

Product Fact Sheet – Consumer Electronics: Televisions

Table 12. Overview of Televisions

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
China	LCD-0.6 PDP-0.6	1.2	(luminance * Screen Area)/(P broadcast - (6, 10 or 17 depending on Input Signal Port))	GB 24850-2013	N/A	N/A	N/A	Luminance efficiency metric cannot be analytically converted into a Watts or Watts/Area Metric
Europe	16 W + A · 3.4579 W/dm ²	N/A	Watts/dm ²	EN 50301 and Commission delegated regulation (EU) No 1062/2010 of 28 September 2010 supplementing Directive 2010/30/EU	IEC 62087 Ed3	1	1	Using Watts/Area as the reference as in EU, US and India
US		N/A	100*TANH(0.00085*(A-140)+0.052)+14.1W, with correction for ABC	ENERGY STAR Televisions V6	IEC 62087 Ed3	1	1	
US California	$P \leq 0.12 \times A + 25$		No ABC or ABC Disabled: Po_Broadcast as per IEC 62087 Ed3. With ABC enabled by default: (0.55 * Po_Broadcast) + (0.45 * Pabc_Broadcast)	ENERGY STAR Televisions V6	IEC 62087 Ed3	1	6.45	

India		$P = (0.964 \times A) + 4.38$	Po_Broadcast	IEC 62087 Ed 3	IEC 62087 Ed 3	1	1	
Australia	\leq base load + 0.1825 x screen area	N/A	.365 x [(computer monitor Po_Broadcast* 10) + (14 hour standby active)] kWh/yr	AS/NZS 62087 2009	IEC 62087 Ed 3	1	0.274	Converts kWh per year and Area to Watts

(*) Conversion factors

Products

1. Televisions are commercially-available products with a display screen and associated electronics, often encased in a single housing and that, as their primary function, display visual information from wired or wireless sources, including:
 - broadcast and similar services for terrestrial, cable, satellite and/or broadband transmission of analog and/or digital signals; and/or
 - display-specific data connections, such as VGA, DVI, HDMI, [such as those from a computer or workstation which is not mechanically attached to the display]; and/or
 - storage devices such as a USB flash drive or a memory card; and/or
 - network connections, usually using Internet Protocol, typically carried over Ethernet or WiFi.
2. Common television display technologies include liquid crystal display (LCD), light emitting diode (LED), cathode-ray tube (CRT), and plasma display panel (PDP).

Overview of international situation with regards to S&L for this product category

1. The televisions covered are mains powered. Battery powered TVs are not covered. CRT, Plasma, LCD and OLED TV are covered.
2. Standards are set by local standards development organizations or the IEC standard is adopted without change.
3. All known test procedures use the IEC 62086 Ed 3 Section 11 method for TV power measurement. All countries except China use a Watts/area metric although Australia converts this to an annual Total Energy Consumption (TEC) metric. China uses a luminance efficiency metric.
4. In terms of power measurement all economies are aligned using the IEC 62087 Ed 3 Broadcast loop. China is alone in using a luminance efficiency approach and not adopting an "Out of Box" condition for measurement. This makes comparisons between China and all other countries currently impossible.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

1. The conversion factors are based on the standards from each country or where directly referenced IEC 62086 Ed3. All countries use the IEC Broadcast loop to determine power consumption and apply this to a Watts/Area Metric. Australia converts this to a kWh/annum TEC, using an assumed on period of 10 hours per day for TV use and 14 hours standby mode. The conversion factor comparing Australia to the US, EU, and India compensates for this.
2. The conversion factor comparing the EU, US, India and Australia are very reliable. No conversion factor can be generated for China, as discussed above.

Notes and assumptions

There are no assumptions made for televisions, apart from a standby power consumption assumption for Australia.

List of sources

IEC 62087 Ed3

AS/NZS 62087 2009

ENERGY STAR V6

GB 24850 2013

Regulations and standards from each country, can be found in CLASP's Global S&L Database http://www.clasponline.org/en/Tools/Tools/SL_Search.aspx



Product Fact Sheet – Consumer Electronics: Displays

Table 13. Overview of Displays

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
China	CRT-0.14 LCD-0.55	CRT: 0.18 LCD: 1.05	(luminance * Screen Area)/Power	GB 21520 -2008	None	N/A	N/A	The Chinese test procedure is fundamentally different from IEC ones, therefore, a comparison is not possible
Europe	12W + A* 3.4579 W/dm ²	0,1* (15W + A 4,3224 W/dm ²)	Po_broadcast:	EN 50301 and EC 642/2009	IEC 62087 Ed 3	1	1	
Us	PO(MEPS) = ([6 for ≤1.1 Mp or 9 for > 1.1 Mp)´ Screen resolution in MP) + (0.007 75 ´ Screen area in cm ²) + 3	N/A	Po_broadcast: where possible. Pon with VESA static patterns where it is not ¹	ENERGY STAR V6	IEC 62087 Ed 3	1	1	
Australia	PO(MEPS) = ([6 for ≤1.1 Mp or 9 for > 1.1 Mp)´ Screen resolution in MP) + (0.007 75 ´ Screen area in cm ²) + 3	N/A	0.365 x [(computer monitor Po_Broadcast × 10) + (14 hour x standby active)] kWh/yr	AS/NZS 5815.1 2012	ENERGY STAR Displays V5.1	1	0.274	

(*) Conversion factors

¹ The ENERGY STAR requirements are extremely complicated and there are several equations relating pixel density and the operation of ABC to the calculated power depending on the displays pixel density and whether ABC is enabled by default. There are also different calculations for displays with special features. ENERGY STAR displays V6 should be used to determine exact requirements.

Product

1. This category includes products with a display and associated electronics of which the primary function is to display visual information and that is connected to the mains power source for its intended continuous use, either directly or via an external power supply. The displays covered are mains powered. Battery powered displays are not covered. CRT, Plasma, LCD and OLED TV are covered. Many displays are excluded for technology reasons particularly in ENERGY STAR specifications. The exclusions are quite complicated and the ENERGY STAR specification should be used to determine the exclusions. This is also true for Australia because their standard is also based on ENERGY STAR.

Overview of international situation with regards to S&L for this product category

1. Standards are set by local standards development organizations and it is these standards that have been used as references.
2. All test procedures use a Watt/Area metric except China which uses a luminance efficiency metric. This makes comparisons between China and all other countries impossible.
3. The conversion factors are based on the standards from each country. All countries use a Watts/Area Metric. Australia converts this to a kWh/a TEC. Australia uses an on period of 10 hour per day for display use. The conversion factor compared to the US and EU is based on this.
4. The conversion factors comparing the EU, US and Australia are very reliable.

Notes and assumptions

Display specifications are very complicated and have both elaborate methods for determining factors for pixel density as well as allowances for automatic brightness control. ENERGY STAR in particular is complicated and also has special equations for advanced technology. The individual standards should be consulted to determine exact requirements.

List of sources

IEC 62087 Ed3
AS/NZS 5815.1 2012 and AS/NZS 5815.2 2013
ENERGY STAR Displays V6
GB 21520 2008



Product Fact Sheet – Consumer Electronics: Digital television decoders (Set top boxes)

Table 14. Overview of Set top boxes

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
China	N/A	N/A	Pon and Psp	GB 25957 - 2010	N/A	N/A	N/A	Cannot convert because too dependent on standby power
EU	Simple STB: Standby 1W+adders Active 5W+adders		TEC = $0.365(5*P_o+19*P_{standby})$	European Voluntary Agreement	IEC 62087 Ed3	1	1	Compared to US and Australia
US	N/A	N/A	$AEC = 0.365 \sum_{i=1}^n P_i * Ni$	ENERGY STAR Set-top box Specification Version 4.1	IEC 62087 Ed3	1	1	Compared to EU and Australia
Australia	SD STBS (On Mode 7W Passive 2W) or (On Mode 8W Passive 1W) - HD (On mode 11W Passive 2W or (On mode 12W Passive 1W)		Pon	AS/NZS 62087.1	N/A	N/A	N/A	
Australia	Satellite and Cable base allowance 60 kWh/annum		TEC = $0.365(P_{on}*5+P_{standby}*19)$	Australian CSTB Voluntary Code	IEC 62087 Ed3	1	1	Compared to EU and US ENERGY STAR

(*) Conversion factors

Product

1. Set top boxes (STBs) vary greatly across regions and platforms. A set top box is a device combining hardware components with software programming designed for the primary purpose of receiving television and related services from terrestrial, cable, satellite, broadband, or local networks, providing video output using at least one direct video connection. There are two broad types of STB categorized for simplicity on the European market: 'Simple set top box' (SSTB) and 'Complex set top box'.
2. SSTBs are stand-alone devices which, irrespectively of the interfaces used,
 - have the primary function of converting standard-definition (SD) or high-definition (HD), free-to-air digital broadcast signals to analogue broadcast signals suitable for analogue television or radio;
 - have no 'conditional access' (CA) function;
 - offer no recording function based on removable media in a standard library format.

A SSTB can be equipped with the following additional functions and/or components which do not constitute a minimum specification of an SSTB:

- time-shift and recording functions using an integrated hard disk;
 - conversion of HD broadcast signal reception to HD or SD video output;
 - second tuner.
3. Complex set top boxes cover digital convertors for TVs, including additional features such as pay TV and network connectivity.

Overview of international situation with regards to S&L for this product category

1. STBs vary greatly between regions and across platforms. There are two approaches of energy performance requirements in use. The first is a power on-mode requirement with a standby requirement. The second is a Total Energy Consumption approach, which is based on measuring energy consumption across a duty cycle. The TEC approach is useful because it includes the energy use of a STB in standby mode in the calculation. Standby is the main contributor to energy consumption in many regions and in particular for subscription TV platforms. The test methods and metrics for each approach are comparable within the approach but not between approaches.
2. The TEC approach is probably the best for inter region and platform comparisons.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

1. The references used for the assessment of conversion factors are the regional standards used and ENERGY STAR where it is referred to directly; the reference test procedure is IEC 62087 Ed3.
2. Because standby power varies so greatly across regions and platforms for STBs no assumption can be made that allows for a conversion factor between the on power approach and the TEC approach.
3. The conversion factors specified are correct as a comparison between TEC programs or on-mode power programs but no conversion factor can be developed to compare on power with the TEC approach.

Notes and assumptions

No assumptions have been made to provide conversion factors. It should be noted that most programs have complicated “functional adders” and the actual standards should be consulted for the detail of these in each region.

List of sources

GB 25957 - 2010

European Voluntary Agreement

ENERGY STAR Set top Box Specification Version 4.1

AS/NZS 62087.1

AS/NZS62087.2.1

Australian CSTB Voluntary Code



Product Fact Sheet – Consumer Electronics: Audio

Table 15. Overview of Audio

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
US	N/A	N/A	Pout/(Pin-Pdisk)	ENERGY STAR Audio/Video Specification Version 3.0	ENERGY STAR Audio/Video Specification Version 3.0	N/A	N/A	Only one program

(*) Conversion factors

Product

- Audio equipment can be found on a wide range of consumer electronics such as:
 - Home-Theater-in-a-Box Systems
 - Sound bars
 - MP3 speaker docks
 - Audio amplifiers
 - AV receivers
 - Shelf systems
 - Blu-ray Disc players
 - DVD players

Overview of international situation with regards to S&L for this product category

- There is only the US ENERGY STAR program in place for audio and it covers mains-connected products that offer Audio Amplification and/or Optical Disc Player functions.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

- As there is only one program there is no conversion factor. The metric is an efficiency metric.

Notes and assumptions

No notes or assumptions needed to be made for this comparison.

List of sources

ENERGY STAR Audio/Video Specification Version 3.0



Product Fact Sheet – ICT: Computers, Games Consoles and Servers

Table 16. Overview of Computers, Games Consoles and Servers

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
Computers and Small Scale Servers								
US		TEC values depending on type of computer	TEC (kWh/a)	ENERGY STAR® Program Requirements for Computers	ENERGY STAR® Program Requirements for Computers	1	1	
Australia		TEC values depending on type of computer	TEC (kWh/a)	AS/NZS 5813.1	ENERGY STAR® Program Requirements for Computers	1	1	
EU	TEC values, depending on type of computer	TEC values depending on type of computer	TEC (kWh/a)	ENERGY STAR® Program Requirements for Computers, with modifications	ENERGY STAR® Program Requirements for Computers	1	1	Weightings between modes differ from to ENERGY STAR v6
EU	Power supply efficiency requirements (similar to ENERGY STAR v6)	TEC values depending on type of computer	TEC (kWh/a)	ENERGY STAR® Program Requirements for Computers	ENERGY STAR® Program Requirements for Computers	1	1	
Games Consoles								
US		N/A	Power measured in Standby, Active Navigation and Active Streaming Modes. Determined by measurement	ENERGY STAR Program for Game Consoles: Performance Requirements Version 1.0	None	N/A	N/A	No other program

			method and has no Formula					
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(*) Conversion factors

Product

- For all the programs stated a computer is defined as:
"A device which performs logical operations and processes data. Computers are composed of, at a minimum: (1) a central processing unit (CPU) to perform operations; (2) user input devices such as a keyboard, mouse, digitizer or game controller; and (3) a computer display screen to output information. For the purposes of this specification, computers include both stationary and portable units, including desktop computers, gaming consoles, integrated desktop computers, notebook computers, small-scale servers, thin clients, and workstations. Although computers must be capable of using input devices and computer displays, as noted in numbers 2 and 3 above, computer systems do not need to include these devices on shipment to meet this definition."
- In addition Games Consoles are defined as:
"A standalone computer-like device whose primary use is to play video games"

Overview of international situation with regards to S&L for this product category

- The requirements for these products are very complicated and for specific requirements for a product the specified reference should be used. All label programs are ENERGY STAR programs; therefore no comparison between requirements is needed. The EU has also introduced Ecodesign requirements for computers. For desktops and laptops, these use the ENERGY STAR approach, however, with different weightings between the energy demand per power modes. An accurate comparison between resulting energy consumption calculations cannot be made. For servers, the EU requires the provision of information about power demand in various modes as well as power supply efficiency requirements in line with ENERGY STAR.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

- The program requirements were determined from the actual program standards.
- As ENERGY STAR is effectively the only program for computers, the only conversion factors that can be determined are between ENERGY STAR 5.1 and Australia. Since Australia uses a complete adoption of ENERGY STAR 5.1 the conversion factor must be 1.

Notes and assumptions

No notes or assumptions needed to be made for this comparison.

List of sources

ENERGY STAR® Program Requirements for Computers Version 5.1.
 ENERGY STAR® Program for Game Consoles: Performance Requirements Version 1.0
 AS/NZS 5813.1
 AS/NZS 5813.2

Product Fact Sheet – ICT: Imaging Equipment

Table 17. Overview of Imaging Equipment

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
EU		N/A	kWh/a ¹	ENERGY STAR V1	ENERGY STAR V1	1	1	Conversion factor for programs based on ENERGY STAR
China	N/A	N/A	kWh/a ¹	GB 21521-2008 GB 25956-2010	ENERGY STAR V1	1	N/A	English Translation not available so it is unclear as to the calculation of TEC
US		N/A	kWh/a ^{1,2}	ENERGY STAR V1	ENERGY STAR V1	1	1	Conversion factor for programs based on ENERGY STAR
Australia		N/A	kWh/a ^{1,2}	ENERGY STAR V1	ENERGY STAR V1	1	1	Conversion factor for programs based on ENERGY STAR

(*) Conversion factors

Notes:

1. Actual metrics are complicated and the referenced document should be consulted for precise requirements for each product type.
2. ENERGY STAR V2 for Imaging Equipment comes into effect in January 2014 but the same comment applies as footnote 1.

Product

1. Products covered in these programs are printers, copiers, facsimile (fax) machines, multifunction devices (MFDs), mailing machines.

Overview of international situation with regards to S&L for this product category

1. The requirements are very complicated, making it impossible within the context of this study to provide a summary of the metrics. The referenced standards should be used to provide the specific requirement for each product type.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

1. ENERGY STAR is essentially the only set of requirements in place and therefore the conversion factor for most programs is 1. Information about the test procedure and metrics for the Chinese program could not be retrieved in an accessible format; therefore, no conversion factor

could be determined for the Chinese requirements.

Notes and assumptions

No notes or assumptions needed to be made for this comparison.

List of sources

ENERGY STAR V1 for Imaging Equipment

GB 21521 - 2008 Imaging Equipment

GB 25956-2010 Printers

ENERGY STAR V2 for Imaging Equipment



Product Fact Sheet – ICT: Power Supplies

Table 18. Overview of Power Supplies

Country	MEPS	High Label	S&L metric	Test procedure	Reference test procedure & metric	Test Procedure (*)	Energy Performance Metric (*)	Notes
Power Supplies								
China	$< 1W:0.49*Po$ 1W to 49W: $0.09 *Ln Po + 0.49$ $>$ 50W: $<po\leq 25$ $0 0.84$		Efficiency = Pout/Pin	GB 20943 - 2007	ENERGY STAR V2	1	1	
EU	$< 1W:0.49*Po$ 1W to 49W: $0.09 *Ln Po + 0.49$ $>$ 50W: $<po\leq 25$ $0 0.845$		Pout/Pin	None	ENERGY STAR V2	1	1	
US	$< 1W:0.5*Po + 0.16;$ 1W to 49W: $0.071 Ln Po - 0.0014 Po + 0.67;$ $>$ 50W: $<po\leq 25$ $0 0.88; 250 <Po 0.875$	$< 1W: 0.48*Po + 0.140$ 1W to 49W: $0.0626 *Ln Po + 0.622;$ $> 50W: <Po 0.87$	Pout/Pin	Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies (August 11, 2004)	ENERGY STAR V2	1	1	
Australia	$< 1W: 0.49*Po$ 1W to 49W: $0.09 *Ln Po + 0.49$ $>$ 50W: $<po\leq 25$ $0 0.84$		Pout/Pin	AS/NZS 4665.1 AS/NZS 4665.2	ENERGY STAR V2	1	1	

Battery Chargers								
US	N/A	N/A	$ER=(E_m+E_s)/E_b$	ENERGY STAR Battery Charging Systems Specification Version 1.1	ENERGY STAR Battery Charging Systems Specification Version 1.1	1	1	This is the only program
Uninterruptible Power Supplies								
US		N/A	$Eff_{avg}=t_{25} * EFF_{25\%} + t_{50} * EFF_{50\%} + t_{75} * EFF_{75\%} + t_{100} * EFF_{100\%}$	ENERGY STAR Uninterruptible Power Supplies Program Requirements Version 1.0	ENERGY STAR Uninterruptible Power Supplies Program Requirements Version 1.0	1	1	This is the only program

(*) Conversion factors

Product

1. This category covers external power supplies AC and DC, battery chargers and uninterruptible power supplies.

Overview of international situation with regards to S&L for this product category

1. All programs, except the EU one, are based on ENERGY STAR.

General description of conversion for test procedures and metrics/ efficiency metrics and standards

1. As all programs are based on ENERGY STAR they are all harmonized. As there is only one set of requirements the conversion factors are all 1.

Notes and assumptions

Some of the requirements are complicated and the ENERGY STAR or other relevant standard should be consulted for specific details.

List of sources

ENERGY STAR® Program Requirements for Single Voltage External Ac-Dc and Ac-Ac Power Supplies: Eligibility Criteria (Version 2.0)

Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies (August 11, 2004)

AS/NZS 4665.1 and AS/NZS 4665.2

GB 20943 - 2007