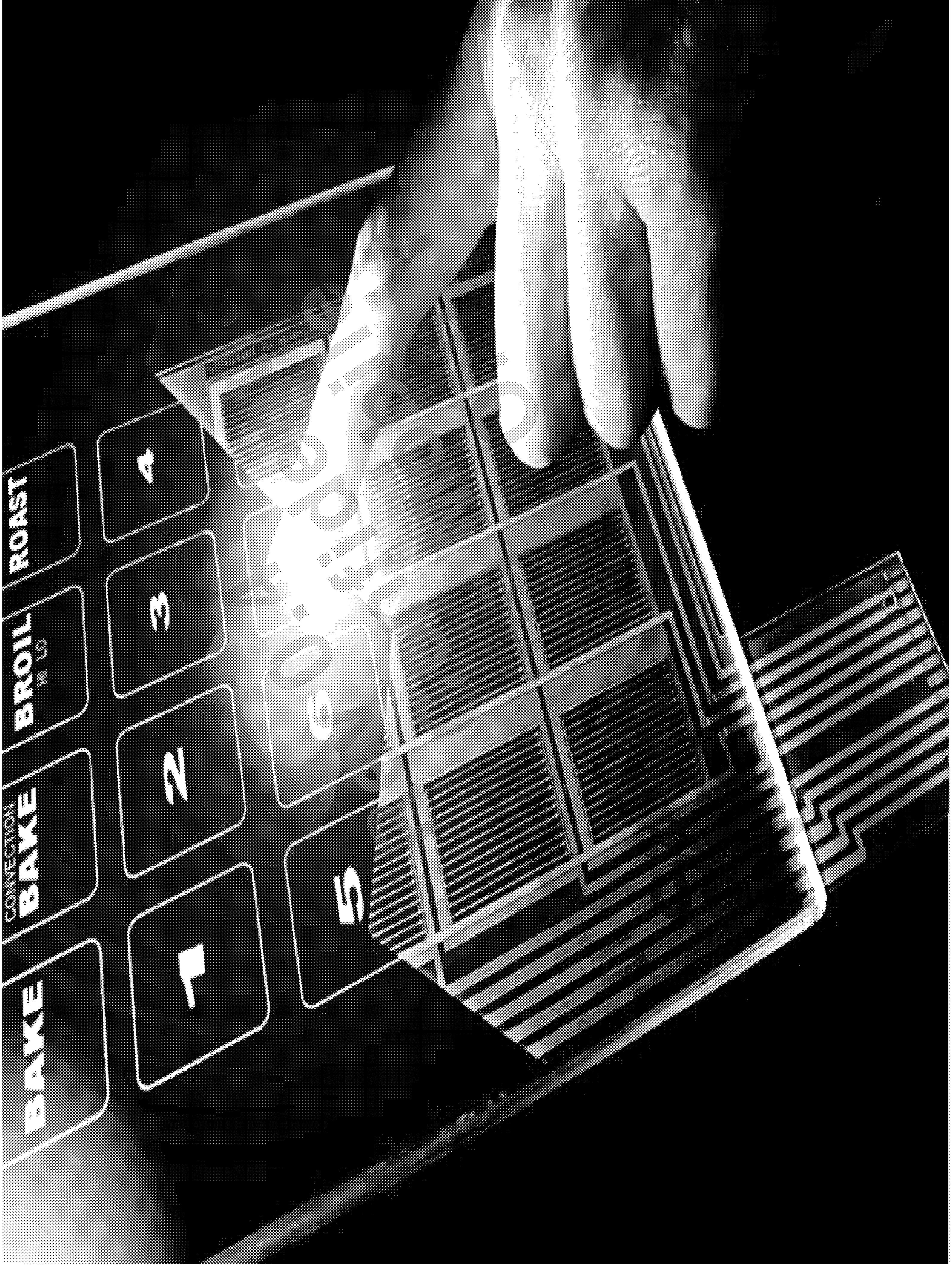
Exhibit M
(Submitted Under Seal)

ATMEL QUANTUM

QMatrix CapSense Technology
of Touch Screen Panel
Rev 0.4
Samsung Mobile Communication Div.


ROAST
BROIL
CONNECTION
BAKE
BAKE
4
3
2
1
5

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- QMatrix
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  - Excellent Immunity
  - Both Glass and PET
  - Various ITO supplier
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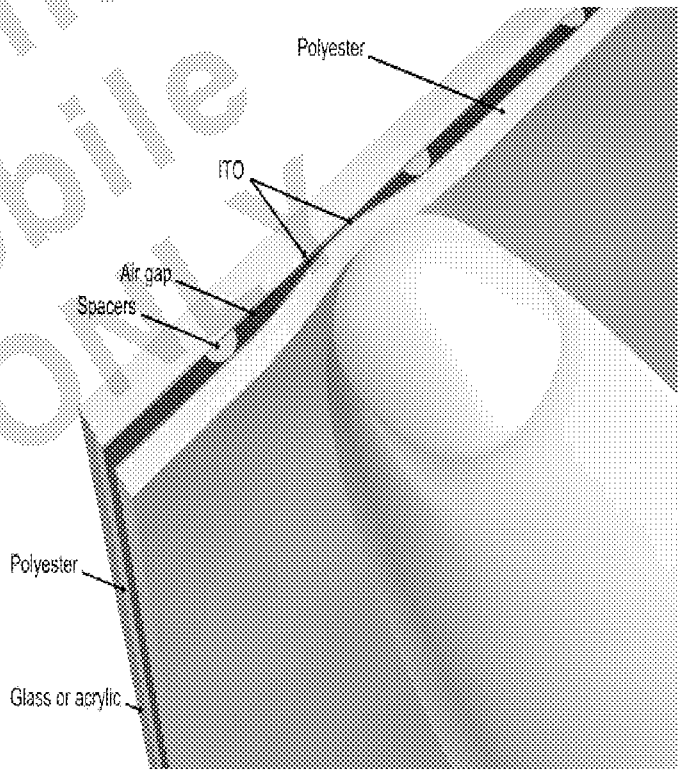
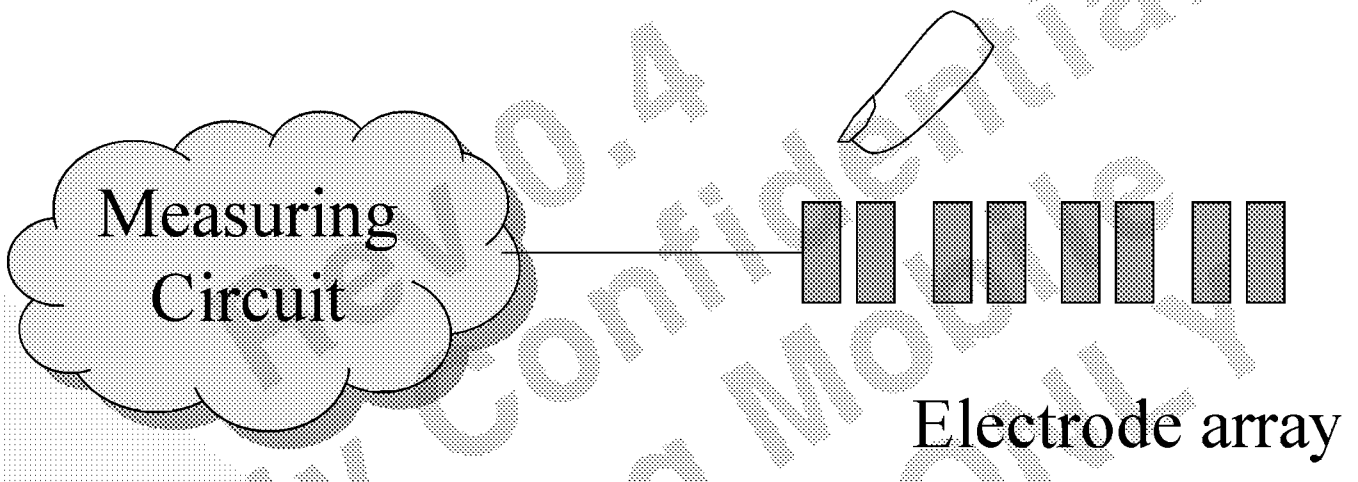
  - Narrow edge
  - Powerful Core

Resistive Touchscreens

- Two layer ITO with air gap & spacers
- Advantages
  - Proven and cost attractive technology
  - Used in high volumes
- Disadvantages
  - No multi finger detection possible
  - Limited industrial design options
  - Mechanically weak – moving parts - field failures
  - Relatively complicated & thick stack
  - Front surface implementation - easily damaged
  - User calibration required
  - Poor optical properties

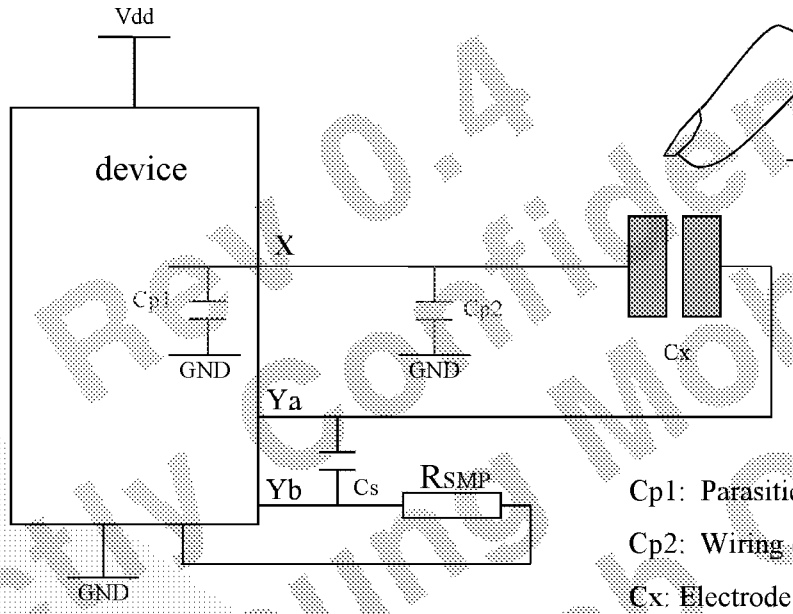


QMatrix: Goals



- To get more sensors (keys) per chip than the other solutions
- To detect finger presence near electrode
- Electrode to be behind a dielectric panel so no direct galvanic connection to measuring circuit

QMatrix: Equivalent Circuit



Cp1: Parasitic IO pin capacitance to GND (1-2pF ?)

Cp2: Wiring capacitance to GND (few pF)

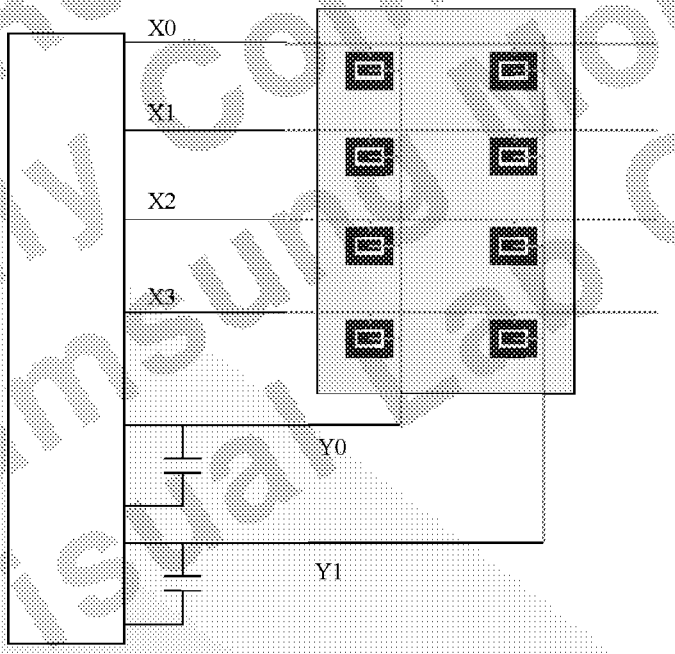
Cx: Electrode self coupling capacitance (2-10pF ?)

Ct: Touch capacitance to earth (few pF)

- Cs – Sampling capacitor
- Cx – Self coupling capacitance of electrode, Cx >> Cp2, Cp1
- X-Line – The sending line used for charge transfer. Charge Emitter to Y line
- Y-Line – The receiver line used for charge transfer. Charge receiver from X line

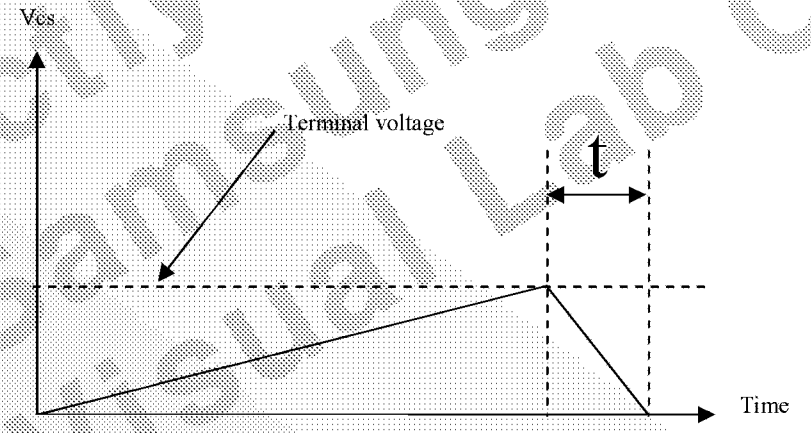
QMatrix: Simple matrix example

- The diagram below shows an example matrix of 8 nodes (sensors)
- Many other configurations are possible
- [4-6 X lines and 4 Y lines] are good for 3-4 inch TSP



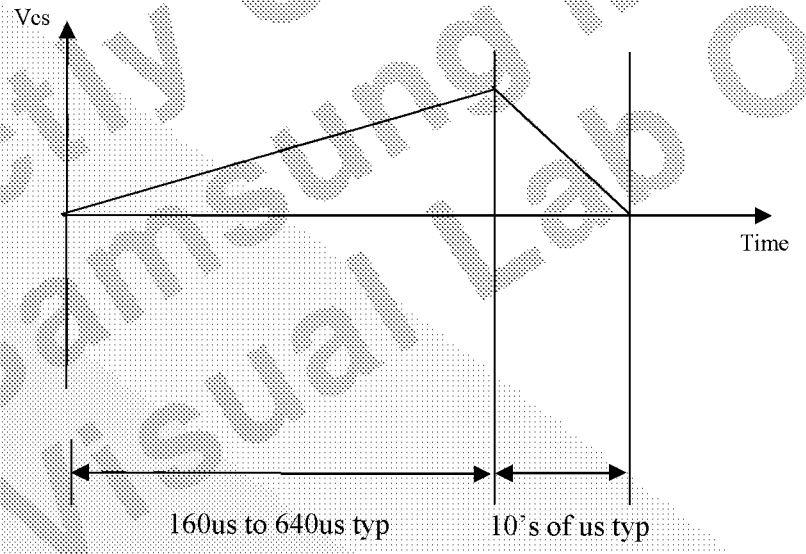
QMatrix: Typical Waveforms:

- Typical voltage across Vcs increases like this
- The discharge time "t" is measured with the counter and comparator
- The counter value is our measurement

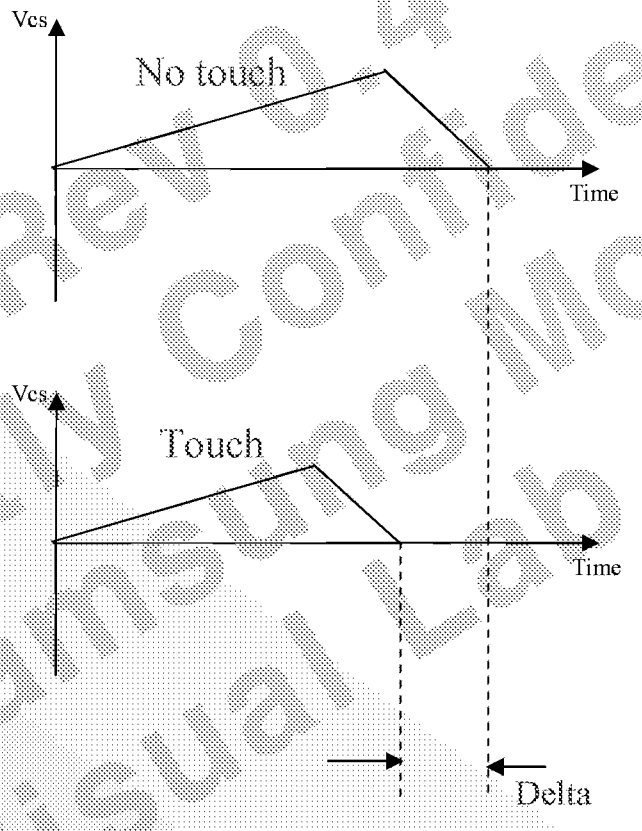


QMatrix: Charge Transfer Waveform Detail:

- Typical burst timing is between 160 to 640µs
- Typical scan timing depends on burst timing and Sleep timing



QMatrix: What Happens During Touch ?:

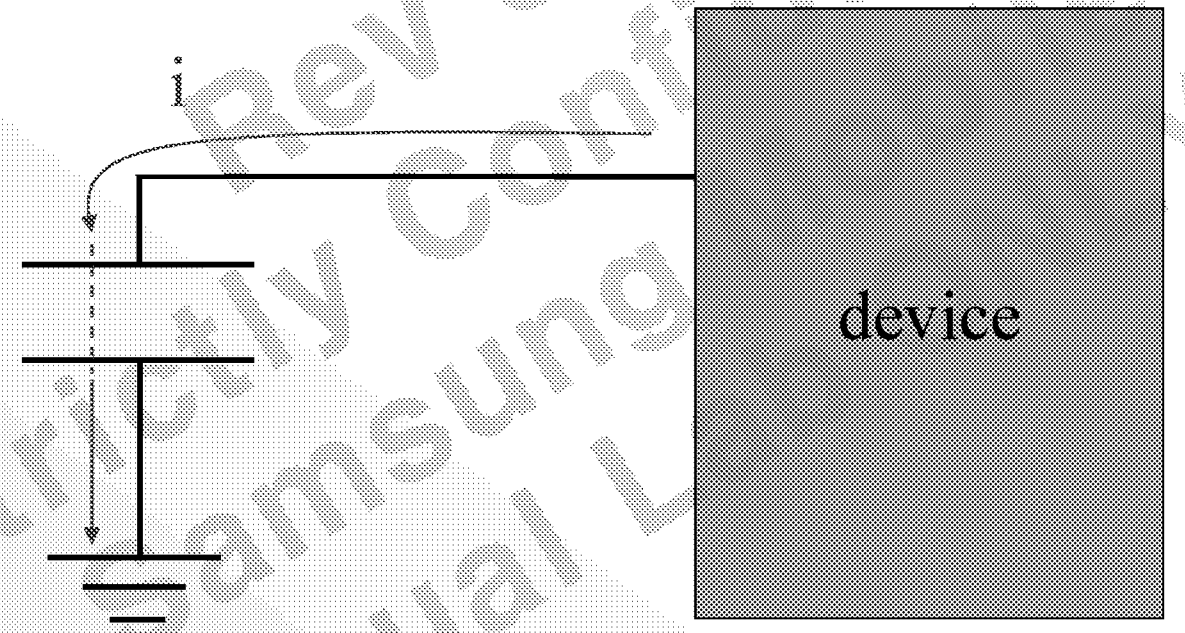


Sensitivity : Increasing Sensitivity

- To increase sensitivity, increase **Rsmp**
- Higher Rsmp resistance makes discharge slope shallower
  - Cs Discharge takes longer
  - giving higher numerical resolution
- Increase the burst length to give a higher terminal voltage
  - This gives a better Signal to Noise Ratio
  - Increased discharge time gives higher numerical resolution
  - Increased discharge time make slower scan time

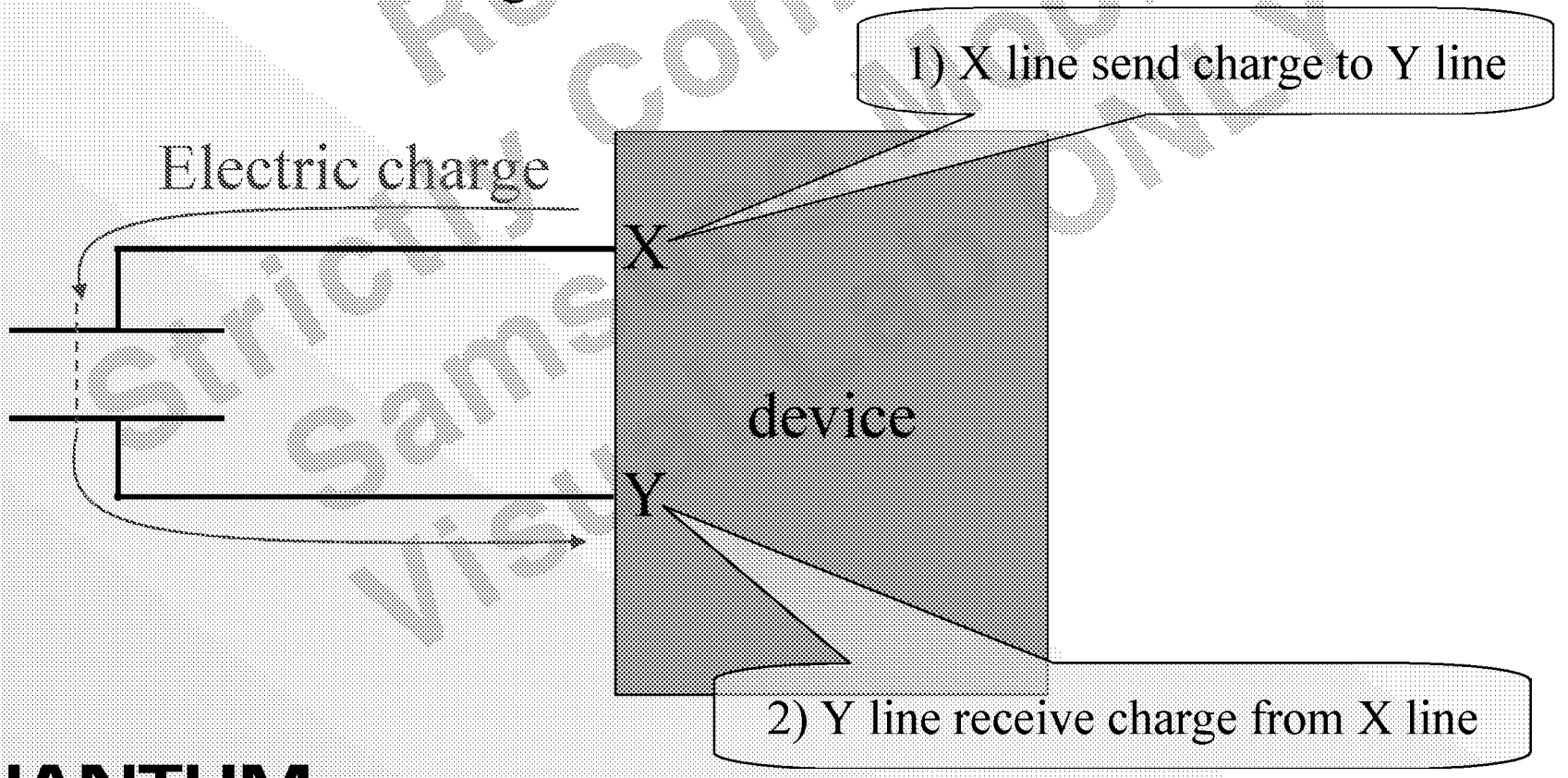
Mutual-Capacitance versus Self-Capacitance

– Current go to GND in self-capacitance

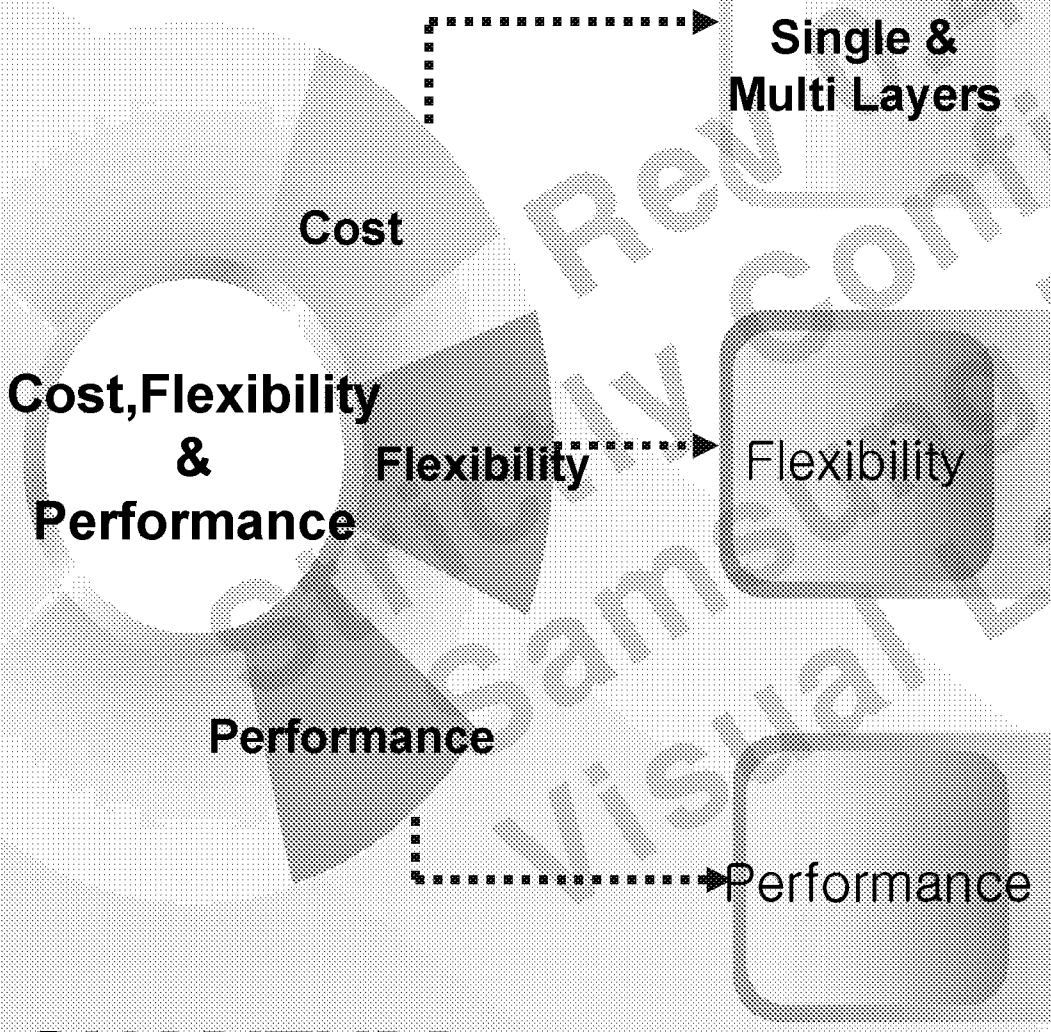


Mutual-Capacitance versus Self-Capacitance

- Mutual-Capacitance: electric charge return to device
  - X line is charge emitter
  - Y line is charge receiver
  - X line send charge and Y line receive it.



Why ATMEL QUANTUM?



- Low & General Full Touch: Single Layer Solution
- High Resolution: 2 Layers

Single & Multi Layers

- SW Solution
- Provide Object Code (Key)
- Multiple ITO company Source
- Advanced ITO Film tester

Flexibility

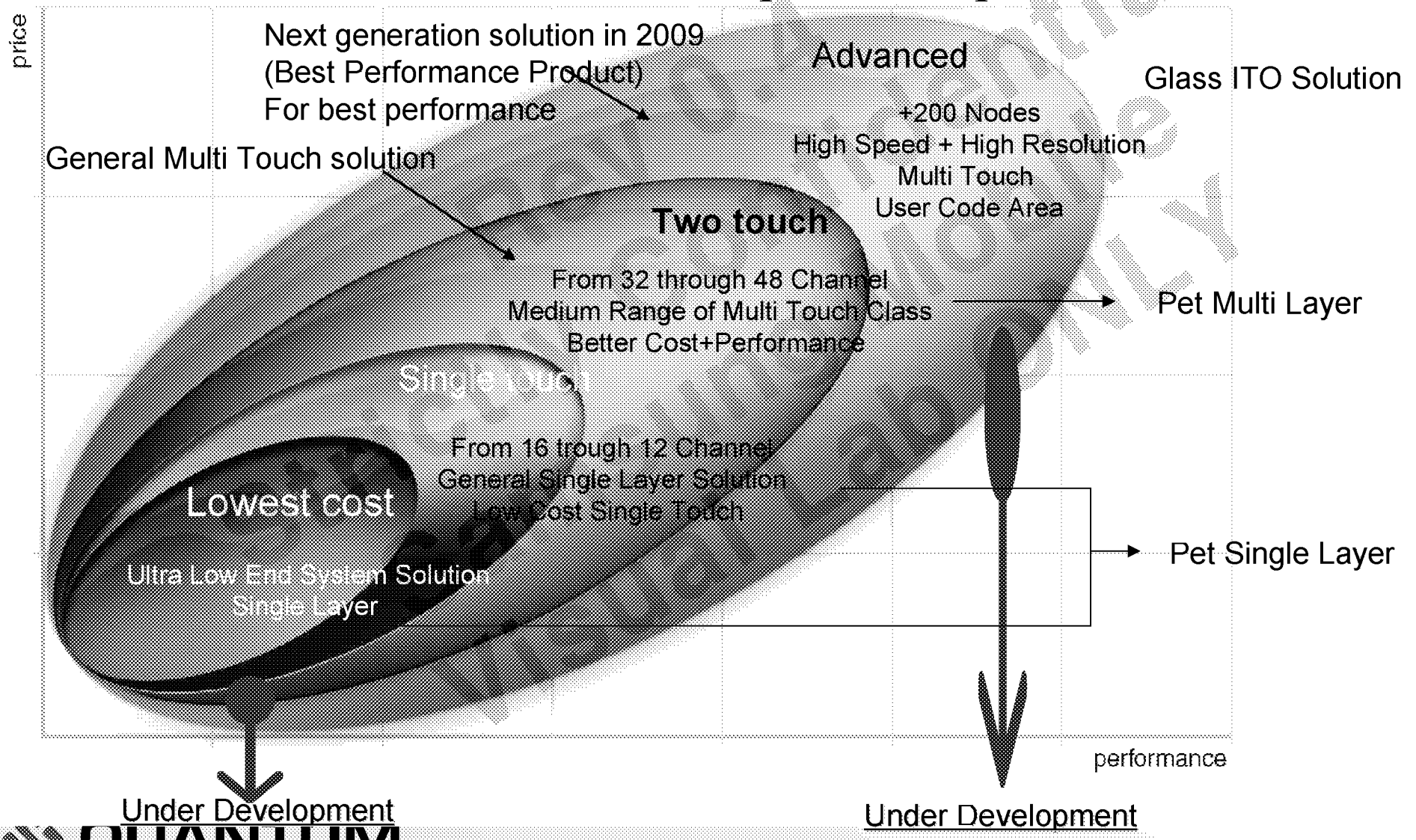
- Best In Class Technology
- Qualified1 Layer Solution
- Leading technology (Dedicated Engineering)

Performance

QUANTUM RESEARCH GROUP

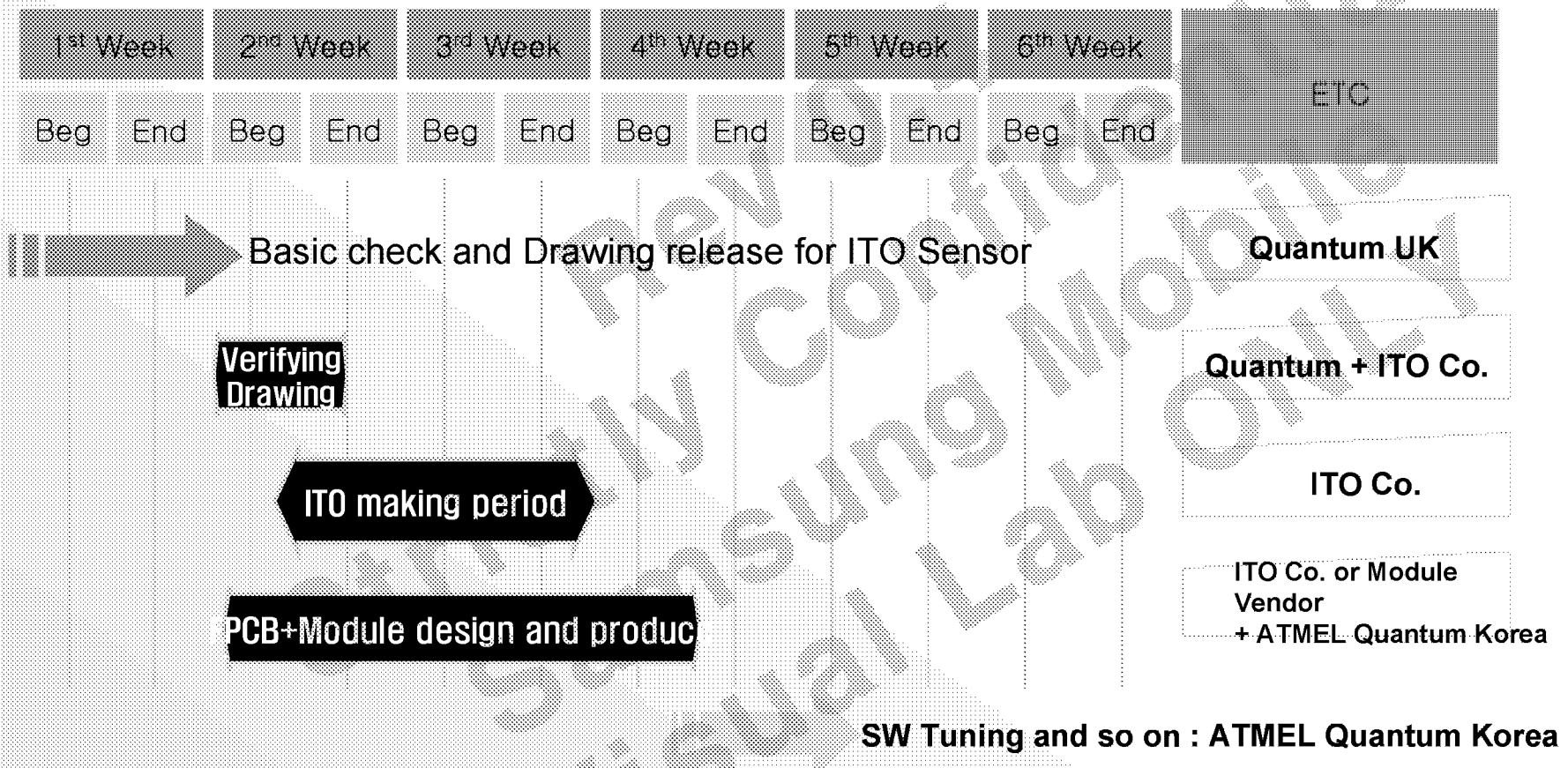
Why ATMEL QUANTUM? Wide solution

<Product Group Roadmap>



Why ATMEL QUANTUM?

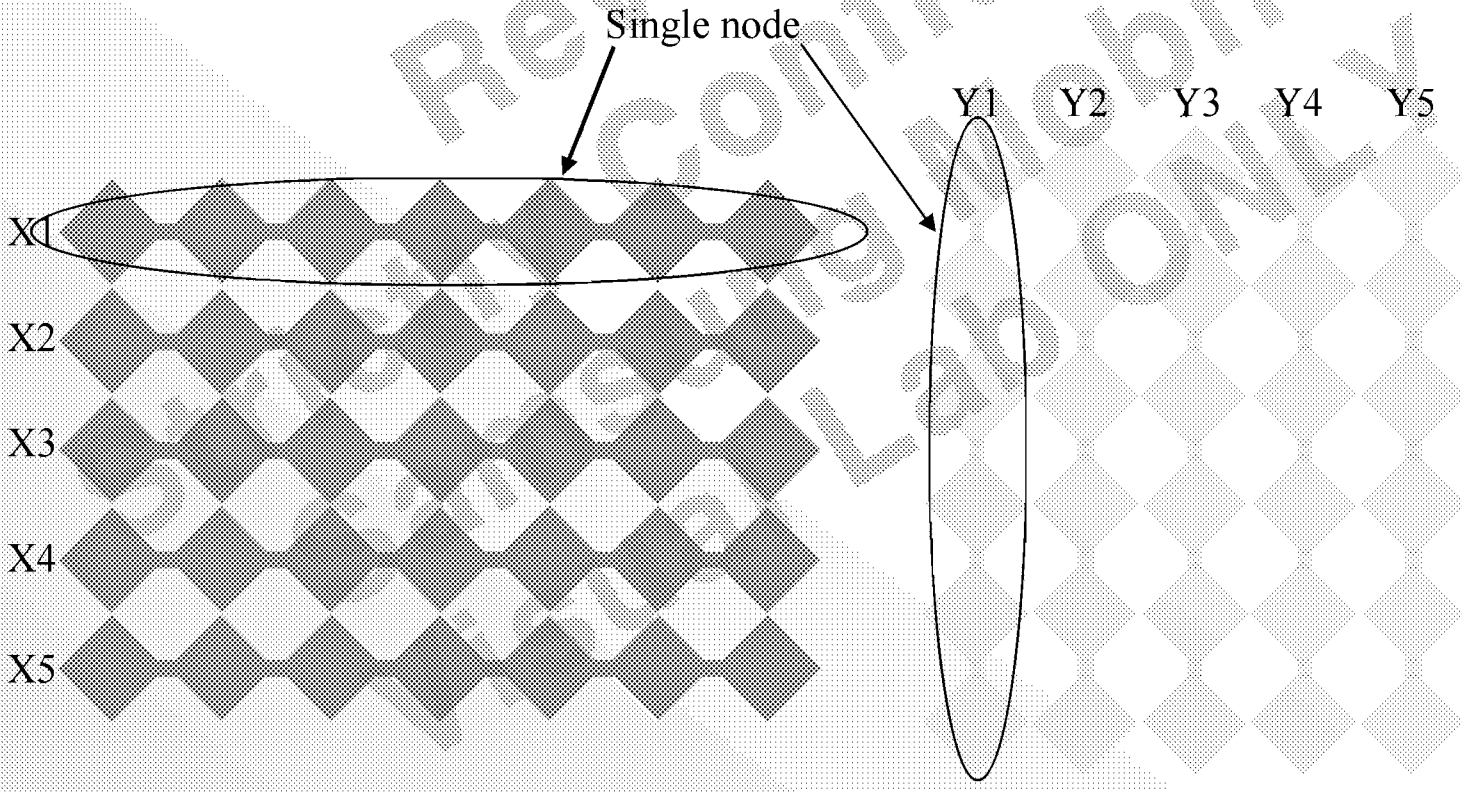
Development Time Schedule



* ITO making period depends on the ITO manufacturer

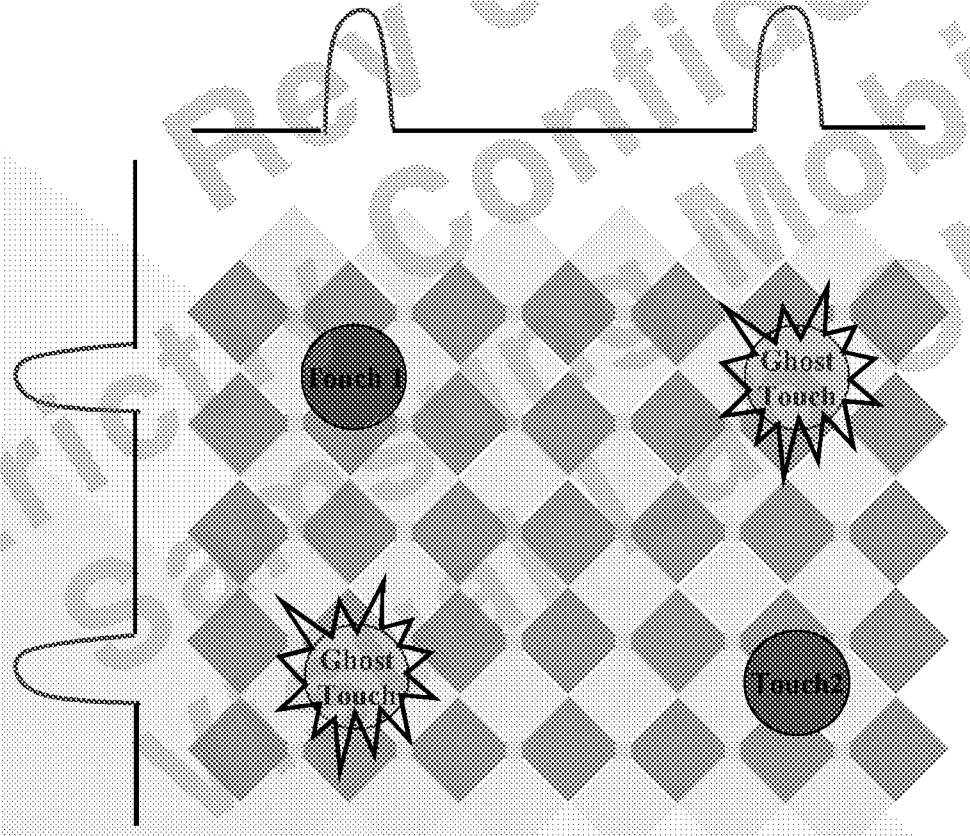
Why ATMEL QUANTUM? Real Matrix

- About self-capacitance (diamond pattern)
  - single channel cross single channel = two single channels
  - 5 X and 5 Y means 10 sensors **Only** → **5 + 5 =10**



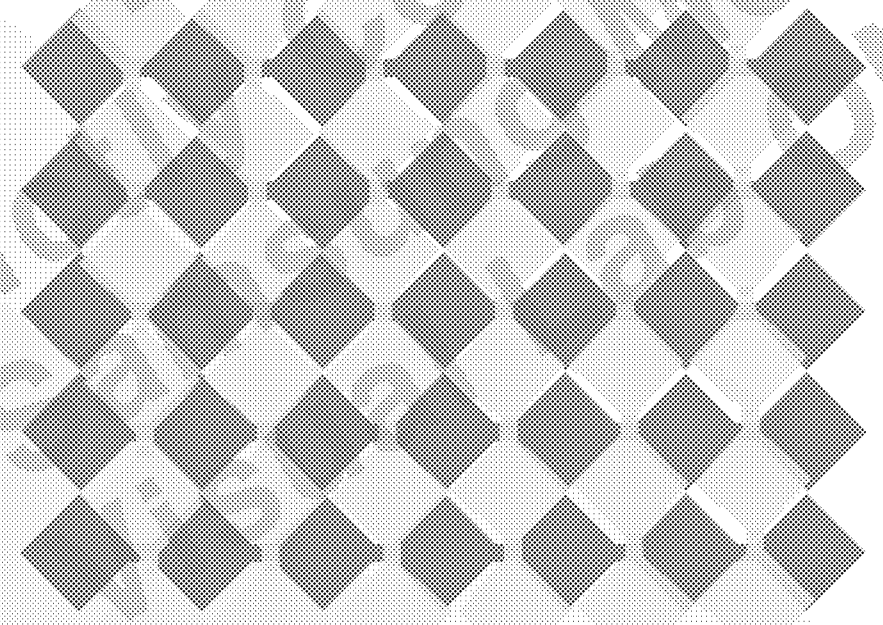
Why ATMEL QUANTUM? Real Matrix

- About self-capacitance (diamond pattern)
  - ghost key effect → no real position report



Why ATMEL QUANTUM? Real Matrix

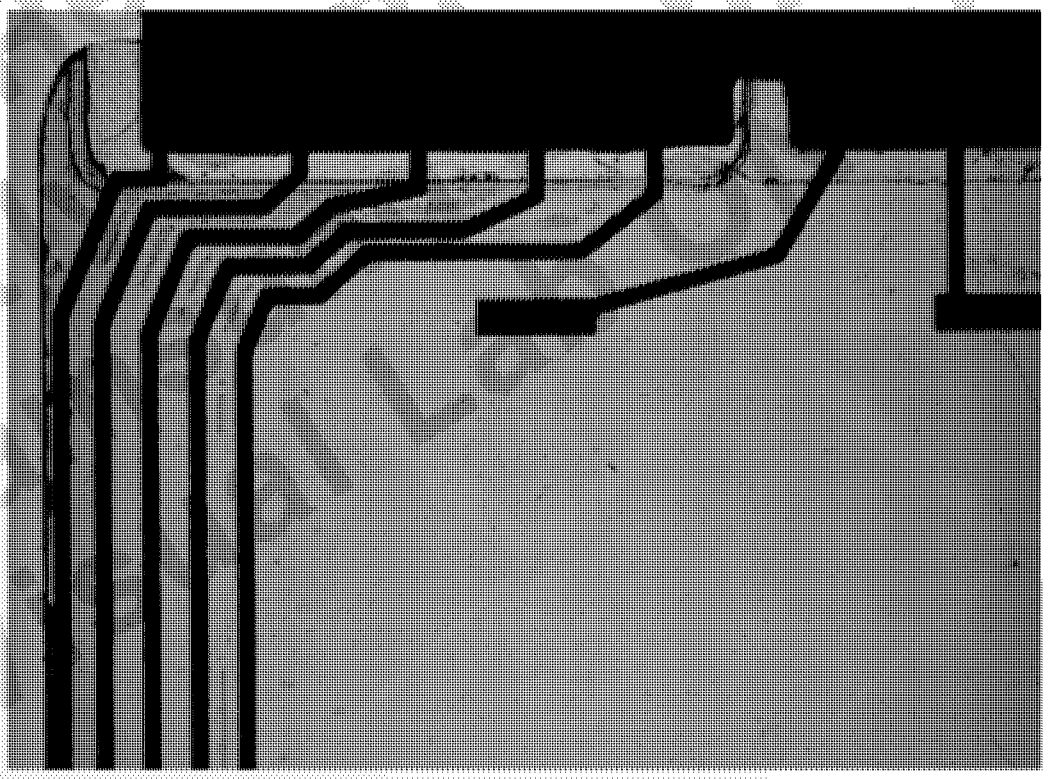
- About diamond pattern (mechanical)
  - Difficult laminating → very small miss-matching make miss-positioning



Why ATMEL QUANTUM? Real Matrix

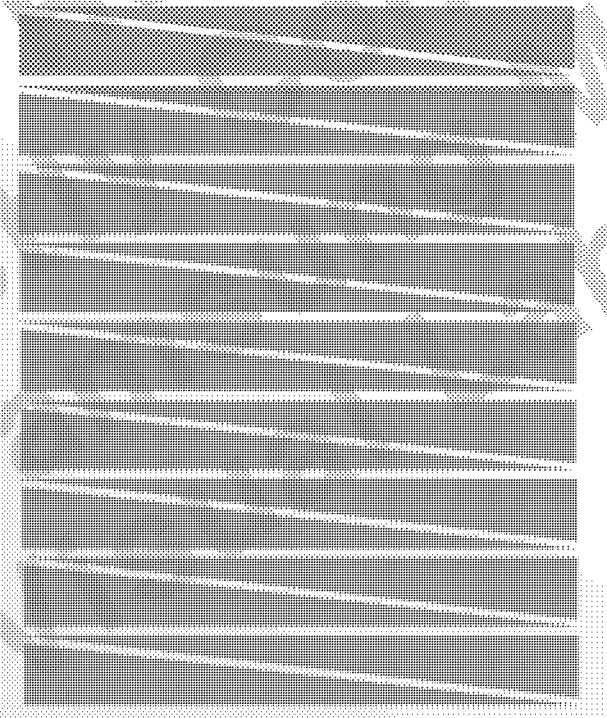
- About diamond pattern (mechanical)
  - Difficult laminating → very small miss-matching make miss-positioning

Real Example



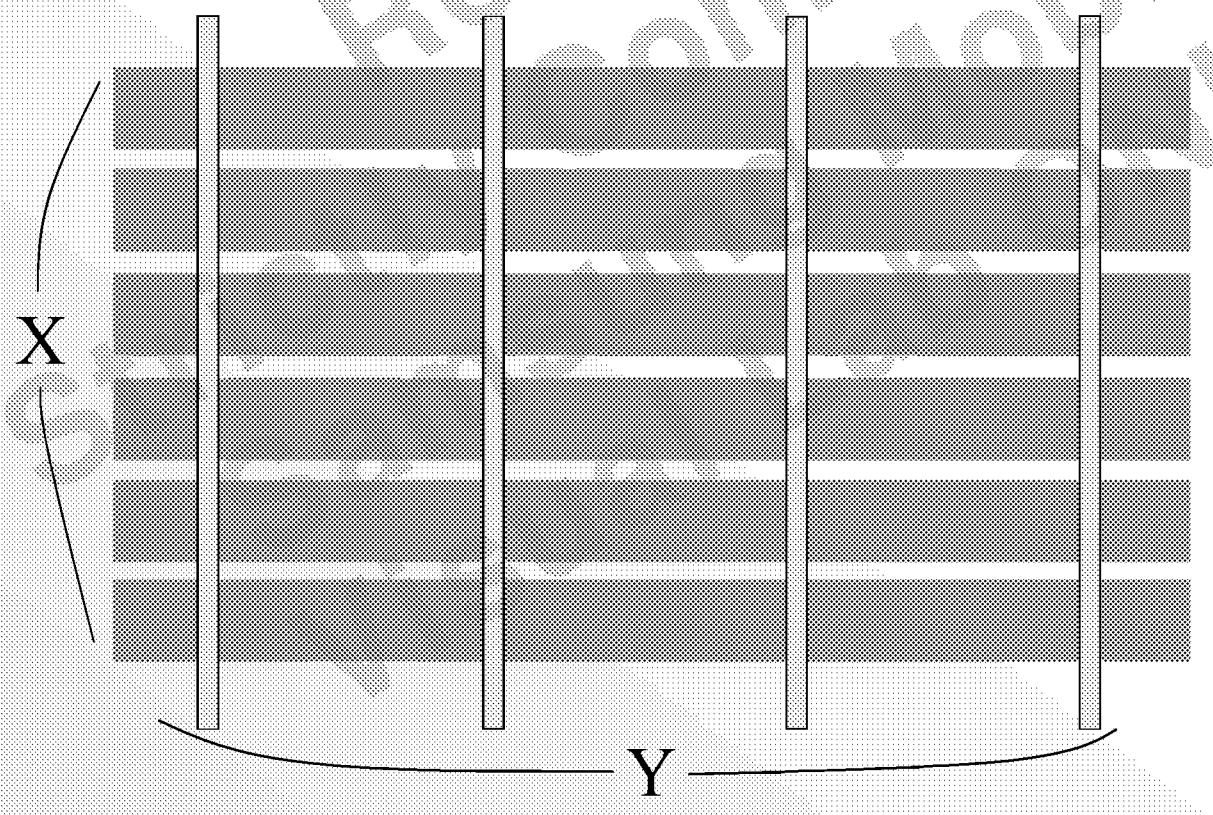
Why ATMEL QUANTUM? Real Matrix

- About Triangle pattern
  - Need many ITO patterns
  - More silver lines make wide edge or multi layer edge



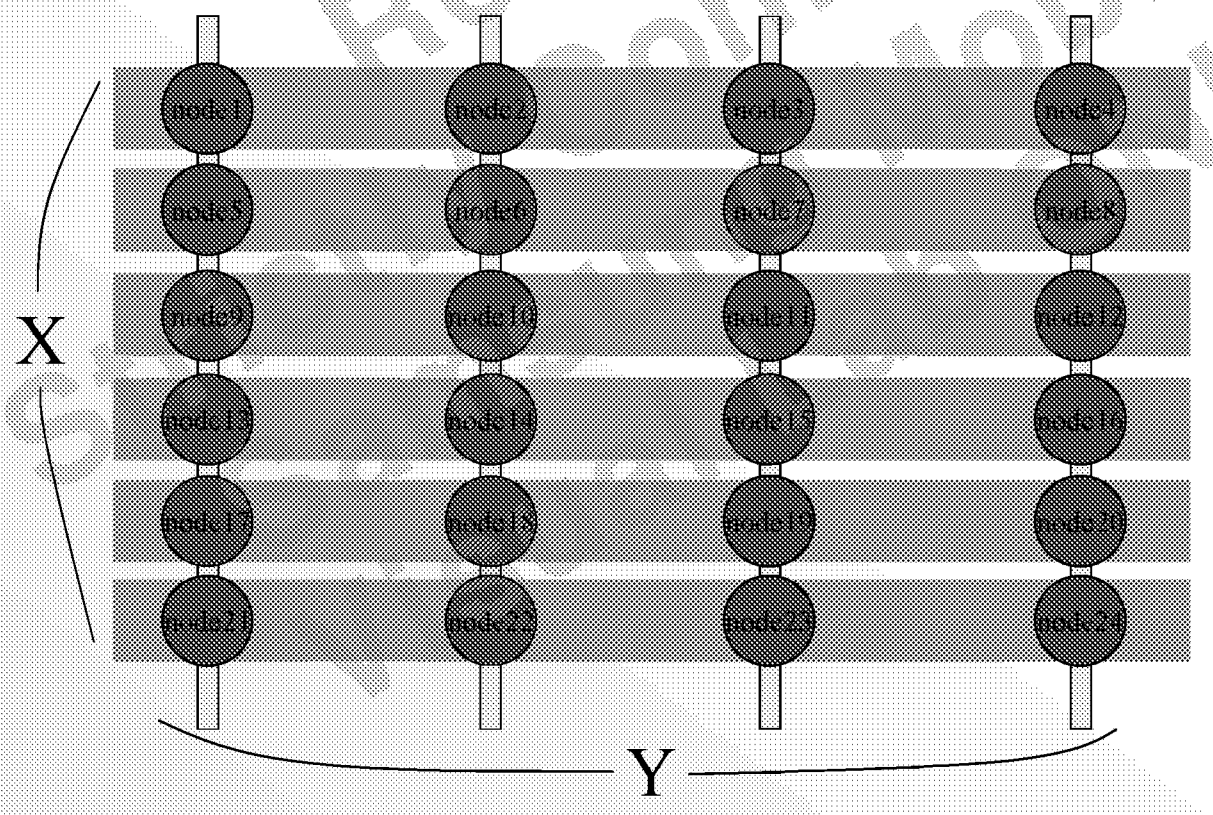
Why ATMEL QUANTUM? Real Matrix

- QMatrix solution is the real matrix
  - More sensing node make better sensing quality and resolution



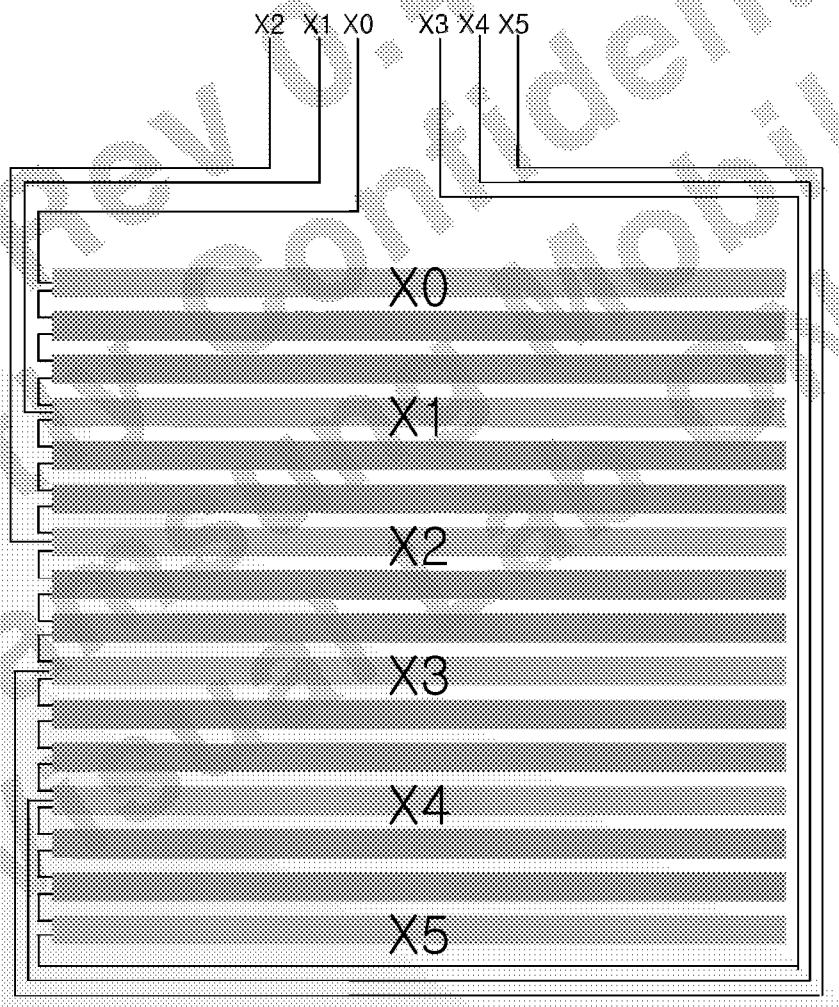
Why ATMEL QUANTUM? Real Matrix / Mutual Capacitance

- Mutual Capacitance (QMatrix)
  - 6 X and 4 Y means 24 nodes (sensors) → 6 X 4 = 24
  - More sensing node make better sensing quality and resolution
  - Each node has its own sensitivity → only QMatrix (Mutual Capacitance) can make it



Why ATMEL QUANTUM? Real Matrix

- QMatrix solution



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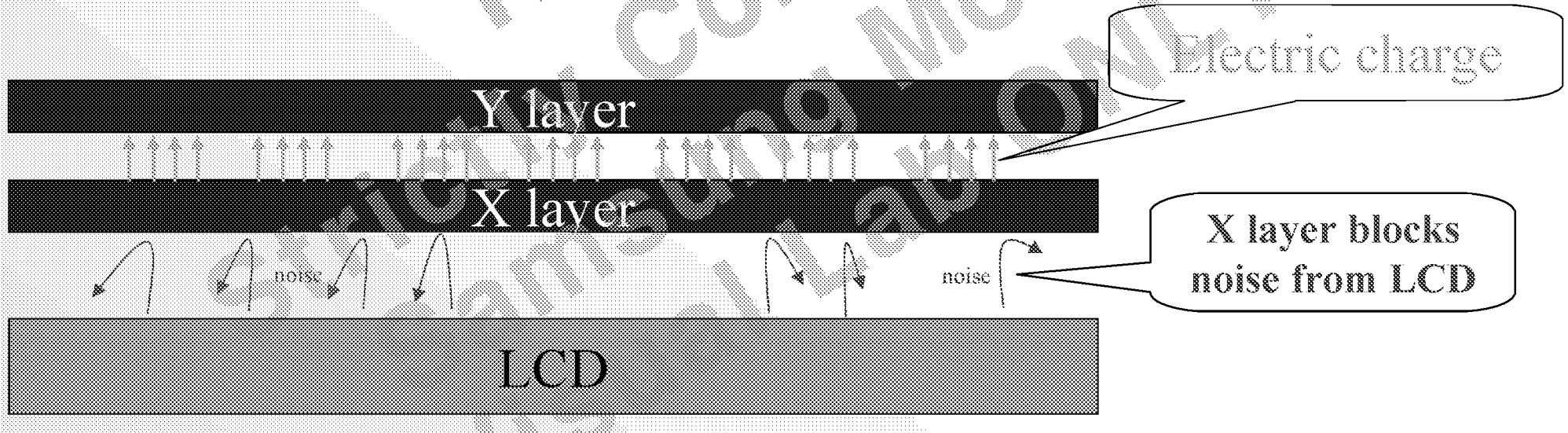
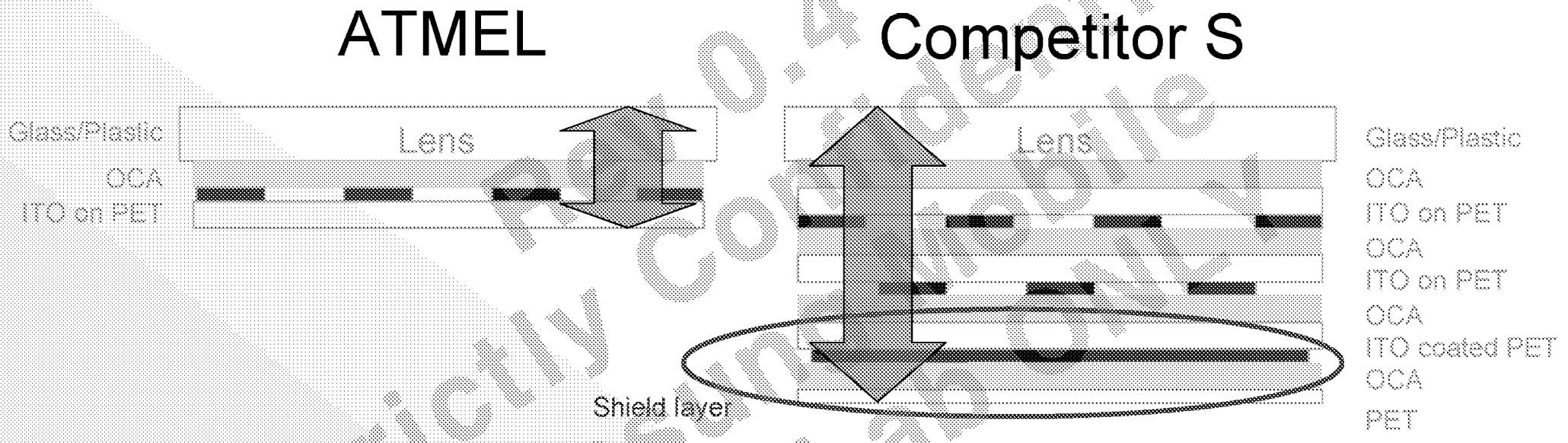
Why ATMEL QUANTUM? Shield w/o shield

- X line is not shield but works as shield
- No need shield layer because of X line



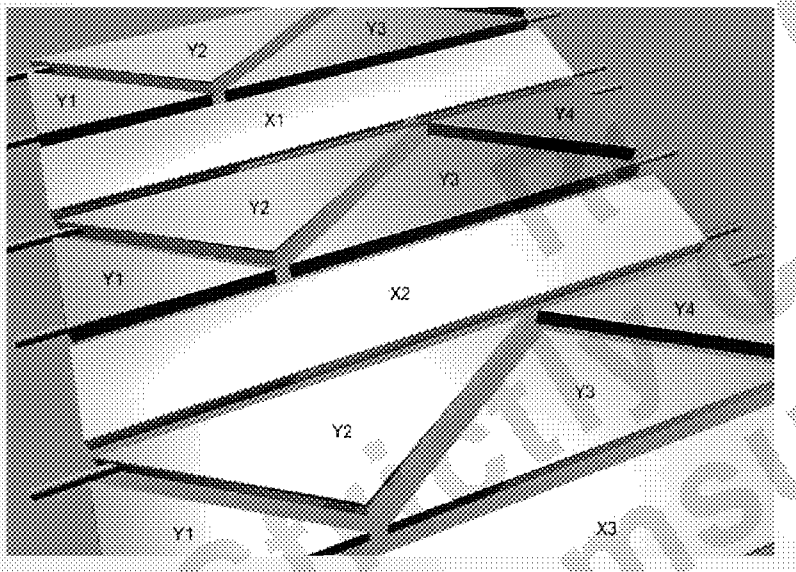
Single Layer versus 3 Layers



- Index matched ITO on PET
  - Total stack up: ~225 um
- Non-index matched material
  - Total stack up: ~75um
- Index matching not possible
  - Total stack up: 380um

Single Layer versus 3 Layers

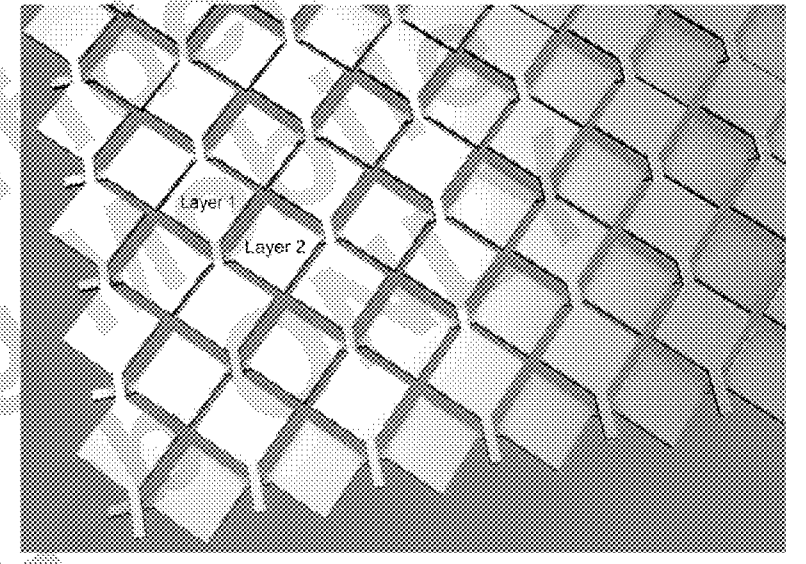
ATMEL



Atmel single layer sensor

- Applicable for Single Touch touchscreens
- No shield layer needed in most designs
- Stack thickness: as low as 100um
  - Higher light transmission
  - Lower power consumption
  - Lower system cost

Competitor S



Multi layer sensor, e.g. Diamond Pattern with shield layer

- Each layer resolves a different axis (X &Y)
- Layers need to be separated by a dielectric material
- Shield layer needed to absorb LCD noise
- Stack thickness: 250um incl. shield layer
- Atmel have specific designs of two layer sensors

Single Layer versus 3 Layers

- 3 Layer structure (competitor solution)
  - Thick and complex structure
  - Shield layer needed to absorb LCD noise
  - Multi layer structure make poor yield in mass production

- **Single layer structure (ATMEL Solution)**
  - Simple structure
  - Stack Thickness: as low as 100um
  - Low price
  - Excellent Yield in mass production

Why ATMEL QUANTUM?
ITO Mass production experience

- Mobile phone manufacturer
  - Motorola
  - Samsung
- Digital Appliances
  - GE (oven 6.3”)
  - Colorado Venet (lighting control)
  - Whirlpool
  - Invensys

Why ATMEL QUANTUM? Verified solution

- ATMEL QUANTUM solution is not in development status but completed and verified solution
  - Host need memory (register) setting only
  - Host very rarely need to update f/w image to CapSense device
  - Even completed solution, host still can refresh if necessary

Why ATMEL QUANTUM? Excellent Immunity

- Resistance: ATMEL QUANTUM solution has very good immunity of resistance of ITO → about 20Kohm
- LCD noise: In most case, no GND shield need. → Emitting layer protect radiation interference from LCD

Why ATMEL QUANTUM? Glass and PET

- ATMEL QUANTUM solution has good performance with both Glass and PET

Why ATMEL QUANTUM? Various ITO suppliers

- ATMEL QUANTUM can work with several ITO manufacturer like below.
  - **Nissha**
  - **ELK**
  - **Jtouch**
  - **Luxe Printing**
  - Young Fast
  - Hyup Jin

- Any ITO supplier can do with QCP (Quantum Certified Program) support

Why ATMEL QUANTUM? QCP program

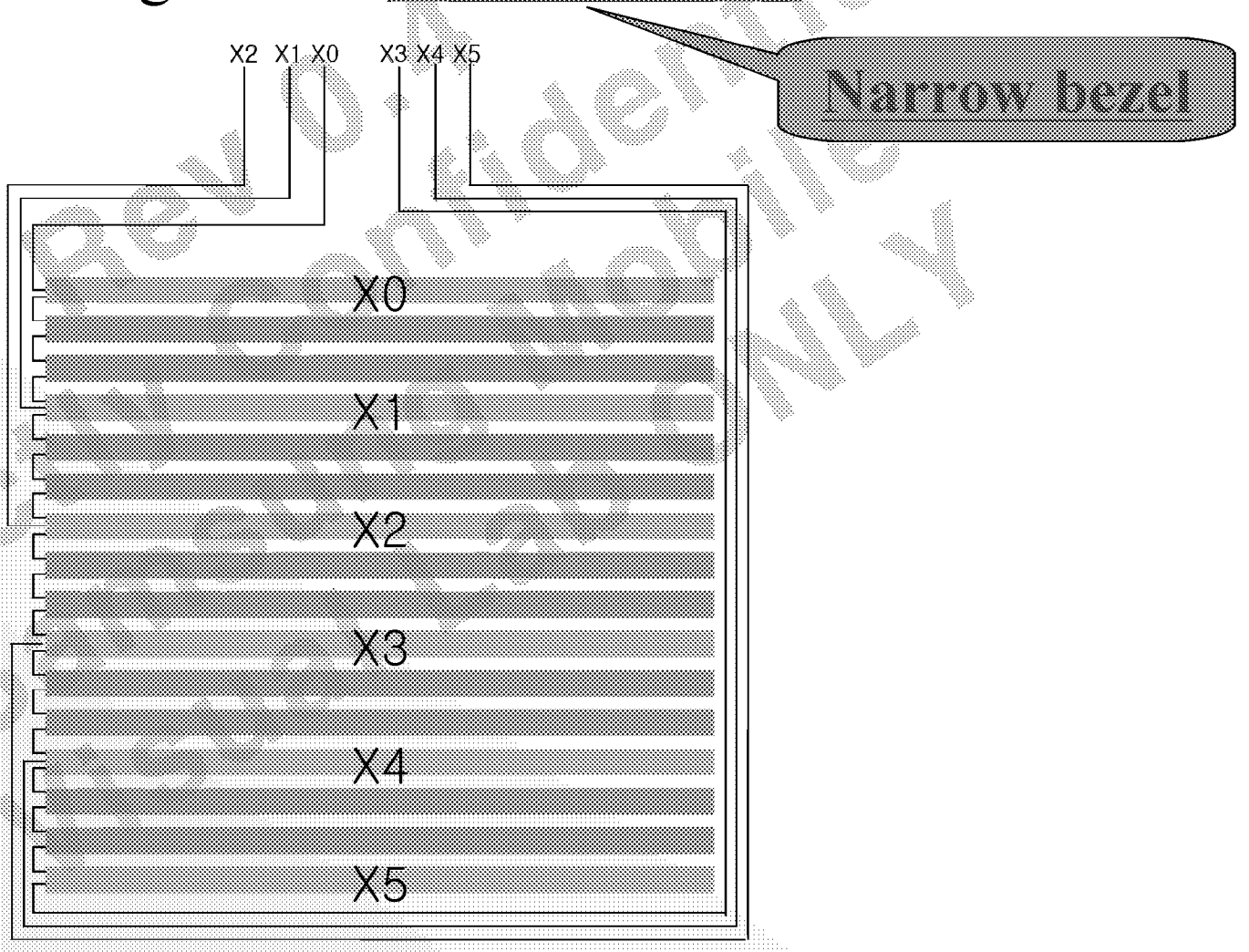
- Improve yields
- Improve test times
- Error check before and after window lamination
- Catches internal shorts and opens
- Detects internal, invisible defects
- Detects high-resistance microfractures
- Reporting by individual film
- Full statistical results on demand

Why ATMEL QUANTUM? Narrow edge (bezel)

- ATMEL QUANTUM QMatrix solution has matrix structure.
- This matrix structure make less lines and more node.
- Less line means less silver pattern.
- Less silver pattern make narrow edge (bezel)
- In normal case, only X lines go through edge
- It might be 2 – 4 X lines in each edge (bezel)

Why Mutual Capacitance? Narrow bezel

- Only X line go through bezel. Less silver lines and more sensors



Why ATMEL QUANTUM? Powerful Core

- ATMEL QUANTUM solution uses powerful AVR core
  - AVR core work with 1.8V to 5.0V Vdd
- Very low power consumption

ATMEL QUANTUM Products

Part Name	Resolution / Node	Interface	V_{DD}(V)	Supply Current	Oper. Temp(°C)	Package
QField Series						
QT702	1024 X 1024	I^2C	1.8~5.0	1.02mA ~ 4.6mA @normal mode 1μA ~ 2μA @sleep mode	-40~85	32-MLF
QT703	1024 X 1024	I^2C	1.8~5.0	1.02mA ~ 4.6mA @normal mode 1μA ~ 2μA @sleep mode	-40~85	32-MLF
QT604	1024 X 1024	I^2C	1.62~5.5	1.02mA ~ 4.6mA @normal mode 1μA ~ 2μA @sleep mode	-40~85	32-MLF
QT614	1024 X 1024	I^2C	1.8~5.5	1.02mA ~ 4.6mA @Normal mode 1μA ~ 2μA @sleep mode	-40~85	32-MLF
AT42QT4120	1024 X 1024 4X x 3Y (12 node)	I^2C	1.8~5.5	2180uA(LP: 16ms) 1440uA(LP:32ms) 3.3V: 120uA @sleep mode	-40~85	32-MLF
AT42QT4160	1024 X 1024 4X x 4Y (16 node)	I^2C	1.8~5.5	2260uA(LP: 16ms) 1560uA(LP:32ms) 3.3V: 120uA @sleep mode	-40~85	32-MLF

ATMEL QUANTUM Products

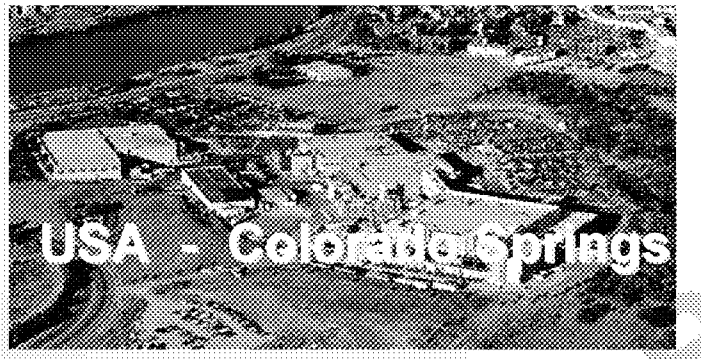
Part Name	Resolution / Node	Interface	V_{DD}(V)	Supply Current	Oper. Temp(°C)	Package
QTwo Series						
AT42QT5320	1024 X 1024 8X x 4Y (32 node)	I^2C	1.8~5.5	1720uA(LP: 16ms) 960uA(LP:32ms) 3.3V: <2uA @sleep mode	-40~85	32-MLF
AT42QT5480	1024 X 1024 8X x 6Y (48 node)	I^2C	1.8~5.5	3670uA(LP: 16ms) 2680uA(LP:32ms) 3.3V: <2uA @sleep mode	-40~85	44-MLF 44-TQFP 49-BGA 44-DRQFN

Competitive Position - Highlights

	Atmel	Competition	Our advantages
Market presence in Capacitive Touch Sense	> 12 years	Average <5 years	Experience in providing more robust solutions
Approach	Highly capable AVR core	Mixed Signal ASIC Designs	Supports good performance at a competitive price
Genuine Two Touch™	Independent touch report and tracking	Not uniquely identified touches	Better usability, broader range of use cases
Gesture Processing	Flexible gesture library	Some	Features handled by Atmel chip minimise host overhead
User configurability	Extensive command Interface	Some configurability	Event based interface for low processor overhead, user configurable for flexibility
Spread Spectrum Acquisition	Yes	Some	Good noise immunity
Low cost sensor designs	Innovative single layer designs	Require multi-layers	Lower cost, better optical properties, less backlighting needed

FAB and Capacity

Atmel Wafer Fab



PROCESS: CMOS, NVM, High Voltage BCD/SOI
SiGe BiCMOS
WAFER SIZE: 150 mm (6-inch)
TECHNOLOGY: 0.5 µm to 0.25 µm

PROCESS: CMOS, NVM, Mixed Signal, BiCMOS
WAFER SIZE: 200 mm (8-inch)
TECHNOLOGY: 0.35 µm to 0.11 µm

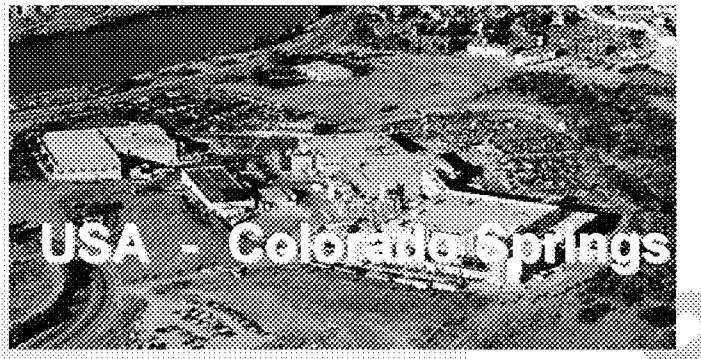
Foundry Partners

UMC THE SoC SOLUTION FOUNDRY ®

XFAB

FAB and Capacity

Atmel Wafer Fab



MCU: 50M units / Month (60% of Capacity)

RF and Automotive product

Foundry Partners

UMC THE SoC SOLUTION FOUNDRY ®

XFAB

Any Question?

Jinho Park

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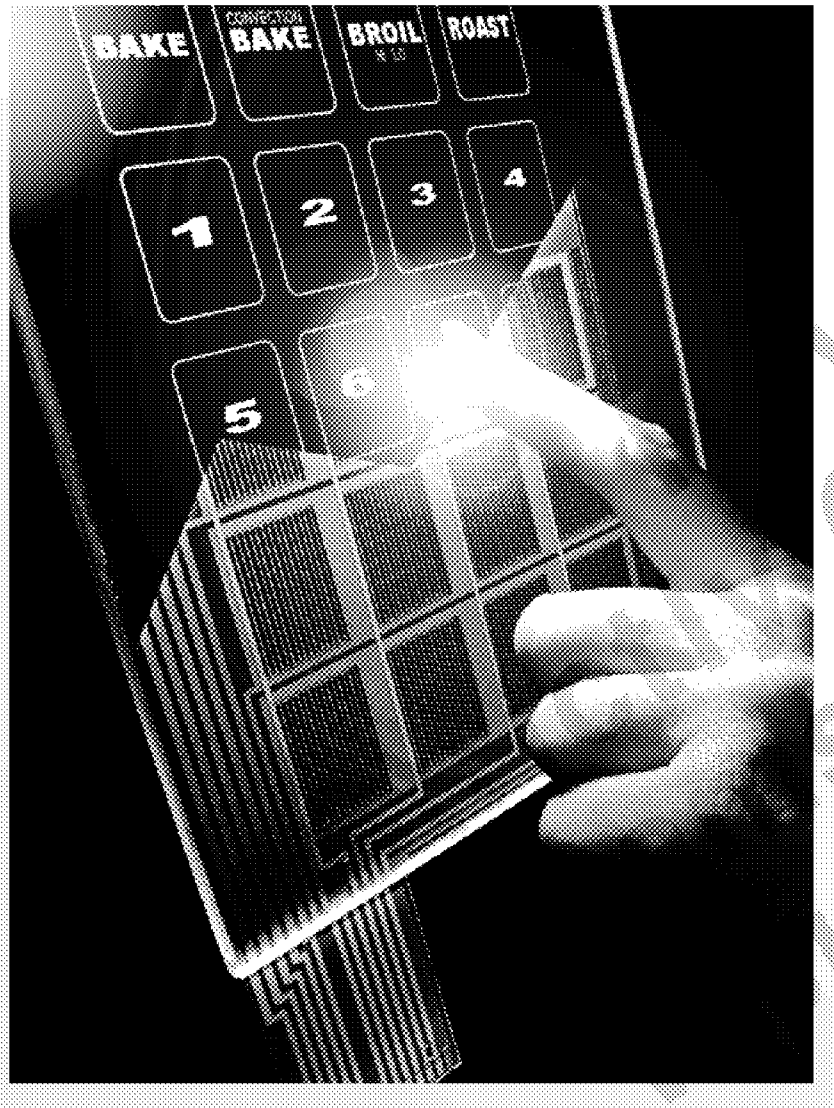

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