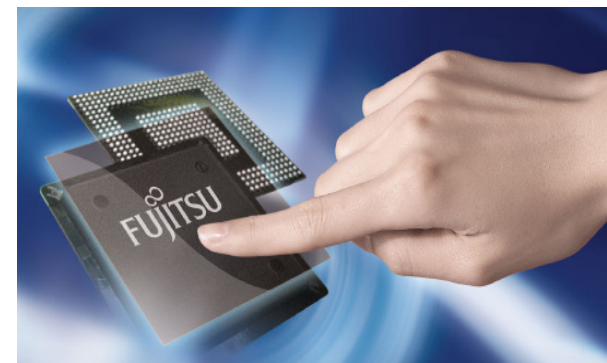


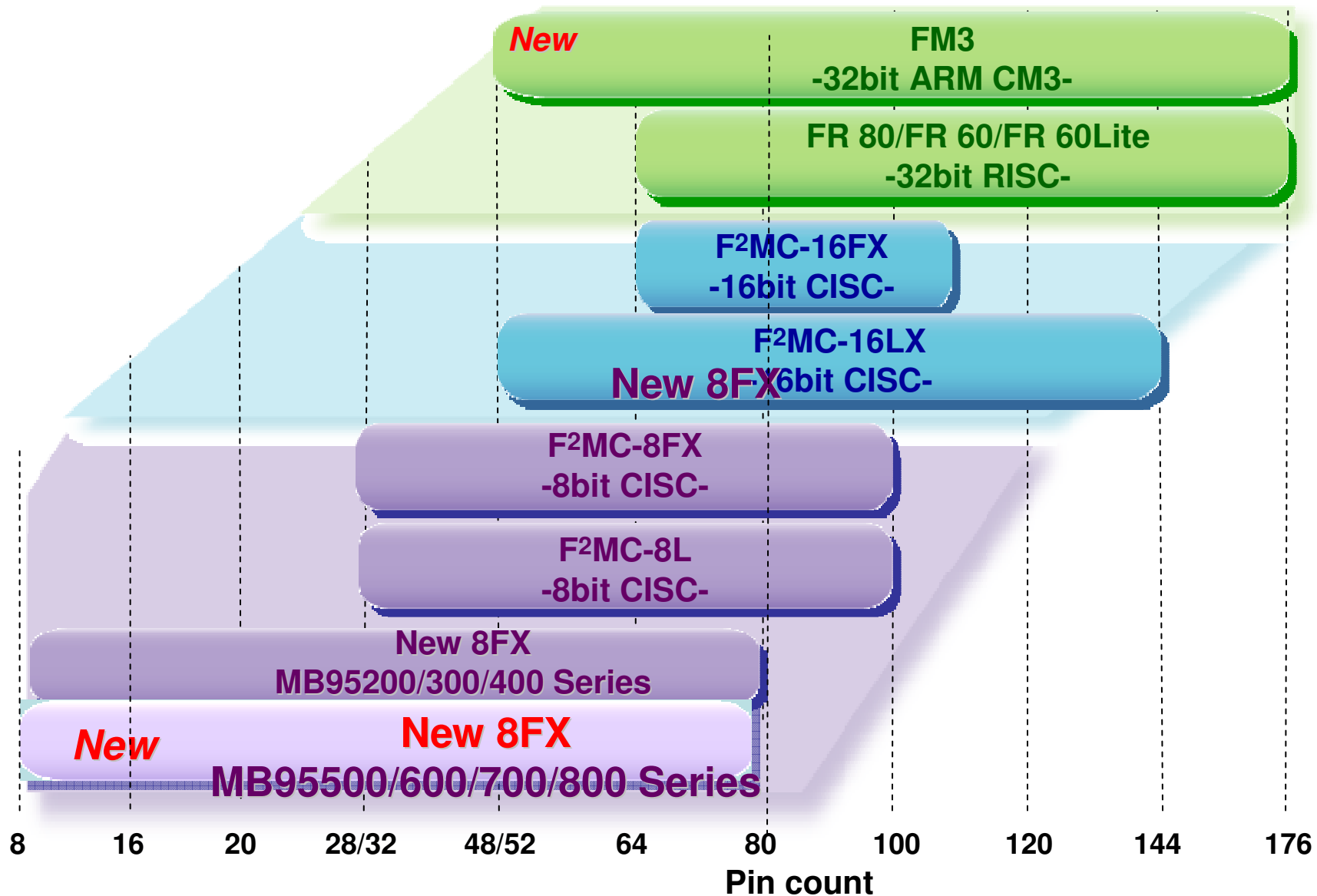
New 8FX MCU family TSC MCU (MB95870 series) Product Introduction

Fujitsu semiconductor (Shanghai) Co., Ltd
June. 2012



Fujitsu New 8FX MCU Roadmap

Fujitsu Microcontrollers

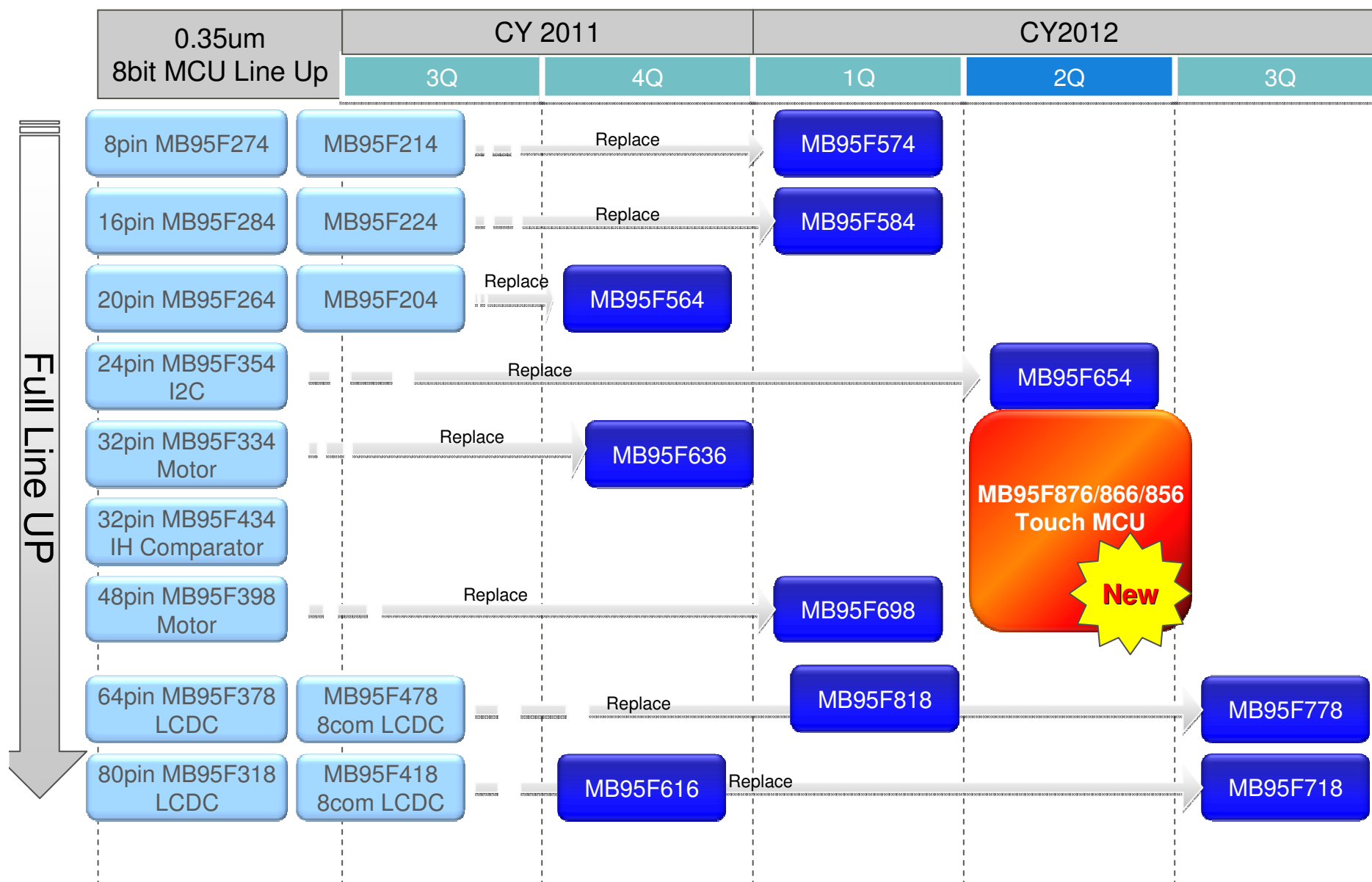


New 8FX MCU Portfolio

0.35um

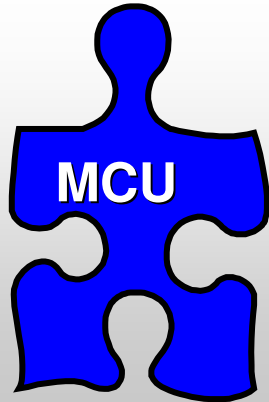
0.18um

FUJITSU



TSC MCU Overview

2 in 1 TSC MCU – A Revolution



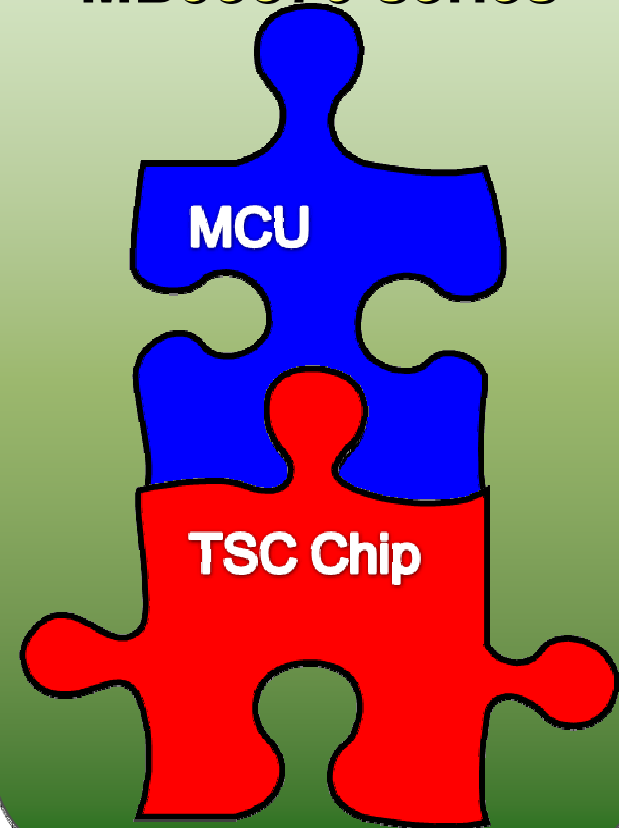
For main
control



For touch
interface



MB95870 series



TSC MCU Overview



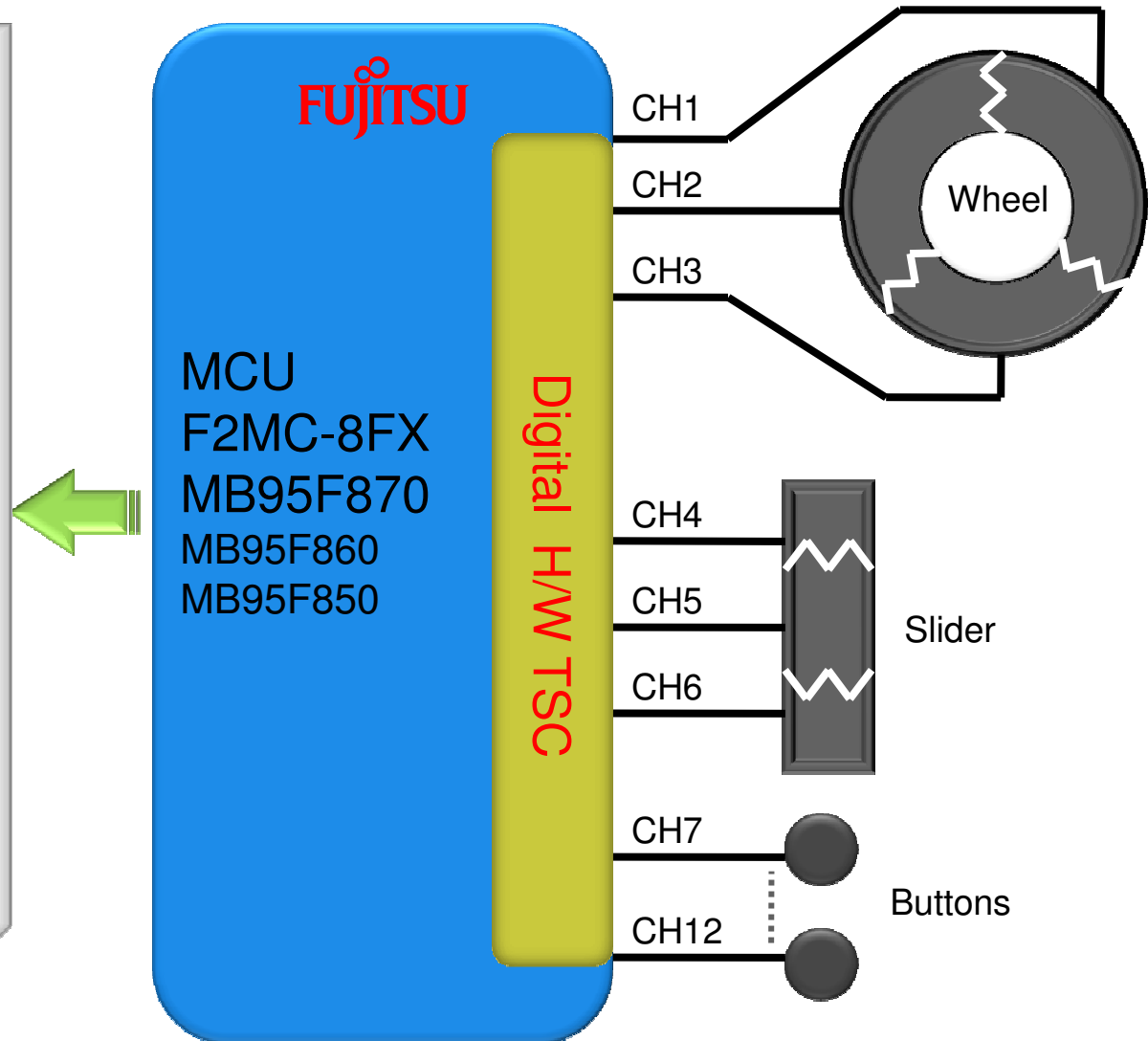
Typical Applications

Single Keys

- Output information: Which key has been touched
- MCU no need to process the touch data
- MCU loading 0%

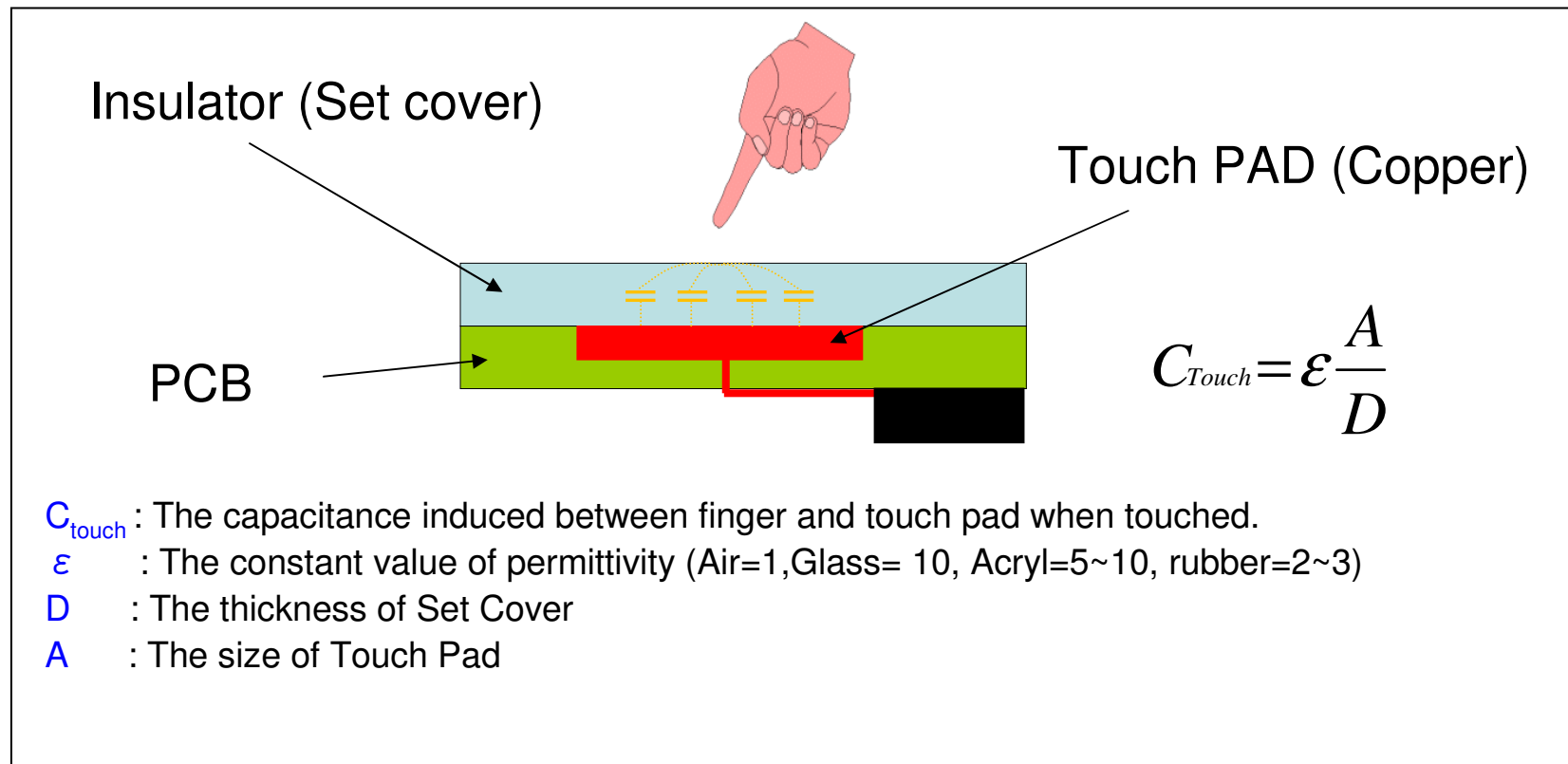
Advanced sensing (slide, wheel, approximation etc.)

- Output information Touch strength
- MCU needs to process the touch data
- MCU loading 1%



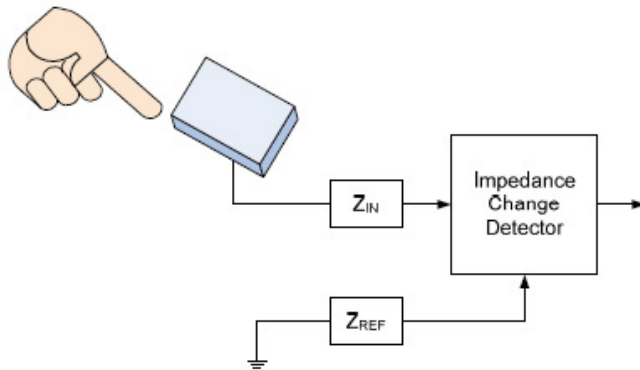
Touch Sensing Human Input

- Touch Sensing – a revolution in Human Input Device
 - Can replace virtually all mechanical buttons, sliders and turning nobs
 - Create a simple, robust, clean and esthetic design

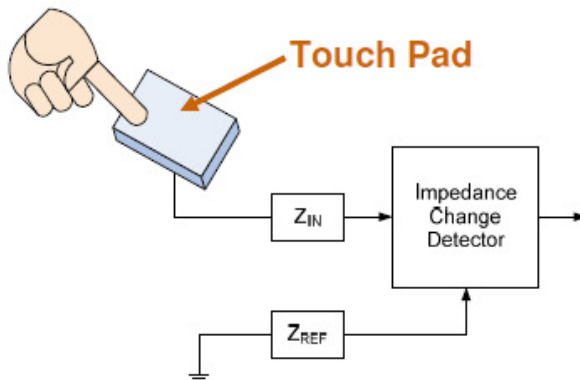


How does TSC works

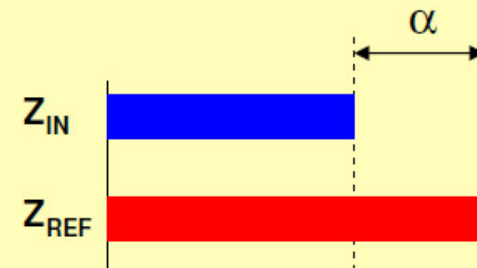
[1] Not Touched



[2] Touched



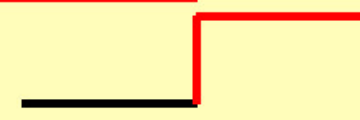
[1] $Z_{IN} < Z_{REF}$



[2] $Z_{IN} > Z_{REF}$

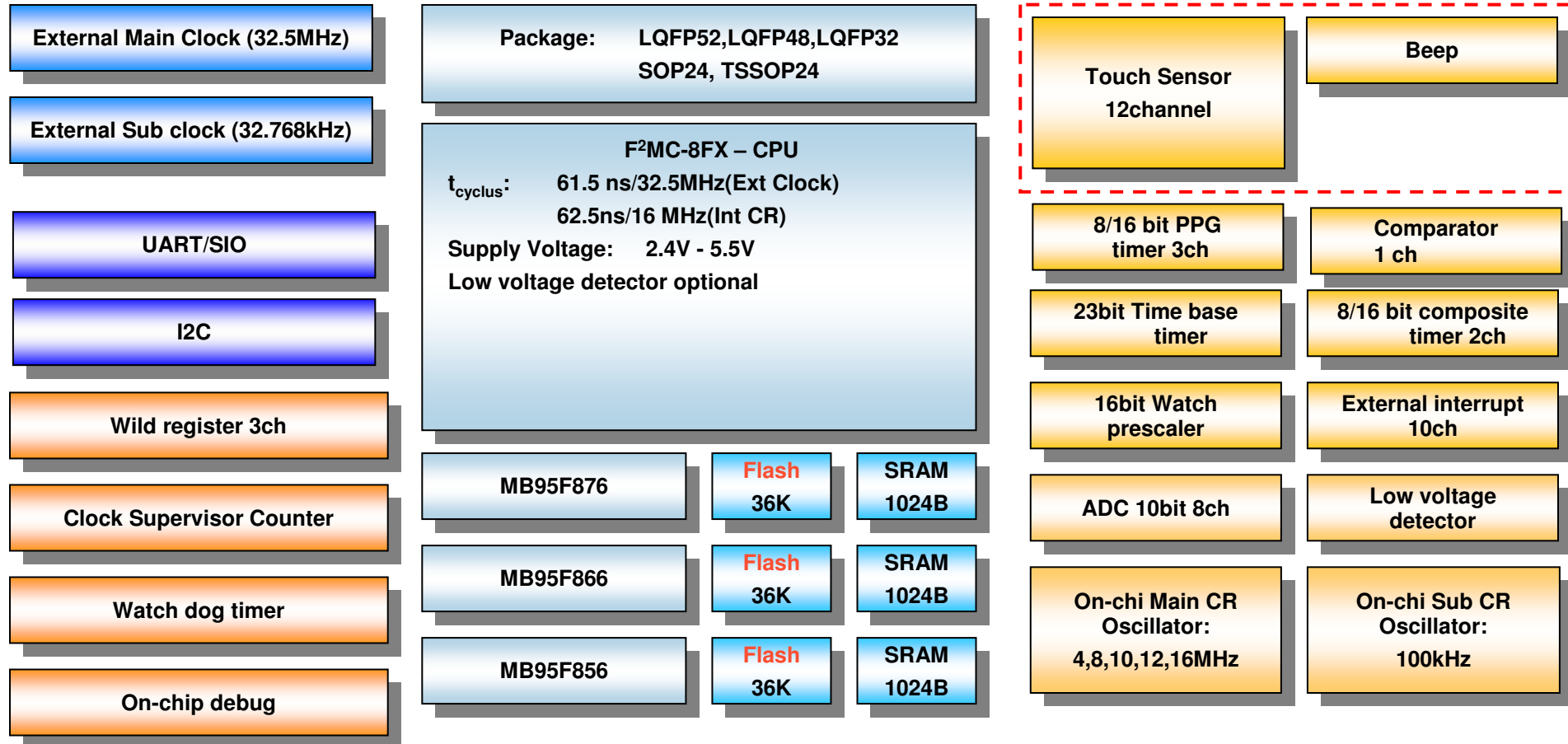


Output Waveform

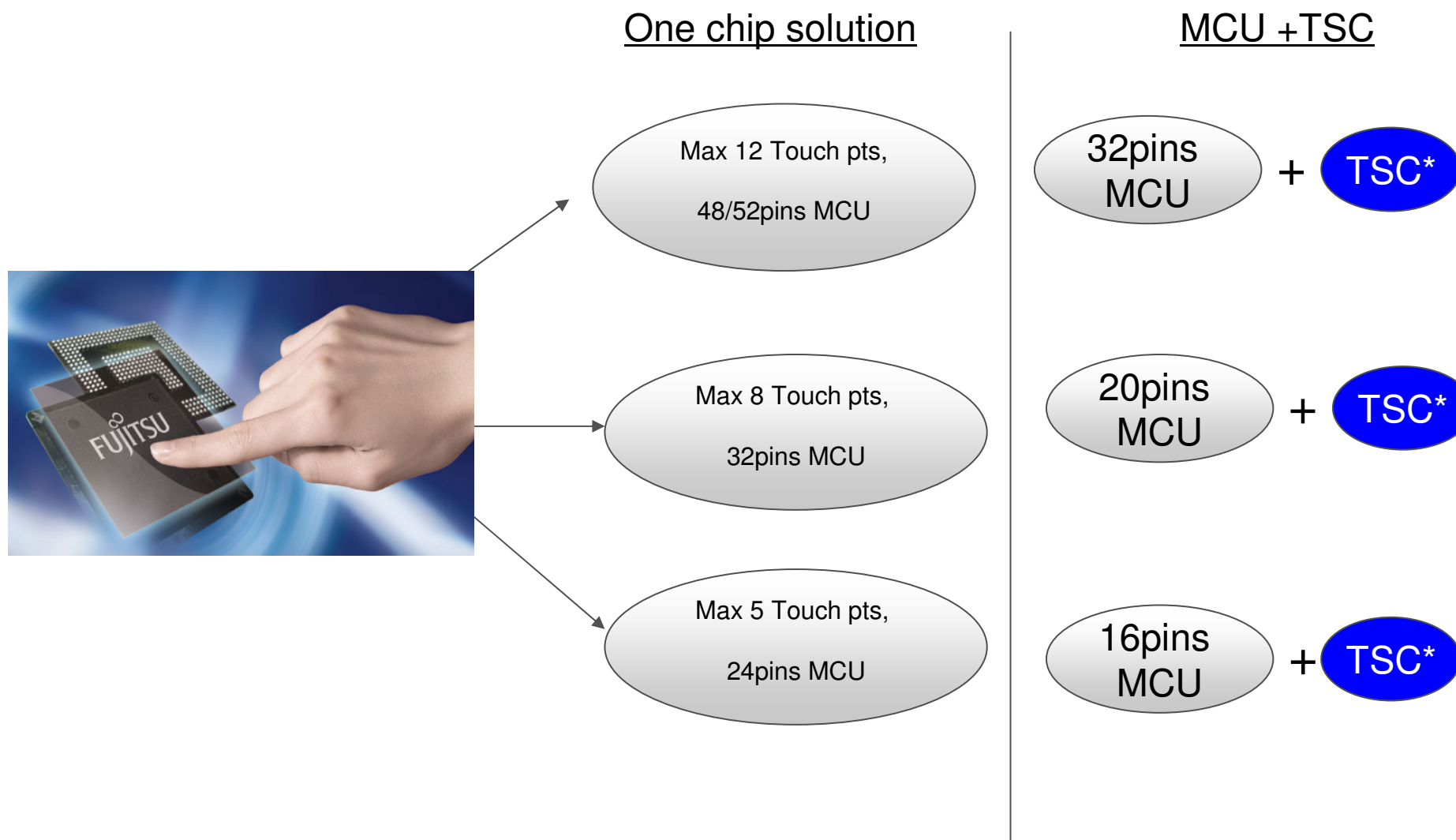


Consistent sensitivity of the touch pad is maintained by setting proper value of α .

MB95870/860/860 Block Diagram



Product Ideas



**TSC touch point can be configured. Max : 12 touch points*

TSC MCU Advantage

Fujitsu TSC Advantage



Easy to use – 1 chip solution

Use 1 chip can achieve “touch” and “Control” functions. Easy for engineer to design

Price competitive -- Cost reduction for the customer

Appliance is a price sensitive market.

Operating supply voltage: 2.9V to 5.5 V

To be compatible with other electronic device in Appliance and Industrial control

Robust in EMC & EMI & ESD

Touch Key performs reliability under all working conditions

Package: Pin Pitch ≥ 0.65 mm

Easy to mount in appliance control board.

F²MC-8FX Family – High Quality & Reliability



- F²MC-8FX Family MB95870/860/850 Series is new family members of F²MC-8FX 8bit microcontrollers
- Enforcement of the existing F²MC-8FX family
 - 52pin, 48pin, 32pin, 24pin products
 - Up to 12 digital H/W TSC Channel
 - Fast, Robust, Low power, Easy for implement
 - High quality & High reliability
 - Proven Flash technology made in Japan
 - 100K erase cycles, 20-year data retention
 - -40C to 85C operation range
 - Safety & Security
 - Flash contents protection
 - Low voltage reset
 - Clock supervisor
 - Easy
 - On-chip RC oscillator
 - Single-wire UART debug interface
 - Low cost development environment
 - Support EEPROM emulation



Advantage of Fujitsu TSC MCU- One-Chip Solution



PCB Size down
※Compare with MCU+TSC

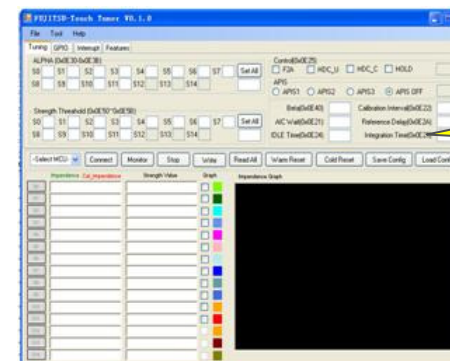
▲10%

▲15%-20%

Cost down

※BOM cost compared with MCU+TSC

Shorten development time



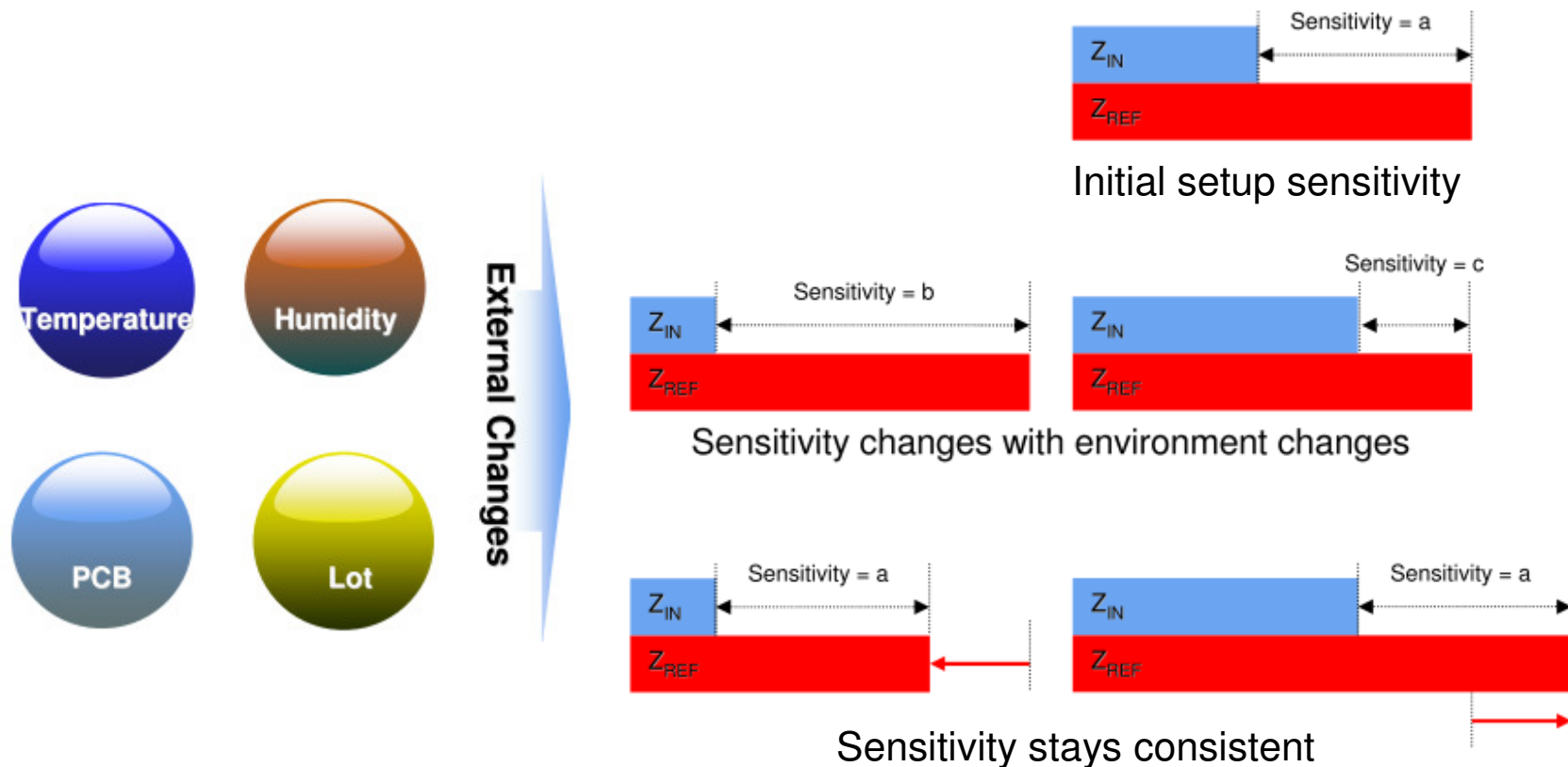
Touchtune

ESD: (With EVB)
IEC614000-4-2 **8KV**
EFT: (With EVB)
IEC614000-4-4 **+4KV**

Better EMC and water proof
performance

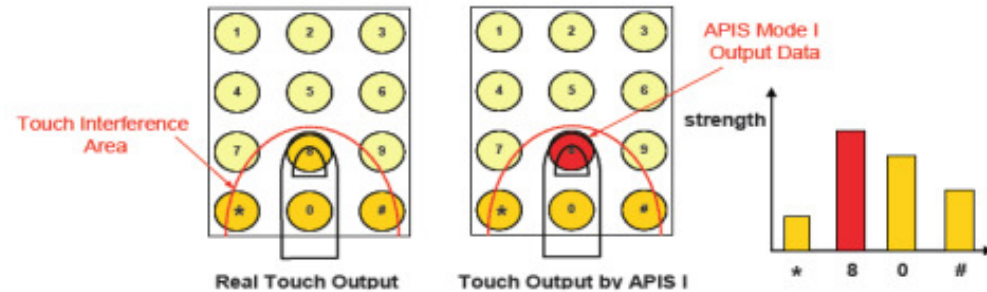
■ AIC™——Automatic Impedance Calibration

- The calibration interval is adjustable
- Maintain consistent sensitivity despite environmental changes
 - temperature, humidity, production tolerance, etc.

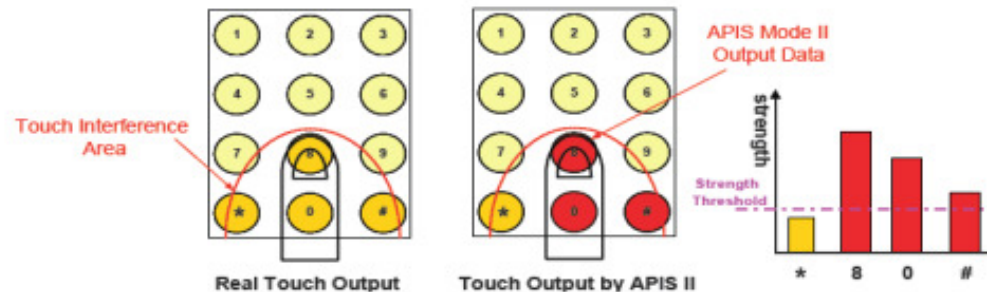


- APIS™——Adjacent Pattern Interference Suppression
- There are three modes in APIS:

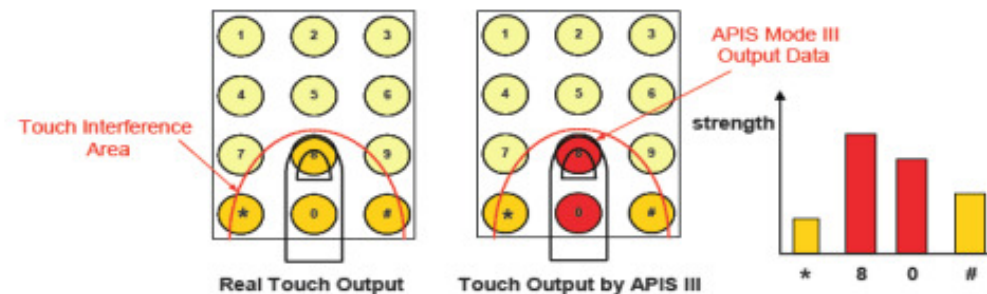
APIS™ Mode 1
Reports the strongest output only



APIS™ Mode 2
Reports all outputs that exceeds predefined thresholds

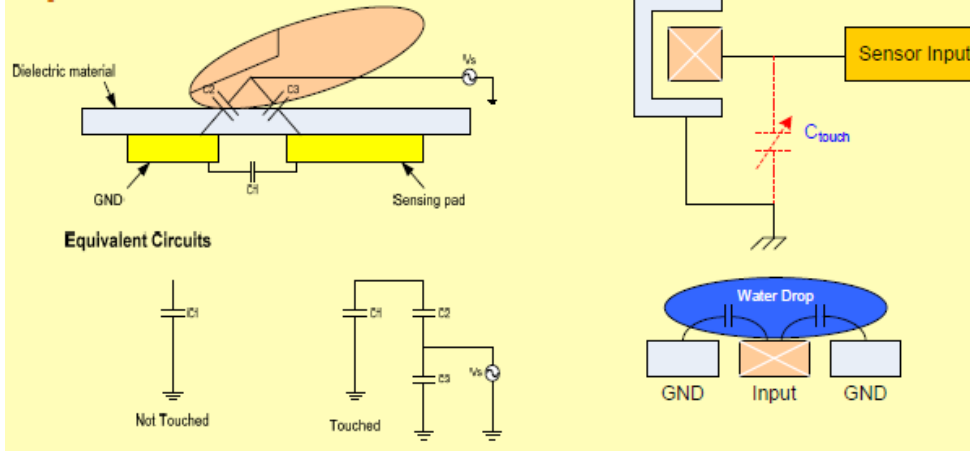


APIS™ Mode 3
Reports two strongest outputs



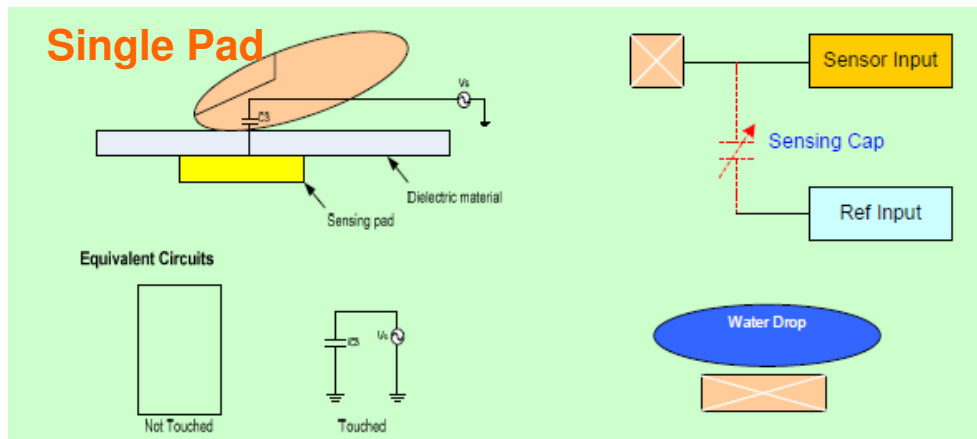
Water proof

Split Pad



- Coupling Capacitance between two electrodes is measured
- Finger increases capacitance coupling
- Water drop has the same effect
- ->False touch detection

Single Pad



- No ground or reference electrode
- Capacitance of pad is measured directly
- Water drop has nearly no effect
- ->No false trigger

Development tool

Platform Overview

■ Hardware

■ EVB:

- MB2146-540-EVB-V1.2.0
- Or customer's PCB

■ BGMA:MB2146-07-E

■ Power Supply: USB-B Cable

■ PC

■ Firmware

■ Sample project:

- (FWSC)TSCMCU-EVP

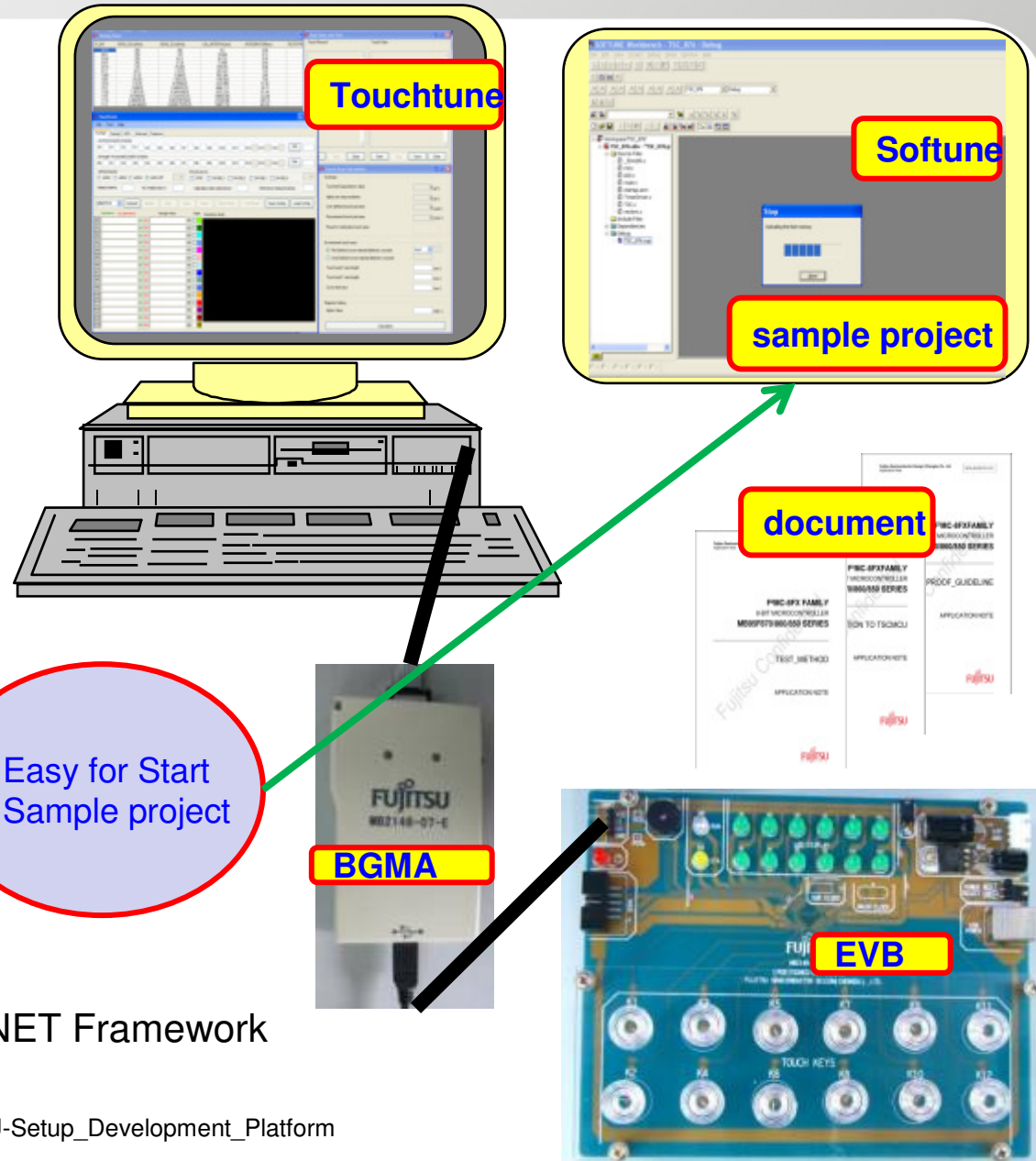
■ Software

■ MCU Tool: Softune

■ Touch Tool: Touchtune

■ Other program :

- Driver of BGMA
- Driver of Touchtune: Microsoft .NET Framework



Relative Document:
MCU-AN-500146-E-01-TSCMCU-Setup_Development_Platform

Development tools-BGM Adaptor



PN: MB2146-07-E



- Small size
 - 58mm(W) X 90mm(L) X 25mm(H)
- USB2.0 interface to PC/SOFTUNE
- Single-wire UART interface to Commodity MCU
- RAM real time monitor
- Stand alone programming
- Power Supply for Target MCU
- Higher debug and programming performance
 - 10 times faster for programming
 - 5 times faster for debug

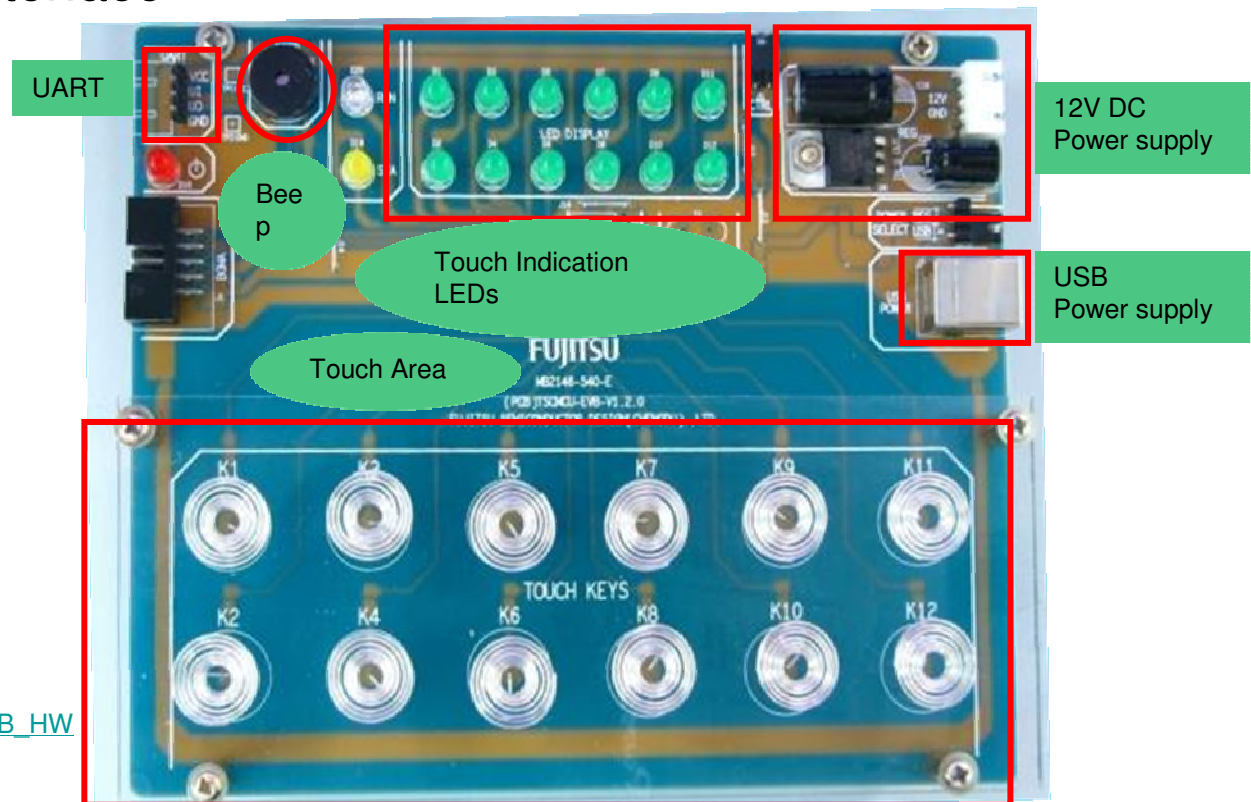
Please order the New BGMA in

Available Now

TSCMCU Demo Overview

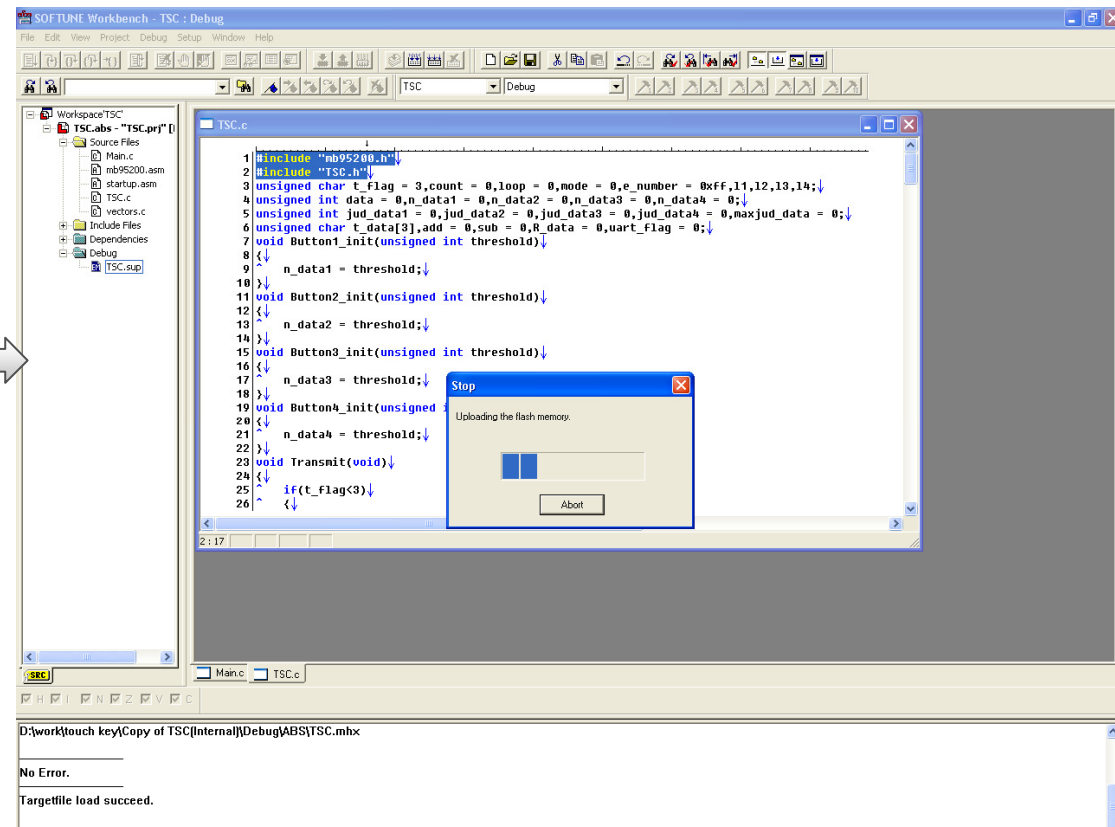
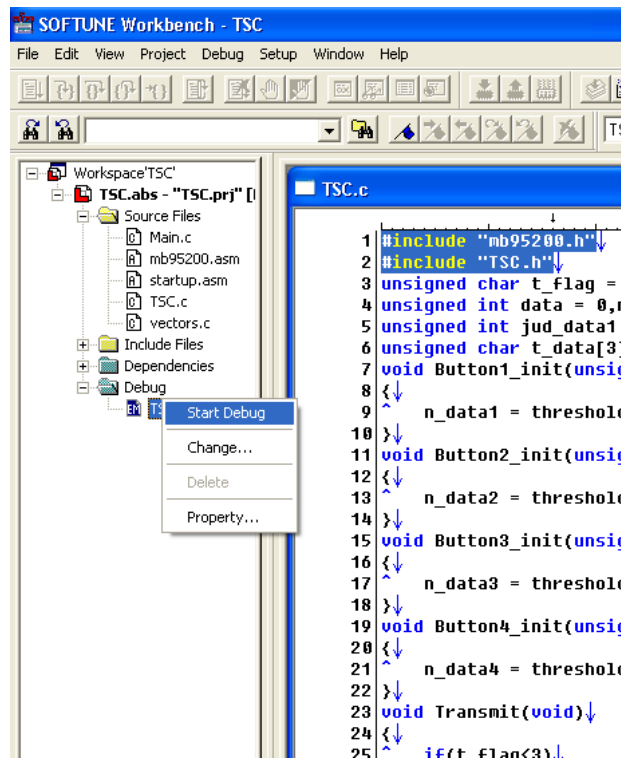


- 12 channels TSC touch key
- 12 LEDs for touch status indication
- TSC directly controlled Beep
- 2 custom LEDs can be used to indicate system status
- UART communication interface
- External control jumper
- Support 2 power supply
 - 12V DC
 - USB 5V DC
- Clock (optional)
 - main clock
 - sub clock



Relative Document:
[MCU-UM-500014-E-03-MB2146_540_E-EVB_HW](#)

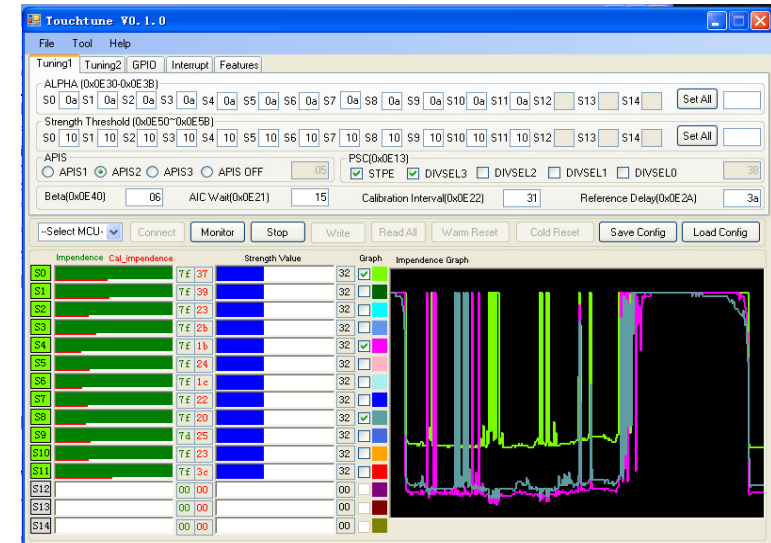
- MCU code are debugged in Softune
- But for Touch:
 - debug in Touchtune
 - And then put related touch register parameters into user code



Touchtune

- Touchtune can help user
 - view touch running status
 - Fine tune suitable touch parameters
- Touchtune including
 - Control touch function
 - Read/write touch registers
 - “Warm Reset”
 - “Cold Reset”
 - Display touch sample value and graph
 - “Impedence”
 - “Cal_impedence”
 - “Strength Value”
 - Control
 - Touch register parameter
 - “Save Config”
 - “Load Config”
 - Tool
 - Timing chart
 - Touch area caculation
 - Manual Register control
 - Data Save and test dialog

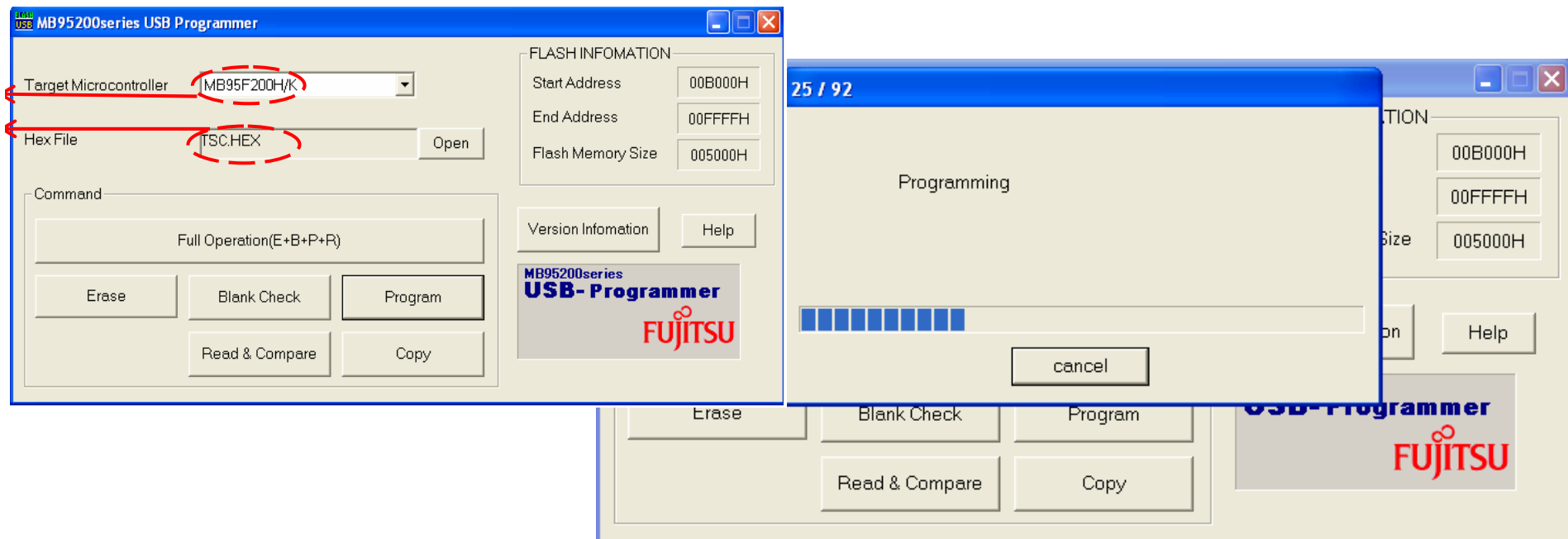
Debug MCU and debug Touch
all use the same toll
MB2146-07-E BGMA Adapter



Programmer

■ USB Programmer Operation

- 1 Open MB95F200 series USB programmer
- 2 Select MCU type (MB95F870/K)
- 3 Select Hex file by the path
- 4 Click Full Operation to start programming
- 5 The USB programmer also provides single operation, including Erase, Blank Check, Program, Read & Compare and Copy



Target applications

Target Applications -Home

■ Larger Home Appliance

- Washing machine
- Air-conditioner
- Refrigerator
- Dishwasher
- etc



■ Small Home Appliance

- Soy milk machine
- Rice Cooker
- Bread machine
- Water heater
- IH cooker Display
- Water purify machine
- Electronic tooth brush
- Bladeless fan
- Etc

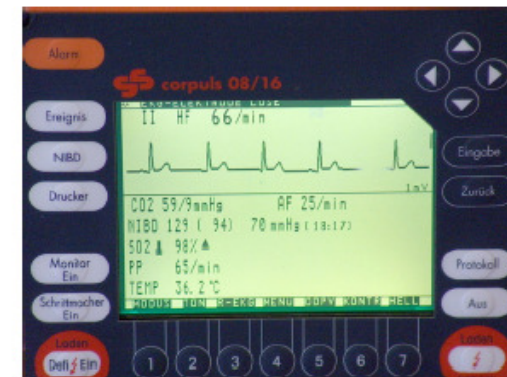


Target Application - Industrial

■ Application examples

---- wherever robust human input device is needed

- Control panels
- Medical instrument
- Test & Measurement Equipment
- Special vehicle



Target Application – Portable Device



Target Application – Office equipment



And Many More...





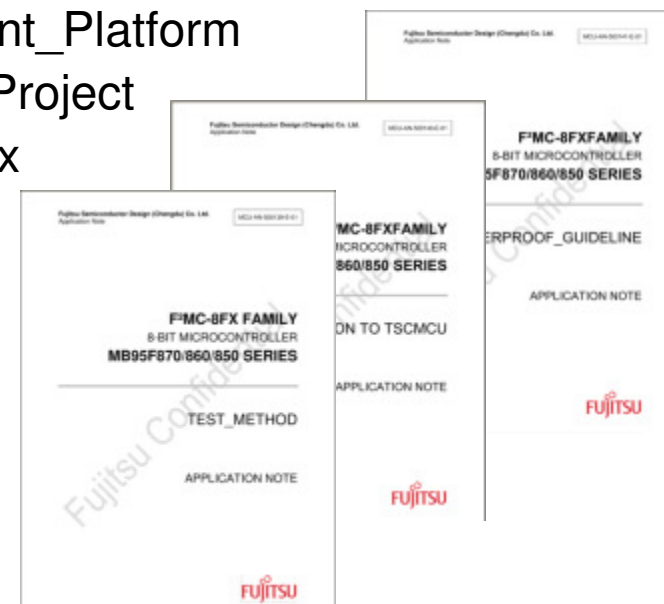
shaping tomorrow with you

Support material

General Application Note



- MCU-AN-500135-E-01-TSCMCU-HW_Guideline
- MCU-AN-500136-E-01-TSCMCU-FW_Guideline
- MCU-AN-500137-E-01-TSCMCU-IMPEDANCE_VS_Enviroment
- MCU-AN-500139-E-01-TSCMCU-Sensitivity_VS_Cover
- MCU-AN-500140-E-01-TSCMCU-Migration_to_TSCMCU
- MCU-AN-500141-E-01-TSCMCU-Waterproof_Guideline
- MCU-AN-500142-E-01-TSCMCU-Quick_Taste_Register
- MCU-AN-500143-E-01-TSCMCU-Test_Method
- MCU-AN-500144-E-01-TSCMCU-Trouble_Shooting
- MCU-AN-500146-E-01-TSCMCU-Setup_Development_Platform
- MCU-AN-500147-E-01-TSCMCU-Get_First_Touch_Project
- MCU-AN-500155-E-01-TSCMCU-Design_Guide.docx
- MCU-AN-500156-E-01-TSCMCU-Start_Guide



More Information—Touchtune AN

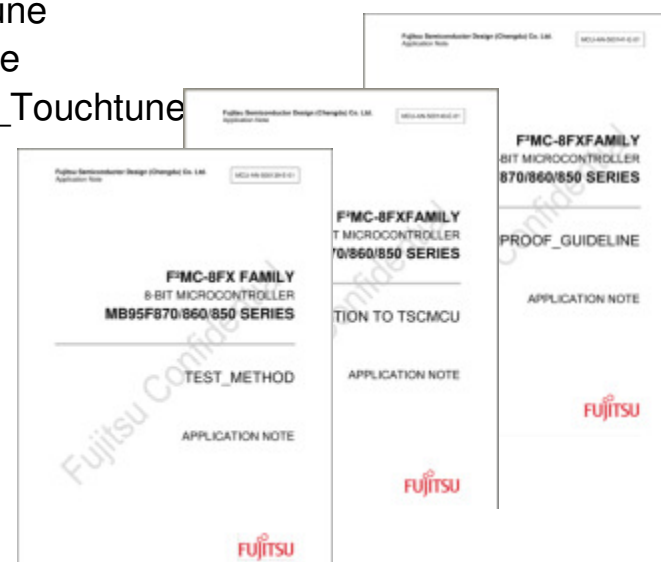


■ Touchtune AN

- MCU-AN-500145-E-01-TSCMCU-Quick_Start_with_Touchtune
- MCU-AN-500148-E-01-TSCMCU-Tuning_Parameters_by_Touchtune
- MCU-AN-500149-E-01-TSCMCU-Tuning_Sensitivity_by_Touchtune
- MCU-AN-500150-E-01-TSCMCU-Tuning_for_Cover_by_Touchtune
- MCU-AN-500151-E-01-TSCMCU-Tuning_for_Water_Robust_by_Touchtune
- MCU-AN-500152-E-01-TSCMCU-Observe_Noise_by_Touchtune
- MCU-AN-500153-E-01-TSCMCU-Check_Touch_by_Touchtune
- MCU-AN-500154-E-01-TSCMCU-Solve_Special_Problem_by_Touchtune

■ Flyers

- **Website:** <http://www.fujitsu.com/cn/fss/mcu/>

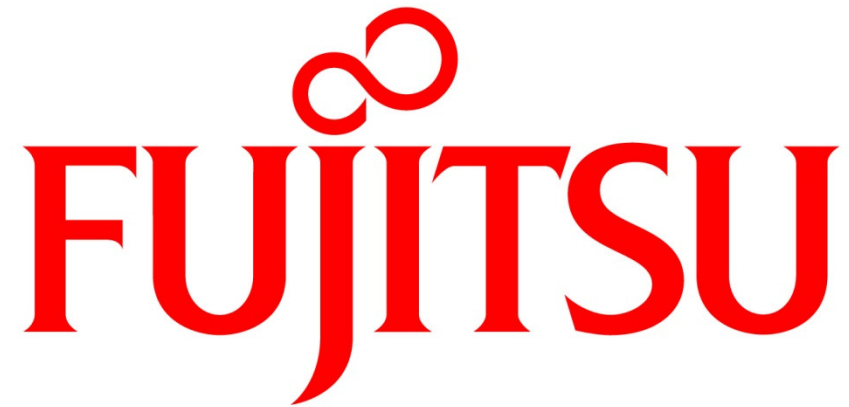


Ordering Information



■ ORDERING INFORMATION

Part number	Package
MB95F856KPFT-G-SNE2	24-pin plastic TSSOP (FPT-24P-M10)
MB95F856KPF-G-SNE2	24-pin plastic SOP (FPT-24P-M34)
MB95F866KPMC-G-SNE2	32-pin plastic LQFP (FPT-32P-M30)
MB95F876KPMC-G-SNE2	48-pin plastic LQFP (FPT-48P-M49)
MB95F876KPMC1-G-SNE2	52-pin plastic LQFP (FPT-52P-M02)



shaping tomorrow with you