

BAL-0006

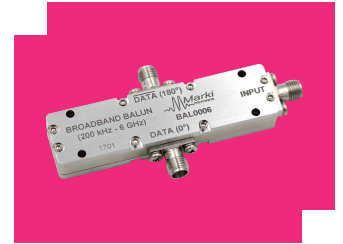
BROADBAND BALUN (200 kHz to 6 GHz)

DEVICE OVERVIEW

General Description

The BAL-0006 is a broadband balun, hand-tuned for optimal phase and amplitude balance over a 200 kHz to 6 GHz bandwidth. It serves as an excellent choice for analog to digital converters, balanced receivers, baseband digital modulations, and signal integrity enhancement.

[Download s-parameters here](#)



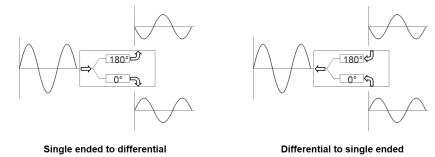
Features

- 2:1 Impedance Ratio
- 200 kHz to 6 GHz Balun (Balanced to Unbalanced Transformer)
- Matched 50 Ohm Impedance on Input and Output Ports
- 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	Connectors	Green Status	Product Lifecycle	Export Classification
BAL-0006	BROADBAND BALUN (200 kHz to 6 GHz)	<u>Standard</u>	REACH RoHS	Released	EAR99

Table Of Contents

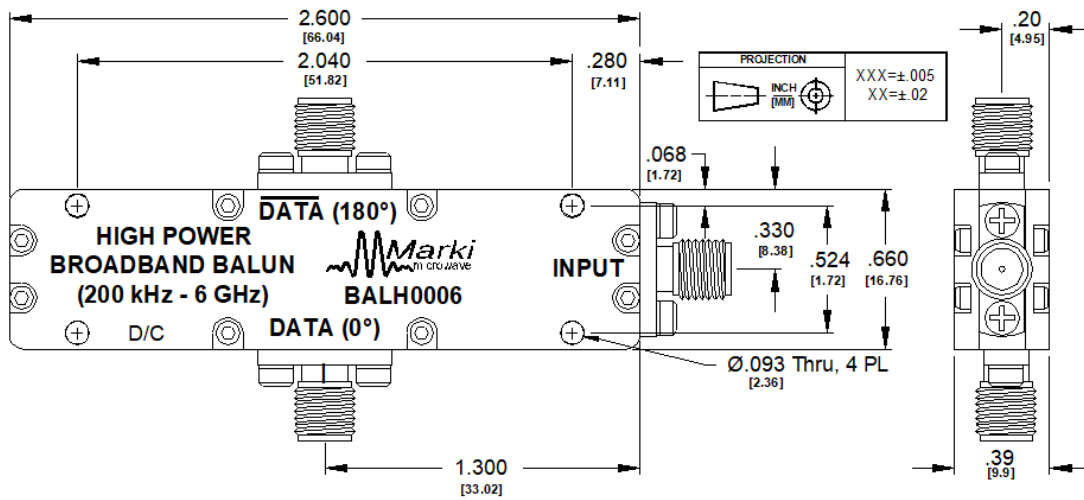
- **Device Overview**
 - General Description
 - Features
 - Applications
 - Functional Block Diagram
- **Port Configuration and Functions**
 - Port Diagram
 - Port Functions
- **Revision History**
- **Specifications**
 - Absolute Maximum Ratings
 - Package Information
 - Electrical Specifications
 - Time Domain Performance Plots
 - Typical Performance Scattering Parameters
 - Mixed Mode Scattering Parameters
- **Mechanical Data**
 - Outline Drawing

Revision History

Revision Code	Revision Date	Comment
-	2011-01-01	Datasheet initial Release
A	2014-01-01	Typical Performance plots added
B	2019-10-01	Mixed Mode Scattering Parameters added
C	2019-11-01	RoHS Compliant assembly
D	2020-07-01	Specs Table Update
E	2020-10-01	Specs Table Update

Port Configuration and Functions

Port Diagram



Port Functions

Port	Function	Connector Type	Description	DC Equivalent Circuit
Common Port / In (Unbalanced)	RF Input	SMAF	The common port is DC short to ground.	Common Port (Unbalanced)
Out 1 / 0° Port (Balanced)	0° Port	SMAF	The 0 port is DC short to ground.	0° Port (Balanced)
Out 2 / 180° Port (Balanced)	180° Port	SMAF	The 180 port is DC short to ground.	180° Port (Balanced)

Specifications

Absolute Maximum Ratings

Parameter	Maximum Rating	Unit
RF Power Handling	1	W

Package Information

Parameter	Details	Rating
Weight	-	27g
Dimensions	-	66.04 x 16.76 mm

Electrical Specifications

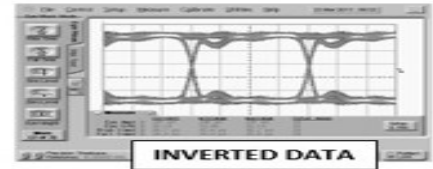
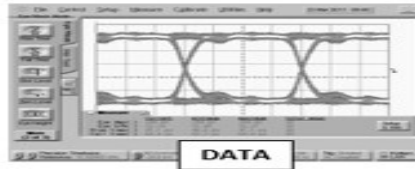
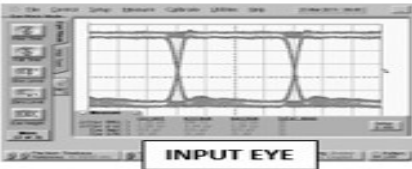
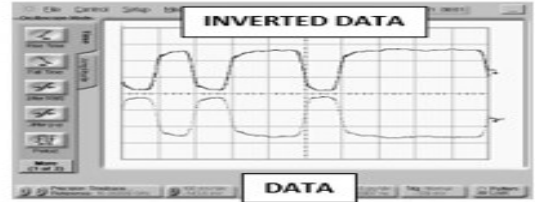
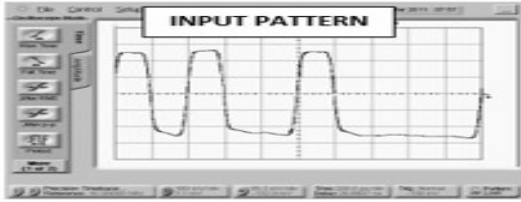
Specifications guaranteed from -55 to +100°C, measured in a 50Ω system.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Amplitude Balance	-	0.0002	6	-	0.05	0.5	dB
Common Mode Rejection	-	0.0002	6	30	40	-	dB
Impedance Ratio	-	-	-	-	2:1	-	
Insertion Loss as a Mode Converter	-	0.0002	6	-	4.5	6	dB
Isolation	-	0.0002	6	-	9	-	dB
Nominal Phase Shift	-	0.0002	6	-	180	-	°
Phase Balance	-	0.0002	6	-	1	5	°
Risetime/Falltime ¹	-	0.0002	6	-	40	-	ps
VSWR (Input)	-	0.0002	6	-	1.35	-	
VSWR (Output)	-	0.0002	6	-	1.7	-	

^[1] Specified as 90%/10%. Calculated from $\tau_{balun}^2 = (\tau_{out}^2 - \tau_{in}^2)$

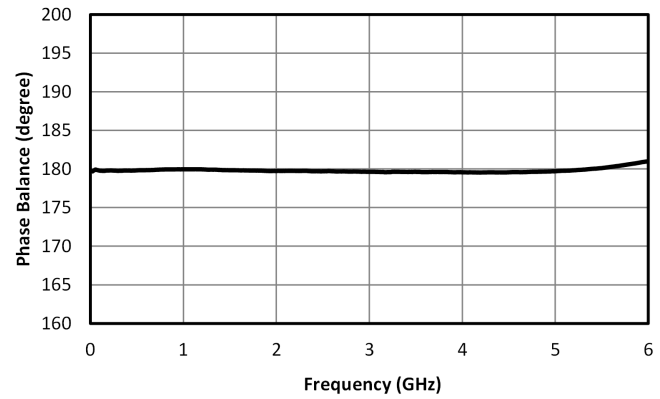
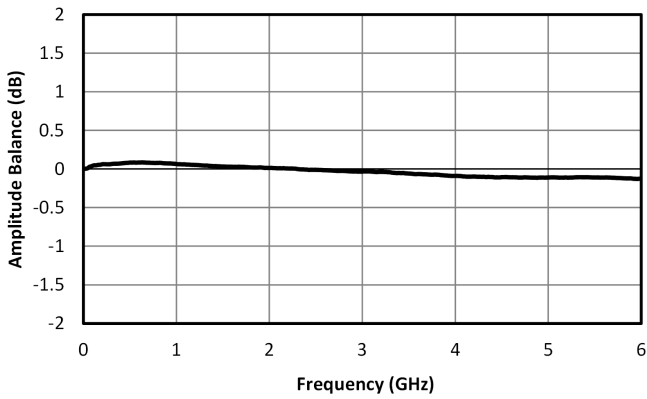
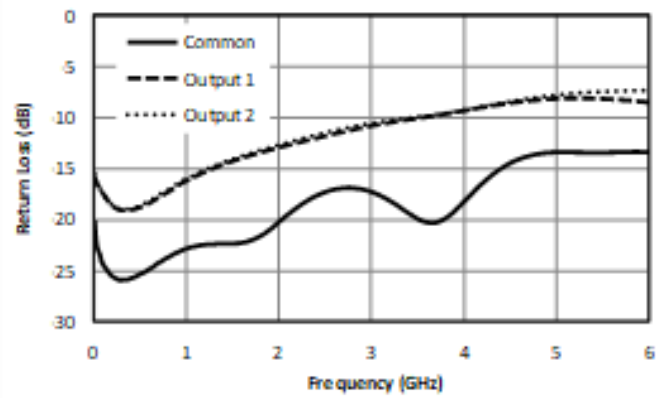
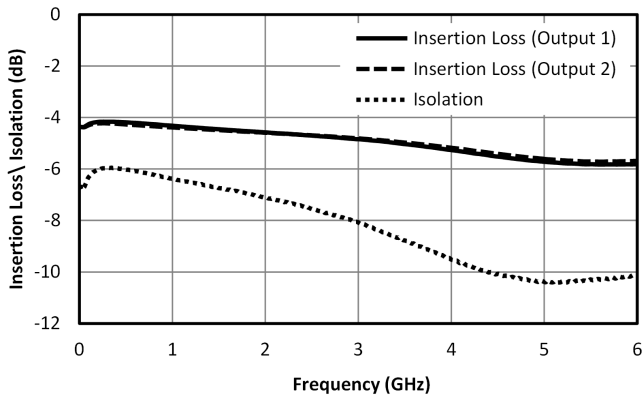
Time Domain Performance Plots

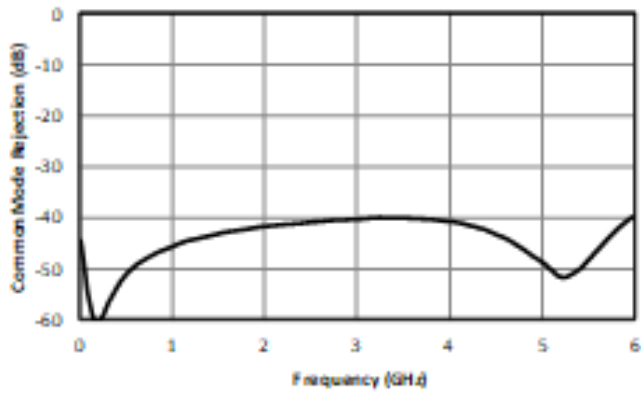
Oscilloscope measurements of the BAL-0006 with a 5 Gb/s PRBS pattern. Bit pattern is measured with a 27-1 PRBS input demonstrating extremely good pulse fidelity for both inverted and non-inverted output. Eye diagrams are taken with a 231-1 PRBS input demonstrating minimal eye distortion/closure afforded by the extremely low frequency operation of the balun (<200 kHz).



Typical Performance Scattering Parameters

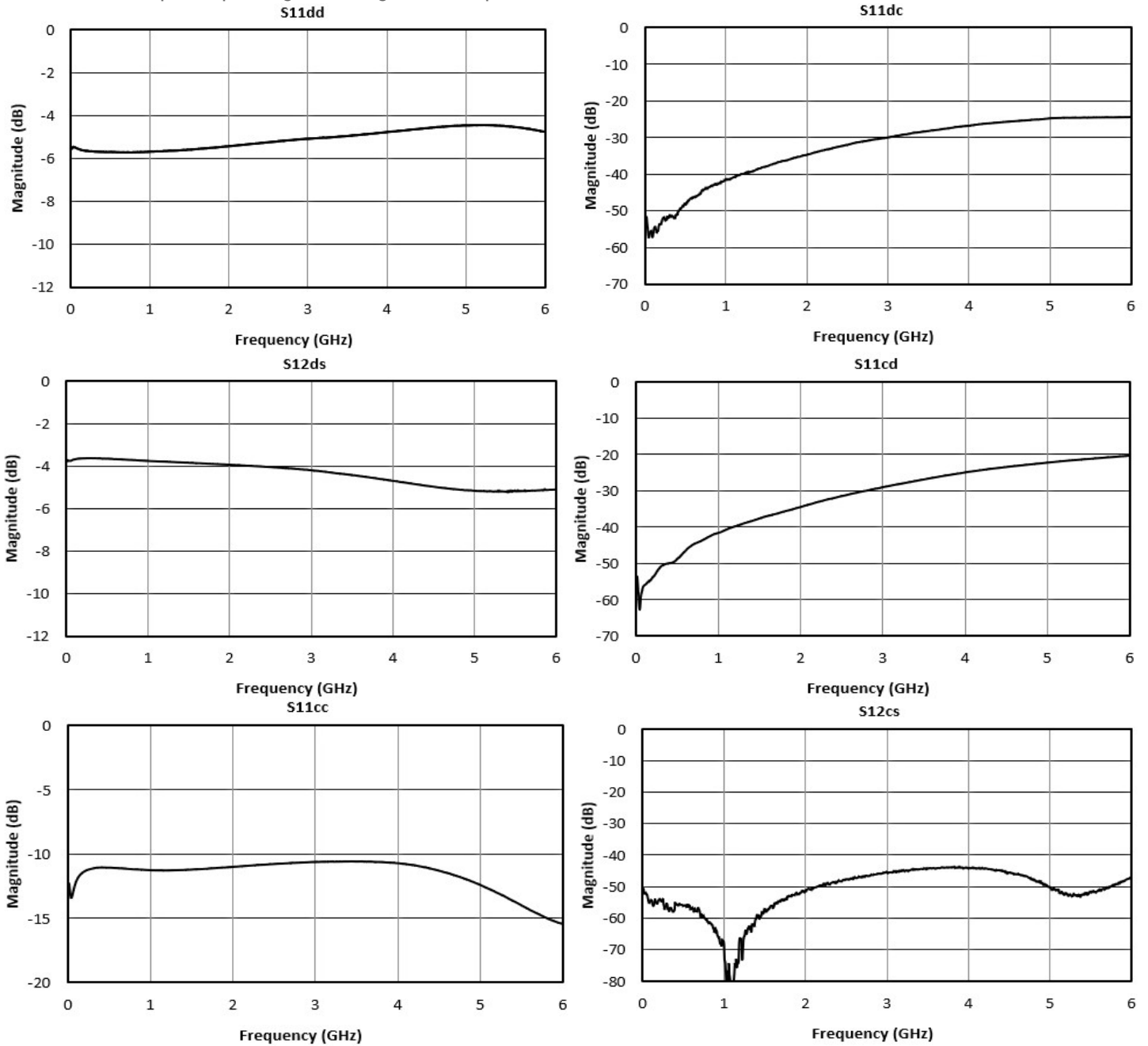
Three port scattering parameters measured as three single-ended 50Ω ports showing relationship between any two ports. For example: S21 and S31, often referred to as insertion loss of a balun, is the output response on ports 2 and 3 with an input stimulus on port 1.



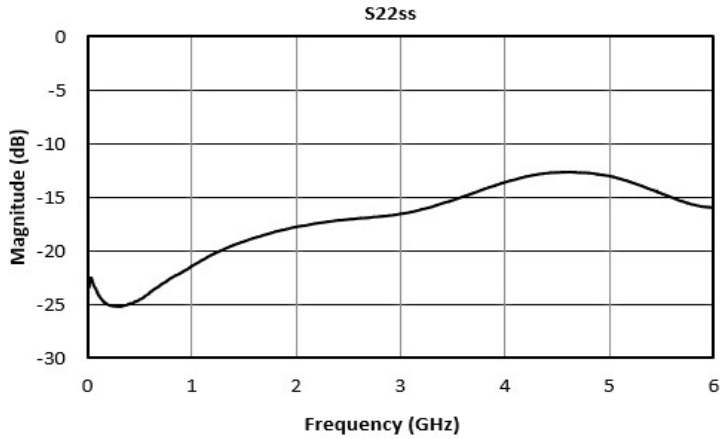
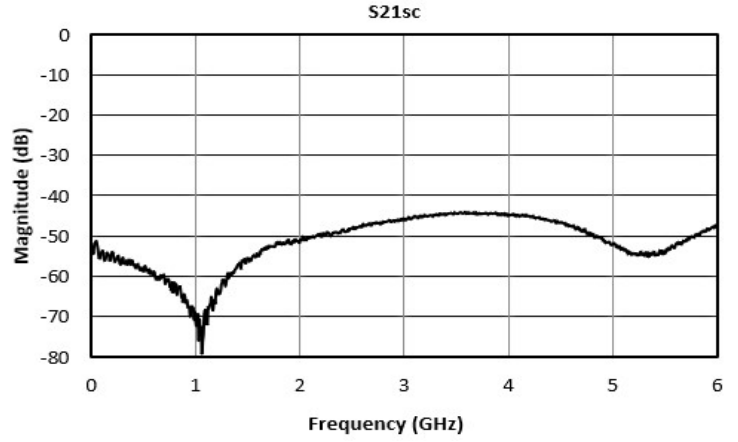
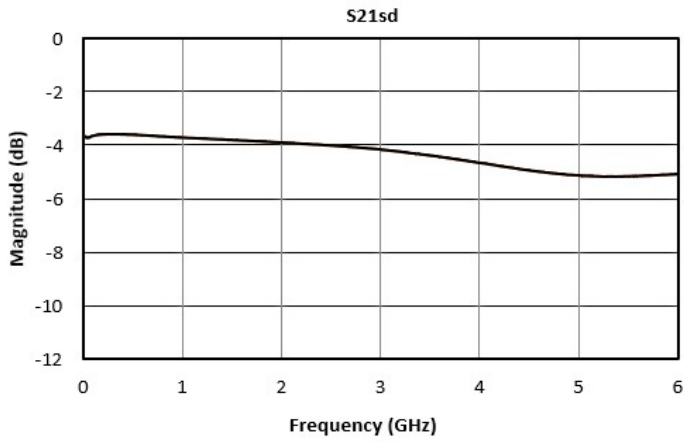


Mixed Mode Scattering Parameters

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.



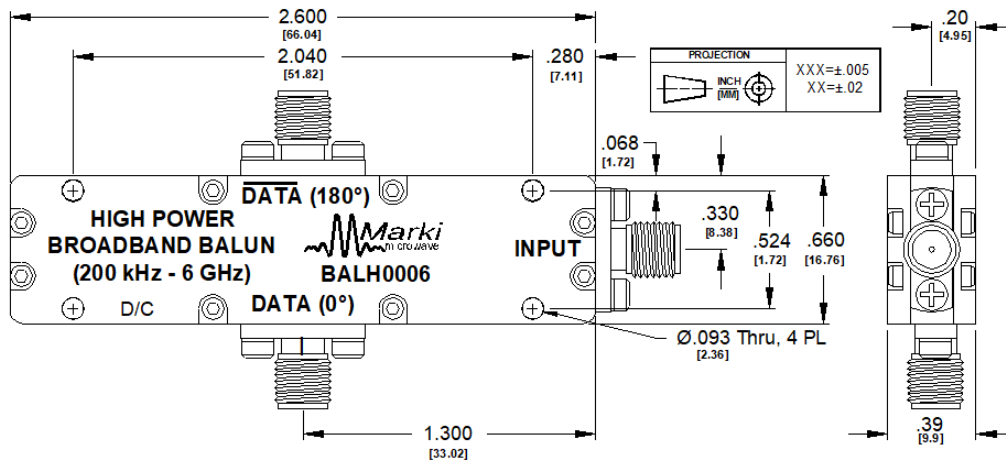
BAL-0006
BROADBAND BALUN (200 kHz to 6 GHz)



Mechanical Data

Outline Drawing

Download : [Outline 2D Drawing](#) | [Outline 3D Drawing](#) | [Outline 3D STP](#)



DISCLAIMER

MARKI MICROWAVE, LLC., ("MARKI") PROVIDES TECHNICAL SPECIFICATIONS AND DATA (INCLUDING DATASHEETS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER INFORMATION AND RESOURCES "AS IS" AND WITH ALL FAULTS. MARKI DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

These resources are intended for developers skilled in the art designing with Marki products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards and other requirements. Marki makes no guarantee regarding the suitability of its products for any particular purpose, nor does Marki assume any liability whatsoever arising out of your use or application of any Marki product.

Marki grants you permission to use these resources only for development of an application that uses Marki products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Marki intellectual property or to any third-party intellectual property. Marki reserves the right to make changes to the product(s) or information contained herein without notice.

MARKI MICROWAVE and T3 MIXER are trademarks or registered trademarks of Marki Microwave, LLC. All other trademarks used are the property of their respective owners.

© 2011, 2014, 2019 - 2020, Marki Microwave, LLC