



July 17, 2007

**TIMCO ENGINEERING INC.**

P.O. Box 370  
849 N.W. State Road 45  
Newberry, Florida  
USA 32669

**Subject: FCC Certification Authorization Application under FCC Part 15, Subpart C, Sec. 15.247 - Frequency Hopping Spread Spectrum Transmitters operating in the frequency band 902 - 928 MHz.**

**Product: WORKABOUT PRO G2 HANDHELD COMPUTER**  
**Model No.: 7527S with WJ MPR6000 Radio Module (FCC ID: NTTWJMPR6XXX)**  
**FCC ID: GM37527SBTMPR6XXX**

Dear Sir/Madam

As appointed agent for **Psion Teklogix Inc.**, we would like to submit this application for FCC Certification of the above product. Please review all required documents uploaded to TIMCO Upload Web Site.

If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,  
V.P., Engineering

Encl

**Ultratech's  
Accreditations:**



0685



31040/SIT



C-1376



46390-2049



200093-0



SL2-IN-E-1119R

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July 17, 2007

**Psion Teklogix Inc.**  
2100 Meadowvale Blvd.  
Mississauga, Ontario  
Canada, L5N 7J9

**Attn.:** Mr. Sada Dhawarkar

**Subject:** FCC Certification Application Testing under FCC Part 15, Subpart C, Sec. 15.247 - Frequency Hopping Spread Spectrum Transmitters operating in the frequency band 902 - 928 MHz.

**Product:** WORKABOUT PRO G2 HANDHELD COMPUTER  
**Model No.:** 7527S with WJ MPR6000 Radio Module (FCC ID: NTTWJMPR6XXX)  
**FCC ID:** GM37527SBTMPR6XXX

Dear Mr. Dhawarkar,

The product sample, as provided by you, has been tested and found to comply with **FCC Part 15, Subpart C, Sec. 15.247 - Frequency Hopping Spread Spectrum Transmitters operating in the frequency band 902 - 928 MHz.**

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,  
V.P., Engineering

Encl.

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# ENGINEERING TEST REPORT



## WORKABOUT PRO G2 HANDHELD COMPUTER Model No.: 7527S with WJ MPR6000 Radio Module (FCC ID: NTTWJMPR6XXX)

**FCC ID: GM37527SBTMPR6XXX**

*Applicant:* **Psion Teklogix Inc.**  
2100 Meadowvale Blvd.  
Mississauga, Ontario  
Canada, L5N 7J9

*In Accordance With*

**FEDERAL COMMUNICATIONS COMMISSION (FCC)  
PART 15, SUBPART C, SEC. 15.247  
Frequency Hopping Spread Spectrum Transmitters  
operating in the frequency band 902 - 928 MHz**

**UltraTech's File No.: TEK596 - FCC15C**

This Test report is Issued under the Authority of  
Tri M. Luu, Professional Engineer,  
Vice President of Engineering  
UltraTech Group of Labs



Date: July 17, 2007

Report Prepared by: Tri Luu, P.Eng.

Tested by: Wei Wu, RFI Engineer

Issued Date: July 17, 2007

Test Dates: June 25 - 30, 2007

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

## UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4  
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SL2-IN-E-1119R

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## EXHIBIT 1. INTRODUCTION

### 1.1. SCOPE

<b>Reference:</b>	FCC Part 15, Subpart C, Section 15.247
<b>Title</b>	Telecommunication - Code of Federal Regulations, CFR 47, Part 15
<b>Purpose of Test:</b>	To gain FCC Certification Authorization for Frequency Hopping Spread Spectrum Transmitters operating in the Frequency Band 902 - 928 MHz .
<b>Test Procedures</b>	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.
<b>Environmental Classification:</b>	<ul style="list-style-type: none"> <li>• Light-industry, Commercial</li> <li>• Industry</li> </ul>

### 1.2. RELATED SUBMITAL(S)/GRANT(S)

None

### 1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	Feb. 16 - 2006	Code of Federal Regulations – Telecommunication
ANSI C63.4	2004	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
CISPR 22 +A1 EN 55022	2003-04-10 2004-10-14 2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement
FCC Test Procedures	Mar. 23, 2005	Measurement of Digital Transmission Systems. Operating under Section 15.247
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval

## EXHIBIT 1. PERFORMANCE ASSESSMENT

### 1.1. CLIENT INFORMATION

<b>APPLICANT:</b>	
<b>Name:</b>	Psion Teklogix Inc.
<b>Address:</b>	2100 Meadowvale Blvd. Mississauga, Ontario Canada, L5N 7J9
<b>Contact Person:</b>	Mr. Sada Dhawarkar Phone #: 905-812-6200 (x3358) Fax #: 905-812-6301 Email Address: sada.dhwarkar@psionteklogix.com

<b>MANUFACTURER:</b>	
<b>Name:</b>	Psion Teklogix Inc.
<b>Address:</b>	2100 Meadowvale Blvd. Mississauga, Ontario Canada, L5N 7J9
<b>Contact Person:</b>	Mr. Sada Dhawarkar Phone #: 905-812-6200 (x3358) Fax #: 905-812-6301 Email Address: sada.dhwarkar@psionteklogix.com

### 1.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

<b>Brand Name</b>	Psion Teklogix Inc.
<b>Product Name</b>	WORKABOUT PRO G2 HANDHELD COMPUTER
<b>Model Name or Number</b>	7527S with WJ MPR6000 Radio Module (FCC ID: NTTWJMPR6XXX)
<b>Serial Number</b>	Pre-production
<b>Type of Equipment</b>	Frequency Hopping Spread Spectrum Transmitters
<b>Input Power Supply Type</b>	Lithium Ion Rechargeable 3000 mAh Battery (3.7 V), Psion Teklogix Model No.: WA3006
<b>Primary User Functions of EUT:</b>	Provide data communication link through air

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File #: July 17, 2007  
 TEK596 - FCC15C

- All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

### 1.3. EUT'S TECHNICAL SPECIFICATIONS

<b>TRANSMITTER</b>	
<b>Equipment Type:</b>	<ul style="list-style-type: none"> <li>▪ Portable</li> </ul>
<b>Intended Operating Environment:</b>	<ul style="list-style-type: none"> <li>▪ Commercial, light industry &amp; heavy industry</li> </ul>
<b>Power Supply Requirement:</b>	Lithium Ion Rechargeable 3000 mAh Battery (3.7 V), Psion Teklogix Model No.: WA3006
<b>RF Output Power Rating:</b>	0.389 Watts maximum
<b>Operating Frequency Range:</b>	902.75 – 927.25 MHz
<b>RF Output Impedance:</b>	50 Ohms
<b>Channel Spacing:</b>	250 KHz
<b>Duty Cycle:</b>	52.5%
<b>20 dB Bandwidth:</b>	255 kHz
<b>Modulation Type:</b>	Frequency Hopping Spread Spectrum
<b>Emission Designation:</b>	255KF1D
<b>Antenna Connector Type:</b>	<ul style="list-style-type: none"> <li>• Integral (the antenna component is soldered onto the radio printed circuit board and located inside the enclosure)</li> </ul>
<b>Antenna Description:</b>	Manufacturer: Psion Teklogix Type: PCB, MMCX connector (inside the enclosure) Model: RFID ANTENNA UHF-A3, Frequency Range: 902-928 MHz In/Out Impedance: 50 Ohms Gain: 1.83 dBi

<b>RECEIVER</b>	
<b>Operating Frequency Range:</b>	902.75 - 927.25 MHz
<b>RF Input Impedance:</b>	50 Ohms

## 1.4. PRODUCT CONFIGURATION

<b>PRODUCT UNDER TEST</b>	7527S BT WJRFID
<b>DESTINATION COUNTRY</b>	FCC/IC
<b>APPLICABLE STANDARD</b>	FCC PART 15 Sub C and Sub B
<b>EQUIPMENT CLASS</b>	Class B
<b>EQUIPMENT TYPE</b>	Handheld Computer
<b>TESTER</b>	Sada dharwarkar
<b>QUOTATION</b>	TEK-596Q
<b>DATE</b>	July 5, 2007

Revision	Date	Change Description	by	Comments
Draft 1	2007-07-05	Initial Draft	Sada Dharwarkar	

HARDWARE	
<b>MANUFACTURER</b>	Askey Computer Corporation
<b>PRODUCT</b>	N/A
<b>MODEL NUMBER</b>	7527S
<b>PRODUCT NAME</b>	WORKABOUTPRO
<b>SERIAL NUMBER</b>	N/A
<b>RAM SIZE</b>	128MSDRAM, 64M Flash
	520MHz

MISCELANEOUS HARDWARE	
<b>MANUFACTURER</b>	Psion Teklogix
<b>PRODUCT</b>	Lithium-ion Rechargeable Battery
<b>MODEL NUMBER</b>	N/A
<b>SERIAL NUMBER</b>	WA7AC6210649
<b>TEKLOGIX PART NUMBER</b>	WA3006 (also WA3010)

SOFTWARE	
<b>OPERATION SYSTEM</b>	Win CE 5.0
<b>OS CODE VERSION</b>	N/A
<b>BOOT CODE VERSION</b>	N/A
<b>PERIPHERAL CONTROLLER</b>	N/A
<b>APPLICATION TYPE</b>	N/A
<b>APPLICATION VERSION</b>	N/A
<b>CLOCK SPEED</b>	13MHz LCD; 520MHz data speed (for CPU)
<b>OSCILLATOR FREQUENCIES</b>	32.768KHz RTC; 6MHz USB hub; 24.576MHz audio Circuit; 13MHz PXA270; 16MHz Bluetooth;

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<b>RADIO 1</b>	
<b>LOCATION</b>	Main Logic Board (Integrated Bluetooth)
<b>MANUFACTURER:</b>	Askey Computer Corporation
<b>PRODUCT</b>	2.4 GHz FHSS Bluetooth
<b>MODEL NUMBER</b>	BTL040
<b>PSION TEKLOGIX MODEL NUMBER</b>	N/A
<b>SERIAL NUMBER</b>	N/A
<b>POWER</b>	<5mW
<b>FREQUENCY RANGE</b>	2402-2480 MHz
<b>DATA RATES</b>	As per the BT standard
<b>CHANNELS</b>	79
<b>INTERNAL/EXTRENAL ANTENNA</b>	internal

<b>RADIO 2</b>	
<b>LOCATION</b>	PCMCIA SLOT
<b>MANUFACTURER:</b>	WJ
<b>PRODUCT</b>	WJRFID
<b>MODEL NUMBER</b>	MPR6000
<b>PSION TEKLOGIX MODEL NUMBER</b>	N/A
<b>SERIAL NUMBER</b>	N/A
<b>TRANSMITTER POWER</b>	0.475 Watt
<b>FREQUENCY RANGE</b>	903-927 MHz
<b>TYPE OF MODULATION</b>	Frequency Hopping Spread Spectrum
<b>DATA RATES</b>	N/A
<b>CHANNELS</b>	79
<b>INTERNAL/EXTRENAL ANTENNA</b>	External (Inside the Host)

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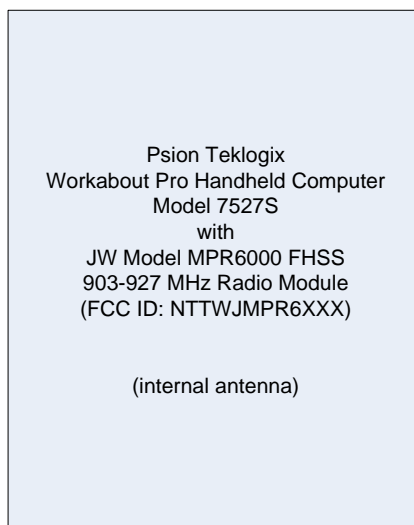
File #: July 17, 2007  
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## 1.5. ANCILLARY EQUIPMENT

N/A

## 1.6. TEST SETUP BLOCK DIAGRAM



## EXHIBIT 2. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

### 2.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	Lithium Ion Rechargeable 3000 mAh Battery (3.7 V), Psion Teklogix Model No.: WA3006

### 2.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

<b>Operating Modes:</b>	<ul style="list-style-type: none"> <li>▪ Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements.</li> <li>▪ The EUT operates in normal Frequency Hopping mode for occupancy duration, and frequency separation.</li> </ul>
<b>Special Test Software:</b>	Special software is provided by the Applicant to disable the hopping function, to select and to operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing.
<b>Special Hardware Used:</b>	N/A
<b>Transmitter Test Antenna:</b>	The EUT is tested with the antenna fitted in a manner typical of normal intended use as an integral antenna equipment.

<b>Transmitter Test Signals:</b>	
<b>Frequencies:</b>	Lowest, middle and highest channel frequencies tested:
<ul style="list-style-type: none"> <li>▪ 902 - 928 MHz band:</li> </ul>	
<b>Transmitter Wanted Output Test Signals:</b>	
<ul style="list-style-type: none"> <li>▪ RF Power Output (measured maximum output power):</li> <li>▪ Normal Test Modulation</li> <li>▪ Modulating signal source:</li> </ul>	<ul style="list-style-type: none"> <li>▪ 0.389 Watts maximum</li> <li>▪ 255KF1D</li> <li>▪ Internal</li> </ul>

## EXHIBIT 3. SUMMARY OF TEST RESULTS

### 3.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049-1). Last Date of Site Calibration: May 17, 2007.

### 3.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.207(a)	AC Power Line Conducted Emissions Measurements (Transmit & Receive)	N/A for battery operated device
15.247(g)&(h)	Other FCC Requirements for Frequency Hopping Spread Spectrum Transmitter	See Note (1)
15.247(a)(1)	Hopping Channel Frequency Characteristics	See Note (1)
15.247(b)	Peak Output Power	Yes
15.247(i) & 1.1307(b)(1)	RF Exposure Limit	See Note (2)
15.247(d)	Band-edge and RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	See Note (1)
15.247(d), 15.209 & 15.205	Transmitter Radiated Emissions	Yes

The Class B digital circuit portion and receiver portion of the EUT have been tested and verified to comply with FCC Part 15, Subpart B, Section 15.109. The engineering test report can be provided upon FCC requests.

#### Notes:

- (1) Please refer to the enclosed test report FCC test Report No.: 0442954-3, FCC ID: NTTWJMPR6XXX
- (2) Comply with FCC SAR Requirements per FCC OET 65. Please refer to the enclosed SAR Test Report, Our File No.: TEK-596-SAR

### 3.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

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File #: July 17, 2007  
 TEK596 - FCC15C

- All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

## EXHIBIT 4. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

### 4.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4, "FCC Measurement of Digital Transmission Systems Operating under Section 15.247 - March 23, 2005", ULTR-P001-2004, ULTR-P002-2004 and ULTR-P003-2004.

### 4.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

### 4.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1.

### 4.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER:

The essential function of the EUT is to correctly communicate data to and from radios over RF link.

## 4.5. PEAK OUTPUT POWER & EFFECTIVE RADIATED POWER (EIRP) @ FCC 15.247(B)

### 4.5.1. Limits

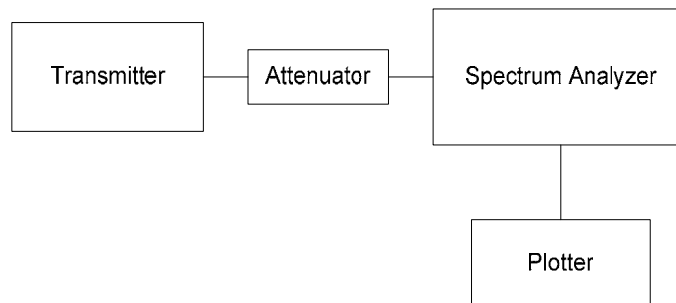
**FCC15.247(b):** The maximum peak conducted output power of the intentional radiator shall not exceed the following:

- (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
- (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 4.5.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P002-2004, FCC DA-00-705 and ANSI C63.4 for measurement methods

### 4.5.3. Test Arrangement



### 4.5.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

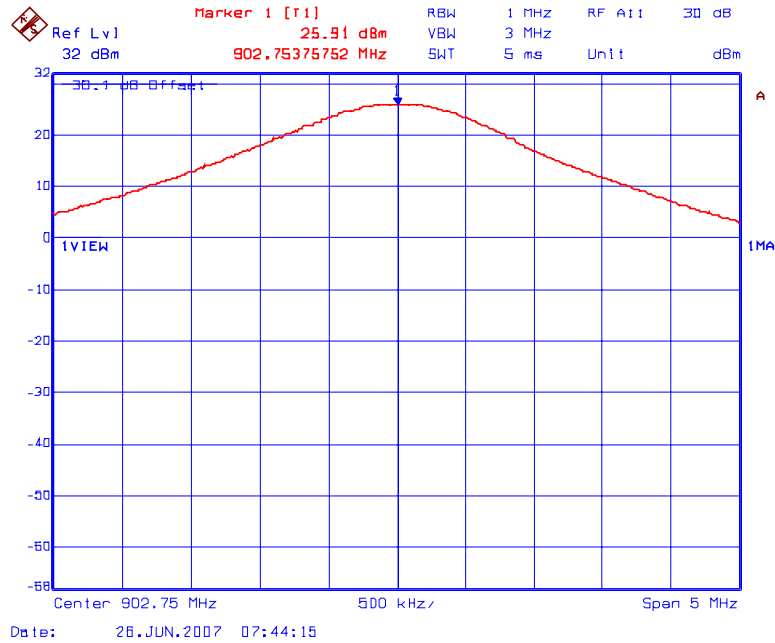
#### 4.5.5. Test Data

The conducted peak power and EIRP comply with FCC Rule 15.247(b):

Transmitter Channel	Frequency (MHz)	Total Peak Power @ Antenna Port (dBm)	Total Peak Power @ Antenna Port (mWatts)	Antenna Gain G (dBi)	Total Peak EIRP (dBm)	Limit of Peak Power @ Antenna Port (dBm)	Limit of Total Peak EIRP (dBm)
Lowest	902.75	25.9	389.05	1.83	27.73	30.0	34.0
Middle	915.25	25.6	363.08	1.83	27.43	30.0	34.0
Highest	927.25	25.5	354.81	1.83	27.33	30.0	34.0

Please refer to Plot #1 to 3 for details of measurements.

### Plot #1: Conducted Peak Power @ 902.75 MHz



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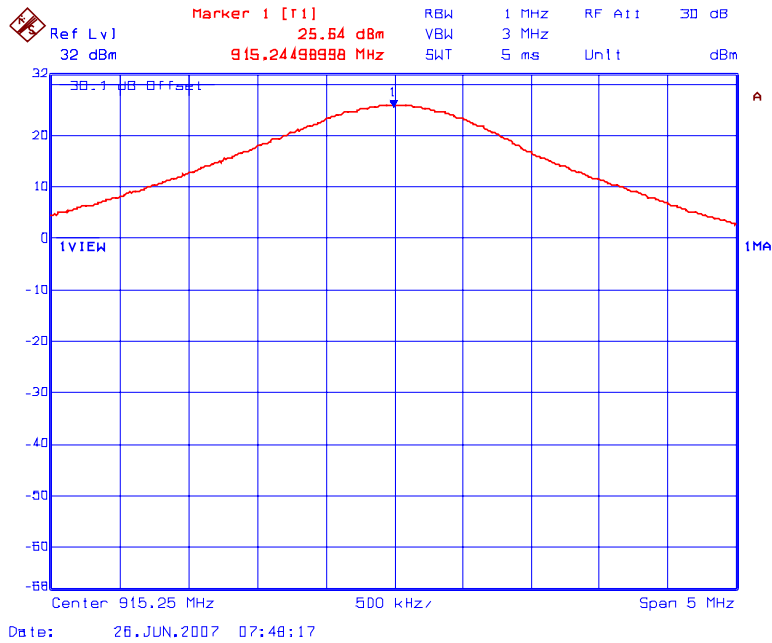
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4  
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: [vic@ultratech-labs.com](mailto:vic@ultratech-labs.com), Website: <http://www.ultratech-labs.com>

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### Plot #2: Conducted Peak Power @ 915.25 MHz



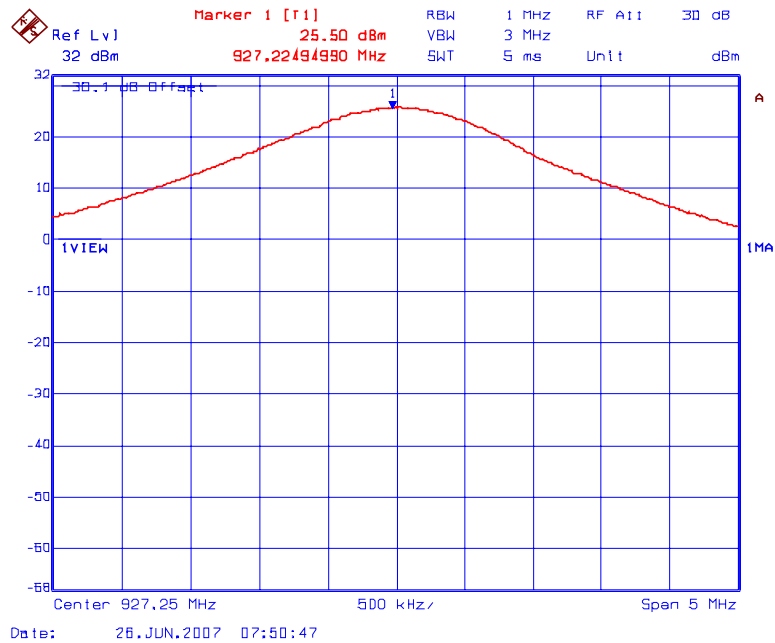
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TEK596 - FCC15C

- All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

### Plot #3: Conducted Peak Power @ 927.25 MHz



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#### 4.6. RF EXPOSURE REQUIREMENTS @ FCC 15.247(I), 1.1307(B)(1)

Comply with FCC SAR Requirements per FCC OET 65. Please refer to the enclosed SAR Test Report, Our File No.: **TEK-596-SAR**.

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## 4.7. TRANSMITTER BAND-EDGE & SPURIOUS EMISSIONS (RADIATED @ 3 METERS), FCC CFR 47, PARA. 15.247(D), 15.209 & 15.205

### 4.7.1. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

#### Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- @ FCC CFR 47, Para. 15.237(c) - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in @15.35 for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 - 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 - 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 - 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 - 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 - 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 - 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 - 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)  
 -- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

#### 4.7.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P002-2004, FCC DA-00-705 and ANSI C63.4 for measurement methods

#### 4.7.3. Test Arrangement

Refer to Sec.3.6 of this test report for test setup.

#### 4.7.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz

#### 4.7.5. Photographs of Test Setup

Refer to the Photographs #1 to #3 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

#### 4.7.6. Test Data

##### 4.7.6.1. Transmitter Radiated Band-edge Spurious Emissions during Hopping

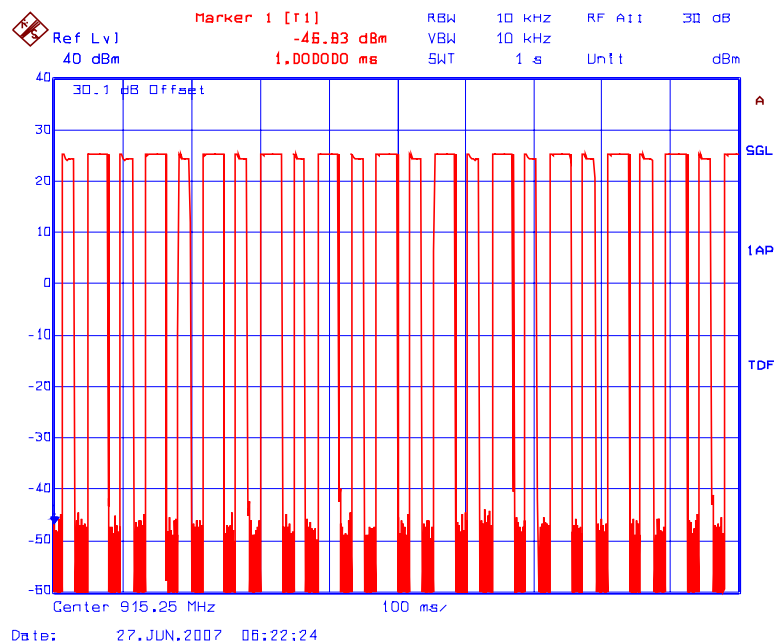
Not required to be repeated, please refer to the enclosed test report FCC test Report No.: 0442954-3, FCC ID: NTTWJMPR6XXX

##### 4.7.6.2. Duty Cycle measurements

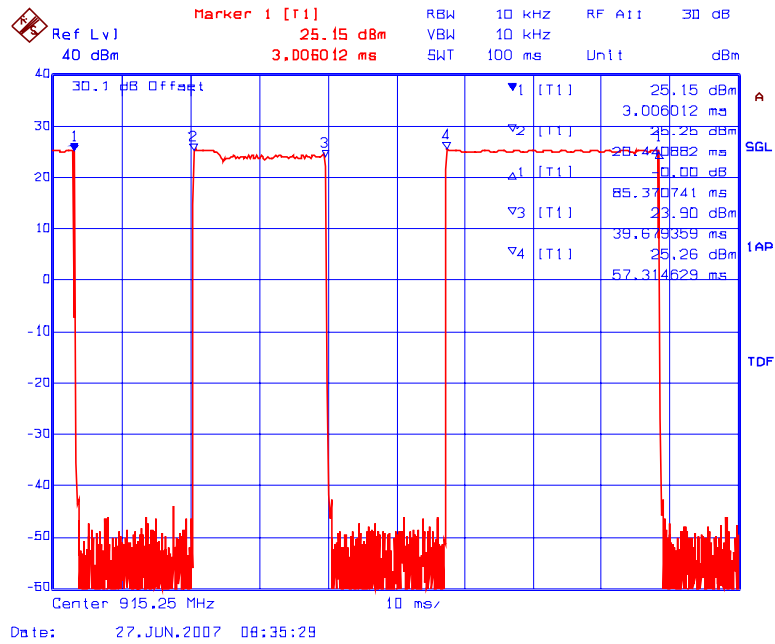
Time on in 100 mS = 3.00+18.54+30.96=52.5 ms  
Duty Cycle = 52.5mS/100mS = 0.525 or 52.5%

#### Plot #4: Duty Cycle - Pulse Train

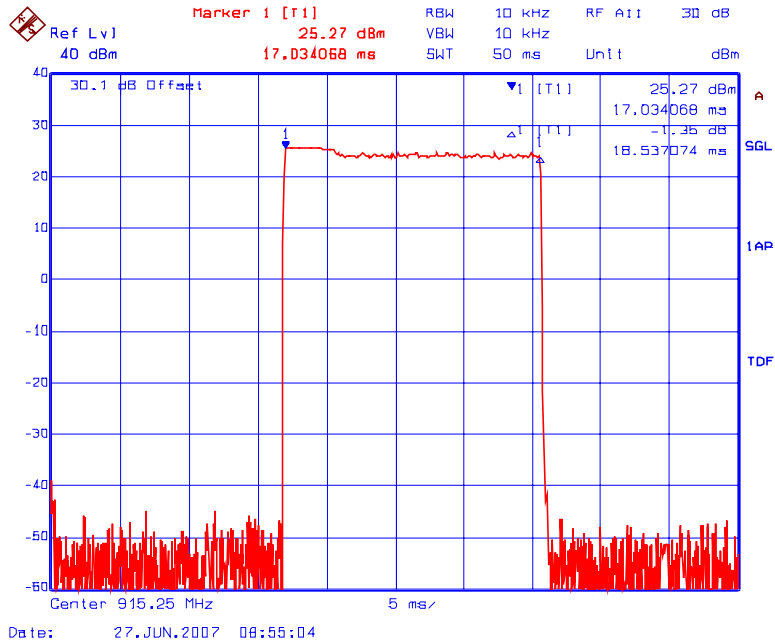
(a) Pulse train in 1 Second



(b) Pulse train in 100ms



### Plot #5: Duty Cycle - Pulse Widths



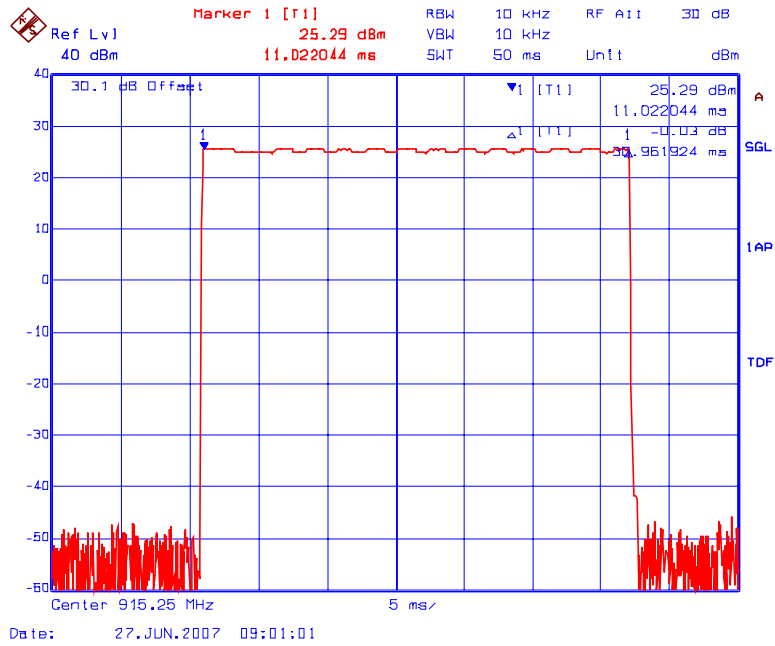
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### 4.7.6.3. Transmitter Radiated Spurious Emissions

#### 4.7.6.3.1. Lowest Frequency (902.75 MHz)

FREQUENCY (MHz)	RF PEAK LEVEL (dBμV/m)	RF AVG LEVEL (dBμV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBμV/m)	LIMIT 15.247 (dBμV/m)	MARGIN (dB)	PASS/ FAIL
902.75	115.1	N/A	V	46.0	105.6	N/A	PASS
902.75	125.6	N/A	H	46.0	105.6	N/A	PASS
1805.50	57.3	48.6	V	54.0	105.6	-57.0	PASS
1805.50	56.5	47.3	H	54.0	105.6	-58.3	PASS
2708.25	55.8	44.9	V	54.0	105.6	-9.1	*PASS
2708.25	55.9	44.6	H	54.0	105.6	-9.4	*PASS
3611.00	62.0	51.2	H	54.0	105.6	-2.8	*PASS
3611.00	56.9	46.0	H	54.0	105.6	-8.0	*PASS
4513.75	52.4	40.5	H	54.0	105.6	-13.5	*PASS
4513.75	49.9	35.7	H	54.0	105.6	-18.3	*PASS

The emissions were scanned from 30 MHz to 10 GHz.  
 \* Emissions fell in restricted band FCC 15.205 which met the Limit specified in FCC 15.209

#### 4.7.6.3.2. Middle Frequency (915.25 MHz)

FREQUENCY (MHz)	RF PEAK LEVEL (dBμV/m)	RF AVG LEVEL (dBμV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBμV/m)	LIMIT 15.247 (dBμV/m)	MARGIN (dB)	PASS/ FAIL
915.25	117.1	N/A	V	46.0	107.4	N/A	PASS
915.25	127.4	N/A	H	46.0	107.4	N/A	PASS
1830.50	60.2	49.1	V	54.0	107.4	-58.3	PASS
1830.50	55.8	45.5	H	54.0	107.4	-61.9	PASS
2745.75	54.9	43.6	V	54.0	107.4	-10.4	*PASS
2745.75	54.9	43.4	H	54.0	107.4	-10.6	*PASS
3661.00	60.8	49.8	H	54.0	107.4	-4.2	*PASS
3661.00	55.5	43.7	H	54.0	107.4	-10.3	*PASS
4576.25	51.3	38.8	V	54.0	107.4	-15.2	*PASS
4576.25	50.7	38.0	H	54.0	107.4	-16.0	*PASS

The emissions were scanned from 30 MHz to 10 GHz.  
 \* Emissions fell in restricted band FCC 15.205 which met the Limit specified in FCC 15.209

**4.7.6.3.3. Highest Frequency (927.25 MHz)**

FREQUENCY (MHz)	RF PEAK LEVEL (dBµV/m)	RF AVG LEVEL (dBµV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBµV/m)	LIMIT 15.247 (dBµV/m)	MARGIN (dB)	PASS/ FAIL
927.25	114.3	N/A	V	46.0	102.9	N/A	PASS
927.25	122.9	N/A	H	46.0	102.9	N/A	PASS
1854.50	59.7	48.6	V	54.0	102.9	-54.3	PASS
1854.50	57.3	46.0	H	54.0	102.9	-56.9	PASS
2781.75	52.6	42.2	V	54.0	102.9	-11.8	*PASS
2781.75	53.2	41.6	H	54.0	102.9	-12.4	*PASS
3709.00	56.7	45.2	H	54.0	102.9	-8.8	*PASS
3709.00	51.6	37.9	H	54.0	102.9	-16.1	*PASS
4636.25	47.9	32.6	H	54.0	102.9	-21.4	*PASS
4636.25	47.7	31.8	H	54.0	102.9	-22.2	*PASS

The emissions were scanned from 30 MHz to 10 GHz.

\* Emissions fell in restricted band FCC 15.205 which met the Limit specified in FCC 15.209

## EXHIBIT 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34

### 5.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (+ dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	+1.0	+1.0
Cable Loss Calibration	Normal (k=2)	+0.3	+0.5
EMI Receiver specification	Rectangular	+1.5	+1.5
Antenna Directivity	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	+2.0	+0.5
Antenna phase center variation	Rectangular	0.0	+0.2
Antenna factor frequency interpolation	Rectangular	+0.25	+0.25
Measurement distance variation	Rectangular	+0.6	+0.4
Site imperfections	Rectangular	+2.0	+2.0
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67(Bi) 0.3 (Lp)$ Uncertainty limits $20\text{Log}(1+\Gamma_1\Gamma_R)$	U-Shaped	+1.1 -1.25	+0.5
System repeatability	Std. Deviation	+0.5	+0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$$U = 2u_c(y) = 2x(+2.19) = +4.38 \text{ dB} \quad \text{And} \quad U = 2u_c(y) = 2x(-2.21) = -4.42 \text{ dB}$$