

FCC TEST REPORT

REPORT NO.: 061225FIA02

MODEL NO.: RL-0510, RL-0510A

RECEIVED: Jan. 4, 2007

TESTED: Jan. 8 ~ Jan. 25, 2007

ISSUED: Jan. 26, 2007

APPLICANT: ZHUHAI ROULE ELECTRIC CO., LTD

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ADT (Shanghai) Corporation.



No.: 2343.01

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1. CERTIFICATION

PRODUCT: 2.4G Wireless Dual-way Digital doorphone
MODEL NO.: RL-0510, RL-0510A
APPLICANT: ZHUHAI ROULE ELECTRIC CO., LTD
TESTED: Jan. 8 ~ Jan. 25, 2007
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.

**TECHNICAL
ACCEPTANCE** :

A handwritten signature in cursive script that reads 'Bright Tong'.

Bright Tong
Engineering Supervisor

DATE: JAN. 26, 2007

APPROVED BY :

A handwritten signature in cursive script that reads 'Wallace Pan'.

Wallace Pan
Director of Operations

DATE: JAN. 26, 2007

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 -26.83dB at 0.360MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation Spec. : Min. 25 kHz or two-thirds of 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. 1W	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.37dB at 2483.50MHz.
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	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz ~ 30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.73 dB
	200MHz ~ 1000MHz	3.74 dB
	1GHz ~ 18GHz	2.20 dB
	18GHz ~ 40GHz	1.88 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	2.4G Wireless Dual-way Digital doorphone
MODEL NO.	RL-0510, RL-0510A
BRAND NAME	RL
POWER SUPPLY	120Vac, 60Hz from adapter
POWER ADAPTER SUPPLIED	Cable out: 1.8m, non-shielded
MODULATION TYPE	GFSK
RADIO TECHNOLOGY	FHSS
TRANSFER RATE	1Mbps
FREQUENCY RANGE	2403.328 ~ 2480.128 MHz
NUMBER OF CHANNEL	75
OUTPUT POWER	+21 ~ 25dBm
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: 1. The whole system (2.4G Wireless Dual-way Digital doorphone) includes two units, one is Indoor unit and the other one is Outdoor unit.

- The Indoor unit is powered by adapter only while the Outdoor unit can be powered both by adapter and batteries.
- When the Outdoor unit is powered by adapter, the model number for the whole system is RL-0510.
- When the Outdoor unit is powered by batteries, the model number for the whole system is RL-0510A.
- When the Outdoor unit is powered by adapter, that is to say, when the whole system is named as RL-1510, the door releaser is required in this system.

Please take table 1 for the primary component of this product:

Model No.	Description	
	Power supply (For Outdoor unit)	Component
RL-0510	Powered by adapter	Indoor unit + Outdoor unit + door releaser
RL-0510A	Powered by batteries	Indoor unit + Outdoor unit

Table 1



2. This test report only records the test results of the Indoor unit. As to the test results of the Outdoor unit, please refer to 061225FIA01 (FCC ID: SUKRL-0510OUT).

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

Manufactory	Model No.	Input voltage	Output voltage
Class 2 Power supply	UCA9-300	120Vac, 60Hz	9Vac, 300mA

Table 2

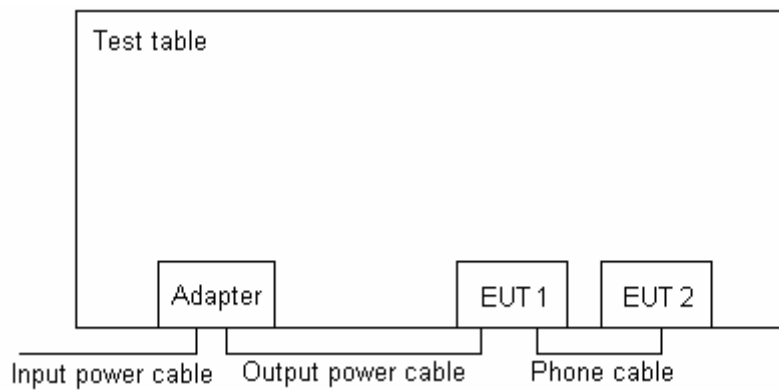
4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

75 channels are provided to this EUT:

CH	Tx / Rx	CH	Tx / Rx
1	2405.760	39	2442.624
2	2406.336	40	2443.200
3	2406.912	41	2446.080
4	2407.488	42	2446.656
5	2408.064	43	2447.232
6	2410.944	44	2447.808
7	2411.520	45	2448.384
8	2412.096	46	2450.688
9	2412.672	47	2451.264
10	2413.248	48	2451.840
11	2416.128	49	2452.416
12	2416.704	50	2452.992
13	2417.280	51	2455.872
14	2417.856	52	2456.448
15	2418.432	53	2457.024
16	2420.736	54	2457.600
17	2421.312	55	2458.176
18	2421.888	56	2461.056
19	2422.464	57	2461.632
20	2423.040	58	2462.208
21	2425.920	59	2462.784
22	2426.496	60	2463.360
23	2427.072	61	2465.664
24	2427.648	62	2466.240
25	2428.224	63	2466.816
26	2431.104	64	2467.392
27	2431.680	65	2467.968
28	2432.256	66	2470.848
29	2432.832	67	2471.424
30	2433.408	68	2472.000
31	2435.712	69	2472.576
32	2436.288	70	2473.152
33	2436.864	71	2476.032
34	2437.440	72	2476.608
35	2438.016	73	2477.184
36	2440.896	74	2477.760
37	2441.472	75	2478.336
38	2442.048		

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



- Note:** 1. EUT 1 – Phone; EUT 2 – Headphone
2. Phone cable – 0.2m



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	Applicable to							Description
	DT	CB	HCS	MPOP	BM	CE	RE	
A	√	√	√	√	√	√	√	GFSK Modulation

Where **DT**: Dwell Time on Each Channel **CB**: Cannel 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
A	0 ~ 75	1, 38, 75	FHSS	GFSK	1Mbps

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
A	0 ~ 75	1, 38, 75	FHSS	GFSK	1Mbps

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
A	0 ~ 75	1, 38, 75	FHSS	GFSK	1Mbps

**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
A	0 ~ 75	1, 38, 75	FHSS	GFSK	1Mbps

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
A	0 ~ 75	1, 75	FHSS	GFSK	1Mbps

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
A	0 ~ 75	1	FHSS	GFSK	1Mbps

RADIATED EMISSION TEST:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE
A	0 ~ 75	1, 38, 75	FHSS	GFSK	1Mbps



3.2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a 2.4G Wireless Dual-way Digital doorphone. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)

ANSI C63.4- 2003

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

3.2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

Note: 2m non-shielded input power cable was used during the test which supplied by the lab.

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	Jun. 12, 2007
LISN ROHDE & SCHWARZ	NSLK8127	E1L1001	Apr. 13, 2007
LISN ROHDE & SCHWARZ	NSLK8126	E1L1002	Jul. 12, 2007
Software ADT	ADT_Cond_V7.3.0	N/A	N/A

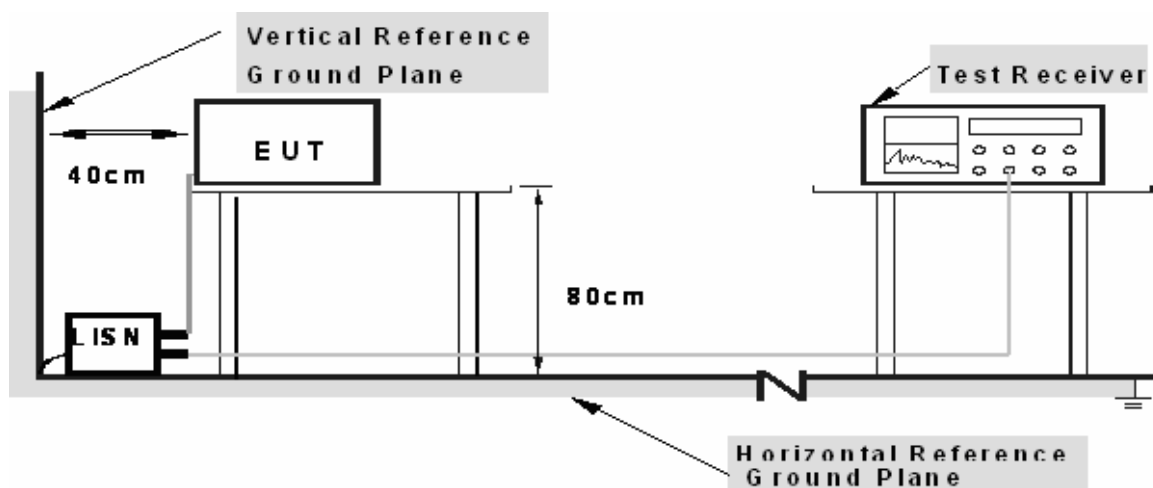
4.1.3 TEST PROCEDURE

- 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 A: Normal operation (hopping according to its hoplist).

4.1.7 TEST RESULTS

EUT	2.4G Wireless Dual-way Digital doorphone	MODEL NO.	RL-0510, RL-0510A
TEST MODE	Mode A	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60Hz	PHASE	Line (L1)
ENVIRONMENTAL CONDITIONS	21 deg. C, 48 % RH, 1012 hPa	TESTED BY: Bright	

No.	Frequency	Corr. Factor	Reading (dBuV)		Emission (dBuV)		Limit (dBuV)		Margins (dB)	
	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV
1	0.178	1.29	34.31	9.58	35.60	10.87	64.57	54.57	-28.98	-43.71
2	0.308	0.73	30.66	9.61	31.39	10.34	60.03	50.03	-28.64	-39.69
3	0.839	0.47	15.06	2.26	15.53	2.73	56.00	46.00	-40.47	-43.27
4	1.533	0.48	9.68	-9.79	10.16	-9.31	56.00	46.00	-45.84	-55.31
5	3.132	0.73	5.01	-10.32	5.74	-9.59	56.00	46.00	-50.26	-55.59
6	23.591	1.51	16.88	10.55	18.39	12.06	60.00	50.00	-41.61	-37.94

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



EUT	2.4G Wireless Dual-way Digital doorphone	MODEL NO.	RL-0510, RL-0510A
TEST MODE	Mode A	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60Hz	PHASE	N
ENVIRONMENTAL CONDITIONS	21 deg. C, 48 % RH, 1012 hPa	TESTED BY: Bright	

No.	Frequency	Corr. Factor	Reading (dBuV)		Emission (dBuV)		Limit (dBuV)		Margins (dB)	
	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV
1	0.181	1.23	34.07	17.26	35.30	18.49	64.44	54.44	-29.14	-35.95
2	0.360	0.68	31.23	4.33	31.91	5.01	58.74	48.74	-26.83	-43.73
3	0.805	0.59	18.08	-4.58	18.67	-3.99	56.00	46.00	-37.33	-49.99
4	2.801	0.71	12.15	-7.25	12.86	-6.54	56.00	46.00	-43.14	-52.54
5	15.513	1.16	12.20	-8.27	13.36	-7.11	60.00	50.00	-46.64	-57.11
6	23.875	1.44	20.14	15.08	21.58	16.52	60.00	50.00	-38.42	-33.48

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	Apr. 19, 2007
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Sept. 26, 2007
Preamplifier Agilent	8447D	E1A2001	Jan. 27, 2007
Preamplifier Agilent	8449B	E1A2002	Jan. 27, 2007
Double Ridged Broadband Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Feb. 15, 2007
Spectrum Analyzer Agilent	E4403B	E1S1001	Jan. 13, 2008
Signal Analyzer ROHDE & SCHWARZ	FSP	E1S1002	May. 16, 2007
RF signal cable Woken	RG-402	E1CBH01	May. 30, 2007
RF signal cable Woken	RG-402	E1CBH05	May. 30, 2007
RF signal cable Woken	RG-402	E1CBH07	May. 30, 2007
RF signal cable Woken	RG-412	E1CBL02	May. 30, 2007
RF signal cable Woken	RG-412	E1CBL03	May. 30, 2007
RF signal cable Woken	RG-412	E1CBL04	May. 30, 2007
Software ADT	ADT_Radiated_V7.5	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months.
 2. "*" = These equipment are used for the final measurement.
 3. The horn antenna and Agilent preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The Spectrum Analyzer (model: FSP) and RF signal cable (SERIAL: E1CBH05&E1CBH07) are 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.

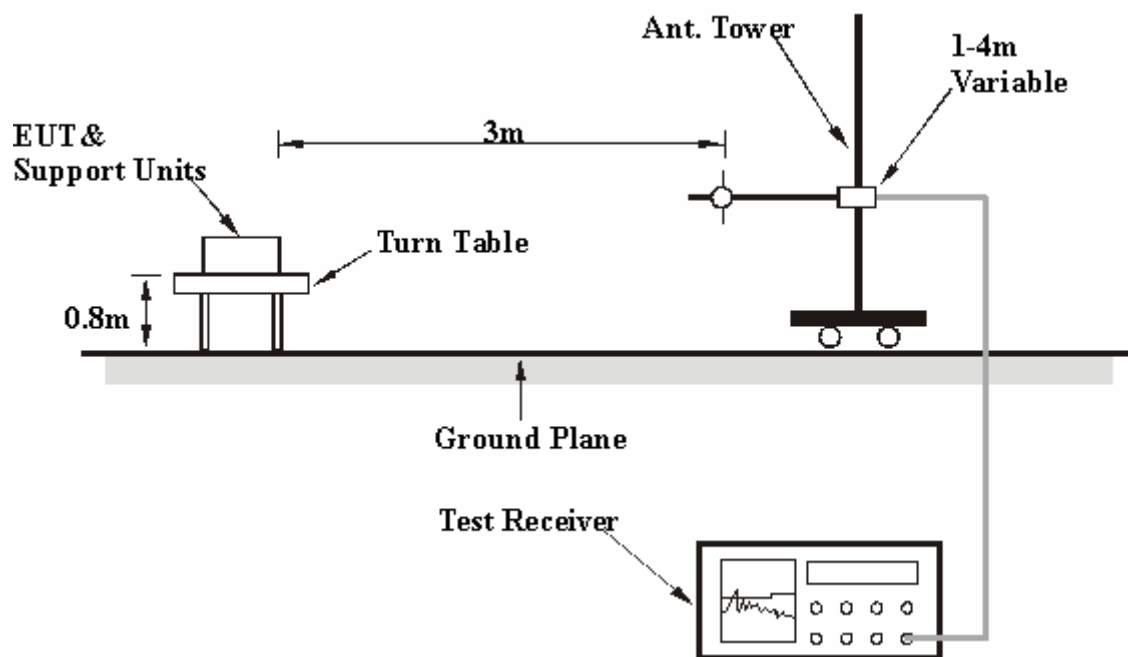
NOTE:

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 Worst Case

EUT	2.4G Wireless Dual-way Digital doorphone	MEASUREMENT DETAIL	
MODEL	RL-0510, RL-0510A	FREQUENCY RANGE	Below 1000MHz
CHANNEL	Channel 1	DETECTOR FUNCTION	Quasi-Peak
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001hPa
TEST MODE	A	INPUT POWER	120Vac, 60Hz
TESTED BY	Bright		

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	248.25	14.80	3.63	18.43	46.00	-27.57	161.00	85.00
2	359.43	17.73	4.86	22.59	46.00	-23.41	312.00	205.00
3	389.80	18.45	-6.74	11.71	46.00	-34.29	235.00	144.00
4	466.50	20.38	-0.04	20.34	46.00	-25.66	160.00	328.00
5	609.58	23.31	-0.31	23.00	46.00	-23.00	100.00	292.00
6	774.48	25.61	-0.58	25.03	46.00	-20.97	100.00	263.00

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	110.60	13.63	3.53	17.17	43.50	-26.33	99.00	317.00
2	138.22	16.07	6.28	22.34	43.50	-21.16	99.00	215.00
3	221.18	13.93	-1.28	12.65	46.00	-33.35	99.00	82.00
4	510.15	21.09	-8.35	12.73	46.00	-33.27	99.00	81.00
5	667.77	24.10	-8.44	15.65	46.00	-30.35	99.00	159.00
6	827.83	26.33	-9.17	17.17	46.00	-28.83	99.00	244.00

- 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

EUT	2.4G Wireless Dual-way Digital doorphone	MEASUREMENT DETAIL	
MODEL	RL-0510, RL-0510A	FREQUENCY RANGE	Above 1GHz
CHANNEL	Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001hPa
TEST MODE	A	INPUT POWER	120Vac, 60Hz
TESTED BY	Bright		

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	4811.54 PK	37.77	15.24	53.02	74	-20.98	100	23
1	4811.54 AV	37.77	-4.76	33.01	54	-20.99	100	23
2	7217.16 PK	44.60	9.71	54.31	74	-19.69	100	47
2	7217.16 AV	44.60	-10.29	34.31	54	-19.69	100	47
3	9623.04 PK	47.16	8.35	55.51	74	-18.49	100	221
3	9623.04 AV	47.16	-11.65	35.51	54	-18.49	100	221
4	12028.20 PK	48.19	9.92	58.10	74	-15.90	100	49
4	12028.20 AV	48.19	-10.08	38.11	54	-15.90	100	49

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	4811.44 PK	37.77	14.87	52.64	74	-21.36	100	67
1	4811.44 AV	37.77	-5.13	32.64	54	-21.36	100	67
2	7217.34 PK	44.60	10.96	55.57	74	-18.43	100	346
2	7217.34 AV	44.60	-9.04	35.56	54	-18.43	100	346
3	9623.04 PK	47.16	8.65	55.81	74	-18.19	100	85
3	9623.04 AV	47.16	-11.35	35.81	54	-18.19	100	85
4	12028.20 PK	48.19	9.66	57.84	74	-16.16	100	69
4	12028.20 AV	48.19	-10.34	37.85	54	-16.16	100	69

- 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: $20\log(\text{Duty cycle}) = 20\log(0.73 \times 10/100) = -22.73\text{dB}$.
But in the actual test report, the duty cycle applied is -20dB if the figure calculated out is less than -20dB.
 6. Average value = peak reading –20dB.
 7. Please take Pg. 27 for the plots.

EUT	2.4G Wireless Dual-way Digital doorphone	MEASUREMENT DETAIL	
MODEL	RL-0510, RL-0510A	FREQUENCY RANGE	Above 1GHz
CHANNEL	Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001hPa
TEST MODE	A	INPUT POWER	120Vac, 60Hz
TESTED BY	Bright		

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	4884.10 PK	38.04	14.74	52.78	74	-21.22	100	221
1	4884.10 AV	38.04	-5.26	32.78	54	-21.22	100	221
2	7326.16 PK	44.65	9.82	54.47	74	-19.53	100	346
2	7326.16 AV	44.65	-10.18	34.47	54	-19.53	100	346
3	9768.19 PK	47.53	8.18	55.72	74	-18.28	100	75
3	9768.19 AV	47.53	-11.82	35.71	54	-18.28	100	75
4	12210.24 PK	48.28	8.86	57.14	74	-16.86	100	48
4	12210.24 AV	48.28	-11.14	37.14	54	-16.86	100	48

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	4884.12 PK	38.04	13.07	51.11	74	-22.89	100	167
1	4884.12 AV	38.04	-6.93	31.11	54	-22.89	100	167
2	7326.16 PK	44.65	12.31	56.96	74	-17.04	100	264
2	7326.16 AV	44.65	-7.69	36.96	54	-17.04	100	264
3	9768.19 PK	47.53	7.61	55.15	74	-18.85	100	68
3	9768.19 AV	47.53	-12.39	35.14	54	-18.85	100	68
4	12210.24 PK	48.28	10.83	59.11	74	-14.89	100	94
4	12210.24 AV	48.28	-9.17	39.11	54	-14.89	100	94

- 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: $20\log(\text{Duty cycle}) = 20\log(0.73 \times 10/100) = -22.73\text{dB}$.
But in the actual test report, the duty cycle applied is -20dB if the figure calculated out is less than -20dB.
 6. Average value = peak reading – 20dB.
 7. Please take Pg. 27 for the plots.

EUT	2.4G Wireless Dual-way Digital doorphone	MEASUREMENT DETAIL	
MODEL	RL-0510, RL-0510A	FREQUENCY RANGE	Above 1GHz
CHANNEL	Channel 75	DETECTOR FUNCTION	Peak (PK) Average (AV)
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001hPa
TEST MODE	A	INPUT POWER	120Vac, 60Hz
TESTED BY	Bright		

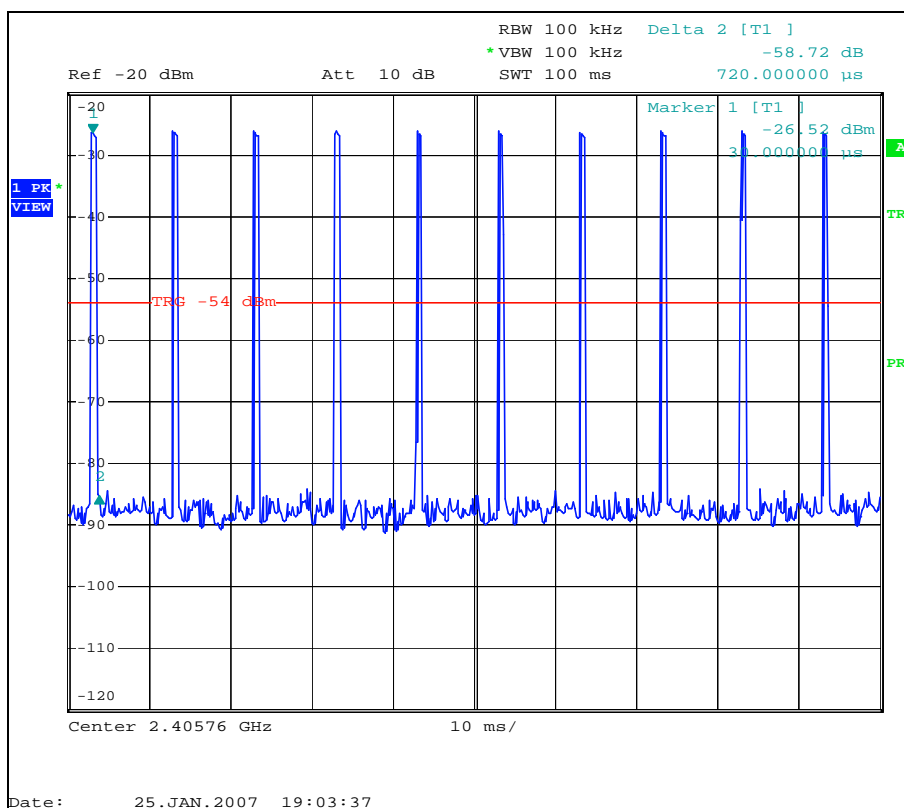
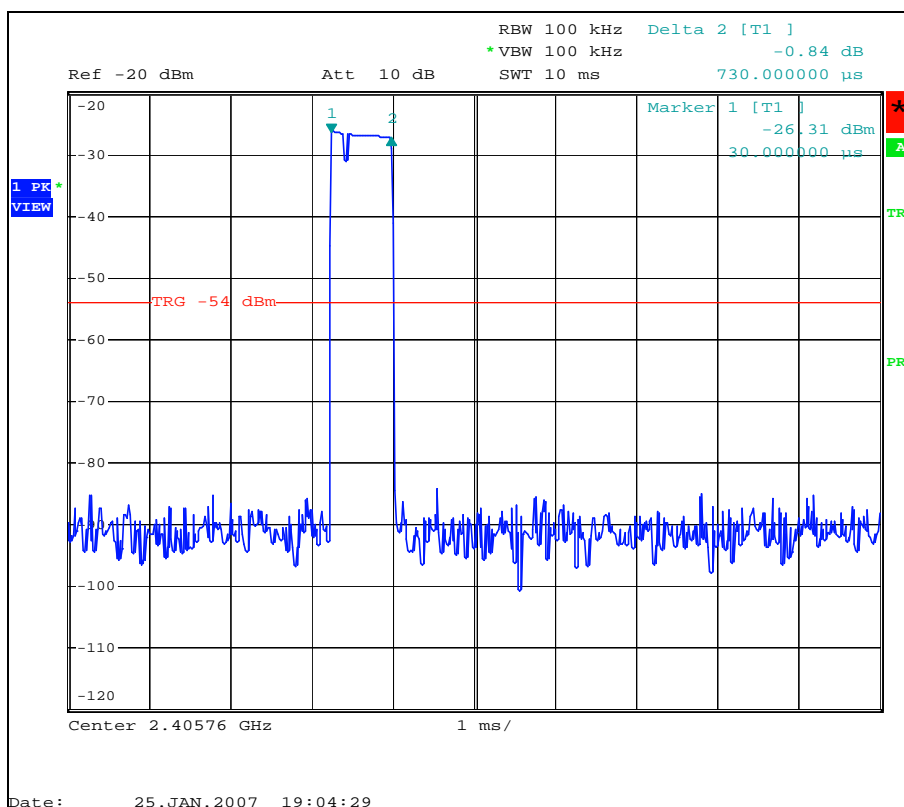
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

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	37.87	70.63	74.00	-3.37	100	64
1	2483.50 AV	32.76	17.87	50.63	54.00	-3.37	100	64
2	4956.68 PK	38.30	14.30	52.60	74.00	-21.40	100	13
2	4956.68 AV	38.30	-5.70	32.60	54.00	-21.40	100	13
3	7435.01 PK	44.58	10.83	55.42	74.00	-18.58	100	69
3	7435.01 AV	44.58	-9.17	35.41	54.00	-18.58	100	69
4	9913.34 PK	47.72	8.80	56.52	74.00	-17.48	100	97
4	9913.34 AV	47.72	-11.20	36.52	54.00	-17.48	100	97
5	12425.76 PK	48.40	10.30	58.70	74.00	-15.30	100	222
5	12425.76 AV	48.40	-9.70	38.70	54.00	-15.30	100	222

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	2483.50 PK	32.76	35.24	68.00	74.00	-6.00	100	76
1	2483.50 AV	32.76	15.24	48.00	54.00	-6.00	100	76
2	4956.68 PK	38.30	12.57	50.88	74.00	-23.12	100	114
2	4956.68 AV	38.30	-7.43	50.88	54.00	-23.12	100	114
3	7435.01 PK	44.58	11.51	56.09	74.00	-17.91	100	36
3	7435.01 AV	44.58	-8.49	56.09	54.00	-17.91	100	36
4	9913.34 PK	47.72	10.27	57.99	74.00	-16.01	100	269
4	9913.34 AV	47.72	-9.73	57.99	54.00	-16.01	100	269
5	12425.76 PK	48.40	13.68	62.08	74.00	-11.92	100	19
5	12425.76 AV	48.40	-6.32	62.08	54.00	-11.92	100	19

- 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: $20\log(\text{Duty cycle}) = 20\log(0.73 \times 10/100) = -22.73\text{dB}$.
But in the actual test report, the duty cycle applied is -20dB if the figure calculated out is less than -20dB.
 6. Average value = peak reading – 20dB.
 7. Please take Pg. 27 for the plots.



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	FSP	E1S1002	May. 15, 2007

NOTE: The calibration interval of the above test instruments is 12 months.

4.3.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 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.
- 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.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP

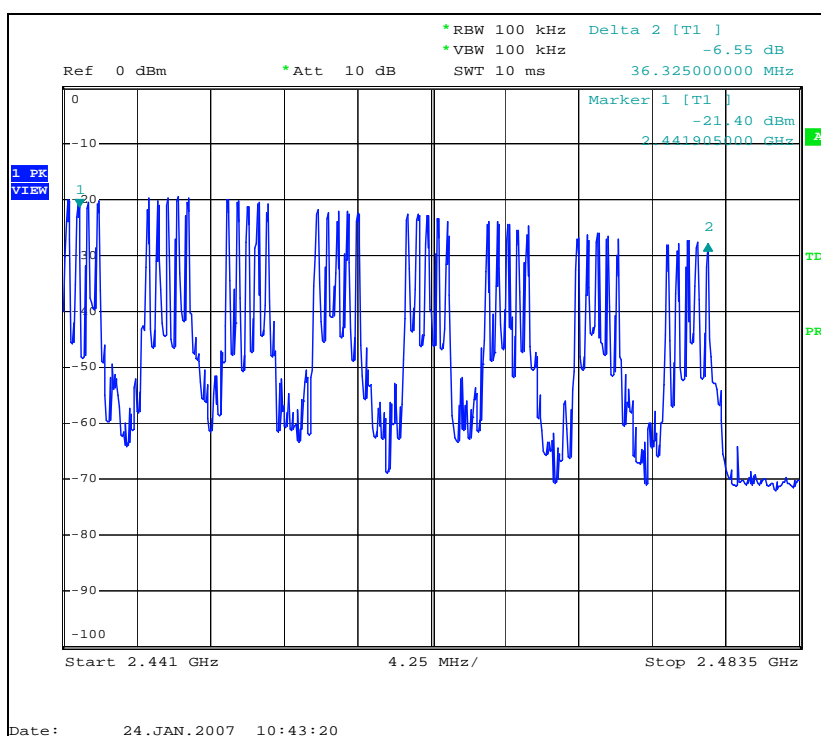
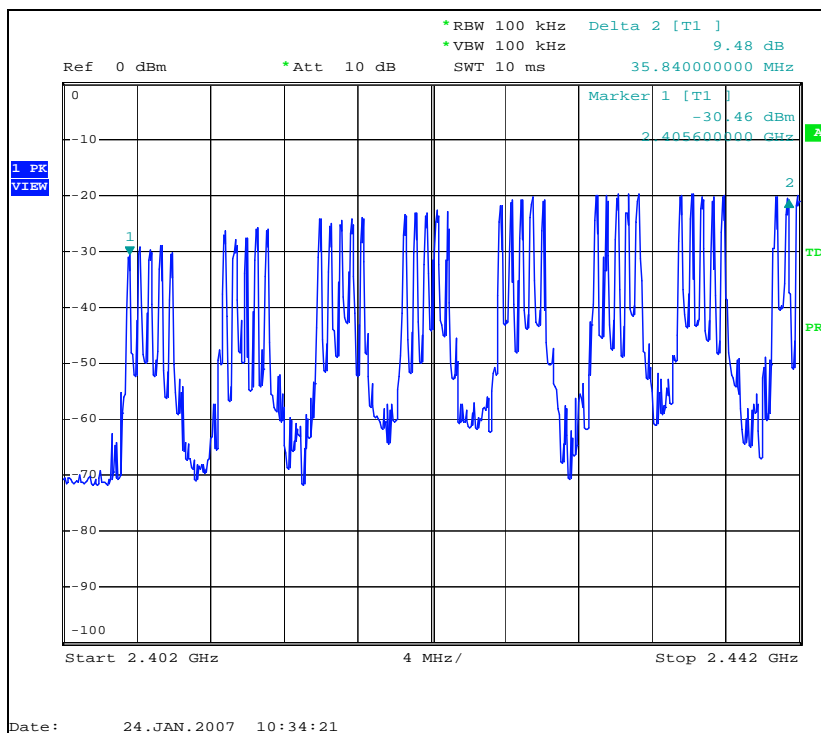


4.3.6 EUT OPERATING CONDITIONS

Normal operation (Hopping according to its hoplist).

4.3.7 TEST RESULTS

There are 75 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.





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	FSP	E1S1002	May.15, 2007

NOTES: The calibration interval of the above test instruments is 12 months.

4.4.3 TEST PROCEDURES

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 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.
- 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.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 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).

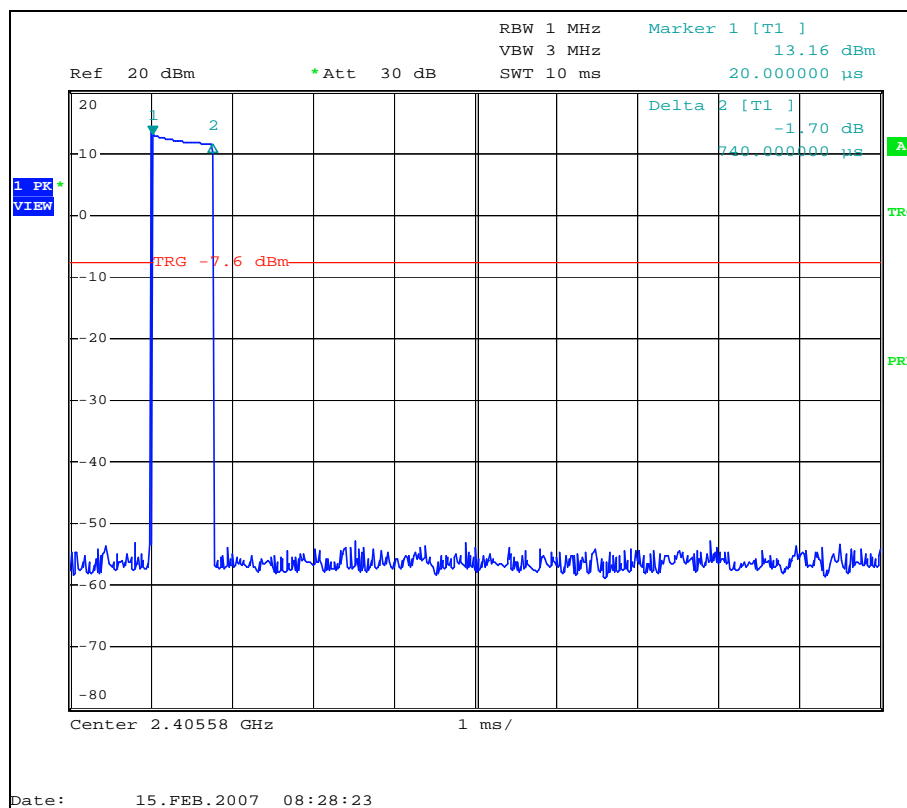
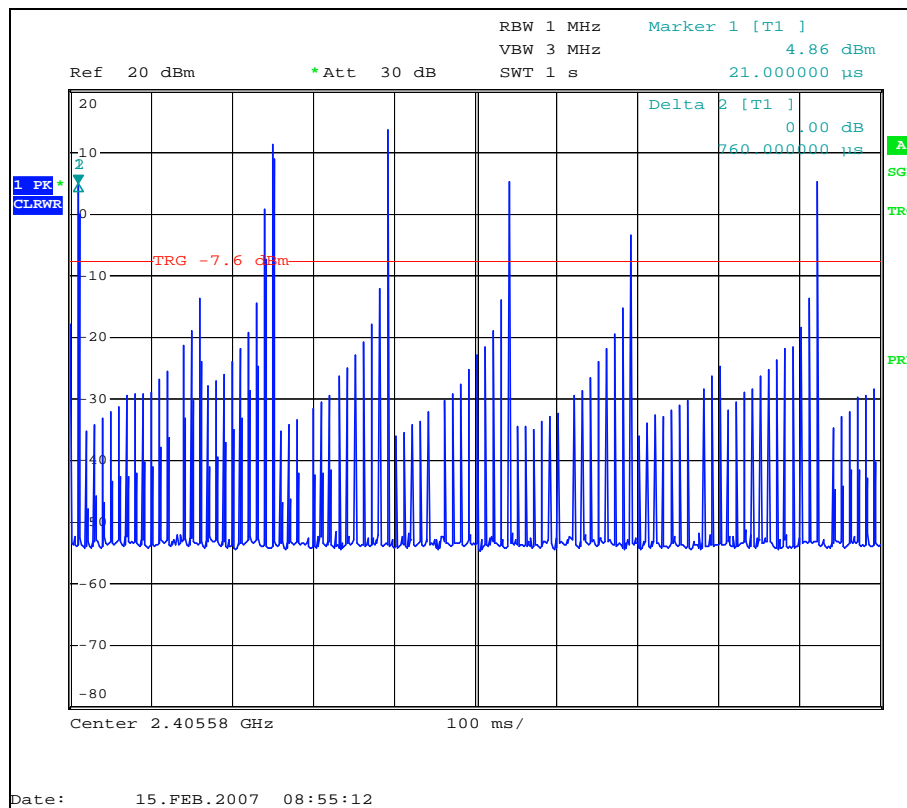
4.4.7 TEST RESULTS

EUT	2.4G Wireless Dual-way Digital doorphone	MODEL	RL-0510, RL-0510A
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
INPUT POWER	120Vac, 60Hz	TESTED BY	Bright

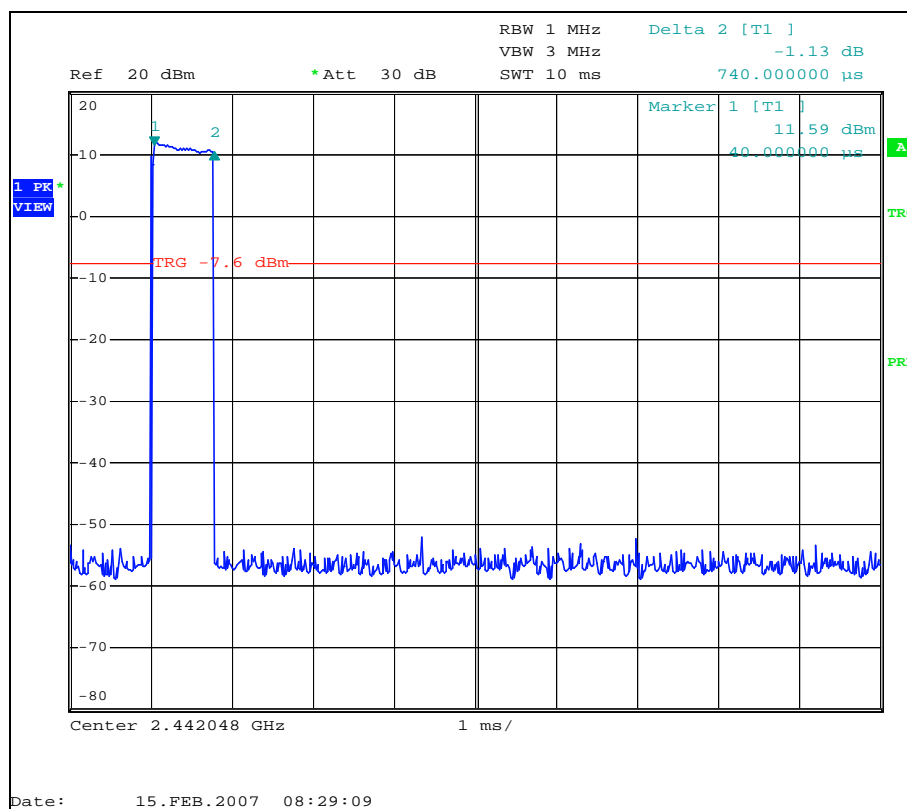
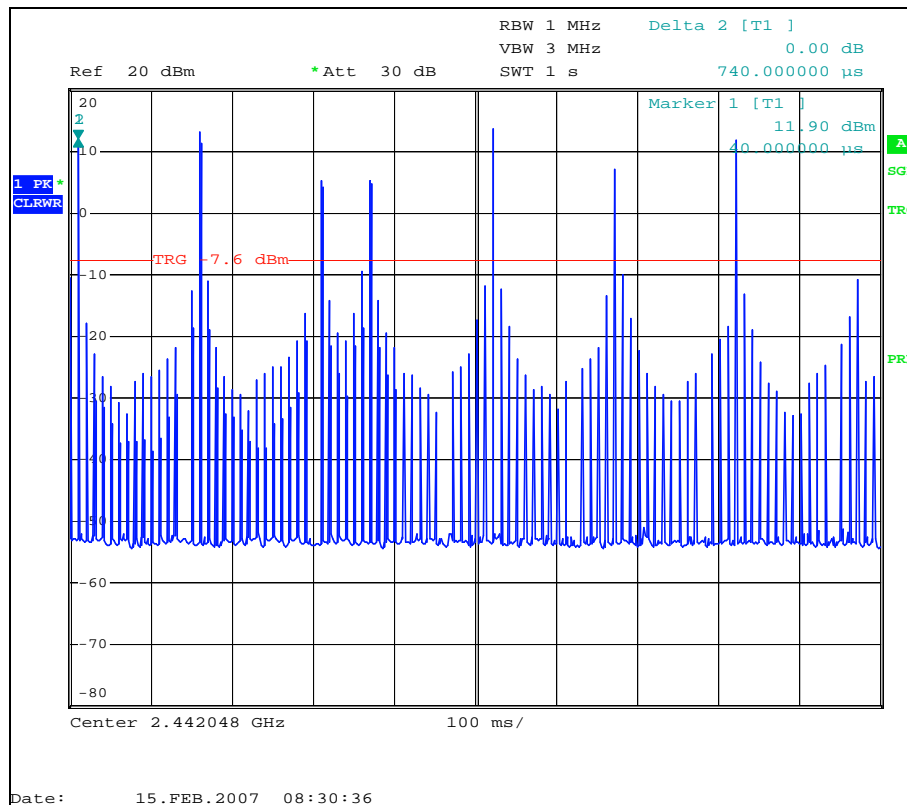
MODE	NUMBER OF TRANSMISSION IN A 30 (75HOPPING * 0.4)	LENGTH OF TRANSMISSION TIME (msec)	RESULT (msec)	LIMIT (msec)
CH1	7(times/1sec)*30=210 times	0.74	155.4	400
CH38	7(times/1sec)*30=210 times	0.74	155.4	400
CH75	7(times/1sec)*30=210 times	0.76	159.6	400

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

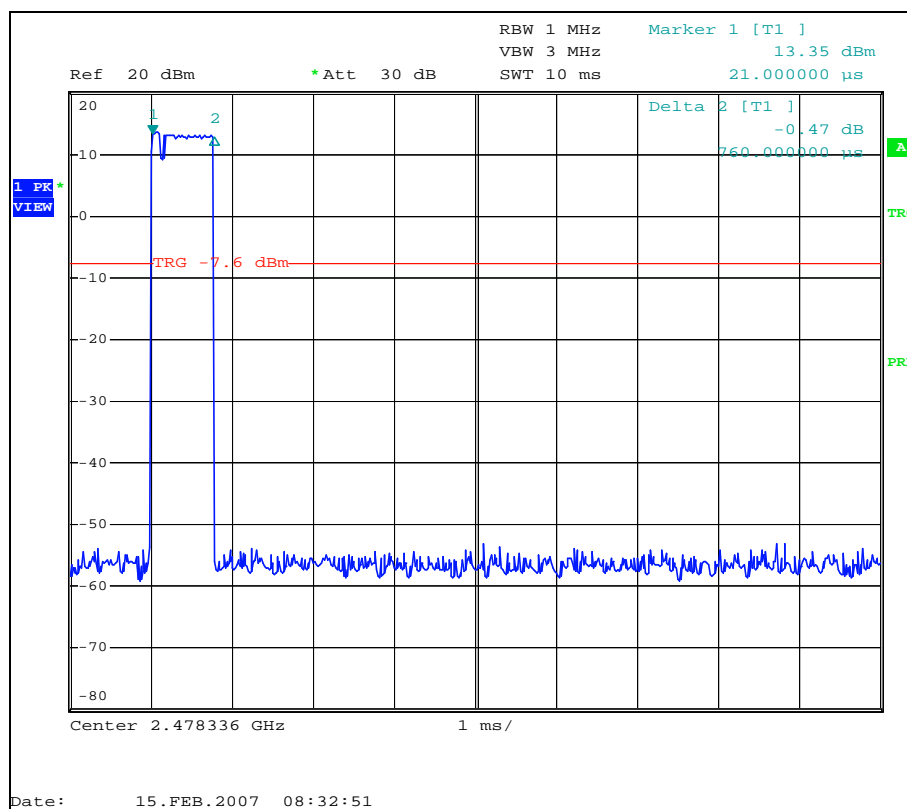
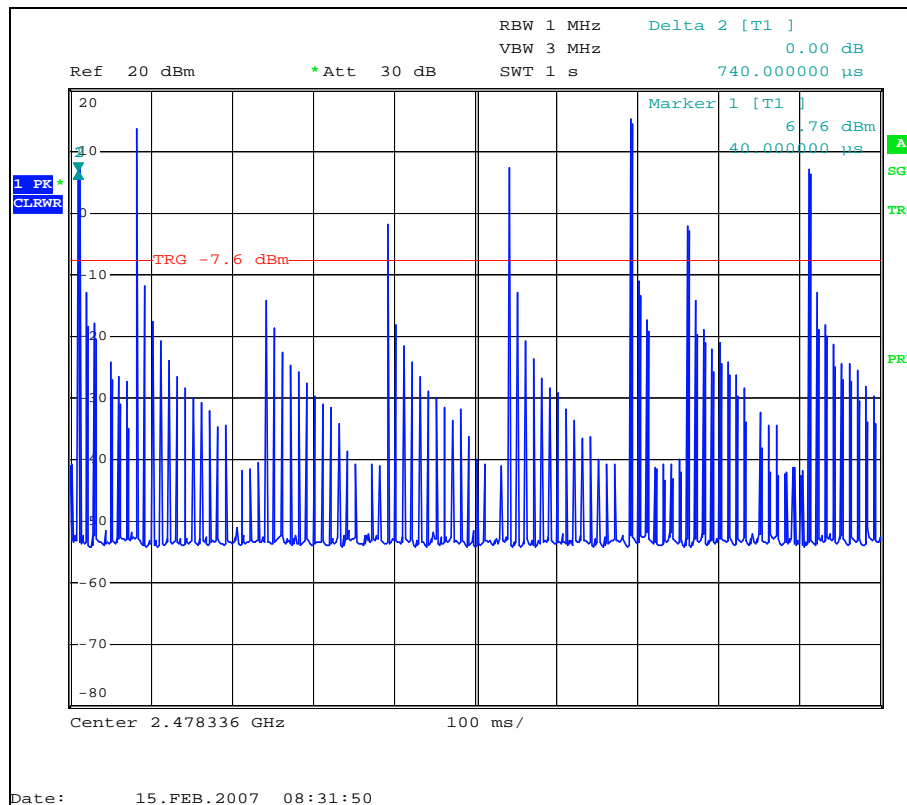
CH1



CH38



CH75



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 shall 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	FSP	E1S1002	May. 15, 2007

NOTE: The calibration interval of the above test instruments is 12 months.

4.5.3 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- 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

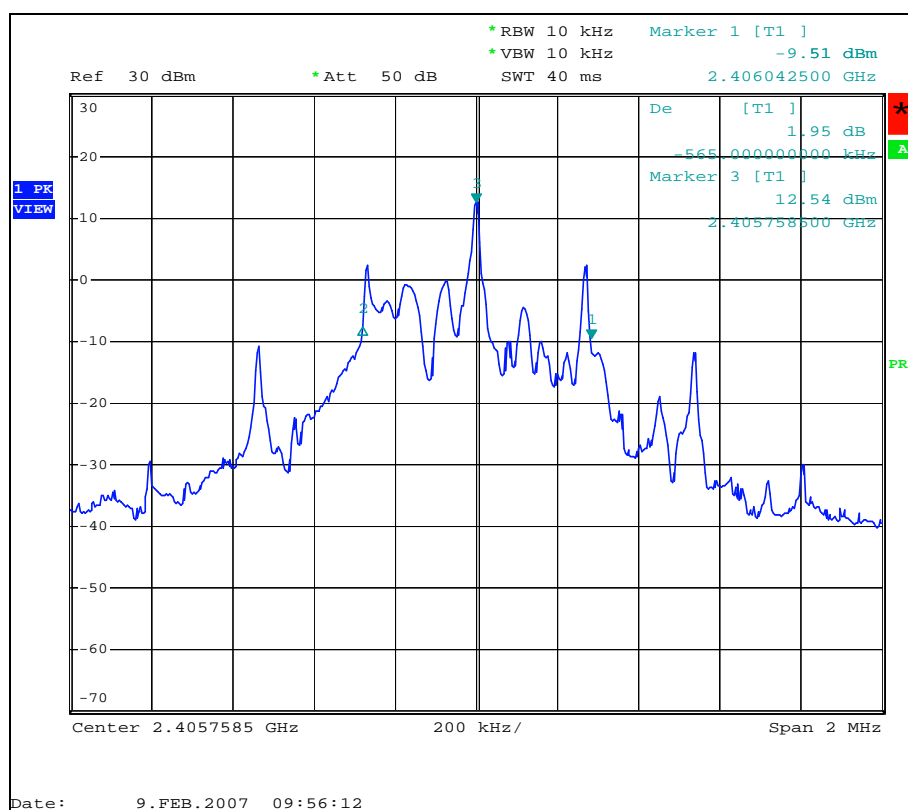
Continuously transmitting with modulation on a certain channel that can be set by the software (with typical data input as the modulation source).

4.5.7 TEST RESULTS

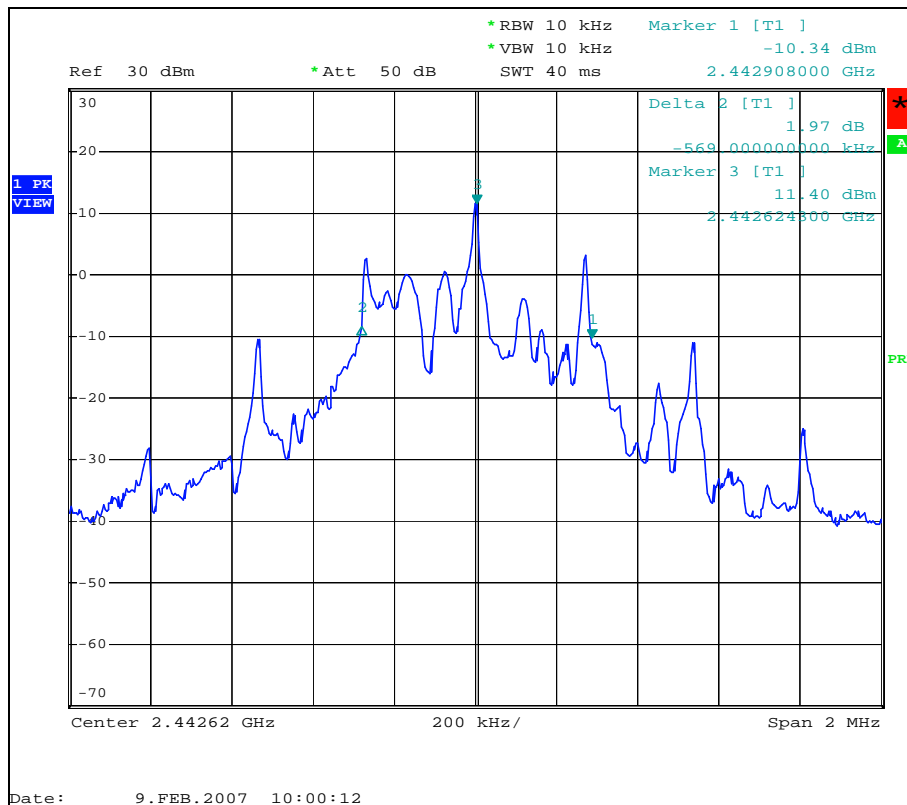
EUT	2.4G Wireless Dual-way Digital doorphone	MODEL	RL-0510, RL-0510A
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
INPUT POWER	120Vac, 60Hz	TESTED BY	Bright

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
1	2405.76	0.565
38	2442.048	0.569
75	2478.336	0.559

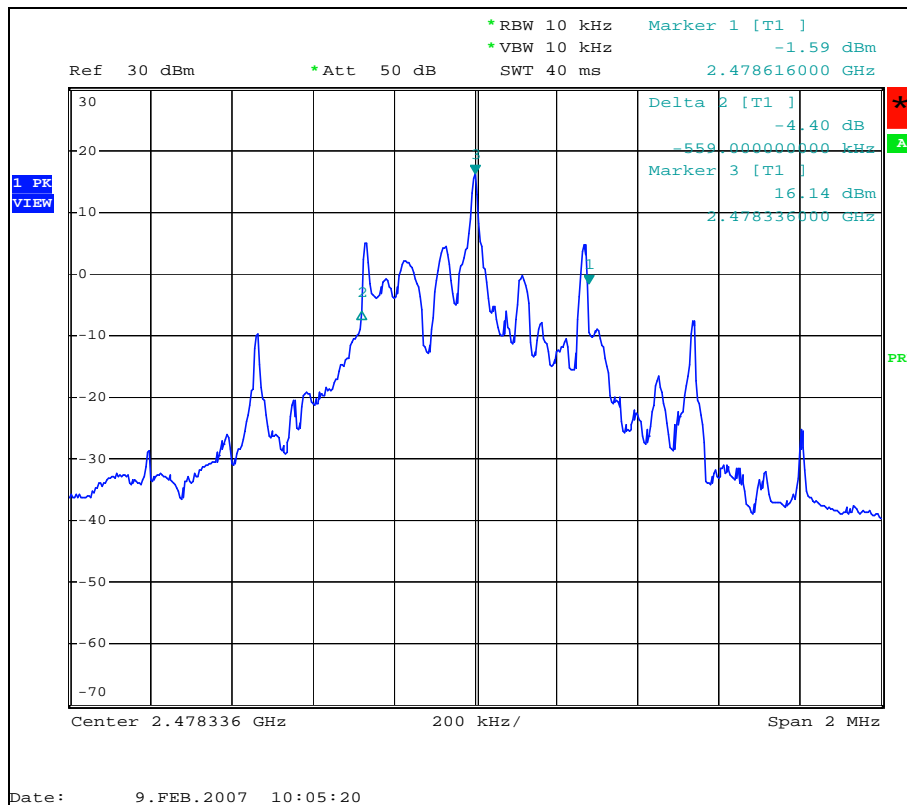
CH1



CH38



CH75



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	FSP	E1S1002	May. 15, 2007

NOTES: The calibration interval of the above test instruments is 12 months.

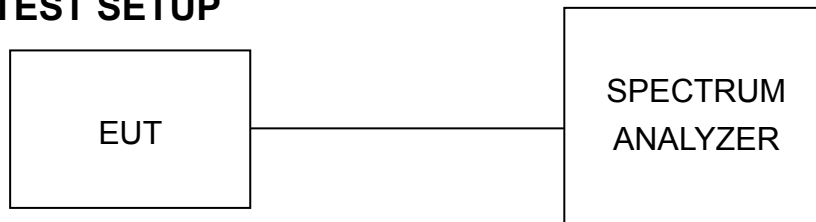
4.6.3 TEST PROCEDURES

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.

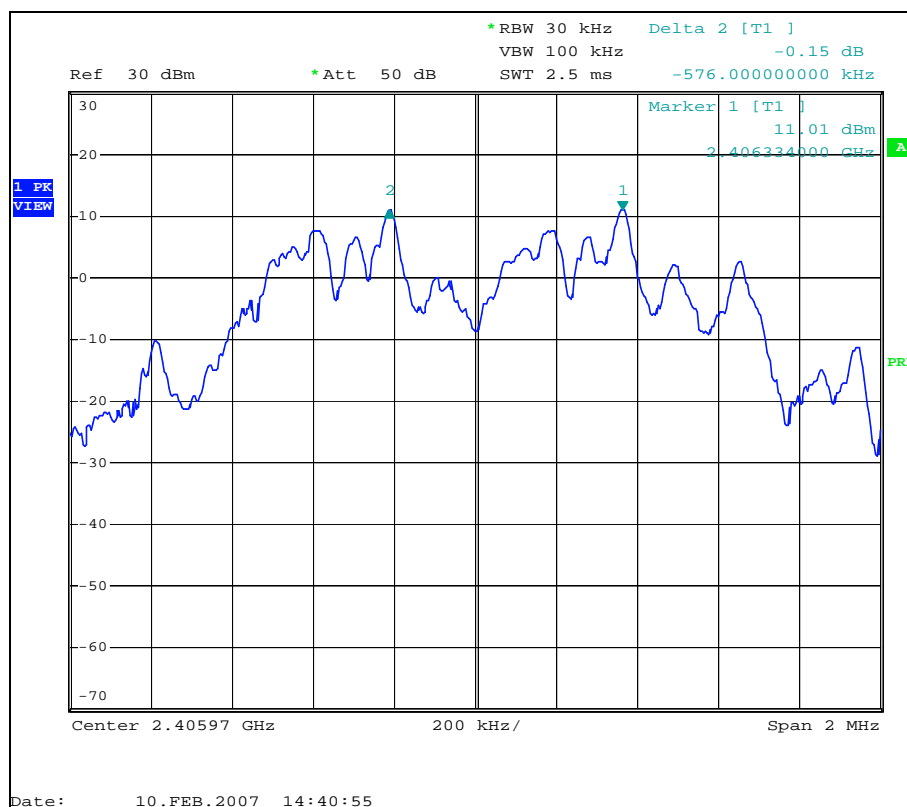
4.6.7 TEST RESULTS

EUT	2.4G Wireless Dual-way Digital doorphone	MODEL	RL-0510, RL-0510A
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
INPUT POWER	120Vac, 60Hz	TESTED BY	Bright

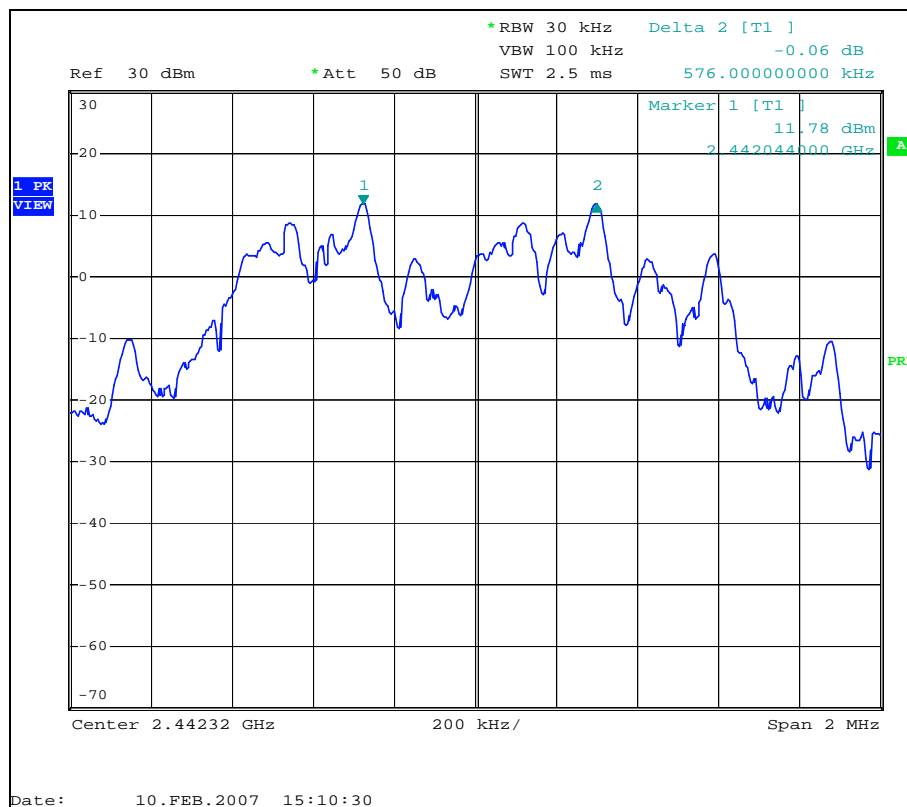
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2405.76	0.576	0.565	0.565	PASS
38	2442.048	0.576	0.569	0.569	PASS
75	2478.336	0.580	0.559	0.559	PASS

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

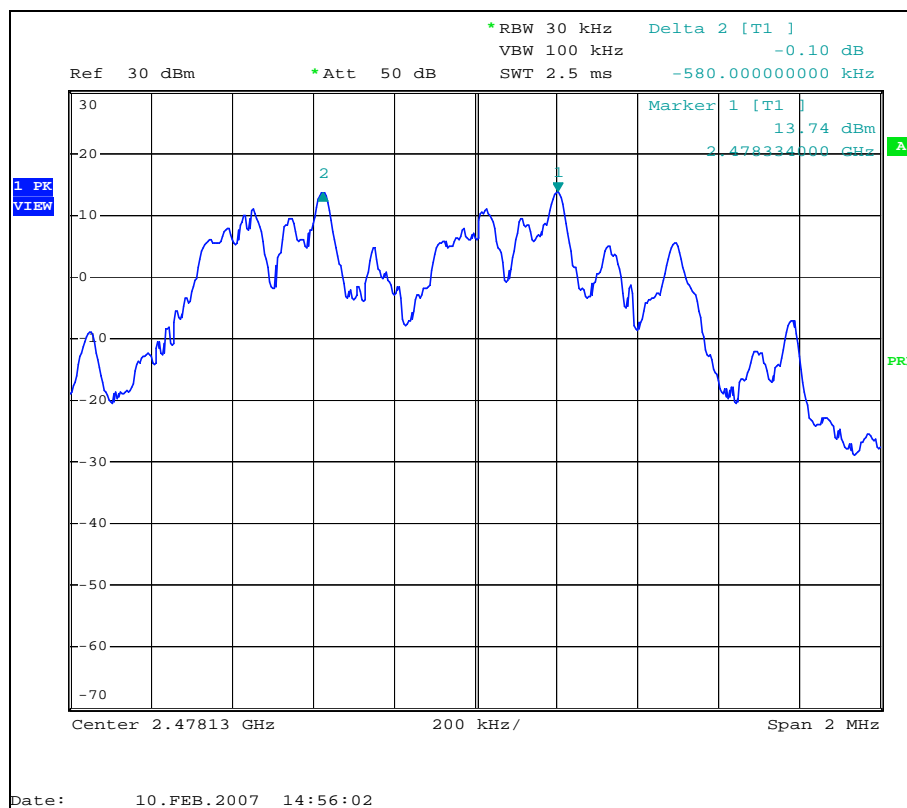
CH1



CH38



CH75



4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 1W.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*Spectrum Analyzer ROHDE & SCHWARZ	FSP	E1S1002	May. 15, 2007

NOTE: The calibration interval of the above test instruments is 12 months.

4.7.3 TEST PROCEDURES

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 1 MHz RBW and 3 MHz VBW.
- Measure the captured power within the band and recording the plot.
- 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

EUT	2.4G Wireless Dual-way Digital doorphone	MODEL	RL-0510, RL-0510A
MODULATION TYPE	GFSK	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 1001Hpa
INPUT POWER	120Vac, 60Hz	TESTED BY	Bright

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2405.76	24.96	30	PASS
38	2442.048	23.89	30	PASS
75	2478.336	21.07	30	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	FSP	E1S1002	May.15, 2007

NOTES: The calibration interval of the above test instruments is 12 months.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss 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

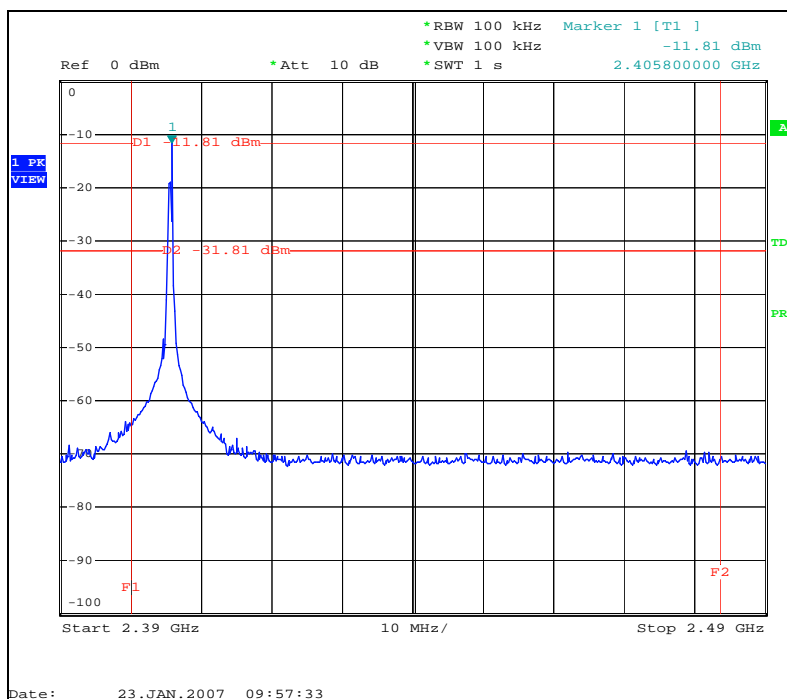
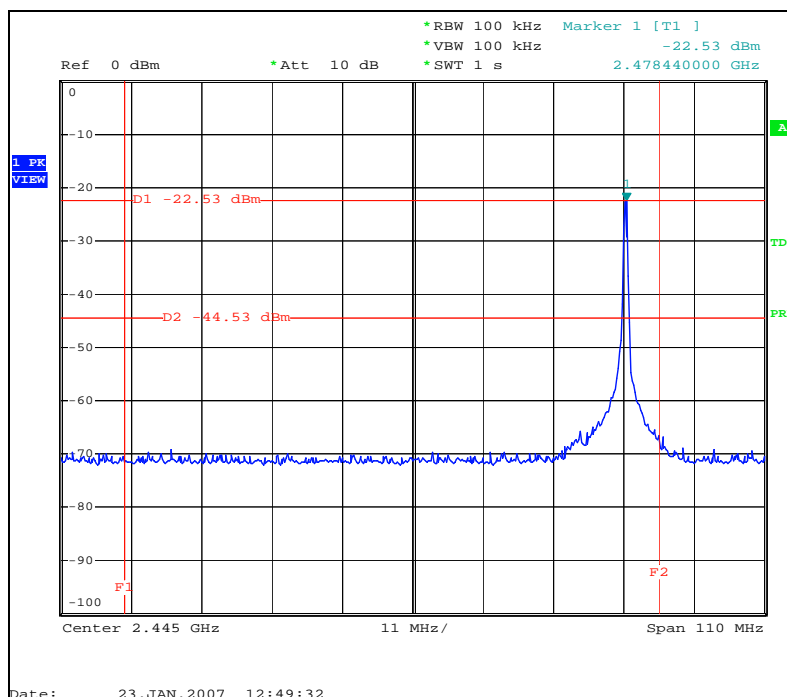
No deviation.

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 2 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).





4.9 ANTENNA REQUIREMENT

4.9.1 STANDARD APPLICABLE

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

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

4.9.2 ANTENNA CONNECTED CONSTRUCTION

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

5. 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



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:

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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.