

COMPRION

COMPRION Connectivity Test Center



Software for Testing SIMs, eSIMs and RSP



Connectivity Test Center at a Glance

COMPRION's Software for Testing SIMs, eSIMs, and Remote SIM Provisioning Offers

- Comprehensive test plan management
- Powerful test reporting features
- Signal analysis with integrated oscilloscope
- nuSIM testing capabilities

Use Cases Include

- Interoperability testing/monitoring of devices and applications
- Quality assurance: Detecting communication errors pre-launch
- Monitoring/measuring on physical, protocol, transport, and application layers
- Writing custom test scenarios
- (e)UICC and smart card conformance testing (analog & digital)

Who Benefits?

- M(V)NOs
- Card manufacturers
- Manufacturers of chipsets & devices



Advanced Test Case Management Software for Smart Cards and eSIM Solutions

Connectivity Test Center is COMPRION's test case management software for testing smart cards, secure elements (on-chip), and all entities involved in remote SIM provisioning (RSP) of embedded SIMs.

It is perfectly suited for manufacturers of smart cards, chips, devices, and servers as well as network operators who need to validate their (e)UICC-based services and solutions. Additionally, it helps to comply with current international standards and supports product development by increasing resilience against real-world challenges.

Connectivity Test Center can communicate with eUICCs already soldered into devices, either through network simulators or directly via WiFi. Unsoldered (e)UICCs are typically connected using COMPRION's terminal simulator tools Spectro 2 and Spectro TP. For other card tests, a simple PC/SC card reader is sufficient.

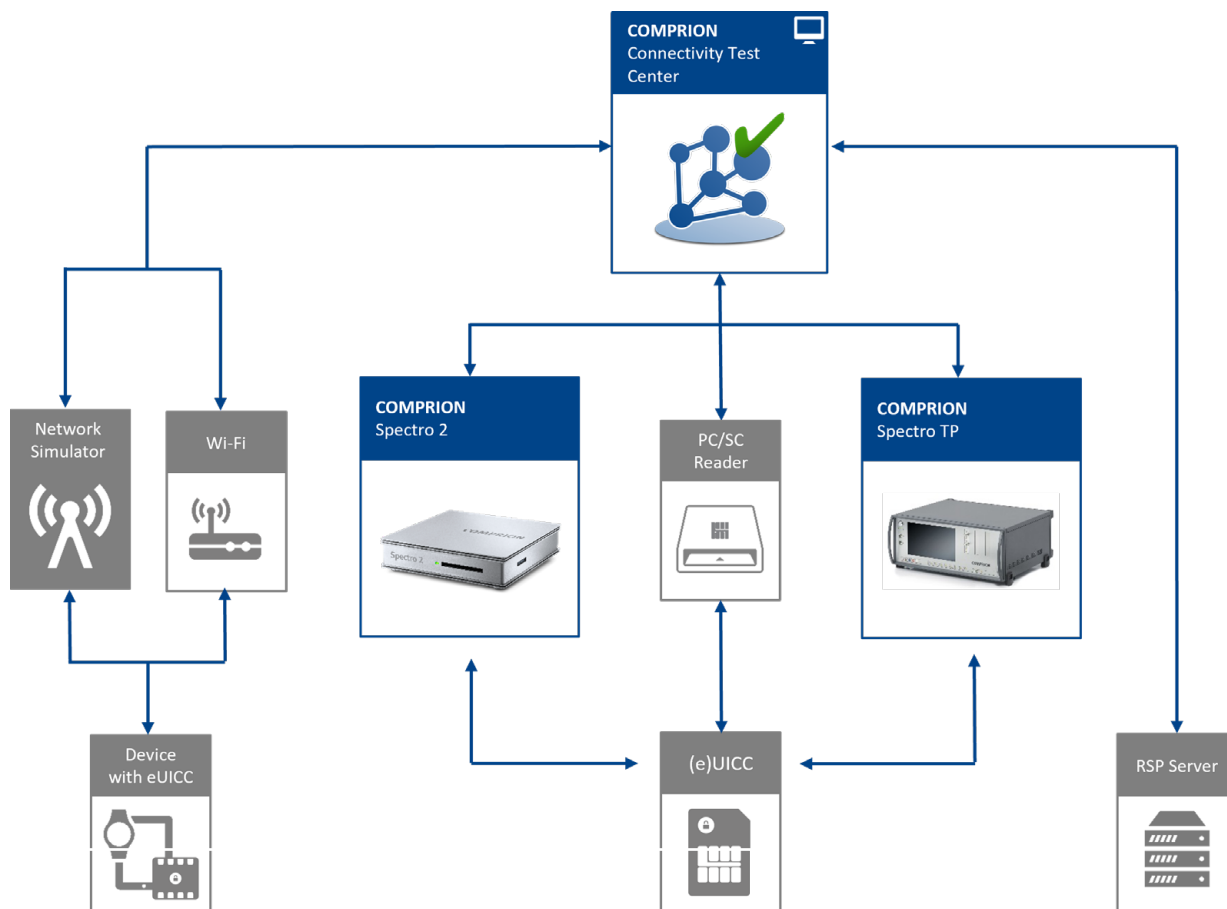


Figure 1: Setup options of Connectivity Test Center installed on a host PC for devices with soldered eUICCs, unsoldered SIMs and eSIMs as well as RSP back-end servers (SM-DP, SM-SR).

Test Plan Management

You can create test plans tailored to your specific requirements. Connectivity Test Center provides a repository of available test benches from which you can select. For each implementation under test (IUT), you can define a set of parameters that serve as input for the test procedure. Based on these parameters, only the relevant test cases from the selected test benches are executed, significantly reducing the number of test runs, overall test duration, and the time required for analyzing the results.

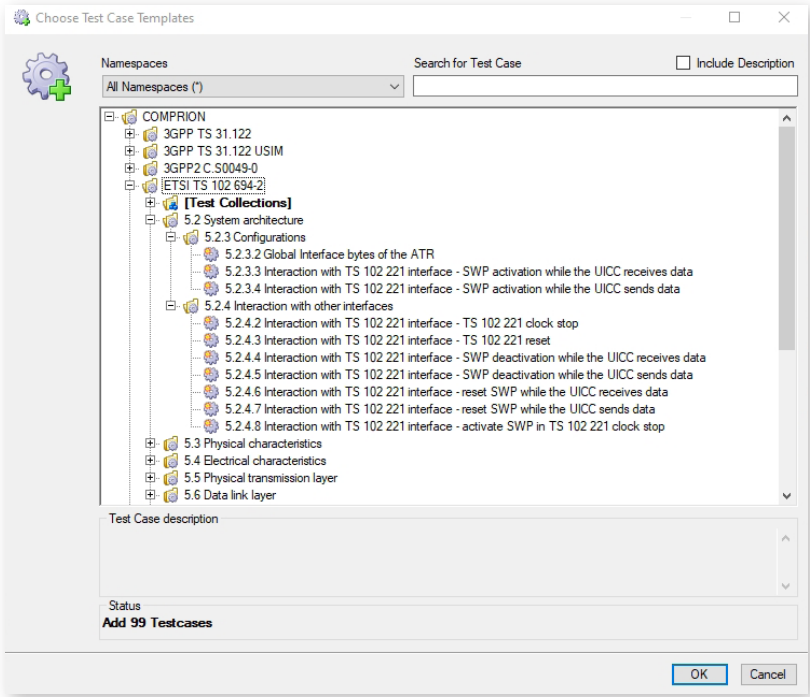


Figure 2: Select test case templates and compile test plans individually according to your needs.

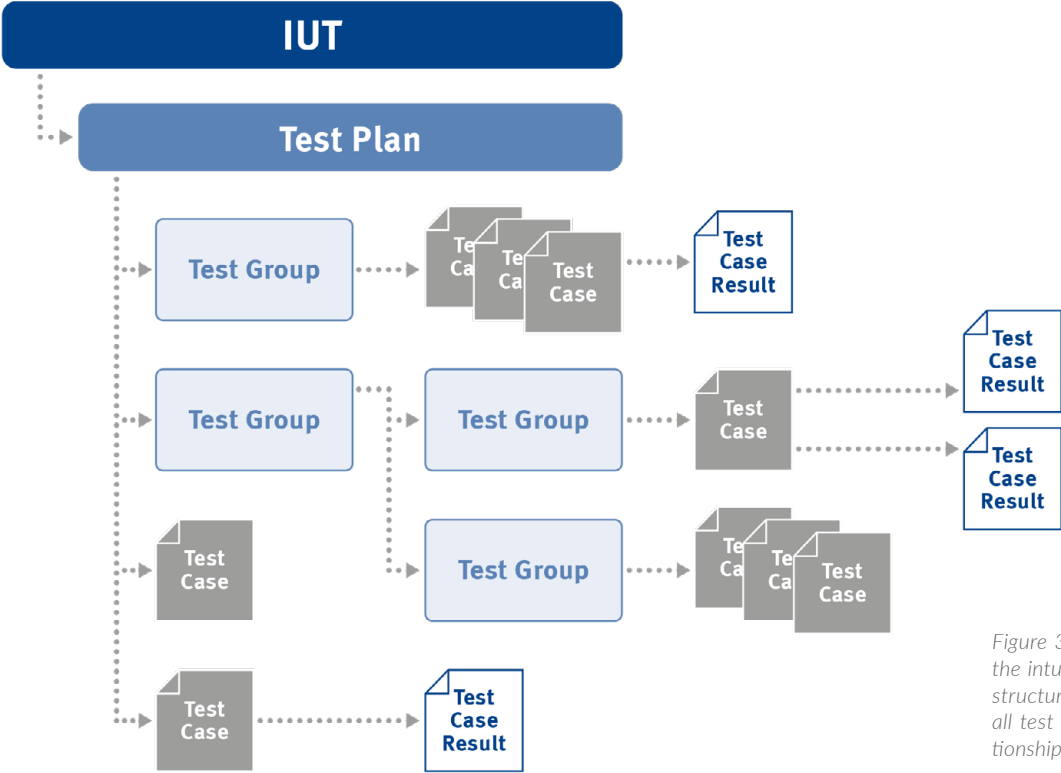


Figure 3: Complete control is ensured by the intuitive and organized test plan tree structure, providing a clear overview of all test cases and their hierarchical relationships

Create Your Own Test Routines with Contact Card Testing API

Each (e)UICC-based application may have individual requirements that are not completely covered by standard test packages. Connectivity Test Center comes with an API that allows writing own test cases in order to test those individual digital and analog capabilities. Connectivity Test Center simulates the communication partner and compares the observed reaction with the expected result.

Functional nuSIM Testing

nuSIM is an integrated SIM developed by Deutsche Telekom, specifically designed for low-cost IoT applications. All SIM functionality is embedded in the IoT chip. This integrated SIM offers optimized space savings by eliminating the need for physical SIM hardware, and its low power consumption extends its lifespan. To verify proper network access, a network simulator acts as a "callbox," connecting to the software on the PC via LAN. Additionally, a custom chip connector facilitates communication between the device under test (DUT) and the test bench executed in Connectivity Test Center.

Operator Specific Testing

Verizon has set specific requirements for entities in its environment that go beyond industry standards, such as those set by ETSI and 3GPP, to ensure compatibility within its network. COMPRION offers a customized smart card conformance test solution that meets these operator-specific requirements. Our VZW test bench makes sure that smart cards meet Verizon standards for network access, security, and OTA provisioning.



Test Reporting & Results

Once the test procedure is complete, the results of each individual test case are presented both separately and in a summary format. With a single click, you can access detailed results for any test case, including specific information about the error causes for failed tests. Additionally, you can show monitoring data that presents all communication data recorded during the test in separate views for easier interpretation. This is very helpful in troubleshooting when tests do not pass.

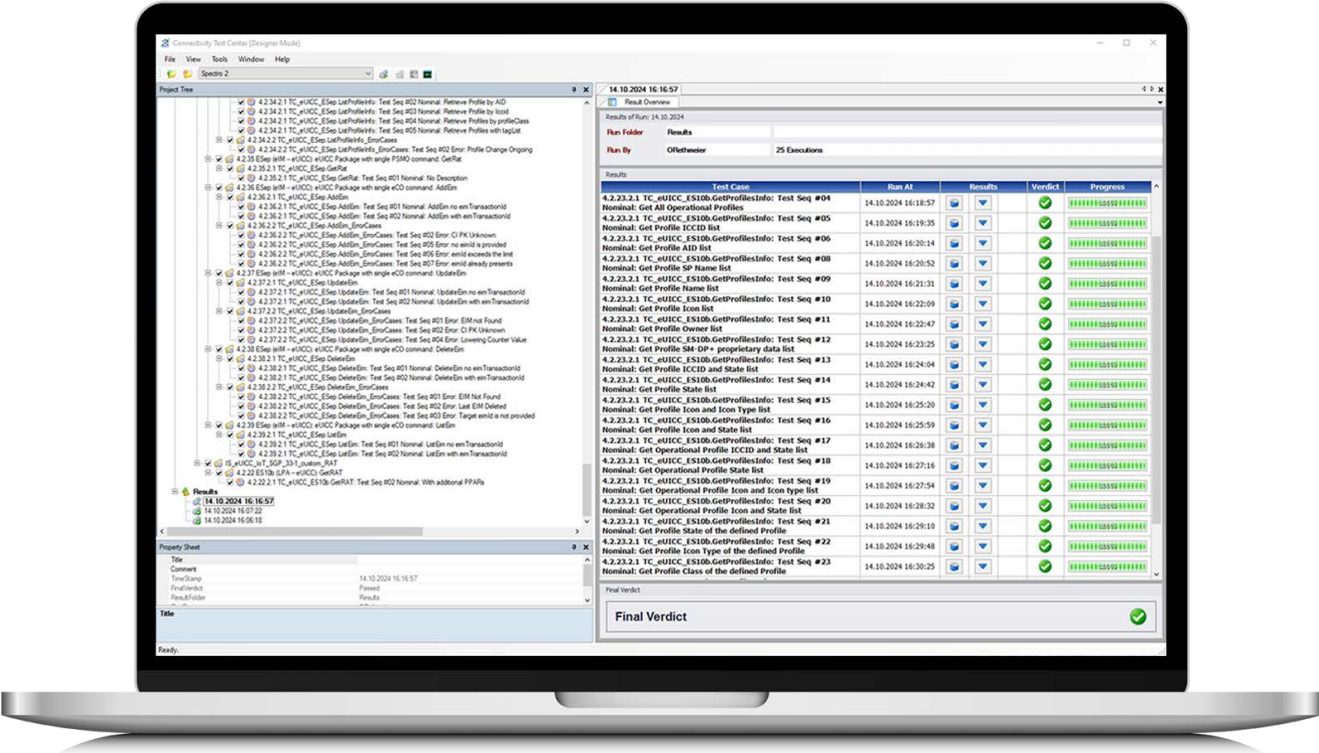


Figure 4: Detailed test results overview, including test verdicts and individual test case progress, enabling quick analysis and streamlined workflow.



"Our Connectivity Test Center provides all means to help card manufacturers, card suppliers, network operators, and implementors of RSP technology to test their products in a comprehensive way."

Marcus Dormanns,
Director Product Management

Monitoring – The Unrivaled Look into Data Communication on All Layers

Monitoring by COMPRION means that the recorded data is processed in different layers – starting on the bits and bytes layer up to the application layer. This works with the data recorded during test case execution and during discrete trace sessions. The layer views are loosely based on the OSI model. The monitoring results for each layer is displayed in a separate window as easily interpretable results.

Your Benefits

The complete data stream is available at a single glance, with bits and bytes translated into the appropriate format for all layers, so that the recorded data is easy to understand. Fast orientation in the recorded log file is made possible through the synchronization of individual layer views - selecting content within one layer automatically synchronizes the views of all layers. Additionally, zoom features provide detailed close-ups of incidents on the physical layer.

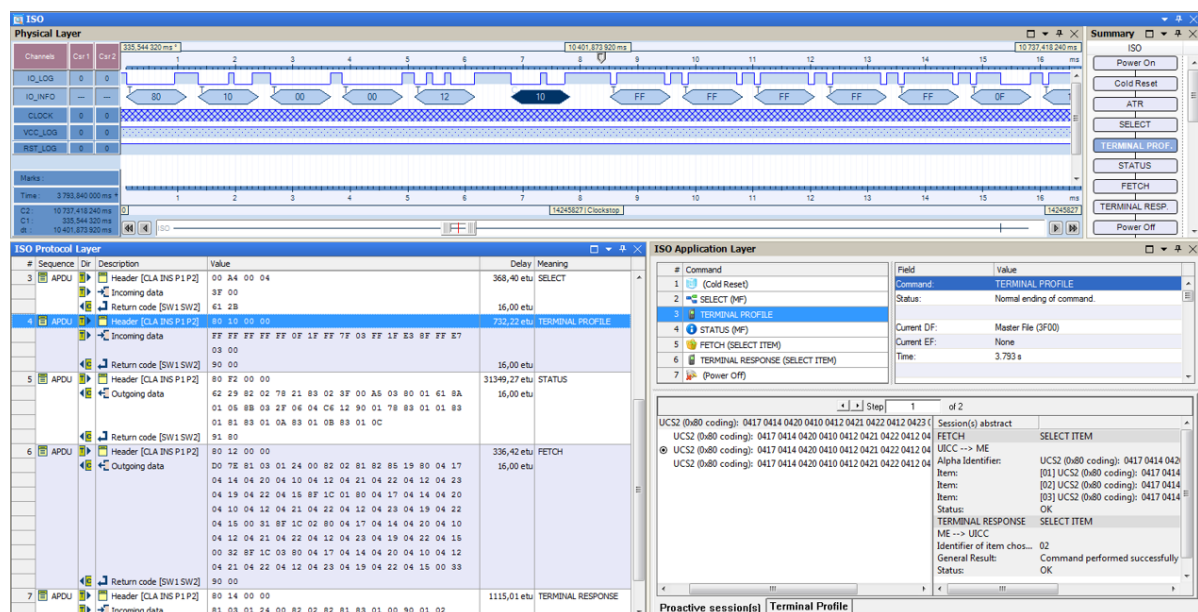


Figure 5: One window for an overview of all layers (physical, protocol & application), as well as a detailed info and summary view.

Real-Time Full-Text Display for Over-the-Air (OTA) Communication

If you provide the necessary keys for over-the-air (OTA) communication, including remote application and file management, Connectivity Test Center offers a full text display of the commands and content transmitted "over the air." This feature supports multiple transport channels such as CAT-TP, HTTPS, and SMS-PP, allowing you to closely monitor and analyze the communication flow.

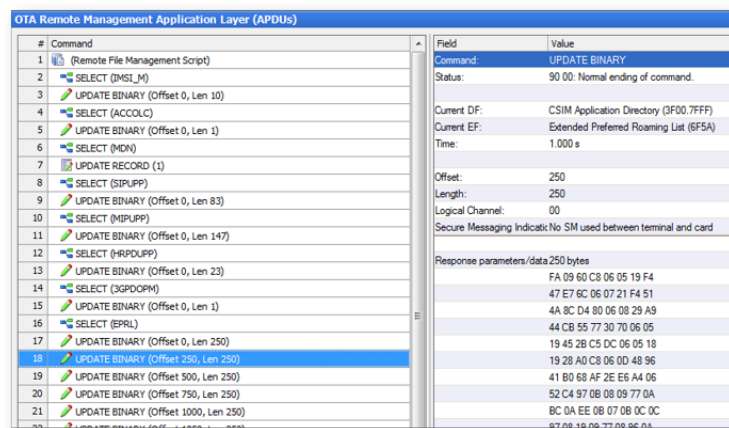


Figure 6: Overview of traffic via a contact (ISO, SWP, USB-IC) and contactless interface (C or CLT)

Troubleshooting with Analog Scope & RSP Views

Analog Scope View

Analog Scope is the optimal tool for analyzing and resolving errors on the signaling level. It is an oscilloscope that offers three main functions:

- **Recording** of analog data using COMPRION hardware
- **Visualizing** analog measurement data using the Analog Scope Viewer
- **Measuring** electrical or waveform characteristics with a single mouse click

Analog Scope view aids troubleshooting by visually displaying a device's performance during tests, allowing users to evaluate results like rising/falling edges and waveform characteristics. You can also use it independently of tests for standalone monitoring. Quick measurements provide key waveform details and detailed explanations of test failures, improving troubleshooting.

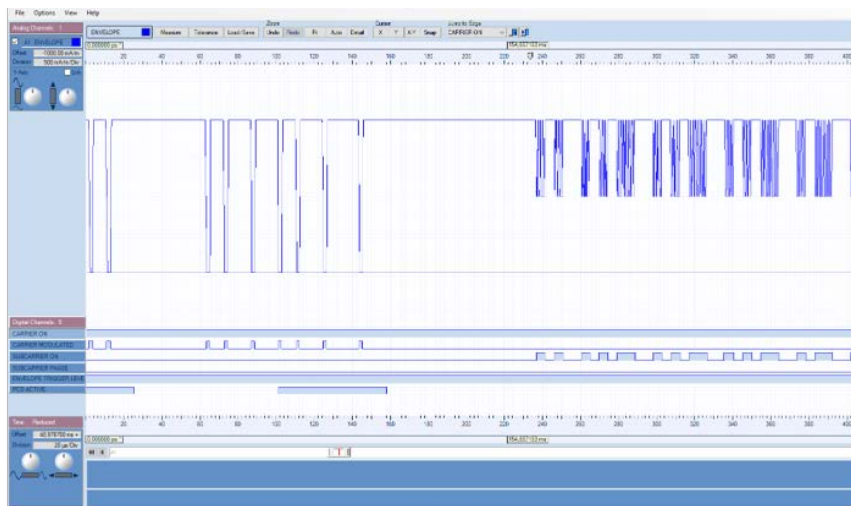


Figure 7: Analog Scope view

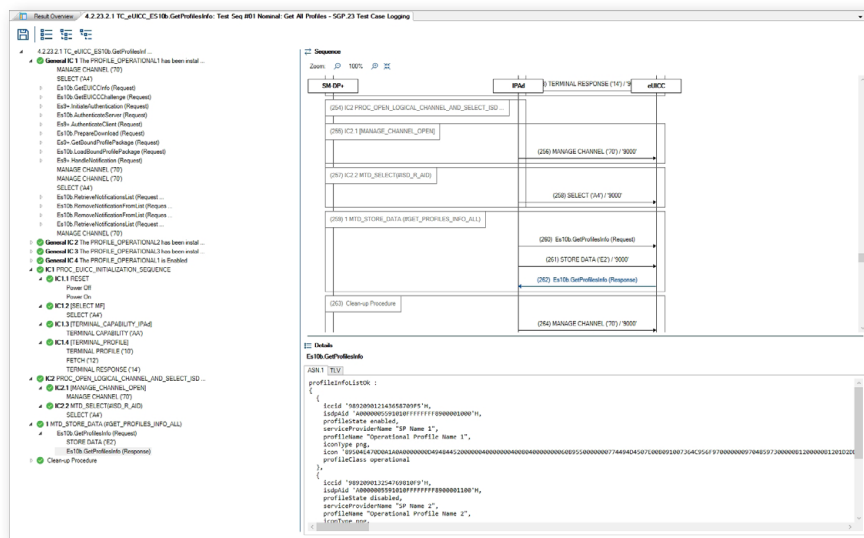


Figure 8: Sequence diagram of the logging of an SGP.23 test case

Analyzing Results in RSP Views

RSP views provide detailed analysis of communication processes in eUICC provisioning. The sequence diagram shows which entities communicate, when, and how, covering both M2M and consumer applications, including profile download, activation, and management.

By visualizing these interactions, RSP views offer key insights into timing, sequence, and potential communication issues, making it easier to detect errors and troubleshoot. This tool also ensures compliance with relevant standards and protocols.

Test Benches

Test Case Packages for All Requirements

Standardization bodies such as 3GPP, ETSI, GSMA, GlobalPlatform, and Trusted Connectivity Alliance publish test specifications that form the foundation of our test solutions. When an item under test (IUT) successfully passes these compliance tests, the most common sources of malfunctions in the field, particularly incompatibility with the technical environment, are largely mitigated. Table 2 outlines the available COMPRION test benches and their applicability to unsoldered UICCs, unsoldered eUICCs, M2M and consumer devices with implemented eUICCs, and RSP servers. Table 1 lists the test coverage of different hardware options.

	Spectro TP	Spectro 2	PC/SC Reader
Application Testing	■	■	■
Interface Testing	■	■	■
ISO/IEC 7816	■	■	■
SWP/HCI	■	■	
IC-USB	■	■	
Electrical Testing	■		

Table 1: Test coverage depending on test tool type

Category	Test Bench	UICC	eUICC	Device	Server
Electrical	3GPP TS 31.122 UICC/USIM Stage 1	■	■		
	ETSI TS 102 694-2 SWP	■	■		
Protocol	3GPP TS 31.122 UICC/USIM Stage 2	■	■		
	ETSI TS 102 694-2 SWP	■	■		
	ETSI TS 102 695-2 HCI	■	■		
Application	3GPP TS 31.122 UICC/USIM Stage 2	■	■		
	3GPP TS 51.017 SIM	■			
	3GPP ISIM	■	■		
	3GPP2 C.S0049-0 R-UIM	■			
	3GPP2 CSIM	■	■		
Java API	3GPP TS 51.013 SIM Java API	■	■		
	3GPP TS 31.213 USIM Java API	■	■		
	ETSI TS 102 268 UICC Java API	■	■		
	ETSI TS 103 115 HCI API	■			
RSP	GSMA SGP.11 eUICC		■		
	GSMA SGP.23 RSP eUICC		■		
	GSMA SGP.23 RSP Device			■	
	GSMA SGP.23 RSP SM-DP+				■
	GSMA SGP.11 Off-Card Interfaces				■
	TCA eUICC M2M Profile Package		■		
	TCA eUICC Consumer Devices Profile Package		■		
Operator Specific	VZW Card	■	■		
	nuSIM IF.2 and Functional Compliance Test Bench Stage 1		■		

Table 2: Test coverage depending on the test specification





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