360 Herndon Parkway
Suite 1400
Herndon, VA 20170
http://www.rheintech.com

CLASS II PERMISSIVE CHANGE
FCC PART 90 CERTIFICATION APPLICATION

Test Lab:	Applicant Information:
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170 Phone: 703-689-0368 Fax: 703-689-2056 Web Site: www.rheintech.com	Dominion Wireless Inc. 22611 Markey Ct, Unit 110 Sterling, VA 20166 USA

FCC ID:	OQUB76060	GRANTEE FRN NUMBER:	
PLAT FORM:	Transmitter	RTL WORK ORDER NUMBER:	2001334
MODEL(S):	Personal Protection Device	RTL QUOTE NUMBER:	QRTL01-232
DATE OF TEST REPORT:	March 12, 2002		

American National Standard Institute:	ANSI/TIA/EIA603 and ANSI/TIA/EIA 603-1
FCC Classification:	☐ TBC – Licensed Broadcast Station Transmitter ☐ TBF – Licensed Broadcast Transmitter Held to Face ☒ TBT – Licensed Broadcast Transmitter Worn on Body ☐ TNB – Licensed Non-Broadcast Station Transmitter ☐ TNE – Licensed Non-Broadcast Transmitter Held to Ear ☐ TNF – Licensed Non-Broadcast Transmitter Held to Face ☐ TNT – Licensed Non-Broadcast Transmitter Worn on Body
FCC Rule Part(s):	Part 90: PRIVATE LAND MOBILE RADIO SERVICES
Industry Canada Standard:	RSS-119; Issue 6: Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
Digital Interface Information	Digital Interface was found to be compliant
Receiver Information	Receiver was found to be compliant

Frequency Range (MHz)	Output Power (W) ERP	Freq. Tolerance	Emission Designator
421-470	0.051	1010 Hz	25K0F7D

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15, FCC Part 90, Industry Canada RSS-119 ANSI C63.4, ANSI/TIA/EIA603 and ANSI/TIA/EIA 603-1.

Signature: _____ Date: March 12, 2002

Typed/Printed Name: Bruno Clavier Position: Vice President of Operations

Signature: _____ Date: March 12, 2002

Typed/Printed Name: Daniel W. Baltzell Position: EMC Test Engineer

Table of Contents

Table Index

1 General Information

1.1 Scope

FCC Rules Part 90.217(b): Private Land Mobile Radio Services - Exemption from technical standards
Additionally, the digital interface of this device was tested and was found compliant with Part 15 subpart B. A test report is placed on file and available upon request.
All measurements contained in this application were conducted in accordance with the FCC Rules and Regulations CFR47 and ANSI/TIA/EIA603-1992/-1-1998 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.2 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 Related SubmiTtal(s)/Grant(s)

This application is a Class II Permissive Change. The original FCC application FCCID: OQUB76060 was granted on February 28, 2000.

The Industry Canada original certification #3527195632 was granted on December 20, 1999.

1.4 Permissive Change

The changes to the unit are a new antenna (+1 dBi), the housing (plastic), the printed circuit board dimensions and layout, label marking which will now be embossed into the plastic housing, a new 9V alkaline battery replaces the 6V Lithium battery, shields which will now clip into surface mount clips, and the microprocessor crystal will be a surface mount oscillator.

2 Equipment Information

2.1 Applicant and Equipment Information

Test Lab:	Applicant Information:
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170 Phone: 703-689-0368 Fax: 703-689-2056 Web Site: www.rheintech.com	Dominion Wireless Inc. 22611 Markey Ct, Unit 110 Sterling, VA 20166 USA

FCC ID:	OQUB76060	GRANTEE FRN NUMBER:	
PLAT FORM:	Transmitter	RTL WORK ORDER NUMBER:	2001334
MODEL(S):	Personal Protection Device	RTL QUOTE NUMBER:	QRTL01-232
DATE OF TEST REPORT:	March 12, 2002		

American National Standard Institute:	ANSI/TIA/EIA603 and ANSI/TIA/EIA 603-1
FCC Classification:	☐ TBC – Licensed Broadcast Station Transmitter ☐ TBF – Licensed Broadcast Transmitter Held to Face ☒ TBT – Licensed Broadcast Transmitter Worn on Body ☐ TNB – Licensed Non-Broadcast Station Transmitter ☐ TNE – Licensed Non-Broadcast Transmitter Held to Ear ☐ TNF – Licensed Non-Broadcast Transmitter Held to Face ☐ TNT – Licensed Non-Broadcast Transmitter Worn on Body
FCC Rule Part(s):	Part 90: PRIVATE LAND MOBILE RADIO SERVICES
Industry Canada Standard:	RSS-119; Issue 6: Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
Digital Interface Information	Digital Interface was found to be compliant
Receiver Information	Receiver was found to be compliant

Frequency Range (MHz)	Output Power (W) ERP	Freq. Tolerance	Emission Designator
421-470	0.051	1010 Hz	25K0F7D

2.2 Justification

To complete the test configuration required by the FCC, the transmitter was wired by the manufacturer to operate in a continuous mode. A high middle and low channel were investigated. The final data was taken as a substitution measurement. Since the device is battery operated conducted line emission is not required.

2.3 Exercising the EUT

The Personal Protection Device (PPD) is a transmitter designed to transmit at a predetermined frequency within the range (421 MHz – 470 MHz). The following frequencies were tested: 421.000 MHz, 458.9375 MHz and 470.000 MHz. Each frequency was measured independently.

2.4 Test System Details

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description
Personal Protection Device	Dominion Wireless, Inc.	N/A	N/A	OQUB76060	Unshielded I/O
Patch Antenna (-4 dBi)* Original Antenna	Linx Technology	ANTSP-458-TWC-A Rev 1	N/A	N/A	N/A
Flexible ¼ wave wire (+1 dBi)*	Dominion Wireless, Inc.	N/A	N/A	N/A	N/A

* Antennas are integral to the transmitter.

3 RF Power Output - §2.1046

3.1 ANSI/TIA/EIA-603-1992, Section 2.2.1 Test Procedure

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A half-wave dipole was substituted in place of the EUT. The dipole was fed by a signal generator and adjusted until the previous field strength level was attained. The conducted power at the antenna feed point was recorded. It was further corrected by subtracting the cable loss from the signal generator to the dipole and correcting the dipole gain to a theoretical ½ wave dipole. For readings above 1GHz the above method is repeated using standard gain horn antennas.

3.2 Effective Radiated Power Output Test Data - §2.1046

This measurement was performed using the new antenna: Flexible ¼ wave wire (+1 dBi).

Table 3-1: Power Output Data - §2.1046

Frequency (MHz)	Spectrum Analyzer (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Corrected Antenna Gain (dB)	Corrected Signal Generator Level (dBm)	ERP (mW)
421.000	92.6	17.0	0.4	0.45	17.05	50.7
458.938	93.7	17.0	0.4	0.35	16.95	49.6
470.000	88.4	11.7	0.5	0.35	11.55	14.3

4 Radiated Spurious and Harmonic Emissions - §2.1053

4.1 Radiated Spurious and Harmonic Emissions - §2.1053

Radiated and harmonic emissions were measured on a 3-meter outdoor site. The EUT was placed on the turntable with the transmitter enabled. A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied from 1 to 4 meters and the polarization was varied through 3 orthogonal planes to determine the worst-case emission level.

4.2 Radiated Spurious Test Equipment

Table 4-1: Radiated Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz–2 GHz)	2648
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1-26.5 GHz)	3008A00505
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz–22 GHz)	3138A07771
900917	Hewlett Packard	8648C	Signal Generator (100kHz–3200 MHz)	3537A01741
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 GHz–20 GHz)	3610A00866
900154	Compliance Design Inc,	Roberts Dipole	Adjustable Elements Dipole Antenna (30-1000 MHz)	N/A
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridges Guide Antenna (1-18 GHz)	2310

4.3 Field Strength Test Data - §2.1053

Operating Frequency (MHz): 421.000
Channel: Low
Measured ERP (dBm): 17.05
Modulation: F7D
Distance: 3 m
Limit: -12.95 dBm

Table 4-2: Field Strength Spurious Radiated Data §2.1053 – 421 MHz

Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Corrected Antenna Gain (dB)	Corrected Signal Generator Level (dBm)	Limit (dBm) (equivalent to -30 dBc)	Margin (dB)
842.0000	-35.1	0.6	-1.00	-36.70	-12.95	-23.75
1260.0000	-33.7	0.7	2.35	-32.05	-12.95	-19.10
1680.0000	-35.7	1.0	4.72	-31.98	-12.95	-19.03
2100.0000	-31.0	1.0	4.91	-27.09	-12.95	-14.14
2520.0000	-37.6	0.9	5.19	-33.31	-12.95	-20.36
2940.0000	-28.7	1.0	6.12	-23.58	-12.95	-10.63
3360.0000	-40.3	1.1	6.03	-35.37	-12.95	-22.42
3780.0000	-34.1	1.1	7.41	-27.79	-12.95	-14.84
4200.0000	-33.0	1.2	6.33	-27.87	-12.95	-14.92

Substitution method

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A half-wave dipole was substituted in place of the EUT. The dipole was fed by a signal generator and adjusted until the previous field strength level was attained. The conducted power at the antenna feed point was recorded. It was further corrected by subtracting the cable loss from the signal generator to the dipole and correcting the dipole gain to a theoretical ½ wave dipole. For readings above 1 GHz the above method is repeated using standard gain horn antennas.

Operating Frequency (MHz): 458.9375
Channel: Middle
Measured ERP (dBm): 16.95
Modulation: F7D
Distance: 3m
Limit: -13.05 dBm

Table 4-3: Field Strength Spurious Radiated Data §2.1053 – 458.9375 MHz

Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Corrected Antenna Gain (dB)	Corrected Signal Generator Level (dBm)	Limit (dBm) (equivalent to 30 dBc)	Margin (dB)
917.8750	-48.2	0.6	-0.90	-49.70	-13.05	-36.65
1376.8125	-32.1	0.8	3.47	-29.43	-13.05	-16.38
1835.7500	-53.6	1.0	4.78	-49.82	-13.05	-36.77
2294.6875	-50.0	0.9	5.03	-45.87	-13.05	-32.82
2753.6250	-51.7	1.0	5.71	-46.99	-13.05	-33.94
3212.5625	-44.9	1.2	6.12	-39.98	-13.05	-26.93
3671.5000	-52.9	1.1	7.38	-46.62	-13.05	-33.57
4130.4375	-35.8	1.2	6.16	-30.84	-13.05	-17.79
4589.3750	-55.5	1.3	7.03	-49.77	-13.05	-36.72

Substitution method

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A half-wave dipole was substituted in place of the EUT. The dipole was fed by a signal generator and adjusted until the previous field strength level was attained. The conducted power at the antenna feed point was recorded. It was further corrected by subtracting the cable loss from the signal generator to the dipole and correcting the dipole gain to a theoretical ½ wave dipole. For readings above 1 GHz the above method is repeated using standard gain horn antennas.

Operating Frequency (MHz): 470.000
Channel: High
Measured ERP (dBm): 11.55
Modulation: F7D
Distance (m): 3
Limit (dBm): -18.45

Table 4-4: Field Strength Spurious Radiated Data §2.1053 – 470 MHz

Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Corrected Antenna Gain (dB)	Corrected Signal Generator Level (dBm)	Limit (dBm) (equivalent to -30 dBc)	Margin (dB)
940.0000	-35.0	0.6	-1.00	-36.60	-18.45	-18.15
1410.0000	-49.2	0.8	3.79	-46.21	-18.45	-27.76
1880.0000	-36.2	1.0	4.80	-32.40	-18.45	-13.95
2350.0000	-46.2	1.0	5.06	-42.14	-18.45	-23.69
2820.0000	-28.7	1.2	5.85	-24.05	-18.45	-5.60
3290.0000	-34.7	1.1	6.08	-29.72	-18.45	-11.27
3760.0000	-35.6	1.2	7.40	-29.40	-18.45	-10.95
4230.0000	-34.6	1.2	6.40	-29.40	-18.45	-10.95
4700.0000	-46.0	1.3	7.01	-40.29	-18.45	-21.84

Substitution method

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A half-wave dipole was substituted in place of the EUT. The dipole was fed by a signal generator and adjusted until the previous field strength level was attained. The conducted power at the antenna feed point was recorded. It was further corrected by subtracting the cable loss from the signal generator to the dipole and correcting the dipole gain to a theoretical ½ wave dipole. For readings above 1GHz the above method is repeated using standard gain horn antennas.

5 Conclusion

The data in this measurement report shows that the Dominion Wireless Inc., Personal Protection Device, FCC ID*:* OQUB76060 complies with all the requirements of Parts 2 and 90.217 of the FCC Rules, and Industry Canada RSS-119.