

ULCA-1 Current Amplifier

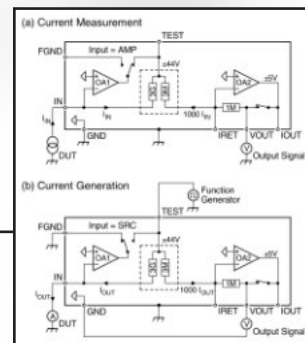
MAGNICON

physical research and instrumentation

ULCA-1 – ultrastable low-noise current amplifier

(licensed by PTB)

- Ultrastable low-noise generation and measurement of small currents
- Stability of transresistance of $< 5 \mu\Omega/\Omega/\text{year}$
- Initial calibration by tracing to QHR
- 2-stage transimpedance amplifier
- Ideal for calibration of ammeters, current sources, and SET measurements
- Convenient and easy to use table-top device
- Outperforms other instruments by orders of magnitude
- Typical current range from fA to 5 nA (5 μA in extended mode)



The new state-of-the-art in low-current metrology



Technical Data

General	■ easy-to-use table-top device ■ delivered with low-noise input cable and several add-ons for convenient operation ■ comes in a shock-proofed and watertight case ■ can be calibrated by tracing to QHR (initial calibration by PTB) ■ uninterrupted battery operation with the included ULCA-1 BatBox ■ isolated internal ground to allow user defined reference potential ■ current generation and measurement with identical precision ■ ideal for calibration of ammeters, current sources, SET characterization, etc. ■ reduced uncertainty by up to 2 orders of magnitude compared to previous devices ■ can be used as a small current travelling standard		
Typical specifications	■ Standard ■ 3 G / 3 M ■ thin film ■ 1000 ■ 1 ■ 1 ■ 5 ■ 5000 ■ 2.248 ■ 2.4 ■ 400 ■ ≈ 10 ■ < 3 ■ < 0.25 ■ 0.05 ■ 0.03 ■ < 0.2 ■ < 5	■ Noise optimized ■ 6.75 G / 6.75 M ■ thin film ■ 1000 ■ 1 ■ 1 ■ 5 ■ 5000 ■ 3.857 ■ 1.6 ■ 300 ■ ≈ 10 ■ < 3 ■ < 0.25 ■ 0.08 ■ 0.03 ■ < 0.2 ■ < 5	■ Low current ■ 25 G / 25 M ■ thick film ■ 1000 ■ 5 ■ 5 ■ 1 ■ 1000 ■ 6.616 ■ 0.9 ■ 200 ■ ≈ 10 ■ < 1 ■ n.a. ■ 2.10 ■ 0.08 ■ < 100 ■ < 100
Input resistor config. (Ω)	■ 3 G / 3 M	■ 6.75 G / 6.75 M	■ 25 G / 25 M
Input resistor technology	■ thin film	■ thin film	■ thick film
Nominal input gain	■ 1000	■ 1000	■ 1000
Nominal output transresistance ($M\Omega$)	■ 1	■ 1	■ 5
Nominal total transresistance A_{TR} ($G\Omega$)	■ 1	■ 1	■ 5
Current range (nA)	■ 5	■ 5	■ 1
Current range extended mode (nA)	■ 5000	■ 5000	■ 1000
Input resistance R_{TEST} ($M\Omega$)	■ 2.248	■ 3.857	■ 6.616
Noise @ 0.1 Hz ($fA/\sqrt{Hz}$)	■ 2.4	■ 1.6	■ 0.9
1/f corner frequency (μHz)	■ 400	■ 300	■ 200
3 dB bandwidth (Hz)	■ ≈ 10	■ ≈ 10	■ ≈ 10
Settling after current reversal to $< 0.1 \mu A/A$ (s)	■ < 3	■ < 3	■ < 1
TC of A_{TR} ($\mu\Omega/\Omega/K$)	■ < 0.25	■ < 0.25	■ n.a.
Extended calibration uncertainty of input gain ($\times 10^{-6}$)	■ 0.05	■ 0.08	■ 2.10
Extended calibration uncertainty of output transresistance ($\mu\Omega/\Omega$)	■ 0.03	■ 0.03	■ 0.08
short term stability ($\mu\Omega/\Omega/week$)	■ < 0.2	■ < 0.2	■ < 100
Long term stability ($\mu\Omega/\Omega/year$)	■ < 5	■ < 5	■ < 100

