DATA SHEET

WaveNxt

# NXBM-8P28

## BUTLER MATRIX

8x8 Butler Matrix

2.4 to 8 GHz

sample image of Butler matrix attenuator

### OVERVIEW

The **8×8 Butler Matrix** is a passive RF network designed to provide a set of predefined spatial beams for multi-antenna systems. The network distributes RF energy from a selected input port to multiple outputs with defined phase offsets, enabling repeatable beam formation without active control. The architecture supports bidirectional operation and is suitable for controlled spatial signal processing in test and measurement environments.

### FEATURES

- Predefined fixed beam patterns
- Passive, bidirectional RF operation
- Controlled phase offsets across output ports
- Uniform signal distribution characteristics
- Broadband implementation for multi-standard testing
- Stable and repeatable RF performance
- SMA, 50-ohm RF interfaces

### APPLICATIONS

- Multi-antenna and beamforming system evaluation
- MIMO and spatial channel testing
- Over-the-air (OTA) measurement setups
- Antenna and beam pattern characterization
- RF verification in laboratory and production environments

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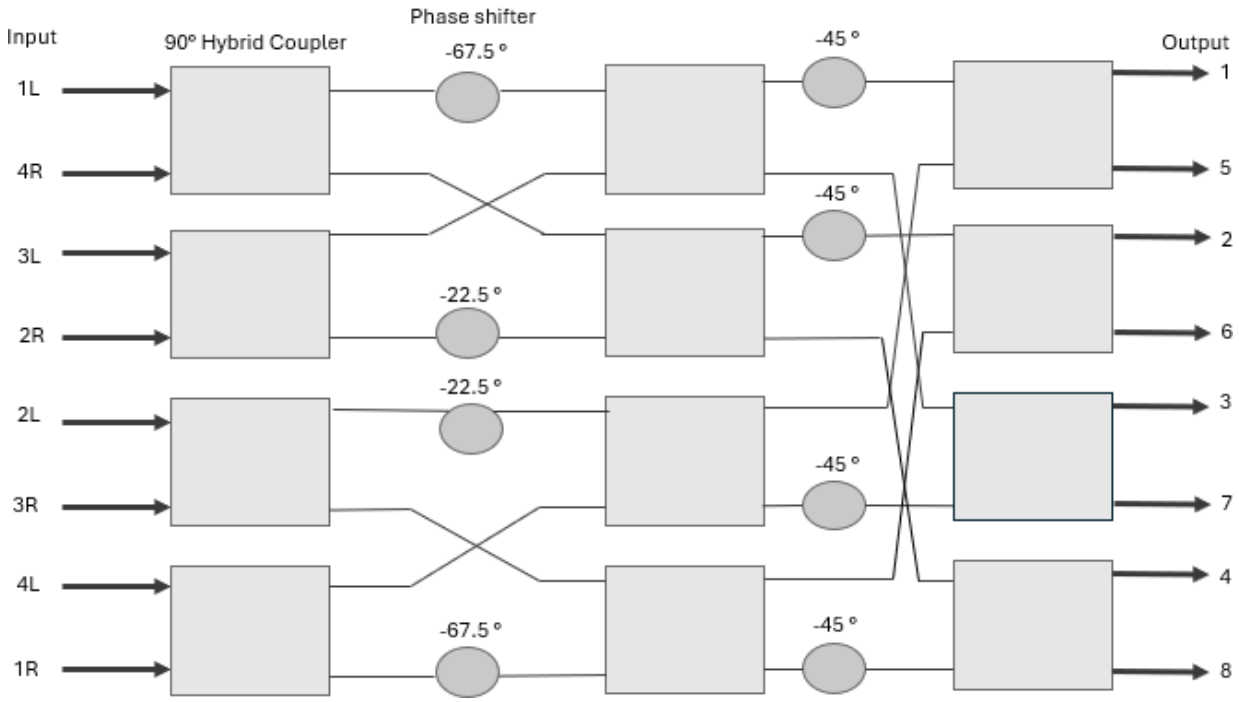
## FUNCTIONAL BLOCK DIAGRAM




## PHASE MAPPING TABLE

| Input port | Expected phase values at output ports ( in degrees) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1L | -112.5 | -135 | -157.5 | -180 | -202.5 | -225 | -247.5 | -270 |
| 2L | -112.5 | -180 | -247.5 | -315 | -22.5 | -90 | -157.5 | -225 |
| 3L | -135 | -247.5 | 0 | -112.5 | -225 | -337.5 | -90 | -202.5 |
| 4L | -180 | -337.5 | -135 | -292.5 | -90 | -247.5 | -45 | -202.5 |
| 4R | -202.5 | -45 | -247.5 | -90 | -292.5 | -135 | -337.5 | -180 |
| 3R | -202.5 | -90 | -337.5 | -225 | -112.5 | 0 | -247.5 | -135 |
| 2R | -225 | -157.5 | -90 | -22.5 | -315 | -247.5 | -180 | -112.5 |
| 1R | -270 | -247.5 | -225 | -202.5 | -180 | -157.5 | -135 | -112.5 |

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## KEY SPECIFICATIONS

| Parameter | | Min | Typ | Max |
|---|---|---|---|---|
| Frequency Range (GHz) | | 2.4 | | 8 |
| Impedance (Ω) | | | 50 | |
| Number of RF Ports | 16 (8 beam input ports, 8 antenna output ports) | | | |
| Insertion loss (in dB) | | | | 11 |
| VSWR | | | 1.5 | |
| Phase Balance (in degrees) | ±9 | | | |
| Amplitude balance (in dB) | 3 | | | |
| Isolation between ports (in dB) | >20 | | | |
| Maximum RF input power (in dBm) | 30 | | | |
| Temperature | 5 °C to 40 °C | | | |
| RF connectors | SMA Female | | | |
| Form factor | Compact and rugged<br>Fits lab racks and field systems easily | | | |
| Dimensions (approx. in mm) | 130 x 110 x 10 | | | |

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