Trimble Navigation Limited

Ranger/TSC3
WWAN Radio

EMC Test Report

Report No. TRPO0055

Report Prepared By

NORTHWEST EMC

www.nwemc.com
1-888-EMI-CERT

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: September 2, 2010

Trimble Navigation Limited

Model: Ranger/TSC3 WWAN Radio

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Out of Band Emissions	FCC 22H:2009	ANSI/TIA/EIA-603-C-2004	**Pass**
Out of Band Emissions	FCC 24E:2009	ANSI/TIA/EIA-603-C-2004	**Pass**
Effective Radiated Power (ERP)	FCC 22H:2009	ANSI/TIA/EIA-603-C-2004	**Pass**
Effective Radiated Power (EIRP)	FCC 24E:2009	ANSI/TIA/EIA-603-C-2004	**Pass**

Modifications made to the product
See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400
Hillsboro, OR 97124

Phone: (503) 844-4066 Fax: (503) 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

Approved By:

Don Facteau, IS Manager

NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP

Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0
NVLAP LAB CODE 200881-0

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1)*

CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.

NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

Accreditations and Authorizations

Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, C-3464, and T-1634).*

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.

GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)*

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

Northwest EMC Locations

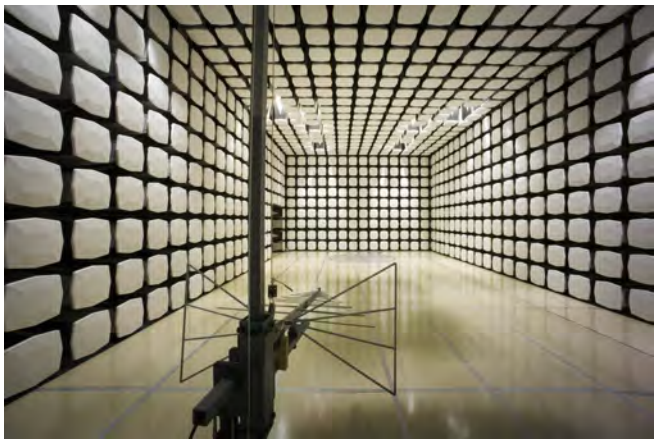
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

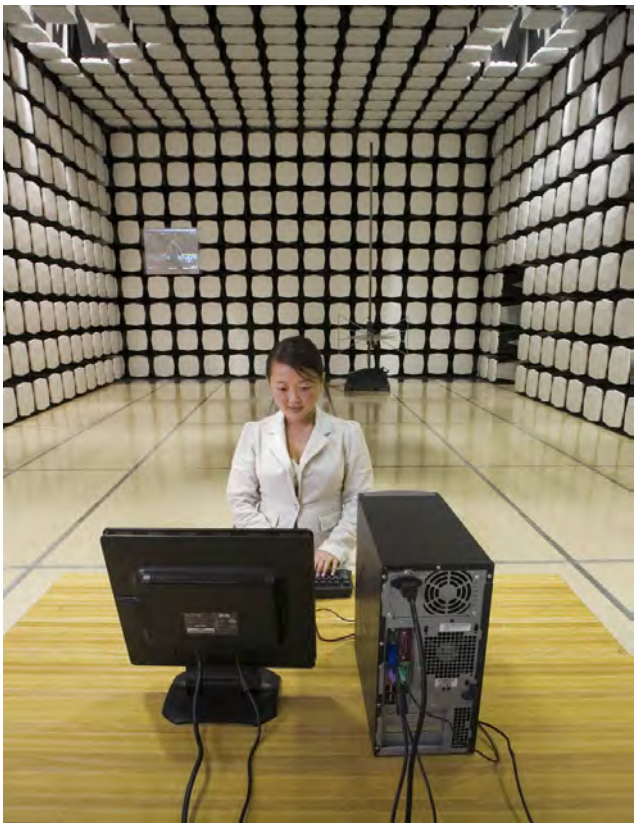
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796





Party Requesting the Test

Company Name:	Trimble Navigation Limted
Address:	345 SW Avery Ave
City, State, Zip:	Corvallis, OR 97333
Test Requested By:	Bob Grant
Model:	Ranger/TSC3 WWAN Radio
First Date of Test:	December 15, 2009
Last Date of Test:	September 2, 2010
Receipt Date of Samples:	December 2, 2009
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
GSM / UMTS radio module

Testing Objective:
Seeking limited modular approval under FCC 22H and 24E for operation in the cellular and PCS bands.

CONFIGURATION 1 TRPO0055

Software/Firmware Running during test	
Description	**Version**
Windows Mobile Professional	6.5
Windows Wireless Manager	Unknown
Windows Phone	Unknown

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hand Held Computer	Trimble Navigation Limited	Ranger/TSC3	RTL2A00004
GSM-UMTS radio	Cinterion	HC25	354114010772342

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Ault	PW173KB1500F03	0933A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	PA	1.0m	PA	Hand Held Computer	AC Adapter
AC Power	No	1.8m	No	AC Addatper	AC Mains
Serial	Yes	1.0m	No	Hand Held Computer	Unterminated
USB	Yes	1.0m	No	Hand Held Computer	Unterminated
Mini USB	Yes	1.0m	No	Hand Held Computer	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	12/15/2010	Effective Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	1/13/2010	Out of Band Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
3	9/2/2010	Effective Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	9/2/2010	Out of Band Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OUT OF BAND EMISSIONS - Part 22H

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting GSM, Circuit Switched
Transmitting E-GPRS, Packet Data, MCS9, Single slot, Test mode B
Transmitting UMTS W-CDMA FDD (12.2k RMC)
Transmitting HSDPA (H-Set 5 QPSK)

CHANNELS OF OPERATION FOR GSM/GPRS/EDGE CELLULAR BAND
Low Channel, Ch. 128, 824.2MHz
Mid Channel, Ch. 192, 837MHz
High Channel, Ch. 251, 848.8MHz

CHANNELS OF OPERATION FOR WCDMA/HSDPA CELLULAR BAND
Low Channel, Ch. 4132, 826.4MHz
Mid Channel, Ch. 4182, 836.4MHz
High Channel, Ch. 4233, 946.6MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	12.5 GHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT USED FOR ORIGINAL TESTING

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFA	11/14/2008	15
Signal Generator	Agilent	E8257D	TGX	12/10/2008	13
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
High Pass Filter	Micro-Tronics	50108	HGF	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	16
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13

TEST EQUIPMENT USED FOR NEW ANTENNA TESTING

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFA	2/9/2010	12
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
High Pass Filter	Micro-Tronics	50108	HGF	1/18/2010	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	7/14/2010	13
EV12 Cables		Bilog Cables	EVS	7/14/2010	13
Antenna, Biconilog	EMCO	3141	AXG	2/15/2010	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/14/2010	13
Antenna, Horn	ETS	3115	AHW	7/8/2010	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
EV12 Cables		Standard Gain Horn Cables	EVU	7/14/2010	13

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain antenna to be used with the EUT was tested for final measurements. The EUT was configured for the lowest, a middle, and the highest transmit frequency in each operational band. For each configuration, the spectrum was scanned throughout the specified range. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.4:2003). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest spurious emissions for emissions below 1 GHz, and a horn antenna for emissions above 1 GHz. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the antenna and its gain; the power (dBm) into an ideal ½ wave dipole antenna is determined for each radiated spurious emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The 3 meter limit was calculated to be 82.5 dBuV/m at 3 meters. The final measurements must be made utilizing the substitution method described above

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 22H

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/29/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

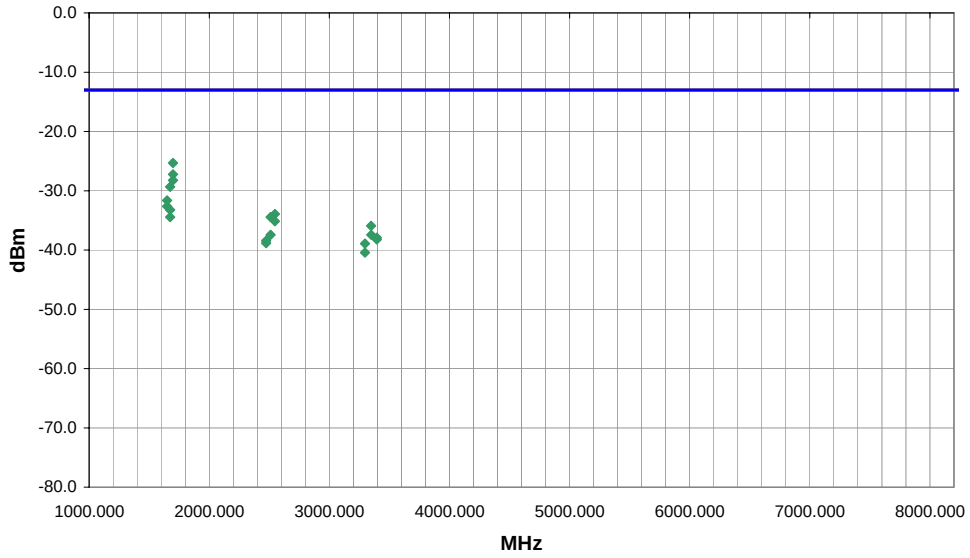
Transmitting GSM (CS) Cell Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1697.613			58.0	1.1			V-Horn	PK	2.93E-06	-25.3	-13.0	-12.3	High channel, EUT vertical
1697.670			282.0	1.0			H-Horn	PK	1.89E-06	-27.2	-13.0	-14.2	High channel, EUT horizontal
1697.533			0.0	1.0			H-Horn	PK	1.50E-06	-28.2	-13.0	-15.2	High channel, EUT vertical
1674.133			355.0	1.0			H-Horn	PK	1.17E-06	-29.3	-13.0	-16.3	Mid channel, EUT horizontal
1648.517			356.0	1.0			H-Horn	PK	6.87E-07	-31.6	-13.0	-18.6	Low channel, EUT horizontal
1648.287			42.0	1.1			V-Horn	PK	5.46E-07	-32.6	-13.0	-19.6	Low channel, EUT vertical
1673.983			32.0	1.6			V-Horn	PK	4.75E-07	-33.2	-13.0	-20.2	Mid channel, EUT vertical
2546.333			19.0	1.0			V-Horn	PK	4.05E-07	-33.9	-13.0	-20.9	High channel, EUT vertical
1673.913			44.0	1.3			V-Horn	PK	3.61E-07	-34.4	-13.0	-21.4	Mid channel, EUT vertical
2511.023			17.0	1.0			V-Horn	PK	3.61E-07	-34.4	-13.0	-21.4	Mid channel, EUT vertical
2546.617			3.0	1.0			H-Horn	PK	3.07E-07	-35.1	-13.0	-22.1	High channel, EUT horizontal
3347.697			4.0	1.0			H-Horn	PK	2.55E-07	-35.9	-13.0	-22.9	Mid channel, EUT horizontal
2511.083			4.0	1.3			H-Horn	PK	1.81E-07	-37.4	-13.0	-24.4	Mid channel, EUT horizontal
3348.300			107.0	1.6			V-Horn	PK	1.81E-07	-37.4	-13.0	-24.4	Mid channel, EUT vertical
3395.020			92.0	1.4			V-Horn	PK	1.61E-07	-37.9	-13.0	-24.9	High channel, EUT vertical
3394.873			297.0	1.0			H-Horn	PK	1.50E-07	-38.2	-13.0	-25.2	High channel, EUT horizontal
2472.767			222.0	1.0			V-Horn	PK	1.44E-07	-38.4	-13.0	-25.4	Low channel, EUT vertical
2472.740			0.0	1.2			H-Horn	PK	1.31E-07	-38.8	-13.0	-25.8	Low channel, EUT horizontal
3296.617			329.0	1.0			H-Horn	PK	1.28E-07	-38.9	-13.0	-25.9	Low channel, EUT horizontal
3296.937			98.0	1.0			V-Horn	PK	9.06E-08	-40.4	-13.0	-27.4	Low channel, EUT vertical

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 22H

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	**Work Order:**	TRPO0055
Serial Number:	35411401.077234.215	**Date:**	12/29/09
Customer:	Trimble Navigation Ltd., MCS	**Temperature:**	22
Attendees:	none	**Humidity:**	38%
Project:	None	**Barometric Pres.:**	29.95
Tested by:	Rod Peloquin	**Power:** 120VAC/60Hz	**Job Site:** EV12

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	**Test Distance (m)**	3

COMMENTS

None

EUT OPERATING MODES

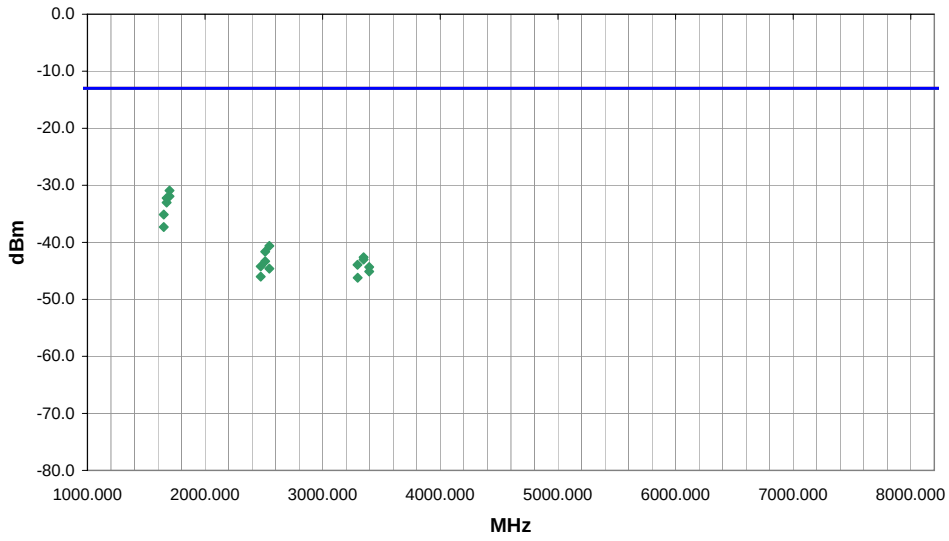
Transmitting E-GPRS (Edge, PD, single slot), Cell Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1697.652			261.0	1.0			H-Horn	PK	8.07E-07	-30.9	-13.0	-17.9	High Channel, EUT horizontal
1697.675			36.0	1.1			V-Horn	PK	6.41E-07	-31.9	-13.0	-18.9	High Channel, EUTvertical
1673.940			284.0	1.0			V-Horn	PK	5.99E-07	-32.2	-13.0	-19.2	Mid Channel, EUTvertical
1674.000			361.0	1.0			H-Horn	PK	4.98E-07	-33.0	-13.0	-20.0	Mid Channel, EUT horizontal
1648.563			40.0	1.1			V-Horn	PK	3.07E-07	-35.1	-13.0	-22.1	Low Channel, EUTvertical
1648.397			357.0	1.4			H-Horn	PK	1.85E-07	-37.3	-13.0	-24.3	Low Channel, EUT horizontal
2546.468			139.0	1.1			V-Horn	PK	8.65E-08	-40.6	-13.0	-27.6	High Channel, EUTvertical
2510.958			18.0	1.0			V-Horn	PK	6.87E-08	-41.6	-13.0	-28.6	Mid Channel, EUTvertical
3348.083			302.0	1.0			H-Horn	PK	5.46E-08	-42.6	-13.0	-29.6	Mid Channel, EUT horizontal
3348.250			95.0	1.0			V-Horn	PK	4.98E-08	-43.0	-13.0	-30.0	Mid Channel, EUTvertical
2511.097			238.0	1.0			H-Horn	PK	4.65E-08	-43.3	-13.0	-30.3	Mid Channel, EUT horizontal
3296.760			333.0	1.0			H-Horn	PK	4.05E-08	-43.9	-13.0	-30.9	Low Channel, EUT horizontal
2472.525			26.0	1.1			V-Horn	PK	3.78E-08	-44.2	-13.0	-31.2	Low Channel, EUTvertical
3394.948			97.0	1.6			V-Horn	PK	3.69E-08	-44.3	-13.0	-31.3	High Channel, EUTvertical
2546.452			197.0	1.0			H-Horn	PK	3.44E-08	-44.6	-13.0	-31.6	High Channel, EUT horizontal
3395.255			300.0	1.0			H-Horn	PK	3.07E-08	-45.1	-13.0	-32.1	High Channel, EUT horizontal
2472.558			150.0	1.0			H-Horn	PK	2.50E-08	-46.0	-13.0	-33.0	Low Channel, EUT horizontal
3297.040			85.0	1.0			V-Horn	PK	2.38E-08	-46.2	-13.0	-33.2	Low Channel, EUTvertical

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 22H

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/22/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

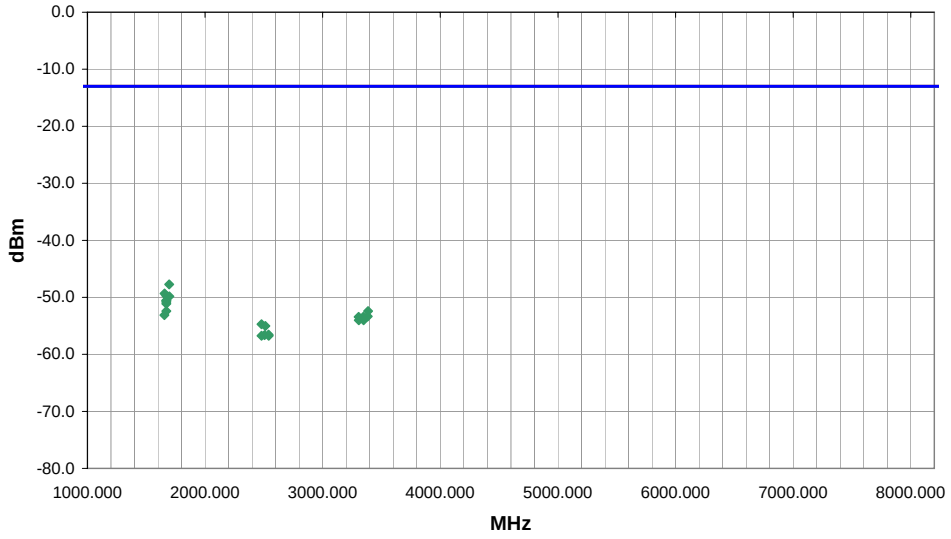
Transmitting WCDMA (CS, RMC) Cell Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1695.000			6.0	1.7			H-Horn	PK	1.69E-08	-47.7	-13.0	-34.7	High Channel, EUT vertical
1655.547			351.0	1.0			H-Horn	PK	1.17E-08	-49.3	-13.0	-36.3	Low Channel, EUT horizontal
1670.440			224.0	1.1			V-Horn	PK	1.06E-08	-49.7	-13.0	-36.7	Mid Channel, EUT on side
1695.880			246.0	1.0			V-Horn	PK	1.04E-08	-49.8	-13.0	-36.8	High Channel, EUT horizontal
1670.360			43.0	2.1			H-Horn	PK	8.85E-09	-50.5	-13.0	-37.5	Mid Channel, EUT vertical
1670.333			239.0	1.0			V-Horn	PK	8.65E-09	-50.6	-13.0	-37.6	Mid Channel, EUT horizontal
1670.240			9.0	1.0			H-Horn	PK	8.26E-09	-50.8	-13.0	-37.8	Mid Channel, EUT horizontal
1670.573			266.0	1.0			H-Horn	PK	7.71E-09	-51.1	-13.0	-38.1	Mid Channel, EUT on side
1670.227			56.0	1.1			V-Horn	PK	5.72E-09	-52.4	-13.0	-39.4	Mid Channel, EUT vertical
3386.187			23.0	1.0			V-Horn	PK	5.72E-09	-52.4	-13.0	-39.4	High Channel, EUT horizontal
1654.387			68.0	1.0			H-Horn	PK	4.87E-09	-53.1	-13.0	-40.1	Low Channel, EUT vertical
3382.907			322.0	1.0			H-Horn	PK	4.65E-09	-53.3	-13.0	-40.3	High Channel, EUT vertical
3305.733			94.0	1.0			H-Horn	PK	4.54E-09	-53.4	-13.0	-40.4	Low Channel, EUT horizontal
3345.307			4.0	1.0			V-Horn	PK	4.54E-09	-53.4	-13.0	-40.4	Mid Channel, EUT horizontal
3307.680			26.0	1.0			H-Horn	PK	3.95E-09	-54.0	-13.0	-41.0	Low Channel, EUT vertical
3347.253			234.0	1.0			H-Horn	PK	3.95E-09	-54.0	-13.0	-41.0	Mid Channel, EUT vertical
2479.547			23.0	1.0			H-Horn	PK	3.37E-09	-54.7	-13.0	-41.7	Low Channel, EUT vertical
2512.853			207.0	1.0			H-Horn	PK	3.14E-09	-55.0	-13.0	-42.0	Mid Channel, EUT vertical
2539.907			360.0	1.0			H-Horn	PK	2.22E-09	-56.5	-13.0	-43.5	High Channel, EUT vertical
2505.733			252.0	1.0			V-Horn	PK	2.17E-09	-56.6	-13.0	-43.6	Mid Channel, EUT horizontal
2480.667			137.0	1.0			H-Horn	PK	2.12E-09	-56.7	-13.0	-43.7	Low Channel, EUT horizontal
2541.280			165.0	1.0			V-Horn	PK	2.12E-09	-56.7	-13.0	-43.7	High Channel, EUT horizontal

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 22H

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	01/12/10
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	none	Humidity:	42%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

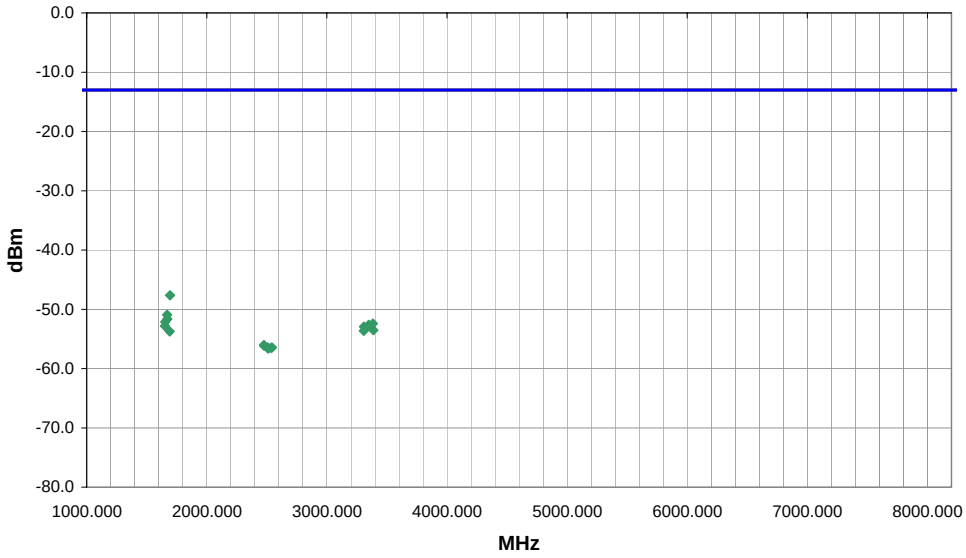
Transmitting HSDPA (PS) Cell Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	8
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1694.413			89.0	1.0			V-Horn	PK	1.73E-08	-47.6	-13.0	-34.6	High Channel, EUT on side
1670.613			241.0	1.4			V-Horn	PK	8.07E-09	-50.9	-13.0	-37.9	Mid Channel, EUT on side
1671.573			151.0	1.0			H-Horn	PK	6.87E-09	-51.6	-13.0	-38.6	Mid Channel, EUT vertical
1654.107			49.0	1.0			V-Horn	PK	6.13E-09	-52.1	-13.0	-39.1	Low Channel, EUT on side
3382.533			89.0	1.0			H-Horn	PK	5.72E-09	-52.4	-13.0	-39.4	High Channel, EUT vertical
3348.987			318.0	1.2			V-Horn	PK	5.46E-09	-52.6	-13.0	-39.6	Mid Channel, EUT on side
3347.693			219.0	1.0			H-Horn	PK	5.33E-09	-52.7	-13.0	-39.7	Mid Channel, EUT vertical
1651.440			300.0	1.0			H-Horn	PK	5.21E-09	-52.8	-13.0	-39.8	Low Channel, EUT vertical
3308.867			66.0	1.0			V-Horn	PK	5.09E-09	-52.9	-13.0	-39.9	Low Channel, EUT on side
3386.627			111.0	1.0			V-Horn	PK	4.44E-09	-53.5	-13.0	-40.5	High Channel, EUT on side
3307.200			17.0	1.0			H-Horn	PK	4.34E-09	-53.6	-13.0	-40.6	Low Channel, EUT vertical
1691.827			71.0	1.4			H-Horn	PK	4.24E-09	-53.7	-13.0	-40.7	High Channel, EUT vertical
2475.733			134.0	1.0			V-Horn	PK	2.50E-09	-56.0	-13.0	-43.0	Low Channel, EUT on side
2476.880			42.0	1.0			H-Horn	PK	2.44E-09	-56.1	-13.0	-43.1	Low Channel, EUT vertical
2508.413			277.0	1.3			V-Horn	PK	2.28E-09	-56.4	-13.0	-43.4	Mid Channel, EUT on side
2542.747			24.0	1.6			H-Horn	PK	2.28E-09	-56.4	-13.0	-43.4	High Channel, EUT vertical
2536.120			323.0	1.0			V-Horn	PK	2.22E-09	-56.5	-13.0	-43.5	High Channel, EUT on side
2510.773			54.0	1.0			H-Horn	PK	2.17E-09	-56.6	-13.0	-43.6	Mid Channel, EUT vertical

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 22H

PSA 2008.07.21
EMI 2008.1.9

EUT:	Regal - Cinterion HC25 Radio Module (New Antenna)			Work Order:	TRPO0065
Serial Number:	35411401.077234.215			Date:	09/01/10
Customer:	Tripod Data Systems, Inc.			Temperature:	20.7
Attendees:	none			Humidity:	44%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	120VAC/60Hz	Job Site:	EV12

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

No external whip antenna.

EUT OPERATING MODES

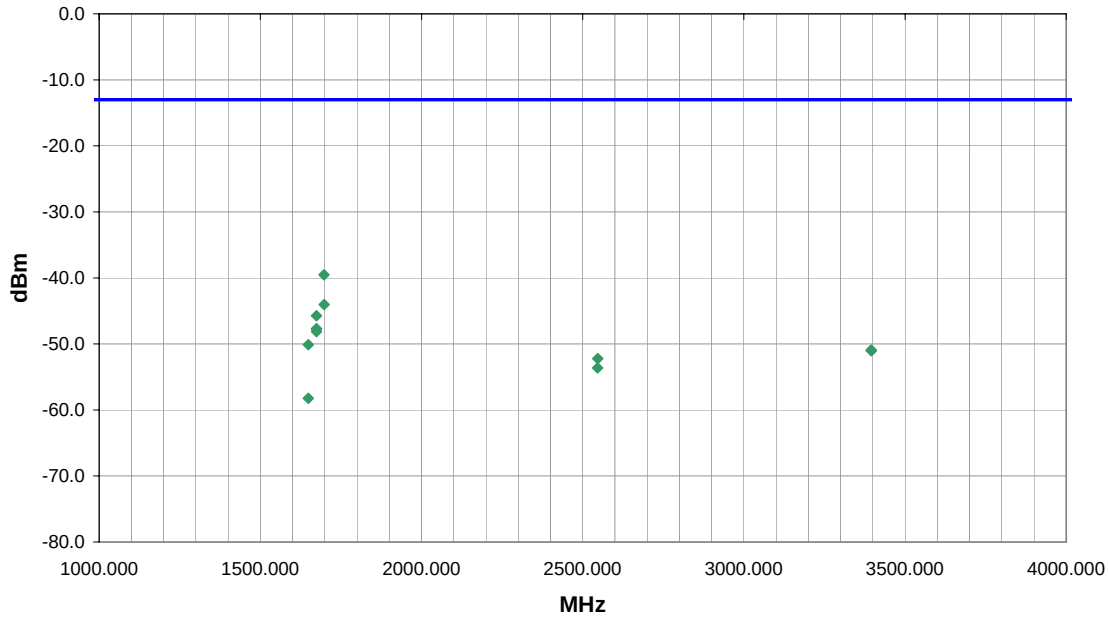
Transmitting GSM (CS) Cell Band

DEVIATIONS FROM TEST STANDARD

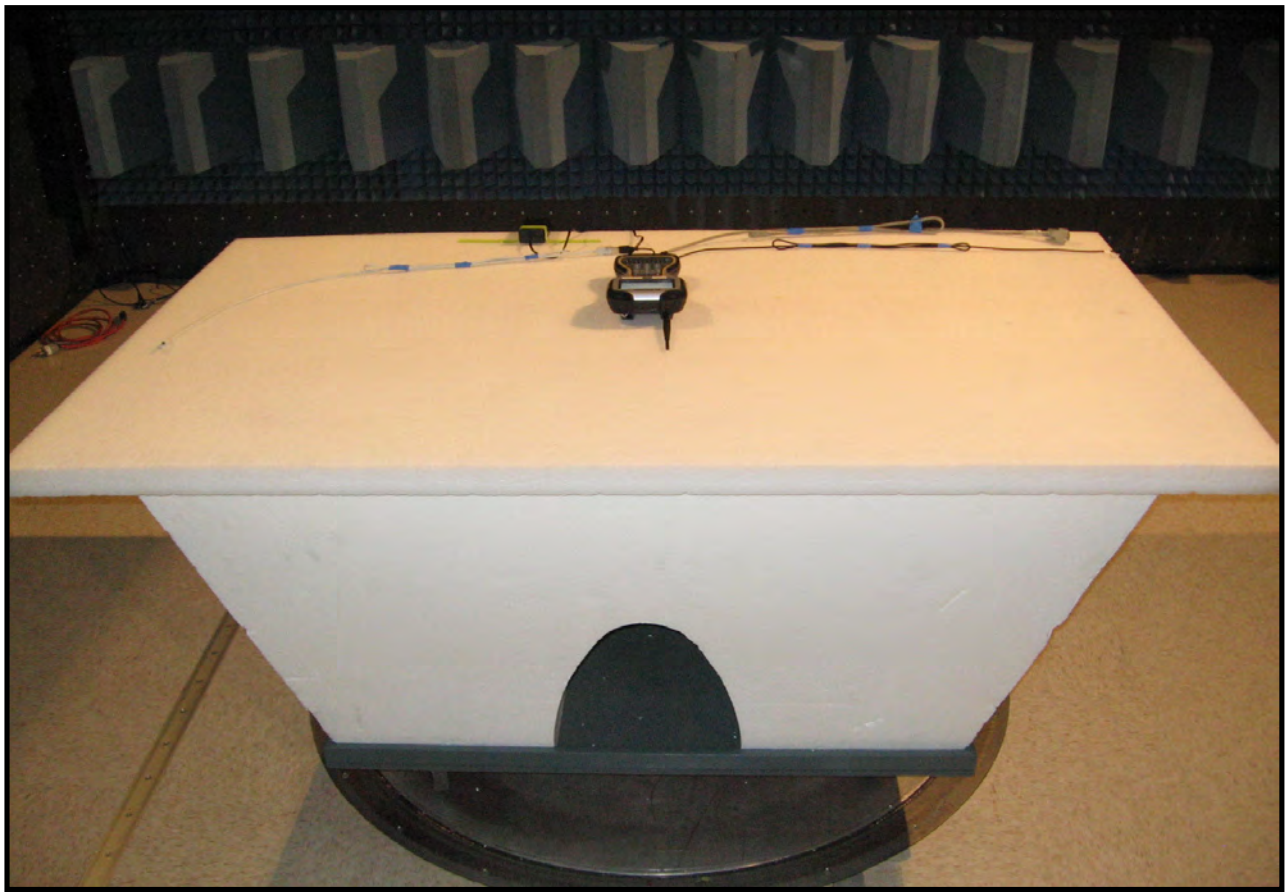
No deviations.

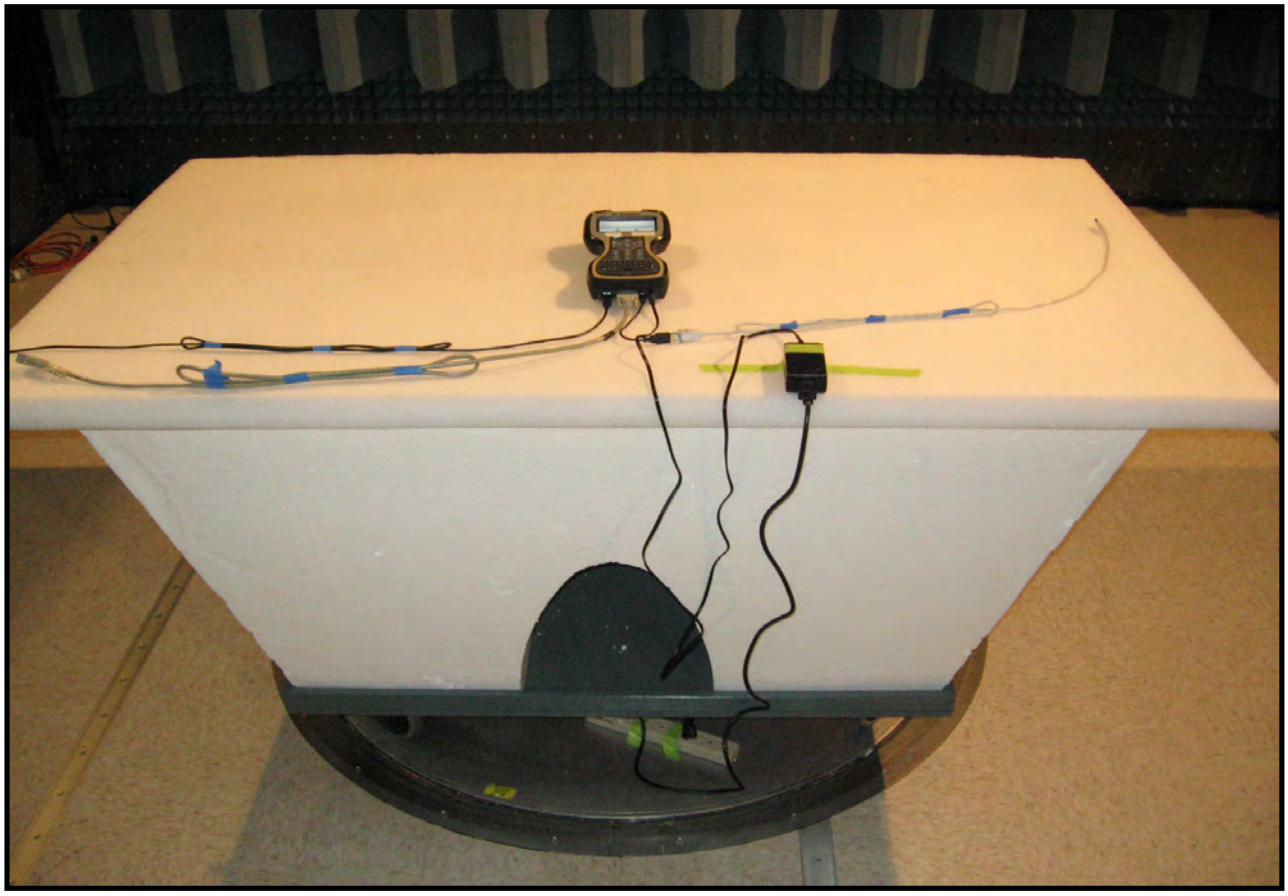
Run #	10
Configuration #	1
Results	Pass

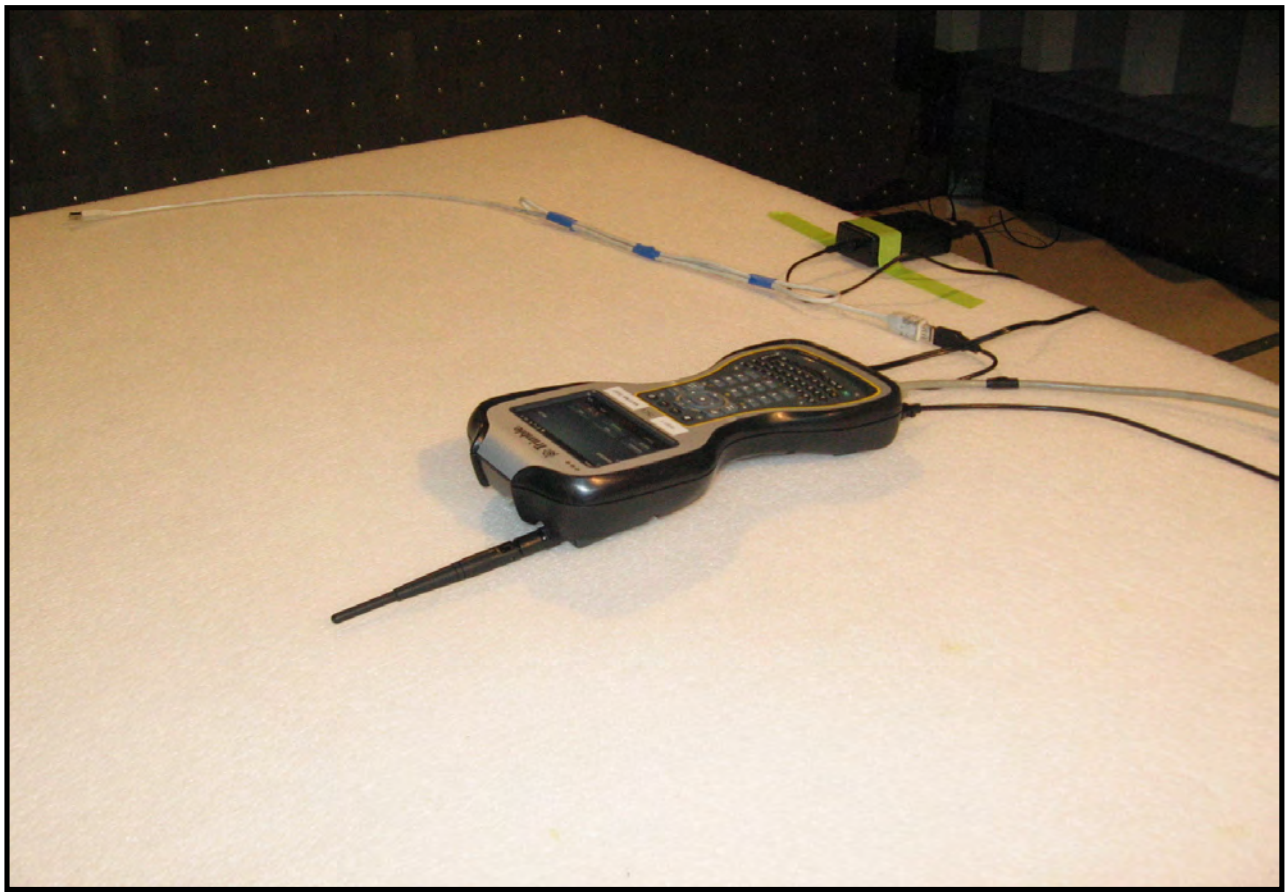
Signature

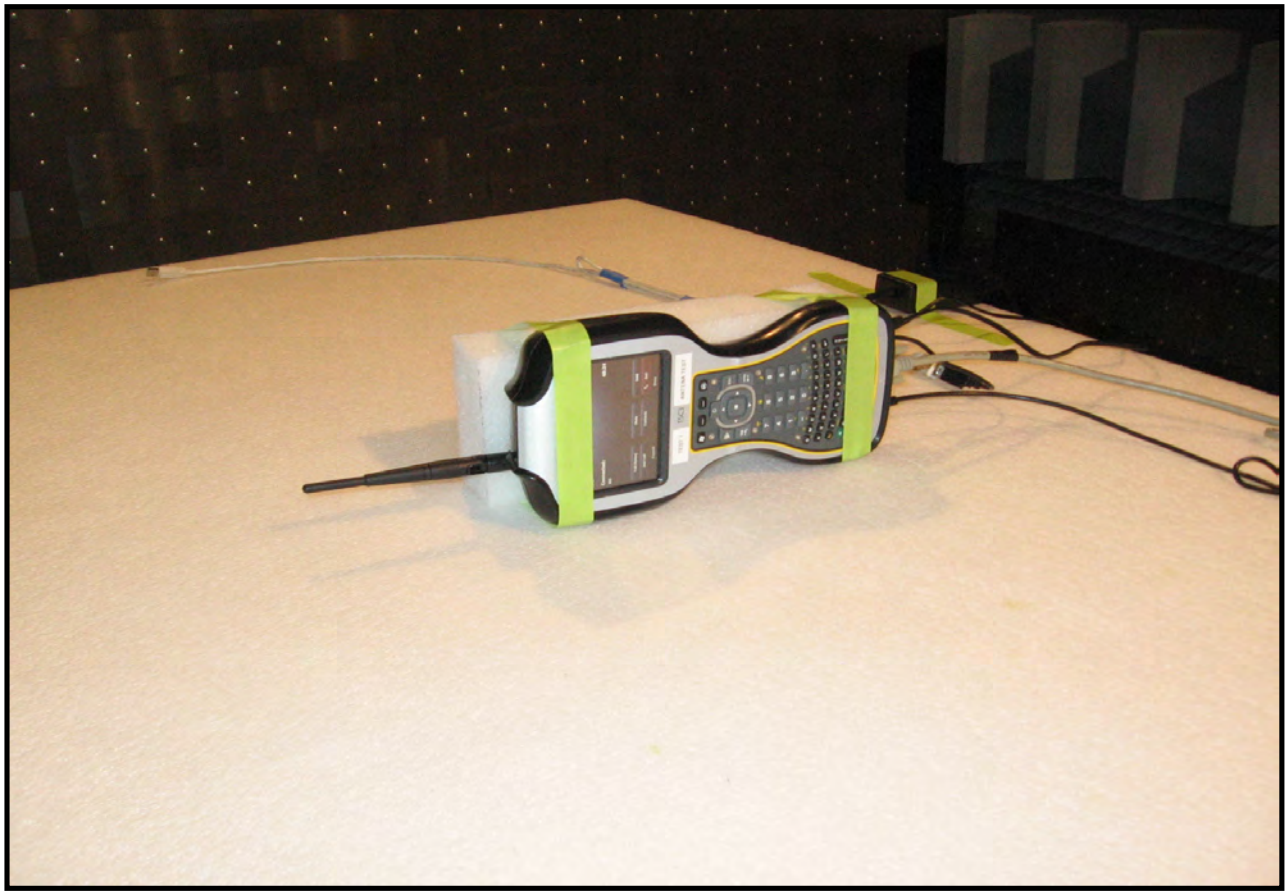


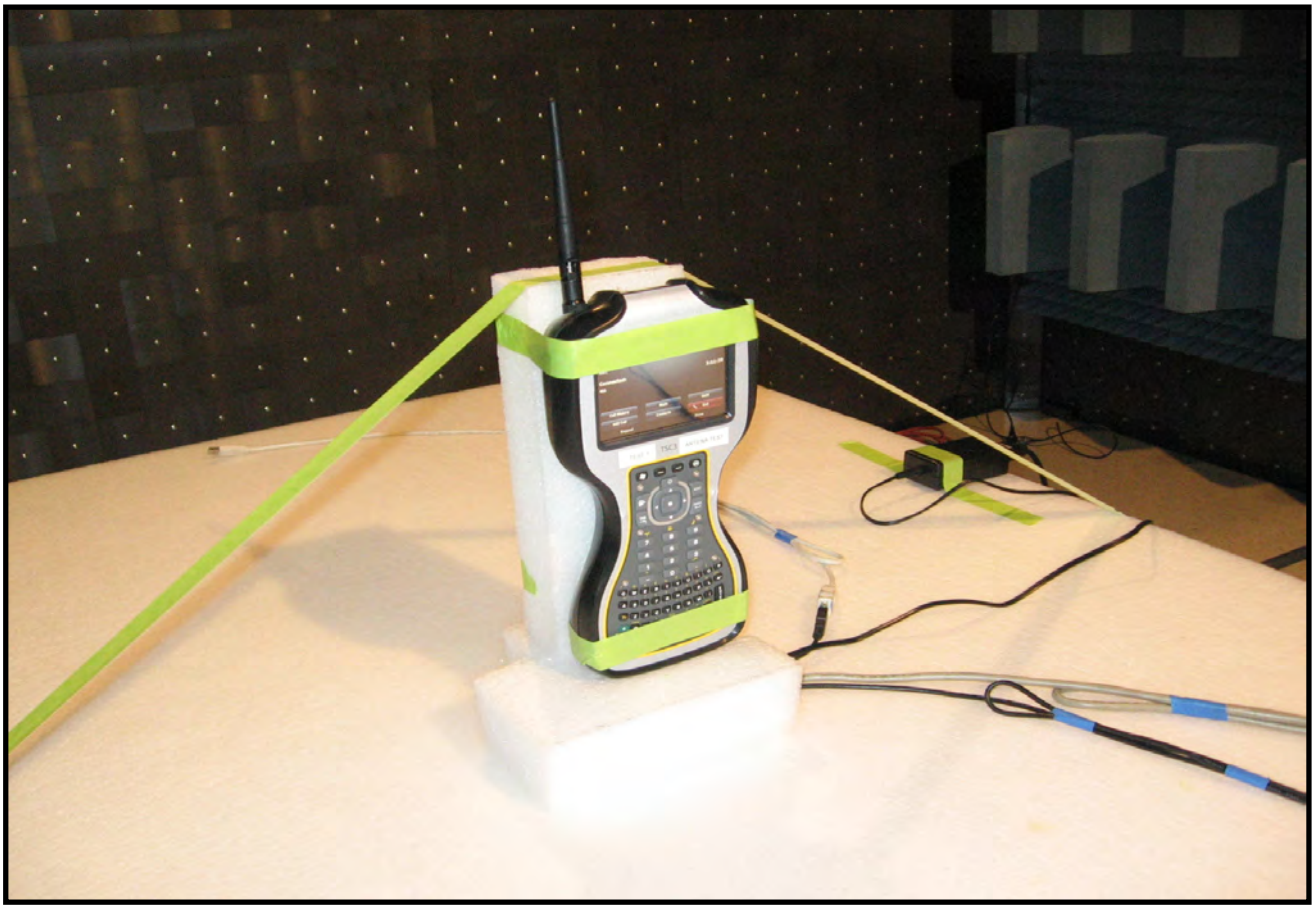
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1697.625			106.0	1.4			V-Horn	PK	1.11E-07	-39.5	-13.0	-26.5	EUT Vert
1697.720			233.0	1.0			H-Horn	PK	3.95E-08	-44.0	-13.0	-31.0	EUT Vert
1674.072			72.0	1.0			H-Horn	PK	2.67E-08	-45.7	-13.0	-32.7	EUT Horz
1674.025			32.0	1.3			V-Horn	PK	1.69E-08	-47.7	-13.0	-34.7	EUT Vert
1674.173			190.0	1.0			V-Horn	PK	1.69E-08	-47.7	-13.0	-34.7	EUT Horz
1673.915			313.0	1.0			H-Horn	PK	1.54E-08	-48.1	-13.0	-35.1	EUT Vert
1648.547			55.0	1.0			V-Horn	PK	9.71E-09	-50.1	-13.0	-37.1	EUT Horz
3395.120			146.0	2.7			H-Horn	PK	8.07E-09	-50.9	-13.0	-37.9	EUT Vert
3395.458			247.0	1.0			V-Horn	PK	7.89E-09	-51.0	-13.0	-38.0	EUT Vert
2546.458			360.0	1.8			V-Horn	PK	5.99E-09	-52.2	-13.0	-39.2	EUT Vert
2546.372			146.0	1.6			H-Horn	PK	4.34E-09	-53.6	-13.0	-40.6	EUT Vert
1648.652			133.0	1.3			H-Horn	PK	1.50E-09	-58.2	-13.0	-45.2	EUT Horz











Effective Radiated Power (ERP)

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting GSM, Circuit Switched
Transmitting E-GPRS, Packet Data, MCS9, Single slot, Test mode B
Transmitting UMTS W-CDMA FDD (12.2k RMC)
Transmitting HSDPA (H-Set 5 QPSK)

CHANNELS OF OPERATION FOR GSM/GPRS/EDGE CELLULAR BAND
Low Channel, Ch. 128, 824.2MHz
Mid Channel, Ch. 192, 837MHz
High Channel, Ch. 251, 848.8MHz

CHANNELS OF OPERATION FOR WCDMA/HSDPA CELLULAR BAND
Low Channel, Ch. 4132, 826.4MHz
Mid Channel, Ch. 4182, 836.4MHz
High Channel, Ch. 4233, 846.6MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	824 MHz	Stop Frequency	850 MHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT USED FOR ORIGINAL TESTING					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAQ	1/6/2010	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	24
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Antenna, Biconilog	EMCO	3141	AXE	1/15/2008	24
EV01 Cables		Bilog Cables	EVA	7/10/2009	13

TEST EQUIPMENT USED FOR NEW ANTENNA TESTING					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAY	1/15/2010	12
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	24
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Antenna, Biconilog	EMCO	3141	AXE	1/14/2010	13
EV01 Cables		Bilog Cables	EVA	7/9/2010	13

MEASUREMENT BANDWIDTHS				
	Frequency Range (MHz)	**Peak Data (kHz)**	**Quasi-Peak Data (kHz)**	**Average Data (kHz)**
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003)

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to the highest emission. A signal generator was connected to the dipole antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the dipole antenna the effective radiated power for each emission was determined.

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/15/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	20°C
Attendees:	None	Humidity:	33%
Project:	None	Barometric Pres.:	29.82 In
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

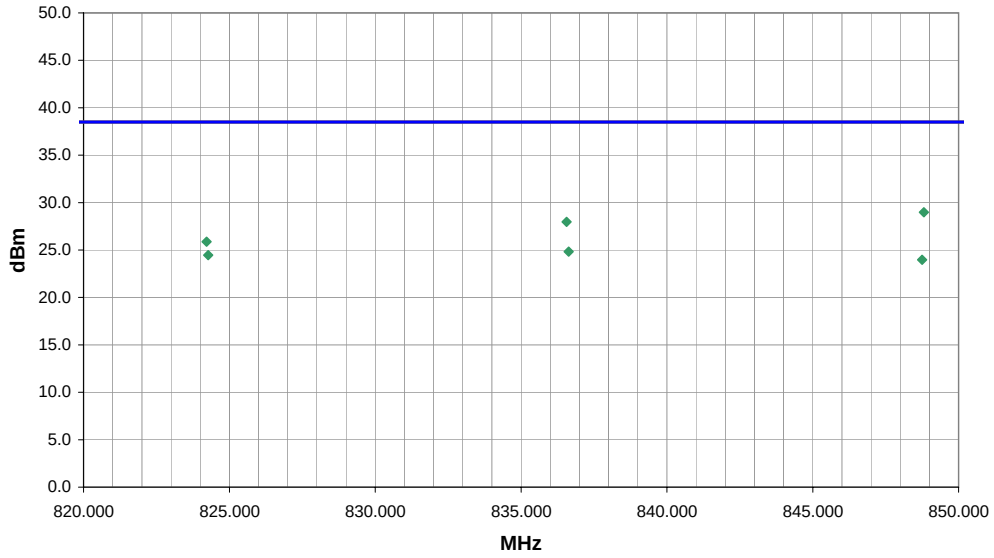
Transmitting GSM, Circuit Switched

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
848.807			187.0	1.1			H-Bilog	PK	7.92E-01	29.0	38.5	-9.5	High channel, EUT horizontal
836.560			34.0	1.0			H-Bilog	PK	6.26E-01	28.0	38.5	-10.5	Mid channel, EUT horizontal
824.217			32.0	1.0			H-Bilog	PK	3.87E-01	25.9	38.5	-12.6	Low channel, EUT horizontal
836.633			143.0	1.0			V-Bilog	PK	3.05E-01	24.8	38.5	-13.7	Mid channel, EUT vertical
824.273			145.0	1.1			V-Bilog	PK	2.79E-01	24.5	38.5	-14.0	Low channel, EUT vertical
848.750			140.0	1.0			V-Bilog	PK	2.50E-01	24.0	38.5	-14.5	High channel, EUT vertical

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/15/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	20°C
Attendees:	None	Humidity:	33%
Project:	None	Barometric Pres.:	29.82 In
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

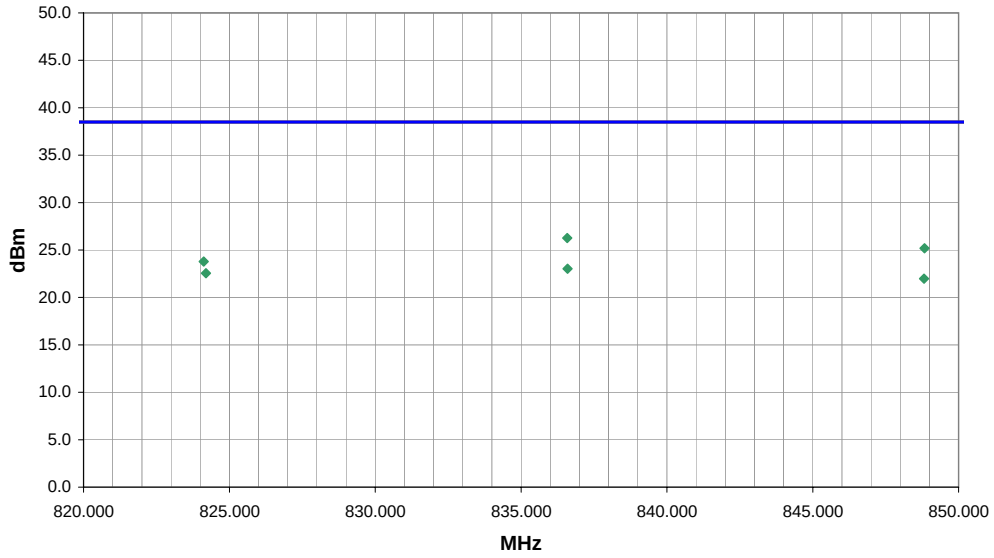
Transmitting E-GPRS, Packet Data, MCS9, Single slot, Test mode B

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
836.580			186.0	1.1			H-Bilog	PK	4.23E-01	26.3	38.5	-12.2	Mid channel, EUT horizontal
848.830			192.0	1.1			H-Bilog	PK	3.30E-01	25.2	38.5	-13.3	High channel, EUT horizontal
824.117			26.0	1.1			H-Bilog	PK	2.39E-01	23.8	38.5	-14.7	Low channel, EUT horizontal
836.593			147.0	1.1			V-Bilog	PK	1.27E+06	23.0	38.5	-15.5	Mid channel, EUT vertical
824.197			143.0	1.1			V-Bilog	PK	1.06E+06	22.6	38.5	-15.9	Low channel, EUT vertical
848.813			149.0	1.0			V-Bilog	PK	1.58E-01	22.0	38.5	-16.5	High channel, EUT vertical

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/15/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	20°C
Attendees:	None	Humidity:	33%
Project:	None	Barometric Pres.:	29.82 In
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

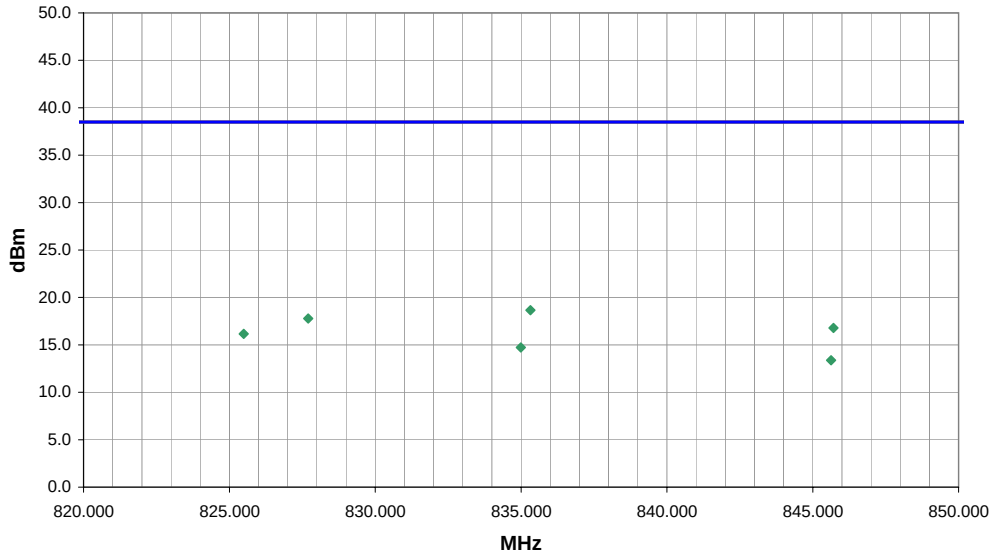
Transmitting UMTS W-CDMA FDD

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
835.320			31.0	1.0			H-Bilog	PK	7.35E-02	18.7	38.5	-19.8	Mid channel, EUT horizontal
827.700			27.0	1.0			H-Bilog	PK	6.00E-02	17.8	38.5	-20.7	Low channel, EUT horizontal
845.710			183.0	1.0			H-Bilog	PK	4.78E-02	16.8	38.5	-21.7	High channel, EUT horizontal
825.490			147.0	1.0			V-Bilog	PK	4.13E-02	16.2	38.5	-22.3	Low channel, EUT vertical
834.990			148.0	1.1			V-Bilog	PK	2.97E-02	14.7	38.5	-23.8	mid channel, EUT vertical
845.630			143.0	1.1			V-Bilog	PK	2.18E-02	13.4	38.5	-25.1	High channel, EUT vertical

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	01/13/10
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	None	Humidity:	42%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

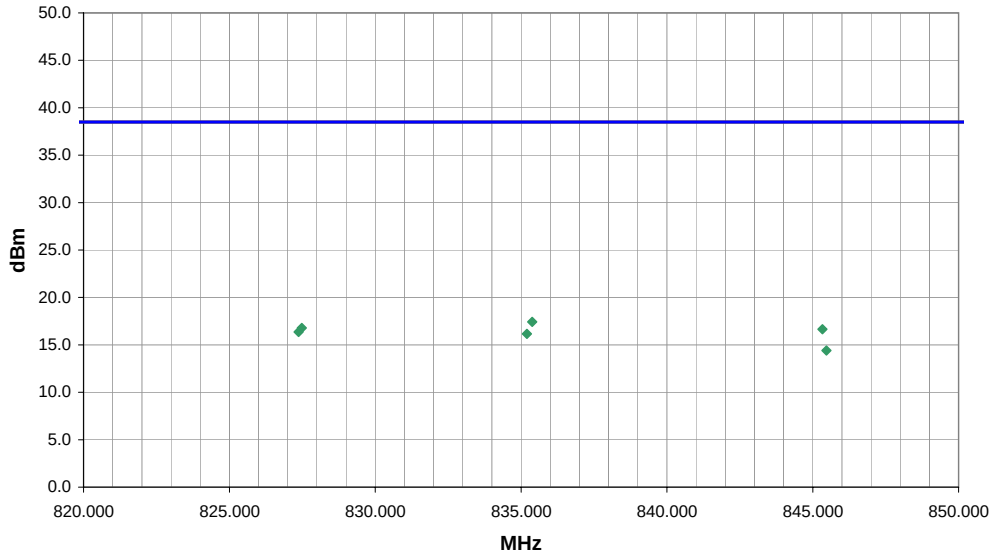
Transmitting HSDPA (Packet Switched)

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	8
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
835.380			48.0	1.0			H-Bilog	PK	5.53E-02	17.4	38.5	-21.1	Mid channel, EUT horizontal
827.480			260.0	1.1			V-Bilog	PK	4.78E-02	16.8	38.5	-21.7	Low channel, EUT vertical
845.330			46.0	1.0			H-Bilog	PK	4.62E-02	16.6	38.5	-21.9	High channel, EUT horizontal
827.370			53.0	1.1			H-Bilog	PK	4.33E-02	16.4	38.5	-22.1	Low channel, EUT horizontal
835.200			263.0	1.2			V-Bilog	PK	4.13E-02	16.2	38.5	-22.3	Mid channel, EUT vertical
845.470			255.0	1.0			V-Bilog	PK	2.75E-02	14.4	38.5	-24.1	High channel, EUT vertical

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2008.1.9

EUT:	TSC3/Ranger WWAN Radio (New Antenna)	Work Order:	TRPO0065
Serial Number:	35411401.077234.215	Date:	09/02/10
Customer:	Tripod Data Systems, Inc.	Temperature:	20.7
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 22H:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

No external whip antenna.

EUT OPERATING MODES

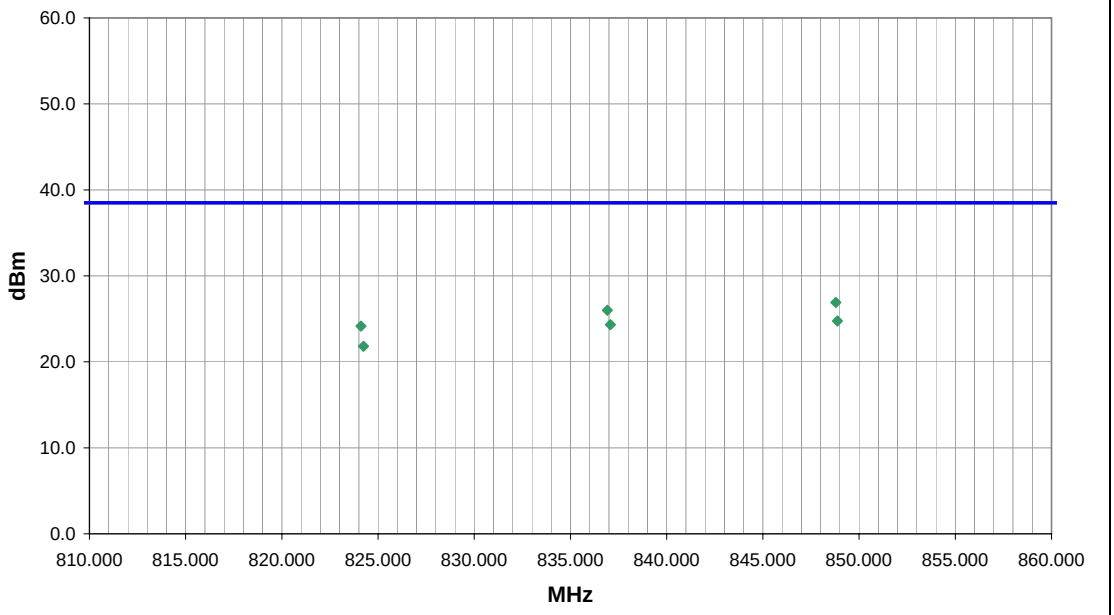
Transmitting GSM, Circuit Switched

DEVIATIONS FROM TEST STANDARD

No deviations.

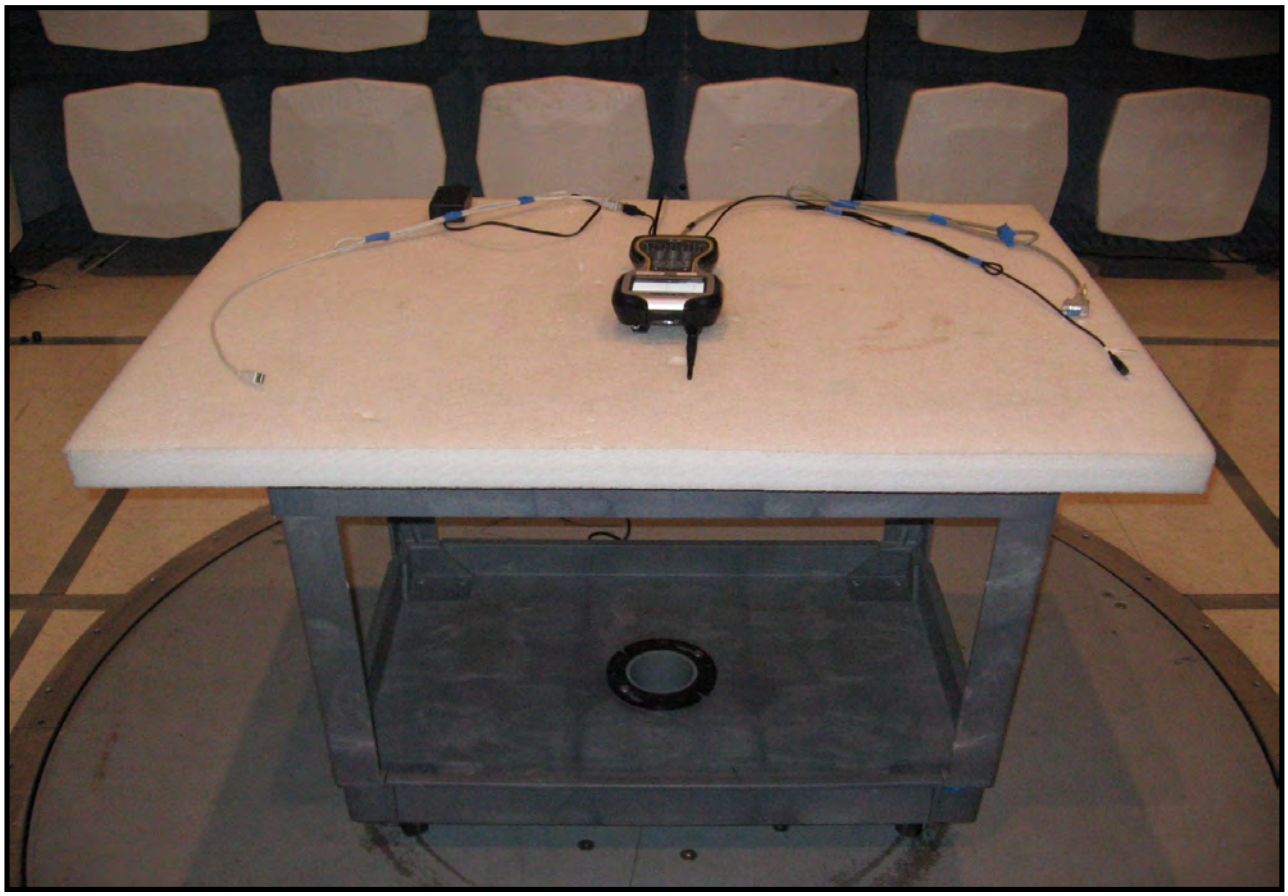
Run #	9
Configuration #	1
Results	Pass

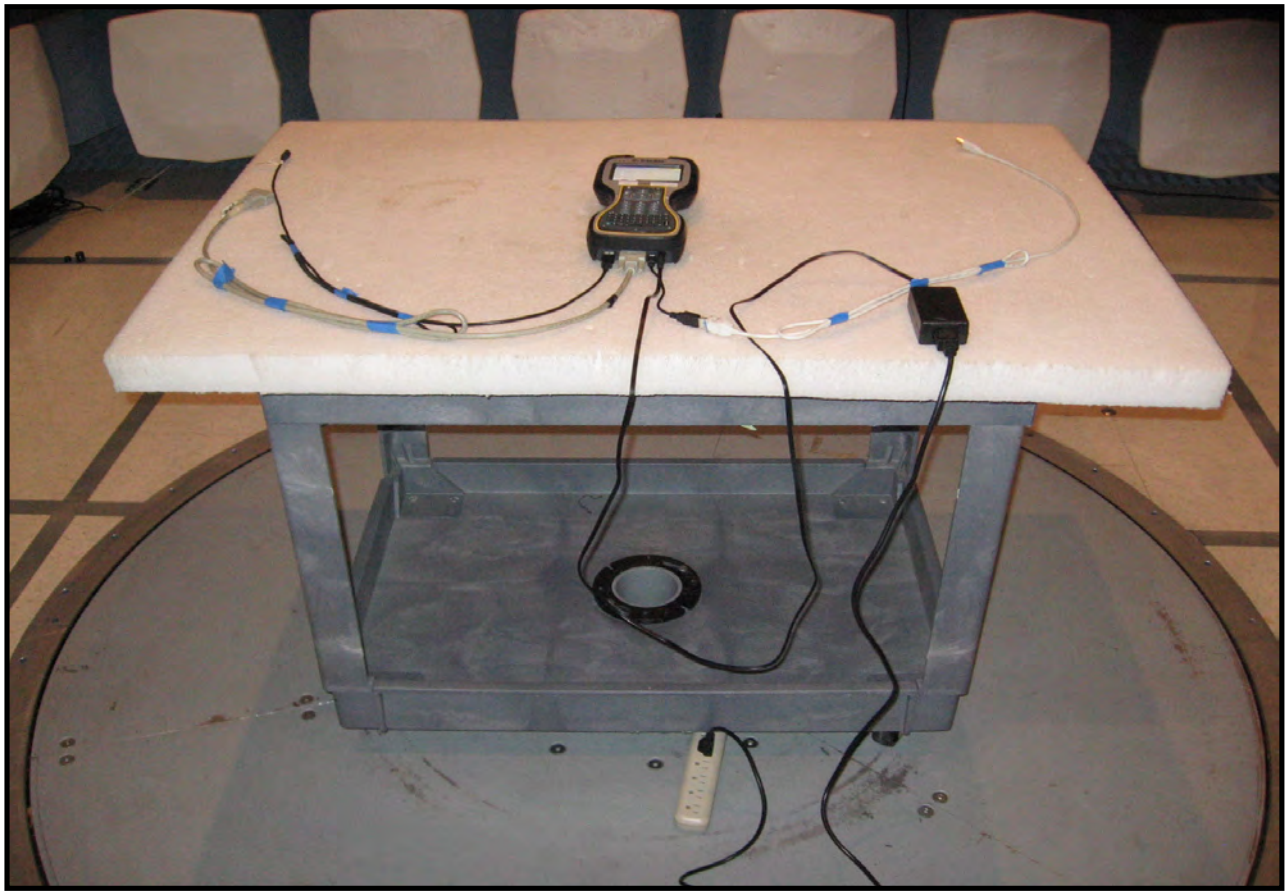
Signature



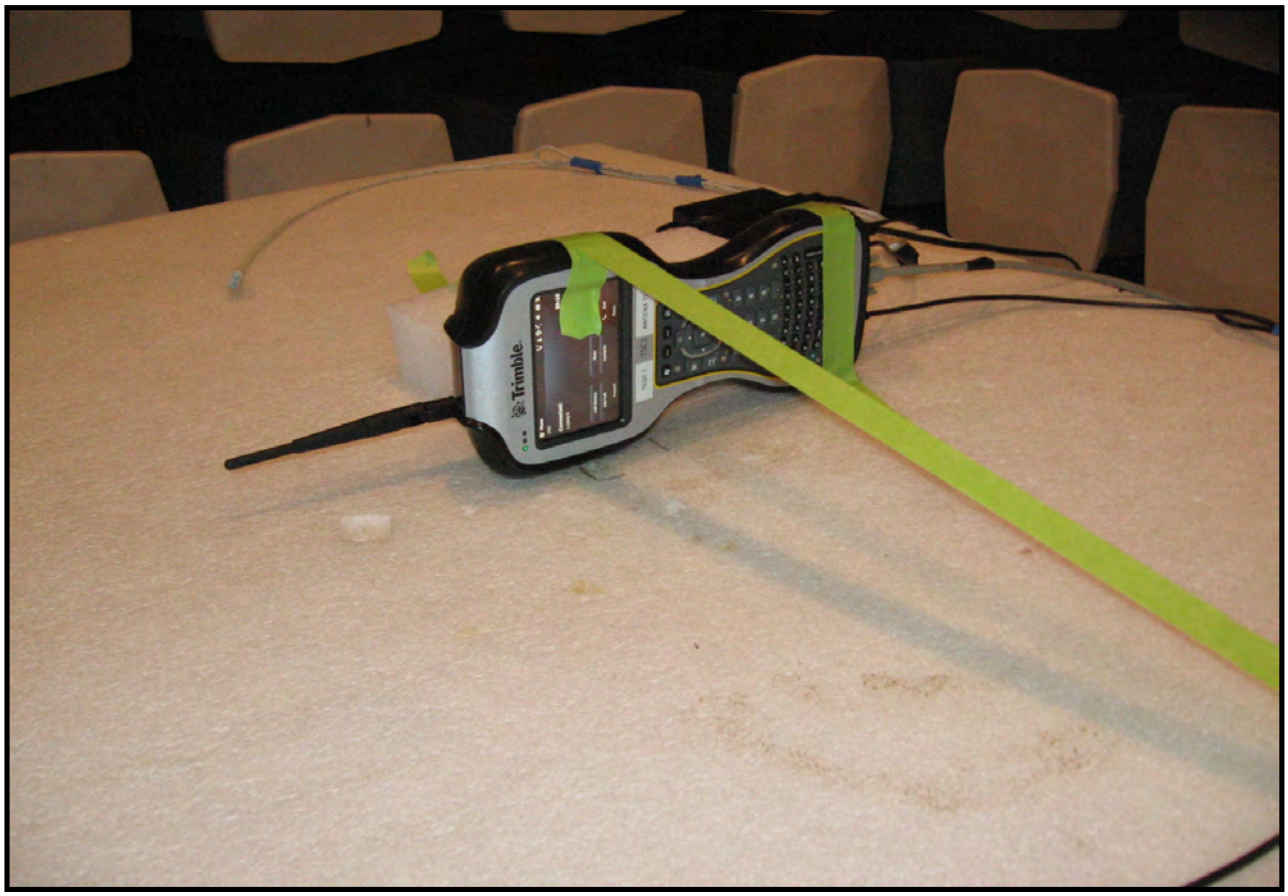
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
848.792			54.0	1.3			V-Bilog	PK	4.92E-01	26.9	38.5	-11.6	EUT On side
836.916			93.0	1.6			V-Bilog	PK	3.99E-01	26.0	38.5	-12.5	EUT On side
848.878			332.0	1.0			H-Bilog	PK	2.98E-01	24.7	38.5	-13.8	EUT Horz
837.071			333.0	1.0			H-Bilog	PK	2.70E-01	24.3	38.5	-14.2	EUT Horz
824.107			7.0	1.0			H-Bilog	PK	2.60E-01	24.2	38.5	-14.3	EUT Horz
824.246			32.0	1.7			V-Bilog	PK	1.52E-01	21.8	38.5	-16.7	EUT On side

Effective Radiated Power (ERP)

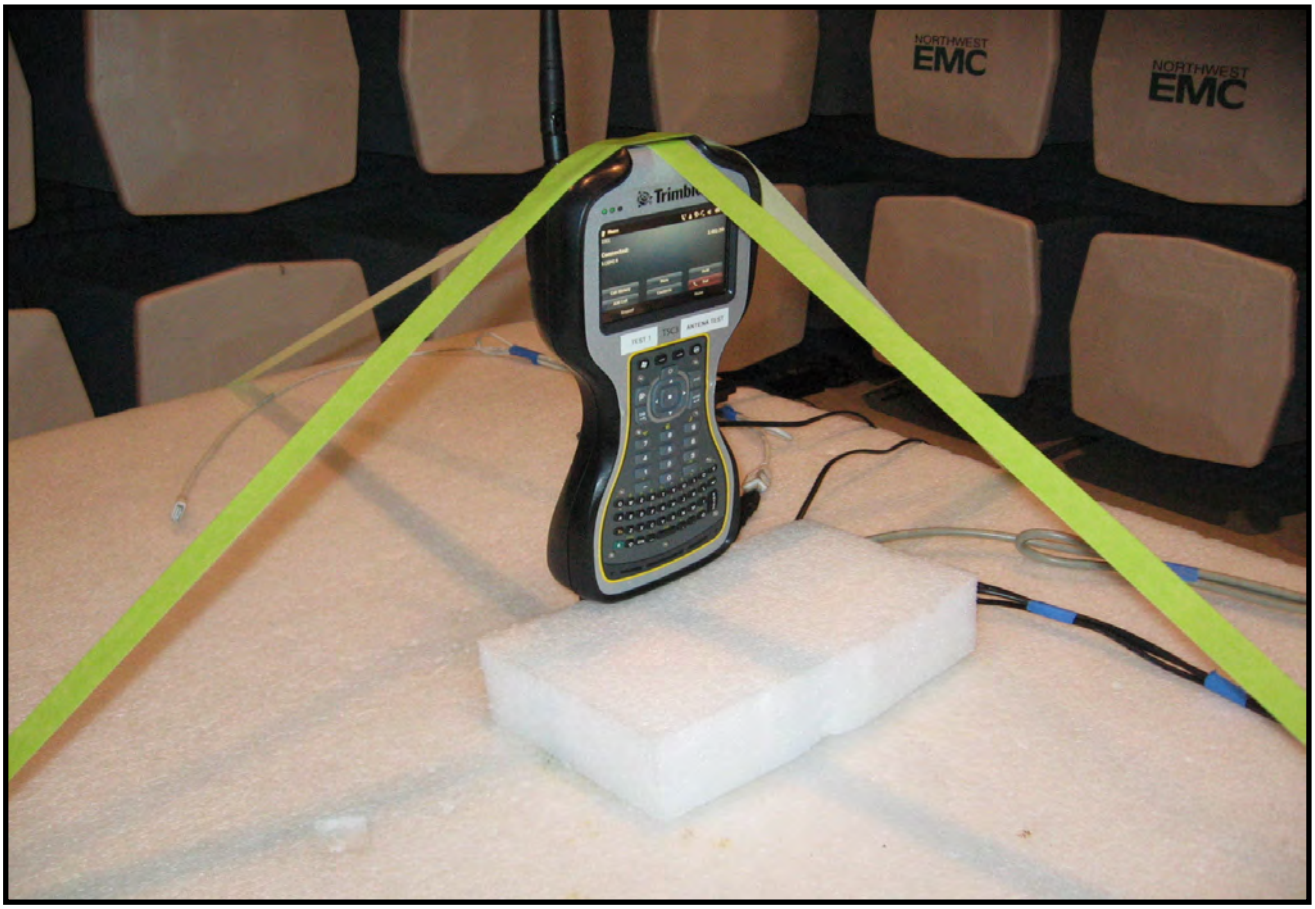




Effective Radiated Power (ERP)



Effective Radiated Power (ERP)



OUT OF BAND EMISSIONS - Part 24E

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting GSM, Circuit Switched
Transmitting E-GPRS (EDGE), Packet Data
Transmitting UMTS W-CDMA FDD, Circuit Switched (12.2k RMC)
Transmitting HSDPA, Packet Switched (H-Set 5 QPSK)

CHANNELS INVESTIGATED FOR GSM/GPRS/EDGE PCS BAND
Low Channel, Ch. 512, 1850.2MHz
Mid Channel, Ch. 661, 1880MHz
High Channel, Ch. 810, 1909.8MHz

CHANNELS INVESTIGATED FOR WCDMA/HSDPA PCS BAND
Low Channel, Ch. 9262, 1852.4MHz
Mid Channel, Ch. 9400, 1880MHz
High Channel, Ch. 9538, 1907.6MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	25 GHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT USED FOR ORIGINAL TESTING

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFA	11/14/2008	15
Signal Generator	Agilent	E8257D	TGX	12/10/2008	13
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	16
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	6/26/2009	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	5/19/2009	13
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Cable	ESM Cable Corp.	KMKM-72	EVY	11/3/2009	13

TEST EQUIPMENT USED FOR NEW ANTENNA TESTING

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFA	2/9/2010	12
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Antenna, Dipole	ETS	3121C-DB4	ADH	3/6/2009	24
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
High Pass Filter	Micro-Tronics	50111	HGE	7/14/2010	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	7/14/2010	13
Antenna, Biconilog	EMCO	3141	AXG	2/15/2010	13
EV12 Cables		Bilog Cables	EVS	7/14/2010	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/17/2010	13
Antenna, Horn	ETS	3115	AHW	7/8/2010	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	7/14/2010	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	7/14/2010	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	5/19/2009	16
EV12 Cables		Standard Gain Horn Cables	EVU	7/14/2010	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Cable	ESM Cable Corp.	KMKM-72	EVY	11/3/2009	13

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain antenna to be used with the EUT was tested for final measurements. The EUT was configured for the lowest, a middle, and the highest transmit frequency in each operational band. For each configuration, the spectrum was scanned throughout the specified range. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.4:2003). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest spurious emissions for emissions below 1 GHz, and a horn antenna for emissions above 1 GHz. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the antenna and its gain; the power (dBm) into an ideal ½ wave dipole antenna is determined for each radiated spurious emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The 3 meter limit was calculated to be 82.5 dBuV/m at 3 meters. The final measurements must be made utilizing the substitution method described above

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 24E

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/28/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

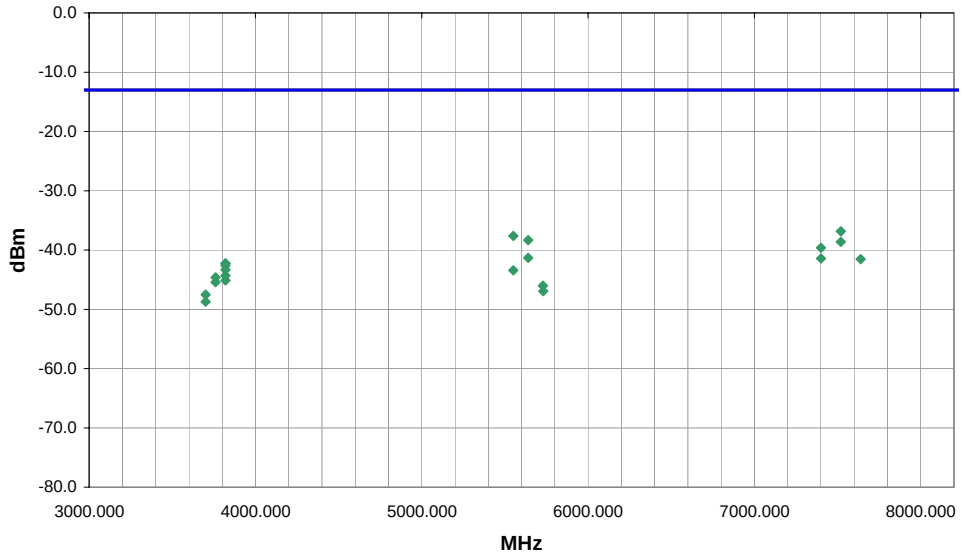
Transmitting GSM (CS) PCS Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7519.985			84.0	1.1			V-Horn	PK	2.08E-07	-36.8	-13.0	-23.8	Mid channel, EUT vertical
5550.528			4.0	1.4			H-Horn	PK	1.73E-07	-37.6	-13.0	-24.6	Low channel, EUT horizontal
5640.141			4.0	1.3			H-Horn	PK	1.47E-07	-38.3	-13.0	-25.3	Mid channel, EUT horizontal
7519.775			357.0	1.1			H-Horn	PK	1.37E-07	-38.6	-13.0	-25.6	Mid channel, EUT horizontal
7400.794			105.0	1.1			V-Horn	PK	1.09E-07	-39.6	-13.0	-26.6	Low channel, EUT vertical
5640.003			76.0	1.0			V-Horn	PK	7.36E-08	-41.3	-13.0	-28.3	Mid channel, EUT vertical
7400.290			120.0	1.3			H-Horn	PK	7.20E-08	-41.4	-13.0	-28.4	Low channel, EUT horizontal
7638.900			107.0	1.3			V-Horn	PK	7.03E-08	-41.5	-13.0	-28.5	High channel, EUT vertical
3819.492			281.0	1.6			V-Horn	PK	5.99E-08	-42.2	-13.0	-29.2	High channel, EUT vertical
3819.497			251.0	1.5			H-Horn	PK	5.85E-08	-42.3	-13.0	-29.3	High channel, EUT on side
3819.417			246.0	1.4			H-Horn	PK	5.46E-08	-42.6	-13.0	-29.6	High channel, EUT horizontal
3819.723			278.0	1.4			H-Horn	PK	4.65E-08	-43.3	-13.0	-30.3	High channel, EUT vertical
5550.441			78.0	1.0			V-Horn	PK	4.54E-08	-43.4	-13.0	-30.4	Low channel, EUT vertical
3819.250			360.0	1.8			V-Horn	PK	3.69E-08	-44.3	-13.0	-31.3	High channel, EUT horizontal
3760.213			15.0	1.0			H-Horn	PK	3.44E-08	-44.6	-13.0	-31.6	Mid channel, EUT horizontal
3819.590			296.0	1.8			V-Horn	PK	3.07E-08	-45.1	-13.0	-32.1	High channel, EUT on side
3760.159			270.0	1.4			V-Horn	PK	2.86E-08	-45.4	-13.0	-32.4	Mid channel, EUT vertical
5728.490			264.0	1.0			V-Horn	PK	2.50E-08	-46.0	-13.0	-33.0	High channel, EUT horizontal
5730.393			38.0	1.0			H-Horn	PK	2.03E-08	-46.9	-13.0	-33.9	High channel, EUT horizontal
3700.469			291.0	1.1			V-Horn	PK	1.77E-08	-47.5	-13.0	-34.5	Low channel, EUT vertical

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 24E

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/28/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

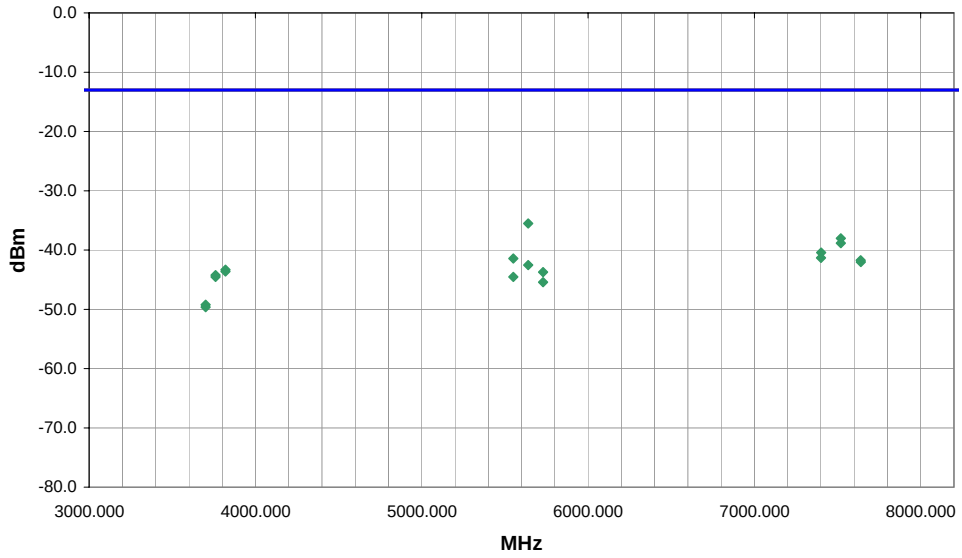
Transmitting EGPRS (EDGE, PD) PCS Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
5640.036			0.0	1.4			H-Horn	PK	2.80E-07	-35.5	-13.0	-22.5	Mid channel, EUT horizontal
7519.997			80.0	1.1			V-Horn	PK	1.57E-07	-38.0	-13.0	-25.0	Mid channel, EUT vertical
7519.466			356.0	1.0			H-Horn	PK	1.31E-07	-38.8	-13.0	-25.8	Mid channel, EUT horizontal
7401.151			73.0	1.4			V-Horn	PK	9.06E-08	-40.4	-13.0	-27.4	Low channel, EUT vertical
7400.629			126.0	1.3			H-Horn	PK	7.36E-08	-41.3	-13.0	-28.3	Low channel, EUT horizontal
5550.573			55.0	1.2			V-Horn	PK	7.20E-08	-41.4	-13.0	-28.4	Low channel, EUT vertical
7639.431			321.0	1.0			H-Horn	PK	6.72E-08	-41.7	-13.0	-28.7	High channel, EUT horizontal
7639.641			44.0	1.6			V-Horn	PK	6.27E-08	-42.0	-13.0	-29.0	High channel, EUT vertical
5640.135			67.0	1.3			V-Horn	PK	5.59E-08	-42.5	-13.0	-29.5	Mid channel, EUT vertical
3819.441			34.0	1.4			V-Horn	PK	4.65E-08	-43.3	-13.0	-30.3	High channel, EUT vertical
3819.579			248.0	1.5			H-Horn	PK	4.34E-08	-43.6	-13.0	-30.6	High channel, EUT horizontal
5729.307			57.0	1.0			V-Horn	PK	4.24E-08	-43.7	-13.0	-30.7	High channel, EUT vertical
3760.105			344.0	1.6			V-Horn	PK	3.78E-08	-44.2	-13.0	-31.2	Mid channel, EUT vertical
3759.778			3.0	1.0			H-Horn	PK	3.52E-08	-44.5	-13.0	-31.5	Mid channel, EUT horizontal
5550.585			109.0	1.4			H-Horn	PK	3.52E-08	-44.5	-13.0	-31.5	Low channel, EUT horizontal
5729.184			318.0	1.0			H-Horn	PK	2.86E-08	-45.4	-13.0	-32.4	High channel, EUT horizontal
3700.637			356.0	1.0			H-Horn	PK	1.19E-08	-49.2	-13.0	-36.2	Low channel, EUT horizontal
3700.361			91.0	1.1			V-Horn	PK	1.09E-08	-49.6	-13.0	-36.6	Low channel, EUT vertical

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 24E

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/28/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

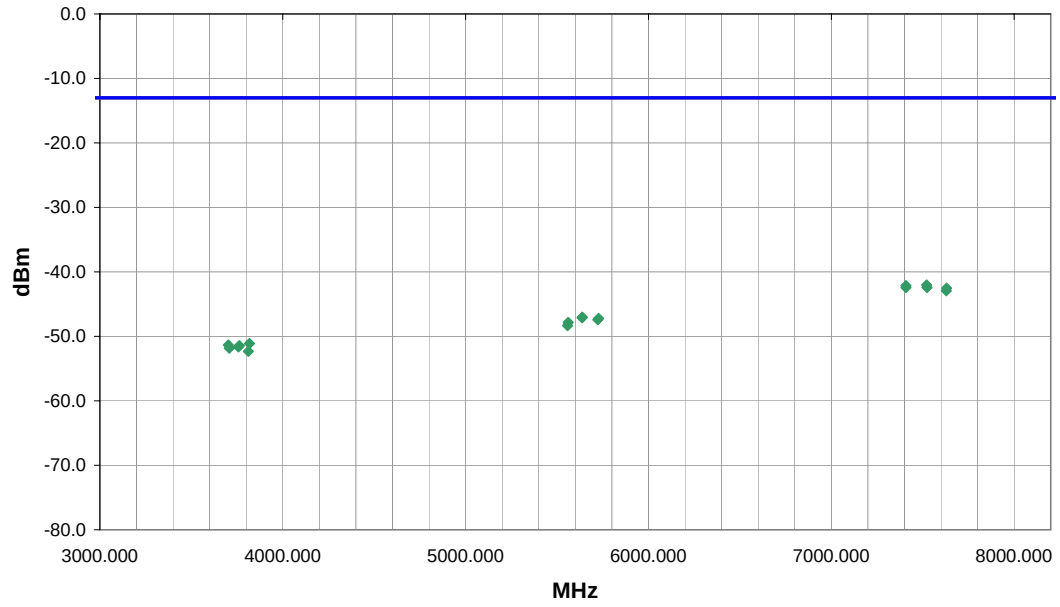
Transmitting WCDMA (CS, RMC) PCS Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7521.400			239.0	1.0			H-Horn	PK	6.27E-08	-42.0	-13.0	-29.0	Mid channel
7408.550			73.0	1.0			H-Horn	PK	6.13E-08	-42.1	-13.0	-29.1	Low channel
7408.083			292.0	1.0			V-Horn	PK	5.72E-08	-42.4	-13.0	-29.4	Low channel
7523.933			275.0	1.0			V-Horn	PK	5.72E-08	-42.4	-13.0	-29.4	Mid channel
7630.400			360.0	1.3			V-Horn	PK	5.59E-08	-42.5	-13.0	-29.5	High channel
7628.783			146.0	1.0			H-Horn	PK	5.09E-08	-42.9	-13.0	-29.9	High channel
5638.450			313.0	1.0			V-Horn	PK	1.98E-08	-47.0	-13.0	-34.0	Mid channel
5636.933			277.0	1.0			H-Horn	PK	1.94E-08	-47.1	-13.0	-34.1	Mid channel
5727.317			143.0	1.0			H-Horn	PK	1.89E-08	-47.2	-13.0	-34.2	High channel
5722.867			223.0	1.0			V-Horn	PK	1.81E-08	-47.4	-13.0	-34.4	High channel
5561.400			343.0	2.1			V-Horn	PK	1.65E-08	-47.8	-13.0	-34.8	Low channel
5557.833			332.0	1.0			H-Horn	PK	1.47E-08	-48.3	-13.0	-35.3	Low channel
3818.467			212.0	1.7			H-Horn	PK	7.71E-09	-51.1	-13.0	-38.1	High channel
3702.617			297.0	1.0			V-Horn	PK	7.36E-09	-51.3	-13.0	-38.3	Low channel
3763.350			108.0	1.0			V-Horn	PK	7.20E-09	-51.4	-13.0	-38.4	Mid channel
3757.683			161.0	1.0			H-Horn	PK	6.87E-09	-51.6	-13.0	-38.6	Mid channel
3707.717			192.0	1.7			H-Horn	PK	6.56E-09	-51.8	-13.0	-38.8	Low channel
3812.317			250.0	1.0			V-Horn	PK	5.85E-09	-52.3	-13.0	-39.3	High channel

NORTHWEST EMC

OUT OF BAND EMISSIONS - Part 24E

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	**Work Order:**	TRPO0055
Serial Number:	35411401.077234.215	**Date:**	01/13/10
Customer:	Trimble Navigation Ltd., MCS	**Temperature:**	22
Attendees:	None	**Humidity:**	38%
Project:	None	**Barometric Pres.:**	29.95
Tested by:	Rod Peloquin	**Power:** 120VAC/60Hz	**Job Site:** EV12

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	**Test Distance (m)**	3

COMMENTS

None

EUT OPERATING MODES

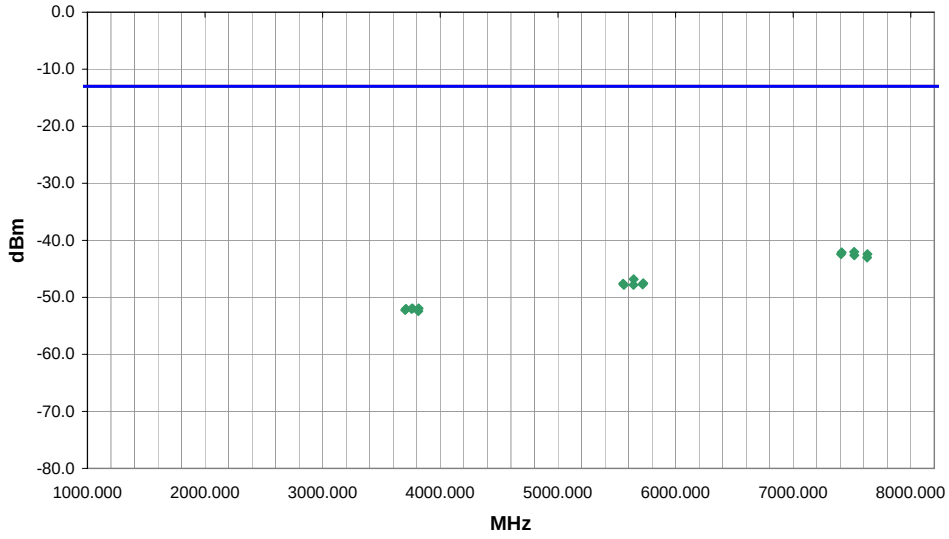
Transmitting HSDPA (PS), PCS Band

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	9
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7518.360			102.0	1.0			H-Horn	PK	6.27E-08	-42.0	-13.0	-29.0	Mid Channel, EUT vertical
7412.587			305.0	1.0			V-Horn	PK	6.13E-08	-42.1	-13.0	-29.1	Low Channel, EUT horizontal
7406.973			360.0	1.0			H-Horn	PK	5.72E-08	-42.4	-13.0	-29.4	Low Channel, EUT vertical
7631.053			235.0	1.0			V-Horn	PK	5.72E-08	-42.4	-13.0	-29.4	High Channel, EUT horizontal
7519.493			39.0	1.0			V-Horn	PK	5.46E-08	-42.6	-13.0	-29.6	Mid Channel, EUT horizontal
7628.120			112.0	1.0			H-Horn	PK	4.98E-08	-43.0	-13.0	-30.0	High Channel, EUT vertical
5643.747			97.0	1.0			V-Horn	PK	2.08E-08	-46.8	-13.0	-33.8	Mid Channel, EUT horizontal
5725.560			58.0	1.0			H-Horn	PK	1.77E-08	-47.5	-13.0	-34.5	High Channel, EUT vertical
5554.373			24.0	1.0			V-Horn	PK	1.73E-08	-47.6	-13.0	-34.6	Low Channel, EUT horizontal
5720.187			115.0	1.0			V-Horn	PK	1.69E-08	-47.7	-13.0	-34.7	High Channel, EUT horizontal
5560.400			135.0	1.0			H-Horn	PK	1.65E-08	-47.8	-13.0	-34.8	Low Channel, EUT vertical
5642.627			51.0	1.0			H-Horn	PK	1.65E-08	-47.8	-13.0	-34.8	Mid Channel, EUT vertical
3763.120			0.0	1.0			V-Horn	PK	6.41E-09	-51.9	-13.0	-38.9	Mid Channel, EUT horizontal
3816.213			0.0	2.1			H-Horn	PK	6.41E-09	-51.9	-13.0	-38.9	High Channel, EUT vertical
3708.733			312.0	1.0			V-Horn	PK	6.27E-09	-52.0	-13.0	-39.0	Low Channel, EUT horizontal
3756.493			257.0	1.0			H-Horn	PK	6.27E-09	-52.0	-13.0	-39.0	Mid Channel, EUT vertical
3700.853			309.0	1.0			H-Horn	PK	5.99E-09	-52.2	-13.0	-39.2	Low Channel, EUT vertical
3812.840			4.0	2.0			V-Horn	PK	5.72E-09	-52.4	-13.0	-39.4	High Channel, EUT horizontal

NORTHWEST EMC

OUT OF BAND EMISSIONS - PART 24E

PSA 2008.07.21
EMI 2008.1.9

EUT:	Regal - Cinterion HC25 Radio Module (New Antenna)			Work Order:	TRPO0065
Serial Number:	35411401.077234.215			Date:	09/01/10
Customer:	Tripod Data Systems, Inc.			Temperature:	20.7
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	120VAC/60Hz	Job Site:	EV12

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

No external whip antenna.

EUT OPERATING MODES

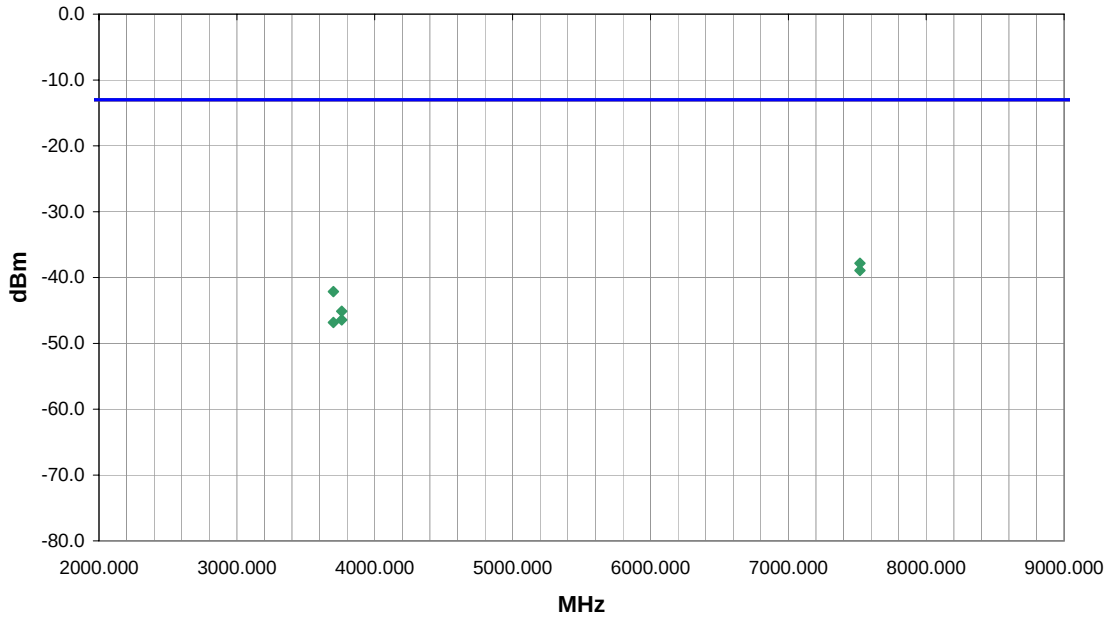
Transmitting GSM, (CS) PCS Band.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	10
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7519.702			237.0	1.0			H-Horn	PK	1.65E-07	-37.8	-13.0	-24.8	EUT Horz
7519.533			231.0	1.0			V-Horn	PK	1.28E-07	-38.9	-13.0	-25.9	EUT Vert
3700.400			209.0	1.1			V-Horn	PK	6.13E-08	-42.1	-13.0	-29.1	EUT Vert
3759.918			279.0	1.0			H-Horn	PK	3.07E-08	-45.1	-13.0	-32.1	EUT Horz
3760.005			216.0	1.4			V-Horn	PK	2.28E-08	-46.4	-13.0	-33.4	EUT Vert
3700.487			194.0	1.0			H-Horn	PK	2.08E-08	-46.8	-13.0	-33.8	EUT Horz

NORTHWEST EMC

OUT OF BAND EMISSIONS - PART 24E

PSA 2008.07.21
EMI 2008.1.9

EUT:	Regal - Cinterion HC25 Radio Module (New Antenna)			Work Order:	TRPO0065
Serial Number:	35411401.077234.215			Date:	09/02/10
Customer:	Tripod Data Systems, Inc.			Temperature:	20.7
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power:	120VAC/60Hz	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	0

COMMENTS

No external whip antenna.

EUT OPERATING MODES

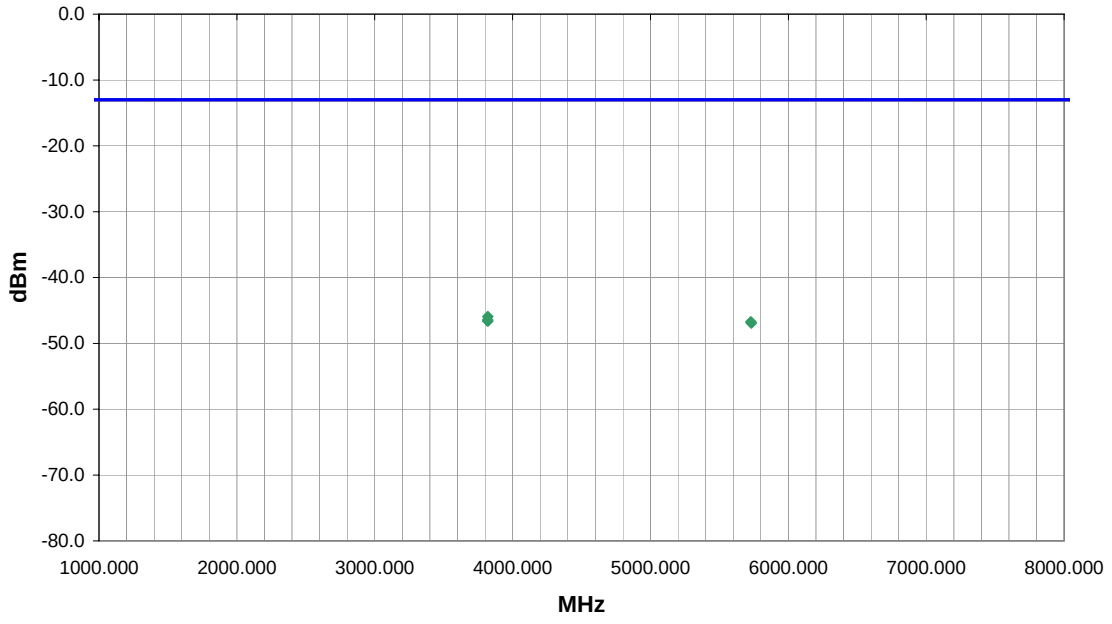
Transmitting GSM, (CS) PCS Band.

DEVIATIONS FROM TEST STANDARD

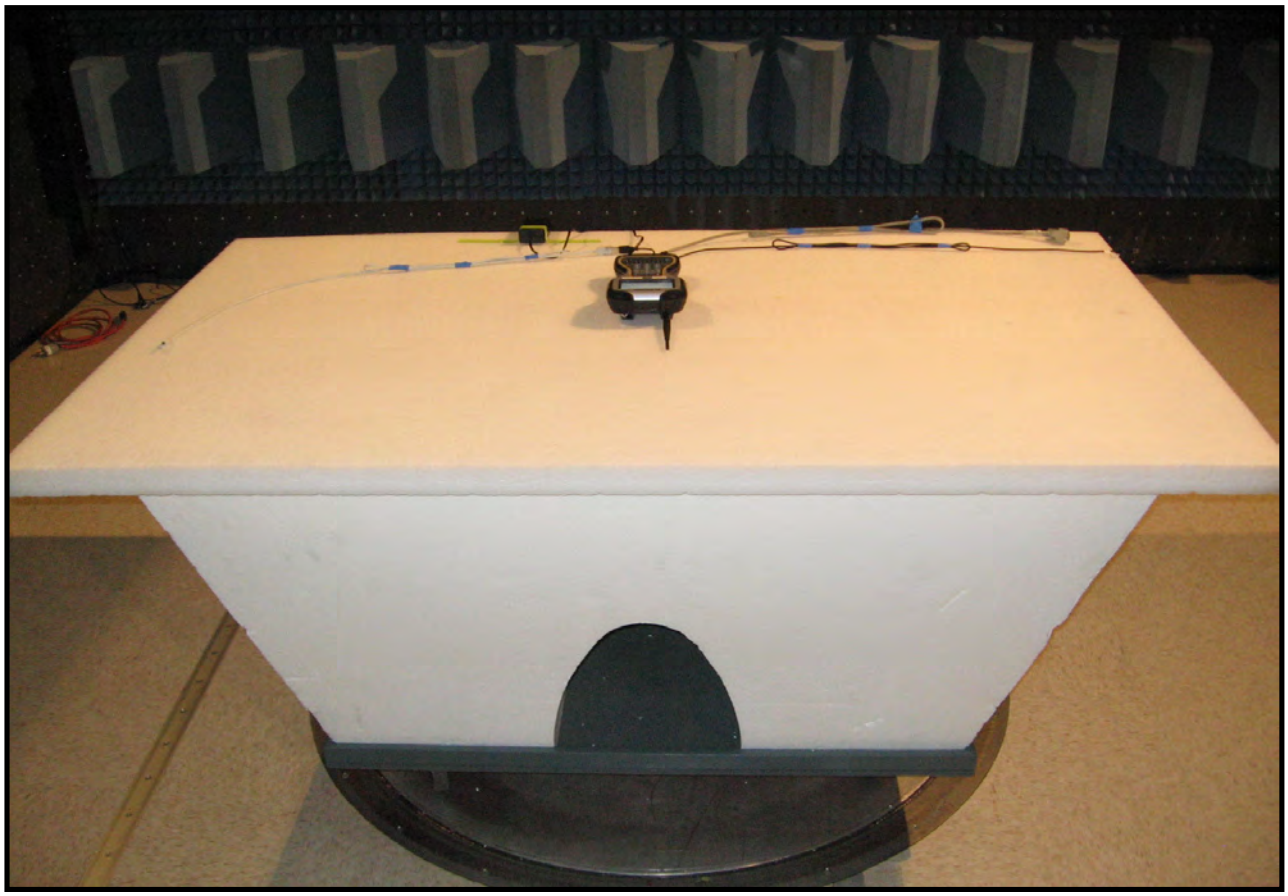
No deviations.

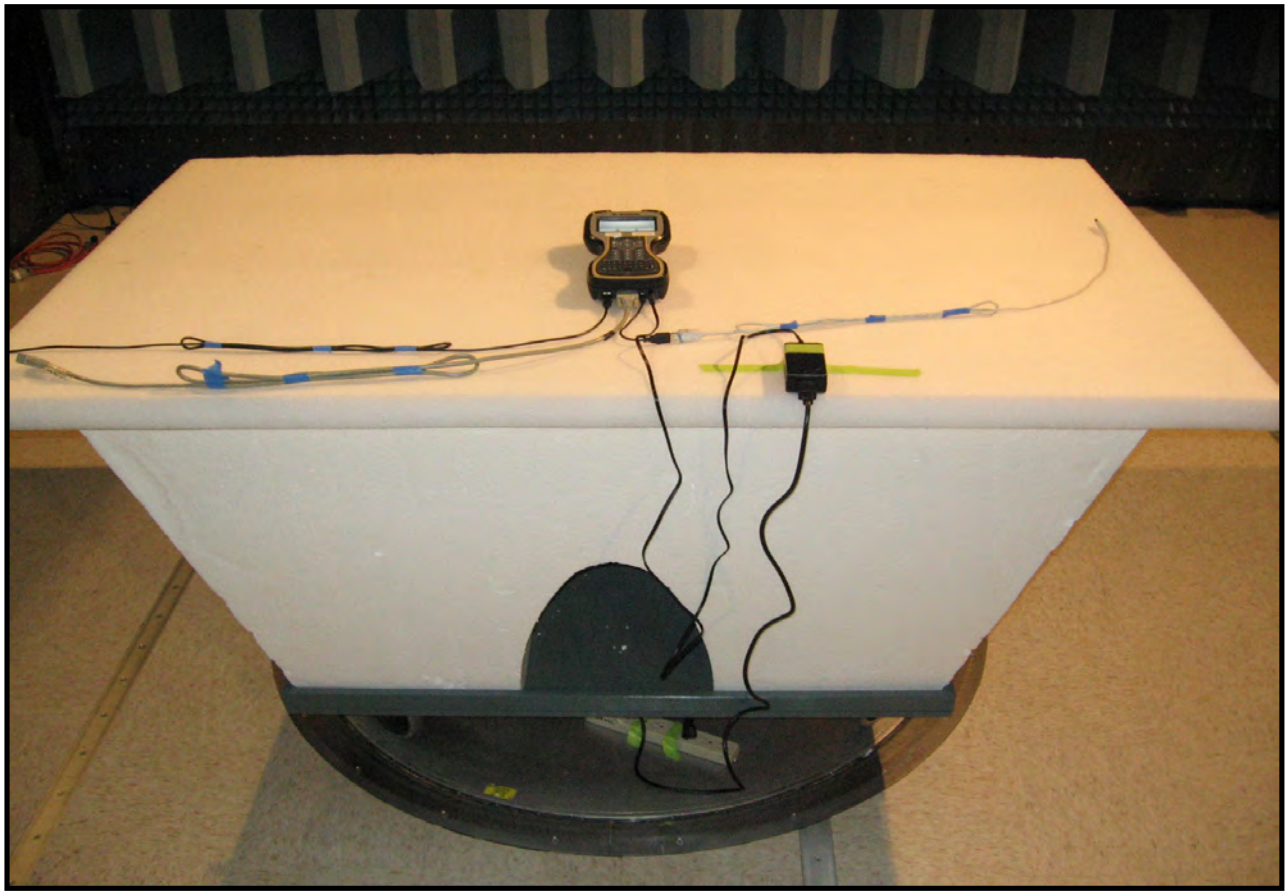
Run #	10
Configuration #	1
Results	Pass

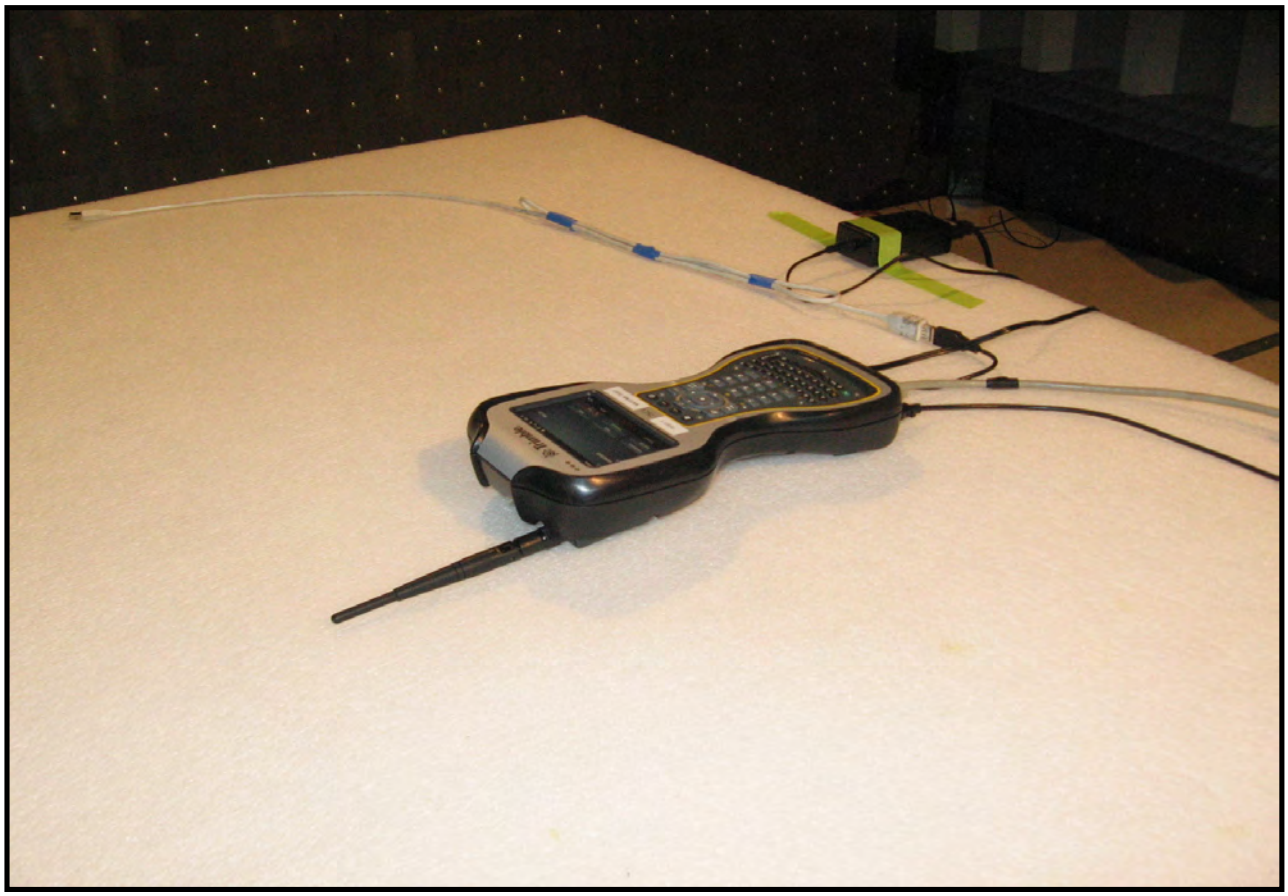
Signature

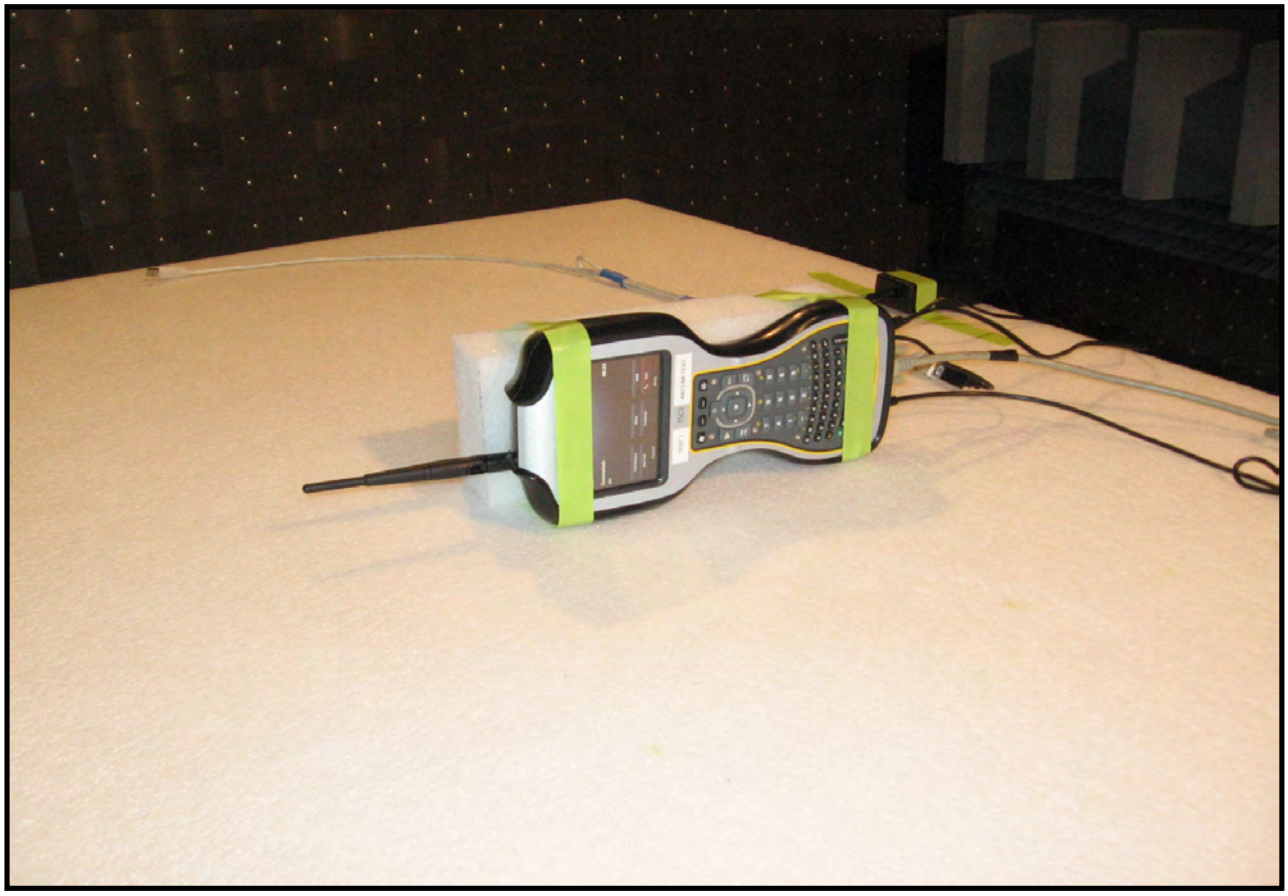


Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
3819.667			253.0	1.0			V-Horn	PK	2.55E-08	-45.9	-13.0	-32.9	EUT Vert
3819.167			313.0	1.0			H-Horn	PK	2.28E-08	-46.4	-13.0	-33.4	EUT Horz
3819.567			268.0	1.0			H-Horn	PK	2.17E-08	-46.6	-13.0	-33.6	EUT Horz
5727.447			280.0	1.0			H-Horn	PK	2.12E-08	-46.7	-13.0	-33.7	EUT Horz
5731.387			175.0	1.5			V-Horn	PK	2.03E-08	-46.9	-13.0	-33.9	EUT Vert

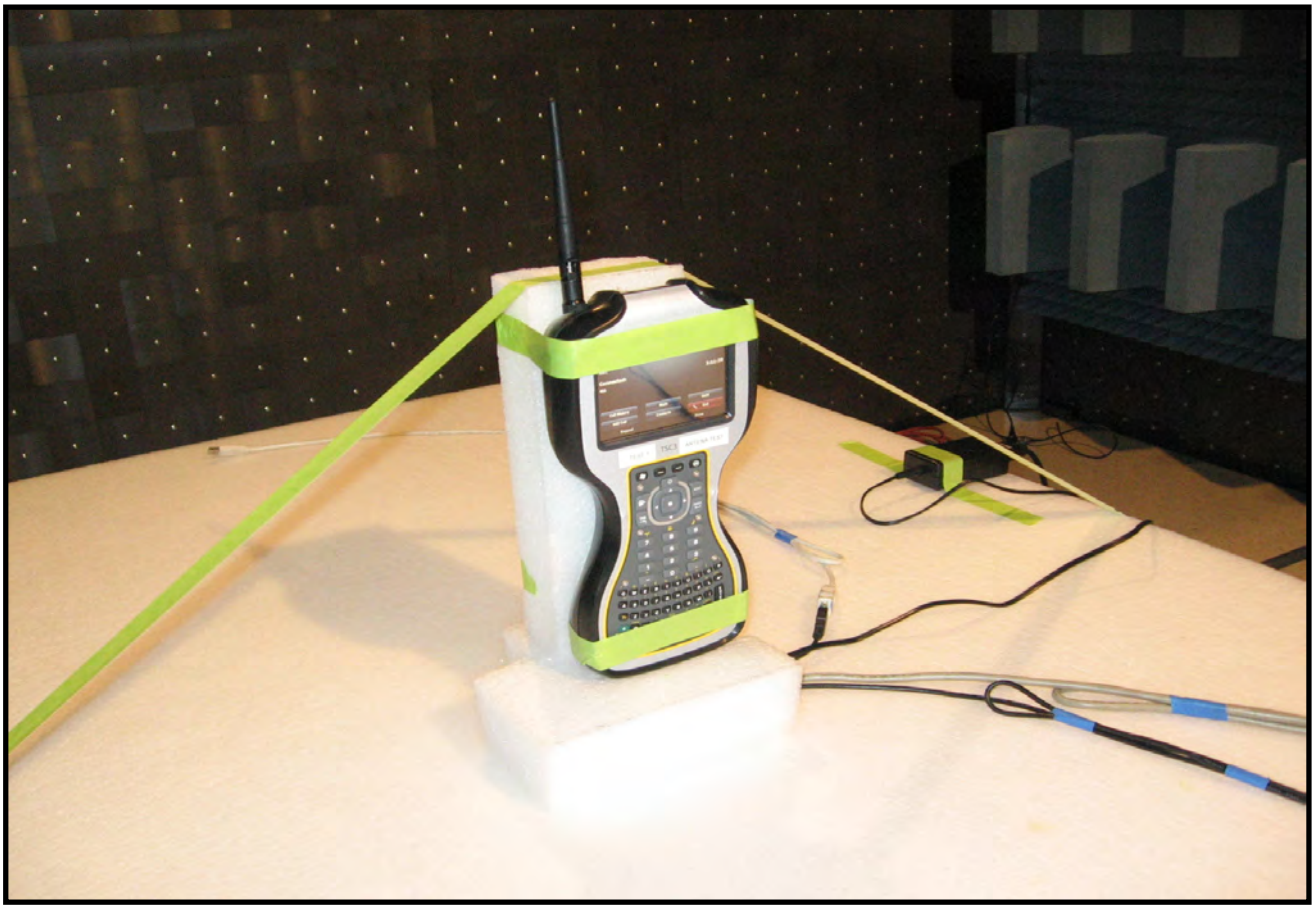








OUT OF BAND EMISSIONS - Part 24E



Effective Radiated Power (EIRP)

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting GSM, Circuit Switched
Transmitting E-GPRS (EDGE), Packet Data
Transmitting UMTS W-CDMA FDD, Circuit Switched (12.2k RMC)
Transmitting HSDPA, Packet Switched (H-Set 5 QPSK)

CHANNELS INVESTIGATED FOR GSM/GPRS/EDGE PCS BAND
Low Channel, Ch. 512, 1850.2MHz
Mid Channel, Ch. 661, 1880MHz
High Channel, Ch. 810, 1909.8MHz

CHANNELS INVESTIGATED FOR WCDMA/HSDPA PCS BAND
Low Channel, Ch. 9262, 1852.4MHz
Mid Channel, Ch. 9400, 1880MHz
High Channel, Ch. 9538, 1907.6MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	1850 MHz	Stop Frequency	1910 MHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT USED FOR ORIGINAL TESTING					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAQ	1/6/2010	13
Antenna, Horn	EMCO	3115	AHC	8/12/2008	24
EV01 Cables		Double Ridge Horn Cables	EVB	7/10/2009	13
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	24

TEST EQUIPMENT USED FOR NEW ANTENNA TESTING					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAY	1/15/2010	12
Antenna, Horn	EMCO	3115	AHC	7/8/2010	24
EV01 Cables		Double Ridge Horn Cables	EVB	7/9/2010	13
Antenna, Horn	EMCO	3115	AHE	10/22/2009	24
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	24

MEASUREMENT BANDWIDTHS				
	Frequency Range (MHz)	**Peak Data (kHz)**	**Quasi-Peak Data (kHz)**	**Average Data (kHz)**
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003)

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a horn antenna. A signal generator was connected to the horn antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the horn antenna the effective radiated power for each emission was determined.

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/17/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	21
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

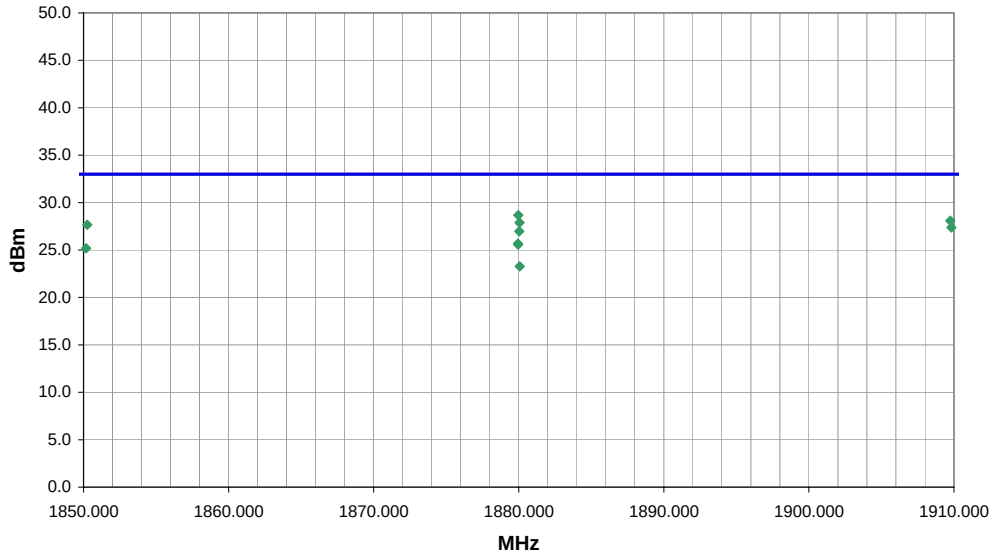
Transmitting GSM, Circuit Switched

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1879.963			325.0	1.1			V-Horn	PK	7.38E-01	28.7	33.0	-4.3	Mid channel, EUT on side
1909.742			57.0	1.1			V-Horn	PK	6.43E-01	28.1	33.0	-4.9	High channel, EUT on side
1880.057			325.0	1.1			H-Horn	PK	6.14E-01	27.9	33.0	-5.1	Mid channel, EUT horizontal
1850.258			346.0	1.1			V-Horn	PK	5.85E-01	27.7	33.0	-5.3	Low channel, EUT on side
1909.822			284.0	1.1			H-Horn	PK	5.47E-01	27.4	33.0	-5.6	High channel, EUT horizontal
1880.037			311.0	1.4			H-Horn	PK	4.99E-01	27.0	33.0	-6.0	Mid channel, EUT on side
1879.948			137.0	1.4			H-Horn	PK	3.70E-01	25.7	33.0	-7.3	Mid channel, EUT vertical
1879.957			321.0	1.2			V-Horn	PK	3.61E-01	25.6	33.0	-7.4	Mid channel, EUT vertical
1850.175			349.0	1.1			H-Horn	PK	3.30E-01	25.2	33.0	-7.8	Low channel, EUT horizontal
1880.068			39.0	1.2			V-Horn	PK	2.13E-01	23.3	33.0	-9.7	Mid channel, EUT horizontal

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/17/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	22
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

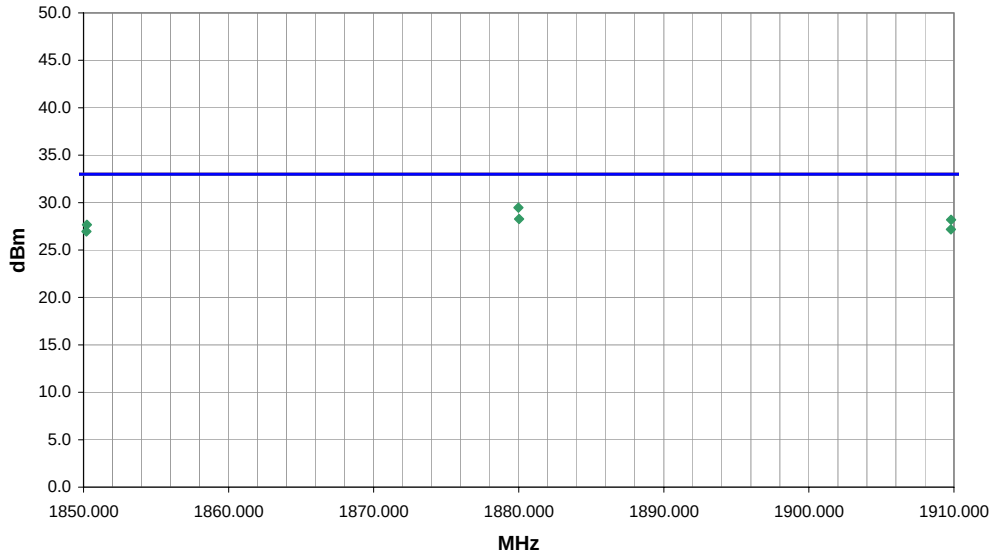
Transmitting E-GPRS, Packet Data

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1879.973			342.0	1.1			V-Horn	PK	8.85E-01	29.5	33.0	-3.5	Mid channel, EUT on side
1880.017			334.0	1.1			H-Horn	PK	6.71E-01	28.3	33.0	-4.7	Mid channel, EUT horizontal
1909.805			324.0	1.1			V-Horn	PK	6.58E-01	28.2	33.0	-4.8	High channel, EUT on side
1850.235			280.0	1.2			H-Horn	PK	5.83E-01	27.7	33.0	-5.3	Low channel, EUT horizontal
1909.792			277.0	1.1			H-Horn	PK	5.22E-01	27.2	33.0	-5.8	High channel, EUT horizontal
1850.195			333.0	1.1			V-Horn	PK	4.97E-01	27.0	33.0	-6.0	Low channel, EUT on side

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	12/18/09
Customer:	Trimble Navigation Ltd., MCS	Temperature:	21
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	29.95
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

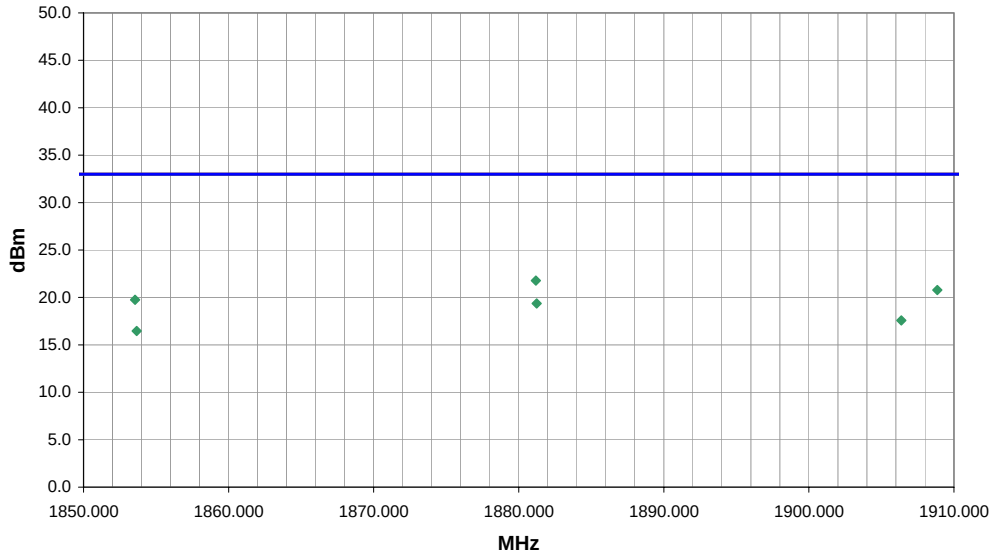
Transmitting UMTS W-CDMA FDD (CS)

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1881.180			339.0	1.1			H-Horn	PK	9.18E-02	21.8	33.0	-11.2	Mid channel, EUT horizontal
1908.850			290.0	1.1			H-Horn	PK	7.31E-02	20.8	33.0	-12.2	High channel, EUT horizontal
1853.550			285.0	1.2			H-Horn	PK	5.78E-02	19.8	33.0	-13.2	Low channel, EUT horizontal
1881.240			224.0	1.3			V-Horn	PK	5.28E-02	19.4	33.0	-13.6	Mid channel, EUT on side
1906.370			223.0	1.3			V-Horn	PK	3.50E-02	17.6	33.0	-15.4	High channel, EUT on side
1853.660			219.0	1.0			V-Horn	PK	2.70E-02	16.5	33.0	-16.5	Low channel, EUT on side

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2009.8.29

EUT:	TSC3/Ranger WWAN Radio	Work Order:	TRPO0055
Serial Number:	35411401.077234.215	Date:	01/13/10
Customer:	Trimble Navigation Ltd., MCS	Temperature:	21
Attendees:	none	Humidity:	38%
Project:	None	Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

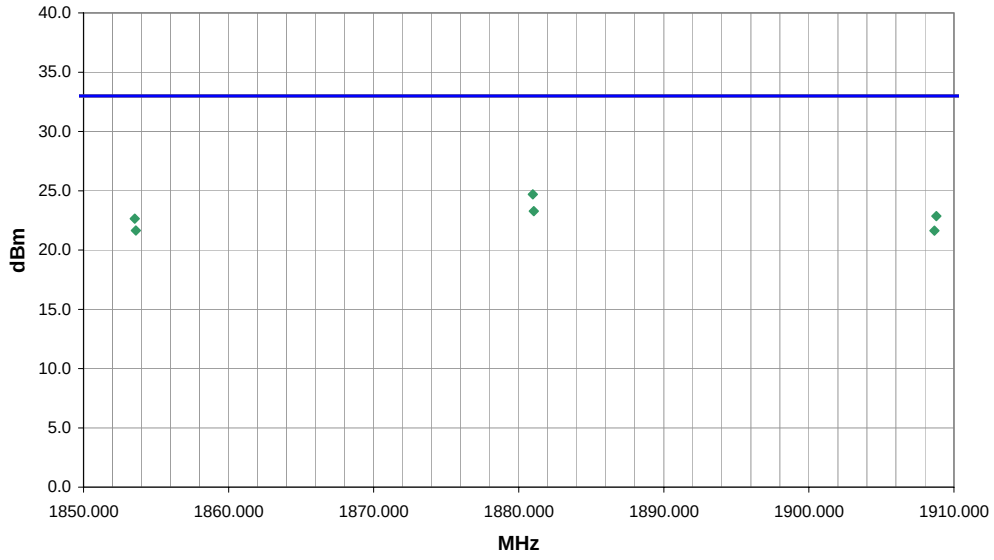
Transmitting UMTS HSDPA, Packet Switched

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1880.967			343.0	1.0			V-Horn	PK	2.95E-01	24.7	33.0	-8.3	Mid channel, EUT on side
1881.033			185.0	1.3			H-Horn	PK	2.13E-01	23.3	33.0	-9.7	Mid channel, EUT horizontal
1908.783			56.0	1.0			V-Horn	PK	1.93E-01	22.9	33.0	-10.1	High channel, EUT on side
1853.533			178.0	1.0			H-Horn	PK	1.84E-01	22.6	33.0	-10.4	Low channel, EUT horizontal
1853.608			58.0	1.1			V-Horn	PK	1.46E-01	21.6	33.0	-11.4	Low channel, EUT on side
1908.658			281.0	1.0			H-Horn	PK	1.46E-01	21.6	33.0	-11.4	High channel, EUT horizontal

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2008.1.9

EUT:	TSC3/Ranger WWAN Radio (New Antenna)	Work Order:	TRPO0065
Serial Number:	35411401.077234.215	Date:	09/02/10
Customer:	Tripod Data Systems, Inc.	Temperature:	20.7
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pres.:	1014
Tested by:	Ethan Schoonover	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 24E:2009	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

No external whip antenna.

EUT OPERATING MODES

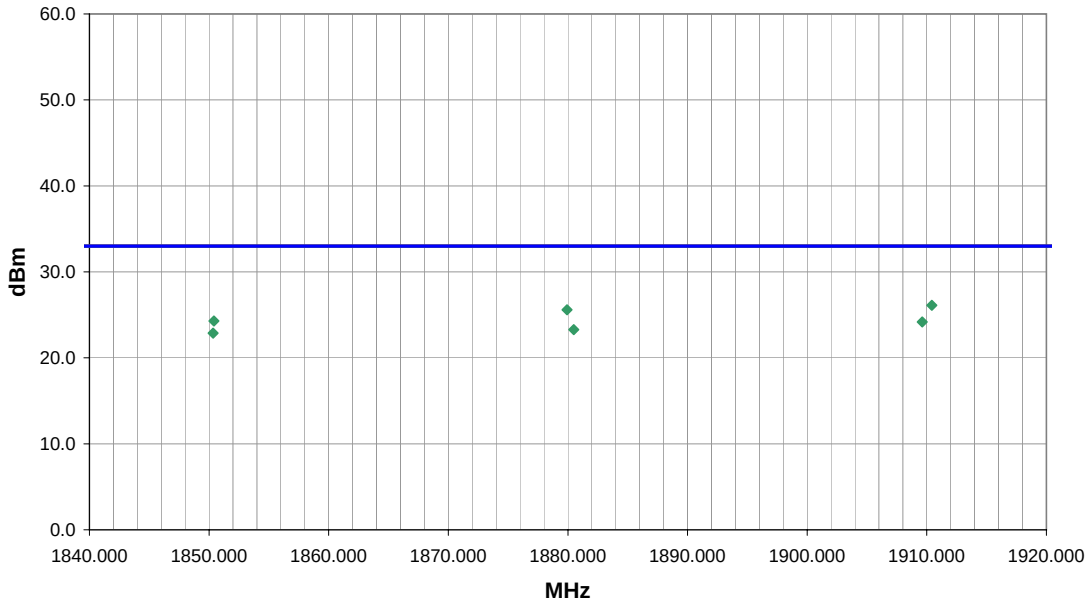
Transmitting E-GPRS, Packet Data

DEVIATIONS FROM TEST STANDARD

No deviations.

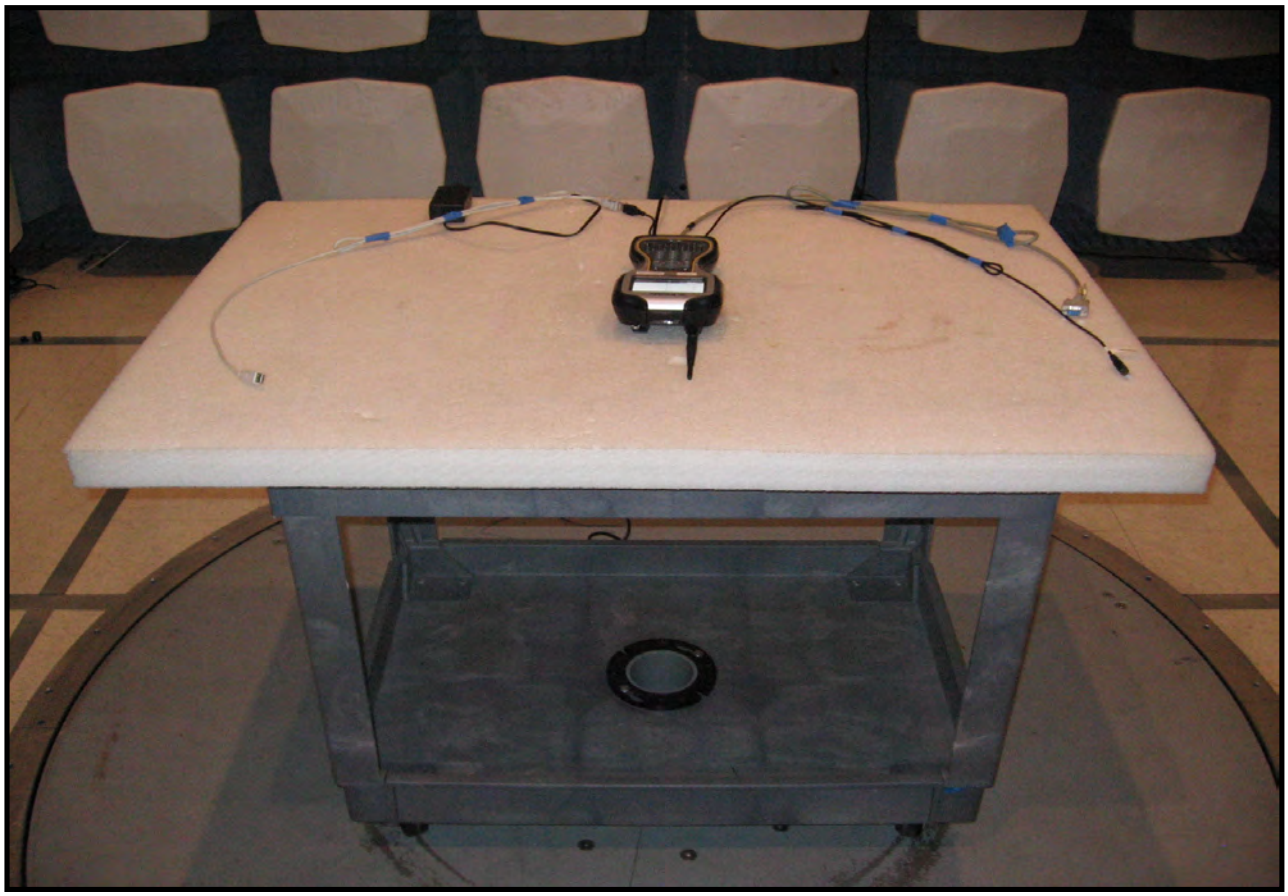
Run #	9
Configuration #	1
Results	Pass

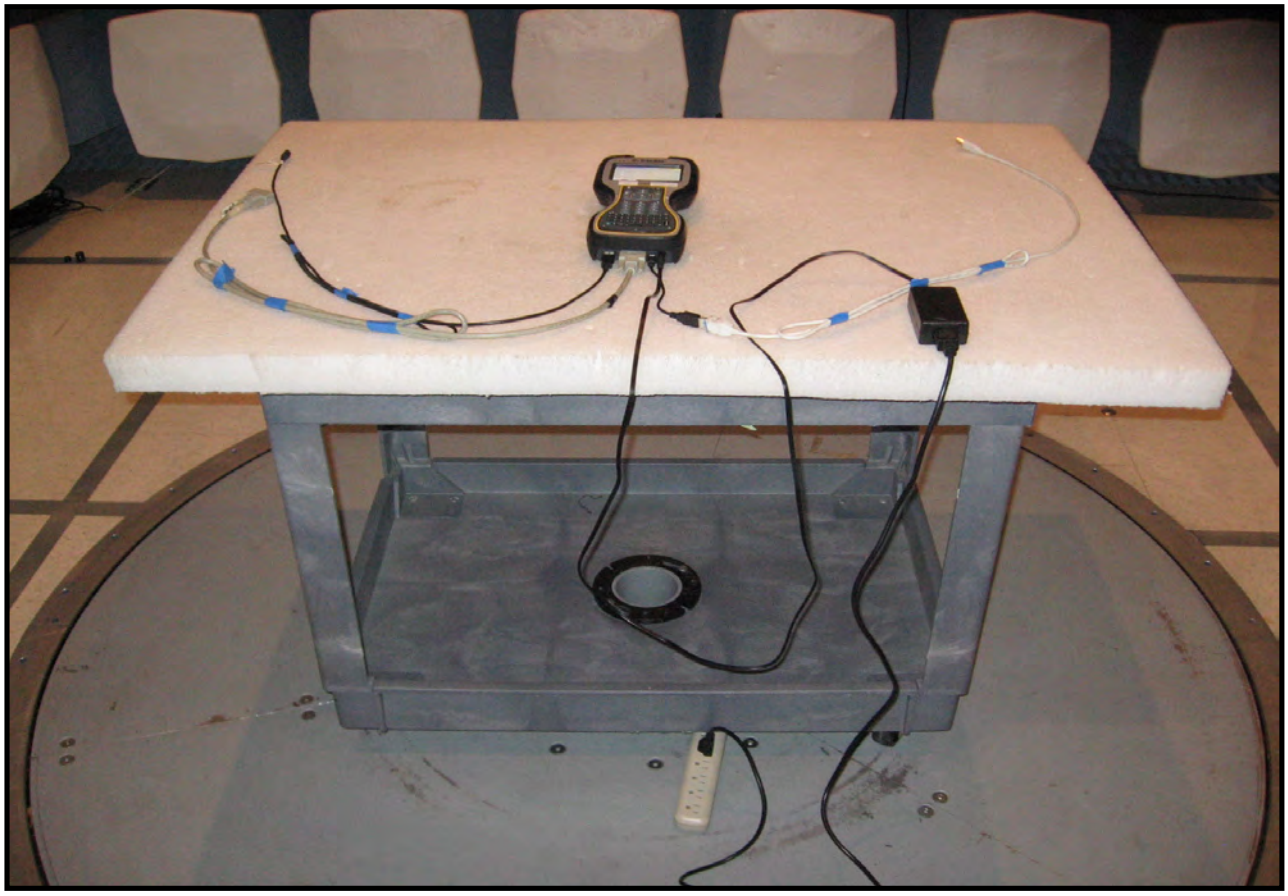
Signature



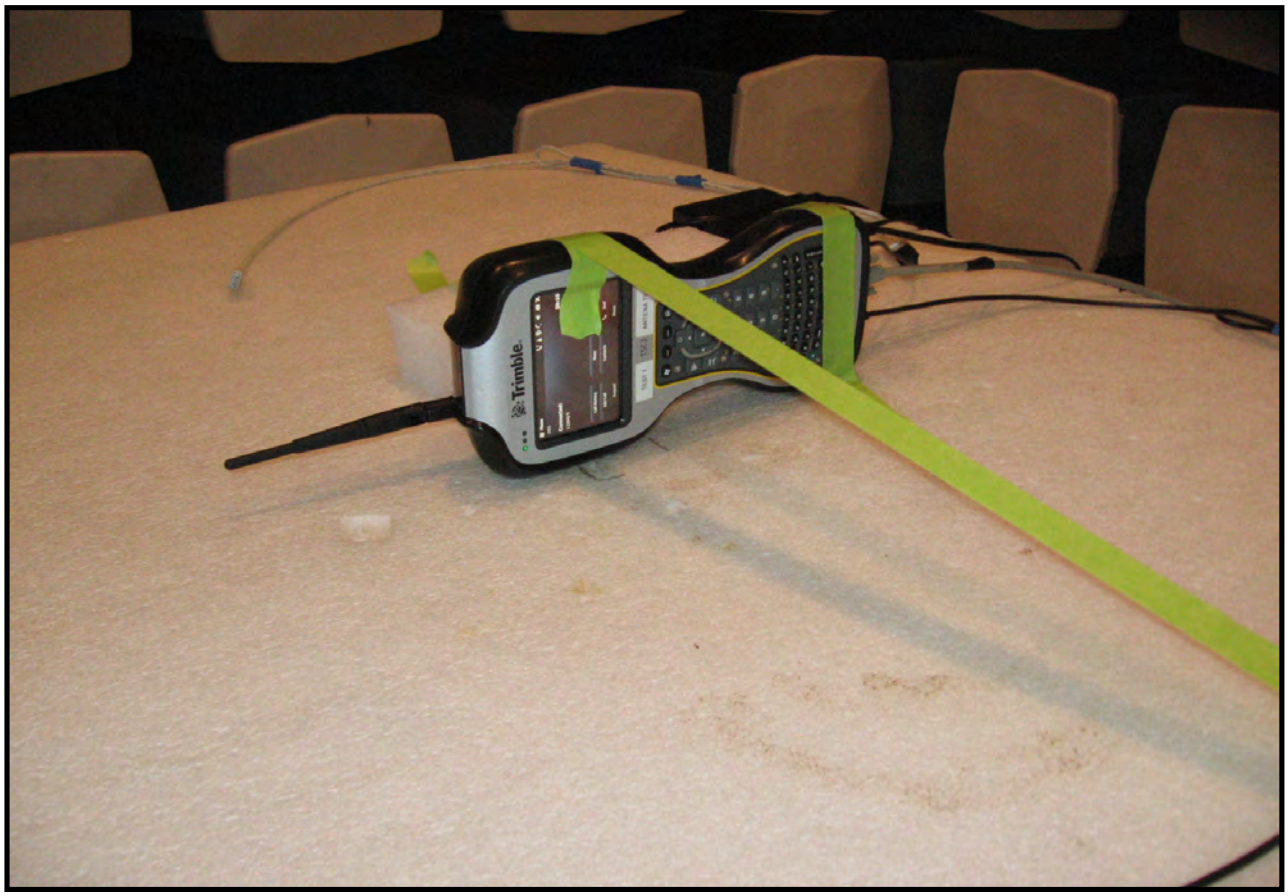
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1910.417			180.0	1.0			H-Horn	PK	4.08E-01	26.1	33.0	-6.9	EUT Horz
1879.933			302.0	1.0			V-Horn	PK	3.62E-01	25.6	33.0	-7.4	EUT On side
1850.408			298.0	1.0			V-Horn	PK	2.68E-01	24.3	33.0	-8.7	EUT On side
1909.625			299.0	1.0			V-Horn	PK	2.61E-01	24.2	33.0	-8.8	EUT On side
1880.492			239.0	1.0			H-Horn	PK	2.13E-01	23.3	33.0	-9.7	EUT Horz
1850.333			99.0	1.0			H-Horn	PK	1.94E-01	22.9	33.0	-10.1	EUT Horz

Effective Radiated Power (EIRP)





Effective Radiated Power (EIRP)



Effective Radiated Power (EIRP)