



849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

FCC PART 80, FCC PART 90 TEST REPORT

APPLICANT	GUIDANCE NAVIGATION LIMITED
	4 DOMINUS WAY MERIDIAN BUSINESS PARK LEICESTER LE19 1RP UNITED KINGDOM
FCC ID	VYM20-0108-4-E-S2
MODEL NUMBER	RadaScan Mini-Target
PRODUCT DESCRIPTION	MINI RESPONDER
DATE SAMPLE RECEIVED	3/8/2013
DATE TESTED	3/27/2013
TESTED BY	SUSHANT KADIMDIVAN
APPROVED BY	MARIO R. DE ARANZETA
TIMCO REPORT NO.	420AUT13TestReport.doc
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Testing Certificate 0955-01

TABLE OF CONTENTS

GENERAL REMARKS	3
GENERAL INFORMATION	4
TEST PROCEDURES.....	5
TECHNICAL DATA	6
RF POWER OUTPUT	6
MODULATION CHARACTERISTICS.....	7
FIELD STRENGTH OF SPURIOUS EMISSIONS	8
FREQUENCY TOLERANCE	11
FREQUENCY STABILITY.....	12
EMC EQUIPMENT LIST.....	13

GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

Summary

The device under test does:

- ☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669



Authorized Signatory Name:

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

Date: April 2013

Applicant: GUIDANCE NAVIGATION LIMITED
FCC ID: VYM20-0108-4-E-S2
Report: G\GUIDANCE\420AUT13\420AUT13TestReport.doc

GENERAL INFORMATION

DUT Specification

DUT Description	MINI RESPONDER
FCC ID	VYMTBA
Model Number	TBA
Operating Frequency	9200 MHZ – 9300 MHZ
Test Frequencies	9200 MHZ, 9250 MHZ, 9300 MHZ
No. of Channels	N.A.
Type of Emission	W2D
Modulation	FMCW, PSK
DUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input type="checkbox"/> DC Power 12V
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
Antenna Connector	No external antenna
Test Conditions	The temperature was 26°C Relative humidity of 50%.
Modification to the DUT	None
Test Exercise	The DUT is an amplifier. A CW signal was applied with a field strength high enough to achieve the maximum possible power output from the amplifier.
Applicable Standards	ANSI/TIA 603-C:2004, FCC CFR 47 Part 80, IC RSS-182 (issue 5) and RSS-GEN (issue 3)
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

Applicant: GUIDANCE NAVIGATION LIMITED
FCC ID: VYM20-0108-4-E-S2
Report: G\GUIDANCE\420AUT13\420AUT13TestReport.doc

TEST PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI/TIA 603-C: 2004 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI C63.4-2004 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a micro volt at the output of the antenna.

TECHNICAL DATA

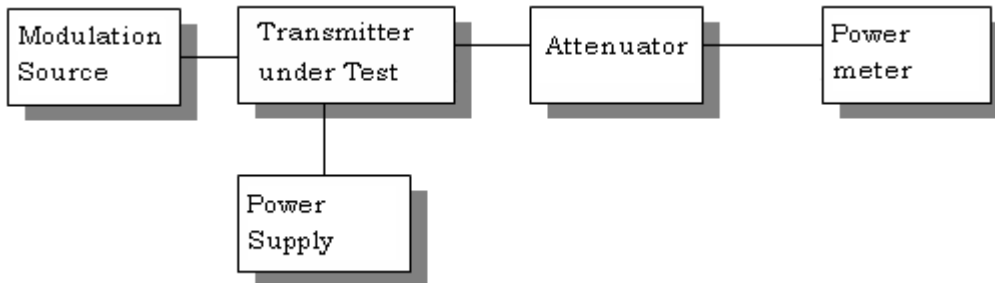
RF POWER OUTPUT

Rule Part No.: FCC Part 2.1046(a), 80.215(e)(1), IC RSS-82

Test Requirements:

Method of Measurement: RF power is measured by connecting as per setup diagram. With a nominal voltage, and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data:

OUTPUT POWER: 4 dBm (Conducted)
OUTPUT POWER: 15.9 dBm (EIRP)

MODULATION CHARACTERISTICS

Part 2.1033(c) (4) Type of Emission: 6M00W2D
FCC Part 80.205(a)
RSS-182, RSS-GEN

The 99 % bandwidth is 6 MHz

The intentional radiator is modulated by a 1 to 3 MHz signal as described in the technical brief.

FIELD STRENGTH OF SPURIOUS EMISSIONS

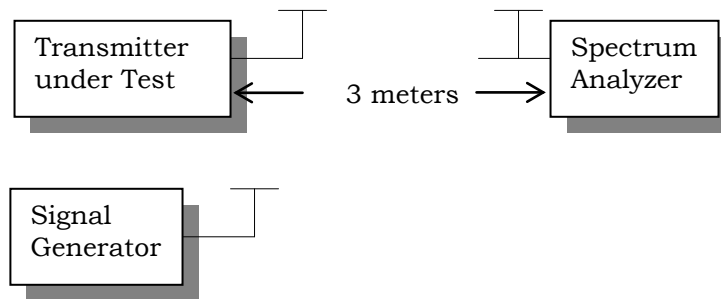
Rule Parts. No.: FCC Part 2.1053, RSS-182

Requirements: Emissions must be $43+10\log(\text{PO})$ dB below the mean power output of the transmitter.

$$43+10\log(0.0025) = 17 \text{ dB}$$

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Test Setup Diagram:



Test Data:

Mean power = 4 dBm

LOW FREQ

Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	dBc
9,200.0	350.40	V	55.6
9,200.0	594.40	V	43.8
9,200.0	734.40	H	47.4
9,200.0	804.80	V	47.9
9,200.0	18,390.0	V	26.6

Applicant: GUIDANCE NAVIGATION LIMITED
 FCC ID: VYM20-0108-4-E-S2
 Report: G\GUIDANCE\420AUT13\420AUT13TestReport.doc

MID FREQ

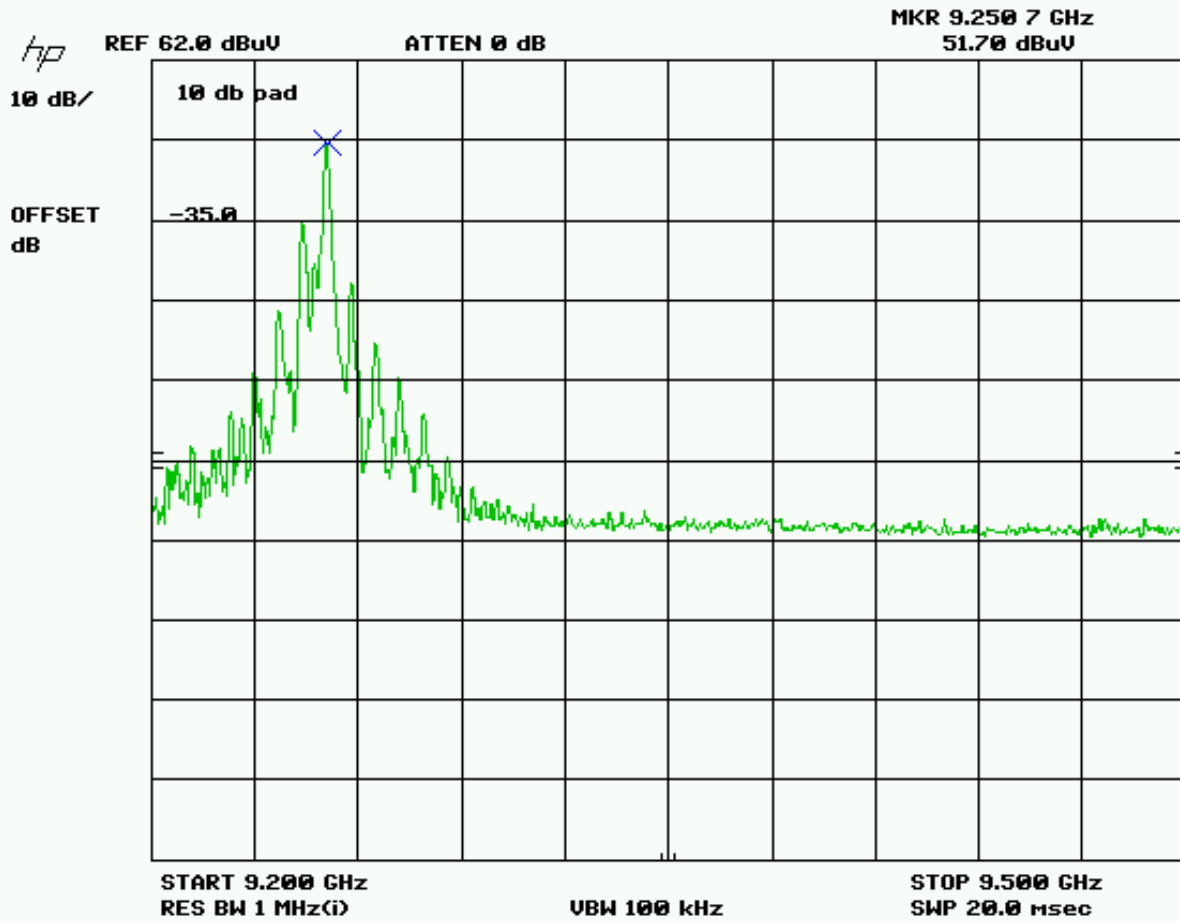
Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	dBc
9,250.0	280.00	H	59.8
9,250.0	280.00	V	56.4
9,250.0	349.60	V	57.1
9,250.0	594.40	V	43.8
9,250.0	664.00	V	52.4
9,250.0	733.60	H	48.2
9,250.0	804.80	V	48.8
9,250.0	1,015.00	V	55.2
9,250.0	1,048.00	V	55.7
9,250.0	1,084.00	V	56.4
9,250.0	1,225.00	H	54.7
9,250.0	1,365.00	V	57.9
9250.0	18,480.0	H	34.2

HIGH FREQ

Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	dBc
9,300.0	280.00	H	57.1
9,300.0	350.60	V	55.2
9,300.0	594.40	V	43.7
9,300.0	734.40	H	47.0
9,300.0	804.00	V	48.3
9,300.0	18,570.0	V	31.1

9200 MHZ TO 9500 MHZ PLOT

TX @ 9250 MHz



Applicant: GUIDANCE NAVIGATION LIMITED
 FCC ID: VYM20-0108-4-E-S2
 Report: G\GUIDANCE\420AUT13\420AUT13TestReport.doc

FREQUENCY TOLERANCE

Rule Parts. No.: Part 80.209(c)

Requirements: TO BE SPECIFIED IN THE LICENSE

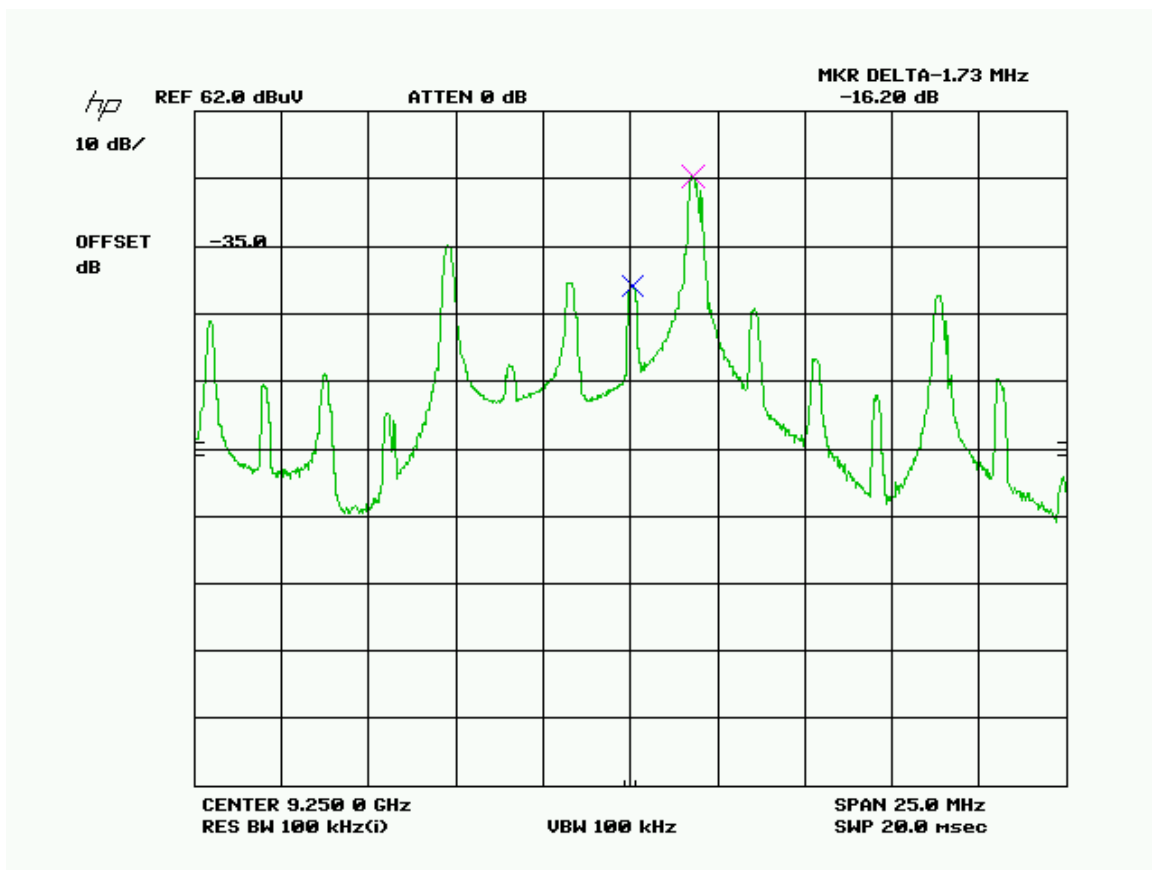
Method of Measurements: ANSI/TIA 603-C: 2004

APPLY A SIGNAL AT 9.25 GHz AND MEASURE THAT THE RETRANSMITTED FREQUENCY IS THE SAME AS THAT RECEIVED PLUS THE MODULATION FREQUENCY (1.75 MHz to 3 MHz)

TEST DATA:

APPLIED SIGNAL FREQUENCY: 9.25 GHz

MEASURED RETRANSMITTED FREQUENCY: 9.25 GHz + 1.73 MHz



Applicant: GUIDANCE NAVIGATION LIMITED
 FCC ID: VYM20-0108-4-E-S2
 Report: G\GUIDANCE\420AUT13\420AUT13TestReport.doc

FREQUENCY STABILITY

Rule Parts. No.: FCC Part 2.1055, Part 80.209(a), RSS-182, RSS-GEN

Requirements: Temperature and voltage tests were performed to verify that the frequency remains within the .0010%, 10.0 ppm, specification limit, for 20 kHz spacing. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25°C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worst-case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -20°C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute and was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute and again frequency readings were noted at 15 sec intervals. The worst-case number was recorded for temperature plotting. This procedure was repeated in 10-degree increments up to +50°C.

Method of Measurements: ANSI/TIA 603-C: 2004

Test Data:

THE PRODUCT DOES NOT HAVE ANY OSCILLATOR/FREQUENCY SOURCE.

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
Antenna: Biconnical	Eaton	94455-1	1096	05/04/11	05/04/13
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/04/11	05/04/13
Frequency Counter	HP	5385A	2730A03025	08/17/11	08/17/13
Signal Generator	HP	8640B	2308A21464	02/23/12	02/23/14
Hygro-Thermometer	Extech	445703	0602	06/15/11	06/15/13
Digital Multimeter	Fluke	77	35053830	09/09/11	09/09/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13
SPECTRUM ANALYZER	R&S	ESIB40	100274	2/15/2013	2/15/2015
HORN ANTENNA 1-18 GHz	ETS LINDGREN	3117	00035923	12/7/11	12/7/13
STANDARD GAIN HORN ANTENNA 18-40 GHz	EMCO	3116	9011-2145	-	-