4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

4.6.3 TEST PROCEDURE

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

The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW=1kHz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

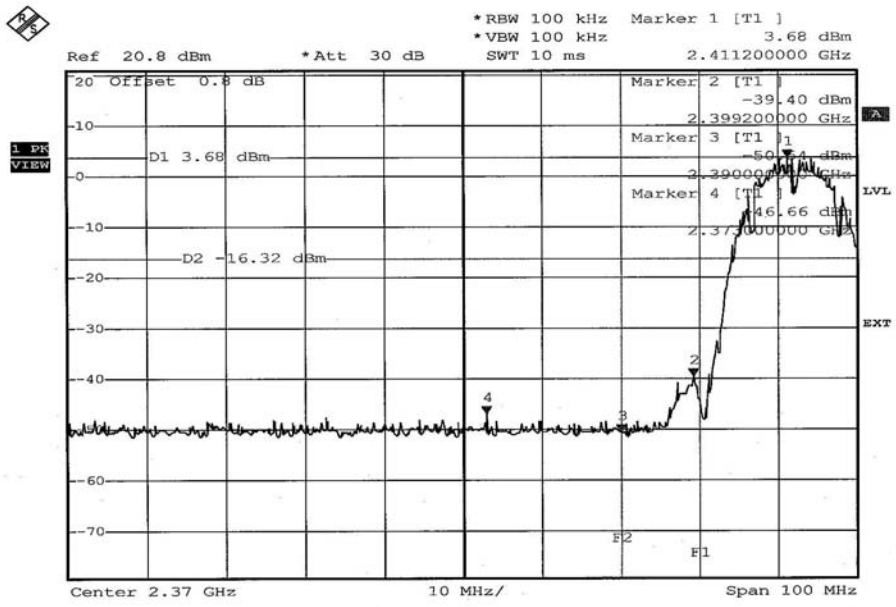
802.11b DSSS MODULATION

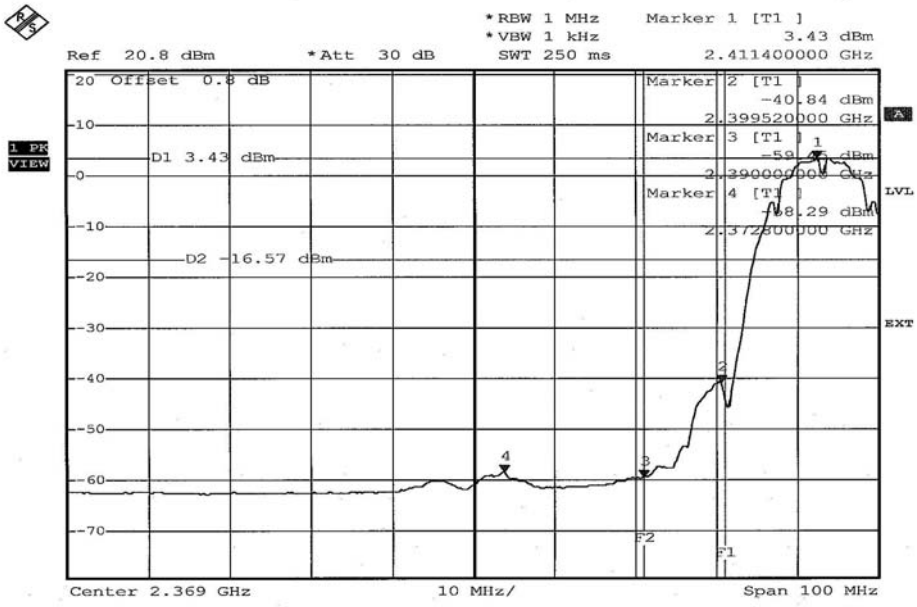
NOTE 1: The band edge emission plot of DSSS technique on the next page shows 50.34dBc between carrier maximum power and local maximum emission in restrict band (2.37300GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 98.27dBuV/m (Peak), so the maximum field strength in restrict band is 98.27 – 50.34 = 47.93dBuV/m which is under 74dBuV/m limit.

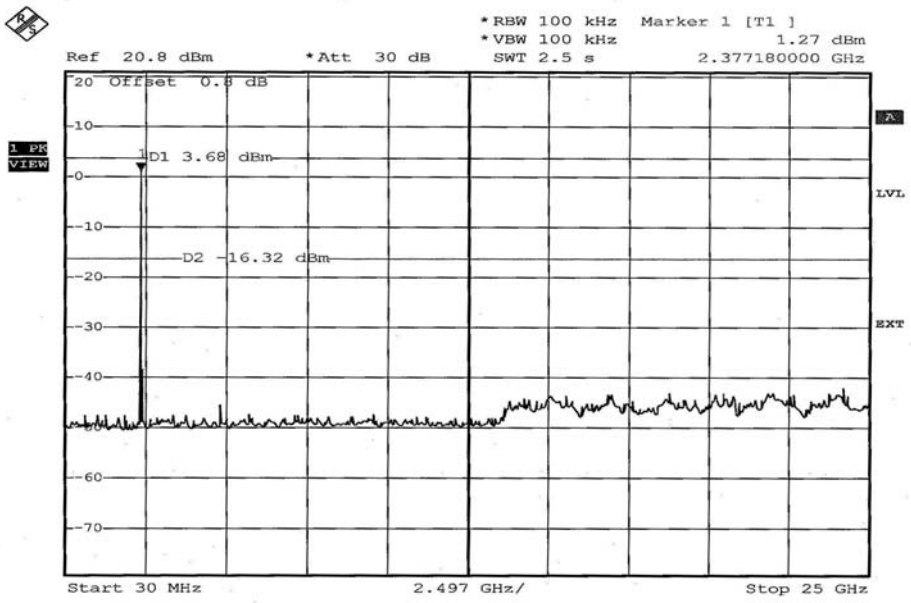
The band edge emission plot of DSSS technique on the next page shows 61.72dBc between carrier maximum power and local maximum emission in restrict band (2.37280GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 94.57dBuV/m (Average), so the maximum field strength in restrict band is 94.57 – 61.72 = 32.85dBuV/m which is under 54dBuV/m limit.

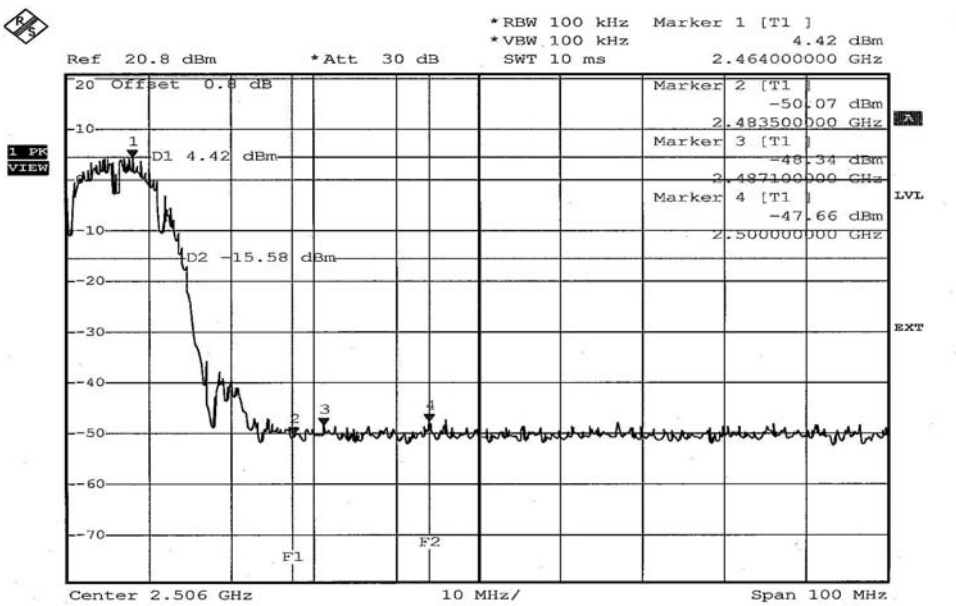
NOTE 2: The band edge emission plot of DSSS technique on the next second page shows 52.08dBc between carrier maximum power and local maximum emission in restrict band (2.50000GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 98.75dBuV/m (Peak), so the maximum field strength in restrict band is 98.75 – 52.08 = 46.67dBuV/m which is under 74dBuV/m limit.

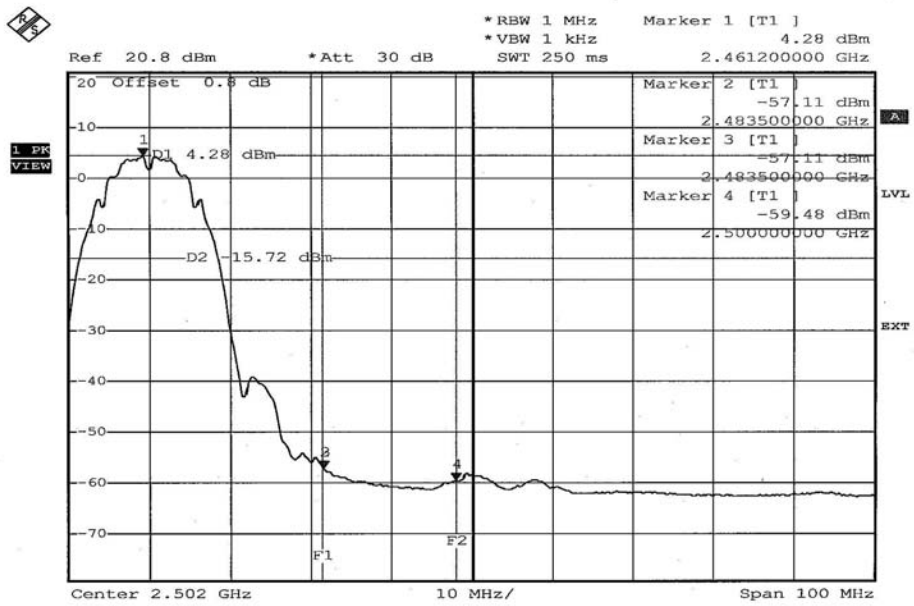
The band edge emission plot of DSSS technique on the next third page shows 61.39dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 95.03dBuV/m (Average), so the maximum field strength in restrict band is 95.03 – 61.39 = 33.64dBuV/m which is under 54dBuV/m limit.

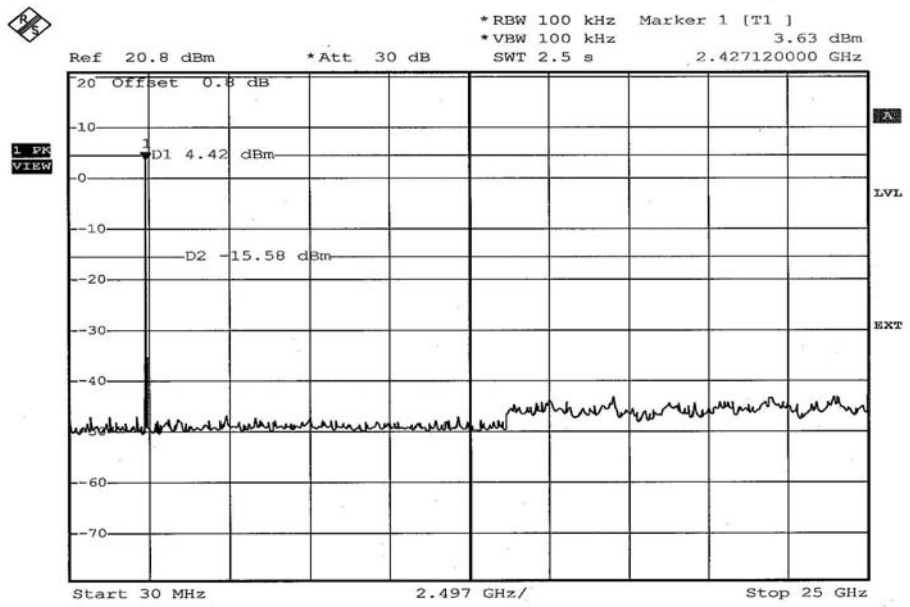

*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
3.68 dBm
2.411200000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-39.40 dBm
2.399200000 GHz
Marker 3 [T1]
Marker 4 [T1]
1 PK
VIEW
D1 3.68 dBm
D2 -16.32 dBm
A
LVL
EXT
F2
F1
Center 2.37 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
3.43 dBm
2.411400000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-40.84 dBm
2.399520000 GHz
Marker 3 [T1]
Marker 4 [T1]
1 PK
VIEW
D1 3.43 dBm
D2 -16.57 dBm
A
LVL
EXT
F2
F1
Center 2.369 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
1.27 dBm
2.377180000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK
VIEW
D1 3.68 dBm
D2 -16.32 dBm
A
LVL
EXT
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
4.42 dBm
2.464000000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-50.07 dBm
2.483500000 GHz
Marker 3 [T1]
-48.34 dBm
2.487100000 GHz
Marker 4 [T1]
-47.66 dBm
2.500000000 GHz
1 PK
VIEW
D1 4.42 dBm
D2 -15.58 dBm
A
LVL
EXT
F1
F2
Center 2.506 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
4.28 dBm
2.461200000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-57.11 dBm
2.483500000 GHz
Marker 3 [T1]
-57.11 dBm
2.483500000 GHz
Marker 4 [T1]
-59.48 dBm
2.500000000 GHz
1 PK VIEW
D1 4.28 dBm
D2 -15.72 dBm
A
LVL
EXT
F1
F2
Center 2.502 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
3.63 dBm
2.427120000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
D1 4.42 dBm
D2 -15.58 dBm
A
LVL
EXT
Start 30 MHz
2.497 GHz/
Stop 25 GHz

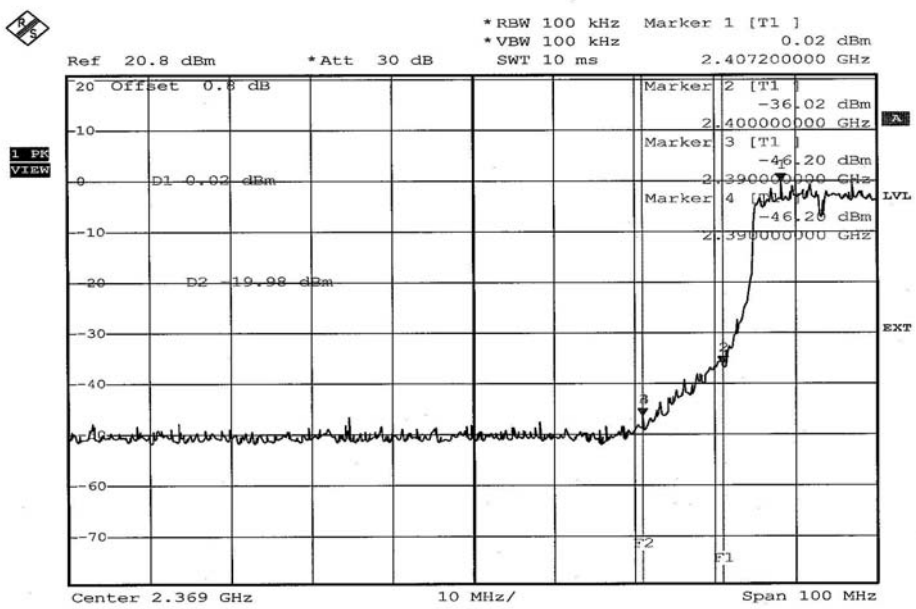
802.11g OFDM MODULATION

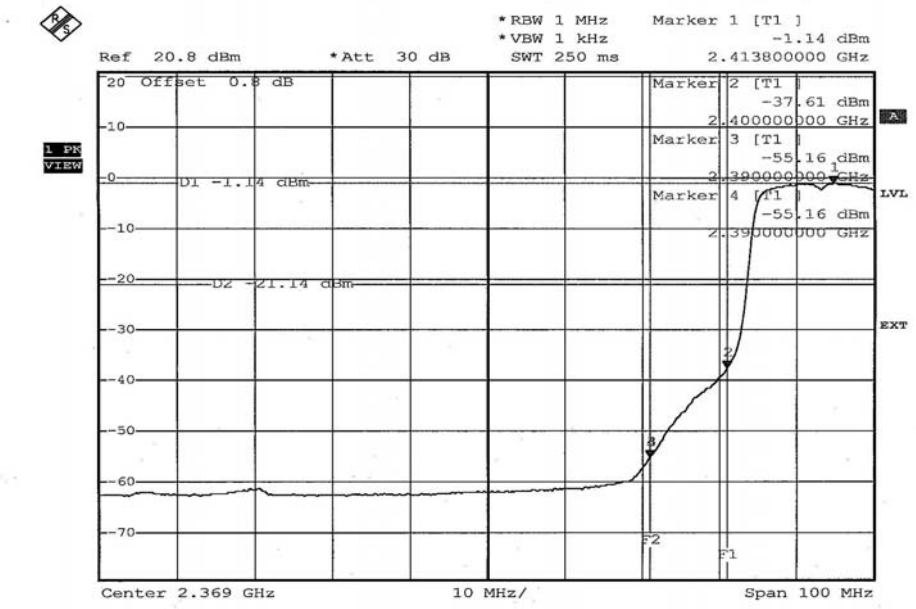
NOTE 1: The band edge emission plot of OFDM technique on the next page shows 46.22dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 99.54dBuV/m (Peak), so the maximum field strength in restrict band is 99.54 – 46.22 = 53.32dBuV/m which is under 74dBuV/m limit.

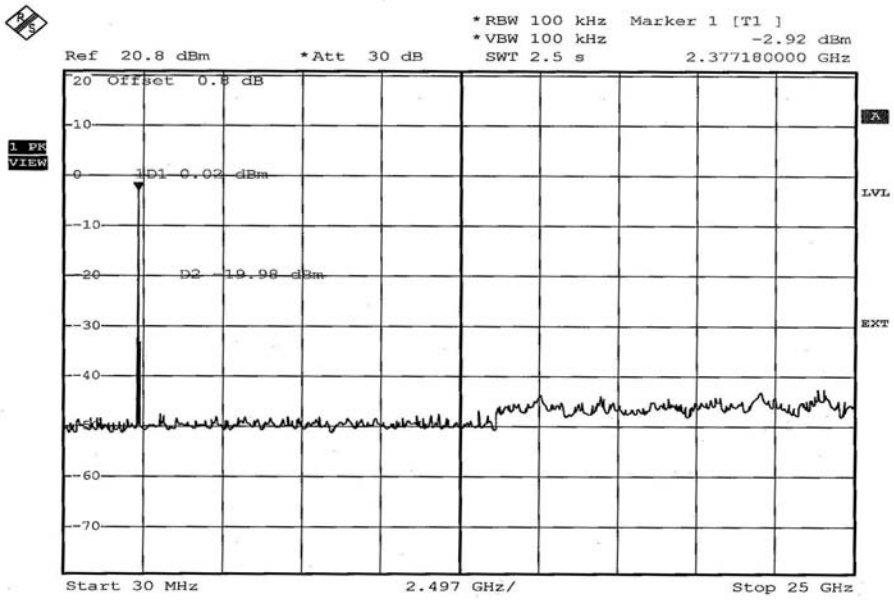
The band edge emission plot of OFDM technique on the next page shows 54.02dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 90.15dBuV/m (Average), so the maximum field strength in restrict band is 90.15 – 54.02 = 36.13dBuV/m which is under 54dBuV/m limit.

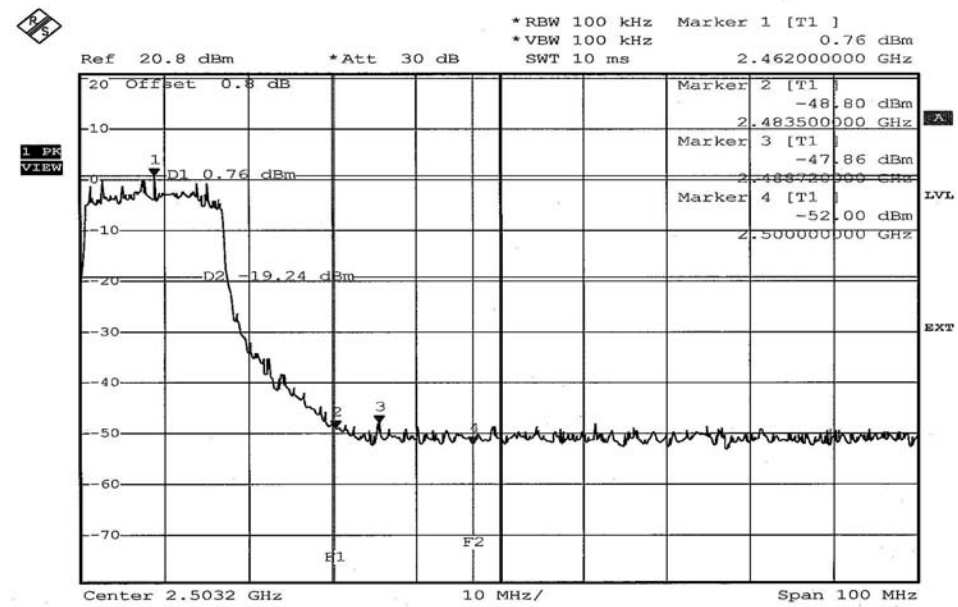
NOTE 2: The band edge emission plot of OFDM technique on the next second page shows 48.62dBc between carrier maximum power and local maximum emission in restrict band (2.498872GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 99.89dBuV/m (Peak), so the maximum field strength in restrict band is 99.89 – 48.62 = 51.27dBuV/m which is under 74dBuV/m limit.

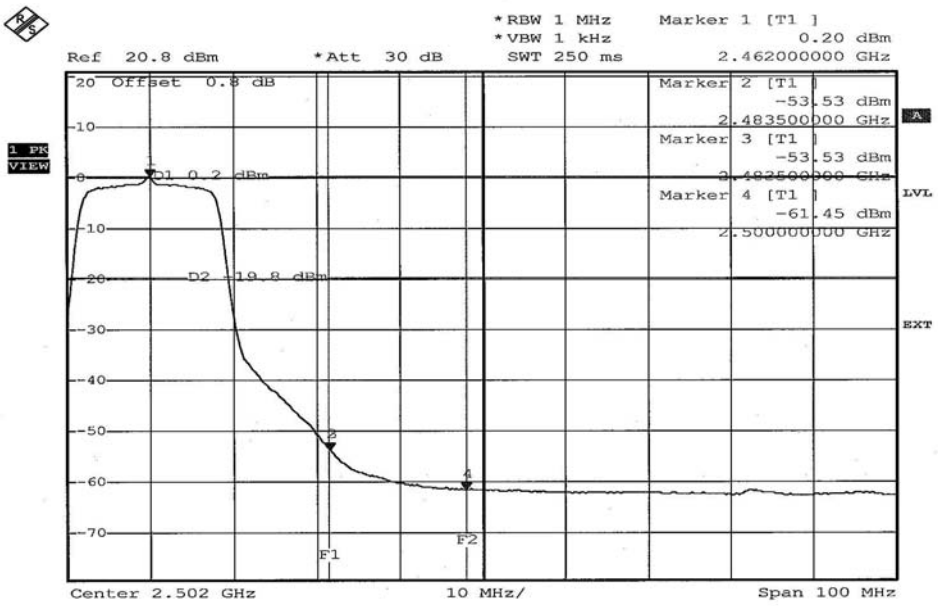
The band edge emission plot of OFDM technique on the next third page shows 53.73dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 91.41dBuV/m (Average), so the maximum field strength in restrict band is 91.41 – 53.73 = 37.68dBuV/m which is under 54dBuV/m limit.

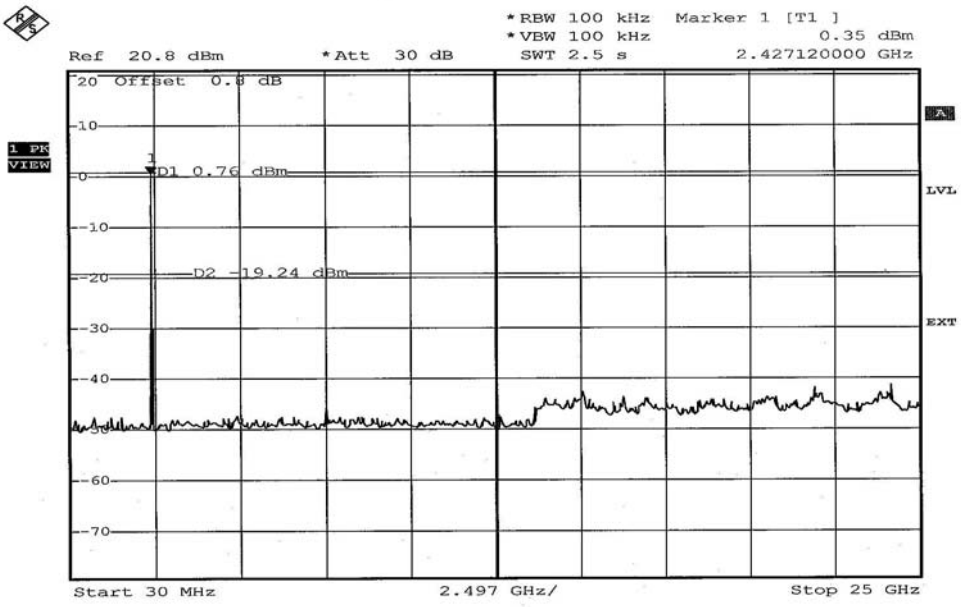

*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
0.02 dBm
2.407200000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
D1 0.02 dBm
D2 -19.98 dBm
Marker 2 [T1]
-36.02 dBm
2.400000000 GHz
Marker 3 [T1]
-46.20 dBm
2.390000000 GHz
Marker 4 [T1]
-46.20 dBm
2.390000000 GHz
A
LVL
EXT
Center 2.369 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
-1.14 dBm
2.413800000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
D1 -1.14 dBm
D2 -21.14 dBm
Marker 2 [T1]
-37.61 dBm
2.400000000 GHz
Marker 3 [T1]
-55.16 dBm
2.390000000 GHz
Marker 4 [T1]
-55.16 dBm
2.390000000 GHz
A
LVL
EXT
Center 2.369 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-2.92 dBm
2.377180000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK
VIEW
1D1 0.02 dBm
D2 -19.98 dBm
A
LVL
EXT
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
0.76 dBm
2.462000000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-48.80 dBm
2.483500000 GHz
Marker 3 [T1]
-47.86 dBm
Marker 4 [T1]
-52.00 dBm
1 PK
VIEW
1D1 0.76 dBm
D2 -19.24 dBm
A
LVL
EXT
F1
F2
Center 2.5032 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
0.20 dBm
2.462000000 GHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 2 [T1]
-53.53 dBm
2.483500000 GHz
Marker 3 [T1]
-53.53 dBm
2.483500000 GHz
Marker 4 [T1]
-61.45 dBm
2.500000000 GHz
1 PK
VIEW
D1 0.2 dBm
D2 -19.8 dBm
A
LVL
EXT
F1
F2
Center 2.502 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
0.35 dBm
2.427120000 GHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
1 PK
VIEW
D1 0.76 dBm
D2 -19.24 dBm
A
LVL
EXT
Start 30 MHz
2.497 GHz/
Stop 25 GHz

4.7 ANTENNA REQUIREMENT

4.7.1 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PIFA antenna with UFL connector. The maximum Gain of the antenna is 0.43dBi.

5. TEST TYPES AND RESULTS (FOR BLUETOOTH)

5.1.1 CONDUCTED EMISSION MEASUREMENT

5.1.2 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

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

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

5.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 02, 2006
RF signal cable Woken	5D-FB	Cable-HyC02-01	Jan. 06, 2007
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 09, 2007
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 22, 2007
Software ADT	ADT_Cond_V3	NA	NA

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

2. The test was performed in HwaYa Shielded Room 3.

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

5.1.4 TEST PROCEDURES

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

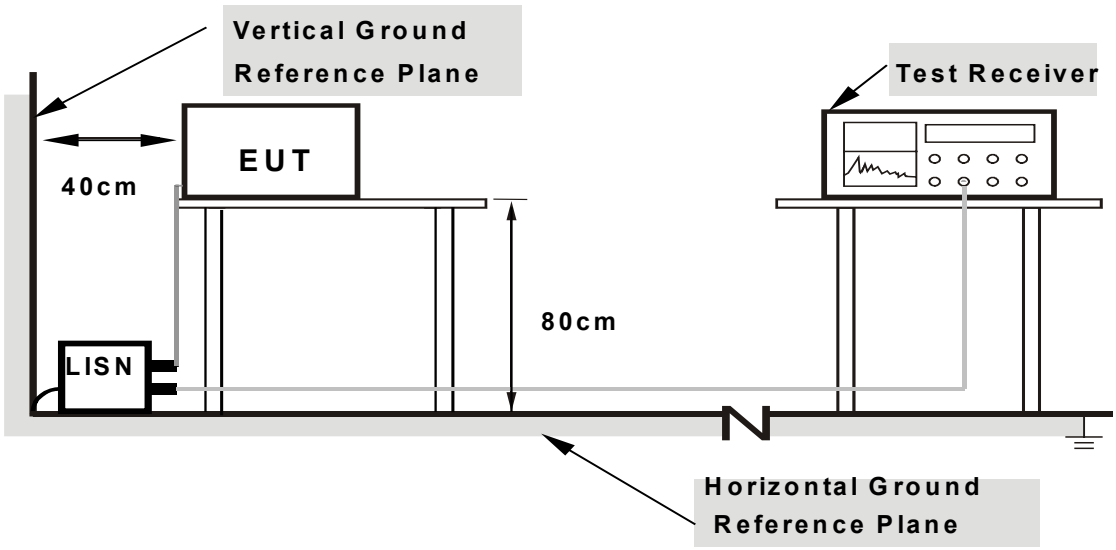
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

5.1.5 DEVIATION FROM TEST STANDARD

No deviation

5.1.6 TEST SETUP



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

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

5.1.7 EUT OPERATING CONDITIONS

Same as 4.1.6

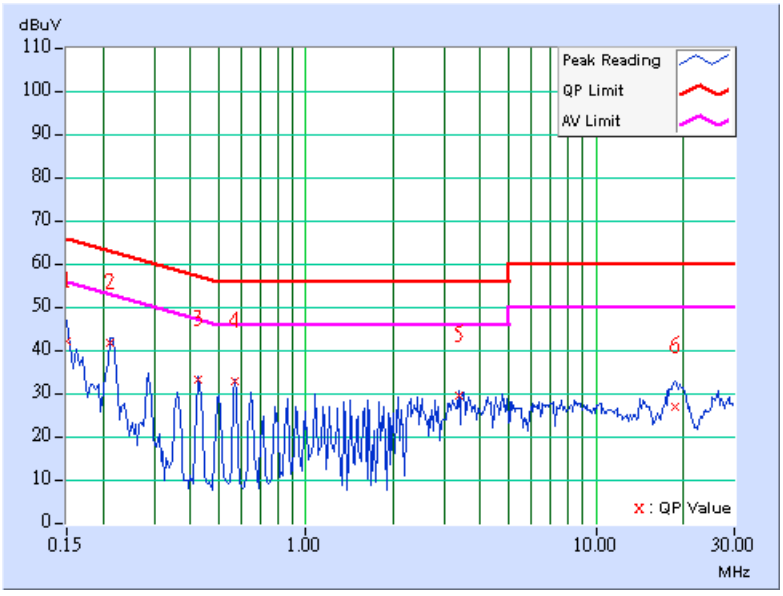
5.1.8 TEST RESULTS

Conducted Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	41.15	-	41.25	-	66.00	56.00	-24.75	-
2	0.213	0.10	41.04	-	41.14	-	63.11	53.11	-21.97	-
3	0.427	0.10	32.44	-	32.54	-	57.30	47.30	-24.76	-
4	0.572	0.13	32.06	-	32.19	-	56.00	46.00	-23.81	-
5	3.359	0.32	28.66	-	28.98	-	56.00	46.00	-27.02	-
6	18.824	0.91	26.10	-	27.01	-	60.00	50.00	-32.99	-

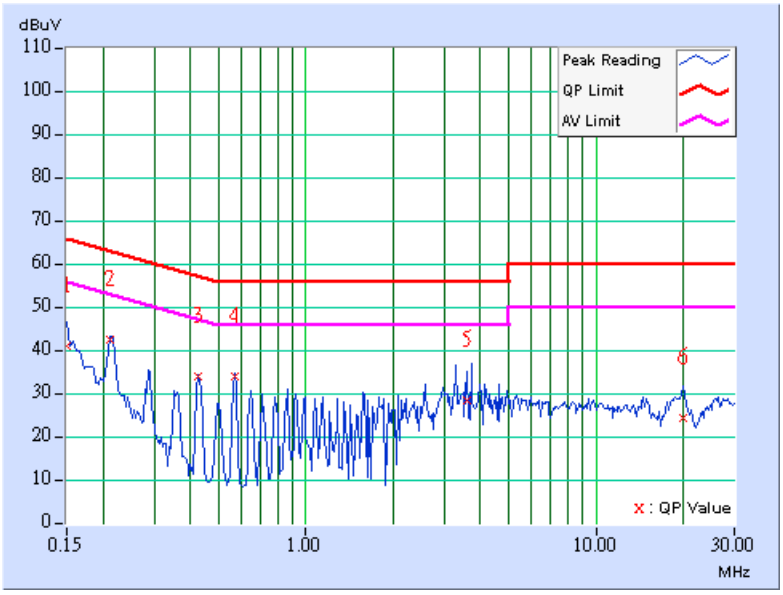
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	40.30	-	40.40	-	66.00	56.00	-25.60	-
2	0.213	0.10	41.52	-	41.62	-	63.11	53.11	-21.49	-
3	0.427	0.10	33.28	-	33.38	-	57.30	47.30	-23.92	-
4	0.572	0.13	32.97	-	33.10	-	56.00	46.00	-22.90	-
5	3.574	0.33	27.49	-	27.82	-	56.00	46.00	-28.18	-
6	19.980	0.96	23.54	-	24.50	-	60.00	50.00	-35.50	-

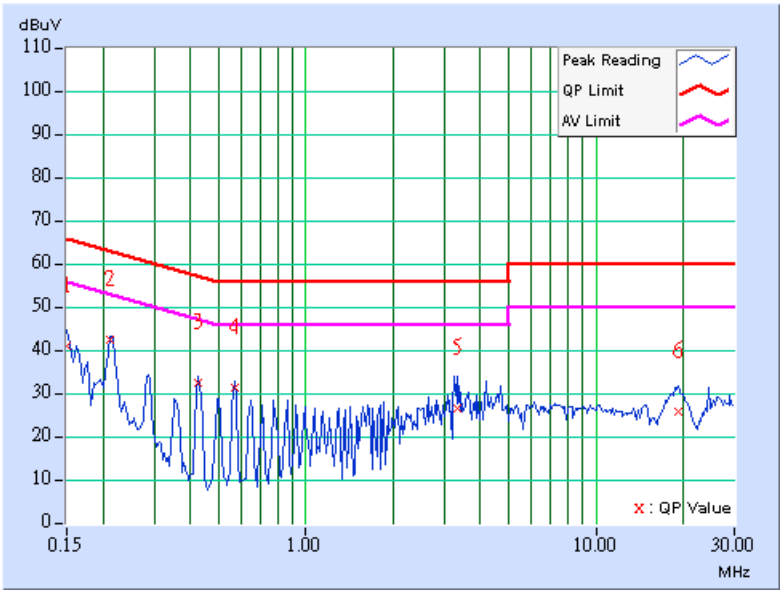
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	40.02	-	40.12	-	66.00	56.00	-25.88	-
2	0.213	0.10	41.52	-	41.62	-	63.11	53.11	-21.49	-
3	0.427	0.10	31.52	-	31.62	-	57.30	47.30	-25.68	-
4	0.572	0.13	30.73	-	30.86	-	56.00	46.00	-25.14	-
5	3.336	0.31	25.78	-	26.09	-	56.00	46.00	-29.91	-
6	19.180	0.92	25.14	-	26.06	-	60.00	50.00	-33.94	-

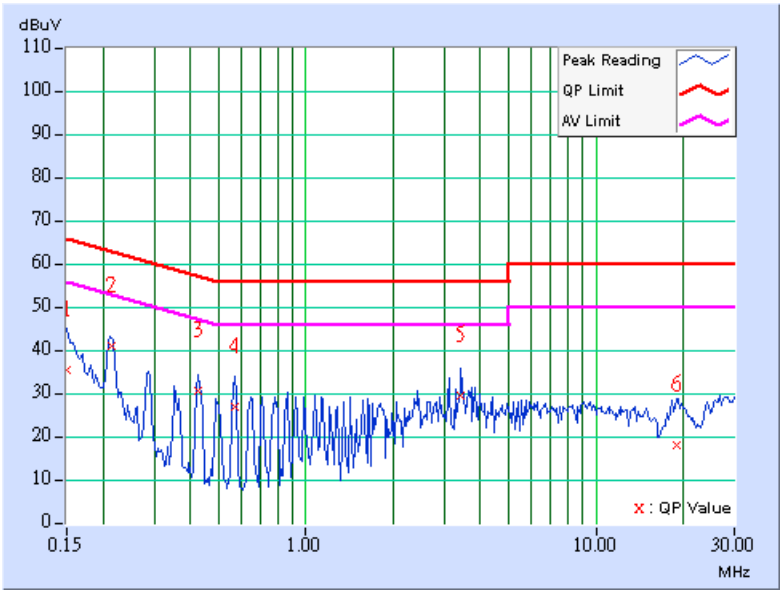
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	A

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	34.58	-	34.68	-	66.00	56.00	-31.32	-
2	0.213	0.10	40.15	-	40.25	-	63.10	53.10	-22.85	-
3	0.423	0.10	29.87	-	29.97	-	57.38	47.38	-27.41	-
4	0.572	0.13	26.13	-	26.26	-	56.00	46.00	-29.74	-
5	3.418	0.32	28.69	-	29.01	-	56.00	46.00	-26.99	-
6	19.035	0.93	17.27	-	18.20	-	60.00	50.00	-41.80	-

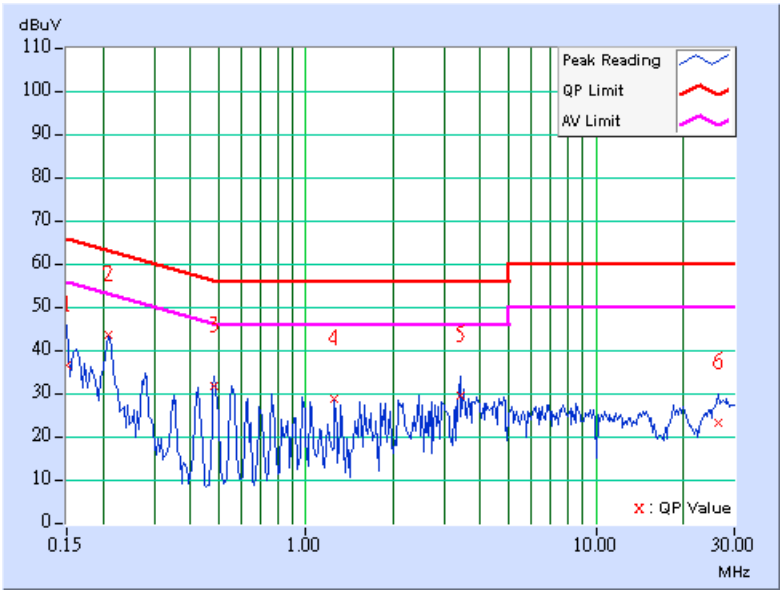
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	35.21	-	35.31	-	66.00	56.00	-30.69	-
2	0.209	0.10	42.29	-	42.39	-	63.26	53.26	-20.87	-
3	0.482	0.11	30.29	-	30.40	-	56.30	46.30	-25.90	-
4	1.254	0.20	27.18	-	27.38	-	56.00	46.00	-28.62	-
5	3.406	0.32	27.87	-	28.19	-	56.00	46.00	-27.81	-
6	26.305	1.59	21.87	-	23.46	-	60.00	50.00	-36.54	-

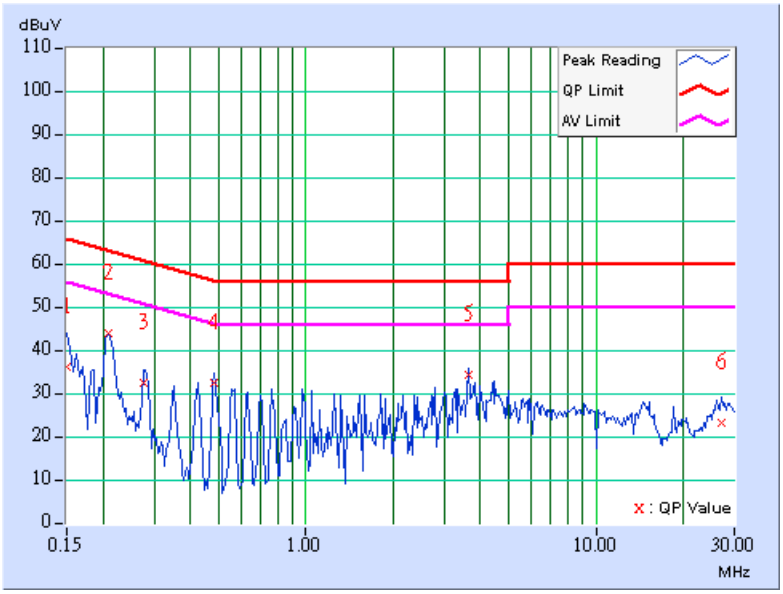
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	34.94	-	35.04	-	66.00	56.00	-30.96	-
2	0.209	0.10	42.55	-	42.65	-	63.26	53.26	-20.61	-
3	0.275	0.10	31.19	-	31.29	-	60.97	50.97	-29.68	-
4	0.482	0.11	31.12	-	31.23	-	56.30	46.30	-25.07	-
5	3.625	0.34	33.15	-	33.49	-	56.00	46.00	-22.51	-
6	27.043	1.41	22.06	-	23.47	-	60.00	50.00	-36.53	-

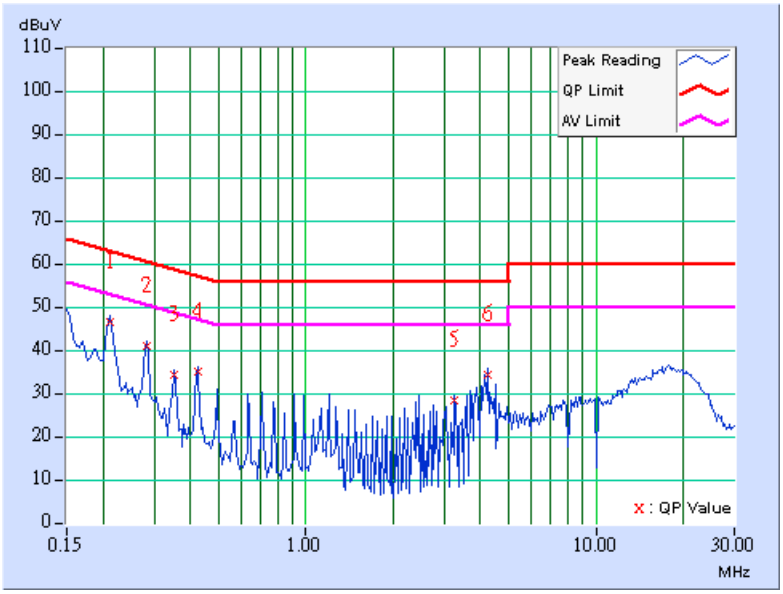
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.213**	**0.10**	**46.21**	**-**	**46.31**	**-**	**63.11**	**53.11**	**-16.80**	**-**
2	0.283	0.10	40.77	-	40.87	-	60.73	50.73	-19.86	-
3	0.353	0.10	34.03	-	34.13	-	58.89	48.89	-24.76	-
4	0.423	0.10	34.85	-	34.95	-	57.38	47.38	-22.43	-
5	3.242	0.31	28.02	-	28.33	-	56.00	46.00	-27.67	-
6	4.227	0.37	34.20	-	34.57	-	56.00	46.00	-21.43	-

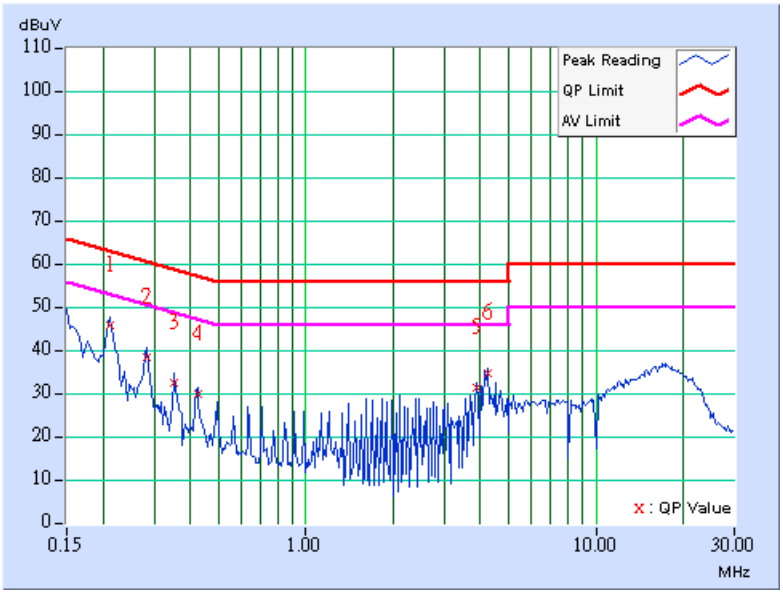
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	B

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.10	45.69	-	45.79	-	63.11	53.11	-17.32	-
2	0.283	0.10	38.32	-	38.42	-	60.73	50.73	-22.31	-
3	0.353	0.10	32.15	-	32.25	-	58.89	48.89	-26.64	-
4	0.423	0.10	29.80	-	29.90	-	57.38	47.38	-27.48	-
5	3.871	0.36	31.01	-	31.37	-	56.00	46.00	-24.63	-
6	4.227	0.38	34.34	-	34.72	-	56.00	46.00	-21.28	-

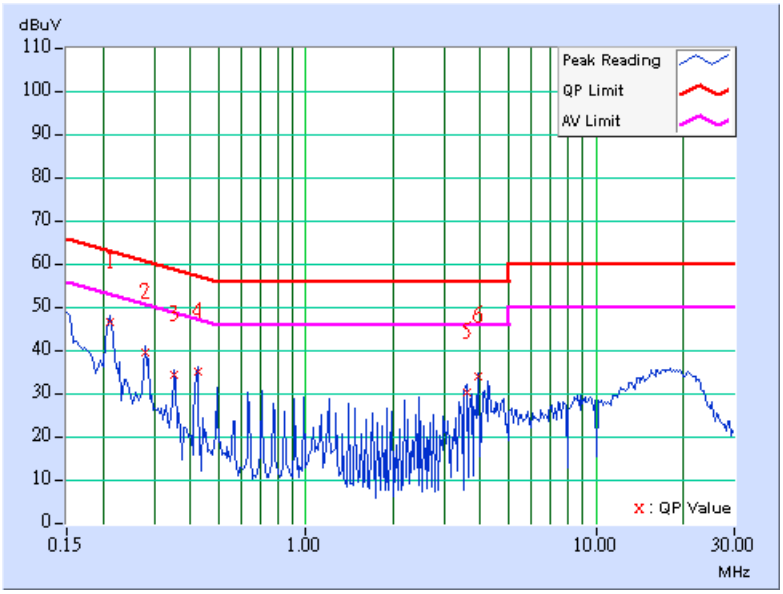
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	B

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.213**	**0.10**	**46.21**	**-**	**46.31**	**-**	**63.11**	**53.11**	**-16.80**	**-**
2	0.279	0.10	39.25	-	39.35	-	60.85	50.85	-21.50	-
3	0.353	0.10	34.01	-	34.11	-	58.89	48.89	-24.78	-
4	0.423	0.10	34.83	-	34.93	-	57.38	47.38	-22.45	-
5	3.594	0.34	29.82	-	30.16	-	56.00	46.00	-25.84	-
6	3.945	0.37	33.70	-	34.07	-	56.00	46.00	-21.93	-

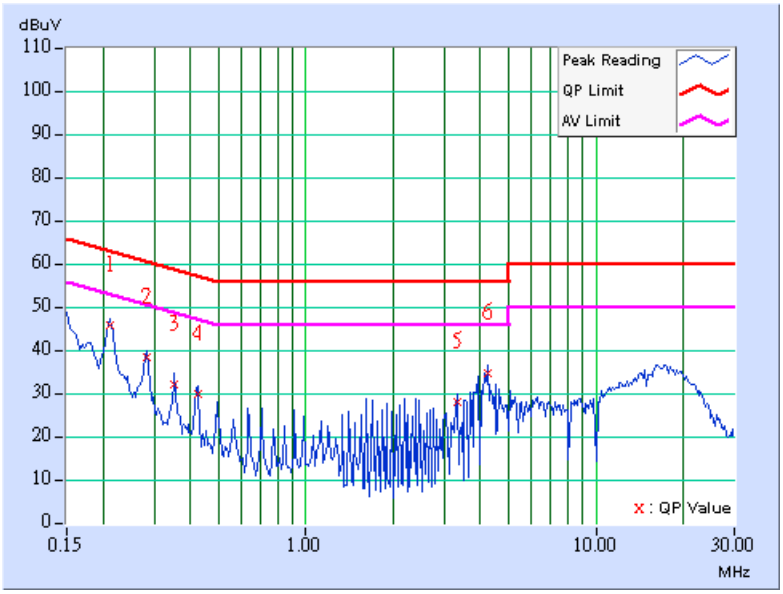
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Match Tsui	TEST MODE	B

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.10	45.55	-	45.65	-	63.11	53.11	-17.46	-
2	0.283	0.10	38.26	-	38.36	-	60.73	50.73	-22.37	-
3	0.353	0.10	31.89	-	31.99	-	58.89	48.89	-26.90	-
4	0.423	0.10	29.76	-	29.86	-	57.38	47.38	-27.52	-
5	3.313	0.31	27.92	-	28.23	-	56.00	46.00	-27.77	-
6	4.227	0.38	34.59	-	34.97	-	56.00	46.00	-21.03	-

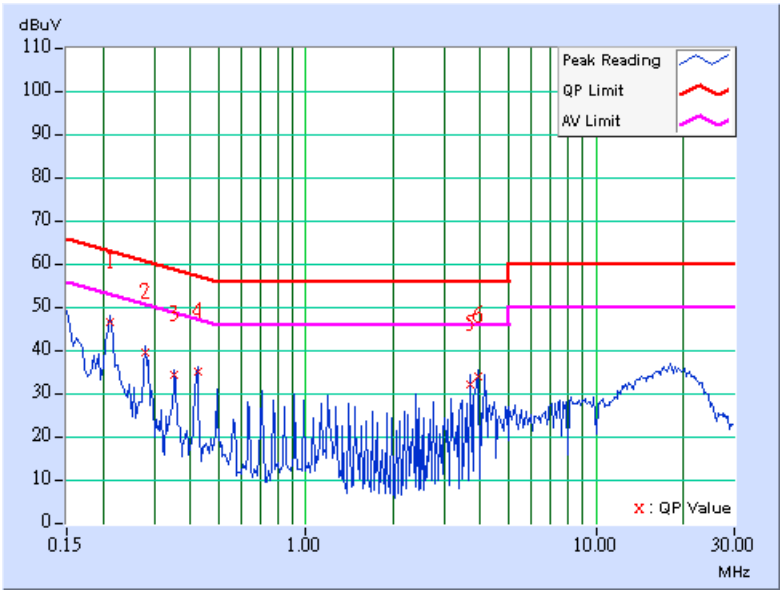
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.10	46.19	-	46.29	-	63.11	53.11	-16.82	-
2	0.279	0.10	39.21	-	39.31	-	60.85	50.85	-21.54	-
3	0.353	0.10	33.99	-	34.09	-	58.89	48.89	-24.80	-
4	0.423	0.10	34.81	-	34.91	-	57.38	47.38	-22.47	-
5	3.664	0.34	31.75	-	32.09	-	56.00	46.00	-23.91	-
6	3.945	0.37	33.58	-	33.95	-	56.00	46.00	-22.05	-

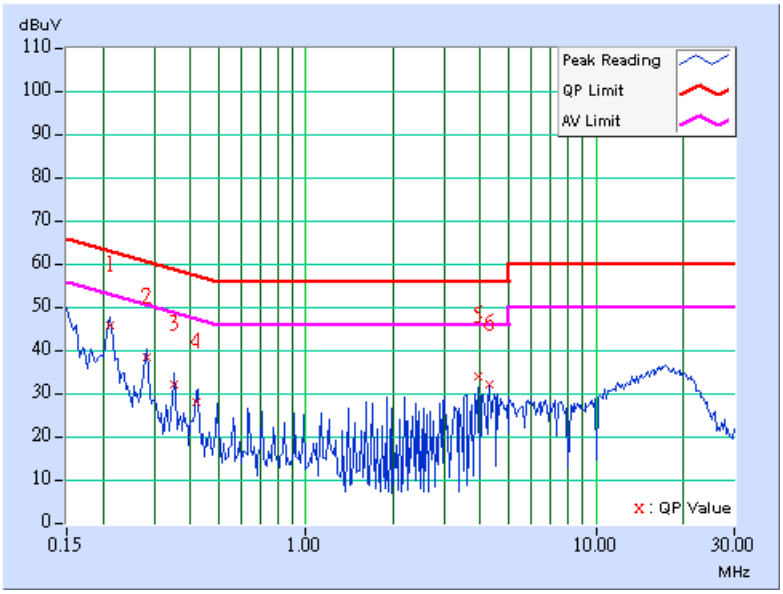
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.10	45.53	-	45.63	-	63.11	53.11	-17.48	-
2	0.283	0.10	38.26	-	38.36	-	60.73	50.73	-22.37	-
3	0.353	0.10	31.86	-	31.96	-	58.89	48.89	-26.93	-
4	0.420	0.10	27.67	-	27.77	-	57.46	47.46	-29.68	-
5	3.945	0.37	33.82	-	34.19	-	56.00	46.00	-21.81	-
6	4.297	0.38	31.68	-	32.06	-	56.00	46.00	-23.94	-

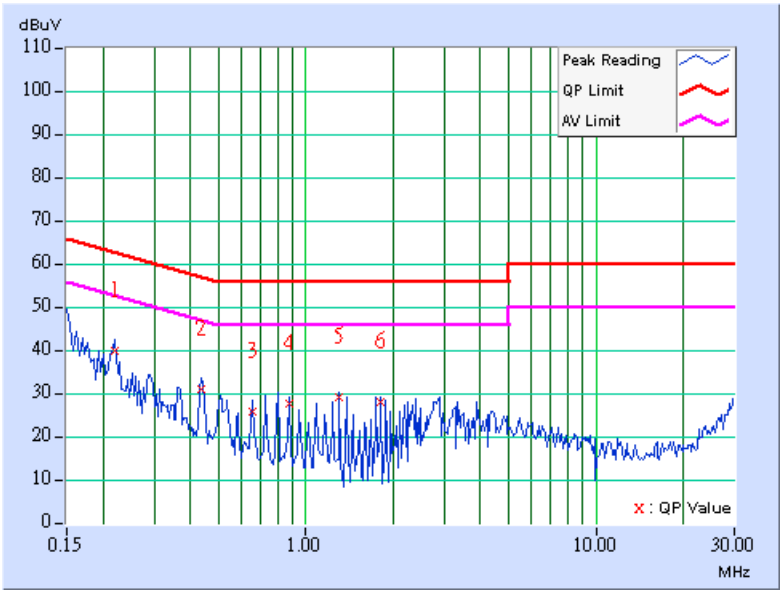
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Lori Chiu	TEST MODE	C

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.220	0.10	39.85	-	39.95	-	62.81	52.81	-22.86	-
2	0.435	0.11	30.93	-	31.04	-	57.15	47.15	-26.12	-
3	0.654	0.14	25.70	-	25.84	-	56.00	46.00	-30.16	-
4	0.873	0.18	27.44	-	27.62	-	56.00	46.00	-28.38	-
5	1.309	0.20	29.02	-	29.22	-	56.00	46.00	-26.78	-
6	1.820	0.20	27.99	-	28.19	-	56.00	46.00	-27.81	-

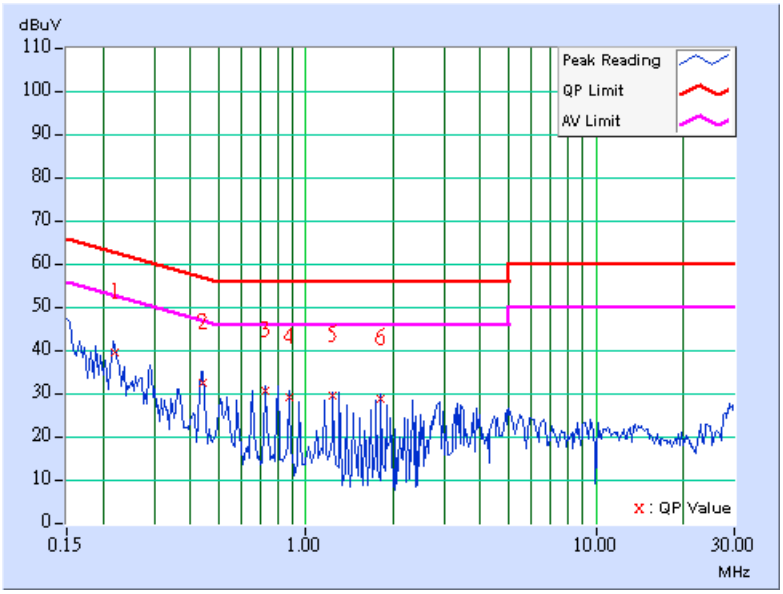
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Lori Chiu	TEST MODE	C

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.219	0.10	39.61	-	39.71	-	62.86	52.86	-23.15	-
2	0.439	0.11	32.35	-	32.46	-	57.08	47.08	-24.62	-
3	0.728	0.15	30.36	-	30.51	-	56.00	46.00	-25.49	-
4	0.873	0.18	29.03	-	29.21	-	56.00	46.00	-26.79	-
5	1.238	0.20	29.31	-	29.51	-	56.00	46.00	-26.49	-
6	1.820	0.20	28.84	-	29.04	-	56.00	46.00	-26.96	-

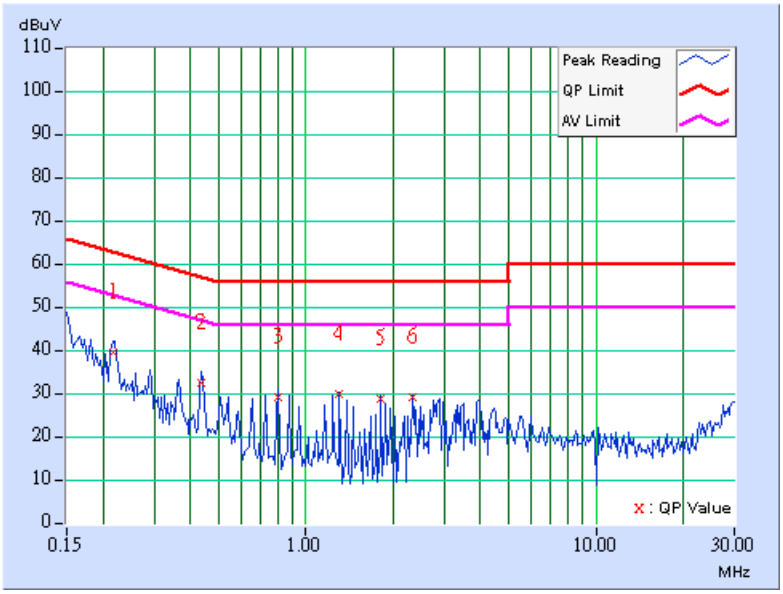
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 1
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Lori Chiu	TEST MODE	C

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.216	0.10	39.58	-	39.68	-	62.96	52.96	-23.28	-
2	0.435	0.11	32.52	-	32.63	-	57.15	47.15	-24.53	-
3	0.802	0.17	28.86	-	29.03	-	56.00	46.00	-26.97	-
4	1.309	0.20	29.67	-	29.87	-	56.00	46.00	-26.13	-
5	1.820	0.20	28.52	-	28.72	-	56.00	46.00	-27.28	-
6	2.328	0.23	28.88	-	29.11	-	56.00	46.00	-26.89	-

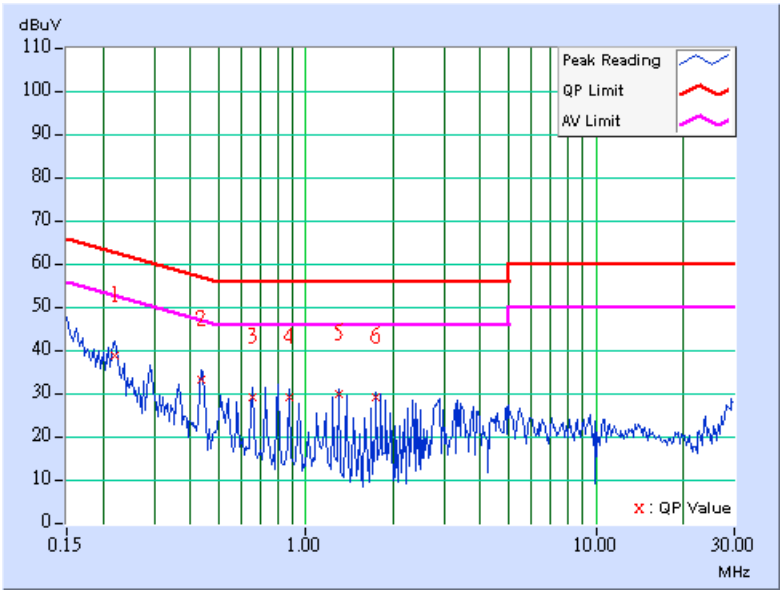
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	PHASE	Line 2
MODULATION TYPE	GFSK	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa
TESTED BY	Lori Chiu	TEST MODE	C

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.220	0.10	38.86	-	38.96	-	62.81	52.81	-23.85	-
2	0.435	0.11	33.19	-	33.30	-	57.15	47.15	-23.86	-
3	0.654	0.14	29.04	-	29.18	-	56.00	46.00	-26.82	-
4	0.873	0.18	29.05	-	29.23	-	56.00	46.00	-26.77	-
5	1.309	0.20	29.97	-	30.17	-	56.00	46.00	-25.83	-
6	1.746	0.20	29.17	-	29.37	-	56.00	46.00	-26.63	-

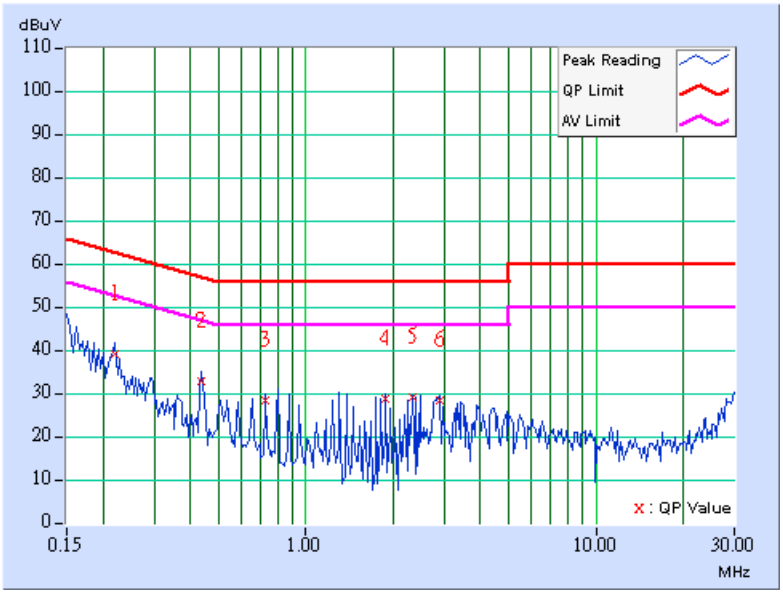
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.220	0.10	39.16	-	39.26	-	62.81	52.81	-23.55	-
2	0.435	0.11	32.52	-	32.63	-	57.15	47.15	-24.53	-
3	0.728	0.15	28.19	-	28.34	-	56.00	46.00	-27.66	-
4	1.891	0.20	28.55	-	28.75	-	56.00	46.00	-27.25	-
5	2.328	0.23	28.92	-	29.15	-	56.00	46.00	-26.85	-
6	2.910	0.28	28.14	-	28.42	-	56.00	46.00	-27.58	-

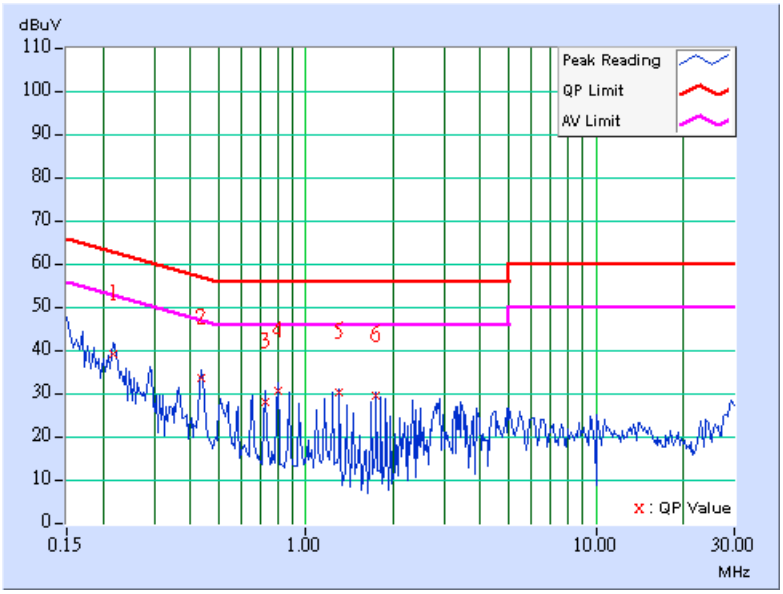
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.216	0.10	39.01	-	39.11	-	62.96	52.96	-23.85	-
2	0.435	0.11	33.33	-	33.44	-	57.15	47.15	-23.72	-
3	0.724	0.15	28.09	-	28.24	-	56.00	46.00	-27.76	-
4	0.798	0.17	30.65	-	30.82	-	56.00	46.00	-25.18	-
5	1.309	0.20	30.01	-	30.21	-	56.00	46.00	-25.79	-
6	1.746	0.20	29.25	-	29.45	-	56.00	46.00	-26.55	-

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



5.2 RADIATED EMISSION MEASUREMENT

5.2.1 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.

5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	100033	May. 19, 2006
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Dec. 05, 2006
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Jun. 01, 2006
HORN Antenna SCHWARZBECK	9120D	9120D-408	Jan. 08, 2007
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Jan. 19, 2007
Preamplifier Agilent	8447D	2944A10633	Nov. 04, 2006
Preamplifier Agilent	8449B	3008A01964	Oct. 30, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214377/4	Dec. 13, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Dec. 13, 2006
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	NA

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

2. The test was performed in HwaYa Chamber 2.

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

4. The VCCI Site Registration No. is R-237.

5. The IC Site Registration No. is IC4924-3.

5.2.3 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.

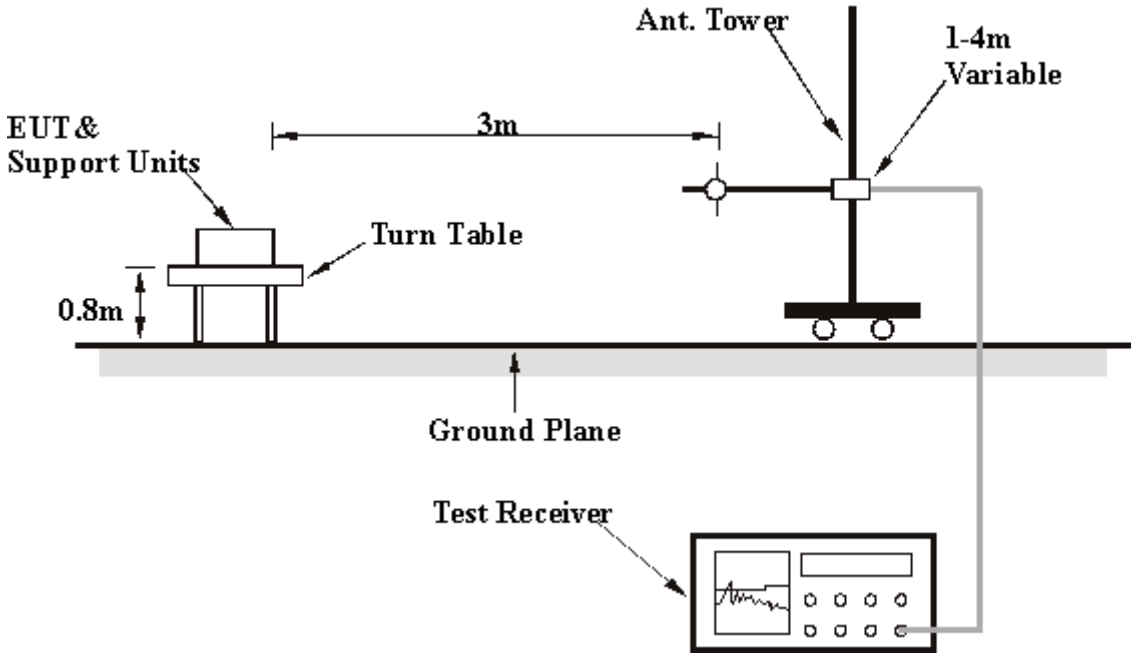
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz 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.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



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

5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

5.2.7 TEST RESULTS

Radiated Worst Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	**FREQUENCY RANGE**	Below 1000MHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 65%RH, 991hPa
TESTED BY	Jay Hsu	**TEST MODE**	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.71	25.89 QP	40.00	-14.11	1.25 H	160	11.48	14.41
2	78.60	26.03 QP	40.00	-13.97	1.00 H	160	15.34	10.69
3	119.42	27.18 QP	43.50	-16.32	1.00 H	157	16.10	11.08
4	140.80	23.86 QP	43.50	-19.64	1.50 H	25	10.56	13.30
5	218.56	25.78 QP	46.00	-20.22	1.50 H	82	14.06	11.73
6	366.29	28.56 QP	46.00	-17.44	1.50 H	232	11.35	17.21
7	817.27	28.62 QP	46.00	-17.38	1.50 H	100	1.80	26.83

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.72	36.50 QP	40.00	-3.50	1.00 V	247	22.08	14.42
2	78.60	35.55 QP	40.00	-4.45	1.50 V	91	24.86	10.69
3	80.17	34.39 QP	40.00	-5.61	1.00 V	1	23.99	10.40
4	119.42	30.61 QP	43.50	-12.89	1.00 V	187	19.53	11.08
5	142.75	27.37 QP	43.50	-16.13	1.00 V	232	14.02	13.35
6	366.29	28.32 QP	46.00	-17.68	1.50 V	10	11.11	17.21
7	432.38	29.57 QP	46.00	-16.43	1.50 V	10	10.70	18.87
8	498.48	28.95 QP	46.00	-17.05	1.50 V	10	8.52	20.43
9	811.44	31.32 QP	46.00	-14.68	1.00 V	118	4.54	26.78
10	912.53	30.00 QP	46.00	-16.00	1.50 V	118	2.23	27.77

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	**FREQUENCY RANGE**	Below 1000MHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 65%RH, 991hPa
TESTED BY	Jay Hsu	**TEST MODE**	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.71	24.70 QP	40.00	-15.30	1.00 H	97	10.29	14.41
2	78.58	27.04 QP	40.00	-12.96	1.00 H	127	16.35	10.69
3	119.42	28.95 QP	43.50	-14.55	1.00 H	37	17.88	11.08
4	138.86	31.53 QP	43.50	-11.97	1.00 H	109	18.37	13.16
5	158.30	31.99 QP	43.50	-11.51	1.00 H	238	18.22	13.76
6	177.74	27.21 QP	43.50	-16.29	1.00 H	127	14.88	12.34
7	220.50	29.97 QP	46.00	-16.03	1.00 H	232	18.18	11.79
8	366.29	32.76 QP	46.00	-13.24	1.00 H	115	15.55	17.21
9	830.88	29.68 QP	46.00	-16.32	1.00 H	127	2.73	26.95

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.78	34.58 QP	40.00	-5.42	1.05 V	68	20.15	14.43
2	59.19	33.18 QP	40.00	-6.82	1.25 V	301	19.62	13.56
3	**78.80**	**36.58 QP**	**40.00**	**-3.42**	**1.00 V**	**91**	**25.93**	**10.65**
4	99.99	33.65 QP	43.50	-9.85	1.02 V	32	24.30	9.35
5	138.86	30.01 QP	43.50	-13.49	1.00 V	58	16.85	13.16
6	160.24	27.99 QP	43.50	-15.51	1.00 V	337	14.20	13.79
7	366.29	29.63 QP	46.00	-16.37	1.50 V	238	12.42	17.21
8	860.04	28.47 QP	46.00	-17.53	1.00 V	22	1.25	27.22
9	918.36	28.59 QP	46.00	-17.41	1.00 V	58	0.73	27.86

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

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	**FREQUENCY RANGE**	Below 1000MHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Quasi-Peak
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25deg. C, 65%RH, 991hPa
TESTED BY	Jay Hsu	**TEST MODE**	C

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.71	30.31 QP	40.00	-9.69	1.50 H	106	15.90	14.41
2	59.16	27.64 QP	40.00	-12.36	1.50 H	292	14.07	13.56
3	78.61	27.62 QP	40.00	-12.38	1.25 H	88	16.93	10.69
4	119.42	30.76 QP	43.50	-12.74	1.50 H	148	19.68	11.08
5	154.41	31.78 QP	43.50	-11.72	1.50 H	163	18.12	13.66
6	162.18	30.65 QP	43.50	-12.85	1.00 H	115	17.02	13.63
7	212.73	28.99 QP	43.50	-14.51	1.50 H	106	17.44	11.55
8	811.44	30.05 QP	46.00	-15.95	1.00 H	124	3.27	26.78
9	817.27	28.98 QP	46.00	-17.02	1.00 H	358	2.15	26.83
10	933.91	28.34 QP	46.00	-17.66	1.50 H	163	0.24	28.10
11	960.00	31.78 QP	46.00	-14.22	1.00 H	292	3.44	28.34

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.00	33.57 QP	40.00	-6.43	1.00 V	89	19.08	14.49
2	119.45	33.10 QP	43.50	-10.40	1.00 V	355	22.02	11.08
3	148.58	35.58 QP	43.50	-7.92	1.05 V	255	22.07	13.51
4	214.69	31.89 QP	43.50	-11.61	1.05 V	222	20.28	11.61
5	486.88	28.65 QP	46.00	-17.35	1.25 V	355	8.52	20.13
6	500.45	28.79 QP	46.00	-17.21	1.00 V	152	8.31	20.48
7	566.58	29.95 QP	46.00	-16.05	1.00 V	155	8.00	21.95

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

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 57%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TESTED BY	Jay Hsu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	34.99 PK	74.00	-39.01	1.64 H	34	3.08	31.91
1	2390.00	26.89 AV	54.00	-27.11	1.64 H	34	-5.02	31.91
2	*2402.00	84.99 PK			1.64 H	34	53.01	31.98
2	*2402.00	54.99 AV			1.64 H	34	23.01	31.98
3	4804.00	46.46 PK	74.00	-27.54	1.23 H	192	8.97	37.49
3	4804.00	16.46 AV	54.00	-37.54	1.23 H	192	-21.03	37.49

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	35.49 PK	74.00	-38.51	1.61 V	37	3.58	31.91
1	2390.00	27.49 AV	54.00	-26.51	1.61 V	37	-4.42	31.91
2	*2402.00	85.49 PK			1.61 V	37	53.51	31.98
2	*2402.00	55.49 AV			1.61 V	37	23.51	31.98
3	4804.00	46.45 PK	74.00	-27.55	1.22 V	27	8.96	37.49
3	4804.00	16.45 AV	54.00	-37.55	1.22 V	27	-21.04	37.49

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30 dB.

6. Average value = peak reading –20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 57%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TESTED BY	Jay Hsu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	83.14 PK			1.60 H	39	50.92	32.22
1	*2441.00	53.14 AV			1.60 H	39	20.92	32.22
2	4882.00	47.78 PK	74.00	-26.22	1.27 H	197	10.22	37.56
2	4882.00	17.78 AV	54.00	-36.22	1.27 H	197	-19.78	37.56

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	83.39 PK			1.66 V	27	51.17	32.22
1	*2441.00	53.39 AV			1.66 V	27	21.17	32.22
2	4882.00	50.01 PK	74.00	-23.99	1.16 V	144	12.45	37.56
2	4882.00	20.01 AV	54.00	-33.99	1.16 V	144	-17.55	37.56

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30 dB.
6. Average value = peak reading –20log(duty cycle).

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	**FREQUENCY RANGE**	1 ~ 25GHz
MODULATION TYPE	GFSK	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 57%RH, 991hPa	**INPUT POWER (SYSTEM)**	120Vac, 60 Hz
TESTED BY	Jay Hsu		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	82.94 PK			1.63 H	39	50.47	32.47
1	*2480.00	52.94 AV			1.63 H	39	20.47	32.47
2	2483.50	33.94 PK	74.00	-40.06	1.63 H	39	1.45	32.49
2	2483.50	25.94 AV	54.00	-28.06	1.63 H	39	-6.55	32.49
3	4960.00	49.34 PK	74.00	-24.66	1.29 H	147	11.74	37.59
3	4960.00	19.34 AV	54.00	-34.66	1.29 H	147	-18.26	37.59

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	86.11 PK			1.61 V	42	53.64	32.47
1	*2480.00	56.11 AV			1.61 V	42	23.64	32.47
2	2483.50	37.11 PK	74.00	-36.89	1.61 V	42	4.62	32.49
2	2483.50	29.12 AV	54.00	-24.88	1.61 V	42	-3.37	32.49
3	4960.00	54.89 PK	74.00	-19.11	1.04 V	148	17.29	37.59
3	4960.00	24.89 AV	54.00	-29.11	1.04 V	148	-12.71	37.59

REMARKS:
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: 20log(3.125/100)= -30 dB.
6. Average value = peak reading –20log(duty cycle).

5.3 NUMBER OF HOPPING FREQUENCY USED

5.3.1 LIMIT OF HOPPING FREQUENCY USED

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

5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

5.3.3 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.

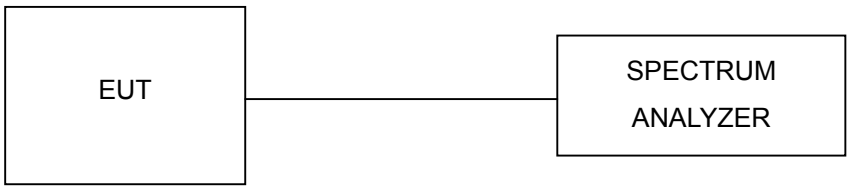
d. Set the SA on View mode and then plot the result on SA screen.

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

5.3.4 DEVIATION FROM TEST STANDARD

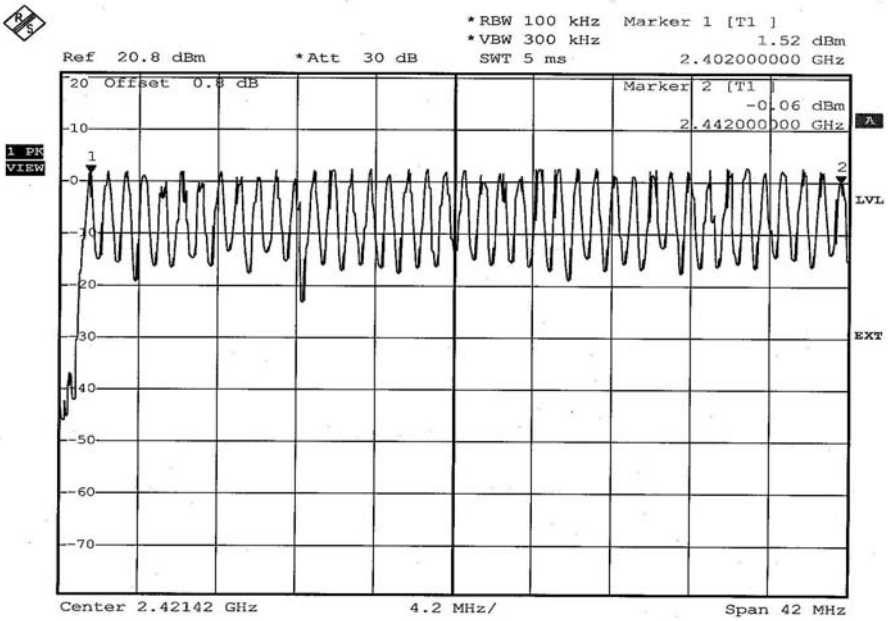
No deviation.

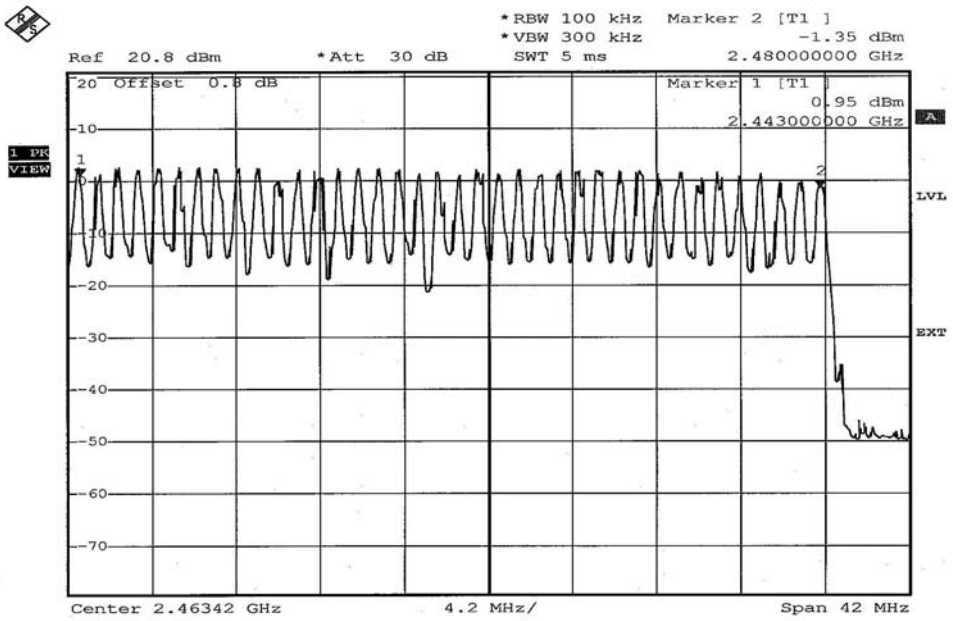
5.3.5 TEST SETUP



5.3.6 TEST RESULTS

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


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 1 [T1]
1.52 dBm
2.402000000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 2 [T1]
-0.06 dBm
2.442000000 GHz
1 PK
VIEW
A
LVL
EXT
Center 2.42142 GHz
4.2 MHz/
Span 42 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Marker 2 [T1]
-1.35 dBm
2.480000000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 1 [T1]
0.95 dBm
2.443000000 GHz
1 PK
VIEW
A
LVL
EXT
Center 2.46342 GHz
4.2 MHz/
Span 42 MHz

5.4 DWELL TIME ON EACH CHANNEL

5.4.1 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.

5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

5.4.3 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.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

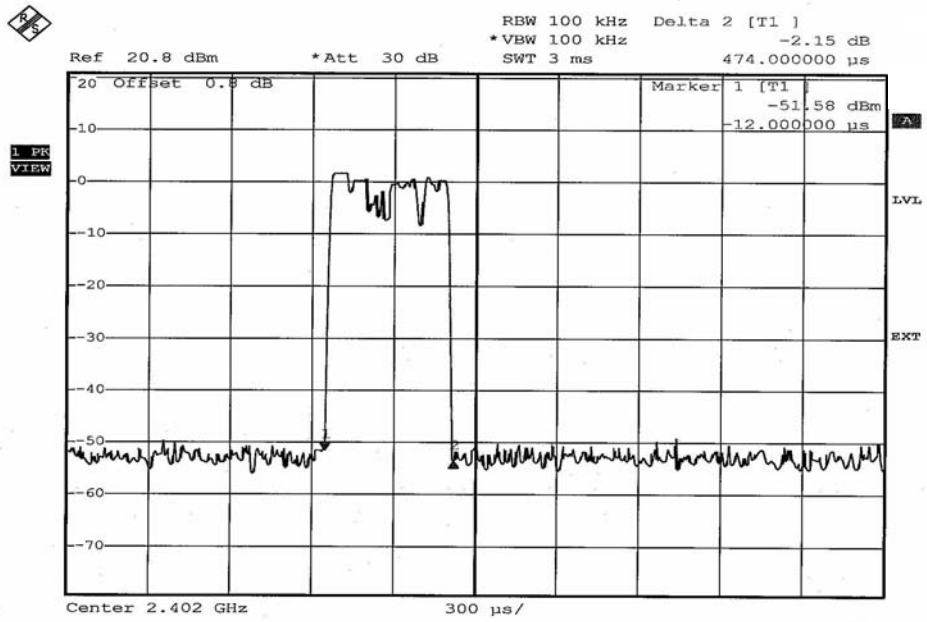
5.4.5 TEST SETUP

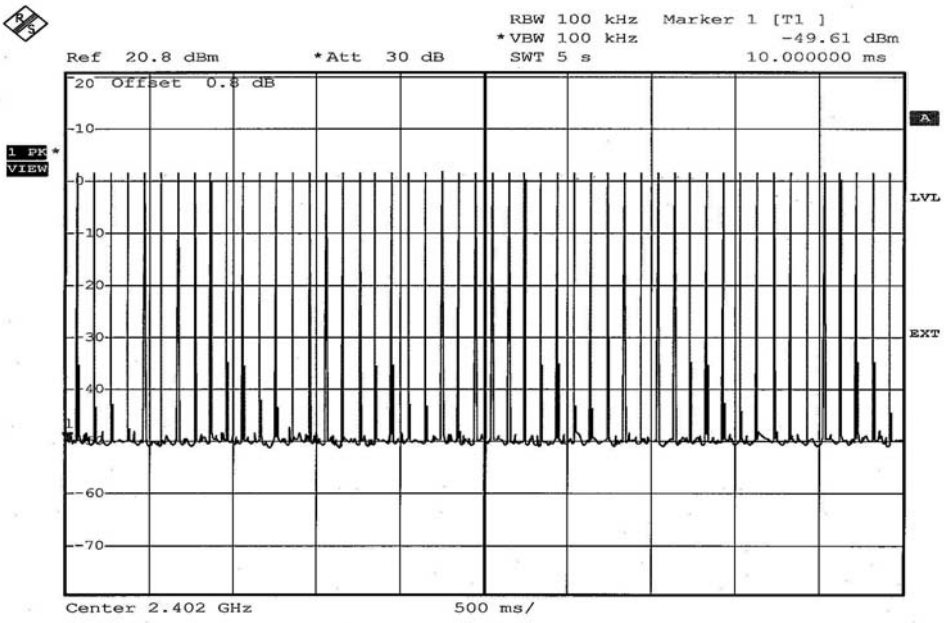
5.4.6 TEST RESULTS

MODE	NUMBER OF TRANSMISSION IN A 31.6 (79HOPPING * 0.4)	LENGTH OF TRANSMISSION TIME (msec)	RESULT (msec)	LIMIT (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.474	149.78	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.740	274.92	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.990	321.25	400

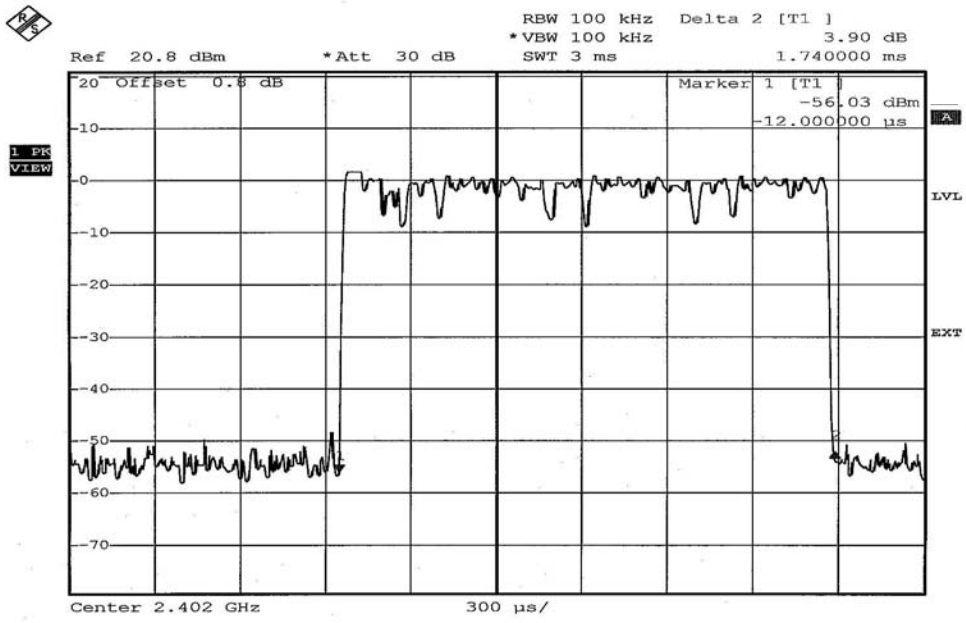
NOTE: Test plots of the transmitting time slot are shown on next 3 pages.

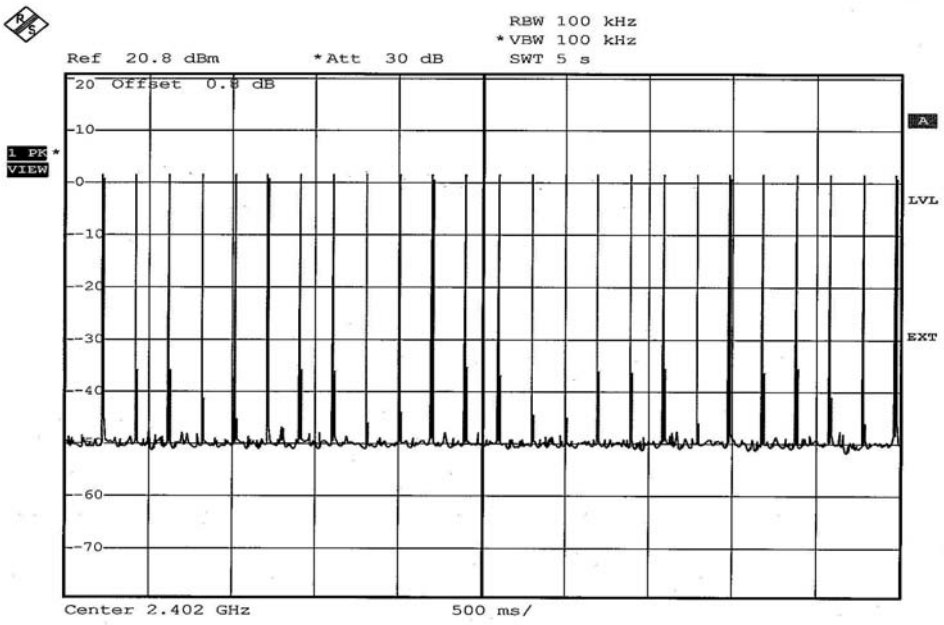
DH1


RBW 100 kHz
*VBW 100 kHz
SWT 3 ms
Delta 2 [T1]
-2.15 dB
474.000000 µs
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 1 [T1]
-51.58 dBm
-12.000000 µs
1 PK VIEW
A
LVL
EXT
Center 2.402 GHz
300 µs/

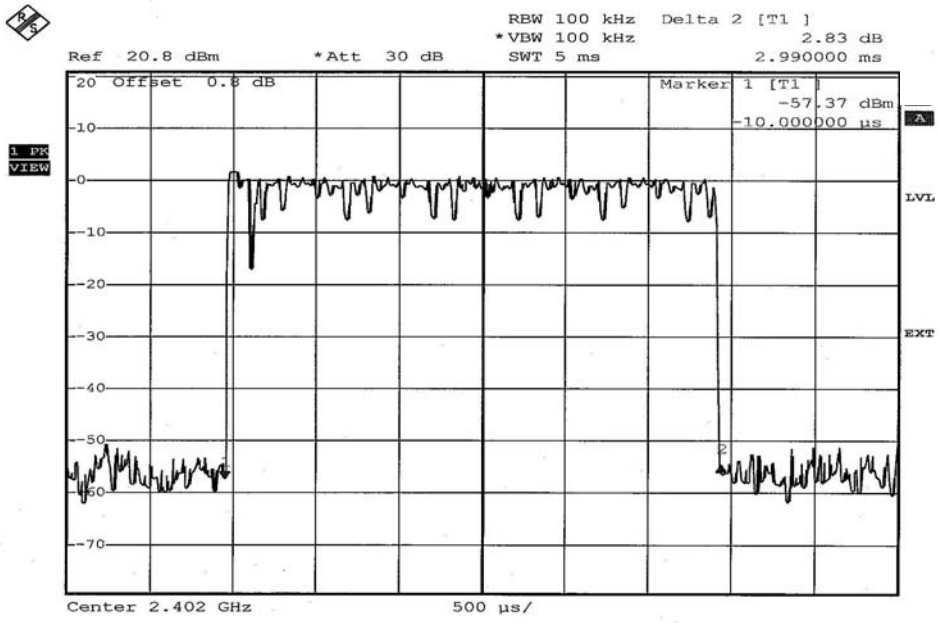

RBW 100 kHz
*VBW 100 kHz
SWT 5 s
Marker 1 [T1]
-49.61 dBm
10.000000 ms
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
A
LVL
EXT
Center 2.402 GHz
500 ms/

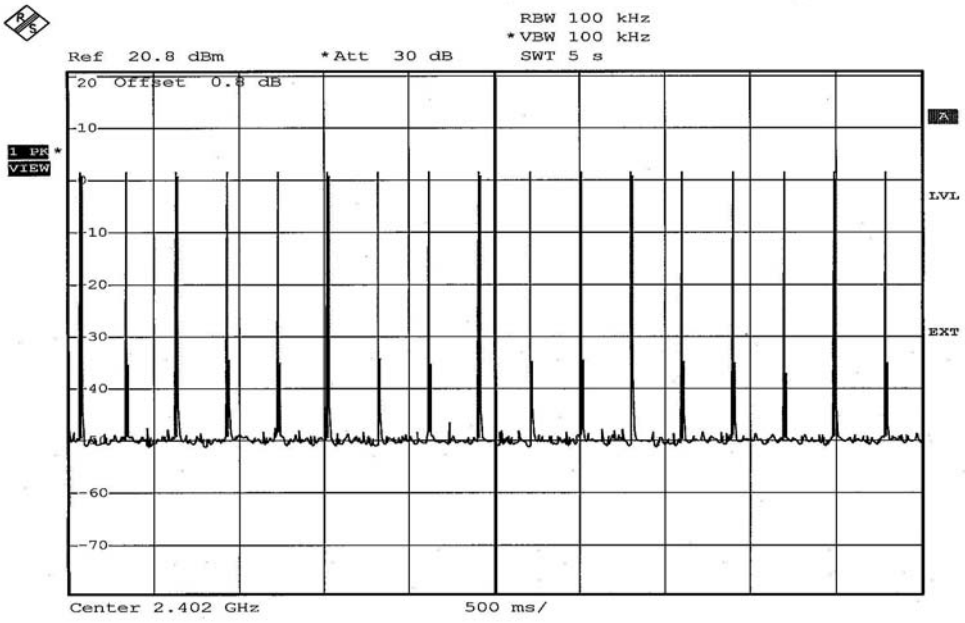
DH3


RBW 100 kHz
*VBW 100 kHz
SWT 3 ms
Delta 2 [T1]
3.90 dB
1.740000 ms
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 1 [T1]
-56.03 dBm
-12.000000 µs
1 PK VIEW
A
LVL
EXT
Center 2.402 GHz
300 µs/


RBW 100 kHz
*VBW 100 kHz
SWT 5 s
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
1 PK* VIEW
A
LVL
EXT
Center 2.402 GHz
500 ms/

DH5


RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 2 [T1]
2.83 dB
2.990000 ms
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 1 [T1]
-57.37 dBm
-10.000000 µs
1 PK VIEW
A
LVL
EXT
Center 2.402 GHz
500 µs/


RBW 100 kHz
*VBW 100 kHz
SWT 5 s
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
A
LVL
EXT
Center 2.402 GHz
500 ms/

5.5 CHANNEL BANDWIDTH

5.5.1 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, the 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

5.5.3 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.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation.

5.5.5 TEST SETUP

5.5.6 EUT OPERATING CONDITION

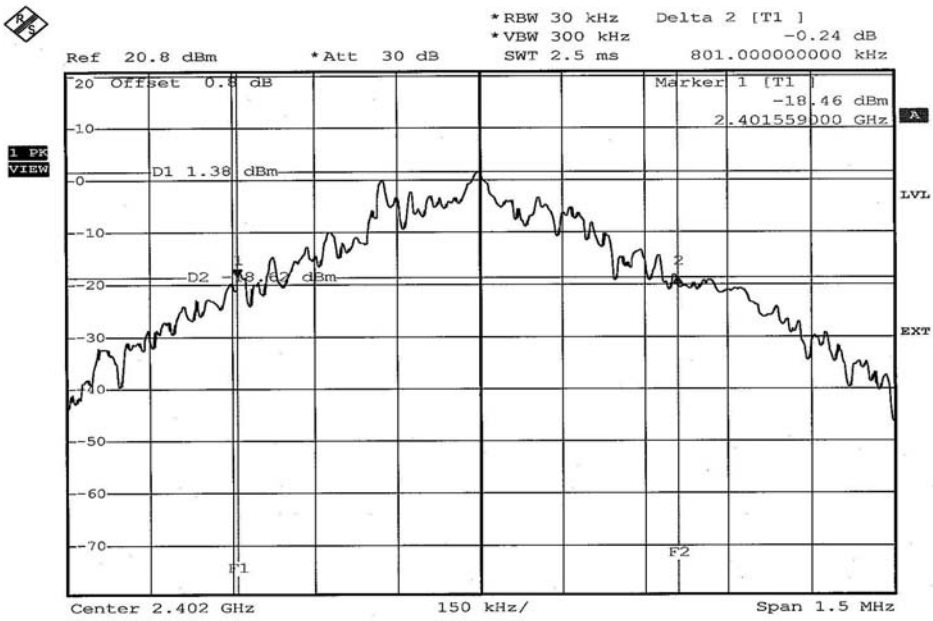
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

5.5.7 TEST RESULTS

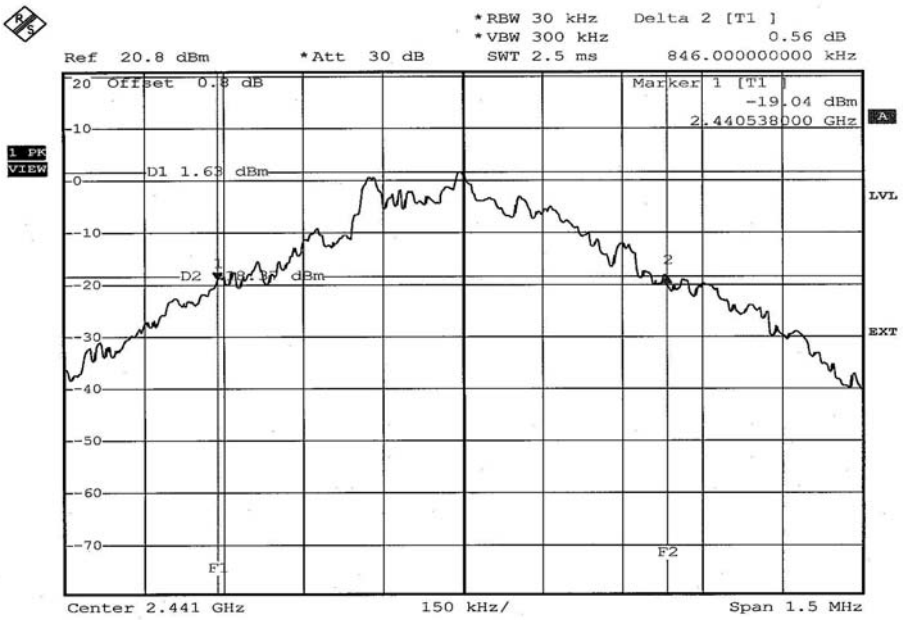
MODULATION TYPE	GFSK	TRANSFER RATE	723Kbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg.C, 54%RH, 991hPa
TESTED BY	Morgan Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	0.801
39	2441	0.846
78	2480	0.837

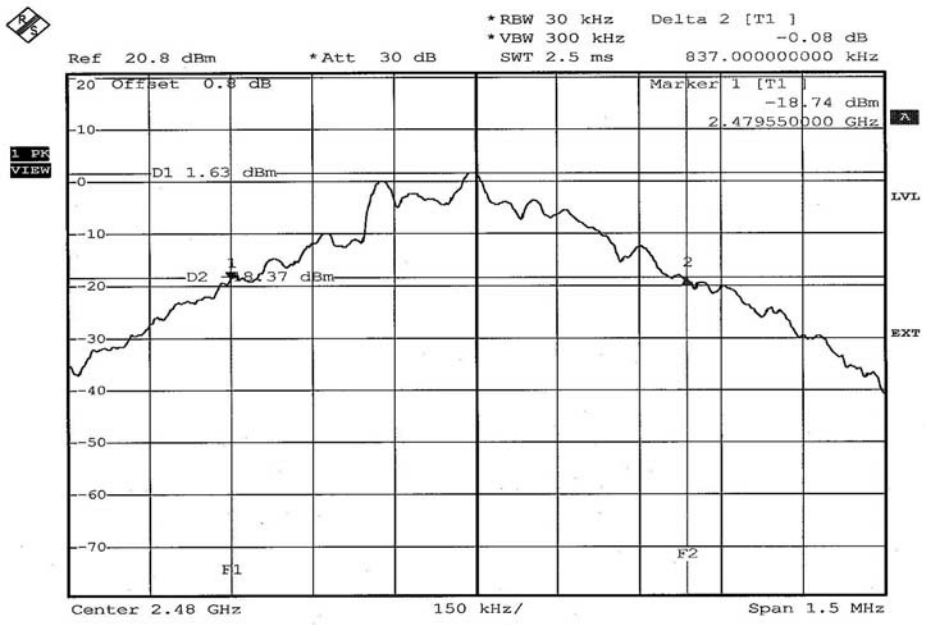
CH 0


*RBW 30 kHz
*VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.24 dB
801.000000000 kHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 1 [T1]
-18.46 dBm
2.401559000 GHz
1 PK VIEW
D1 1.38 dBm
D2 -18.62 dBm
LVL
EXT
F1
F2
Center 2.402 GHz
150 kHz/
Span 1.5 MHz

CH 39


*RBW 30 kHz
*VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1]
0.56 dB
846.000000000 kHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 1 [T1]
-19.04 dBm
2.440538000 GHz
1 PK VIEW
D1 1.63 dBm
D2 -18.37 dBm
LVL
EXT
F1
F2
Center 2.441 GHz
150 kHz/
Span 1.5 MHz

CH 78


*RBW 30 kHz
*VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.08 dB
837.000000000 kHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 1 [T1]
-18.74 dBm
2.479550000 GHz
1 PK VIEW
D1 1.63 dBm
D2 -8.37 dBm
LVL
EXT
F1
F2
Center 2.48 GHz
150 kHz/
Span 1.5 MHz

5.6 HOPPING CHANNEL SEPARATION

5.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

5.6.3 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.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation.

5.6.5 TEST SETUP

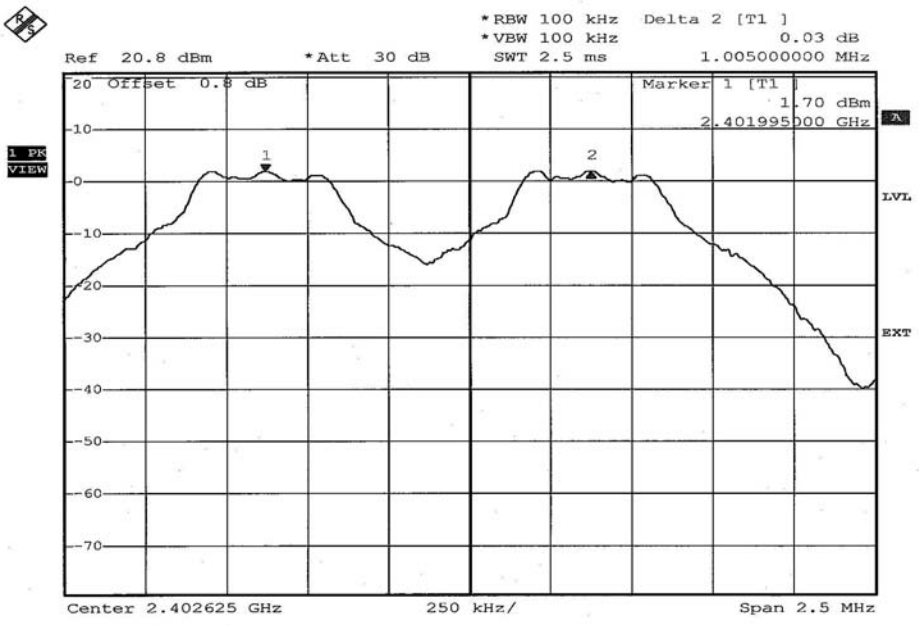
5.6.6 TEST RESULTS

MODULATION TYPE	GFSK	TRANSFER RATE	723Kbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg.C, 54%RH, 991hPa
TESTED BY	Morgan Chen		

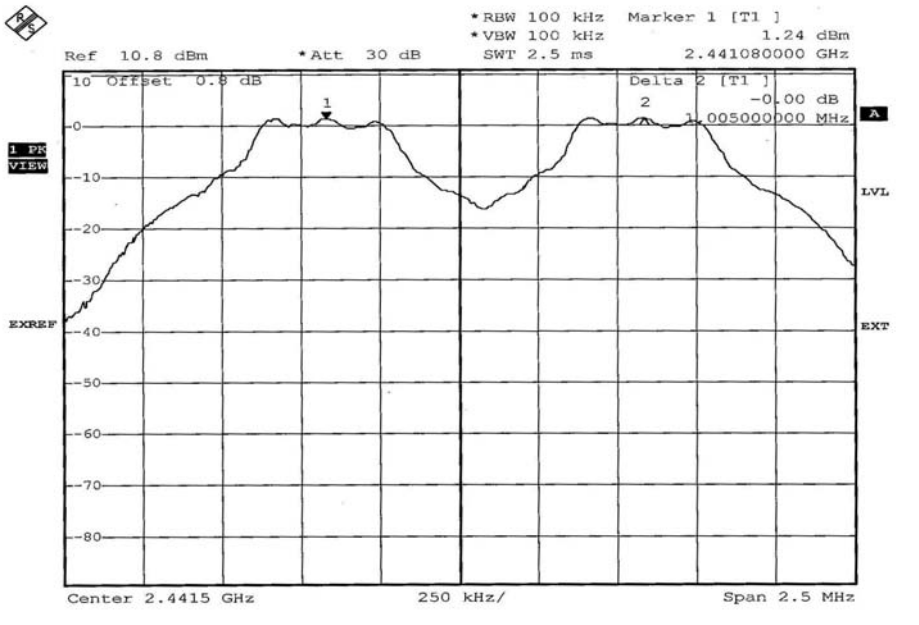
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.005	0.801	PASS
39	2441	1.005	0.846	PASS
78	2480	1.005	0.837	PASS

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

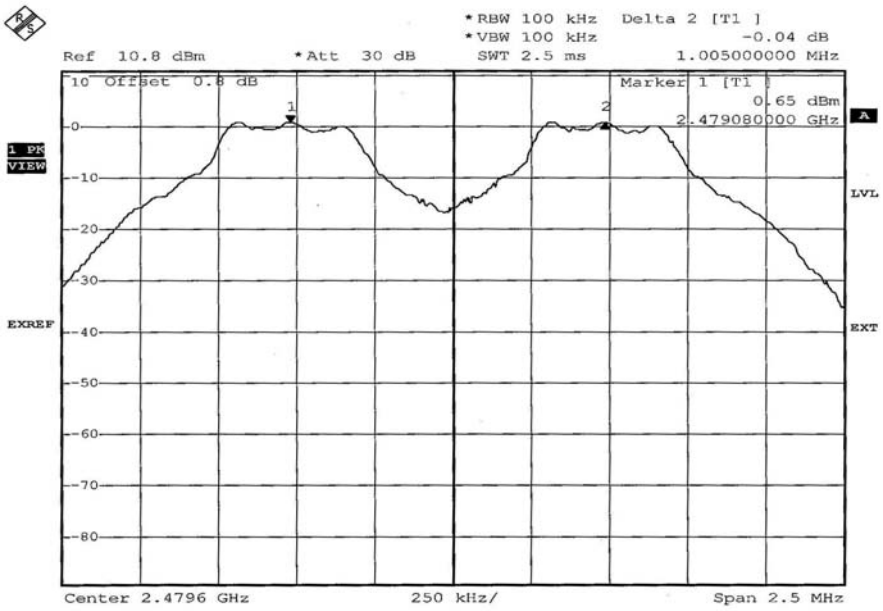
CH 0


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
0.03 dB
1.005000000 MHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
Marker 1 [T1]
1.70 dBm
2.401995000 GHz
1 PK VIEW
A
LVL
EXT
Center 2.402625 GHz
250 kHz/
Span 2.5 MHz

CH 39


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Marker 1 [T1]
1.24 dBm
2.441080000 GHz
Delta 2 [T1]
-0.00 dB
1.005000000 MHz
Ref 10.8 dBm
*Att 30 dB
10 Offset 0.8 dB
1 PK VIEW
EXREF
A
LVL
EXT
Center 2.4415 GHz
250 kHz/
Span 2.5 MHz

CH 78


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.04 dB
1.005000000 MHz
Ref 10.8 dBm
*Att 30 dB
10 Offset 0.8 dB
Marker 1 [T1]
0.65 dBm
2.479080000 GHz
1 PK
VIEW
A
LVL
EXT
EXREF
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.4796 GHz
250 kHz/
Span 2.5 MHz

5.7 MAXIMUM PEAK OUTPUT POWER

5.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYEER	FSEK30	100049	Aug. 14, 2006

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

5.7.3 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 1 MHz RBW and 3 MHz VBW.

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

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

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP

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

5.7.6 EUT OPERATING CONDITION

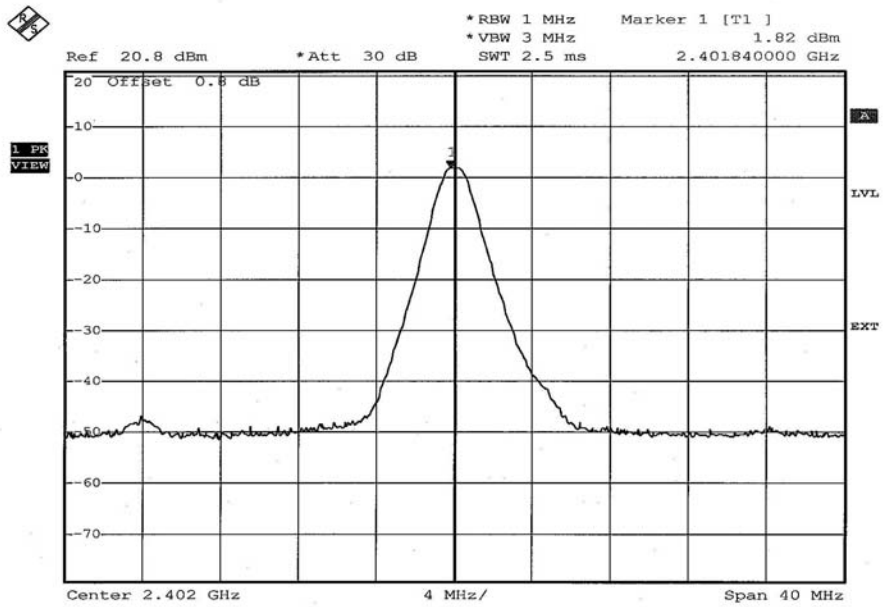
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

5.7.7 TEST RESULTS

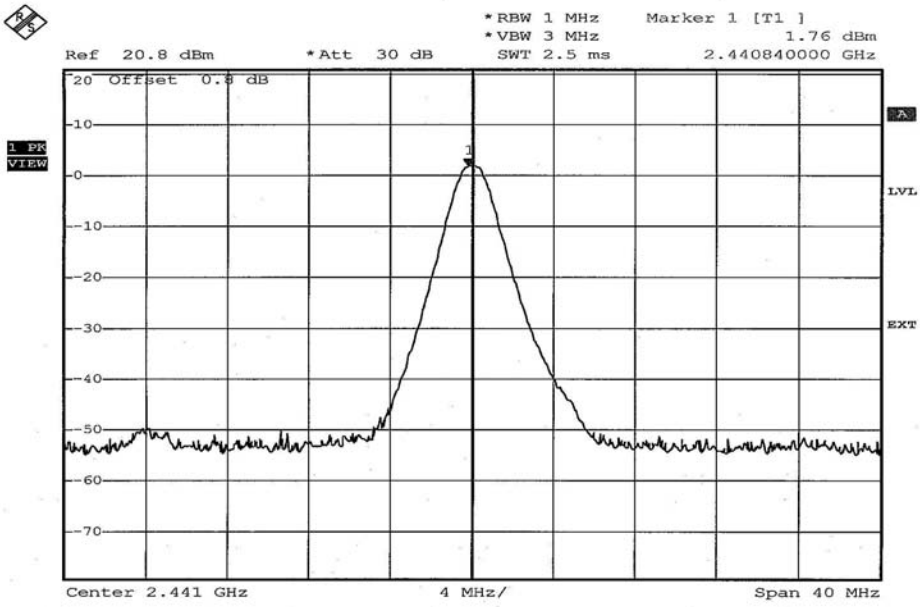
MODULATION TYPE	GFSK	TRANSFER RATE	723Kbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg.C, 54%RH, 991hPa
TESTED BY	Morgan Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	1.521	1.820	30	PASS
39	2441	1.500	1.760	30	PASS
78	2480	1.330	1.240	30	PASS

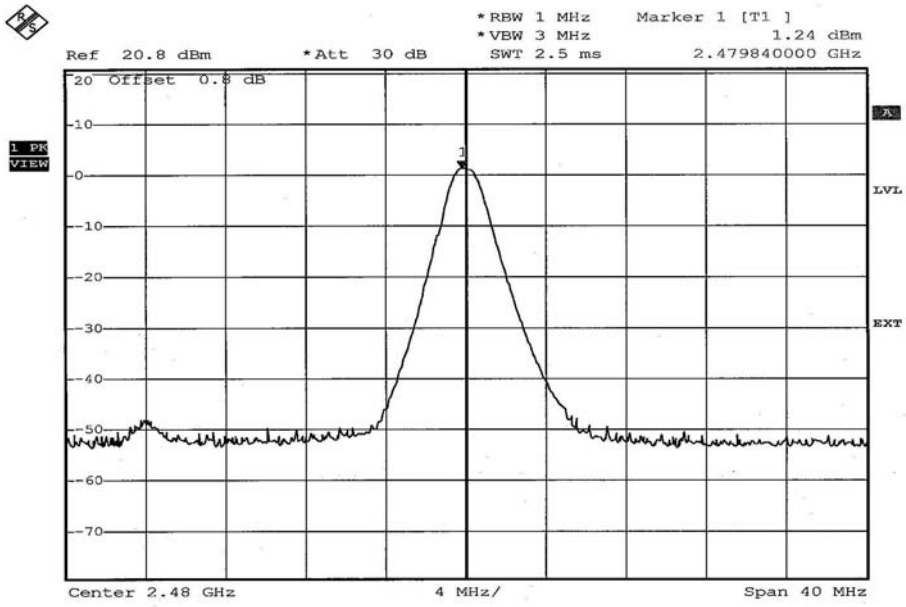
CH 0


*RBW 1 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
1.82 dBm
2.401840000 GHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
1 PK
VIEW
A
LVL
EXT
Center 2.402 GHz
4 MHz/
Span 40 MHz

CH 39


*RBW 1 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
1.76 dBm
2.440840000 GHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
1 PK
VIEW
A
LVL
EXT
Center 2.441 GHz
4 MHz/
Span 40 MHz

CH 78


*RBW 1 MHz
*VBW 3 MHz
SWT 2.5 ms
Marker 1 [T1]
1.24 dBm
2.479840000 GHz
Ref 20.8 dBm
*Att 30 dB
20 Offset 0.8 dB
1 PK VIEW
LVL
EXT
Center 2.48 GHz
4 MHz/
Span 40 MHz

5.8 BAND EDGES MEASUREMENT

5.8.1 LIMITS OF BAND EDGES MEASUREMENT

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

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

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

5.8.3 TEST PROCEDURE

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

5.8.4 DEVIATION FROM TEST STANDARD

No deviation.

5.8.5 EUT OPERATING CONDITION

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

5.8.6 TEST RESULTS

The spectrum plots are attached on the following 4 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).

NOTE 1:

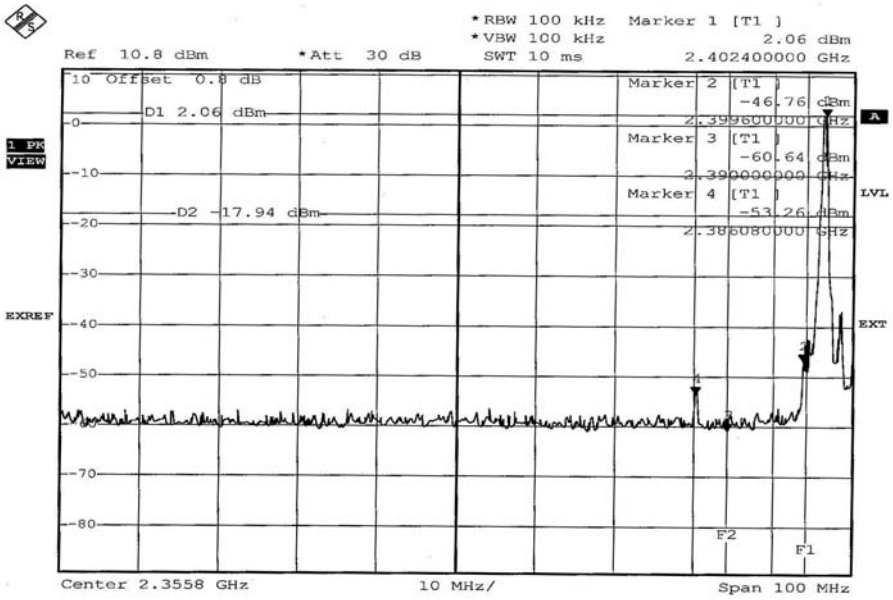
The band edge emission plot on the next page shows 55.32dBc between carrier maximum power and local maximum emission in restrict band (2.38608GHz). The emission of carrier strength list in the test result of channel 0 at the item 6.2.7 is 85.49dBuV/m (Peak), so the maximum field strength in restrict band is 85.49-55.32=30.17dBuV/m, which is under 74 dBuV/m limit.

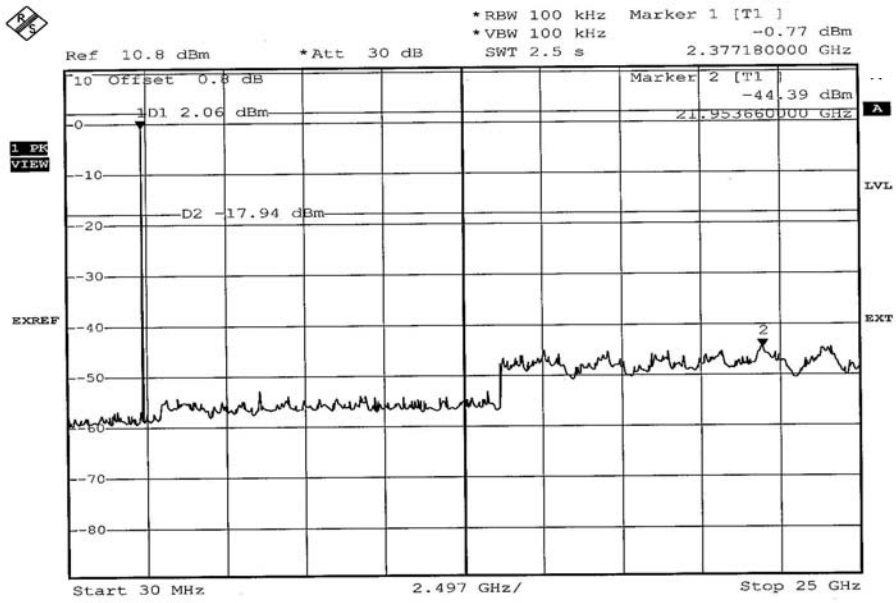
The band edge emission plot on the next page shows 55.32dBc between carrier maximum power and local maximum emission in restrict band (2.38608GHz). The emission of carrier strength list in the test result of channel 0 at the item 6.2.7 is 55.49dBuV/m (Average), so the maximum field strength in restrict band is 55.49-55.32=0.17dBuV/m, which is under 54 dBuV/m limit.

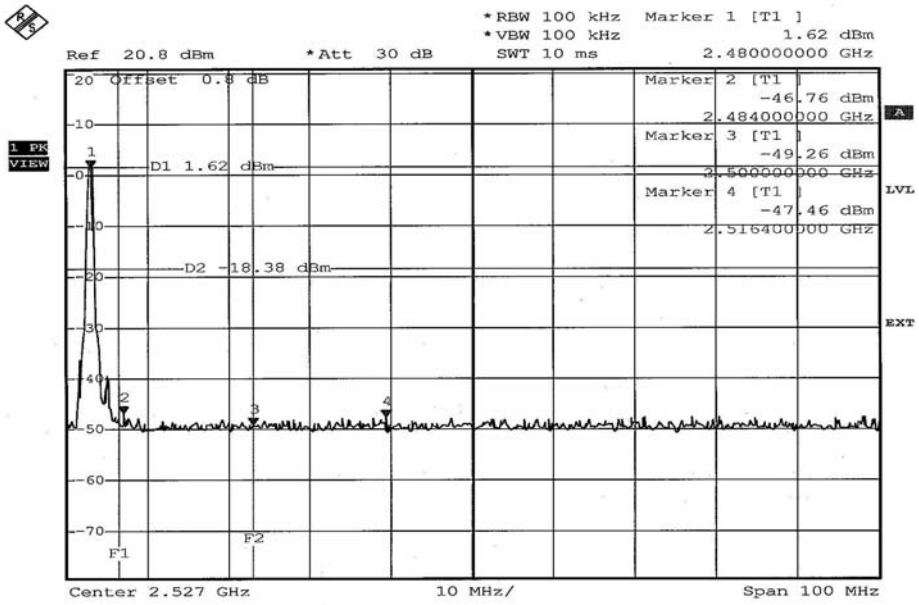
NOTE 2:

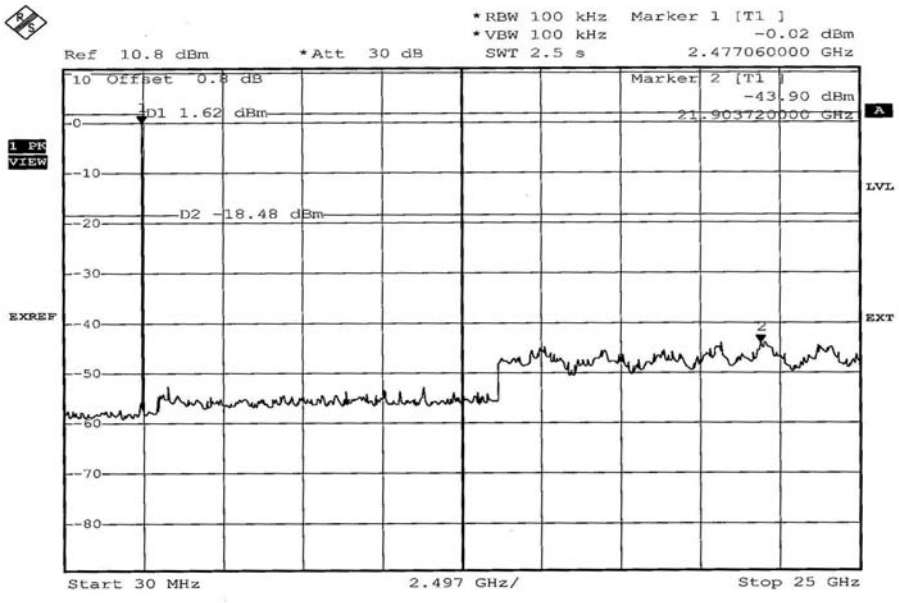
The band edge emission plot on the next second page shows 48.38dBc between carrier maximum power and local maximum emission in restrict band (2.48400GHz). The emission of carrier strength list in the test result of channel 78 at the item 6.2.7 is 86.11dBuV/m (Peak), so the maximum field strength in restrict band is 86.11-48.38=37.73dBuV/m, which is under 74 dBuV/m limit.

The band edge emission plot on the next second page shows 48.38dBc between carrier maximum power and local maximum emission in restrict band (2.48400GHz). The emission of carrier strength list in the test result of channel 78 at the item 6.2.7 is 56.11dBuV/m (Average), so the maximum field strength in restrict band is 56.11-48.38=7.73dBuV/m, which is under 54 dBuV/m limit.


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
2.06 dBm
2.402400000 GHz
Ref 10.8 dBm
*Att 30 dB
10 Offset 0.8 dB
D1 2.06 dBm
D2 -17.94 dBm
Marker 2 [T1]
-46.76 dBm
2.399600000 GHz
Marker 3 [T1]
-60.64 dBm
2.390000000 GHz
Marker 4 [T1]
-53.26 dBm
2.386080000 GHz
1 PK
VIEW
EXREF
A
LVL
EXT
F2
F1
Center 2.3558 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-0.77 dBm
2.377180000 GHz
Ref 10.8 dBm
*Att 30 dB
10 Offset 0.8 dB
D1 2.06 dBm
D2 -17.94 dBm
Marker 2 [T1]
-44.39 dBm
21.953660000 GHz
1 PK
VIEW
EXREF
A
LVL
EXT
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
1.62 dBm
2.480000000 GHz
Ref 20.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 2 [T1]
-46.76 dBm
2.484000000 GHz
Marker 3 [T1]
-49.26 dBm
2.500000000 GHz
Marker 4 [T1]
-47.46 dBm
2.516400000 GHz
1 PK
VIEW
D1 1.62 dBm
D2 -18.38 dBm
A
LVL
EXT
F1
F2
Center 2.527 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-0.02 dBm
2.477060000 GHz
Ref 10.8 dBm
*Att 30 dB
Offset 0.8 dB
Marker 2 [T1]
-43.90 dBm
21.903720000 GHz
1 PK
VIEW
D1 1.62 dBm
D2 -18.48 dBm
A
LVL
EXT
EXREF
Start 30 MHz
2.497 GHz/
Stop 25 GHz

5.9 ANTENNA REQUIREMENT

5.9.1 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.

5.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is PIFA antenna with UFL antenna connector. The maximum gain of this antenna is -2.13321dBi.

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

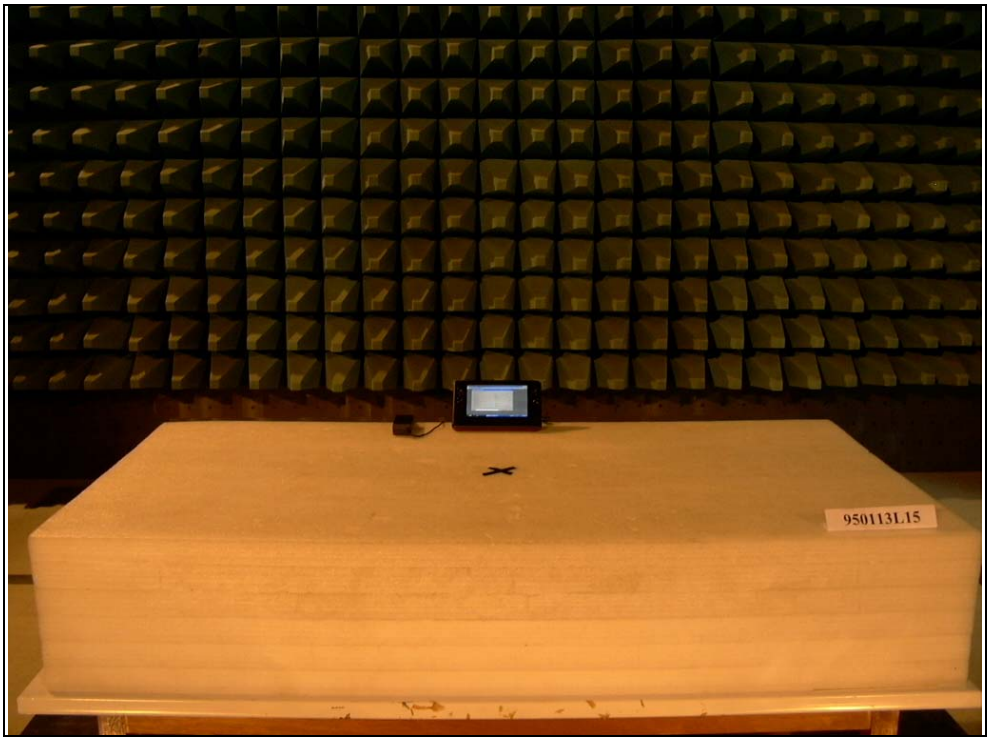
TEST MODE A

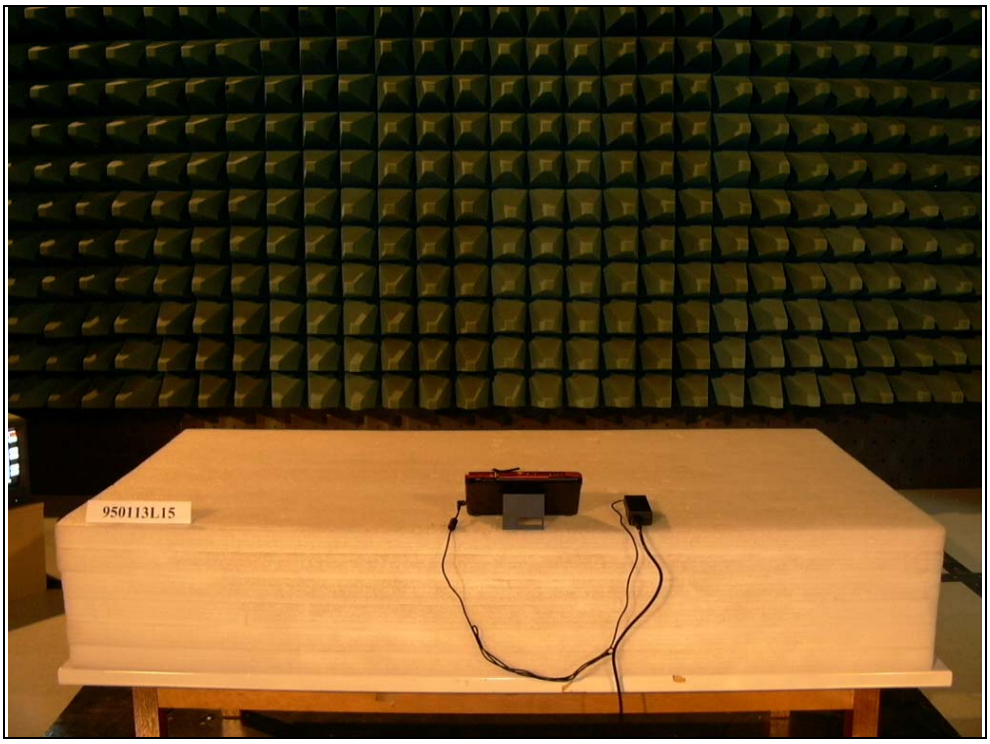
TEST MODE B

TEST MODE C

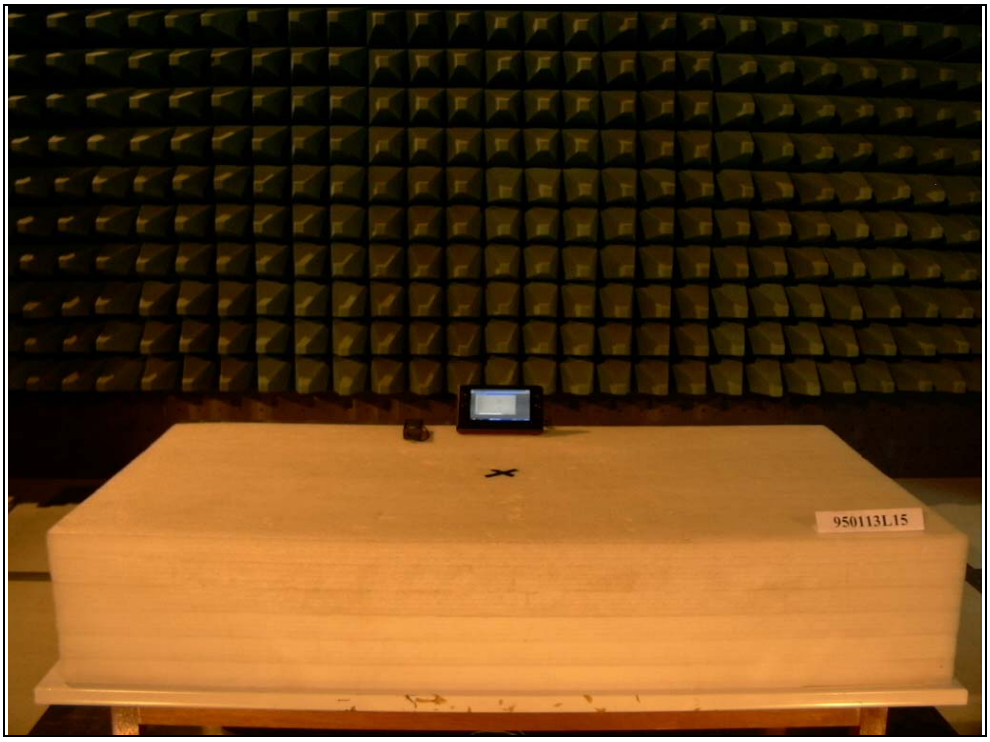
RADIATED EMISSION TEST

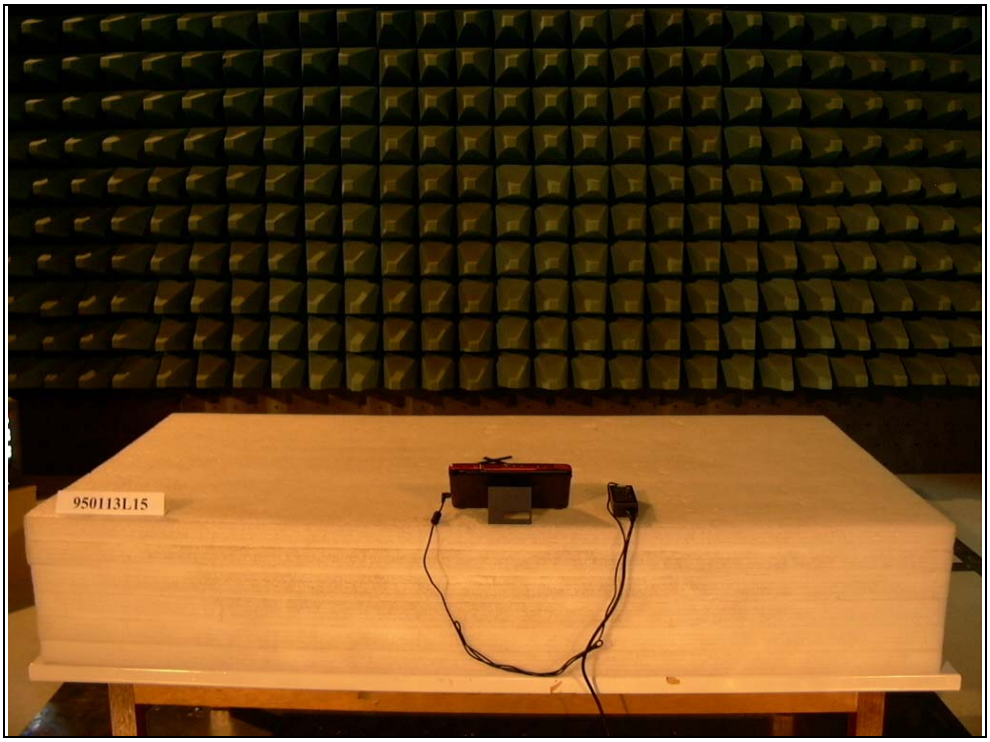
TEST MODE A



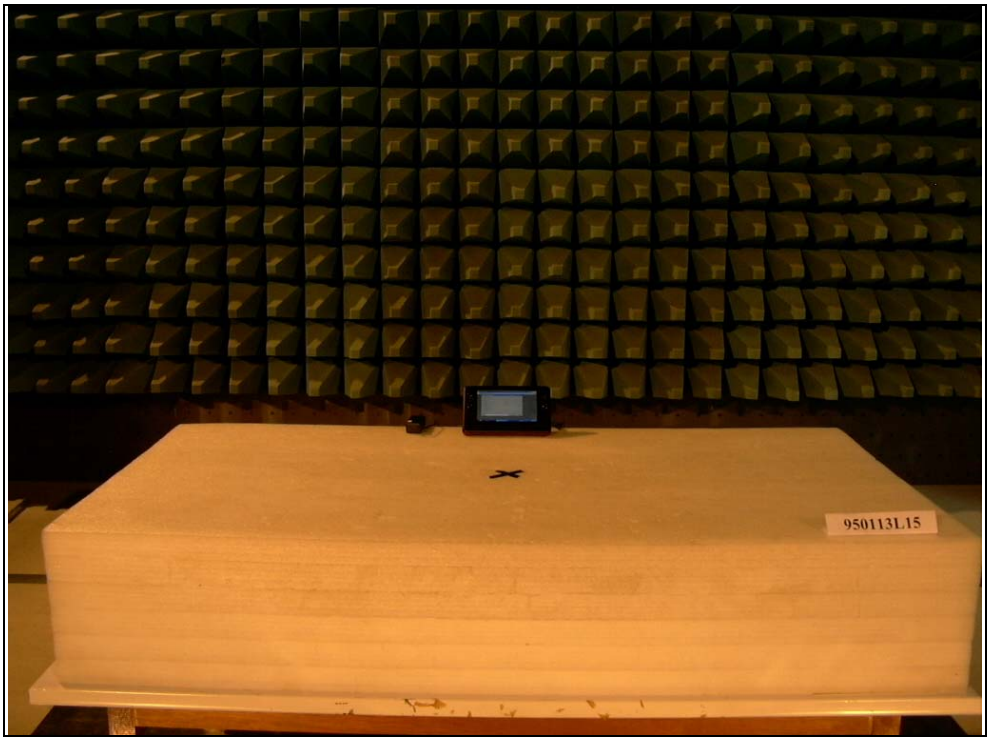


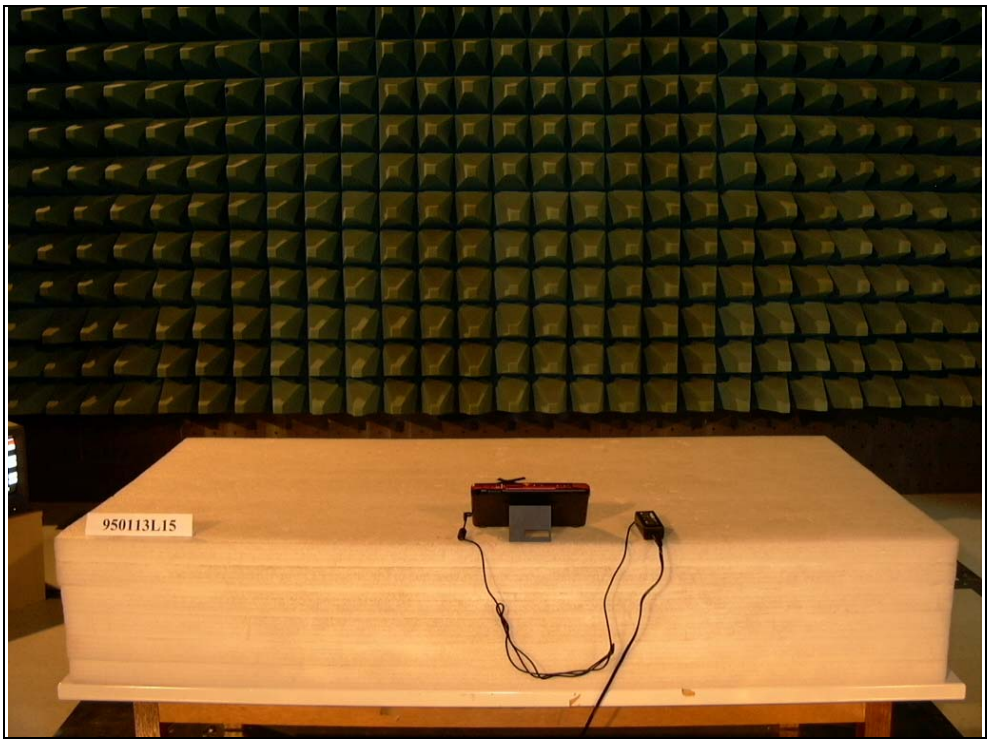
TEST MODE B





TEST MODE C





7. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Linko RF Lab.
Tel: 886-3-3270910
Fax: 886-3-3270892

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

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.