

Comments on Draft 2 Version 3.0 ENERGY STAR TV Products Specification

Submitted by:

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Abstract

Draft 2 has elected not to follow the recommendations that I made in my comments of August 7, 2007. I believe the arguments in these earlier comments are still valid. In this set of comments, I will present additional data that supporting these original arguments.

Two Types of TV Display Power Usage

TV displays today use displays having two fundamental types of power usage. These are the Flat-Panel Type and the Projection Type. The Flat-Panel Type includes technologies such as LCDs, Plasma, OLED, FED, SED and other emissive types of flat-panel displays. The Projection Type includes: DLP projectors, LCD projectors and other Micro-Display type Projectors that use a High Pressure Arc Lamp.

These two types of display use power quite differently. Figure 1 shows the power usage dependence of the Flat-Panel Type on screen area and Figure 2 shows the same for the Projection Type. These follow some very simple fundamental rules.

The Flat-Panel Type shows a simple proportional dependence of power on screen area. This is because the basic unit of power dissipation in flat-panel displays is the light generating mechanism that takes a certain amount of power per unit area to obtain a given amount of display luminance. As the area of the display gets larger, the amount of power simply increases proportionally.

The Projection Type shows a constant power independent of screen area. This is because most of the power in the projection displays is dissipated by the High Pressure Arc Lamp. This type of lamp has been an enabling technology for home TV projectors because it has a very small arc size of typically 1 millimeter. This small arc size is necessary in order to use low cost small light modulators such as the transmissive LCD, or Digital Mirror Device (DMD). There is a very significant technology limitation for these arc lamps that keeps their power from going higher than 200 watts. It is not likely that there will be a higher power available in these 1 millimeter arc size lamps because they are already running very near the melting point of tungsten which is the highest melting point metal known to man. Because of this technical limitation, home television projectors do not use a higher power lamp. Of course higher power arc lamps are available that can handle thousands of watts such as those use in the professional movie theatre industry. However these arc lamps have a much bigger spot size than 1 millimeter and so the cost of the modulating LCD or DMD would be excessive and therefore unattractive for a consumer product.

Figure 3 shows the luminance of the Flat-Panel Type as a function of display area. It is typically constant, independent of screen area. This is because the function of adding additional size to the display does not change the luminance of the other areas of the display. This is a simple consequence of the fixed power per unit area that Flat-Panel Type displays have as shown in Figure 1.

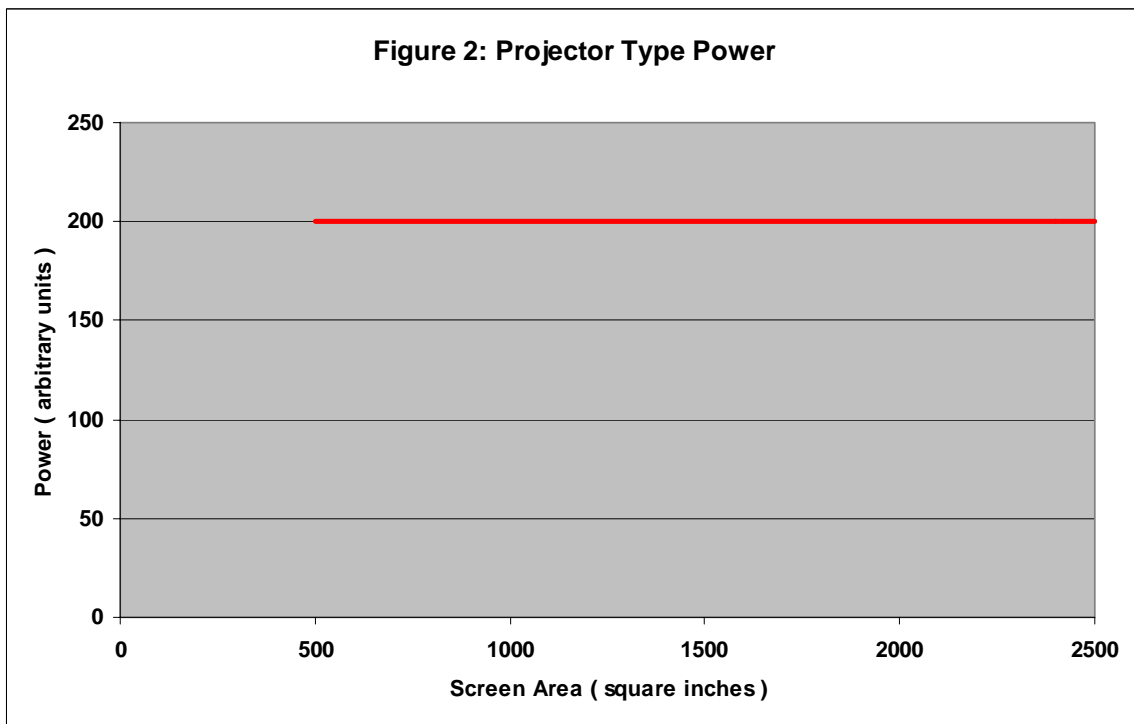
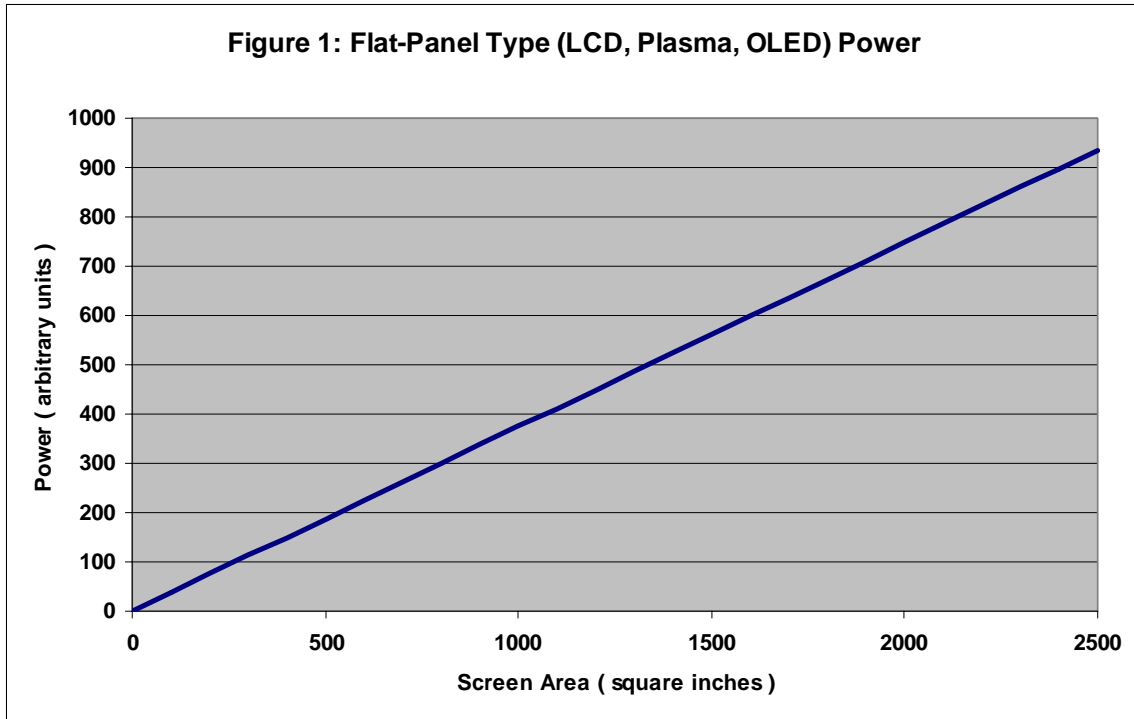
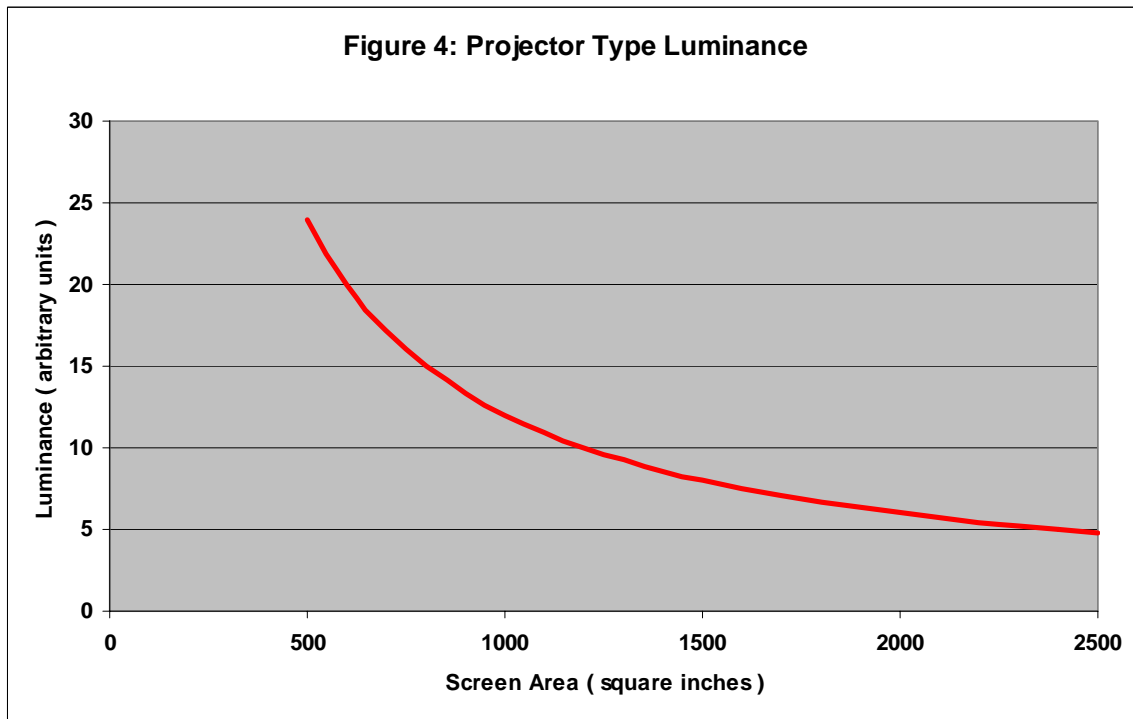
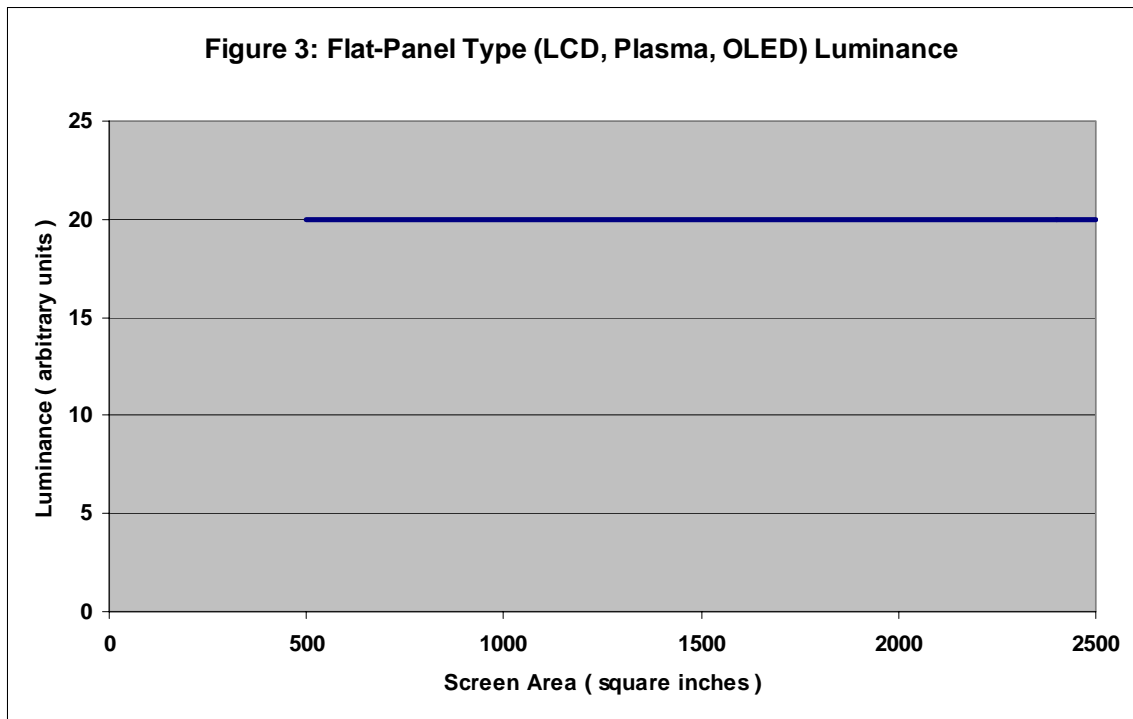


Figure 4 shows the luminance dependence on screen area of a Projector Type display. The luminance of the Projector Type decreases hyperbolically as the screen area increases. This is because of the 200 watt power limitation of the High Pressure Arc Lamp. Because the arc lamp power is limited, the total amount of light that it emits is

limited. A larger area display must spread that constant light over a larger area and this means that the large areas must have lower luminance.



Comparison of two Types

It is instructive to compare the respective curves of the two types. Figures 1 and 2 show that the power dependence on screen area of the two types is quite different. Also figures 3 and 4 show that the luminance dependence on screen area of the two types is quite different.

The luminance characteristic of the Projection Type shown in figure 4 is not very desirable since it means that the larger area projection TVs get have a rather low luminance. This makes these larger area projectors are less competitive in the market place. If it was technically possible, the projection TV manufacturers would certainly try to change this figure 4 characteristic to be more like that of figure 3. However they can't because of the limitation of the High Pressure Arc Lamp that keeps it from generating more light than allowed by the 200 watt power limitation.

The seemingly desirable constant 200 watt power of the projection displays as shown in figure 2 has the rather undesirable luminance characteristic of figure 4 which makes these larger screen area projection displays not so successful in the market place. The Flat-Panel Type displays do not have the undesirable characteristic of figure 4 as seen in figure 3. The consumer prefers the characteristic of figure 3. However this means that Flat-Panel Type displays have the power characteristic of figure 1.

Apples and Oranges

It is very clear that these two Types of displays are as different as apples and oranges. Both Types serve the function of providing a TV image just as apples and oranges provide a source of nourishment. However, examination of figures 1 through 4 show that these two Types are quite different in regard to power usage and luminance dependence on screen area.

Unfortunately the Energy Star Draft 1 and Draft 2 Specifications treat these two Types as if they are the same. These drafts use the fundamentally flawed procedure of averaging these two Types of displays in order to arrive at the mathematical equation that determines which TVs get Energy Stars. Not surprisingly all of the Projection Type displays would get Energy Stars because they have the power limitation characteristic of figure 2 due to the limitations of the High Pressure Arc Lamp. Projection Type TVs do not have lower power because the manufacturers did something special to reduce power.

We teach our grade school children that when we want to determine what percentage of children have apples in their lunch boxes, that it is not proper to include a count of the oranges in the calculation. Yet this is exactly what the Energy Star Drafts 1 and 2 do to arrive at the proposed equation for determining which TVs get Energy Stars. Averaging the Flat-Panel Types and the Projection Types is fundamentally wrong.

Future Markets

TV Display markets are rapidly changing. The Cathode Ray Tube (CRT) is being displaced by the flat-panels. But also the market share of the Projection Type displays is rapidly declining. So certainly by the time that most consumers buy the TVs based on the new Energy Star Specification, there will be a considerably smaller number of Projection Type displays being sold.

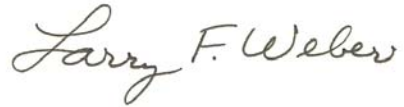
We should ask:

Is it wise to adhere to a fundamentally flawed calculation method in order to include a TV technology that is rapidly declining in the market place?

Please consider these comments along with those made in my August 7, 2007 document.

I would be happy to have further discussions with the EPA officials on these comments.

Respectfully submitted,

A handwritten signature in cursive script that reads "Larry F. Weber". The signature is written in black ink and is positioned below the typed name.

Dr. Larry F. Weber