Review of uSDX+ QRP Transceiver by KM6RSS

My QRP Rig - Introduction

The uSDX+ QRP transceiver is a compact, low-power radio popular among amateur radio operators for its affordability and portability. Below is an overview of its pros and cons based on its features and user experiences, including my own.

*****Pros**

- **Affordability**: Priced around $100-$150 (based on accessories), it's one of the cheapest multi-band, multi-mode transceivers, making QRP accessible for beginners or budget-conscious hams. (note, with tariffs, the price may increase).

- **Portability**: Small (roughly 4x3x1 inches) and lightweight (~140g), it's ideal for portable operations like SOTA (Summits on the Air) or POTA (Parks on the Air).

- **Multi-Band Coverage**: Typically covers 80/60/40/30/20/17/15/10m (8 bands), offering flexibility for HF operations.

- **Multi-Mode Support**: Handles SSB (USB/LSB), CW, AM, FM, and digital modes like FT8, catering to diverse operating styles.

- **Efficient Design**: Uses a Class E amplifier for high power efficiency, producing ~5W output at 13.8V with minimal heat, suitable for battery-powered use.

- **Open-Source Firmware**: Built with Arduino IDE, allowing users to experiment, add features, or fix bugs via community contributions on platforms like GitHub.

- **Built-In Features**: My version includes a speaker mic, an internal speaker, OLED display, internal battery, wall wart charger, and USB CAT interface, reducing the need for external accessories.

- **Low Power Consumption**: Draws ~80mA on receive and ~500mA on transmit, extending battery life for field use.

Cons

- **Audio Quality Issues**: High noise floor (S5-S6) and weak internal speaker make it hard to hear weak signals, especially in noisy environments. Volume above certain levels (e.g., 14) may cause squealing. It's best to use an earphone or headset, especially in noisy environments.

- **Receiver Performance**: Struggles with strong or closely spaced signals, with reports of overloading and bleed-through (e.g., FT8 signals interfering with CW). Not ideal for crowded bands or contests.

- **Variable Build Quality**: Especially with Chinese clones, quality control varies. Some units have poor receiver sensitivity or unclean transmitted signals close to or exceeding FCC purity standards.

- **Ergonomic Challenges**: Menu navigation can be clunky, with some models burying critical controls like volume in submenus. The encoder may feel awkward, and small knobs are hard to use in the field.

- **Limited Power Output**: Output drops on higher bands (e.g., ~2.4W on 10m vs. 5W on 80m), limiting range compared to higher-power rigs.

- **Documentation Gaps**: Manuals are often vague, poorly translated, or small-printed, making setup and troubleshooting difficult for new users.

- **Modest Speaker and Mic**: Internal speaker lacks volume for outdoor use, and the stock mic may produce subpar audio. External accessories often improve performance.

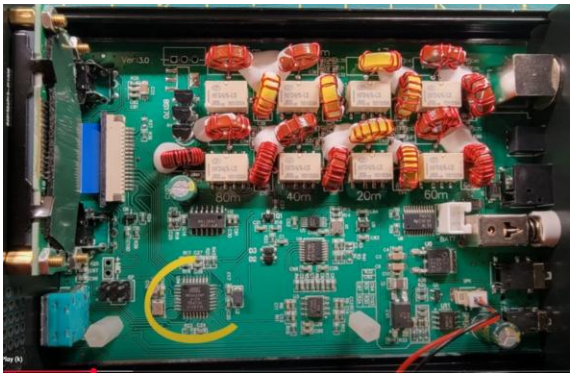
- **Not Contest-Grade**: Lacks the selectivity and robustness of pricier rigs like the Elecraft KX2, making it less suited for high-pressure scenarios.

Summary

The uSDX+ is a fun, cost-effective option for casual QRP operation, especially for portable CW or SSB. Its low price, compact size, and open-source nature make it appealing for tinkerers and beginners. However, its receiver limitations, audio issues, and inconsistent build quality mean it's not a substitute for higher-end transceivers in demanding conditions. It shines best in low-noise environments with a good antenna and external audio solutions.The uSDX+ is very portable and has nice features. The one that Ed Fong WB6IQN sold me was a clone of the original, which has gone out of production. All the boards in the units he sells are manufactured with high quality pc boards, toroids, caps, etc. He also said to "remember all this is open source, so there are a lot of versions out there". The one I have works really well considering it uses a switching RF amp and the battery lasts forever. However, although it receives very well, its transmit output is limited to 3-4 watts, depending on using the internal battery (an external power source of 13.8 DCV will provide additional power) and the band. I paid Ed $155 (plus $10 for expedited shipping).

What is the uSDX+?

The uSDX+ is a multi-band, multi-mode rig covering 20-80 meters with a maximum of 5w out. It operates SSB, AM, CW, and digital (with the right interface). It has a lot of really slick features for a sub $200 HF rig.



Here’s a test from a YouTuber:

Band	Power Out (Bench)	Power Out (Wart)
80m	4.9w	4.7w
60m	5w	4.7w
40m	5w	4.9w
30m	4.9w	4.6w
20m	5w	4.8w
17m	4.8w	4.5w
15m	2w	1w
10m	3w	2w

Key Features:

☑**Covers 80, 60, 40, 30, 20, 17, 15, and 10 meters**

☑**5W output (lower output on 15m & 10m)**

☑**Arduino & Si5351-based frequency control**

☑**Kenwood-style mic connector**

☑**Compact and lightweight – perfect for portable ops**

☑**Works with 12V or 13.8V power sources**

☑**Side-by-side power output comparisons Power Sources**

Detailed specifications:

- This is a shortwave QRP SSB/CW transceiver. Ultra-small size makes it easy to carry for outdoor use. It boasts a built-in 4000mAh lithium battery, a 1602N LCD screen, a built-in speaker. It supports connection to a PC and uses FT8, JS8, FT4 and other digital mode software control, and supports CW automatic decoding. Abundant interfaces include CAT, PTT OUT, MIC/KEY and K-head microphone. -

- 8 BAND COVERAGE: Mobile transceiver is designed for 8 band coverage, 80m, 60m, 40m, 30m, 20m, 17m, 15m, 10m. Rich interface, CAT, PTT OUT, MIC, KEY, K-head hand microphone.
- HIGH LAUNCH EFFICIENCY: Radio transceiver transmitting efficiency on 80m, 60m, 40m, 30m and 20m higher than 85%, 17m and 15m efficiency higher than 70%, finally, 10m efficiency higher than 60%. It uses TO 220 package pads.
- HIGH PERFORMANCE: 8 band radio transceiver is designed to meet the principles of high frequency circuit design and PCB wiring to ensure excellent performance. Up to 3-5W power in 8 bands. Whether using internal built-in 11.1v (12.6v) lithium battery or external 13.8v power supply, it can reach 3-5W power in 8 bands, and reserve the SOT-223 and TO-220 package pads required for upgrading.
- - ULTRA-SMALL SIZE: 83*38*124mm (excluding protruding parts)
- FREQUENCY STABILITY: QRP transceiver has separate core and RF boards to avoid its own interference. High accuracy for KDS brand for TCXO with frequency accuracy better than 1PPM and frequency stability better than 0.5PPM.
- PROFESSIONAL: LPF parts all using 100V C0G NP0 capacitors, using original genuine magnetic hold relay, LM4562 or LM833 op amp chip, built in speaker with cavity and BNC antenna interface. Uses original genuine Omron magnetic latching relays.
- OPTIMIZED: From uSDX QCX-SSB open-source hardware. Here's a link to a menu spreadsheet https://docs.google.com/spreadsheets/d/19s_1PlK7b-dUGOg6TZGuzaWtJnKjvMaXcomjNyL60mM/edit?usp=sharing
- The powerful software supports the use of less hardware to complete the SW transceiver and supports the SSB mode (reception quality is very good, transmission quality is slightly worse). In addition, the developer also developed an AM/FM mode for it, but AM/FM is defined as a gift function. Don't expect AM/FM to be of high quality.
- EXCELLENT: PCB layout design in line with high-frequency circuit design principles to ensure excellent performance.

List of Functions:

- Simple, fun and versatile QRP SSB HF transceiver with embedded DSP and SDR functions;
  - EER Class-E driven SSB transmit-stage

- Approximately 5W PEP SSB output from 13.8V supply
- All-Mode support: USB, LSB, CW, AM, FM
- DSP filters: 4000, 2500, 1700, 500, 200, 100, 50 Hz passband
- DSP features: Automatic Gain Control (AGC), Noise-reduction (NR), Voice-triggered Xmit (VOX), RX Attenuators (ATT), TX noise gate, TX drive control, Volume control, dBm/S-meter
- SSB opposite side-band/carrier suppression Transmit: better than -45dBc, IMD3 (two-tone) -33dBc, Receive: better than -50dBc
- Multiband support, continuously tunable through bands 160m-10m (and from 20kHz..99MHz with loss in performance)
- Open source firmware, built with Arduino IDE; allows experimentation, new features can be added, contributions can be shared via Github, software-complexity: 2000 lines of code
- Software-based VOX that can be used as fast Full Break-In (QSK and semi-QSK operation) or assist in RX/TX switching for operating digital modes (no CAT or PTT interface required), external PTT output/PA control with TX-delay
- Simple to install modification with 8 component changes and 8 wires
- Lightweight and low-cost transceiver design: because of the EER-transmitter class-E stage it is highly power-efficient (no bulky heatsinks required), and has a simple design (no complex balanced linear power amplifier required)
- Fully digital and software-based SSB transmit-stage: samples microphone-input and reconstruct a SSB-signal by controlling the phase of the SI5351 PLL (through tiny frequency changes over 800kbits/s I2C) and the amplitude of the PA (through PWM of the PA key-shaping circuit)
- Fully digital and software-based SDR receiver-stages (optionally): samples I/Q (complex) signal from Quadrature
- Sampling Detector digital mixer, and performs a 90-degree phase-shift mathematically in software (Hilbert-transform) and cancels out one side-band by adding them
- Three independent switchable analog front-end receiver attenuators (0dB, -13dB, -20dB, -33dB, -53dB, -60dB, -73dB)
- Receiver Noise floor MDS: -135 dBm at 28MHz (in 200Hz BW)
- Receiver Front-end selectivity: steep -45dB/decade roll-off +/-2kHz from tuned-frequency
- Blocking dynamic range: 20kHz offset 123dB, 2kHz offset 78dB
- CW decoder, Straight/Iambic-A/B keyer
- VFO A/B + RIT and Split, and corresponding relay band-filter switching via I2C
- CAT support (TS480 subset)

Microphone/Speaker (does both)

The transceiver comes with a microphone/speaker combination but Ed suggested I purchase the QRPkits microphone (it is an electret microphone). Audio is much better and the cost is well worth the $15.00. Using this microphone enables the sound to come through the speaker in the transceiver and I have received better audio reports using it when compared with the included microphone/speaker.

https://www.qrpkits.com/microphone.html

The Pacific Antenna Electret Microphone kit is a lightweight, easy to build accessory.It has a high impedance (HiZ) element 2.2K ohm (Max), integral PPT switch, and it is perfect for backpacking or emergency use. The weight is a mere 1.4oz. (40gm.). All the components are provided, along with a 30" long flexible cable terminated with a 3.5mm molded stereo plug. Our microphone kit is compatible with the BitX, MMR-40, Survivor and many other SSB transceivers that can use electret microphones.

Specifications:

- Sensitivity: 44±(0dB=1V/Pa,1KHZ)
- Output impedance: 2.2K ohm (Max)

- Frequency Range: 70-20KHz
- Standard operating Voltage: 3.0V
- Current Consumption: 0.5mA (Max)
- S/N ratio: >58dB

Antennas:

Since I use a Ciro Mazzoni Baby Loop as my main antenna, I have to use my Yaesu FT 991A to tune it first, then switch the transceiver over to the uSDX+ to operate.

When the loop is limited (it only can tune to 40 meters), I switch to my Octopus antenna with the appropriate ham sticks:

My QRP Rig - Summary

I am new to QRP and need to get used to the capabilities and limitations of this rig. Like all QRP transceivers, this is not a beginner's radio. It does take patience and a special touch, but it's very much worthwhile with this radio. QRP is a challenge, and that makes it FUN. Wonderful fun radio and at a bargain price!