

Description of TEGAM High Voltage Amplifier 2350 Used in My Research

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My research project is “Electrically Tunable Quantum Dot Intersubband Devices”. Quantum dot intersubband devices, such as quantum dot infrared photodetectors (QDIPs) and quantum dot cascade lasers (QDCLs) have broad applications in many areas, such as medical and biological imaging, environmental and chemical monitoring, and infrared imaging for space and night vision. To fabricate such devices, many processing steps are needed. One of the most important steps is to apply a high voltage to electrically anodize aluminum film and form a highly electrically insulated layer of aluminum oxide. To form the layer of aluminum oxide with a very good quality, a stable high DC voltage is required, because the thickness of the aluminum oxide is strongly depending on the final voltage applied. Thanks to the high voltage amplifier 2350 from TEGAM, Inc, it supplies a very stable amplification with a high gain value of 50. Besides that, the maximum current limit of 2350 can be as high as 40mA, which is also important for our application. The anodization process for aluminum is a process that the conductive aluminum film is being gradually converted to the insulated layer of aluminum oxide. So, a big current limitation is required to keep the process going through. Additionally, the voltage amplifier 2350 also has a slew rate as high as 250V/usec, which is also very crucial for our experiment. A high slew rate means that a higher voltage can be applied as fast as possible when the aluminum oxide is becoming thicker and thicker.

We have been looking for a lot of high voltage power amplifiers in the past and I think that TEGAM 2350 is always a good choice. It has two voltage channels and each channel has a monitor to trace the output voltage. The output voltage can be as high as 400 Vp-p, and the broadband frequency response is also desired in many different applications. Not only was TEGAM 2350 used for the DC amplification in our anodization process, but it could also be used to amplify the AC signal of high frequency. To electrically characterize the response of the sample at high frequency, we always rely on TEGAM 2350 to amplify the small AC signal, and the frequency response up to 2 MHz really makes the instrument unique in the amplification market.