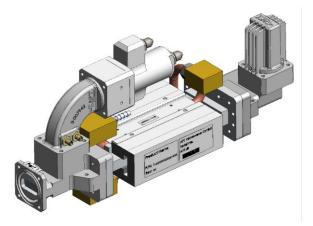
Data Sheet I4-WR112-02-9300-Xp-Xw 4-Port Isolator 9300MHz WR112



Mave Wave

AFT

- 4-port ferrite phase shifter circulator with water load and dry load
- Low insertion loss
- High isolation
- Excellent power capability covering operation into short circuit
- Robust and reliable design
- RoHS compliant
- Designed for X-band LINACs

Parameter	Value				
Footprint Drawing No.	3-124309-FP				
Product Type	Isolator				
Configuration	4-port ferrite phase shifter circulator with a full-power water-				
	cooled RF water load at port 3 and a dry load at port 4.				
Orientation of Rotation	see footprint drawing for port labeling				
Center Frequency f ₀	9300 MHz				
Bandwidth BW	± 10 MHz				
Forward Power	Options:	Xp = 1	Xp = 2		
Forward Peak Power		2 MW	2.5 MW		
Forward Average Power		2 kW	2.5 kW		
Reverse Power	100% of forward	100% of forward power, at any phase			
Insertion Loss	≤ 0.2 dB				
Return Loss	\geq 30 dB, both ports				
Isolation	≥ 30 dB				
RF Waveguide	WR112				
RF Flanges / Connectors	Input Flange :	UG-137 B/U (AI), choke flange			
	Output Flange :	UG-137 B/U (Al), choke flange			
RF Coupling Probes	Coupler type :	non-directional E-probe			
	Connector type :	SMA female, 50 Ω			
	Coupling :	60 dB ± 2 dB			
	Location :	at port 3 (high-power water load)			
Cooling System	demineralized water				
Water Tube Materials	Copper or Stainless steel only				
Water Connectors	Circulator :	2x ¼" hose barb fitt	2x %'' hose barb fitting, stainless steel		
	Water Load :	2x ¼" hose barb fitt	$2x \varkappa''$ hose barb fitting, stainless steel		



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Water Inlet Temperature (nominal)	selectable between 20°C and 40°C			
Water Inlet Temperature Range	± 5°C			
Water Flow Rate	\geq 500 l/h, for circulator and water load			
Water Pressure Drop	< 2 bar @ 500 l/h, valid for each part seperately			
Water Inlet Pressure	\leq 10 bar	\leq 10 bar		
Water Leak Test Pressure	15 bar for 10min			
Waveguide Dielectric Filling Gas	SF6			
Gas Pressure	nominal:	3 bar absolute		
	maximum	4 bar absolute		
Gas Leak Rate (Helium)	< 5·10 ⁻⁴ mbar l/s,			
	device pressurized with He gas at 2.5 bar gauge			
Ambient Temperature	operational :	10°C to 40°C		
	storage :	0°C to 60°C		
Relative Humidity	< 80%, non-condensing			
Magnetic Stray Field	< 5 G in 1m distance			
	No magnetic material is allowed within a distance of 10cm			
	from the envelope of the device. The device must not be			
	exposed to magnetic stray radiation of >5G.			
Body Material	Aluminium, alodined			
Surface Finish	none			
Dimensions	see footprint drawing			
Weight	5.5 kg ± 10%			
Mounting Orientation	any			

Ordering Code

14-WR112	2-02-9300 - Xp - Xw		
Variable	Description	Value Options	
Хр	Forward Power Option	1 : 2 MW / 2 kW	2 : 2.5 MW / 2.5 kW
Xw	Water Inlet Temp. [°C]	2040	

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Notes:

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- 1 <u>Characteristic Power Capability</u>: The circulator is designed to operate above ferromagnetic resonance to offer lowest loss and highest peak power capability. The device is designed to handle full forward power into a 100% reflective short-circuit at port 2, covering all phase angles, without breakdown. The isolated port 3 of the circulator must be terminated with a reliable dummy load. The same applies to port 4, in case of a 4-port device. The return loss of the dummy loads is required to maintain a match of > 28 dB over the full power range. Under these conditions the peak power capability of the device can be expressed by a "characteristic" power of about Pc = 4x forward peak power.
- 2 <u>Electrical Parameters</u>: The specified values for insertion loss, return loss and isolation are valid for the circulator terminated with well-matched loads on all ports. The return loss of the circulator terminated with a short circuit at port 2 and a dummy load at port 3 (and port 4) may differ from these values, depending on the complex reflection coefficient (magnitude and phase) of these terminations.
- 3 <u>Arc Detector Viewport</u>: The device is equipped with one or more arc detector viewport connector(s) that allow(s) the connection of an AFT arc detector device via a low-loss fiber optical cable.

The device itself is not protected against arcing that can occur as a consequence moisture or contamination inside the waveguide or under abnormal operating conditions. However, the use of an arc detector can reduce the risk of permanent damage by arcing significantly. The use of at least one arc viewport in connection with a proper arc detector system is recommended for a safe operation of the present device.

AFT's high-sensitivity arc detector systems detect light and provide an interlock output signal within a very short response time of a few microseconds. The interlock signal must be hard wired to the RF source in such a way that the RF source can be shut down within about 10μ s.

- 4 <u>Water</u> quality, temperature, flow, and input pressure need to be controlled carefully according to the specified values. Air bubbles in the cooling channel have to be avoided. In case the separate cooling channels of circulator and load are connected in series, water inlet must be connected to the circulator in order to place it first in the loop. For reason of protection, the device requires sensorics with RF interlocks for specified water temperature, water flow, and water inlet pressure. The corresponding equipment is to be provided by the customer.
- 5 <u>Low-Power Acceptance Tests</u>: The following tests will be performed at the AFT factory before shipment, if applicable:

(1) small-signal network analyzer measurements of insertion loss, isolation, and return loss vs. frequency at room temperature and at the nominal water inlet temperature, for all ports and signal paths.

- (2) Water leak test under static pressure.
- (3) Helium gas leak rate test.
- (4) Visual inspection.
- 6 <u>Documentation</u>: An owner's manual is supplied for providing information on the installation, operation and maintenance of the device. The documentation will also include the specification sheet and the footprint drawing.

The test results of each S/N are documented in an inspection certificate and an RF test report with proper viewgraphs of all S parameters vs. frequency.

Rev.	Remark	Date	Name
00	Initial	28.02.2022	C. Weil