

FCC TEST REPORT

REPORT NO. : RF961121L15

MODEL NO. : CF-3100

RECEIVED : Nov. 21, 2007

TESTED : Dec. 04, ~ Dec. 05, 2007

ISSUED : May 15, 2008

APPLICANT : Teraoka Weigh-System Pte Ltd.

ADDRESS : 4, Leng Kee Road, #05-02/03/04/05/11, SIS
Building, Singapore 159088

ISSUED BY : Advance Data Technology Corporation

LAB ADDRESS : No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou
Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

TEST LOCATION : No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1. CERTIFICATION

PRODUCT: ESL CF Card

MODEL: CF-3100

BRAND: DIGI

APPLICANT: Teraoka Weigh-System Pte Ltd.

TESTED: Dec. 04, ~ Dec. 05, 2007

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.249)

ANSI C63.4-2003

The above equipment (model: CF-3100) have been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY :  , **DATE** : May 15, 2008
Joanna Wang / Senior Specialist

TECHNICAL ACCEPTANCE :  , **DATE** : May 15, 2008
Responsible for RF Long Chen / Senior Engineer

APPROVED BY :  , **DATE** : May 15, 2008
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.249)			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.207	Conducted Emission Test	NA	Power supply is 3.3Vdc from PDA
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -2.06dB at 175.72MHz

2.1 MEASUREMENT UNCERTAINTY

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

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

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	ESL CF Card
MODEL NO.	CF-3100
FCC ID	SUFCF3100
POWER SUPPLY	3.3Vdc form PDA
MODULATION TYPE	FSK / MSK
FREQUENCY RANGE	2445 ~ 2459MHz
NUMBER OF CHANNEL	7
DATA RATE	TX: 1.2kbps RX: 500kbps
ANTENNA TYPE	Chip antenna with 1dBi gain
DATA CABLE	NA
I/O PORT	NA
ACCESSORY DEVICES	NA

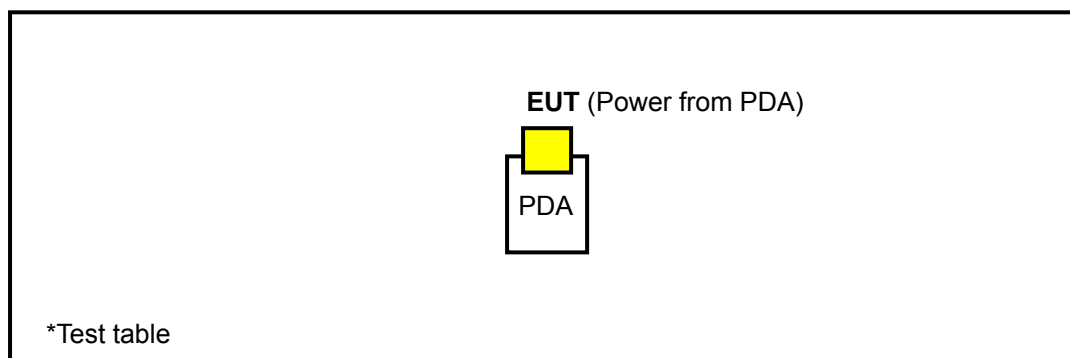
NOTE: The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

7 channels are provided to this EUT:

CHANNEL	FREQUENCY (MHz)
1	2445
2	2447
3	2449
4	2451
5	2453
6	2455
7	2459

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	BM	
A	√	√	NOTE 1	√	FSK
B	√	-	NOTE 1	√	MSK

Where **PLC**: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE \geq 1G: Radiated Emission above 1GHz

BM: Bandedge Measurement

NOTE: 1. No need to concern of Conducted Emission due to the EUT is powered by PDA.

2. "-" means no effect.

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

EUT CONFIGUR MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	AXIS
A	1 to 7	1, 4, 7	FSK	Z
B	1 to 7	1, 4, 7	MSK	Z

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

EUT CONFIGUR MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	AXIS
A	1 to 7	1	FSK	Z

BANDEDGE MEASUREMENT:

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

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

EUT CONFIGUR MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	1 to 7	1, 7	FSK
B	1 to 7	1, 7	MSK

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (Section 15.249)

ANSI C63.4-2003

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

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

3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PDA	FUJITSU	FHT401S3W: KD03034-A006	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 1 was provided by the client.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, 15.249 as following:

15.209 Limit		
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
15.249 Limit		
Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 02, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 03, 2009
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-405	Dec. 17, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10634	Dec. 12, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274397/4	Nov. 07, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283401/4	Nov. 07, 2008
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC3789B-4.

4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

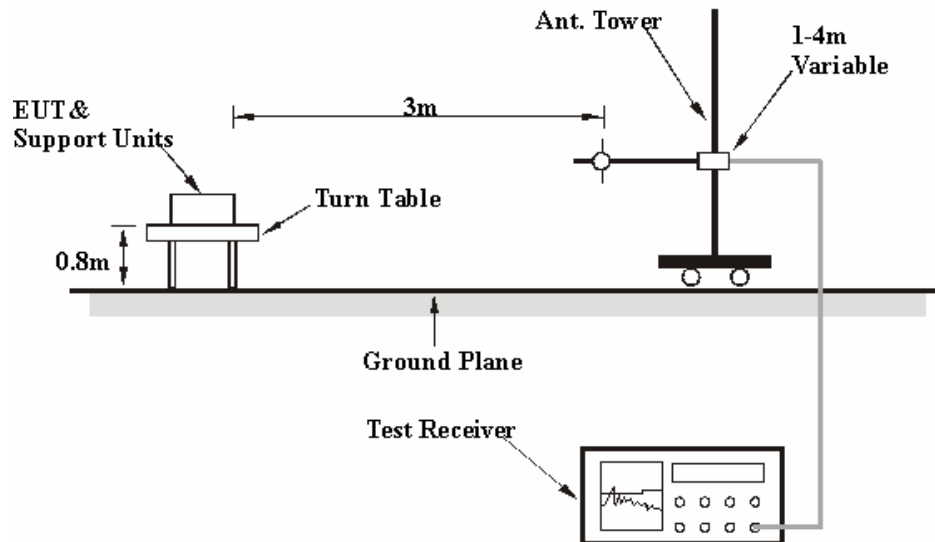
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

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

4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	FSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	A
TESTED BY	Kevin Liang		

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	2277.00	56.92 PK	74.00	-17.08	1.85 H	122	25.93	30.99
2	2277.00	45.51 AV	54.00	-8.49	1.85 H	122	14.52	30.99
3	2390.00	56.03 PK	74.00	-17.97	1.93 H	159	24.65	31.38
4	2390.00	43.53 AV	54.00	-10.47	1.93 H	159	12.15	31.38
5	2399.50	56.52 PK	74.00	-17.48	1.93 H	158	25.10	31.42
6	2399.50	44.16 AV	54.00	-9.84	1.93 H	158	12.74	31.42
7	*2445.00	90.31 PK	114.00	-23.69	1.93 H	159	58.73	31.58
8	*2445.00	90.31 AV	94.00	-3.69	1.93 H	159	58.73	31.58
9	4890.00	49.23 PK	74.00	-24.77	1.00 H	141	11.40	37.83
10	4890.00	40.85 AV	54.00	-13.15	1.00 H	141	3.02	37.83

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	2277.00	55.36 PK	74.00	-18.64	1.35 V	236	24.37	30.99
2	2277.00	44.10 AV	54.00	-9.90	1.35 V	236	13.11	30.99
3	2390.00	56.02 PK	74.00	-17.98	1.43 V	313	24.63	31.38
4	2390.00	42.88 AV	54.00	-11.12	1.43 V	313	11.50	31.38
5	2399.50	55.95 PK	74.00	-18.05	1.43 V	313	24.53	31.42
6	2399.50	43.25 AV	54.00	-10.75	1.43 V	313	11.83	31.42
7	*2445.00	90.22 PK	114.00	-23.78	1.43 V	313	58.64	31.58
8	*2445.00	90.22 AV	94.00	-3.78	1.43 V	313	58.64	31.58
9	4890.00	47.95 PK	74.00	-26.05	1.41 V	202	10.12	37.83
10	4890.00	38.31 AV	54.00	-15.69	1.41 V	202	0.48	37.83

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + $20\log(\text{Duty cycle})$ Where the duty factor is calculated from following formula:
 $20\log(\text{Duty cycle}) = 20\log(100\%) = 0\text{dB}$
Please see page 19 for plotted duty

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	FSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	A
TESTED BY	Kevin Liang		

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	2277.00	56.48 PK	74.00	-17.52	1.67 H	173	25.49	30.99
2	2277.00	45.19 AV	54.00	-8.81	1.67 H	173	14.20	30.99
3	*2451.00	89.81 PK	114.00	-24.19	1.87 H	147	58.21	31.60
4	*2451.00	89.81 AV	94.00	-4.19	1.87 H	147	58.21	31.60
5	4902.00	49.71 PK	74.00	-24.29	1.55 H	111	11.84	37.87
6	4902.00	41.55 AV	54.00	-12.45	1.55 H	111	3.68	37.87

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	2277.00	54.93 PK	74.00	-19.07	1.80 V	132	23.94	30.99
2	2277.00	43.89 AV	54.00	-10.11	1.80 V	132	12.90	30.99
3	*2451.00	89.49 PK	114.00	-24.51	1.47 V	315	57.89	31.60
4	*2451.00	89.49 AV	94.00	-4.51	1.47 V	315	57.89	31.60
5	4902.00	49.36 PK	74.00	-24.64	1.39 V	220	11.49	37.87
6	4902.00	40.77 AV	54.00	-13.23	1.39 V	220	2.90	37.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + $20\log(\text{Duty cycle})$ Where the duty factor is calculated from following formula:
 $20\log(\text{Duty cycle}) = 20\log(100\%) = 0\text{dB}$
 Please see page 19 for plotted duty

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	FSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	A
TESTED BY	Kevin Liang		

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	2277.00	56.12 PK	74.00	-17.88	1.75 H	140	25.13	30.99
2	2277.00	44.84 AV	54.00	-9.16	1.75 H	140	13.85	30.99
3	*2459.00	89.06 PK	114.00	-24.94	1.14 H	162	57.43	31.63
4	*2459.00	89.06 AV	94.00	-4.94	1.14 H	162	57.43	31.63
5	2483.50	56.66 PK	74.00	-17.34	1.14 H	161	24.95	31.71
6	2483.50	44.12 AV	54.00	-9.88	1.14 H	161	12.41	31.71
7	4918.00	48.89 PK	74.00	-25.11	1.16 H	119	10.98	37.91
8	4918.00	41.68 AV	54.00	-12.32	1.16 H	119	3.77	37.91

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	2277.00	53.88 PK	74.00	-20.12	1.51 V	233	22.89	30.99
2	2277.00	43.71 AV	54.00	-10.29	1.51 V	233	12.72	30.99
3	*2459.00	88.68 PK	114.00	-25.32	1.46 V	323	57.05	31.63
4	*2459.00	88.68 AV	94.00	-5.32	1.46 V	323	57.05	31.63
5	2483.50	56.54 PK	74.00	-17.46	1.46 V	323	24.83	31.71
6	2483.50	44.06 AV	54.00	-9.94	1.46 V	323	12.35	31.71
7	4918.00	48.37 PK	74.00	-25.63	1.39 V	208	10.46	37.91
8	4918.00	39.37 AV	54.00	-14.62	1.39 V	208	1.47	37.91

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + $20\log(\text{Duty cycle})$ Where the duty factor is calculated from following formula:
 $20\log(\text{Duty cycle}) = 20\log(100\%) = 0\text{dB}$
Please see page 19 for plotted duty

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	MSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	B
TESTED BY	Kevin Liang		

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	55.44 PK	74.00	-18.56	1.15 H	189	24.05	31.38
2	2390.00	43.56 AV	54.00	-10.44	1.15 H	189	12.18	31.38
3	2399.50	55.95 PK	74.00	-18.05	1.15 H	189	24.53	31.42
4	2399.50	44.05 AV	54.00	-9.95	1.15 H	189	12.63	31.42
5	*2445.00	89.23 PK	114.00	-24.77	1.15 H	189	57.65	31.58
6	*2445.00	83.11 AV	94.00	-10.89	1.15 H	189	51.53	31.58
7	4890.00	51.09 PK	74.00	-22.91	1.10 H	79	13.26	37.83
8	4890.00	44.97 AV	54.00	-9.03	1.10 H	79	7.14	37.83

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	2390.00	54.80 PK	74.00	-19.20	1.48 V	341	23.41	31.38
2	2390.00	42.81 AV	54.00	-11.19	1.48 V	341	11.43	31.38
3	2399.50	55.28 PK	74.00	-18.72	1.48 V	341	23.86	31.42
4	2399.50	43.21 AV	54.00	-10.79	1.48 V	341	11.79	31.42
5	*2445.00	86.81 PK	114.00	-27.19	1.48 V	341	55.23	31.58
6	*2445.00	80.69 AV	94.00	-13.31	1.48 V	341	49.11	31.58
7	4890.00	49.75 PK	74.00	-24.25	1.28 V	18	11.92	37.83
8	4890.00	43.63 AV	54.00	-10.37	1.28 V	18	5.80	37.83

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{0.42*4 \text{ ms}}{3.4 \text{ ms}} = -6.12\text{dB}$$

Please see page 19 for plotted duty

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	MSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	B
TESTED BY	Kevin Liang		

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	*2451.00	88.56 PK	114.00	-25.44	1.13 H	204	56.96	31.60
2	*2451.00	82.44 AV	94.00	-11.56	1.13 H	204	50.84	31.60
3	4902.00	51.41 PK	74.00	-22.59	1.06 H	71	13.54	37.87
4	4902.00	45.29 AV	54.00	-8.71	1.06 H	71	7.42	37.87

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	*2451.00	88.36 PK	114.00	-25.64	1.46 V	326	56.76	31.60
2	*2451.00	82.24 AV	94.00	-11.76	1.46 V	326	50.64	31.60
3	4902.00	49.17 PK	74.00	-24.83	1.24 V	240	11.30	37.87
4	4902.00	43.05 AV	54.00	-10.95	1.24 V	240	5.18	37.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + $20\log(\text{Duty cycle})$ Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{0.42 \times 4 \text{ ms}}{3.4 \text{ ms}} = -6.12\text{dB}$$

Please see page 19 for plotted duty

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	MSK	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	B
TESTED BY	Kevin Liang		

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	*2459.00	88.10 PK	114.00	-25.90	1.14 H	188	56.47	31.63
2	*2459.00	81.98 AV	94.00	-12.02	1.14 H	188	50.35	31.63
3	2483.50	56.58 PK	74.00	-17.42	1.14 H	188	24.87	31.71
4	2483.50	43.95 AV	54.00	-10.05	1.14 H	188	12.24	31.71
5	4918.00	51.38 PK	74.00	-22.62	1.05 H	76	13.48	37.91
6	4918.00	45.26 AV	54.00	-8.74	1.05 H	76	7.35	37.91

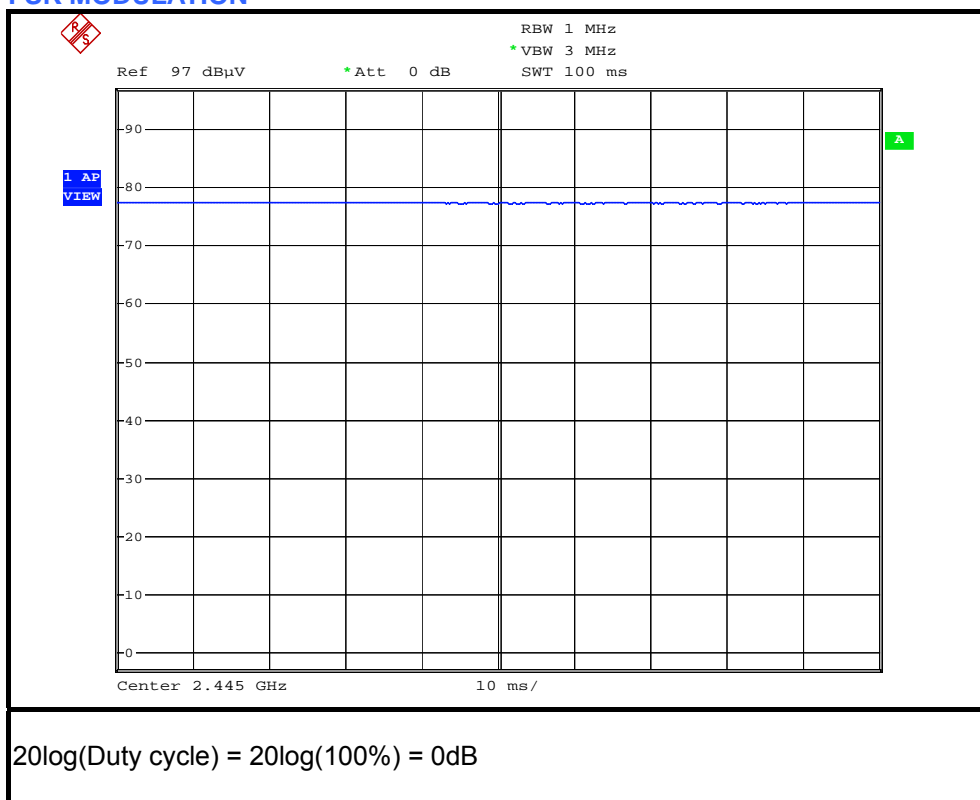
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2459.00	87.06 PK	114.00	-26.94	1.44 V	317	55.43	31.63
2	*2459.00	80.94 AV	94.00	-13.06	1.44 V	317	49.31	31.63
3	2483.50	55.67 PK	74.00	-18.33	1.43 V	317	23.96	31.71
4	2483.50	43.77 AV	54.00	-10.23	1.43 V	317	12.06	31.71
5	4918.00	49.12 PK	74.00	-24.88	1.29 V	231	11.21	37.91
6	4918.00	43.00 AV	54.00	-11.00	1.29 V	231	5.09	37.91

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency
 6. The average value of fundamental frequency is: Average = Peak value + $20\log(\text{Duty cycle})$ Where the duty factor is calculated from following formula:

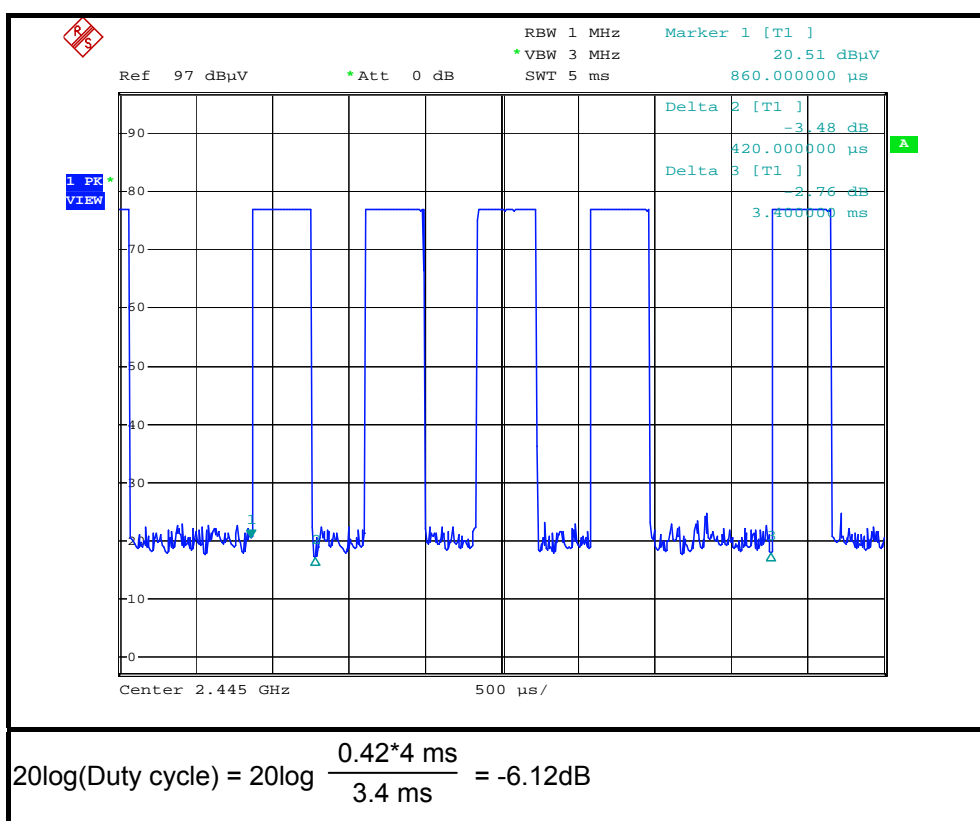
$$20\log(\text{Duty cycle}) = 20\log \frac{0.42 \times 4 \text{ ms}}{3.4 \text{ ms}} = -6.12\text{dB}$$

Please see page 19 for plotted duty

FSK MODULATION



MSK MODULATION



RADIATED WORST-CASE DATA: BELOW 1GHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	FSK	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH, 1016hPa	TEST MODE	A
TESTED BY	Kevin Liang		

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	80.45	31.34 QP	40.00	-8.66	2.00 H	217	20.32	11.02
2	175.72	41.44 QP	43.50	-2.06	1.50 H	109	28.03	13.41
3	267.10	39.21 QP	46.00	-6.79	1.00 H	94	25.15	14.06
4	358.48	40.88 QP	46.00	-5.12	1.00 H	250	24.62	16.27
5	500.42	38.06 QP	46.00	-7.94	2.00 H	64	17.52	20.54
6	696.79	38.96 QP	46.00	-7.04	1.00 H	43	13.78	25.18
7	858.17	38.27 QP	46.00	-7.73	1.00 H	310	10.98	27.28

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	177.67	37.02 QP	43.50	-6.48	1.00 V	202	23.93	13.09
2	267.10	29.62 QP	46.00	-16.38	1.00 V	175	15.56	14.06
3	368.21	31.27 QP	46.00	-14.73	2.00 V	196	14.75	16.52
4	506.25	34.01 QP	46.00	-11.99	1.00 V	325	13.32	20.69
5	696.79	30.90 QP	46.00	-15.10	2.00 V	313	5.71	25.18
6	858.17	31.87 QP	46.00	-14.13	2.00 V	1	4.58	27.28

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

4.2 CONDUCTED EMISSION MEASUREMENT

NA

4.3 BAND EDGES MEASUREMENT

4.3.1 LIMITS OF BAND EDGES MEASUREMENT

Below -50dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.3.2 TEST INSTRUMENTS

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

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

4.3.3 TEST PROCEDURE

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

The spectrum plots are attached on the following pages.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

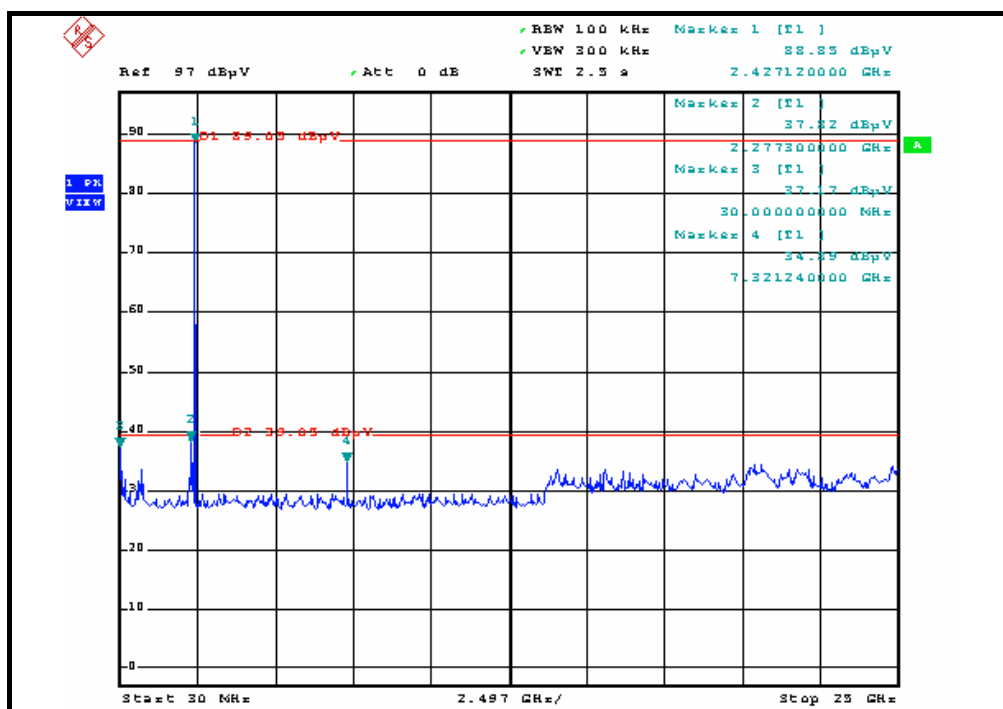
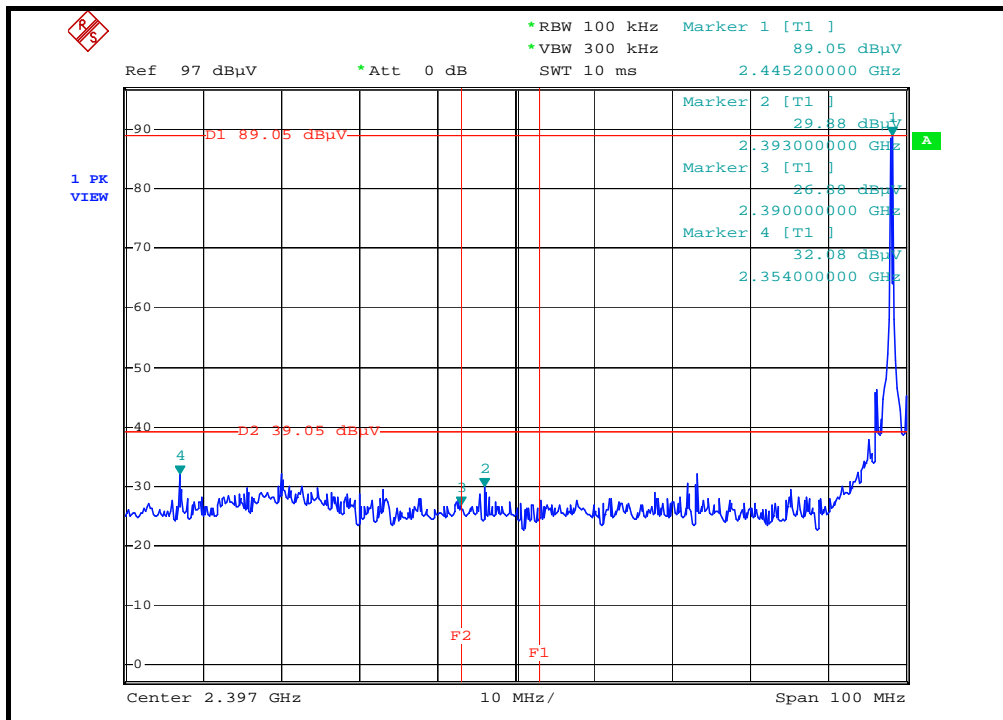
4.3.5 EUT OPERATING CONDITION

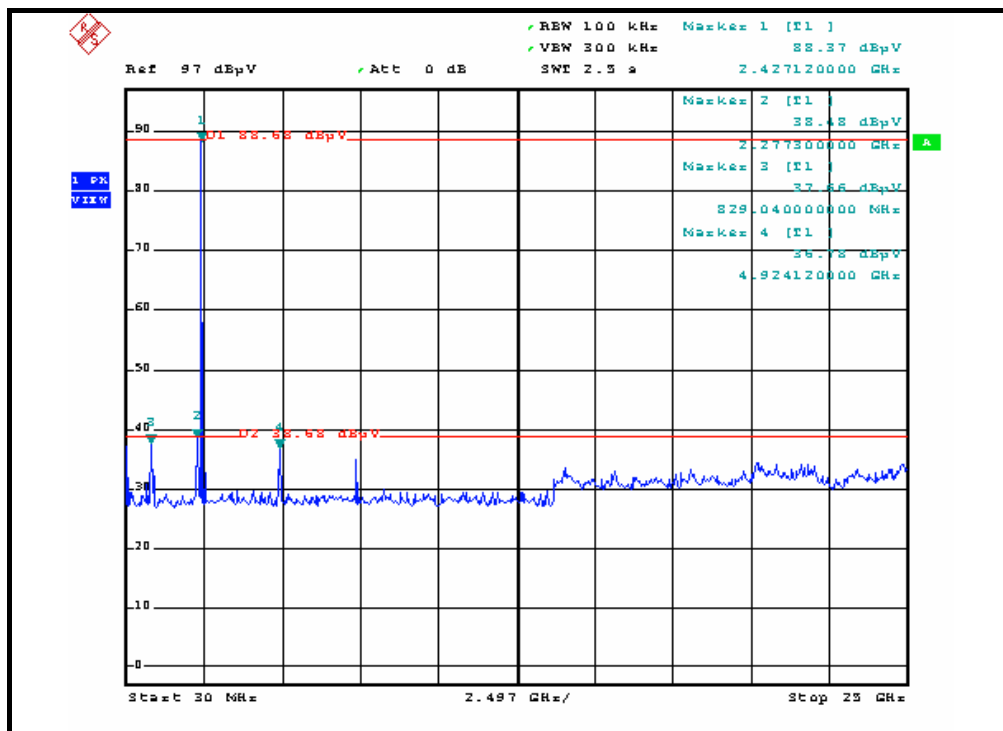
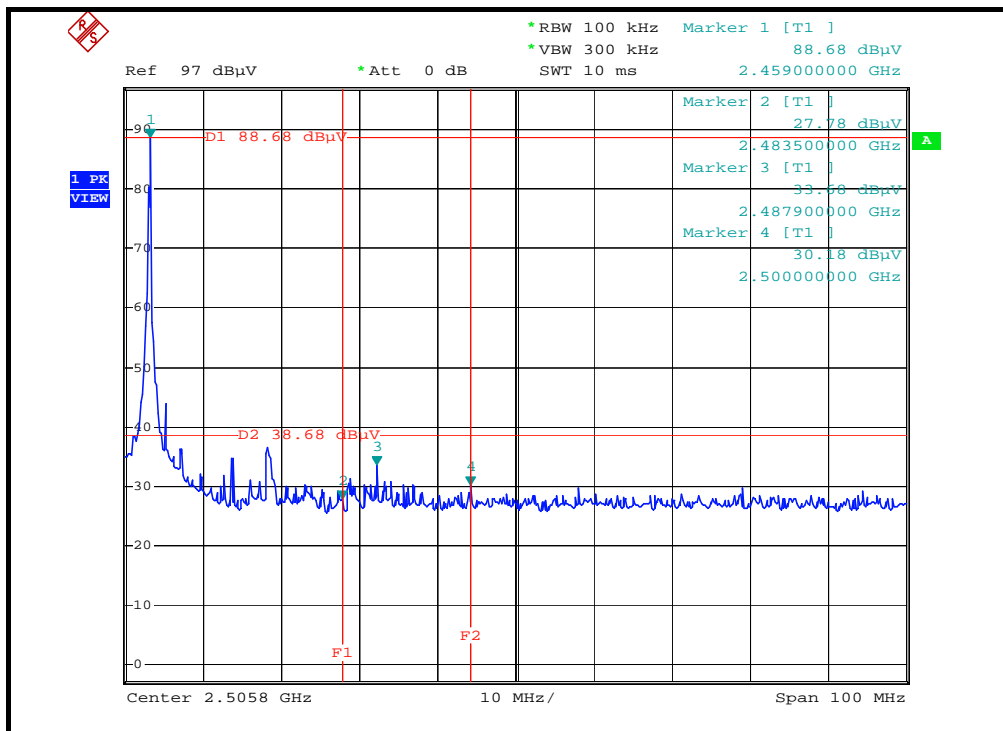
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.6 TEST RESULTS

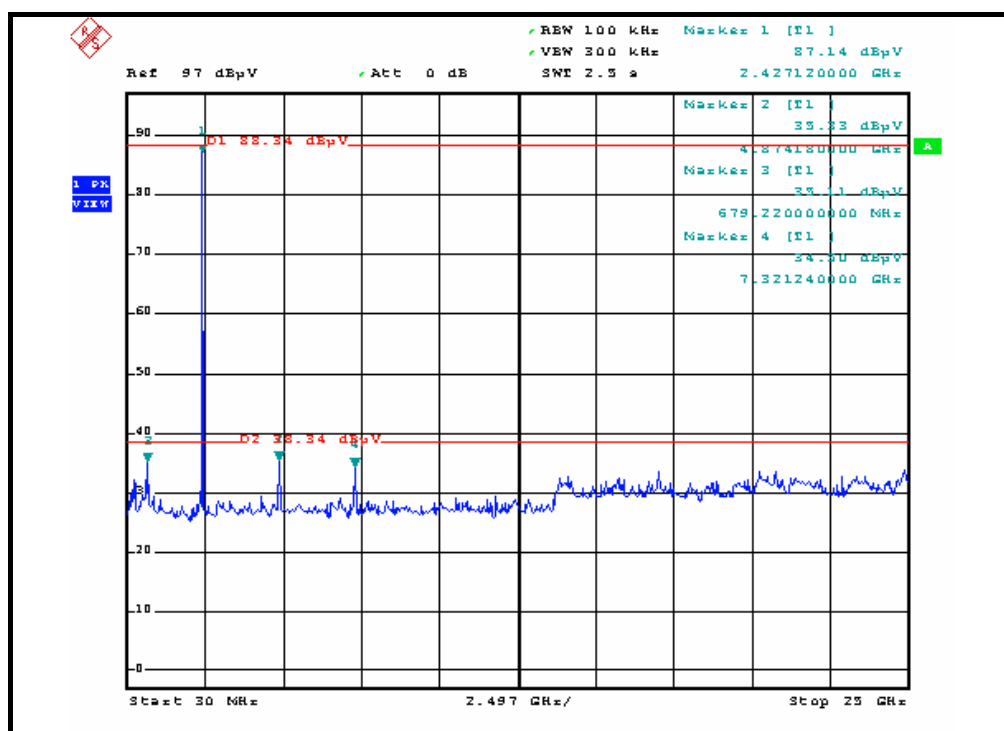
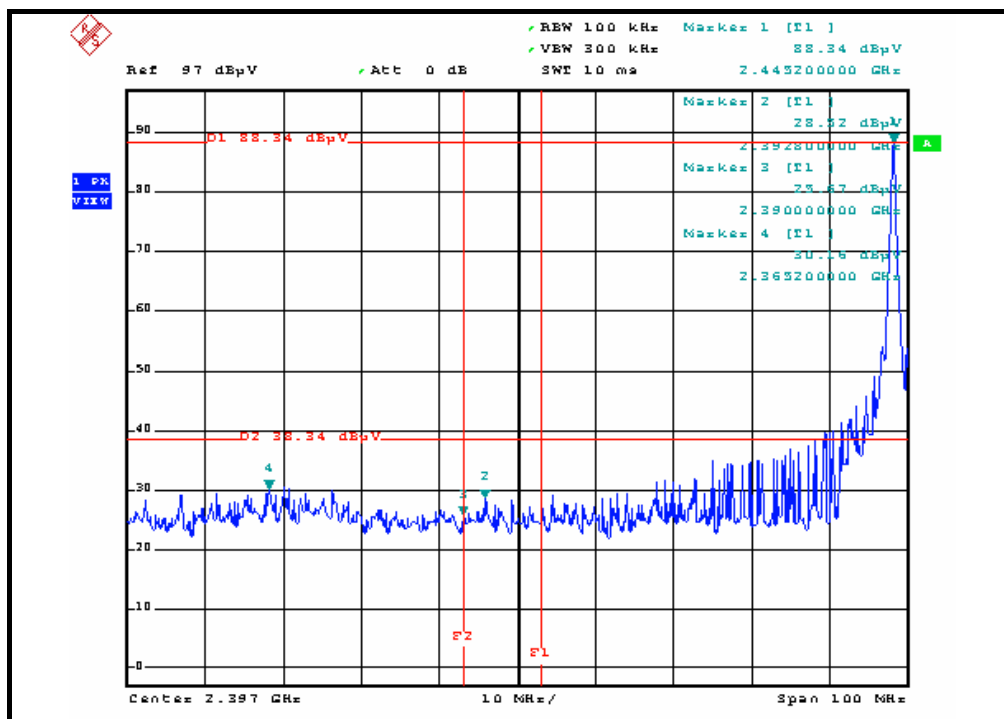
The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 50dB offset below D1. It shows compliance with the requirement in part 15.249 (d).

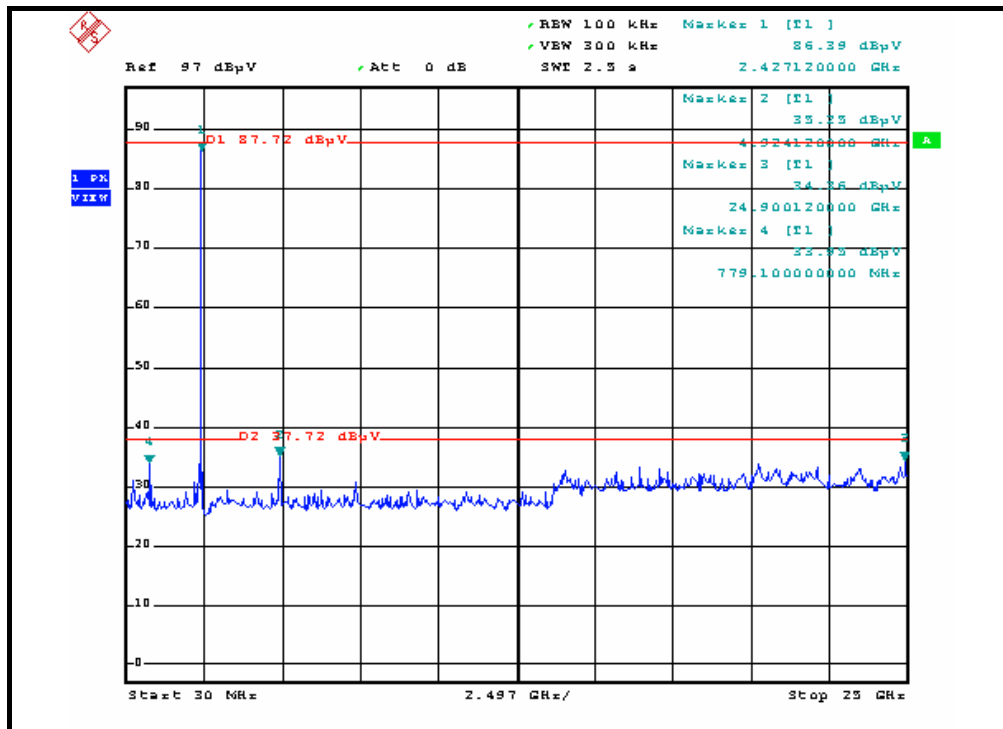
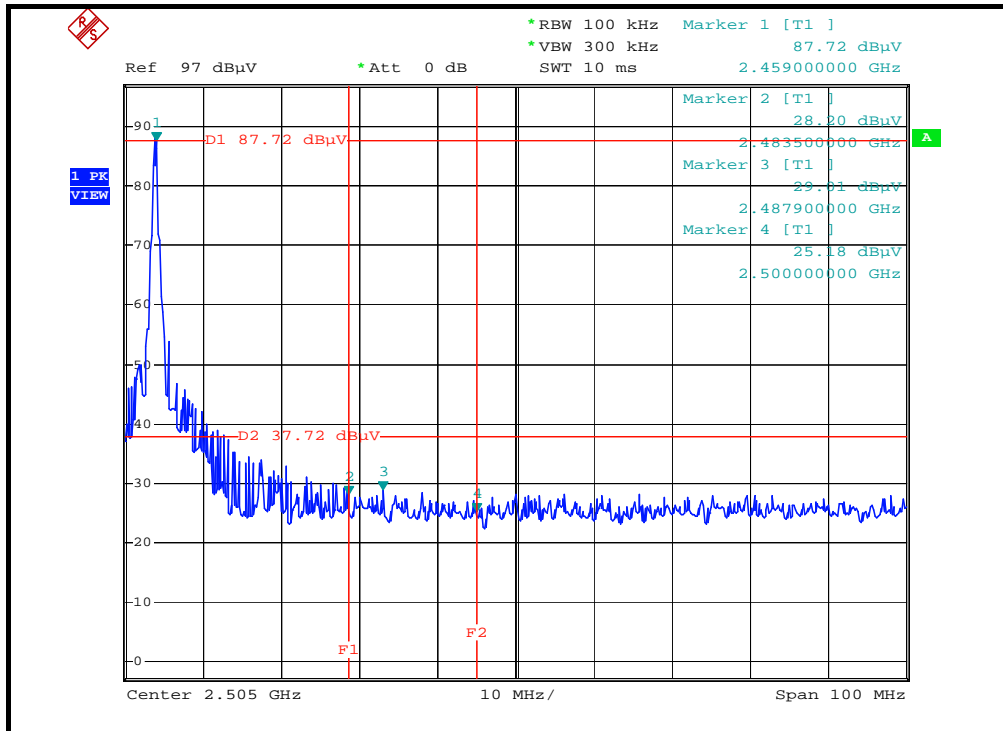
FSK MODULATION





MSK MODULATION





5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6. INFORMATION ON THE TESTING LABORATORIES

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

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

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab

Tel: 886-3-3183232

Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.