

X-Plode Board

Release Notes – Firmware version 1.0

Contents

About this document	3
Revision history	3
Pinout and board measures	4
LEDs pads	4
Typical connections.....	5
Software	5
Configuration file	5
Settings section	5
Smoothswing parameters.....	6
Notes about emergency shutdown	7
Battery charger.....	7
Firmware programming	7
Bootloader.....	9
Board characteristics.....	9

About this document

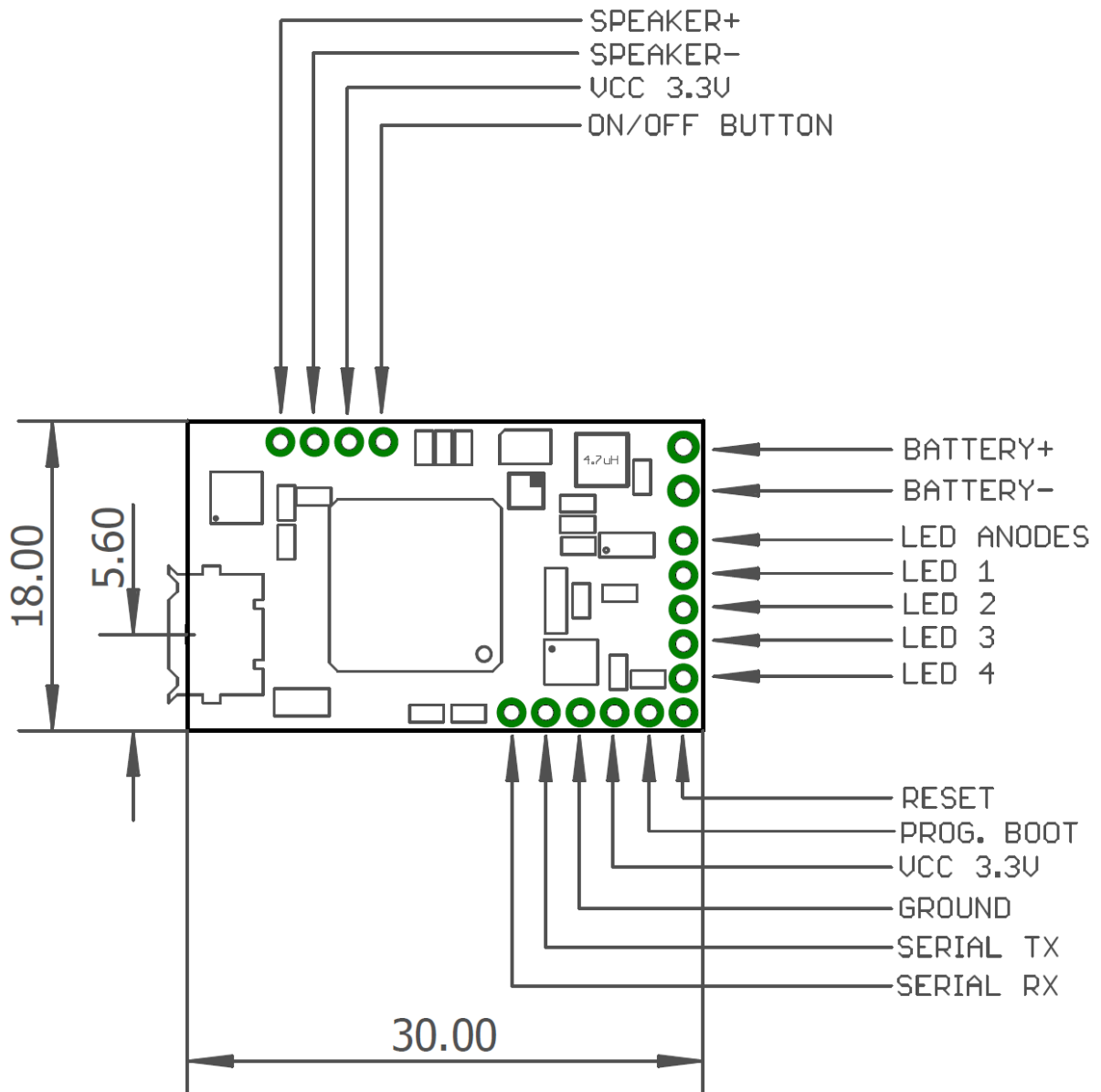
Revision history

The table below displays the revision history for the chapters in this manual.

Chapter	Date	Revision	Changes made
All	June 2020	1.0	First draft

Pinout and board measures

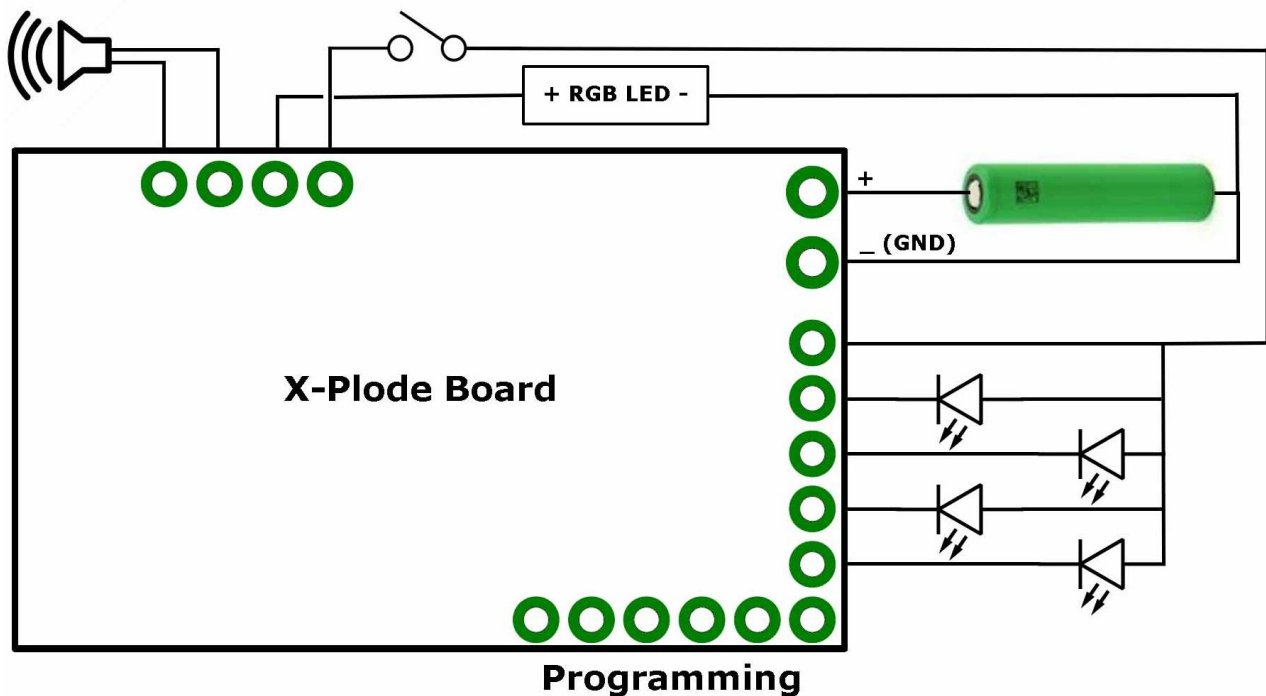
X-Plode BOARD TOP VIEW (TOP SIDE)



LEDs pads

LED 1, 2, and 3 are the pads dedicated to the 3mm white LEDs. LED 4 is the pad dedicated to the 5mm white LED for the switch/button.

Typical connections



Software

Configuration file

The configuration file is an INI text file (config.ini) placed at the root of the SD card. It has only one section called [Settings]. All the parameters are optional (except for *sampling_frequency* and *smoothswing* parameters) and the default value (if the parameter is omitted) is described in the following section, along with the meaning.

Settings section

- *volume* defines the master output volume. Is a value between 0 and 2 (with decimal point), being 1 the default volume without any extra gain.
- *is_smoothswing* determines if the sound files used are of type "smoothswing". Can be "yes" or "no". The default value is "no".
- *idle* is the full path of the WAV file for the IDLE sound. The default value is "idle.wav" (for smoothswing sound, "high" files must be always called "idlehnn.wav" and "low" files must be called "idlel nn .wav" where nn is a number with two digit, for example idleh01.wav, idl02.wav).
- *armed* is the full path of the WAV file for the ARMED sound. The default value is "armed.wav" (for smoothswing sound, "high" files must be called "armedh nn .wav" and "low" files must be called "armedl nn .wav" where nn is a number with two digit, for example armedh01.wav, armedl02.wav).
- *explosion* is the full path of the file for the explosion sound. The default value is "explosion.wav".

-
- *on* is the full path of the file for the sound made when the switch is toggled to the ON position. The default value is "on.wav"
 - *off* is the full path of the file for the sound made when the switch is toggled to the OFF position. The default value is "off.wav"
 - *leds_idle_time_on* is a value in milliseconds. Is the quantity of time an LED is turned on while blinking in the random sequence when idling. The default value is 1800.
 - *leds_idle_time_off* is a value in milliseconds. Is the quantity of time an LED is turned off while blinking in the random sequence when idling. The default value is 200.
 - *leds_armed_time_on* is a value in milliseconds. Is the quantity of time an LED is turned on while blinking in the random sequence in the ARMED state. The default value is 900.
 - *leds_armed_time_off* is a value in milliseconds. Is the quantity of time an LED is turned off while blinking in the random sequence in the ARMED state. The default value is 100.
 - *leds_freq_explosion* is the frequency in hertz of the LED blinking effect when doing the explosion. The default value is 25.
 - *leds_explosion_duration* is the duration in milliseconds of the LED blinking effect for the explosion. The default value is 500.
 - *leds_freq_off* is the frequency in hertz of the LED blinking effect when transitioning into the OFF state (switch toggled in the OFF position). The default value is 15.
 - *leds_off_duration* is the duration in milliseconds of the LED blinking effect when transitioning into the OFF state (switch toggled in the OFF position). The default value is 400.
 - *standby_by* is the time in seconds between the last user activity (OFF state) and the stand-by (low power state). The default value is 30 seconds.
 - *clash_sensitivity*: this is a value between 1 and 200, being 1 the most sensible value (i.e. the explosion effect will be triggered with less motion). The default value is 100.
 - *lowbatt_thrs* indicates the low-battery threshold in millivolts. If the battery voltage is lower than this value for the time defined with the *lowbatt_timebelow* parameter, then a low battery condition is declared. If this value is zero, then the low battery detection is disabled.
 - *lowbatt_timebelow* is the time in seconds with a battery voltage below *lowbatt_thrs* to declare a low battery condition.
 - *lowbatt_timeabove* is the time in seconds with a battery voltage above *lowbatt_thrs* to exit the low battery condition. This is an optional parameter. Setting this value to zero will make the low battery condition permanent until the next board reset.
 - *lowbatt_interval* is the WAV file interval time in seconds. If set to zero, the user indication WAV file is played a single time (when the low battery condition is detected).
 - *emergency_voltage* is minimum the voltage in millivolts (a value between 3000 and 3700) before declaring a power supply *emergency*. The default value is 3500.
 - *emergency_timeout* is the time in seconds with the voltage below *emergency_voltage* to declare a power supply *emergency*. The default value is 10 seconds.
 - *sampling_frequency* is the sampling frequency of all the sound files used with the board (except those used by the bootloader). The value must be one of the following:
 - 22050
 - 44100

Smoothswing parameters

- *smoothswing_idle_count* is a number describing the quantity of sounds (high and low) for the IDLE state.
- *smoothswing_armed_count* is a number describing the quantity of sounds (high and low) for the ARMED state.

-
- *smoothswing_threshold* is the degrees / second needed to register as a swing.
 - *smoothswing_sensitivity* are the degrees of rotations per second required to reach full volume.
 - *smoothswing_sharpness* is the non-linear swing response, higher values makes it more non-linear.
 - *smoothswing_hum_ducking* is the quantity (in percent) the IDLE and ARMED sounds should decrease as swing increases.
 - *smoothswing_max_volume* is the maximum volume for a “swing”. Defaults to 3 times the normal volume.
 - *smoothswing_transition1* is the length of the first transition in degrees.
 - *smoothswing_transition2* is the length of the second transition in degrees.

Notes about emergency shutdown

The X-Plode board, when going into low-power because of an emergency condition, it will stay OFF until the battery is replaced. Unlike the Verso board that can be turned on again by pressing the ignition button, the X-Plode board may go into low-power (during an emergency condition) while the switch is still in the ON position, and thus, turning the board ON again right after entering low-power. This generates an infinite loop.

Because of this, when entering into low-power because an emergency condition, the only way to wake-up the board is by replacing the battery (or putting it into charge).

Battery charger

The X-Plode board has a battery charger capable of charging Li-Po or Li-Ion, 3.7V nominal batteries. The battery is charged using the power supply provided by the 5V available through the USB connector. It is enough to use a wall charger or a USB host and a USB cable to charge the battery.

NOTE: In the two samples, the current used for charging the battery is 500mA (maximum USB capacity). The customer can evaluate the charging speed / temperature and eventually specify a lower charging current (350mA).

Bootloader

When to board resets, the bootloader is executed. This bootloader will check if there is a "firmware.bin" file in the root of the SD card. If it is present, then the bootloader will copy its contents into the MCU flash and verify the copy. The "firmware.bin" file is deleted from the SD card when the copy is completed.

When the copy starts, the bootloader will play a "prog.wav" file. When the firmware programming is completed, the bootloader will play a "progsuccess.wav" file or "progerror.wav" if there was an error.

When the programming is completed, the board resets and executes the new firmware. If there is an error, the bootloader will not do any other operation and will wait for the next board reset (power cycle).

All the WAV files played by the bootloader have to have 22050 Hz sampling frequency and have to be placed at the root of the SD card.

Board characteristics

The X-Plode board must be used with a Li-Ion or Li-Pol batteries only. It is not recommend using a fixed external power supply, because the battery charger IC could be damaged.

When the board is used without battery using only the USB power supply, the battery charger device power the board at 3.7V. Due to the power consumption of the audio amplifier, when powering the board from the 5V @ 500mA from a USB host (and no battery), the audio output might be interrupted.

Dimensions:

18mm width

30mm height

Power Supply:

Voltage Min: 3.5V

Voltage Max: 4.2V

Standby consumption: 350 uA (TBD)

Audio:

Powered at 5V

3.2W with 4 Ohm speaker

1.8W with 8 Ohm speaker

Speaker type: 4-8 Ohm.