



Confidential Report

<b>Client:</b>	<b>Test of:</b>
<b>Irish Aviation Authority Shannon Area Control Centre Ballycasey Shannon Co. Clare</b>	<b>EMF Survey of IAA Radar at Dooncarton, Ballina, Co. Mayo</b>
<b>Attention: Mr. Ray Whitsell</b>	

---

**COPIES TO: File**

---

**REPORT REF: 11E3725-3**

**TESTED BY: Paul Reilly**

---

**DATE RECEIVED: October 2011**

**REPORT BY: Paul Reilly**

---

**ISSUE DATE: October 2011**

**AUTHORISED SIGNATORY: J McAuley**

---

## Compliance Engineering Ireland Ltd Terms and Conditions

1. All quotations are submitted, orders are accepted and services supplied by Compliance Engineering Ireland Limited ("CEIL") subject to and upon the following express Terms and Conditions and all other Conditions, warranties and representations express or implied and statutory or otherwise are hereby excluded insofar as it is lawful to do so. No addition thereto or variation therefrom, contained or referred to in the Customers order form or otherwise effected shall apply unless specifically agreed in writing by a duly Authorised Officer of CEIL.
2. All orders including any based on a quotation previously submitted by CEIL are subject to acceptance in writing by CEIL.
- 3.(a) The prices set out in any quotation are based upon current costs and if there is any variation in the said costs between the date of the order or Contract and delivery of the final report CEIL shall be entitled to adjust prices to reflect such variations.
  - b) In the event of any suspension or variation of work arising from the Customer's instructions or lack of instructions the price set out in any quotation may be increased to cover any extra expense incurred by CEIL.
  - c) All prices quoted are strictly NET. The customer shall where applicable, in addition to the relevant price, pay a sum equal to the VAT chargeable in respect of the supply of services.
  - d) Accounts must be paid in full in advance or by way of an irrevocable letter of credit opened with a Bank approved by CEIL unless credit terms have been agreed by CEIL in which event accounts must be paid in full within 1 month from the date of the invoice. Time for payment is of the essence and the customer shall be liable to pay any outstanding amount from its due date until the date of payment at a rate of 2% per month or part thereof.
4. Any times quoted for the performance of services are to be treated as estimates only. CEIL shall not be liable in any manner whatsoever for failure to perform services within the time quoted, nor in such circumstances shall the Customer be entitled to cancel or terminate any order or contract.
5. The Customer is responsible for delivery to CEIL of test item(s) free of any duty, VAT, freight charges etc. unless otherwise agreed in writing by CEIL.
6. The Customer shall be responsible for collecting non-perishable samples received for testing or laboratory work upon completion of tests or laboratory work. If the Customer fails to collect such samples within 90 days from completion of the tests or laboratory work CEIL shall be entitled without further notice to dispose of the samples without liability.
7. No action or legal proceedings shall be taken (except in the case of wilful neglect or default) against CEIL by reason of or arising out of any research, investigation, test or analyses or the publication of the results thereof in the name of CEIL. Under no circumstances shall CEIL be liable to the Customer for any indirect, incidental, special or consequential damages of any nature whatsoever (including but not limited to loss of use, revenue, profit, data or business opportunity) either based upon a claim or action in Contract or in Tort, indemnity or contribution, or otherwise arising out of the Contract or performance of services by CEIL even if CEIL has been advised of the possibility of such damages. The limit of CEIL's aggregate liability (whether in Contract, Tort, strict liability in Tort or by statute or otherwise) to the Customer or to any third party for non-performance by CEIL and for any and all other claims shall not in the aggregate exceed the fees paid by the Customer to CEIL. The Customer shall indemnify CEIL against all claims made against CEIL by any third party arising from this Contract.
8. The copyright of any report is reserved to CEIL and it shall not be used either in whole or in part, for the purposes of advertising, publicity, litigation or otherwise without the prior written consent of a duly Authorised Officer of CEIL where such consent is given the Customer shall comply with any conditions attaching to the consent. In conformance with laboratory accreditation requirements reports shall only be produced in full. The test results tabulated shall relate only to the defined item(s) tested.
9. If in CEIL's judgment, the customer's financial condition is such as could adversely affect the customer's ability to perform any of its obligations or if the customer is in default in any of its obligations to CEIL whether hereunder or under any other Contract CEIL may terminate this Contract and/ or any other Contract between CEIL and the Customer, cancel any uncompleted order or suspend performance of services or the delivery of any reports and if it does so the Customer shall indemnify CEIL against all costs, charges, expense and damages incurred thereby.
10. CEIL will not be liable for non-performance in whole or in part of its obligations if this is attributable to any cause beyond the control of CEIL including (without limitation) any act of god, force majeure, war, civil war, disturbance, rebellion, embargo, strike, labour dispute, illness, flood, fire, sabotage or government action or regulation. If a Contract or order or any part thereof shall become impossible of performance or otherwise frustrated CEIL shall be entitled to reasonable remuneration for any work done up to the date of such impossibility or frustration, due credit being given for any amounts in respect of the Contract or order paid by the Customer.
11. These Conditions and the Contract to which the document relates shall in all respects be governed by and construed in accordance with the laws of the Republic of Ireland and in accordance with the Republic of Ireland shall have exclusive jurisdiction to determine any disputes arising therefrom unless otherwise agreed.

## **EMF Survey of IAA Radar at Dooncarton, Ballina, Co. Mayo**

### **1 Introduction**

At the request of Mr. Ray Whitsell of the Irish Aviation Authority, Compliance Engineering Ireland Ltd., has conducted a survey of the electromagnetic field strengths from the 1030 MHz Radar at Dooncarton, Co Mayo.

Detailed narrowband measurements of the 1030 MHz signal were made at a number of points as requested by the Irish Aviation Authority. The measurements were made to determine compliance with international guidelines on electromagnetic radiation to ensure public safety.

Non-ionising radiation such as that emitted by a radio transmitter has a physiological interaction with the body and guideline limits defining allowable levels have been published.

The measurements were carried out on the 12<sup>th</sup> of October 2011. Mr Ray Whitsell and Mr Gary Corrigan of the Irish Aviation Authority were present for the duration of the survey. Ms Diana Taylor and Mr. Tommy Deane along with other residents were present at different points where measurements were made.

## **2 Discussion of Guideline Safety Levels**

### **2.1 ICNIRP**

The International Commission on Non-Ionising Radiation Protection (ICNIRP) guidelines for limiting exposures to electromagnetic fields were published in 1998. These guidelines were developed in co-operation with the Environmental Health Division of the World Health Organisation (WHO) as part of the WHO Environmental Health Criteria Programme.

### **2.2 EU EMF Recommendation**

The European Commission has published a Recommendation (1999/519/EC) requesting Member States to put in place national legislation setting down maximum limits of non-ionising electromagnetic fields. This Recommendation has closely adopted the ICNIRP 1998 guidelines. It applies to public exposure only.

### **2.3 EU Directive**

Guidelines similar to those adopted by the ICNIRP were adopted in a proposed EU Directive (2004/40/EC), which was intended to ensure the protection of workers from non-ionising electromagnetic fields. The aim of the Directive was to protect workers only and will not specify levels for public areas. This directive is currently under review.

### **2.4 CENELEC Standardisation**

CENELEC, the European Committee for Electrotechnical Standardisation, develops standards to provide protection for both workers and members of the public. CENELEC comprises EU and European Free Trade Association member countries. These standards are based on the ICNIRP guidelines and the EU EMF Recommendation.

## 2.5 ICNIRP 1998 Guideline Limits

Frequency Range	E-field strength (V/m)	H-field strength (A/m)	B-field ( $\mu$ T)	Equivalent plane wave power density, $S_{eq}$ ( $W/m^2$ )
Up to 1 Hz	-	$1.63 \times 10^5$	$2 \times 10^5$	-
1-8 Hz	20000	$1.63 \times 10^5/f^2$	$2 \times 10^5/f^2$	-
8-25 Hz	20000	$2 \times 10^4/f$	$2 \times 10^4/f$	-
0.025-0.82 kHz	$500/f$	$20/f$	$25/f$	-
0.82-65 kHz	610	24.4	30.7	-
0.065-1 MHz	610	$1.6/f$	$2.0/f$	-
1-10 MHz	$610/f$	$1.6/f$	$2.0/f$	-
10-400 MHz	61	0.16	0.2	10
400-2000 MHz	$3f^{1/2}$	$0.008f^{1/2}$	$0.01f^{1/2}$	$f/40$
2-300 GHz	137	0.36	0.45	50

**Table1:** Reference levels for occupational exposure to time-varying electric and magnetic fields.

Frequency Range	E-field strength (V/m)	H-field strength (A/m)	B-field ( $\mu$ T)	Equivalent plane wave power density, $S_{eq}$ ( $W/m^2$ )
Up to 1 Hz	-	$3.2 \times 10^4$	$4 \times 10^4$	-
1-8 Hz	10000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	-
8-25 Hz	10000	$4000/f$	$5000/f$	-
0.025-0.82 kHz	$250/f$	$4/f$	$5/f$	-
0.8-3 kHz	$250/f$	5	6.25	-
3-150 kHz	87	5	6.25	-
0.15-10 MHz	87	$0.73/f$	$0.92/f$	-
1-10 MHz	$87f^{1/2}$	$0.73/f$	$0.92/f$	-
10-400 MHz	28	0.073	0.092	2
400-2000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2-300 GHz	61	0.16	0.20	10

**Table 2:** Reference levels for general public exposure to time-varying electric and magnetic fields.

The guidelines are expressed in terms of induced electric currents in the body and specific absorption rate (SAR) values. Different levels are set for workers and for members of the public. From the basic restrictions ICNIRP derive limits in terms of the root mean square values for the electric and magnetic field strengths and for the equivalent plane wave power flux density.

The appropriate restrictions on exposure recommended by the ICNIRP are summarised below.

The average specific energy absorption rate in the body over any 6-minute period should not exceed 0.4 W/kg for workers or 0.08 W/kg for members of the public at frequencies above 10 MHz.

When taken in conjunction with the above restriction, the maximum value of the specific energy absorption rate in any 0.1 kg of tissue, other than in the hands, wrists, feet and ankles, should not exceed 10 W/kg for workers.

The maximum value of the specific energy absorption rate in any in the hands, wrists, feet and ankles should not exceed 20 W/kg for workers.

In addition to the time averaged limits in the case of pulsed fields the equivalent plane wave power density averaged over a pulse width should not exceed 1000 times the  $P_{eq}$  limits or the field strength should not exceed 32 times the field strength limits.

### **3 Method of Measurement**

A series of narrowband measurements were made around the site, using a spectrum analyser in conjunction with an appropriate antenna.

The antenna tilt and polarization were varied to ascertain the maximum field strengths. The antenna was placed on a non reflective nylon stand. The receiving equipment was operated in maximum hold mode for six minutes at each location. At each location the measuring antenna was oriented to ensure that the maximum component of the field was measured.

Measurements were made at a number of predefined points outlined by the Irish Aviation Authority.

The equipment used for this survey is listed in Appendix A.

### **4 Results**

The results obtained on the 12<sup>th</sup> of October can be seen in from page 8 – 34.

The following information on the radar was provided by the Irish Aviation Authority which is used in the analysis of the final results.

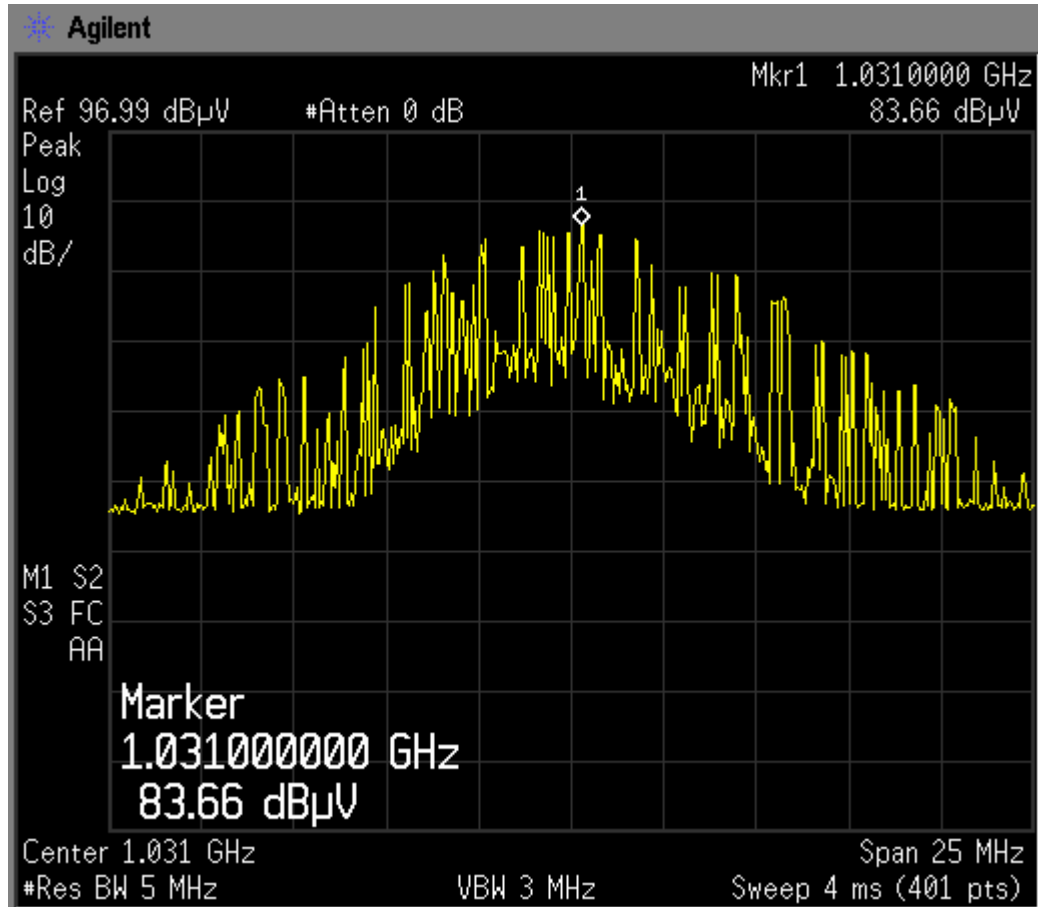
<b>Name</b>	<b>Rotation</b>	<b>Range</b>	<b>Mode</b>	<b>Bandwidth</b>
<b>Dooncarton</b>	<b>5.8</b>	<b>256</b>	<b>SSR</b>	<b>10 MHz</b>

The pulse width of the radar was 800ns (pulse doubles). The Pulse Repetition Rate (PRF) was 208 Hz. The duty cycle was calculated at 3000:1. The ICNIRP requirement is that the peak energy in the pulse is 1000 times the average limit. As such, the peak energy compliance margins are one third of the average compliance results.

Correction factors were applied to the data to account for antenna factors and spectrum analyser pulse desensitisation factors.

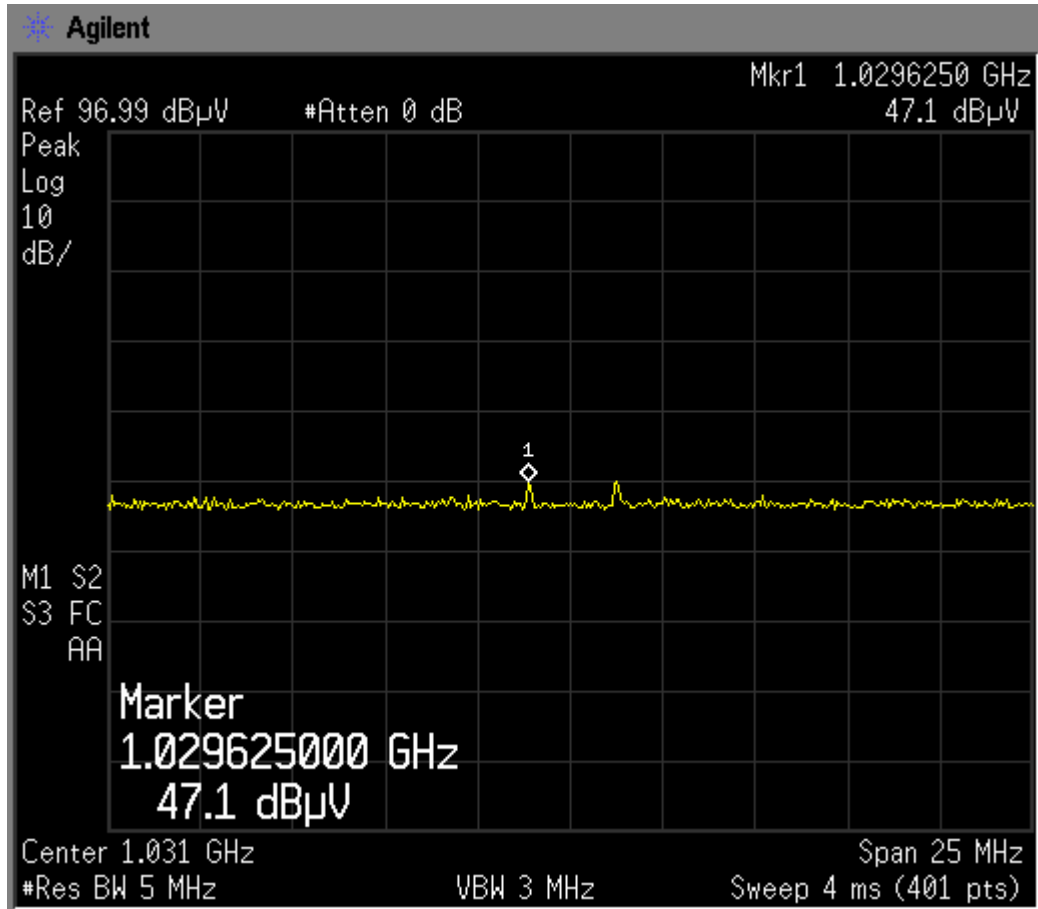
No factors have been added to take account of the radar antenna rotation which would further mitigate the exposure levels. As such, the results shown are pessimistic and over estimate the exposure levels.

The following plots show the six minute maximum hold results from each measurement location.



Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000294889	208	8.00E-07	0.0003328	0.000000009813908	0.515	52476548

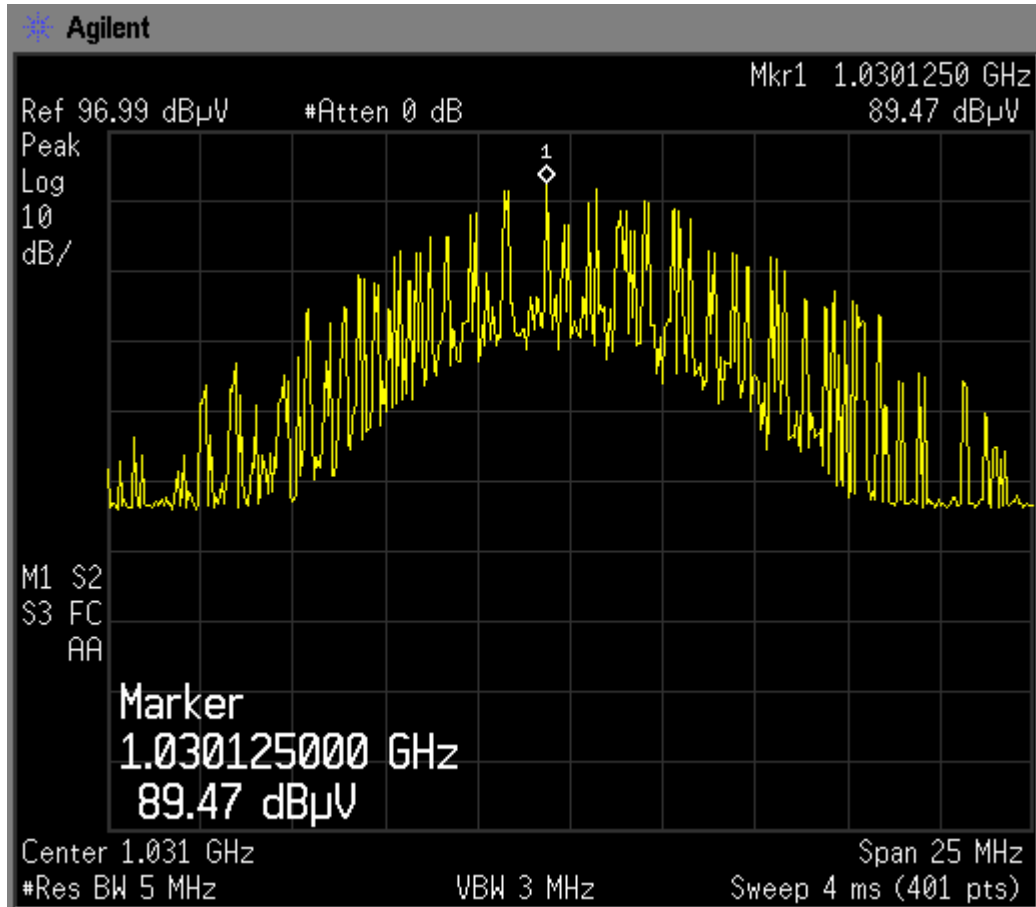
Location 1:  
Broadhaven Hotel Car Park



Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000000065	208	8.00E-07	0.0003328	0.000000000002167	0.515	237665017539

Location 2:  
N54 ° 16' 49 "  
W09 ° 59' 51 "

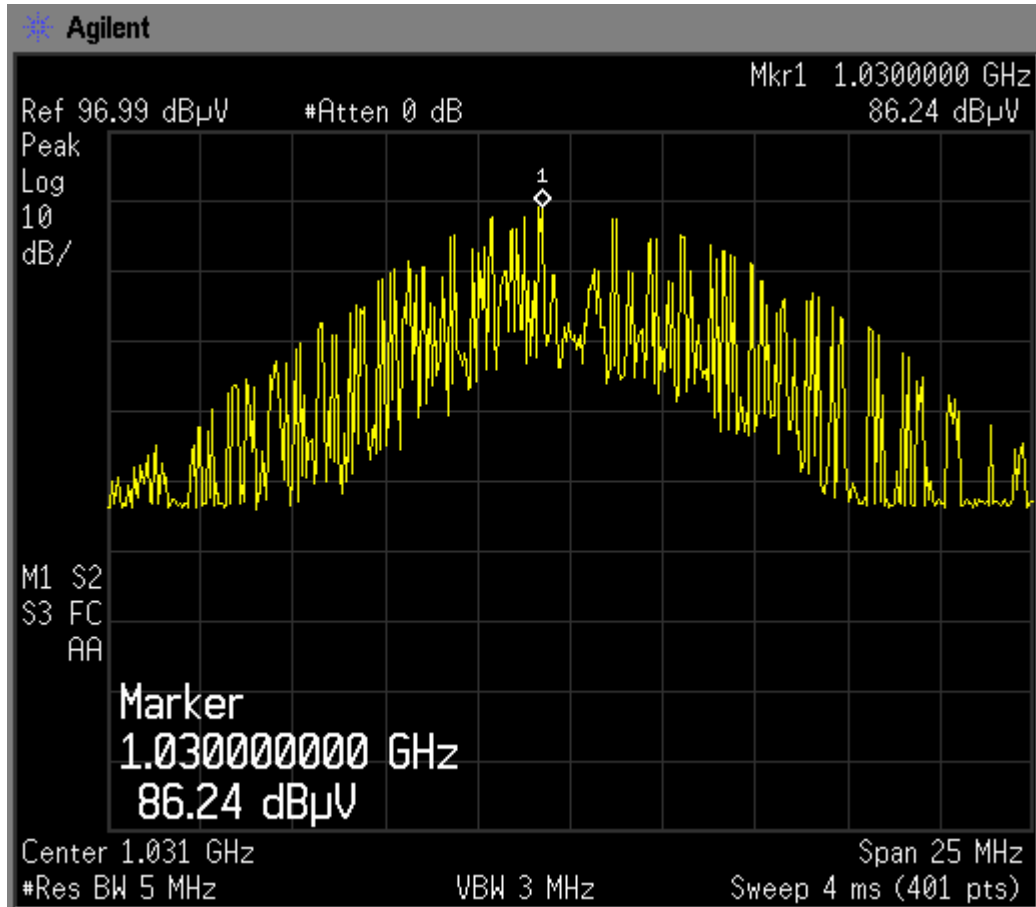
KRA1



Location 3:  
N54 ° 14' 02 "  
W09 ° 59' 03 "

KRA2

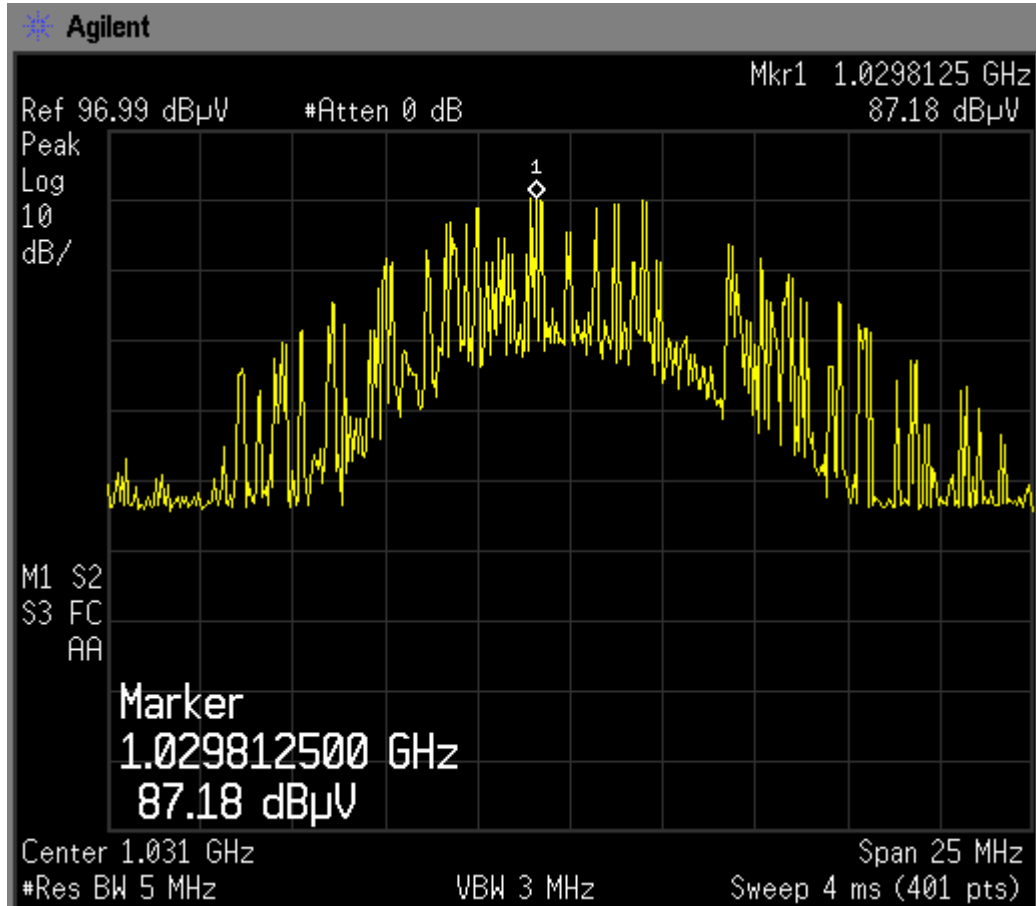
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001123721	208	8.00E-07	0.0003328	0.000000037397448	0.515	13770993



Location 4:  
N54 ° 15' 15 "  
W09 ° 53' 31 "

Point 1

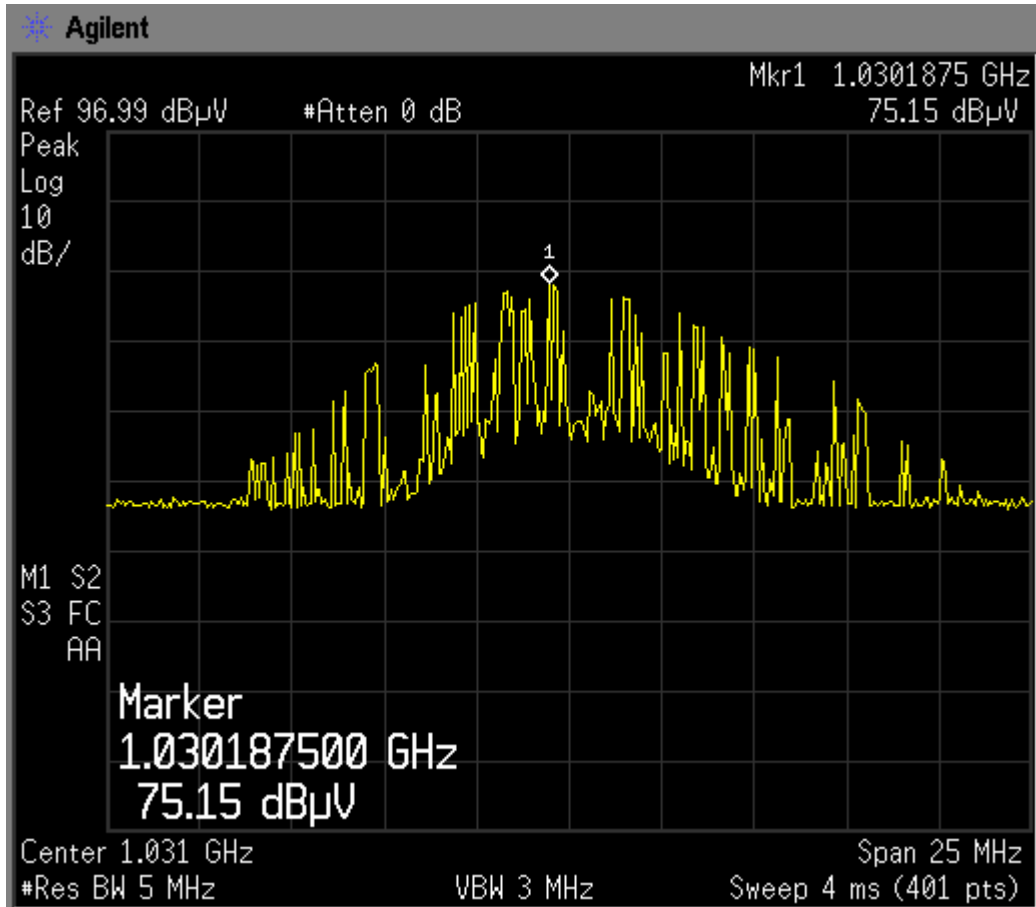
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000534144	208	8.00E-07	0.0003328	0.000000017776324	0.515	28971118



Location 5:  
N54 ° 12' 39 "  
W09 ° 57' 07 "

KRA3

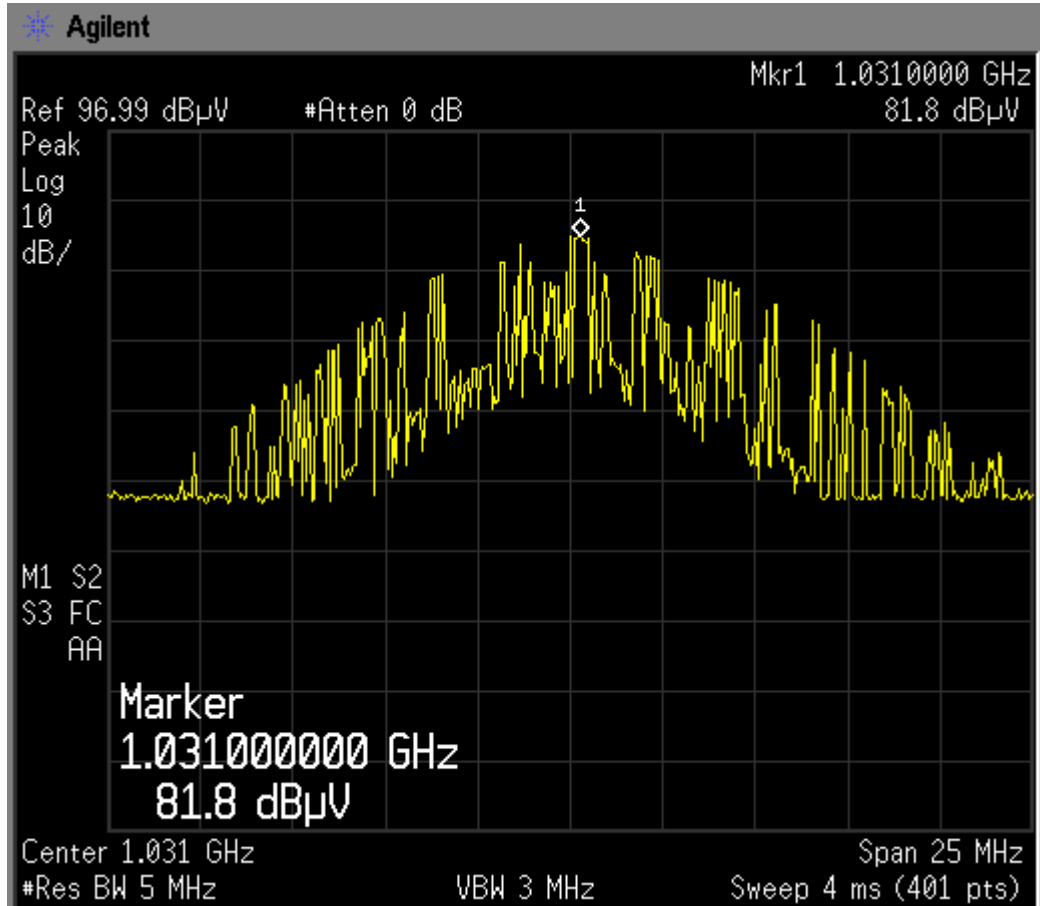
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000663222	208	8.00E-07	0.0003328	0.000000022072014	0.515	23332714



Location 6:  
N54 ° 10' 26 "  
W09 ° 55' 19 "

KRA13

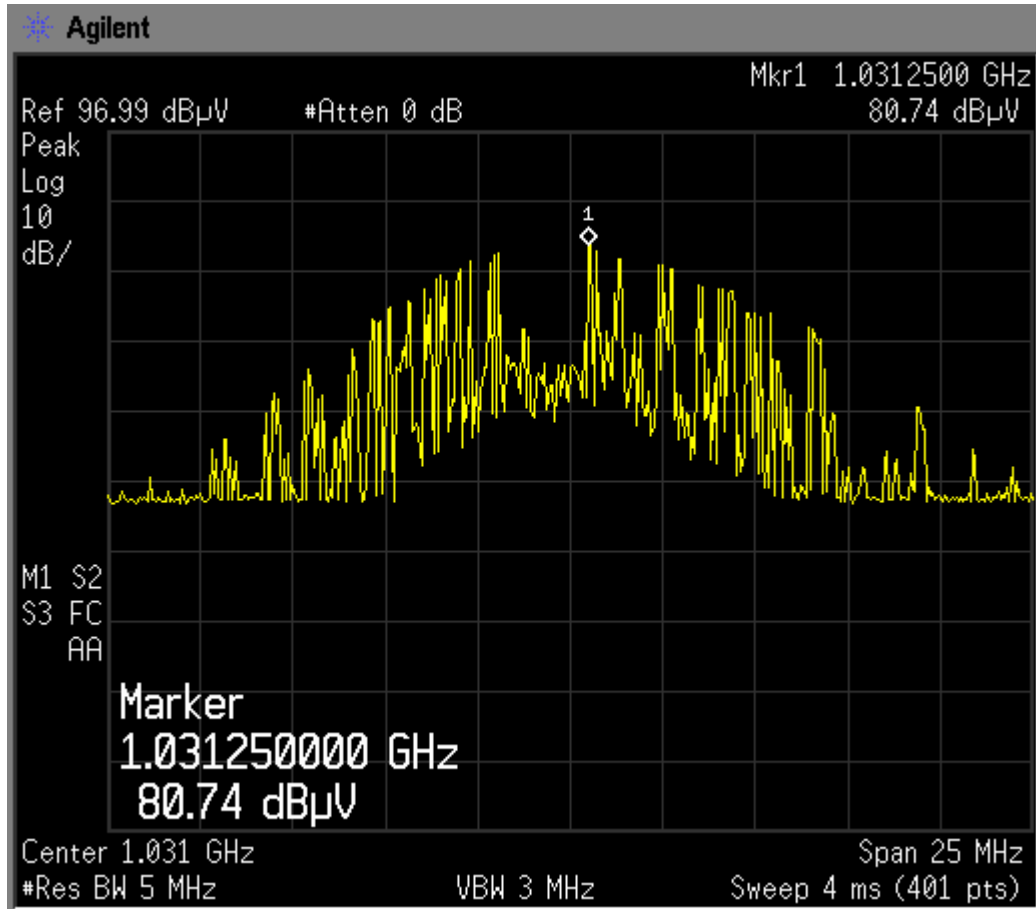
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000041558	208	8.00E-07	0.0003328	0.000000001383063	0.515	372361921



Location 7:  
N54 ° 09' 40 "  
W09 ° 46' 00 "

KRA12

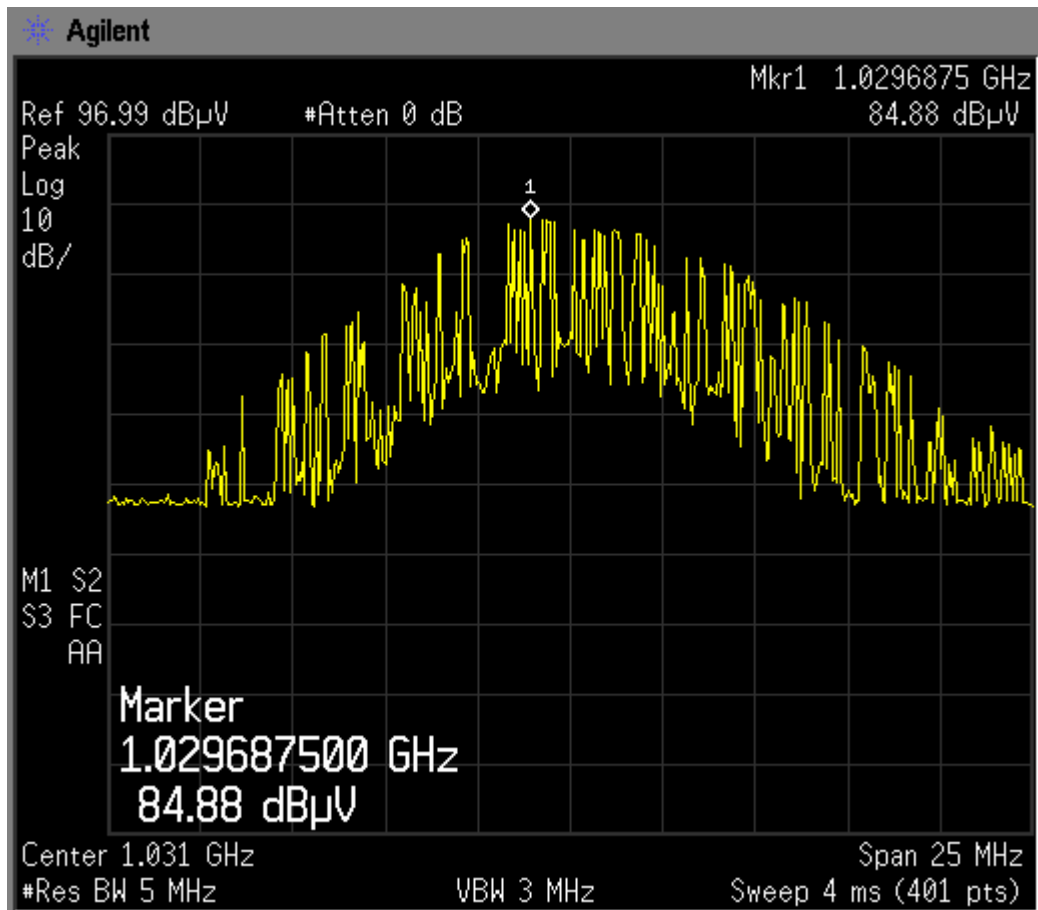
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000192158	208	8.00E-07	0.0003328	0.000000006395021	0.515	80531402



Location 8:  
N54° 12' 45 "  
W09° 43' 20 "

Point 9

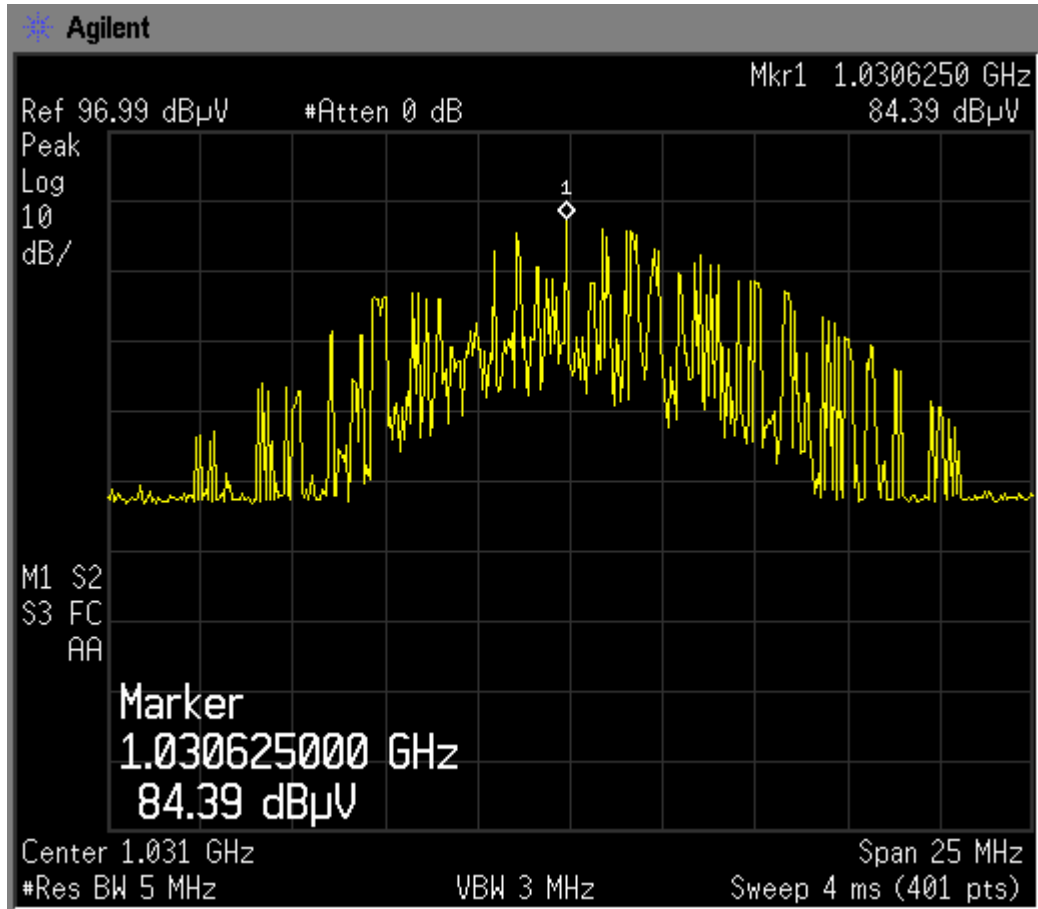
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000150542	208	8.00E-07	0.0003328	0.000000005010049	0.515	102793407



Location 9:  
 N54° 14' 33 "  
 W09° 39' 03 "

Point 10 & KRA11

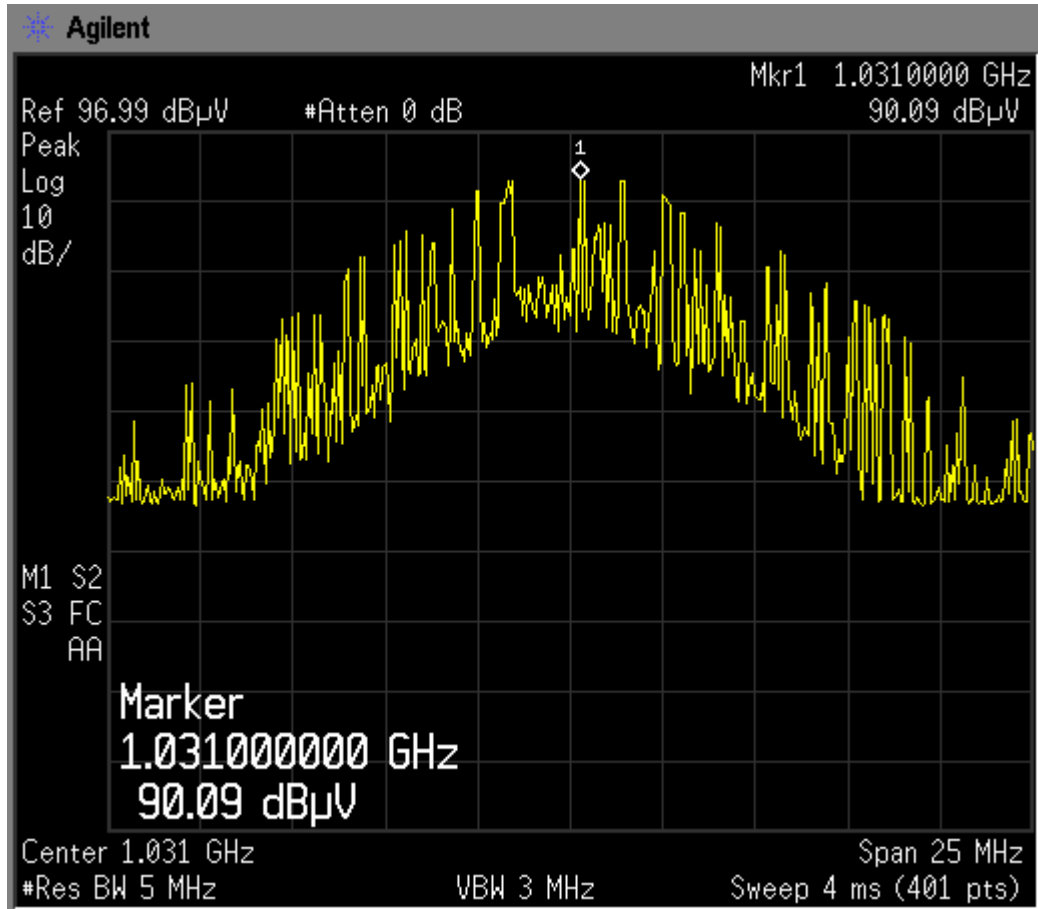
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000390534	208	8.00E-07	0.0003328	0.000000012996966	0.515	39624634



Location 10:  
N54° 15' 39 "  
W09° 44' 16 "

Point 12

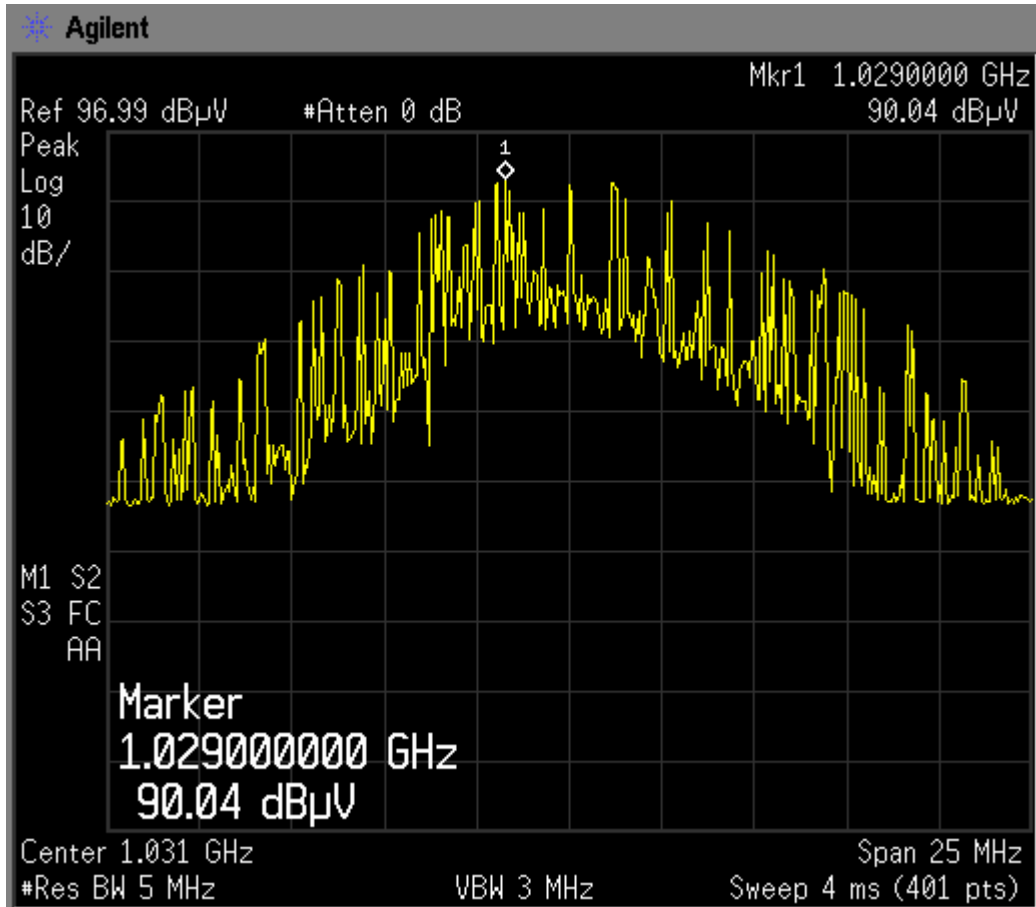
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000348866	208	8.00E-07	0.0003328	0.000000011610261	0.515	44357316



Location 11:  
N54° 17' 34 "  
W09° 45' 47 "

Point 14

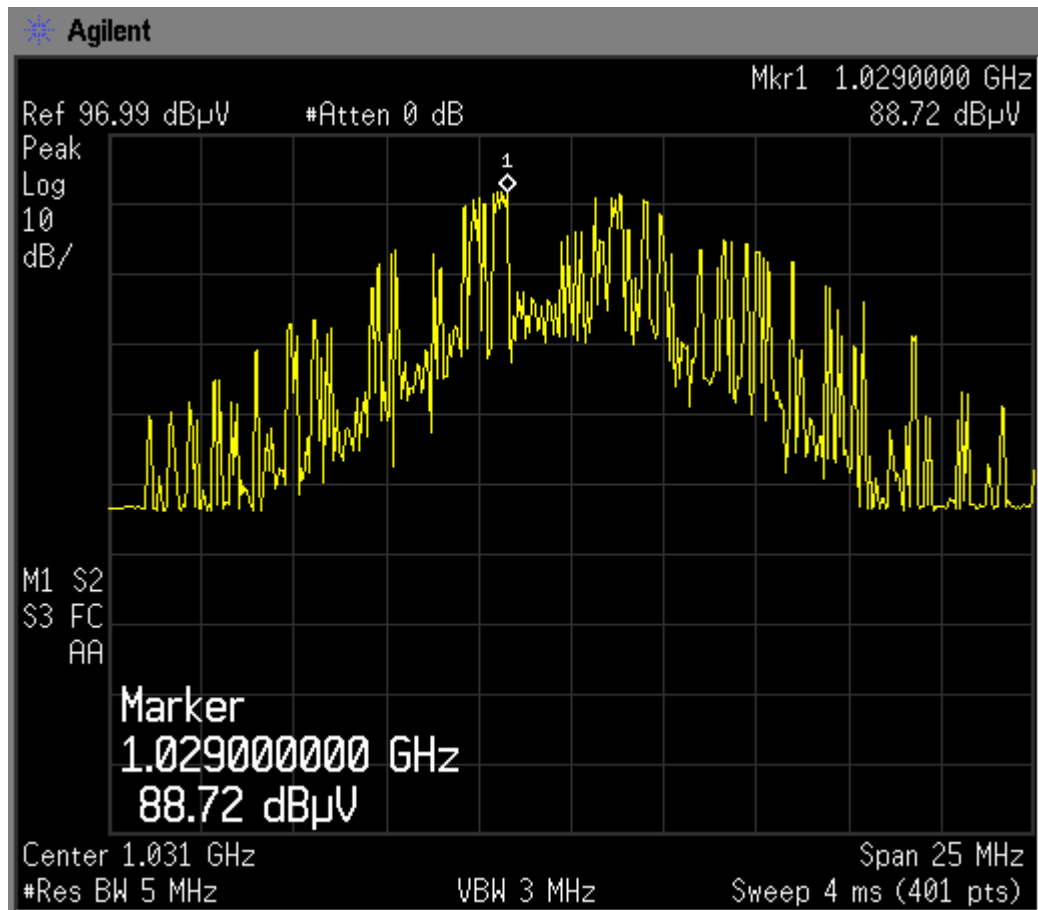
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001296160	208	8.00E-07	0.0003328	0.000000043136208	0.515	11938926



Location 12:  
N54° 18' 19 "  
W09° 43' 36 "

Point 16

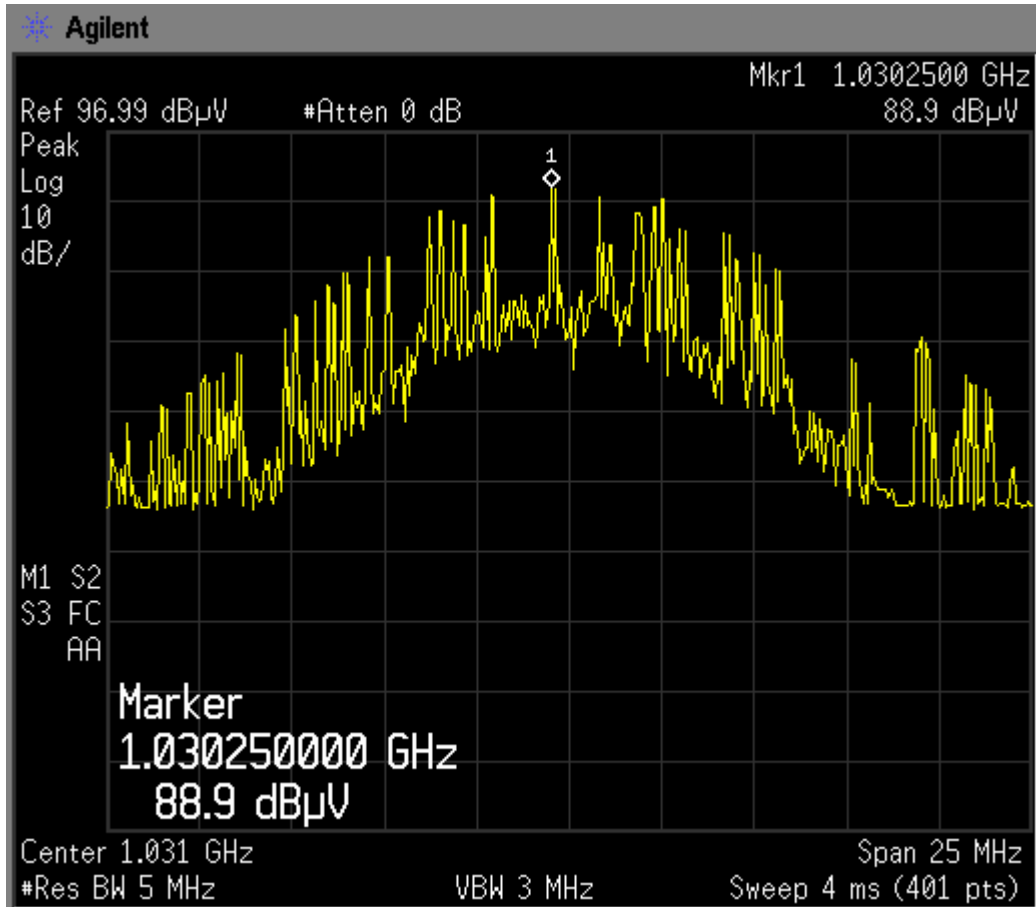
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001281323	208	8.00E-07	0.0003328	0.000000042642432	0.515	12077172



Location 13:  
N54° 18' 43 "  
W09° 42' 38 "

Point 15 & KRA 10

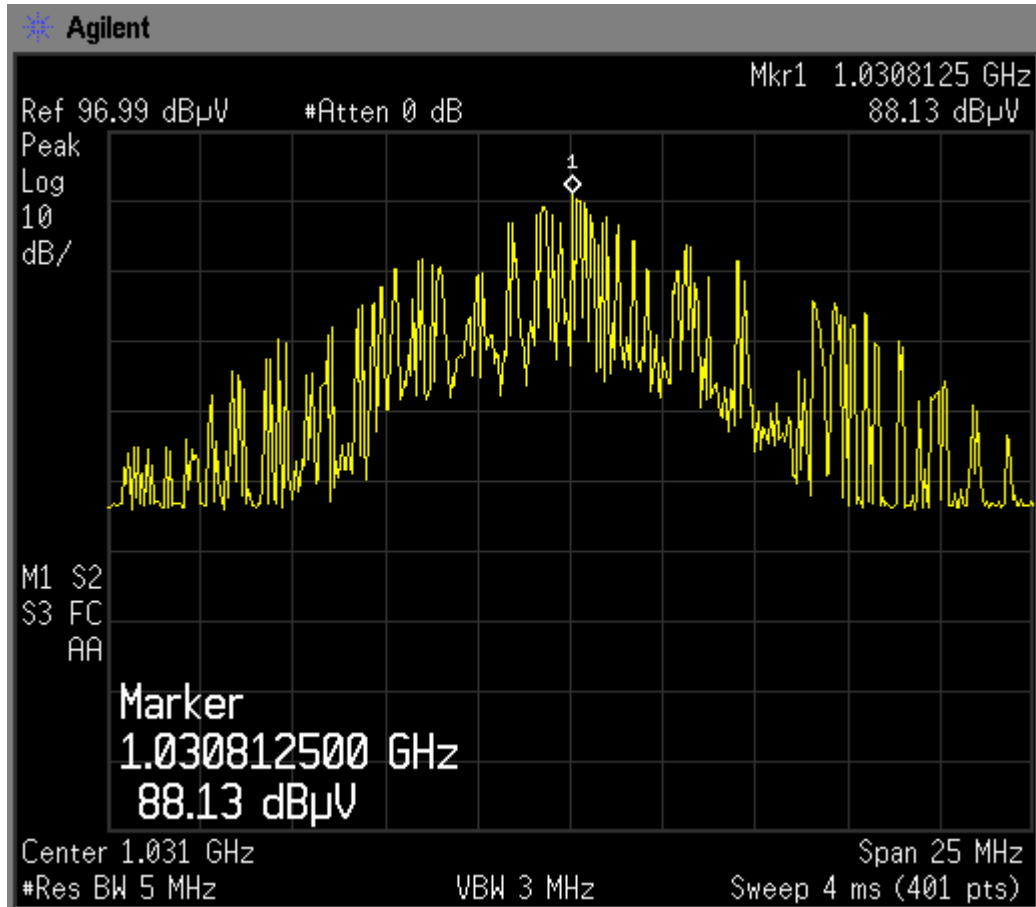
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000945494	208	8.00E-07	0.0003328	0.000000031466031	0.515	16366856



Location 14:  
N54° 18' 45 "  
W09° 48' 52 "

KRA8

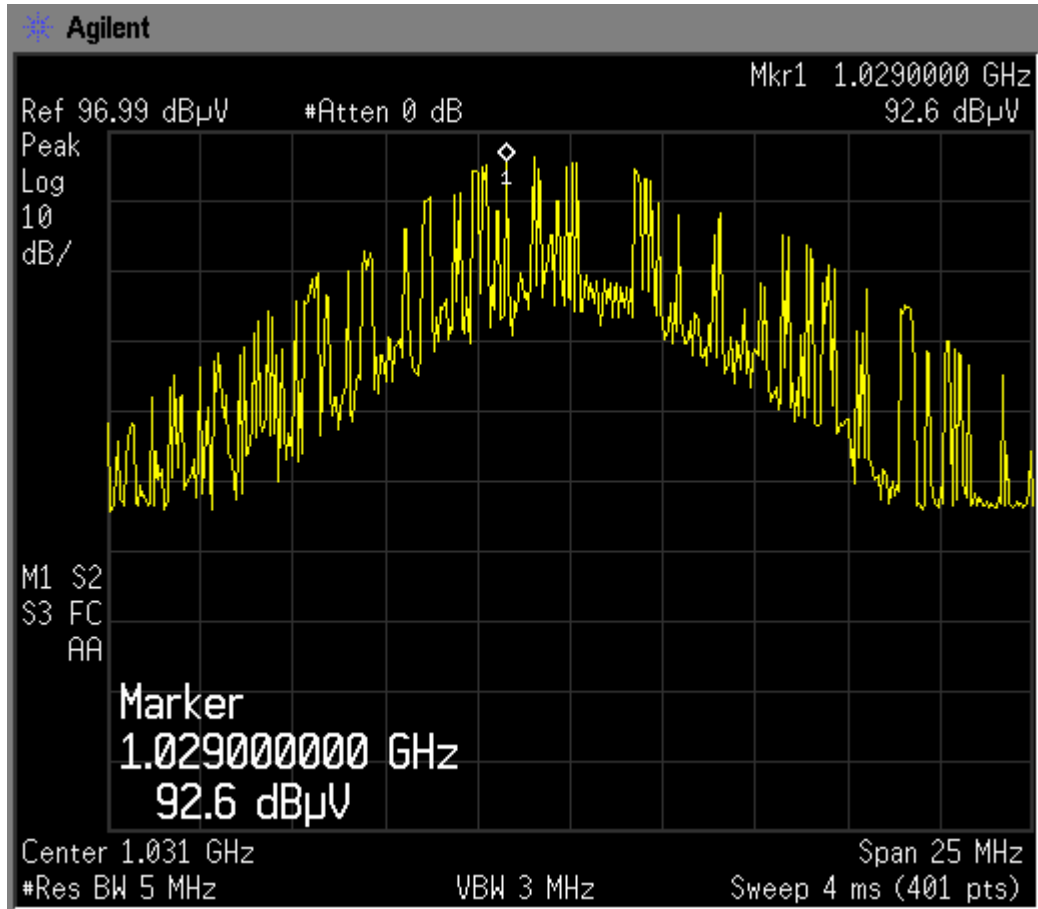
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000985505	208	8.00E-07	0.0003328	0.000000032797593	0.515	15702372



Location 15:  
N54° 18' 43 "  
W09° 49' 42 "

Point 19

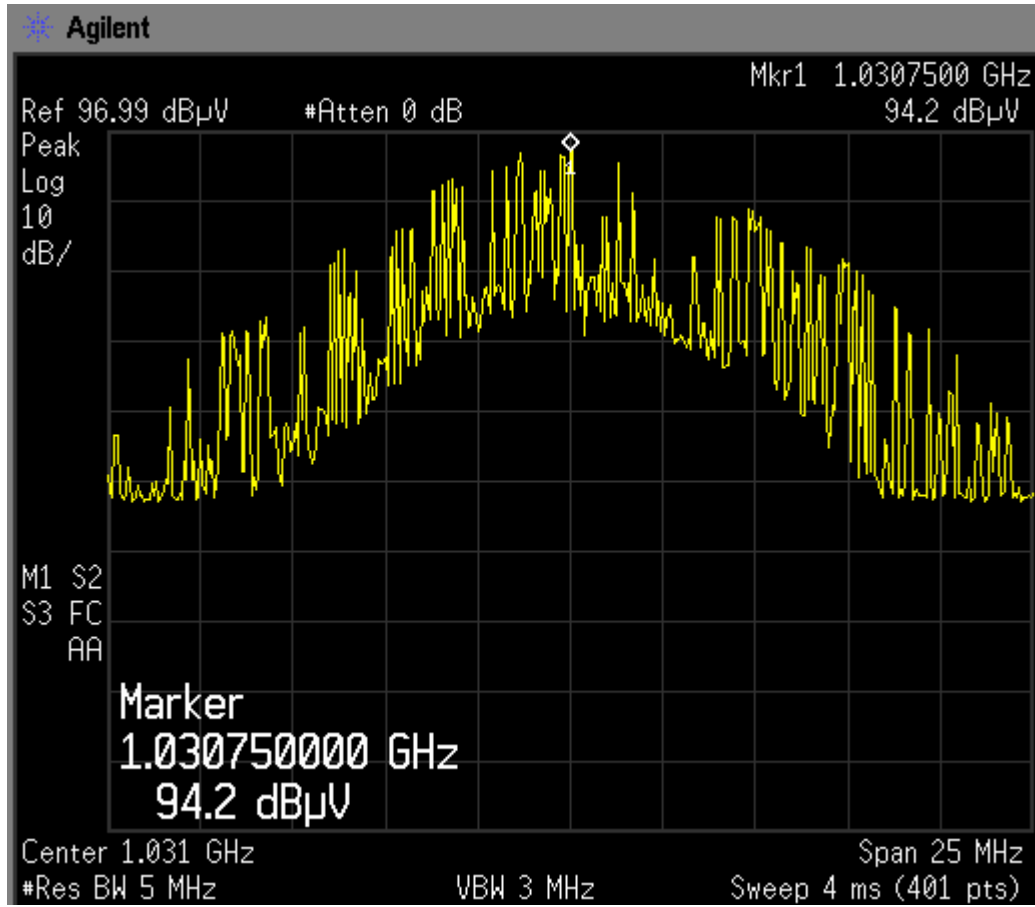
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000825389	208	8.00E-07	0.0003328	0.000000027468944	0.515	18748445



Location 16:  
N54° 18' 42 "  
W09° 50' 34 "

KRA7

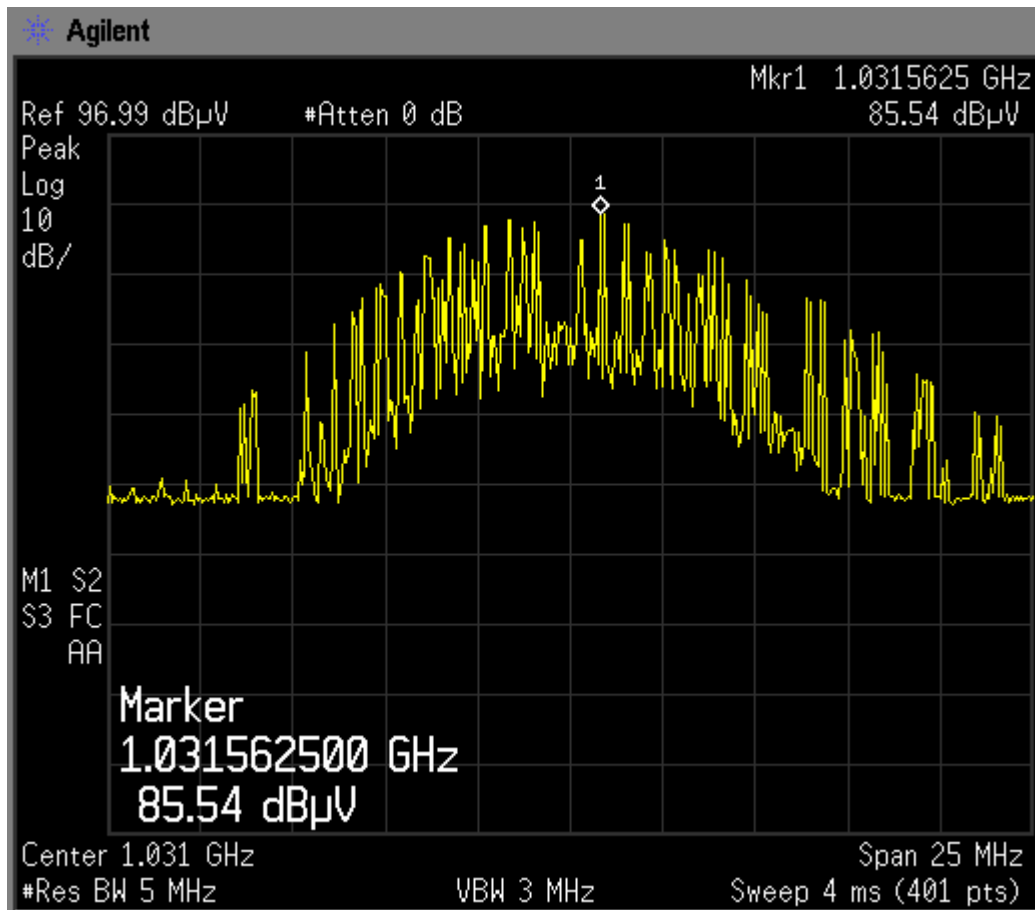
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0002310248	208	8.00E-07	0.0003328	0.000000076885062	0.515	6698310



Location 17:  
N54° 18' 37 "  
W09° 50' 48 "

Point 18

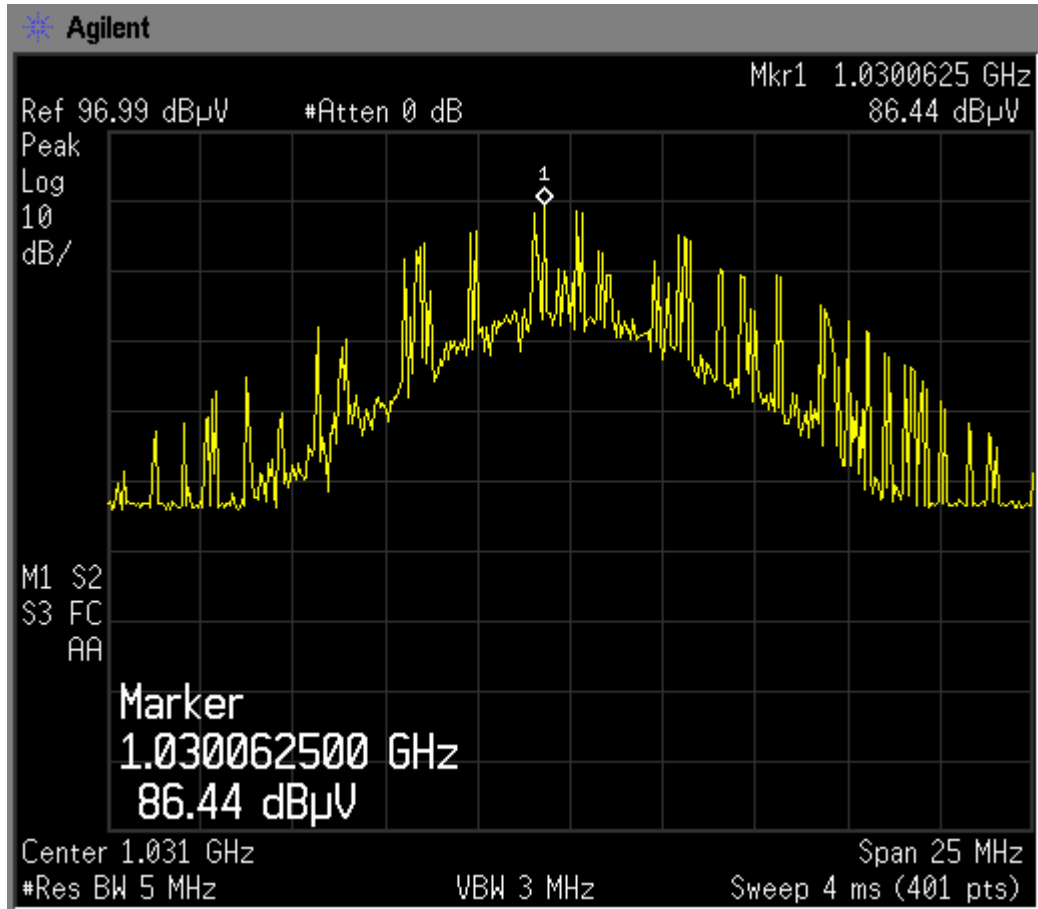
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0003339325	208	8.00E-07	0.0003328	0.000000111132726	0.515	4634099



Location 18:  
N54° 18' 13 "  
W09° 50' 03 "

Point 17

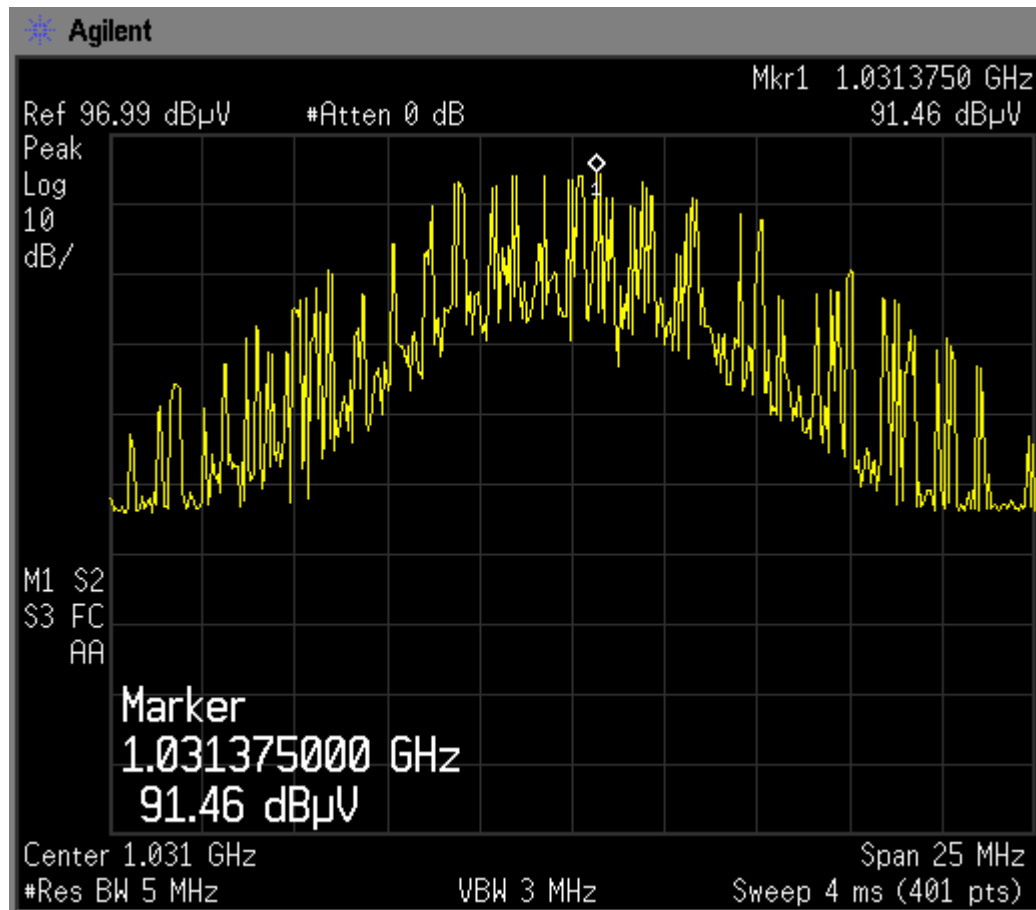
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000454631	208	8.00E-07	0.0003328	0.000000015130106	0.515	34038096



Location 19:  
N54° 17' 09 "  
W09° 48' 06 "

Point 13 & KRA 9

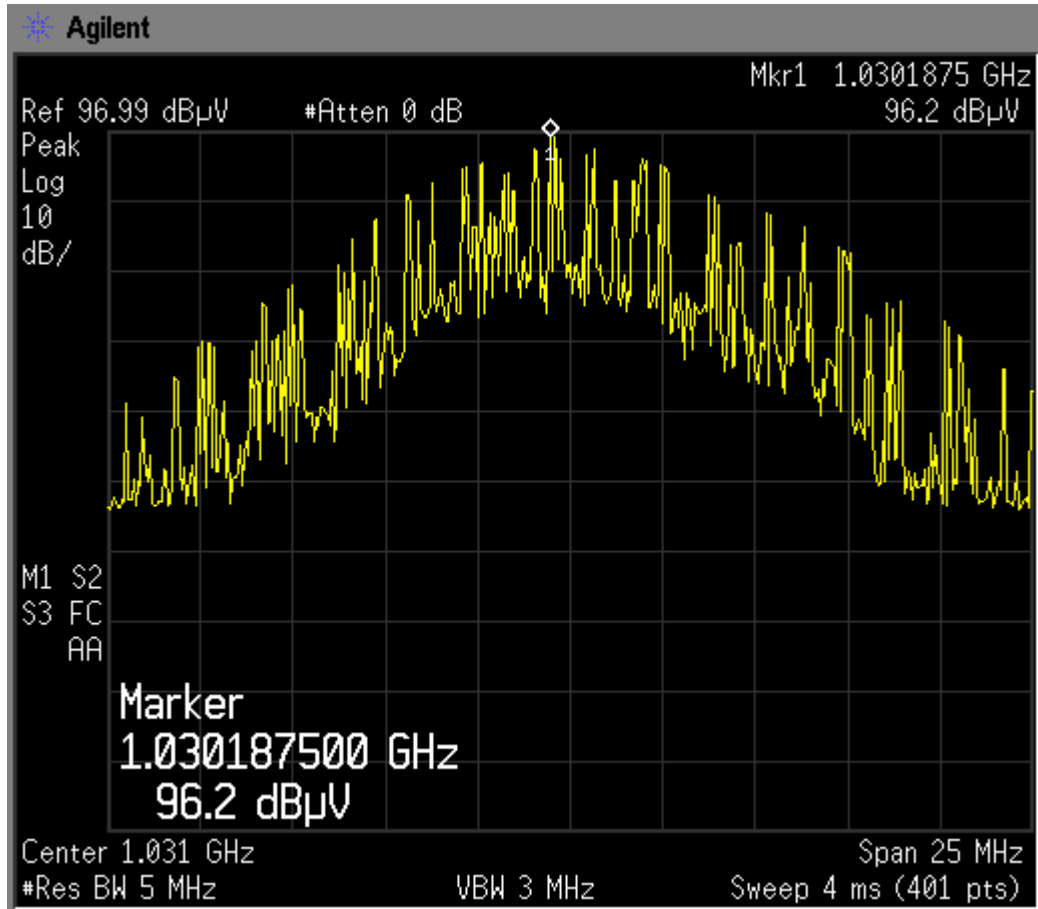
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000559318	208	8.00E-07	0.0003328	0.000000018614097	0.515	27667203



Location 20:  
N54° 15' 55 "  
W09° 45' 41 "

Point 11

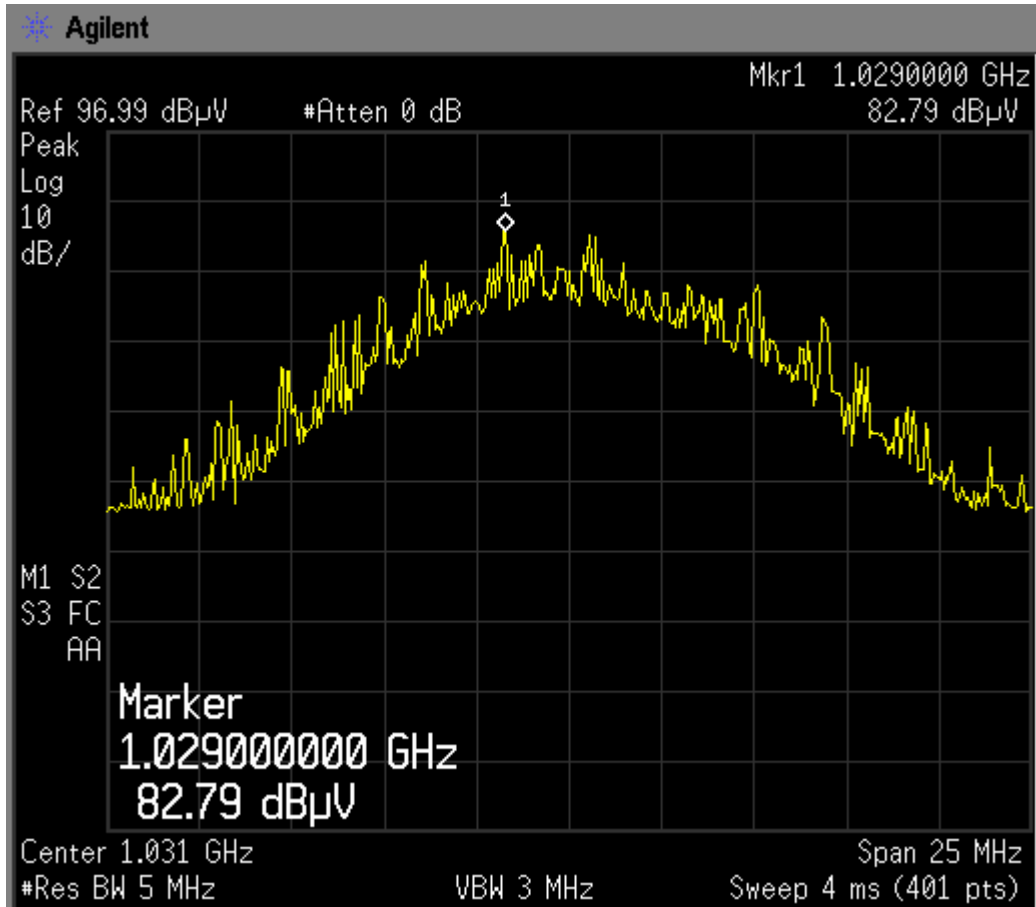
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001776882	208	8.00E-07	0.0003328	0.000000059134641	0.515	8708939



Location 21:  
N54° 15' 19 "  
W09° 46' 44 "

Point 8

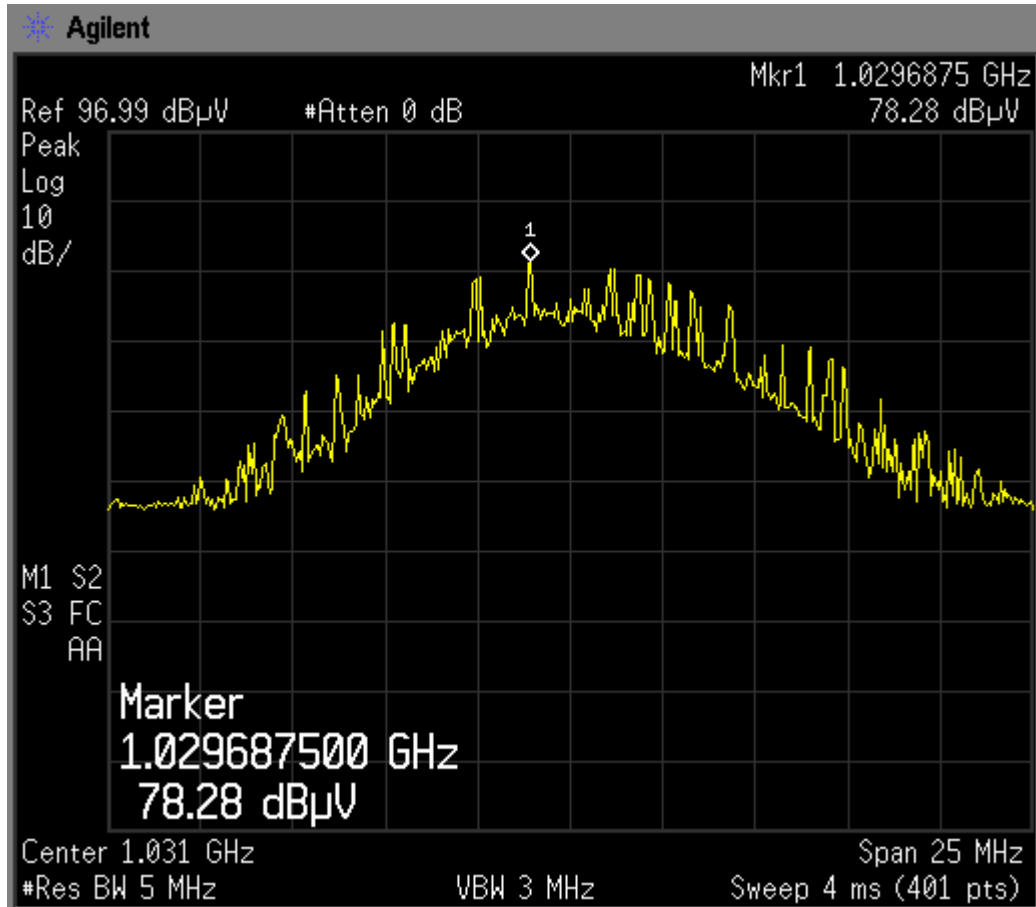
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0005292473	208	8.00E-07	0.0003328	0.000000176133501	0.515	2923918



Location 22:  
N54° 16' 00 "  
W09° 46' 57 "

Point 7

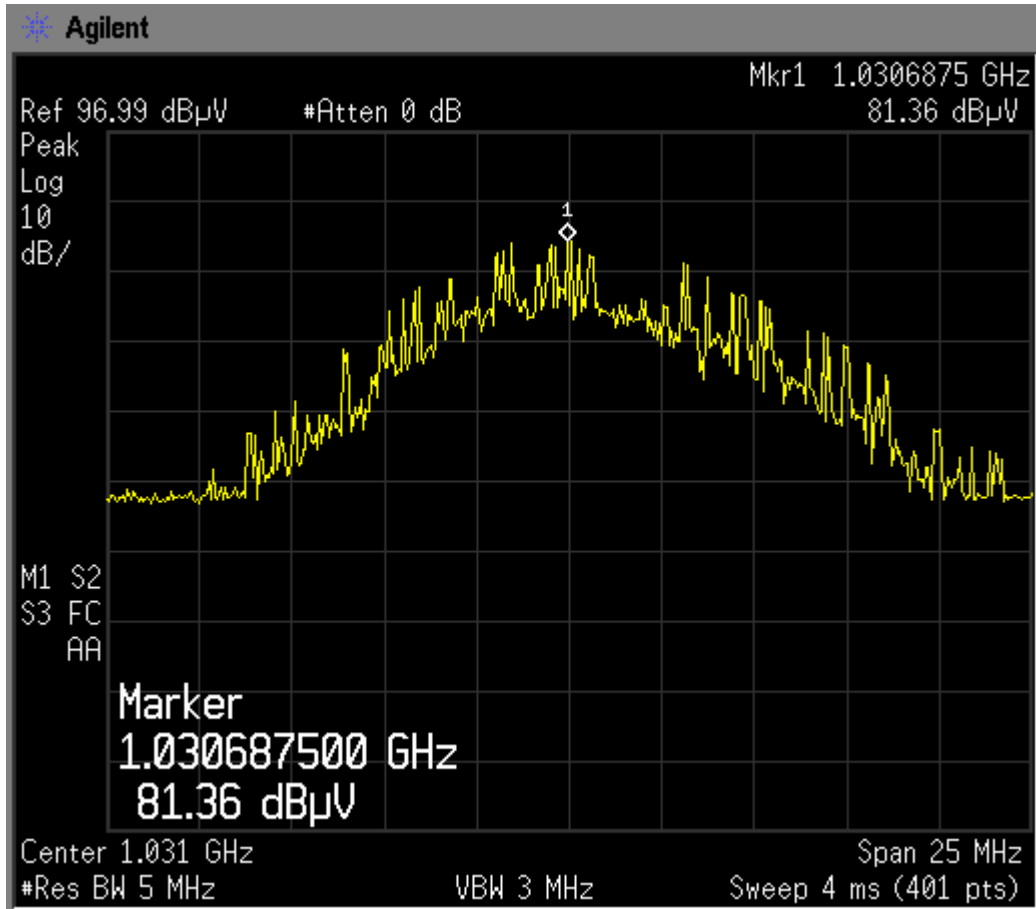
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000241356	208	8.00E-07	0.0003328	0.000000008032338	0.515	64115829



Location 23:  
N54° 16' 48 "  
W09° 49' 26 "

Point 6

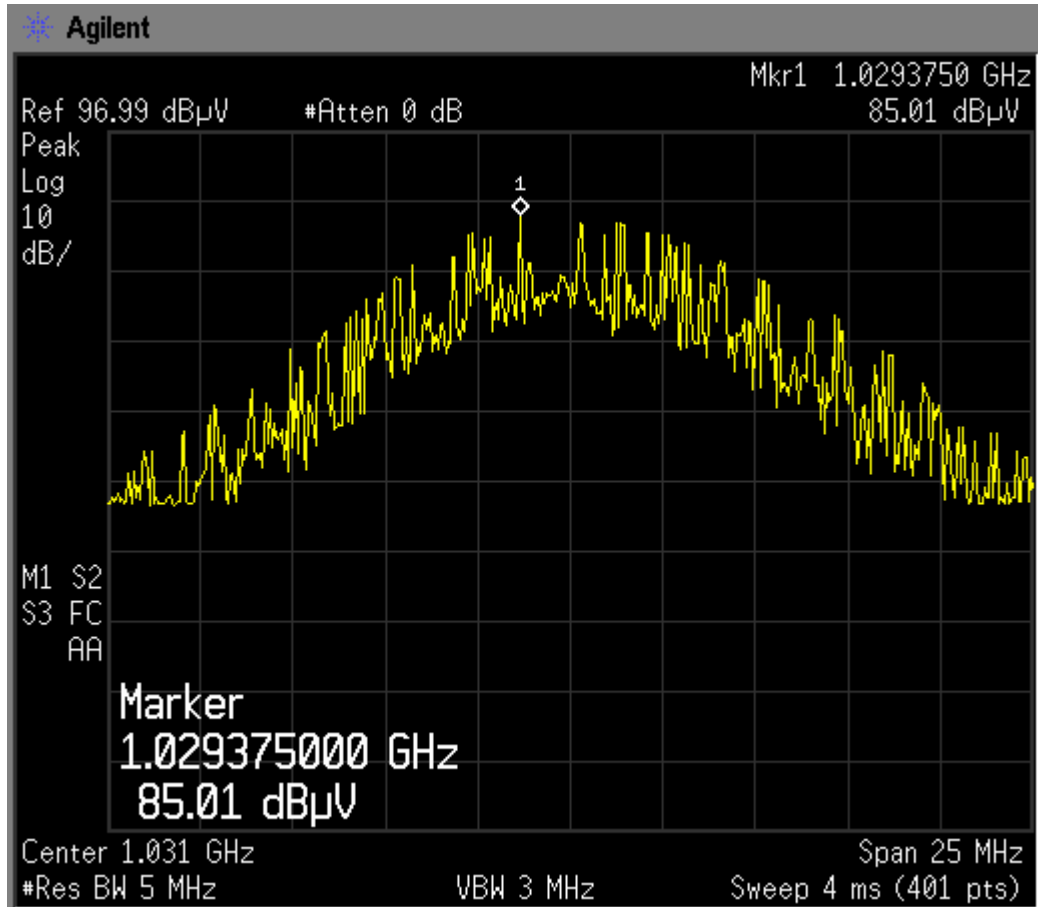
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000085439	208	8.00E-07	0.0003328	0.000000002843426	0.515	181119521



Location 24:  
N54° 16' 43 "  
W09° 50' 09 "

Point 5

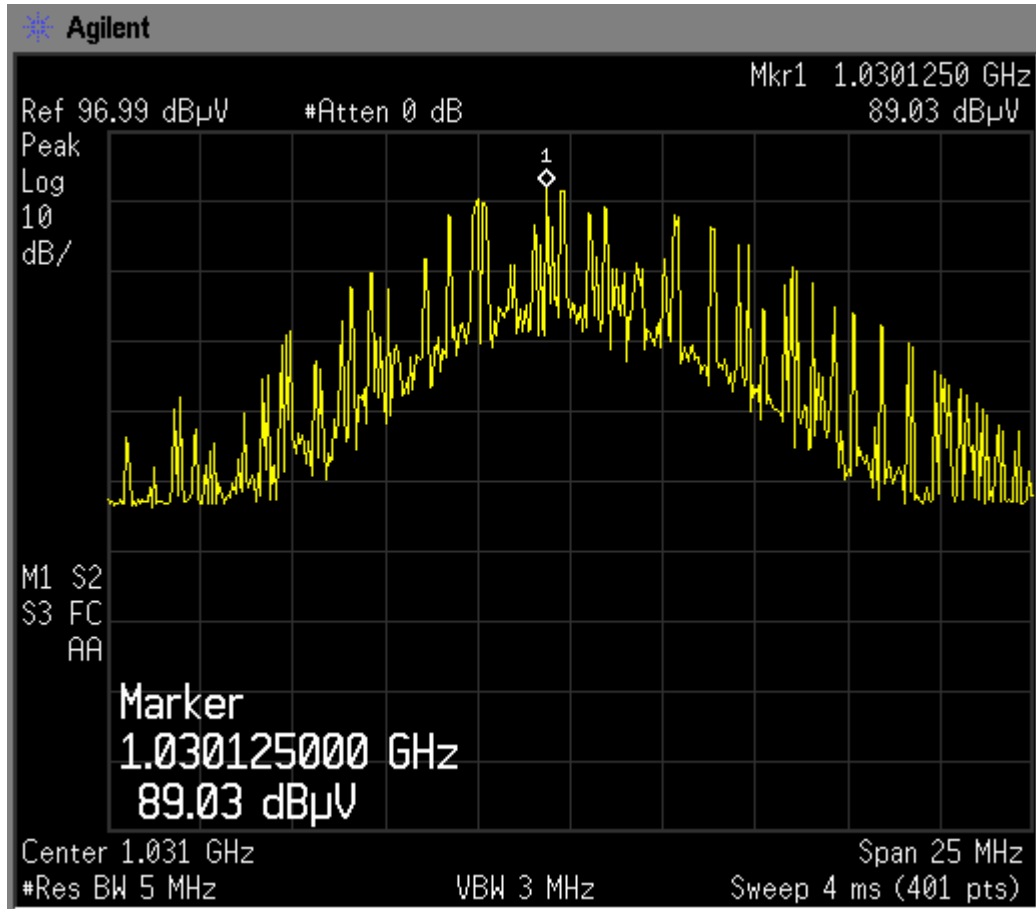
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000173644	208	8.00E-07	0.0003328	0.000000005778857	0.515	89117965



Location 25:  
N54° 16' 20 "  
W09° 51' 14 "

Point 4

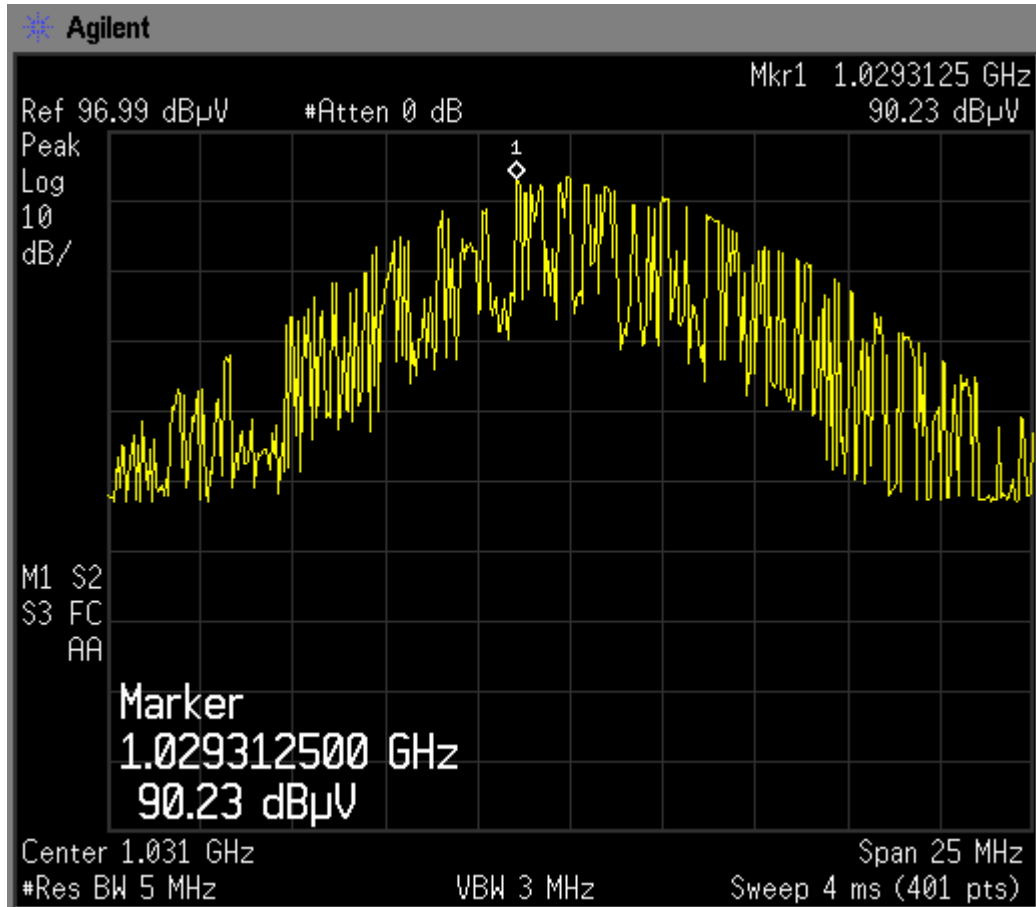
Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0000402401	208	8.00E-07	0.0003328	0.000000013391893	0.515	38456102



Location 26:  
N54° 15' 50 "  
W09° 51' 46 "

Point 3

Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001015450	208	8.00E-07	0.0003328	0.000000033794184	0.515	15239309



Location 27:  
N54° 13' 50 "  
W09° 52' 50 "

Point 1

Frequency (MHz)	Power Density (Pk) mW/cm <sup>2</sup>	PRF	Pulse	Duty Cycle	Power Density (Ave) mW/cm <sup>2</sup>	Power Density (Pub. Limit) mW/cm <sup>2</sup>	times below limit
1030.000	0.0001338624	208	8.00E-07	0.0003328	0.000000044549411	0.515	11560198

## **5 Conclusions**

At all locations measured, the levels were significantly below the guideline limits outlined by the International Commission on Non Ionising Radiation Protection (ICNIRP). The highest level, measured at Location 21, was a factor of 2,923,918 times below the limit at that particular frequency.

In addition to the time averaged limits in the case of pulsed fields the equivalent plane wave power density averaged over a pulse width should not exceed 1000 times the  $P_{eq}$  limits. This requirement was complied with by a margin of 974,639.

This survey is valid for the configuration at the time of test.

As such, the levels of radio frequency electromagnetic field strengths from the IAA Dooncarton radar at points outlined prior to the survey do not pose a threat as defined by the International Commission on Non Ionising Radiation Protection (1998) and the European Union Recommendation on Electromagnetic Fields 1999/519/EC.

**Appendix A**  
**Equipment used**

<b>Item</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>
Spectrum Analyser	Agilent	E4408B	722
Horn Antenna	AH Systems	200/571	839

### Appendix C Test Photographs







## **Appendix D References**

### **List of References:**

ICNIRP, 1998. Guidelines for limiting exposure to Time-Varying Electric Magnetic, and Electromagnetic Fields (Up to 300 GHz), Health Physics, Vol. 74, No. 4, April 1998

European Union Recommendation on Electromagnetic Fields 1999/519/EC