Personal Monitors

RadMan/RadMan XT RF Personal Monitors

DE Patent 19,726,138
US Patents 5,955,954 4,634,968

narda Safety Test Solutions
an L3 Communications Company

- **1 MHz to 40 GHz**
- **Shaped Frequency Response Matched to Your Standard**
- **1 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**

DESCRIPTION

All RadMan monitors share the same compact housing, dual electric (E) and magnetic (H) field detection, and wideband shaped frequency response. The "shaped" frequency response means that the monitor has frequency-dependent 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 to set the monitor's internal clock. The data logger is always on – it simply stores the newest data in place of the oldest data.

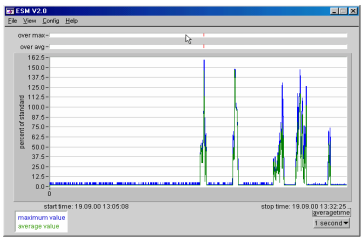
All RadMan monitors are multi-function tools. With the RF absorber cap off, the RadMan functions as a simple instrument with isotropic detection and four level indicator LEDs that provide an approximate indication of field strength. The RadMan can also be used as a simple area monitor. The fiber optic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

RadMan PC Interface Set

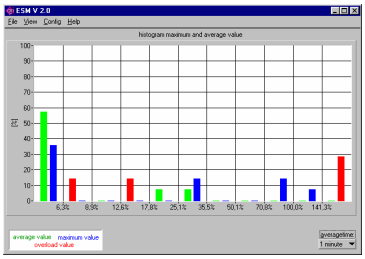
Allows you to monitor both E and H fields in real time via fiber optic cable when monitor is used off the body. You can download and analyze logged data from RadMan XT monitors. Interface Set ESM-TS includes:

- 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



Exposure versus time



Histogram analysis

APPLICATIONS

RadMan RF monitors are generally usable over their entire rated frequency range with two limitations.

- The RadMan XT ELF Immune Series is specifically designed for use in strong ELF fields, such as where wireless antennas are mounted on towers that carry high voltage 50/60 Hz utility power. RadMan and RadMan XT Series models are not designed for this environment and false alarms may occur.
- 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.

There are three 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 three 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 much 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 what levels an individual has been exposed to.

RadMan XT ELF Immune
These monitors are very similar to the RadMan XT series except that the inside of the housing has a special conductive coating. This coating blocks the ELF signals. The frequency range of these monitors is reduced at the low end due to the coating.

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

DETECTING PEAK RADAR SIGNALS

Most RadMan XT, RadMan XT ELF Immune 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.

MODEL SELECTION GUIDE

Select the model based on standard/guidance and the product series (RadMan XT, RadMan XT ELF Immune or RadMan). Models with short E-field integration time for peak detection are marked as "fast".

STANDARD / GUIDANCE	RadMan XT		RadMan XT ELF Immune		RadMan	
BGV B11 2001 EXP. 1 Occupational	2251/01 2251/51, fast	(A)	2251/71	(E)	2250/51 2250/01, fast	(B)
Canada Safety Code 6 99-EHD-237 RF Workers	2251/10	(A)	2251/80	(E)	2250/60 2250/10, fast	(A)
ENV 50166-2 Occupational	2251/04	(B)			2250/54 2250/04, fast	(B)
FCC 1997 Occupational / Controlled	2251/02	(D)	2251/72	(F)	2250/52 2250/02, fast	(D)
ICNIRP 1998 Occupational	2251/06 2251/56, fast	(B)	2251/76	(G)	2250/56 2250/06, fast	(B)
ICNIRP 1998 General Public **- E-Field only -**	2251/16	(C)	2251/86	(H)		
IEEE C95.1-1999/ANSI C95.1-1992 Controlled	2251/05	(D)			2250/55 2250/05, fast	(D)
Japan RCR-38 Controlled	2251/03	(D)			2250/53 2250/03, fast	(D)
Ö NORM S 1120, 1992 Occupational	2251/09	(D)	2251/79	(F)	2250/59 2250/09, fast	(D)

FREQUENCY RANGE	H-FIELD	E-FIELD
(A)	1 MHz to 1 GHz	1 MHz to 40 GHz
(B)	27 MHz to 1 GHz	
(C)	- no H-field -	
(D)	3 MHz to 1 GHz	3 MHz to 40 GHz
(E)	1 MHz to 1 GHz	27 MHz to 40 GHz
(F)	3 MHz to 1 GHz	
(G)	27 MHz to 1 GHz	
(H)	- no H-field -	

NATO STOCK NUMBERS	
2250/05	6625-12-349-3027
2251/06	6625-12-355-2053
2251/56	6625-12-360-2005

SPECIFICATIONS [a]

RadMan/ RadMan XT/ RadMan XT ELF Immune			
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 damage level	20 dB above standard but not more than 10 kV/m or 26.5 A/m		
Peak damage level	40 dB above standard for pulse widths < 10 µs		
Sensors	E and H-Field (no H-Field for General Public versions) Diode based design		
Directivity	Isotropic (Tri-axial)		
Sensitivity [c]	6% of standard		
UNCERTAINTY			
Flatness of frequency response	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)		
SERIES	**RadMan XT**	**RadMan XT ELF Imm**	**RadMan**
ELF Immunity @ 50/60 Hz	1 kV/m	100 kV/m	1 kV/m
Memory Number of Data Points (six values per data point) [e] Logging Intervals Logging Time @ rate of 1/min	1638 1 s, 2 s, 5 s, 10 s, 1 min, 3 min 27.3 hrs.		no memory
GENERAL SPECIFICATIONS			
Calibration frequency	100 MHz (200 MHz for IEEE versions /05, /55)		
Recommended calibration interval	36 months		
Battery type/ life (approx.)	2 x AAA Alkaline, 200 hrs. with LEDs and alarm OFF		
Temperature range Operating Non-operating (Transport)	-10 °C to +55 °C -40 °C to +70 °C		
Humidity	5 to 95 %, non-condensing ≤ 29 g/m^3 absolute humidity (IEC 60721-3-2 class 7K2)		
Size (with cap as absorber)	37 mm x 41 mm x 163 mm / 1.5" x 1.6" x 6.4"		
Weight	130 g / 4.6 oz		
Accessories (included)	Earphone, operating manual, belt bag, batteries		

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 data point includes the maximum, minimum and average values for both the E field and the H field

ORDERING INFORMATION

ORDERING NUMBERS	
RadMan/ RadMan XT	See Model Selection Guide
ACCESSORIES (OPTIONAL)	
ESM-TS, PC Interface Set	2251/90.50
Extension rod for hand-held use	2250/92.02
Hardcase	2250/92.03
Tripod, non-conductive (height 1.65m)	2244/90.31

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