Microcontroller Module
NanoSAMD21

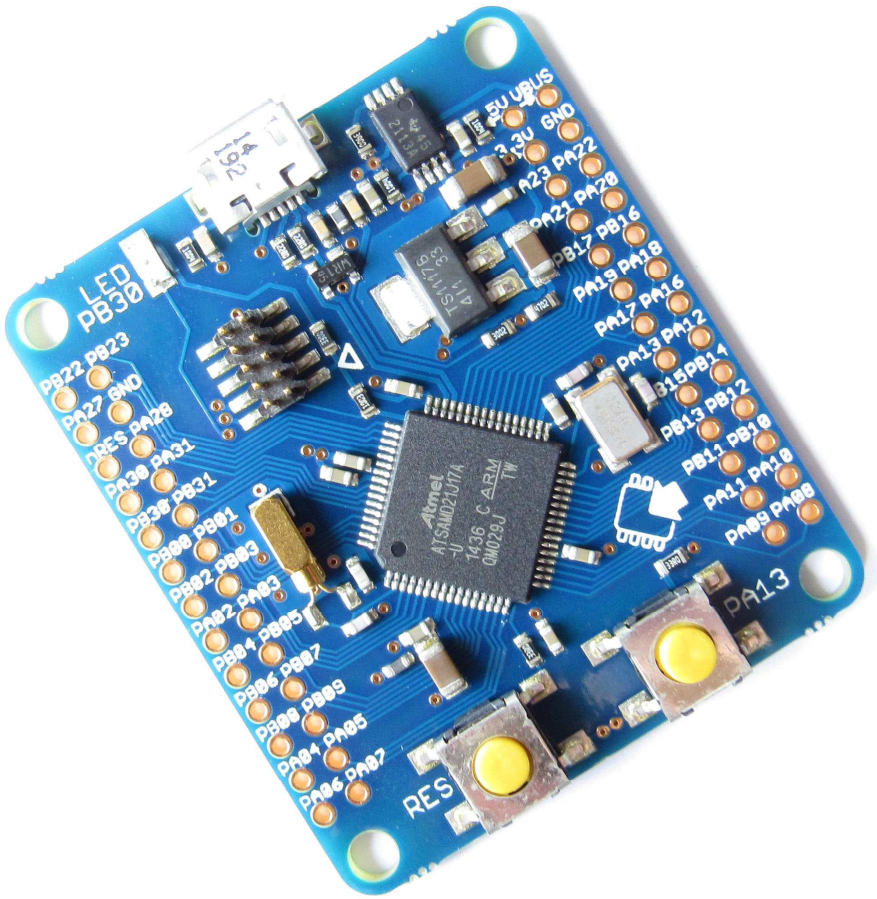


Table of contents

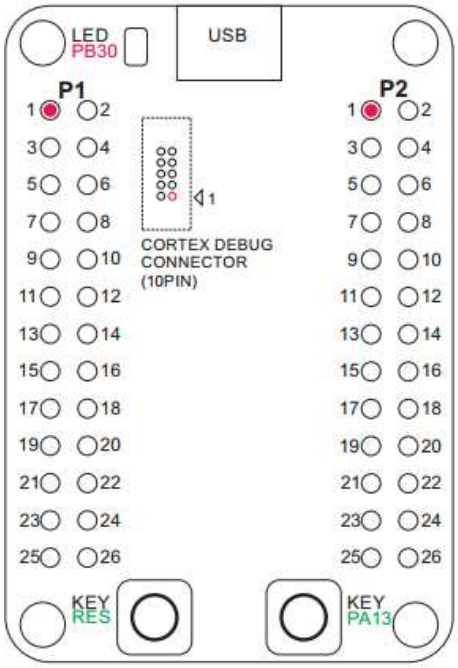
Microcontroller Module NanoSAMD21 Key Features

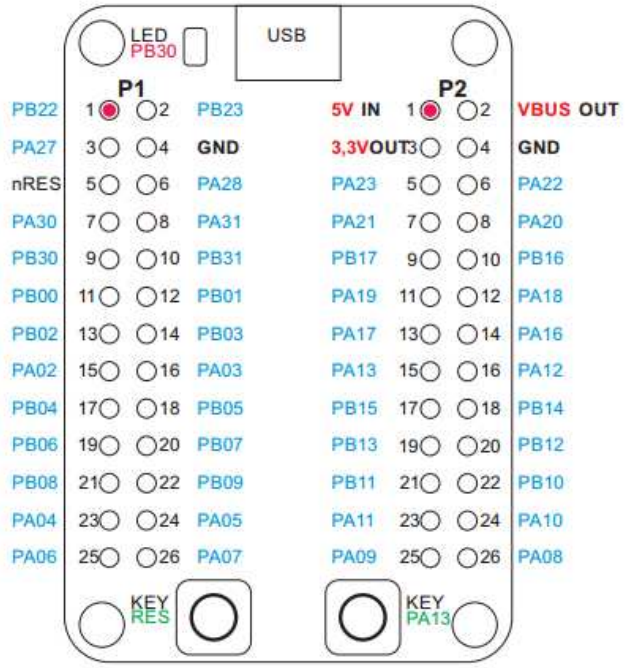
- Microcontroller module based on ARM Cortex M0 SAMD21 microcontroller (Atmel®), maximum CPU frequency 48MHz
- Cortex Debug Connector (10pin), Serial Wire Debug Interface (SWD), pin-compatible to SWD interface of Atmel®-ICE Programmer
- Power Switch TPS2113APW (typ. 84mOhm on-resistance)
- Power supply configuration:
  - External 5V Power Supply connected to P2-1 Pin or
  - VBUS
- On board LDO voltage regulator 3,3V
- Micro USB-Connector
- USB section ESD and EMI protected (Filters and Suppressor diode array: VBUS, D+, D-)
- USB Detection Resistor Divider connected to PA12
- User-Key Reset the microcontroller
- User-Key connected to PA13
- User-LED connected to PB30
- C-L filter connected to VDDANA pin, decoupling capacitors connected to VCC path
- Microcontroller IO pins are routed to pinheader connector pads P1 and P2 (2 x 13-pin 2-row, contact spacing 2,54mm, module fits on 2,54mm perfboard)
- Quartz 12MHz connected to XTAL pins
- Quartz 32,768kHz connected to XTAL32 pins
- Pcb dimensions 38mm x 44mm
- Maximum module high of 6,1mm
- Pcb technology: FR4, two layers, solder resist, surface immersion gold, RoHS

Optional available:

- Pinheader 2 x 13-pin 2-row, Au, contact spacing 2,54mm
- Receptacle 2 x 13-pin 2-row, Au, contact spacing 2,54mm

Pin Assignment





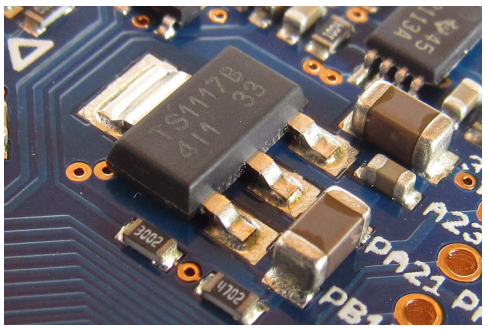
Power Supply Configuration

The microcontroller module can be powered via **USB VBUS** or an **external 5V** supply voltage.

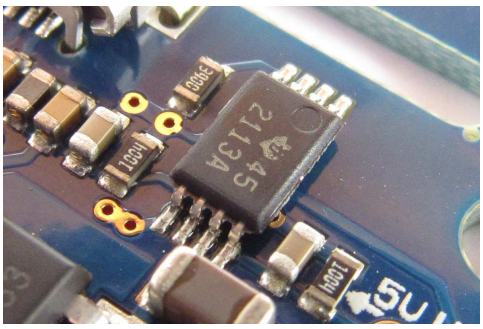
If an external 5V supply voltage is applied, this voltage has priority over USB VBUS voltage.

The linear low-drop-out regulator **TS1117** regulates the 3,3V supply voltage VCC of the microcontroller.

The TS1117 has a typical dropout voltage of 1,3V @ 1A, maximum 1,5V.



The power switch **TPS2112A** blocks reverse and cross-conduction. The current through this switch is limited to 641mA (I_{limit}=250/R_{limit}, R_{limit}=390Ohm). This is a typical value and according to the datasheet we can expect a minimum of 510mA and a maximum of 800mA. The power switch TPS2113A has an on-resistance of typically 84mOhm and maximal 110mOhm.



USB cable connected	External 5V connected at P2-1	Voltage source
Yes	No	VBUS
Yes	Yes	external 5V connected to P2-1
No	Yes	external 5V connected to P2-1

Precausion using VBUS connected to P2-2 (VBUS OUT):

USB VBUS voltage 5V is always available at pin P2-2. USB VBUS is direct connected to this pin!

If supplying external components with VBUS voltage

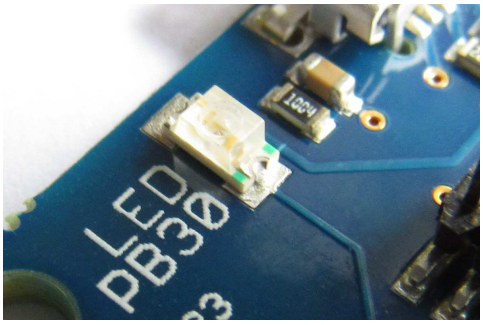
PLEASE NOTE THE MAXIMUM CURRENT CAPABILITY OF USB VBUS!
DO NOT CONNECT EXTERNAL SUPPLY VOLTAGE TO THIS PIN!

Power Supply Voltage

	Pin	Condition	Value			Unit
			min	typ	max	
External Supply Voltage applied to Pin P2-1	P2-1		4,7	**5,0**	5,5	V

User LED

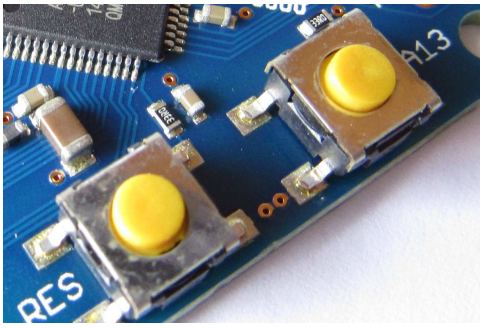
The cathode of the user on-board LED is connected to PB30.



User Keys

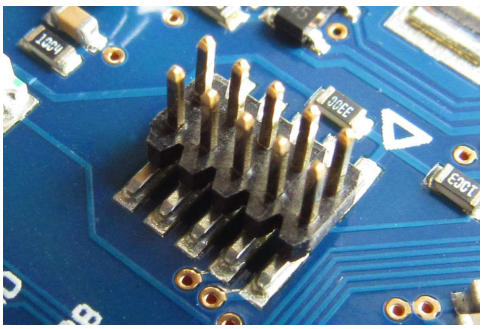
Press the key RES to reset the microcontroller.

The right user key is connected to PA13. The signal PA13 is set to low level if key is pressed.



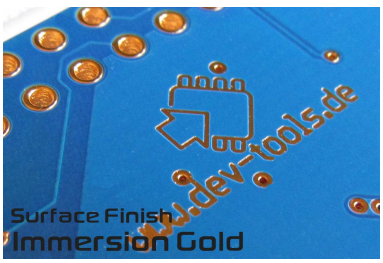
Cortex Debug Connector

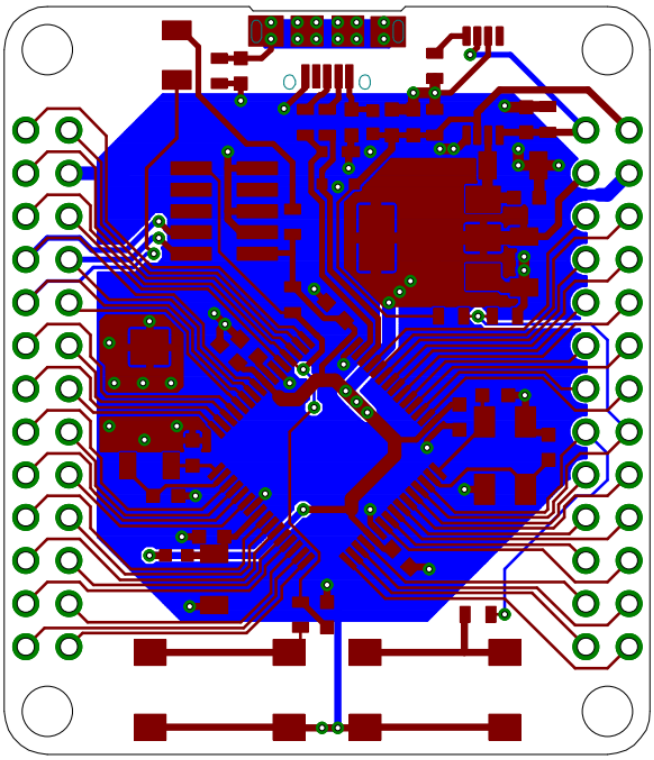
Pin	Signal
1	VTG 3,3V
2	PA31 SWDIO
3	GND
4	PA30 SWDCLK
5	GND
6	NC (SWO)
7	NC (KEY)
8	NC
9	GND
10	nRESET



Layout

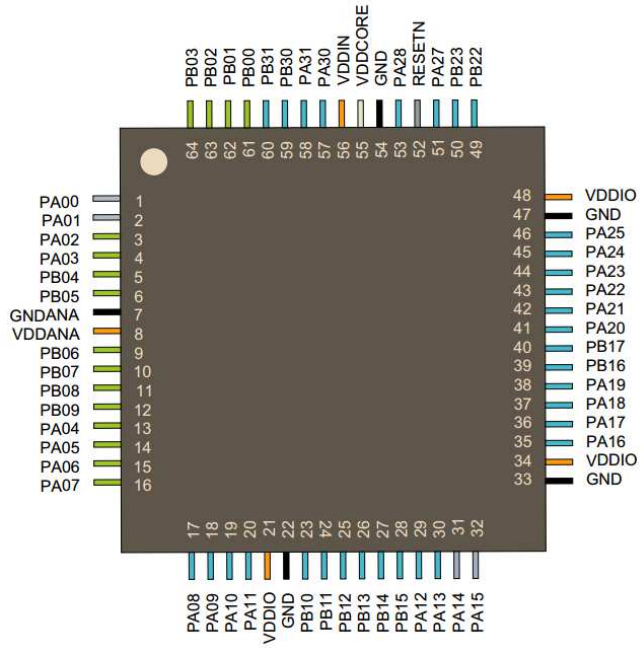
PCB Size	38mm x 44mm, 1,6mm thickness
Design	2 Layers, SMD Top Layer
Material	FR4
Surface	Immersion Gold
Soldermask	Dev-Tools blue
Silk Skreen	White
Panel Processing	Milled, Rounded Corners
E-Test	Yes
RoHS	Yes

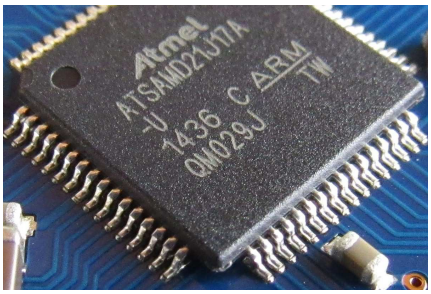




SAM D21J Features

Pins	64
General Purpose I/O-pins (GPIOs)	52
Flash	256/128/64/32KB
SRAM	32/16/8/4KB
Timer Counter (TC) instances	5
Waveform output channels per TC instance	2
Timer Counter for Control (TCC) instances	3
Waveform output channels per TCC	8/4/2
DMA channels	12
USB interface	1
Serial Communication Interface (SERCOM) instances	6
Inter-IC Sound (I2S) interface	1
Analog-to-Digital Converter (ADC) channels	20
Analog Comparators (AC)	2
Digital-to-Analog Converter (DAC) channels	1
Real-Time Counter (RTC)	Yes
RTC alarms	1
RTC compare values	1 32-bit value or 2 16-bit values
External Interrupt lines	16
Peripheral Touch Controller (PTC) X and Y lines	16x16
Maximum CPU frequency	48MHz
Event System channels	12
SW Debug Interface	Yes
Watchdog Timer (WDT)	Yes





Intended use

This product is intended to use as development and evaluation board for developing microcontroller based applications.

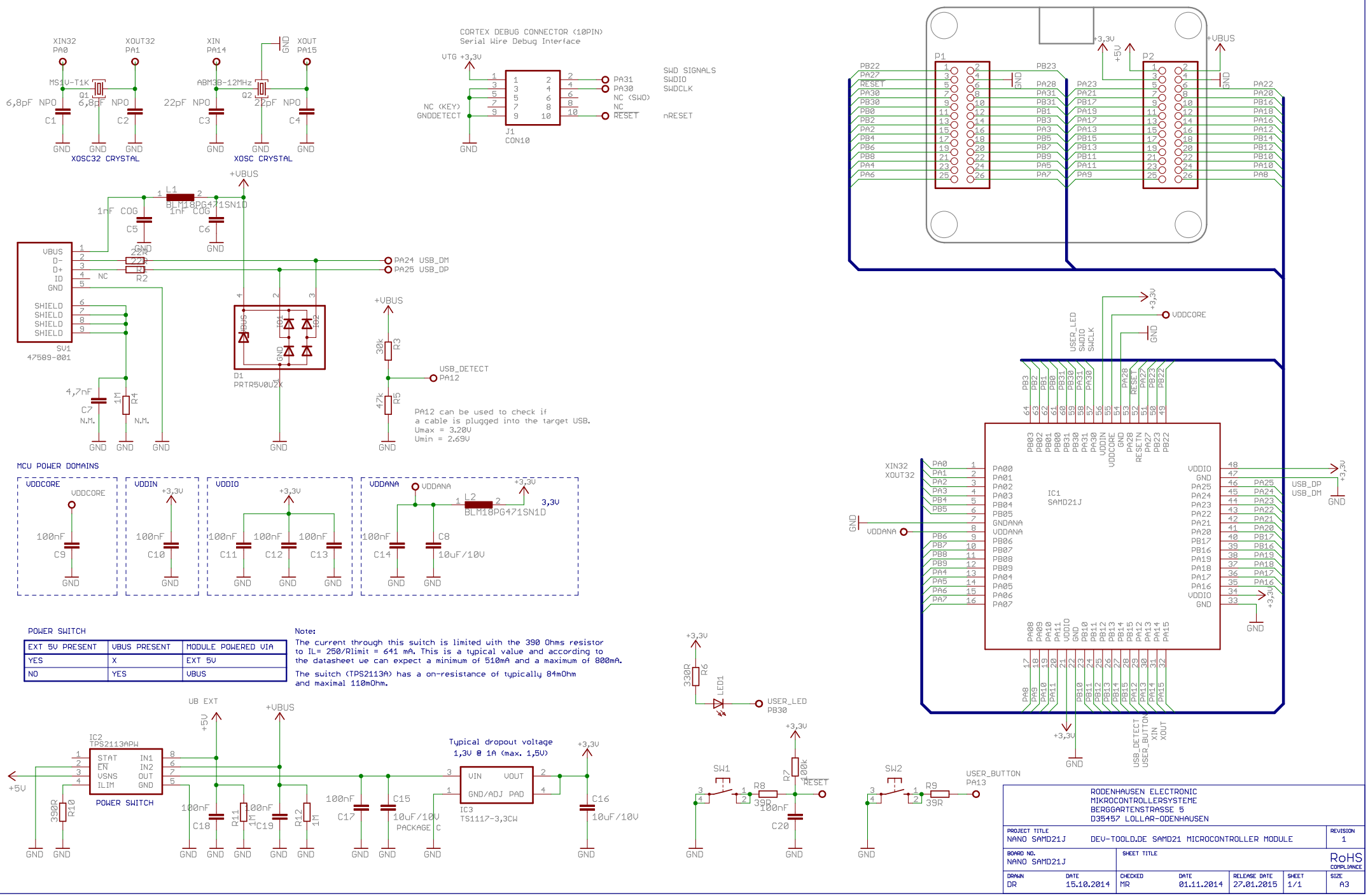
Warning

To avoid damage due to electrostatic discharge (ESD), appropriate measures for ESD protection are to be taken for handling and only appropriately trained personnel should handle the board.

Disclaimer

This product is not authorized for use in safety-critical applications (such as life support) where a failure of this product would reasonably be expected to cause severe personal injury or death. RODENHAUSEN ELECTRONIC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does RODENHAUSEN ELECTRONIC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in this documentation and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. RODENHAUSEN ELECTRONIC reserve the right to make corrections, modifications, enhancements, improvements, and other changes to this product (including changes of layout, schematic and documentation) at any time and to discontinue this product without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

Note



POWER SWITCH		
EXT 5V PRESENT	VBUS PRESENT	MODULE POWERED VIA
YES	X	EXT 5V
NO	YES	VBUS

RODENHAUSEN ELECTRONIC
MIKROCONTROLLERSYSTEME
BERGGARTENSTRASSE 5
D35457 LOLLAR-ODENHAUSEN

PROJECT TITLE		REVISION
NANO SAMD21J	DEV-TOOLD.DE SAMD21 MICROCONTROLLER MODULE	1

BOARD NO.	SHEET TITLE					
NANO SAMD21J						RoHS COMPLIANCE
DRAWN	DATE	CHECKED	DATE	RELEASE DATE	SHEET	SIZE
DR	15.10.2014	MR	01.11.2014	27.01.2015	1/1	A3