



**Trimble Navigation Limited MCS
Ranger/TSC3 Handheld Computer
w/WWAN radio Model RANGER/TSC3WN2**

FCC 22H:2013

FCC 24E:2013

Report #: TRPO0084



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

Last Date of Test: August 21, 2013
Trimble Navigation Limited MCS
Model: Ranger/TSC3 Handheld Computer
w/WWAN radio Model RANGER/TSC3WN2

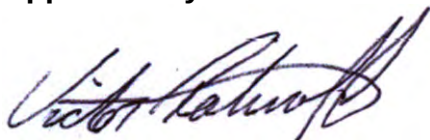
Emissions

Test Description	Specification	Test Method	Pass/Fail
Effective Radiated Power	FCC 22H:2013	ANSI/TIA/EIA-603-C-2004	Pass
Equivalent Isotropic Radiated Power	FCC 24E:2013	ANSI/TIA/EIA-603-C-2004	Pass
Out of Band Emissions	FCC 22H:2013	ANSI/TIA/EIA-603-C-2004	Pass
Out of Band Emissions	FCC 24E:2013	ANSI/TIA/EIA-603-C-2004	Pass

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, Operations Manager



NVLAP Lab Code: 200676-0

NVLAP Lab Code: 200630-0

Test Facility

The measurement facility used to collect the data is located at:
Northwest EMC, Inc.
41 Tesla Ave.
Irvine, CA 92618

Phone: (503) 844-4066

Fax: 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 #2834B-1).

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 HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

KCC / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Hong Kong

OFTA – Recognized by OFTA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

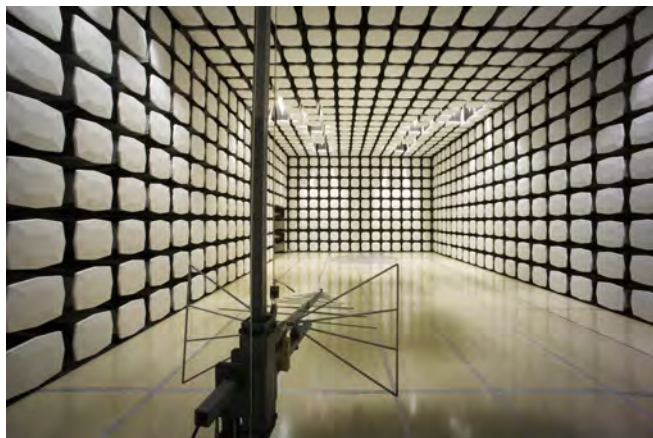
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-1 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy (Hz)	0.12	-0.01
Amplitude Accuracy (dB)	0.49	-0.49
Conducted Power (dB)	0.41	-0.41
Radiated Power via Substitution (dB)	0.69	-0.68
Temperature (degrees C)	0.81	-0.81
Humidity (% RH)	2.89	-2.89
Field Strength (dB)	4.00	-4.00
AC Powerline Conducted Emissions (dB)	2.70	-2.70



Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Minnesota Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Washington Labs NC01-05, SU02, SU07 19201 120 th Ave. NE Bothell, WA 98011 (425) 984-6600
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-2	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1
NVLAP				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0





PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Trimble Navigation Limited MCS
Address:	345 SW Avery Ave
City, State, Zip:	Corvallis, OR 97333
Test Requested By:	Bob Grant
Model:	Ranger/TSC3
First Date of Test:	June 26, 2013
Last Date of Test:	August 21, 2013
Receipt Date of Samples:	June 26, 2013
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

The Trimble Ranger/TSC3WN2 is a UMTS / CDMA modem for wireless internet connectivity. It is installed inside the Ranger/TSC3 handheld computer.

Testing Objective:

To demonstrate compliance of the UMTS portion to FCC 22H and 24E radiated emissions requirements. The antenna port direct connect data is contained in a separate test report.

Configuration TRPO0084- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Handheld PC	Trimble	Ranger/TSC3	RS1WC39899

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC\DC Power Converter	SL Power and Ault	CENB1030A1500F02	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8m	No	AC Mains	AC\DC Power Converter
DC Cable	No	1.4m	Yes	Handheld PC	AC\DC Power Converter
USB Cable (A)	No	1.0m	No	Handheld PC	Unterminated
Serial Cable	No	1.4m	No	Handheld PC	Unterminated
USB Cable (B)	No	1.4m	No	Handheld PC	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Configuration TRPO0084- 3

Software/Firmware Running during test	
Description	Version
Windows Embedded Handheld Professional	6.5

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Handheld PC	Trimble	Ranger/TSC3	RS1XC40554

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC/DC Adapter	SL Power	CENB1030A1500F02	C1118A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.6m	No	AC Mains	AC/DC Adapter
DC Power	No	1.5m	PA	Handheld PC	AC/DC Adapter
USB A	Yes	1.9m	No	Handheld PC	Unterminated
USB Mini-B	Yes	1.8m	No	Handheld PC	Unterminated
Serial Modem	No	1.8m	No	Handheld PC	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	6/27/2013	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	8/19/2013	Equivalent Isotropic 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.
3	8/21/2013	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled Testing was completed.

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting CDMA, Cell Band 850, EV-DO Rev A, All up bits
Transmitting CDMA, Cell Band 850, 1xRTT FWD3 RVS3 SO55, All up bits

CHANNELS TESTED

Low Channel 1013 (824.7 MHz)
Mid Channel 384 (836.52 MHz)
High Channel 777 (848.31 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency 824 MHz Stop Frequency 848 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator, 'N'	Coaxicom	66702 5910-6	ATZ	3/20/2013	12 mo
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0 mo
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36 mo
Power Meter	Gigatronics	8651A	SPM	1/9/2012	24 mo
Antenna, Dipole	AH Systems	FCC-4	ADEA	8/13/2013	36 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	24 mo
EV01 Cables	N/A	Bilog Cables	EVA	6/20/2013	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	36 mo
Antenna, Horn	EMCO	3115	AHE	NCR	0 mo
Wireless Communication Test Set	Agilent	E5515C	BSV	NCR	0 mo

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

TEST DESCRIPTION

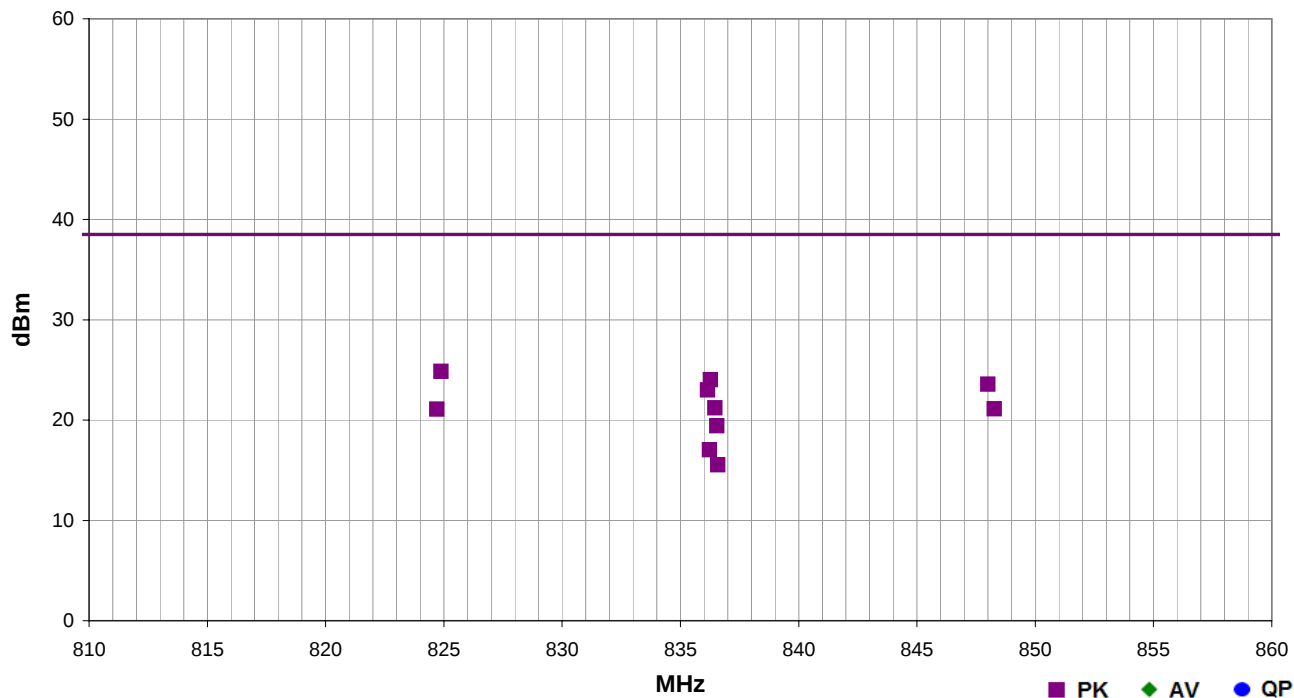
The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. The amplitude and frequency of the highest emission were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to the highest emission. A signal generator was connected to the dipole, and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded. The signal generator, amplifier, and cable were then connected to an analyzer and the power output was recorded. By factoring in the dipole antenna gain (dBi), the effective radiated power for the maximum fundamental emission was determined. The ERP value was obtained from taking the value in EIRP – 2.15.

Effective Radiated Power - CDMA

Work Order:	TRPO0084	Date:	08/16/13	<i>Rodney Le Pelouin</i>
Project:	None	Temperature:	24.2 °C	
Job Site:	EV01	Humidity:	49% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1015 mbar	
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, Cell Band 850, 1xRTT FWD3 RVS3 SO55, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	1	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



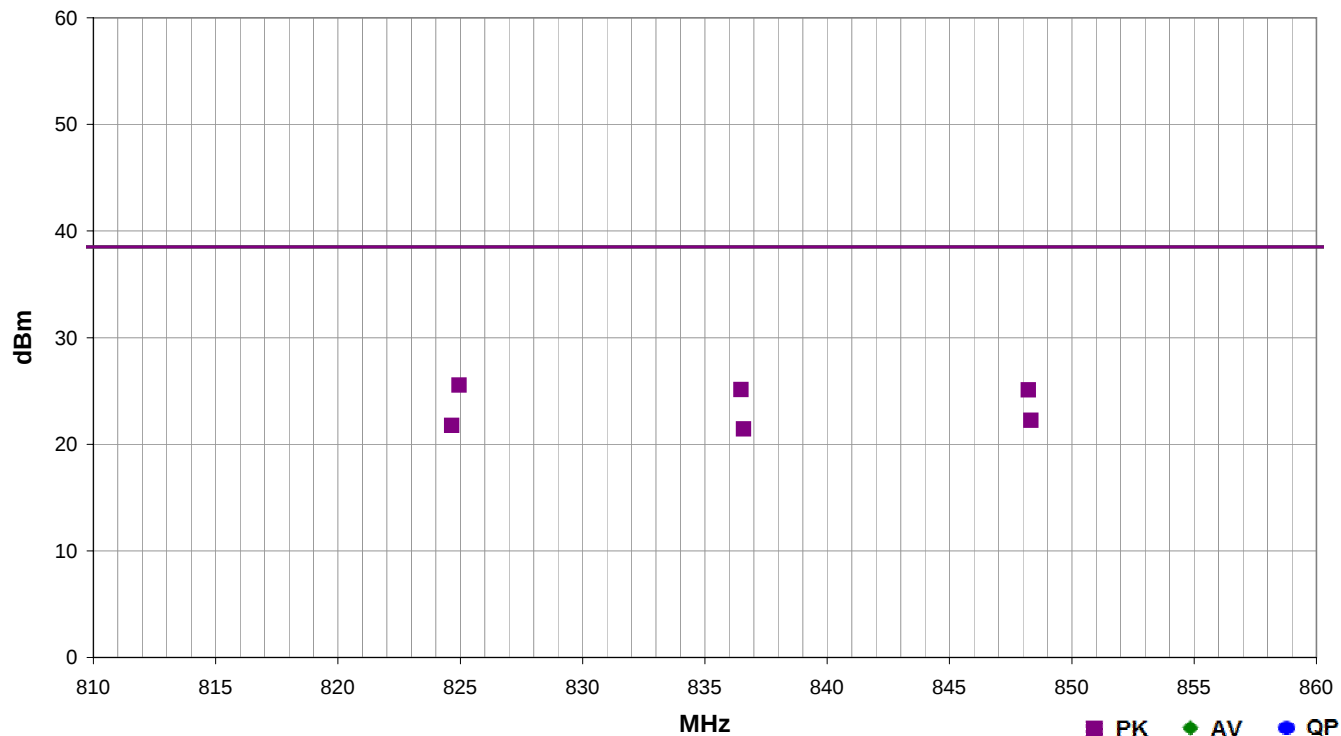
	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	824.883	1.1	253.0	Horz	PK	3.05E-01	24.9	38.5	-13.6	Low Ch 1013 (824.7 MHz), EUT Horizontal
	836.272	1.1	278.0	Horz	PK	2.52E-01	24.0	38.5	-14.5	Mid Ch 384 (836.52 MHz), EUT Horizontal
	848.002	1.0	255.0	Horz	PK	2.28E-01	23.6	38.5	-14.9	High Ch 777 (848.31 MHz), EUT Horizontal
	836.147	1.4	69.0	Horz	PK	2.00E-01	23.0	38.5	-15.5	Mid Ch 384 (836.52 MHz), EUT Vertical
	836.460	1.2	99.0	Vert	PK	1.32E-01	21.2	38.5	-17.3	Mid Ch 384 (836.52 MHz), EUT on Side
	848.277	1.3	190.0	Vert	PK	1.30E-01	21.1	38.5	-17.4	High Ch 777 (848.31 MHz), EUT on Side
	824.700	1.3	134.0	Vert	PK	1.28E-01	21.1	38.5	-17.4	Low Ch 1013 (824.7 MHz), EUT on Side
	836.547	1.0	173.0	Horz	PK	8.73E-02	19.4	38.5	-19.1	Mid Ch 384 (836.52 MHz), EUT on Side
	836.235	2.5	203.0	Vert	PK	5.04E-02	17.0	38.5	-21.5	Mid Ch 384 (836.52 MHz), EUT Vertical
	836.585	1.2	241.0	Vert	PK	3.56E-02	15.5	38.5	-23.0	Mid Ch 384 (836.52 MHz), EUT Horizontal

Effective Radiated Power - CDMA

Work Order:	TRPO0084	Date:	08/16/13	
Project:	None	Temperature:	24.2 °C	
Job Site:	EV01	Humidity:	49% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1015 mbar	Tested by: Carl Engholm, Rod Peloquin
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, Cell Band 850, EV-DO Rev A, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	2	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
824.950	1.0	252.0	Horz	PK	3.59E-01	25.6	38.5	-13.0	Low Ch 1013 (824.7 MHz), EUT Horizontal
836.481	1.0	255.0	Horz	PK	3.24E-01	25.1	38.5	-13.4	Mid Ch 384 (836.52 MHz), EUT Horizontal
848.227	1.0	253.0	Horz	PK	3.22E-01	25.1	38.5	-13.4	High Ch 777 (848.31 MHz), EUT Horizontal
848.327	1.3	187.0	Vert	PK	1.67E-01	22.2	38.5	-16.3	High Ch 777 (848.31 MHz), EUT on Side
824.658	1.3	134.0	Vert	PK	1.50E-01	21.8	38.5	-16.7	Low Ch 1013 (824.7 MHz), EUT on Side
836.577	1.3	140.0	Vert	PK	1.39E-01	21.4	38.5	-17.1	Mid Ch 384 (836.52 MHz), EUT on Side

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting WCDMA Cell Band V - Low Channel 4132: 826.5MHz, Mid Channel 4182: 836.4MHz, High Channel 4233: 846.6MHz
Transmitting EGRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz
Transmitting GRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	824 MHz	Stop Frequency	849 MHz
-----------------	---------	----------------	---------

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Dipole	EMCO	3121C-DB1,DB2,DB3,DB4	ADC	5/17/2013	36 mo
Signal Generator	Agilent	E8257D	TGU	2/1/2012	36 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	11/21/2012	12 mo
Attenuator, 20db, 'SMA'	Weinschel Corp	4H-20	AWB	6/7/2013	12 mo
HP Filter	Micro-Tronics	HPM50111	HFM	4/2/2012	36 mo
HP Filter	Micro-Tronics	HPM50108	HFW	4/2/2012	36 mo
BP Filter	K&L Microwave	3TNF-500/1000-N/N	HFR	11/27/2012	36 mo
Low Pass Filter 0-425 MHz	Micro-Tronics	LPM50003	LFA	11/27/2012	24 mo
Antenna, Bilog	Teseq	CBL 6141A	AYE	4/26/2012	36 mo
OC10 Cables	N/A	10kHz-1GHz RE Cables	OCH	6/6/2013	12 mo
Spectrum Analyzer	Agilent	E4440A	AFA	6/15/2012	24 mo
Antenna, Horn	ETS	3117	AHQ	9/12/2012	36
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	BSW	NCR	0 mo
OC10 Cables	N/A	10kHz-6GHz RE Cables	N/A	NCR	0 mo

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

TEST DESCRIPTION

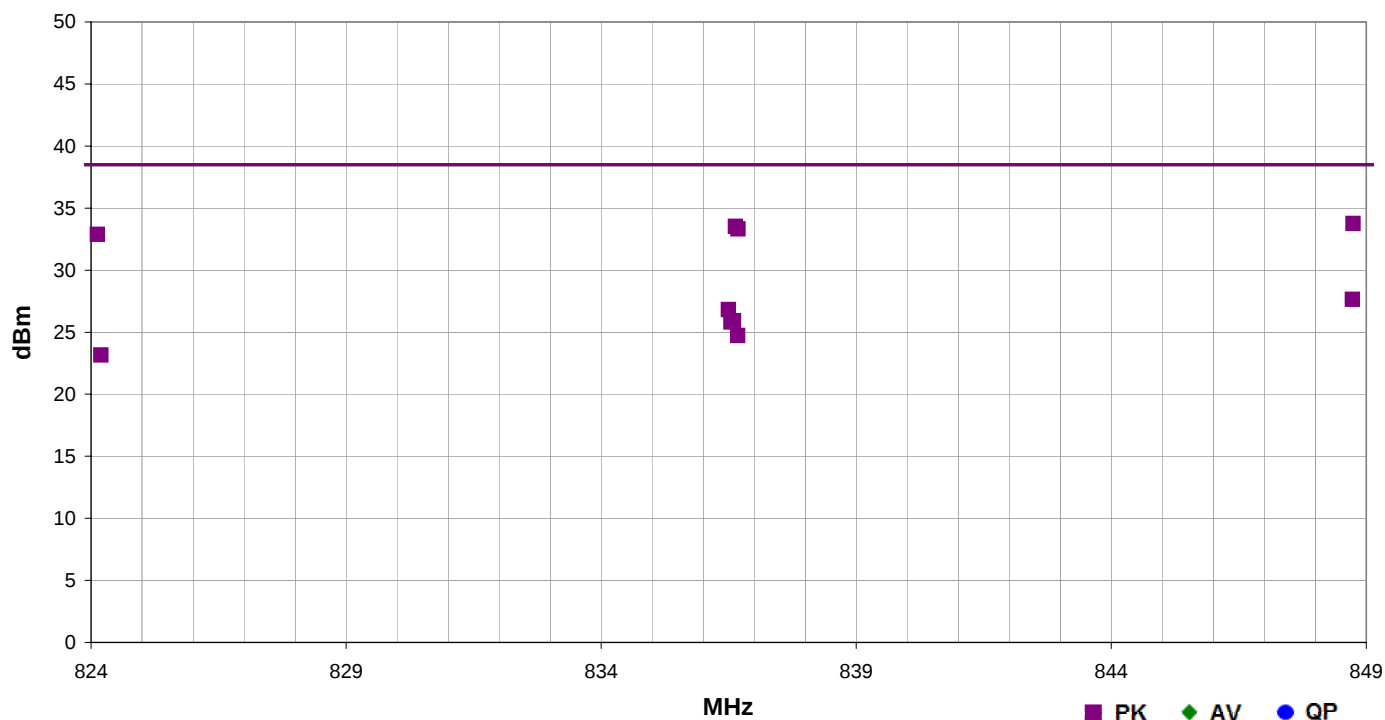
The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. The amplitude and frequency of the highest emission were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to the highest emission. A signal generator was connected to the dipole, and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded. The signal generator, amplifier, and cable were then connected to an analyzer and the power output was recorded. By factoring in the dipole antenna gain (dBi), the effective radiated power for the maximum fundamental emission was determined. The ERP value was obtained from taking the value in EIRP – 2.15.

Effective Radiated Power - UMTS

Work Order:	TRPO0084	Date:	06/27/13		
Project:	None	Temperature:	25 °C		
Job Site:	OC10	Humidity:	45% RH		
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	Tested by:	Johnny Candelas
EUT:	Ranger/TSC3				
Configuration:	1				
Customer:	Trimble Navigation Limited MCS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting GRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz				
Deviations:	None				
Comments:	None				

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	3	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



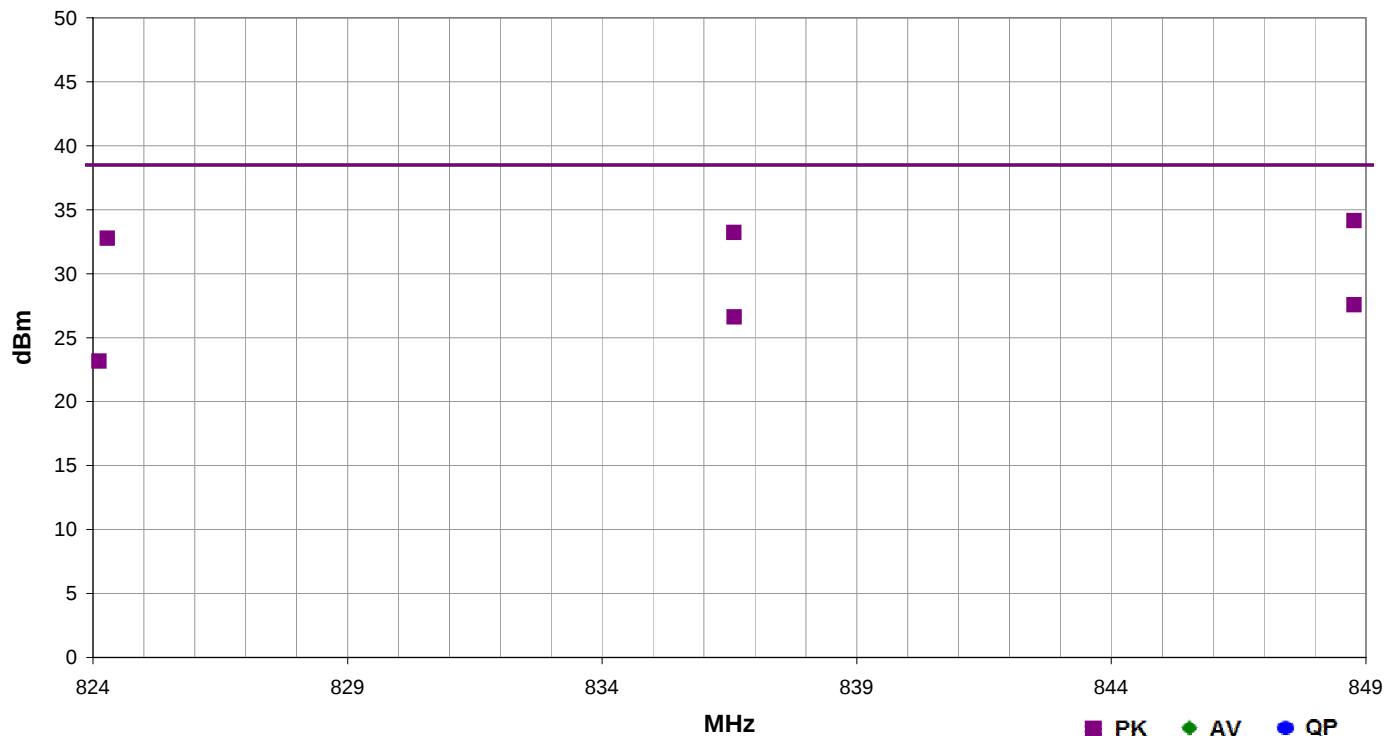
Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
848.742	1.0	228.0	Horz	PK	2.37E+00	33.8	38.5	-4.7	High Ch 251, EUT horiz
836.637	1.0	68.0	Horz	PK	2.25E+00	33.5	38.5	-5.0	Mid Ch 190, EUT horiz
836.687	1.5	52.0	Horz	PK	2.15E+00	33.3	38.5	-5.2	Mid Ch 190, EUT vert
824.125	1.0	45.0	Horz	PK	1.94E+00	32.9	38.5	-5.6	Low Ch 128, EUT horiz
848.733	1.9	153.0	Vert	PK	5.82E-01	27.7	38.5	-10.8	High Ch 251, EUT horiz
836.495	1.1	161.0	Vert	PK	4.80E-01	26.8	38.5	-11.7	Mid Ch 190, EUT vert
836.595	1.9	262.0	Horz	PK	3.91E-01	25.9	38.5	-12.6	Mid Ch 190, EUT on side
836.545	2.6	360.0	Vert	PK	3.81E-01	25.8	38.5	-12.7	Mid Ch 190, EUT on side
836.678	1.9	270.0	Vert	PK	2.97E-01	24.7	38.5	-13.8	Mid Ch 190, EUT horiz
824.192	1.0	289.0	Vert	PK	2.07E-01	23.2	38.5	-15.3	Low Ch 128, EUT horiz

Effective Radiated Power - UMTS

Work Order:	TRPO0084	Date:	06/27/13	
Project:	None	Temperature:	25 °C	
Job Site:	OC10	Humidity:	45% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting EGRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	4	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



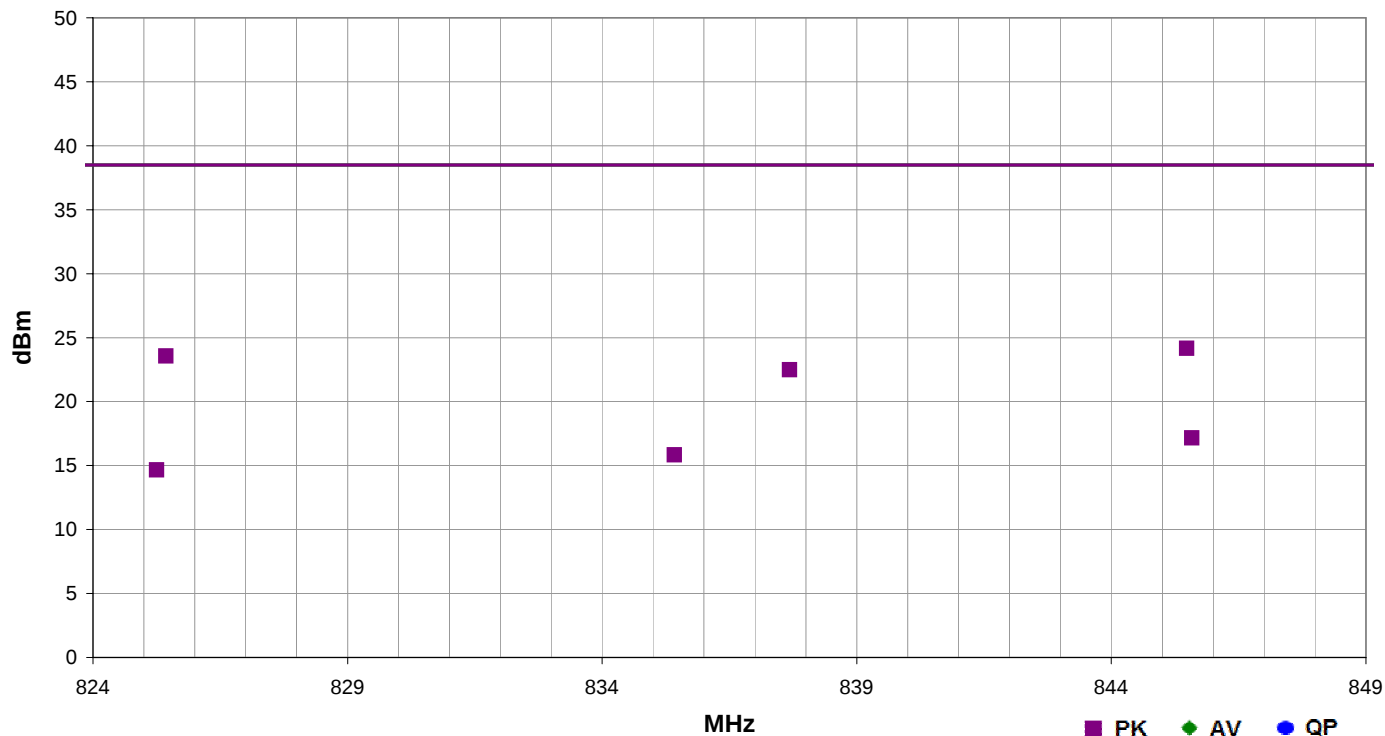
	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	848.767	1.0	262.0	Horz	PK	2.60E+00	34.2	38.5	-4.3	High Ch 251, EUT horiz
	836.587	1.0	55.0	Horz	PK	2.10E+00	33.2	38.5	-5.3	Mid Ch 190, EUT horiz
	824.283	1.0	230.0	Horz	PK	1.89E+00	32.8	38.5	-5.7	Low Ch 128, EUT horiz
	848.767	1.9	149.0	Vert	PK	5.69E-01	27.6	38.5	-10.9	High Ch 251, EUT horiz
	836.595	1.8	151.0	Vert	PK	4.59E-01	26.6	38.5	-11.9	Mid Ch 190, EUT horiz
	824.117	1.0	292.0	Vert	PK	2.07E-01	23.2	38.5	-15.3	Low Ch 128, EUT horiz

Effective Radiated Power - UMTS

Work Order:	TRPO0084	Date:	06/27/13	
Project:	None	Temperature:	25 °C	
Job Site:	OC10	Humidity:	45% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting WCDMA Cell Band V - Low Channel 4132: 826.5MHz, Mid Channel 4182: 836.4MHz, High Channel 4233: 846.6MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	5	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	845.483	1.0	223.0	Horz	PK	2.60E-01	24.2	38.5	-14.3	High Ch 4233, EUT horiz
	825.433	1.0	222.0	Horz	PK	2.27E-01	23.6	38.5	-14.9	Low Ch 4132, EUT horiz
	837.683	1.0	227.0	Horz	PK	1.77E-01	22.5	38.5	-16.0	Mid Ch 4182, EUT horiz
	845.583	2.0	150.0	Vert	PK	5.20E-02	17.2	38.5	-21.3	High Ch 4233, EUT horiz
	835.417	1.9	148.0	Vert	PK	3.84E-02	15.8	38.5	-22.7	Mid Ch 4182, EUT horiz
	825.250	1.0	289.0	Vert	PK	2.92E-02	14.7	38.5	-23.8	Low Ch 4132, EUT horiz

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting CDMA, PCS Band 1900, 1xRTT FWD3 RVS3 SO55, All up bits
Transmitting CDMA, PCS Band 1900, EV-DO Rev A, All up bits

CHANNELS TESTED

Low Channel 25 (1851.25 MHz)
Mid Channel 600 (1880 MHz)
High Channel 1175 (1908.75 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	1851 MHz	Stop Frequency	1908 MHz
-----------------	----------	----------------	----------

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	6/20/2013	12 mo
Antenna, Horn	ETS	3115	AIZ	1/24/2011	36 mo
Attenuator, 'N'	Coaxicom	66702 5910-6	ATZ	3/20/2013	12 mo
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0 mo
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36 mo
Power Meter	Gigatronics	8651A	SPM	1/9/2012	24 mo
Antenna, Horn	EMCO	3115	AHC	6/20/2012	24 mo
Antenna, Horn	EMCO	3115	AHE	NCR	0 mo
Wireless Communication Test Set	Agilent	E5515C	BSV	NCR	0 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	24 mo

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

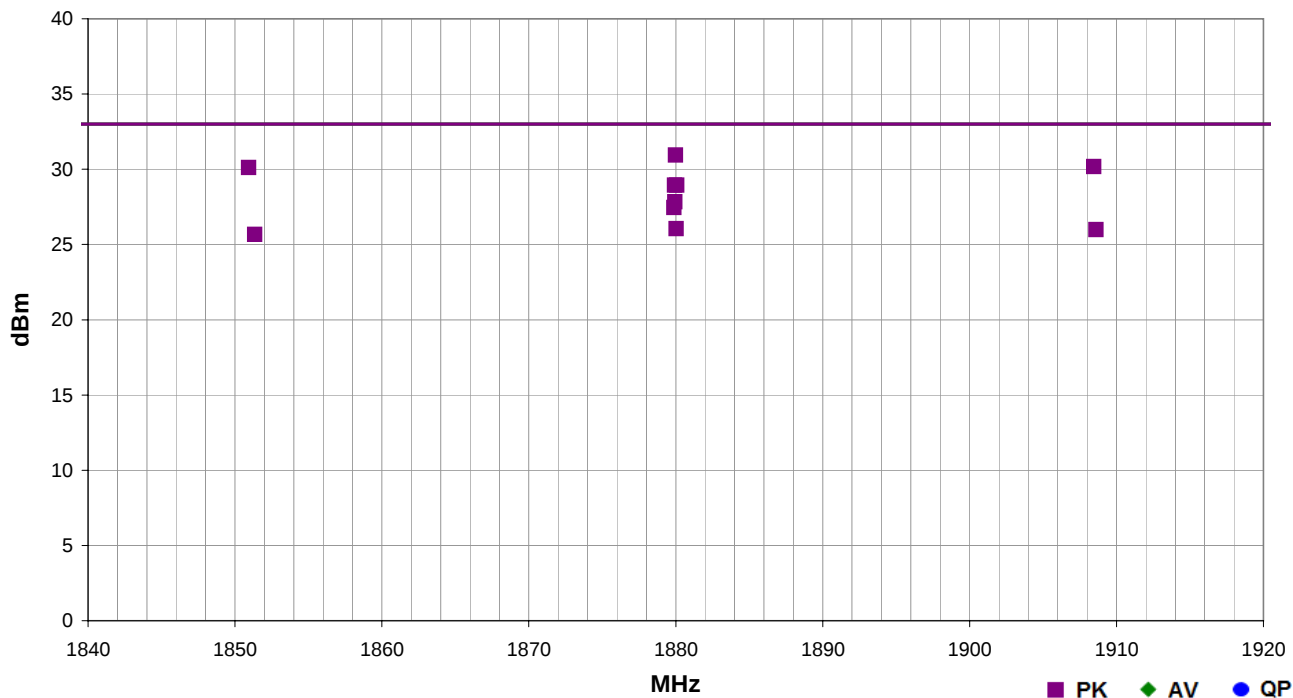
TEST DESCRIPTION

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. 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.

Work Order:	TRPO0084	Date:	08/19/13	
Project:	None	Temperature:	24.4 °C	
Job Site:	EV01	Humidity:	46% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1019 mbar	Tested by: Carl Engholm, Rod Peloquin
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, PCSI Band 1900, EV-DO Rev A, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C-2004

Run #	3	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	1879.993	1.0	41.0	Horz	PK	1.24E+00	31.0	33.0	-2.0	Mid Ch 600 (1880 MHz), EUT Vertical
	1908.463	1.0	41.0	Horz	PK	1.04E+00	30.2	33.0	-2.8	High Ch 1175 (1908.75 MHz), EUT Vertical
	1850.943	1.0	55.0	Horz	PK	1.03E+00	30.1	33.0	-2.9	Low Ch 25 (1851.25 MHz), EUT Vertical
	1880.073	1.3	166.0	Horz	PK	7.85E-01	29.0	33.0	-4.0	Mid Ch 600 (1880 MHz), EUT on Side
	1879.933	1.0	38.0	Vert	PK	7.83E-01	28.9	33.0	-4.1	Mid Ch 600 (1880 MHz), EUT Vertical
	1879.940	1.9	268.0	Vert	PK	6.08E-01	27.8	33.0	-5.2	Mid Ch 600 (1880 MHz), EUT on Side
	1879.887	1.1	209.0	Horz	PK	5.56E-01	27.5	33.0	-5.5	Mid Ch 600 (1880 MHz), EUT Horizontal
	1908.603	1.0	38.0	Vert	PK	3.97E-01	26.0	33.0	-7.0	High Ch 1175 (1908.75 MHz), EUT Vertical
	1880.027	1.2	50.0	Vert	PK	4.02E-01	26.0	33.0	-7.0	Mid Ch 600 (1880 MHz), EUT Horizontal
	1851.350	1.0	31.0	Vert	PK	3.68E-01	25.7	33.0	-7.3	Low Ch 25 (1851.25 MHz), EUT Vertical



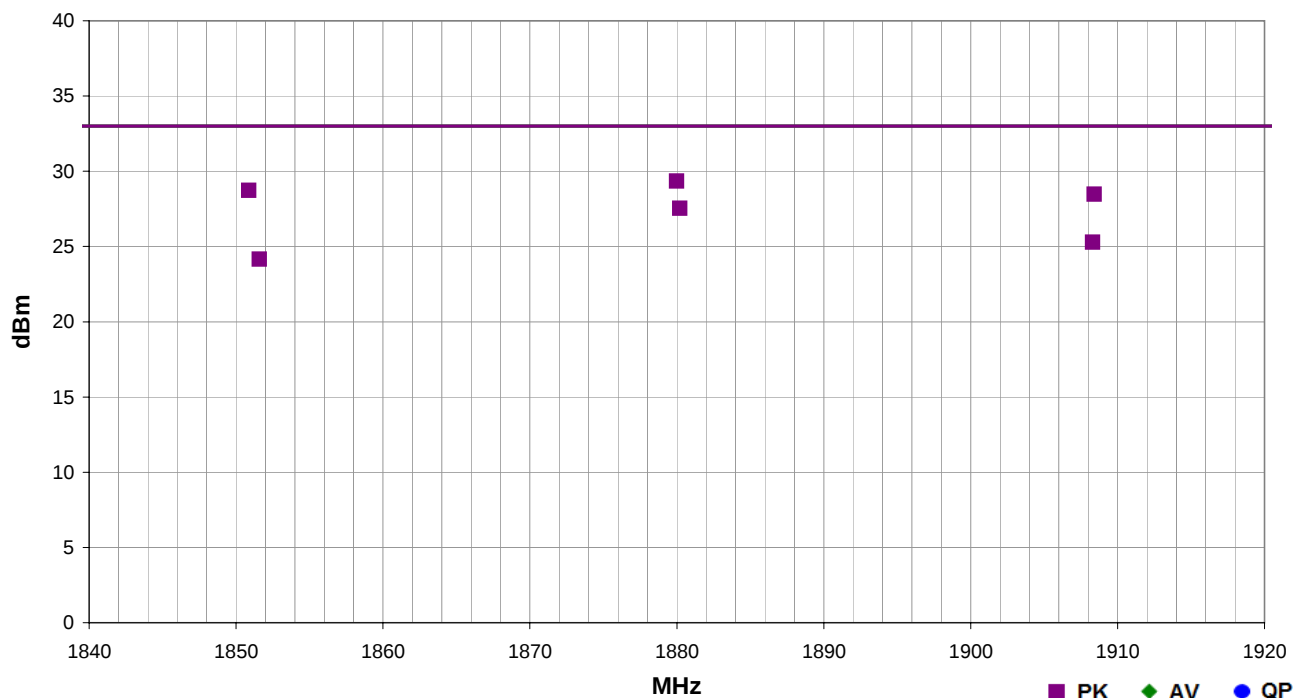
Equivalent Isotropic Radiated Power - CDMA

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	08/19/13		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV01	Humidity:	46% RH		
Serial Number:	RS1XC40554	Barometric Pres.:	1019 mbar	Tested by:	Carl Engholm, Rod Peloquin
EUT:	Ranger/TSC3				
Configuration:	3				
Customer:	Trimble Navigation Limited MCS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting CDMA, PCS Band 1900, 1xRTT FWD3 RVS3 SO55, All up bits				
Deviations:	None				
Comments:	See comments below for channel, frequency, and EUT orientation.				

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C-2004

Run #	4	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1879.987	1.1	43.0	Horz	PK	8.61E-01	29.4	33.0	-3.6	Mid Ch 600 (1880 MHz), EUT Vertical
1850.877	1.1	55.0	Horz	PK	7.45E-01	28.7	33.0	-4.3	Low Ch 25 (1851.25 MHz), EUT Vertical
1908.417	1.0	43.0	Horz	PK	7.03E-01	28.5	33.0	-4.5	High Ch 1175 (1908.75 MHz), EUT Vertical
1880.213	1.0	25.0	Vert	PK	5.68E-01	27.5	33.0	-5.5	Mid Ch 600 (1880 MHz), EUT Vertical
1908.303	1.0	39.0	Vert	PK	3.38E-01	25.3	33.0	-7.7	High Ch 1175 (1908.75 MHz), EUT Vertical
1851.590	1.0	39.0	Vert	PK	2.61E-01	24.2	33.0	-8.8	Low Ch 25 (1851.25 MHz), EUT Vertical

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting WCDMA, Cell Band II - Low Channel 9262: 1852.4MHz, Mid Channel 9400: 1880MHz, and High Channel 9538: 1907.6MHz

Transmitting EGPRS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz

Transmitting GRPS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 1

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

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Horn	ETS	3117	AHQ	9/12/2012	36 mo
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	BSW	NCR	0 mo
OC10 Cables	N/A	10kHz-6GHz RE Cables	N/A	NCR	0 mo
Antenna, Dipole	EMCO	3121C-DB1,DB2,DB3,DB4	ADC	5/17/2013	36 mo
Signal Generator	Agilent	E8257D	TGU	2/1/2012	36 mo
HP Filter	Micro-Tronics	HPM50111	HFM	4/2/2012	36 mo
Low Pass Filter 0-1000 MHz	Micro-Tronics	LPM50004	LFC	11/27/2012	24 mo
BP Filter	K&L Microwave	3TNF-1000/2000-N/N	HFS	11/17/2011	36 mo
Antenna, Horn	EMCO	3115	AHB	3/8/2011	36 mo
OC10 Cables	N/A	1-8GHz RE Cables	OCJ	10/10/2012	12 mo
Spectrum Analyzer	Agilent	E4440A	AFA	6/15/2012	24 mo

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

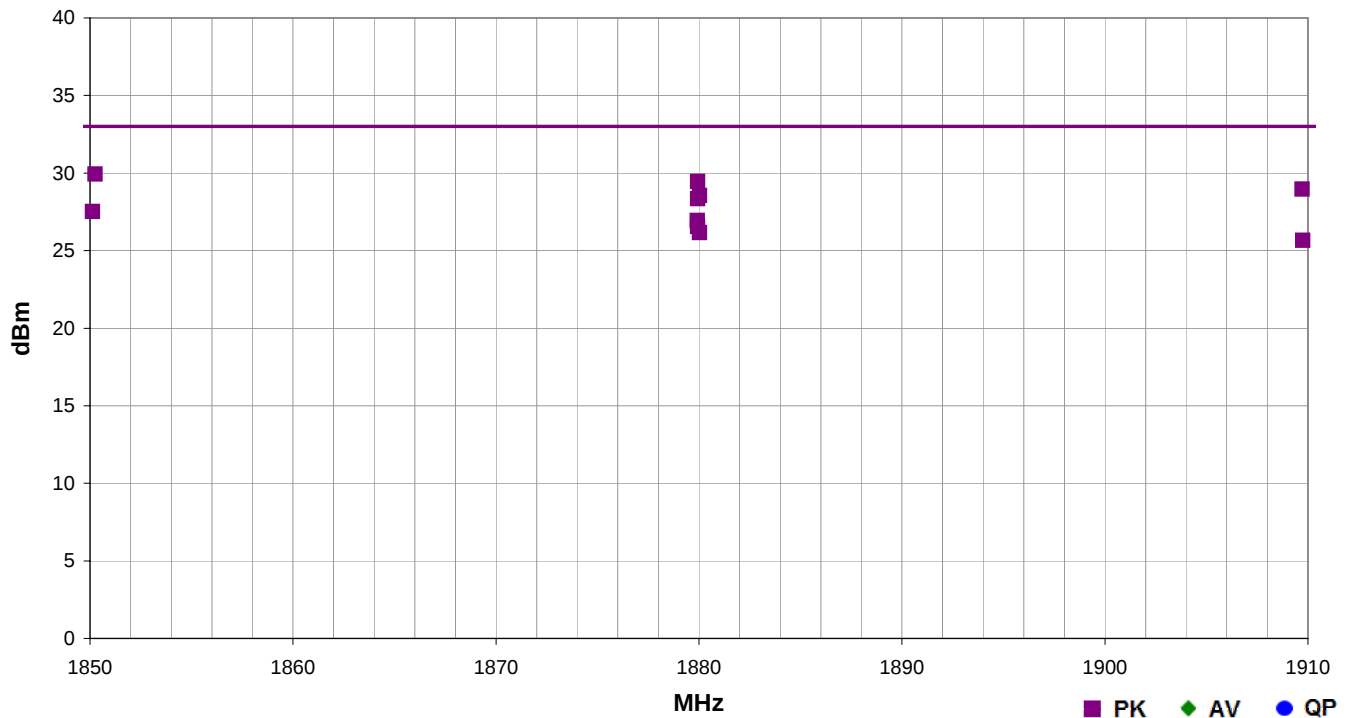
TEST DESCRIPTION

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. 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.

Work Order:	TRPO0084	Date:	06/27/13		
Project:	None	Temperature:	25 °C		
Job Site:	OC10	Humidity:	45% RH		
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	Tested by:	Johnny Candelas
EUT:	Ranger/TSC3				
Configuration:	1				
Customer:	Trimble Navigation Limited MCS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting GRPS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz				
Deviations:	None				
Comments:	None				

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C:2004

Run #	6	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1850.247	1.1	27.0	Horz	PK	9.83E-01	29.9	33.0	-3.1	Low Ch, EUT vert
1879.933	1.1	44.0	Horz	PK	8.81E-01	29.4	33.0	-3.6	Mid Ch, EUT vert
1909.720	1.1	37.0	Horz	PK	7.88E-01	29.0	33.0	-4.0	High Ch, EUT vert
1880.027	1.0	1.0	Vert	PK	7.16E-01	28.5	33.0	-4.5	Mid Ch, EUT on side
1879.933	1.0	62.0	Horz	PK	6.84E-01	28.3	33.0	-4.7	Mid Ch, EUT horiz
1850.120	1.0	185.0	Vert	PK	5.66E-01	27.5	33.0	-5.5	Low Ch, EUT vert
1879.920	1.0	155.0	Vert	PK	4.95E-01	26.9	33.0	-6.1	Mid Ch, EUT horiz
1879.933	1.0	257.0	Horz	PK	4.52E-01	26.5	33.0	-6.5	Mid Ch, EUT on side
1880.033	1.0	149.0	Vert	PK	4.12E-01	26.1	33.0	-6.9	Mid Ch, EUT vert
1909.747	1.0	177.0	Vert	PK	3.68E-01	25.7	33.0	-7.3	High Ch, EUT vert



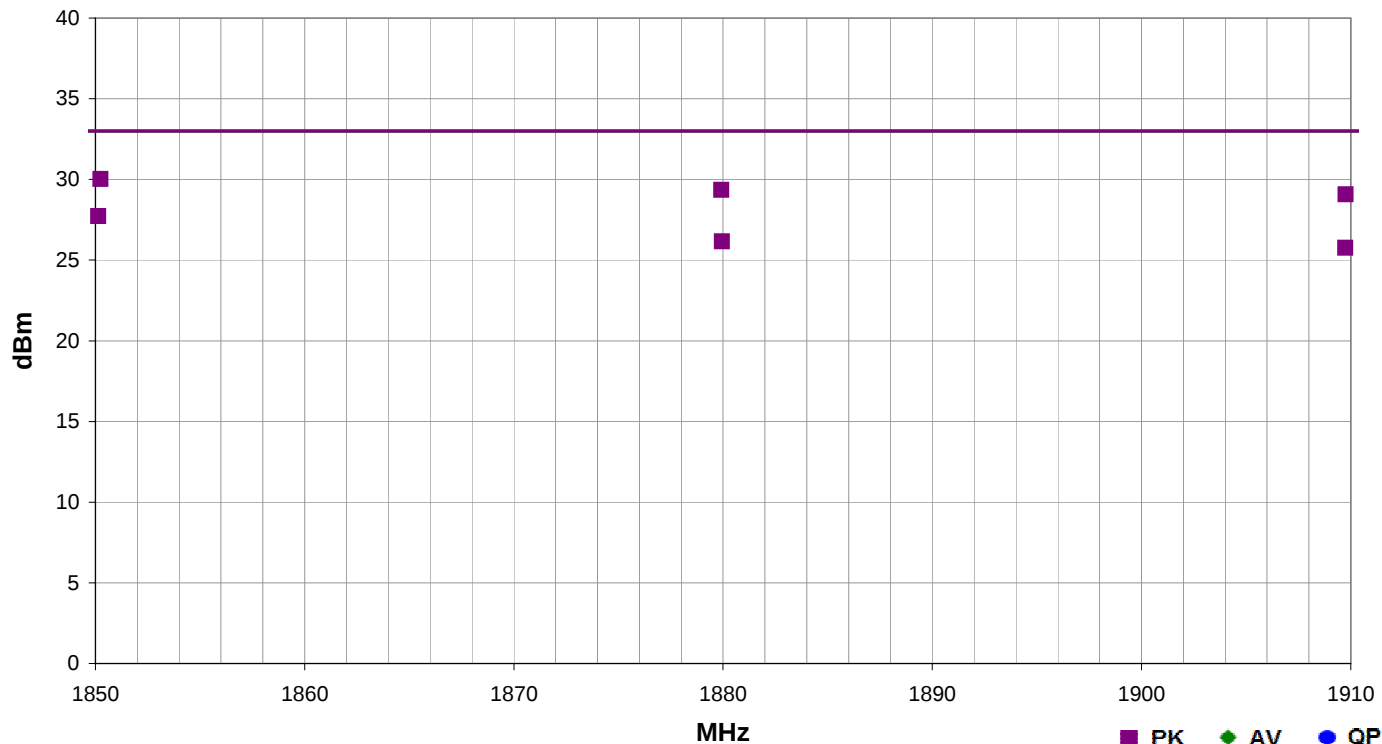
Equivalent Isotropic Radiated Power - UMTS

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	06/27/13		
Project:	None	Temperature:	25 °C		
Job Site:	OC10	Humidity:	45% RH		
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	Tested by:	Johnny Candelas
EUT:	Ranger/TSC3				
Configuration:	1				
Customer:	Trimble Navigation Limited MCS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting EGPRS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz				
Deviations:	None				
Comments:	None				

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C:2004

Run #	7	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1850.247	1.1	28.0	Horz	PK	1.01E+00	30.0	33.0	-3.0	Low Ch, EUT vert
1879.913	1.1	43.0	Horz	PK	8.61E-01	29.3	33.0	-3.7	Mid Ch, EUT vert
1909.753	1.1	40.0	Horz	PK	8.06E-01	29.1	33.0	-3.9	High Ch, EUT vert
1850.133	1.0	133.0	Vert	PK	5.92E-01	27.7	33.0	-5.3	Low Ch, EUT vert
1879.947	1.0	108.0	Vert	PK	4.12E-01	26.1	33.0	-6.9	Mid Ch, EUT vert
1909.740	1.0	179.0	Vert	PK	3.77E-01	25.8	33.0	-7.2	High Ch, EUT vert



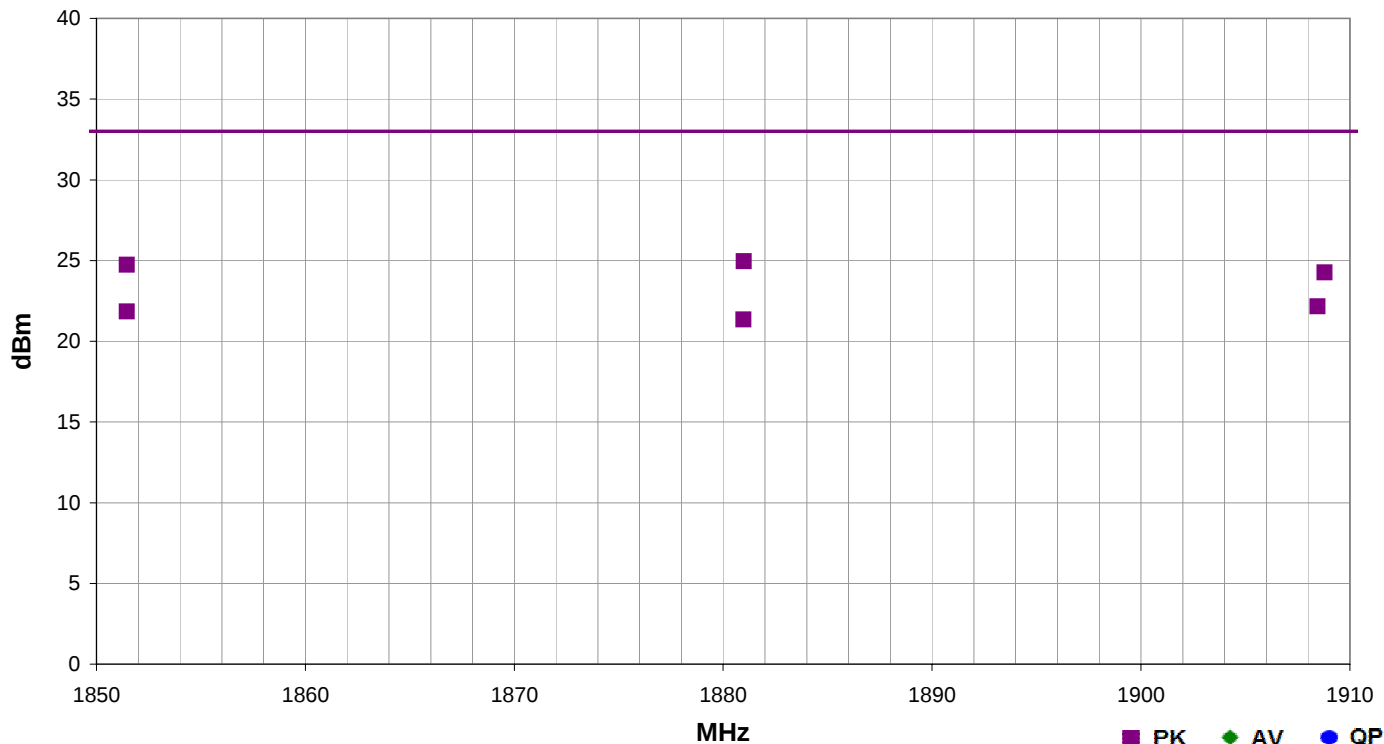
Equivalent Isotropic Radiated Power - UMTS

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	06/27/13		
Project:	None	Temperature:	25 °C		
Job Site:	OC10	Humidity:	45% RH		
Serial Number:	RS1WC39899	Barometric Pres.:	1015 mbar	Tested by:	Johnny Candelas
EUT:	Ranger/TSC3				
Configuration:	1				
Customer:	Trimble Navigation Limited MCS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting WCDMA, Cell Band II - Low Channel 9262: 1852.4MHz, Mid Channel 9400: 1880MHz, and High Channel 9538: 1907.6MHz				
Deviations:	None				
Comments:	None				

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C:2004

Run #	8	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	---	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1880.983	1.1	28.0	Horz	PK	3.13E-01	25.0	33.0	-8.0	Mid Ch, EUT vert
1851.450	1.1	25.0	Horz	PK	2.98E-01	24.7	33.0	-8.3	Low Ch, EUT vert
1908.783	1.1	42.0	Horz	PK	2.67E-01	24.3	33.0	-8.7	High Ch, EUT vert
1908.450	1.0	179.0	Vert	PK	1.64E-01	22.2	33.0	-10.8	High Ch, EUT vert
1851.450	1.0	177.0	Vert	PK	1.53E-01	21.8	33.0	-11.2	Low Ch, EUT vert
1880.967	1.0	175.0	Vert	PK	1.37E-01	21.4	33.0	-11.6	Mid Ch, EUT vert

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting CDMA, Cell Band 850, EV-DO Rev A, All up bits
Transmitting CDMA, Cell Band 850, 1xRTT FWD3 RVS3 SO55, All up bits

CHANNELS TESTED

Low Channel 1013 (824.7 MHz)
Mid Channel 384 (836.52 MHz)
High Channel 777 (848.31 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 12500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	2/27/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2/27/2013	12 mo
Antenna, Horn	ETS	3160-07	AHU	NCR	0 mo
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	6/20/2013	12 mo
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	6/20/2013	12 mo
Antenna, Horn	ETS	3115	AIZ	1/24/2011	36 mo
EV01 Cables	N/A	Bilog Cables	EVA	6/20/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/20/2013	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	36 mo
BP Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	12/31/2012	36 mo
HP Filter	Micro-Tronics	HPM50108	HFV	7/6/2012	36 mo
Low Pass Filter 0-425 MHz	Micro-Tronics	LPM50003	LFB	7/6/2012	24 mo
Attenuator, 'N'	Coaxicom	66702 5910-6	ATZ	3/20/2013	12 mo
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0 mo
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36 mo
Power Meter	Gigatronics	8651A	SPM	1/9/2012	24 mo
Antenna, Horn	EMCO	3115	AHC	6/20/2012	24 mo
Antenna, Horn	EMCO	3115	AHE	NCR	0 mo
Wireless Communication Test Set	Agilent	E5515C	BSV	NCR	0 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	24 mo

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

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 C63.10:2009). 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 placed 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



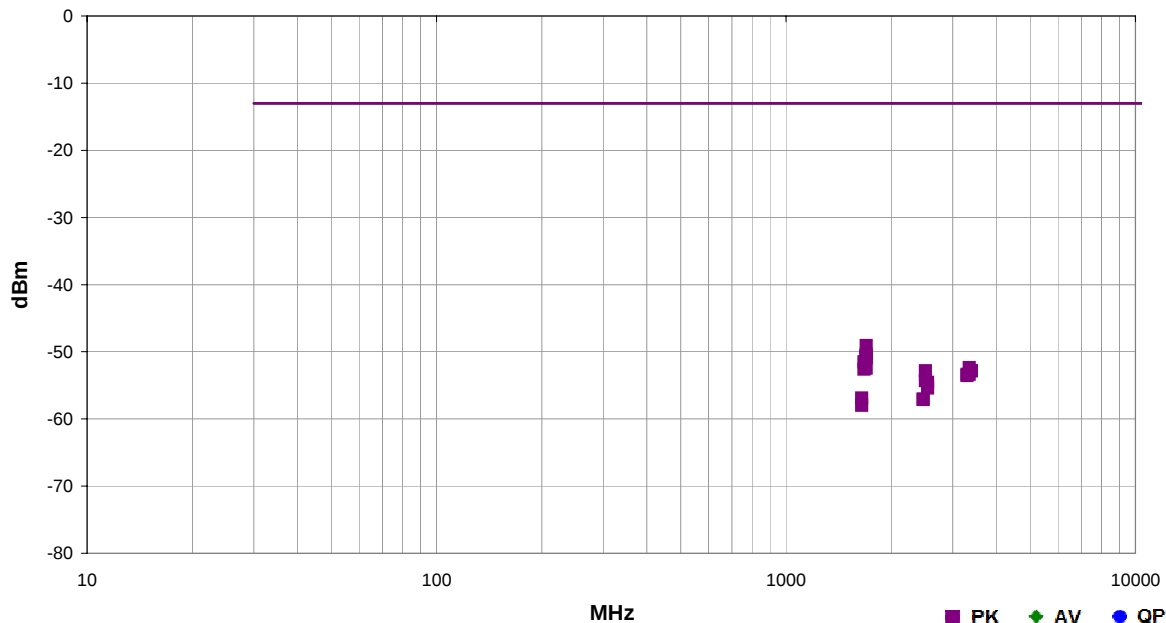
Out of Band Emissions - Part 22H CDMA

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	08/21/13	
Project:	None	Temperature:	23.1 °C	
Job Site:	EV01	Humidity:	41% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1016 mbar	
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, Cell Band 850, 1xRTT FWD3 RVS3 SO55, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	67	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1696.045	1.2	52.0	Horz	PK	1.24E-08	-49.1	-13.0	-36.1	High Ch 777 (848.31 MHz), EUT Horizontal
1696.128	1.1	306.0	Vert	PK	9.19E-09	-50.4	-13.0	-37.4	High Ch 777 (848.31 MHz), EUT Vertical
1695.712	1.2	209.0	Vert	PK	8.57E-09	-50.7	-13.0	-37.7	High Ch 777 (848.31 MHz), EUT on Side
1695.903	1.2	260.0	Horz	PK	8.38E-09	-50.8	-13.0	-37.8	High Ch 777 (848.31 MHz), EUT on Side
1696.528	1.5	37.0	Horz	PK	8.00E-09	-51.0	-13.0	-38.0	High Ch 777 (848.31 MHz), EUT Vertical
1672.457	1.1	36.0	Horz	PK	7.03E-09	-51.5	-13.0	-38.5	Mid Ch 384 (836.52 MHz), EUT Horizontal
3347.147	1.0	45.0	Horz	PK	5.82E-09	-52.4	-13.0	-39.4	Mid Ch 384 (836.52 MHz), EUT Horizontal
1696.478	1.3	30.0	Vert	PK	5.67E-09	-52.5	-13.0	-39.5	High Ch 777 (848.31 MHz), EUT Horizontal
1673.823	1.0	94.0	Vert	PK	5.46E-09	-52.6	-13.0	-39.6	Mid Ch 384 (836.52 MHz), EUT Vertical
2510.168	1.2	271.0	Vert	PK	5.22E-09	-52.8	-13.0	-39.8	Mid Ch 384 (836.52 MHz), EUT Vertical
3393.923	1.0	292.0	Horz	PK	5.18E-09	-52.9	-13.0	-39.9	High Ch 777 (848.31 MHz), EUT Horizontal
3393.632	1.2	352.0	Vert	PK	5.17E-09	-52.9	-13.0	-39.9	High Ch 777 (848.31 MHz), EUT Vertical
3348.055	1.1	356.0	Vert	PK	4.63E-09	-53.3	-13.0	-40.3	Mid Ch 384 (836.52 MHz), EUT Vertical
3298.742	1.0	347.0	Vert	PK	4.61E-09	-53.4	-13.0	-40.4	Low Ch 1013 (824.7 MHz), EUT Vertical
3300.058	1.0	217.0	Horz	PK	4.42E-09	-53.5	-13.0	-40.5	Low Ch 1013 (824.7 MHz), EUT Horizontal
2509.510	1.5	347.0	Horz	PK	3.69E-09	-54.3	-13.0	-41.3	Mid Ch 384 (836.52 MHz), EUT Horizontal
2544.213	1.2	6.0	Horz	PK	3.51E-09	-54.6	-13.0	-41.6	High Ch 777 (848.31 MHz), EUT Horizontal
2545.813	1.2	293.0	Vert	PK	2.86E-09	-55.4	-13.0	-42.4	High Ch 777 (848.31 MHz), EUT Vertical
1649.200	1.1	289.0	Vert	PK	2.05E-09	-56.9	-13.0	-43.9	Low Ch 1013 (824.7 MHz), EUT Vertical
2472.367	1.0	186.0	Horz	PK	1.97E-09	-57.0	-13.0	-44.0	Low Ch 1013 (824.7 MHz), EUT Horizontal
2472.808	1.0	22.0	Vert	PK	1.93E-09	-57.1	-13.0	-44.1	Low Ch 1013 (824.7 MHz), EUT Vertical
1649.133	1.1	15.0	Horz	PK	1.59E-09	-58.0	-13.0	-45.0	Low Ch 1013 (824.7 MHz), EUT Horizontal



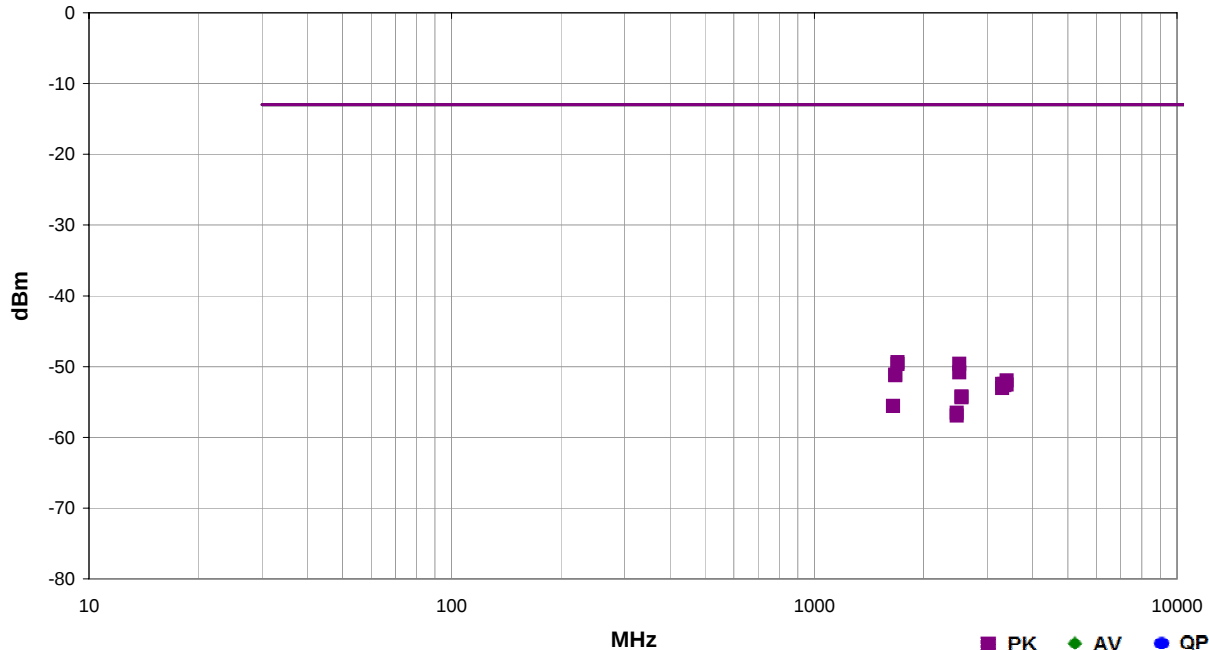
Out of Band Emissions - Part 22H CDMA

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	08/21/13	<i>Rocky Le Pelley</i>
Project:	None	Temperature:	23.1 °C	
Job Site:	EV01	Humidity:	41% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1016 mbar	
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, Cell Band 850, EV-DO Rev A, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	68	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1696.220	1.1	312.0	Vert	PK	1.16E-08	-49.4	-13.0	-36.4	High Ch 777 (848.31 MHz), EUT Vertical
2509.640	1.3	293.0	Vert	PK	1.09E-08	-49.6	-13.0	-36.6	Mid Ch 384 (836.52 MHz), EUT Vertical
1695.787	1.1	16.0	Horz	PK	1.08E-08	-49.7	-13.0	-36.7	High Ch 777 (848.31 MHz), EUT Horizontal
2510.173	1.0	2.0	Horz	PK	8.27E-09	-50.8	-13.0	-37.8	Mid Ch 384 (836.52 MHz), EUT Horizontal
1673.047	1.0	292.0	Vert	PK	7.72E-09	-51.1	-13.0	-38.1	Mid Ch 384 (836.52 MHz), EUT Vertical
1673.167	1.0	34.0	Horz	PK	7.54E-09	-51.2	-13.0	-38.2	Mid Ch 384 (836.52 MHz), EUT Horizontal
3393.473	1.1	348.0	Vert	PK	6.36E-09	-52.0	-13.0	-39.0	High Ch 777 (848.31 MHz), EUT Vertical
3345.080	1.3	310.0	Horz	PK	5.66E-09	-52.5	-13.0	-39.5	Mid Ch 384 (836.52 MHz), EUT Horizontal
3297.447	1.0	103.0	Horz	PK	5.66E-09	-52.5	-13.0	-39.5	Low Ch 1013 (824.7 MHz), EUT Horizontal
3394.327	1.0	124.0	Horz	PK	5.55E-09	-52.6	-13.0	-39.6	High Ch 777 (848.31 MHz), EUT Horizontal
3346.920	1.0	354.0	Vert	PK	5.43E-09	-52.7	-13.0	-39.7	Mid Ch 384 (836.52 MHz), EUT Vertical
3300.740	1.0	357.0	Vert	PK	4.96E-09	-53.0	-13.0	-40.0	Low Ch 1013 (824.7 MHz), EUT Vertical
2545.850	1.0	290.0	Vert	PK	3.77E-09	-54.2	-13.0	-41.2	High Ch 777 (848.31 MHz), EUT Vertical
2545.430	1.0	4.0	Horz	PK	3.68E-09	-54.3	-13.0	-41.3	High Ch 777 (848.31 MHz), EUT Horizontal
1649.833	1.1	15.0	Horz	PK	2.76E-09	-55.6	-13.0	-42.6	Low Ch 1013 (824.7 MHz), EUT Horizontal
1648.647	1.1	291.0	Vert	PK	2.76E-09	-55.6	-13.0	-42.6	Low Ch 1013 (824.7 MHz), EUT Vertical
2472.127	1.0	309.0	Vert	PK	2.21E-09	-56.5	-13.0	-43.5	Low Ch 1013 (824.7 MHz), EUT Vertical
2473.033	1.0	262.0	Horz	PK	2.02E-09	-56.9	-13.0	-43.9	Low Ch 1013 (824.7 MHz), EUT Horizontal

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting WCDMA Cell Band V - Low Channel 4132: 826.5MHz, Mid Channel 4182: 836.4MHz, High Channel 4233: 846.6MHz
Transmitting EGRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz
Transmitting GRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	20000 MHz
-----------------	--------	----------------	-----------

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Dipole	EMCO	3121C-DB1,DB2,DB3,DB4	ADC	5/17/2013	36 mo
Signal Generator	Agilent	E8257D	TGU	2/1/2012	36 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	2/1/2012	12 mo
Antenna, Horn	EMCO	3160-09	AHN	NCR	0 mo
OC floating Cable	N/A	18-26GHz RE Cables	OCK	4/29/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	11/21/2012	12 mo
Antenna, Horn	ETS	3160-07	AHR	NCR	0 mo
OC 10 Cables	N/A	8-18GHz RE Cables	OCO	10/10/2012	12 mo
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6/6/2013	12 mo
Antenna, Horn	EMCO	3115	AHB	3/8/2011	36 mo
OC10 Cables	N/A	1-8GHz RE Cables	OCJ	10/10/2012	12 mo
Antenna, Bilog	Teseq	CBL 6141A	AYE	4/26/2012	36 mo
OC10 Cables	N/A	10kHz-1GHz RE Cables	OCH	6/6/2013	12 mo
Pre-Amplifier	Miteq	AM-1064-9079	AOO	6/6/2013	12 mo
Spectrum Analyzer	Agilent	E4440A	AFA	6/15/2012	24 mo
BP Filter	K&L Microwave	3TNF-500/1000-N/N	HFR	11/27/2012	36 mo
Attenuator, 20db, 'SMA'	Weinschel Corp	4H-20	AWB	6/7/2013	12 mo
HP Filter	Micro-Tronics	HPM50111	HFM	4/2/2012	36 mo
HP Filter	Micro-Tronics	HPM50108	HFW	4/2/2012	36 mo
Low Pass Filter 0-425 MHz	Micro-Tronics	LPM50003	LFA	11/27/2012	24 mo
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	BSW	NCR	0 mo
OC10 Cables	N/A	10kHz-6GHz RE Cables	N/A	NCR	0 mo
Antenna, Horn	ETS	3117	AHQ	9/12/2012	36

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

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 C63.10:2009). 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 placed 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



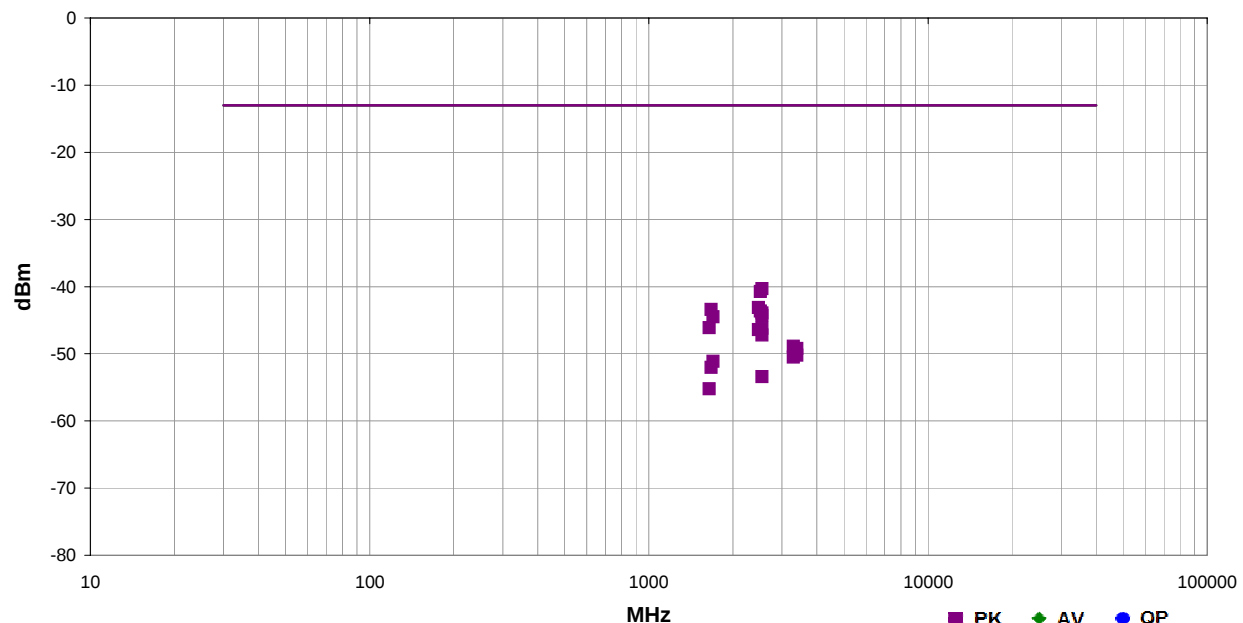
Out of Band Emissions - Part 22H UMTS

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	06/28/13	
Project:	None	Temperature:	24.2 °C	
Job Site:	OC10	Humidity:	44.6% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1011 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting GRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	17	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



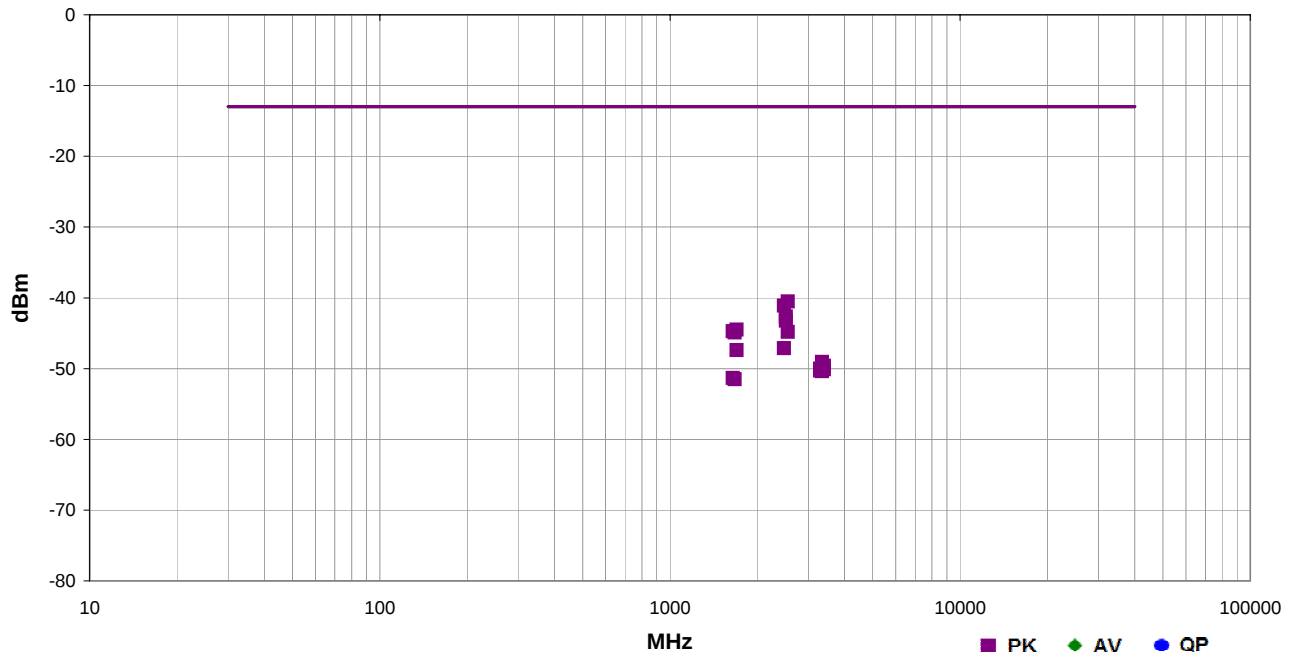
Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
2546.197	1.2	162.0	Horz	PK	9.26E-08	-40.3	-13.0	-27.3	High Ch 251, GPRS, EUT flat
2509.807	1.0	304.0	Horz	PK	8.46E-08	-40.7	-13.0	-27.7	Mid Ch 190, GPRS, EUT flat
2472.493	1.0	179.0	Horz	PK	4.88E-08	-43.1	-13.0	-30.1	Low Ch 128, GPRS, EUT flat
1673.033	1.0	143.0	Horz	PK	4.54E-08	-43.4	-13.0	-30.4	Mid Ch 190, GPRS, EUT flat
2509.520	1.0	4.0	Vert	PK	4.34E-08	-43.6	-13.0	-30.6	Mid Ch 190, GPRS, EUT flat
2546.437	1.2	4.0	Vert	PK	4.04E-08	-43.9	-13.0	-30.9	High Ch 251, GPRS, EUT flat
2546.357	1.3	112.0	Horz	PK	3.69E-08	-44.3	-13.0	-31.3	High Ch 251, GPRS, EUT Vertical
1697.762	1.2	336.0	Vert	PK	3.54E-08	-44.5	-13.0	-31.5	High Ch 251, GPRS, EUT flat
1648.373	1.0	200.0	Horz	PK	2.43E-08	-46.1	-13.0	-33.1	Low Ch 128, GPRS, EUT flat
2546.477	1.2	133.0	Horz	PK	2.38E-08	-46.2	-13.0	-33.2	High Ch 251, GPRS, EUT on side
2472.633	1.0	334.0	Vert	PK	2.28E-08	-46.4	-13.0	-33.4	Low Ch 128, GPRS, EUT flat
2546.504	1.2	150.0	Vert	PK	1.89E-08	-47.2	-13.0	-34.2	High Ch 251, GPRS, EUT Vertical
3297.160	3.2	73.0	Vert	PK	1.29E-08	-48.9	-13.0	-35.9	Low Ch 128, GPRS, EUT flat
3396.873	1.0	284.0	Vert	PK	1.20E-08	-49.2	-13.0	-36.2	High Ch 251, GPRS, EUT flat
3345.387	3.2	24.0	Horz	PK	1.01E-08	-50.0	-13.0	-37.0	Mid Ch 190, GPRS, EUT flat
3348.267	3.6	144.0	Vert	PK	9.88E-09	-50.1	-13.0	-37.1	Mid Ch 190, GPRS, EUT flat
3393.773	1.0	76.0	Horz	PK	9.51E-09	-50.2	-13.0	-37.2	High Ch 251, GPRS, EUT flat
3297.267	1.0	9.0	Horz	PK	8.89E-09	-50.5	-13.0	-37.5	Low Ch 128, GPRS, EUT flat
1697.610	1.2	306.0	Horz	PK	7.74E-09	-51.1	-13.0	-38.1	High Ch 251, GPRS, EUT flat
1673.373	1.8	81.0	Vert	PK	6.27E-09	-52.0	-13.0	-39.0	Mid Ch 190, GPRS, EUT flat
2547.057	1.2	107.0	Vert	PK	4.54E-09	-53.4	-13.0	-40.4	High Ch 251, GPRS, EUT on side
1648.407	1.9	165.0	Vert	PK	2.99E-09	-55.2	-13.0	-42.2	Low Ch 128, GPRS, EUT flat

Out of Band Emissions - Part 22H UMTS

Work Order:	TRPO0084	Date:	06/28/13	
Project:	None	Temperature:	24.2 °C	
Job Site:	OC10	Humidity:	44.6% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1011 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting EGRPS, Cell Band 850 - Low Channel 128: 824.2 MHz, Mid Channel 190: 836.6 MHz, and High Channel 251: 848.8MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	17	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



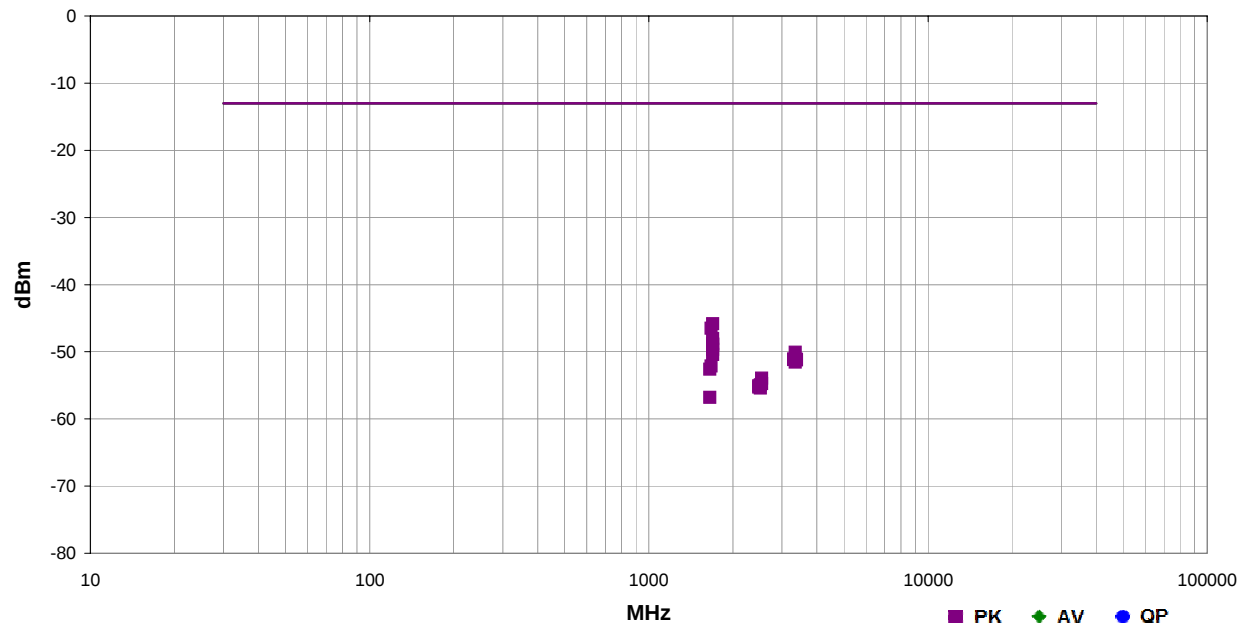
Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
2546.071	2.1	359.0	Vert	PK	8.84E-08	-40.5	-13.0	-27.5	High Ch 251, EGPRS, EUT flat
2472.487	1.0	354.0	Horz	PK	7.74E-08	-41.1	-13.0	-28.1	Low Ch 128, EGPRS, EUT flat
2509.660	1.0	338.0	Horz	PK	5.46E-08	-42.6	-13.0	-29.6	Mid Ch 190, EGPRS, EUT flat
2509.947	1.5	1.0	Vert	PK	4.76E-08	-43.2	-13.0	-30.2	Mid Ch 190, EGPRS, EUT flat
1697.543	1.5	207.0	Horz	PK	3.54E-08	-44.5	-13.0	-31.5	High Ch 251, EGPRS, EUT flat
1648.373	1.0	207.0	Horz	PK	3.36E-08	-44.7	-13.0	-31.7	Low Ch 128, EGPRS, EUT flat
2546.264	1.2	295.0	Horz	PK	3.29E-08	-44.8	-13.0	-31.8	High Ch 251, EGPRS, EUT flat
1673.173	1.0	144.0	Horz	PK	3.22E-08	-44.9	-13.0	-31.9	Mid Ch 190, EGPRS, EUT flat
2472.340	1.9	33.0	Vert	PK	1.94E-08	-47.1	-13.0	-34.1	Low Ch 128, EGPRS, EUT flat
1697.642	1.2	359.0	Vert	PK	1.81E-08	-47.4	-13.0	-34.4	High Ch 251, EGPRS, EUT flat
3348.300	2.6	150.0	Horz	PK	1.24E-08	-49.1	-13.0	-36.1	Mid Ch 190, EGPRS, EUT flat
3393.447	1.0	338.0	Horz	PK	1.09E-08	-49.6	-13.0	-36.6	High Ch 251, EGPRS, EUT flat
3296.273	1.0	170.0	Horz	PK	9.97E-09	-50.0	-13.0	-37.0	Low Ch 128, EGPRS, EUT flat
3393.300	1.0	173.0	Vert	PK	9.72E-09	-50.1	-13.0	-37.1	High Ch 251, EGPRS, EUT flat
3297.240	3.5	75.0	Vert	PK	9.31E-09	-50.3	-13.0	-37.3	Low Ch 128, EGPRS, EUT flat
3346.587	1.8	279.0	Vert	PK	9.21E-09	-50.4	-13.0	-37.4	Mid Ch 190, EGPRS, EUT flat
1648.800	1.0	143.0	Vert	PK	7.35E-09	-51.3	-13.0	-38.3	Low Ch 128, EGPRS, EUT flat
1673.153	1.7	129.0	Vert	PK	7.04E-09	-51.5	-13.0	-38.5	Mid Ch 190, EGPRS, EUT flat

Out of Band Emissions - Part 22H UMTS

Work Order:	TRPO0084	Date:	07/01/13	
Project:	None	Temperature:	26.3 °C	
Job Site:	OC10	Humidity:	38.9% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1011 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting WCDMA Cell Band V - Low Channel 4132: 826.5MHz, Mid Channel 4182: 836.4MHz, High Channel 4233: 846.6MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 22H:2013	ANSI/TIA/EIA-603-C-2004

Run #	47	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1695.418	1.0	214.0	Horz	PK	2.61E-08	-45.8	-13.0	-32.8	High Ch 4233, EUT flat
1674.733	1.0	17.0	Horz	PK	2.23E-08	-46.5	-13.0	-33.5	Mid Ch 4182, EUT flat
1695.118	1.2	225.0	Horz	PK	1.57E-08	-48.0	-13.0	-35.0	High Ch 4233, EUT vertical
1695.238	1.2	123.0	Vert	PK	1.31E-08	-48.8	-13.0	-35.8	High Ch 4233, EUT flat
1695.058	1.2	348.0	Vert	PK	1.28E-08	-48.9	-13.0	-35.9	High Ch 4233, EUT vertical
1695.264	1.2	183.0	Vert	PK	1.09E-08	-49.6	-13.0	-36.6	High Ch 4233, EUT on side
3348.053	1.0	234.0	Horz	PK	9.87E-09	-50.1	-13.0	-37.1	Mid Ch 4182, EUT flat
1695.751	1.2	232.0	Horz	PK	9.06E-09	-50.4	-13.0	-37.4	High Ch 4233, EUT on side
3307.640	1.0	53.0	Vert	PK	7.81E-09	-51.1	-13.0	-38.1	Low Ch 4138, EUT flat
3385.147	2.2	98.0	Horz	PK	7.68E-09	-51.1	-13.0	-38.1	High Ch 4233, EUT flat
3306.533	1.0	128.0	Horz	PK	7.62E-09	-51.2	-13.0	-38.2	Low Ch 4138, EUT flat
3385.960	1.0	57.0	Vert	PK	7.51E-09	-51.2	-13.0	-38.2	High Ch 4233, EUT flat
3347.773	1.8	290.0	Vert	PK	6.99E-09	-51.6	-13.0	-38.6	Mid Ch 4182, EUT flat
1674.587	1.0	351.0	Vert	PK	6.15E-09	-52.1	-13.0	-39.1	Mid Ch 4182, EUT flat
1654.700	1.0	284.0	Horz	PK	5.51E-09	-52.6	-13.0	-39.6	Low Ch 4138, EUT flat
2541.173	1.0	174.0	Vert	PK	4.02E-09	-54.0	-13.0	-41.0	High Ch 4233, EUT flat
2541.513	1.8	347.0	Horz	PK	3.34E-09	-54.8	-13.0	-41.8	High Ch 4233, EUT flat
2509.327	1.0	317.0	Horz	PK	3.21E-09	-54.9	-13.0	-41.9	Mid Ch 4182, EUT flat
2481.027	1.0	238.0	Horz	PK	3.11E-09	-55.1	-13.0	-42.1	Low Ch 4138, EUT flat
2480.007	2.1	312.0	Vert	PK	2.97E-09	-55.3	-13.0	-42.3	Low Ch 4138, EUT flat
2512.433	1.0	214.0	Vert	PK	2.88E-09	-55.4	-13.0	-42.4	Mid Ch 4182, EUT flat
1654.780	2.1	169.0	Vert	PK	2.10E-09	-56.8	-13.0	-43.8	Low Ch 4138, EUT flat

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting CDMA, PCS Band 1900, 1xRTT FWD3 RVS3 SO55, All up bits
Transmitting CDMA, PCS Band 1900, EV-DO Rev A, All up bits

CHANNELS TESTED

Low Channel 25 (1851.25 MHz)
Mid Channel 600 (1880 MHz)
High Channel 1175 (1908.75 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 26500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVY	9/11/2012	12 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	9/11/2012	12 mo
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2/27/2013	12 mo
Antenna, Horn	ETS	3160-08	AHV	NCR	0 mo
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	2/27/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2/27/2013	12 mo
Antenna, Horn	ETS	3160-07	AHU	NCR	0 mo
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	6/20/2013	12 mo
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	6/20/2013	12 mo
Antenna, Horn	ETS	3115	AIZ	1/24/2011	36 mo
EV01 Cables	N/A	Bilog Cables	EVA	6/20/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/20/2013	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	36 mo
Attenuator, 'N'	Coaxicom	66702 5910-6	ATZ	3/20/2013	12 mo
MXG Vector Signal Generator	Agilent	N5182A	TIF	NCR	0 mo
Power Sensor	Gigatronics	80701A	SPL	7/8/2011	36 mo
Power Meter	Gigatronics	8651A	SPM	1/9/2012	24 mo
LP Filter	Micro-Tronics	LPM50004	LFD	7/6/2012	24 mo
HP Filter	Micro-Tronics	HPM50111	HFO	7/6/2013	24 mo
BP Filter	K&L Microwave	3TNF-1000/2000-N/N	HFU	12/31/2012	36 mo
Antenna, Horn	EMCO	3115	AHC	6/20/2012	24 mo
Antenna, Horn	EMCO	3115	AHE	NCR	0 mo
Wireless Communication Test Set	Agilent	E5515C	BSV	NCR	0 mo
Spectrum Analyzer	Agilent	E4446A	AAQ	2/7/2012	24 mo

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

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 C63.10:2009). 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 placed 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.



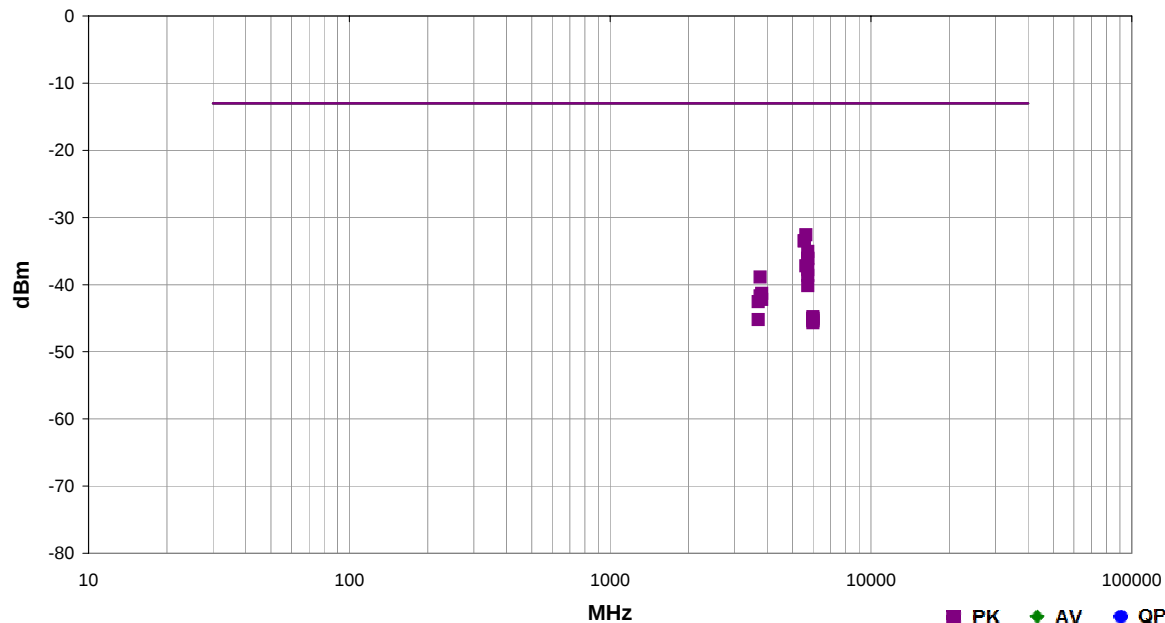
Out of Band Emissions - Part 24E CDMA

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	08/21/13	
Project:	None	Temperature:	23.1 °C	
Job Site:	EV01	Humidity:	41% RH	
Serial Number:	None	Barometric Pres.:	1016 mbar	
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, PCS Band 1900, EV-DO Rev A, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C-2004

Run #	69	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
5639.940	1.0	53.0	Horz	PK	5.50E-07	-32.6	-13.0	-19.6	Mid Ch 600 (1880 MHz), EUT on Side
5553.890	1.0	46.0	Horz	PK	4.48E-07	-33.5	-13.0	-20.5	Low Ch 25 (1851.25 MHz), EUT on Side
5553.757	1.4	94.0	Vert	PK	4.48E-07	-33.5	-13.0	-20.5	Low Ch 25 (1851.25 MHz), EUT on Side
5725.843	1.0	41.0	Horz	PK	3.11E-07	-35.1	-13.0	-22.1	High Ch 1175 (1908.75 MHz), EUT on Side
5726.050	1.0	53.0	Vert	PK	2.47E-07	-36.1	-13.0	-23.1	High Ch 1175 (1908.75 MHz), EUT on Side
5726.423	1.0	27.0	Horz	PK	2.42E-07	-36.2	-13.0	-23.2	High Ch 1175 (1908.75 MHz), EUT Vertical
5640.907	1.0	74.0	Vert	PK	1.91E-07	-37.2	-13.0	-24.2	Mid Ch 600 (1880 MHz), EUT on Side
5725.883	1.0	324.0	Vert	PK	1.67E-07	-37.8	-13.0	-24.8	High Ch 1175 (1908.75 MHz), EUT Horizontal
5726.763	1.3	356.0	Horz	PK	1.36E-07	-38.7	-13.0	-25.7	High Ch 1175 (1908.75 MHz), EUT Horizontal
3759.853	1.0	287.0	Vert	PK	1.29E-07	-38.9	-13.0	-25.9	Mid Ch 600 (1880 MHz), EUT on Side
5726.457	1.0	38.0	Vert	PK	9.63E-08	-40.2	-13.0	-27.2	High Ch 1175 (1908.75 MHz), EUT Vertical
3818.193	1.0	297.0	Vert	PK	7.42E-08	-41.3	-13.0	-28.3	High Ch 1175 (1908.75 MHz), EUT on Side
3759.647	1.0	194.0	Horz	PK	6.76E-08	-41.7	-13.0	-28.7	Mid Ch 600 (1880 MHz), EUT on Side
3818.200	1.0	349.0	Horz	PK	6.03E-08	-42.2	-13.0	-29.2	High Ch 1175 (1908.75 MHz), EUT on Side
3701.993	1.0	281.0	Vert	PK	5.57E-08	-42.5	-13.0	-29.5	Low Ch 25 (1851.25 MHz), EUT on Side
5997.747	1.0	10.0	Horz	PK	3.31E-08	-44.8	-13.0	-31.8	Low Ch 25 (1851.25 MHz), EUT on Side
5996.480	1.0	12.0	Horz	PK	3.15E-08	-45.0	-13.0	-32.0	Mid Ch 600 (1880 MHz), EUT on Side
5999.867	1.0	349.0	Vert	PK	3.10E-08	-45.1	-13.0	-32.1	High Ch 1175 (1908.75 MHz), EUT on Side
3703.300	1.0	351.0	Horz	PK	3.00E-08	-45.2	-13.0	-32.2	Low Ch 25 (1851.25 MHz), EUT on Side
5996.667	1.0	359.0	Horz	PK	2.94E-08	-45.3	-13.0	-32.3	High Ch 1175 (1908.75 MHz), EUT on Side
5996.253	1.0	13.0	Vert	PK	2.87E-08	-45.4	-13.0	-32.4	Low Ch 25 (1851.25 MHz), EUT on Side
5996.780	1.0	229.0	Vert	PK	2.68E-08	-45.7	-13.0	-32.7	Mid Ch 600 (1880 MHz), EUT on Side



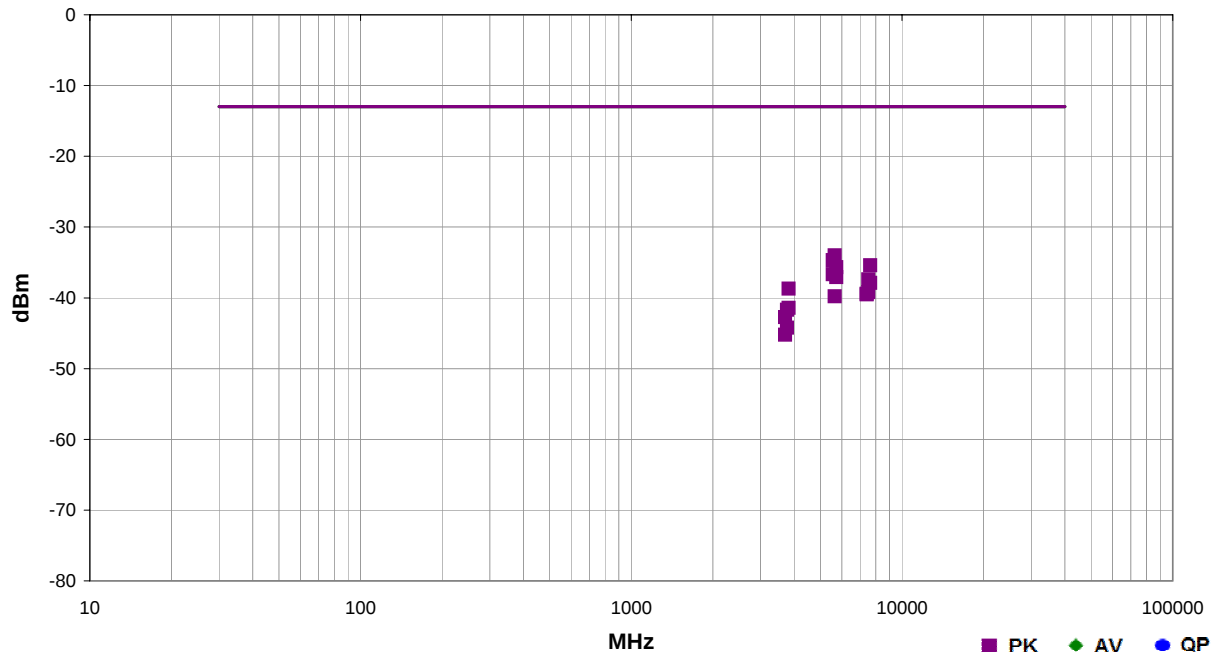
Out of Band Emissions - Part 24E CDMA

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	08/21/13	<i>Rocky Le Pelouin</i>
Project:	None	Temperature:	23.1 °C	
Job Site:	EV01	Humidity:	41% RH	
Serial Number:	RS1XC40554	Barometric Pres.:	1016 mbar	
EUT:	Ranger/TSC3			
Configuration:	3			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting CDMA, PCS Band 1900, 1xRTT FWD3 RVS3 SO55, All up bits			
Deviations:	None			
Comments:	See comments below for channel, frequency, and EUT orientation.			

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C-2004

Run #	70	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
5639.953	1.2	55.0	Horz	PK	3.98E-07	-34.0	-13.0	-21.0	Mid Ch 600 (1880 MHz), EUT on Side
5552.997	1.0	54.0	Horz	PK	3.39E-07	-34.7	-13.0	-21.7	Low Ch 25 (1851.25 MHz), EUT on Side
7636.313	1.5	42.0	Horz	PK	2.88E-07	-35.4	-13.0	-22.4	High Ch 1175 (1908.75 MHz), EUT on Side
5725.250	1.2	41.0	Horz	PK	2.71E-07	-35.7	-13.0	-22.7	High Ch 1175 (1908.75 MHz), EUT on Side
5553.803	1.3	95.0	Vert	PK	2.14E-07	-36.7	-13.0	-23.7	Low Ch 25 (1851.25 MHz), EUT on Side
5726.323	1.2	82.0	Vert	PK	1.97E-07	-37.1	-13.0	-24.1	High Ch 1175 (1908.75 MHz), EUT on Side
7518.727	1.5	42.0	Horz	PK	1.82E-07	-37.4	-13.0	-24.4	Mid Ch 600 (1880 MHz), EUT on Side
7633.460	1.0	48.0	Vert	PK	1.63E-07	-37.9	-13.0	-24.9	High Ch 1175 (1908.75 MHz), EUT on Side
3816.780	1.1	141.0	Vert	PK	1.35E-07	-38.7	-13.0	-25.7	High Ch 1175 (1908.75 MHz), EUT on Side
7519.753	1.0	2.0	Vert	PK	1.20E-07	-39.2	-13.0	-26.2	Mid Ch 600 (1880 MHz), EUT on Side
7404.600	1.0	129.0	Vert	PK	1.14E-07	-39.4	-13.0	-26.4	Low Ch 25 (1851.25 MHz), EUT on Side
7404.653	1.0	5.0	Horz	PK	1.11E-07	-39.5	-13.0	-26.5	Low Ch 25 (1851.25 MHz), EUT on Side
5640.253	1.0	128.0	Vert	PK	1.05E-07	-39.8	-13.0	-26.8	Mid Ch 600 (1880 MHz), EUT on Side
3817.107	1.0	185.0	Horz	PK	7.23E-08	-41.4	-13.0	-28.4	High Ch 1175 (1908.75 MHz), EUT on Side
3759.347	1.0	292.0	Vert	PK	6.75E-08	-41.7	-13.0	-28.7	Mid Ch 600 (1880 MHz), EUT on Side
3702.460	1.0	284.0	Vert	PK	5.32E-08	-42.7	-13.0	-29.7	Low Ch 25 (1851.25 MHz), EUT on Side
3759.053	1.0	357.0	Horz	PK	3.79E-08	-44.2	-13.0	-31.2	Mid Ch 600 (1880 MHz), EUT on Side
3702.020	1.0	354.0	Horz	PK	2.99E-08	-45.2	-13.0	-32.2	Low Ch 25 (1851.25 MHz), EUT on Side



Out of Band Emissions - Part 24E UMTS

PSA-ESCI 2012.12.14

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting WCDMA, Cell Band II - Low Channel 9262: 1852.4MHz, Mid Channel 9400: 1880MHz, and High Channel 9538: 1907.6MHz
Transmitting EGPRS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz
Transmitting GRPS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

TRPO0084 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz	Stop Frequency 20000 MHz
------------------------	--------------------------

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Dipole	EMCO	3121C-DB1,DB2,DB3,DB4	ADC	5/17/2013	36 mo
Signal Generator	Agilent	E8257D	TGU	2/1/2012	36 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	4/29/2013	12 mo
Antenna, Horn	EMCO	3160-09	AHN	NCR	0 mo
OC floating Cable	N/A	18-26GHz RE Cables	OCK	4/29/2013	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	11/21/2012	12 mo
Antenna, Horn	ETS	3160-07	AHR	NCR	0 mo
OC 10 Cables	N/A	8-18GHz RE Cables	OCO	10/10/2012	12 mo
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6/6/2013	12 mo
Antenna, Horn	EMCO	3115	AHB	3/8/2011	36 mo
OC10 Cables	N/A	1-8GHz RE Cables	OCJ	10/10/2012	12 mo
Antenna, Bilog	Teseq	CBL 6141A	AYE	4/26/2012	36 mo
OC10 Cables	N/A	10kHz-1GHz RE Cables	OCH	6/6/2013	12 mo
Pre-Amplifier	Miteq	AM-1064-9079	AOO	6/6/2013	12 mo
Spectrum Analyzer	Agilent	E4440A	AFA	6/15/2012	24 mo
HP Filter	Micro-Tronics	HPM50111	HFM	4/2/2012	36 mo
Low Pass Filter 0-1000 MHz	Micro-Tronics	LPM50004	LFC	11/27/2012	24 mo
BP Filter	K&L Microwave	3TNF-1000/2000-N/N	HFS	11/17/2011	36 mo
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	BSW	NCR	0 mo
OC10 Cables	N/A	10kHz-6GHz RE Cables	N/A	NCR	0 mo
Antenna, Horn	ETS	3117	AHQ	9/12/2012	36 mo

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

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 C63.10:2009). 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 placed 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



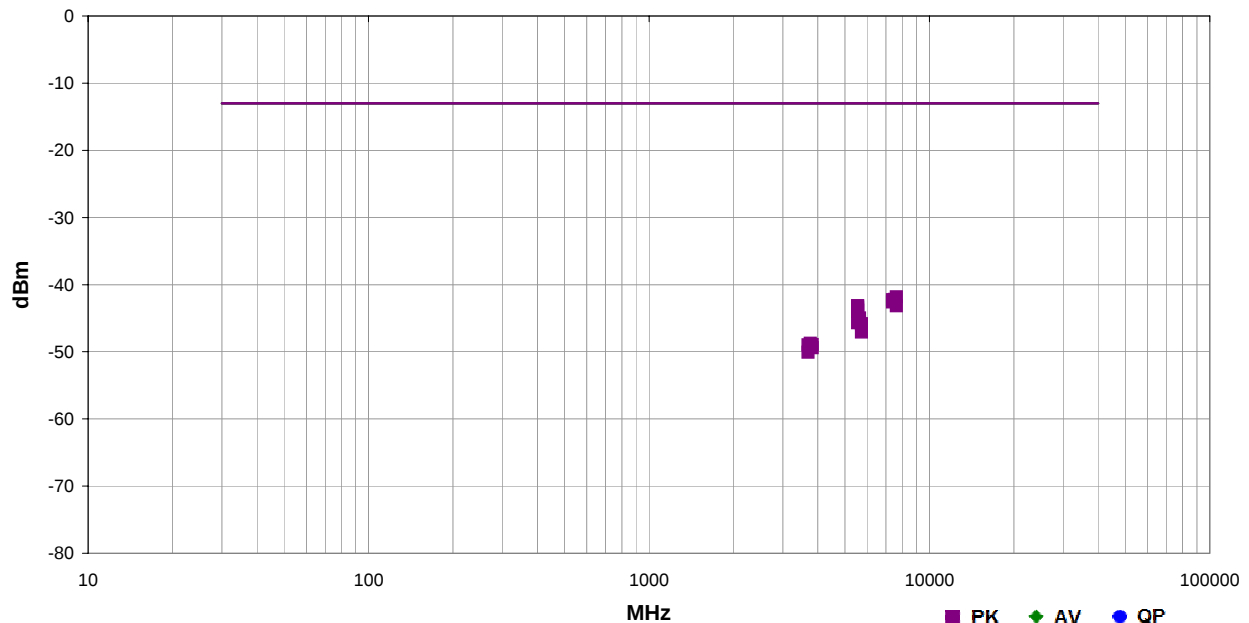
Out of Band Emissions - Part 24E UMTS

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	07/01/13	
Project:	None	Temperature:	24.6 °C	
Job Site:	OC10	Humidity:	45.3% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1010.6 mbar	Tested by: Johnny Candelas
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting GRPS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C:2004

Run #	29	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------

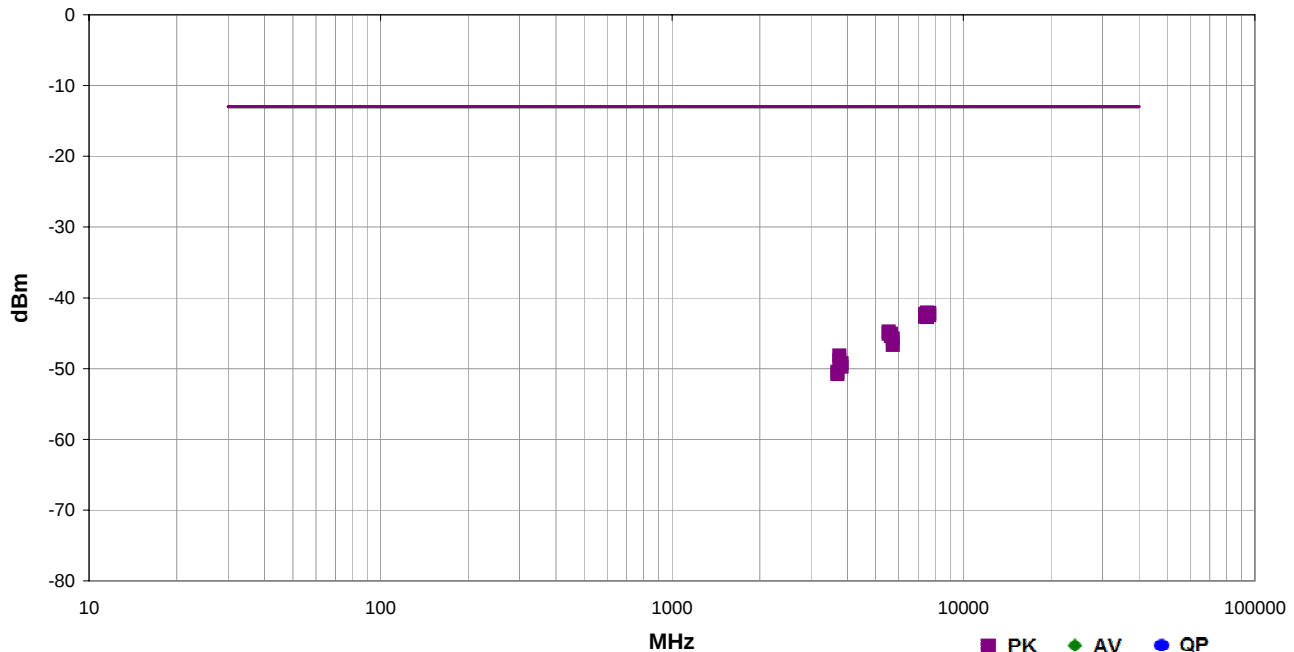


Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7638.420	2.9	318.0	Vert	PK	6.53E-08	-41.9	-13.0	-28.9	High Ch 810, GPRS, EUT flat
7520.650	1.2	155.0	Vert	PK	6.00E-08	-42.2	-13.0	-29.2	Mid Ch 661, GPRS, EUT flat
7400.313	1.2	181.0	Horz	PK	5.92E-08	-42.3	-13.0	-29.3	Low Ch 512, GPRS, EUT flat
7519.353	1.2	153.0	Horz	PK	5.73E-08	-42.4	-13.0	-29.4	Mid Ch 661, GPRS, EUT flat
7401.747	1.2	142.0	Vert	PK	5.52E-08	-42.6	-13.0	-29.6	Low Ch 512, GPRS, EUT flat
7638.830	1.2	190.0	Horz	PK	4.84E-08	-43.2	-13.0	-30.2	High Ch 810, GPRS, EUT flat
5550.493	1.4	209.0	Vert	PK	4.80E-08	-43.2	-13.0	-30.2	Low Ch 512, GPRS, EUT flat
5550.377	1.8	46.0	Vert	PK	4.80E-08	-43.2	-13.0	-30.2	Low Ch 512, GPRS, EUT on side
5550.700	1.1	335.0	Vert	PK	4.59E-08	-43.4	-13.0	-30.4	Low Ch 512, GPRS, EUT vertical
5550.457	1.1	50.0	Horz	PK	4.28E-08	-43.7	-13.0	-30.7	Low Ch 512, GPRS, EUT flat
5551.027	1.1	309.0	Horz	PK	4.09E-08	-43.9	-13.0	-30.9	Low Ch 512, GPRS, EUT on side
5639.520	1.2	168.0	Vert	PK	3.17E-08	-45.0	-13.0	-32.0	Mid Ch 661, GPRS, EUT flat
5640.417	1.2	272.0	Horz	PK	2.76E-08	-45.6	-13.0	-32.6	Mid Ch 661, GPRS, EUT flat
5549.937	1.2	313.0	Horz	PK	2.70E-08	-45.7	-13.0	-32.7	Low Ch 512, GPRS, EUT vertical
5729.877	1.2	181.0	Horz	PK	2.60E-08	-45.9	-13.0	-32.9	High Ch 810, GPRS, EUT flat
5729.177	1.2	135.0	Vert	PK	1.97E-08	-47.1	-13.0	-34.1	High Ch 810, GPRS, EUT flat
3760.320	1.2	275.0	Vert	PK	1.34E-08	-48.7	-13.0	-35.7	Mid Ch 661, GPRS, EUT flat
3819.730	1.2	213.0	Horz	PK	1.28E-08	-48.9	-13.0	-35.9	High Ch 810, GPRS, EUT flat
3700.297	2.0	307.0	Horz	PK	1.27E-08	-49.0	-13.0	-36.0	Low Ch 512, GPRS, EUT flat
3760.217	1.2	243.0	Horz	PK	1.16E-08	-49.3	-13.0	-36.3	Mid Ch 661, GPRS, EUT flat
3819.767	1.2	243.0	Vert	PK	1.14E-08	-49.4	-13.0	-36.4	High Ch 810, GPRS, EUT flat
3700.973	1.2	164.0	Vert	PK	9.83E-09	-50.1	-13.0	-37.1	Low Ch 512, GPRS, EUT flat

Work Order:	TRPO0084	Date:	07/01/13	
Project:	None	Temperature:	24.6 °C	
Job Site:	OC10	Humidity:	45.3% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1010.6 mbar	
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting EGPRS, PCS 1900 - Low Channel 512: 1850.2MHz, Mid Channel 661: 1880MHz, and High Channel 810: 1909.8MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
RSS-133:2013	RSS-133:2013

Run #	29	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
7519.377	1.2	351.0	Horz	PK	6.14E-08	-42.1	-13.0	-29.1	Mid Ch 661, E-GPRS, EUT flat
7640.143	2.4	260.0	Vert	PK	6.10E-08	-42.1	-13.0	-29.1	High Ch 810, EGPRS, EUT flat
7401.023	1.2	115.0	Vert	PK	5.92E-08	-42.3	-13.0	-29.3	Low Ch 512, E-GPRS, EUT flat
7638.340	1.6	307.0	Horz	PK	5.68E-08	-42.5	-13.0	-29.5	High Ch 810, EGPRS, EUT flat
7400.780	1.8	326.0	Horz	PK	5.40E-08	-42.7	-13.0	-29.7	Low Ch 512, E-GPRS, EUT flat
7519.617	1.5	171.0	Vert	PK	5.35E-08	-42.7	-13.0	-29.7	Mid Ch 661, E-GPRS, EUT flat
5550.613	1.2	130.0	Vert	PK	3.32E-08	-44.8	-13.0	-31.8	Low Ch 512, E-GPRS, EUT flat
5550.800	1.2	322.0	Horz	PK	3.10E-08	-45.1	-13.0	-32.1	Low Ch 512, E-GPRS, EUT flat
5639.273	1.6	68.0	Vert	PK	3.10E-08	-45.1	-13.0	-32.1	Mid Ch 661, E-GPRS, EUT flat
5639.537	1.2	305.0	Horz	PK	2.89E-08	-45.4	-13.0	-32.4	Mid Ch 661, E-GPRS, EUT flat
5728.717	1.2	237.0	Horz	PK	2.66E-08	-45.8	-13.0	-32.8	High Ch 810, EGPRS, EUT flat
5729.523	2.0	135.0	Vert	PK	2.16E-08	-46.7	-13.0	-33.7	High Ch 810, EGPRS, EUT flat
3760.077	1.6	298.0	Vert	PK	1.53E-08	-48.1	-13.0	-35.1	Mid Ch 661, E-GPRS, EUT flat
3760.183	1.7	241.0	Horz	PK	1.31E-08	-48.8	-13.0	-35.8	Mid Ch 661, E-GPRS, EUT flat
3819.303	1.2	211.0	Horz	PK	1.19E-08	-49.2	-13.0	-36.2	High Ch 810, EGPRS, EUT flat
3820.413	1.2	177.0	Vert	PK	1.06E-08	-49.7	-13.0	-36.7	High Ch 810, EGPRS, EUT flat
3700.537	1.2	50.0	Horz	PK	8.96E-09	-50.5	-13.0	-37.5	Low Ch 512, E-GPRS, EUT flat
3700.607	1.2	143.0	Vert	PK	8.36E-09	-50.8	-13.0	-37.8	Low Ch 512, E-GPRS, EUT flat



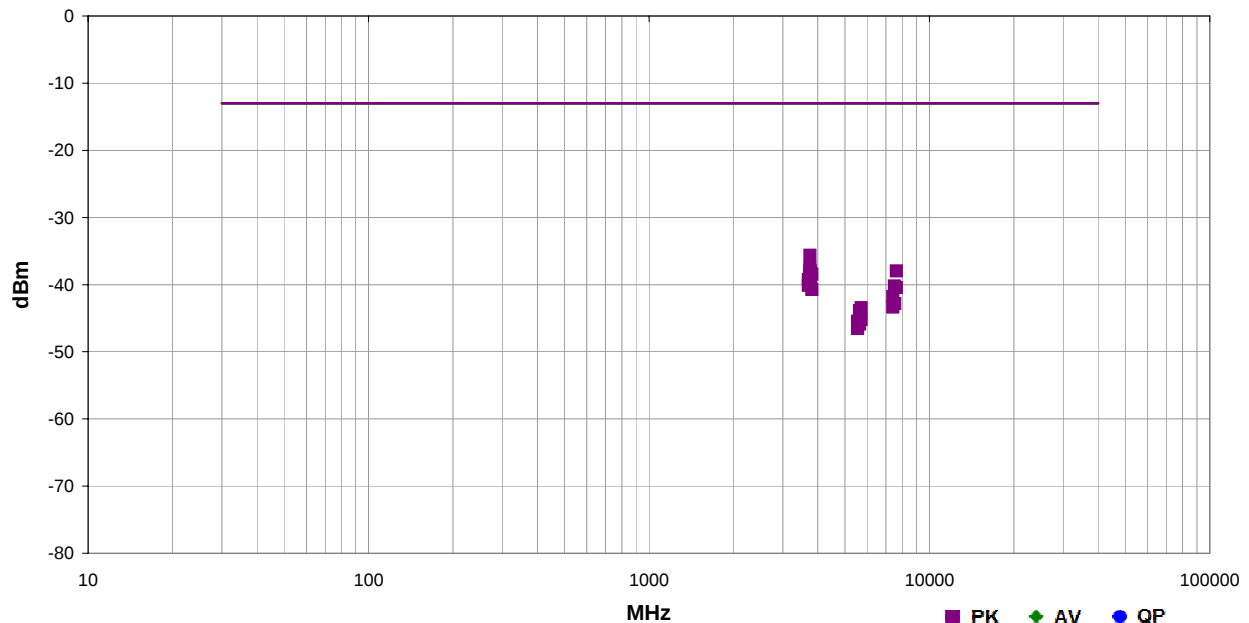
Out of Band Emissions - Part 24E UMTS

PSA-ESCI 2012.12.14
PSA-ESCI Version 2013.2.20

Work Order:	TRPO0084	Date:	07/02/13	
Project:	None	Temperature:	24 °C	
Job Site:	OC10	Humidity:	50.5% RH	
Serial Number:	RS1WC39899	Barometric Pres.:	1013.8 mbar	Tested by: Johnny Candelas
EUT:	Ranger/TSC3			
Configuration:	1			
Customer:	Trimble Navigation Limited MCS			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting WCDMA, Cell Band II - Low Channel 9262: 1852.4MHz, Mid Channel 9400: 1880MHz, and High Channel 9538: 1907.6MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 24E:2013	ANSI/TIA/EIA-603-C:2004

Run #	57	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
-------	----	-------------------	---	-------------------	------	---------	------



Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
3757.850	1.5	117.0	Horz	PK	2.72E-07	-35.7	-13.0	-22.7	Mid Ch 9400, EUT on side
3758.117	1.1	98.0	Vert	PK	1.80E-07	-37.5	-13.0	-24.5	Mid Ch 9400, EUT on side
3757.833	1.3	106.0	Vert	PK	1.64E-07	-37.9	-13.0	-24.9	Mid Ch 9400, EUT flat
7634.200	1.2	194.0	Horz	PK	1.60E-07	-38.0	-13.0	-25.0	High Ch 9538, EUT on side
3761.917	1.2	360.0	Horz	PK	1.57E-07	-38.0	-13.0	-25.0	Mid Ch 9400, EUT vertical
3817.000	1.6	25.0	Horz	PK	1.44E-07	-38.4	-13.0	-25.4	High Ch 9538, EUT on side
3758.133	1.4	9.0	Vert	PK	1.33E-07	-38.8	-13.0	-25.8	Mid Ch 9400, EUT vertical
3702.750	1.2	171.0	Horz	PK	1.19E-07	-39.3	-13.0	-26.3	Low Ch 9262, EUT on side
3762.150	1.9	41.0	Horz	PK	9.94E-08	-40.0	-13.0	-27.0	Mid Ch 9400, EUT flat
3707.083	1.2	80.0	Vert	PK	9.71E-08	-40.1	-13.0	-27.1	Low Ch 9262, EUT on side
7519.933	1.2	196.0	Horz	PK	9.51E-08	-40.2	-13.0	-27.2	Mid Ch 9400, EUT on side
7635.367	1.2	235.0	Vert	PK	8.99E-08	-40.5	-13.0	-27.5	High Ch 9538, EUT on side
3813.233	1.2	102.0	Vert	PK	8.44E-08	-40.7	-13.0	-27.7	High Ch 9538, EUT on side
7412.233	1.2	298.0	Horz	PK	6.65E-08	-41.8	-13.0	-28.8	Low Ch 9262, EUT on side
7524.883	1.2	210.0	Vert	PK	5.23E-08	-42.8	-13.0	-29.8	Mid Ch 9400, EUT on side
7413.450	1.2	337.0	Vert	PK	4.60E-08	-43.4	-13.0	-30.4	Low Ch 9262, EUT on side
5720.483	1.3	207.0	Horz	PK	4.53E-08	-43.4	-13.0	-30.4	High Ch 9538, EUT on side
5635.633	1.2	268.0	Vert	PK	4.10E-08	-43.9	-13.0	-30.9	Mid Ch 9400, EUT on side
5719.000	1.2	271.0	Vert	PK	3.00E-08	-45.2	-13.0	-32.2	High Ch 9538, EUT on side
5553.650	1.5	208.0	Horz	PK	2.83E-08	-45.5	-13.0	-32.5	Low Ch 9262, EUT on side
5637.300	1.2	201.0	Horz	PK	2.58E-08	-45.9	-13.0	-32.9	Mid Ch 9400, EUT on side
5561.583	2.8	188.0	Vert	PK	2.20E-08	-46.6	-13.0	-33.6	Low Ch 9262, EUT on side