FCC TEST REPORT

REPORT NO.:	RF981002L04
MODEL NO.:	NCUN-3
	(Refer to item 3.1 for the more details)
RECEIVED:	Oct. 02, 2009
TESTED:	Oct. 06 ~ Oct. 08, 2009
ISSUED:	Oct. 12, 2009

APPLICANT:	novero GmbH
ADDRESS:	Rensingstrasse 15, 44807 Bochum, Germany

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

PRODUCT:	Bluetooth Car Kit NCKI-3 (Refer to item 3.1 for the more details) (H/W version: R4a, S/W version: 0.029)
BRAND:	novero
MODEL:	NCUN-3 (Refer to item 3.1 for the more details)
APPLICANT:	novero GmbH
TESTED:	Oct. 06 ~ Oct. 08, 2009
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247),** ANSI C63.4-2003

The above equipment (Model: NCUN-3, NCUN-1) 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 / Specialist	, **DATE:**	Oct. 12, 2009
TECHNICAL ACCEPTANCE Responsible for RF	: Long Chen / Senior Engineer	, **DATE:**	Oct. 12, 2009
APPROVED BY	: Gary Chang / Assistant Manager	, **DATE:**	Oct. 12, 2009

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	NA	Power supply is 12Vdc.
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 –6.29dB at 3204.0MHz.
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
Radiated emissions	150MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 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	Bluetooth Car Kit NCKI-3 (Refer to Note for the more details)
MODEL NO.	NCUN-3 (Refer to Note for the more details)
FCC ID	WJLNCUN-3
POWER SUPPLY	12Vdc
MODULATION TYPE	GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	1/2/3Mbps
FREQUENCY RANGE	2402 ~ 2480MHz
NUMBER OF CHANNEL	79
CHANNEL SPACING	1MHz
OUTPUT POWER	1.45mW
ANTENNA TYPE	F antenna with 1.47dBi gain
DATA CABLE	Refer to Note
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to Note

NOTE:

1. There are two model no. shown as below.

Brand	Product Name	Model No.	Remark
novero	Bluetooth Car Kit NCKI-3	NCUN-3	with motion sensor
novero	Bluetooth Car Kit NCKI-1	NCUN-1	without motion sensor

2. The EUT has following accessory devices.

PRODUCT	BRAND	MODEL	SPECIFICATION
Remote Control	novero	NIDE-1	Cable length: 1.5 m, w/o core
Microphone	novero	NMIC-1	Cable length: 3.0 m, w/o core
System Cable	novero	NCAB-2	Cable length: 1.0 m, w/o core; includes power & audio cable

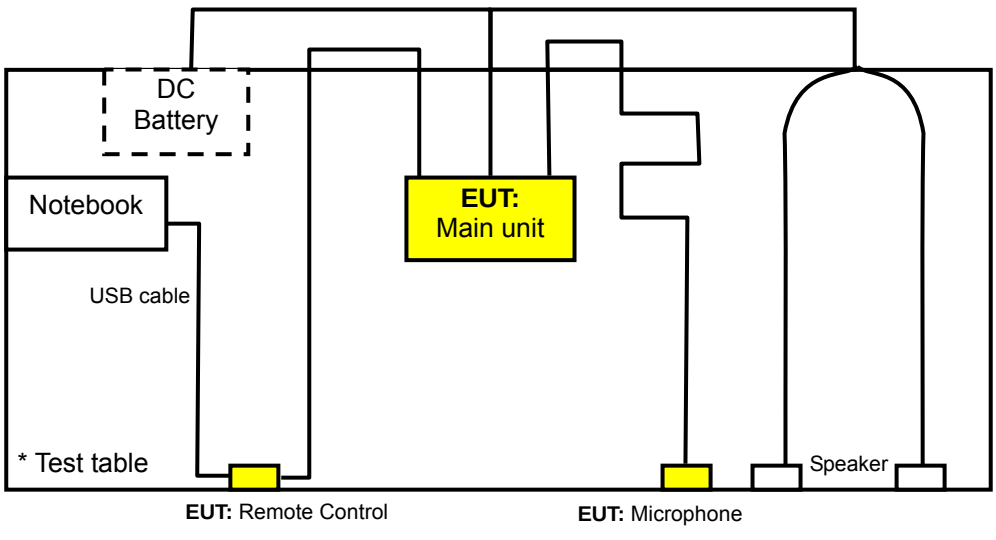
3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

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



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION	
	RE≥1G	RE<1G	PLC	APCM	Test Condition	Model
A	√	√	Note 1	√	BT Link (TX mode)	NCUN-3
B	-	√	Note 1	-		NCUN-1

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

Note: 1. No need to concern of Conducted Emission due to the EUT is powered by power supply
2. "-": 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
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5	X
A	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, B	0 to 78	78	FHSS	GFSK	DH5	X

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
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	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.

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 COMPUTER	DELL	D531	CN-0XM006-48643-81U-2973	QDS-BRCM1020
2	SPEAKER	NOKIA	SP-3	NA	NA
3	DC BATTERY	YUASA	36B20R	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.1m USB cable
2	1.5m cable
3	NA

NOTE:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 2 was provided by client.
3. Item 3 was placed under the test table.

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, 2009	Jul. 05, 2010
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.

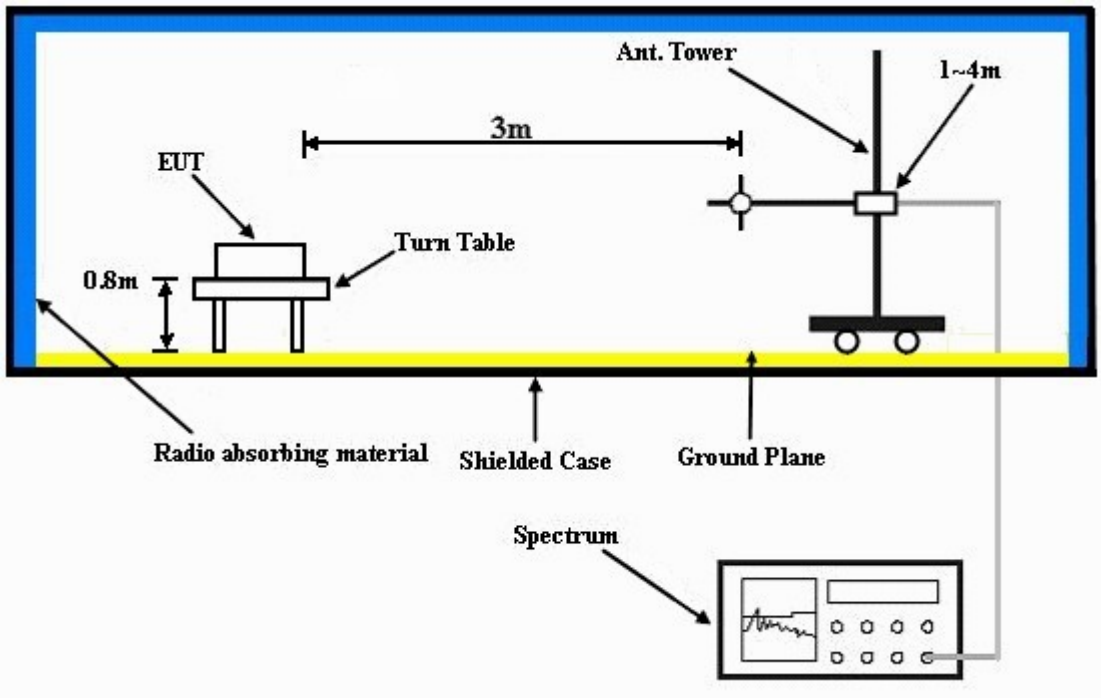
NOTE:

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

a. Placed the EUT on a testing table.
b. The notebook ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	**FREQUENCY RANGE**	1 ~ 25GHz
INPUT POWER (SYSTEM)	12Vdc	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	**TESTED BY**	Mark Liao

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	2376.00	41.80 PK	74.00	-32.20	1.08 H	30	11.10	30.70
2	2376.00	35.21 AV	54.00	-18.79	1.08 H	30	4.51	30.70
3	2400.00	55.24 PK	74.00	-18.76	1.07 H	23	24.45	30.79
4	2400.00	25.14 AV	54.00	-28.86	1.07 H	23	-5.65	30.79
5	*2402.00	97.89 PK			1.07 H	23	67.09	30.80
6	*2402.00	67.79 AV			1.07 H	23	36.99	30.80
7	3204.00	55.36 PK	74.00	-18.64	1.17 H	40	22.48	32.88
8	**3204.00**	**47.71 AV**	**54.00**	**-6.29**	**1.17 H**	**40**	**14.83**	**32.88**
9	4804.00	57.78 PK	74.00	-16.22	1.12 H	54	21.15	36.63
10	4804.00	27.68 AV	54.00	-26.32	1.12 H	54	-8.95	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).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

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	2376.00	40.81 PK	74.00	-33.19	1.69 V	49	10.11	30.70
2	2376.00	31.07 AV	54.00	-22.93	1.69 V	49	0.37	30.70
3	2400.00	51.69 PK	74.00	-22.31	1.71 V	64	20.90	30.79
4	2400.00	21.59 AV	54.00	-32.41	1.71 V	64	-9.20	30.79
5	*2402.00	94.34 PK			1.71 V	64	63.54	30.80
6	*2402.00	64.24 AV			1.71 V	64	33.44	30.80
7	3204.00	51.21 PK	74.00	-22.79	1.01 V	213	18.33	32.88
8	3204.00	44.11 AV	54.00	-9.89	1.01 V	213	11.23	32.88
9	4804.00	55.75 PK	74.00	-18.25	1.04 V	310	19.12	36.63
10	4804.00	25.65 AV	54.00	-28.35	1.04 V	310	-10.98	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).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	99.42 PK			1.02 H	315	68.50	30.92
2	*2441.00	69.32 AV			1.02 H	315	38.40	30.92
3	3253.00	52.98 PK	74.00	-21.02	1.14 H	37	20.06	32.92
4	3253.00	46.75 AV	54.00	-7.25	1.14 H	37	13.83	32.92
5	4882.00	60.81 PK	74.00	-13.19	1.11 H	41	24.08	36.73
6	4882.00	30.71 AV	54.00	-23.29	1.11 H	41	-6.02	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	95.90 PK			1.04 V	67	64.98	30.92
2	*2441.00	65.80 AV			1.04 V	67	34.88	30.92
3	3253.00	52.76 PK	74.00	-21.24	1.89 V	78	19.84	32.92
4	3253.00	45.61 AV	54.00	-8.39	1.89 V	78	12.69	32.92
5	4882.00	59.70 PK	74.00	-14.30	1.01 V	221	22.97	36.73
6	4882.00	29.60 AV	54.00	-24.40	1.01 V	221	-7.13	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)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

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	100.00 PK			1.30 H	22	68.95	31.05
2	*2480.00	69.90 AV			1.30 H	22	38.85	31.05
3	2483.50	41.88 PK	74.00	-32.12	1.30 H	22	10.82	31.06
4	2483.50	11.78 AV	54.00	-42.22	1.30 H	22	-19.28	31.06
5	3305.00	51.67 PK	74.00	-22.33	1.57 H	40	18.71	32.96
6	3305.00	45.48 AV	54.00	-8.52	1.57 H	40	12.52	32.96
7	4960.00	62.75 PK	74.00	-11.25	1.11 H	45	25.75	37.00
8	4960.00	32.65 AV	54.00	-21.35	1.11 H	45	-4.35	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	96.56 PK			1.69 V	72	65.51	31.05
2	*2480.00	66.46 AV			1.69 V	72	35.41	31.05
3	2483.50	38.44 PK	74.00	-35.56	1.69 V	72	7.38	31.06
4	2483.50	8.34 AV	54.00	-45.66	1.69 V	72	-22.72	31.06
5	3305.00	51.60 PK	74.00	-22.40	1.87 V	80	18.64	32.96
6	3305.00	44.15 AV	54.00	-9.85	1.87 V	80	11.19	32.96
7	4960.00	62.19 PK	74.00	-11.81	1.00 V	220	25.19	37.00
8	4960.00	32.09 AV	54.00	-21.91	1.00 V	220	-4.91	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)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

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	2376.00	41.09 PK	74.00	-32.91	1.07 H	28	10.39	30.70
2	2376.00	31.51 AV	54.00	-22.49	1.07 H	28	0.81	30.70
3	2400.00	48.81 PK	74.00	-25.19	1.07 H	28	18.02	30.79
4	2400.00	18.71 AV	54.00	-35.29	1.07 H	28	-12.08	30.79
5	*2402.00	96.59 PK			1.07 H	28	65.79	30.80
6	*2402.00	66.49 AV			1.07 H	28	35.69	30.80
7	3204.00	52.27 PK	74.00	-21.73	1.47 H	233	19.39	32.88
8	3204.00	46.24 AV	54.00	-7.76	1.47 H	233	13.36	32.88
9	4804.00	53.38 PK	74.00	-20.62	1.47 H	87	16.75	36.63
10	4804.00	23.28 AV	54.00	-30.72	1.47 H	87	-13.35	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).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

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	2376.00	39.12 PK	74.00	-34.88	1.76 V	66	8.42	30.70
2	2376.00	29.57 AV	54.00	-24.43	1.76 V	66	-1.13	30.70
3	2400.00	45.25 PK	74.00	-28.75	1.76 V	66	14.46	30.79
4	2400.00	15.15 AV	54.00	-38.85	1.76 V	66	-15.64	30.79
5	*2402.00	93.03 PK			1.76 V	66	62.23	30.80
6	*2402.00	62.93 AV			1.76 V	66	32.13	30.80
7	3204.00	53.20 PK	74.00	-20.80	1.92 V	78	20.32	32.88
8	3204.00	45.06 AV	54.00	-8.94	1.92 V	78	12.18	32.88
9	4804.00	52.58 PK	74.00	-21.42	1.32 V	311	15.95	36.63
10	4804.00	22.48 AV	54.00	-31.52	1.32 V	311	-14.15	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).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	98.14 PK			1.05 H	46	67.22	30.92
2	*2441.00	68.04 AV			1.05 H	46	37.12	30.92
3	3253.00	51.52 PK	74.00	-22.48	1.42 H	255	18.60	32.92
4	3253.00	45.36 AV	54.00	-8.64	1.42 H	255	12.44	32.92
5	4882.00	58.09 PK	74.00	-15.91	1.36 H	93	21.36	36.73
6	4882.00	27.99 AV	54.00	-26.01	1.36 H	93	-8.74	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	94.66 PK			1.91 V	164	63.74	30.92
2	*2441.00	64.56 AV			1.91 V	164	33.64	30.92
3	3253.00	50.14 PK	74.00	-23.86	1.56 V	136	17.22	32.92
4	3253.00	43.18 AV	54.00	-10.82	1.56 V	136	10.26	32.92
5	4882.00	56.12 PK	74.00	-17.88	1.05 V	231	19.39	36.73
6	4882.00	26.02 AV	54.00	-27.98	1.05 V	231	-10.71	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)	12Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH 1002 hPa	TESTED BY	Mark Liao

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	98.41 PK			1.30 H	23	67.36	31.05
2	*2480.00	68.31 AV			1.30 H	23	37.26	31.05
3	2483.50	41.27 PK	74.00	-32.73	1.30 H	23	10.21	31.06
4	2483.50	11.17 AV	54.00	-42.83	1.30 H	23	-19.89	31.06
5	3305.00	51.71 PK	74.00	-22.29	1.57 H	41	18.75	32.96
6	3305.00	45.43 AV	54.00	-8.57	1.57 H	41	12.47	32.96
7	4960.00	56.82 PK	74.00	-17.18	1.10 H	45	19.82	37.00
8	4960.00	26.72 AV	54.00	-27.28	1.10 H	45	-10.28	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	94.89 PK			1.51 V	162	63.84	31.05
2	*2480.00	64.79 AV			1.51 V	162	33.74	31.05
3	2483.50	37.75 PK	74.00	-36.25	1.51 V	162	6.69	31.06
4	2483.50	7.65 AV	54.00	-46.35	1.51 V	162	-23.41	31.06
5	3305.00	51.54 PK	74.00	-22.46	1.84 V	79	18.58	32.96
6	3305.00	44.27 AV	54.00	-9.73	1.84 V	79	11.31	32.96
7	4960.00	55.49 PK	74.00	-18.51	1.31 V	234	18.49	37.00
8	4960.00	25.39 AV	54.00	-28.61	1.31 V	234	-11.61	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：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao
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	107.67	32.27 QP	43.50	-11.23	3.00 H	295	20.77	11.50
2	249.60	25.43 QP	46.00	-20.57	1.25 H	295	11.63	13.80
3	331.26	26.15 QP	46.00	-19.85	2.00 H	184	11.04	15.11
4	455.70	25.21 QP	46.00	-20.79	2.00 H	232	5.78	19.43
5	764.84	28.31 QP	46.00	-17.69	1.50 H	241	2.66	25.65
6	998.16	37.64 QP	54.00	-16.36	1.50 H	43	8.87	28.77
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	28.09 QP	40.00	-11.91	1.00 V	246	15.67	12.42
2	70.73	27.90 QP	40.00	-12.10	1.00 V	226	15.01	12.88
3	220.44	31.33 QP	46.00	-14.67	1.25 V	355	19.49	11.84
4	333.21	26.10 QP	46.00	-19.90	1.50 V	277	10.90	15.20
5	825.11	30.36 QP	46.00	-15.64	1.25 V	316	3.88	26.48
6	1000.00	39.12 QP	54.00	-14.88	1.25 V	268	10.34	28.78

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	12Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000 hPa	TESTED BY	Mark Liao
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	107.67	30.93 QP	43.50	-12.57	3.00 H	283	19.44	11.50
2	232.11	33.05 QP	46.00	-12.95	1.00 H	244	20.42	12.63
3	249.60	32.64 QP	46.00	-13.36	1.00 H	235	18.83	13.80
4	461.53	30.70 QP	46.00	-15.30	1.50 H	244	11.13	19.56
5	724.01	31.82 QP	46.00	-14.18	1.50 H	292	6.56	25.26
6	998.16	40.50 QP	54.00	-13.50	1.50 H	52	11.73	28.77
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	107.67	29.19 QP	43.50	-14.31	2.00 V	280	17.70	11.50
2	232.11	32.85 QP	46.00	-13.15	1.25 V	256	20.22	12.63
3	263.21	31.36 QP	46.00	-14.64	1.25 V	247	17.57	13.80
4	461.53	31.33 QP	46.00	-14.67	1.50 V	238	11.77	19.56
5	725.96	34.15 QP	46.00	-11.85	1.50 V	265	8.87	25.28
6	998.16	39.53 QP	54.00	-14.47	1.25 V	295	10.76	28.77

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 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

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

4.2.2 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.

4.2.3 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.

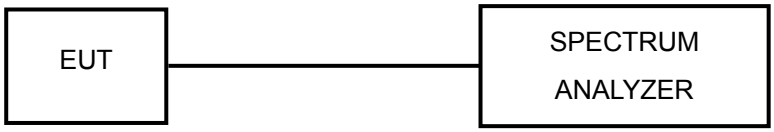
d. Set the SA on View mode and then plot the result on SA screen.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

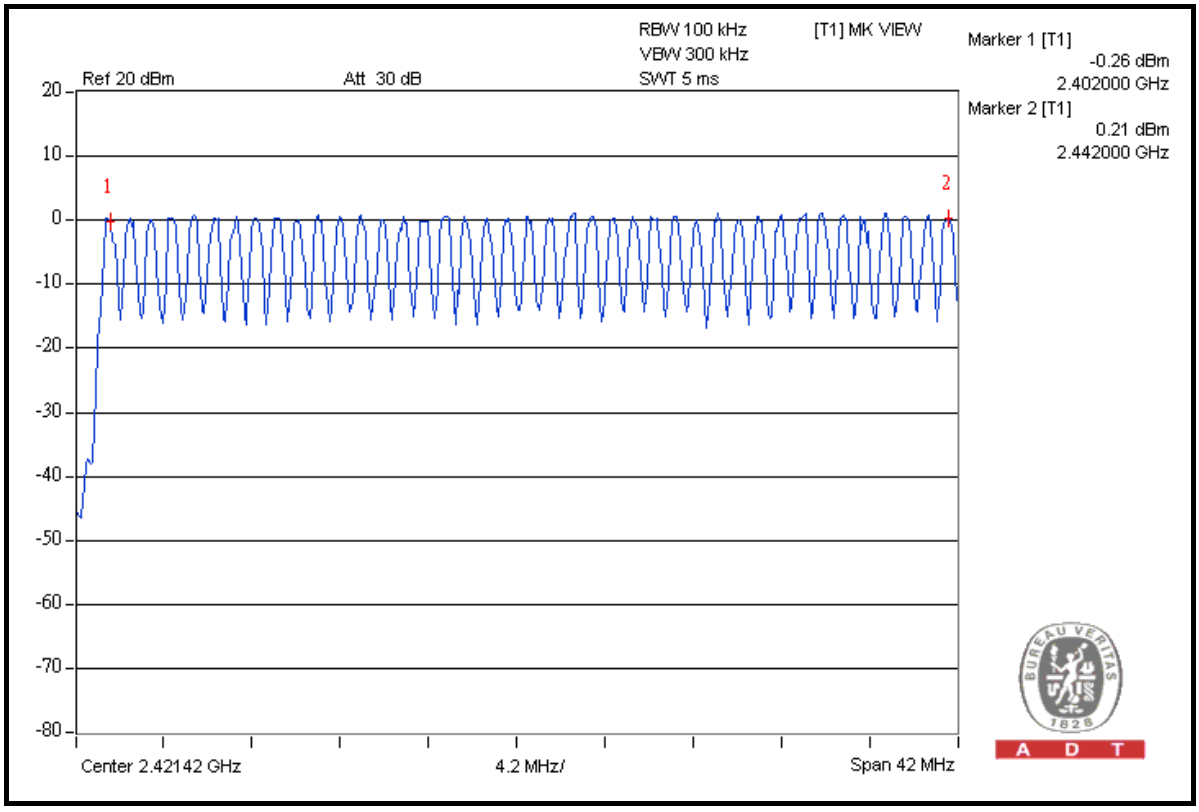
4.2.5 TEST SETUP

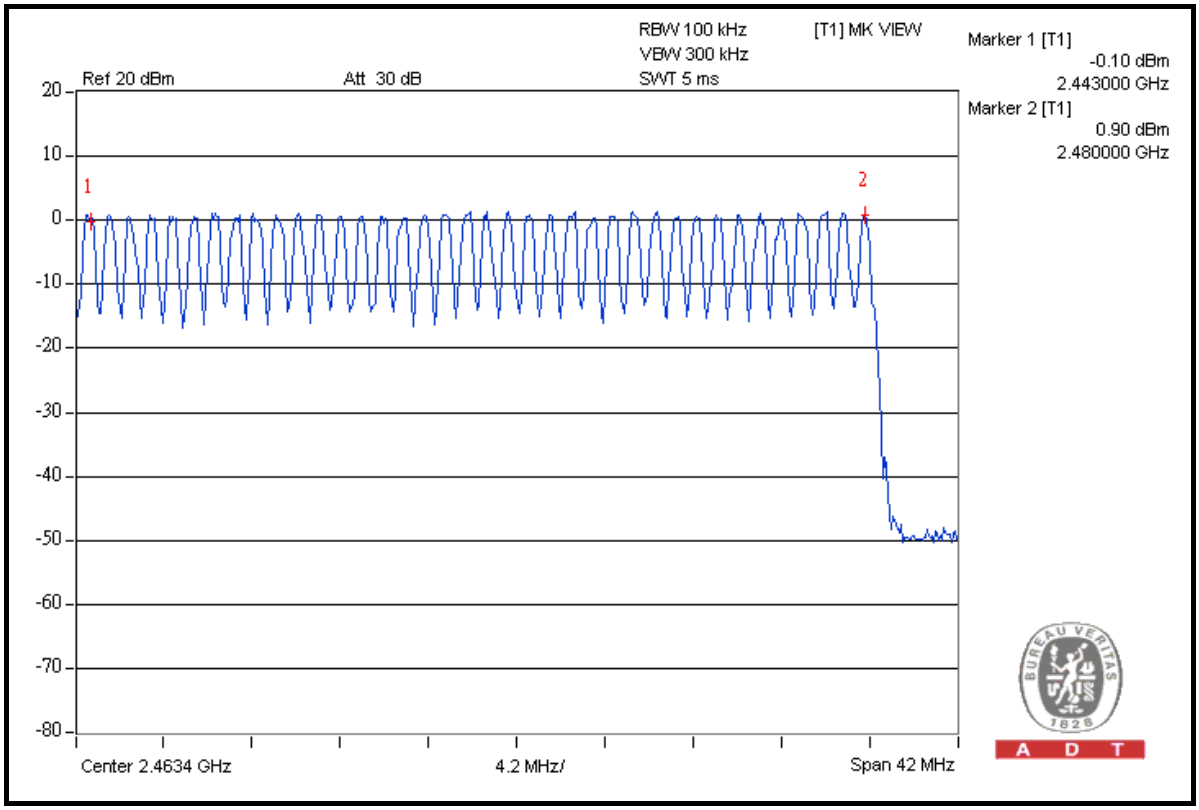


4.2.6 TEST RESULTS

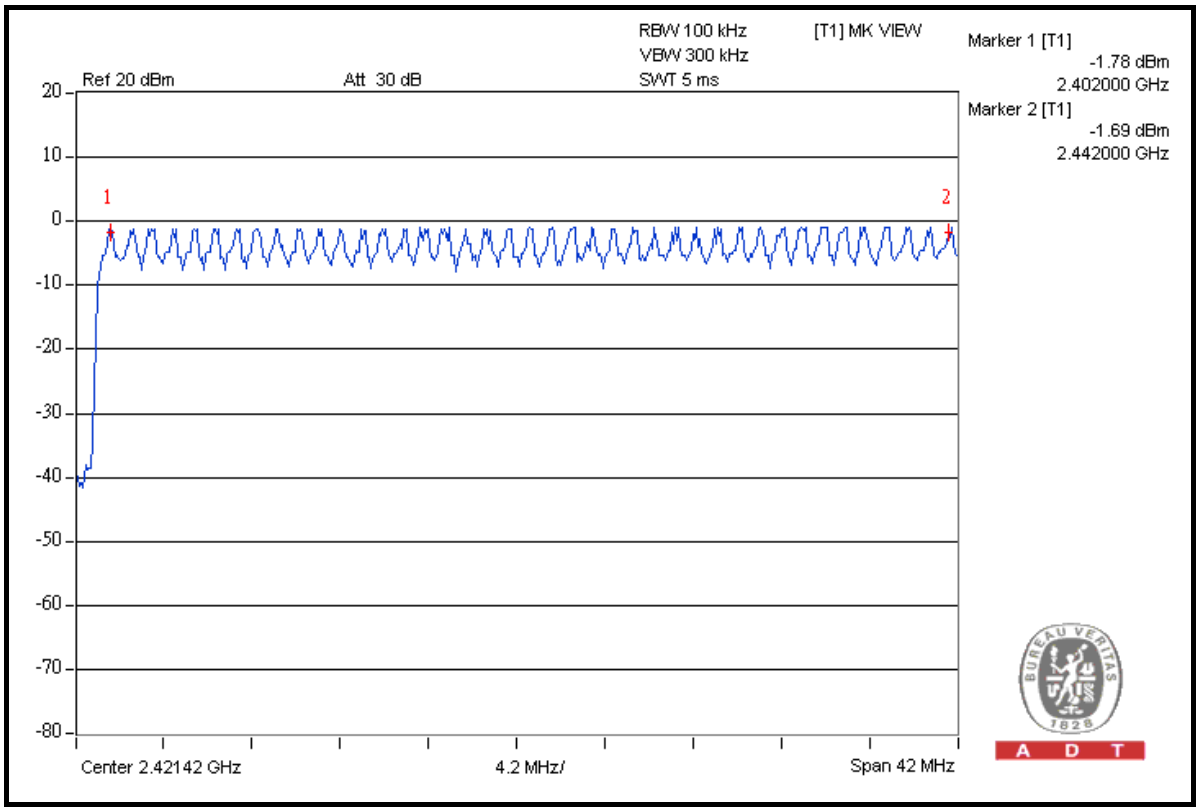
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

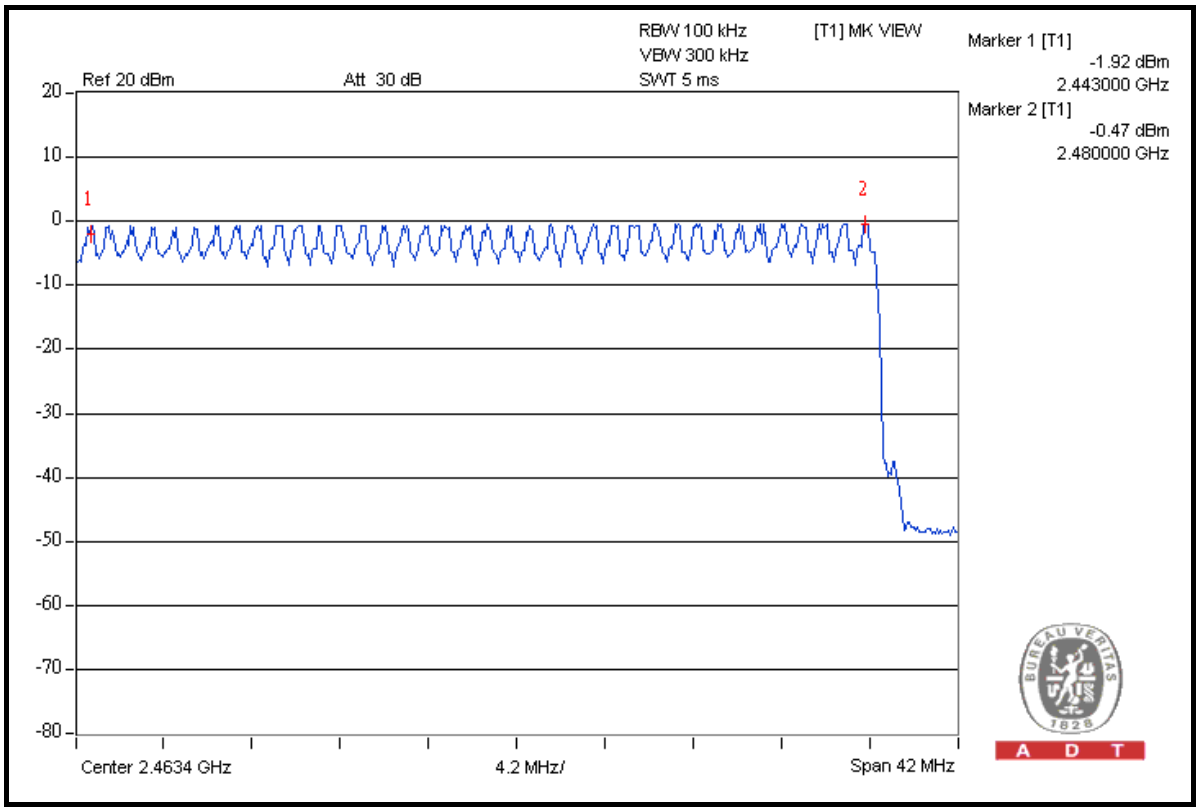
GFSK MODULATION





8DPSK MODULATION





4.3 DWELL TIME ON EACH CHANNEL

4.3.1 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.

4.3.2 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. 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.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP

Same as 4.2.5.

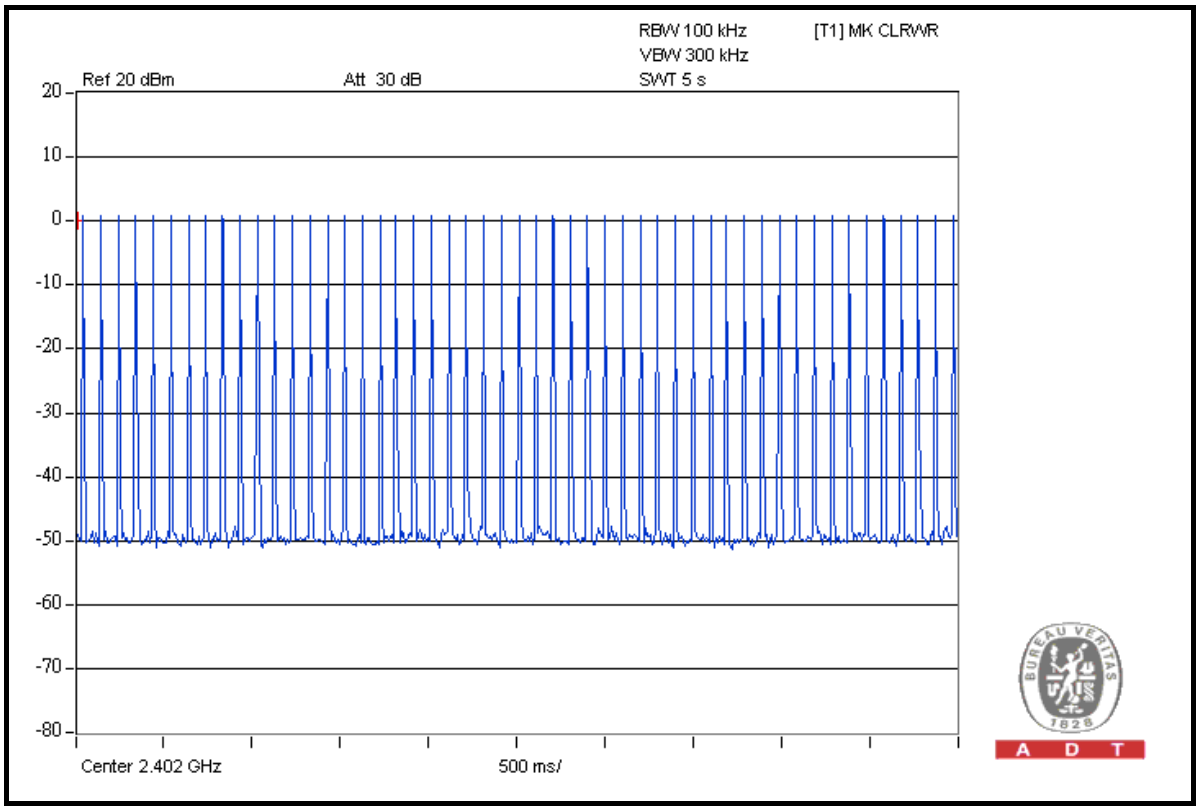
4.3.6 TEST RESULTS

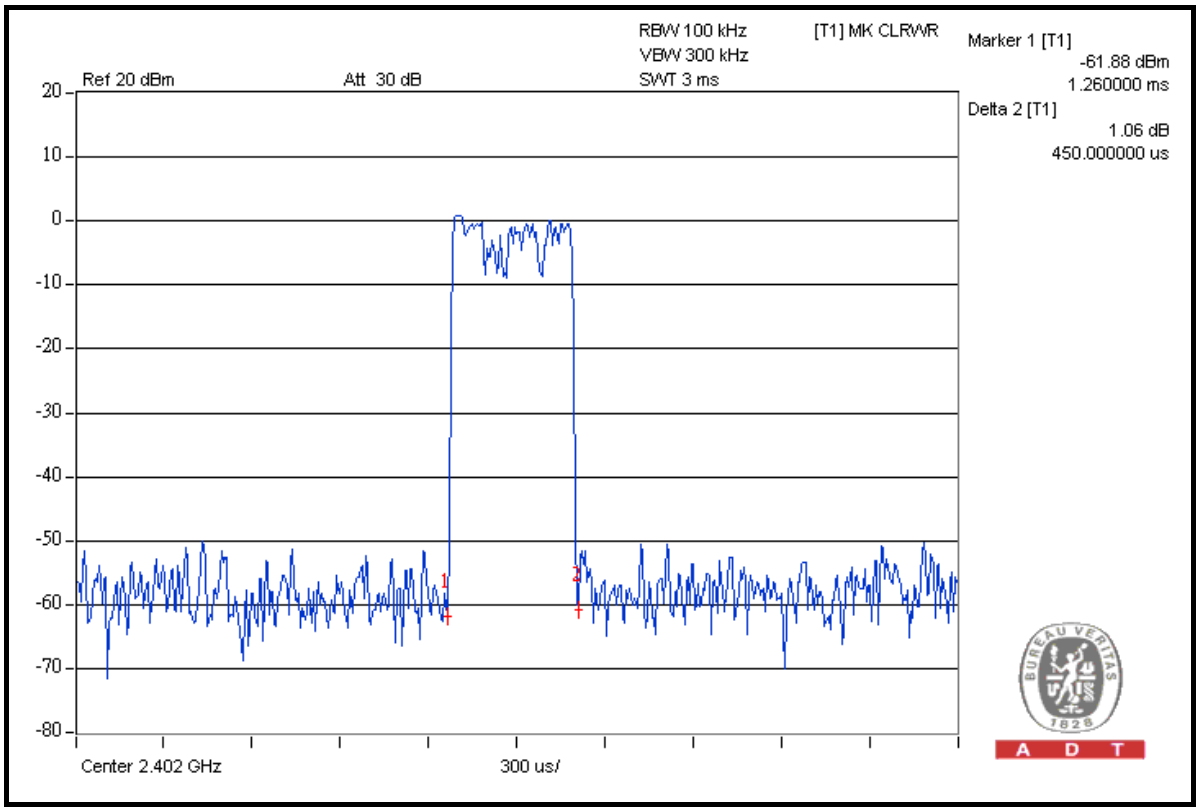
GFSK MODULATION

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.450	145.044	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.728	273.024	400
DH5	17 (times / 5 sec) * 6.32 = 107.44times	3.000	322.320	400

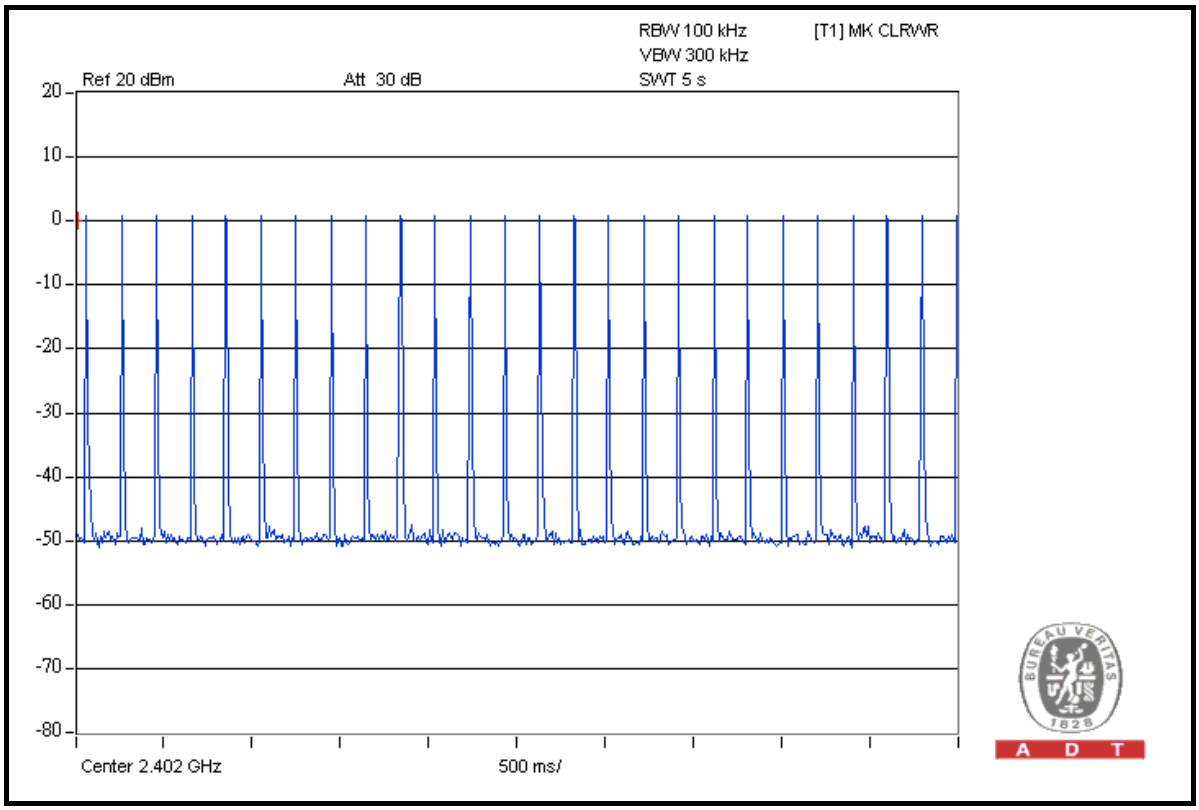
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

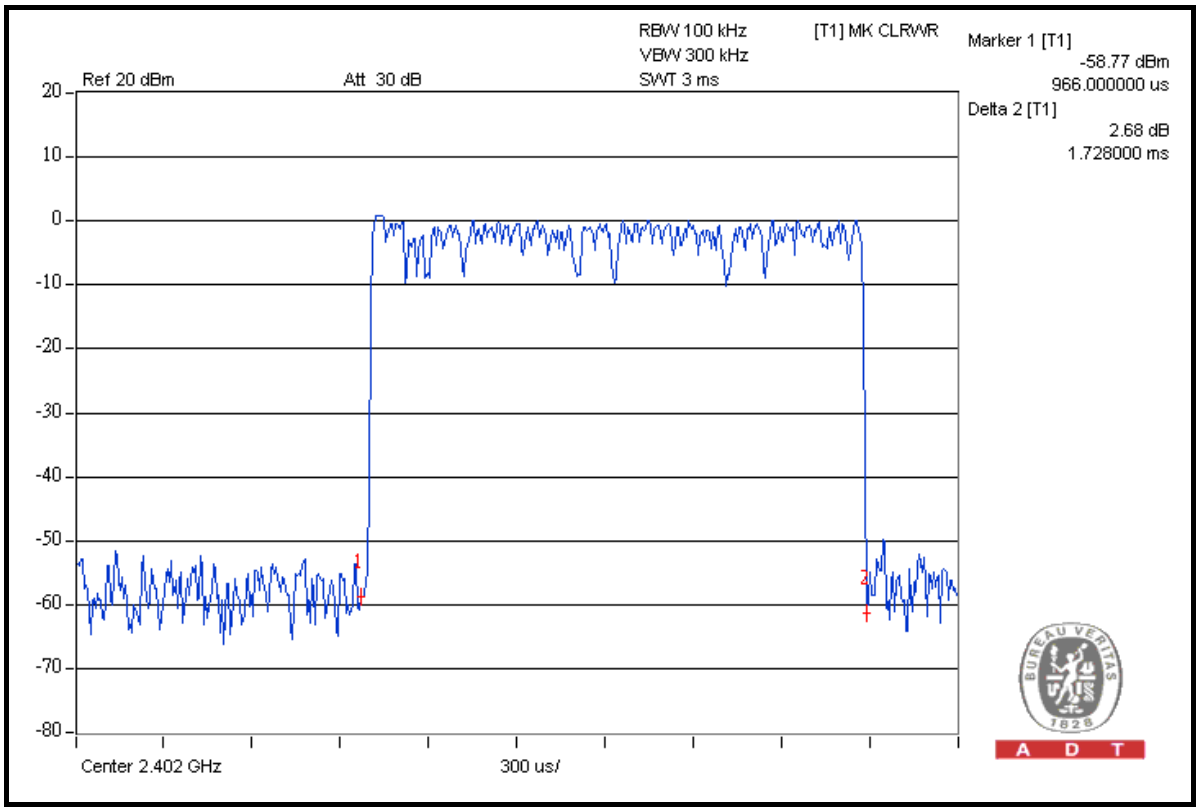
DH1


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/

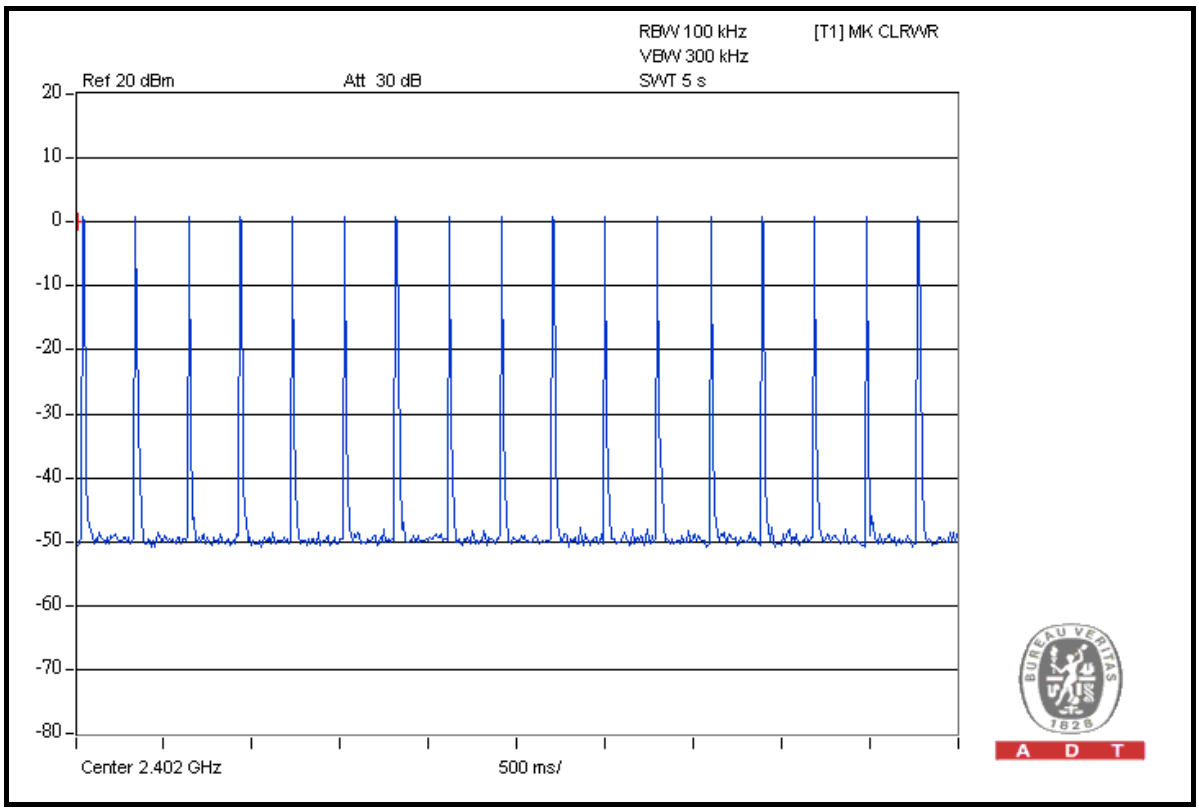

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-61.88 dBm
1.260000 ms
Delta 2 [T1]
1.06 dB
450.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

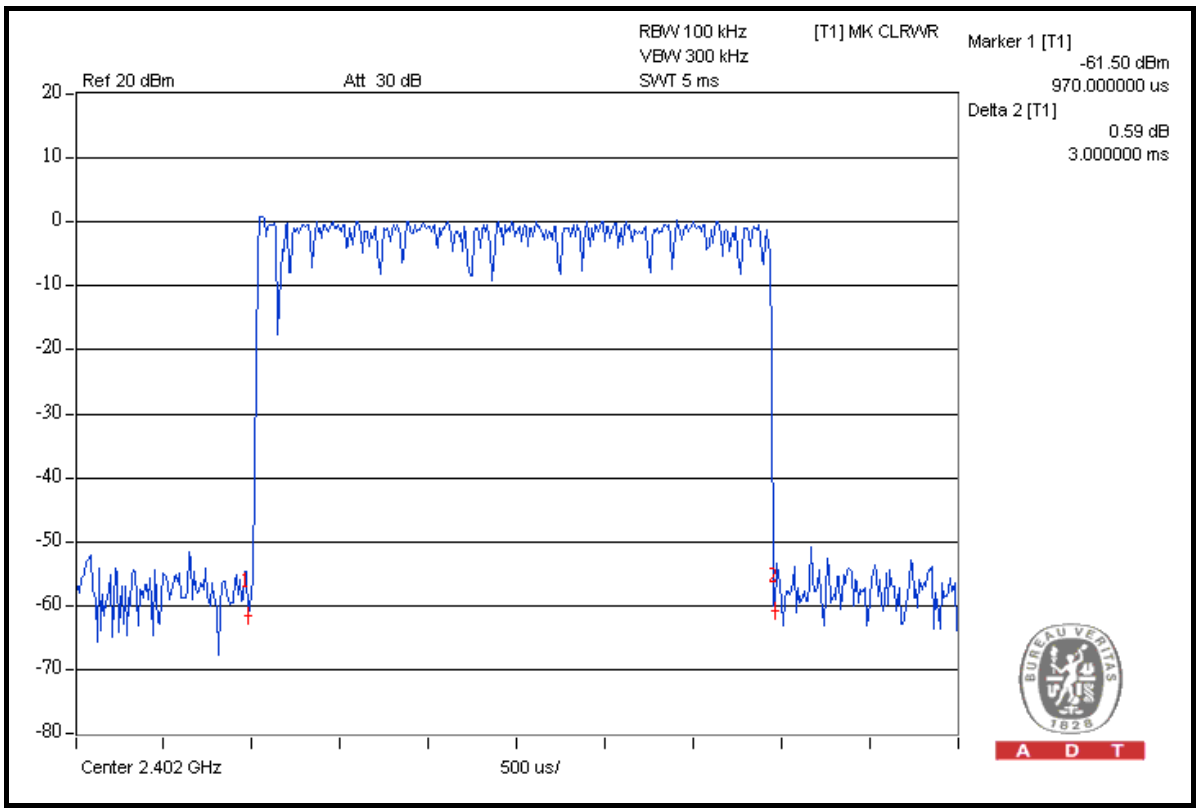
DH3


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]
-58.77 dBm
966.000000 us
Delta 2 [T1]
2.68 dB
1.728000 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/

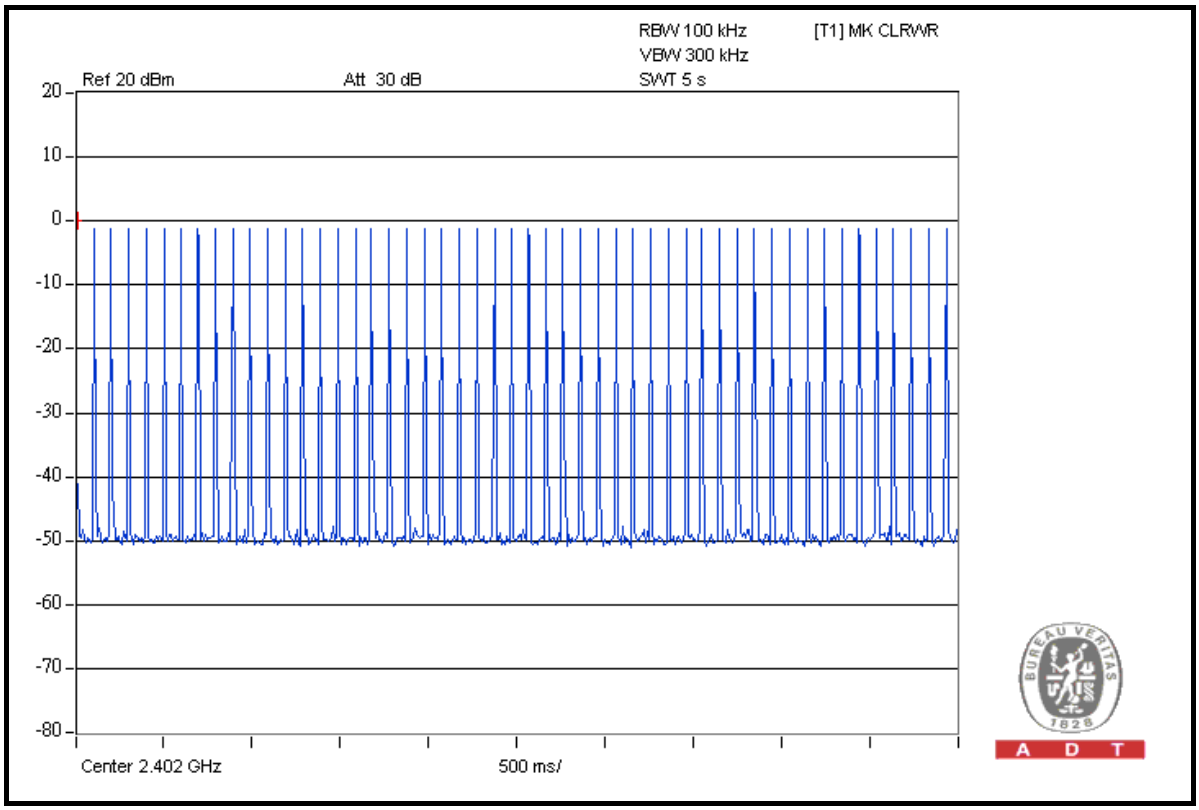

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-61.50 dBm
970.000000 us
Delta 2 [T1]
0.59 dB
3.000000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 us/

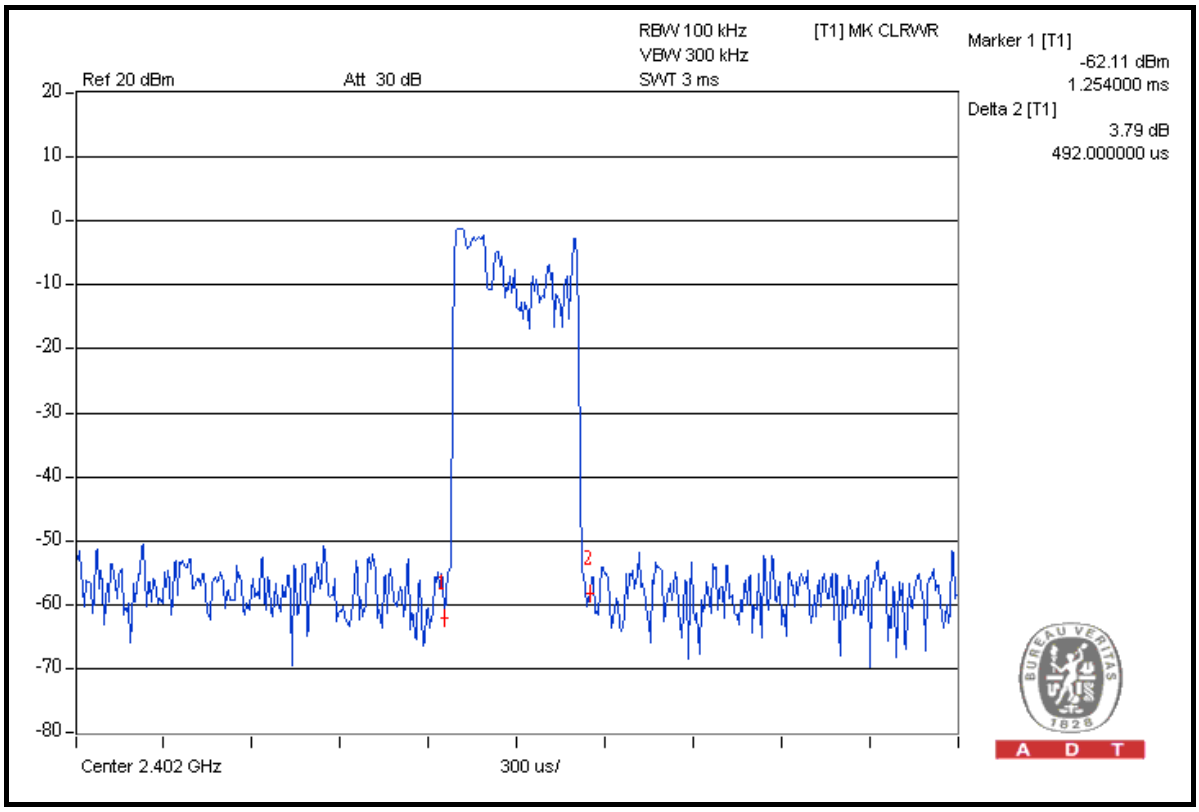
8DPSK MODULATION

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	0.492	155.472	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.716	271.128	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.030	325.543	400

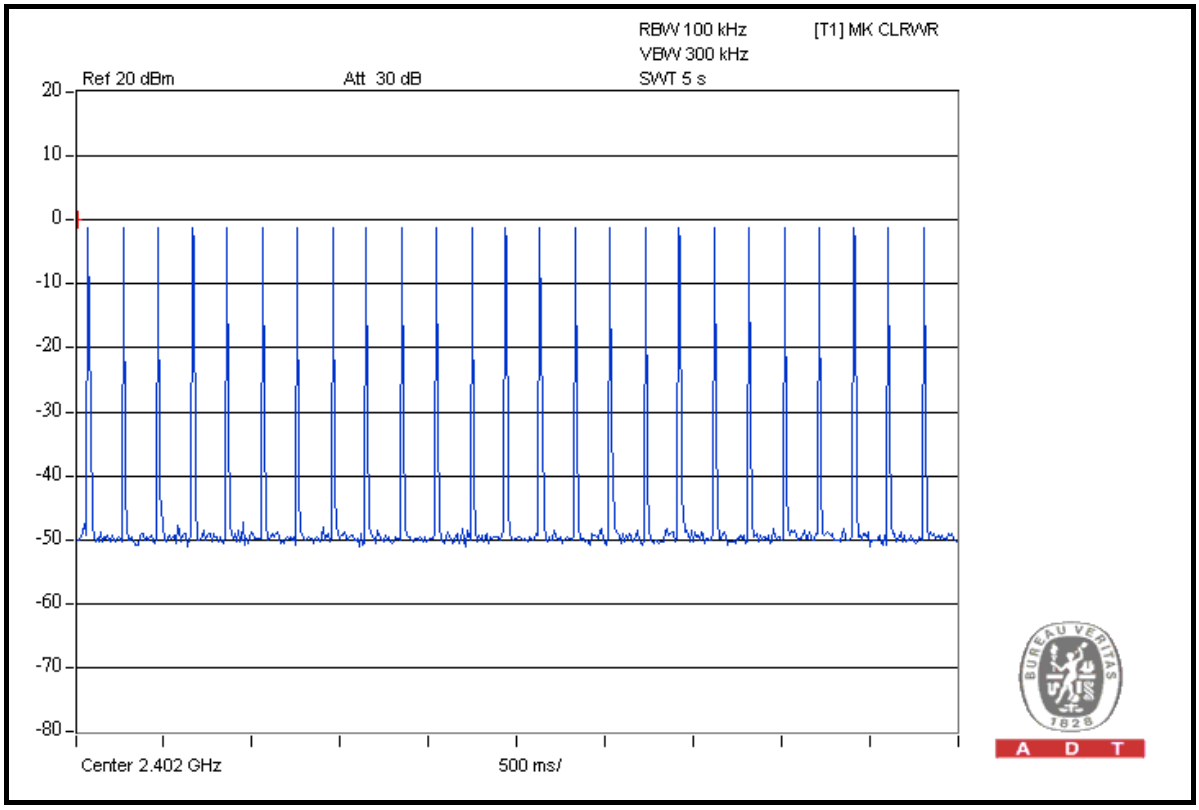
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

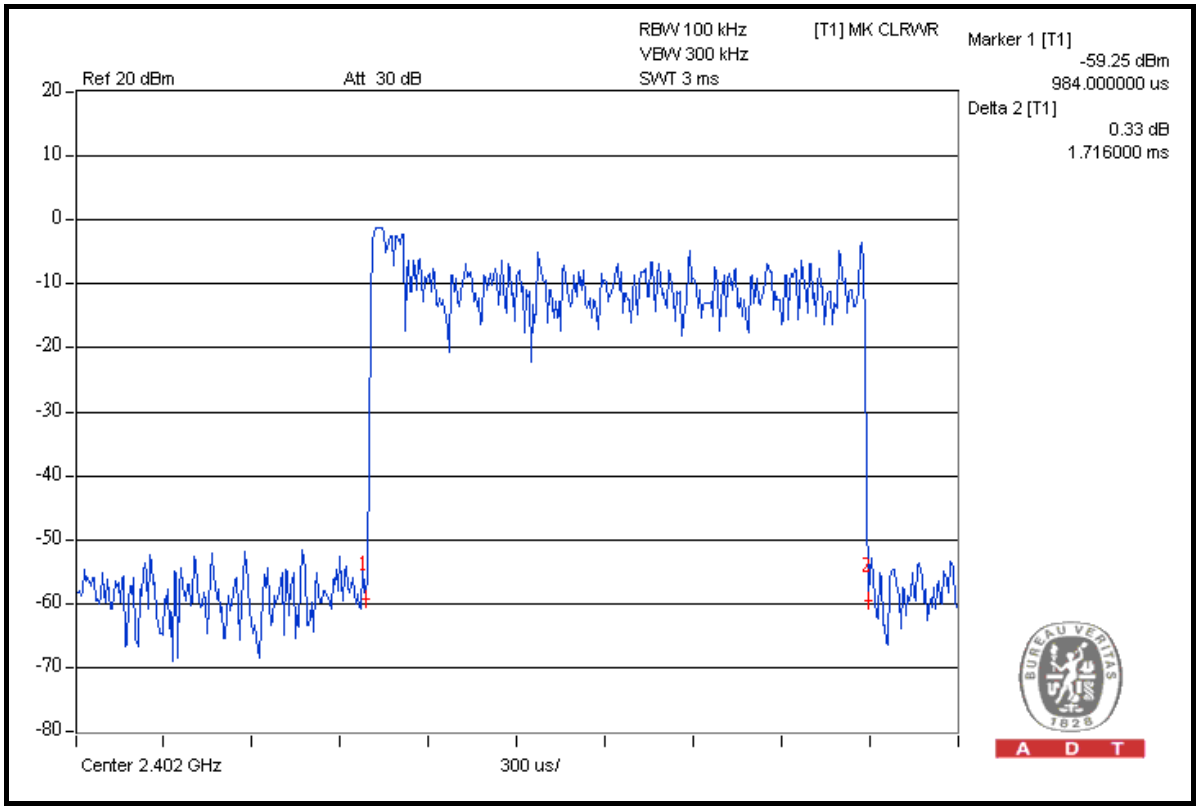
DH1


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/

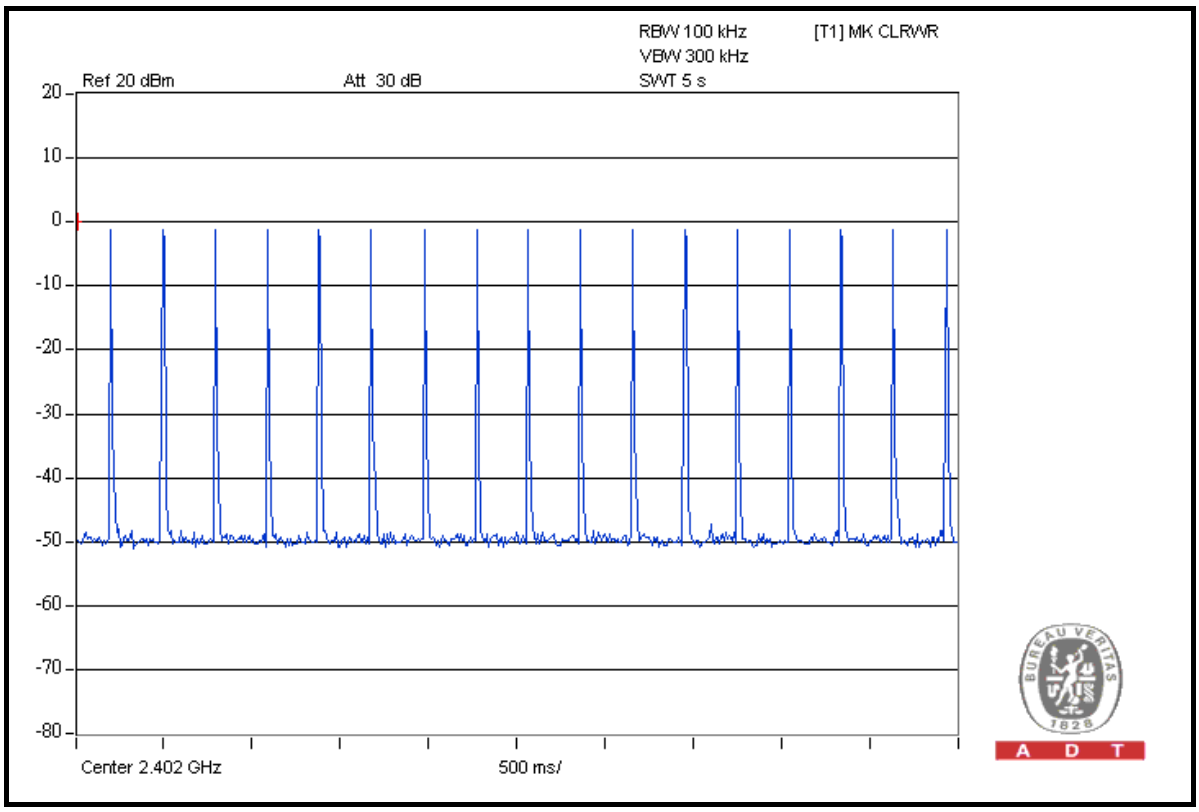

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-62.11 dBm
1.254000 ms
Delta 2 [T1]
3.79 dB
492.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/

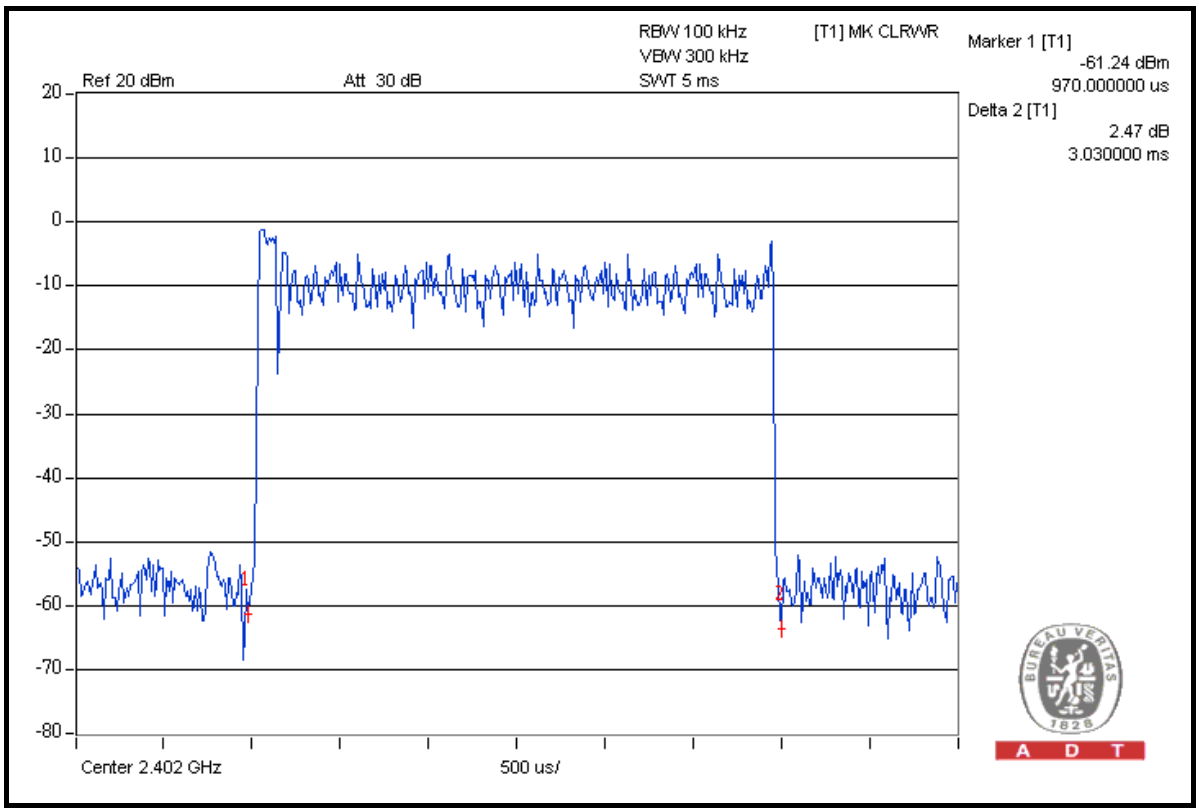
DH3


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]
-59.25 dBm
984.000000 us
Delta 2 [T1]
0.33 dB
1.716000 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]
-61.24 dBm
970.000000 us
Delta 2 [T1]
2.47 dB
3.030000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 us/

4.4 CHANNEL BANDWIDTH

4.4.1 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.

4.4.2 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 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

Same as 4.2.5.

4.4.6 EUT OPERATING CONDITION

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

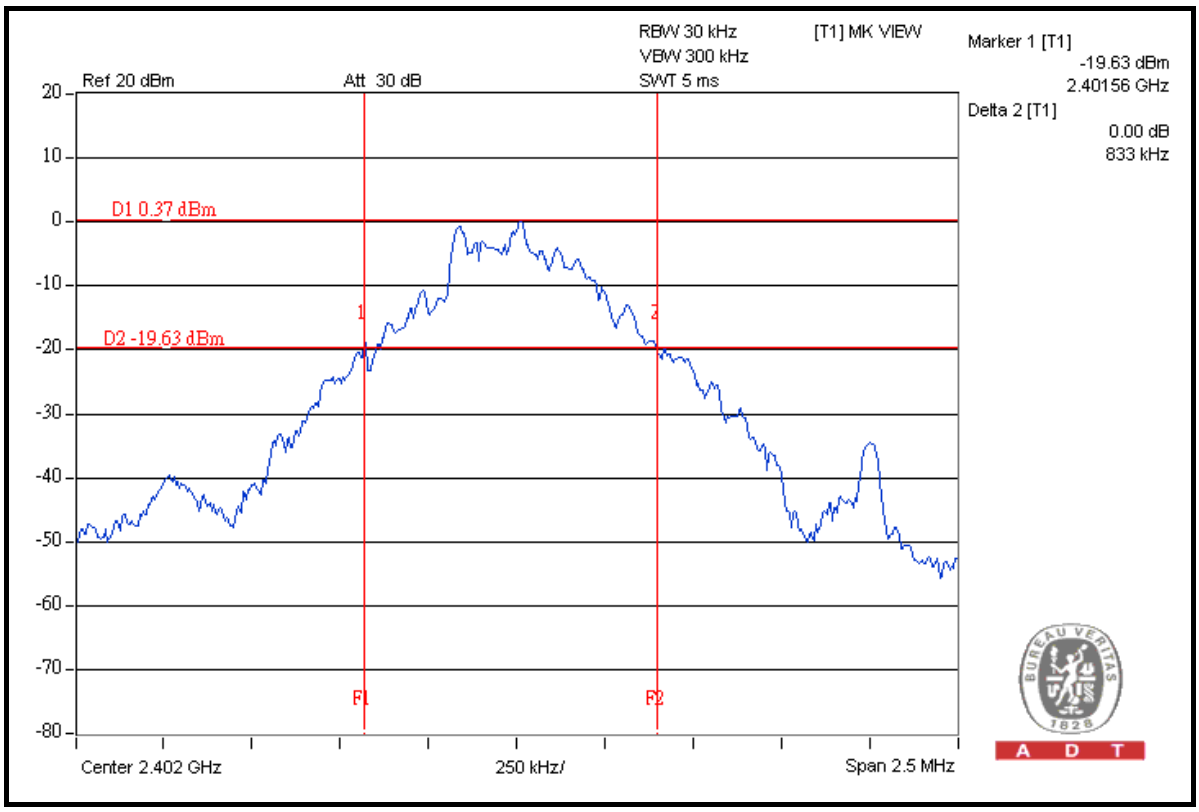
4.4.7 TEST RESULTS

GFSK MODULATION

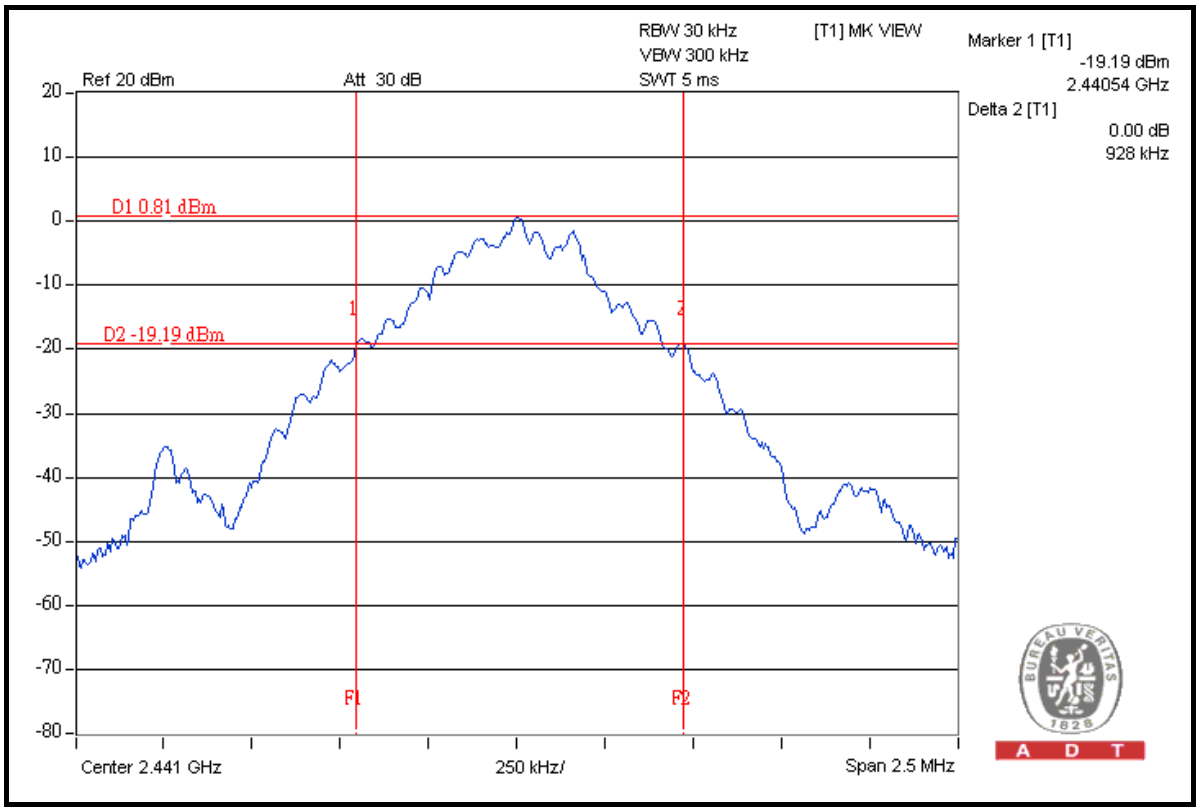
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.833
39	2441	0.928
78	2480	0.926

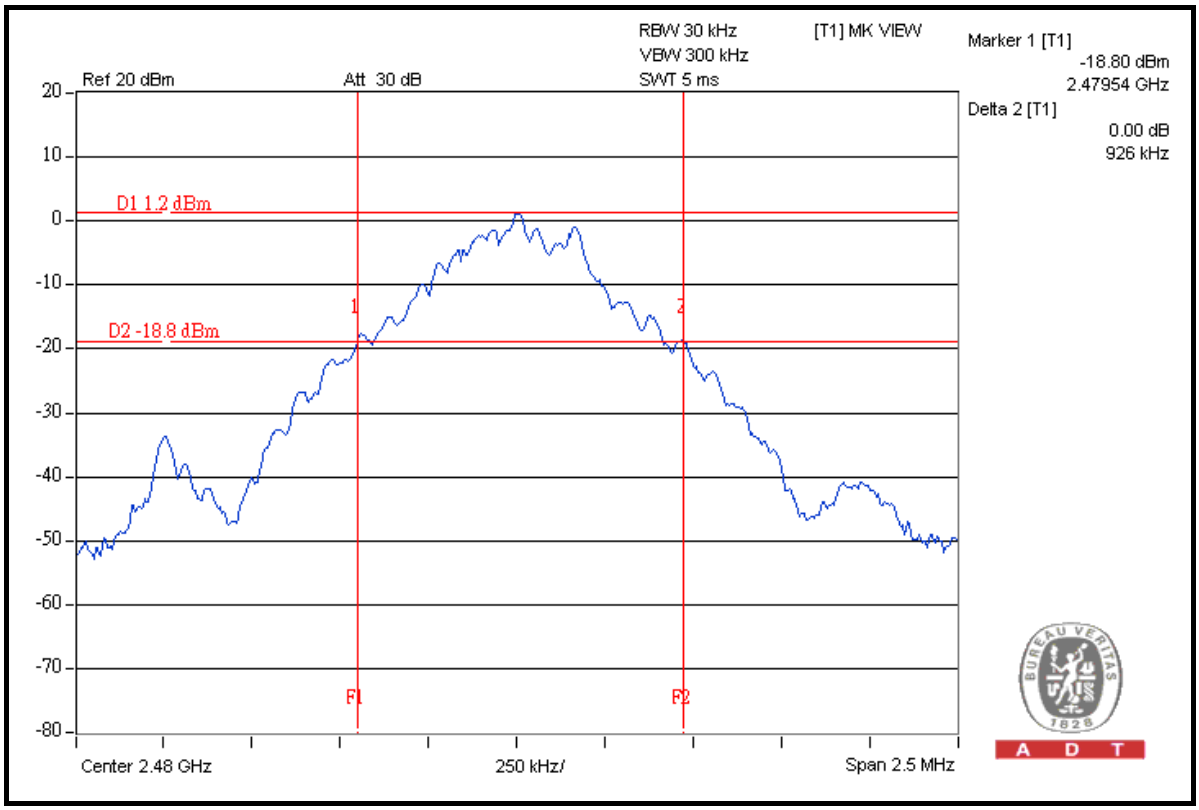
CH 0


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-19.63 dBm
2.40156 GHz
Delta 2 [T1]
0.00 dB
833 kHz
Ref 20 dBm
Att 30 dB
D1 0.37 dBm
D2 -19.63 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
F1
F2
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]
-19.19 dBm
2.44054 GHz
Delta 2 [T1]
0.00 dB
928 kHz
Ref 20 dBm
Att 30 dB
D1 0.81 dBm
D2 -19.19 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
F1
F2
Center 2.441 GHz
250 kHz/
Span 2.5 MHz

CH 78

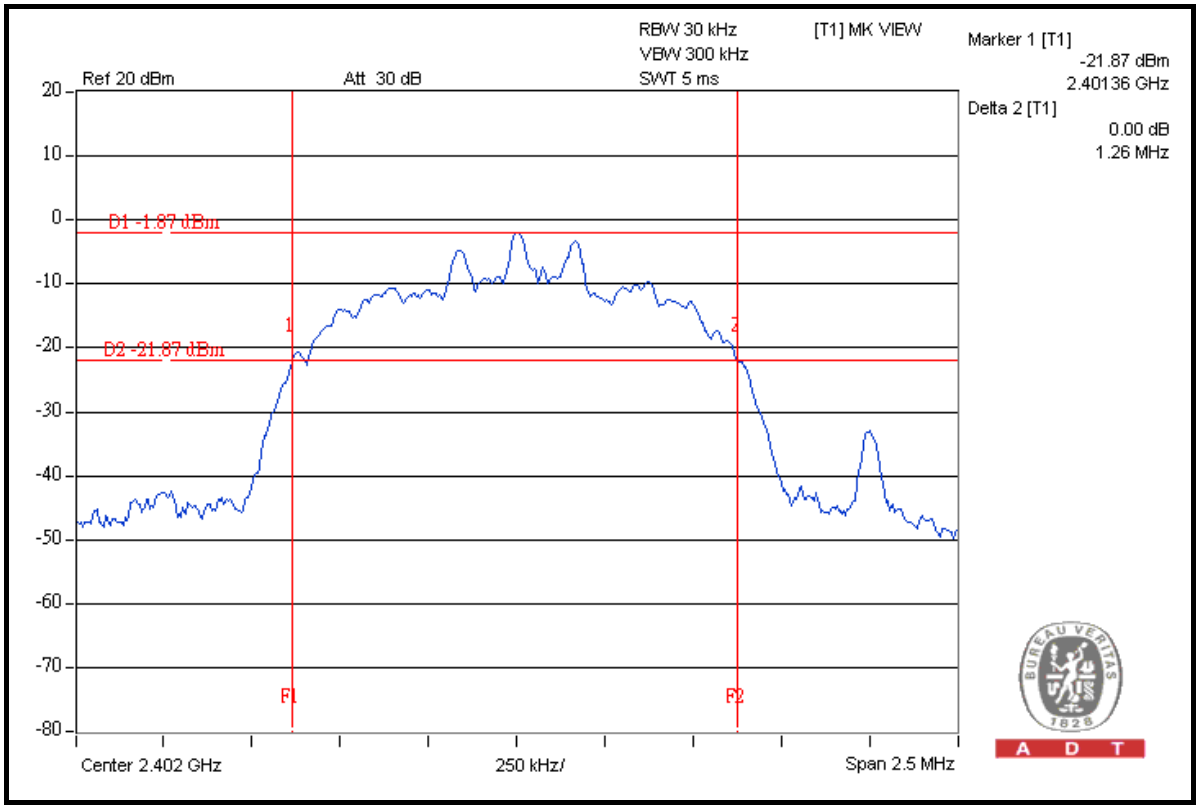

RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-18.80 dBm
2.47954 GHz
Delta 2 [T1]
0.00 dB
926 kHz
Ref 20 dBm
Att 30 dB
D1 1.2 dBm
D2 -18.8 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

8DPSK MODULATION

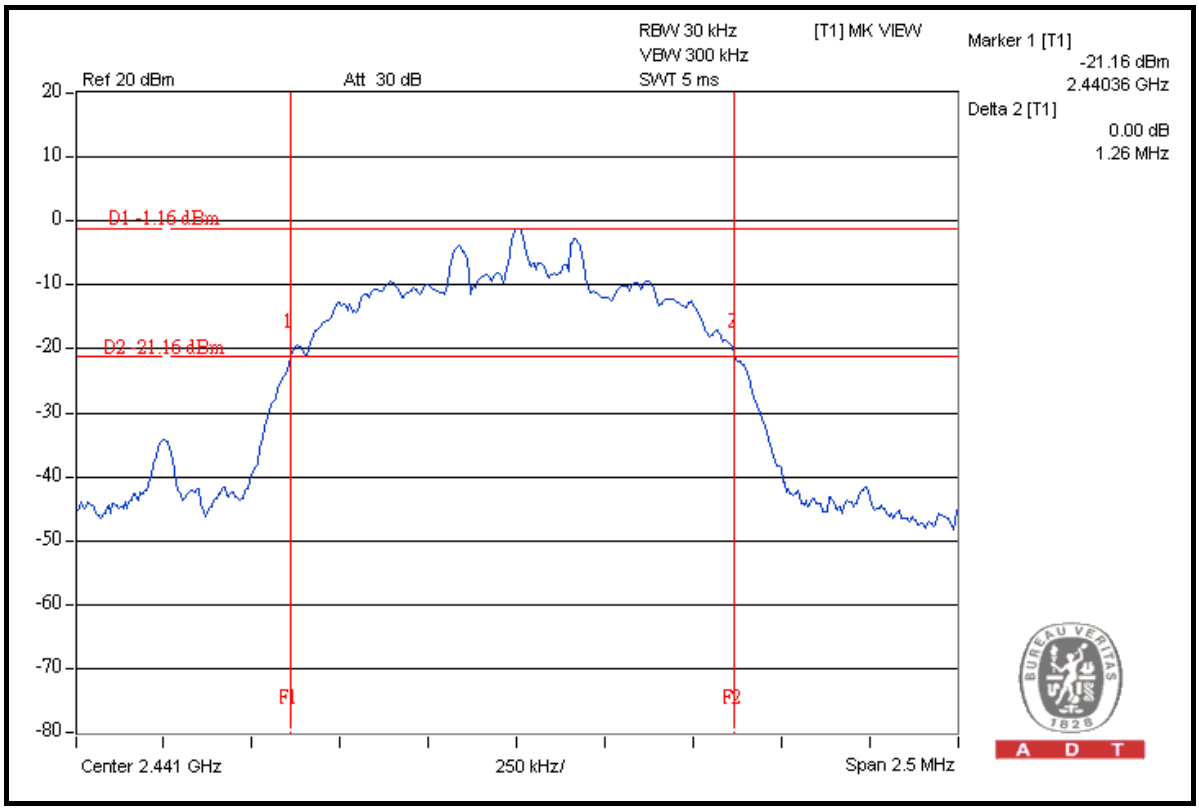
MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	TESTED BY	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.260
39	2441	1.260
78	2480	1.260

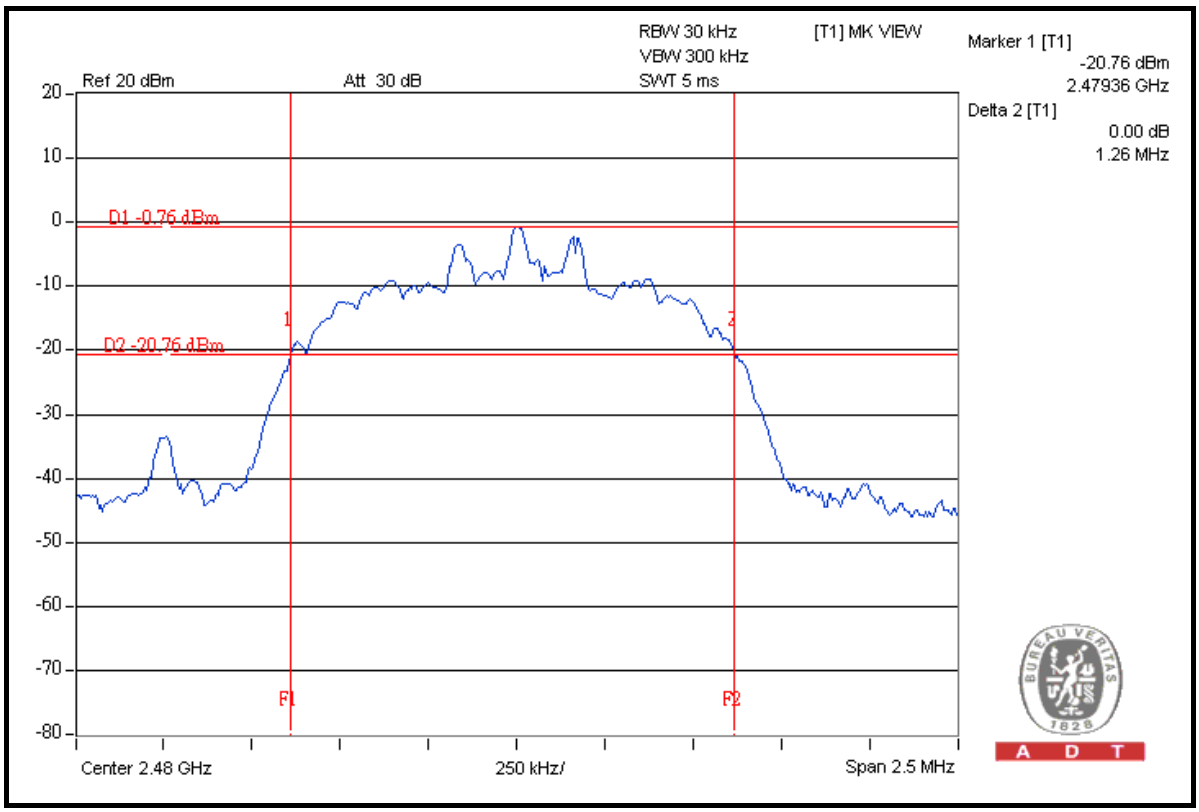
CH 0



CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-21.16 dBm
2.44036 GHz
Delta 2 [T1]
0.00 dB
1.26 MHz
Ref 20 dBm
Att 30 dB
D1 -1.16 dBm
D2 -21.16 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
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]
-20.76 dBm
2.47936 GHz
Delta 2 [T1]
0.00 dB
1.26 MHz
Ref 20 dBm
Att 30 dB
D1 -0.76 dBm
D2 -20.76 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz

4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

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 PROCEDURES

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

Same as 4.2.5

4.5.6 TEST RESULTS

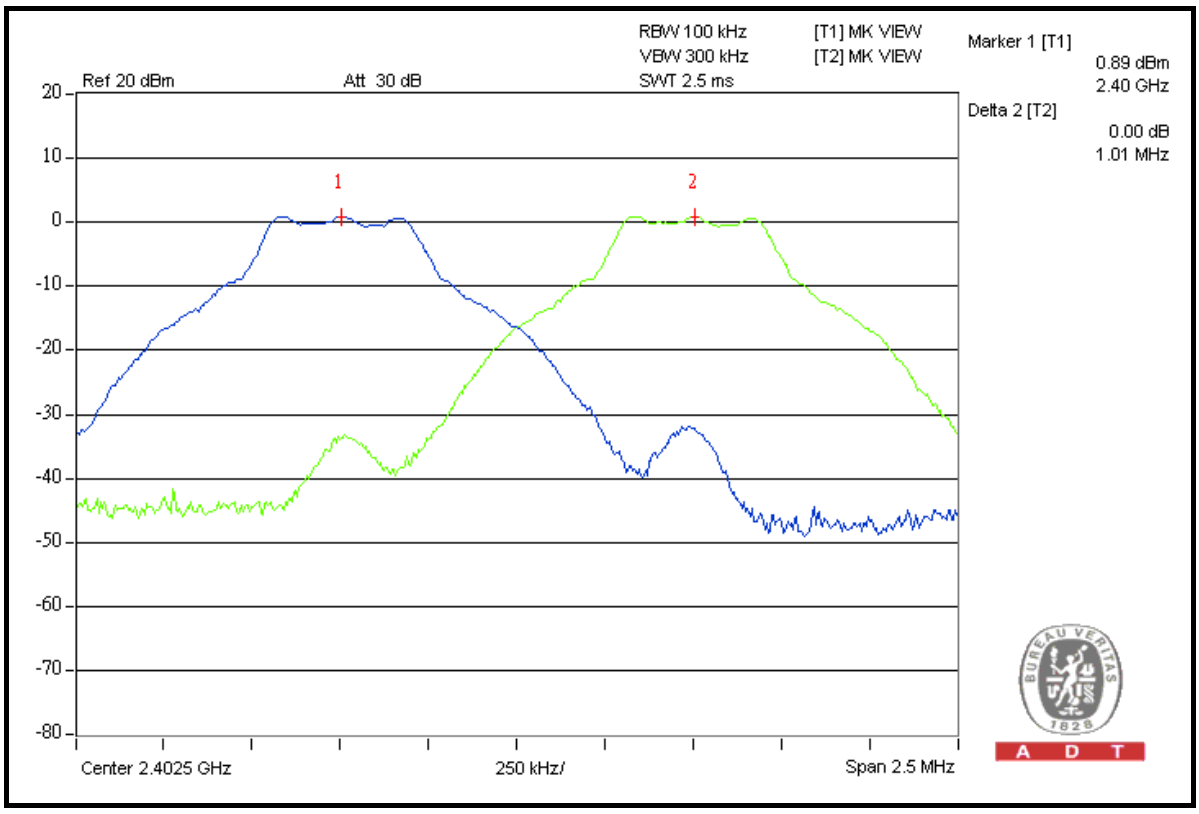
GFSK MODULATION

MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	TESTED BY	Dean Wang

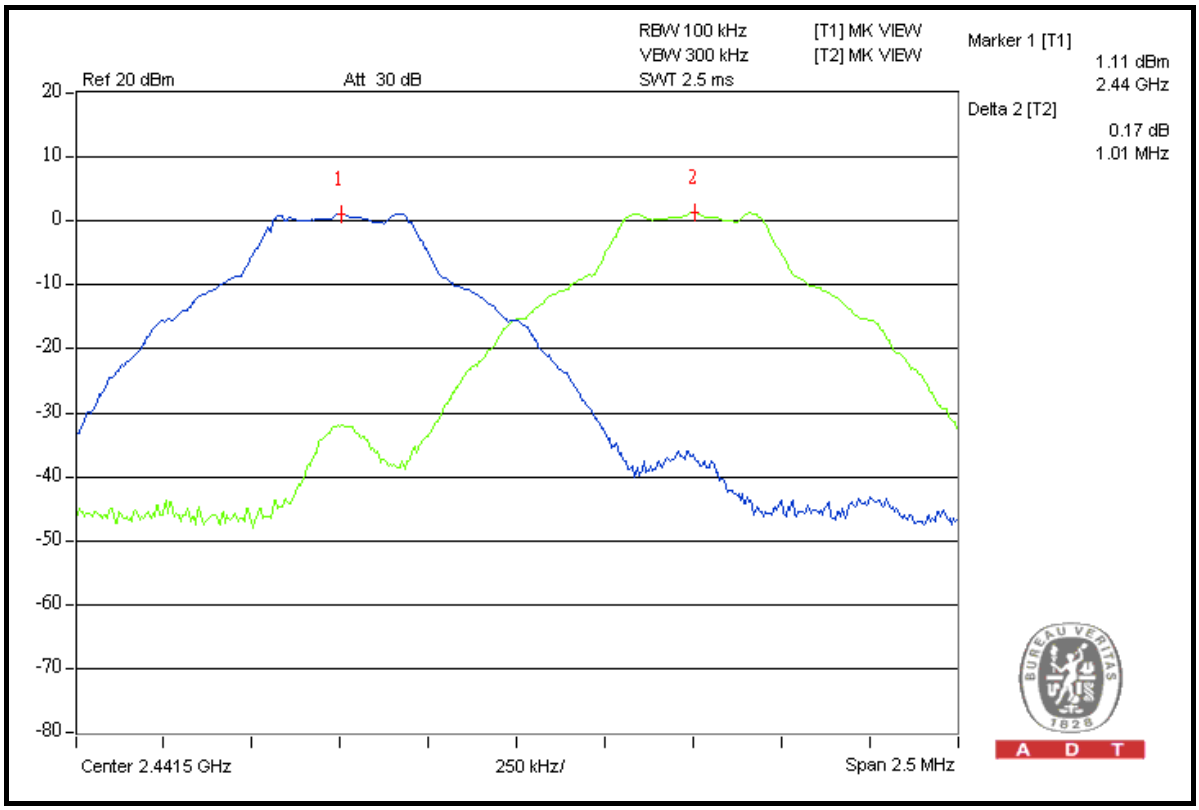
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.010	0.833	0.555	PASS
39	2441	1.010	0.928	0.619	PASS
78	2480	1.000	0.926	0.617	PASS

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

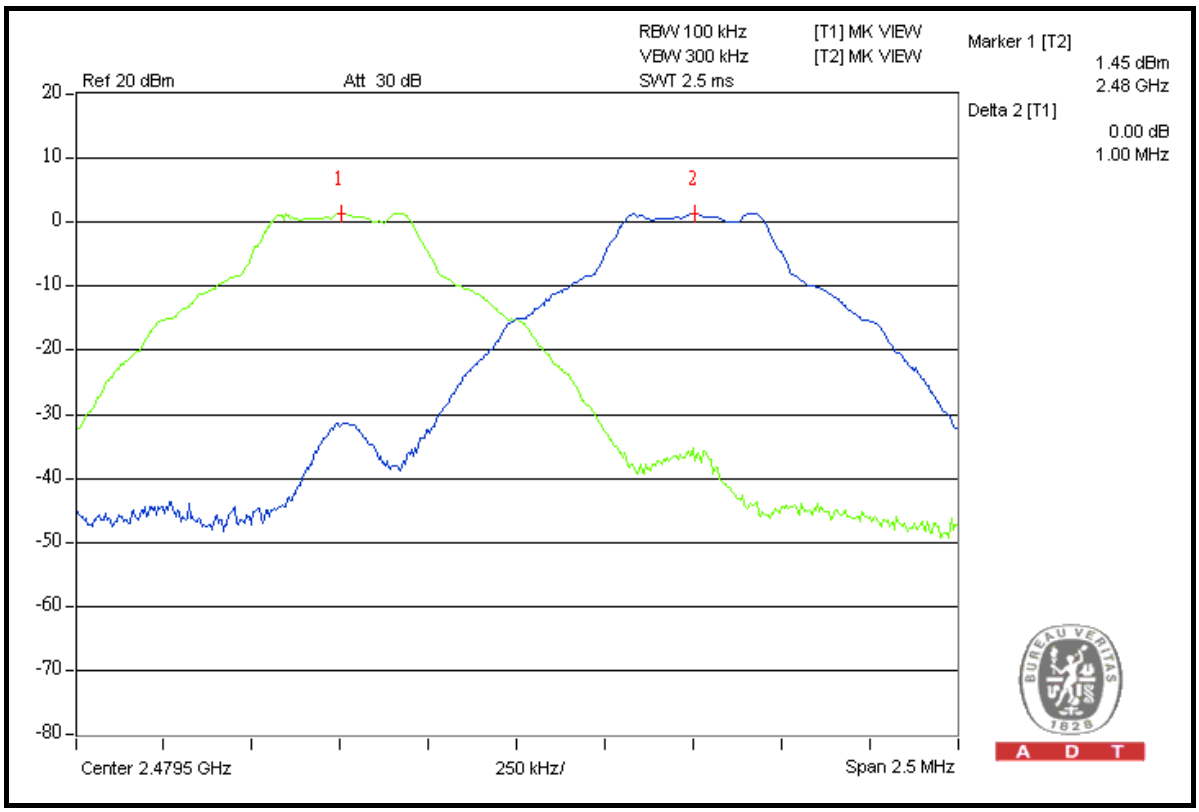
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
1.11 dBm
2.44 GHz
Delta 2 [T2]
0.17 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]
1.45 dBm
2.48 GHz
Delta 2 [T1]
0.00 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

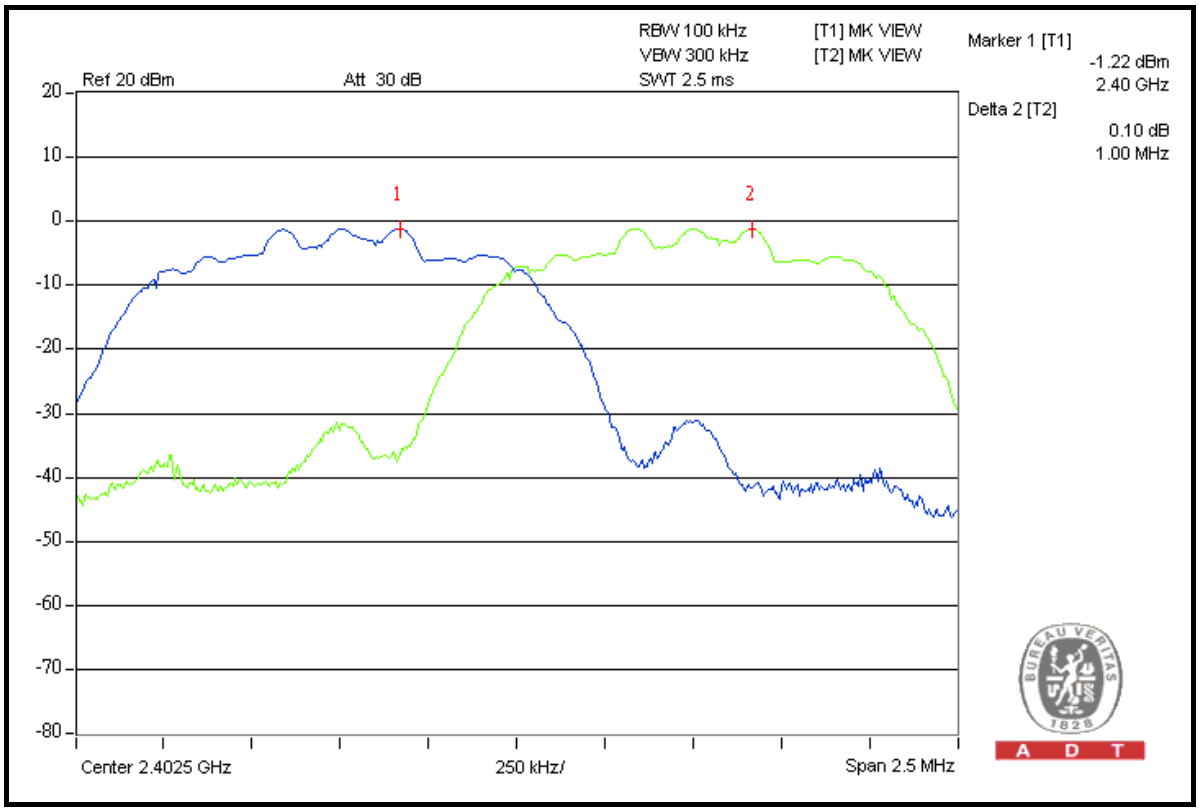
8DPSK MODULATION

MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	TESTED BY	Dean Wang

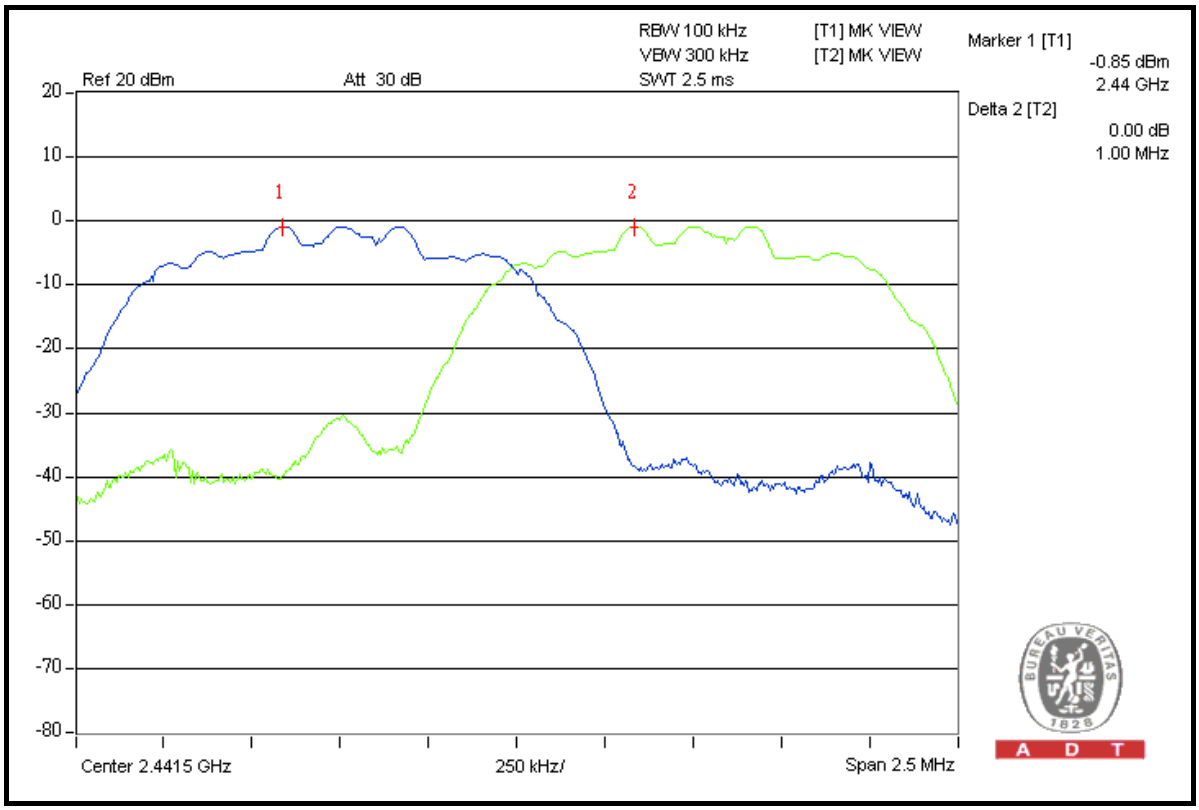
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	1.260	0.840	PASS
39	2441	1.000	1.260	0.840	PASS
78	2480	1.000	1.260	0.840	PASS

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

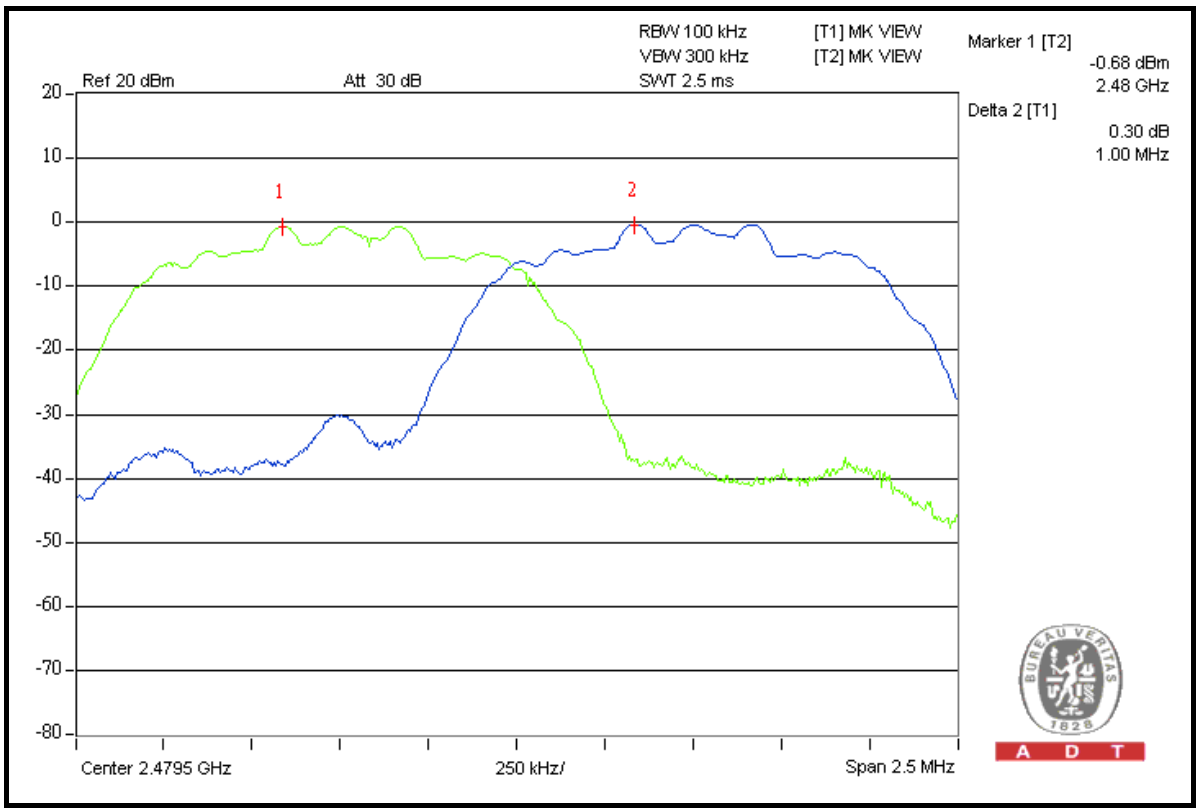
CH 0



CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
-0.85 dBm
2.44 GHz
Delta 2 [T2]
0.00 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]
-0.68 dBm
2.48 GHz
Delta 2 [T1]
0.30 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

4.6 MAXIMUM PEAK OUTPUT POWER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.6.2 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

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP

Same as 4.3.5.

4.6.6 EUT OPERATING CONDITION

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

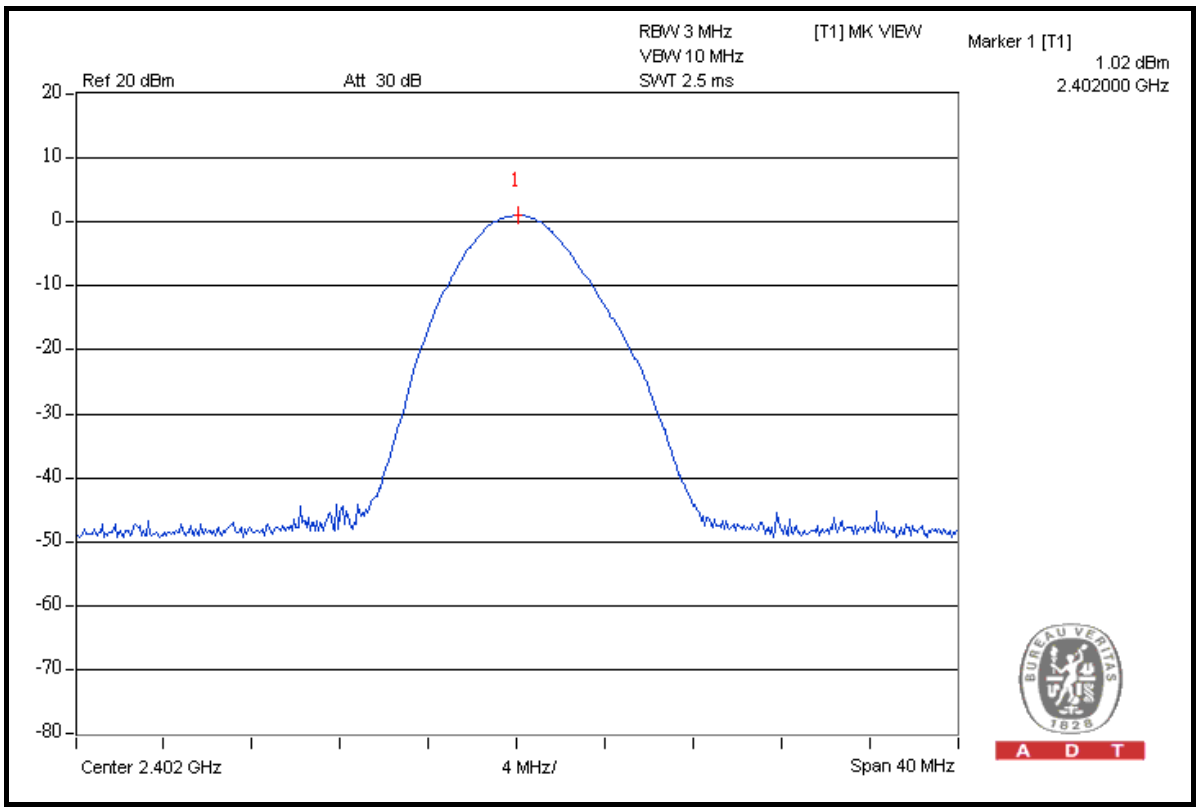
4.6.7 TEST RESULTS

GFSK MODULATION

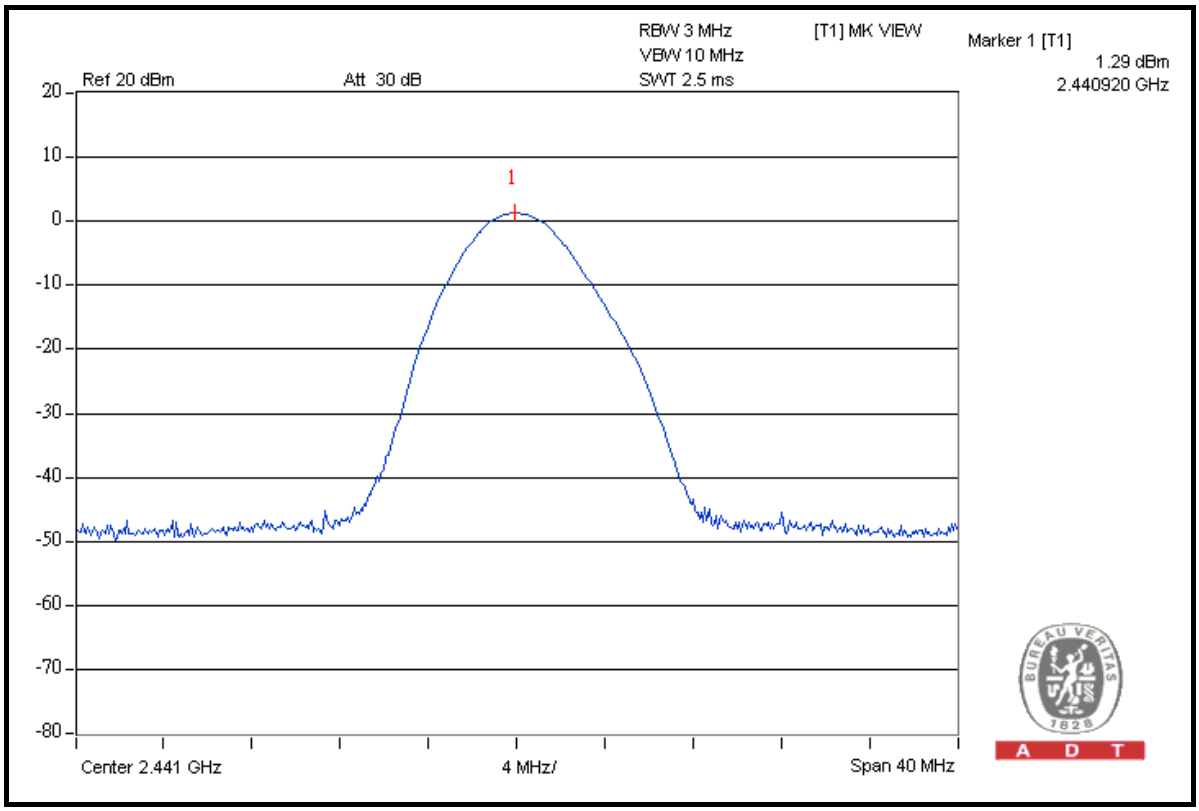
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.27	1.02	125	PASS
39	2441	1.35	1.29	125	PASS
78	2480	1.45	1.60	125	PASS

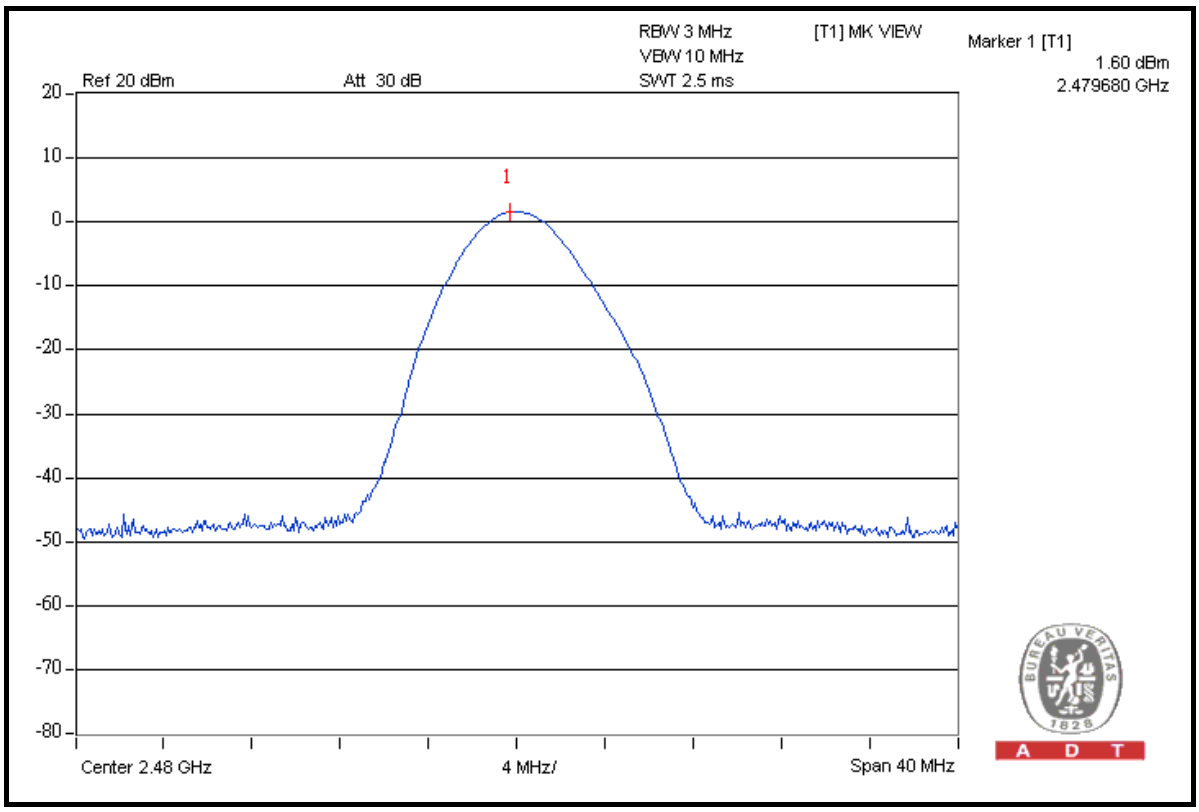
CH 0


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
1.02 dBm
2.402000 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]
1.29 dBm
2.440920 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

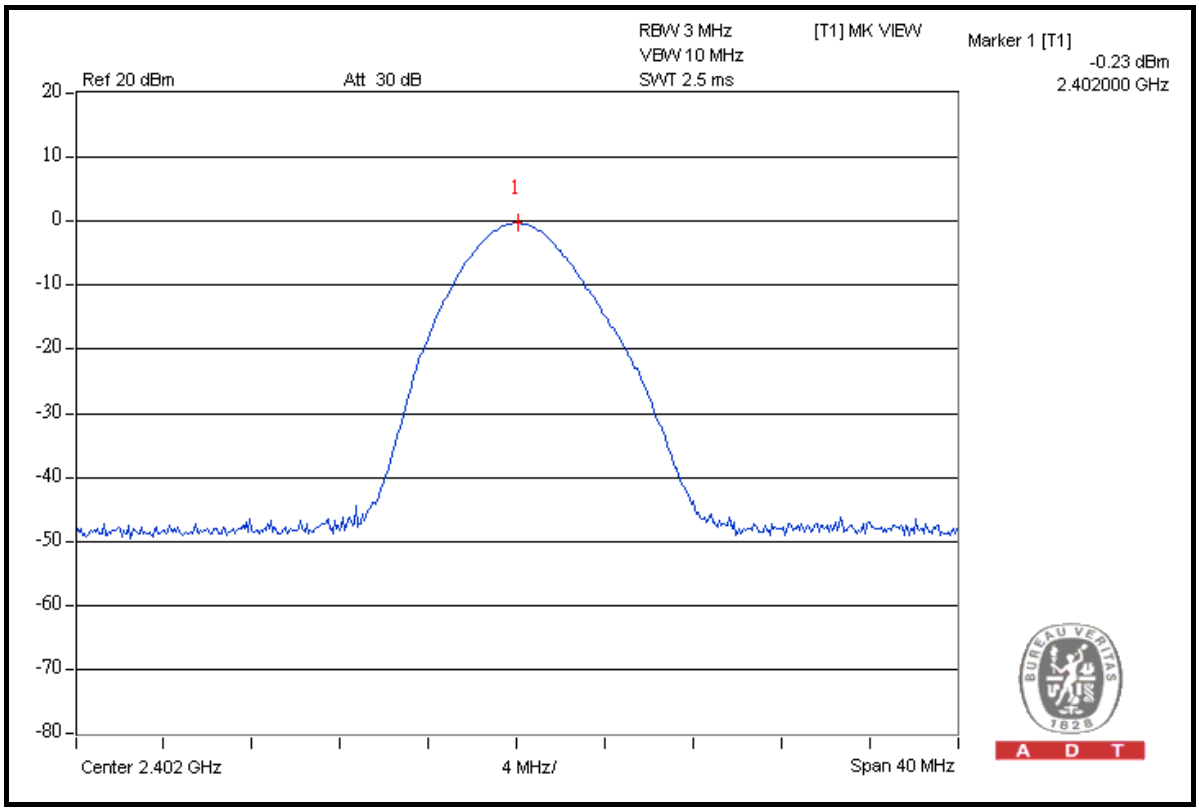

RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
1.60 dBm
2.479680 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.48 GHz
4 MHz/
Span 40 MHz

8DPSK MODULATION

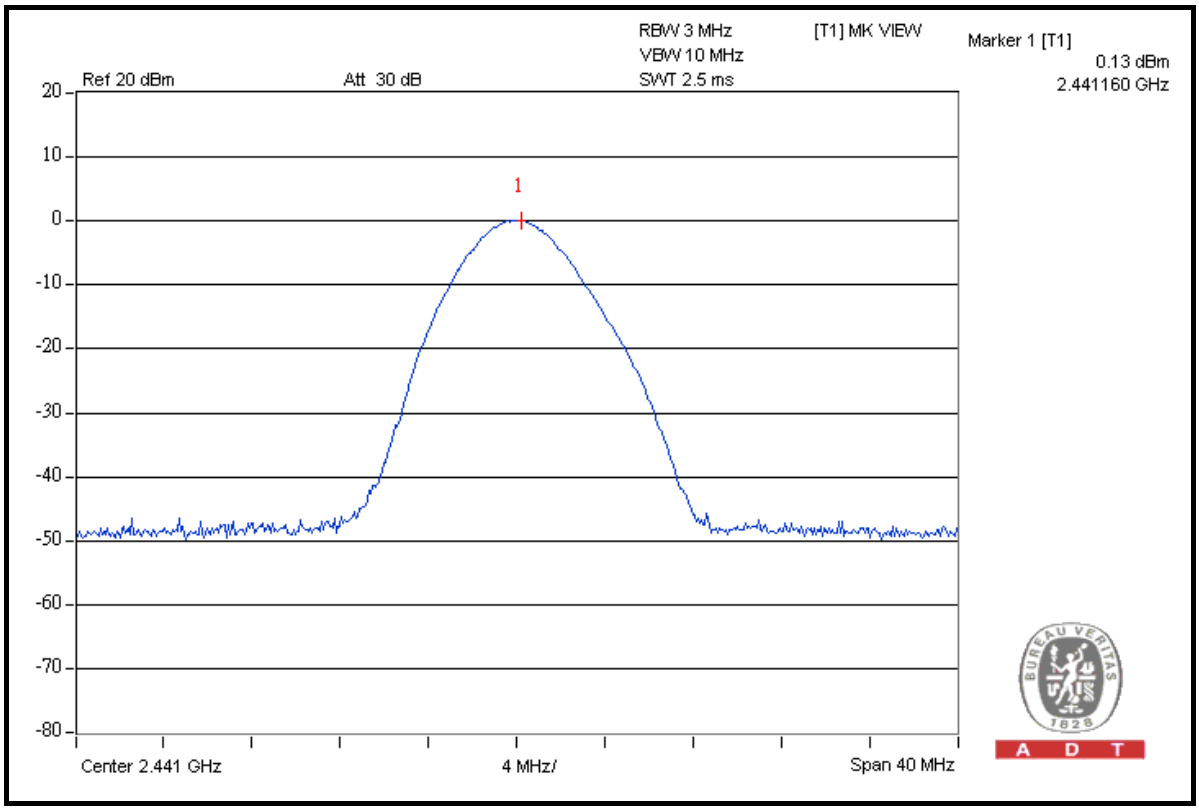
MODULATION TYPE	8DPSK	**ENVIRONMENTAL CONDITIONS**	25deg. C, 66%RH, 1010hPa
INPUT POWER (SYSTEM)	12Vdc	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.95	-0.23	125	PASS
39	2441	1.03	0.13	125	PASS
78	2480	1.19	0.77	125	PASS

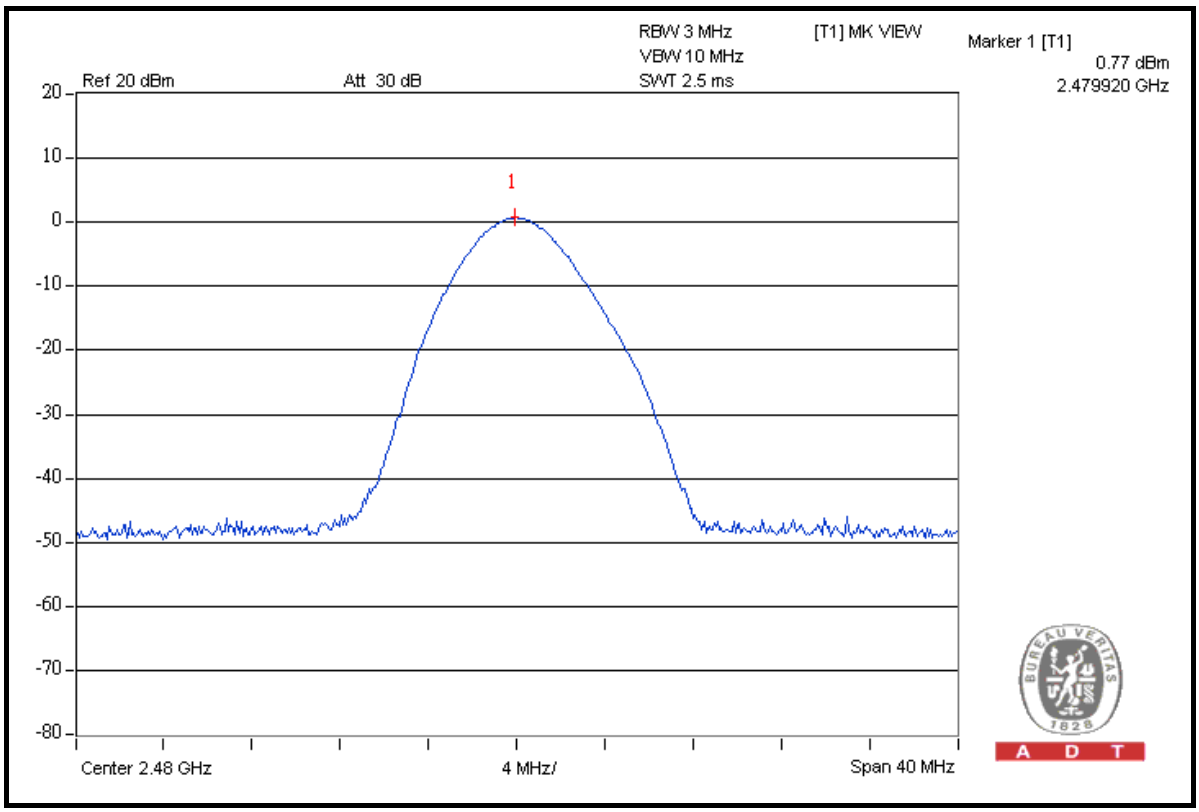
CH 0



CH 39


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
0.13 dBm
2.441160 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]
0.77 dBm
2.479920 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

4.7 BAND EDGES MEASUREMENT

4.7.1 LIMITS OF BAND EDGES MEASUREMENT

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

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 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.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

4.7.5 EUT OPERATING CONDITION

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

4.7.6 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 49.06dBc between carrier maximum power and local maximum emission in restrict band (2.3618GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.1.7 is 97.89dBuV/m (Peak), so the maximum field strength in restrict band is 97.89 – 49.06 = 48.83dBuV/m, which is under 74dBuV/m limit.

Average value = 48.83 – 30.10 = 18.73dBuV/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.

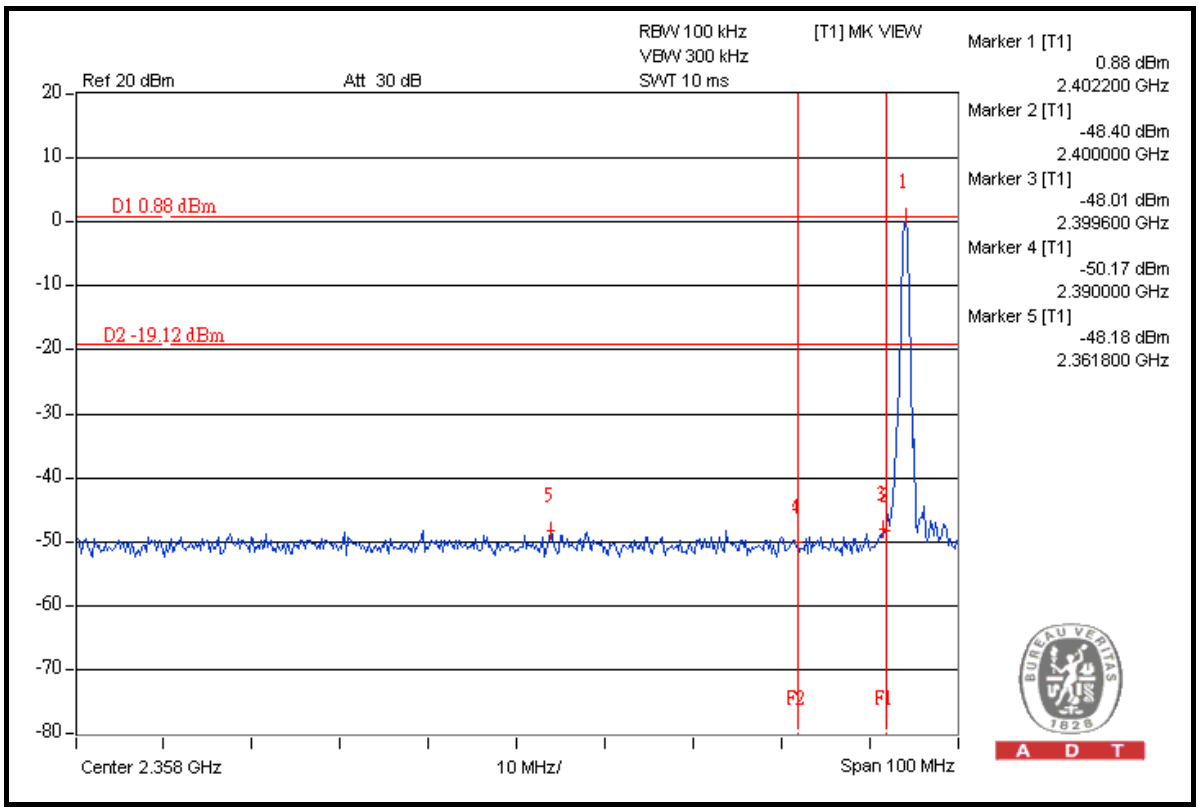
Average value = peak reading – 30.1

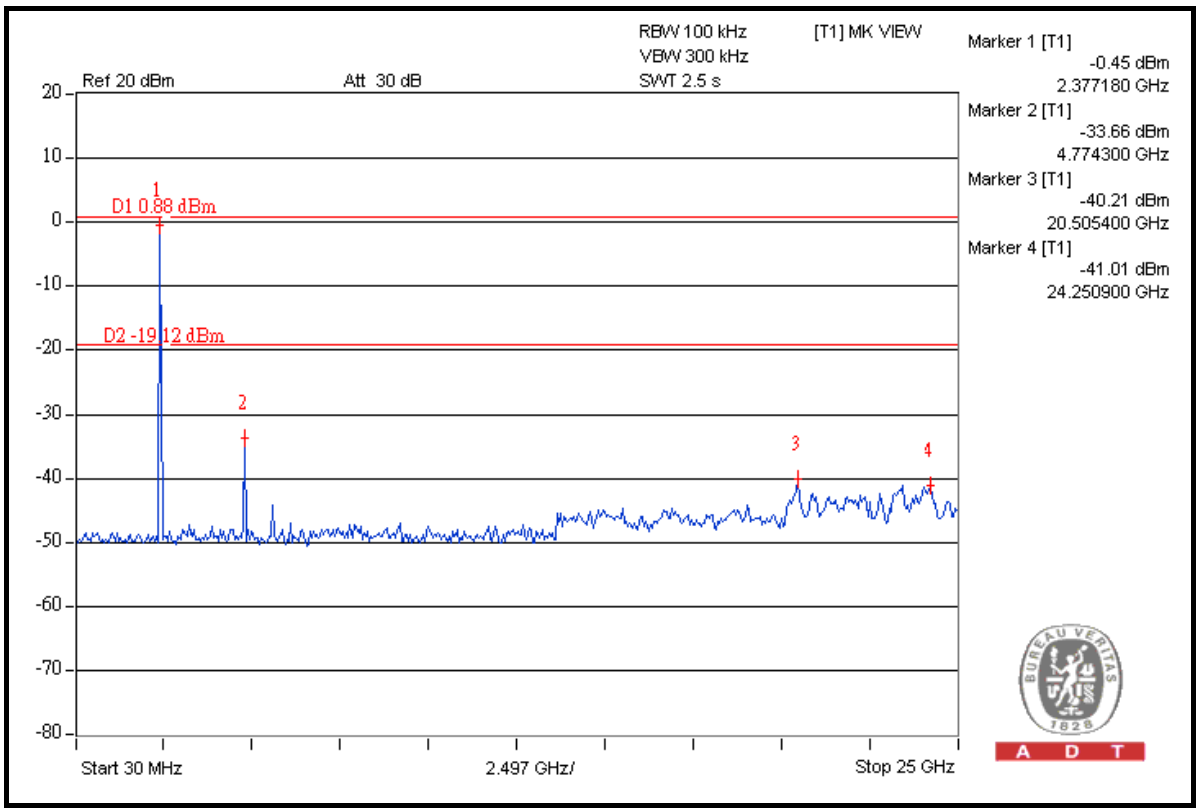
NOTE 2: The band edge emission plot on the next second page shows 49.72dBc between carrier maximum power and local maximum emission in restrict band (2.4916GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.1.7 is 100.00 dBuV/m (Peak), so the maximum field strength in restrict band is 100.00 – 49.72 = 50.28dBuV/m, which is under 74 dBuV/m limit.

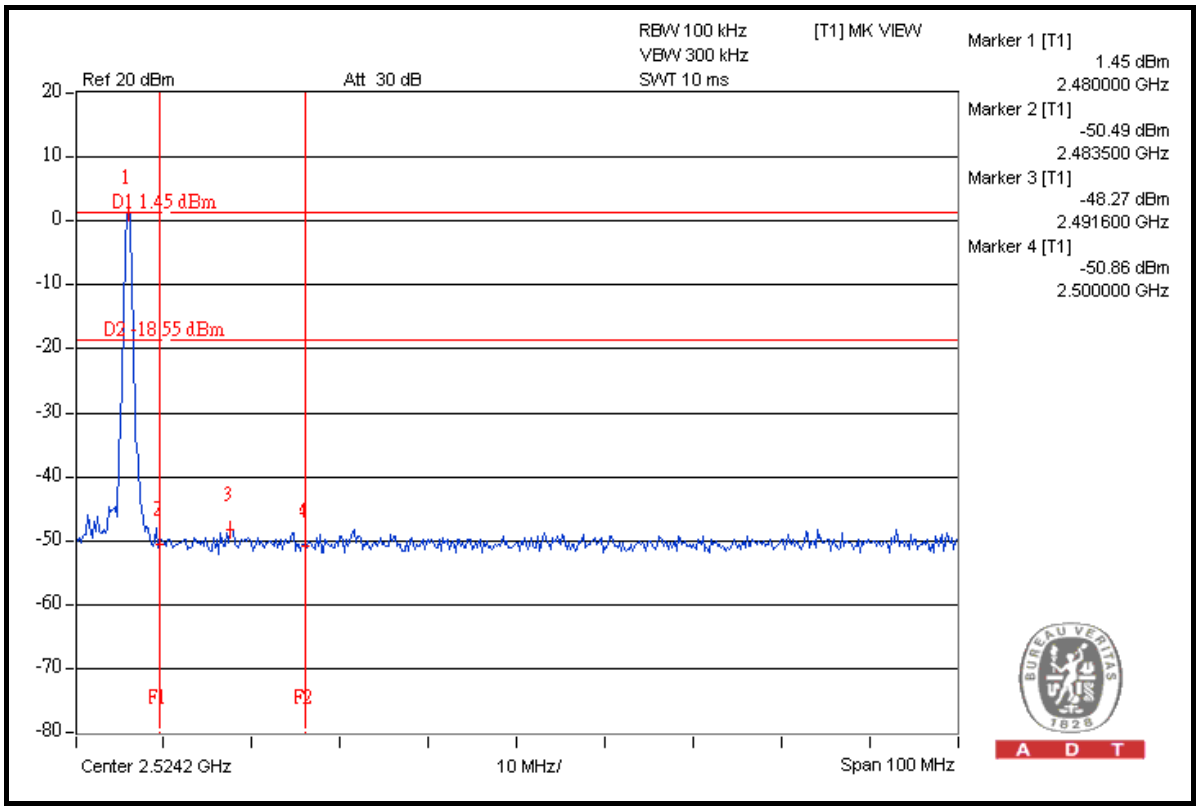
Average value = 50.28 – 30.10 = 20.18dBuV/m, which is under 54dBuV/m limit.

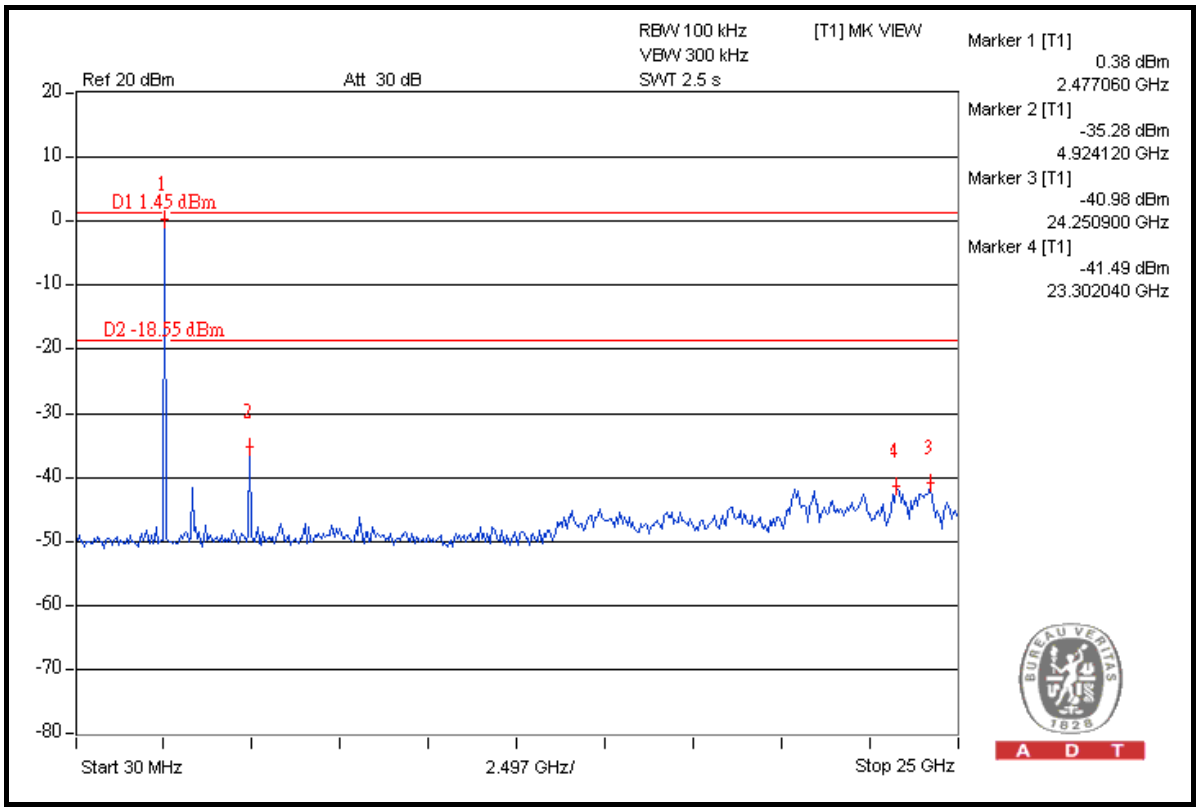
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: 20log(3.125/100)= -30.1 dB.

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 0.88 dBm
D2 -19.12 dBm
Marker 1 [T1]
0.88 dBm
2.402200 GHz
Marker 2 [T1]
-48.40 dBm
2.400000 GHz
Marker 3 [T1]
-48.01 dBm
2.399600 GHz
Marker 4 [T1]
-50.17 dBm
2.390000 GHz
Marker 5 [T1]
-48.18 dBm
2.361800 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 0.88 dBm
D2 -19.12 dBm
Marker 1 [T1]
-0.45 dBm
2.377180 GHz
Marker 2 [T1]
-33.66 dBm
4.774300 GHz
Marker 3 [T1]
-40.21 dBm
20.505400 GHz
Marker 4 [T1]
-41.01 dBm
24.250900 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]
1.45 dBm
2.480000 GHz
Marker 2 [T1]
-50.49 dBm
2.483500 GHz
Marker 3 [T1]
-48.27 dBm
2.491600 GHz
Marker 4 [T1]
-50.86 dBm
2.500000 GHz
D1 1.45 dBm
D2 -18.55 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]
0.38 dBm
2.477060 GHz
Marker 2 [T1]
-35.28 dBm
4.924120 GHz
Marker 3 [T1]
-40.98 dBm
24.250900 GHz
Marker 4 [T1]
-41.49 dBm
23.302040 GHz
D1 1.45 dBm
D2 -18.55 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

8DPSK MODULATION

NOTE 1: The band edge emission plot on the next page shows 46.33dBc between carrier maximum power and local maximum emission in restrict band (2.3652GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.1.7 is 96.59dBuV/m (Peak), so the maximum field strength in restrict band is 96.59 – 46.33 = 50.26dBuV/m, which is under 74 dBuV/m limit.

Average value = 50.26 – 30.10 = 20.16dBuV/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.

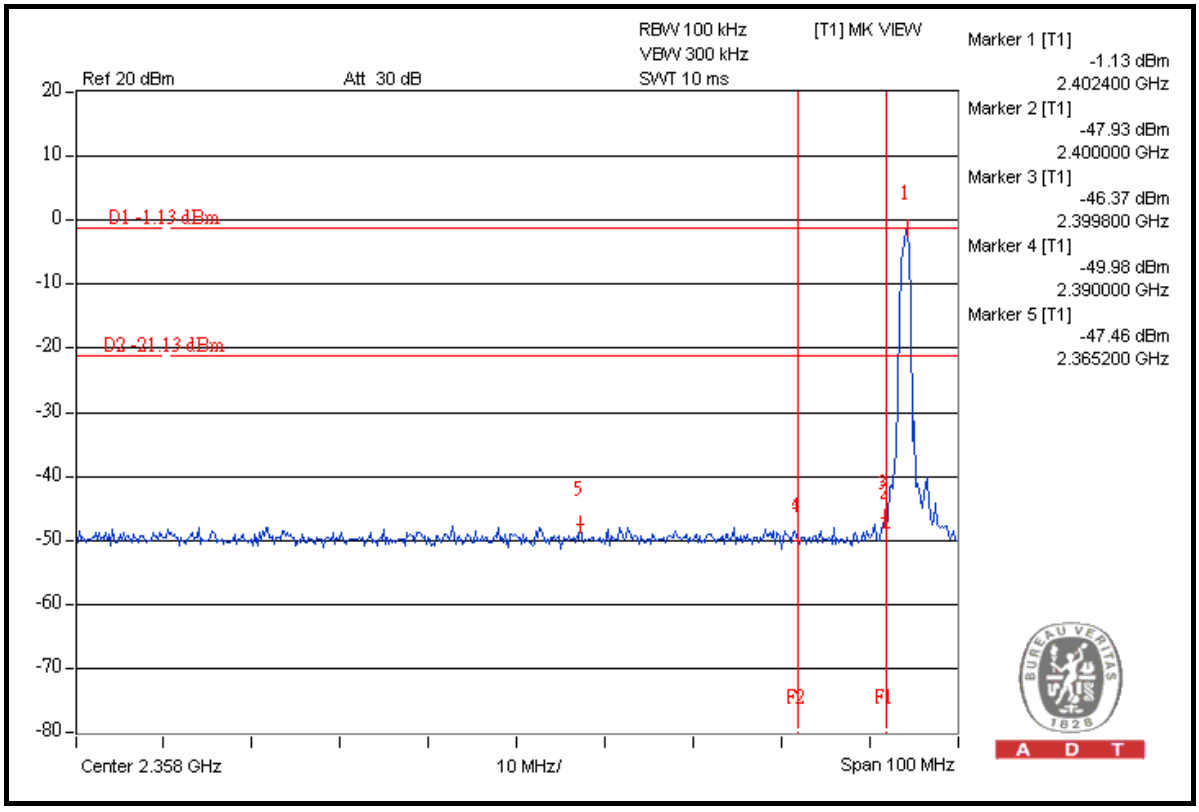
Average value = peak reading – 30.1

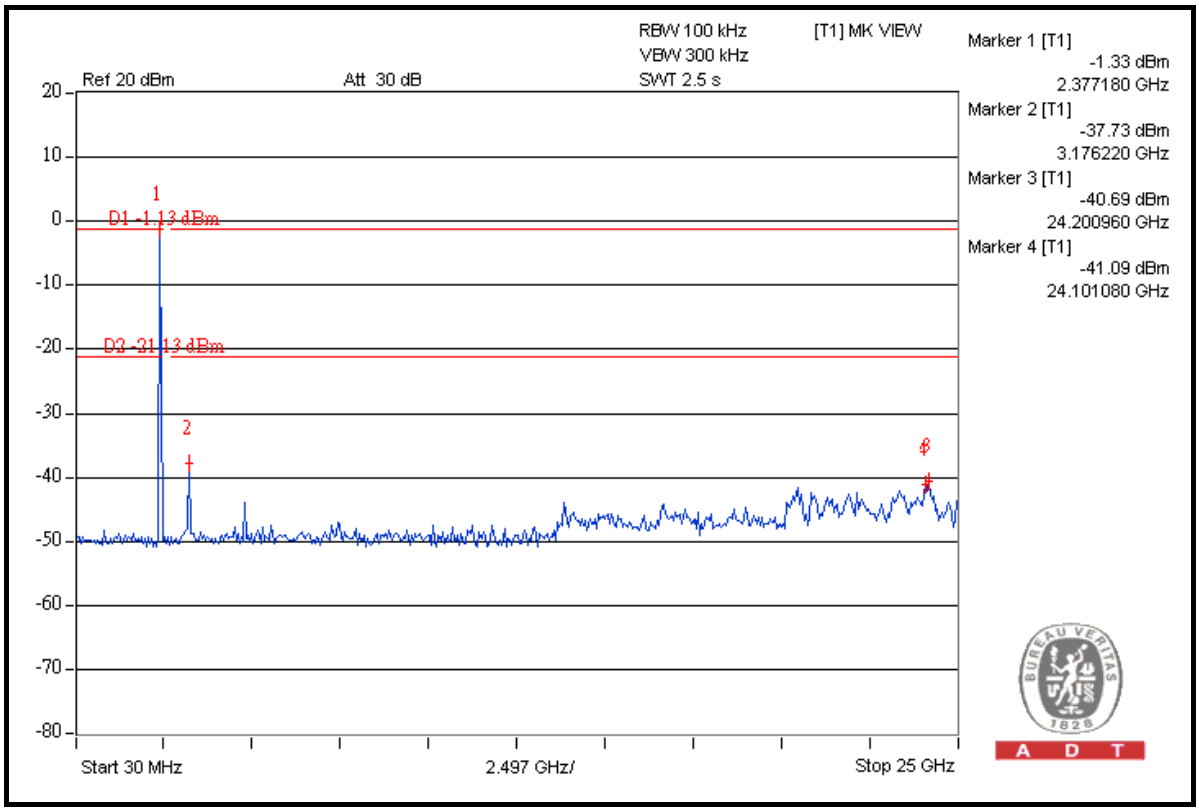
NOTE 2: The band edge emission plot on the next second page shows 46.27dBc between carrier maximum power and local maximum emission in restrict band (2.4954GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.1.7 is 98.41dBuV/m (Peak), so the maximum field strength in restrict band is 98.41 – 46.27 = 52.14dBuV/m, which is under 74 dBuV/m limit.

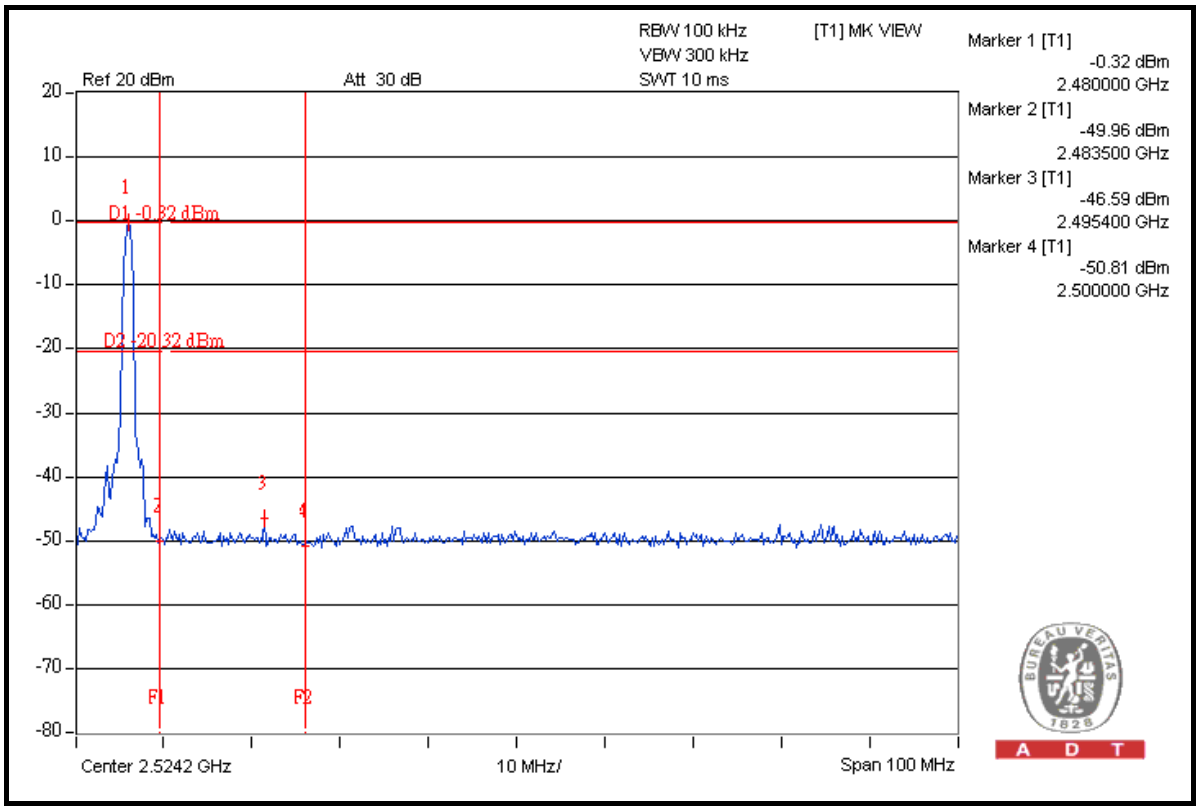
Average value = 52.14 – 30.10 = 22.04dBuV/m, which is under 54dBuV/m limit.

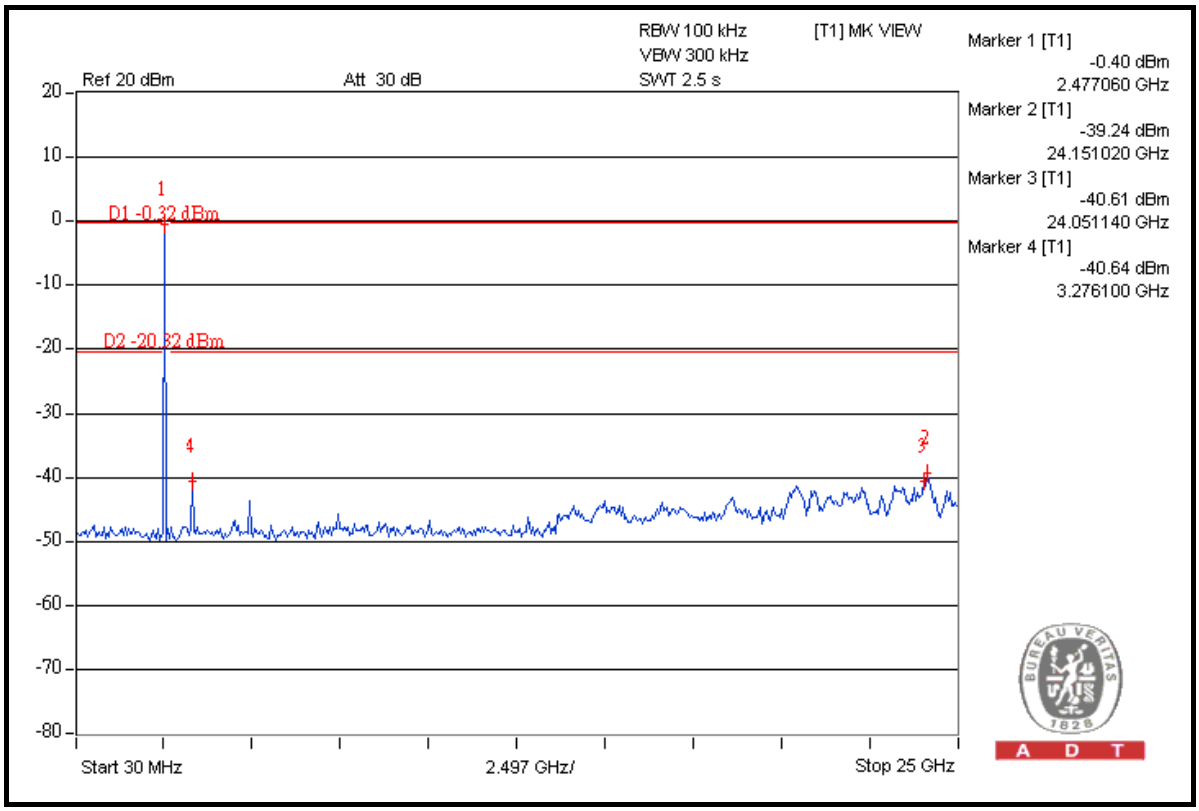
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30.1 dB.

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 -1.13 dBm
D2 -21.13 dBm
Marker 1 [T1]
-1.13 dBm
2.402400 GHz
Marker 2 [T1]
-47.93 dBm
2.400000 GHz
Marker 3 [T1]
-46.37 dBm
2.399800 GHz
Marker 4 [T1]
-49.98 dBm
2.390000 GHz
Marker 5 [T1]
-47.46 dBm
2.365200 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 -1.13 dBm
D2 -21.13 dBm
Marker 1 [T1]
-1.33 dBm
2.377180 GHz
Marker 2 [T1]
-37.73 dBm
3.176220 GHz
Marker 3 [T1]
-40.69 dBm
24.200960 GHz
Marker 4 [T1]
-41.09 dBm
24.101080 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]
-0.32 dBm
2.480000 GHz
Marker 2 [T1]
-49.96 dBm
2.483500 GHz
Marker 3 [T1]
-46.59 dBm
2.495400 GHz
Marker 4 [T1]
-50.81 dBm
2.500000 GHz
D1 -0.32 dBm
D2 -20.32 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]
-0.40 dBm
2.477060 GHz
Marker 2 [T1]
-39.24 dBm
24.151020 GHz
Marker 3 [T1]
-40.61 dBm
24.051140 GHz
Marker 4 [T1]
-40.64 dBm
3.276100 GHz
D1 -0.32 dBm
D2 -20.32 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

4.8 ANTENNA REQUIREMENT

4.8.1 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.

4.8.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is F antenna that without antenna connector. The maximum gain of this antenna is 1.47dBi.

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 ---