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# TBS UNIFY 2G4 500mW / 800mW 16ch Video Tx

*High quality, long range, micro video transmitter*

*Revision 2014-07-11*

The latest and greatest 2G4 video transmitter from the leaders in long range technology. A successor to the widely popular Lawmate 2G4 VTx with 16ch, and a choice of 500mW and 800mW of output power.

The TBS Unify is a new line of video transmitters, optimized for long range and small form factor, completely redesigned and tailored for FPV use. Perfect for small multi rotor platforms or in applications where flight times are critical. It obviously works on big platforms too! We've taken this to 40km and back in prototype phase, with a regular TBS Yagi you can expect up to 15km of flyable video. The transmitter is protected by a rugged aluminum case that also acts as heat sink, making it extremely reliable, robust and crash-friendly. The sexy design rounds off an otherwise already perfect product.

This transmitter makes it possible to fly between trees, fly out long distance a few feet off the deck, do proximity runs down a steep alpine slope, in and out of LOS.

## Key features

- Tiny form factor
- Low power consumption at 5V input
- Full aluminum enclosure for heat dissipation and protection
- Hardware designed and manufactured for outdoor use
- Small size, 37mm x 26mm x 8mm, only 15.6 grams



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## Specifications

<b>Input voltage:</b>	Regulated 5V
<b>Output power:</b>	500mW and 800mW respectively
<b>Channels:</b>	16Ch, 2370MHz - 2510MHz
<b>Transmission:</b>	PAL or NTSC Video, Mono audio
<b>Range:</b>	1.5km with 3dBi whip antennas, 10km with 11dBi TBS Yagi
<b>Receiver compatibility:</b>	TBS Groundstation, Lawmate 2.4, ImmersionRC 2.4 Uno & Duo, Iftron 2.4
<b>Antenna connector:</b>	SMA Female
<b>Port connector:</b>	JST-XH socket, 4 pin
<b>Working temperature:</b>	0 - 40°C
<b>Dimensions:</b>	37 (H) x 26 (W) x 8 (D) mm
<b>Weight:</b>	14.4g; 22.2g including antenna
<b>Kit contents:</b>	1x TBS Unify 2G4 VTx, 1x TBS Unify tin shield, 1x 5V cable, 1x 2G4 2.5dBi whip antenna



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## Channel Selection

The 16 channels are made available via the first 5 pins of the dip switches located at the front of the transmitter. Dip switches are encoded in binary format, please reference to below table for the switch position to channel mapping.

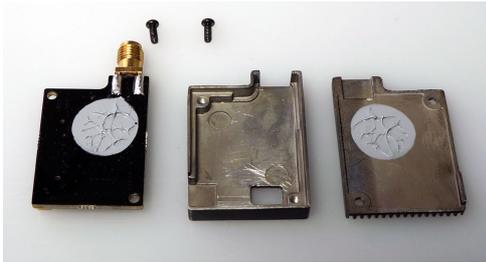
↓ ↓ ↓ ↓ ↓	Channel 1	2410 MHz
↑ ↓ ↓ ↓ ↓	Channel 2	2430 MHz
↓ ↑ ↓ ↓ ↓	Channel 3	2450 MHz
↑ ↑ ↓ ↓ ↓	Channel 4	2470 MHz
↓ ↓ ↑ ↓ ↓	Channel 5	2370 MHz
↑ ↓ ↑ ↓ ↓	Channel 6	2390 MHz
↓ ↑ ↑ ↓ ↓	Channel 7	2490 MHz
↑ ↑ ↑ ↓ ↓	Channel 8	2510 MHz
↓ ↓ ↓ ↑ ↓	Channel 9	2414 MHz
↑ ↓ ↓ ↑ ↓	Channel 10	2432 MHz
↓ ↑ ↓ ↑ ↓	Channel 11	2450 MHz
↑ ↑ ↓ ↑ ↓	Channel 12	2468 MHz
↓ ↓ ↑ ↑ ↓	Channel 13	2411 MHz
↑ ↓ ↑ ↑ ↓	Channel 14	2433 MHz
↓ ↑ ↑ ↑ ↓	Channel 15	2453 MHz
↑ ↑ ↑ ↑ ↓	Channel 16	2473 MHz



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## TBS Unify 2G4 tin shield (Advanced!)

In some cases it may be beneficial to reduce the weight of the TBS UNIFY 2G4 video transmitter. Please keep in mind that this requires advanced soldering skills. Also, it is recommended to provide adequate airflow over the video transmitter.



Open up the TBS UNIFY video transmitter and remove the aluminum case. Please try to avoid electrostatic discharge when handling the PCB.



Remove the heat-transfer paste from the back of the video transmitter. Do NOT use any water to remove the paste.



Solder the tin shield around the front side of the video transmitter, starting from the SMA connector. Be sure to wear gloves as the heat sink will get very hot.



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## Good practices

We have compiled a list of all of practices which have been tried and tested in countless environments and situations by the TBS crew and other experienced FPV pilots.

Follow these simple rules, even if rumors on the internet suggest otherwise, and you will have success in FPV.

- Start with the bare essentials and add equipment one step at a time, after each new equipment was added to proper range- and stress tests.
- Do not fly with a video system that is capable of outperforming your R/C system in terms of range.
- Do not fly with a R/C frequency higher than the video frequency (e.g. 2.4GHz R/C, 900MHz video).
- Monitor the vitals of your plane (R/C link and battery). Flying with a digital R/C link without RSSI is dangerous.
- Do not use 2.4GHz R/C unless you fly well within its range limits, in noise-free environments and always within LOS. Since this is most likely never the case, it is recommended to not use 2.4GHz R/C systems for longer range FPV.
- Do not fly at the limits of video, if you see noise in your picture, turn around and buy a higher-gain receiver antenna before going out further.
- Shielded wires or twisted cables only, anything else picks up RF noise and can cause problems.
- When using powerful R/C transmitters, make sure your groundstation equipment is properly shielded.
- Adding Return-To-Home (RTH) to an unreliable system does not increase the chances of getting your plane back. Work on making your system reliable without RTH first, then add RTH as an additional safety measure if you must.
- Avoid powering the VTx directly from battery, step-up or step-down the voltage and provide a constant level of power to your VTx. Make sure your VTx runs until your battery dies.
- Do not power your camera directly unless it works along the complete voltage range of your battery. Step-up or step-down the voltage and provide a constant level of power to your camera. Make sure your camera runs until your battery dies.
- A single battery system is safer than using two dedicated batteries for R/C and FPV. Two batteries in parallel even further mitigate sources of failure.
- For maximum video range and "law compatibility", use 2.4GHz video with high-gain antennas.
- When flying with R/C buddies that fly on 2.4GHz, or when flying in cities, it is perfectly possible to use 2.4GHz video provided you stick to the channels that do not lie in their band (CH5 to CH8 for Lawmate systems, available from TBS).
- Do not use diversity video receivers as a replacement for pointing your antennas, diversity should be used to mitigate polarization issues.
- Improving the antenna gain on the receiver end is better than increasing the output power (except in RF-noisy areas). More tx power causes more issues with RF on your plane. 500mW is plenty of power!



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- Try to achieve as much separation of the VTx and R/C receiver as possible to lower the RF noise floor and EMI interference.
  - Do not buy the cheapest equipment unless it is proven to work reliably (e.g. parts falling off, multitudes of bug fix firmware updates, community hacks and mods are a good indicator of poor quality and something you do NOT want to buy for a safe system). Do due diligence and some research before sending your aircraft skyward.



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## Troubleshooting

- **Issue: Not getting any decent video signal**

Solution: 2G4 video transmitters operate on the same band as many popular devices, including regular R/C transmitters, wifi routers, walkie talkies, etc. Ensure that you are away from interfering sources, and try using Channels 5-8 for best reception. Also, make sure that the RF module on your remote control is disabled.

For Taranis users: Select mode, hit PAGE, then scroll down to "Internal RF" and ensure it's OFF.

For Futaba users: Turn on the R/C with throttle all the way up. Disable RF when prompted.

- **Issue: Lawmate receiver picture jumps from good signal to blank in regular intervals**

Solution: There are multiple channels selected on your Lawmate receiver, so it will toggle between the selected channels. Ensure that only one channel is selected, and that it corresponds with the channel that the video transmitter is operating on.

*Manual designed by ivc.no, written by TBS.*

