Hybrid Coupler
3 dB, 90°

Description:

The JP503AS is a low profile, high performance 3dB hybrid coupler in an easy to use, manufacturing friendly surface mount package. It is designed for W-CDMA and other 3G applications. The JP503AS is designed for balanced amplifiers, variable phase shifters and attenuators, LNAs, signal distribution and is an ideal solution for the ever-increasing demands of the wireless industry for smaller printed circuit boards and high performance. Parts have been subjected to rigorous qualification testing and they are manufactured using materials with coefficients of thermal expansion (CTE) compatible with common substrates such as FR4, G-10, RF-35, RO4003 and polyimide. Produced with 6 of 6 RoHS compliant tin immersion finish.

Features:

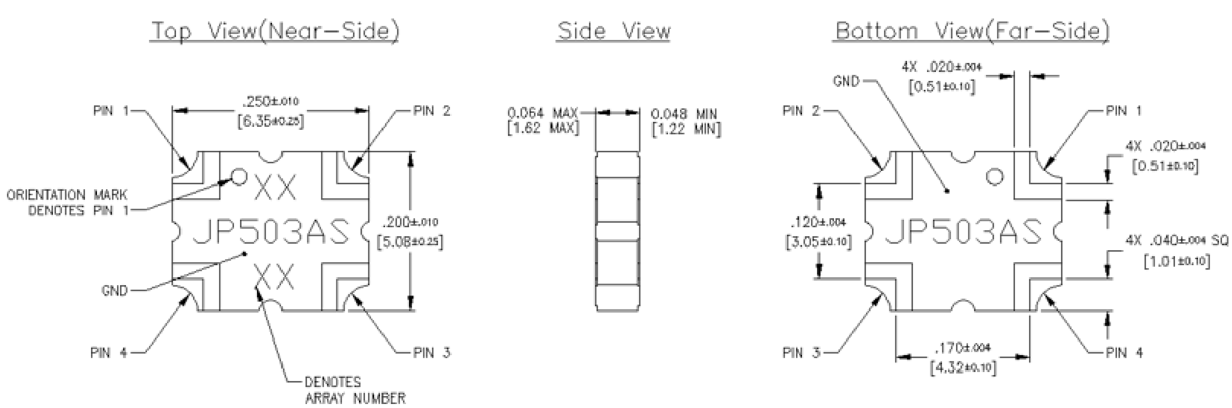
- **2000-2300 MHz**
- **3G Frequencies**
- **Low Loss**
- **High Isolation**
- **90° Quadrature**
- **Surface Mountable**
- **Tape And Reel**
- **Lead Free**
- **100% Tested**

Detailed Electrical Specifications:

Frequency	**Isolation**	**Insertion Loss**	**VSWR**
MHz	*dB Min*	*dB Max*	*Max:1*
2000-2300	20	0.30	1.20
Amplitude Balance	**Phase Balance**	**Power**	**Operating Temp.**
dB Max	*Degrees*	*Avg. CW Watts @ 85 ºC*	*ºC*
± 0.25	± 3	25	-55 to +140

**Specification based on performance of unit properly installed on microstrip printed circuit boards with 50 Ω nominal impedance. Specifications subject to change without notice.

Outline Drawing:

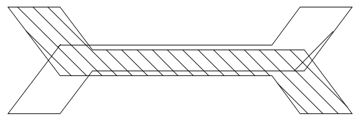


Dimensions are in Inches [Millimeters]
JP503AS Mechanical Outline

Part is Symmetric About All Axis
Tolerances are Non-Cumulative

Hybrid Coupler Pin Configuration

The **JP503AS** has an orientation marker to denote Pin 1. Once port one has been identified the other ports are known automatically. Please see the chart below for clarification:

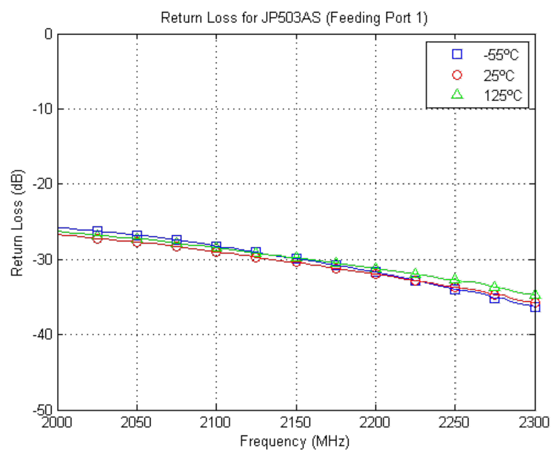


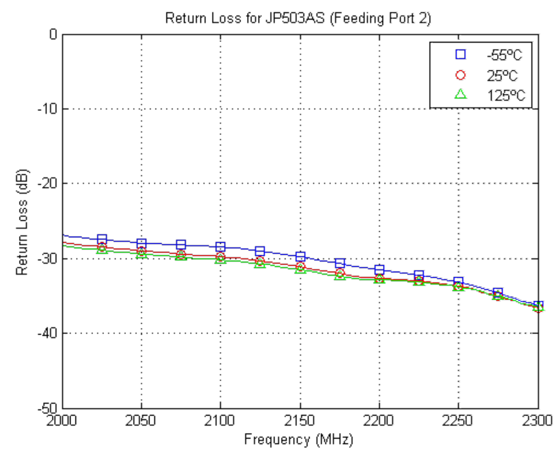
Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-3dB $\angle\theta - 90$	-3dB $\angle\theta$
Splitter	Isolated	Input	-3dB $\angle\theta$	-3dB $\angle\theta - 90$
Splitter	-3dB $\angle\theta - 90$	-3dB $\angle\theta$	Input	Isolated
Splitter	-3dB $\angle\theta$	-3dB $\angle\theta - 90$	Isolated	Input
***Combiner**	A $\angle\theta - 90$	A$\angle\theta$	Isolated	Output
***Combiner**	A $\angle\theta$	A $\angle\theta - 90$	Output	Isolated
***Combiner**	Isolated	Output	A $\angle\theta - 90$	A $\angle\theta$
***Combiner**	Output	Isolated	A $\angle\theta$	A $\angle\theta - 90$

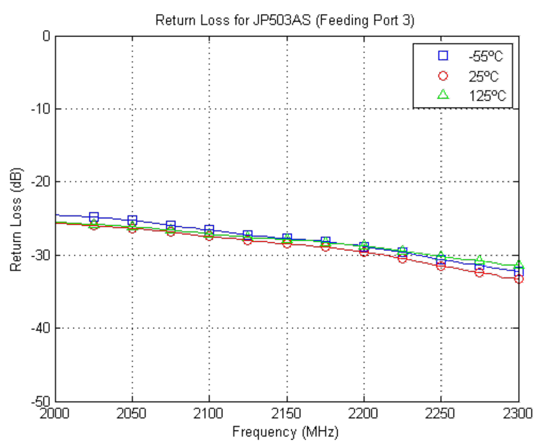
*Notes: “A” is the amplitude of the applied signals. When two quadrature signals with equal amplitudes are applied to the coupler as described in the table, they will combine at the output port. If the amplitudes are not equal, some of the applied energy will be directed to the isolated port.

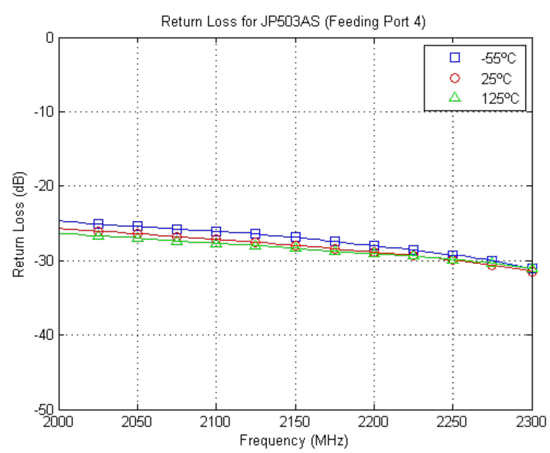
The actual phase, $\angle\theta$, or amplitude at a given frequency for all ports, can be seen in our de-embedded s-parameters, that can be downloaded at www.TTM.com

Typical Performance: (-55°C, 25°C& 125°C): 2000 - 2300 MHz

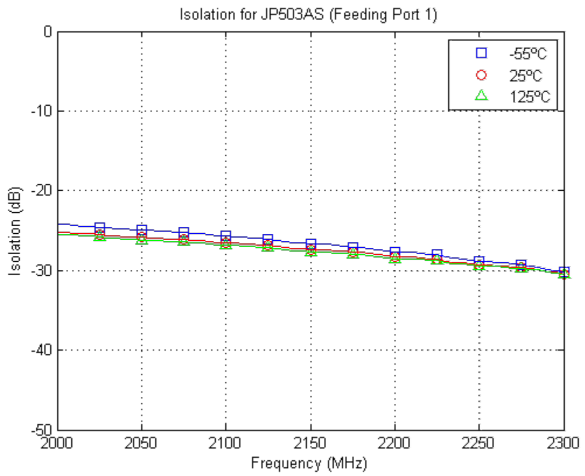


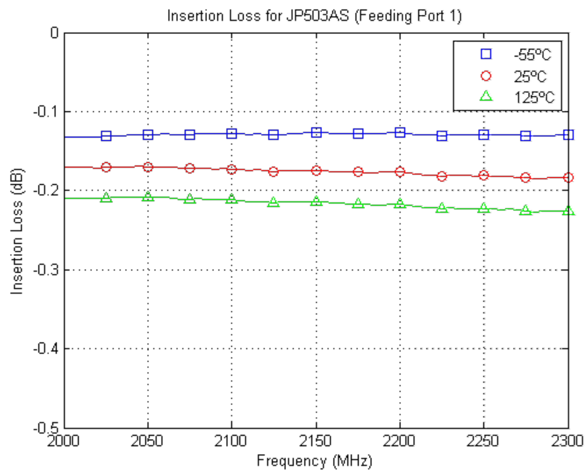


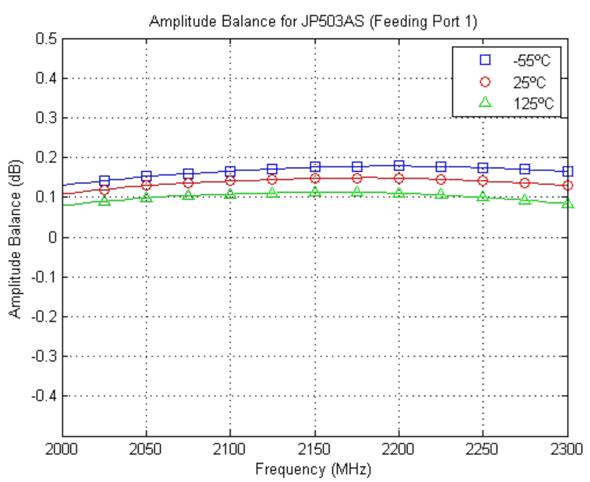


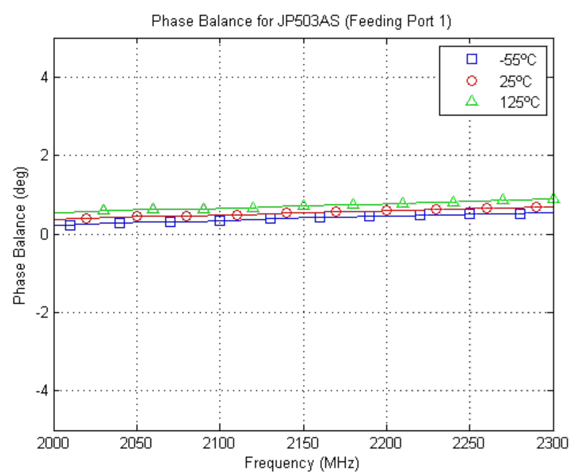


Typical Performance: (-55°C, 25°C& 125°C): 2000 - 2300 MHz





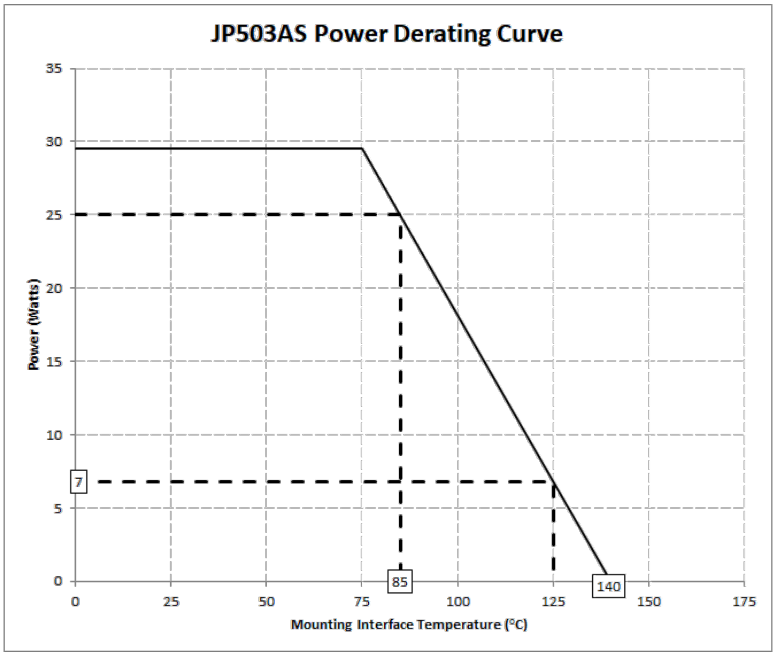




Definition of Measured Specifications

Parameter	Definition	Mathematical Representation
VSWR (Voltage Standing Wave Ratio)	The impedance match of the coupler to a 50Ω system. A VSWR of 1:1 is optimal.	$VSWR = \frac{V_{max}}{V_{min}}$ Vmax = voltage maxima of a standing wave Vmin = voltage minima of a standing wave
Return Loss	The impedance match of the coupler to a 50Ω system. Return Loss is an alternate means to express VSWR.	$Return\ Loss(dB) = 20log\frac{VSWR+1}{VSWR-1}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	$Insertion\ Loss(dB) = 10log\frac{P_{in}}{P_{cpl}+P_{direct}}$
Isolation	The input power divided by the power at the isolated port.	$Isolation(dB) = 10log\frac{P_{in}}{P_{iso}}$
Phase Balance	The difference in phase angle between the two output ports.	Phase at coupled port – Phase at direct port
Amplitude Balance	The power at each output divided by the average power of the two outputs.	$10\log\frac{P_{cpl}}{(P_{cpl}+P_{direct})/2}$ and $10\log\frac{P_{direct}}{(P_{cpl}+P_{direct})/2}$

JP503AS Power Derating Curve



Power Derating:

The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the coupler, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling section of the data sheet.

As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.