



Retail 2D barcode scanning Tier 2 (GTIN +) preliminary results

May 2022



GS1 has commissioned global, consistent and impartial testing of barcode scanner systems to benchmark and improve their ability to meet the needs of industry. Retailers will need to plan to welcome multiple types of barcodes through the POS and the scanners will need to be able to recognise them. These scanner tests are designed to support and enable that future.

Comprehensive Tier 2 testing of scannability of 1D and 2D barcodes that contain the Global Trade Item Number **plus additional data** (GTIN +) is being executed in a lab environment. The formal report with additional details will be provided in June.

The key preliminary findings from Tier 2 testing:

- 2D barcodes with additional data are reading at retail scanning speeds.
 - Average scan times marginally increased for barcodes with additional data compared to the GTIN-only control UPC-A test
 - The number of enabled barcode decoder algorithms has little measurable effect on scan time.
- All retail barcode sizes (smallest to largest) have performed equally well.
- Encoded data in QR Codes (GS1 Digital Link URI) are delivered to the host system faster than data from both GS1 DataMatrix (GS1 element string) and Data Matrix (GS1 Digital Link URI) barcodes.

Tier 2 barcode testing with the GTIN + additional data

Building on the [results from Tier 1 testing](#) that determined baseline performance of 1D and 2D barcodes with the GTIN only, the goal of the Tier 2 testing is to:

1. Determine scanning capabilities and performance for single barcodes with a GTIN and additional data.
2. Understand performance differences between different barcodes and syntaxes encoded with a GTIN and additional data.
3. Provide insights into whether the number of additional data attributes in a barcode have an impact on retail POS efficiency.

Test Lab Setup

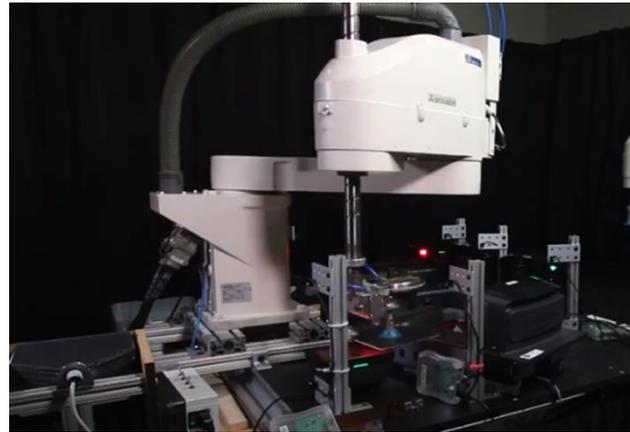
The [Automatic Identification Lab at the University of Memphis](#) is partly funded by GS1 Global Office. The lab uses commercial scanning and printing equipment that has been donated by Solution Providers. Scanning tests are performed via robotic control to provide for consistency and repeatability. University students and staff set up and conduct experiments in strict accordance with test plans developed by GS1. For more information on the testing methodology, see the [executive summary of the 2D barcode scanning test plan](#).

Technical tools to assist the Global Migration to 2D

In addition to the technical testing summarised here, GS1 is developing additional tools and guidance in collaboration with global partners and Solution Providers. The [GS1 GitHub](#) includes open-source code for parser and translator tools, as well as GS1 Digital Link tools.

Important notes

- The additional data elements selected for testing are representative of the general type and length of data that would be in a retail POS barcode. The selected attributes were deemed appropriate for assessing system capabilities for Tier 2 testing goals.
 - The barcodes containing the GS1 Digital Link URI syntax use <https://dalgiardino.com> as a typical URL.
 - The GS1 Application Identifiers (AIs) used in testing include:
 - Global Trade Item Number (GTIN)
 - Batch/Lot number
 - Expiration date
 - Serial number
 - Packaging component number



University of Memphis, GS1 AIDC test lab

- Barcodes used in the testing include GS1 DataBar Expanded Stacked, GS1 DataMatrix, QR Code (GS1 Digital Link URI), and Data Matrix (GS1 Digital Link URI) and an UPC-A control sample.
- This testing is performed on six commercial retail POS systems from four different manufacturers.
- Testing to determine how systems process, use and store additional attributes is out of scope for the lab testing, since system configurations can vary from retailer to retailer.

Tier 2 preliminary results and final report

At the time of this preliminary report, the Tier 2 GTIN + testing is being completed. This is a summary of initial observations from the data collected to provide an early view of key findings. The Tier 2 final report will be available in June 2022. The Tier 2 final report will include detailed information, including the encoded data, x-dimension, quality measurements and scanner data collected.

The final Tier 2 report will be an input to scanner manufacturers for their solutions and leveraged in GS1 standards and guidance development.

What can retailers do to help support this work?

- Research your 2D readiness
 - Identify and inventory your 1D only (laser) and 2D (camera-based) scanners from warehouse to POS
 - Connect with your hardware and software Solution Providers to investigate 2D scanning and collaborate on potential uses of additional on-pack data
 - Test retail systems to establish baseline capabilities for next steps
- Support the 2D journey by conducting pilots in your stores or retail test labs
 - Review the [2D Barcodes at Retail POS Getting Started Guide](#)
 - Identify the business use case opportunity
 - Identify the potential retail products
 - Connect with stakeholders (GS1, solution providers, and other partners) to collaborate on an initial pilot
 - Share the results to enable your learnings to help industry adoption
- Join the [2D in Retail MSWG](#)

[Contact](#) the GS1 Global Office for questions on the test plan.