Texas Instruments Based PAN13xx Series

Frequently Asked Questions

Revision List

1.00	December 1, 2011 Added AAC part number
1.01	January 1, 2012, Product Life, Ref Design updated from 1315 to 1323
1.02	Updated data sheet section, clarified evaluation kit paragraph

Table of Contents

Scope,

The following FAQs provide an update on the TI PAN13xx RF module series; this includes the PAN1313, 1315, 1316, 1317, 1323, 1325, 1326, and 1327.

Part Number Conventions

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

PANxxxx are series numbers that may refer to multiple part numbers. A typical series number would represent between one and nine part numbers. Part numbers describe the module's 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.

List of available Versions

Series	Function	Version	Controller	Part Number	Antenna on board
PAN1315	BT Classic)	BT v 2.1	CC2560A	ENW89818C2JF	No
PAN1315A	BT Classic	BT v 2.1	CC2560	ENW89829C2JF	No
PAN1316	BT Classic and BT Low Energy	BT v4.0	CC2564	ENW89823C2JF	No
PAN1317	BT Classic ANT	BT v 2.1	CC2567	ENW89827C2JF	No
PAN1325	BT Classic	BT v 2.1	CC2560	ENW89818A2JF	Yes
PAN1325A	BT Classic	BT v 2.1	CC2560A	ENW89829A2JF	Yes
PAN1326	BT 4.0	BT v4.0	CC2564	ENW89823A2JF	Yes
PAN1327	BT Classic ANT	BT v 2.1	CC2567	ENW89827A2JF	Yes
PAN1323ETU	BT Classic BT LE ANT	BT v4.0	CC25xx	EVAL_PAN1323ETU	Yes

PAN13xx series description and compatibility chart

Series	Description	Compatibility
PAN1315	BT Classic	100 % Pin Compatible
PAN1316	Dual mode BT + Low Energy	
PAN1317	Dual Mode BT + ANT	
PAN1323	Triple Mode with antenna	100 % Pin Compatible
PAN1325	BT Classic with antenna	
PAN1326	Dual Mode BT + Low Energy with antenna	
PAN1327	Dual Mode BT + ANT with antenna	

Compatibility is determined solely by firmware. A single PCB layout, for either module group, -- embedded antenna / external antenna -- allows the flexibility of different protocol functionality implemented with firmware.

Host Controlled Interface HCI

HCI devices are a cost effective and flexible means to implement a Bluetooth network. The Bluetooth stack and profile reside and execute on the application's host processor, reducing cost by eliminating redundant processing capacity and giving designers the flexibility to work with a controller of their choosing. New designs can be completed quickly by mating the PAN13xx series modules with Texas Instruments' MSP430BT5190 that contains Mindtree's EtherMind Bluetooth Protocol Stack and serial port profile, additional computing power can be achieved by choosing TI's Stellaris ARM7 controller that includes StoneStreet One's A2DP profile. All other BT profiles are available on custom development basis. Other controllers are also supported by the PAN13xx series by using a TI/Panasonic software development partner to port the Bluetooth stack and profiles. Mindtree's Software Development Kit (SDK) is available on TI's website -- www.ti.com/connectivity.com

Creating a software interface to communicate with the PAN1315 / PAN1325 is done using HCI commands, which are defined at a high level by the BT SIG. Silicon manufacturers may modify HCI commands to suit their specific integrated circuits. The HCI commands needed for the PAN13xx are defined in TI's CC256x specification. As this specification is a confidential document, customers may contact TI directly or consider a TI approved software developer. For applications under 100K units per year, Panasonic recommends using a developer.

Bluetooth Low Energy

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.

Panasonic has released several Bluetooth Low Energy (BLE) module series; single mode -- PAN1720 -- and dual mode -- PAN1326.

ANT

The PAN1327 is a dual mode Bluetooth classic device plus an Area Network Technology (ANT). For a customer that needs both technologies, the alternative is to purchase two modules or two chipsets and create a hardware interface between the two devices, so the PAN1327 adds value for the customer as a fully integrated solution with a single antenna, smaller footprint and decreased cost that is BT and ANT certified.

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.

Reference Design

For a reference design including a BOM and PCB layout files for the PAN13xx series visit:

1. http://www.panasonic.com/rfmodules
2. Go to Bluetooth Modules
3. PAN1323ETU
4. Go to resources at the top of the page, Technical Information and download the PAN1323ETU Design Guide and Eagle Files.

This is a direct link to the design guide:

http://www.panasonic.com/industrial/includes/pdf/PAN1323ETUDesignGuide.pdf

Data Sheet

- Panasonic's RF module website: www.panasonic.com/rfmodules

  To find data sheets, Video FAQs and brochures,

  Go to the Bluetooth section,
  Then choose the PAN series -- i.e. PAN1325, PAN1326
  At the top of the page select **Resources**

  (Note: The data sheet for the PAN13xx family is contained in a single document.)

  To find gerber files, schematics and BOMs.

  Go to the Bluetooth section,
  Then choose the PAN1323ETU
  At the top of the page select **Resources**

  (Note: The PAN1323ETU is the development environment for the PAN13xx family. The PAN1323ETU design guide contains schematics, BOM, and gerber files for all PAN13xx series modules.)

Evaluation Kit

1.1 PAN1323

The EVAL_PAN1323 development kit is the development environment for all of the TI based PAN13xx series. It replaces the EVAL_ PAN1315ETU and EVAL_ PAN1325ETU.

The PAN1323ETU is the development module (part number: EVAL_PAN1323ETU) found in the EVAL_PAN1323 development kit. The EVAL_PAN1323ETU is our module mounted on a carrier board that is footprint compatible with TI's experimenter boards.

Part Number EVAL_PAN1323

EVAL_PAN1323 evaluation kit contents:

Texas Instruments: MSP430 Experimenter Board
Panasonic: EVAL_PAN1323ETU, evaluation module or TI Part Number PAN1323EMK
(Note: TI's kit contains two EVAL_PAN1323ETU, evaluation modules)

Texas Instruments: MSP430BT5190IPZ and/or MSP430F5438 microcontroller

Customers may order either the EVAL_PAN1323 from Panasonic, if inventory is unavailable, consider instead purchasing the components of the kit from DK, Arrow, Mouser, Avnet or TI.

1.2 PAN1325

The difference between the PAN1315 and PAN1325 is an integrated antenna. .

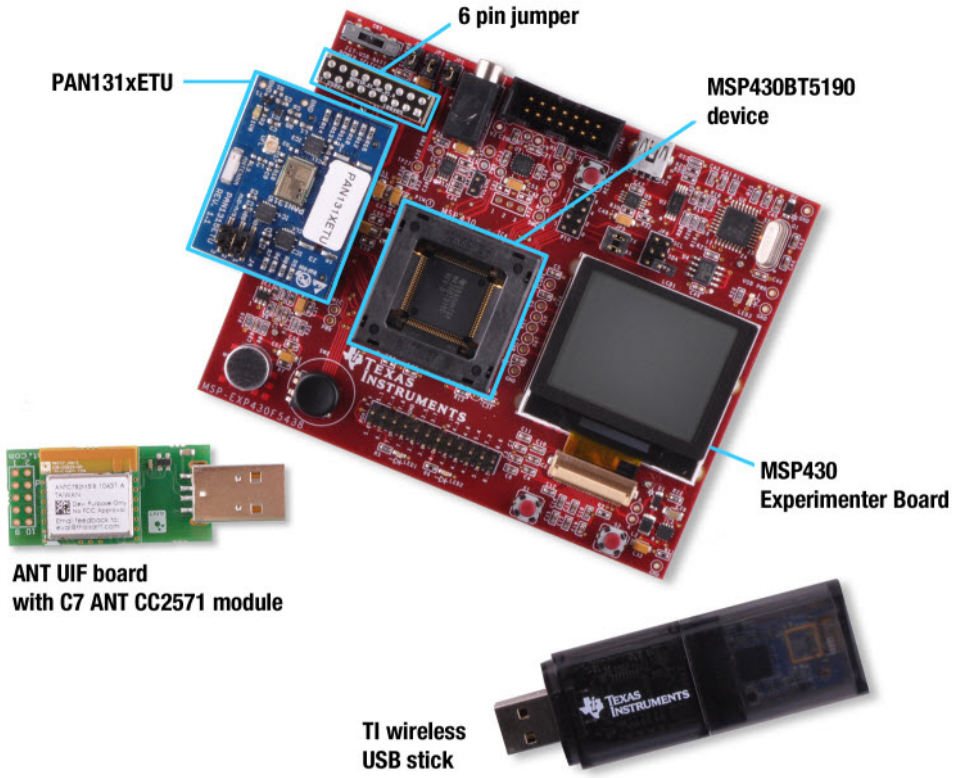
1.3 PAN1327 and PAN1317 ANT + Bluetooth Health and Fitness Aggregator Kit

Panasonic is offering the first wireless modules with dual-mode ANT and Bluetooth connectivity - the PAN1327 and PAN1317. The PAN1327 and PAN1317 requires 80 percent 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.

To evaluate the PAN1327 and PAN1317 Dual Mode ANT & Bluetooth Platform you will need to:

- Order the ANT + Bluetooth Health and Fitness Aggregator Kit. The kit is available through DigiKey, DigiKey part number: 296-28085-ND
- Order PAN1327/17 Module when you are ready to go into production

Evaluation Kit Video



1.4 Experimenter Board Documentation

MSP430 Experimenter Board: http://focus.ti.com/docs/toolsw/folders/print/msp-exp430f5438.html#Technical Documents

Samples

Samples of production modules – part number ENW898xxxxx -- have a small pad pitch, similar to integrated circuits, so they are generally of little use to engineers. Development kits (EVAL_PAN1323) and or development modules (EVAL_PAN1323ETU) should always be recommended as the first step in the development and evaluation phase of a project.

Lead Time

Part numbers listed as available are in production and available in the distribution channel. Panasonic has near unlimited capacity. For orders that exceed distributor's stock levels, lead time must be considered. Panasonic's recommendation is to forecast orders as early as possible. The quoted lead time for all RF modules is 16 weeks. The factory does carry a limited amount raw material inventory for PAN13xx series modules. The amount of raw material inventory carried is a function of the sales forecast. Customer's that provide a non-binding forecast, will receive reduced lead times. As a

rule, the factory can respond to small orders of less than 1000 pieces within 4 to 8 weeks. In the absence of a forecast, larger orders may require full lead time.

Antenna Version

The PAN1315 plus antenna has a new series name, PAN1325. The part number remains the same, ENW-89818A2JF

Software Development

Creating a software interface to communicate with the PAN1315 / PAN1325 is done using HCI commands, which are defined at a high level by the BT SIG. Silicon manufacturers may modify HCI commands to suit their specific integrated circuits. The HCI commands needed for the PAN13xx are defined in TI's CC256x specification. As this specification is a confidential document, customers may contact TI directly or consider a TI approved software developer. For applications under 100K units per year, Panasonic recommends using a developer.

Bluetooth software support

Set up, platform details, user guides and more: www.ti.com/connectivitywiki

Ask an engineer about Wireless connectivity at the MSP430 forum: http://e2e.ti.com/support/microcontrollers/msp43016-bit_ultra-low_power_mcus/f/default.aspx

Mindtree SDK: http://focus.ti.com/docs/toolsw/folders/print/mt-bt-sdk.html

Profiles

The PAN1315/1325 is compatible with all Bluetooth profiles, as the module is a Host Controlled Interface (HCI) device; profiles reside upon and are executed from the application's host processor. Panasonic's software partners have already developed many BT profiles. These profiles may need to be customized to execute on the application's host processor, NRE and or license fees may apply. Contact one of Panasonic's software partners for additional information.

The following popular profiles are available or under development.

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

Software Developers

1.5 Searan (formerly CandleDragon)

Arkady Pittel
President & CEO
SEARAN LLC
www.searanllc.com
a.pittel@searanllc.com
office: 857-919-8400

1.6 StoneStreetOne

9960 Corporate Campus Drive
Suite 3300
Louisville, KY 40223
+1-502-708-3500 (main)

Jim Wargnier
VP Sales
Office: (502) 708-3526
jwargnier@stonestreetone.com

1.7 Stollmann

Christian Andresen
Stollmann
Hamburg, Germany
49-40-890-88-126

1.8 Mindtree

bluetooth@mindtree.com

MindTree's EtherMind Bluetooth® SDK provides a platform for end system designers to quickly evaluate EtherMind Bluetooth Software Protocol Stack and Profiles, and implement applications using it. The SDK is available for TI MSP430BT5190 processor. The reference applications and the development tool included in the kit help implementers to quickly develop customized Bluetooth prototype applications on the MSP430BT5190+PAN1315 platform. This SDK supports the Serial Port Profile (SPP). FreeRTOS is used to support the Bluetooth read and write tasks. Users can develop their own application and interact with the Bluetooth Ethermind Stack APIs to enable Bluetooth connectivity on their end products.

- Sample Applications to show features like - Turning Bluetooth on; making the device discoverable; performing inquiry; pairing the devices; receive/transmit data over SPP; get and transmit RF parameters.

  The MSP430BT5190+CC2560 Developer's Guide provides a complete description of the software architecture, including detailed API description and examples on how to use them.

  www.mindtree.com

  - System integration capabilities including hardware and software design services
  - For additional integration and design services you can email MindTree - bluetooth@mindtree.com

Optional EEPROM -- ENW89818C2KF

The EEPROM option is no longer available. The optional EEPROM on the PAN1315 and PAN1325 was conceived to reduce power by having the init script in the EEPROM and allowing the module to start more quickly. However, this increased power efficiency is offset by the power consumed by the EEPROMs themselves, so benefit of the EEPROM is diminished. Customers using the PAN1325 or PAN1315 are instead encouraged to use the ENW-89818A2JF or ENW-89818C2JF; respectively.

Certifications

1.9 Integrated and external antennae

All 13xx devices are FCC, IC and ETSI certified. For modules that use an external antenna, designers may use existing certifications by using one of the three recommended antennae found in the PAN13xx Specification. Should a different antenna be used, the antenna must be a similar type and have equal or less gain than the recommended antennae, to use existing certifications.

Should an approval in a country outside of the US, Canada or Europe be needed, Panasonic will apply, but an NRE charge may be requested. NRE may be relevant on the basis of projected sales in to a region and the cost of the certification.

1.10 FCC ID: T7V1315.

The device PAN1325, including the ceramic antenna (ENW89818A2JF) and also the SMD type PAN1315 (ENW89818C2JF), including with the antennas, which are listed in 29.5, complies with Part 15 of the FCC Rules. The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407.transmitter Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

1.11 Industry Canada

PAN1315 complies with the regulatory requirements of Industry Canada (IC), license: IC: 216Q-PAN1315
Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from www.ic.gc.ca.

1.12 European R&TTE Declaration of Conformity

Panasonic Electronic Devices Europe GmbH, declares that the Bluetooth module PAN1315 and their versions are in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. As a result of the conformity assessment procedure described in Annex III of the Directive 1999/5/EC, the end-customer equipment should be labelled as follows:

CE

PAN1315 and their versions in the specified reference design can be used in the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, the United Kingdom, Switzerland, and Norway.

Declaration of Conformity (DoC)
1999/5/EC

We, Panasonic Electronic Devices Europe GmbH
High Frequency Products Business Group
Zeppelinstrasse 19, 21337 Lueneburg, Germany

declare under our sole responsibility that the product:

Type of equipment: Bluetooth Module

Brand name: PAN1315, PAN1316, PAN1325, PAN1326

Model name: ENW89818C2JF, ENW89823C2JF
ENW89818A2JF, ENW89823A2JF

to which this declaration relates, is in compliance with all the applicable essential requirements, and other provisions of the European Council Directive:

1999/5/EC	Radio and Telecommunications Terminal Equipment Directive (R&TTE)

The conformity assessment procedure used for this declaration is Annex IV of this Directive.

Product compliance has been demonstrated on the basis of:

- EN 60950-1: 2006 - EN 50371: 2002	For article 3.1 (a) : Health and Safety of the User
- EN 301 489-1 V1.8.1 - EN 301 489-17 V2.1.1	For article 3.1 (b) : Electromagnetic Compatibility
- EN 300 228 V1.7.1	For article 3.2 : Effective use of spectrum allocated

The technical contruction file is kept available at:

Panasonic Electronic Devices Europe GmbH, Zeppelinstrasse 19, 21337 Lueneburg, Germany

Issued on: 04 th of November 2010

Signed by the manufacturer:

(Company name) Panasonic Electronic Devices Europe GmbH

(Signature)

Panasonic Electronic
Devices Europe GmbH
Technology Center – Module Business
Zeppelinstraße 19
D - 21337 Lüneburg
Tel. +49 (0)4131 / 899 - 304

(Printed name) Heino Kaehler

(Title) Manager Wireless Modules

1.13 Bluetooth Certifications

The PAN13xx series have BT component certifications. Component certifications may be combined to achieve a BT product certification. The Module has EPL Controller Subsystem Listing based upon the BL6450 QDID B015490.

Panasonic's listing is based upon the CC2560/BL6450 listing. Customer's seeking an End Product Listing (EPL) must refer to this listing:
PRD 2.0 B015490 BL6450 - Controller Subsystem BL6450 Texas Instruments Incorporated Controller Subsystem 2.1+EDR 21-May-2009 EPL(s):1

The PAN13xx series modules must be used in conjunction with both a controller and firmware, all components must be BT certified to receive a BT product certification.

BT certification for PAN13xx modules requires certification from the three components that make up the BT system:

Hardware
Software
Microcontroller

Component certifications from each vendor are combined to apply for a BT End Product Listing -- EPL.

Customer's seeking products with a full BT certification may consider Panasonic modules with embedded controllers and firmware, such as the PAN1321 or PAN1555.

Tx Power Level Adjustment

1.14 MindTree Firmware

The MindTree SDK includes API for setting the max output power in the range between 4dBm to 12dBm (0.5dB step).

The MSP430BT5190+CC2560 Developer's Guide provides a complete description of the software architecture, including detailed API description and examples on how to use them.

1.14.1 Maximum output power configuration

" sdk_set_max_output_power" API present in
BT_SDK_DIR/bluetooth/private/platforms/spp/temp_arch/msp430/sdk_pl.h is provided to set the
maximum output power at the CC2560 chip port. API Description is given below:

sdk_set_max_output_power ()

```
API_RESULT sdk_set_max_output_power
(
UCHAR max_power
)
```

Parameters:

max_power: Maximum output power in dBm. Valid values are OP_POWER_6 (6dBm) and
OP_POWER_10 (10 dBm).

Returns:

API_RESULT: API_SUCCESS or one of the error codes as defined in BT_error.h

Current Consumption for different BT BR/EDR Scenarios

6.6 Current Consumption for Different Bluetooth BR/EDR Scenarios

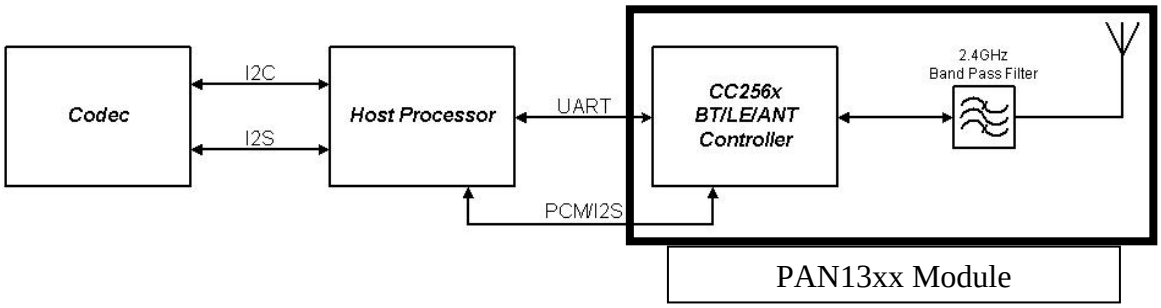
Conditions: VDD_IN = 3.6 V, 25°C, 26-MHz fast clock, nominal unit, 4 dBm output power

Mode Description	Master/Slave	Average Current	Unit
Idle current (ARM off)	Master/slave	2.5	mA
SCO link HV3	Master/slave	12	mA
eSCO link EV3 64 kbps, no retransmission	Master/slave	11.5	mA
eSCO link 2-EV3 64 kbps, no retransmission	Master/slave	8.3	mA
GFSK full throughput: TX = DH1, RX = DH5	Master/slave	38.5	mA
EDR full throughput: TX = 2-DH1, RX = 2-DH5	Master/slave	39.2	mA
EDR full throughput: TX = 3-DH1, RX = 3-DH5	Master/slave	39.2	mA
Sniff, one attempt, 1.28 s	Master/slave	76/100	µA
Page or inquiry scan 1.28 s, 11.25 ms	Master/slave	300	µA
Page (1.28 s) and inquiry (2.56 s) scans, 11.25 ms	Master/slave	430	µA
Low power scan, 1.28-s interval, quiet environment	Master/slave	135	µA

Power Supply

The module's supply supply voltage (VDD) can range from 1.7 to 4.8 volts. The IO supply voltage can range from 1.6 to 1.9 volts. Customers may avoid level shifters by running the application microcontroller at 1.8 volts. TI's MSP430 supports low voltage operation.

Audio Applications



Low quality audio - PAN1315 or PAN1325 + TI's MSP430 + BT Headset Profile (HSP)

High quality audio -- PAN1315 or PAN1325 + TI's Stellaris microcontroller + BT Advanced Audio Distribution Profile (A2DP)

Note: TI's MSP430 and Stellaris processors are highly recommended to simplify designs and reduce development costs by taking advantage of off-the-shelf software. Other processors may be substituted.

Headset Profile (HSP) defines the process and options available for low quality audio applications. Advanced Audio Distribution Profile (A2DP) a.k.a. "Stereo Bluetooth" is used for audio streaming applications.

A2DP audio may be demonstrated using the PAN1325ETU and TI's LM3S9B96 Stellaris development board -- which has audio capabilities using an I2S-connected Audio TLV320AIC23 CODEC -- and StoneStreet One's Bluetopia.

I2S, also known as Inter-IC Sound, Integrated Interchip Sound, or IIS, is an serial bus interface standard used for connecting digital audio devices together. It is most commonly used to carry PCM information.

SBC (SubBand Codec) is a low-complexity, audio encoder and decoder that is mandatory in the Advanced Audio Distribution Profile (A2DP). Other encoding schemes are optional in A2DP. Advanced Audio Coding (AAC) is a standardized, lossy compression and encoding scheme. Designed to be the successor of the MP3 format, AAC generally achieves better sound quality than MP3 at similar bit rates. AAC is also the default or standard audio format for Apple i-devices i.e. iPhone, iPod, iPad.

StoneStreet One's Bluetopia is a transport mechanism that can pass AAC/MP3 coded data provided the hardware platform has a AAC/MP3 codec.

Audio Video Remote Control Profile (AVRCP) is frequently used in conjunction with A2DP to control audio functions. StoneStreet One's Bluetopia includes AVRCP in its A2DP profile.

Apple iPhone Support

The PAN131xx family supports Bluetooth Apple iPhone connectivity. Designers wishing to receive audio from an Apple iDevice can do so using Bluetooth A2DP, Hands Free (HFP) and Headset (HSP) profiles. Applications that only receive audio from an Apple iDevice – not exchange data -- do **NOT** require the Apple authentication IC, certification or licensing.

An Apple authentication coprocessor -- **MFI341S2164 --** and Bluetooth profile capable of recognizing the chip, iAP, are required to exchange data with an Apple iDevice or access an Apple iDevice application.

Certified MFI -- Made for iPod, iPhone, or iPad -- developers can develop these profiles. Customers using the Apple authentication IC must register as developer to become an Apple certified MFI. License fees may apply, for additional information visit: http://developer.apple.com/programs/which-program/index.html

Certified MFI developers receive technical specifications describing the iPod Accessory protocol, the communication protocol used to interact with iPod, iPhone, and iPad. Developers also gain access to the hardware connectors and components that are required to manufacture iPod, iPhone, and iPad accessories.

StoneStreetOne, Stollmann and MindTree have developed profiles that support the PAN1315 and PAN1325 with the Apple authentication IC that is compatible with several popular microprocessors.

Evaluation kits that include Apple authentication IC and firmware are available.

We have two projects in production that communicate with Apple products.

Google "iGrill" for one example of a PAN1315 in an Apple application...

Slow Clock

The PAN1315 specification describes the clock input for 32.768KHz in Chapter 5.4 at 250ppm.

When using the MSP430 with MindTree Stack the 32KHz is exposed on the MSP430 to the PAN13xx. There are two methods to access the clock signal, either by external oscillator or by exposing the signal on the host controller.

Additional Information

For more information...

- Panasonic's RF module website: www.panasonic.com/rfmodules

  Go to the Bluetooth section, PAN1315, resources, at the top of the page -- design guide, Video FAQs, specs, brochures, Gerber files, schematics, BOM

- http://processors.wiki.ti.com/index.php/MSP430_Bluetooth_Platform

Product life

Panasonic builds modules for the automotive, utility and medical industries, customers in these markets demand that products be available for up to 25 years. As a company that has been in business nearly 100 years, with over 50 years in high frequency products and 10+ years in RF modules, Panasonic is one of the few module manufacturers in the world that has the ability, and history, to provide customers with the stability of a 90 billion dollar enterprise to assure long product life.

Panasonic commits to maintain a constant module footprint for as long as customer purchases the module in production volume. While Panasonic can not guarantee the life of the module's components, our commitment to a constant footprint gives designers assurance that as silicon evolves, the module's interface will remain the same. Should the need arise for an engineering change, Panasonic gives customers ample notice and the opportunity to keep purchasing legacy parts for as long as possible, typically one year.

SPP & IAP Memory Requirements

dotstack™ Memory Requirements for Cortex M3

	RAM	Flash
SPP	4KB	32KB
SPP + IAP (iPhone, iPod)	5KB	46KB

Notes:

1. RAM requirement depends on transfer rate. Larger buffers will be needed for higher than 3-5KBytes/sec rates.
2. Initialization script for CC2560 (PAN1325) takes 40KB Flash.