

EMC TEST REPORT
for
Gembird Europe B.V.
POWER INVERTER
Model No.: EG-PWC-031

Prepared for : Gembird Europe B.V.
Address : Wittevrouwen 56, 1358CD Almere, The Netherlands

Prepared by : Accurate Technology Co., Ltd.
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Date of Test : September 22, 2012
Date of Report : October 8, 2012

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Test Report Declaration

Applicant: Gembird Europe B.V.
Manufacturer: Gembird Electronics Ltd.
Product: POWER INVERTER
(A) Model No.: EG-PWC-031
(B) Rating: DC 12V

Measurement Procedure Used:


EN 55022: 2010
EN 55024: 2010 (IEC61000-4-2: 2008
IEC61000-4-3: 2010
IEC61000-4-8: 2009)

The device described above is tested by Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Accurate Technology Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN55022 and EN 55024 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Accurate Technology Co., Ltd.

Date of Test : _____ September 22, 2012 _____

Prepared by : _____  _____
(Kelly Cheng, Engineer)

Approved & Authorized Signer : _____  _____
(Sean Liu, Manager)

1. TEST RESULTS SUMMARY

Test Items	Test Standard	Test Results
Radiated Emission	EN 55022: 2010	Pass
Electrostatic Discharge Immunity	EN 55024: 2010 (IEC61000-4-2: 2008)	Pass
Radiated Electromagnetic Fields Immunity	EN 55024: 2010 (IEC 61000-4-3: 2010)	Pass
Magnetic Field Immunity	EN 55024: 2010 (IEC 61000-4-8: 2009)	Pass

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product : POWER INVERTER

Model No. : EG-PWC-031

Rating : DC 12V

Applicant : Gembird Europe B.V.
Address : Wittevrouwen 56, 1358CD Almere, The Netherlands

Manufacturer : Gembird Electronics Ltd.
Address : Building B, ShiFeng Industry District, Huaning Road,
LongHuaDaLang Street, Baoan District, Shenzhen, China

Date of sample received : September 21, 2012
Date of Test : September 22, 2012

2.2. Accessory and Auxiliary Equipment

n.a.

2.3. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen, May 10, 2004

Listed by FCC

The Registration Number is 253065

The Registration Number is 752051

Listed by Industry Canada

The Registration Number is 5077A-1

The Registration Number is 5077A-2

Accredited by China National Accreditation Committee for Laboratories

The Certificate Registration Number is L3193

Name of Firm : Accurate Technology Co., Ltd.

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

Subcontracted Items : RF Field Strength Susceptibility Test

Subcontractor : Shenzhen Academy of Metrology and Quality Inspection

Site Location : Bldg. of Shenzhen Academy of Metrology and Quality
Inspection, Longzhu Road, Nanshan, Shenzhen, China.

2.4. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Power Disturbance Expanded Uncertainty = 2.92 dB, k=2

Radiated emission expanded uncertainty
(9kHz-30MHz) = 3.08dB, k=2

Radiated emission expanded uncertainty
(30MHz-1000MHz) = 4.42dB, k=2

Radiated emission expanded uncertainty
(Above 1GHz) = 4.06dB, k=2

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	ANRITSU	MS2651B	6200238856	Jan. 7, 2012	1 Year
2.	Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 7, 2012	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	9163-194	Jan. 7, 2012	1 Year
4.	50 Coaxial Switch	Anritsu Corp	MP59B	6200237248	Jan. 7, 2012	1 Year
5.	RF Coaxial Cable	Schwarzbeck	N-5m	No.1	Jan. 7, 2012	1 Year
6.	RF Coaxial Cable	Schwarzbeck	N-1m	No.6	Jan. 7, 2012	1 Year
7.	RF Coaxial Cable	Schwarzbeck	N-1m	No.7	Jan. 7, 2012	1 Year
8.	RF Coaxial Cable	RESENBERGER	N-0.5m	No.12	Jan. 7, 2012	1 Year
9.	Pre-Amplifier	Agilent	8447D	294A10619	Jan. 7, 2012	1 Year

3.2. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	PESD1610	H4001552	Jan.11, 2012	1 Year

3.3. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Rohde&Schwarz	SMT03	100059	Jan. 23, 2012	1 Year
2.	Voltage Probe	Rohde&Schwarz	URV5-Z2	100013	Jan. 23, 2012	1 Year
3.	Power Amplifier	AR	150W1000	300999	Jan. 23, 2012	1 Year
4.	Power Amplifier	AR	25S1G4AM1	305993	Mar. 10, 2012	2 Year
5.	Bilog Antenna	Chase	CBL6111C	2576	Jan. 23, 2012	1 Year
6.	Anechoic chamber	Albatross Projects	MCDC	----	Mar. 20, 2012	2 Year

3.4. For Magnetic Field Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100	150577	Jan. 7, 2012	1 Year

4. RADIATED EMISSION MEASUREMENT

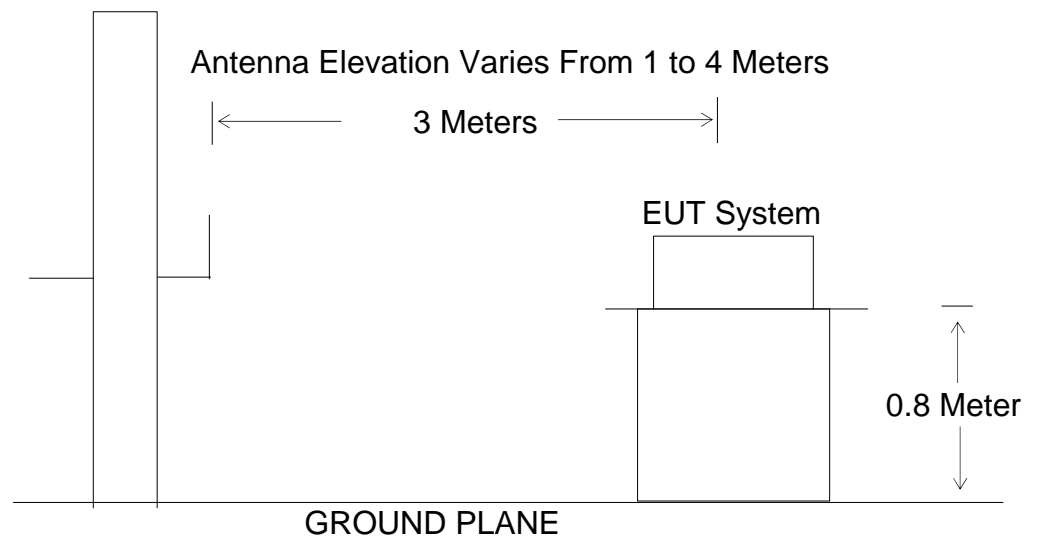
4.1. Block Diagram of Test

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: POWER INVERTER)

4.1.2. Block diagram of test setup (In chamber)



(EUT: POWER INVERTER)

4.2. Measuring Standard

EN 55022: 2010

4.3. Radiated Emission Limits (Class B)

4.3.1. Limit below 1GHz

Frequency (MHz)	Quasi-peak limits dB(μ V/m)
30 – 230	40
230 - 1000	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
 (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.3.2. Limit above 1GHz

Frequency (GHz)	Average Limit dB(μ V/m)	Peak Limit dB(μ V/m)
1 – 3	50	70
3 - 6	54	74

Note: The lower limit applies at the transition frequency.

4.4. Conditional Testing Procedure

If the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz.

If the highest frequency of the internal sources of the EUT is between 108MHz and 500MHz, the measurement shall only be made up to 2GHz.

If the highest frequency of the internal sources of the EUT is between 500MHz and 1GHz, the measurement shall only be made up to 5GHz.

If the highest frequency of the internal sources of the EUT is above 1GHz, the measurement shall only be made up to 5 times the highest frequency or 6GHz, whichever is less.

4.5. EUT Configuration on Test

Test equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

4.5.1. POWER INVERTER (EUT)

Model No.: EG-PWC-031

Manufacturer: Gembird Electronics Ltd.

4.6. Operating Condition of EUT

4.6.1. Turn on the power.

4.6.2. Let the EUT work in test mode (Full Load) and measure it.

4.7. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarizations of the antenna are set on test.

The bandwidth of the Receiver (ESCS30) is set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

4.8.Measuring Results

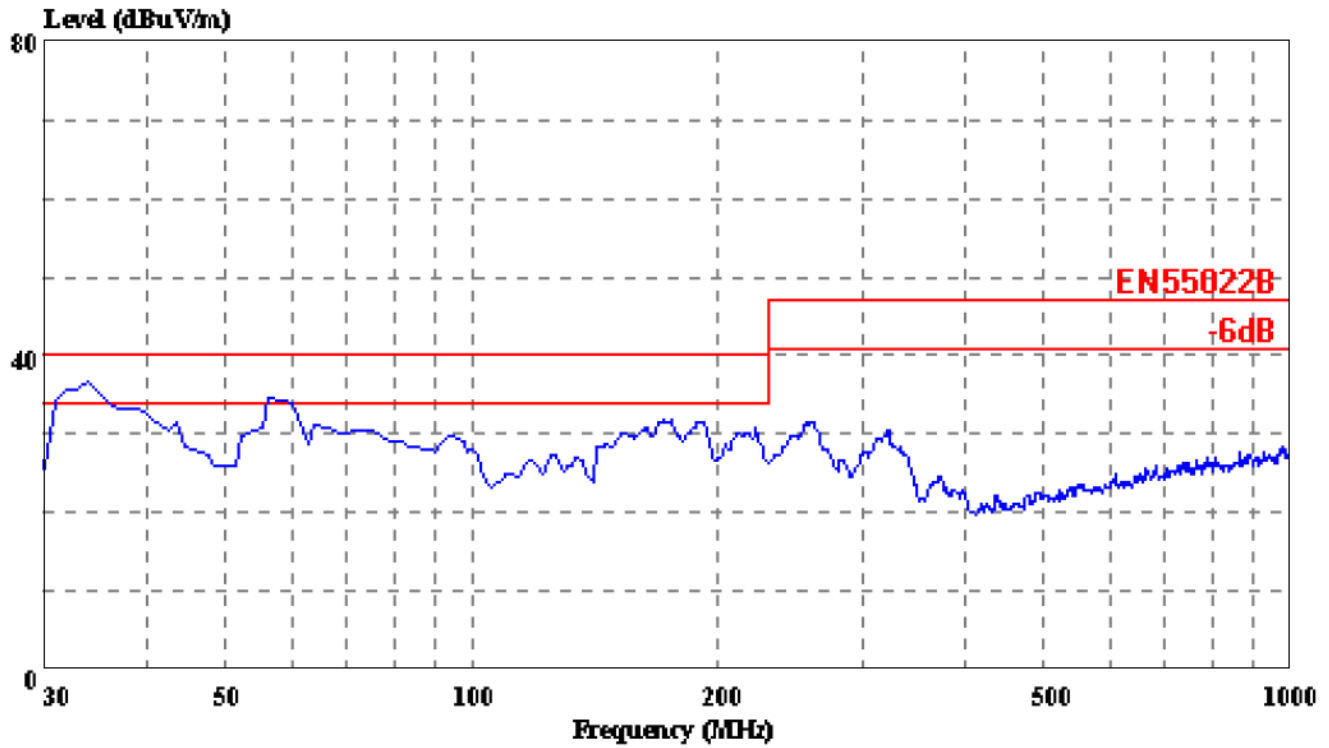
PASS.

The highest frequency of the internal sources of the EUT is less than 108MHz; the measurement shall only be made up to 1GHz.

Test Mode: Full Load						
Polarization						
Horizontal		Freq	Level	Limit	Over	Probe
		MHz	dBuV/m	Line	Limit	Factor
	1 !	33.880	36.61	40.00	-3.39	13.91
	2 !	56.190	34.51	40.00	-5.49	11.69
	3	94.020	28.78	40.00	-11.22	8.20
Vertical		Freq	Level	Limit	Over	Probe
		MHz	dBuV/m	Line	Limit	Factor
	1 !	35.820	36.08	40.00	-3.92	12.66
	2	59.100	32.06	40.00	-7.94	6.87
	3	94.020	27.73	40.00	-12.27	6.36

Note: Emissions attenuated more than 20 dB below the permissible value are not reported.

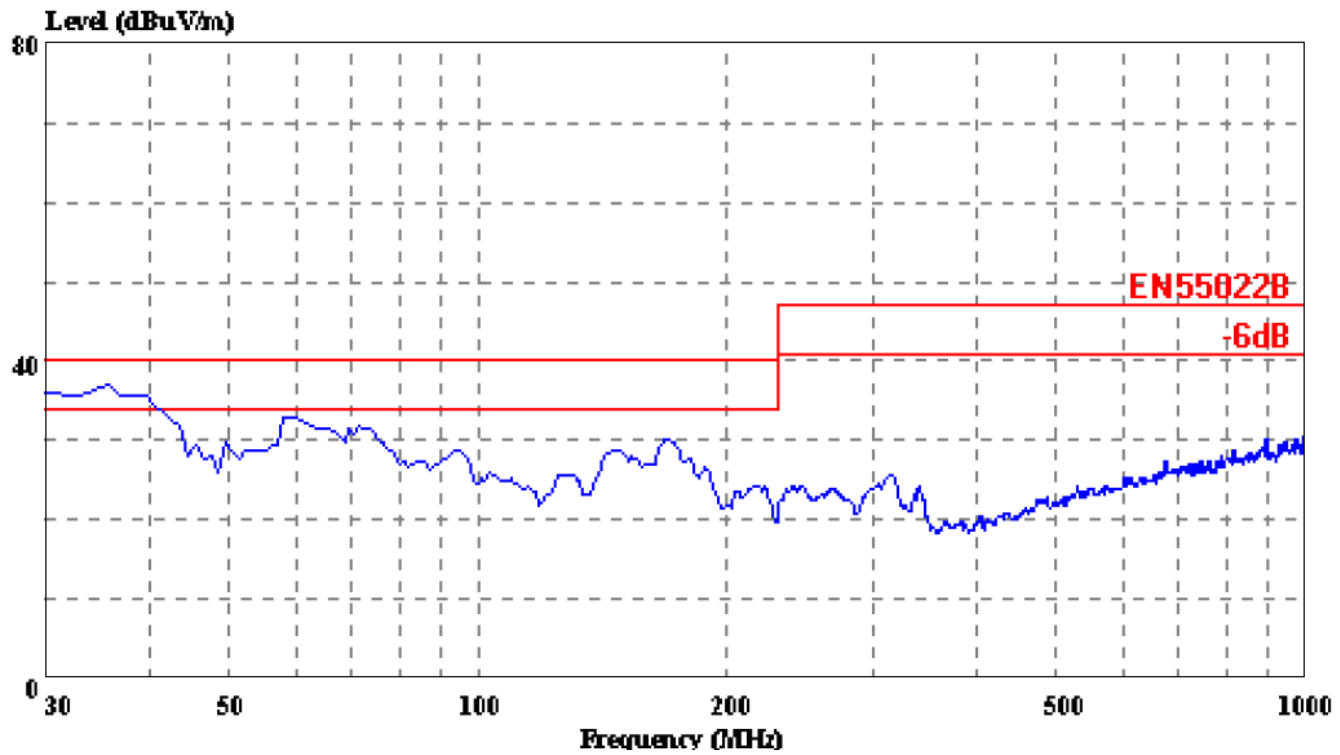
The spectral diagrams are attached as below.



Trace:

Ref Trace:

Condition: EN55022B 3m ATC VULB9163 (NEW) HORIZONTAL
Manuf : NEW FOCUS
EUT : POWER INVERTER
M/N : 8084Y
Memo : ON
Power : DC 12V
Report No: ATE2012246



Trace:

Ref Trace:

Condition: EN55022B 3m ATC VULB9163 (NEW) VERTICAL

Manuf : NEW FOCUS

EUT : POWER INVERTER

M/N : 8084Y

Memo : ON

Power : DC 12V

Report No: ATE2012246

5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

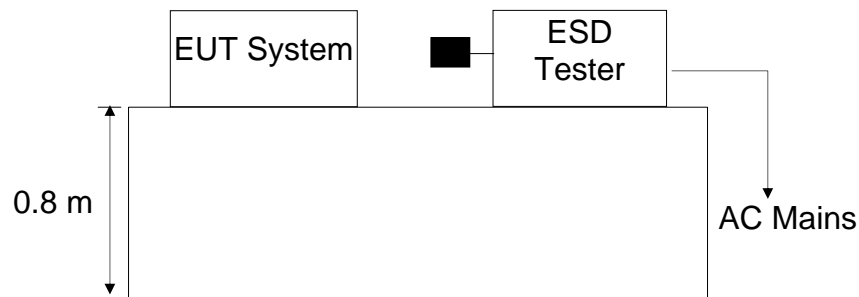
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: POWER INVERTER)

5.1.2. Block diagram of test setup



(EUT: POWER INVERTER)

5.2. Test Standard

EN 55024: 2010 (IEC61000-4-2: 2008, Severity Level: 2
Contact Discharge: ± 4 kV, Severity Level: 3/ Air Discharge: ± 8 kV)
Testing shall also be satisfied at the lower levels.

5.3. Severity Levels and Performance Criterion

5.3.1. Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

5.3.2. Performance Criterion: **B**

5.4.EUT Configuration

The configuration of EUT is listed in Section 4.4.

5.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.5 except for the test set up replaced by Section 5.1.

5.6.Test Procedure

5.6.1.Contact discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points shall be subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode [see IEC 61000-4-2 for use of the Vertical Conducting Plane (VCP)]. Tests shall be performed at a maximum repetition rate of one discharge per second.

5.6.2.Air discharge at slots and apertures, and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur; examples are openings at edges of keys, or in the cover of keyboards and telephone handsets. Such points are tested using the air discharge method. See also IEC 61000-4-2 regarding painted surfaces. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The application of electrostatic discharges to the contacts of open connectors is not required by this publication.

5.7.Test Results

PASS

Please refer to the following page.

Electrostatic Discharge Test Results

Accurate Technology Co., Ltd.

Applicant:	Gembird Europe B.V.	Test Date:	September 22, 2012
EUT:	POWER INVERTER	Temperature:	25°C
M/N:	EG-PWC-031	Humidity:	46%
Air discharge:	±2.0kV, ±4.0kV, ±8.0kV	Criterion:	B
Contact discharge:	±2.0kV, ±4.0kV	Test Engineer:	Alen
Test Mode:	Full Load		
Location	Kind A-Air Discharge C-Contact Discharge	Result	
Nonconductive Enclosure	A	PASS	
Conductive Enclosure	C	PASS	
Metal	C	PASS	
HCP	C	PASS	
VCP of front	C	PASS	
VCP of rear	C	PASS	
VCP of left	C	PASS	
VCP of right	C	PASS	
Note:			
Test Equipment: ESD Simulator (HAEFELY, PESD1610)			

6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

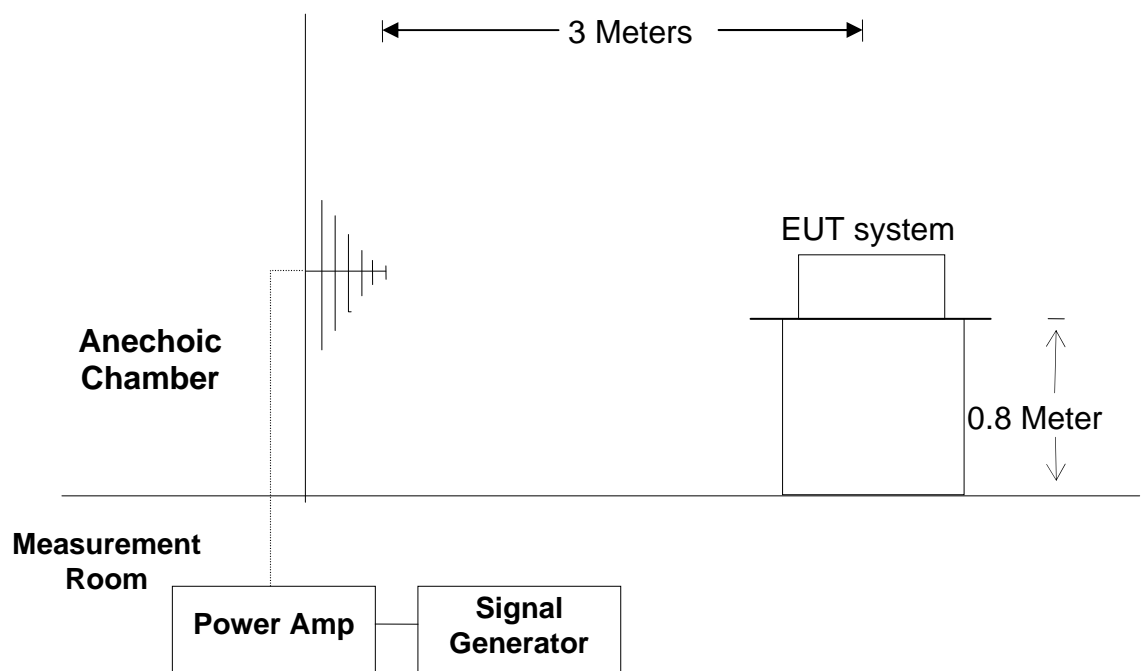
6.1. Block Diagram of Test

6.1.1. Block diagram of connection between the EUT and simulators



(EUT: POWER INVERTER)

6.1.2. Block diagram of R/S test setup



(EUT: POWER INVERTER)

6.2. Test Standard

EN 55024: 2010 (IEC61000-4-3: 2010, Severity Level: 2, 3V/m)

6.3. Severity Levels and Performance Criterion

6.3.1. Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

6.3.2. Performance Criterion: **A**

6.4. EUT Configuration on Test

The configuration of the EUT is same as Section 4.4.

6.5. Operating Condition of EUT

6.5.1. Turn on the power.

6.5.2. Let the EUT work in test mode (Full Load) and measure it.

6.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

6.7. Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

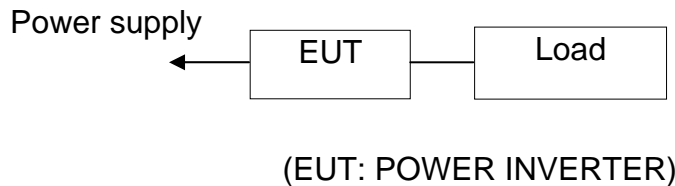
Accurate Technology Co., Ltd.

Applicant:	Gembird Europe B.V.	Test Date:	September 22, 2012			
EUT:	POWER INVERTER	Temperature:	25°C			
M/N:	EG-PWC-031	Humidity:	46%			
Field Strength:	3 V/m	Criterion:	A			
Frequency Range:	80 MHz to 1000 MHz	Power Supply:	DC 12V			
Test Mode:	Full Load	Test Engineer:	SMQ			
Modulation:	<input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM 1kHz 80%					
	Frequency Range 1: 80- 1000MHz		Frequency Range 2:			
Steps	#	/	%	#	/	%
	Horizontal		Vertical	Horizontal		Vertical
Front	PASS		PASS			
Right	PASS		PASS			
Rear	PASS		PASS			
Left	PASS		PASS			
Test Equipment : 1. Signal Generator : SMT03 (Rohde & Schwarz) 2. Power Amplifier : 150W1000 (AR) 3. Bilog Antenna : CBL6111C (Chase)						
Note:						

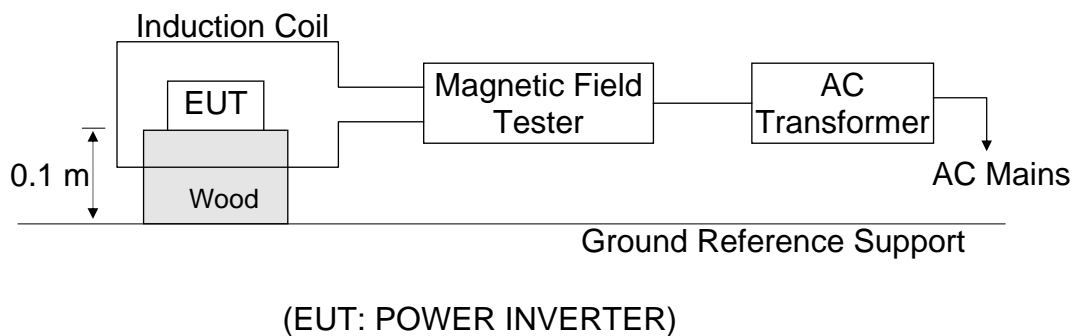
7. MAGNETIC FIELD IMMUNITY TEST

7.1. Block Diagram of Test Setup

7.1.1. Block diagram of connection between the EUT and simulators



7.1.2. Block Diagram of Test Setup



7.2. Test Standard

EN 55024: 2010 (IEC61000-4-8: 2009, Severity Level 1: 1A/m)

7.3. Severity Levels and Performance Criterion

7.3.1. Severity level

Level	Magnetic Field Strength A/m
1.	1
2.	3
3.	10
4.	30
5.	100
X	Special

7.3.2. Performance Criterion: A

7.4.EUT Configuration

The configuration of the EUT is same as Section 4.4.

7.5.Operating Condition of EUT

7.5.1. Turn on the power.

7.5.2. Let the EUT work in test mode (Full Load) and measure it.

7.6.Test Procedure

- 1) Set up the EUT system as shown on Section 7.1.2.
- 2) The Induction coil is set up in horizontal or vertical.
- 3) Let the EUT work in test mode and measure it.

7.7.Test Results

PASS.

Please refer to the following page.

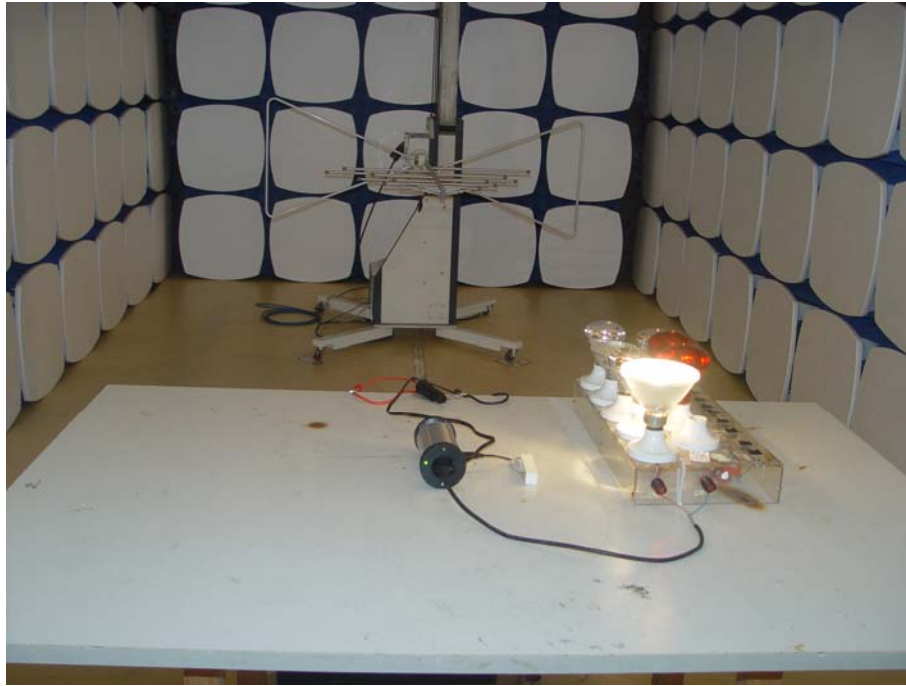
Magnetic Field Immunity Test Results

Accurate Technology Co., Ltd.

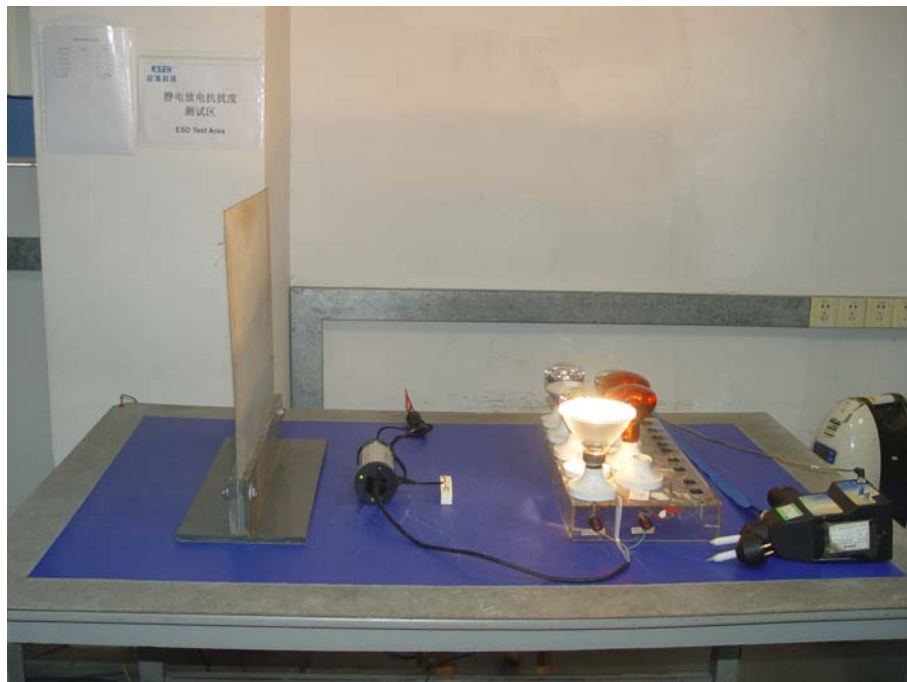
Applicant :Gembird Europe B.V.			Test Date : <u>September 22, 2012</u>	
EUT : <u>POWER INVERTER</u>			Temperature : <u>25°C</u>	
M/N : <u>EG-PWC-031</u>			Humidity : <u>46%</u>	
Test Mode : Full Load			Test Engineer: Alen	
Test Level	Testing Duration	Coil Orientation	Criterion	Result
1A/m	5 mins	Horizontal	A	PASS
1A/m	5 mins	Vertical	A	PASS
Remark:			Test Equipment: Magnetic Field Tester: MAG100 AC Transformer: TDGC2J-5	

8. PHOTOGRAPHS

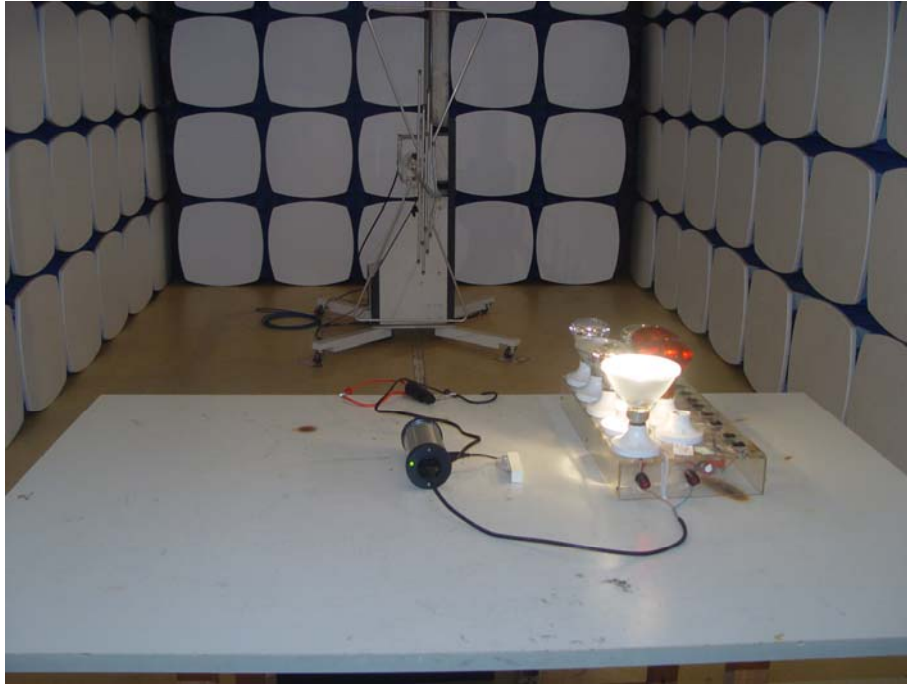
8.1.Photos of Radiated Emission Measurement



8.2.Photos of Electrostatic Discharge Test



8.3.Photos of RF Field Strength susceptibility Test



8.4.Photos of Magnetic Field Susceptibility Test



8.5.Photo of EUT



