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1 SCOPE OF THIS DOCUMENT

This application note applies to Panasonic's PAN13xx series of HCI, Class 1, Bluetooth® modules, using the CC256x from Texas Instruments, namely the PAN1315, PAN1316, PAN1317, PAN1325, PAN1326, PAN1327.

It is the description for the available versions and their different functionalities to enable the connectivity between widely used standards within one device.

For more details regarding the hardware (description) please refer to the PAN1315 [1] master specification and the application note for the antenna versions "AN-1325-2420-111. Application Note for PAN1325/26/27 Antenna Versions.[3].

For design assistance refer to the PAN1315ETU Design-Guide for PAN1315/16/17 + MSP430:

http://www.panasonic.com/industrial/includes/pdf/PAN1315ETU_design-guide.pdf [2].

The latest documentation can be downloaded from:

<http://www.panasonic.com/industrial/electronic-components/rf-modules/bluetooth/>

2 TERMINOLOGY

PAN13xx will be used when referring to the entire series of modules. PAN13x5 refers to the PAN1315 family which includes the PAN1325, similarly PAN13x7 refers to the PAN1317 family which includes and PAN1327.

PANxxxx are series numbers that may refer to multiple part numbers. Series numbers describe families of part numbers and part numbers describe the module's specific attributes, such as optional profiles, all RF module part numbers begin with the prefix ENW or EVAL. EVAL part numbers are reserved for evaluation kits and modules. Always search and order RF modules by part number.

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3 LIST OF AVAILABLE VERSIONS

Version	Function	Controller	Production Available	Part Number	Antenna on board
PAN1315	Bluetooth (BT) Basic Data Rate (BR)/Enhanced Data Rate (EDR) BT2.1 (=>BT Classic)	CC2560	Now	ENW89818C2JF	No
PAN1316	BT Classic BT 4.0 LE	CC2564	TBD	ENW89823C2JF	No
PAN1317	BT Classic ANT	CC2567	On Request	ENW89827C2JF	No
PAN1325	BT Classic	CC2560	Now	ENW89818A2JF	Yes
PAN1326	BT Classic BT LE	CC2564	TBD	ENW89823A2JF	Yes
PAN1327	BT Classic ANT	CC2567	On Request	ENW89827A2JF	Yes
Version	Function	Controller	Function	Part Number	Antenna on board
PAN1313ETU PAN13xxETU	BT Classic BT LE ANT	CC256x	For Evaluation	Refer to links in chapter 5	Yes

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4 LIST OF PROFILES

Profile	Software Developer	Controller	Availability
SPP	Mindtree	TI, MSP430	Now
SPP	CandleDragon	STM32, MSP430	Now
HDP	Mindtree	TI, MSP430	Upon request
A2DP, AVRCP, SPP	StoneStreetOne	TI, Stellaris	Q1, 2011

For all other profiles please contact your local sales representative.

5 EVALUATION KITS

For information on Bluetooth kit for PAN13xx :

http://wiki.msp430.com/index.php/MSP430_Bluetooth_Platform

www.panasonic.com/rfmodules

<http://focus.ti.com/docs/toolsw/folders/print/pan1315emk.html>

For information on Bluetooth + ANT kit for PAN13xx :

<http://focus.ti.com/docs/toolsw/folders/print/cc2567-pan1327ant-btkit.html>

http://processors.wiki.ti.com/index.php/CC2567-PAN1327_Dual_Mode_ANT_%26_Bluetooth_Wiki

For additional information :

www.ti.com/connectivitywiki

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6 BLUETOOTH LE (LOW ENERGY) PAN1316/26

6.1 NETWORK TOPOLOGY

Bluetooth Low Energy is designed to reduce power consumption. It can be put into a sleep mode and is only activated for event activities such as sending files to a gateway, PC or mobile phone. Furthermore the maximum power consumption is set to less than 15 mA and the average power consumption is about 1 uA. The foundations of low energy consumption are short messages and establishing very fast connections (few ms). Using these techniques, energy consumption is reduced to a tenth of a Classic Bluetooth unit. Thus, a small coin cell – such as a CR2032 – is capable of powering a device for up to 10 years of operation.

To be backwards compatible with Classic Bluetooth and to be able to offer an affordable solution for very inexpensive devices, Panasonic Low Energy Bluetooth modules are offered in two versions:

Dual-mode: Bluetooth Low Energy technology combined with Classic Bluetooth functionality on a single module. Dual mode devices act as gateways between these two technologies.

Single Mode: Bluetooth Low Energy technology to optimize power consumption, which is particularly useful for products powered by small batteries. These modules have embedded controllers allowing the module to operate autonomously in low cost applications that lack intelligence.

This application note only describes dual-mode Bluetooth Low Energy technology combined with Classic Bluetooth functionality on a single module. Additional information on Panasonic's single mode products will be available in the second quarter of 2011.

6.2 MODULE FEATURES

Fully compliant with Bluetooth 4.0:

- Optimized for proximity and sports use
- Supports up to 10 simultaneous connections
- Multiple sniff instances are tightly coupled to minimize power consumption
- Independent buffering allows a large number of multiple connections without affecting BR/EDR performance
- Includes built-in coexistence and prioritization handling for BR/EDR and LE

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6.3 CURRENT CONSUMPTION FOR DIFFERENT LE SCENARIOS

Conditions: VDD_{IN} = 3.6 V, 25°C, 26-MHz fast clock, nominal unit, 10 dBm output power

Mode	Description	Average Current	Unit
Advertising, non-connectable	Advertising in all 3 channels 1.28msec advertising interval 15Bytes advertise Data	104	µA
Advertising, discoverable	Advertising in all 3 channels 1.28msec advertising interval 15Bytes advertise Data	121	µA
Scanning	Listening to a single frequency per window 1.28msec scan interval 11.25msec scan window	302	µA
Connected (master role)	500msec connection interval 0msec Slave connection latency Empty Tx/Rx LL packets	169	µA

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7 ANT PAN1317/27

7.1 NETWORK TOPOLOGY

ANT™ is a wireless sensor network protocol operating in the 2.4 GHz spectrum. Designed for ultra-low power, ease of use, efficiency and scalability, ANT supports peer-to-peer, star, tree and fixed mesh topologies. It provides reliable data communications, flexible and adaptive network operation and cross-talk immunity. The ANT protocol stack is compact, requiring minimal microcontroller resources to reduce system costs, lighten the computational burden and improve efficiency. Low-level security is implemented to allow user-defined network security.

PAN1317/1327 provides the first wireless, single-chip solution with dual-mode ANT and Bluetooth connectivity with inclusion of TI's CC2567 device. This solution wirelessly connects 13 million ANT-based devices to the more than 3 billion Bluetooth endpoint devices used by people every day, creating new market opportunities for companies building ANT products and Bluetooth products alike. CC2567 requires 80% less board area than a design with two single-mode solutions (one ANT+, one Bluetooth) and increases the wireless transmission range up to two times the distance of a single-mode ANT+ solution.

7.2 MODULE FEATURES

Fully compliant with ANT protocol:

- ANT solution optimized for fitness, health and consumers use cases
- Supports up to eight simultaneous connections, various network topologies and high-resolution proximity pairing
- Includes built-in coexistence and prioritization handling for BR/EDR and ANT

Features	Benefits
Dual-mode ANT+ and Bluetooth (Bluetooth v2.1 + EDR) on a single chip	- Requires 80% less board area than any dual module or device design - Reduces costs associated with incorporating two wireless technologies
Fully validated optimized single antenna solution	- Enables simultaneous operation of ANT+ and Bluetooth without the need for two devices or modules - Includes built-in coexistence
Best-in-class Bluetooth and ANT RF performance: - +10 dBm Tx power with transmit power control - -93 dBm sensitivity	- Delivers twice the distance between the aggregator and ANT sensor device than competitive single-mode ANT solutions - Enables a robust and high-throughput connection with extended range

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Support for:

- ANT+ ultra low power (master and slave devices)
- Bluetooth power saving modes (park, sniff, hold)
- Bluetooth ultra low power modes (deep sleep, power down)

- Improves battery life and power efficiency of the finished product

Turnkey solution:

- Fully integrated module
- Complete development kit with software and documentation
- TI MSP430 hardware and software platform integration (optional)

- Ease of integration into system allows quick time to market
- Reduces costs and time associated with certification

7.3 ANT CURRENT CONSUMPTION

Mode	Description	Average Current	Unit
Rx message mode	250msec interval	380	µA
Rx message mode	500msec interval	205	µA
Rx message mode	1000msec interval	118	µA

8 HISTORY OF THIS DOCUMENT

Revision	Date	Modification / Remarks
1.0	17.02.2011	1 st version
1.1	07.06.2011	Added Link to ANT+ wiki page and Bluetooth platform wiki page.
1.2	05.07.2011	Added power consumption tables for ANT and BT-LE scenarios.

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9 RELATED DOCUMENTS

For an update, please visit the correspondent website

[1] DS-1315-2420-102 Master Specification for PAN13xx >> PAN1315/16/17/25/26/27:
<http://www.panasonic.com/industrial/electronic-components/rf-modules/bluetooth/pan1315.aspx>

[2] PAN1315ETU Design-Guide for PAN1315/16/17 + MSP430:
http://www.panasonic.com/industrial/includes/pdf/PAN1315ETU_design-guide.pdf

[3] AN-1325-2420-111. Application Note for PAN1325/26/27 Antenna Versions.
<http://www.panasonic.com/industrial/includes/pdf/PAN1325-Specifications.pdf>

[4] CC2560 Product Bulletin:
http://focus.ti.com/pdfs/wtbu/cc2560_slyt377.pdf

[5] Bluetooth SW for MSP430 is supported by IAR IDE service pack 5.10.6 and later. You must use IAR full version edition (you cannot use kick-start version). You can find info on IAR at
<http://www.iar.com/website1/1.0.1.0/3/1/> and
www.MSP430.com

Please note, that there is an option for a 30-days free version of IAR evaluation edition

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10 GENERAL INFORMATION

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This product description does not claim to be complete and free of mistakes.

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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.