

TEST REPORT

Report Number: 201400902LEX-003
Project Number: G102400902

Report Issue Date: 5/11/2016

Product Name: 6500C

FCC Standards: FCC Part 22 and 24
(Radiated Spurious Emissions)

Industry Canada Standards: RSS-132 Issue 3 and RSS-133 Issue 6
(Radiated Spurious Emissions)

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TABLE OF CONTENTS

1	<i>Introduction and Conclusion</i>	3
2	<i>Test Summary</i>	3
3	<i>Description of Equipment Under Test</i>	4
4	<i>Radiated Spurious Emissions (Transmitter)</i>	6
5	<i>Measurement Uncertainty</i>	10
6	<i>Revision History</i>	11

1 Introduction and Conclusion

The tests indicated in Section 2 were performed on the product constructed as described in Section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington laboratory is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under Registration Number 485103.

2 Test Summary

Page	Test full name	FCC Reference	Industry Canada	Result
6	Radiated Spurious Emissions (Transmitter)	§2.1053 §22.917(a)(b) §24.238(a)(b)	RSS-132 (5.5) RSS-133 (6.5)	Pass
---	Conducted Output Power, ERP, EIRP	§2.1046 §24.232(d)	RSS-132 (5.4) RSS-133 (6.4)	Pass
---	Conducted Spurious Emissions	§2.1051 §22.917(a)(b) §24.238(a)(b)	RSS-132 (5.5) RSS-133 (6.5)	Pass
---	Frequency Stability	§2.1055 §22.355 §24.235	RSS-132 (5.3) RSS-133 (6.3)	Pass
---	Occupied Bandwidth, 26dB Emission Bandwidth	§2.1049 §22.917(b)(d) §24.238(a)	RSS-GEN (4.6.1) RSS-133 (2.3)	Pass

Note: This test report contains only radiated spurious emission data. The remainder of the testing was performed on the antenna ports of the module and the results still pertain to the host with the module integrated. Reference the module test report for that data.

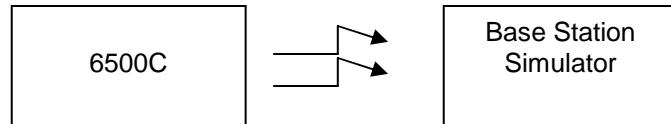
3 Description of Equipment Under Test

Equipment Under Test	
Manufacturer	NetworkFleet, Inc.
Model Number	6500C
Serial Number	Test Sample 1
Receive Date	4/27/2016
Test Start Date	4/20/2016
Test End Date	4/28/2016
Device Received Condition	Good
Test Sample Type	Production
Frequency Band	824.7MHz – 848.31MHz (Cell Band) 1851.25MHz – 1908.75MHz (PCS Band)
Modulation Type	CDMA
Transmission Control	Base Station Simulator
Maximum Output Power (Conducted)	24.65dBm (Cell Band) 24.44dBm (PCS Band)
Antenna Type	Internal
Operating Voltage	12VDC

Description of Equipment Under Test	
The 6500C is a tracking device used in vehicles for asset management purposes.	

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitting on low, mid, or high channels
2	Receive / Idle Mode

3.1 System setup including cable interconnection details, support equipment and simplified block diagram**3.2 EUT Block Diagram:**

Block Diagram for Radiated Tests

3.3 Cables:

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
12VDC Power Cable	6ft	None	None	DC Source	DC Input

3.4 Support Equipment:

Support Equipment			
Description	Manufacturer	Model Number	Asset Number
Power Supply	HP	6296A	1036

4 Radiated Spurious Emissions (Transmitter)

4.1 Test Limits

§ 2.1051

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 22.917

- (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
- (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§ 24.238

- (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
- (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4.2 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The EUT was forced to transmit at its maximum output power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to the tenth harmonic was investigated in order to identify the spurious emission. Once the spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-D. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

4.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	1302.6005.40	Rohde&Schwarz	ESU40	9/20/2015	9/20/2016
Preamplifier	122005	Rohde&Schwarz	TS-PR18	11/19/2015	11/19/2016
Horn Antenna	00156319	ETS	3117	5/15/2015	5/15/2016
Horn Antenna	00154521	ETS	3117	11/3/2015	11/3/2016
Biconnical Antenna	3958	ETS	3180B	3/8/2016	3/8/2017
Biconnilog Antenna	00051864	ETS	3142C	3/23/2016	3/23/2017
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use
High Pass Filter	1	Wainwright	WHKX12-2533.85-2710-18000-40SS	Time of Use	Time of Use
High Pass Filter	25	Wainwright	WHKX12-1028.5-1100-1500-40SS	Time of Use	Time of Use
Base Station Simulator	3917	Rohde & Schwarz	CMW500	9/19/2015	9/19/2016
Signal Generator	3915	Rohde&Schwarz	SMB100A	9/18/2015	9/18/2016

4.4 Results:

All radiated spurious emissions were attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB which is equivalent to -13dBm.

Worst Case Spurious Measurements – Cell Band

Radiated Spurious Emissions Measurement								
Test Engineer:	Carmen Davis		Start Date:	4/27/2016		End Date:	4/28/2016	
Temperature:	23.4C		Humidity:	53.60%		Pressure:	988.9mBar	
RBW:	1MHz		VBW:	3MHz				
Notes: Results represent the worst case from 3 orthogonal axis positions.								
Band/Channel	Spurious Frequency (MHz)	Polarity	Device Reading (dBm)	Signal Generator Level (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBd)	Limit (dBm)	Radiated Spurious Emission Level (dBm)
CDMA Cell Band Low Channel (1013)	1649.4	H	-43.3	-38.96	3.26	6.14	-13	-36.08
	1649.4	V	-43.22	-36.58	3.26	6.14	-13	-33.70
	2474.1	H	-53.11	-44.02	4.17	5.66	-13	-42.53
	2474.1	V	-55.73	-45.15	4.17	5.66	-13	-43.66
	3298.8	H	-74.52	-64.65	4.58	7.44	-13	-61.79
	3298.8	V	-70.66	-59.34	4.58	7.44	-13	-56.48
	4123.5	H	-62.43	-50.62	5.33	8.81	-13	-47.14
	4123.5	V	-66.99	-54.34	5.33	8.81	-13	-50.86
	4948.2	H	-77.69	-63.66	5.82	9.86	-13	-59.63
	4948.2	V	-77.55	-63.26	5.82	9.86	-13	-59.23
CDMA Cell Band Mid Channel (384)	1673.04	H	-30.35	-25.53	3.30	6.11	-13	-22.72
	1673.04	V	-35.38	-28.17	3.30	6.11	-13	-25.36
	2509.56	H	-48.12	-38.9	3.97	5.68	-13	-37.19
	2509.56	V	-47.75	-37.42	3.97	5.68	-13	-35.71
	3346.08	H	-66.12	-56.27	4.63	7.56	-13	-53.34
	3346.08	V	-65.43	-54.08	4.63	7.56	-13	-51.15
	4182.6	H	-57.91	-45.89	5.19	8.97	-13	-42.11
	4182.6	V	-56.74	-43.91	5.19	8.97	-13	-40.13
	5019.12	H	-66.87	-52.48	6.19	10.00	-13	-48.67
	5019.12	V	-66.98	-52.81	6.19	10.00	-13	-49.00
CDMA Cell Band High Channel (777)	1696.62	H	-45.27	-39.86	3.48	6.11	-13	-37.23
	1696.62	V	-44.81	-36.84	3.48	6.11	-13	-34.21
	2544.93	H	-56.38	-47.19	4.09	5.68	-13	-45.60
	2544.93	V	-63.25	-52.96	4.09	5.68	-13	-51.37
	3393.24	H	-76.02	-65.97	4.84	7.74	-13	-63.07
	3393.24	V	-77.29	-65.83	4.84	7.74	-13	-62.93
	4241.55	H	-70.09	-58.07	5.00	9.12	-13	-53.95
	4241.55	V	-64.68	-51.92	5.00	9.12	-13	-47.80
	5089.86	H	-77.07	-62.84	6.25	10.08	-13	-59.01
	5089.86	V	-77.54	-63.19	6.25	10.08	-13	-59.36

F=B-C+D

Worst Case Spurious Measurements – PCS Band

Radiated Spurious Emissions Measurement														
Test Engineer:	Carmen Davis	Start Date:	4/27/2016	End Date:	4/28/2016									
Temperature:	23.4C	Humidity:	53.60%	Pressure: 988.9mBar										
RBW:	1MHz	VBW:	3MHz											
Notes: Results represent the worst case from 3 orthogonal axis positions.														
Band/Channel	Spurious Frequency (MHz)	Polarity	Device Reading (dBm)	Signal Generator Level (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBd)	Limit (dBm)	Radiated Spurious Emission Level (dBm)						
CDMA PCS Band Low Channel (25)	3702.50	H	-44.5	-33.05	4.85	8.14	-13	-29.76						
	3702.50	V	-47.48	-35.27	4.85	8.14	-13	-31.98						
	5553.75	H	-64.61	-48.04	6.91	10.50	-13	-44.45						
	5553.75	V	-61.18	-45.35	6.91	10.50	-13	-41.76						
	7405.00	H	-75.24	-55.73	7.75	11.85	-13	-51.63						
	7405.00	V	-74.89	-56.93	7.75	11.85	-13	-52.83						
	9256.25	H	-77.82	-56.59	9.21	13.16	-13	-52.64						
	9256.25	V	-77.58	-58.14	9.21	13.16	-13	-54.19						
	11107.50	H	-77.15	-51.98	10.47	13.08	-13	-49.37						
	11107.50	V	-78.11	-30.1	10.47	13.08	-13	-27.49						
CDMA PCS Band Mid Channel (600)	3760.00	H	-48.06	-37.04	5.20	8.16	-13	-34.09						
	3760.00	V	-47.01	-35.03	5.20	8.16	-13	-32.08						
	5640.00	H	-65.23	-49.22	7.09	10.52	-13	-45.80						
	5640.00	V	-62.76	-47.75	7.09	10.52	-13	-44.33						
	7520.00	H	-73.03	-53.09	8.01	11.98	-13	-49.12						
	7520.00	V	-72.56	-54.11	8.01	11.98	-13	-50.14						
	9400.00	H	-77.76	-56.05	9.15	13.20	-13	-52.00						
	9400.00	V	-78.15	-57.76	9.15	13.20	-13	-53.71						
	11280.00	H	-78.25	-52.36	10.16	13.08	-13	-49.44						
	11280.00	V	-78.77	-53.99	10.16	13.08	-13	-51.07						
CDMA PCS Band High Channel (1175)	3817.50	H	-49.06	-37.43	5.00	8.21	-13	-34.22						
	3817.50	V	-50.98	-38.36	5.00	8.21	-13	-35.15						
	5726.25	H	-64.71	-47.12	7.06	10.61	-13	-43.57						
	5726.25	V	-62.49	-46.01	7.06	10.61	-13	-42.46						
	7635.00	H	-73.19	-54.61	8.15	11.95	-13	-50.82						
	7635.00	V	-76.31	-58.86	8.15	11.95	-13	-55.07						
	9543.75	H	-77.44	-55.09	8.41	13.16	-13	-50.34						
	9543.75	V	-78.66	-58.02	8.41	13.16	-13	-53.27						
	11452.50	H	-78.82	-52.19	9.51	13.08	-13	-48.62						
	11452.50	V	-78.16	-52.52	9.51	13.08	-13	-48.95						

F=B-C+D

5 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of $k = 2$, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty	Notes
Radiated emissions, 30 to 1000 MHz	+3.9dB	
Radiated emissions, 1 to 18 GHz	+4.2dB	
Radiated emissions, 18 to 40 GHz	+4.3dB	
Power Port Conducted emissions, 150kHz to 30 MHz	+2.8dB	

6 Revision History

Revision Level	Date	Report Number	Notes
0	5/11/2016	201400902LEX-003	Original Issue