WAVEGUIDE

µNMR for Medical and Industrial Diagnostics and Screening

INTRODUCTION

Nuclear magnetic resonance (NMR) is a widely used analytical technique best known for its application in medical imaging (MRI) and material analysis. Other applications include chemical and food process control, fat content analysis, drug discovery, data logging for oil and gas exploration, and magnetic field mapping.

Commercially available bench-top NMR solutions are expensive, large and heavy instruments that require trained staff to operate. Until now, this has limited NMR to low volume and niche applications with high fixed costs.

A portable low-cost system opens up new high volume applications and reduces size, cost, and complexity of existing solutions.

WAVEGUIDE µNMR SOLUTION

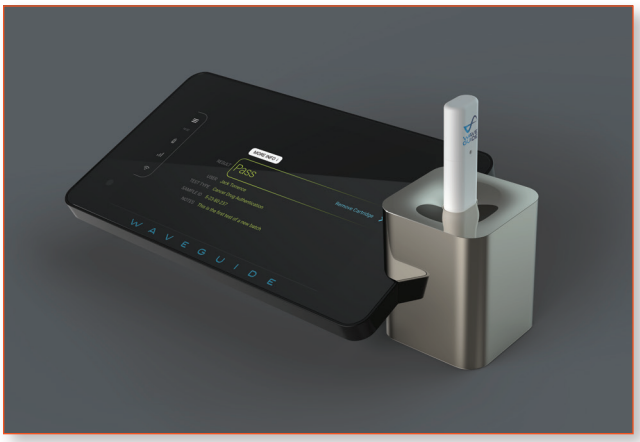
WaveGuide is the pioneer of µNMR instruments for point-of-care detection across healthcare and industrial applications. Founded in 2015, the company has built upon founding research and patents assigned from Harvard University and has filed several additional patents.

WaveGuide is located in the heart of the biotech and medical device innovation corridor in the area of Cambridge Massachusetts USA. WaveGuide is an ISO 13485:2016 certified facility (certificates MD 687233 & FM 672330) for medical grade device quality management.

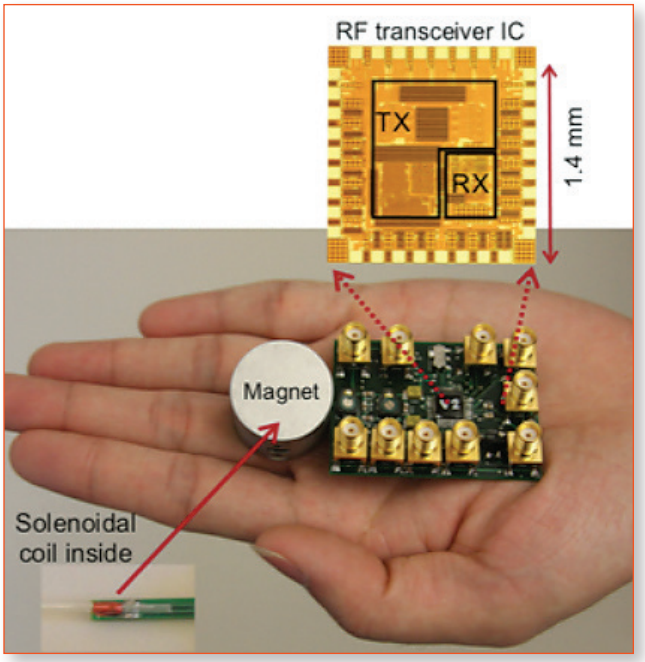
WaveGuide is registered with the U.S. DEA (Drug Enforcement Agency) to conduct experiments with federally regulated products such as THC/Cannabis and other restricted substances.

WaveGuide has core expertise in three primary domains:

1. Custom ASICs – key enabler of low cost, portable, and robust NMR systems
2. Embedded system, algorithms, and application/ repeatable method development
3. Customized functionalized magnetic nanoparticles



WaveGuide Formµla™



WaveGuide NMR Transceiver ASIC[1]

NMR RELAXOMETRY

WaveGuide Formμla is the world's first battery operated, portable nuclear magnetic resonance (NMR) device. A tenth of the cost and a fraction of the size of traditional NMR devices, it goes just about anywhere without sacrificing analytical horsepower. All analytical decisions are made on-board the device, but the platform also contains embedded WiFi and Cellular (2G to 4G) connectivity to upload analytics to a secure cloud-based environment to track outbreaks of disease, threats of counterfeit products, through to a 'learn network' of measurement points about a process over time.

POTENTIAL APPLICATIONS

- Anti-counterfeit, substandard screening or field-forensic in-situ analysis of BioPharma, vaccines, liquors, olive oils, and more
- Fat, oil and moisture content analysis in food products
- Food safety monitoring such as bacteria levels in milk (i.e. somatic cell counting) for the screening of mastitis from the dairy
- Early wear and tear detection of complex machines before catastrophic failure
- Hydrogen and sulfur content in hydrocarbon liquids
- Fluorine content in liquids
- Particulates and water in oil detection and lubricant breakdown analysis
- THC/Cannabis screening for producers through to roadside detection (including edibles) and water content in legal cannabis products
- Iron and Iron-oxide magnetic nanoparticle (MNP) detection

The battery powered instrument is portable and robust enough to operate in the field without the need for a trained NMR technician.

SYSTEM SPECIFICATIONS

TD-NMR (time domain nuclear magnetic resonance) platform with patents secured
0.5 Tesla field, 21 MHz NMR magnet
Probe size: 3mm (d)
Probe Deadtime: 10 μS for 3mm probe
Data sampling rate: 125 kHz, 14 bit
Datapoint capacity: >14 million
RF power: 100 mW
Available pulse sequences: • FID • CPMG • T1 inversion recovery • T1 saturation recovery • FID/Hahn Echo
Dimensions: 278mm x 128mm x 74mm
Weight: 3 lbs (1.4kg)
Communications: • WiFi and LTE enabled • Multiple USB ports for power and data extraction • AT&T Global wireless connectivity (if required)
Sample volume: <80 μL per sample (typically 30 μL for biologics and vaccines)
Sample tube: 3 mm diameter, WaveGuide proprietary and RFID traceable
Temperature: Algorithmically compensated
Ambient operating conditions: 10 °C to 40 °C
Battery: Minimum of five hours of operation
AC Power: Unit can be operated via wall plug

1. Sun, N. et al. Palm NMR and 1-chip NMR. IEEE J. Solid-State Circuits 46, 342 (2011)

