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PAN1323ETU DESIGN GUIDE

www.panasonic.com/rfmodules

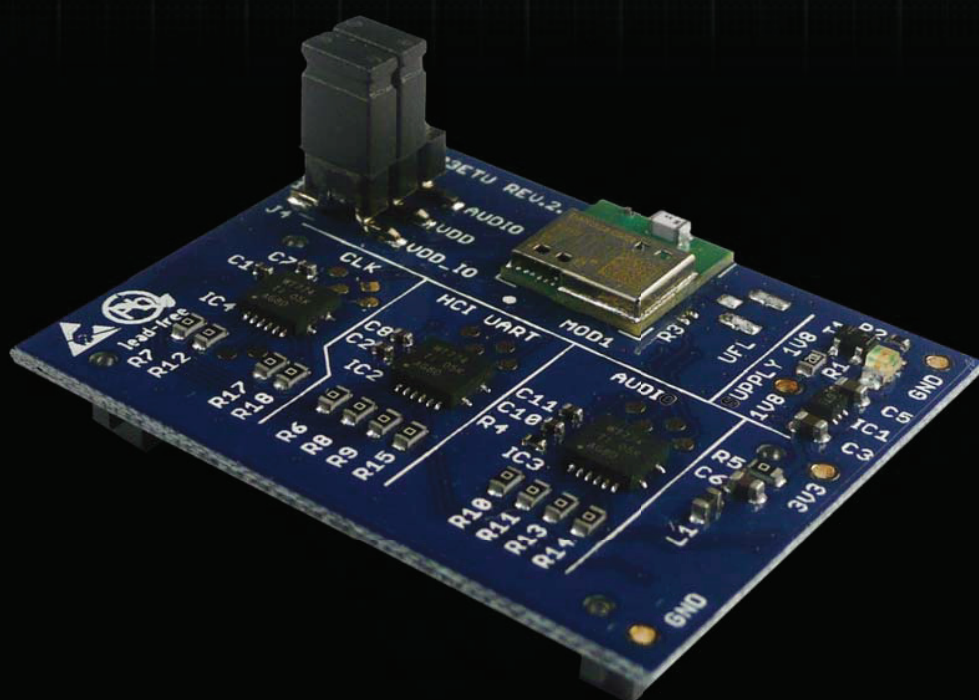


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1. SCOPE OF THIS DOCUMENT

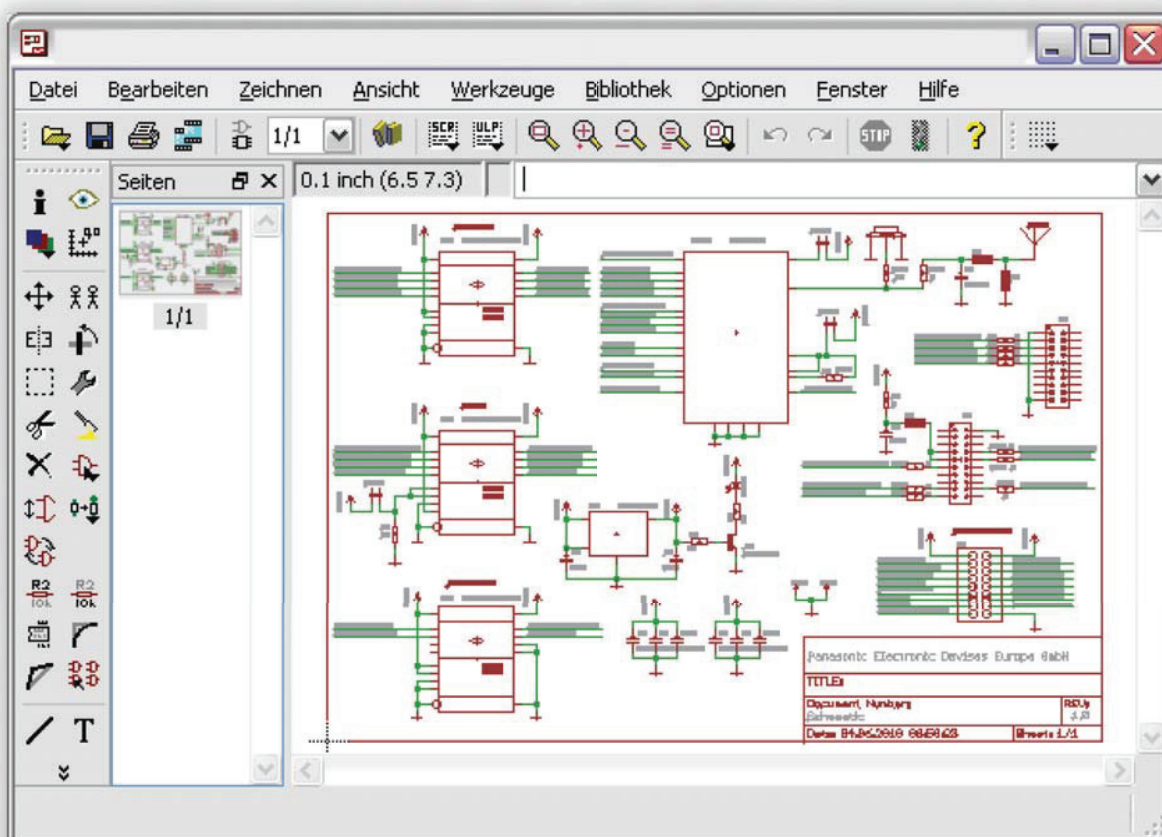
This Design Guide is intended for use with the Bluetooth development platform PAN1323ETU (Easy To Use). This guide will help you create a design that can be implemented quickly into your product.

This guide describes the hardware and gives useful tips. In addition, the software description can be downloaded from TI's website.

Please refer to chapter 8 "Application Development" for a quick overview.

2. KEY FEATURES

- Fast Time to Market
- Easy PCB Layout Using Eagle CAD Files
- Capable of 2 Layer PCB with 0.2mm line width
- MindTree Ethermind Bluetooth Stack with SPP for TI MSP430 Available From TI
- Other Profiles Available on Request i.e. Audio Profiles
- FCC, IC and ETSI Compliant



Eagle CAD Files in use

3. PAN1323ETU APPLICATIONS

All Embedded Wireless Applications

Access Points	Cable Replacement
Printer Adapters	Personal Digital Assistants (PDAs)
Printers	Access Points
Scanners	Computers and Peripherals
Wireless Sensors	Industrial Control Applications
Low Power	Medical

4. MODULE DESCRIPTION

This unique triple mode ETU – that’s ETU for “Easy-To-Use” – module plugs directly into Panasonic developments kits, Texas Instruments MSP430 and Stellaris experimenter boards with the added benefit of header connectors that simplify prototype wiring and field trials.

The PAN1323ETU is the development environment for the PAN13xx family*. This family is based upon Texas Instrument’s CC256x integrated circuits and uses a host controlled interface (HCI), a cost effective and flexible means to implement a Bluetooth network. HCI reduces BOM cost by eliminating redundant processing capacity and giving designers the flexibility to work with a controller of their choosing, as the Bluetooth stack resides and executes on the application’s host processor.

The PAN1323ETU is intended for evaluation purpose and works with Texas Instrument’s MSP430 Hardware Development Kit. Please refer to chapter 8, APPLICATION DEVELOPMENT.

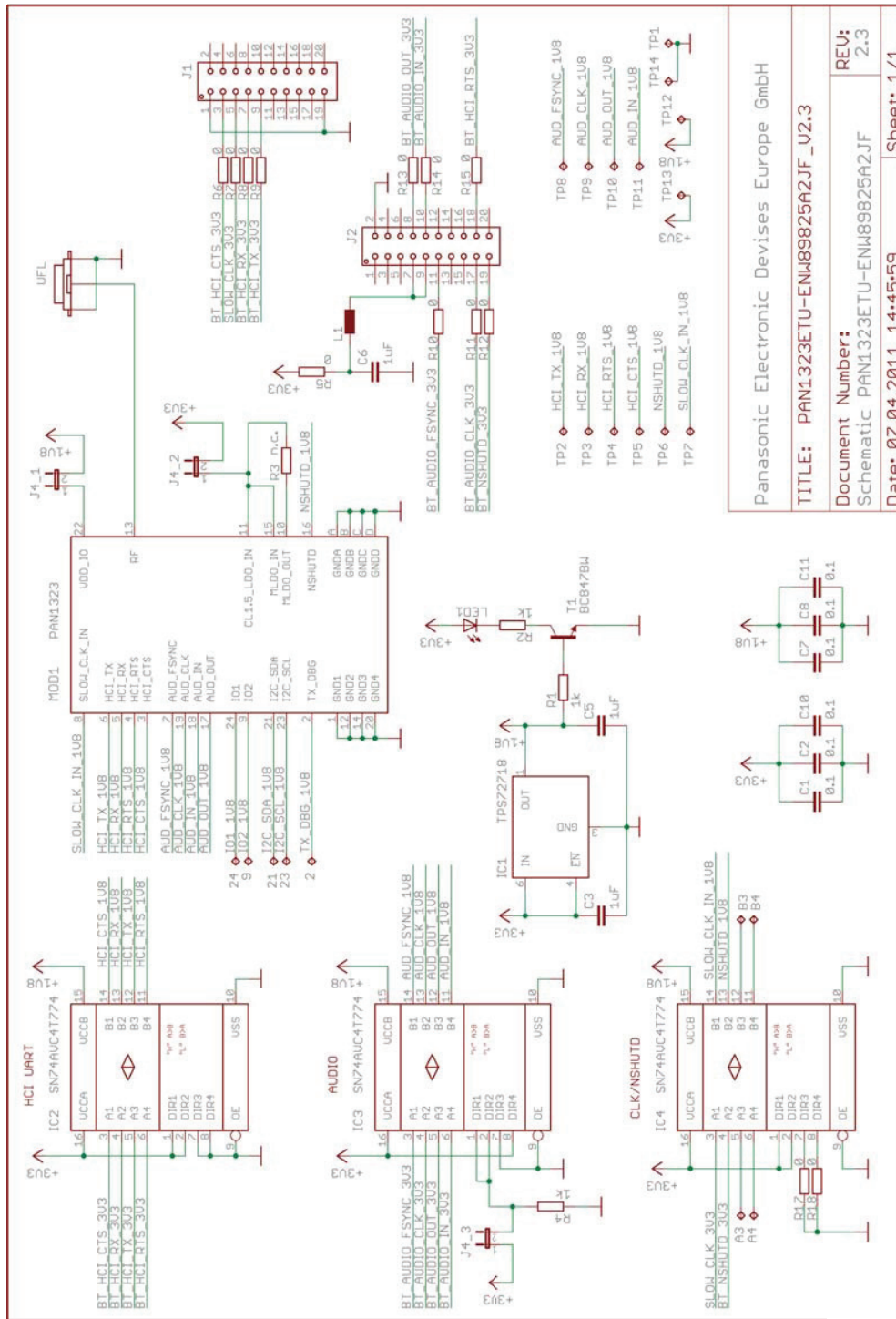
To aide in the implementation of this reference design, Eagle formatted application and layout files are available on the web at the address below.

www.panasonic.com/industrial/includes/pdf/PAN1323ETU_Eagle_Ver1_1.zip

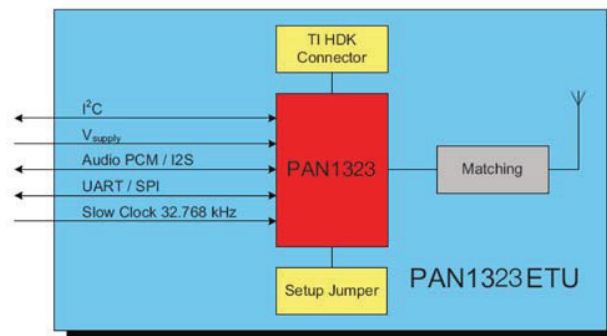
Please contact your local sales office for further details on additional options and services, by visiting www.panasonic.com/rfmodules.

* References in this document are restricted to TI CC256x based modules and do not include the PAN1321

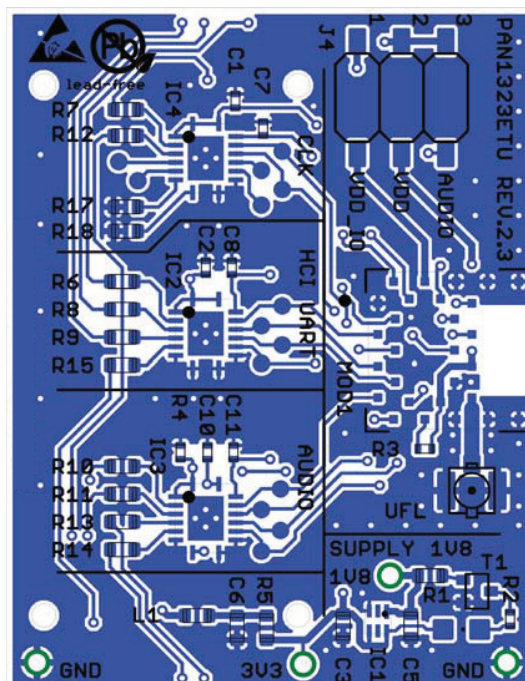
5.2. SCHEMATIC



Please refer to pages 14 & 15 for a complete parts list.



5.3 COMPONENT PLACEMENT DIAGRAM



5.4. PIN DESCRIPTION*

No	Pin Name	Connector	Def. Dir.1	Description of Options (Common)
1,19	GND	J1		Connect to Ground
3	BT_HCI_CTS_3V3	J1	I	HCI UART clear-to-send
5	SLOW_CLK_3V3	J1	I	HCI
7	BT_HCI_RX_3V3	J1	I	HCI UART data receive
9	BT_HCI_TX_3V3	J1	O	HCI UART data transmit
other	Not connected	J1		
2	GND	J2	I	
7	+3V3	J2	I	
8	BT_AUDIO_OUT_3V3	J2	O	PCM data output
9	+3V3	J2	I	
10	BT_AUDIO_IN_3V3	J2	I	PCM data input
11	BT_AUDIO_FSYNC_3V3	J2	IO	PCM frame synch
17	BT_AUDIO_CLK_3V3	J2	IO	PCM clock
18	BT_HCI_RTS_3V3	J2	O	HCI UART request-to-send
19	BT_NSHUTD_3V3	J2	I	Shutdown input (active low)
other	Not connected	J2		
All	Only for Debug	J3		Do not use
1/2	VDD_IO	J4_1	IO	Used for current measurement
1/2	VDD_LDO/MLDO_IN	J4_2	IO	Used for current measurement
1/2	Audio Direction	J4_3	IO	Audio Direction Set: Direction to PAN1315

I = input; O = output; IO = bidirectional; P = power; PU = pulled up; PD = pulled down

*Refer to PAN1315 Core Specification

5.5. CLOCK INPUTS

The slow clock is always supplied from an external source. It is connected to the SLOW_CLK_IN and can be a digital signal in the range of 0-1.8 V.

The slow clock's frequency accuracy must be 32.768 kHz $\pm$ 250 ppm for Bluetooth usage (according to the Bluetooth specification).

When the MSP430 Experimenter board is connected the signal is exposed from the μ Controller. So within this application there is no additional clock needed.

6. KEY PARTS LIST

Reference Designator	Partnumber	Supplier
PAN1323	-	Panasonic
J1,J2	SFM-110-02-S-D-K-A	Samtec, Farnell
IC1	TPS72718DSET	TI
IC2,3,4	SN74AVC4T774RGYR	TI
J4	Pinheader 2.54mm 6pol	Generic
T1	BC847	Generic
LED1	SMD LED Rot	Generic
ANT1	2450AT43B100	Johanson
UFL2	U.FL	Hirose

7. MODULE DIMENSIONS

No.	Item	Dimension [mm]	Tolerance [mm]	Remark
1	Width	40	± 1	
2	Lenght	30	± 1	
3	Height	15	± 1	With connectors

8. APPLICATION DEVELOPMENT

Mindtree Ltd. has developed Bluetooth software, including a few profiles, for TI's MSP430 and Panasonic's PAN13xx. Detailed documentation will be available in the next revision of this document. Also refer to www.panasonic.com/rfmodules

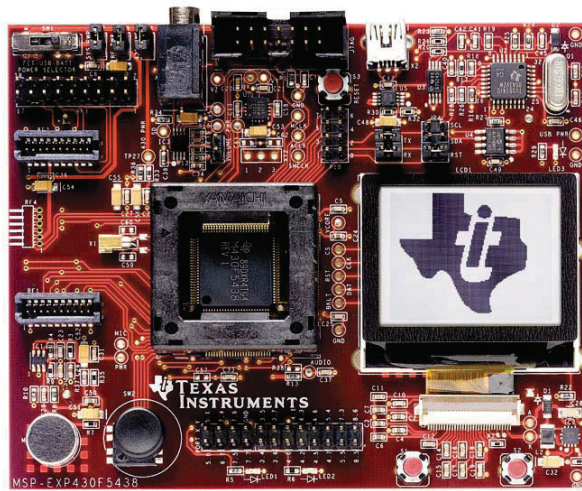
8.1. NEEDED TOOLS

The MSP-EXP430F5438, Experimenter Board can be ordered here:

<http://focus.ti.com/docs/toolsw/folders/print/msp-exp430f5438.html>

The MSP-FET430UIF430, Debugging Interface can be ordered here:

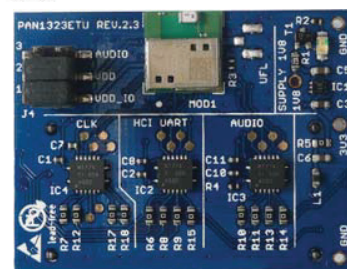
<http://focus.ti.com/docs/toolsw/folders/print/msp-fet430uif.html>



MSP-EXP430F5438
MSP430F5438 Experimenter Board



TEXAS
INSTRUMENTS
MSP430



PAN1323ETU

In addition, a software development environment, e.g. IAR Embedded Workbench, is required, please visit www.iar.com

For a detailed description on usage of these tools please refer to:

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

Evaluation kits and modules are available through Panasonic's network of authorized distributors. For additional information visit www.panasonic.com/rfmodules.

9. ROHS DECLARATION

Declaration of environmental compatibility for supplied products:

Panasonic Electronic Devices Europe GMBH hereby declares, to the best of our current knowledge, based on the declaration of our suppliers that this product does not contain the following substances which are banned by Directive 2002/95/EC (RoHS) or if contain a maximum concentration of 0.1% by weight in homogeneous materials:

- Lead and lead compounds
- Mercury and mercury compounds
- Chromium (VI)
- PBB (polybrominated biphenyl) category
- PBDE (polybrominated biphenyl ether) category

And a maximum concentration of 0.01% by weight in homogeneous materials for

- Cadmium and cadmium compounds

10. DATA SHEET STATUS

This data sheet contains preliminary product specification. Panasonic reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.

Preliminary product specification means also that the hardware has the engineering sample (ES) status.

Please consult the most recently issued data sheet before initiating or completing a design.

11. HISTORY FOR THIS DOCUMENT

Revision Version	Date Datum	Modification / Remarks Änderungen / Bemerkungen
0.90	24.02.2010	1st preliminary version
0.95	13.03.2010	Accept all changes from RT and added the FCC warning. Correct some formats and create a new directory
0.96	09.06.2010	Included Design Guide, BOM
1.0	-	Added PAN1323ETU data

12. RELATED DOCUMENTS

For an update, please visit the following websites:

- IAR Embedded Workbench Version 3+ for MSP430 User's Guide
Rev. Q, 25 Nov 2009
<http://www.ti.com/lit/pdf/slau138>
- PAN1315 Datasheet:
<http://www.panasonic.com/industrial/electronic-components/rf-modules/bluetooth/pan1315.aspx>
- PAN1327 ANT and Bluetooth LE Addendum:
<http://www.panasonic.com/industrial/includes/zip/PAN1327-PAN1317 Specification Sheets.zip>
- PAN1325 Antenna Addendum
<http://www.panasonic.com/industrial/includes/zip/PAN1325-PAN1315 Specification Sheets.zip>
- PAN13xx Series FAQ
http://www.panasonic.com/industrial/includes/zip/PAN13xx_Series_FAQ.pdf

13. 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.

Any ES samples delivered to the customer 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 that will be published in the most recent 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

- 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 disclaims any liability for consequential and incidental damages.

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

14. 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.

15. 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.

16.

PARTS LIST: (Please refer to the schematic on page 6)

	Part	Value	Device	Package	Comments
Antenna	ANT1	JOH_2450AT43B100 JOH_2450AT43B100	SMD_7X2X2	Antenna	1 *
Capacitors	C1	0.1	C-EUC0402	C0402	rcl
	C2	0.1	C-EUC0402	C0402	rcl
	C3	1u	C-EUC0603	C0603	rcl
	C5	1u	C-EUC0603	C0603	rcl
	C6	1u	C-EUC0603	C0603	rcl
	C7	0.1	C-EUC0402	C0402	rcl
	C8	0.1	C-EUC0402	C0402	rcl
	C9	2.2 pF	C-EUC0402	C0402	rcl *
	C10	0.1	C-EUC0402	C0402	rcl
	C11	0.1	C-EUC0402	C0402	rcl
Integrated Circuits	IC1	TPS72718	TPS72718	DSE_S-PDS0-N6 texas	1
	IC2	SN74AVC4T774	SN74AVC-4T774RGY	RGY	SN74AVC4T774 1
	IC3	SN74AVC4T774	SN74AVC-4T774RGY	RGY	SN74AVC4T774 1
	IC4	SN74AVC4T774	SN74AVC-4T774RGY	RGY	SN74AVC4T774 1
Connectors	J1	SFM-110-02-SM-D-A-K- TRSFM-110-02_2 SFM- 110-02_2 Samtec	1		
	J2	SFM-110-02-SM-D-A-K- TRSFM-110-02_2 SFM- 110-02_2 Samtec	1		
	J3	NC	_PINHD- 2X9SMD	_2X09SMD	pinhead
	J4_1	_PINHD-2X1SMD	_2X1SMD	pinhead	1
	J4_2	_PINHD-2X1SMD	_2X1SMD	pinhead	1
	J4_3	_PINHD-2X1SMD	_2X1SMD	pinhead	1
	UFL2	U.FL	U.FL	U.FL	hirose

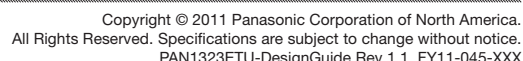
* Not used in integrated antenna versions.

	Part	Value	Device	Package	Comments
Inductors	L1	Ferrite Bead, 1K Ω , 100mA	L0603	rcl	1
	L2	3.6 nH	L0402	rcl	1 *
	L3	Not Mounted	L0402	rcl	1 *
LED	LED1	LEDCHIPLED_0805	CHI- PLED_0805 led	1	
RF Module	MOD1	PAN1315, ENW-89818C2JF	P1315FP_1	P1315_Eagle4 1	
Resistors	R1	1k	R-EU_R0402	R0402	rcl
	R2	1k	R-EU_R0402	R0402	rcl
	R3	N.C.	R-EU_R0402	R0402	rcl
	R4	1k	R-EU_R0402	R0402	rcl
	R5	0	R-EU_R0603	R0603	rcl
	R6	0	R-EU_R0603	R0603	rcl
	R7	0	R-EU_R0603	R0603	rcl
	R8	0	R-EU_R0603	R0603	rcl
	R9	0	R-EU_R0603	R0603	rcl
	R10	0	R-EU_R0603	R0603	rcl
	R11	0	R-EU_R0603	R0603	rcl
	R12	0	R-EU_R0603	R0603	rcl
	R13	0	R-EU_R0603	R0603	rcl
	R14	0	R-EU_R0603	R0603	rcl
	R15	0	R-EU_R0603	R0603	rcl
	R17	NC	R-EU_R0402	R0402	rcl
	R18	0	R-EU_R0402	R0402	rcl
Other	T1	BC847BW	BC847BW	SOT323	nano_JHO
	TP1	TPP1-10	TPP1-10	_P1-10	testpad
	TP2	TPP1-10	TPP1-10	_P1-10	testpad

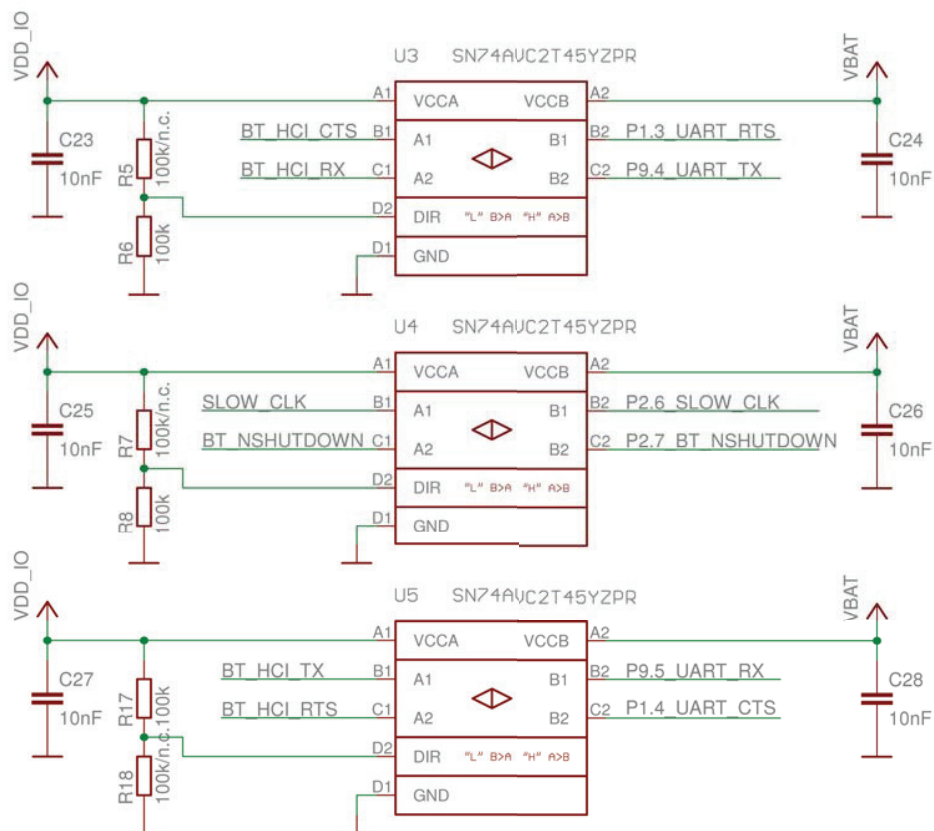
* Not used in integrated antenna versions.

EZ430 SCHEMATIC

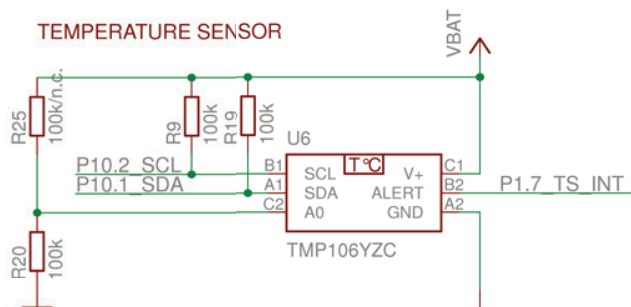
RF256xT Reference Design



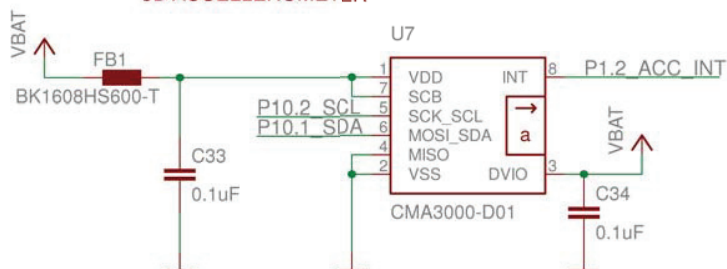
LEVEL SHIFTERS (and crossing point for UART link)



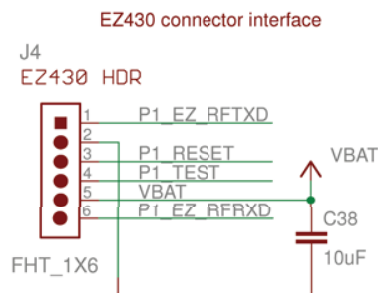
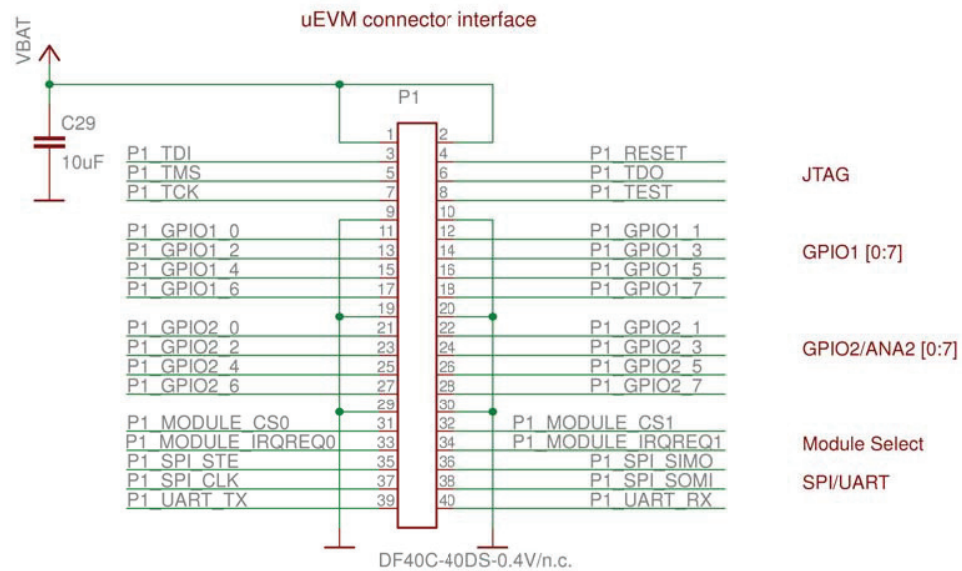
TEMPERATURE SENSOR

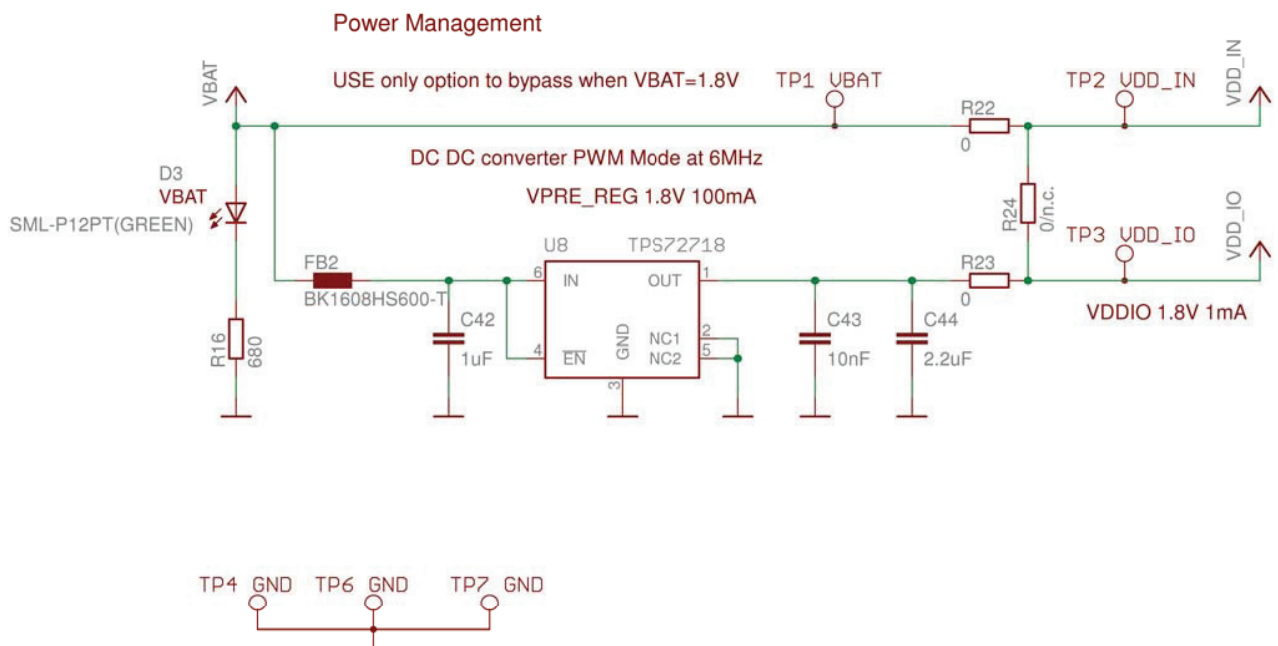
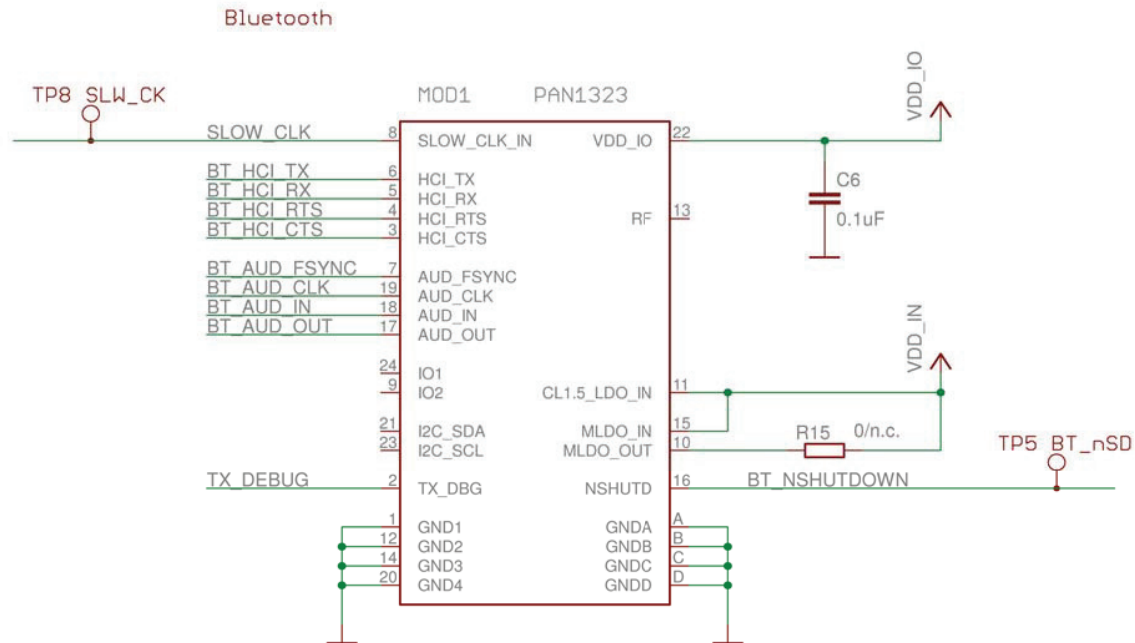


3D ACCELEROMETER



RF256xT Reference Design





18.

EZ430 Parts List

TI_USB_Mount

Partlist

Exported from RF256xT Target Board.brd at 12.08.2011 08:21:37

EAGLE Version 5.10.0 Copyright (c) 1988-2010 CadSoft

Designation	Value	Package	Description
C6 R180	0.1uF	0402	RLC_Modules
C17 R90	0.47uF	0402	RLC_Modules
C18 R270	0.1uF	0402	RLC_Modules
C19 R90	0.1uF	0402	RLC_Modules
C20 R270	0.1uF	0402	RLC_Modules
C21 R180	0.1uF	0402	RLC_Modules
C22 R0	0.1uF	0402	RLC_Modules
C23 R180	10nF	0402	RLC_Modules
C24 R0	10nF	0402	RLC_Modules
C25 R270	10nF	0402	RLC_Modules
C26 R0	10nF	0402	RLC_Modules
C27 R0	10nF	0402	RLC_Modules
C28 R0	10nF	0402	RLC_Modules
C29 R180	10uF	0603	RLC_Modules
C30 R90	10nF	0402	RLC_Modules
C31 R270	10nF	0402	RLC_Modules
C32 R270	2.2nF	0402	RLC_Modules
C33 R270	0.1uF	0402	RLC_Modules
C34 R270	0.1uF	0402	RLC_Modules
C38 R0	10uF	0603	RLC_Modules
C42 R270	1uF	0402	RLC_Modules
C43 R0	10nF	0402	RLC_Modules
C44 R0	2.2uF	0402	RLC_Modules
D1 R90	SML-P12VT(RED)	0402	Led-ROHM
D2 R270	SMLP12BC7T(BLUE)	0402	Led-ROHM
D3 R180	SML-P12PT(GREEN)	0402	Led-ROHM
FB1 R90	BK1608HS600-T	0603	RLC_Modules

Designation	Value	Package	Description
FB2 R180	BK1608HS600-T	0603	RLC_Modules
J1 R0	PH_1X6/n.c.	6X1.27HEDER	con-mpe
J2 R0	PH_1X6/n.c.	6X1.27HEDER	con-mpe
J3 R180	n.c.	6X1.27HEDER	con-mpe
J4 R270	FHT_1X6	6X1.27FEMALE	con-mpe
MOD1 R270	PAN1323	P1325FP	P1325
P1 R270	DF40C-40DS-0.4V/n.c.	2X20BOTTOM	Con-HRS
R5 R180	100k/n.c.	0402	RLC_Modules
R6 R0	100k	0402	RLC_Modules
R7 R180	100k/n.c.	0402	RLC_Modules
R8 R0	100k	0402	RLC_Modules
R9 R270	100k	0402	RLC_Modules
R10 R90	100k	0402	RLC_Modules
R11 R90	100k	0402	RLC_Modules
R12 R90	680	0402	RLC_Modules
R13 R270	680	0402	RLC_Modules
R14 R270	47k	0402	RLC_Modules
R15 R270	0/n.c.	0402	RLC_Modules
R16 R180	680	0402	RLC_Modules
R17 R180	100k	0402	RLC_Modules
R18 R0	100k/n.c.	0402	RLC_Modules
R19 R270	100k	0402	RLC_Modules
R20 R270	100k	0402	RLC_Modules
R22 R90	0	0603	RLC_Modules
R23 R0	0	0603	RLC_Modules
R24 R0	0/n.c.	0603	RLC_Modules
R25 R90	100k/n.c.	0402	RLC_Modules
SW1 R270	SKRKAEE010	SKRK	switch-alps
SW2 R270	SKRKAEE010	SKRK	switch-alps
SW3 R90	SKRKAEE010	SKRK	switch-alps
U2 R0	MSP430BT5190IZQW	S-PBGA-N113(ZQW)	msp430
U3	SN74AVC2T45YZPR	YZP	SN74AVC
U4 R180	SN74AVC2T45YZPR	YZP	SN74AVC
U5 R180	SN74AVC2T45YZPR	YZP	SN74AVC
U6 R0	TMP106YZC	YZC	Temp.Sensor
U7 R270	CMA3000-D01	CMA3000	VTI-Sensor
U8 R180	TPS72718	DSE_S-PDS0-N6	texas
Y2 R90	ABS07-32.768KHZ-9-4-T	ABS07	Abracom-Crystal

19.
EZ430 PCB Layout

