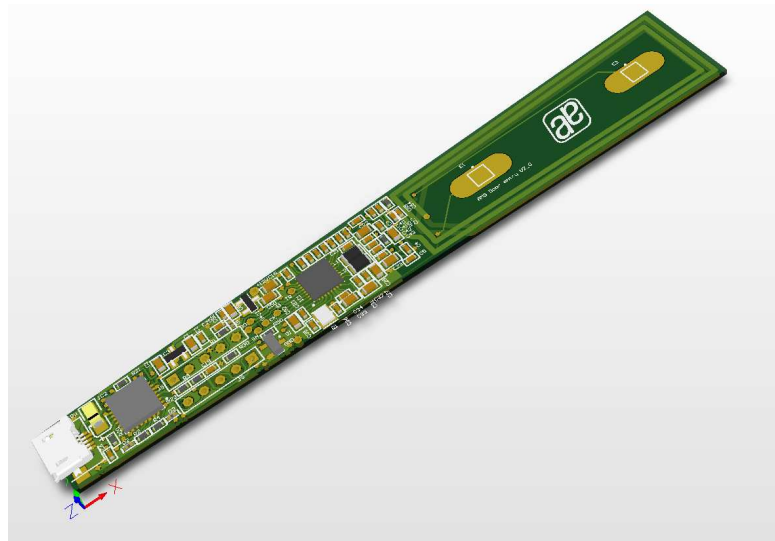


AS3911

AS3911 door handle Hardware description



Application note
Rev 1V00 December 2011

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1 Disclaimer

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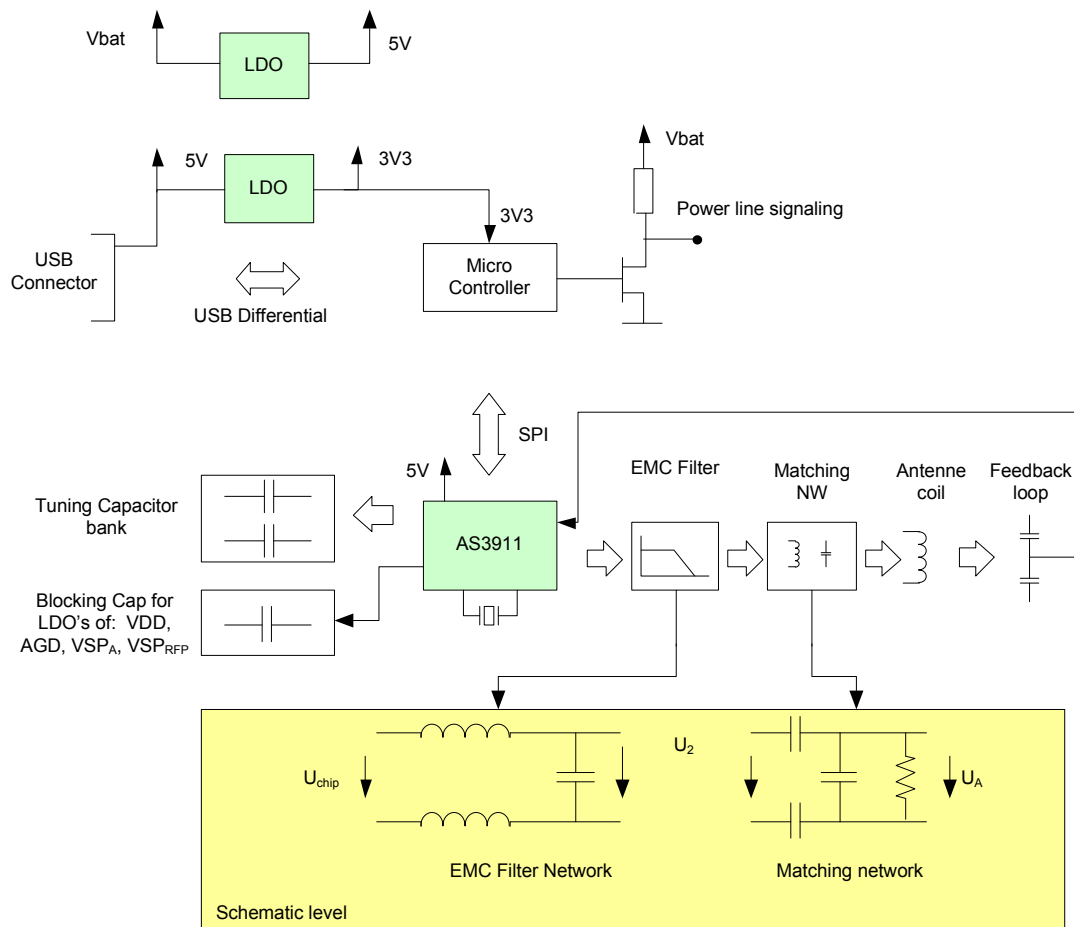
The fee associated with the demonstration circuit boards is a nonrecurring engineering fee (NRE) to partially defray the hardware and software engineering costs associated with the development and provision of the demonstration circuit boards.

The demonstration circuit boards may be operated for demonstration or evaluation purposes in non-residential areas only. austriamicrosystems’ understanding is that the customer’s products using the semiconductor integrated circuits shall be designed in compliance with all applicable requirements of the appropriate regulatory agency (e.g. FCC, ETSI, CE, JQA, etc.) and will, upon testing and release, be in compliance with these regulatory requirements. Operation of the customer’s products must not cause harmful interference and must accept any interference. This application shall not be offered for end-customer sale or lease until certification is obtained.

2 Block Diagram and Introduction

This reference design is focused to enable fast evaluation of the usage of AS3911 in the automotive environment. The specific use case of a reader in door handles is the implemented wherein the space is limited with little compromise on the performance. This reference design features the following:

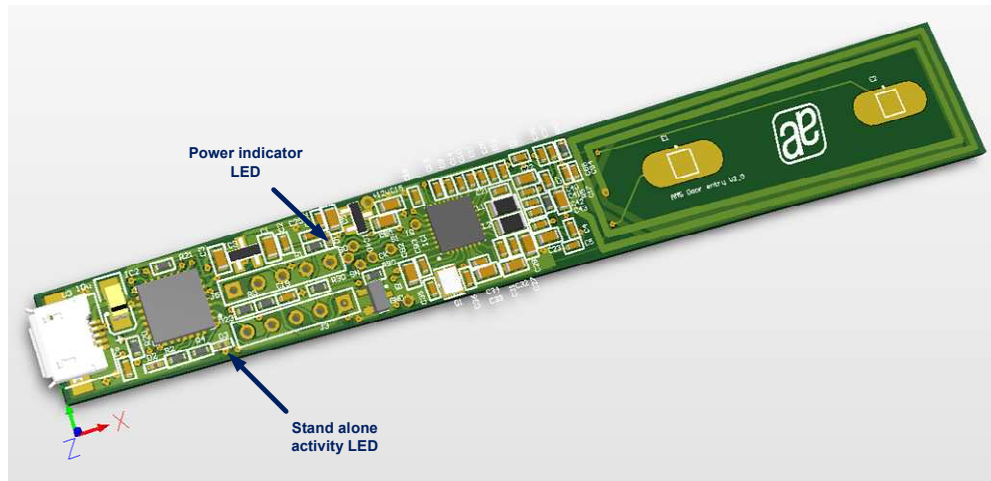
- The AS3911 door handle board has several options' to be used: 5 Volt with USB operations
- Vbat Standalone configurations with power line signaling
- Small form factor; 11x107mm (dual layer & single side assembly board) Capacitive and inductive wakeup
- USB operation to Graphical User Interface
- Antenna tuning
- 3,3V logic level UART Interface



2.1 Use of device

The Device has three signalling LED's.

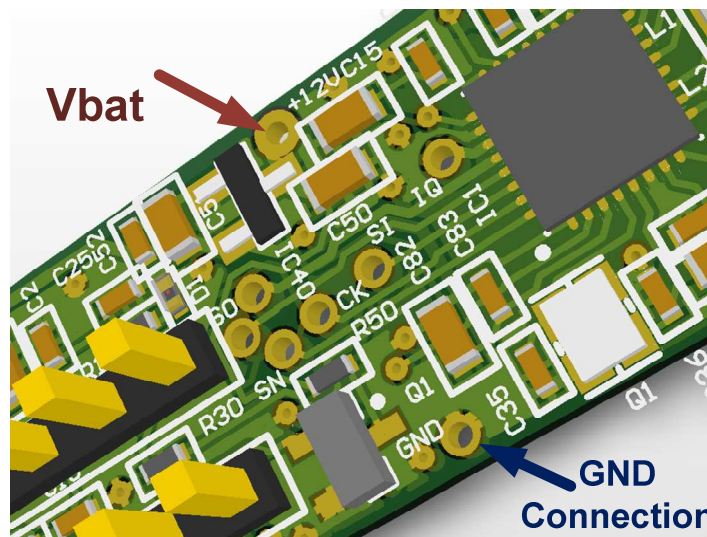
The power LED is close at the antenna and is immediate on when the device is powered. The other two LEDs are controlled by the micro controller and gives information about the software state.



When powered by USB, this reader works under control of the Graphical user Interface (for details please refer to *AS3911 AN Software user guide 1v0.pdf*).

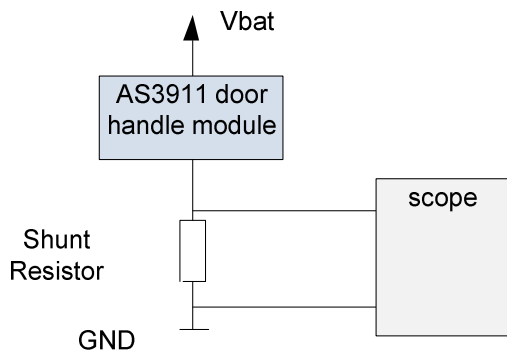
2.2 Stand-alone operation

The device offers the option to direct a supply with an external supply. The pins are shown in picture below

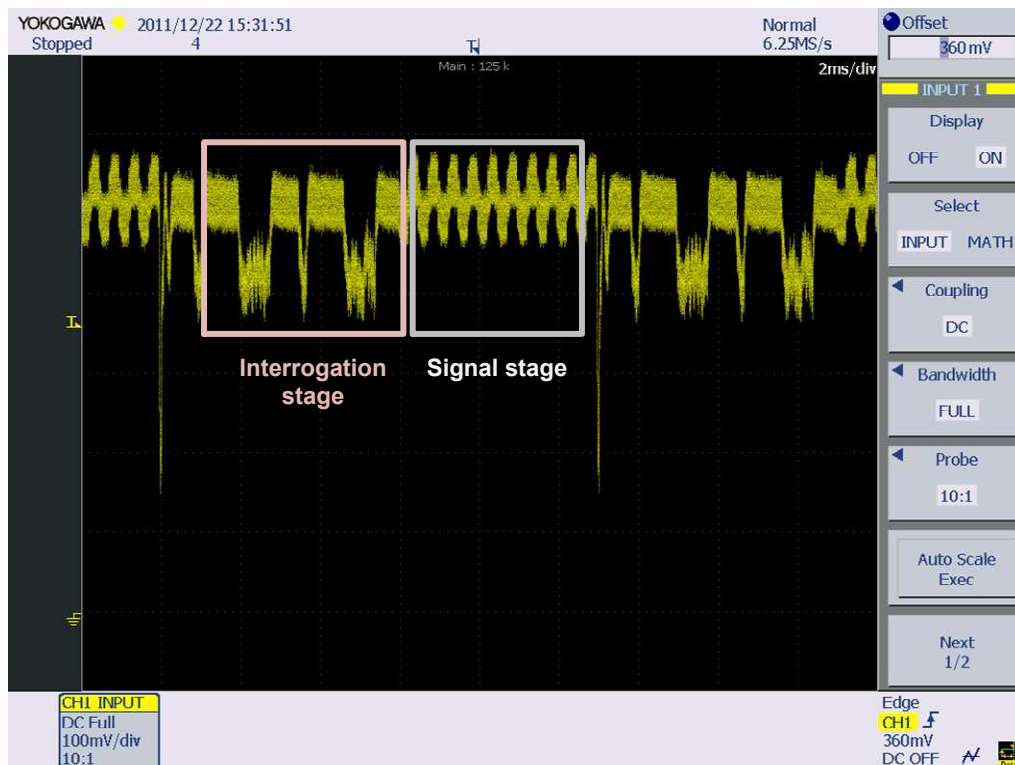


Once powered, the micro controller will scan immediately for Tags. In case of a found Tag, the device signals the presence of a Tag with a sequence of eight pulses of alternating load over the power line. The frequency for the pulses is 2 kHz.

The expected current consumption of the door handle module is at 150 mA.
For detection of the pulses we recommend using a shunt of maximum 3,3 Ohm.



Below scope pictures has been done with a 3,3 Ohm shunt resistor at 7 Volt supply.



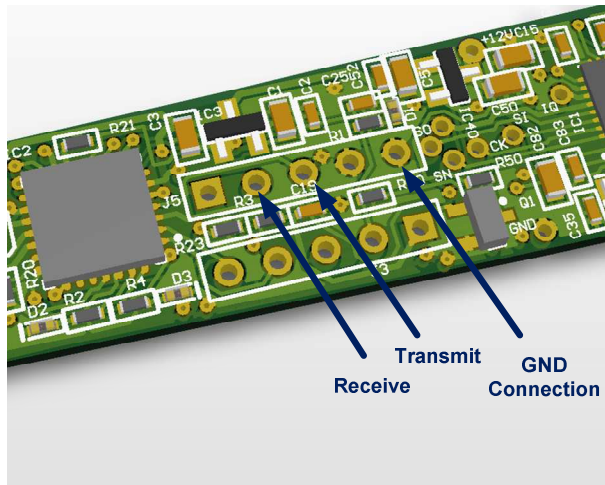
$V_{scope\ max} = 500mV \Rightarrow I_{max} = 151\ mA$

Time for Interrogation: 5ms

Time for signaling: 4 ms

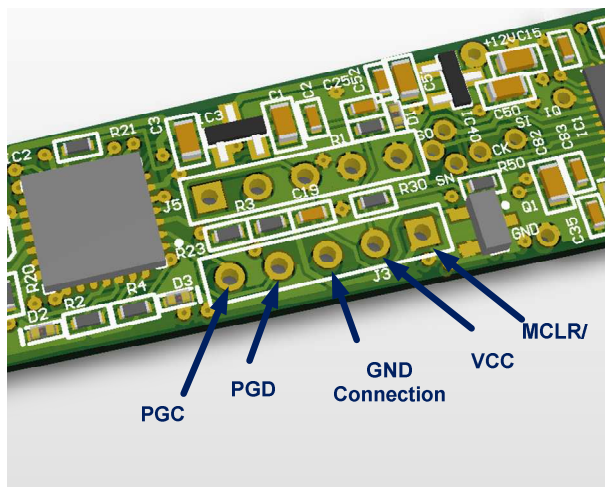
2.3 3.3 Volt UART Interface

The UART Interface is located next to the micro controller and can be used with a 3.3 Volt interface.

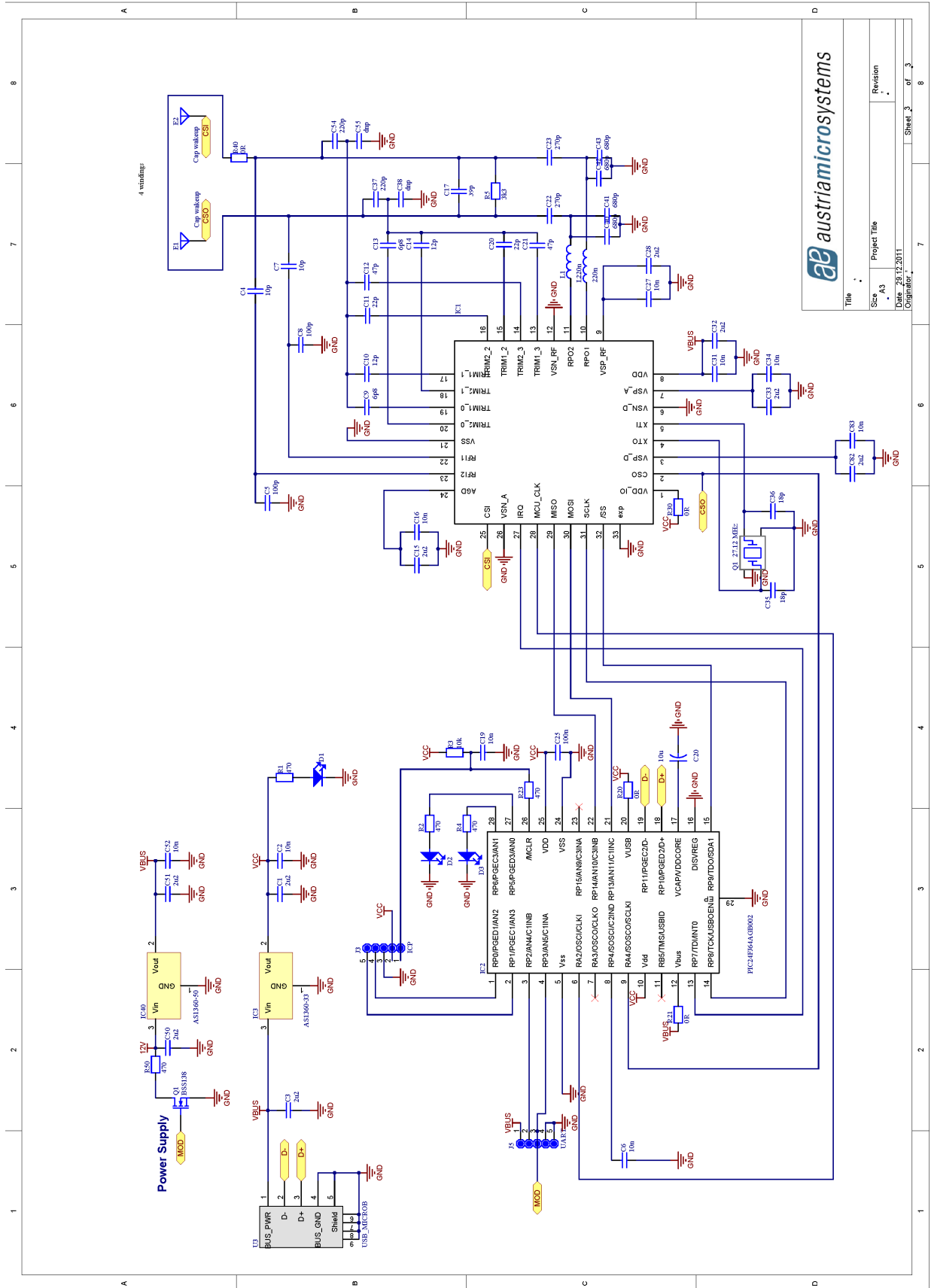


2.4 Program Interface

The program Interface for the Controller has the same pin out as the standard PIC programmer Kits thus can be used without adapter.

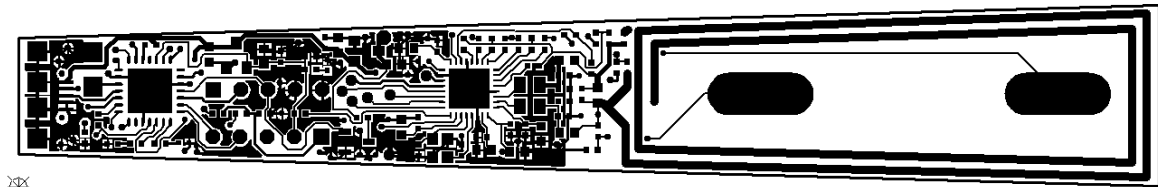


2.1 Schematic

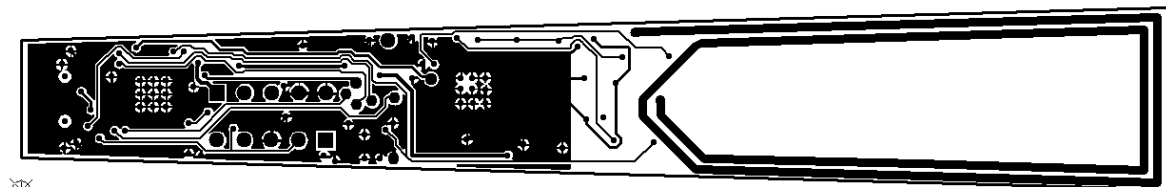


3 Gerber

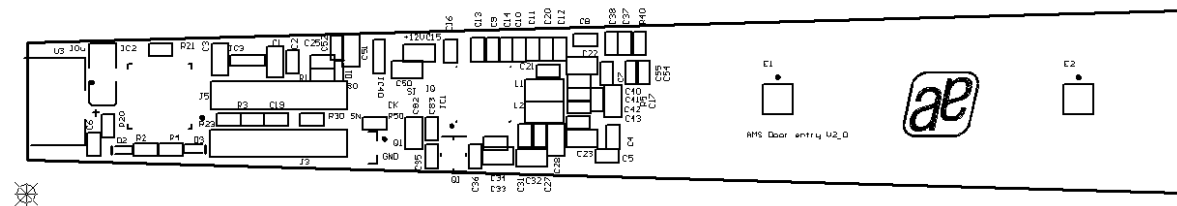
3.1.1 Top layer



3.1.2 Bottom layer



3.1.3 Silk screen



3.2 Bill of Material

Part Info	Reference	Footprint	Producer	Distributor	Distributor Number
Integrated Circuits (IC)					
AS3911	IC1	QFN32	austriamicrosystems		
PIC24FJ64AGB002	IC2	QFN28_6x6	Microchip	Digikey	PIC24FJ64GB002T-I/ML-ND
AS1360-33	IC3	SOT23	austriamicrosystems		
AS1360-50	IC40	SOT23	austriamicrosystems		
SMD resistor					
470R	R1, R2, R4, R23, R50	R0402	Stackpole Electronics	Digikey	RMCF0402JT470RTR-ND
10k	R3	R0402	Yageo	Digikey	311-10KJRT-ND
3k3	R5	R0402	Yageo	Digikey	311-3.3KJRT-ND
0R	R20, R21, R30, R40	R0402	Yageo	Digikey	311-0.0JRT-ND
SMD capacitors					
10u	C20	CP_SMD_A	Nichicon	Digikey	493-2351-2-ND
2u2	C1, C3, C15, C28, C32, C33, C50, C51, C82	C0603	Taiyo Yuden	Digikey	587-2983-2-ND
10n	C2, C6, C16, C19, C27, C31, C34, C52, C83	C0402	Yageo	Digikey	311-1042-2-ND
10p	C4, C7	C0402	Yageo	Digikey	311-1014-2-ND
100p	C5, C8	C0402	Yageo	Digikey	311-1024-2-ND
6p8	C9, C13	C0402	TDK Corporation	Digikey	445-4887-2-ND
12p	C10, C14	C0402	Yageo	Digikey	311-1016-2-ND
22p	C11, C20	C0402	Yageo	Digikey	311-1018-2-ND
47p	C12, C21	C0402	Yageo	Digikey	311-1021-2-ND
39p	C17	C0603	TDK Corporation	Digikey	445-1276-2-ND
270p	C22, C23	C0603	TDK Corporation	Digikey	445-1286-2-ND
100n	C25	C0402	TDK Corporation	Digikey	445-5942-2-ND
18p	C35, C36	C0402	TDK Corporation	Digikey	445-1238-2-ND
220p	C37, C54	C0402	TDK Corporation	Digikey	445-1251-2-ND
680p	C40, C41, C42, C43	C0402	Yageo	Digikey	311-1030-2-ND
SMD inductors					
220n	L1, L2	L0805	Murata	Digikey	490-5669-2-ND
SMD transistors					
BSS138	Q1	SOT23_N	ON Semiconductor	Digikey	BSS138LT3GOSTR-ND
SMD LED					
LED_LUMEX	D1, D2, D3	LED_Lumex_0402	Kingbright Corp	Digikey	754-1104-2-ND
Oscillator					
27.12 MHz	Q1	XRCGB27 M120F3M0 0R0	Murata	Digikey	490-5581-2-ND
Mechanical					
USB_MICROB	U3	Micro USB	Hirose Electric	Digikey	H11634TR-ND
Not populated					
dnp	C38, C55	C0402			
ICP	J3	PLUG_THM D_STRIP5			
UART	J5	PLUG_THM D_STRIP5			
Cap wakeup	E1	PIN1			
Cap wakeup	E2	PIN1			

4 Version History

Version	Date	Change log	Originator
1.00	29.12.2011	Initial Version	tlu

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