MAX30003WING Expansion Board

Evaluates: MAX30003 Biopotential AFE

General Description

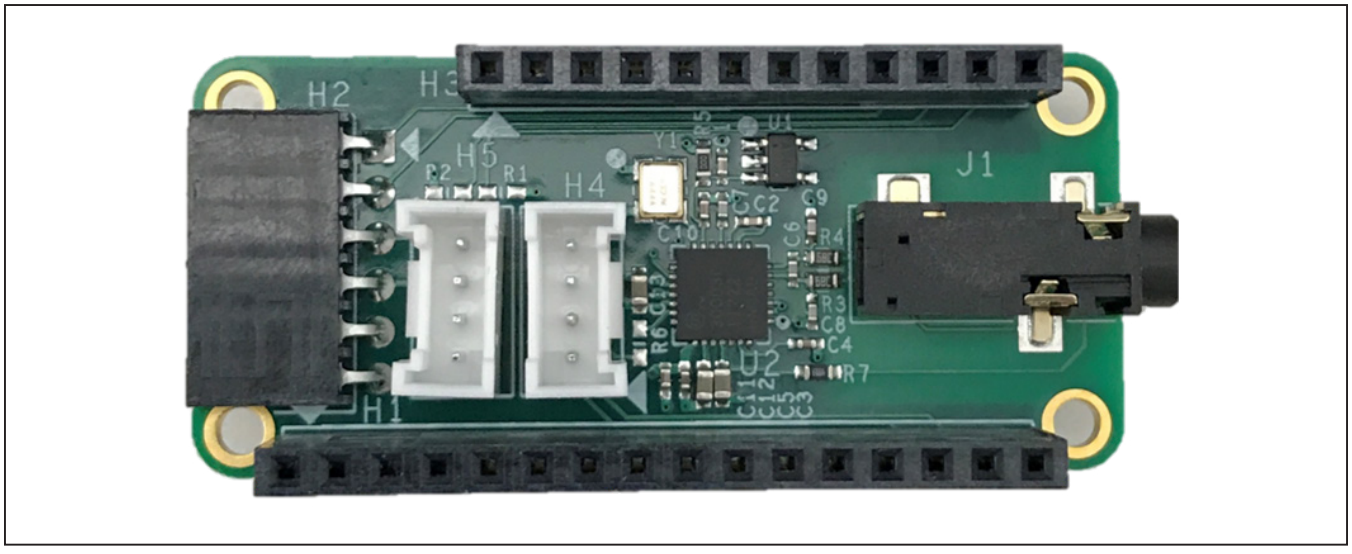
The MAX30003WING is an expansion board designed to help engineers and students alike to rapidly prototype ECG applications for wearables using the MAX30003 biopotential analog front end. The form factor is a small 0.9in by 2.0in dual-row header footprint that is compatible with breadboards and featherboards from Maxim and Adafruit®, as well as additional expansion boards called wings. Two grove connectors and a 6-pin Pmod™ connector are also included for additional connectivity to popular development boards offered by Seeed Studio® and Digilent®.

***Ordering Information* appears at end of data sheet.**

Features

- Expansion Board
  - 0.9in x 2.0in DIP Form Factor
    - Breadboard Compatible
    - Feather Compatible
  - 6-Pin PMOD Compatible Socket
    - I^2C
    - Two Optional GPIO
  - Two Grove Connectors
    - I^2C
    - UART
  - 3.5mm Jack for ECG Leads
- MAX30003 Biopotential AFE
  - Clinical-Grade ECG AFE with High-Resolution Data Converter
    - 15.5 Bits Effective Resolution with 5µV_{P-P} Noise
  - Longer Battery Life Compared to Competing Solutions
    - 85µW at 1.1V Supply Voltage
  - Built-In Heart Rate Detection with Interrupt Feature
    - Eliminates the Need to Run HR Algorithm on the Microcontroller
    - Robust R-R Detection in High-Motion Environment at Extremely Low Power
  - 32-Word FIFO Allows You to Wake Up Microcontroller Every 256ms with Full ECG Acquisition

MAX30003WING Expansion Board Photo



319-100122; Rev 0; 1/18

maxim integrated™

Detailed Description

The MAX30003WING expansion board is designed to provide a compact rapid development platform for the MAX30003 biopotential AFE. A 3.5mm jack has been provided for prototyping with ECG leads that support this interface. Two 4-pin grove connectors allow for integration of additional I²C and UART sensors from the Seeed Studio Grove ecosystem. The dual inline pinout and form-factor for this board are based on the Adafruit feather board series, and it is intended to be compatible with many of their boards, but it is not guaranteed to work with all of them.

Firmware Development

The simplest way to develop firmware for the MAX3003WING is through the Mbed™ development site. At the Mbed site, import examples into the online IDE, then edit, compile, and load them into the Mbed-compatible featherboard without installing any software. Go to **https://os.mbed.com/platforms/MAX32620FTHR/** to get started programming with the MAX32630FTHR now. To support software development with the MAX30003, an example library has been developed and can be found at the following link: **https://os.mbed.com/teams/MaximIntegrated/code/MAX30003/**.

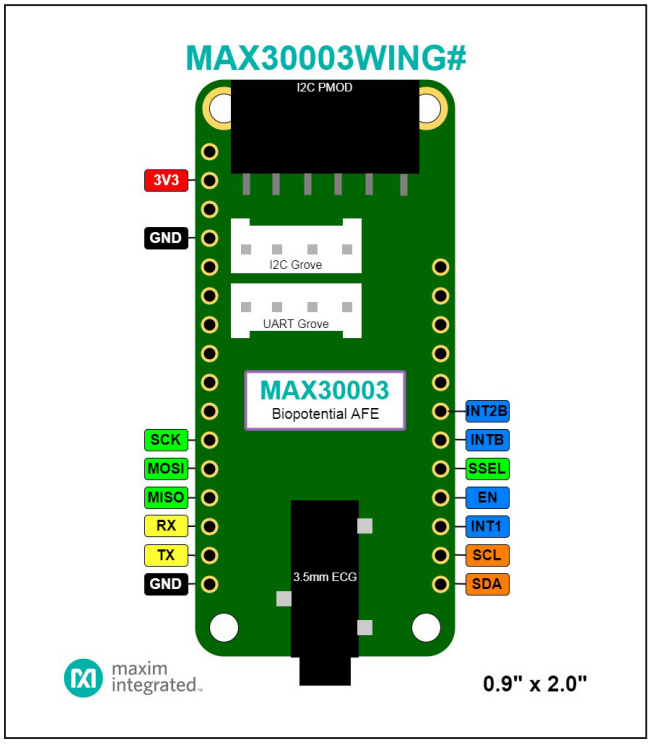


Figure 1. DIP Pinout

Additionally, the two demo programs have been developed to expedite prototyping. The MAX30003WING_Demo_Debug program notifies the user that there has been an interrupt, calculates heart rate, displays the status register, FIFO data, and ETAG result. The MAX30003WING_Demo_Debug program can be found at the following link: **https://os.mbed.com/teams/Maxim-Integrated/code/MAX30003WING_Demo_Debug/**. The MAX30003WING_Demo_QRS program serially streams FIFO data to be plotted by a serial plotter of the user's choosing. The MAX30003WING_Demo_QRS program reproduces the recorded QRS complex and can be found at the following link: **https://os.mbed.com/teams/Maxim-Integrated/code/MAX30003WING_Demo_QRS/**. For information on how to start using the MAX30003WING, refer to the Application Note 6556: *How to Interface the MAX30003WING ECG AFE with the MAX32630FTHR* located in the Design Resource tab of the product page.

Table 1. DIP Header H1 Pins

PIN	PORT	DESCRIPTION
1, 3, 5–10	N.C.	No Connection
2	3V3	3.3V supply voltage
4, 16	GND	Ground
11	SCK	MAX30003 SCLK
12	MOSI	MAX30003 SDI
13	MISO	MAX30003 SDO
14	Rx	UART Receive (with respect to MCU)
15	Tx	UART Transmit (with respect to MCU)

Table 2. DIP Header H3 Pins

PIN	PORT	DESCRIPTION
1–5	N.C.	No Connection
6	INT2B	Default No Connection. Install 0Ω resistor R6 for INT2B.
7	INTB	MAX30003 Interrupt
8	SSEL	MAX30003 CSB
9	EN	PMOD Enable
10	INT1	PMOD Interrupt
11	SCL	PMOD/Grove I²C SCL
12	SDA	PMOD/Grove I²C SDA

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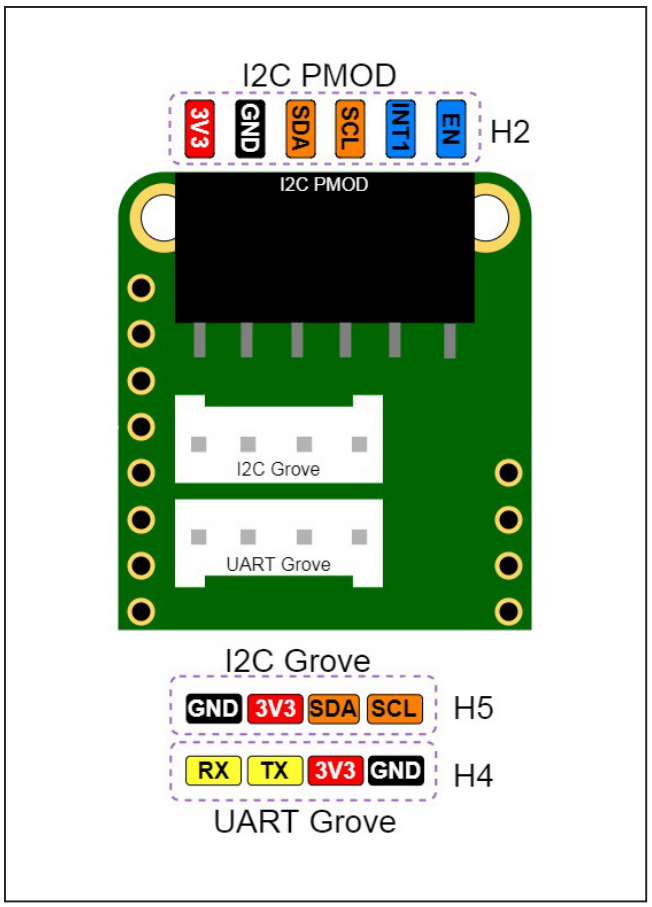


Figure 2. PMOD/Grove Connectors

Table 3. PMOD Socket H2 Pins

PIN	PORT	DESCRIPTION
1	EN	Optional Enable (GPIO)
2	INT1	Optional Interrupt (GPIO)
3	SCL	I²C Serial Clock
4	SDA	I²C Serial Data
5	GND	Ground
6	3V3	3.3V Supply (Output)

Table 4. Grove Socket H4 Pins

PIN	PORT	DESCRIPTION
1	Rx	UART Receive (with Respect to MCU)
2	Tx	UART Transmit (with Respect to MCU)
3	3V3	3.3V Supply (Output)
4	GND	Ground

Table 5. Grove Socket H5 Pins

PIN	PORT	DESCRIPTION
1	SCL	I²C Serial Clock
2	SDA	I²C Serial Data
3	3V3	3.3V Supply (output)
4	GND	Ground

Ordering Information

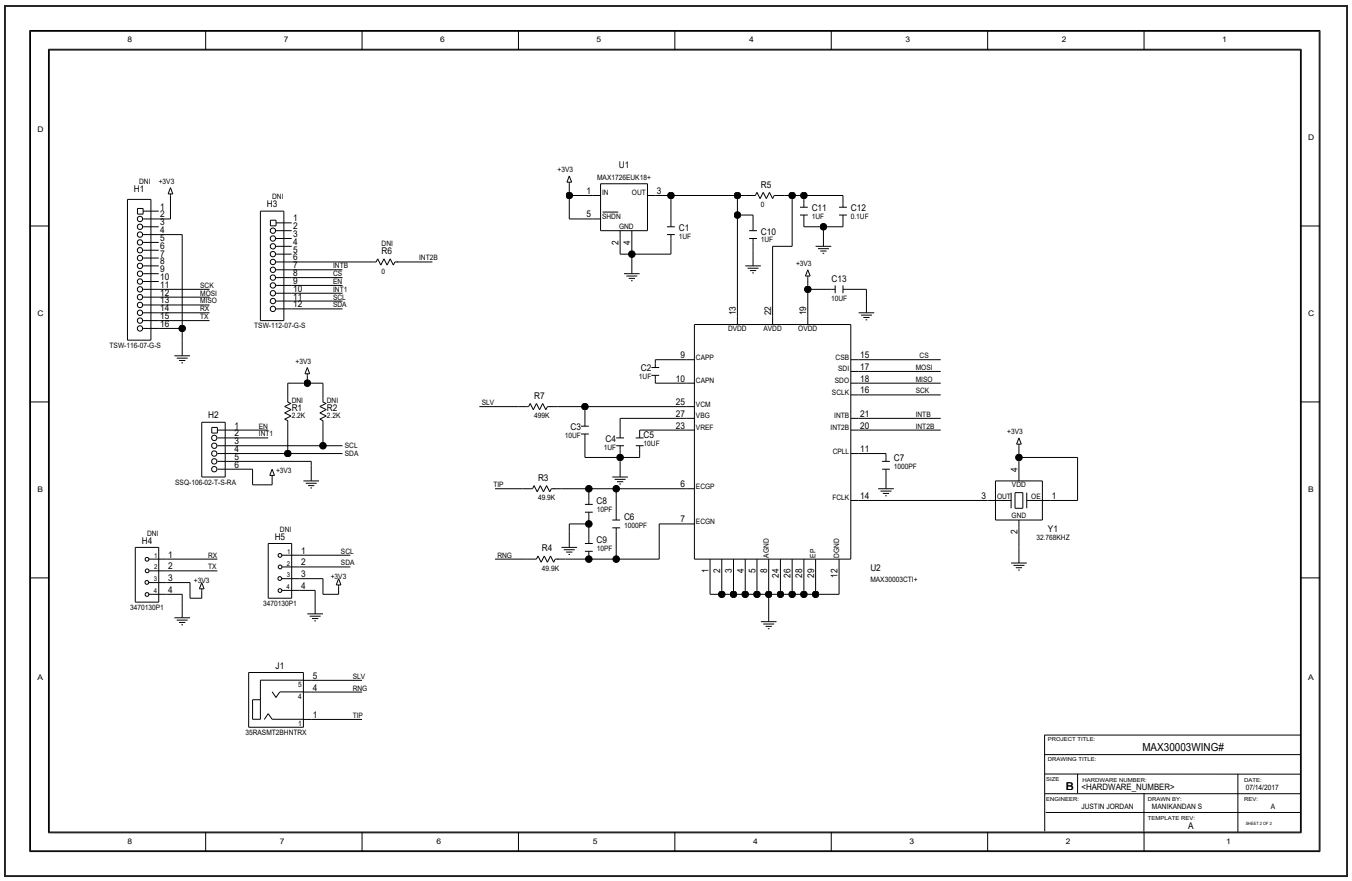
PART	TYPE
MAX30003WING#	Expansion Board

#Denotes RoHS compliance.

MAX30003WING EV Kit Bill of Materials

QTY	REF_DES	MFG	PART NUMBER	DESCRIPTION
5	C1, C2, C4, C10, C11	SAMSUNG	CL05B105KQ5NQNC	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
3	C3, C5, C13	MURATA	GRM188R61A106KE69	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 10V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R
2	C6, C7	MURATA	GRM1555C1H102JA01	CAPACITOR; SMT (0402); CERAMIC CHIP; 1000PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC
2	C8, C9	KEMET	C0402C100D5GAC	CAPACITOR; SMT (0402); CERAMIC CHIP; 10PF; 50V; TOL=0.5PF; TG=-55 DEGC TO +125 DEGC; TC=C0G
1	C12	MURATA	GRM155R71A104JA01	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 10V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=X7R
1	H2	SAMTEC	SSQ-106-02-T-S-RA	CONNECTOR; FEMALE; THROUGH HOLE; .025INCH SQ POST SOCKET; RIGHT ANGLE; 6PINS
1	J1	SWITCHCRAFT	35RASMT2BHNTRX	CONNECTOR; FEMALE; SMT; 3.5MM PHONE JACK; RIGHT ANGLE; 3PINS
2	R3, R4	YAGEO	RC0603FR-0749K9L	RESISTOR; 0603; 49.9K OHM; 1%; 100PPM; 0.10W; THICK FILM
1	R5	SAMSUNG ELECTRONICS	RC1608J000CS	RESISTOR; 0603; 0 OHM; 5%; JUMPER; 0.10W; THICK FILM
1	R7	VISHAY DALE	CRCW0603499KFK	RESISTOR; 0603; 499K OHM; 1%; 100PPM; 0.1W; THICK FILM
1	U1	MAXIM	MAX1726EUK18+	IC; REG; 12V; ULTRA-LOW IQ; LOW-DROPOUT LINEAR REGULATOR; SOT23-5
1	U2	MAXIM	MAX30003CTI+	IC; AFEC; ULTRA-LOW POWER; SINGLE-CHANNEL INTEGRATED BIOPOTENTIAL (ECG R TO R DETECTION) AFE; TQFN28-EP
1	Y1	SARONIX	KX3211A0032.768000	CRYSTAL; SMT 3.2X2.5; 15PF; 32.768KHZ; +/-20PPM; +/-50PPM

MAX30003WING EV Kit Schematic



Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/18	Initial release	—

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Maxim Integrated:

MAX30003WING#