

## SuperLinear® FAQs

### 1. What is meant by the term **SuperLinear® TWTA**?

*“SuperLinear®” is a trade name for a product line of special Traveling Wave Tube Amplifiers created by CPI Satcom Division. This family of amplifiers exhibits superior operating characteristics (including better prime power efficiency) compared to both solid state amplifiers and traditional TWTAs when the amplifiers are **running at linear output power levels**.*

### 2. So what are the superior characteristics that **SuperLinear® TWTA**s possess?

*The main one is efficiency. The 2.25 kW SuperLinear® TWTA achieves 22% efficiency for output power vs. prime power, whereas the traditional 2.25 kW TWTA is around 13% and the typical SSPA is only around 7%. Depending on the local cost of electricity, this can result in savings of up to thousands of dollars per year per amplifier. It can also reduce requirements for expensive UPS systems and air conditioning. Further, if the user wants to run the HPA at a reduced output power level, the prime power requirement is correspondingly lower for the SuperLinear® TWTAs, while SSPAs must consume the same amount of power at all times. We’d also like to note that the lower prime power draw helps to keep your carbon footprint lower.*

*This superior efficiency results in other advantages for the SuperLinear® TWTA. As the units are more efficient, they generate less heat. CPI has been able to take advantage of this fact to design units that are up to 40% smaller and considerably lighter than traditional TWTAs, which are already much lighter than comparable SSPAs. And since heat is the enemy of electronic components, the cooler SuperLinear® TWTAs are also more reliable than other amplifiers.*

### 3. Do **SuperLinear® TWTA**s require linearizers?

*If you wish to run your SuperLinear® amplifier with the least amount of backoff (i.e. the maximum allowable output power) while still maintaining linearity in a multicarrier scenario, then yes, a linearizer is required. SuperLinear® TWTAs exhibit the same linearity as traditional TWTAs. The reason they are called SuperLinear® is because they are the amplifiers you should first consider if your application requires that you always run your HPAs **at traditional linear output power levels**. Thus if you desire an amplifier which achieves -25 dBc intermodulation at 3 dB backoff from peak or rated power, you still need a linearizer.*

### 4. Under what circumstances would I still want a traditional TWTA or KPA?

*There are some applications that require full, saturated CW output power, such as TT&C. Traditional TWTAs and KPAs are optimized for operating at these high power levels, thus in those cases they are still a good choice.*