

Environmental product data sheet

Zebra TC22R Integrated Handheld RFID Reader



Sustainability highlights

The TC22R Integrated Handheld RFID Reader from Zebra Technologies (Zebra) is packaged in 99% biodegradable materials and annually consumes 41% less energy than the United States Department of Energy (US DOE) Unit Energy Consumption threshold.

Life Cycle Assessment (LCA) methodology

Zebra performed an LCA in accordance with International Organization for Standardization 14040 and 14044 guidance. The functional unit of this study is one (1) TC22R Integrated Handheld RFID Reader used over an assumed five (5) year lifespan, and the system boundary extends from cradle to grave. Unless otherwise specified, environmental characterization factors are taken from the ecoinvent version 3.11 database accessed via SimaPro. The Global Warming Potential (GWP) 100 2021 v1.03 methodology from the Intergovernmental Panel on Climate Change is used to calculate the carbon footprint of the TC22R.

Data

Data was collected through various Zebra and supplier channels. Detailed assembly data consisting of over 10,000 lines of materials was obtained from the final assembly supplier, as well as facility energy consumption, which was normalized per one TC22R device. Use phase electricity consumption data was obtained by testing the product against the US DOE's 10 CFR Part 430, a battery charger consumption test at the system level. Open-source grid emissions data for 2025 from Carbon Database Initiative was used for country-specific electricity grid carbon intensity.

Results

The GWP from a single TC22R device, over its 5-year cradle-to-grave lifecycle, was estimated to be 146 kg CO₂e. See the pie chart to the right for a breakdown of impacts within the system boundary.

Assumptions and limitations

- Transportation of raw materials is modeled using "market for" datasets in ecoinvent.
- Packaging and transportation of subcomponent materials are not included due to lack of data availability.
- Waste disposal data during final assembly manufacturing was not made available by the associated supplier.
- Accessories (e.g., case) and charging materials are not included in this assessment.
- The battery (500 cycle life) is assumed to last five years, although everyday use of the device may deplete the battery life before five years, requiring new battery replacement by a Zebra repair facility. This would increase the total 5-year cradle-to-grave carbon footprint of a TC22R device to approximately 151 kg CO₂e.
- Impacts from cloud computing and associated data storage during product use are not included in this study.
- Impacts from use phase electricity consumption are modeled based on aggregated, country-specific characterization factors, weighted according to percentage of product sales within each country.
- The disposal scenario for this study was assumed to be 100% landfill, representing a conservative estimate of environmental impacts, despite the existence of Zebra's refurbishment and recycling programs.

Disclaimers

- This study represents an attributional LCA and does not evaluate consequential impacts.
- These LCA results are specific to Zebra's products and assumptions. LCAs vary widely by scope, data, and methodology; direct comparisons with other companies' LCAs may be misleading. Zebra does not endorse such comparisons and accepts no responsibility for interpretations beyond this context.
- This LCA is non-comparative and therefore does not trigger the requirements for a critical review as defined in ISO 14040, 14044, and 14071.
- Zebra is not responsible for the quality assurance and quality control of supplier-provided data.
- No normalization, grouping, or weighting of results were conducted.
- While GWP has been modeled in this LCA study, the results herein cannot be utilized to estimate or project impacts relating to other LCA impact metrics.
- Results described in this document are relative expressions and do not predict endpoint impacts, the exceeding of thresholds, safety margins, or risks.



Product carbon footprint

1. Use (6%)
2. Disposal (<1%)
3. Raw materials (12%)
4. Manufacturing (78%)
5. Packaging (<1%)
6. Downstream transportation (4%)

