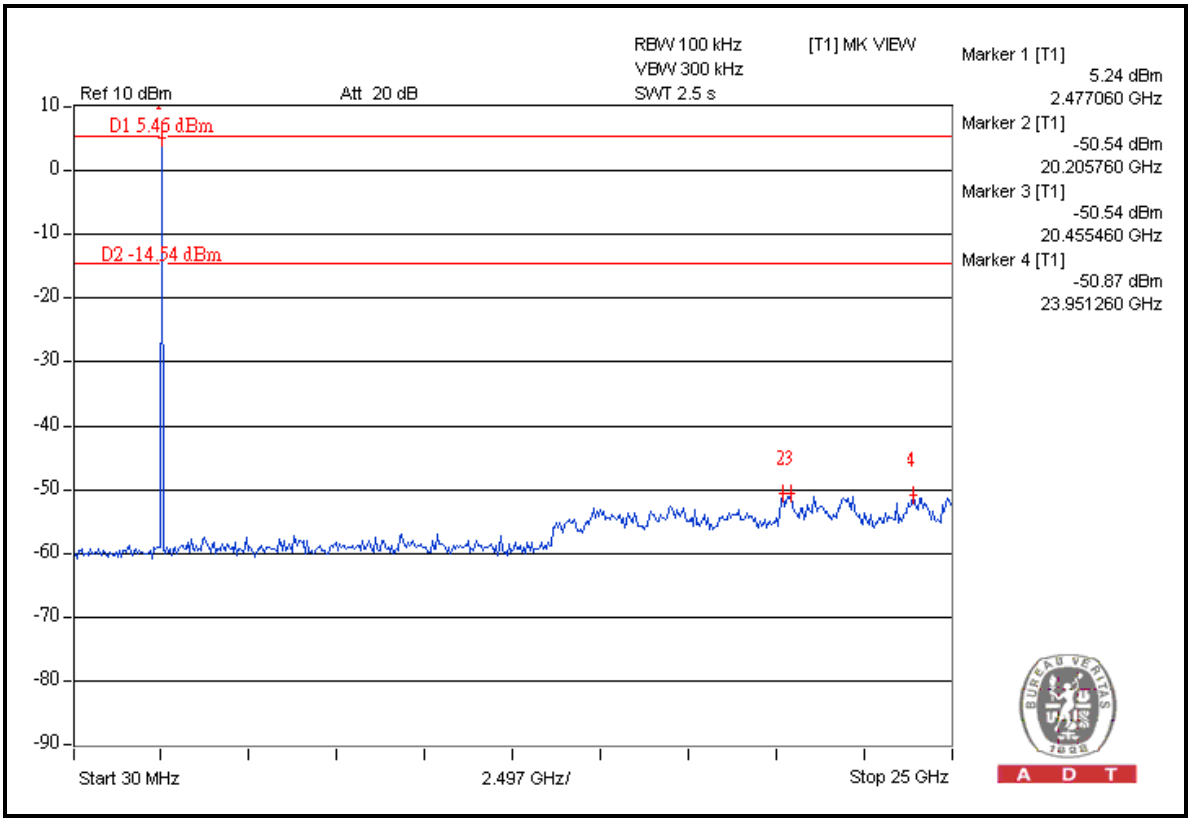
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30.1 dB.

Average value = peak reading –30.10.


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 6.29 dBm
D2 -13.71 dBm
Marker 1 [T1]
6.29 dBm
2.402200 GHz
Marker 2 [T1]
-44.95 dBm
2.400000 GHz
Marker 3 [T1]
-44.95 dBm
2.400000 GHz
Marker 4 [T1]
-60.04 dBm
2.390000 GHz
Marker 5 [T1]
-54.25 dBm
2.350400 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 6.29 dBm
D2 -13.71 dBm
Marker 1 [T1]
5.22 dBm
2.377180 GHz
Marker 2 [T1]
-50.44 dBm
24.900120 GHz
Marker 3 [T1]
-50.57 dBm
20.505400 GHz
Marker 4 [T1]
-50.69 dBm
22.053540 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 5.46 dBm
D2 -14.54 dBm
Marker 1 [T1]
5.46 dBm
2.480000 GHz
Marker 2 [T1]
-55.31 dBm
2.483500 GHz
Marker 3 [T1]
-55.25 dBm
2.483600 GHz
Marker 4 [T1]
-58.66 dBm
2.500000 GHz
Center 2.5242 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 5.46 dBm
D2 -14.54 dBm
Marker 1 [T1]
5.24 dBm
2.477060 GHz
Marker 2 [T1]
-50.54 dBm
20.205760 GHz
Marker 3 [T1]
-50.54 dBm
20.455460 GHz
Marker 4 [T1]
-50.87 dBm
23.951260 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz

MODE A: FOR 8DPSK MODULATION

NOTE 1:

The band edge emission plot on the next page shows 62.66dBc between carrier maximum power and local maximum emission in restrict band (2.3762GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 106.61dBuV/m (Peak), so the maximum field strength in restrict band is 106.61 – 62.66 = 43.95dBuV/m, which is under 74 dBuV/m limit.

Average value = 43.95 - 30.10= 13.85dBuV/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 –30.10.

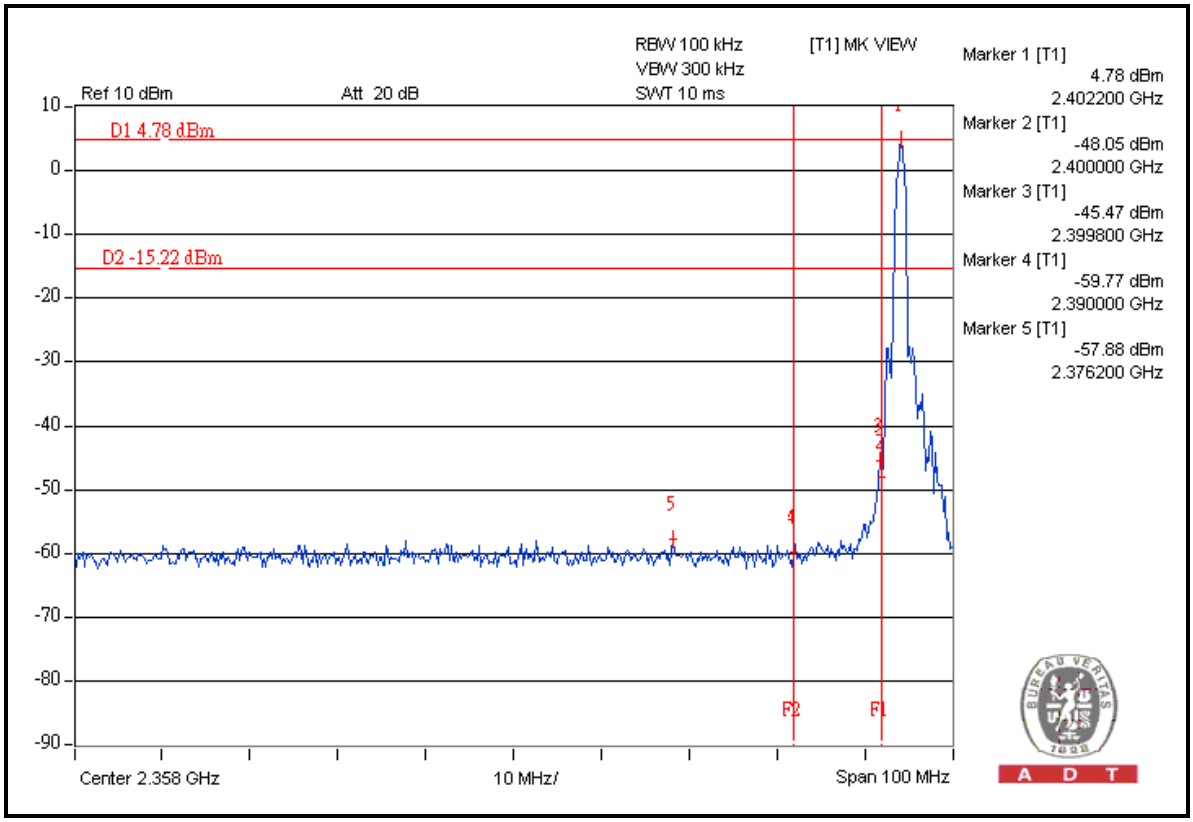
NOTE 2:

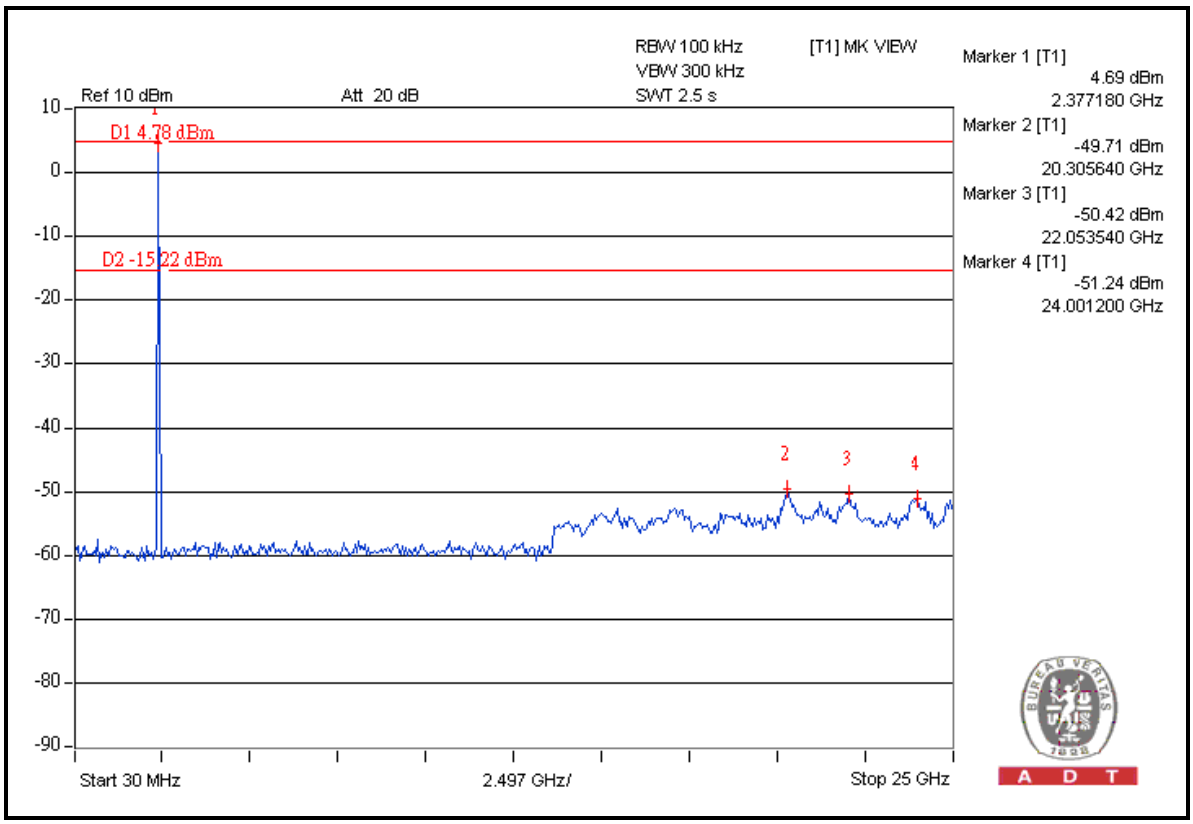
The band edge emission plot on the next second page shows 59.50dBc between carrier maximum power and local maximum emission in restrict band (2.4836GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2.7 is 104.82dBuV/m (Peak), so the maximum field strength in restrict band is 104.82 – 59.50 = 45.32dBuV/m, which is under 74 dBuV/m limit.

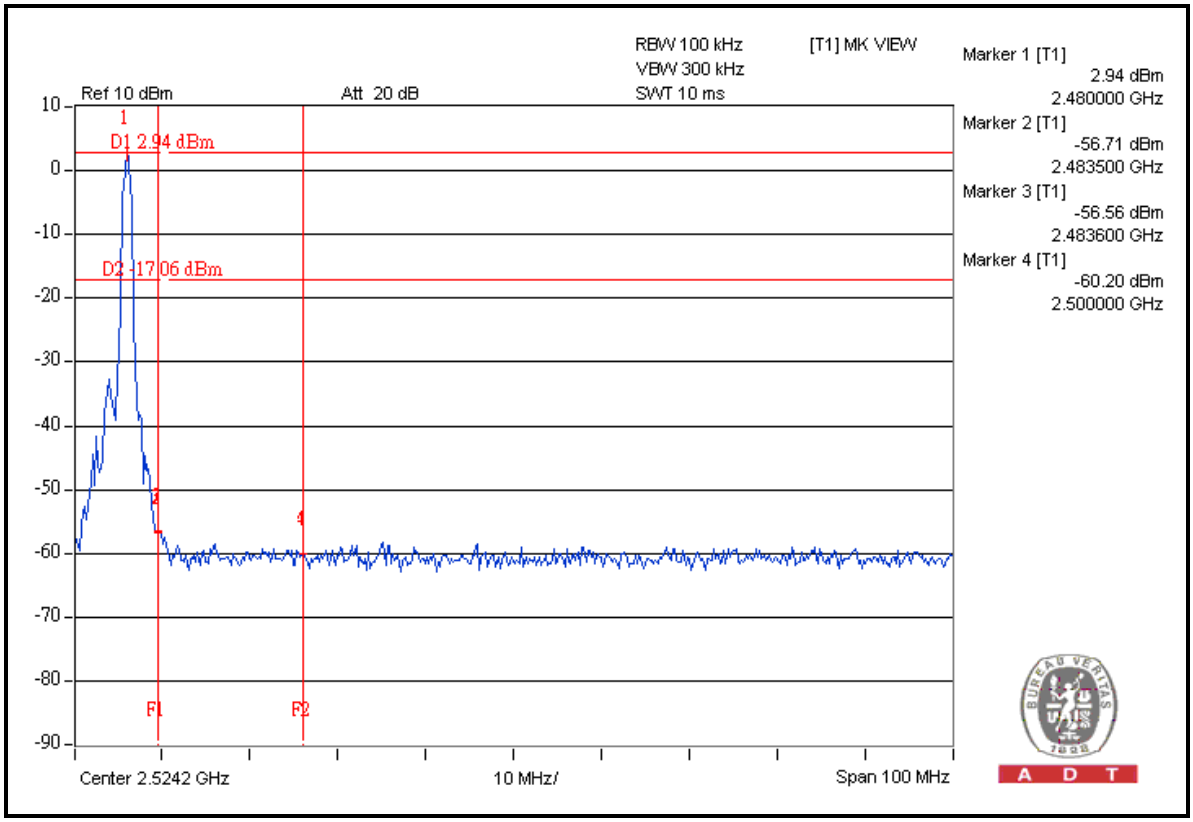
Average value = 45.32 - 30.10= 15.22dBuV/m, which is under 54dBuV/m limit.

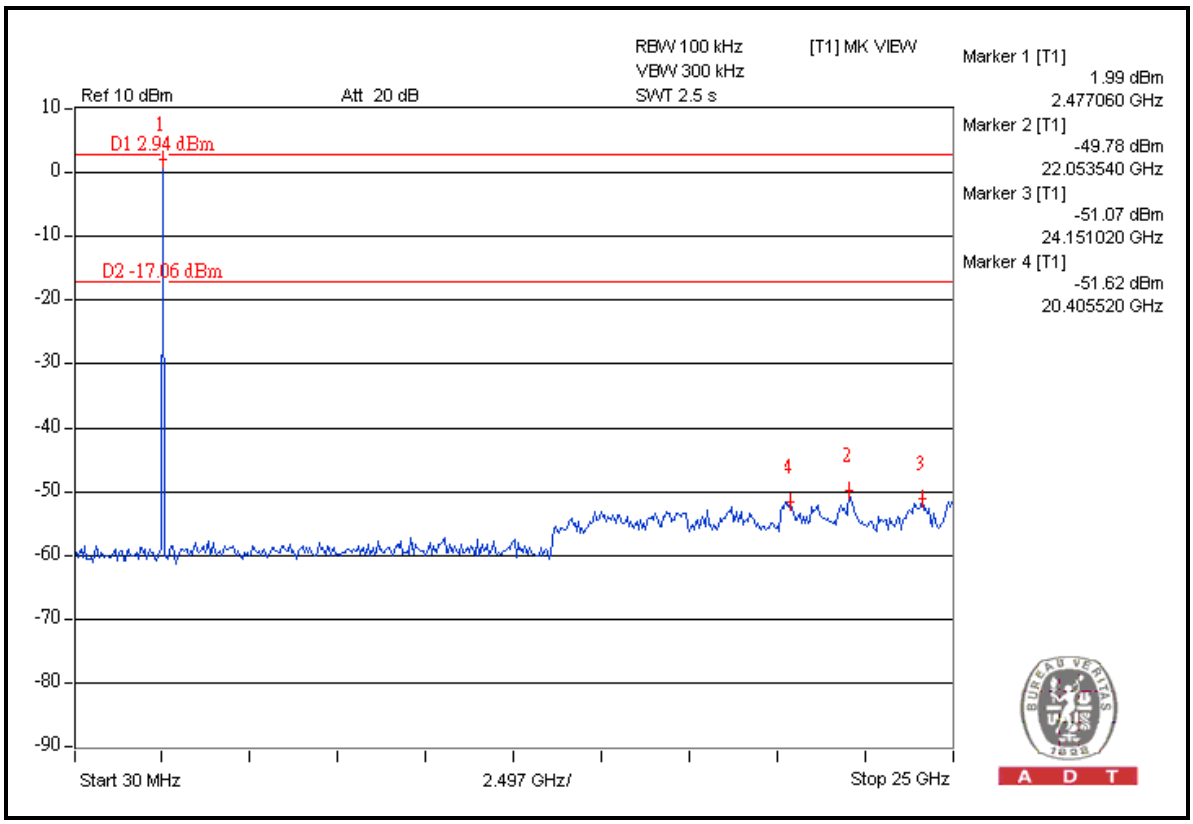
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30.1 dB.

Average value = peak reading –30.10.


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 4.78 dBm
D2 -15.22 dBm
Marker 1 [T1]
4.78 dBm
2.402200 GHz
Marker 2 [T1]
-48.05 dBm
2.400000 GHz
Marker 3 [T1]
-45.47 dBm
2.399800 GHz
Marker 4 [T1]
-59.77 dBm
2.390000 GHz
Marker 5 [T1]
-57.88 dBm
2.376200 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 4.78 dBm
D2 -15.22 dBm
Marker 1 [T1]
4.69 dBm
2.377180 GHz
Marker 2 [T1]
-49.71 dBm
20.305640 GHz
Marker 3 [T1]
-50.42 dBm
22.053540 GHz
Marker 4 [T1]
-51.24 dBm
24.001200 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 2.94 dBm
D2 -17.06 dBm
F1
F2
Center 2.5242 GHz
10 MHz/
Span 100 MHz
Marker 1 [T1]
2.94 dBm
2.480000 GHz
Marker 2 [T1]
-56.71 dBm
2.483500 GHz
Marker 3 [T1]
-56.56 dBm
2.483600 GHz
Marker 4 [T1]
-60.20 dBm
2.500000 GHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 10 dBm
Att 20 dB
D1 2.94 dBm
D2 -17.06 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz
Marker 1 [T1]
1.99 dBm
2.477060 GHz
Marker 2 [T1]
-49.78 dBm
22.053540 GHz
Marker 3 [T1]
-51.07 dBm
24.151020 GHz
Marker 4 [T1]
-51.62 dBm
20.405520 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

The antenna used in this product is Printed antenna 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, ADT Corp., 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, UL
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---