CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS

INSTRUMENTS

G09 EDUCATION; CRYPTOGRAPHY; DISPLAY; ADVERTISING; SEALS

G09G ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRESENT VARIABLE INFORMATION (lighting in general F21; arrangements for displaying electric variables or waveforms G01R 5/00; devices or arrangements for the control of light beams G02F 1/00; indicating of time by visual means G04B 19/00, G04C 17/00, G04G 9/00; arrangements for transferring data between computers and peripheral equipment G06F 3/00; visible signalling arrangements or devices G08B 5/00; traffic control systems G08G; display, advertising, signs G09F, e.g. static indicating arrangements comprising an association of a number of separate sources or light control cells G09F 9/00; static indicating arrangements comprising integral associations of a number of light sources H01J, H01K, H01L, H05B 33/12; circuits in pulse counters for indicating the result H03K 21/18; coding, decoding or code conversion, in general H03M; reproducing a picture or pattern using electric signals representing parts thereof and produced by scanning an original H04N)

NOTES
1. This subclass covers indicator consoles, i.e. arrangements or circuits for processing control signals to achieve the display, e.g. for the calling up, reception, storage, regeneration, coding, decoding, addressing of control signals.
2. This subclass does not cover the structural details of the indicating devices, such as panels or tubes per se, or assemblies of individual light sources, which are covered by the relevant subclasses, e.g. H01J, H01K, H01L, G02F, G09F, H05B.
3. Contrary to subclass H04N, in which are classified display devices capable of representing continuous brightness value scales, this subclass is limited to devices using only a discrete number of brightness values, e.g. visible/non-visible.
4. The visual effect may be produced by a luminescent screen scanned by an electron beam, directly by controlled light sources, by projection of light, from controlled light sources onto characters, symbols, or elements thereof drawn on a support, or by electric, magnetic, or acoustic control of the parameters of light rays from an independent source.

WARNINGS
1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   - G09G 5/32 covered by G09G 5/42
   - G09G 5/37 covered by G09G 5/39
   - G09G 5/373 covered by G09G 5/39
   - G09G 5/377 covered by G09G 5/39
   - G09G 5/38 covered by G09G 5/42
   - G09G 5/397 covered by G09G 5/395, G09G 5/399

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Control arrangements or circuits, of interest only in connection with cathode-ray tube indicators;
   (General aspects or details, e.g. selection emphasis on particular characters, dashed line or dotted line generation; Preprocessing of data) (cathode-ray oscilloscopes G01R 13/20; [radar display arrangements G01S 7/04; display of digital non-picture data in television systems H04N 7/0255])
   1/002 [Intensity circuits (G09G 1/06 - G09G 1/28 take precedence)]
   1/005 [Power supply circuits]

1/007 [Circuits for displaying split screens]
1/02 Storage circuits (G09G 1/06 - G09G 1/28 take precedence)
1/04 Deflection circuits [Constructional details not otherwise provided for (electron-optical arrangements H01J 29/46, H01J 37/04, H01J 37/302)]
1/06 . . . using single beam tubes (G09G 1/26, G09G 1/28 take precedence), (e.g. three-dimensional or perspective representation, rotation or translation of display pattern, hidden lines, shadows (G09G 1/28 takes precedence; stereoscopic TV-systems, details thereof H04N 13/00); oscilloscopes for three-dimensional representation G01R 13/206; vectorscopes G01R 13/208)

1/07 . . . with combined raster scan and calligraphic display

1/08 . . . the beam directly tracing characters, the information to be displayed controlling the deflection (and the intensity) as a function of time in two spatial co-ordinates, e.g. according to a cartesian co-ordinate system

1/10 . . . the deflection signals being produced by essentially digital means, e.g. incrementally

1/12 . . . the deflection signals being produced by essentially analogue means

1/14 . . . the beam tracing a pattern independent of the information to be displayed, this latter determining the parts of the pattern rendered respectively visible and invisible

1/13 . . . (Circuits for displaying horizontal and vertical lines)

1/16 . . . the pattern of rectangular co-ordinates extending over the whole area of the screen, i.e. television type raster

1/12 . . . (for displaying digital inputs as analog magnitudes, e.g. curves, bar graphs, coordinate axes, singly or in combination with alpha-numeric characters (cathode-ray oscilloscopes for displaying analog inputs, singly or in combination with alpha-numeric characters G01R 13/20; television receiver circuitry for displaying supplementary, e.g. alpha-numeric, information [H04N 5/445])

1/15 . . . (Details of a display terminal using a CRT, the details relating to the control arrangement of the display terminal and to the interfaces thereto (details suitable for both CRT and flat panel G09G 5/003; specific for a flat panel G09G 3/2092))

1/167 . . . (Details of the interface to the display terminal specific for a CRT (details suitable for both CRT and flat panel G09G 5/006; specific for a flat panel G09G 3/2096))

1/18 . . . a small local pattern covering only a single character, and stepping to a position for the following character, e.g. in rectangular or polar co-ordinates, or in the form of a framed star

1/20 . . . using multi-beam tubes (G09G 1/26, G09G 1/28 take precedence)

1/22 . . . using tubes permitting selection of a complete character from a number of characters (tubes therefor H01J 31/16)

1/24 . . . using tubes permitting selection of individual elements forming in combination a character (see provisionally also G09G 1/22)

1/26 . . . using storage tubes (tubes therefor H01J 31/38)

1/28 . . . using colour tubes (tubes therefor H01J 31/20)

1/285 . . . (Interfacing with colour displays, e.g. TV receiver)

3/00 Control arrangements or circuits, of interest only in connection with visual indicators other than cathode-ray tubes (optical scanning systems in general G02B 26/10)

3/001 . . . (using specific devices not provided for in groups G09G 3/02 - G09G 3/36, e.g. using an intermediate record carrier such as a film slide; Projection systems; Display of non-alphanumerical information, solely or in combination with alphanumerical information, e.g. digital display on projected diapositive as background (slide projectors per se G03B 23/00 = 42 HP))

3/002 . . . (to project the image of a two-dimensional display, such as an array of light emitting or modulating elements or a CRT)

3/003 . . . (to produce spatial visual effects)

3/004 . . . (to give the appearance of moving signs)

3/005 . . . (forming an image using a quickly moving array of imaging elements, causing the human eye to perceive an image which has a larger resolution than the array, e.g. an image on a cylinder formed by a rotating line of LEDs parallel to the axis of rotation)

3/005 . . . (Electronic inspection or testing of displays and display drivers, e.g. of LED or LCD displays (testing individual LED's G01R 31/2635; testing lamps G01R 31/44; testing of optical features of LCD displays G02F 1/1399))

3/007 . . . (Use of pixel shift techniques, e.g. by mechanical shift of the physical pixels or by optical shift of the perceived pixels)

3/008 . . . (forming an image on an image carrier by relative movement of a writing unit to the image carrier, e.g. on a photoconductive rotating belt, or on an electronic blackboard)

3/02 . . . by tracing or scanning a light beam on a screen

3/025 . . . (with scanning or deflecting the beams in two directions or dimensions)

3/04 . . . for presentation of a single character by selection from a plurality of characters, or by composing the character by combination of individual elements, e.g. segments (using a combination of such display devices for composing words, rows or the like, in a frame with fixed character positions)

3/045 . . . (Selecting complete characters)

3/06 . . . using controlled light sources

3/08 . . . using incandescent filaments

3/10 . . . using gas tubes

3/12 . . . using electroluminescent elements (using cathode-ray tubes with phosphor screens G09G 1/00)

3/14 . . . Semiconductor devices, e.g. diodes

3/16 . . . by control of light from an independent source

3/18 . . . using liquid crystals

3/19 . . . using electrophochromatic devices

3/20 . . . for presentation of an assembly of a number of characters, e.g. a page, by composing the assembly by combination of individual elements arranged in a matrix (no fixed position being assigned to or needed to be assigned to the individual characters or partial characters)

3/2003 . . . (Display of colours (specific for liquid crystal displays G09G 3/3607))

3/2007 . . . (Display of intermediate tones)

3/2011 . . . (by amplitude modulation)
using controlled light sources

3/29 . . . . using self-shift panels { with sequential transfer of the discharges from an input position to a further display position (tubes therefor H01J 17/49)}

3/291 . . . . controlling the gas discharge to control a cell condition, e.g. by means of specific pulse shapes

3/292 . . . . for reset discharge, priming discharge or erase discharge occurring in a phase other than addressing

3/2922 . . . . {Details of erasing]
3/2925 . . . . {Details of priming]
3/2927 . . . . {Details of initialising]
3/293 . . . . for address discharge

3/2932 . . . . [Addressed by writing selected cells that are in an OFF state]
3/2935 . . . . [Addressed by erasing selected cells that are in an ON state]
3/2937 . . . . [being addressed only once per frame}
3/294 . . . . for lighting or sustain discharge
3/2942 . . . . [with special waveforms to increase luminous efficiency]
3/2944 . . . . [by varying the frequency of sustain pulses or the number of sustain pulses proportionally in each subfield of the whole frame]
3/2946 . . . . [by introducing variations of the frequency of sustain pulses within a frame or non-proportional variations of the number of sustain pulses in each subfield]
3/2948 . . . . [by increasing the total sustaining time with respect to other times in the frame]
3/296 . . . . Driving circuits for producing the waveforms applied to the driving electrodes

3/2965 . . . . [using inductors for energy recovery]
3/297 . . . . using opposed discharge type panels
3/298 . . . . using surface discharge panels
3/2983 . . . . [using non-standard pixel electrode arrangements]
3/2986 . . . . [with more than 3 electrodes involved in the operation]
3/299 . . . . using alternate lighting of surface-type panels

3/30 . . . . using electroluminescent panels
3/32 . . . . semiconductive, e.g. using light-emitting diodes [LED]

3/3208 . . . . organic, e.g. using organic light-emitting diodes [OLED]
3/3216 . . . . using a passive matrix
3/3225 . . . . using an active matrix
3/3233 . . . . with pixel circuitry controlling the current through the light-emitting element
3/3241 . . . . the current through the light-emitting element being set using a data current provided by the data driver, e.g. by using a two-transistor current mirror
the data current flowing through the driving transistor during a setting phase, e.g. by using a switch for connecting the driving transistor to the data driver

with pixel circuitry controlling the voltage across the light-emitting element

Details of drivers for scan electrodes

Details of drivers for data electrodes

in which the data driver supplies a variable data current for setting the current through, or the voltage across, the light-emitting elements

in which the data driver supplies a variable data voltage for setting the current through, or the voltage across, the light-emitting elements

by control of light from an independent source

[Control of illumination source (illumination devices structurally associated with liquid crystal cells G02F 1/1336)]

[Details of control of colour illumination sources]

[using several illumination sources separately controlled corresponding to different display panel areas, e.g. along one dimension such as lines]

the different display panel areas being distributed in two dimensions, e.g. matrix

[using light modulating elements actuated by an electric field and being other than liquid crystal devices and electrochromic devices (using liquid crystal devices G09G 3/36; using electrochromic devices G09G 3/38)]

[based on particles moving in a fluid or in a gas, e.g. electrophoretic devices (electrophoretic devices per se G02F 1/167)]

[with more than two electrodes controlling the modulating element]

[based on rotating particles or microelements]

[based on modulation of the reflection angle, e.g. micromirrors (micromirrors devices per se G02B 26/0833)]

[based on interferometric effect]

[based on light coupled out of a light guide, e.g. due to scattering, by contracting the light guide with external means]

[based on the deformation of a fluid drop, e.g. electrowetting]

[based on light modulating elements actuated by a magnetic field]

[based on light modulating elements actuated by a piezoelectric effect]

using liquid crystals

[with thermally addressed liquid crystals]

[for displaying colours or for displaying grey scales with a specific pixel layout, e.g. using sub-pixels (display of colours in flat matrix panels other than liquid crystal displays G09G 3/2003; grey scales specific for television H04N 3/127)]

[Control of matrices with row and column drivers]

[Control of polarity reversal in general]

[with automatic refresh of the display panel using sense/write circuits]

[using a passive matrix (G09G 3/3674 - G09G 3/3696 take precedence)]

[using active addressing]

[using liquid crystals having memory effects, e.g. ferroelectric liquid crystals]

[with transmission/voltage characteristic comprising multiple loops, e.g. antiferroelectric liquid crystals]

[with intermediate tones displayed by domain size control (domain size control in flat matrix panels other than liquid crystal displays having memory effects G09G 3/207)]

[with use of subpixels]

[with the matrix divided into sections]

[using an active matrix (G09G 3/367 - G09G 3/3696 take precedence)]

[using multistable liquid crystals, e.g. ferroelectric liquid crystals]

[Details of drivers for counter electrodes, e.g. common electrodes for pixel capacitors or supplementary storage capacitors]

[the addressing of the pixel involving the control of two or more scan electrodes or two or more data electrodes, e.g. pixel voltage dependant on signal of two data electrodes]

[using plasma-addressed liquid crystal displays]

[with the matrix divided into sections]

[with a nonlinear element in series with the liquid crystal cell, e.g. a diode, or M.I.M. element]

[Details of drivers for scan electrodes]

[suitable for active matrices only]

[suitable for passive matrices only]

[Details of drivers for data electrodes]

[suitable for active matrices only]

[suitable for passive matrices only]

[Generation of voltages supplied to electrode drivers]

[using electrophoretic devices]

Control arrangements or circuits for visual indicators common to cathode-ray tube indicators and other visual indicators (image data processing or generation, in general G06T)

[Arbitration of resources in a display system, e.g. control of access to frame buffer by video controller and/or main processor]

[Details of a display terminal, the details relating to the control arrangement of the display terminal and/or main processor]

[Adapting incoming signals to the display format of the display terminal]
G09G

5/006 . . . (Details of the interface to the display terminal (specific for a display terminal using a CRT G09G 1/167; using a flat panel G09G 3/2006; circuits for interfacing with colour displays G09G 5/04))

5/008 . . . (Clock recovery)

5/02 . . . characterised by the way in which colour is displayed (details of colour display specific for CRTs G09G 1/28; specific for flat matrix panels other than liquid crystal displays G09G 3/2003; specific for liquid crystal displays G09G 3/3607)

5/022 . . . (using memory planes)

5/024 . . . (using colour registers, e.g. to control background, foreground, surface filling (G09G 5/06 takes precedence))

5/026 . . . (Control of mixing and/or overlay of colours in general (G09G 5/022 and G09G 5/024 take precedence))

5/028 . . . (Circuits for converting colour display signals into monochrome display signals)

5/04 . . . using circuits for interfacing with colour displays

5/06 . . . using colour palettes, e.g. look-up tables

5/08 . . . Cursor circuits

5/10 . . . Intensity circuits

5/12 . . . Synchronisation between the display unit and other units, e.g. other display units, video-disc players

5/14 . . . Display of multiple viewpoints

5/16 . . . Display of right-to-left language

5/18 . . . Timing circuits for raster scan displays (specially adapted for television H04N ( ; synchronisation between the display unit and other display units, videodisc player G09G 5/12))

5/20 . . . Function-generator circuits, e.g. circle generators [line or curve smoothing circuits]

5/22 . . . characterised by the display of characters or indicia using display control signals derived from coded signals representing the characters or indicia, e.g. with a character-code memory

5/222 . . . (Control of the character-code memory)

5/225 . . . (comprising a loadable character generator (character generators per se G09G 5/24))

5/227 . . . (Resolution modifying circuits, e.g. variable screen formats, resolution change between memory contents and display screen)

5/24 . . . (Circuits for displaying proportional spaced characters or for kerning)

5/243 . . . (of ideographic or arabic-like characters)

5/26 . . . for modifying the character dimensions, e.g. double width, double height

5/28 . . . for enhancement of character form, e.g. smoothing

5/30 . . . Control of display attribute

5/32 . . . with means for controlling the display position (see provisionally G09G 5/42))

5/34 . . . for rolling or scrolling

5/343 . . . (for systems having a character code-mapped display memory)

5/346 . . . (for systems having a bit-mapped display memory)

5/36 . . . characterised by the display of a graphic pattern, e.g. using an all-points-addressable [APA] memory

5/363 . . . (Graphics controllers)

5/366 . . . (with conversion of CRT control signals to flat panel control signals, e.g. adapting the palette memory)

5/37 . . . Details of the operation on graphic patterns (G09G 5/38 takes precedence)

5/373 . . . for modifying the size of the graphic pattern

5/377 . . . for mixing or overlaying two or more graphic patterns (G09G 5/02, G09G 5/397 take precedence)

5/38 . . . with means for controlling the display position

5/39 . . . Control of the bit-mapped memory

5/391 . . . Resolution modifying circuits, e.g. variable screen formats

5/393 . . . Arrangements for updating the contents of the bit-mapped memory

5/395 . . . Arrangements specially adapted for transferring the contents of the bit-mapped memory to the screen (G09G 5/399 takes precedence)

5/397 . . . Arrangements specially adapted for transferring the contents of two or more bit-mapped memories to the screen simultaneously, e.g. for mixing or overlay (G09G 5/02 takes precedence)

**WARNING**

Not complete. See also G09G 5/395, G09G 5/399

5/399 . . . using two or more bit-mapped memories, the operations of which are switched in time, e.g. ping-pong buffers

5/40 . . . characterised by the way in which both a pattern determined by character code and another pattern are displayed simultaneously, or either pattern is displayed selectively, e.g. with character code memory and APA, i.e. all-points-addressable, memory

5/42 . . . characterised by the display of patterns using a display memory without fixed position correspondence between the display memory contents and the display position on the screen

2230/00 Details of flat display driving waveforms

2290/00 Indexing scheme relating to details of a display terminal

2300/00 Aspects of the constitution of display devices (not used, see subgroups)

2300/00 . Composition of display devices

2300/02 . . . Display panel composed of stacked panels

2300/023 . . . Video wall, i.e. juxtaposition of a plurality of screens to create a display screen of bigger dimensions

2300/04 . . . Structural and physical details of display devices

2300/0404 . . . Matrix technologies

2300/0408 . . . Integration of the drivers onto the display substrate

2300/0413 . . . Details of dummy pixels or dummy lines in flat panels

2300/0417 . . . Special arrangements specific to the use of low carrier mobility technology

2300/0421 . . . Structural details of the set of electrodes

2300/0426 . . . Layout of electrodes and connections
or modulating elements

in the pixels together with light emitting
elements, inclusive of non-linear two terminal
OLED

Passive matrix structure, i.e. with direct application
to distortions or compensation signals, e.g. for
modifying TFT threshold voltage in column
driver

Flat panel display in which a field is applied
parallel to the display plane

with several sub-pixels for the same colour
in a pixel, not specifically used to display
gradations (G09G 3/364 takes precedence)

for multi-domain technique to improve the
viewing angle in a liquid crystal display,
such as multi-vertical alignment [MVA]

Details of colour pixel setup, e.g. pixel
composed of a red, a blue and two green
components

with a reflective area and a transmissive area
combined in one pixel, such as in transfectance
pixels

with an emissive area and a light-modulating
area combined in one pixel

Improved aperture ratio, e.g. by size reduction
of the pixel circuit, e.g. for improving the pixel
density or the maximum displayable luminance
or brightness

Details of the physics of pixel operation

Use of light emitting or modulating elements
having two or more stable states when no
power is applied

related to liquid crystal pixels

Use of memory effects in nematic liquid
crystals

Cholesteric liquid crystals, including
chiral-nematic liquid crystals, with
transitions between focal conic, planar,
and homeotropic states

Use of a bi-refringent liquid crystal, optically
controlled bi-refringerence [OCB] with bend
and splay states, or electrically controlled bi-
refringerence [ECB] for controlling the color

Use of transitions between isotropic and
anisotropic phases in liquid crystals, by
voltage controlled deformation of the liquid
crystal molecules, as opposed to merely
changing the orientation of the molecules
as in, e.g. twisted-nematic [TN], vertical-
aligned [VA], cholesteric, in-plane, or bi-
refringent liquid crystals

Passive matrix structure, i.e. with direct application
of both column and row voltages to the light
emitting or modulating elements, other than LCD or
OLED

Active matrix structure, i.e. with use of active
elements, inclusive of non-linear two terminal
elements, in the pixels together with light emitting
or modulating elements

Sub-multiplexed active matrix panel, i.e. wherein
one active driving circuit is used at pixel level for
multiple image producing elements

Several active elements per pixel in active matrix
panels

used for selection purposes, e.g. logical AND
for partial update

used for counteracting undesired variations,
e.g. feedback or autozeroing

used to establish symmetry in driving, e.g. with
polarity inversion

forming a digital to analog [D/A] conversion
circuit

forming a linear amplifier or follower

with level shifting

forming a memory circuit, e.g. a dynamic
memory with one capacitor

being a dynamic memory without any
storage capacitor, i.e. with use of parasitic
capacitances as storage elements

being a dynamic memory with more than one
capacitor

Static memory circuit, e.g. flip-flop

with additional control of the display period
without amending the charge stored in a
pixel memory, e.g. by means of additional
select electrodes

by means of changes in the pixel supply
voltage

with level shifting

Supplementary capacities in pixels having special
driving circuits and electrodes instead of being
connected to common electrode or ground; Use
of additional capacitively coupled compensation
electrodes

using a non-linear two-terminal element

Pixel comprising a non-linear two-terminal
element alone in series with each display pixel
element

Pixel comprising a non-linear two-terminal
element in series with each display pixel
element, the series comprising also other
elements

having more than one selection line for a two-
terminal active matrix LCD, e.g. Lechner and
D2R circuits

Command of the display device

Addressing, scanning or driving the display screen
or processing steps related thereto

Addressing of scan or signal lines

Simultaneous scanning of several lines in flat
panels

using active addressing

Double addressing, i.e. scanning two or more
elements, e.g. lines 2 and 3; 4 and 5, at a time
in a first field, followed by scanning two or
more lines in another combination, e.g. lines
1 and 2; 3 and 4, in a second field

controlling the sequence of the scanning lines
with respect to the patterns to be displayed, e.g.
to save power

Interleaved control phases for different scan
lines in the same sub-field, e.g. initialization,
addressing and sustaining in plasma displays
that are not simultaneous for all scan lines

with collection of electrodes in groups for n-
dimensional addressing

with use of split matrices (G09G 3/3644 and
G09G 3/3666 take precedence)

Details of interfacing
related to multiple interlacing, i.e. involving more fields than just one odd field and one even field

De-interlacing

Special driving of display border areas

Field-sequential colour display

Switching ON and OFF the backlight within one frame

Scrolling of light from the illumination source over the display in combination with the scanning of the display screen

Details of the generation of driving signals

Clearing or presetting the whole screen independently of waveforms, e.g. on power-on (G09G 2310/063 takes precedence)

Precharge or discharge of column electrodes before or after applying exact column voltages

Precharge or discharge of pixel before applying new pixel voltage

Control of polarity reversal in general, other than for liquid crystal displays

with the purpose of reversing the voltage across a light emitting or modulating element within a pixel

with use of an analog or digital ramp generator in the column driver or in the pixel circuit

The addressing of the pixel, in a display other than an active matrix LCD, involving the control of two or more scan electrodes or two or more data electrodes, e.g. pixel voltage dependent on signals of two data electrodes

Details of driving circuits

details of drivers for scan electrodes, other than drivers for liquid crystal, plasma or OLED displays

details of drivers for data electrodes, the drivers handling digital grey scale data, e.g. use of D/A converters

details of drivers for data electrodes, the drivers communicating data to the pixels by means of a current

details of drivers for data electrodes, other than drivers for liquid crystal, plasma or OLED displays, not related to handling digital grey scale data or to communication of data to the pixels by means of a current

details of driving circuits arranged to drive both scan and data electrodes

Arrangement of scan or data electrode driver circuits at the periphery of a panel not inherent to a split matrix structure

Arrangement of drivers for different directions of scanning

details of a shift registers arranged for use in a driving circuit

details of voltage level shifters arranged for use in a driving circuit

details of output amplifiers or buffers arranged for use in a driving circuit

details of sampling or holding circuits arranged for use in a driver for data electrodes

Special arrangements with multiplexing or demultiplexing of display data in the drivers for data electrodes, in a pre-processing circuitry delivering display data to said drivers or in the matrix panel, e.g. multiplexing plural data signals to one D/A converter or demultiplexing the D/A converter output to multiple columns

Partial updating of the display screen

details of flat display driving waveforms

for resetting or blanking

Waveforms for resetting a plurality of scan lines at a time

Waveforms for resetting the whole screen at once

Waveforms comprising zero voltage phase or pause

Waveforms comprising a gently increasing or decreasing portion, e.g. ramp

Special waveforms for scanning, where no circuit details of the gate driver are given

Application of pulses of alternating polarity prior to the drive pulse in electrophoretic displays

Details of timing specific for flat panels, other than clock recovery

Control of display operating conditions

Improving the quality of display appearance

Compensation of DC component across the pixels in flat panels

Crosstalk reduction, i.e. to reduce direct or indirect influences of signals directed to a certain pixel of the displayed image on other pixels of said image, inclusive of influences affecting pixels in different frames or fields or sub-images which constitute a same image, e.g. left and right images of a stereoscopic display

with crosstalk due to leakage current of pixel switch in active matrix panels

Reducing feedthrough effects in active matrix panels, i.e. voltage changes on the scan electrode influencing the pixel voltage due to capacitive coupling

Compensation for problems related to R-C delay and attenuation in electrodes of matrix panels, e.g. in gate electrodes or on-substrate video signal electrodes

Increasing the driving margin in plasma displays

Improving the luminance or brightness uniformity across the screen

Improving the black level

Compensation of deficiencies in the appearance of colours

Flicker reduction other than flicker reduction circuits used for single beam cathode-ray tubes

Improving the response speed

Reduction of after-image effects

in the context of movement of objects on the screen or movement of the observer relative to the screen

Reduction of sub-frame artefacts

Adjustment of the gradation levels within the range of the gradation scale, e.g. by redistribution or clipping
Aspects of the architecture of display systems

Aspects of display data security

Aspects of display data processing

- Reducing the instantaneous peaks of current
- Controlling or limiting the speed of brightness change of orientation of the displayed image, e.g.
- Resolution change, inclusive of the use of different resolutions for different screen areas
- Vertical resolution change
- Gradation resolution change
- Change or adaptation of the frame rate of the video stream
- Zooming at least part of an image, i.e. enlarging it or shrinking it
- Handling or displaying different aspect ratios, or changing the aspect ratio
- Improvement of perceived resolution by subpixel rendering
- Positioning
- Vertical positioning
- Horizontal positioning
- Centering horizontally or vertically
- Change of orientation of the displayed image, e.g. upside-down, mirrored
- Colour space transformation
- Monochrome to colour transformation
- Mixing of images, i.e. displayed pixel being the result of an operation, e.g. adding, on the corresponding input pixels
- Overlay of images, i.e. displayed pixel being the result of switching between the corresponding input pixels
- wherein one of the images is motion video
- Solving problems related to the presentation of information to be displayed
- related to small screens
- Determination of a pixel data signal depending on the signal applied in the previous frame
- Handling of images in compressed format, e.g. JPEG, MPEG
- Changes in size, position or resolution of an image
- Resolution change, inclusive of the use of different resolutions for different screen areas
- Vertical resolution change
- Gradation resolution change
- Change or adaptation of the frame rate of the video stream
- Handling or displaying different aspect ratios, or changing the aspect ratio
- Improvement of perceived resolution by subpixel rendering
- Positioning
- Vertical positioning
- Horizontal positioning
- Centering horizontally or vertically
- Change of orientation of the displayed image, e.g. upside-down, mirrored
- Colour space transformation
- Monochrome to colour transformation
- Mixing of images, i.e. displayed pixel being the result of an operation, e.g. adding, on the corresponding input pixels
- Overlay of images, i.e. displayed pixel being the result of switching between the corresponding input pixels
- wherein one of the images is motion video
- Solving problems related to the presentation of information to be displayed
- related to small screens
- Determination of a pixel data signal depending on the signal applied in the previous frame
- Power management, e.g. power saving
- in absence of operation, e.g. no data being entered during a predetermined time
- using energy recovery or conservation
- with inductors, other than in the electrode driving circuitry of plasma displays
- Reduction of instantaneous peaks of current
- Arrangements or methods related to booting a display

Aspects of power supply; Aspects of display protection and defect management

- Arrangements or methods related to powering off a display
- Generation of voltages supplied to electrode drivers in a matrix display other than LCD
- Display protection
- Protection against panel overheating
- Handling electromagnetic interferences [EMI], covering emitted as well as received electromagnetic radiation
- Fault-tolerant or redundant circuits, or circuits in which repair of defects is prepared
- Dealing with defective pixels
- Test circuits or failure detection circuits included in a display system, as permanent part thereof

Arrangements or methods related to small screens

Handling of images in compressed format, e.g. JPEG, MPEG

Changes in size, position or resolution of an image

Resolution change, inclusive of the use of different resolutions for different screen areas

Vertical resolution change

Gradation resolution change

Change or adaptation of the frame rate of the video stream

Handling or displaying different aspect ratios, or changing the aspect ratio

Improvement of perceived resolution by subpixel rendering

Positioning

Vertical positioning

Horizontal positioning

Centering horizontally or vertically

Change of orientation of the displayed image, e.g. upside-down, mirrored

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wherein one of the images is motion video

Solving problems related to the presentation of information to be displayed

related to small screens

Determination of a pixel data signal depending on the signal applied in the previous frame

Solving problems of bandwidth in display systems

Parallel handling of streams of display data

Aspects of interface with display user

Detection of the display position w.r.t. other display screens

Arrangements for display data security

Aspects of the architecture of display systems
Graphics controller able to handle multiple formats, e.g. input or output formats

Display device controller operating with a plurality of display units

Use of more than one graphics processor to process data before displaying to one or more screens

Power processing, i.e. workload management for processors involved in display operations, such as CPUs or GPUs

Display system comprising arrangements, such as a coprocessor, specific for motion video images

Frame memory handling

Using a cache memory

Using interleaving

Using unified memory architecture [UMA]

The frame memory having additional data ports, not inclusive of standard details of the output serial port of a VRAM

Updating a frame memory using a transfer of data from a source area to a destination area

Frame memory using a Synchronous Dynamic RAM [SDRAM]

Detecting light within display terminals, e.g. using a single or a plurality of photosensors

The light conveying information used for selecting or modulating the light emitting or modulating element

The light being detected by light detection means within each pixel

The light being ambient light

The light originating from the display screen

The originated light output being determined for each pixel

The light being detected by light detection means within each pixel

Calculation or use of calculated indices related to luminance levels in display data

Use of a frame buffer in a display terminal, inclusive of the display panel

Use of DVI or HDMI protocol in interfaces along the display data pipeline

Use of wireless transmission of display information

Use of optical transmission of display information

Details of the management of multiple sources of image data

Detection of presence or absence of input display information or of connection or disconnection of a corresponding information source

Keyboard-Video-Mouse [KVM] switch

Applications of flexible displays

Electronic labels

Remotely controlled electronic signs other than labels

Biomedical applications

Automotive applications

Avionics applications

Electronic books and readers

Digital picture frames

Networking aspects

Centralised management of display operation, e.g. in a server instead of locally

LAN communication management

Arrangements and methods specific for the display of internet documents

Exchange of auxiliary data, i.e. other than image data, between monitor and graphics controller

for monitor identification

using multiple communication channels, e.g. parallel and serial

using display data channel standard [DDC] communication

Consumer Electronics Control, i.e. control of another device by a display or vice versa

Details of image data interface between the display device controller and the data line driver circuit

Use of a protocol of communication by packets in interfaces along the display data pipeline

Use of DVI or HDMI protocol in interfaces along the display data pipeline

Aspects of data communication

Networking aspects

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Specific applications

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