LC717 series

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CMOS LSI

Capacitance-Digital-Converter LSI for Electrostatic Capacitive Touch Sensors

Line of Electric Force Viewer User's Manual

Products

LC717A00AR (VCT28)
LC717A00AJ (SSOP30)
LC717A10AR (VCT28)
LC717A10AJ (SSOP30)

Semiconductor Components Industries, LLC, 2013

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Line of Electric Force Viewer User's Manual

1. Features of Software

*It is possible to visualize the "Line of Electric Force" generated from the sensor pattern.
*It is possible to investigate sensitivity (not accurate) and the rate of capacitance change between Cin and Cdrv from a motion of "Line of Electric Force".

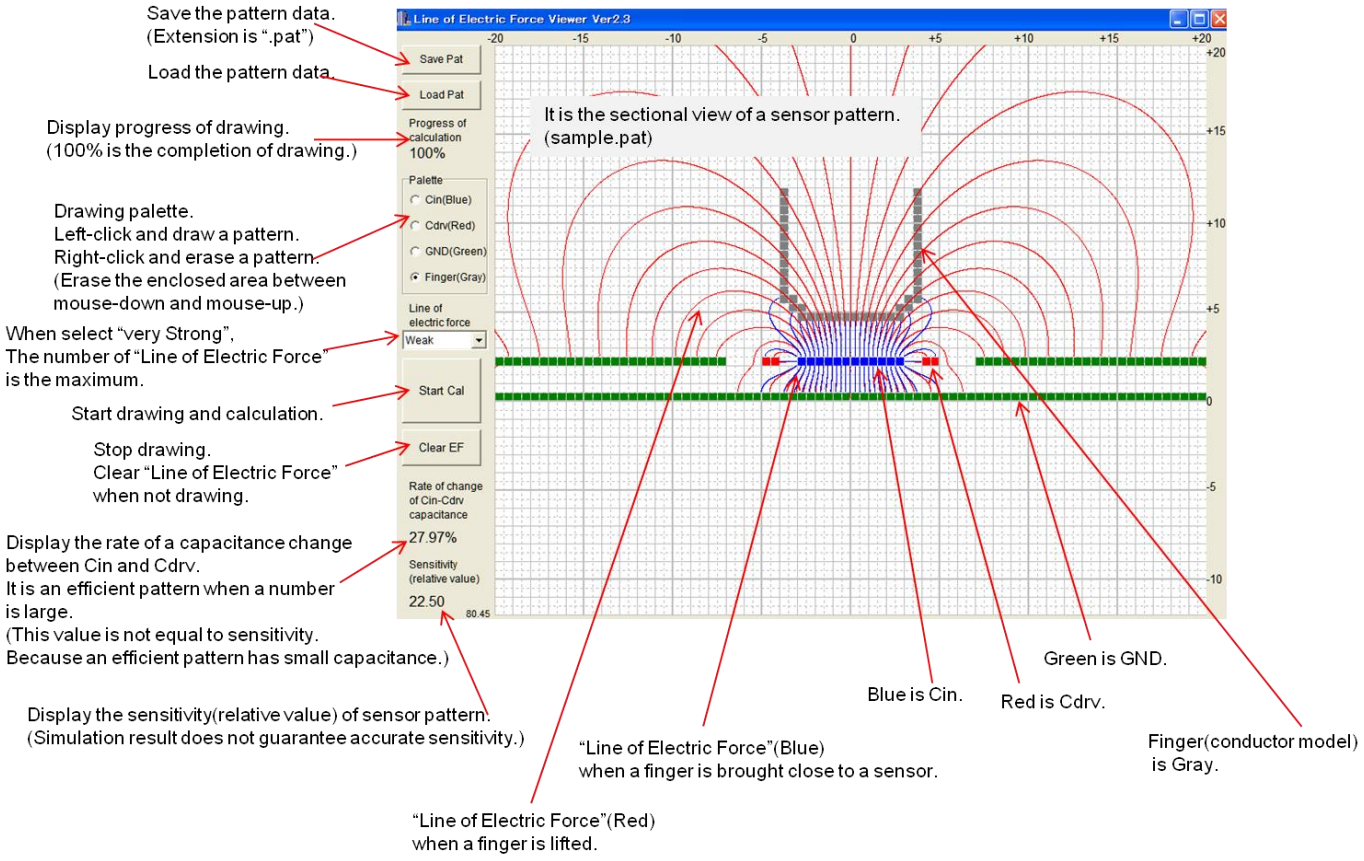
2. Error factors of Software

*3D simulation is not available.
*Permittivity is always constant.
*Computational errors by using meshes.
*Ignore characteristics of CV Amplifer connected to Cin.
*Ignore Cref capacitance.
Therefore, simulation result using this software does not guarantee accurate sensitivity.

3. Operating environment

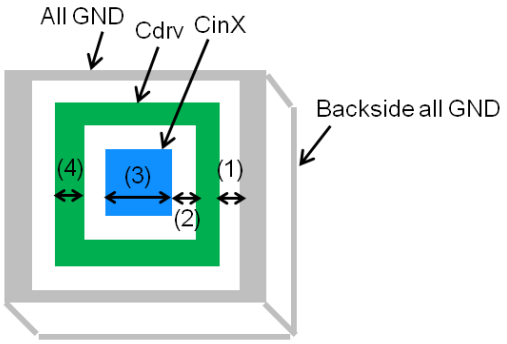
*Windows OS

4. Simple Operation Manual



5. Tutorial

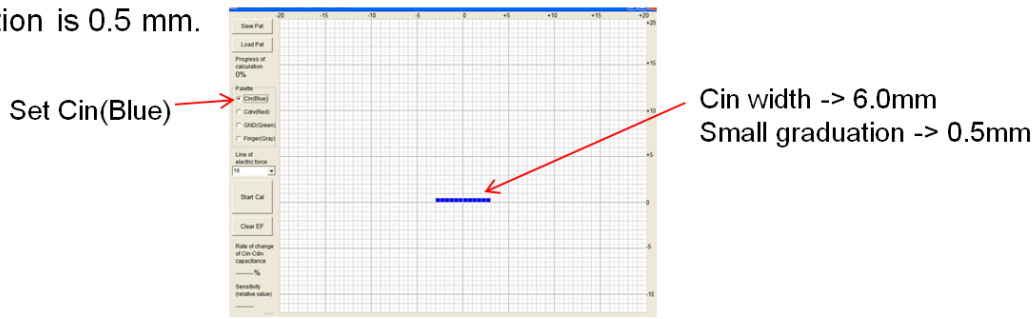
Investigate the detection sensitivity of the following patterns.



(1). Distance between Cdrv and GND -> 2.0mm
(2). Distance between Cdrv and Cin -> 1.0mm
(3). Cin width -> 6.0mm
(4). Cdrv width -> 2.0mm
(5). Backside is all GND.

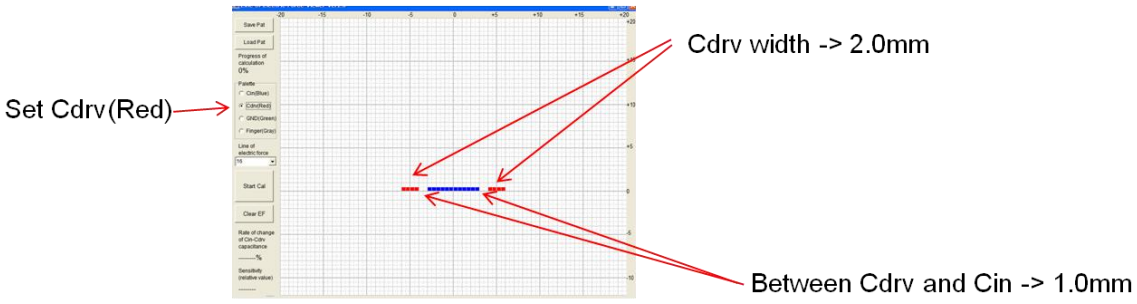
1. Run the EfViewerVxx.exe and draw the pattern at the canvas on software.
2. Draw Cin.

Set the palette as Cin(Blue) and left-click and draw on canvas. If you hold down left-button and move the mouse, you can draw the line. Cin becomes the following figure when small graduation is 0.5 mm.



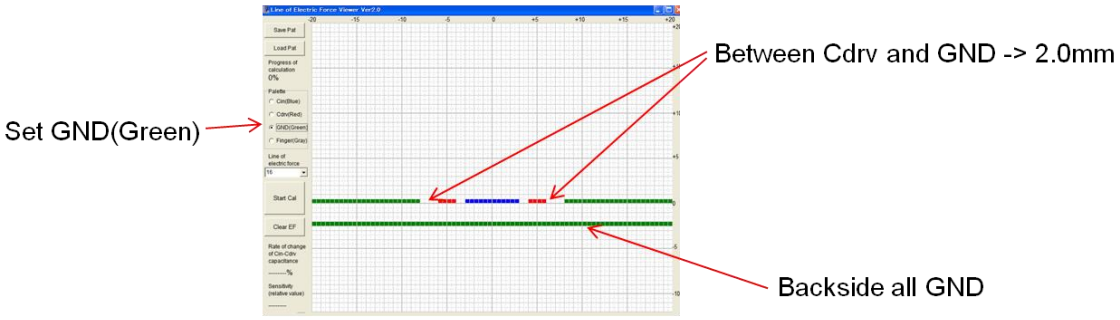
3. Draw Cdrv.

Set the palette as Cdrv(Red) and draw. Cdrv becomes the following figure.



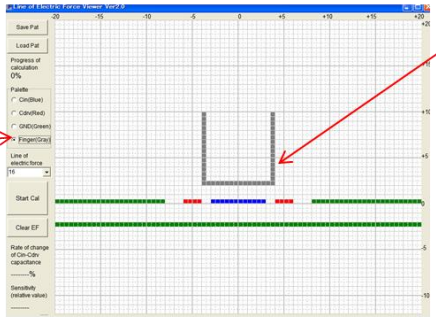
4. Draw GND.

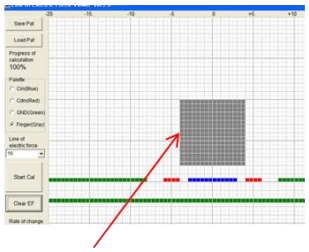
Set the palette as GND(Green) and draw. GND becomes the following figure.



5. Draw Finger(conductor model).

Set the palette as Finger(Gray) and draw. Finger becomes the following figure.

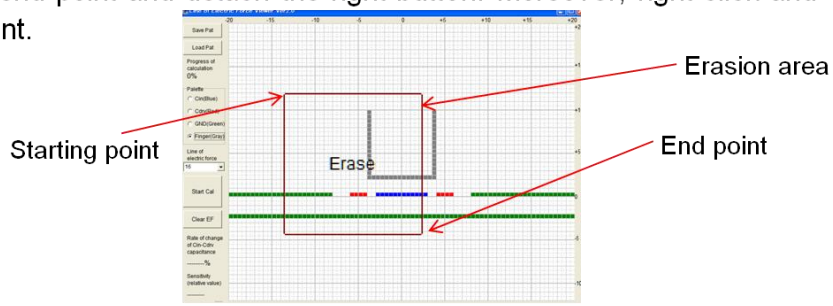




A fill pattern(Cin/Cdrv/GND/Finger) is prohibition.
Because the inside of a conductor has no electric charge.

*How to erase the mistaken pattern.

Push the right-button and choose the starting point to erase. Next, hold down right-button and move the mouse to a end point and detach the right-button. Moreover, right-click and can erase the only one point.



6. Start drawing and calculation by pushing "Start Cal" button.

"Line of Electric Force"(Red)
when a finger is lifted.

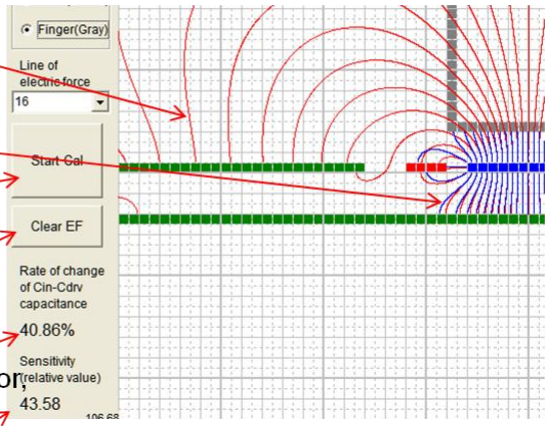
"Line of Electric Force"(Blue)
when a finger is brought close to a sensor.

"Start Cal" button

Stop drawing.
Clear "Line of Electric Force"
when not drawing.

When the finger was brought close to the sensor,
Cin-Cdrv capacitance changed to 40.86%.

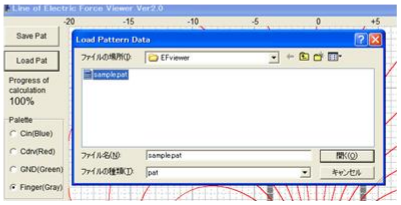
Detection sensitivity is 43.58 (relative value).
It is highly sensitive when the value is large.



7. Save/Load the pattern data.

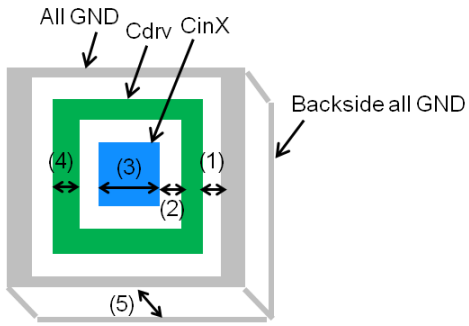
• Push the "Save pat" button to save the pattern data. (Extension is ".pat")

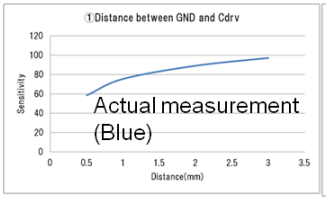
• Push the "Load pat" button to load the pattern data. and choose the file of *.pat.

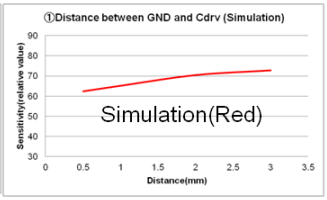


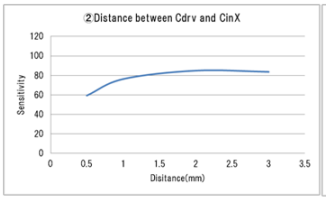
These graphs compare about relation between the pattern and sensitivity.

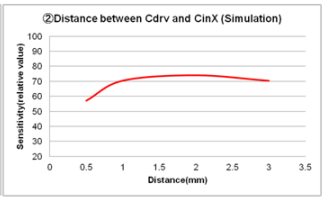
* The reference parameters are used except for varying parameters.
  Reference parameters: (False finger : φ8.0mm)
  (1)Distance between Cdrv and GND: 2mm
  (2)Distance between Cdrv and CinX: 1mm (3)CinX width: 8mm
  (4)Cdrv width: 1mm (5)Vertical distance between CinX & all GND: without all

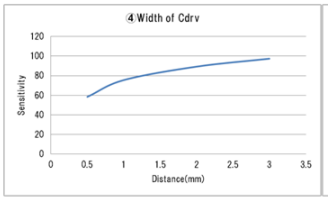


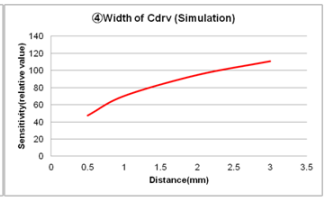


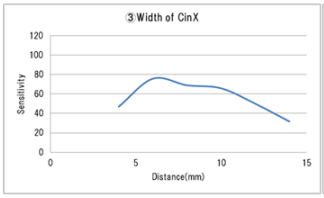


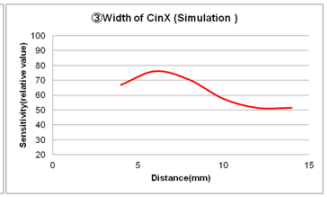


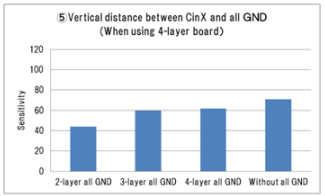


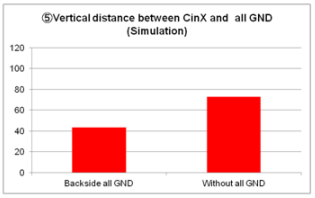












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