Telemeter Electronic

# LUMILOOP

LASER-POWERED SENSOR SYSTEMS


Datasheet

# LSProbe 1.2

## Electric-Field Probe
## (10Hz) 10kHz – 8.2(12)GHz

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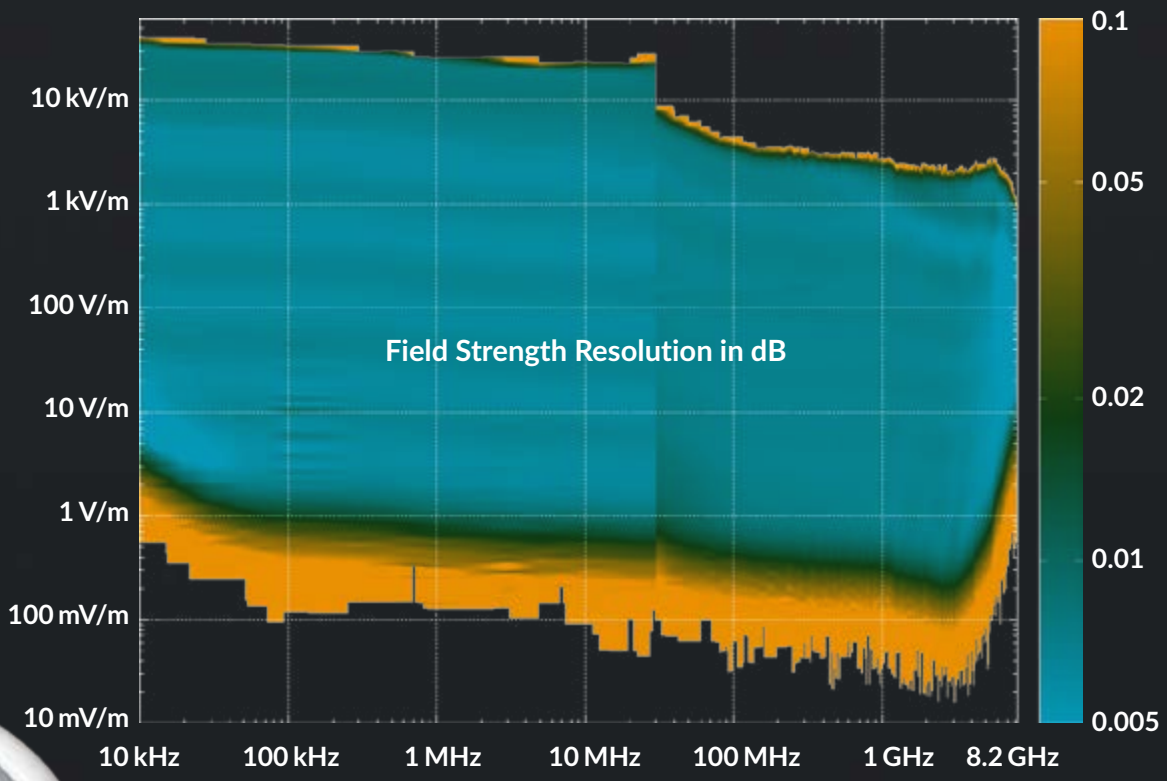
The LSProbe 1.2 Field Probe is a high speed, high accuracy and high dynamic range electric-field probe. Its standard frequency range of 10 kHz – 8.2 GHz can be extended to 10 Hz – 12 GHz. Best-in-class compensation of linearity, frequency and temperature guarantees accurate measurements from less than 0.1 to at least 1,000 V/m. A dynamic range of 100 dB is achieved for many frequencies, enabling field measurements at more than 10,000 V/m. Customized high field-strength "X"-variants, supporting up to 30,000 V/m and a damage level of 100,000 V/m, are available upon request. Please contact LUMILOOP support for detailed information.




A single axis, continuously sampling mode, operating at 2 MS/s, can be used for Equivalent Isotropically Radiated Power (EIRP) measurements of IoT products without antenna connectors in accordance with EN 300 328 and EN 301 893.

Laser-powered operation eliminates battery recharging and replacement. Extensive in-house calibration data are provided with each field probe and is handled automatically by the LSProbe Software (TCP Server and GUI). Third-party EMC-software support for R&S EMC32, R&S ELEKTRA, Emcware, BAT-EMC, Tepto, Tile, Win6000, Compliance5 and Radimation.

**LSProbe 1.2 Variants**

| Variant | Low Band Frequency Ranges | | High Band Frequency Ranges | |
|---|---|---|---|---|
| | 10 Hz - 10 kHz | 10 kHz - 200 MHz | 30 MHz - 8.2 GHz | 8.2 GHz - 12 GHz |
| A ... D | Legacy variants incl. LO, HI, HI+LO with in-house calibration up to 6 GHz. | | | |
| E | – | ✓ | ✓ | – |
| F | ✓ | ✓ | ✓ | – |
| G | – | ✓ | 15 kV/m ✓ | – |
| X | ✓ | ✓ | ✓ | ✓ |
| | Customized for high frequency and electric-field strengths, e.g., 30 kV/m. | | | |

## LSProbe 1.2 Field Sensor

| | |
|---|---|
| Supported Frequency Ranges | Variant |
| 10 kHz ... 8.2 GHz | E, F, G* |
| 10 Hz ... 10 kHz | F |
| 8.2 GHz ... 12 GHz | X |
| Detectors | |
| Low Band | (10 Hz) 10 kHz ... 200 MHz |
| High Band | 30 MHz ... 8.2 GHz (12 GHz) |
| Field Strength Range, Dynamic Range | |
| 10 Hz ... 30 MHz (F) | <3 V/m ... >10 kV/m, >70 dB |
| 10 kHz ... 30 MHz (E, G) | <1 V/m ... >10 kV/m, >80 dB |
| 30 MHz ... 6 GHz (E, F) | <0.1 V/m ... >1 kV/m, >80 dB |
| 6 GHz ... 8.2 GHz (E, F) | <1 V/m ... >1 kV/m, >60 dB |
| 8.2 GHz ... 12 GHz (X) | <100 V/m ... >1 kV/m, >20 dB |
| Damage Level | >25 kV/m |
| Sampling Rate, Minimum Pulse Width | |
| Burst Mode | 2 MSamples/s, 500 ns |
| Continuous Mode | 500 kSamples/s, 2 µs |
| Single Axis Continuous Mode | 2 MSamples/s, 500 ns |
| Analog Rise Time | |
| Low Band, low bandwidth | 1.9 ms |
| Low Band, high bandwidth | 770 ns |
| High Band | 330 ns |
| Resolution | <0.01 dB |
| Typical Worst-Case Isotropy Error | |
| @ 1 GHz | ±1.0 dB |
| @ 3 GHz | ±1.7 dB |
| @ 6 GHz | Please see Application Note 8. |
| Amplitude Accuracy | Accredited Cal. at PTB, Germany |
| 10 kHz ... 30 MHz | ±0.6 dB |
| 30 MHz ... 1 GHz | ±1.0 dB |
| 1 GHz ... 8.2 GHz | ±1.4 dB |
| Linearity Error | ±0.2 dB relating to 10 V/m |
| Temperature Stability | ±0.1 dB |
| Fiber Optic Connectors | ST/FC |
| Standard Fiber Optic Cables | 5 m permanently attached, 15 m ST/FC extension, two E2000 Sacrificial Cable Kits |
| Max. Fiber Optic Cable Length | 1,000 m |
| Fiber Optic Cable Bending Radius | >30 mm |
| Ambient Temperature | 10 °C ... 40 °C |
| Dimensions (W × D × H) | 46 × 46 × 114 mm³ |

*) Variant G, reduced sensitivity to support 15 kV/m

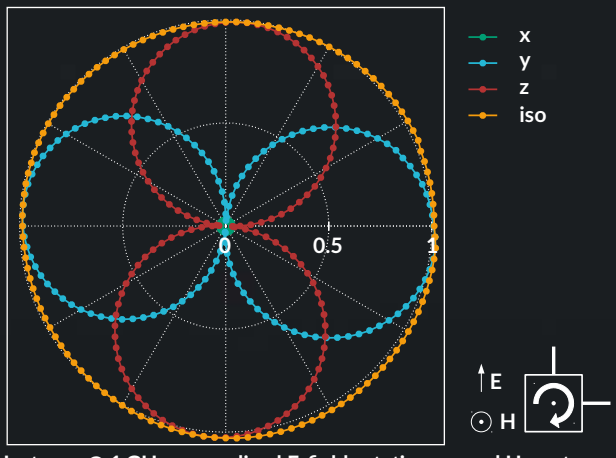
## LSProbe 1.2 Computer Interface

| | |
|---|---|
| PC Interface | USB 2.0 |
| Application Software | LSProbe 1.2 TCP Server, LSProbe 1.2 GUI |
| Trigger Voltage | 5 V |
| Trigger Connector | BNC |
| Laser Wavelength | 830 nm |
| Laser, Max. Output Power | 1,000 mW |
| Laser Class | 1M |
| Laser Shutdown Time | 1 ms |
| Fiber Optic Connectors | ST/FC |
| Number of Fiber Optic Couplers | >6 |
| Input Voltage | 5 V ±5 % |
| Input Current | <3 A |
| Ambient Temperature | 10 °C ... 40 °C |
| Dimensions (W × D × H) | 135 × 120 × 38 mm³ |
| Certifications | CE, IEC 60825-1:2014 |

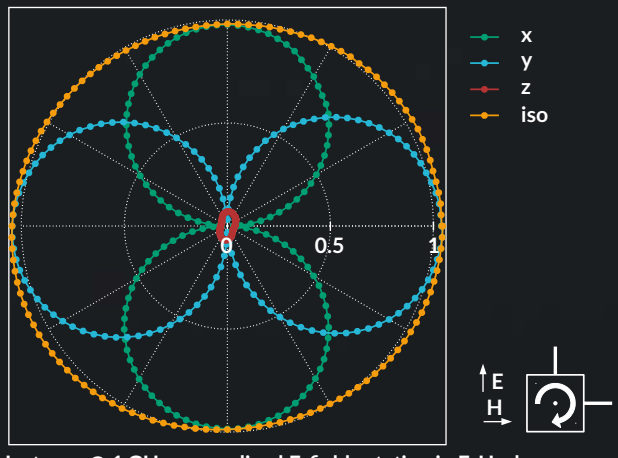

Computer Interface Rear Side View

## Selected International Standards

| | |
|---|---|
| ISO | 11451-2, WD 11451-5, 11452-2, 11452-11 |
| IEC | 61000-4-3, 61000-4-21 |
| EN | 300 328, 301 893 |
| Other | RTCA/DO-160 |




Isotropy @ 1 GHz, normalized E-field rotating around H-vector




Isotropy @ 1 GHz, normalized E-field rotating in E-H-plane

## LSProbe 1.2 Documentation and Application Notes (AN)

- LSProbe 1.2 User's Manual
- AN 1: Measuring Radio Jammers
- AN 2: Measuring Pulsed Fields
- AN 3: Multi-Probe EUT-Monitoring using EMC32
- AN 4: Reliable Operation of LSProbe 1.2 Electric-Field Probes
- AN 5: Third Party EMC-Software Integration of LSProbe 1.2 Electric-Field Probes
- AN 6: Calibration of LSProbe 1.2 Electric-Field Probes
- AN 7: LSProbe 1.2 Variants

## LSProbe 1.2 Accessories

### E2000 Sacrificial Cable Kit

- prevents contamination of connectors
- quick and simple replacement in case of connector burn-in
- includes two 0.5 m E2000 to ST/FC cables
- includes E2000 and ST/FC couplers

### Optic Fiber Cable Extension

- 5/10/15/20 m duplex fiber optic cable with ST/FC connectors
- includes ST/FC coupler
- arbitrary length of cable available on request

### Tabletop Probe Stand Base

- quick positioning for table and ground-plane setups
- horizontal probe position 100 mm relative to all edges
- relative permittivity better than 2.7 @ 1 kHz

### Tabletop Probe Stand Mounting Pole

- to position the field sensors center at 100 mm, 125 mm, 150 mm, 200 mm or 300 mm above surface
- well-defined field probe alignment with quick mount/release
- relative permittivity better than 2.7 @ 1 kHz

### Flexible Probe Stand

- flexible tripod feet for versatile positioning
- vertical position approximately 150 to 250 mm above surface
- strong magnetic feet with rubber coating
- no metal parts
- quick mount/release

### Fiber Connector Cleaning Kit

- optical fiber microscope
- lint-free cassette cleaner wipes
- an unfilled isopropyl alcohol (IPA) pipette/bottle
- spare FC/ST dust caps and two E2000 locking caps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