APPLICATION NOTE

Implementation of Paramount 3013 in Implanter Tools

Introduction

The Advanced Energy (AE) Paramount 3013 option AE PN: 3156330-636 provides improved Common Exciter (CEX) performance and enhanced reliability over the existing RFG 3kW generator, which has proven particularly useful in implanter tool installations..

This application note explains how to implement the Paramount in existing resonator applications in implanter tools. Many of these resonator installations are particularly susceptible to beam shift issues that cause the generator to see high reflected power. This application note discusses how to select appropriate cable lengths to minimize reflected power and improve overall performance.

Background

A typical implanter installation is shown in Figure 1 below, with either a Paramount or RFG serving as the RF generator. The generator's RF output is connected to the resonator via a coax cable. Because the architecture of the Paramount is different than the RFG, even a well-tuned RFG installation can operate differently when replaced with a Paramount. The ability of the system to tune well is highly dependent on the coax cable length. The Paramount is controlled via CEX and the 25-pin analog user port.

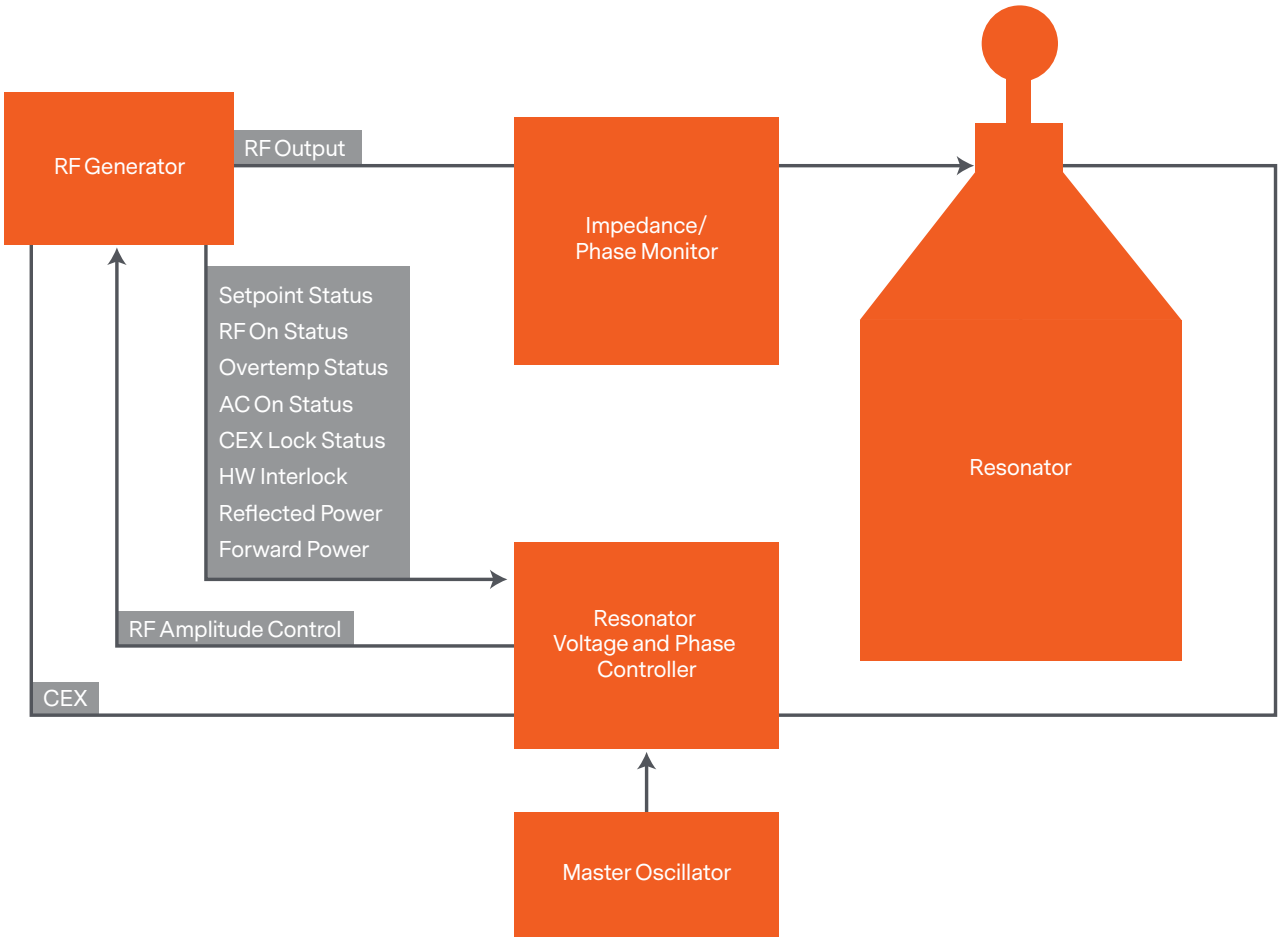

Figure 1: Typical Implanter System Schematic

Paramount Installation

While the Paramount is a functionally compatible replacement for the RFG, there are two key differences. The Paramount is 1.5” wider and 2.4” longer than the RFG and the water fittings require adapters (which are included in the retrofit kit). If the RFG is installed in a rack, the Paramount’s slightly larger footprint should not be an issue (both units fit in 1/2 rack width). However, if the RFG is mounted in another way the Paramount’s dimensions needs to be taken into consideration. The 25-pin user port operates the same on both units, making control of the unit simple. See rear panel drawings of each unit below in Figure 2.

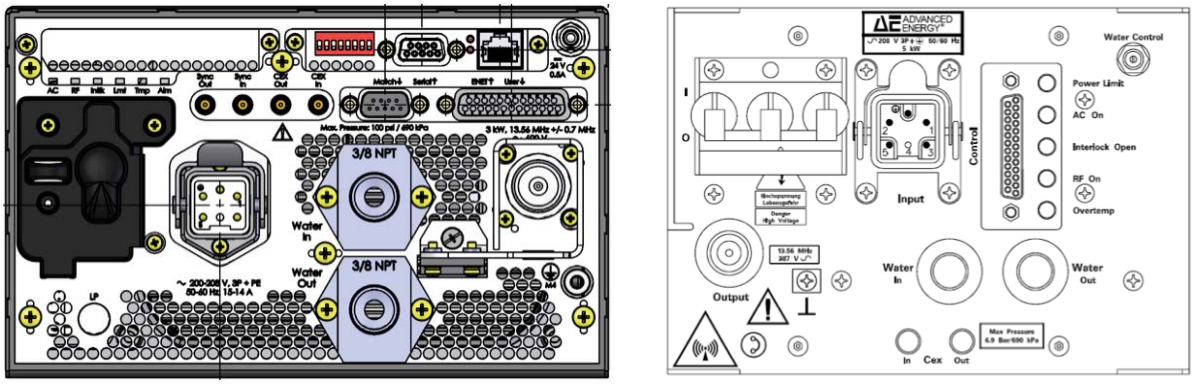

Figure 2: Rear Panel Drawings of Paramount (left) and RFG (right)

Selecting proper coaxial cable length from the RF generator to the resonator is key in achieving optimal process performance with minimal reflected power. Older resonator tools can be difficult to fine tune and may require the use of the iterative process below to determine the precise cable length required for that specific application.

Step 1: Before installing the Paramount unit, record a baseline on the existing system using the template provided in Table 1 to record reflected power at varying setpoints. If the existing system exhibits high levels of reflected power (above 10W), the resonator may need to be scheduled for repair.

	Setpoint	Within Setpoint	Reflected Power
SETTING 1	10kV	Yes / No	
SETTING 2	20kV	Yes / No	
SETTING 3	30kV	Yes / No	
SETTING 4	40kV	Yes / No	
SETTING 5	50kV	Yes / No	
SETTING 6	60kV	Yes / No	
SETTING 7	70kV	Yes / No	
SETTING 8	80kV	Yes / No	

Table 1: Template for Data Collection

Step 2: Inspect existing cable for wear. Coax cable made with PTFE insulator can show wear as the cable is heated and cooled during normal use. If the insulator is dried out or cracked, the whole cable should be replaced.

Step 3: Install the replacement Paramount and cable (if required). It is recommended to start testing with 26' of coax cable between the generator and the resonator. Turn on the generator and cycle through the settings given in Table 1, recording the reflected power seen at the generator for each setting. If the reflected power stays under 10W over the entire range of setpoints, this length is optimized for this application.

Step 4: If the reflected power rises above a threshold of 20W at any of the setpoints, the cable length should be adjusted. Repeat Step 3 with varied cable lengths from 12' to 26' (or lengths suitable for this installation) in 2' or 4' increments. These lengths can be achieved by using AE cable length kits outlined in Table 2 below.

AE PN	Kit Contents	
31020010-00	1x 33430219-00	CABLE, 12', RG393 HN-M TO HN-M
	2x 14713389	ADAPTER HN-F TO HN-F
31020011-00	1x 33430221-00	CABLE, 26', RG393 HN-M TO HN-M
	2x 14713389	ADAPTER HN-F TO HN-F
31020009-00	1x 33430214-00	CABLE, 2', RG393 HN-M TO HN-M
	1x 33430215-00	CABLE, 4', RG393 HN-M TO HN-M
	1x 33420216-00	CABLE, 8', RF393 HN-M TO HN-M
	4x 14713389	ADPAPTER HN-F TO HN-F

Table 2: Available AE Cable Length Kits

For questions about this Application Note, please contact AE Technical Support at 1.800.446.9167 (option 2).

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

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