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

Results of measurements made between

October and December 2009

## A Report issued by the

## Telecommunications Regulatory Authority

Reference: LIC/1209/918

31 December 2009

**Purpose**

To present the results of RF field strength measurements taken in Bahrain during the 4th Quarter of 2009.

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# 1 Executive Summary

1.1 This report is the fourth 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 October and December 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 0.1% of the ICNIRP level as shown in Figures 9 and 10 for Janabiya Block 579 and Saar Block 525 respectively.

c. The measurements using Insite Free equipment at Hamad Town and Hidd are higher than typical public/domestic measurements which are consistent with the location of the measurements very close to base stations at a distance of about 50m. Never the less, the measurements are still very small indeed at just a 0.2% and 0.19% of the ICNIRP level.

# 2 Introduction

2.1 This report is the fourth 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 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 October to December 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 October and December 2009 at the following locations:

| Location | General Area | Specific location |
|---|---|---|
| 1 | Barbar | Block 518 |
| 2 | Jidhafs | Granada garden, villa 513 |
| 3 | Hamad Town | Block 206 |
| 4 | West Riffa | Block 912 |
| 5 | Seef Area | Seef views building |
| 6 | Amwaj Island | inside one of the villas |
| 7 | Hidd | Block 109 |
| 8 | Janabiya | Block 571 |
| 9 | Janabiya | Block 579 |
| 10 | Saar | Block 525 |
| 11 | Jufair | Block 340 |
| 12 | Qudaibiya | Block 308 |
| 13 | Seef area | TRA new office |

**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 is limited to only 3 GHz 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 and also when specific instantaneous measurements are required – particularly involving the WiMAX band.

**Insite Free**

4.2 Measurements using the Insite Free equipment were made at Jidhaffs, Hamad Town, Hidd and in Qudaibiya.

4.3 The measurements made in the above 4 areas were in response to specific requirement from the public due to the erection of new masts in these areas.

4.4 The measurements in the above areas were made at street level approximately 50m away from a recently installed GSM masts and base stations. TRA would expect to measure higher levels of RF field strengths at such a location than in a typical public exposure scenario.

4.5 The following table shows the total exposure measured at each location as a percentage of the ICNIRP level:

| Location / site name | Total % exposure limit |
|---|---|
| Jidhafs (Granada Garden)[1] | 0.01% |
| Hamad Town-Block 206 | 0.2 % |
| Hidd-Block 109 | 0.19% |
| Qudaibiya-Block 308 | 0.03% |

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

[1] It transpired that this base station had not been commissioned at the time of measurement. TRA will return to the site at a later date once the site is operational.

**Insite Box**

4.6 Figures 1 to 12 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.

4.7 All measurements were taken in typical public or domestic locations (i.e. inside homes, offices or apartments).

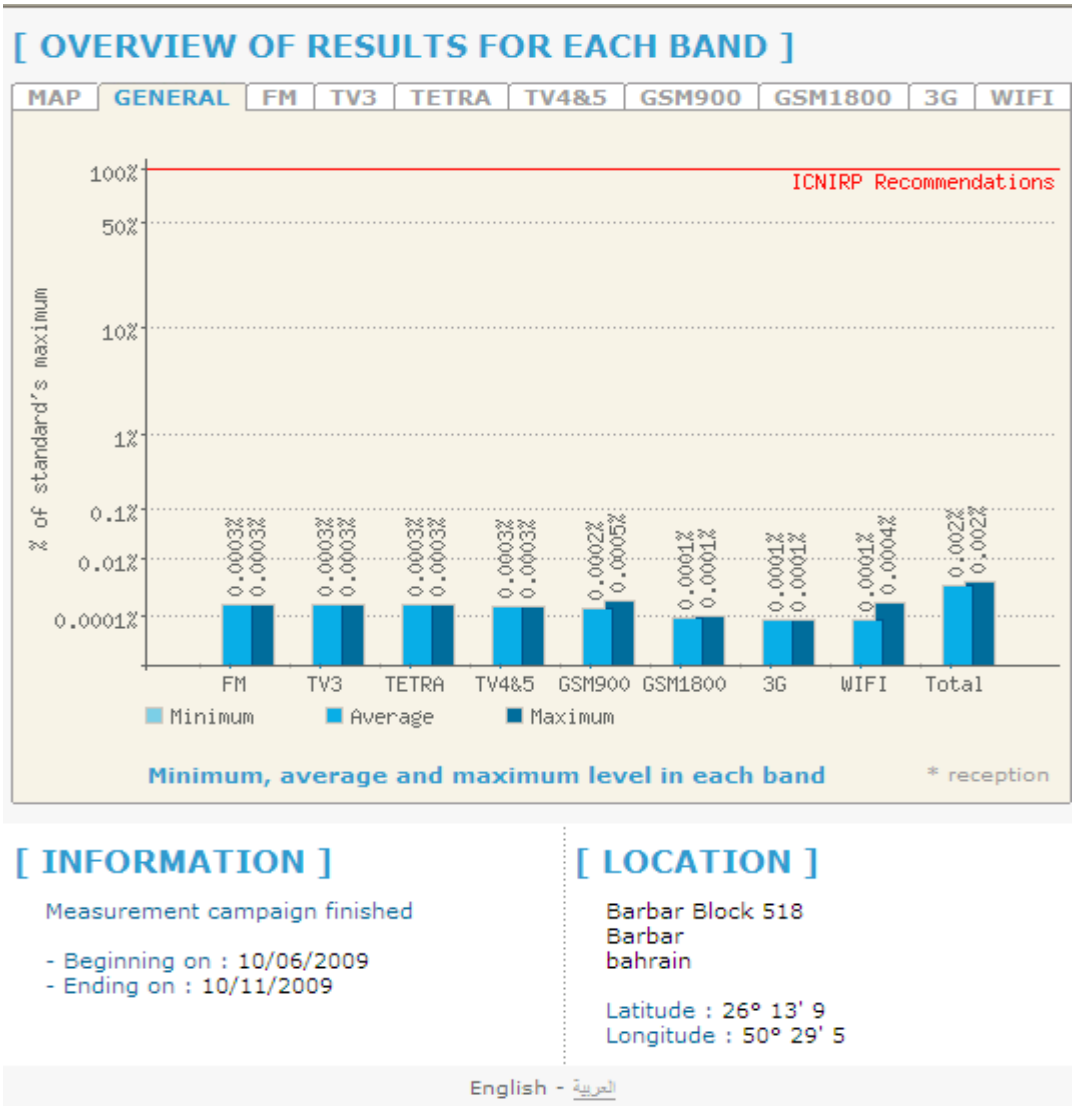

**Figure 1: Result for Barbar Block 518**

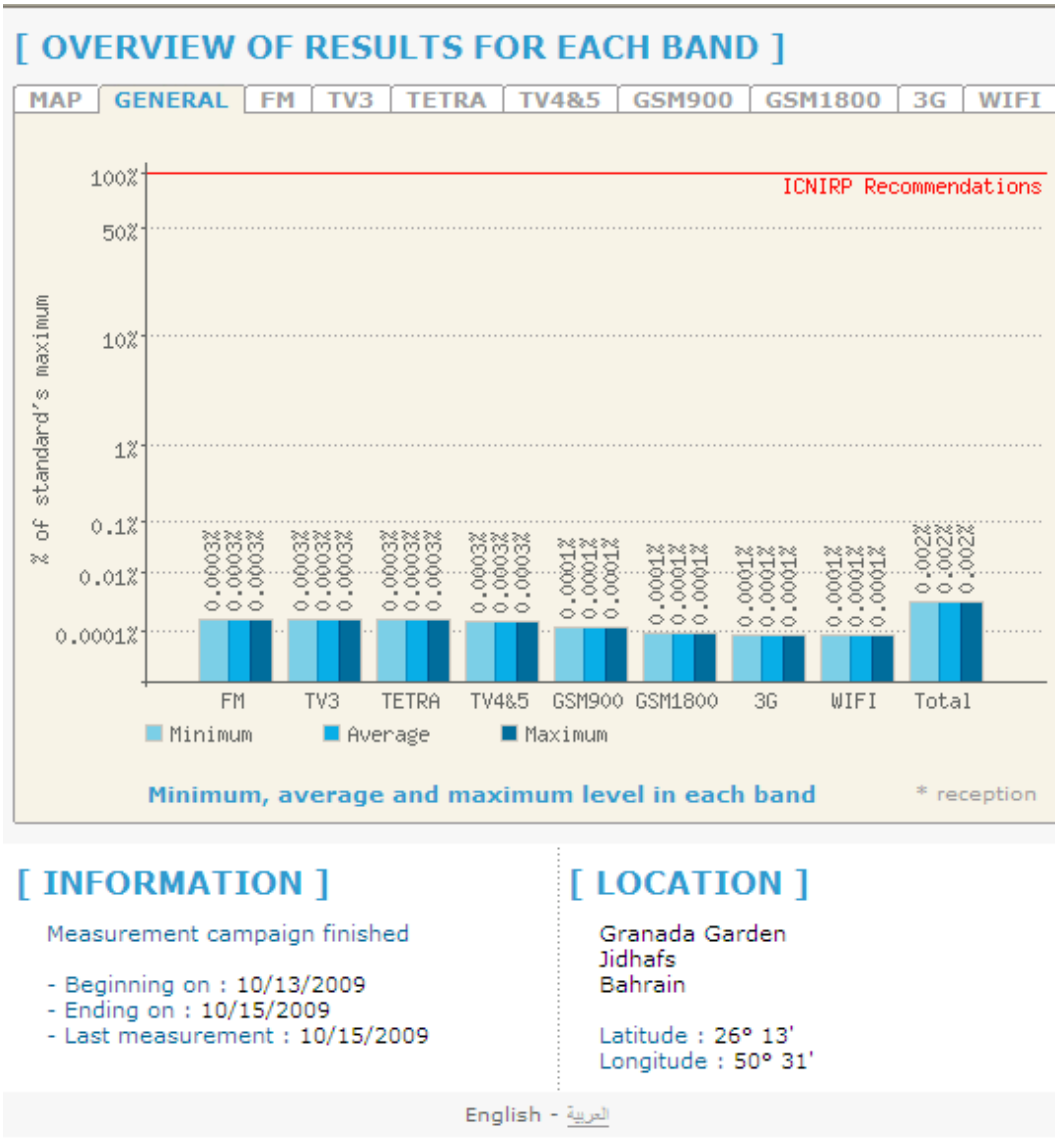


**Figure 2: Result for Jidhafs (Granada Garden)**

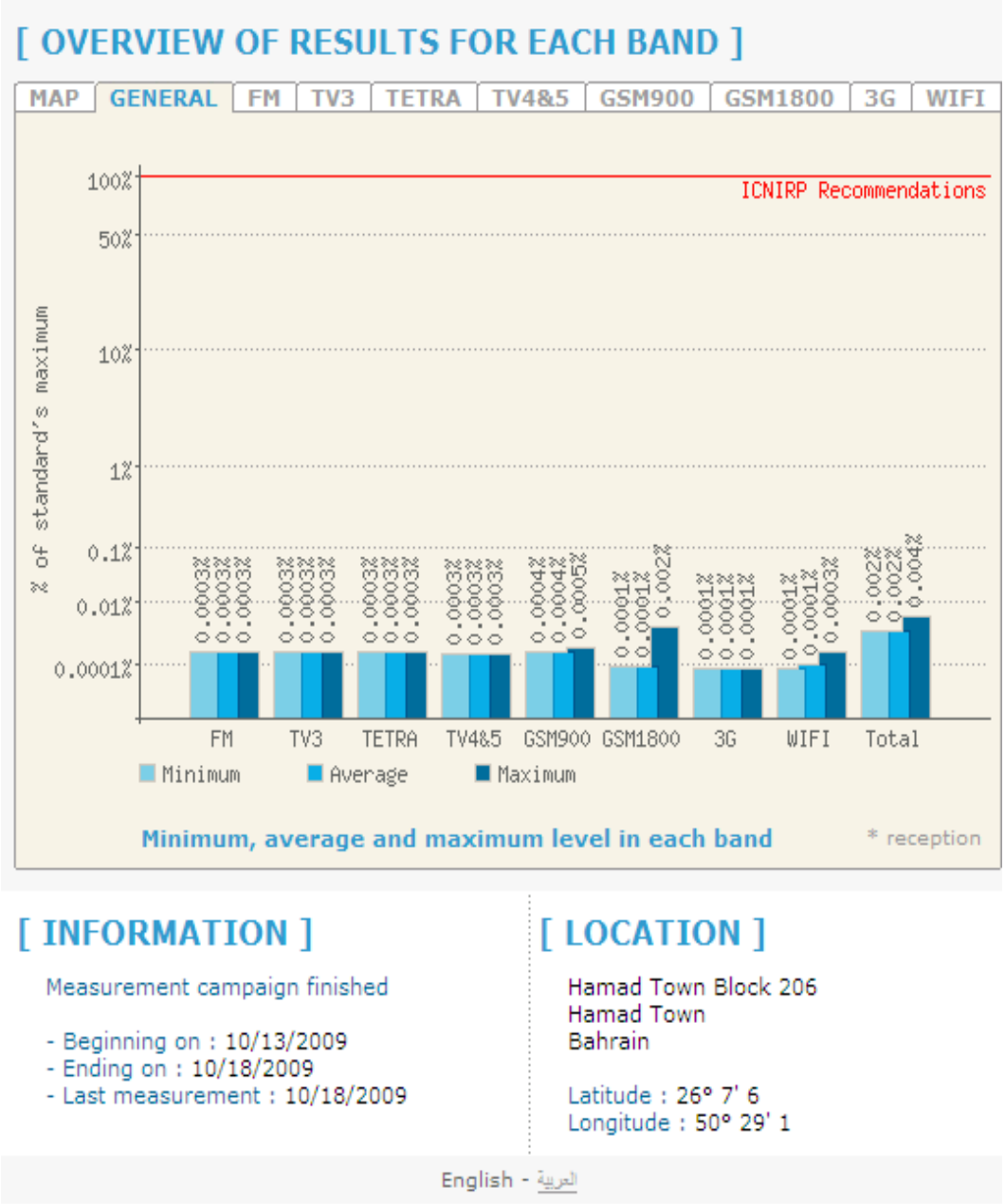


**Figure 3: Result for Hamad Town Block 206**

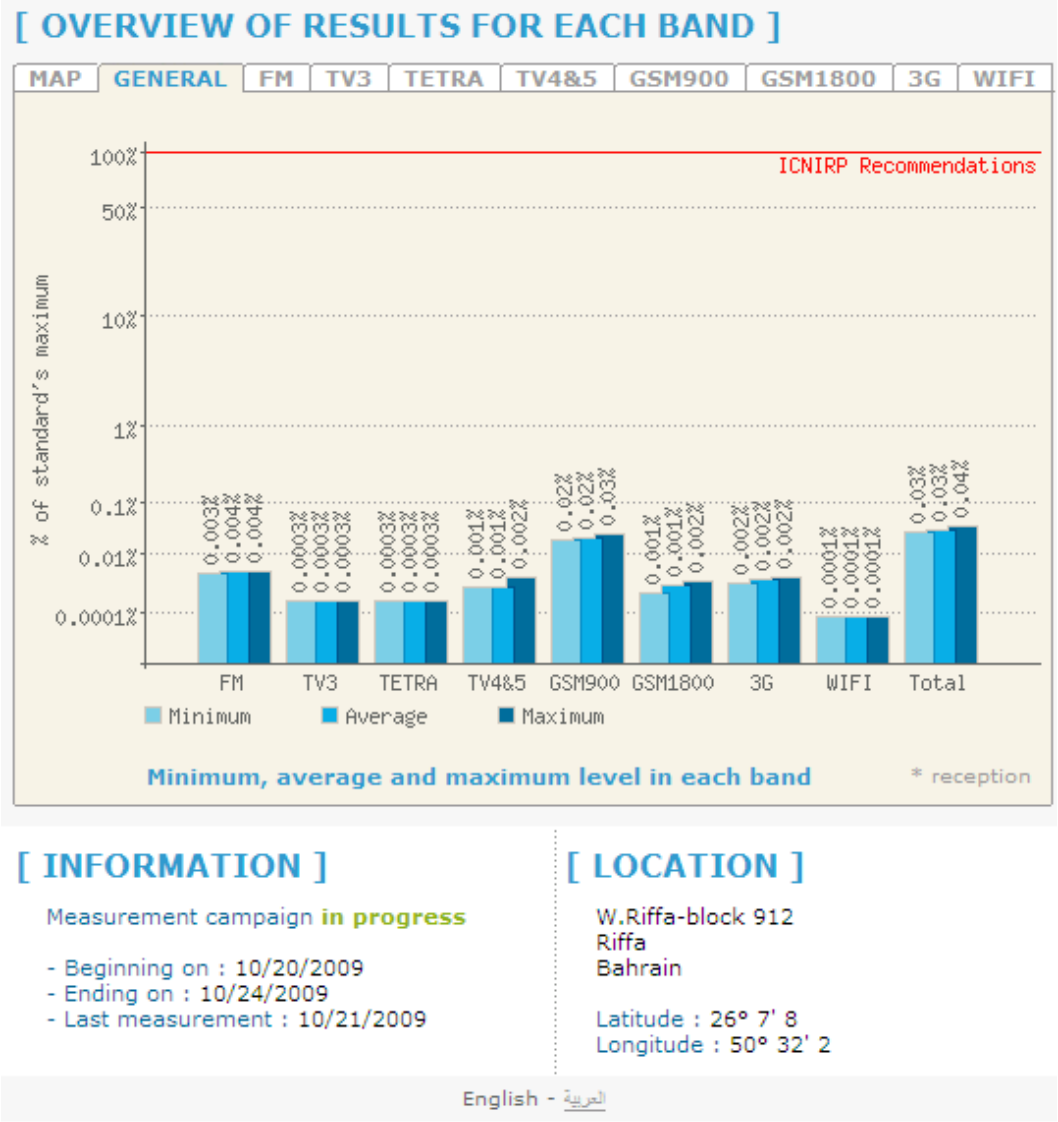


**Figure 4: Result for West Riffa Block 912**

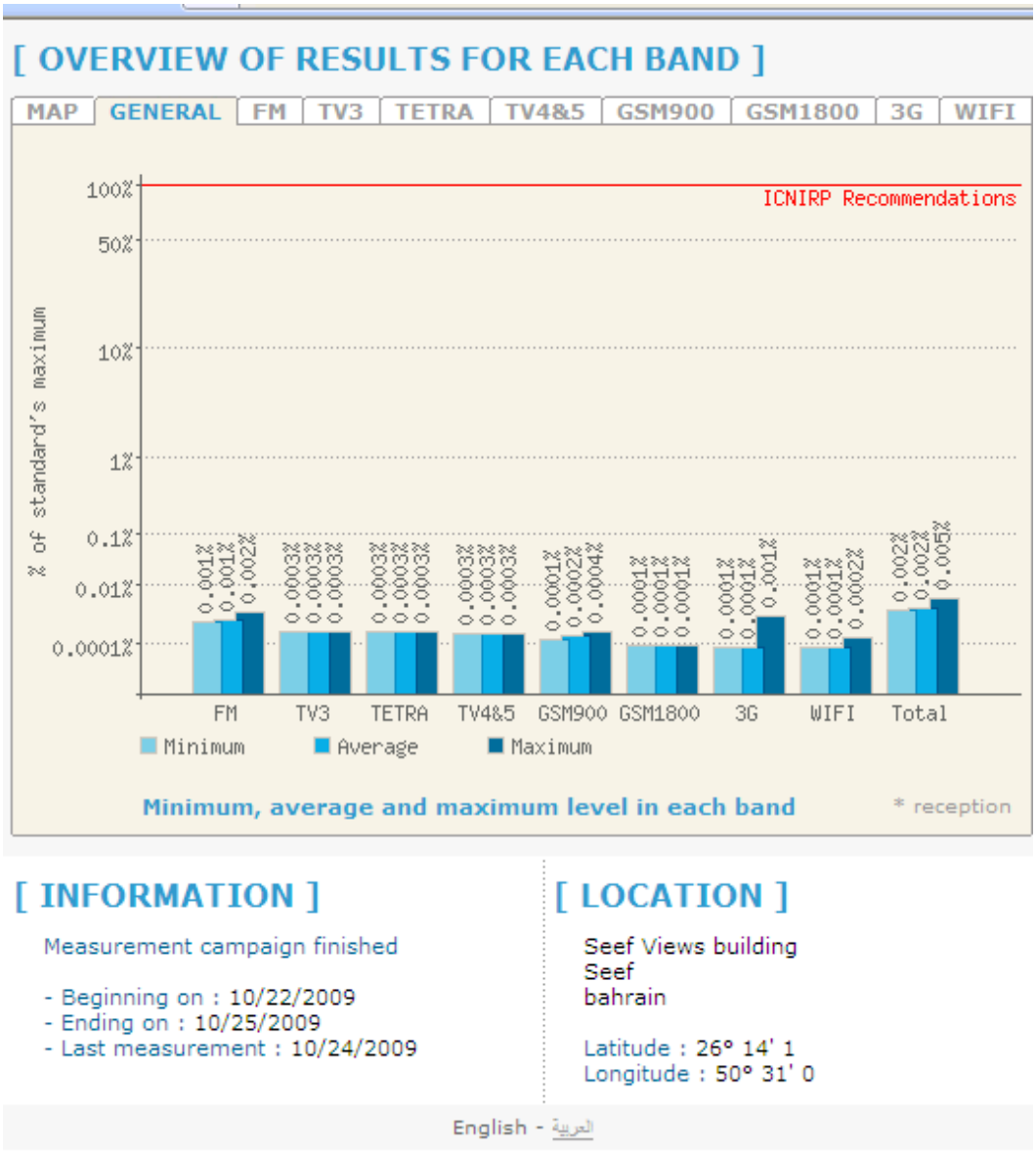


**Figure 5: Result for Seef Views Building**

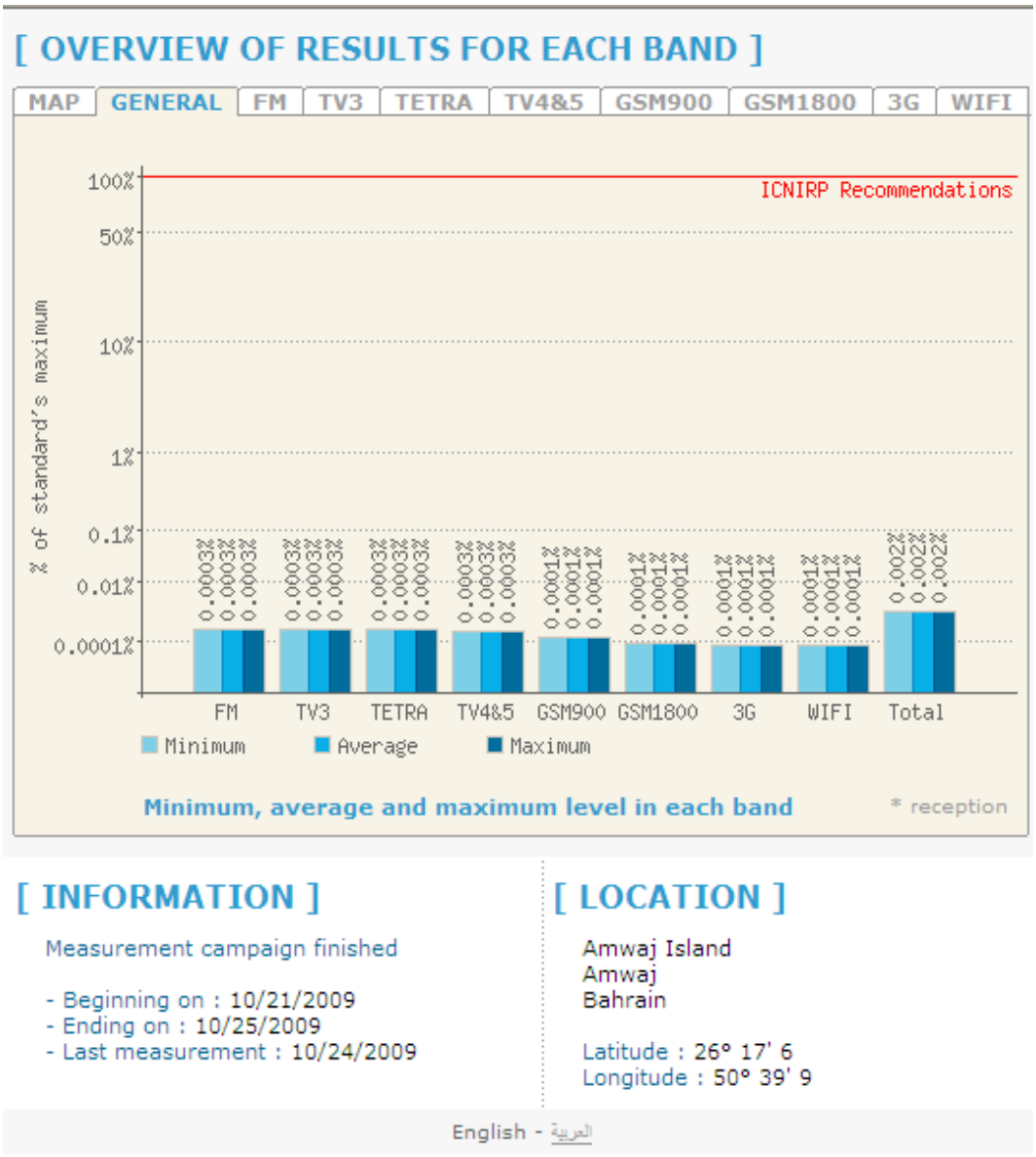


**Figure 6: Result for Amwaj Island**

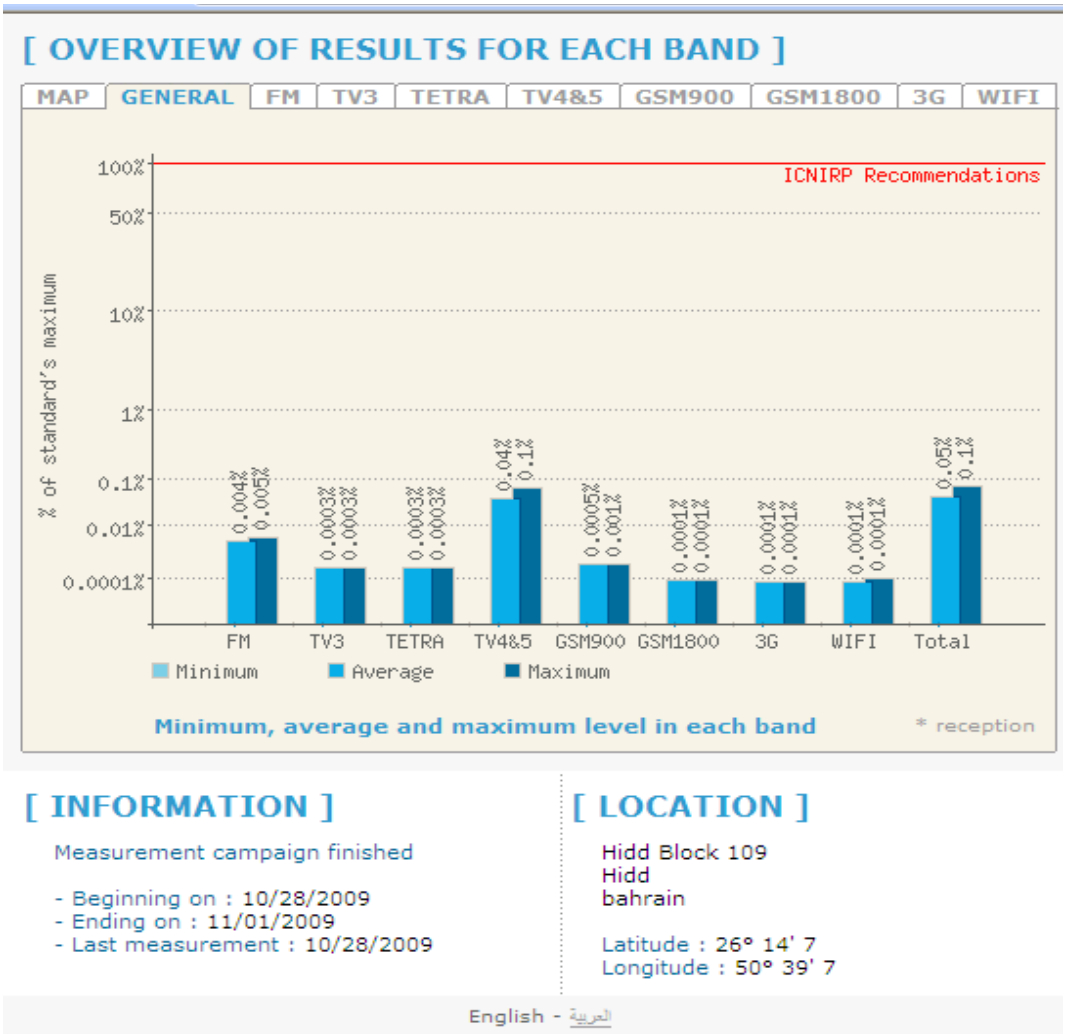


**Figure 7: Result for Hidd Block 109**

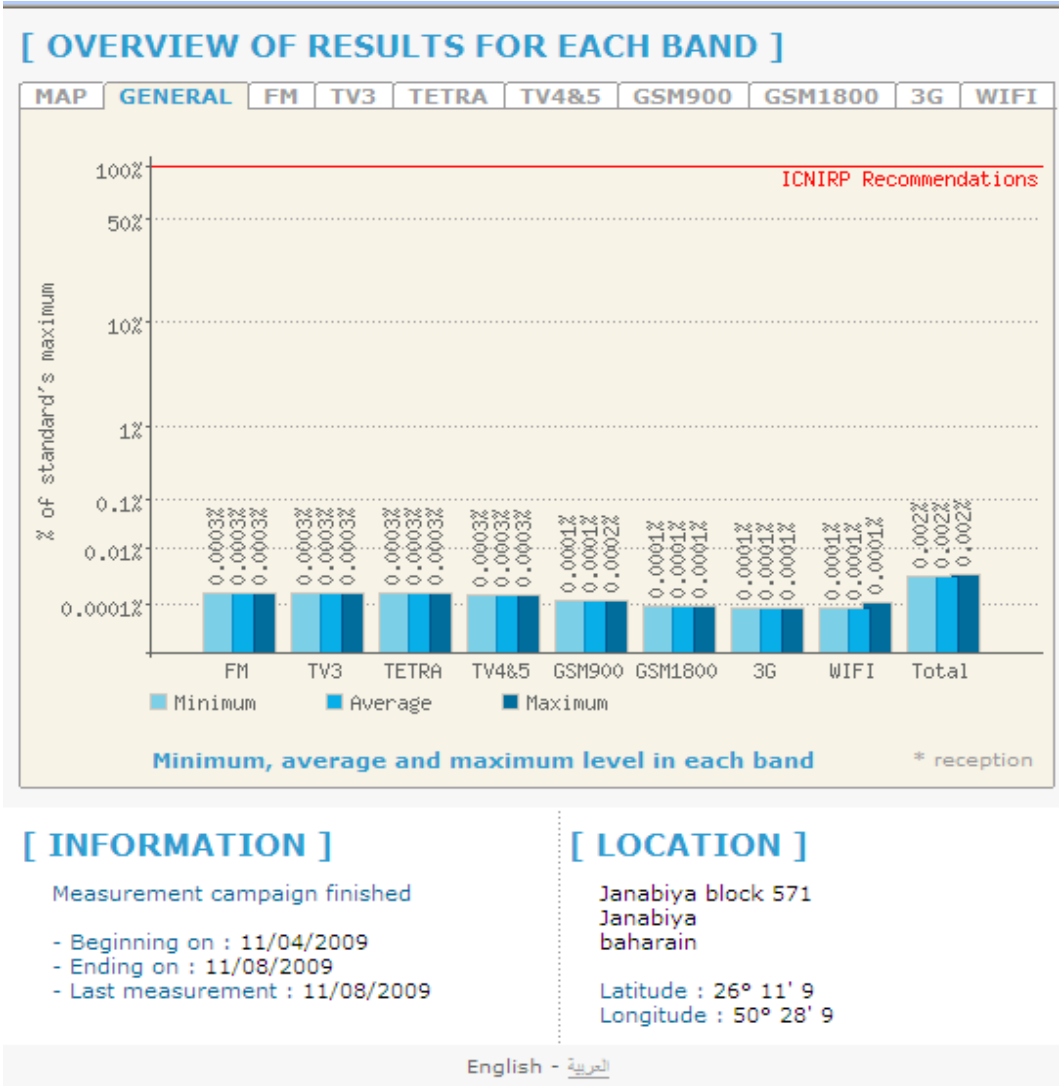


**Figure 8: Result for Janabiya Block 571**

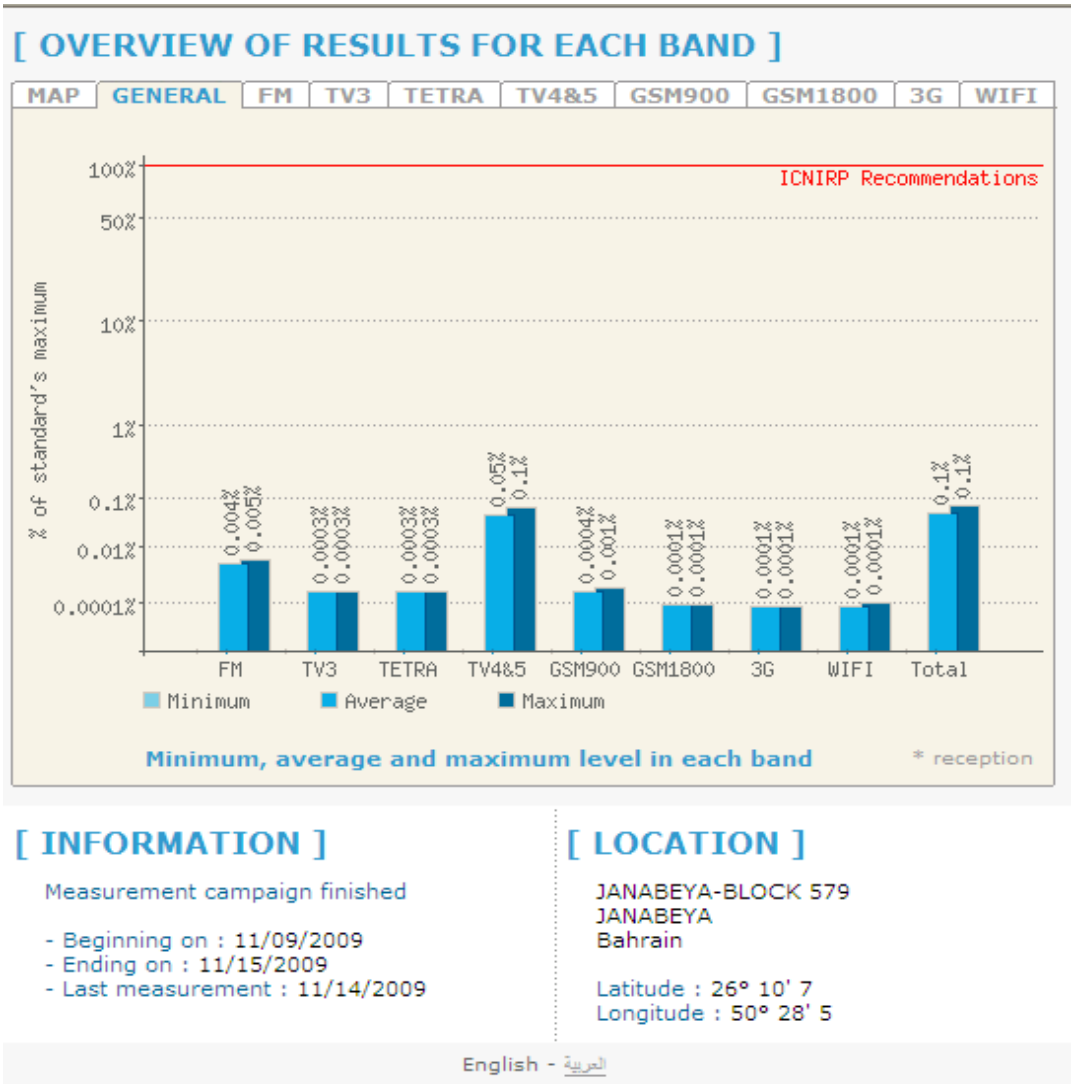


**Figure 9: Result for Janabiya Block 579**

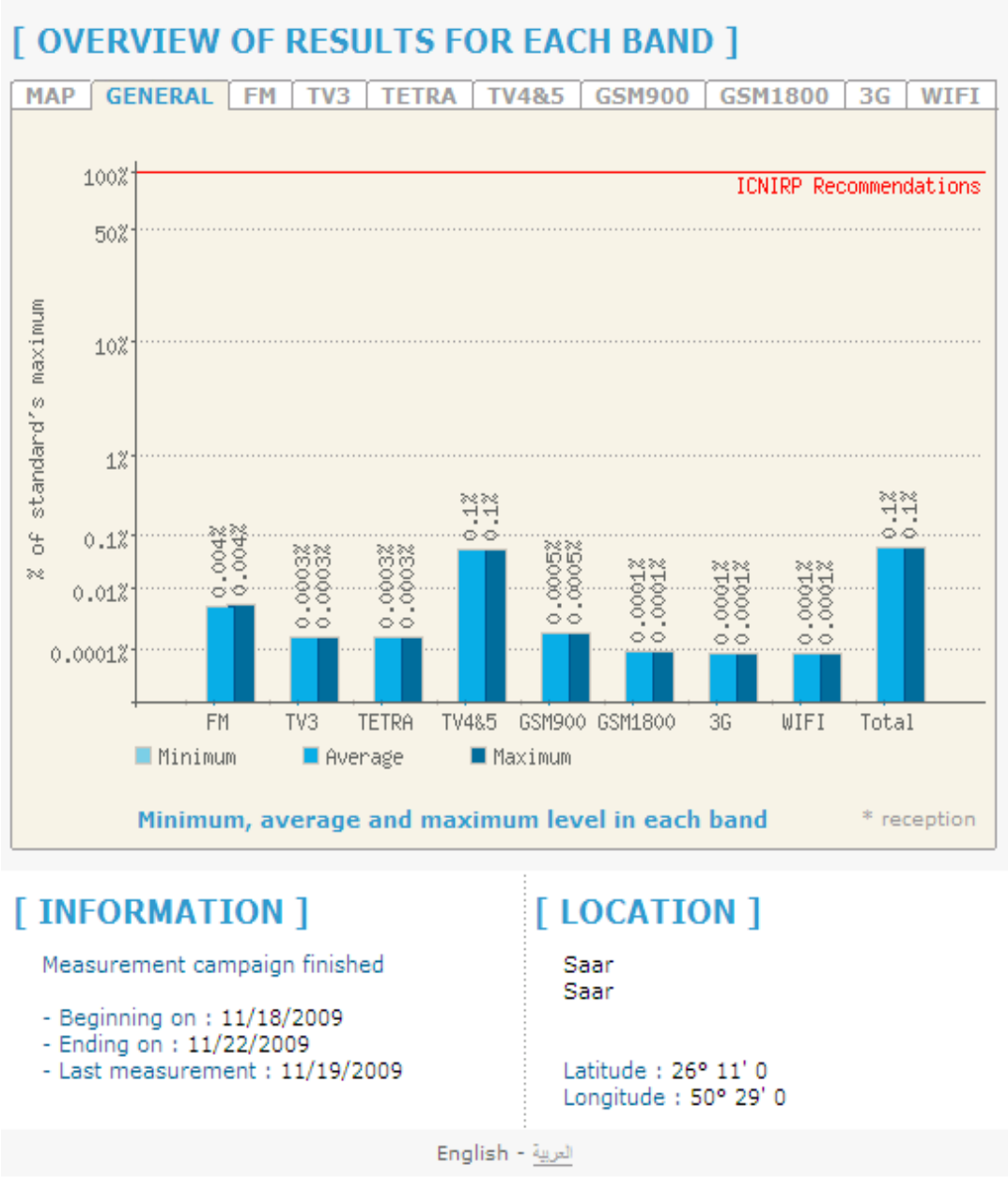


**Figure 10: Result for Saar Block 525**

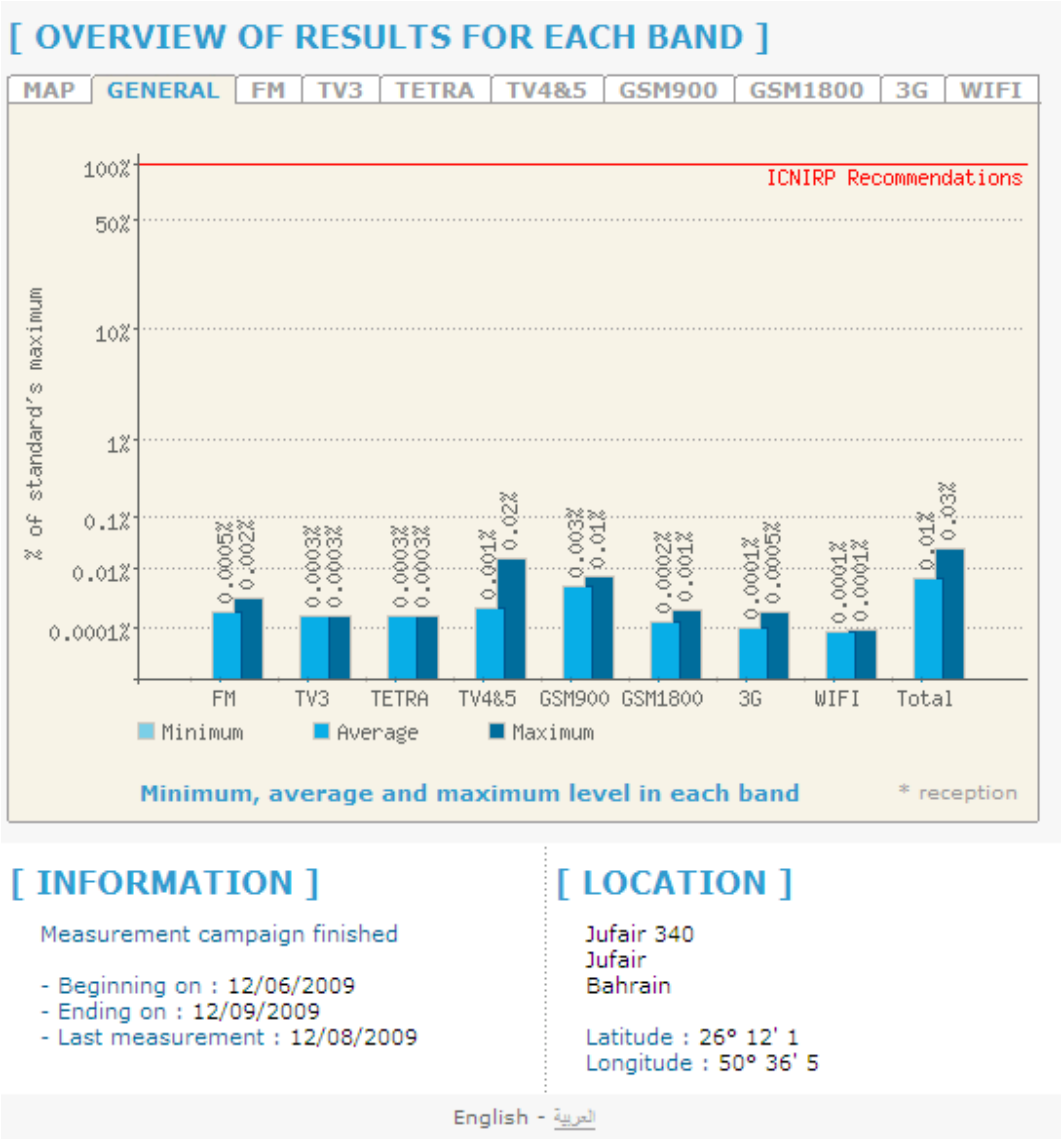


**Figure 11: Result for Jufair Block 340**

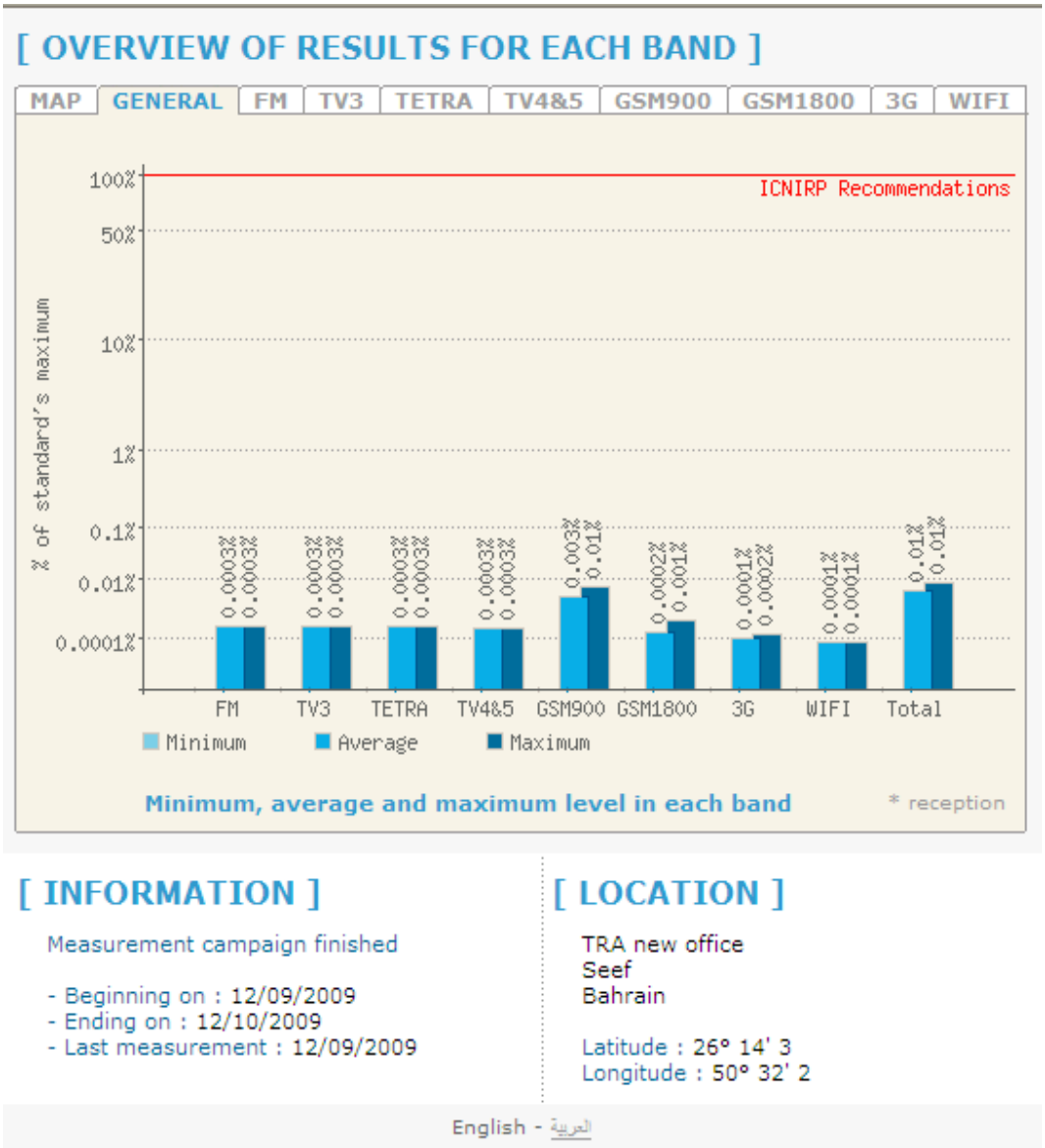


**Figure 12: Result for TRA new Office at Seef**

# 5 Conclusions

5.1 All measurements were very small compared to the ICNIRP guidelines.

5.2 The highest total exposure level for typical public sites measured during the quarter was 0.1% of the ICNIRP level as shown in Figures 9 and 10 for Janabiya Block 579 and Saar Block 525 respectively

5.3 The measurements using Insite Free equipment at Hamad Town and Hidd are higher than typical public/domestic measurements which are consistent with the location of the measurements very close to base stations at a distance of about 50m. Never the less, the measurements are still very small indeed at just a 0.2% and 0.19% of the ICNIRP level.

# 6 Next steps

6.1 TRA will continue with the measurement campaign in 2010 to map RF signal levels throughout the Kingdom of Bahrain.