

1.2GHz 2W VTX Transmitter (Model: KP-T1220A) Specification

1. Product Overview

The KP-T1220A is an ultra-compact 1.2GHz analog VTX with dual adjustable power (25mW/2W), wide 7-36V (2-8S) input, and an ultra-small lightweight aluminum design (38x36x11mm, 16g). It delivers stable short-to-mid-range transmission, features efficient heat dissipation, mechanical protection, and ultra-low latency (<30ms) for FPV and light industrial use.

2. General Specifications

Parameter	Specification
Model Number	KP-T1220A
Transmitter Type	Analog Video Transmitter (VTX)
Operating Frequency	1.2GHz
Frequency Range	1080MHz - 1360MHz (Continuous adjustable)
Number of Channels	8CH (8 Selectable Channels)
Input Voltage	DC 7V ~ 36V, compatible with 2-8S LiPo Batteries
Output Power	Dual Adjustable: 25mW (Low Power) / 2000mW = 2W (High Power)
Antenna Connector	SMA Female Connector (50Ω Impedance), compatible with SMA Male Antennas
Housing Material	Aluminum Alloy (CNC Machined)
Dimensions (L×W×H)	38mm × 36mm × 11mm
Net Weight	16g (Without Antenna)

3. Channel & Frequency Table (1.2GHz Band)

Channel Number	Transmit Frequency (MHz)
CH1	1080
CH2	1120
CH3	1160
CH4	1200
CH5	1240
CH6	1280
CH7	1320
CH8	1360

4. Electrical Parameters

4.1 Power Specifications

- **Input Voltage Range:** DC 7V ~ 36V, compatible with 2-8S LiPo batteries, offering exceptional versatility for integration into small to medium UAVs, FPV drones, and compact industrial monitoring equipment—eliminating the need for additional voltage converters and adapting to diverse power supply scenarios. This wide voltage range aligns with industry standards for professional VTX modules, ensuring compatibility with most drone power systems.
- **Output Power:** Dual adjustable power levels for flexible application: 25mW (low power) for short-range, low-interference scenarios (e.g., indoor FPV, close-range inspection) and 2W (2000mW, high power) for mid-to-long-distance transmission, ensuring strong signal penetration in complex outdoor environments. The 2W high power falls into the mid-power category, balancing transmission range and power efficiency, while the 25mW low power complies with strict regional regulations for short-range operation.
- **Power Consumption:** $\leq 24W$ (Max) @ 2W Output; $\leq 0.3W$ (Max) @ 25mW Output (varies with input voltage), optimizing power efficiency for both low and high power modes. At 12V input, the typical current draw is 600mA @ 2W output, ensuring efficient power utilization without excessive battery drain, critical for extending flight time of small UAVs and FPV drones.

- **Power Switching:** One-key power adjustment (25mW/2W) via integrated DIP switch or optional OSD control, enabling quick adaptation to different transmission distance requirements without disassembling the device. This user-friendly design allows operators to switch power modes based on real-time environmental conditions and regulatory requirements.
- **Frequency Stability:** $\pm 6\text{ppm}$ (At 25°C , Ambient Temperature), supported by advanced PLL (Phase-Locked Loop) frequency control technology, ensuring stable signal transmission without frequency drift—even during long-term 2W high-power operation—and precise channel locking to avoid interference. This stability is critical for maintaining clear video transmission, especially in environments with multiple RF devices.
- **Safety Protection:** Built-in multi-layer protection mechanisms, including over-temperature protection (automatic power reduction to 25mW when temperature exceeds 65°C), reverse polarity protection (prevents damage from incorrect power connection), antenna disconnection protection (shuts down RF output if no antenna is connected), and over-current protection—critical for 2W mid-power operation and preventing component damage. These protections align with industry safety standards, ensuring reliable operation in harsh conditions.

4.2 Frequency & Channel Specifications

- **Frequency Range:** 1080MHz - 1360MHz (Continuous adjustable within the range), supporting flexible channel selection to avoid signal interference from other RF devices (e.g., other VTXs, wireless routers, industrial equipment), ensuring clear signal transmission in crowded RF environments. This frequency range is widely used for analog VTX applications, offering better penetration than higher frequency bands (such as 5.8GHz) in complex environments.
- **Channel Quantity:** 8 Selectable Channels, **Channel Spacing:** 40MHz (Typical), ensuring clear signal separation between channels to minimize cross-interference and maintain signal integrity, compatible with most 1.2GHz analog receivers. The channel frequencies are optimized for analog transmission, aligning with industry-standard 1.2GHz VTX channel layouts.
- **Modulation Mode:** FM (Frequency Modulation), Analog Video Transmission, supporting both PAL and NTSC video formats for wide compatibility with various analog FPV cameras and surveillance cameras. FM modulation offers strong anti-interference capabilities and high-quality video transmission, with the characteristic gradual signal degradation (rather than sudden 中断) that is ideal for FPV racing and high-speed flight, allowing operators to adjust their position based on signal quality.
- **RF Impedance:** 50Ω , matching standard SMA antennas for optimal signal transmission efficiency, with a VSWR (Voltage Standing Wave Ratio) of $\leq 1.6:1$ for stable signal output and minimal power loss—critical for maximizing the performance of the 2W output power. This impedance matches industry-standard antennas, ensuring wide compatibility and optimal signal transfer.

- Harmonic Suppression: $\geq 50\text{dBc}$, complying with CE/FCC/SRRC standards and international radio frequency regulations, reducing electromagnetic interference to other electronic devices (e.g., UAV flight controllers, navigation systems) and ensuring compliance with local regulatory requirements. Different regions have specific power limits: FCC standards (US) allow up to 33dBm ($\approx 2\text{W}$), while CE standards (EU) and SRRC standards (China) typically limit power to $20\text{--}25\text{dBm}$, making the dual-power design compliant across regions.

4.3 Video Parameters

- Video Input: CVBS (Composite Video Broadcast Signal), 1Vpp (75Ω Load), compatible with most analog FPV cameras and surveillance cameras, supporting video input levels of $0.8\text{--}1.2\text{Vpp}$ for flexible camera compatibility, ensuring clear video signal input without distortion. This video input standard is widely used in analog VTX systems, ensuring compatibility with most consumer and professional analog cameras.
- Transmission Distance (Open Area, Without Obstacles; Subject to Antenna Performance):
 - 25mW Low Power + 2.0dBi Omni-Directional Antenna: Up to 500m (ideal for short-range, low-interference scenarios such as indoor FPV, close-range inspection), consistent with typical low-power analog VTX performance in open environments.
 - 2W High Power + 2.0dBi Omni-Directional Antenna: Up to 3km (suitable for mid-to-long-range missions, such as agricultural surveying, small-scale industrial inspection), aligning with mid-power analog VTX performance expectations.
 - 2W High Power + 5.8dBi High-Gain Omni-Directional Antenna: Up to 6km (long-range missions, such as search and rescue, long-range FPV exploration), leveraging high-gain antennas to extend transmission distance while maintaining signal stability.
 - Actual distance may vary based on environmental obstacles (e.g., buildings, trees), electromagnetic interference, and weather conditions. In urban environments with heavy interference, actual effective distance may be reduced to $1\text{--}2\text{km}$ for 2W high power operation.
- Signal-to-Noise Ratio (SNR): $> 80\text{dBc}$ (Typical), ensuring clear, low-noise video transmission even in complex environments with minimal interference, delivering high-quality real-time video feedback that meets both hobbyist and light industrial application requirements. This high SNR ensures that video signals remain clear even as distance increases, minimizing snow and noise artifacts.
- Video Bandwidth: 9MHz (Typical), supporting clear video transmission with minimal distortion, suitable for high-definition analog cameras and ensuring detailed video capture for inspection and surveying tasks. The video bandwidth is optimized

for analog transmission, balancing image quality and signal stability.

- Transmission Latency: < 30ms (Typical), a key advantage of analog transmission, ensuring real-time video feedback critical for FPV racing, high-speed flight, and precision inspection tasks where even minor delays can impact performance.

5. Physical & Environmental Specifications

5.1 Physical Dimensions & Weight

- Dimensions (L×W×H): 38mm × 36mm × 11mm (Excluding Antenna, Connectors and Cables), engineered with an ultra-compact design to fit weight-sensitive and space-constrained applications (e.g., small FPV drones, lightweight UAVs, compact surveillance equipment), while accommodating internal high-power RF modules, precision heat dissipation components, and protection circuits. This ultra-small size makes it one of the most compact 2W VTX modules on the market, ideal for miniaturized setups.
- Net Weight: 16g (Without Antenna); Gross Weight: 65g (Including Packaging and Accessories), the ultra-lightweight design (16g) is a core advantage, minimizing payload impact on small UAVs and FPV drones without compromising 2W mid-power performance and durability. This weight is significantly lighter than larger mid-power VTX modules, making it ideal for weight-sensitive applications.
- Mounting: Compatible with 20×20mm (M2) standard mounting holes, facilitating quick and secure installation on small UAV frames, FPV drone bodies, and compact industrial monitoring equipment—consistent with industry mounting standards for lightweight, compact devices. The compatible mounting size ensures easy integration into most small drone builds.

5.2 Housing & Heat Dissipation

Housing Material: High-strength Aluminum Alloy (CNC Machined), selected for its excellent thermal conductivity (160–220 W/(m·K)), robust mechanical properties, and corrosion resistance—critical for 2W mid-power operation. While 2W power generates less heat than higher-power modules (8W/10W), efficient heat dissipation is still essential for long-term stability. Despite its ultra-compact size, the housing integrates a precision micro finned heat sink (with high fin density for maximum heat transfer) and 2oz thick copper foil on the internal PCB (to spread heat evenly), combined with phase change thermal interface material (PCM) between the RF module and heat sink. This advanced passive cooling system efficiently dissipates heat generated during 2W continuous operation, ensuring the transmitter operates within a safe temperature range ($\leq 65^{\circ}\text{C}$) without additional cooling fans—ideal for compact, weight-sensitive applications. For confined installation spaces or high-temperature working conditions (e.g., desert environments, high-altitude flights), an optional ultra-thin cooling pad is recommended to further enhance heat dissipation.

performance, ensuring long-term operational stability and extending the product service life. The CNC-machined aluminum housing also provides mechanical protection, reducing the risk of damage from impact and vibration during flight.

5.3 Operating Environment

- Operating Temperature: $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ (ensures stable performance in both cold and hot outdoor environments, suitable for year-round use in diverse regions, from cold mountainous areas to hot desert regions), aligning with industry standards for outdoor electronic equipment.
- Storage Temperature: $-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
- Relative Humidity: 10% ~ 90% (Non-Condensing)
- Operating Altitude: Up to 3500m (suitable for high-altitude aerial surveying, mountainous area inspection, and high-altitude search and rescue operations), ensuring stable performance at high elevations where atmospheric conditions may impact signal transmission.
- Electromagnetic Compatibility (EMC): Complies with CE/FCC/SRRC Standards, ensuring compliance with regional radio frequency regulations (such as Title 47 CFR for the US and EU EMC directives) and minimizing electromagnetic interference to other devices (e.g., drone flight controllers, navigation systems). Compliance with these standards ensures the product can be sold and used globally, adhering to local regulatory requirements.
- Shock Resistance: 15G (IEC 60068-2-29), vibration resistance: 10-2000Hz, 1.5G, ensuring durability in harsh industrial and outdoor environments, such as construction sites, remote wilderness areas, and high-vibration UAV operations—critical for lightweight devices that may be exposed to frequent movement and impact during flight or transportation.

6. Interface Description

- Power Interface: 2-Pin PH2.0 Connector (Input Voltage: 7-36VDC, Center Positive), with reverse polarity protection to prevent damage from incorrect power connection—critical for mid-power devices—and compatible with standard small UAV and FPV power cables, ensuring stable power delivery in compact setups. The compact connector size matches the transmitter's ultra-small design, minimizing space usage.
- Video Input Interface: Mini BNC Connector (CVBS Signal Input, 75Ω), compact design to match the transmitter's ultra-small size, easy to connect with mini FPV cameras and compact surveillance cameras, supporting secure signal transmission without loss, even during high-power operation. The mini BNC connector is widely used in compact analog VTX systems, ensuring compatibility with small cameras.
- Audio Input Interface: 2.5mm Audio Jack (Optional, for Audio Transmission),

compact and lightweight, supporting external microphones or audio sources, enabling synchronized audio and video transmission for real-time communication, compatible with most standard compact audio devices. The optional audio interface adds versatility for applications requiring audio feedback, such as remote monitoring and search and rescue.

- **Antenna Interface:** SMA Female Connector (50Ω Impedance), compact and durable, compatible with all standard SMA Male antennas (e.g., dipole, patch, or high-gain directional antennas) for flexible signal optimization. The SMA connector supports a passband of 0–18GHz, ensuring compatibility with 1.2GHz signals and future expandability, with a secure thread design to prevent antenna disconnection during high-vibration operation. This connector is industry-standard for VTX modules, ensuring wide compatibility with available antennas.
- **Channel & Power Selection:** Integrated Dual DIP Switches (On the Side Panel) – one for 8-channel selection (CH1-CH8) and one for power adjustment (25mW/2W), easy to adjust and lock, ensuring stable settings without accidental changes during operation. The DIP switches are dust-proof and waterproof, suitable for outdoor use in harsh environments, and their compact design fits within the transmitter's small form factor.
- **Indicator Lights:** Dual LED Indicators (Power/Power Mode), providing clear visual feedback: green light for 25mW low power (normal operation), blue light for 2W high power (normal operation), and red light for over-temperature or abnormal operation (e.g., no antenna connected), allowing users to quickly identify and troubleshoot issues without additional tools. The LED indicators are bright and easy to see, even in outdoor sunlight, ensuring quick status checks.

7. Key Features

- **Dual Adjustable Power (25mW/2W):** Flexible adaptation to short-range and mid-to-long-range scenarios, with 2W (2000mW) mid-power delivering reliable signal penetration and transmission distance for both hobbyist and light industrial missions, while 25mW low power complies with strict regional regulations.
- **Ultra-Compact & Lightweight:** 38x36x11mm size and 16g weight, ideal for weight-sensitive applications (small FPV drones, lightweight UAVs) without compromising mid-power performance. This ultra-small form factor makes it easy to integrate into compact setups where space is limited.
- **Wide Voltage Compatibility:** 7-36V DC input, compatible with 2-8S LiPo batteries, enabling seamless integration into diverse UAV and industrial systems, eliminating the need for voltage converters and adapting to different power supply configurations.
- **8 Selectable Channels:** 1080MHz-1360MHz frequency range with optimized 40MHz channel spacing, easy to avoid signal interference and compatible with most 1.2GHz analog receivers, ensuring flexible operation in crowded RF environments.
- **Efficient Heat Dissipation:** CNC-machined aluminum housing with micro finned

heat sink, copper PCB, and PCM thermal material, ensuring stable 2W continuous operation without overheating—critical for compact mid-power devices, even in high-temperature environments.

- **Robust & Durable:** High-strength aluminum alloy housing, high shock/vibration resistance, and comprehensive safety protection (over-temperature, reverse polarity, antenna disconnection), suitable for harsh outdoor and industrial environments, ensuring long service life.
- **Stable Performance:** High frequency stability ($\pm 6\text{ppm}$), low noise ($\text{SNR} > 80\text{dBc}$), ultra-low latency ($< 30\text{ms}$), and advanced PLL frequency control, ensuring clear, consistent video transmission in complex environments—ideal for FPV racing and precision inspection tasks.
- **Easy Installation & Operation:** Compatible with $20\times 20\text{mm}$ standard mounting holes, intuitive DIP switches for channel/power selection, and clear LED indicators, suitable for both professional operators and hobbyists, with no complex setup required.
- **Global Regulatory Compliance:** Complies with CE/FCC/SRRC standards, with dual power modes to meet regional power regulations, ensuring the product can be used and sold globally without regulatory issues.

8. Applications

- **Small FPV Drones & Mini UAVs:** Ideal for FPV racing, mini UAV exploration, and hobbyist FPV applications, leveraging ultra-lightweight design and 2W mid-power to extend transmission range without payload impact, while the ultra-low latency ensures real-time feedback for high-speed flight.
- **Light Industrial Inspection:** Small-scale pipeline, power line, and equipment inspection, where lightweight and compact size are critical, delivering stable mid-to-long-range video transmission for remote inspection of hard-to-reach areas—improving work efficiency and safety without adding excessive weight to inspection drones.
- **Aerial Surveying & Mapping (Lightweight Platforms):** Small-area agricultural mapping, land surveying, and environmental monitoring, providing clear video capture for data collection with lightweight UAVs, where 2W power offers sufficient range for small to medium survey areas.
- **Remote Video Surveillance (Compact Setups):** Outdoor security surveillance, perimeter monitoring, and remote small-area surveillance (e.g., gardens, small factories, construction sites), where compact size and mid-range transmission are required, and wired monitoring is impractical.
- **Search and Rescue (Lightweight UAVs):** High-altitude and remote area SAR operations, using lightweight UAVs with 2W VTX to deliver real-time video and optional audio feedback, aiding in efficient mission execution and locating missing persons or objects in small to medium-sized search areas.

- **Hobbyist FPV & Drone Modifications:** High-performance hobby applications, offering dual power modes for flexible use (short-range practice, mid-range exploration) and ultra-compact design for easy integration into mini drones, meeting the needs of both beginner and advanced hobbyists.

9. Important Notes

- **Critical Warning:** Always connect a compatible SMA antenna (50Ω impedance) to the transmitter before powering it on. Operating without an antenna will cause severe damage to the RF module (due to impedance mismatch) and void the warranty—especially critical for 2W mid-power operation, as the RF module generates significant power that must be properly dissipated through an antenna. Use only high-quality SMA antennas to ensure optimal performance and avoid power loss, as low-quality antennas can reduce transmission range and cause overheating.
- **Power Supply:** Use a stable DC 7-36V power supply. Unstable voltage or voltage exceeding the specified range may cause signal distortion, power failure, or permanent device damage. For 2W high-power operation, ensure the power supply can provide sufficient current to support peak power consumption (≥600mA @ 12V) to avoid performance issues or damage.
- **Heat Dissipation:** Ensure sufficient airflow and ventilation during 2W high-power operation, especially in confined spaces or high-temperature environments. Avoid installing near high-temperature components (e.g., drone motors) or in direct sunlight for extended periods. For compact installations, use the optional cooling pad to enhance heat dissipation, ensuring long-term stability.
- **Power Switching:** When switching between 25mW and 2W modes, ensure the transmitter is in a stable environment and the antenna is securely connected to avoid signal instability or component damage. Select the appropriate power mode based on local regulatory requirements—25mW for regions with strict power limits (e.g., EU CE standards) and 2W for regions allowing higher power (e.g., US FCC standards).
- **Transmission Distance:** Actual range varies based on environmental factors (obstacles, interference), antenna gain, and weather conditions. Conduct a pre-flight test to confirm signal stability in the operating area, especially for mid-to-long-range missions. In urban or high-interference environments, reduce power to 25mW if necessary to avoid interfering with other RF devices.
- **Regulatory Compliance:** Comply with local radio frequency (RF) regulations and licensing requirements when operating at 2W output power. Different regions have specific restrictions on maximum output power; failure to comply may result in legal penalties. The dual-power design allows users to switch between compliant power levels based on their location.
- **Device Maintenance:** Do not disassemble or modify the transmitter without professional guidance, as this may void the warranty and cause safety hazards. Regularly clean the micro finned heat sink to remove dust and debris, ensuring efficient heat dissipation. Check the antenna connection regularly to ensure it is

secure, and inspect cables for damage or wear before each use.

- Environmental Protection: Avoid exposing the transmitter to harsh weather conditions (heavy rain, snow, strong wind) or corrosive environments (saltwater, chemical fumes) to prevent damage to the housing and internal components. Store in a dry, cool place when not in use, and avoid extreme temperature changes that may damage internal circuits.

10. Package List

- 1 × KP-T1220A 1.2GHz 2W VTX Transmitter
- 1 × DC Power Cable (2-Pin PH2.0 Connector, 30cm)
- 1 × Video Input Cable (Mini BNC Connector, 30cm)
- 1 × 2.0dBi SMA Male Omni-Directional Antenna