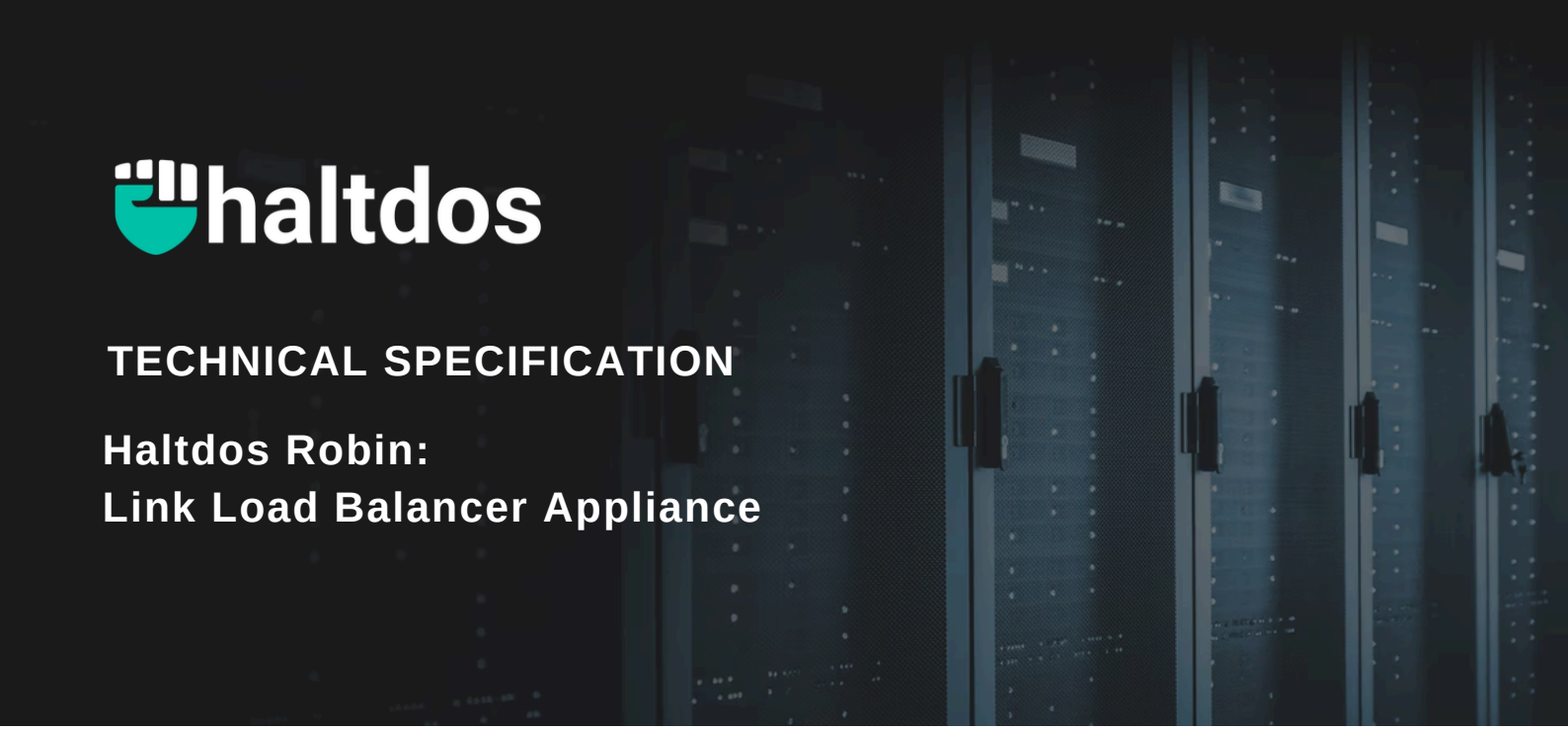

# TECHNICAL SPECIFICATION

## Haltdos Robin:
## Link Load Balancer Appliance

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### Fast . Scalable . Reliable

Haltdos hardware appliances deliver a hardened and scalable, reliable platform to power Haltdos solutions. Haltdos Hardware Appliances offer exceptional performance, allowing organizations to consolidate device management and address future bandwidth requirements. Haltdos appliances can manage heavy traffic loads without impacting application or network performance.

### Fault Tolerant Hardware Design

With multi-gigabit throughput, fail open interfaces, secure out-of-band management, and low latency, Haltdos appliances are high assurance, fast and easy to manage. To maximize system uptime, Haltdos appliances offer redundant, hot-swappable components including redundant power supplies and hard drives. In the event of a hardware failure, the redundant component will automatically take over, providing continuous system operations.

### Flexible Expansion Options to Address Unique Business Needs

The appliances are built on a common hardware platform with flexibility in mind. Haltdos appliances can be extended to provide remote, out-of-band management and monitoring, performance acceleration, and more with expansion modules. Expansion modules include:

- Network Cards (copper or optical)
- Hardware Security Module (HSM) (non-FIPS and FIPS-140-2)
- SSL acceleration card
- Disk Space & RAM


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# Product Specifications

| MITIGATION PERFORMANCE | HD-RBN-4100 | HD-RBN-4600 | HD-RBN-5100 | HD-RBN-5400 | HD-RBN-6200 |
|---|---|---|---|---|---|
| 1.1 Throughput Range | 4 Gbps | 24 Gbps | 48 Gbps | 64 Gbps | 120 Gbps |
| 1.2 Compression Throughput | 4 Gbps | 24 Gbps | 48 Gbps | 64 Gbps | 120 Gbps |
| 1.3 SSL Throughput | 4 Gbps | 20 Gbps | 40 Gbps | 50 Gbps | 100 Gbps |
| 1.4 TCP Connection Tracking | 1M - 4M | 4M - 10M | 10M - 15M | 25M - 35M | 35M - 50M |
| 1.5 SSL/TLS RSA 2K Rate (tps) | 22K | 40K | 40K | 100K | 100K |
| 1.6 SSL/TLS ECC Rate (tps) | 15K | 25K | 25K | 50K | 50K |
| 1.7 Latency | < 50 micro second | | | | |
| **HARDWARE SPECS** | | | | | |
| 2.1 Processor | Intel Xeon | | | | |
| 2.2 CPU Cores | 12 | 24 | 32 | 40 | 48 |
| 2.3 Memory* | 32 GB | 64 GB | 64 GB | 96 GB | 128 GB |
| 2.4 Hard Disk* | 256 GB SSD | 512 GB SSD | 1 TB SSD | 2 TB SSD | 2 TB SSD |
| 2.6 Additional Specs | Built-in TPM Chip and Hardware HSM for SSL offloading & compression optimization Option available for FIPS-140-2 (additional charge) or Non-FIPS compliant HSM | | | | |
| 2.7 Form Factor | 1U/2U Rack Mount Server (19 inch mounting) | | | | |
| 2.8 Operating Temperature & Humidity | 0 - 40 C with 8%-95% humidity (non-condensing) | | | | |
| 2.9 Power Supply and Fans | Redundant Power Supply (Hot Swappable)AC 170-240V,50 Hz and Redundant fans. | | | | |
| 2.10 Inspection Ports | | | | | |
| 1 GE Ports | 8 | 8 | 4 | - | - |
| 10 GE Ports | 2 | 4 | 4 | 8 | 8 |
| 25 GE Ports | - | - | - | - | - |
| 40 GE Ports | - | - | 2 | 2 | 4 |
| 100 GE Ports | - | - | - | - | - |
| 2.11 Out Of Band Ports | | | | | |
| 1 GE (RJ-45) Ports | 2 | 2 | 2 | 2 | 2 |
| Console (RS232/RJ45) Ports | 1 | 1 | 1 | 1 | 1 |
| HA Ports (RJ45/SFP/SFP+) | 1 | 1 | 1 | 1 | 1 |
| Input/Output (USB) | 2 | 2 | 2 | 2 | 2 |


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## Centralized Management

Depending upon the chosen deployment as standalone or cluster, Haltdos also offers a centralized management solution for management of Haltdos products. The centralized management is API first solution that comes in the following flavors:

- HD-MGT-ST: This model is a single tenant centralized management solution that supports only one license dedicated to a single customer.
- HD-MGT-MT: This model is a multi-tenant centralized management solution that supports multiple licenses that can be used by one or more customers.

Like the products, Haltdos Centralized Management solution can be deployed in Hardware or virtual form factor.

| **Standalone Virtual Models** | **Cluster Virtual Model** | **Throughput** (Mbps) |
|---|---|---|
| HD-VS-100 | HD-VM-100 | 100 |
| HD-VS-200 | HD-VM-200 | 200 |
| HD-VS-500 | HD-VM-500 | 500 |
| HD-VS-750 | HD-VM-750 | 750 |
| HD-VS-1000 | HD-VM-1000 | 1000 |
| HD-VS-2500 | HD-VM-2500 | 2500 |
| HD-VS-5000 | HD-VM-5000 | 5000 |
| HD-VS-7500 | HD-VM-7500 | 7500 |
| HD-VS-10000 | HD-VM-10000 | 10000 |


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# Product Specifications

## TECHNOLOGY & CERTIFICATION

| | | |
|---|---|---|
| **3.1** | **Platform & Technology** | Haltdos Platform (certified) with signature from Threat Intelligence & Machine Learning |
| **3.2** | **License** | Bandwidth capped license. Upgrade possible without hardware replacement up to max supported hardware bandwidth |
| **3.3** | **Additional Licenses** | Optional license for GSLB, WAF, DDoS, SSL VPN, SLB and DNS Firewall |
| **3.4** | **Certifications** | FCC, ROHS, CE compliant, Common Criteria EAL 2+, IPv6 Ready Gold certifications |
| **3.5** | **Support** | 24x7 via Online, Email, Telephone and Dedicated Account Manager |
| **3.6** | **Warranty** | 1 year warranty for software and hardware maintenance. Additional charges for extended warranty |
| **3.7** | **TAC Support** | TAC support in India |

## INTEGRATION FEATURES

| | | |
|---|---|---|
| **4.1** | **Security Tools Integration** | Support for integration with SAST/DAST/IAST tools. Integration with 3rd party Threat Intelligence (TI) feeds |
| **4.2** | **Storage and Export** | Local retention of logs, reports and events. Support for export to 3rd party storage |
| **4.3** | **NIMS Integration** | Support for SNMP, NTP / SNTP, DNS, Web Proxy integration |
| **4.4** | **3rd Party Integration** | Notification & Logging via SNMP, SMTP, SMS Gateway, and 3rd party integration via API hooks, CI/CD, Kubernetes |
| **4.5** | **SIEM Integration** | Support for integration with SIEM and Syslog services |
| **4.6** | **AAA Integration** | Support for integration via RADIUS and TACACS+ |
| **4.7** | **Identity Management** | Inbuilt with support for integration with AD / SAML / LDAP |
| **4.8** | **Hybrid DDoS Integration** | Support for integration with Haltdos Cloud Scrubbing or ISP clean pipe services |
| **4.9** | **Export IOCs** | Support for exporting attacking IOCs via STIX / TAXII |

## OPERATION MODE

| | | |
|---|---|---|
| **5.1** | **Network Operations** | Transparent L2 or Inline L3 |
| **5.2** | **Stateful Mode** | Stateful (Symmetric) or Stateless (Asymmetric) mode |
| **5.3** | **Supported Flow Ingestion** | Netflow v5, Netflow v9, sFlow, IPFIX |
| **5.4** | **Deployment Modes** | Offline (SPA port of Flow), Inline, Out-of-path |
| **5.5** | **IP Stack** | Dual IPv4 & IPv6 stack |
| **5.6** | **IP Fragmentation** | IP Defragmentation & TCP Stream assembly |
| **5.7** | **Jumbo Frames** | Yes |
| **5.8** | **Tunnelling Protocols** | VLAN, MPLS, GRE, L2TP, GTP, IPinIP |
| **5.9** | **Mitigation Modes** | Bypass, Record (Report Only), Learning, Mitigation (Block & Report) |
| **5.10** | **Networking** | VLAN, VXLAN, Link Aggregation & Trunking (LACP), Multiple Routing Tables, ARP Table etc |
| **5.11** | **Dynamic Routing** | BGP, OSFP, RIPv1/v2 |
| **5.12** | **Link Aggregation** | Support for link bundling via LACP |
| **5.13** | **Block Action** | Drop Packet, Terminate Connection (RST), Blacklist (temporary or permanent), Send Challenge (TCP, HTTP, DNS), Rate Limiting |


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## HIGH AVAILABILITY

| | | |
|---|---|---|
| **6.1** | Hardware Bypass | Internal or External |
| **6.2** | Software Bypass | Yes |
| **6.3** | Multiple Appliances | N + 1 Active - Active or Active – Passive (VRRP) with floating MAC |
| **6.4** | Management Modes | Standalone / Centralized Management (VM or appliance) |
| **6.5** | Secure Communication | Secure communication between centralized management and HA appliances for full state synchronization |

## MANAGEMENT FEATURES

| | | |
|---|---|---|
| **7.1** | Graphical User Interface (GUI) | Secure web interface over HTTPs with support for all modern browsers |
| **7.2** | Command Line Interface (CLI) | Command Line Interface over SSH or console port |
| **7.3** | System Management | IPMI 2.0 Compliant |
| **7.4** | Audit Trail, Logging & Recovery | Centralized logging of system, services, MIS, incidents. Built-in MIS with policy recovery |
| **7.5** | RBAC Administration | Configurable user profiles with role based access control |
| **7.6** | Policy Management | On the fly configuration updates on mitigation appliances |
| **7.7** | Dashboards & Reporting | Real-Time & historical dashboards with custom duration. Support for custom dashboards. Status dashboard for 1-click health check. Periodic daily, weekly or monthly reports in PDF or Excel |
| **7.8** | API integration | Yes (XML or JSON) |
| **7.9** | Events / Alerts | Detailed event and alert reporting on attack, health, etc. |
| **7.10** | Backup, Restore & Snapshots | Automatic or manual backup and restore. CLI tool for pushing current snapshot to Haltdos Cloud for diagnostics |
| **7.11** | Certificate Management | SSL/TLS certificate management with support for Let's Encrypt certificate generation |
| **7.12** | Network Forensics | Network forensic with packet capture and traceroute. Built-in utilities for investigating attacks, payloads and managing false positives |
| **7.13** | Updates | Periodic threat intel updates (Signatures, Geo IP, Bad IP, TOR IP, Anon Proxy, etc.) from Haltdos. Update and upgrade management on version releases and patch updates from Haltdos. Support for multiple OS Templates |

## LLB FEATURES (ADDITIONAL LICENCING)

| | | |
|---|---|---|
| **8.1** | **NAT Rules** | Support for static NAT, dynamic NAT, SNAT, DNAT, PAT, Full NAT |
| **8.2** | **Health Monitoring** | Link monitoring with instant failover (<1s). Support for TCP, HTTP, DNS, ICMP or script based monitoring |
| **8.3** | **Routing Rules** | Custom rules for Static and Policy based routing |
| **8.4** | **Dual Stack Lite** | Support for NAT 46 / 64 and DNS 46 / 64 with DNS Proxy |
| **8.5** | **Traffic Shaping** | Traffic shaping and QoS on inbound and outbound links |
| **8.6** | **Load Balancing & Path Selection** | Round robin (RR), weighted round robin, minimum packet loss, persistent hash, tuneable hash, least connections, least response time, least bandwidth, etc. Path selection based on jitter, packet loss, latency, etc. |

## GSLB FEATURES (ADDITIONAL LICENSING)

| | | |
|---|---|---|
| **9.1** | **Global Load Balancing** | Routing traffic across multiple data centers based on health checks |
| **9.2** | **WAN load Balancing** | Outbound WAN link selection based on link health |


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| | | |
|---|---|---|
| **9.3** | **Operation Mode** | Option for Authoritative or Recursive operational modes |
| **9.4** | **Routing Rules** | Custom rules for Static and Policy based routing |
| **9.5** | **Network Mode** | Support DNS over HTTP, UDP, TCP & SSL as well as DNSSEC |
| **9.6** | **DNS Firewall** | Protecting DNS infrastructure from bot attacks |
| **9.7** | **Load Balancing Algorithm** | Outbound WAN link selection based on link health |
| **9.8** | **Blacklist / Whitelist** | Support for permanent Blacklisting and Whitelisting based on IP, IP prefix, domain, country, etc |
| **9.9** | **Custom Signature** | Support for user defined custom rules with support for pattern, suffix, domain, etc. |

**ANTI-DDoS FEATURES (ADDITIONAL LICENSING)**

| | | |
|---|---|---|
| **10.1** | **Comprehensive Security** | Layer 3 to Layer 7 protection covering Network, Protocol, Application, Reflection / Amplification and 0-day DDoS attacks |
| **10.2** | **Block Actions** | Drop Packet, Terminate Connection (RST), Blacklist (temporary or permanent), Send Challenge (TCP, HTTP, DNS), Rate Limiting |
| **10.3** | **Hybrid DDoS Integration** | Support for integration with Haltdos Cloud Scrubbing or ISP clean pipe services |
| **10.4** | **Bi-Directional** | Support for both inbound and outbound traffic protection |
| **10.5** | **Deep Packet Inspection** | Protection against malformed packets (TCP, UDP, ICMP, Ping of death, DNS, HTTP, SIP, SNMP, IPv4, IPv6, Fragmented packets, etc.) |
| **10.6** | **Enforce RFC Compliance** | Protection against misbehaving clients sending invalid or out of state packets |
| **10.7** | **Bot Protection** | Automatic detection and blocking of bot traffic with support for manual bot policy |
| **10.8** | **Behavior Analysis** | Network behavior analysis for anomaly detection and packet scoring technology |
| **10.9** | **Multiple Security Profiles** | Support for multiple security profiles for enforcing different policy for different sub - networks (Src, Dst IP Prefix, VLAN). Default Global security profile |
| **10.10** | **Port Mirroring** | Mirror traffic / specific traffic to another NIC port |
| **10.11** | **Rate Limit & QoS Management** | Rate limit capability for bandwidth and QoS management with option for rate limit of specific traffic (based on proto, src, dst, etc.) |
| **10.12** | **Blacklist / Whitelist** | Support for temporary or permanent Blacklisting and Whitelisting based on IP, IP prefix, domain, country, etc |
| **10.13** | **Malicious Source Protection** | Protection against TOR IP, Bad Reputation IP, dark IP, known Bots, proxies, spammers provided by Haltdos or user defined threat intel |
| **10.14** | **Custom Signatures** | Support for user defined custom rules with support for REGEX and byte matching |
| **10.15** | **SYN Flood Protection** | TCP SYN flood protection with SYN Proxy and connection aging |
| **10.16** | **Challenge & Response** | Support for TCP, HTTP, DNS challenge and response for validation of traffic from suspicious sources |
| **10.17** | **Connection Based Protection** | Protection against TCP connection DDoS attacks such as sockstress, connection / src, zombie flood, SSL renegotiations, etc |
| **10.18** | **DNS Protection** | Built-in DNS firewall capability for protecting DNS infrastructure against DNS DDoS attacks (Water Torture, NXDomain, etc.) |


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| | | |
|---|---|---|
| **10.19** | **L7 DDoS Protection** | Protection against low & slow attacks such as Slowloris, R.U.D.Y., slow HTTP GET / POST, etc |
| **10.20** | **Machine Learning Protection** | Automatic learning counter measures and dynamic signature creation upon attack detection |
| **10.21** | **Signatures for Known Vulnerabilities** | Built-in rules for known vulnerabilities (server, web, mail, FTP, SIP, SQL, DNS, etc.) |
| **10.22** | **DDoS Protection & Mitigation** | Attack detection & mitigation in less than 18s and 10s respectively. |

## HARDWARE FLEXIBILITY

Haltdos appliances are built on a common hardware platform with flexibility in mind. The appliances can be extended to provide remote, out-of-band management and monitoring, performance acceleration, and more with expansion modules

**Expansion Module includes:**

- Network Cards (copper or optical)
- Hardware Security Module (HSM) (non-FIPS and FIPS-140-2)
- SSL acceleration card
- Hard Disk & RAM

### Hard Disk

| | | |
|---|---|---|
| **11.1** | HD-DSK-128G-SSD | 128 GB SSD Hard Disk |
| **11.2** | HD-DSK-256G-SSD | 256 GB SSD Hard Disk |
| **11.3** | HD-DSK-512G-SSD | 512 GB SSD Hard Disk |
| **11.4** | HD-DSK-1T-SSD | 1 TB SSD Hard Disk |
| **11.5** | HD-DSK-1T-HDD | 1 TB HDD Hard Disk |
| **11.6** | HD-DSK-2T-HDD | 2 TB HDD Hard Disk |
| **11.7** | HD-DSK-4T-HDD | 4 TBHDD Hard Disk |

### SSL Cards

| | Part Code | Throughput | | SSL TPS | |
|---|---|---|---|---|---|
| **12.1** | HD-SSL-25G | SSL | 25 Gbps | RSA | 40 |
| | | Compression | 20 Gbps | ECC | 25K |
| **12.2** | HD-SSL-50G | SSL | 50 Gbps | RSA | 95K |
| | | Compression | 37 Gbps | ECC | 48K |


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## NIC Cards

| 11.1 | Part Code | Description | Copper/Fiber | Hardware Bypass |
|---|---|---|---|---|
| 11.2 | HD-NIC-1x4C | Quad Port 1 Gbps | Copper | No |
| 11.3 | HD-NIC-1x4CB | Quad Port 1 Gbps | Copper | Yes |
| 11.4 | HD-NIC-1x4F | Quad Port 1 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.5 | HD-NIC-10x2C | Dual Port 10 Gbps | Copper | No |
| 11.6 | HD-NIC-10x2CB | Dual Port 10 Gbps | Copper | Yes |
| 11.7 | HD-NIC-10x2F | Dual Port 10 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.8 | HD-NIC-10x2FB | Dual Port 10 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.9 | HD-NIC-10x4F | Quad Port 10 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.10 | HD-NIC-10x4FB | Quad Port 10 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.11 | HD-NIC-25x2F | Dual Port 25 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.12 | HD-NIC-25x2FB | Dual Port 25 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.13 | HD-NIC-25x4F | Quad Port 25 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.14 | HD-NIC-25x4FB | Quad Port 25 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.15 | HD-NIC-40x2F | Dual Port 40 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.16 | HD-NIC-40x2FB | Dual Port 40 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.17 | HD-NIC-40x4F | Quad Port 40 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.18 | HD-NIC-40x4FB | Quad Port 40 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.19 | HD-NIC-100x2F | Dual Port 100 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.20 | HD-NIC-100x2FB | Dual Port 100 Gbps | Fiber (Single / Multi-Mode) | Yes |
| 11.21 | HD-NIC-100x4F | Quad Port 100 Gbps | Fiber (Single / Multi-Mode) | No |
| 11.22 | HD-NIC-100x4FB | Quad Port 100 Gbps | Fiber (Single / Multi-Mode) | Yes |

## RAM

| | | |
|---|---|---|
| 12.1 | HD-RAM-8G | 8 GB DDR4 RAM |
| 12.2 | HD-RAM-16G | 16 GB DDR4 RAM |
| 12.3 | HD-RAM-32G | 32 GB DDR4 RAM |
| 12.4 | HD-RAM-64G | 64 GB DDR4 RAM |


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