Lowpass Filter, DIE
12 GHz

ENGFC00022
Rev. V1

Features

- Wideband Performance
- Excellent Return Loss: >20 dB
- RF Power Handling: 32 dBm
- Die Size:
  1.5 x 0.72 x 0.1 mm
  0.059 x 0.028 x 0.004 inch
- RoHS* Compliant

Applications

- Miniature Clean-up Circuit
- Narrow or Wideband Products
- Space Hybrids
- Military Hybrids
- Test & Measurement Systems

Description

The ENGFC00022 is a miniature lowpass filter design with a cutoff frequency above 12 GHz. The device offers low insertion loss of less than 0.3 dB. It provides a minimum of 5 dB attenuation from 24 to 36 GHz. The design optimizes around small size and custom products can incorporate additional rejection as required. The filter 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
- 3 to 7 Section Response
- Capabilities for:
  Bandpass
  Highpass
  Lowpass
- 32 dBm Power Handling Standard
- 40 dBm with Custom Design

Ordering Information

Part Number	Package
ENGFC00022	Die

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

Electrical Specifications: T_A = +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	2 GHz 12 GHz	dB		0.07 0.25	0.15 0.35
Input / Output Return Loss	3.5 - 18.5 GHz	dB	—	20	—
Attenuation	24 GHz	dB	5	—	—
Power Handling	3.5 - 18.5 GHz	dBm	—	32	—

Absolute Maximum Ratings[1,2:]

Parameter	Absolute Maximum
RF Power	34 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

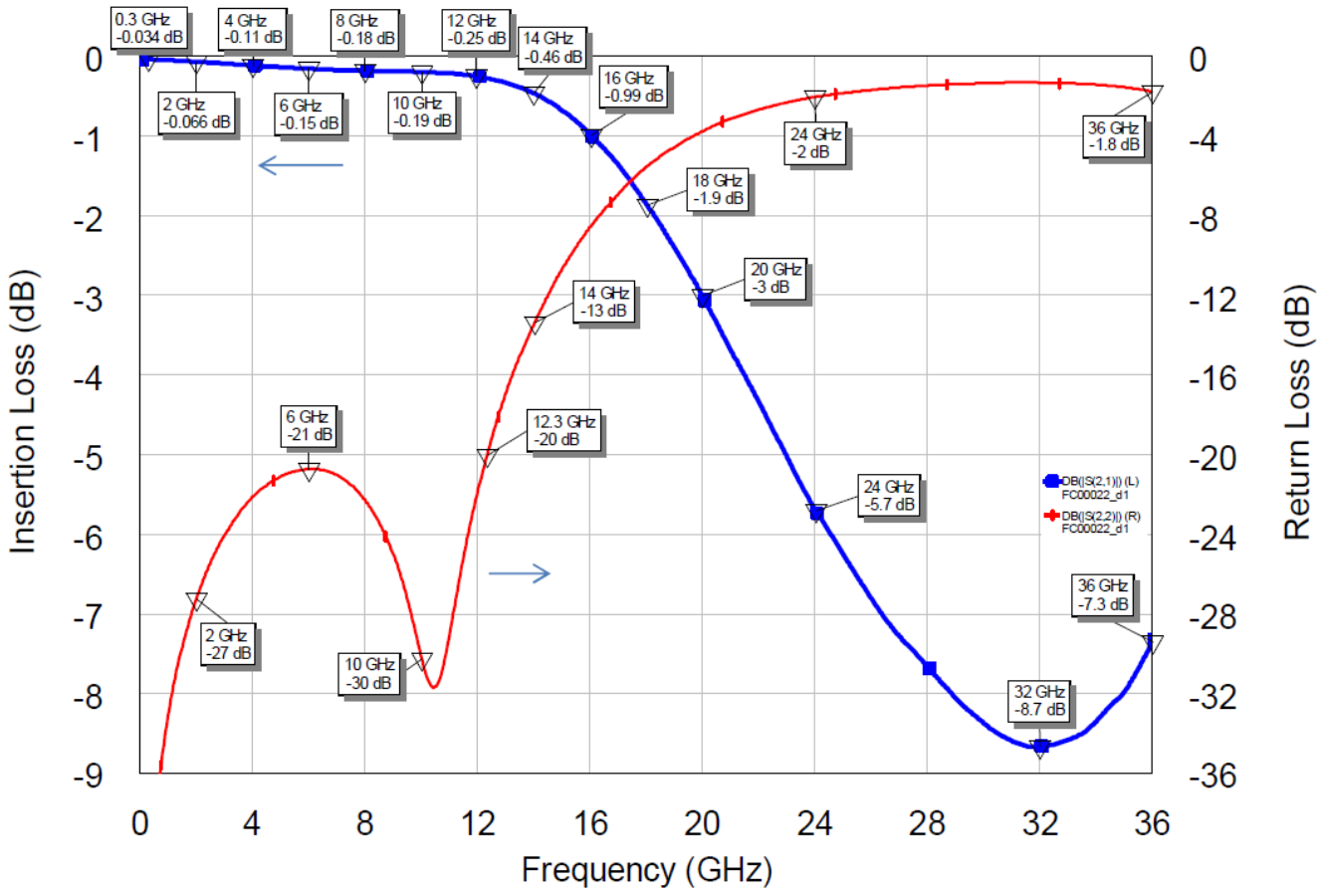
Please observe the following precautions to avoid damage:

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.

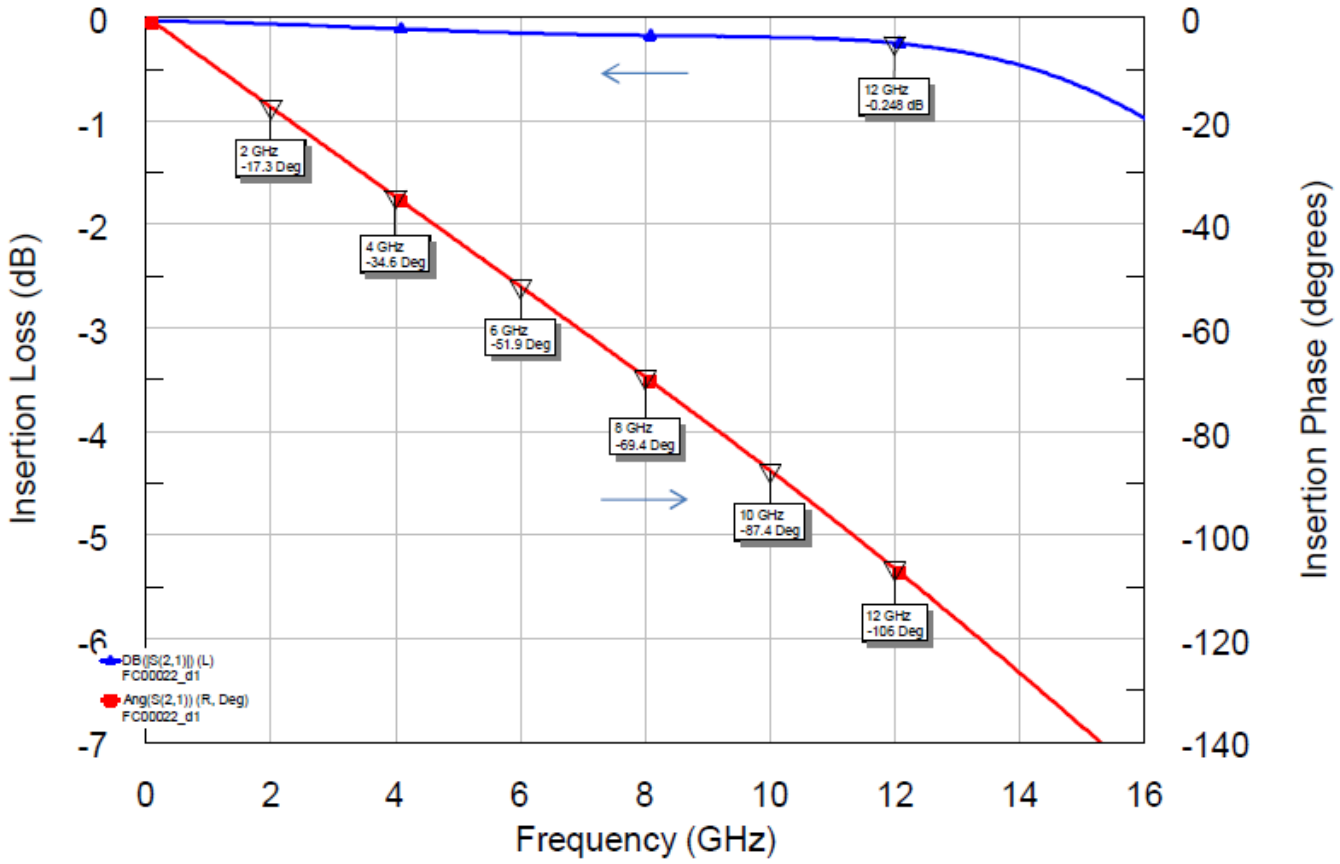
RF Data With Wirebonds and External Flare Pads

Insertion Loss & Return Loss



RF Data With Wirebonds and External Flare Pads

Insertion Loss and Insertion Phase

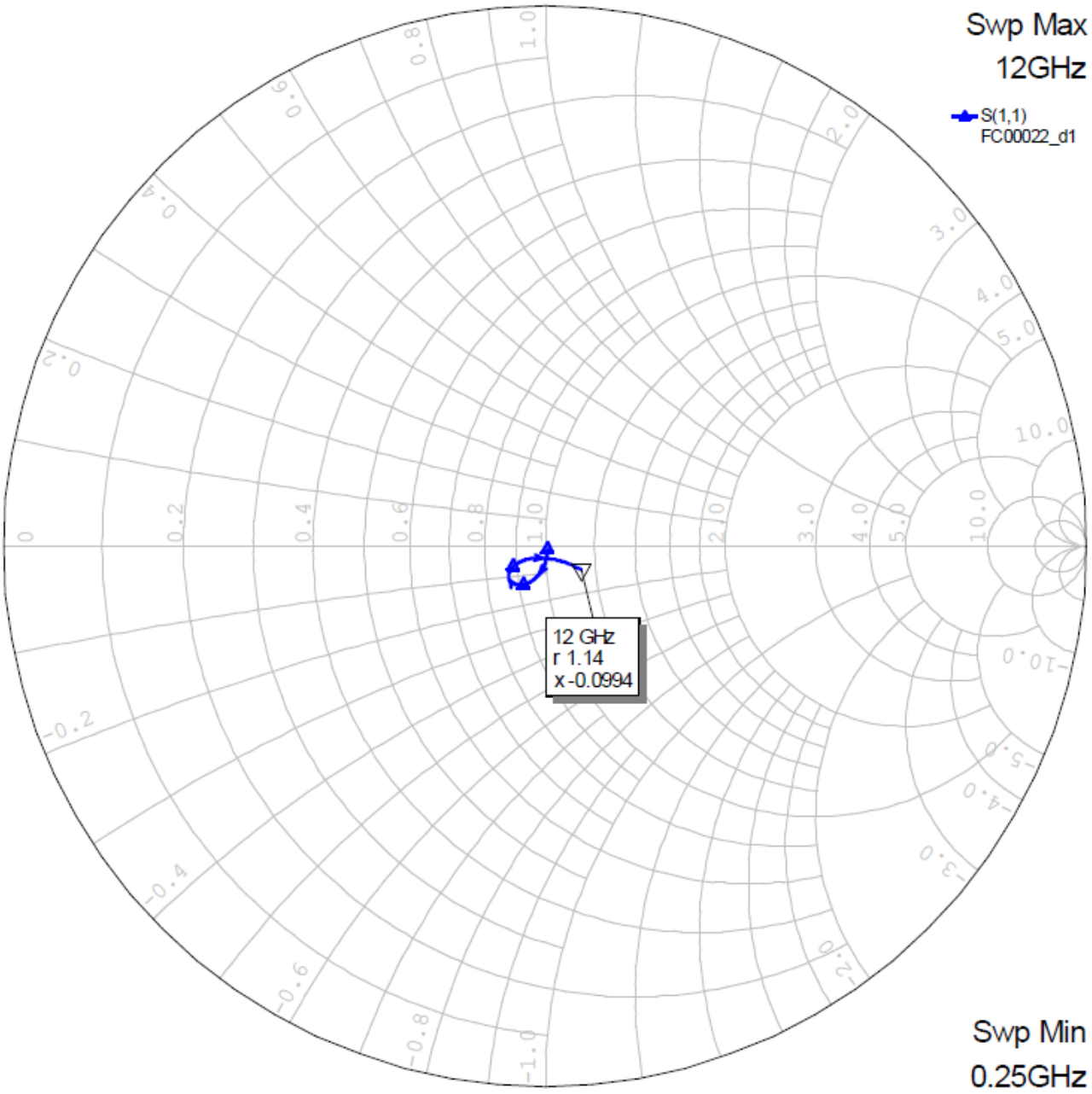


Deviation from Linear Phase:

6 GHz:	0 degrees
10 GHz:	1
12 GHz:	2

RF Data With Wirebonds and External Flare Pads

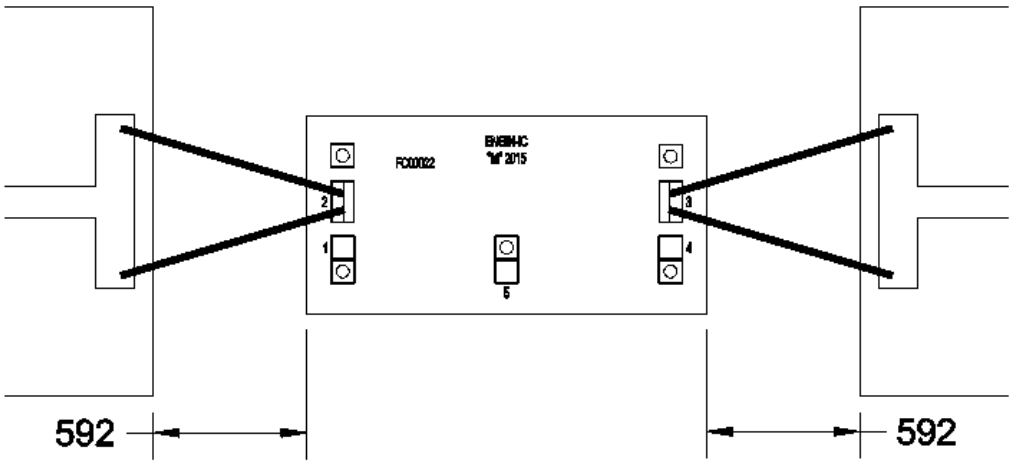
Input (blue) & Output (green) Reflection Coefficients



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

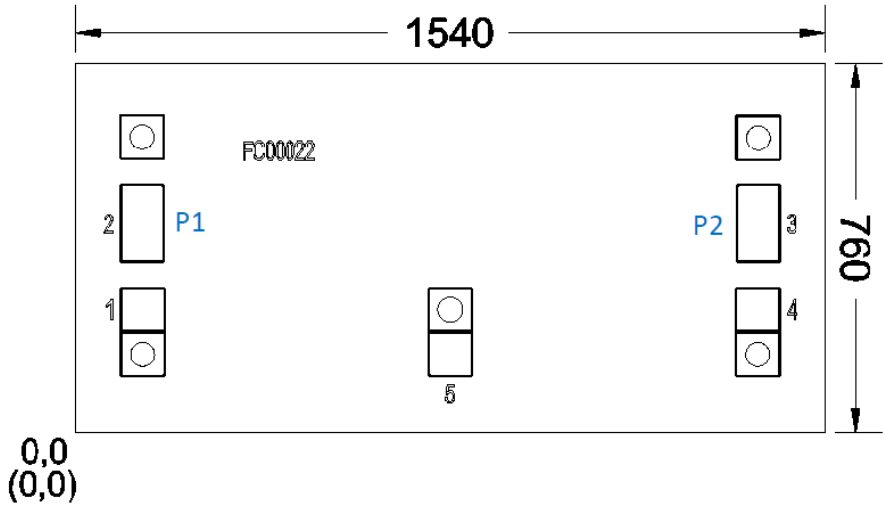
S-parameters can be supplied at DIE level such that optimal flare dimensions can be made for the substrate connection medium used (if different from 5-mil Alumina).

Flare Dimensions	Flare Width (µm)	Flare Length (µm)	Wire Inductance (nH)	Wire Length (µm)	Number of Wires
Port 1	668	148	0.42	889	2
Port 2	668	148	0.42	889	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.

Outline Drawing



Pad Dimensions

	Length (x-dim, µm)	Width (y-dim, µm)	Length (x-dim, µm)	Width (y-dim, µm)
Port 1	90	160	3.5	6.3
Port 2	90	160	3.5	6.3

Pad Location

	Length (x-dim, µm)	Width (y-dim, µm)	Angle (deg.)	Length (x-dim, µm)	Width (y-dim, µm)
Port 1	137	430	0	5.4	16.9
Port 2	1403	430	0	55.2	16.9

Notes:
All dimensions are in µm (inches).
Substrate thickness: 100 µm (0.004”).
Backside metallization is gold.
Bond pad metallization is gold.
No DC blocking capacitors