

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun

Gyeonggi-Do, 469-803, Korea

T820318835092F820318835169 email thrukang@kornet.net

Test Report

Product Name: Digital Transmission System

FCC ID: ROYTDSS-2400T

Applicant:
Trinus Systems Inc.

Unitech-Ville 8F 801, #1141-2
Beakseok-Dong, Ilsan-Donggu, Goyang-City
Gyeonggi-Do, 410-722
Korea

Date Receipt: July 30, 2007

Date Tested: July 30, 2007

APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT : THRU-707005

COVER SHEET

THRU Lab & Engineering.

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TABLE OF CONTENTS LIST

APPLICANT: Trinus Systems Inc.

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TEST REPORT CONTAINING:

PAGE 1.....	TEST EQUIPMENT LIST
PAGE 2-3.....	TEST PROCEDURES
PAGE 4.....	RADIATED EMISSIONS
PAGE 5.....	POWER LINE CONDUCTED INTERFERENCE
PAGE 6-9.....	OCCUPIED BANDWIDTH
PAGE 10-13.....	PEAK POWER OUTPUT
PAGE 14.....	BAND DUTY CYCLE
PAGE 15-16.....	RADIATED SPURIOUS EMISSIONS
PAGE 17-19.....	BAND EDGES MEASUREMENT
PAGE 20-23.....	POWER SPECTRAL DENSITY

EXHIBITS CONTAINING:

EXHIBIT 1.....	BLOCK DIAGRAM
EXHIBIT 2.....	SCHEMATIC
EXHIBIT 3.....	INSTRUCTION MANUAL
EXHIBIT 4.....	SAMPLE OF FCC ID LABEL
EXHIBIT 5.....	LOCATION OF FCC ID LABEL
EXHIBIT 6.....	EXTERNAL PHOTO - FRONT SIDE
EXHIBIT 7.....	EXTERNAL PHOTO - BACK SIDE
EXHIBIT 8.....	INTERNAL PHOTO - COMPONENT SIDE
EXHIBIT 9.....	INTERNAL PHOTO - COPPER SIDE
EXHIBIT 10.....	CIRCUIT DESCRIPTION
EXHIBIT 11.....	TEST SET UP PHOTO

APPLICANT: Trinus Systems Inc.

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REPORT :THRU-707005

TABLE OF CONTENTS

THRU Lab & Engineering.

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TEST EQUIPMENT LIST

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.	Used
1	Test Receiver	Rohde & Schwarz	ESHS 10	862970/018	2008.05.01	☐
2	Test Receiver	Rohde & Schwarz	ESVS 10	826008/014	2008.06.12	☐
3	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2008.06.13	☒
4	Spectrum Display	Hewlett Packard	85662A	2542A12429	2008.06.13	☒
5	Quasi-peak Adapter	Hewlett Packard	85650A	2521A00887	2008.06.13	☐
6	RF Preselector	Hewlett Packard	85685A	2648A00504	2008.06.13	☐
7	Preamplifier	Hewlett Packard	8447F	2805A02570	2008.05.28	☐
8	Preamplifier	A.H. Systems	PAM-0118	164	2008.05.08	☒
9	Biconical Antenna	Eaton Corp.	94455-1	0977	2008.04.01	☐
10	Biconical Antenna	EMCO	3104C	9111-2468	2008.06.07	☒
11	Log Periodic Antenna	EMCO	3146	2051	2008.05.11	☒
12	Horn Antenna	A.H. Systems	SAS-571	414	2008.03.17	☒
13	Loop Antenna	Rohde & Schwarz	HFH2-Z2.335.4711.52	826532/006	2009.01.31	☐
14	Dipole Antenna	Rohde & Schwarz	VHAP	574	2007.12.12	☐
15	Dipole Antenna	Rohde & Schwarz	VHAP	575	2007.12.12	☐
16	Dipole Antenna	Rohde & Schwarz	UHAP	546	2007.12.12	☐
17	Dipole Antenna	Rohde & Schwarz	UHAP	547	2007.12.12	☐
18	Signal Generator	Hewlett Packard	8673D	2708A00448	2008.06.12	☒
19	Spectrum Analyzer	Advantest Corp.	R3261C	61720208	2008.06.12	☐
20	LISN	EMCO	3825/2	9111-1912	2008.12.12	☐
21	LISN	Kyoritsu	KNW-242	8-923-2	2009.05.23	☐
22	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2008.05.25	☐
23	Waveform Generator	Hewlett Packard	33120A	US34001190	2008.05.21	☐
24	Audio analyzer	Hewlett Packard	8903B	3011A12915	2008.05.21	☐

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TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written Approval of THRU & ENGINEERING. Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal data transmission on a network.

POWER LINE CONDUCTED INTERPERENCE: The procedure used ANSI STANDARD C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The ambient temperature of the UUT was 30 with a humidity of 65%.

BANDWIDTH 6.0dB : The measurement were made with the spectrum analyzer's resolution bandwidth (RBW)=100 kHz and the video bandwidth (VBW) =100 kHz and the span set as shown on plot.

POWER OUTPUT: The RF power output was measured at the antenna feed point by removing the permanent antenna and connecting the UUT to a spectrum analyzer, HP Model No.8566B, RBW=3MHz, VBW>or=RBW, span=5MHz.

ANTENNA CONDUCTED EMISSIONS: The RBW=100kHz, VBW > or = RBW and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth (RBW) of the spectrum analyzer was 100kHz up to 1GHz and 1.0MHz above 1 GHz with an appropriate sweep speed. The VBW above 1.0 GHz was = 1.0 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 18.4 with a humidity of 59%.

15.247(d) POWER SPECTRAL DENSITY: Starting from the settings that were used for the 6 dB bandwidth the peak signal was located and the span was reduced and the sweep time increased in a manner to maintain calibration and to keep the peak emission in the display, then the sweep time was increased to 2 seconds at 2MHz span and a RBW changed to 3kHz. The spectrum analyzer was put into the noise power mode and the plots made.

15.247(e) : PROCESSING GAIN, This gain is supplied by the manufacturer of the UUT.

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2.1033(b) (4)

ANTENNA AND GROUND SYSTEM : The antenna for the handset is a wire type built-in the enclosure, which has no provision for connection of an external antenna.

No ground connection is provided. The only ground in use is the ground plane on the printed circuit board.

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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: RADIATED EMISSIONS (Below 1000MHz)

RULES PART NO.: 15.209

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	s15.209
OF Fundamental :	of Harmonics	30 – 88 MHz 40 dBuV/m@
902-928MHz		88- 216MHz 43.5
2.4-2.4835GHz		216-916MHz 46
127.38dBuV/m @3m	54 dBuV	ABOVE 960MHz 54dBuV/m

TEST DATA: 1CH

No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Polarity	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuV)	Limit (dBuV/m)
1	66.48	12.4	H	6.2	1.2	19.7	-20.3	40.0
2	73.91	11.9	H	6.5	1.3	19.7	-20.3	40.0
3	83.36	10.5	H	8.9	1.4	20.8	-19.2	40.0
4	147.60	10.7	V	16.3	2.1	29.1	-14.4	43.5
5	194.30	9.6	V	14.7	2.5	26.7	-16.8	43.5
6	467.40	7.6	V	19.6	4.7	31.9	-14.1	46.0
7	500.20	8.7	H	18.2	4.9	31.8	-14.2	46.0
8	522.00	8.2	V	17.8	5.1	31.0	-15.0	46.0
9	594.00	9.1	H	18.9	5.5	33.5	-12.5	46.0
10	619.40	5.9	V	20.4	5.7	32.0	-14.0	46.0
11	705.50	6.0	H	21.4	6.2	33.6	-12.4	46.0
12	875.00	5.5	H	23.6	7.2	36.3	-9.7	46.0

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FCC ID: ROYTDSS-2400T

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NO.: 15.207

REQUIREMENTS:

	QUASI-PEAK	AVERAGE
--	------------	---------

.15 – 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 – 5.0	56	46
5.0 – 30.	60	50

TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum was scanned from .15 to 30MHz.

THE HIGHEST EMISSION READ FOR LINE 1 was

THE HIGHEST EMISSION READ FOR LINE 2 was.

TEST RESULTS : Both lines were observed with the UUT transmitting. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

PERFORMED BY: K.M CHOI

DATE : July 30, 2007

This device was used 3.7V rechargeable battery (Lithium-ion Battery-LG103450).

“NOT APPLIED”

APPLICANT: Trinus Systems Inc.

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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: OCCUPIED BANDWIDTH

RULES PART NO.: 15.247

15.247(a) (2)

6dB bandwidth shall be at least 500 kHz as shown in the accompanying plots. The bandwidth was measured at three places in the band and the narrowest is reported below.

Handset 6dB Bandwidth

HANDY		
CHANNEL	MHz	LIMIT
1	1.530	6dB bandwidth shall be at least 500kHz
20	1.485	
40	1.475	

PERFORMED BY: K.M CHOI

DATE : July 30, 2007

APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

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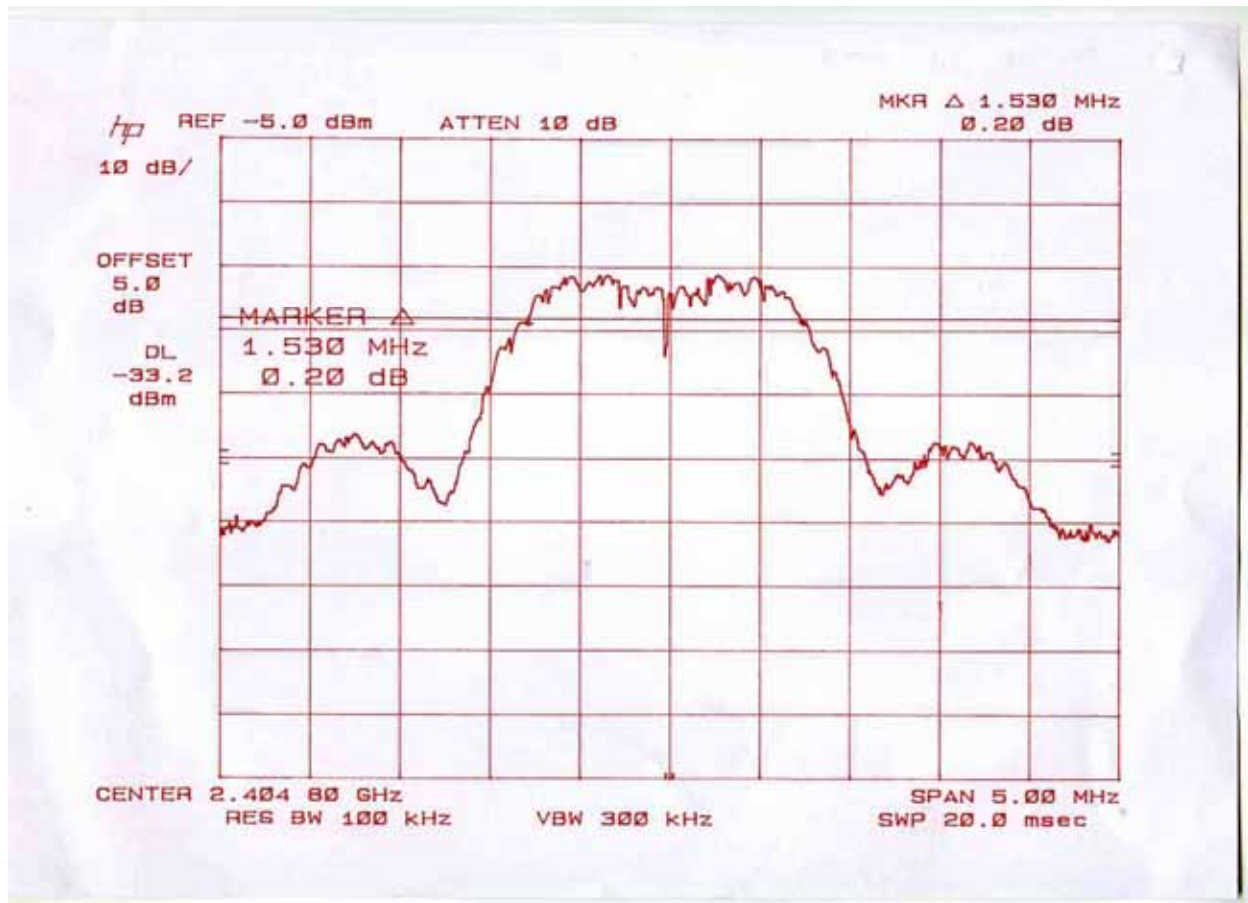
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: OCCUPIED BANDWIDTH (1ch)

RULES PART NO.: 15.247



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005

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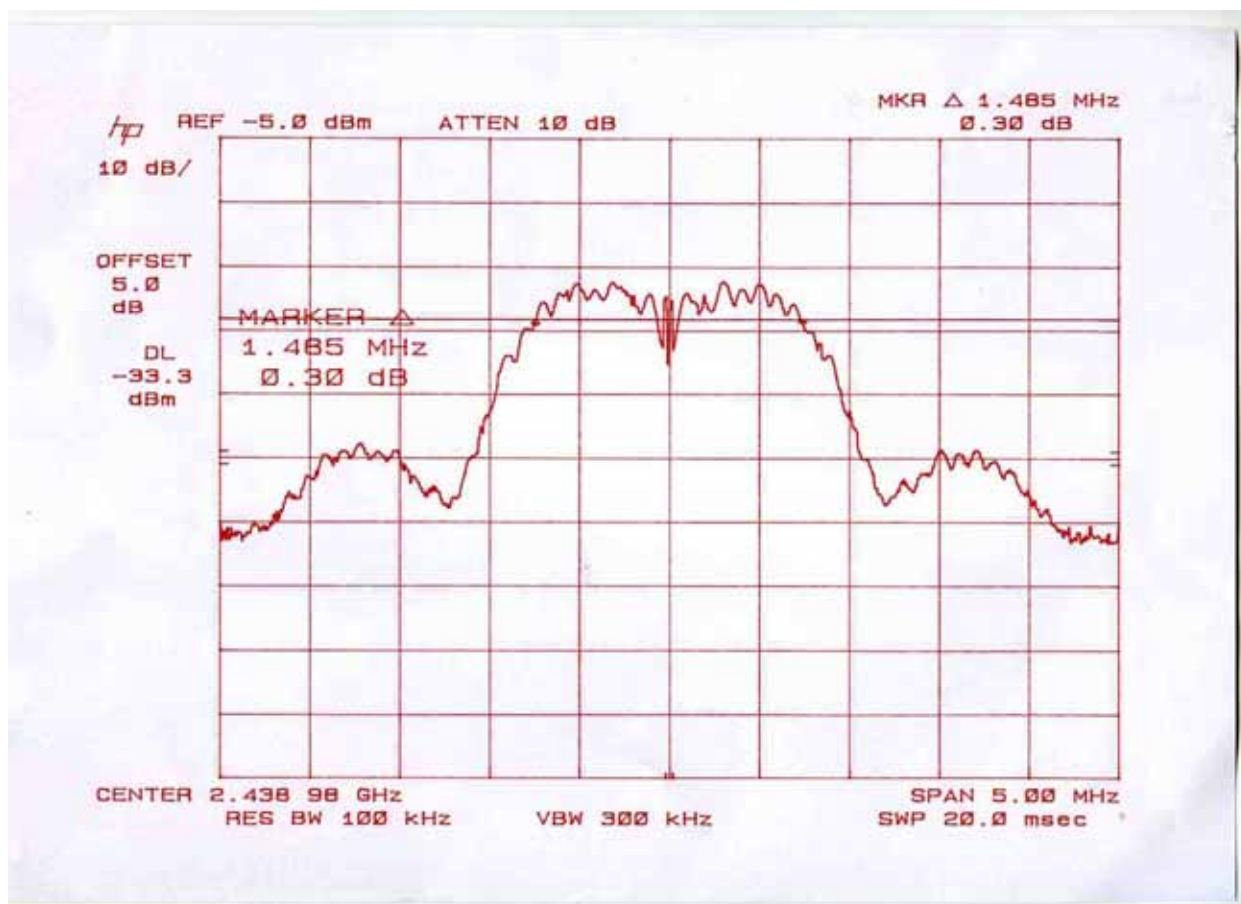
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: OCCUPIED BANDWIDTH (20ch)

RULES PART NO.: 15.247



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005

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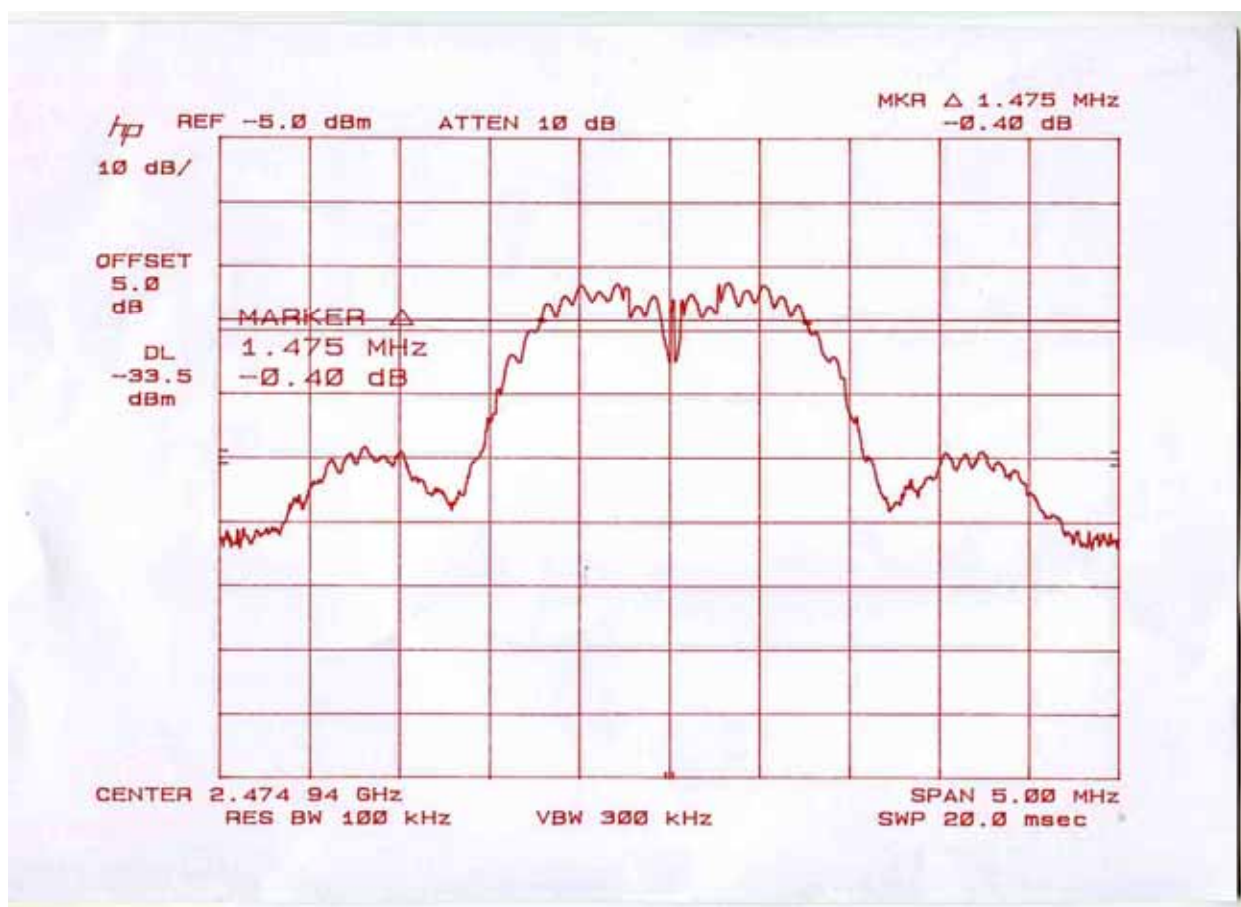
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: OCCUPIED BANDWIDTH (40ch)

RULES PART NO.: 15.247



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: PEAK POWER OUTPUT

RULES PART NO.: 15.247(b)

The maximum peak output power shall not exceed 1 watt (30dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Both the base and handset have a maximum power output of less than +30 dBm. Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a HP spectrum analyzer Model 8566B. The antennas are non-directional and do not exceed 6dBi gain. The power output was measured at three places in the band highest is reported below.

POWER OUTPUT – LIMIT + 30 dBm

HANDY			
CHANNEL	dBm	mW	LIMIT
1	6.70	4.68	2.400-2.4835GHz 1.0 WATT or 30dBm
20	5.30	3.39	
40	4.80	3.02	

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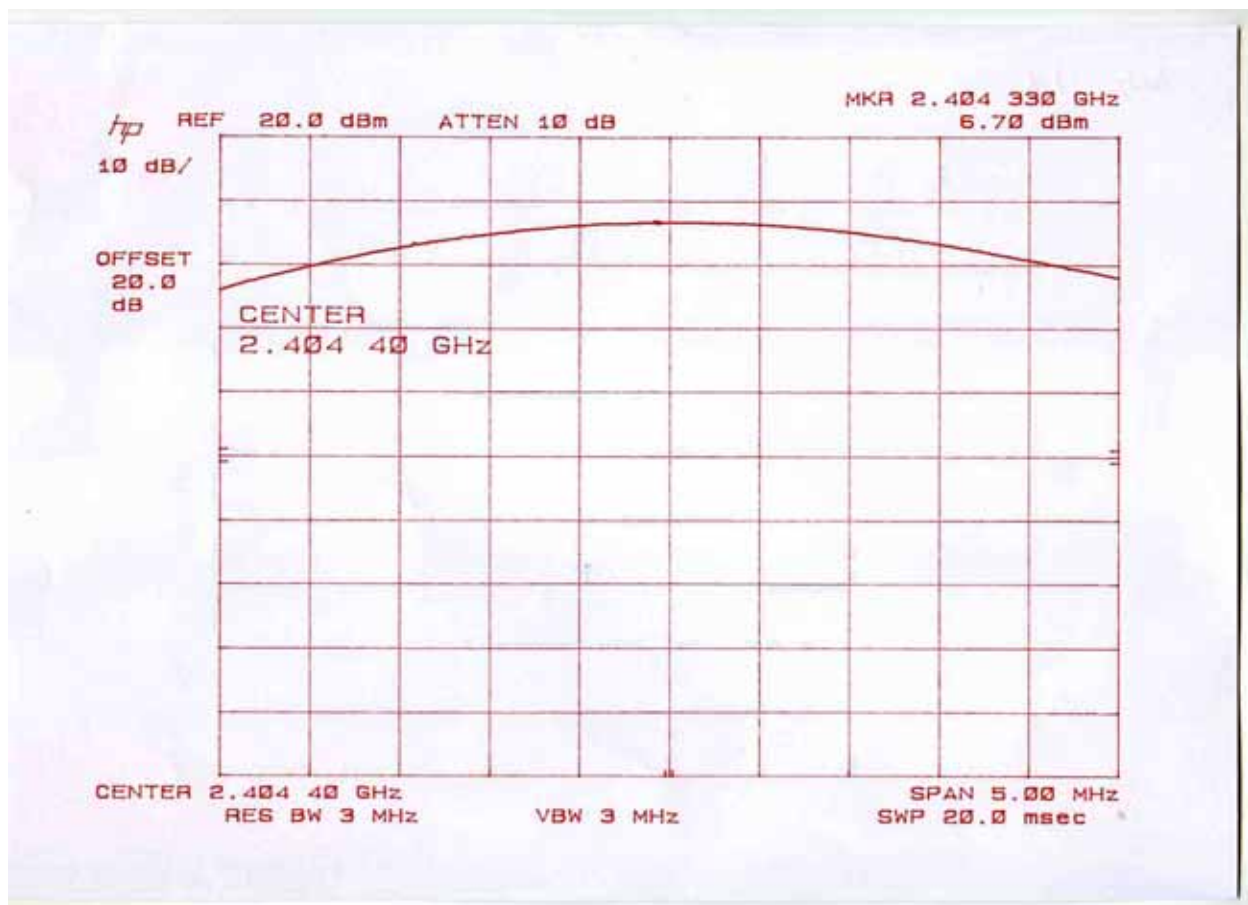
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: PEAK POWER OUTPUT (1ch)

RULES PART NO.: 15.247(b)



APPLICANT: Trinus Systems Inc.

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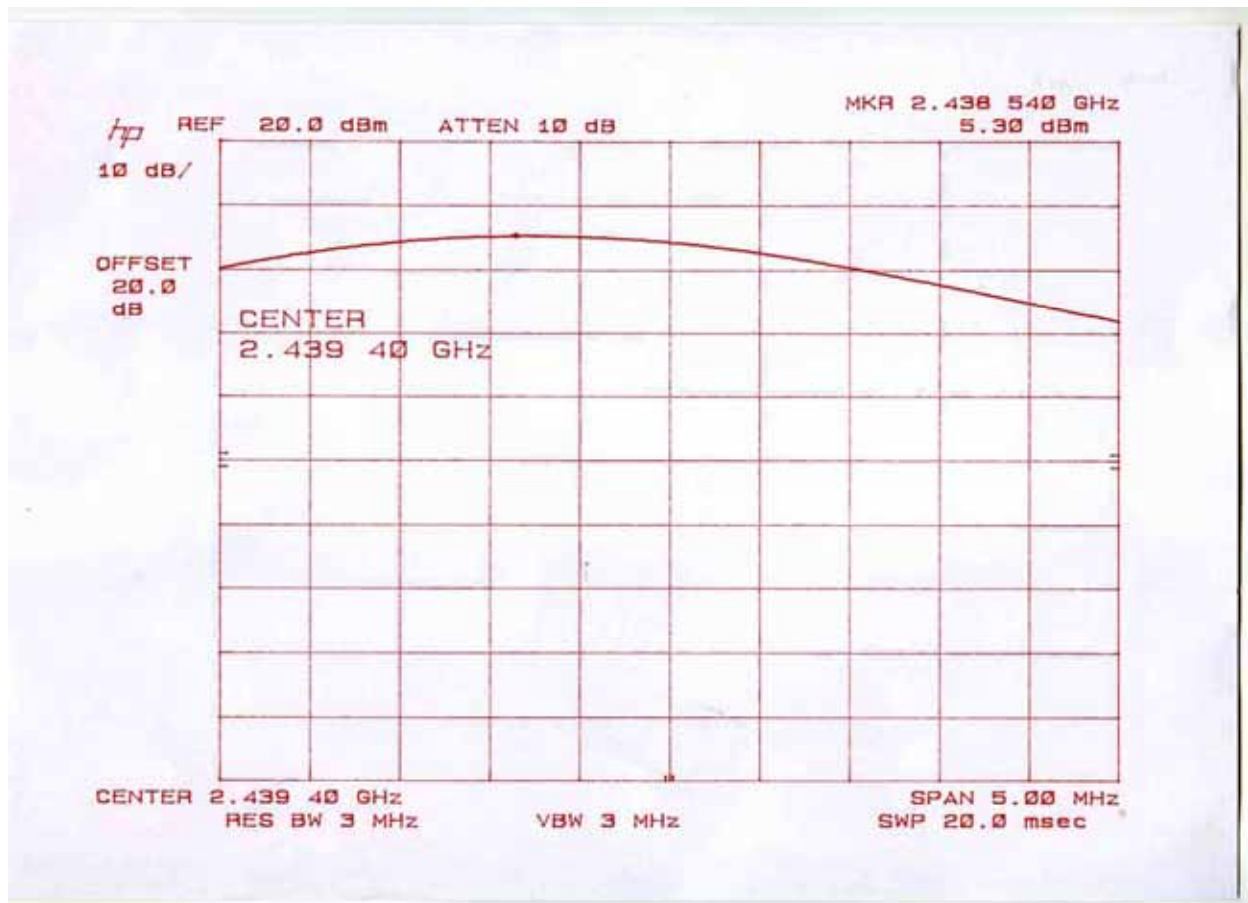
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FCC ID: ROYTDSS-2400T

NAME OF TEST: PEAK POWER OUTPUT (20ch)

RULES PART NO.: 15.247(b)



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NAME OF TEST: PEAK POWER OUTPUT (40ch)

RULES PART NO.: 15.247(b)



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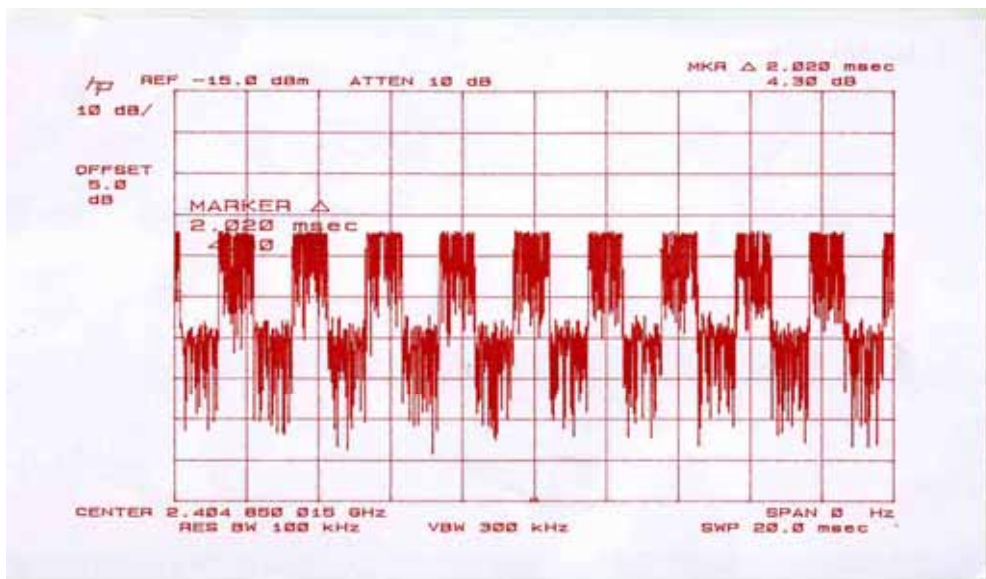
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FCC ID: ROYTDSS-2400T

NAME OF TEST: DUTY CYCLE

RULES PART NO.: 15.209, 15.247(c)

$$\text{Duty cycle value} = 20\log(\text{Twidth}/\text{Tperiod}) = 20\log(0.980 \times 10^{-3} / 2.020 \times 10^{-3}) = -6.84$$



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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

RULES PART NO.: 15.209, 15.247(c)

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	s15.209
OF Fundamental :	of Harmonics	30 – 88 MHz 40 dBuV/m@
902-928MHz		88- 216MHz 43.5
2.4-2.4835GHz		216-916MHz 46
127.38dBuV/m @3m	54 dBuV	ABOVE 960MHz 54dBuV/m

TEST DATA:

No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Pola	ANT Factor dB	Cable Loss dB	Duty Cycle dB	Field Strength (dBuV/m)	Margin (dBuV)	Limit (dBuV/m)	Detector mode
2404.8	2404.8	63.9	H	27.8	3.3		95.0	95.0		PK
2404.8	4810.8	16.9	H	33.7	4.6	6.8	48.4	-5.6	54.0	PK
2439.4	2439.6	60.0	H	27.9	3.3		91.2	91.2		PK
2439.4	4878.2	17.3	H	33.9	4.6	6.8	49.0	-5.0	54.0	PK
2475.3	2475.8	61.0	H	27.9	3.3		92.2	92.2		PK
2475.3	4950.6	21.4	H	34.1	4.7	6.8	53.4	-0.6	54.0	PK(*)
2404.8	2404.8	62.0	V	27.8	3.3		93.1	93.1		PK
2404.8	4810.8	16.4	V	33.7	4.6	6.8	47.9	-6.1	54.0	PK
2439.4	2439.6	57.4	V	27.9	3.3		88.6	88.6		PK
2439.4	4878.2	22.5	V	33.9	4.6	6.8	54.2	0.2	54.0	PK(*)
2475.3	2475.8	58.4	V	27.9	3.3		89.6	89.6		PK
2475.3	4950.6	21.0	V	34.1	4.7	6.8	53.0	-1.0	54.0	PK(*)

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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

RULES PART NO.: 15.209, 15.247(c)

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	s15.209
oF Fundamental :	of Harmonics	30 – 88 MHz 40 dBuV/m@
902-928MHz		88- 216MHz 43.5
2.4-2.4835GHz		216-916MHz 46
127.38dBuV/m @3m	54 dBuV	ABOVE 960MHz 54dBuV/m

Emissions that fall in the restricted bands(15.205) must be less than or equal to 500uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

PK(*) exceed 54dBuv/m and retested AV Mode (RBW=1MHZ,VBW=10Hz)										
No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Pola	ANT Factor dB	Cable Loss dB	Duty Cycle dB	Field Strength (dBuv/m)	Margin (dBuv)	Limit (dBuv/m)	Detector mode
2439.4	4878.2	15.1	H	33.9	4.6	6.8	46.8	-7.2	54.0	AV
2439.4	4878.2	18.6	V	33.9	4.6	6.8	50.3	-3.7	54.0	AV
2475.3	4950.6	18.0	V	34.1	4.7	6.8	50.0	-4.0	54.0	AV

SAMPLE CALCULATION: FSdBuV/m = MR(dBuV) + ACFdB + COAX + DUTY CYCLE.

METHOD OF MEASUREMENT : The procedure used was ANSI STANDARD C63.4-2003. 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 scanned from 30MHz to 10GHz using a Hewlett Packard Model8566B Spectrum Analyzer, Hewlett Packard Model 85685A Preselector, Hewlett Packard Model 85650A Quasi-peak Adaptor, and an appropriate antenna. Low loss coax was used above 1 GHz. Measurements were made at ThruLab & ENGINEERING. located at 477-6, Hager-Ri, Yoju-Up, Yoju-Gun, Kyunggi-Do, 469-803, Korea

TEST RESULTS : The unit DOES meet the FCC requirements.

PERFORMED BY: K.M CHOI

DATE : July 30, 2007

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NAME OF TEST: BAND EDGES MEASUREMENT

RULES PART NO.: 15.209, 15.247(c)

TEST PROCEDURE : An in band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4-2003 and FCC Rules. The procedure was repeated with an peak detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.

Result :

1. Reading dBuV + Step Atten Value(20dB) – PAM-0118 Preamplifier Gain

2. 1 + ANT Factor + Cable Loss

Low

PK : $52.1 + 12 - 43.9 = 20.2\text{dBuV}$

AV : $39.8 + 12 - 43.9 = 7.9\text{dBuV}$

High

PK : $54.7 + 12 - 44.2 = 22.5\text{dBuV}$

AV : $40.0 + 12 - 44.2 = 7.8\text{dBuV}$

No	Emission Frequency (MHz)	Meter Reading dBuV/m	Ant. Polarity	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuV)	Limit (dBuV/m)
	Low							
PK	2395.01	20.2	V	27.8	3.3	51.3	-2.7	54.0
AV	2395.01	7.9	V	27.8	3.3	39.1	-14.9	54.0
	HIGH							
PK	2485.26	22.5	V	27.9	3.3	52.8	-1.7	54.0
AV	2485.26	7.8	V	27.9	3.3	39	-15	54.0

PERFORMED BY: K.M CHOI

DATE : July 30, 2007

APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT : THRU-707005

THRU Lab & Engineering.

477-6, Hager-Ri, Yoju-Up, Yoju-Gun

Gyeonggi-Do, 469-803, Korea

T820318835092F820318835169 email thrukang@kornet.net

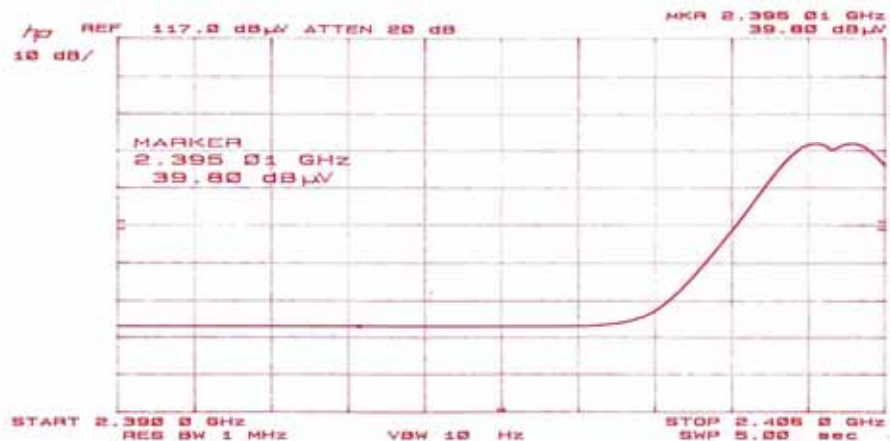
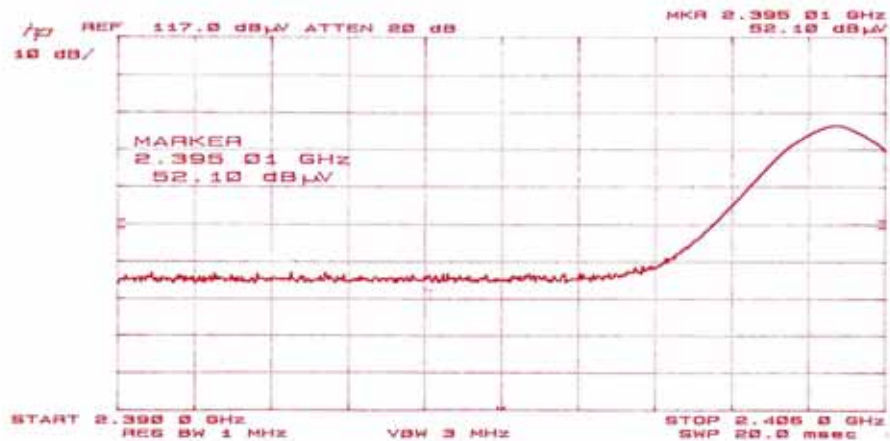
APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: BAND EDGES MEASUREMENT

RULES PART NO.: 15.209, 15.247(c)

TEST PROCEDURE : An in band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4-2003 and FCC Rules. The procedure was repeated with an peak detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.



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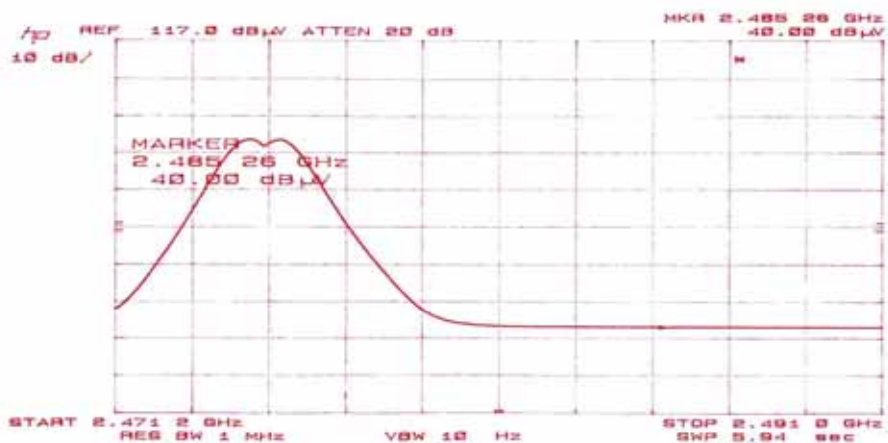
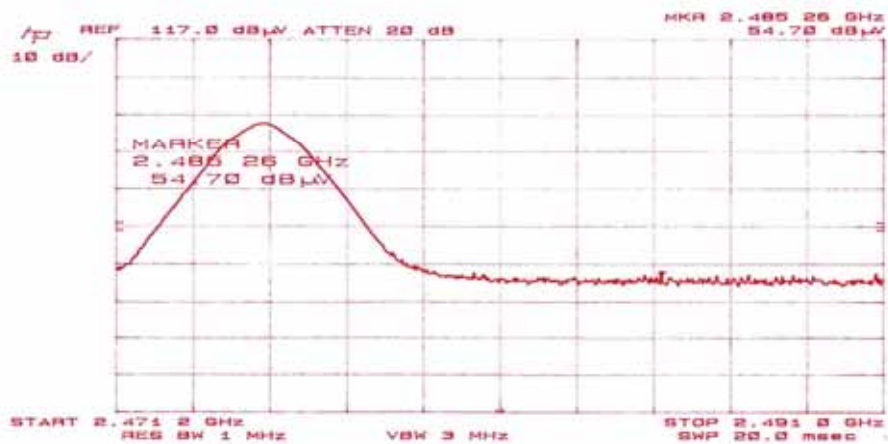
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APPLICANT : ISV Co.,LTD.

FCC ID: ROYTDSS-2400T

NAME OF TEST: POWER SPECTRAL DENSITY

RULES PART NO.: 15.247(d)

REQUIREMENTS: The power spectral density averaged over any 1-second interval shall not be greater than 8 dBm in any 3KHz bandwidth within these bands.

TEST DATA :

HANDY		
CHANNEL	dBm	LIMIT
1	-10.30	Less than 8 dBm
20	-10.60	
40	-10.60	

Measurement Method;

Starting from the settings that were used for the 6 dB bandwidth the peak signal was located and the span was reduced and the sweep time increased in a manner to maintain calibration and to keep the peak emission in the display, then the sweep time was increased to 670seconds at 2MHz span and a RBW changed to 3KHz. The spectrum analyzer was put into the noise power mode and the plots made.

PERFORMED BY: K.M CHOI

DATE : July 30, 2007

APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005

THRU Lab & Engineering.

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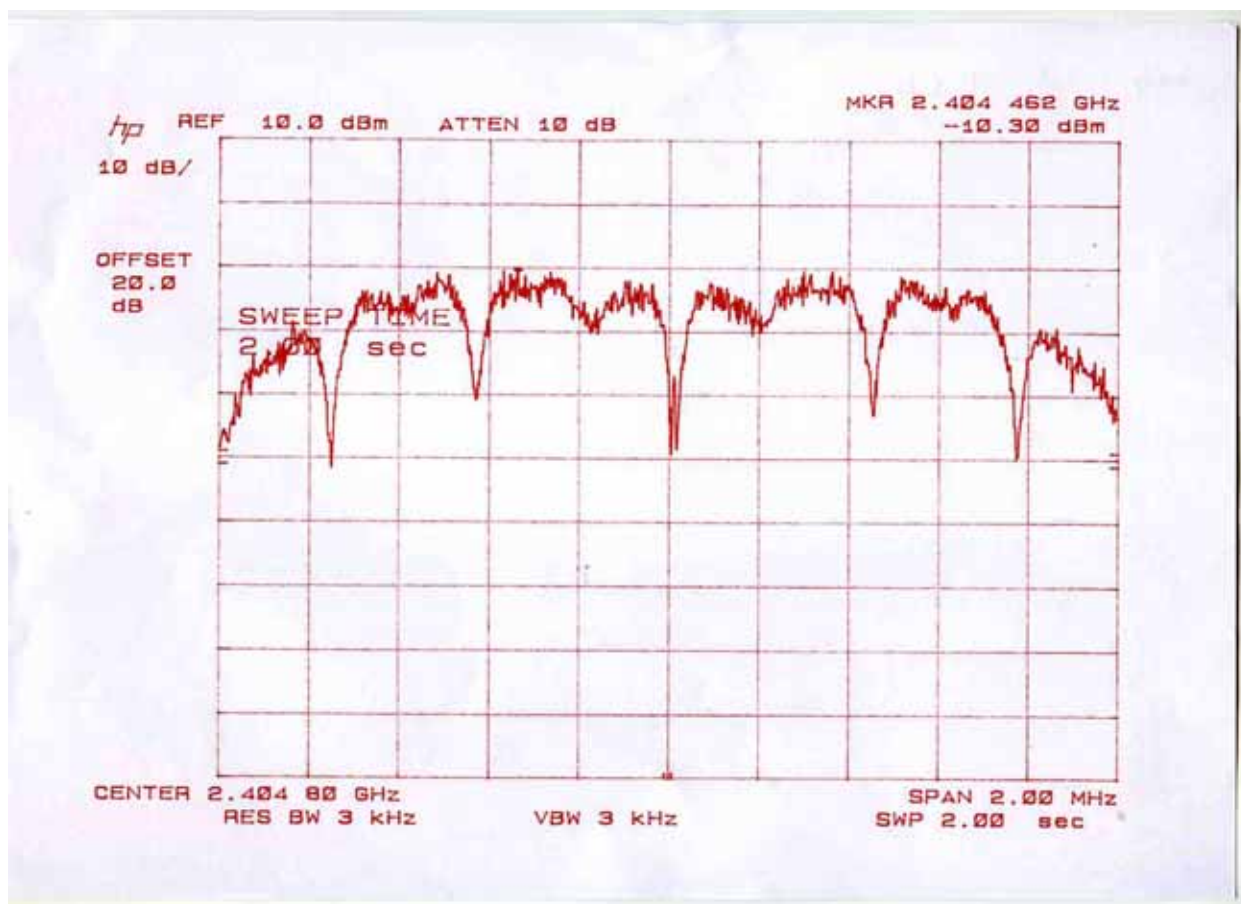
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: POWER SPECTRAL DENSITY (1ch)

RULES PART NO.: 15.247(d)



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005

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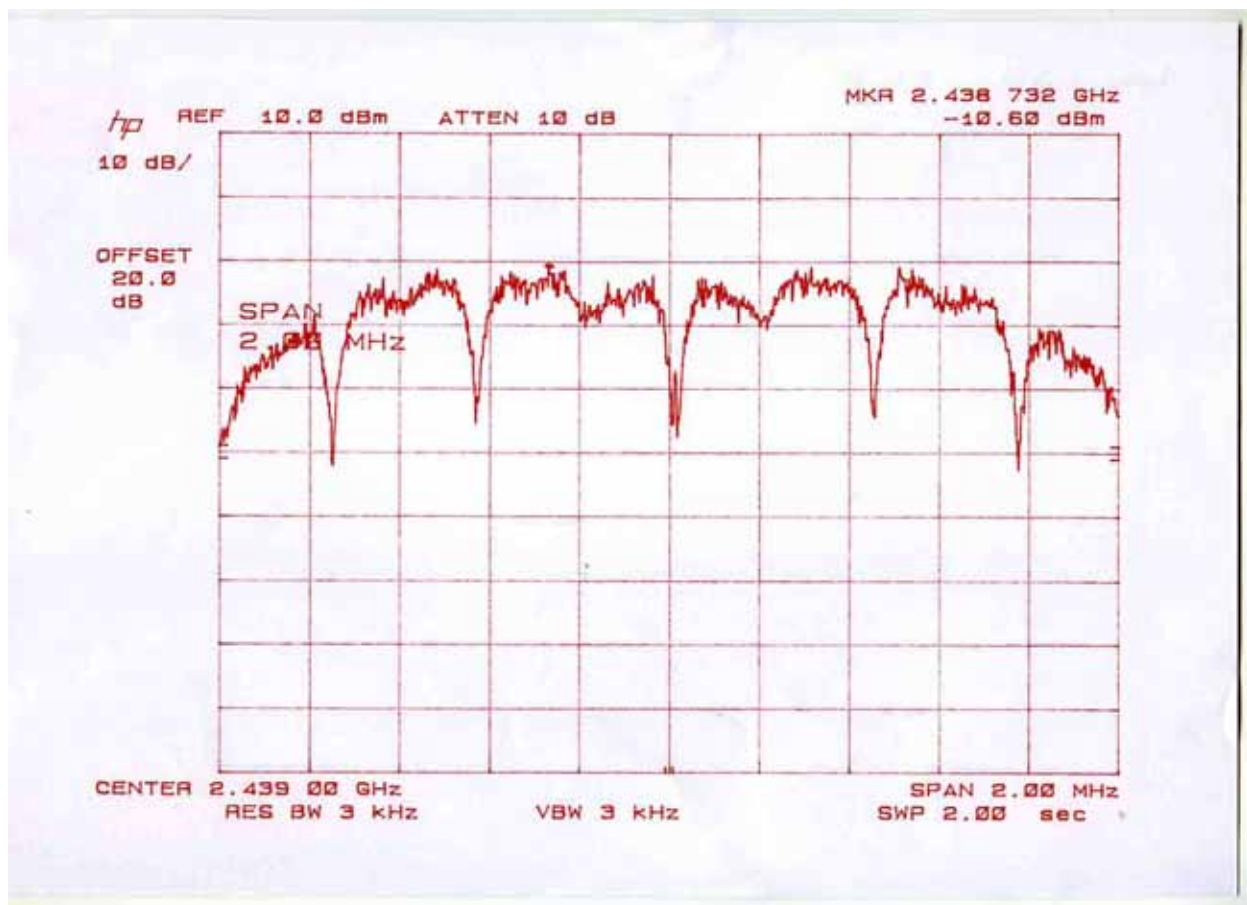
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: POWER SPECTRAL DENSITY (20ch)

RULES PART NO.: 15.247(d)



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005

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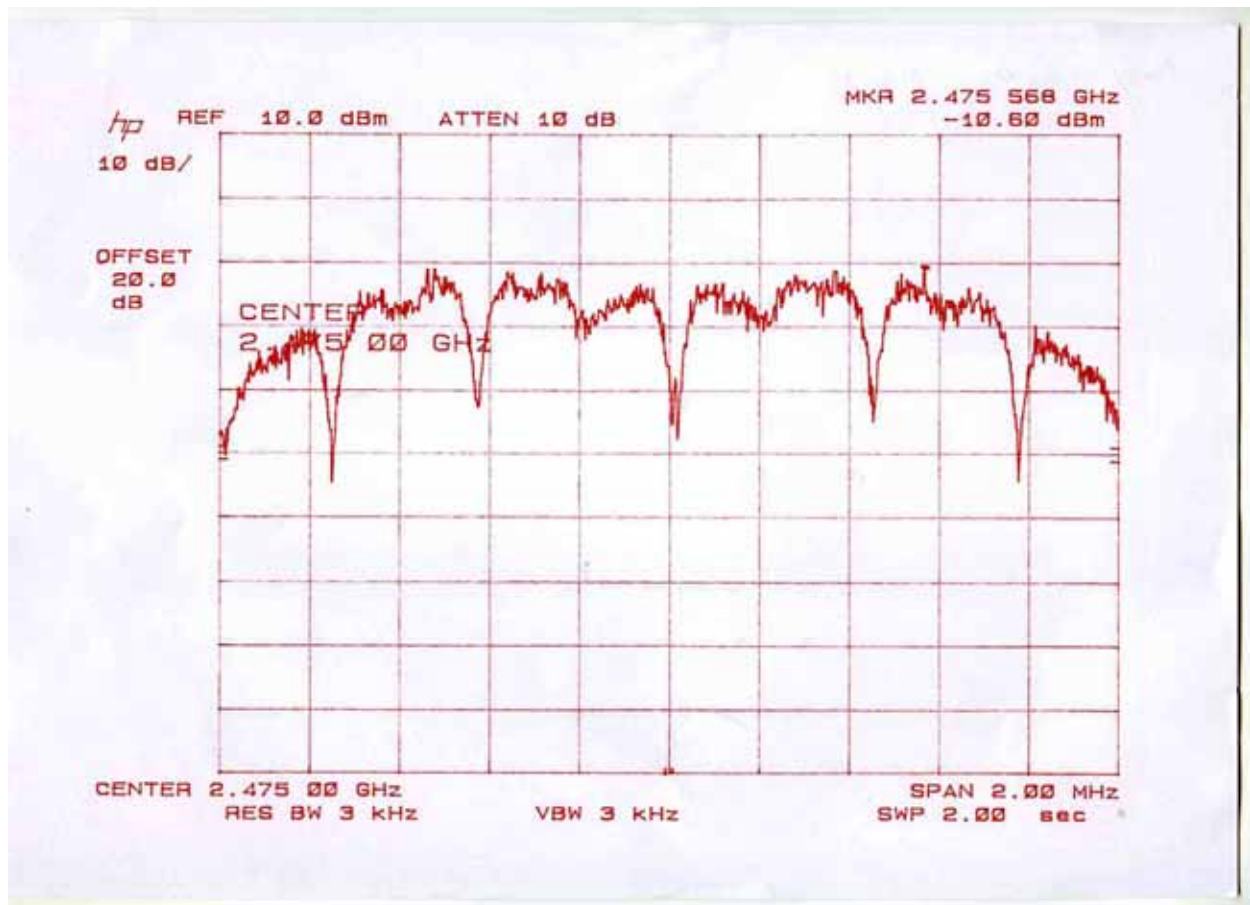
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APPLICANT : Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

NAME OF TEST: POWER SPECTRAL DENSITY (40ch)

RULES PART NO.: 15.247(d)



APPLICANT: Trinus Systems Inc.

FCC ID: ROYTDSS-2400T

REPORT :THRU-707005