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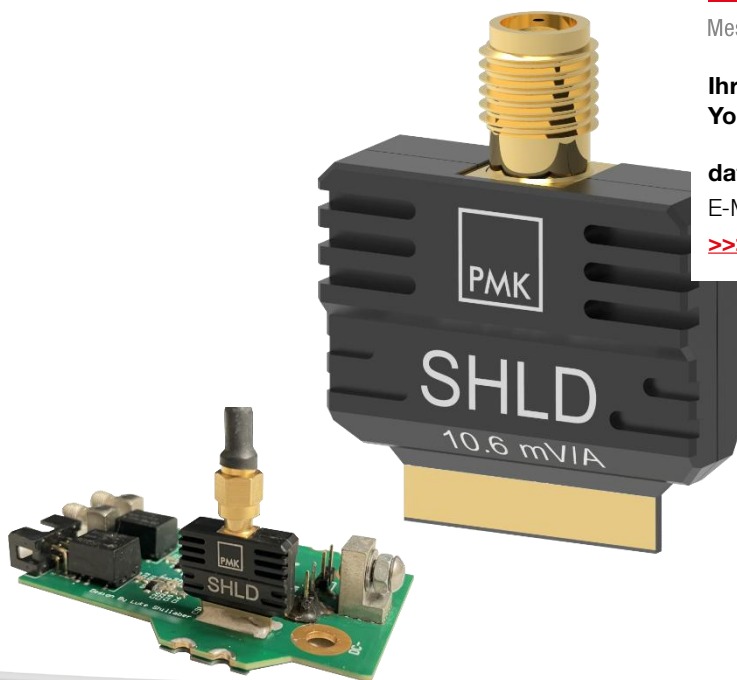
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## Ultra-Fast Current Shunt Series UFCS

**>1 GHz Bandwidth, <200 pH Insertion Inductance**  
**Various sizes available: 1 m $\Omega$  – 52 m $\Omega$**

PRELIMINARY Datasheet



## The Ultra-Fast Current Shunt series UFCS

The Ultra-Fast Current Shunts (UFCS) represent a paradigm shift in the realm of current measurement technology, setting new standards in terms of technological sophistication. >1GHz bandwidth and ultra-low insertion inductance of <200pH enable the precise analysis of fast rise time signals with exceptional signal fidelity, making PMK's shunts with non-inductive frequency response ideal for challenging measurements like WBG (wide-bandgap) switching loss or pulse current analysis.

The UFCS models' compact form factor and high current carrying capacity ensure consistent and reliable performance. Whether measuring GaN switching losses or analyzing high-frequency transients, the solder-in shunts always guarantee highest accuracy.

The UFCS are a result of technological advancement that has not been surpassed in the field of current measurement in modern power electronics. For measurements with highest CMRR requirements the UFCS can be connected to optically isolated voltage probes, like PMK's FireFly®. For general purpose measurements the UFCS can also be connected directly to an 50  $\Omega$  input measuring instrument.

The first model releases of the UFCS shunt series are the 11 m $\Omega$ , 24 m $\Omega$  and 52 m $\Omega$  versions.

### Specifications

Read the Instruction Manual before first use and keep it for future reference. A digital copy of the latest Instruction Manual revision can be downloaded at [www.pmk.de](http://www.pmk.de).

### Electrical Specifications

Allow the shunt to warm up for 20 minutes. This shunt comes with 1 year warranty. Each specification is determined at +23°C ambient temperature. Do not exceed the specifications.

PMK's UFCS ultra-fast current shunts are for use in a controlled environment in accordance with IEC 61010-1 only. The shunts are not for hand-held use. This product is not rated for CAT II, III or IV. Do not exceed the specifications<sup>1</sup>.

| Order number | Shunt Resistance | Gain      | Bandwidth (3dB) | Typical Insertion Inductance <sup>3</sup> |
|--------------|------------------|-----------|-----------------|-------------------------------------------|
| UFCS-R001    | 1 m $\Omega$     | TBD       | >600 MHz        | < 200pH                                   |
| UFCS-R005    | 5 m $\Omega$     | TBD       | >800 MHz        | < 200pH                                   |
| UFCS-R011    | 11 m $\Omega$    | 10.6 mV/A | >1 GHz          | 110 pH                                    |
| UFCS-R024    | 24 m $\Omega$    | 23.6 mV/A | >1 GHz          | 140 pH                                    |
| UFCS-R052    | 52 m $\Omega$    | 51.1 mV/A | >900 MHz        | 150 pH                                    |

| Order number | Maximum 1us Pulse Current <sup>2</sup> | Maximum 100us Pulse Current <sup>2</sup> | Continuous Current <sup>2, 4</sup> |
|--------------|----------------------------------------|------------------------------------------|------------------------------------|
| UFCS-R001    | TBD                                    | TBD                                      | TBD                                |
| UFCS-R005    | TBD                                    | TBD                                      | TBD                                |
| UFCS-R011    | 340 A                                  | 105 A                                    | 7.3 A                              |
| UFCS-R024    | 230 A                                  | 70 A                                     | 4.9 A                              |
| UFCS-R052    | 160 A                                  | 50 A                                     | 3.4 A                              |

Notes:

<sup>1</sup> Electrical Specifications<sup>1</sup> that are not marked with (\*) as guaranteed are typical.

Performance parameters may vary if not using the recommended footprint.

<sup>2</sup> See Maximum Current per Pulse Length graph.

<sup>3</sup> When soldered into recommended footprint, measured at 5-10 MHz, does not include footprint inductance.

<sup>4</sup> Preliminary – measured at room temperature

The following specifications are valid for all models of the UFCS series:

**Pollution Degree:** 1

**DC Gain Accuracy:** 1 %

**Output connector:** SMA (female)

**Input Coupling of the Measuring Instrument:** 50  $\Omega$



Exceeding the specified ratings may cause irreversible failure and damage to the connected equipment.



The ratings may vary depending on usage conditions and usage environment. The provided data is intended as a reference only.

## Environmental Specifications

| Parameter                 | Specification |                                                                                                                      |
|---------------------------|---------------|----------------------------------------------------------------------------------------------------------------------|
| Temperature Range         | Operating     | -40 °C to +85 °C                                                                                                     |
|                           | Non-Operating | -40 °C to +85 °C                                                                                                     |
| Maximum Relative Humidity | Operating     | 80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +50 °C, non-condensing humidity |
|                           | Non-Operating | 95 % relative humidity for temperatures up to +40 °C, non-condensing humidity                                        |
| Altitude                  | Operating     | up to 2000 m                                                                                                         |
|                           | Non-Operating | up to 15000 m                                                                                                        |

Please contact sales@pmk.de, if another temperature range is of interest.

## Mechanical Specifications

| Parameter                                               | Shunt Specifications        | UFCS-Choke Specifications        |
|---------------------------------------------------------|-----------------------------|----------------------------------|
| Weight                                                  | TBD                         | TBD                              |
| Dimensions                                              | See drawing <sup>5</sup>    | L = TBD, choke $\varnothing$ TBD |
| Input                                                   | Soldering Pads <sup>5</sup> | SMA (male)                       |
| Output Connector                                        | SMA (female)                | BNC (male)                       |
| Input Coupling of the Measuring Instrument <sup>6</sup> | 50 $\Omega$                 |                                  |

Notes:

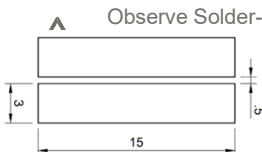
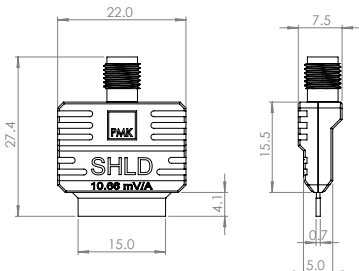
<sup>5</sup> See section "Dimensional Drawing and Recommended Footprint"

<sup>6</sup> Or 1M  $\Omega$  input impedance and a 50  $\Omega$  feed-through termination, see ordering information

## Dimensional Drawing and Recommended Footprint

The schematical drawing and all dimensions in the recommended footprint drawing are shown in [mm].

Contact sales@pmk.de or your local PMK representative for design files. Drawings not to scale.



Maximum Pulse Current Derating

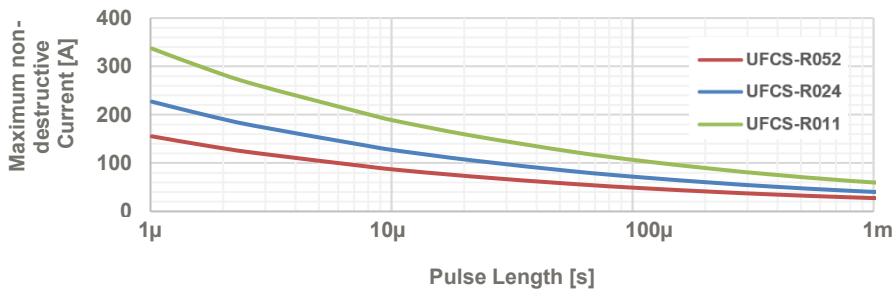
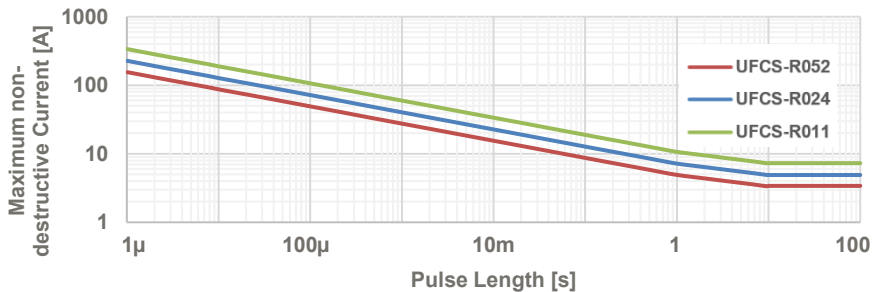


Exceeding the maximum pulse rating of the UFCS can cause irreversible damage to the product and connected accessories.



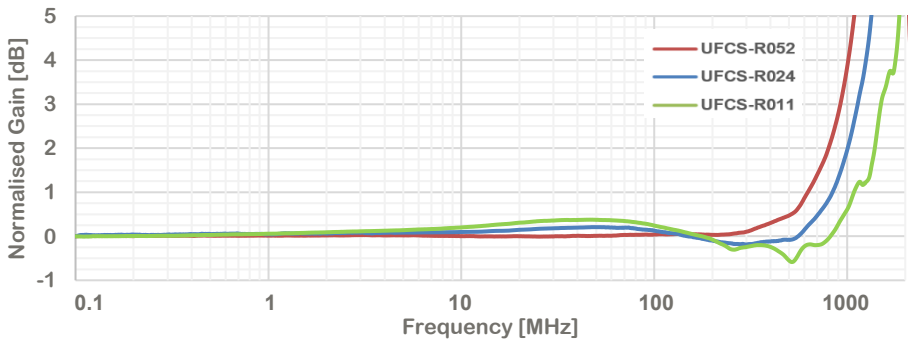
Always check that output voltage is compatible with ratings of oscilloscope or isolated probe.  
 $V_{OUT,SHUNT} = \text{Shunt Gain} \times \text{Test Current}$ .

UFCS-R0XX Maximum Pulse Current Ratings (Preliminary Calculated Data)



Frequency Response

UFCS-R0XX Frequency Response (Preliminary Calculated Data)



The Frequency Response graphs are normalised to 0 dB for better comparison.

## Scope of Delivery

See chapter “Ordering Information” to review the selection of accessories for connections to different measuring instruments.

UFCS series shunt

Quick Start Guide

## Ordering Information

First deliveries of the models UFCS-R001 and UFCS-R005 are planned for Q4-2025, the others in Q3.

### Step 1: Select the Shunt

Each resistance model is available as a single pack or as more cost-effective packs of 10 or 25 pieces.

|                  |                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UFCS-R001</b> | 1m $\Omega$ , >600MHz bandwidth, <200pH insertion inductance,<br>TBD A maximum pulse current, SMA (F) output, 1pc.<br>Also available as packs: 10pcs <b>UFCS-R001x10</b> , 25pcs <b>UFCS-R001x25</b>            |
| <b>UFCS-R005</b> | 5m $\Omega$ , >800MHz bandwidth, <200pH insertion inductance,<br>TBD A maximum pulse current, SMA (F) output, 1pc.<br>Also available as packs: 10pcs <b>UFCS-R005x10</b> , 25pcs <b>UFCS-R005x25</b>            |
| <b>UFCS-R011</b> | 11m $\Omega$ , >1GHz bandwidth, 110pH insertion inductance,<br>105A maximum pulse current @ 100 $\mu$ s, SMA (F) output, 1pc<br>Also available as packs: 10pcs <b>UFCS-R011x10</b> , 25pcs <b>UFCS-R011x25</b>  |
| <b>UFCS-R024</b> | 24m $\Omega$ , >1GHz bandwidth, 140pH insertion inductance,<br>70A maximum pulse current @ 100 $\mu$ s, SMA (F) output, 1pc<br>Also available as packs: 10pcs <b>UFCS-R024x10</b> , 25pcs <b>UFCS-R024x25</b>   |
| <b>UFCS-R052</b> | 52m $\Omega$ , >900MHz bandwidth, 150pH insertion inductance,<br>50A maximum pulse current @ 100 $\mu$ s, SMA (F) output, 1pc<br>Also available as packs: 10pcs <b>UFCS-R052x10</b> , 25pcs <b>UFCS-R052x25</b> |

### Step 2: Select Output Connection Accessories

Different output connection accessories are available for either using the shunt as input for optically isolated probes or for direct electrical connection to an oscilloscope because the shunt is no stand-alone measuring instrument.

|                    |                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>018-291-970</b> | Adapter for use with PMK's >1.5GHz FireFly® optically isolated probe series' input tip cables with integrated 50 $\Omega$ feed-through. SMA plug to MMCX socket, 50 $\Omega$                                                                                              |
| <b>UFCS-CHOKE</b>  | 50 $\Omega$ impedance matched, common mode choke with a high permeability special core for increasing CMRR ( <i>specs to follow</i> ), preventing issues with unexpected ground loops and common mode noise. SMA (male) in, BNC (male) out, for use with UFCS shunts only |
| <b>D010031</b>     | 50 $\Omega$ BNC feed-through for 1 M $\Omega$ input oscilloscopes, >500MHz                                                                                                                                                                                                |



## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## Notes

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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