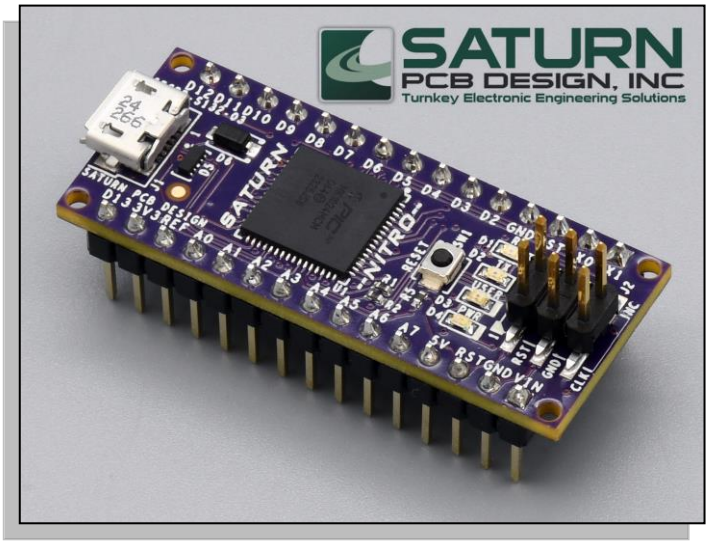
—SATURN NITRO—

Part Number: SPCBD-S132-03



Description

The ***SATURN –NITRO–*** is a low-cost solution for applications that need a professional, ultra powerful, high-speed plug-in processing unit. It utilizes a PIC32 IC for processing that runs at a far higher speed than other plug-in devices. Microchip MPLAB libraries available!

The PCB is manufactured using high temperature FR-4 for durability in extreme conditions.

For its CPU, the ***SATURN –NITRO–*** utilizes an extremely versatile and powerful PIC32MK1024MCM064 by Microchip Technology, Inc.

Introduction Video:

Saturn PCB NITRO Introduction

Saturn PCB Design, Inc.
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DeBary, FL 32713
www.saturnpcb.com || 407-340-2668

SATURN PCB DESIGN, INC
Turnkey Electronic Engineering Solutions

Features

- Arduino Nano Compatible*
- Vin: 6.5 to 20VDC
- 120MHz Operation
- 1MB Flash memory
- 256K x 8 RAM memory
- 4K x 8 EEPROM memory
- I2C, IrDA, LIN bus, PMP, SPI, UART/USART, USB OTG
- Independent simultaneous USB and UART communications.
- Operating Temperature: -0°C to 85°C
- Small PCB Size: 43.18mm x 17.78mm
- Customization available upon request.

*This device only works with 3.3V logic levels.

Power

- Micro USB 5V
- 6.5-20VDC input on pin B1 (VIN)
- 5V Regulated output on pin B4 (5V) Can also be used for 5V input.
- 3V3 Regulated output on pin B14 (3V3)

I/O

- 20 Digital or 20 Analog depending on configuration.
- 7 12bit ADC modules @ 3.75msps
- 3 12bit DAC modules
- 12 PWM Output pairs
- 6 Quadrature encoder modules
- 8 DMA Channels
- 4 Op-Amps

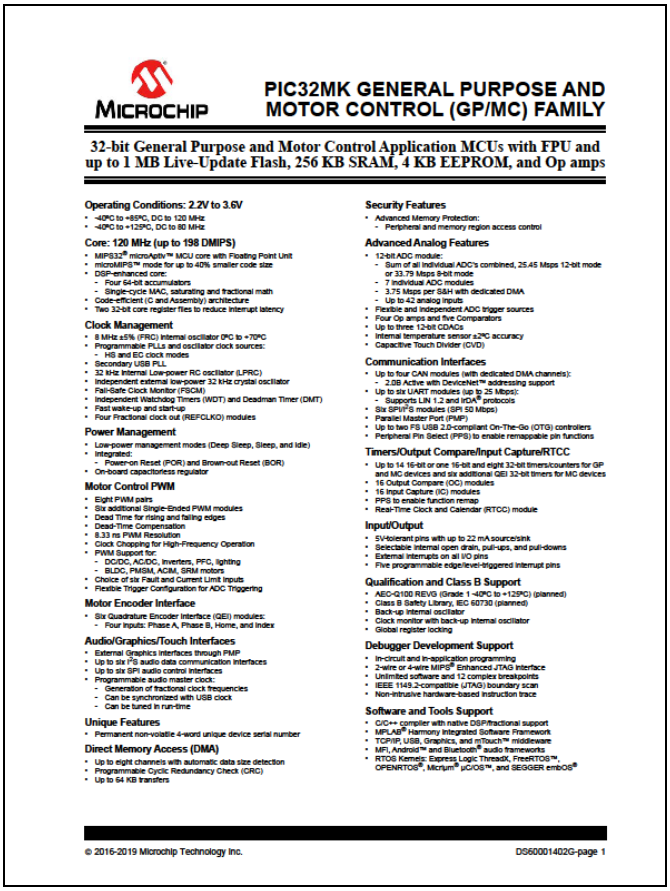
Product Link:

https://saturnpcb.com/nitro/

Applications

- Consumer electronics / military / aerospace

More information on the PIC32 can be found here:
https://www.microchip.com/en-us/product/PIC32MK1024MCM064



MICROCHIP

PIC32MK GENERAL PURPOSE AND MOTOR CONTROL (GP/MC) FAMILY

32-bit General Purpose and Motor Control Application MCUs with FPU and up to 1 MB Live-Update Flash, 256 KB SRAM, 4 KB EEPROM, and Op amps

Operating Conditions: 2.2V to 3.6V
- -40ºC to +85ºC, DC to 120 MHz
- -40ºC to +125ºC, DC to 80 MHz

Core: 120 MHz (up to 198 DMIPS)
- MIPS32® microAptiv™ MCU core with Floating Point Unit
- microMIPS™ mode for up to 40% smaller code size
- DSP-enhanced core:
  - Four 64-bit accumulators
  - Single-cycle MAC, saturating and fractional math
- Code-efficient (C and Assembly) architecture
- Two 32-bit core register files to reduce interrupt latency

Clock Management
- 8 MHz ±5% (FRC) internal oscillator 0ºC to +70ºC
- Programmable PLLs and oscillator clock sources:
  - HS and EC clock modes
- Secondary USB PLL
- 32 kHz internal Low-power RC oscillator (LPRC)
- Independent external low-power 32 kHz crystal oscillator
- Fail-Safe Clock Monitor (FSCM)
- Independent Watchdog Timers (WDT) and Deadman Timer (DMT)
- Fast wake-up and start-up
- Four Fractional clock out (REFCLKO) modules

Power Management
- Low-power management modes (Deep Sleep, Sleep, and Idle)
- Integrated:
  - Power-on Reset (POR) and Brown-out Reset (BOR)
- On-board capacitorless regulator

Motor Control PWM
- Eight PWM pairs
- Six additional Single-Ended PWM modules
- Dead Time for rising and falling edges
- Dead-Time Compensation
- 8.33 ns PWM Resolution
- Clock Chopping for High-Frequency Operation
- PWM Support for:
  - DC/DC, AC/DC, Inverters, PFC, lighting
  - BLDC, PMSM, ACIM, SRM motors
- Choice of six Fault and Current Limit inputs
- Flexible Trigger Configuration for ADC Triggering

Motor Encoder Interface
- Six Quadrature Encoder Interface (QEI) modules:
  - Four inputs: Phase A, Phase B, Home, and Index

Audio/Graphics/Touch Interfaces
- External Graphics Interfaces through PMP
- Up to six I²S audio data communication interfaces
- Up to six SPI audio control interfaces
- Programmable audio master clock:
  - Generation of fractional clock frequencies
  - Can be synchronized with USB clock
  - Can be tuned in run-time

Unique Features
- Permanent non-volatile 4-word unique device serial number

Direct Memory Access (DMA)
- Up to eight channels with automatic data size detection
- Programmable Cyclic Redundancy Check (CRC)
- Up to 64 KB transfers

Security Features
- Advanced Memory Protection:
  - Peripheral and memory region access control

Advanced Analog Features
- 12-bit ADC module:
  - Sum of all individual ADC's combined, 25.45 Msps 12-bit mode or 33.79 Msps 8-bit mode
  - 7 individual ADC modules
  - 3.75 Msps per S&H with dedicated DMA
  - Up to 42 analog inputs
- Flexible and Independent ADC trigger sources
- Four Op amps and five Comparators
- Up to three 12-bit CDACs
- Internal temperature sensor ±2ºC accuracy
- Capacitive Touch Divider (CVD)

Communication Interfaces
- Up to four CAN modules (with dedicated DMA channels):
  - 2.0B Active with DeviceNet™ addressing support
- Up to six UART modules (up to 25 Mbps):
  - Supports LIN 1.2 and IrDA® protocols
- Six SPI/I²S modules (SPI 50 Mbps)
- Parallel Master Port (PMP)
- Up to two PB USB 2.0-compliant On-The-Go (OTG) controllers
- Peripheral Pin Select (PPS) to enable remappable pin functions

Timers/Output Compare/Input Capture/RTCC
- Up to 14 16-bit or one 16-bit and eight 32-bit timers/counters for GP and MC devices and six additional QEI 32-bit timers for MC devices
- 16 Output Compare (OC) modules
- 16 Input Capture (IC) modules
- PPS to enable function remap
- Real-Time Clock and Calendar (RTCC) module

Input/Output
- 5V-tolerant pins with up to 22 mA source/sink
- Selectable internal open drain, pull-ups, and pull-downs
- External interrupts on all I/O pins
- Five programmable edge/level-triggered interrupt pins

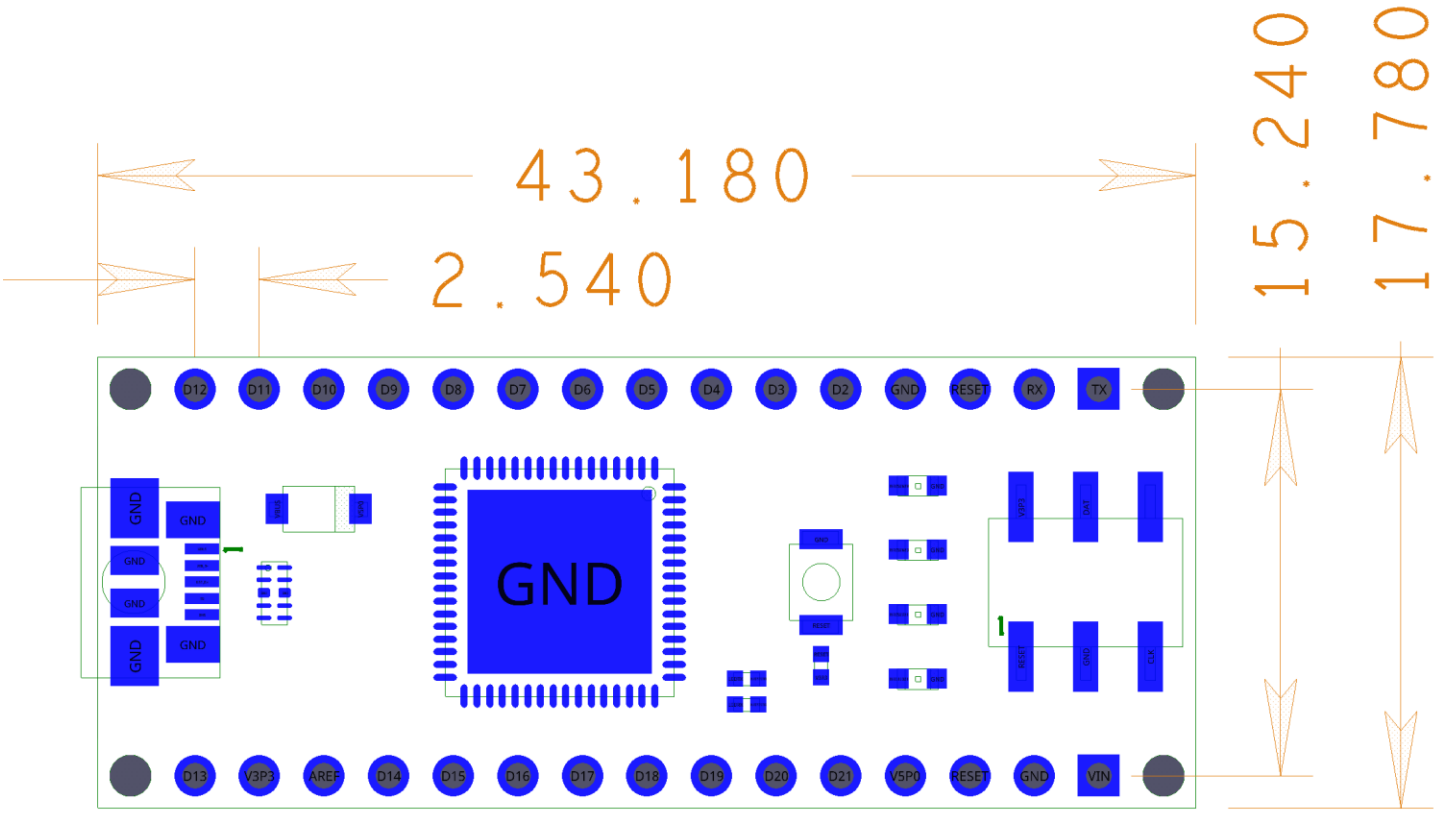
Qualification and Class B Support
- AEC-Q100 REVG (Grade 1 -40ºC to +125ºC) (planned)
- Class B Safety Library, IEC 60730 (planned)
- Back-up internal oscillator
- Clock monitor with back-up internal oscillator
- Global register locking

Debugger Development Support
- In-circuit and in-application programming
- 2-wire or 4-wire MIPS® Enhanced JTAG interface
- Unlimited software and 12 complex breakpoints
- IEEE 1149.2-compatible (JTAG) boundary scan
- Non-intrusive hardware-based instruction trace

Software and Tools Support
- C/C++ compiler with native DSP/fractional support
- MPLAB® Harmony Integrated Software Framework
- TCP/IP, USB, Graphics, and mTouch™ middleware
- MFi, Android™ and Bluetooth® audio frameworks
- RTOS Kernels: Express Logic ThreadX, FreeRTOS™, OPENRTOS®, Micrium® µC/OS™, and SEGGER embOS®

Dimensions

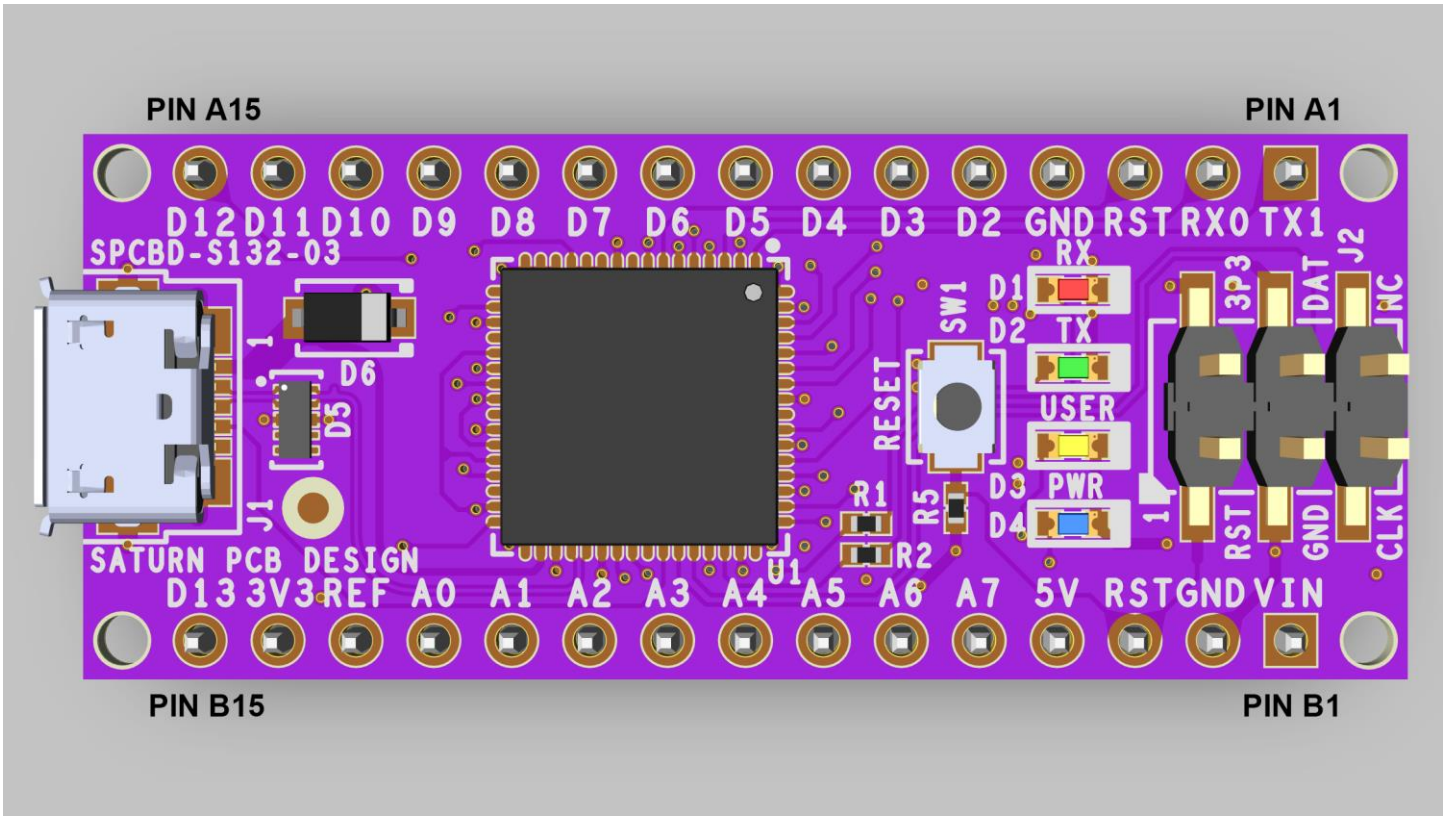
L•W•H: 143.18mm x 17.78mm x 20mm



J2 Pinnout
Amphenol ICC Connector: 54202-S0803LF

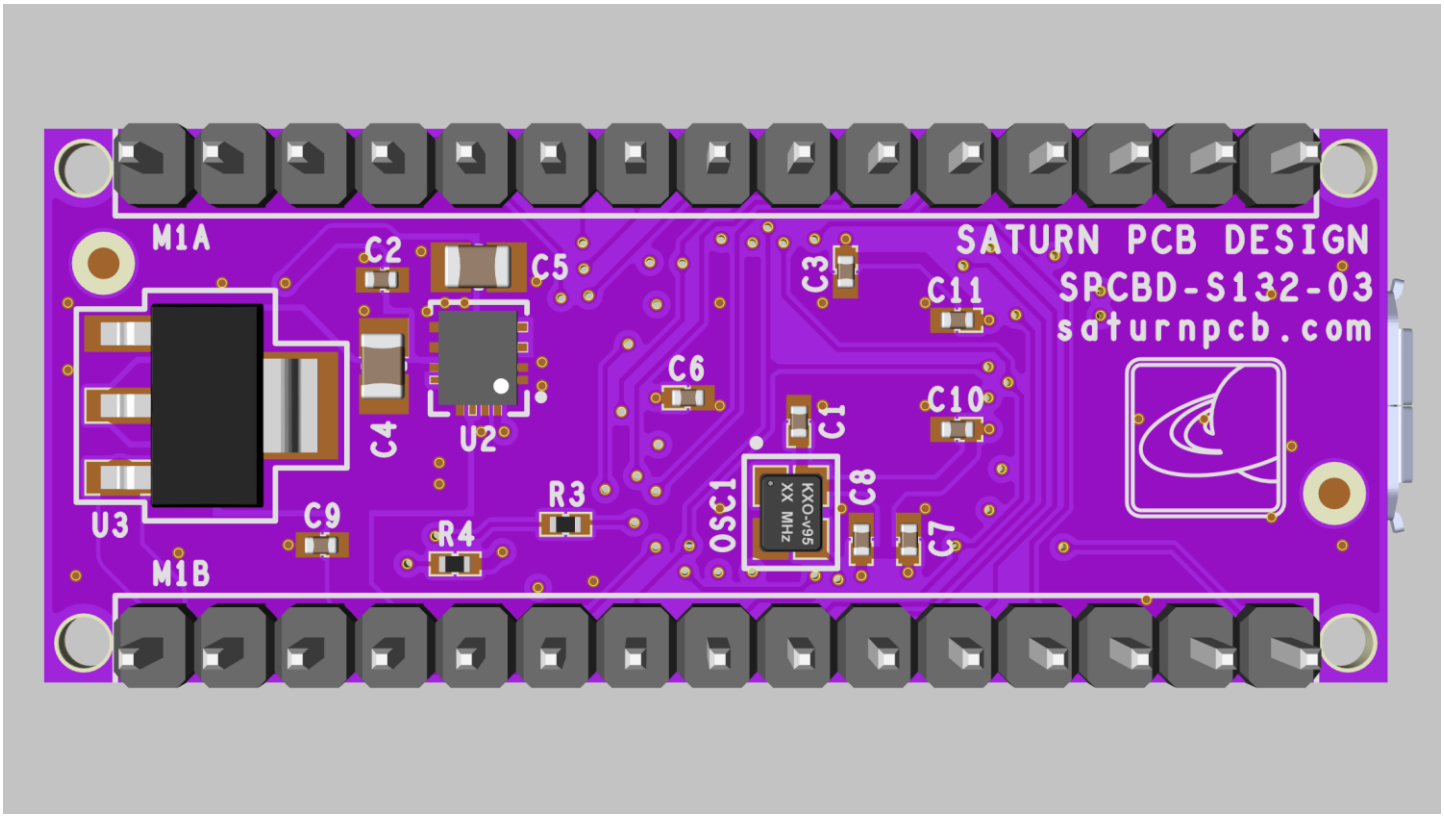
1: Reset
2: V3P3
3: GND
4: DAT
5: CLK
6: NC

Top View



D1: Data Receive
D2: Data Transmit
D3: User controlled
D4: V3P3 On

Bottom View


M1A
M1B
U3
C9
C4
C2
C5
U2
R4
R3
C6
OSC1
C1
C8
C7
C3
C11
C10
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SPCBD-S132-03
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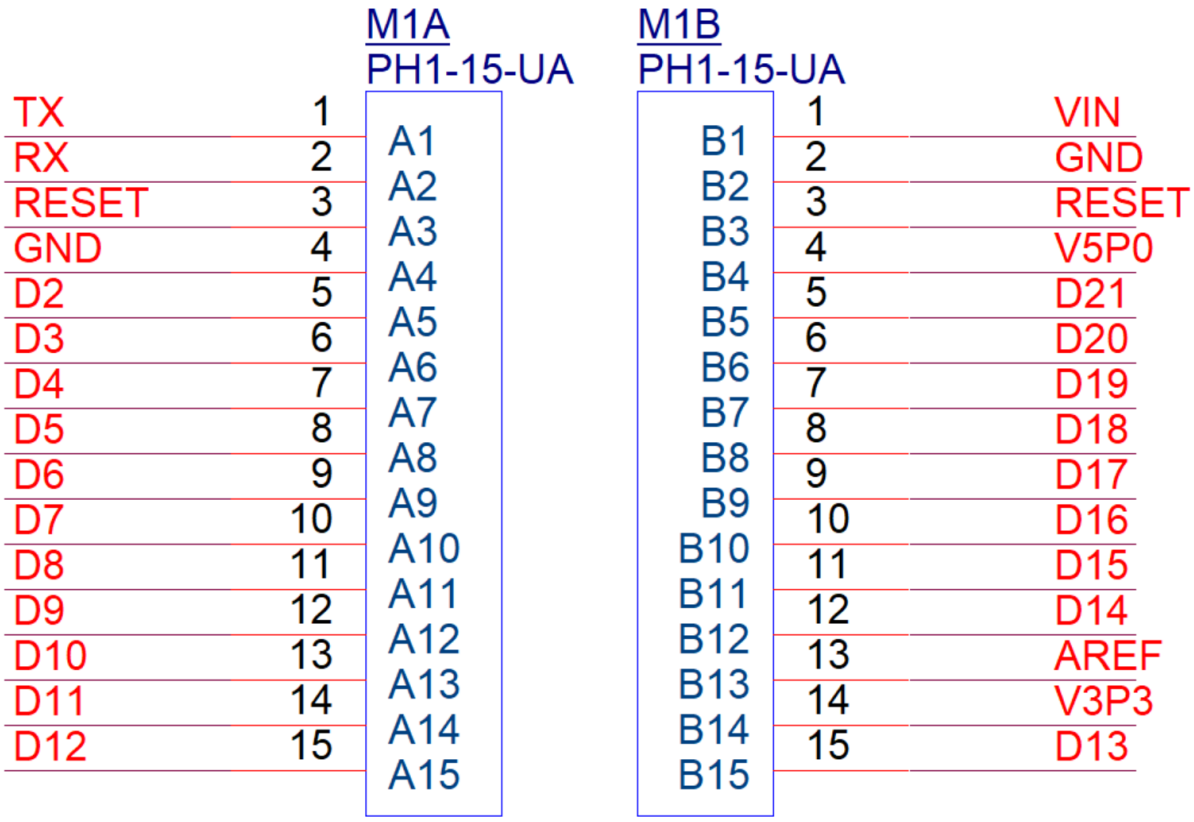
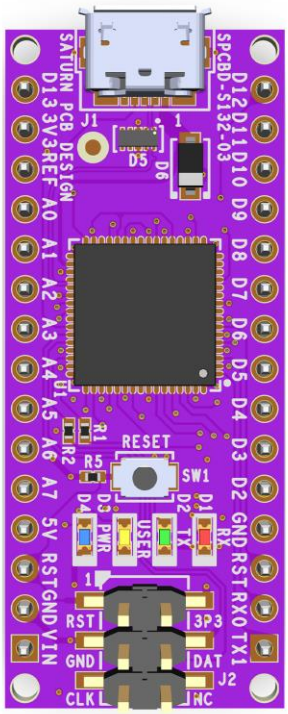
Header Pinnouts



SATURN –NITRO–

Pin Assignment Work Sheet



RB4, RD6 ____ D13
3V3
RE14, RE15 ____ REF
RC13, RG6, RG9 ____ A0
RA0, RA11, RA12 ____ A1
RA1, RB0, RB1 ____ A2
RB2, RB3, RC10 ____ A3
RA4, RC2, RG8 ____ A4
RB8, RC1, RG7 ____ A5
RA8, RC10, RE13 ____ A6
RC11, RE12 ____ A7
5V
RST
GND
VIN

D12 ____ RB10
D11 ____ RB13
D10 ____ RB14
D9 ____ RB12
D8 ____ RC7
D7 ____ RC8
D6 ____ RA10, RC9
D5 ____ RF0
D4 ____ RF1
D3 ____ RB11
D2 ____ RD5
GND
RST
RX0 ____ RB15
TX1 ____ RA7

TX, RX, D2 to D13 are all 5V tollerent