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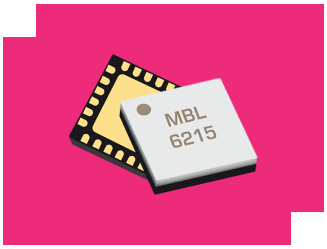
MBAL-0104SM

Passive MMIC 1-4GHz Surface Mount Balun

DEVICE OVERVIEW

General Description

The MBAL-0104SM is a GaAs passive MMIC balun in a 4mm QFN surface mount package. It features excellent amplitude and phase balance across its 1 to 4 GHz frequency range that offers a 2:1 impedance ratio. The 4mm QFN package is a lead free, RoHS compliant package compatible with standard leaded and lead-free solder reflows. SMA connectorized evaluation packages are available. The MBAL-0104SM is an excellent choice for balanced amplifiers, clock distribution, and higher order Nyquist sampling in analog to digital converters.



Download s-parameters here

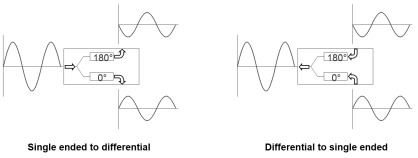
Features

- 2:1 Impedance Ratio
- 1 GHz to 4 GHz Balun (Balanced to Unbalanced Transformer)
- Transforms 50 Ω Input to 100 Ω Differential (50 Ohm Single) Output
- Tuned for Optimal Phase/Amplitude Balance

Applications

- Analog to Digital Converters
- Balanced Receivers
- Baseband Digital Modulation
- Signal Integrity

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
MBAL-0104SM	Passive MMIC 1-4GHz Surface Mount Balun	QFN	-	REACH RoHS	Released	EAR99
EVAL-MBAL-0104	Evaluation Board, Passive MMIC 1-4GHz Surface Mount Balun	EVAL	-	REACH RoHS	Released	EAR99
MBAL-1040-TR	Tape and Reel, Passive MMIC 1-4GHz Surface Mount Balun	QFN	7"	REACH RoHS	Released	EAR99

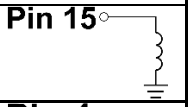
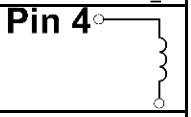
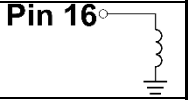
Table Of Contents

Revision History

Revision Code	Revision Date	Comment
-	2017-01-01	Datasheet initial Release
A	2019-08-01	PCB Footprint Corrected
B	2019-10-01	Mixed Mode Scattering Parameters added

Port Configuration and Functions

Port Functions

Port	Function	Description	DC Equivalent Circuit
1-3, 5-14, 17-24	Non-connect (NC)	These pins are not connected internally. Datasheet performance is tested with NC pins grounded.	-
15	Out 2	Pin 15 is DC short. Blocking capacitor is optional.	
4	Common	Pin 4 is DC open and AC matched to 50 Ω from 1 to 4 GHz. Blocking capacitor is optional.	
Paddle	Ground	Ground pad should be connected to RF/DC ground with low electrical and thermal resistance.	-
Pin 16	Out 1	Pin 16 is DC short. Blocking capacitor is optional.	

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	125	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-65	°C
Minimum Storage Temperature	-65	°C
RF Power Handling	30	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	4 x 4 mm
Moisture Sensitivity Level	-	MSL 1

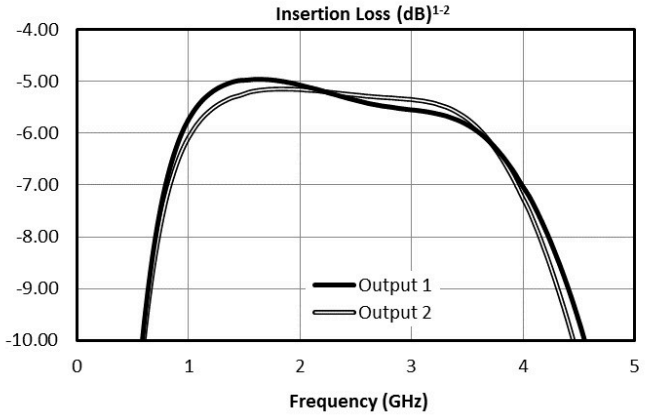
Electrical Specifications

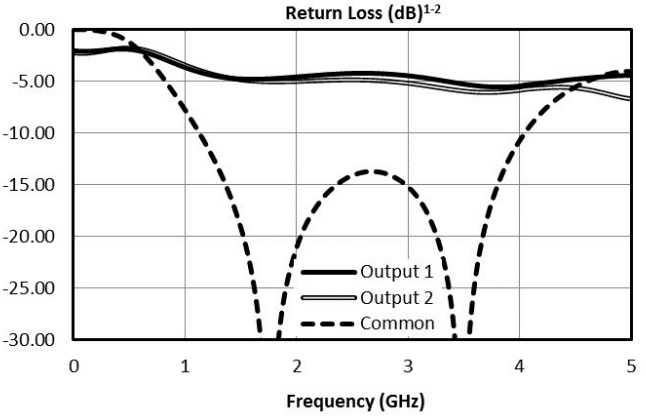
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	-	1	4	-	0	0.5	dB
Common Mode Rejection	-	1	4	25	33	-	dB
Isolation	-	1	4	-	8	-	dB
Nominal Phase Shift	-	1	4	-	180	-	°
Phase Balance	-	1	4	-	2	5	°
VSWR (Common)	-	1	4	-	1.25	-	
VSWR (Output)	-	1	4	-	3.6	-	
Impedance Ratio	-	-	-	-	2:1	-	
Insertion Loss as a Mode Converter [1]	-	1	1	-	2.5	5	dB

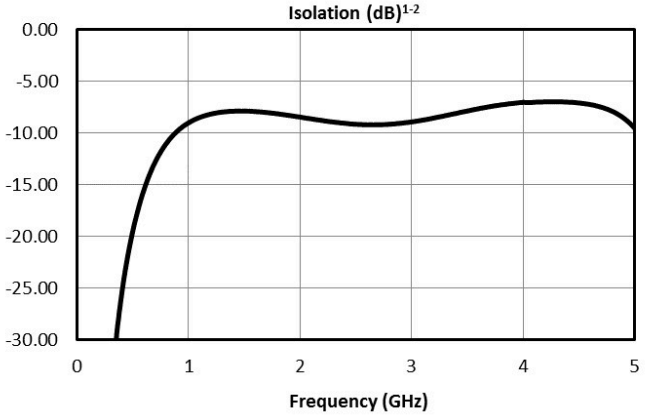
[1] For port locations and I/O designations, refer to Port Functions section.

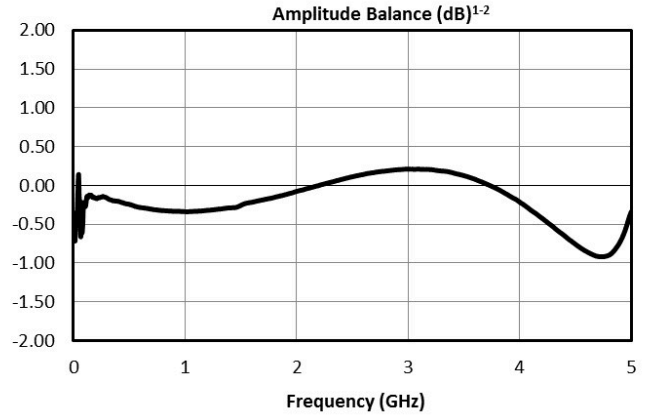
Typical Performance Scattering Parameters

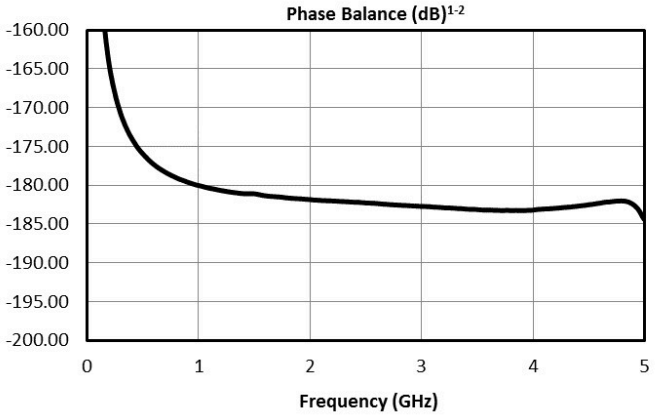
Three port scattering parameters measured as three single-ended 50Ω ports showing relationship between any two ports. For example: S21 and S31, often referred to as insertion loss of a balun, is the output response on ports 2 and 3 with an input stimulus on port 1.

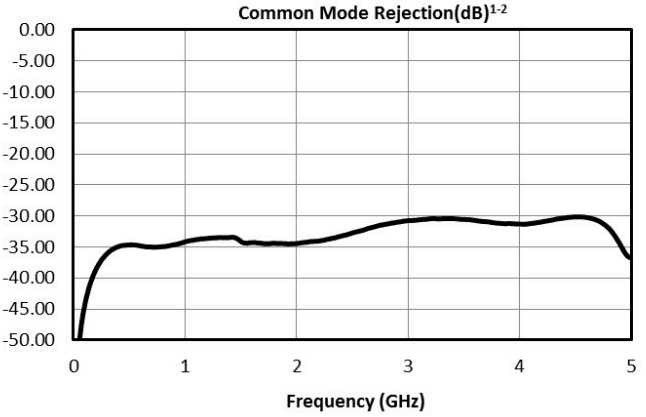






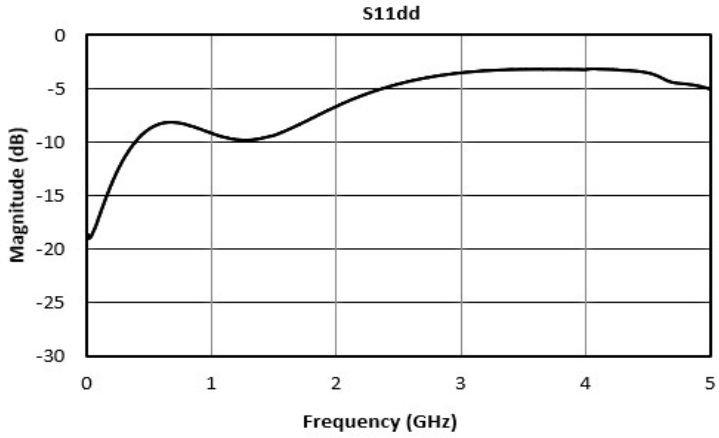


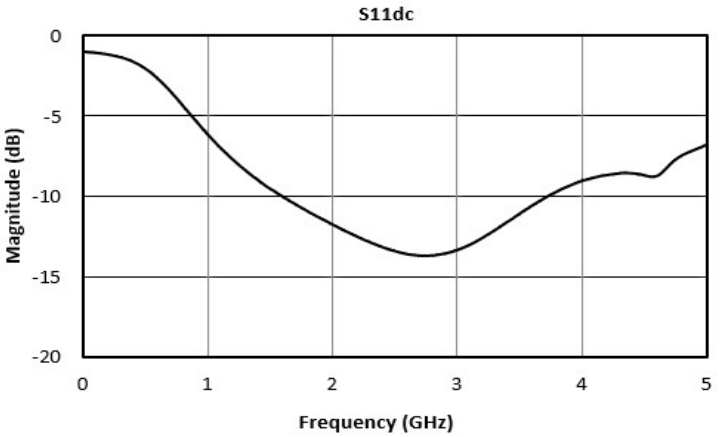


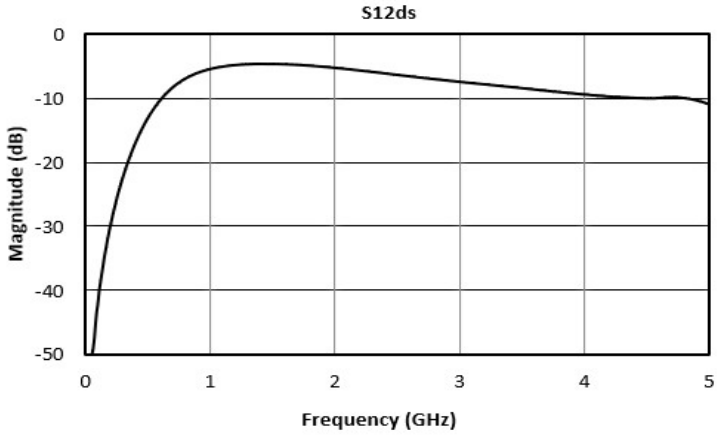


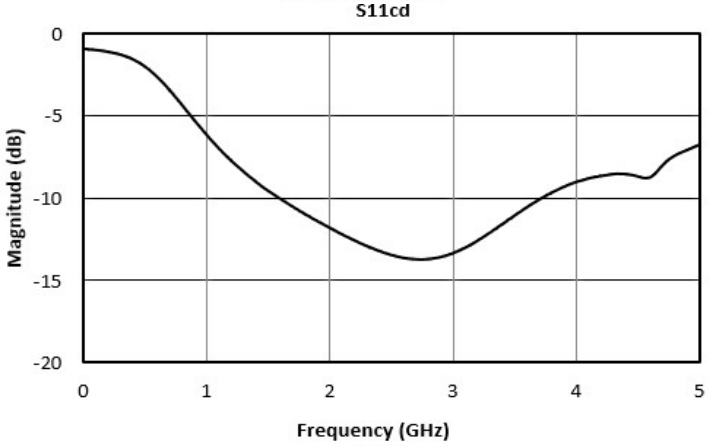
Mixed Mode Scattering Parameters

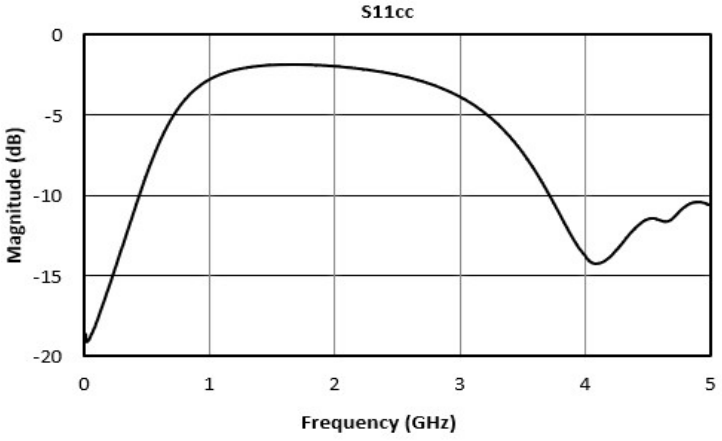
Mixed mode scattering parameters are used to characterize differential circuits. For baluns, this means that the 0° and 180° ports become a single 100Ω differential port and the common port remains the same 50Ω common port. The two-port s-parameters of the balun are then characterized based on differential (d), common mode (c), or single-ended (s) signals. For example: S12ds is the differential output response given a single ended input.

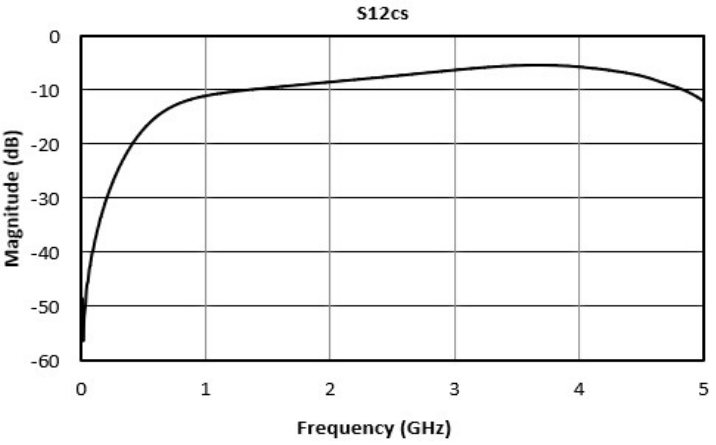






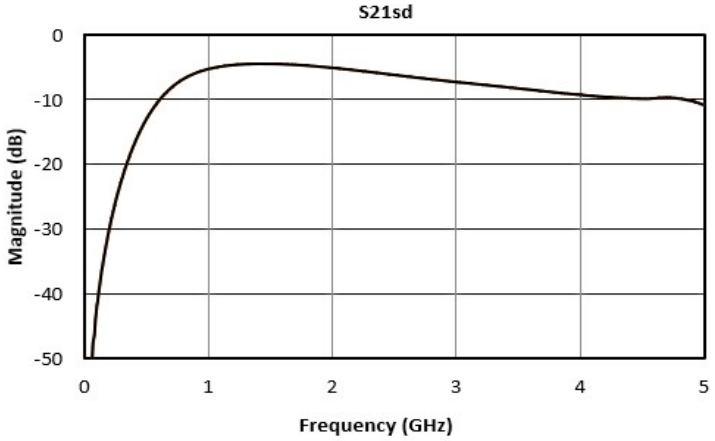


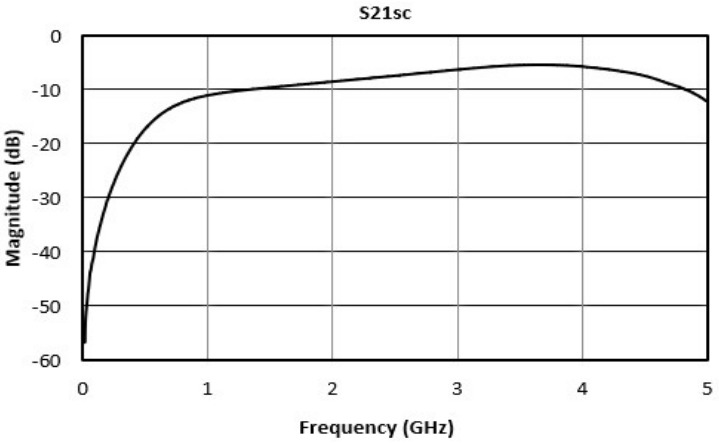


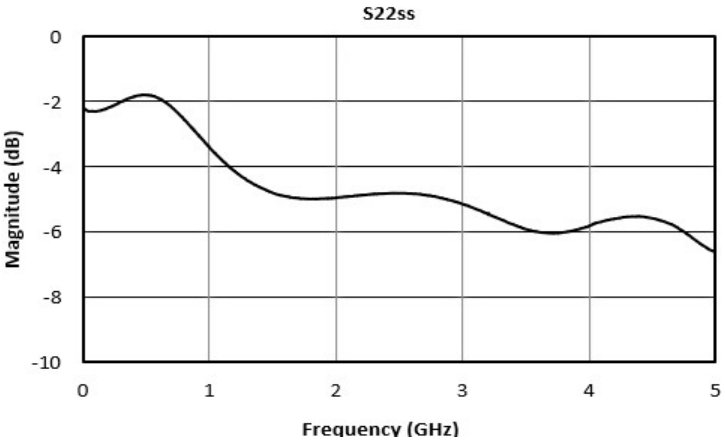


MBAL-0104SM

Passive MMIC 1-4GHz Surface Mount Balun







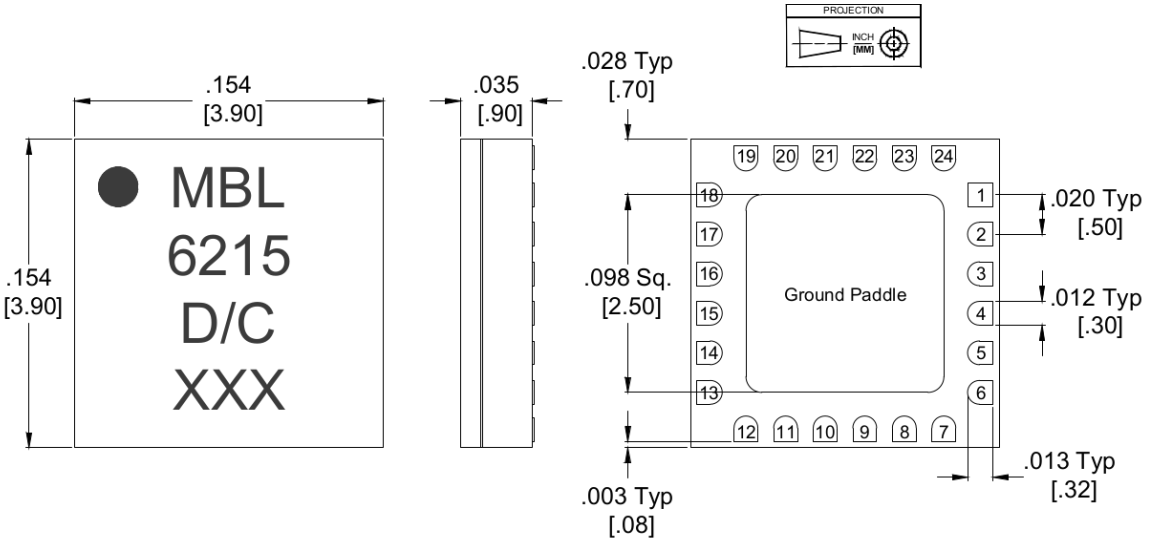
Application Information

1. Balun measured as a splitter. Combiner measurement is equivalent to splitter measurement.
2. Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
3. Catalog circuits are continually improved. Configuration control requires custom model numbers and specifications

Mechanical Data

Outline Drawing

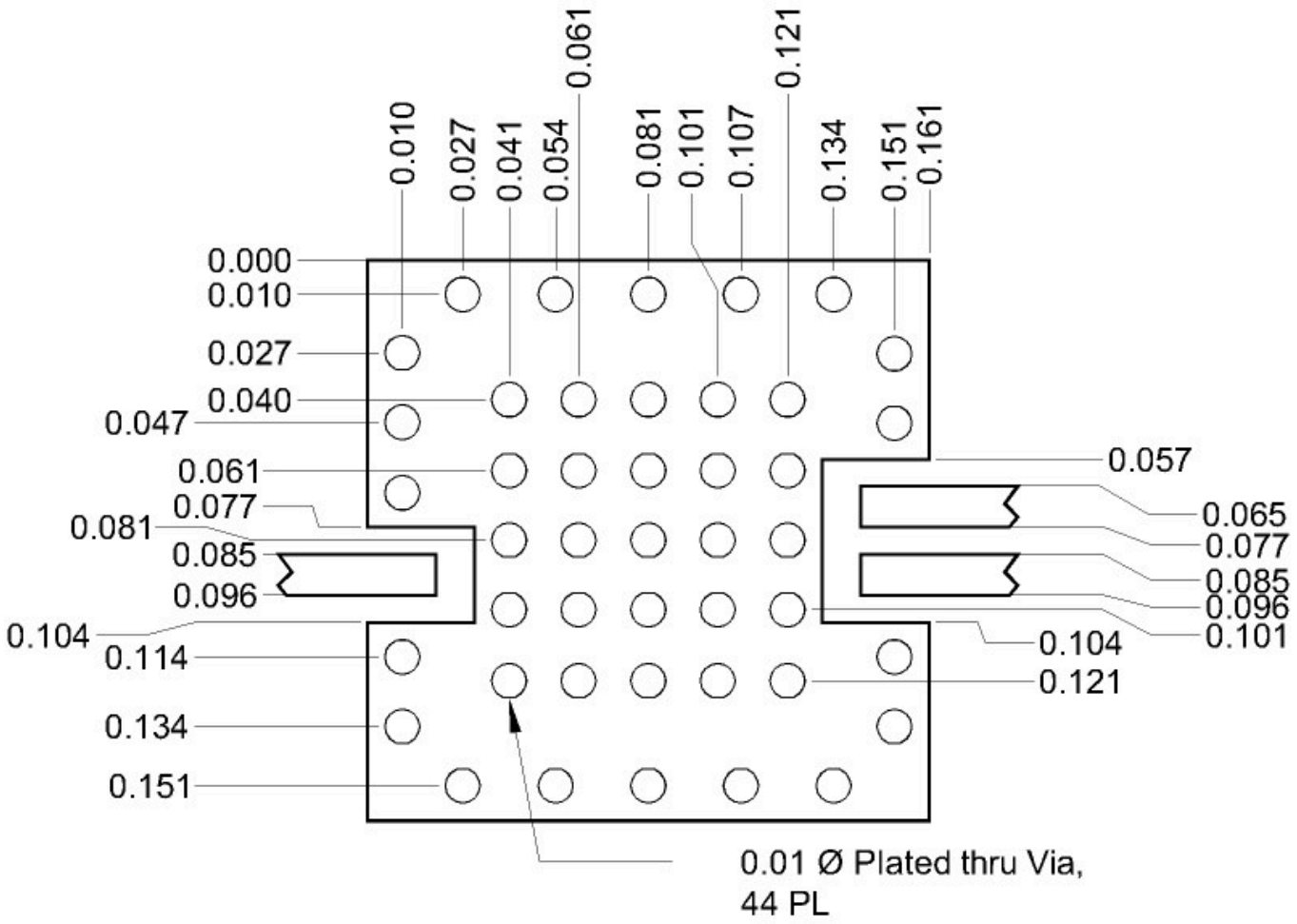
Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



Pad #	Function
1	N/C
2	N/C
3	N/C
4	Common
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	N/C
14	N/C
15	Output 2
16	Output 1
17	N/C
18	N/C
19	N/C
20	N/C
21	N/C
22	N/C
23	N/C
24	N/C

Footprint Image

Download : Footprint Drawing



Evaluation Board - Performance Data

Parameter	Test Conditions	Frequency Range (GHz)	Min	Typ	Max	Unit
Impedance Ratio	-	-	-	2	-	

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