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The Elektor DSP radio

DSP world receiver with USB interface

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Many radio amateurs in practice use two receivers, one portable and the other a fixed receiver with a PC control facility. The Elektor DSP radio can operate in either capacity, with a USB interface giving the option of PC control. An additional feature of the USB interface is that it can be used as the source of power for the receiver, the audio output being connected to the PC's powered speakers. To allow portable 6 V battery operation the circuit also provides for an audio amplifier with one or two loudspeakers.

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- PCB PDF: [100126-PCB.pdf](#)
- Software: [100126-11.zip](#)

Products

- [Magazine July/August 2010](#)
- [ATmega168 PU, programmed](#)
- [PCB, bare](#)

Extra info, Update

Features

- no set-up adjustments required
- Si4735 DSP receiver IC
- ATmega168 microcontroller
- USB interface using FT232R
- backlit 2 x 16 LCD panel
- battery voltage 4.8 to 6 V
- current consumption approximately 50 mA
- 3.3 V internal power supply
- power from PC over USB interface
- stereo audio output
- stereo audio amplifier (2 x LM386)
- RDS display
- AM from 153 kHz to 21.85 MHz
- automatic station search
- antenna signal strength indication in dB μ V
- signal strength meter connection
- diode switching of AM band
- automatic tuning of AM resonant circuit
- switchable AM bandwidth
- optional PC control over USB
- tuning using rotary encoder
- four control pushbuttons
- station memory (30 AM presets and 30 FM presets)
- open-source firmware (free download)
- in-system programming interface
- printed circuit board available ready-populated and tested>

Components

Resistors

(5%, 0.25 W)

R1-R3 = 100Ohm

R4,R5 = 470Ohm

R6-R8 = 22kOhm

R9,R10 = 1kOhm

R11 = 47Ohm

R12,R13 = 10Ohm

P1 = 10kOhm trimpot, linear, vertical adjustment, PCB mount, ALPS type RK09K11310KB (Farnell # 1191725)

Capacitors

C1,C23,C24,C26,C27 = 1uF 16V, electrolytic, radial, 5mm diameter

C2, C3 = 4.7uF 16V, electrolytic, radial, 5mm diameter

C4-C16 = 100nF, ceramic capacitor, 2.54 mm lead pitch

C17, C18 = 47pF, ceramic capacitor, NPO, 5.08mm lead pitch

C19, C20 = 22pF, ceramic capacitor, NPO, 5.08mm lead pitch

C21, C22 = 12pF, ceramic capacitor, NPO, 5.08mm lead pitch

C25 = 100uF 16V, electrolytic, radial, 6.3mm diameter

C28, C29 = 47uF 16 V, electrolytic, radial, 6.3mm diameter

C30, C31 = 470uF 16 V, electrolytic, radial, 8.0mm diameter

C32, C33 = 100nF, polyester (MKT), 5.08 mm lead pitch

Inductors

L1 = 10uH (Fine Inductors Fastron type SMCC-100X-YY)

L2 = 0.1uH (Fine Inductors Fastron type SMCC-R10X-YY)

L3 = 4.7uH (Fine Inductors Fastron type SMCC-4R7X-YY)

L4 = 220uH (Fine Inductors Fastron type SMCC-221X-YY)

L5 = 2.2mH (Fine Inductors Fastron type SMCC-222X-YY)

Semiconductors

D1-D5 = BAT48, Schottky diode, 330 mW, DO-35

D6,D7 = 1N4148

IC1 = LP2950ACZ-3.3/NOPB, LDO voltage regulator, 3.3 V, 100 mA, TO-92

IC2 = FT232RL, USB to serial UART interface, FTDI, SSOP-28

IC3 = ATmega168PA-PU, PDIP-28, programmed, Elektor # 100126-41)

IC4, IC5 = LM386N-1, DIL-8

Y1 = Si4735 broadcast AM/FM/SW/LW radio receiver carrier board, DIL-20, Elektor # 090740-71

Miscellaneous

ENC1 = Rotary encoder, vertical, 12 ppr, ALPS type EC12E1220401 (Farnell # 1520809)

JP1 = 3-way pinheader, 2.54 mm lead pitch + jumper

JP2-JP5 = 2-way pinheader, 2.54 mm lead pitch + jumper

K1-K3 = 2-way, screw-type terminal block, 5mm lead pitch

K4 = BNC connector 50 ohms, black, PCB, mount, Tyco Electronics type 1-1634612-0 (right angle); type 1-1634505-0 (vertical) (Farnell # 1020957; # 1020960)

K5 = 3-way PCB terminal block, 5mm lead pitch

K6 = jack socket, 3.5mm, stereo (Farnell # 1267400)

K7 = USB socket type B, PCB mount

K8 = 6-way (2x3) header, wire-to-board (Farnell # 1096984)

LCD1 = Alphanumeric LCD 2x16, (Electronic Assembly type EA DOGM162W-A) + LED blue backlight (type EA LED55X31-B)

S1 = slide switch, SPDT, C&K type OS102011MS2QN1 (Farnell # 1201430)

S2-S5 = Tactile switch, SPNO, MULTIMEC type 3FTL6 (Farnell # 1132885) + elevation caps

X1 = 8MHz quartz crystal, low-profile, case type HC49

X2 = 32.768 kHz quartz crystal, cylindrical case (3x8 mm)

2 pcs IC socket, DIL-8

1 pc IC socket, DIL-28 narrow body

Sockets for LCD elevation

PCB, bare, Elektor # 100126-1

PCB ready assembled and tested, Elektor # 100126-91

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