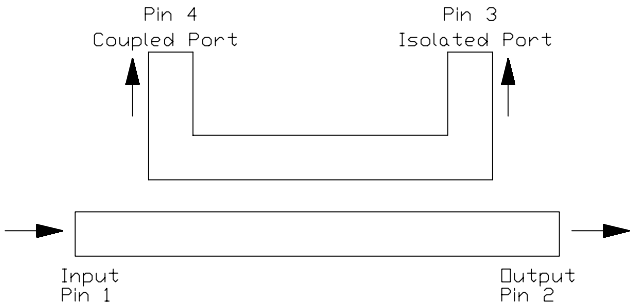
Specification Definitions, Directional Couplers:

Directional couplers provide a simple and convenient means for monitoring or sampling RF energy. Because these couplers can sample transmission line power by a known value, accurate measurements can be made without system interruption. The directional coupler can also monitor system operating frequency, provide signal samples for automatic leveling and frequency control loops and provide relative forward and reverse power for VSWR measurement[1]. The following table is a reference guide to the definitions of the electrical parameters in the specification tables for these directional couplers.



Directional Coupler Schematic Drawing

Parameter	Definition	Mathematical Representation
VSWR	(Voltage Standing Wave Ratio) The impedance match of the device to the overall system. A VSWR of 1.0:1 is optimal[2].	VSWR = Vmax/Vmin Vmax = voltage maxima of a standing wave Vmin = voltage minima of a standing wave VSWR = (1 + ρ)/(1 - ρ)
Reflection Coefficient	The ratio of the amplitude of the reflected wave to that of the incident wave.	ρ = (VSWR - 1)/(VSWR + 1)
Reflection Loss	Also referred to as mismatch loss and is the increase of the insertion loss due to a mismatch.	-10log(1-ρ^2) [dB]
Return Loss	The decibel difference between the power incident on a mismatched discontinuity and the power reflected from the discontinuity	-20log[(VSWR - 1)/(VSWR + 1)] = -20log(ρ) [dB]
Coupling	The decibel difference between the power at the coupled port and the input port	-10log(Power at Pin 4/Power at Pin 1) [dB]
Coupling Loss	Loss to the main line due to coupled power[3].	-10log[1- (Power at Pin 4/Power at Pin 1)] [dB]
Insertion Loss	Power lost on the main line due to reflection, dielectric and conductor losses.	-10log[(Power at Pin 2/Power at Pin 1)+ (Power at Pin 3/Power at Pin 1)+ (Power at Pin 4/Power at Pin 1)] [dB]
Directivity	Power at the isolated port with the coupled power removed.	-10log[(Power at Pin 3/Power at Pin 1)/ (Power at Pin 4/Power at Pin 1)] = -10log[(Power at Pin 3/Power at Pin 4)] [dB]
Frequency Sensitivity	Variation of the coupling response over the bandwidth.	= Max Coupling Value - Min Coupling Value

Notes:
1) For more information on couplers and coupler theory, refer to Anaren's 1997 Catalog, pages 60-73.
2) RF systems are usually matched to 50 ohms, the VSWR is the ratio of the match.
3) For example, a 10dB coupler has 10% of the input power to the coupled port and 90% is transmitted to the coupler's output, which corresponds to a coupling loss of 0.46dB.

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