

5th Generation Intel® Core™ Processor Mobile Series

Application Power Guidelines Addendum

Supporting the 5th Generation Intel® Core™ Processor Series Based on the H-Processor Lines

June 2015

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Revision History

Date	Revision	Description
June 2015	001	Initial release

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1.0 Introduction

This document provides power numbers for the 5th Generation Intel® Core™ Processor Series for mobile processors while running real life applications. This document supplements the specifications published in the product datasheet.

Use these Application Power Guidelines for reference purposes only. The power data elements provided in this document are not design points or technical specifications and should not be used as such.

Table 1 provides definitions for Application Power Guidelines terms and acronyms used in this document.

1.1 Terminology

Table 1. Terminology

Term	Description
APG	Application Power Guidelines
NDA	Non-Disclosure Agreement
SKU	Stock Keeping Unit
TAT	Thermal Analysis Tool
TDP	Thermal Design Power

1.2 Reference Documents

Refer to the documents in Table 2 for the titles and locations of key related technical documents.

Table 2. Reference Documents

Document	Document Number
Intel® Embedded Application Power Guideline Whitepaper	324759
Intel® Embedded Application Power Guidelines Refresh Whitepaper	554966
5th Generation Intel® Core™ Processor Family and Intel® Core™ M Processor Family External Design Specification (EDS) – Volume 1 of 2	514405
5th Generation Intel® Core™ Processor Family, Intel® Core™ M Processor Family, and Broadwell H-Processor (2-chip) External Design Specification (EDS) – Volume 2 of 2	514525
Haswell Mobile Platform - Design Guide *Haswell 6 Layer Mobile Platform – Design Guide*	486713 486714
Intel® Broadwell Client Platform Thermal Management Design Guide	524987

NOTE: Contact your local Intel representative(s) for the most recent revision of these documents

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2.0 Application Power Guidelines

The Application Power Guidelines (APG) data listed in this document are intended to reflect the typical use conditions. Factors such as temperature, platform configuration, and other variables can influence power usage. Specific information about the platforms and test configurations is provided to enable a repeatable power measurement.

2.1 Intel® Xeon® Processor E3-1278LV4 Application Power Guidelines

Figure 1 indicates the Application Power Guidelines for various embedded applications for the Intel® Xeon® Processor E3-1278LV4 with a 47W TDP specification.

Figure 1. Intel® Xeon® Processor E3-1278LV4 Application Power Guidelines

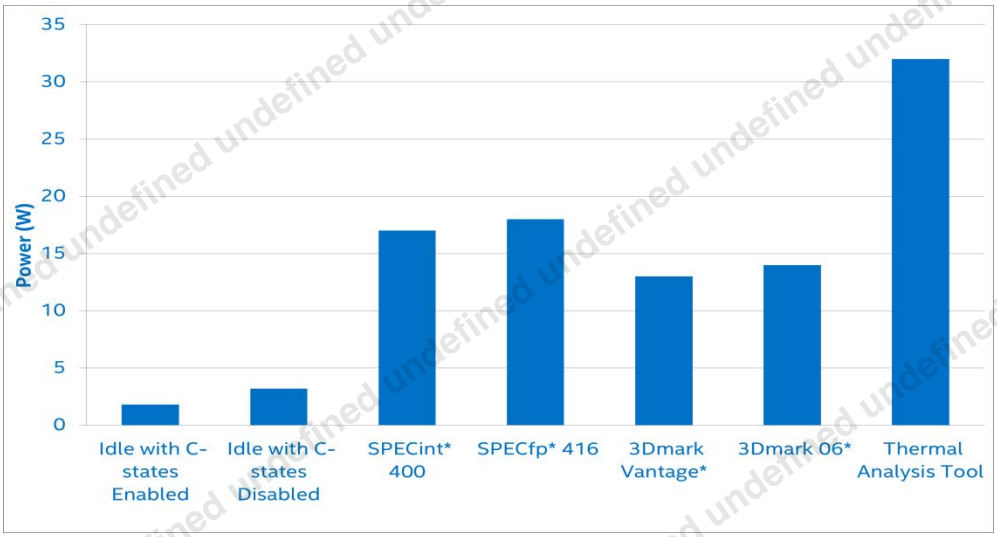


Table 3. Intel® Xeon® Processor E3-1278LV4 Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	1.8	21
Idle with C-states Disabled	3.2	22
SPECint* 400	17	34
SPECfp* 416	18	36
3DMark Vantage*	13	30
3DMark06*	14	30
Thermal Analysis Tool	32	46

NOTES:

1. Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause results to vary. Consult additional information and performance tests to fully evaluate all potential purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.
2. Test Configuration: Presented results are from a single sample. The data was not post-processed to account for part-to-part variation. Intel internal testing as of May 2015.
3. Platform: Intel® Xeon® Processor E3-1278LV4 Processor with QM87 chipset.
4. BIOS Revision: BDW.E1R1.86C.0118.R01.1503110617.
5. Memory: 4x 2GB 1Rx8 PC3-10600E-09-11-C1 DDR3 DIMMS 1333MHz.
6. Operating System: Windows 7* x64 and Linux* Ubuntu* 12.04 64 bit (kernel 3.11.0-15-generic).
7. Additional Configuration details are listed Section 3 Configuration and Disclaimer.

2.2 Intel® Xeon® Processor E3-1258LV4 Application Power Guidelines

Figure 2 indicates the Application Power Guidelines for various embedded applications for the Intel® Xeon® Processor E3-1258LV4 with a 47W TDP specification.

Figure 2. Intel® Xeon® Processor E3-1258LV4 Application Power Guidelines

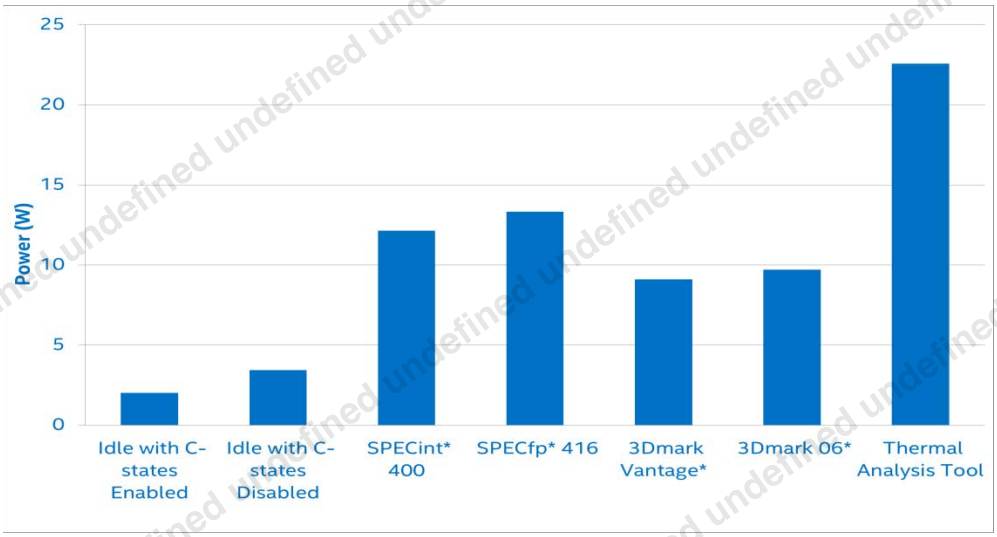


Table 4. Intel® Xeon® Processor E3-1258LV4 Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	2.0	21
Idle with C-states Disabled	3.4	23
SPECint* 400	12.1	30
SPECfp* 416	13.3	31
3DMark Vantage*	9.1	29
3DMark06*	9.7	29
Thermal Analysis Tool	22.6	40

NOTES:

1. Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause results to vary. Consult additional information and performance tests to fully evaluate all potential purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.
2. Test Configuration: Presented results are from a single sample. The data was not post-processed to account for part-to-part variation. Intel internal testing as of May 2015.
3. Platform: Intel® Xeon® Processor E3-1258LV4 with QM87 Chipset.
4. BIOS Revision: BDW.E1R1.86C.0118.R01.1503110617.
5. Memory: 4x 2GB 1Rx8 PC3-10600E-09-11-C1 DDR3 DIMMS 1333MHz.
6. Operating System: Windows 7* x64 and Linux* Ubuntu* 12.04 64 bit (kernel 3.11.0-15-generic).
7. Additional Configuration details are listed Section 3 Configuration and Disclaimer.

2.3 Intel® Core™ Processor i7-5850EQ Application Power Guidelines

Figure 3 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i7-5850EQ with a 47W TDP specification.

Figure 3. Intel® Core™ Processor i7-5850EQ Application Power Guidelines

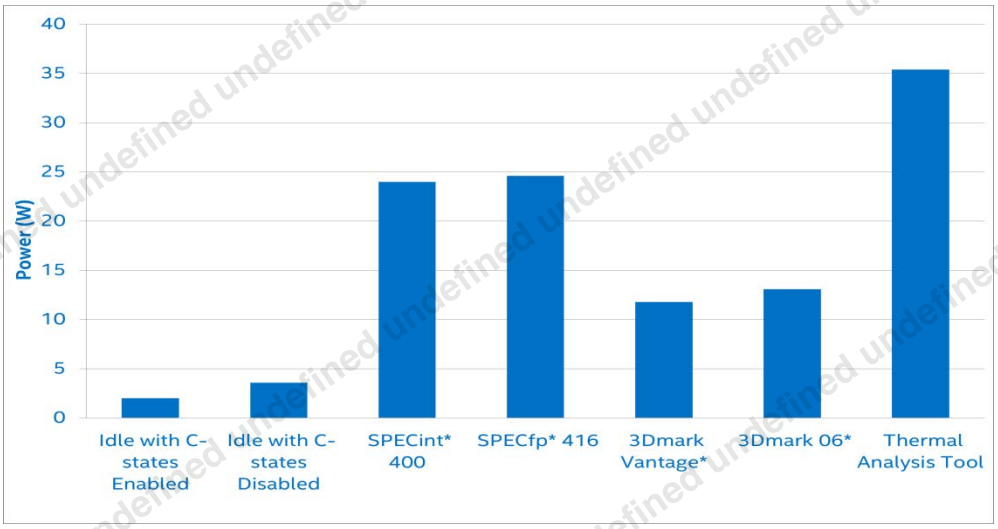


Table 5. Intel® Core™ Processor i7-5850EQ Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	2.0	23
Idle with C-states Disabled	3.6	24
SPECint* 400	24.0	41
SPECfp* 416	24.6	45
3DMark Vantage*	11.8	31
3DMark06*	13.1	31
Thermal Analysis Tool	35.4	56

1. Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause results to vary. Consult additional information and performance tests to fully evaluate all potential purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.
2. Test Configuration: Presented results are from a single sample. The data was not post-processed to account for part-to-part variation. Intel internal testing as of May 2015.
3. Platform: Intel® Xeon® Processor E3-1258LV4 with QM87 Chipset.
4. BIOS Revision: BDW.E1R1.86C.0118.R01.1503110617.
5. Memory: 4x 2GB 1Rx8 PC3-10600E-09-11-C1 DDR3 DIMMS 1333MHz.
6. Operating System: Windows 7* x64 and Linux* Ubuntu* 12.04 64 bit (kernel 3.11.0-15-generic).
7. Additional Configuration details are listed Section 3 Configuration and Disclaimer.

2.4 Intel® Core™ Processor i7-5700EQ Application Power Guidelines

Figure 4 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i7-5700EQ with a 47W TDP specification.

Figure 4. Intel® Core™ Processor i7-5700EQ Application Power Guidelines

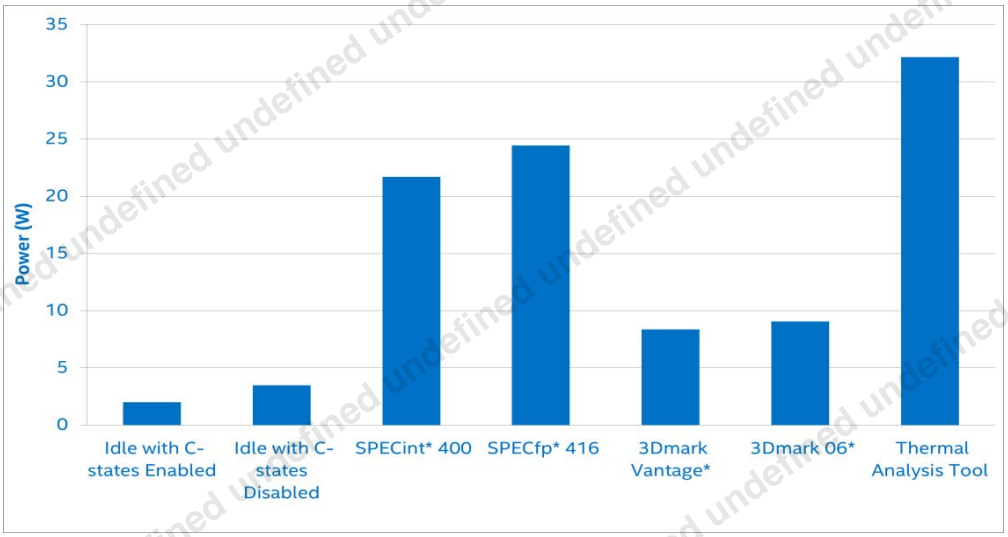


Table 6. Intel® Core™ Processor i7-5700EQ Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	2.0	22
Idle with C-states Disabled	3.5	25
SPECint* 400	21.7	42
SPECfp* 416	24.4	45
3DMark Vantage*	8.4	29
3DMark06*	9.0	29
Thermal Analysis Tool	32.2	54

NOTES:

1. Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause results to vary. Consult additional information and performance tests to fully evaluate all potential purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.
2. Test Configuration: Presented results are from a single sample. The data was not post-processed to account for part-to-part variation. Intel internal testing as of May 2015.
3. Platform: Intel® Core™ i7-5700EQ Processor with QM87 chipset.
4. BIOS Revision: BDW.E1R1.86C.0094.R01.140132152.
5. Memory: 4x 2GB 1Rx8 PC3-10600E-09-11-C1 DDR3 DIMMS 1333MHz.
6. Operating System: Windows 7* x64 and Linux* Ubuntu* 12.04 64 bit (kernel 3.11.0-15-generic).
7. Additional Configuration details are listed Section 3 Configuration and Disclaimer.

3.0 Configuration and Disclaimer

Values presented represent a typical or average processor SKU and do not guarantee that a customer will achieve these exact values for each silicon sample. These values are not intended to replace TDP, nor are they intended to be used for reliability assessments. Individual test results may vary.

Software and workloads used in performance tests may have been optimized for performance only on Intel® processors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. Consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

3.1 Application Power Guidelines Configuration

The following list defines the Application Power Guidelines Configuration.

- The results presented in this document are collected on a single sample. The data has not been post processed to account for part-to-part variation.
- Platforms:
  - Platform 1: Intel® Xeon® E3-1278LV4 with QM87 chipset
  - Platform 2: Intel® Xeon® E3-1258LV4 with QM87 chipset
  - Platform 3: Intel® Core™ i7-5850EQ with QM87 chipset
  - Platform 4: Intel® Core™ i7-5000EQ with QM87 chipset
- BIOS Revision: BDW.E1R1.86C.0094.R01.140132152.
- Memory: 4x 2GB 1Rx8 PC3-10600E-09-11-C1 DDR3 DIMMS 1333MHz
- Windows* Benchmarks: 3DMark* 06, 3DMark* Vantage, Thermal Analysis Tool (TAT) (rev 5.0.1010 IA-70%+GFX-100%).
- Linux* Ubuntu* Benchmarks: SPEC* CPU2006v1.2 (SPECint* 400.Perlbench, SPECfp* 416.Gamess) with supporting SSE42, AVX, and AVX 2.0 binaries.
- The Intel® Turbo Boost Technology for the Intel® Architecture (IA) was disabled in the BIOS for all Platforms. In the Operating System, “Power Saver” was selected in the Power options under the control panel options. The “Power saver” option was also selected, for idle measurement with C-states disabled.
- The Application Power Guideline testing was conducted by Intel.
- For more information, go to http://www.intel.com/performance.



3.2 Additional Considerations

The following list details additional key relevant considerations.

- In the case of any conflicting information, the datasheet supersedes this document.
- The temperature values are mean temperatures measured through the duration of the test.
- Application Power Guidelines Configuration data are provided for repeatability of the test.
- SPEC CPU2006* is an industrial standard benchmark designed to provide performance measurements that can be used to compare compute-intensive workloads on different computer systems. The SPEC CPU2006* test on Intel® microprocessors is measured using particular, well-configured systems. These results may or may not reflect the relative performance of Intel® microprocessors in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering to purchase. For more information about SPEC CPU2006* visit http://www.spec.org/cpu2006/.
- 3DMark06* is a 3D graphics benchmark, designed for DirectX* 9.0. It includes four graphics tests, two CPU tests, and several feature tests. The CPU tests measure the contribution of the processor on a 3D graphical, while the graphics test measures game simulation performance. Power was measured while running Graphic Test 1: Return to Proxycon. For more information about 3DMark06* visit http://www.futuremark.com/benchmarks/3dmark/all.
- 3DMarkVantage* is a 3D graphics benchmark, designed for DirectX*10. It includes two graphics tests, two CPU tests, and six feature tests. The CPU test covers physics simulation and artificial intelligence while the graphics test measures various visual techniques. Power was measured while running Graphic Test 1- Jane Nash in the performance preset. For more information about 3Dmark06 please visit www.futuremark.com/benchmarks/3dmark-vantage.
- Thermal Analysis Tool (TAT) is developed by Intel to generate TDP-like workloads on a system. A Non-Disclosure Agreement (NDA) is required for usage.
- The idle power reported above is while displaying the Windows* desktop screen.

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