



Mobile Telephone Base-station Radio Emission Audit

Audit Site: Dudley Ward Tunnel
Dudley Ward Tunnel
Sir Herbert Miles Road
Gibraltar
GX11 1AA

The Gibraltar Regulatory Authority (GRA) is responsible for the management of the electromagnetic spectrum in Gibraltar. The Government has asked the GRA to implement a national measurement programme to ensure that emissions from cellular base stations do not exceed recommended guidelines.

GRA engineers measure the power density of transmissions in the various radio bands to be surveyed. The results, derived from electric field voltage measurements, are referenced to and presented alongside the relevant International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommended public maximum exposure levels. On the left hand side of the results page(s) is a graphical representation of the radio spectrum surveyed at each location on the site. At the top of each graph a solid pink line indicates the ICNIRP recommended exposure level for that frequency band. To the right hand side of each graph is a table showing the ten highest peak level emissions recorded within a band. For a list of audits conducted to date please visit the GRA website at www.gra.gi

Further explanation of the results and their context within ICNIRP guidelines can be provided by the GRA engineers at the time of the audit or by contacting the GRA on (+350) 20074636 or by e-mail.

Report Summary

The Gibraltar Regulatory Authority performed this survey of the RF emission environment prevailing in:
Dudley Ward Tunnel
Dudley Ward Tunnel Eastern Entrance
Monday, 3 June 2019

As the radio spectrum is continually changing, these measurements can only provide information on the RF conditions for the specific location(s) at the time of the survey. The following table, summarises the results obtained at the measurement location.

Summary of results:

Location	Total Band Exposure Quotient	Relationship to ICNIRP Public Exposure Level
Dudley Ward Tunnel	4.89129276737957E-04	1 / 2,044

Issued on behalf of the Gibraltar Regulatory Authority

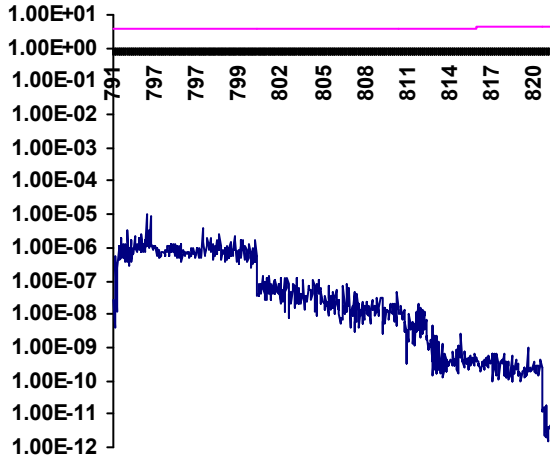
Issued by:
L Vinet

Received by:

Site: Dudley Ward Tunnel
Location: Dudley Ward Tunnel
Date: 03/06/2019
Engineer: L Vinet

Receiver:
 Manufacturer: Rohde Schwarz
 Model: PR100
 Serial Number: 4079.9011K02-103340-EC
Antenna:
 Manufacturer: Rohde Schwarz
 Model: HE300
 Serial Number:

800 MHz Mobile

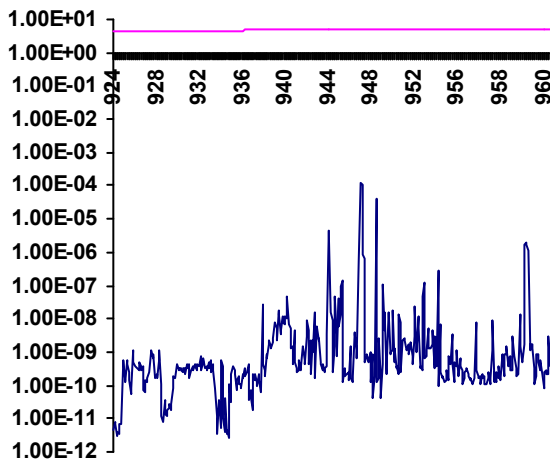


Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
795.600	1.072E-05	3.978	2.696E-06
796.200	8.913E-06	3.981	2.239E-06
796.800	3.799E-06	3.984	9.536E-07
792.800	3.563E-06	3.964	8.989E-07
795.800	3.550E-06	3.979	8.922E-07
793.000	3.402E-06	3.965	8.581E-07
796.000	2.692E-06	3.980	6.764E-07
795.000	2.574E-06	3.975	6.476E-07
798.000	2.449E-06	3.990	6.138E-07
799.000	2.390E-06	3.995	5.984E-07

Band Exposure Quotient:

9.615E-05

900 MHz Mobile



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
947.400	1.160E-04	4.737	2.449E-05
948.800	4.017E-05	4.744	8.467E-06
944.400	4.324E-06	4.722	9.157E-07
958.800	1.902E-06	4.794	3.968E-07
947.600	8.798E-07	4.738	1.857E-07
947.200	5.951E-07	4.736	1.257E-07
954.600	2.699E-07	4.773	5.655E-08
945.600	1.335E-07	4.728	2.823E-08
953.200	1.264E-07	4.766	2.653E-08
949.400	1.080E-07	4.747	2.276E-08

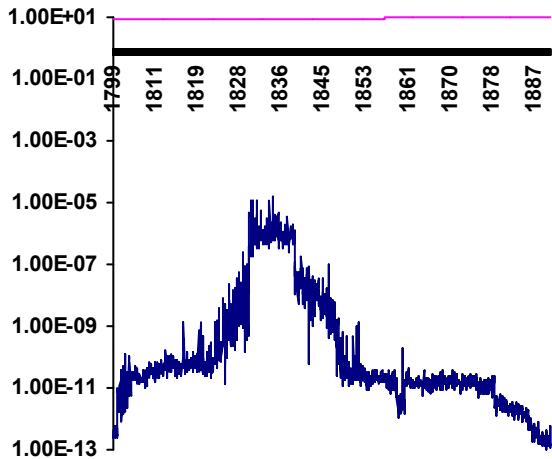
Band Exposure Quotient:

1.651E-04

Site: Dudley Ward Tunnel
Location: Dudley Ward Tunnel
Date: 03/06/2019
Engineer: L Vinet

Receiver:
 Manufacturer: Rohde Schwarz
 Model: PR100
 Serial Number: 4079.9011K02-103340-EC
Antenna:
 Manufacturer: Rohde Schwarz
 Model: HE300
 Serial Number:

1800 MHz Mobile

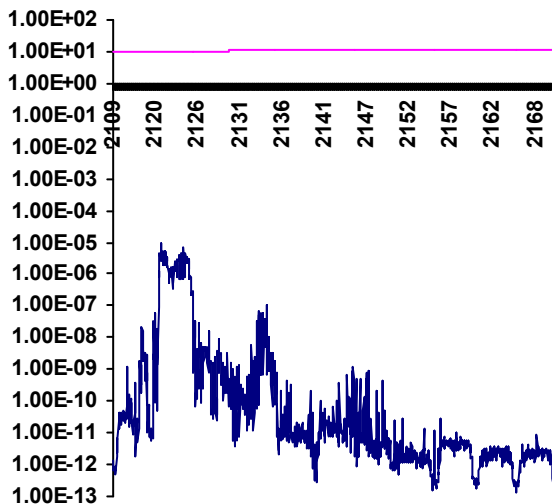


Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
1834.200	1.540E-05	9.171	1.679E-06
1830.000	1.171E-05	9.150	1.280E-06
1830.200	1.144E-05	9.151	1.250E-06
1833.800	1.142E-05	9.169	1.246E-06
1831.000	1.092E-05	9.155	1.193E-06
1830.400	5.476E-06	9.152	5.984E-07
1832.000	5.347E-06	9.160	5.837E-07
1829.800	5.112E-06	9.149	5.588E-07
1835.400	4.867E-06	9.177	5.304E-07
1835.000	4.144E-06	9.175	4.516E-07

Band Exposure Quotient:

1.439E-04

UMTS 2100



Frequency (MHz)	Maximum Exposure (W/m ²)	ICNIRP Limit (W/m ²)	Frequency Exposure Quotient
2121.000	8.800E-06	10.605	8.298E-07
2123.800	6.667E-06	10.619	6.278E-07
2121.400	5.063E-06	10.607	4.773E-07
2122.000	5.062E-06	10.610	4.771E-07
2122.200	4.946E-06	10.611	4.661E-07
2120.800	4.836E-06	10.604	4.561E-07
2123.600	4.613E-06	10.618	4.344E-07
2121.200	4.513E-06	10.606	4.255E-07
2121.600	4.512E-06	10.608	4.253E-07
2124.000	4.304E-06	10.620	4.053E-07

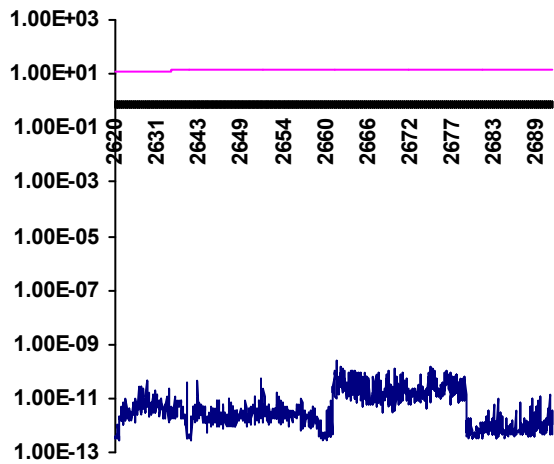
Band Exposure Quotient:

8.400E-05

Site: Dudley Ward Tunnel
Location: Dudley Ward Tunnel
Date: 03/06/2019
Engineer: L Vinet

Receiver:
 Manufacturer: Rohde Schwarz
 Model: PR100
 Serial Number: 4079.9011K02-103340-EC
Antenna:
 Manufacturer: Rohde Schwarz
 Model: HE300
 Serial Number:

2600 MHz Mobile



<i>Frequency (MHz)</i>	<i>Maximum Exposure (W/m²)</i>	<i>ICNIRP Limit (W/m²)</i>	<i>Frequency Exposure Quotient</i>
2661.400	2.322E-10	13.307	1.745E-11
2662.000	1.432E-10	13.310	1.076E-11
2674.200	1.425E-10	13.371	1.066E-11
2669.400	1.332E-10	13.347	9.982E-12
2674.400	1.185E-10	13.372	8.864E-12
2662.400	1.163E-10	13.312	8.740E-12
2674.600	1.158E-10	13.373	8.660E-12
2663.600	1.136E-10	13.318	8.533E-12
2664.000	1.136E-10	13.320	8.531E-12
2674.800	1.106E-10	13.374	8.269E-12

Band Exposure Quotient:

7.041E-09

Glossary

Location:

The point at which the readings are taken. Each location is identified by its address and its timestamp. A description of the location should be sufficient to allow the position to be identified at a later date.

Date:

The date and time at which the receiver started taking its measurements at a location.

Antenna:

The antenna device connected to the receiver. This is known by its serial number, type and manufacturer, and has an associated calibration (see definition).

Sweep Band:

The measurements are taken at regular frequency intervals within a band of frequencies. A sweep band is defined by the band title (which appears on each graph), start frequency, end frequency, frequency step, bandwidth and dwell time.

Exposure:

This is the name given to the measured results. The maximum electric field strength values in decibel microvolts per metre (dB(mV/m)) are converted to power density in watts per square metre (W/m²).

Table Data:

The 'Maximum Exposure' column consists of the ten highest exposure values in a band. Accompanying them are the frequency at which they occurred, the ICNIRP limit at that frequency (see definition), and the frequency exposure quotient (see definition).

ICNIRP:

International Commission for Non-Ionizing Radiation Protection

ICNIRP Limit:

This is a guideline for the maximum permitted power density of non-ionizing radiation for public exposure. The guideline is frequency dependent and is currently defined as:

Frequency ICNIRP Limit
Less than 400MHz 2W/m²
400MHz to 2GHz ($f / 200$)W/m², where f is frequency in MHz
2GHz to 300GHz 10 W/m²

Frequency Exposure Quotient:

This is the ratio of the measured maximum electromagnetic power density to the ICNIRP limit at a given frequency. A value close to 1 signifies that exposure levels could be near to the maximum permitted at that frequency.

Band Exposure Quotient:

The sum of all the frequency exposure quotients in a band at a single location.

Total Band Exposure Quotient:

The sum of all the frequency exposure quotients in all bands at a single location.

Power Density:

The energy flowing from an antenna through a unit area normal to the direction of propagation in a unit time. This is measured in watts per square metre (W/m²).

GSM / UMTS:

Global System for Mobile communication / Universal Mobile Telecommunications System

TETRA:

Terrestrial Trunked Radio

1.000E-06 Exponential (or scientific) number format. Equal to one millionth

1.000E-09 Equal to one thousand millionth

1.000E-12 Equal to one million millionth