F M 0 6 TX

6W PLL FM TRANSMITTER

User's Guide

(Please read carefully before using for the first time!)

1. Preliminary Instructions

This manual is written as a general guide for those having previous knowledge and experience with this kind of equipment, and who are conscious of the risks connected with the operation of electrical equipment. It is not intended to contain a complete statement of all safety rules which should be observed by personnel in using this or other electronic equipment.

The installation, use, and maintenance of this piece of equipment involve risks both for the personnel performing them, and for the device itself that shall be used only by trained personnel.

ASPiSYS Ltd doesn't assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit. Please observe all local codes and fire protection standards in the operations of this unit.

WARNING: Always disconnect power before opening covers or removing any part of this unit. Please observe all local codes and fire protection standards in the operations of this unit.

WARNING: This device can irradiate radio frequency waves, and if it's not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications. This is a "CLASS A" equipment. In a residential place this equipment can cause interference (RFI). In this case the user may be requested to take whatever necessary measures to correct the situation.

ASPiSYS Ltd reserves the right to modify the design and/or technical specifications of the product and this manual without notice.

2. Warranty

Any product by **ASPiSYS Ltd** is covered by a 24 (twenty-four) month warranty. For components the original manufacturer's warranty applies. **ASPiSYS Ltd** extends to the original end-user purchaser all manufacturers warranties which are transferrable and all claims are to be made directly to ASPiSYS per indicated procedures. Warranty shall not include:

- Re-shipment of the unit to ASPiSYS for repair purposes
- Any unauthorized repair/modification
- Incidental/consequential damages as a result of any defect
- Nominal non-incidental defects
- Re-shipment costs or insurance of the unit or replacement units/parts

Any damage to the goods must be reported to the carrier in writing on receipt of the shipment.

Any discrepancy or damage discovered subsequent to delivery, shall be reported to **ASPiSYS Ltd** within **5** (five) days from delivery date.

To claim your rights under this warranty, you should follow this procedure:

1. Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected. Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.
2. If your dealer cannot help you, contact **ASPiSYS Ltd** and explain the problem. If it is decided to return the unit to the factory, **ASPiSYS Ltd** will mail you a regular authorization with all the necessary instructions to send back the goods;
3. When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e., ASPiSYS is never responsible for damage or loss during transport) until the package reaches ASPiSYS premises. For this reason, we suggest you to insure the goods for their full value. Shipment must be effected C.I.F. (PREPAID) to the address specified by ASPiSYS Ltd service manager on the authorization

   DO NOT RETURN UNITS WITHOUT OUR PRIOR AUTHORIZATION AS THEY WILL BE REFUSED!
4. Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty. Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

ASPiSYS Ltd
Avlidos 26 b
ATHENS 11527
GREECE
(Tel. +30 210 7719544)

3. First Aid

The personnel employed in the installation, use and maintenance of the device shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If the victim is not responsive

Follow the A-B-C's of basic life support.

. Place victim flat on his back on a hard surface.
. Open airway: lift up neck, push forehead back (**1**)

1

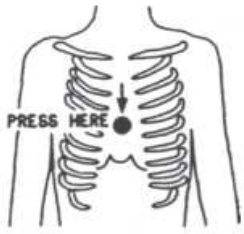
. Clear out mouth if necessary and observe for breathing
. If not breathing, begin artificial breathing (**2**): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

2

. Check carotid pulse (**3**); if pulse is absent, begin artificial circulation (**4**) depressing sternum (**5**).

3

4



5

. In case of only one rescuer, 15 compressions alternated to two breaths.
. If there are two rescuers, the rhythm shall be of one breath each 5 compressions.
. Do not interrupt the rhythm of compressions when the second person is giving breath.
. Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

. Keep them warm.
. Keep them as quiet as possible.
. Loosen their clothing (a reclining position is recommended).
. Call for medical help as soon as possible.

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

. Cover area with clean sheet or cloth.
. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
. Treat victim for shock as required.
. Arrange transportation to a hospital as quickly as possible.
. If arms or legs are affected keep them elevated.

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot nor cold).
Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.
Discontinue fluid if vomiting occurs. **DO NOT give alcohol.**

3.2.2 Less severe burns

. Apply cool (not ice cold) compresses using the cleansed available cloth article.
. Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
. Apply clean dry dressing if necessary.
. Treat victim for shock as required.
. Arrange transportation to a hospital as quickly as possible.
. If arms or legs are affected keep them elevated.

3. General information

FM06TX is an FM analog broadcasting exciter / transmitter for the FM band (normally, 87.50-108 MHz). It achieves high stability thanks to the latest technology PLL-based design. It also has an embedded FM Stereo encoder to provide a total solution for any broadcaster.

To operate you must first connect power DC 13.8V-15V using an appropriate power transformer.

To avoid damage, always operate the unit with the RF Out connected to an antenna, or a 'dummy load'.

Connect your audio source to the corresponding Left and Right RCA jacks. The unit will combine the stereo signals to a mono channel.

Please note that the firmware in the unit covers several different models (both AM and FM). Therefore, some options may not be available in your unit.

O P E R A T I O N

FM06TX features a 20-character by 4-line LCD and a 4-button keyboard. When powered up, the LCD displays a brief version and copyright message followed by the current transmission frequency.

The keyboard buttons (**MENU**, **UP**, **DOWN**, and **ENTER**) which, depending on the keyboard type, may appear verbally or symbolically, are described next:

[■]/[Menu] Acts as Menu or Escape. It cycles through the possible menu screens *(sequence shown farther below)* or selections within a single menu item.

[🡅]/[Up] Acts as Up. It cycles through the possible choices in a forward or upward direction. *Menus with only two possible choices use the [●] key instead to toggle between the two options.*

[🡇]/[Down] Acts as Down. It cycles through the possible choices in a reverse or downward direction. *Menus with only two possible choices use the [●] key instead to toggle between the two options.*

[●]/[Enter] Acts as Enter. It enters the Settings screen from any screen. If inside the Settings screen, it enters the editing mode for the specific item the cursor is currently on. If editing an item, it stops the editing and accepts the changes. For menu items that have only two possible options *(e.g., toggle switches)*, pressing [●] toggles the current option. *Note: Some choices may become active immediately when selected with the [🡅]/[🡇] buttons while most options (e.g., frequency) are activated only by pressing [●].*

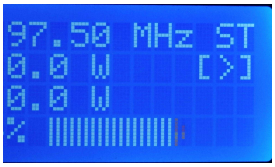
I N F O R M A T I O N A L I T E M S

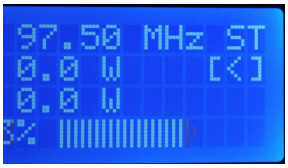
All pages show a combination of at most four of the following predefined informational items.

FRQ: A line which shows the current OnAir/OffAir status, the frequency of operation in MHz and the indicator [ST] when operating in Stereo Mode (only if the optional stereo encoder board is installed, non-functional otherwise). The OnAir indicator is always steady. The OffAir indicator always blinks to draw your attention.

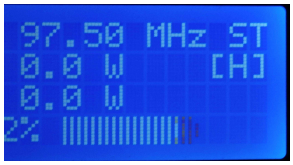
The unit may go OffAir automatically based on certain conditions. For example, excessive reflective power (over the preset limit) will cause the transmitter to go to OffAir mode.

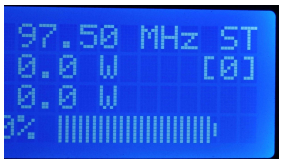
While keeping the Up/Down button pressed, an **[>]** or **[<]** indication will appear.





When the output level is at its highest limit, **[H]** will appear, and when it is off, **[O]** will appear.





MOD: This screen looks the same as the **FRQ** screen with one exception. Instead of the REF line (3rd line), a modulation adjustment bar appears.

Modulation adjustment is possible by pressing the **Up/Down buttons** until the desired modulation is achieved. The current level is indicated by a bar-graph, while the actual modulation is displayed on the 4th line as with the FRQ screen.

FWD: Shows the measured forward power in Watts. The measurement is based on average (AVG) or peak-envelope-power (PEP) reading, which is settable by the user in the Settings Screen, but it normally should not be changed from the manufacturer's preset value.

FWD measurements are based on the 'PowerMeterMode' setting of either 'AVG' or 'PEP'.

The brackets [ ] next to the **FWD** reading is used to display the status while turning the RF output level Up/Down (see the FRQ screen description). In previous versions of the firmware, a number appeared inside the [ ] which was a rough indication of the currently selected output level but since this number did not have any linear correspondence with the actual output level, it was found to be confusing for many users, and so it was replaced with a more intuitive method of showing when the RF output level is being adjusted. The RF output level can only be seen by the actual **FWD** measurement.

REF: Shows the measured reflected power in Watts. The measurement is based on average (AVG) or peak-envelope-power (PEP) reading, which is settable by the user in the Settings Screen, but it normally should not be changed from the manufacturer's preset value.

Next to the reflected power, an Alert message may be displayed, whenever the reflected power goes above the 'Lim REF' setting, which may be changed from the manufacturer's preset value by the user. The ALERT message blinks to draw your attention. If you have turned the 'Sounding' setting to 'On' a very discrete ticking sound will be heard while the ALERT message flashes. If you have also turned the 'Loudness' setting to 'On', the sound will be much louder and easily noticeable from some distance.

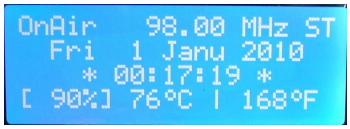
REF measurements are based on the 'PowerMeterMode' setting of either 'AVG' or 'PEP'.

Mod: Shows the modulation level as peak percentage (0 to 120%) and bargraph. **The 100% reading is set for +/-75 KHz FM deviation.**

Date: Shows the current date as Day-of-week, date, month, and year.

Time: Shows the current time as hours, minutes, and seconds.

Temp: Shows the current LCD backlight level as percentage followed by the internal MCU temperature in approximate degrees Celsius and Fahrenheit.



IMPORTANT NOTE: In older versions, when there is excessive reflected power the RF power will not be disabled unless the device is currently in a page where the REF reading is shown. Pages where the REF reading does not show will not automatically go into ALERT / OffAir mode when the REF reading exceeds the 'Lim REF' value.

M E N U S E Q U E N C E

Menus show a different collection of informational items.

The menu sequence is shown below. Menus do not show the actual titles. The titles below are indicative of the function and may appear slightly different on the actual LCD.

MAIN | TEMPERATURE | FORWARD | REFLECTED | MODULATION

MAIN Displays FRQ, FWD, REF, and Mod.

Press **[↑]** to increase the RF output level, or to re-attempt OnAir after auto-OffAir due to excessive reflected power.

Press **[↓]** to decrease the RF output level.

Note: If the OffAir setting is saved to internal memory, then every time the device is restarted, its RF output will be disabled, unless dictated otherwise by the saved schedule.

TEMPERATURE Displays FRQ, Date, Time, LCD backlight percentage, and Temp.

Press **[↑]** to increase the LCD background lighting from off (0%) to full (100%) in 10% increments.

Press **[↓]** to decrease the LCD background lighting from full (100%) to off (0%) in 10% decrements.

FORWARD Displays FRQ, Date, Time, and FWD.

Press **[↑]** until the desired level is shown and to turn the status to OnAir, or to re-attempt OnAir after auto-OffAir due to excessive reflected power.

Press **[↓]** until the desired level is shown, or zero is shown within the brackets, and to turn the status to OffAir.

Note: If the OffAir setting is saved to internal memory, then every time the device is restarted, its RF output will be disabled, unless dictated otherwise by the saved schedule.

REFLECTED Displays FRQ, Date, Time, and REF.

MODULATION Displays FRQ, Date, Time, and Mod.

S E T T I N G S M E N U

FRQ

This setting defines the frequency of operation. The frequency is adjustable in 10KHz steps from 87.50 MHz to 108.00 MHz *(special versions may have a different range)*. If a number outside the allowed range is entered, it will be brought to the closest range limit.

Mode

Press **[●]** to toggle the mode between STEREO and MONO. Stereo is compatible with mono receivers so operating at Stereo will not affect reception from typical mono receivers.

Max FWD

It defines the Maximum Forward power *(in Watts)*.

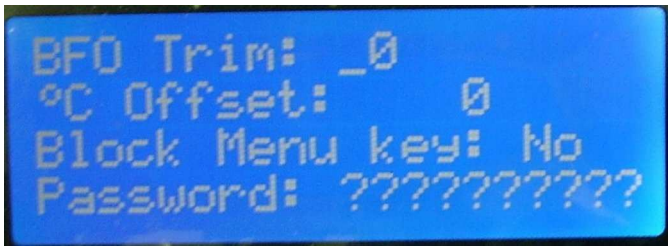
Max REF

It defines the Maximum Reflected power *(in Watts)*.

PowerMeterMode

For the FM version, this is fixed at AVG (average).

BFO Trim



This is non-functional for the FM version.

°C Offset

This setting defines an offset for temperature reading. Adjust so that the temperature reading is correct. This is normally preset at the factory.

Block Menu key

Press **[●]** to toggle the option that enables/disables the Menu key for changing thru the various display screens. This is useful if one wants to lock the display to a single screen.

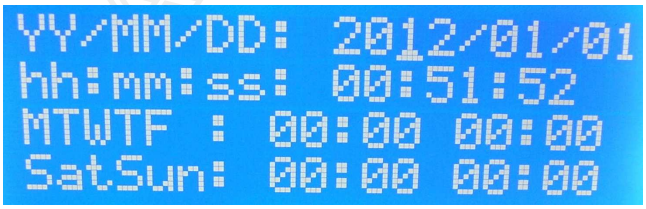
Password

This setting defines a password for accessing the Settings Screen. The password is up to 10 characters long and it's made of either spaces or upper case alphabetic characters. There are $27^{10}-1$ possible passwords.

When the password is all spaces, it is effectively disabled, and no password will be required to enter the settings menu.

The password protection is useful for locking all settings from unauthorized changes. If used in combination with the 'Block Menu key' option above, it will lock the display to a screen that the user cannot override.

IMPORTANT NOTE: Make sure you enter the password carefully to avoid mistakes that will lock out. The password is always visible when the screen that contains it is shown.



YY/MM/DD

This allows editing the Year (YY), Month (MM), and Date (DD) for the built-in real-time clock.

hh:mm:ss

This allows editing the Hours (hh), Minutes (mm), and Seconds (ss) for the built-in real-time clock.

MTWTF

It defines an optional schedule for workdays (Monday thru Friday).

SatSun

It defines an optional schedule for weekends (Saturday and Sunday).

Hint: Pressing **[■]** while editing a clock item will zero the item.

D E T A I L E D D E S C R I P T I O N O F V A R I O U S S E T T I N G S

Item Editing Mode

Item Editing Mode is indicated by a full-size blinking cursor. When exiting the item editing mode back to Settings Screen item selection mode the cursor changes to a non-blinking solid underline.

Clock

The only required use for the clock is when schedules are defined (see below). You do not need to set the clock if schedules are not used. An unset clock will start counting from January 1, 2010 00:00:00; you may use this to know how long your transmitter has been continuously on. The clock will automatically switch from Normal to DST based on the EU rules (i.e., last Sunday in March from Normal to DST and last Sunday in October from DST to Normal, at 3:00am). *This may be different from rules in other parts of the world.*

When in clock editing mode the blinking cursor appears on the LCD at the position to edit next. Use **[🡅]**/**[🡇]** to change the current element (e.g., hour), or **[■]** to clear the current element value to zero. When done editing, press **[●]** to accept the changes, and exit the editing mode returning back to the clock display mode. The clock will continue running with the new settings.

WARNING: The clock is lost when the unit is turned off, or the power supply is momentarily lost. This is no problem for normal operation unless schedules are defined. In that case, it is presumed that you make sure a backup battery properly backs the clock's power.

MTWTF schedule Allows editing of the daily schedule for automatic RF Output On/Off switching. The daily schedule is effective only for weekdays except Saturday and Sunday *(which are controlled separately by the SatSun schedule)*. To edit the current schedule, you must enter the schedule-editing mode by pressing **[●]**. When in schedule editing mode the blinking cursor appears on the LCD at the position to edit next. Use **[🡅]**/**[🡇]** to change the current element *(e.g., hour)*, or **[■]** to clear the current element value to zero. The left-hand-side time is for the On Time while the right-hand-side time is for the Off Time. When done editing, press **[●]** to accept the changes, and exit the editing mode. When exiting the edit mode, the start and end times will be put in the correct order so that the start time is always before the end time.

If you need to disable the current schedule (so that the unit operates full time in the inherited RF Output state during the corresponding days for the current schedule), you need to set both the On Time and the Off Time to zeros. The new settings will be effective immediately.

SatSun schedule Defined in the same was as the MTWTF schedule *(see above)*, except that it applies to Saturdays and Sundays only.

Exiting the Setting Screen automatically saves any changes to an internal non-volatile memory. These will be the settings used when FM06TX is powered next time.

Important note: Current clock is lost when the device is powered off (or if there is any loss of power supply), but any saved Daily or Weekend schedules aren't. This means when the unit is powered up again (with an incorrect clock setting), the schedules will appear to be random! Do not use schedules if some form of UPS doesn't protect your device.

All keyboard buttons auto-repeat if held pressed. This is useful mostly for the **[🡅]** or **[🡇]** buttons so you can quickly locate a different value. While selecting from any list in a menu, if you keep the button continuously pressed, the speed will increase from normal to faster. If while searching in faster speed you happen to go beyond the selection you want, you can use the opposite direction (**[🡅]**/**[🡇]**) button from the one you were using to go back, either continuously or one at a time.

A U D I O L E V E L A D J U S T

Although the unit is factory trimmed, you may wish to re-adjust this setting.

It is possible that your audio source produces a higher or lower level signal than what's expected.

A good method to correctly adjust the audio level is described below:

Turn the RF output level to the minimum non-zero value (from the LCD menu).

Start by connecting an audio source at a nominal level to the appropriate inputs. Both inputs should be given the same signal (monophonic) at the same time. It's better if you can supply a steady 1KHz tone from your audio source. Next, increase or decrease the level of your audio source until the Modulation reading (Mod) on the LCD shows approximately 100%. Stop the 1KHz audio generator from the source and connect your actual program audio with a level that will not exceed the level used with the 1KHz tone when you reading Modulation of 100%. Nevertheless, it's possible for the program audio to reach 115% momentarily during peaks but it's best to keep it as close as possible to 100% as your compressor allows.

As with all FM broadcasts, it's recommended that you use compression on the audio program before it enters the transmitter. The transmitter has a built-in pre-emphasis for FM, and if using some audio processor with its own pre-emphasis setting, you must have it disabled.

R F O U T P U T L E V E L A D J U S T

It is recommended that the following procedure be followed after the audio level has been set *(see above)*.

FM06TX has been set at the nominal RF output level before shipping. There is built-in protection from VSWR in case someone turns it on without first having connected an appropriate load or antenna.

First, attempt to tune the antenna with unmodulated carrier, so that it has the least VSWR possible. Provided the antenna is correctly tuned for the transmission frequency and it appears as a 50Ohm load at the transmitter's output, we may start increasing the output level of the transmitter up to the desired level. This setting must be done from within the Main screen (which shows both FWD and REF) and without having any modulation on the transmitter.

You should increase the output power up to point we read 6W. The transmitter may be able to output up to 8W. Nevertheless, this extra output power should only be used in case we need to overdrive an amplifier.

VERY IMPORTANT NOTE, READ CAREFULLY

This device is a high power FM transmitter. Use of this device may be in violation of local laws/regulations, depending on your region. If unsure, please check with your local telecommunications authorities. Under no circumstances should it be used in violation of any such laws/regulations. The responsibility for legal/proper usage rests solely on you!

For proper operation, it must be connected to a 50Ohm load or to a tuned antenna capable of accepting power of at least 10W.

Thank you for purchasing the FM06TX by ASPiSYS Ltd.

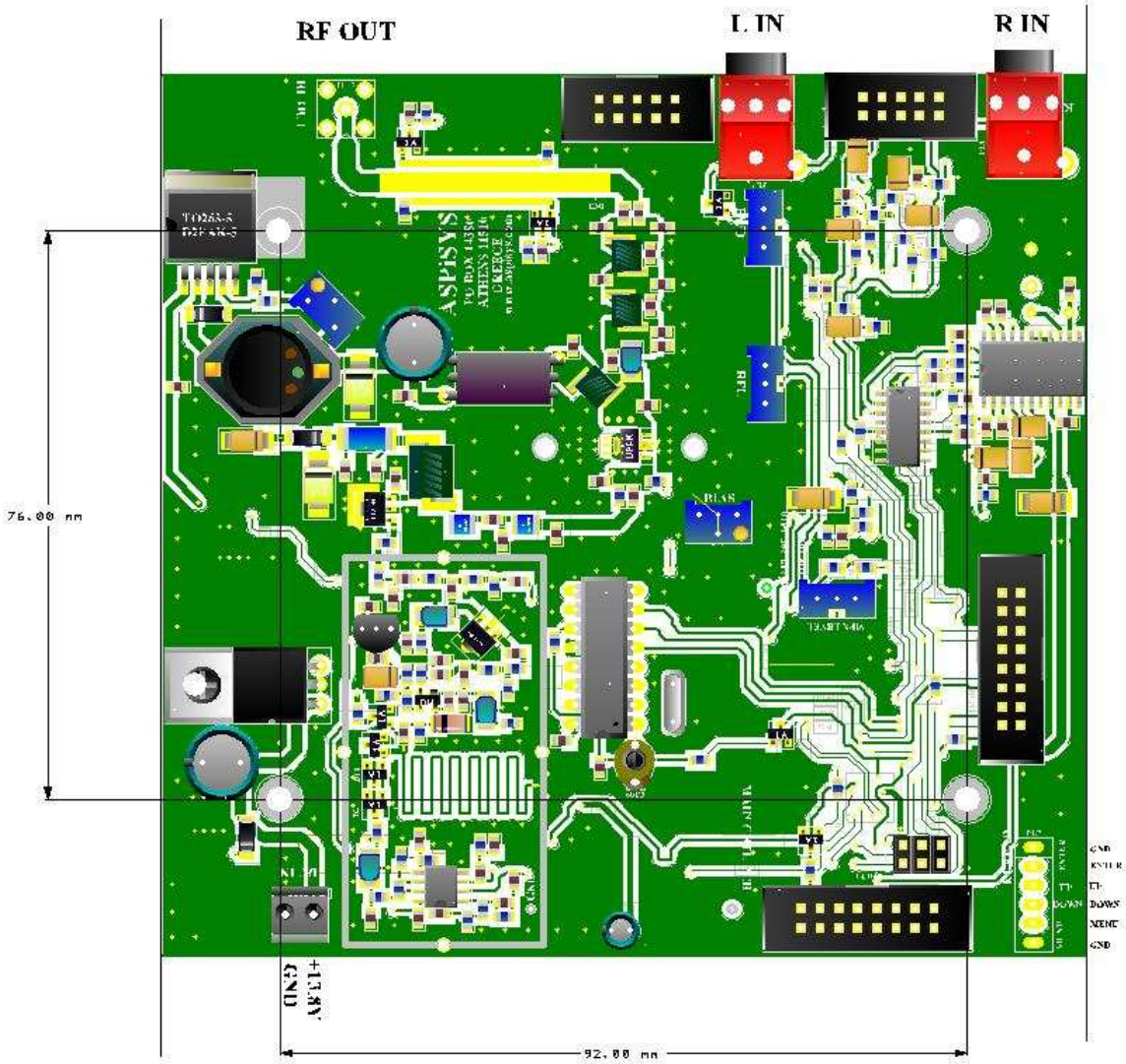
Technical Specifications

Subject to change without notice

RF Output Frequency	87.50 to 108.00 MHz (Special versions may vary according to requirements)
Minimum Step	10 KHz
Frequency Accuracy	+/- 500Hz max. (PLL)
RF Output Level	6W @50Ω
Output Impedance	50 Ω
Harmonics (out-of-band)	-60 dBc
RF modulation	FM (Mono or Stereo System)
Input Level	0.25V up to 2.5V p.p. (adjustable)
Input Impedance	10KΩ unbalanced
Pre-emphasis	75 μS or 50 μS (according to country system)
Total Harmonic Distortion	<0.2% @ 1KHz
Operating Voltage	13.8-15VDC at 2A max.

CE

For technical support email support@aspisys.com, or write to:
ASPiSYS Ltd., P.O.Box 14386, Athens 115 10, Greece (EU), or call: (+30) 210 771-9544 FAX: (+30) 210 771-4983.
We are in the GMT+2 time zone.


RF OUT
L IN
R IN
76.00 mm
92.00 mm
GND
+3.3V