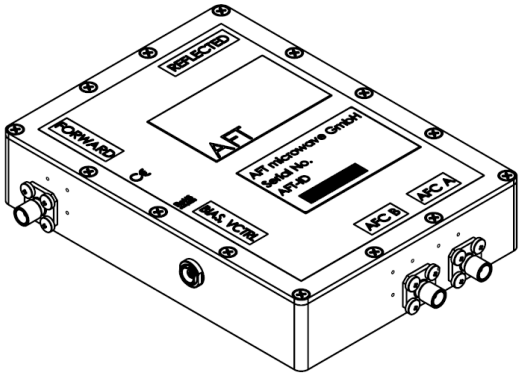


- Automatic frequency control module for Magnetron or Klystron-driven LINACs
- Forms two output signals AFCA and AFCB from forward and reflected RF signal
- Error signal AFC B – AFC A acts in proportion to the phase difference of the RF input signals
- Electronic phase shifter to adjust the phase relationship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

Product Characteristics

Characteristics

RF Signals	
■ Center Frequency f_0	2856 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 Control Voltage Vctrl	0 V to 13 V (<1 mA), 15 V max.
■ Phase-Voltage Sensitivity	approx. +35 deg/V, see Fig. 3 for details
Bias Voltage	+24 VDC (50..60 mA typical)
Mechanical Data	
■ Dimensions	131 mm x 96 mm x 27 mm
■ Weight	370 g ± 10%
■ Mounting holes/threads	4x M4, see footprint drawing
Ambient Temperature Range	
■ Operating	+15°C to +50°C
■ Storage	-40°C to +80°C

Interfaces

Signals	
■ RF Forward Power (FWD)	SMA female connector, 50 Ω
■ RF Reverse Power (REF)	SMA female connector, 50 Ω
■ AFC A	SMA female connector
■ AFC B	SMA female connector
Bias and Control Voltage	
■ Connector type	ODU MINI-SNAP Series L 6.5mm, 3-pin, female, see **Fig. 4** for pin assignment
■ Accessories	1x mating connector (male), for cable assembly instructions see **P000191886**
Footprint Drawing No.	**FP-100059**

Conformity	CE, RoHS
Former Part No.	1-0285623100-001

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 an electronically 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.

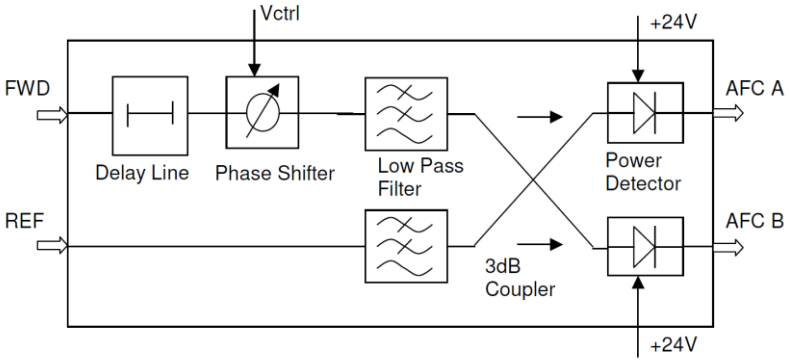


Fig. 1: Block diagram of the AFC circuit

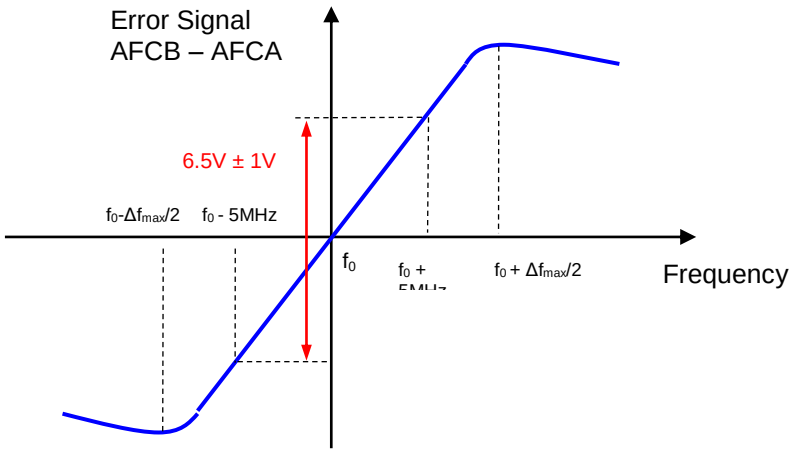


Fig. 2: Typical AFC error curve

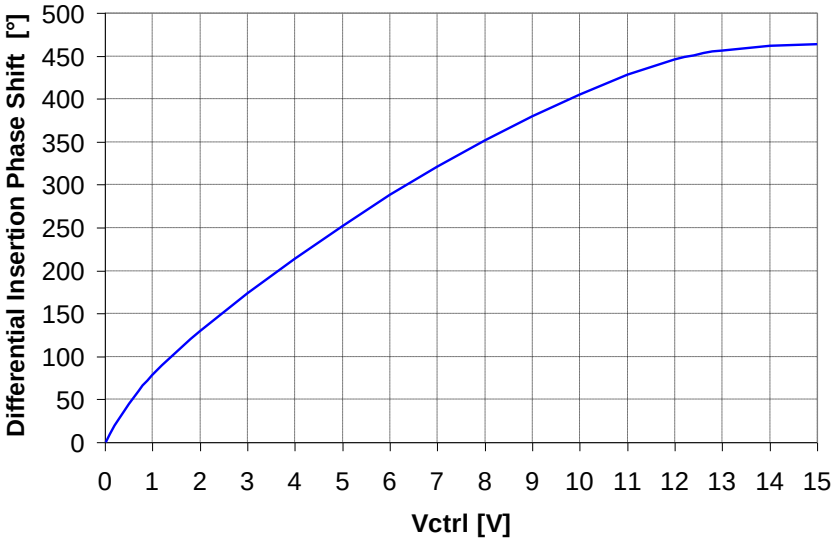
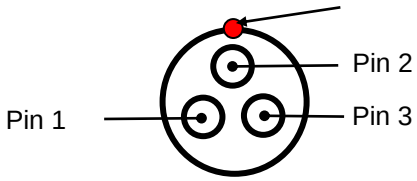


Fig. 3: Typical phase shift vs. control voltage Vctrl at room temperature



Pin	Description	Voltage Range
1	Bias	+24 VDC
2	GND	----
3	Vctrl	0 V to +13 V

Fig. 4: Pin assigment of connector for bias and control voltage.
The figure shows a top view of the connector on the housing side.

Handling & Operating Instructions

(1) This device contains ESD sensitive RF detector diodes and ICs. The ESD rating is class 1B (100 V max.). Provisions for ESD protection must be made, accordingly. Handle with care to avoid static discharge to the pins Vctrl and Vias in particular.

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

(3) Do not exceed the rated bias supply voltages.

(4) Faulty wiring of the connecting cable could cause damage to the device.

Rev.	Remark	Date	Name
00	Initial	12.10.2015	C. Weil
	Handling instructions, ESD class rating	18.11.2016	C. Weil