

FCC TEST REPORT

REPORT NO.: RF991022E12

MODEL NO.: 28030

FCC ID: PZK-28030R

RECEIVED: Oct. 22, 2010

TESTED: Nov. 01 to 05, 2010 and Nov. 29, 2010

ISSUED: Nov. 29, 2010

APPLICANT: Summer Infant Inc.

ADDRESS: 1275 Park East Drive Woonsocket, RI. 02895. United States

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1 CERTIFICATION

PRODUCT :	Best View digital color video monitor
BRAND NAME :	Summer Infant
MODEL NO. :	28030
APPLICANT :	Summer Infant Inc.
TESTED DATE :	Nov. 01 to 05, 2010 and Nov. 29, 2010 (only for radiated above 1GHz test and duty cycle test items)
TEST SAMPLE :	ENGINEERING SAMPLE
STANDARDS :	FCC Part 15, Subpart C (Section 15.247)
	ANSI C63.4-2003

The above equipment (Model: 28030) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

DATE: Nov. 29. 2010 PREPARED BY (Carol Liao, Specialist) **TECHNICAL** DATE: Nov. 29, 2010 ACCEPTANCE

(Hank Chung, Deputy Manager)

APPROVED BY

(May Chen, Deputy Manager)

DATE: Nov. 29, 2010

Revision Note:

Revision No.	Revised Date	Comment
Rev 1 0	Nov 29 2010	1. Modify test data of radiated above 1GHz and all of related items
	1011 20, 2010	2. Add duty cycle plot.



2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

	APPLIED STANDARD: FCC Part 15, Subpart C						
Standard Section	Test Type and Limit	Result	REMARK				
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -11.85dB at 0.714MHz				
15.247(a)(1) (I)-(ii)	Number of Hopping Frequency Used Spec.: At least 15 channels	PASS	Meet the requirement of limit				
15.247(a)(1) (ii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit				
15.247(a)(1) (I)-(ii)	Hopping Channel Separation Spec. : Min. 25 kHz or two-thirds of 20 dB bandwidth, which ever is greater	PASS	Meet the requirement of limit				
15.247(a)(2)	Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit				
15.247(b)	Maximum Peak Output Power Spec.: max. 125mW	PASS	Meet the requirement of limit				
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -1.7dB at 2485.80MHz				
15.247(c)	Conducted Out-Band Emissions Measurement	PASS	Meet the requirement of limit				
15.203	Antenna Requirement	PASS	No antenna connector is used.				



2.1 ME ASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.3 dB
Radiated emissions (1GHz ~18GHz)	2.19 dB



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Best View digital color video monitor	
MODEL NO.	28030	
FCC ID	PZK-28030R	
POWER SUPPLY	DC 6V from power adapter or DC 3.7V from battery	
MODULATION TYPE	GFSK	
MODULATION TECHNOLOGY	FHSS	
FREQUENCY RANGE	2408.625MHz ~ 2469.375MHz	
NUMBER OF CHANNEL	18	
MAXIMUM OUTPUT POWER	123 mW	
ANTENNA TYPE	monopole antenna (Gain :0dBi)	
DATA CABLE	AV OUT cable x 1(Shielded, 2.0m)	
I/O PORTS	AV OUT port x 1	
ASSOCIATED DEVICES	Rechargeable battery x 1 power adapter x 1	

NOTE:

1. The EUT could be supplied with a power adapter or a rechargeable battery as the following table:

Item	Brand	Model No.	Spec.
			AC I/P: 100~240V, 50~60Hz, 200mA
Adapter	CSEC	CS5B060080FU	DC O/P: 6V, 800mA
			DC output cable : unshielded, 2m
Rechargeable battery	Summer	N-S150	DC 3.7V, 1100mAh



2	The FUT	was pre-to	ested unde	r the follo	wing test	modes.
۷.		was pro t			wing toot	mouco.

Test Mode	Description	Power Source
Mode A	EUT display (X-Z plane)	Battery + Adapter
Mode B	EUT display (X-Y plane)	Battery + Adapter
Mode C	EUT display (Y-Z plane)	Battery + Adapter
Mode D	EUT display (X-Y plane)	Battery
Mode E	AV out display (X-Y plane)	Battery

From the above modes, the worst radiated emission case was found in Mode B. Therefore only the test data of the mode was recorded in this report.

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



3.2 DESCRIPTION OF TEST MODES

Channel	Freq. (MHz)		Channel	Freq. (MHz)		
Onanner	ТХ	RX	Onannei	ΤХ	RX	
0	2,408.625	2,404.125	32	2,440.125	2,435.625	
4	2,412	2,407.5	36	2,444.625	2,440.125	
8	2,415.375	2,410.875	41	2,448	2,443.5	
12	2,418.75	2,414.25	45	2,451.375	2,446.875	
17	2,423.25	2,418.75	40	2,454.75	2,450.25	
21	2,426.625	2,422.125	49	2,458.125	2,453.625	
16	2,430	2,425.5	52	2,462.625	2,458.125	
25	2,433.375	2,428.875	56	2,466	2,461.5	
28	2,436.75	2,432.25	60	2,469.375	2,464.875	

Eighteen channels are provided to this EUT.



3.3 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EU	л	APPLICABLE TO				
	IGURE DDE	PLC	RE < 1G	RE ³ 1G	APCM	DESCRIPTION
-	-		\checkmark	\checkmark	\checkmark	-
Where	Where PLC: Power Line Conducted E		ed Emissio	on	RE < 1G: Radiated Emission below 1GHz	
	RE ³	1 G: Radia	ated Emissi	on above	1GHz	APCM: Antenna Port Conducted Measurement
Power	l ine C	onduct	ed Fmis	sion Te	st.	
Pr be ar	re-Scar etween chitecti	n has be availabl ure).	en condi le moduli	ucted to ations, d	determin ata rates	e the worst-case mode from all possible combination and antenna ports (if EUT with antenna diversity
⊠ Fo	ollowing	g chann	el(s) was	(were)	selected	for the final test as listed below.
	Tested		Modulat	ion N		n
		nei	FHSS	Jgy	GESK	
	Ū		11100	·		
be ar∉ ⊠ Fo	etween chitectu ollowing	availab ure). g chann	le modula	ations, d	ata rates selected	and antenna ports (if EUT with antenna diversity for the final test as listed below.
	Char	nel	Technol	oav		
	0)	FHS	S	GFSK	
<u>Radiate</u> ⊠ Pr b€	ed Emi e-Scar etween chitectu	i <mark>ssion T</mark> has be availabl ure).	F <u>est (Abc</u> een condu le modula el(s) was	ove 1 GI ucted to ations, d	1z): determin ata rates selected	e the worst-case mode from all possible combination and antenna ports (if EUT with antenna diversity for the final test as listed below.
ar 🛛 Fo		y chann	()			
ar K	Test	ed	Modulat	ion Mo	dulation	
ar E	Test Chan 0, 28.	ed nel 60	Modulat Technolo FHSS	ion Mo ogy	dulation Type GFSK	



Conducted Out-Band Emission Measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Tested	Modulation	Modulation
Channel	Technology	Туре
0, 60	FHSS	GFSK

Antenna Port Conducted Measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Tested	Modulation	Modulation	
Channel	Technology	Туре	
0, 28, 60	FHSS	GFSK	

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE ³ 1G	25deg. C, 67%RH, 1012 hPa	120Vac, 60Hz	Frank Liu
RE<1G	24deg. C, 70%RH, 1012 hPa	120Vac, 60Hz	Frank Liu
APCM	25deg. C, 60%RH, 1012 hPa	120Vac, 60Hz	Rex Huang
PLC	25deg. C, 61%RH, 1012 hPa	120Vac, 60Hz	Andy Ho



3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.247) ANSI C63.4 : 2003

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



3.5 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	Best View digital color video monitor	Summer Infant	28030	NA	PZK-28030T

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

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





4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	DESCRIPTION & MODEL NO.		CALIBRATED DATE	CALIBRATED UNTIL				
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011				
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 22, 2010	Sep. 21, 2011				
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011				
RF Cable (JYEBAO)	5DFB	COBCAB-001	Nov. 24, 2009	Nov. 23, 2010				
50 ohms Terminator	50	3	Oct. 27, 2010	Oct. 26, 2011				
Software	BV ADT_Cond_V7.3.7	NA	NA	NA				

Test date: Nov. 05, 2010

Note:

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

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

3 The VCCI Con C Registration No. is C-3611.



4.1.3 TEST PROCEDURES

- a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/HOST were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported



4.1.4 TEST SETUP

Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMIN) 80 cm from EUT and at the least 80 cm

from other units and other metal planes support units.

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



4.1.5 EUT OPERATING CONDITIONS

- 1 The EUT linked to support unit 1 (Best View digital color video monitor) which was placed at outside of testing area via wireless.
- 2 Set the EUT under transmission / receiver condition continuously at specific channel frequency.



3.0.1 TEST RESULTS

PHASE			ne (L)			6DB BANDWIDTH			9 kHz	
	Freq. Corr. Reading Value Emission Level		Lir	nit	Mar	gin				
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(dl	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.303	0.09	42.90	-	42.99	-	60.16	50.16	-17.17	-
2	0.392	0.09	37.56	-	37.65	-	58.02	48.02	-20.37	-
3	0.572	0.09	43.39	-	43.48	-	56.00	46.00	-12.52	-
4	0.714	0.10	44.05	-	44.15	-	56.00	46.00	-11.85	-
5	0.877	0.10	40.97	-	41.07	-	56.00	46.00	-14.93	-
6	1.191	0.10	41.67	-	41.77	-	56.00	46.00	-14.23	_
7	1.430	0.10	39.23	-	39.33	-	56.00	46.00	-16.67	-
8	1.961	0.11	38.38	-	38.49	-	56.00	46.00	-17.51	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

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





PHASE			Neutral (N)			6DB BANDWIDTH			9 kHz	
	Freq.	Freq. Corr. Reading Value Emission Level		Lii	nit	Mar	gin			
No		Facto	or [dB ((uV)]	[dB	(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.245	0.09	39.57	-	39.66	-	61.94	51.94	-22.28	-
2	0.470	0.10	36.59	-	36.69	-	56.51	46.51	-19.82	-
3	0.603	0.10	38.64	-	38.74	-	56.00	46.00	-17.26	-
4	0.681	0.10	38.61	-	38.71	-	56.00	46.00	-17.29	-
5	0.954	0.11	39.39	-	39.50	-	56.00	46.00	-16.50	-
6	6.226	0.22	37.64	-	37.86	-	60.00	50.00	-22.14	-

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.





3.1 NUMBER OF HOPPING FREQUENCY USED

3.1.1 LIMIT OF HOPPING FREQUENCY USED

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

3.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

NOTE:

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

3.1.3 TEST PROCEDURES

- 1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 2. 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.
- 3. 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.
- 4. Set the SA on View mode and then plot the result on SA screen.
- 5. Repeat above procedures until all frequencies measured were complete.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation



3.1.5 TEST SETUP



3.1.6 TEST RESULTS

There are18 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.







3.2 DWELL TIME ON EACH CHANNEL

3.2.1 LIMIT OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 7.2 second period.

3.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

NOTE:

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

3.2.3 TEST PROCEDURES

- 1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- 4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 5. Repeat above procedures until all frequencies measured were complete.



3.2.4 DEVIATION FROM TEST STANDARD

No deviation

3.2.5 TEST SETUP



3.2.6 TEST RESULTS

Number of transmission in a 7.2 (18Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
10 (times / 0.72 sec) * 10=100.00 times	0.48	48	400

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









3.3 CHANNEL BANDWIDTH

3.3.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the two-thirds 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

3.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

3.3.3 TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.

3.3.4 DEVIATION FROM TEST STANDARD

No deviation



3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITION

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



3.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2408.625	3.78
28	2436.75	3.58
60	2469.375	3.6

Channel 0





Channel 28



Channel 60





3.4 HOPPING CHANNEL SEPARATION

3.4.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

3.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

3.4.3 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.



3.4.4 DEVIATION FROM TEST STANDARD

No deviation

3.4.5 TEST SETUP





3.4.6 TEST RESULTS

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2408.625	3.100	2.520	PASS
28	2436.75	3.400	2.387	PASS
60	2469.375	3.300	2.400	PASS

The minimum limit is two-thirds of 20dB bandwidth. Test results please refer to below pages.

Channel 0





Channel 28



Channel 60





3.5 MAXIMUM PEAK OUTPUT POWER

3.5.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

3.5.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

3.5.3 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. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 10 MHz RBW and 10 MHz VBW.
- 4. Measure the captured power within the band and recording the plot.
- 5. Repeat above procedures until all frequencies measured were complete.

3.5.4 DEVIATION FROM TEST STANDARD

No deviation



3.5.5 TEST SETUP



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

3.5.6 EUT OPERATING CONDITION

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



3.5.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	2408.625	20.9	123.0	125	PASS
28	2436.75	20.4	109.6	125	PASS
60	2469.375	19.9	97.7	125	PASS

Channel 0





Channel 28





3.6 RADIATED EMISSION MEASUREMENT

3.6.1 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

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.



3.6.2 TEST INSTRUMENTS

For below 1GHz test:

DECODIDITION &				
MANUFACTURER	MODEL NO.	SERIAL NO.	DATE	UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 13, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Sep. 29, 2010	Sep. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 29, 2010	Sep. 28, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_ V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

 Turn Table
 Image: Construction of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

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

 3. The test was performed in 966 Chamber No. G.

 4. The FCC Site Registration No. is 966073.

 5. The VCCI Site Registration No. is G-137.

 6. The CONMADA Site Registration No. is IC 7450H 2

6. The CANADA Site Registration No. is IC 7450H-2.



For above 1GHz test:						
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL		
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011		
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011		
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011		
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011		
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011		
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA		
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011		
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011		
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011		
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010		
RF Cable	NA	CHGCAB_001	NA	NA		
Software	ADT_Radiated_ V8.7.05	NA	NA	NA		
CT Antenna Tower & Turn Table	NA	NA	NA	NA		

Iurn Table
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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.



3.6.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meters chamber room. 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 and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.

3.6.4 DEVIATION FROM TEST STANDARD

No deviation



3.6.5 TEST SETUP



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



3.6.6 TEST RESULTS

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz	
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak	
ENVIRONMENTAL CONDITIONS	24deg. C, 70%RH 1012 hPa	TESTED BY	Frank Liu	

	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	34.03	22.2 QP	40.0	-17.9	1.00 H	204	9.02	13.13
2	252.04	33.0 QP	46.0	-13.0	1.25 H	306	19.73	13.27
3	294.08	30.5 QP	46.0	-15.5	1.00 H	122	15.55	14.96
4	599.97	27.3 QP	46.0	-18.7	1.50 H	135	5.32	21.97
5	624.01	26.0 QP	46.0	-20.0	1.25 H	29	3.78	22.24
6	648.05	25.4 QP	46.0	-20.6	1.25 H	29	2.88	22.50
		ANTENNA	POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 3 M	
NO.	NO. FREQ. (MHz) EMISSION LEVEL (dBuV/m) LIMIT (dBuV/m) MARGIN (dB) ANTENNA HEIGHT (m) (Degree) RAW VALUE (dBuV) (dBuV) (dB/n)							Correction Factor (dB/m)
1	32.99	31.5 QP	40.0	-8.5	1.00 V	354	18.55	12.95
2	251.92	27.1 QP	46.0	-18.9	1.50 V	0	13.86	13.26
3	336.36	25.4 QP	46.0	-20.6	1.25 V	42	9.41	15.99
4	374.02	25.6 QP	46.0	-20.5	1.75 V	130	8.76	16.79
5	420.20	25.0 QP	46.0	-21.0	1.25 V	125	7.16	17.81
6	599.97	26.4 QP	46.0	-19.6	1.00 V	292	4.39	21.97

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.



GFSK MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)	
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1012 hPa	TESTED BY	Frank Liu	

	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	2389.10	68.6 PK	74.0	-5.4	1.01 H	245	36.43	32.17		
2	2389.10	28.2 AV	54.0	-25.8	1.01 H	245	-3.97	32.17		
3	*2408.625	120.5 PK			1.00 H	242	88.26	32.24		
4	*2408.625	80.1 AV			1.00 H	242	47.86	32.24		
5	4817.20	58.5 PK	74.0	-15.5	1.53 H	354	18.80	39.70		
6	4817.20	18.1 AV	54.0	-35.9	1.53 H	354	-21.60	39.70		
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	Т 3 М			
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	2388.90	63.4 PK	74.0	-10.6	1.43 V	221	31.23	32.17		
2	2388.90	23.0 AV	54.0	-31.0	1.43 V	221	-9.17	32.17		
3	*2408.625	114.3 PK			1.42 V	218	82.06	32.24		
4	*2408.625	73.9 AV			1.42 V	218	41.66	32.24		
5	4817.20	58.6 PK	74.0	-15.4	1.08 V	355	18.90	39.70		
6	4817.20	18.2 AV	54.0	-35.8	1.08 V	355	-21.50	39.70		

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. Average value = peak reading + 20log(Dwell Time / 100ms).
- 7. 20 log (0.48 * 2 ms / 100ms) = -40.4 dB Please see page 47 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETA	L
CHANNEL	Channel 28	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1012 hPa	TESTED BY	Frank Liu

	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	*2436.75	120.4 PK			1.00 H	241	88.07	32.33		
2	*2436.75	80.0 AV			1.00 H	241	47.67	32.33		
3	4873.50	58.4 PK	74.0	-15.6	1.19 H	343	18.50	39.90		
4	4873.50	18.0 AV	54.0	-36.0	1.19 H	343	-21.90	39.90		
5	7310.20	59.2 PK	74.0	-14.8	1.38 H	295	11.64	47.56		
6	7310.20	18.8 AV	54.0	-35.2	1.38 H	295	-28.76	47.56		

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	*2436.75	114.1 PK			1.40 V	217	81.77	32.33
2	*2436.75	73.7 AV			1.40 V	217	41.37	32.33
3	4873.50	59.0 PK	74.0	-15.0	1.05 V	10	19.10	39.90
4	4873.50	18.6 AV	54.0	-35.4	1.05 V	10	-21.30	39.90
5	7310.20	60.9 PK	74.0	-13.1	1.04 V	52	13.34	47.56
6	7310.20	20.5 AV	54.0	-33.5	1.04 V	52	-27.06	47.56

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. " * ": Fundamental frequency.
- 6. Average value = peak reading + 20log(Dwell Time / 100ms).
- 7. 20 log (0.48 * 2 ms / 100ms) = -40.4 dB Please see page 47 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETA	L
CHANNEL	Channel 60	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH 1012 hPa	TESTED BY	Frank Liu

	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	*2469.375	119.4 PK			1.00 H	237	86.95	32.45		
2	*2469.375	79.0 AV			1.00 H	237	46.55	32.45		
3	2485.80	72.3 PK	74.0	-1.7	1.00 H	248	39.80	32.50		
4	2485.80	31.9 AV	54.0	-22.1	1.00 H	248	-0.60	32.50		
5	4938.80	58.6 PK	74.0	-15.4	1.14 H	313	18.48	40.12		
6	4938.80	18.2 AV	54.0	-35.8	1.14 H	313	-21.92	40.12		
7	7408.10	58.2 PK	74.0	-15.8	1.37 H	283	10.68	47.52		
8	7408.10	17.8 AV	54.0	-36.2	1.37 H	283	-29.72	47.52		
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2469.375	113.9 PK			1.41 V	211	81.45	32.45		
2	*2469.375	73.5 AV			1.41 V	211	41.05	32.45		
3	2485.90	68.6 PK	74.0	-5.4	1.37 V	203	36.10	32.50		
4	2485.90	28.2 AV	54.0	-25.8	1.37 V	203	-4.30	32.50		
5	4938.80	59.6 PK	74.0	-14.4	1.07 V	19	19.48	40.12		
6	4938.80	19.2 AV	54.0	-34.8	1.07 V	19	-20.92	40.12		
7	7408.10	61.3 PK	74.0	-12.7	1.03 V	64	13.78	47.52		
0	7408 10	20 9 AV	54.0	-33 1	1 03 V	64	-26 62	47 52		

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. Average value = peak reading + 20log(Dwell Time / 100ms).
- 7. 20 log (0.48 * 2 ms / 100ms) = -40.4 dB Please see page 47 for plotted duty.





3.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010

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

4.8.3 TEST PROCEDURE

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

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 EUT OPERATING CONDITION

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



4.8.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer following pages for met the requirement of the general radiated emission limits in § 15.209.









4 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025:

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: <u>www.adt.com.tw/index.5/phtml</u>. 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

Email: <u>service@adt.com.tw</u> Web Site: <u>www.adt.com.tw</u>

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



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

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

---- END ----