

## DC114, DC123, DC132: Loop Directional Couplers for 2.45 GHz Waveguides

### General Description

DC114, DC123, and DC132 are small-housing loop-type directional couplers intended for sampling the powers of the incident or reflected waves in high-power 2.45 GHz industrial applications using the rectangular waveguides WR340, WR284, WR430, respectively.

Standard coupling factor is -60 dB, allowing maximal waveguide working power 30 kW. Optional coupling factors are -50 dB (3 kW) and -70 dB (50 kW).

The output connector can be either Nf or SMAf.

The coupler module is fastened to a parent waveguide with a set of M3 or similar-diameter screws after machining of appropriate openings in the waveguide wall according to the waveguide machining template. The template is the same for all coupler models. Alternatively, a calibrated assembly consisting of the coupler module fixed to a precisely machined parent waveguide with standard length of 174 mm can be provided.

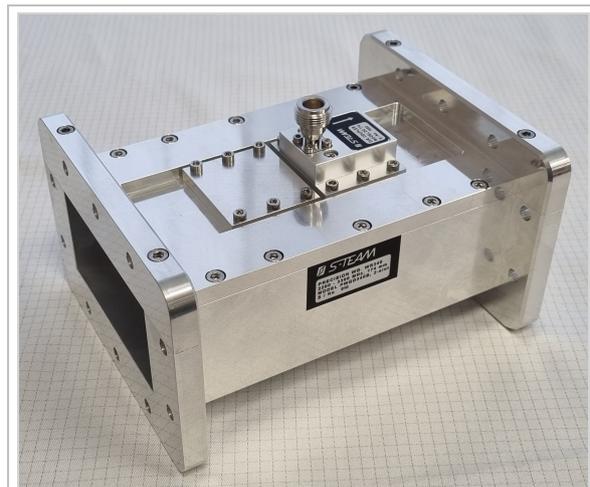
Reversing the coupler causes it to sample the wave propagating in the opposite direction.

The calibrated assembly is shown in [Fig. 2](#) above.

The waveguide machining template is shown in [Fig. 5](#) on page 4.



**Fig. 1.** Directional coupler DC114N.



**Fig. 2.** DC114N installed on a standard-length waveguide.

## Specifications

Waveguide of destination	DC114: WR340 (R26) DC123: WR284 (R32) DC132: WR430 (R22)
Waveguide wall thickness	2 mm ± 0.1 mm
Frequency range	2425 – 2475 MHz
Coupling factor / Max working power	-50 dB / 3 kW -60 dB / 30 kW (default) -70 dB / 50 kW
Coupling factor uncertainty limits (3-σ deviation)	±1 dB
Directivity	25 dB min
Coupled port impedance	50 Ω
Coupled port connectors	DC1xxN: N-female (Nf) DC1xxS: SMA-female (SMAf)
Dimensions (L × W × H)	DC1xxN: 40 × 46 × 37.1 mm DC1xxS: 40 × 46 × 25.9 mm
Mass	75 g (DC1xxN), 65 g (DC1xxS)
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

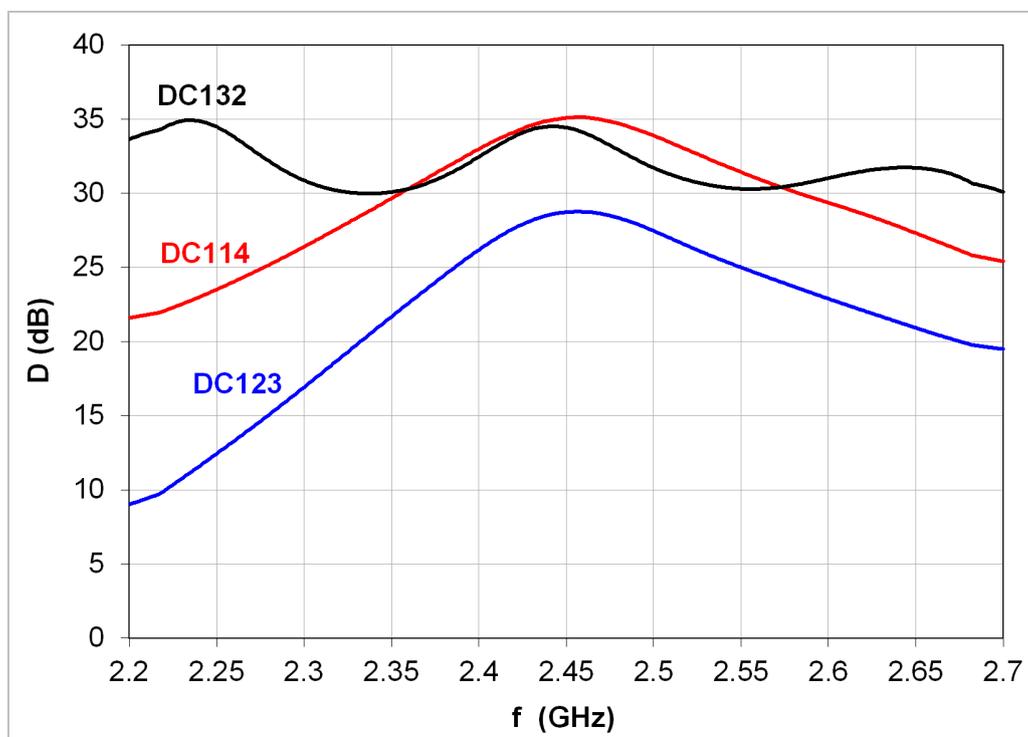
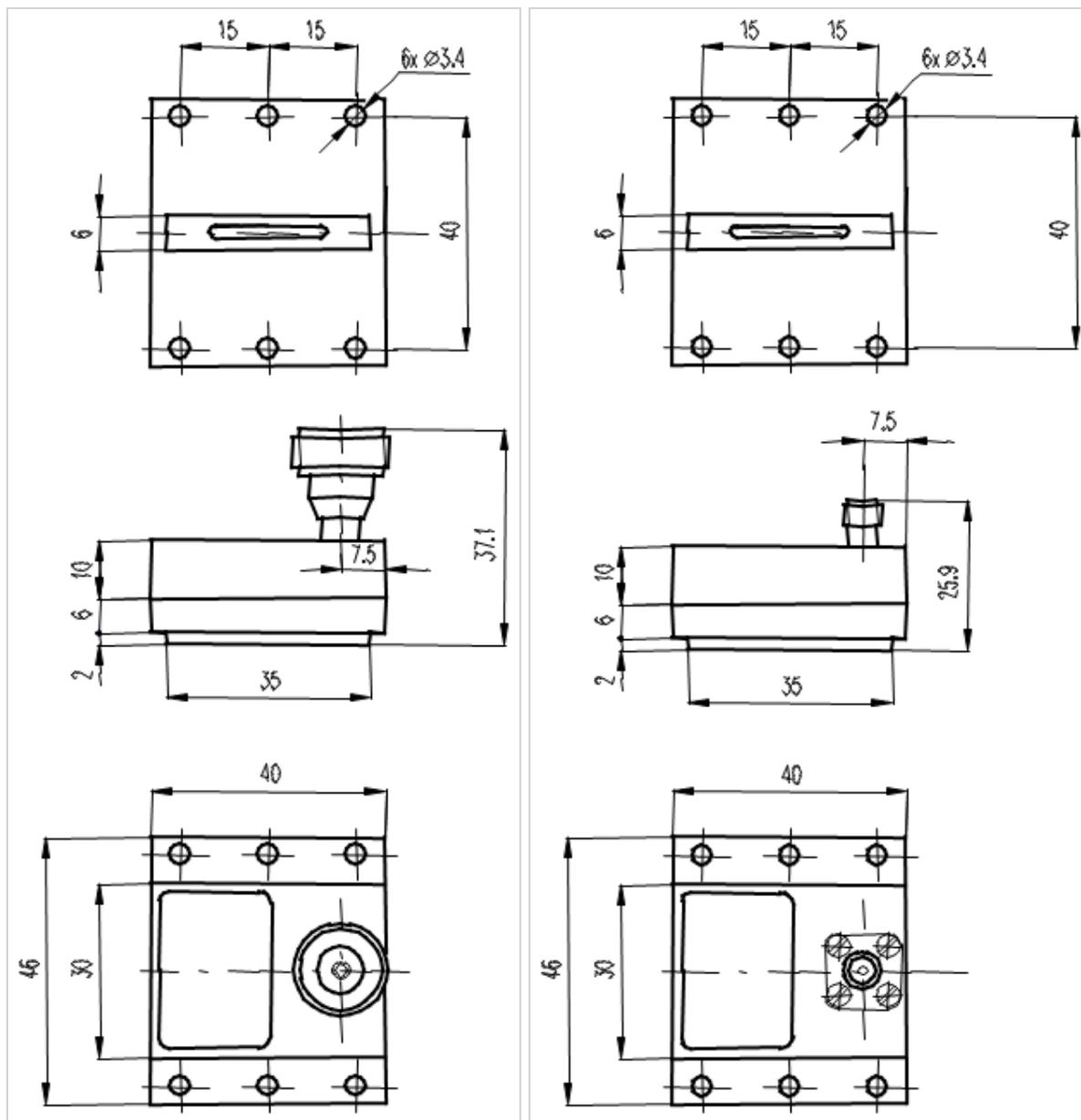


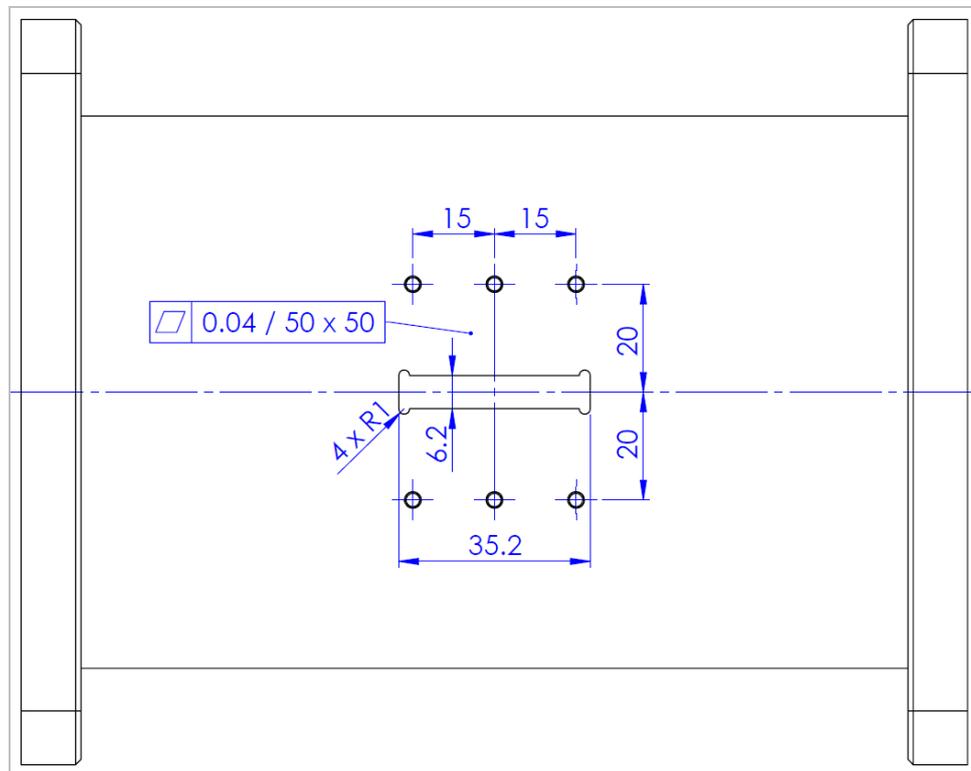
Fig. 3. Typical directivity of the couplers DC114 (red), DC123 (blue), and DC132 (black).

Dimensional Drawings



**Fig. 4.** Basic DC114, DC123, and DC132 dimensions in millimeters. Left: variant with Nf connector, right: variant with SMAf connector.

## Waveguide Machining Template



**Fig. 5.** Waveguide machining template. All dimensions are in millimeters. The pattern is centered about the waveguide axis. The waveguide wall thickness must be  $2 \text{ mm} \pm 0.1 \text{ mm}$ . The pattern is valid for all coupler models.

### Important Note

Complying with the specified waveguide wall thickness and flatness of its surface interfacing with the coupler module is essential for the specified coupling factor. The slope of the coupling factor as a function of the wall thickness is about  $-6 \text{ dB/mm}$  (i.e., increasing the wall thickness decreases the coupled power).

If the wall thickness differs from the specified figure but is known, one can apply a user-defined correction based on the above slope. Nevertheless, the wall thickness should not deviate from the specification by more than  $\pm 0.3 \text{ mm}$ , otherwise the coupler module's directivity will deteriorate.

To avoid problems with manufacturing precision waveguide components, one can order a calibrated assembly consisting of the coupler module fixed to a precision parent waveguide. The standard waveguide length is 174 mm.