SRM-3000 Selective Radiation Meter

- **Complete Solution for Selective Measurement of RF and Microwave Electromagnetic Fields**
- **Isotropic and Single-Axis Measurements from 100 kHz to 3 GHz**
- **Excellent Immunity for Operation in High Field Strengths**
- **Automatic Antenna and Cable Detection**
- **Results in V/m, A/m, Power Density, or Percentage of Permissible Limit**
- **Automatic Correlation of Results with Telecommunication Services (e.g., TETRA, GSM, UMTS) Based on User-Defined Tables**
- **Automatic Computation of Contribution of Individual Services to Overall Field Exposure (Safety Evaluation mode)**
- **Resolution Bandwidths (RBWs) up to 5 MHz for UMTS and W-CDMA**
- **Optional UMTS P-CPICH Demodulation mode for worst-case extrapolation of UMTS Node-B base station emissions**

Features

The Selective Radiation Meter (SRM) is a hand-held selective measuring device for safety analysis of RF and microwave electromagnetic fields. The SRM can be used by broadcasters, radio network operators, measurement service providers and public authorities to selectively measure the field exposure produced by individual telecom services and assess the results in accordance with the applicable standards. Most measurements required in the mobile radio sector can be performed directly using the hand-held device. The SRM immediately evaluates the results on site.

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The SRM consists of a basic unit and a measurement antenna. The basic unit contains a spectrum analyzer for the 100 kHz to 3 GHz frequency range. It can be operated using antennas from Narda or in combination with measurement antennas from other manufacturers. The triaxial antenna allows isotropic (non-directional) measurements from 50 MHz to 3 GHz, covering FM radio up to the W-CDMA and UMTS services.

The basic unit and antenna are battery powered, rugged, and easily hand portable, offering all of the functions needed to evaluate, store, and document results without a separate PC. However, when required, results can easily be exported to a PC for long-term storage or further analysis.

Applications

The SRM is a hand-held measuring device that was developed for analyzing safety issues in electromagnetic fields. It includes specially designed modes for safety applications. It can also be used as a conventional RF spectrum analyzer for general field strength measurements. Typical applications are as follows:

COMPARISON MEASUREMENT IN A KNOWN-FIELD ENVIRONMENT

"Site sharing" is the usual situation today: Suppose that several mobile radio service operators have antennas located on a common tower or a roof. The overall electromagnetic radiation exposure from any number of sources needs to remain below a specified limit that usually varies with frequency. The SRM displays the total field exposure and also the contributions of the individual services (absolute value or percentage of permissible limit).

This allows operators, public authorities and measurement service providers to verify directly, on-site, whether the different services comply with emission regulations and if not, to know which operator needs to reduce its output power and by how much.

OVERVIEW MEASUREMENT IN AN UNKNOWN-FIELD ENVIRONMENT

All of the industrialized nations have stipulated emission limits for both working environments and for the general public. Special care is often taken in sensitive areas such as schools and hospitals.

The SRM allows public authorities and measurement service providers to verify whether operators are complying with the applicable limits. With the SRM it is easy to make a fast scan of all the field sources in the frequency range of interest. The SRM is so sensitive that the very weak sources, such as individual mobile radio channels, can be separately evaluated – even inside buildings. An overview measurement is also useful for detecting any unknown sources.

MEASUREMENT OF INDIVIDUAL TELECOM SERVICES

Operators are responsible for the fields produced by their own services. Even in a very complex field environment, and in the vicinity of powerful broadcast signals, the SRM can be used to measure individual transmit channels or frequencies. The device is capable of integrating over its frequency range and displaying the total value (an absolute value). For example, for GSM measurements, the SRM can use a 200 kHz resolution bandwidth (RBW) to measure the field strength of an individual control channel (BCCH) which always transmits at full power and estimates the field emissions which all of the traffic channels (TCH) would produce under full load. For UMTS measurements, the SRM can use a 5 MHz resolution bandwidth to measure an entire frequency block.

The SRM is capable of taking long-term measurements showing how the field strength of a selected frequency varies over time. The peak values can be saved to provide valuable information for service providers and local authorities alike.

Additionally, the SRM can demodulate the pilot channels (P-CPICH) of individual cells of UMTS base stations and extrapolate the "worst case" electromagnetic exposure level from the result

Operation

The SRM's basic unit contains the spectrum analyzer with the RF input unit, measurement/operations processor, input panel and display. All of the functions and parameters can be set directly using softkeys and/or a thumb-wheel. The SRM can also compute results as follows:

- Field strength level or percentage of permissible exposure level
- Single source or single channel
- List of sources or channels
- Contribution from a given telecom service
- Contribution from all services and their percentage of the total field strength

The SRM automatically recognizes the following data:

- **Antenna factors for converting the antenna output voltage into field strength values.** The SRM automatically recognizes the individual correction factors from an EEPROM built into the antenna via a separate control cable. If the antenna is connected to the basic unit via a Narda extension cable, the SRM will also recognize the frequency-dependent loss factors for the cable from an EEPROM in the cable. For antennas and cables from other manufacturers, the user can input the relevant correction factors using the supplied PC software and transfer the data to the SRM via the serial interface. To make measurements, just select the antenna and cable type in the configuration menu.

- **Exposure limits from common safety guidelines and standards.** Exposure limits are stored in the SRM and can be easily selected via a simple menu. Other limits can be transferred to the SRM as an update via the serial interface.
- **Assignment of telecom services to frequency bands.** User-editable tables are provided in the supplied PC software. A service table (e.g., "GSM-900") is a list of individual operators by name along with the upper and lower limits of the assigned frequency band. These lists are transferred to the SRM via the serial interface.

MEASUREMENTS USING NARDA'S TRIAXIAL ANTENNA

Such measurements automatically produce isotropic (i.e., non-directional) results. These measurements can be made in three different ways.

- **Antenna connected directly to the basic unit.** This makes it possible to perform measurements in the entire mobile radio band. The SRM is well suited for use on radio masts and towers where it is difficult to make conventional narrowband measurements. As a true hand-held device, the SRM is relatively easy to use in these awkward environments.
- **Antenna connected to basic unit via cable**. This is useful if you need to take measurements over a given volume to find the location with the highest field strength. It is also possible to hang the basic unit from a belt or harness and hand-carry the antenna.
- **Antenna mounted on a tripod and connected to basic unit via cable.** This arrangement produces the most reliable results since the field being measured is not influenced by the presence of the basic unit or the user.

MEASUREMENTS USING ANTENNAS FROM OTHER MANUFACTURERS

Antennas built by other manufacturers may be used with the SRM. Of course, single-axis antennas will produce directional results. For example, you can connect a directional antenna to the SRM via a cable and carry it in your hand to determine the main direction of radiation or 'main beam' from a source.

The SRM can also measure three axes with a single-axis antenna. To do this, a special apparatus must be used on the tripod to arrange the receiving axis of the antenna in three mutually orthogonal positions in succession. The SRM saves the result for each of the axes and then computes the field strength.

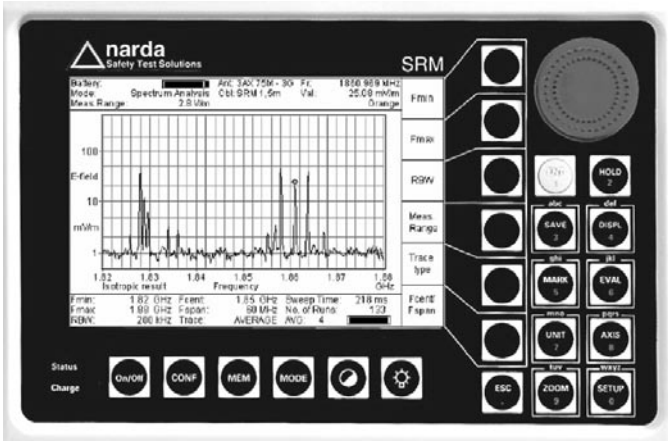
Operating Modes

Since it is built for broad everyday use, the SRM has both general and special modes which are tailored to the main applications.

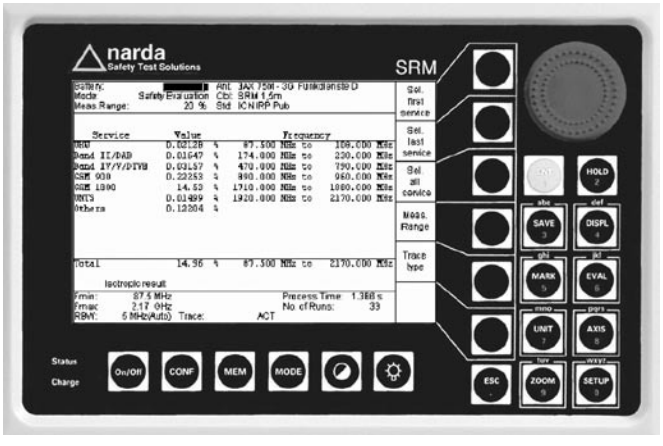
SPECTRUM ANALYSIS

In multi-frequency environments, the *Spectrum Analysis* mode provides an overview of all frequency components with their field strengths. The user just has to set the desired frequency range. The SRM will only accept values which do not exceed the frequency limits of the connected antenna. The spectrum is clearly displayed, and the markers and zoom function can be used to quickly make a field strength assessment. Peak tables show all field strength values above a certain value along with their frequency.

One special feature of the SRM in this mode is the ability to integrate over a desired frequency range. This allows the user to display the power of a transmit channel with a bandwidth greater than the resolution bandwidth (RBW) of the measurement.



Spectrum Analysis mode is useful for identifying all field sources within the chosen frequency range.



Safety Evaluation Mode enables contributions from individual telecom services to be compared with the total field strength value. Here, the results are shown as a percentage of the permissible exposure level.

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SAFETY EVALUATION

In this mode, the SRM displays the field strength results in tabular format, broken down by the contributions from individual telecom services. The total exposure is also displayed. The frequency bands for individual services can be user-defined. The results can be displayed as a percentage of an exposure limit, or as absolute values in V/m, A/m or W/m^2 and mW/cm^2. The *Safety Evaluation* mode provides the user with an immediate overview of contributions from individual services which make up the total field strength level. This is very useful where several operators are sharing an antenna site.

The SRM displays the results as a percentage or as absolute values in V/m, A/m or W/m^2 and mW/cm^2 of the given exposure limit. *Safety Evaluation* mode is based on spectrum analysis followed by integration across certain frequency ranges. The measurement process is fully automated. The SRM measures the entire frequency range for all selected services and automatically sets its resolution bandwidth (RBW) to fit the smallest frequency span to be measured. It saves the absolute field strength values from the selective measurements, evaluates the data based on the selected standard, and stores these results also. Integration over the frequency ranges of the individual services provides the individual contributions. The SRM groups together the frequency ranges between the selected services as 'Others' and includes them in the overall total result.

TIME ANALYSIS

In Time Analysis mode, the SRM measures the field strength values at a user-definable center frequency and with a selectable resolution bandwidth between 6.4 kHz and 6 MHz.

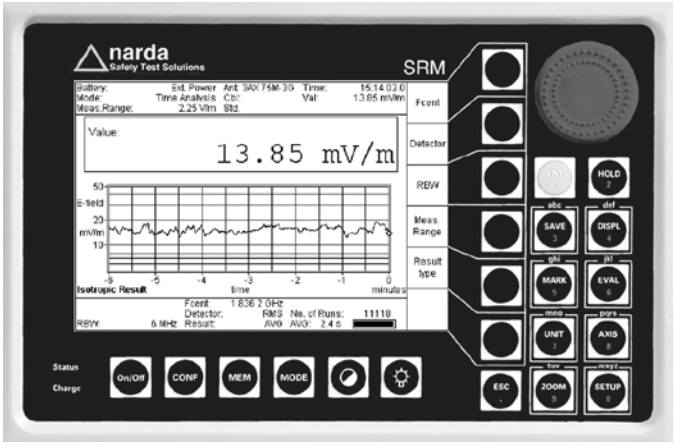
The measurement algorithm employed ensures that the measurement results are recorded, processed and saved in real time without any gaps (as determined by the sampling rate).

Either a peak value detector (PEAK) or an RMS detector can be selected in Time Analysis mode.

The current or "actual" value (ACT) or the maximum value (MAX) can be displayed numerically when the PEAK detector is used.

The average value (AVG) or maximum average value (MAX AVG) can additionally be determined and displayed numerically when the RMS detector is used. The averaging time can be set between 0.96 seconds and up to 30 minutes, which includes the "6-minute average" required by many standards.

The SRM uses channel filters with steep cutoff characteristics in Time Analysis mode, so that a specific service can be monitored over a period of time without being influenced by neighboring services.



In Time Analysis mode, the SRM measures one peak value or RMS value against time. changes in the measured values over a period of time can be recorded in this way.

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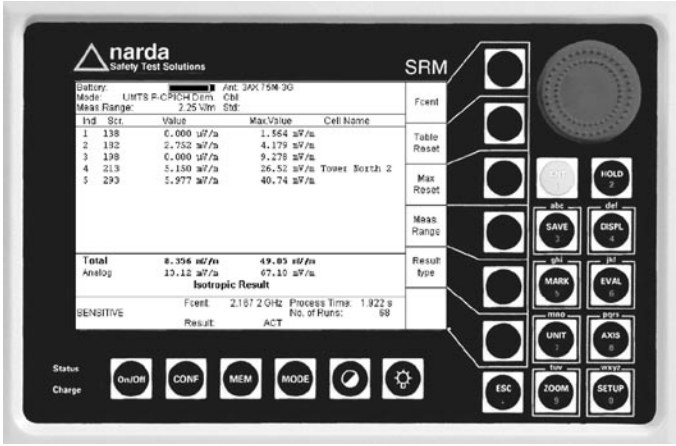
UMTS P-CPICH DEMODULATION (OPTIONAL)

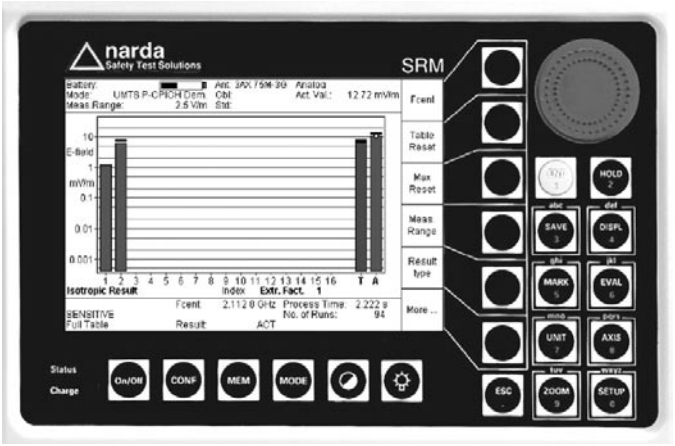
In UMTS P-CPICH Demodulation mode, the SRM can decode the primary common pilot channels (P-CPICH) of each UMTS cell detected in a 5 MHz UMTS frequency block.

The instrument provides the results in a table arranged according to the scrambling codes used to identify the various cells. The SRM displays the results as percentages of a limit value or as absolute values in V/m, A/m or W/m^2 and mW/cm^2. In addition to the sum of all the demodulated field strength results (Total), the SRM also determines the actual overall analog channel power level of the UMTS frequency block being evaluated.

The SRM simultaneously displays the current values (Value) and the maximum values that occurred for each cell since the last Max Reset.

UMTS channel selection is made by entering the center frequency or the corresponding channel number. For quick and easy identification of the various scrambling codes, user defined cell name tables can be selected, in which each scrambling code is assigned a user defined alphanumeric comment.





The UMTS P-CPICH Demodulation Option allows the SRM to decode all the pilot channels (P-CPICH) contained in a 5 MHz bandwidth UMTS frequency block and can thus correlate the measured field strengths to the respective pilot channels.

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Measurement Functions

Detection of Narda Measurement Antennas	Automatic consideration of antenna parameters after antenna is plugged in: antenna type, serial number, calibration date, and antenna factors (see below) Automatic limitation of the frequency range according to the frequency range of the connected antenna.
Antenna Factors	Used for display in field strength units Saved in all Narda antennas during calibration 20 antenna factor lists for antennas from other manufacturers can be saved (these lists defined using the PC configuration software *SRM Tools* or *SRM TS*)
Detection of Narda Cables	Automatic consideration of cable parameters after cable is plugged in: cable type, serial number, calibration date, and loss factors (see below) Automatic limitation of the frequency range according to the frequency range of the connected cable
Cable Loss Factors	Used for compensation of the power level display Saved in all Narda cables during calibration 20 cable loss lists for cables from other manufacturers can be saved (these lists defined using the PC configuration software *SRM Tools* included in delivery)
Units with antenna	% of the standard, V/m, A/m, W/m^2, mW/cm^2, dBVm, dBmV/m, dBA/m, dBµV/m
without antenna	dBV/m, dBmV/m, dBµV/m, dBm
Isotropic Measurements	Automatic switching of the antenna axes, when using Narda's triaxial measurement antenna, followed by computation of the isotropic result Sequential measurements, using single-axis antennas with subsequent computation of the isotropic result are supported Both results are directly displayed as a spectrum curve or as numerical values
Weighted Display	In % of the standard for the following human safety standards: ICNIRP, IEEE, FCC, BGV B11, BlmSchV, Safety Code 6 Updating for new human safety standards can be made using the PC configuration software "SRM tools" included in delivery
Correlation of Results with Telecom Services	Definition and editing of service tables in the PC configuration software *SRM Tools* or *SRM TS* i.e., lists of frequency bands (upper and lower limit frequency, name for defined frequency band) Storage of up to 50 service tables in the basic unit Use of the service tables for automatic correlation of measurement results with defined services based on frequency (marker functions, peak table evaluation function, Safety Evaluation mode)
Setups	Up to 20 complete device configurations can be saved in the basic unit; up- and downloadable using *SRM Tools* or *SRM TS* Software
Memory Modes	Instantaneous result stored as: SPECTRUM in Spectrum Analysis mode (SPEC), TABLE in Safety Evaluation mode (TAB) (option), VALUES in UMTS P-CPICH Demodulation mode (UTAB) VALUES in Time Analysis mode (VAL) with the Time Controlled Storing Option (LIST)
Conditional Storing	Conditional storing of results exceeding a specified threshold value (in all operating modes) with individual storage rates and reset function
Time Controlled Storing (option)	Timer controlled storage of results for long term monitoring (in all operating modes) with individual storage rates and reset function Start date and start time settable with a resolution of one second Measurement duration settable from 1 second to 99 hours in 1 second steps Storage rate settable to every 1.2 s, 2.4 s, 3.6 s, 6 s, 12 s, 18 s, 30 s, 1 min, 2 min, 3 min, 5 min, 6 min, 10 min, 15 min, 20 min, 30 min Reset function for automatically resetting the stored maximum values, either after every result save (Always), or when the measurement starts (On start), or never (Never)
Memory Capacity	16 MB, 48 MB from F Series (up to 9999 data sets)

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Specifications

Basic Unit SRM-3000			
Frequency Range		100 kHz to 3 GHz	
Modes		Spectrum Analysis	Time Analysis - Time Controlled Storing
		Safety Evaluation	UMTS P-CPICH Demodulation (option)
RF FEATURES			
Frequency	Resolution Bandwidths (RBW)	See specifications for each mode	
	Phase Noise (SSB)	30 kHz carrier spacing < -85 dBc (1 Hz) 100 kHz carrier spacing < -105 dBc (1 Hz) 1 MHz carrier spacing < -120 dBc (1 Hz)	
	Reference Frequency	Initial Deviation < 1.5 ppm Aging < 0.5 ppm/year Thermal Drift < 2.0 ppm (within specified operating temperature range)	
Amplitude	Measurement Range Setting (MR)	-27 dBm to +23 dBm (in steps of 1 dB)	
	Display Range	From noise floor up to +26 dBm	
	Maximum RF Power Level	+30 dBm	
	Maximum DC Voltage	50 V	
	Intrinsic Noise	- 120 dBm for 1 kHz RBW, f>20 MHz and MR = -27 dBm	
	RF Attenuation	0 to 50 dB in steps of 1 dB (coupled with measurement range)	
	2nd Order Intermodulation Products	≤ - 57 dBc for two signals of level 9 dB below MR and a spectral line spacing of more than 100 kHz	
	3rd Order Intermodulation Products	≤ - 68 dBc for two signals of level 9 dB below MR and a spectral line spacing of more than 500 kHz	
	Level Measurement Uncertainty	< 1.1 dB for the frequency range 20 MHz to 3 GHz (within the temperature range from 15°C to 30°C)	
	Spurious Responses (input-related)	< - 65 dBc or MR - 71 dB for signals with a level below MR - 6 dB (whichever is worse), input frequency f > 40 MHz < - 60 dBc for a carrier spacing of 72 MHz	
	Spurious Responses (residual)	< - 94 dBm or MR -67 dB for frequencies above 20 MHz	
	Units	dBm, dBV, dBmV, dBµV Units of field strength available according to measurement antenna used (see "Measurement Functions")	
RF Input	Type	N Connector, 50 Ω	
	Return Loss	>12 dB for 200 kHz ≤ f ≤ 2.7 GHz	

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SPECTRUM ANALYSIS MODE	
Measurement Principle	Spectrum analysis
Resolution Bandwidths (-3 dB)	1 kHz to 5 MHz (in steps of 1, 2, 3, 5, 10) List of available RBWs depends on selected sweep SPAN
Measurement Range Setting (MR Range)	Set individually from a list or using the "MR Search" function for determining the optimum measurement range at a given time
Sweep Time	50 ms to 1 s (depending on span), measured in uniaxial direction (axis)
Filter **Type** **Shape Factor (-3 dB / -60 dB)**	 Gaussian < 3.8 (for RBW ≤ 100 kHz)
Detection	Detection selected by Result Type: (AVG → RMS value; MAX → Peak value)
Result Type	ACT: Displays current spectrum MAX: Maximum Hold function AVG: Average over a selectable number of spectra (4 to 64) or a selectable time period (1-30 min) MAX AVRG: Maximum Hold function after averaging over the defined number of spectra SAVG - Spatial Averaging (option)
Marker Functions	Highest peak, peak right, peak left, higher peak, lower peak Marker field (frequency, level and service name from selected service table)
Evaluation Functions	Peak Table (list of 50 highest peaks) Integration over a user-specified frequency range
Axis	Isotropic measurement (isotropic result displayed directly) Measurement of X-, Y- or Z- axis (separate measurement of a single axis using the isotropic / three-axis antenna)
Display Functions	Y-scale range 20, 40, 60, 80 or 100 dB Y-scale reference - 47 dB to 43 dBm Full screen (enlarges the graph window to fill the entire screen area)
Zoom Functions	Zoom Min: Sets the lower frequency limit of the zoom window Zoom Max: Sets the upper frequency limit of the zoom window) Move Zoom Area: Moves the zoom window along the frequency axis Reduce/Enlarge Zoom Area: Changes the scale of the zoom window Zoom to Marker: Moves the zoom window to the current marker position) Execute Zoom: Sets the zoom window limits to the selected frequency values
SAFETY EVALUATION MODE	
Measurement Principle	Spectrum analysis, followed by integration over user-defined frequency bands ("services")
Resolution Bandwidths (-3 dB)	Automatically, depending on the narrowest user-defined service
Measurement Range Setting (MR Range)	Set individually from a list or using the "MR Search" function for determining the optimum measurement range at a given time
Filter	See *Spectrum Analysis* mode
Detection	RMS (integration time = $\frac{1}{2 \times RBW}$)
Result Type	See *Spectrum Analysis* mode
Axis	Isotropic measurement (for direct display of the isotropic result) Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display	Table view showing service names, field strenghts and the corresponding frequency band (up to three columns) Full Screen: Function enabling the entire screen to be used to display the table
Noise Suppression	Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with "<" (less than threshold)

TIME ANALYSIS MODE		
Measurement Principle		Selective level measurement at a fixed frequency
Detection		Peak RMS (integration time = 480 ms)
Filter	**Type**	Steep cutoff channel filter
Resolution Bandwidth RBW (-6 dB)		6.4 kHz to 6 MHz
Result Type		ACT: Displays the instantaneous value MAX: Maximum hold function AVG: Average over a defined time (0.96 seconds to 30 minutes) – with RMS detector only Max AVRG: Maximum hold function for the averaged values – with RMS detector only SAVG: Spatial averaging (option) in Value display mode
Marker Functions (in Hold mode only) (Mixed and Graph display)		Marker, highest peak, next peak right, next peak left, next highest peak, next lowest peak
Evaluation Functions		Duty cycle (ratio of average power to maximum power)
Time Averaging		Selectable from 0.96 seconds up to 30 minutes (0.96 s; 1.2 s; 2.4 s; 3.6 s; 6 s;12 s; 18 s; 30 s; 1 min; 2 min; 3 min; 5 min; 6 min; 10 min;15 min; 20 min; 30 min)
Axis		Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display	**Mixed**	Result of measurement at the specified frequency: Value and Max Value shown as enlarged numerical format with graphical display of the history for the last 1 to 60 minutes
	Value	Result of measurement at the specified frequency: Value and Max Value shown as enlarged numerical format
	Graph	Result of measurement at the specified frequency: Value and Max Value shown as graphical display of the history for the last 1 to 60 minutes
Noise Suppression		Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with "<" (less than threshold). Only applies to the numerical result display (Value)

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UMTS P-CPICH DEMODULATION MODE (optional)		
Measurement Principle		Demodulation of the P-CPICH (Primary Common Pilot Channel) as the basis for automatic assignment of measured field strength values to the individual UMTS radio cells (defined as cell name tables)
UMTS Channel Selection		By entering the center frequency (Fcent) By entering the channel number (Chann)
Resolution Bandwidth (-3 dB)		3.84 MHz (fixed)
Measurement Range Setting (MR Range)		Set individually from a list or using the "MR Search" function for determining the optimum measurement range at a given time
Frequency Setting Resolution		100 kHz (for Fcent frequency entry) 0.5 x channel number (for channel entry)
Detection		RMS (integration time = 10 ms)
Filter		
Type		Root-Raised Cosine (RRC)
Roll-Off Factor		$\alpha = 0.22$
Demodulation Algorithms		FAST SENSITIVE
Result Types		ACT: Displays the instantaneous value combined with the maximum value MAX (maximum hold function) which occurred since the last reset AVG: Averages over a selectable number of results (4 to 64) or over a specified time period (1 to 30 minutes) combined with Max AVRG (maximum hold function of the average values)
Marker Functions (in Hold mode only) (Bar graph, Mixed and Graph display)		Marker, highest peak, next peak right, next peak left, next highest peak, next lowest peak Display switchable between Value and Max Value
Evaluation Functions		Extrapolation factor settable from 0 to 100 in steps of 0.001
Received / Demodulated Signal		P-CPICH
Axis		Isotropic measurement (for direct display of the isotropic result) Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display		Up to 16 scrambling codes simultaneously Value (instantaneous) and MAX Value (maximum) channel power User-defines cell names (using cell name tables) Number of sweeps since the last reset Selection of individual scrambling codes Extrapolation factor settable from 0 to 100 in steps of 0.001
	Normal Table	Table format: Index, Scrambling Code, Value, Max. Value, Cell Name Total of all ACT (Value) and MAX (Max Value) values (Total) Analog measurement result (Analog)
	Table Ratio	Table format: Index, Scrambling Code, Value, Max. Value, Ratio of Value to Analog Total of all ACT (Value) and MAX (Max Value) values (Total) Analog measurement result (Analog)
	Bar Graph	Bar graph display of selected scrambling codes, with the Total value and the Analog measurement result with maximum values indicated in each case
	Mixed	Total of selected scrambling codes: Value and Max Value shown in enlarged numerical format with graphical display of the history for the last 1 to 60 minutes
	Value	Total of selected scrambling codes Value and Max Value shown in enlarged numerical format
	Graph	Total of selected scrambling codes Graphical display of the history for the last 1 to 60 minutes
Noise Suppression		Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with "<" (less than threshold)

SRM-3000 Selective Radiation Meter

GENERAL SPECIFICATIONS		
Operating Temperature Range		-10°C to +50°C during normal operation 0°C to +40°C when charging
Immunity		200 V/m between 100 kHz and 3 GHz
Compliance	Climatic	
	Storage	1K3 (IEC 60721-3) extended to -10°C to +50°C
	Transport	2K4 (IEC 60721-3)
	Operating	7K2 (IEC 60721-3)
	Mechanical	
	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operating	7M3 (IEC 60721-3)
	ESD and EMC	EN 61326 : 2004
	Safety	EN 61010-1 : 2002
CE (European Community)		Yes
Air Humidity (Operating Range)		<29 g/m^3 (<93% at +30°C)
Weight		4.2 lbs. (1.9 kg) including rechargeable cell
Dimensions		10.0 x 7.7 x 2.4 inches (255 x 195 x 60 mm)
Display	Type	Monochrome, LCD (transflective) with backlighting for indoor or outdoor use
	Size, Resolution	4.5 x 3.1 inches (115 x 80 mm), 480 x 320 pixels
Interface		RS-232, electrical or optical (with additional accessory), 115.2 kbaud USB
Power Supply	Rechargeable Cell	Lithium-Ion rechargeable battery - typical 4 hour operating time Charged using external power supply
	External Power Supply (12 V DC / 2.5 A)	AC/DC adapter Input: 100-240 V / 47-63 Hz / 700 mA
Recommended Calibration Interval		24 months

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Antenna Specifications

ANTENNA	Three Axis E-Field (supplied antenna)	Three Axis H-Field 3581/01	Single Axis E-Field 3531/01	Single Axis E-Field 3531/02	Single Axis H-Field 3551/01
Frequency Range **The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.**	50 MHz to 3 GHz	100 kHz to 250 MHz	27 MHz to 3 GHz	100 kHz to 300 MHz	100 kHz to 300 MHz
Antenna Type	E-Field	H-Field	E-Field	E-Field	H-Field
Sensor Type	Triaxial design with scanned axes	Triaxial active magnetic loop design with scanned axes	Single axis passive wide band dipole	Single axis active broadband dipole	Single axis active magnetic loop
Dynamic Range [a]	0.25 mV/m to 200 V/m	2.5 µA/m to 560 mA/m	90 µV/m to 80 V/m	125 µV/m to 36 V/m	0.4 µA/m to 71 mA/m
CW Damage Level	435 V/m or 50 mW/cm^2	250 A/m / f[MHz]	> 300 V/m or 25 mW/cm^2	> 1000 V/m	> 2.65 A/m above 1 MHz
RF Connector [b]	N connector, 50 Ω				
Operating Temperature Range	-10° C to 50° C (same as SRM basic unit)				
Compliance — **Climatic**					
Storage[c]	1K3 (IEC 60721-3)				
Transport	2K4 (IEC 60721-3)				
Operating	7K2 (IEC 60721-3)				
Compliance — **Mechanical**					
Storage	1M2 (IEC 60721-3)				
Transport	2M3 (IEC 60721-3)				
Operating	7M3 (IEC 60721-3)				
ESD and EMC	EN 61326:2004				
Safety	EN 61010-1:2002				
CE (European Community)	Yes				
Air Humidity	< 29 g/m^3 (< 93% at +30°C)				
Weight	450 g				
Dimensions	450 mm length, 120 mm antenna head diameter	450 mm length, 120 mm antenna head diameter	460 mm length, 135 x 90 mm antenna head dimension	460 mm length, 135 x 90 mm antenna head dimension	460 mm length; 43 x 100 mm antenna head dimension
Calibration **The SRM applies linear interpolation between reference points.**	18 reference points[d] 75, 100, 200, 300, 433, 600, 750, 900 MHz 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.45, 2.7, 3 GHz	136 reference points[d]	24 reference points[d] 26, 30, 40, 50, 60, 75, 100, 200, 300, 433, 600, 750, 900 MHz 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.45, 2.6, 2.8, 3 GHz	141 reference points[d]	141 reference points[d]
Calibration Interval	24 months (recommended)				

NOTES:

[a] Typical measurement dynamic range for 10 dB signal to noise ratio (RBW = 1 kHz)

[b] Typical Values

[c] Extended to -10°C to +50°C

[d] The SRM basic unit applies linear interpolation between reference points

Antenna Uncertainty[a]

THREE AXIS E-FIELD ANTENNA (supplied antenna)			
Intrinsic Noise Display in conjunction with the SRM basic unit (separate measurement of a single axis) [a, b]	50 µV/m at 900 MHz with 1 kHz resolution bandwidth (RBW) 70 µV/m at 2.1 GHz with 1 kHz resolution bandwidth (RBW)		
Intrinsic Noise Display in conjunction with the SRM basic unit (for isotropic result) [a]	87 µV/m at 900 MHz with 1 kHz resolution bandwidth (RBW) 120 µV/m at 2.1 GHz with 1 kHz resolution bandwidth (RBW)		
Measurement Range Limit (for single CW signal)	300 V/m, 1000 V/m for f ≤110 MHz		
Max. Measurement Range (in conjunction with the SRM basic unit) [a]	200 V/m (without restrictions for total span of 50 MHz to 3 GHz)		
Damage / Overload Level	≥ 1000 V/m		
Extended Measurement Uncertainty [b] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency Range	Single Axis Measurement with Isotropic Antenna	Isotropic Measurement
	75-900 MHz	+2.4 / -3.4 dB	+2.4 / -3.3 dB
	901-1400 MHz	+2.3 / -3.1 dB	+2.4 / -3.3 dB
	1401-1600 MHz	+2.2 / -3.1 dB	+2.6 / -3.7 dB
	1601-1800 MHz	+1.8 / -2.2 dB	+2.2 / -3.0 dB
	1801-2200 MHz	+1.8 / -2.2 dB	+2.4 / -3.3 dB
	2201-2700 MHz	+1.8 / -2.3 dB	+2.6 / -3.6 dB
	2701-3000 MHz	+1.9 / -2.4 dB	+3.2 / -5.3 dB
Calibration Uncertainty	< 1.5 dB		
THREE AXIS H-FIELD ANTENNA 3581/01			
Intrinsic Noise Display in conjunction with the SRM basic unit (separate measurement of a single axis) [a]	0.3 µA/m with 1 kHz resolution bandwidth (RBW)		
Intrinsic Noise Display in conjunction with the SRM basic unit (for isotropic result) [a]	0.8 µA/m with 1 kHz resolution bandwidth (RBW)		
Extended Measurement Uncertainty [a, b]	Frequency Range	Single Axis Measurement with Isotropic Antenna	Isotropic Measurement
	0.1-20 MHz	3 dB	3.5 dB
	20-120 MHz	2.1 dB	2.7 dB
	120-250 MHz	2.3 dB	3.5 dB
Calibration Uncertainty	< 1.5 dB		
SINGLE AXIS E-FIELD ANTENNA 3531/01			
Intrinsic Noise Display in conjunction with the SRM basic unit [a, c]	30 µV/m from 100 MHz to 2.1 GHz with 1 kHz resolution bandwidth (RBW)		
Measurement Range Limit (for single CW signal) [a]	100 V/m		
Extended Measurement Uncertainty [a, b] (in conjunction with SRM basic unit and 1.5m RF cable)	Frequency Range	Single Axis Measurement	
	36-300 MHz	2.1 dB	
	301-433 MHz	2.3 dB	
	434-1600 MHz	2.1 dB	
	1601-3000 MHz	1.8 dB	
Calibration Uncertainty	< 1.5 dB		
SINGLE AXIS E-FIELD ANTENNA 3531/02			
Intrinsic Noise Display in conjunction with the SRM basic unit [a]	40 µV/m in the range from 100 MHz to 300 MHz with 1 kHz resolution bandwidth (RBW)		
Measurement Range Limit (for single CW signal) [a]	50 V/m		
Extended Measurement Uncertainty [a, b] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency Range	Single Axis Measurement	
	0.1-20 MHz	2.7 dB	
	20.1-300 MHz	2.0 dB	
Calibration Uncertainty	< 1.2 dB		

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SRM-3000 Selective Radiation Meter

Antenna Uncertainty[a] con't.

SINGLE AXIS H-FIELD ANTENNA 3551/01		
Intrinsic Noise Display in conjunction with the SRM basic unit [a]	0.17 µA/m for each frequency > 20 MHz with 1 kHz resolution bandwidth (RBW)	
Measurement Range Limit (for single CW signal) [a]	100 mA/m	
Extended Measurement Uncertainty [a, b] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency Range	Single Axis Measurement
	0.1-20 MHz	2.7 dB
	20.1-300 MHz	2.0 dB
Calibration Uncertainty	< 1.2 dB	

NOTES:

[a] Typical Values

[b] Typical value k=2 (k=extrapolation or correction factor for determining the assessment value); +15°C to +30°C

[c] Intrinsic noise increases by 0.5 dB per 100 MHz above 2 GHz

Ordering Information

SRM-3000	ORDER NUMBER
Set comprising: Selective Radiation Meter SRM3000, basic unit, calibrated Triaxial antenna, E-field, 50 MHz to 3 GHz, calibrated Time Controlled Storing and Spatial Averaging Included 1.5 meter SRM RF cable, 100 kHz to 3 GHz, 50 Ω Carrying strap for SRM-3000 (basic unit) Operating manual Power supply 12.0 VDC, 100 – 240 VAC, universal AC line connector SRM-TS - Configuration, Evaluation and Remote Control Software USB 2.0 Cable - Master/Slave, 3 m DB9 / DB9 Cable for serial interface, 3 m Transport Hard Case	**3001/101/USA**
OPTION	
UMTS P-CPICH Demodulation	**3701/02**
OPTIONAL ANTENNAS	
Three-axis H Field Antenna, 100 kHz to 250 MHz	**3581/01**
Single-axis E-Field Antenna, 27 MHz to 3 GHz	**3531/01**
Single-axis E-Field Antenna, 100 kHz to 300 MHz	**3531/02**
Single-axis H-Field Antenna, 100 kHz to 300 MHz	**3551/01**
OPTIONAL ACCESSORIES	
5 meter SRM RF cable, 100 kHz to 3 GHz, 50 Ω	**3601/02**
Antenna holder for single axis and triaxial antennas	**3501/90.01**
Antenna holder for triaxial antennas (horizontal/vertical)	**3501/90.02**
Additional battery pack, rechargeable, 7.4 V / 4 A/h	**3001/90.01**
Tripod Adapter for SRM3000 Basic Unit	**3001/90.06**
External charger set for SRM3000 battery pack	**3001/90.07**
Tripod, non conductive, 1.65 m, with carrying bag	**2244/90.31**
Cable, Adapter USB 2.0 - RS232, 0.8 m	**2260/90.53**
Softcase with wheels	**3001/90.05**
O/E converter	**2260/90.05**
Cable, Fiber Optic Duplex, F-SMA, 10 m	**2260/90.42**
Cable, Fiber Optic Duplex, F-SMA, 30 m	**2260/90.44**
Cable, Fiber Optic Duplex, F-SMA, 50 m	**2260/90.46**
Cable, Fiber Optic Duplex, F-SMA, 100 m	**2260/90.48**