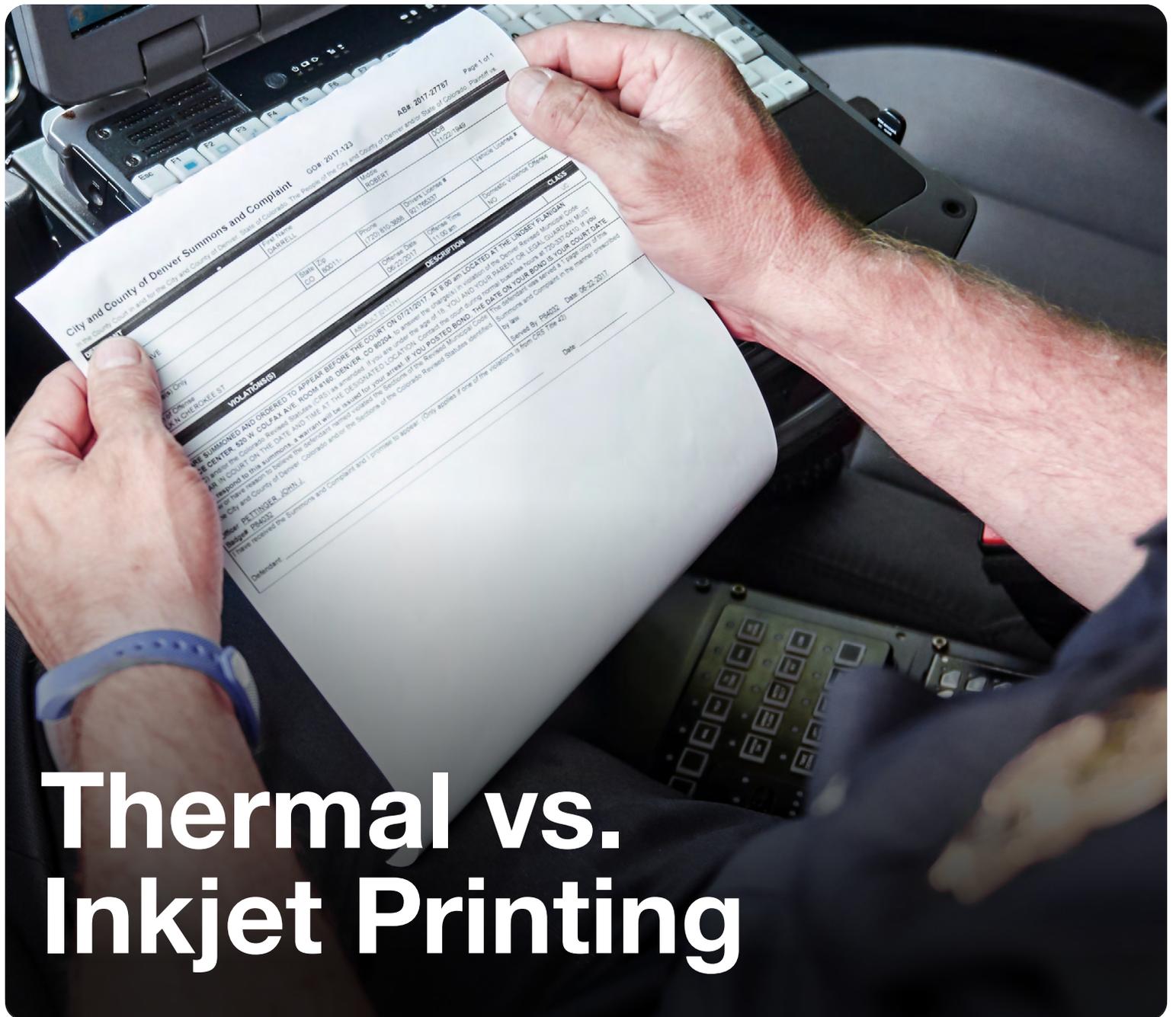




 EBOOK

# Thermal vs. Inkjet Printing

Choosing the best mobile printing solution for on-the-go workforces and applications.



# Thermal vs. Inkjet Printing

Across public sector and field service environments – from emergency response and natural resource management to roadside inspections and beyond – mobile printing is a must. While inkjet printers were once the standard, mobile thermal printers have increasingly gained traction for their durability, reliability, and lower total cost of ownership in on-the-road conditions.

Still, many agencies continue to rely on inkjet technology – even for on-the-go needs. For some, legacy investments, existing contracts, and “good enough” performance can make change feel unnecessary without a clear business case. For others, limited awareness that mobile thermal printers capable of full-page (8.5 × 11) printing exist has prevented consideration of alternative technologies.

Whether you’re evaluating a transition from inkjet to thermal or selecting a mobile printing solution for the first time, understanding the key differences between the printing technologies matters. This paper outlines the factors that impact performance, cost, and long-term value – so you can make a confident, ROI-driven decision.

## SECTION 1

# About the technology

Understanding how inkjet and thermal printing technologies originated – and how they work – provides important context for evaluating their performance in mobile environments.

## Inkjet printing

While early concepts of inkjet technology surfaced in the 1950s, it wasn't refined for commercial applications until the late 70s and early 80s. Originally designed to replace loud, inefficient dot-matrix printers in the publishing industry, inkjet printers have since become a staple in both businesses and homes worldwide. The technology has also expanded into portable and handheld devices used for on-the-fly printing in the field.

Inkjet printers work by propelling tiny droplets of ink onto paper through microscopic nozzles. They are known for high print quality, color capacity, media versatility, and relatively low upfront cost.

## Thermal printing

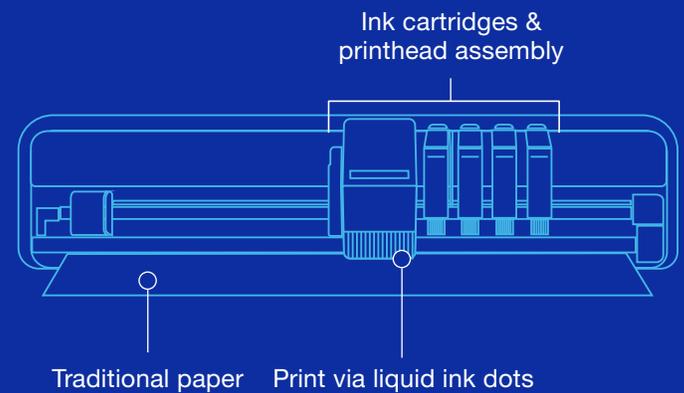
Thermal printing emerged in the 1960s and 70s as a simpler, more durable alternative to impact and ink-based printing. While thermal printers were primarily used in industrial, medical, and point-of-sale environments early on, they soon gained popularity for their reliability, speed, and minimal maintenance requirements.

Thermal printers work by applying heat to specially coated paper (direct thermal) or by transferring ink from a ribbon onto media (thermal transfer). In thermal printing, the printhead contains a line of tiny heating elements arranged across the width of the print area. When printing, these elements selectively heat in precise patterns as media passes beneath them.

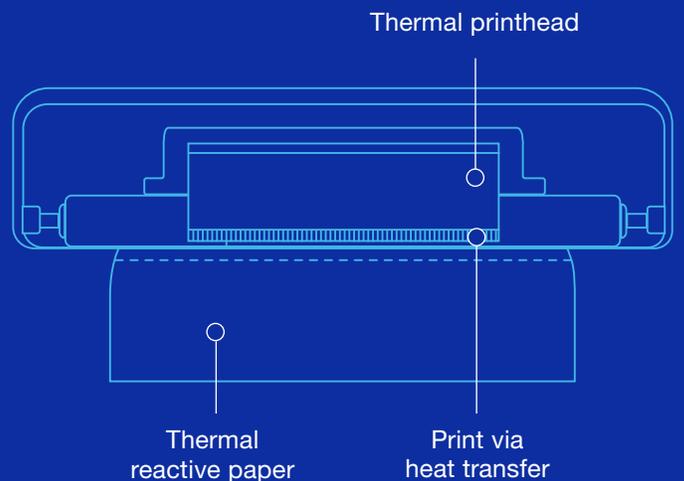
Through the years, thermal technology proved well suited for on-the-go printing as mobile computing expanded across logistics, field services, and public safety. With no liquid ink, cartridges, or complex nozzle systems, thermal printers are designed with fewer moving parts – helping them perform consistently in demanding conditions. They are also known for their speed, overall durability, and low maintenance needs.

# How it works

## Inkjet technology



## Thermal technology



# Side-by-side comparisons for field operations

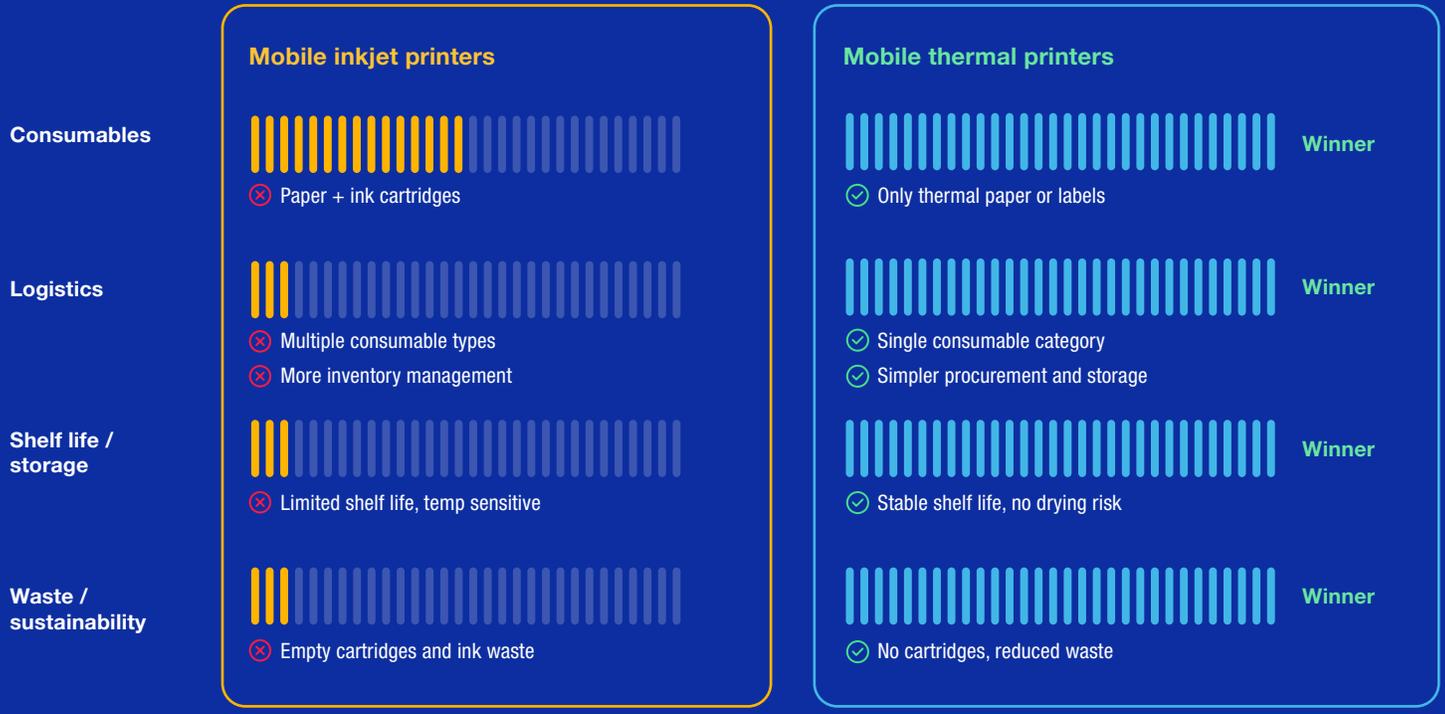
With a foundational understanding of how inkjet and thermal printing technologies work, the next step is evaluating how each performs in real-world environments. The following sections break down how mobile inkjet and thermal printers compare across additional factors that impact long-term value in the field, including consumables, durability, print performance, mobility, integration, and day-to-day usability. With detailed explanations and clear visual representations, these comparisons help clarify which technology is best suited to meet the demands of modern, on-the-go operations.

## Complexity of consumables

For mobile and field-based operations, consumables and logistics play a significant role in long-term cost and reliability. Mobile thermal printers eliminate the need for ink, reducing the number and size of consumables that must be purchased, stored, transported, and discarded. With fewer components to manage and no risk of ink leaking, drying, or depleting, thermal solutions simplify logistics while helping agencies lower operating costs and maintain consistent performance in the field.

### Consumables and logistics

Mobile suitability



**\$ Lower initial cost**  
 Inkjet printers have lower upfront purchase price but higher long-term operating costs

**TCO Lower total cost**  
 Thermal printers offer better total cost of ownership over the device lifecycle

## Printer upkeep

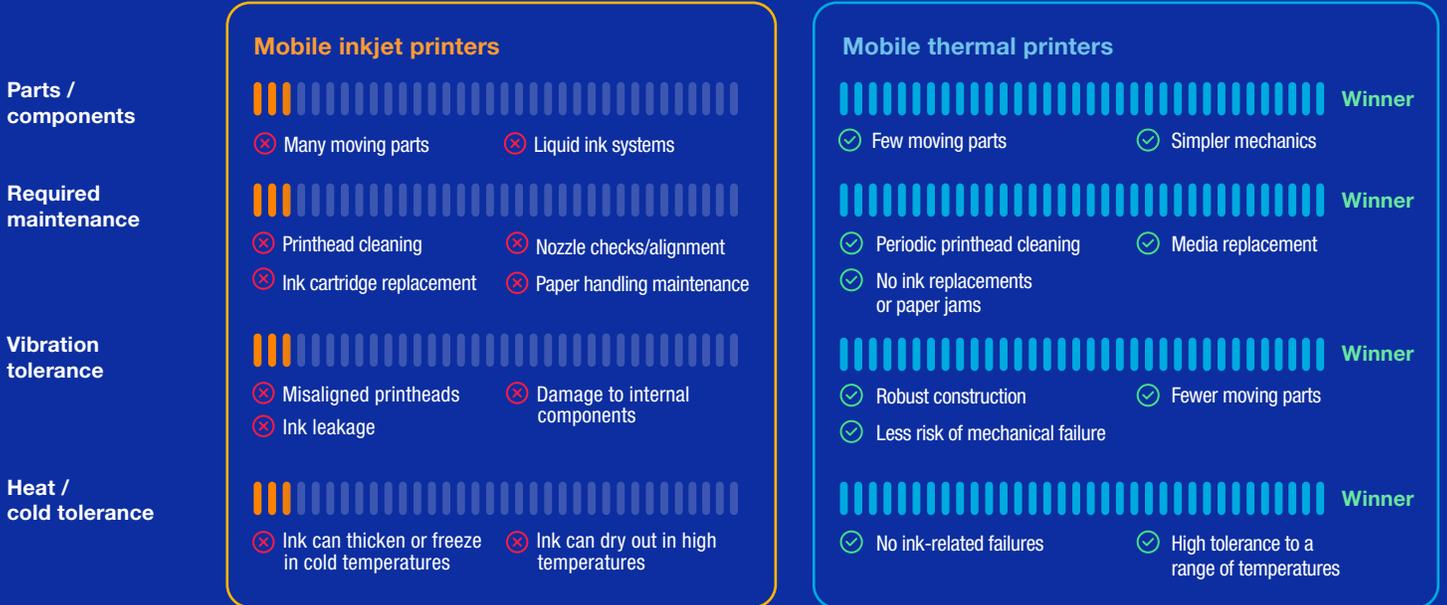
In mobile public sector environments, printer durability and maintenance requirements directly impact uptime, service continuity, and total cost of ownership. With fewer moving parts and no liquid ink systems, mobile thermal printers reduce mechanical complexity and routine maintenance demands. Their ability to withstand vibration, temperature extremes, and intermittent use makes them a more dependable choice for field operations where equipment must perform consistently with minimal intervention.

## Quality of output

In the field, print quality is measured less by visual richness and more by clarity, consistency, and durability over time. While inkjet printers can deliver high-resolution output under ideal conditions, thermal printers provide predictable, high-contrast results that resist smudging, moisture, and temperature-related degradation. For public sector applications where documents must remain legible despite handling and environmental exposure, thermal printing offers a clear advantage. When color output is a core requirement, however, inkjet technology remains the appropriate choice.

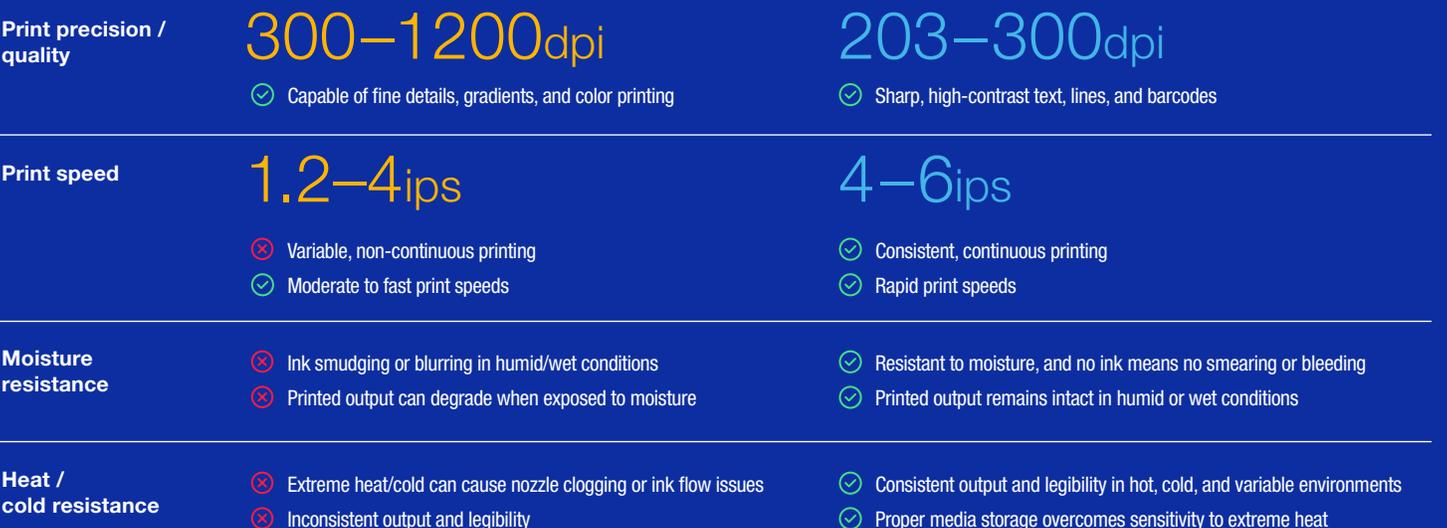
## Printer durability and maintenance

Mobile suitability



## Print quality and durability

Mobile suitability



## Mobility matters

True mobility requires equipment that is lightweight, energy efficient, and easy to deploy across vehicles, jobsites, and workflows. Mobile thermal printers are purpose-built for these conditions, offering compact designs, extended battery operation, and flexible mounting or carry options. By eliminating bulky ink systems and reducing power demands, thermal technology supports greater freedom of movement and more efficient field operations.

### Mobility

#### Mobile inkjet printers

#### Mobile thermal printers

##### Size / weight

3.5–6.7 lbs

- ⊗ Bulkier housing for components
- ⊗ Cartridge compartments add depth/weight
- ⊗ Heavier to carry

1.0–2.7 lbs

- ✓ Slimmer form factors
- ✓ No bulky cartridges
- ✓ Lighter weight

Winner

##### Power / energy efficiency

- ⊗ Moderate to high power consumption
- ⊗ Usually require AC power
- ⊗ Heavier to carry

- ✓ Low, consistent power consumption
- ✓ Extended battery life
- ✓ Rechargeable Li-ion battery options

Winner

##### Consumables

- ⊗ Ink cartridges require temperature-controlled storage
- ⊗ Performance and shelf life can be affected by extreme heat or cold

- ✓ Media can be stored and transported with fewer temperature constraints
- ✓ No liquid ink to degrade due to heat or freezing conditions

Winner

##### Mounting / carry options

- ⊗ Cannot operate in various orientations
- ⊗ Few ruggedized mounting kits available

- ✓ Consistent performance in any orientation
- ✓ Multiple mounting and carry options

Winner

## Cost considerations

#### Mobile inkjet printers

#### Mobile thermal printers

##### Initial acquisition cost



✓ Lower upfront purchase price



⊗ Higher upfront investment

Winner

##### Consumables over time



- ⊗ Frequent ink and cartridge replenishment
- ⊗ Higher long-term operating costs



- ✓ Fewer consumable replacements
- ✓ Lower long-term operating costs

Winner

##### Maintenance and service



- ⊗ More frequent maintenance and cleaning cycles



- ✓ Minimal routine maintenance

Winner

##### Downtime and productivity impact



- ⊗ Potential delays due to maintenance, ink issues, or environmental sensitivity



- ✓ Consistent uptime with fewer operational interruptions

Winner

##### Total cost of ownership (TCO)



- ⊗ Consumable, maintenance, and downtime costs can add up quickly over 3-5 years



- ✓ Initial cost can be recovered through fewer operating costs and improved productivity

Winner

Because cost is often one of the most influential considerations in technology decisions, it's important to take a look at upfront investment and total cost of ownership when evaluating mobile inkjet and thermal printers. Mobile inkjet printers typically have a lower initial price point, making them attractive for budget-conscious buyers. While mobile thermal printers generally cost more upfront, they can save workforces money in the longterm thanks to their significantly lower operating costs over time.

# The right printing technology for common public sector applications



## Inspection reports

✓ THERMAL

On-site inspection summaries and compliance documentation require fast, consistent printing to ensure accuracy and legibility in the field.



## Citations and enforcement notices

✓ THERMAL

Time-sensitive citations, warnings, and notices must print immediately and remain clear during roadside or in-field interactions.



## Permits, licenses, and certificates

✓ THERMAL

Temporary permits and regulatory documents issued on demand require predictable performance and minimal consumables to support efficient field workflows.



## Payment receipts and transaction records

✓ THERMAL

Receipts and transaction confirmations must print instantly and remain readable despite frequent handling or environmental exposure.



## Tags, labels, and field identification

✓ THERMAL

Labels for samples, equipment, or assets demand durable, high-contrast printing for tracking and barcodes in outdoor and mobile environments.



## Emergency response documentation

✓ THERMAL

Forms, instructions, and records produced during emergency response require dependable printing where power and connectivity may be limited.



## A clear path forward for mobile field printing

As more work takes place beyond traditional office settings, mobile printing technology must be evaluated through the lens of real-world field conditions. Across factors such as consumables management, durability, print reliability, mobility, and ease of integration, thermal printing consistently demonstrates advantages that align with the demands of mobile public sector operations.

By eliminating ink-related complexities and reducing maintenance requirements, mobile thermal printers help agencies lower operating costs while improving

reliability and readiness in the field. Their compact form factors, energy efficiency, and consistent performance in challenging environments make them a practical choice for departments that rely on timely, accurate documentation to carry out their missions.

For public sector organizations seeking a mobile printing solution that supports efficiency, resilience, and long-term value, mobile thermal printers – such as those available from Brother Mobile Solutions – offer a clear and proven path forward.



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## Explore public sector solutions

Discover leading mobile thermal printers that help you stay responsive, prepared, and productive in the field.

[See the printers](#)

## Try one for free

Put a mobile thermal printer from Brother to the test so you can experience the benefits firsthand.

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