

TIMI-MB DATASHEET

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Introduction

TIMI-MB (ref. TIMI-MB) is a unique breadboard compatible display development module designed to provide development boards/modules which have a mikroBUS Click socket a simple to interface display solution. TIMI-MB is aimed to speed up and reinvent the way electronic testing, development and projects are carried out.

mikroBUS and Click Boards are TM's of MikroElektronika.

TIMI-MB is a 0.96" TFT LCD display module that is driven directly by a PIXXI28 graphics processor from 4D Labs. It features a mikroBUS interface, designed to attach to development platforms featuring a mikroBUS socket or headers.

Product Features

The TIMI-MB also features a 5-pin programming header, to program its processor using the Mates Programmer, and a selection switch (on the back – accessible from the bottom edge) to switch between device programming mode or connection of the device to the mikroBUS Host.

TIMI-MB was created as a flexible design aid, primarily to simulate components readouts and meters, which would otherwise be cumbersome or demanding on hardware resources for breadboard or electronic development. Simulating component readouts allows accelerated development and retains the often-limited GPIO hardware associated with many developments.

TIMI-MB was designed for engineers, hobbyists, and students, from beginner to advanced levels, designed to make project development, easier.

- Powered by 4D Labs Pixxi28 Graphics Processor
- 160(W)x80(H) resolution TFT LCD, non-touch
- 3.3V (5V tolerant) Serial UART interface, capable 300 to 2187500 Baud
- 16MB of External SPI Flash Memory
- · 32KB of Processor Flash Memory
- 14KB of Processor SRAM for User Variables
- Single supply 5V power input (*3.3V possible See 'System Pins' Section)
- Standard 0.1" (2.54mm) pitch male pin headers, mikroBUS compatible
- · RoHS and REACH compliant
- PCB is UL 94V-0 Flammability Rated
- Weight approx. 6.0 grams







Hardware Detail

TIMI-MB utilises the mikroBUS interface, which is a unique interface pinout designed to be simple and easy to use.

The mikroBUS is made up of 2 rows of 8 pins, 0.1" (2.54mm) pitch, spaced 0.9" (22.86mm) apart. Please refer to the Mikroelektronika mikroBUS Standard.

The TIMI-MB can be orientated in any of its 4 positions, Portrait, Landscape, Portrait Reversed and Landscape Reversed, and is defined using the Mates Studio IDE.

Pin Configuration

The TIMI-MB has 16 physical pins, 8 on each side of the mikroBUS interface. The TIMI-MB does not utilise all the pins in the mikroBUS however.

📋 mikroBUS Pinc	but		
Header/Pin	Symbol	I/О Туре	Description
Header1–1	GND	Power	Module / System GND
Header1–2	5V	Power	Module 5V Input, Main Power
Header1–3	NC	-	Not Connected / Used
Header1–4	NC	-	Not Connected / Used
Header1–5	RX	I	Asynchronous Serial UART Receive Pin (3.3V, 5V Tolerant)
Header1–6	TX	0	Asynchronous Serial UART Transmit Pin (3.3V Level)
Header1–7	NC	-	Not Connected / Used
Header1–8	NC	-	Not Connected / Used
Header2–1	GND	Power	Module / System GND
Header2–2	NC	-	Not Connected / Used
Header2–3	NC	-	Not Connected / Used
Header2–4	NC	-	Not Connected / Used
Header2–5	NC	-	Not Connected / Used
Header2–6	NC	-	Not Connected / Used
Header2–7	RESET	I	Reset (Series 680R Resistor), for resetting the TIMI-MB
Header2–8	NC	-	Not Connected / Used

For more detail on the mikroBUS pinout and specification, please refer to the Mikroelektronika website, and the mikroBUS Standard documentation, or the product documentation for the Host device being used which features the mikroBUS socket.

Hardware Interfaces

The TIMI-MB connects to the mikroBUS Click interface and utilises the Serial UART of the Host device.

System Pins

+5V (Device Supply Voltage)

Display supply voltage pin. This pin supplies the TIMI-MB with 5VDC from the Host board.

GND (Module Ground)

Device ground pin.

TX (Serial UART Transmit)

TX of the TIMI-MB connects to RX of the Host board, this is the 3.3V Asynchronous Serial UART Transmit for communications between the two devices.

RX (Serial UART Receive)

RX of the TIMI-MB connects to TX of the Host board, this is the 3.3V Asynchronous Serial UART Receive for communications between the two devices. This pin is also 5V tolerant, so can be interfaced to 5V UART devices.

RESET (Module Master Reset)

This pin is connected to the Host via a 680ohm resistor to the RST pin on the mikroBUS, making it possible for the Host to initiate a reset as required. It is also connected to the BBM-PROG header (bypassing the resistor), for programming the 4D Labs processor using the Mates Studio IDE, based on the position of the switch.

NC (Not connected)

These pins are not connected or used on the Interface.

Serial Ports – TTL Level Serial

The PIXXI28 Processor has a single hardware asynchronous serial port with fixed pins TX/RX. The PIXXI28's serial port can be used to communicate with external serial devices and is also used for programming the PIXXI28 itself.

The primary features are:

- Full-Duplex 8-bit data transmission and reception.
- · Data format: 8-bits, No Parity, 1 Stop bit.
- Independent Baud rates from 300 baud up to 2187500 baud.

This serial UART is also the programming interface for User program downloads. Once the compiled application is downloaded and the user code starts executing, the serial port is then available to the user application.

🖍 Note

The serial UART output at the level of TTL 3.3V, however is 5V tolerant on the RX pin, so can accept communications from 5V devices.

HOST/PROG Switch

The HOST/PROG selection switch is used to switch the RX signal which comes from the TIMI-MB, between the Host's TX, and the programmer headers TX. This allows the User to select if the TIMI-MB is being programmed by the programmer header, or if its connected to the Host, making it possible to program the TIMI-MB without having to unplug it from the mikroBUS socket.

When you want communications to be between the Host and the TIMI-MB, the switch should be on **HOST**.

When you want the communications to be between the programmer header and the TIMI-MB, the switch should be on **PROG**.

Hardware Requirements

Hardware Overview

TIMI-MB is designed to be used in several ways, but the most basic configurations can be achieved with a TIMI-MB module and a Mates Programmer, connected to your PC in a tethered configuration (See Programming Hardware section).

What You Will Need

- TIMI-MB Module
- Mates Programmer
- · MicroUSB Cable (Standard Type A USB to microUSB Not included)
- Windows PC/Laptop running Windows 7 or higher, x86 or x64. ARM is currently not supported at this time.







The Mates Programmer does not come with the microUSB cable, this can be purchased from virtually any hardware/computer store.

Currently, Microsoft Windows is the only supported Operating System for Mates Studio. Announcements will be made when other OS's will become supported.

Optional Hardware

Typically, the TIMI-MB would be used with a Host board featuring a mikroBUS Click socket. This is not strictly required to use the TIMI-MB, however is the intended interface for the TIMI-MB.

There are a huge variety of mikroBUS compatible development boards, featuring a mikroBUS Click socket. Select the most appropriate host board for your requirements, and the TIMI-MB should be able to connect to it without a problem.

Not all Host platforms will have demo software or libraries available however, but since the TIMI-MB interface is a simple UART, writing of code should be a simple task using the documentation provided on the Breadboard Mates website.

Programming Hardware

TIMI-MB utilises a USB-to-Serial programmer for application and firmware updates, which programs both the Processor Flash memory, along with the on-board SPI Flash memory.

The programmer, dubbed BBM-PROG, is the official Mates Programmer and can also be used for testing and debugging of TIMI-MB applications using the Mates Studio IDE.

The Mates Programmer utilises the Silicon Labs CP2104 USB to UART bridge, and uses the TIMI-MB's Serial UART to load applications, firmware/PmmC and media content.



The programmer features a 3-pin jumper with shunt, which is present to change the way the programmer handles the Reset line, utilised by TIMI and other devices.

TIMI-MB requires the jumper to be positioned like the image above, closest to the 5-way female header. This makes the programmer compatible with programming the 4D Labs Pixxi28 processor.

If the jumper is placed on the 2 pins closest to the USB connector, this will make the programmer compatible with programming Atmel chips, such is used on many of the Arduino boards, or barebone chips. This may also be compatible with other microcontrollers too.

Software Requirements

All software development for the TIMI-MB module utilises the Mates Studio IDE.



The latest version of Mates Studio can be downloaded from the 4D Systems website or directly from this link here.

Details specific about the Mates Studio IDE can be found in the Mates Studio IDE documentation.

🔃 Untitled Mates Studio - Commander				– 🗆 X	
Project Control → 🖿 📩	±×i	TIMI-Click on COM5 PORTRAIT	Сом5	Connect Reset	
		SELECT PAGE(S) FROM LIBRARY	CLOSE		
	Audio	2 Bar Gauges with LED Digits Portrait			
+	Distance	A page layout designed to be used in Electrical applications	2468		
	Electrical	4 Dot Matrix Panels A page layout designed to be used in Electrical applications	Amps 10		
	Environmental	4 LED Digits			
	Graphs	A page layout designed to be used in Electrical applications	Range x100		
	Miscellaneous	A page layout designed to be used in Electrical applications			
	Motion	Battery Status A page layout designed to be used in Electrical applications Volt Meter Portrait			
	Navigation				
	Notifications	A page layout designed to be used in Electrical applications	mA		
	User				
			CONFIRM		
	Browse Computer				

Host Connection

The TIMI-MB connects to the Host directly using the mikroBUS Click interface.

The TIMI-MB's male pin headers connect to the Hosts Click female headers / socket. This is compatible with both traditional Female Click headers, and the newer mikroBUS proprietary Click socket which is found on newer boards.

To illustrate, here is a STM32 M4 Clicker development board from Mikroelectronika, with the TIMI-MB connected.







Connected to M4 Clicker



Bottom View

Hardware Drawing



Hardware Schematic



Specifications & Ratings

Recommended Operating Conditions					
Parameter	Conditions / Information	Min	Тур	Max	Un
Operating Temperature		-20	_	+70	٥(
Storage Temperature		-30	_	+80	٥(
Humidity (RH)	Max 60°C	—	_	90%	R
Supply Voltage (VCC)	Stable external supply required	4.0	5.0	5.5	١
Processor voltage (VP)		_	3.3	_	١
Input Low Voltage (VIL)	all pins	GND	_	0.2VP	٨
Input High Voltage (VIH)	non 5V tolerant pins	0.8VP	_	3.3	٨
Input High Voltage (VIH)	5V Tolerant Pins, (RX pin)	0.8VP	_	VCC	١
Reset Pulse	External Open Collector (RESET pin)	1.3	_		μ
Operational Delay	Power-Up or External Reset	500	_	3000	rr

Operating Characteristics

—					
Parameter	Conditions / Information	Min	Тур	Max	Ur
Supply Current (ICC)	5V Supply – Normal Operation	_	90	_	m
Supply Current (ICC)	5V Supply – Sleep Mode	_	3	_	m
Supply Current (ICC)	5V Supply – Deep Sleep Mode	_	2	_	m
Display Endurance	Hours of operation, measured to when display is 50% original brightness	30000	_	_	F

LCD Display Information				
Parameter	Conditions / Information	Specification		
Display Type		TFT IPS LCD		
Display Size		0.96" Diagonal		
Display Resolution		160×80 pixels		
Display Brightness	5V Supply	120 cd/m2 (typical)		
Display Contrast Ratio		800:1 (typical)		
Display Viewing Angles	Above, Below, Left and Right of Center	80 Degrees		
Display Viewing Direction		ALL (IPS Display)		
Display Backlighting	White LED Backlighting	1 LED		
Pixel Pitch		0.135 x 0.135mm (Square pixels)		
Pixel Density	Number of pixels in 1 row in 25.4mm	187 DPI/PPI		