



Measurement of RF Interference from a Motorola Model Canopy Transciever ISM Band (5725MHz to 5850MHz) using a Wireless Beehive Snap On Reflector Dish Antenna

For : Wireless Beehive, LLC.
Lake Point, UT

P.O. No. : 042105TH-01

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Specification : FCC "Code of Federal Regulations" Title 47
Part 15.247, Subpart C

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THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.

Measurement of RF Emissions from a Canopy Transceiver with Snap On Reflector Dish Antenna

1.0 INTRODUCTION:

1.1 Description of Test Item - This document presents the results of tests performed to determine if the Motorola Canopy Transceiver (ISM Band) would meet the FCC requirements when using a Snap On Reflector Dish Antenna. The test item is a Motorola Canopy transceiver that utilizes a Wireless Beehive Snap On Reflector Dish Antenna. The tests were performed for Wireless Beehive LLC, of Lake Point, Utah.

1.2 Purpose - The test series was performed to determine if the test item meets the requirements of the radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections for Intentional Radiators. Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions - There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 Applicable Documents - The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2004
- 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"

1.5 Subcontractor Identification - This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.6 Laboratory Conditions The temperature at the time of the test was 23°C and the relative humidity was 41%.

2.0 TEST ITEM SETUP AND OPERATION:

The test item is a Motorola Canopy transceiver that utilizes a Wireless Beehive Snap On Reflector Dish Antenna. A block diagram of the test item setup is shown as Figure 1.

2.1 Power Input - The test item was powered with 24VDC from a Motorola model SADB-1129 transformer via the 45 feet of CAT 5 ethernet cable.

2.2 Grounding - The test item was grounded via the 45 feet of CAT 5 ethernet cable to the transformer.

2.3 Peripheral Equipment - The test item was submitted with a Sony Vaio laptop that was used to power and communicate with the test item via one 45 foot long CAT 5 ethernet cable.

2.4 Interconnect Cables - The test item was connected to the laptop via a 45 foot long CAT 5 ethernet cable.

2.5 Operational Mode - For all tests the test item was placed on a 80cm high non-conductive stand. The test item and all peripheral equipment were energized.

For all tests, the test item was controlled and powered by the laptop computer. Through the computer the test item was set to transmit continuously in a continuous wave mode. The tests were performed with the test item transmitting at 5725MHz, 5790MHz and 5850MHz.

3.0 TEST EQUIPMENT:

3.1 Test Equipment List - A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

3.2 Calibration Traceability Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 Powerline Conducted Emissions Measurements

4.1.1 Requirements – Since the scope of this test is limited to the radiated emission measurements, no conducted emission measurements were taken.

4.2 Antenna Conducted Emissions Measurements:

4.2.1 Requirements – Since the scope of this test is limited to the radiated emission measurements, no antennas conducted emission measurements were taken.

4.3 Radiated Emission Measurements:

4.3.1 Requirements - Per section 15.247(c), radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in

§15.209(a) (see§ 15.205(c)).

Paragraph 15.209(a) has the following radiated emission limits:

Frequency MHz	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

4.3.2 Procedures - Radiated measurements were manually performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

The radiated emission tests were performed for any harmonics which fall in restricted bands.

To ensure that maximum emission levels were measured, the following steps were taken:

- 1) Measurements were made using an average detector and a standard gain horn antenna.
- 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
 - (a) The test item was rotated so that all of its sides were exposed to the receiving antenna.
 - (b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - (c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

Photographs of the test item setup with each antenna are presented as Figures 2.

4.3.3 Results - The radiated emission levels are presented on data pages 13 through 15. As can be seen by the data the test item did meet the emissions limits of 15.247(c).

5.0 CONCLUSIONS:

It was determined that the Motorola Canopy Transciever tested with the Wireless Beehive Snap On Reflector dish Antenna, did fully meet the selected radiated mission requirements of the FCC "Code of



Federal Regulations" Title 47, Part 15.247, Subpart C, for Intentional Radiators.

6.0 CERTIFICATION:

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the test item. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

7.0 ENDORSEMENT DISCLAIMER:

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.



TABLE I: TEST EQUIPMENT LIST

ELITE ELECTRONIC ENG. INC.								Page: 1
Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ			NOTE 1
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---			N/A
Equipment Type: AMPLIFIERS								
APK3	PREAMPLIFIER	AGILENT TECHNOLOGIES	8449B	3008A01593	1-26.5GHZ	05/10/04	12	05/10/05
Equipment Type: ANTENNAS								
NHA0	STANDARD GAIN HORN ANTENNA	NARDA	640	---	8.2-12.4GHZ			NOTE 1
NHG0	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ			NOTE 1
Equipment Type: CONTROLLERS								
CMA0	MULTI-DEVICE CONTROLLER	EMCO	2090	9701-1213	---			N/A
Equipment Type: RECEIVERS								
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/09/05	12	02/09/06
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	02/09/05	12	02/09/06
RAF4	QUASIPeAK ADAPTER	HEWLETT PACKARD	85650A	2043A00320	0.01-1000MHZ	02/09/05	12	02/09/06

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable
 Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

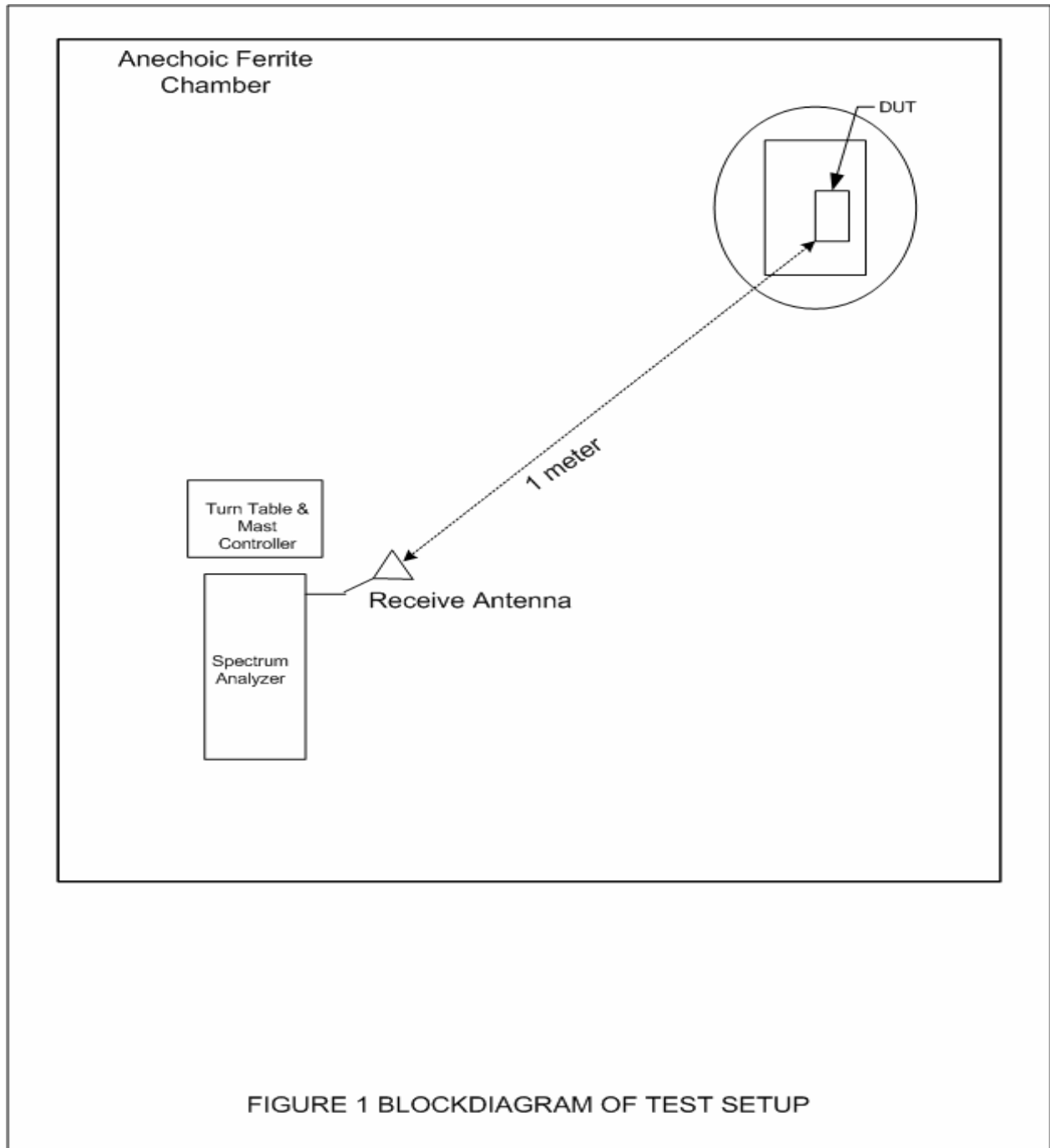
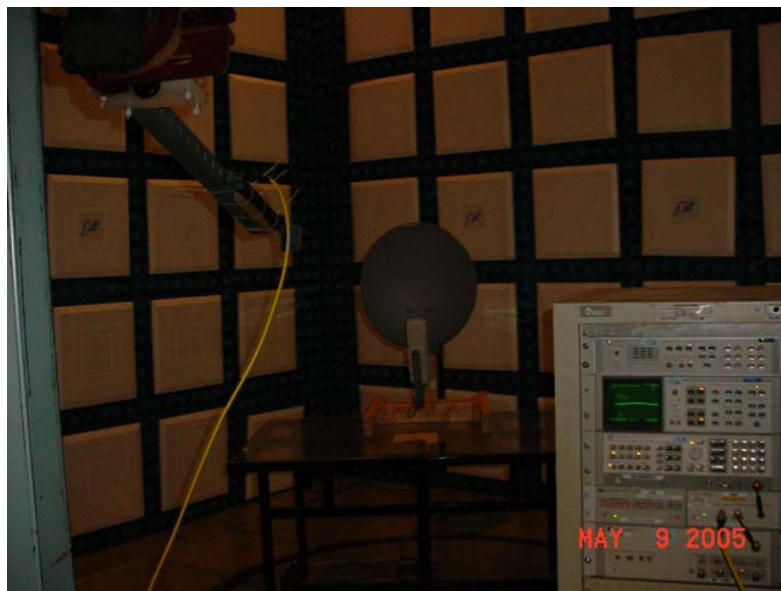


Figure 2



Test Setup for Measurement of Radiated Emissions



MANUFACTURER : Wireless Beehive LLC.
MODEL : Canopy Transceiver
ANTENNA : Snap On Reflector Plate
S/N : None given
SPECIFICATION : FCC-15.247 Radiated Emissions in restricted bands
DATE : May 9, 2005
NOTES : LOW MID HIGH Channels

LOW Channel

FREQ	ANT	MTR	Amb	Dist.	ANT	CABLE	PRE	TOTAL	15.209
MHz	POL	RDG	.	Corr.	FAC	LOSS	AMP	dBuV/m	dBuV/m
		dBuV	BW	Fac					LIMIT
11450.0	H	45.3	1M/10	-9.5	34.2	2.5	-34.1	38.4	54.0
	V	47.2	1M/10	-9.5	34.2	2.5	-34.1	40.3	54.0
22900.0	H	48.4	* 1M/10	-9.5	40.6	0.0	-29.7	49.8	54.0
	V	48.0	* 1M/10	-9.5	40.6	0.0	-29.7	49.4	54.0

MIDDLE Channel

FREQ	ANT	MTR	Amb	Dist.	ANT	CABLE	PRE	TOTAL	15.209
MHz	POL	RDG	.	Corr.	FAC	LOSS	AMP	dBuV/m	dBuV/m
		dBuV	BW	Fac					LIMIT
11580.0	H	46.4	1M/10	-9.5	34.2	2.5	-34.1	39.5	54.0
	V	48.5	1M/10	-9.5	34.2	2.5	-34.1	41.6	54.0
23160.0	H	51.0	* 1M/10	-9.5	40.6	0.0	-29.2	52.9	54.0
	V	48.5	* 1M/10	-9.5	40.6	0.0	-29.2	50.4	54.0

HIGH Channel

FREQ	ANT	MTR	Amb	Dist.	ANT	CABLE	PRE	TOTAL	15.209
MHz	POL	RDG	.	Corr.	FAC	LOSS	AMP	dBuV/m	dBuV/m
		dBuV	BW	Fac					LIMIT
11700.0	H	45.1	1M/10	-9.5	34.2	2.5	-34.1	38.2	54.0
	V	47.0	1M/10	-9.5	34.2	2.5	-34.1	40.1	54.0
23400.0	H	48.9	* 1M/10	-9.5	40.6	0.0	-28.6	51.4	54.0
	V	48.0	* 1M/10	-9.5	40.6	0.0	-28.6	50.5	54.0