Preliminary

2 dB Equalizer; 3.5 to 18.5 GHz

ENGEZ00012

Typical Applications

- Wideband Products
- Space Hybrids
- Military Hybrids
- Test and Measurement Systems

Features

- Wideband performance
- Excellent return loss
  - > 18 dB typical
- Small Size
  - 0.76 x 0.76 x 0.1 mm
  - 0.030 x 0.030 x 0.004 inch
- Good attenuation linearity
- RF Power handling: +24 dBm

Description

The ENGEZ00012 is a broadband equalizer. The device is optimized for performance from 3.5 to 18.5 GHz but offers excellent return loss from 1 to 22 GHz. The product is designed for form-fit replacement to the ENGIN-IC line of attenuators and can be used to compensate for broadband insertion loss variation with frequency. The equalizer 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.

Capabilities

- Low cost custom product development
- Up to 10 to 1 Bandwidth
- Positive or Negative slope with frequency
- 1.5 to 8 dB attenuation compensation
- 24 dBm power handling standard
- 33 dBm with custom design

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Electrical Specifications, T = 25 ^{o}C, Typical Data, ENGEZ00012

Parameter	Symbol	Minimum	Typical	Maximum	Units
Insertion Loss @ 3.5 GHz	IL	3.7	4	4.3	dB
Insertion Loss @ 18.5 GHz	IL	1.7	2	2.3	dB
Input Return Loss	S11		20.0		dB
Output Return Loss	S22		20.0		dB
Power Handling	Phand			24	dBm

Absolute Maximum Ratings

Parameter	Max level
RF Power	+27 dBm
Storage Temperature	-65 ^{o}C to +150 ^{o}C
Operating Temperature	-55 ^{o}C to +125 ^{o}C

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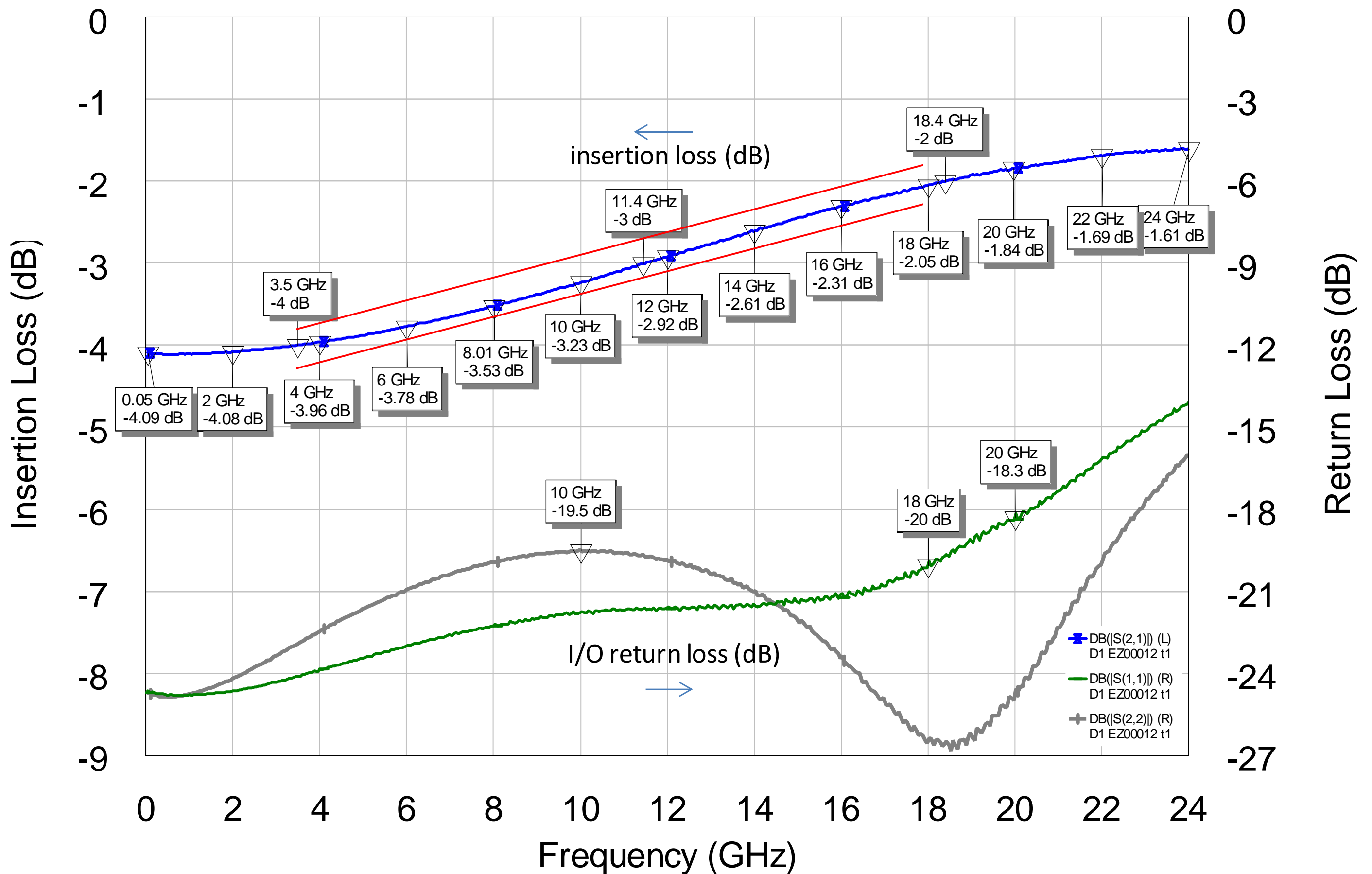
Measured RF Insertion Loss & Return Loss (dB);

assembly includes bond wires and external microstrip flares



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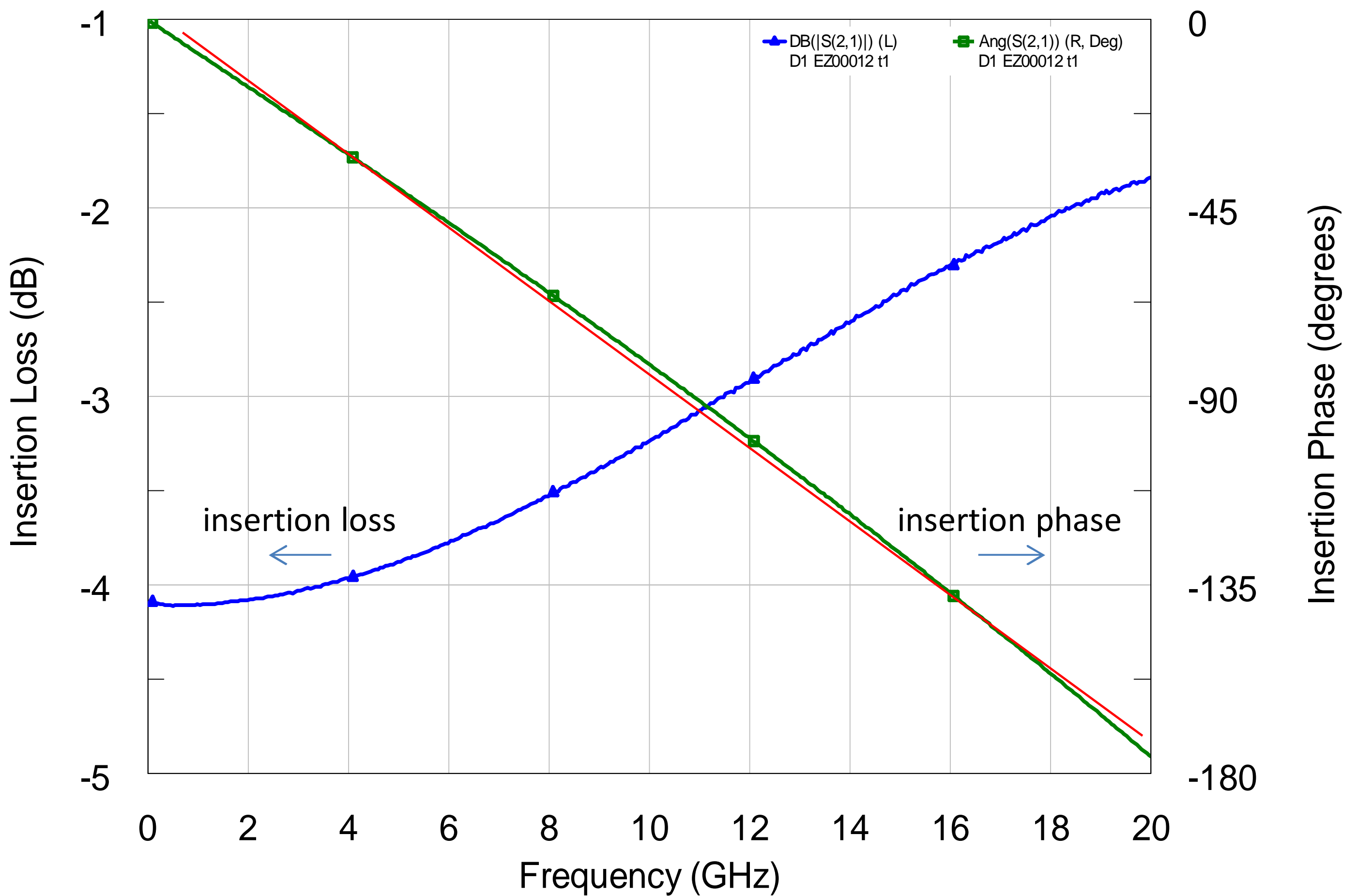
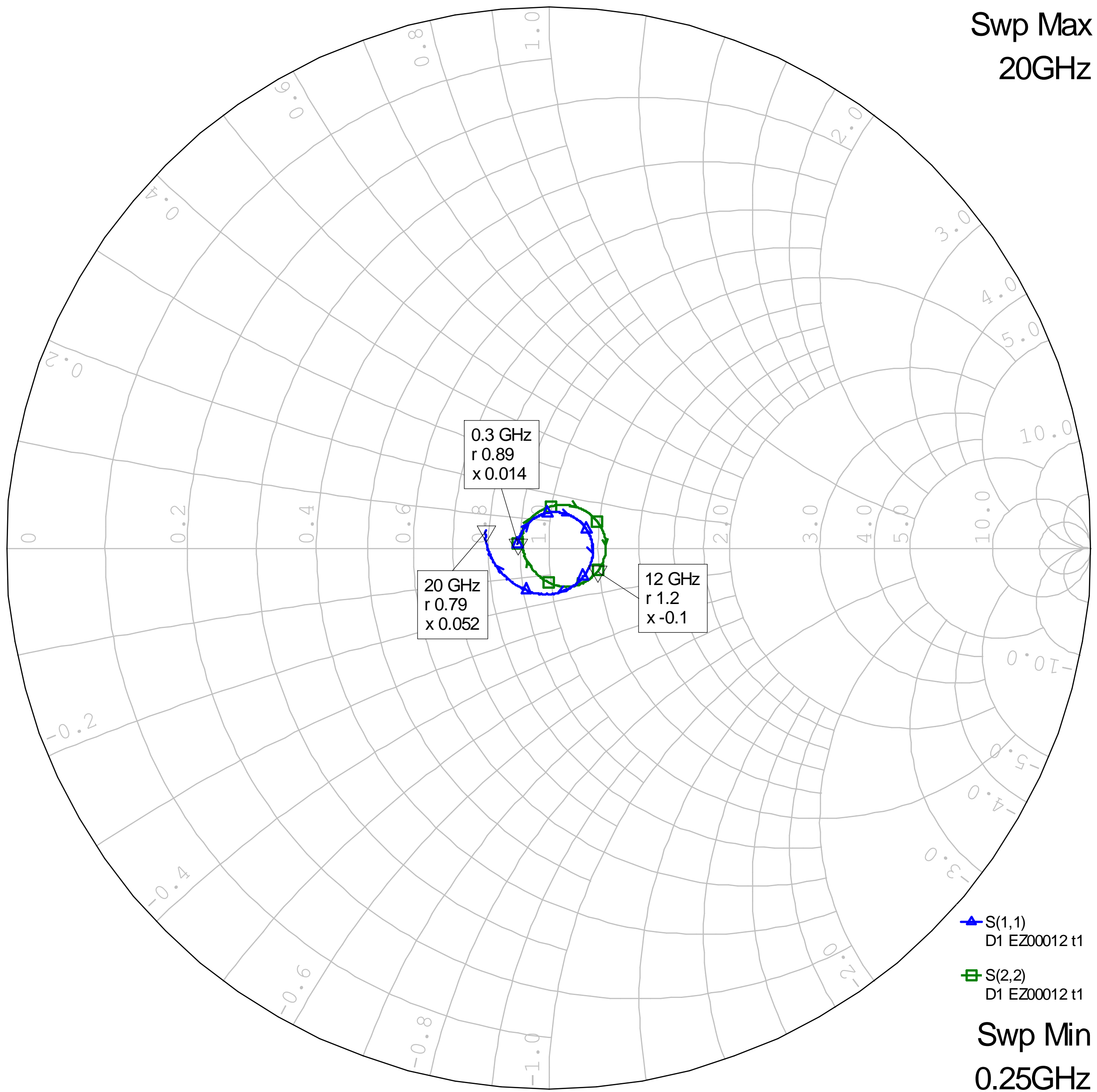
Measured RF Insertion Loss & Insertion Phase (degrees);

assembly includes bond wires and external microstrip flares

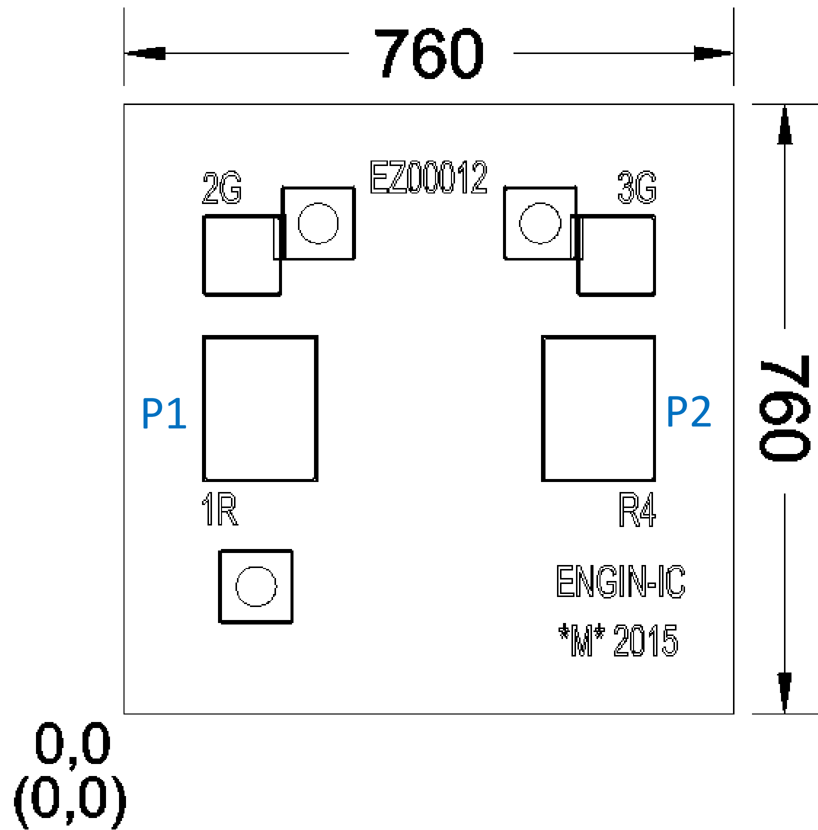


straight line, to aid in showing deviation from linear phase

Measured Input (blue) & Output (green) Reflection Coefficients;
assembly includes bond wires and external microstrip flares



Outline Drawing



	Pad Dimensions			
	Length (x-dim, um)	Width (y-dim, um)	Length (x-dim, mils)	Width (y-dim, mils)
Port 1 Pad Dimensions	142	181	5.6	7.1
Port 2 Pad Dimensions	142	181	5.6	7.1

	RF Bond Pad Center Point Locations				
	x-dim, um	y-dim, um	Angle (deg)	x-dim, mils	y-dim, mils
Port 1 Pad Location	169	380	0	6.7	15
Port 2 Pad Location	591	380	0	23.3	15

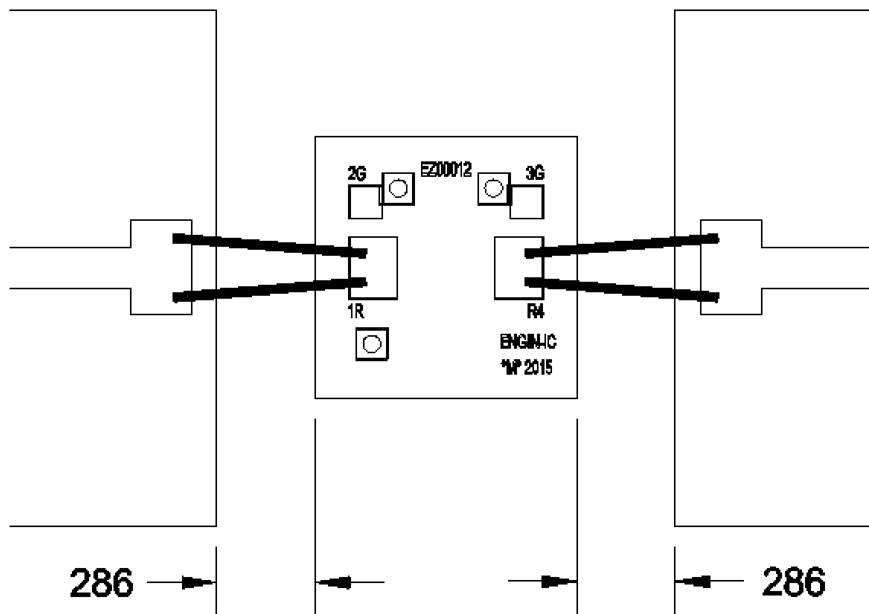
Notes:

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 Flare Dimensions	273	175	0.26	559	2
Port 2 Flare Dimensions	273	175	0.26	559	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.***

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