We present to you TAKRAD, an advanced tactical radio based on SDR (Software Defined Radio) technology. TAKRAD is the result of a joint effort and cooperation between two Croatian companies - RIZ Profesionalna elektronika d.o.o. (RIZ PE) and Impel Group d.o.o.

TAKRAD was created by combining the experience and tradition of RIZ PE, with youth and innovativeness of Impel. One would not think of Croatia as a leader in radio technology, but it is the birthplace of great Nikola Tesla, whose innovations greatly helped in development of radio. We are proud that TAKRAD brings back to mind this interesting fact. Our technology based on software signal processing is a completely new chapter in the development of military radio devices that places TAKRAD on the world stage of radio communication devices.

RIZ PE is a Croatian company with 70 years of tradition and is the project holder and a long-time partner of Ministry of Defense of the Republic of Croatia, as a Croatian manufacturer of military communication devices and systems.

Impel Group is a young company which directed its vision toward development and manufacture of innovative solutions in the area of radio communication electronics and embedded computer systems. This is an engineering team with many years of experience in implementing demanding projects that develop highly sophisticated devices custom-designed according to the needs of the client.

TAKRAD is the result of this synergy. This is a personal radio for a modern-day soldier with a superior SDR architecture that allows reliable and secure data and voice communication. TAKRAD is perfectly designed for military needs with its robust mechanical design and advanced electronics.
Except for internal communication, thanks to integrated and exterior sensors (GPS, accelerometer, dosimeter, heart rate monitor etc.) TAKRAD offers detailed information on the location and physical condition of the soldier. TAKRAD also automatically recognizes dangerous situations (SOS - Man Down Alert) and reports them using a robust security channel.

Connection to an outside terminal for display of multimedia information (pictures, maps, locations, chat) is simple, and simultaneously secure and reliable thanks to the integrated Bluetooth Low Energy system.

SDR architecture in TAKRAD device enables easy customization for the required purpose. By using the narrowband and broadband mode, the device ensures simultaneous work of several work groups, creation of self-forming and self-healing ad-hoc mesh networks.

Exceptionally solid mechanical housing made of aluminum ensures reliable work in extreme conditions and compatibility with MIL STD 810 and IP 67. TAKRAD is a modern and long-term solution for C3 on tactical level. It is equipped with various telephone combinations, high capacity battery, various antennae and other accessories, depending on the user’s needs.

Innovative solutions and modern technology with which TAKRAD was developed ensure competitiveness, and therefore, are an advantage in comparison to the leaders in communication radio devices.
TAKRAD
SPECIFICATIONS
**TAKRAD**

**KEY BENEFITS**

- **Double independent Software Defined Radio (SDR)** architecture for narrowband and wideband custom waveforms, easy upgrading over USB interface via PC control application.
- **UHF SDR** for simultaneous, full duplex multiple users voice and data over 225MHz-450 MHz frequency range.
- **2.4 GHz SDR** for short-range accessory DATA port and wireless remote control implemented Bluetooth Low Energy (BLE) for Command & Control (C2) systems.
- **Self-forming, self-healing, ad hoc complex radio network support**.
- **Frequency hopping and Direct Sequence Spread Spectrum (DSSS) operation**.
- **Secure embedded AES 256-bit encrypted voice, data and situational awareness for high mission effectiveness**.
- **Integrated GPS receiver and accelerometer for automatic Position Location Information (PLI) and smart SOS/MAN DOWN detection**.
- **Dual Push-to-Talk with dual-net function for easy integration with upper-echelon network**.
- **Audible user friendly Human Machine Interface (HMI) for presets, channels and battery status. Additional customisation available**.
- **User defined customizable waveforms and functionality**.
- **Professional military connectors with heavy duty metallic housing meets IP68 and MIL-STD-810G**.
GENERAL TAKRAD KEY SPECIFICATIONS

• UHF Frequency Range: 225 to 450 MHz (other on request)
• UHF RF Bandwidth: 12.5 kHz, 25 kHz, 100 kHz, 500 kHz or 1.2 MHz
• Presets: 16 highly customised presets
• Modulation: constant envelope phase modulation (FSK, GMSK...)
• Voice: dual-net, unlimited listeners, High priority interrupt, VOX
• Data: simultaneous data and voice up to 1 Mbps through the air
• Location: embedded GPS with automatic Position Location Information (PLI) and anti jamming/spoofing detection
• Audible HMI: language customizable with presets, channels and battery status
• Graphical HMI: tactical handheld device graphical control, Situation Awareness (SA), messaging over 2.4 GHz SDR
• Battery: rechargeable Lithium-Ion, >14 hour life time, 11.1V, 37.7 Wh
• Architecture: software defined radio (SDR)
• Encryption: certified 256-bit Advanced Encryption Standard (AES) hardware engine, keyfill over RS485 interface and DS-101 protocol
INTERFACES

Data: over wire 9pin Fischer connector for USB 2.0, serial over USB, RS485 wireless 2.4 GHz SDR radio (BLE, custom protocol)
Audio: standard 6-pin, MIL-DTL-55116C
UHF Antenna: IP68 TNC connector
GPS Antenna: IP68 SMA connector
Firmware update: over USB
Keypads: ON/OFF, PTT A, PTT B, INFO, VOLUME +, VOLUME -, CH +, CH -, FUNCTION
HMI: customizable audio and graphical
**TRANSMITTER**

- **UHF Power Output**: 100 mW up to 2 W (20 dBm up to 33 dBm @ 50 Ω)
- **2.4 GHz Power Output**: 1 mW up to 100 mW (0 dBm up to 20 dBm @ 50 Ω)
- **Frequency Stability**: ± 1.0 ppm

**RECEIVER**

- **Sensitivity**: -122 dBm @ 12 dB SINAD in SOS mode
- **Noise Floor**: ≤ -148 dBC/Hz
- **Audio input**: high impedance, automatic level control (ALC), noise gate (NG), high pass filter (HPF), wind noise reduction filter, low noise bias for microphone
- **Audio output**: 32 Ω up to 1 kΩ, dynamic level compressor
ENVIRONMENTAL

Shock and Vibration: MIL-STD-810G ground mobile environment
Immersion: 2 meters MIL-STD 810G
Temperature: operating: -30° C to +55° C
storage: -40° C to +80° C MIL-STD-810G
EMI/RFI: MIL-STD-461F
Sand/Dust/Salt/Fog/Rain: MIL-STD-810G

DIMENSIONS WITHOUT ANTENNA

<table>
<thead>
<tr>
<th>RADIO</th>
<th>BATTERY</th>
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<tbody>
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