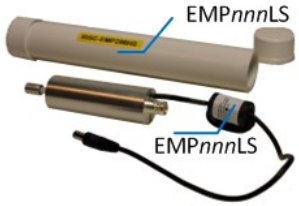
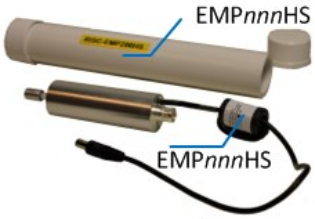
EM Probe

Quick Start Guide

What is in the box

The box contains the EM Probe and all accessories to connect it to an oscilloscope.

Box content checklist

Qty [1]	Description		Identifier [2]
1	Probe: - EM Probe LS (low sensivity) (*nnn* = serial number)		EMP*nnn*LS
1	Probe: - EM Probe HS (high sensivity) (*nnn* = serial number)		EMP*nnn*HS
1	Power Supply Unit, 5 V DC input 100 V to 240 V AC, 50 – 60 Hz, customized with female plug		PSU
-	Power cable (included with PSU)	 Country specific	
2	Signal cable: BNC - BNC, 50 Ω, coax		BNC2BNC

Qty [1]	Description		Identifier [2]
-	This “EM Probe - Quick Start Guide”		

[1] The amount or number of registered items (quantity, Qty)

[2] Identifier used in this document to refer to the item.

Manufactured by

Riscure BV

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What does it do

The EM Probe is a very sensitive probe used in Side Channel Analysis (SCA). It is used to pick up electromagnetic emissions from semiconductor circuits.

The probe has a tip with a directed coil and an adjustable shield. The probe can pick up EM fields with frequencies up to 1 GHz and converts these into an AC signal.

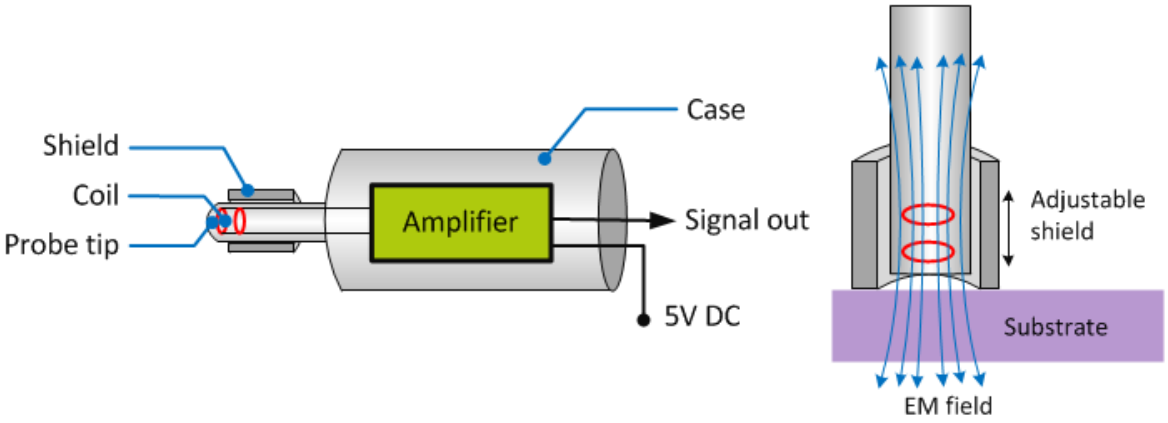


Figure 1 EM Probe construction details.

By moving it over the surface of a target, the probe is used to find highly active circuits ('hotspots'). The signals picked up on such a hotspot are the measurements for Simple or Differential ElectroMagnetic Analysis (SEMA/DEMA).

The EM Probe is provided in two models: low sensitivity (LS) and high sensitivity (HS). They are mechanically identical but differ in amplification factor.

The EM Probe is normally used in combination with an XYZ-motion platform, for example the Riscure Probe Station

Using the probe

Connecting the probe

Connect the EM Probe with cable BNC2BNC to a measurement channel with 50 Ω impedance (or through a 50 Ω impedance adapter [not supplied]).

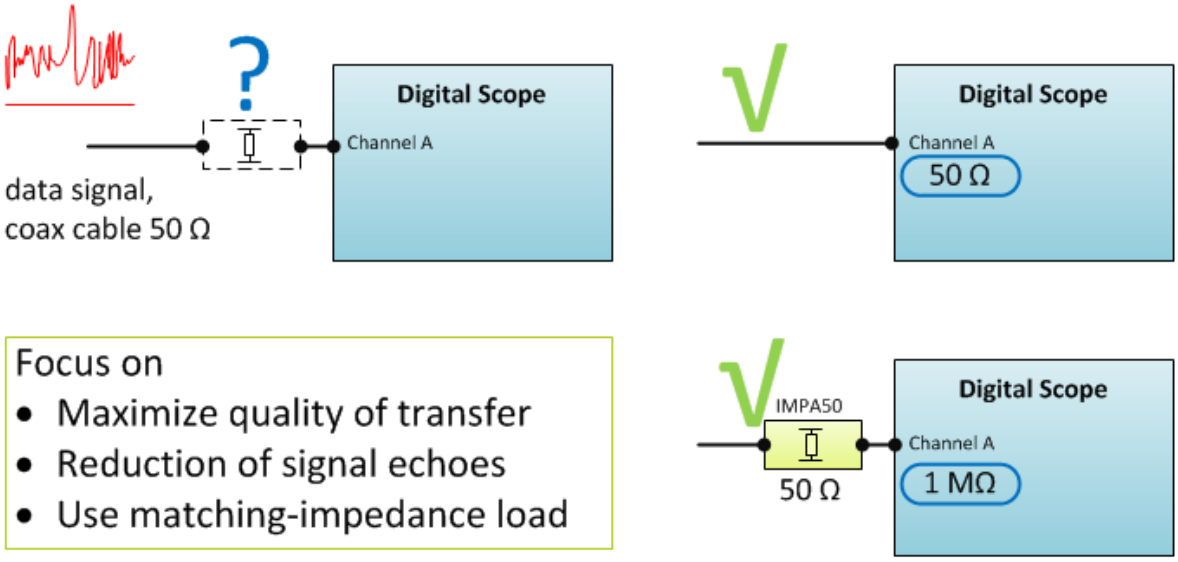


Figure 2 Reading the EM Probe signal with a matching impedance.

Moving the probe

Do not apply any pushing force on the probe tip**.**
Pay attention when lowering the probe under control of a XYZ-platform.

Do not apply any sideways force on the probe tip.
Pay attention when moving the probe through a hole (as in the PowerTracer and the VC Glitcher products) by control of a XYZ-platform.

Do not drag the probe tip over the target.
Pay attention if the target surface is not parallel to the XY-motion plane of the probe tip.

Use the Inspector XYZ-plane calibration function where applicable to accommodate a slanted target surface.

Storing the probe

To protect the EM Probe when not in use, it comes with a storage tube. This tube has a fixed cap and an easily removable cap.

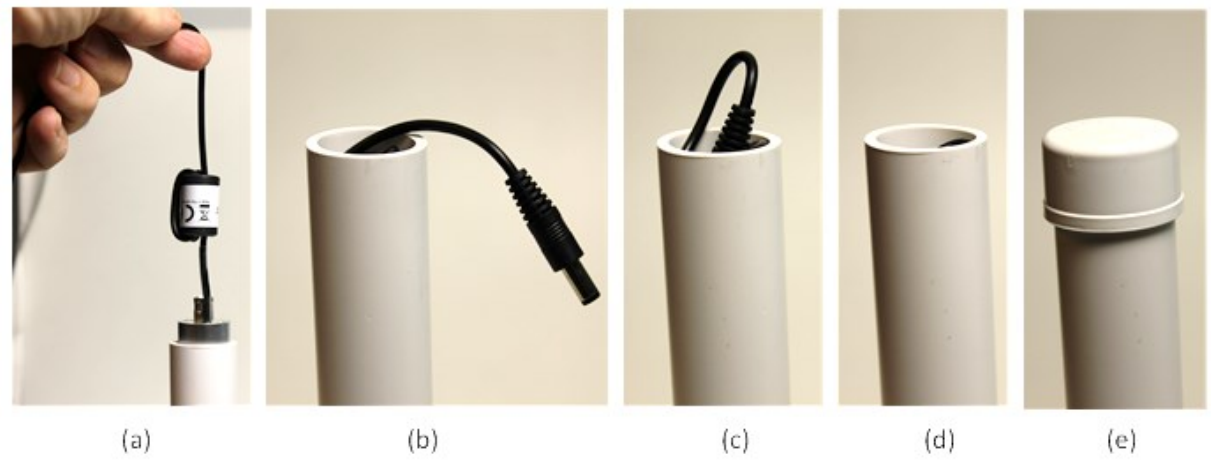


Figure 3 Putting the EM Probe in the tube.

To store the EM Probe in the tube:

- Remove the cap to open the tube.
- Gently lower the probe by the wire into the tube (a).
- Neatly wind the power cable into the tube (b).
- Put the connector into the tube (c).
- Ensure the cable completely fit within the tube (d).
- Place the cap to close the tube.

> At the fixed cap end, the tube is fitted with a protective, soft foam cylinder which encloses the probe's delicate tip.

Help and troubleshooting

Common problems

Bend or broken probe tip.	**CAUSE**: Probe damaged by unsupervised use. **SOLUTION**: Get in contact with Riscure through the Riscure Support Portal.
Measuring 0 V values.	**CAUSE**: Probe is not powered. **SOLUTION**: Connect the probe's power jack to the PSU. Connect the PSU to mains power.
Measuring noise only (up to 50 µV).	**CAUSE**: Probe is too far from target. **SOLUTION**: Place EM probe closer to target.
	CAUSE 2: Target emits a too weak EM signal. **SOLUTION 2**: Use the high sensivity (HS) probe.
Measured samples show step-wise signal levels.	**CAUSE**: Low resolution of digitization. **SOLUTION**: Set the voltage range of the scope to a lower, more sensitive, value.
Compressed signal is 0 V.	**CAUSE**: The EM Probe returns an AC signal which averages to a zero signal. **SOLUTION**: In Inspector, apply the magnitude (or rectification) operator before compressing measurements.

Still have questions?

1. The Inspector Help menu, has detailed information on the EM Probe.
2. Visit the Riscure Support Portal: http://support.riscure.com.

Technical specifications

Operating conditions

- Room temperature 20 – 30 °C, (68 – 86 °F), preferred.
- Use the storage tube to safeguard the probe when not in use.
- The probe case is grounded.

It is safe to operate a powered EM Probe with bare hands.

Power supply input

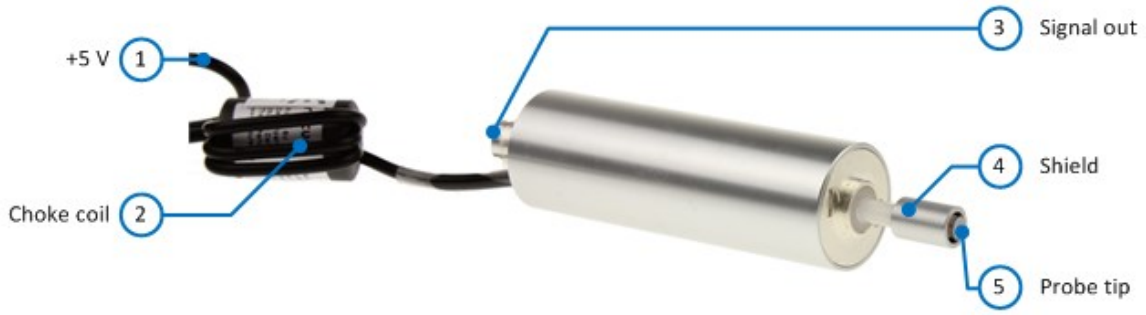
- 5 V DC, nominal load 50 mA
- Center-positive plug, inner-Ø 2.5 mm, outer-Ø 5.5 mm
- Requires a PSU with female plug (non-standard).

Use of a PSU other than supplied by Riscure is not supported.
Power spikes may cause internal damage and loss of accuracy.

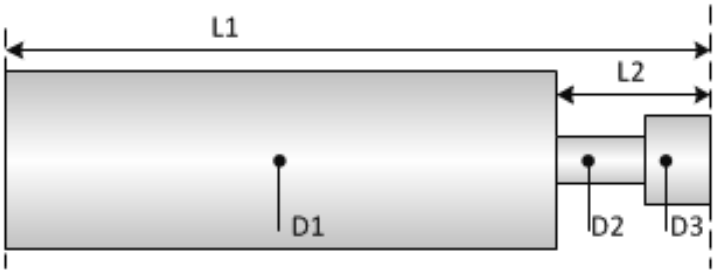
Probe characteristics

- 3 stage amplification providing high sensitivity
- Sensitivity of LS probe: 20 mV/1 µT@1 MHz
- Sensitivity of HS probe: 100 mV/1 µT@1 MHz
- Tip diameter ø 4 mm
- High spatial resolution. Coil inner area 1 mm^2 and outer area 2 mm^2
- Operating distance of probe tip to target: ≤ 2 mm
- Output signal: -1.0 V to +1.0 V
- Weight: 65 g

Product case



Element	Function	Description
1	**Power supply-**	5 V DC
2	**Choke coil**	Reduction of electromagnetic noise in the power cable
3	**Signal out**	BNC, Analog output -1 V .. +1 V
4	**Shield**	Adjustable electromagnetic shield
5	**Probe tip**	Multi-winding coil

Dimensions	Value
	Length: L1 = 95.0 mm L2 = 25.0 mm Diameter ø : D1 = 25 mm D2 = 4 mm D3 = 8 mm