EMI TEST REPORT

Test report No.: **EMC- FCC- 0443**

Type of equipment: **PMP**

Model Name: **BFN-OP67E**

FCC ID : **UOOBFN-OP67E**

Applicant: **tinnos, inc.**

Test standards: **FCC part 15 subpart B Class B**

Test Procedure and Items :
AC Power Line Conducted Emissions Measurement: ANSI C63.4:2003
Radiated Emissions Measurement : ANSI C63.4:2003

Test result : Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: 2006. 09. 11

Issued date: 2006. 11. 01

Tested by: BAEK, JEONG-SOO

Approved by: M.S. Chung CHUNG, MIN-SEOK

EMC Compliance Ltd.
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1. Client information

Applicant:	tinnos, inc.
Address:	7F, Dongyoung Bldg, 891-62 Daechi-dong, Gangnam-gu, Seoul 135-280, Korea
Telephone number:	+822-3452-8589
Facsimile number :	+82303-0404-8051
Contact person:	Jeong-Sik Lee/ Senior Research Engineer

Manufacturer:	tinnos, inc.
Address:	7F, Dongyoung Bldg, 891-62 Daechi-dong, Gangnam-gu, Seoul 135-280, Korea
Telephone number:	+822-3452-8589
Facsimile number :	+82303-0404-8051
Contact person:	Jeong-Sik Lee/ Senior Research Engineer

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

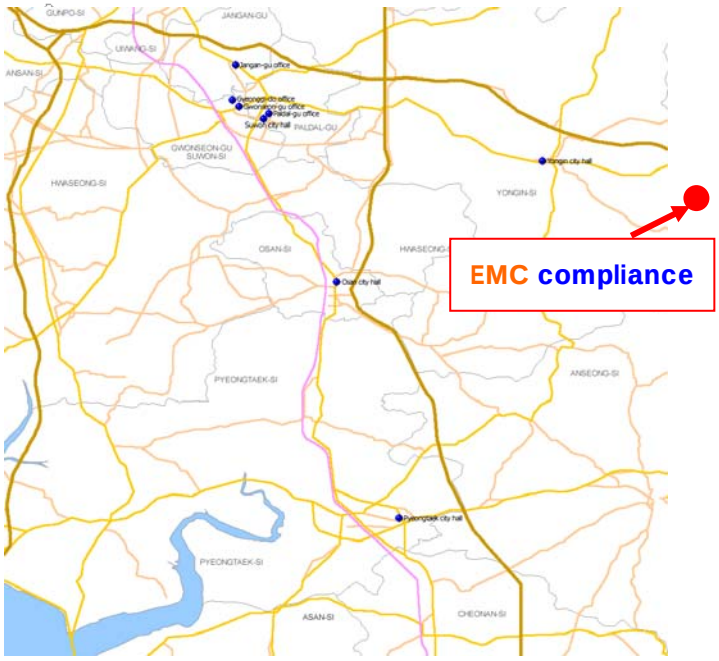
Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

VCCI Registration No. : C-1713, R-1606

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation Environment

		Temperature	Humidity	Pressure
OATS	:	25 °C	48 %	1001 hPa
Shielded room	:	24 °C	50 %	1000 hPa

Test site

These testing were performed following locations;

OATS : Radiated emission

Shielded room: Conducted emission

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are test receiver, Cable Loss, antenna factor calibration, Antenna directivity, antenna factor Variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, Site imperfection, mismatching, and system repeatability.

Based on NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

Radiated emission

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follows :

FS = MR + AF + CL + AT -AG

MR = Meter Reading / AF = Antenna Factor / CL = Cable Loss

AP = Antenna Pad / AG=Amplifier Gain /

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

30 + 12 + 5 + 10 –35 = 22dBuV/m

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss to the measured reading.

The sample calculation is as follows :

FS = MR + LF + CL

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (FS) is

30 + 1 + 1 = 32dBuV

4. Description of E.U.T.

4.1 Product description

Applicant :	tinnos, inc.
Address of Applicant:	7F, Dongyoung Bldg, 891-62 Daechi-dong, Gangnam-gu, Seoul 135-280, Korea
Manufacturer:	tinnos, inc.
Address of Manufacturer:	7F, Dongyoung Bldg, 891-62 Daechi-dong, Gangnam-gu, Seoul 135-280, Korea
Type of equipment:	PMP
Basic Model:	BFN-OP67E
Brand name:	blufin
Rating:	Adaptor input: 100-240VAC, 50/60Hz, 0.7A Output: DC +5V, 3A
Serial number:	N/A

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
PC	DIMESION4700	BN34F1S	DELL
MONITOR	CT1810	MP02215088	CORNEA
PS/2 KEYBOARD	SK-8110	MY-04N729-71619-544-0325	DELL
PS/2 MOUSE	M-S34	311060-001	Logitech
SERIAL MOUSE	Microsoft HOME	489798	Microsoft Corp.

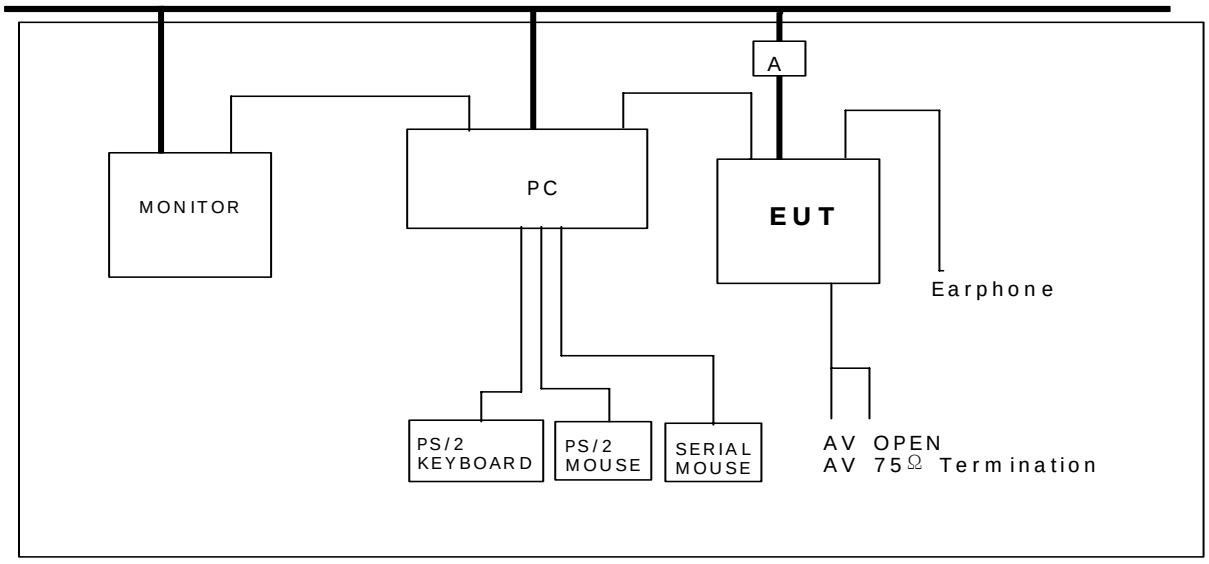
4.3 Operating conditions

- USB up/down mode

4.4 Used cables

Start		END		Cable Spec.	
Name	**I/O Port**	**Name**	**I/O Port**	**Length**	**Shield**
E.U.T	A/V Y Cable	75ΩTermination	-	1.5	SHIELD
	A/V Y Cable	OPEN	-	1.5	SHIELD
	Earphone	OPEN	-	1.0	UNSHIELD
	USB Cable	PC	USB Cable	1.5	SHIELD
	Adaptor	-	-	1.3	UNSHIELD

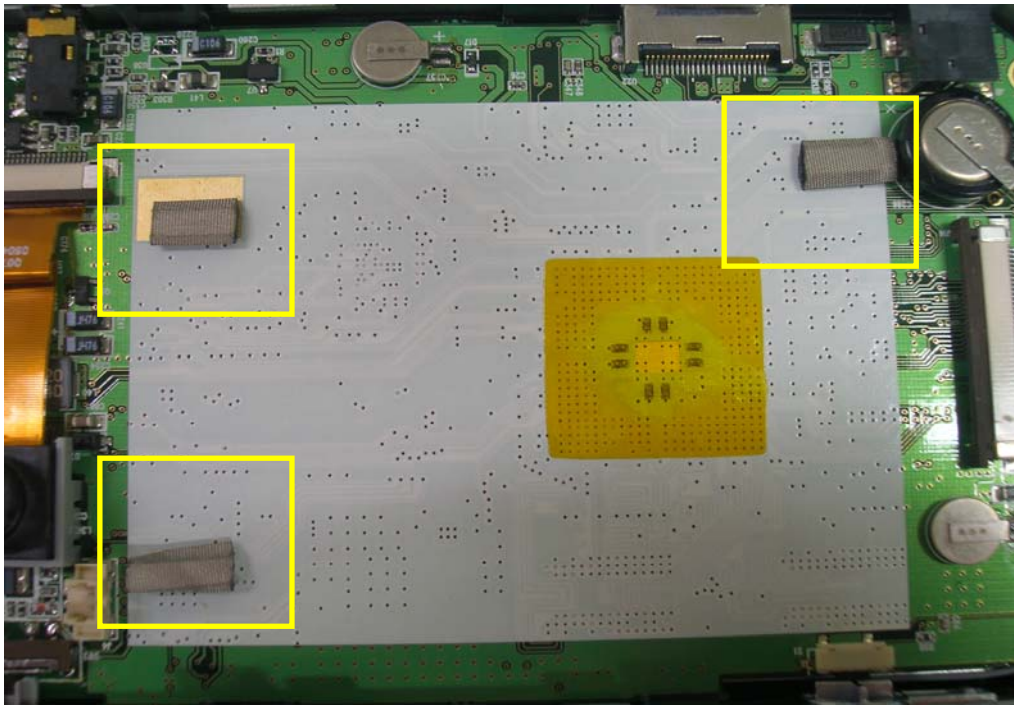
4.5 EUT test configuration

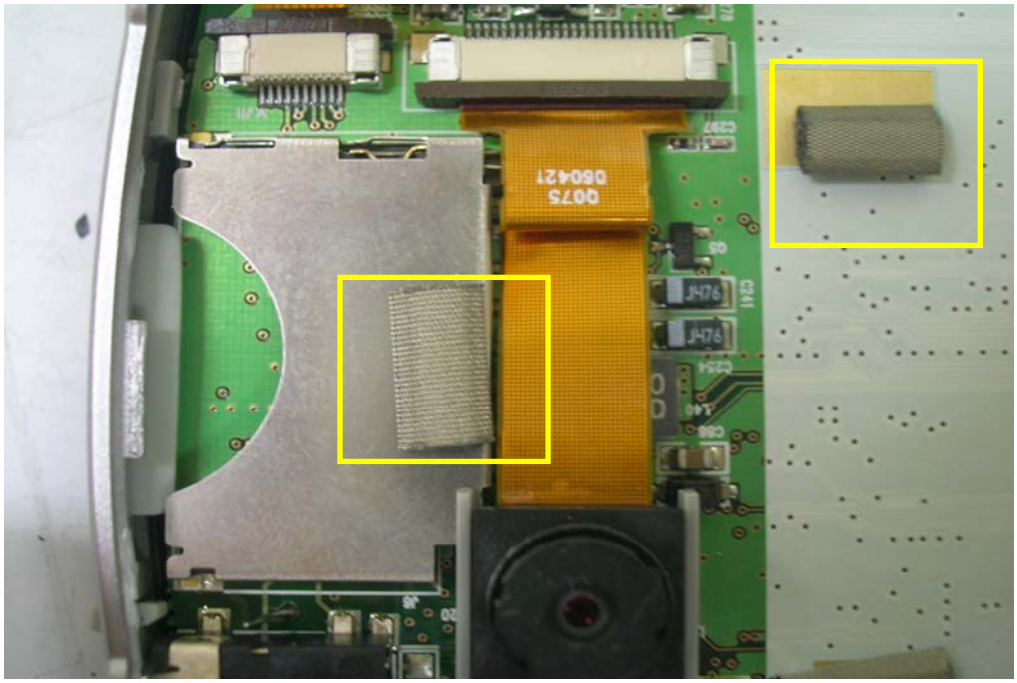


5. Summary of test results

5.1 Modification to the E.U.T.

-Add the form gasket





5.2 Standards & results

FCC part 15 subpart B (Class B)

ANSI C63.4 – 2003

Test items	Test methods	Result
Conducted emission	ANSI C63.4-2003	Pass
Radiated emission	ANSI C63.4-2003	Pass

6. Test results

6.1 Conducted Emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.
EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.
The rear of table was located 0.4 m to the vertical conducted plane.
Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.
Both lines of power cord, hot and neutral, were measured.

6.1.2 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test receiver	ESHS30	844827/011	R&S	07.07.14	☒
L.I.S.N.	ESH3-Z5	100267	R&S	07.06.17	☒
	L3-32	0120J20305	PMM	05.12.27	☐
Test site	Shield room	-	-	-	☒

6.1.3 Measurement uncertainty

Conducted emission measurement : (k=2, 95%)
9kHz-150 kHz : ±3.46 [dB]
150kHz-30 MHz : ±3.01 [dB]

6.1.4 Test data

Frequency	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.153	0.28	0.2	N	65.84	54.47	54.95	55.84	35.19	35.67
0.165	0.28	0.2	N	65.21	53.57	54.05	55.21	35.96	36.44
0.177	0.11	0.3	H	64.63	52.69	53.10	54.63	23.42	23.83
0.207	0.11	0.3	H	63.32	51.02	51.43	53.32	32.35	32.76
0.225	0.11	0.3	H	62.63	50.61	51.02	52.63	28.22	28.63
0.261	0.12	0.3	N	61.40	48.64	49.06	51.40	32.56	32.98
0.510	0.14	0.1	H		35.43	35.67		14.00	14.24
0.555	0.16	0.1	N		36.73	36.99		20.38	20.64
0.630	0.16	0.1	N	56.00	36.41	36.67	46.00	24.07	24.33
0.723	0.15	0.1	H		33.69	33.94		20.26	20.51
0.804	0.16	0.1	N		36.75	37.01		23.76	24.02
0.921	0.16	0.1	N		34.37	34.63		22.00	22.26
5.110	0.29	0.3	N		22.10	22.69		11.95	12.54
5.740	0.34	0.3	N		23.07	23.71		12.06	12.70
5.910	0.33	0.3	H	60.00	20.45	21.08	50.00	8.77	9.40
6.400	0.34	0.3	N		22.66	23.30		12.46	13.10
6.680	0.36	0.4	H		21.02	21.78		9.75	10.51
9.800	0.40	0.1	N		20.02	20.52		11.95	12.45

- Note. QP = Quasi-Peak, AV= Average / LINE(N) : NEUTRAL, LINE(H) : HOT
- Loss = LISN Loss + Cable Loss
- Measurement time :1s

6.1.5. Result

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.107(a).

6.2 Radiated Emission

6.2.1 Measurement procedure

A pretest was performed at 3 m distance in a mini chamber for searching correct frequency.
The final test was done at a 10 m open area test site with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.
They were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.
Cables connected to EUT were fixed to cause maximum emission.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESCI	100001	R&S	06.10.24	☒
TRILOG SUPER Broadband ANT	VULB 9160	3138	Schwarzbeck Mess-Electronik	06.10.26	☒
Antenna Mast	A109	N/A	DEAIL	-	☒
Turn Table	TS14	N/A	DEAIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

6.2.3 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)
30-300 MHz ; 3 m: ±3.69 [dB], 10 m: ±3.67 [dB]
300-1000 MHz ; 3 m: ±4.07 [dB], 10 m: ±3.41 [dB]

6.2.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
60.61	11.5	V	1.0	142	11.38	1.80	30.0	24.68	5.32
93.70	7.1	V	1.0	157	8.35	2.10	30.0	17.55	12.45
189.87	11.4	H	2.7	240	10.25	2.90	30.0	24.55	5.45
296.89	14.4	H	3.2	214	12.76	3.90	37.0	31.06	5.94
333.78	8.0	V	1.7	247	13.60	4.20	37.0	25.80	11.20
480.00	3.5	V	1.2	229	16.89	5.30	37.0	25.69	11.31
826.34	1.2	H	1.5	124	22.41	7.30	37.0	30.91	6.09
897.73	2.5	V	1.2	121	22.88	7.40	37.0	32.78	4.22

* Receiving Antenna Mode : *Horizontal, Vertical*

* 10 m OATS

* *Note : Reading = Test Receiver meter,*

P= Polarization → POL H = Horizontal, POL V = Vertical

* *Result = Field Strength (Antenna factor + Cable factor + Reading*

6.2.5. Result

The EUT tested complied with the limits detailed in FCC Rules Part 15 Section 15.109(g).

7. Test graphs

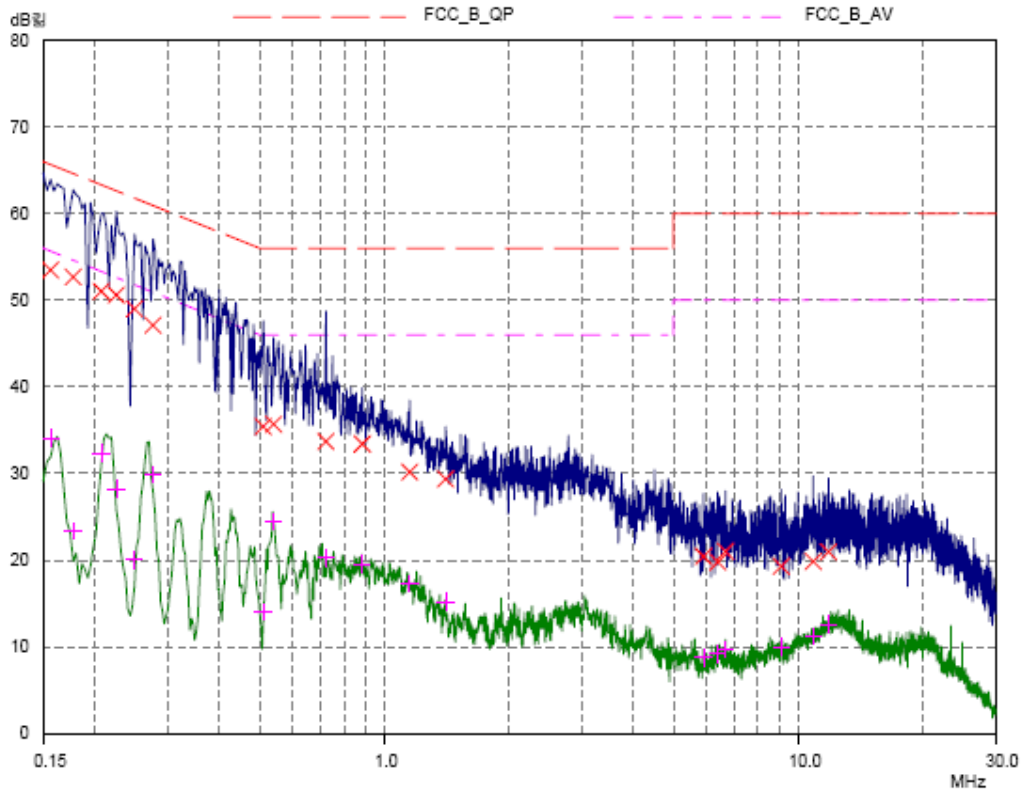
EUT: PMP
Manuf: TINOS
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: tinos_h.dat : PMP TINOS H

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



EUT:	PMP
Manuf:	TINOS
Op Cond:	N
Operator:	
Test Spec:	FCC Class B Conducted Emission
Comment:	

Result File: tinos_n.dat : PMP TINOS N

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement:

Detectors:	X QP / + AV
Meas Time:	1sec
Peaks:	8
Acc Margin:	25 dB