mikromedia

for PIC18FK

Compact development system rich with on-board peripherals for all-round multimedia development on PIC18F67K40 device.

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in MikroElektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Nebojsa Matic
General Manager

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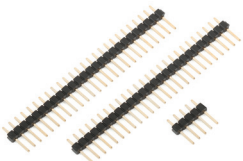
Introduction to mikromedia for PIC18FK

Mikromedia for PIC18FK is a compact smart display and development platform with the PIC18F67K40 microcontroller from Microchip. The large 320x240 TFT color display will allow you to build multimedia applications with speed and ease. You can use it for development and as a final product. A 320x240 TFT Color Display with Touch Screen and Stereo MP3 Codec chip, microSD™ card, a preprogrammed PIC18FK MCU and compiler support — you are set for creating some amazing projects. It comes preprogrammed with USB bootloader, but can also be programmed with external programmers, such as mikroProg™ or ICD2/3. Mikromedia is compact and slim, and perfectly fits in the palm of the hand, which makes it convenient platform for mobile devices.

Package Contains

01 Damage resistant protective box

02 mikromedia for PIC18FK development system

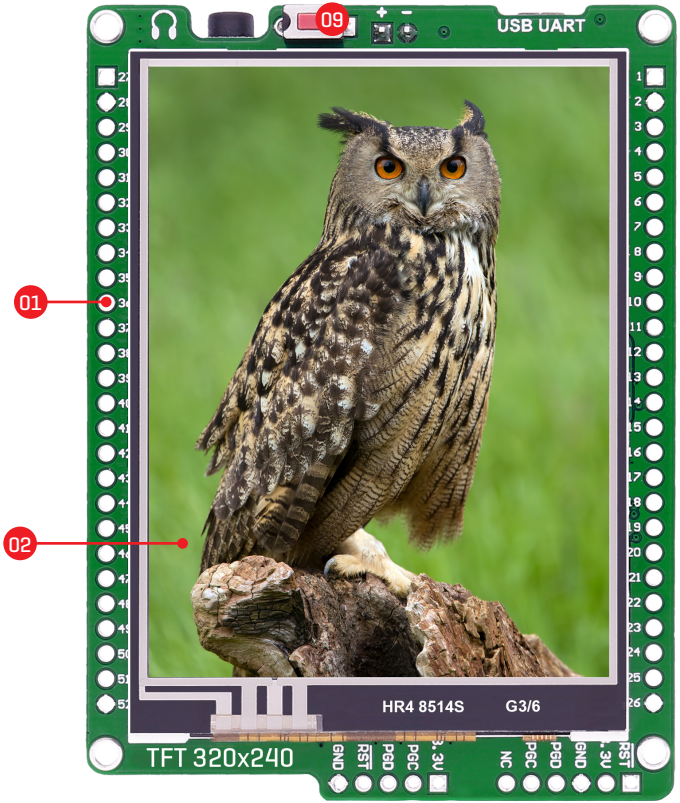


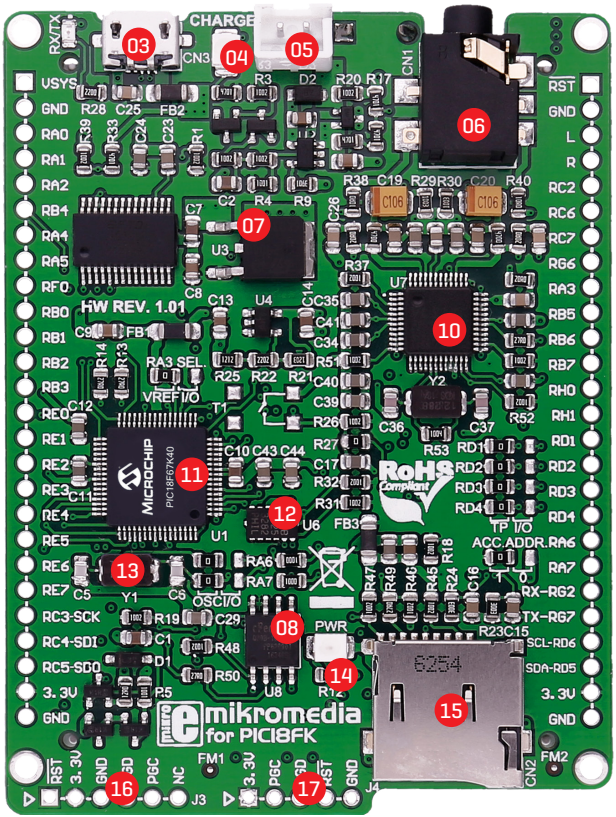
03 Two 1x26 male headers and one 1x5 header

04 USB cable

Key Features

01 Connection Pads
02 TFT 320x240 display
03 Micro USB connector
04 CHARGE indication LED
05 LI-Polymer battery connector
06 3.5mm headphone connector
07 Power supply regulator
08 Serial Flash memory
09 RESET button
10 VS1053 Stereo mp3 coder/decoder
11 PIC18F87J50 microcontroller
12 Accelerometer
13 Crystal oscillator
14 Power indication LED
15 microSD Card Slot
16 ICD2/3 connector
17 mikroProg connector





System Specification

power supply
Via USB cable (5V DC)

power consumption
52 mA with erased MCU (when back-light is ON)

board dimensions
81.2 x 60.5 mm (3.19 x 2.38 inch)

weight
~45.5g (0.10lbs)

class B product
Product complies with the Class B limit of EN 55022 and can be used in the domestic, residential, commercial and industrial environments.

CAUTION: Electrostatic Sensitive Device
Permanent damage may occur on devices subjected to high energy electrostatic discharges which readily accumulate on the human body or test equipment and can discharge without detection.

1. Power supply

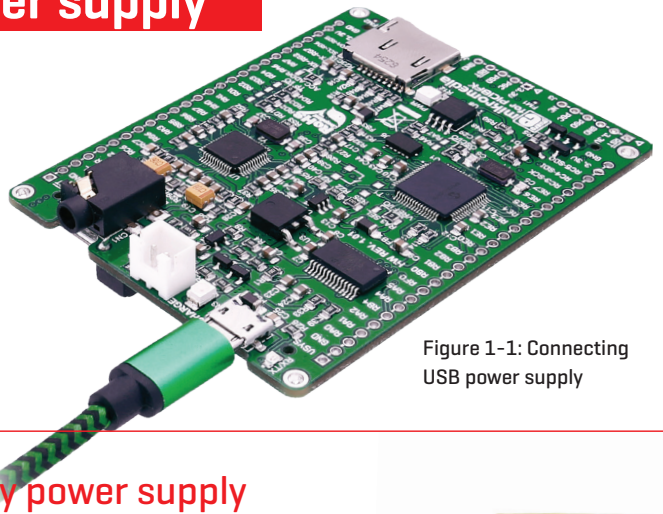


Figure 1-1: Connecting USB power supply

USB power supply

USB power supply - You can apply power supply to the board using micro USB cable provided with the board. On-board voltage regulators provide the appropriate voltage levels to each component on the board. Power LED (green) will indicate the presence of power supply.

Battery power supply

You can also power the board using Li-Polymer battery, via on-board battery connector. On-board battery charger circuit MCP73832 enables you to charge the battery over USB connection. LED diode (RED) will indicate when battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.

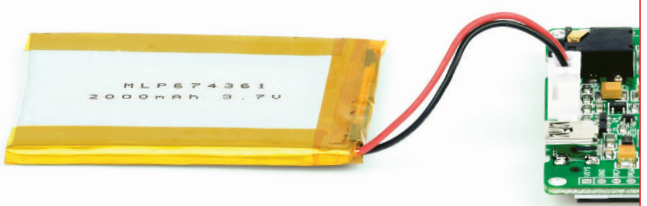


Figure 1-2: Connecting Li-Polymer battery

2. PIC18F67K40 microcontroller

PIC18F67K40 is a 64-Pin, low-power, high performance microcontroller with XLP technology. equipped with a 10-bit ADC with Computation (ADCC) automating Capacitive Voltage Divider (CVD) techniques for advanced touch sensing, averaging, filtering, oversampling and performing automatic threshold comparisons.

Key MCU features

- 128K bytes Program Flash
- 3568 Bytes Data SRAM
- 1024 Bytes Data EEPROM

Sleep mode: Lowest Power Consumption

3. Programming the microcontroller

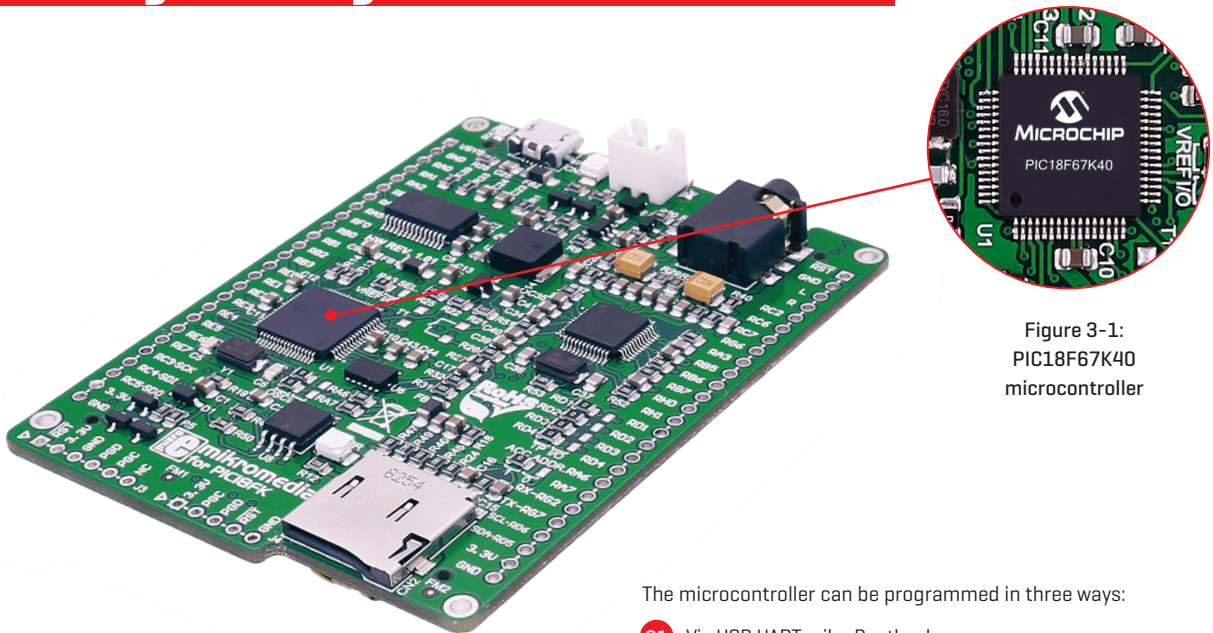


Figure 3-1:
PIC18F67K40
microcontroller

The microcontroller can be programmed in three ways:

01 Via USB UART mikroBootloader

02 Using mikroProg external programmer

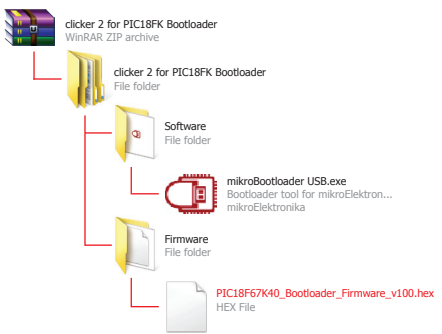
03 Using ICD2/3® external programmer

3.1 Programming with mikroBootloader

You can program the microcontroller with a bootloader which is preprogrammed by default. To transfer .hex file from a PC to MCU you need bootloader software (mikroBootloader USB HID) which can be downloaded from:

https://download.mikroe.com/examples/starter-boards/clicker-2/pic18fk/clicker-2-pic18fk-mikrobootloader-v100.zip

After the mikroBootloader software is downloaded, unzip it to desired location and start it.



step 1 – Connecting clicker 2 for PIC18FK

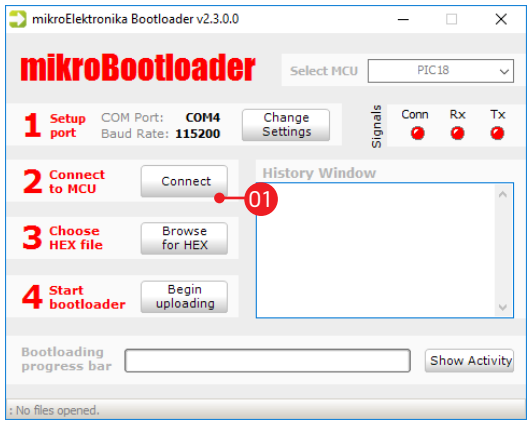


Figure 3-2: mikroBootloader window

01 To start, connect the USB cable, or if already connected press the Reset button on your clicker 2 for PIC18FK. Click the Connect button within 5s to enter the bootloader mode, otherwise existing microcontroller program will execute.

step 2 – Browsing for .HEX file

Figure 3-3: Browse for HEX

01 Click the Browse for HEX button and from a pop-up window (Figure 3-4) choose the .HEX file which will be uploaded to MCU memory.

step 3 – Selecting .HEX file

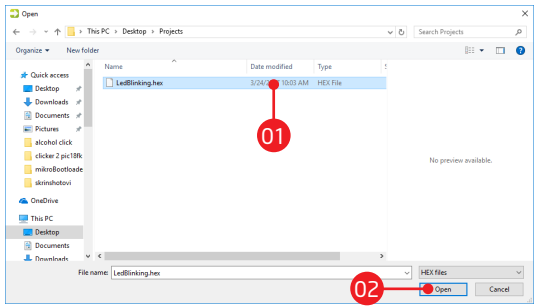


Figure 3-4: Selecting HEX

01 Select .HEX file using open dialog window.

02 Click the Open button.

step 4 – Uploading .HEX file

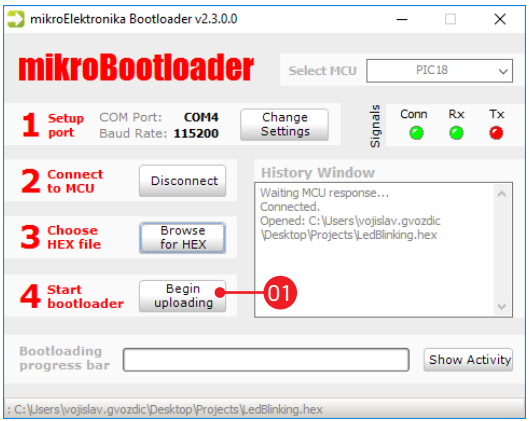


Figure 3-5: Begin uploading

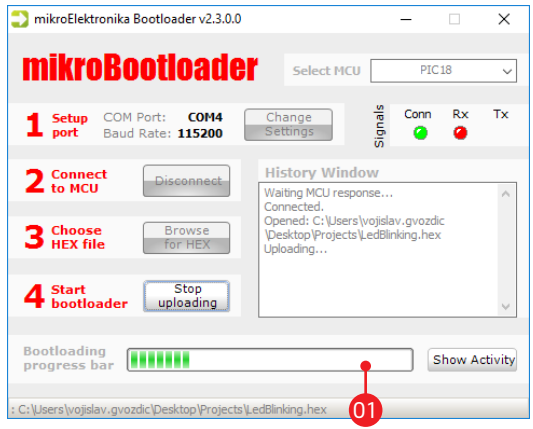


Figure 3-6: Progress bar

01 To start .HEX file bootloading click the Begin uploading button.

01 Progress bar enables you to monitor .HEX file uploading.

step 5 – Finish upload

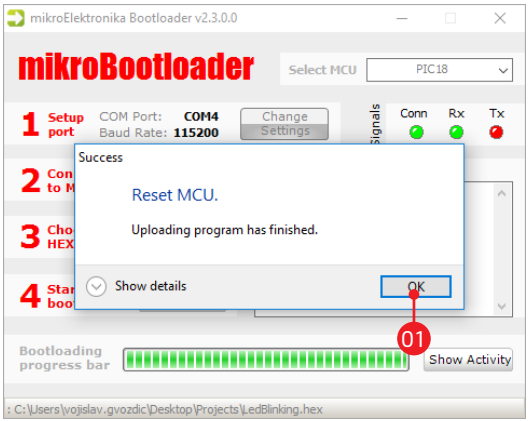


Figure 3-7: Restarting MCU

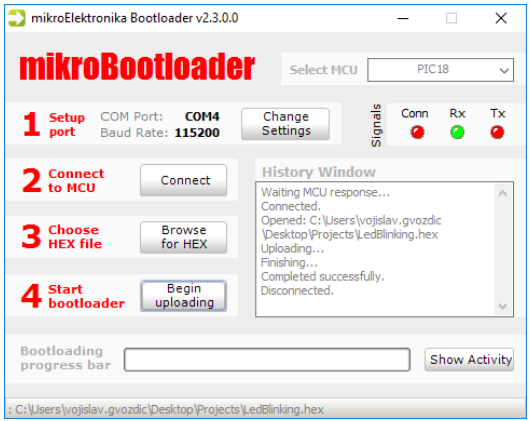


Figure 3-8: mikroBootloader ready for next job

01 Click OK button after the uploading process is finished.

02 Press Reset button on clicker 2 for PIC18FK board and wait for 5 seconds. Your program will run automatically.

Programing with mikroProg programmer

The microcontroller can be programmed with mikroProg programmer and mikroProg Suite for PIC® software.
The mikroProg programmer is connected to the development system via the CN6 connector, **Figure 3-9**.

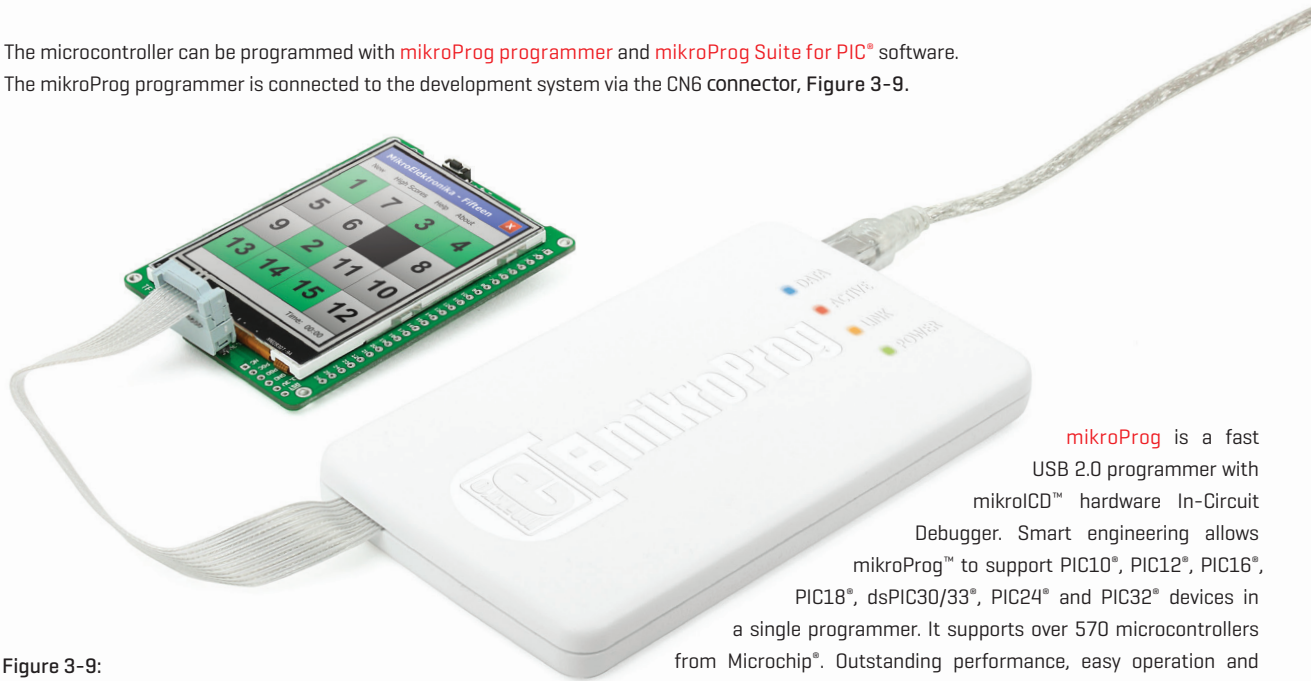


Figure 3-9:
Connecting mikroProg to mikromedia

mikroProg is a fast USB 2.0 programmer with mikroICD™ hardware In-Circuit Debugger. Smart engineering allows mikroProg™ to support PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32® devices in a single programmer. It supports over 570 microcontrollers from Microchip®. Outstanding performance, easy operation and elegant design are it's key features.

mikroProg Suite for PIC software

mikroProg programmer requires special programming software called mikroProg Suite for PIC. This software is used for programming of ALL Microchip® microcontroller families, including PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32®. Software has intuitive interface and SingleClick™ programming technology. Just by downloading the latest version of mikroProg Suite your programmer is ready to program new devices. mikroProg Suite is updated regularly, at least four times a year, so your programmer will be more and more powerful with each new release.

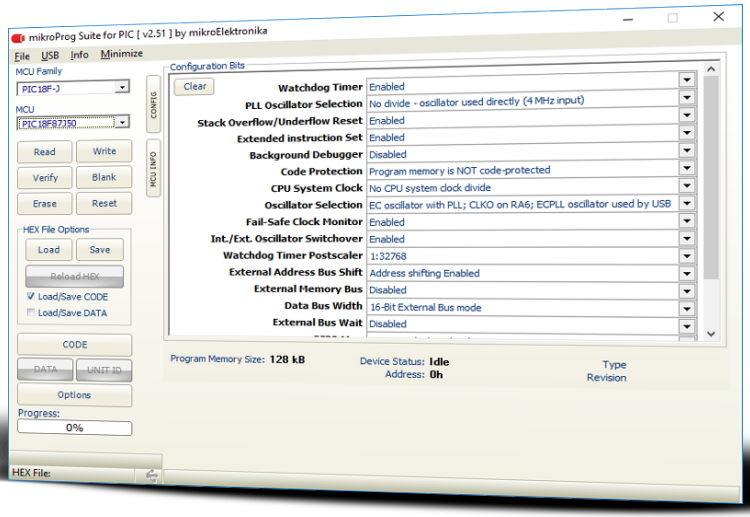


Figure 3-10: Main window of mikroProg Suite for PIC® programming software

Programing with ICD2® or ICD3® programmer

The microcontroller can be also programmed with ICD2® or ICD3® programmer. These programmers connects with mikromedia board via ICD2 CONNECTOR BOARD.

In order to enable the ICD2® and ICD3® programmers to be connected to the development system, it is necessary to provide the appropriate connector such as the ICD2 CONNECTOR BOARD. This connector should be first soldered on the CN5 connector. Then you should plug the ICD2® or ICD3® programmer into it, Figure 3-11.

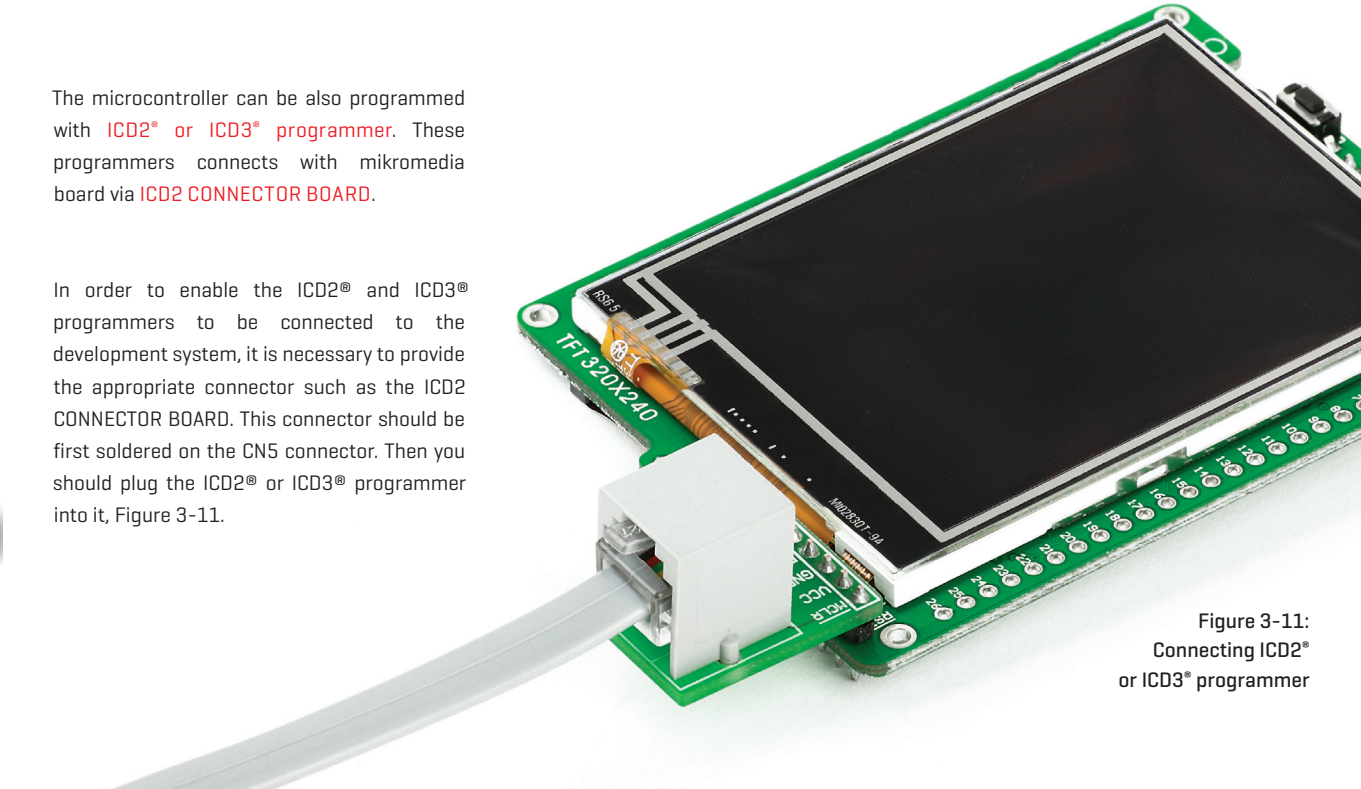
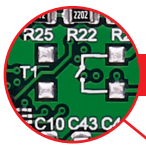


Figure 3-11:
Connecting ICD2®
or ICD3® programmer

4. Reset Button

Board is equipped with reset button, which is located at the top of the front side **(Figure 4-2)**. If you want to reset the circuit, press the reset button. It will generate low voltage level on microcontroller reset pin (input). In addition, a reset can be externally provided through pin 27 on side headers **(Figure 4-3)**.



NOTE

*You can also solder additional reset button on the appropriate place at the back side of the board, **Figure 4-1**.*

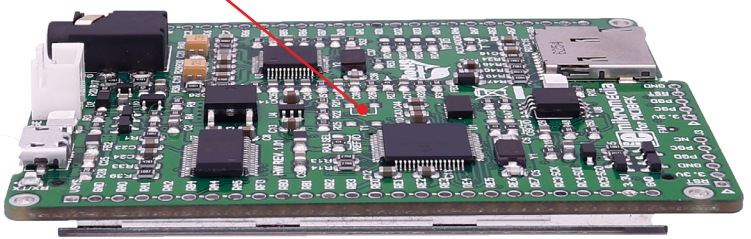


Figure 4-1: Location of additional reset button

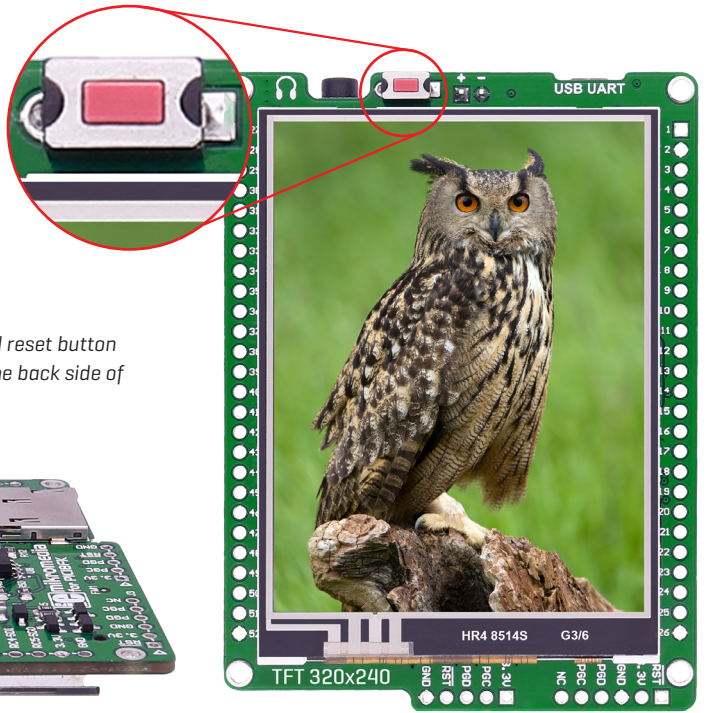


Figure 4-2: Frontal reset button

5. microSD Card Slot

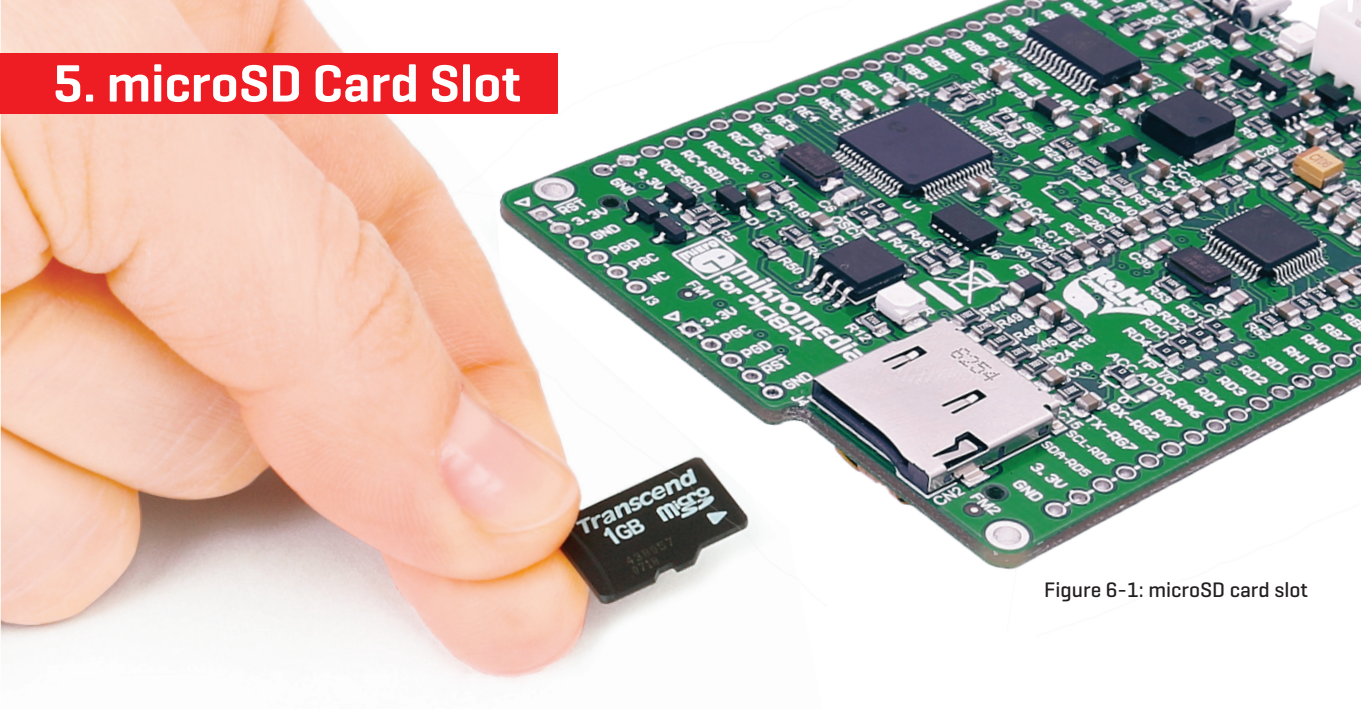


Figure 6-1: microSD card slot

Board contains microSD card slot for using microSD cards in your projects. It enables you to store large amounts of data externally, thus saving microcontroller memory. microSD cards use Serial Peripheral Interface (SPI) for communication with the microcontroller.

6. Crystal oscillator

Figure 5-1:
Crystal oscillator module

Board is equipped with 16MHz crystal oscillator (Y1) circuit that provides external clock waveform to the microcontroller CLKO and CLKI pins. This base frequency is suitable for further clock multipliers and ideal for generation of necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications.

NOTE : *The use of crystal in all other schematics is implied even if it is purposely left out, because of the schematics clarity.*

7. Audio Module

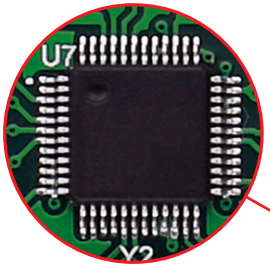


Figure 8-1: On-board VS1053 MP3 codec

The mikromedia for PIC18FK features stereo audio codec VS1053. This module enables audio reproduction by using stereo headphones connected to the system via a 3.5mm connector CN2. All functions of this module are controlled by the microcontroller over Serial Peripheral Interface (SPI).

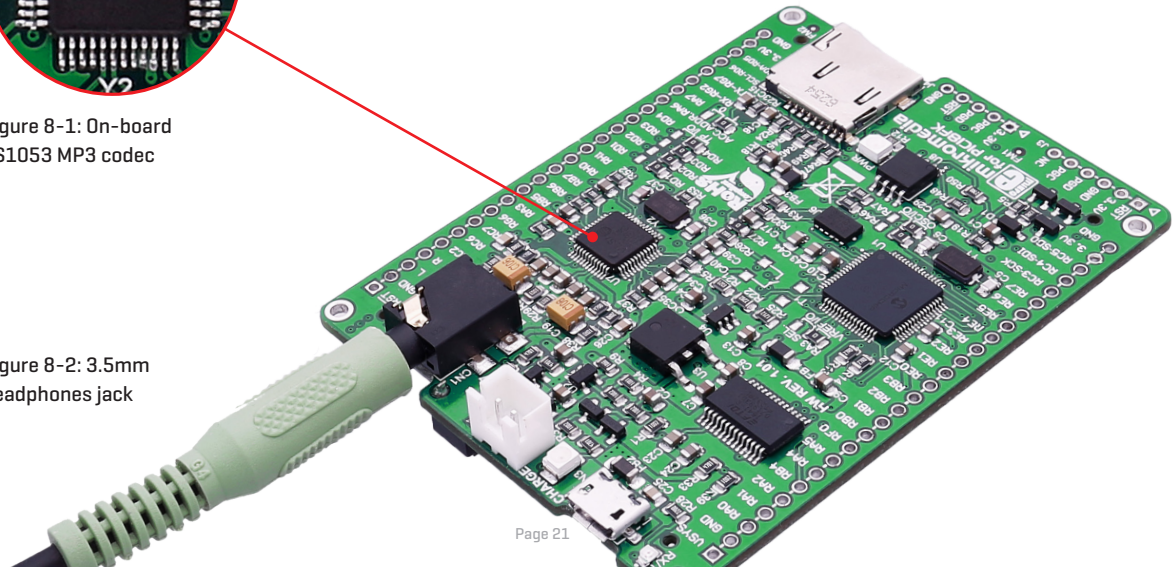


Figure 8-2: 3.5mm headphones jack

8. Touch Screen

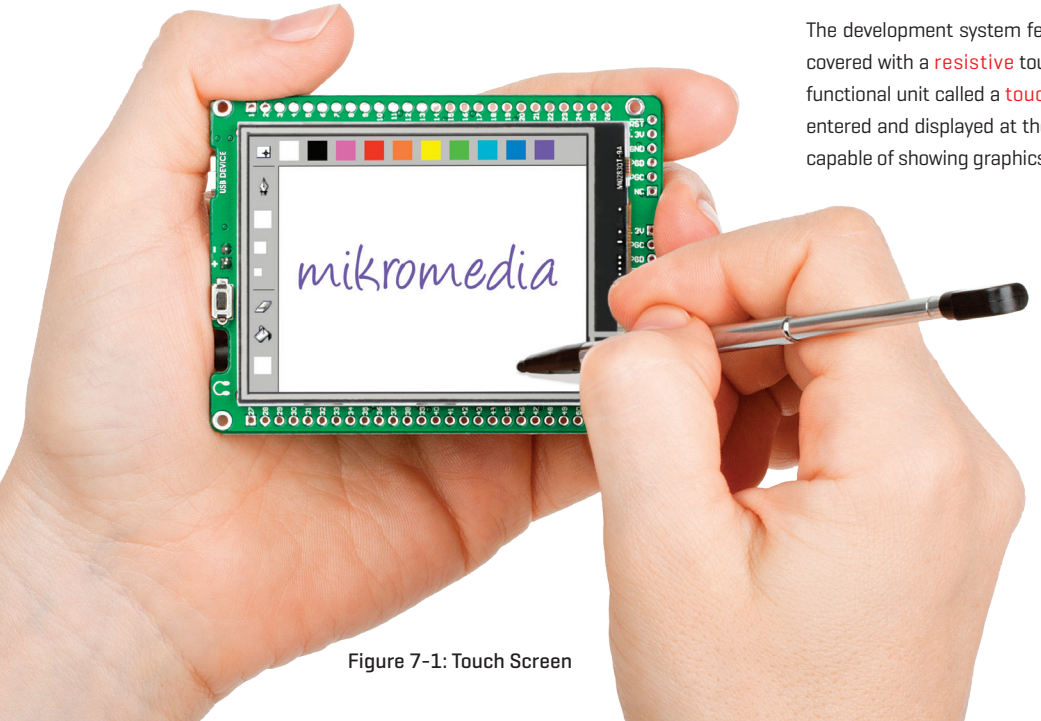


Figure 7-1: Touch Screen

The development system features a TFT 320x240 display covered with a resistive touch panel. Together they form a functional unit called a touch screen. It enables data to be entered and displayed at the same time. The TFT display is capable of showing graphics in 262.144 different colors.

9. Accelerometer

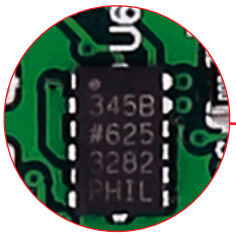


Figure 10-1: Accelerometer module

On board ADXL345 accelerometer is used to measure acceleration in three axis: x, y and z. The accelerometer function is defined by the user in the program loaded into the microcontroller. Communication between the accelerometer and the microcontroller is performed via the I^2C interface.

You can set the accelerometer address to 0 or 1 by re-soldering the SMD jumper (zero-ohm resistor) to the appropriate position. Jumper is placed in address 1 position by default.

10. USB connection

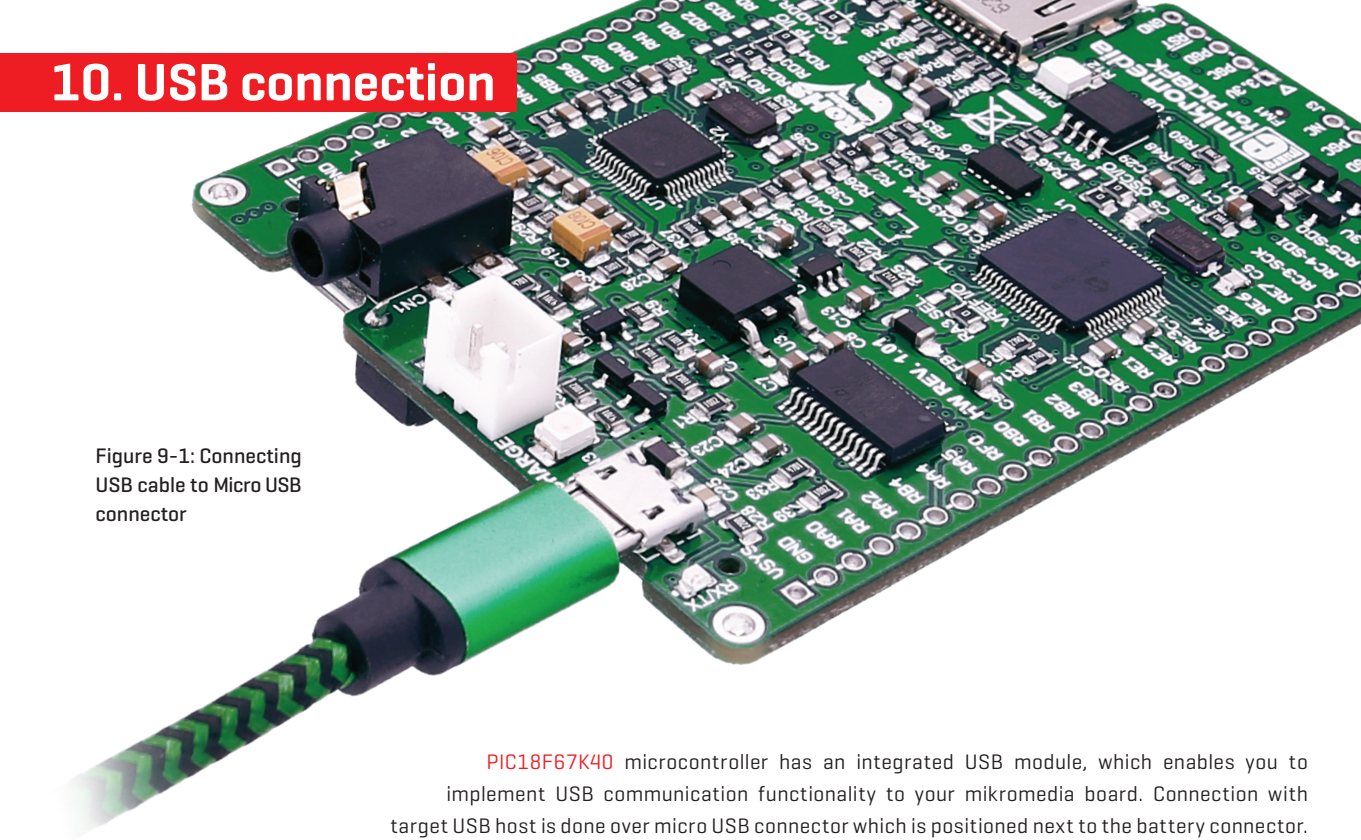


Figure 9-1: Connecting USB cable to Micro USB connector

PIC18F67K40 microcontroller has an integrated USB module, which enables you to implement USB communication functionality to your mikromedia board. Connection with target USB host is done over micro USB connector which is positioned next to the battery connector.

11. Flash Memory

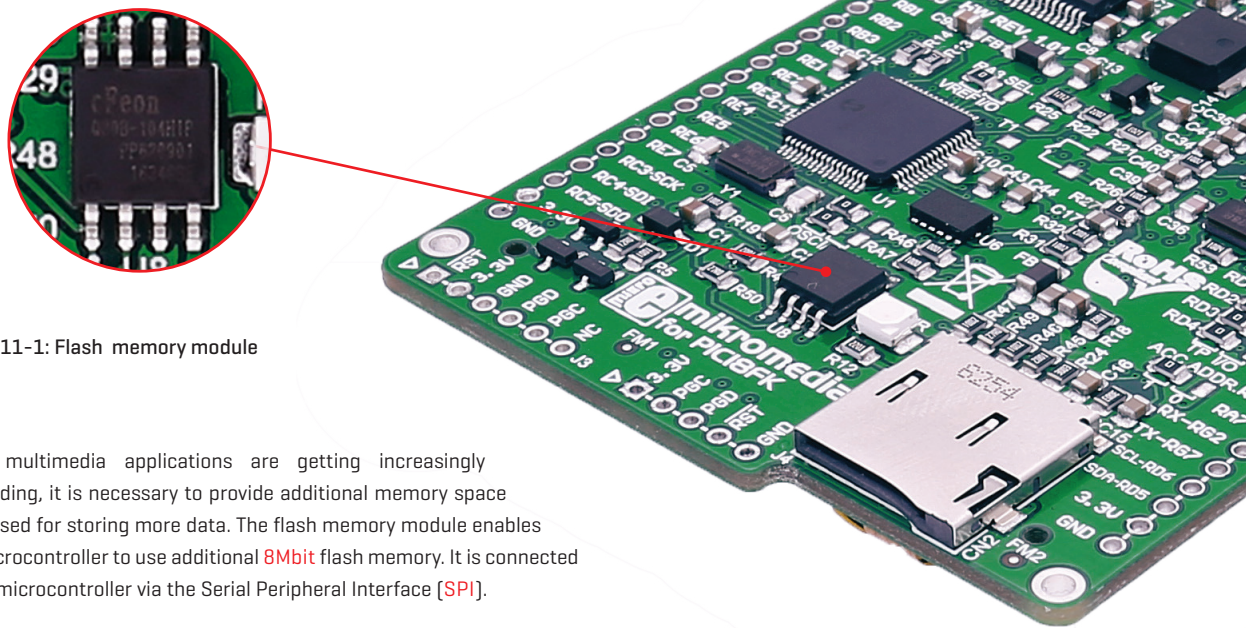
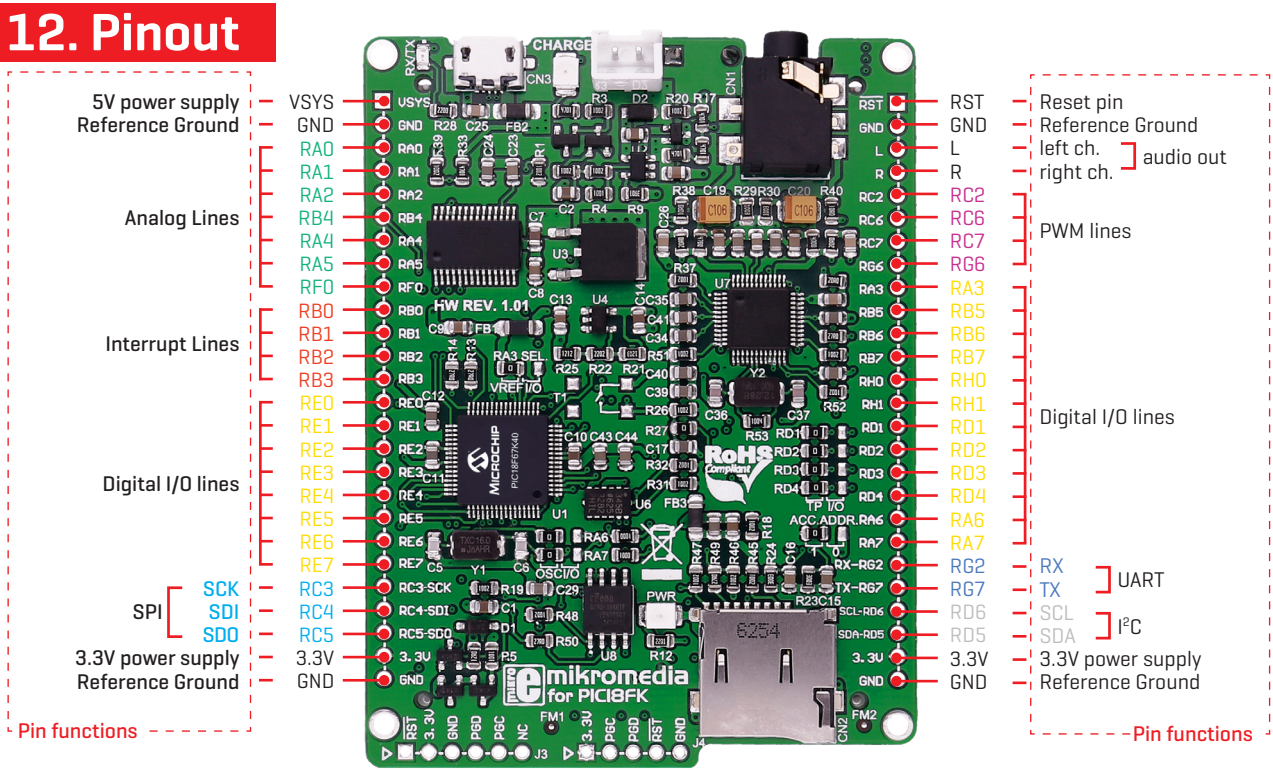


Figure 11-1: Flash memory module

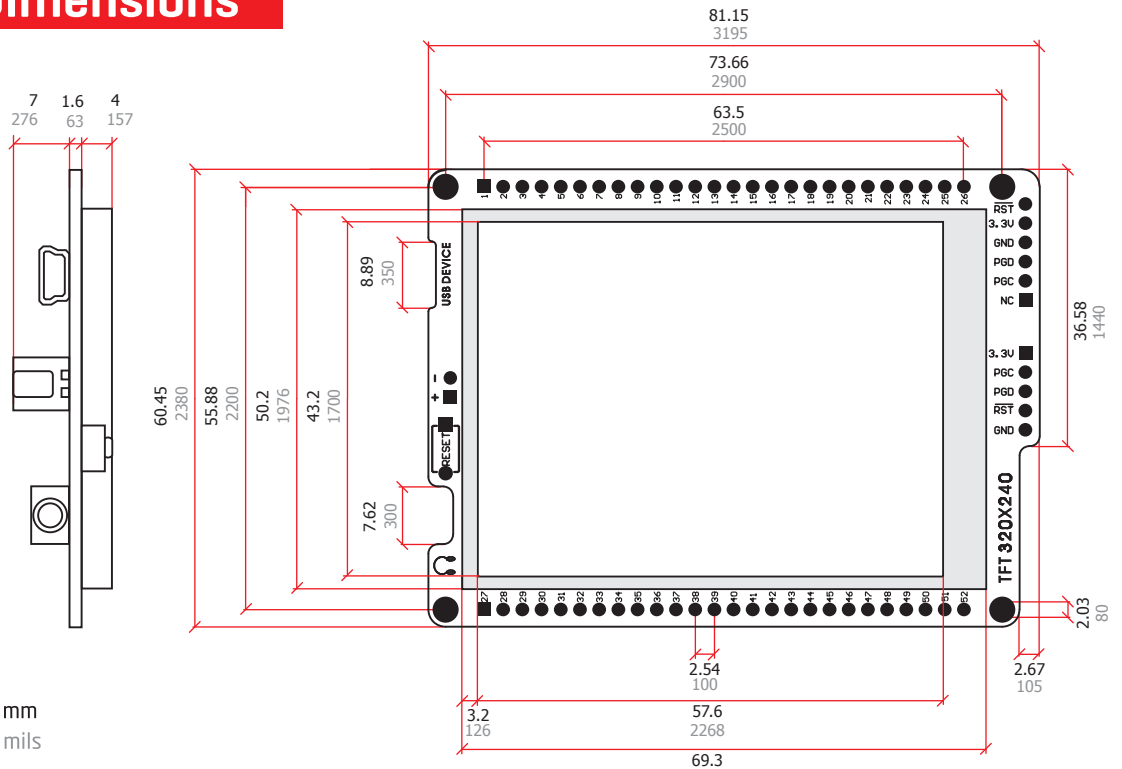
Since multimedia applications are getting increasingly demanding, it is necessary to provide additional memory space to be used for storing more data. The flash memory module enables the microcontroller to use additional 8Mbit flash memory. It is connected to the microcontroller via the Serial Peripheral Interface (SPI).

12. Pinout

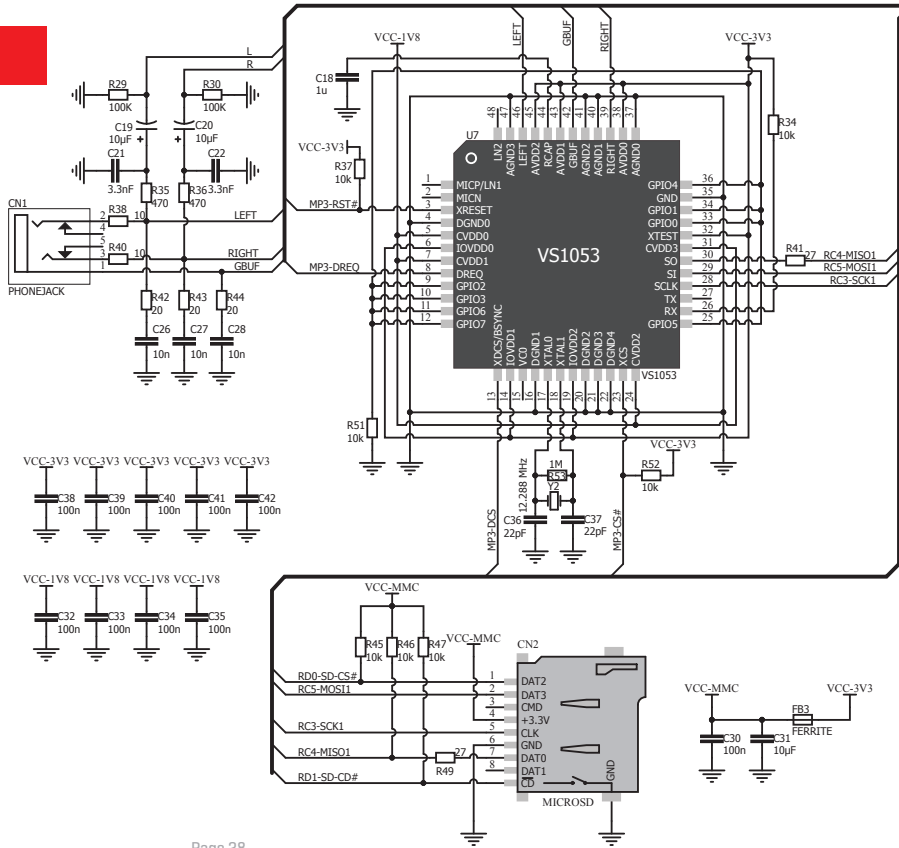


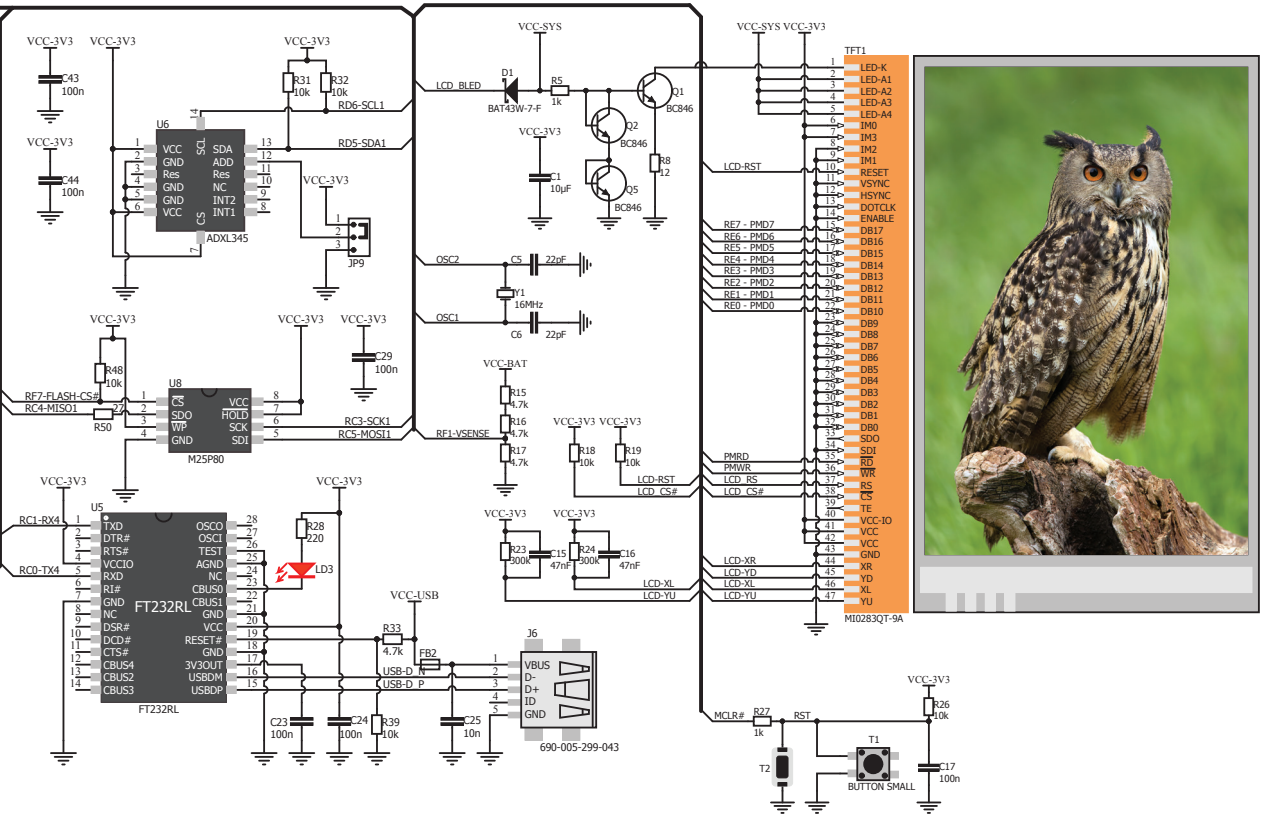
5V power supply
Reference Ground
Analog Lines
Interrupt Lines
Digital I/O lines
SPI
SCK
SDI
SDO
3.3V power supply
Reference Ground
Pin functions
VSYS
GND
RA0
RA1
RA2
RB4
RA4
RA5
RF0
RB0
RB1
RB2
RB3
RE0
RE1
RE2
RE3
RE4
RE5
RE6
RE7
RC3
RC4
RC5
3.3V
GND
RST
GND
L
R
RC2
RC6
RC7
RG6
RA3
RB5
RB6
RB7
RH0
RH1
RD1
RD2
RD3
RD4
RA6
RA7
RG2
RG7
RD6
RD5
3.3V
GND
Reset pin
Reference Ground
left ch.
right ch.
audio out
PWM lines
Digital I/O lines
RX
TX
UART
SCL
SDA
I²C
3.3V power supply
Reference Ground
Pin functions
Digital lines
Analog Lines
Interrupt Lines
SPI Lines
I2C Lines
UART lines
PWM lines

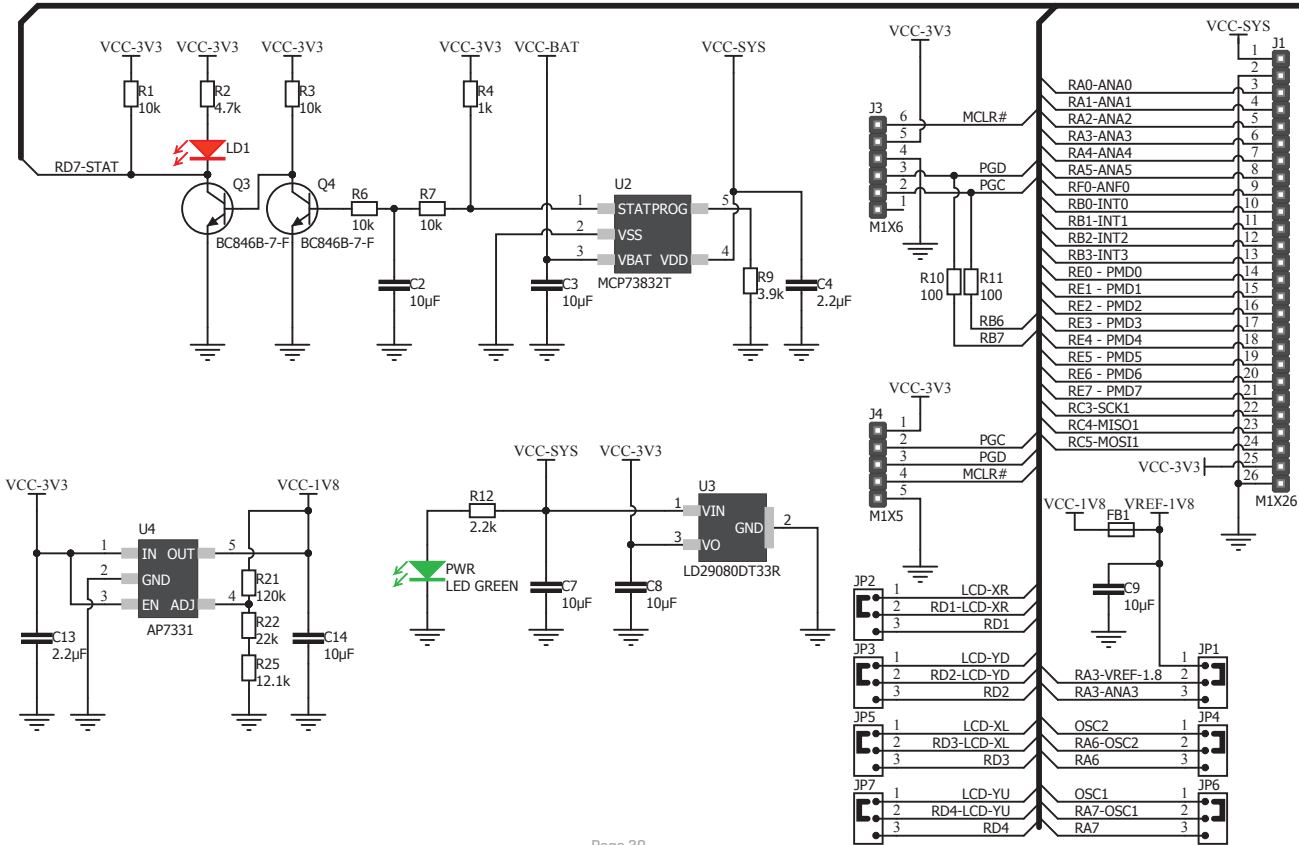
13. Dimensions

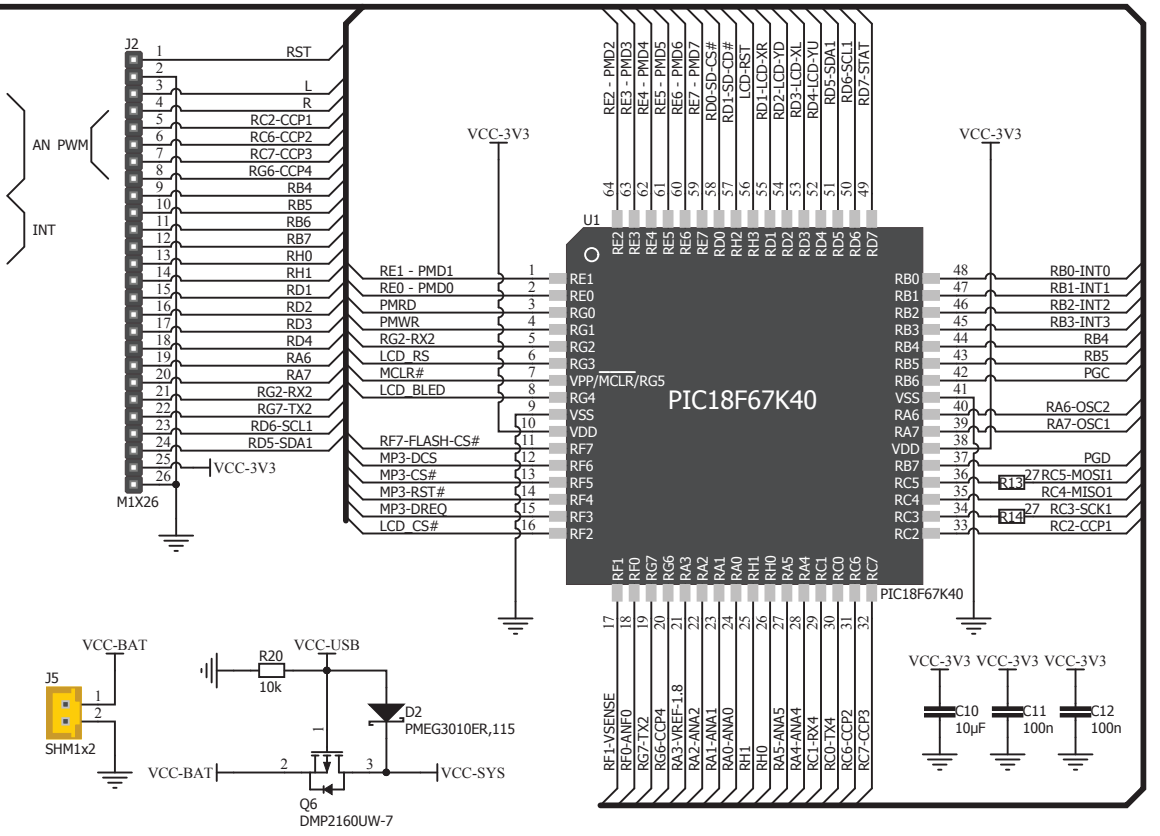


14. Schematic



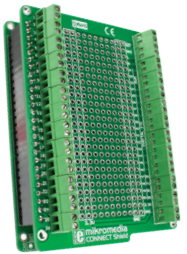

VCC-3V3
C43
100n
C44
100n
U6
VCC
GND
Res
GND
GND
VCC
SCL
CS
SDA
ADD
Res
NC
INT2
INT1
ADXL345
R31
10k
R32
10k
RD6-SCL1
RD5-SDA1
JP9
VCC-SYS
D1
BAT43W-7-F
R5
1k
LCD_BLED
Q1
BC846
Q2
BC846
Q5
BC846
R8
12
C1
10µF
OSC2
C5
22pF
Y1
16MHz
OSC1
C6
22pF
VCC-SYS VCC-3V3
TFT1
LED-K
LED-A1
LED-A2
LED-A3
LED-A4
IM0
IM3
IM2
IM1
RESET
VSYNC
HSYNC
DOTCLK
ENABLE
DB17
DB16
DB15
DB14
DB13
DB12
DB11
DB10
DB9
DB8
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SDO
SDI
RD
WR
RS
CS
TE
VCC-IO
VCC
VCC
GND
XR
YD
XL
YU
MI0283QT-9A
LCD-RST
RE7 - PMD7
RE6 - PMD6
RE5 - PMD5
RE4 - PMD4
RE3 - PMD3
RE2 - PMD2
RE1 - PMD1
RE0 - PMD0
PMRD
PMWR
LCD_RS
LCD_CS#
LCD-XR
LCD-YD
LCD-XL
LCD-YU
R48
10k
RF7-FLASH-CS#
RC4-MISO1
R50
U8
CS
SDO
WP
GND
VCC
HOLD
SCK
SDI
M25P80
C29
100n
RC3-SCK1
RC5-MOSI1
VCC-BAT
R15
4.7k
R16
4.7k
R17
4.7k
RF1-VSENSE
R18
10k
R19
10k
LCD-RST
LCD_CS#
U5
TXD
DTR#
RTS#
VCCIO
RXD
RI#
GND
NC
DSR#
DCD#
CTS#
CBUS4
CBUS2
CBUS3
FT232RL
OSCO
OSCI
TEST
AGND
NC
CBUS0
CBUS1
GND
VCC
RESET#
GND
3V3OUT
USBDM
USBDP
RC1-RX4
RC0-TX4
R28
220
LD3
R23
300k
C15
47nF
R24
300k
C16
47nF
LCD-XL
LCD-YU
VCC-USB
R33
4.7k
FB2
USB-D N
USB-D P
J6
VBUS
D-
D+
ID
GND
690-005-299-043
C23
100n
C24
100n
R39
10k
C25
10n
MCLR#
R27
1k
RST
T2
T1
BUTTON SMALL
R26
10k
C17
100n


VCC-3V3
VCC-3V3
VCC-3V3
VCC-3V3
VCC-BAT
VCC-SYS
R1
10k
R2
4.7k
R3
10k
R4
1k
LD1
RD7-STAT
Q3
Q4
BC846B-7-F
BC846B-7-F
R6
10k
R7
10k
U2
STATPROG
VSS
VBAT VDD
MCP73832T
C2
10µF
C3
10µF
R9
3.9k
C4
2.2µF
VCC-3V3
J3
MCLR#
PGD
PGC
M1X6
R10
100
R11
100
RB6
RB7
VCC-3V3
J4
PGC
PGD
MCLR#
M1X5
VCC-SYS
J1
RA0-ANA0
RA1-ANA1
RA2-ANA2
RA3-ANA3
RA4-ANA4
RA5-ANA5
RF0-ANF0
RB0-INT0
RB1-INT1
RB2-INT2
RB3-INT3
RE0 - PMD0
RE1 - PMD1
RE2 - PMD2
RE3 - PMD3
RE4 - PMD4
RE5 - PMD5
RE6 - PMD6
RE7 - PMD7
RC3-SCK1
RC4-MISO1
RC5-MOSI1
VCC-3V3
M1X26
VCC-3V3
VCC-1V8
U4
IN OUT
GND
EN ADJ
AP7331
R21
120k
R22
22k
R25
12.1k
C13
2.2µF
C14
10µF
VCC-1V8
VREF-1V8
FB1
C9
10µF
VCC-SYS
VCC-3V3
R12
2.2k
PWR
LED GREEN
C7
10µF
C8
10µF
U3
VIN
GND
VO
LD29080DT33R
JP2
LCD-XR
RD1-LCD-XR
RD1
JP3
LCD-YD
RD2-LCD-YD
RD2
JP5
LCD-XL
RD3-LCD-XL
RD3
JP7
LCD-YU
RD4-LCD-YU
RD4
JP1
RA3-VREF-1.8
RA3-ANA3
JP4
OSC2
RA6-OSC2
RA6
JP6
OSC1
RA7-OSC1
RA7

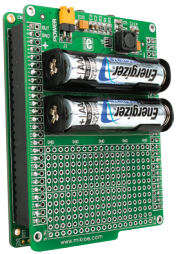

J2
M1X26
AN PWM
INT
RST
L
R
RC2-CCP1
RC6-CCP2
RC7-CCP3
RG6-CCP4
RB4
RB5
RB6
RB7
RH0
RH1
RD1
RD2
RD3
RD4
RA6
RA7
RG2-RX2
RG7-TX2
RD6-SCL1
RD5-SDA1
VCC-3V3
U1
PIC18F67K40
RE1 - PMD1
RE0 - PMD0
PMRD
PMWR
RG2-RX2
LCD_RS
MCLR#
LCD_BLED
RF7-FLASH-CS#
MP3-DCS
MP3-CS#
MP3-RST#
MP3-DREQ
LCD_CS#
RE2 - PMD2
RE3 - PMD3
RE4 - PMD4
RE5 - PMD5
RE6 - PMD6
RE7 - PMD7
RD0-SD-CS#
RD1-SD-CD#
LCD-RST
RD1-LCD-XR
RD2-LCD-YD
RD3-LCD-XL
RD4-LCD-YU
RD5-SDA1
RD6-SCL1
RD7-STAT
RB0-INT0
RB1-INT1
RB2-INT2
RB3-INT3
RB4
RB5
PGC
RA6-OSC2
RA7-OSC1
PGD
RC5-MOSI1
RC4-MISO1
RC3-SCK1
RC2-CCP1
R13
R14
RF1-VSENSE
RF0-ANF0
RG7-TX2
RG6-CCP4
RA3-VREF-1.8
RA2-ANA2
RA1-ANA1
RA0-ANA0
RH1
RH0
RA5-ANA5
RA4-ANA4
RC1-RX4
RC0-TX4
RC6-CCP2
RC7-CCP3
VCC-BAT
J5
SHM1x2
R20
10k
VCC-USB
D2
PMEG3010ER,115
Q6
DMP2160UW-7
VCC-SYS
C10
10µF
C11
100n
C12
100n

15. Mikromedia accessories

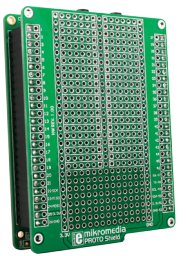
We have prepared a set of extension boards pin-compatible with your mikromedia, which enable you to easily expand your board basic functionality. We call them mikromedia shields. But we also offer other accessories, such as Li-polymer battery, stacking headers, wire jumpers and more.



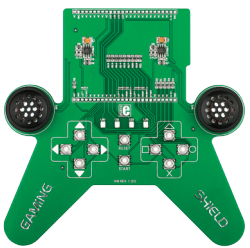
01 Connect shield



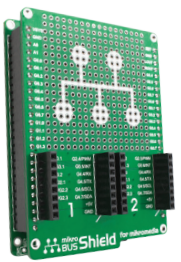
02 BatteryBoost shield



03 PROTO shield

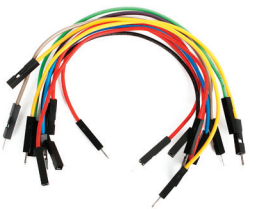


04 Gaming shield



05 mikroBUS shield

06 Li-Polymer battery



07 Wire Jumpers

What's next?

You have now completed the journey through each and every feature of mikromedia for PIC18FK board. You got to know it's modules and organization. Now you are ready to start using your new board. We are suggesting several steps which are probably the best way to begin. We invite you to join the users of mikromedia™ brand. You will find very useful projects and tutorials and can get help from a large ecosystem of users. Welcome!

Compiler

You still don't have an appropriate compiler? Locate PIC® compiler that suits you best on our site:

https://shop.mikroe.com/compilers

Choose between mikroC, mikroBasic and mikroPascal and download fully functional demo version, so you can begin building your first applications.

Projects

Once you have chosen your compiler, and since you already got the board, you are ready to start writing your first projects. Visual TFT software for rapid development of graphical user interfaces enables you to quickly create your GUI. It will automatically create necessary code which is compatible with mikroElektronika compilers. Visual TFT is rich with examples, which are an excellent starting point for your future projects. Just load the example, read well commented code, and see how it works on hardware. Visual TFT is also available on our site:

https://shop.mikroe.com/software-tools

Notes:

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