



narda[®]
Safety Test Solutions
an **B** communications company



Personal Monitors

Nardalert S3 and RadMan / RadMan XT

Nardalert S3 and RadMan / RadMan XT, the personal monitors for electromagnetic fields

Nardalert S3 and RadMan / RadMan XT, the personal monitors from NARDA Safety Test Solutions, provide warnings wherever people can be in danger from strong electromagnetic fields, in particular in the following areas:

- Telecommunications
- Broadcasting
- Industry
- Military
- Air Traffic Control

Personal monitors are worn on the body as warning devices. The RadMan / RadMan XT can also be used as a hand-held detector for initial qualification and to find leaks in waveguide and coaxial connections.

Who Should Use the Monitors?

Nardalert S3 and RadMan / RadMan XT should be worn by all individuals who work in areas where there is a potential for exposure to significant electromagnetic field levels and who have been trained to properly respond to a potential alarm. This includes people,

- who are responsible for everyday operations
- who provide services (painters, cleaners, HVAC or elevator repair, etc.)
- who inspect or visit industrial facilities
- who inspect or visit wireless facilities



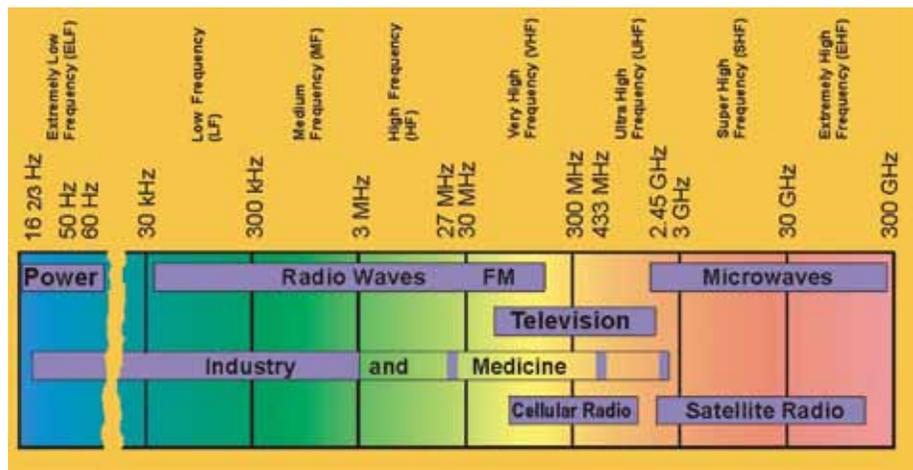


Switch It On and Wear It

Nardalert S3 and RadMan / RadMan XT are ready for immediate use: simply switch on and they will provide you with reliable warnings if threshold values are exceeded. There are no functions that require expert knowledge. The basic functions cannot be changed without the special software and hardware. This makes our personal monitors suitable for use by anyone.

Optimized for Use in the Field

These warning devices have been designed for daily use. They consume very little power except when in alarm mode. Therefore, the batteries have a very long life. They also provide reliable measurements even in extreme temperatures (-10° C to +55° C).



The Personal Monitor as Your Daily Companion



Personal monitors are best worn on the outside of clothing or in your outside breast pocket (though not in the outside pocket of very heavy clothing) and lying flat against your body. Absorbers minimize the influence of the body. The absorber for the RadMan / RadMan XT is located in the yellow protective cap. The absorber for the Nardalert S3 is an integral part of the housing.

What to do if the Alarm Sounds

When the level reaches 50% of the threshold value, there is an audio alarm and the LEDs light up. If the level reaches 100% (RadMan) or 200% (Nardalert, factory default), you will hear a different alarm tone. If this happens, you should leave the area immediately. Before you re-enter the area, ensure that the source of energy is turned off so that the intended work can be done.

Initial Qualification

After repositioning the absorber cap, the RadMan / RadMan XT can also be used as a measuring device for initial qualification. Its isotropic sensors are a particular advantage.

Searching for Leaks

To search for leaks, move the absorber cap of the RadMan / RadMan XT to the position where you can use it as a grip and pass it slowly and at a good distance along the cables.

When the alarm sounds, approach the source of the radiation only until the display shows a maximum of 100%. RadMan's small, slim shape makes it especially suitable for places that are difficult to access.



Evaluations that Conform to Standards through Shaping

Different services operate at different frequencies. The frequency-dependent response of the sensors in the Nardalert S3 and the RadMan / RadMan XT ensure that the evaluations for all services conform to standards – independent of their frequencies. Shaped frequency response is a Narda Safety Test Solutions patent.

Evaluation of Data through User Software

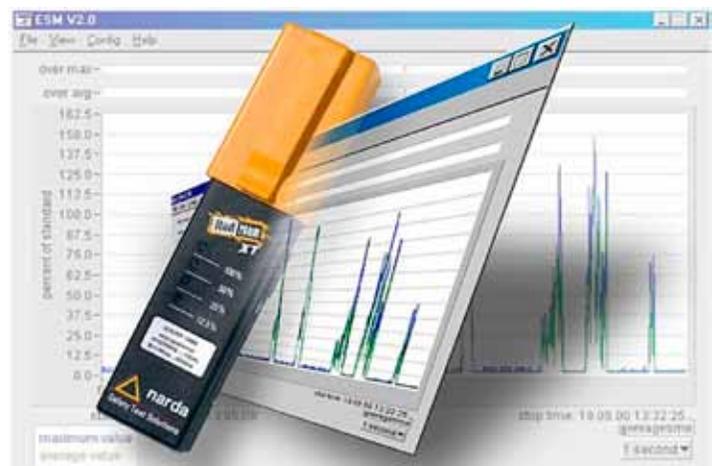
Nardalert S3 and RadMan XT both have internal memories. This function is unprecedented in personal monitors. The user software allows you to read the data and evaluate it, e.g., to

- Provide Proof of whether the Threshold Value was exceeded or not
- Calculate Averages
- Statistical Analysis
- View the Chronological Development of Events

These features allow safety personnel to produce complete and accurate documentation.

Questions? We are there for you!

Our sales partners will be delighted to help if you have any problems with applications or questions about our monitors.





Patent Pending

Nardalert S3

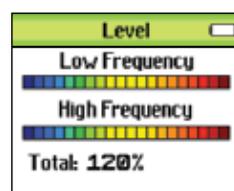
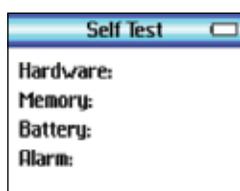
Personal Monitor

- Field Replaceable Sensor Modules
- Color LCD Display
- Multi-Color Alarm LED's
- USB Interface for Data and Charging
- Interchangeable Lanyard or Belt Clips
- Comprehensive Software Included
- Standard and Optioned Models
- Fiber Optic Port for Remote Monitoring
- Fail-Safe Design

The professionals at Narda Safety Test Solutions have designed the next generation of Non-Ionizing Radiation (NIR) Personal and Area monitor – the Nardalert S3. The award winning designs of the Nardalert XT and RadMan monitors have been extended to an entirely new product that builds on years of safety product leadership. Sensor technology has been improved in this series by re-designing not only the sensor itself, but also by packaging it in a field replaceable package that contains all the electronic data necessary to maintain calibrated operation. This new feature allows your S3 to stay in service without costly logistics to keep multiple units calibrated – a major advantage for any NIR Safety Program. Your new Nardalert S3 will always be capable of supporting new standards or guidance's and even different fields or frequencies, allowing future expandability and extending longevity.

LCD Display

Alarm events are always evident with visual LED's combined with vibration and audible notifications. However, to provide the user more accurate information than just simple alarms we've incorporated a top mounted LCD. The LCD simplifies operation, showing key data at start-up such as battery state and sensor information that the operator needs. With RF/microwave sensors attached, the display indicates to the user the bands (<> 1 GHz) that are being detected. Optioned units use the display to provide even more information such as exposure history, logged data, alarm indications and more.



Accuracy

Our engineers have designed the new Nardalert S3 to exceed the accurate performance of our earlier models. Our customers know they can trust our designs to provide the same or better performance when they are worn on the human body, as it would perform in a calibration facility. All testing is performed with the sensor in the housing in order to replicate normal day-to-day use and our new shaped-response sensors more closely follow international standards and guidance's. Each sensor is individually calibrated and that information is stored right in the sensor itself.

Housing

We packaged everything in a rugged plastic housing that allows you to use it mounted in a common shirt pocket or secure it with the supplied lanyard or belt-clip mounts. We supply a strong silicon rubber skin that provides additional shock protection as a standard accessory. The Nardalert S3 operates from a single standard Type RCR123A battery. This battery is automatically re-charged whenever it is plugged into a computer and we supply a universal charger to accelerate charging from any common AC source or mains plug. Common automobile USB adapters can also be used, so your monitor is always ready to work.



Nardalert S3 Mainframe shown with interchangeable sensor.

Sensors

Initial sensors available cover the most common international exposure limits. We offer sensors to follow the RF/microwave frequency limits promoted by the US FCC, IEEE (C95.1), Canada's Safety Code 6 and ICNIRP. Many users around the world will find that one of these limits meets their local requirements for RF and microwave exposures. Future coverage will include lower frequency ranges and flat frequency response sensor modules to perform alternate tasks using the same Nardalert S3 Mainframe.

Model Selection Guide

| STANDARD / GUIDANCE | Nardalert S3 and Sensor System | Sensor Alone* |
|-----------------------------|--------------------------------|---------------|
| ACGIH | 2271/111 | 2271/11 |
| ARPANSA - RP3 | 2271/131 | 2271/31 |
| Brazil - ANATEL 303 | 2271/131 | 2271/31 |
| Canada Safety Code 6 (2009) | 2271/121 | 2271/21 |
| FCC | 2271/101 | 2271/01 |
| ICNIRP | 2271/131 | 2271/31 |
| IEEE C95.1 | 2271/111 | 2271/11 |
| Japan RCR-38 | 2271/101 | 2271/01 |

*Requires Nardalert S3 Mainframe P/N 2270/01 to form operable set

Standard and Optioned Models

The Nardalert S3 can be supplied in one of two different capabilities. Standard units provide all of the basic performance necessary for normal operations. Alarm levels are factory set at 50% and 200% of Reference levels and basic screens provide all the information the user needs. Advanced users and applications should consider the additional capabilities of the NS3 Option Key. By entering a software code through the user software you can expand the operation of your Nardalert to store, display and download exposure data, alter alarm modes and levels, display historical data on the Nardalert S3's display and re-configure the interface for fiber optic connections.

Software

The Nardalert S3 software (NS3-TS) is supplied standard with every unit. Readings can be downloaded and displayed numerically (Figure 1) or graphically (Figure 2) by simply installing the software and plugging in the supplied USB cable.

Users can download stored data into a database that is stored in the software for future recall. The six major software controls are:

1. **File** – Allows file manipulation, storing, sorting and exporting.
2. **Database** – Database management of files stored on computer (Figures 1 and 2)
3. **Device Memory** – Data management of readings stored on Nardalert (Figure 3)
4. **Measurement** – Displays real-time measurements on computer (Figure 4)
5. **Configuration** – Configures Nardalert S3 for use. Set alarm thresholds, logging rate, backlight time, etc.
6. **Extras** – sets unit up for regional preferences, installs options, general settings

This software closely mimics the NBM-TS software that our customers have used for the last few years. Keeping a common interface allows new users to quickly get up to full speed and explore all of the unit's functions.

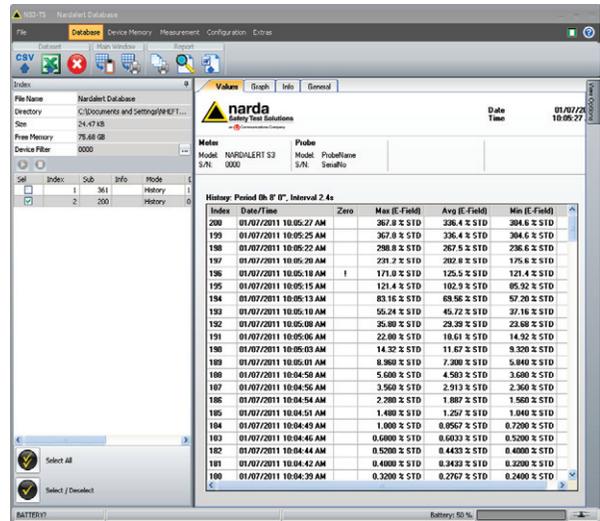


Figure 1

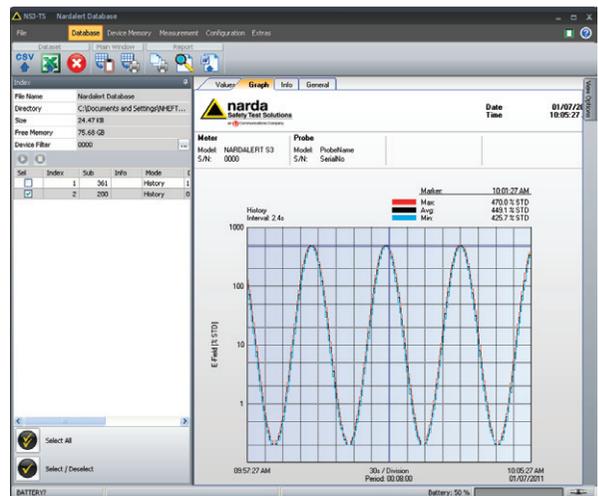


Figure 2

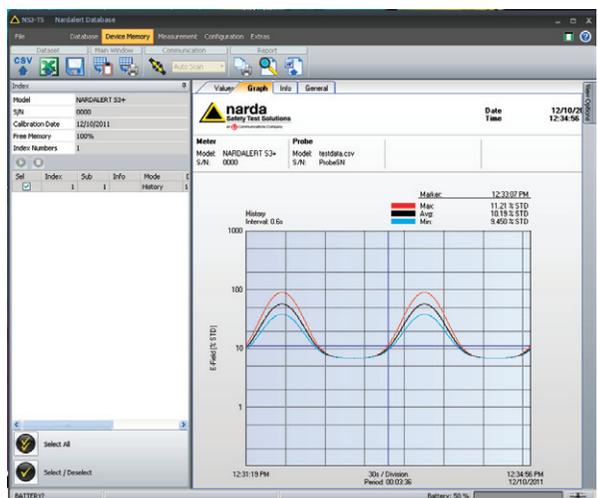


Figure 3

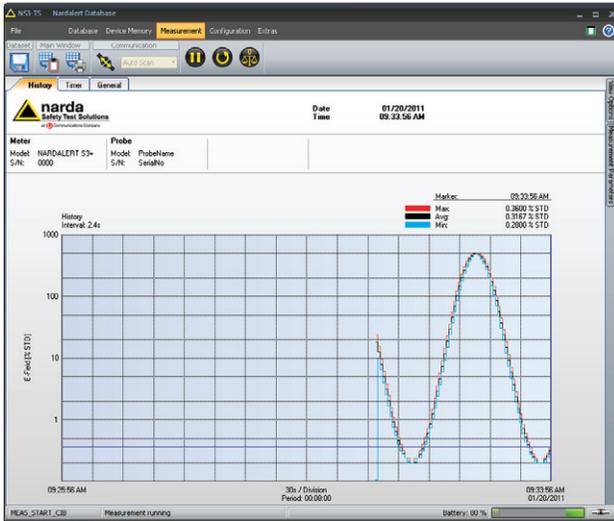
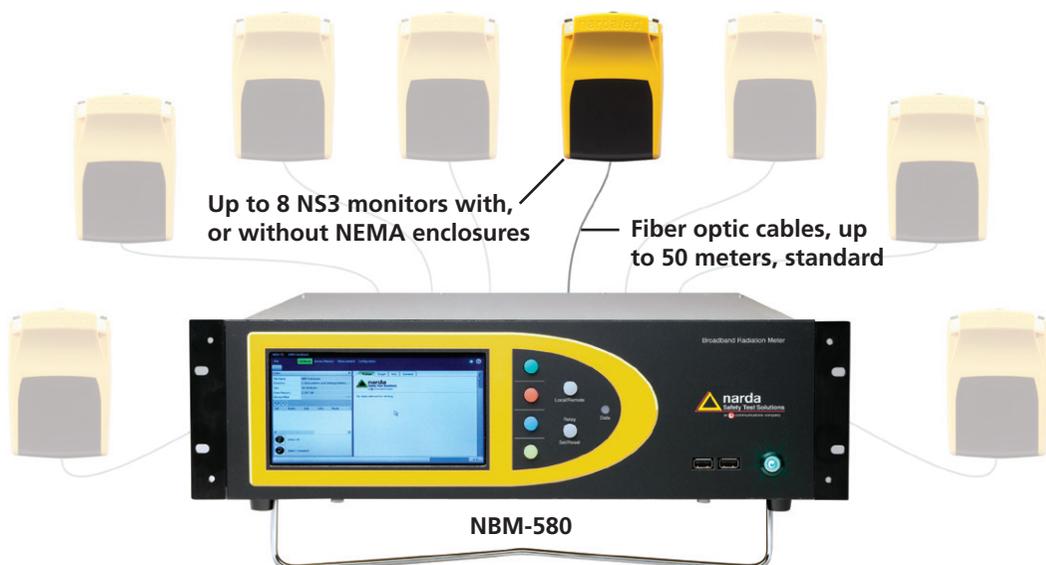


Figure 4

FIXED AREA MONITORING APPLICATIONS

Nardalert monitors can be continuously powered through their USB interface while field levels are read through the fiber optic interface. Optional NEMA 4X enclosures and solar panels are also available for outdoor installations, as well as longer (> 50m) cable solutions. The NBM-580 provides powerful alarm interface capabilities when employing multiple sensors for a stand-alone monitoring system.



Specifications

| MONITOR | 2271/101, FCC | 2271/111, IEEE | 2271/121, SC6 | 2271/131, ICNIRP |
|---|---|-----------------|-------------------|-------------------|
| Frequency Range | 100 kHz to 50 GHz | 3 MHz to 50 GHz | 100 kHz to 50 GHz | 100 kHz to 50 GHz |
| Field Measured | Electric Field, V ² /m ² | | | |
| Sensor Design | Radial field, Diode-Dipole and Thermocouple Array | | | |
| Alarm Accuracy ^a (Frequency Sensitivity and Polarization Uncertainty) | +4.5 / -3.0 dB (100 kHz to 30 GHz) +2.5 / -6.0 dB (30 to 50 GHz) +2.5 / -6.0 dB (50 to 100 GHz, Typical) | | | |
| Monitor Range ^b | 5% to 200% of Standard or Guidance | | | |
| ELF Immunity | 6 kV/m | | | |
| Alarm Thresholds | Standard is two alarms. May be programmed through NS3-TS for one alarm | | | |
| Alarm 1, Default Setting Range of Adjustment | 50% of Standard or Guidance 10% to 100% (in 5% increments) and OFF | | | |
| Alarm 2, Default Setting Range of Adjustment | 200% of Standard or Guidance 20% to 200% (in 5% increments) | | | |
| Alarm Indications | Visual (LCD and LED) with Audible and/or Vibrate | | | |
| CW Overload | 3000% of Standard or Guidance | | | |
| Peak Overload | 32 dB above Standard or Guidance | | | |
| Battery Type/ Approximate Life | RCR123A, Lithium (Re-chargeable) / 25 hours | | | |
| Display Type | TFT Transmissive | | | |
| Display Size | 1.77 inches, 28 x 35 mm, 128 x 160 pixels | | | |
| Backlight | White LED's | | | |
| Display Refresh Rate | 250 msec. | | | |
| Displayed Items on LCD | All units display Model Information, Self Test Results, Calibration Date and Real-Time Readings during operation. | | | |
| NS3 Option Key | Allows access to stored data from NS3-TS and/or LCD screen. Additional items made available include Alarm Mode, Alarm Set, Backlight, Data Log, Fiber Optic Interface, and History (P/N 2270/90.01) | | | |
| Memory ^c | 62,000 events | | | |
| Storage Rate | 4 per second, 1 per second, 1 per 5 seconds, 1 per 10 seconds, 1 per 20 seconds, 1 per 60 seconds | | | |
| Storage Time | Variable - from 4.3 hours (4 per second), to 43 Days (1 per 60 seconds). | | | |
| Remote Operation | Via USB or Optical RS-232 Interface | | | |
| USB | Serial, Full Duplex, 57600 baud (virtual com port), multi-function plug connector | | | |
| Optical Interface | Serial, Full Duplex, 57600 baud, no parity, 1 start bit, 1 stop bit | | | |
| Recommended Calibration Intervals | 4 Years for Mainframe (P/N 2270/01) and 2 Years for Sensors (2271/X1) | | | |
| Temperature Range | Operational: -10°C to +50°C Non-Operational: -30°C to +70°C | | | |
| Humidity | 5 to 95% relative humidity, no condensation; ≤29 g/m ³ absolute humidity (IEC 60721-3-2 class 7K2) | | | |
| Size | 117.1 x 82.6 x 31.8 mm (4.61 x 3.25 x 1.25 in.) | | | |
| Weight (including battery) | 0.5 lbs. (0.23 kg), with sensor | | | |
| Accessories Included | AC Charger with Plugs, Charger/Data cable (USB), Carrying Case, Belt Clip, Lanyard Clip, Manual, NS3-TS Software, Calibration Certificate | | | |

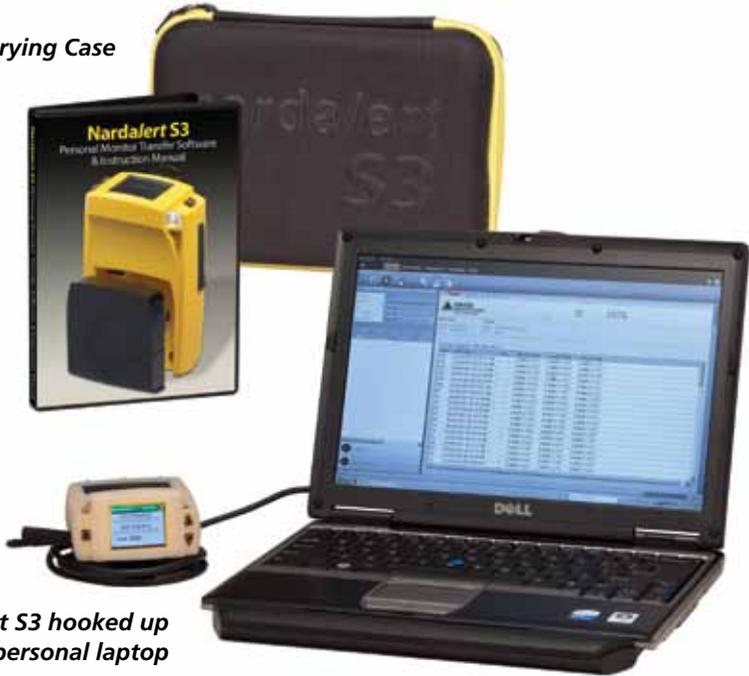
NOTES: ^a Accuracy specified as the mean of the radial and vertical orientations (10 to 1600 MHz) and mean of the vertical and horizontal orientations (1600 MHz to 50 GHz).

^b Percentages related to the highest (Controlled, Occupational) exposures allowed by Standard or Guidance

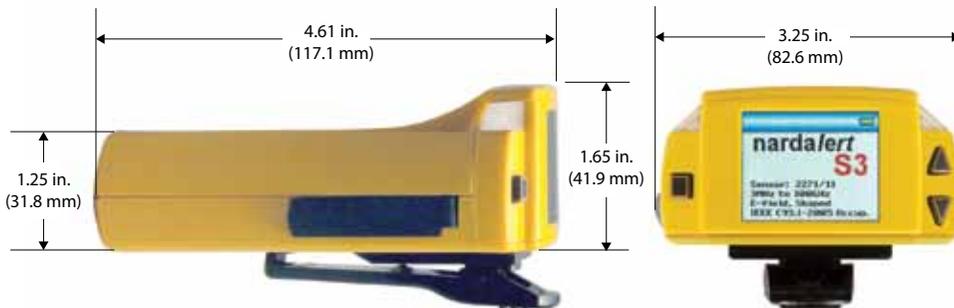
^c Memory function only available to "Optioned" units.

Nardalert S3 Soft Carrying Case

*Nardalert S3
Instruction Manual
and NBM-TS Software*



*Nardalert S3 hooked up
to personal laptop*



RadMan / RadMan XT

Personal Monitors

- 1 MHz to 40 GHz
- Shaped Frequency Response Matched to Your Standard
- Multi-Function Tool – Personal Monitor, Leakage Detector, Simple Measurement Instrument
- Simultaneous E- and H-Field Measurement
- Data Logger Records Continuously (RadMan XT)
- Four LED Level Indicators
- Isotropic Response when used Off the Body
- Optical Interface can be used “Real Time”
- Patented Design



All RadMan monitors share the same compact housing, dual electric (E) and magnetic (H) field detection, and wide-band shaped frequency response. The “shaped” frequency response means that the monitor has frequency-selective sensitivity that matches your standard – all major standards are supported. The alarm criteria and the output information are incorporated in the “Percent of Standard.”

Narda Safety Test Solutions’ latest RF personal monitor is the Series ESM-30 RadMan XT. This “Extended Technology” monitor is very similar to the ESM-20 Series monitors that have been available since 1997 with one very important difference: the RadMan XT continuously records the field strength that it measures. Since the monitor has both electric and magnetic (E and H) field sensors, it records six different values for every data point: Maximum, Minimum, and Average values during the averaging period for both the E field and the H field. The time and date of each data point is also stored. This data may be retrieved at any time using the optional ESM-TS Interface Set which includes a fiber optic cable, adapter circuit, and software. The software permits the user to download the data that the monitor has collected, analyze the data, and set the monitor’s internal clock. The data logger is always on – it simply stores the newest data in place of the oldest data.

All RadMan monitors are multi-function tools. With the RF absorber cap off, the RadMan functions as a simple instrument with isotropic detection and four level indicator LEDs that provide an approximate indication of field strength. The RadMan can also be used as a simple area monitor. The fiber optic interface and available software can be used to continuously monitor the detected field strength levels from both the electric field and magnetic field sensors.

Applications

RadMan RF monitors are generally usable over their entire rated frequency range with one limitation:

Standard RadMan monitors are not recommended for use with radar signals. "Fast" RadMan monitors are available for applications where peak detection of radar signals is desired. See Detecting Peak Radar Signals on the next page.

There are two series of RadMan RF monitors. Within each series, the specifications are essentially identical except for the sensor "shaping." Each specific standard or guidance requires some differences in the sensor design and calibration. The specified frequency range of each model can vary depending on the difficulty in shaping the frequency response of the monitor to match the standard. The two RadMan series are:

RadMan XT

This is the full-featured RadMan monitor. It operates over the maximum frequency range and contains both E and H field sensors. Monitors are generally shaped to match the higher level of two-tier standards, i.e., the "Controlled," "Occupational," or "RF Worker" limits. The data-logger can log more than 1,600 sets of data that can be used to analyze personnel exposures in order to improve operations. Or it can be used in the same way a Flight Data Recorder

is used on board an aircraft – the logged data can be reviewed whenever there is a need to determine an individual's level of exposure.

RadMan

This series is identical to the full-featured RadMan XT except they do not include the data-logging capability.

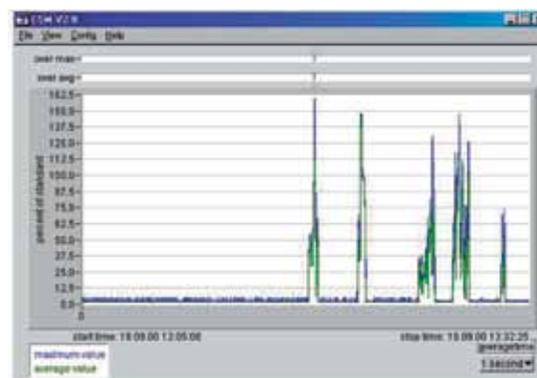
RadMan PC Interface Set

Allows you to monitor both E and H fields in real time via fiber optic cable when monitor is used off the body. You can download and analyze logged data from RadMan XT monitors.

Interface Set ESM-TS includes:

- Windows® compatible User's Software
- Interface Module that connects directly to the COM port of your PC
- Fiber optic cable to connect module to RadMan

ONE TRANSFER KIT PER LOCATION IS RECOMMENDED (P/N 2251/90.50)



RadMan / RadMan XT Model Selection Guide

Select the model based on standard/guidance and the product series (RadMan XT or RadMan). The frequency rating is for the E-field sensor. The H-field sensor is rated 1 MHz to 1 GHz for most models. Exceptions are noted.

| STANDARD / GUIDANCE | RadMan XT | RadMan |
|--|---|---|
| BGV B11, 2001, Exp. 1 Occupational | 2251/01 (2251/51 fast) E-Field 1 MHz to 40 GHz H-Field 1 MHz to 1 GHz | 2250/51 (2250/01 fast) E-Field 1 MHz to 40 GHz H-Field 1 MHz to 1 GHz |
| Canada Safety Code 6 (2009) Controlled | 2251/10 E-Field 1 MHz to 40 GHz H-Field 1 MHz to 1 GHz | 2250/60 (2250/10 fast) E-Field 1 MHz to 40 GHz H-Field 1 MHz to 1 GHz |
| ENV 50166-2 Occupational | 2251/04 E-Field 1 MHz to 40 GHz H-Field 27 MHz to 1 GHz | 2250/54 (2250/04 fast) E-Field 1 MHz to 40 GHz H-Field 27 MHz to 1 GHz |
| FCC 96-326 Occupational / Controlled | 2251/02 E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz | 2250/52 (2250/02 fast) E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz |
| ICNIRP 1998 Occupational | 2251/06 (2251/56 fast) E-Field 1 MHz to 40 GHz H-Field 27 MHz to 1 GHz | 2250/56 (2250/06 fast) E-Field 1 MHz to 40 GHz H-Field 27 MHz to 1 GHz |
| ICNIRP 1998 General Public (E-Field Only) | 2251/16 E-Field 1 MHz to 40 GHz no H-Field | — |
| IEEE C95.1-2005 Controlled | 2251/05 E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz | 2250/55 (2250/05 fast) E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz |
| Japan RCR-38 Controlled | 2251/03 E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz | 2250/53 (2250/03 fast) E-Field 3 MHz to 40 GHz H-Field 3 MHz to 1 GHz |

Detecting Peak Radar Signals

Most RadMan XT and RadMan monitors use a one-second averaging time for their alarm criteria. “Fast” RadMan models (see Model Selection Guide) have a 30-millisecond averaging period for the electric field sensor. These monitors detect the peaks of sharp, narrow radar pulses. The ICNIRP standard, for example, requires peak detection when the ratio of peak to average power is greater than 30 dB.

Specifications

| SERIES | RadMan XT | RadMan |
|---|---|--------|
| Frequency Range | See Model Selection Guide | |
| Type of Frequency Response | Shaped | |
| LED Indicators | 12.5%, 25%, 50%, and 100% of Standard ^a | |
| Alarm Threshold | 50% of Standard ^b | |
| CW Overload | 20 dB above standard but not more than 10 kV/m or 26.5 A/m | |
| Peak Overload | 40 dB above standard for pulse widths < 10 µsec | |
| Sensors | E and H Field (no H field for General Public versions) Diode based design | |
| Directivity | Isotropic (Tri-axial) | |
| Sensitivity ^c | 6% of Standard | |
| Frequency Sensitivity (Typical) | | |
| H-Field | ±3 dB | |
| E-Field | ±3 dB (up to 3 GHz) +4/-3 dB (3 GHz to 10 GHz) +6/-3 dB (10 GHz to 18 GHz) +6/-10 dB (18 GHz to 40 GHz) | |
| Isotropic Response ^d | +4/-2 dB (27 MHz to 500 MHz) | |
| ELF Immunity | 1 kV/m | |
| Memory | | |
| Number of Data Points (six values per data point) ^e | 1638 | — |
| Logging Intervals ^f | 1 sec., 2 sec., 5 sec., 10 sec., 1 min., 3 min. (default: 1 min.) | — |
| Logging Time @ rate of 1/min | 27.3 hrs. | — |
| Calibration Frequency | 100 MHz (200 MHz for IEEE versions /05, /55) | |
| Recommended Calibration Interval | 36 months | |
| Battery Type | 2 x AAA Alkaline | |
| Life | 200 hrs. with LEDs and Audio Alarm OFF | |
| Temperature | | |
| Operating | -10°C to +55°C | |
| Non-operating | -40°C to +70°C | |
| Humidity | 5 to 95%, non condensing ≤29 g/m ³ , absolute humidity (IEC 60721-3-2 class 7K2) | |
| Weight (including cap and batteries) | 4.6 oz. (130 g.) | |
| Size | | |
| without cap | 1.0 x 1.4 x 6.2 inches (26 x 36.4 x 157 mm) | |
| with cap as absorber | 1.5 x 1.6 x 6.4 inches (37 x 41 x 163 mm) | |
| with cap as handle | 1.5 x 1.6 x 7.8 inches (37 x 41 x 197 mm) | |
| Accessories Supplied | Earphone, Operating Manual, Soft Case, Batteries | |
| Optional Accessories | PC Transfer Set ^f , Extension Rod for Hand-Held Use (BN 2250/92.02), Hard Case (BN 2250/92.03) and Tripod (BN 2244/90.31) | |

Notes:

^a The percent of standard ratings refer to equivalent power density.

^b The alarm threshold is set to 50% of Standard ±1 dB at the calibration frequency.

^c This value is only significant for data logging and online measurements.

^d Uncertainty due to varying polarization (verified by type approval test). Ellipse ratio included.

^e Each record includes the maximum, minimum and average values for both the E field and the H field (optional, P/N 2251/90.50).

^f The logging interval can be selected via the ESM-TS software (optional)

Personal Monitor Areas of Application

| Areas of Application | Nardalert S3 | RadMan / RadMan XT |
|---------------------------------------|---|---|
| Wireless | Recommended | Recommended |
| Military | Thermocouple sensors yield accurate results even with radar systems | Fast models available for measuring peak values (special version) |
| Broadcast | Recommended also for long and middle wave transmitters | VHF frequencies including FM-Radio and higher |
| Antennas on Power Transmitting Towers | ELF-immune models available | — |



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