

## The Big Deal

- Ultra-Wide Bandwidth, usable over 1.8 to 28 GHz
- High Power Handling, 2.5W as a Splitter



## Product Overview

Mini-Circuits EP2K-D+ is a MMIC splitter/combiner die designed for wideband operation from 2 to 26.5 MHz. This model provides excellent power ratings up to 2.5W power handling (as a splitter) and up to 1.2A DC current handling. Manufactured using GaAs IPD technology, it provides a high level of ESD protection and excellent reliability.

## Key Features

| Feature                                                                                   | Advantages                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wideband, 1.8 to 28 GHz                                                                   | One power splitter can be used in many applications, saving component count. Also ideal for wideband applications such as military and instrumentation.                                                                                                                                                                                                                                                |
| Excellent power handling<br>2.5W as a splitter<br>1.7W internal dissipation as a combiner | In power combiner applications, half the power is dissipated internally. EP2K-D+ is designed to handle 1.7W internal dissipation as a combiner allowing reliable operation without excessive temperature rise. Similar splitters implemented as Wilkinson splitters on PCB require big resistors and additional heat sinking.<br>As a splitter, EP2K-D+ can handle up to 2.5W in a very small package. |
| DC Passing up to 1.2A                                                                     | DC current passing is helpful in applications where both RF & DC need to pass through the DUT, such as antenna mounted hardware.                                                                                                                                                                                                                                                                       |
| Unpackaged die                                                                            | Enables user to integrate it directly into hybrids.                                                                                                                                                                                                                                                                                                                                                    |

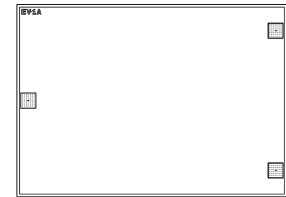
2 Way-0° 50Ω 2 to 26.5 GHz

**Features**

- Wide bandwidth, 2 to 26.5 GHz, usable over 1.8 to 28 GHz
- Excellent amplitude unbalance, 0.1 dB typ.
- Good phase unbalance, 1.5 to 8.5 deg. typ.
- High ESD level\*
- DC passing

**Applications**

- WIMAX
- ISM
- Instrumentation
- Radar
- WLAN
- Satellite communications
- LTE

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

**Electrical Specifications at 25°C<sup>1</sup>**

| Parameter                                 | Frequency (GHz) | Min. | Typ. | Max. | Unit   |
|-------------------------------------------|-----------------|------|------|------|--------|
| Frequency Range                           |                 | 2    |      | 26.5 | GHz    |
| Insertion Loss, above 3.0 dB <sup>2</sup> | 2 - 5           |      | 0.8  |      | dB     |
|                                           | 5 - 10          |      | 0.9  |      |        |
|                                           | 10 - 18         |      | 1.6  |      |        |
|                                           | 18 - 26.5       |      | 2.1  |      |        |
| Isolation                                 | 2 - 5           |      | 9.5  |      | dB     |
|                                           | 5 - 10          |      | 18.0 |      |        |
|                                           | 10 - 18         |      | 18.9 |      |        |
|                                           | 18 - 26.5       |      | 15.9 |      |        |
| Phase Unbalance                           | 2 - 5           |      | 1.5  |      | Degree |
|                                           | 5 - 10          |      | 2.9  |      |        |
|                                           | 10 - 18         |      | 6.0  |      |        |
|                                           | 18 - 26.5       |      | 8.5  |      |        |
| Amplitude Unbalance                       | 2 - 5           |      | 0.1  |      | dB     |
|                                           | 5 - 10          |      | 0.1  |      |        |
|                                           | 10 - 18         |      | 0.2  |      |        |
|                                           | 18 - 26.5       |      | 0.3  |      |        |
| VSWR (Port S)                             | 2 - 5           |      | 1.6  |      | :1     |
|                                           | 5 - 10          |      | 1.2  |      |        |
|                                           | 10 - 18         |      | 1.3  |      |        |
|                                           | 18 - 26.5       |      | 1.5  |      |        |
| VSWR (Port 1-2)                           | 2 - 5           |      | 1.7  |      | :1     |
|                                           | 5 - 10          |      | 1.2  |      |        |
|                                           | 10 - 18         |      | 1.4  |      |        |
|                                           | 18 - 26.5       |      | 1.6  |      |        |

1. Tested on Mini-Circuits die characterization test board.

**Maximum Ratings<sup>2,3</sup>**

| Parameter                   | Ratings                                             |
|-----------------------------|-----------------------------------------------------|
| Operating Temperature       | -40°C to 85°C                                       |
| Power Input (as a splitter) | 2.5W max. at 25°C. Derate linearly to 1.25W at 85°C |
| Internal Dissipation        | 1.7W max. at 25°C. Derate linearly to 1.1W at 85°C  |
| DC Current                  | 1.2A max. at 25°C. Derate linearly to 0.6A at 85°C  |

2. Permanent damage may occur if any of these limits are exceeded.

3. Die performance is measured in industry standard 4x4mm 24-lead MCLP package.

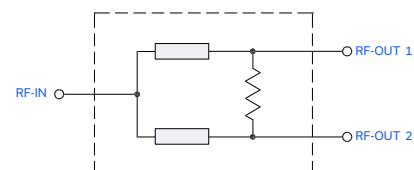
\* ESD rating

Human body model (HBM): Class 2(1800 to <4000 V) in accordance with ANSI/ESD 5.1-2007

Machine model (MM): Class M3 (200 to <400 V) in accordance with ANSI/ESD 5.2-2009

**Pad Connections**

| Pad     | Description                              |
|---------|------------------------------------------|
| RF IN   | RF-IN as splitter / RF-OUT as combiner   |
| RF OUT1 | RF-OUT1 as splitter / RF-IN1 as combiner |
| RF OUT2 | RF-OUT1 as splitter / RF-IN1 as combiner |

**Simplified Electrical Schematic**

Die Layout

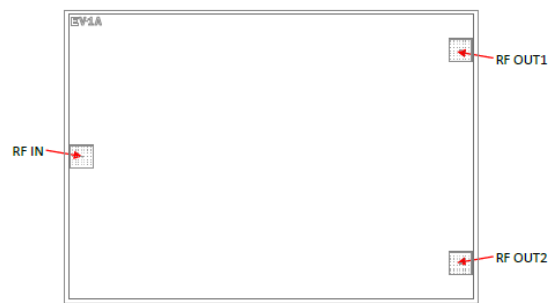


Fig 2. Die Layout

Bonding Pad Position

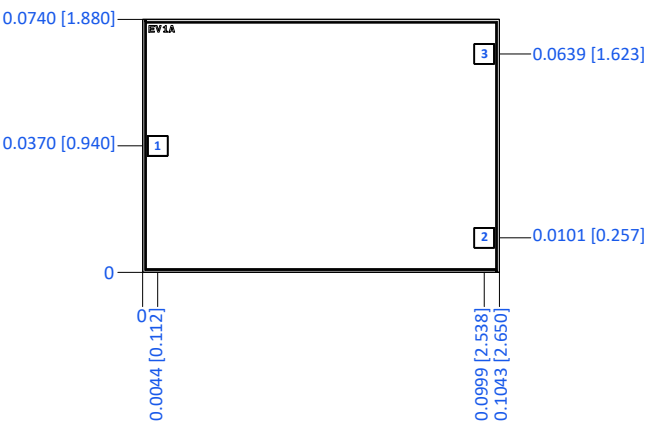


Fig 3. Bonding Pad Positions

Assembly and Handling Procedure

- 1. Storage**  
Dice should be stored in a dry nitrogen purged desiccators or equivalent.
- 2. ESD**  
MMIC amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
- 3. Die Attach**  
The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
- 4. Wire Bonding**  
Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

**DIMENSION: inches [mm], Typical**

|                                |                                    |
|--------------------------------|------------------------------------|
| Die Size                       | 0.1043 x 0.0740<br>[2.650 x 1.880] |
| Die Thickness                  | 0.0079<br>[0.200]                  |
| Bond Pad Size                  |                                    |
| Pad 1,2,3                      | 0.0056 x 0.0056<br>[0.142 x 0.142] |
| Plating (Pads & bottom of Die) | Gold                               |

Assembly Diagram



Four 1 mil bond wires should be used for RF input and RF output.

Recommended Wire Length, Typical

| Wire                    | Wire Length (mm) | Wire Loop Height (mm) |
|-------------------------|------------------|-----------------------|
| RF IN, RF OUT1, RF OUT2 | 0.40             | 0.15                  |

**Additional Detailed Technical Information***additional information is available on our dash board.*

|                                                 |                                                                             |           |
|-------------------------------------------------|-----------------------------------------------------------------------------|-----------|
| Performance Data                                | Data Table                                                                  |           |
|                                                 | Swept Graphs                                                                |           |
|                                                 | S-Parameter (S3P Files) Data Set with and without port extension(.zip file) |           |
| Case Style                                      | Die                                                                         |           |
| Die Ordering and packaging information (Note 3) | Quantity, Package                                                           | Model No. |
|                                                 | Small, Gel - Pak: 5,10,50                                                   | EP2K-DG+  |
|                                                 | Medium†, Partial Wafer: 350                                                 | EP2K-DP+  |
|                                                 | Large†, Full Wafer                                                          | EP2K-DF+  |
|                                                 | †Available upon request contact sales representative                        |           |
|                                                 | Refer to <a href="#">AN-60-067</a>                                          |           |
| Environmental Ratings                           | ENV-80                                                                      |           |

3. Dice taken from PCM good wafer. No RF or DC test performed.

**ESD Rating\*\***

Human Body Model (HBM): Class 2 (1800 to &lt;4000V) in accordance with ANSI/ESD STM 5.1 - 2007

Machine Model (MM): Class M3 (200 to &lt;400V) in accordance with ANSI/ESD STM5.2-1999

\*\* Tested in industry standard 4X4mm, 24-Lead MCLP package.

**Additional Notes**

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
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# 2 Way-0° Power Splitter/Combiner Die

EP2K-D+

## Typical Performance Data

### Full 2-Port Extension

TEST CONDITIONS: Input Power = -10dBm @Temperature = +25°C

| FREQ.<br>(MHz) | TOTAL LOSS <sup>(1)</sup> |      | AMP.<br>UNBAL. | ISOLATION | PHASE<br>UNBAL. | VSWR |      |      |
|----------------|---------------------------|------|----------------|-----------|-----------------|------|------|------|
|                | (dB)                      | (dB) | (dB)           | (dB)      | (deg.)          | (:1) |      |      |
|                | S-1                       | S-2  |                | 2-1       |                 | S    | 1    | 2    |
| 500            | 3.73                      | 3.75 | 0.02           | 4.46      | 0.10            | 1.88 | 1.77 | 1.76 |
| 1000           | 3.79                      | 3.81 | 0.02           | 5.73      | 0.28            | 1.92 | 1.80 | 1.78 |
| 1500           | 3.77                      | 3.76 | 0.01           | 7.60      | 0.33            | 1.90 | 1.92 | 1.88 |
| 1800           | 3.76                      | 3.73 | 0.02           | 8.79      | 0.27            | 1.85 | 1.97 | 1.92 |
| 2000           | 3.76                      | 3.73 | 0.03           | 9.54      | 0.19            | 1.82 | 1.98 | 1.93 |
| 2500           | 3.78                      | 3.76 | 0.02           | 11.07     | 0.03            | 1.78 | 1.92 | 1.88 |
| 3000           | 3.72                      | 3.75 | 0.02           | 12.31     | 0.12            | 1.74 | 1.78 | 1.78 |
| 3500           | 3.63                      | 3.69 | 0.07           | 13.61     | 0.01            | 1.68 | 1.64 | 1.68 |
| 3800           | 3.58                      | 3.66 | 0.08           | 14.34     | 0.17            | 1.63 | 1.59 | 1.64 |
| 4000           | 3.56                      | 3.65 | 0.09           | 14.82     | 0.29            | 1.60 | 1.57 | 1.62 |
| 4200           | 3.54                      | 3.63 | 0.09           | 15.30     | 0.39            | 1.55 | 1.55 | 1.59 |
| 4400           | 3.52                      | 3.60 | 0.08           | 15.84     | 0.49            | 1.50 | 1.53 | 1.56 |
| 4600           | 3.49                      | 3.57 | 0.07           | 16.47     | 0.57            | 1.44 | 1.51 | 1.53 |
| 4800           | 3.46                      | 3.53 | 0.07           | 17.20     | 0.61            | 1.37 | 1.47 | 1.49 |
| 5000           | 3.44                      | 3.49 | 0.06           | 18.03     | 0.64            | 1.29 | 1.43 | 1.44 |
| 5200           | 3.42                      | 3.47 | 0.05           | 18.95     | 0.64            | 1.22 | 1.39 | 1.38 |
| 5400           | 3.41                      | 3.46 | 0.05           | 19.94     | 0.64            | 1.15 | 1.34 | 1.33 |
| 5600           | 3.41                      | 3.45 | 0.05           | 20.97     | 0.62            | 1.11 | 1.28 | 1.27 |
| 5800           | 3.40                      | 3.45 | 0.05           | 22.00     | 0.61            | 1.09 | 1.23 | 1.22 |
| 6000           | 3.40                      | 3.45 | 0.05           | 23.05     | 0.60            | 1.08 | 1.18 | 1.17 |
| 6200           | 3.40                      | 3.46 | 0.06           | 24.05     | 0.61            | 1.09 | 1.13 | 1.14 |
| 6400           | 3.41                      | 3.47 | 0.06           | 25.03     | 0.64            | 1.10 | 1.09 | 1.12 |
| 6600           | 3.41                      | 3.48 | 0.07           | 25.95     | 0.68            | 1.12 | 1.06 | 1.12 |
| 6800           | 3.42                      | 3.49 | 0.07           | 26.77     | 0.73            | 1.13 | 1.06 | 1.13 |
| 7000           | 3.43                      | 3.50 | 0.08           | 27.43     | 0.79            | 1.12 | 1.06 | 1.14 |
| 7200           | 3.44                      | 3.51 | 0.08           | 27.86     | 0.86            | 1.11 | 1.07 | 1.13 |
| 7400           | 3.45                      | 3.52 | 0.08           | 28.00     | 0.92            | 1.10 | 1.06 | 1.11 |
| 7600           | 3.46                      | 3.53 | 0.07           | 27.89     | 0.99            | 1.11 | 1.04 | 1.07 |
| 7800           | 3.48                      | 3.54 | 0.07           | 27.57     | 1.03            | 1.13 | 1.05 | 1.04 |
| 8000           | 3.50                      | 3.56 | 0.06           | 27.11     | 1.08            | 1.17 | 1.10 | 1.07 |
| 8500           | 3.61                      | 3.66 | 0.05           | 25.80     | 1.14            | 1.34 | 1.27 | 1.25 |
| 9000           | 3.74                      | 3.79 | 0.04           | 24.65     | 1.16            | 1.52 | 1.44 | 1.43 |
| 9500           | 3.82                      | 3.85 | 0.04           | 23.83     | 1.17            | 1.63 | 1.53 | 1.53 |
| 10000          | 3.79                      | 3.83 | 0.04           | 23.13     | 1.19            | 1.60 | 1.51 | 1.52 |
| 10500          | 3.73                      | 3.78 | 0.04           | 22.16     | 1.24            | 1.49 | 1.43 | 1.44 |
| 11000          | 3.70                      | 3.74 | 0.05           | 21.09     | 1.30            | 1.38 | 1.33 | 1.34 |
| 11500          | 3.67                      | 3.71 | 0.04           | 20.42     | 1.36            | 1.27 | 1.26 | 1.27 |
| 12000          | 3.65                      | 3.69 | 0.04           | 20.75     | 1.39            | 1.15 | 1.22 | 1.22 |
| 12500          | 3.65                      | 3.70 | 0.04           | 22.10     | 1.37            | 1.07 | 1.23 | 1.23 |
| 13000          | 3.65                      | 3.71 | 0.06           | 23.48     | 1.38            | 1.08 | 1.26 | 1.27 |
| 13500          | 3.65                      | 3.73 | 0.09           | 23.41     | 1.49            | 1.11 | 1.28 | 1.31 |
| 14000          | 3.71                      | 3.81 | 0.10           | 23.08     | 1.73            | 1.21 | 1.31 | 1.33 |
| 15000          | 3.89                      | 3.97 | 0.08           | 26.23     | 2.22            | 1.42 | 1.42 | 1.44 |
| 16000          | 4.05                      | 4.08 | 0.03           | 24.75     | 2.38            | 1.61 | 1.52 | 1.53 |
| 17000          | 4.15                      | 4.16 | 0.01           | 22.54     | 2.49            | 1.73 | 1.55 | 1.52 |
| 18000          | 4.32                      | 4.28 | 0.03           | 19.26     | 2.43            | 1.89 | 1.63 | 1.57 |
| 19000          | 4.23                      | 4.21 | 0.01           | 18.17     | 2.04            | 1.62 | 1.63 | 1.68 |
| 20000          | 3.95                      | 4.04 | 0.09           | 18.16     | 2.17            | 1.04 | 1.46 | 1.49 |
| 21000          | 4.08                      | 4.21 | 0.13           | 18.99     | 3.00            | 1.44 | 1.39 | 1.47 |
| 22000          | 4.26                      | 4.33 | 0.07           | 21.69     | 3.59            | 1.58 | 1.49 | 1.54 |
| 23000          | 4.53                      | 4.55 | 0.02           | 19.85     | 3.77            | 1.80 | 1.65 | 1.55 |
| 24000          | 4.61                      | 4.59 | 0.02           | 20.11     | 3.83            | 1.77 | 1.54 | 1.50 |
| 25000          | 4.57                      | 4.54 | 0.03           | 19.66     | 3.77            | 1.54 | 1.45 | 1.60 |
| 26000          | 4.51                      | 4.50 | 0.01           | 17.88     | 3.97            | 1.51 | 1.39 | 1.57 |
| 27000          | 4.46                      | 4.42 | 0.04           | 16.71     | 4.50            | 1.31 | 1.29 | 1.29 |
| 28000          | 4.52                      | 4.38 | 0.14           | 18.43     | 4.57            | 1.37 | 1.45 | 1.29 |

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss



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IF/RF MICROWAVE COMPONENTS

REV. OR  
 EP2K-D+  
 2/24/2016  
 Page 1 of 2

# 2 Way-0° Power Splitter/Combiner Die

EP2K-D+

## Typical Performance Data

### Without Full 2-Port Extension

TEST CONDITIONS: Input Power = -10dBm @Temperature = +25°C

| FREQ.<br>(MHz) | TOTAL LOSS <sup>(1)</sup> |      | AMP.<br>UNBAL.<br>(dB) | ISOLATION<br>(dB) | PHASE<br>UNBAL.<br>(deg.) | VSWR |      |      |
|----------------|---------------------------|------|------------------------|-------------------|---------------------------|------|------|------|
|                | (dB)                      | (dB) |                        |                   |                           | (:1) |      |      |
|                | S-1                       | S-2  |                        |                   |                           | S    | 1    | 2    |
| 500            | 3.78                      | 3.78 | 0.00                   | 4.53              | 0.08                      | 1.88 | 1.76 | 1.76 |
| 1000           | 3.90                      | 3.90 | 0.00                   | 5.88              | 0.24                      | 1.91 | 1.78 | 1.77 |
| 1500           | 3.93                      | 3.90 | 0.03                   | 7.82              | 0.32                      | 1.88 | 1.89 | 1.86 |
| 1800           | 3.95                      | 3.90 | 0.05                   | 9.04              | 0.25                      | 1.83 | 1.93 | 1.90 |
| 2000           | 3.97                      | 3.91 | 0.06                   | 9.82              | 0.17                      | 1.80 | 1.94 | 1.90 |
| 2500           | 4.04                      | 3.98 | 0.05                   | 11.40             | 0.08                      | 1.75 | 1.88 | 1.86 |
| 3000           | 4.03                      | 4.02 | 0.02                   | 12.69             | 0.21                      | 1.71 | 1.74 | 1.75 |
| 3500           | 3.98                      | 4.01 | 0.03                   | 14.05             | 0.10                      | 1.65 | 1.61 | 1.65 |
| 3800           | 3.96                      | 4.01 | 0.04                   | 14.82             | 0.08                      | 1.60 | 1.55 | 1.61 |
| 4000           | 3.96                      | 4.01 | 0.05                   | 15.32             | 0.20                      | 1.57 | 1.53 | 1.58 |
| 4200           | 3.96                      | 4.00 | 0.05                   | 15.84             | 0.32                      | 1.53 | 1.52 | 1.56 |
| 4400           | 3.95                      | 3.99 | 0.04                   | 16.40             | 0.41                      | 1.47 | 1.50 | 1.53 |
| 4600           | 3.94                      | 3.97 | 0.03                   | 17.05             | 0.48                      | 1.41 | 1.47 | 1.50 |
| 4800           | 3.93                      | 3.95 | 0.02                   | 17.79             | 0.52                      | 1.34 | 1.44 | 1.46 |
| 5000           | 3.92                      | 3.93 | 0.01                   | 18.63             | 0.53                      | 1.27 | 1.40 | 1.41 |
| 5200           | 3.92                      | 3.92 | 0.00                   | 19.55             | 0.52                      | 1.20 | 1.36 | 1.36 |
| 5400           | 3.93                      | 3.93 | 0.00                   | 20.56             | 0.50                      | 1.14 | 1.31 | 1.31 |
| 5600           | 3.94                      | 3.94 | 0.00                   | 21.61             | 0.48                      | 1.10 | 1.26 | 1.25 |
| 5800           | 3.95                      | 3.95 | 0.00                   | 22.69             | 0.47                      | 1.08 | 1.21 | 1.20 |
| 6000           | 3.97                      | 3.97 | 0.00                   | 23.79             | 0.46                      | 1.08 | 1.16 | 1.16 |
| 6200           | 3.98                      | 3.99 | 0.01                   | 24.84             | 0.47                      | 1.08 | 1.12 | 1.13 |
| 6400           | 4.00                      | 4.01 | 0.01                   | 25.86             | 0.49                      | 1.10 | 1.08 | 1.11 |
| 6600           | 4.02                      | 4.04 | 0.02                   | 26.84             | 0.53                      | 1.11 | 1.06 | 1.11 |
| 6800           | 4.04                      | 4.06 | 0.02                   | 27.66             | 0.58                      | 1.12 | 1.05 | 1.12 |
| 7000           | 4.07                      | 4.09 | 0.02                   | 28.32             | 0.64                      | 1.12 | 1.06 | 1.13 |
| 7200           | 4.09                      | 4.11 | 0.02                   | 28.71             | 0.69                      | 1.11 | 1.06 | 1.12 |
| 7400           | 4.12                      | 4.14 | 0.02                   | 28.80             | 0.75                      | 1.10 | 1.05 | 1.10 |
| 7600           | 4.14                      | 4.16 | 0.02                   | 28.66             | 0.80                      | 1.10 | 1.04 | 1.07 |
| 7800           | 4.17                      | 4.18 | 0.01                   | 28.31             | 0.85                      | 1.12 | 1.04 | 1.04 |
| 8000           | 4.21                      | 4.21 | 0.01                   | 27.86             | 0.88                      | 1.16 | 1.09 | 1.06 |
| 8500           | 4.35                      | 4.34 | 0.01                   | 26.60             | 0.93                      | 1.31 | 1.25 | 1.24 |
| 9000           | 4.52                      | 4.51 | 0.02                   | 25.55             | 0.94                      | 1.48 | 1.40 | 1.40 |
| 9500           | 4.63                      | 4.61 | 0.02                   | 24.79             | 0.93                      | 1.57 | 1.47 | 1.47 |
| 10000          | 4.63                      | 4.61 | 0.02                   | 24.15             | 0.93                      | 1.54 | 1.45 | 1.46 |
| 10500          | 4.60                      | 4.59 | 0.02                   | 23.22             | 0.97                      | 1.43 | 1.37 | 1.39 |
| 11000          | 4.60                      | 4.59 | 0.01                   | 22.20             | 1.02                      | 1.33 | 1.28 | 1.30 |
| 11500          | 4.61                      | 4.59 | 0.02                   | 21.61             | 1.06                      | 1.24 | 1.22 | 1.23 |
| 12000          | 4.62                      | 4.60 | 0.02                   | 21.99             | 1.07                      | 1.14 | 1.20 | 1.20 |
| 12500          | 4.66                      | 4.65 | 0.01                   | 23.40             | 1.04                      | 1.07 | 1.21 | 1.21 |
| 13000          | 4.69                      | 4.69 | 0.00                   | 24.85             | 1.04                      | 1.08 | 1.23 | 1.25 |
| 13500          | 4.72                      | 4.74 | 0.03                   | 24.76             | 1.15                      | 1.09 | 1.24 | 1.27 |
| 14000          | 4.80                      | 4.85 | 0.04                   | 24.40             | 1.37                      | 1.18 | 1.26 | 1.28 |
| 15000          | 5.05                      | 5.07 | 0.02                   | 27.52             | 1.84                      | 1.36 | 1.35 | 1.37 |
| 16000          | 5.27                      | 5.24 | 0.03                   | 26.16             | 1.95                      | 1.52 | 1.42 | 1.45 |
| 17000          | 5.44                      | 5.39 | 0.05                   | 24.06             | 2.05                      | 1.62 | 1.45 | 1.43 |
| 18000          | 5.65                      | 5.56 | 0.09                   | 20.89             | 1.95                      | 1.73 | 1.51 | 1.47 |
| 19000          | 5.61                      | 5.54 | 0.07                   | 19.87             | 1.53                      | 1.51 | 1.50 | 1.55 |
| 20000          | 5.40                      | 5.44 | 0.04                   | 19.92             | 1.65                      | 1.04 | 1.36 | 1.39 |
| 21000          | 5.58                      | 5.66 | 0.08                   | 20.78             | 2.45                      | 1.36 | 1.32 | 1.38 |
| 22000          | 5.83                      | 5.85 | 0.02                   | 23.52             | 3.02                      | 1.48 | 1.39 | 1.43 |
| 23000          | 6.15                      | 6.11 | 0.04                   | 21.77             | 3.13                      | 1.64 | 1.49 | 1.42 |
| 24000          | 6.28                      | 6.21 | 0.07                   | 22.10             | 3.18                      | 1.61 | 1.41 | 1.40 |
| 25000          | 6.30                      | 6.22 | 0.08                   | 21.70             | 3.10                      | 1.44 | 1.35 | 1.47 |
| 26000          | 6.30                      | 6.24 | 0.06                   | 19.89             | 3.28                      | 1.41 | 1.30 | 1.43 |
| 27000          | 6.29                      | 6.20 | 0.09                   | 18.81             | 3.76                      | 1.25 | 1.22 | 1.22 |
| 28000          | 6.42                      | 6.24 | 0.19                   | 20.70             | 3.81                      | 1.30 | 1.34 | 1.23 |

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss



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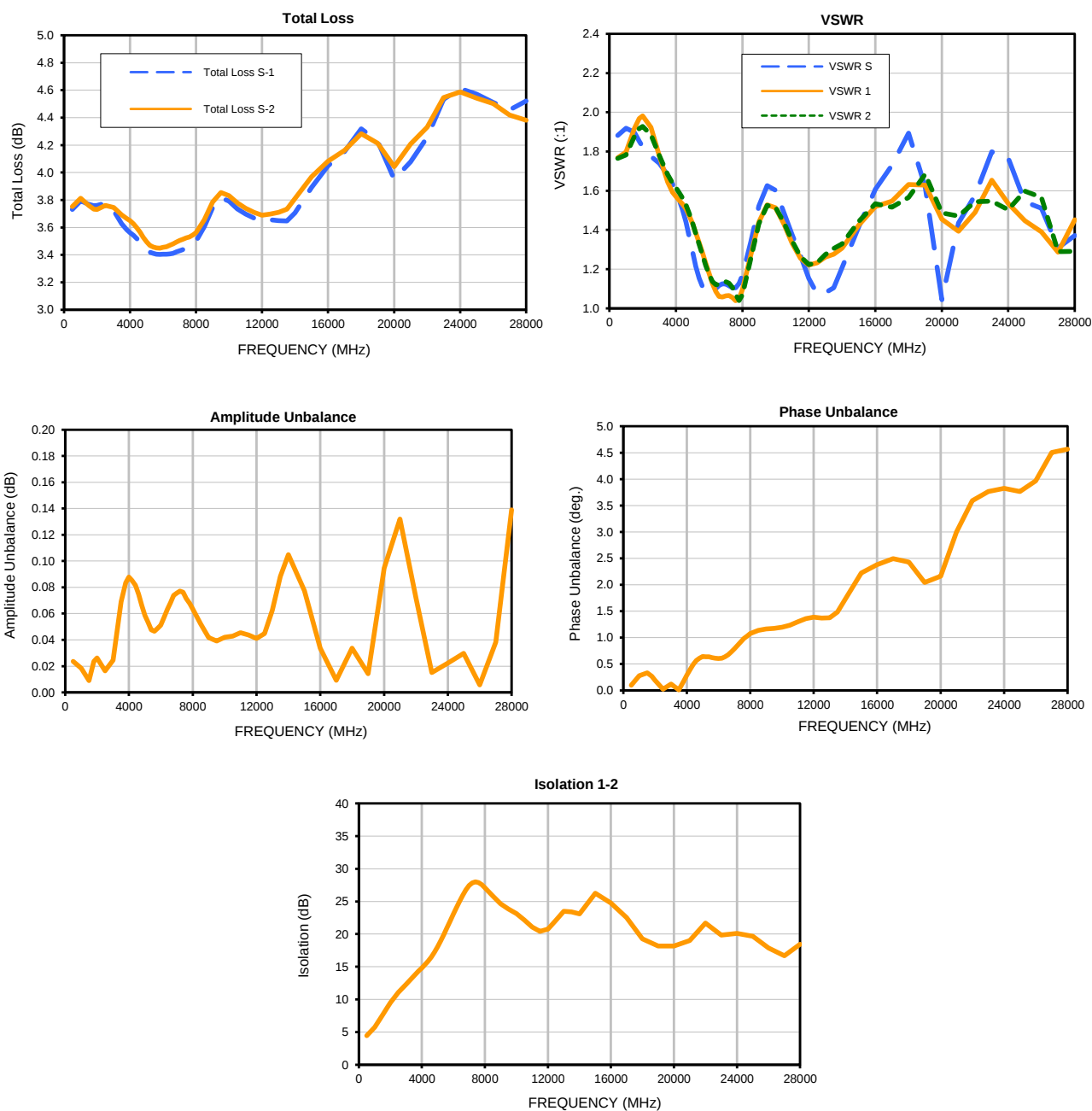


IF/RF MICROWAVE COMPONENTS

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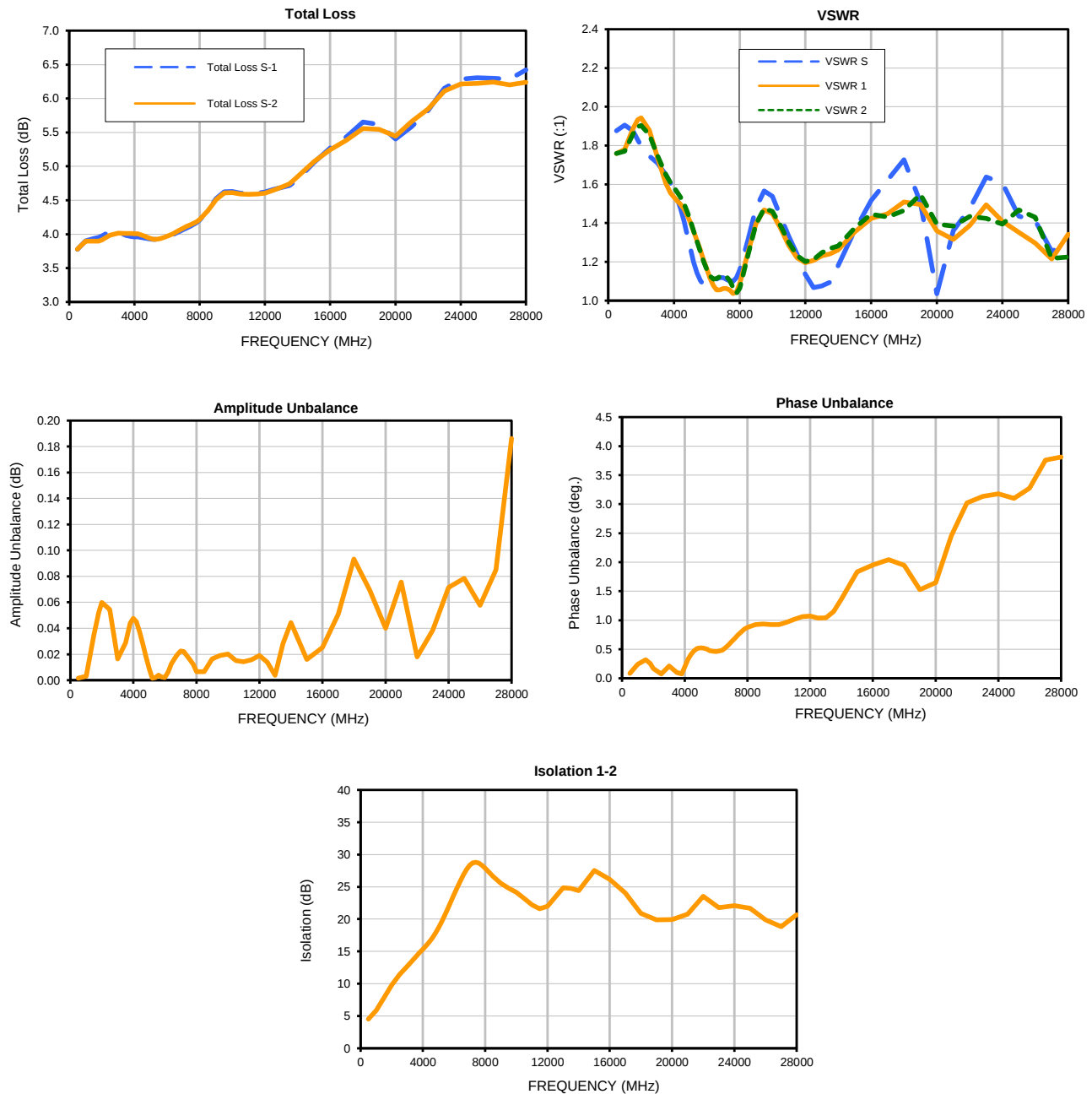
## Typical Performance Curves

### Full 2-Port Extension



## Typical Performance Curves

### Without Full 2-Port Extension





All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification         | Test/Inspection Condition                                                | Reference/Spec                       |
|-----------------------|--------------------------------------------------------------------------|--------------------------------------|
| Operating Temperature | -40° to 85° C or -40° to 105° C or -55° to 105° C<br>Ambient Environment | Refer to Individual Model Data Sheet |
| Storage Environment   | 20° to 35° C and 40 to 60% humidity<br>(In Factory Shipped Package)      | Individual Model Data Sheet          |