Wideband Power Divider, DIE
2 - 18 GHz

ENGPD00014
Rev. V1

Features

- Wideband Performance
- Excellent Return Loss: 20 dB
- RF Power Handling: 27 dBm
- Excellent Balance
- Small Size:
  2.76 x 2.26 x 0.1 mm
  0.109 x 0.089 x 0.004 inch
- RoHS* Compliant

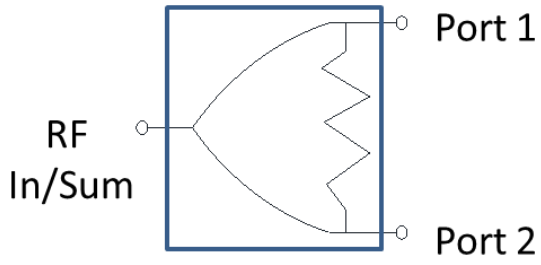
Applications

- Space Hybrids
- Military Hybrids
- Microwave Radios
- Test & Measurement Systems

Description

The ENGPD00014 is a two-way, in-phase Wilkinson-style power splitter / combiner. The device is optimized for performance from 2 to 18 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 Schematic



Ordering Information

Part Number	Package
ENGPD00014	DIE

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: Freq. = 2 - 18 GHz, T_A = +25°C

Parameter	Units	Min.	Typ.	Max.
Insertion Loss	dB	0.4	1.0	2.0
Input Return Loss	dB	15	19	—
Output Return Loss	dB	17	20	—
Isolation	dB	12	18	—
Amplitude Balance	dB	—	+0.1 / -0.1	+0.2/-0.2
Phase Balance	Deg	—	+1.0 / -1.0	+3.5 / -3.5
Power Handling	dBm	—	—	27

Absolute Maximum Ratings[5,6]

Parameter	Absolute Maximum
RF Input Power	28 dBm
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

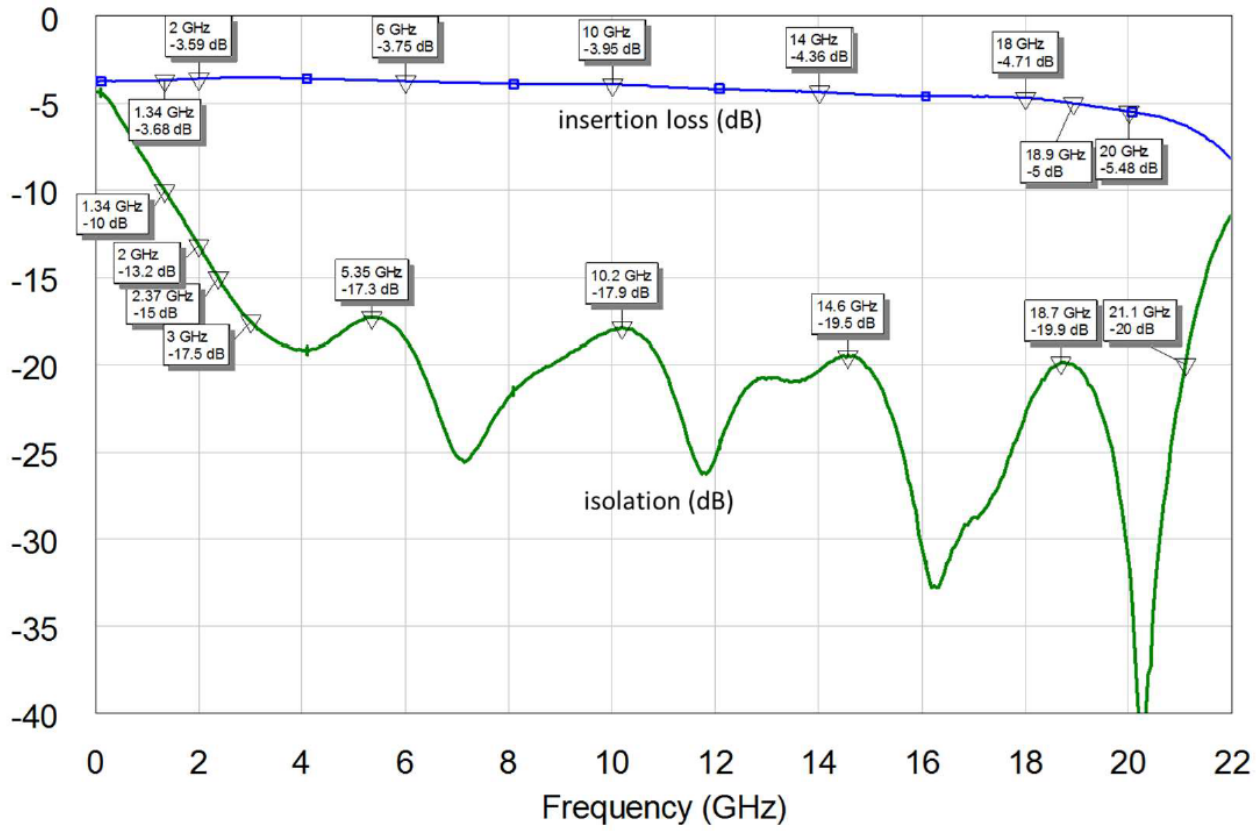
Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves

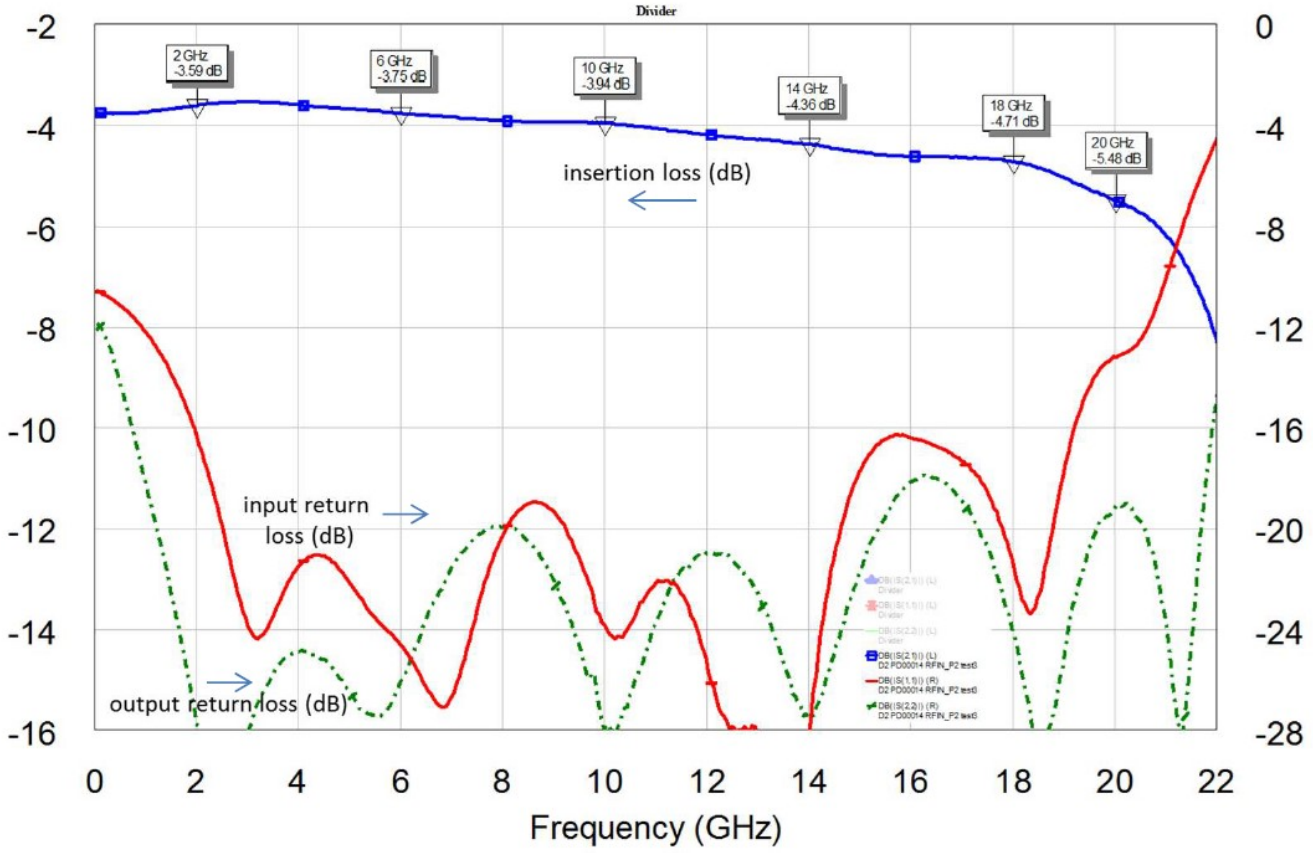
Measured RF Insertion Loss*, & Isolation Between Output Ports (dB)



* 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 de-embedded

Typical Performance Curves

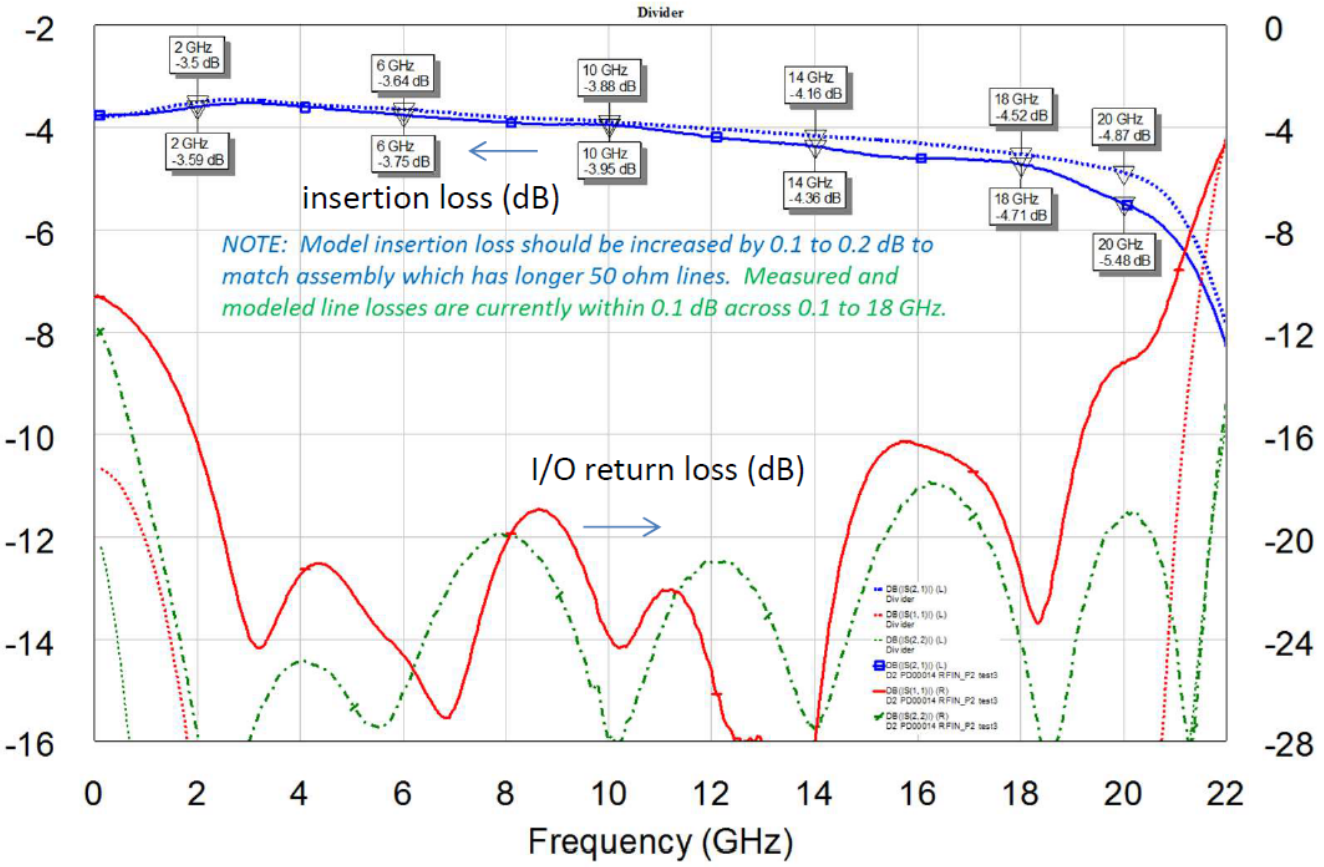
Measured RF Insertion Loss*, & In / Out Return Loss (dB)



* 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 de-embedded

Typical Performance Curves

Measured (solid lines) and Modeled RF Insertion Loss – good agreement to 18 GHz

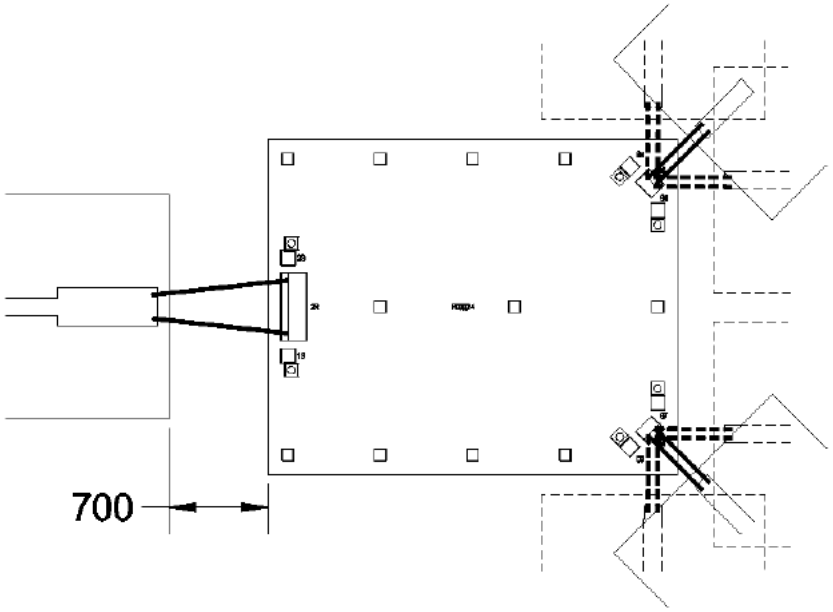


* Note: Insertion loss (from common arm to either output port) is 0.1 - 0.2 dB less than shown in the plot; fixture losses were not fully de-embedded

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

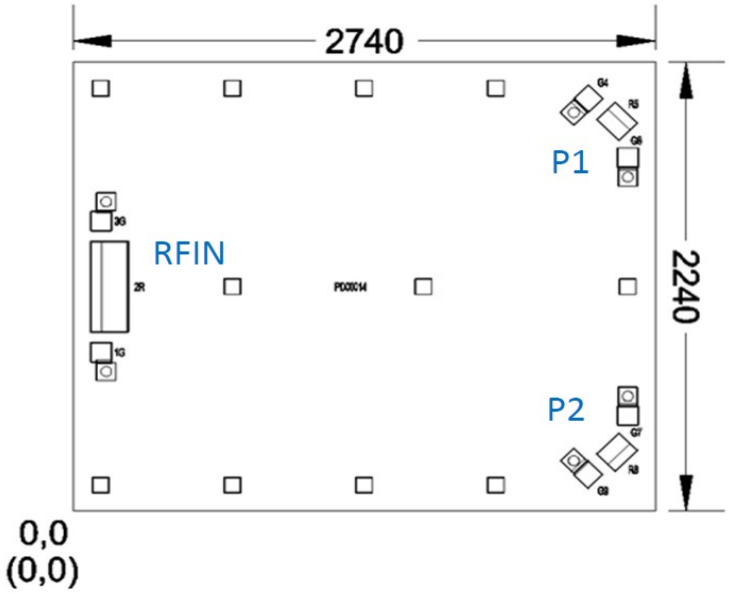
S-parameters can be supplied at DIE level such that optimal flare dimensions can be made for the substrate connection medium used (if different from 5-mil Alumina).

Pad Flare Dimension	Flare Length x-dim, (µm)	Flare Width y-dim, (µm)	Wire Inductance (nH)	Wire Length (µm)	# of Wires
RF Input / Sum Flare	669	257	0.42	914	2
Port 1 Pad Flare	90	117	0.22	483	2
Port 2 Pad Flare	90	117	0.22	483	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:
   Diameter: 25.4 µm (1 mil)
   Spacing: 4 mils (~ 100 µm) typical
   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 & 2 can be connected at an angle between 0 and 90 degrees.

Outline Drawing



Pad Dimensions

Pad Description	Length x-dim, (µm)	Width y-dim, (µm)	Length x-dim, (mils)	Width y-dim, (mils)
RF Input / Sum	179	454	7	17.9
Port 1 / Port 2	129	150	4.9	5.9

RF Bond Pad Center Point Locations

Pad Description	Length x-dim, (µm)	Width y-dim, (µm)	Angle (deg.)	Length x-dim, (mils)	Width y-dim, (mils)
RF Input / Sum	173	1120	0	6.8	44.1
Port 1	2560	1945	45	100.8	76.6
Port 2	2560	296	45	100.8	11.7

Notes:
All dimensions are given in both µm and mils.
Substrate thickness: 100 µm (0.004”).
Backside metallization is gold.
Bond pad metallization is gold.