

## BC111: Bidirectional Coupler for WR340 Waveguide

### General Description

BC111 is a dual directional (bidirectional) coupler intended for simultaneous sampling of the powers of both incident and reflected waves in high-power 2.45 GHz industrial applications using a WR340 (R26) rectangular waveguide.

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

The coupler integrates two attenuators to isolate the internal coupling structure from the coupled port loads, and to improve the match of the coupled ports.

Standard coupling factor is -60 dB, allowing maximal waveguide working power 10 kW.

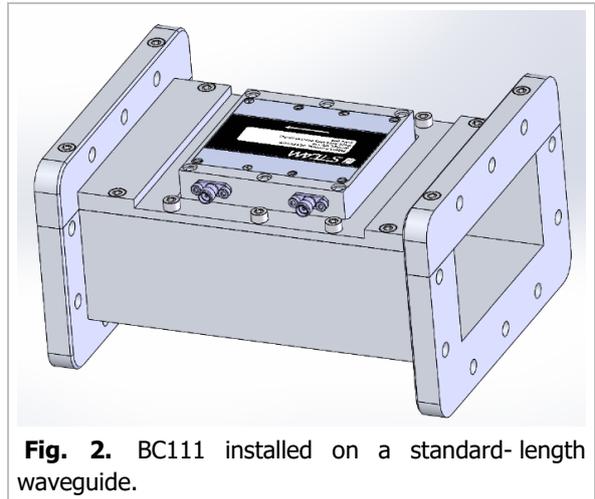
The coupler module is fastened to a parent waveguide with a set of M3 or similar-diameter screws after machining of appropriate openings in the waveguide wall according to the waveguide machining template. Alternatively, a calibrated assembly consisting of the coupler module fixed to a precisely machined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

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

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



**Fig. 1.** Bidirectional coupler BC111.

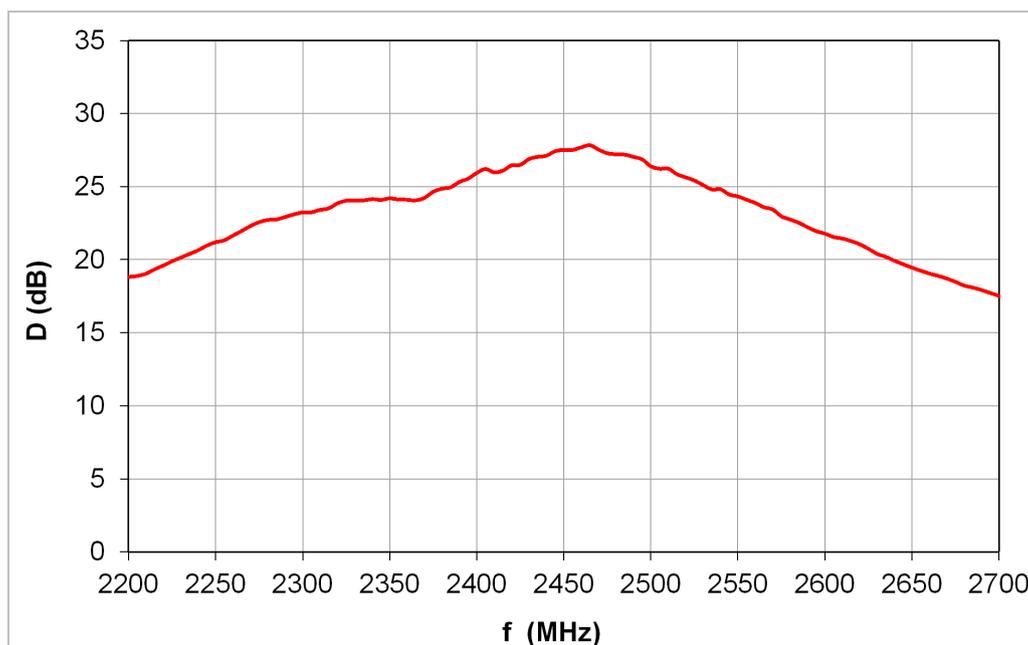


**Fig. 2.** BC111 installed on a standard-length waveguide.

## Specifications

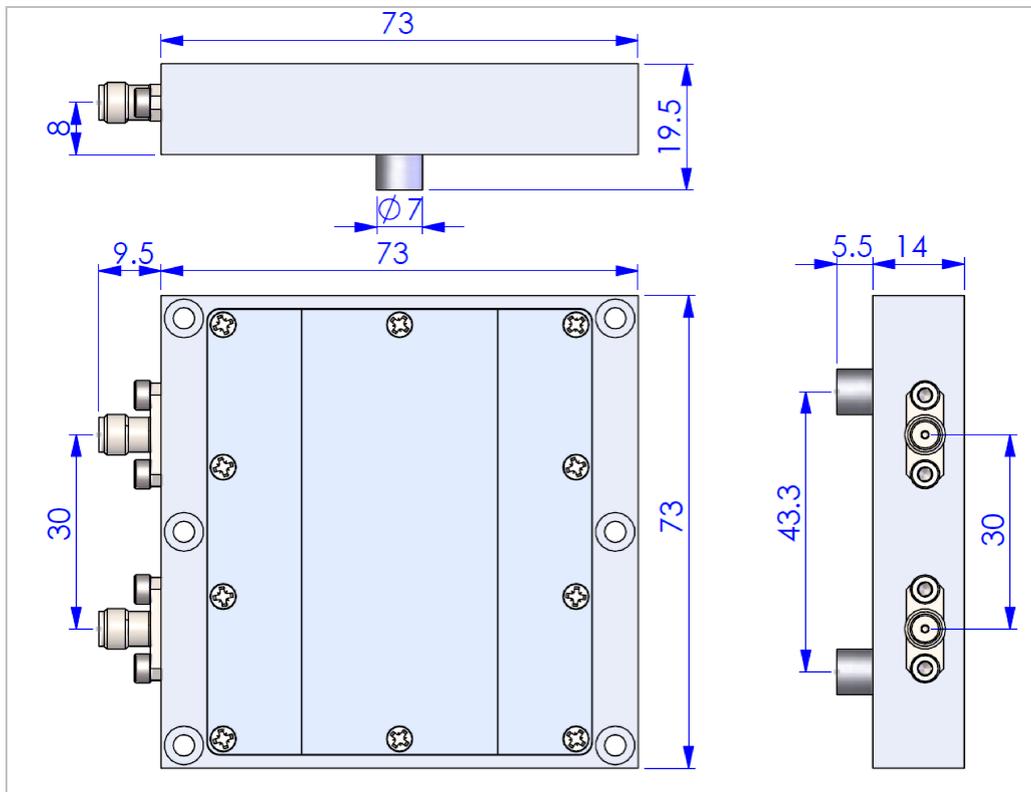
Waveguide of destination	WR340 (R26)
Waveguide wall thickness	2 mm $\pm$ 0.025 mm
Frequency range	2425 – 2475 MHz
Coupling factor / Max working power	-60 dB / 10 kW
Coupling factor uncertainty limits (3- $\sigma$ deviation)	$\pm$ 1 dB
Directivity	25 dB min
Coupled ports impedance	50 $\Omega$
Coupled ports connectors	SMA-female (SMAf)
Dimensions (L x W x H)	73 x 82.5 x 19.5 mm
Mass	160 g
Waveguide surface flatness required at BC interface	0.04 mm
Surface finish	E-CLPS 4600
Operating temperature range	-10 $^{\circ}$ C to +65 $^{\circ}$ C
Storage temperature range	-20 $^{\circ}$ C to +80 $^{\circ}$ C

## Typical Directivity



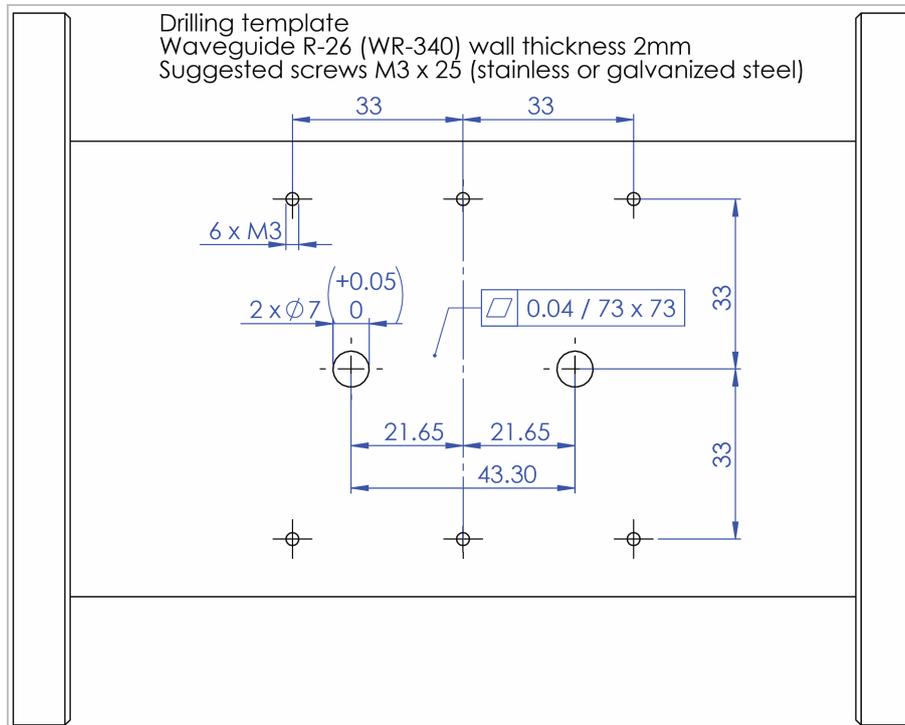
**Fig. 3.** Typical BC111 directivity (both directions).

## Dimensional Drawing



**Fig. 4.** Basic BC111 dimensions in millimeters.

## 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 mm.

### 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 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  $\pm 0.3$  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.