

Test Report of FCC Part 15 B: 2006 FOR FCC CERTIFICATE

On Behalf of

Acoustic Arc International Ltd.

Product Description: Radarbox System

Model No.: AR0810

Brand Name: AirNav

FCC ID: VHC- AR0810

Prepared for: Acoustic Arc International Ltd.

Unit 207,2/F,Photonics Centre,No.2 Science Park, East Avenue,
HongKong Science Park,N.T Hong Kong

Prepared by: Bontek Compliance Testing Laboratory Ltd

1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road,
Nanshan, Shenzhen, China

Tel: 86-755-86337020

Fax: 86-755-86337028

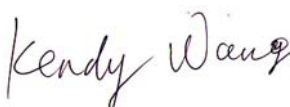
Report No.: BCT08IR-672E

Issue Date: September 22, 2008

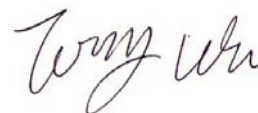
Test Date: September 03~12, 2008

Test by:

Reviewed By:



Kendy Wang



Tony Wu

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bontek Compliance Testing Laboratory Ltd.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Acoustic Arc International Ltd.
Address of applicant: Unit C,26/F,Gold King Industrial Buldg,35-41 Tai Lin Pai Rd,
Kwai Chung,N.T,Hong Kong
Manufacturer: Acoustic Arc International Ltd.
Address of manufacturer: Unit C,26/F,Gold King Industrial Buldg,35-41 Tai Lin Pai Rd,
Kwai Chung,N.T,Hong Kong

General Description of E.U.T

EUT Description: **Radarbox System**
Trade Name: AirNav
Model No.: **AR0810**
Power Rating: Input: 5VDC 1.09G Hz 0.18A

Remark: * The test data gathered are from the production sample provided by the manufacturer.
Supplementary Models share same circuit and with different appearance.

General Description of Test Auxiliary

EUT Description:	Manufacturer	Model No.	Certificate
Host Computer	Dell	78MD82X	CE, FCC
Monitor	MAG	777NS	CE, FCC
Keyboard	Dell	L100	CE, FCC
Mouse	Dell	OCJ339	CE, FCC
Printer	Epson	Photo 810	CE,FCC

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart B Class B 2006

The objective of the manufacturer is to demonstrate compliance with the described above standards.

1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart B for Emissions

Tests Carried Out Under FCC Part 15 Subpart B

Standard	Test Items	Status
FCC Part 15 Subpart B	Conduction Emission, 0.15MHz to 30MHz	√
FCC Part 15 Subpart B	Radiation Emission, 30MHz to 1000MHz	√

- √ Indicates that the test is applicable
× Indicates that the test is not applicable

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All measurement required was performed at Bontek Compliance Testing Laboratory Ltd at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 338263

Bontek Compliance Testing Laboratory Ltd, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March, 2008.

The facility also complies with the radiated and AC line conducted test site criteria set forth in CISPR 16-1: 2002, CISPR16-2: 2002.

1.6 Test Equipment List and Details

Test equipments list of Bontek Compliance Testing Laboratory Ltd.

Equipment	Manufacturer	Model No.	Last Cal	Calibration Period
EMI Test Receiver	R&S	ESCI	2008-2-22	1 year
EMI Test Receiver	R&S	ESPI	2008-2-22	1 year
Amplifier	HP	8447D	2008-2-22	1 year
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2008-2-22	1 year
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	2008-2-22	1 year
Horn Antenna	SCHWARZBECK	BBHA9120A	2008-2-27	1 year
High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	2008-2-27	1 year
Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2008-2-27	1 year
Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	2008-2-27	1 year
Power Clamp	SCHWARZBECK	MDS-21	2008-2-22	1 year
Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	2008-3-31	1 year
Positioning Controller	C&C	CC-C-1F	2008-2-22	1 year
Electrostatic Discharge Simulator	TESEQ	NSG437	2008-3-31	1 year
Fast Transient Burst Generator	SCHAFFNER	MODULA6150	2008-2-22	1 year
Fast Transient Noise Simulator	Noiseken	FNS-105AX	2008-2-22	1 year
Capacitive Coupling Clamp	TESEQ	CDN8014	2008-2-22	1 year
Color TV Pattern Genenator	PHILIPS	PM5418	2008-2-22	1 year
Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	2008-2-22	1 year
Triple-Loop Antenna	EVERFINE	LLA-2	2008-2-22	1 year

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

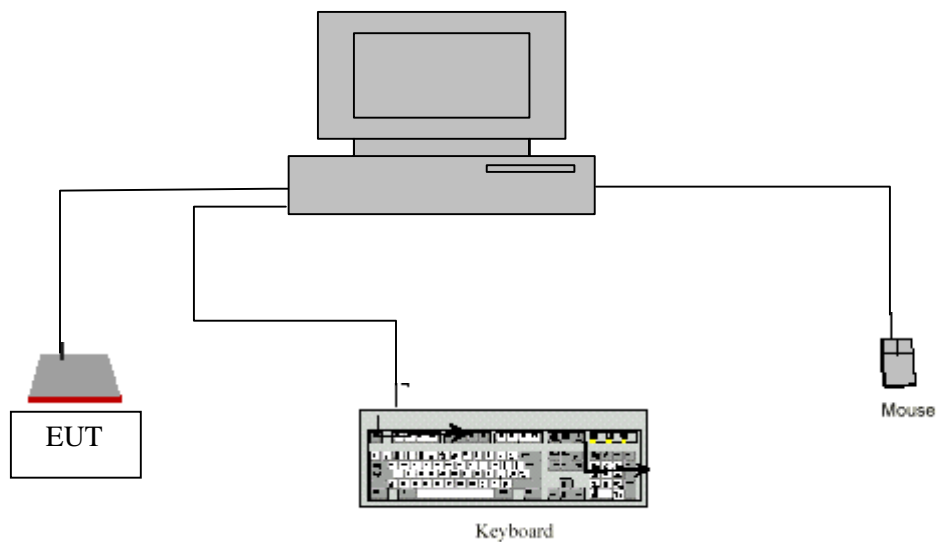
2.3 Special Accessories

As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by **Acoustic Arc International Ltd.** and its respective support equipment manufacturers.

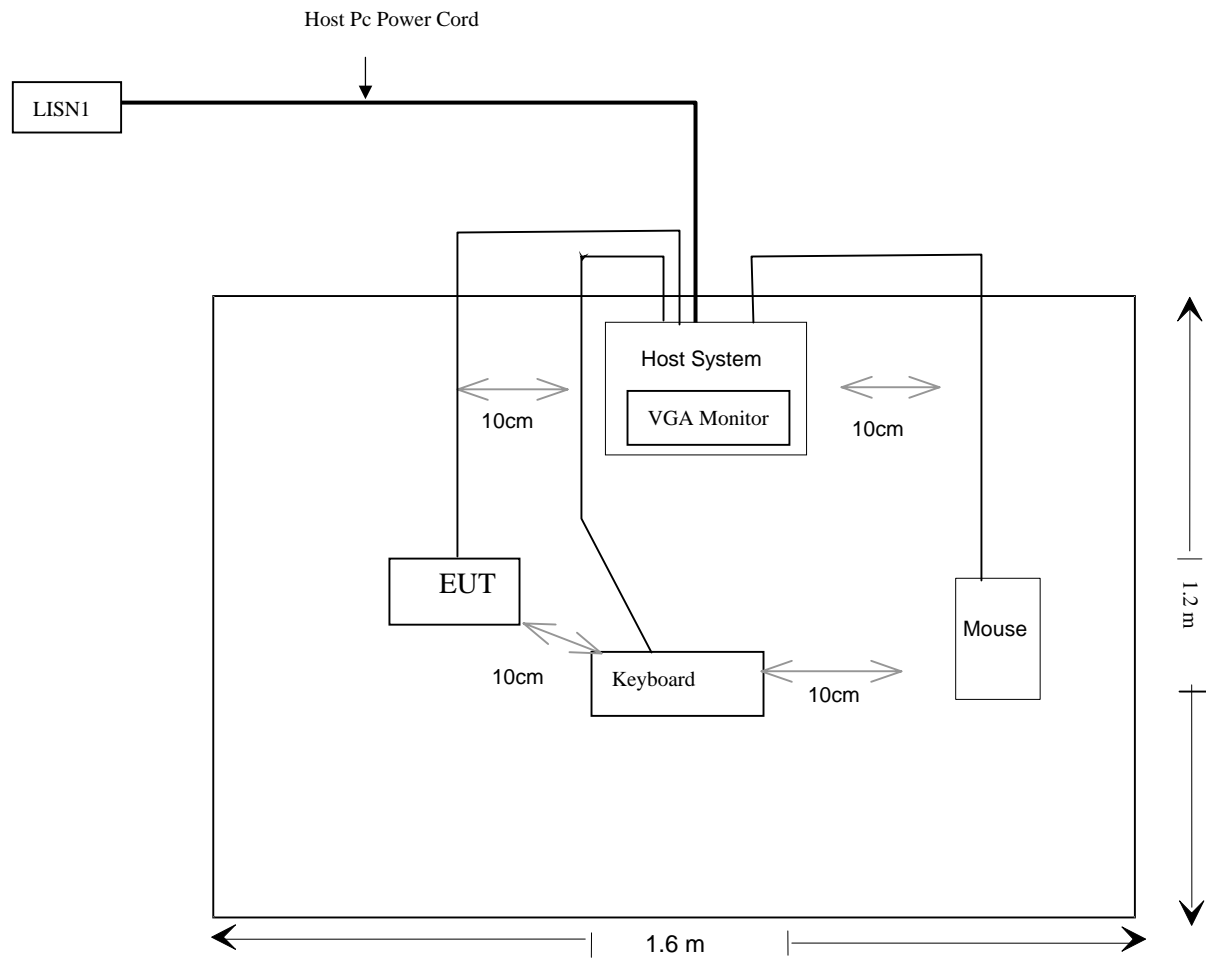
2.4 Equipment Modifications

The EUT tested was not modified by BCT.

2.5 Basic Configuration of Test System



2.6 Basic Test Setup Block Diagram



3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.4 dB.

3.2 Limit of Disturbance Voltage at The Mains Terminals (Class B)

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup

The setup of EUT is according with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart B Class B limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz
Detector.....Peak & Quasi-Peak & Average
Sweep Speed.....Auto
IF Band Width.....9 KHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB μ V of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 B Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (°C)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	Radarbox System
M/N	AR0810
Operating Mode	Connected to PC

Test data see following pages (Page 10 -11)

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

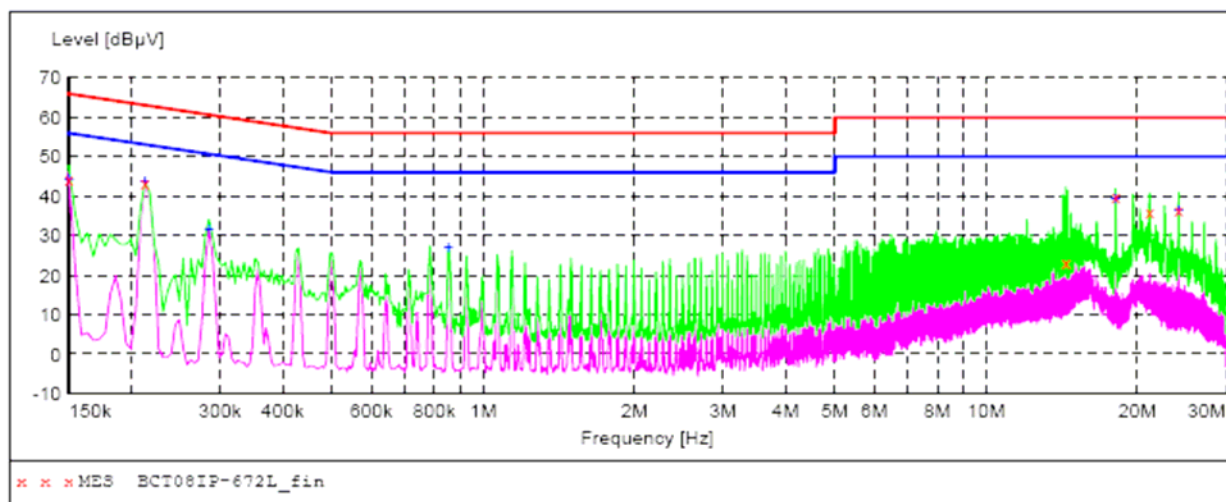
3.8 Test Result

Pass

Conducted Emission Test Data

EUT: Radarbox System M/N: AR0810
Operating Condition: Connected to PC
Test Site: Shielded Room
Operator: Eva
Test Specification: AC 120V/60Hz
Comment: Live Line
Start of Test: 09/11/08 / 14:53PM

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "BCT08IP-672L_fin"

9/11/2008 14:53

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	44.30	11.4	66	21.7	QP	L1	GND
0.213000	43.50	10.8	63	19.6	QP	L1	GND
14.428500	23.20	10.5	60	36.8	QP	L1	GND
18.109500	39.80	10.6	60	20.2	QP	L1	GND
21.129000	35.80	10.7	60	24.2	QP	L1	GND
24.144000	36.60	10.9	60	23.4	QP	L1	GND

MEASUREMENT RESULT: "BCT08IP-672L_fin2"

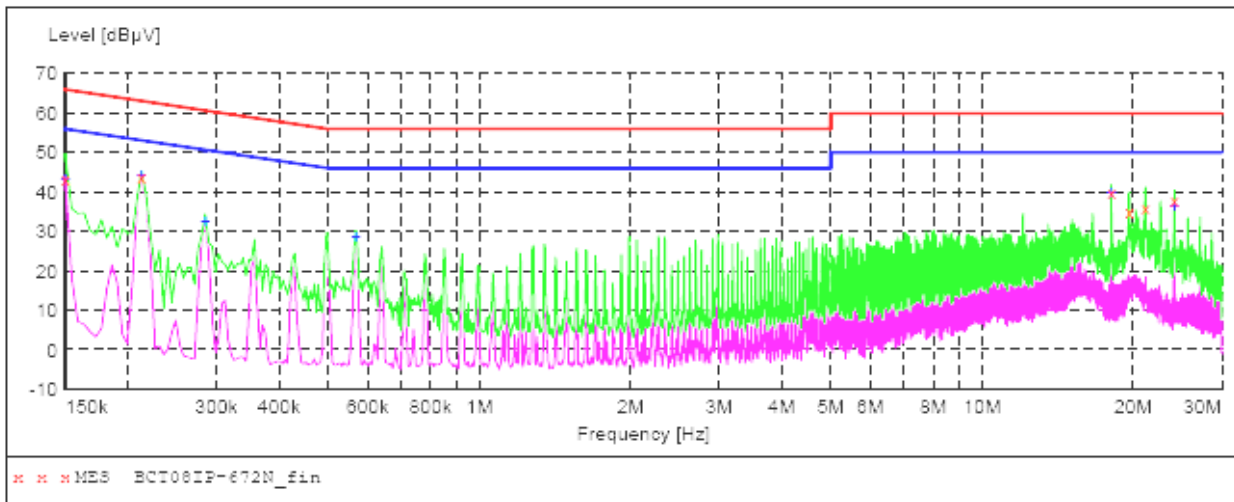
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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	44.40	11.4	56	11.6	AV	L1	GND
0.213000	43.70	10.8	53	9.4	AV	L1	GND
0.285000	31.70	10.6	51	19.0	AV	L1	GND
0.852000	27.20	10.2	46	18.8	AV	L1	GND
18.109500	39.50	10.6	50	10.5	AV	L1	GND
24.148500	36.30	10.9	50	13.7	AV	L1	GND

Conducted Emission Test Data

EUT: Radarbox System M/N: AR0810
Operating Condition: Connected to PC
Test Site: Shielded Room
Operator: Eva
Test Specification: AC 120V/60Hz
Comment: Neutral Line
Start of Test: 09/11/08 / 14:57PM

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "BCT08IP-672N_fin"

9/11/2008 14:57

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	43.40	11.4	66	22.6	QP	N	GND
0.213000	43.90	10.8	63	19.2	QP	N	GND
18.109500	39.90	10.6	60	20.1	QP	N	GND
19.621500	34.90	10.6	60	25.1	QP	N	GND
21.129000	36.00	10.7	60	24.0	QP	N	GND
24.148500	37.90	10.9	60	22.1	QP	N	GND

MEASUREMENT RESULT: "BCT08IP-672N_fin2"

9/11/2008 14:57

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	43.40	11.4	56	12.6	AV	N	GND
0.213000	44.10	10.8	53	9.0	AV	N	GND
0.285000	32.70	10.6	51	18.0	AV	N	GND
0.568500	28.50	10.2	46	17.5	AV	N	GND
18.109500	39.70	10.6	50	10.3	AV	N	GND
24.148500	36.60	10.9	50	13.4	AV	N	GND

4 - RADIATED DISTURBANCES

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 4.0 dB.

4.2 Limit of Radiated Disturbances (Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
960 ~ 1000	3	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak
IF Band Width.....120KHz
Frequency Range.....30MHz to 1000MHz
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m
Polarity.....Horizontal and Vertical

4.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB μ V of specification limits), and are distinguished with a "QP" in the data table.

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

4.7 Radiated Emissions Test Result

Temperature (°C)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	Radarbox System
M/N	AR0810
Operating Mode	Connected to PC

Test data see following pages (Page14)

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

4.8 Test Result

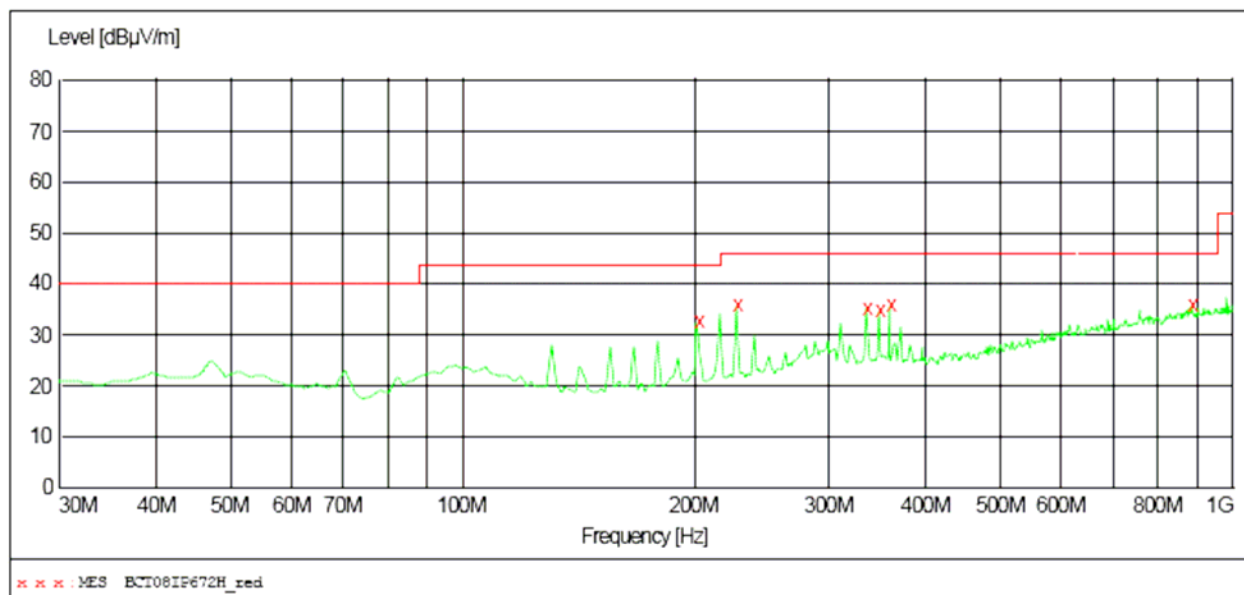
Pass

Radiated Emission Test Data:

EUT: Radarbox System M/N: AR0810
Operating Condition: Connected to PC
Test Site: Shielded Room
Operator: Gavin
Test Specification: AC 120V/60Hz
Comment: Polarization: Horizontal
Start of Test: 09/11/08/ 09:59AM

SWEEP TABLE: "test (30M-1G)"

Short Description:	Field Strength
Start Stop Detector Meas. IF Transducer	
Frequency Frequency MaxPeak Coupled Time Bandw.	
30.0 MHz 1.0 GHz	VULB9163 NEW



MEASUREMENT RESULT: "BCT08IP672H_red"

9/11/2008 09:59

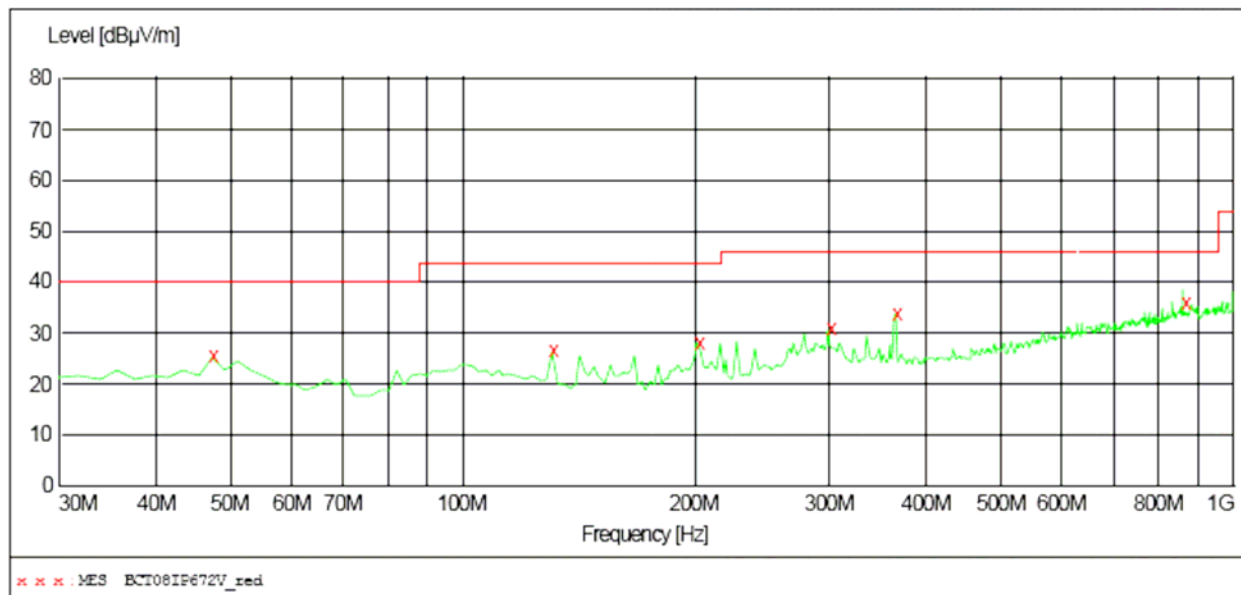
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Asimuth deg	Polarisation
202.660000	32.80	15.9	43.5	10.7	QP	100.0	0.00	HORIZONTAL
227.880000	35.90	16.5	46.0	10.1	QP	100.0	0.00	HORIZONTAL
336.520000	35.40	19.8	46.0	10.6	QP	100.0	0.00	HORIZONTAL
348.160000	34.80	19.9	46.0	11.2	QP	100.0	0.00	HORIZONTAL
359.800000	36.00	19.9	46.0	10.0	QP	100.0	0.00	HORIZONTAL
689.420000	36.00	28.1	46.0	10.0	QP	100.0	0.00	HORIZONTAL

Radiated Emission Test Data:

EUT: Radarbox System M/N: AR0810
 Operating Condition: Connected to PC
 Test Site: Shielded Room
 Operator: Gavin
 Test Specification: AC 120V/60Hz
 Comment: Polarisation: Vertical
 Start of Test: 09/11/08/ 09:54AM

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VUL9163 NEW



MEASUREMENT RESULT: "BCT08IP672V_red"

9/11/2008 09:54

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarisation
47.460000	25.40	15.7	40.0	14.6	QP	100.0	0.00	VERTICAL
130.880000	26.60	13.5	43.5	16.9	QP	100.0	0.00	VERTICAL
202.660000	28.20	15.9	43.5	15.3	QP	100.0	0.00	VERTICAL
299.660000	30.80	19.2	46.0	15.2	QP	100.0	0.00	VERTICAL
367.560000	34.00	19.8	46.0	12.0	QP	100.0	0.00	VERTICAL
665.560000	35.80	27.8	46.0	10.2	QP	100.0	0.00	VERTICAL