Anritsu Advancing beyond

Application Brief

Gain Measurement of Pulsed TWTA Amplifiers

with ML2439A Power Meter

Introduction

Pulsed traveling wave tube amplifiers (TWTAs) are a cost-effective high RF power source for many applications such as radar, satellite and EMC testing. Pulsed TWTA's incorporate a control grid that can turn on and off the TWTs beam current. The TWT acts as an RF amplifier only when the beam is turned on. Turning the beam off when no RF output is needed results in a significant reduction in power consumption and reduces the amount of heat to be dissipated.

When compared to a continuous wave (CW) rated amplifier with similar power specifications, a low to moderate duty cycle pulsed TWTA typically uses less AC input power, produces less heat, is smaller and lighter, costs less, has lower noise power output during the pulse off time, and allows the use of peripheral components (connectors, cables or waveguides, directional couplers, loads, and so forth) with lower power ratings.

Measuring TWTA Gain

Measuring the gain of pulsed TWT amplifiers requires monitoring the RMS power at its input and pulsed power at its output simultaneously. Anritsu's ML2439A power meter is ideal for this type of application because of its versatile power measurement capability. It has unique ability of measuring and displaying a graph of RMS and pulse power vs. time simultaneously on the same screen.

Below is the equipment setup for a pulsed TWTA gain measurement:

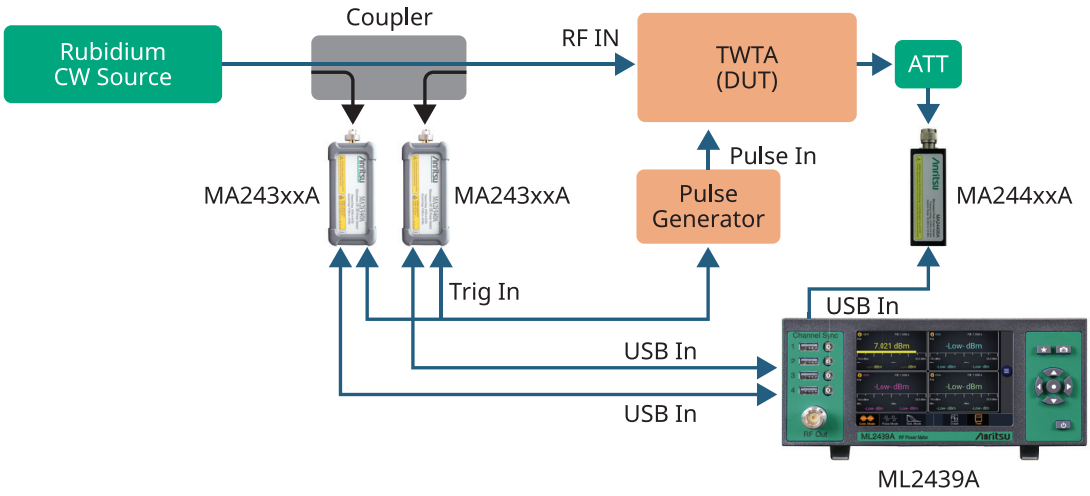

Figure 1. TWTA Gain Measurement with the ML2439A

Anritsu MA243xxA CW power sensors are used to measure input through and reflected power to the TWTA. A pulse generator that drives the TWTA control grid to turn its RF output ON and OFF is also used to trigger MA243xxA CW power sensors. TWTA output is connected to Anritsu MA244xxA peak power sensor RF input after attenuation. All three power sensors are connected to the ML2439A USB input ports and the ML2439A is configured to Pulse Mode and Graph display. The ML2439A trigger mode is set to the channel that measures pulse power. This enables RMS and pulse power traces to be displayed simultaneously on a single graph in real time.

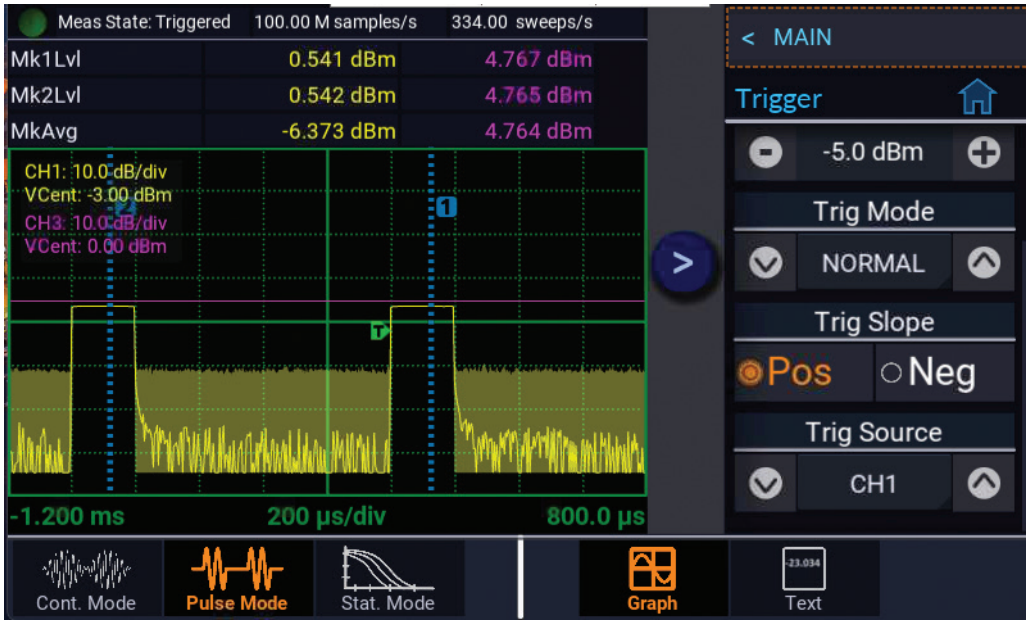

Figure 2. ML2439A Displaying RMS and Pulse Trace Views on a Single Screen

Summary

The ML2439A is the most versatile power meter that enables many types of power measurements on a single unit

- Peak and wideband power measurements with MA244xxA sensors
- RMS power measurement of CW signals with MA243xxA sensors
- RMS power measurement of modulated signals with MA242xxA and MA241xxA sensors

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Specifications are subject to change without notice.

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