

NanoSpeaker KT-019

Built-in class-D audio amplifier

Efficient neodyme speaker: 40 mm / 1.65", 2 W RMS

Ultra compact design: 54 x 41 x 24 mm, lightweight aluminum housing

Features

- Ultra small form factor
- High power neodyme speaker
- Built-in class D audio power amplifier (1.7 W)
- Frequency range optimised for CW mode (300-900 Hz)
- Durable aluminum housing: black anodised with permanent laser-engraved symbols
- LED PWR indicator (super low current)
- Regular Line In input; no wireless operation
- Reverse polarity protection
- Special power distributor cable attached

Specifications

- Transducer: 40 mm/1.65", neodyme, 2 W RMS, 3 W peak
- Power amplifier power: 1.7 W RMS
- Audio input connector: mini jack 3.5 mm TS female
- DC input: 5.5 x 2.1 male
- Power supply requirement: 7...18 VDC
- Operatable temperature: -25°C to +60°C; -13°F to +140°F
- Dimensions: 54 x 41 x 24 mm; 2.1 x 1.6 x 0.9 in (WxHxD)
- IP (Ingress Protection) rating: 20
- Four rubber feets
- Weight: 0.085 kg (2.99 oz)

Applications

- Great choice for all operators looking for the best portable equipment (POTA, SOTA and others)
- Designed to be electrical and mechanical compatible with the QCX-mini® and QMX-mini® transceivers from QRP Labs®

Introduction

Congratulations on your purchase of a KRAIT Technologies NanoSpeaker KT-019! This manual contains information you will need for proper operation, maintenance and care of your portable active speaker.

Circuit Description

To keep the circuit easy for assembly two subboards were used. The main part of NanoSpeaker are: efficient loud speaker with neodyme magnet and class D amplifier. Thanks to built in DC/DC converter the amplifier works properly regardless of the input voltage. This feature may be useful when working in the field with batteries. Power the speaker from the same source as the radio station. The system is protected against connecting the wrong polarity.

To keep all connections simple the speaker is shipped with a dedicated cable adapter which helps to easily distribute DC power supply between TRX, NanoSpeaker and optionally ATU (i.e. KT-005).

A high-performance LED is used as the PWR indicator. It consumes only 2 mW of power.

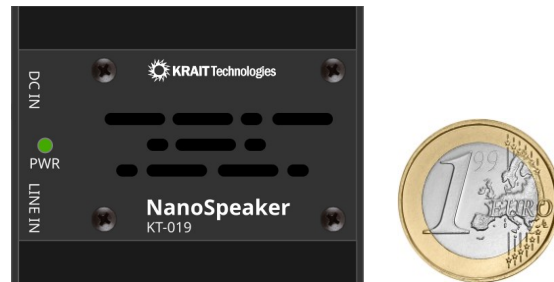


FIGURE 1. Assembled NanoSpeaker KT-019

Mechanical Details

PCB board dimensions: 50 x 37 mm
 PCB specification: FR 4, 35 um layers, HAL, one-layer, 1.5 mm

On the top side:
 - power LED indicator
 - speaker's holes ("QRP" pattern according to Morse code)

On the left side are located:
 - DC input connector (left top)
 - Audio Line In connector (left bottom)

Absolute Maximum Ratings

Maximum Input Voltage:	18.0 VDC
Current consumption @ 9 Vin DC	16.0 mA (no signal)
Current consumption @ 9 Vin DC	188 mA (full volume)
Operating Temperature Range:	-25...+60°C
Audio input level for 1.7 W output:	0.25 V RMS

Notice:

Do **not exceed** the supply voltage!



This product was **NOT** designed for use in wet/damp locations and should **NOT** be used near water or exposed to rain.



The use of class D amplifier and a DC/DC converter **may cause interference** with a sensitive RF receiver. In such a situation, move the amplifier circuit away from the sensitive receiver circuits by a few centimeters.



Assembly Instructions

► **Attention! Electrostatic sensitive components!**
Observe precautions for handling.



► Before you solder LED diode please check twice where is anode and cathode leg. The cathode (shorter leg) has to be soldered into a GND pad on the PCB.

Required tools for assembly and startup

- ☐ soldering iron, ☐ tin and flux, ☐ tweezers, ☐ side cutters,
- ☐ digital multimeter, ☐ screwdriver PH1

►► Before you solder any LED diode remember to put diode's leg pair into a plastic spacer to easily get the required height.

Recommended assembly order

- ☐ solder diodes: D1 (1N4001) Watch the polarity!
- ☐ solder resistor: R1 (1kΩ)
- ☐ solder green diode: LED1 Watch the polarity! Pay attention to the height of the diode!
- ☐ solder minijack input connector: X1 (NEBJ21R type)
- ☐ solder DC input connector: X2 (5.5/2.1 type)
- ☐ solder amplifier module on the bottom side of the board
- ☐ solder DC/DC module on the top side of the board
- ☐ solder two cables to the speaker
- ☐ screw speaker to the housing using four screws and nuts
- ☐ solder two cables to the main PCB

►►► Pay attention to the polarization of the soldered boards and their mechanical position!

Final assembly step

- ☐ Put board into slots in the housing. Close two parts of the housing.
- ☐ Put two M3x10 screws via two holes on the side walls of the housing.
- ☐ Pay attention to the cover, where the sockets are located.

Startup Procedure

Run the circuit from a current-limited laboratory power supply.
Expected current draw is 16 mA at 9 VDC (no signal condition).

Schematic Diagram

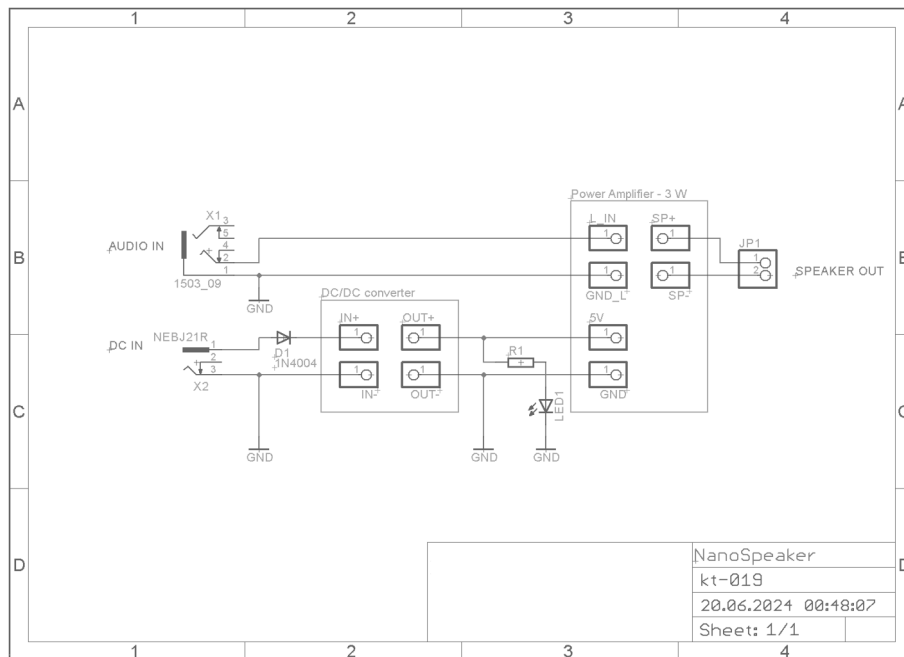


FIGURE 2. NanoSpeaker (KT-019) schematic diagram

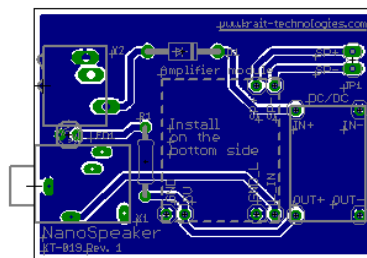


FIGURE 3. KT-019 PCB description layer

Components List

Table 1. Components list

No.	Designator	Description	QTY	Part Number	Value
1	X1	Mini jack 3.5 mm TS female THT	1		
2	X2	DC male connector 5.5/2.1 THT	1		
3	D1	Rectifier diode	1	1N4001	
4	R1	1k0/0.5W THT resistor	1		
5	LED1	1.8 mm green high efficient LED	1		
6	DC/DC converter	7-18 V DC to 5 VDC/ 1 A	1		
7	Power Amplifier module	2 W class D power amplifier module	1		
8	SP1	Transducer: 40 mm/1.65", neodyme, 2 W RMS, 3 W peak	1		
9		Screws M3x8, Philips, black anodised	4		
10		Nuts M3	4		
11		Housing (top, bottom, covers and 4 x screws)	1		
12		LED spacer	1		
13		Two-wire cable 0.124 mm ² , 40 mm	1		

Ordering Information

Table 2. Ordering information

Description	Version	Ordering Code	QTY
Kit for self assembly (with black housing and screws)	Kit	KT-019K	1
Assembled device in a black metal housing	Assembled	KT-019A	1

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