

## G02F

**DEVICES OR ARRANGEMENTS, THE OPTICAL OPERATION OF WHICH IS MODIFIED BY CHANGING THE OPTICAL PROPERTIES OF THE MEDIUM OF THE DEVICES OR ARRANGEMENTS FOR THE CONTROL OF THE INTENSITY, COLOUR, PHASE, POLARISATION OR DIRECTION OF LIGHT, e.g. SWITCHING, GATING, MODULATING OR DEMODULATING; TECHNIQUES OR PROCEDURES FOR THE OPERATION THEREOF; FREQUENCY-CHANGING; NON-LINEAR OPTICS; OPTICAL LOGIC ELEMENTS; OPTICAL ANALOGUE/DIGITAL CONVERTERS (optical transfer means between sensing member and indicating or recording part in connection with measuring [G01D 5/26](#); devices in which mathematical operations are carried out with optical elements [G06E 3/00](#), {[G06E 3/001](#)} ; electrical signal transmission systems using optical means to convert the input signal [G08C 19/36](#); information-recording by electric or magnetic means and reproducing by sensing optical properties [G11B 11/00](#); static stores using optical elements [G11C 13/04](#); transmission systems employing electromagnetic waves other than radio waves, e.g. light, infra-red radiation, [H04B 10/00](#); optical multiplex systems [H04J 14/00](#); pictorial communication, e.g. television [H04N](#))**

### Definition statement

*This place covers:*

Devices, the optical operation of which is modified by changing the optical properties (refraction, birefringence, absorption, nonlinear susceptibility) of the medium of the devices.

The term "optical" applies not only to visible light but also to ultra-violet, infra-red radiations or Terahertz ([G02F 1/3534](#)).

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.

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, insofar these demodulators are based in substantial manner on elements which are provided for under the bullets above.

Optical logic elements: Optical bistable devices, i.e. devices exhibiting two different optical output states for a same optical input value, Optical logic elements, insofar these demodulators are based in substantial manner on elements which are provided for under the bullets above.

Optical analogue/digital converters: Optical bistable devices, i.e. devices exhibiting two different optical output states for a same optical input value, Optical logic elements, insofar these devices are based in substantial manner on elements which are provided for under the bullets above.

## Relationships with other classification places

[G09F 9/35](#) covers display having a particular shape and or used for a particular application, mainly for the purpose of advertising.

[G09F 9/37](#) covers displays using movable (rotatable) elements.

## References

### Limiting references

*This place does not cover:*

Investigating or analysing materials by the use of optical means	<a href="#">G01N 21/00</a>
Devices with movable or deformable element (DMD; electro-wetting)	<a href="#">G02B 26/00</a>
Control arrangements or circuits for visual indicators other than cathode-ray tubes	<a href="#">G09G 3/00</a>
Photoconductive antenna for Terahertz (US2011080329)	<a href="#">H01Q 9/00</a> , <a href="#">H01L 31/00</a>
Optical Transmission system	<a href="#">H04B 10/00</a>
Optical multiplex system	<a href="#">H04J 14/00</a>

### 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:*

Projection devices for colour picture display	<a href="#">H04N 9/31</a>
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### Informative references

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

Devices in which mathematical operation are carried out with optical elements Optical processing (correlator)	<a href="#">G06E 3/00</a>
Indicating arrangements for variable information by selection or combination of individual elements	<a href="#">G09F 9/35</a>
Information-recording and reproducing by sensing optical properties	<a href="#">G11B 7/00</a> , <a href="#">G11B 11/00</a>
Control of light sources	<a href="#">H01S 3/00</a> , <a href="#">H05B 35/00</a> - <a href="#">H05B 43/00</a>

## 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 (thermometers using change of colour or translucency [G01K 11/12](#); using changes in fluorescence [G01K 11/32](#); light guide devices [G02B 6/00](#); optical devices or arrangements using movable or deformable elements for controlling light independent of the light source [G02B 26/00](#); control of light in general [G05D 25/00](#); visible signalling systems [G08B 5/00](#); indicating arrangements for variable information 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](#); control of light sources [H01S 3/10](#), [H05B 33/08](#), [H05B 35/00](#) - [H05B 43/00](#); {photochromic filters [G02B 5/23](#); optical logic elements [G02F 3/00](#)})

### 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

#### Limiting references

*This place does not cover:*

Electrochromic material	<a href="#">C09K 9/02</a>
Photo luminescent material	<a href="#">C09K 11/00</a>
Liquid crystal material	<a href="#">C09K 19/00</a>
Integrated optical device with other passive /active optical elements (photonic chip)	<a href="#">G02B 6/12</a>
Digital stores characterised by the use of electro-optical storage elements	<a href="#">G11C 13/044</a>

### 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	<a href="#">G02F 1/355</a>
Electrochromic materials	<a href="#">C09K 9/02</a>
Photoluminescent materials	<a href="#">C09K 11/00</a>
Liquid crystal materials	<a href="#">C09K 19/00</a>
Radiation pyrometry	<a href="#">G01J 5/00</a>
Thermometer using change of colour or translucency	<a href="#">G01K 11/12</a>

**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, color).

**Relationships with other classification places**

Passive optical element (Color 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:*

Lighting Device in general	<a href="#">F21H - F21V</a>
Measuring Instruments characterised by the use of an interferometer	<a href="#">G01B 9/02</a>
Measuring characteristics of light, e.g. intensity, spectrum	<a href="#">G01J</a>
Measuring force or stress by measuring variations of optical properties of material	<a href="#">G01L 1/24</a>
Holography	<a href="#">G03H</a>

Optical transmission system	<a href="#">H04B 10/00</a>
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### 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)	<a href="#">A61F 9/00</a>
Rear-view mirrors	<a href="#">B60R 1/08</a>
(smart) Windows with controllable transmission	<a href="#">E06B 9/24</a>
Optical RF spectrum analyser	<a href="#">G01R 23/17</a>
Head-up display	<a href="#">G02B 27/02</a>
Electro-optic spectacle (sunglasses)	<a href="#">G02C 7/101</a>
Constructional details related to the housing of computer displays, e.g. of flat displays	<a href="#">G06F 1/1601</a>
Transparent conductive material TCO	<a href="#">H01B</a>
Thin film Transistor TFT	<a href="#">H01L 21/00</a> , <a href="#">H01L 27/00</a>
LED Display	<a href="#">H01L 25/00</a>
Stereoscopy	<a href="#">H04N 13/00</a>
Detail of television receiver	<a href="#">H04N 5/64</a>
Electroluminescent Display	<a href="#">H05B 33/00</a>
Passive optical element (colour filter, polariser)	<a href="#">G02B</a>
Backlight comprising a light guide	<a href="#">G02B 6/00</a>
Integrated optical element	<a href="#">G02B 6/00</a>
Arrangements in which the information is build-up by the combination of elements	<a href="#">G09F 9/35</a>

### Informative references

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

Integrated display and digitiser	<a href="#">G06F 3/0412</a>
Active matrix with TFT	<a href="#">H01L 27/12</a>

### 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 1/0128

{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 1/0147

{based on thermo-optic effects ([G02F 1/132](#) takes precedence; tenebrescent compositions [C09K 9/00](#); radiation pyrometry [G01J 5/00](#); thermometers using change of colour or translucency [G01K 11/12](#))}

### 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	<a href="#">G02F 1/132</a>
Tenebrescent materials	<a href="#">C09K 9/00</a>

### Informative references

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

Radiation pyrometry	<a href="#">G01J 5/00</a>
Thermometers using change of colour or translucency	<a href="#">G01K 11/12</a>

**G02F 1/015**

based on semiconductor elements with at least one potential jump barrier, e.g. PN, 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	<a href="#">G02F 1/03</a>
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**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 periodic potential variation, e.g. superlattices, quantum wells	<a href="#">G02F 1/017</a>
Optical waveguides made of semiconductor material	<a href="#">G02F 1/2257</a>

**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 LiNbO<sub>3</sub>, LiTtaO<sub>3</sub>, KTP material

**References****Limiting references**

*This place does not cover:*

Based on electro-optical organic material	<a href="#">G02F 1/061</a>
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**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:*

Wuth ferro-electric properties	<a href="#">G02F 1/05</a>
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**G02F 1/05**

with ferro-electric properties ([G02F 1/035](#), [G02F 1/055](#) take precedence {; domain inversion in ferro-electric materials [G02F 1/3558](#); ferro-electric digital stores [G11C 11/22](#)})

**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	<a href="#">G02F 1/035</a>
The active material being a ceramic	<a href="#">G02F 1/055</a>
Domain inversion on ferro-electric materials	<a href="#">G02F 1/3558</a>

**Informative references**

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

Ferro-electric digital stores	<a href="#">G11C 11/22</a>
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**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	<a href="#">G02F 1/035</a>
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## 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 (elasto-optic effect without wave propagation [G02F 1/0131](#); } acousto-optical deflection [G02F 1/33](#))

### Definition statement

*This place covers:*

Acousto-optic

## References

### Limiting references

*This place does not cover:*

Elasto-optic effect without wave propagation	<a href="#">G02F 1/0131</a>
Acousto-optical deflection	<a href="#">G02F 1/33</a>

## G02F 1/13

based on liquid crystals, e.g. single liquid crystal display cells (liquid crystal materials [C09K 19/00](#))

### 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	<a href="#">G09G 3/30</a>
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### References

#### Limiting references

*This place does not cover:*

Liquid crystal materials	<a href="#">C09K 19/00</a>
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## G02F 1/1313

{specially adapted for a particular application}

### Special rules of classification

Not used anymore for classifying new documents.

## 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 1/133602

{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 ([G02B 6/0001](#) takes precedence)}

### 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

#### Limiting references

*This place does not cover:*

Light guides specially adapted for lighting devices or systems	<a href="#">G02B 6/0001</a>
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## 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 ([H01L 21/00](#) takes precedence; electrical details inside the cell [G02F 1/133](#));}

### 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](#) (see for example US2011108979).

## References

### Limiting references

*This place does not cover:*

Constructional arrangements; operation of liquid crystal cells; circuit arrangements	<a href="#">G02F 1/133</a>
Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or parts thereof	<a href="#">H01L 21/00</a>

### Informative references

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

Drivers integrated with an active matrix	<a href="#">G02F 1/13454</a>
TAB tape automated bonding. COB chip-on-board. COG chip-on-glass.	<a href="#">H01L 23/00</a>

## G02F 1/15

### based on an electrochromic effect

#### Definition statement

*This place covers:*

Electrochromic.

#### References

##### Limiting references

*This place does not cover:*

Electrochromic materials	<a href="#">C09K 9/00</a>
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#### 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 1/167

### 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	<a href="#">G02F 1/015</a>
Based on ceramics or electro-optical crystals e.g. exhibiting Pockels effect or Kerr effect	<a href="#">G02F 1/03</a>
Based on electro-optical organic material	<a href="#">G02F 1/061</a>
Based on electro-optical liquids exhibiting Kerr effect	<a href="#">G02F 1/07</a>
Based on magneto-optical elements, e.g. exhibiting Faraday effect	<a href="#">G02F 1/09</a>
Based on acousto-optical elements e.g. using variable diffraction by sound or like mechanical waves	<a href="#">G02F 1/11</a>
Based on liquid crystals, e.g. single liquid crystal display cells	<a href="#">G02F 1/13</a>
Based on electrochromic elements	<a href="#">G02F 1/15</a>
Based on electrophoresis	<a href="#">G02F 1/167</a>
Organic tenebrescent materials	<a href="#">C09K 9/00</a>

**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...	<a href="#">G02F 1/01</a>
Constructional details	<a href="#">G02F 1/0102</a>
in optical waveguides	<a href="#">G02F 1/011</a>
Operation of the device; Circuit arrangement not otherwise provided for	<a href="#">G02F 1/0121</a>
by another light beam, i.e. opto-optical modulation	<a href="#">G02F 1/0126</a>
based on electro-mechanical, magneto-mechanical, elasto-optic effects	<a href="#">G02F 1/0128</a>
for the control of polarisation, e.g. state of polarisation (SOP) control, polarisation	<a href="#">G02F 1/0136</a>
based on thermo-optic effects	<a href="#">G02F 1/0147</a>
based on semiconductor elements with at least one potential jump barrier, e.g. PN, PIN junction	<a href="#">G02F 1/015</a>
based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect	<a href="#">G02F 1/03</a>
based on electro-optical organic material	<a href="#">G02F 1/061</a>
based on electro-optical liquids exhibiting Kerr effect	<a href="#">G02F 1/07</a>
based on magneto-optical elements, e.g. exhibiting Faraday effect	<a href="#">G02F 1/09</a>
based on acousto-optical elements, e.g. using variable diffraction by sound or like mechanical waves	<a href="#">G02F 1/11</a>
based on liquid crystals, e.g. single liquid crystal display cells	<a href="#">G02F 1/13</a>
based on electrochromic elements	<a href="#">G02F 1/15</a>
based on electrophoresis	<a href="#">G02F 1/167</a>

## 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](#); [H01L 33/00](#) (US2008007172)

## References

### Limiting references

*This place does not cover:*

Based on ceramic or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect	<a href="#">G02F 1/03</a> - <a href="#">G02F 1/21</a>
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## G02F 1/29

for the control of the position or the direction of light beams, i.e. deflection ([optical coupling means G02B 6/26](#); optical-mechanical scanning in general [G02B 26/10](#)); static stores with electric or magnetic read-in and optical read-out [G11C](#); lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted [H01S 3/101](#))

### Definition statement

*This place covers:*

Devices and methods for the 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 [H04Q 11/0001H04J 14/02](#) for the control details.

### References

#### Limiting references

*This place does not cover:*

Working and shaping a Laser beam	<a href="#">B23K 26/06</a>
Optical coupling means	<a href="#">G02B 6/26</a>
Scanning systems	<a href="#">G02B 26/10</a>
Static stores	<a href="#">G11C</a>
Lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted	<a href="#">H01S 3/101</a>
Scanning arrangement	<a href="#">H04N 1/04</a>

#### 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:*

Working and shaping a Laser beam	<a href="#">B23K 26/06</a>
Scanning arrangement	<a href="#">H04N 1/04</a>
Optical switching system	<a href="#">H04Q 3/52</a>

#### Informative references

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

Optical beam shaping, splitting, combining	<a href="#">G02B 27/09</a> - <a href="#">G02B 27/10</a>
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## G02F 1/35

**Non-linear optics (optical bistable devices [G02F 3/02](#); lasers using stimulated Brillouin or Raman effect [H01S 3/30](#))**

### 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

#### Limiting references

*This place does not cover:*

Optical bistable devices	<a href="#">G02F 3/02</a>
Photoconductive Terahertz emitter (antenna) (Auston switch)	<a href="#">H01L 31/00</a> , <a href="#">H01Q 9/00</a>
Brillouin, Raman laser	<a href="#">H01S 3/30</a>

#### 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	<a href="#">G01N 21/636</a>
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## G02F 2/00

**Demodulating light; Transferring the modulation of modulated light; Frequency-changing of light ([G02F 1/35](#) takes precedence; photoelectric detecting or measuring devices [G01J](#), [H01J 40/00](#), [H01L 31/00](#); demodulating laser arrangements {, e.g. switching, gating} [H01S 3/10](#); demodulation or transference of modulation of modulated electro-magnetic waves in general [H03D 9/00](#))**

### Definition statement

*This place covers:*

Demodulating light; Transferring the modulation of modulated light.

Frequency-changing of light, e.g. by quantum counters Up-converter Infrared to visible converter, Down converter.

Frequency-changing of light using nonlinear optical effect [G02F 1/35](#) takes precedence.

### References

#### Limiting references

*This place does not cover:*

Non linear optics	<a href="#">G02F 1/35</a>
Measuring optical wavelength	<a href="#">G01J 3/00</a>
Measuring optical phase difference	<a href="#">G01J 9/00</a>
Photoelectric discharge tubes not involving the ionisation of a gas	<a href="#">H01J 40/00</a>
Semiconductor devices sensitive to infra-red 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	<a href="#">H01L 31/00</a>
Controlling the intensity, frequency, phase, polarisation or direction or the emitted radiation (of lasers) e.g. switching, gating, modulating or demodulating	<a href="#">H01S 3/10</a>

#### 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	<a href="#">G01D 5/26</a>
Optical receiver/ transmitter	<a href="#">H04B 10/00</a>
Millimeter wave (RF) generation using optical means (Radio over Fiber system)	<a href="#">H04B 10/2575</a>
Optical clock arrangement for synchronisation	<a href="#">H04L 7/0075</a>
Optical demodulator for modulated carrier	<a href="#">H04L 27/223</a>

**Informative references**

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

Phase antenna array (US 5859611)	<a href="#">H01Q 3/2676</a>
Pulse train generation using laser	<a href="#">H01S</a>
RF synthesizer	<a href="#">H03B 21/00</a>

**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 (luminescent materials [C09K 11/00](#))**

**Definition statement**

*This place covers:*

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

Obsolete technology.

**References****Limiting references**

*This place does not cover:*

Luminescent, e.g. electroluminescent, chemiluminescent materials	<a href="#">C09K 11/00</a>
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**G02F 3/00**

**Optical logic elements ({optical computing [G06E](#)}; electric pulse generators using opto-electronic devices as active elements [H03K 3/42](#); logic circuits using opto-electronic devices [H03K 19/14](#)); 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

### Limiting references

*This place does not cover:*

Optical computing	<a href="#">G06E</a>
Electric-pulse generators using opto-electronic devices as active elements	<a href="#">H03K 3/42</a>
Logic circuits using opto-electronic devices	<a href="#">H03K 19/14</a>

## 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	<a href="#">H03M 7/008</a>
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