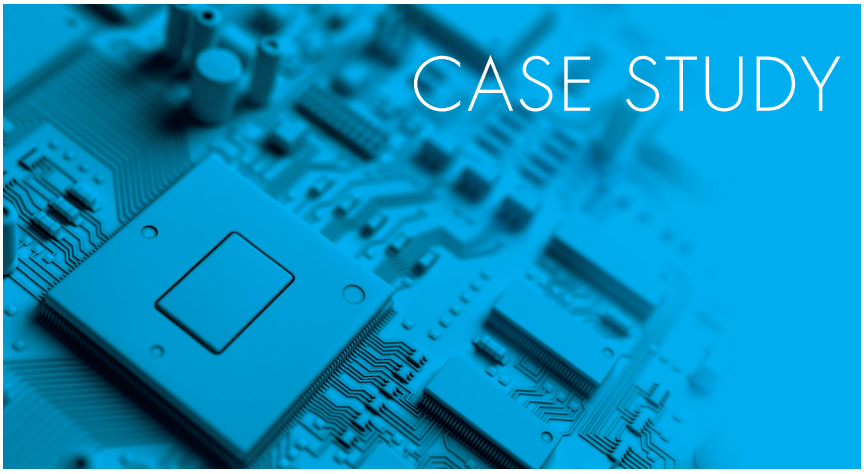
Advanced Cable Tester v2 — Infrastucture Team



Company:
Fortune 500 Tech Company

CHALLENGE

The infrastructure operations team for a mobile phone department within a Fortune 500 tech company uses thousands of cables in order to test mobile devices against various hosts to ensure mobile applications are operating properly and have full interoperability. This company purchases cables routinely for their test farm; however, many new cables do not meet the published standards, and cable variations cause delays in testing or provide potentially inaccurate results.

SOLUTION

The Total Phase Advanced Cable Tester v2 tests and verifies incoming cables destined for use in the test farm to ensure compliance and consistency.

BENEFIT

Using cables of known good quality ensures less downtime, fewer USB drops, faster data rate transfers, and accurate test results. Ultimately, this saves time, which is money.

When testing the interoperability of devices, it is crucial that all aspects of the testing operation are working as expected to get the most accurate and dependable results. Because interoperability of the devices depends on the quality of the cable, it is essential that the cable is up to standard to avoid issues of device connection, unnecessary rebooting, or slow transfer rates and failed devices.

In this case study, we explore how the Total Phase Advanced Cable Tester v2 is used as 100% incoming quality control for this company's critical testing application. If an application requires reliable and consistent cables, the Advanced Cable Tester v2 can provide quick, accurate results for pennies per test.

Whether it is a lab that is dependent on high quality cables for accurate test results, a cable manufacturer that wants to provide the highest possible quality guarantee to your customers, or an OEM seeking to protect the quality of your brand, implementing some combination of individual or statistical process control with the Total Phase Advanced Cable Tester v2 can make operations more efficient, more economical, and of higher quality than any other testing methodology.

Background/Problem

For this company's mobile test lab, the infrastructure team tests the interoperability of thousands of mobile devices with various host systems to validate that internal and external applications are working correctly between each other. To perform this type of testing, it's necessary to connect the host to a hub and the hub to many mobile devices. This means using lots and lots of cables, consisting largely of USB cables to power and run tests for devices supporting USB 2.0 and USB 3.0.

Cables used within their setup are traditionally purchased through websites such as Amazon.com, or directly from larger brand manufacturers. The challenge was that even certified cables purchased online often led to inconsistencies within their testing environment. In some cases, the results were consistent, but the cables themselves were not up to standard, causing frequent issues and interoperability failures between the devices. While in other cases, there was significant variance within a batch of cables.

Additionally, the testing required using different types of USB cables, e.g. USB Type-C to USB Standard-A, USB Type-C to USB Micro-B, USB Standard-A to USB Micro-B, etc. The requirement was to find good cables across a variety of form factors.

Applying full compliance testing methodologies with oscilloscopes and TDRs is not practical, so there were no suitable options for incoming quality control of cables to be used within the test farm.

This team found that they could not quantifiably determine the issue until they used the Advanced Cable Tester v2, where they were able to determine that certain cables being used within the tests were the root cause for many of the inconsistencies. They found that almost half the cables they were using failed the compliance tests taken with the Advanced Cable Tester v2.

Technical Approach

The Total Phase Advanced Cable Tester v2 provides the perfect tool for incoming quality control. Now, the infrastructure team at this company tests each cable that is used within their operation for criteria including continuity, opens/shorts, DC resistance, signal integrity, and if appropriate E-Marker accuracy and quiescent current. Fast test times allow them to perform individual quality control on every single cable being used in their test farm, leaving no opportunity for cable variabilities to impact test results. Additionally, as cables wear, they have been able to re-test recurrent cables to ensure all cables used in the test setup are consistently up to standard and provide dependable results.

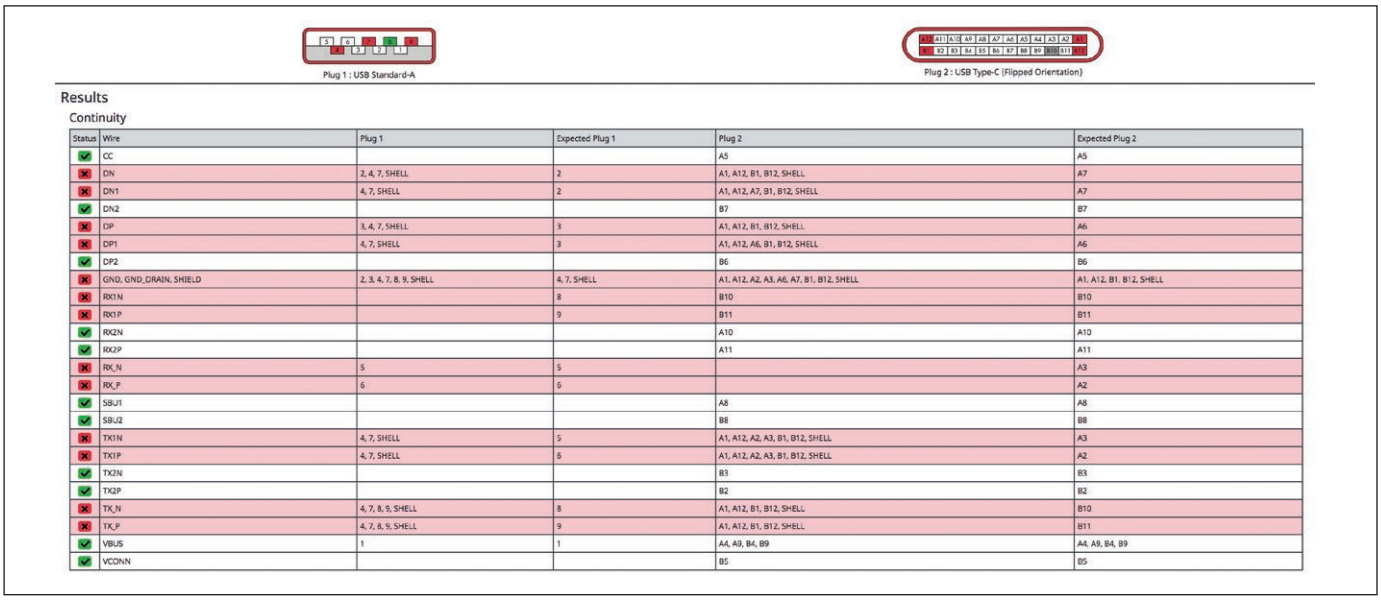
"Prior to the Advanced Cable Tester v2, we purchased cables and experienced failures due to the inconsistency of cables available in the market. The time required to track down and replace bad cables impacted our reliability and made it harder to provide consistent uptime for our operation. The Advanced Cable Tester v2 saves time and money by enabling a single test to verify the performance of a wide variety of cables before we put them in service, ensuring uptime and quality results for our operation."

—Senior Manager, Infrastructure Team

Some examples of failing cables that affect cable quality within their testing include safety violations from inaccurate pin configurations, high DC resistance, and poor signal quality.

Pin Continuity (Safety Violation)

Pin continuity testing has allowed this team to detect unsafe conditions such as shorts within their cables. Additionally, they have been able to detect miswiring that has been known to prevent proper data and power transfer.



Results

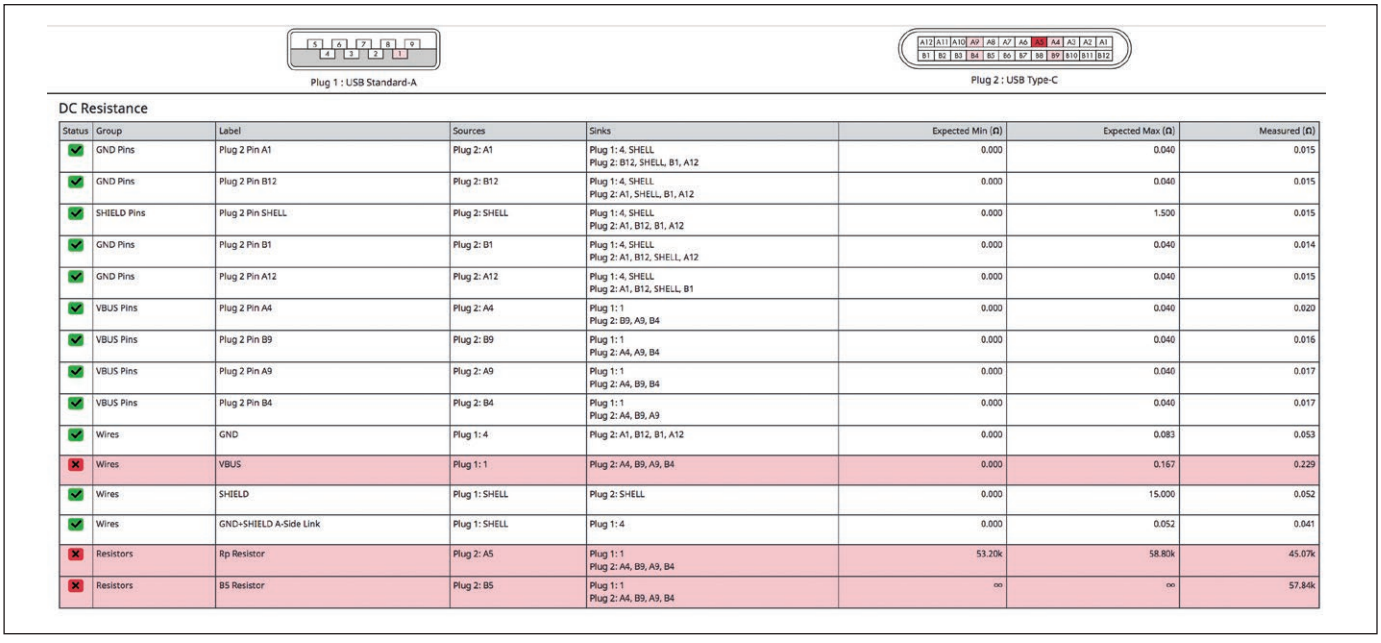
Continuity

Status	Wire	Plug 1	Expected Plug 1	Plug 2	Expected Plug 2
✓	CC			A5	A5
✗	DN	2, 4, 7, SHELL	2	A1, A12, B1, B12, SHELL	A7
✗	DN1	4, 7, SHELL	2	A1, A12, A7, B1, B12, SHELL	A7
✓	DN2			B7	B7
✗	DP	3, 4, 7, SHELL	3	A1, A12, B1, B12, SHELL	A6
✗	DP1	4, 7, SHELL	3	A1, A12, A6, B1, B12, SHELL	A6
✓	DP2			B6	B6
✗	GND, GND_DRAIN, SHIELD	2, 3, 4, 7, 8, 9, SHELL	4, 7, SHELL	A1, A12, A2, A3, A6, A7, B1, B12, SHELL	A1, A12, B1, B12, SHELL
✗	RX1N		8	B10	B10
✗	RX1P		9	B11	B11
✓	RX2N			A10	A10
✓	RX2P			A11	A11
✗	RX_N	5	5		A3
✗	RX_P	6	6		A2
✓	SBU1			A8	A8
✓	SBU2			B8	B8
✗	TX1N	4, 7, SHELL	5	A1, A12, A2, A3, B1, B12, SHELL	A3
✗	TX1P	4, 7, SHELL	6	A1, A12, A2, A3, B1, B12, SHELL	A2
✓	TX2N			B3	B3
✓	TX2P			B2	B2
✗	TX_N	4, 7, 8, 9, SHELL	8	A1, A12, B1, B12, SHELL	B10
✗	TX_P	4, 7, 8, 9, SHELL	9	A1, A12, B1, B12, SHELL	B11
✓	VBUS	1	1	A4, A9, B4, B9	A4, A9, B4, B9
✓	VCONN			B5	B5

Figure 1. Test result extract of Pin Continuity from a USB Standard-A to USB Type-C Cable

DC Resistance

DC Resistance testing has allowed them to avoid using cables that exhibit a higher than permissible DC Resistance, where there may be an inadequate transfer of current from one end of the cable to the other, causing power related issues within their operation.



DC Resistance

Status	Group	Label	Sources	Sinks	Expected Min (Ω)	Expected Max (Ω)	Measured (Ω)
✓	GND Pins	Plug 2 Pin A1	Plug 2: A1	Plug 1: 4, SHELL Plug 2: B12, SHELL, B1, A12	0.000	0.040	0.015
✓	GND Pins	Plug 2 Pin B12	Plug 2: B12	Plug 1: 4, SHELL Plug 2: A1, SHELL, B1, A12	0.000	0.040	0.015
✓	SHIELD Pins	Plug 2 Pin SHELL	Plug 2: SHELL	Plug 1: 4, SHELL Plug 2: A1, B12, B1, A12	0.000	1.500	0.015
✓	GND Pins	Plug 2 Pin B1	Plug 2: B1	Plug 1: 4, SHELL Plug 2: A1, B12, SHELL, A12	0.000	0.040	0.014
✓	GND Pins	Plug 2 Pin A12	Plug 2: A12	Plug 1: 4, SHELL Plug 2: A1, B12, SHELL, B1	0.000	0.040	0.015
✓	VBUS Pins	Plug 2 Pin A4	Plug 2: A4	Plug 1: 1 Plug 2: B9, A9, B4	0.000	0.040	0.020
✓	VBUS Pins	Plug 2 Pin B9	Plug 2: B9	Plug 1: 1 Plug 2: A4, A9, B4	0.000	0.040	0.016
✓	VBUS Pins	Plug 2 Pin A9	Plug 2: A9	Plug 1: 1 Plug 2: A4, B9, B4	0.000	0.040	0.017
✓	VBUS Pins	Plug 2 Pin B4	Plug 2: B4	Plug 1: 1 Plug 2: A4, B9, A9	0.000	0.040	0.017
✓	Wires	GND	Plug 1: 4	Plug 2: A1, B12, B1, A12	0.000	0.083	0.053
✗	Wires	VBUS	Plug 1: 1	Plug 2: A4, B9, A9, B4	0.000	0.167	0.229
✓	Wires	SHIELD	Plug 1: SHELL	Plug 2: SHELL	0.000	15.000	0.052
✓	Wires	GND+SHIELD A-Side Link	Plug 1: SHELL	Plug 1: 4	0.000	0.052	0.041
✗	Resistors	Rp Resistor	Plug 2: A5	Plug 1: 1 Plug 2: A4, B9, A9, B4	53.20k	58.80k	45.07k
✗	Resistors	B5 Resistor	Plug 2: B5	Plug 1: 1 Plug 2: A4, B9, A9, B4	∞	∞	57.84k

Figure 2. Test results extract of DC Resistance for a USB Standard-A to USB Type-C Cable

Signal Integrity

The signal integrity testing has also helped them determine the quality of cables and their ability to effectively and efficiently transfer data between the host devices and mobile phones, helping to avoid slow transfer rates, interoperability issues, and complications with device connection.

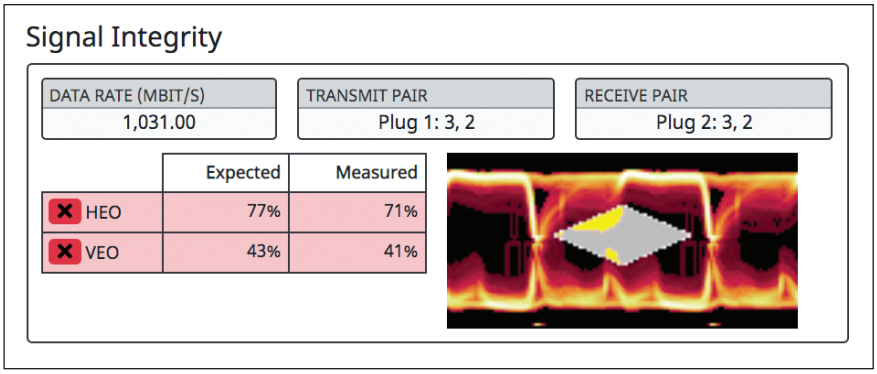


Figure 3. Test results extract of Signal Integrity for a USB Standard-A to USB Standard-B Cable.

Conclusion

When testing the interoperability of devices, it is crucial that all components within a testing farm are operating seamlessly and efficiently to get the most accurate and trustworthy results, and in this case, this infrastructure team required the integration of cables within their operation to establish a secure connection between host devices, hubs, and mobile phones. Prior to using a cable testing solution, this team experienced inconsistent results within their test farm operation, causing setbacks that resulted in high costs and loss of valuable time. With the introduction of the Advanced Cable Tester v2, this allowed this team to quickly and easily determine the root cause of their inconsistency issue and presented a new approach to avoid using poor quality cables within their testing application moving forward.

Product Brief

The Advanced Cable Tester v2 combines blazing fast performance with a low cost per test and a rugged design, enabling rapid spot-checking of cables, easy-to-understand reports, with 100% test coverage for lab and production environments at a fraction of the price, time, and labor versus other solutions. Supporting a variety of cable types including USB, Apple Lightning, HDMI, and DisplayPort, this cable tester comprehensively tests each cable for criteria including pin continuity, DC resistance, signal integrity, E-marker, and other tests to ensure it meets the required cable specification.

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