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1 SCOPE OF THIS DOCUMENT

This Design Guide applies to the Bluetooth development platform PAN1026 USB. The intention is to enable our customers to easily and fast integrate our module PAN1026 in their product.

This guide describes the Hardware and gives usefull hints. Software related documents are described in chapter 4.

Please refer to chapter 5.8 Development of Applications for an overview.

2 BLUETOOTH 4.0

Bluetooth Low Energy (BLE), part of Bluetooth Ver. 4.0, specifies two types of implementation: Single mode and dual mode. Single mode chips implement the low energy specification and consume just a fraction of the power of classic Bluetooth, allowing the short-range wireless standard to extend to coin cell battery applications for the first time. Dual mode chips combine low energy with the power of classic Bluetooth and are likely to become a de facto feature in almost all new Bluetooth enabled cellular phones and computers.

Single mode Bluetooth 4.0 Low Energy is not backwards compatible with previous Bluetooth standards. Dual mode Bluetooth 4.0 Low Energy is backwards compatible but is not practical for low power devices but targeted to gateway products.

In case BLE is constantly connected and constantly sends data power consumtion will be In case BLE is constantly connected and constantly sends data power consumption will be similar like Classic Bluetooth. The BLE maximal net data rate is about 6Kb/sec compared to 2Mb/sec with Bluetooth EDR. The typical BLE packet size is 20Bytes.
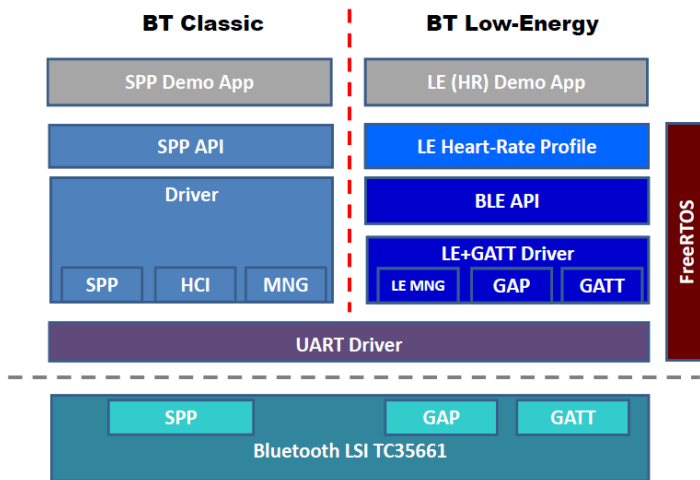
3 BLUETOOTH MARKS

According to the new Bluetooth SIG marks "Bluetooth Smart" (single mode → mainly sensors) and "Bluetooth Smart Ready" (dual mode → gateway and hub devices) the PAN1026 fulfills criteria to lable your product as a Bluetooth Smart Ready device.

4 SOFTWARE RELATED DOCUMENTS SUMMARY

4.1 PREDEFINED HIGH LEVEL APIS

Make use of the Easy to use High-Level SPP and Bluetooth Low Energy API for PAN1026 setup, connect and data transfer in an easy way. Driver layer provide access to the entire function set of the module. SPP and Bluetooth Low Energy application example is available on Toshiba CortexM3 MCU with FreeRTOS integration.

High Level SPP APIs are sufficient for communication with a remote SPP device.

With the LE+GATT Driver the use of PAN1026 Command Interface is simplified. It encapsulates Chiron LE MNG, GAP & GATT Commands in one.

	High Level SPP APIs	High Level BLE APIs
Documentation	• SPP API Specification • SPP Driver Specification • SPP Application Note	• BLE API Specification • LE+GATT Driver Specification • LE Heart-Rate Profile Application Note
Software	• SPP Application example source code • SPP API as source code • SPP drivers as source code • Project files for Toshiba TMPM395 MCU	• LE Application example source code • LE Heart-Rate Profile example source code • BLE API source code • LE+GATT driver source code • Project files for Toshiba TMPM369 MCU

4.2 SOFTWARE DOCUMENTATION OVERVIEW

This Documentation Guide explains how to work with the manuals available for apllication development.

Along with PAN1026 with TC35661-501 product, Toshiba provides a rich set of documents covering different topics, which might be relevant from a developer's perspective. This guide should help user find its way through the available documentation.

Document Guide

The individual PDF's are available for DOWNLOAD

4.3 UNIQUE MAC/BLUETOOTH ADDRESS

The PAN1026 has a preprogrammed address in the EEPROM that needs to be copied into the RAM during the intialisation. Therefore three TCU commands need to be used. Below is an example with the individual address 00 13 43 00 00 1A

I2C Enable:
--> 01 08 FC 0B 00 A0 00 00 00 14 5B FF 02 03 01
<-- 04 FF 0A 08 00 A0 00 00 00 14 5B 00 00
I2C Enable: Success

Read BT address from E2PROM:
--> 01 08 FC 10 00 A1 00 00 00 14 88 FF 10 06 A0 01 01 06 02 00
<-- 04 FF 11 08 00 A1 00 00 00 14 88 00 10 06 00 13 43 00 00 1A
Read E2PROM: Success

Set BD Addr (into RAM):
--> 01 13 10 06 1A 00 00 43 13 00
<-- 04 0E 04 04 13 10 00
Set BD Addr: Success

Comment: The "red" BT address is original and needs to be byte switched to write into the RAM of the module to be visible in an BT inquiry as example.

5 PAN1026 USB EVALUATION KIT

PAN1026 USB (EasyToUse) is a development platform for PAN1026 BLE dual module to implement Bluetooth functionality into various electronic devices.
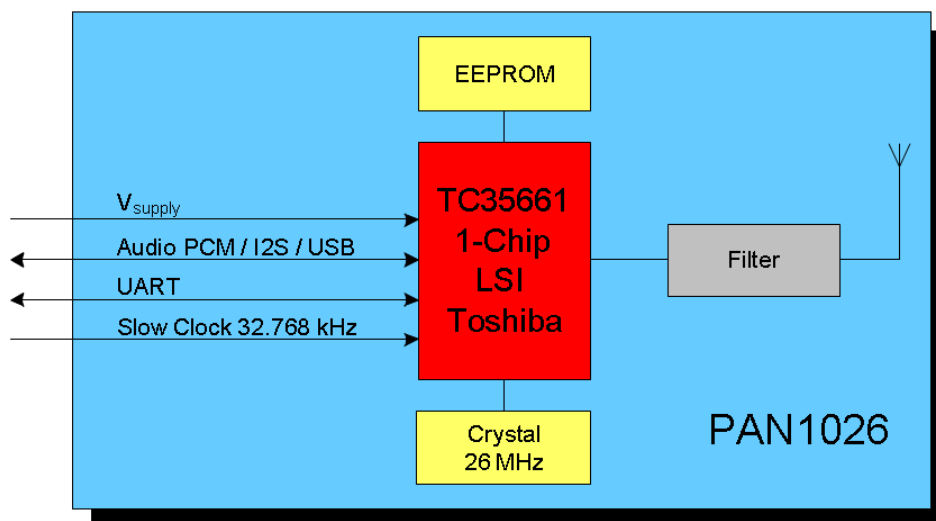

The PAN1026 USB is intended for evaluation purpose and can be used together with EasySPP and EasyBLE Software.
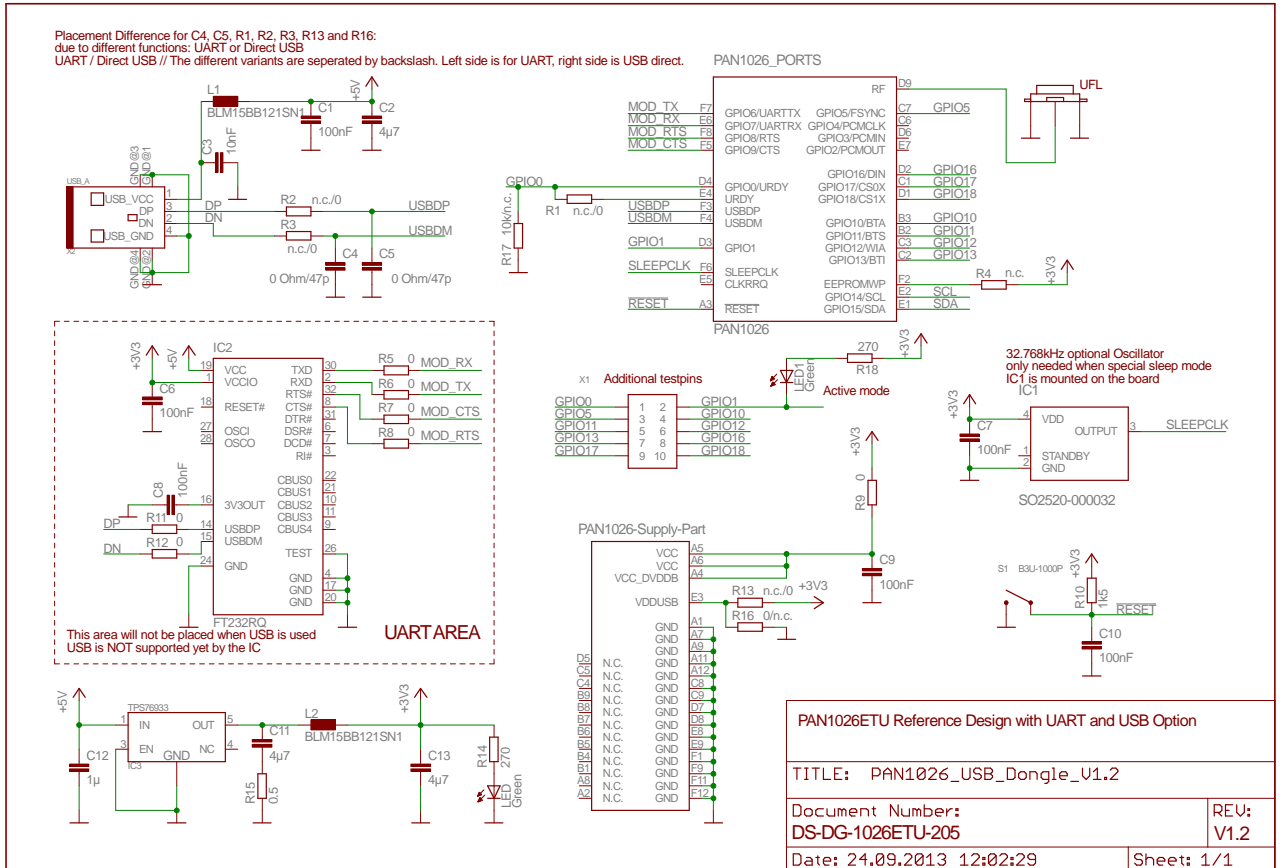
The API, a very useful abstracted tool is described on the Toshiba website: http://www.toshiba-components.com/bluetooth/technicaldocuments.html

Please contact your local sales office for further details on additional options and services, by visiting www.panasonic.com/rfmodules for US and http://industrial.panasonic.com/eu/ for Europe or write an e-mail to wireless@eu.panasonic.com

5.1 BLOCK DIAGRAM PAN1026 MODULE

5.2 REFERENCE DESIGN USB EVALUATION KIT

PAN1026ETU Reference Design with UART and USB Option

TITLE: PAN1026_USB_Dongle_V1.2

Document Number: DS-DG-1026ETU-205	REV: V1.2
Date: 24.09.2013 12:02:29	Sheet: 1/1

5.3 PLACEMENT (LIVE VIEW)
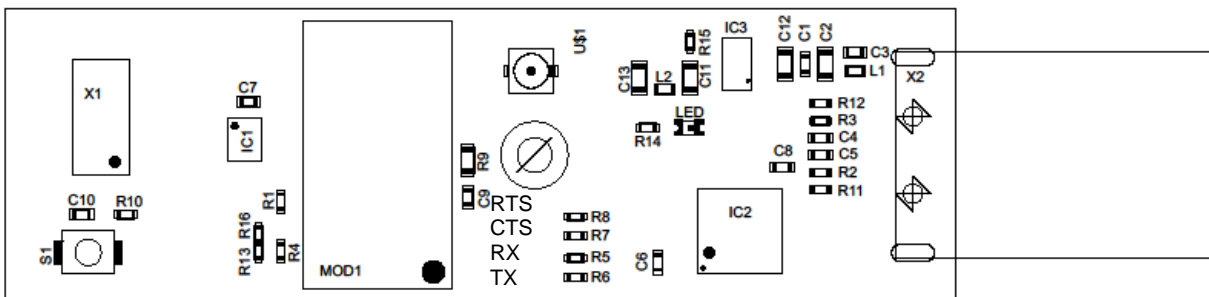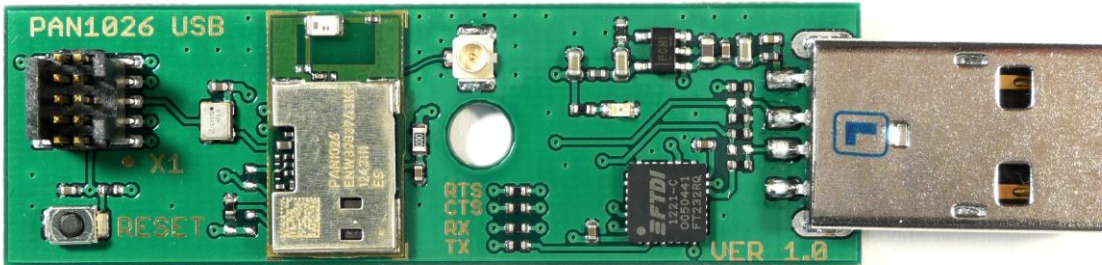
5.4 OVERVIEW FOR THE USB EVALUATION BOARD OPTIONS
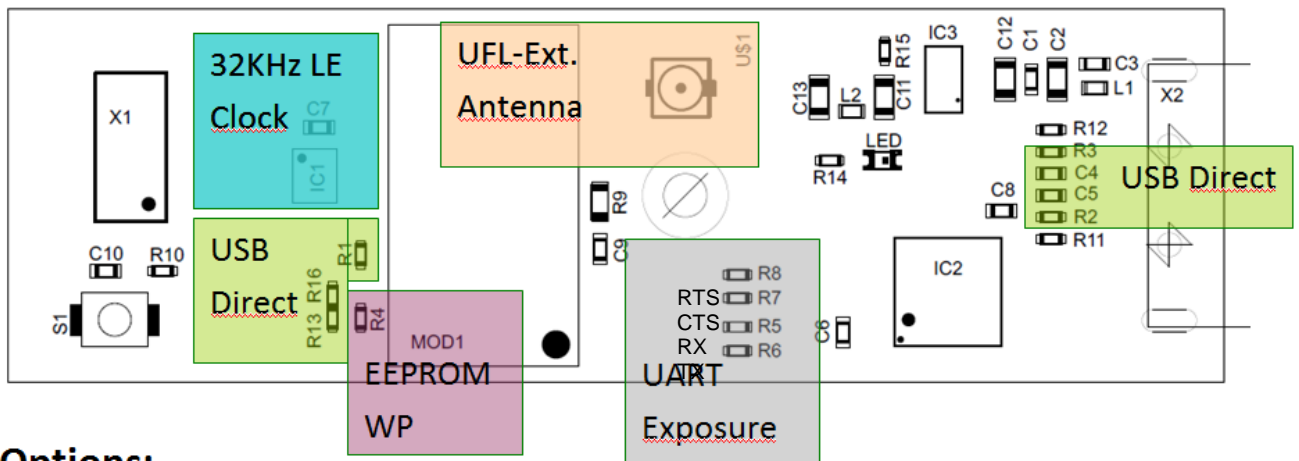
Options:

1. UFL External Antenna
2. USB – Direct
3. 32KHz Low Power Clock
4. EEPROM Write Protect
5. UART Exposure

Note: UFL external antenna connector can be used if the cap next to the modules shield is moved (de-soldered – soldered) to the other (free) pin.

5.5 PLACEMENT RECOMMONDATIONS
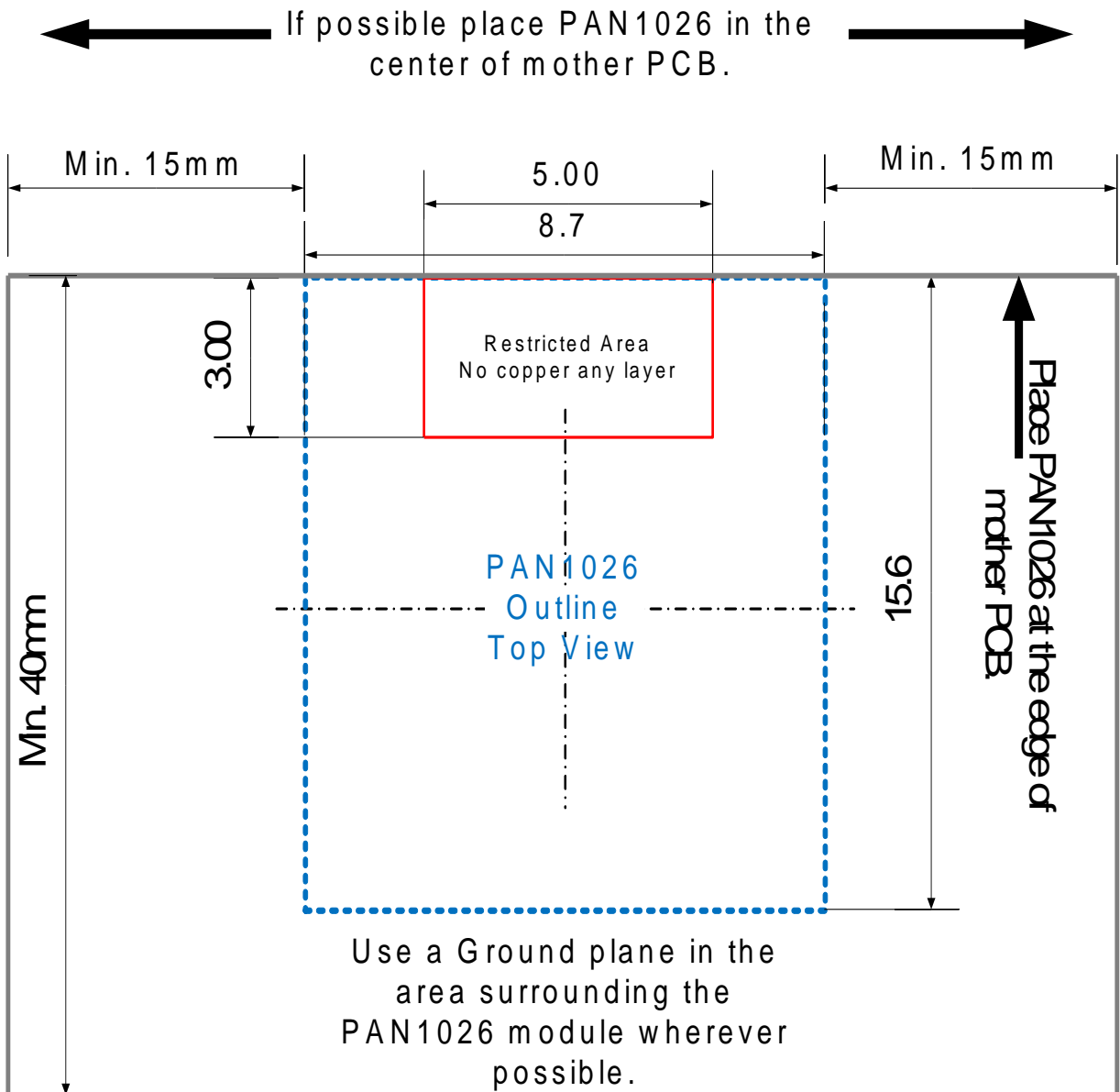
PAN1026 WITH ANTENNA PLACEMENT

If possible place PAN1026 in the center of mother PCB.

Min. 15mm — 5.00 — 8.7 — Min. 15mm

3.00

Restricted Area
No copper any layer

PAN1026
Outline
Top View

Mn 40mm

15.6

Place PAN1026 at the edge of mother PCB.

Use a Ground plane in the area surrounding the PAN1026 module wherever possible.

Dimensions are in mm.

5.6   RADIATION PATTERN
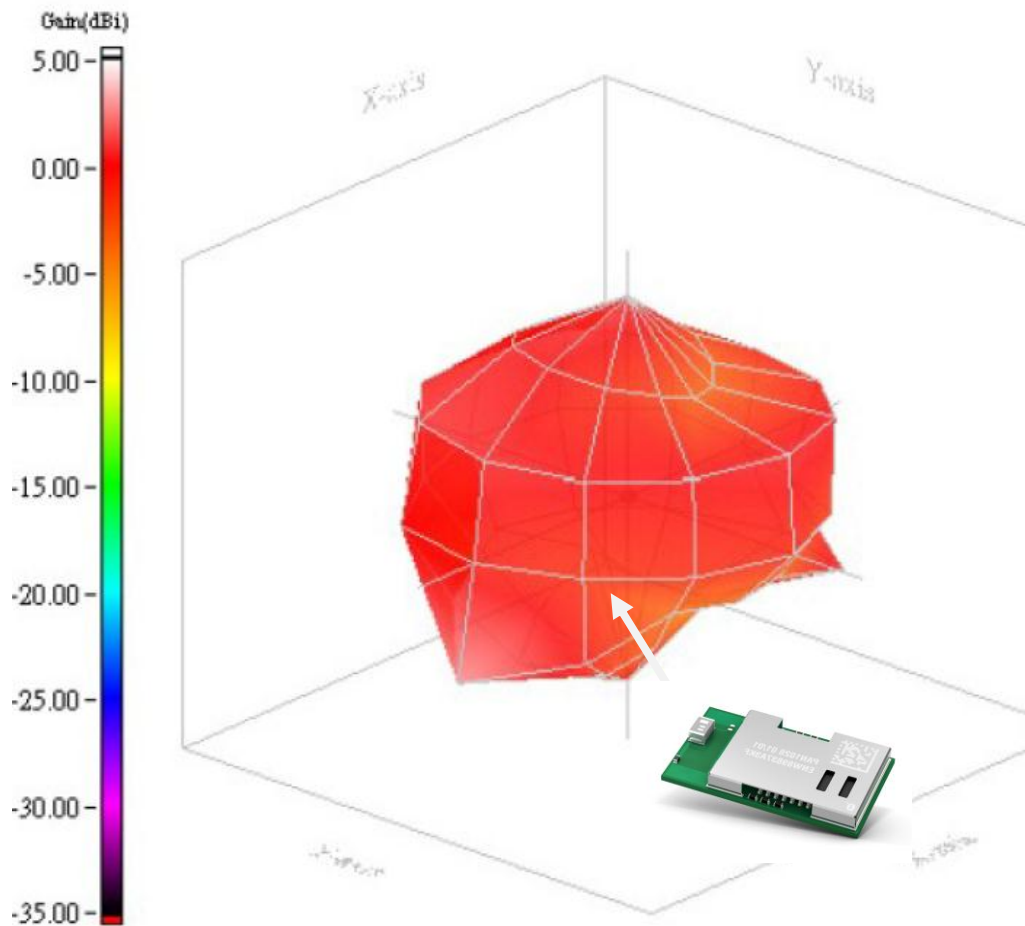
5.7   RECOMMENDED TOOLS

EasySPP:

This tool is the first step to get familiar with the TCU commands. The issued commands can be copied and then ported to any microcontroller. Hyperterminal is not recommended to use because the commands are in binary format.

You will need Microsoft .NET framework version 4, which can be downloaded from the Microsoft website.

EasySPP

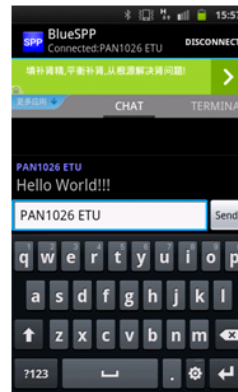EasySPP documentation includes an application example how to connect PAN1026 USB stick and an Android device with the app BlueSPP.

Easy BLE:

This tool has the same intention as the EasySPP and shows some example BLE profiles e.g. heart rate sensor. It can be used together with various of the shelf Apps running on iPhone and Android phones supporting BT.4.0. One example is "Wahoo Utility" which is available in the Apples iTunes App Store.

EasyBLE

EasyBLE documentation includes an application example how to connect PAN1026 USB stick and an iOS device
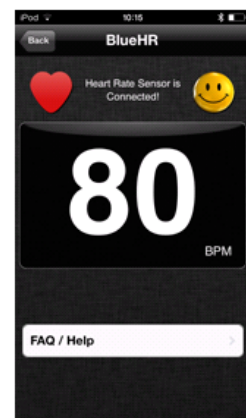
5.8 DEVELOPMENT OF APPLICATIONS

Please contact your local sales office for customized development of your individual application. Note that the individual MAC address is stored in the EEPROM and has to be loaded into the RAM after each start-up.

The API is described here:

http://www.toshiba-components.com/bluetooth/technicaldocuments.html

Recommended tool chain: IAR, J-Link debugger

The BMSKTOPASM369BT(kc) starter kit makes it possible to quickly and easily evaluate Toshiba's Bluetooth® Dual Mode LSI TC35661-5xx in combination with Toshiba CortexM3 MCU as host MCU. It is made to execute the Toshiba Bluetooth Driver software and debug user application code via an embedded J-Link debugger interface. The TMPM369FDFG Microcontroller offers embedded Ethernet, CAN, USB host, USB device and RS-232 connectivity.

Starter Kit Content:
• Toshiba TOPAS369BT Board
• Segger J-Link JTAG/SWD Emulator with USB interface
• J-Link 19-pin Cortex-M Adapter
• USB Cable
• Rapid Start-up Guide

6 ORDERING INFORMATION

Ordering part number	Description
	Development Kits
ENW89837AYKF	PAN1026ETU Development Kit (includes 2 USB Sticks)
	Modules
ENW89837A3KF	PAN1026 CLASS 2 Bluetooth dual mode Module according BT-4.0. 115kBaud *Bluetooth*® smart ready device
	PAN1026 CLASS 2 Bluetooth dual mode Module according BT-4.0. 9k6Baud *Bluetooth*® smart ready device

7 HISTORY FOR THIS DOCUMENT

Revision	Date	Modification / Remarks
0.1	05.02.2013	1st version.
0.2	17.12.2013	Several new informations regarding the BLE part.
1.0	09.09.2014	Updated Schematic.
1.1	17.11.2014	Included chapter MAC/BT Address. Added Radiation Pattern.

7.1 RELATED DOCUMENTS

All files and documentations are available for download: DOWNLOAD

8 GENERAL INFORMATION

This product description does not lodge the claim to be complete and free of mistakes.
Please contact the related product manager in every case.
If we deliver ES samples to the customer, these samples have the status Engineering Samples. This means, the design of this product is not yet concluded. Engineering Samples may be partially or fully functional, and there may be differences to be published Data Sheet.
Engineering Samples are not qualified and are not to be used for reliability testing or series production.

<u>Disclaimer:</u>
Customer acknowledges that samples may deviate from the Data Sheet and may bear defects due to their status of development and the lack of qualification mentioned above.
Panasonic rejects any liability or product warranty for Engineering Samples. In particular, Panasonic disclaims liability for damages caused by

- the use of the Engineering Sample other than for Evaluation Purposes, particularly the installation or integration in an other product to be sold by Customer,
- deviation or lapse in function of Engineering Sample,
- improper use of Engineering Samples.

Panasonic disclaimes any liability for consequential and incidental damages.
In case of any questions, please contact your local sales partner or the related product manager.

9 FCC WARNING

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

The FCC and other regulatory certifications for the PAN1026 will be published in the PAN1026 Datasheet.

10 LIFE SUPPORT POLICY

This Panasonic product is not designed for use in life support appliances, devices, or systems where malfunction can reasonably be expected to result in a significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness. Panasonic customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Panasonic for any damages resulting.