



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

Results of measurements made between  
July and September 2009

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 for the 3rd Quarter report for 2009.

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## 1 Executive Summary

- 1.1 This report is the third in a series of reports issued 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 July and September 2009 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 (one ten thousandth) as shown in Figures 2 and 4 for Maameer Block 634 and Isa Town Block 804 respectively.
  - c. The measurements using Insite Free equipment at Nabih Saleh Island and Salmanya are higher than typical public/domestic measurements which are consistent with the location of the measurements very close to base stations. Never the less, the measurements are still very small indeed at just a 0.06% and 0.18% of the ICNIRP level.



## **2 Introduction**

- 2.1 This report is the third in a series of reports issued 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 each report. This report provides the results of further measurements and can therefore be considered to be an extension of the earlier reports.
- 2.3 During the period July to September 2009 measurements of RF field strengths were made at 13 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 July and September 2009 at the following locations:

<b>Location</b>	<b>General Area</b>	<b>Specific location</b>
1	Sitra	Block 606
2	Maameer	Block 634
3	Jid Ali	Block 812
4	Isa Town	Block 804
5	Aali	Block 736
6	Hamad Town	Block 1204
7	Tubli	Block 701
8	Muharraq Municipal Council	Head office
9	Southern Municipal Council	Head office-Riffa
10	Jidhafs	Block 419
11	Sar	Block 525
12	Nabih Saleh Island	Block 381
13	Salmanya	Zain GSM station next to Police Fort

**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 measurements to be made continuously over a period of time (i.e. 24 hours a day and 7 days a week) but it does not cover the WiMAX band. The Insite Free equipment covers the WiMAX band and enables more detailed investigation of any specific frequency band, thus the Insite Free system is used to follow-up on measurements made using the Insite Box equipment at locations near a WiMAX base station and also when specific instantaneous measurements are required.

### Insite Free

- 4.2 Measurements using the Insite Free equipment were made at Nabih Saleh Island and in Salmanya.
- 4.3 The measurements made in Nabih Saleh Island were as a follow-up to measurements reported in the 2nd Quarter report which showed higher than typical signal levels in the area. As a result, TRA returned to the area to measure in a more exposed area closer to a base station in order to investigate the full extent of higher signal levels.
- 4.4 The measurements in Salmanya were made on the roof top of a building on which a mast and base station is installed. They therefore represent measurements taken in an extreme location which is not typical of public exposure.
- 4.5 The measurements in Jidhafs were made at street level approximately 50m away from a recently installed WiMAX mast and base station. This represents a typical public exposure scenario.
- 4.6 The following table shows the total exposure measured at each location as a percentage of the ICNIRP level:

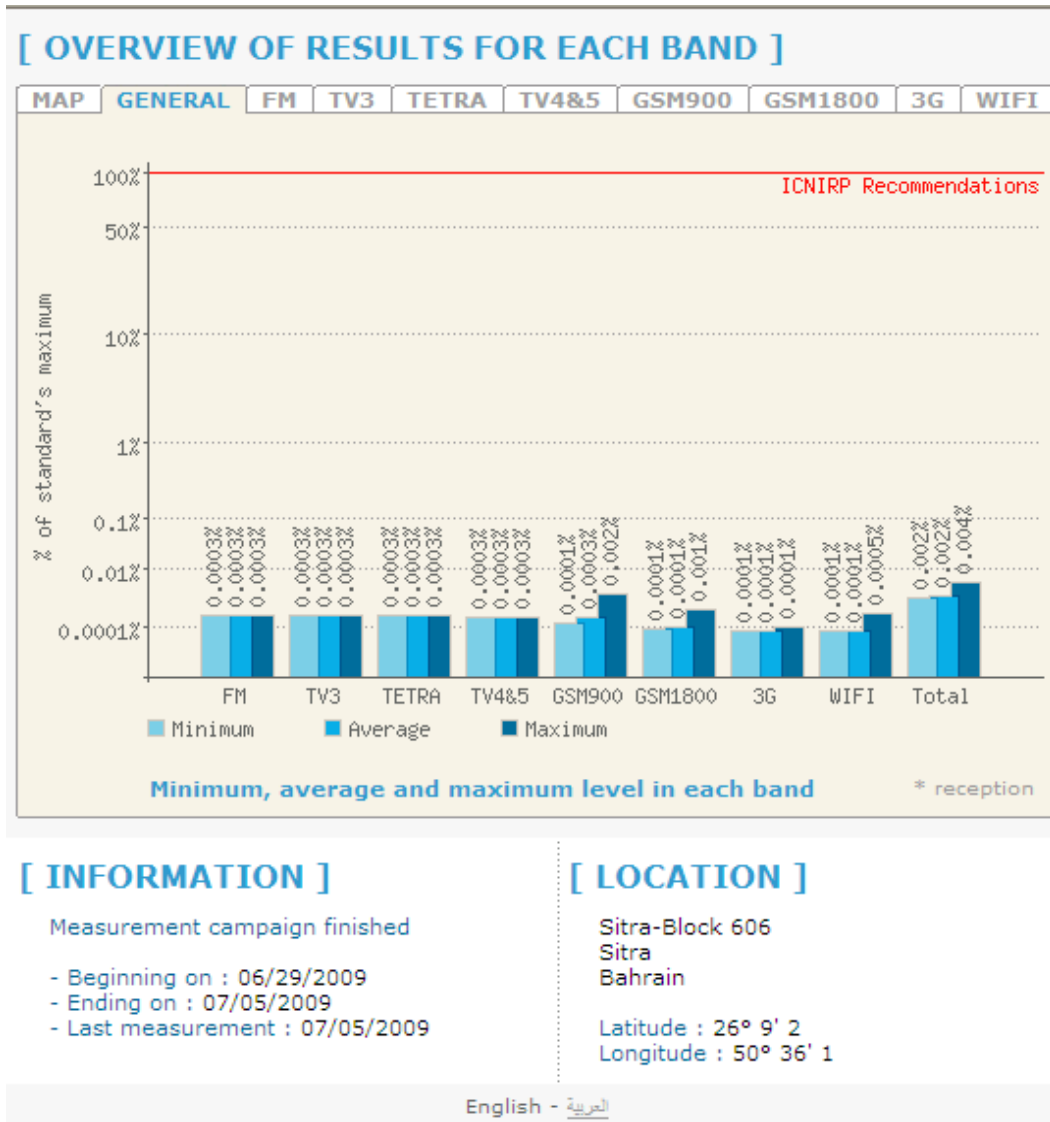
Location / site name	Total % exposure limit
Nabih Saleh Island	0.06%
Salmanya	0.18 %
Jidhafs Block 419	0.002%

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

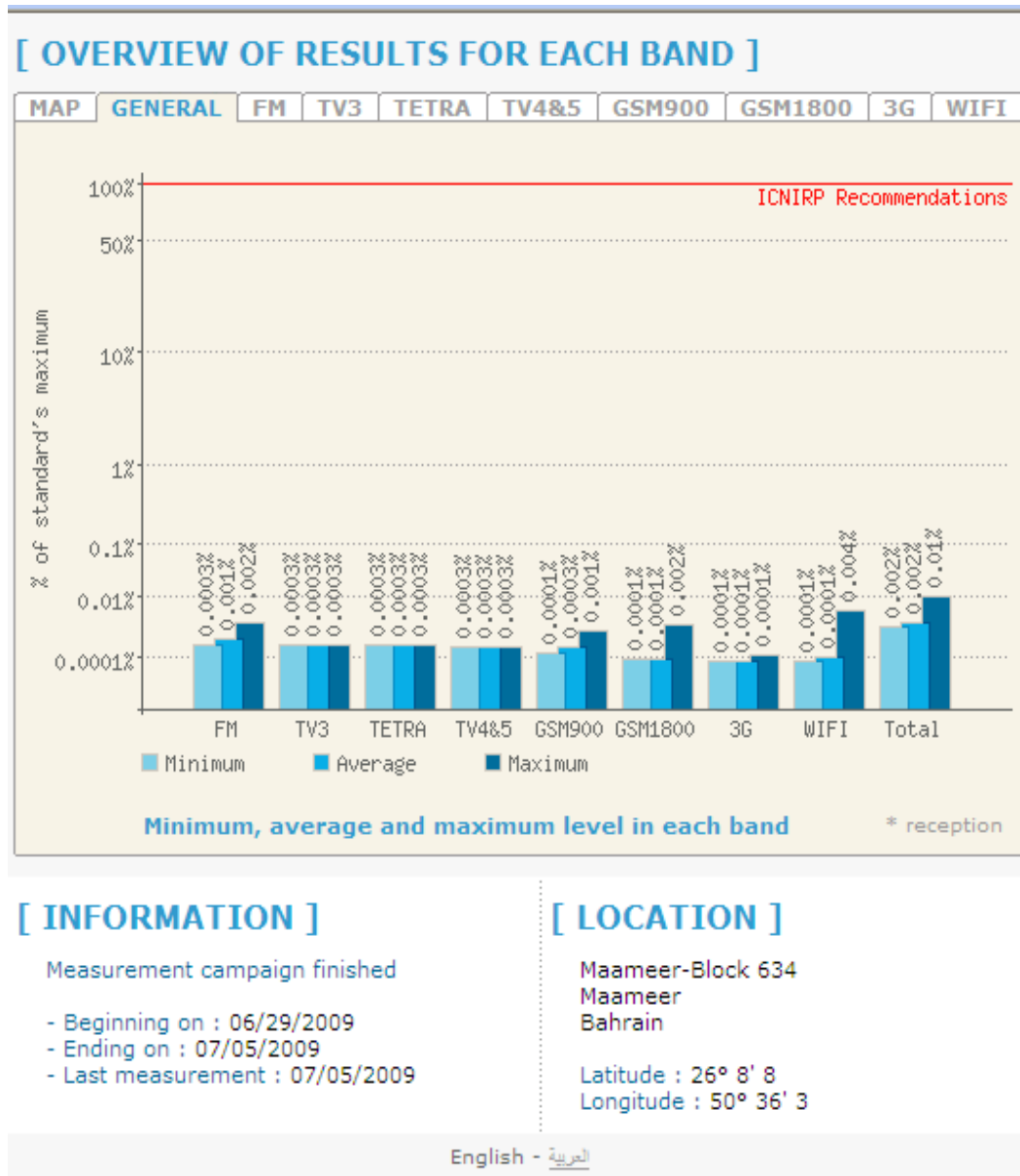


**Insite Box**

- 4.7 Figures 1 to 10 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.
- 4.8 All measurements were taken in typical public or domestic locations (i.e. inside malls or in homes).



**Figure 1: Result for Sitra Block 606**



**Figure 2: Result for Maameer Block 634**

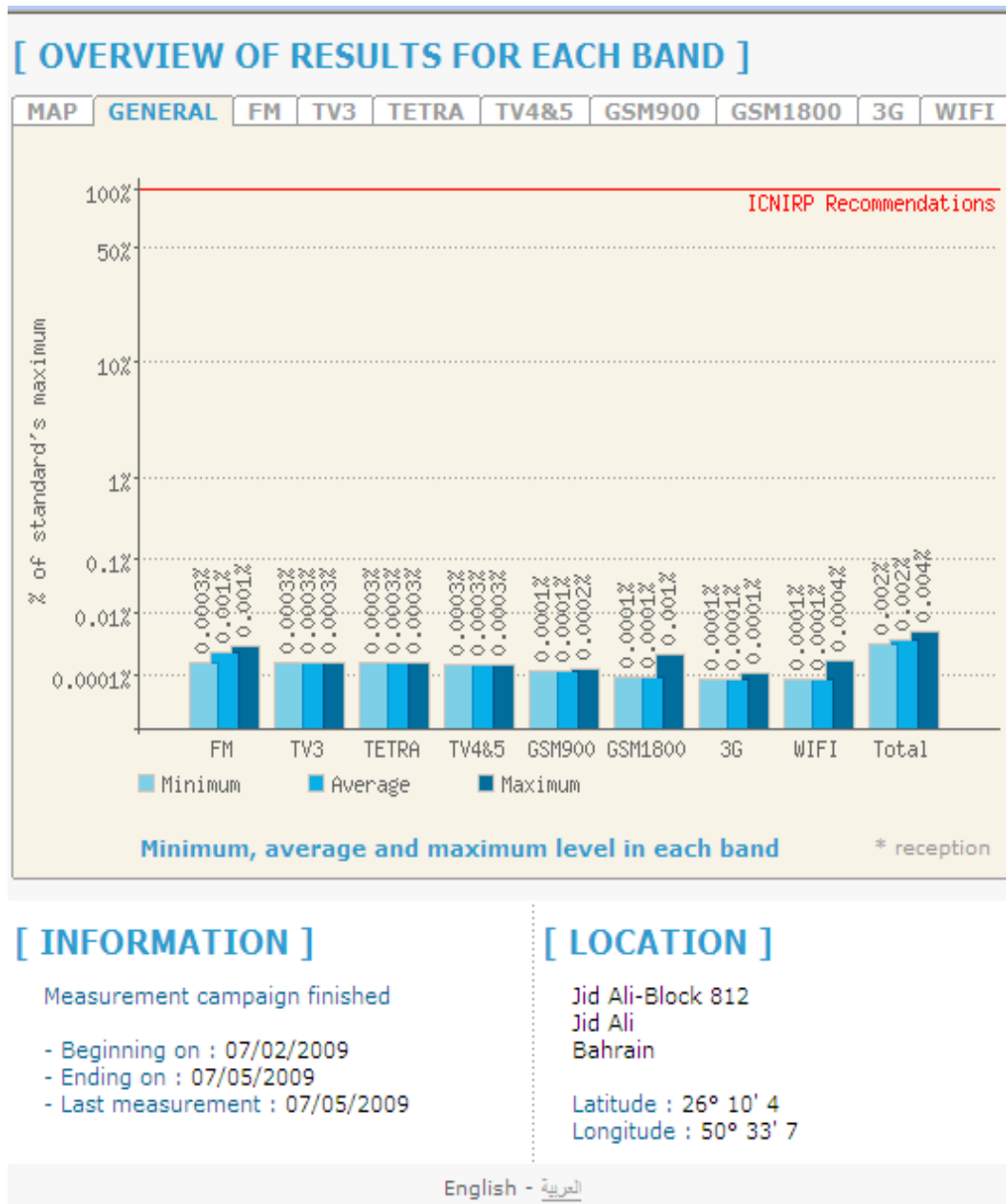
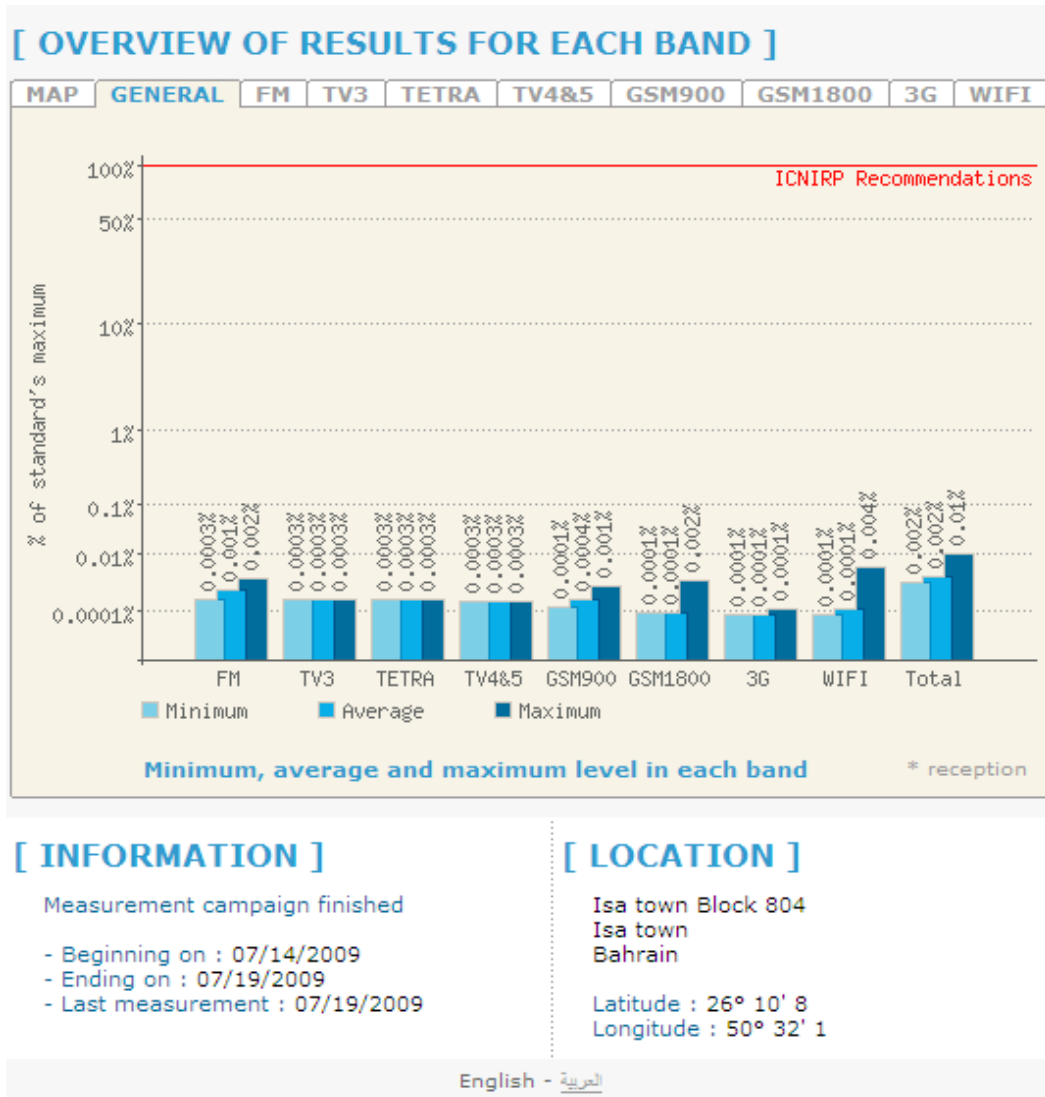


Figure 3: Result for Jid Ali Block 812



**Figure 4: Result for Isa Town Block 804**

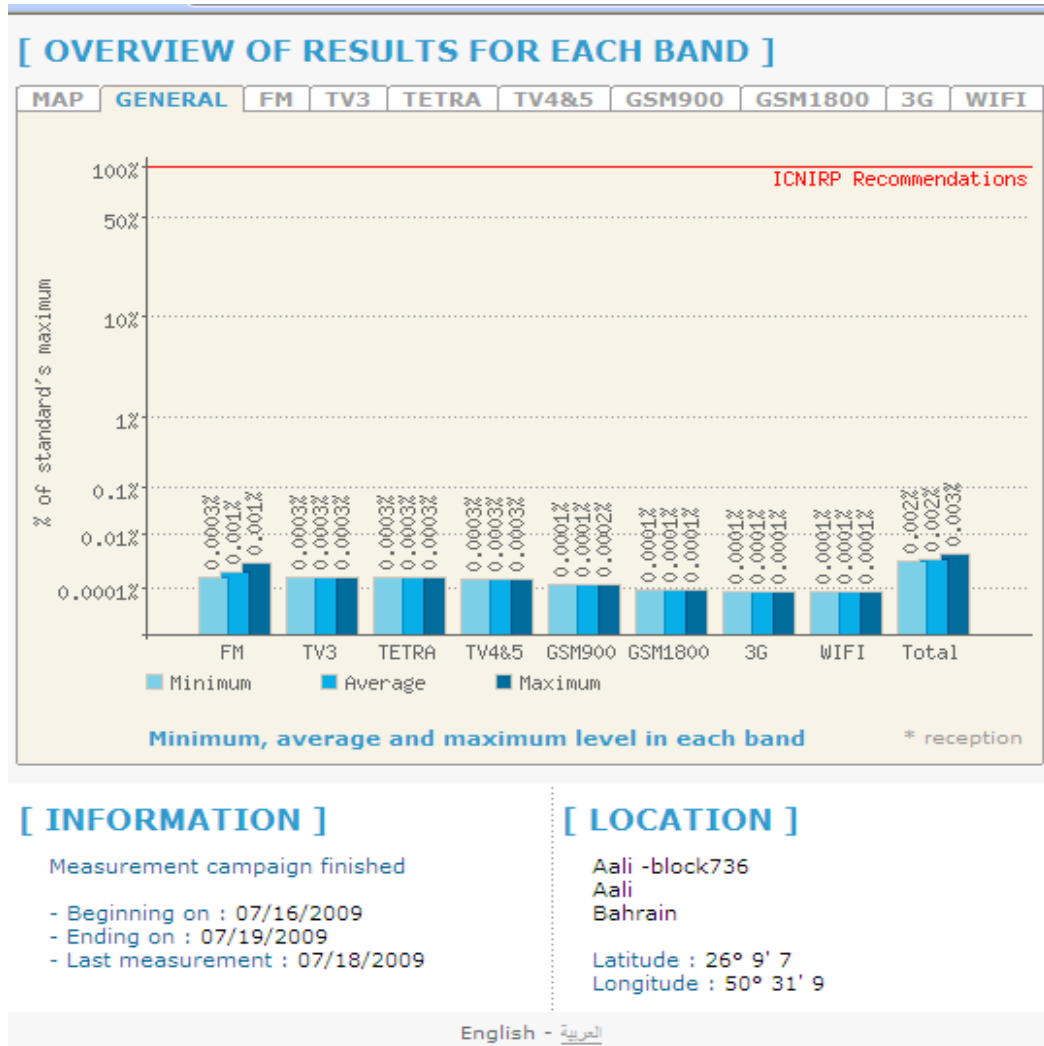


Figure 5: Result for Aali area

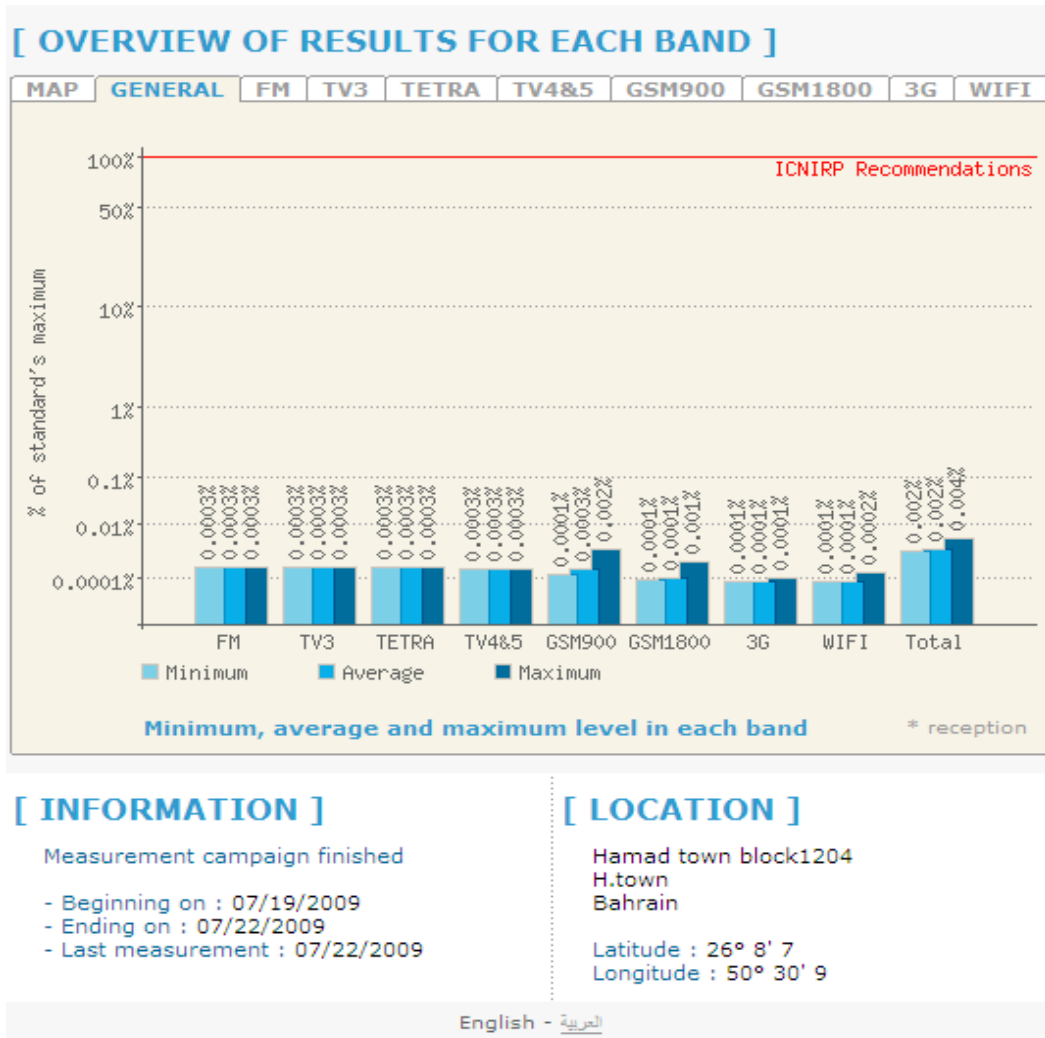
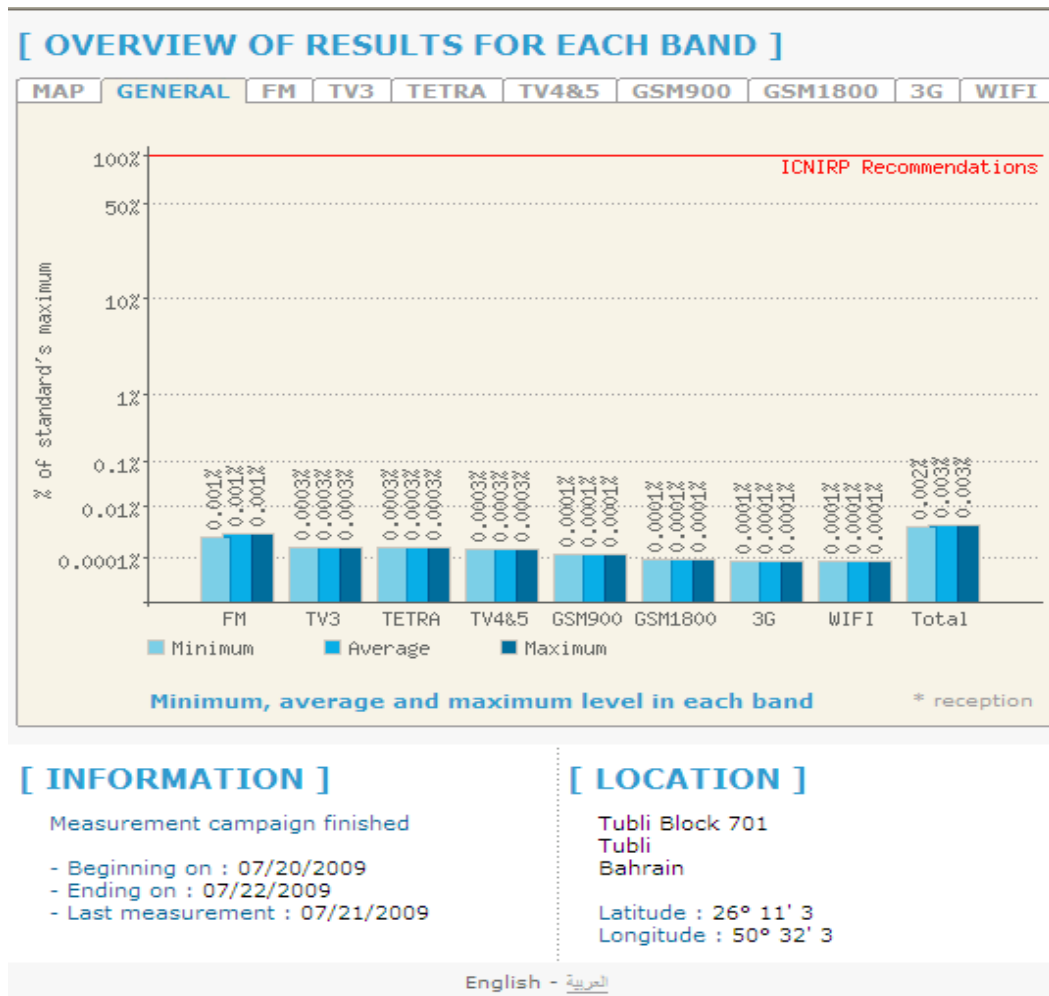


Figure 6: Result for Hamad Town Area



**Figure 7: Result for Tubli Block 701**

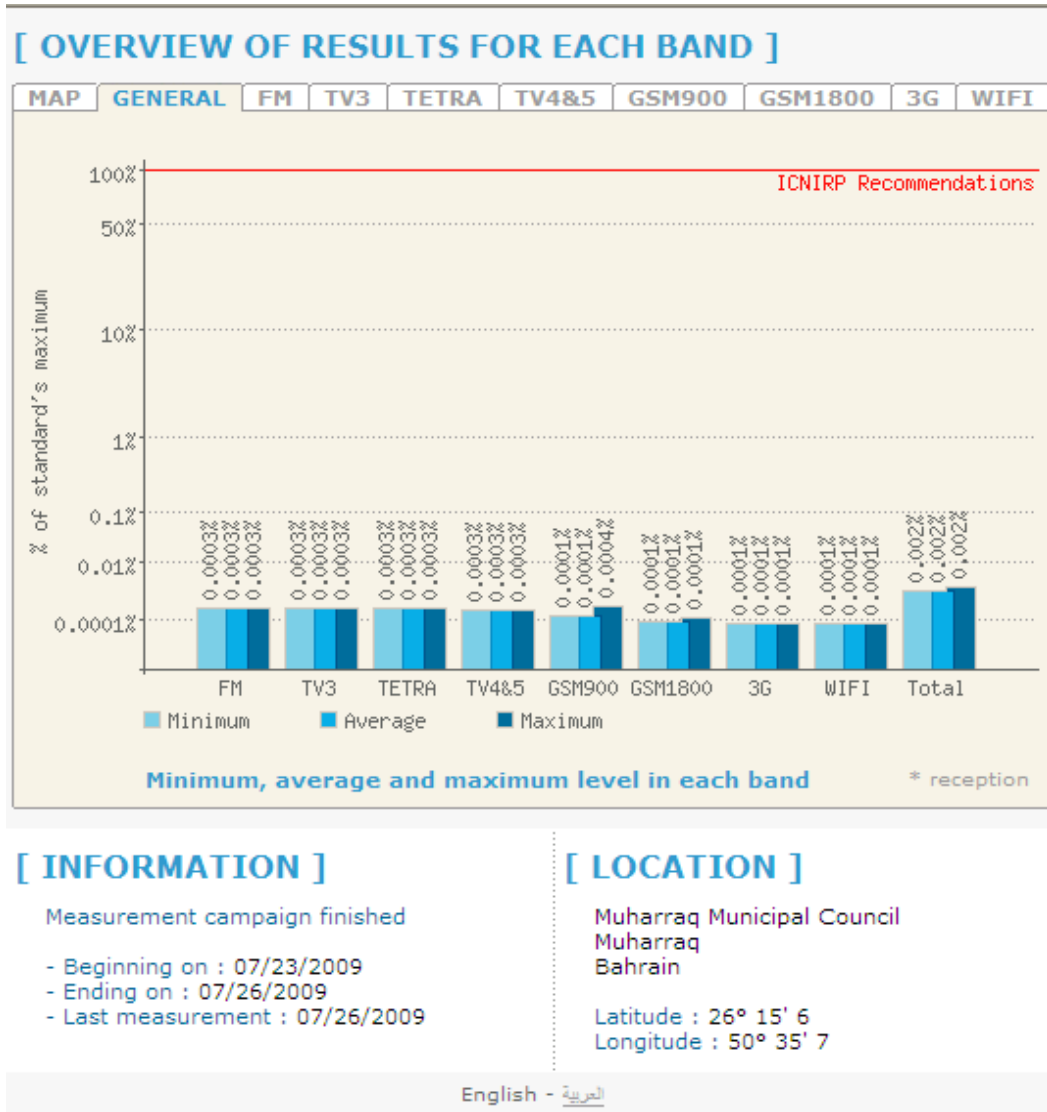


Figure 8: Result for Muharraq Municipal Council



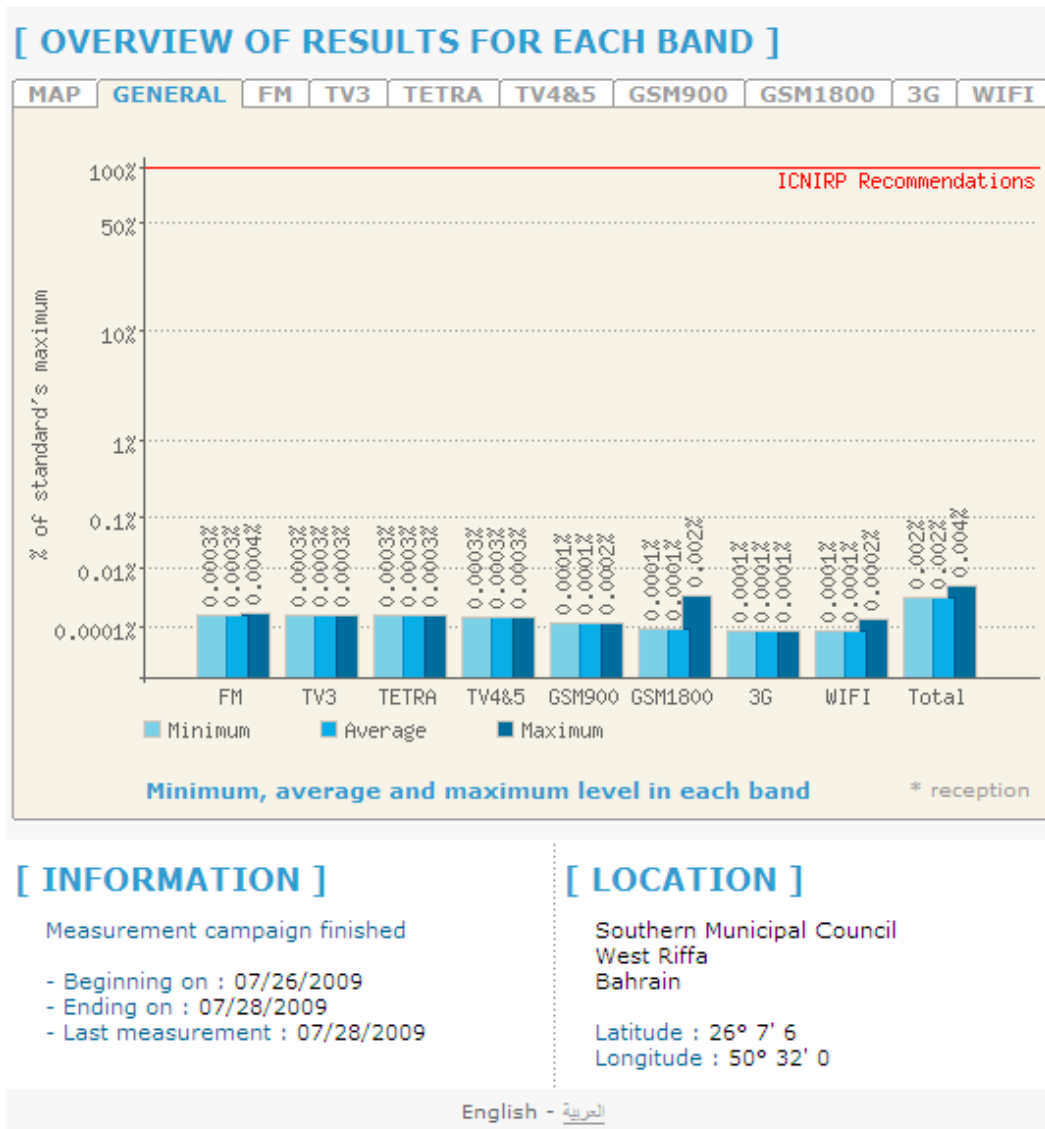


Figure 9: Result for Southern Municipal Council

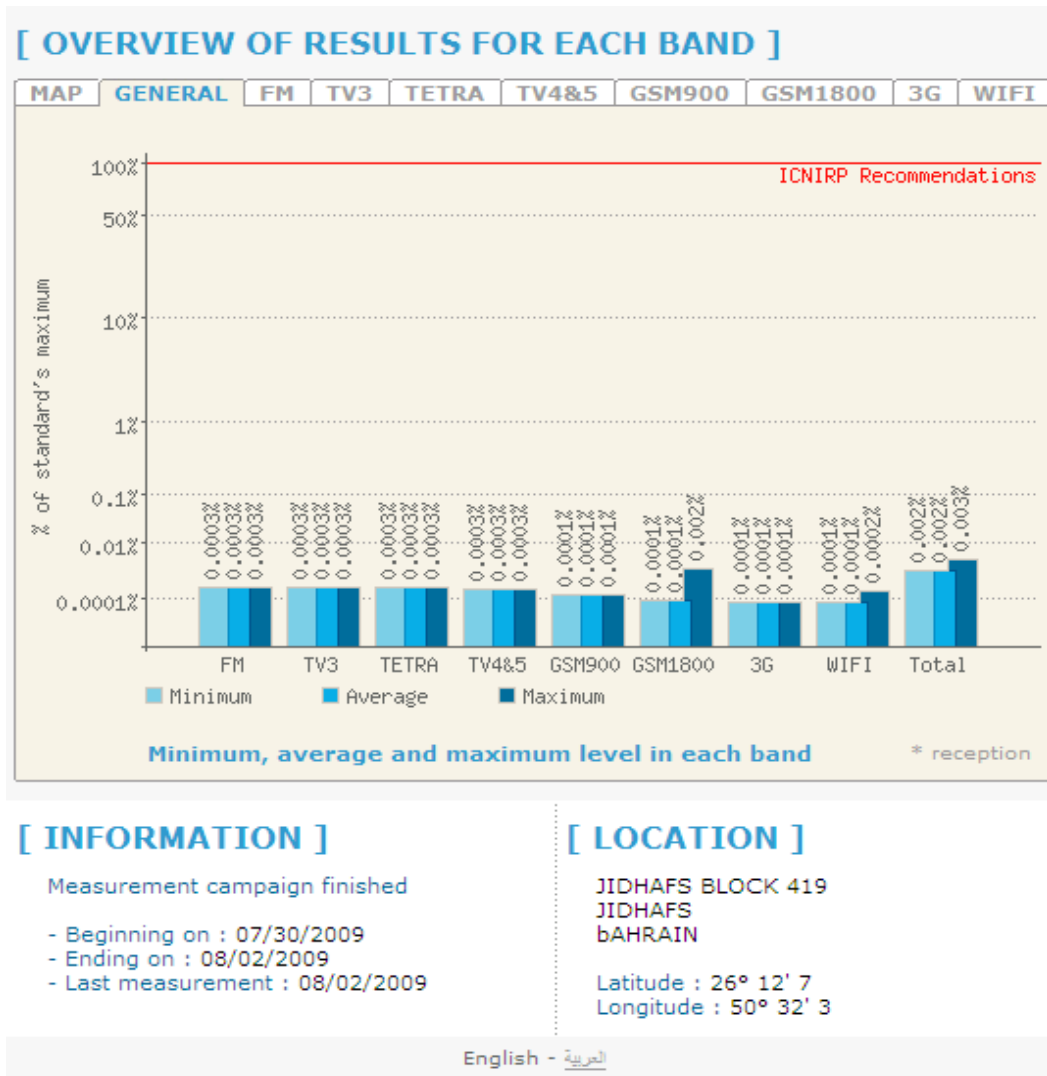


Figure 10: Result for Jidhafs area

## **5 Conclusions**

- 5.1 All measurements were very small compared to the ICNIRP guidelines.
- 5.2 The highest total exposure level for new, typical public, sites measured during the quarter was 0.01% of the ICNIRP level (one ten thousandth) as shown in Figures 2 and 4 for Maameer Block 634 and Isa Town Block 804.
- 5.3 The measurements using Insite Free equipment at Nabih Saleh Island and Salmanya are higher than typical public/domestic measurements which are consistent with the location of the measurements very close to base stations. Never the less, the measurements are still very small indeed at just a 0.06% and 0.18% of the ICNIRP level.

## **6 Next steps**

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