

# TIMCO ENGINEERING INC.

849 NW State Road 45  
Newberry, Florida 32669  
<http://www.timcoengr.com>  
888.472.2424 F 352.472.2030 email: [sid@timcoengr.com](mailto:sid@timcoengr.com)



## Test Report

Product Name: TRANSCEIVER MODULE

FCC ID: TE6-CM2201N

Applicant:

RF MONOLITHICS, INC.  
4441 SIGMA ROAD  
DALLAS TX 75244  
USA

Date Receipt: 9/29/2005

Date Tested: 10/13/2005

APPLICANT: RF MONOLITHICS, INC.  
FCC ID: TE6-CM2201N  
REPORT #: R\RF MONOLITHICS TE6\1717ZUT5\1717ZUT5TestReport.doc

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### EXHIBIT INCLUDED:

COVER LETTER  
REQUEST FOR CONFIDENTIALITY LETTER  
BLOCK DIAGRAM  
SCHEMATIC  
USERS MANUAL  
LABEL SAMPLE  
LABEL LOCATION  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS  
OPERATIONAL DESCRIPTION  
TEST SET UP PHOTOGRPAHS

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## MODULAR REQUIREMENTS

1. The modular transmitter must have its own RF shielding.  
**All of the transceiver RF portions are in a hermetically sealed case on the top surface of the module.**
2. The modular transmitter must have buffered modulation data inputs.  
**The transmitter has a modulated buffer amplifier for data transmission. See the operational description exhibit.**
3. The modular transmitter must have its own power supply regulation.  
**This unit uses coin cells.**
4. The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c).  
**The module is being certified with one antenna. The antenna is printed on the circuit board. No antenna connector is available.**

**400-1595-001 - 916.5 MHz ¼ Wavelength Insulated Wire Antenna**

5. The modular transmitter must be tested in a stand-alone configuration.  
**The CM2201N was tested stand alone. See the test setup photographs.**
6. The modular transmitter must be labeled with its own FCC ID number.  
**The FCC ID Label Sample and Label Location are included in the exhibits.**

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## MODULAR REQUIREMENTS CONTD.

7. The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter.  
**The CM2201N meets all of the requirements per FCC Rules Part 15.249 and data is included in the report.**
  
8. The modular transmitter must comply with any applicable RF exposure requirements.  
**The unit is of such low power it meets all RF Exposure requirements.**

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## EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
Biconnical Antenna	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 8/3/05	8/3/07
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Log-Periodic Antenna	Eaton	96005	1243	CAL 5/8/03	5/8/05

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## TEST PROCEDURE

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. The UUT was transmitting a test signal during the testing.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 using a HEWLETT PACKARD spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the UUT was 74.3oF with a humidity of 69%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS  
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 74.3oF with a humidity of 69%.

**ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:** The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The UUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-2003 with the EUT 40 cm from the vertical ground wall.

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**NAME OF TEST:** RADIATION INTERFERENCE

**RULES PART NUMBER:** 15.249, 15.209

**REQUIREMENTS:**

FIELD STRENGTH	FIELD STRENGTH	S15.209
of Fundamental: 902-928 MHZ 2.4-2.4835 GHz 94 dBuV/m @3m	of Harmonics 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz 54 dBuV/m @3m	40 dBuV/m @3M 43.5 46 54dBuV/m
		ABOVE 960 MHz

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

**TEST RESULTS:** This unit DOES meet the FCC requirements.

**TEST DATA:**

Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB	Correction Factor dB	DUTY CYCLE FACTOR	Field Strength dBuV/m	Margin dB
916.50	54.0	V	1.97	22.60	22.60	6.14	72.43	21.57
916.50	58.1	H	1.97	23.43	23.43	6.14	77.36	16.64
2,749.30	20.2	H	3.42	32.90	32.90	6.14	50.38	3.62
2,749.30	23.4	V	3.42	32.90	32.90	6.14	53.58	0.42
3,665.80	11.0	H	4.20	33.43	33.43	6.14	42.49	11.51
3,665.80	11.3	V	4.20	33.43	33.43	6.14	42.79	11.21

**TEST PROCEDURE:** ANSI STANDARD C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental. Emissions attenuated more than 20 dB below the permissible value are not reported.

PERFORMED BY: JOSEPH SCOGLIO DATE: 10/13/2005

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**APPLICANT:** RF MONOLITHICS, INC.

**FCC ID:** TE6-CM2201N

**NAME OF TEST:** Occupied Bandwidth

**RULES PART NO.:** 15.249

**REQUIREMENTS:** The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

THE PLOTS ON THE NEXT PAGE REPRESENTS THE EMISSIONS TAKEN FOR THIS DEVICE.

**METHOD OF MEASUREMENT:** A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 20 kHz per division.

**TEST RESULTS:** The unit DOES meet the FCC requirements.

**PERFORMED BY:** JOSEPH SCOGLIO

**DATE:** 10/13/2005

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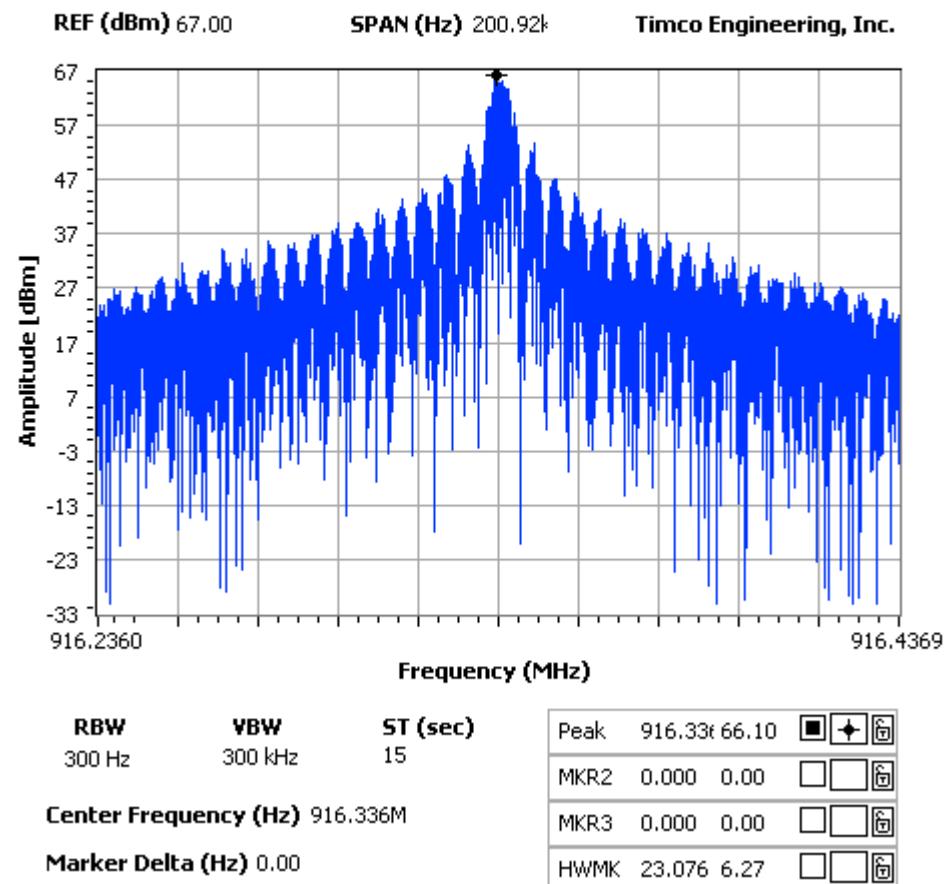
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**NOTES:**

1717aut5 occupied bandwidth



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