



Program for California Energy Commission (CEC) Friendly Motherboards

California Energy Commission – Computer Energy Efficiency Standard

Tier 1 & Tier 2 TEC Criteria

June 2020

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CEC Computer Standard Links:

Official Regulation is combined with all Title 20 product types - <http://www.energy.ca.gov/appliances/2016-AAER-02/rulemaking/>

Easier to sort to just Computers (v) <https://energycodeace.com/content/reference-ace-t20-tool>

FAQs - http://www.energy.ca.gov/appliances/documents/computers_and_displays_regulation_FAQ.html

WHAT IS CEC? – CALIFORNIA ENERGY COMMISSION



CEC has defined a **Mandatory** energy efficiency standard for PCs.

Goal: 50% Desktop idle power reduction from 2016 to 2021

System Level Energy (Power/TEC) Targets effect all sales into California, many other states in the USA, and one province in Canada

January 1, 2018

Identify **TEC Exempt** systems and register (Slide 22 for details)

January 1, 2019

Tier I TEC Limits go into effect for all Computers

July 1, 2021

Tier II TEC limits go into effect for Desktop, AIO, Thin Client and Mobile Gaming Systems

Important words to know:

TEC (Typical Energy Consumption) Calculated power value based on different idle states and time periods

$$E_{TEC} = \frac{8760}{1000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE} + P_{SHORT_IDLE} \times T_{SHORT_IDLE})$$

ES (Expandability score) is a value obtained by adding up all of the number of interfaces multiplied by a defined interface value in the system. (example: 2 x16PCIe slots x 75 = 150 points)

Program for CEC Friendly Motherboards – Overview

- Intel has a program for CEC Friendly Motherboards for LOEMs & Board ODM vendors to help with match making opportunities so LOEMs can build systems to meet the CEC Computer Standard Desktop Tier 1 & Tier 2 TEC Limits
 - Idle Power Target determined based on System Level Power Budgets for Intel® 300, 400 and newer Series Chipset based designs¹
 - Motherboard determines CEC Expandability Score therefore Idle Power limits can be assigned to individual boards
 - Tier 2 DC Power limits also include system characteristics to determine DC Power Limits
 - Intel® 300, 400 & newer Series Chipset based Motherboards need to be shipped to the Intel Lab to be tested and included in the program
 - Intel will promote Motherboards that meet the CEC Friendly Motherboard criteria to the Channel (LOEMs) on a website and in collateral

¹ more detail in pages 12-16

Program for CEC Friendly Motherboards Details

Program for CEC Friendly Motherboards – CEC Tier 1 Details

Products Eligible for this program

- The CEC Friendly Motherboard program will only list and test motherboards that are based on the Intel® 300 Series Chipset
- Any motherboard with an Expandability Score greater than 690 is TEC Exempt and will not be tested for eligibility for this program

Pass Criteria

- Calculate Expandability Score for each specific motherboard model number to determine DC Power Limit
- Combining “CPU” + “Board +8GB Memory” from the Intel Power Budgets to meet CEC Tier I is where the DC power limits come from.
- 2 units per model number will be tested, 2 tests per unit with different CPUs will be tested, results from all 4 tests will be averaged to check if DC power is less than the criteria.

MB Exp. Score	CPU + Board (+8GB Memory)	Total DC Power limit
$250 < ES \leq 425$	2.0 + 5.5	7.5 W
$425 < ES \leq 690$	2.0 + 9.0	11.0 W
>690	TEC Exempt, must have EEE – Will not be listed on website	

Program for CEC Friendly Motherboards – CEC Tier 2 Details

CEC Tier 2 is coming July 2021

- All motherboards that are based on the Intel® 400 Series Chipset or newer will be evaluated for CEC Tier 2
 - Any motherboard with an Expandability Score greater than 690 is TEC Exempt and will not be tested for eligibility for this program
- OEMs can choose to use a 2.5” HDD or SSD to reduce system power, purpose of this program is to include boards that will pass with 3.5” HDD and standard power supplies

Pass Criteria for CEC Tier 2

- System Level capabilities + Expandability Score for each specific motherboard model number will determine the CEC Tier 2 DC Power Limit
 - Power supply support: ATX12V - Traditional Multi Rail (MR) vs. ATX12VO - 12 Volt Only (SR)
 - Modern Standby* support (S0ix) – changes the way the system behaves and TEC Calculations to lower measured TEC value
- Combining “CPU” + “Board +8GB Memory” from the Intel Power Budgets to meet CEC Tier 2 is how the DC power limits are derived (next few slides)

MB Exp. Score	CEC T1 - MR + S3 DC Power limit	CEC T2 - MR+S3 DC Power Limit	CEC T2 - SR+S3 DC Power Limit	CEC T2 - MR+S0ix DC Power Limit	CEC T2 - SR+S0ix DC Power Limit
250 < ES ≤ 425	7.5 W	n/a	6.5 W	7.0 W	9.0 W
425 < ES ≤ 690	11.0 W	7.2 W w/16GB	8.5 W	10.5 W	12.0 W
>690	TEC Exempt, must have EEE				

Program for CEC Friendly Motherboards - Details

Test Configuration

- Hardware to be used with Motherboard during testing
 - 8GB of total memory (2 sticks @ 4GB Each, DDR4-2666, populate one stick per channel)
 - 3.5” Hard Disk Drive, 1 TB, 7200 RPM
 - PSU with good Low Load Efficiency and meets requirement in Intel’s latest PSU DG Rev 1.4 ([Doc #336521 - 001](#))
 - Windows 10 Pro*/Enterprise version
- Measure DC power consumed at these connectors
 - 24 pin Board power connector - all 5 Voltage rails (5V, 3.3V, +12V, 5VSB,-12V) and then combine into total board power
 - 2x2 or 2x4 CPU Power connector
 - If board uses AC Brick power connector (example – Thin Mini-ATX) these will be judged differently (criteria is at the system level TEC)
- Testing from the Short Idle Mode will be used to determine if motherboard meets the CEC Friendly Motherboard Requirements
 - Short Idle is system in S0 state, Display on, no applications loaded or running, after a fresh re-boot into Windows* OS ;
 - Wait 5 minutes after stopping user interaction, then start data collection for 5 min, 1 reading per second, and average 300 data points.
 - Will Follow CEC Test Procedure by testing system for 36 minutes to measure Short Idle (5-10 minutes), Long Idle (15-20 min), and Sleep Mode (31-36 min).
Windows will automatically put the system to sleep.
- Test Results will be provided to the Board Vendor in a Excel* based test report and include results from Long Idle, Sleep, and Off mode measurements.
 - Any motherboard listed on the website passed the published limit

Program for CEC Friendly Motherboards - Disclaimer

- Intel has developed Power Budgets for Desktop Computers based on the Expandability Score to come up with the program for CEC Friendly Motherboards
 - The purpose of the program for CEC Friendly Motherboards is to help promote and educate LOEMs with energy efficient motherboard selections that when used in a computer system along with other energy efficient components is more likely to comply with the CEC computers TEC Limits.
 - Motherboards are one of the main power consuming components in a computer, and the CEC Computer Category system is based on the Expandability Score of the computer, which is almost completely derived from the motherboard expansion interfaces and inter-connects. Therefore, the motherboard attributes become the basis for the category allocation for the computer configuration and the TEC limits that scale with the expandability score which is a function of motherboard expandability attributes.
 - Participants of the program for CEC Friendly Motherboards will have their motherboards tested in accordance with Intel-drafted testing document. (available upon request.) The test will only focus on motherboard power consumption values measured in DC Watts. The tested values will be compared with Intel developed power budgets. If the motherboard meets the DC Power values, it would be listed as a CEC Friendly Motherboard as part of the Intel program. Inclusion of a motherboard on the approved list itself does not guarantee that the computer configuration the motherboard is part of, will ultimately comply with the CEC Computers standard.
 - Conversely, a given computer configuration could still meet the CEC program requirements, even if the motherboard is not part of the Intel program or does not meet the Intel-developed power budget, if the system manufacturer has made the proper tradeoffs for other components selection. Examples include a lower power storage device like an SSD or a more low load efficient power supply.
 - There are other components in the system that may not meet the appropriate power budget for the computer configuration to comply with the CEC standard. Every component in the computer is important to meet system level TEC Targets.
 - The program for CEC Friendly Motherboards now includes both DC Power limits for CEC's DT Tier 1 & Tier 2. CEC criteria will change on July 1, 2021 when Tier 2 criteria goes into effect.

Program for CEC Friendly Motherboards - Disclaimer

- CEC Computer Standard requires a Typical Energy Consumption (TEC) based limit for all computers sold into the State of California with a manufacturing date on or after January 1, 2019
 - This TEC limit is for Complete Systems, and there are no specific guidelines for individual components in the computer from the CEC Computer Program.
- Additional background and limitations:
 - This program is not endorsed by the California Energy Commission.
 - This program is only available and validated for Intel® 300 or newer Series chipset based motherboards
 - No pre-release, non-production quality motherboards may be delivered to Intel as part of the program for CEC Friendly Motherboards.
 - To sell computers into the state of CA, even when a motherboard from the CEC Friendly Motherboard list is used in a computer, the system integrator is responsible for conducting the computer compliance test at the system level, and register the compliant system with the CEC program. <http://www.energy.ca.gov/appliances/>

Power Budget to meet Desktop Tier 1 & Tier 2 TEC Levels

Power Breakdown shows justification for DC Power Levels chosen as part of the program for CEC Friendly Motherboards

TEC = Typical Energy Consumption

Power Budget to meet Desktop Tier I TEC Limits

Example for NUC/Mini PC size board that fits in lower DT category (ES below 250), Tier I Base Limit of 50

- Adders include 8GB memory = 5.2 & EEE = 0.9,
Total TEC Limit of 56.1

Any NUCs/ Mini PCs that uses an AC Bricks and DC Power levels can't be measured via ATX Power Supply connections will be evaluated at the System Level TEC Values.

System will be tested with the following Hardware:

- AC Brick to be provided by the Motherboard Vendor, should be what is sold with the motherboard
- Memory – 8GB
- Storage option chosen in this order. (if sold in a specific chassis this can be dependent on chassis limitations)
 1. 3.5" 1TB HDD
 2. 2.5" 1TB HDD
 3. M.2 SSD

Measured Data	2015 System - NUC 5i5RYH	2016 system - NUC 6i3SYK	2016 system – NUC 6i5SYH
Short Idle (W)	8.4	7.6	6.6
Long Idle (W)	8.4	7.3	6.1
Sleep (W)	1.4	1.1	0.9
OFF (W)	0.5	0.5	0.5
TEC Measured	39.1	35.2	30.5
TEC Limit	56.1		

Power Budget to meet Desktop Tier I TEC Limits

Motherboard Power limit is defined by the Expandability Score

Tier I Base TEC Limit for each category includes basic adders expected for majority of systems

- Adders include 8GB memory = 5.2 & EEE = 0.9,

Power Budget uses Traditional Sleep Mode (ACPI S3)

- Difference from Short Idle to Long Idle is based on observed 0.5 watt difference from a variety of measured systems

Expectations:

- Low CPU Idle Power
 - CPU must get to C6/C7/C8 for 90% Residency, BIOS interaction
- Average power for a 3.5" 1TB HDD
- Assuming 62% PSU Efficiency at 12 W load

Board + Memory power includes: PCH, memory, keyboard, mouse, WLAN, Ethernet, Audio Codec, Fan, Other Board devices (Jelly Bean Logic), and VR Efficiency

Data is based on average or expected data, not actual tested results.

Intel® 300 Series Chipset based System with HDD	250 < ES ≤ 425	425 < ES ≤ 690
	Short Idle Power Breakdown	
CPU ¹	2.0	2.0
Board +8 GB memory	5.5	9.0
HDD/SSD	4.2	4.2
ODD	Zero power ODD or none	
DC Power	11.8	15.2
PSU Loss (efficiency)	7.2 (62%)	7.5 (67%)
Short Idle Total Power	18.9	22.7
Long Idle	18.4	22.2
Sleep	1.2	1.2
OFF	0.6	0.6
TEC Measured	84.9	101.7
TEC Limit	86.1	106.1

¹ CPU power is not a promise from Intel for future CPU power, but a good faith estimate to power budget the whole system

Power Budget for Desktop Tier 2 TEC Limits - Criteria

Motherboard Power limit is defined by the Expandability Score + System Level Characteristics

Tier 2 Base TEC Limit for each category includes basic adders expected for majority of systems

- Adders include 8GB memory = 5.2 & EEE = 0.9,
 - Multi Rail + S3 was given the 16 GB memory adder to create a more reasonable DC Power limit
- Difference from Short Idle to Long Idle is based on observed 0.5 watt difference from a variety of measured systems

Expectations:

- Low CPU Idle Power¹
 - CPU must get to C6/C7/C8 for 90% Residency, BIOS interaction
- Average power² for a 3.5" 1TB HDD
- Assuming 60% PSU Efficiency at 10 W load for Multi Rail ATX12V PSU, ATX12VO power supplies assumption is 70-74%

Board + Memory power includes: PCH, memory, keyboard, mouse, WLAN, Ethernet, Audio Codec, Fan, Other Board devices (Jelly Bean Logic), and VR Efficiency

¹ CPU power is not a promise from Intel for future CPU power, but a good faith estimate to power budget the whole system

² Data is based on average or expected data, not actual tested results.

CEC Tier II Power Budgets - Detail

	ModS w/ MultiRail		ModS w/ Single Rail		S3 w/ Single Rail		S3 + MR
	250-425	425-690	250-425	425-690	250-425	425-690	425-690
Exp Score	250-425	425-690	250-425	425-690	250-425	425-690	425-690
CPU	2	2	2	2	2	2	2
Total Brd+8GB	5	8.5	7	10	4.5	6.5	5.2 w/16GB
Storage-HDD	4	4	4	4	4	4	3.8
Storage-ODD	0	0	0	0	0	0	0
Total DC Power	11	14.5	13	16	10.5	12.5	11.0
PSU Eff	60%	63%	70%	70%	74%	70%	60%
PSU Loss	7.33	8.52	5.57	6.86	3.69	5.36	7.4
Total AC Pwr	18.33	23.02	15.57	22.86	14.19	17.86	18.33
Long Idle					13.84	17.41	17.83
Sleep	3.8	4	3.8	4.0	1.2	1.2	1.2
Off	0.6	0.6	0.6	0.6	0.6	0.6	0.53
Measured TEC	65.2	79.9	65.96	79.5	64.5	80.5	82.27
CEC Tier II Limit	66.1	81.1	66.1	81.1	66.1	81.1	82.3

¹ CPU power is not a promise from Intel for future CPU power, but a good faith estimate to power budget the whole system

Will test with 16 GB, need extra adder for MB power at a reasonable level

CEC Computers Details and Key Definitions

Details provided for Reference Information

CEC Regulation Summary

Two Tier Implementation for Desktop/ Integrated Desktop (AIO)/Thin Client/Mobile Gaming systems

- DT/AIO/Thin Clients – (Tier 1: Jan 2019; Tier 2: July 2021)

- Category based on Expandability Score

Notebooks only have a Tier I TEC Limit (Jan 2019)

Exemptions from TEC* Limits

- Workstations; Small Scale Servers; High Expandability DT systems; Mobile WS; Small volume manufacturers (sales <\$2M annually)
- These computers still have 4 requirements that go into effect Jan 2018

From Table V-7	Expandability Score Category	Tier 1 TEC ¹ Limits	Tier2 TEC ¹ Limits	ENERGY STAR v6.1 (Int Gfx)	Units
Notebooks	One Category	30	30	22,24,28	kWh/yr
DT / AIO / Thin Clients / Mobile Gaming Systems	ES ≤ 250 (NUC / Mini PC)	50	50	112, 120, 135	kWh/yr
	250 < ES ≤ 425 (mainstream DT)	80	60		kWh/yr
	425 < ES ≤ 690 (Larger DT)	100	75		kWh/yr
	> 690	TEC Exempt	TEC Exempt		

~50% Desktop Idle Power Reduction by 2021

¹ Typical energy consumption (kWh/year)

Expandability Score Calculation

Table V-1

Interface Types and Scores for Expandability Score Calculation

Expandability Score (ES) is used to put computers into different categories based on the external and internal interfaces available in the Computer.

- The ES is designed to approximate a computer's power supply capacity based on the max power draw for each interface type.
- Only applies to Desktop, Integrated Desktops (AIO), Mobile Gaming Systems and Thin Clients

The expandability score calculation :

1. Sum the product of each interface score multiplied by the number of such interfaces present in the system as sold or offered for sale.
2. Each individual interface may only receive one score.
3. Add 100 to the score.

If ES > 690 then it is defined as a high expandability computer and does not need to meet TEC requirements (still need to meet other requirements starting in 2018)

Interface Type	Interface Score
USB 2.0 or less	5
USB 3.0 or 3.1 Gen 1	10
USB 3.1 Gen 2	15
USB ports or Thunderbolt 3.0 or greater that can provide 100 or more watts of power	100
USB ports or Thunderbolt 3.0 or greater that can provide from 60 or more to less than 100 watts of power	60
USB ports or Thunderbolt 3.0 or greater that can provide from 30 or more to less than 60 watts of power	30
Thunderbolt 3.0 or greater or USB ports that are not otherwise addressed in Table V-1 and that cannot provide 30 or more watts of power	20
Unconnected USB 2.0 motherboard header	10 per header
Unconnected USB 3.0 or 3.1 Gen 1 motherboard header	20 per header
PCI slot other than PCIe x16 (only count mechanical slots)	25
PCIe x16 or higher (only count mechanical slots)	75
Thunderbolt 2.0 or less	20
M.2 (except key M)	10
IDE, SATA, eSATA	15
M.2 key M, SATA express, U.2	25
Integrated liquid cooling	50
Either: 1) CPU and motherboard support for 4 or more channels of system memory and at least 8 GB of installed and compatible system memory; or 2) At least 8 GB of system memory installed on a 256 bit or greater memory interface.	100

CEC 2018 Computers Requirements – TEC Exempt Computers

Small-scale servers, high expandability computers, mobile workstations, and workstation, as defined by CEC standard, shall meet the following requirements, on or after Jan 1, 2018

- Power Supply efficiency:
 - 80Plus gold IPS efficiency requirements; PFC 0.9 @ 50% load
 - Level VI DOE's EPS efficiency requirements
- Energy Efficient Ethernet functionality
- Power Management:
 - Display sleep within 15 min of inactivity
 - System sleep or off within 30 min of inactivity (sleep mode defined as ACPI S3 or alternative sleep with specific power consumption requirements less than or equal to the values in Table V-6 (Alternative Sleep Mode) – see back up)
 - Note: Small-scale servers and rack-mounted workstations are not required to meet the power management requirements

TEC Limits and Measured TEC Equation

Measured TEC equation

- Calculated TEC (E_{TEC}) based on measured power shall be less than or equal to maximum TEC requirement (E_{TEC_MAX})

$$- E_{TEC} = \frac{8760}{1000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE} + P_{SHORT_IDLE} \times T_{SHORT_IDLE})$$

- TEC Limit (E_{TEC_MAX}) for each system is calculated by Base TEC + Additional TEC Adders

$$- E_{TEC_MAX} = TEC_{BASE} + \underbrace{TEC_{MEMORY} + TEC_{EEE} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{GRAPHICS} + TEC_{AIC} + TEC_{SYSTEMBW}}_{\text{Additional Adders}}$$

Additional Adders

- Additional Adders: Not all adders are applicable to all systems and depends on the form factor and capability –see other pages for more information
- TEC Equation Definitions:

For systems with ACPI S3 state for Sleep

- Short Idle: Idle with Display ON
- Long Idle: Idle with Display OFF
- Sleep: S3
- Off: S5

For systems with Alternative Sleep Mode (i.e.. Modern Standby) for Sleep

- Short Idle: Idle with Display ON
- Long Idle + Sleep: Alternative Sleep Mode (i.e.. Modern Standby)
- Off: S5

High End Desktop & Mobile Gaming Systems

Text is directly copied from the regulation

High Expandability Computer

- Meets any of the following:
 - (1) An expandability score of more than 690;
 - (2) If the computer is manufactured before January 1, 2020, a power supply of 600 watts or greater and either:
 - i. a first discrete GPU with a frame buffer bandwidth of 400 gigabytes per second (GB/s) or greater; or
 - ii. a total of 8 gigabytes or more of system memory with a bandwidth of 432 GB/s or more and an integrated GPU.
 - (3) If the computer is manufactured on or after January 1, 2020, a power supply of 600 watts or greater and either:
 - i. a first discrete GPU with a frame buffer bandwidth of 600 gigabytes per second (GB/s) or greater; or
 - ii. a total of 8 gigabytes or more of system memory with a bandwidth of 632 GB/s or more and an integrated GPU.

Note:

- If a system meets the High Expandability Computer Definition it does not have to meet the TEC Requirement but does have 4 non power requirements

Mobile Gaming Systems

“Mobile gaming system” means a computer that is primarily used for gaming and that is designed specifically for portability and to be operated for extended periods both with and without a direct connection to an AC mains power source. A mobile gaming system is sold with an integrated display and a physical keyboard, and has ALL of the following criteria:

1. Discrete video card with frame buffer bandwidth of 128 gigabytes per second or greater;
2. System memory of 16 gigabytes or more;
3. AC adaptor size of 150 watts or greater; and
4. Total battery capacity of 75 watt-hours or greater.

Note:

- If a computer meets the Mobile Gaming System definition it moves from the Notebook category TEC limits and adds to the Desktop TEC limits and adds

New CEC Definitions

Text is directly copied from the regulation

“Workstation” means a computer used for graphics, computer-aided design (CAD), software development, financial, or scientific applications, among other computation intensive tasks. A workstation covered by this specification must meet the following criteria:

1. Product as shipped does not support altering frequency or voltage beyond the computer processing unit and GPU manufacturers’ operating specifications;
2. Has system hardware that supports error-correcting code (ECC) that detects and corrects errors with dedicated circuitry on and across the CPU, interconnect, and system memory; and
3. Meets two or more of the following criteria:
 1. Supports one or more discrete GPU graphic or discrete compute accelerators.
 2. Supports four or more lanes of PCI-express, other than discrete GPU graphics, connected to accessory expansion slots or ports where each lane has a bandwidth of 8 gigabits per second (Gb/s) or more.
 3. Provides multi-processor support for two or more physically separate processor packages or sockets. This requirement cannot be met with support for a single multi-core processor.
 4. Has qualified or is currently being reviewed for qualification by two or more independent software vendor (ISV) product certifications.

New CEC Definitions

Text is directly copied from the regulation

“Mobile Workstation” means a high-performance, single-user computer primarily used for graphics, computer-aided design (CAD), software development, financial, or scientific applications, among other computation intensive tasks, excluding game play, and that is designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an external power source. Mobile workstations utilize an integrated display and are capable of operation on an integrated battery. A mobile workstation may use an external power supply and have an integrated keyboard and pointing device.

In addition, a mobile workstation must meet all of the following criteria:

1. Has a mean time between failures (MTBF) of at least 13,000 hours;
2. Has qualified or is currently being reviewed for qualification by two or more independent software vendor (ISV) product certifications;
3. Supports either:
 - a) At least one integrated or discrete GPU graphics processing unit with frame buffer bandwidth of 134 96 gigabytes per second or greater; or
 - b) A total of 4 gigabytes or more of system memory with a bandwidth of 134 gigabytes per second or greater and an integrated GPU;
4. Supports the inclusion of three or more internal storage devices; and
5. Supports at least 32 gigabytes of system memory.

New CEC Definitions

Text is directly copied from the regulation

“Industrial computer” means any of the following:

1. A process controller that is designed specifically to automate an industrial, medical, or laboratory process.
2. A computer that is integrated into the chassis of industrial, medical, or laboratory equipment that contains more than a computer, and that is designed specifically to perform logical operations and process data for an industrial, medical, or laboratory product using product-specific software.

New CEC Definitions

Text is directly copied from the regulation

“Limited capability operating system” means an operating system that performs basic operations and that meets all of the following criteria does not:

1. Does not have automatic power management features;
2. Does not support USB devices;
3. Does not have a Graphical User Interface (GUI); and
4. Does not support multiple user profiles or distinguish between users.

New CEC Definitions

Text is directly copied from the regulation

“Small volume manufacturer” means a manufacturer that meets all of the following criteria:

1. The manufacturer’s gross revenues from the 12-month period preceding the certification, from all of the entity’s operations, including operations of any other person or business entity that controls, is controlled by, or is under common control of the entity, is \$2,000,000 or less;
2. The manufacturer assembles and sells the computers at the same location; and.
3. The manufacturer has certified as a small volume manufacturer to the Energy Commission under Section 1606(k).

Alternative to Sleep mode power limits (Table V-6)

Table is directly copied from the regulation

If the computer system uses an Alternative Sleep Mode (i.e.. Modern Standby), then this modal power requirement is applicable:

Computer Type	Maximum Power	Note
Workstations, Mobile Workstations, High Expandability Computers, Small-Scale Server	$10 + 0.03 * C$	Where C is the system memory capacity in GB minus 32 GB. If C is less than zero, use zero for the value of C
Desktop Computers, Integrated Desktops (AIO), Thin Clients, and Mobile Gaming Systems	$5 + 0.03 * C$	
Notebook Computers and Portable All-In-Ones	$2.5 + 0.03 * C$ – no Discrete GPU $4.5 + 0.03 * C$ – with Discrete GPU	Where C is the system memory capacity in GB minus 16 GB. If C is less than zero, use zero for the value of C

Other CEC Definitions – Text directly from Regulation

“Small-scale server” means a computer that uses desktop components in a desktop form factor but that is designed to be a storage host for other computers. A small-scale server is designed to perform functions such as providing network infrastructure services (for example, archiving) and hosting data and media. This product is not designed to process information for other systems or run Web servers as a primary function. A small-scale server has all the following characteristics:

1. Designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box or product;
2. Designed to operate continuously, except for maintenance;
3. Capable of operating in a simultaneous multi-user environment serving several users through networked client units; and
4. Designed for an industry-accepted operating system for home or low-end server applications (e.g., Windows Home Server, Mac OS X Server, Linux, UNIX, Solaris).

Other CEC Definitions – Text directly from Regulation

“Computer” means a device that performs logical operations and processes data. A computer includes both stationary and portable units and includes a desktop computer, a portable all-in-one, a notebook computer, a mobile gaming system, a high expandability computer, a small-scale server, a thin client, and a workstation. Although a computer is capable of using input devices and displays, such devices are not required to be included with the computer when the computer is shipped. A computer is composed of, at a minimum:

1. A central processing unit (CPU) to perform operations or, if no CPU is present, then the device must function as a client gateway to a server and the server acts as a computational CPU;
2. Ability to support user input devices such as a keyboard, mouse, or touchpad; and
3. An integrated display screen or the ability to support an external display screen to output information.

The term **“computer”** does not include a tablet, a game console, a television, a small computer device, a server other than a small-scale server, or an industrial computer.

Other CEC Definitions – Text directly from Regulation

“Desktop computer” means a computer whose main unit is designed to be located in a fixed location, often on a desk or on the floor. A desktop computer includes an integrated desktop computer. A workstation, a high expandability computer, or a small-scale server is not a desktop computer.

“Notebook computer” means a computer designed specifically for portability and to be operated for extended periods both with and without a direct connection to an AC mains power source. A notebook computer is sold with an integrated display and a physical keyboard. The term “notebook computer” includes two-in-one notebooks, mobile thin clients, and notebook computer models with touch-sensitive screens. Notebook computer does not include mobile workstations or mobile gaming systems.

“Two-in-one notebook” means a notebook computer which has a clam shell form factor, but has a detachable keyboard. The keyboard and display portions of the product must be shipped as an integrated unit.

Other CEC Definitions – Text directly from Regulation

“Portable all-in-one” means a computer designed for limited portability that meets all of the following criteria:

1. Includes an integrated display with a diagonal size greater than or equal to 17.4 inches;
2. Does not have a keyboard integrated into the physical housing of the product in its as-shipped configuration;
3. Includes and primarily relies on touch-screen input, with optional keyboard;
4. Includes the capacity to connect to a wireless network; and
5. Includes an internal battery that can power the computer’s primary functions.

“Tablet” means a device that is designed for portability and that meets all of the following criteria:

1. Has an integrated display with a diagonal size less than 17.4 inches;
2. Does not have an integrated, physically attached keyboard in its as-shipped configuration;
3. Has and primarily relies on touch-screen input;
4. Has and primarily relies on a wireless network connection; and
5. Has and is primarily powered by an internal battery with connection to an AC mains power source for battery charging and not for primary powering of the device.

A tablet may be referred to as a slate.

“Small computer device” means a computer system with an integrated and primary display that has a screen area of 20 square inches or less.

Other CEC Definitions – Text directly from Regulation

“Integrated desktop computer” means a desktop computer in which the computing hardware and display are integrated into a single housing, and which is connected to AC power through a single cable. Integrated desktop computers come in one of two forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a DC power cord, and both the computer and display are powered from a single power supply.

“Thin client” means an independently powered computer that relies on a connection to remote computing resources (for example, a computer server or a remote workstation) to obtain primary functionality. Main computing functions (for example, program execution, data storage, interaction with other internet resources) are provided by remote computing resources. A thin client does not have integral rotational storage media and is designed for use in a fixed location during operation.

Other CEC Definitions – Text directly from Regulation

“Idle condition” means an active state of a computer where no user interaction is occurring and where no user prescribed task is underway.

“Short-idle mode” means a state where the computer has reached an idle condition five minutes after operating system boot, after completing an active workload, or after resuming from computer sleep mode, and the primary computer display is on and the computer remains in the working mode ACPI G0 (S0).

“Long-idle mode” means a state where the computer has reached an idle condition 15 minutes after operating system boot, after completing an active workload, or after resuming from computer sleep mode, and the primary computer display has entered a low-power state where screen contents cannot be observed (for example, backlight has been turned off) but remains in the working mode ACPI G0.

“Computer sleep mode” means a low-power mode that the computer enters automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly “wake” in response to network connections or user interface devices with a latency of less than or equal to five seconds from initiation of the wake event to the system becoming fully usable, including rendering of display. For systems where ACPI standards are applicable, computer sleep mode is ACPI System Level S3 (suspend to RAM) state. Some computers utilize an alternative sleep mode to ACPI S3.

“Computer off mode” means an ACPI System Level S5 state.

Other CEC Definitions – Text directly from Regulation

“Thin client” means an independently powered computer that relies on a connection to remote computing resources (for example, a computer server or a remote workstation) to obtain primary functionality. Main computing functions (for example, program execution, data storage, interaction with other internet resources) are provided by remote computing resources. A thin client does not have integral rotational storage media and is designed for use in a fixed location during operation.

“Mobile thin client” means a notebook computer that relies on a connection to remote computing resources, such as a computer server or a remote workstation, to obtain primary functionality, and does not have integral rotational storage media.

Other CEC Definitions – Text directly from Regulation

“**Energy-Efficient Ethernet** capability” means Ethernet interfaces that are capable of reducing power consumption during times of low data throughput, as specified in *IEEE 802.3az-2010*.

