



TEST REPORT FROM RFI GLOBAL SERVICES LTD



Test of: Torch (EVDO Rev A) DCM300C

FCC ID: JUP-WCDCM300C

To: FCC Part 22.913 & Part 24.232

Test Report Serial No:
RFI-RPT-RP79038JD03B V2.0

Version 2.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals: <div style="text-align: right; margin-top: 10px;">  </div>	
Checked By:	A. Henriques
Signature:	
Date of Issue:	12 January 2011

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1. Customer Information





Company Name:	Trimble Navigation Ltd
Address:	10355 Westmoor Dr Westminster Colo 80021 United States

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 22 Subpart H (Public Mobile Services) - Section 22.913
Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 24 Subpart E (Personal Communication Services) - Section 24.232
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH
Test Dates:	13 December 2010

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 22		
Part 22.913(a)	Transmitter Output Power (ERP)	
Part 24		
Part 24.232	Transmitter Output Power (EIRP)	
Key to Results		
 = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile Communications Equipment, Measurements and performance Standards

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Product Name:	Trimble Navigation DCM300C
Model Number:	Torch / DCM300C
Serial Number:	5042Z00083
Hardware Version Number:	A
Software Version Number:	0.1.5
FCC ID:	JUP-WCDCM300C

3.2. Description of EUT

The equipment under test was a data communications module (DCM) for use in construction vehicles. It contains a Sierra Wireless CDMA module (FCC ID: N7N-MC5728) capable of 1xEV-DO and a Wi2Wi Wi-Fi module (FCC ID: U9R-W2CBW009DI) capable of 802.11b and 802.11g.

The following antennas have been specified for use with the EUT:

- Taoglas MA.104 "Hercules" Antenna, part number MA.104.C.A301111.B301311, declared antenna gain 0 dBi
- Pulse IP67 Active 6 bands GPS Antenna, part number W4120GW5000, declared antenna gain 0 dBi
- Wilson NMO Cellular Antenna /20 feet LMR-240 RF coaxial cable combination consisting of:
Wilson NMO Cellular Antenna, part number 301104, declared antenna gain 4.9 dBi in the 800 MHz band and 5.9 dBi in the 1900 MHz band and 20 feet of type LMR-240 cable, part number GBR-20-240-T1-A.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Type of Radio Device:	Transceiver		
Mode:	1xEV-DO		
Modulation Type:	QPSK, 8-PSK and 16-QAM		
Power Supply Requirement(s):	Nominal	13.8 V	
Technology Tested:	US Cellular (800 band)		
Maximum Output Power (ERP):	1xEV-DO	27.25 dBm	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1013	824
	Middle	384	836
	Top	777	848
Technology Tested:	US PCS (1900 band)		
Maximum Output Power (EIRP):	1xEV-DO	28.3 dBm	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	25	1851
	Middle	600	1880
	Top	1175	1901

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Latitude D610
Serial Number:	RFI Asset Number PC 344NT

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Constantly transmitting at full power on bottom, middle and top channels as required.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The sample with serial number 50242Z00083 was used for conducted power measurements.
- The EUT was placed into test mode via HyperTerminal, using instruction set as supplied by the customer. This then enabled the EUT to be set to transmit at full power on bottom, middle and top channels.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%.

5.2. Test Results – Part 22**5.2.1. Transmitter Output Power (ERP)****Test Summary:**

Test Engineer:	Steve White	Test Date:	13 December 2010
Test Sample:	5042Z00083		

FCC Part:	22.913(a) & 2.1046(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1 referencing FCC CFR Part 2.1046(a)

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	29

Results - 0 dBi gain Antenna Types:

Channel	Frequency (MHz)	Conducted Power (dBm)	Declared Antenna Gain (dB)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	824	29.4	-2.15	27.25	38.45	11.2	Complied
Middle	836	28.9	-2.15	26.75	38.45	11.7	Complied
Top	848	28.6	-2.15	26.45	38.45	12.0	Complied

Note(s):

1. The declared antenna gain for the antennas specified for use with the EUT (i.e. Taoglas MA.104 "Hercules" Antenna, part number MA.104.C.A301111.B301311 and Pulse IP67 Active 6 bands GPS Antenna, part number W4120GW5000) is stated as nominal 0 dBi which equates to -2.15 dBd. This was calculated using the specified dBi to dBd conversion ($\text{dBd} = \text{dBi} - 2.15$) as the limit is stated as an ERP value.
2. The declared antenna gain in dBd was added to the conducted output power in order to calculate the final ERP figure.

Transmitter Output Power (ERP) (continued)**Results – Wilson NMO Cellular Antenna:**

Channel	Frequency (MHz)	Conducted Power (dBm)	Declared Antenna Gain (dB)	Cable Loss (dB)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	824	29.4	2.75	1.4	30.75	38.45	7.7	Complied
Middle	836	28.9	2.75	1.4	30.25	38.45	8.2	Complied
Top	848	28.6	2.75	1.4	29.95	38.45	8.5	Complied

Note(s):

1. The declared antenna gain for the Wilson NMO Cellular Antenna, part number 301104, is stated as nominal 4.9 dBi which equates to 2.75 dBd. This was calculated using the specified dBi to dBd conversion ($\text{dBd} = \text{dBi} - 2.15$) as the limit is stated as an ERP value.
2. The combined declared antenna gain in dBd and cable loss in dB was added to the conducted output power in order to calculate the final ERP figure.
3. The RF coaxial cable (part number GBR-20-240-T1-A) specified for use with the Wilson NMO Cellular Antenna is a 20 feet length type LMR-240 cable which has a minimum loss of 1.4 dB in the 800 MHz cellular band.

5.3. Test Results – Part 24**5.3.1. Transmitter Output Power (EIRP)****Test Summary:**

Test Engineer:	Steve White	Test Date:	13 December 2010
Test Sample:	5042Z00083		

FCC Part:	24.232 & 2.1046(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1 referencing FCC CFR Part 2.1046(a)

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	29

Results - 0 dBi gain Antenna Types:

Channel	Frequency (MHz)	Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	1851	28.0	0.0	28.0	33.0	5.0	Complied
Middle	1880	28.2	0.0	28.2	33.0	4.8	Complied
Top	1901	28.3	0.0	28.3	33.0	4.7	Complied

Note(s):

1. The declared antenna gain for the antennas specified for use with the EUT (i.e. Taoglas MA.104 "Hercules" Antenna, part number MA.104.C.A301111.B301311 and Pulse IP67 Active 6 bands GPS Antenna, part number W4120GW5000) is stated as nominal 0 dBi
2. The declared antenna gain was added to the conducted output power in order to calculate the final EIRP figure.

Transmitter Output Power (EIRP) (continued)**Results – Wilson NMO Cellular Antenna:**

Channel	Frequency (MHz)	Conducted Power (dBm)	Declared Antenna Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	1851	28.0	5.9	2.2	31.7	33.0	1.3	Complied
Middle	1880	28.2	5.9	2.2	31.9	33.0	1.1	Complied
Top	1901	28.3	5.9	2.2	32.0	33.0	1.0	Complied

Note(s):

1. The declared antenna gain for the Wilson NMO Cellular Antenna, part number 301104, is stated as nominal 5.9 dBi.
2. The combined declared antenna gain in dBi and cable loss in dB was added to the conducted output power in order to calculate the final EIRP figure.
3. The RF coaxial cable (part number GBR-20-240-T1-A) specified for use with the Wilson NMO Cellular Antenna is a 20 feet length type LMR-240 cable which has a minimum loss of 2.2 dB in the 1900 MHz PCS band.

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Output Power	824 to 849 MHz & 1850 to 1910 MHz	95%	±0.27 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (mths)
M1009	Power Meter	Hewlett Packard	437B	3125U13706	26 Jan 2011	12
M1254	Preselector Mixer	HP	11974U	3001A00152	08 Sep 2011	12

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.