Keysight Wireless Coexistence Test Solution

Smart, Scalable and Automated Solution for Wireless Coexistence Test

Introduction

The widespread adoption of wireless technologies across industries has added new layers of complexity to maintaining reliable performance for wireless devices in increasingly crowded RF environments. While wireless coexistence is a concern across all sectors, it becomes especially critical in applications where performance directly impacts safety and reliability. Medical devices are a prime example where uninterrupted wireless communication can be vital to patient outcomes and clinical workflows.

To ensure the highest standards of patient safety and device reliability, the FDA requires manufacturers to demonstrate that their products can operate reliably without harmful interference from other devices, with guidelines recommending compliance with the ANSI C63.27 standard. Therefore, adhering to ANSI C63.27 can facilitate regulatory approval.

Additionally, the Technical Information Report (TIR) from the Association for the Advancement of Medical Instrumentation (AAMI) known as AAMI TIR69 provides guidance on performing RF wireless coexistence evaluation as part of an overall risk management approach.

Medical device engineers should conduct coexistence testing to ensure their devices function correctly in real-world conditions.

KEYSIGHT

Solution Overview

The Keysight wireless coexistence test solution enables pre-verification testing for engineers to test the physical layer of their device and the application-level mitigation techniques, simulate realistic end-to-end scenarios to ensure seamless coexistence with other devices and provides quantitative performance measurements.

The solution features a vector signal generator with a frequency range spanning from 9 kHz to 8.5 GHz and is future-scalable up to 110 GHz at different frequency breaks. It supports modulation bandwidths up to 250 MHz, with scalability to 2.5 GHz for advanced applications. It offers one RF port to enable the emulation of up to 8 virtual signals.

The solution also enables signal monitoring with 100 MHz to 160 MHz of instantaneous bandwidth for monitoring of the signals in the spectrum and for system-level path-loss characterization, and an automated software with built-in waveform library. It also offers signal conditioning which integrates RF switches, amplifiers, and attenuators to automate more test scenarios

This comprehensive approach ensures that devices meet rigorous requirements for patient safety and device reliability.

Figure 1. Keysight Wireless Coexistence Test solution

Key Capabilities

Automation of ANSI C63.27 Standard

Compliance with ANSI C63.27 not only helps engineers design more resilient products but also supports regulatory approval, market competitiveness, and customer trust — especially in crowded RF environments like smart homes, hospitals, and industrial settings.

The ANSI C63.27 compliance level defines how well a device performs under wireless coexistence conditions. It categorizes testing into three tiers based on increasing levels of complexity and interference. Tier 3 represents baseline testing with minimal interference, typically involving single-channel scenarios. Tier 2 introduces moderate challenges such as adjacent and co-channel interference. Tier 1 is the most rigorous, simulating high-interference environments with multiple simultaneous signals.

The accompanying table outlines this tiered approach across key wireless technologies, including *Bluetooth*®/BLE, Wi-Fi (2.4 GHz and 5 GHz), LTE-LAA, and DECT in the UPCS band. Each tier specifies test configurations that reflect real-world signal congestion. For example, Tier 3 includes single 64 QAM 802.11n setups and adjacent-channel LTE-LAA, with DECT testing based on the ANSI C63.17-2013 standard. Tier 2 expands to multiple adjacent-band LTE signals and co-channel interference. Tier 1 pushes the limits with concurrent channels and increased amplitude interference to stress-test device resilience.

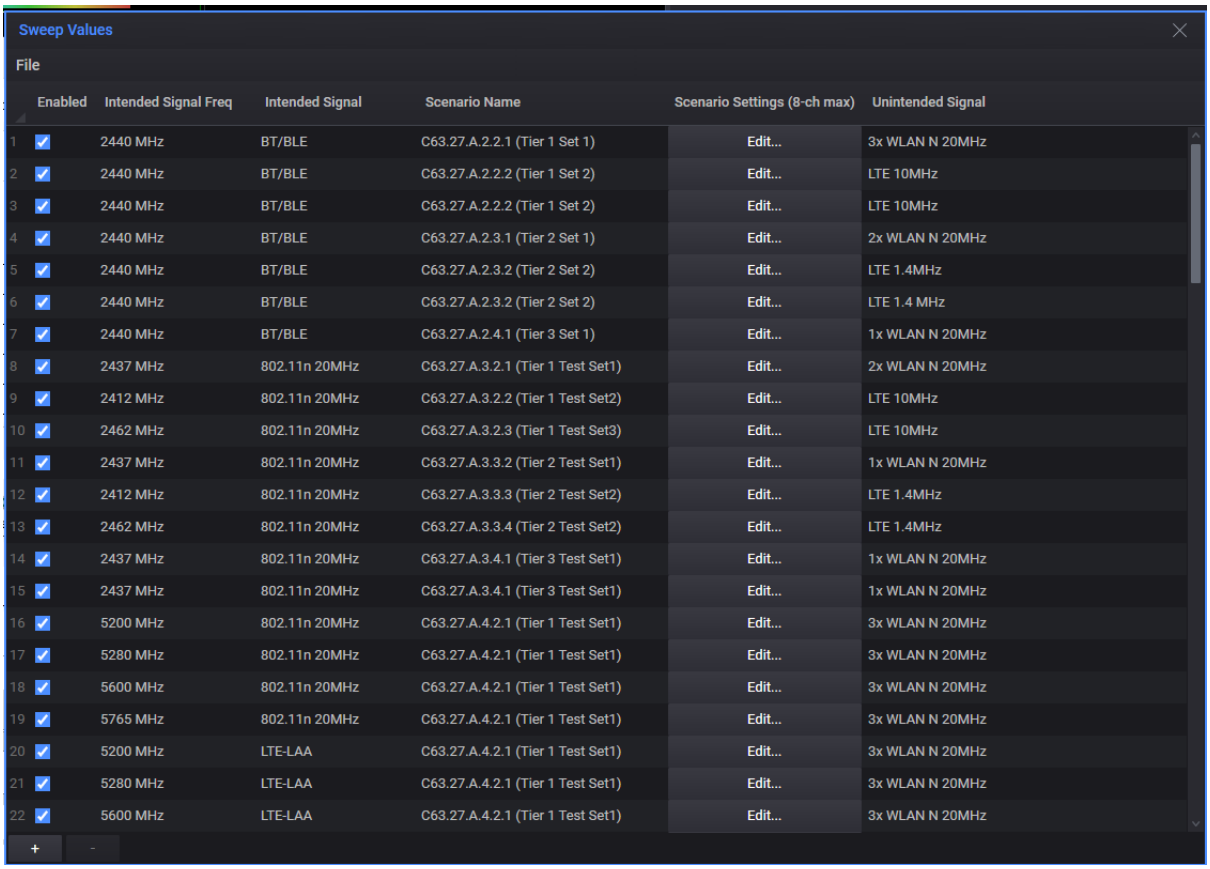
	To test Bluetooth and BLE	To test Wi-Fi at 2.4 GHz	To test Wi-Fi or LTE-LAA at 5 GHz	To test DECT at UPCS band (1920 MHz to 1930 MHz)
Tier 3	Single 64 QAM 802.11n	Single 64 QAM 802.11n	Single adjacent-channel 802.11n Single adjacent-channel LTE-LAA	ANSI C63.17-2013 standard
Tier 2	Two 64 QAM 802.11n	Single co-channel 802.11n	Single co-channel 802.11n Single adjacent-channel 802.11n	Single adjacent band LTE
Tier 1	Two 64 QAM 802.11n Two adjacent-band LTE	Three concurrent co/lower/higher Ch 802.11n One adjacent-band lower LTE One adjacent-band upper LTE	Three concurrent co/lower/higher Ch 802.11n Two concurrent co/adjacent Ch LTE-LAA	Increased amp. single adjacent band LTE

Figure 2. ANSI C63.27 Annex A: Band-specific test guidance

Our wireless coexistence test solution automates the ANSI C63.27 evaluation process across all three tiers. This enables efficient, repeatable testing under increasingly complex interference scenarios with minimal manual intervention.

Easy-to-access waveform library

Conveniently select and play from a built-in library of close to 100 predefined test scenarios aligned with ANSI C63.27. This removes the need for manual waveform loading and generator configuration.



	Enabled	Intended Signal Freq	Intended Signal	Scenario Name	Scenario Settings (8-ch max)	Unintended Signal
1	☑	2440 MHz	BT/BLE	C63.27.A.2.2.1 (Tier 1 Set 1)	Edit...	3x WLAN N 20MHz
2	☑	2440 MHz	BT/BLE	C63.27.A.2.2.2 (Tier 1 Set 2)	Edit...	LTE 10MHz
3	☑	2440 MHz	BT/BLE	C63.27.A.2.2.2 (Tier 1 Set 2)	Edit...	LTE 10MHz
4	☑	2440 MHz	BT/BLE	C63.27.A.2.3.1 (Tier 2 Set 1)	Edit...	2x WLAN N 20MHz
5	☑	2440 MHz	BT/BLE	C63.27.A.2.3.2 (Tier 2 Set 2)	Edit...	LTE 1.4MHz
6	☑	2440 MHz	BT/BLE	C63.27.A.2.3.2 (Tier 2 Set 2)	Edit...	LTE 1.4 MHz
7	☑	2440 MHz	BT/BLE	C63.27.A.2.4.1 (Tier 3 Set 1)	Edit...	1x WLAN N 20MHz
8	☑	2437 MHz	802.11n 20MHz	C63.27.A.3.2.1 (Tier 1 Test Set1)	Edit...	2x WLAN N 20MHz
9	☑	2412 MHz	802.11n 20MHz	C63.27.A.3.2.2 (Tier 1 Test Set2)	Edit...	LTE 10MHz
10	☑	2462 MHz	802.11n 20MHz	C63.27.A.3.2.3 (Tier 1 Test Set3)	Edit...	LTE 10MHz
11	☑	2437 MHz	802.11n 20MHz	C63.27.A.3.3.2 (Tier 2 Test Set1)	Edit...	1x WLAN N 20MHz
12	☑	2412 MHz	802.11n 20MHz	C63.27.A.3.3.3 (Tier 2 Test Set2)	Edit...	LTE 1.4MHz
13	☑	2462 MHz	802.11n 20MHz	C63.27.A.3.3.4 (Tier 2 Test Set2)	Edit...	LTE 1.4MHz
14	☑	2437 MHz	802.11n 20MHz	C63.27.A.3.4.1 (Tier 3 Test Set1)	Edit...	1x WLAN N 20MHz
15	☑	2437 MHz	802.11n 20MHz	C63.27.A.3.4.1 (Tier 3 Test Set1)	Edit...	1x WLAN N 20MHz
16	☑	5200 MHz	802.11n 20MHz	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
17	☑	5280 MHz	802.11n 20MHz	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
18	☑	5600 MHz	802.11n 20MHz	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
19	☑	5765 MHz	802.11n 20MHz	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
20	☑	5200 MHz	LTE-LAA	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
21	☑	5280 MHz	LTE-LAA	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz
22	☑	5600 MHz	LTE-LAA	C63.27.A.4.2.1 (Tier 1 Test Set1)	Edit...	3x WLAN N 20MHz

Figure 3. Waveform library with predefined test scenarios aligned with ANSI C63.27

Dynamic power calculation & control

Automate signal power delivery and calculation across all key points in the wireless coexistence test setup. Our solution manages the signal power transmitted from the companion device, determines the power received at the Equipment Under Test (EUT), and calculates the interference power at the EUT receiver. It dynamically computes the EUT's received signal strength and determines the required interference level to maintain the target Signal-to-Interference Ratio (SIR).

Automated test sequences

Streamline the entire test flow with sequenced automation — from configuring waveform, frequency, and power settings on the signal generator to managing activation timing, EUT evaluation, and recovery. This approach can significantly reduce test cycle time, allowing you to concentrate on analyzing EUT behavior rather than managing repetitive setup tasks.

Robust Hardware Platform

The solution provides a frequency range of 9 kHz to 8.5 GHz and one RF port, supporting up to 8 virtual signal emulations. The solution's signal generation capability simplifies frequency selection and power level adjustments to the interfering signals to create repeatable known test scenarios.

Its large memory depth of 64 MSa and RF bandwidth of 250 MHz allow you to replicate complex RF environments, simulate multiple co-channel and adjacent-channel interferers in the 2.4 GHz, and 5 GHz and enables long-duration waveform playback, essential for emulating realistic traffic patterns and hopping sequences (e.g., *Bluetooth*) for extended coexistence scenarios.

The solution also offers modulation bandwidth from 160 MHz to 2.5 GHz, enabling real-time analysis of overlapping signals, transient interference, and timing-sensitive behaviors across multiple devices. It also enables signal monitoring for signals in the spectrum and for system level pathloss characterization.

It also offers signal conditioning which integrates RF switches, amplifiers, and attenuators to automate more test scenarios. Designed for flexibility and full automation, this all-in-a-box setup supports signal routing between EUT, companion, interference, and monitoring devices. Key capabilities include selective channel path attenuation up to 121 dB, support for both conductive and radiative testing in a single configuration, instant switching across multiple interference sources, and precise timing-sensitive measurements — all engineered to streamline complex RF test environments.

The Keysight wireless coexistence test solution also includes a companion device for devices with radio signals like Wi-Fi and *Bluetooth* Low Energy.

You can also see how your device interacts with an application and monitor data loss during the wireless coexistence test. You can use the solution software to send commands to your device to enable it to do certain tasks. During testing, you have access to your device to check for signal loss, images or texts and measure interference time.

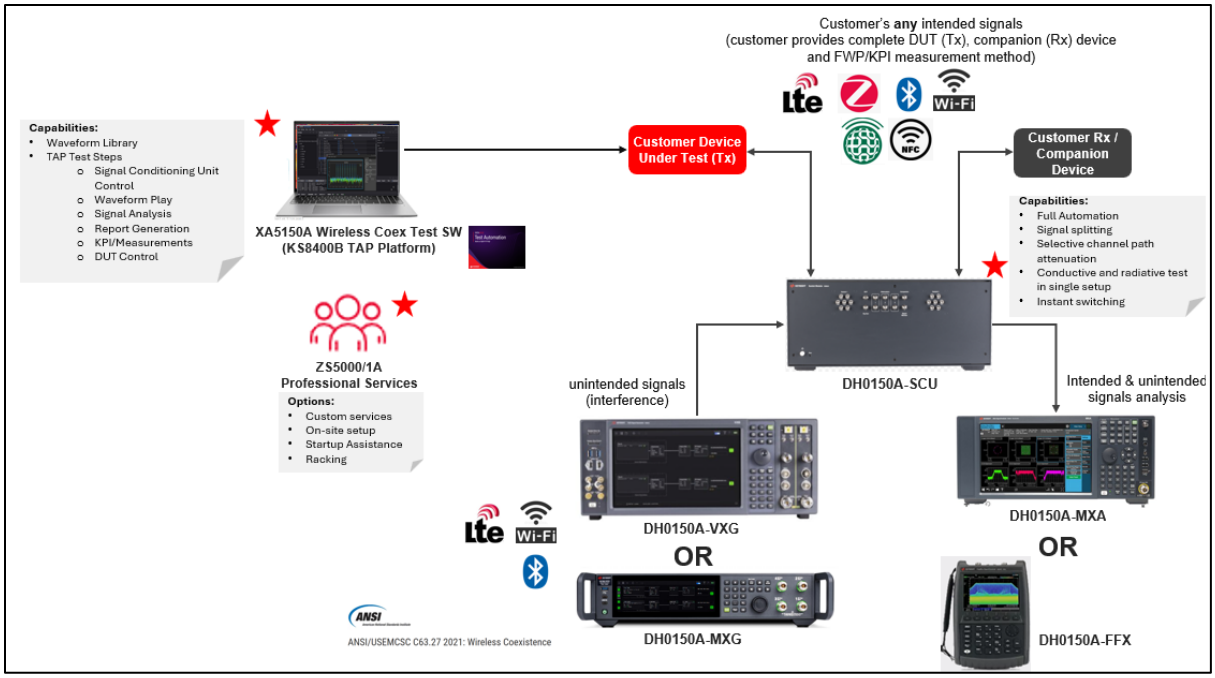


Figure 4. Operational overview of Keysight wireless test solution

Scalable and Configurable Test

The Keysight Wireless Coexistence Test solution's user-friendly GUI accelerates test development, while the open software platform, built on OpenTAP, allows for custom test step creation and seamless integration into existing workflows.

Figure 5. Create own custom test step

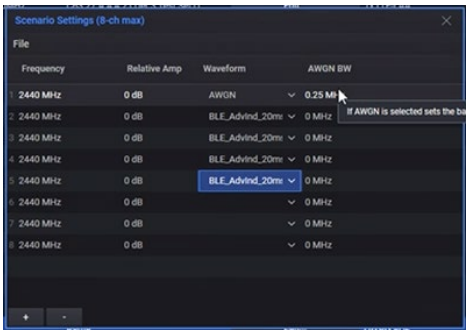


Figure 6. Configure RF channel to emulate up to 8 virtual signals and test against multiple interferers simultaneously

The solution also provides a scalable library of interference signals. With a simple click-and-upload interface, users can effortlessly add their own custom waveforms to the library, streamlining the process of expanding and tailoring signal sets to meet specific testing or operational needs.

You can develop and validate test plans offline using simulation mode and deploy them in semi-automated or fully automated environments for efficient, repeatable testing.

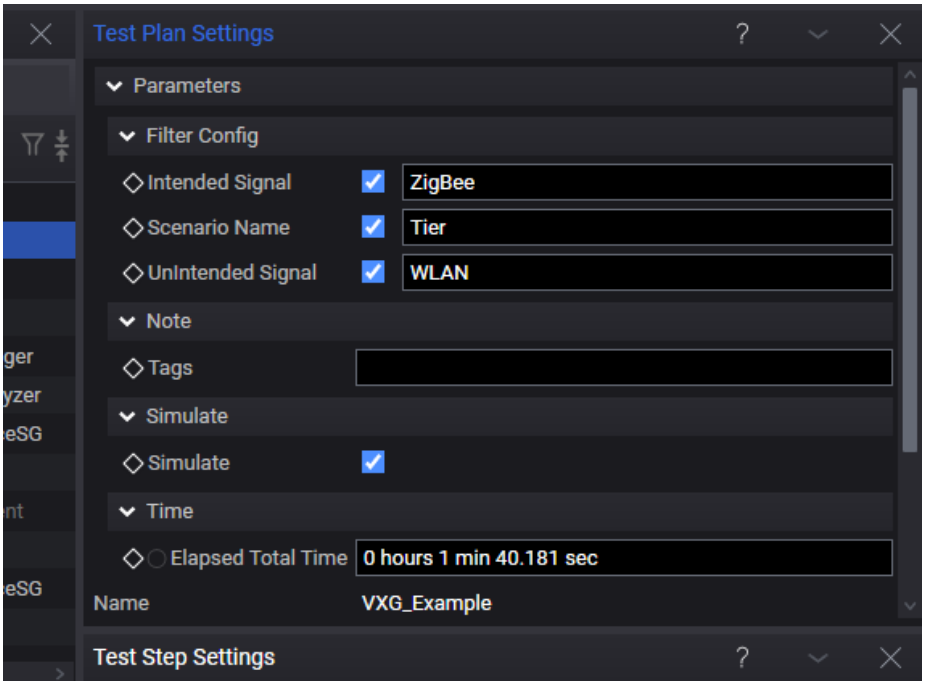


Figure 7. Simulation mode

Data-Driven Interference Test Evaluation

The solution provides test results in Excel file format to facilitate the identification of vulnerabilities and device behavior during interference tests at various power levels and types of interference signals. The results will help you better understand the interference space of your device and determine the risk mitigation techniques. Additionally, you will be able to test if your mitigation techniques are working as intended.

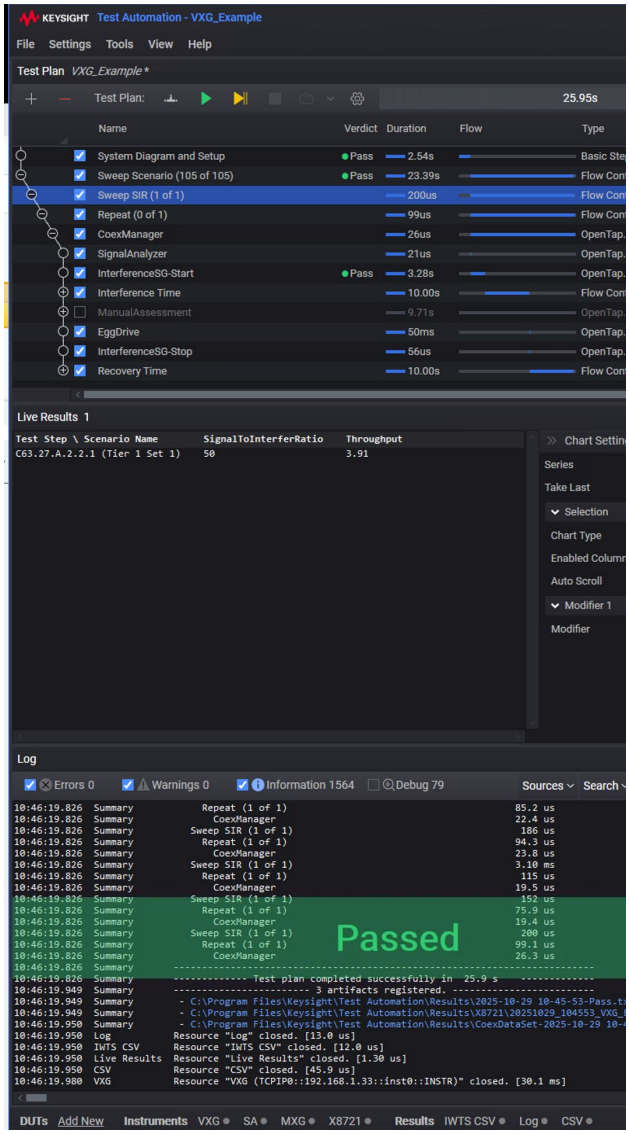


Figure 8. This EUT demonstrated stable performance under interference

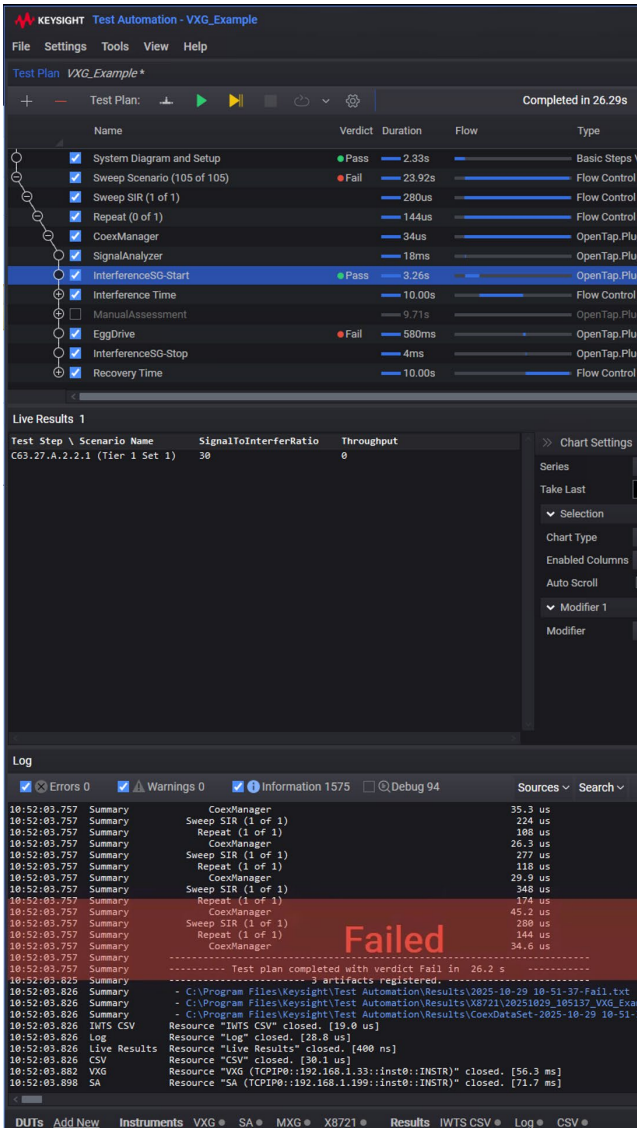


Figure 9. Example of a EUT that failed to maintain performance under defined interference conditions

Consulting Services for Performance Insights

Keysight offers consultancy services that support Key Performance Indicators (KPI) reporting and automate performance metric tracking to enhance visibility and operational efficiency. These services help streamline compliance workflows, accelerate product development, and improve data-driven decision-making.

Examples of KPIs include:

1. Latency
2. Throughput
3. Jitter
4. Bit Error Rate
5. Packet Error Rate

KPIs are highly dependent on the EUT and its application. KPIs are selected based on the EUT and its use cases to ensure that performance metrics are tailored to specific operational requirements.

Key Specifications

The table below outlines the key specifications of the wireless coexistence test solution.

	With DH0150A-VXG	With DH0150A-MXG
Signal Generation		
Supported wireless technologies (intended signal from your EUT)	Dependent on your EUT; supports any radio signal provided a compatible companion device is available.	
Frequency range	9 kHz to 8.5 GHz (future-scalable up to 110 GHz)	9 kHz to 8.5 GHz
Number of RF port	1	1
Number of virtual signal emulation	Up to 8 virtual signals	1
RF bandwidth	250 MHz with 64 MSa memory (future-scalable up to 2.5 GHz)	250 MHz with 256 MSa memory (future-scalable up to 1 GHz)
Interference Simulation		
Interference Types	AWGN (Additive White Gaussian Noise), CW (Continuous Wave), ARB	
Interference form	Multiple including adjacent channel/band, co-channel interference, harmonic	
Multi-Signal Support	Simultaneous generation of modulated and interferer signals	Single or composite signal
Unintended signal type	ANSI C63.27 recommended signals, BLE	
Number of waveform license	50 packs	

	With DH0150A-MXA	With DH0150A-FFX
Signal Analysis		
Frequency range	10 Hz to 8.4 GHz	Up to 18 GHz
Analysis bandwidth	160 MHz	100 MHz
Real time spectral analysis	Yes	Yes
Displayed Average Noise Level (DANL)	As low as –163 dBm/Hz @ 1 GHz	Around –135 dBm/Hz at 1 GHz
Companion Device		
DH0150A-IOT as BLE 4.2/5.0/5.1/5.2 and 802.11 a/b/g/n/ac (Rx) devices		

DH0150A-SCU Characteristics

Main Line Insertion Loss or Attenuation

Path	Frequency (GHz)	Min	Typical	Max	Unit
EUT to companion	0.3 to 8	6.5	-	15.5	dB
EUT step attenuation	0.3 to 8	0	-	121	dB
Companion step attenuation	0.3 to 8	0	-	121	dB
Signal Path Coupling					
Path	**Frequency (GHz)**	**Min**	**Typical**	**Max**	**Unit**
EUT to monitor	0.3 to 8	26.0	30.0	33.5	dB
Companion to monitor	0.3 to 8	26.0	30.0	33.5	dB
Signal generator to EUT	0.3 to 8	12.8	16.0	19.0	dB
SP6T Switch Insertion Loss					
Path	**Frequency (GHz)**	**Min**	**Typical**	**Max**	**Unit**
Switch 1	0.3 to 8	0.30	-	0.42	dB
Switch 2	0.3 to 8	0.30	-	0.42	dB
Attenuator Insertion Loss at 0 dB					
	Frequency (GHz)	**Min**	**Typical**	**Max**	**Unit**
Attenuator 1	0.3 to 8	0.5	-	4.2	dB
Attenuator 2	0.3 to 8	0.5	-	4.2	dB
Attenuator 3	0.3 to 8	0.5	-	4.2	dB

General Specifications

Connectivity and Environmental Specifications

RF connectors	SMA
I/O interfaces	USB, Ethernet, GPIB
Temperature range	Operating condition: 0 to 40 °C Storage condition: -40 to 70 °C
Humidity	Operating condition: Up to 80% RH at 40 °C (non-condensing) Storage condition: Up to 95% RH at 40 °C (non-condensing)
Altitude	Up to 2000 m

Ordering Information

Hardware		
DH0150A-VXG	M9484C Vector Signal Generator, 1-ch	Select one signal generator
DH0150A-MXG	N5186A MXG Vector Signal Generator, 1-ch	
DH0150A-MXA	N9020B MXA Signal Analyzer, Multi-Touch	Select one signal analyzer
DH0150A-FFX	N9917B FieldFox 18 GHz Microwave Analyzer	
DH0150A-SCU	Keysight Signal Conditioning Unit	For signal routing between EUT, companion, interference, and monitoring devices
DH0150A-IOT	IoT Wireless Test Solution	As companion device for BLE 4.2/5.0/5.1/5.2 and 802.11 a/b/g/n/ac (Rx)

Software		
XA5150A	Keysight Wireless Coexistence Test Software	Mandatory
KS8400B	PathWave Test Automation, Developer System	

Custom Services		
ZS5000A	Service and Support	Optional – if required
ZS5001A	Custom Software Development	

Related Resources

Title
Use case: How to Test Wireless Coexistence for Medical Devices