CORNET Microsystem ED-85EXS Quick user’s manual

CORNET ED-85EX Electromag meter is designed for quick measurement of high frequency (RF) Electromagnetic wave field strength and power level for living environment, excellent for individual or company with Electromagnetic wave safety concerns. It has broad bandwidth (1MHz to 8GHz), high sensitivity (-55dBm to 0dBm) and fast response time. The ED85EX has the external SMA connector to connect to the external RF signal source to be measured, or with coxial cable or to the External Antenna, filters, and attenuators.

Applications:
- High frequency (RF) Electromagnetic wave field strength and RF power measurement
- Mobile phone base station antenna radiation power density measurement
- Wireless communication applications (AM/FM, TDMA, GSM, DECT, CDMA)
- RF power level measurement for transmitters
- Wireless LAN (Wi-Fi, 2.4GHz/ 5.8GHz), Bluetooth, Ultra-wide-band detection, installation
- Spy camera, wireless bug finder, Electrical Smart meters
- Cellular/Cordless phone radiation safety level
- Microwave oven leakage detection
- Personal living environment EMF safety

Features:
- Broad Frequency range: 1MHz to 8GHz (SMA connector RF input)
- High Dynamic range: 60 dB
- High sensitivity: -55dBm to 0dBm (0.025V/m to 14.8V/m)
- Peak power density measurement: 1.5uw/m² to 0.58uw/m² (*with external antenna)
- External 50 ohms SMA connector for external antenna, attenuator, and filter connection
- LCD digital power level and power density level display with auto scale
- Moving graphic Histogram, and Bar signal level display (5dBm/segment)
- 8 high brightness color LED to display power density level with 3 safety range indications
- Continues wave (AM/FM) and high speed digital burst RF (GSM, TDMA, PCS, CDMA, Wi-Fi)
- Super fast response time with easy reading color LED segment display (5dBm/segment)
- LCD backlight (15 seconds auto-off). LCD back light on/off control, Sound Signature function
- Hold mode, Correction Factor for calibration, Maximum level, and Low battery indication
- Small, compact handheld design 13cmx6.5cmx3cm
- Battery operated (9V DC ) "9V alkaline battery recommended, not included in the package"

Usage guide

(1) Put the 9V battery in the ED85EX, push the power switch button to turn on the ED85EX.
(2) The RF connector (SMA) is located on the top of ED85EX, connect the ED85EX to the RF source to be measured with 50ohms RF cable or External sensing Antenna. The Input impedance of ED85EX is 50 ohms.
(3) Measured RF signal level/power density is shown on the digital LCD display (with dBm, mw/m² and V/m). There are two LCD display modes: Power meter mode and Field strength mode. The 1st push button is used to change the LCD display modes:
   (a) Power meter display mode—see Fig.1, the signal level is displayed in dBm with big characters and the mw/m² in small characters.
   (b) Field strength meter display mode—see Figure, the signal level is displayed in mW/m² or V/m with big characters and the Max signal level is displayed in small characters.
   The 2nd push button is used to get into and exit the HOLD-mode of the ED85EX LCD display
(4) 8 color LED lights. With 3Red, 3Yellow, and 2Green color on the right hand side of LCD window is used for quick RF signal level indications. 3 Red LEDs are used to indicate the 3 safety range. The power level of each LED can be found in the table label on the ED85 front panel. (5 dBm LED segment)
(5) Histogram of previous 30 signal level readings are recorded and shown as moving graph
(6) LCD Bar (5dBm/segment) display can be used for relative signal strength indications.
(7) LCD control (FB_RST/Save/Setup)—to turn on/off the LCD backlight and Sound function on/off (in sequence of LCD-on, LCD-off, Sound-on, Sound-off) Get out of the HOLD mode by pushing the 2nd button after the LCD back light/Sound function is set up.
(8) Max signal level display —— In Field strength mode, the Maximum signal level (since the meter power-on) is displayed below the mw/m² display line, the Max signal level is excellent for recording the Max. Signal level while measuring the field strength around with the meter. Getting in/out of the HOLD-mode will not clear the Max value, the Max level recording is continued after getting out of the HOLD-mode. Power off the meter and power on again to clear the Max signal level.

(9) Correction factor (CF) for signal level displayed —— the signal level displayed on the LCD display can be adjusted by using the Correction factor(CF), (* from +1 ~+20 dB, to -1~20 dB). To setup the Correction factor, hold the 2nd push button down, turn on the power switch to get into Calibr-menu: use the 1st push button to move the cursor in the menu, Push the 2nd push button to increase or decrease the CF value. Use the CF-CLR to clear the CF value. The CF value is useful for correcting the offset of the signal level received by the ED85EX such as: external antenna gain correction, external attenuator used, or meter calibration adjustments. If the CF value is not zero, the CF value will be displayed on the top of LCD display with C+xx, or C-xx (xx is the CF value) when in the Hold mode, to remind you the CF is on. 11 different CF value can be setup and stored, use FB/RST to store/system the CF value, the RFxx mark displayed on the LCD display indicates the current CF location (CF value is used). Use FB/RST to reset the CF to 0 if it is not used (or just select the FB where the CF is 0). The FBs can be used to store different CF values for different frequency band for fine adjustment of the signal level displayed if the signal frequency is known. (move cursor with 1st button to SAVE in the menu and use 2nd button to save the new value of the CF or FB.)

*NOTE: The Correction factor will not increase the dynamic range of the ED85EX. It only increase or decrease the offset of the signal level displayed by fixed amount. Please do not touch the factory setup if you get into the Factory-Setup menu by accident. Just turn-off the power of the meter to exit the "Factory Setup" mode. (use the RESET to reset it to the factory default value if you mess up the calibration accidently.)

(10) Most high frequency RF antenna such as Mobile phone base station is vertical polarized (in vertical direction), therefore if ED85EX is connected to External sensing Antenna, the Antenna normally is in vertical direction. Please also rotate the Antenna to find the maximum power reading directions to take care of the high frequency RF wave reflections in real world environments.

(11) Modern communication devices (Mobile phone, Wireless LAN, Wi-Fi, etc.) use digital communication technology with burst digital RF signals. When measuring the digital RF signals, several LED lights may blinking at the same time. This is normal and can be used as an indication of burst type of digital RF signals. For continues waves (AM/FM) signals, the LED light will stable. ED85EX measures peak power level of signal with very quick response time. It measures the input signal several thousand times for each update of the LCD readout. It is more accurate than the needle style of readout which only shown the average value of signal power most of the time.

(12) ED85EX is a broadband High frequency RF signal power level measuring device. It is used for applications such as Mobile phone base station antenna radiation, Microwave oven, Cellular/cordless phone, Radio transmitters, and WiFi wireless LAN installation ad.

It is not for low frequency magnetic field measurement (AC power transformer, high voltage power transmission line, motor...etc) which should be measured with Gauss-meters such as CORNET ED25G or ED75G RF/LF dual mode meter.
LED table and Field strength/power density readout:

<table>
<thead>
<tr>
<th>LED color</th>
<th>Power level</th>
<th>Power density (dBm)</th>
<th>Display LED color</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red3</td>
<td>-5 dBm up</td>
<td>0.18 W/m²</td>
<td>Safety range #3</td>
<td>Caution!</td>
</tr>
<tr>
<td>Red2</td>
<td>-10 dBm</td>
<td>0.058 W/m²</td>
<td>Safety range #2</td>
<td>Caution!</td>
</tr>
<tr>
<td>Red1</td>
<td>-15 dBm</td>
<td>0.018 W/m²</td>
<td>Safety range #1</td>
<td>Caution!</td>
</tr>
<tr>
<td>Yellow3</td>
<td>-20 dBm</td>
<td>0.0058 W/m²</td>
<td>Safe</td>
<td></td>
</tr>
<tr>
<td>Yellow2</td>
<td>-25 dBm</td>
<td>1.8 mw/m²</td>
<td>Safe</td>
<td></td>
</tr>
<tr>
<td>Yellow1</td>
<td>-30 dBm</td>
<td>0.58 mw/m²</td>
<td>Safe</td>
<td></td>
</tr>
<tr>
<td>Green3</td>
<td>-35 dBm</td>
<td>0.18 mw/m²</td>
<td>Wireless LAN, WiFi typically in this range</td>
<td>Safe</td>
</tr>
<tr>
<td>Green2</td>
<td>-40 dBm</td>
<td>0.06 mw/m²</td>
<td>Some signal source around</td>
<td>Safe</td>
</tr>
</tbody>
</table>

**NOTE:**
* Electromagnetic wave field strength/power density reduces very fast with distance (distance square). Keep a good distance from the high frequency RF signal source can reduce the high frequency radiation effect. Alumina foil or window sun reflector film (silver color) can be used as a effective and cheap shielding material for most of RF radiations.
* ED85EX does not have build-in internal Antenna. Please use external Antenna with SMA connector or adaptors to connect to ED85EX for measuring the RF field strength. Use external antenna with right frequency coverage for the RF signal to be measured. The included whip antenna is centered at 2.4GHz, it can be used for general use (10MHz-6GHz) Broadband antenna such as LPDA1810 Log Periodic Antenna (1.8GHz-10GHz) or UWB Antenna can be used for more broad frequency coverage. (see the whip antenna and ED85EX frequency response chart in front page for reference)
* ED85EX is designed for quick living environment RF radiation evaluation and refer to Radiation Protection Guidelines, ICNIRP published similar guidelines in April 1998. ICNIRP published similar guidelines in April 1998. ICNIRP published similar guidelines in April 1998. ICNIRP published similar guidelines in April 1998.
* ED85EX is not a medical instrument. Please do not use it in medical, legal certification or other related applications. This product is not for commercial rental or option.

The European Community provided general guidelines in its Council Recommendation of July 1999. ICNIRP published similar guidelines in April 1998. Table I gives a sampling of the international and national field strength/power density values for the general public and continuous exposure (reference only).

<table>
<thead>
<tr>
<th>Country</th>
<th>Standard/Recommendation</th>
<th>950 MHz</th>
<th>1850 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Council Recommendation 1999/519/EC</td>
<td>42 V/m (4.79W/m²)</td>
<td>59 V/m (0.29W/m²)</td>
</tr>
<tr>
<td>International</td>
<td>ICNIRP Guidelines, April 1998</td>
<td>42 V/m (4.79W/m²)</td>
<td>59 V/m (0.29W/m²)</td>
</tr>
<tr>
<td>Austria</td>
<td>ÖNORM S1120</td>
<td>48 V/m</td>
<td>61 V/m</td>
</tr>
<tr>
<td>Belgium</td>
<td>Belgisch Staatsblad F. 2001-1365</td>
<td>21 V/m (1.18W/m²)</td>
<td>30 V/m (2.31W/m²)</td>
</tr>
<tr>
<td>Germany</td>
<td>26. Deutsche Verordnung</td>
<td>42 V/m</td>
<td>59 V/m</td>
</tr>
<tr>
<td>Italy</td>
<td>Decreto n. 381, 1998</td>
<td>6 V/m (0.1W/m²)</td>
<td>6 V/m (0.1W/m²)</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Health Council</td>
<td>51 V/m (6.52W/m²)</td>
<td>83 V/m (18W/m²)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Verordnung 1999</td>
<td>4 V/m (0.64W/m²)</td>
<td>6 V/m (0.1W/m²)</td>
</tr>
<tr>
<td>United States</td>
<td>IEEE C95.1</td>
<td>49 V/m</td>
<td>58 V/m</td>
</tr>
<tr>
<td>China</td>
<td>Draft National Quality Technology Monitoring Bureau</td>
<td>49 V/m (6.33W/m²)</td>
<td>81 V/m (10W/m²)</td>
</tr>
<tr>
<td>Japan</td>
<td>Radio-Radiation Protection Guidelines, 1990</td>
<td>49 V/m (6.33W/m²)</td>
<td>61 V/m (10W/m²)</td>
</tr>
</tbody>
</table>

**SPECIFICATION:**
- Sensor type: Electric field sensor with SMA connector
- Frequency range: 1MHz to 8GHz (meter itself, SMA connector RF input), usable up to 10GHz
- Sensitivity: * In field strength mode: depend on external antenna used:
  - -55dBm to 0dBm (calibrated), down to -65dBm (uncalibrated)
  - 60 dB
- Dynamic range: 50 Ohms
- Input Impedance: 50 Ohms
- Connector type: SMA female
- Peak power measurement: 1.5uW to 0.58 W/m² (*with external antenna for RF field strength*)
  - 0.025V/m 0.014 V/m (*with external antenna for RF field strength*)
- Display type: Digital LCD display, LED color segment display
- Unit of measurements: dBm, uW/m² , mW/m², V/m (auto scale)
- Display error rate: ±1.5dBm (SMA connector input)
- LCD backlight: 12-15 seconds auto-off or manual on/off control
- Display of data: LCD 3 and 5 digit, 8 LED color segment, Histogram of 30 reading, LCD Bar segment (5 dBm/segment)
- Maximum level display: HOLD function
- Safety standard indication: Power level mode and Field Strength mode display
- Sound: Audio Sound Signature function for signal indication
- Battery used: 9V alkaline battery, (not included)
- Battery life: >20 hours
- Internal Antenna: None
- External whip antenna included: or optional Log periodic antenna

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1400 Coleman Ave #C28, Santa Clara, CA 95050 USA. Tel:+1(408)9690205 www.cornetmicro.com
ED85EXS rev. 07/11/2012