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Display lighting unit – Part 1-2: Terminology and letter symbols

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Part 1-2: Terminology and letter symbols

FOREWORD

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IEC 62595-1-2 has been prepared by IEC technical committee 110: Electronic displays. It is an International Standard.

This third edition cancels and replaces the second edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) new terms are added considering recent advances in display lighting unit (DLU) technology;
b) some of the terms and definitions are corrected and revised, particularly to be consistent with IEC 60050 policy;
c) clause structure is updated for categorizing terms correctly;

d) some of the figures in informative Annex A and their captions are revised for better understanding;

e) an informative Annex B is added for pictorial definition of the backlight unit structure.

f) an informative Annex C is added for pictorial definition of the backlight unit varieties and light-guide plate shapes.

The text of this International Standard is based on the following documents:

Draft	Report on voting
110/1698/FDIS	110/1725/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62595 series, published under the general title *Display lighting unit*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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DISPLAY LIGHTING UNIT –

Part 1-2: Terminology and letter symbols

1 Scope

This part of IEC 62595 gives the preferred terms, their definitions and symbols, for display lighting units such as backlight units of transmissive and transflective displays, and frontlight units of reflective displays, with the objective of using standardized terminology when publications are prepared.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-845, *International Electrotechnical Vocabulary (IEV) – Part 845: Lighting* (available at www.electropedia.org)

3 Terms and definitions

3.1 General

For the purposes of this document, the terms and definitions given in IEC 60050-845[1] and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.2 Classification of terms

Terms for display lighting units, such as backlight units and frontlight units are classified as follows:

a) Fundamental terms (3.3);
b) Terms related to passive optical components (3.4);
c) Terms related to spatio-temporally modulated BLUs (3.5);
d) Terms related to solid-state light sources (3.6);
e) Terms related to light shaping guide in frontlight unit (3.7);
f) Terms related to specifications (3.8);
g) Terms related to backlight dimming (3.9);
h) Terms related to photoluminescent materials (3.10);

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[1] Identical to CIE 17.4.

i) Terms related to DLU luminance (3.11).

The following definitions are applied for international standardization of the display lighting units.

For background to the terms in 3.3 to 3.11, refer to [1] to [27][2].

3.3 Fundamental terms

3.3.1
display lighting unit
DLU
lighting unit for recognition of the displayed images on a non-emissive electronic display device

Note 1 to entry: A display lighting unit illuminates a spatio-temporal light modulator (STLM or SLM), for example a liquid crystal panel, which together constitute an electronic display.

3.3.2
backlight unit
BLU
display lighting unit that is set at the rear of a non-emissive electronic display device which is a spatio-temporal light modulator (STLM or SLM) device such as a transmissive or transflective liquid crystal (LC) device

Note 1 to entry: For an example, see Figure A.1.

Note 2 to entry: Terms included in this document are mainly adopted from the references listed in the Bibliography.

3.3.3
edge-lit backlight unit
backlight unit in which an optically transparent medium (typically light-guide plate) is used in proximity with the light source(s) for introducing the light into the medium from one or multiple sides of the medium to illuminate a liquid crystal display or device (LCD)

Note 1 to entry: For an example, see Figure A.2.

Note 2 to entry: The "edge-lit backlight unit" is sometimes called "side-lit backlight unit", "edge-light backlight unit" or "side-light backlight unit".

Note 3 to entry: For information on backlight unit, see [1] to [17].

3.3.4
direct-lit backlight unit
backlight unit in which a light cavity is used in combination with light source(s) that is(are) mounted inside the cavity, for illuminating a transmissive LC device mounted on the light cavity for image reconstruction

Note 1 to entry: For an example, see Figure A.3.

3.3.5
side-driven direct-lit backlight unit
backlight unit in which a light chamber is used in combination with light sources(s) that is(are) mounted on the inner sides of the light cavity for illuminating a panel mounted on the cavity for image reconstruction

Note 1 to entry: For an example, see Figure C.1.

[2] Numbers in square brackets refer to the Bibliography.

3.3.6
static backlight unit
single or integrated planar illumination system that operates with steady-state direct or alternating current and is free from temporal modulation of the spectral power distribution

3.3.7
dynamic backlight unit
single or integrated illumination units, the light output of which are spatially or temporally modulated, or both, in synchronization with the display's input signal, with any image formation or analysing unit of the display, or with ambient environment sensors

3.3.8
blinking backlight unit
backlight unit without spatial modulation that is switched on and off synchronously with and at the same frequency as the vertical synchronization input signal of the display

3.3.9
scanning backlight unit
backlight unit that is divided optically or spatially into several line blocks and is periodically switched on and off, block by block, synchronously with the display's scan drivers

3.3.10
directional backlight unit
backlight unit that collimates emergent light into a predefined solid angle or directs the collimated emergent light toward a spatial zone or surface on the back side of the LC device

3.3.11
diffractive BLU
functional BLU that includes a lightguide plate or film with micro or sub micro-gratings on one of its surfaces, for example the light introduction surface, rear surface or front light emerging surface for diffracting the light in a predefined direction or a solid angle

3.3.12
multi-directional backlight unit
backlight unit in which the light sources (LEDs or LDs) are mounted in an array around a micro- or submicron-featured light-guide plate (LGP) or film (LGF), for sequentially switching to obtain directional light for reconstructing a 3D image on the SLM (LC) device

Note 1 to entry: LED and LD are defined in "Terms related to solid-state light sources" (3.6).

3.3.13
segmented backlight unit
backlight unit that is divided into blocks or segments for synchronization with the driving of an SLM (LC) device for individually illuminating each block or segment of the SLM (LC) device

3.3.14
scanning directional backlight unit
directional BLU that continuously or distinctively illuminates a wide solid angle or an area in front of the backlight unit, i.e., the backside of the LC device, by consecutively switching (on and off) the spatially distributed light source array on the side surfaces of the light-guide plate (LGP)

3.3.15
field-alternating LC display lighting unit
unit having a single light-guide plate or which is spatially divided into top and bottom, with distinctive upper and lower light source groups for illuminating an SLM (LC) device in which an image is divided into top and bottom parts to reconstruct the upper and lower parts of an image alternately on the SLM (LC) device for compensating the response time of the SLM

Note 1 to entry: Sometimes "field-alternating" is called "top and bottom flashing".

Note 2 to entry: There is an explanation for field alternate LCD backlight unit, as follows: "Backlight unit that includes a single light-guide plate (LGP) or stacked LGPs for illuminating an SLM (LC) device, in which an image is divided into a left and right image in which the two images are oriented in different directions and where the left and right images are displayed alternately on the SLM (LC) device in order to create a 3D image display". Sometimes this backlight unit is called "field-alternating" or "left and right alternating flashing".

3.3.16
spatio-temporal switching backlight unit
backlight unit that is divided optically or spatially into several horizontal blocks and periodically switched on and off from top to bottom under a time table for illuminating or flashing red, green, or blue light in synchronization with a field-sequential colour LC device with or without micro colour filters

3.3.17
single-side light emission backlight unit
backlight unit that emits light either from a front surface or rear surface for illuminating a single SLM (LC) device

Note 1 to entry: A BLU has front and rear surfaces of illumination. A special case is using two LC panels each on the front and rear.

3.3.18
narrow-band backlight unit
backlight unit with light emitters, at least one of which has a full-width half-maximum (FWHM) of maximum 5 nm

3.3.19
mobility enhanced backlight unit
optical components with reduced weight and power consumption used in DLU, i.e., for enhanced portability

3.3.20
LGP-corner driven backlight unit
edge-lit backlight unit in which the light is driven from one or several flattened corners of a rectangular light-guide plate using single or multiple light sources

3.3.21
stack backlight unit
backlight unit in which more than one single light control medium or light-guide plate is used in stack form in the structure for additional light shaping capability

Note 1 to entry: For an example, see Figure C.2.

3.3.22
tandem backlight unit
backlight unit that is an integration of multiple distinct and overlapped edge-lit backlight units

Note 1 to entry: For an example, see Figure C.3.

3.3.23
wide SPD backlight unit
backlight unit that uses light sources of three or more emission peaks in order to produce a wide colour gamut on an SLM (LC) device

Note 1 to entry: The colour gamut of a QD-based LCD module depends on the respective peak wavelength (PWL) and full-width half-maximum (FWHM) of the three primary colours (R, G, B), and other optical units in the LCD module including the lightguide plate (LGP), diffuser plate and colour filter.

Note 2 to entry: The colour gamut in "lighting and imaging" (IEV 845-32-007) has been defined as "volume, area, or solid in a colour space, consisting of all those colours that are either; present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or capable of being created using a particular output device and/or medium". Refer to Note 3.

Note 3 to entry: In reproduction and media applications only the volume or solid in a colour space is regarded as colour gamut. In applications such as signal lighting the colour gamut is an area.

3.3.24
light-emitting diode backlight unit
LED backlight unit
backlight unit that uses LEDs as light sources

Note 1 to entry: Sometimes the "light-emitting diode (LED) backlight unit" is called "LED backlight unit".

3.3.25
laser backlight unit
backlight unit that uses laser(s) as light source(s)

3.3.26
laser diode backlight unit
LD backlight unit
laser backlight unit that uses LD(s) as light source(s)

Note 1 to entry: Sometimes the "laser diode backlight unit" is called "LD backlight unit".

3.3.27
RGB backlight unit
backlight unit that uses LEDs with primary colours of red, green, and blue, such as six-primary ($R_1G_1B_1$ with $R_2G_2B_2$), quasi-monochromatic LEDs or monochromatic LDs as light sources

3.3.28
three-primary (R,G,B) backlight unit
backlight unit that uses three primary colours of red, green, and blue quasi-monochromatic LEDs or monochromatic LDs as light sources

3.3.29
six-primary (R_1,G_1,B_1,R_2,G_2,B_2) backlight unit
backlight unit employing two groups of red, green and blue light sources for illuminating an SLM (LC) device which is used for reproduction of colours of photographs

3.3.30
single-flash backlight unit
backlight unit that flashes periodically and is synchronized with an SLM (LC) device for the purpose of inserting a grey frame in order to enhance the moving image quality on the display

Note 1 to entry: The BLU is synchronized with the LCD, to be switched off when the black is written on the panel.

3.3.31
multi-flash backlight unit
spatially linear segmented backlight unit for scanning or field-sequential colour display that flashes periodically and is synchronized with the SLM (LC) device for the purpose of inserting colour fields (displayed image with single colour) or grey fields in order to enhance the displayed image quality on the display or spatially combining the different spectra for displaying colour images

3.3.32
multi-chromatic backlight unit
backlight unit that consists of multiple primaries or multiple quasi-monochromatic or more than three primaries light sources to illuminate an LC device for display of a wide colour gamut to be used for soft proofing, such as in printing applications, or alternative wide colour gamut applications

3.3.33
frontlight unit
FLU
transparent medium with side illuminating light sources that is set on the front side of non-emissive electronic display devices such as a reflective or transflective (partially transmissive or partially reflective) SLM (LC) panel or electronic paper display

Note 1 to entry: For an example, see Annex D.

Note 2 to entry: For information on frontlight unit, see [18] to [22].

3.4 Terms related to passive optical components

3.4.1
light-guide plate
LGP
optically transparent medium with a thick and solid structure that is generally employed in an edge-lit backlight unit or frontlight unit for forming the required light distribution spatially for transmissive, transflective or reflective SLM (LC) display devices

Note 1 to entry: For an example, see Annex C.

3.4.2
light-guide film
LGF
optically transparent medium with a thin and flexible structure that is employed instead of a light-guide plate (LGP) in an edge-lit backlight unit or frontlight unit for forming the required light distribution spatially for a transmissive, transflective or reflective SLM (LC) display devices

3.4.3
micro-featured light-guide plate
micro-featured light-guide film
optically transparent medium characterized by optical micro- or submicron-structures for shaping spatially or angularly the required light distribution in an edge-lit backlight or frontlight unit for illuminating a transmissive, transflective or reflective SLM (LC) device

3.4.4
slab light-guide plate
slab light-guide film
light-guide plate or light-guide film that has a plane or plate-like geometrical shape