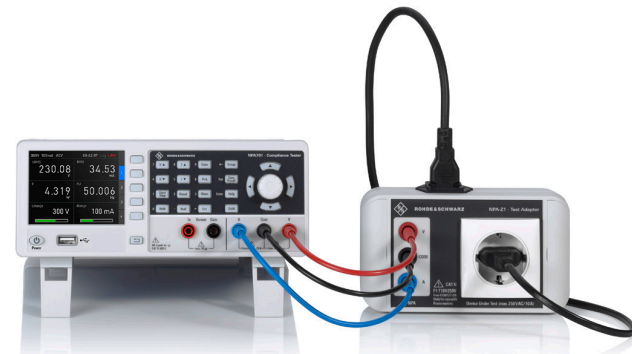


# MEASURING INRUSH CURRENT

All electronic devices have capacitive or inductive parts that generate inrush current when switched on. This is more than just a part of operations – it is a vital aspect and demands keen oversight. The R&S®NPA power analyzers are the right instrument for the job.



Typical test setup with the R&S®NPA701 compliance tester and the R&S®NPA-Z1 socket adapter

## Your task

From FPGAs to drilling machines, virtually every component or device has an inrush current far exceeding the normal operating current. Inrush current is particularly important for switching mode power supplies. The inrush current needs to be correctly determined to properly design circuitry or calculate safety-relevant factors.

## Rohde & Schwarz solution

The R&S®NPA501 power analyzer and R&S®NPA701 compliance tester seamlessly acquire and process signals in real time with a high dynamic range. The versatile display provides fast and reliable results.

The internal current measurement range is  $\pm 15$  mA to  $\pm 60$  A (peak). An additional sensor can extend the current measurement range. The input can be combined with external current sense resistors to display smaller current ranges or combined with current probes to display larger ones. R&S®HMC51 current probe extends the current measurement range to  $\pm 1000$  A.

## Numerical view

If just the maximum inrush current needs to be measured (e.g. to determine cable thickness) a numerical display can be used to view direct results. The peak value is IPeak. If outliers need to be captured, the DUT must be switched off and on several times. The maximum peak value is then determined with the Peak Hold function.

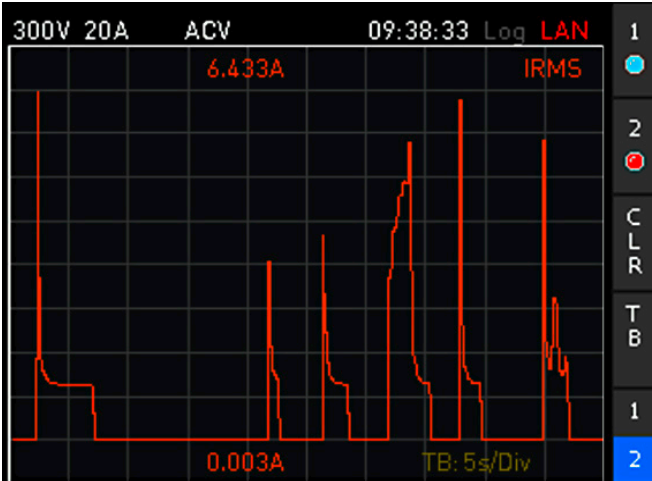
The current range should be manually set to meet the expected current with the Range Up button. Autorange mode can be reactivated by holding down the Range Up button

300V 200mA ACV		09:28:53 Log LAN	
UAVG	0.01 V	I AVG	-0.53 mA
UPeak	327.65 V	IPeak	458.18 mA
UMPeak	-327.73 V	IMPeak	-464.75 mA
FU	50.027 Hz	FI	8.5837 kHz
UTHD	1.69 %	ITHD	63.70 %

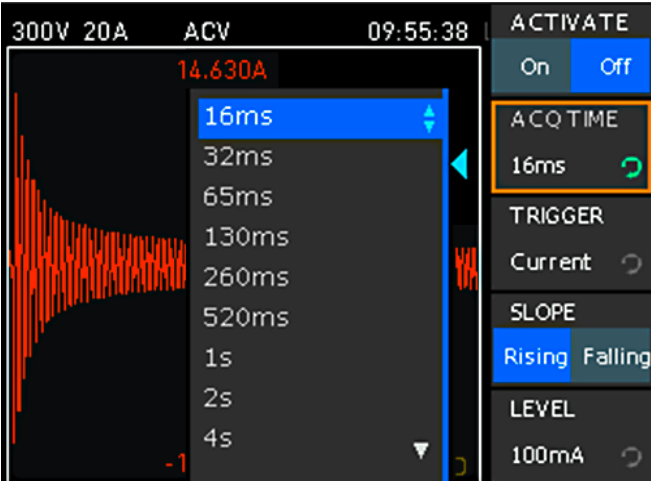
Numerical view of the measured values

## Trend chart view

The trend chart view shows the differences between individual switch-on operations. The characteristics of multiple switch-on operations can be easily recorded and compared.



Trend chart view showing six example switch-on operations for the DUT

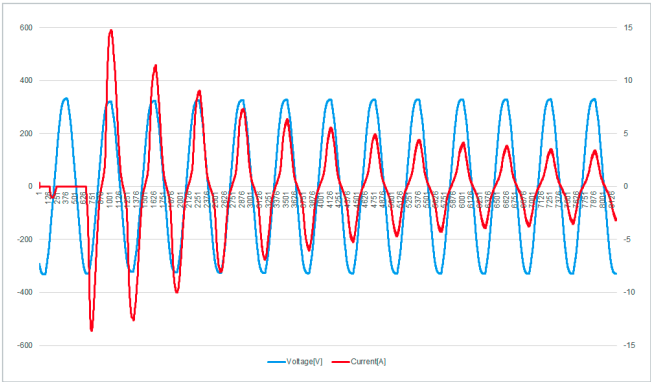


Inrush view for a drilling machine during power-up

The Hold button pauses measurements. Holding down the SAVE/RECALL button will save a screenshot to a USB flash drive.

### Inrush view

The Inrush view provides more precise analysis of switch-on operations (e.g. to determine the melting integral of a fuse). Non-compressed acquisition of up to 8192 voltage and current points is possible with a logging period from 16 ms to 67 s. A number of trigger options are also available. The ACQ TIME button can be used to adjust the recording time as needed.



Data evaluation, e.g. in Excel or MATLAB®

### Measurement documentation

After a successful measurement, the precise data can be conveniently saved to a USB flash drive as a configurable CSV file. The data can then be evaluated on a PC using standard data processing software.

inrush current in devices to help with circuit design and safety component calculations. They provide real-time analysis, extendable current measurement ranges and customizable data views for precise results.

### Summary

The R&S®NPA501 power analyzer and R&S®NPA701 compliance tester from Rohde&Schwarz efficiently measure

### See also

[www.rohde-schwarz.com/product/NPA](http://www.rohde-schwarz.com/product/NPA)

Designation	Type	Order No.
Power analyzer, DC to 100 kHz	R&S®NPA501	3657.0562.03
Power analyzer, DC to 100 kHz, incl. IEEE-488 (GPIB) interface	R&S®NPA501-G	3657.0562.05
Compliance tester, DC to 100 kHz	R&S®NPA701	3657.0562.04
Compliance tester, DC to 100 kHz, incl. IEEE-488 (GPIB) interface	R&S®NPA701-G	3657.0562.06
Mains adapter, EU version	R&S®NPA-Z1	3657.8911.02
Mains adapter, UK version	R&S®NPA-Z2	3657.8911.03
Mains adapter, US version	R&S®NPA-Z3	3657.8911.04
Mains adapter, CHN/AUS version	R&S®NPA-Z4	3657.8911.05
AC/DC current probe, 30 A, 4 mm connectors	R&S®HXC50	3622.4690.02
AC/DC current probe, 1000 A, 4 mm connectors	R&S®HXC51	3622.4684.02

MATLAB® is registered trademark of The MathWorks, Inc.

Rohde & Schwarz GmbH & Co. KG  
www.rohde-schwarz.com

Rohde & Schwarz training  
www.training.rohde-schwarz.com  
Rohde & Schwarz customer support  
www.rohde-schwarz.com/support

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG  
Trade names are trademarks of the owners  
PD 3672.9667.92 | Version 01.00 | March 2024 (jr)  
Measuring inrush current  
Data without tolerance limits is not binding | Subject to change  
© 2024 Rohde & Schwarz GmbH & Co. KG | 81671 Munich, Germany

