Supplementary Test Measurements
to Demonstrate IPJ-R1000
Section 15.247 (a) 1. Compliance to
"Each frequency must be used equally on the average by each transmitter".

September 2007

Tests Description

The same test measurement sequence is run three times:
1. Reader configured with all 50 channels as high power channels; this is the default reader configuration if the low power channel feature is not enabled.
2. Reader configured with 48 high power channels and 2 low power channels; this is the minimum number of low power channels a user could specify when using the reader.
3. Reader configured with 34 high power channels and 16 low power channels; this is the maximum number of low power channels a user could specify when using the reader.

Test equipment used is a Tektronix RSA3303A with the reader connected via RF cable as shown on photo.

The reader is started to perform RFID tag inventory and a PC program controls the RSA3303A via GPIB in order to automate the exact measurements of 20 captures per channel. The measurements taken are:
- dwell times on the channel
- period(s) of the dwell as defined by interval between two successive power ramp on the channel being monitored

Out of all captures for a given channel N, the average period time ($T_{Period(channel\ N)}$) and dwell time ($T_{dwell(channel\ N)}$) are computed.

RSA3303A is configured as follows:
- SPAN: 200 kHz
- Acquisition length: 12s

For instance, in the following example capture taken with 50 full power channels:
- dwell times measured at 202.63125 ms (shown by markers) and 202.43675 ms (not shown)
- period measured at 10.17874375 s (shown by markers)
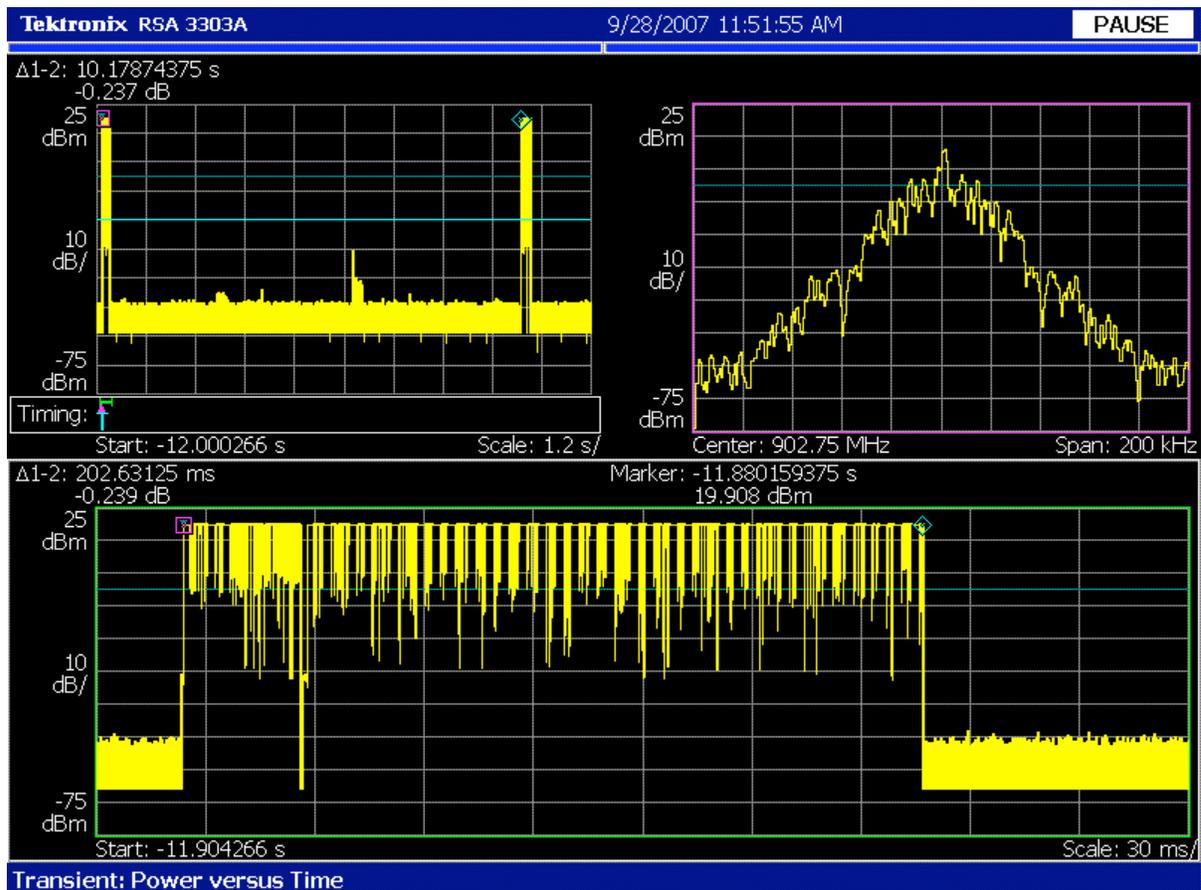
Results are then normalized into average occupancy within 20s for each channel using:
Occupancy(channel N) = (20s / $T_{Period(channel\ N)}$) x $T_{dwell(channel\ N)}$

Average percentage of ON time for any given channel within 20s is then computed to demonstrate in each configuration compliance to Section 15.247 (a) 1. "Each frequency must be used equally on the average by each transmitter".

Results when reader is configured with 50 high power channels
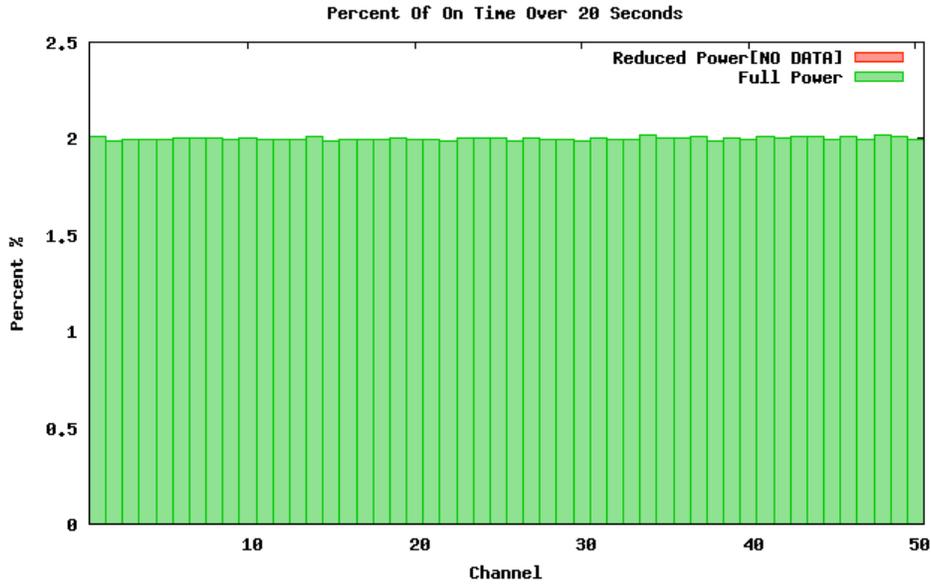
		Over 20 s	
Channel	**Power**	**Average occupancy (ms)**	**Percentage of total ON Time (%)**
1	Full	397.917	2.0097
2	Full	394.042	1.9901
3	Full	395.704	1.9985
4	Full	395.813	1.9991
5	Full	394.362	1.9918
6	Full	395.985	2
7	Full	395.978	1.9999
8	Full	396.518	2.0026
9	Full	395.652	1.9983
10	Full	397.246	2.0063
11	Full	395.689	1.9985
12	Full	394.504	1.9925
13	Full	395.816	1.9991
14	Full	397.716	2.0087
15	Full	393.962	1.9897
16	Full	395.843	1.9992
17	Full	394.833	1.9941
18	Full	395.746	1.9987
19	Full	396.195	2.001
20	Full	394.734	1.9936

21	Full	394.468	1.9923
22	Full	394.285	1.9914
23	Full	396.496	2.0025
24	Full	396.451	2.0023
25	Full	396.194	2.001
26	Full	394.295	1.9914
27	Full	395.939	1.9997
28	Full	395.448	1.9972
29	Full	395.405	1.997
30	Full	393.087	1.9853
31	Full	397.314	2.0067
32	Full	394.925	1.9946
33	Full	395.509	1.9976
34	Full	399.053	2.0154
35	Full	396.714	2.0036
36	Full	396.299	2.0015
37	Full	397.458	2.0074
38	Full	393.154	1.9857
39	Full	397.003	2.0051
40	Full	394.512	1.9925
41	Full	398.398	2.0121
42	Full	396.998	2.0051
43	Full	397.409	2.0071
44	Full	398.465	2.0125
45	Full	395.239	1.9962
46	Full	397.566	2.0079
47	Full	395.058	1.9953
48	Full	399.578	2.0181
49	Full	397.676	2.0085
50	Full	395.05	1.9952

Results when reader is configured with 48 high power channels and 2 low power channels

Percent Of On Time Over 20 Seconds
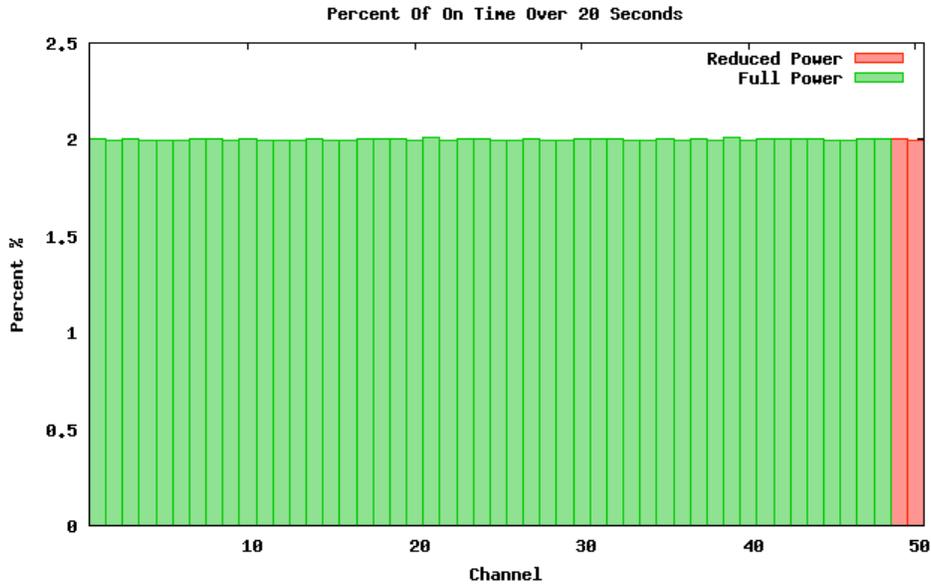
Channel	Power	Over 20 s	
		Average occupancy (ms)	Percentage of total ON Time (%)
1	Full	393.752	2.0035
2	Full	392.84	1.9989
3	Full	392.965	1.9995
4	Full	392.455	1.9969
5	Full	391.44	1.9917
6	Full	392.129	1.9952
7	Full	394.238	2.006
8	Full	393.655	2.003
9	Full	392.692	1.9981
10	Full	394.095	2.0052
11	Full	392.79	1.9986
12	Full	392.657	1.9979
13	Full	392.624	1.9978
14	Full	393.386	2.0016
15	Full	392.367	1.9965
16	Full	392.863	1.999
17	Full	393.671	2.0031
18	Full	393.168	2.0005
19	Full	393.873	2.0041
20	Full	392.39	1.9966
21	Full	394.818	2.0089
22	Full	392.82	1.9988
23	Full	393.42	2.0018
24	Full	394.312	2.0063

25	Full	392.857	1.9989
26	Full	392.217	1.9957
27	Full	393.185	2.0006
28	Full	392.742	1.9984
29	Full	392.663	1.998
30	Full	392.995	1.9996
31	Full	394.394	2.0068
32	Full	393.424	2.0018
33	Full	392.401	1.9966
34	Full	392.187	1.9955
35	Full	393.638	2.0029
36	Full	391.91	1.9941
37	Full	393.325	2.0013
38	Full	391.688	1.993
39	Full	394.623	2.0079
40	Full	391.83	1.9937
41	Full	393.001	1.9997
42	Full	393.891	2.0042
43	Full	393.652	2.003
44	Full	393.899	2.0042
45	Full	392.213	1.9957
46	Full	392.26	1.9959
47	Full	393.465	2.002
48	Full	393.515	2.0023
49	Reduced	393.129	2.0003
50	Reduced	392.679	1.998

Results when reader is configured with 34 high power channels and 16 low power channels

Percent Of On Time Over 20 Seconds
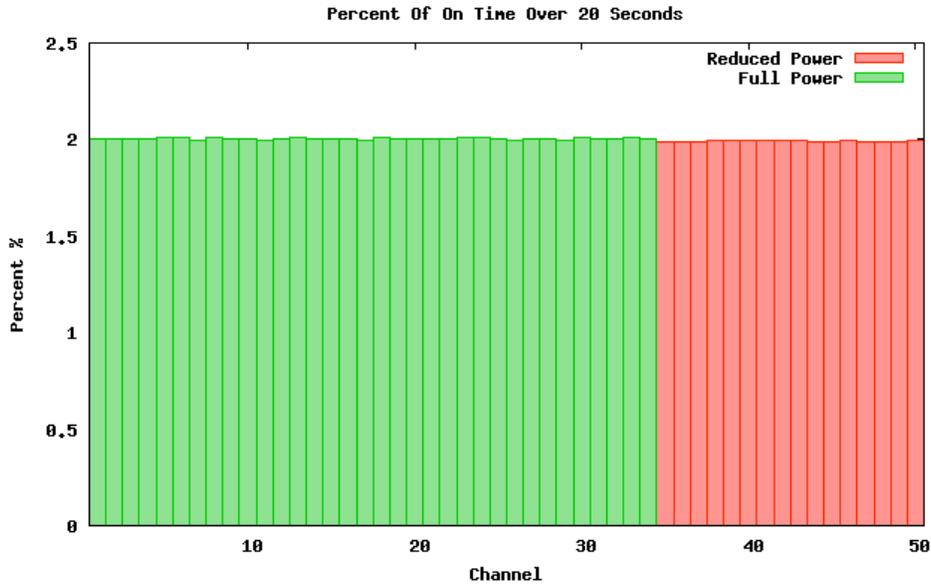
| Channel | Power | Over 20 s | |
		Average occupancy (ms)	Percentage of total ON Time (%)
1	Full	395.846	2.0055
2	Full	395.768	2.0051
3	Full	395.448	2.0034
4	Full	394.843	2.0004
5	Full	396.898	2.0108
6	Full	396.463	2.0086
7	Full	394.543	1.9989
8	Full	396.545	2.009
9	Full	394.646	1.9994
10	Full	395.647	2.0045
11	Full	394.589	1.9991
12	Full	395.614	2.0043
13	Full	396.89	2.0108
14	Full	396.037	2.0064
15	Full	394.653	1.9994
16	Full	394.915	2.0007
17	Full	394.576	1.999
18	Full	396.334	2.0079
19	Full	394.813	2.0002
20	Full	395.753	2.005
21	Full	395.051	2.0014
22	Full	395.425	2.0033
23	Full	396.167	2.0071
24	Full	396.148	2.007

25	Full	395.888	2.0057
26	Full	394.097	1.9966
27	Full	394.948	2.0009
28	Full	395.817	2.0053
29	Full	393.94	1.9958
30	Full	396.704	2.0098
31	Full	395.324	2.0028
32	Full	395.683	2.0046
33	Full	397.275	2.0127
34	Full	395.934	2.0059
35	Reduced	392.95	1.9908
36	Reduced	392.947	1.9908
37	Reduced	393.041	1.9913
38	Reduced	393.237	1.9922
39	Reduced	393.219	1.9922
40	Reduced	393.474	1.9934
41	Reduced	393.168	1.9919
42	Reduced	393.143	1.9918
43	Reduced	393.163	1.9919
44	Reduced	393.034	1.9912
45	Reduced	392.924	1.9907
46	Reduced	393.164	1.9919
47	Reduced	392.858	1.9903
48	Reduced	393.011	1.9911
49	Reduced	392.687	1.9895
50	Reduced	393.113	1.9916