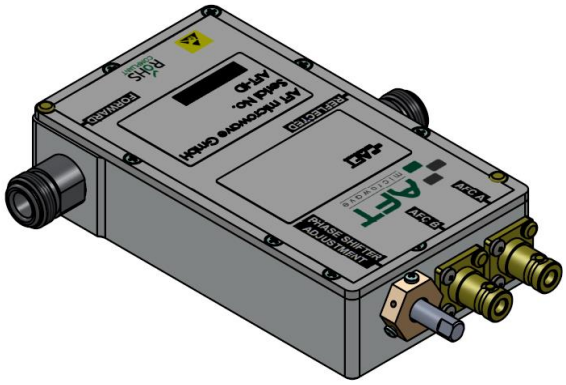

- Automatic frequency control module for Magnetron or Klystron-driven LINACs
- Forms two output signals AFCA and AFCB from forward and reflected RF input signal
- Error signal AFC B – AFC A acts in proportion to the phase difference of the RF input signals
- Mechnical phase shifter to adjust the phase relationship between the RF signals
- Compact design
- RoHS compliant

Product Characteristics

Characteristics

RF Signals	
■ Center Frequency f_0	2998 MHz
■ Bandwidth Δf	± 10 MHz
■ Forward Peak Power (FWD and REF)	+38 dBm max.
■ Forward Average Power (FWD and REF)	+20 dBm max.
■ Pulse Width	4 to 5 µs typical
■ Suppression of Second Harmonic	> 30 dB
Output signals	
■ AFC A and AFC B	+3.75 V ± 0.75 V *
■ Matching of AFC A and AFC B within	10% max.
■ Error Voltage AFC B – AFC A	6.5 V ± 1 V ** (peak-to-peak), see Fig. 2
Phase Control	
■ Phase Shifting Range	400 deg min.
■ Phase Adjustment	manual tuning knob, incl. locking screw
■ Number of Turns	78 ± 10%
Mechanical Data	
■ Dimensions	130 mm x 73 mm x 31 mm
■ Weight	750 g ± 10%
■ Mounting holes/threads	4x M4, see footprint drawing
■ Footprint drawing no.	**FP-10074165**
Ambient Temperature Range	
■ Operating	+15°C to +50°C
■ Storage	-40°C to +80°C

Interfaces

Signals	
■ RF Forward Power (FWD)	N female connector, 50 Ω
■ RF Reverse Power (REF)	N female connector, 50 Ω
■ AFC A	BNC female connector
■ AFC B	BNC female connector
Conformity	RoHS

Notes:

* for P_{FWD}= 4W and P_{REF}= 0W or P_{FWD}= 0W and P_{REF}= 4W,
$\Delta f = \pm 5$ MHz, both AFC A and AFC B terminated with 2 kΩ loads each

** for P_{FWD}= P_{REF} = 4W, $\Delta f = \pm 5$ MHz, both AFC A and AFC B terminated with 2 kΩ loads each

The AFC (Automatic Frequency Control) circuit module is a key component within a feedback control loop of linear accelerator (LINAC) systems. It provides a control signal for the frequency tuning of a magnetron at the resonant frequency of the accelerator cavity. A compact microwave integrated circuit processes the RF forward (FWD) and reflected (REF) signal picked up between magnetron and accelerator cavity. As illustrated in **Fig. 1**, the module generates two output signals AFC A and AFC B. The differential error signal AFC B – AFC A acts in proportion to the phase difference of the two RF input signals. It forms a reliable control variable, which is used for a frequency tuning of the magnetron at the resonant frequency of the accelerator. The AFC provides a mechanically tunable RF phase shifter. The purpose of this phase shifter is to set the phase relationship between the FWD and REFL signal such that the AFC allows for equal frequency correction on both side of the resonance frequency.

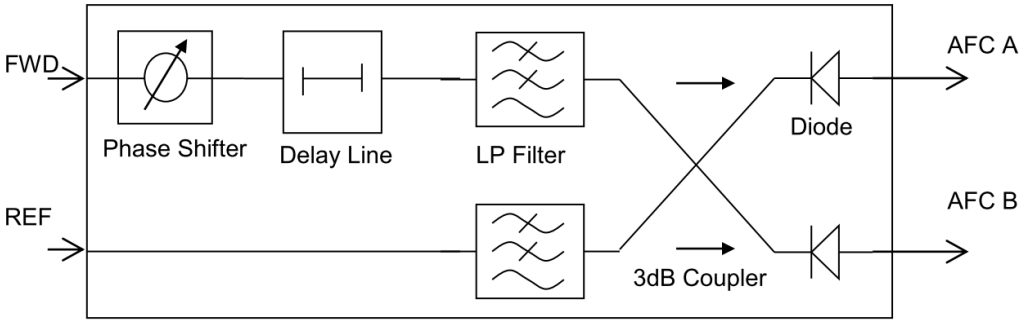

Fig. 1: Block diagram of AFC circuit.

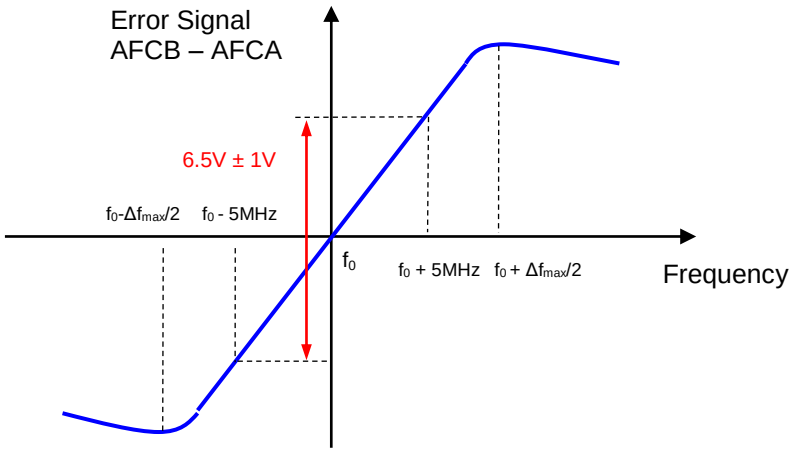

Fig. 2: Typical AFC error curve

Handling & Operating Instructions

(1) This device contains ESD sensitive RF detector diodes. Handle with care to avoid static discharge through the diode.

(2) Do not apply RF input power without properly terminating AFC A and AFC B.

(3) Do not exceed the max. allowed RF input power.

Rev.	Remark	Date	Name
00	Initial	09.03.2016	C. Weil