

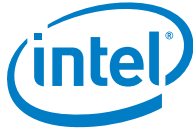
# Mobile 6th Generation Intel® Core™ Processor Series

## Application Power Guidelines Addendum

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Supporting the 6th Generation Intel® Core™ Processor Series Based on the H-Processor  
Lines

*September 2015*



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## Revision History

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Date	Revision	Description
September 2015	001	Initial release

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## 1.0 Introduction

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This document provides power numbers for the 6th 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 links to key related technical documents.

**Table 2. Reference Documents**

Document	Document Number
<a href="#"><u>Intel® Embedded Application Power Guideline Whitepaper</u></a>	324759
<a href="#"><u>Intel® Embedded Application Power Guidelines Refresh Whitepaper</u></a>	554966
<a href="#"><u>6th Generation Intel® Core™ Processor Family External Design Specification (EDS) – Volume 1 of 2</u></a>	544924
<a href="#"><u>6th Generation Intel® Core™ Processor Family External Design Specification (EDS) – Volume 2 of 2</u></a>	544925
<a href="#"><u>IOTG Embedded Skylake Processor Desktop and Mobile Platform External Design Specification Addendum (EDS)</u></a>	557315
<a href="#"><u>Skylake H Platform Design Guide Based on Skylake H Processor</u></a>	546884
<a href="#"><u>Skylake Mobile Thermal Mechanical Design Guide For Embedded Applications</u></a>	554457

**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 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® Core™ Processor i7-6820EQ Application Power Guidelines

Figure 1 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i7-6820EQ with a 45W TDP specification.

Figure 1. Intel® Core™ Processor i7-6820EQ Application Power Guidelines

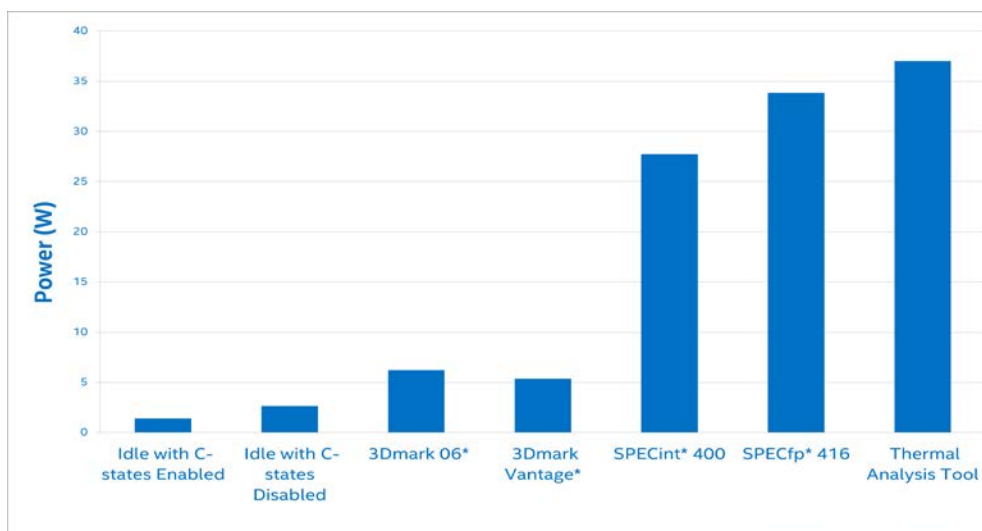
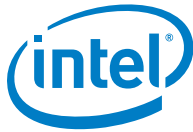


Table 3. Intel® Core™ Processor i7-6820EQ Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	1.4	20
Idle with C-states Disabled	2.6	21
3DMark06*	6.2	26
3DMark Vantage*	5.4	26
SPECint* 400	27.7	49
SPECfp* 416	33.8	54
Thermal Analysis Tool	37.0	60

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. A 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 August 2015.
3. Platform: Intel® Core™ Processor i7-6820EQ Processor with HM170 chipset.
4. BIOS Revision: SKLSE2R1.R00.X089.B00.1506170220
5. Memory: 4GB 1RX8 PC4-2133P-SAP-10 DDR4 DIMMS - MTA8ATF51264HZ-2G1A1
6. Operating System: Windows 8.1\* x64 and Linux\* Ubuntu\* 12.04 64 bit (kernel 3.11.0-26-generic).
7. Additional configuration details are listed in [Section 3.0 Configuration and Disclaimer](#).

## 2.2 Intel® Core™ Processor i7-6822EQ Application Power Guidelines

Figure 2 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i7-6822EQ with a 25W TDP specification.

Figure 2. Intel® Core™ Processor i7-6822EQ Application Power Guidelines

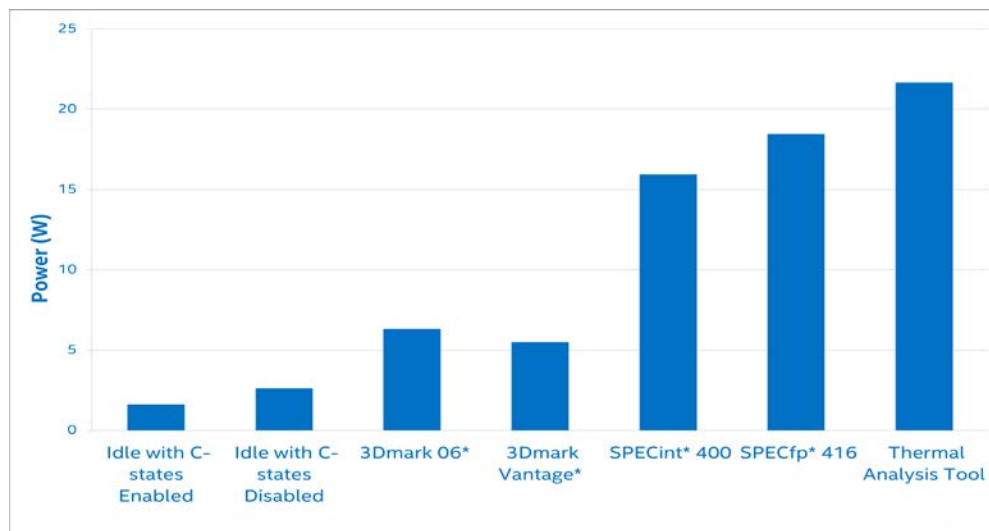


Table 4. Intel® Core™ Processor i7-6822EQ Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	1.6	21
Idle with C-states Disabled	2.6	22
3DMark06*	6.3	26
3DMark Vantage*	5.5	26
SPECint* 400	15.9	35





Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
SPECfp* 416	18.5	38
Thermal Analysis Tool	21.7	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. A 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 August 2015.
3. Platform: Intel® Core™ Processor i7-6822EQ Processor with HM170 chipset.
4. BIOS Revision: SKLSE2R1.R00.X089.B00.1506170220
5. Memory: 4GB 1RX8 PC4-2133P-SAP-10 DDR4 DIMMS - MTA8ATF51264HZ-2G1A1
6. Operating System: Windows 8.1\* x64 and Linux\* Ubuntu\* 12.04 64 bit (kernel 3.11.0-26-generic).
7. Additional configuration details are listed in [Section 3.0 Configuration and Disclaimer](#).

## 2.3 Intel® Core™ Processor i5-6440EQ Application Power Guidelines

Figure 3 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i5-6440EQ with a 45W TDP specification.

**Figure 3. Intel® Core™ Processor i5-6440EQ Application Power Guidelines**

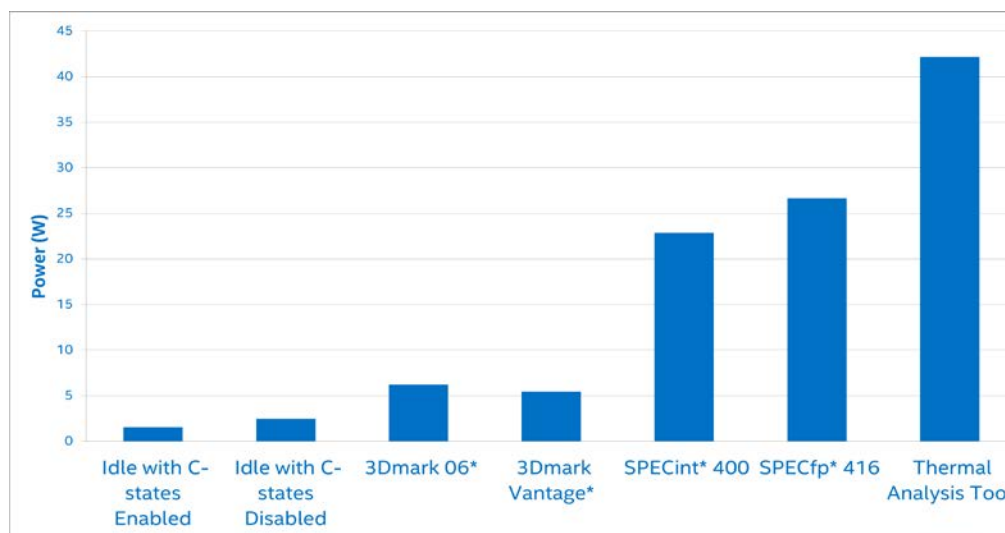




Table 5. Intel® Core™ Processor i5-6440EQ Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	1.5	21
Idle with C-states Disabled	2.5	22
3DMark06*	6.2	27
3DMark Vantage*	5.4	27
SPECint* 400	22.9	37
SPECfp* 416	26.7	43
Thermal Analysis Tool	42.2	56

**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. A 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 August 2015.
3. Platform: Intel® Core™ Processor i5-6440EQ Processor with HM170 chipset.
4. BIOS Revision: SKLSE2R1.R00.X089.B00.1506170220
5. Memory: 4GB 1RX8 PC4-2133P-SAP-10 DDR4 DIMMS - MTA8ATF51264HZ-2G1A1
6. Operating System: Windows 8.1\* x64 and Linux\* Ubuntu\* 12.04 64 bit (kernel 3.11.0-26-generic).
7. Additional configuration details are listed in [Section 3.0 Configuration and Disclaimer](#).

## 2.4 Intel® Core™ Processor i3-6102E Application Power Guidelines

Figure 4 indicates the Application Power Guidelines for various embedded applications for the Intel® Core™ Processor i3-6102E with a 25W TDP specification.



Figure 4. Intel® Core™ Processor i3-6102E Application Power Guidelines

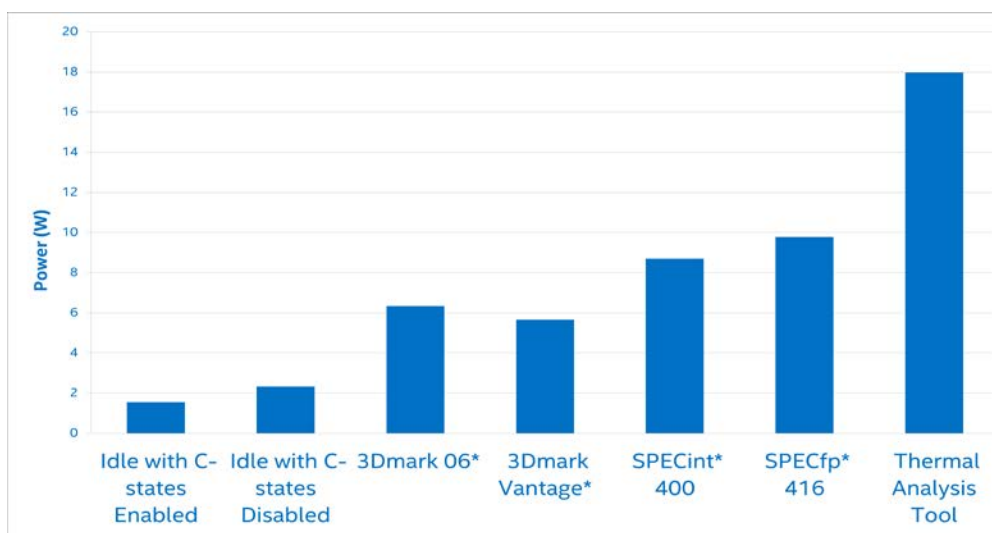


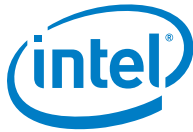
Table 6. Intel® Core™ Processor i3-6102E Application Power Guidelines

Application/Benchmark	Processor Power (W)	Junction Temperature (°C)
Idle with C-states Enabled	1.6	22
Idle with C-states Disabled	2.3	22
3DMark06*	6.3	27
3DMark Vantage*	5.7	26
SPECint* 400	8.7	27
SPECfp* 416	9.8	29
Thermal Analysis Tool	18.0	35

**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. A 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 August 2015.
3. Platform: Intel® Core™ Processor i3-6102E Processor with HM170 chipset.
4. BIOS Revision: SKLSE2R1.R00.X089.B00.1506170220
5. Memory: 4GB 1RX8 PC4-2133P-SAP-10 DDR4 DIMMS - MTA8ATF51264HZ-2G1A1
6. Operating System: Windows 8.1\* x64 and Linux\* Ubuntu\* 12.04 64 bit (kernel 3.11.0-26-generic).
7. Additional configuration details are listed in [Section 3.0 Configuration and Disclaimer](#).

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## 3.0 Configuration and Disclaimer

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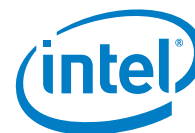
Values presented represent a typical or average processor SKU and do not guarantee that a customer will achieve these exact values for each silicon sample. These values are not intended to replace TDP, nor are they intended to be used for reliability assessments. Individual test results may vary.

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® Core™ i7-6820EQ with HM170 chipset
  - Platform 2: Intel® Core™ i7-6822EQ with HM170 chipset
  - Platform 3: Intel® Core™ i5-6440EQ with HM170 chipset
  - Platform 4: Intel® Core™ i3-6102E with HM170 chipset
- BIOS Revision: SKLSE2R1.R00.X089.B00.1506170220
- Memory: 4GB 1RX8 PC4-2133P-SAP-10 DDR4 DIMMS - MTA8ATF51264HZ-2G1A1
- Windows\* Benchmarks: 3DMark\* 06, 3DMark\* Vantage, Thermal Analysis Tool (TAT) (rev 5.0.1017 TDP mode).
- Linux\* Ubuntu\* Benchmarks: SPEC\* CPU2006v1.2 (SPECint\* 400.Perlbench, SPECfp\* 416.Games) 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](http://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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