

# 棋港电子代理之ATMEL(爱特梅尔)一电容性触摸界面



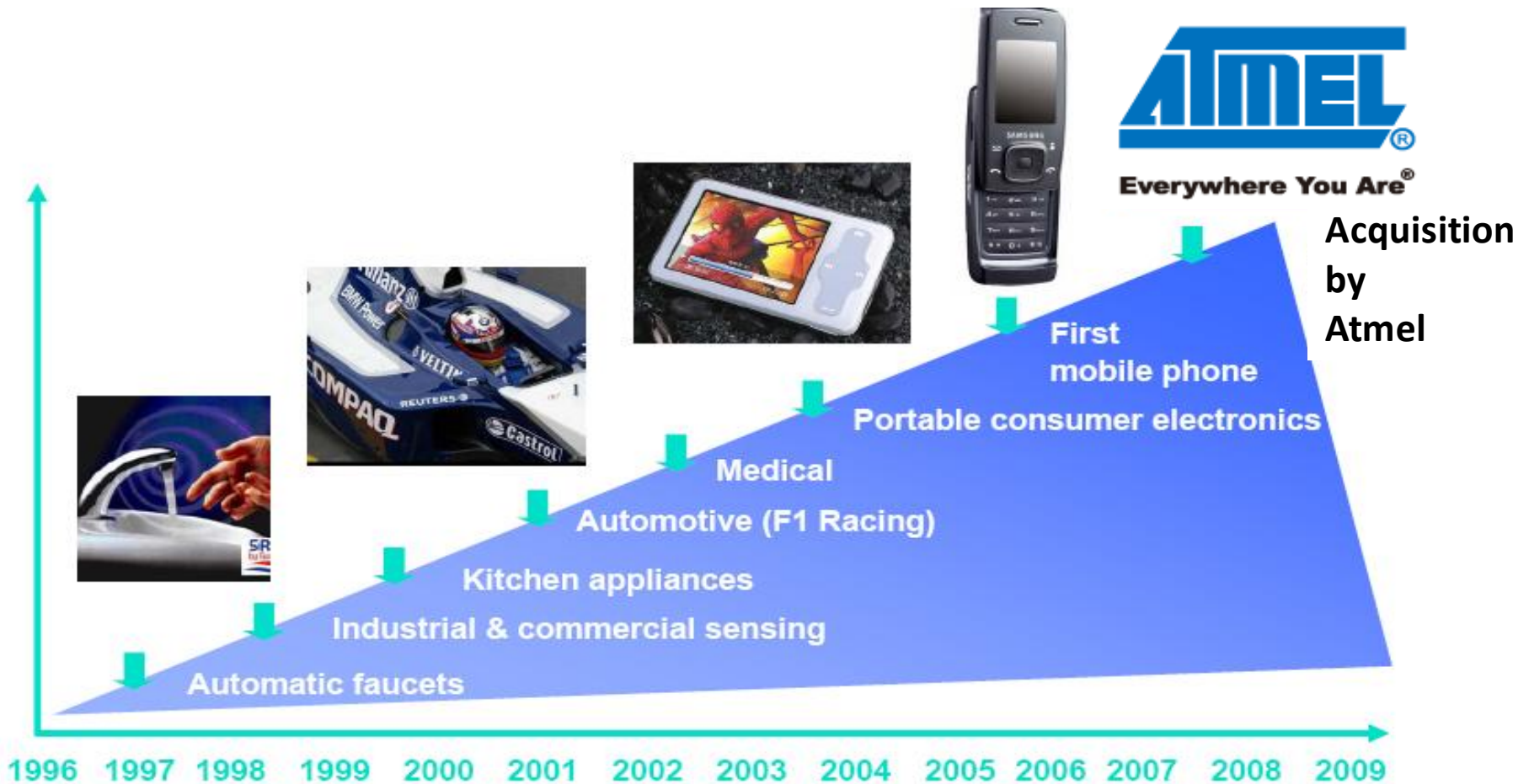
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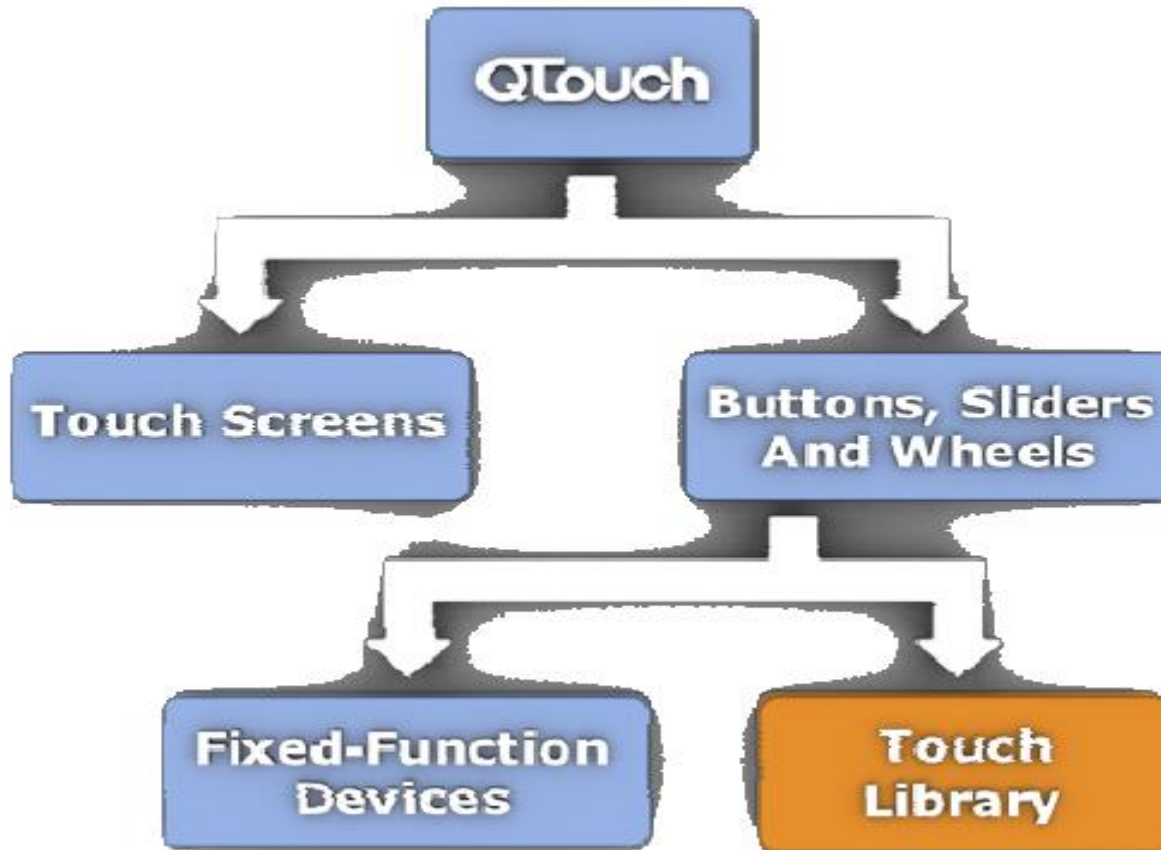


# 10 Years Success



QTouch<sup>™</sup>

# Atmel® Touch Solutions



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# Technology Portfolio

## QTouch™



- For 1 to 10 buttons
- Simple key shapes
- Easy to wire

## QMatrix™



- Up to 64 keys
- Water resistant
- High temperature

## QWheel™



- Linear touch
- Rotary touch
- 3 channels



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Everywhere You Are®

# Our Technology

- **Best in class technology**
- **Robust and problem free**
- **Ease of design**
- **Standard or custom Products**
- **End to end solutions**
- **Reference designs.**



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# Customer Advantages

- **Short design time**
- **Reliable**
- **Cost effective**
- **Highly integrated Solution**
- **Ability to influence value chain.**



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# Market Environment



- **Capacitive Touch is mainstream**
- **Touch buttons, wheels and sliders are in demand**
- **Touch sense on LCD screens**
  - **Fixed buttons**
  - **XY Output**
    - **Multi-touch**
    - **Gestures**



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# Common User Interfaces

## Buttons and Sliders

- **Mechanical**
  - Cost leading technology
  - Dominant
- **Resistive**
  - Complex and costly system design
- **Optical**
  - Infrared buttons mainly in appliances
  - Expensive and unreliable
- **Capacitive**
  - Direct implementation on PCB
  - Flexible sensor size and shape
  - Lowest system cost.



*Attrezzi Kitchen Blender  
Jenn-Air, USA*

# Common User Interfaces

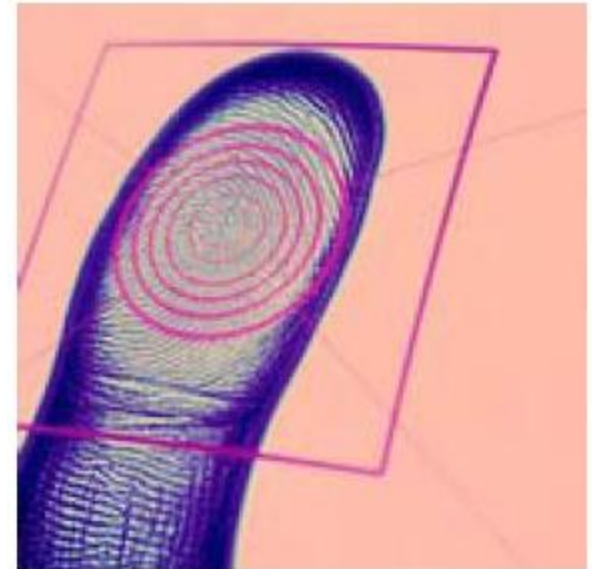
- **Resistive**
  - Cost competitive by volume
  - Multiple layer ITO for screens
- **Inductive**
  - High system cost
  - Only works with active stylus
- **Optical or Surface acoustic wave**
  - More complex system design
  - Expensive solution
- **Capacitive**
  - Direct implementation on PCB
  - Flexible sensor size and shape
  - Lowest system cost.

## Touch Pads & Screens



# Capacitive Touch Sense Methods

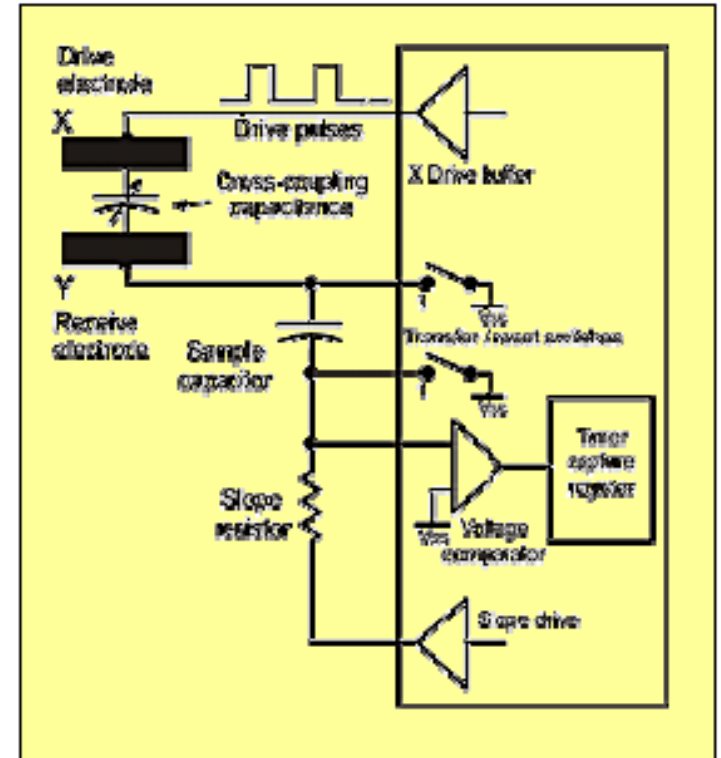
- R/C charge/discharge
- Capacitive measurement via Sigma-Delta modulator (C/D converter)
- Relaxation oscillator Method
- Current source voltage ramp timing
- Switched reactance technology
- Sine wave measurement
- **Charge transfer technology.**



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# Charge Transfer - Advantages

- **Best signal-to-noise ratio**
- **Excellent field penetration**
- **Spread spectrum Modulation**
- **Best in class EMC characteristic**
- **Multiple patents by QRG, Atmel**



QMatrix™ charge transfer principal



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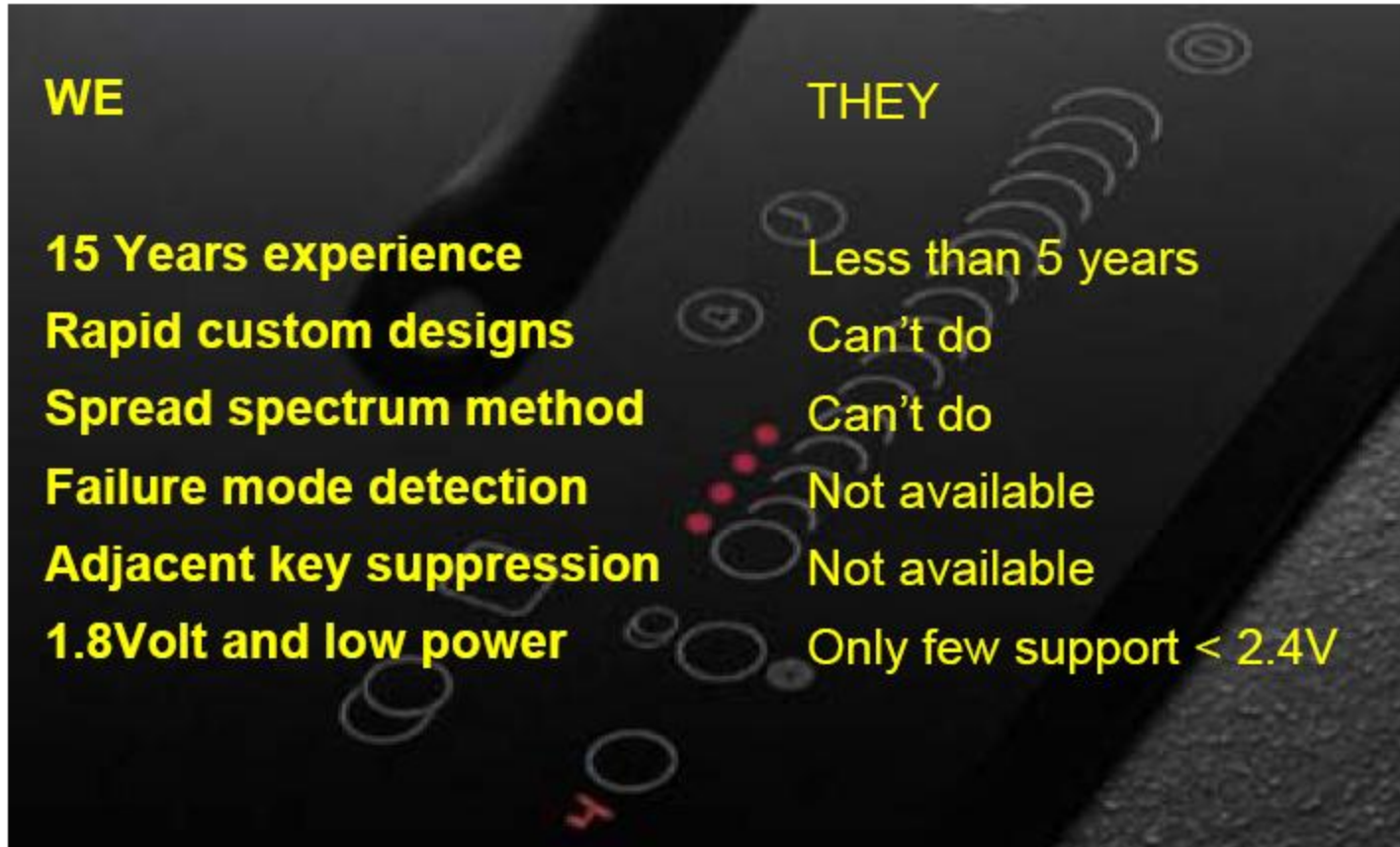
# Quantum Product Advantages

- **AKS - Adjacent Key Suppression**
- **Spread Spectrum Modulation**
  - Superior EMC and EMI behavior
- **Auto Calibration**
  - Adjusts for temperature, humidity, component fade on everykey individually
  - Covers slow and quick moving gradients
- **Low power operation**
  - 1.8V – 5.5V, multiple sleep modes
- **Best field penetration & SNR**
- **Works in moisture environments**
- **Ease of system design**



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# Competitive Position

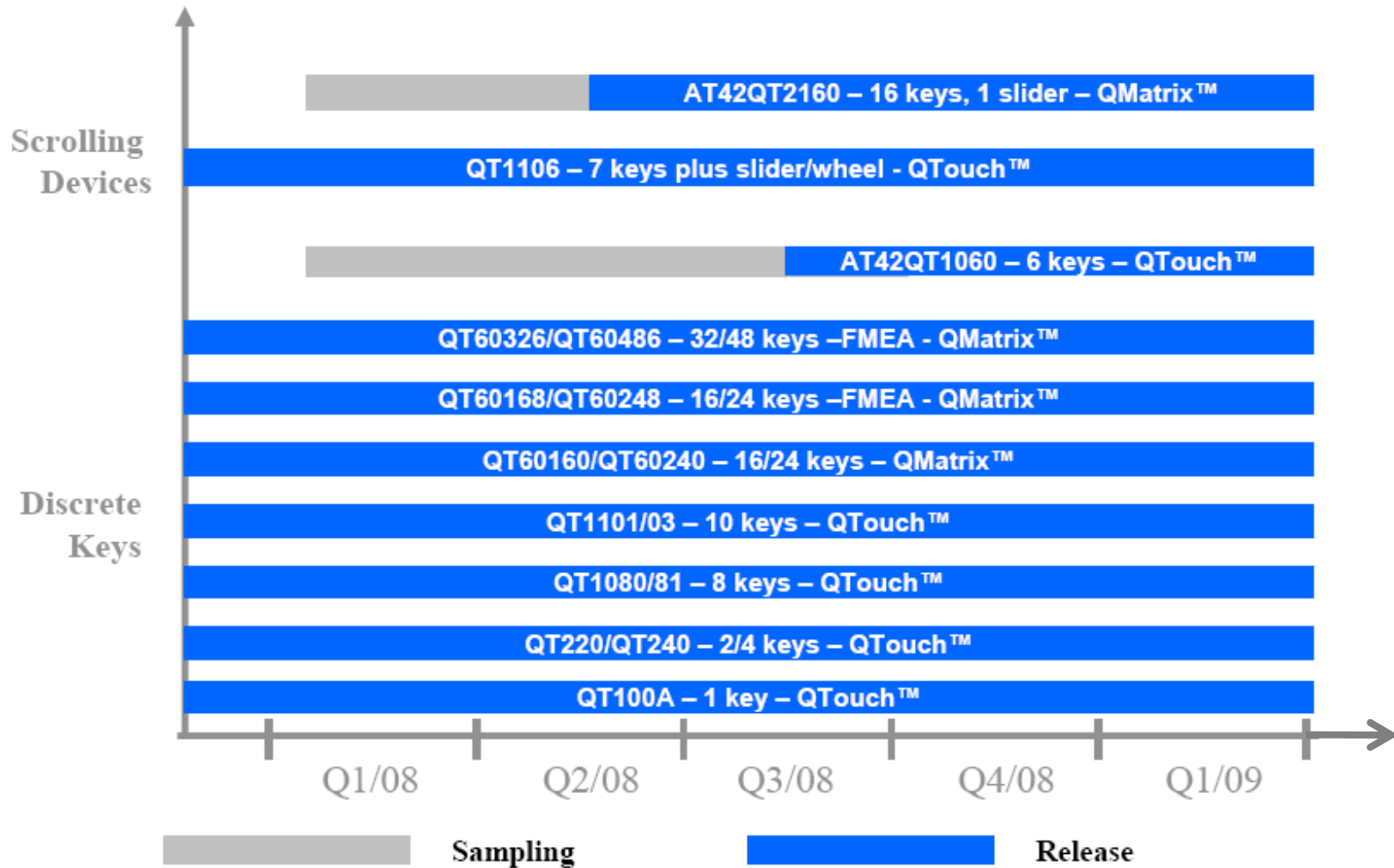


<b>WE</b>	<b>THEY</b>
<b>15 Years experience</b>	Less than 5 years
<b>Rapid custom designs</b>	Can't do
<b>Spread spectrum method</b>	Can't do
<b>Failure mode detection</b>	Not available
<b>Adjacent key suppression</b>	Not available
<b>1.8Volt and low power</b>	Only few support < 2.4V



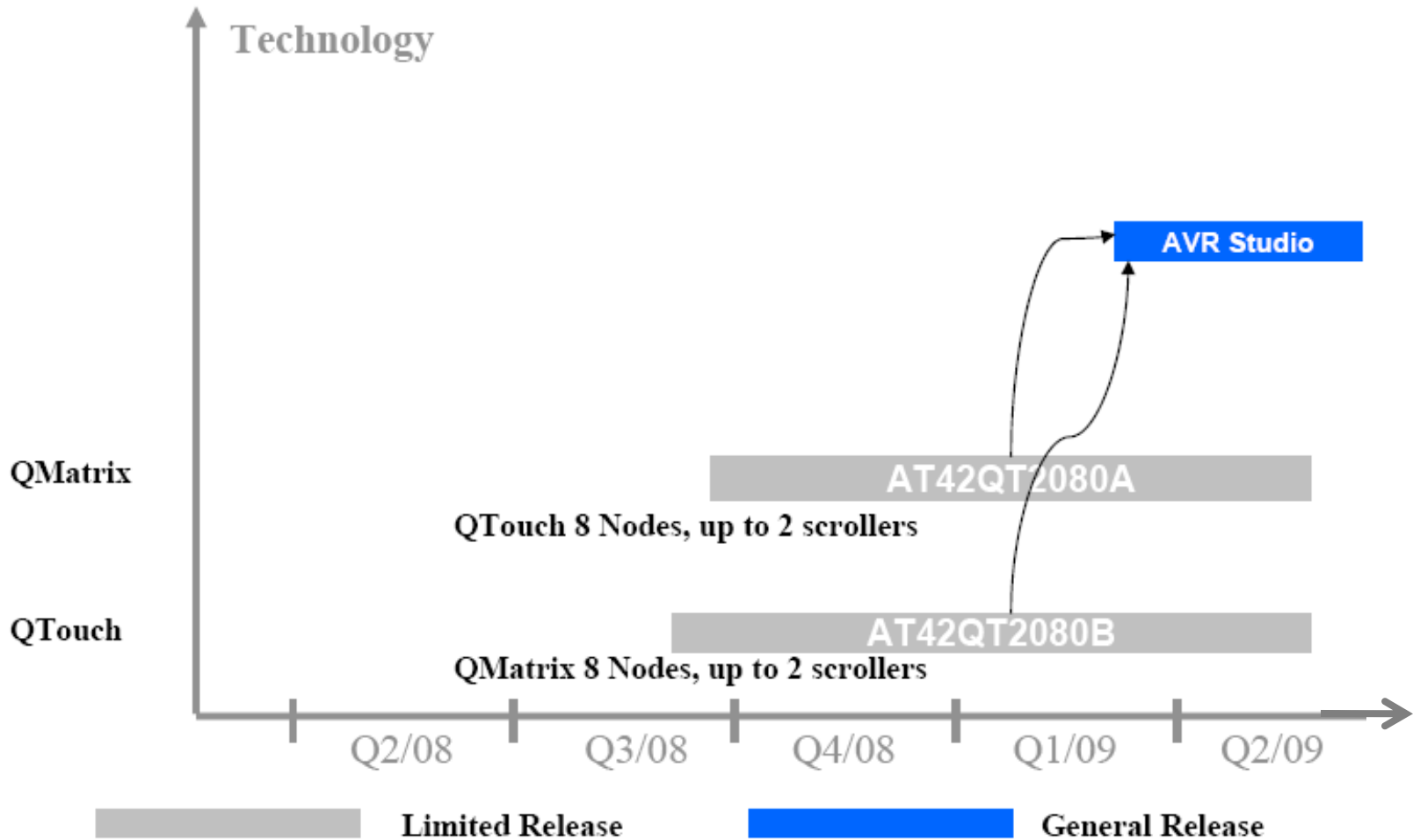
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# Products and Roadmap: Keys & Scrolling Devices



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# Code Module – Roadmap



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# AT42QT2160 – 16 Touch Control Channels

- **Features**
  - Up to 16 independent touch channels
  - Touch slider control (2 to 8 channels), up to 8 bit resolution
  - 11 programmable interface lines
  - Integrated LED control through 11 PWM outputs
  - Host programmability through an I<sup>2</sup>C compatible interface
  - Spread spectrum acquisition
  - Recalibration and Dynamic drift compensation
  - Adjacent Key Suppression™ (AKS™)
  - Very low power operation: < 1.0  $\mu$ A @ 1.8 V in sleep mode)
  - Tiny 4mm x 4mm MLF package RoHS compliant
- **Applications**
  - Mobile phones
  - Personal media players
  - Digital picture frames



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# EVK2160 & EVK1060 Evaluation Kits

- **Easy to use**
- **Supports all functions of the touch sense controllers**
- **Stand alone or connected to a host PC**
- **Part number: AT42EVK2160A & AT42EVK1060**



# QT60160/240 – 6/24 Touch Control Channels

- **Features**
  - 1.8V to 5.5V single supply operation
  - Self calibration
  - Auto drift compensation
  - AKS™ Adjacent Key Suppression
  - Spread spectrum bursts for superior noise rejection
  - Serial I2C interface
  - RoHS compliant 32-pin MLF package
- **Applications**
  - Mobile phones
  - Remote Controls
  - Domestic appliances
  - PC peripherals



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# QT60168/248/326/468 – 16/24/32/48 Touch Control Channels

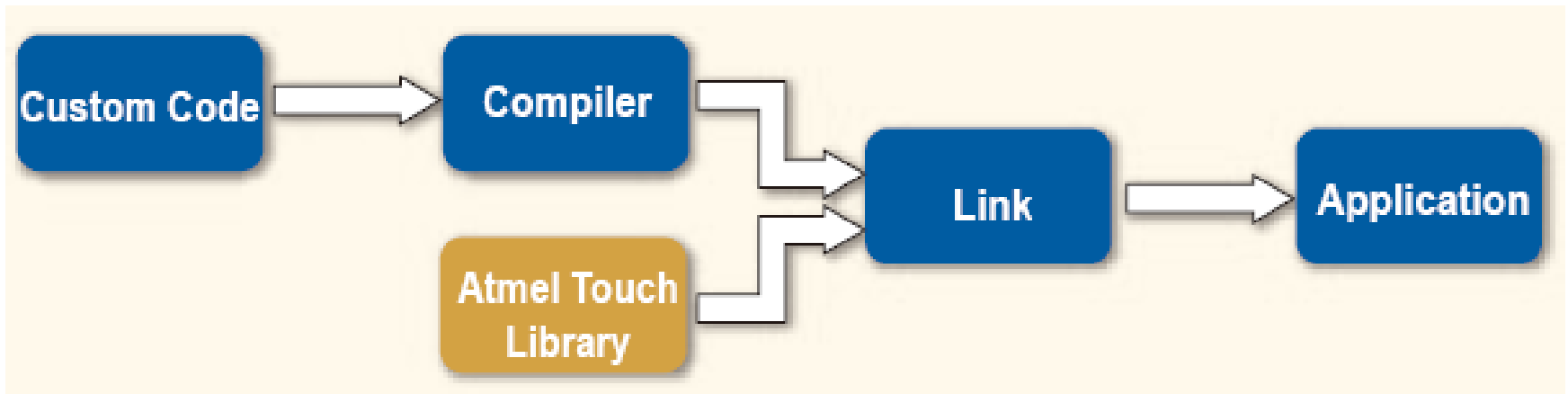
- **Features**
  - 3V to 5V single supply operation
  - Auto drift compensation
  - 100% Auto-calibration for life
  - AKS™ Adjacent Key Suppression
  - Spread spectrum bursts for superior noise rejection
  - Synchronous noise suppression Feature
  - FMEA compliant design features
  - Serial I2C interface
  - RoHS compliant 32-pin and 44-pin
  - TQFP packages
- **Applications**
  - Mobile phones
  - Remote Controls
  - Domestic appliances



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# Touch Library API

## Free software adding QTouch to your AVR<sup>®</sup> Designs



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# What is Touch Library?

- **Free software library**
  - Available as library files. Source code is not available
- **Adds touch capabilities to AVR devices**
- **Uses PORTB and PORTD for up to 8 touch channels**
  - Any combination of buttons, wheels and sliders possible
- **Extending QTouch support to the entire range of tinyAVR, megaAVR, XMEGA and AVR32 UC3 devices**
- **More devices to be supported in near future**
- **Updates can be downloaded from Touch Library website**



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# QTouch Library 2.0 Device Support

Available Now!

	tinyAVR	megaAVR	XMEGA	AVR32
QTouch	All devices <i>(4K flash or more)</i>	All devices	Partial Support <i>(ATxmega128A1)</i>	UC3A Support <i>UC3B on request</i>
QMatrix	Partial Support <i>(ATtinyx8)</i>	Partial Support <i>(ATmegax8)</i>	Not yet Supported <i>(Planned for Q4)</i>	Not yet Supported

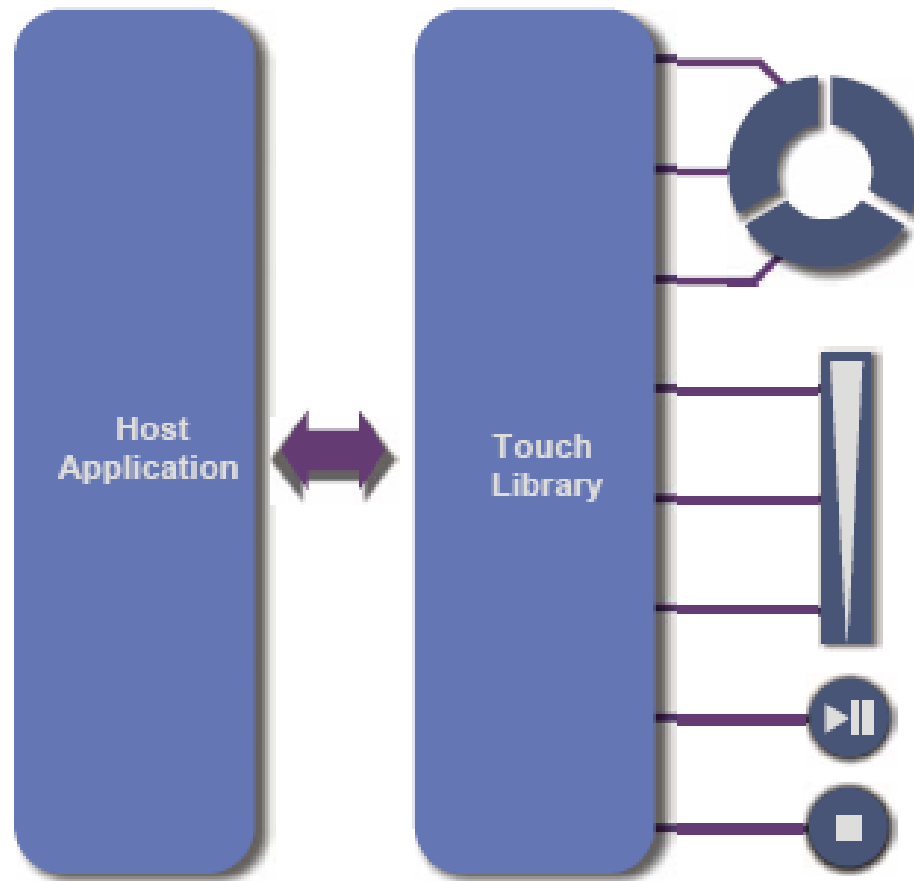
- **Version 2.0 provide complete QTouch support for all AVR devices**
  - Including USB AVR, CAN AVR, LCD AVR and Lighting AVR
  - In total, Atmel QTouch library supports more than 70 devices



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# Basic Concept

- **Example: 8 channels form 2 keys, a rotor, and a slider**





# QTouch vs. QMatrix - Differences

- **QTouch and QMatrix are the two technologies available in Atmel's Qtouch library. The main differences are:**
- **Qtouch**
  - Simple sensor design rules, which makes it good for “first-timers” engineers
  - Very stable and reliable
  - Uses no peripherals like timers or ADCs
- **Qmatrix**
  - Predictable timing
  - Tolerant regarding moisture and high temperatures
  - Uses the ADCMUX and one Timer/Counter



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# Atmel QTouch Library – Key Benefits

- **It's Free**
  - *Full access to the industry leading QTouch technology.*
- **Easy to use**
  - *Just Compile, Plug and Play.*
- **A flexible Touch Solution**
  - *Adds capacitive touch capabilities on AVR and AVR32 microcontrollers.*
- **Supports up to 32 Touch Channels**
  - *Any combinations of Buttons, Sliders and Wheels possible.*
- **Fits a wide range of AVR products**
  - *Supports tinyAVR, megaAVR, XMEGA and AVR32 UC3 devices.*



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# QTouch Offers Superior Performance



- **Excellent when it comes to high resolution using very few pins**
  - Atmel QTouch Only needs 3 channels to achieve 256 levels of resolution
  - Cypress will typically need up to 10 channels to achieve the same accuracy
- **Uses 3 channels for one slider or wheel**
  - Two wheels, two Sliders or one of each can be supported on the 8 channel QTouch library



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# Availability

- **Free of charge**
- **Available on Atmel website**
  - <http://www.atmel.com/touchlib>
- **Users need to agree to a Limited License Agreement**
  - Use with Atmel microcontroller
  - No redistribution except in integrated product
  - Full details are stated in the License Agreement



# Development Tools

- **Atmel Touch Library**
    - Fully Documented
  - **Evaluation Kits**
    - ATAVRTS2080A for ATmega88
    - ATAVRTS2080B for ATtiny88
    - Software and documentation must be downloaded
  - **Free AVR QTouch Studio**
    - Front-end for all Evaluation Kits
    - Download from [www.atmel.com/touchlib](http://www.atmel.com/touchlib)
- Complete toolchain available now!***



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