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**Organic light emitting diode (OLED) displays –
Part 1-2: Terminology and letter symbols**

PREVIEW
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**Afficheurs à diodes électroluminescentes organiques (OLED) –
Partie 1-2: Terminologie et symboles littéraux**

IEC 62341-1-2:2014
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IEC 62341-1-2

Edition 2.0 2014-04

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

U

ICS 31.260

ISBN 978-2-8322-1512-8

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –**Part 1-2: Terminology and letter symbols**

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International Standard IEC 62341-1-2 has been prepared by IEC technical committee 110: Electronic display devices.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

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

- a) Additional terms were added in Clause 2.
- b) Several terms were deleted from Clause 2.
- c) The definition of several terms was revised in Clause 2.
- d) Annex B is added as informative part.
- e) The new edition was editorially changed according with the current ISO/IEC directives.

The text of this standard is based on the following documents:

CDV	Report on voting
110/465/CDV	110/520A/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62341 series, under the general title *Organic light emitting diode (OLED) displays*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –

Part 1-2: Terminology and letter symbols

1 Scope

This part of IEC 62341 gives the preferred terms, their definitions and symbols for organic light emitting diode (OLED) displays, with the object of using the same terminology when publications are prepared in different countries.

2 Terms and definitions

For purposes of this document, the following terms and definitions apply.

2.1 Classification of terms

Terms for organic light emitting diode (OLED) displays are classified as follows:

- a) fundamental terms (2.2)
- b) terms related to physical properties (2.3)
- c) terms related to constructive elements (2.4)
- d) terms related to performances and specifications (2.5)
- e) terms related to the production process (2.6)

2.2 Fundamental terms

2.2.1

active matrix driving

active addressed driving

matrix driving method in which each pixel or subpixel has at least one active switching (e.g. diode or transistor) and storage element

2.2.2

addressing method

method of selecting each pixel or subpixel for activation

2.2.3

alphanumeric display

display that is able to show a limited set of characters comprising at least letters and Arabic numerals

2.2.4

area-colour display

zone-colour display

display in which the display panel is partitioned into several parts, each one showing a colour different from each other

2.2.5

bottom emission

device structure, in which almost all light emitted passes through a substrate on which organic electroluminescent layers are made

2.2.6**constant-current driving**

driving method where a constant current is applied to each pixel or subpixel

2.2.7**constant-voltage driving**

driving method where a constant voltage is applied to each pixel or subpixel

2.2.8**display with a bright background**

display showing dark images on a bright background

2.2.9**display with a dark background**

display showing bright images on a dark background

2.2.10**doping method**

method of adding a small quantity of different material to the host material

Note 1 to entry: This method is used in order to improve the device characteristics or to change the emission spectrum.

2.2.11**driving method**

specific method for activating each pixel or subpixel

2.2.12**dual emission display**

display in which light is emitted from both sides (top and bottom) of a substrate on which organic electroluminescent layers are made

2.2.13**emissive display**

display that uses light generation to produce visual information (electro-luminescence, photoluminescence, etc.)

2.2.14**flexible display**

display that is mechanically flexible

2.2.15**full-colour display**

display capable of showing at least 3 primary colours, the colour gamut of which includes a white area (e.g. containing D50, D65, D75) and having at least a 64 grey scale per primary

2.2.16**hybrid organic light emitting diode****hybrid OLED**

OLED that uses more than one kind of material and/or processing method

Note 1 to entry: A hybrid OLED can be as follows, for example:

- a) an OLED which contains fluorescent and phosphorescent emitters,
- b) an OLED which contains polymer and small molecule layers.

2.2.17**inverted organic light emitting diode
inverted OLED**

OLED where the substrate carries the cathode

2.2.18**matrix display**

display device consisting of regularly distributed pixels arranged in rows and columns

2.2.19**molecular organic light emitting diode display**

organic light emitting diode display composed of organic (small) molecules

2.2.20**monochrome display**

display capable of reproducing only one colour

2.2.21**multi-colour display**

display other than monochrome display and full-colour display

2.2.22**multiplex driving**

driving method of time-share driving in which one common electrode is addressed to more than two pixels or subpixels

2.2.23**organic electroluminescence****OEL**

emission from organic materials by recombination of negatively and positively charged carriers when forward electric bias is applied

Note 1 to entry: This note applies to the French language only.

2.2.24**organic electroluminescent display****OEL display**

display showing visual information using organic electroluminescence

2.2.25**organic light emitting diode****OLED**

light emitting diode in which light is emitted from organic materials

Note 1 to entry: This note applies to the French language only.

2.2.26**organic light emitting diode display****OLED display**

display incorporating organic light emitting diodes

2.2.27**organic light emitting diode display module**

organic light emitting diode display panel, its driving electronics and optical films if used in the device design

2.2.28**organic light emitting diode panel****organic light emitting diode display panel**

display panel of an organic light emitting diode display without external drivers

2.2.29**passive matrix addressing**

matrix driving method in which each pixel or subpixel is addressed directly by applied signals on the addressing and data lines

2.2.30**PIN organic light emitting diode**

OLED incorporating conductivity doping

Note 1 to entry: See “p-HTL” and “n-ETL”.

2.2.31**polymer organic light emitting diode**

light emitting diode in which light is emitted from polymeric materials

Note 1 to entry: The term “polymer light emitting diode” is sometimes used.

2.2.32**segment display**

display device showing fixed patterns made of segment electrodes which may be different in size and orientation

2.2.33**stacked organic light emitting diode****stacked OLED****tandem organic light emitting diode****tandem OLED**

at least two single OLED units stacked on top of each other

Note 1 to entry: The interface between the single OLED unit is not formed by an anode and a cathode pair, but by a charge generation layer.

2.2.34**standard light source**

light source that approximates a defined illuminant, such as CIE illuminant A and D65

2.2.35**standard reference atmosphere**

reference atmospheric conditions used for standardizing the data measured under different atmospheric conditions

2.2.36**static driving**

method of driving in which all pixels are activated simultaneously and constantly

2.2.37**top emission**

device structure, in which almost all the light is emitted (toward) outside from a (top) side of a substrate, on which the OLED device is formed

2.2.38**transparent display**

display in which the display area is visibly transparent

2.3 Terms related to physical properties

2.3.1

charge carrier density

density of mobile electrons and/or holes in a material

Note 1 to entry: Expressed in cm^{-3} .

2.3.2

crystallization temperature

temperature at which the material changes into a crystalline state when it is cooled from a liquid state, molten state or solution form

Note 1 to entry: In the case of an amorphous material, the temperature at which the material changes into partly or wholly crystalline state.

2.3.3

electroluminescence spectrum

spectral distribution of the light emitted by the process of electroluminescence

2.3.4

emission ratio

ratio of the two averaged luminance values on two sides of the OLED

Note 1 to entry: The ratio is given in a normalised form, stating the bigger value first. The smaller value is normalised to unity.

2.3.5

external quantum efficiency (standards.iteh.ai)

ratio of the number of the photons emitted from an organic light emitting diode divided by the number of the injected electrons or holes

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Note 1 to entry: An external quantum efficiency is indicated as a product of an internal quantum efficiency and an external light out-coupling efficiency.

2.3.6

fluorescence yield

fluorescence yield efficiency

ratio of the number of fluorescent photons divided by the number of photons absorbed into the material

2.3.7

fluorescence

emission of light from an excited singlet state of materials

2.3.8

injection barrier

energy barrier of the carrier injection at the interface of an organic layer and another organic layer or at the interface of an organic layer and an electrode

2.3.9

internal quantum efficiency

ratio of the number of the photons produced from the electric charges injected from the electrode divided by the number of the injected electrons or holes

Note 1 to entry: An internal quantum efficiency is indicated as a product of a recombination probability of electrons and holes, as an efficiency of exciton generation through carrier recombination and as an efficiency of photon generation from exciton.

2.3.10**optical axis**

distinct direction in optically anisotropic materials and elements, e.g. polarizers, wave plates and retarders

2.3.11**phosphorescence yield****phosphorescence yield efficiency**

ratio of the number of phosphorescent photons divided by the number of photons absorbed into the material

2.3.12**phosphorescence**

emission of light from an excited triplet state of materials

2.3.13**photoluminescence spectrum**

spectral distribution of the light emitted from materials excited by the light of wavelengths shorter than that of the photoluminescent emission

2.4 Terms related to constructive elements**2.4.1****amorphous silicon**

solid state silicon without a distinct crystalline structure

Note 1 to entry: The carrier mobility is rather low compared with polycrystalline silicon.

2.4.2**anode separator**

rib to electrically separate each anode from the adjacent anode in a passive matrix organic light emitting diode display panel

2.4.3**bank**

raised elevation that is fabricated around each pixel or subpixel

Note 1 to entry: Generally, it is used to prevent overflowing of the coated solution.

2.4.4**black matrix**

film-like structure that absorbs ambient or internally scattered light

2.4.5**buffer layer**

layer inserted in the device structure which may be used, for example, to improve current injection or reduce surface roughness

2.4.6**cathode separator**

rib to electrically separate each cathode from the adjacent cathode in a passive matrix organic light emitting diode display panel

2.4.7**charge generation layer****CGL**

layer in a stacked OLED which generates electrons for one adjacent OLED unit (acting as a cathode) and holes for a second adjacent OLED unit (acting as an anode)

Note 1 to entry: The CGL is not directly connected to an electrical power supply.

Note 2 to entry: This note applies to the French language only.

2.4.8 circular polarizer

optical component consisting of a linear polarizer and 1/4-wavelength retarder plate which transforms the component of incoming light parallel to the polarizer, into circularly polarized light

2.4.9 colour changing medium

medium containing fluorescent dyes that absorb the emission energy of organic electroluminescence and re-emit photons with longer wavelength than the absorbed photons

2.4.10 colour filter

regularly transmitting device used to modify the radiant or luminous flux, the relative spectral distribution, or both, of the radiation passing through it

Note 1 to entry: Generally, it is used as 3-primary-colour (red, green, blue) filters with white organic light emitting diode for colour image display or as a filter to improve the colour saturation of an organic light emitting diode.

2.4.11 common electrode

2.4.11.1

common electrode

<segment display> electrode connected to all segments

2.4.11.2

common electrode

<passive matrix display> row- or column- scanning electrode

2.4.11.3

common electrode

<active matrix display> electrode connecting all pixels in a row and/or a column

2.4.12

data electrode

electrode driven by the data signal voltage or current synchronized with the scanning signals in a multiplexed display

2.4.13

dopant

different materials added to the host material in small quantity to improve the device characteristics such as enhancement of luminous efficiency, spectrum change of emission, and decreasing of resistance

2.4.14

dot electrode

discrete electrode for each pixel or subpixel in an active matrix display, which is separated from the data electrode line by a switching device such as a thin film transistor

2.4.15

driver

circuits that supply signal- and scanning voltages and/or currents to a display panel

Note 1 to entry: There are two types of drivers, a scanning electrode (row electrode) driver and a data electrode (column electrode) driver, in a matrix display.

2.4.16**encapsulation**

enclosing device/structure to protect the organic layers and the electrodes from humidity and/or oxygen

2.4.17**encapsulation glass
cover glass**

glass to protect the organic layer and the electrodes from humidity and/or oxygen

2.4.18**exciton blocking layer**

organic layer with a wide energy band gap that blocks exciton diffusion, usually incorporated in an organic light emitting diode for confining triplet excitons in a light emitting layer

2.4.19**external outcoupling structures**

optical outcoupling structures which are located on the outer substrate surface to extract more light from the substrate into the air

2.4.20**gate electrode**

electrode which controls or connects with a gate terminal of a transistor in an active matrix-addressed display

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2.4.21**getter**

material that helps maintain vacuum by chemically adsorbing gases outgassing from the surfaces in vacuum

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2.4.22**p-doped hole transport layer****p-HTL**

electrically doped hole transport layer for further conductivity increase

Note 1 to entry: This note applies to the French language only.

2.4.23**n-doped electron transport layer****n-ETL**

electrically doped electron transport layer for further conductivity increase

Note 1 to entry: This note applies to the French language only.

2.4.24**host material**

material that provides a mechanical/electrical matrix for the dopants

2.4.25**insulating layer**

insulator formed below the cathode separator to prevent an electrical short between anodes and cathodes

**2.4.26
interlayer****2.4.26.1
interlayer
ITL**

<hybrid OLED (type a)> layer which serves to separate the fluorescent from the phosphorescent emission zone

Note 1 to entry: This note applies to the French language only.

**2.4.26.2
interlayer
ITL**

<polymer OLED> layer which separates emission layers and carrier injection layers

Note 1 to entry: This note applies to the French language only.

**2.4.27
internal outcoupling structures**

optical outcoupling structures which are located between the OLED stack and the substrate to bring more light into the substrate which finally leads to a higher amount of photons extracted into the air

**2.4.28
low temperature polysilicon
LTPS**

poly crystalline silicon fabricated at a substrate temperature below 450 °C

Note 1 to entry: This note applies to the French language only.

**2.4.29
microlens
microlens array**

optical lenses fabricated close to pixels in order to enhance the out-coupling efficiency of emission

**2.4.30
molecular material**

organic materials used for an organic light emitting diode, often indicating organic materials with molecular weight of less than 2 000

Note 1 to entry: Different molecular materials are used for carrier injection, carrier transport, and emission in a multilayer form.

**2.4.31
multi-layer organic structure**

structure that has multiple organic layers to improve emission efficiency

Note 1 to entry: Each layer has one or more functions, such as electron transport, emission or hole transport.

**2.4.32
OLED controller**

electric device that supplies control signal voltages, e.g. timing signals, to operate driving ICs

Note 1 to entry: It may process display signals such as analogue-to-digital (A/D) and/or digital-to-analogue (D/A) signal conversion. An IC for controller is called controller-IC.

**2.4.33
optical outcoupling structures**

optical structures to enhance the light extraction from the OLED to the air