



Intertek Testing Services

ETL SEMKO

Emissions Testing
Performed
on the
Saar Associates
Narrow Band Transmitter
Model: WSI002

To

FCC Part 15 Subpart C, 15.249
Requirements for Peak Emissions
Date of Test: December 17, 2003

This report supplements report 3019852

5 Pages

Report Number: 3019852A

Contact: David Saar

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Intertek Testing Services NA, Inc.

70 Codman Hill Road, Boxborough, MA 01719

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This test was initiated to provide peak measurements of emissions above 1 GHz to show compliance with the requirement that peak emissions measurements do not exceed the maximum permitted average value by more than 20 dB. Since the limit on average emissions in this case is 54 dBuV/m, the limit on peak emissions is therefore 74 dBuV/m. During this retest, it was noted that the 3 emissions located above 2 GHz were noise floor measurements and therefore this test is not applicable to them. The emission at 1830 MHz was measured and found to comply with the limits on peak emissions values.

Company Name: Saar Associates, Inc.
Address: 37 Todd Ridge Road
Titusville, NJ, 08560

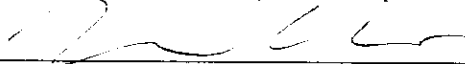
Model: WSI002

Date of Test(s): December 17, 2003

Test Site Location: INTERTEK TESTING SERVICES NA INC.
70 Codman Hill Road
Boxborough, MA 01719

Site: 2

I attest to the accuracy of this report:




Signature

Nicholas Abbondante

Testing Performed By

Engineer

Title



Signature

Michael F. Murphy

Reviewer

Staff Engineer/EMC

Title

Equipment Under Test: Narrow Band Transmitter

Model: WSI002

Serial No.: Proto1

FCC Identifier: OV6WSI002

Support Equipment:

None, the EUT was operated in a standalone configuration.

Cables:

QTY	Description	Shield Description	Hood Description	Length (m)
None				

Test Equipment

Description	Manufacturer	Model	Serial#	Cal Due
High Freq Cable 40Ghz	Megaphase	TM40 K1K1 80	CBL030	11/11/2004
High Freq Cable 40Ghz	Megaphase	TM40 K1K1 197	CBL027	11/11/2004
Spectrum Analyzer	Rohde & Schwartz	FSEK-30	100225	05/26/2004
HORN ANTENNA	EMCO	3115	9512-4632	10/24/2004

Description of how the EUT was exercised during test

The EUT was activated using fresh batteries. The transmitter was set to transmit an FSK modulated signal twice a second for 200 ms per pulse during testing. In normal usage, this 400 ms on time occurs once every 8 hours.

Site Description

Site 2C (Middle Site) is a 3m and 10m sheltered EMI measurement range located in a light commercial environment in Boxborough, Massachusetts. It meets the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets of metal are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically

connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. It is copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

Config Photos



Results

Radiated Emissions / Interference

Table: 1

Company: Saar Associates, Inc. Tested by: Nicholas Abbondante
Model #: Narrow Band Transmitter Serial #: Proto1 Location: EMU Site 2
Project #: 3019852 Pressure: 1001 mb Detector: R&S FSEK30
Date: 12/17/03 Temp: 16c Antenna: HORN1
Standard: FCC Part 15 C Humidity: 36% PreAmp: PRE8
Class: None Group: None Cable(s): CBL030, CBL 027 None
Notes: RBW 1 MHz, VBW 3 MHz, Detector +Peak Distance: 3 meters

Ant. Pol. (V/H)	Frequency MHz	Reading dB(μV)	Antenna Factor dB(1/m)	Cable Loss dB	Preamp Factor dB	Distance Factor dB	Net dB(μV/m)	Limit dB(μV/m)	Margin dB
H	1830.000	41.1	28.5	3.8	19.4	0.0	54.0	74.0	-6.1
V	2745.000	Noise Floor Reading: No emission to measure peak value							
V	3660.000	Noise Floor Reading: No emission to measure peak value							
V	4575.000	Noise Floor Reading: No emission to measure peak value							

The following is how net radiated field strength readings were determined:

$$NF = RF + AF + CF - PF - AVF - DF$$

Where,

NF = Net Reading in dBμV/m

RF = Reading from receiver in dBμV

AF = Antenna Correction Factor in dB(1/m)

CF = Cable Correction Factor in dB

PF = Pre-Amplifier Correction Factor in dB

AVF = Duty Cycle Correction Factor in dB (only if applicable)

DF = Distance Factor in dB (using 20 dB/decade unless otherwise specified)

To convert from dBμV/m to μV/m or mV/m the following was used:

$$UF = 10^{(NF / 20)}$$

Where,

$$UF = \text{Net Reading in } \mu\text{V/m}$$

Example:

$$NF = RF + AF + CF - PF - AVF - DF = 62.9 + 13.7 + 2.1 - 16.1 - 0.0 - 10.5 = 52.1 \text{ dB}\mu\text{V/m}$$

$$UF = 10^{(52.1 \text{ dB}\mu\text{V} / 20)} = 403 \mu\text{V/m}$$