ENGIN·IC

ENGPD00015

Preliminary

Wideband Power Divider, DIE, 4 to 13 GHz

ENGPD00015

Typical Applications

- Space Hybrids
- Military Hybrids
- X-band Radar
- Microwave Radios
- Test and Measurement Systems

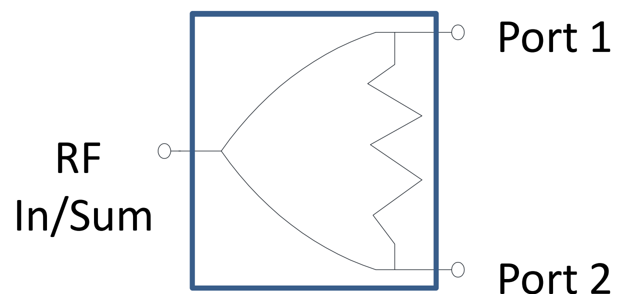
Features

- Wideband performance
- Excellent return loss
  - 18 dB typical
- 20-dB typical isolation
- Small Size
  - 2.26 x 1.56 x 0.1 mm
  - 0.089 x 0.061 x 0.004 inch
- Excellent balance
- RF Power handling: +27 dBm

Description

The ENGPD00015 is a two-way, in-phase Wilkinson-style power splitter / combiner. The device is optimized for performance from 4 to 13 GHz. The chip device offers excellent return loss, high isolation, and very small size. The power divider has gold backside metallization and is designed to be silver epoxy attached. The RF interconnects are designed to account for wire bonds and external microstrip flares for optimal integrated return loss. No additional ground interconnects are required. Nichrome resistors with low temperature coefficients are set up to handle half-watt RF input power levels.

Functional Block Diagram



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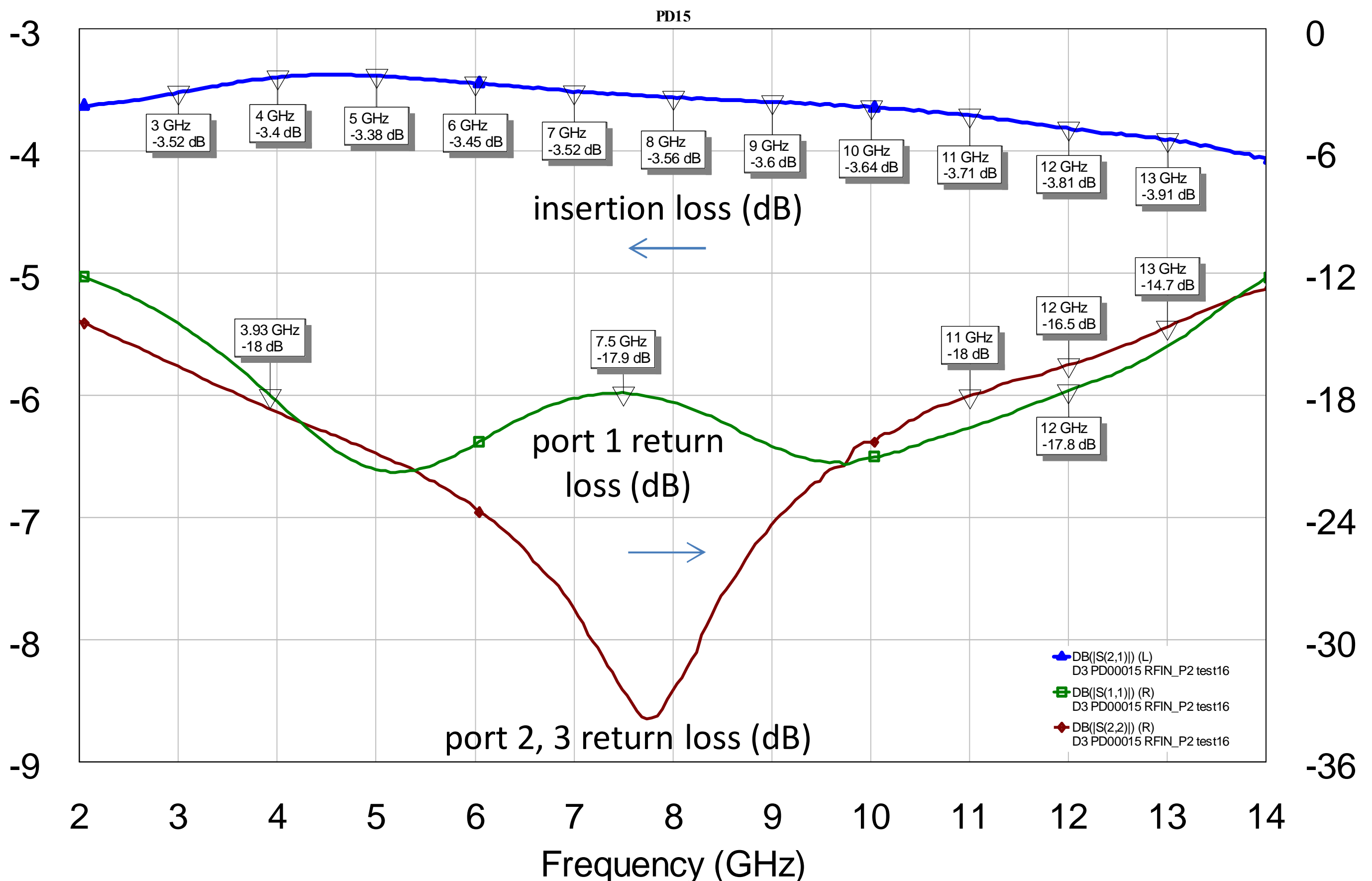
Electrical Specifications, T = 25 °C, Typical Data, 4 – 13 GHz

Parameter	Symbol	Minimum	Typical	Maximum	Units
Insertion Loss	IL	0.3	0.6	1.0	dB
Input Return Loss	S11	14.0	18.0		dB
Output Return Loss	S22/S33	13.0	18.0		dB
Isolation	Iso	13.0	20.0		dB
Amplitude Balance	Abal		+0.1 / -0.1	+0.2 / -0.2	dB
Phase Balance	Pbal		+1.0 / -1.0	+3.5 / -3.5	Deg
Power Handling	Phand			27	dBm

Absolute Maximum Ratings

Parameter	Max level
RF Power	+28 dBm
Storage Temperature	-65 °C to +150 °C
Operating Temperature	-55 °C to +125 °C

Measured RF Insertion Loss*, & In / Out Return Loss (dB)



* Note: Insertion loss (from common arm to either output port) is 0.1 - 0.2 dB less than shown in the plot; fixture losses were not fully deembedded

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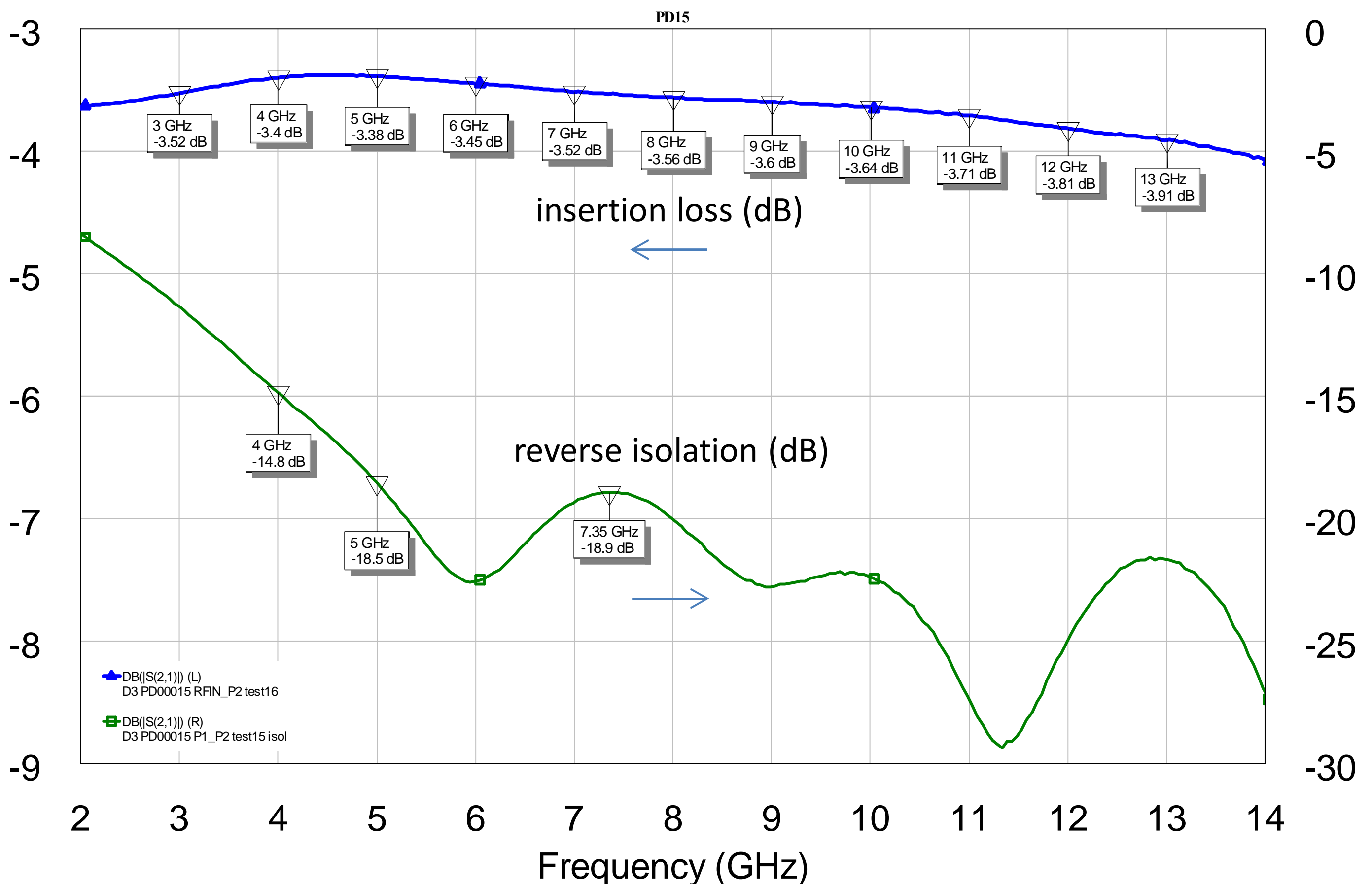
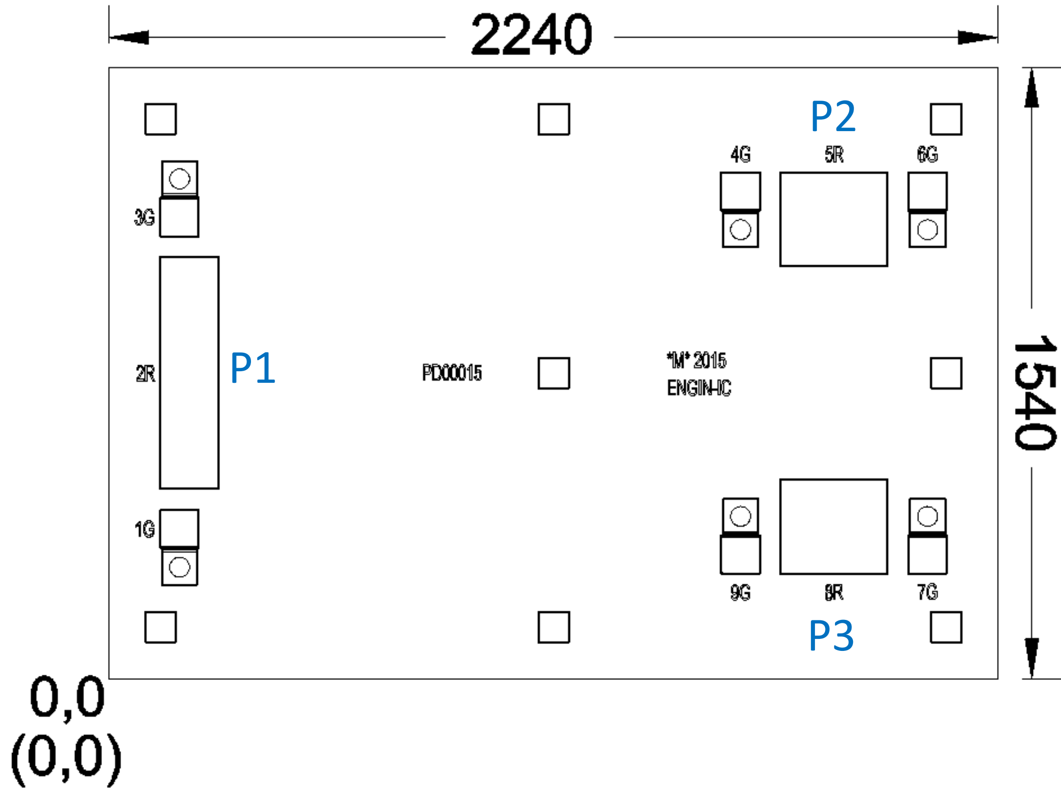
Measured RF Insertion Loss*, & Isolation Between Output Ports (dB)



* Note: Insertion loss (from common arm to either output port) is 0.1 - 0.2 dB less than shown in the plot; fixture losses were not fully deembedded

Outline Drawing



	Pad Dimensions			
	Length (x-dim, um)	Width (y-dim, um)	Length (x-dim, mils)	Width (y-dim, mils)
Port 1 / Common Pad Dimensions	150	586	5.9	23.1
Port 2 / Port 3 Dimensions	271	240	10.7	9.5

	RF Bond Pad Center Point Locations				
	x-dim, um	y-dim, um	Angle (deg)	x-dim, mils	y-dim, mils
Port 1 / Common Pad location	202	770	0	7.95	30.3
Port 2 Location	1827	1157	0	71.93	45.55
Port 3 Location	1827	383	0	71.93	15.08

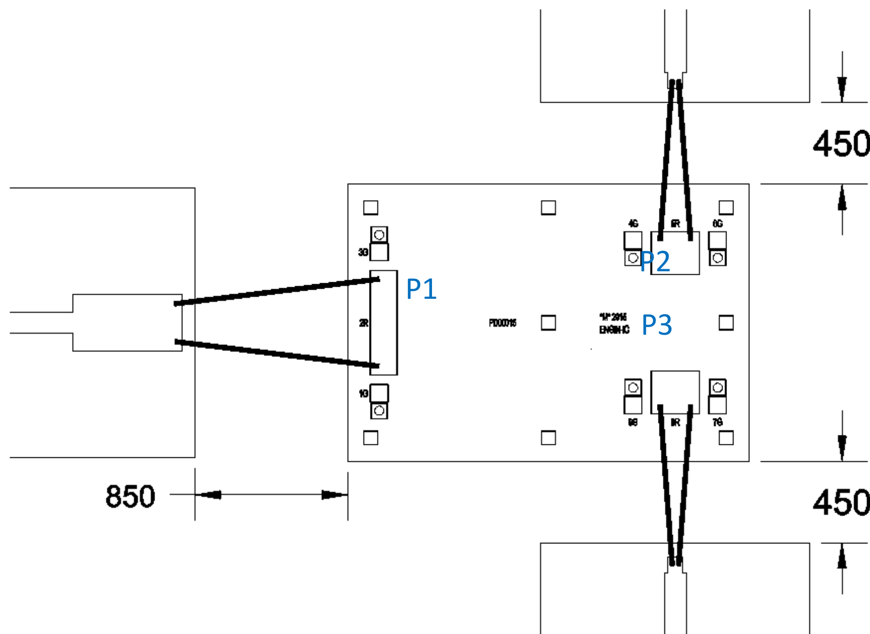
Notes:

1. ***All dimensions are given in both µm and mils. Substrate thickness: 100 µm (0.004").***
2. ***Backside metallization is gold.***
3. ***Bond pad metallization is gold.***

External I/O Microstrip Flare Dimensions (on 5-mil Alumina) and I/O Bond Wire Inductances for Optimum Insertion and Return Loss Performance

S-parameters can be supplied at DIE level such that optimal flare dimensions can be made for the substrate connection medium used (if different from 5-mil Alumina).

	RF I/O port - External Microstrip Flares on 5-mil Alumina				
	Flare Width y-dim, um	Flare Length x-dim, um	Wire Inductance (nH)	Wire Length (um)	Number of Wires
Port 1 / Common Flare Dimensions	310	607	0.59	1220	2
Port 2 Pad Flare Dimensions	85	90	0.41	890	2
Port 3 Pad Flare Dimensions	85	90	0.41	890	2



Notes:

1. ***To achieve bond wire inductance noted, bond the number of wires shown in parallel from each external flare to each associated MMIC RF bond pad as shown above.***
2. ***Gold Wire details:***
   a) ***Diameter: 25.4 µm (1 mil)***
   b) ***Spacing: 4 mils (~ 100 µm) typical***
   c) ***Height above Ground: 8 mils (~ 200 µm) typical (wedge bonds)***
3. ***Wire Length is total length if the wire were made perfectly straight.***
4. ***Ports 1 and 2 can be connected at an angle between 0 and 90 degrees.***