



Barcode Symbology and Syntax Under Project Sunrise: What You Need to Know



As retailers, brands, and solution providers prepare for GS1 Sunrise 2027, much of the conversation has centered on the adoption of 2D barcodes. While the benefits of moving beyond traditional linear barcodes are widely understood, many organizations are now asking a more practical question: **Which barcode format should we use, and what data belongs inside it?**

The answer depends on your business objectives.

Project Sunrise enables a single 2D barcode to carry significantly more information than a traditional UPC, supporting everything from point-of-sale scanning to product traceability and consumer engagement. However, with this

added flexibility comes the need to make informed decisions about both **symbology** (the barcode type) and **syntax** (how the data is structured).

Understanding 2D Barcode Options



GS1 currently recognizes three primary 2D barcode formats that support Sunrise initiatives.

1. GS1 DataMatrix with GS1 Element Strings

GS1 DataMatrix encodes data using standardized GS1 Application Identifiers (AIs), allowing information such as GTIN, lot number, serial number, and expiration date to be stored in a compact symbol.

Example: (01)09506000134376(10)560274(21)123456(17)250801

Because of its small footprint and efficient encoding, DataMatrix is well suited for applications where label space is limited or where detailed operational data is required. It is commonly used in healthcare, medical devices, industrial manufacturing, and other environments where traceability is a primary objective.

2. QR Codes with GS1 Digital Link

GS1 Digital Link takes a different approach by encoding a structured web address rather than a traditional element string.

Example: <https://example.com/01/09506000134376/10/560274/21/123456?17=250801>

This format supports both business systems and consumer-facing experiences. Retail systems can interpret the encoded product information, while consumers can scan the same code with a smartphone to access product details, instructions, sustainability information, authentication resources, promotions, or other digital content.

For many consumer brands, GS1 Digital Link provides a path to meet Sunrise requirements while creating additional value beyond the checkout lane.

3. DataMatrix with GS1 Digital Link

Organizations with limited package space may choose to encode a GS1 Digital Link within a DataMatrix symbol rather than a QR code. This approach combines the compact footprint of DataMatrix with the flexibility of a web-based data structure, making it an effective option when packaging constraints exist but digital consumer engagement is still desired.

Choosing the Right Symbology

There is no single "best" barcode format for every implementation. The appropriate choice depends on several factors, including:

- Available package or label space
- Operational requirements for traceability
- Consumer engagement objectives
- Existing scanning infrastructure
- Long-term digital transformation goals

DataMatrix is often preferred for compact, operationally focused applications, while QR codes with GS1 Digital Link are increasingly being adopted for retail environments where both point-of-sale functionality and consumer interaction are important.

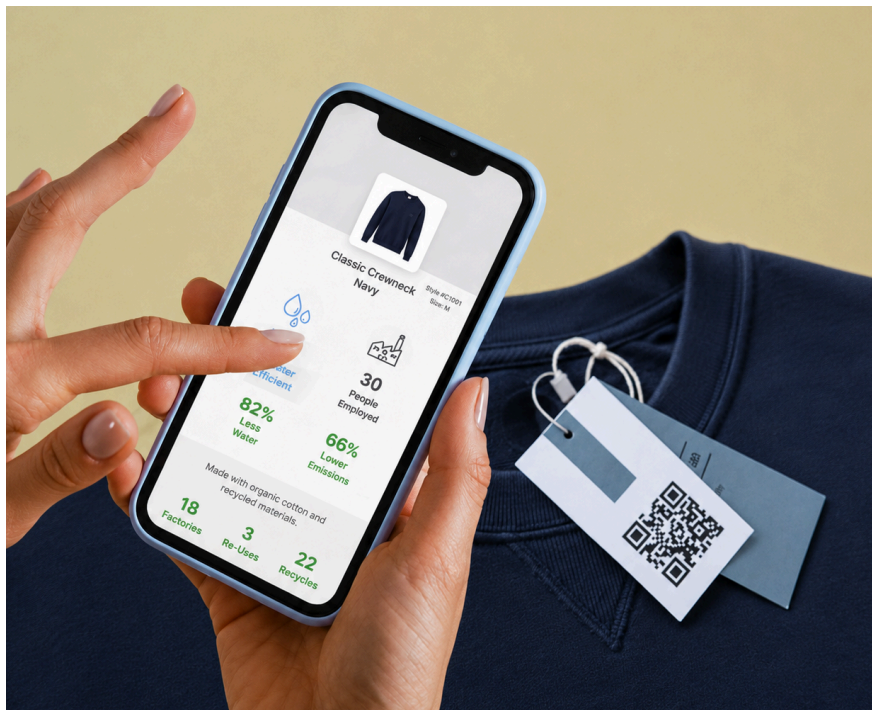
Syntax Matters Just as Much as Symbology

Selecting the barcode type is only part of the decision. Organizations must also determine **which data should be encoded**.

At a minimum, most Sunrise implementations include a GTIN. Many companies are also adding serialized identifiers to support item-level traceability, while

others include lot numbers, expiration dates, or additional application identifiers based on regulatory or operational requirements.

The encoded data should align with the organization's broader data strategy. Information contained within the barcode should match backend master data, enterprise systems, and where RFID is also deployed, the Electronic Product Code (EPC) structure. Maintaining consistent identifiers across technologies reduces implementation complexity and supports more reliable data sharing throughout the supply chain.



Start with the Business Objective

One of the biggest challenges organizations face is not understanding the technology, but determining where to begin.

Companies often achieve best results by starting with defining a clear initial use case. Whether the objective is improving traceability, preparing for future POS requirements, enabling consumer engagement, or supporting regulatory compliance, that business goal should guide decisions around both symbology and syntax.

From there, organizations can evaluate barcode formats, validate scanner performance, assess packaging implications, and ensure compatibility with existing systems before scaling more broadly.

Supporting the Sunrise Transition

Successfully implementing 2D barcodes requires more than selecting a symbol. It requires coordination across packaging, labeling, data management, and retail operations.

FineLine helps retailers, brands, and suppliers at every step of the Sunrise 2027 transition including helping define the right barcode strategy, selecting the appropriate symbology, structuring the data correctly, and ensuring alignment across labeling, RFID, and backend systems. Because we support both the physical label production and the underlying data requirements, we're able to help bridge the gap between concept and execution.

As the industry continues its transition to 2D barcodes, understanding the relationship between symbology and syntax will be essential. Organizations that establish a strong data foundation today will be better positioned to realize the operational, consumer, and supply chain benefits envisioned under Project Sunrise.

About FineLine

FineLine is a global provider of RFID, barcode, and variable data labeling and packaging solutions. FineLine supports retailers and suppliers with shelf-ready smart labels, tags, and packaging designed for unique item identification, compliance, and operational efficiency.

FineLine integrates these technologies to meet retailer mandates, GS1 standards, and Sunrise 2027 requirements, supporting POS, inventory accuracy, and consumer engagement. Our solutions enable item-level identification and traceability for CPG and hard-to-tag items, with data embedded across cartons, blisters, and packaging formats while preserving branding and design.

Backed by data management expertise and proprietary quality control, FineLine ensures encoding accuracy, consistent performance, and fast turnaround. To learn more about how to prepare for GS1 Sunrise 2027, please contact us at **+1 800 500 8687** or visit our website at **finelinetech.com**.