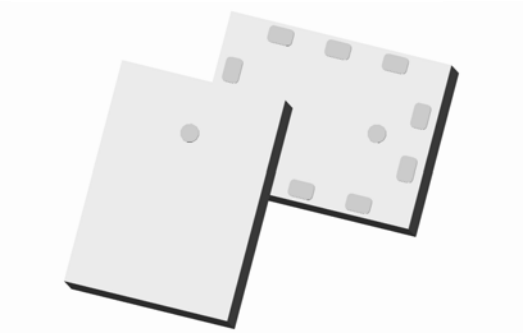
Model B0110E50200AHF

RevA

Ultra Low Profile 1008 Balun 50Ω to 200Ω Balanced



Description

The B0110E50200AHF is a low profile sub-miniature balanced to unbalanced transformer designed for differential inputs and output locations on next generation digital TV chipsets in an easy to use surface mount package. The B0110E50200AHF is ideal for high volume manufacturing and is higher performance than traditional wire wound Baluns. The B0110E50200AHF has an unbalanced port impedance of 50Ω and 200Ω balanced port impedance. This transformation enables single ended signals to be applied to differential ports on modern semiconductors. The output ports have equal amplitude (-3dB) with 180 degree phase differential. The B0110E50200AHF is available on tape and reel for pick and place high volume manufacturing.

Features:

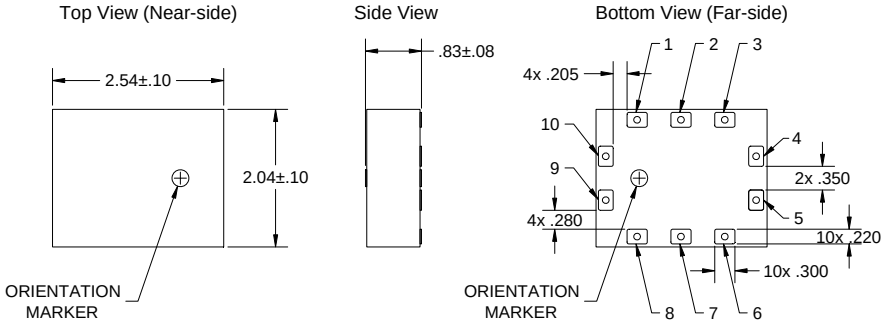
- **50 – 1450 MHz (IL 2dB BW)**
- **85-13000 MHz (IL 1dB BW)**
- **0.83 mm Height Profile**
- **50 Ohm to 2 x 100 Ohm**
- **Excellent CMRR (30dB typical)**
- **Surface Mountable**
- **Tape & Reel**
- **Non-conductive Top Surface**
- **RoHS Compliant**
- **Halogen Free**

Detailed Electrical Specifications:

Specifications subject to change without notice.

Parameter	ROOM (25°C) Min.	Typ.	Max	Min.	Typ.	Max	Unit
Frequency	50		1450	85		1300	MHz
Unbalanced Port Impedance		50			50		Ohm
Balanced Port Impedance		200			200		Ohm
Return Loss	8	9.8		11	12.3		dB
Insertion Loss*		2.2	2.5		1.2	1.5	dB
Amplitude Balance		0.4	0.8		0.4	0.8	dB
Phase Balance		5.6	8		2.6	4	Degrees
CMRR		26			30		dB
Power Handling			0.5			0.5	Watts
Operating Temperature	-55		+85	-55		+85	*ºC*

* Insertion Loss stated at room temperature (Insertion Loss is approximately 0.15 dB higher at +85 ºC). All performances stated for recommended operation with external circuitry.



Pin	Designation	Pin	Designation
1	Input	6	Balanced Port 1
2	GND	7	GND
3	NC	8	Balanced Port 2
4	GND	9	GND
5	GND	10	GND

Mechanical Outline
Dimensions are in Milimeters

Outline Drawing



Available on Tape and Reel for Pick and Place Manufacturing.

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Typical Performance with Two External 220pF Capacitors (test/specification condition)

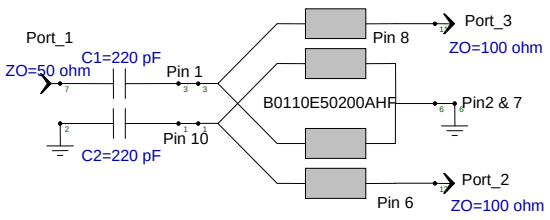
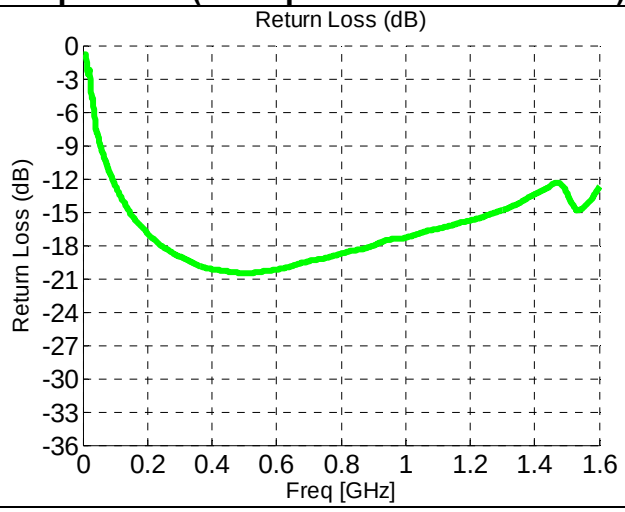
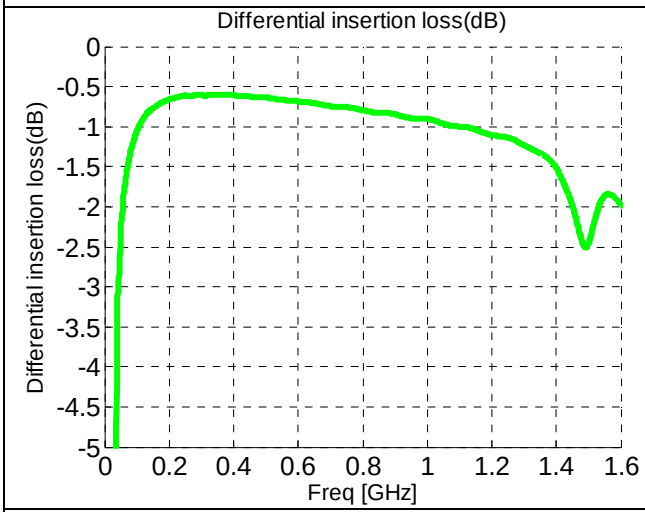
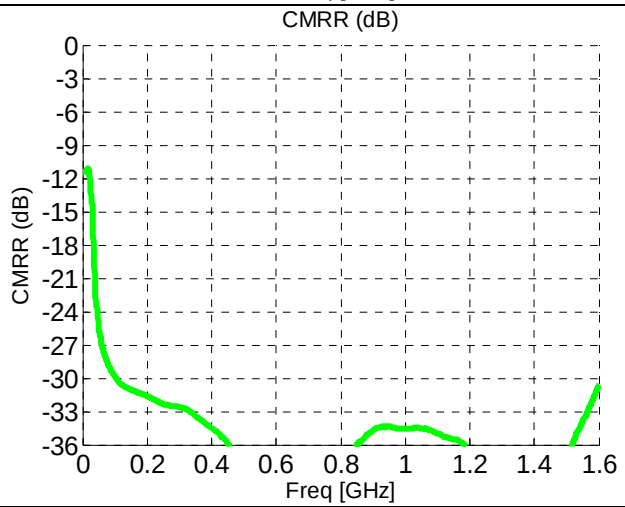
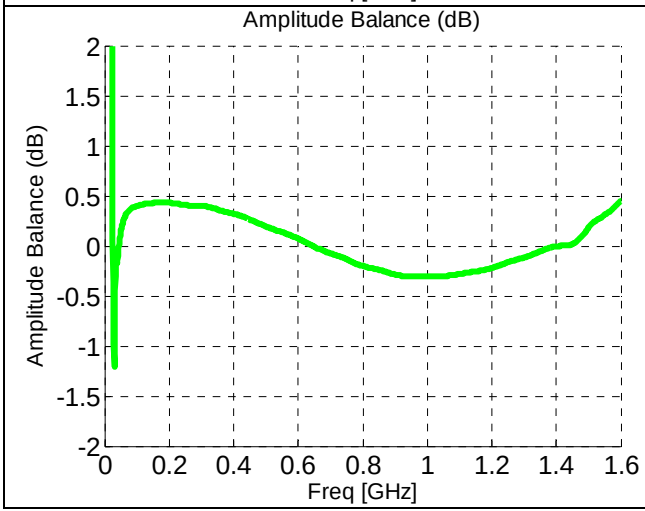


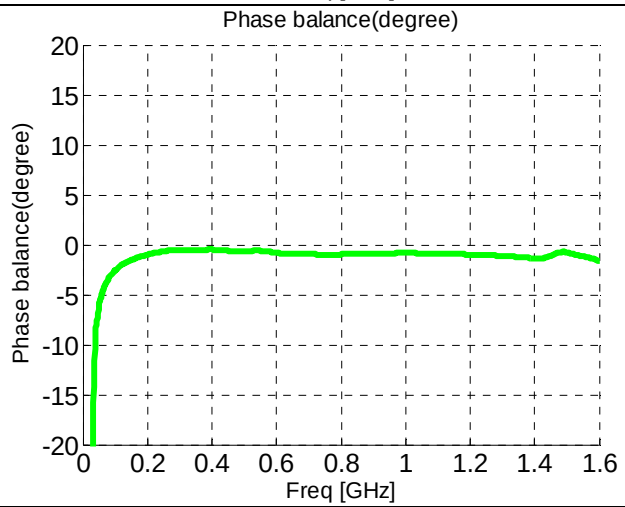
Figure 1 The Balun with external capacitors on both low impedance ports (nominal/test configuration). The two capacitors improve the insertion loss and return loss in the 40-200MHz range over that of the basic balun.











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Typical Performance with no External Components

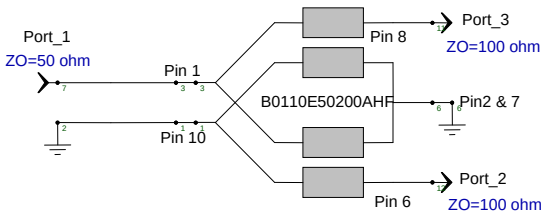
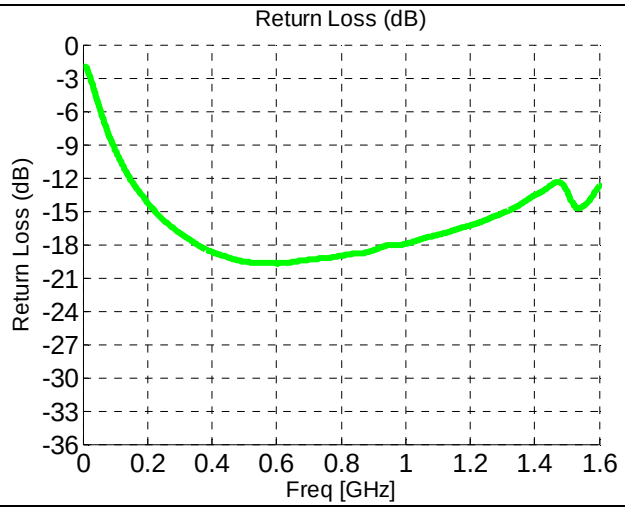
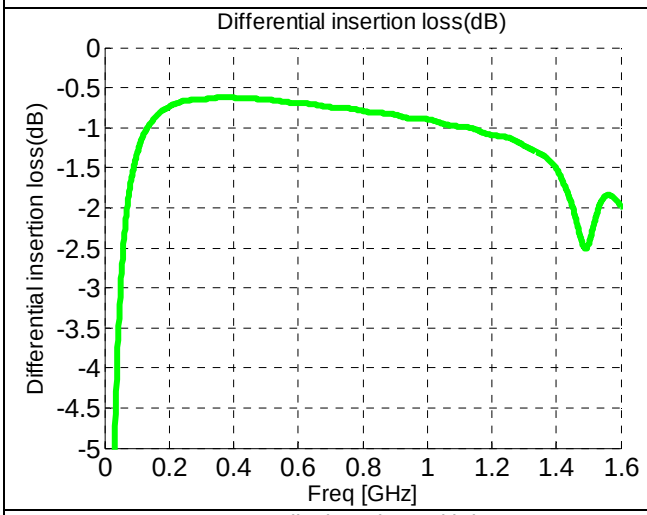
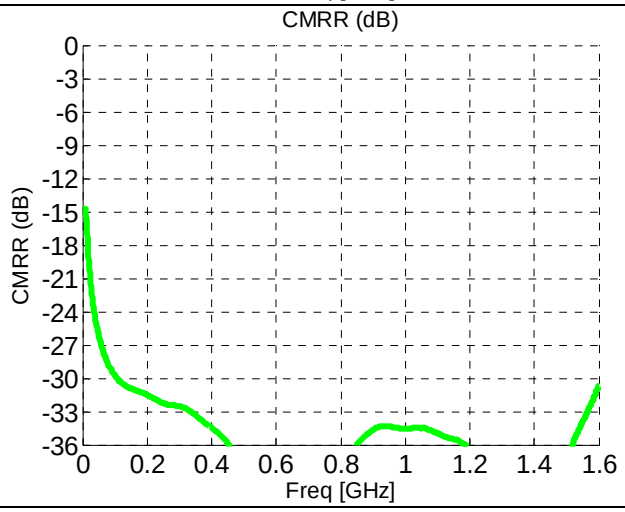
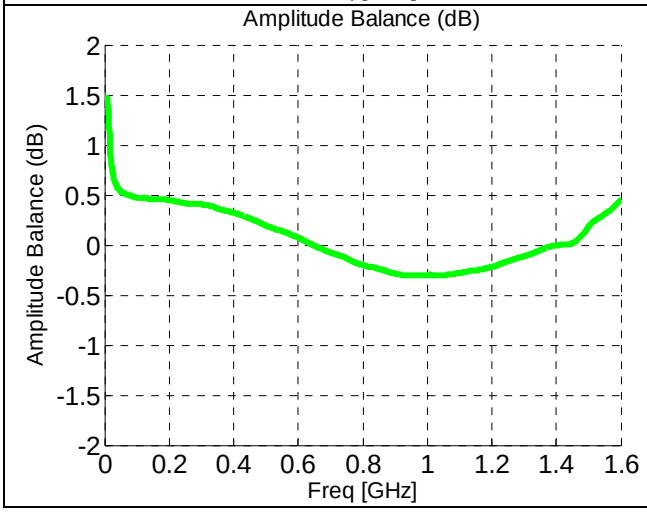


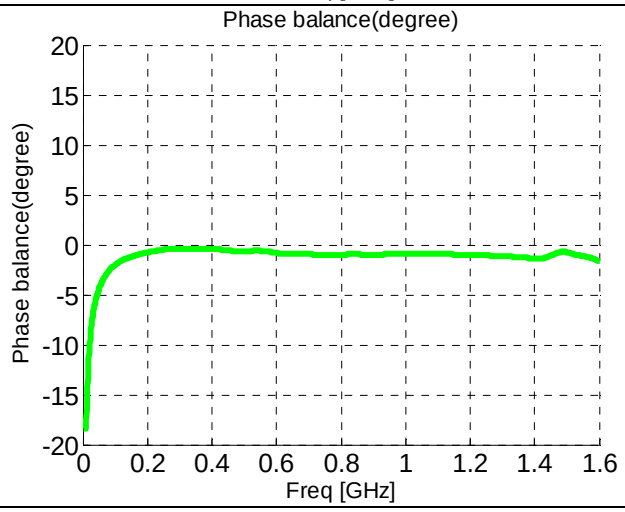
Figure 2 The Balun in it's basic configuration with no external components.













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Distortion Considerations:

This balun does NOT contain any ferrite materials and are as such distortion free. Very, very low levels of distortion can arise from dissimilar metals on the contact pads of the part (Cu-Ni-Au) and from inter-metallic contaminations within the part.

Power Handling Considerations:

The RF-power handling capability of these baluns depends on the temperature at the mounted interface (base plate temperature), and whether or not DC-bias is feed through the part. The power handling specified is for a mounted temperature of 85˚C and no DC-bias and is based on a maximum operating temperature of the part itself of 125˚C (do not exceed this).

The maximum power handling relates to the dissipated power within the part and is therefore a function of insertion loss. The insertion loss of this device changes within the specified band. Thus if operated with a narrowband signal at either band edge (this is what is specified) it will have less power handling than if operated closer to the center of the band or if operated with a very wideband signal. If signals arrive at the balun that are out of the specified band, these must be included in the total dissipated power calculation. However the deteriorating return loss will eliminate some of this power.

The dissipated RF power can be estimated as;

$$P_{RF,diss} = P_{in}\left(1-10^{-\left(\frac{RL_{dB}}{10}\right)}\right)\left(1-10^{-\left(\frac{IL_{dB}}{10}\right)}\right)\ [W]$$

Where:

- P_{in} is the input power, either on the low impedance side, single ended or the combined differential power on the balanced side, depending on the feeding direction.
- RL_{dB} is the return loss in dB associated with the feeding port. I.e. if feed from the balanced side then the balanced return loss must be used (this however is very similar to the single ended return loss).
- IL_{dB} is the insertion loss **at the operating temperature of the device**.

Below the dissipated power is shown at a normalized 1W input power for the balun internal temperature of 125˚C.

When used with DC-biasing the RF-power must be de-rated with the amount of DC power dissipated;

$$P_{dc,diss} = \left(R_{out1} \parallel R_{out2}\right)I_{dc}^2 \approx 7I_{dc}^2\ [W]$$

The total dissipated power cannot exceed 0.5watts.

When the duty cycle is not 100% the input power can be averaged, however the instantaneous input power should newer exceed 0.5watts.

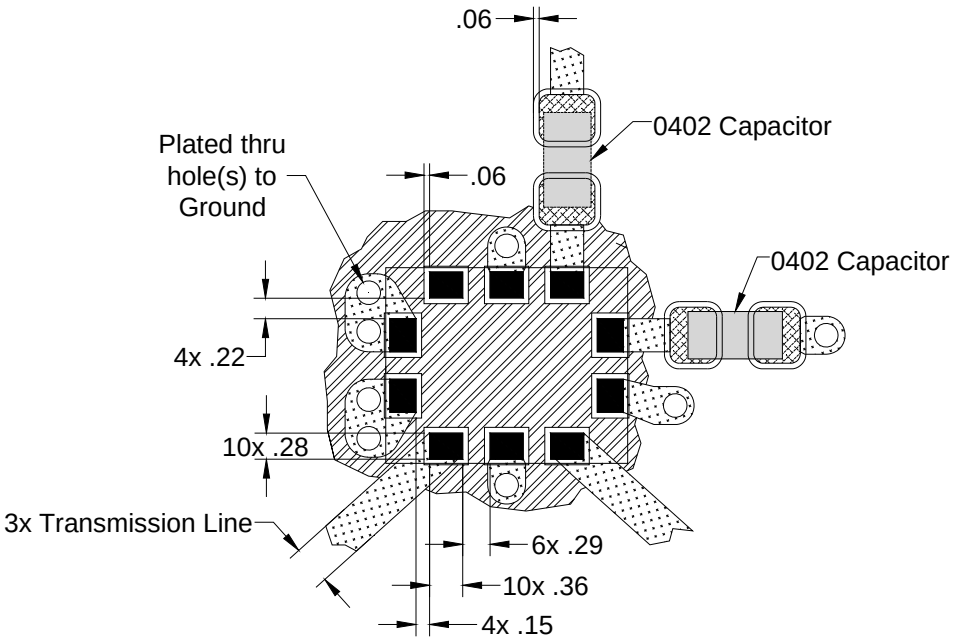
Mounting Configuration:

In order for Xinger surface mount components to work optimally, the proper impedance transmission lines must be used to connect to the RF ports. If this condition is not satisfied, insertion loss, Isolation and VSWR may not meet published specifications.

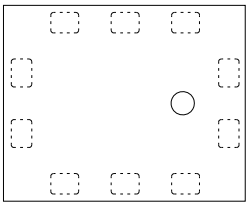
All of the Xinger components are constructed from organic PTFE based composites which possess excellent electrical and mechanical stability. Xinger components are compliant to a variety of ROHS and Green standards and ready for Pb-free soldering processes. Pads are Gold plated with a Nickel barrier.

To supply common mode voltage offset to the analog-to-digital converter, DC blocking capacitors are needed at the balanced port (pins 6 & 8).

An example of the PCB footprint used in the testing of these parts is shown below. In specific designs, the transmission line widths need to be adjusted to the unique dielectric coefficients and thicknesses as well as varying pick and place equipment tolerances. In addition, two external 0402 capacitors must be mounted in locations C1 and C2 as shown in the figure below to get the performance specified in the datasheet.



Part Orientation (Top View)



Circuit Pattern
Footprint Pad(s)
Solder Resist
External Component Footprint

Dimensions are in millimeters



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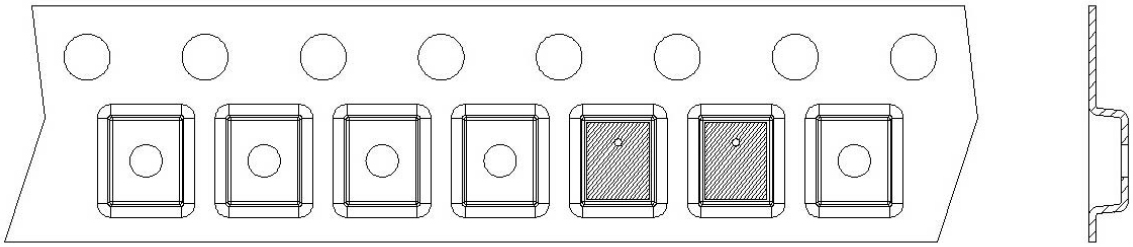
Packaging and Ordering Information

Parts are available in reel and are packaged per EIA 481-D. Parts are oriented in tape and reel as shown below. Minimum order quantities are 4000 per reel.

PACKAGING & ORIENTATION



Direction of Part Feed
(Unloading)

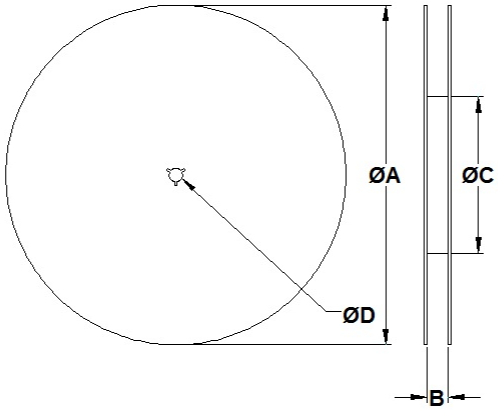


TABLE 1	
REEL DIMENSIONS (inches [mm])	
ØA	13.0 [330.0]
B	.315 [8.0]
ØC	7.146 [181.5]
ØD	0.512 [13.0]

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