

## DC211: Directional Coupler for WR975 Waveguide

### General Description

DC211 (Fig. 1) is a directional coupler intended for sampling of the powers of the incident or reflected waves in high-power 900 MHz industrial applications using WR975 (R9) rectangular waveguide.

The coupling mechanism involves two probes (antennas) inserted into the waveguide, outputs of which are appropriately combined and conducted to the output connector.

The output connector can be either Nf (DC211N) or SMAf (DC211S).

Two coupling factor options are available: -60 dB for maximal waveguide working power 10 kW, and -70 dB for maximal working power 100 kW.

The DC211 coupler module is fastened to a parent waveguide by means of eight M3 or similar-diameter screws after machining of appropriate holes in the waveguide wall (see the waveguide machining template shown in Fig. 5).

Alternatively, a calibrated assembly consisting of a DC211 fixed to a precisely machined parent waveguide PWGD975 with the standard length 300 mm can be provided as shown in Fig. 2.

Simply reversing the coupler causes it to sample the wave propagating in the opposite direction.

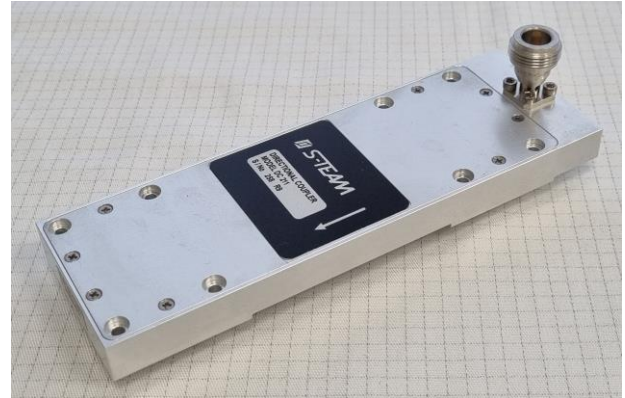


Fig. 1 Directional coupler DC211N.

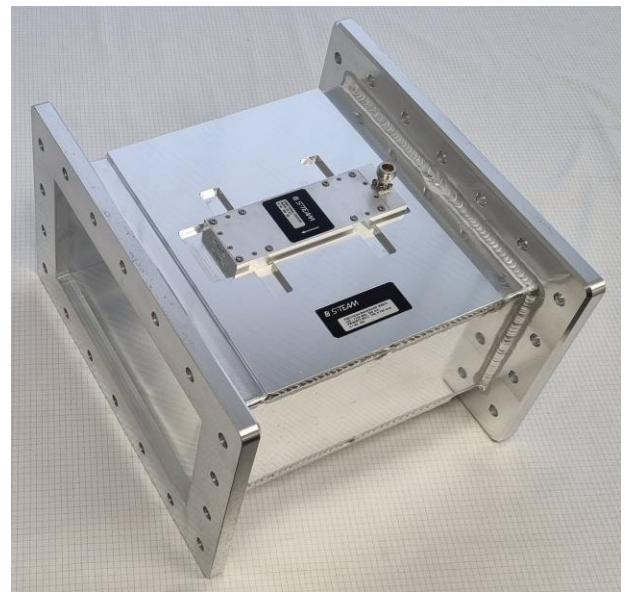


Fig. 2 DC211N installed on a standard-length waveguide.

## Specifications

Waveguide of destination	WR975 (R9)
Waveguide wall thickness	4 mm, optionally 0.125 inch
Frequency range	895 – 925 MHz
Coupling factor/Max working power	-60 dB / 10 kW -70 dB / 100 kW
Coupling factor uncertainty limits (3- $\sigma$ deviation)	$\pm 1$ dB
Directivity	25 dB min
Coupled port impedance	50 $\Omega$
Coupled port connector	Nf (DC211N) or SMAf (DC211S)
Dimensions (L x W x H)	154.5 mm x 50.5 mm x 39.3 mm (Nf) or 28.1 mm (SMAf)
Mass	205 g (DC211N), 195 g (DC211S)
Waveguide surface flatness required at DC interface	0.04 mm
Surface finish	E-CLPS 4600
Operating temperature range	-10 °C to +65 °C
Storage temperature range	-20 °C to +80 °C

## Typical Directivity

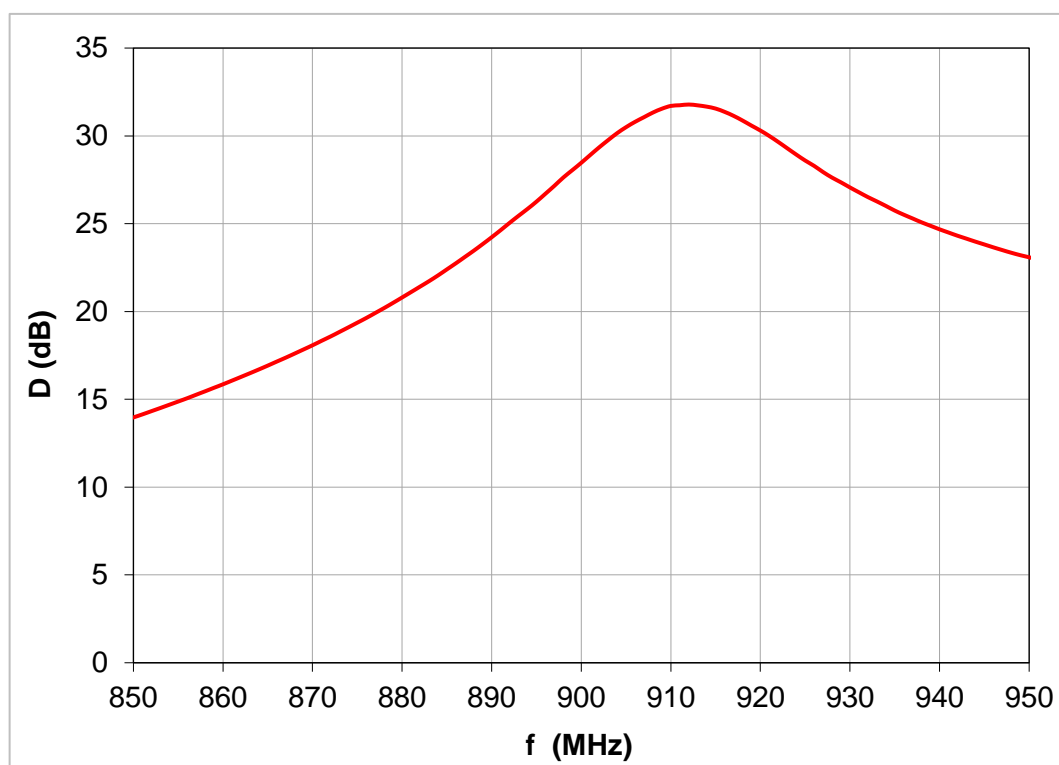


Fig. 3. Typical DC211 directivity.

## Dimensional Drawing

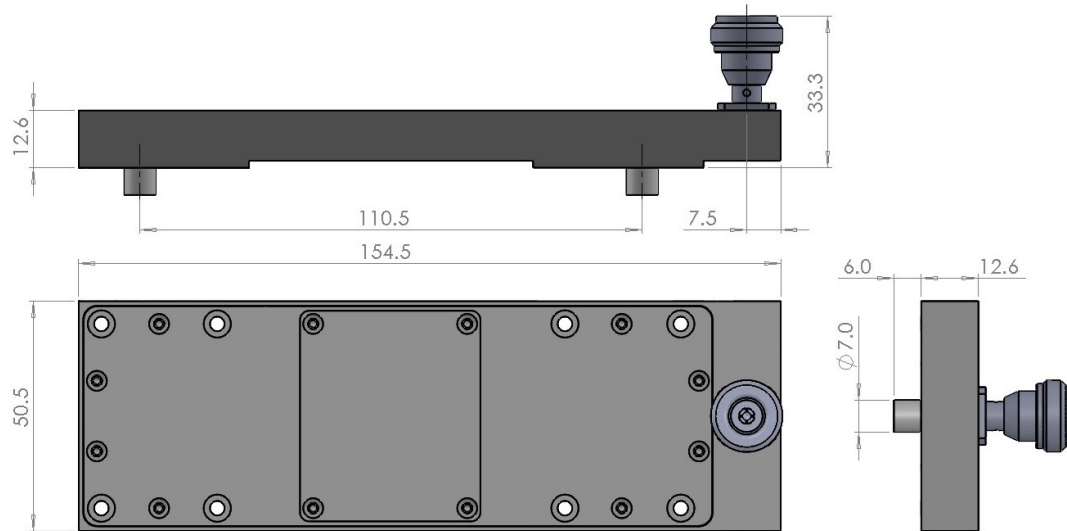


Fig. 4. Basic DC211N dimensions (the case of Nf connector). All dimensions are in millimeters. Compared to Nf, the SMAf connector in DC211S is shorter by 11.2 mm.

## Waveguide Machining Template

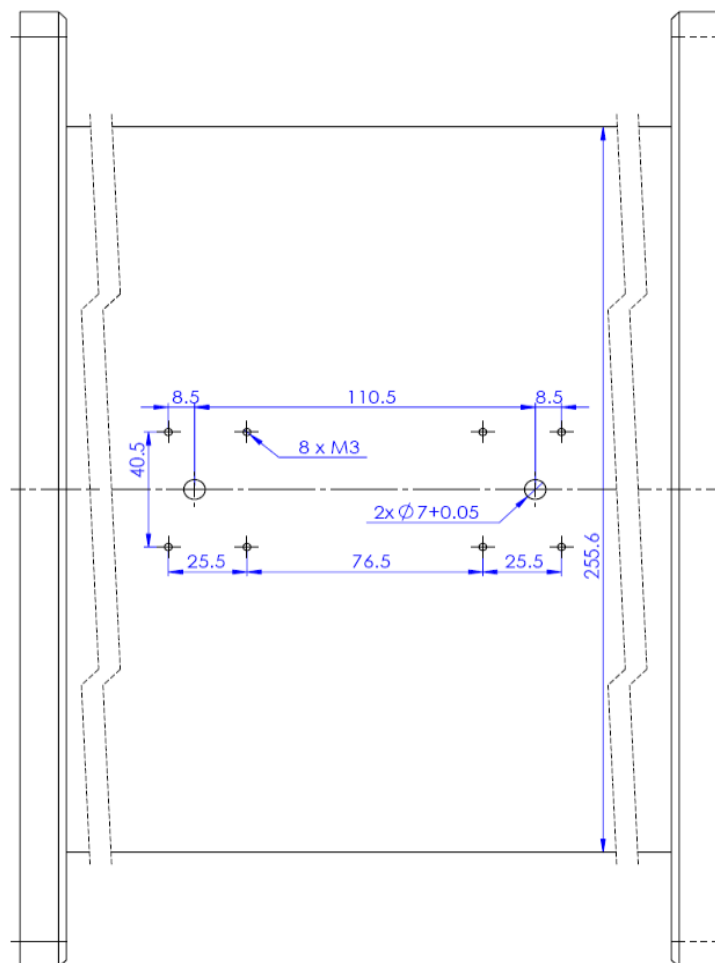


Fig. 5. Waveguide machining template. All dimensions are in millimeters. The pattern is centered about the waveguide axis. Unless the option 0.125" is demanded, the waveguide wall thickness must be 4 mm. Suggested screws: M3 × 13 or M3 × 12 (stainless or galvanized steel).

### Important Note

Complying with the specified waveguide wall thickness and flatness of its surface interfacing with the DC211 is essential for the specified coupling factor. The slope of the coupling factor as a function of the wall thickness is about -6 dB/mm (increasing the wall thickness decreases the coupled power).

If the wall thickness differs from the specified figure but is known, a user-defined correction based on the above slope can be applied. Nevertheless, the wall thickness should not deviate from the specification by more than  $\pm 0.3$  mm, otherwise the DC211 directivity will deteriorate.

To avoid problems with manufacturing precision waveguide components, a calibrated assembly consisting of a DC211 module fixed to a precision parent waveguide can be ordered. The standard waveguide length is 300 mm.