Compact development system rich with on-board peripherals for all-round multimedia development on dsPIC33FJ256GP710A device.
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.

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Nebojsa Matic
General Manager
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mikromedia for dsPIC33® is a compact development system with lots of on-board peripherals which allow development of devices with multimedia contents. The central part of the system is a 16-bit dsPIC33FJ256GP710A microcontroller. mikromedia for dsPIC33 features integrated modules such as stereo MP3 codec, TFT 320x240 touch screen display, accelerometer, USB connector, audio connector, MMC/SD card slot, 8 Mbit flash memory, 2x26 connection pads and other. It comes pre-programmed with UART 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 a convenient platform for mobile devices.
We present you with a complete color schematics for mikromedia™ for dsPIC33® development board. We want you to know what your board is consisted of and how it actually works.

**Pin functions**

- **Audio out**
- **CAN**
- **UART**
- **I2C**
- **SPI1**
- **SPI2**

**Package contains**

- **01** Damage resistant protective box
- **02** mikromedia for dsPIC33® development system
- **03** User’s guide, schematic and pinout
- **04** USB cable, two 1x26, one 1x6 and one 1x5 male headers
Key features

01 Connection pads
02 TFT 320x240 display
03 USB MINI-B connector
04 CHARGE indication LED
05 Li-Polymer battery connector
06 3.5mm headphone connector
07 Power supply regulator
08 FTDI chip
09 Serial flash memory
10 RESET button
11 VS1053 Stereo mp3 coder/decoder
12 dsPIC33FJ256GP710A microcontroller
13 Accelerometer
14 Crystal oscillator
15 Power indication LED
16 microSD card slot
17 ICD2/3 connector
18 mikroProg connector
**System specification**

**power supply**
Via USB cable (5V DC)

**power consumption**
77 mA with erased MCU (when on-board modules are inactive)

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

**weight**
~50g (0.11lbs)

**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

You can apply power supply to the board using MINI-B USB cable provided in the package. On-board voltage regulators provide the appropriate voltage levels to each component of the board. Power LED (GREEN) will indicate the presence of power supply.

Battery power supply

You can also power the board using a Li-Polymer battery, via on-board battery connector. On-board battery charger circuit MCP73832 enables you to charge the battery over a USB connection. LED diode (RED) will indicate when the battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.
Figure 1-3: Power supply schematics
mikromedia for dsPIC33® development system comes with the dsPIC33FJ256GP710A microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

**Key microcontroller features**

- Up to **40 MIPS** Operation;
- 16-bit architecture;
- 256KB of program memory;
- 30.720 Bytes of RAM;
- 85 I/O pins;
- Internal Oscillator 7.37 MHz, 512kHz;
- nanoWatt features: Fast Wake/Fast Control;
- 2-UART, 2-SPI, 2-I2C, 2-CAN;
- DAC, ADC, etc.
The microcontroller can be programmed in three ways:

01 Over UART bootloader
02 Using mikroProg™ external programmer
03 Using ICD2/3 external programmer
Programming with mikroBootloader

You can program the microcontroller with the bootloader which is preprogrammed into the device by default. To transfer .HEX file from a PC to MCU you need bootloader software (ds30 Loader) which can be downloaded from:

www.mikroe.com/eng/downloads/get/1493/mikrommb_dspic33_bootloader.zip

Upon download, unzip the file to the desired location and start ds30 Loader software.

Figure 3-1: ds30 Loader open-source software

note Connect mikromedia for dsPIC33® with a PC before starting ds30 Loader software
Identifying device COM port

**step 1 - Choosing COM port**

From drop down list select USB COM port which is used for communication with a PC (in this case COM5)

*note*

In Device Manager you can see which COM port is assigned to mikromedia (in this case COM5)

---

**Figure 3-2: Identifying COM port**

**Figure 3-3: Selecting COM port**
step 2 - Choosing device family

From drop down list select MCU family (**dsPIC33FJ**)

Figure 3-4: Selecting MCU family

step 3 - Choosing device

From drop down list select MCU chip (**256GP710A**)

Figure 3-5: Selecting MCU chip
step 4 - Browse for .HEX file

Click on **Browse button** and from pop-up window (figure 3-7) select .HEX file which will be uploaded to MCU memory.

**Figure 3-6: Browse for .HEX file**

**Figure 3-7: Pop-up window for .HEX file choosing**

- **01** Select desired .HEX file
- **02** Folder list
- **03** Click on Open button
step 5 - Set Baud rate

01 From drop down list set baud rate value to 256000
02 Check **Write program** check box

Figure 3-8: Setting baud rate

step 6 - Uploading .HEX file

01 First RESET mikromedia and then, within 5s click on **Write button**

Figure 3-9: Write program
If you accidently erase bootloader program from MCU memory it is possible to load it again with external programmer. mikromedia for dsPIC33® bootloader firmware.hex file is located in Firmware subfolder, Page 12.

**Figure 3-10: Program uploading**

01 Progress bar indicates .HEX file upload process

**Figure 3-11: Uploading is finished**

01 After uploading is finished you will get a notice in ds30 Loader history window
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 3-12.

**mikroProg™** is a fast USB 2.0 programmer with mikrolCD™ 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 its key features.

**Figure 3-12:**
Connecting mikroProg™ to mikromedia™
mikroProg™ programmer requires special programming software called mikroProg Suite™ for PIC®. This software is used for programming 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 3-13: Main Window of mikroProg Suite™ for PIC® programming software
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 an 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 3-14.
Figure 3-16: ICD2 / ICD3 & mikroProg™ programmer connection schematics
4. Reset buttons

Board is equipped with a 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 a low voltage level on the microcontroller reset pin (input). In addition, a reset can be externally provided through pin 27 on side headers (Figure 4-3).

You can also solder an additional reset button on the appropriate place at the back side of the board, Figure 4-1.
Figure 4-3: Reset circuit schematics
Board is equipped with an **8MHz crystal oscillator (X1)** circuit that provides external clock to the microcontroller OSC pins. This base frequency is suitable for further clock multipliers and ideal for generation of the necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications. Board also contains **32.768kHz Crystal oscillator (X3)** which provides external clock for the internal RTCC module.

*note* The use of crystal in all other schematics is implied even if it is purposely left out, because of the schematics clarity.
Figure 5-2: Crystal oscillator schematics
6. microSD card slot

Board contains a **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.
Figure 6-2: microSD Card Slot module connection schematics
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 data in **262,144** different **colors**.

Figure 7-1: Touch Screen
Figure 7-2: Touch Screen connection schematics
mikromedia for dsPIC33 features a 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 8-1**: On-board VS1053 MP3 codec

**Figure 8-2**: 3.5mm headphones jack
Figure 8-3: Audio module connection schematic
9. USB-UART connection

Mikromedia contains a USB MINI-B connector which is positioned next to the battery connector. FT232RL USB-UART IC enables you to implement UART serial communication functionality via USB cable, since dsPIC33FJ256GP710A does not support USB protocol.

Before connecting the board, make sure that you have FTDI drivers installed on your computer. Tx/Rx LED flashes when USB and controller communicate.
Figure 9-2: USB module connection schematics
10. Accelerometer

Figure 10-1: Accelerometer module

On board ADXL345 accelerometer is used to measure acceleration in three axes: x, y and z. The accelerometer’s function is defined by the user in the program loaded into the microcontroller. Communication between the accelerometer and the microcontroller is performed via the I2C 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.
Figure 10-2: Accelerometer connection schematic
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).
Figure 11-2: Flash memory module connection schematic
12. Pads

Figure 12-1: Pads connecting schematic

Most microcontroller pins are available for further connectivity via two 1x26 rows of connection pads on both sides of the mikromedia board. They are designed to match additional shields, such as Battery Boost shield, Gaming, PROTO shield and others.
### Pinout

#### SPI Lines
- SPI1
- SPI2

#### Interrupt Lines
- RA0
- RA7

#### Analog Lines
- RA12
- RA13
- RA14
- RA15
- RB1
- RB2
- RB3
- RB4
- RB5
- RB8
- RB9
- RB20
- AN10
- AN2
- AN3
- AN4
- AN5
- AN6
- AN7
- AN8
- AN9
- AN20
- AN21

#### Programming lines
- RA0
- RA7

#### I2C Lines
- RB6
- RB7
- RB8
- RB9

#### UART lines
- RB10
- RB11
- RB12
- RB13
- RB14
- RB15

#### PWM lines
- RB16
- RB17

#### Comparator lines
- RB18
- RB19

#### 5V power supply
- RST
- GND

#### 3.3V power supply
- GND
- GND

#### Pin functions
- Audio out
- CAN
- UART
- I²C
- Reference Ground
14. Dimensions

Legend
- mm
- mils
### 15. mikromedia accessories

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

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<tbody>
<tr>
<td><strong>01</strong></td>
<td>Connect shield</td>
<td><strong>02</strong></td>
</tr>
<tr>
<td><img src="image" alt="Connect shield" /></td>
<td><img src="image" alt="BatteryBoost shield" /></td>
<td><img src="image" alt="PROTO shield" /></td>
</tr>
<tr>
<td><strong>04</strong></td>
<td>Gaming shield</td>
<td><strong>05</strong></td>
</tr>
<tr>
<td><img src="image" alt="Gaming shield" /></td>
<td><img src="image" alt="Li-Polimer battery" /></td>
<td><img src="image" alt="Wire Jumpers" /></td>
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You have now completed the journey through each and every feature of mikromedia for dsPIC33® board. You got to know its 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. Find useful projects and tutorials on the Libstock website (www.libstock.com). Join our Forum (www.mikroe.com/forum) and get help from a large ecosystem of users.

Compiler

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

http://www.mikroe.com/dspic/compilers/

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

Visual TFT

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 enables you to quickly create your GUI. It will automatically generate code compatible with MikroElektronika compilers. Visual TFT is rich with examples, which are an excellent starting point for your future projects. Download it from the link below:

http://www.mikroe.com/visualtft/
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