TOSHIBA
Leading Innovation

WIRELESS

MODULE²

EMBEDDED BLUETOOTH SYSTEM SOLUTION

Module² combines a Bluetooth 4.0 module with integrated stack and selected Bluetooth profiles, a microcontroller and low power components making it especially suitable for wireless battery driven applications. Simple integration into sensor control systems, lighting or heating systems, PC peripheral systems and legacy host control systems, Module² helps you shorten the development time between ideas and products.

MODULE² FEATURES

- PAN1026 Panasonic Bluetooth Module with Toshiba TC35661-501 Bluetooth LSI
  - ProfileSubSystem QDID: B019234
  - HostSubSystem QDID: B019248
  - Baseband Component QDID: B019235
  - Controller Sub System QDID : B020093
- Supported firmware:
  - Classic and BLE Stack with SPP (Serial Port Profile) + BLE GATT (Generic Attribute) profile (TC35661-501)
- Internal crystal oscillator (26MHz)
- 32kHz clock for Bluetooth sleep mode
- 2.7V - 3.3V single supply voltage
- User interface: HCI / high level API command set (part of application software package)
- 14 Multifunctional GPIO selectable for UART, I2C, SPI, Interrupts, Analog Input, PWM(2)
- JTAG debugger I/F
- Memory: 128KB FlashROM, 8KB RAM memory
- Low power consumption MCU

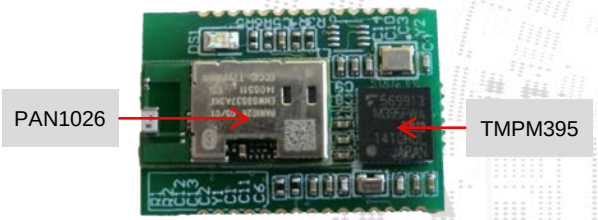
BENEFITS

- Ready made module to enable fast turn around time from idea to product
- Easy BT SIG EPL listing by use of Bluetooth pre-certified BT hardware and firmware
- Small Module² form factor 25 x 17 mm for easy system integration
- Low power components suitable for battery driven applications
- MCU flash memory for Bluetooth driver and system application software
- Easy programming by use of high level Bluetooth API

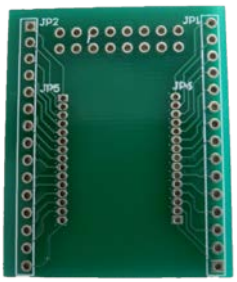
MODULE² BUILDING BLOCKS

Key Embedded Components:

- PAN1026 Dual Mode Bluetooth Module
- CortexM3 Microcontroller TMPM395
- Oscillators, LED

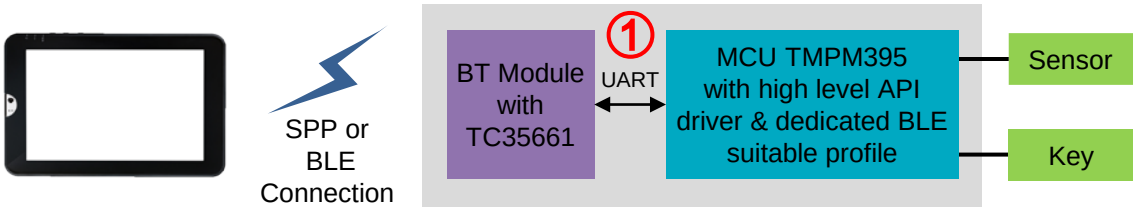


MODULE² ADAPTER PCB



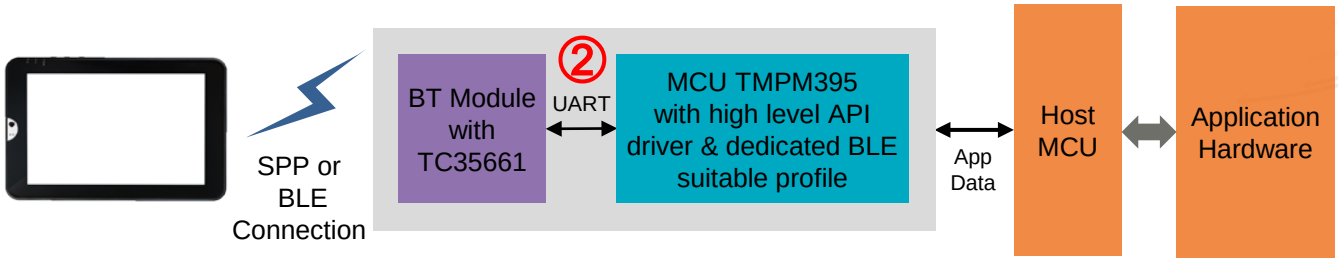
USE CASE EXAMPLE 1: SENSOR SYSTEM

- MCU TMPM395 senses sensors/inputs and controls the BT module
- MCU TMPM395 sends data via flashed Toshiba BT high level SPP/BLE API via UART to the BT module
- BT module send data via SPP or selected BLE profiles to receiver (or viceversa)

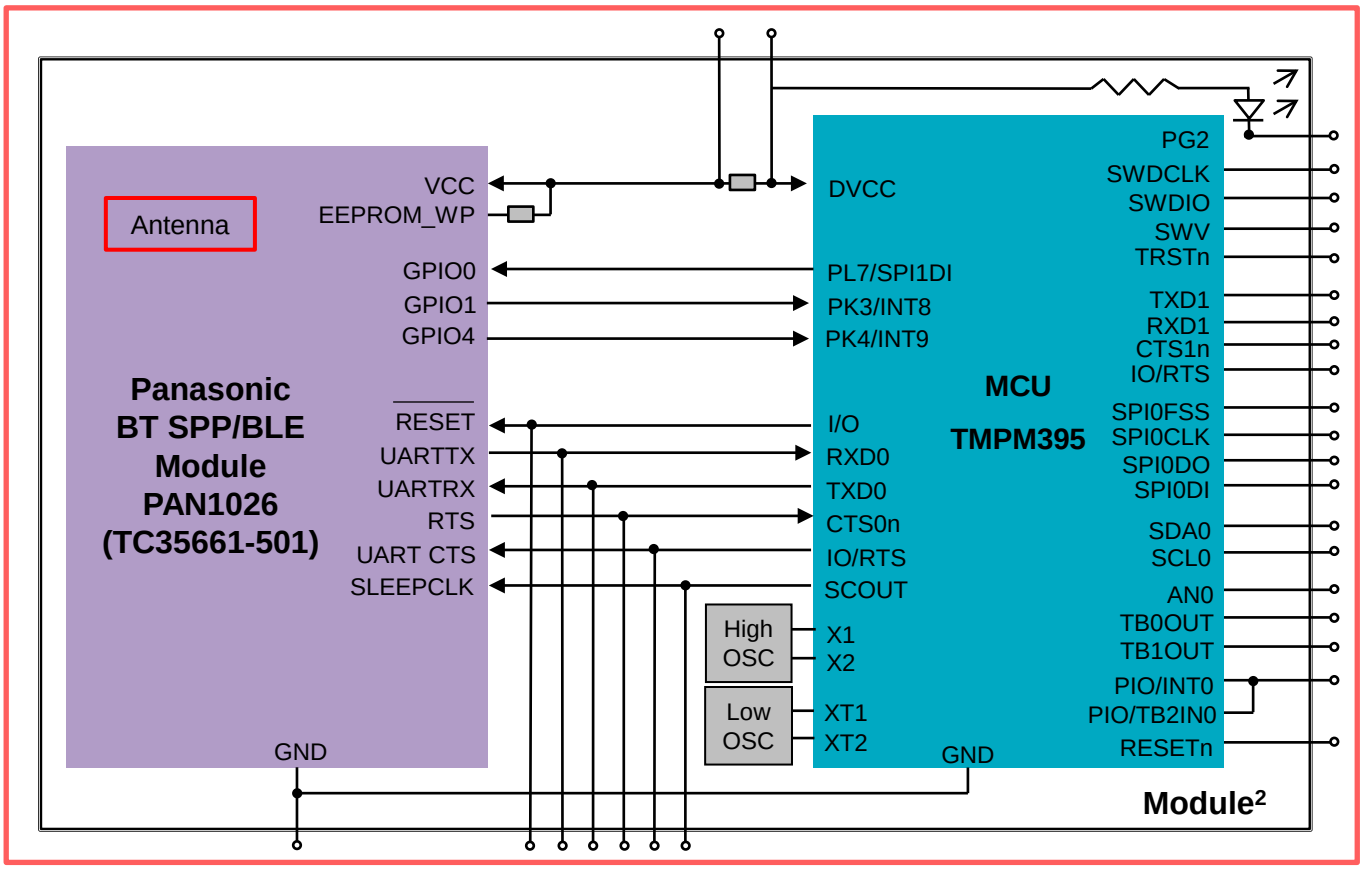


USE CASE EXAMPLE 2: PC PERIPHERAL/LEGACY HOST SYSTEM CONTROL

- Separate host MCU controls application and prepares data
- MCU TMPM395 controls BT module via flashed high level SPP/BLE
- BT module sends data via SPP or selected BLE profiles to receiver (or vice versa)

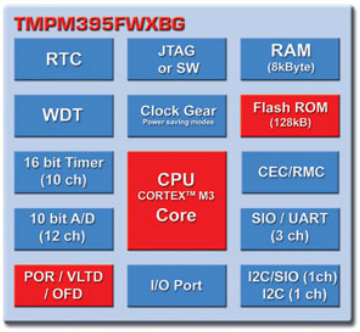


MODULE² BLOCK DIAGRAM



TMPM395FWAXBG

The TMPM395 is a highly-functional, low-power 32-bit microcontroller incorporating an ARM Cortex™-M3 core. With independent RTC and IO capable of separating or shutting off power supplies, the TMPM395 is ideal for controlling digital AV equipment and realizing 1.8V low-power operation.



TMPM39 SERIES PACKAGES

Part Number	ROM	RAM	Package
TMPM395FWAXBG	128KB (Flash)	8KB	BGA120 (6mm x 6mm 0.5mm pitch)
TMPM390FWFG**	128KB (Flash)	8KB	LQFP100 (14mm x 14mm 0.5mm pitch)

**Under development

MODULE² PIN CONFIGURATION

Pin	Name	Pin	Name
1	UART_RTS	16	BT_SLEEPCLK
2	UART_CTS	17	BT_UART_TX
3	UART_RX	18	BT_UART_RX
4	UART_TX	19	BT_UART_CTS
5	RESETn	20	BT_UART_RTS
6	VCC	21	BT_RESETn
7	GND	22	BT_VCC
8	TRSTn_Debug	23	BT_GND
9	SWV_Debug	24	BT_STATUS INDn
10	SWCLK_Debug	25	I2C_SDA
11	SWDIO_Debug	26	I2C_SCL
12	SPI_FSS	27	IO_PWM0
13	SPI_CLK	28	IO_PWM1
14	SPI_DO	29	IO_INT0/TB2IN0
15	SPI_DI	30	IO_AN

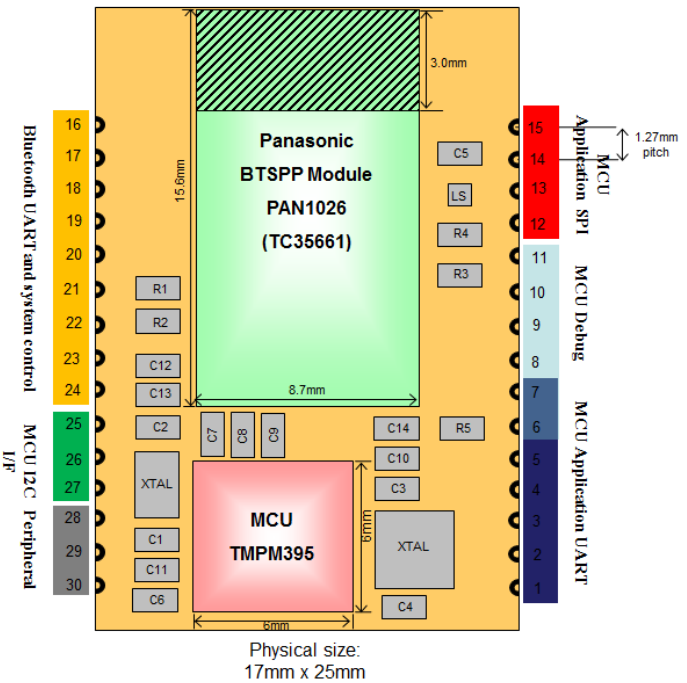
ARM CORTEX™-M3 CPU CORE

- Operating voltage: 1.7 to 3.6V (Single supply/ on-chip regulator)
- Maximum operating freq.: 20 MHz
- Internal memory ROM: 128KB
  RAM: 8KB
- On-chip debug circuit: JTAG, SWD, SWV or 4-bit trace interface
- Power saving op.: Clock gear (1/2, 1/4, 1/8)
  Standby modes (IDLE, SLOW, SLEEP, Backup, STOP)

BUILT-IN FUNCTIONS

- 10 bit AD converter: 12ch
- 16 bit timer: 10ch (free-running, compare output, PPG output, input capture)
- Serial interface: SIO/UART 3ch
  I2C (100KHz,400KHz)/SIO 2ch
  SSP(SPI) 4ch
- CEC: 1ch
- Remote control signal pre-processor: 2ch
- Real time clock timer: 1ch
- Voltage detection circuit (LVD)
- On-chip oscillator (9.91MHz)
- Power-on reset circuit (POR)

MODULE² SIZE



Physical size:
17mm x 25mm

MODULE² BLUETOOTH SOLUTION: HIGH LEVEL API FOR EASE-OF-USE

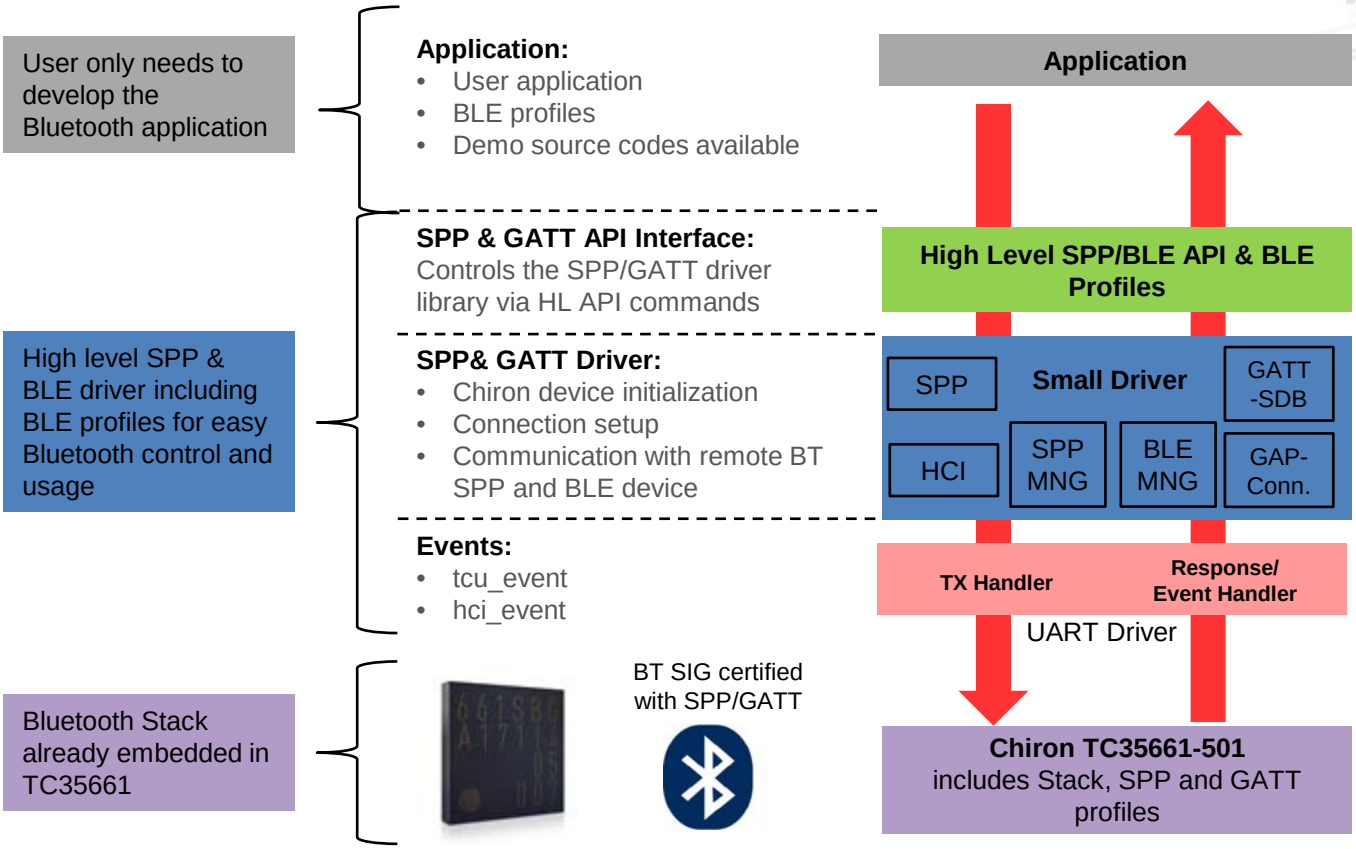
The Toshiba high level SPP and BLE API allows easy use of the Bluetooth module for programing the microcontroller application. It can be downloaded as source code from Toshiba Electronics Europe website http://www.toshiba-components.com/bluetooth/

The API may be combined with an operating system (for example FreeRTOS®) or run without (V2.x). The API can then be compiled by a commercial development tool such as IAR® tool chain, downloaded to the Flash memory of the MCU and debugged there.

Toshiba Electronics Europe also offers various standard BLE profiles for this package, which communicate with the embedded BLE GATT profile. A proprietary SPP over BLE profile for simple cable replacement is available on request.

All software is subject to a software license agreement and offered as reference only.

TOSHIBA SOFTWARE ARCHITECTURE INCLUDING HIGH LEVEL API



GENERAL MODULE² INFORMATION

- The product is available as reference design
- Schematics, Gerber files and samples can be supplied on request
- Bill of materials calculation support available
- Software application source codes are available including SPP / GATT driver software