FCC TEST REPORT

REPORT NO.:	RF121009D04
MODEL NO.:	LPS-6
FCC ID:	PYALPS-6
VERSION:	HW: 1.0, SW:1.0, MV:1.0, Proto:B4.0
RECEIVED:	Jun. 5, 2012
TESTED:	Jun. 8 ~ 13, 2012
ISSUED:	Nov. 9, 2012

APPLICANT:	Nokia Corporation
ADDRESS:	Joensuunkatu 7E P.O. Box 86 Salo, FIN-24100, Finland

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121009D04	Original release	Nov. 9, 2012

1. CERTIFICATION

PRODUCT:	Wireless Loopset
MODEL NO.:	LPS-6
BRAND:	NOKIA
APPLICANT:	Nokia Corporation
TESTED:	Jun. 8 ~ 13, 2012
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	ANSI C63.10-2009

The above equipment 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 : Annie Chang , **DATE:** Nov. 9, 2012

(Annie Chang / Supervisor)

APPROVED BY : Ken Liu , **DATE:** Nov. 9, 2012

(Ken Liu / 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 -12.11dB at 0.45469MHz.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -6.0dB at 110.83 & 865.82MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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

2.1 MEASUREMENT UNCERTAINTY

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

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	2.41 dB
Radiated emissions	30MHz ~ 1GHz	3.78 dB
	Above 1GHz	3.36 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless Loopset
MODEL NO.	LPS-6
POWER SUPPLY	5Vdc from host equipment 5Vdc from AC adapter 3.7Vdc from battery
MODULATION TYPE	GFSK, π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	FHSS
TRANSFER RATE	1/2/3Mbps
OPERATING FREQUENCY	2402 ~ 2480MHz
NUMBER OF CHANNEL	79
MAX. OUTPUT POWER	6.0mW
ANTENNA TYPE	Chip antenna with 1dBi gain
ANTENNA CONNECTOR	NA
I/O PORTS	Refer to user's manual
DATA CABLE	Shielded USB cable (0.8m)
ACCESSORY DEVICES	Refer to note below

NOTE:

1. The EUT is a Wireless Loopset.

2. The EUT equipped the following accessories:

Item	Brand	Model	Spec.
AC Adapter	NOKIA	AC-20U	AC I/P: 100-240V, 50/60Hz, 120mA DC O/P: 5V, 750mA AC 2 Pin, Shielded USB cable (1.8m)
Battery 1	Synergy	AHB652228PI	3.7Vdc, 355mAh
Battery 2	FT	FT672029PB	3.7Vdc, 340mAh

3. The above EUT information is 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 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	OB	
A	√	√	√	√	√	Operating (EUT w. Notebook)
B	-	√	√	-	-	Operating (EUT w. Adapter)
C	-	√	Note	-	-	Operating (EUT only)

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

NOTE 1: No need to concern of Conducted Emission due to the EUT is powered by battery.
NOTE 2: "-"means no effect.
NOTE 3: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane.**

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ 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 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
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, 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
A ~ C	0 to 78	0	FHSS	GFSK	DH5

POWER LINE CONDUCTED EMISSION TEST:

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

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

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

CONDUCTED OUT-BAND EMISSION 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, 78	FHSS	GFSK	DH5
A	0 to 78	0, 78	FHSS	8DPSK	DH5

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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

TEST CONDITION:

APPLICABLE TO	EUT CONFIGURE MODE	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	A	23deg. C, 82% RH	120Vac, 60Hz (System)	Nick Chen
RE<1G	A	23deg. C, 82% RH	120Vac, 60Hz (System)	Nick Chen
	B	23deg. C, 82% RH	120Vac, 60Hz	Nick Chen
	C	23deg. C, 82% RH	3.7Vdc	Nick Chen
PLC	A	26deg. C, 76% RH	120Vac, 60Hz (System)	Jun Wu
	B	26deg. C, 76% RH	120Vac, 60Hz	Jun Wu
OB	A	21deg. C, 70% RH	120Vac, 60Hz (System)	Jun Wu

3.3 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.

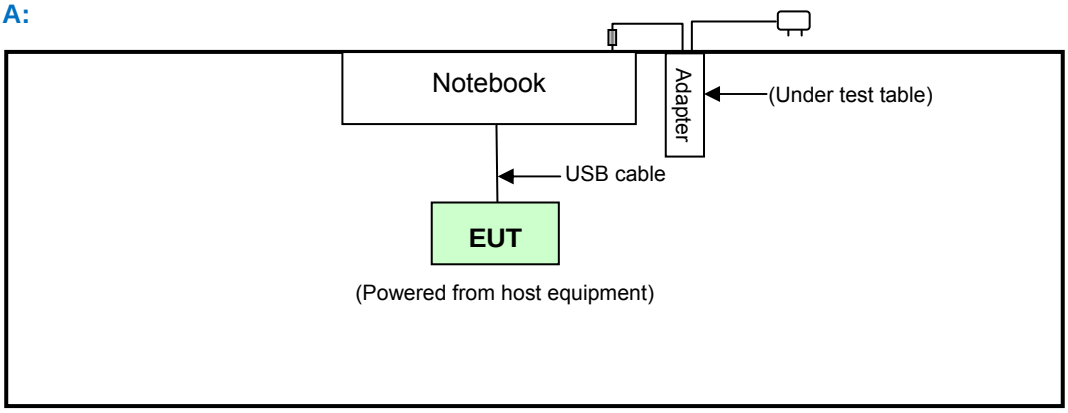
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP27L	8SNZ12S	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

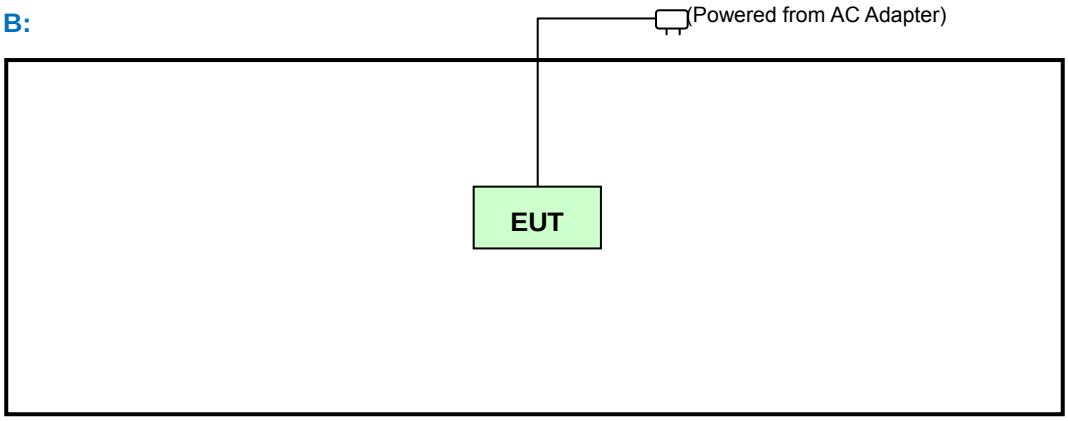
NOTE: All power cords of the above support units are non shielded (1.8m).

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST

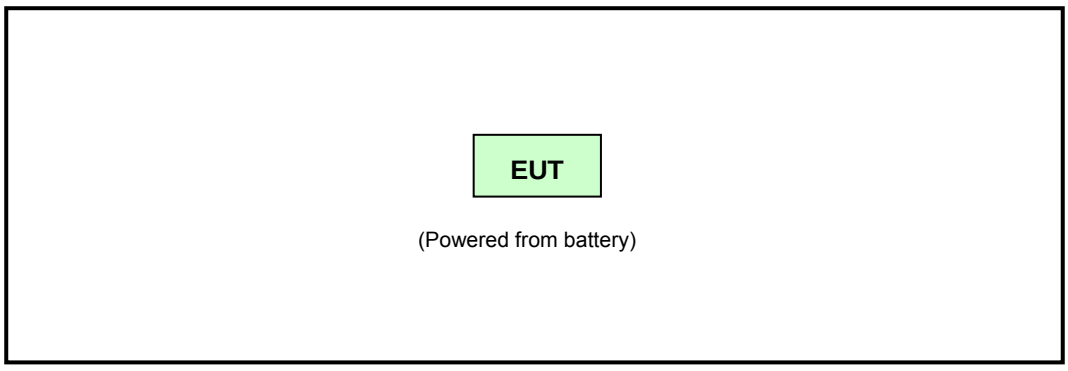
Mode A:



Mode B:



Mode C:



3.4 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 C63.10-2009

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

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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. 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 DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 29, 2012	Feb. 28, 2013
HP Preamplifier	8449B	3008A01201	Feb. 29, 2012	Feb. 28, 2013
Agilent Spectrum Analyzer	E4446A	MY46180403	Jun. 13, 2012	Jun. 12, 2013
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Oct. 14, 2011	Oct. 13, 2012
Schwarzbeck Antenna	VULB 9168	137	Apr. 03, 2012	Apr. 02, 2013
Schwarzbeck Antenna	VHBA 9123	480	May 22, 2012	May 21, 2013
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 19, 2011	Aug. 18, 2012
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	May 18, 2012	May 17, 2013
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	May 09, 2012	May 08, 2013
Anritsu Power Sensor	MA2411B	0738404	Apr. 28, 2012	Apr. 27, 2013
Anritsu Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

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 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.

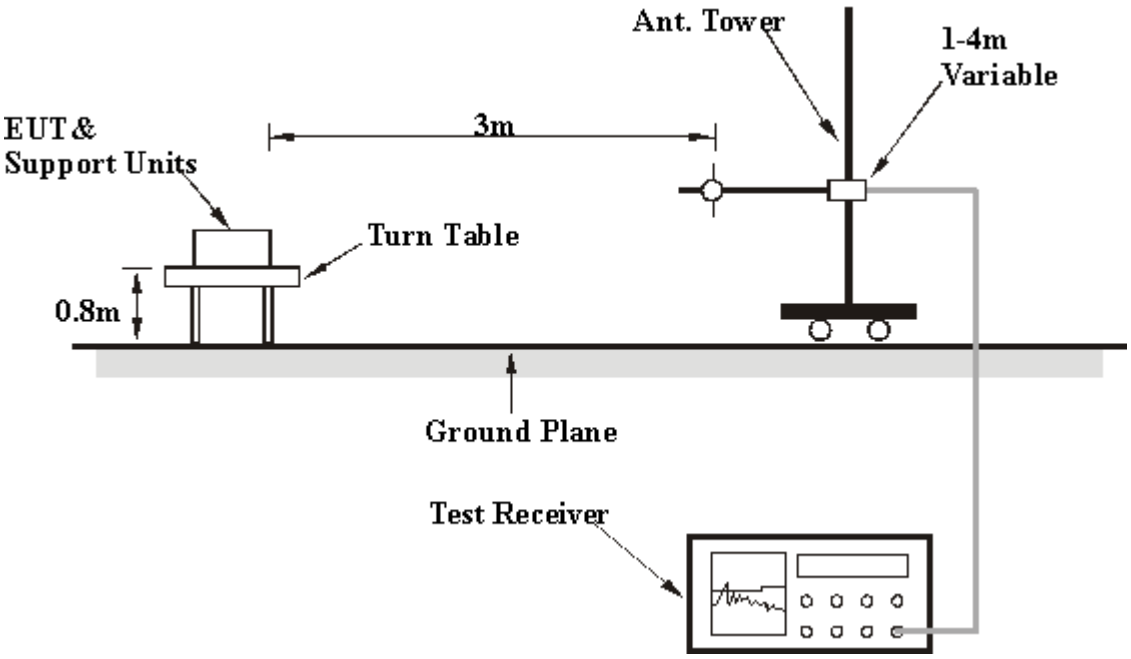
NOTE:

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

For Mode A:

a. Connected the EUT with Notebook placed on testing table.

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

For Mode B:

a. Connected the EUT with AC adapter placed on testing table.

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

For Mode C:

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

4.1.7 TEST RESULTS

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)
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	59.7 PK	74.0	-14.3	1.00 H	200	29.49	30.24
2	2390.00	44.3 AV	54.0	-9.7	1.00 H	200	14.06	30.24
3	#2400.00	74.3 PK	90.8	-16.5	1.00 H	200	44.05	30.29
4	#2400.00	44.2 AV	60.7	-16.5	1.00 H	200	13.95	30.29
5	*2402.00	110.8 PK			1.00 H	200	80.54	30.30
6	*2402.00	80.7 AV			1.00 H	200	50.44	30.30
7	4804.00	48.7 PK	74.0	-25.3	1.00 H	168	12.10	36.59
8	4804.00	18.6 AV	54.0	-35.4	1.00 H	168	-18.00	36.59
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	55.7 PK	74.0	-18.3	1.06 V	288	25.45	30.24
2	2390.00	43.5 AV	54.0	-10.5	1.06 V	288	13.29	30.24
3	#2400.00	65.5 PK	82.0	-16.5	1.06 V	288	35.23	30.29
4	#2400.00	35.4 AV	51.9	-16.5	1.06 V	288	5.13	30.29
5	*2402.00	102.0 PK			1.06 V	288	71.72	30.30
6	*2402.00	71.9 AV			1.06 V	288	41.62	30.30
7	4804.00	49.4 PK	74.0	-24.6	1.05 V	289	12.77	36.59
8	4804.00	19.3 AV	54.0	-34.7	1.05 V	289	-17.33	36.59

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).
8. "#":The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		
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	108.9 PK			1.00 H	59	78.50	30.43
2	*2441.00	78.8 AV			1.00 H	59	48.40	30.43
3	4882.00	48.8 PK	74.0	-25.2	1.00 H	256	11.99	36.79
4	4882.00	18.7 AV	54.0	-35.3	1.00 H	256	-18.11	36.79
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	100.9 PK			1.00 V	177	70.44	30.43
2	*2441.00	70.8 AV			1.00 V	177	40.34	30.43
3	4882.00	51.3 PK	74.0	-22.7	1.00 V	258	14.48	36.79
4	4882.00	21.2 AV	54.0	-32.8	1.00 V	258	-15.62	36.79

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).

CHANNEL	TX Channel 78	**DETECTOR FUNCTION**	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)
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	108.8 PK			1.00 H	207	78.26	30.56
2	*2480.00	78.7 AV			1.00 H	207	48.16	30.56
3	2483.50	48.1 PK	74.0	-25.9	1.00 H	207	17.55	30.57
4	2483.50	18.0 AV	54.0	-36.0	1.00 H	207	-12.55	30.57
5	4960.00	47.4 PK	74.0	-26.6	1.00 H	18	10.38	36.99
6	4960.00	17.3 AV	54.0	-36.7	1.00 H	18	-19.72	36.99
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*2480.00	101.8 PK			1.00 V	349	71.20	30.56
2	*2480.00	71.7 AV			1.00 V	349	41.10	30.56
3	2483.50	41.1 PK	74.0	-32.9	1.00 V	349	10.49	30.57
4	2483.50	11.0 AV	54.0	-43.0	1.00 V	349	-19.61	30.57
5	4960.00	48.2 PK	74.0	-25.8	1.00 V	22	11.22	36.99
6	4960.00	18.1 AV	54.0	-35.9	1.00 V	22	-18.88	36.99

REMARKS:

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

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		
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	56.6 PK	74.0	-17.5	1.00 H	162	26.31	30.24
2	2390.00	44.5 AV	54.0	-9.5	1.00 H	162	14.23	30.24
3	#2400.00	70.8 PK	88.0	-17.2	1.00 H	162	40.48	30.29
4	#2400.00	40.7 AV	57.9	-17.2	1.00 H	162	10.38	30.29
5	*2402.00	108.0 PK			1.00 H	162	77.67	30.30
6	*2402.00	77.9 AV			1.00 H	162	47.57	30.30
7	4804.00	47.9 PK	74.0	-26.1	1.00 H	256	11.32	36.59
8	4804.00	17.8 AV	54.0	-36.2	1.00 H	256	-18.78	36.59
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	55.7 PK	74.0	-18.4	1.07 V	191	25.41	30.24
2	2390.00	44.1 AV	54.0	-9.9	1.07 V	191	13.82	30.24
3	#2400.00	65.7 PK	82.9	-17.2	1.07 V	191	35.41	30.29
4	#2400.00	35.6 AV	52.8	-17.2	1.07 V	191	5.31	30.29
5	*2402.00	102.9 PK			1.07 V	191	72.60	30.30
6	*2402.00	72.8 AV			1.07 V	191	42.50	30.30
7	4804.00	51.1 PK	74.0	-22.9	1.00 V	258	14.49	36.59
8	4804.00	21.0 AV	54.0	-33.0	1.00 V	258	-15.61	36.59

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB.
7. Average value = peak reading + 20log(duty cycle).
8. "#":The radiated frequency is out the restricted band.

CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		
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	106.9 PK			1.00 H	201	76.45	30.43
2	*2441.00	76.8 AV			1.00 H	201	46.35	30.43
3	4882.00	48.1 PK	74.0	-26.0	1.00 H	24	11.26	36.79
4	4882.00	18.0 AV	54.0	-36.1	1.00 H	24	-18.84	36.79
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	100.8 PK			1.00 V	254	70.33	30.43
2	*2441.00	70.7 AV			1.00 V	254	40.23	30.43
3	4882.00	50.5 PK	74.0	-23.6	1.00 V	84	13.66	36.79
4	4882.00	20.4 AV	54.0	-33.7	1.00 V	84	-16.44	36.79

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).

CHANNEL	TX Channel 78	**DETECTOR FUNCTION**	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)
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	106.9 PK			1.00 H	202	76.32	30.56
2	*2480.00	76.8 AV			1.00 H	202	46.22	30.56
3	2483.50	50.2 PK	74.0	-23.8	1.00 H	202	19.61	30.57
4	2483.50	20.1 AV	54.0	-33.9	1.00 H	202	-10.49	30.57
5	4960.00	47.7 PK	74.0	-26.3	1.00 H	23	10.67	36.99
6	4960.00	17.6 AV	54.0	-36.4	1.00 H	23	-19.43	36.99
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*2480.00	102.3 PK			1.00 V	255	71.78	30.56
2	*2480.00	72.2 AV			1.00 V	255	41.68	30.56
3	2483.50	45.6 PK	74.0	-28.4	1.00 V	255	15.07	30.57
4	2483.50	15.5 AV	54.0	-38.5	1.00 V	255	-15.03	30.57
5	4960.00	48.9 PK	74.0	-25.1	1.00 V	214	11.95	36.99
6	4960.00	18.8 AV	54.0	-35.2	1.00 V	214	-18.15	36.99

REMARKS:

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

CHANNEL	TX Channel 0	**DETECTOR FUNCTION**	Quasi-Peak
FREQUENCY RANGE	Below 1000MHz		
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	60.72	33.1 QP	40.0	-6.9	1.04 H	78	19.70	13.42
2	**110.83**	**37.5 QP**	**43.5**	**-6.0**	**1.22 H**	**142**	**26.91**	**10.57**
3	167.42	37.2 QP	43.5	-6.3	1.50 H	266	23.63	13.55
4	398.60	39.7 QP	46.0	-6.3	1.03 H	89	21.39	18.29
5	731.63	39.3 QP	46.0	-6.7	1.00 H	236	14.22	25.09
6	**865.82**	**40.0 QP**	**46.0**	**-6.0**	**1.00 H**	**267**	**12.74**	**27.26**
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	33.23	31.4 QP	40.0	-8.6	1.07 V	10	19.34	12.03
2	110.83	32.0 QP	43.5	-11.5	1.24 V	118	21.40	10.57
3	159.33	31.6 QP	43.5	-11.9	1.22 V	7	17.52	14.05
4	180.95	37.4 QP	43.5	-6.1	1.02 V	9	24.70	12.68
5	400.22	38.1 QP	46.0	-8.0	1.00 V	204	19.71	18.34
6	665.35	38.8 QP	46.0	-7.2	1.00 V	12	14.71	24.08

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.

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak
FREQUENCY RANGE	Below 1000MHz		
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	33.23	28.3 QP	40.0	-11.7	1.50 H	9	16.23	12.03
2	251.48	26.4 QP	46.0	-19.6	1.24 H	232	12.81	13.56
3	267.65	26.8 QP	46.0	-19.2	1.50 H	228	12.58	14.19
4	770.43	25.5 QP	46.0	-20.6	1.24 H	203	-0.31	25.76
5	789.83	25.8 QP	46.0	-20.2	1.50 H	34	-0.29	26.10
6	901.38	27.8 QP	46.0	-18.2	1.50 H	281	0.07	27.75
7	917.55	28.0 QP	46.0	-18.1	1.24 H	120	0.02	27.93
8	948.27	28.2 QP	46.0	-17.8	1.24 H	10	-0.08	28.28
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	24.0 QP	40.0	-16.0	1.00 V	92	12.33	11.67
2	70.42	22.8 QP	40.0	-17.2	1.25 V	63	10.43	12.34
3	154.48	23.7 QP	43.5	-19.8	1.25 V	335	9.69	14.03
4	728.40	24.4 QP	46.0	-21.6	1.00 V	10	-0.66	25.03
5	804.38	25.7 QP	46.0	-20.3	1.50 V	49	-0.61	26.34
6	885.22	27.2 QP	46.0	-18.8	1.25 V	354	-0.32	27.53
7	953.12	28.2 QP	46.0	-17.9	1.00 V	108	-0.17	28.32

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.

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak
FREQUENCY RANGE	Below 1000MHz		
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	47.78	19.6 QP	40.0	-20.5	1.25 H	9	5.39	14.16
2	256.33	30.0 QP	46.0	-16.0	1.00 H	269	16.22	13.74
3	291.90	25.0 QP	46.0	-21.0	1.25 H	92	9.92	15.08
4	644.33	24.7 QP	46.0	-21.3	1.25 H	60	0.89	23.81
5	665.35	24.1 QP	46.0	-21.9	1.25 H	217	-0.01	24.08
6	869.05	26.7 QP	46.0	-19.3	1.25 H	9	-0.64	27.31
7	885.22	27.5 QP	46.0	-18.5	1.00 H	10	-0.05	27.53
8	945.03	28.7 QP	46.0	-17.3	1.50 H	307	0.47	28.24
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	39.70	26.8 QP	40.0	-13.2	1.50 V	9	13.39	13.40
2	676.67	24.2 QP	46.0	-21.9	1.50 V	127	-0.08	24.23
3	739.72	24.6 QP	46.0	-21.4	1.50 V	9	-0.59	25.23
4	799.53	26.0 QP	46.0	-20.1	1.24 V	234	-0.31	26.26
5	849.65	27.7 QP	46.0	-18.3	1.50 V	353	0.62	27.04
6	925.63	28.2 QP	46.0	-17.8	1.24 V	146	0.18	28.02
7	956.35	27.8 QP	46.0	-18.2	1.24 V	10	-0.55	28.35

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 0.50MHz.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100276	Jan. 04, 2012	Jan. 03, 2013
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100219	Nov. 24, 2011	Nov. 23, 2012
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 24, 2011	Nov. 23, 2012
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Dec. 08, 2011	Dec. 07, 2012
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 20, 2012	Feb. 19, 2013
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 22, 2012	Feb. 21, 2013

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

2. The test was performed in Shielded Room No. 10.

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

4.2.3 TEST PROCEDURES

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

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

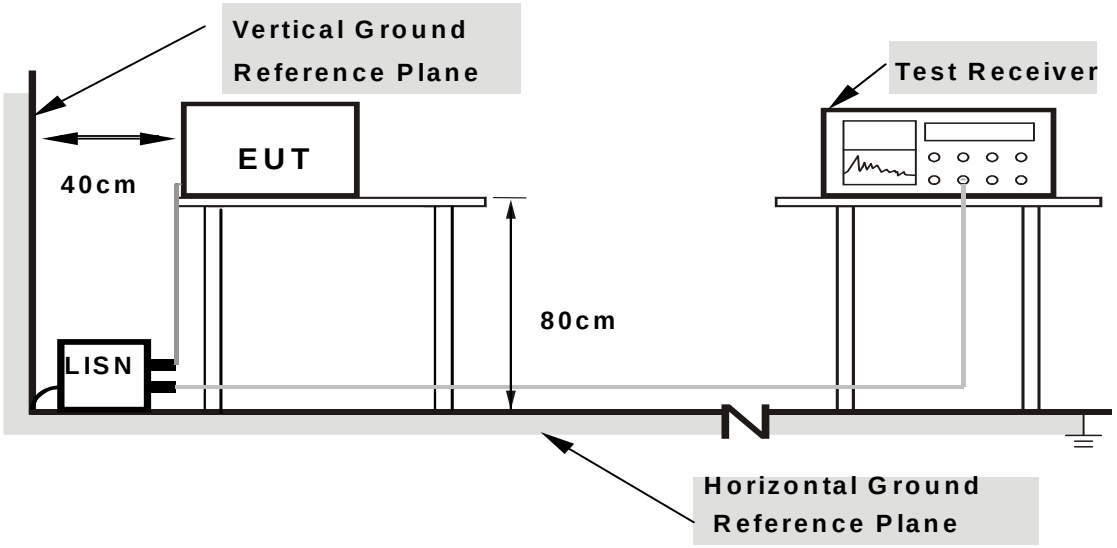
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

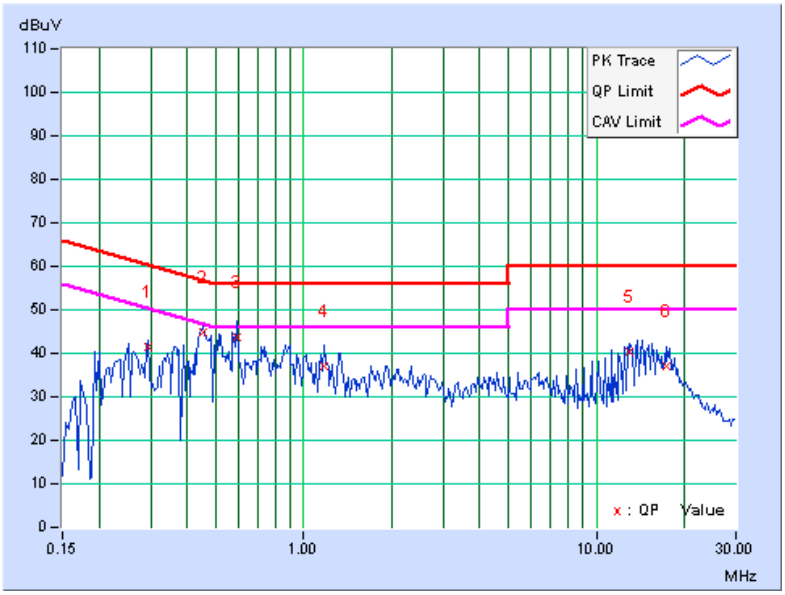
CONDUCTED WORST-CASE DATA：GFSK

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.29453	0.17	41.27	-	41.44	-	60.40	50.40	-18.96	-
2	**0.45469**	**0.19**	**44.49**	**-**	**44.68**	**-**	**56.79**	**46.79**	**-12.11**	**-**
3	0.59141	0.20	43.41	-	43.61	-	56.00	46.00	-12.39	-
4	1.17578	0.24	36.81	-	37.05	-	56.00	46.00	-18.95	-
5	13.02544	0.90	39.30	-	40.20	-	60.00	50.00	-19.80	-
6	17.27344	1.13	36.02	-	37.15	-	60.00	50.00	-22.85	-

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.

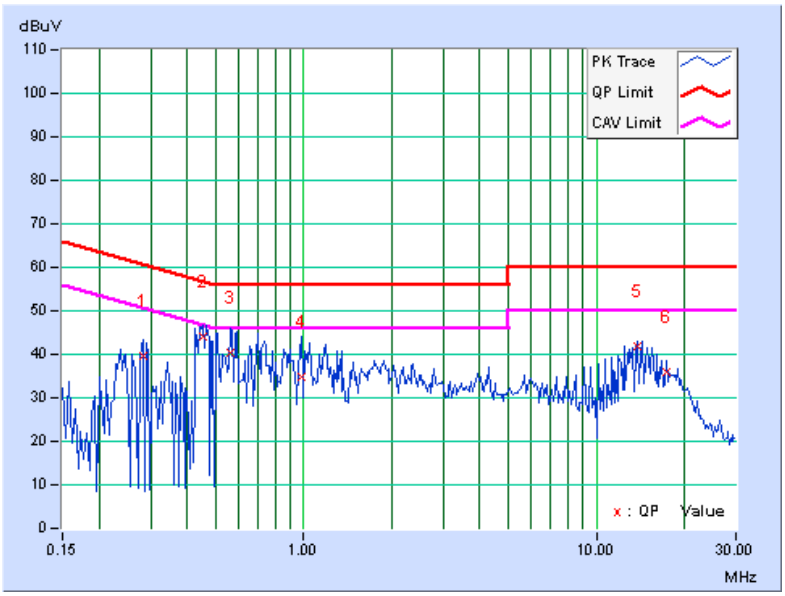


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.28281	0.17	39.60	-	39.77	-	60.73	50.73	-20.97	-
2	0.45469	0.19	43.84	-	44.03	-	56.79	46.79	-12.76	-
3	0.56406	0.20	40.13	-	40.33	-	56.00	46.00	-15.67	-
4	0.98203	0.23	34.47	-	34.70	-	56.00	46.00	-21.30	-
5	13.86328	0.75	41.22	-	41.97	-	60.00	50.00	-18.03	-
6	17.26563	0.86	34.90	-	35.76	-	60.00	50.00	-24.24	-

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.

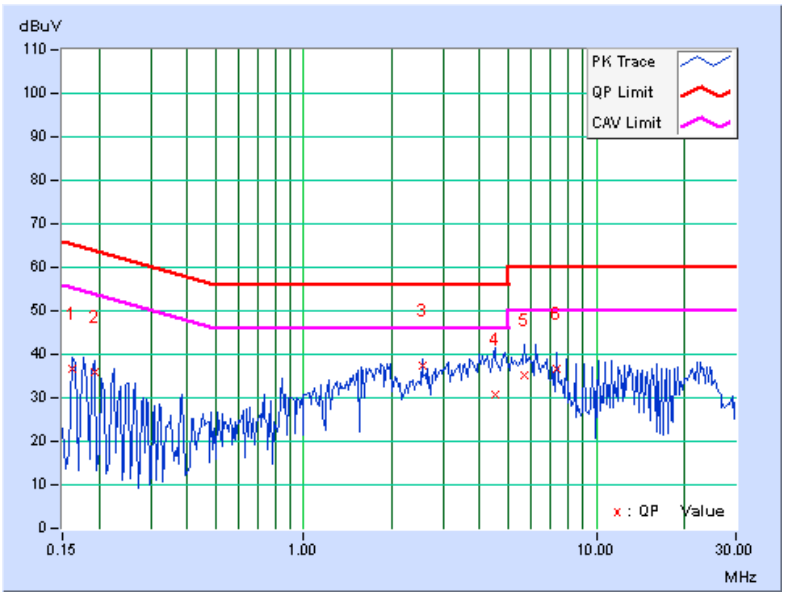


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.17	36.65	-	36.82	-	65.38	55.38	-28.56	-
2	0.19297	0.19	35.61	-	35.80	-	63.91	53.91	-28.10	-
3	2.54688	0.38	37.11	-	37.49	-	56.00	46.00	-18.51	-
4	4.49219	0.45	30.31	-	30.76	-	56.00	46.00	-25.24	-
5	5.66406	0.51	34.71	-	35.22	-	60.00	50.00	-24.78	-
6	7.36328	0.61	36.15	-	36.76	-	60.00	50.00	-23.24	-

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.

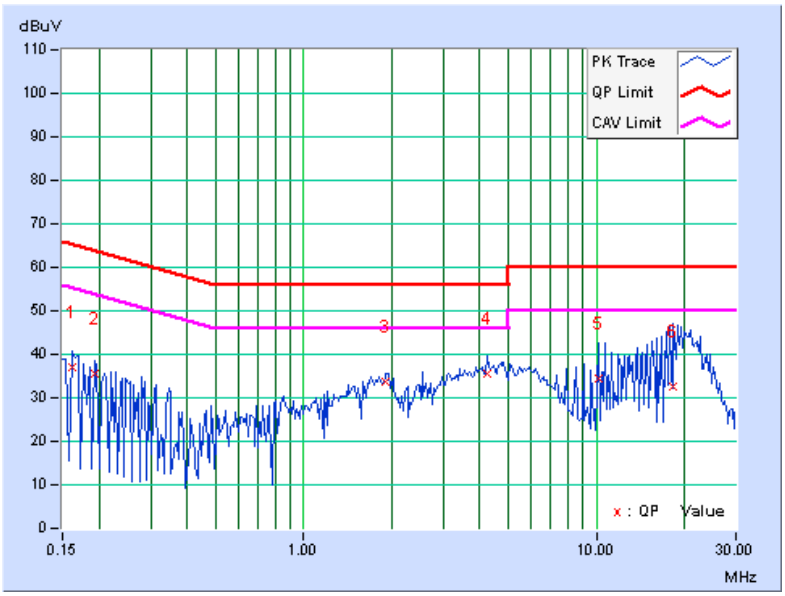


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.16	36.73	-	36.89	-	65.38	55.38	-28.48	-
2	0.19297	0.19	35.32	-	35.51	-	63.91	53.91	-28.39	-
3	1.91016	0.34	33.29	-	33.63	-	56.00	46.00	-22.37	-
4	4.24609	0.40	35.21	-	35.61	-	56.00	46.00	-20.39	-
5	10.18750	0.66	33.73	-	34.39	-	60.00	50.00	-25.61	-
6	18.39063	0.96	31.69	-	32.65	-	60.00	50.00	-27.35	-

REMARKS:

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

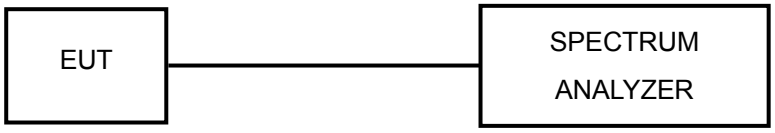


4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

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

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 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.

4.3.5 DEVIATION FROM TEST STANDARD

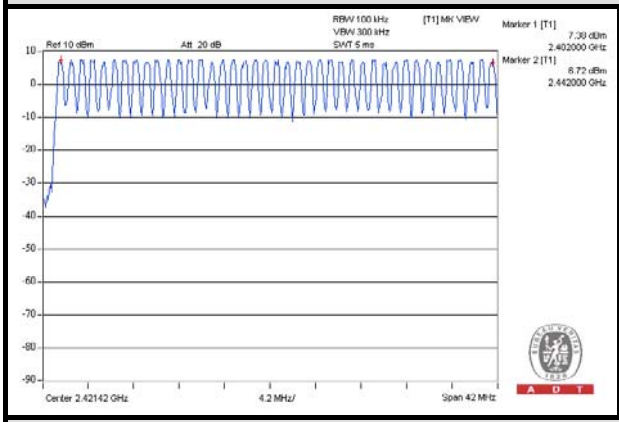
No deviation.

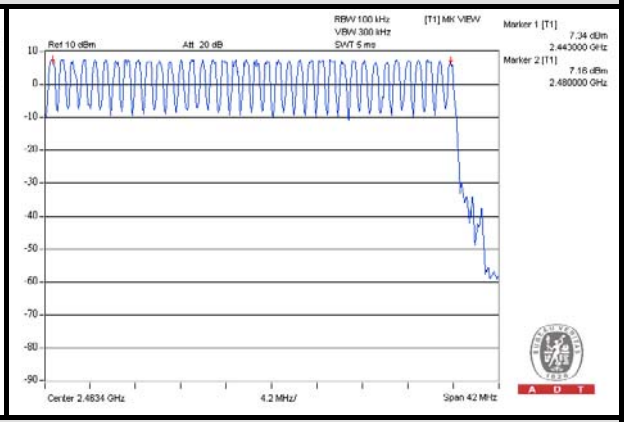
4.3.6 TEST RESULTS

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

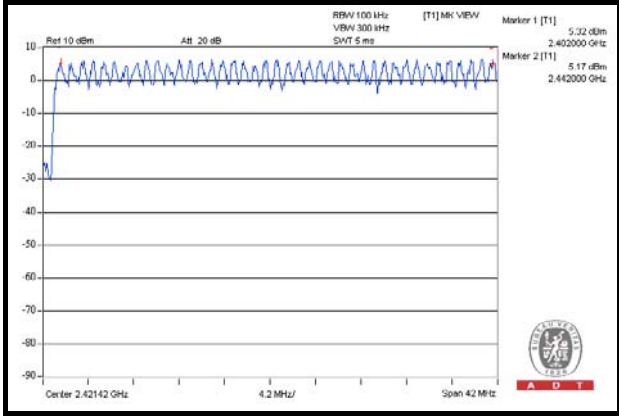
MODE A:

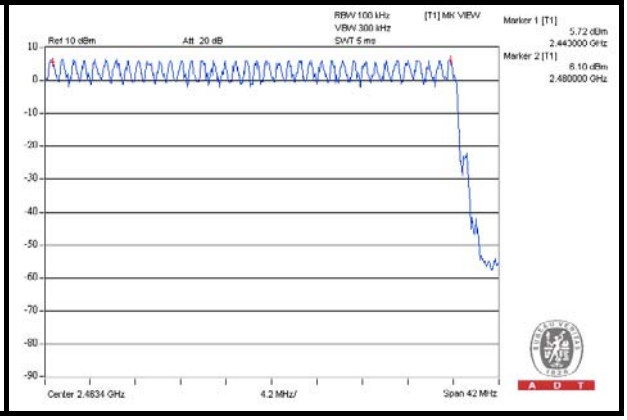
GFSK





8DPSK



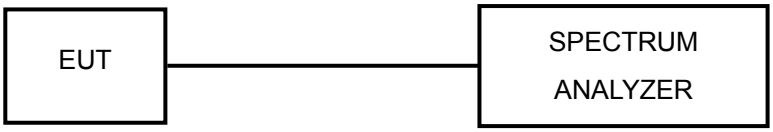


4.4 DWELL TIME ON EACH CHANNEL

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 SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 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.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

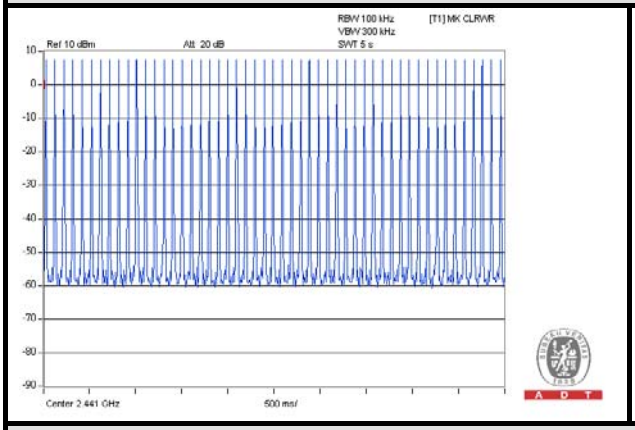
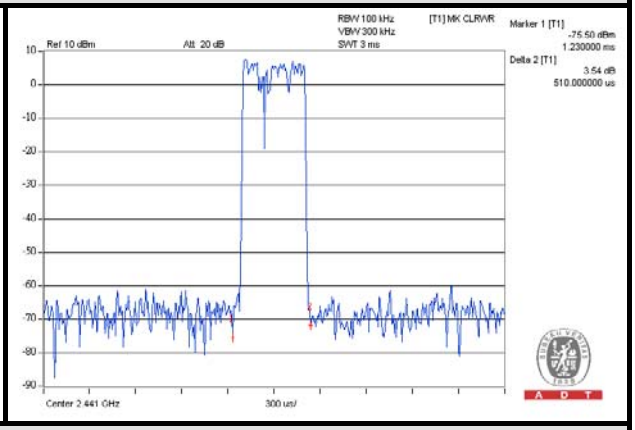
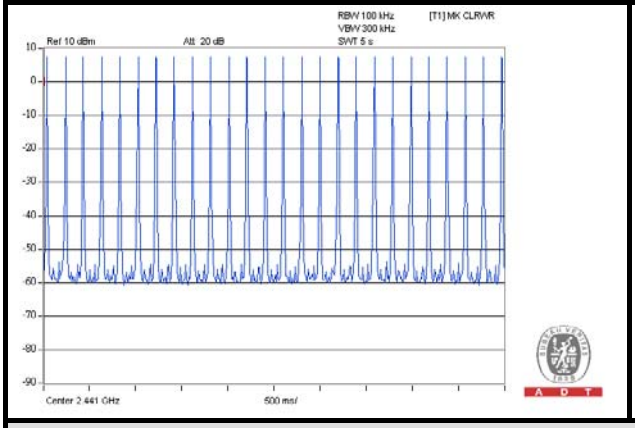
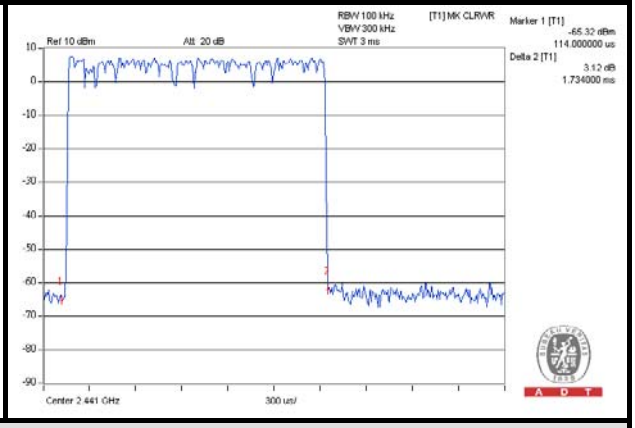
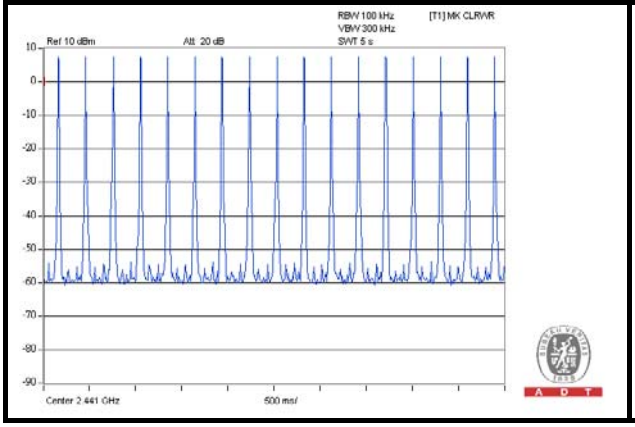
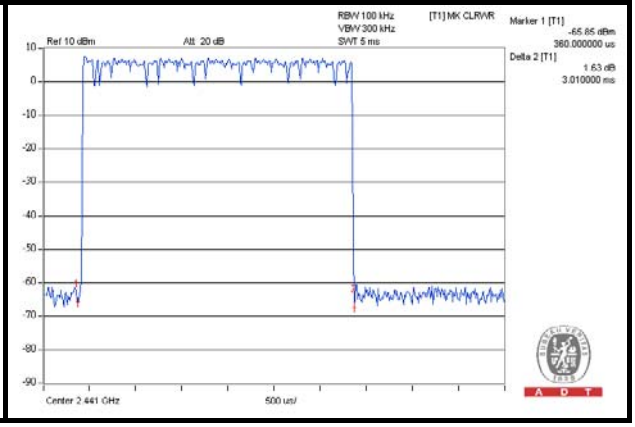
4.4.6 TEST RESULTS

MODE A:

GFSK

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 = 322.32times	0.510	164.38320	400
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.734	284.93088	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.010	323.39440	400

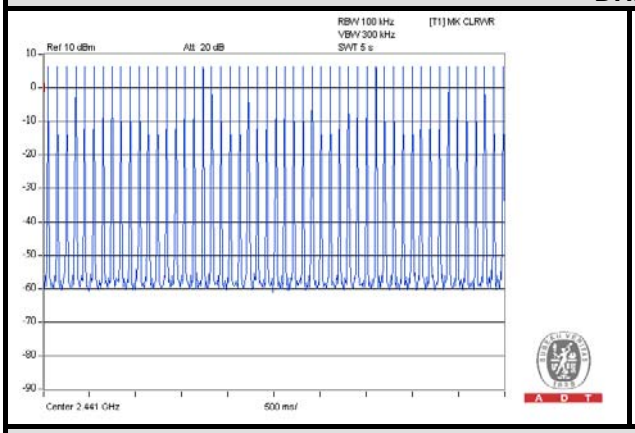
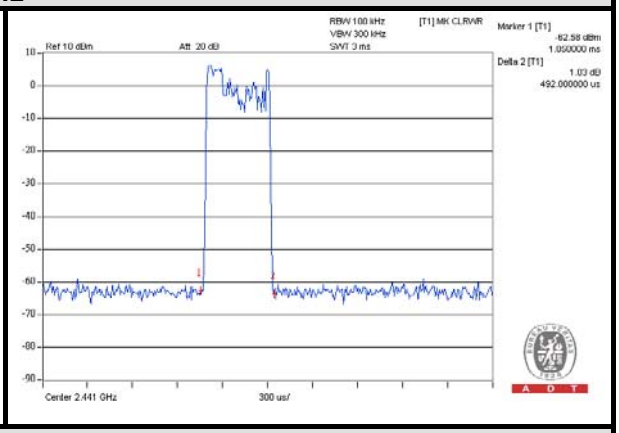
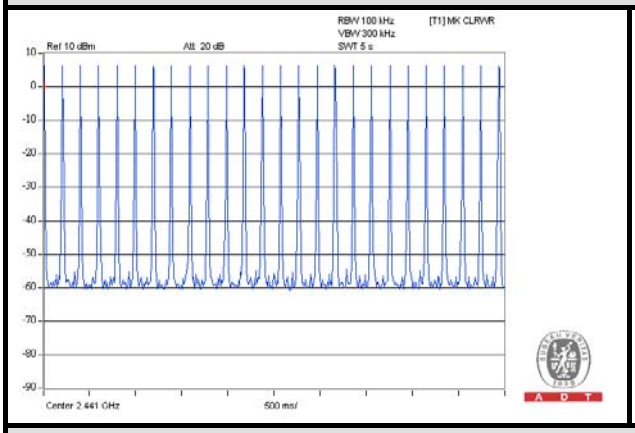
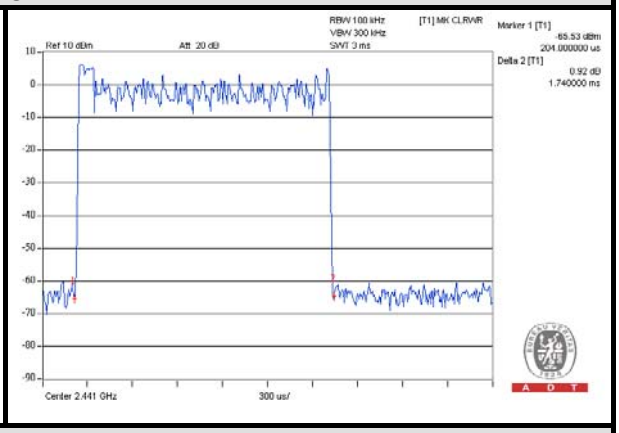
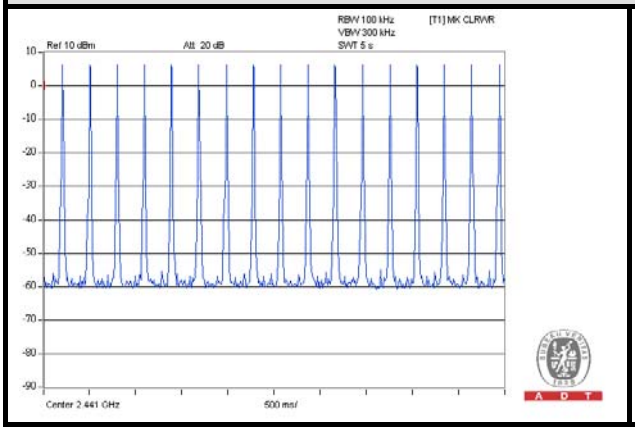
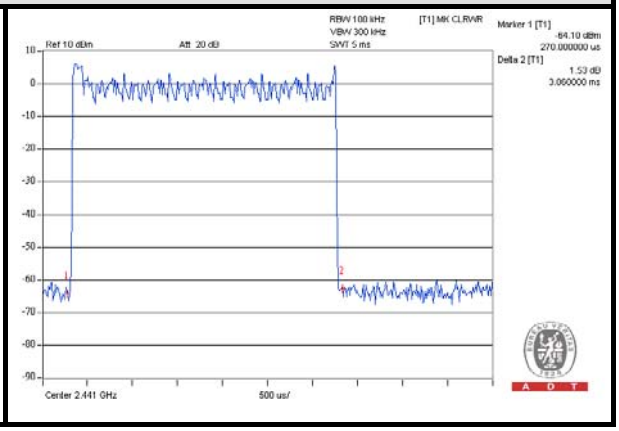
NOTE: Test plots of the transmitting time slot are shown on next page.

DH1	
	
DH3	
	
DH5	
	

8DPSK

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 = 322.32times	0.492	158.58144	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.740	274.92000	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.060	328.76640	400

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

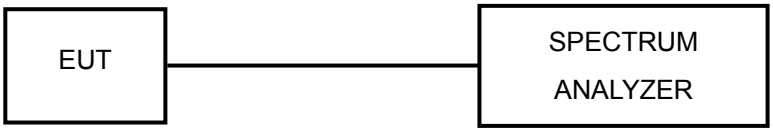
DH1	
	
DH3	
	
DH5	
	

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 SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 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.

4.5.5 DEVIATION FROM TEST STANDARD

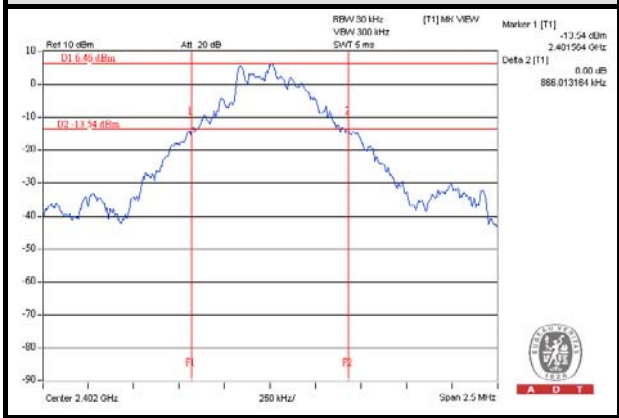
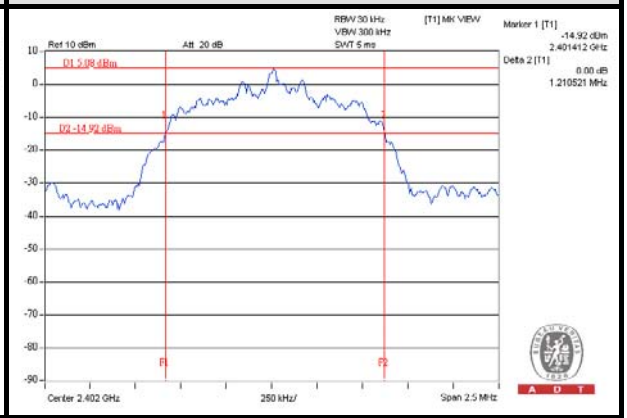
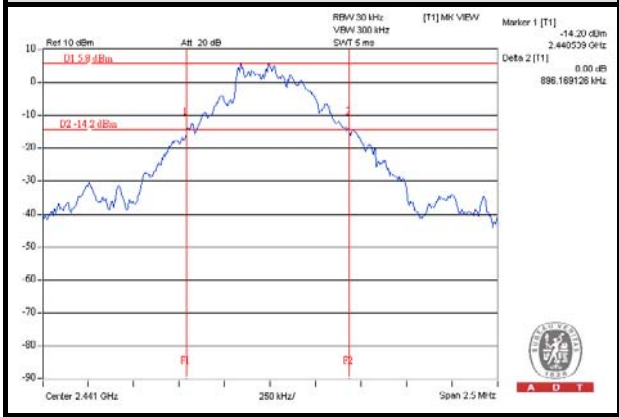
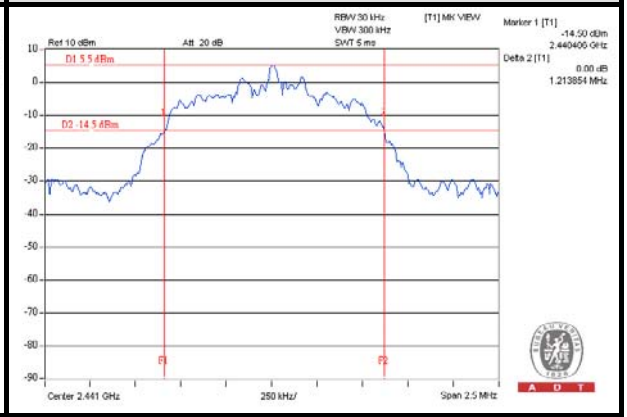
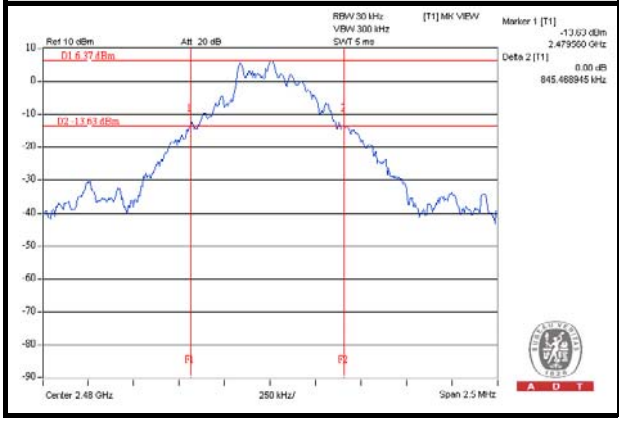
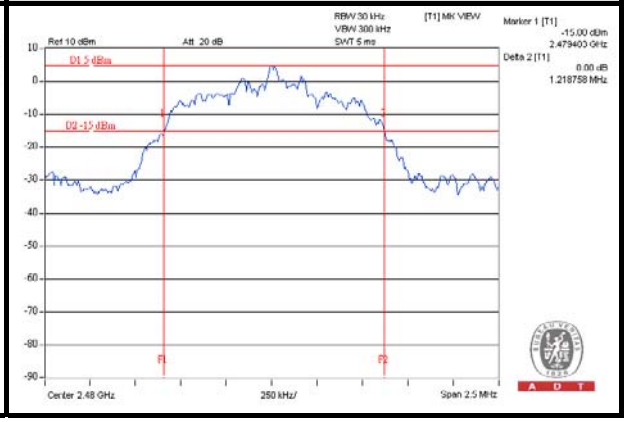
No deviation.

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

CHANNEL	FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	
		GFSK	8DPSK
0	2402	0.866	1.210
39	2441	0.896	1.213
78	2480	0.845	1.218

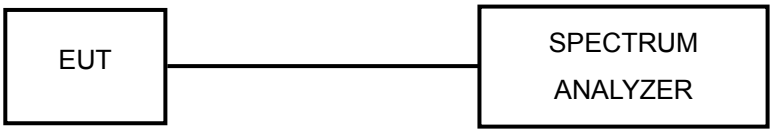
GFSK	8DPSK
CH 0	**CH 0**
	
CH 39	**CH 39**
	
CH 78	**CH 78**
	

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 SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 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.

c. By using the MaxHold function record the separation of two adjacent channels.

d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

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

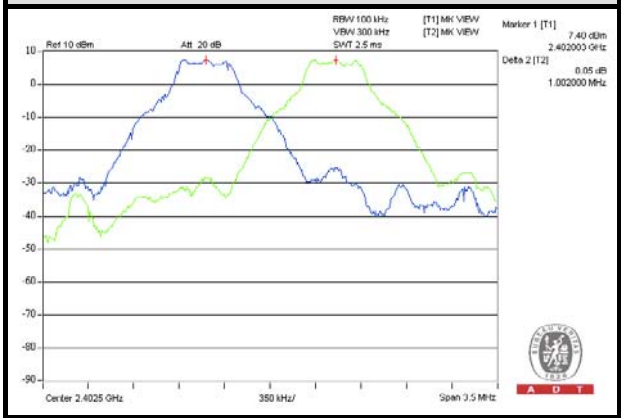
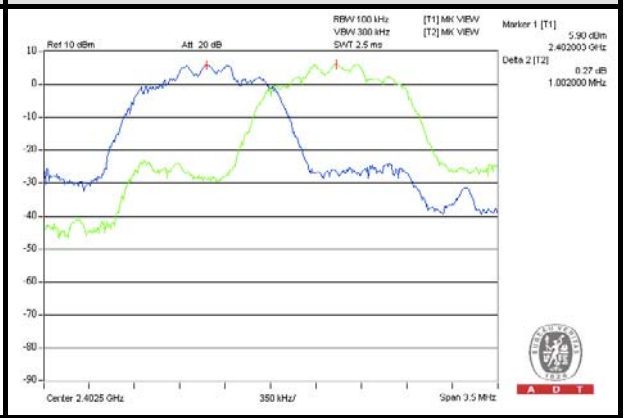
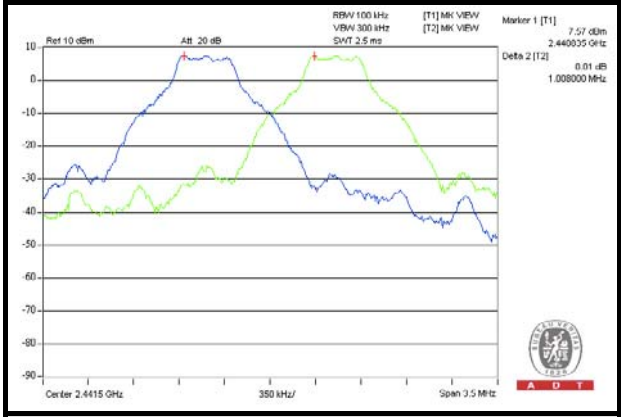
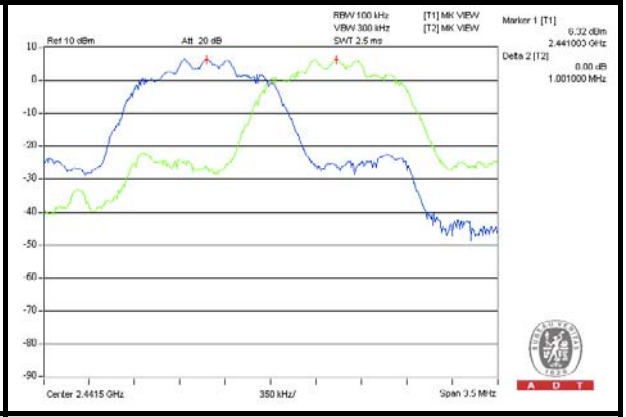
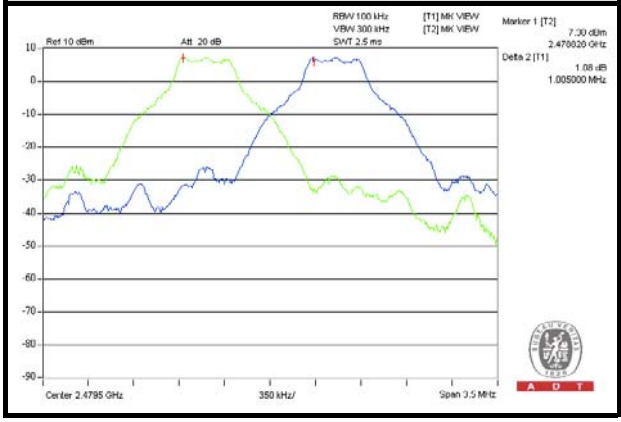
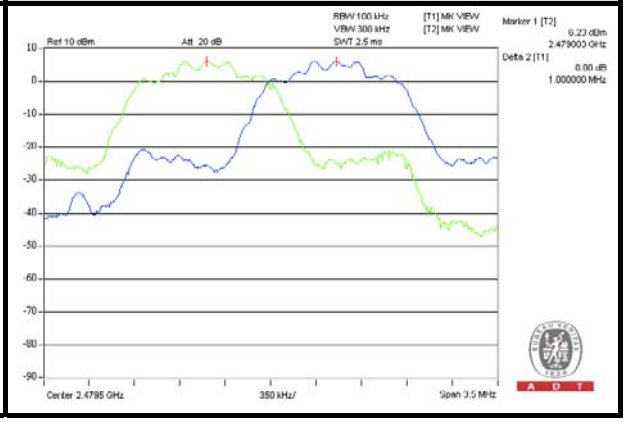
4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)		20dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)		PASS / FAIL
		GFSK	8DPSK	GFSK	8DPSK	GFSK	8DPSK	
0	2402	1.002	1.002	0.866	1.210	0.577	0.807	PASS
39	2441	1.008	1.001	0.896	1.213	0.597	0.809	PASS
78	2480	1.005	1.000	0.845	1.218	0.563	0.812	PASS

NOTE: The minimum limit is two-third 20dB bandwidth.

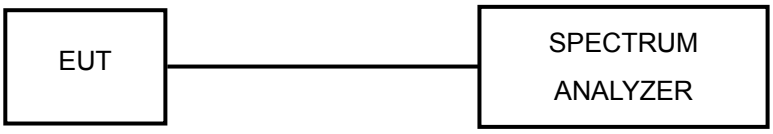
GFSK	8DPSK
CH 0	**CH 0**
	
CH 39	**CH 39**
	
CH 78	**CH 78**
	

4.7 MAXIMUM OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.7.4 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.

4.7.5 DEVIATION FROM TEST STANDARD

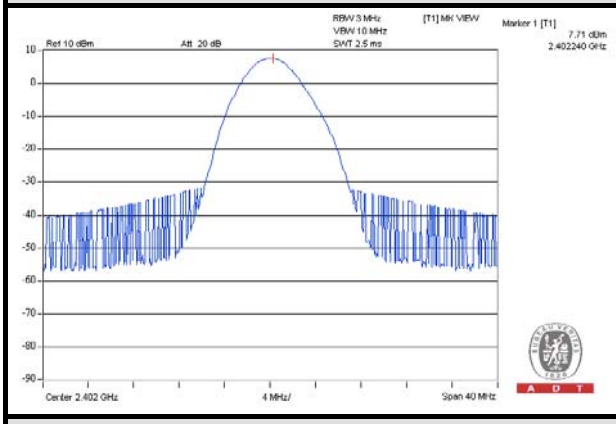
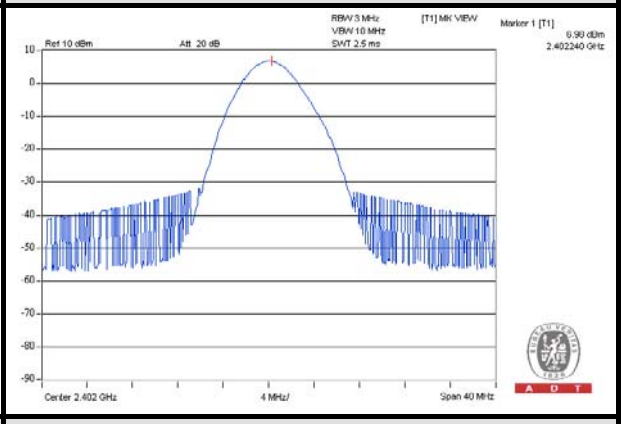
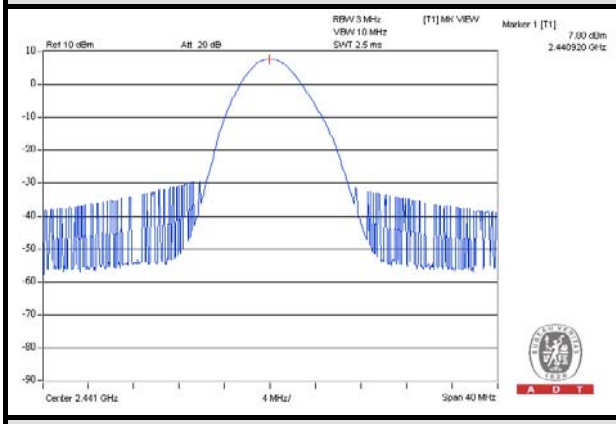
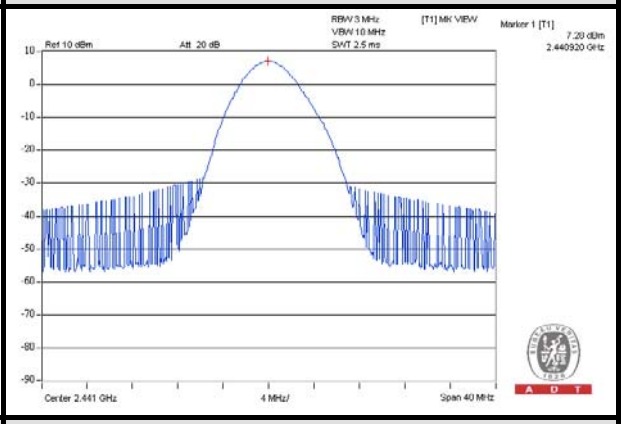
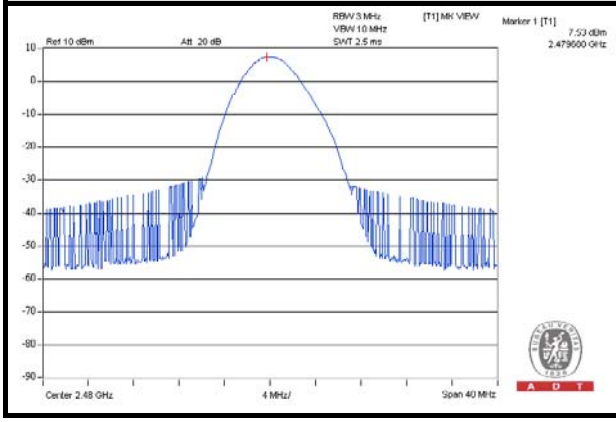
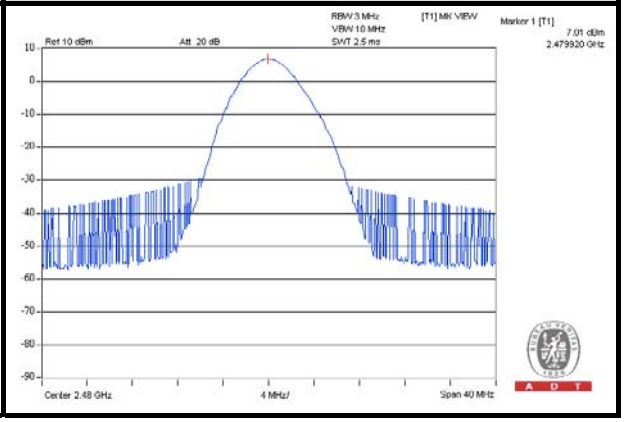
No deviation.

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

CHANNEL	FREQUENCY (MHz)	OUTPUT POWER (dBm)		OUTPUT POWER (mW)		POWER LIMIT (mW)	PASS / FAIL
		GFSK	8DPSK	GFSK	8DPSK		
0	2402	7.7	7.0	5.9	5.0	125	PASS
39	2441	7.8	7.3	**6.0**	5.4	125	PASS
78	2480	7.5	7.0	5.6	5.0	125	PASS

GFSK	8DPSK
CH 0	CH 0
	
CH 39	CH 39
	
CH 78	CH 78
	

4.8 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

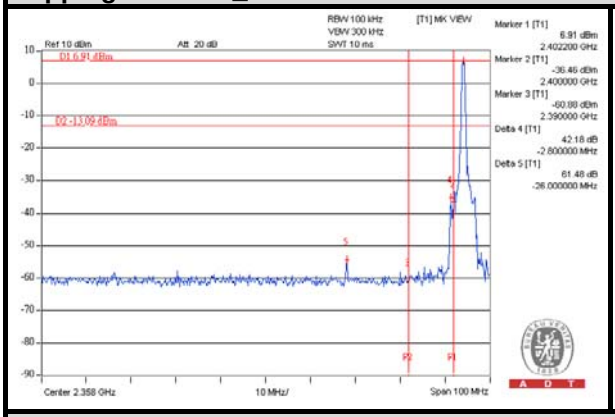
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

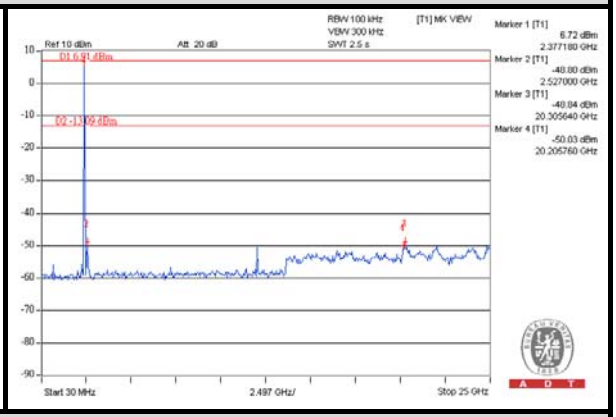
4.8.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

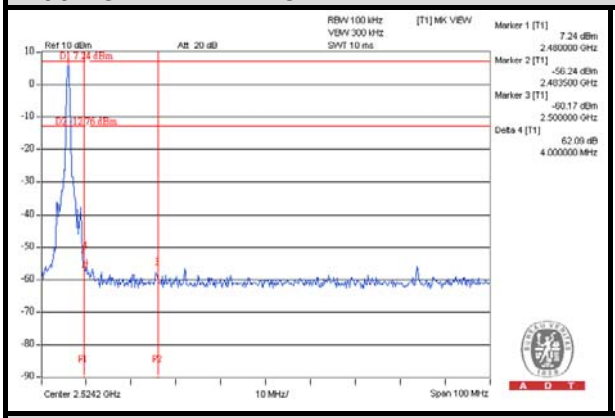
GFSK

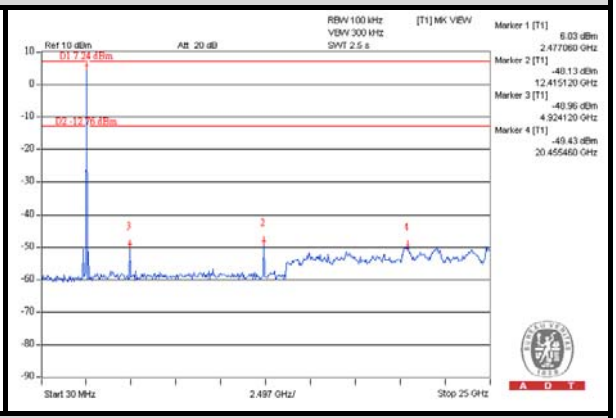
Hopping disabled_ Low Channel



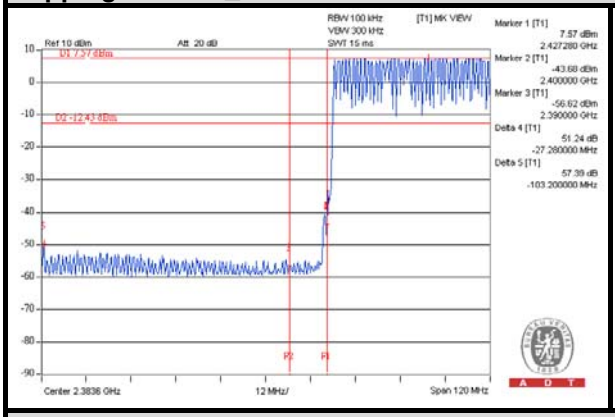


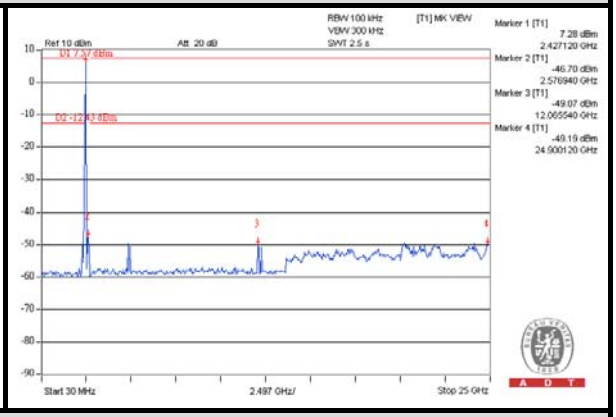
Hopping disabled_ High Channel



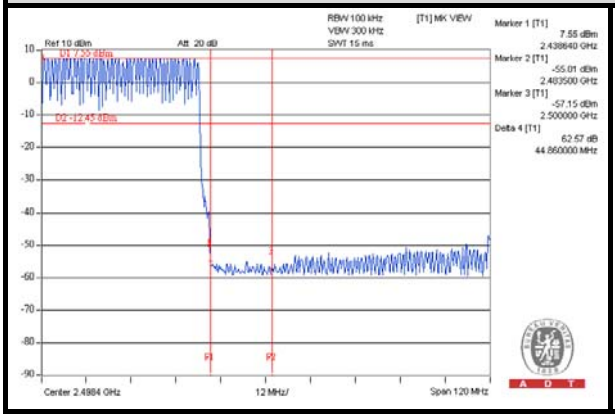


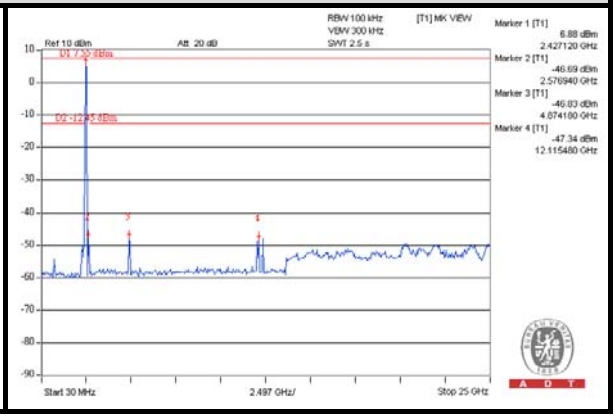
Hopping enabled_ Low Channel





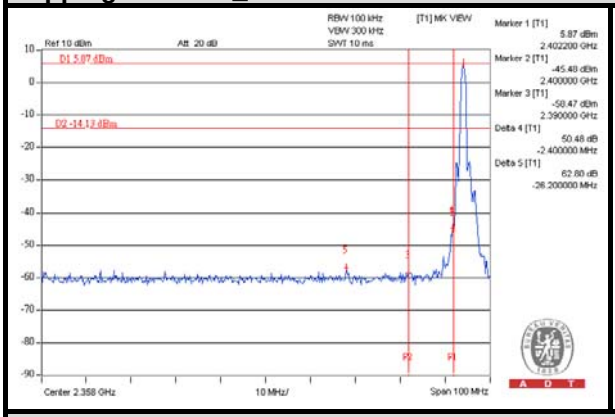
Hopping enabled_ High Channel

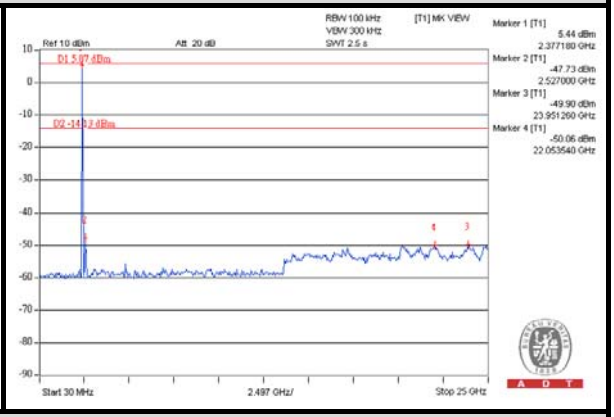




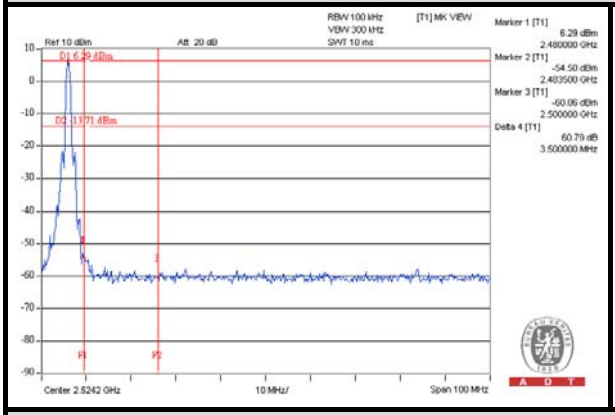
8DPSK

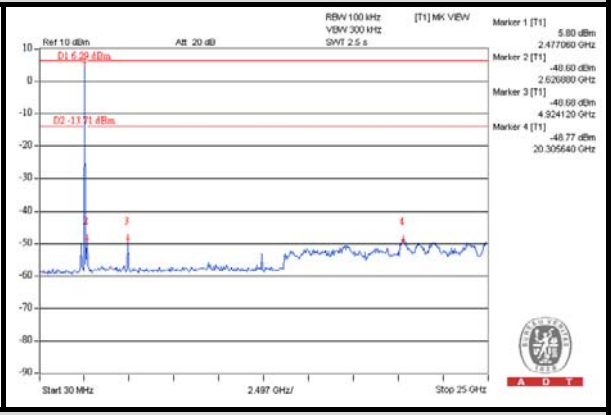
Hopping disabled_ Low Channel



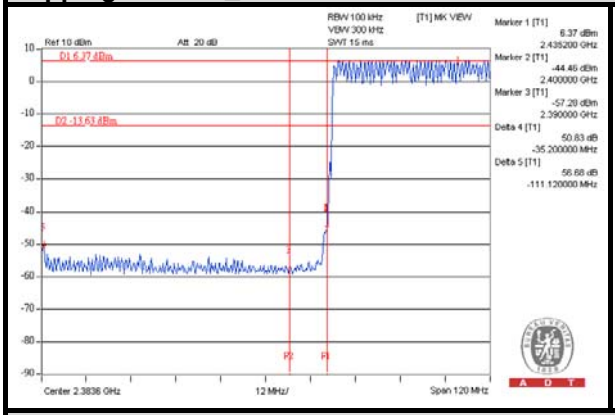


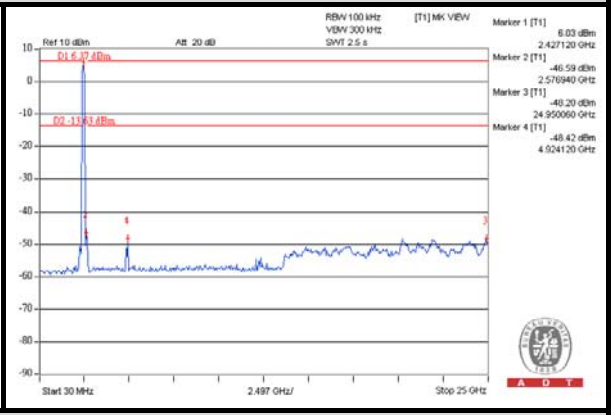
Hopping disabled_ High Channel



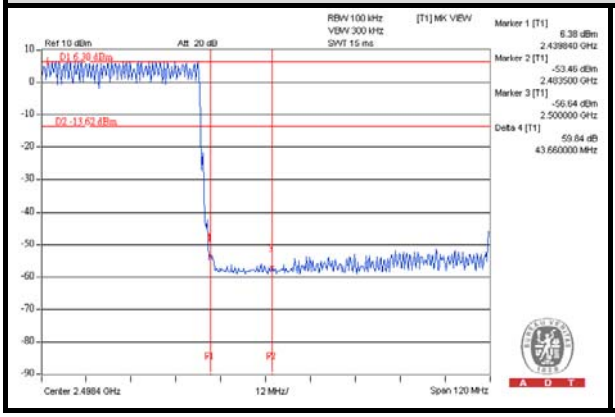


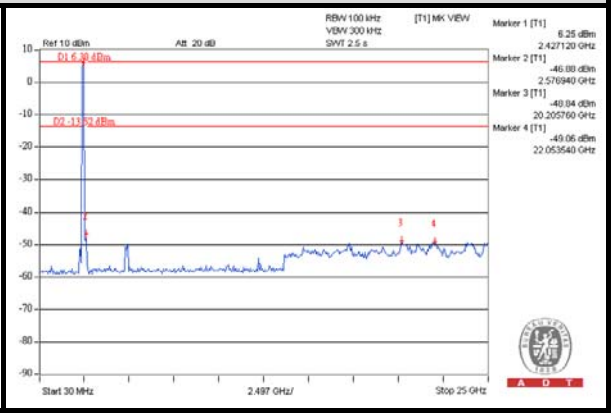
Hopping enabled_ Low Channel





Hopping enabled_ High Channel





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 according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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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 modifications were made to the EUT by the lab during the test.

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