

## SPARC T5 PROCESSOR

### SPARC T5 KEY FEATURES

- Integrated and scalable enterprise server compute engine
- 16 SPARC V9 cores with full binary compatibility
- Private 128K Level 2 Cache per core and shared 8MB Level 3 Cache
- Supports up to 128 compute threads
- Dual integrated PCIe 3.0 ports on-chip
- Cryptographic Instruction Accelerators integrated in the pipeline
- Solaris OS compatibility guaranteed

### KEY BENEFITS

- Seamless 2x performance improvement when moving a binary from previous generation
- Scales to cost-effectively meet needs of growing data center requirements
- Integrated crypto provides wire speed security capabilities without performance penalties
- Built-in virtualization technology enables dynamic scaling and resource utilization for simpler operations
- On-chip networking functionality to drive high capacity network-intensive content and eliminate storage bottlenecks



*Oracle's SPARC T5 processor is the industry's most scalable multi-thread, multi-core processor – doubling the compute cores and threads while delivering more than twice the performance of its predecessor.*

### SPARC T5 Processor Overview

The SPARC T5 processor drives performance and scalability to new heights, offering twice the performance over the previous generation while doubling the number of cores to deliver an unprecedented amount of computing resources in a power efficient design. Featuring sixteen complex cores, 128 threads, dedicated 128K L2 cache per core, 8MB shared L3 cache, and a higher frequency (3.6GHz) clock, the SPARC T5 delivers the horsepower demanded by next generation datacenter applications. The SPARC T-5 processor has a new high performance directory based protocol which enables T5 systems to scale to eight sockets without any additional silicon needed to maintain memory coherence links. Combined with a new high-bandwidth memory controller, advanced reliability algorithms, the latest generation PCIe 3.0 interfaces, and cutting-edge power management features, SPARC T5 is the ideal platform for running any application in your data center and can scale to meet any workload.

In addition to outstanding multithreaded performance, the SPARC T5 processor offers exceptional single-thread performance as well. In particular, the processor has a robust out-of-order, dual-issue processor core that is heavily threaded among eight strands. The core of the SPARC T5 has a 16-stage integer pipeline to achieve high operating frequencies, advanced branch prediction to mitigate the effect of a deep pipeline, and dynamic allocation of processor resources to threads. This allows the SPARC T5 processor to achieve very high single-thread performance while simultaneously scaling to high levels of throughput.

The SPARC T5 processor was designed from the ground up with security as a focus and has Crypto Instruction Accelerators integrated directly into each processor core. These accelerators enable high-speed encryption for over a dozen industry standard ciphers including DES, 3DES, AES, SSL, and RSA. By integrating encryption capabilities directly inside the instruction pipeline the SPARC T5 processor eliminates the performance and cost barriers typically associated with secure computing.

The SPARC T5 processor includes new advanced power management features such as dynamic voltage and frequency scaling (DVFS), per core-pair cycle skip, coherence link power savings modes, and memory interface power saving modes – which means that power consumption will scale with the work load.

The SPARC T5 processor is a revolutionary new design that elevates multi-thread, multi-core processor technology to an unprecedented levels of performance and reliability. By integrating system level features directly onto the silicon, applications perform more efficiently while

overall system reliability is improved due to reduced part count in the server. By leveraging the unique, no-cost capabilities of Solaris Zones and Oracle VM 3.1 for SPARC, the SPARC T5 processor enables customers to run up to 128 domains on one processor to save on hardware costs while minimizing operational complexity.

### SPARC T5 Processor Features and Specifications

#### Processor Features

- 16 SPARC V9 cores
- Die size 478 mm<sup>2</sup>
- Frequency: 3.6 GHz
- 28nm process technology
- Up to 128 threads per CPU
- Up to 16 DDR3 DIMMs per T5 supporting DDR3 1066 MHz memory
- Scalability up to 8 sockets with no additional silicon necessary to maintain memory coherency links
- Cryptographic Instruction Accelerators in each core are directly accessible through non-privileged access crypto instructions
- 8 MB, 8 banked, Level 3 Cache
- Dual PCI Express 3.0 x8 interfaces integrated in silicon
- On-chip Encryption Instruction Accelerators with direct non-privileged support for 16 industry-standard cryptographic algorithms plus random number generation in each of the sixteen cores: AES, Camellia, CRC32c, DES, 3DES, DH, DSA, ECC, Kasumi, MD5, RSA, SHA-1, SHA-224, SHA-256, SHA-384, SHA-512

#### T5 Core Specifications

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• 15.4 mm<sup>2</sup> core size</li> <li>• 8 threads</li> <li>• Sophisticated branch predictor</li> <li>• Hardware data prefetcher</li> </ul> | <ul style="list-style-type: none"> <li>• 128 KB Level 2 unified cache per core</li> <li>• 16 KB Level 1 D-cache and 16 KB Level 1 I-cache</li> <li>• 2 out-of-order integer execution pipelines, one floating-point unit (FGU), and cryptographic stream-processing integrated in the pipeline</li> </ul> |
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### Oracle Hardware Warranty

Visit <http://www.oracle.com/us/support/policies/index.html> for more information about Oracle's hardware warranty for the SPARC T5 processor.

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