



Independent Television Commission

ITC GUIDANCE NOTE FOR LICENSEES
ON FLASHING IMAGES AND REGULAR
PATTERNS IN TELEVISION

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ITC GUIDANCE NOTE FOR LICENSEES ON FLASHING IMAGES AND REGULAR PATTERNS IN TELEVISION

1. Flickering or intermittent images and certain types of regular pattern can cause problems for some viewers who have photosensitive epilepsy. The television licensees, together with the ITC, have consulted with leading medical opinion in this area to draw up guidelines aimed at reducing the risk of exposure to potentially harmful stimuli.
2. Television is by nature a flickering medium. In Europe each transmitted picture is refreshed 50 times each second and interlaced scanning generates flicker 25 times each second. It is therefore impossible to eliminate the risk of television causing convulsions in viewers with photosensitive epilepsy. To reduce risk the following guidelines on visual content should be applied when flashing or regular patterns are clearly discernible in normal domestic viewing conditions. It should be noted that the level of any cumulative risk arising from successive sequences of 'potentially harmful' flashes over a prolonged period is unknown. If, as medical opinion suggests, the risk of seizures increases with the duration of flashing, licensees should note that it is possible that a sequence of flashing images lasting more than 5 seconds might constitute a risk even when it complies with the guidelines below:
3. **A potentially harmful flash** occurs when there is a pair of opposing changes in luminance (i.e., an increase in luminance followed by a decrease, or a decrease followed by an increase) of 20 candelas per square metre (cd.m^{-2}) or more (see notes 1 and 2). This applies only when the screen luminance of the darker image is below 160 cd.m^{-2} . Irrespective of luminance, a transition to or from a saturated red is also potentially harmful.
 - 3.1.1. Isolated single, double, or triple flashes are acceptable, but a sequence of flashes is not permitted when both the following occur:
 - i. the combined area of flashes occurring concurrently occupies more than one quarter of the displayed (see note 3) screen area; and
 - ii. there are more than three flashes within any one-second period. For clarification, successive flashes for which the leading edges are separated by 9 frames or more are acceptable, irrespective of their brightness or screen area.
4. **Rapidly changing image sequences** (for example, fast cuts) are provocative if they result in areas of the screen that flash, in which case the same constraints apply as for flashes.

5. A **potentially harmful regular pattern** contains clearly discernible stripes when there are more than five light-dark pairs of stripes in any orientation.

The stripes may be parallel or radial, curved or straight, and may be formed by rows of repetitive elements such as polka dots. If the stripes change direction, oscillate, flash or reverse in contrast they are more likely to be harmful than if they are stationary. If the patterns obviously flow smoothly across, into, or out of the screen in one direction they are exempt from restriction.

- 5.1. Potentially harmful patterns are not permitted when either of the following two conditions apply:
- i. the stripes are stationary and the pattern occupies more than 40% of the displayed screen area; or
 - ii. the stripes change direction, oscillate, flash, or reverse in contrast and the pattern occupies more than twenty five per cent of screen area; and in addition to either of the above two conditions applying, when
 - iii. the screen luminance of the darker bars in the pattern is below 160 cd.m^{-2} and differs from the lighter bars by 20 cd.m^{-2} or more (see notes 1 and 2).

Footnotes:

1. Video waveform luminance is not a direct measure of display screen brightness. Not all domestic display devices have the same gamma characteristic, but a display with a gamma of 2.2 may be assumed for the purpose of determining electrical measurements made to check compliance with these guidelines (see Appendix I).
2. For the purpose of measurements made to check compliance with these guidelines, pictures are assumed to be displayed in accordance with the 'home viewing environment' described in Recommendation ITU-R BT.500 in which peak white corresponds to a screen illumination of 200 cd.m^{-2} .
3. It may be assumed that overscan on modern domestic television receiver displays will normally be in the range $3.5\% \pm 1\%$ of the overall picture width or height (as indicated in EBU Technical recommendation R95-2000).

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Further References

Relevant ITC Codes

The ITC Programme Code, *Autumn 1998, Section 7.3 revised September 1999, Section 1.12(iii) revised Spring 2001*

The ITC Advertising Standards Code, *September 2002*

External Publications

Harding, Graham F.A., & Jeavons Peter M. *Photosensitive Epilepsy (1994) ISBN: 0 898683 02 6*

Harding, Graham F.A. *TV can be bad for your health, Nature Medicine Vol.4 No.3 March 1998*

Wilkins, Arnold J. *Visual Stress (1995) ISBN 0 19 852174 X*

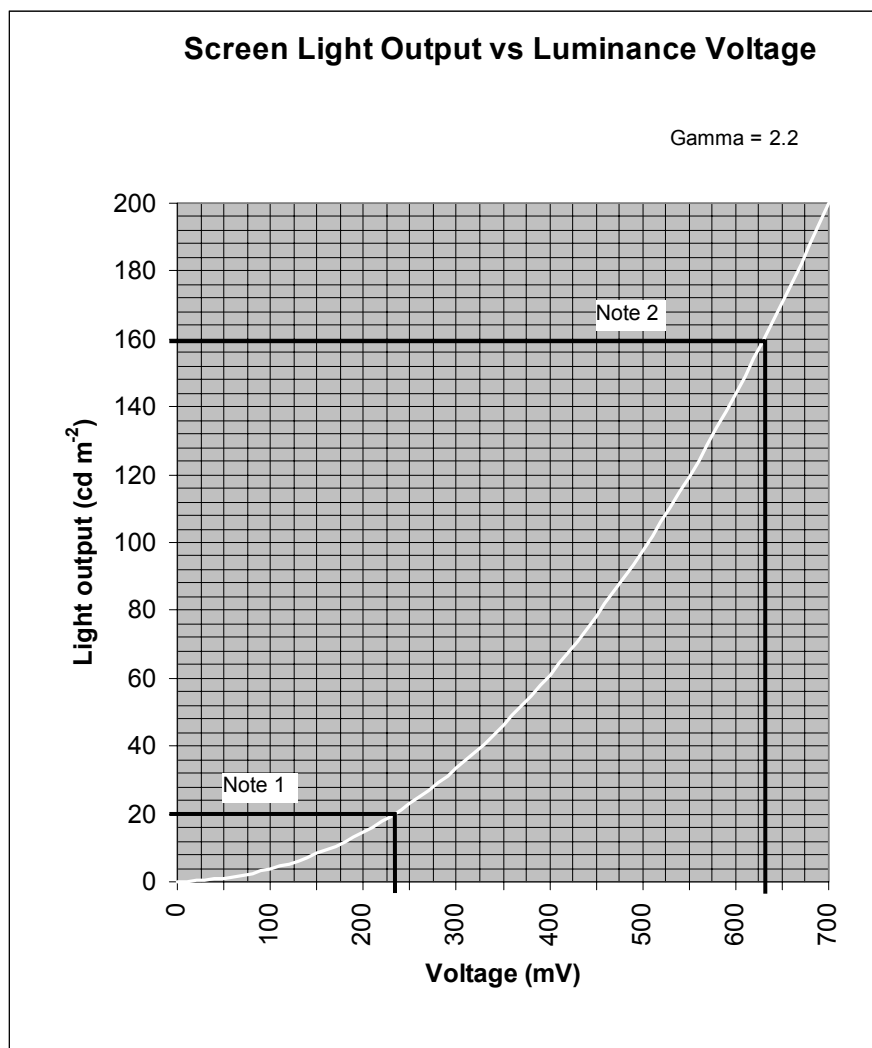
Appendix I

ITC Guidance Note on Flashing Images and Regular Patterns: Luminance Measurement

Screen luminance may be measured using a hand-held spot photometer with a CIE characteristic designed for making measurements from a television screen. The display conditions are those of the 'home viewing environment' described in Recommendation ITU-R BT.500. For accurate results, the display brightness and contrast should first be set up using PLUGE (Rec. ITU-R BT. 814) with peak white corresponding to a screen illumination of 200 cd.m^{-2} .

As an alternative, the following graph and table may be consulted if electrical measurements are more convenient. This shows the typical relationship between luminance (monochrome) voltage and the emitted light output of a television display.

There are measurement uncertainties associated with both methods. Nevertheless, flashing images or regular patterns described in this Guidance Note as being potentially harmful can be expected to be obviously discernible. Such potentially harmful images occur only rarely during the course of programme material with scenes that appear natural or represent real life; examples include photographers' flashlights or strobe lights in a disco. Part of the purpose of the Guidance Note is to assist programme producers to avoid inadvertently creating video effects that contain flashing images or patterns likely to be harmful.



Voltage (mV)	Light (cd/m^2)
0	0.1
25	0.4
50	1.2
75	2.3
100	3.8
125	5.8
150	8.3
175	11.2
200	14.6
225	18.6
234	20.1
250	23
275	28
300	33.5
325	39.5
350	46.1
375	53.2
400	61
425	69.3
450	78.1
475	87.6
500	97.6
525	108.3
550	119.5
575	131.4
600	143.9
625	157
631	160
650	170.7
675	185
700	200

Appendix I

Notes:

1. A luminance voltage of 234 mV results in light output of 20.1 cd.m^{-2} . If the **brighter** image of a flash or pattern is **above** this level, then it is potentially harmful if the light output between the darker and brighter images differs by 20 cd.m^{-2} or more.
2. A luminance voltage of 631 mV results in light output of 160 cd.m^{-2} . If the **darker** image of a flash or pattern is **below** this level, then it is potentially harmful if the light output between the darker and brighter images differs by 20 cd.m^{-2} or more.