

Terrestrial Radio Link Solid-State TWT Replacements

SSPAs VS TWTAs

As previously mentioned SSPAs have been replacing vacuum tube technology since the early 1980's. The following information provides several advantages of SSPAs over TWTAs. SSPAs offer the following superior performance characteristics, lower operating and maintenance costs, far greater operating life, better intermodulation performance, consume less power and operate at safe low DC voltage levels.



Operating and Maintenance Costs - When comparing Solid-State versus TWTAs total cost of ownership the following factors should be taken into consideration, initial TWT and associated power supply purchase price and tube replacement cost. Two to Three or more new (**not used**) tubes may be required before ever considering to replace a Solid-State equivalent. TWTAs continually decrease output power as the tube ages requiring readjustment, radio realignment and eventual tube replacement. SSPAs on the other hand, do not typically require readjustment nor do they have any equivalent aging mechanism.



Operating Life - SSPA devices have Mean Time Between Failure (MTBF) rates measured in millions of hours. A typical Shason TWT replacement SSPA has an MTBF of > 20 years or more. This in many cases means Shason's TWT replacement amplifiers will outlast even the radio's life. TWTAs, in contrast, have MTBFs measured in hundreds of thousands of hours. A typical TWTAs has an average MTBF of 6-8 years. TWTAs also have a limited shelf life, while SSPAs do not.



Intermodulation Performance and Lower Power Consumption - TWTAs have inherently higher phase and noise characteristics when compared to a compatible SSPA. These lower noise characteristics allow the SSPA to provide a much cleaner and more stable signal for data and video transmission. SSPAs also provide better and more efficient intermodulation performance by not having to back the power down as much as a typical TWTAs. In other words, a lower output power SSPA can typically replace a higher power TWTAs and provide equivalent or better intermod performance while consuming less power.



DC Voltage Levels - Solid-State GaAs FET devices normally require low operating voltages by design. Low DC voltages are safer to work on and around as compared to the high voltages typically associated with TWTAs. Solid-State DC voltages do not pose any shock hazards. TWTAs amplifiers, in contrast, are high voltage devices by design and tube manufacturers must provide elaborate safety precautions to prevent accidental operator contact with dangerous voltage levels. Even with these precautions contact with high voltage levels can result in death.

