Certification Test Report

For

PASS Unit

Manufacturer:

Grace Industries, Inc.
P.O. Box 167
Transfer, PA 16154

Testing Facility:

F-Squared Laboratories
10880 Moxley Road
Damascus, MD 20872

The PASS, model TPASS-3, has been tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47, Part 15 subpart C. The product was received on August 16, 2002 and the testing was completed on January 22, 2003

Evaluation Conducted By:

Sin-Lun Chau
Senior EMC Engineer

Report Reviewed By:

Wendy Fuster
President

F-Squared Laboratories
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Damascus, MD 20872
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Exhibit I

Engineering Statement

This report has been prepared on behalf of Grace Industries, Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15 subpart C of the FCC Rules, using ANSI C63.4 1992 standards. The test results found in this report relate only to the items tested.

EQUIPMENT UNDER TEST:	PASS Unit Trade Name: Grace Industries, Inc. FCC ID: J5XTP3TXRX Model #: TPASS-3 Power Supply: 9VDC Battery
APPLICABLE RULES:	CFR 47 Part 15
EQUIPMENT CATEGORY:	PASS Unit
MEASUREMENT LOCATION:	F-Squared Laboratories in Damascus, MD. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.
MEASUREMENT PROCEDURE:	All measurements were performed according tot he 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.
A2LA STATEMENT:	This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report.
A2LA CERTIFICATE NUMBER:	793.01

UNCERTAINTY BUDGET:

- Radiated Emission
  Combined Uncertainty (+ or -) 2.24 dB
  Expanded Uncertainty (+ or -) 4.48 dB

- Conducted Emission
  Combined Uncertainty (+ or -) 1.13 dB
  Expanded Uncertainty (+ or -) 2.26 dB

ENGINEERING STATEMENT:

I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

Certified by: _____
Wendy Fuster, President

Exhibit II

List of Measurement Instrumentation

Equipment Type	Manufacturer	Model #	Serial #	Calibration Due Date
Receiver System	Rohde & Schwarz	ESMI	DE23119	2/19/2003
Combination Antenna	Sunol	BJ1	A101101	12/5/2003
Horn Antenna	ARA	DRG-188/A	1105	2/5/2003
Antenna Mast	Compliance Design, Inc.	M100	NA	NA
Amplifier	HP	83006A	3104A00500	9/3/2003
Turntable	F-Squared Laboratories	Site 1	NA	NA
Spectrum Analyzer	HP	8391A	3149A07546	2/19/2003

Exhibit III

Equipment Under Test Information and Data

TEST ITEM CONDITION: The equipment to be tested was received in good condition.

TESTING ALGORITHM: The EUT powered on up and pressed both side buttons to make the EUT continuous to transmit during the test. The fundamental emissions, harmonic emissions and any spurious emissions within 20dB of the limit are recorded in the data tables.

RADIATED EMISSION TESTING: The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Both horizontal and vertical field components were measured. The output of the antenna was connected through a pre-amplifier, to the input of the receiver and emissions were measured in the range 30MHz to 1GHz. The values up to 1GHz with a resolution bandwidth of 120KHz are quasi-peak reading made at 3 meters. The measurements above 1GHz with a resolution bandwidth of 1MHz are peak reading at a distance of 3 meters. Emission limits from 15.249 were used for harmonic and fundamental emissions, 15.205 for spurious emissions. All data for radiated emissions is found in Exhibit VI.

CALCULATION OF DATA: RADIATED EMISSIONS – The antenna factors (included cable losses) of the biconical antennas used, and the pre-amplifier gain, are input into the memory of the receiver. The receiver then corrects the reading for amplitude automatically. The field strength reading can then be taken directly from the receiver and compared to the FCC limits in dBuV/m. The following equation is used to convert to uV/m:

$$^{E}\text{uV/m} = \text{antilog}(^{E}\text{dBuV/m}/20)$$

SAMPLE OF FIELD STRENGTH CALCULATION:

$$Ea=Va + AF + Ae + (-AG)$$

Where Ea = Field Strength(dBuV/m)
Va = 20 x log10 (measure RF voltage, uV)
Ae = Cable Loss Factor, dB
AG = Amplifier Gain, dB
AF = Antenna Factor dB(m-1)

i.e. if the reading is 57.0 dBuV, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, so the field strength will be:

$$Ea(dBuV/m) = 57 + 8 + 1 + (-25)$$
$$= 41 \text{ dBuV/m}$$

OR

$$Ea(uV/m) = 10^{(41/20)}$$
$$= 112.20 \text{ uV/m}$$

20DB BANDWIDTH REQUIREMENT:

The bandwidth measurement can be found in Exhibit V. The low and high frequencies of this equipment are 906.32 and 925.93MHz respectively. The bandwidth was found to be within the permitted frequency range of 902 to 928MHz specified by Section 15.249.

ANTENNA REQUIREMENT:

The antenna supplied with this equipment is a removable antenna with a unique, non-standard connector that complies with the rules found in Section 15.203.

Exhibit IV

EUT Configuration

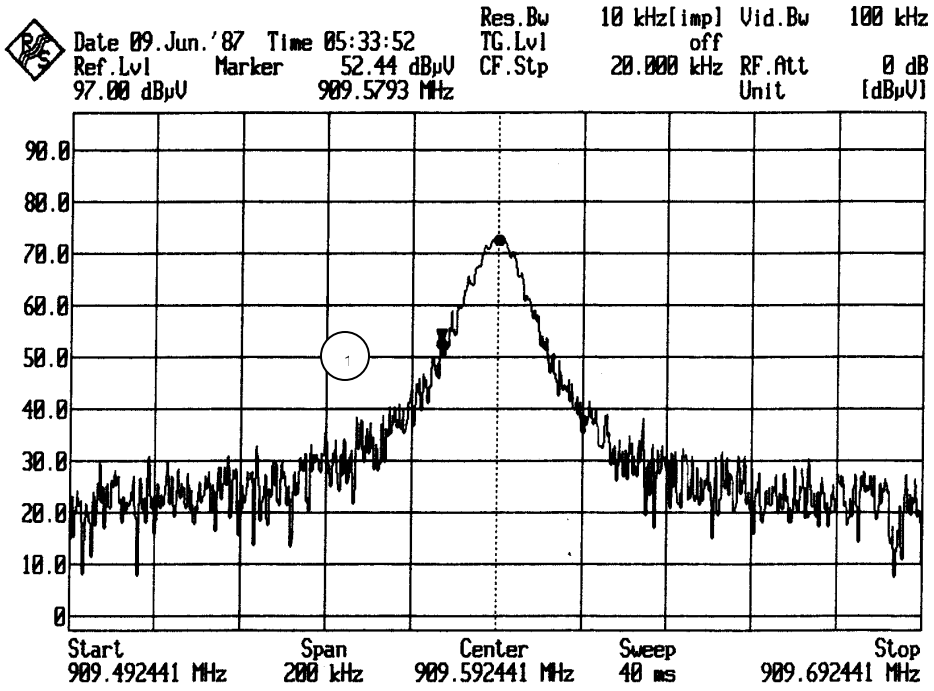
EUT:

Device	Manufacturer	Model #	FCC ID
PASS Unit	Grace Industries, Inc.	TPASS-3	J5XTP3TXRX

Exhibit V

20 dB Bandwidth Measurement Results

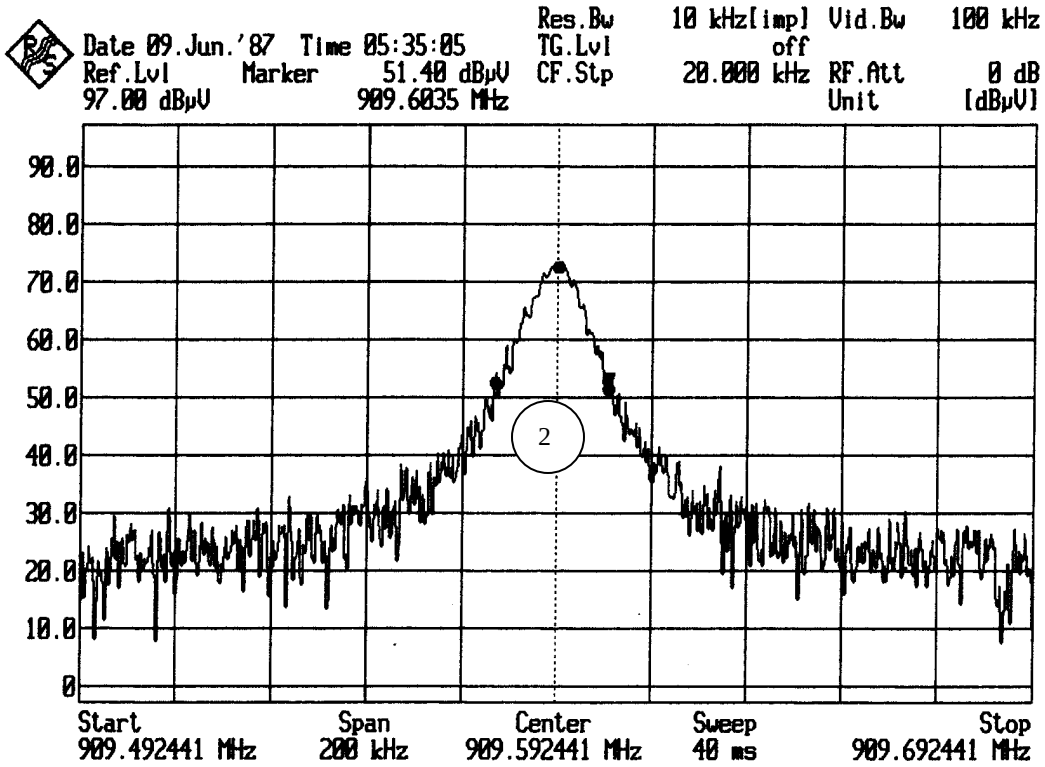
30dB Extension Attenuator with software changed



Marker 1 on 909.5793MHz

20 dB Bandwidth Measurement Results

30dB Extension Attenuator with software changed

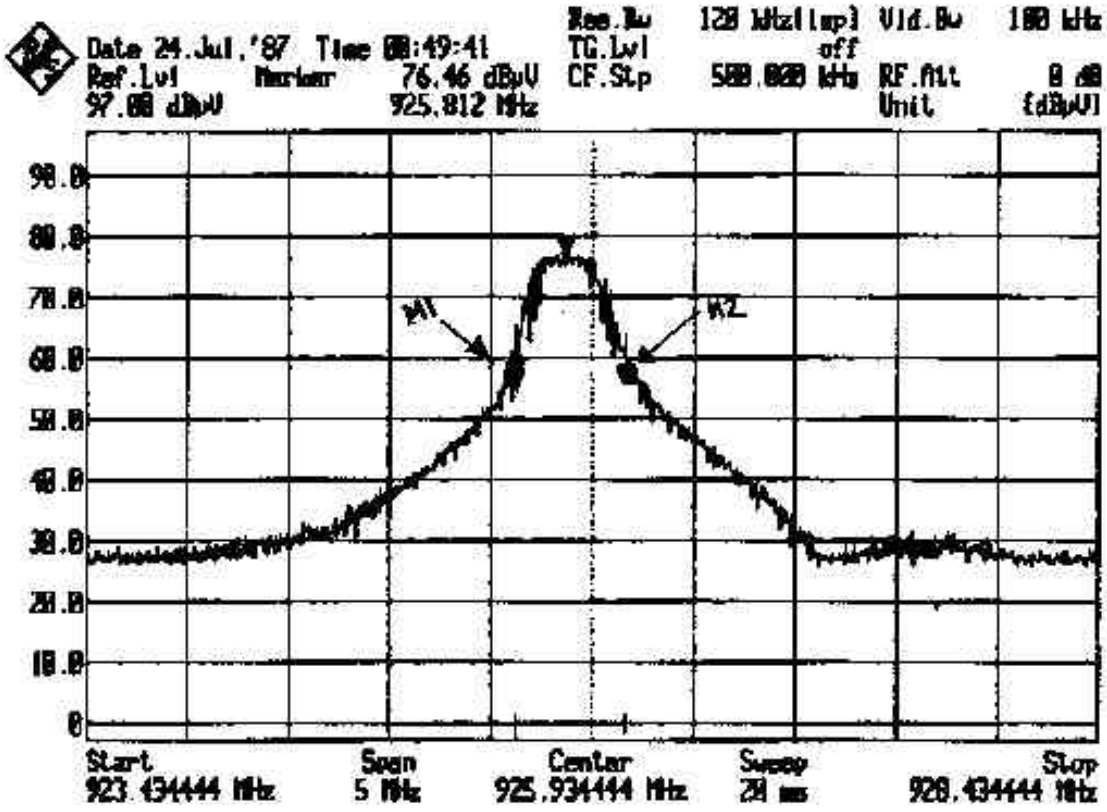


Marker 2 on 909.6035MHz

Bandwidth between marker1 and marker 2 = 24.2kHz

20 dB Bandwidth Measurement Results

30dB Extension Attenuator with software changed



Marker 1 – Marker 2 Bandwidth = .5MHz

Exhibit VI

Radiated Emissions Test Data Sheet

Test Date:	1/23/2003	**Test Engineer:**	Shi-Lun Chau
Standard:	FCC Part 15 Subpart C	**Air Temperature:**	23 °C
Limit:	Class B	**Barometric Pressure:**	995 mb
Distance:	3 Meters	**Relative Humidity:**	11 % RH

Frequency (MHz)	Antenna Polarization	Cable Loss (dB)	Antenna Factor (dB)	Reading (dBuV)/m	Emission (dBuV)/m	FCC Limits (dBuV)/m	Margins (dBuV/m)
906.24	H	3.20	23.10	51.55	77.85	94.00	-16.15
906.24	V	3.20	23.10	58.91	85.21	94.00	-8.79
915.56	H	3.20	23.10	50.86	77.16	94.00	-16.84
915.56	V	3.20	23.10	59.37	85.67	94.00	-8.33
925.61	H	3.20	23.45	50.36	77.01	94.00	-16.99
925.61	V	3.20	23.45	59.63	86.28	94.00	-7.72

Remark: All the harmonic radiated emissions from the EUT are below the noise floor of the receiver systems. (Receiver Systems noise floor is 20 dBuV).
No spurious emissions within 20dB of the limit were recorded.

■ **PASS** ☐ **FAIL**

EUT test on X position

Radiated Emissions Test Data Sheet

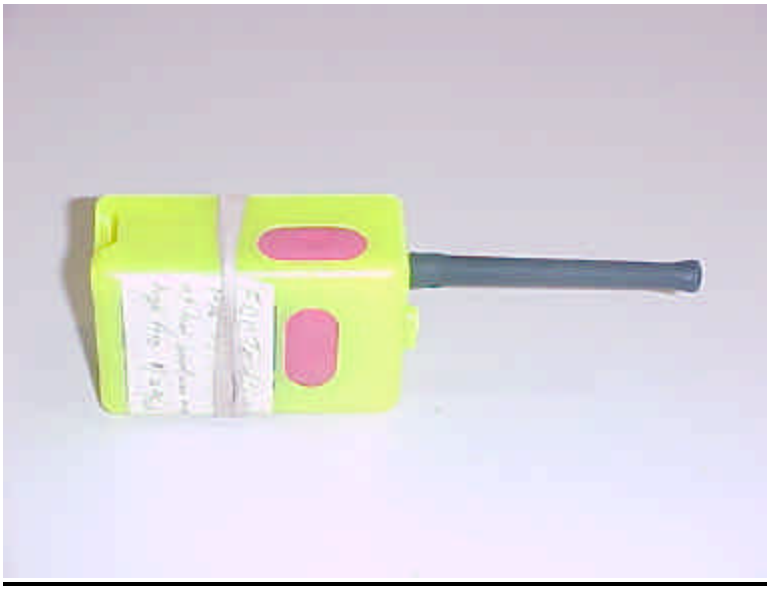
Test Date:	1/23/2003	**Test Engineer:**	Shi-Lun Chau
Standard:	FCC Part 15 Subpart C	**Air Temperature:**	23 °C
Limit:	Class B	**Barometric Pressure:**	995 mb
Distance:	3 Meters	**Relative Humidity:**	11 % RH

Frequency (MHz)	Antenna Polarization	Cable Loss (dB)	Antenna Factor (dB)	Reading (dBuV)/m	Emission (dBuV)/m	FCC Limits (dBuV)/m	Margins (dBuV/m)
906.32	H	3.20	23.10	62.04	88.34	94.00	-5.66
906.32	V	3.20	23.10	52.46	78.76	94.00	-15.24
915.44	H	3.20	23.10	62.27	88.57	94.00	-5.43
915.44	V	3.20	23.10	52.57	78.87	94.00	-15.13
925.67	H	3.20	23.45	61.84	88.49	94.00	-5.51
925.67	V	3.20	23.45	54.09	80.74	94.00	-13.26

Remark: All the harmonic radiated emissions from the EUT are below the noise floor of the receiver systems. (Receiver Systems noise floor is 20 dBuV).
No spurious emissions within 20dB of the limit were recorded.

■ **PASS** ☐ **FAIL**

EUT test on Y position



Radiated Emissions Test Data Sheet

Test Date:	1/23/2003	**Test Engineer:**	Shi-Lun Chau
Standard:	FCC Part 15 Subpart C	**Air Temperature:**	23 °C
Limit:	Class B	**Barometric Pressure:**	995 mb
Distance:	3 Meters	**Relative Humidity:**	11 % RH

Frequency (MHz)	Antenna Polarization	Cable Loss (dB)	Antenna Factor (dB)	Reading (dBuV)/m	Emission (dBuV)/m	FCC Limits (dBuV)/m	Margins (dBuV/m)
907.11	H	3.20	23.10	62.17	88.47	94.00	-5.53
907.11	V	3.20	23.10	51.99	78.29	94.00	-15.71
916.06	H	3.20	23.10	61.84	88.14	94.00	-5.86
916.06	V	3.20	23.10	54.09	80.39	94.00	-13.61
926.08	H	3.20	23.45	61.81	88.46	94.00	-5.54
926.08	V	3.20	23.45	48.43	75.08	94.00	-18.92

Remark: All the harmonic radiated emissions from the EUT are below the noise floor of the receiver systems. (Receiver Systems noise floor is 20 dBuV).
No spurious emissions within 20dB of the limit were recorded.

■ **PASS** ☐ **FAIL**

EUT test on Z position

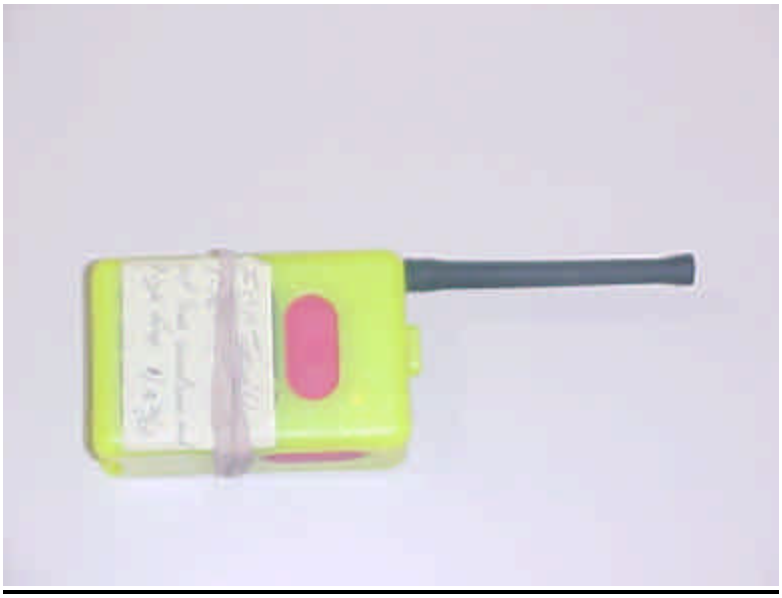


Exhibit VII

Modifications

EUT COMPLIES

WITHOUT MODIFICATIONS