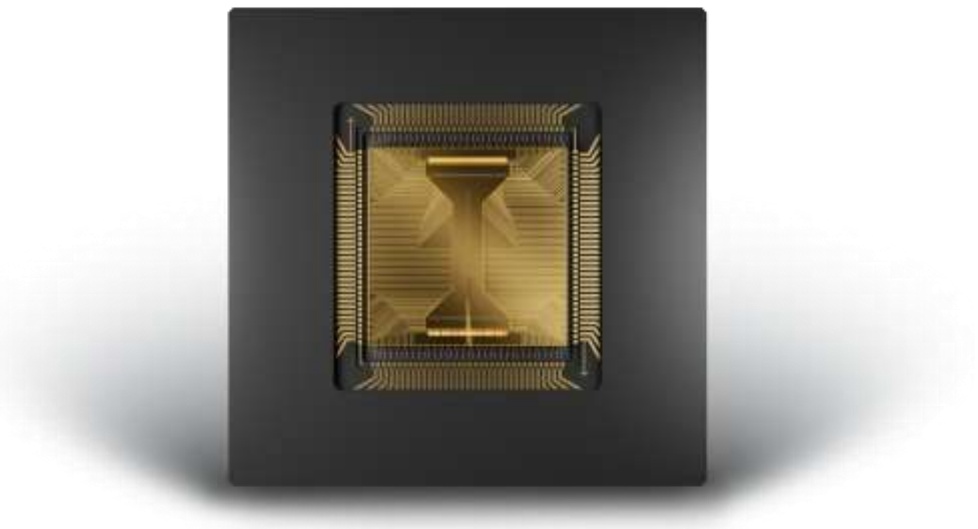
QUANTINUUM



Quantinuum System Model H1

Product Data Sheet

Version 8.0.1 June 09, 2025

INTRODUCTION

This Product Data Sheet covers all features and characteristics of the **Quantinuum System Model H1, Powered by Honeywell.**

FEATURES

- N ≥ 20 qubit trapped-ion based quantum computers
- All-to-all connectivity
- Laser based quantum gates
- Quantum charge-coupled device (QCCD) architecture with five parallel gate zones
- Mid-circuit measurement conditioned circuit branching
- Qubit reuse after mid-circuit measurement
- Native gate set: single-qubit rotations, two-qubit ZZ gates, arbitrary-angle ZZ gates, general SU(4) entangler
- TKET supported in the stack provides circuit optimization to all submitted circuits. Additional details on TKET options can be found in the Quantinuum Application Programming Interface (API) Specification.

SPECIFICATIONS

Table 1 lists the specifications for Quantinuum System Model H1. Machine-specific data can be found on the Performance Validation document and Quantinuum Hardware Specifications repository. The "*Typical*" column specifies the most representative infidelities during machine operation. The "*Max*" column specifies an upper bound on infidelities during machine operation. It is unlikely the infidelity during machine operation will be higher than the specified Max infidelity.

Table 1 Quantinuum H1-1 Specifications

System Fundamentals		
Parameters	**Typical**	**Max**
General		
Qubits	20	
Connectivity	All-to-all	
Parallel two-qubit operations	5	
Errors		
1-qubit gate infidelity	2×10^{-5}	2×10^{-4}
2-qubit gate infidelity	1×10^{-3}	3×10^{-3}
State preparation and measurement (SPAM) error	2×10^{-3}	5×10^{-3}
Memory error per qubit at average depth-1 circuit	2×10^{-4}	1×10^{-3}
Mid-circuit measurement cross-talk error	4×10^{-5}	2×10^{-4}

© 2025 by Quantinuum. All rights reserved.

SYSTEM OPERATION

The **Quantinuum System Model H1, Powered by Honeywell**, operates on qubits implemented through atomic hyperfine states of $^{171}Yb^{+}$. System Model H1 has twenty physical qubits (ions) that move, individually or in pairs, between five interaction zones where all quantum operations (initialization, measurement, single-, and two-qubit gates) are performed using lasers. By rearranging the physical location of the qubits, a two-qubit gate can be performed on any arbitrary pair, giving the system all-to-all connectivity. Additionally, because there are multiple interaction zones, multiple quantum operations may be performed in parallel.

Although the qubits are all identical, there may be differences in the errors associated with quantum operations depending on the location, i.e., interaction zone, in which the quantum operations take place, independent of the specific qubits that are in that location. However, the location for each quantum operation is determined by the compiler and may vary even for similar circuits, as each circuit is optimized to minimize the number of transport operations and the time required to run the circuit. The typical infidelities reported on this product data sheet are an average over all operational zones.

More details as well as a user guide can be found at: Quantinuum Systems documentation.

© 2025 by Quantinuum. All rights reserved.