

**Application Report**

# Broadcast signal exposure measurement

Example: Sankt Chrischona TV mast

**Task:**

**Determination and interpretation of the maximum exposure level values of broadcast signals:**

- Determination of measurement values
- Interpretation / processing of measurement results

**Equipment:**

- SRM-3000 with isotropic antenna 75 MHz – 3 GHz
- Optional single-axis E-field antenna 27 MHz – 3 GHz
- 1.5 m cable
- SRM carrying strap
- Laptop if service tables need to be processed

**Recommendation:**

The term “broadcast signals” does not immediately describe the wide variety of different signals encountered within this frequency band. As a result, it is a good idea to prepare this application specifically for each signal type likely to be encountered. In the case of the Sankt Chrischona (Basel) TV mast, the signals to be measured are FM (frequency modulation) radio, analog TV signals, digital audio broadcasting (DAB), and digital video broadcasting (DVB).

Appropriate service tables and setups should be created for the measurement during the preparation phase. It is easiest to create a service table with all the frequency bands for the location, plus a sequence of setups for an overview measurement and one setup for each application from FM up to DVB. This allows the best comparison of the measured values because the settings for each different measuring point are always the same.

**Method:**

First of all, an overview measurement was performed at the measurement location in the vicinity of the TV mast at Sankt Chrischona. This ensures that the test equipment is not overloaded and it also assists in determining the real transmission frequencies as compared with the theoretical frequencies obtained by research. The measurement range should be chosen according to the peak value occurring within the entire frequency range of the SRM-3000. The result type MAX was selected for all measurements.



*Making measurements with the SRM-3000 by the TV tower in Sankt Chrischona (Basel)*

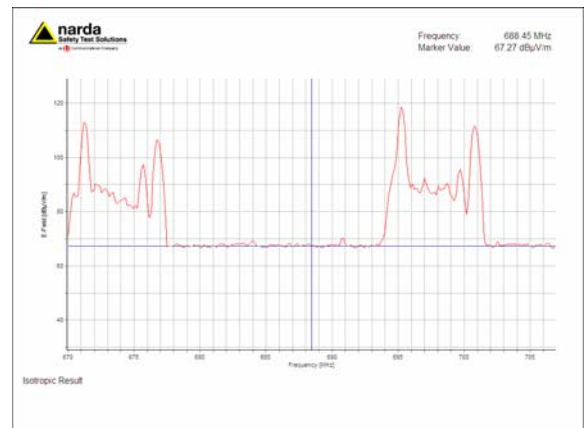
#### Test equipment settings for measuring in the FM band:

- Operating mode: **Spectrum Analysis**  
Alternatively: Safety Evaluation with a prepared service table
- Span: **75 MHz – 108 MHz**
- Resolution bandwidth RBW: **200 kHz**

#### Test equipment settings for measuring analog TV signals:

- Operating mode: **Spectrum Analysis**  
Alternatively: Safety Evaluation with a prepared service table
- Span: in this case 670 - 702 MHz as channels 46 and 49 are active
- Resolution bandwidth RBW: **300 kHz**

To determine the maximum field strength value from the measured value of the analog TV signal (see figure 1), a factor of 2.3 dB must be added to the maximum measured field strength.



**Figure 1 Analog TV signals measured using the following setting:**

Resolution Bandwidth 300 kHz

#### Test equipment settings for measuring DAB signals:

- Operating mode: **Safety Evaluation**
- Span: in this case channel 12C (band 12), 223 – 230 MHz was active
- Resolution bandwidth RBW: **10 kHz**

#### Test equipment settings for measuring DVB signals:

- Operating mode: **Safety Evaluation**
- Span: in this case channel 31 at 550 MHz was active
- Resolution bandwidth RBW: **50 kHz**

Figure 2 clearly shows that channel 31 was the only active DVB channel, thanks to noise suppression.



Service	Value	Lower Frequency	Upper Frequency
K 21	< 86.84 dBu/m	470.200 MHz	477.800 MHz
K 22	< 86.43 dBu/m	478.200 MHz	485.800 MHz
K 23	< 86.46 dBu/m	486.200 MHz	493.800 MHz
K 24	< 86.36 dBu/m	494.200 MHz	501.800 MHz
K 25	< 86.27 dBu/m	502.200 MHz	509.800 MHz
K 26	< 86.17 dBu/m	510.200 MHz	517.800 MHz
K 27	< 86.06 dBu/m	518.200 MHz	525.800 MHz
K 28	< 85.95 dBu/m	526.200 MHz	533.800 MHz
K 29	< 85.85 dBu/m	534.200 MHz	541.800 MHz
K 30	< 85.79 dBu/m	542.200 MHz	549.800 MHz
K 31	< 86.29 dBu/m	550.200 MHz	557.200 MHz
K 32	< 85.64 dBu/m	558.200 MHz	565.800 MHz
K 33	< 85.54 dBu/m	566.200 MHz	573.800 MHz
K 34	< 85.45 dBu/m	574.200 MHz	581.800 MHz
K 35	< 85.36 dBu/m	582.200 MHz	589.800 MHz
K 36	< 85.28 dBu/m	590.200 MHz	597.800 MHz
K 37	< 85.27 dBu/m	598.200 MHz	605.800 MHz
K 38	< 85.30 dBu/m	606.200 MHz	613.800 MHz
K 39	< 85.33 dBu/m	614.200 MHz	621.800 MHz
K 40	< 85.35 dBu/m	622.200 MHz	629.800 MHz
K 41	< 85.38 dBu/m	630.200 MHz	637.800 MHz
K 42	< 85.41 dBu/m	638.200 MHz	645.800 MHz
K 43	< 85.44 dBu/m	646.200 MHz	653.800 MHz
Others	< 86.53 dBu/m		
Total	< 99.62 dBu/m	470.200 MHz	653.800 MHz

**Figure 2: DVB signal channel table**

Resolution Bandwidth 50 kHz

It is important to always have a direct line of sight to the mast during the measurement and to move the SRM-3000 System slowly so that the local maxima can be detected.

### Interpretation and evaluation:

Evaluation of the results shows low exposure levels at the measurement site compared to the ICNIRP General Public limit value.

The SRM-3000's isotropic E-field antenna sufficed for evaluating exposure levels for normal transmission operations of the Sankt Chrischona TV mast. There was therefore no need to use the single-axis E-field antenna. Good preparation allowed for rapid completion of the task with the aid of service tables and setups. After the measurement, a report was produced from the results using the SRM-TS application (see figures 1 and 2).

For further Application Notes and references visit: <http://www.narda-sts.de/1/content.php?pit=01-06-XX-060007&change=Go%21>

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**The measurement team interpreting the results**