

# Boulder Amateur Television Club TV Repeater's REPEATER

February, 2024  
2ed edition, issue #155

BATVC web site: [www.kh6htv.com](http://www.kh6htv.com)

ATN web site: [www.atn-tv.com](http://www.atn-tv.com)



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## ATV Antennas - Wrap Up

Jim, KH6HTV

We have finally finished our testing of 70 cm & 23 cm antennas for possible use in ATV service. Here is our list of recommended antennas.

### RECOMMENDED ANTENNAS for ATV Service:

- Yagi Antennas:** M-Squared, model 440-6SS (70 cm, 10 dBi)  
Directive Systems, model DSE2414LYRMK (23 cm, 15 dBi)  
Antennas-Amplifiers, model 70cm23cm11WB (70cm, 8dBi & 23cm, 11dBi)
- Base Station:** Diamond, model X50NA (70 cm, 6 dBi)  
Diamond, model X6000A (*qualified endorsement, 23 cm only, 7 dBi do not use on 70 cm,*)
- HT Antenna:** Diamond, model SRH999 (70 cm, +1.5 dBi & 23 cm, +3.5 dBi)  
Bingfu, model BFN00606 (70 cm, +1.5 dBi)
- Mobile Antenna:** Diamond, model NR2000N (70 cm, 5 dBi & 23 cm, 7.5 dBi)

We have written up complete documentation of our testing. It includes more antennas than just in the above list. It is now posted on-line at our web site: [www.kh6htv.com](http://www.kh6htv.com) Go to the "Application

Notes" tab/page. There are now three new documents posted there. They are too long to publish here in our newsletter.

AN-66 "Comparison Tests of Various 70 & 23cm Antennas for ATV", 15 pages

AN-66 RL "Appendix 3 - Return Loss Measurements vs. Frequency plots", 9 pages

AN-66 notes "Appendix 4 - Additional Data & Comments on Antennas, 15 pages

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Mario, KD6ILO, just sent us this notice. ***"FYI new modification to our dish for laser communication from deep space. See that box it's a laser optics receiver."***

**NASA's New Experimental Antenna Tracks Deep Space Laser**



Capable of receiving both radio frequency and optical signals, the DSN's hybrid antenna has tracked and decoded the downlink laser from DSOC, aboard NASA's Psyche mission. [Read More](#)

Deep Space Station #13 at NASA's Goldstone, California site. Experimental antenna retrofitted with an optical terminal. The 34 meter dish has tracked a down-link laser in addition to the RF signals from the Psyche spacecraft. It has down-linked data from 32 million kms away at a rate of 15 Mbps.

The box seen in the photo contains seven segmented mirrors similar to those used in the James Webb space telescope. They create a 1 meter aperture telescope. The focused laser light wave is then transmitted through an optical fiber to cryogenically cooled, semiconducting nanowire single photon detector.

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**QO-100 FEED-BACK:**

**QO-100 is Not a Ham Satellite**

**(What is it ?)**

**Mario, KD6ILO** writes --- " There was talk more among the private sector at their last east coast conference. Note: QO-100 is often referred to as a satellite. It's not. QO-100 is a hosted payload on a

commercial communications satellite. That's important to understand. Intelsat does host payloads as long as they can meet specific requirements, weight, space accommodations {room} and don't forget power source [it's own] etc. There is no way we can have an Amateur Radio TV standalone satellite in GEO; it's just valuable space real estate, a costly endeavor. Again it's finding that "maybe we can host your package" kind of answer. It has to be a very robust package.

Activity here in San Diego on QO-100 has been very active, thanks to Benno, PA3FBX, in the Netherlands for providing us with seven(7) channels of LIVE real time downlink feeds from [10Ghz] QO-100 and I appreciate the 24/7 feed to one of our channels for re-transmitting on our network as our STEM Students enjoy and the MODTS WB Quick Tune v1\_26b spectrum readout."

## Launching an Amateur Radio Satellite Digital TV transponder

into GEO (Geostationary Earth Orbit) is no easy feat. It is a complex and expensive undertaking involving multiple challenges. Here is a breakdown of the difficulty:

### Technical Challenges:

Sponsor Launch Vehicle: You need a powerful and reliable launch vehicle capable of lifting your transponder (weight) and its fuel to a designated altitude of 35,786 km above the Earth's equator. *This requires significant engineering expertise and resources.*

Orbital Maneuvers: Reaching GEO is not enough. You need to precisely adjust the satellite's trajectory and speed to achieve a circular orbit at the correct altitude and over the desired longitude. This delicate process requires complex calculations and fuel expenditure.

Station Keeping: Once in GEO, *the satellite is not truly stationary*. Subtle gravitational forces and solar radiation pressure can nudge it off course. Maintaining its position within specified tolerances (usually  $< 0.1^\circ$ ) requires continuous thrusting using on-board propulsion systems, demanding fuel, and careful monitoring.

Transponder Technology: The transponder itself *needs to be robust and dependable*, operating flawlessly for years in the harsh space environment. It withstands extreme temperatures, vacuum, radiation, and micrometeoroid impacts. Additionally, your transponder design must comply with international regulations regarding spectrum allocation and signal characteristics.

### Financial Challenges:

Launch Cost: Launch costs are substantial, ranging from tens to hundreds of millions of dollars depending on the vehicle and mission complexity.

Satellite Development: Building a sophisticated transponder with all the necessary components and systems is expensive, *requiring specialized engineering teams and materials.*

Ground Infrastructure: You need ground stations for communication and control of the satellite, adding to the overall cost.

Regulatory Compliance: Obtaining licenses and complying with international regulations can be a lengthy and expensive process.

### Competition:

Limited Slots: GEO orbit is a crowded space with limited vacant positions. Obtaining the rights to a specific longitude slot can be challenging and expensive.

### **In Conclusion**

Placing a satellite digital TV transponder in GEO orbit is a demanding and expensive endeavor. It requires significant technical expertise, financial resources, and careful planning. However, advancements in technology and a growing demand for satellite TV in certain regions can make it feasible for ventures with the necessary capabilities and market strategy.

\*Remember, this is just a general overview. The specific difficulty depends on several factors like the transponder's size, launch vehicle used, target region, and existing competition for that GEO space.

Mario Badua Jr., KD6ILO  
San Diego DATV Society

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# **New: TV with a view through**

**Klaus Welter, DH6MAV**

About three years ago, I reported for the first time on a "pane of glass"; a pane not only for looking through, but also suitable as a display. The idea was actually the dual use of a window pane, or to put it more carefully, a pane in a window frame. The idea was to make it possible to look outside during the day (a play on words in German: in die Ferne zu sehen) and watch television in the evening (German: fernzusehen). Okay, back then everything was still in the laboratory stage.

In the latest issue of the German magazine "connect professional" (formerly "Funkschau"), the matching report came as a surprise. It reports on CES 2024 and the presentation of a „TV for look through" (Fernseher zum Durchsehen). The Consumer Electronics Show (CES) took place in January 2024. LG received two honours for the TV discussed here.

The TV model bears the name "Signature OLED T" and is designed in a 77-inch size (= 2 diagonally). If you go straight to the German homepage of the manufacturer LG to find out more: No answer. A statement as to when the innovation will be available in Germany has been kept open. The presentation at the CES in Las Vegas suggests that, in addition to the South Korean domestic market, the large American market could be supplied as a first step. Further indications refer exclusively to use within the living environment, i.e. not as a window pane, as speculated above.

With various advertising images aimed specifically at North Americans - who tend to live in spacious rooms - LG presents its innovation, the see-through television.



*The Signature OLED T from LG allows three things: a transparent view, a "punch-out" view (as shown here) or a regular opaque TV picture. (Photo: LG)*

It is integrated into an airy shelf, which is positioned in different ways, but always functions as a room divider. An undoubtedly nice interior design solution. This means that the owner does not have a dark wall in the middle of the room all day. During the time when no TV programme is being watched, art pictures, videos or photos, for example, can be displayed, even semi-transparently. Or news, weather or information about the music currently playing can be displayed at the bottom of the "digital screen".

The resolution is 4K with up to 120 frames per second. The only cable required is the power cable. LG calls this proprietary wireless solution Zero Connect Technology. The necessary connection box with tuner, HDMI etc. is located off to the side. Anyone researching on the Internet will stumble across a reference to a not so strong contrast. LG claims to be able to increase the contrast at the touch of a button. Speculatively, this certainly reduces other measured values. So be it.

Transparent TV will rarely find its way into the Shack. But as an ATV enthusiast, you want to know what's going on in the TV scene. Hence our report. And who knows whether someone among us will end up with the device in their living room and the next ATV repeater will get a programme slot. After all, you don't treat yourself to anything else.

73 de Klaus Welter, DH6MAV, Hofstetten, Germany





## Sat-Link DVB-T Modulator

Mike, KM7MH, writes to us with this report.

"Jim -- I've been experimenting with the SatLink WS-6990 DVB-T for several months and have not experienced any difficulties. There is one quirk: QPSK will not work with HDMI input but with composite input; I believe that to be a design issue. The unit must be operated QAM16 at a minimum for the HDMI input to work.



The settings are as follows: Frequency selection up to 900 MHz, 7M, Output attenuation: 0 = -5Dbm, HDMI, QAM16, 7/8, 1/32" Unfortunately, running the SatLink at 6 MHz BW causes pausing of the video stream. Upon further investigation, pausing also occurs to a lesser extent at 7 MHz BW. Moving to 8 MHz BW appears to eliminate pausing.

SatLink WS-6990 Key Specs: freq. range 50-860 MHz, BW 6, 7 or 8 MHz, QPSK/16QAM/64QAM Video Inputs or analog composite or HDMI, H.264 encoding.

Price ??? -- A google search shows prices all over the place ranging from \$116 to a high of \$317 !!!

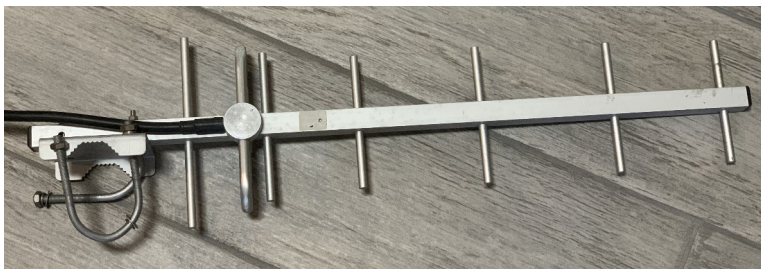
**Editor's Note:** *We have reported on the WS-6990 previously here in our ATV newsletter. We first mentioned it in Dec. 2021, (issue # 94). In issue #96, Mario, KD6ILO, reported he had one and it worked fine for him. In the spring of 2022, I purchased one for evaluation and wrote a complete report on it which we published in May, 2022 (issue # 101). I had encountered some "quirks" in it which I thought I had de-bugged. We then got some "feed-back" about it in issue #102 from John, KOZAK. But then "ops", the box failed on me, and I again wrote about this in June issue #103 and said I was giving up on SatLink as a supplier. Then again in June, 2023, (issue # 134 ), Fran, PAFEX, in Holland wrote to us about his issue with not being able to get the HDMI input to work on his WS-6990.*

*Now today (2/13/24), after receiving Mike's report -- I found our WS-6990. I had given up on it and given it to a fellow Boulder ATV ham. He didn't have any more success with it, so had simply sat it on the back shelf, instead of ash canning it. He returned it to me today and I again tried to make it work. So -- the good news is that Yes, I can confirm Mike's finding that the WS-6990 does work OK with both video and audio, either CVBS or HDMI, on 8 MHz band-width with either 16QAM or 64QAM. The bad news is it doesn't work with 6 MHz BW, nor QPSK suffering from bad freeze-framing.*

So - I rest my case on the SatLink WS-6990 is

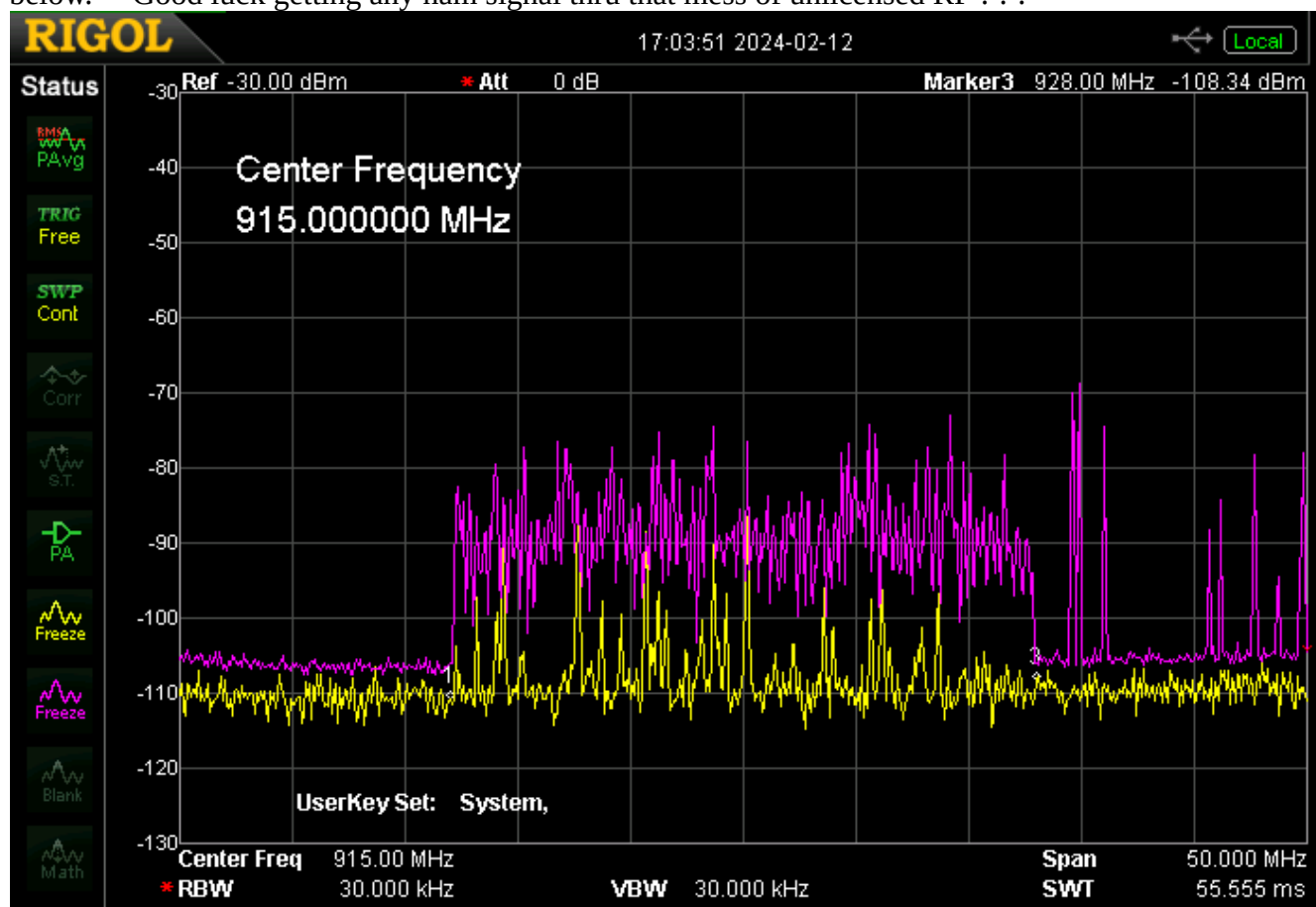
**"DO NOT BUY - a Waste of \$\$\$ for ATV"**

73 de Jim, KH6HTV, editor



## Why Most Hams Ignore the 33 cm (900 MHz) Band

I have gotten from a swap-fest a very nice, well built, Yagi antenna for 900 MHz, of unknown manufacturer. So, I decided to add it to my array of yagis on the back deck ( 70cm, 23cm & 13cm). They all are pointing towards Boulder and the W0BTV repeater. Connecting this new yagi to my spectrum analyzer vividly demonstrates why we hams tend to stay away from the 900 MHz band. See below. Good luck getting any ham signal thru that mess of unlicensed RF !!!



### 13 cm, 900 MHz Spectrum as seen from KH6HTV's QTH.

center frequency = 915 MHz, span = 50 MHz, 10dB/div & 5 MHz/div. 30kHz BW, top ref. line is -30dBm. analyzer noise level = -110dBm. Yellow trace is "live" single sweep. Magenta trace is in Peak Hold, for 1 min. data acquisition time. Markers 1 & 3 at the band edges of 902 & 928 MHz exactly match where the cluster of rf occurs.

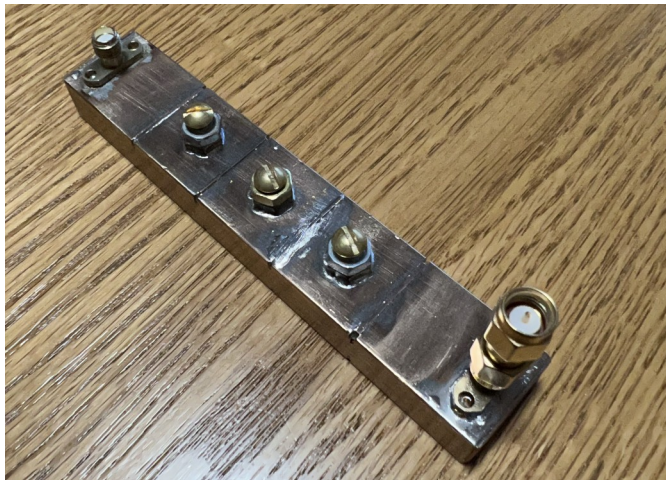
## 3 cm, 10 GHz, DVB-T Transverter -- Progress Report

Mike Henkoski, KM7MH, Athol, Idaho

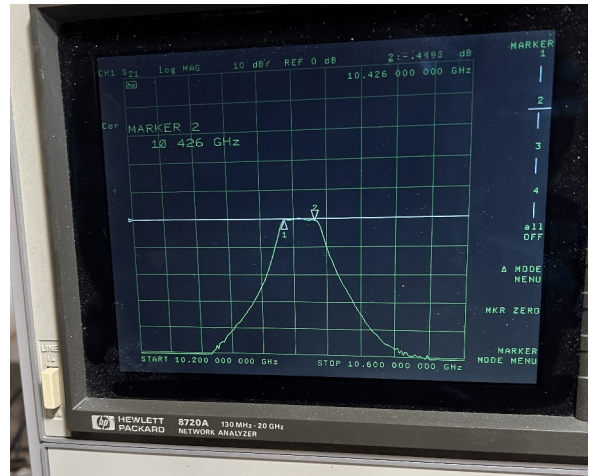
I've been working on a 10.4GHz transverter design for use as a repeater output, where BW is not so much a concern at this time. There is a second LO option for running a HiDes at 1200 MHz (-10 dBm). The ubiquitous Ham Bulls Eye Ku band-down converters work great for receiving into the GT Media V7 Pro SAT receiver at 650 MHz, -100dBm +/- threshold at 6 MHz QPSK. I use a USB to 12V converter cable plugged into the V7 and into a bias tee for Bulls Eye power. +20dBm out of the Down East Microwave 1 watt L3-3PA from the -5dBm transverter into a wave guide iris filter without much at all spectral regrowth. I plan to use an omni-directional, twelve slot waveguide antenna at around 10dB gain. Range should be decent with the Bulls Eye in front of an 18" pizza pan dish.



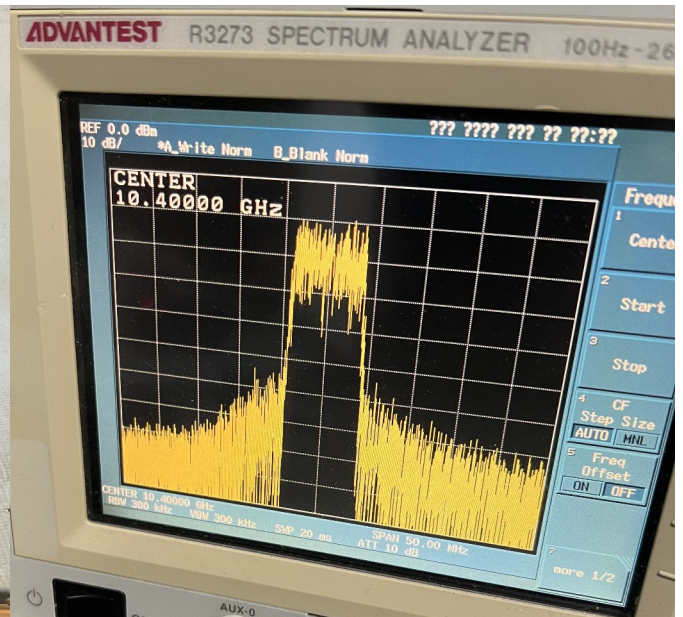
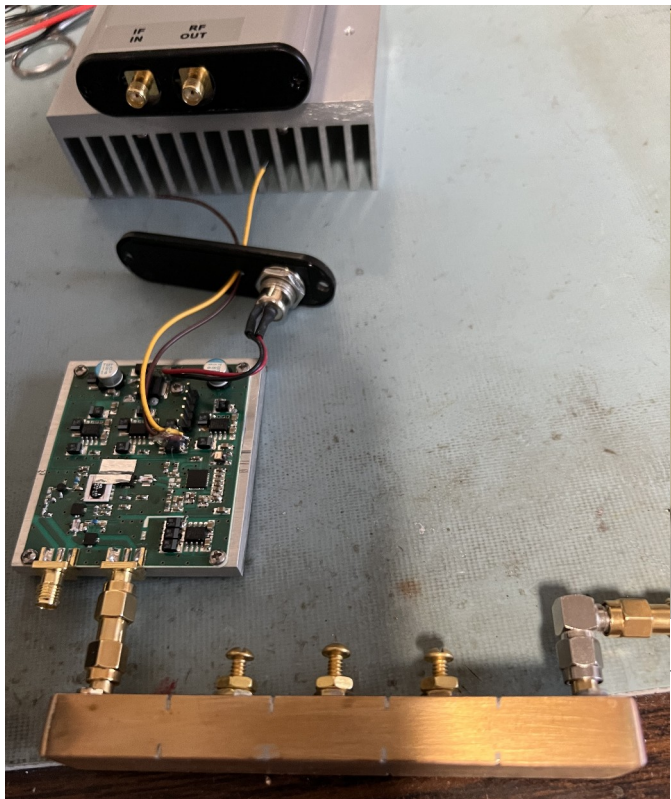




10 GHz Iris Band-Pass Filter



Filter Response



10.4 GHz RF output spectrum of the transverter with the SatLink modulator as the IF input.

**WOBTV Details:** **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm secondary all digital using European Broadcast TV standard, DVB-T 23cm, 1243 MHz/6 MHz BW (primary), plus 70cm (secondary) on 441 MHz with 2 receivers of 6 & 2 MHz BW  
**Outputs:** 70 cm Primary (CCARC co-ordinated), Channel 57 -- 423 MHz/6 MHz BW, DVB-T Also, secondary analog, NTSC, FM-TV output on 5.905 GHz (24/7 microwave beacon).  
**Operational details in AN-51c    Technical details in AN-53c.    Available at:**  
<https://kh6htv.com/application-notes/>

**WOBTV ATV Net:** We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). The net typically runs for 1 to 1 1/2 hours. A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: <https://batc.org.uk/live/> Select *ab0my or n0ye*. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz ( -600 kHz, 100 Hz PL tone required to access).

**Newsletter Details:** This is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 700+. News and articles from other ATV groups are welcomed. Permission is granted to re-distribute it and also to re-print articles, as long as you acknowledge the source. All past issues are archived at: <https://kh6htv.com/newsletter/>

**ATV HAM ADS -- *Free* advertising space is offered here to ATV hams, ham clubs or ARES groups. List here amateur radio & TV gear**  
***For Sale - or - Want to Buy.***



## **NEW PRODUCT ANNOUNCEMENT**

### **23 cm, 2 Watt, Digital ATV Amplifier**

**--- \$325**

**The KH6HTV-VIDEO Model 23-12A, RF Power Amplifier is for use in the amateur radio 23 cm band. It is a Class A-B amplifier designed for linear service. It can produce a 2 Watt, high-definition (1080P), digital TV (DTV) signal. It can also be used to produce an 10 Watt (pep), analog TV or SSB signal, or 15 Watts for FM/CW service. For DTV service with it's low DC current draw of only 1.0 Amp at 13.8 Vdc, it is ideal for in the field battery operations, such as for ARES emergency operations. With it's heat sink and fan it is rated for 100% duty cycle.**

for detailed specs. - go to: <https://kh6htv.com/products/>

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