



# Ambient Levels of Radio Frequency Emissions in the Kingdom of Bahrain

Results of measurements made between  
October and December 2010

A Report issued by the  
Telecommunications Regulatory Authority

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## **Purpose**

To present the results of RF field strength measurements taken in Bahrain during the 4th Quarter of 2010.

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## 1 Executive Summary

- 1.1 This report is the 4th report issued in 2010 by TRA as part of its ongoing campaign to measure the ambient level of Radio Frequency (RF) field strengths in the Kingdom of Bahrain.
- 1.2 Previous reports provided a detailed background to the issue as well as the results for measurements taken during the period covered by the report. This report provides the results of measurements made between October and December 2010 and can be considered to be an extension of the earlier reports.
- 1.3 The key findings of the measurements presented in this report are:
  - a. All RF field strengths measured are significantly below the ICNIRP guideline.
  - b. The highest total exposure level for new typical public sites measured during the quarter was 0.01% of the ICNIRP level as shown in figures 1, 2 & 6.
  - c. The measurement using Insite Free equipment at Aali Rd 3240 is higher than at other locations but this is to be expected given that the measurement was taken, in open air, at a distance of about 200m from the base station. Never the less, the measurement is still very small at just a 0.61% of the ICNIRP level.

## **2 Introduction**

- 2.1 This report is the 4th report issued in 2010 by TRA as part of its ongoing campaign to measure the ambient level of Radio Frequency (RF) field strengths in the Kingdom of Bahrain.
- 2.2 Previous reports provided a detailed background to the issue as well as the results for measurements taken during the period covered by the report. This report provides the results of measurements made between October and December 2010 and can be considered to be an extension of the earlier reports.
- 2.3 During the period October to December 2010 measurements of RF field strengths were made at 14 locations throughout the Kingdom of Bahrain.
- 2.4 The results of these measurements are presented in section 4 of this report.

### 3 Scope

3.1 This report presents the results of measurements made between October and December 2010 at the following locations:

<b>Location</b>	<b>General Area</b>	<b>Specific location</b>
1	Aali	Rd 3240
2	Al Daih	Rd 1410
3	Hamad Town	Rd 438
4	Isa town -Jurdab	Rd 2941
5	Hamad Town	Rd 608
6	Sadad	Rd 3735
7	West Riffa	Rd1311
8	Seef District	TRA Building
9	Dar Kulaib	Rd 1505
10	Dumistan	Rd 2215
11	Gudaibya	Rd 807
12	Malkeya	Rd 3449
13	Mugaba-Saar	Rd 1726
14	Hamad Town	Rd 707

**Table 1: locations of measurement**

## 4 Results

- 4.1 Measurements were made either with the Insite Free or Insite Box systems. The Insite Box system enables automated measurements to be made continuously over a period of time (i.e. 24 hours a day and 7 days a week), but can only measure up to 3 GHz. The Insite Free equipment can measure up to 6GHz and therefore also measures the WiMAX band. Further, it enables a more detailed investigation of any specific frequency band, but has to be operated manually. Thus the Insite Free system is used to measure signals in the WiMAX band and also to investigate the detail of measurements made using the Insite Box equipment.

### Insite Free

- 4.2 Measurements using the Insite Free equipment were made at the sites listed in Table 2 below. These sites were selected as they are close to recently erected base stations.
- 4.3 The following table shows the total exposure measured at each location as a percentage of the ICNIRP level:

Location / site name	Total % exposure limit
Aali Rd 3240	0.61
Al Daih Rd 1410	0.14
Hamad Town -Rd 438	0.003
Hamad Town - Rd 707	0.05
Isa town -Jurdab	0.22
Hamad Town - 608	0.10

**Table 2: Locations of measurement with Insite Free**

### Insite Box

- 4.4 Figures 1 to 9 below present the results of measurements taken at each site showing the total exposure as a fraction of the ICNIRP level, as well as the minimum, maximum and average field strengths measured, per band, as a fraction of the ICNIRP level.
- 4.5 All measurements were taken in typical public or domestic locations (i.e. inside homes, offices or apartments).

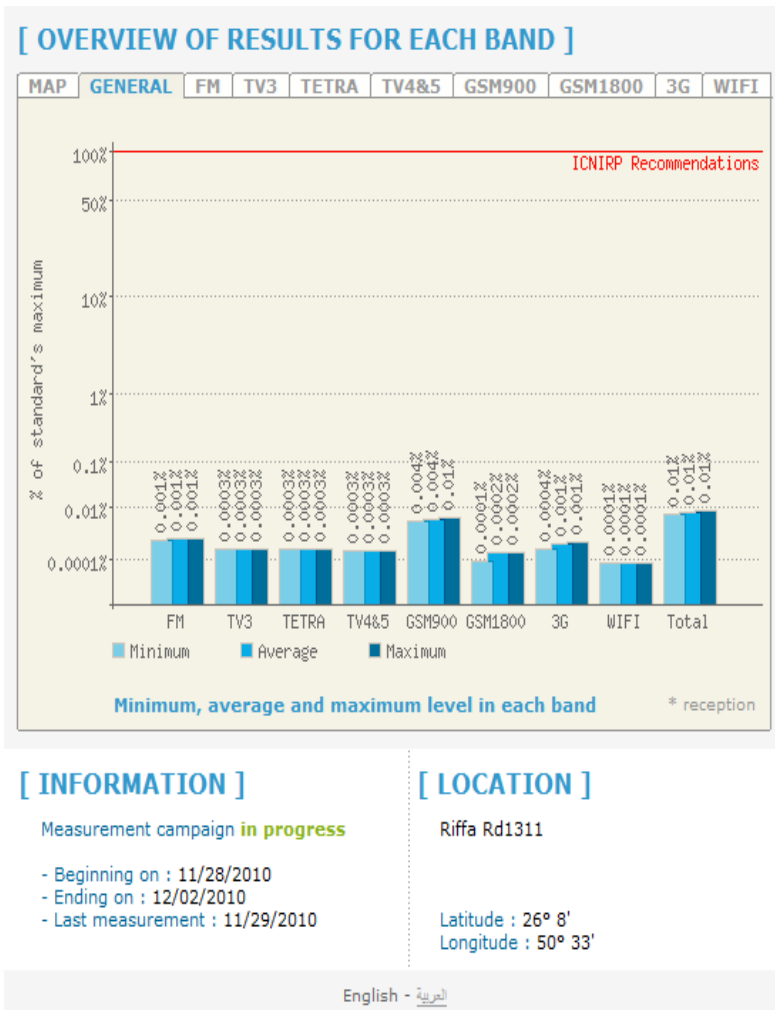


Figure 1: Result for Riffa Rd 1311

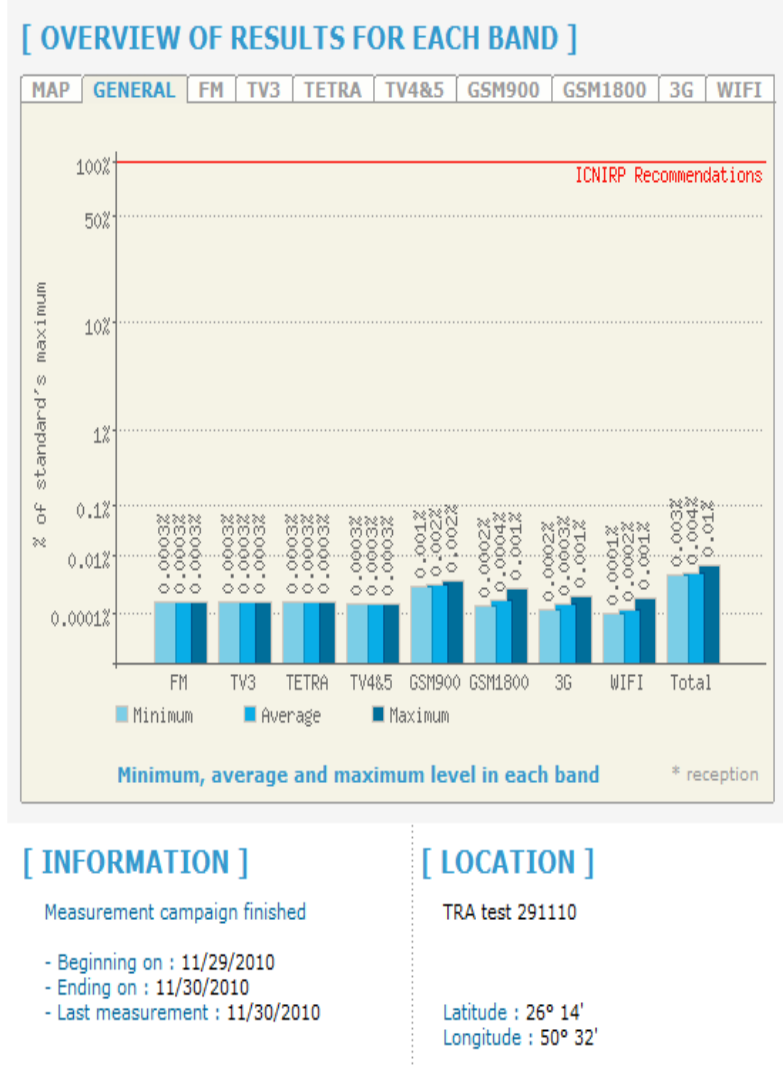


Figure 2: Result for TRA Building at Seef



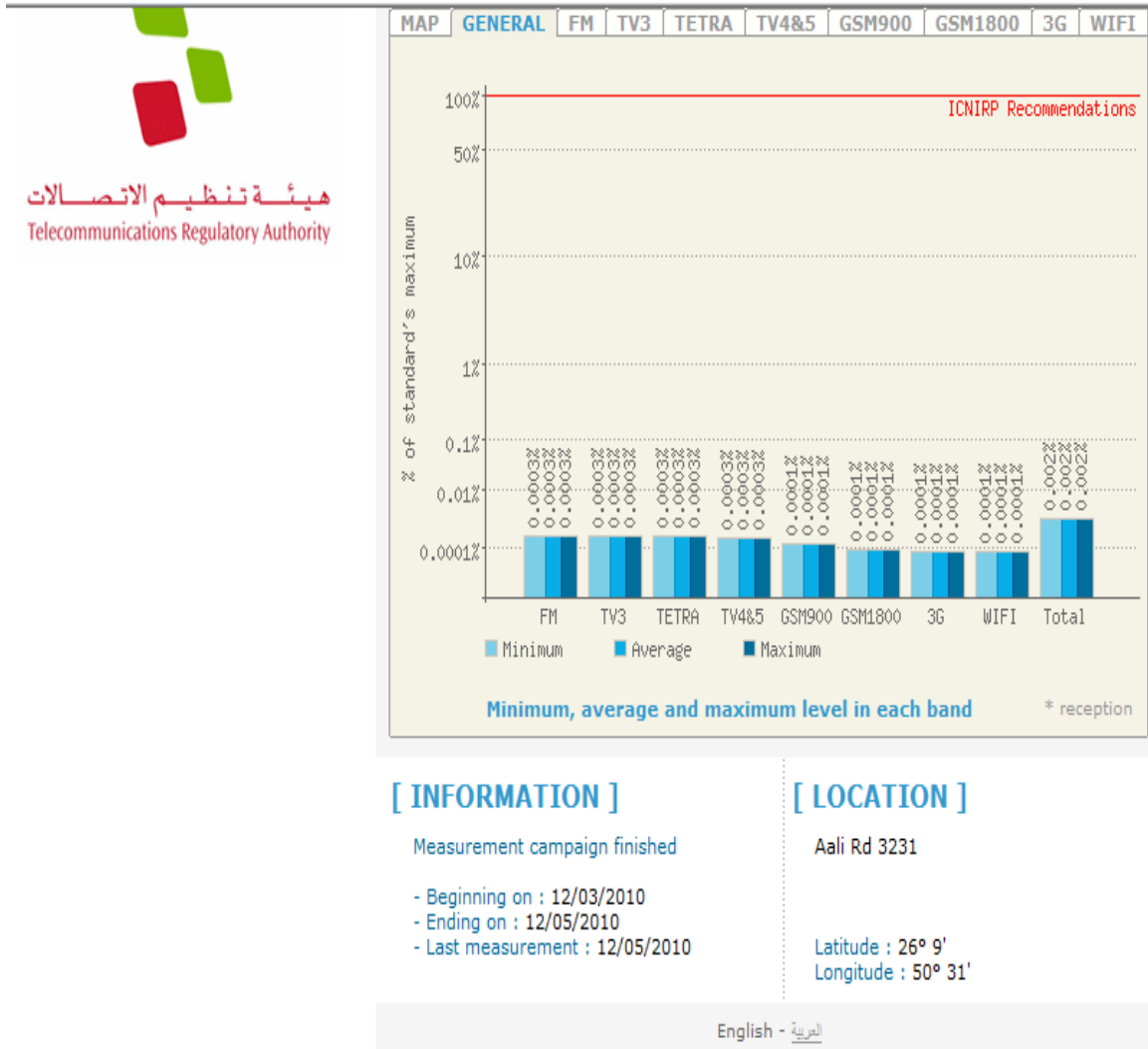
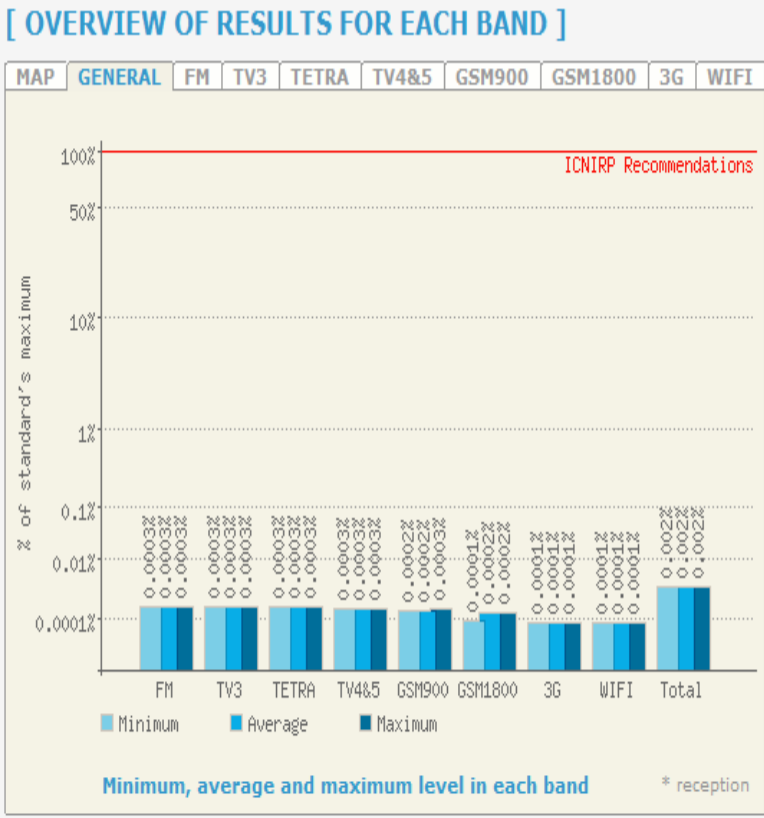


Figure 3: Result for Aali Rd 3231



[ INFORMATION ]

Measurement campaign **in progress**

- Beginning on : 12/08/2010
- Ending on : 12/10/2010
- Last measurement : 12/09/2010

[ LOCATION ]

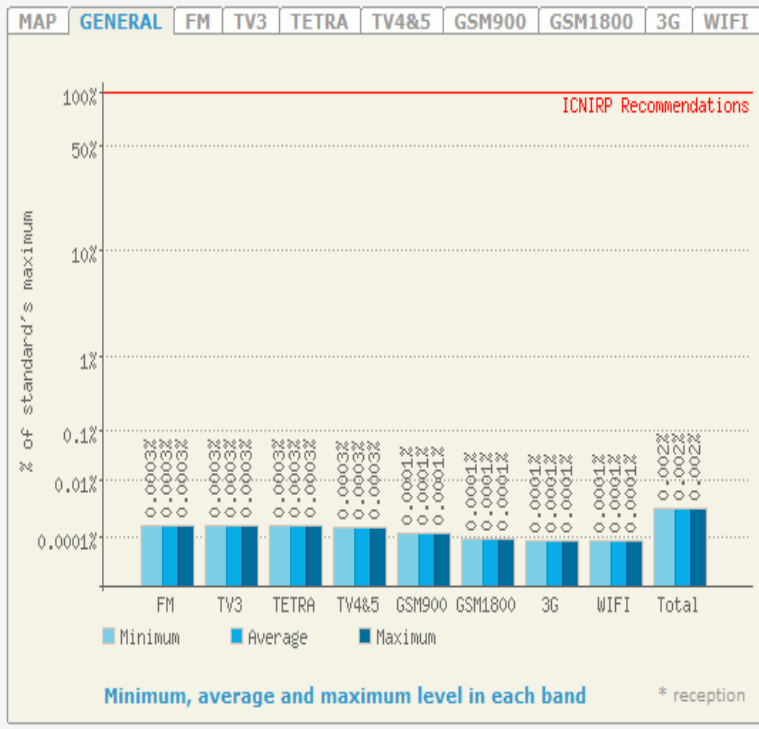
Dar Kulaib Rd 1505

Latitude : 26° 3' 4  
Longitude : 50° 30' 8

Figure 4: Result for Dar Kulaib Rd 1505



[ OVERVIEW OF RESULTS FOR EACH BAND ]



[ INFORMATION ]

Measurement campaign finished

- Beginning on : 12/06/2010
- Ending on : 12/08/2010
- Last measurement : 12/08/2010

[ LOCATION ]

Dumistan Rd 2215

Latitude : 26° 7' 5  
Longitude : 50° 28' 2

Figure 5: Result for Dumistan Rd 2215

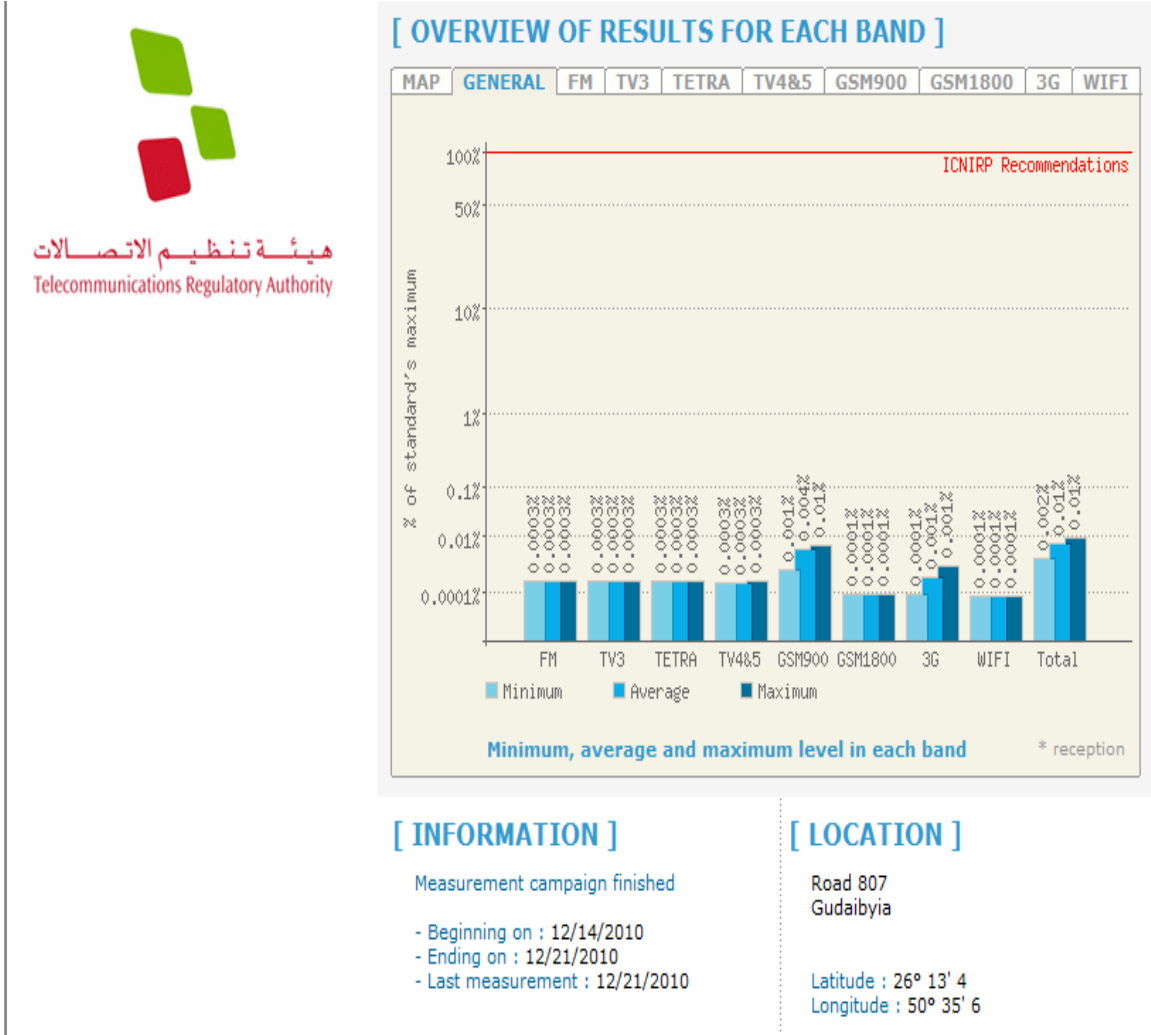


Figure 6: Result for Gudaibya Rd 807

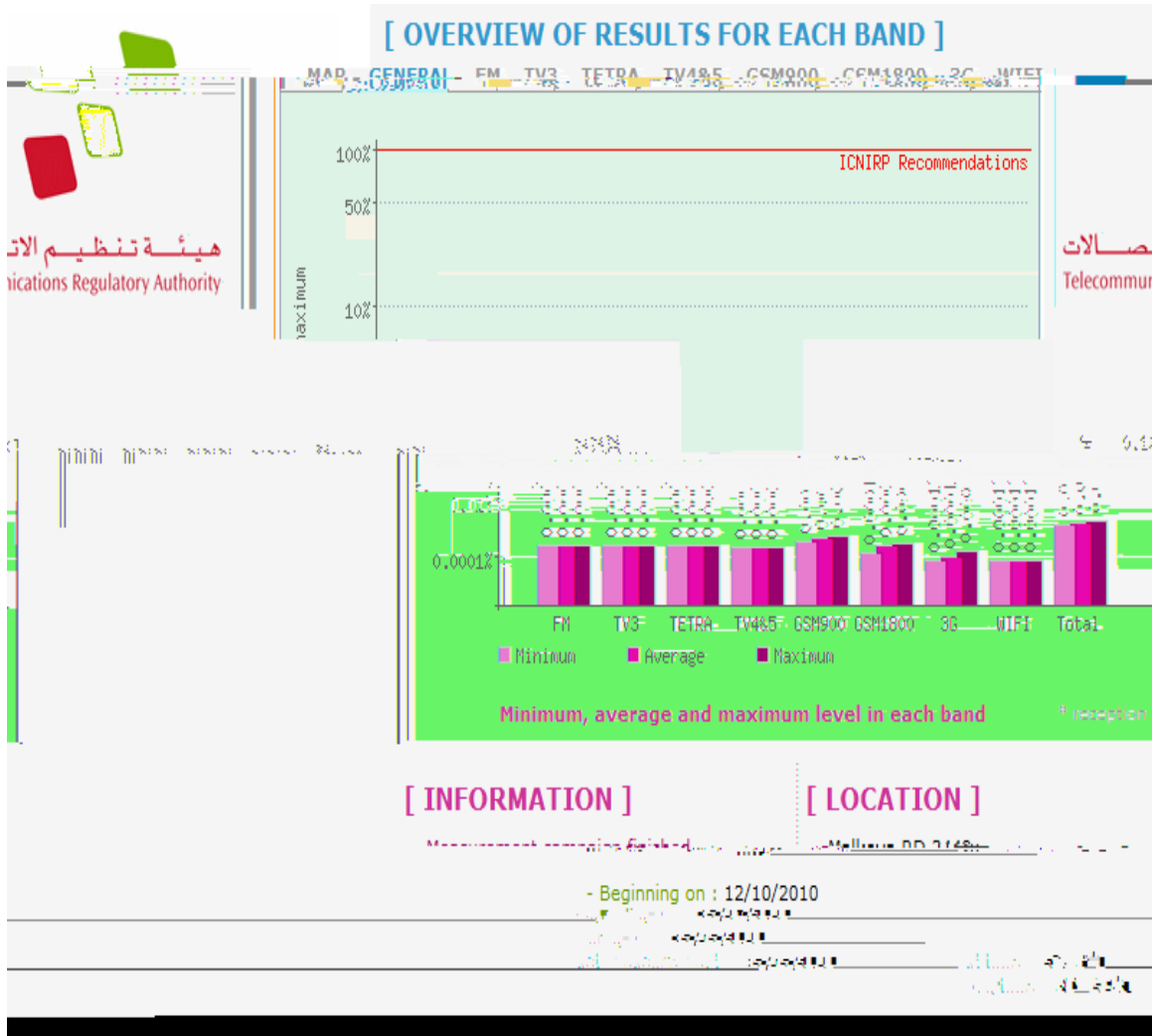
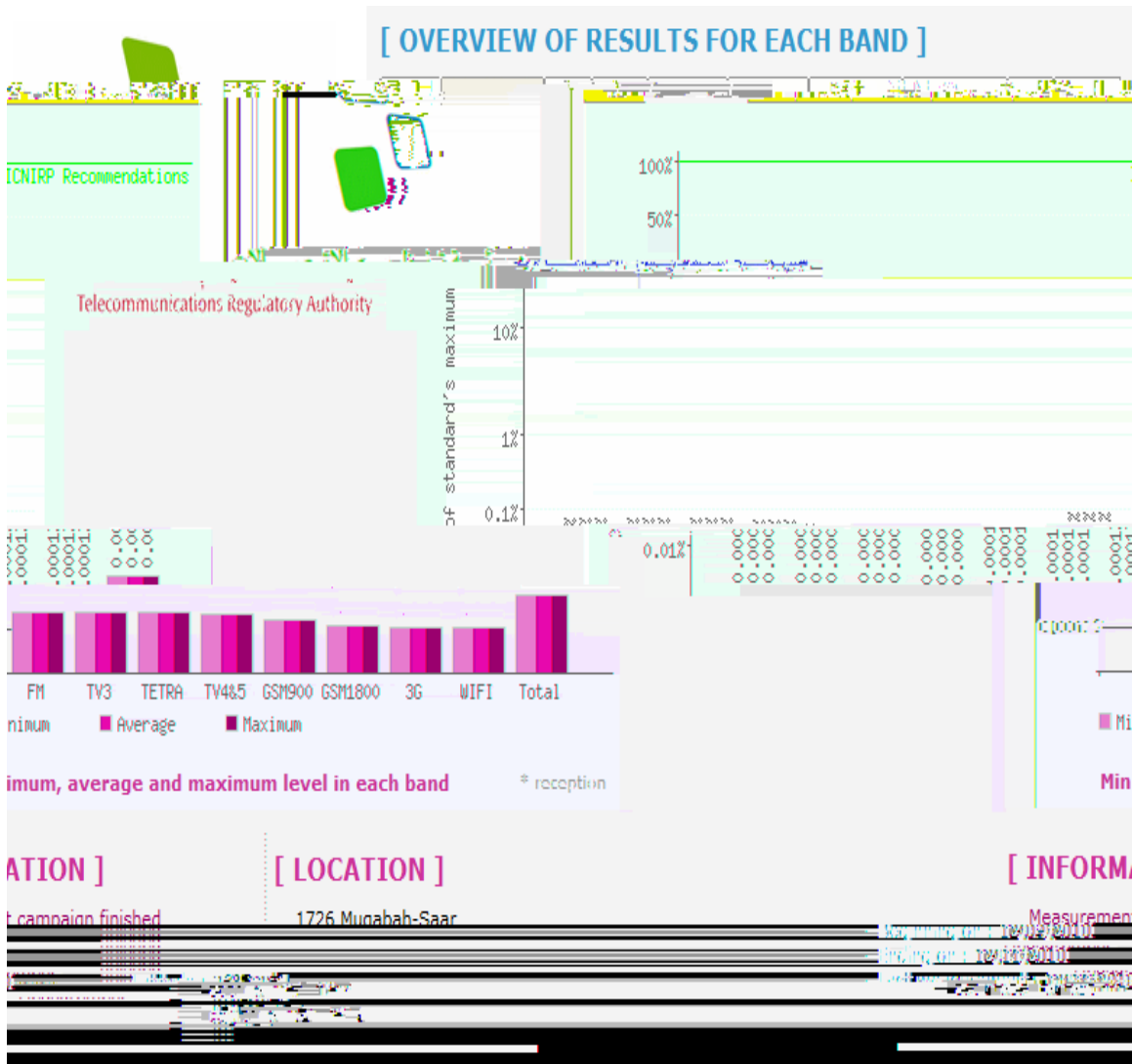


Figure 7: Result for Malkeya Rd 3449



**Figure 8: Result for Mugabah Rd 1726**

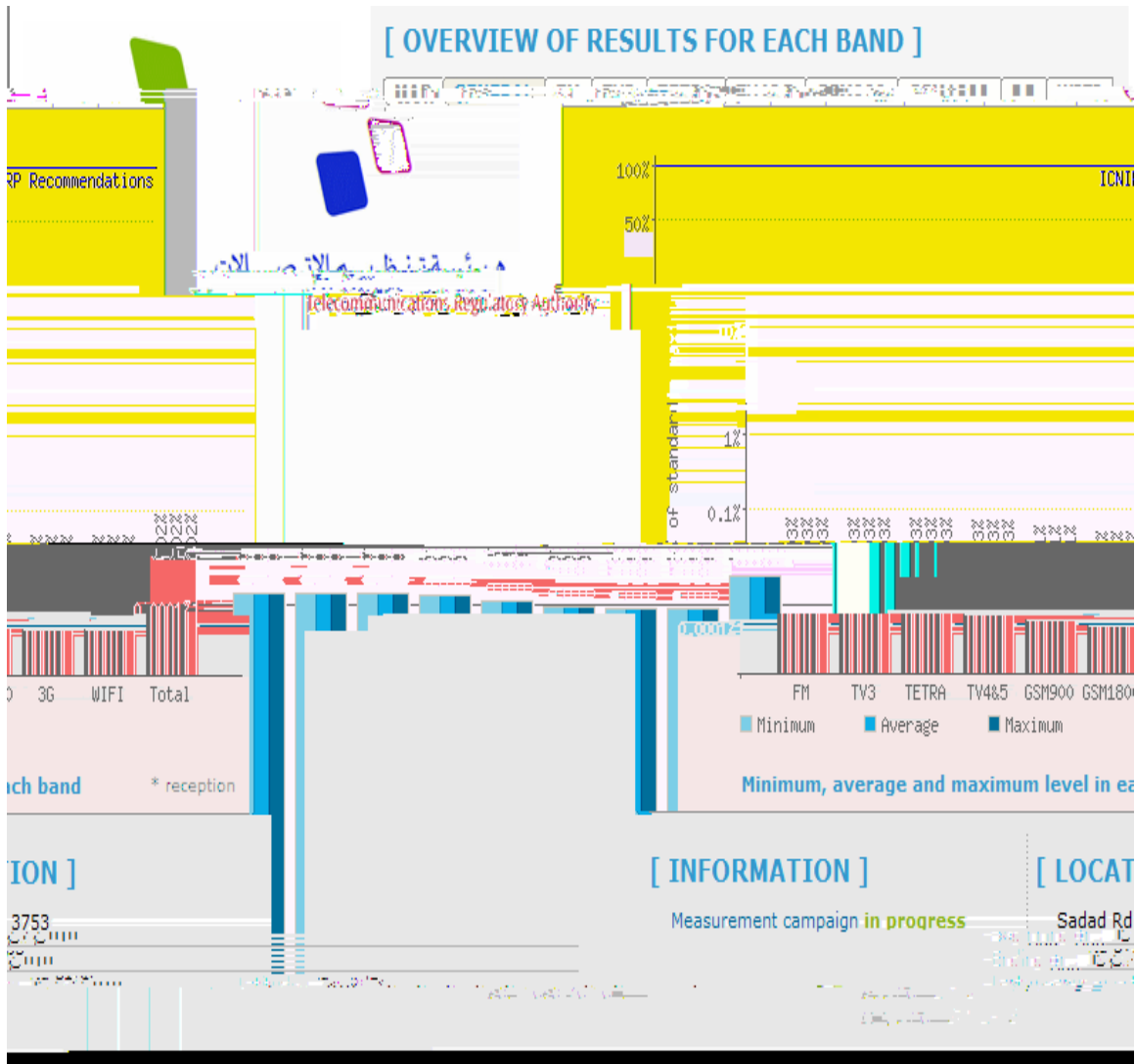


Figure 9: Result for Sadad Rd 3753

## **5 Conclusions**

- 5.1 All measurements are very small compared to the ICNIRP guidelines and at, or very close the lowest signal level measureable by the test equipment.
- 5.2 The highest total exposure level for typical public sites measured during the quarter was 0.01% of the ICNIRP level as shown in figures 1, 2 & 6.
- 5.3 The measurement using Insite Free equipment at Aali Rd 3240 is higher than at other locations but this is to be expected given that the measurement was taken, in open air, at a distance of about 200m from the base station. Never the less, the measurement is still very small at just a 0.61% of the ICNIRP level.

## **6 Next Steps**

- 6.1 TRA will continue with the measurement campaign in 2011 to map RF signal levels throughout the Kingdom of Bahrain