

CPC COOPERATIVE PATENT CLASSIFICATION

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](#))

WARNING

The following IPC group is not used in the CPC scheme.

Subject matter covered by these groups is classified in the following CPC groups:

[G02F 1/13357](#) covered by [G02F 1/1336](#) and subgroups

- 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](#)})
- control of light by electromagnetic waves, e.g. radio waves, or by electrons or other elementary particles.
- NOTE**
- [G02F 1/0009](#) and subgroups contain mostly non-patent literature
- 1/0009 . {Materials therefor}
 - 1/0018 . . {Electro-optical materials}
 - 1/0027 . . . {with ferro-electric properties (domain inversion in ferro-electric materials [G02F 1/3558](#); ferro-electric materials in general [H01G 7/02](#))}
 - 1/0036 . . {Magneto-optical materials (magnetic materials in general [H01F](#))}
 - 1/0045 . . {Liquid crystals as far as the physical properties are concerned (chemical composition and properties of liquid crystals [C09K 19/00](#))}
 - 1/0054 . . {Structure, phase transitions, NMR, ESR, Moessbauer spectra}
 - 1/0063 . . {Optical properties, e.g. absorption, reflection, non-linear effects, birefringence (non linear optics in general [G02F 1/35](#))}
 - 1/0072 . . {Mechanical, acoustic, electro-elastic, magneto-elastic properties}
 - 1/0081 . . {Electric or magnetic properties}
 - 1/009 . . {Thermal properties (thermometers using change of colour or translucency [G01K 11/12](#); radiation pyrometry [G01J 5/00](#))}
- NOTE**
- This group covers only :
- devices or arrangements, e.g. cells, the optical operation of which is modified by changing the optical properties of the medium of the devices or arrangements by the influence or control of physical parameters, e.g. electric fields, electric current, magnetic fields, sound or mechanical vibrations, stress or thermal effects;
 - devices or arrangements in which the electric or magnetic field component of the light beams influences the optical properties of the medium, i.e. non-linear optics;

1/01	for the control of the intensity, phase, polarisation or colour (G02F 1/29 , G02F 1/35 take precedence; polarising elements <i>per se</i> G02B 5/30 ; static storage <i>per se</i> 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 ; recording by light G11B 7/00 - G11B 11/00 })	2001/0153	{by electro-refraction (Kramers-Kronig relation)}
1/0102	{Constructional details (G02F 1/1306 , G02F 1/133 take precedence)}	2001/0154	{by electro-optic effects (LEO=Pockels, QEO=Kerr)}
1/0105	{Illumination devices (for liquid crystal cells G02F1/13357 ; for display devices for electronic time pieces G04G 9/0041)}	2001/0155	{modulating the optical absorption}
1/0107	{Gaskets, spacers, sealing of the cell; Filling and closing of the cell (for liquid crystal cells G02F 1/1339 , G02F 1/1341 ; for electrochromic or electrolytic cells G02F 1/161)}	2001/0156	{by free carrier absorption}
1/011	{in optical waveguides (G02F 1/0134 , G02F 1/01708 , G02F 1/025 , G02F 1/035 , G02F 1/0508 , G02F 1/0553 , G02F 1/065 , G02F 1/073 , G02F 1/095 , G02F 1/125 , G02F 1/1326 , G02F 1/225 take precedence; optical waveguides in general G02B 6/00)}	2001/0157	{by electro-absorption effects (FK, Stark, QCSE)}
2001/0113	{made of glass, e.g. silica-based optical waveguides}	2001/0158	{with blue-shift of the absorption band}
1/0115	{in optical fibres}	2001/0159	{with red-shift of the absorption band}
1/0118	{by controlling the evanescent coupling of light from a fibre into an active, e.g. electro-optic, overlay}	1/017	Structures with periodic or quasi periodic potential variation, e.g. superlattices, quantum wells
1/0121	{Operation of the device; Circuit arrangements not otherwise provided for (G02F 1/0327 , G02F 1/0516 , G02F 1/076 , G02F 1/092 , G02F 1/113 , G02F 1/13306 , G02F 1/163 take precedence)}	1/01708	{in an optical waveguide structure}
1/0123	{Circuits for the control or stabilisation of the bias voltage, e.g. automatic bias control [ABC] feedback loops}	1/01716	{Optically controlled superlattice or quantum well devices}
1/0126	{by another light beam, i.e. opto-optical modulation (G02F 1/01716 , G02F 1/0338 , G02F 1/0533 , G02F 1/0541 , G02F 1/0558 , G02F 1/135 , G02F 1/293 take precedence)}	1/01725	{with a non-rectangular quantum well structure, e.g. coupled, graded, stepped quantum wells}
1/0128	{based on electro-mechanical, magneto-mechanical, elasto-optic effects}	2001/01733	{Coupled or double quantum wells}
1/0131	{based on elasto-optic, i.e. photoelastic effect, e.g. mechanically induced birefringence (acousto-optic devices G02F 1/11)}	2001/01741	{Asymmetrically coupled or double quantum wells}
1/0134	{in optical waveguides}	2001/0175	{with a spatially varied well profile, e.g. graded, stepped quantum wells}
1/0136	{for the control of polarisation, e.g. state of polarisation [SOP] control, polarisation scrambling, TE-TM mode conversion or separation (G02F 1/0353 takes precedence)}	2001/01758	{with an asymmetric well profile, e.g. asymmetrically stepped quantum wells}
2001/0139	{Polarisation scrambling; Depolarisers}	2001/01766	{Strained superlattice or quantum well devices}
2001/0142	{TE-TM mode conversion}	2001/01775	{involving an intersubband transition in one well, e.g. e1→e2}
2001/0144	{TE-TM mode separation}	2001/01783	{Quantum wire}
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)}	2001/01791	{Quantum box or dot}
1/015	based on semiconductor elements with at least one potential jump barrier, e.g. PN, PIN junction (G02F 1/03 takes precedence)	1/025	in an optical waveguide structure (G02F 1/017 , G02F 1/2257 take precedence)
2001/0151	{modulating the refractive index}	1/03	based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect (G02F 1/061 takes precedence)
2001/0152	{by free carrier effects (Plasma)}	1/0305	{Constructional arrangements (G02F 1/0327 - G02F 1/05 take precedence)}
		1/0311	{Structural association of optical elements, e.g. lenses, polarizers, phase plates, with the crystal}
		1/0316	{Electrodes}
		1/0322	{Arrangements comprising two or more independently controlled crystals}
		1/0327	{Operation of the cell; Circuit arrangements (G02F 1/05 takes precedence)}
		1/0333	{addressed by a beam of charged particles, e.g. directed to an adjacent layer exhibiting secondary emission or bombardment-induced conductivity effect (G02F 1/05 takes precedence; electrography, electrophotography G03G ; screens for cathode ray tubes acting as light valves H01J 29/12)}
		1/0338	{structurally associated with a photoconductive layer or having photo-refractive properties (G02F 1/05 takes precedence)}
		1/0344	{controlled by a high-frequency electromagnetic wave component in an electric waveguide (G02F 1/0356 , G02F 1/05 , G02F 1/2255 , G02F 1/3134 take precedence)}
		1/035	in an optical waveguide structure
		1/0353	{involving an electro-optic TE-TM mode conversion}

1/0356	. . . . {controlled by a high-frequency electromagnetic wave component in an electric waveguide structure}	1/116	. . . . {using an optically anisotropic medium, wherein the incident and the diffracted light waves have different polarizations, e.g. acousto-optic tunable filter [AOTF] (G02F 1/125 takes precedence)}
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})	1/125	. . . . in an optical waveguide structure
1/0508	. . . . {specially adapted for gating or modulating in optical waveguides}	1/13	. . . . based on liquid crystals, e.g. single liquid crystal display cells (liquid crystal materials C09K 19/00)
1/0516	. . . . {Operation of the cell; Circuit arrangements}	1/1303	. . . . {Apparatus specially adapted to the manufacture of LCDs}
1/0525	. . . . {addressed by a beam of charged particles, e.g. directed to an adjacent layer exhibiting secondary emission or bombardment-induced conductivity effect (electrography, electrophotography G03G; screens for cathode-ray tubes acting as light valves H01J 29/12)}	1/1306	. . . . {Details (not used, see sub-groups)}
1/0533	. . . . {structurally associated with a photo-conductive layer}	1/1309	. . . . {Repairing; Testing (testing of optical apparatus G01M 11/00; electronic testing of displays or display drivers, e.g. of LCDs, G09G 3/006)}
1/0541	. . . . {using photo-refractive effects (holography G03H; electro-optical digital static stores using an interference pattern G11C 13/044)}	1/1313	. . . . {specially adapted for a particular application}
1/055	. . . . the active material being a ceramic (G02F 1/035 takes precedence)	2001/1316	. . . . {Cleaning methods or materials for cleaning part of liquid crystal cell components during the manufacturing process}
1/0551	. . . . {Constructional details}	1/132	. . . . {Thermal activation of liquid crystals exhibiting a thermo-optic effect (thermometers using change of colour or translucency of liquid crystals G01K 11/165; thermally addressed liquid crystal elements in a matrix G09G 3/3603)}
1/0553	. . . . {specially adapted for gating or modulating in optical waveguides}	1/1323	. . . . {Arrangements for providing a switchable viewing angle}
1/0555	. . . . {Operation of the cell; Circuit arrangements}	1/1326	. . . . {Liquid crystal optical waveguides or liquid crystal cells specially adapted for gating or modulating between optical waveguides}
1/0556	. . . . {specially adapted for a particular application}	1/133	. . . . Constructional arrangements; Operation of liquid crystal cells; Circuit arrangements (arrangements or circuits for control of liquid crystal elements in a {segment display or a} matrix, not structurally associated with these elements, {respectively G09G 3/18 and } G09G 3/36)
1/0558	. . . . {structurally associated with a photoconductive layer or exhibiting photo-refractive properties}	1/13306	. . . . {Circuit arrangements or driving methods for the control of single liquid crystal cells (G02F 1/132, G02F 1/133382 take precedence)}
1/061	. . . . based on electro-optical organic material (G02F 1/07, {G02F 1/13} take precedence)	2001/13312	. . . . {Circuits comprising a photodetector not for feedback}
1/065	. . . . in an optical waveguide structure	1/13318	. . . . {Circuits comprising a photodetector}
1/07	. . . . based on electro-optical liquids exhibiting Kerr effect	2001/13324	. . . . {Circuits comprising a solar cell}
1/073	. . . . {specially adapted for gating or modulating in optical waveguides}	1/1333	. . . . Constructional arrangements; {Manufacturing methods} (G02F 1/135, G02F 1/136 take precedence)
1/076	. . . . {Operation of the cell; Circuit arrangements}	2001/133302	. . . . {rigid substrate, e.g. inorganic}
1/09	. . . . based on magneto-optical elements, e.g. exhibiting Faraday effect	1/133305	. . . . {Flexible substrates, e.g. plastics, organic film}
1/091	. . . . {based on magneto-absorption or magneto-reflection}	1/133308	. . . . {LCD panel immediate support structure, e.g. front and back frame or bezel}
1/092	. . . . {Operation of the cell; Circuit arrangements}	2001/133311	. . . . {Environmental protection, e.g. dust, humidity}
1/093	. . . . {used as non-reciprocal devices, e.g. optical isolators, circulators (G02F 1/0955 takes precedence)}	2001/133314	. . . . {Back frame}
2001/094	. . . . {Based on magnetophoretic effect}	2001/133317	. . . . {Intermediate frame, e.g. between backlight housing and front frame}
1/095	. . . . in an optical waveguide structure	2001/13332	. . . . {Front frame}
1/0955	. . . . {used as non-reciprocal devices, e.g. optical isolators, circulators}	2001/133322	. . . . {Mechanical guiding and alignment of LCD panel support components}
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)	2001/133325	. . . . {Method of assembling (G02F 2201/465 takes precedence)}
1/113	. . . . {Circuit or control arrangements}		

2001/133328	{Segmented frame}	2001/133347	{Reverse mode, i.e. clear in the off-state and scattering in the on-state}
2001/133331	{Cover glass}	1/1335	Structural association of optical devices, e.g. polarisers, reflectors or illuminating devices, with the cell
2001/133334	{Electromagnetic shield}	1/133502	{Antiglare, refractive index matching layers}
2001/133337	{Ion-diffusion preventing or absorbing layer}	1/133504	{Diffusing, scattering, diffracting elements (associated to illuminating devices G02F 1/133606)}
1/13334	{Plasma addressed liquid crystal cells [PALC] (plasma panels H01J 17/49)}	2001/133507	{Luminance enhancement films}
2001/133342	{for double side displays}	1/133509	{Filters, e.g. light shielding masks (optical filters G02B 5/20)}
1/133345	{Insulating layers (G02F 1/1335 , G02F 1/1337 , G02F 1/135 , G02F 1/136 take precedence)}	1/133512	{Light shielding layers, e.g. black matrix (G02F 1/136209 takes precedence)}
1/133348	{Charged-particles, e.g. electron-beam, addressed liquid crystals cells (screen for cathode ray tubes acting as light valves H01J 29/12 ; electrography, electrophotography G03G)}	1/133514	{Colour filters (luminescent elements G02F 1/133617)}
1/133351	{Manufacturing of individual cells out of a plurality of cells, e.g. by dicing}	1/133516	{Methods of making thereof, e.g. printing, electro-deposition, photolithography (photomechanical production of textured or patterned surfaces G03F)}
2001/133354	{Arrangements for aligning or assembling the substrates}	2001/133519	{overcoating}
2001/133357	{Planarisation layer}	2001/133521	{Interference filters}
1/13336	{Combining plural substrates to produce large-area displays, e.g. tiled displays}	1/133524	{Light-guides, e.g. fibre-optic bundles, louvered or jalousie light-guides}
1/133362	{Optically addressed liquid crystal cells (G02F 1/135 takes precedence)}	1/133526	{Lenses, e.g. micro-lenses, Fresnel lenses (lenses in general G02B 3/00)}
1/133365	{Cells in which the active layer comprises a liquid crystalline polymer (liquid crystalline polymers in general C09K 19/38)}	1/133528	{Polarisers (polarisers per se G02B 5/30)}
2001/133368	{cell having two substrates with different characteristic, e.g. thickness or material}	2001/133531	{Special arrangement of polariser or analyser axes}
1/133371	{Cells with varying thickness of the liquid crystal layer}	1/133533	{Colour selective polarisers (G02F 1/1347 takes precedence)}
2001/133374	{for displaying permanent signs or marks}	1/133536	{Reflective polarizers (G02F 1/13362 takes precedence)}
1/133377	{Cells with plural compartments or having plurality of liquid crystal micro-cells partitioned by walls, e.g. one micro-cell per pixel}	2001/133538	{with a spatial distribution of the polarisation direction}
1/13338	{Input devices, e.g. touch-panels (specially adapted as input devices to computers G06F 3/033 ; touch-panels per se G06K 11/06 , keyboard switches per se H01H 13/70)}	2001/133541	{Circular polarisers}
1/133382	{Heating or cooling of liquid crystal cells other than for activation, e.g. circuits or arrangements for temperature control, stabilisation or uniform distribution over the cell}	2001/133543	{Cholesteric polarisers}
1/133385	{with cooling means, e.g. fans}	2001/133545	{Dielectric stack polarisers}
2001/133388	{Constructional difference between the display region and the peripheral region}	2001/133548	{Wire-grid polarisers}
2001/133391	{Constructional arrangement for sub-divided displays}	2001/13355	{Polarising beam splitters [PBS]}
2001/133394	{Piezoelectric element associated with the cell}	1/133553	{Reflecting elements (associated to illuminating devices G02F 1/133605)}
2001/133397	{for suppressing after-image or image-sticking}	1/133555	{Transflectors}
1/1334	based on polymer dispersed liquid crystals, e.g. microencapsulated liquid crystals (compositions C09K 19/544)}	2001/133557	{Half-mirror}
1/13342	{Holographic polymer dispersed liquid crystals}	2001/13356	{Particular location of the optical element}
2001/13345	{Network or three-dimensional gel}	2001/133562	{on the viewer side}
		2001/133565	{inside the LC element, i.e. between the cell substrates}
		2001/133567	{on the back side}
		1/1336	{Illuminating devices (in general F21V ; associated with display devices for electronic watches G04G 9/0041)}
		2001/133601	{for spatial active dimming}
		1/133602	{Direct backlight}
		1/133603	{with LEDs}
		1/133604	{with lamps}
		1/133605	{including specially adapted reflectors}

1/133606	{including a specially adapted diffusing, scattering or light controlling members}	2001/133638	{Waveplates, i.e. plates with a retardation value of λ/n }
2001/133607	{the light controlling member including light directing or refracting elements, e.g. prisms or lenses}	1/1337	Surface-induced orientation of the liquid crystal molecules, e.g. by alignment layers
1/133608	{including particular frames or supporting means}	1/133703	{by introducing organic surfactant additives into the liquid crystal material (C09K 19/56 takes precedence)}
1/133609	{including means for improving the color mixing, e.g. white}	1/133707	{Structures for producing distorted electric fields, e.g. bumps, protrusions, recesses, slits in pixel electrodes}
1/133611	{including means for improving the brightness uniformity}	1/133711	{by organic films, e.g. polymeric films}
2001/133612	{Electrical details}	2001/133715	{by first depositing a monomer}
2001/133613	{including a particular sequence of light sources}	1/133719	{with coupling agent molecules, e.g. silane}
2001/133614	{the light is generated by photoluminescence, e.g. a phosphor is illuminated by UV or blue light}	1/133723	{Polyimide, polyamide-imide}
1/133615	{Edge-illuminating devices, i.e. illuminating from the side (G02B 6/0001 takes precedence)}	2001/133726	{made of a mesogenic material}
2001/133616	{Front illuminating devices}	2001/13373	{Disclination line; Reverse tilt}
1/133617	{Illumination with ultra-violet light; Luminescent elements or materials associated to the cell}	1/133734	{by obliquely evaporated films, e.g. Si or SiO ₂ films}
2001/133618	{for ambient light}	2001/133738	{for homogeneous alignment}
1/13362	{providing polarised light, e.g. by converting a polarisation component into another one (optical systems for polarising G02B 27/28)}	2001/133742	{for homeotropic alignment}
1/133621	{providing coloured light (G02F 1/133617 , G02F 1/133533 take precedence)}	2001/133746	{for high pretilt angle, i.e. > 15 degrees}
2001/133622	{colour sequential illumination}	2001/133749	{for low pretilt angle, i.e. < 15 degrees}
2001/133623	{Inclined coloured light beams}	1/133753	{with different alignment orientations or pretilt angles on a same surface, e.g. for grey scale or improved viewing angle}
2001/133624	{having a particular spectral emission}	2001/133757	{with different alignment orientations}
2001/133625	{Electron stream lamps}	2001/133761	{with different pretilt angles}
2001/133626	{providing two modes of illumination, e.g. day-night}	2001/133765	{without a surface treatment}
2001/133627	{Projection-direct viewing}	2001/133769	{comprising an active, e.g. switchable alignment layer}
2001/133628	{with cooling means}	2001/133773	{The alignment material or treatment is different for the two opposite substrates}
1/13363	Birefringent elements, e.g. for optical compensation	2001/133776	{having structures, i.e. unevenness locally influencing the alignment}
2001/133631	{with a spatial distribution of the retardation value}	1/13378	{by treatment of the surface, e.g. embossing, rubbing, light irradiation (G02F 1/133711 , G02F 1/133734 , G02F 1/133753 take precedence)}
1/133632	{with refractive index ellipsoid inclined relative to the LC-layer surface}	1/133784	{by rubbing}
2001/133633	{using mesogenic materials}	1/133788	{by light irradiation, e.g. linearly polarised light photo-polymerisation}
1/133634	{the refractive index Nz perpendicular to the element surface being different from in-plane refractive indices Nx and Ny, e.g. biaxial or with normal optical axis}	2001/133792	{by etching}
2001/133635	{Multifunctional compensators}	2001/133796	{having conducting property}
1/133636	{with twisted orientation, e.g. comprising helically oriented LC-molecules or a plurality of twisted birefringent sublayers}	1/1339	Gaskets; Spacers, {also spacers with conducting properties (electric line connectors H01R)}; Sealing of the cell
2001/133637	{characterized by the wavelength dispersion}	1/13392	{spacers dispersed on the cell substrate, e.g. spherical particles, micro-fibres}
		1/13394	{spacers regularly patterned on the cell substrate, e.g. walls, pillars (G02F 1/133377 takes precedence)}
		2001/13396	{Spacers having different sizes}
		2001/13398	{Materials and properties of the spacer}
		1/1341	Filling or closing of the cell ({ G02F 1/133365 , G02F 1/1334 take precedence})
		2001/13415	{Drop filling process}
		1/1343	Electrodes ({ reflective electrodes G02F 1/133553 })

1/134309	{characterised by their geometrical arrangement (G09F 9/302 takes precedence)}	2001/1355	{material or manufacturing process thereof}
2001/134318	{having a patterned common electrode}	2001/1357	{electrode structure}
1/134327	{Segmented, e.g. alpha numeric display}	1/1358	{the supplementary layer being a ferro-electric layer}
1/134336	{Matrix}	1/136	Liquid crystal cells structurally associated with a semi-conducting layer or substrate, e.g. cells forming part of an integrated circuit (G02F 1/135 takes precedence)
2001/134345	{Subdivided pixels, e.g. grey scale, redundancy}	2001/13606	{having means for reducing parasitic capacitance}
2001/134354	{the sub-pixels being capacitively coupled}	2001/13613	{the semiconductor element is formed on a first substrate and thereafter transferred to the final cell substrate}
1/134363	{for applying an electric field parallel to the substrate, i.e. in-plane switching [IPS]}	1/1362	Active matrix addressed cells {(G02F 1/134336 , G02F 1/134363 take precedence)}
2001/134372	{for fringe field switching [FFS] where the common electrode is not patterned, e.g. planar}	1/136204	{Arrangements to prevent high voltage or static electricity failures}
2001/134381	{Hybrid switching mode, i.e. for applying an electric field both parallel and orthogonal to the substrates}	1/136209	{Light shielding layers, e.g. black matrix, incorporated in the active matrix substrate, e.g. structurally associated with the switching element}
1/13439	{characterised by their electrical, optical, physical properties; materials therefor; method of making}	1/136213	{Storage capacitors associated with the pixel electrode}
1/1345	Conductors connecting electrodes to cell terminals	2001/136218	{Shield electrode}
1/13452	{Conductors connecting driver circuitry and terminals of panels (H01L 21/00 takes precedence ; electrical details inside the cell G02F 1/133;)}	2001/136222	{Color filter incorporated in the active matrix substrate}
1/13454	{Drivers integrated on the active matrix substrate (G02F 1/136277 takes precedence)}	1/136227	{Through-hole connection of the pixel electrode to the active element through an insulation layer}
2001/13456	{cell terminals on one side of the display only}	2001/136231	{for reducing the number of lithographic steps}
1/13458	{Terminal pads}	2001/136236	{using a gray or half tone lithographic process}
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 {(colour projection displays with liquid crystal valves H04N 9/3197)}	1/13624	{having more than one switching element per pixel}
1/13471	{in which all the liquid crystal cells or layers remain transparent, e.g. FLC, ECB, DAP, HAN, TN, STN, SBE-LC cells (G02F 1/13475 takes precedence)}	2001/136245	{having complementary transistors}
1/13473	{for wavelength filtering or for colour display without the use of colour mosaic filters}	2001/13625	{Patterning using a multi-mask exposure}
1/13475	{in which at least one liquid crystal cell or layer is doped with a pleochroic dye, e.g. GH-LC cell (G02F 1/13476 takes precedence)}	2001/136254	{Checking; Testing}
1/13476	{in which at least one liquid crystal cell or layer assumes a scattering state}	1/136259	{Repairing; Defects}
2001/13478	{based on selective reflection}	2001/136263	{Line defect}
1/135	Liquid crystal cells structurally associated with a photoconducting or a ferro-electric layer, the properties of which can be optically or electrically varied {(G02F 1/133348 takes precedence)}	2001/136268	{Switch defect}
2001/1351	{light-absorbing or blocking layer}	2001/136272	{Auxiliary line}
2001/1352	{light-reflecting layer}	1/136277	{formed on a semiconductor substrate, e.g. silicon}
1/1354	{having a particular photoconducting structure or material}	2001/136281	{having a transmissive semiconductor substrate}
		1/136286	{Wiring, e.g. gate line, drain line}
		2001/13629	{Multi-layer wirings}
		2001/136295	{Materials; Compositions; Methods of manufacturing}
		1/1365	in which the switching element is a two-electrode device {(G02F 1/136277 takes precedence)}
		1/1368	in which the switching element is a three-electrode device {(G02F 1/136277 takes precedence)}
		2001/13685	{Top gate}
		1/137	characterised by a particular electro- or magneto-optical effect, e.g. field-induced phase transition, orientation effect, guest-host interaction, dynamic scattering

2001/13706	. . . .	{the LC having positive dielectric anisotropy}	2001/1504	. . . .	{having an inorganic electrochromic layer and a second solid organic electrochromic layer}
2001/13712	. . . .	{the LC having negative dielectric anisotropy}	1/1506	. . .	{based on electrolytic deposition of a non-organic material on or in the vicinity of an electrode}
1/13718	. . . .	{based on a change of the texture state of a cholesteric liquid crystal}	1/1508	. . . .	{using a solid electrolyte}
1/13725	. . . .	{based on guest-host interaction (G02F 1/13762, G02F 1/13737, take precedence)}	2001/151	. . .	{the electrochromic material comprises ferrocene compounds}
1/13731	. . . .	{based on a field-induced phase transition (G02F 1/13781 takes precedence)}	2001/1512	. . .	{the electrochromic layer comprises a mixture of anodic and cathodic compounds}
1/13737	. . . .	{in liquid crystals doped with a plechroic dye}	2001/1515	. . .	{the electrochromic material is made of polymer}
1/13743	. . . .	{based on electrohydrodynamic instabilities or domain formation in liquid crystals}	2001/1517	. . .	{based on cyano complex compound, e.g. Prussian blue}
1/1375	. . . .	{using dynamic scattering}	2001/1519	. . .	{the electrolyte is made of polymer}
2001/13756	. . . .	{the liquid crystal selectively assuming a light-scattering state (G02F 1/1334, G02F 1/13718 take precedence)}	1/1521	. . .	{based on oxidation reduction in organic liquid solutions, e.g. viologens solutions}
1/13762	. . . .	{containing luminescent or electroluminescent additives (luminescent materials in general C09K 11/00; compositions of liquid crystals comprising additives C09K 19/52 - C09K 19/603; electroluminescent light sources H05B 33/00)}	1/1523	. . .	{based on solid inorganic materials, e.g. transition metal compounds, e.g. in combination with a liquid or solid electrolyte (G02F 1/1506 takes precedence)}
1/13768	. . . .	{based on magneto-optical effects}	1/1525	. . . .	{characterised by a particular ion transporting layer, e.g. electrolyte (H01M 6/18, H01M 10/08 take precedence)}
2001/13775	. . . .	{Polymer stabilized liquid crystal layers}	1/1527	. . . .	{based on iridium oxide or hydroxide}
1/13781	. . . .	{using smectic liquid crystals (G02F 1/141 takes precedence)}	1/153	. . .	Constructional arrangements
2001/13787	. . . .	{Hybrid alignment cells (G02F 1/1393 takes precedence)}	1/1533	. . . .	{structural features not otherwise provided for}
2001/13793	. . . .	{Blue phases}	2001/1536	. . . .	{additional, e.g. protective, layer inside the cell}
1/139	. . . .	based on orientation effects in which the liquid crystal remains transparent	1/155	. . . .	Electrodes
1/1391	. . . .	{Bistable or multi-stable liquid crystal cells (G02F 1/141 takes precedence)}	2001/1552	. . . .	{Inner electrode, e.g. the electrochromic layer being sandwiched between the inner electrode and the support substrate---- this group, now to be changed, should already been created by implementation of a previous DOC14 (prior to the one referred to above)----}
1/1392	. . . .	{using a field-induced sign-reversal of the dielectric anisotropy}	2001/1555	. . . .	{Counter electrode}
1/1393	. . . .	{the birefringence of the liquid crystal being electrically controlled, e.g. ECB-, DAP-, HAN-, PI-LC cells (G02F 1/1396, G02F 1/141 take precedence)}	2001/1557	. . . .	{Side by side arrangements of working and counter electrodes}
1/1395	. . . .	{Optically compensated birefringence [OCB]- cells or PI- cells}	1/157	. . . .	Structural association of optical devices, e.g. reflectors or illuminating devices, with the cell
1/1396	. . . .	{the liquid crystal being selectively controlled between a twisted state and a non-twisted state, e.g. TN-LC cell (G02F 1/141 takes precedence)}	1/161	. . . .	Gaskets; Spacers; Sealing of the cell; Filling or closing of the cell
1/1397	. . . .	{the twist being substantially higher than 90°, e.g. STN-, SBE-, OMI-LC cells}	1/163	. . .	Operation of electrochromic cells; Circuit arrangements
2001/1398	. . . .	{the twist being below 90°C}	2001/1635	. . . .	{the pixel comprises active switching elements, e.g. TFT}
1/141	. . . .	using ferroelectric liquid crystals	1/167	. .	based on electrophoresis
2001/1412	. . . .	{Antiferroelectric liquid crystals}	2001/1672	. . .	{of the microcup type}
2001/1414	. . . .	{Deformed helix ferroelectric [DHL]}	2001/1674	. . .	{comprising a dry toner particle}
1/1416	. . . .	{Details of the smectic layer structure, e.g. bookshelf, chevron, C1 and C2}	2001/1676	. . .	{having a particular electrode}
1/1418	. . . .	{using smectic liquid crystals, e.g. based on the electroclinic effect}	2001/1678	. . .	{having a particular composition or particle type}
1/15	. .	based on electrochromic elements {(electrochromic materials C09K 9/00)}	1/17	. .	based on variable absorption elements (G02F 1/015 - G02F 1/167 take precedence; {tenebrescent compositions C09K 9/00})
2001/1502	. . .	{complementary cell}	1/172	. . .	{based on a suspension of orientable dipolar particles, e.g. suspended particles displays}

- 1/174 . . . {based on absorption band-shift, e.g. Stark - or Franz-Keldysh effect ([G02F 1/015](#), [G02F 1/178](#) take precedence)}
- 1/176 . . . {using acid- based indicators}
- 1/178 . . . {based on pressure effects ([G02F 1/195](#) takes precedence)}
- 1/19 . . based on variable reflection or refraction elements ([G02F 1/015](#) - [G02F 1/167](#) take precedence)
- 1/195 . . . {by using frustrated reflection (digital reflection using controlled total internal reflection [G02F 1/315](#))}
- 1/21 . . by interference
- 2001/211 . . . {Sagnac type}
- 2001/212 . . . {Mach-Zender type}
- 2001/213 . . . {Fabry-Perot type}
- 2001/215 . . . {Michelson type}
- 1/216 . . . {using liquid crystals, e.g. liquid crystal Fabry-Perot filters}
- 2001/217 . . . {Multi mode interference type}
- 1/218 . . . {using semi-conducting materials}
- 1/225 . . . in an optical waveguide structure
- 1/2252 {in optical fibres}
- 1/2255 {controlled by a high-frequency electromagnetic component in an electric waveguide structure}
- 1/2257 {the optical waveguides being made of semiconducting material}
- 1/23 . . for the control of the colour ([G02F 1/03](#) - [G02F 1/21](#) take precedence)
- 1/25 . . . as to hue or predominant wavelength
- 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](#))
- 2001/291 . . {Two-dimensional analog deflection}
- 1/292 . . {by controlled diffraction or phased-array beam steering (controlled diffraction for optical switching [G02F 1/31](#))}
- 1/293 . . {by another light beam, i.e. opto-optical deflection}
- 2001/294 . . {Variable focal length device}
- 1/295 . . {Analog deflection from or} in an optical waveguide structure]
- 1/2955 . . . {by controlled diffraction or phased-array beam steering (controlled diffraction for optical waveguide switching [G02F 1/313](#))}
- 1/31 . . Digital deflection, {i.e. optical switching} ([G02F 1/33](#) takes precedence)
- 2001/311 . . . {Cascade arrangement of plural switches}
- 1/313 . . . in an optical waveguide structure
- 1/3131 {in optical fibres}
- 1/3132 {of directional coupler type (all-optical modulation, gating or switching using a non-linear directional coupler [G02F 1/3521](#))}
- 1/3133 {the optical waveguides being made of semiconducting materials}
- 1/3134 {controlled by a high-frequency electromagnetic wave component in an electric waveguide structure}
- 2001/3135 {vertical structure}
- 1/3136 {of interferometric switch type}
- 1/3137 {with intersecting or branching waveguides, e.g. X-switches and Y-junctions}
- 1/3138 {the optical waveguides being made of semiconducting materials}
- 1/315 . . . based on the use of controlled internal reflection
- 1/33 . . Acousto-optical deflection devices {(circuit or control arrangements therefor [G02F 1/113](#))}
- 1/332 . . . {comprising a plurality of transducers on the same crystal surface, e.g. multi-channel Bragg cell}
- 1/335 . . . having an optical waveguide structure
- 1/35 . . Non-linear optics (optical bistable devices [G02F 3/02](#); lasers using stimulated Brillouin or Raman effect [H01S 3/30](#))
- 1/3501 . . {Constructional arrangements of non-linear optical devices, e.g. shape of non-linear crystals (constructional arrangements of electro-optic devices [G02F 1/0305](#))}
- 2001/3503 . . . {Structural association of optical elements, e.g. lenses, with the nonlinear optical device}
- 2001/3505 . . . {Coatings; Housings; Supports}
- 2001/3507 . . . {Arrangements comprising two or more nonlinear optical devices}
- 2001/3509 . . . {Shape, e.g. shape of end face}
- 1/3511 . . {Self-focusing or self-trapping of light; Light-induced birefringence; Induced optical Kerr-effect (photorefractive effects of electro-optic crystals [G02F 1/0338](#), [G02F 1/0541](#), of ceramics [G02F 1/0558](#); opto-optical modulation [G02F 1/0126](#); opto-optical deflection [G02F 1/293](#))}
- 1/3513 . . . {Soliton propagation}
- 1/3515 . . {All-optical modulation, gating, switching, e.g. control of a light beam by another light beam ([G02F 1/353](#), [G02F 1/37](#), [G02F 1/39](#) take precedence)}
- 1/3517 . . . {using an interferometer}
- 1/3519 {of Sagnac type, i.e. nonlinear optical loop mirror [NOLM]}
- 1/3521 . . . {using a directional coupler}
- 1/3523 . . {Non-linear absorption changing by light, e.g. bleaching (laser Q-switching using bleachable media [H01S 3/113](#))}
- 1/3525 . . {Optical damage}
- 1/3526 . . {using two-photon emission or absorption processes (Raman effect [H01S 3/30](#))}
- 2001/3528 . . {for producing a supercontinuum}
- 1/353 . . {Frequency conversion, i.e. wherein a light beam with frequency components different from those of the incident light beams is generated (second harmonic generation [G02F 1/37](#); optical parametric generation or amplification [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](#))}
- 1/3532 . . . {Arrangements of plural nonlinear devices for generating multi-colour light beams, e.g. arrangements of SHG, SFG, OPO devices for generating RGB light beams}
- 1/3534 . . . {Three-wave interaction, e.g. sum-difference frequency generation ([G02F 1/3532](#) takes precedence)}

1/3536	. . . {Four-wave interaction}	2/002	. {using optical mixing (homodyne, heterodyne systems H04B 10/142)}
1/3538	. . . . {for optical phase conjugation (H01S 3/10076 takes precedence)}	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}
2001/354	. . . {Third or higher harmonic generation}	2002/006	. . {All-optical wavelength conversion}
2001/3542	. . . {Multi-pass arrangements, i.e. arrangements to pass light a plurality of times through the same element, e.g. by using an enhancement cavity}	2002/008	. . {Opto-electronic wavelength conversion, i.e. involving photo-detection of the first optical carrier}
1/3544	. . . {Particular phase matching techniques}	2/02	. Frequency-changing of light, e.g. by quantum counters (luminescent materials C09K 11/00)
2001/3546	. . . . {Active phase matching, e.g. by electro- or thermo-optic tuning}	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
2001/3548	. . . . {Quasi-phase-matching [QPM], e.g. using a periodic domain inverted structure}	3/02	. Optical bistable devices
1/355	. . characterised by the materials used	3/022	. . {based on electro-, magneto- or acousto-optical elements (G02F 3/028 takes precedence)}
1/3551	. . . {Crystals}	3/024	. . {based on non-linear elements, e.g. non-linear Fabry-Perot cavity (G02F 3/028 takes precedence)}
1/3553	. . . . {having the formula MTiOYO ₄ , where M=K, Rb, TI, NH ₄ or Cs and Y=P or As, e.g. KTP}	3/026	. . {based on laser effects}
1/3555	. . . {Glasses}	3/028	. . {based on self electro-optic effect devices [SEED]}
1/3556	. . . {Semiconductor materials, e.g. quantum wells}	7/00	Optical analogue/digital converters
1/3558	. . . {Poled materials, e.g. with periodic poling; Fabrication of domain inverted structures, e.g. for quasi-phase-matching [QPM]}	NOTE	This group covers only converters based in substantial manner on elements which are provided for in group G02F 1/00 .
1/361	. . . Organic materials	2201/00	Constructional arrangements not provided for in groups G02F 1/00 - G02F 7/00
1/3611	. . . . {containing Nitrogen}	2201/02	. fibre
1/3612	. . . . . {Heterocycles having N as heteroatom}	2201/04	. monomode
1/3613	. . . . . {containing Sulfur}	2201/05	. multimode
1/3614	. . . . . {Heterocycles having S as heteroatom}	2201/06	. integrated waveguide
1/3615	. . . . . {containing polymers}	2201/063	. . ridge; rib; strip loaded
1/3616	. . . . . {having the non-linear optical group in the main chain}	2201/066	. . channel; buried
1/3617	. . . . . {having the non-linear optical group in a side chain}	2201/07	. buffer layer
1/3618	. . . . {Langmuir Blodgett Films}	2201/08	. light absorbing layer
1/3619	. . . . {Organometallic compounds}	2201/083	. . infra-red absorbing
1/365	. . in an optical waveguide structure (G02F 1/377 , G02F 1/395 take precedence)	2201/086	. . UV absorbing
1/37	. . for second-harmonic generation ({ G02F 1/3532 takes precedence})	2201/12	. electrode
2001/372	. . . {means for homogenizing the output beam}	2201/121	. . common or background
2001/374	. . . {Cerenkov radiation}	2201/122	. . having a particular pattern
1/377	. . . in an optical waveguide structure	2201/123	. . pixel
1/3775	. . . . {with a periodic structure, e.g. domain inversion, for quasi-phase-matching [QPM] (G02F 1/383 takes precedence)}	2201/124	. . interdigital
1/383	. . . . of the optical fibre type	2201/125	. . delta-beta
1/39	. . for parametric generation or amplification of light, infra-red or ultra-violet waves (G02F 1/3532 takes precedence; } electrical parametric amplifiers H03F 7/00)	2201/126	. . push-pull
2001/392	. . . {Parametric amplification}	2201/127	. . travelling wave
1/395	. . . {in optical waveguides}	2201/128	. . field shaping
1/397	. . . {Amplification of light by wave mixing involving an interference pattern, e.g. using photorefractive material}	2201/14	. asymmetric
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)	2201/15	. periodic
		2201/16	. series; tandem
		2201/17	. Multi-pass arrangements, i.e. arrangements to pass light a plurality of times through the same element, e.g. by using an enhancement cavity
		2201/18	. parallel

2201/20	. delay line	2202/108	. . quantum wells
2201/205	. . of fibre type	2202/12	. photoconductor
2201/30	. grating	2202/13	. photorefractive
2201/302	. . grating coupler	2202/14	. photochromic
2201/305	. . diffraction grating	2202/16	. conductive
2201/307	. . Reflective grating, i.e. Bragg grating	2202/20	. LiNbO ₃ , LiTaO ₃
2201/34	. reflector	2202/22	. Antistatic materials or arrangements
2201/343	. . cholesteric liquid crystal reflector	2202/28	. Adhesive materials or arrangements
2201/346	. . distributed (Bragg) reflector	2202/30	. Metamaterials
2201/36	. Airflow channels, e.g. constructional arrangements facilitating the flow of air	2202/32	. Photonic crystals
2201/38	. Anti-reflection arrangements	2202/34	. Metal hydrides materials
2201/40	. Arrangements for improving the aperture ratio	2202/36	. Micro or nano materials
2201/42	. Arrangements for providing conduction through an insulating substrate	2202/38	. Sol-gel materials
2201/44	. Arrangements combining different electro-active layers, e.g. electrochromic, liquid crystal or electroluminescent layers	2202/40	. Materials having a particular birefringence, retardation
2201/46	. Fixing elements	2202/42	. Materials having a particular dielectric constant
2201/465	. . Snap -fit	2202/99	. Test HW
2201/48	. Flattening arrangements	2203/00	Function characteristic
2201/50	. Protective arrangements	2203/01	. transmissive
2201/501	. . Blocking layers, e.g. against migration of ions	2203/02	. reflective
2201/503	. . Arrangements improving the resistance to shock	2203/023	. . total internal reflection
2201/505	. . Arrangements improving the resistance to acoustic resonance like noise	2203/026	. . attenuated or frustated internal reflection
2201/506	. . Repairing, e.g. with redundant arrangement against defective part	2203/03	. scattering
2201/508	. . . Pseudo repairing, e.g. a defective part is brought into a condition in which it does not disturb the functioning of the device	2203/04	. wavelength independent
2201/52	. RGB geometrical arrangements	2203/05	. wavelength dependent
2201/54	. Arrangements for reducing warping-twist	2203/055	. . wavelength filtering
2201/56	. Substrates having a particular shape, e.g. non-rectangular	2203/06	. Polarisation independent
2201/58	. Arrangements comprising a monitoring photodetector	2203/07	. Polarisation dependent
2202/00	Materials and properties	2203/09	. transfective
2202/01	. dipole	2203/10	. plasmon
2202/02	. organic material	2203/11	. involving infrared radiation
2202/021	. . low molecular weight	2203/12	. spatial light modulator
2202/022	. . polymeric	2203/13	. involving THZ radiation
2202/023	. . . curable	2203/15	. involving resonance effects, e.g. resonantly enhanced interaction
2202/025	. . . thermocurable	2203/16	. involving spin polarization effects
2202/026	. . charge transfer complex	2203/17	. involving soliton waves
2202/027	. . Langmuir-Blodgett film	2203/18	. adaptive optics, e.g. wavefront correction
2202/028	. . photobleached	2203/19	. linearised modulation; reduction of harmonic distortions
2202/04	. dye	2203/20	. Intrinsic phase difference, i.e. optical bias, of an optical modulator; Methods for the pre-set thereof
2202/043	. . pleochroic	2203/21	. Thermal instability, i.e. DC drift, of an optical modulator; Arrangements or methods for the reduction thereof
2202/046	. . fluorescent	2203/22	. diffractive
2202/06	. dopant	2203/24	. beam steering
2202/07	. poled	2203/25	. Frequency chirping of an optical modulator; Arrangements or methods for the pre-set or tuning thereof
2202/08	. glass transition temperature	2203/255	. . Negative chirp
2202/09	. inorganic glass	2203/26	. Pulse shaping; Apparatus or methods therefor
2202/10	. semiconductor	2203/28	. focussing or defocussing
2202/101	. . Ga×As and alloy	2203/30	. Gray scale
2202/102	. . In×P and alloy	2203/34	. Colour display without the use of colour mosaic filters
2202/103	. . a-Si	2203/48	. Variable attenuator
2202/104	. . poly-Si	2203/50	. Phase-only modulation
2202/105	. . single crystal Si	2203/52	. Optical limiters
2202/106	. . Cd×Se or Cd×Te and alloys	2203/54	. Optical pulse train (comb) synthesizer
2202/107	. . Zn×S or Zn×Se and alloys	2203/56	. Frequency comb synthesizer

G02F

- 2203/58 . Multi-wavelength, e.g. operation of the device at a plurality of wavelengths
- 2203/585 . . Add/drop devices
- 2203/60 . Temperature independent
- 2203/62 . Switchable arrangements whereby the element being usually not switchable
- 2203/64 . Normally black display, i.e. the off state being black
- 2203/66 . Normally white display, i.e. the off state being white
- 2203/68 . Green display, e.g. recycling, reduction of harmful substances
- 2203/69 . Arrangements or methods for testing or calibrating a device
- 2203/70 . Semiconductor optical amplifier [SOA] used in a device covered by [G02F](#)

2413/00 Indexing scheme related to [G02F 1/13363](#), i.e. to birefringent elements, e.g. for optical compensation, characterised by the number, position, orientation or value of the compensation plates

- 2413/01 . Number of plates being 1
- 2413/02 . Number of plates being 2
- 2413/03 . Number of plates being 3
- 2413/04 . Number of plates greater than or equal to 4
- 2413/05 . Single plate on one side of the LC cell
- 2413/06 . Two plates on one side of the LC cell
- 2413/07 . All plates on one side of the LC cell
- 2413/08 . with a particular optical axis orientation
- 2413/09 . with a spatial distribution of the retardation value
- 2413/10 . with refractive index ellipsoid inclined, or tilted, relative to the LC-layer surface O plate
- 2413/105 . . with varying inclination in thickness direction, e.g. hybrid oriented discotic LC
- 2413/11 . The refractive index N_z perpendicular to the element surface being different from in-plane refractive indices N_x and N_y , e.g. C plate
- 2413/12 . Biaxial compensators
- 2413/13 . Positive birefringence
- 2413/14 . Negative birefringence
- 2413/15 . with twisted orientation, e.g. comprising helically oriented LC-molecules or a plurality of twisted birefringent sublayers