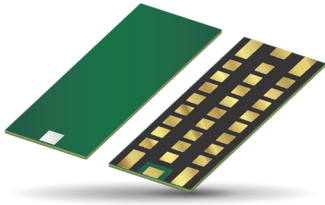


# Multilayer Organic (MLO®) Band Pass Filters



## BP Series



### GENERAL DESCRIPTION

The BP series of MLO® High Performance Band Pass Filters exhibit low insertion loss, steep roll-offs, and very high rejection of out of band frequencies. MLO® Band Pass Filters support many frequency bands and multiple wireless standards, and are less than 1.0mm in thickness.

MLO components are low profile devices with best in class performance based on AVX's patented multilayer organic high density interconnect technology. MLO components utilize high dielectric constant and low loss materials to realize high Q passive printed elements, such as inductors and capacitors, in a multilayer stack. All MLO components are expansion matched to most organic PCB materials, thereby resulting in improved reliability over standard Si and ceramic devices.

### FEATURES

- Low insertion loss
- High rejection out-of-band
- Steep roll-off
- 50Ω Impedance
- Expansion matched to PCB
- Surface Mount
- RoHS Compliant

### APPLICATIONS

- Wireless Communications Systems
- Military Radios
- EMS Radios
- UAVs
- Basestations
- Wireless access points and terminals
- Instrumentation

### LAND GRID ARRAY ADVANTAGES

- Inherent Low Profile
- Excellent Solderability
- Low Parasitics
- Better Heat Dissipation

### HOW TO ORDER

|                   |  |          |                  |                  |             |   |
|-------------------|--|----------|------------------|------------------|-------------|---|
| <b>BP</b>         | <b>0F</b>  | <b>A</b> | <b>1100</b>      | <b>A</b>         | <b>7</b>    | <b>00</b>   |
| Series            | Case Size  | Type     | Center Frequency | Standard Testing | Termination | Package Code  |
| Band Pass Filters | 0A = 2616<br>0B = 3116<br>0C = 3416<br>0D = 4016<br>0E = 4617<br>0F = 5021 |          | In MHz           |                  | 7 – Gold    | 00 – Waffle Pack<br>TR – 1000 pcs Tape & Reel<br>TR\250 – 250 pcs Tape & Reel |

### QUALITY INSPECTION

Finished Parts are 100% electrically tested



LEAD-FREE

LEAD-FREE COMPATIBLE COMPONENT



RoHS COMPLIANT

For RoHScompliant products, please select correct termination style

### TERMINATION

All finishes are compatible with automatic soldering technologies: Pb free reflow, wave soldering, vapor phase, and manual soldering.

### OPERATING TEMPERATURE

-55°C to +85°C



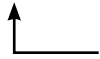
# Multilayer Organic (MLO®) Band Pass Filters



## BP Series

### ELECTRICAL SPECIFICATIONS

| AVX PN        | Fc (GHz) | Typical Insertion Loss @ Fc (dB) | Passband (GHz) | Insertion Loss (dB) |     | Stopband Rejection (GHz) |       |       |                     |              |              | Rated RF Power (W) |
|---------------|----------|----------------------------------|----------------|---------------------|-----|--------------------------|-------|-------|---------------------|--------------|--------------|--------------------|
|               |          |                                  |                |                     |     | Low Band (DC - F3)       |       |       | High Band (F4 - Fn) |              |              |                    |
|               |          |                                  |                | Typ.                | Max | -20dB                    | -30dB | -40dB | -20dB               | -30dB        | -40dB        |                    |
| BP0CA0770A7** | 0.77     | 1.28                             | 0.62 - 0.97    | 1.96                | 5   | 0.5                      | 0.48  | 0.46  | 1.15 - 9.00         | 1.19 - 4.50  | 1.23 - 4.00  | 1                  |
| BP0CA1100A7** | 1.1      | 1.18                             | 0.86 - 1.39    | 1.97                | 5   | 0.7                      | 0.68  | 0.66  | 1.63 - 9.00         | 1.68 - 5.00  | 1.73 - 4.50  | 1                  |
| BP0FA1100A7** | 1.1      | 1.37                             | 0.87 - 1.39    | 2.41                | 5   | 0.69                     | 0.67  | 0.64  | 1.67 - 18.00        | 1.72 - 16.70 | 1.78 - 11.11 | 1                  |
| BP0FA1130A7** | 1.13     | 1.43                             | 0.89 - 1.44    | 2.25                | 5   | 0.71                     | 0.68  | 0.66  | 1.71 - 18.00        | 1.76 - 15.54 | 1.79 - 11.7  | 1                  |
| BP0FA1190A7** | 1.19     | 1.56                             | 0.99 - 1.44    | 2.26                | 5   | 0.8                      | 0.76  | 0.74  | 1.68 - 18.00        | 1.74 - 18.00 | 1.78 - 16.29 | 1                  |
| BP0CA1610A7** | 1.61     | 1.1                              | 1.27 - 2.05    | 1.88                | 5   | 1.07                     | 1.04  | 1.02  | 2.42 - 9.00         | 2.50 - 9.00  | 2.57 - 6.26  | 1                  |
| BP0EA1950A7** | 1.95     | 0.96                             | 1.44 - 2.64    | 2.03                | 5   | 1.24                     | 1.19  | 1.16  | 3.04 - 9.00         | 3.14 - 9.00  | 3.22 - 7.50  | 1                  |
| BP0EA1980A7** | 1.98     | 0.85                             | 1.47 - 2.68    | 1.89                | 5   | 1.26                     | 1.21  | 1.17  | 3.14 - 9.00         | 3.27 - 9.00  | 3.37 - 7.62  | 1                  |
| BP0EA2090A7** | 2.09     | 0.96                             | 1.54 - 2.84    | 1.94                | 5   | 1.33                     | 1.28  | 1.23  | 3.28 - 9.00         | 3.4 - 9.00   | 3.6 - 7.92   | 1                  |
| BP0EA2500A7** | 2.5      | 1.19                             | 2.02 - 3.10    | 2.03                | 5   | 1.76                     | 1.69  | 1.64  | 3.60 - 9.00         | 3.71 - 9.00  | 3.80 - 7.51  | 1                  |
| BP0EA2540A7** | 2.54     | 1.24                             | 2.02 - 3.21    | 2.12                | 5   | 1.76                     | 1.7   | 1.64  | 3.70 - 9.00         | 3.80 - 8.31  | 3.89 - 7.8   | 1                  |
| BP0EA2620A7** | 2.62     | 1.13                             | 2.09 - 3.28    | 1.92                | 5   | 1.81                     | 1.74  | 1.68  | 3.79 - 9.00         | 3.91 - 7.81  | 3.96 - 7.7   | 1                  |
| BP0EA3180A7** | 3.18     | 0.97                             | 2.45 - 4.14    | 1.81                | 5   | 1.88                     | 1.81  | 1.75  | 4.97 - 20.00        | 5.25 - 18.43 | 5.46 - 15.5  | 1                  |
| BP0EA3310A7** | 3.31     | 1.13                             | 2.62 - 4.19    | 1.79                | 5   | 1.99                     | 1.91  | 1.86  | 4.99 - 20.00        | 5.22 - 19.05 | 5.41 - 15.94 | 1                  |
| BP0EA3430A7** | 3.43     | 1                                | 2.64 - 4.46    | 1.57                | 5   | 2.04                     | 1.95  | 1.89  | 5.32 - 20.00        | 5.59 - 20.00 | 5.83 - 16.01 | 1                  |
| BP0EA4440A7** | 4.44     | 0.98                             | 3.49 - 5.66    | 1.83                | 5   | 2.99                     | 2.89  | 2.79  | 6.72 - 20.00        | 7.06 - 13.82 | 7.39 - 9.26  | 1                  |
| BP0EA4600A7** | 4.6      | 0.96                             | 3.66 - 5.78    | 2.12                | 5   | 3.1                      | 2.99  | 2.9   | 6.81 - 20.00        | 7.15 - 9.68  | 7.50 - 9.55  | 1                  |
| BP0EA4680A7** | 4.68     | 0.99                             | 3.70 - 5.93    | 2.01                | 5   | 3.16                     | 3.05  | 2.96  | 6.99 - 20.00        | 7.37 - 9.86  | 7.73 - 8.40  | 1                  |



Click on part number to see full specifications

\*\* Packaging: 00 = waffle pack, TR = 1000pcs T&R, TR\250 = 250pcs T&R

### ELECTRICAL SPECIFICATIONS

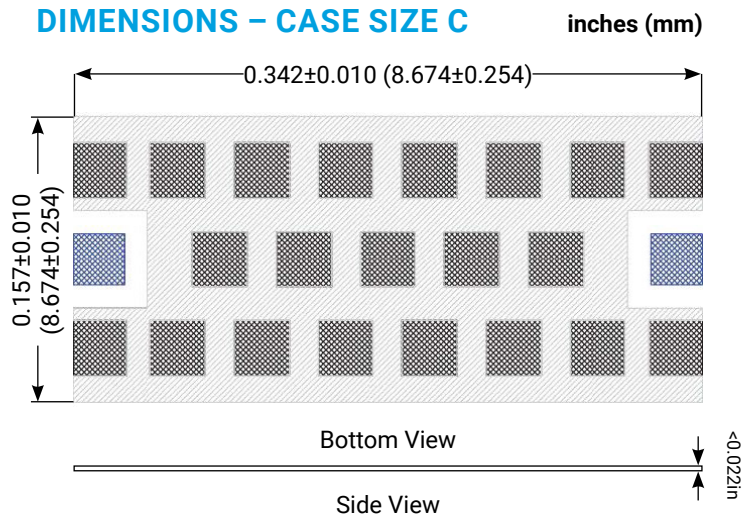
inches (mm)

| Case Size | Length                          | Width                        | Height                          |
|-----------|---------------------------------|------------------------------|---------------------------------|
| A 2616    | 0.259±0.010<br>(6.579±0.254)    | 0.157±0.010<br>(3.975±0.254) | Varies - see part specification |
| B 3116    | 0.306±0.010<br>(7.785±0.254)    | 0.156±0.010<br>(3.975±0.254) | Varies - see part specification |
| C 3416    | 0.342±0.010<br>(8.674±0.254)    | 0.157±0.010<br>(3.975±0.254) | Varies - see part specification |
| D 4016    | 0.401±0.010<br>(10.198±0.254)   | 0.156±0.010<br>(3.975±0.254) | Varies - see part specification |
| E 4617    | 0.460 ±0.010<br>(11.684 ±0.254) | 0.170±0.010<br>(4.318±0.254) | Varies - see part specification |
| F 5021    | 0.512±0.010<br>(12.992 ±0.254)  | 0.207±0.010<br>(5.245±0.254) | Varies - see part specification |

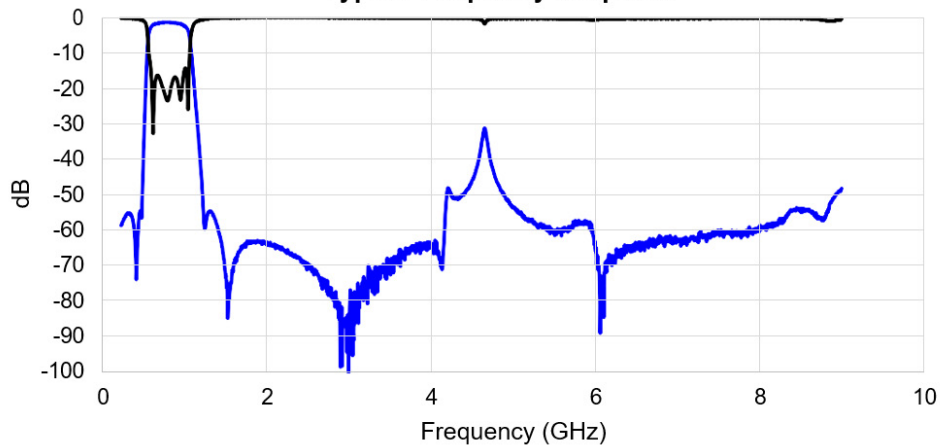
## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 0.62 - 0.97 GHz |
| Passband IL            | 1.96 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 0.77 GHz        |
| Center Frequency IL    | 1.28 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -0.46 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 1.23 - 4.00 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

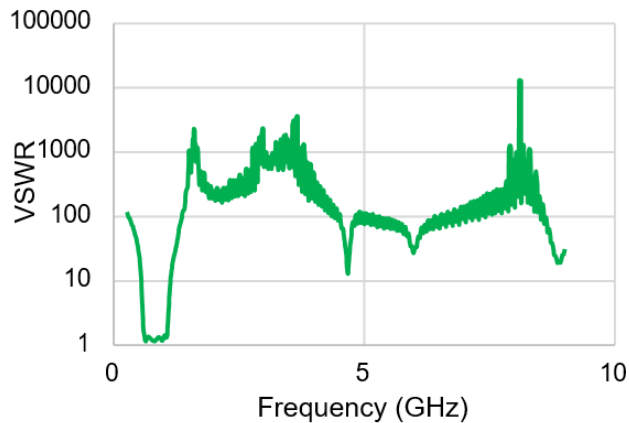
## DIMENSIONS – CASE SIZE C



Typical Frequency Response



VSWR



## TYPICAL PERFORMANCE AT 25°C

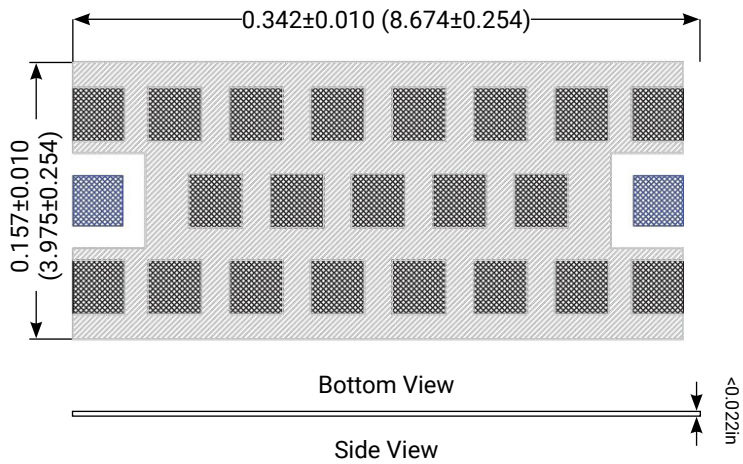
| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 0.46            | -54.61              | 33.13     | -0.52            |
| 0.48            | -52.50              | 26.87     | -0.65            |
| 0.50            | -33.72              | 18.77     | -0.93            |
| 0.62            | -1.96               | 1.08      | -28.19           |
| 0.77            | -1.28               | 1.16      | -22.82           |
| 0.97            | -1.94               | 1.25      | -19.20           |
| 1.15            | -29.34              | 17.72     | -0.98            |
| 1.19            | -40.50              | 25.38     | -0.68            |
| 1.23            | -57.84              | 36.26     | -0.48            |
| 4.00            | -65.01              | 122.71    | -0.14            |
| 4.50            | -45.94              | 96.37     | -0.18            |

## ELECTRICAL SPECIFICATIONS

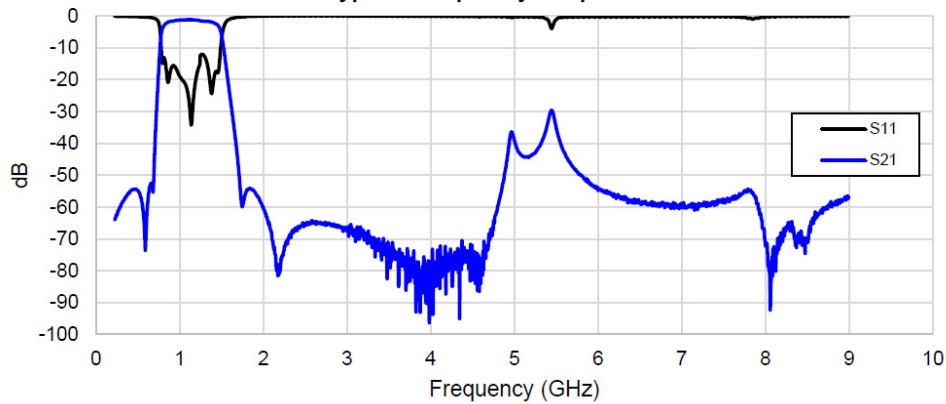
| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 0.56 - 1.39 GHz |
| Passband IL            | 1.97 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.10 dB         |
| Center Frequency IL    | 1.18 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -0.66 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 1.73 - 4.50 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE C

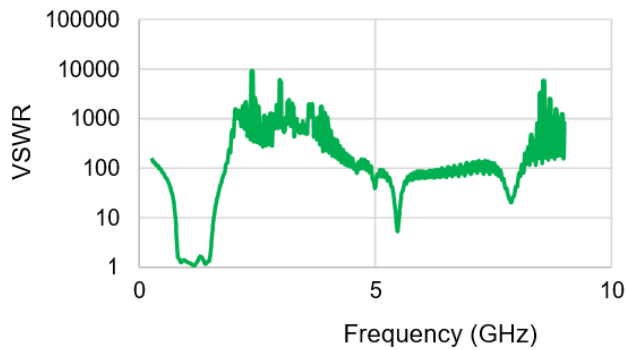
inches (mm)



Typical Frequency Response



VSWR



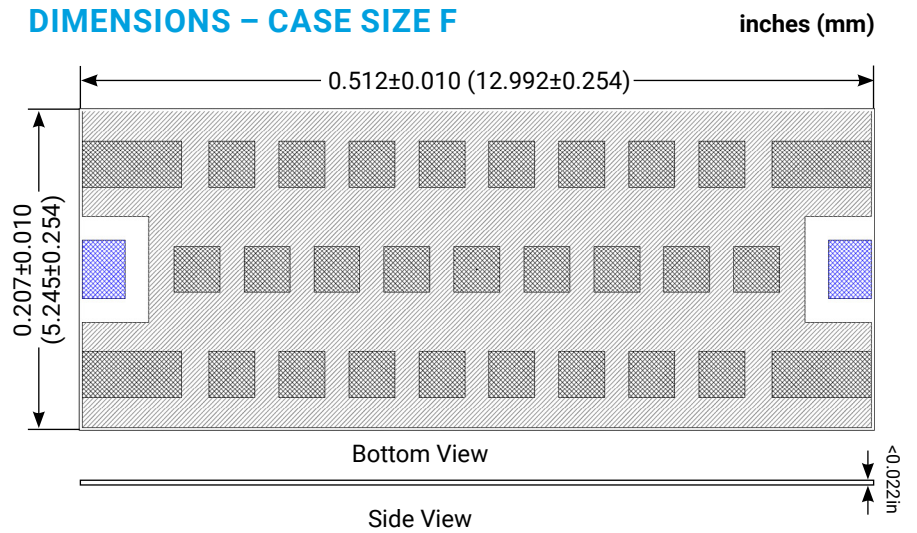
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 0.66            | -67.20              | 47.97     | -0.36            |
| 0.68            | -54.87              | 30.46     | -0.57            |
| 0.70            | -44.36              | 23.59     | -0.74            |
| 0.86            | -1.97               | 1.20      | -20.72           |
| 1.10            | -1.18               | 1.13      | -24.44           |
| 1.39            | -1.97               | 1.14      | -23.50           |
| 1.63            | -30.10              | 24.50     | -0.71            |
| 1.68            | -41.86              | 40.14     | -0.43            |
| 1.73            | -56.31              | 55.01     | -0.32            |
| 4.50            | -82.71              | 148.10    | -0.12            |
| 5.00            | -38.95              | 59.80     | -0.29            |

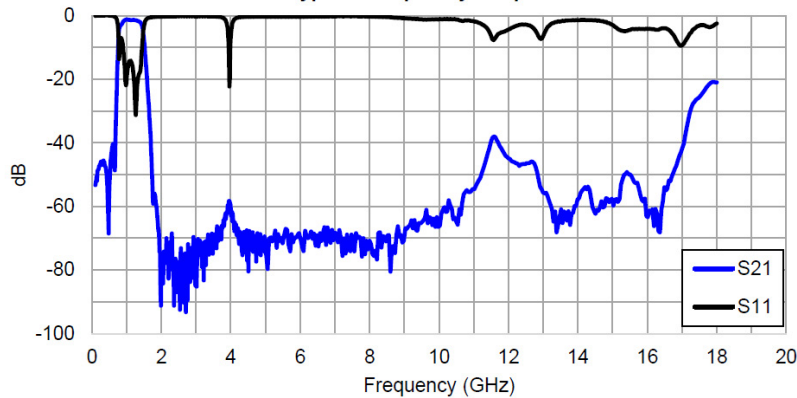
## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 0.87 - 1.39 GHz |
| Passband IL            | 2.41dB typ.     |
|                        | 5 dB max        |
| Center Frequency       | 1.10 GHz        |
| Center Frequency IL    | 1.37 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -0.64 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 1.78 - 11.1 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

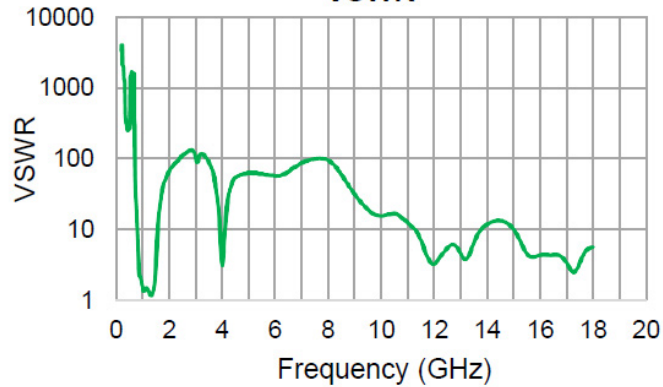
## DIMENSIONS – CASE SIZE F



Typical Frequency Response



VSWR



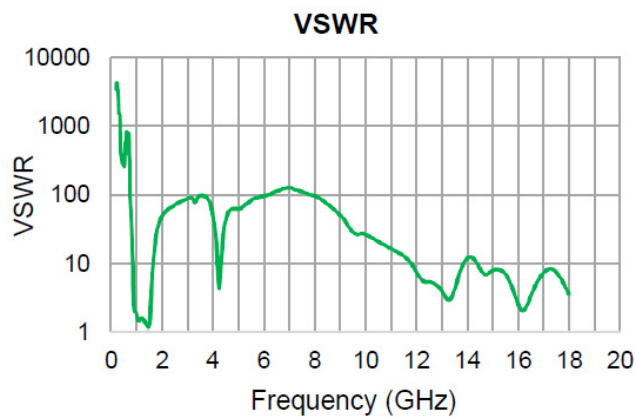
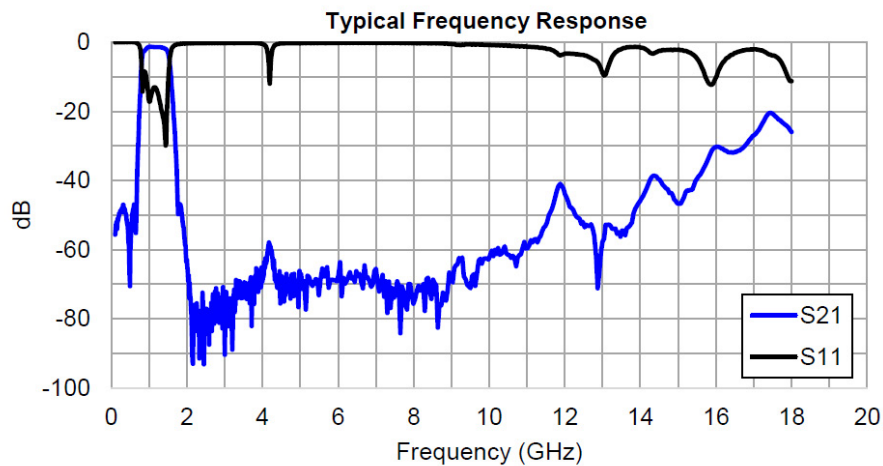
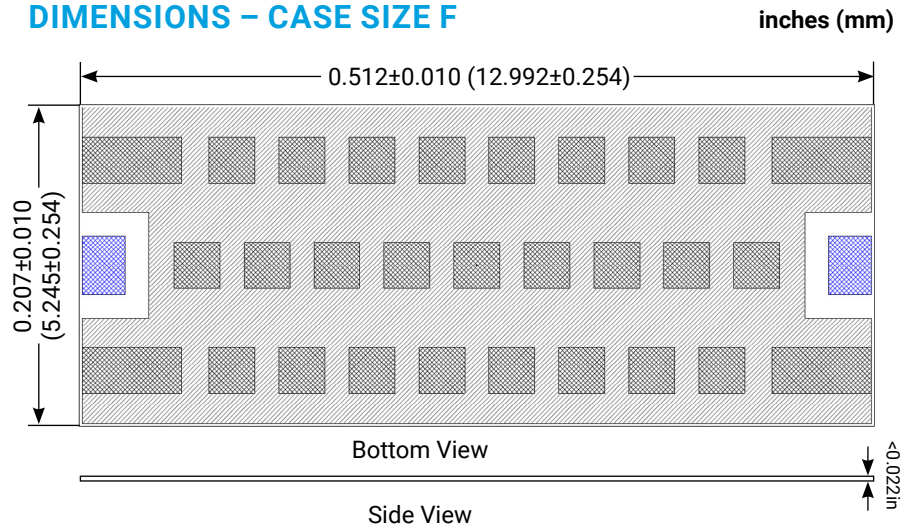
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 0.68            | -40.70              | 43.35     | -0.40            |
| 0.69            | -33.99              | 30.12     | -0.58            |
| 0.71            | -23.81              | 15.46     | -1.13            |
| 0.85            | -2.85               | 2.60      | -7.05            |
| 0.87            | -2.41               | 2.33      | -7.96            |
| 1.41            | -2.30               | 1.41      | -15.43           |
| 1.44            | -2.88               | 1.74      | -11.34           |
| 1.60            | -21.19              | 20.26     | -0.86            |
| 1.66            | -31.44              | 27.41     | -0.63            |
| 1.71            | -41.61              | 35.11     | -0.49            |
| 4.00            | -59.62              | 2.41      | -7.67            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 0.89 - 1.44 GHz |
| Passband IL            | 2.25 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.13 GHz        |
| Center Frequency IL    | 1.43 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -0.66 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 1.79 - 13.8 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE F



## TYPICAL PERFORMANCE AT 25°C

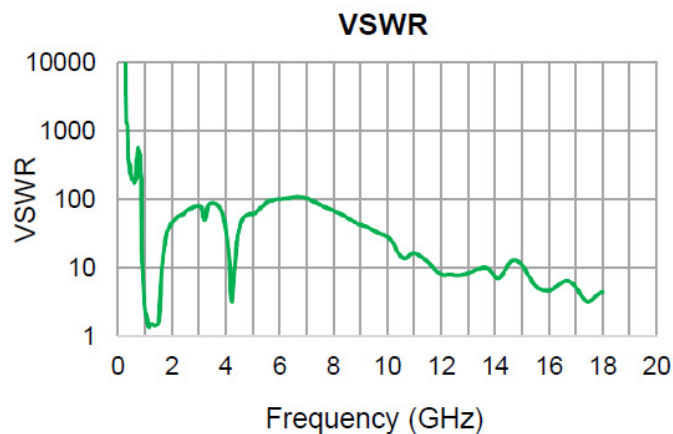
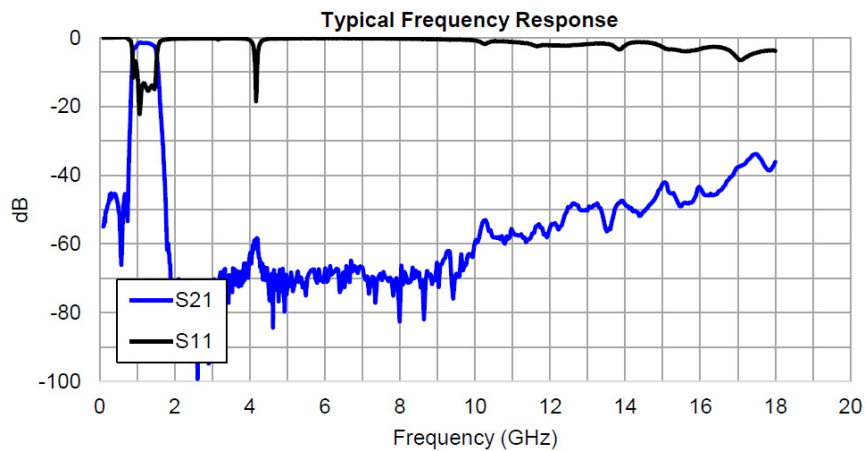
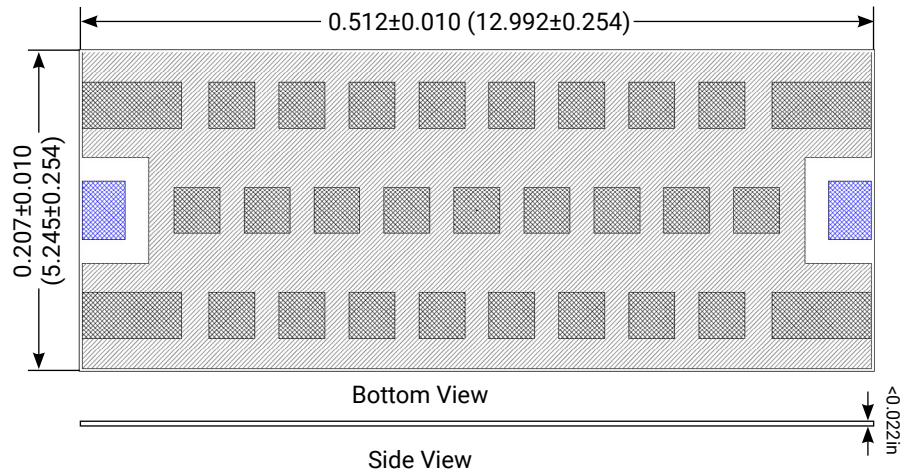
| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 0.68            | -42.81              | 106.22    | -0.16            |
| 0.70            | -33.02              | 41.57     | -0.42            |
| 0.74            | -22.03              | 21.38     | -0.81            |
| 0.85            | -2.78               | 1.83      | -10.65           |
| 0.88            | -2.41               | 2.22      | -8.42            |
| 1.47            | -2.37               | 1.22      | -20.03           |
| 1.50            | -2.96               | 1.56      | -13.19           |
| 1.66            | -21.99              | 16.34     | -1.06            |
| 1.71            | -31.05              | 23.77     | -0.73            |
| 1.74            | -40.79              | 27.99     | -0.62            |
| 4.00            | -69.31              | 37.57     | -0.46            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 0.99 - 1.44 GHz |
| Passband IL            | 2.26 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.19 GHz        |
| Center Frequency IL    | 1.56 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC - 0.74 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 1.78 - 16.3 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE F

inches (mm)



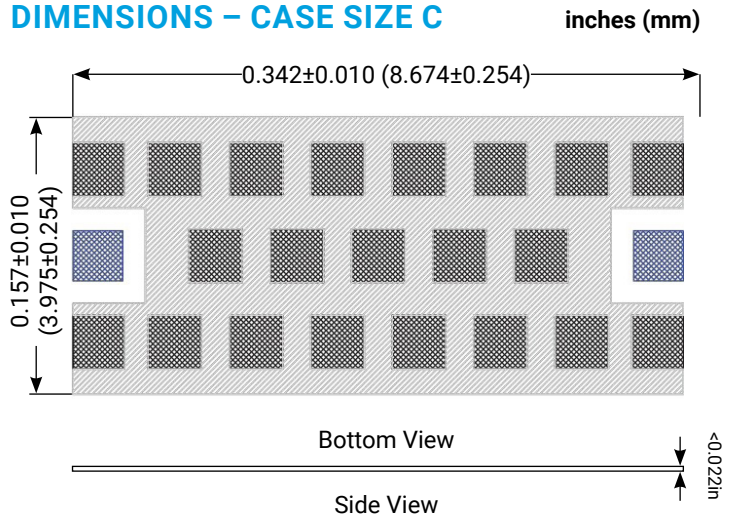
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 0.76            | -45.35              | 39.68     | -0.44            |
| 0.79            | -33.86              | 27.32     | -0.64            |
| 0.82            | -21.36              | 20.11     | -0.86            |
| 0.95            | -2.99               | 2.69      | -6.80            |
| 0.98            | -2.46               | 2.26      | -8.26            |
| 1.46            | -2.49               | 1.43      | -15.06           |
| 1.48            | -2.96               | 1.56      | -13.19           |
| 1.63            | -21.95              | 18.19     | -0.96            |
| 1.68            | -30.48              | 25.41     | -0.68            |
| 1.73            | -40.11              | 26.78     | -0.65            |
| 4.00            | -63.31              | 25.83     | -0.67            |

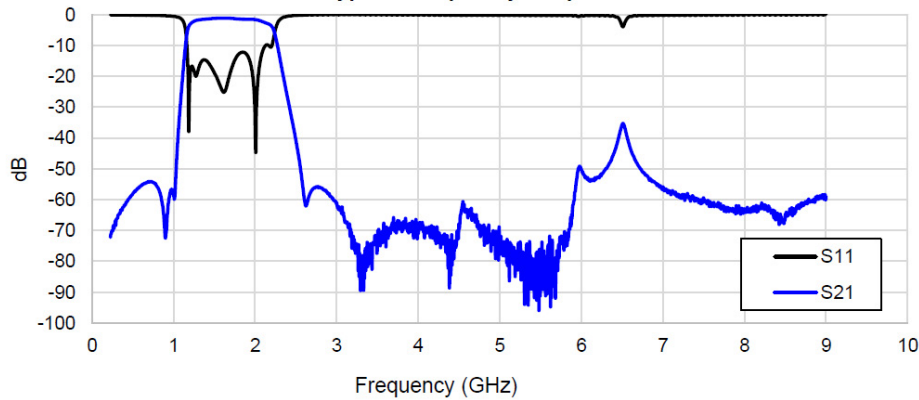
## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 1.27 - 2.05 GHz |
| Passband IL            | 1.88 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.61 dB         |
| Center Frequency IL    | 1.10 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -1.02 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 2.57 - 6.26 GHz |
| Rejection High Band    | 30 dB typ.      |
|                        | 25 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

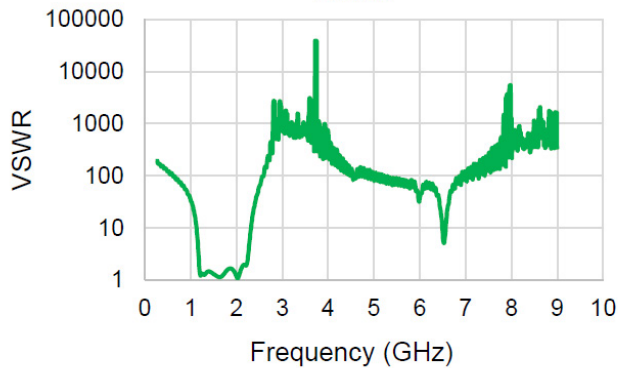
## DIMENSIONS – CASE SIZE C



Typical Frequency Response



VSWR



## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.02            | -56.22              | 27.80     | -0.63            |
| 1.04            | -44.39              | 21.86     | -0.80            |
| 1.07            | -33.47              | 17.92     | -0.97            |
| 1.27            | -1.86               | 1.22      | -19.93           |
| 1.61            | -1.10               | 1.12      | -25.14           |
| 2.05            | -1.88               | 1.34      | -16.80           |
| 2.42            | -30.50              | 42.88     | -0.41            |
| 2.50            | -41.00              | 62.73     | -0.28            |
| 2.57            | -53.36              | 88.84     | -0.20            |
| 6.26            | -51.31              | 77.23     | -0.22            |
| 7.50            | -60.32              | 358.65    | -0.05            |

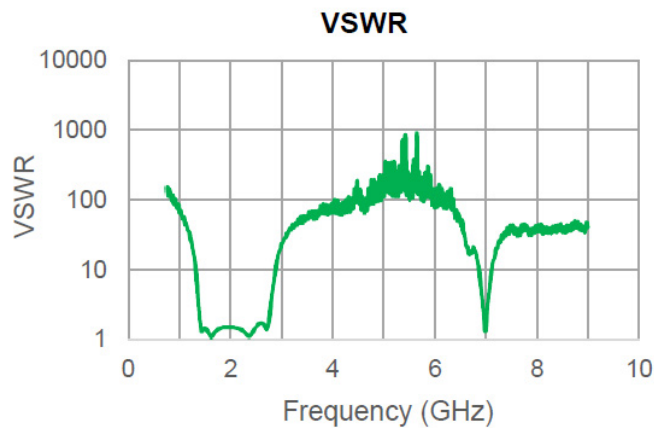
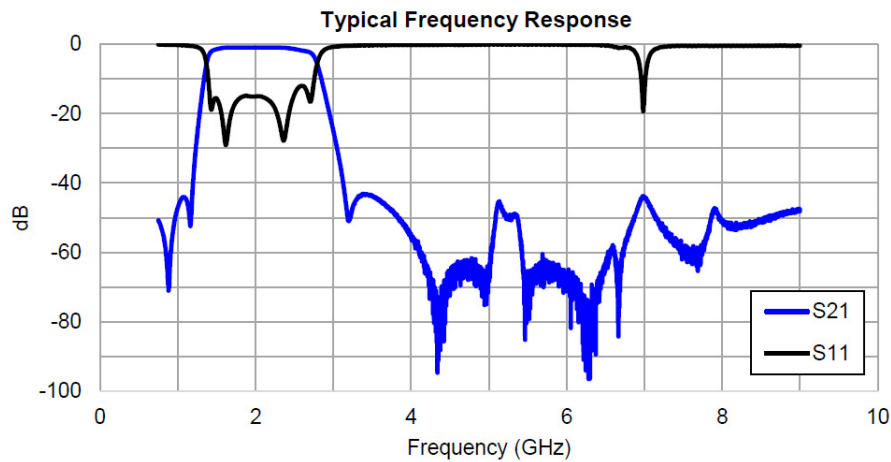
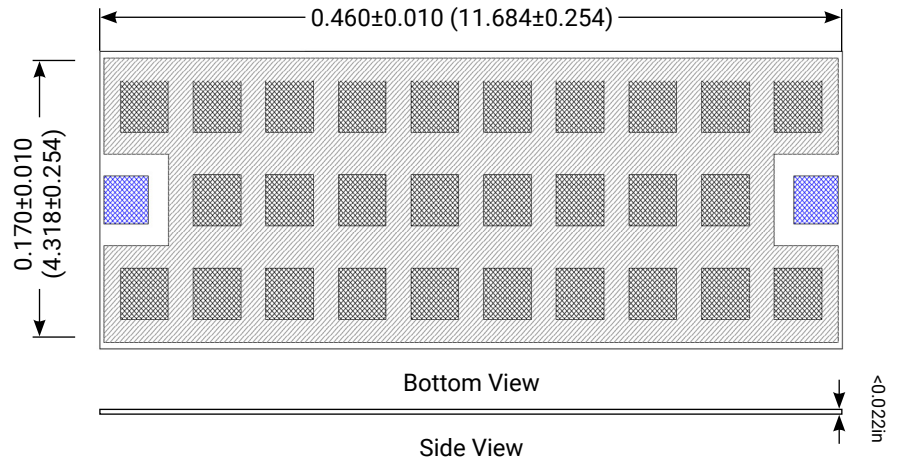


## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 1.44 - 2.64 GHz |
| Passband IL            | 1.03 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.95 GHz        |
| Center Frequency IL    | 0.96 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -1.16 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.22 - 7.50 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE E

inches (mm)



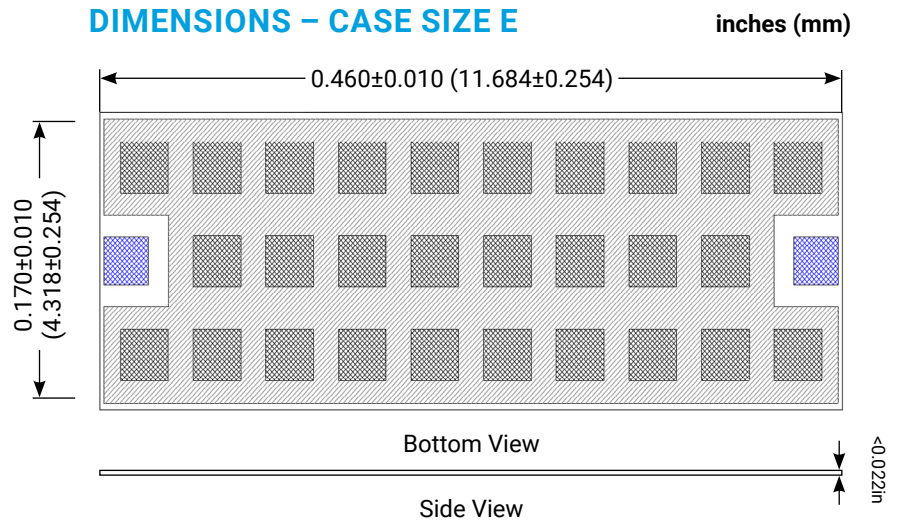
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.19            | -40.36              | 31.60     | -0.55            |
| 1.23            | -30.30              | 24.48     | -0.71            |
| 1.28            | -20.16              | 15.36     | -1.13            |
| 1.40            | -2.94               | 1.53      | -13.55           |
| 1.42            | -2.45               | 1.32      | -17.14           |
| 2.71            | -2.51               | 1.35      | -16.53           |
| 2.73            | -2.90               | 1.49      | -14.06           |
| 2.95            | -20.10              | 17.87     | -0.97            |
| 3.05            | -30.06              | 27.05     | -0.64            |
| 3.13            | -40.12              | 32.21     | -0.54            |
| 5.00            | -65.35              | 113.56    | -0.15            |

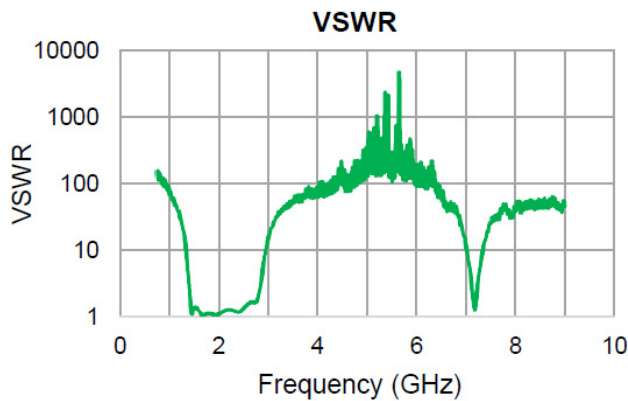
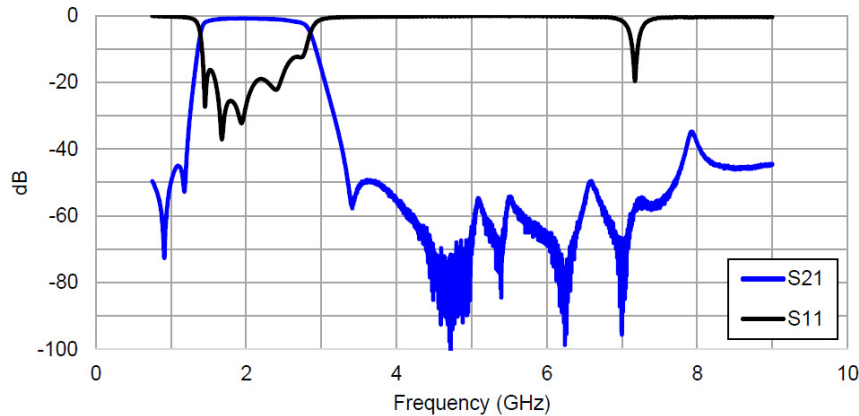
## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 1.47 - 2.68 GHz |
| Passband IL            | 1.89 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 1.98 dB         |
| Center Frequency IL    | 0.85 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC -1.17 GHz    |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.27 - 9.00 GHz |
| Rejection High Band    | 30 dB typ.      |
|                        | 25 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE E



Typical Frequency Response



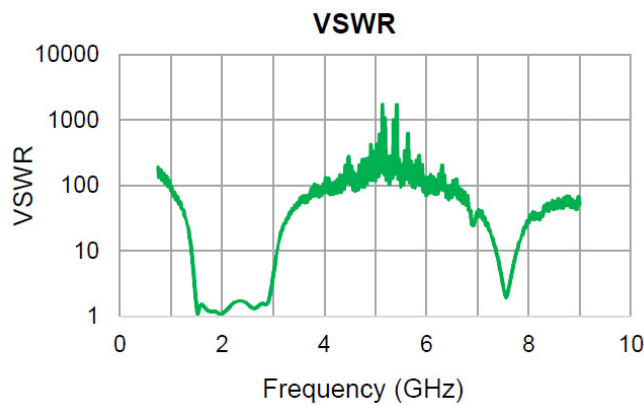
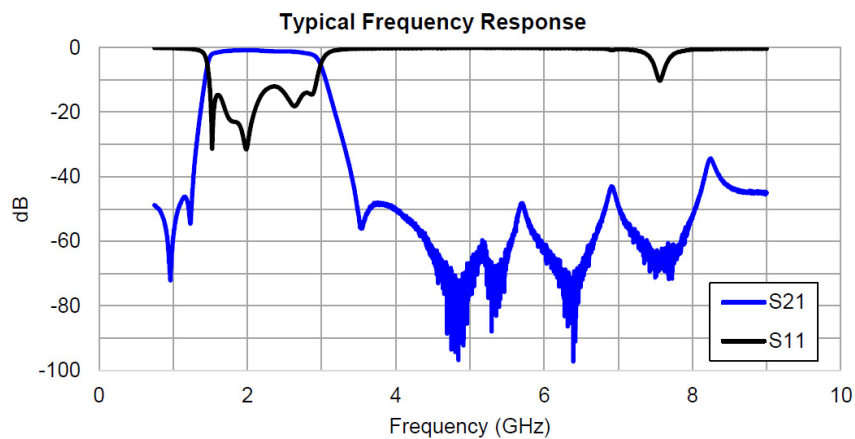
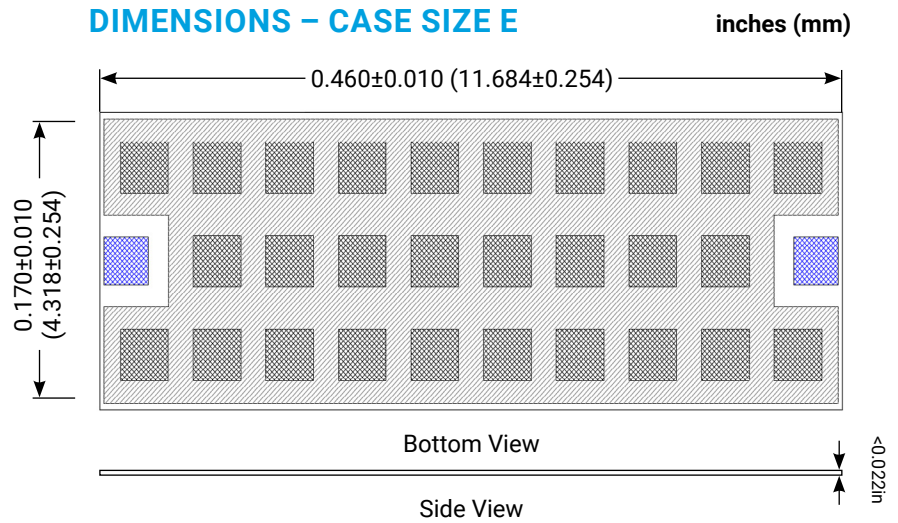
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.21            | -40.30              | 29.86     | -0.58            |
| 1.25            | -30.19              | 24.58     | -0.71            |
| 1.30            | -20.19              | 16.08     | -1.08            |
| 1.42            | -2.93               | 1.52      | -13.77           |
| 1.43            | -2.47               | 1.26      | -18.87           |
| 2.77            | -2.49               | 1.71      | -11.65           |
| 2.80            | -2.99               | 1.98      | -9.68            |
| 3.05            | -20.07              | 20.81     | -0.84            |
| 3.17            | -30.05              | 31.57     | -0.55            |
| 3.28            | -40.04              | 39.93     | -0.44            |
| 7.85            | -40.03              | 39.14     | -0.44            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 1.54 - 2.84 GHz |
| Passband IL            | 1.94 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 2.09 GHz        |
| Center Frequency IL    | 0.96 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.23 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.60 - 7.92 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE E



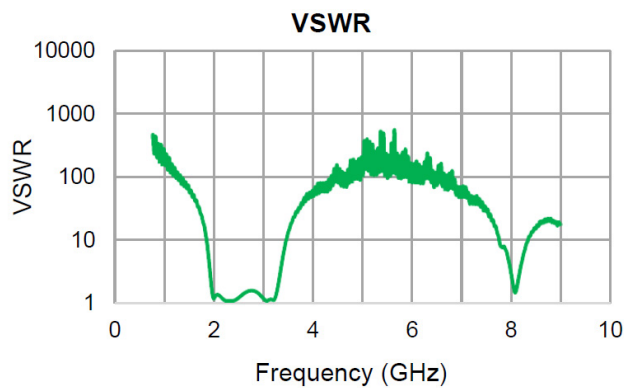
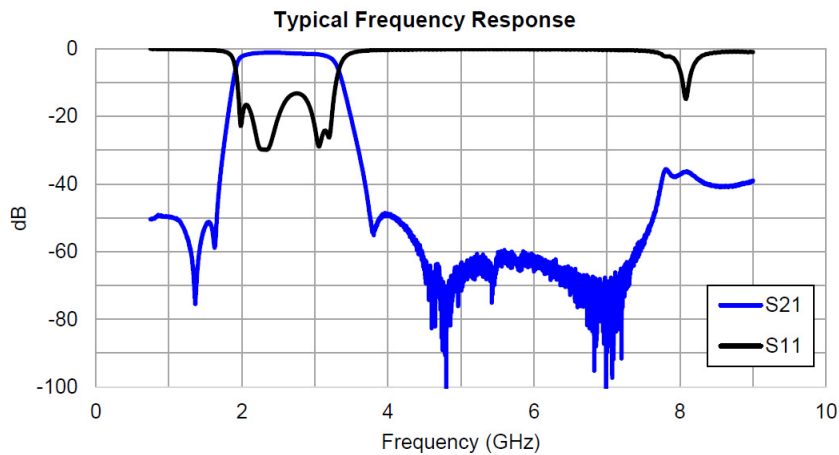
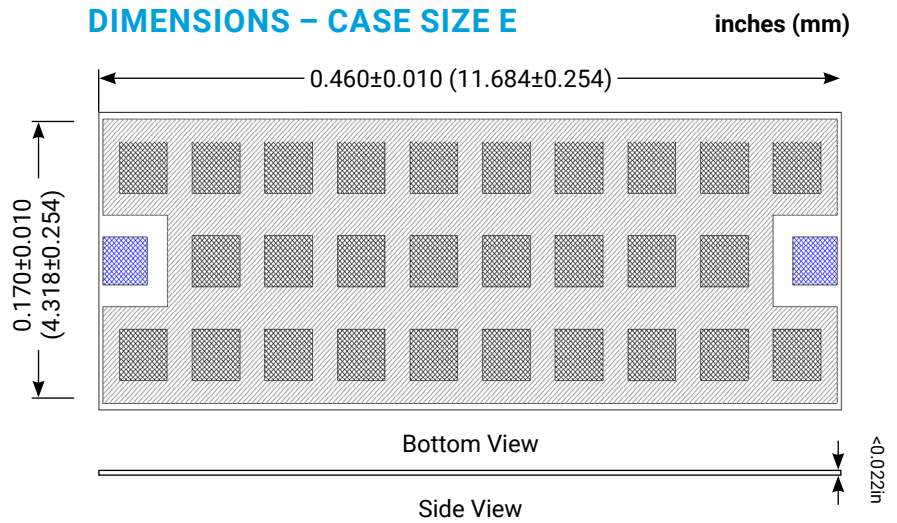
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.27            | -40.18              | 32.06     | -0.54            |
| 1.32            | -30.16              | 26.06     | -0.67            |
| 1.37            | -20.00              | 17.13     | -1.02            |
| 1.49            | -2.99               | 1.64      | -12.31           |
| 1.51            | -2.48               | 1.33      | -16.91           |
| 2.90            | -2.49               | 1.56      | -13.18           |
| 2.93            | -2.98               | 1.80      | -10.86           |
| 3.18            | -20.00              | 19.67     | -0.88            |
| 3.30            | -30.07              | 31.74     | -0.55            |
| 3.41            | -40.07              | 40.01     | -0.43            |
| 8.17            | -40.09              | 29.97     | -0.58            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.02 - 3.10 GHz |
| Passband IL            | 2.03 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 2.50 GHz        |
| Center Frequency IL    | 1.19 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.64 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.80 - 7.51 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE E



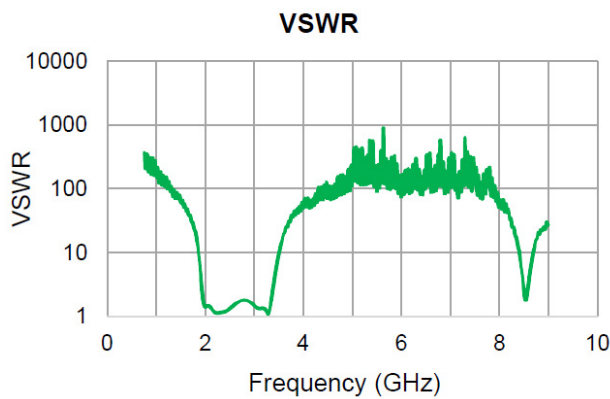
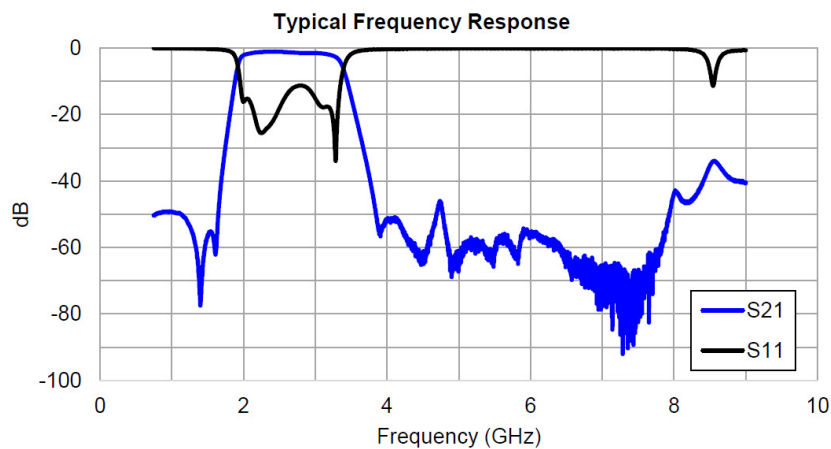
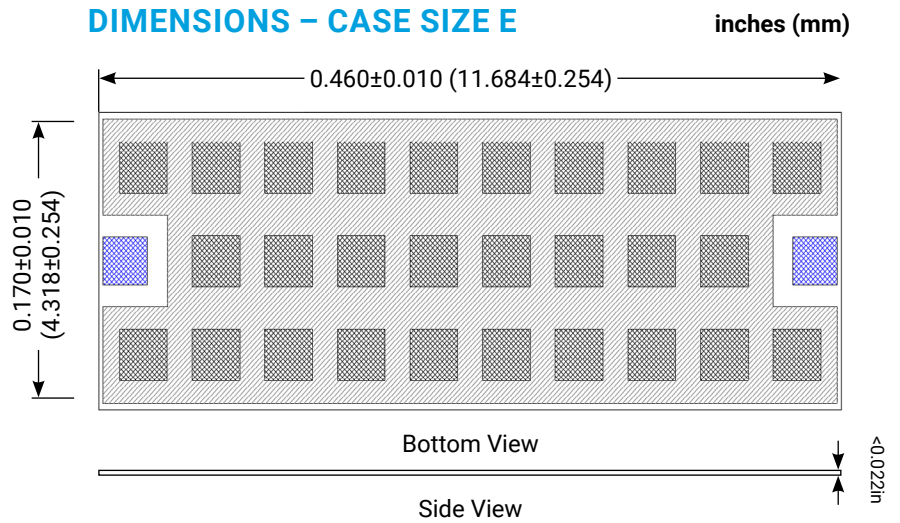
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.69            | -40.00              | 32.46     | -0.54            |
| 1.75            | -30.14              | 24.26     | -0.72            |
| 1.81            | -20.11              | 14.61     | -1.19            |
| 1.96            | -2.96               | 1.31      | -17.41           |
| 1.98            | -2.47               | 1.16      | -22.81           |
| 3.20            | -2.49               | 1.10      | -26.16           |
| 3.23            | -2.94               | 1.21      | -20.56           |
| 3.49            | -20.06              | 13.17     | -1.32            |
| 3.60            | -30.30              | 23.16     | -0.75            |
| 3.69            | -40.14              | 28.76     | -0.60            |
| 7.74            | -40.21              | 11.30     | -1.54            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.02 - 3.21 GHz |
| Passband IL            | 2.12 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 2.54 GHz        |
| Center Frequency IL    | 1.24 dB         |
| Power                  | 1 W             |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.64 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.80 - 8.31 GHz |
| Rejection High Band    | 30 dB typ.      |
|                        | 25 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in Max.  |

## DIMENSIONS – CASE SIZE E



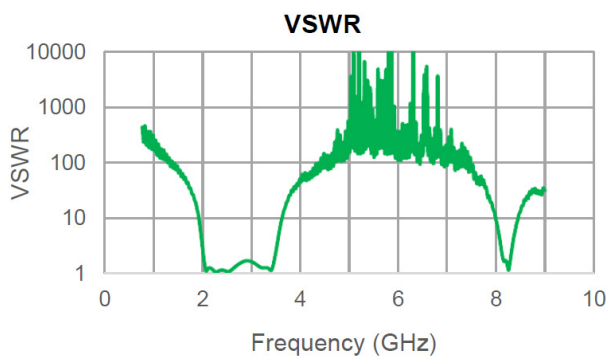
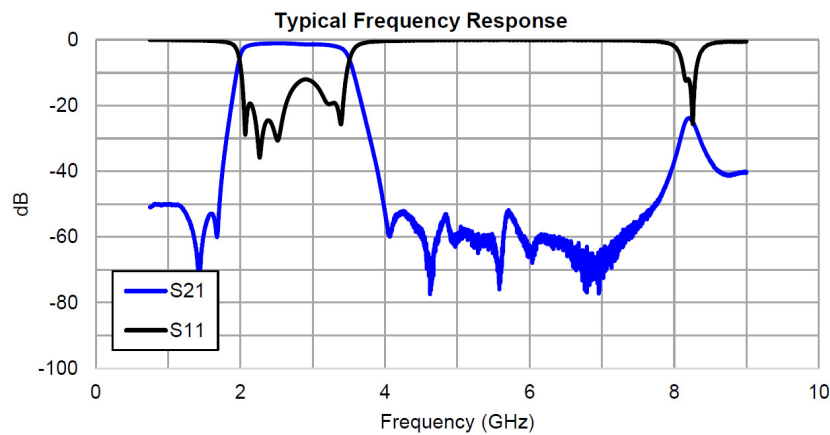
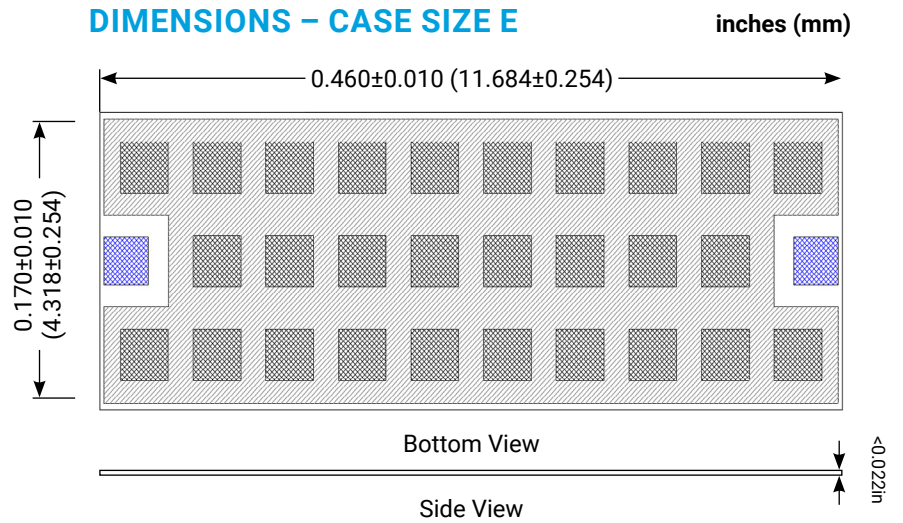
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.69            | -40.30              | 38.24     | -0.45            |
| 1.75            | -30.10              | 28.65     | -0.61            |
| 1.81            | -20.03              | 17.56     | -0.99            |
| 1.96            | -2.98               | 1.70      | -11.75           |
| 1.97            | -2.60               | 1.50      | -14.05           |
| 3.28            | -2.63               | 1.05      | -33.06           |
| 3.32            | -3.32               | 1.30      | -17.60           |
| 3.56            | -20.11              | 14.85     | -1.17            |
| 3.67            | -30.07              | 24.47     | -0.71            |
| 3.77            | -40.19              | 37.95     | -0.46            |
| 8.41            | -40.14              | 9.67      | -1.80            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.09 - 3.28 GHz |
| Passband IL            | 1.92 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 2.62 GHz        |
| Center Frequency IL    | 1.13 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.68 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 3.96 - 7.70 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



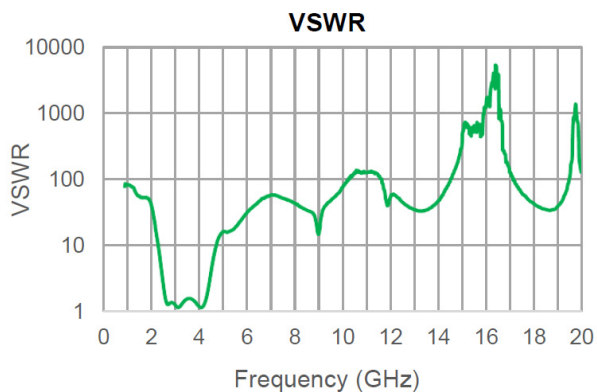
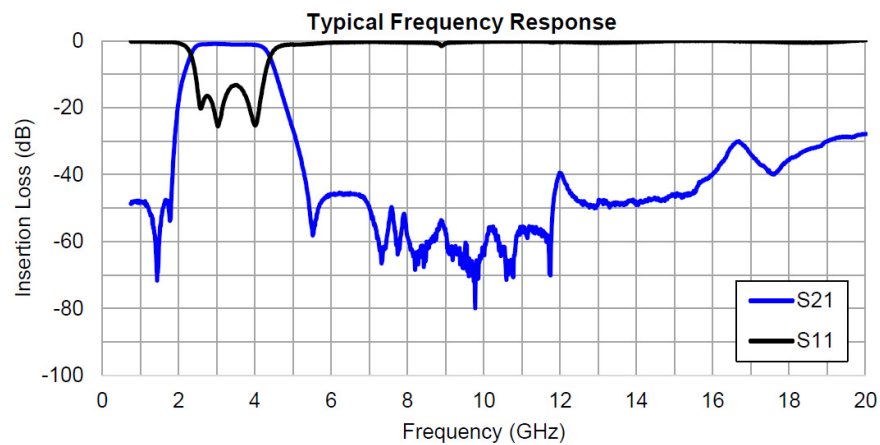
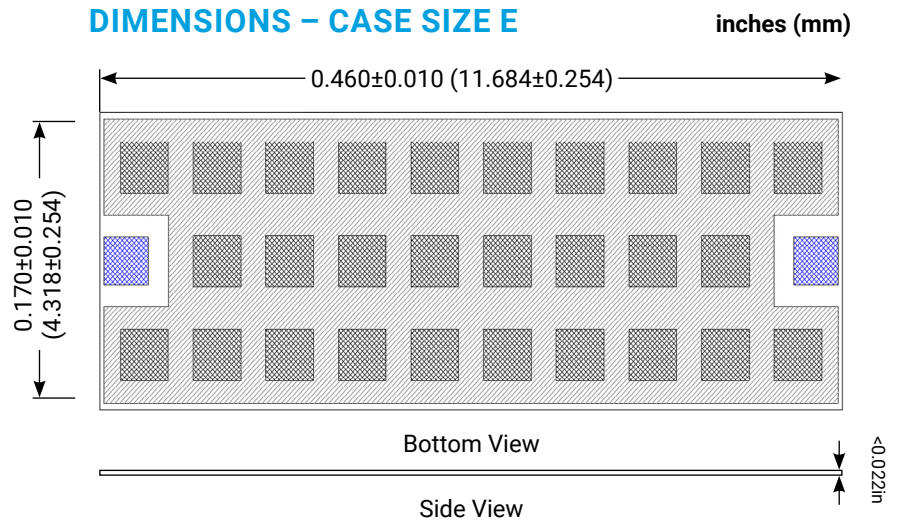
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.75            | -40.02              | 32.49     | -0.53            |
| 1.81            | -30.21              | 24.79     | -0.70            |
| 1.87            | -20.18              | 14.87     | -1.17            |
| 2.03            | -2.99               | 1.43      | -14.97           |
| 2.05            | -2.48               | 1.17      | -21.90           |
| 3.39            | -2.47               | 1.11      | -25.76           |
| 3.43            | -3.03               | 1.29      | -17.96           |
| 3.68            | -20.05              | 15.19     | -1.15            |
| 3.79            | -30.07              | 26.23     | -0.66            |
| 3.90            | -40.06              | 33.08     | -0.53            |
| 7.96            | -40.06              | 13.45     | -1.29            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.45 - 4.14 GHz |
| Passband IL            | 1.81 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 3.18 GHz        |
| Center Frequency IL    | 0.97 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.75 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 5.46 - 15.5 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



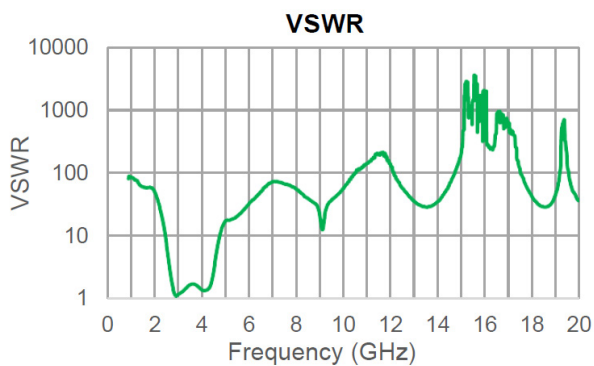
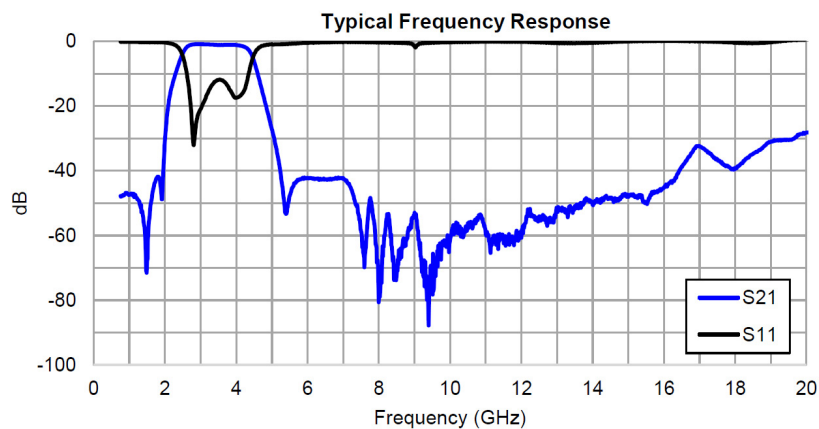
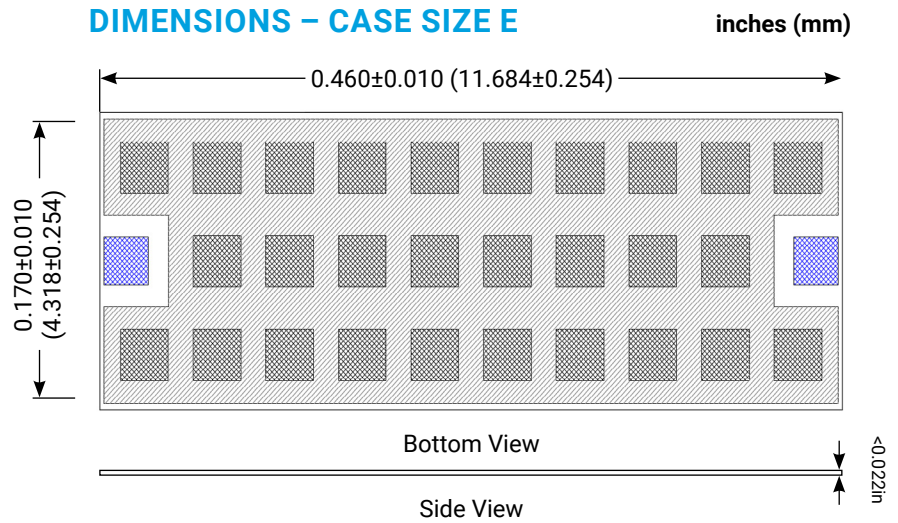
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.83            | -41.86              | 53.42     | -0.33            |
| 1.89            | -30.69              | 45.33     | -0.38            |
| 1.98            | -20.23              | 31.45     | -0.55            |
| 2.37            | -2.96               | 3.04      | -0.59            |
| 2.41            | -2.31               | 2.36      | -0.79            |
| 4.26            | -2.38               | 1.88      | -10.31           |
| 4.30            | -2.84               | 2.20      | -8.50            |
| 4.83            | -20.22              | 14.45     | -1.20            |
| 5.09            | -30.25              | 15.74     | -1.11            |
| 5.30            | -40.82              | 16.77     | -1.04            |
| 15.98           | -40.27              | 598.41    | -0.03            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.62 - 4.19 GHz |
| Passband IL            | 1.79 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 3.31 GHz        |
| Center Frequency IL    | 1.13 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.86 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 5.41 - 15.9 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



## TYPICAL PERFORMANCE AT 25°C

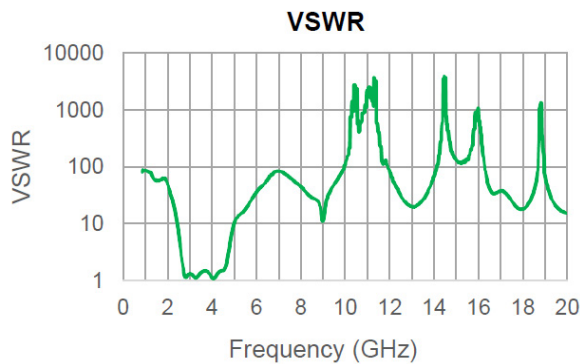
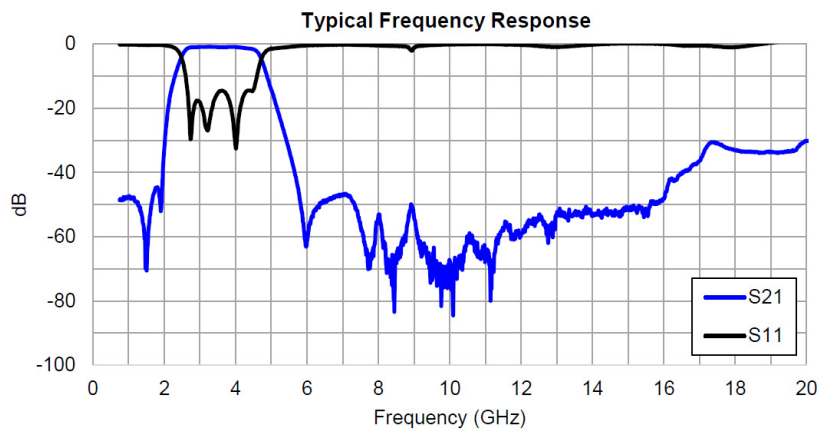
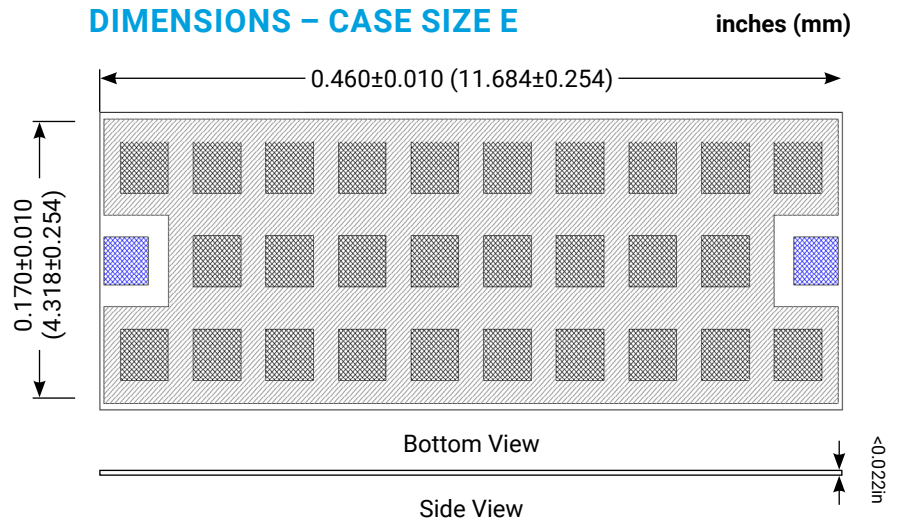
| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.94            | -42.93              | 42.40     | -0.41            |
| 2.00            | -30.11              | 39.11     | -0.44            |
| 2.09            | -20.21              | 30.68     | -0.57            |
| 2.54            | -2.79               | 2.88      | -6.30            |
| 2.57            | -2.42               | 2.46      | -7.49            |
| 4.32            | -2.43               | 1.76      | -11.23           |
| 4.36            | -2.86               | 2.02      | -9.42            |
| 4.84            | -20.27              | 15.53     | -1.12            |
| 5.07            | -30.35              | 17.71     | -0.98            |
| 5.24            | -40.46              | 18.01     | -0.97            |
| 16.43           | -40.21              | 832.00    | -0.02            |



## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 2.64 - 4.46 GHz |
| Passband IL            | 1.57 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 3.43 GHz        |
| Center Frequency IL    | 1.00 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 1.89 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 5.83 - 16.0 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



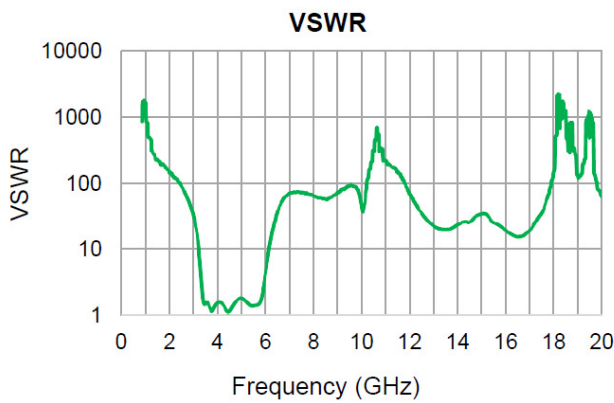
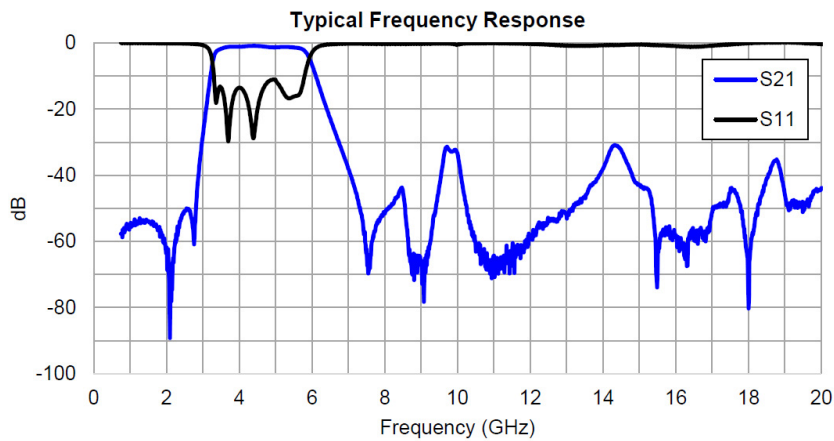
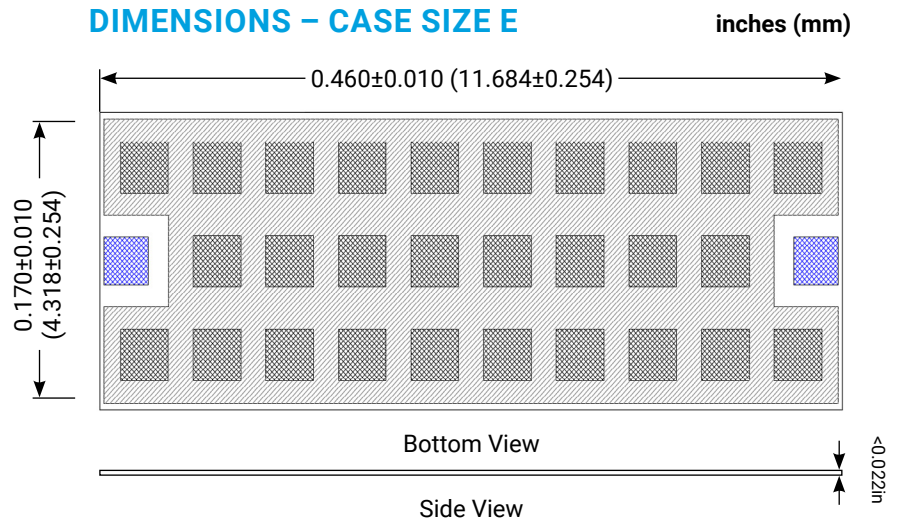
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 1.95            | -41.31              | 43.19     | -0.40            |
| 2.01            | -30.50              | 35.65     | -0.49            |
| 2.10            | -20.88              | 29.44     | -0.59            |
| 2.53            | -2.90               | 2.98      | -6.06            |
| 2.56            | -2.49               | 2.50      | -7.34            |
| 4.60            | -2.41               | 1.95      | -9.84            |
| 4.64            | -2.86               | 2.35      | -7.89            |
| 5.17            | -20.70              | 13.79     | -1.26            |
| 5.43            | -30.31              | 17.43     | -1.00            |
| 5.66            | -40.26              | 22.59     | -0.77            |
| 16.50           | -40.43              | 34.01     | -0.51            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 3.49 - 5.66 GHz |
| Passband IL            | 1.83 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 4.44 GHz        |
| Center Frequency IL    | 0.98 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 2.79 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 7.06 - 13.8 GHz |
| Rejection High Band    | 30 dB typ.      |
|                        | 25 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



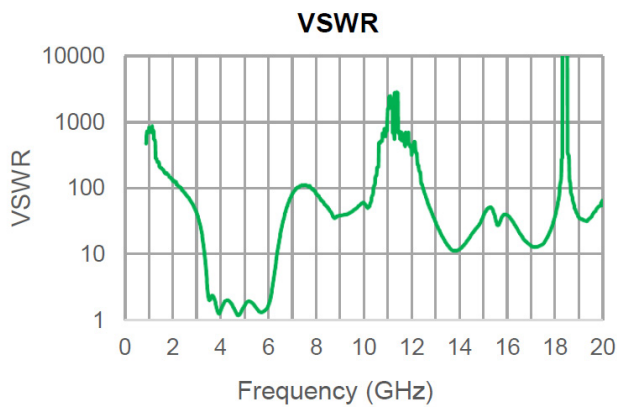
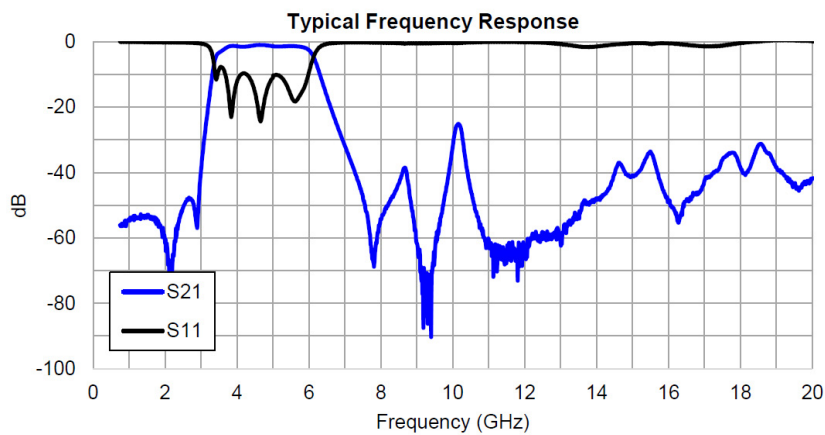
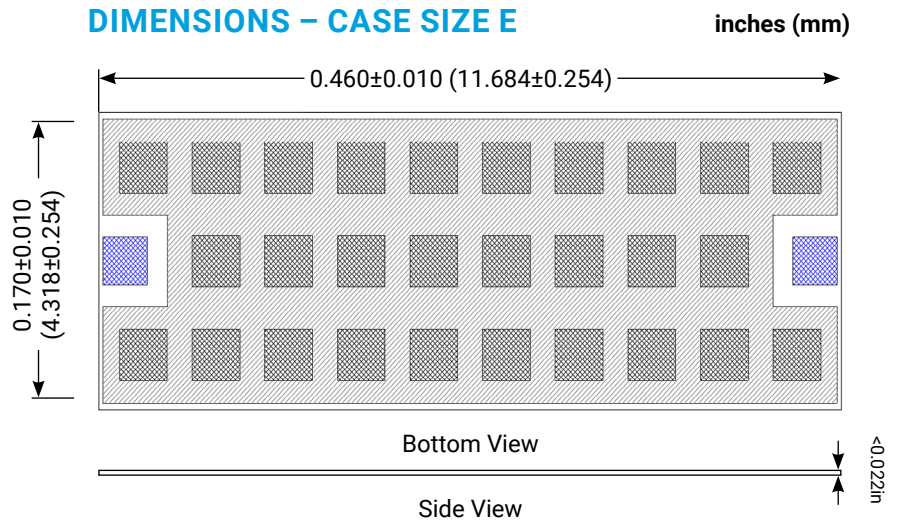
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 2.88            | -40.10              | 35.61     | -0.49            |
| 2.98            | -30.16              | 25.90     | -0.67            |
| 3.08            | -20.62              | 16.75     | -1.04            |
| 3.35            | -2.95               | 1.32      | -17.10           |
| 3.39            | -2.43               | 1.32      | -17.21           |
| 5.80            | -2.48               | 1.97      | -9.69            |
| 5.84            | -2.93               | 2.31      | -8.03            |
| 6.42            | -20.27              | 38.88     | -0.45            |
| 6.74            | -30.10              | 57.91     | -0.30            |
| 7.07            | -40.09              | 71.03     | -0.24            |
| 9.55            | -40.29              | 63.69     | -0.27            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 3.66 - 5.78 GHz |
| Passband IL            | 2.12 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 4.60 GHz        |
| Center Frequency IL    | 0.96 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 2.90 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 7.50 - 9.55 GHz |
| Rejection High Band    | 40 dB typ.      |
|                        | 35 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



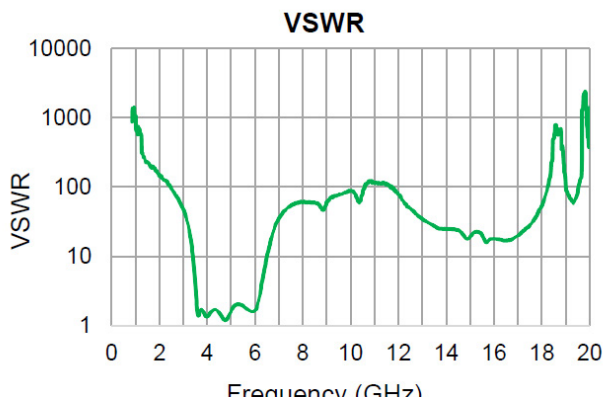
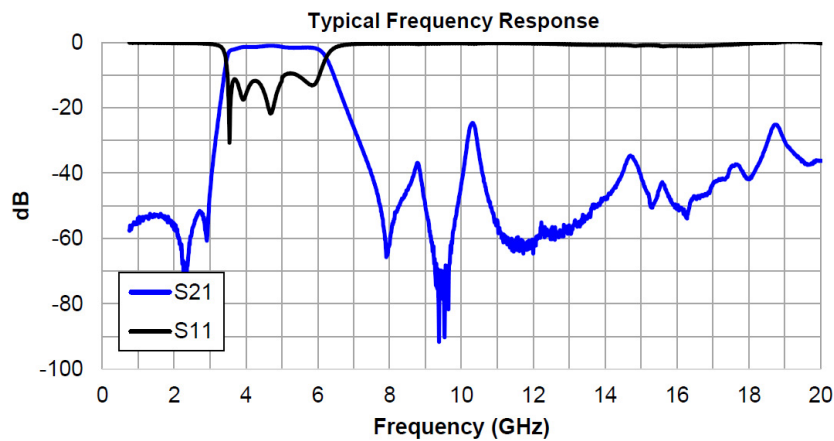
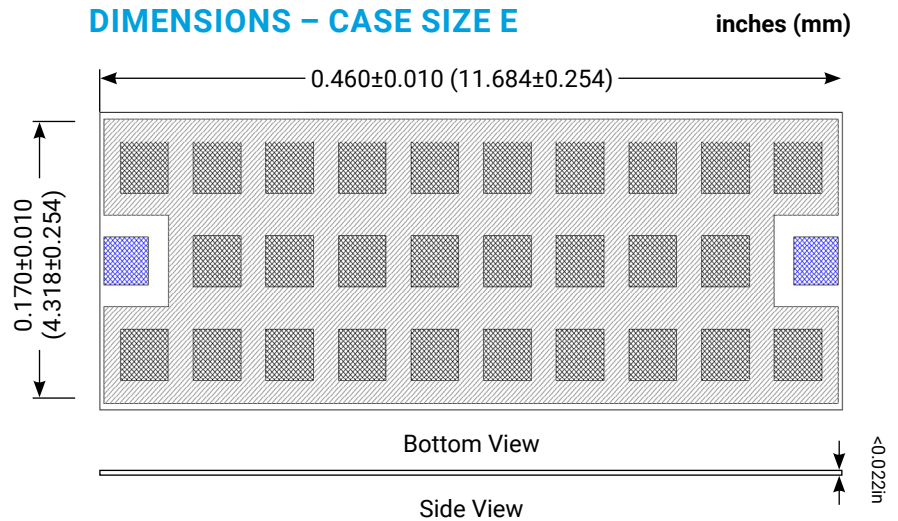
## TYPICAL PERFORMANCE AT 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 2.99            | -40.84              | 34.54     | -0.50            |
| 3.08            | -30.26              | 25.90     | -0.67            |
| 3.19            | -20.51              | 13.48     | -1.29            |
| 3.55            | -2.97               | 2.41      | -7.66            |
| 3.63            | -2.41               | 2.24      | -8.36            |
| 6.00            | -2.47               | 1.99      | -9.60            |
| 6.03            | -2.91               | 2.31      | -8.05            |
| 6.61            | -20.21              | 33.30     | -0.52            |
| 6.95            | -30.17              | 112.45    | -0.15            |
| 7.28            | -40.04              | 104.23    | -0.17            |
| 9.89            | -40.05              | 50.09     | -0.35            |

## ELECTRICAL SPECIFICATIONS

| Passband               |                 |
|------------------------|-----------------|
| Passband Frequency     | 3.70 - 5.93 GHz |
| Passband IL            | 2.01 dB typ.    |
|                        | 5 dB max        |
| Center Frequency       | 4.68 GHz        |
| Center Frequency IL    | 0.99 dB         |
| Power                  | 1 Watt          |
| Stopband               |                 |
| Low Stopband Frequency | DC - 2.96 GHz   |
| Rejection Low Band     | 40 dB typ.      |
|                        | 35 dB min.      |
| High Frequency         | 6.99 - 20.0 GHz |
| Rejection High Band    | 20 dB typ.      |
|                        | 15 dB min.      |
| Dimension              |                 |
| Thickness              | <0.022 in. Max  |

## DIMENSIONS – CASE SIZE E



## TYPICAL PERFORMANCE AT 25°C

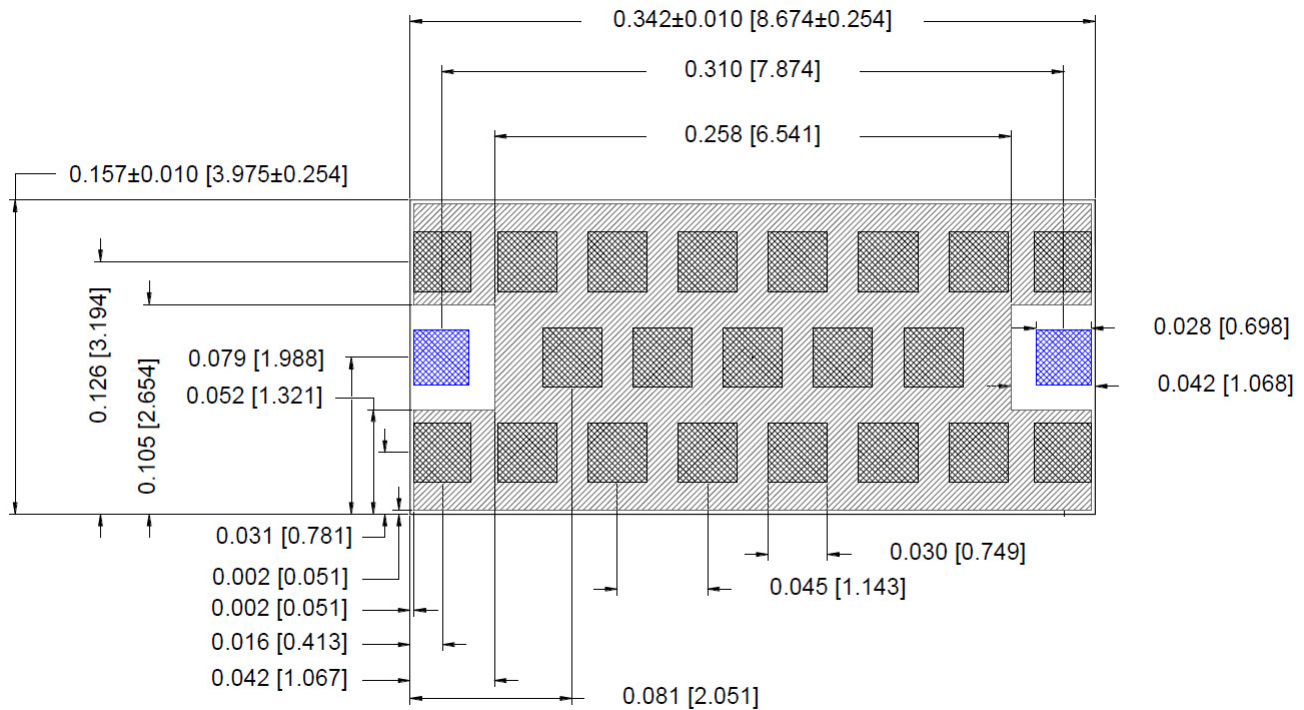
| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) | Return Loss (dB) |
|-----------------|---------------------|-----------|------------------|
| 3.05            | -40.07              | 33.16     | -0.52            |
| 3.14            | -30.81              | 29.20     | -0.60            |
| 3.26            | -20.74              | 16.34     | -1.06            |
| 3.53            | -2.88               | 1.15      | -22.99           |
| 3.57            | -2.44               | 1.22      | -20.22           |
| 6.08            | -2.48               | 2.11      | -8.94            |
| 6.12            | -2.88               | 2.38      | -7.78            |
| 6.79            | -20.02              | 29.28     | -0.59            |
| 7.15            | -30.08              | 47.23     | -0.37            |
| 7.50            | -40.54              | 50.73     | -0.34            |
| 8.68            | -40.14              | 53.72     | -0.32            |

# Multilayer Organic (MLO®) Filters

## Mechanical Specifications, PCB Layout & Mounting Recommendations

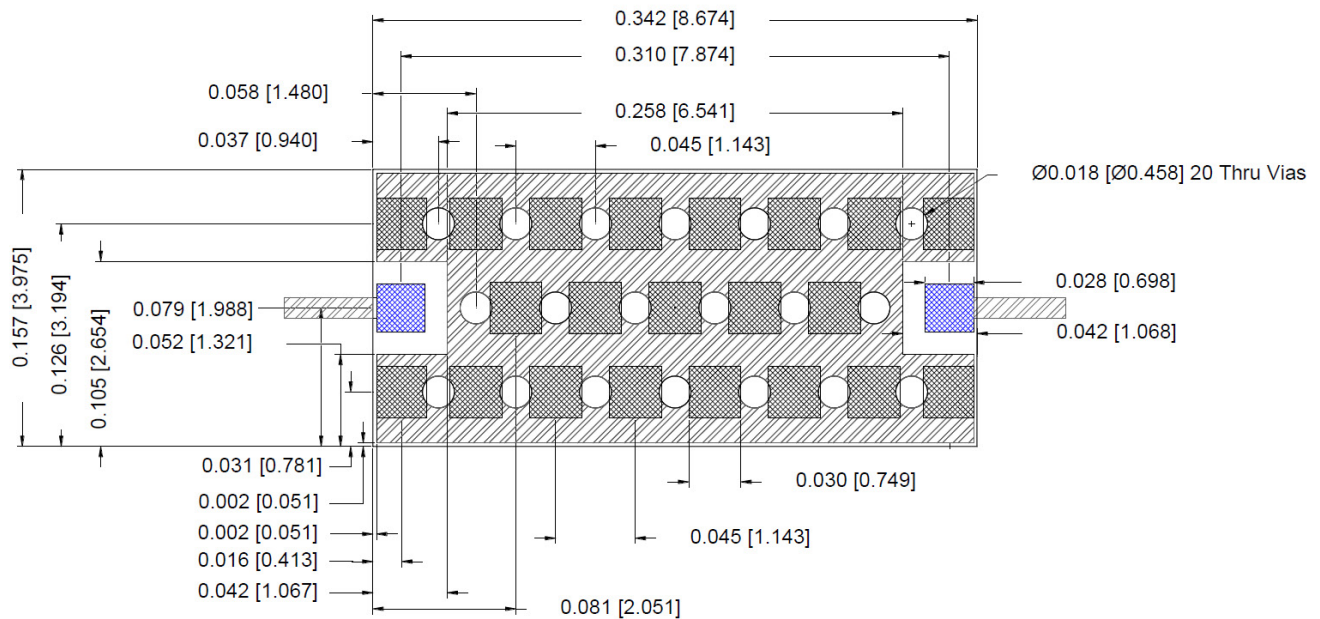


### MECHANICAL SPECIFICATIONS – FOOTPRINT C



Dimensions in inches [mm]  
Tolerance are  $\pm 0.002$  [0.05], unless noted.  
All contact areas are gold plated, including I/O pads.  
Blue pads are I/O, Gray are ground

### RECOMMENDED PCB LAYOUT – FOOTPRINT C



Dimensions in inches [mm].  
Line width should be designed to match 50 ohm characteristic impedance, depending on PCB material and thickness.  
Grounding is solid copper under solder mask, with solder mask defined pads for ground openings. I/O pads are not shorted to ground.  
DXF Files available upon request.

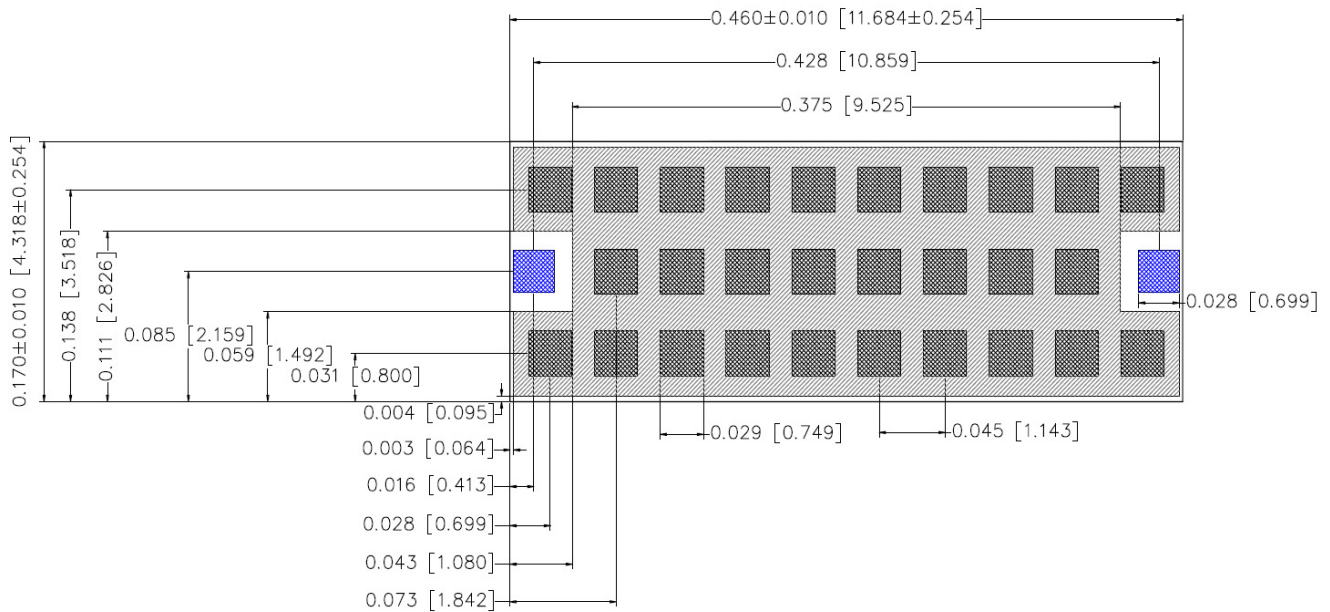


# Multilayer Organic (MLO®) Filters

## Mechanical Specifications, PCB Layout & Mounting Recommendations



### MECHANICAL SPECIFICATIONS – FOOTPRINT E

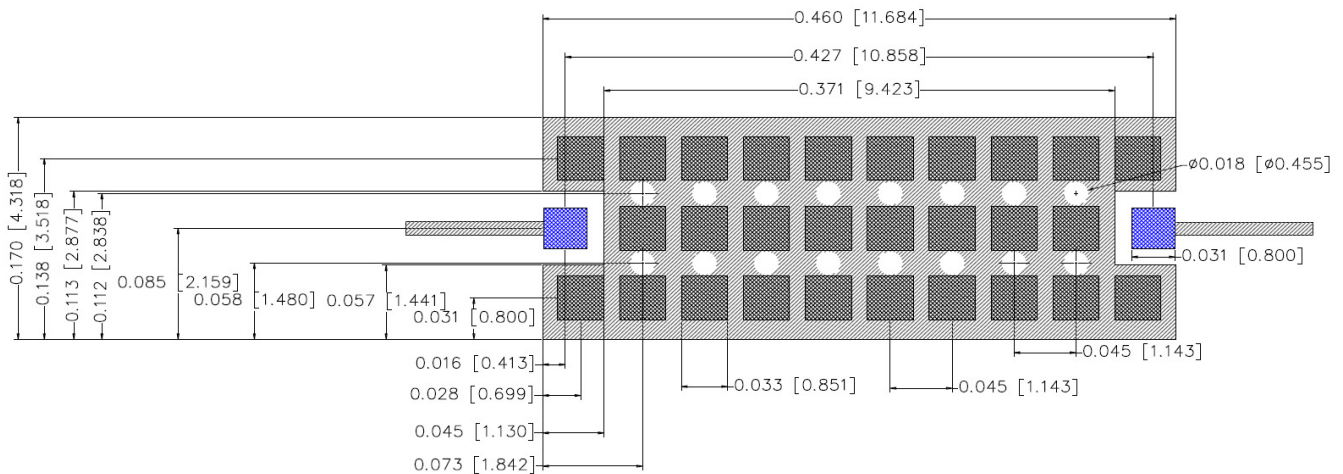


Dimensions in inches [mm]

Tolerances are +/-0.002 [0.05], unless noted.

All contact areas are gold plated, including I/O pads.

### RECOMMENDED PCB LAYOUT – FOOTPRINT E



Dimensions in inches [mm].

Line width should be designed to match 50 ohm characteristic impedance, depending on PCB material and thickness.

Grounding is solid copper under solder mask, with solder mask defined pads for ground openings. I/O pads are not shorted to ground.

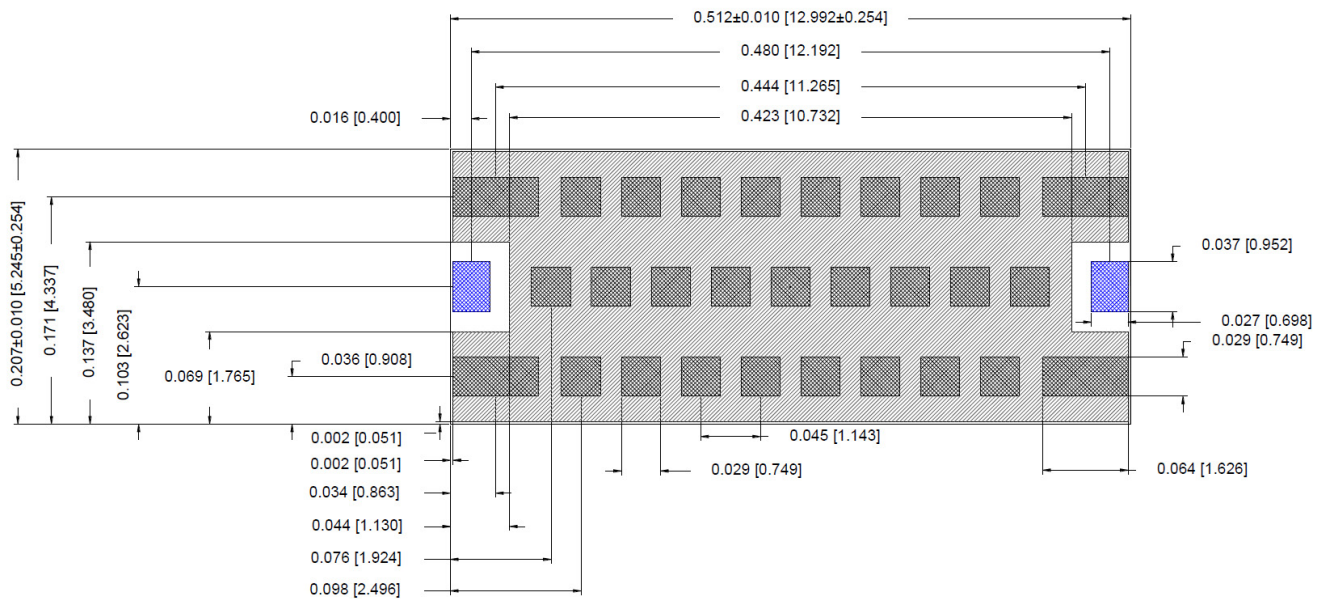
DXF Files available upon request.

# Multilayer Organic (MLO®) Filters

## Mechanical Specifications, PCB Layout & Mounting Recommendations



### MECHANICAL SPECIFICATIONS – FOOTPRINT F

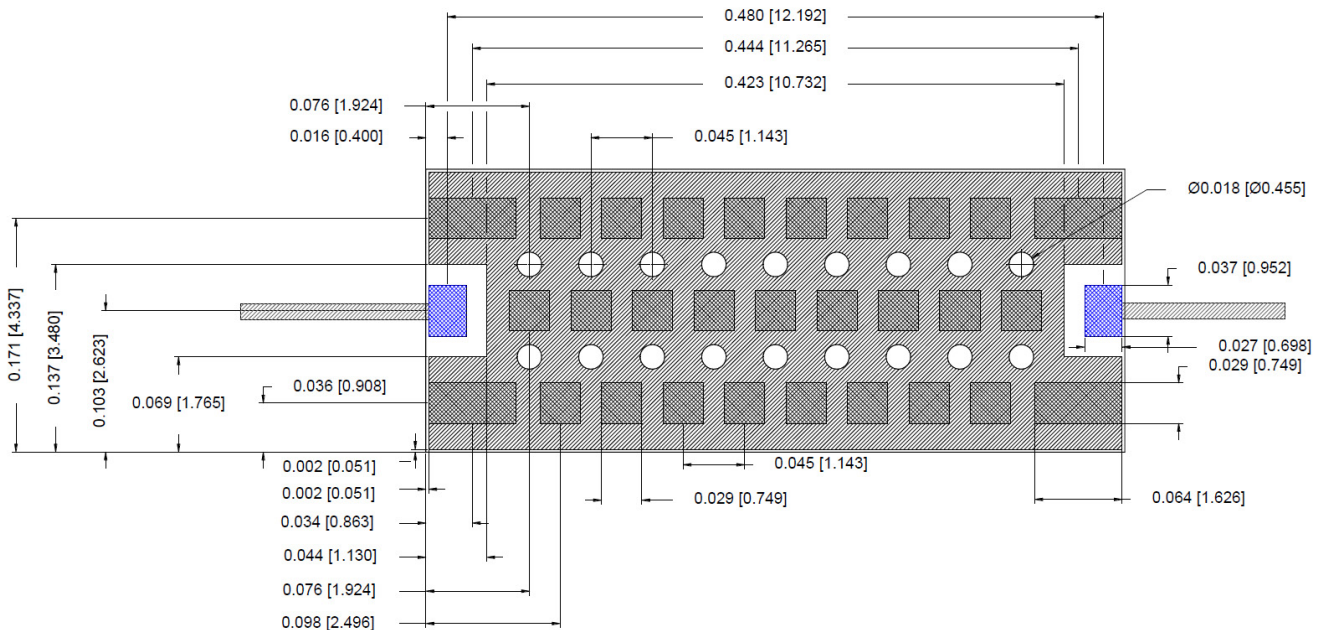


Dimensions in inches [mm]

Tolerances are +/-0.002 [0.05], unless noted.

All contact areas are gold plated, including I/O pads.

### RECOMMENDED PCB LAYOUT – FOOTPRINT F



Dimensions in inches [mm].

Line width should be designed to match 50 ohm characteristic impedance, depending on PCB material and thickness.

Grounding is solid copper under solder mask, with solder mask defined pads for ground openings. I/O pads are not shorted to ground.

DXF Files available upon request.



### MOUNTING RECOMMENDATIONS

#### AUTOMATED SMT ASSEMBLY

The following section describes the guidelines for automated SMT assembly of MLO® RF devices which are typically Land Grid Array (LGA) packages or side termination SMT packages.

Control of solder and solder paste volume is critical for surface mount assembly of MLO® RF devices onto the PCB.

#### SMT REFLOW PROFILE

Common IR or convection reflow SMT processes shall be used for the assembly. Standard SMT reflow profiles, for eutectic and Pb free solders, can be used to surface mount the MLO® devices onto the PCB. In all cases, a temperature gradient of 3°C/sec, or less, should be maintained to prevent warpage of the package and to ensure that all joints reflow properly. Additional soak time and slower preheating time may be required to improve the out-gassing of solder paste. In addition, the reflow profile depends on

Stencil thickness and aperture openings should be adjusted according to the optimal solder volume. The following are general recommendations for SMT mounting of MLO® devices onto the PCB.

the PCB density and the type of solder paste used. Standard no-clean solder paste is generally recommended. If another type of flux is used, complete removal of flux residual may be necessary. Example of a typical lead-free reflow profile is shown below.

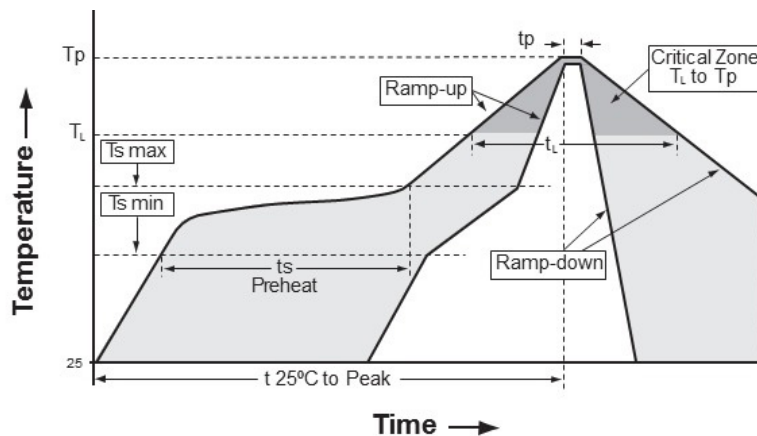


Figure A. Typical Lead Free Profile and Parameters

| Profile Parameter   | Pb free, Convection, IR/Convection |
|---|------------------------------------|
| Ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )             | 3°C/second max.                    |
| Preheat temperature (T <sub>s min</sub> to T <sub>s max</sub> ) | 150°C to 200°C                     |
| Preheat time (t <sub>s</sub> )                                  | 60 - 180 seconds                   |
| Time above T <sub>L</sub> , 217°C (t <sub>L</sub> )             | 60 - 120 seconds                   |
| Peak temperature (T <sub>p</sub> )                              | 260°C                              |
| Time within 5°C of peak temperature (t <sub>p</sub> )           | 10 - 20 seconds                    |
| Ramp-down rate  | 4°C/second max.                    |
| Time 25° C to peak temperature                                  | 6 minutes max.                     |



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