

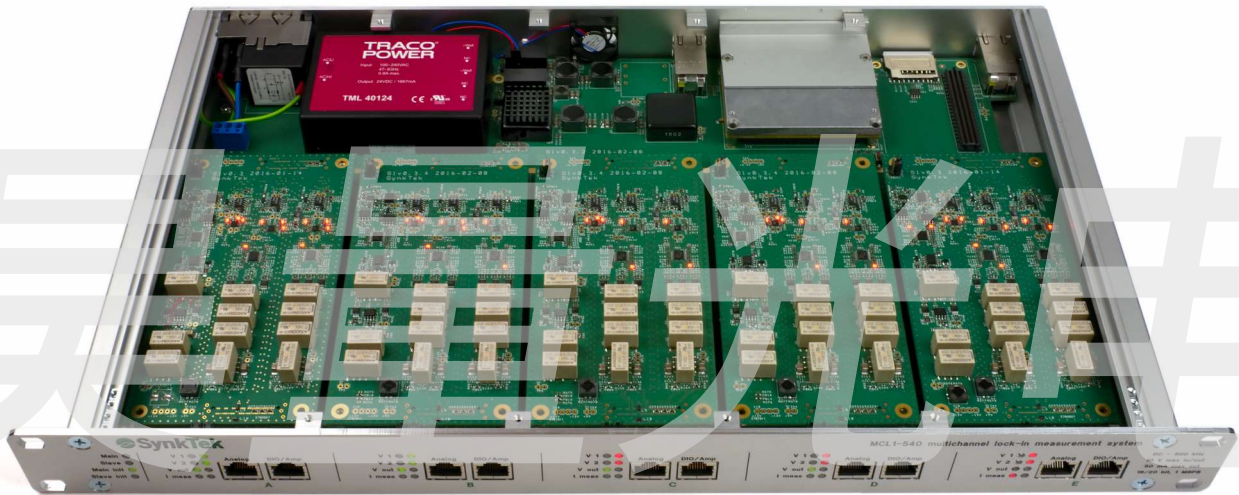


MCL1-540

Multichannel Lock-in Measurement System

Flexible lock-in platform for the highest research demands

- » Synchronized lock-in measurements of up to 18 analog signals, each with multiple frequency analysis and DC separation
- » All modules fully integrated and synchronized
- » Simultaneous sampling ADCs and DACs - no multiplexing
- » Integrated, autoranging low-noise preamplifier stages with high input impedance - no need for additional preamplifiers



Module features

- » 2 differential analog inputs + 1 analog output
- » Digital trigger/phase marker output / input
- » up to 5 modules per system

Analog output

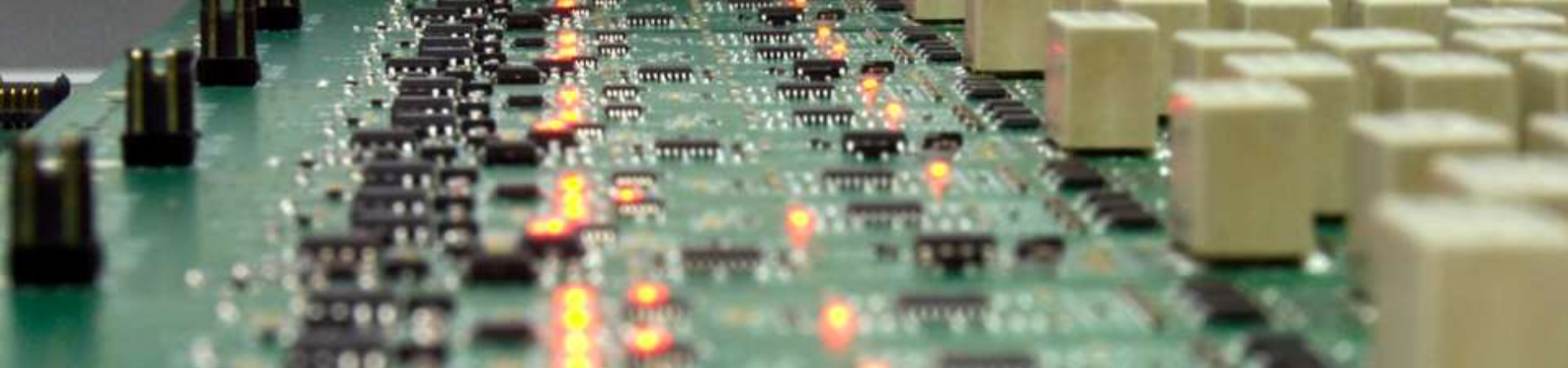
- » 20-bit DAC at 1 MSPS
- » ± 10 V, ± 1 V and ± 0.1 V full range
- » 50 mA output current
- » Ground referenced and floating outputs
- » Integrated current measurement of floating output (50 mA down to 25 nA full scale in 20 steps)
- » Noise floor at lowest range < 4 nV/√Hz (ground referenced) and < 30 nV/√Hz (floating), max 55 nV/√Hz at 10 V full range

Analog input

- » 18-bit ADCs at 1 MSPS
- » Full range ± 10 V, preamplification 1 to 5000 in 12 steps
- » DC & AC-coupling, < 0.2 Hz break frequency

Analog input options

- » ~ 1.8 nV/√Hz at 1 G Ω amplifier impedance (typical 15/0.5 nA input bias/offset current)
- » ~ 3.7 nV/√Hz at 30 G Ω amplifier impedance (typical 0.5/0.1 nA input bias/offset current)
- » ~ 18 nV/√Hz at $\sim T\Omega$ amplifier impedance (typical 10/5 pA input bias current)

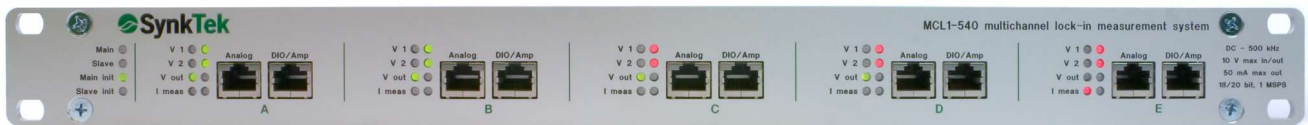


Standard lock-in features

- » Frequency range DC - 500 kHz
- » Set of 15 lock-ins on arbitrary inputs and/or harmonics
- » Synchronous X, Y, DC, R and θ for each lock-in
- » Phase resolution 64 bit, integral resolution 96 bit

Optional lock-in features

- » Additional set of 15 lock-ins on an independent frequency and time constant
- » Boxcar averaging



Output features

- » Sine, square-wave, triangle, sawtooth
- » Frequency, amplitude, offset & duty cycle programmatically controllable
- » Demodulated signal output: X, Y, DC

Optional output features

- » Composite and modulated waveforms
- » Real-time feedback options
- » Additional frequencies

Standard features

- » DAC / oscilloscope
- » FFT

Optional features

- » Slave system with user-programmable FPGA
- » Calorimetry module



Interfaces

- » Control: 1000BASE-T Ethernet and USB 2.0
- » USB-host and SDHC card reader for data storage
- » Integrated web server
- » LabVIEW API
- » 40 W power supply, 60 W option
- » RJ45 (8P8C modular connectors) for analog signals

Applications

- » Transport measurements, bridges
- » Multi-terminal measurements
- » Differential dI / dV characteristics
- » Hall-probe arrays
- » Calorimetry (AC steady state, 3-omega, relaxation)
- » AC susceptibility
- » Thermal conductivity
- » Laser stabilization
- » Optical spectroscopy, interferometry
- » Strain-gauge systems
- » Vibration measurements
- » Semiconductor/photovoltaics characterization
- » Correlation measurements

Accessories

- » Breakout box BB8
- » Signal cables with individually shielded twisted pairs 0.5 / 1 / 2 / 5 / 10 / 20 m
- » Custom-design connectivity