Applications:
- High frequency RF Electromagnetic wave field strength and power density measurement
- Low frequency LF Magnetic field measurement (Gauss meter function)
- Low frequency ELF Electric field measurement (E-field meter function)
- Mobile phone base station antenna radiation power density measurement
- Wireless communications, Analog & Digital RF field meter function
- Wireless LAN (Wi-Fi), Bluetooth, Ultra-wide-band detection, installation, optimization
- Spy camera, wireless bug finder
- Cellular/Cordless phone radiation safety level, Electrical Utilities SMART METER radiation level
- AC power line, High voltage tower, power Transformer, motors and small appliance EMF
- Microwave oven leakage detection
- Personal living environment EMF safety evaluation

Usage guide:
1. Put the 9V battery in the ED88. Handle the unit with right hand in vertical direction, and push the power switch button to turn on the power, it will come up with RF meter mode.
2. The RF sensor is located in the left hand side of the ED88; the LF sensor is located in the right hand top side of the ED88. Please do not cover the sensor area with hand or other objects.
3. There are two push button below the power switch: "Mode" button and "Hold" button. "Mode" button is used to switch in between RF mode, two LF modes, and E-field mode. The "Hold" button is used to freeze the data reading of the ED88.
4. RF mode: measured RF field strength/power density is shown on the digital LCD display (with dBm, v/m, or mw/m²). 8 LED lights with Red, Yellow, and Green color on the right hand side of LCD window are used for quick RF signal level indications. 3 Red LEDs are used to indicate the 3 safety ranges. The power level of each LED can be found in the table on the ED88 front panel.
5. LF mode: measured LF magnetic field strength is shown on the digital LCD display (with uT and mGauss). Two LF modes can be selected by "Mode" button: (a) LF30mode (0.1mG-10mG) and (b) LF600 mode (1mG-600mG). 8 color LED lights are also available to show the relative strength of the magnetic field.
6. E-field mode: measured ELF electric field strength is shown on the digital LCD display with V/m.
7. Histogram: previous 30 signal level readings are recorded and shown as moving graph on the LCD display for RF, LF, and E-field modes. It can be used for finding direction of signal source and recording bursts from digital RF signals such as signals from AC smart meter.
8. Hold: HOLD button can be used to halt the data measurement of the ED88, a "HOLD" mark will be shown on the LCD screen to indicate the "Hold" condition. Push the "Hold" button again the ED88 will exit from the "Hold" condition.
9. MAX: MAX measured data value since the last power-on is shown on the LCD display.
10. Average: average signal value is displayed on the LCD with "A" mark. It can be used to estimate the duty cycle of digital RF burst signals.
11. Sound function & LCD backlight: go into the "Hold" mode first, then toggle the "Mode" button in sequence to turn-off the LCD backlight and the Sound signature function, a "S" mark on the LCD indicates the sound mode is on. The LCD backlight is forced off when the Sound is ON to reduce the battery current consumption. (Remember to turn-off the LCD backlight or the sound function when it is not needed). Audio can be used to detect very low level RF signals (down to 0.05uw/m²) especially the modern digital RF burst signals.

The Audio sound will output from bottom hole of the enclosure. (do not plug the bottom hole)
12. SysSetupMenu: can be enabled by push and hold the "HOLD" button then push the "Mode" button to get into the SysSetup menu, use the 1st button to move the cursor in the Menu and use the 2nd button to enable/disable the function. In the SysSetup menu:
(1) EXIT: exit the SysSetup menu, return to normal mode
(2) RF channel select: "mw/m", "v/m", or "dBm"
(3) MAX_CLEAR bit: If the MAX_CLEAR is "ON" the MAX value can be cleared by toggling the "HOLD" button. If it is "OFF" the MAX value can be cleared only by power off the meter.
(4) Alarm function: ON/Off and one of the 8 trigger levels(0, -5, -10, -15, -20, -25, -30, 35dBm) can be selected to trigger the audio Alarm. "Alarm function is used in RF mode only.
(5) RESET: reset to factory default (mw/m, MAX_CLEAR="on", Alarm="off"
(6) Save: push the 2nd button to save the changes of setup to EEPROM memory. Do not power off meter, Wait until save is done! (EXIT without SAVE to EEPROM the changes will still functional, but it will lost if the meter is power off.
13. The LF30 mode: has high sensitivity (0.1mG-10mG), but with lower frequency range (50Hz -1KHz) to reduce the digital noise. (The Histogram and LED segment display can go up to 30mG)
14. The LF600 mode: with sensitivity (1mG-600mG), has higher frequency coverage (50Hz -10KHz).

When measuring the high frequency digital/pulse type of signals,(such as switching power supply) the LF30 mode might have lower reading than the LF600 mode, this is due to the lower frequency coverage range of the LF30 mode.
15. While in LF (magnetic/electric field measurement) or E-field mode, please hold the ED88 steady to get the good stable reading, avoid fast moving of the ED88 to prevent the sudden change of the reading caused by the Earth magnetic field or the induced electric field of nearby objects.
16. AC Smart Meter radiates RF signal in short burst every few minutes, use MAX function and Histogram function of ED88, and wait a few minutes to capture the RF signals from smart meter.

ED88 use 8 high brightness LED to indicate the measured power density with 3 safety indications.

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Most high frequency RF antenna such as Mobile phone base station is vertical polarized (in vertical direction), therefore while in RF mode, the ED88 is normally used in vertical direction. For LF mode, the LF sensor is located in the top right hand of the ED88 and the meter is normally used in horizontal position in LF mode. For E-field mode, the E-field sensor is located in the top middle of the meter, point the sensor to the ELF source. Please rotate the meter to find the maximum reading direction in either case. The maximum reading will also increase as you approach the source. ED88 can be used to find the location of signal source.

Most of modern communication devices (Mobile phone, Wireless LAN, Wi-Fi, etc.) use digital RF burst signals. When measuring this type of signals, several LED lights will blink at the same time. this is normal and it can be used as an indication of burst type of RF signals. For continuous waves (AM/FM) signals, the LED light will be stable. ED88 measures the peak power density of the signal with very fast sampling time. It is more accurate than the needle style readout which only shown the average value of signal power most of the time.

Electromagnetic wave field strength/power density reduces very fast with distance (distance law). For LF mode, the LF sensor is located in the top middle of the meter, point the sensor to the ELF source. For E-field mode, the electric field induced by human body or large objects nearby can affect the measurement results, hold the ED88 by hand on the lower right side of the meter, do not cover the E-field sensor area (top of the meter) by hand or other objects, keep away from large metal door or objects. Point the top of the ED88 to the high voltage AC power line (with ED88 at least 1 meter above the ground) when measuring the VLF/ELF E-field radiation from AC power lines or towers.

### Specification

- **Sensor type:** Electric field sensor and Magnetic field sensor
- **Frequency range & Sensitivity:**
  - RF: 100MHz to 8GHz (-60dBm to +5dBm), (0.5uw/m² to 1.8uw/m²), (14MW/m² to 26.2uW/m²)
  - LF1: 50Hz to 10KHz (0.1uT to 60uT)(1mG to 600mG)
  - LF2: 50Hz to 1KHz (0.01uT to 1uT)(0.1mG to 10mG)
  - ELF: 50Hz to 50KHz (10uT to 1000uT/m)
- **RF Peak power measurement:** 0.5uw/m² to 1.8uw/m²
- **Display type:** digital LCD graphic display
- **Unit of measurements:** dBm, mw/m², v/m, uT, mG
- **LCD back light:** 15 seconds auto-off and manual on/off control
- **Display of data:** LCD 4 and 5 digit, 8 LED color segment, Moving Histogram(1level/time) of previous 30 recorded data, Analog segment bar
- **Data update rate:** Sampling rate: 10000/sec. Display update rate: 2/sec.
- **Error rate:** RF: +/- 3.5dBm, LF: 20%, E-field: 25%
- **Functions:** Hold, Max, Average, Sound signature. Alarm, Audio Sound ON/OFF control, programmable Alarm triggering level
- **Safety standard indication:** 3 safety range indication by 3 Red LED
- **Battery used:** 9V alkaline battery, or 9v Li-ion rechargeable battery (not included)
- **Battery life:** >20 hours

### Table: International Guidelines

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference</th>
<th>RF Peak Power</th>
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</thead>
<tbody>
<tr>
<td>International</td>
<td>Council Recommendation 1999</td>
<td>42 V/m (4.75W/m²)</td>
</tr>
<tr>
<td>International</td>
<td>ICNIRP Guidelines, April 1998</td>
<td>42 V/m (4.75W/m²)</td>
</tr>
<tr>
<td>Austria</td>
<td>ÖNORM S1120</td>
<td>49 V/m (6.33W/m²)</td>
</tr>
<tr>
<td>Belgium</td>
<td>Belgisch Staatsblad F.2001-1365</td>
<td>21 V/m (1.16W/m²)</td>
</tr>
<tr>
<td>Germany</td>
<td>26. Deutsche Verordnung</td>
<td>42 V/m (4.75W/m²)</td>
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<tr>
<td>Italy</td>
<td>Decreto n. 381, 1998</td>
<td>6 V/m (0.1W/m²)</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Health Council</td>
<td>51 V/m (6.92W/m²)</td>
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<tr>
<td>Switzerland</td>
<td>Verordnung 1999</td>
<td>4 V/m (0.04W/m²)</td>
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<tr>
<td>United States</td>
<td>IEEE C95.1</td>
<td>49 V/m (6.33W/m²)</td>
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<tr>
<td>China</td>
<td>Draft National Quality Technology Monitoring Bureau</td>
<td>49 V/m (6.33W/m²)</td>
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<tr>
<td>Japan</td>
<td>Radio-Radiation Protection Guidelines, 1990</td>
<td>49 V/m (6.33W/m²)</td>
</tr>
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1W/m² = 1000mW/m², 1mW/m² = 1000uW/m² = 0.1uW/cm²
1uW/m² = 0.001mW/m², 1uT = 10mG