FCC TEST REPORT

REPORT NO.: 081001FIA01

MODEL NO.: BM-244 Series

RECEIVED: Oct. 6, 2008

TESTED: Oct. 7 ~ Nov. 5, 2008

ISSUED: Nov. 5, 2008

APPLICANT: Tsuen Shing Enterprises Ltd

ADDRESS: 19/F, Billion Plaza, No. 8, Cheung Yue Street, Chueng Sha Wan, Kowloon, H.K.

ISSUED BY: ADT (Shanghai) Corporation

ADDRESS: 2F, Building C, No.1618, Yishan Rd., 201103, Shanghai, China

ADT (Shanghai) Corporation.

ACCREDITED
No.: 2343.01

V 1.0

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1. CERTIFICATION

PRODUCT:	Wireless 2.4GHz Digital Baby monitor
MODEL NO.:	BM-244 Series
BRAND NAME:	TSUEN SHING
APPLICANT:	Tsuen Shing Enterprises Ltd.
TESTED:	Oct. 7 ~ Nov. 5, 2008
TEST ITEM:	Engineering Sample
STANDARDS:	FCC Part 15, Subpart C (Section 15.247), ANSI C63.4-2003

We, **ADT (Shanghai) Corporation**, declare that the equipment above has been tested in our facility and found compliance with the requirement limits of applicable standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.

PREPARED BY : Lucy Tian , **DATE:** Nov. 5, 2008
(Lucy Tian / Engineer)

TECHNICAL ACCEPTANCE : Joy Zhu , **DATE:** Nov. 5, 2008
(Joy Zhu / Manager)

APPROVED BY : , **DATE:** Nov. 5, 2008
(Wallace Pan / Director)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

FCC Part 15, Subpart C (Section 15.247)			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission (Test mode B1)	PASS	Meet the requirement of limit. Minimum passing margin is –1.21dB at 4.02MHz.
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 seconds within 7.2 seconds	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec. : Min. 25 kHz or 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. 0.125W	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209 (Test mode A1)	PASS	Meet the requirement of limit. Minimum passing margin is –4.36dB at 576.00MHz.
	Transmitter Radiated Emissions Spec.: Table 15.209 (Test mode B1)	PASS	Meet the requirement of limit. Minimum passing margin is –3.98dB at 170.57MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.

Note: If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz 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:

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

Measurement	Value
Conducted emissions	2.55 dB
Radiated emissions	3.99 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless 2.4GHz Digital Baby monitor
MODEL NO.	BM-244 Series
BRAND NAME	TSUEN SHING
POWER SUPPLY	For test mode A1: 4.5Vdc from batteries (3*AAA) For test mode B1: 120Vac, 60Hz from adapter
POWER ADAPTER SUPPLIED	Cable out: 1.8m, non-shielded
MODULATION TYPE	GFSK
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	3Mbps
FREQUENCY RANGE	2410.875 ~ 2468.25 MHz
NUMBER OF CHANNEL	18
OUTPUT POWER	14.96mW
ANTENNA TYPE	Soldered on PCB
ANTENNA GAIN	0dBi
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	N/A

Note: The whole system [Wireless 2.4GHz Digital Baby monitor], with the general model number of BM-244 Series, is composed by two single parts, one is with the model number of BM-244 Series TRANSMITTER and the other one is with the model number of BM-244 Series RECEIVER. This test report only contains the test results of model BM-244 Series TRANSMITTER. For model BM-244 Series RECEIVER, please refer to 081002FIA01 (FCC ID: PERBM-244RX).

1. Please take table 1 for the primary description of this product:

Description			
Power supply	**Test mode**		**Component's model number**
Powered by batteries	A	A1	BM-244 Series TRANSMITTER
		A2	BM-244 Series RECEIVER with 2.0' LCM
		A3	BM-244 Series RECEIVER with 2.8' LCM
Powered by adapter	B	B1	BM-244 Series TRANSMITTER
		B2	BM-244 Series RECEIVER with 2.0' LCM
		B3	BM-244 Series RECEIVER with 2.8' LCM

(This test report only recorded the test data performed under test mode A1 & B1.)

Table 1

2. Please take table 2 for the specifications of power adapter:

Manufactory	Model No.	Input voltage	Output voltage
TSUEN SHING	65AS112CJ	100~240V,50/60Hz,0.15A	6V, 650mA

Table 2

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.

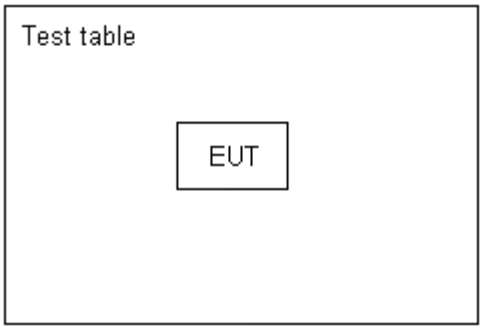
3.2 DESCRIPTION OF TEST MODES

18 channels are provided to this EUT:

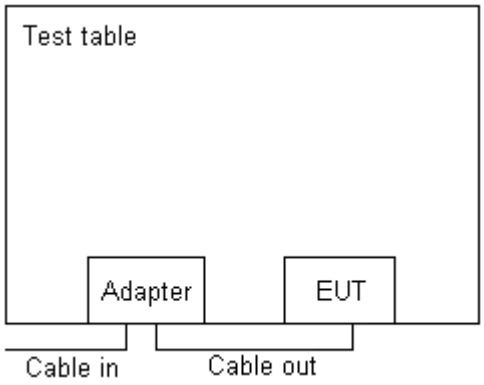
CH	FREQUENCY	CH	FREQUENCY
0	2410.875	9	2441.25
1	2414.25	10	2444.625
2	2417.625	11	2448
3	2421	12	2451.375
4	2424.375	13	2454.75
5	2427.75	14	2458.125
6	2431.125	15	2461.5
7	2434.5	16	2464.875
8	2437.875	17	2468.25

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Test mode A1



Test mode B1



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to							Description
	DT	CB	HCS	MPOP	BM	CE	RE	
A1	--	--	--	--	--	--	√	Powered by batteries
B1	√	√	√	√	√	√	√	Powered by adapter

Where **DT:** Dwell Time on Each Channel **CB:** Channel Bandwidth
HCS: Hopping Channel Separation **MPOP:** Maximum Peak Output Power
BM: Band edge Measurement **CE:** AC Power Conducted Emission
RE: Radiated Emission

DWELL TIME ON EACH CHANNEL:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0, 8, 17	FHSS	GFSK	3Mbps

CHANNEL BANDWIDTH:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0, 8, 17	FHSS	GFSK	3Mbps

HOPPING CHANNEL SEPARATION

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0, 8, 17	FHSS	GFSK	3Mbps

MAXIMUM PEAK OUTPUT POWER

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0, 8, 17	FHSS	GFSK	3Mbps

BANDEDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0, 17	FHSS	GFSK	3Mbps

AC POWER CONDUCTED EMISSION:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
B1	0 ~ 17	0 ~ 17	FHSS	GFSK	3Mbps

RADIATED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

☒ Pre-Scan has been tested in 3 orthogonal planes (X, Y, Z),and Z is the worse condition.

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
A1	0 ~ 17	0 ~ 17	FHSS	GFSK	3Mbps
B1	0 ~ 17	0 ~ 17	FHSS	GFSK	3Mbps

3.2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless 2.4GHz Digital Baby monitor. 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: Public Notice DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

NOTES: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1002	Oct. 31, 2009
LISN ROHDE & SCHWARZ	NSLK8127	E1L1001	Jul. 31, 2009
Software ADT	ADT_Cond_V7.3.0	N/A	N/A

4.1.3 TEST PROCEDURE

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.

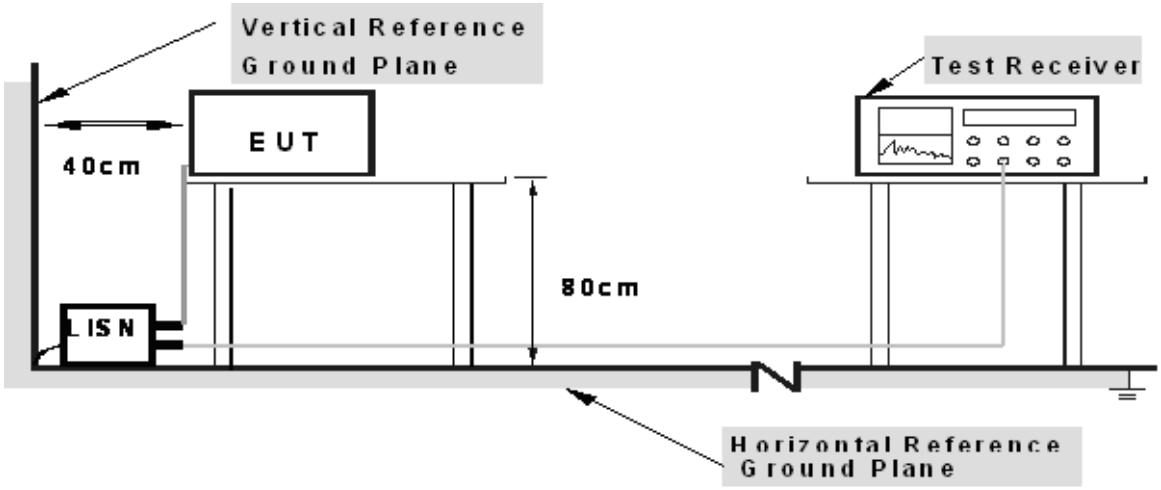
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

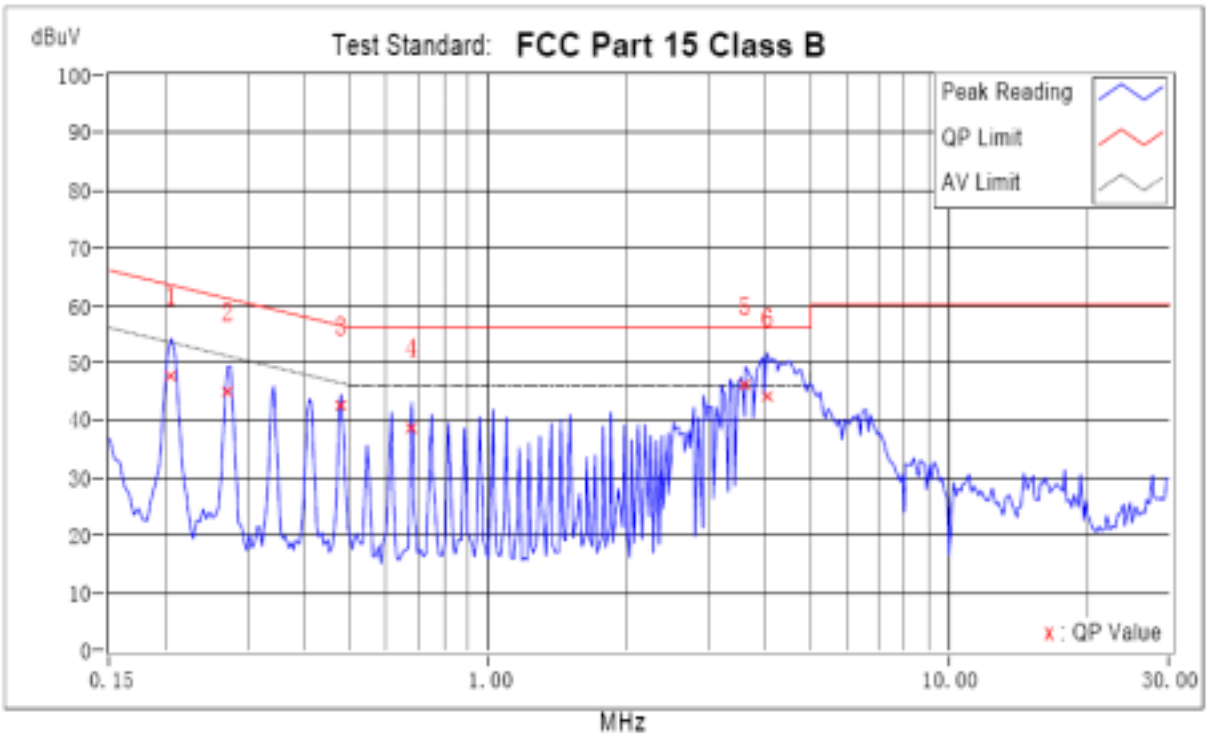
For Test mode B1: Normal operation (hopping according to its hoplist).

4.1.7 TEST RESULTS

CHANNEL	Channel 0	6dB BANDWIDTH	9 kHz
TEST MODE	Mode B1	PHASE	Line (L1)
ENVIRONMENTAL CONDITIONS	21 deg. C, 48 % RH, 1012 hPa	INPUT POWER	120Vac, 60Hz
TESTED BY	Ray Xue		

	Frequency	Corr. Factor	Reading (dBuV)		Emission (dBuV)		Limit (dBuV)		Margins (dB)	
No.	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV
1	0.20	0.84	47.02	37.11	47.86	37.95	63.42	53.42	-15.55	-15.46
2	0.27	0.75	44.33	34.21	45.08	34.96	61.08	51.08	-16.00	-16.12
3	0.48	0.46	41.88	36.80	42.34	37.26	56.37	46.37	-14.03	-9.11
4	0.68	0.44	38.09	30.52	38.53	30.96	56.00	46.00	-17.47	-15.04
5	3.61	0.52	45.53	42.22	46.05	42.74	56.00	46.00	-9.95	-3.26
6	4.02	0.53	43.58	38.76	44.11	39.29	56.00	46.00	-11.89	-6.71

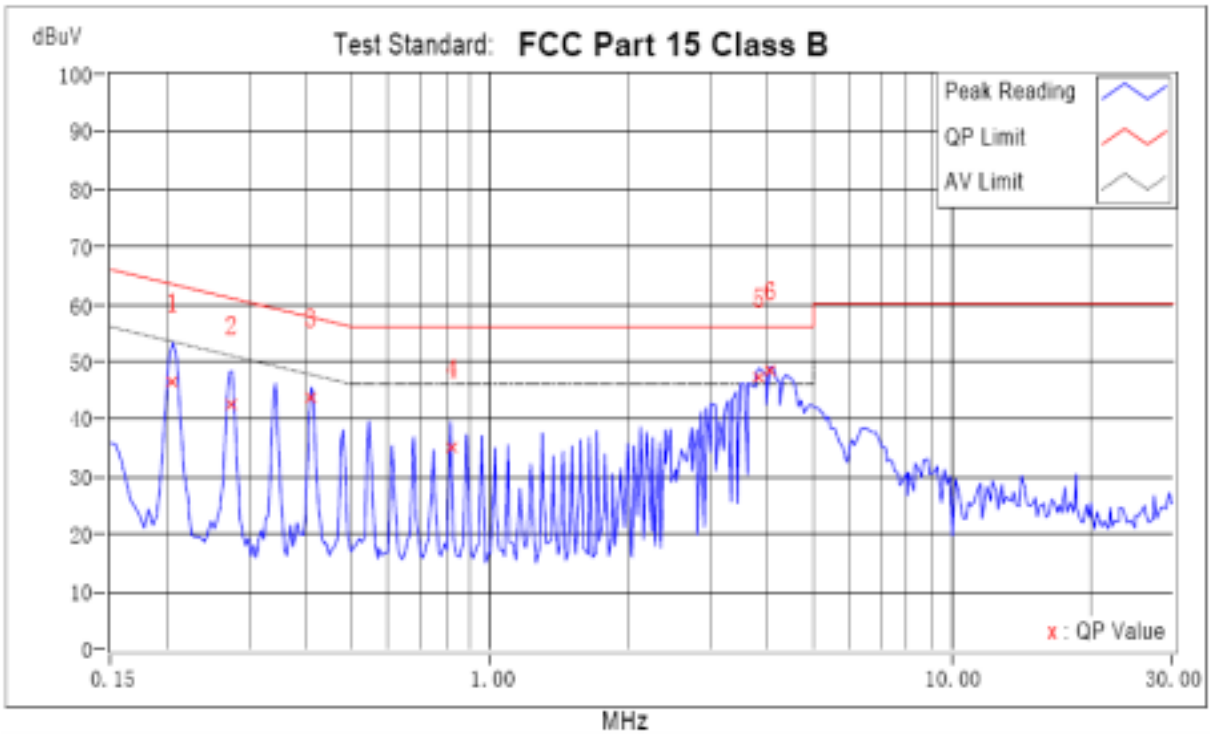
REMARKS: 1. Margin value = Emission level - Limit value
2 Correction factor = Insertion loss + Cable loss
3. Emission Level = Correction Factor + Reading Value.



CHANNEL	Channel 0	**6dB BANDWIDTH**	9 kHz
TEST MODE	Mode B1	**PHASE**	N
ENVIRONMENTAL CONDITIONS	21 deg. C, 48 % RH, 1012 hPa	**INPUT POWER**	120Vac, 60Hz
TESTED BY	Ray Xue		

	Frequency	Corr. Factor	Reading (dBuV)		Emission (dBuV)		Limit (dBuV)		Margins (dB)	
No.	**MHz**	**dB**	**QP**	**AV**	**QP**	**AV**	**QP**	**AV**	**QP**	**AV**
1	0.20	0.84	46.03	38.61	46.87	39.45	63.42	53.42	-16.54	-13.96
2	0.28	0.75	42.17	33.83	42.92	34.58	60.97	50.97	-18.04	-16.38
3	0.41	0.58	43.24	39.94	43.82	40.52	57.69	47.69	-13.87	-7.17
4	0.82	0.53	34.44	27.71	34.97	28.24	56.00	46.00	-21.03	-17.76
5	3.82	0.47	46.84	44.25	47.31	44.72	56.00	46.00	-8.69	-1.28
6	**4.02**	**0.47**	**47.83**	**44.32**	**48.30**	**44.79**	**56.00**	**46.00**	**-7.70**	**-1.21**

REMARKS: 1. Margin value = Emission level - Limit value
2 Correction factor = Insertion loss + Cable loss
3. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1001	Oct. 31, 2009
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Aug. 31, 2009
Preamplifier Agilent	8447D	E1A2001	Oct. 1, 2010
Preamplifier Agilent	8449B	E1A2002	Aug. 1, 2009
Double Ridged Broadband Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Sep. 30, 2009
Spectrum Analyzer Agilent	E4403B	E1S1001	Jul. 31, 2009
Signal Analyzer ROHDE & SCHWARZ	FSP	E1S1002	Jul. 31, 2009
Software ADT	ADT_Radiated_V7.5	N/A	N/A

NOTE: 1. The horn antenna and Agilent preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
2. The Spectrum Analyzer (model: FSP) is used only for the measurement of emission frequency above 1GHz if tested.

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

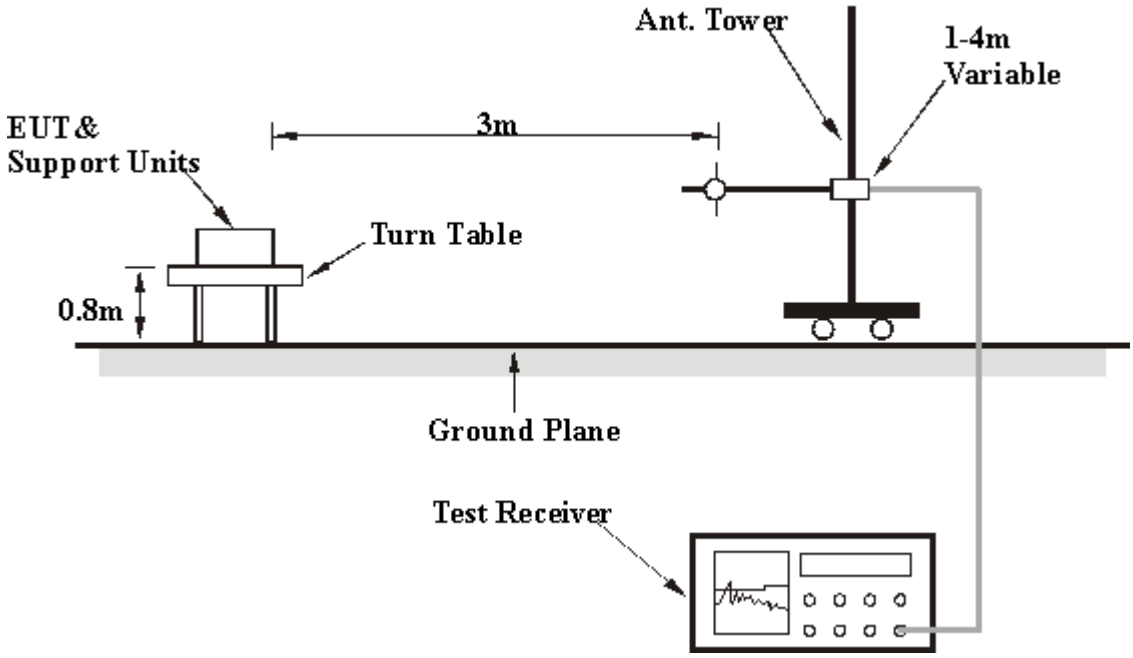
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) at frequency above 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

4.2.6 EUT OPERATING CONDITIONS

Below 1 GHz: Normal operation (hopping according to its hoplist).

Above 1 GHz: Continuously transmitting with modulation on a certain channel that can be set by the software (with typical data input as the modulation source).

4.2.7 TEST RESULTS

Below 1 GHz

INPUT POWER	4.5Vdc from batteries	**FREQUENCY RANGE**	Below 1000MHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
TEST MODE	A1	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TESTED BY	Ice Peng		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	93.42	12.04	8.70	20.74	43.50	-22.76	183.00	19.00
2	154.00	17.01	4.28	21.29	43.50	-22.21	172.00	19.00
3	384.00	18.34	11.11	29.45	46.00	-16.55	100.00	304.00
4	576.00	22.64	9.09	31.73	46.00	-14.27	144.00	296.00
5	720.00	24.99	6.45	31.44	46.00	-14.56	138.00	316.00
6	815.98	26.17	2.78	28.95	46.00	-17.05	100.00	353.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	66.00	13.70	7.99	21.69	40.00	-18.31	100.00	0.00
2	132.00	15.53	13.65	29.19	43.50	-14.31	100.00	105.00
3	527.99	21.48	13.76	35.24	46.00	-10.76	100.00	296.00
4	**576.00**	**22.64**	**19.00**	**41.64**	**46.00**	**-4.36**	**100.00**	**301.00**
5	623.99	23.58	11.91	35.49	46.00	-10.51	100.00	281.00
6	671.99	24.15	5.85	29.99	46.00	-16.01	100.00	115.00

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

INPUT POWER	120Vac, 60Hz	**FREQUENCY RANGE**	Below 1000MHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
TEST MODE	B1	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TESTED BY	Ice Peng		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	123.62	14.98	21.69	36.68	43.50	-6.82	214.00	18.00
2	170.60	16.02	21.40	37.42	43.50	-6.08	199.00	0.00
3	241.97	14.76	20.43	35.19	46.00	-10.81	126.00	94.00
4	383.99	18.34	16.99	35.33	46.00	-10.67	100.00	276.00
5	721.12	25.01	-2.79	22.22	46.00	-23.78	140.00	293.00
6	961.20	27.77	-4.05	23.72	54.00	-30.28	148.00	20.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	40.95	15.85	21.91	37.76	40.00	-2.24	100.00	0.00
2	66.00	13.70	20.75	34.45	40.00	-5.55	100.00	329.00
3	123.62	14.98	18.70	33.69	43.50	-9.81	100.00	0.00
4	**170.57**	**16.03**	**23.50**	**39.52**	**43.50**	**-3.98**	**100.00**	**343.00**
5	242.00	14.76	19.01	33.77	46.00	-12.23	100.00	352.00
6	623.99	23.58	14.34	37.92	46.00	-8.08	100.00	352.00

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

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

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

4. Margin value = Emission level – Limit value.

Above 1 GHz

INPUT POWER	4.5Vdc from batteries	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 0	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	A1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4821.81 PK	37.81	8.80	46.61	74.00	-27.39	101.00	18.00
1	4821.81 AV	37.81	-24.00	13.81	54.00	-40.19	101.00	18.00
2	7232.71 PK	44.63	0.94	45.57	74.00	-28.43	100.00	18.00
2	7232.71 AV	44.63	-31.86	12.77	54.00	-41.23	100.00	18.00
3	9643.61 PK	47.21	0.87	48.08	74.00	-25.92	100.00	18.00
3	9643.61 AV	47.21	-31.93	15.28	54.00	-38.72	100.00	18.00
4	12054.51 PK	48.20	2.21	50.41	74.00	-23.59	100.00	18.00
4	12054.51 AV	48.20	-30.59	17.61	54.00	-36.39	100.00	18.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4821.81 PK	37.81	15.19	53.00	74.00	-21.00	100.00	0.00
1	4821.81 AV	37.81	-17.61	20.20	54.00	-33.80	100.00	0.00
2	7232.71 PK	44.63	0.71	45.34	74.00	-28.66	100.00	0.00
2	7232.71 AV	44.63	-32.09	12.54	54.00	-41.46	100.00	0.00
3	9643.61 PK	47.21	0.60	47.81	74.00	-26.19	100.00	0.00
3	9643.61 AV	47.21	-32.20	15.01	54.00	-38.99	100.00	0.00
4	12054.51 PK	48.20	2.26	50.46	74.00	-23.54	100.00	0.00
4	12054.51 AV	48.20	-30.54	17.66	54.00	-36.34	100.00	0.00

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

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

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

4. Margin value = Emission level – Limit value.

5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.23/100) =-32.8dB.

6. Average value = peak reading – 32.8dB.

7. Please take Pg. 29 for the plots.

INPUT POWER	4.5Vdc from batteries	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 8	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	A1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4875.81 PK	38.01	16.79	54.80	74.00	-19.20	100.00	0.00
1	4875.81 AV	38.01	-16.01	22.00	54.00	-32.00	100.00	0.00
2	7313.72 PK	44.65	12.30	56.95	74.00	-17.05	100.00	0.00
2	7313.72 AV	44.65	-20.50	24.15	54.00	-29.85	100.00	0.00
3	9751.62 PK	47.49	1.44	48.93	74.00	-25.07	100.00	0.00
3	9751.62 AV	47.49	-31.36	16.13	54.00	-37.87	100.00	0.00
4	12189.52 PK	48.27	1.08	49.35	74.00	-24.65	100.00	0.00
4	12189.52 AV	48.27	-31.72	16.55	54.00	-37.45	100.00	0.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4875.81 PK	38.01	22.74	60.75	74.00	-13.25	100.00	18.00
1	4875.81 AV	38.01	-10.06	27.95	54.00	-26.05	100.00	18.00
2	7313.72 PK	44.65	11.99	56.64	74.00	-17.36	100.00	18.00
2	7313.72 AV	44.65	-20.81	23.84	54.00	-30.16	100.00	18.00
3	9751.62 PK	47.49	1.04	48.53	74.00	-25.47	100.00	18.00
3	9751.62 AV	47.49	-31.76	15.73	54.00	-38.27	100.00	18.00
4	12189.52 PK	48.27	1.81	50.08	74.00	-23.92	100.00	18.00
4	12189.52 AV	48.27	-30.99	17.28	54.00	-36.72	100.00	18.00

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.23/100) =-32.8dB.
6. Average value = peak reading – 32.8dB.
7. Please take Pg. 29 for the plots.

INPUT POWER	4.5Vdc from batteries	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 17	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	A1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	2483.50 PK	32.76	29.27	62.03	74.00	-11.97	100.00	0.00
1	2483.50AV	32.76	-3.53	29.23	54.00	-24.77	100.00	0.00
2	4936.56 PK	38.23	10.87	49.10	74.00	-24.90	100.00	0.00
2	4936.56 AV	38.23	-21.93	16.30	54.00	-37.70	100.00	0.00
3	7404.85 PK	44.63	2.25	46.88	74.00	-27.12	100.00	0.00
3	7404.85 AV	44.63	-30.55	14.08	54.00	-39.92	100.00	0.00
4	9873.13 PK	47.68	1.60	49.28	74.00	-24.72	100.00	0.00
4	9873.13 AV	47.68	-31.20	16.48	54.00	-37.52	100.00	0.00
5	12341.41 PK	48.35	2.84	51.19	74.00	-22.81	100.00	0.00
5	12341.41 AV	48.35	-29.96	18.39	54.00	-35.61	100.00	0.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	2483.50PK	32.76	32.73	65.49	74.00	-8.51	100.00	18.00
1	2483.50AV	32.76	-0.07	32.69	54.00	-21.31	100.00	18.00
2	4936.56 PK	38.23	15.55	53.78	74.00	-20.22	100.00	18.00
2	4936.56 AV	38.23	-17.25	20.98	54.00	-33.02	100.00	18.00
3	7404.85 PK	44.63	1.06	45.69	74.00	-28.31	100.00	18.00
3	7404.85 AV	44.63	-31.74	12.89	54.00	-41.11	100.00	18.00
4	9873.13 PK	47.68	1.02	48.70	74.00	-25.30	100.00	18.00
4	9873.13 AV	47.68	-31.78	15.90	54.00	-38.10	100.00	18.00
5	12341.41 PK	48.35	2.16	50.51	74.00	-23.49	100.00	18.00
5	12341.41 AV	48.35	-30.64	17.71	54.00	-36.29	100.00	18.00

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

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

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

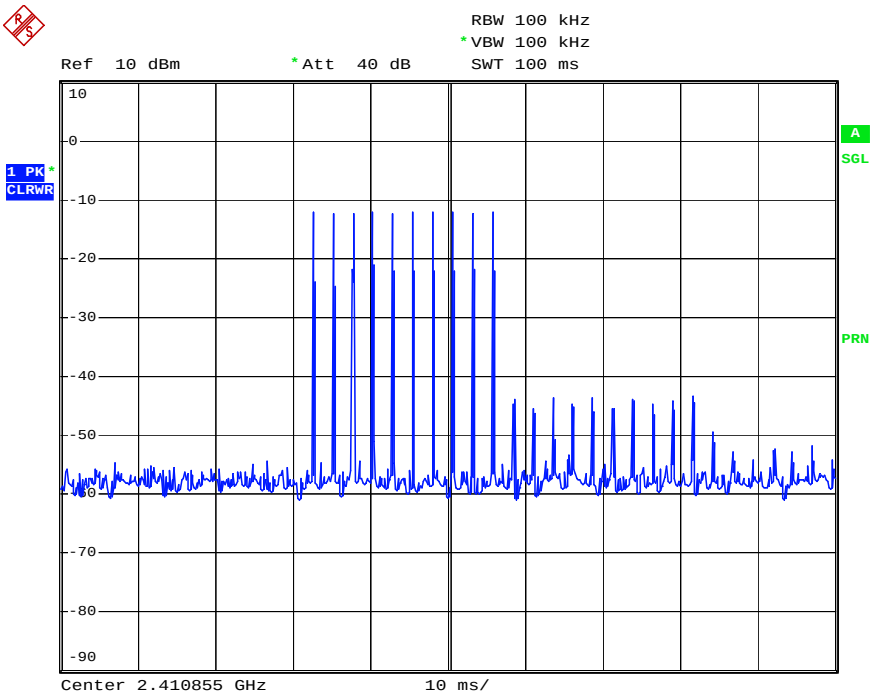
4. Margin value = Emission level – Limit value.

5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.23/100) =-32.8dB.

6. Average value = peak reading – 32.8dB.

7. Please take Pg. 29 for the plots.

The following analyzer plots show the duty cycle of the device in a test mode where the frequency hopping has been disabled. The device cannot operate in this mode normally. However, this test mode was used to generate a "worst-case" duty-cycle factor (see calculation on previous pages). Since the average measurements calculated with this factor meet the limits, the much smaller duty cycle (with frequency hopping enabled) need not be taken into account.



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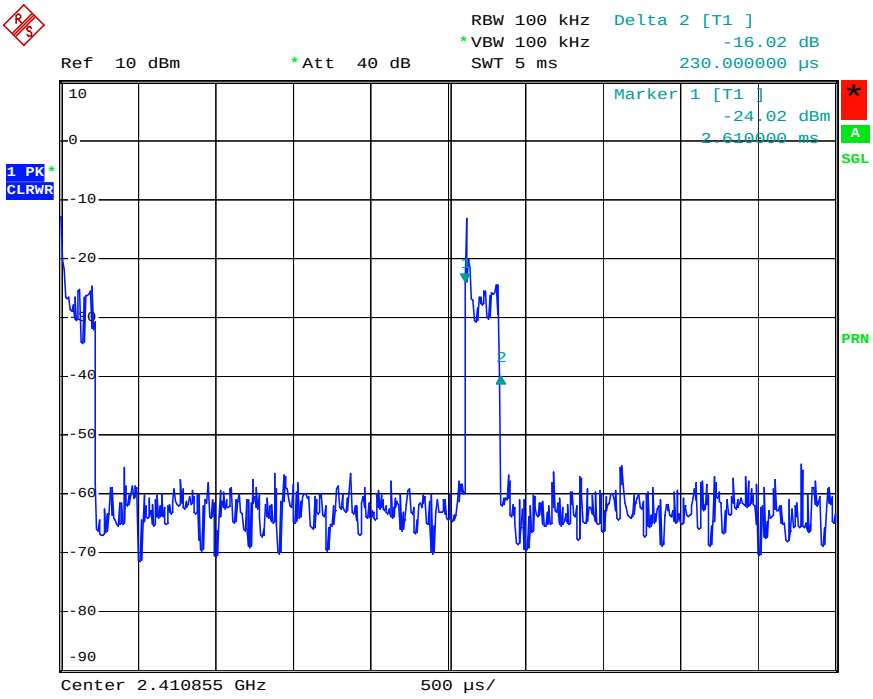

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INPUT POWER	120Vac, 60Hz	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 0	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	B1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4821.81 PK	37.81	8.89	46.70	74.00	-27.30	100.00	0.00
1	4821.81 AV	37.81	-24.11	13.70	54.00	-40.30	100.00	0.00
2	7232.71 PK	44.63	-0.45	44.18	74.00	-29.82	100.00	0.00
2	7232.71 AV	44.63	-33.45	11.18	54.00	-42.82	100.00	0.00
3	9643.61 PK	47.21	0.43	47.64	74.00	-26.36	100.00	0.00
3	9643.61 AV	47.21	-32.57	14.64	54.00	-39.36	100.00	0.00
4	12054.51 PK	48.20	1.32	49.52	74.00	-24.48	100.00	0.00
4	12054.51 AV	48.20	-31.68	16.52	54.00	-37.48	100.00	0.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4821.81 PK	37.81	10.46	48.27	74.00	-25.73	100.00	18.00
1	4821.81 AV	37.81	-22.54	15.27	54.00	-38.73	100.00	18.00
2	7232.71 PK	44.63	-0.14	44.49	74.00	-29.51	100.00	18.00
2	7232.71 AV	44.63	-33.14	11.49	54.00	-42.51	100.00	18.00
3	9643.61 PK	47.21	0.91	48.12	74.00	-25.88	100.00	18.00
3	9643.61 AV	47.21	-32.09	15.12	54.00	-38.88	100.00	18.00
4	12054.51 PK	48.20	1.40	49.60	74.00	-24.40	100.00	18.00
4	12054.51 AV	48.20	-31.60	16.60	54.00	-37.40	100.00	18.00

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.22/100) =-33dB.
6. Average value = peak reading – 33dB.
7. Please take Pg. 33 for the plots.

INPUT POWER	120Vac, 60Hz	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 8	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	B1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4875.81 PK	38.01	16.50	54.51	74.00	-19.49	128.00	18.00
1	4875.81 AV	38.01	-16.50	21.51	54.00	-32.49	128.00	18.00
2	7313.15 PK	44.65	6.42	51.07	74.00	-22.93	100.00	18.00
2	7313.15 AV	44.65	-26.58	18.07	54.00	-35.93	100.00	18.00
3	9751.62 PK	47.49	0.65	48.14	74.00	-25.86	100.00	18.00
3	9751.62 AV	47.49	-32.35	15.14	54.00	-38.86	100.00	18.00
4	12189.52 PK	48.27	1.77	50.04	74.00	-23.96	100.00	18.00
4	12189.52 AV	48.27	-31.23	17.04	54.00	-36.96	100.00	18.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	4875.81 PK	38.01	21.38	59.39	74.00	-14.61	190.00	18.00
1	4875.81 AV	38.01	-11.62	26.39	54.00	-27.61	190.00	18.00
2	7313.72 PK	44.65	4.92	49.57	74.00	-24.43	100.00	18.00
2	7313.72 AV	44.65	-28.08	16.57	54.00	-37.43	100.00	18.00
3	9751.62 PK	47.49	1.25	48.74	74.00	-25.26	100.00	18.00
3	9751.62 AV	47.49	-31.75	15.74	54.00	-38.26	100.00	18.00
4	12189.52 PK	48.27	2.37	50.64	74.00	-23.36	100.00	18.00
4	12189.52 AV	48.27	-30.63	17.64	54.00	-36.36	100.00	18.00

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.22/100) =-33dB.
6. Average value = peak reading – 33dB.
7. Please take Pg. 33 for the plots.

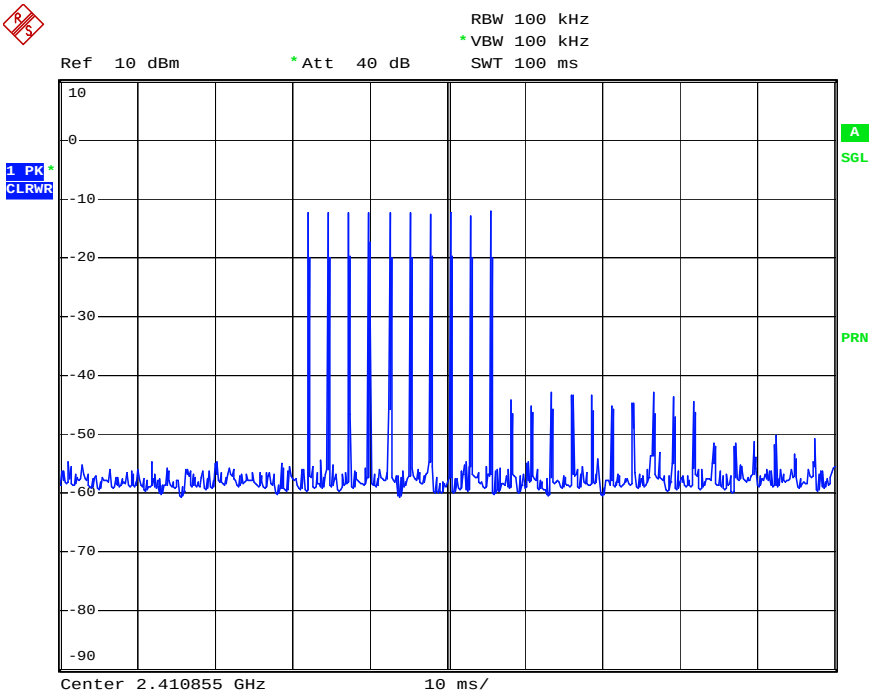
INPUT POWER	120Vac, 60Hz	**FREQUENCY RANGE**	Above 1GHz
CHANNEL	Channel 17	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	**ENVIRONMENTAL CONDITIONS**	20deg. C, 60%RH, 1001hPa
TEST MODE	B1	**TESTED BY**	John Zhou

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	2483.50 PK	32.76	28.57	61.33	74.00	-12.67	100.00	0.00
1	2483.50AV	32.76	-4.43	28.33	54.00	-25.67	100.00	0.00
2	4936.56 PK	38.23	11.45	49.68	74.00	-24.32	121.00	0.00
2	4936.56 AV	38.23	-21.55	16.68	54.00	-37.32	121.00	0.00
3	7404.85 PK	44.63	1.14	45.77	74.00	-28.23	100.00	0.00
3	7404.85 AV	44.63	-31.86	12.77	54.00	-41.23	100.00	0.00
4	9873.13 PK	47.68	2.83	50.51	74.00	-23.49	100.00	0.00
4	9873.13 AV	47.68	-30.17	17.51	54.00	-36.49	100.00	0.00
5	12341.41 PK	48.35	1.84	50.19	74.00	-23.81	100.00	0.00
5	12341.41 AV	48.35	-31.16	17.19	54.00	-36.81	100.00	0.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Frequency MHz	Factor dB	Reading dBuV/m	Emission dBuV/m	Limit dBuV/m	Margin dB	Tower cm	Table deg
1	2483.50PK	32.76	31.43	64.19	74.00	-9.81	100.00	0.00
1	2483.50AV	32.76	-0.57	32.19	54.00	-21.81	100.00	0.00
2	4936.56 PK	38.23	14.76	52.99	74.00	-21.01	100.00	0.00
2	4936.56 AV	38.23	-18.24	19.99	54.00	-34.01	100.00	0.00
3	7404.85 PK	44.63	0.80	45.43	74.00	-28.57	100.00	0.00
3	7404.85 AV	44.63	-32.20	12.43	54.00	-41.57	100.00	0.00
4	9873.13 PK	47.68	1.21	48.89	74.00	-25.11	100.00	0.00
4	9873.13 AV	47.68	-31.79	15.89	54.00	-38.11	100.00	0.00
5	12341.41 PK	48.35	1.31	49.66	74.00	-24.34	100.00	0.00
5	12341.41 AV	48.35	-31.69	16.66	54.00	-37.34	100.00	0.00

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The duty cycle is equal to: 20log (Duty cycle) =20log (10*0.22/100) =-33dB.
6. Average value = peak reading – 33dB.
7. Please take Pg. 33 for the plots.

The following analyzer plots show the duty cycle of the device in a test mode where the frequency hopping has been disabled. The device cannot operate in this mode normally. However, this test mode was used to generate a "worst-case" duty-cycle factor (see calculation on previous pages). Since the average measurements calculated with this factor meet the limits, the much smaller duty cycle (with frequency hopping enabled) need not be taken into account.



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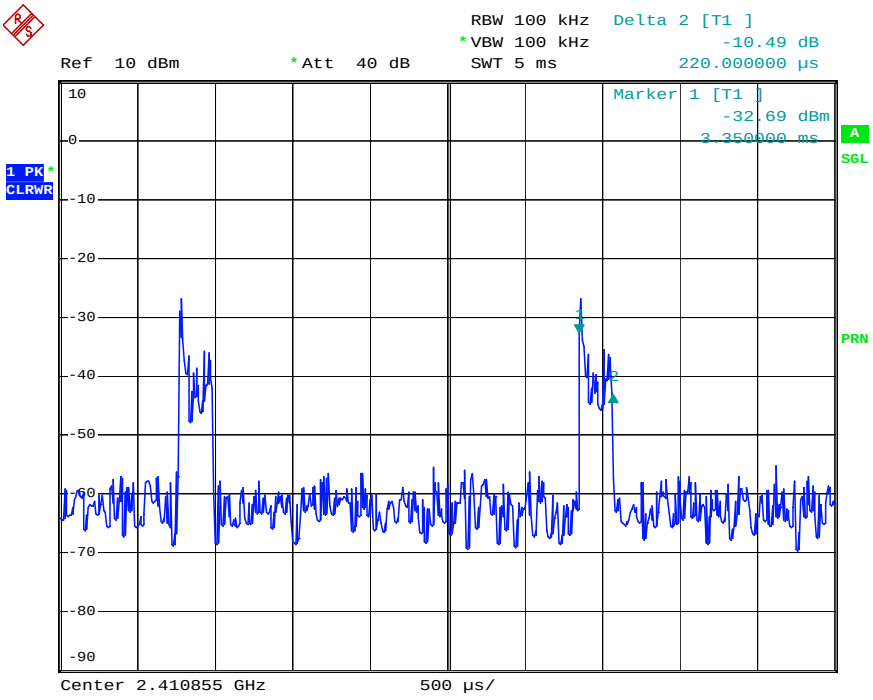

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4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

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

4.3.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum Analyzer ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

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

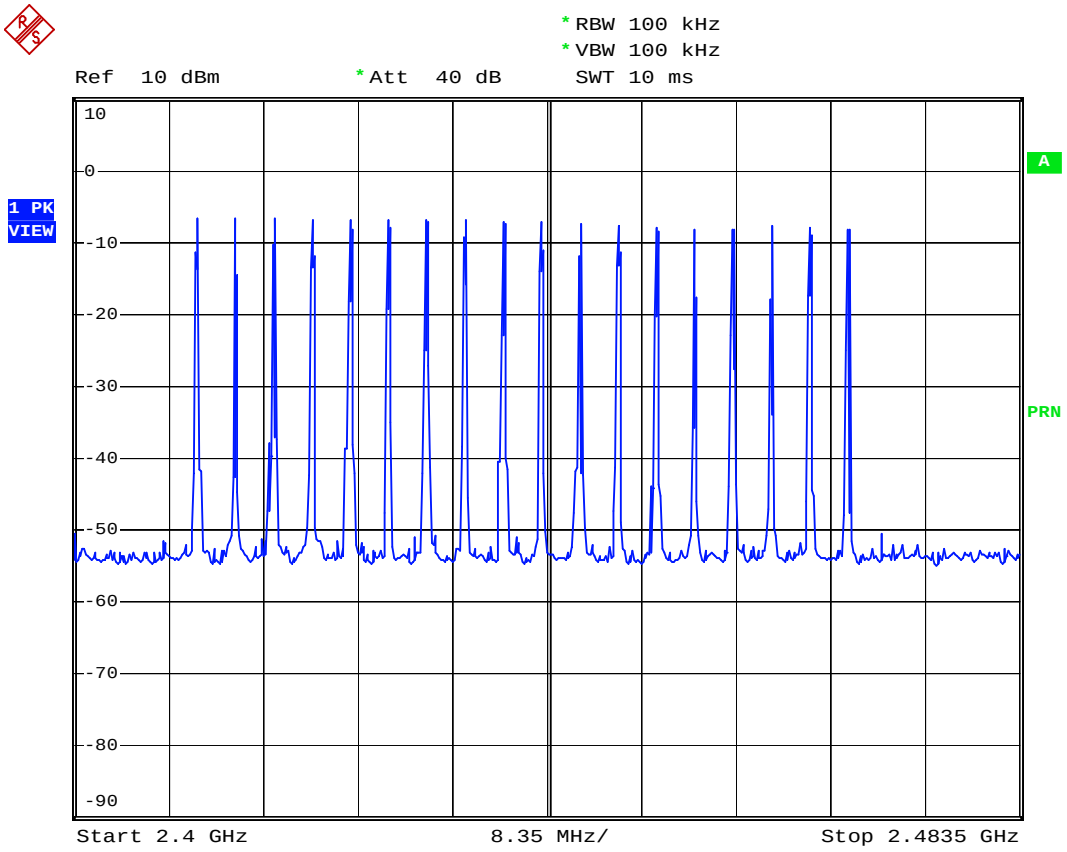
4.3.6 EUT OPERATING CONDITIONS

Normal operation (Hopping according to its hoplist).

4.3.7 TEST RESULTS

There are 18 hopping frequencies in the hopping mode. Please refer to the test results. On the plots, it shows that the hopping frequencies are equally spaced.

Test mode B1



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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 ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

4.4.3 TEST PROCEDURES

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

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

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

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

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

4.4.6 EUT OPERATING CONDITIONS

Normal operation (Hopping according to its hoplist).

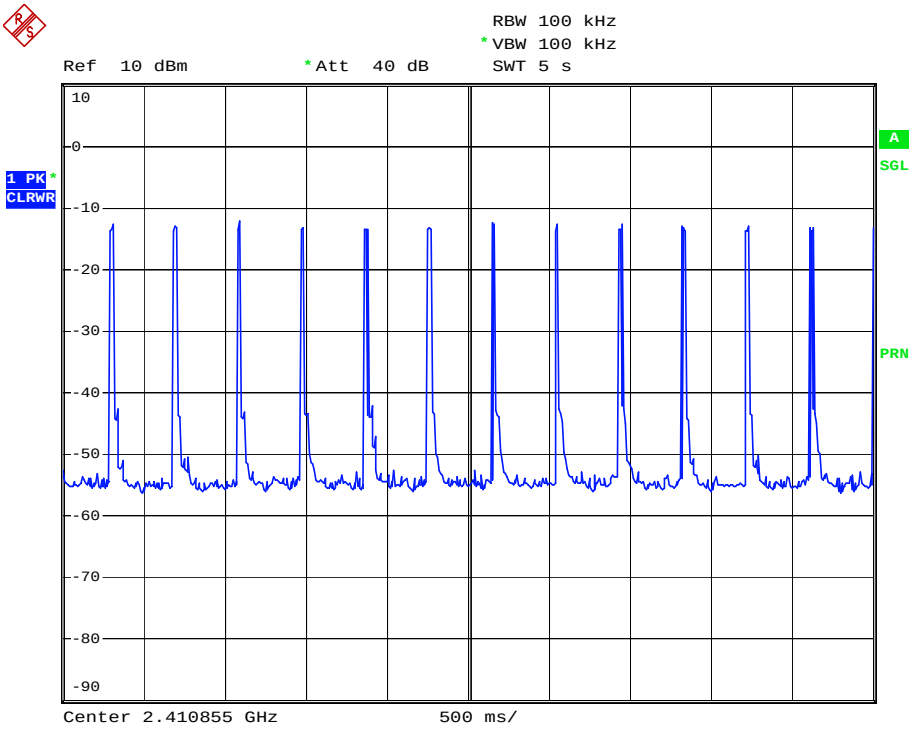
4.4.7 TEST RESULTS

TEST MODE	B1	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
TESTED BY	Ray Xue		

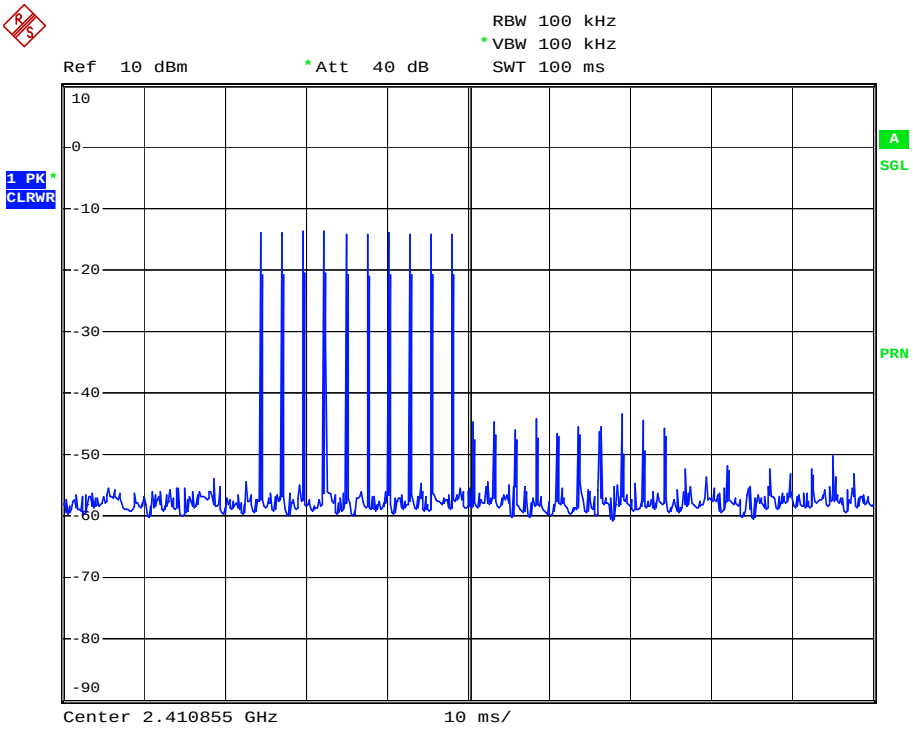
MODE	NUMBER OF TRANSMISSION IN A 7.2 SECONDS (18 HOPPING * 0.4)	LENGTH OF TRANSMISSION TIME (msec)	RESULT (msec)	LIMIT (msec)
CH0	13*(7.2/5) times	2.3	43.056	400
CH8	13*(7.2/5) times	2.3	43.056	400
CH18	13*(7.2/5) times	2.4	44.928	400

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

CH0

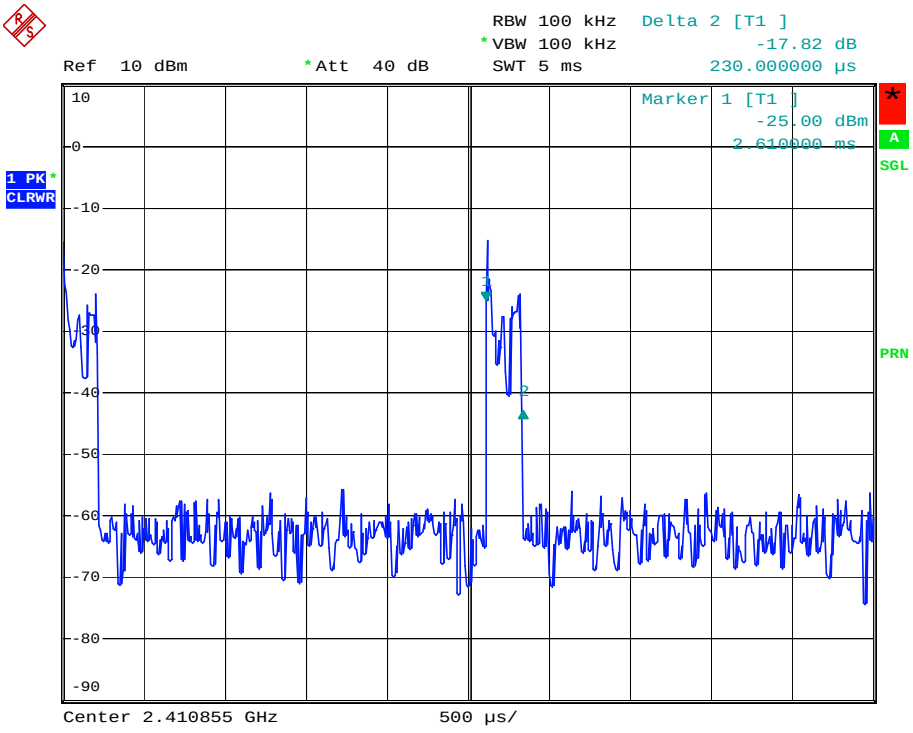


Date: 21.OCT.2008 11:36:30



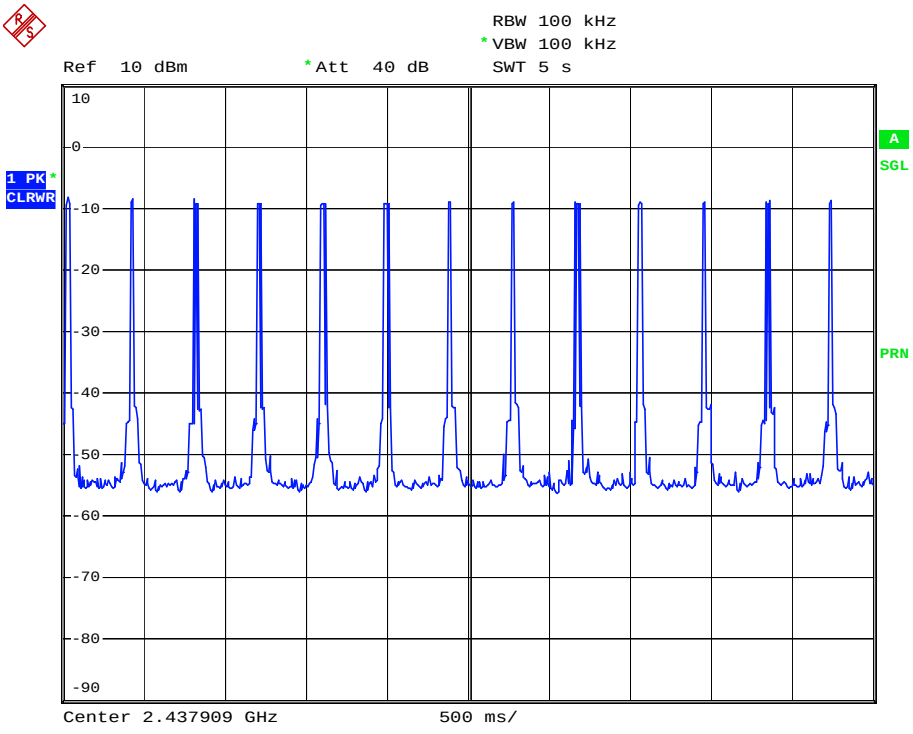
Date: 21.OCT.2008 11:37:15

CH0



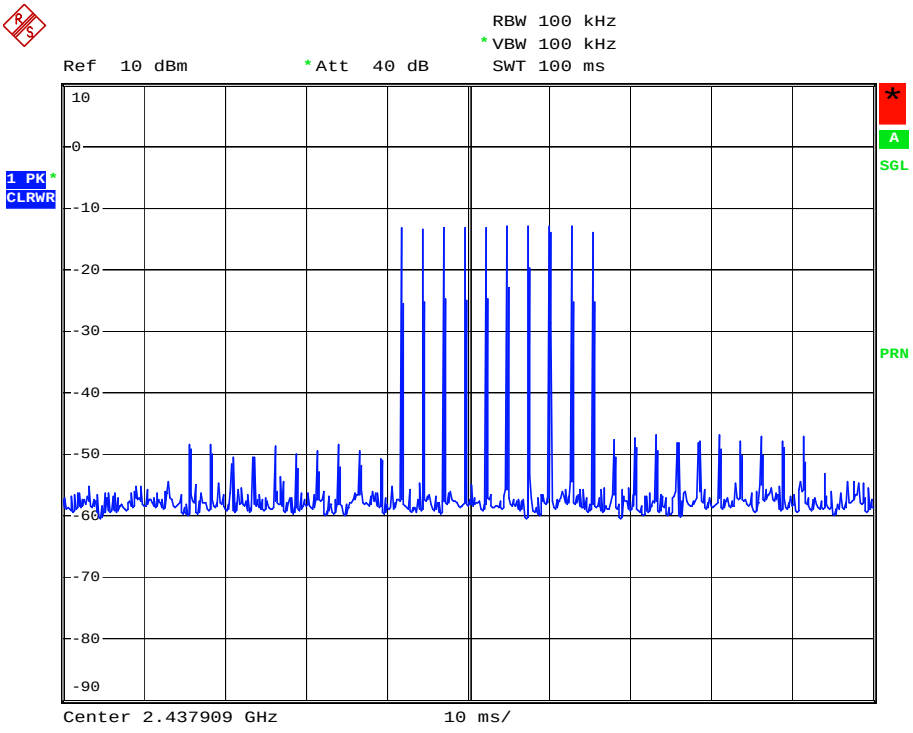
Date: 21.OCT.2008 11:38:02

CH8



Date: 21.OCT.2008 12:15:43

CH8



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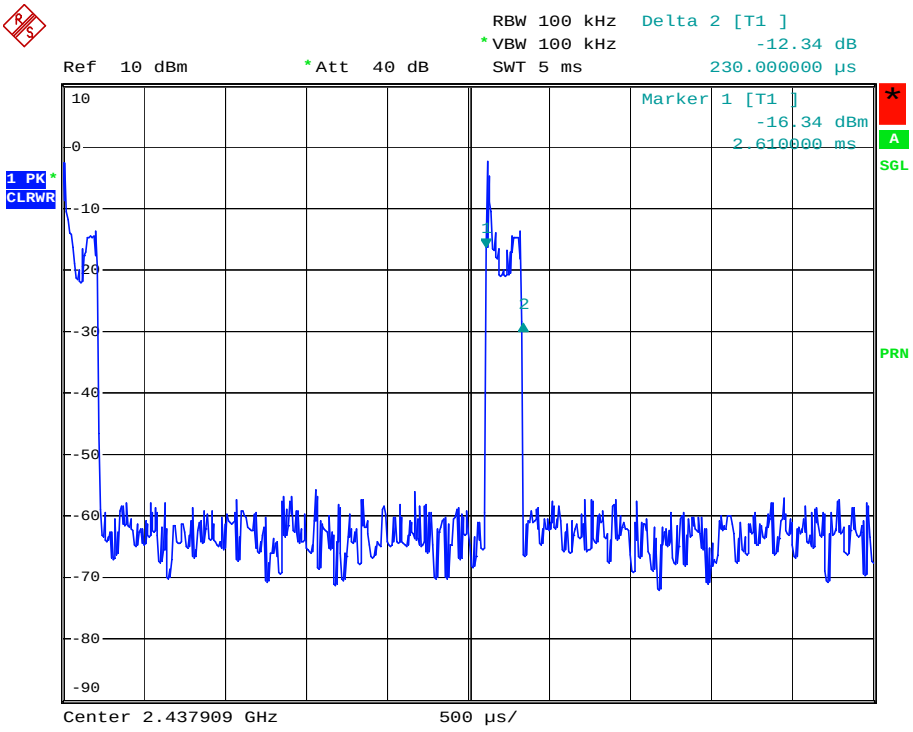
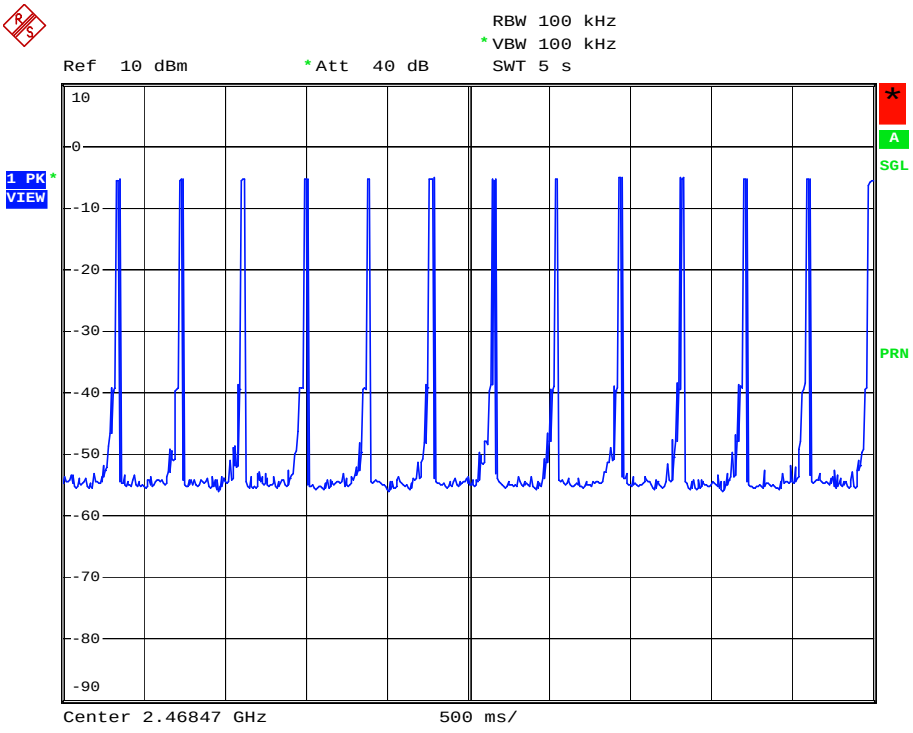
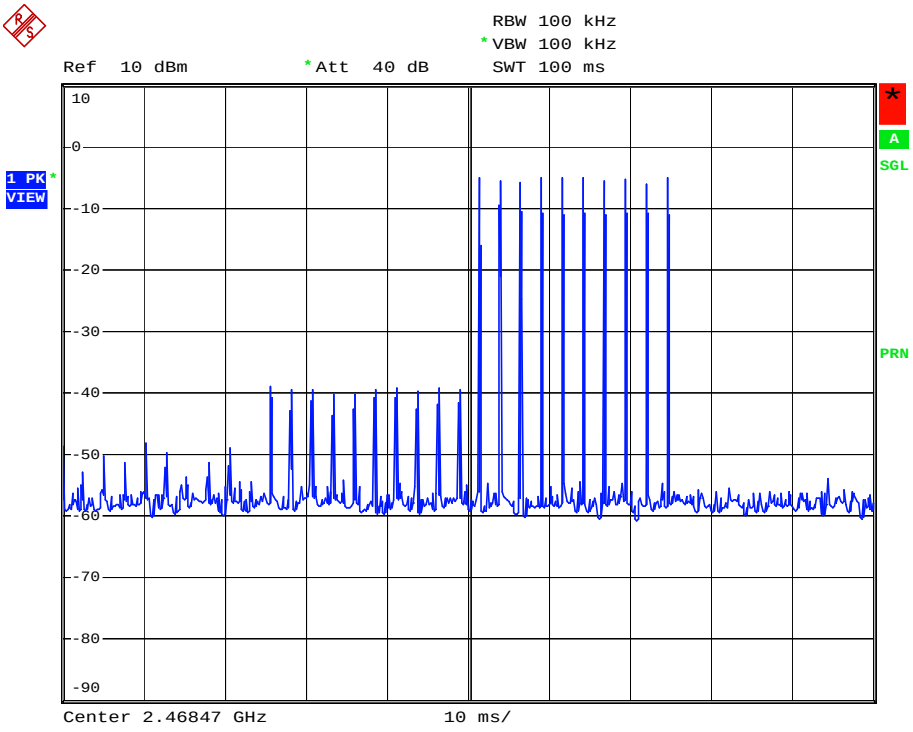


Date: 21.OCT.2008 12:16:43

CH17

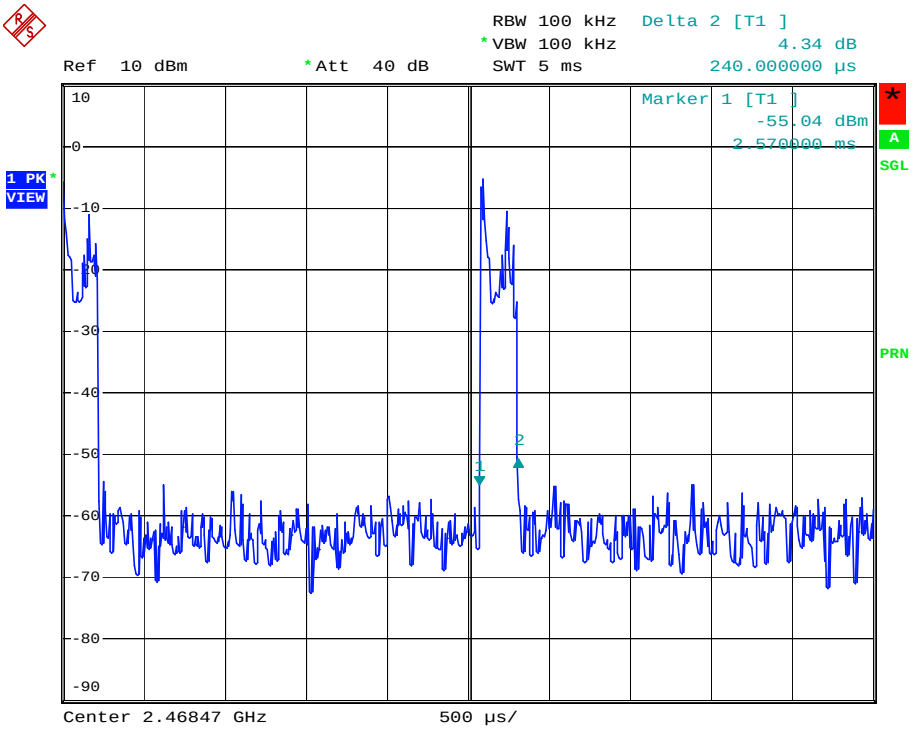


Date: 21.OCT.2008 16:04:43



Date: 21.OCT.2008 16:03:49

CH17



Date: 21.OCT.2008 16:02:23

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 20dB bandwidth 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 ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

4.5.3 TEST PROCEDURE

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

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

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

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

4.5.6 EUT OPERATING CONDITION

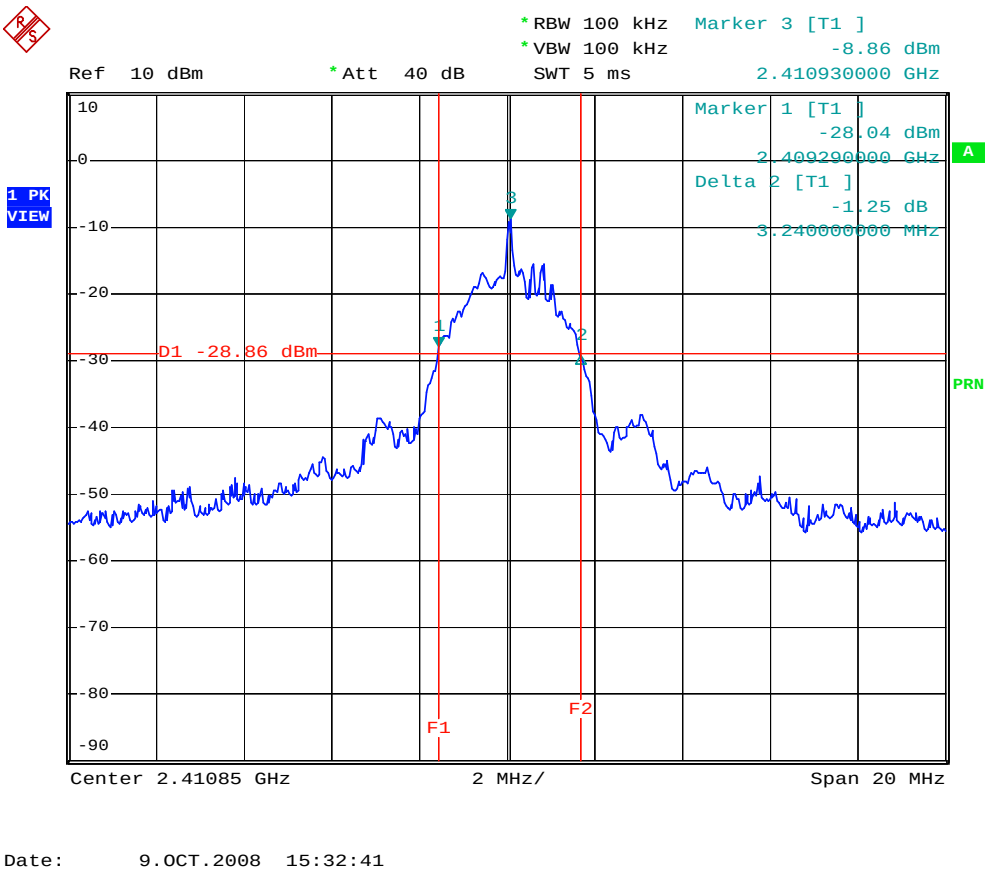
Continuously transmitting with modulation on a certain channel that can be set by the software (with typical data input as the modulation source).

4.5.7 TEST RESULTS

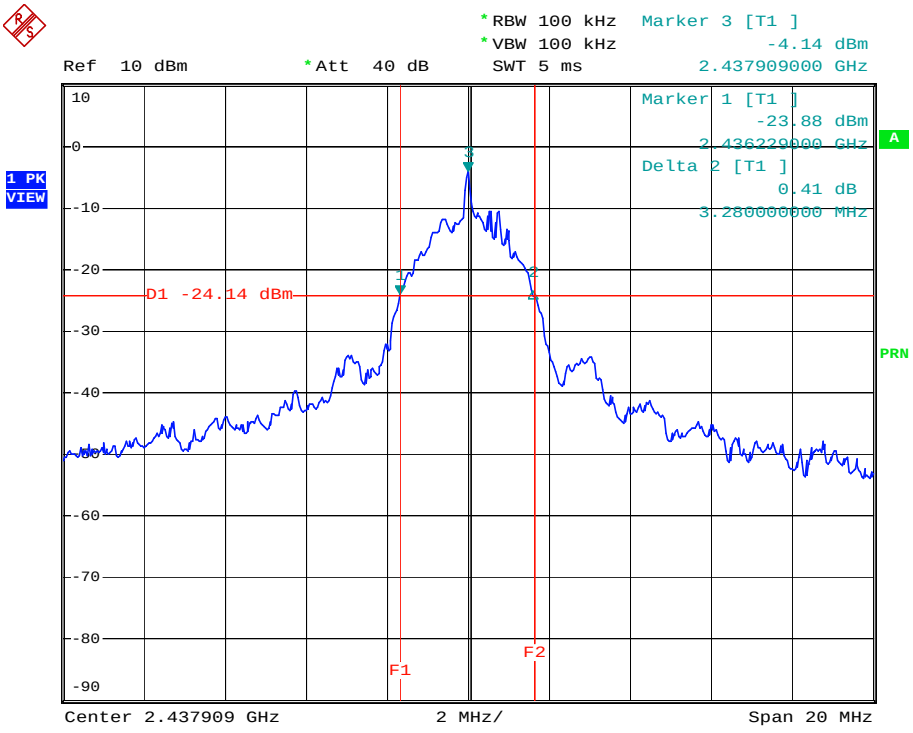
TEST MODE	B1	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
TESTED BY	Ray Xue		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2410.930	3.24
8	2437.909	3.28
17	2468.310	3.24

CH0

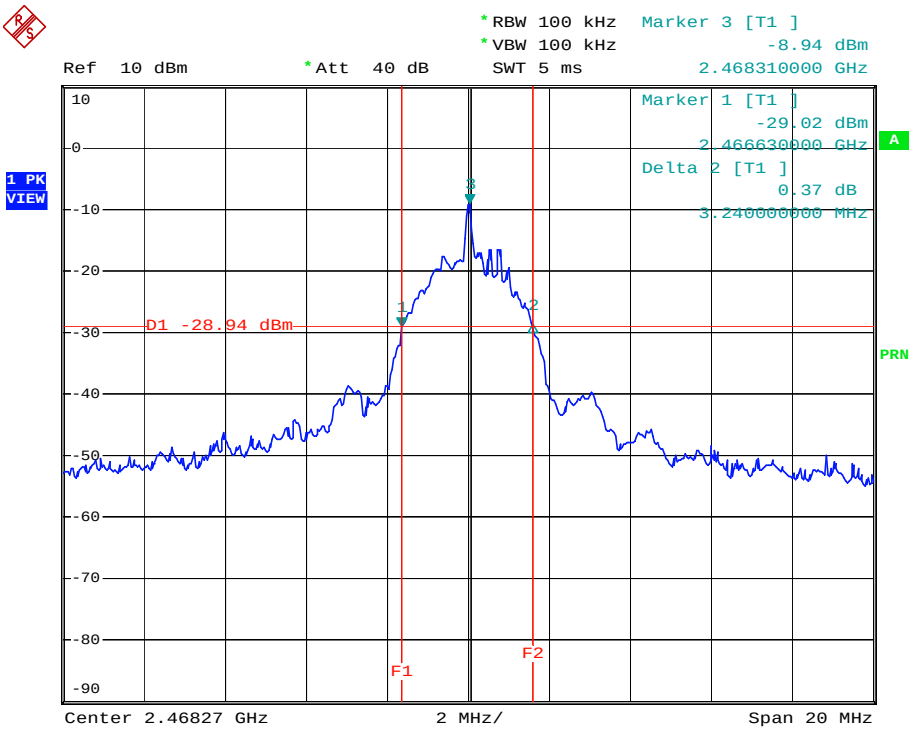


CH8



Date: 9.OCT.2008 15:35:02

CH17



Date: 9.OCT.2008 15:37:18

4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25 kHz 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 ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

4.6.3 TEST PROCEDURES

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP

4.6.6 EUT OPERATING CONDITIONS

Hopping on a single channel that can be set by the software.

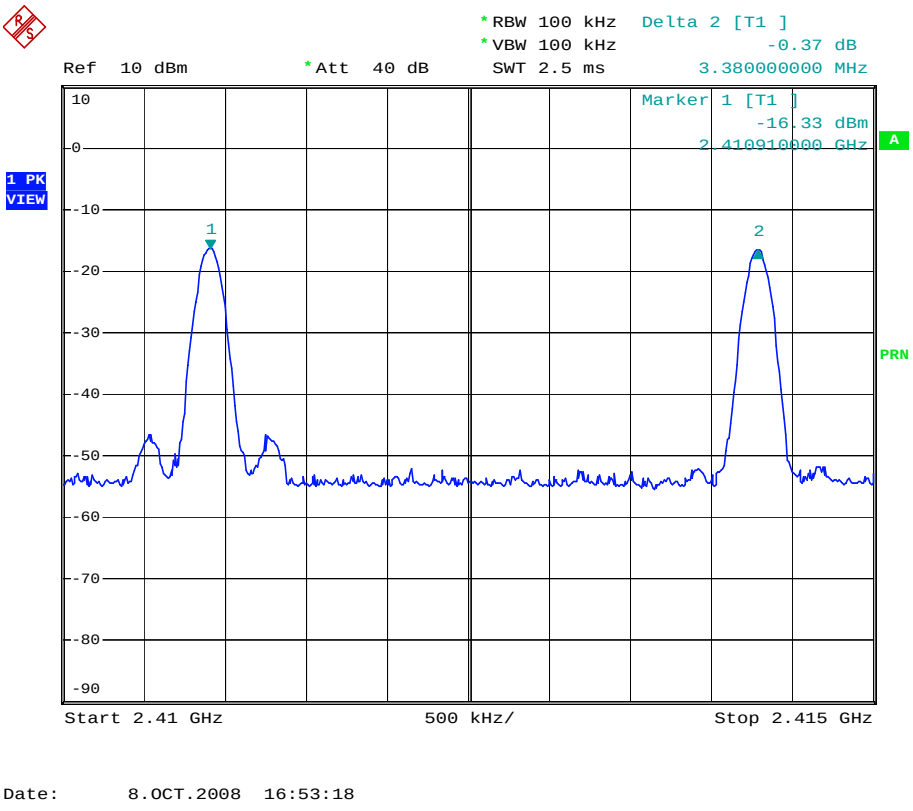
4.6.7 TEST RESULTS

TEST MODE	B1	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
TESTED BY	Ray Xue		

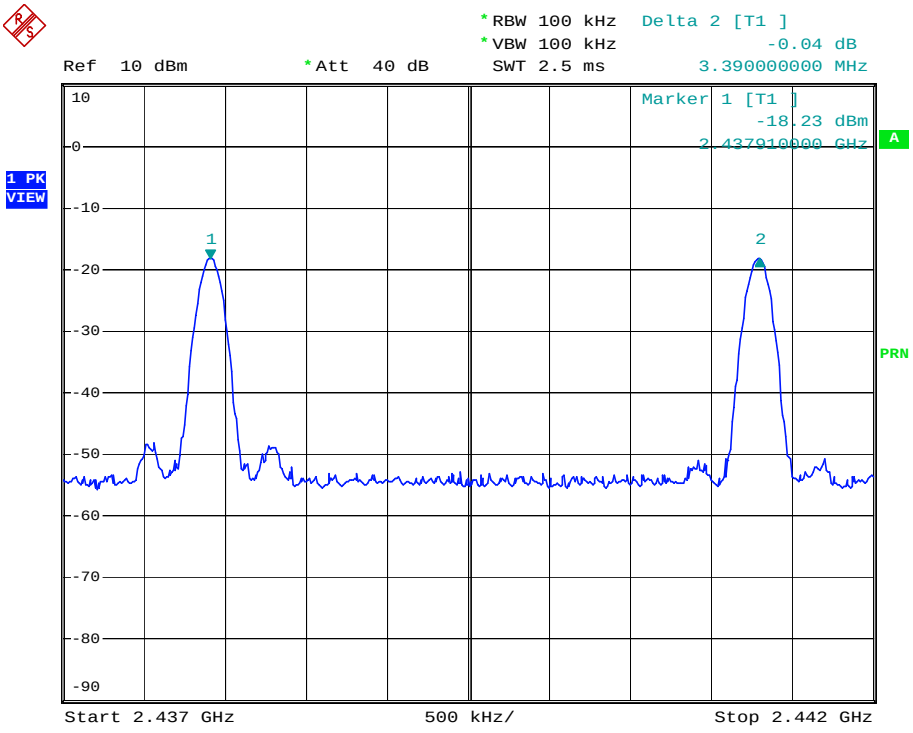
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2410.91	3.38	3.24	2.16	PASS
8	2437.91	3.39	3.28	2.19	PASS
17	2468.30	3.38	3.24	2.16	PASS

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

CH0

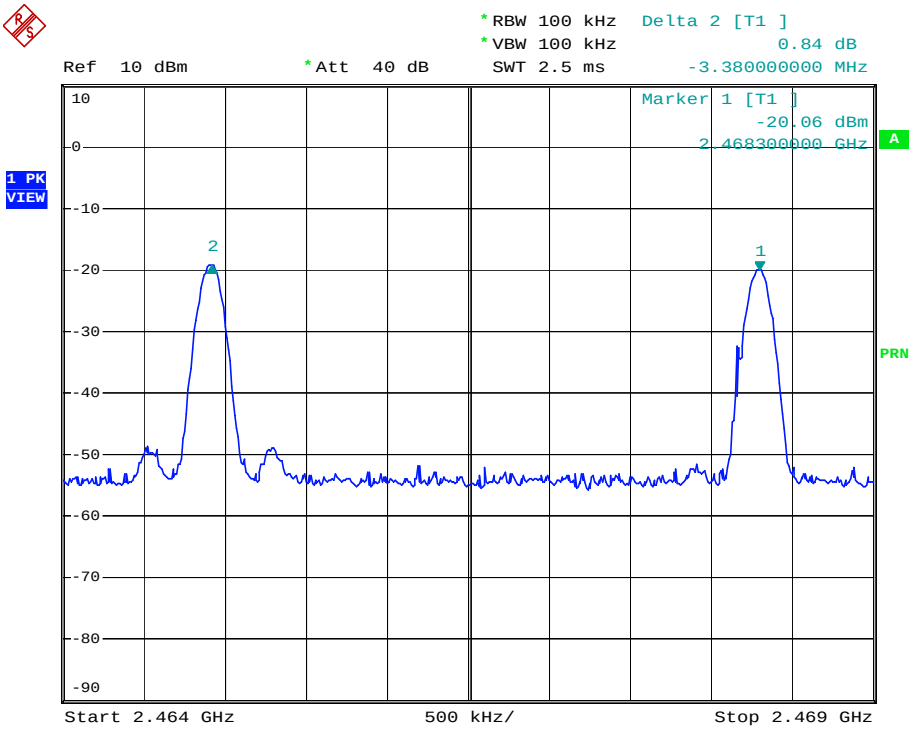


CH8



Date: 8.OCT.2008 16:55:12

CH17



Date: 8.OCT.2008 16:58:46

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 Analyzer ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

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 10 MHz RBW and 10 MHz VBW.

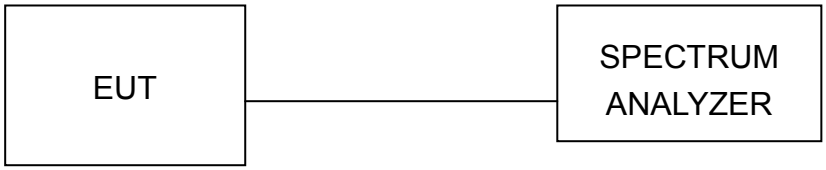
d. Measure the captured power within the band and recording the plot.

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

4.7.5 TEST SETUP



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

4.7.6 EUT OPERATING CONDITION

Continuously transmitting with modulation on a certain channel that can be set by the software (with typical data input as the modulation source).

4.7.7 TEST RESULTS

TEST MODE	B1	INPUT POWER	120Vac, 60Hz
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
TESTED BY	Ray Xue		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2410.92	13.84	11.41	125	PASS
8	2437.88	14.52	11.62	125	PASS
17	2468.32	14.96	11.75	125	PASS

4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band.

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Spectrum Analyzer ROHDE & SCHWARZ	ESCI	E1S1003	Sep. 30, 2009

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 with suitable frequency span including bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

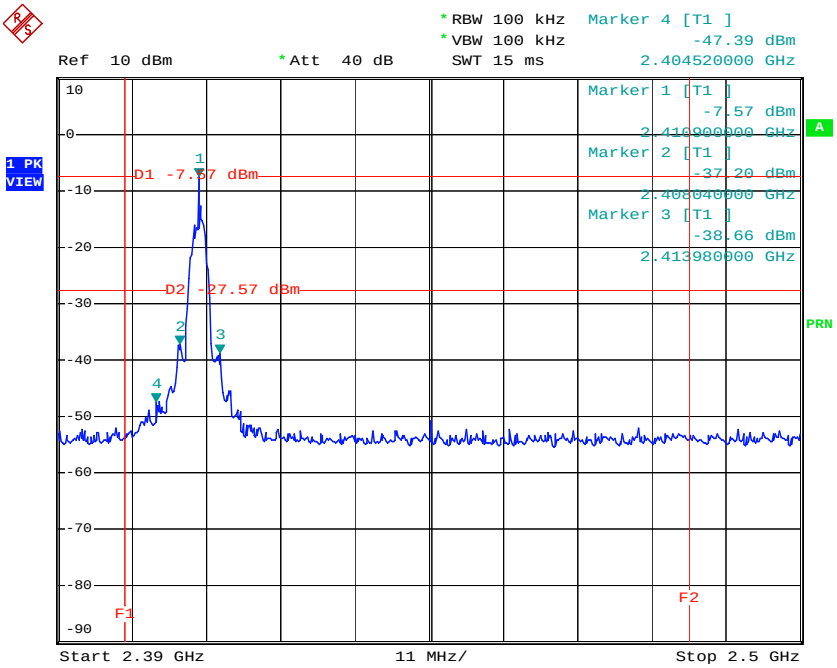
4.8.5 EUT OPERATING CONDITION

Continuously transmitting with modulation on a certain channel that can be set by the software (with typical data input as the modulation source).

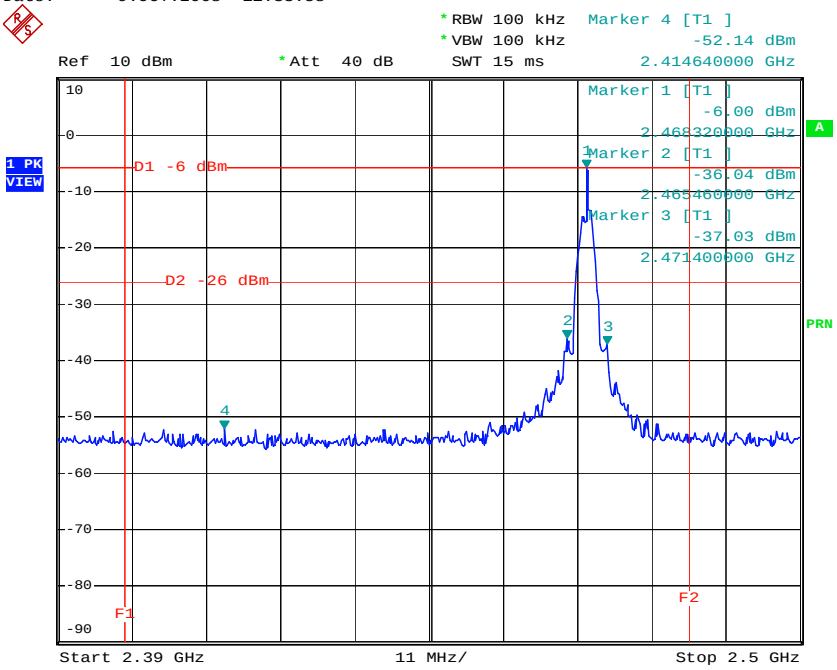
4.8.6 TEST RESULTS

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 in part 15.247(d).

For test mode B1



Date: 9.OCT.2008 11:33:58



Date: 9.OCT.2008 11:23:13

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 soldered on PCB without antenna connector. The maximum gain of this antenna is 0dBi.

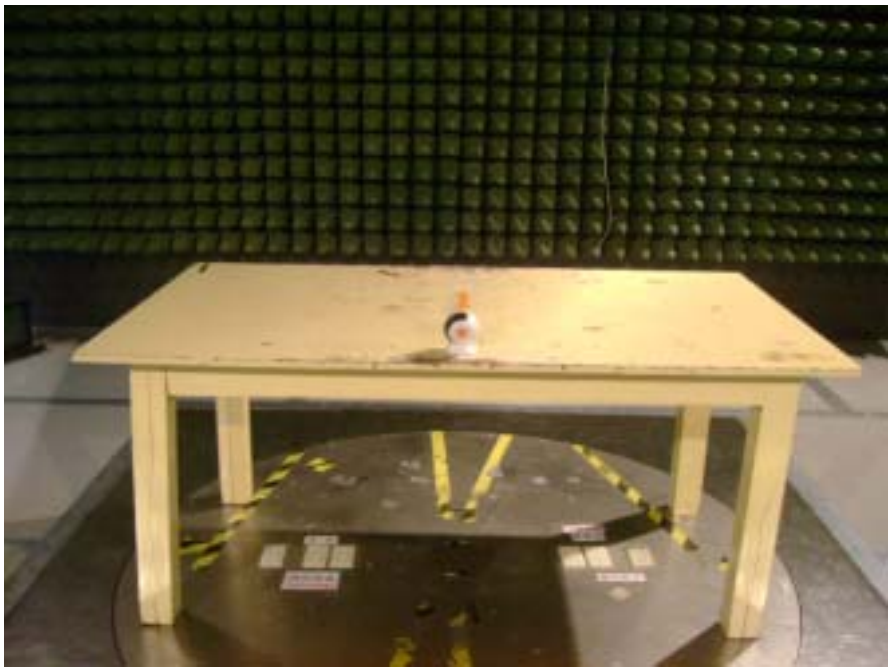
5. PHOTOGRAPHS OF THE TEST CONFIGURATION

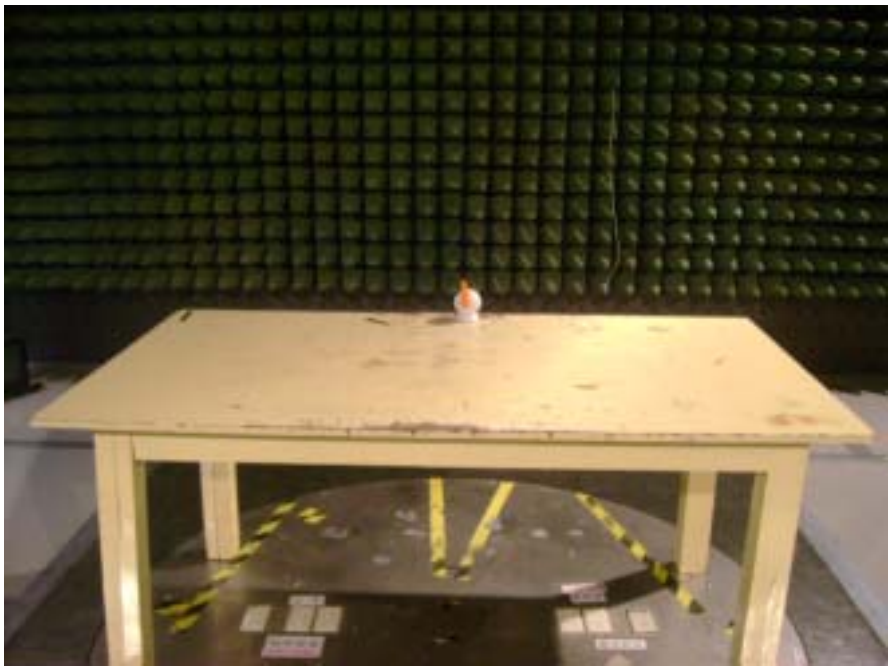
CONDUCTED EMISSION TEST

Test mode B1

RADIATED EMISSION TEST

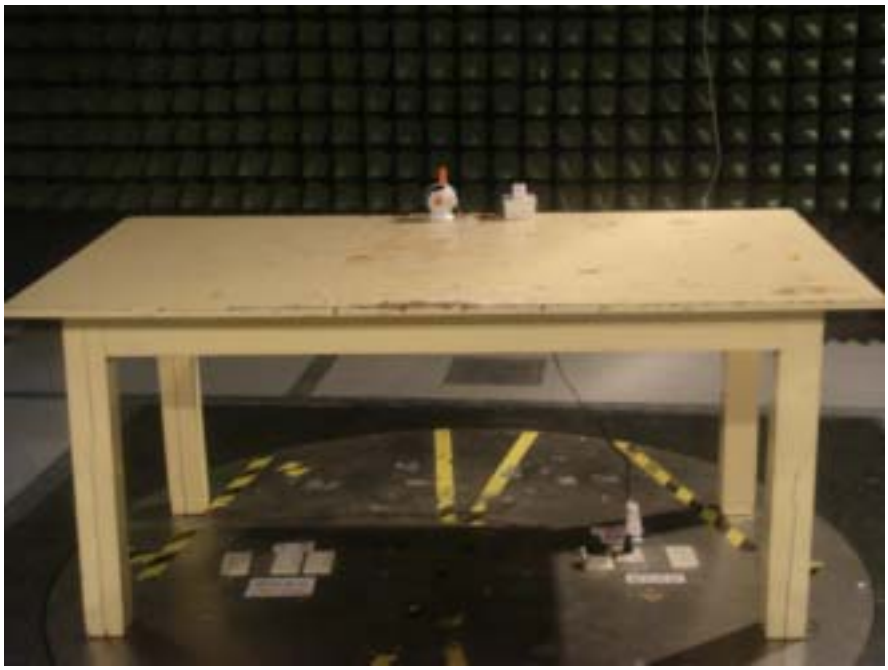
Test mode A1

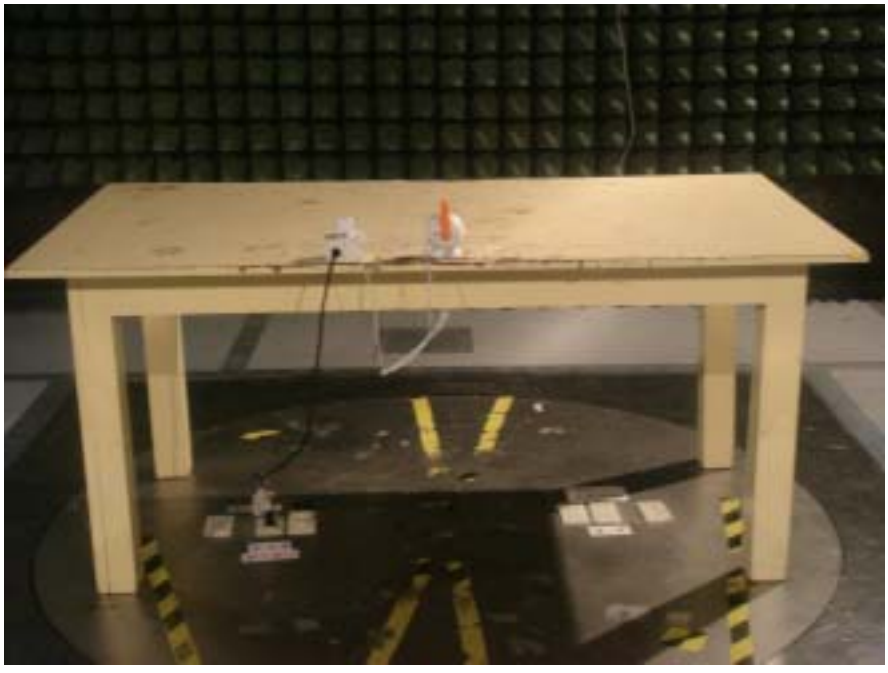




RADIATED EMISSION TEST

Test mode B1





6. INFORMATION ON THE TESTING LABORATORY

We, ADT (Shanghai) Corp., was founded in 2003 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratory is accredited and approved by the following approval agencies according to ISO / IEC 17025 (2005).

The client should not use it to claim product endorsement by CNLS, A2LA, or any government agency.

Japan	VCCI
USA	FCC, A2LA
Norway	DNV
China	CNAS

No.: 2343.01

Copies of accreditation certificates of our laboratory obtained from approval agencies can be downloaded from our web site: www.cnadt.com
If you have any comments, please feel free to contact us at the following:

ADT (Shanghai) Corporation
TEL :86-21-6465-9091
Fax : 86-21-6465-9092
Email: service@adt-sh.com
Web Site: www.cnadt.com

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 --