

Keysight in Connected Medical Device Design and Development




Increase Your Confidence in Connected Medical Device Development with Keysight

If you design, develop, validate and manufacture connected medical devices, you need to balance efficacy, safety and time to market. These devices are complex to develop and produce and the market is highly scrutinized and regulated by FDA, EMA and other governing bodies.

Keysight offers accurate and reliable test and measurement solutions for the entire connected medical device product lifecycle. Here are the Keysight solutions we have for you, as you work on these design and test phases for your new medical device.

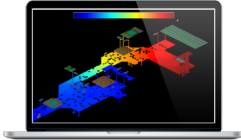


Product Development and Design Validation

Test important sensors within the device, manage power and characterize your device.

Task	Product	Benefits
Sensors simulation	Arbitrary waveform generator 	<ul style="list-style-type: none"> • Simulate sensor behavior to verify, tune and test your device • Vary signals from a single pulse, a burst of pulses, or a steady pulse train with high bandwidth up to 100 MHz and fast edge times down to 2.9 ns to simulate physiological conditions
Optimize battery life	Battery and power management: N6705C DC power analyzer, N6781A SMU, X8712A, CX3300 	<ul style="list-style-type: none"> • Perform run-down tests for battery-powered devices requiring up to 3A of current • Do current drain or event-based power analysis • Emulate battery • Measure the current waveform from a low sleep current (< 1 mA) to a high-current active mode without missing any signals
Verify performance of components	Network analyzer: E5080B ENA vector, E5061B 	<ul style="list-style-type: none"> • Measure S-parameter of filters, amplifiers, antennas and low frequency power-line EMI filters without using external test sets • Perform high impedance probing measurements




Signal Integrity and Systems Verification

Measure electrical signals during troubleshooting, installation and maintenance, verify IO digital transmission, power integrity, power management and validate DDR memory.

Task	Product	Benefits
Uncover design issues e.g. power and signal integrity before prototyping with simulation	PathWave Advanced Design System (ADS) high speed digital design software 	<ul style="list-style-type: none">• Avoid costly rework by discovering and solving signal integrity issues (delays, ringing, crosstalk, electromagnetic interference...) and power integrity issue (system noise) early
Analyze and perform power integrity measurements	InfiniiVision X-Series oscilloscopes and S-Series oscilloscopes with power rail probe (N7020A) 	<ul style="list-style-type: none">• Measure periodic and random disturbances (PARD), static and dynamic load response, and similar power integrity (PI) measurements• Provides mV sensitivity for noise, ripple and transients on DC power rail measurements• Find the high-speed transients that can have detrimental effects on clocks and digital data
Solve signal integrity issues	ENA vector network analyzer: E5080B, E5061B 	<ul style="list-style-type: none">• Measure insertion loss, attenuation, reflections, crosstalk, delay, and differential to common mode conversion


RF Design

Design and test wireless hardware of the device.

Task	Product	Benefits
Characterize the device and system level RF performance	IOT8700 Series wireless test solution 	<ul style="list-style-type: none"> Perform over-the-air signaling test of end-device, including the antenna
Test all the necessary standards, and support the addition of new standards as they emerge	X-Series signal analyzers + signal generators 	<ul style="list-style-type: none"> Accurately produce and analyze wireless signals and perform advanced receiver testing with the latest standards Achieve faster throughput and greater manufacturing uptime
Test multi-format devices	E6640A wireless test set 	<ul style="list-style-type: none"> Maximize production throughput and yield with the speed, accuracy and port density


Digital Artificial Intelligence and Analysis

Design and implement firmware, and create commercial software.

Task	Product	Benefits
Test device in real-world conditions to ensure seamless user experience	Eggplant software 	<ul style="list-style-type: none"> Noninvasive testing tool - comprehensive test coverage without ever touching the source code Image recognition technology for test automation across entire user interface



Cybersecurity

Test device to detect device vulnerability.

Task	Product	Benefits
Cybersecurity validation to discover device vulnerability	IoT security assessment 	<ul style="list-style-type: none">• Comprehensive and proven validation covering known and unknown exposures• Modular and extensible software solution• UI and REST API-driven• Detailed reporting• Easy integration into CI/CD pipeline



Compliance

Accomplish regulatory pre-compliance and compliance testing throughout the product life cycle – from design to test validation, manufacturing, and deployment.

Task	Product	Benefits
Test new device in accordance with the latest regulatory standards	IoT0047A regulatory test solution 	<ul style="list-style-type: none">• Prepare product design for compliance testing with automated pre-compliance testing• Select, set up and perform required test cases based on standard and device type (e.g., FHSS, non-FHSS)
Meet EMC regulations	N9038B MXE EMI receiver 	<ul style="list-style-type: none">• Perform EMI tests with a standard-compliant receiver: IEC 60101-1, ANSI C63.2, and FCC to ensure connected medical device meet emission standards

Coexistence Verification

Consider and measure ability of device to function properly within its intended use environment.

Task	Product	Benefits
Do wireless RF coexistence testing as per FDA recommendation	N5182B MXG RF vector signal generator and N9020B MXA signal analyzer 	<ul style="list-style-type: none">• A coaxial test method to generate a variety of signals and record the RF environment during the test• High-speed ADC to provide real-time Fast Fourier Transform (FFT) to convert collected data into a spectral view and identify the signal types, signal strength, and transmission rates (spectrum utilization).
Detect wireless signal coverage and find unexpected wireless interference	N9914B FieldFox 	<ul style="list-style-type: none">• Identify multiple types of signals in the same frequency band, like Bluetooth or WLAN signals• Portable and easy to use

Keysight Services

From financial to technical challenges, Keysight is here to help you shorten your device life cycles and accelerate innovation.

Keysight Access

Access the test instruments, software, and technical expertise you need today and for the future with flexible subscription terms.

Keysight Consulting Services

Do you have to incorporate a new technology or standard that you are not familiar with? Keysight can optimize your specific measurement needs and test strategies.

Keysight Financial Services ¹

Keysight Instant Buy	Spread the price of the instrument you need into monthly payments at 0% interest
Keysight Finance Lease	To manage your budget, skip the buying but still get ongoing access to leading technologies.
Keysight Rent-to-Own	Rent the instrument you need now and decide if you will buy later.

Keysight Hardware Services

Extend the life of your products

Are you worried about a test equipment in your test setup obsoleting on you? Get our Keysight extended support to keep your test setup stable.

Technology refresh

Your product is evolving; hence your test and measurement instrument needs to keep up with new technology too. Migrate to a new replacement product by trading in.

Trade-in for these new models: E5080B VNA, X-Series signal analyzers and signal generators, N5182B MXG RF Vector Signal Generator and N9020B MXA Signal Analyzer, Infiniium S-Series Oscilloscopes

Repair and calibration

We can calibrate many instruments in a short amount of time. Contact us to find out more at <https://www.keysight.com/my/en/products/services/calibration-services.html>.

¹ The financial solutions vary by region. Please contact your Keysight representative or visit www.keysight.com/find/financialservices for more information.