

Quality & **Precise**



MAXWELLON 3943B

9kHz~ 8GHz
Monitoring Receiver
2023

The overall size of the handheld monitoring receiver is 182.5mm×289mm×69mm, the weight of the whole machine is less than 3.5kg, the working time is 3-4h with battery, the display is 10.1-inch TFT, and the integrated touch screen. With multiple functions such as radio signal search, interception, measurement, analysis, demodulation, direction finding, positioning, etc., it can be used to perform emission monitoring, coverage measurement, illegal emission source/interference source rapid detection and positioning, and major activities that comply with ITU specifications Radio security and other tasks. The whole machine adopts a full touch screen design, and the software supports multi-touch interactive mode. The touch operation experience of the smart phone is completely transplanted to the monitoring receiver device. The users can conveniently complete the display trajectory zoom in, zoom out, window movement, parameter setting and other operations through touch gestures, providing a user-friendly UI interface to the greatest extent, so that the user can operate the monitoring receiver just like using a mobile phone or a pad computer.

■ Key Feature

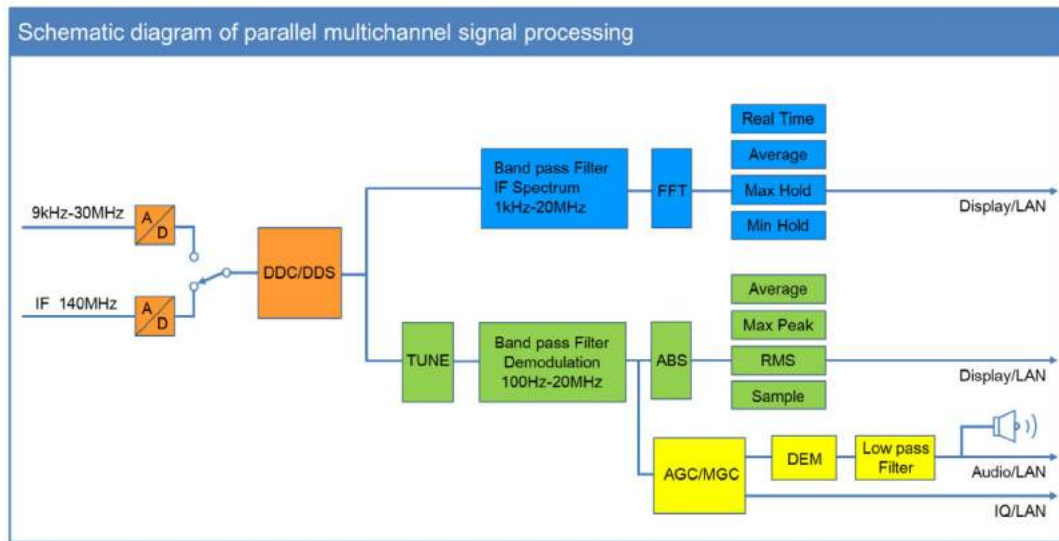
- Excellent reception performance
- Multi-channel parallel operation
- Multi-mode scanning with ITU compliance
- Signal demodulation supporting multiple modulation patterns
- Computer video leak detection and restoration
- Manual radiation source direction finding by directional antenna
- Automatic radiation source direction finding through multi-element directional antenna
- Radiation source positioning function
- Radio signal recording function
- Audio and spectrum data playback
- Remote control
- High-precision time synchronization
- New operating concept
- Support multiple operation method

Excellent Reception Performance

- Wide monitoring frequency range (9kHz~8GHz) and direction finding frequency range (20MHz~6GHz) to meet current and future radio service signal reception
- Provide a maximum 20MHz analysis bandwidth, even a wide spectrum of short pulses or bursts can be detected and analyzed
- The full-band pre-selection design conforms to the radio frequency characteristics, that is, avoiding equipment overload, high-sensitivity receiving signal, supplemented by higher signal resolution, and superior reception performance.

Multi-channel Parallel Operation

- Three parallel processing channels provide spectrum measurement, level field strength measurement and demodulation functions respectively, which is convenient for users to obtain multi-domain correlation analysis results of signals.
- The spectrum measurement channel's real-time spectrum bandwidth can be set from 1 kHz to 20MHz, with 35 steps from 0.625Hz to 2MHz resolution bandwidth. The spectrum can be selected to perform averaging, sampling, maximum hold or minimum hold before output through the screen or LAN interfaces.
- The level field strength measurement channel has 34 IF filters, the IF bandwidth is from 100Hz to 20MHz, and can be selected independently of the spectrum bandwidth, which is convenient for users to process different signals with optimal signal ratio; level/field strength through screen or LAN interface Optional sampling, peak, power or average detection before output
- Demodulation channel receive level field strength measurement channel the complex baseband signal output of the IF filter can be directly used for FM/PM demodulation. The complex baseband signal adjusted by AGC/MGC can be directly output through the LAN interface or used for AM/LSB/USB/ISB/CW/PULSE demodulation and demodulation result data can be output through LAN interface; digital audio demodulation data can be output by LAN interface or converted into analog signal for speaker playback.



Multi-mode Scanning with ITU Recommendations

■ Fixed Frequency Reception

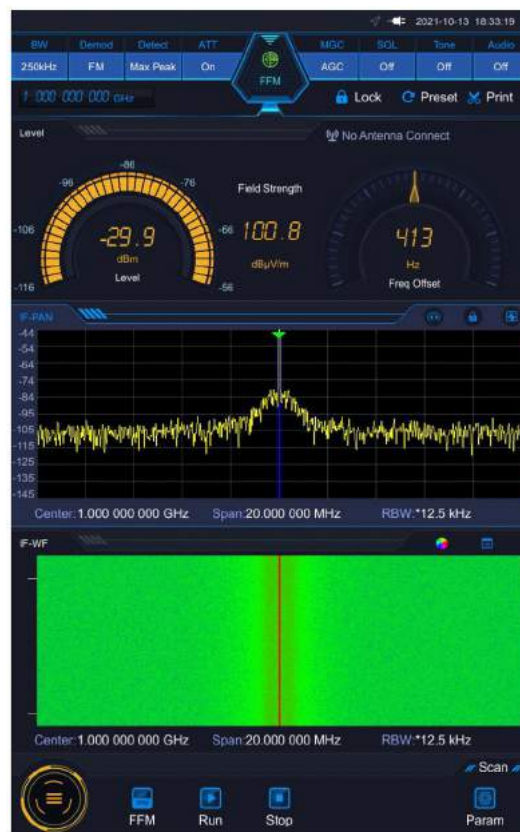
It can realize spectrum measurement of fixed frequency points, display measurement information such as level, field strength and frequency offset, and combine signal demodulation function to measure and observe signals.

The receiving bandwidth is selectable from 1 kHz to 20MHz. The resolution bandwidth supports automatic matching and manual adjustment to meet different test scenario requirements.

Drag and demodulate the bandwidth histogram in the IF spectrum window to quickly modify the demodulation frequency, which is convenient and fast.

Real-time display of the IF waterfall map, and a variety of color display modes are available, support for adjusting the color display threshold, filtering the signal below the threshold for easy observation.

Support historical data playback, slide the waterfall map vertically or drag the historical frequency to display historical data in the spectrum window



■ Panoramic Scan

Supports panoramic scanning in the 9kHz to 8GHz frequency range with resolution bandwidths from 100Hz to 2MHz for fast signal scanning
Support differential mode for easy observation of signal changes and rapid detection of abnormal signals

It can be linked with the fixed frequency receiving function to select the target frequency point on the panoramic trajectory, and the target frequency point information can be quickly correlated to the IF spectrum window. When the panoramic scanning stops, the fixed frequency receiving starts to work, which can be seamlessly switched for fast observation.



■ Frequency Sweep

By setting the scanning frequency band range and the step frequency, the measured frequency band is divided into multiple frequency points, and then these frequency points are stepped and scanned with uniform parameters, including: bandwidth, squelch level, dwell time, demodulation Mode, attenuation mode, number of scans, etc. The fixed frequency receiving function works in parallel with the frequency scanning function. Each step to a frequency point associates the frequency point information with the fixed frequency receiving and stays at the frequency point. At this time, the specific frequency of the frequency point can be viewed in the intermediate frequency window. It can realize frequency scanning in the frequency range of 9 kHz to 8GHz. The stepping frequency can be arbitrarily input in the range of 1Hz to 100MHz, supporting forward scanning and reverse scanning.

By setting the squelch level, you can control the dwell state of the frequency sweep to filter signals that are less than the squelch level. The suppression table is used to record the frequency band to be ignored in the scanning frequency range. It includes two parameters of the starting frequency and the ending frequency. When the frequency scanning is stepped to the recording range of the suppression table, it is directly stepped to the next frequency point. The suppression table supports a maximum of 100 pieces of frequency information.



■ List Scan

It can realize the scanning of the frequency of the storage table records one by one.

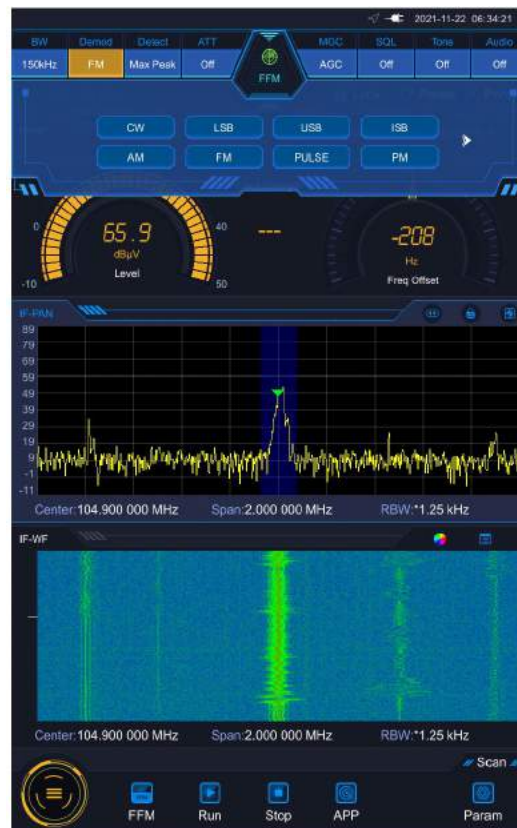
The fixed frequency receiving function and the list scanning function also work in parallel. Each time it switches to a frequency point, it will reside at the frequency point, and the band information is associated with the fixed frequency reception, and the spectrum can be measured and observed in the intermediate frequency window. The difference from the frequency sweep is that the parameters of the list scan at each frequency point can be arbitrarily set, including the center frequency, bandwidth, demodulation mode, attenuation mode, squelch value, squelch switch, activation state, etc.

The storage table can record up to 1000 scanning frequency points, supporting forward scanning and reverse scanning.



Signal Demodulation Supporting Multiple Modulation Patterns

- Signal formats that support demodulation include FM/ PM/ AM/ LSB/ USB/ ISB/ CW/PULSE/ IQ.
- Supports up to 20MHz demodulation bandwidth, demodulation bandwidth can be set from 100Hz to 20MHz
- Automatic frequency control (AFC) for automatic tracking of received signals within the demodulation bandwidth
- Gain control allows users to get the best demodulation in complex environments; gain control switches between automatic gain control (AGC) and manual gain control (MGC)
- CW demodulation with BFO function, it is a secondary oscillator to recover CW carrier, BFO frequency range is 0~±8kHz

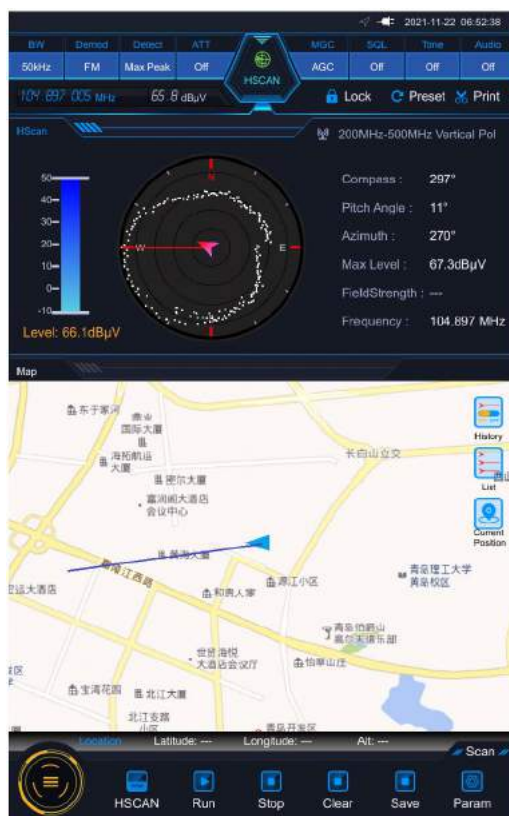


Computer Video Leak Detection and Restoration

- Ability to detect and restore images of computer video leaks
- Supported computer video signal format is HDMI
- Restore image stabilization

Manual Radiation Source Direction Finding by Directional Antenna

- 9kHz-20MHz, 20MHz-200MHz, 200MHz-500MHz, 500MHz-8GHz directional antenna full-band coverage
- Reflect 360-degree signal intensity distribution in compass mode, automatically indicating the maximum intensity direction
- Support digital map function for easy outdoor source search
- Directional, spectrum, digital map multi-window parallel display
- Intelligent control of antenna handle for user convenience



Automatic Radiation Source Direction-find through Multi-element Directional Antenna

- 20MHz-1.3GHz, 700MHz-6GHz multi-array DF antenna with single channel correlation interferometer algorithm for direction finding
- DF maximum bandwidth 20MHz, direction finding accuracy is better than 2RMS°
- Fastest direction of 30ms/time, with level threshold for direction finding of abnormal signals
- Support digital map function for easy outdoor source search
- Directional, spectrum, digital map multi-window parallel display





Radiation Source Positioning Function

- Positioning the radiation source based on the direction finding result
- Direction finding results, positioning results can be visually displayed on a digital map



Radio Signal Recording Function

- Ability to record measurement data including IQ, audio and spectrum
- Data can be recorded to internal memory or external SD card

Audio and Spectrum Data Playback

- Ability to play back recorded audio and spectral data
- Audio data playback supports pause, fast forward, backward, etc.
- Spectrum data playback supports multiple playback rates for easy viewing

Remote Control

- Transmission of measurement data via LAN interface
- Measurement data including level data, spectrum data, audio data, IQ data
- IQ data transmission supporting up to 20MHz analysis bandwidth

High-precision Time Synchronization

- Support Beidou/GPS time synchronization function, data timestamp accuracy is better than 100ns, frequency accuracy is better than 0.01ppm
- Can be used to build TDOA positioning systems and multi-device collaborative work systems

New Operating Concept

- 10.1-inch widescreen LCD display with no buttons, full touch design
- Support a variety of common gesture operations, click, move, zoom, etc., convenient for users to operate
- Support multi-window display, display window can be customized, test information display is richer and more comprehensive

Support Multiple Operation Methods

- Supports a variety of usage methods such as hand-held, piggyback, and workbench, making it easy to adapt to various environments.
- Ergonomic grip strap for added comfort
- Separate bracket for more flexible operation and optimized support angle for clearer viewing data
- Carrying the best lightweight experience and excellent mobility, supporting tablet and mobile connected devices, supporting both wired and wireless interconnections

■ Typical Application

■ Radio Spectrum Monitoring

3943B can be applied to the radio regulatory department, using the various scanning methods of the receiver to conveniently carry out the daily supervision business recommended by ITU.

■ Interference Source Lookup

The 3943B panoramic scanning function can quickly detect the interference caused by illegal radio stations, interference sources, sudden transmission, etc., and quickly locate the interference source through horizontal scanning or DF direction finding function.

■ Radio Service Coverage Test

The actual coverage of the radio service is an important part before the service is launched. The 3943B can be used to easily implement the actual road test of the service signal and quickly complete the service coverage.

■ Site/mobile Station and other Site Selection Tests

Before the deployment of mobile stations, reconnaissance positions, etc., the location selection is very important. It is convenient to carry out field test using 3943B, and obtain on-site electromagnetic spectrum data to assist location decision.

■ Computer Security Assessment

Using the computer video leakage information detection and restoration function of 3943B, the information leakage during the process of computer video signal transmission can be detected, and the original display image can be restored to reflect the computer security status intuitively and truthfully.

■ Important Location Stealing Inspection

Whether it is commercial competition or espionage, there is a clear upward trend. Anti-stealing will become more and more important. You can use the 3943B to easily conduct confidential inspections on important places and eliminate wireless stealing equipment.

■ Major Event Radio Security

The 3943B is small in size and light in weight. It is especially suitable for performing radio security tasks in major activities, quickly discovering hidden dangers and ensuring the normal operation of radio frequency equipment.

■ Communication Signal Reconnaissance

As the core receiving device, 3943B can be applied to the field of communication intelligence reconnaissance to realize real-time monitoring of communication signals. Using the control interface of 3943B, the IQ data in the analysis bandwidth can be obtained for the user's required intelligence analysis.

■ Specifications

Specifications (spec): Unless otherwise stated, the calibrated instrument is placed in the operating temperature range of 0 to 50 °C for at least two hours , and after 45 minutes of warm-up, performance is guaranteed; this includes measurement uncertainty.The data in this article are technical indicators unless otherwise stated.

Typical (typ): Indicates typical performance that can be achieved with 80% of the instrument; this data is not guaranteed and does not include uncertainties in the measurement process, only valid at room temperature (about 25 ° C).

Rating (nom): Indicates the expected average performance or design performance characteristics, such as a 50 Ω connector.The measured values are not guaranteed data and are measured at room temperature (approximately 25 °C).

Meas (meas): Indicates the performance characteristics measured during the design phase, such as amplitude drift over time, for comparison with expected performance.This data is not guaranteed and is measured at room temperature (approximately 25 °C).

Model	3943B
Frequency Range	9kHz~8GHz
Maximum linear operating input level	-13dBm, 9kHz~30MHz +3dBm, 20MHz~3.6GHz (low distortion mode) -24dBm, 20MHz~3.6GHz (low noise mode) -24dBm,3.6GHz~8GHz
RF input port voltage standing wave ratio	<2.5, 9kHz~5.8GHz <4.0, 5.8GHz~8GHz
Display average noise level (spectral channel)	≤ -125dBm,9kHz~100kHz ≤ -151dBm,100kHz~1MHz ≤ -155dBm,1MHz~20MHz ≤ -154dBm, 20MHz~80MHz (low noise mode) ≤ -160dBm, 80MHz~1.5GHz (low noise mode) ≤ -155dBm, 1.5GHz~3.6GHz (low noise mode) ≤ -128dBm, 20MHz~3.6GHz (low distortion mode) ≤ -158dBm,3.6GHz~5.8GHz ≤ -154dBm,5.8GHz~7.5GHz ≤ -151dBm,7.5GHz~8GHz
Phase noise	Carrier 21MHz <-115dBc/Hz, 10kHz frequency offset <-117dBc/Hz, 100kHz frequency offset Carrier 500MHz, <-95dBc/Hz, 10kHz frequency offset <-95dBc/Hz, 100kHz frequency offset Carrier 3.4GHz, <-92dBc/Hz, 10kHz frequency offset <-92dBc/Hz, 100kHz frequency offset
AM Demodulation sensitivity	≤ -105.5dBm,9kHz~30MHz ≤ -110dBm,20MHz~1.5GHz ≤ -106dBm,1.5GHz~3.6GHz ≤ -102dBm,3.6GHz~8GHz
FM Demodulation sensitivity	≤ -103dBm,9kHz~30MHz ≤ -111dBm,20MHz~1.5GHz ≤ -107dBm,1.5GHz~3.6GHz ≤ -102dBm,3.6GHz~8GHz
Third-order interception point	> +18dBm,9kHz~30MHz >-10dBm, 20MHz~650MHz (low noise mode) >-11.5dBm, 650MHz~2.5GHz (low noise mode) >-8dBm, 2.5GHz~3.6GHz (low noise mode) > +15dBm, 20MHz~1.5GHz (low distortion mode) > +15dBm, 1.5GHz~3.6GHz (low distortion mode) >-8dBm, 3.6GHz~4.7GHz >-6dBm,4.7GHz~8GHz
Image Rejection ¹	>90dB, 20 MHz to 3.6 GHz (low noise mode) >80dB, 20 MHz to 3.6 GHz (low distortion mode) >70dB, 3.6 GHz to 8 GHz

Model	3943B
Image Rejection ²	>60dB, 20 MHz to 3.6 GHz (low noise mode) >60dB, 20 MHz to 3.6 GHz (low distortion mode) >70dB, 3.6 GHz to 8 GHz
Intermediate frequency suppression	>80dB, 20 MHz to 3.6 GHz (low noise mode) >65dB, 20 MHz to 3.6 GHz (low distortion mode) >90dB, 3.6 GHz to 8 GHz
Local oscillator re-radiation	<-89dBm
Panoramic scan rate	>2GHz/s
Amplitude accuracy	Better than $\pm 1.5\text{dB}$ ($+15^{\circ}\text{C} \sim +35^{\circ}\text{C}$) Better than $\pm 3\text{dB}$ ($0^{\circ}\text{C} \sim +50^{\circ}\text{C}$)
Analysis bandwidth	20MHz
IF spectrum display range	1kHz, 2kHz, 5kHz, 10kHz, 20kHz, 50kHz, 100kHz, 200kHz, 500kHz, 1 MHz, 2MHz, 5MHz, 10MHz, 20MHz
Demodulation bandwidth	100Hz, 150Hz, 300Hz, 600Hz, 1kHz, 1.5kHz, 2.1kHz, 2.4kHz, 2.7kHz, 3.1kHz, 4kHz, 4.8kHz, 6kHz, 9kHz, 12kHz, 15kHz, 30kHz, 50kHz, 120kHz, 150kHz, 250kHz, 300kHz, 500kHz, 800kHz, 1MHz, 1.25MHz, 1.5 MHz, 2MHz, 5MHz, 8MHz, 10MHz, 12.5MHz, 15MHz, 20MHz
Demodulation mode	AM, FM, PM, CW, LSB, USB, ISB, PULSE, IQ
Dimensions	Width \times Height \times Depth = $(289 \pm 1.2)\text{mm} \times (182.5 \pm 1.2)\text{mm} \times (69 \pm 0.8)\text{mm}$ (without hand strap)
Weight	<3.5kg (with battery and hand strap)
Power supply	Battery powered and power adapter powered Power adapter input nominal value: AC 100~240V, 50~60Hz
Power consumption	Less than 30w
Temperature range	Working temperature: $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$ Storage temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
Input connector	N type (female), impedance 50 Ω

Note: 1. Rating refers to the expected performance, or the performance of the product that is useful in the product but not included in the warranty of the product.
2. Typical values refer to other product performance information that is not covered by the product warranty; when the performance exceeds the technical specifications, 80% of the samples exhibits 95% confidence in the temperature range of $20^{\circ}\text{C} \sim 30^{\circ}\text{C}$; typical performance does not include measurement uncertainty.

■ Ordering Information


Model

Part Number	Name	Frequency Range
3943B	Monitoring Receiver	9kHz ~ 8GHz

Standard

No.	Name	Description
1	Power cord assembly	Standard three-core power cord 18v power adapter (3.6A) Rechargeable lithium ion battery
2	User manual	/
3	Program manual	/
4	Certificate	/

Options

Option Number	Name	Features
3943B-001	Panoramic scan option	Panoramic scan function for wide frequency range scanning for fast signal discovery
3943B-002	Horizontal scanning option	Horizontal scanning function, combined with 014 option to measure the radiation source
3943B-003	Field strength measurement option	The field strength of the measured signal is obtained by the preset antenna factor table in the device and displayed directly on the device.
3943B-004	Video restore option	Image restoration of computer HDMI video leak signal
3943B-005	Signal recording and playback options	The measurement data (spectrum, I/Q, audio) can be stored on the SD card or in the internal memory to play back the recorded spectrum and audio data (optional 008 option is required)
3943B-006	Map option	Display the current test position on the map, and combine the 002 option or 016 option to locate the radiation source (optional 008 option is required)
3943B-007	GPS Beidou option	External antenna (BNC), built-in GPS module and software
3943B-008	Micro SD card	Class10, capacity 128G, with 005, 006 options
3943B-009	External attenuator 71512	10dB attenuation, maximum input power 2W
3943B-010	External attenuator 71512A	20dB attenuation, maximum input power 2W
3943B-011	External attenuator 71512B	30dB attenuation, maximum input power 2W
3943B-012	External attenuator 71512C	40dB attenuation, maximum input power 2W
3943B-013	External attenuator 71522D	40dB attenuation, maximum input power 25W
3943B-014	Handheld directional antenna	Includes antenna handle (integrated GPS and electronic compass), four directional antenna modules (9kHz-30MHz, 20MHz-200MHz, 200MHz-500MHz, 500MHz-8GHz) and transport case.
3943B-016	Direction finding option	Upgrade 3943B to a direction finding receiver
3943B-017	Direction finding antenna 1	20MHz-1.3GHz
3943B-018	Direction finding antenna 2	700MHz-6GHz
3943B-020	Metal shell construction product (without display screen)	<p>can be changed into a structure suitable for system rack installation; This option can not be used at the same time because it interferes with the injection molding case of the main engine</p> 



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