



Rev 1.3  
24.03.2010

# Handheld RF Spectrum Analyzer series SPECTRAN® 40xx incl. EMC test antenna

VECTOR Spectrum Analyzer for the semi professional



HF-4040 Rev.3



HF-4040 Rev.3

"Unbeatable price.."

"Particularly Aaronia's very powerful (especially considering their price) SPECTRAN handheld spectrum analysers caused much excitement."  
(Markt&Technik 20/2005)

## References / examples of proof:

- ◆ BMW, München
- ◆ BASF, Schwarzheide
- ◆ Siemens AG, Nürnberg
- ◆ Vattenfall, Berlin
- ◆ Fedex, USA
- ◆ EnBW, Stuttgart

  
**AARONIA AG**  
 WWW.AARONIA.DE

Made in Germany

# Specifications

## SPECTRAN® HF-4040 Rev.3

- ◆ Frequency range: 100MHz to 4GHz\*
- ◆ Typ. level range: -90dBm to 0dBm\*
- ◆ Lowest possible SampleTime: 100mS
- ◆ Typ. accuracy: +/- 3dB\*
- ◆ Filter bandwidth (RBW) Min: 100kHz
- ◆ Filter bandwidth (RBW) Max: 50MHz
- ◆ Vector (I/Q) / True RMS level measurement
- ◆ High performance DSP (Digital Signal Processor)
- ◆ USB 2.0 interface
- ◆ Direct RF spectrum display
- ◆ Frequency and signal strength display
- ◆ Enhanced triple multi-function display
- ◆ Advanced HOLD function
- ◆ Switchable PULS mode
- ◆ Exposure limit calculation according to DIN/VDE 0848
- ◆ AM / FM Demodulation
- ◆ DECT & TimeSlot Analyser
- ◆ Realtime PEAK power detector (option)
- ◆ Internal datalogger (64K)
- ◆ Internet software updates
- ◆ Incl. battery pack and charger
- ◆ Incl. HyperLOG 7040 EMC antenna
- ◆ Incl. aluminum carrycase
- ◆ Dimensions (L/W/D): (260x86x23) mm
- ◆ Weight: 420gr
- ◆ **Warranty: 10 years**

## SPECTRAN® HF-4060 Rev.3

- ◆ Frequency range: 100MHz to **6GHz\***
- ◆ Typ. level range: -90dBm to 0dBm\*
- ◆ Lowest possible SampleTime: 100mS
- ◆ Typ. accuracy: +/- 3dB\*
- ◆ Filter bandwidth (RBW) Min: 100kHz
- ◆ Filter bandwidth (RBW) Max: 50MHz
- ◆ Vector (I/Q) / True RMS level measurement
- ◆ High performance DSP (Digital Signal Processor)
- ◆ USB 2.0 interface
- ◆ Direct RF spectrum display
- ◆ Frequency and signal strength display
- ◆ Enhanced triple multi-function display
- ◆ Advanced HOLD function
- ◆ Switchable PULS mode
- ◆ Exposure limit calculation according to DIN/VDE 0848
- ◆ AM / FM Demodulation
- ◆ DECT & TimeSlot Analyser
- ◆ Realtime PEAK power detector (option)
- ◆ **1MB memory expansion (option)**
- ◆ Internal datalogger (64K)
- ◆ Internet software updates
- ◆ Incl. battery pack and charger
- ◆ Incl. HyperLOG **7060** EMC antenna
- ◆ Incl. aluminum carrycase
- ◆ Dimensions (L/W/D): (260x86x23) mm
- ◆ Weight: 420gr
- ◆ **Warranty: 10 years**

## Application examples Spectran® HF-40xx Spectrum Analyzer

### Analysis and measurement of:

- ◆ WLAN
- ◆ UMTS
- ◆ WiFi
- ◆ active Radar
- ◆ GSM900
- ◆ GMS1800
- ◆ Bluetooth
- ◆ microwave ovens
- ◆ DECT-phones
- ◆ TETRA
- ◆ 70cm ham radio
- ◆ UWB (FB1-FB4)



# Description



## Conforming to standards and exact

RF Measurement in this price range has never been this professional. Find radiation sources in your surroundings. Find their respective frequencies and signal strengths, including **direct display of exposure limits**. This used to be impossible in this price category, professional units often costing several thousand euros and being excessively complicated in handling.

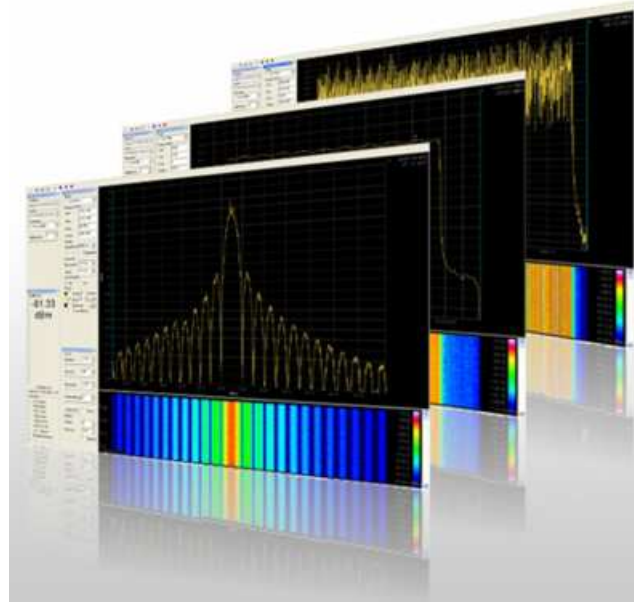
The highly complex calculations in spectrum analysis incl. exposure limit calculation is being performed, unnoticed in the background, by a high-performance DSP (digital signal processor). This ultra-fast processor even allows REAL-TIME display in all EMF (LF) versions of the SPECTRAN® series.

**Fast, handy, cost-effective, beautiful exterior and PRECISION - what more could you ask ?**

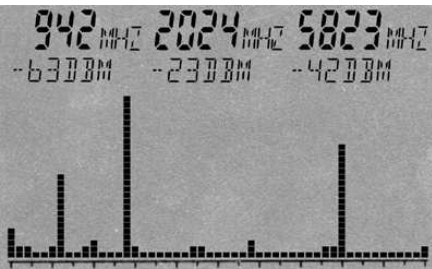
## Professional PC analysis software (free download)

The professional PC analysis software demonstrates SPECTRAN's vast capabilities. This software can be used in addition to SPECTRAN and offers an incredible amount of features. All this for FREE. Just download it from our homepage, and your PC turns into a real spectrum analyser with a huge display:

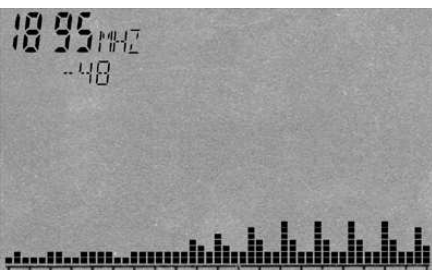
- ◆ **MULTI-device capability!** Remote control of several SPECTRAN units. These can be controlled and their data displayed at once on a single PC.
- ◆ **HIGH-RESOLUTION!**, freely scalable, coloured spectrum display with falloff function..
- ◆ **Display of channel identifiers!** for EXACT identification of providers. Channel numbers etc. freely programmable and extensible!
- ◆ Up to 10! markers with frequency and level display.
- ◆ Intuitive zoom control with very comfortable frequency adjustment.
- ◆ High quality "waterfall"-display with TIMECODE. Colour scale freely configurable. Size freely scalable. Optional display of data DIRECTLY ON TOP OF THE GRAPH by pointing with your mouse and CTRL-clicking!
- ◆ **High-resolution SLOT ANALYSER with 3D display!**
- ◆ **SUPER-LOGGER:** ALL data can be written to disk continuously. File format is readable by spreadsheet applications, for creating custom reports, etc.
- ◆ Freely positionable windows for comfortable entry of frequency, RBW, sweep time etc. etc.
- ◆ **Various pre-defined profiles** for DECT, UMTS, GSM, WLAN etc. etc. for instant recall. Incl. optimal parameters and extensive channel information! Freely programmable and extensible!
- ◆ Independent main display with SIMULTANEOUS display of dBm, dBµV, V/m, W/m<sup>2</sup> and A/m, each with AUTORANGE. Freely transposable and scalable.
- ◆ **SUPERB exposure limit display** with various profiles (ICNIRP, Salzburg precautionary values, ECOLOG, etc. etc.). Freely programmable with a virtually infinite amount of display options.
- ◆ Functionality to update SPECTRAN measurement device firmwares.
- ◆ Freely programmable key assignments and labels for SPECTRAN measurement devices.
- ◆ Filemanager and COMPILER for creation and management of YOUR OWN PROGRAMS for SPECTRAN measurement devices.
- ◆ "Rename" option for renaming any of your SPECTRAN units (for example, including location) for better identification
- ◆ etc. etc. etc.



AMAZING: The PROFESSIONAL PC software for SPECTRAN. Get to know SPECTRAN's real capabilities!



RF spectrum display and automatic triple multi-marker display on the digital screen of SPECTRAN® (Screenshot)



Well visible: "Frequency hopping" of a DECT portable phone between 1890 and 1900 MHz (Screenshot)

## Spectrum ANALYSIS

### The perfect analysis:

Professional RF measurement devices use a **frequency dependant measurement approach**, the so-called **spectrum analysis**. In a certain frequency range, the individuals signals and their respective strengths are being broken down, for example into a "bargraph" display (see SPECTRAN® screenshots on the left). The height of the individual bars represents the corresponding signal strength. For the 3 strongest signal sources, SPECTRAN® automatically displays the exact frequency and signal level, thanks to its "Auto Marker" feature. Of course, you can also setup the filter width and the frequency range to be analysed as you like.

In the RF spectrum shown, a frequency range of approx. 100MHz to 7GHz from left to right is being analysed (full sweep). During analysis, the Auto Marker feature has determined - fully automatic - three main signal sources:

Signal#1=942MHz (GSM communications) at -63dBm

Signal#2=2024MHz (UMTS) at -23dBm

Signal#3=5832MHz (802.11a WLAN) at -42dBm

Thanks to its DIRECT frequency display of the individual signal sources, a doubtless mapping of measurement results to the corresponding radiation sources is possible.

## Long-term measurement (data logging feature)

SPECTRAN® measurement devices with data logger allow **long-term recordings of measurement results** over a **freely adjustable** period of time. This is particularly indispensable for serious evaluation of exposure by appliances and machinery which have a changing power consumption or radiation strength over time. Examples for these include railroads, power lines and plants, but also home appliances and their respective power cables, and various high-frequency transmission facilities like mobile phone transmission towers, mobile phones, radar etc. Depending on the time of day, considerable variation of exposure can occur (see graphics on the right). Without long-term recordings, massive misinterpretation of total exposure can occur. With long-term data logging using SPECTRAN®, the daily variation of exposure can be recorded and analysed. Thus, the actual total exposure can be evaluated precisely.

With this functionality, you can even discover sporadic EMC problems which would otherwise be very hard to detect. Even though SPECTRAN® units "only" last 2 to 3 (depending on model) hours with one battery charge, the intelligent "Powerdown mode" enables much longer data logging and measurement timespans. Finally, if this is not enough, the external power supply can be used to extend the recording timespan infinitely.



Daily variation of this RF transmitter discloses EXTREME variation in time



Lot of space for optionally accessories (picture shows the Intermediate-Bundle with second LF-Analyzer)

## INCLUDED WITH DELIVERY

- ◆ RF spectrum analyzer SPECTRAN HF-40xx
- ◆ HyperLOG 70xx EMC/directional antenna
- ◆ 1300mAh power battery with charger
- ◆ Pistol grip with miniature tripod mode
- ◆ SMA toolset
- ◆ SMA adapter
- ◆ 1m SMA cable
- ◆ Sturdy aluminum-design carrycase (with custom padding!)
- ◆ Exhaustive manual with lots of basic information, hints and exposure limit tables

# Overview of features SPECTRAN® RF Spectrum Analyzer

| SPECIFICATIONS base unit*  | Novice   | Intermediate |         | Professional |           |              | Outdoor         |
|--|----------|--------------|---------|--------------|-----------|--------------|-----------------|
|  | HF-2025E | HF-4040      | HF-4060 | HF-6060V4    | HF-6080V4 | HF-60100V4   | HF-XFR          |
| Frequency range Min  | 700MHz   | 100MHz       | 100MHz  | 10MHz        | 10MHz     | 1MHz         | 1MHz            |
| Frequency range Max  | 2,5GHz   | 4GHz         | 6GHz    | 6GHz         | 8GHz      | 9,4GHz       | 9,4GHz          |
| Optional PEAK Power-Detector (Maximum usable frequency)***           | 2,5GHz   | 4GHz         | 6GHz    | 6GHz         | 8GHz      | 10GHz        | -               |
| AVG Noise Level (1Hz)  | -80dBm   | -90dBm       | -90dBm  | -135dBm      | -145dBm   | -155dBm      | -               |
| AVG Noise Level (1Hz) with PreAmp                                    | -        | -            | -       | -150dBm      | -160dBm   | -170dBm      | -170dBm         |
| Maximum Level  | 0dBm     | 0dBm         | 0dBm    | +10dBm       | +10dBm    | +40dBm**     | +40dBm**        |
| Filter bandwidth (RBW) Min   | 1MHz     | 100kHz       | 100kHz  | 3kHz         | 1kHz      | 200Hz (TCXO) | 200Hz           |
| Filter bandwidth (RBW) Max   | 50MHz    | 50MHz        | 50MHz   | 50MHz        | 50MHz     | 50MHz        | 50MHz           |
| EMC-Filter (RBW) 9kHz, 120kHz, 5MHz; 20MHz; 40MHz                    | -        | -            | -       | ✓            | ✓         | ✓            | ✓               |
| Accuracy Base unit (typical)   | +/-4dB   | +/-3dB       | +/-3dB  | +/-2dB       | +/-2dB    | +/-1dB       | +/-1dB          |
| Vector power measurement (I/Q) and True RMS                          | -        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Lowest possible SampleTime   | 100mS    | 100mS        | 100mS   | 1mS          | 1mS       | 1mS          | 1mS             |
| <b>FEATURES</b>  |          |              |         |              |           |              |                 |
| 14Bit Dual-ADC & DDC-Hardware-Filter                                 | -        | -            | -       | ✓            | ✓         | ✓            | ✓               |
| Standards-conformant exposure limits (ICNIRP, BGV B11, BImSchV etc.) | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Extended full ICNIRP range   | -        | -            | -       | -            | -         | ✓            | ✓               |
| Fast ZERO-SPAN Sweep   | -        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| PULS-Mode  | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| ADVANCED HOLD mode (HOLD function)                                   | -        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| INTERNAL Data Logger (long-term measurements)                        | -        | ✓            | ✓       | ✓            | ✓         | ✓            | 64GB            |
| TIME-SLOT-ANALYZER   | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Internal speaker   | Piezo    | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Configurable antenna and cable calibration data                      | -        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Audio demodulation   | AM       | AM&FM        | AM&FM   | AM&FM&PM     | AM&FM&PM  | AM&FM&PM     | -               |
| <b>DISPLAY</b>   |          |              |         |              |           |              |                 |
| DIRECT RF spectrum display   | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Exposure limits display with simultaneous percentage display         | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Main display in dBm, V/m, A/m or dB <sub>i</sub> V (switchable)      | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | simultaneous    |
| ADDITIONAL display in W/m <sup>2</sup> with AUTORANGE (pW, μW etc.)  | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | simultaneous    |
| High-resolution bargraph (trend display)                             | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | 14" Display     |
| 3fold marker display (ex. 3x power & frequency at once)              | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | 10fold          |
| <b>INTERFACES / CONNECTORS</b>                                       |          |              |         |              |           |              |                 |
| Fast USB 2.0 Interface (PC connection)                               | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | 2x              |
| Audio output (2,5mm MONO)  | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | -               |
| DC input (max. 15V) for external power supply                        | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| 50 Ohm SMA RF input (F)  | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | ✓               |
| Jog Dial (multi-function dial) for "one-hand operation"              | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | Key- & Touchpad |
| <b>OPTIONS (extra charge)</b>  |          |              |         |              |           |              |                 |
| Option 001 (1MB memory expansion)                                    | -        | -            | ✓       | ✓            | ✓         | ✓            | Harddisk        |
| Option 002 (high sensitive 0,5ppm TCXO timebase)                     | -        | -            | -       | -            | -         | ✓            | inclusive       |
| Option 020 (internal, switchable 15dB PreAmplifier)                  | -        | -            | -       | ✓            | ✓         | ✓            | inclusive       |
| Option 20x (REALTIME broad band Power-Meter)                         | 2,5GHz   | 4GHz         | 6GHz    | 6GHz         | 8GHz      | 10GHz        | -               |
| <b>INCLUDED ACCESSORIES (in addition to the base unit)</b>           |          |              |         |              |           |              |                 |
| Miniature SMA rod antenna  | ✓        | ✓            | ✓       | -            | -         | -            | Omnilog 90200   |
| HyperLOG EMC directional LogPer antenna (model)                      | 7025     | 7040         | 7060    | 7060         | 6080      | 60100        | 60100 (black)   |
| Aaronia 7,2V high-performance battery (1300mAh) + charger            | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | 6 cell battery  |
| Aluminum design transport case                                       | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | -               |
| PC analysis software (Windows, downloadable)                         | ✓        | ✓            | ✓       | ✓            | ✓         | ✓            | installed       |

\*Preliminary specifications as of 05.03.2009. The V4 and XFR-series are available with latest Beta-Firmware. All options are available for the V4 series too. The Beta-Firmware is in continuous development. Some functionality may still be limited and not fully to specifications (Beta-Status). By regularly checking our homepage for updates, you can always keep your measurement device up-to-date. As soon as V1.0 of the firmware is released, all functionality and features will be fully available. Range, sensitivity and accuracy can change depending on frequency, antenna and used parameters. Precision values are based on Aaronia calibration-reference under specific test conditions. Unless otherwise stated, these specifications apply for the reference condition: ambient temperature 22±3°C, relative air humidity 40% to 60%, continuous wave signal (CW), RMS detection. V4 and XFR Noise Level @5,555GHz. Maximum sensitivity of Rev.3 units: -90dBm @2,2GHz.

\*\* Internal: +20dBm. External (with optional 20dB precision attenuator): +40dBm

\*\*\* Depending on frequency the optional PEAK power meter offers sensitivity up to -50dBm and max. +10dBm input power with an extremely fast response time.

# Recommended accessories for Aaronia Spectrum Analyzer

## Heavy Plastic Carrycase PRO

Shock resistant, heavy version with padding. Offers spaces for 2 SPECTRAN units with all accessories and a HyperLOG 70xx or 60xx antenna. A MUST for the professional user or outdoor usage!

Order/Art.-No.: 243



## Calibration Certificate

Available for all SPECTRAN® units. With detailed calibration sheet.

Order/Art.-No.: 784



## 3000mAh LiPo Power-Battery

Offers a MUCH higher runtime of your SPECTRAN (up to 400%). Strongly recommended for autonomic measurement! The 1300mAh standard-battery will be replaced.

Order/Art.-No.: 254



## DC-Blocker (SMA)

It prevents the RF-input of the SPECTRAN to be destroyed by the DC-voltages of f.e. DSL/ISDN lines.

Order/Art.-No.: 778



## Pistol grip / miniature tripod

Detachable handle with super-practical miniature tripod mode: this handle is attachable to the backside of the unit and allows optimal handling (esp. for directional measurement) and even fixed installation of the unit. STRONGLY recommended for PC use!

Order/Art.-No.: 280



## USB Cable (Special Version)

To connect your Spectran to the PC. Special version with high performance EMC-ferrite. STRONGLY recommended for PC use!

Order/Art.-No.: 774



## Car power adapter for mobile use

With power-LED. For charging batteries or operating our units in your car, including special plug.

Order/Art.-No.: 260



## Calibration Resistor (DC-18GHz)

This calibration resistor is necessary for the best possible calibration of the noise-floor of each Spectran V4-Analyzer.

Order/Art.-No.: 779



## Aluminum tripod

Height adjustable, high stability. STRONGLY recommended for PC use! Max. height: 105cm.

Order/Art.-No.: 281



## 1m / 5m / 10m SMA-Cable

High quality special SMA cable for connecting any HyperLOG®-Antenna or BicoLOG®-Antenna with our RF Spectrum-Analyzer. Available as 1m, 5m and 10m Cable. All versions: SMA plug (male) / SMA plug (male).



## Protection rubber

Protect and personalize your SPECTRAN with a sturdy rubber case and keep it scratch-n-dent free. Allows full access to all functions.

Order/Art.-No.: 290



## 20dB SMA high-end Attenuator

Expands the measurement range to +40dBm. (ONLY SPECTRAN HF-60100 V4 and HF-XFR).

Order/Art.-No.: 775





# References

## User of Aeronia Antennas and Spectrum Analyzers (Examples)

### Government, Military, Aeronautic, Astronautic

- ◆ NATO, Belgien
- ◆ Boeing, USA
- ◆ Airbus, Hamburg
- ◆ Bund (Bundeswehr), Leer
- ◆ Bundeswehr (Technische Aufklärung), Hof
- ◆ Lufthansa, Hamburg
- ◆ DLR (Deutsches Zentrum für Luft- und Raumfahrt, Stuttgart)
- ◆ Eurocontrol (Flugüberwachung), Belgien
- ◆ Australian Government Department of Defence, Australien
- ◆ EADS (European Aeronautic Defence & Space Company) GmbH, Ulm
- ◆ Institut für Luft- und Raumfahrtmedizin, Köln
- ◆ Deutscher Wetterdienst, Tauche
- ◆ Polizeipräsidium, Bonn
- ◆ Landesamt für Umweltschutz Sachsen-Anhalt, Halle
- ◆ Zentrale Polizeitechnische Dienste, NRW
- ◆ Bundesamt für Verfassungsschutz, Köln
- ◆ BEV (Bundesamt für Eich- und Vermessungswesen)

### Research/Development, Science and Universitys

- ◆ Deutsches Forschungszentrum für Künstliche Intelligenz, Kaiserslautern
- ◆ Universität Freiburg
- ◆ Indonesien Institute of Sience, Indonesien
- ◆ Max-Planck-Institut für Polymerforschung, Mainz
- ◆ Los Alamos National Labratory, USA
- ◆ University of Bahrain, Bahrain
- ◆ University of Florida, USA
- ◆ Universität Erlangen, Erlangen
- ◆ Universität Hannover, Hannover
- ◆ University of Newcastle, Großbritannien
- ◆ Universität Strasbourg, Frankreich
- ◆ Universität Frankfurt, Frankfurt
- ◆ Uni München – Fakultät für Physik, Garching
- ◆ Technische Universität Hamburg, Hamburg
- ◆ Max-Planck Institut für Radioastronomie, Bad Münstereifel
- ◆ Max-Planck-Institut für Quantenoptik, Garching
- ◆ Max-Planck-Institut für Kernphysik, Heidelberg
- ◆ Max-Planck-Institut für Eisenforschung, Düsseldorf
- ◆ Forschungszentrum Karlsruhe, Karlsruhe

### Industry

- ◆ Shell Oil Company, USA
- ◆ ATI, USA
- ◆ Fedex, USA
- ◆ Walt Disney, Kalifornien, USA
- ◆ Agilent Technologies Co. Ltd., China
- ◆ Motorola, Brasilien
- ◆ IBM, Schweiz
- ◆ Audi AG, Neckarsulm
- ◆ BMW, München
- ◆ Daimler Chrysler AG, Bremen
- ◆ BASF, Ludwigshafen
- ◆ Deutsche Bahn, Berlin
- ◆ Deutsche Telekom, Weiden
- ◆ Siemens AG, Erlangen
- ◆ Rohde & Schwarz, München
- ◆ Infineon, Österreich
- ◆ Philips Technologie GmbH, Aachen
- ◆ ThyssenKrupp, Stuttgart
- ◆ EnBW, Stuttgart
- ◆ RTL Television, Köln
- ◆ Pro Sieben – SAT 1, Unterföhring
- ◆ Channel 6, Großbritannien
- ◆ WDR, Köln
- ◆ NDR, Hamburg
- ◆ SWR, Baden-Baden
- ◆ Bayerischer Rundfunk, München
- ◆ Carl-Zeiss-Jena GmbH, Jena
- ◆ Anritsu GmbH, Düsseldorf
- ◆ Hewlett Packard, Dornach
- ◆ Robert Bosch GmbH, Plochingen
- ◆ Mercedes Benz, Österreich
- ◆ EnBW Kernkraftwerk GmbH, Neckarwestheim
- ◆ AMD, Dresden
- ◆ Infineon Technologies, Regensburg
- ◆ Intel GmbH, Feldkirchen
- ◆ Philips Semiconductors, Nürnberg
- ◆ Hyundai Europe, Rüsselsheim
- ◆ Saarschmiede GmbH, Völklingen
- ◆ Wilkinson Sword, Solingen
- ◆ IBM Deutschland, Stuttgart
- ◆ Vattenfall, Berlin
- ◆ Fraport, Frankfurt

# Visit us at the



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