FCC TEST REPORT
(FOR BLUETOOTH)

REPORT NO.:	RF970611L05-1
MODEL NO.:	Atrust t100
RECEIVED:	Jun. 11, 2008
TESTED:	Jun. 19 ~ Jul. 02, 2008
ISSUED:	Jul. 03, 2008

APPLICANT:	A-TRUST computer company
ADDRESS:	3F., No. 361, Fusing 1st Rd., Gueishan Township, Taoyuan County 333, Taiwan (R.O.C)

ISSUED BY:	Advance Data Technology Corporation
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang 244, Taipei Hsien, 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.

Testing Laboratory 0528

TESTING CERT # 2177-01

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1. CERTIFICATION

PRODUCT:	Thin Client
BRAND:	Atrust
MODEL:	Atrust t100
APPLICANT:	A-TRUST computer company
TESTED:	Jun. 19 ~ Jul. 02, 2008
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247),** ANSI C63.4-2003

The above equipment (model: Atrust t100) 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 : Peggy Chen , **DATE:** Jul. 03, 2008
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jul. 03, 2008
Responsible for RF
Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Jul. 03, 2008
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is –11.73dB at 0.185MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec.: Min. 25 kHz or $\frac{2}{3}$*20 dB bandwidth, whichever is greater 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Spec.: max. 21dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is –4.45dB at 59.06MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.

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

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz ~ 30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Thin Client
MODEL NO.	Atrust t100
FCC ID	WF6ATRUST-T100
POWER SUPPLY	12.0Vdc from power adapter 9.5Vdc from power adapter
MODULATION TYPE	Wireless LAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM Bluetooth: GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	DSSS, OFDM, FHSS
TRANSFER RATE	Wireless LAN: 802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps Bluetooth: 1/2/3Mbps
FREQUENCY RANGE	2400 ~ 2483.5MHz
NUMBER OF CHANNEL	Wireless LAN: 11 Bluetooth: 79
CHANNEL SPACING	Wireless LAN: 5MHz Bluetooth: 1MHz
OUTPUT POWER	Wireless LAN: 65.013mW Bluetooth: 2.023mW
ANTENNA TYPE	Wireless LAN: PIFA antenna with 1.36dBi gain Bluetooth: Printed antenna with -3.95dBi gain
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT is a Thin Client. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g	FCC Part 15	RF970611L05
BLUETOOTH		RF970611L05-1

2. The EUT was operated with following power adapters:

Adapter 1	
BRAND:	LI SHIN INTERNATIONAL ENTERPRISE CORP.
MODEL:	0225A1236
INPUT:	100-240Vac, 1.5A, 50-60Hz
OUTPUT:	12Vdc, 3A
POWER LINE:	AC: 0.7m non-shielded cable without core DC: 1.8m non-shielded cable with one core

Adapter 2	
BRAND:	PIE
MODEL:	AD59230
INPUT:	100-240Vac, 680mA, 50/60Hz
OUTPUT:	9.5Vdc, 2.315A
POWER LINE:	3.0m non-shielded cable without core

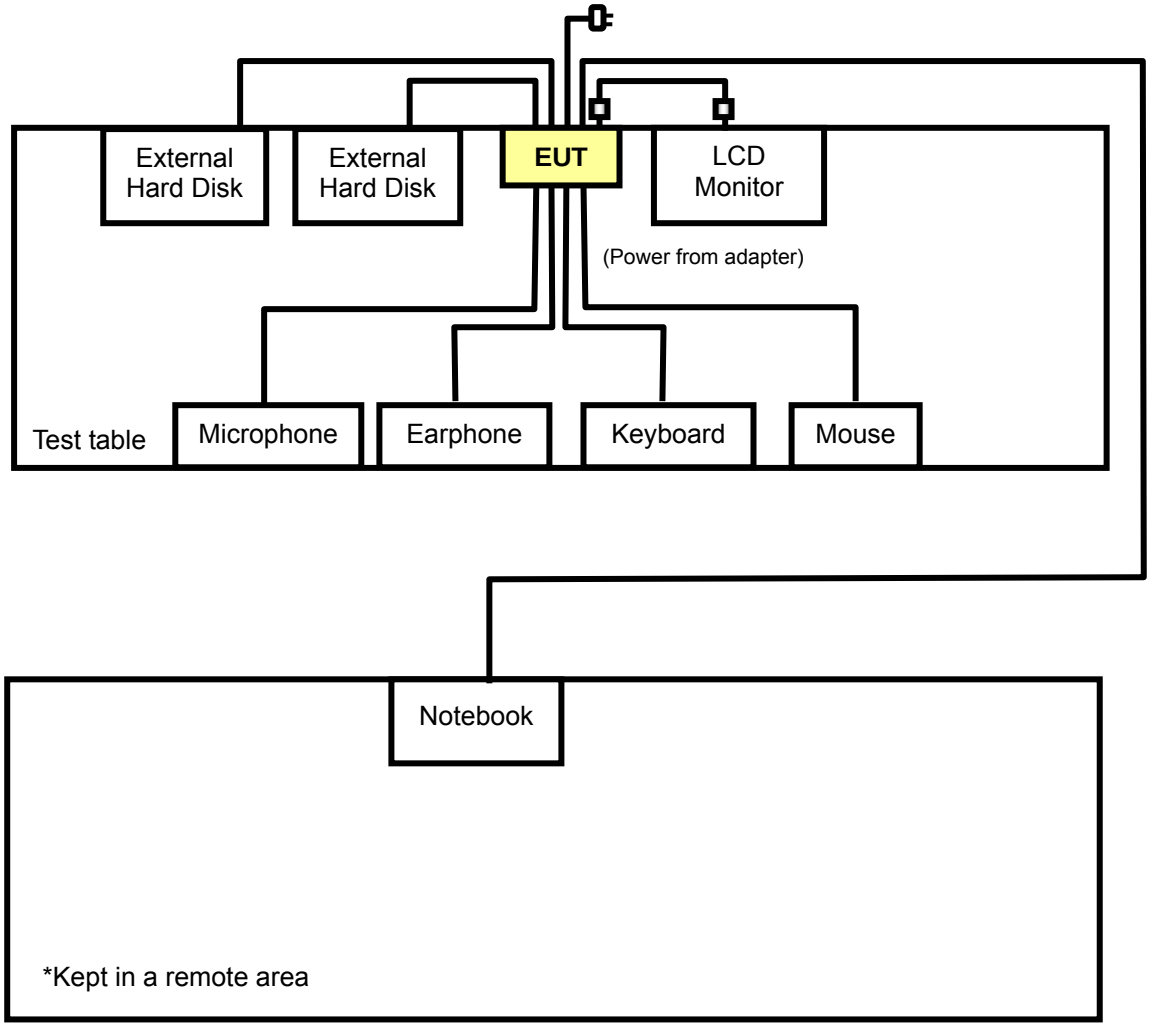
3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

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

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION	
	RE≥1G	RE<1G	PLC	APCM	RAM	Adapter Model
A	√	√	√	√	5G	0225A1236
B	-	√	√	-		AD59230
C	-	√	√	-	8G	0225A1236
D	-	√	√	-		AD59230

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

NOTE: "-" means no effect.

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet type, XYZ 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	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, packet type, XYZ 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	PACKET TYPE	AXIS
A	0 to 78	78	FHSS	GFSK	DH5	X
B	0 to 78	78	FHSS	GFSK	DH5	X
C	0 to 78	78	FHSS	GFSK	DH5	X
D	0 to 78	78	FHSS	GFSK	DH5	X

POWER LINE CONDUCTED EMISSION TEST:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	78	FHSS	GFSK	DH5
B	0 to 78	78	FHSS	GFSK	DH5
C	0 to 78	78	FHSS	GFSK	DH5
D	0 to 78	78	FHSS	GFSK	DH5

BANDEDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet type, XYZ 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	PACKET TYPE	AXIS
A	0 to 78	0, 78	FHSS	GFSK	DH5	X
A	0 to 78	0, 78	FHSS	8DPSK	DH5	X

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
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.

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

3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	LCD Monitor	Samsung	173v	NA	NA
2	Keyboard	BTC	5200U	G09302046467	E5XKB5122U
3	Mouse	DELL	MO56UO	510026062	FCC DoC Approved
4	External Hard Disk	Terasys	F12-UF	A0100222-4A71007	FCC DoC Approved
5	External Hard Disk	Terasys	F12-UF	A0100222-4A60012	FCC DoC Approved
6	Earphone	PHILIPS	SBC HL125	NA	NA
7	Microphone	Labtec	LVA7313	NA	NA
8	Notebook	DELL	PP05L	12130898320	E2K24CLNS

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m shielded VGA cable with two cores.
2	1.5m foil shielded wire, USB Connector, w/o core.
3	1.8m foil shielded wire, USB Connector, w/o core.
4	1.5m shielded cable, terminated with USB connector, w/o core.
5	1.5m shielded cable, terminated with USB connector, w/o core.
6	1.2m wrapped shielded wire, terminated with 3.5mm phone plug via drain wire, w/o core.
7	1.0m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.
8	10m RJ45 cable

NOTE: 1. All power cords of the above support units are non shielded (1.8m).
2. Item 8 act as a communication partner to transfer data.

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.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	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 4.

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

4. The FC Site Registration No. is 460141.

5. The IC Site Registration No. is IC3789B-4.

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.

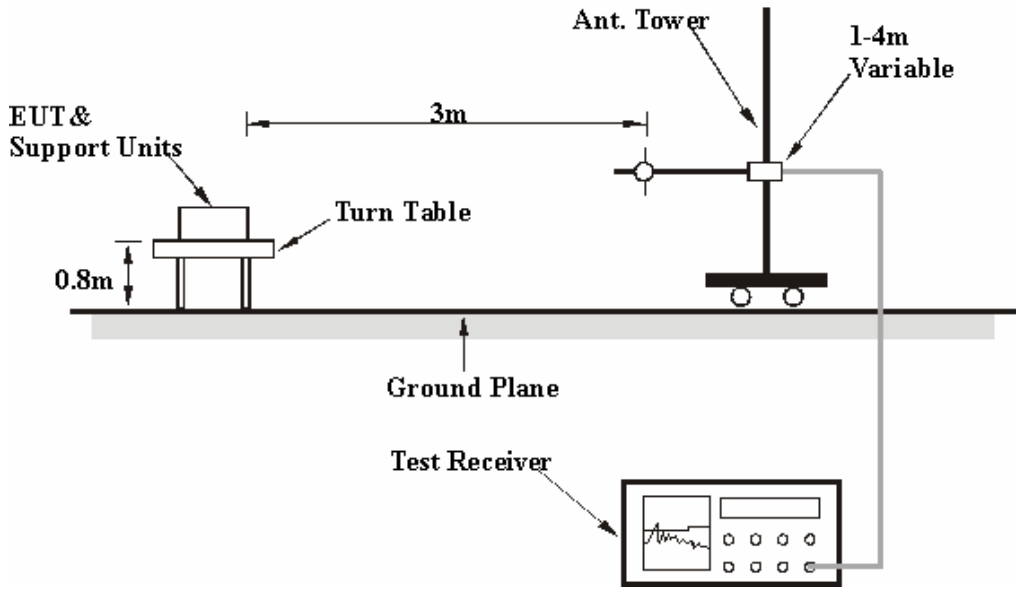
NOTE:

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 testing table.
b. Prepared the notebook to act as communication partners and placed it outside of testing area.
c. Connected the EUT to notebook via an RJ45 cable.
d. The notebook system ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
e. The necessary accessories enable the system in full functions.

4.1.7 TEST RESULTS

GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	2390.00	31.15 PK	74.00	-42.85	1.00 H	269	-2.33	33.48
2	2390.00	21.65 AV	54.00	-32.35	1.00 H	269	-11.83	33.48
3	*2402.00	87.43 PK			1.87 H	249	53.96	33.47
4	*2402.00	57.33 AV			1.87 H	249	23.86	33.47
5	4804.00	48.31 PK	74.00	-25.69	1.00 H	188	9.02	39.29
6	4804.00	18.21 AV	54.00	-35.79	1.00 H	188	-21.08	39.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	32.93 PK	74.00	-41.07	1.18 V	91	-0.55	33.48
2	2390.00	23.43 AV	54.00	-30.57	1.18 V	91	-10.05	33.48
3	*2402.00	89.21 PK			1.18 V	91	55.74	33.47
4	*2402.00	59.11 AV			1.18 V	91	25.64	33.47
5	4804.00	51.35 PK	74.00	-22.65	1.01 V	168	12.06	39.29
6	4804.00	21.25 AV	54.00	-32.75	1.01 V	168	-18.04	39.29

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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	*2441.00	88.64 PK			1.52 H	249	55.17	33.47
2	*2441.00	58.54 AV			1.52 H	249	25.07	33.47
3	4882.00	48.88 PK	74.00	-25.12	1.02 H	220	9.41	39.47
4	4882.00	18.78 AV	54.00	-35.22	1.02 H	220	-20.69	39.47
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	90.55 PK			1.20 V	100	57.08	33.47
2	*2441.00	60.45 AV			1.20 V	100	26.98	33.47
3	4882.00	51.80 PK	74.00	-22.20	1.01 V	166	12.33	39.47
4	4882.00	21.70 AV	54.00	-32.30	1.01 V	166	-17.77	39.47

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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	*2480.00	89.65 PK			1.11 H	159	56.18	33.47
2	*2480.00	59.55 AV			1.11 H	159	26.08	33.47
3	2483.50	43.83 PK	74.00	-30.17	1.11 H	159	10.36	33.47
4	2483.50	34.33 AV	54.00	-19.67	1.11 H	159	0.86	33.47
5	4960.00	49.63 PK	74.00	-24.37	1.01 H	25	9.90	39.73
6	4960.00	19.53 AV	54.00	-34.47	1.01 H	25	-20.20	39.73
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	*2480.00	91.76 PK			1.09 V	151	58.29	33.47
2	*2480.00	61.66 AV			1.09 V	151	28.19	33.47
3	2483.50	45.94 PK	74.00	-28.06	1.09 V	151	12.47	33.47
4	2483.50	36.44 AV	54.00	-17.56	1.09 V	151	2.97	33.47
5	4960.00	52.52 PK	74.00	-21.48	1.12 V	159	12.79	39.73
6	4960.00	22.42 AV	54.00	-31.58	1.12 V	159	-17.31	39.73

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).

8DPSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	2390.00	30.22 PK	74.00	-43.78	1.33 H	317	-3.26	33.48
2	2390.00	20.72 AV	54.00	-33.28	1.33 H	317	-12.76	33.48
3	*2402.00	85.21 PK			1.33 H	317	51.74	33.47
4	*2402.00	55.11 AV			1.33 H	317	21.64	33.47
5	4804.00	48.21 PK	74.00	-25.79	1.05 H	255	8.92	39.29
6	4804.00	18.11 AV	54.00	-35.89	1.05 H	255	-21.18	39.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	31.65 PK	74.00	-42.35	1.11 V	94	-1.83	33.48
2	2390.00	22.15 AV	54.00	-31.85	1.11 V	94	-11.33	33.48
3	*2402.00	86.64 PK			1.11 V	94	53.17	33.47
4	*2402.00	56.54 AV			1.11 V	94	23.07	33.47
5	4804.00	49.79 PK	74.00	-24.21	1.05 V	336	10.50	39.29
6	4804.00	19.69 AV	54.00	-34.31	1.05 V	336	-19.60	39.29

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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	*2441.00	86.02 PK			1.42 H	269	52.55	33.47
2	*2441.00	55.92 AV			1.42 H	269	22.45	33.47
3	4882.00	48.63 PK	74.00	-25.37	1.27 H	184	9.16	39.47
4	4882.00	18.53 AV	54.00	-35.47	1.27 H	184	-20.94	39.47
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	87.78 PK			1.09 V	211	54.31	33.47
2	*2441.00	57.68 AV			1.09 V	211	24.21	33.47
3	4882.00	49.82 PK	74.00	-24.18	1.25 V	123	10.35	39.47
4	4882.00	19.72 AV	54.00	-34.28	1.25 V	123	-19.75	39.47

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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 69%RH 1000hPa	TESTED BY	Lori Chiu
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	*2480.00	86.66 PK			1.45 H	264	53.19	33.47
2	*2480.00	56.56 AV			1.45 H	264	23.09	33.47
3	2483.50	42.97 PK	74.00	-31.03	1.45 H	264	9.50	33.47
4	2483.50	33.47 AV	54.00	-20.53	1.45 H	264	0.00	33.47
5	4960.00	49.36 PK	74.00	-24.64	1.00 H	19	9.63	39.73
6	4960.00	19.26 AV	54.00	-34.74	1.00 H	19	-20.47	39.73
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	*2480.00	88.97 PK			1.12 V	100	55.50	33.47
2	*2480.00	58.87 AV			1.12 V	100	25.40	33.47
3	2483.50	45.28 PK	74.00	-28.72	1.12 V	100	11.81	33.47
4	2483.50	35.78 AV	54.00	-18.22	1.12 V	100	2.31	33.47
5	4960.00	50.22 PK	74.00	-23.78	1.10 V	166	10.49	39.73
6	4960.00	20.12 AV	54.00	-33.88	1.10 V	166	-19.61	39.73

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).

BELOW 1GHz WORST-CASE DATA：GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000hPa	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	59.06	33.80 QP	40.00	-6.20	1.50 H	37	20.01	13.78
2	96.01	31.95 QP	43.50	-11.55	2.00 H	61	22.57	9.38
3	397.37	33.15 QP	46.00	-12.85	1.00 H	301	15.91	17.24
4	475.14	34.90 QP	46.00	-11.10	1.50 H	235	15.16	19.74
5	720.12	32.26 QP	46.00	-13.74	2.00 H	271	6.77	25.49
6	875.67	33.51 QP	46.00	-12.49	1.00 H	10	5.80	27.71
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	**59.06**	**35.55 QP**	**40.00**	**-4.45**	**1.00 V**	**322**	**21.76**	**13.78**
2	142.67	28.71 QP	43.50	-14.79	1.00 V	349	15.02	13.68
3	393.48	29.50 QP	46.00	-16.50	1.25 V	196	12.36	17.14
4	492.64	29.95 QP	46.00	-16.05	1.00 V	214	9.68	20.27
5	624.85	27.52 QP	46.00	-18.48	1.00 V	199	3.88	23.64
6	875.67	31.35 QP	46.00	-14.65	1.25 V	181	3.64	27.71

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	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1000hPa	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	59.06	34.68 QP	40.00	-5.32	2.00 H	10	20.89	13.78
2	96.01	34.45 QP	43.50	-9.05	2.00 H	70	25.07	9.38
3	395.43	33.77 QP	46.00	-12.23	1.00 H	310	16.58	17.19
4	475.14	36.45 QP	46.00	-9.55	1.50 H	220	16.71	19.74
5	689.01	32.15 QP	46.00	-13.85	1.25 H	349	7.15	25.00
6	887.33	29.68 QP	46.00	-16.32	1.25 H	235	1.79	27.89
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	34.41 QP	40.00	-5.59	1.00 V	154	21.84	12.57
2	59.06	33.82 QP	40.00	-6.18	1.00 V	307	20.04	13.78
3	346.82	29.18 QP	46.00	-16.82	1.50 V	10	13.21	15.97
4	397.37	29.68 QP	46.00	-16.32	1.50 V	139	12.44	17.24
5	564.58	28.19 QP	46.00	-17.81	1.00 V	16	5.95	22.24
6	887.33	29.27 QP	46.00	-16.73	1.00 V	163	1.38	27.89

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	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000hPa	TESTED BY	Match Tsui
TEST MODE	C		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	286.55	32.09 QP	46.00	-13.91	1.00 H	121	17.26	14.83
2	335.15	31.08 QP	46.00	-14.92	1.00 H	124	15.00	16.08
3	490.70	32.26 QP	46.00	-13.74	1.00 H	7	12.14	20.12
4	498.47	34.69 QP	46.00	-11.31	1.50 H	10	14.43	20.26
5	566.52	33.26 QP	46.00	-12.74	2.00 H	328	11.61	21.65
6	624.85	31.51 QP	46.00	-14.49	1.50 H	325	8.49	23.02
7	751.23	33.03 QP	46.00	-12.97	1.50 H	130	7.37	25.65
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	61.01	35.15 QP	40.00	-4.85	1.00 V	82	21.31	13.84
2	96.01	30.03 QP	43.50	-13.47	1.50 V	61	20.35	9.68
3	175.72	30.56 QP	43.50	-12.94	1.50 V	7	17.24	13.32
4	624.85	32.02 QP	46.00	-13.98	1.00 V	160	8.99	23.02
5	751.23	32.76 QP	46.00	-13.24	1.50 V	118	7.11	25.65
6	957.33	31.82 QP	46.00	-14.18	1.50 V	142	3.45	28.37

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH 1000hPa	TESTED BY	Match Tsui
TEST MODE	D		

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	82.40	27.95 QP	40.00	-12.05	2.00 H	118	17.79	10.16
2	96.01	32.69 QP	43.50	-10.81	2.50 H	256	23.00	9.68
3	156.28	29.17 QP	43.50	-14.33	2.00 H	268	14.80	14.37
4	177.67	29.68 QP	43.50	-13.82	1.50 H	118	16.50	13.18
5	288.49	34.48 QP	46.00	-11.52	1.00 H	235	19.61	14.87
6	751.23	35.24 QP	46.00	-10.76	1.00 H	229	9.59	25.65
7	799.84	35.31 QP	46.00	-10.69	2.50 H	178	9.43	25.88
8	875.67	34.11 QP	46.00	-11.89	1.50 H	214	6.82	27.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	28.08 QP	40.00	-11.92	1.50 V	88	13.84	14.24
2	64.90	27.68 QP	40.00	-12.32	1.00 V	157	14.33	13.35
3	566.52	32.67 QP	46.00	-13.33	1.00 V	172	11.02	21.65
4	624.85	32.65 QP	46.00	-13.35	1.50 V	139	9.63	23.02
5	751.23	32.80 QP	46.00	-13.20	1.50 V	214	7.14	25.65
6	875.67	33.67 QP	46.00	-12.33	1.00 V	172	6.38	27.29

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

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

4. Margin value = Emission level – Limit value.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

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

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 21, 2008
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2009
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 09, 2009
LISN SCHWARZBECK	ESH3-Z5	100311	Jan. 21, 2009
Software ADT	ADT_Cond_V3	NA	NA

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

2. The test was performed in HwaYa Shielded Room 2.

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

4.2.3 TEST PROCEDURES

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

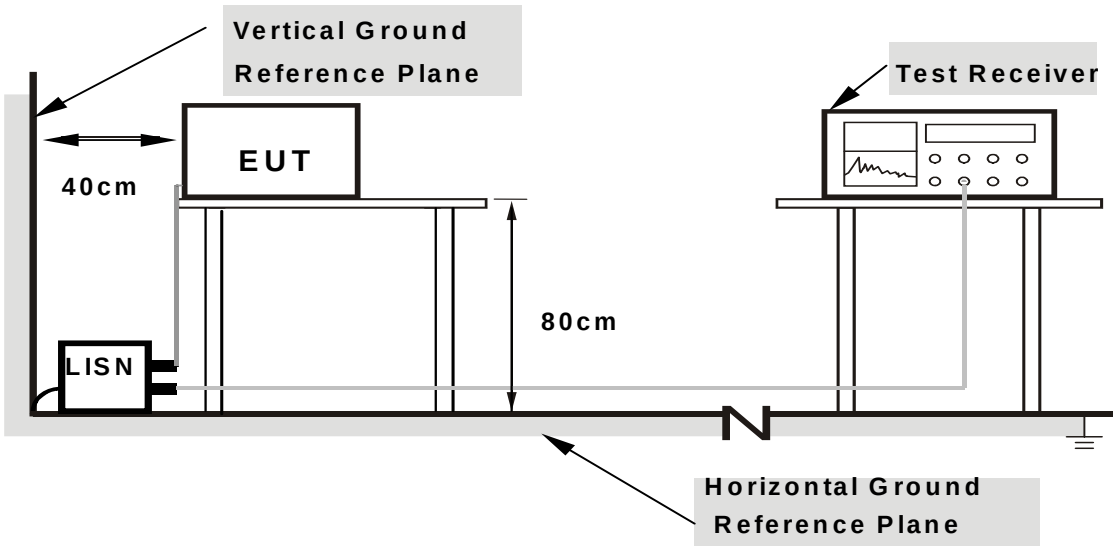
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

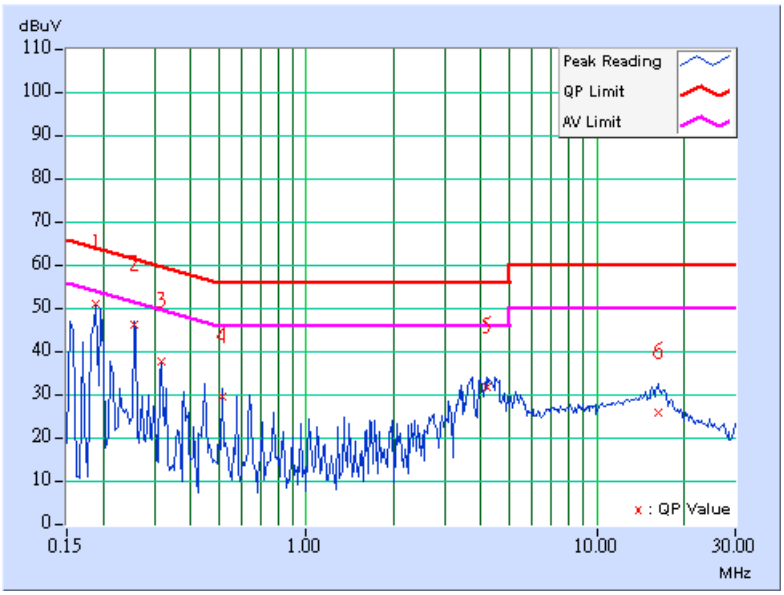
4.2.7 TEST RESULTS

CONDUCTED WORST CASE DATA_GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Match Tsui	TEST MODE	A

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	0.189	0.13	50.13	-	50.26	-	64.08	54.08	-13.82	-
2	0.255	0.13	45.25	-	45.38	-	61.58	51.58	-16.19	-
3	0.318	0.14	36.80	-	36.94	-	59.76	49.76	-22.82	-
4	0.513	0.15	28.71	-	28.86	-	56.00	46.00	-27.14	-
5	4.168	0.45	30.84	-	31.29	-	56.00	46.00	-24.71	-
6	16.277	0.98	25.03	-	26.01	-	60.00	50.00	-33.99	-

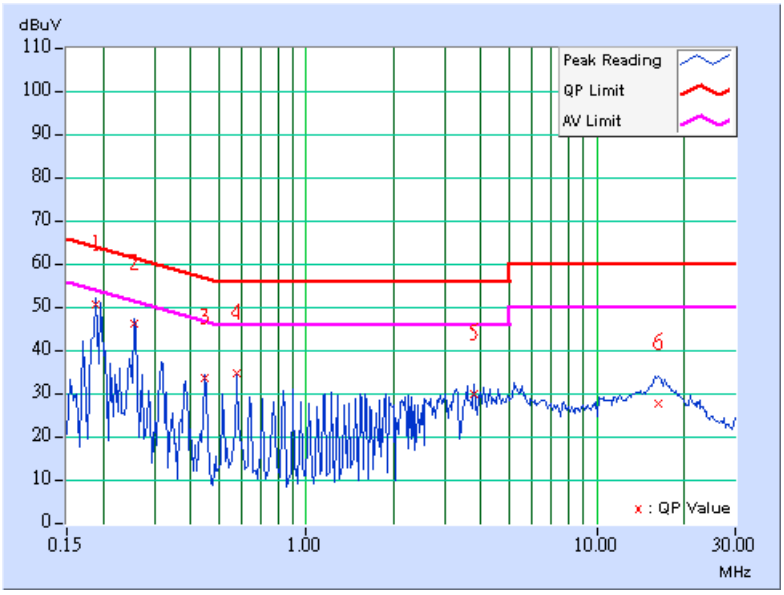
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Match Tsui	TEST MODE	A

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	0.189	0.14	50.13	-	50.27	-	64.08	54.08	-13.81	-
2	0.255	0.14	45.54	-	45.68	-	61.58	51.58	-15.89	-
3	0.447	0.15	33.08	-	33.23	-	56.93	46.93	-23.70	-
4	0.576	0.16	34.03	-	34.19	-	56.00	46.00	-21.81	-
5	3.777	0.41	29.26	-	29.67	-	56.00	46.00	-26.33	-
6	16.270	0.78	26.83	-	27.61	-	60.00	50.00	-32.39	-

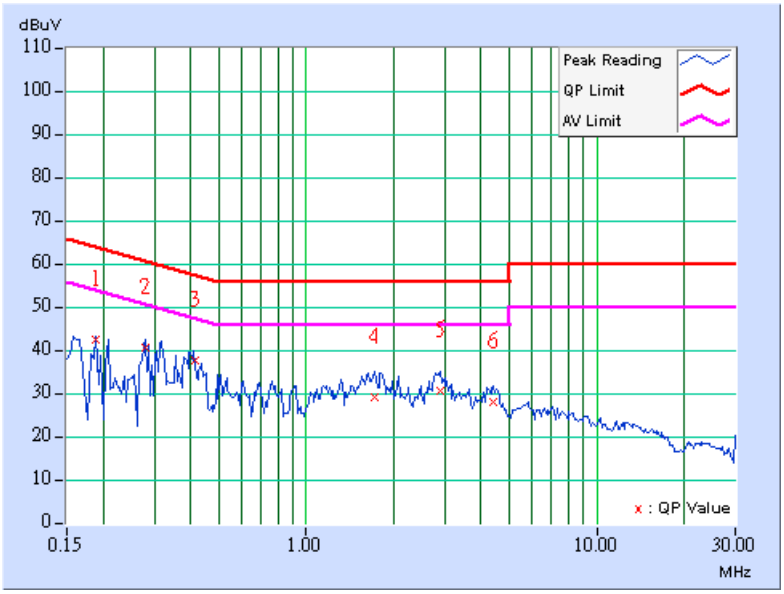
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Match Tsui	TEST MODE	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.190	0.13	42.10	-	42.23	-	64.06	54.06	-21.83	-
2	0.280	0.13	40.24	-	40.37	-	60.83	50.83	-20.45	-
3	0.413	0.14	37.35	-	37.49	-	57.58	47.58	-20.09	-
4	1.719	0.23	28.74	-	28.97	-	56.00	46.00	-27.03	-
5	2.885	0.34	30.25	-	30.59	-	56.00	46.00	-25.41	-
6	4.404	0.45	27.64	-	28.09	-	56.00	46.00	-27.91	-

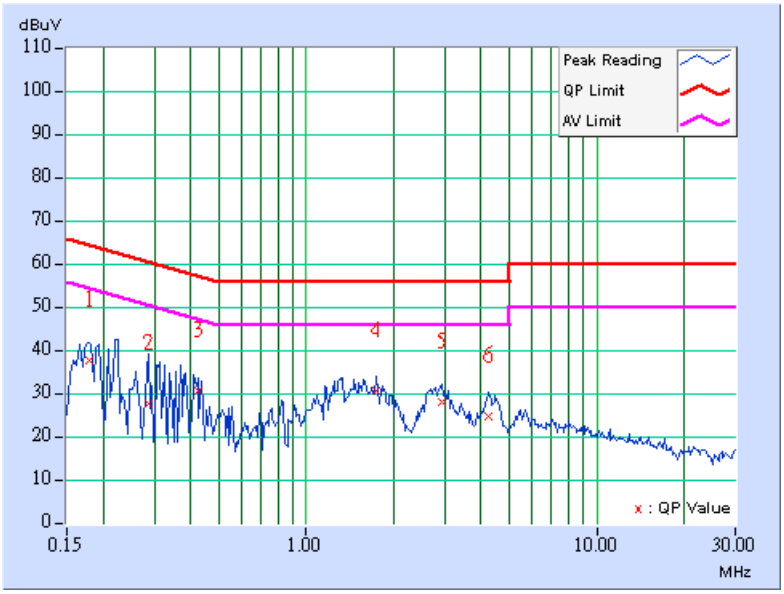
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Match Tsui	TEST MODE	B

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	0.179	0.14	37.51	-	37.65	-	64.54	54.54	-26.89	-
2	0.287	0.14	27.21	-	27.35	-	60.60	50.60	-33.25	-
3	0.425	0.15	30.44	-	30.59	-	57.35	47.35	-26.76	-
4	1.747	0.24	30.37	-	30.61	-	56.00	46.00	-25.39	-
5	2.943	0.34	27.61	-	27.95	-	56.00	46.00	-28.05	-
6	4.248	0.44	24.24	-	24.68	-	56.00	46.00	-31.32	-

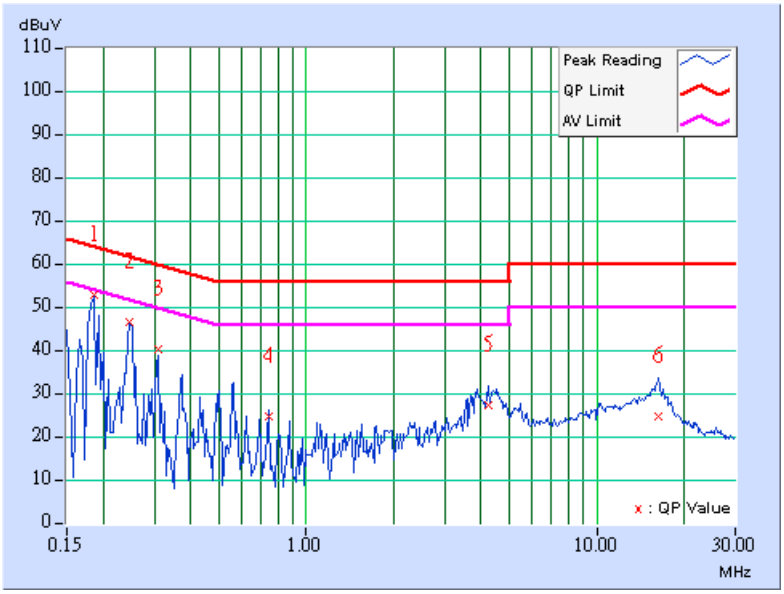
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28deg. C, 66%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Dean Wang	TEST MODE	C

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	0.185	0.13	51.87	-	52.00	-	64.25	54.25	-12.25	-
2	0.248	0.13	45.59	-	45.72	-	61.84	51.84	-16.11	-
3	0.310	0.14	39.37	-	39.51	-	59.97	49.97	-20.46	-
4	0.744	0.16	23.91	-	24.07	-	56.00	46.00	-31.93	-
5	4.226	0.45	26.47	-	26.92	-	56.00	46.00	-29.08	-
6	16.406	0.99	23.89	-	24.88	-	60.00	50.00	-35.12	-

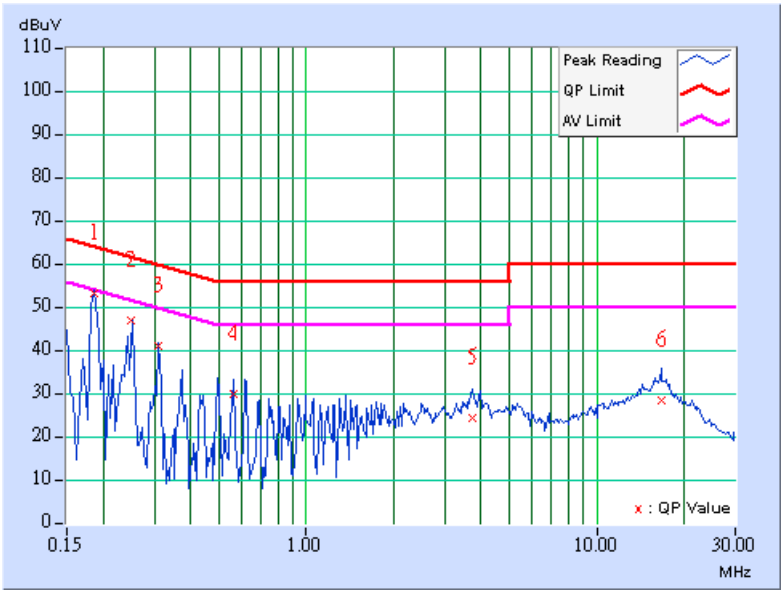
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28deg. C, 66%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Dean Wang	TEST MODE	C

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	**0.185**	**0.14**	**52.38**	**-**	**52.52**	**-**	**64.25**	**54.25**	**-11.73**	**-**
2	0.249	0.14	46.08	-	46.22	-	61.79	51.79	-15.57	-
3	0.310	0.15	40.24	-	40.39	-	59.97	49.97	-19.58	-
4	0.560	0.16	29.11	-	29.27	-	56.00	46.00	-26.73	-
5	3.730	0.41	23.58	-	23.99	-	56.00	46.00	-32.01	-
6	16.617	0.80	27.54	-	28.34	-	60.00	50.00	-31.66	-

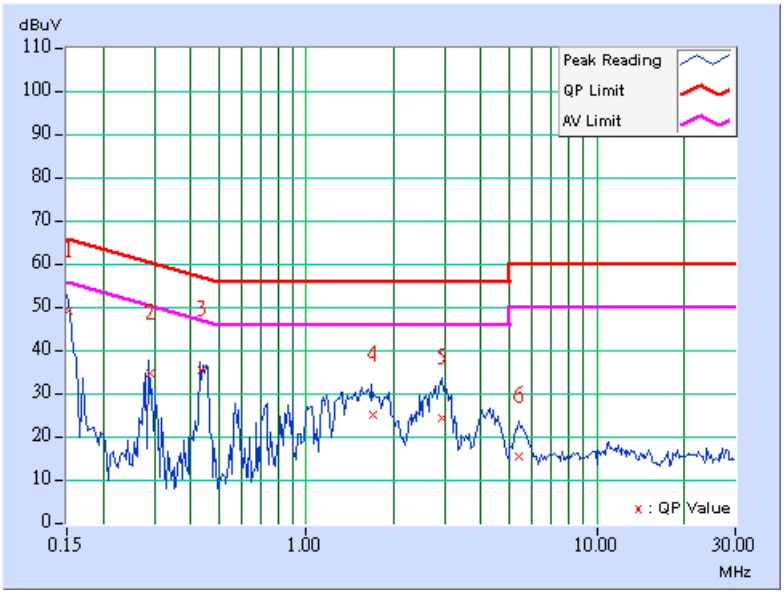
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28deg. C, 66%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Dean Wang	TEST MODE	D

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	0.152	0.13	48.87	-	49.00	-	65.90	55.90	-16.90	-
2	0.291	0.13	34.42	-	34.55	-	60.51	50.51	-25.95	-
3	0.434	0.14	34.91	-	35.05	-	57.18	47.18	-22.12	-
4	1.694	0.23	24.72	-	24.95	-	56.00	46.00	-31.05	-
5	2.930	0.34	23.87	-	24.21	-	56.00	46.00	-31.79	-
6	5.430	0.48	15.11	-	15.59	-	60.00	50.00	-44.41	-

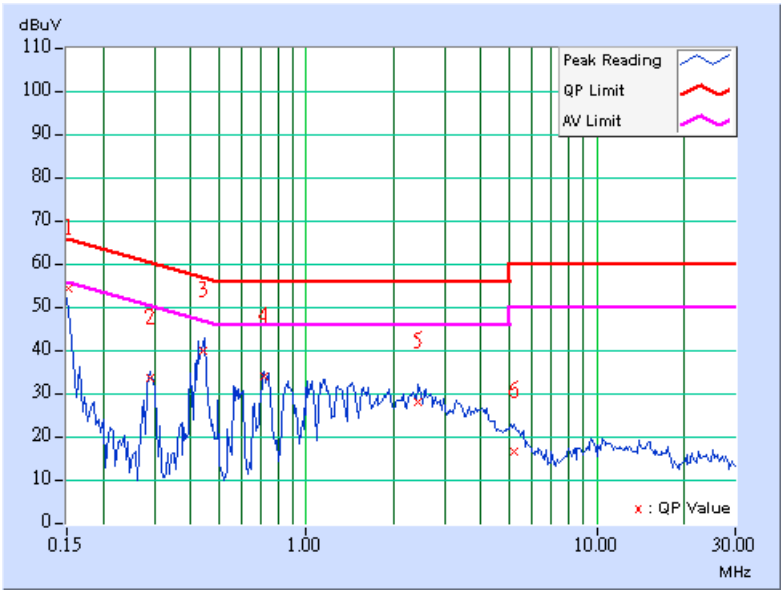
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	28deg. C, 66%RH, 991hPa	INPUT POWER	120Vac, 60 Hz
TESTED BY	Dean Wang	TEST MODE	D

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	0.152	0.14	53.94	-	54.08	-	65.92	55.92	-11.84	-
2	0.291	0.14	33.32	-	33.46	-	60.51	50.51	-27.04	-
3	0.441	0.15	39.60	-	39.75	-	57.04	47.04	-17.29	-
4	0.720	0.17	33.54	-	33.71	-	56.00	46.00	-22.29	-
5	2.438	0.30	27.65	-	27.95	-	56.00	46.00	-28.05	-
6	5.168	0.46	16.30	-	16.76	-	60.00	50.00	-43.24	-

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



4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMITS 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 UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

4.3.3 TEST PROCEDURES

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

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

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

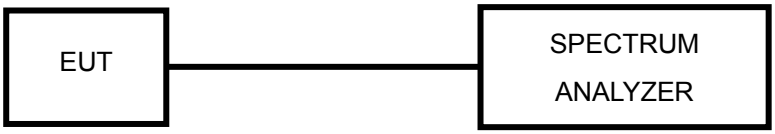
d. Set the SA on View mode and then plot the result on SA screen.

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

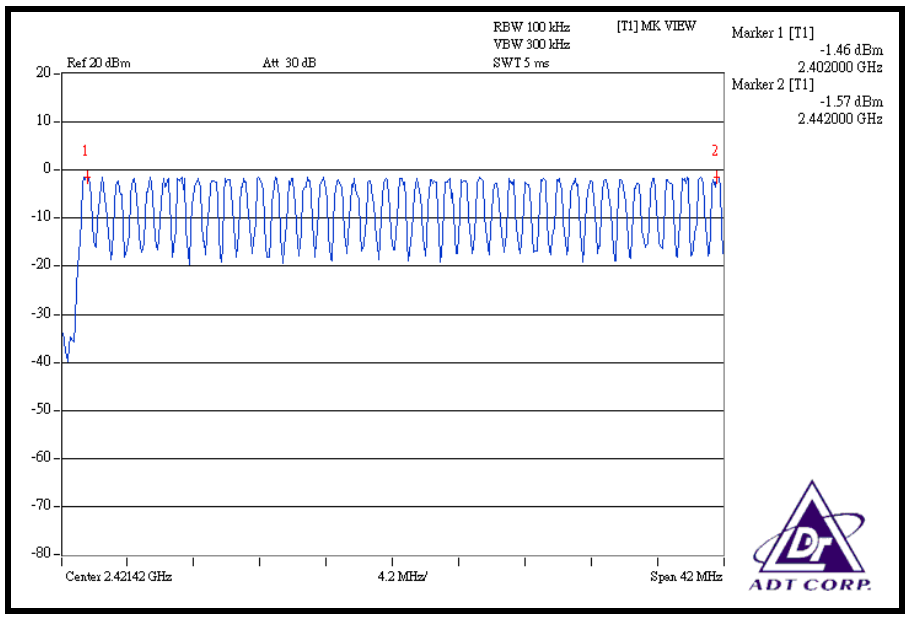
4.3.5 TEST SETUP

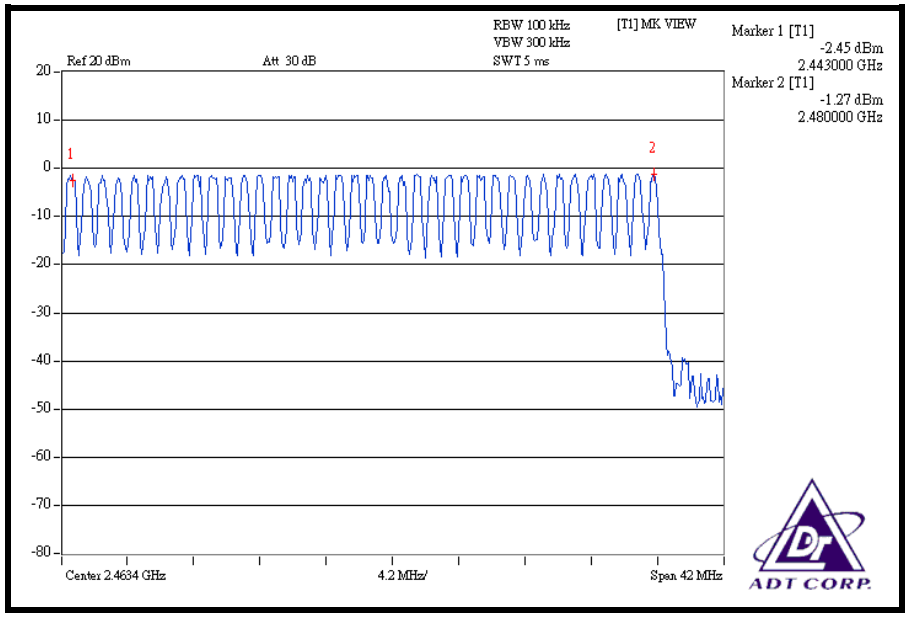


4.3.6 TEST RESULTS

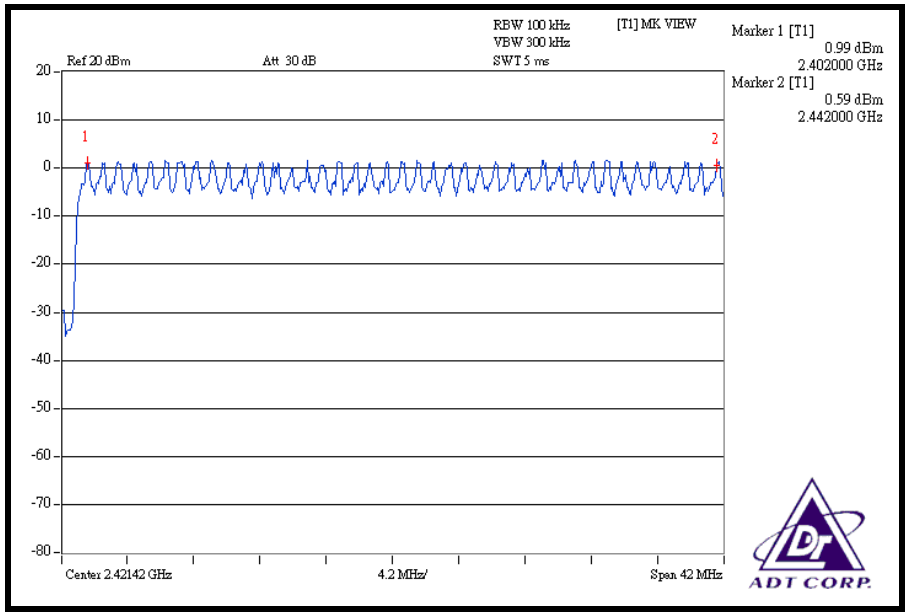
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

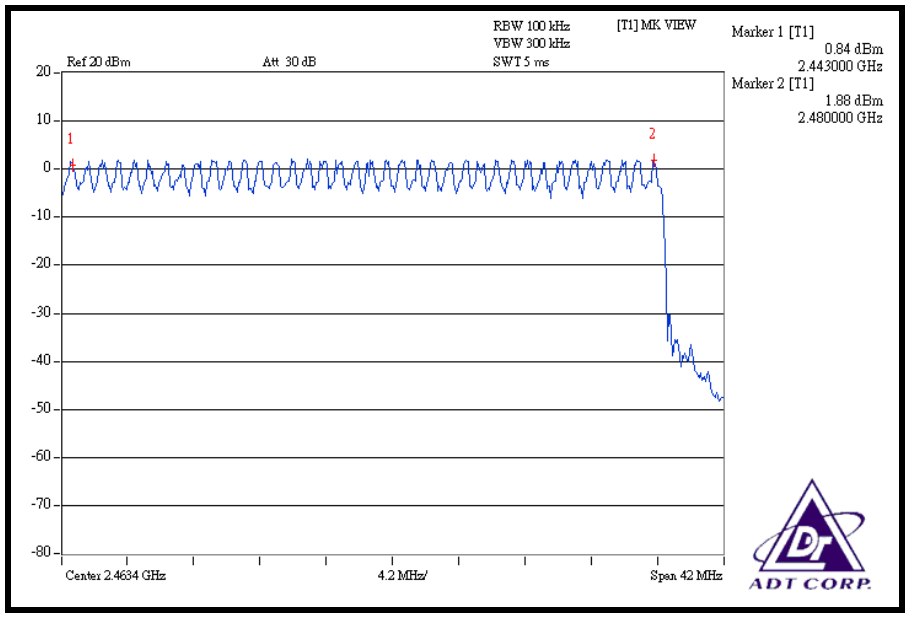
GFSK MODULATION





8DPSK MODULATION





4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

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

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

4.4.3 TEST PROCEDURES

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

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

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

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

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

Same as 4.3.5.

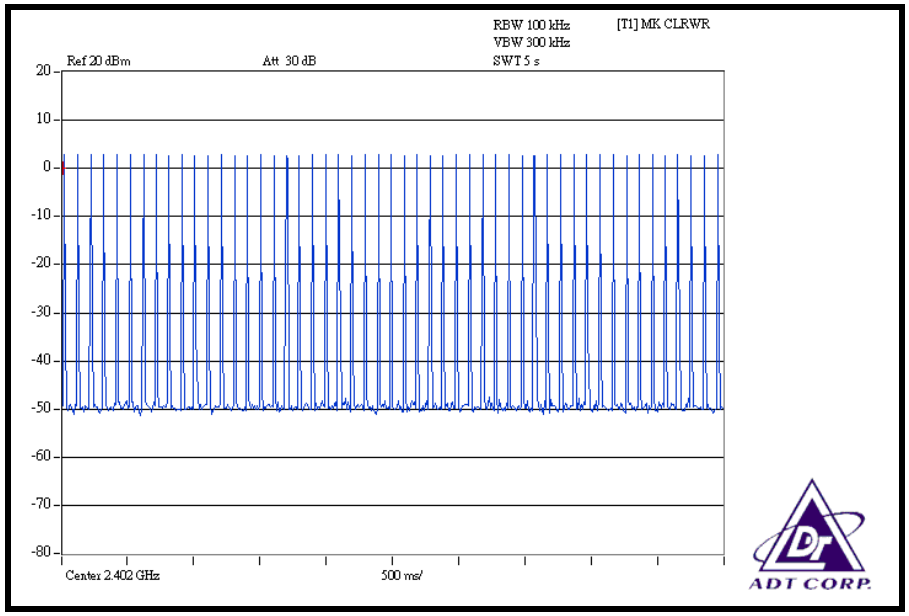
4.4.6 TEST RESULTS

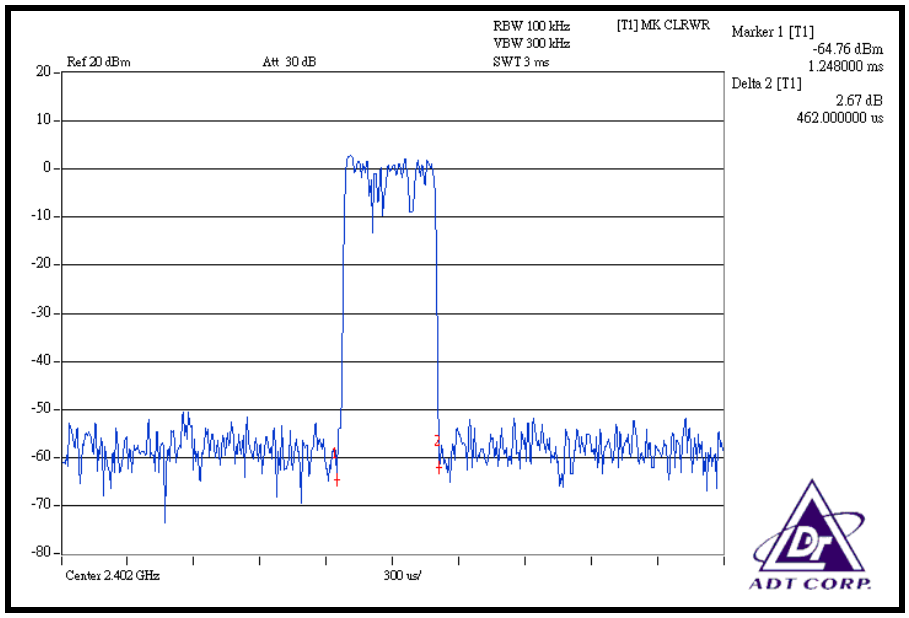
GFSK MODULATION

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.462	148.912	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.710	270.180	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.960	318.022	400

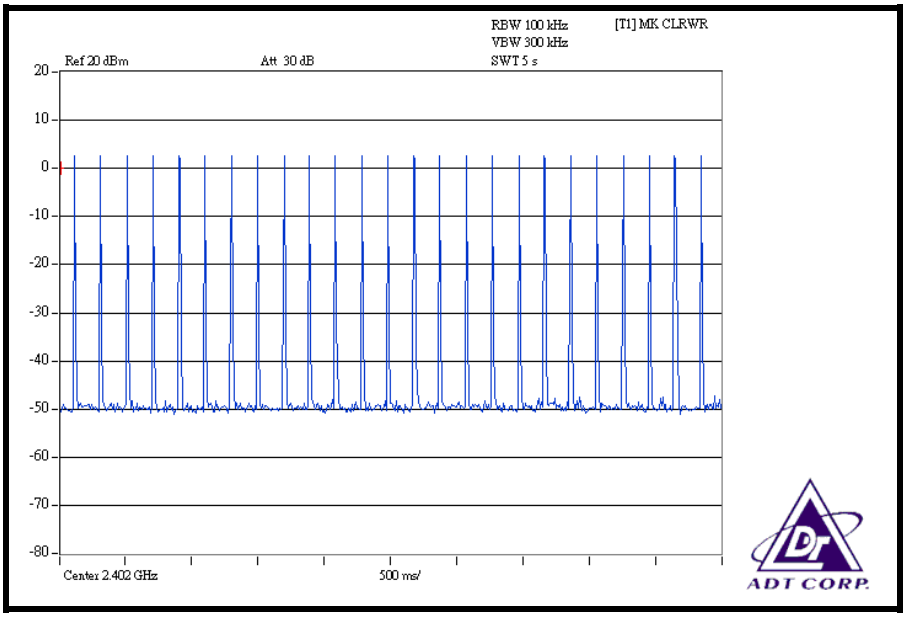
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

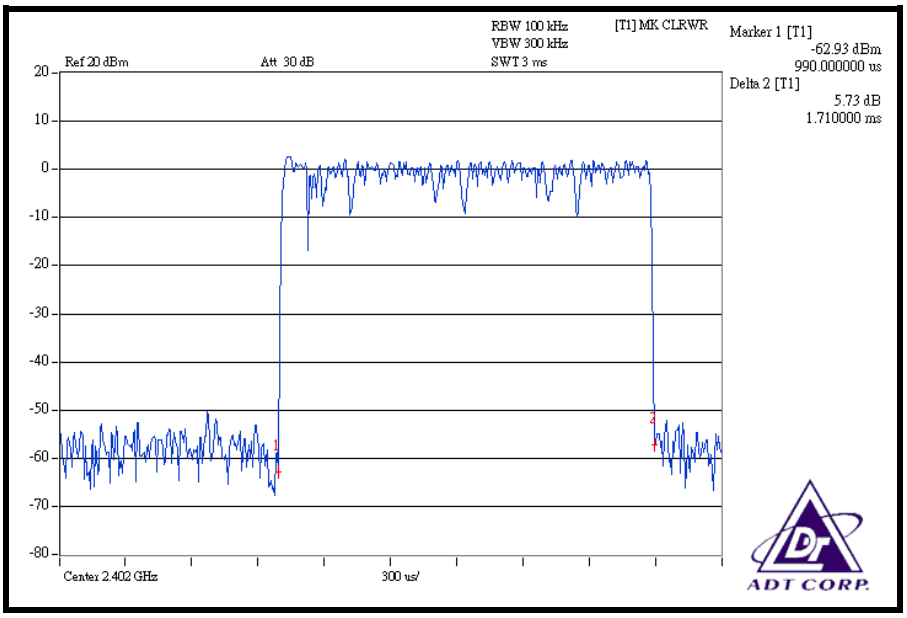
DH1


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/
ADT CORP.

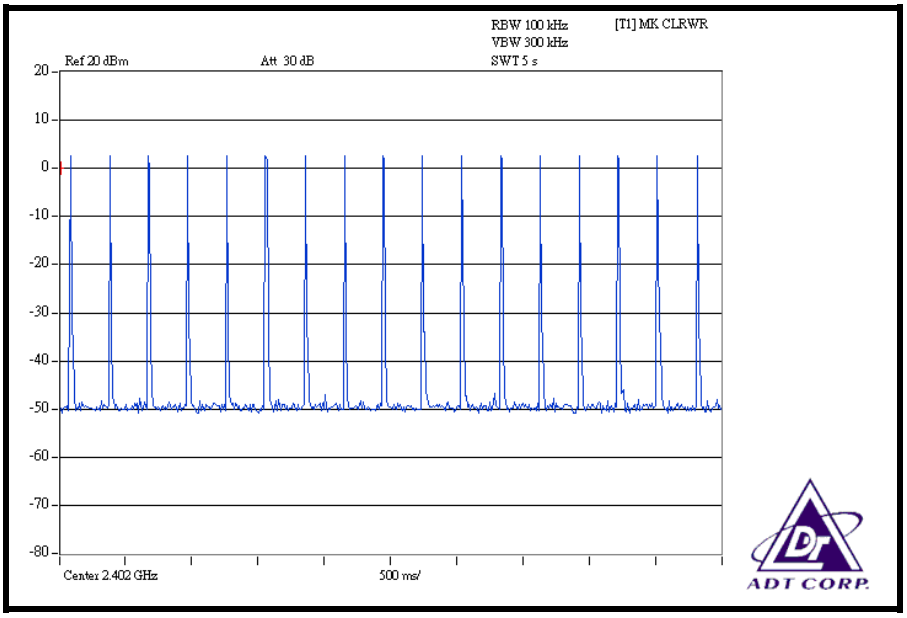

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-64.76 dBm
1.248000 ms
Delta 2 [T1]
2.67 dB
462.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/
ADT CORP.

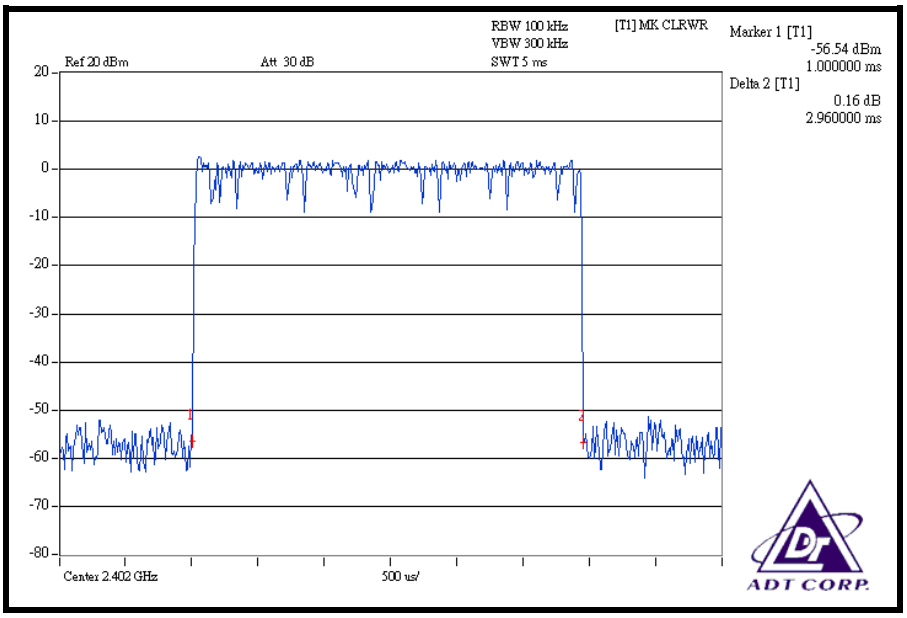
DH3


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/
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-62.93 dBm
990.000000 us
Delta 2 [T1]
5.73 dB
1.710000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/
ADT CORP.

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/
ADT CORP.

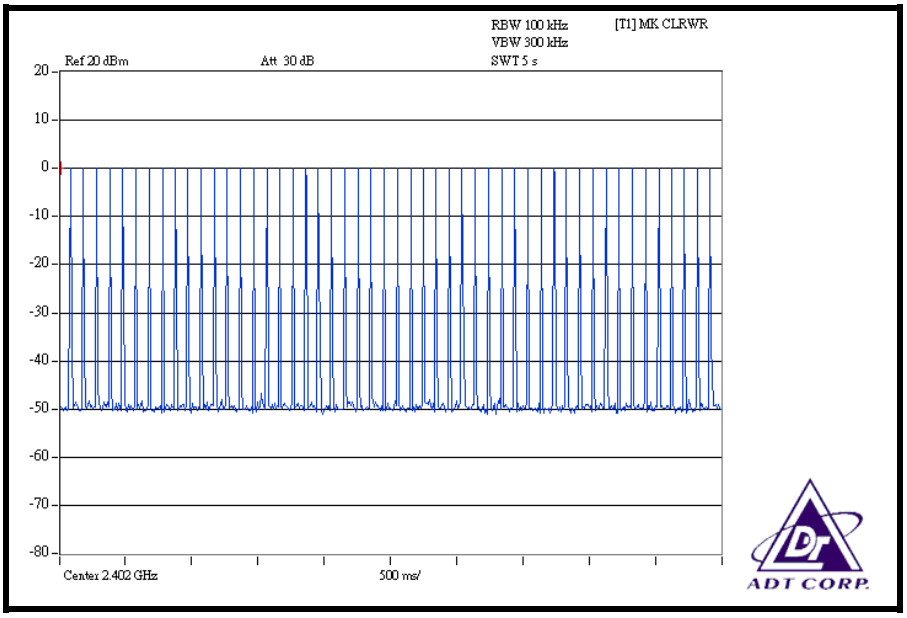

RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-56.54 dBm
1.000000 ms
Delta 2 [T1]
0.16 dB
2.960000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 us/
ADT CORP.

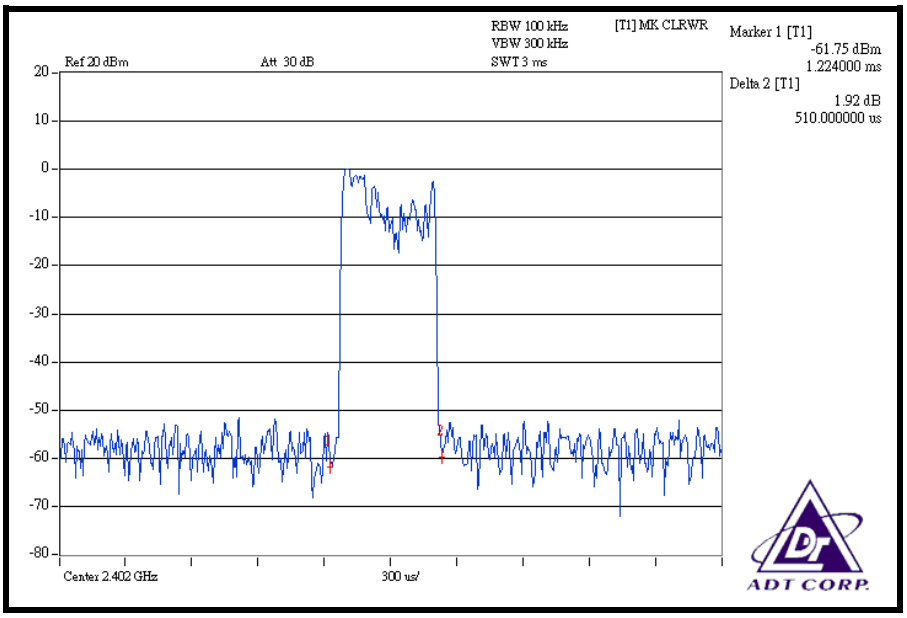
8DPSK MODULATION

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	0.510	161.160	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.746	275.868	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.980	320.171	400

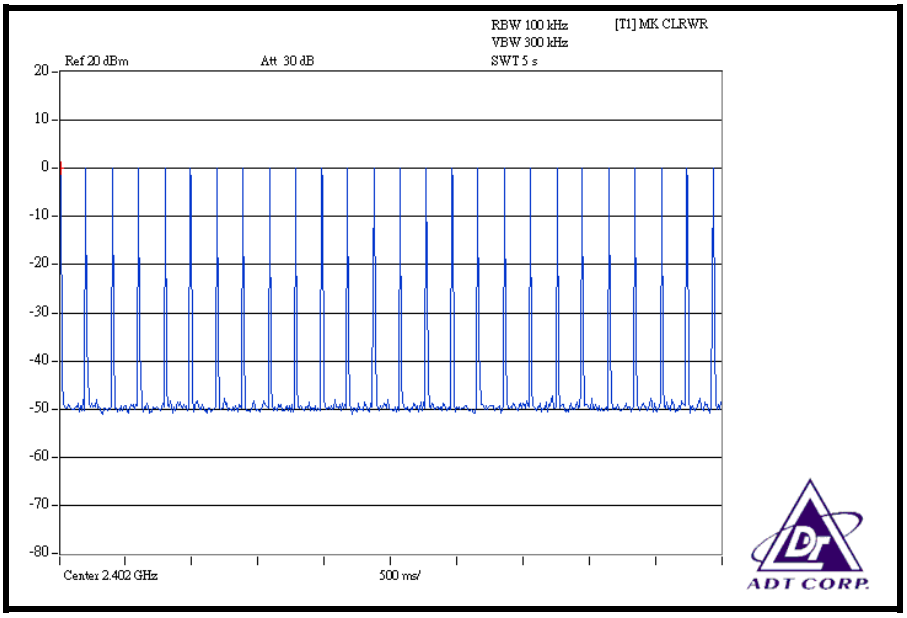
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

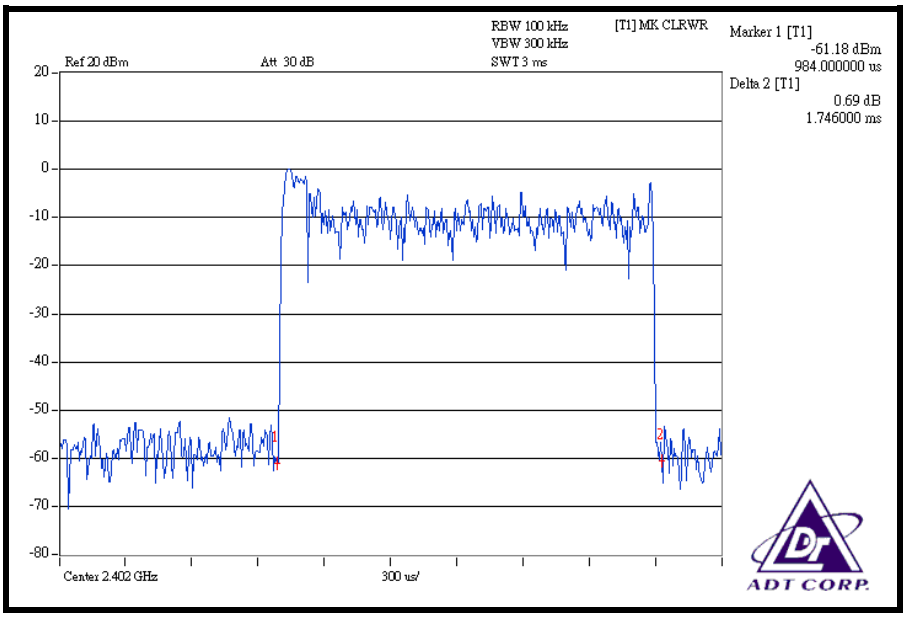
DH1


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/
ADT CORP.

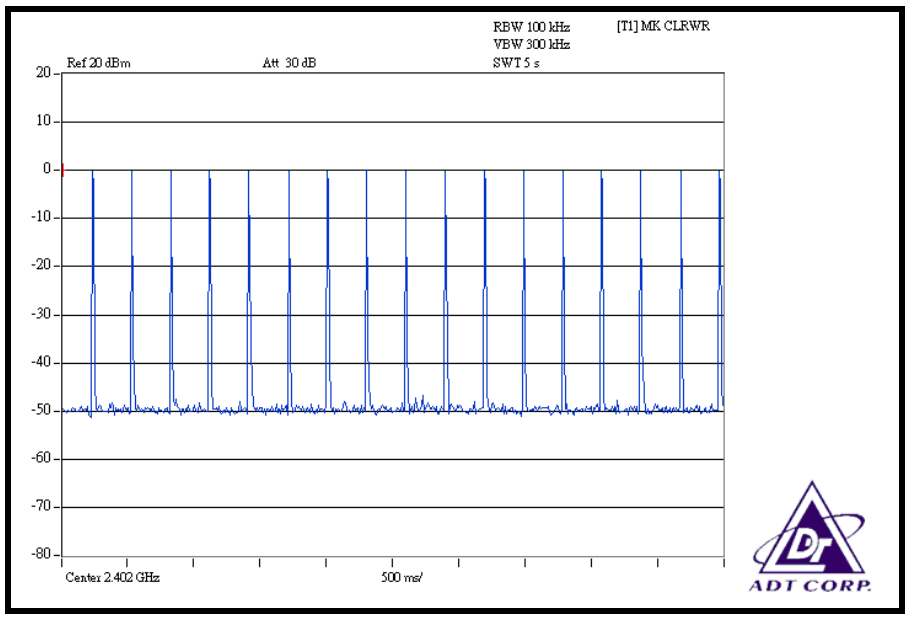

RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-61.75 dBm
1.224000 ms
Delta 2 [T1]
1.92 dB
510.000000 us
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/
ADT CORP.

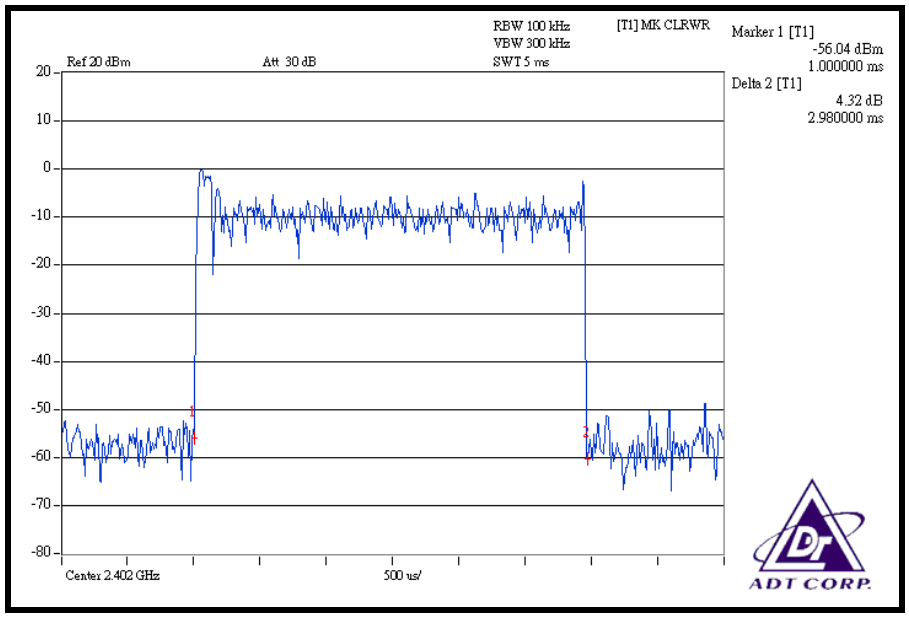
DH3


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/
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 3 ms
[T1] MK CLRWR
Marker 1 [T1]
-61.18 dBm
984.000000 us
Delta 2 [T1]
0.69 dB
1.746000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
300 us/
ADT CORP.

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/
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK CLRWR
Marker 1 [T1]
-56.04 dBm
1.000000 ms
Delta 2 [T1]
4.32 dB
2.980000 ms
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
500 us/
ADT CORP.

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 UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

4.5.3 TEST PROCEDURE

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

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

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

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

Same as 4.3.5.

4.5.6 EUT OPERATING CONDITION

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

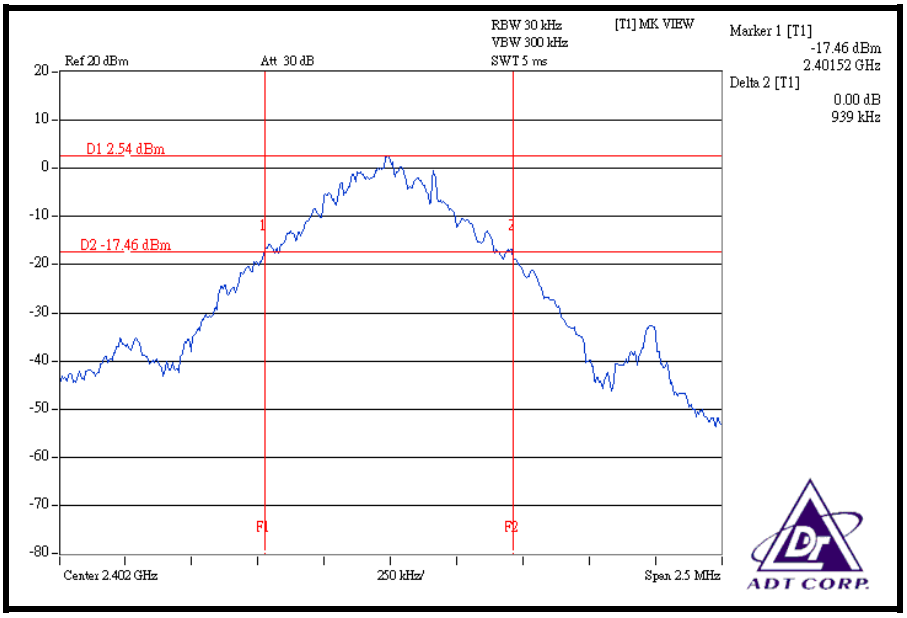
4.5.7 TEST RESULTS

GFSK MODULATION

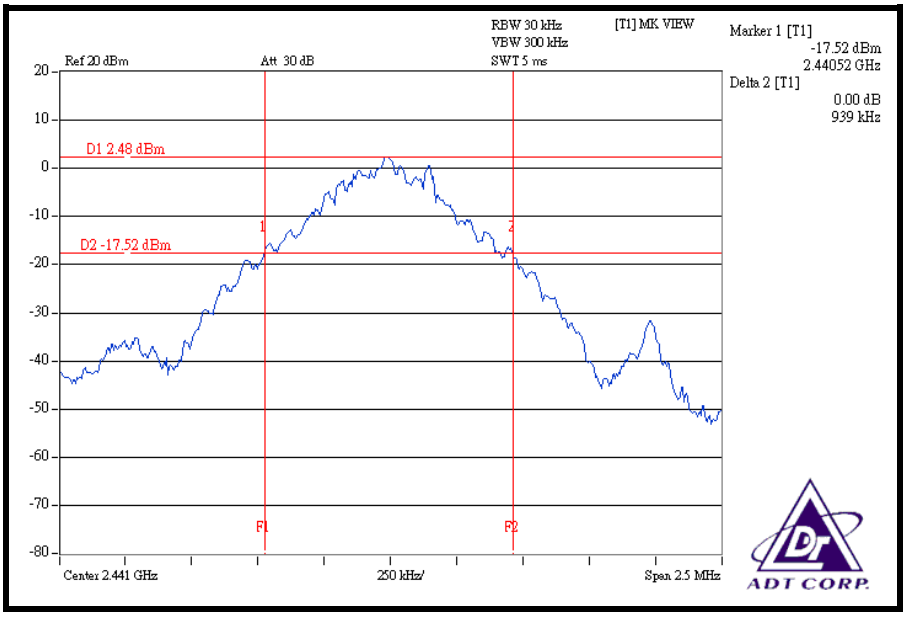
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.939
39	2441	0.939
78	2480	0.942

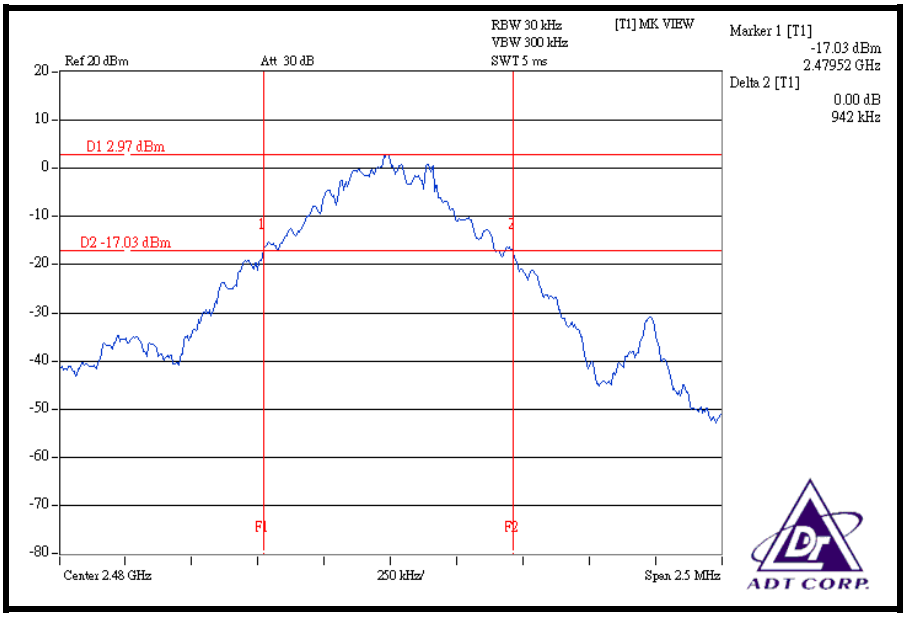
CH 0


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-17.46 dBm
2.40152 GHz
Delta 2 [T1]
0.00 dB
939 kHz
Ref 20 dBm
Att 30 dB
D1 2.54 dBm
D2 -17.46 dBm
Center 2.402 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-17.52 dBm
2.44052 GHz
Delta 2 [T1]
0.00 dB
939 kHz
Ref 20 dBm
Att 30 dB
D1 2.48 dBm
D2 -17.52 dBm
Center 2.441 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 78

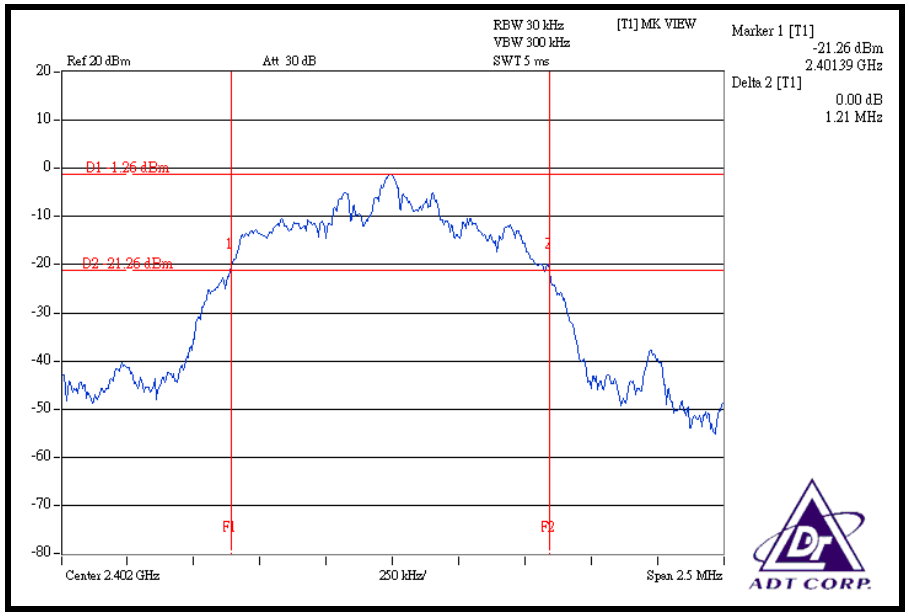

RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-17.03 dBm
2.47952 GHz
Delta 2 [T1]
0.00 dB
942 kHz
Ref 20 dBm
Att 30 dB
D1 2.97 dBm
D2 -17.03 dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

8DPSK MODULATION

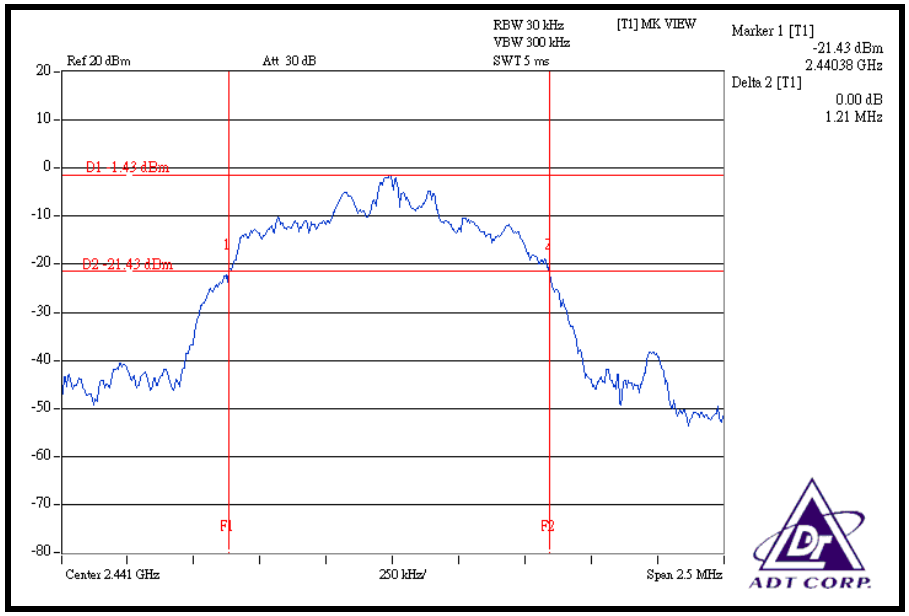
MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	TESTED BY	Dean Wang

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

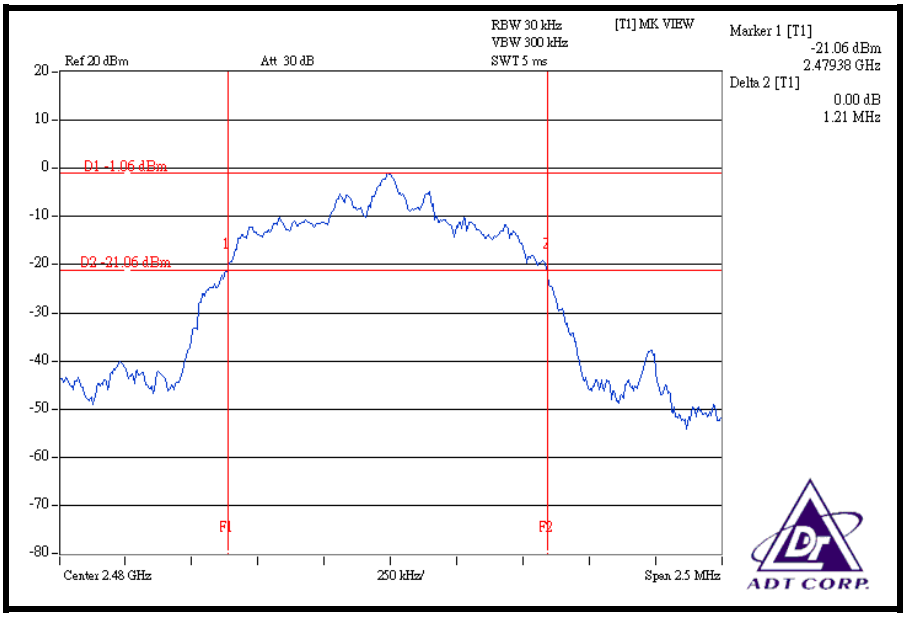
CH 0


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-21.26 dBm
2.40139 GHz
Delta 2 [T1]
0.00 dB
1.21 MHz
Ref 20 dBm
Att 30 dB
D1 -1.26 dBm
D2 -21.26 dBm
Center 2.402 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 39


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-21.43 dBm
2.44038 GHz
Delta 2 [T1]
0.00 dB
1.21 MHz
Ref 20 dBm
Att 30 dB
D1 -1.43 dBm
D2 -21.43 dBm
Center 2.441 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 78


RBW 30 kHz
VBW 300 kHz
SWT 5 ms
[T1] MK VIEW
Marker 1 [T1]
-21.06 dBm
2.47938 GHz
Delta 2 [T1]
0.00 dB
1.21 MHz
Ref 20 dBm
Att 30 dB
D1 -1.06 dBm
D2 -21.06 dBm
F1
F2
Center 2.48 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

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 UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

4.6.3 TEST PROCEDURES

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP

Same as 4.3.5

4.6.6 TEST RESULTS

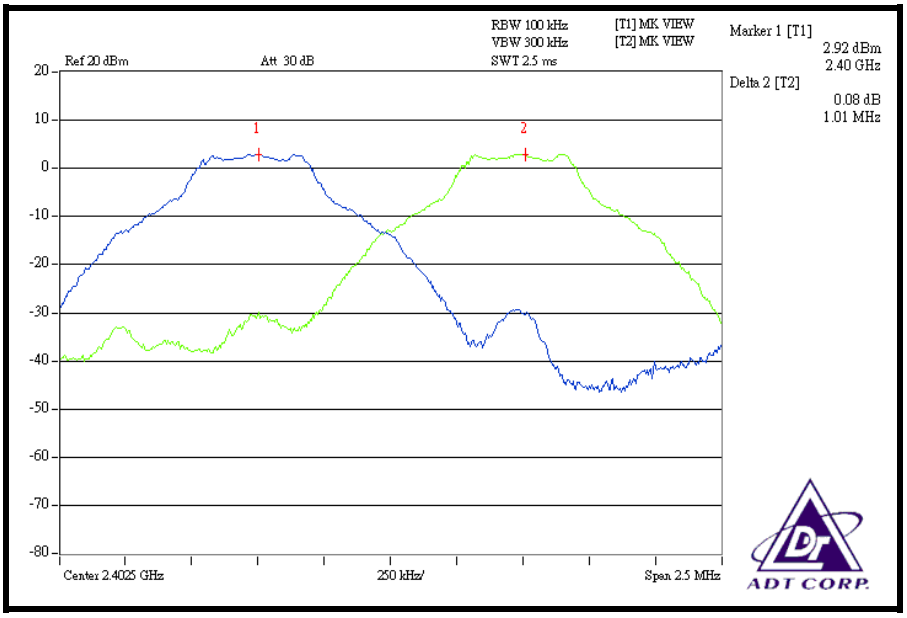
GFSK MODULATION

MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	**TESTED BY**	Dean Wang

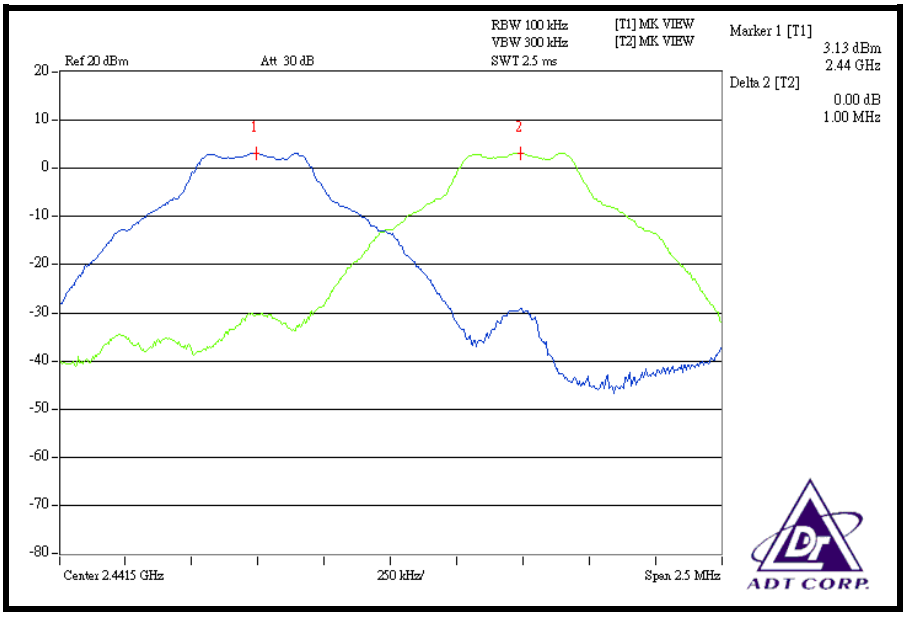
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.010	0.939	0.626	PASS
39	2441	1.000	0.939	0.626	PASS
78	2480	1.000	0.942	0.628	PASS

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

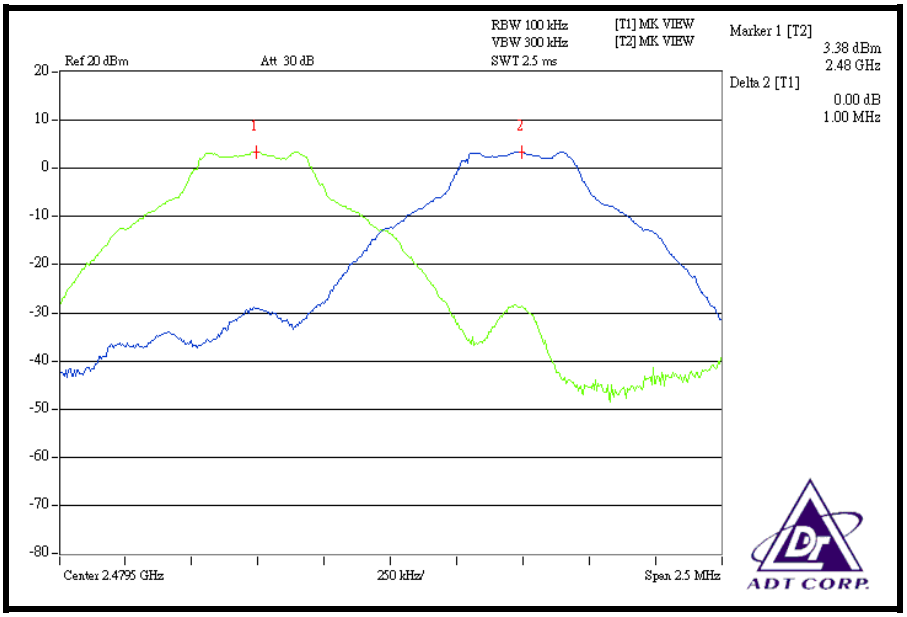
CH 0


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
2.92 dBm
2.40 GHz
Delta 2 [T2]
0.08 dB
1.01 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.4025 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
3.13 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
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T2]
3.38 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
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

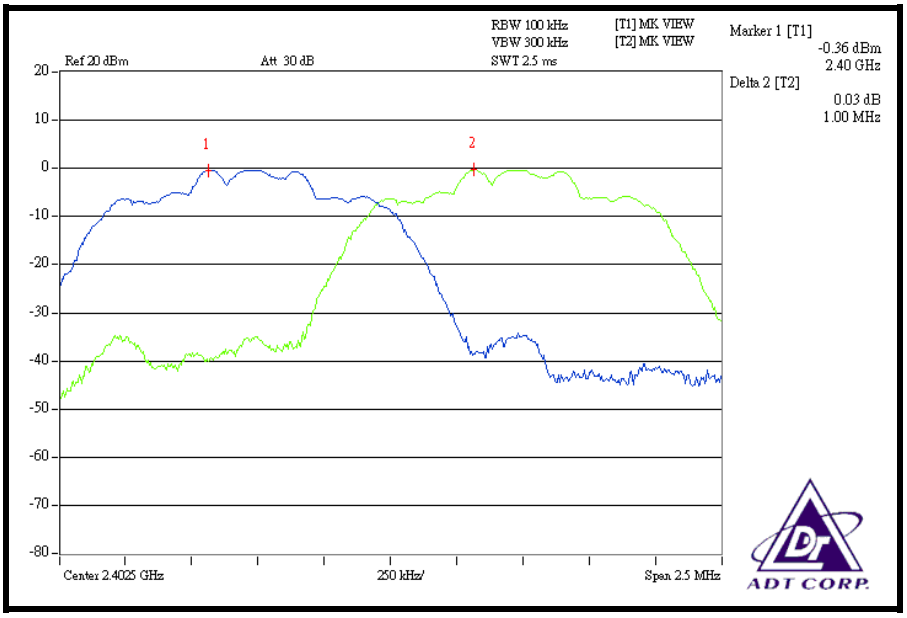
8DPSK MODULATION

MODULATION TYPE	8DPSK	ENVIRONMENTAL CONDITIONS	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	TESTED BY	Dean Wang

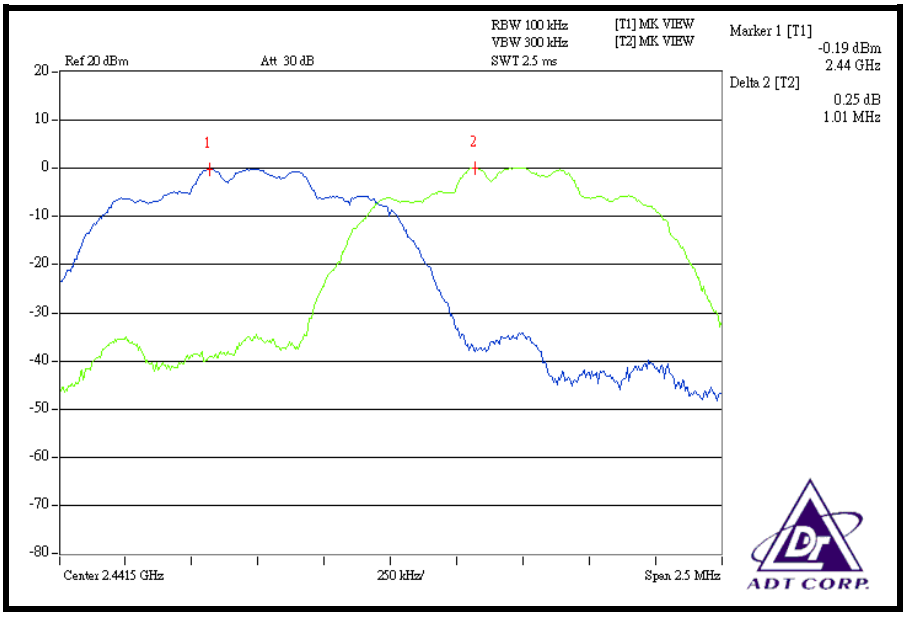
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.000	1.210	0.807	PASS
39	2441	1.010	1.210	0.807	PASS
78	2480	1.010	1.210	0.807	PASS

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

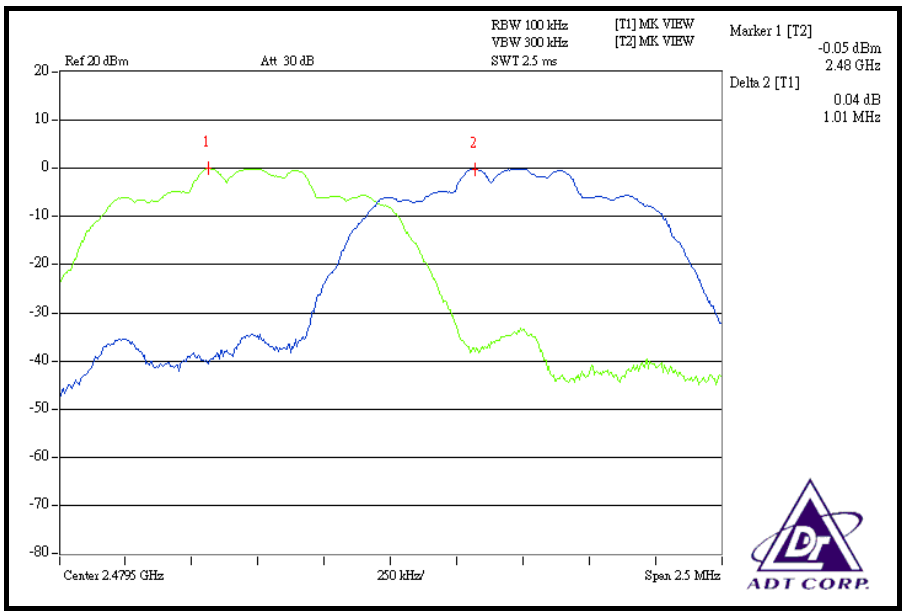
CH 0


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
-0.36 dBm
2.40 GHz
Delta 2 [T2]
0.03 dB
1.00 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4025 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

CH 39


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T1]
-0.19 dBm
2.44 GHz
Delta 2 [T2]
0.25 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
ADT CORP.

CH 78


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1] MK VIEW
[T2] MK VIEW
Marker 1 [T2]
-0.05 dBm
2.48 GHz
Delta 2 [T1]
0.04 dB
1.01 MHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
2
Center 2.4795 GHz
250 kHz/
Span 2.5 MHz
ADT CORP.

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 UNTIL
SPECTRUM ANALYEER	FSP40	100040	Jun. 28, 2008

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

4.7.3 TEST PROCEDURES

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

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

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

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

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP

Same as 4.3.5.

4.7.6 EUT OPERATING CONDITION

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

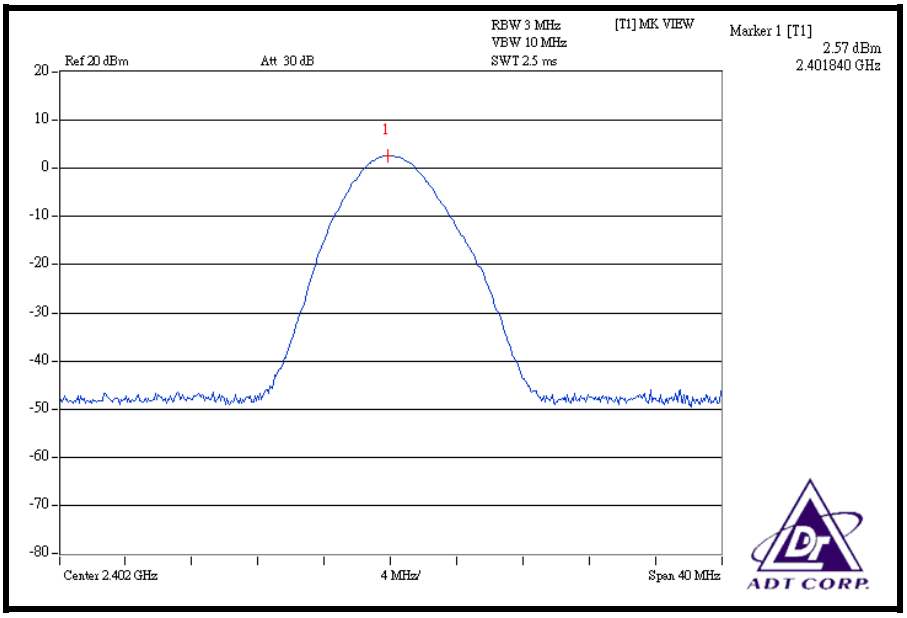
4.7.7 TEST RESULTS

GFSK MODULATION

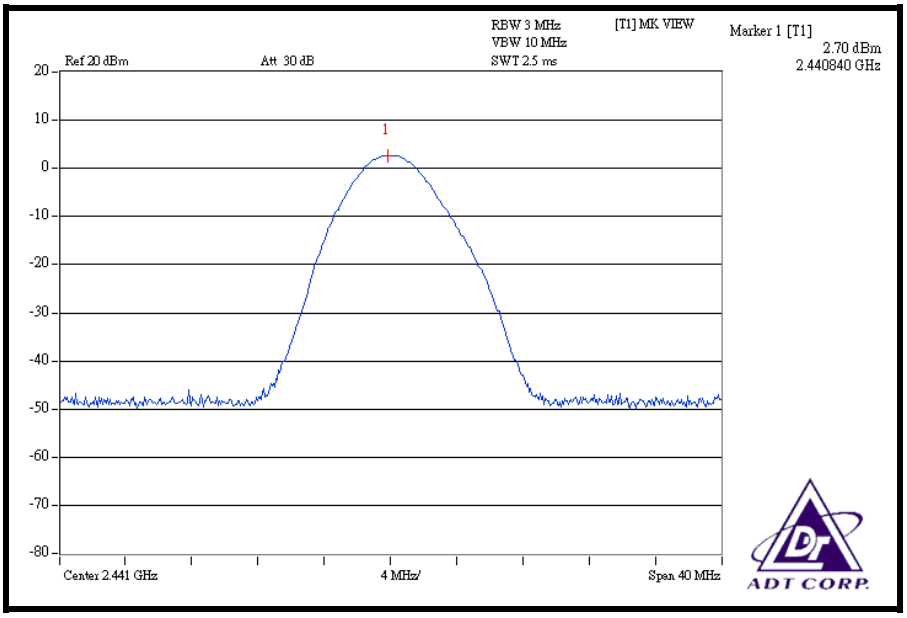
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	1.807	2.57	125	PASS
39	2441	1.862	2.70	125	PASS
78	2480	2.023	3.06	125	PASS

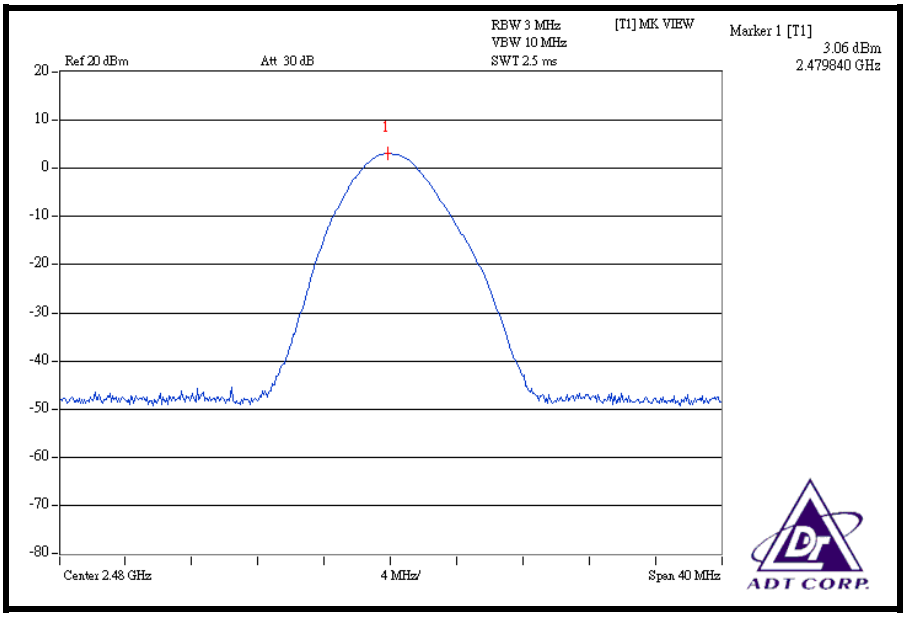
CH 0


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

CH 39


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

CH 78

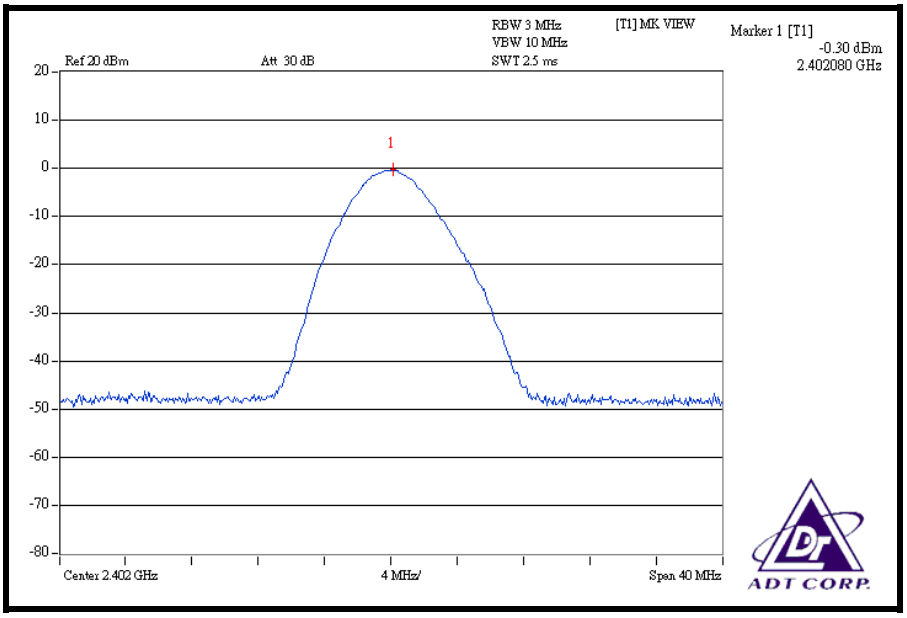

RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
3.06 dBm
2.479840 GHz
Ref 20 dBm
Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
Center 2.48 GHz
4 MHz/
Span 40 MHz
ADT CORP.

8DPSK MODULATION

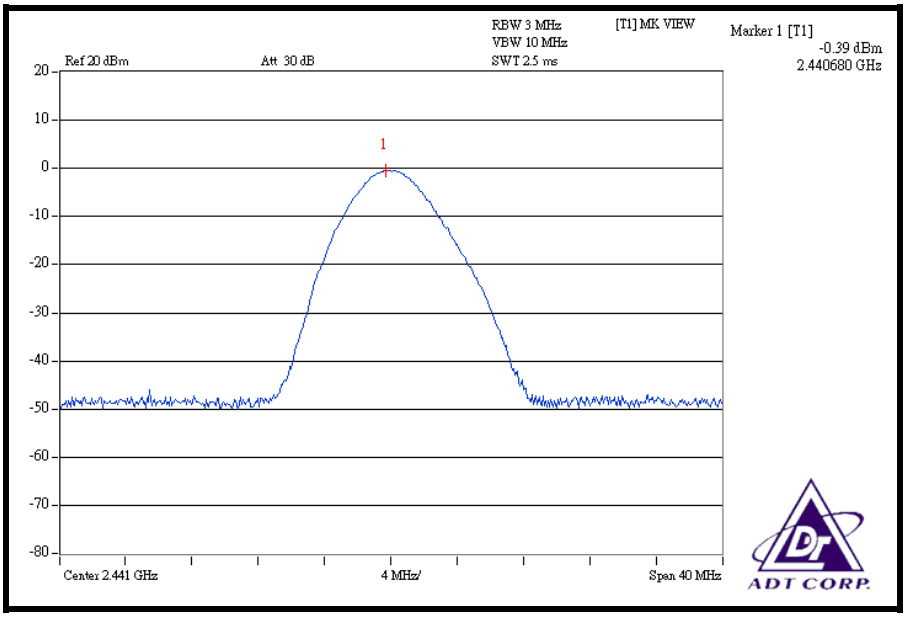
MODULATION TYPE	8DPSK	**ENVIRONMENTAL CONDITIONS**	30deg. C, 67%RH, 991hPa
INPUT POWER	120Vac, 60 Hz	**TESTED BY**	Dean Wang

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2402	0.933	-0.30	125	PASS
39	2441	0.914	-0.39	125	PASS
78	2480	0.955	-0.20	125	PASS

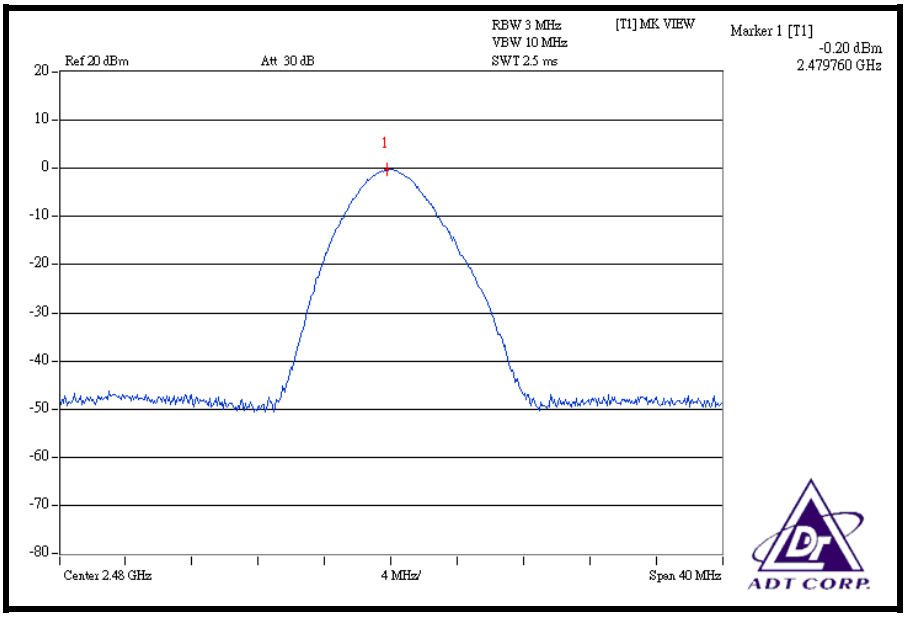
CH 0


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.30 dBm
2.402080 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
ADT CORP.

CH 39


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.39 dBm
2.440680 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
ADT CORP.

CH 78


RBW 3 MHz
VBW 10 MHz
SWT 2.5 ms
[T1] MK VIEW
Marker 1 [T1]
-0.20 dBm
2.479760 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
ADT CORP.

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 UNTIL
SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

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

4.8.3 TEST PROCEDURE

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

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

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

4.8.6 TEST RESULTS

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

GFSK MODULATION

NOTE 1: The band edge emission plot on the next page shows 51.05dBc between carrier maximum power and local maximum emission in restrict band (2.36240GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 89.21dBuV/m (Peak), so the maximum field strength in restrict band is 89.21 – 51.05 = 38.16dBuV/m, which is under 74 dBuV/m limit.

Average value = 38.16 – 30.10 = 8.06dBuV/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.

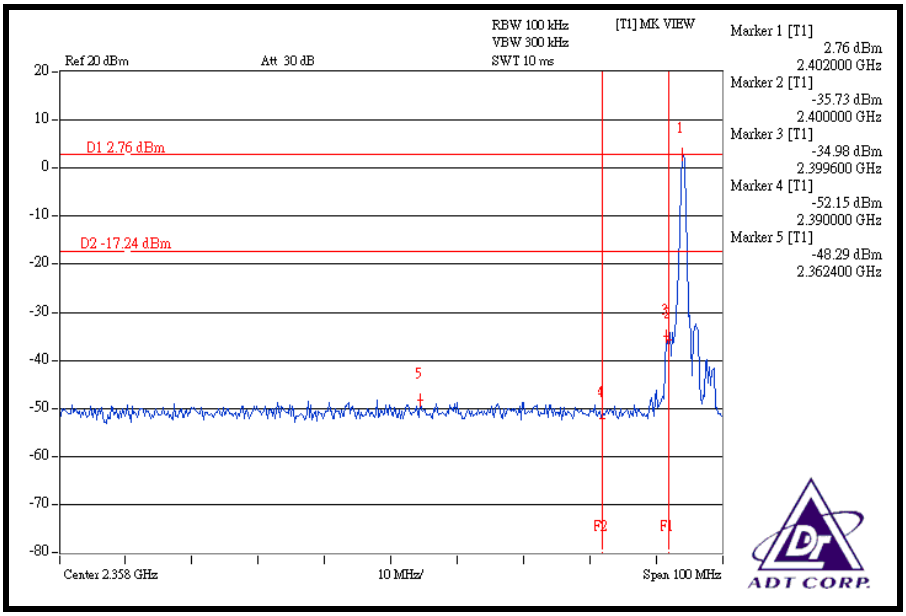
Average value = peak reading – 30.1

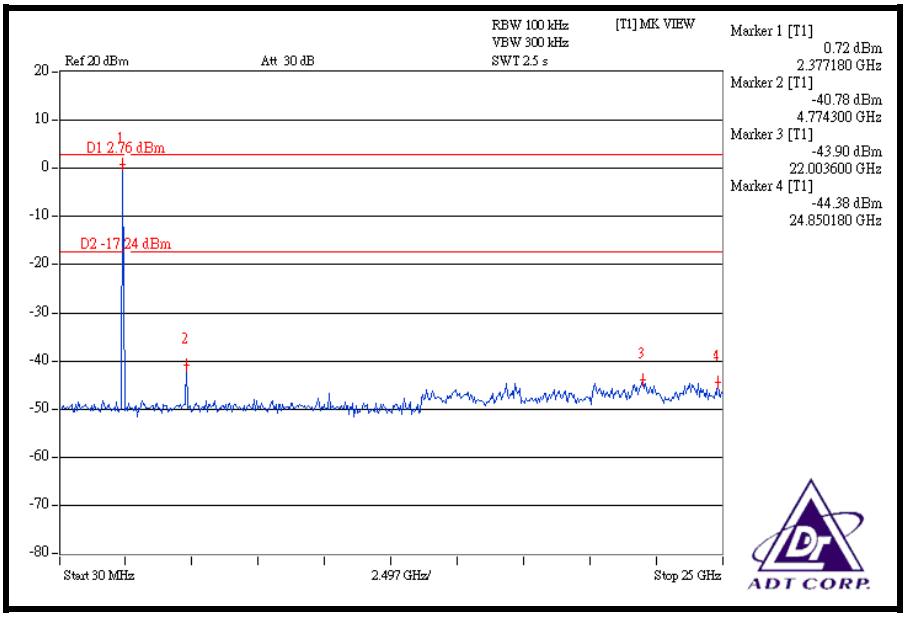
NOTE 2: The band edge emission plot on the next page shows 46.46dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 91.76dBuV/m (Peak), so the maximum field strength in restrict band is 91.76 – 46.46 = 45.30dBuV/m, which is under 74 dBuV/m limit.

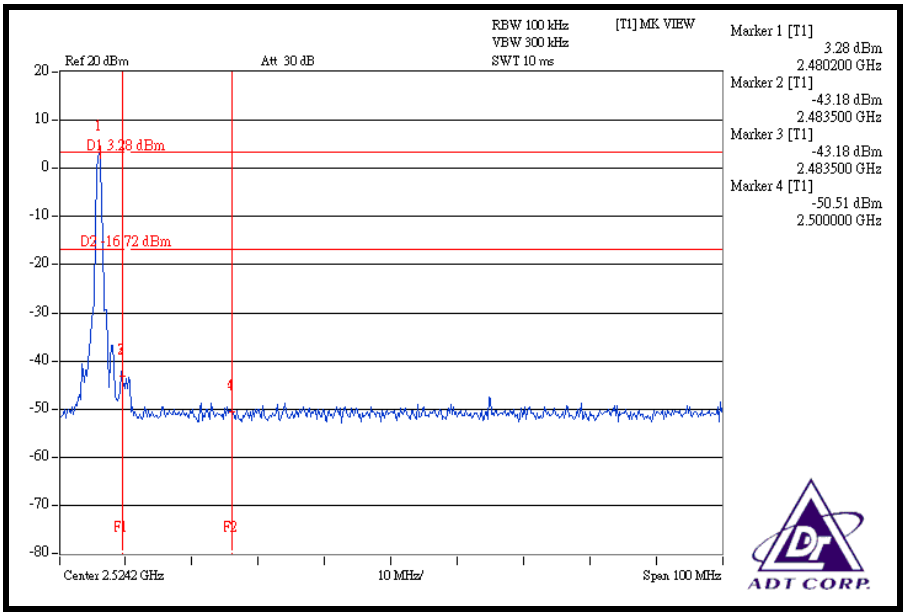
Average value = 45.30 – 30.10 = 15.20dBuV/m, which is under 54dBuV/m limit.

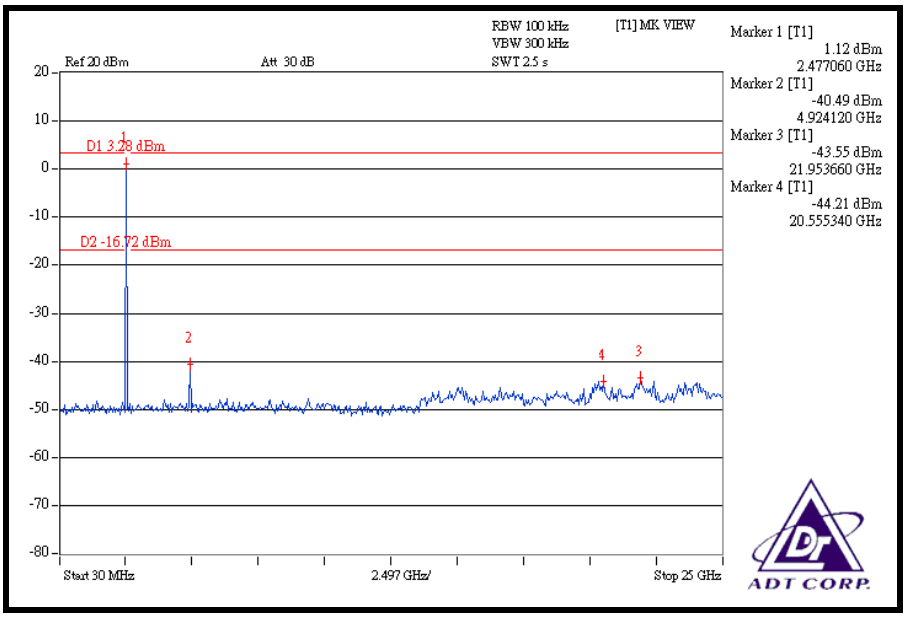
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: 20log(3.125/100)= -30.1 dB.

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 2.76 dBm
D2 -17.24 dBm
Marker 1 [T1]
2.76 dBm
2.402000 GHz
Marker 2 [T1]
-35.73 dBm
2.400000 GHz
Marker 3 [T1]
-34.98 dBm
2.399600 GHz
Marker 4 [T1]
-52.15 dBm
2.390000 GHz
Marker 5 [T1]
-48.29 dBm
2.362400 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 2.76 dBm
D2 -17.24 dBm
Marker 1 [T1]
0.72 dBm
2.377180 GHz
Marker 2 [T1]
-40.78 dBm
4.774300 GHz
Marker 3 [T1]
-43.90 dBm
22.003600 GHz
Marker 4 [T1]
-44.38 dBm
24.850180 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 3.28 dBm
D2 -16.72 dBm
F1
F2
Center 2.5242 GHz
10 MHz/
Span 100 MHz
Marker 1 [T1]
3.28 dBm
2.480200 GHz
Marker 2 [T1]
-43.18 dBm
2.483500 GHz
Marker 3 [T1]
-43.18 dBm
2.483500 GHz
Marker 4 [T1]
-50.51 dBm
2.500000 GHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 3.28 dBm
D2 -16.72 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz
Marker 1 [T1]
1.12 dBm
2.477060 GHz
Marker 2 [T1]
-40.49 dBm
4.924120 GHz
Marker 3 [T1]
-43.55 dBm
21.953660 GHz
Marker 4 [T1]
-44.21 dBm
20.555340 GHz
ADT CORP.

8DPSK MODULATION

NOTE 1: The band edge emission plot on the next page shows 47.84dBc between carrier maximum power and local maximum emission in restrict band (2.35040GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 86.64dBuV/m (Peak), so the maximum field strength in restrict band is 86.64 – 47.84 = 38.80dBuV/m, which is under 74 dBuV/m limit.

Average value = 38.80 – 30.10 = 8.70dBuV/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.

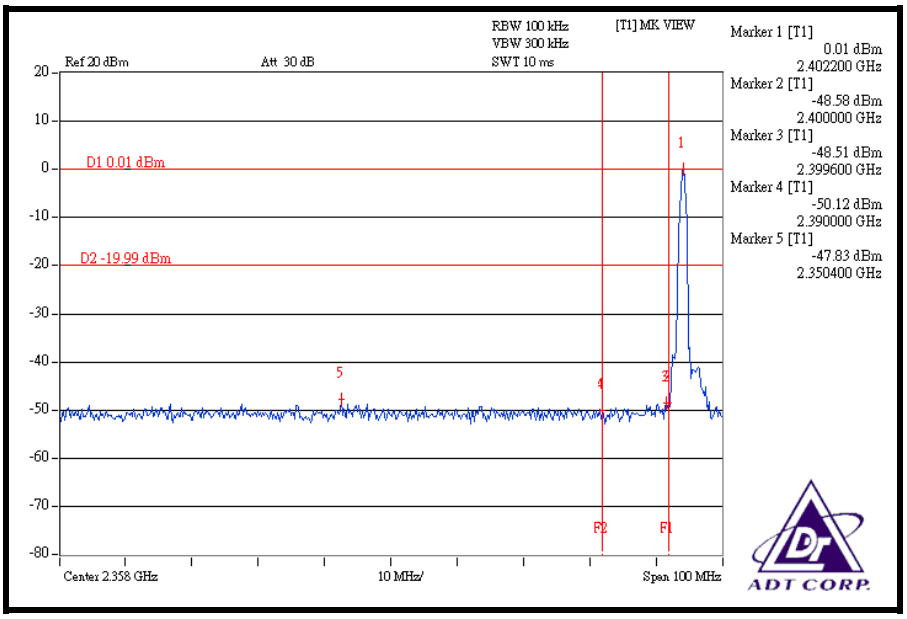
Average value = peak reading – 30.1

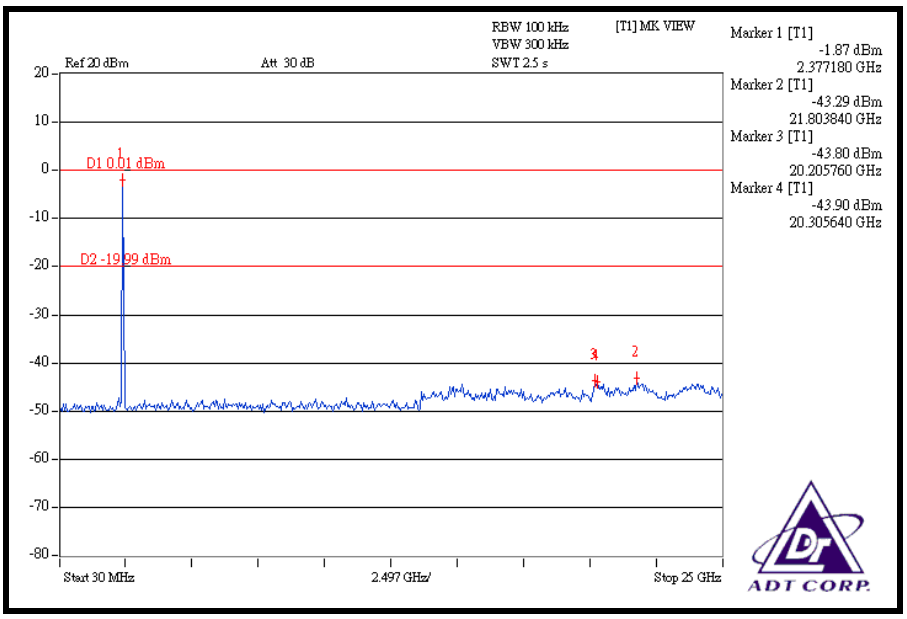
NOTE 2: The band edge emission plot on the next page shows 46.87dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2.7 is 88.97dBuV/m (Peak), so the maximum field strength in restrict band is 88.97 – 46.87 = 42.10dBuV/m, which is under 74 dBuV/m limit.

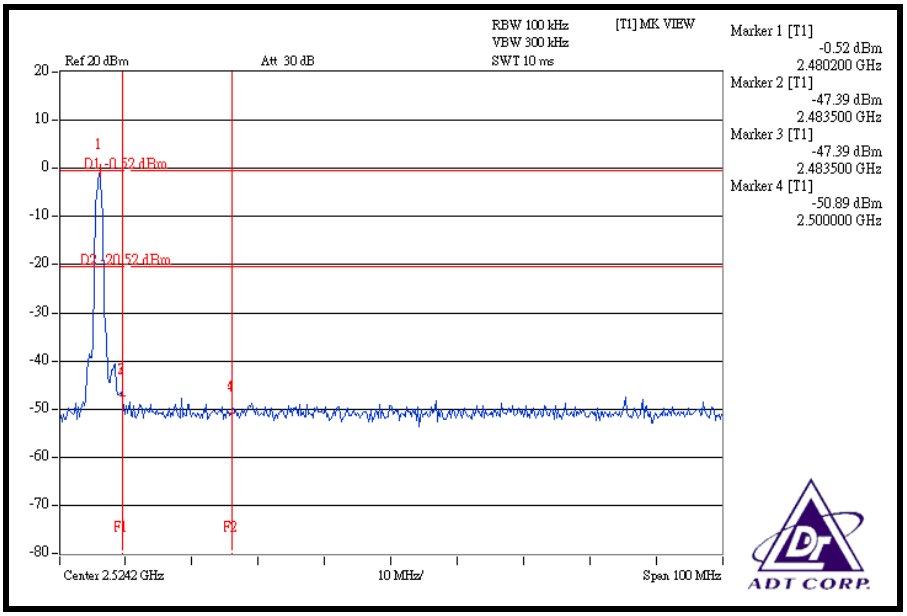
Average value = 42.10 – 30.10 = 12.00dBuV/m, which is under 54dBuV/m limit.

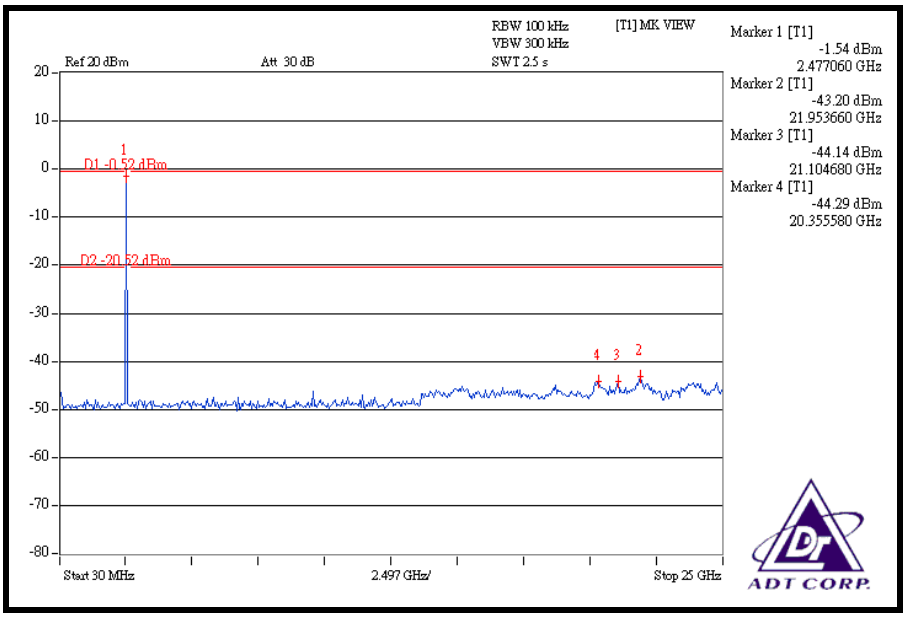
*The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: 20log(3.125/100)= -30.1 dB.

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 0.01 dBm
D2 -19.99 dBm
Marker 1 [T1]
0.01 dBm
2.402200 GHz
Marker 2 [T1]
-48.58 dBm
2.400000 GHz
Marker 3 [T1]
-48.51 dBm
2.399600 GHz
Marker 4 [T1]
-50.12 dBm
2.390000 GHz
Marker 5 [T1]
-47.83 dBm
2.350400 GHz
Center 2.358 GHz
10 MHz/
Span 100 MHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
D1 0.01 dBm
D2 -19.99 dBm
Marker 1 [T1]
-1.87 dBm
2.377180 GHz
Marker 2 [T1]
-43.29 dBm
21.803840 GHz
Marker 3 [T1]
-43.80 dBm
20.205760 GHz
Marker 4 [T1]
-43.90 dBm
20.305640 GHz
Start 30 MHz
2.497 GHz/
Stop 25 GHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-0.52 dBm
2.480200 GHz
Marker 2 [T1]
-47.39 dBm
2.483500 GHz
Marker 3 [T1]
-47.39 dBm
2.483500 GHz
Marker 4 [T1]
-50.89 dBm
2.500000 GHz
D1 -0.52 dBm
D2 -20.52 dBm
F1
F2
Center 2.5242 GHz
10 MHz/
Span 100 MHz
ADT CORP.


RBW 100 kHz
VBW 300 kHz
SWT 2.5 s
[T1] MK VIEW
Ref 20 dBm
Att 30 dB
Marker 1 [T1]
-1.54 dBm
2.477060 GHz
Marker 2 [T1]
-43.20 dBm
21.953660 GHz
Marker 3 [T1]
-44.14 dBm
21.104680 GHz
Marker 4 [T1]
-44.29 dBm
20.355580 GHz
D1 -0.52 dBm
D2 -20.52 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz
ADT CORP.

4.9 ANTENNA REQUIREMENT

4.9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is printed antenna without antenna connector. The maximum gain of this antenna is -3.95dBi.

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, A2LA
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---