G02F

OPTICAL DEVICES OR ARRANGEMENTS FOR THE CONTROL OF LIGHT BY MODIFICATION OF THE OPTICAL PROPERTIES OF THE MEDIA OF THE ELEMENTS INVOLVED THEREIN; NON-LINEAR OPTICS; FREQUENCY-CHANGING OF LIGHT; OPTICAL LOGIC ELEMENTS; OPTICAL ANALOGUE/ DIGITAL CONVERTERS

Definition statement

This place covers:

This subclass covers the control of light by optical devices or arrangements involving at least one element with at least one optical medium, the optical properties thereof being changeable by the influence of external forces or fields affecting the element.

The following is a non-exhaustive list of the optical properties that can be changed in the optical element:

- refraction index;
- birefringence;
- absorption;
- nonlinear susceptibility.

The following is a non-exhaustive list of the external forces or fields which can affect the optical element:

- electric fields;
- magnetic fields;
- electric currents;
- acoustic or mechanical vibrations;
- pressure, stress or the like;
- temperature or heat.

The following optical elements are therefore covered, the list being not exhaustive:

- thermo-optic elements.
- electro-optic elements.
- magneto-optic elements.
- elasto-optic elements.
- acousto-optic elements.
- liquid crystal devices.
- electrochromic elements.
- electrophoretic elements.
- non-linear optics, i.e. devices or arrangements in which the electric or magnetic field component of the light beam influences the optical properties of the medium.

Non-linear optics, i.e. devices or arrangements in which the electric or magnetic field component of the light beam influences the optical properties of the medium.

Control of light beams by electromagnetic waves, e.g. radio waves, or by electrons or other elementary particles.

Optical analogue/digital converters, i.e. devices performing the digitalisation of an optical analogue signal, insofar these converters are based in substantial manner on elements which are provided for under the bullets above.

Demodulating light.

Transferring the modulation of modulated light, i.e. transferring the information from one optical carrier of a first wavelength to a second optical carrier of a second wavelength.

Frequency changing of light, e.g. by quantum counters.

Optical logic elements.

Optical bistable devices, i.e. devices exhibiting two different optical output states for a same optical input value.

Relationships with other classification places

Group G02B 26/00 covers optical devices or arrangements for controlling light using movable or deformable elements, as opposed to subclass G02F that covers devices or arrangements involving a modification or control of the optical properties of the medium of said devices or arrangements.

Group G05D 25/00 covers control of light in general, e.g. by using electric or mechanical means, as opposed to subclass G02F that covers devices or arrangements involving a modification or control of the optical properties of the medium of said devices or arrangements.

Group G09F 9/35 covers indicating arrangements in which characters are formed on a support by combining individual liquid crystal elements, as opposed to group G02F 1/13 that covers devices or arrangements for the control of the intensity, phase, polarisation or colour based on liquid crystals. Classification should be given in G09F 9/35 when the emphasis is on the indicating aspects, and in the relevant subgroups of G02F 1/13 when the emphasis is on the devices or arrangements aspects of the liquid crystal cells involved.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Optical computing devices, e.g. devices in which mathematical operations are carried out with optical elements	G06E, G06E 3/00
Modulators for heads used in optical recording or reproducing	G11B 7/125

Informative references

Attention is drawn to the following places, which may be of interest for search:

Liquid crystal materials	C09K 19/00
Non-portable lighting devices in general	F21S
Features or details of lighting devices, e.g. use of light guides	F21V
Optical transfer means between sensing member and indicating or recording part in connection with measuring	G01D 5/26
Testing of optical apparatus	G01M 11/00
Investigating or analysing materials by the use of optical means	G01N 21/00
Optical devices, systems or arrangements per se, e.g. devices with movable or deformable element [DMD] or electro-wetting	G02B 26/00
Control of light in general, e.g. by using electric means	G05D 25/00
Electrical signal transmission systems using optical means to convert the input signal	G08C 19/36

Indicating arrangements for variable information by selection or combination of individual elements	G09F 9/35
Displays using movable, e.g. rotatable, elements	G09F 9/37
Control arrangements or circuits for visual indicators other than cathode-ray tubes	G09G 3/00
Optical recording associated with non-optical reproducing, or optical reproducing associated with non-optical recording	G11B 11/00
Static digital stores using optical elements	G11C 13/04
Photoconductive antenna for Terahertz radiation	H01Q 9/00
Modulation of electromagnetic waves	H03C 7/00
Transmission systems employing light	H04B 10/00
Optical multiplex systems	H04J 14/00
Spatial multiplexing	H04J 14/05
Orbital angular momentum [OAM] multiplex systems	H04J 14/07
Pictorial communication, e.g. television	H04N
Projection devices for colour picture display	H04N 9/31
Control of light sources	H05B 35/00 - H05B 41/00, H05B 46/00, H05B 47/00
Semiconductor devices sensitive to radiation	H10F

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Control	When referred to light or optical, covers affecting or directing one or more of the following properties of light: intensity; colour; phase; frequency or wavelength; polarisation; direction and one or more of the following optical operations: gating; switching or deflecting; modulation, demodulation or transfer of modulation.
Light	Applies to electromagnetic radiation not only in the portion of the electromagnetic spectrum which can be perceived by the human eye (i.e. visible) but also to ultraviolet or infrared radiation.
Optical, Optics	Applies not only to visible light but also to ultraviolet or infrared radiation.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

AMLCD	Active Matrix Liquid Crystal Display
G-H	Guest-Host
IPS-LCD	In Plane Switching Liquid Crystal Display
LCD	Liquid Crystal Display
MQW	Multiple Quantum Well
PALC (display)	Plasma Addressed Liquid Crystal (display)
PDLC	Polymer Dispersed Liquid Crystal

SEED	Self Electro-optic Effect Device
SHG	Second Harmonic Generation
SLM	Spatial Light Modulator
STN-LC	Super-Twisted Nematic Liquid Crystal
TFT-LCD	Thin Film Transistor Liquid Crystal Display
TN-LC	Twisted Nematic Liquid Crystal

G02F 1/00

Devices or arrangements for the control of the intensity, colour, phase, polarisation or direction of light arriving from an independent light source, e.g. switching, gating or modulating; Non-linear optics

Definition statement

This place covers:

Devices and methods for the control of intensity, phase, polarisation (G02F 1/01); or direction of light (G02F 1/29).

Devices and methods using nonlinear optical effect (G02F 1/35)

Relationships with other classification places

Light sources (Laser, LED, Lamp) are classified in the appropriate entries

H01S, H01L; H01J

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical logic elements	G02F 3/00
Organic tenebrescent materials	C09K 9/02
Luminescent materials	C09K 11/00
Liquid crystal materials	C09K 19/00
Measuring temperature using change of colour or translucency	G01K 11/12
Measuring temperature using changes in fluorescence in optical fibres	G01K 11/32
Photochromic filters	G02B 5/23
Light guides	G02B 6/00
Integrated circuits of the optical waveguide type, e.g. photonic chip	G02B 6/12
Optical devices or arrangements using movable or deformable optical elements for controlling light properties	G02B 26/00
Control of light in general	G05D 25/00
Visible signalling systems	G08B 5/00
Indicating arrangements for variable information on a support by selection or combination of individual elements	G09F 9/00
Control arrangements or circuits for visual indicators other than cathode-ray tubes	G09G 3/00

Digital stores characterised by the use of electro-optical storage elements	G11C 13/044
Control of light sources in general	H01S 3/10, H05B 44/00, H05B 35/00 - H05B 47/00

Special rules of classification

The class G02F 1/00 is mainly empty and consists only of materials (except nonlinear materials classified in G02F 1/355) insofar these materials are used in the devices provided for in this subclass.

G02F 1/0009

{Materials therefor}

Definition statement

This place covers:

NNew materials or compositions used in light modulation devices as far as the physical properties are concerned.

References

Limiting references

This place does not cover:

Non linear materials	G02F 1/355
Electrochromic materials	C09K 9/02
Photoluminescent materials	C09K 11/00
Liquid crystal materials	C09K 19/00
Radiation pyrometry	G01J 5/00
Thermometer using change of colour or translucency	G01K 11/12

G02F 1/0027

{Ferro-electric materials}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Non-linear optics fabrication of domain inverted structures using ferro-electric materials	G02F 1/3558

Informative references

Attention is drawn to the following places, which may be of interest for search:

Capacitors with electrets, i.e. having a permanently polarised dielectric	H01G 7/02

G02F 1/0036

{Magneto-optical materials}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Magnetic materials in general	H01F

G02F 1/0045

{Liquid crystals characterised by their physical properties}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Liquid crystals materials in general	C09K 19/00

G02F 1/009

{Thermal properties}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Radiation pyrometry	G01J 5/00
Measuring temperature by using change of colour or translucency	G01K 11/12

G02F 1/01

for the control of the intensity, phase, polarisation or colour (G02F 1/29, G02F 1/35 take precedence)

Definition statement

This place covers:

Devices and methods for modulating the light (intensity, phase, polarization, colour).

Relationships with other classification places

Passive optical element (Colour filter, polarizer): G02B

Backlight comprising a light guide: G02B 6/00

Integrated optical element G02B 6/00

Laser: H01S

References

Limiting references

This place does not cover:

For the control of the position or the direction of light beams, i.e. deflection	G02F 1/29
Non-linear optics	G02F 1/35

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Eye protecting filters (Welding Helmet)	A61F 9/00
Rear-view mirrors	B60R 1/08
(smart) Windows with controllable transmission	E06B 9/24
Optical RF spectrum analyser	G01R 23/17
Passive optical element (colour filter, polariser)	G02B
Backlight comprising a light guide	G02B 6/00
Integrated optical element	G02B 6/00
Head-up display	G02B 27/02
Electro-optic spectacle (sunglasses)	G02C 7/101
Constructional details related to the housing of computer displays, e.g. of flat displays	G06F 1/1601
Arrangements in which the information is build-up by the combination of elements	G09F 9/35
Transparent conductive material TCO	H01B
LED Display	H01L 25/00
Detail of television receiver	H04N 5/64
Stereoscopy	H04N 13/00
Electroluminescent Display	H05B 33/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical polarising elements per se	G02B 5/30
Integrated display and digitiser	G06F 3/0412
Recording by light	G11B 7/00 - G11B 11/00
Static storage per se	G11C
Image tube screens acting as light valves by shutter operation	H01J 29/12
Such screens acting by discoloration	H01J 29/14
Projection arrangements for television image reproduction, e.g. using eidophor	H04N 5/74
Active matrix with TFT	H10D 86/60

Special rules of classification

Common features of devices or arrangements for the control of intensity, phase, polarization or colour classified in G02F 1/167 (based on electrophoresis) are also classified in the G02F 1/13 and subgroups

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

BLU	Backlight Unit
TFT	Thin film transistor

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

SOP	State Of Polarization
PDLC	Polymer dispersed Liquid crystal
TCO	Transparent conductive oxide
EA	Electro Absorption
VOA	Variable Optical Attenuator

G02F 1/0105

{Illuminating devices}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

For liquid crystal cells	G02F 1/1336
For display means of electronic time pieces	G04G 9/0041

G02F 1/0107

{Gaskets, spacers or sealing of cells; Filling and closing of cells}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

For liquid crystal cells	G02F 1/1339, G02F 1/1341
For electrochromic or electrolytic cells	G02F 1/161

G02F 1/011

{in optical waveguides, not otherwise provided for in this subclass}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Light guides in general	G02B 6/00

G02F 1/0128

{based on electro-mechanical, magneto-mechanical, elasto-optic effects}

Definition statement

This place covers:

Devices where a (electro, magnetic, pressure) field produce a deformation of the structure of the material which result in change in refractive index, absorption etc, e.g. elasto-optic effect (mechanically, stress induced birefringence).

G02F 1/0131

{based on photo-elastic effects, e.g. mechanically induced birefringence}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Acousto-optical devices	G02F 1/11

G02F 1/0147

{based on thermo-optic effects (G02F 1/132 takes precedence)}

Definition statement

This place covers:

Thermo optic effect.

References

Limiting references

This place does not cover:

Thermal activation of liquid crystals exhibiting a thermo-optic effect	G02F 1/132

Informative references

Attention is drawn to the following places, which may be of interest for search:

Tenebrescent materials	C09K 9/00
Radiation pyrometry	G01J 5/00

Measuring temperature using change of colour or translucency	G01K 11/12

G02F 1/015

based on semiconductor elements having potential barriers, e.g. having a PN or PIN junction (G02F 1/03 takes precedence)

Definition statement

This place covers:

Mainly GaAs InP devices.

References

Limiting references

This place does not cover:

Based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effects or Kerr effect	G02F 1/03

G02F 1/025

in an optical waveguide structure (G02F 1/017, {G02F 1/2257} take precedence)

Definition statement

This place covers:

Using silicon as the electro-optical material for the waveguide.

References

Limiting references

This place does not cover:

Structure with periodic or quasi-peridoic potential variation, e.g. superlattices, quantum wells	G02F 1/017
Optical waveguides made of semiconductor material	G02F 1/2257

G02F 1/03

based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect (G02F 1/061 takes precedence)

Definition statement

This place covers:

Device using insulating electro-optic crystals, e.g. made of LiNbO3, LiTtaO3, KTP material

References

Limiting references

This place does not cover:

Based on electro-optical organic material	G02F 1/061

G02F 1/0333

{addressed by a beam of charged particles (G02F 1/05 takes precedence)}

References

Limiting references

This place does not cover:

Light control based on ceramics or electro-optical crystals with ferro-electric properties	G02F 1/05

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrography, electrophotography	G03G
Screens for cathode-ray tubes acting as light valves	H01J 29/12

G02F 1/0338

{structurally associated with a photoconductive layer or having photo-refractive properties (G02F 1/05 takes precedence)}

Definition statement

This place covers:

Photo-refractive effect.

References

Limiting references

This place does not cover:

With ferro-electric properties	G02F 1/05

G02F 1/05

with ferro-electric properties (G02F 1/035, G02F 1/055 take precedence)

Definition statement

This place covers:

G02F 1/055 covers device using PLZT ceramic material.

Obsolete technology.

References

Limiting references

This place does not cover:

Ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect in an optical waveguide structure	G02F 1/035
The active material being a ceramic	G02F 1/055

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Domain inversion in ferro-electric materials	G02F 1/3558

Informative references

Attention is drawn to the following places, which may be of interest for search:

Ferro-electric digital stores	G11C 11/22

G02F 1/0525

{addressed by a beam of charged particles}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrography, electrophotography	G03G
Screens for cathode-ray tubes acting as light valves	H01J 29/12

G02F 1/0541

{using photorefractive effects}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Holography	G03H
Electro-optical digital static stores using an interference pattern	G11C 13/044

G02F 1/055

the active material being a ceramic (G02F 1/035 takes precedence)

Definition statement

This place covers:

Covers device using PLZT ceramic material.

References

Limiting references

This place does not cover:

In an optical waveguide structure	G02F 1/035

G02F 1/07

based on electro-optical liquids exhibiting Kerr effect

Definition statement

This place covers:

Obsolete technology

G02F 1/09

based on magneto-optical elements, e.g. exhibiting Faraday effect

Definition statement

This place covers:

Magneto-optic effect

G02F 1/11

based on acousto-optical elements, e.g. using variable diffraction by sound or like mechanical waves (acousto-optical deflection G02F 1/33)

Definition statement

This place covers:

Acousto-optic

References

Limiting references

This place does not cover:

Acousto-optical deflection	G02F 1/33

Informative references

Attention is drawn to the following places, which may be of interest for search:

Elasto-optic effect without wave propagation	G02F 1/0131

G02F 1/13

based on liquid crystals, e.g. single liquid crystal display cells

Definition statement

This place covers:

Liquid crystal.

Groups in G02F 1/13 are also used to classify common devices features in electrochromic and Electrophoretic device (see for example US2007024954, US20100137569)

Relationships with other classification places

Control arrangement and circuits for Liquid crystal device	G09G 3/30

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Liquid crystal materials	C09K 19/00

G02F 1/1309

{Repairing; Testing}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Testing of optical apparatus	G01M 11/00
Electronic testing of displays and display drivers, e.g. of LCDs	G09G 3/006

G02F 1/1313

{specially adapted for a particular application}

Special rules of classification

Not used anymore for classifying new documents.

G02F 1/132

{Thermal activation of liquid crystals exhibiting a thermo-optic effect}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring temperature using change of colour or translucency of liquid crystals	G01K 11/165
Thermally addressed liquid crystal elements in a matrix	G09G 3/3603

G02F 1/133

Constructional arrangements; Operation of liquid crystal cells; Circuit arrangements (arrangements or circuits for control of liquid crystal elements in a matrix, not structurally associated with these elements G09G 3/36)

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Arrangements or circuits for control of liquid crystal elements in a segment display, not structurally associated with these elements	G09G 3/18

G02F 1/13334

{Plasma addressed liquid crystal cells [PALC]}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Plasma display panels	H01J 17/49

G02F 1/133348

{Charged particles addressed liquid crystal cells, e.g. controlled by an electron beam}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrography, electrophotography	G03G
Screens for cathode-ray tubes acting as light valves	H01J 29/12

G02F 1/133365

{Cells in which the active layer comprises a liquid crystalline polymer}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Liquid crystalline polymers in general	C09K 19/38

G02F 1/13338

{Input devices, e.g. touch panels}

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Touch-panels as input devices for computers structurally associated with displays	G06F 3/0412

Informative references

Attention is drawn to the following places, which may be of interest for search:

Touch-panels in general	G06K 11/06
Keyboard switches	H01H 13/70

G02F 1/1334

based on polymer dispersed liquid crystals, e.g. microencapsulated liquid crystals

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Chemical compositions of additive materials	C09K 19/544

G02F 1/1335

Structural association of cells with optical devices, e.g. polarisers or reflectors

Definition statement

This place covers:

Integration of optical elements with the LCD panel.

Relationships with other classification places

When the invention concerns the optical elements (for example polarizers) themselves and the incorporation in an LCD is trivial then they should only be classified the in G02B.

Side illuminated LCD backlights employing a waveguide should be classified in G02B 6/00.

If the invention is to be used in the field of lighting (for example luminaire, with waveguide and LEDs) then F21V should also be considered

G02F 1/133509

{Filters, e.g. light shielding masks}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical filters	G02B 5/20

G02F 1/133514

{Colour filters}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Luminescent elements	G02F 1/133617

G02F 1/133516

{Methods for their manufacture, e.g. printing, electro-deposition or photolithography}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Photomechanical production of textured or patterned surfaces	G03F

G02F 1/133526

{Lenses, e.g. microlenses or Fresnel lenses}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Simple or compound lenses in general	G02B 3/00

G02F 1/133528

{Polarisers}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical polarising elements in general	G02B 5/30

G02F 1/1336

{Illuminating devices}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Lighting devices in general	F21V
Associated with display devices for electronic timepieces	G04G 9/0041

G02F 1/133602

{Direct backlight}

Definition statement

This place covers:

Pattern of LEDs in an array in a direct type (i.e. without waveguide) LCD back light device.

G02F 1/133615

{Edge-illuminating devices, i.e. illuminating from the side}

Definition statement

This place covers:

Backlight light employing side illumination without a waveguide.

Relationships with other classification places

Where the invention concerns the waveguide (or plurality of waveguides) shape or integration into the support structure on the LCD device then it should be classified in the G02B 6/001 and subgroups.

If the integration of the waveguide type side illuminated backlight involves adaptation of the general LCD panel support structure then G02F 1/133308 and its subgroups should be considered.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Light guides specially adapted for lighting devices or systems	G02B 6/0001

G02F 1/13362

{providing polarized light, e.g. by converting a polarisation component into another one}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical systems for polarising	G02B 27/28

G02F 1/134309

{characterised by their geometrical arrangement}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Displaying information by combining elements in general	G09F 9/302

G02F 1/1345

Conductors connecting electrodes to cell terminals

Definition statement

This place covers:

Details of the connection terminals of the LCD.

See for example US2011116028, US2011075089, US2010321624

G02F 1/13452

{Conductors connecting driver circuitry and terminals of panels}

Definition statement

This place covers:

Detail of the connection of the IC driver or PCB with the terminal pads of the LCD.

Relationships with other classification places

Further details of the PCB (printed circuit board) are in H05K. Further details concerning bonding of the drivers are in H01L 21/00.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Constructional arrangements; operation of liquid crystal cells; circuit arrangements	G02F 1/133

Drivers integrated with an active matrix	G02F 1/13454
Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or parts thereof	H01L 21/00
TAB tape automated bonding. COB chip-on-board. COG chip-on-glass.	H01L 23/00

G02F 1/1347

Arrangement of liquid crystal layers or cells in which the final condition of one light beam is achieved by the addition of the effects of two or more layers or cells

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Colour projection displays with liquid crystal valves	H04N 9/3197

G02F 1/13762

{containing luminescent or electroluminescent additives}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Luminescent materials in general	C09K 11/00
Composition of liquid crystals materials comprising additives	C09K 19/52 - C09K 19/603
Electroluminescent light sources	H05B 33/00

G02F 1/15

based on an electrochromic effect

Definition statement

This place covers:

Electrochromic.

References

Limiting references

This place does not cover:

Electrochromic materials	C09K 9/00

Special rules of classification

Common devices features are also classified in G02F 1/13 and subgroups

G02F 1/1506

caused by electrodeposition, e.g. electrolytic deposition of an inorganic material on or close to an electrode

Definition statement

This place covers:

Electroplating RED (Reversible electrodeposition device).

G02F 1/1514

characterised by the electrochromic material, e.g. by the electrodeposited material

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Materials for which the range of wavelengths for energy absorption is changed as a result of excitation by electric energy	C09K 9/00

G02F 1/167

by electrophoresis

Definition statement

This place covers:

Electrophoretic

G02F 1/17

based on variable-absorption elements not provided for in groups G02F 1/015 - G02F 1/169

Definition statement

This place covers:

Variable absorption device

References

Limiting references

This place does not cover:

Based on semiconductor elements with at least one potential jump barrier e.g. PN, PIN junction	G02F 1/015
Based on ceramics or electro-optical crystals e.g. exhibiting Pockets effect or Kerr effect	G02F 1/03
Based on electro-optical organic material	G02F 1/061
Based on electro-optical liquids exhibiting Kerr effect	G02F 1/07
Based on magneto-optical elements, e.g. exhibiting Faraday effect	G02F 1/09

Based on acousto-optical elements e.g. using variable diffraction by sound or like mechanical waves	G02F 1/11
Based on liquid crystals, e.g. single liquid crystal display cells	G02F 1/13
Based on electrochromic elements	G02F 1/15
Based on electrophoresis	G02F 1/167
Organic tenebrescent materials	C09K 9/00

G02F 1/172

{based on a suspension of orientable dipolar particles, e.g. suspended particles displays}

Definition statement

This place covers:

Suspended Particle Display

G02F 1/19

based on variable-reflection or variable-refraction elements not provided for in groups G02F 1/015 - G02F 1/169

Definition statement

This place covers:

Variable reflection device (switchable mirror using metal hydride)

References

Limiting references

This place does not cover:

For the control of the intensity, phase, polarization or colour...	G02F 1/01
Constructional details	G02F 1/0102
in optical waveguides	G02F 1/011
Operation of the device; Circuit arrangement not otherwise provided for	G02F 1/0121
by another light beam, i.e. opto-optical modulation	G02F 1/0126
based on electro-mechanical, magneto-mechanical, elasto-optic effects	G02F 1/0128
for the control of polarisation, e.g. state of polarisation (SOP) control, polarisation	G02F 1/0136
based on thermo-optic effects	G02F 1/0147
based on semiconductor elements with at least one potential jump barrier, e.g. PN, PIN junction	G02F 1/015
based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect	G02F 1/03
based on electro-optical organic material	G02F 1/061
based on electro-optical liquids exhibiting Kerr effect	G02F 1/07
based on magneto-optical elements, e.g. exhibiting Faraday effect	G02F 1/09

based on acousto-optical elements, e.g. using variable diffraction by sound or like mechanical waves	G02F 1/11
based on liquid crystals, e.g. single liquid crystal display cells	G02F 1/13
based on electrochromic elements	G02F 1/15
based on electrophoresis	G02F 1/167

G02F 1/23

for the control of the colour (G02F 1/03 - G02F 1/21 take precedence)

Definition statement

This place covers:

Obsolete technologies

Relationships with other classification places

Led associated with phosphor for the control of the colour of the emitted light are classified in H05B 33/00, F21K 9/00 - F21K 99/00, C09K 11/00; H10H 20/00

References

Limiting references

This place does not cover:

Based on ceramic or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect	G02F 1/03 - G02F 1/21

G02F 1/29

for the control of the position or the direction of light beams, i.e. deflection

Definition statement

This place covers:

Devices and methods for the control or direction (deflection) of light

- deflection of a light beam that can be spanned over a discrete number (digital) of positions, as opposed to deflection spanned over a continuous range (analog) of positions.

Analog scanner US2008112042 (Electro-optic beam steering) electro active lens US2010226000.

Deflection based on total internal reflection (TIR), producing a yes/no deflection, which is covered by group G02F 1/315.

Relationships with other classification places

Wavelength multiplexer /demultiplexer are classified in G02B 6/12007 for the optical details, and in H04J 14/02218 and H04J 14/02219 for the control details.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted	H01S 3/101
Optical switching system	H04Q 3/52

Informative references

Attention is drawn to the following places, which may be of interest for search:

Working and shaping a Laser beam	B23K 26/06
Optical coupling means	G02B 6/26
Scanning systems	G02B 26/10
Optical beam shaping, splitting, combining	G02B 27/09 - G02B 27/10
Static stores	G11C
Scanning arrangement	H04N 1/04

G02F 1/3132

{of directional coupler type}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

All-optical modulation, gating or switching using non-linear directional couplers	G02F 1/3521

G02F 1/35

Non-linear optics

Definition statement

This place covers:

Devices and methods using nonlinear optical processes.

Frequency conversion; Harmonic generation.

Wave mixing.

Optical rectification.

Optical KERR effect.

Self de or /focusing.

Self phase modulation (Soliton propagation).

Cross phase modulation.

nonlinear absorption (optical limiter).

Optical phase conjugation.

Parametric amplification.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Analysing materials by the use of optical means and of the non-linear properties of the material	G01N 21/636
Brillouin, Raman laser	H01S 3/30

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical bistable devices	G02F 3/02
Photoconductive Terahertz emitter (antenna) (Auston switch)	H01Q 9/00

G02F 1/3501

{Constructional details or arrangements of non-linear optical devices, e.g. shape of non-linear crystals}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Constructional arrangements of electro-optical crystals	G02F 1/0305

G02F 1/3511

{Self-focusing or self-trapping of light; Light-induced birefringence; Induced optical Kerr-effect}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Opto-optical modulation	G02F 1/0126
Photo-refractive properties or effects of electro-optical crystals	G02F 1/0338, G02F 1/0541
Photo-refractive effects of ceramics	G02F 1/0558
Opto-optical deflection	G02F 1/293

G02F 1/3523

{Non-linear absorption changing by light, e.g. bleaching}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Laser Q-switching using bleachable media	H01S 3/113

G02F 1/3526

{using two-photon emission or absorption processes}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Raman effects	H01S 3/30

G02F 1/353

{Frequency conversion, i.e. wherein a light beam is generated with frequency components different from those of the incident light beams}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Second harmonic generation	G02F 1/37
Parametric generation or amplification of optical waves	G02F 1/39
Transferring the modulation of modulated light	G02F 2/004
Optical pumping of a laser by another laser	H01S 3/094
Nonlinear optical devices inside a laser cavity	H01S 3/108

G02F 1/39

for parametric generation or amplification of light, infrared or ultraviolet waves

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements of plural non-linear devices for generating multi-colour light beams	G02F 1/3532
Electrical parametric amplifiers	H03F 7/00

G02F 2/00

Demodulating light; Transferring the modulation of modulated light; Frequency-changing of light (G02F 1/35 takes precedence)

Definition statement

This place covers:

Demodulating light; Transferring the modulation of modulated light.

Frequency-changing of light, e.g. by quantum counters:

- Up-converter, e.g. Infrared to visible converter,
- Down-converter.

Frequency-changing of light using nonlinear optical effects.

References

Limiting references

This place does not cover:

Non linear optics	G02F 1/35

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Demodulator for optical sensor	G01D 5/26
Measuring optical wavelength	G01J 3/00
Measuring optical phase difference	G01J 9/00
Photoelectric discharge tubes not involving the ionisation of a gas	H01J 40/00
Controlling the intensity, frequency, phase, polarisation or direction or the emitted radiation (of lasers), e.g. switching, gating, modulating or demodulating	H01S 3/10
Optical receiver/ transmitter	H04B 10/00
Millimeter wave (RF) generation using optical means (Radio over Fiber system)	H04B 10/2575
Optical clock arrangement for synchronisation	H04L 7/0075
Optical demodulator for modulated carrier	H04L 27/223
Semiconductor devices sensitive to infrared radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation and adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation; processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof; details thereof	H10F

Informative references

Attention is drawn to the following places, which may be of interest for search:

Phase antenna array	H01Q 3/2676
RF synthesiser	H03B 21/00

Demodulation of electromagnetic waves, or transferring modulation of electromagnetic waves from one carrier to another	H03D 9/00

G02F 2/002

{using optical mixing}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Coherent homodyne or heterodyne receivers	H04B 10/63, H04B 10/64

G02F 2/004

{Transferring the modulation of modulated light, i.e. transferring the information from one optical carrier of a first wavelength to a second optical carrier of a second wavelength, e.g. all-optical wavelength converter}

Definition statement

This place covers:

Wavelength converter used to convert the carrier of high-bit-rate data from one wavelength to another

G02F 2/02

Frequency-changing of light, e.g. by quantum counters

Definition statement

This place covers:

Frequency-changing of light, e.g. by quantum counters.

Obsolete technology.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Luminescent, e.g. electroluminescent, chemiluminescent materials	C09K 11/00

G02F 3/00

Optical logic elements; Optical bistable devices

Definition statement

This place covers:

Optical logic elements, i.e. optical basic logic gates, e.g. AND, OR, NAND.

Optical bistable devices i.e. devices exhibiting two different optical output states for a same optical input value.

This group is not active.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Optical computing	G06E

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electric-pulse generators using opto-electronic devices as active elements	H03K 3/42
Logic circuits using opto-electronic devices	H03K 19/14

G02F 3/02

Optical bistable devices

Definition statement

This place covers:

Obsolete technology.

G02F 7/00

Optical analogue/digital converters

Definition statement

This place covers:

Optical analogue/digital converters

This group covers only converters based in substantial manner on elements which are provided for in group G02F 1/00.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Conversion of a code using opto-electronic devices	H03M 7/008