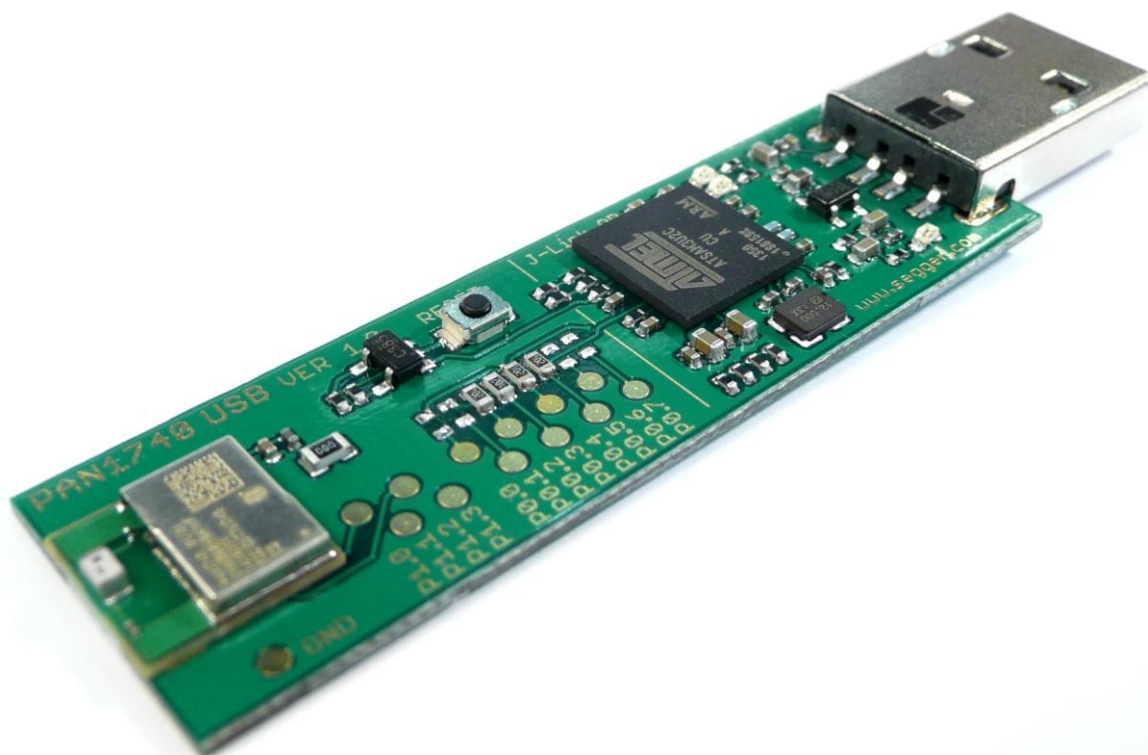


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PAN1740 Design Guide



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1. SCOPE OF THIS DOCUMENT

This Design Guide applies to the Bluetooth development modules PAN1740ETU and PAN1740ETU. The intention is to enable our customers to easily and quickly integrate Panasonic's PAN1740 module in their product.

This guide describes the Hardware and gives usefull hints.

2. KEY BENEFITS WHEN USING PAN1740

- Single-mode Bluetooth Smart System-on-Chip
- ARM CORTEX M0 CPU
- Small 9.0 x 9.5 x 1.8 mm SMD package with antenna
- Includes 16MHz and 32.768kHz crystal
- Temperature Range from -40°C to +85°C
- Pre-programmed calibration data and BT-Address
- Peak Power consumption 4.9mA Rx and Tx
- Less than a few µA in low power modes
- Link budget 93dBm (Rx Sensitivity -93, Tx 0 dBm)

3. BLUETOOTH LOW ENERGY

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.

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 PAN1740 fulfills criteria to lable your product as a Bluetooth Smart device.



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4. DESCRIPTION PAN1740

PAN1740 is the next generation Bluetooth Low Energy Module from Panasonic with reduced form factor, significantly lower power consumption and embedded Software Stack. The Singlemode Bluetooth Smart System-on-Chip module is optimized for low power, small size and low system cost products. It reduces external component count, development effort and time to market.

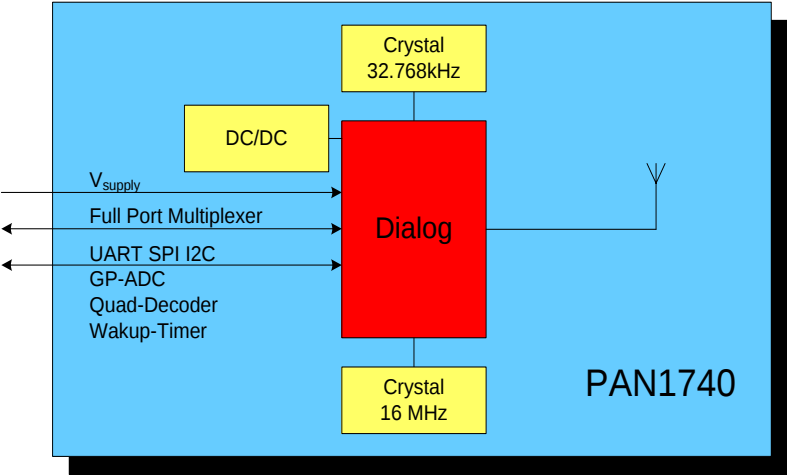
The Module is manufactured in a very small 9.0* 9.5* 1.8 mm SMD package with shielded case and chip antenna. The power consumption of only 4.9mA in Tx and Rx mode makes the use of coin cell batteries possible or reduces the needed battery capacity and cost of existing solution by at least 50%. It is qualified according to Bluetooth 4.0 standard. FCC, IC and CE approvals are under preparation.

The PAN1740 comes with a complete software development platform, which includes a qualified Bluetooth Smart single-mode stack to be programmed on chip. Multiple Bluetooth Smart profiles for consumer wellness, sport, fitness, security and proximity applications are supplied as standard, while additional customer profiles can be developed and added as needed.

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

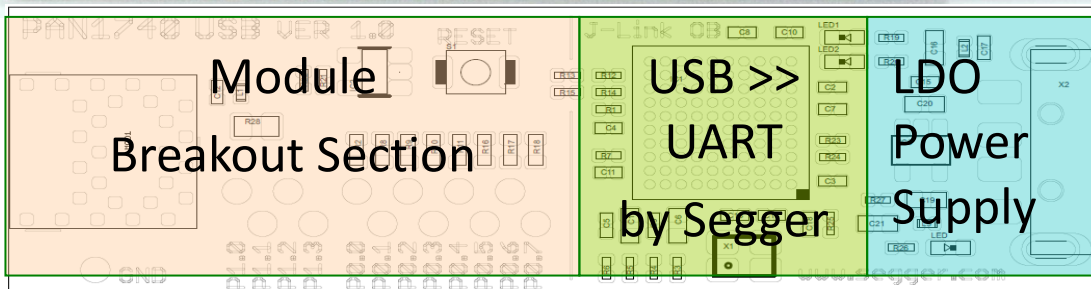
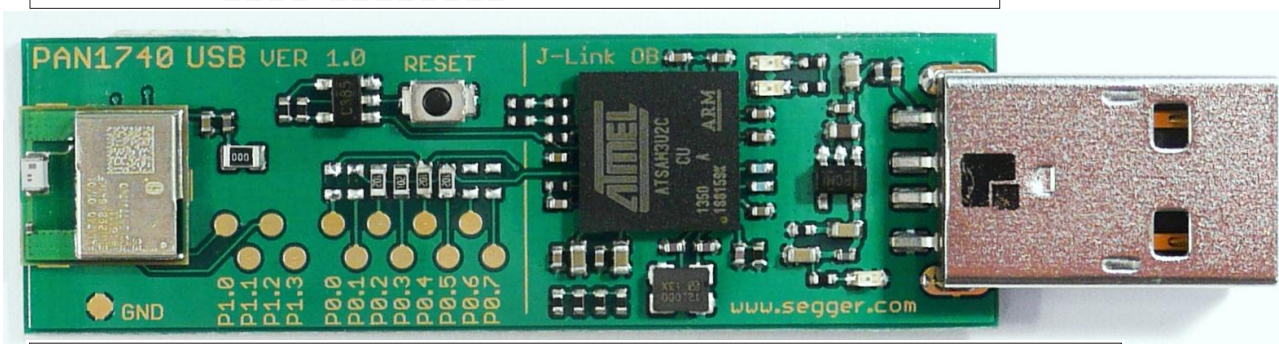
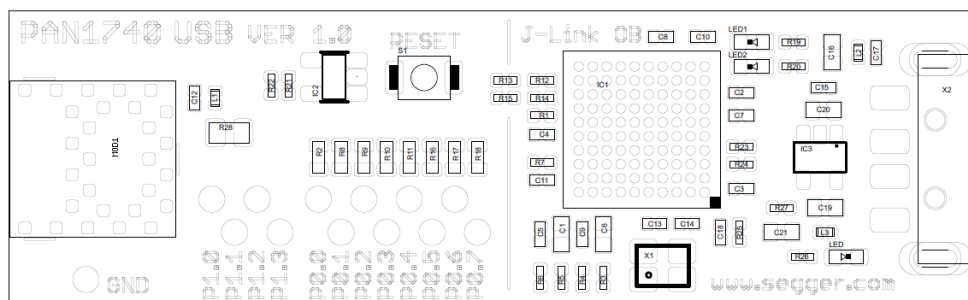
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5. BLOCK DIAGRAM PAN1740 MODULE



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6. COMPONENT LAYOUT DIAGRAM PAN1740 USB-DONGLE



6.1. FUNCTIONALITY

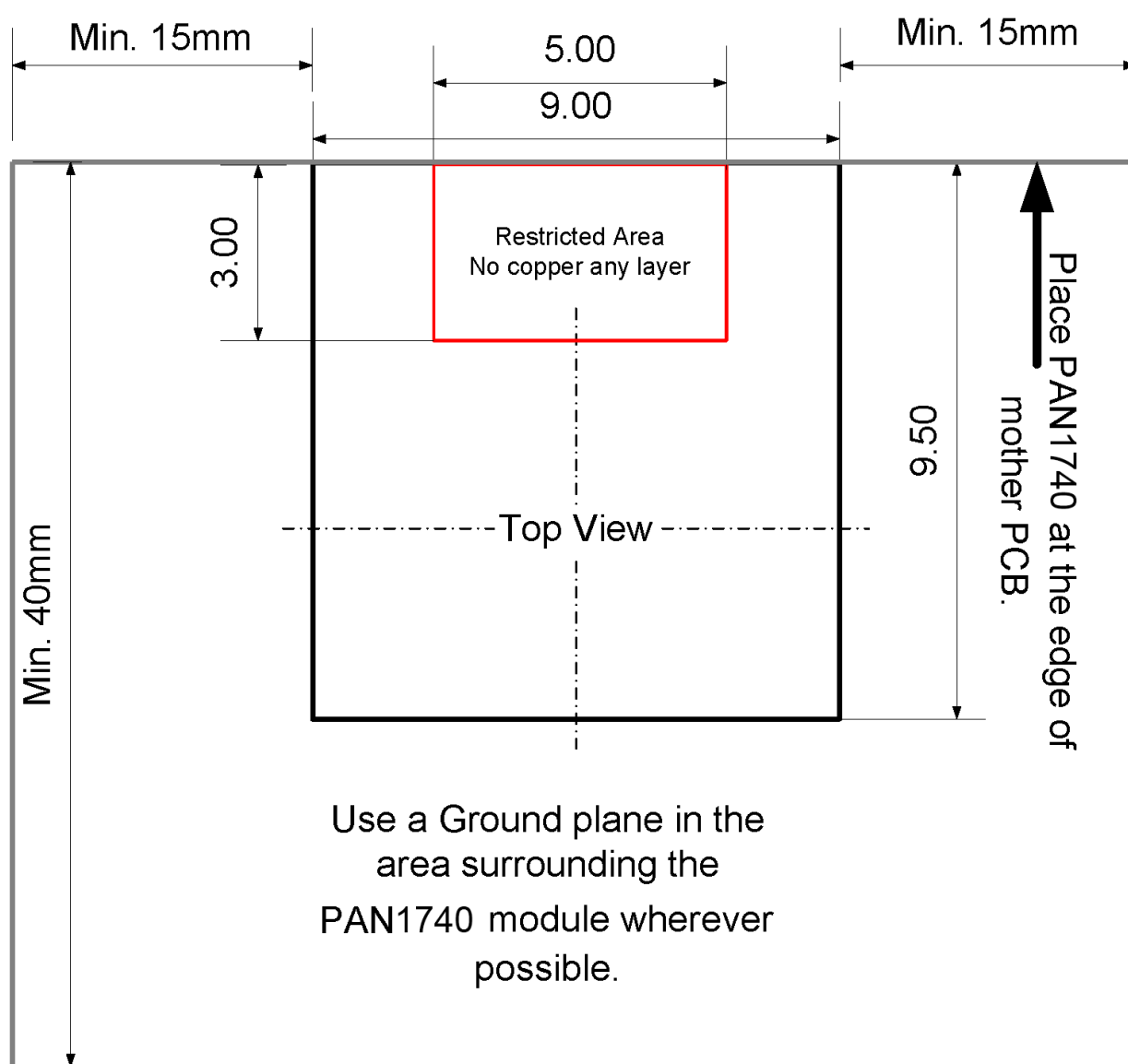
- Atmel μ C includes Segger USB-to-UART programmer (serial number on the backside)
- OTP can not be damaged - Failsafe development
- Runs with Dialogs Keil compiler projects
- Runs with "Connection Manager"
- Can be used for SW development "on the fly"

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8. LAYOUT RECOMMENDATION

PAN1740 WITH ANTENNA PLACEMENT

← If possible place PAN1740 in the center of mother PCB. →



Dimensions are in mm.

Note: The above recommendation for the Ground plane are based on a double layer PCB. If enough GND planes are applied also on other layers and connected by enough vias between the layers the xy min. dimensions can be reduced.

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9. DEVELOPMENT OF APPLICATIONS

9.1. BASIC TOOLS:

1. Windows 7 or higher - www.microsoft.com
2. Keil Compiler 32K free license – www.keil.com/arm/mdk.asp
3. Segger J-Link free license - www.segger.com/jlink-software.html
4. Bluetooth 4.1 - www.bluetooth.org

9.2. DIALOG SPECIFIC TOOLS

Download in the support forum <http://support.dialog-semiconductor.com>

1. Connection Manager

Enables basic GATT connections between two BLE devices. In the following example two USB-dongles are used. PAN1026-USB works as an peripheral and the PAN1740-USB as central device.

2. Dialogs Projects

Keil Projects with BLE Profiles and examples. These project files are used to implement the customers application. The BLE profiles are already implemented and you can setup the full feature set and I/O capability of the module.

3. Smart Snippets

Tool for reading and writing the OTP. With this tool you can do the last step in the development chain and burn the OTP fuses when you go into production. This tool does not work with the USB-Dongle for security reason. The programming voltage of 6.8V needed to enable the programming is not supported.

9.3. PANASONIC UNIQUE FEATURES

1. Main Frequency Calibration up to 1ppm @ 2.4GHz

In our production we calibrate the 16 MHz crystal and write the calibration data in the OTP header. This provides best performance and a stable frequency. Customers do not need to take care of this step in their production.

2. Pre-programmed Bluetooth/MAC Address

Each Bluetooth device must have a unique MAC address which is provided from the IEEE. Since this may lead to additional costs and registration effort for customers we burn a unique address into the OTP header from our database. Customers do not need to take care of this step in their production.

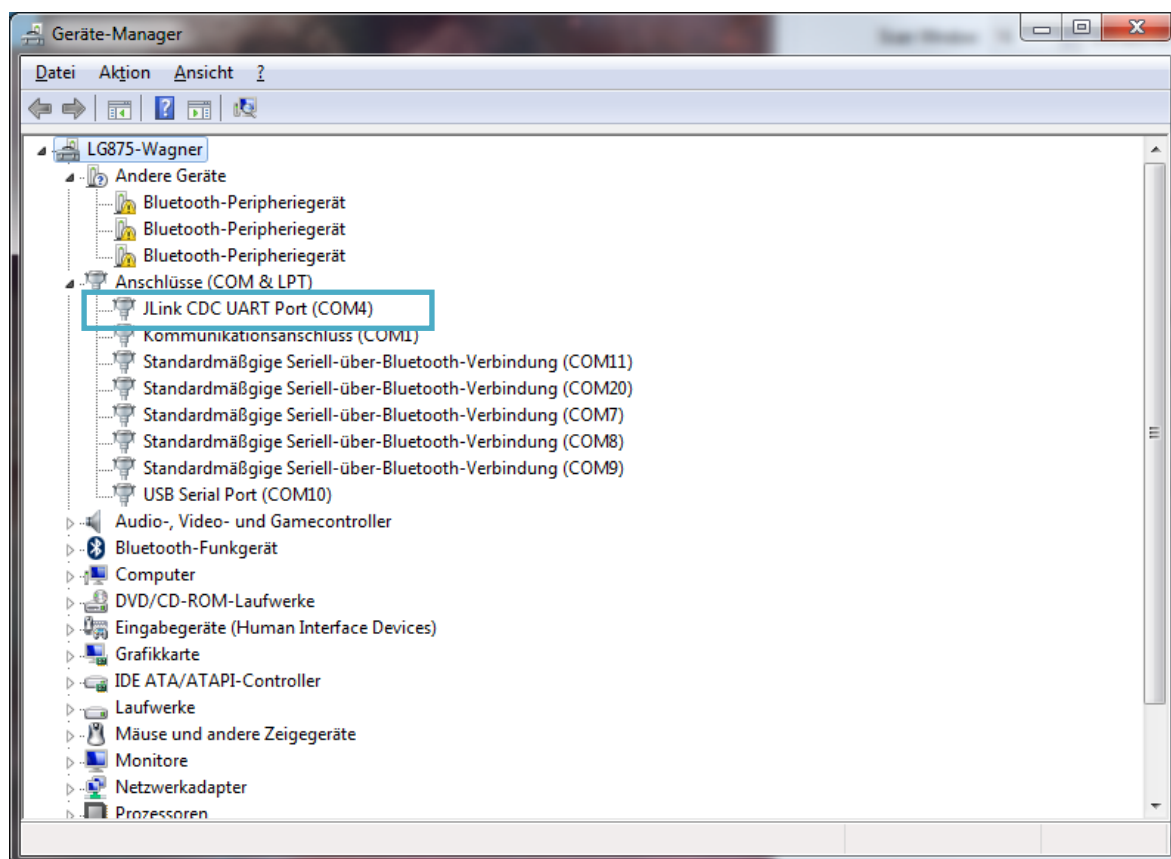
3. Precise High Performance Crystal Sleep clock

Since this is a low energy device and the key functionalities are the sleep functions with just a few μ A current draw we support also a 32.768 kHz crystal clock. Therefore no external components are needed and there are no hidden costs.

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9.4. EXAMPLE FOR CONNECTION MANAGER

9.4.1. Get the USB Driver installed

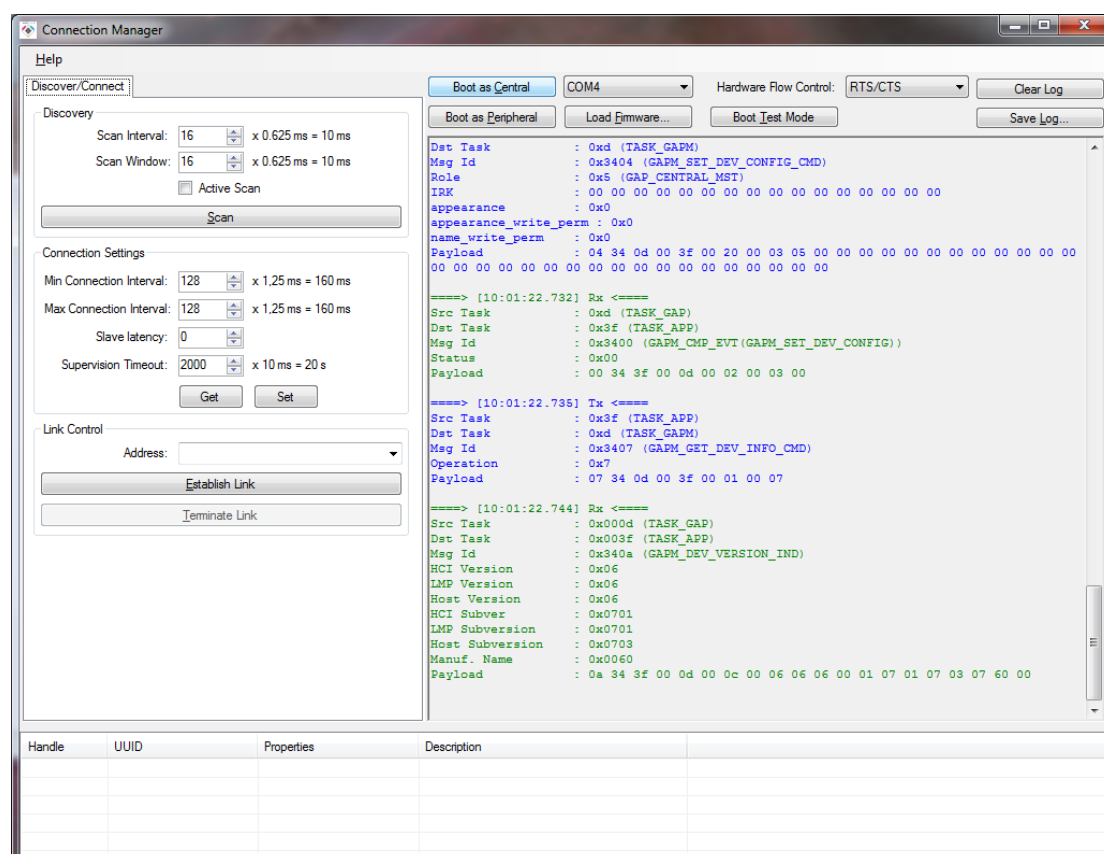


Note: Segger driver has to be installed previously - www.segger.com

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9.4.2. Start the Connection Manager

1. Make sure you have admin rights and access to the program folder
2. Press load Firmware and select "full_emb_sysram.hex"
3. Wait until the init phase is finished
4. Press either "Boot as Central" or "Boot as Peripheral" (Example shows Central)



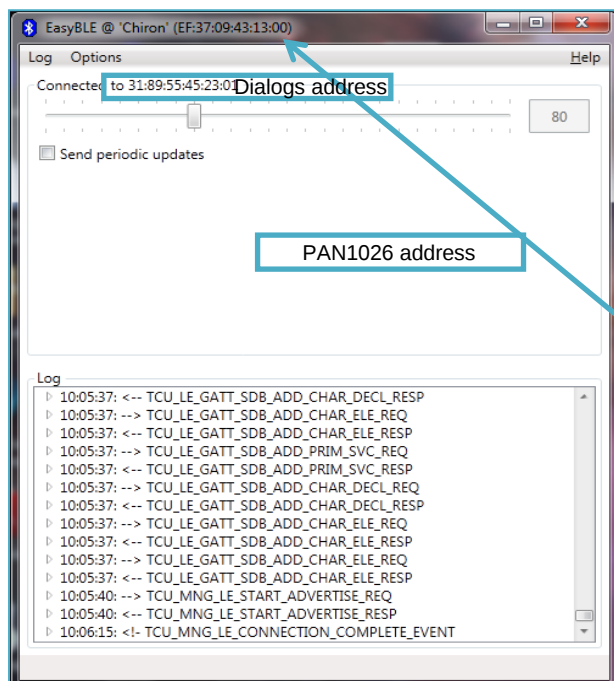
9.4.3. Make PAN1026 Peripheral visible

You can use the EasyBLE Tool and a PAN1026-USB dongle to make a visible peripheral with the heart rate profile. The tool and description you can find here:

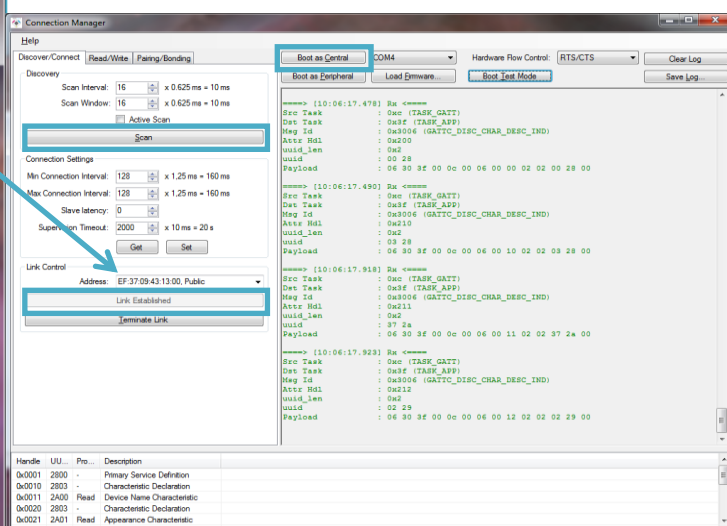
<http://pideu.panasonic.de/files/Documents/WM%20Documents/PAN1026/EasyBLE.zip>

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9.4.4. Open a Connection

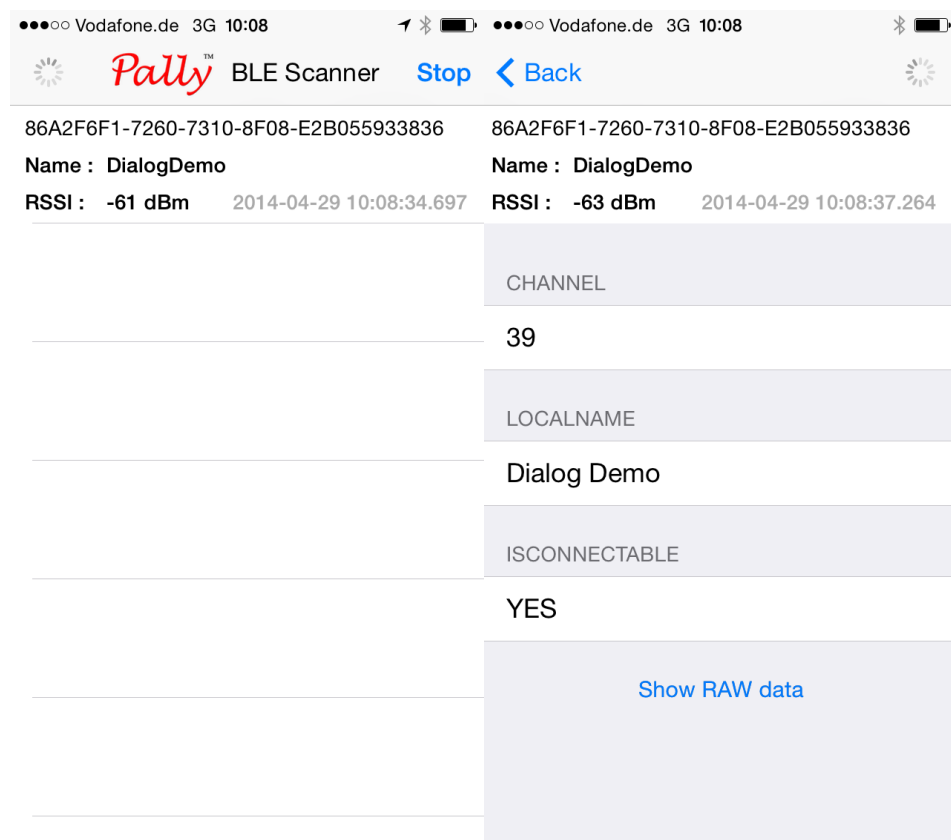


1. Press "Scan"
2. Select PAN1026 address and establish link



9.4.5. iPhone Demo

The same you can also do with for example the iPhone above 4S and the "Pally BLE Scanner" App instead of using a PAN1026 or PAN1740 USB dongle.



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10. HISTORY FOR THIS DOCUMENT

Revision	Date	Modification / Remarks
0.1	02.04.2014	Initial Preliminary Release.
1.0	04.06.2014	Added USB dongle and Connection Manager description. Release Version.

11. RELATED DOCUMENTS

[1] PAN1740 Datasheet

http://pideu.panasonic.de/files/Documents/WM%20Documents/PAN1740/PAN1740_Datasheet.pdf

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12. GENERAL INFORMATION

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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.

Disclaimer:

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

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- deviation or lapse in function of Engineering Sample,
- improper use of Engineering Samples.

Panasonic disclaims any liability for consequential and incidental damages.

In case of any questions, please contact your local sales partner or the related product manager.

13. 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 PAN1740 will be published in the PAN1740 Datasheet.

14. 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.