

BC111: Bidirectional Coupler for WR-340 Waveguide

General Description

BC111 (Fig. 1) is a dual directional (bidirectional) coupler intended for simultaneous sampling the powers of both incident and reflected wave in high-power 2450 MHz industrial applications using WR-340 (R-26) 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 coupled port match.

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

The BC111 coupler module is fastened to a parent waveguide by means of six 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 BC111 fixed to a precisely machined parent waveguide with standard or customized length can be provided (Fig. 2). The standard waveguide length is 174 mm.

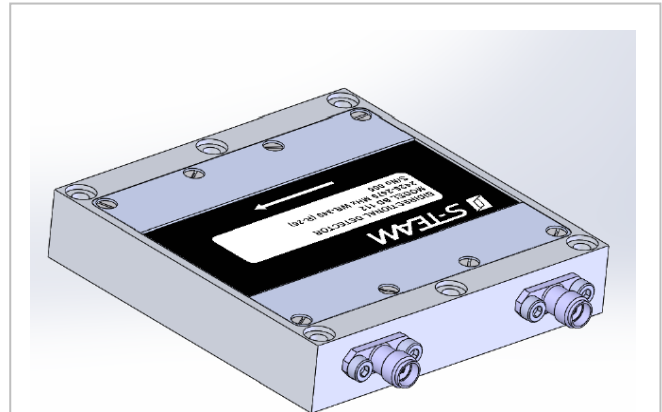


Fig. 1. Bidirectional coupler BC111.

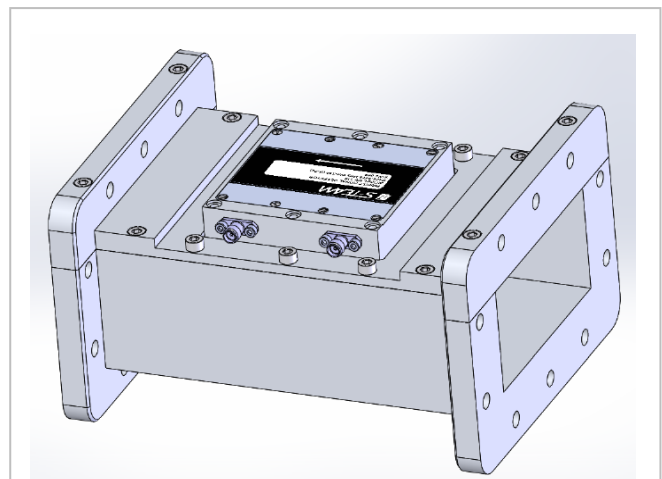


Fig. 2. BC111 installed on the standard-length waveguide.

Specifications

Destination waveguide	WR-340 (R-26): 86.36 × 43.12 mm
Waveguide wall thickness	2 mm ± 0.025 mm
Frequency range	2425 – 2475 MHz
Coupling factor/Max input power	-60 dB / 10 kW
Coupling factor uncertainty limits (3-σ deviation)	±1 dB
Directivity	25 dB min
Coupled ports connectors	SMAf, 50 Ω
Waveguide surface flatness at BC111 interface	0.04 mm
Surface finish	E-CLPS 4600
Mass	160 g
Dimensions (L x W x H)	73 × 82.5 × 19.5 mm

Typical Directivity

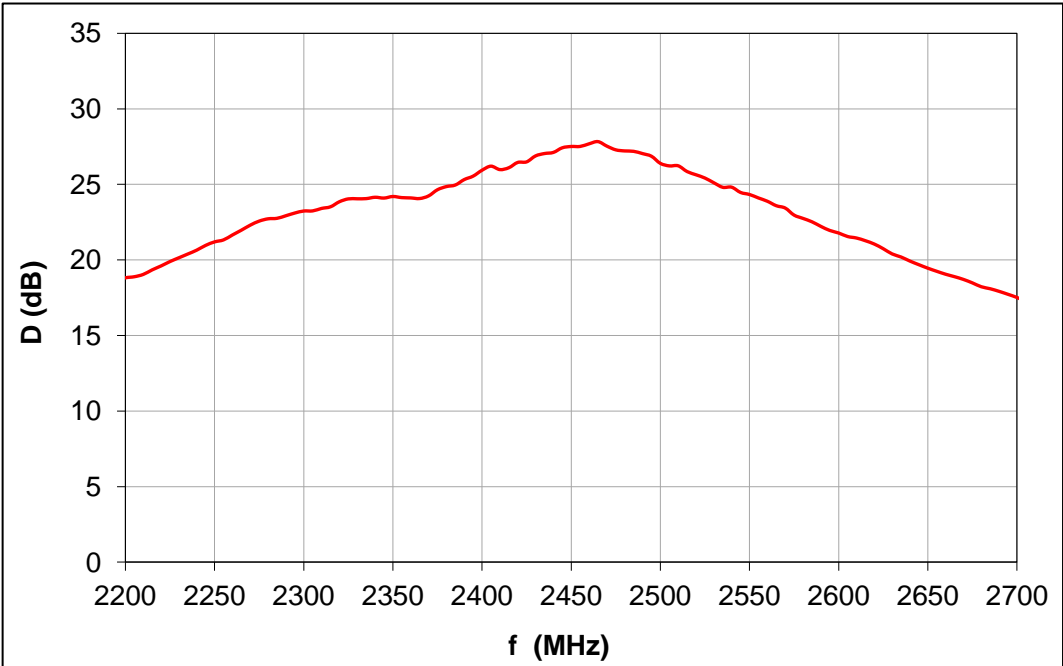


Fig. 3. Typical BC111 directivity (both directions).

Dimensional Drawing

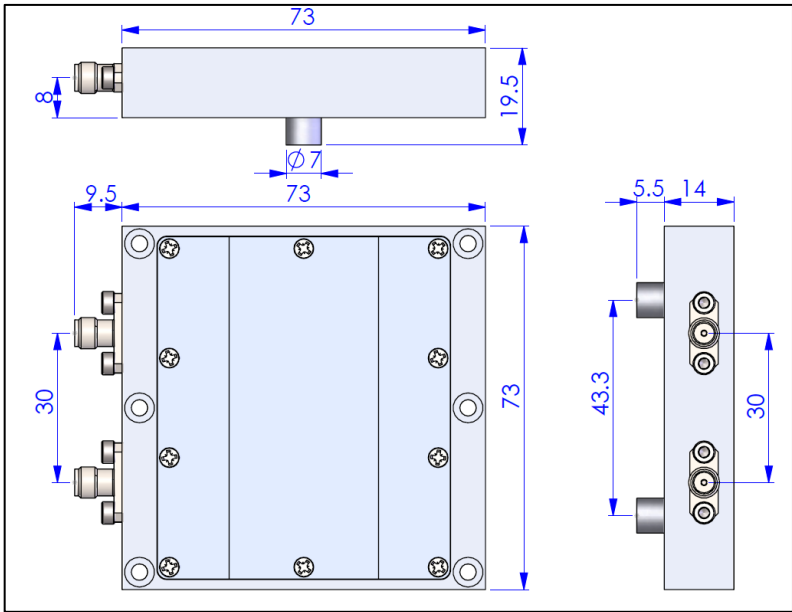


Fig. 4. Basic BC111 dimensions. All dimensions are in millimeters.

Waveguide Machining Template

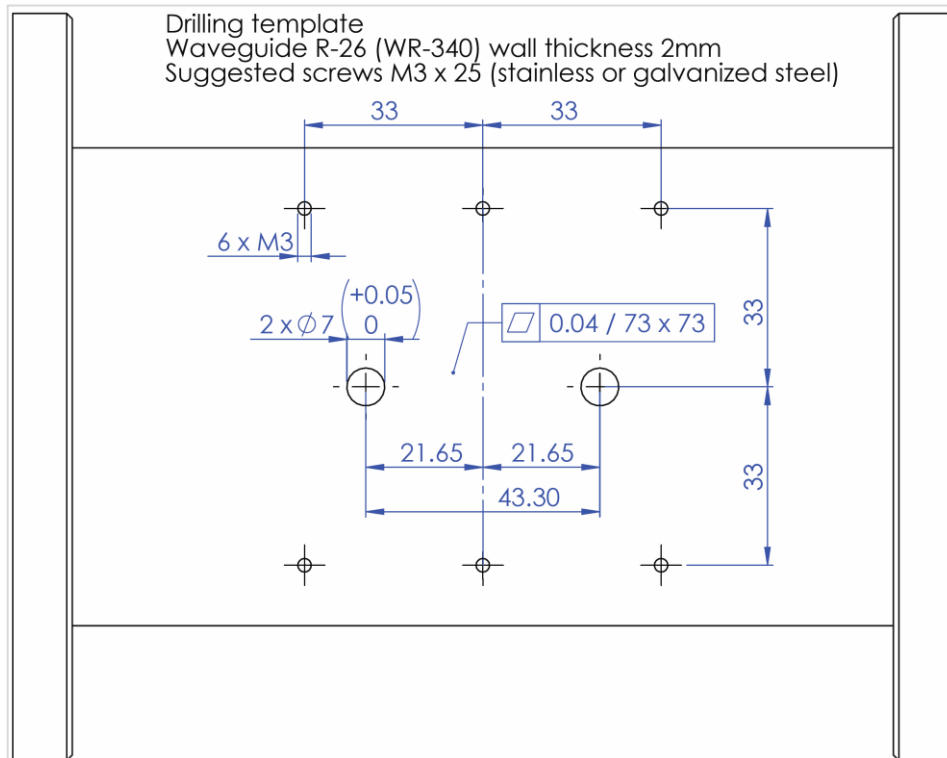


Fig. 5. Waveguide machining template. All dimensions are in millimeters. The pattern is centered about the waveguide axis. The waveguide wall thickness must be 2 mm.

Important Note

Complying with the specified waveguide wall thickness and flatness of its surface interfacing with the BC111 is essential for the specified coupling factor. The slope of the coupling factor as a function of the wall thickness is about -0.6 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 ± 0.3 mm, otherwise the BC111 directivity will deteriorate.

To avoid problems with manufacturing precision waveguide components, a calibrated assembly consisting of a BC111 module fixed to a parent waveguide can be ordered. Standard waveguide length is 174 mm; customizing the length is possible.