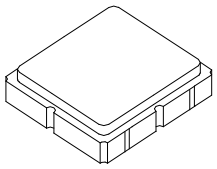
muRata
INNOVATOR IN ELECTRONICS

# SF2170D

## 165 MHz SAW Filter

- ***Low Insertion Loss***
- ***3.8 X 3.8 X 1.0 mm Surface Mount Case***
- ***Single-Ended Input/Output***
- ***Complies with Directive 2002/95/EC (RoHS)***



**SM3838-6**

**Absolute Maximum Ratings**

| Rating | Value | Units |
|---|---|---|
| Maximum Incident Power in Passband | +10 | dBm |
| Maximum DC Voltage Between any 2 Terminals | 30 | VDC |
| Storage Temperature Range in Tape and Reel | -40 to +85 | °C |
| Suitable for Lead-free Soldering - Maximum Soldering Profile | 260°C for 30 s | |

**Electrical Characteristics**

| Characteristic | Sym | Notes | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Center Frequency | $f_C$ | 1 | | 165 | | MHz |
| Source Impedance to Matching Network (single ended) | | | | 50 | | Ω |
| Load Impedance to Matching Network (single ended) | | | | 50 | | Ω |
| Passband Width | | | 20 | 22 | | MHz |
| Rejection Referenced to Minimum Insertion Loss: | | | | | | dB |
| 10 MHz to 110 MHz | | | 35 | 40 | | |
| 127 MHz to 149 MHz | | | 10 | 15 | | |
| 190 to 210 MHz | | | 30 | 40 | | |
| 210 to 450 MHz | | | 40 | 45 | | |
| Maximum Insertion Loss | | | | 9 | 10 | dB |
| Insertion Loss Variation over -40 to 85 °C | | | | | 1 | dB |
| Amplitude Variation over 20 MHz Passband | | | | 1.0 | 1.5 | $dB_{P-P}$ |
| Group Delay Variation over 20 MHz Passband | | | | 40 | 80 | $ns_{P-P}$ |
| Absolute Group Delay at $f_C$ | | | | 0.33 | | µs |
| Input/Output Return Loss into Matching over 20 MHz BW | | | 6 | 8 | | dB |
| Operating Temperature | | | -40 | | +85 | °C |

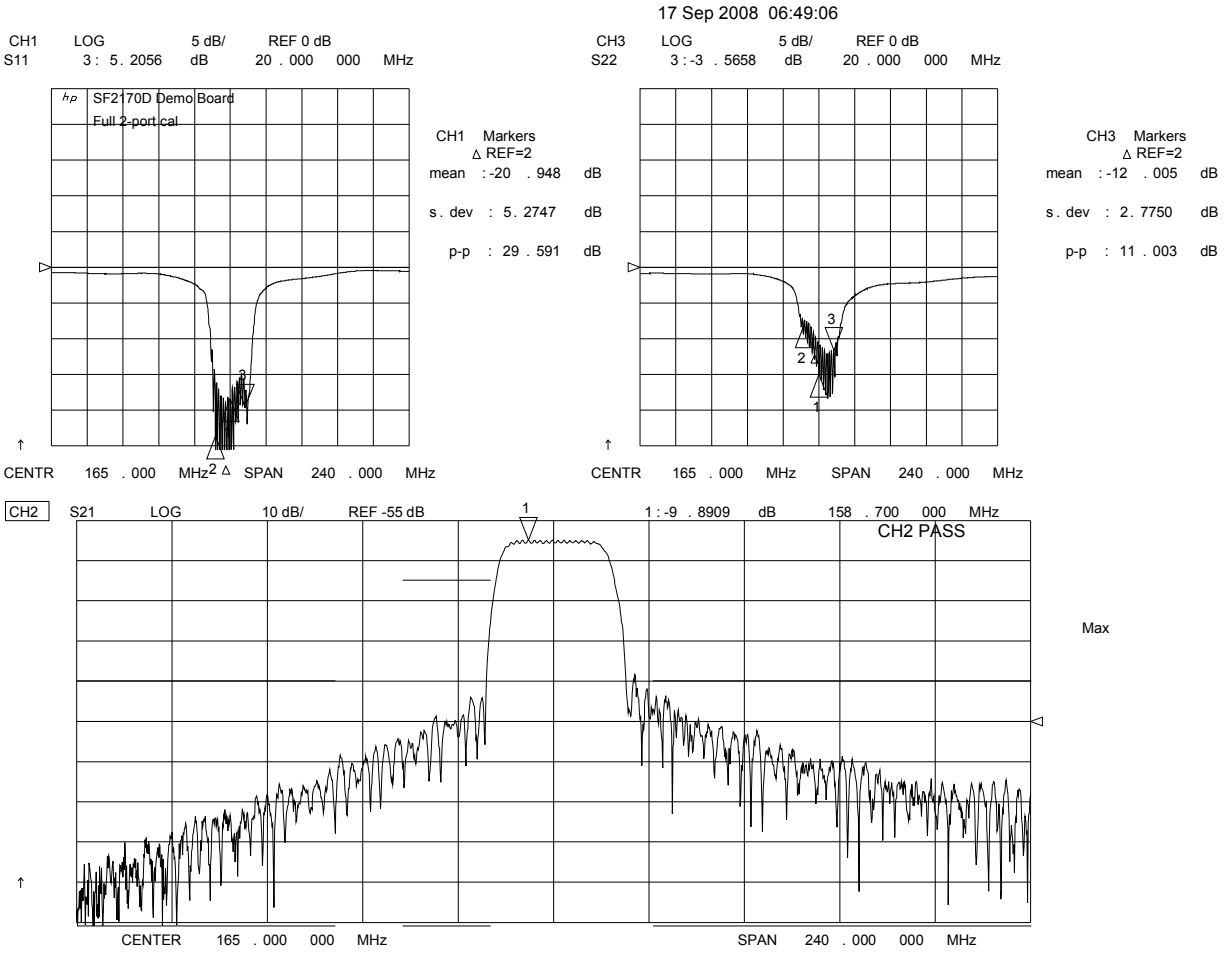
| | | |
|---|---|---|
| Case Style | | SM3838-6 3.8 x 3.8 mm Nominal Footprint |
| Lid Symbolization (Y=year, WW=week, S=shift) dot=pin 1 indicator | | 865, YWWS |
| Standard Reel Quantity | Reel Size 7 Inch | 1000 Pieces/Reel |
| | Reel Size 13 Inch | 3000 Pieces/Reel |

**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

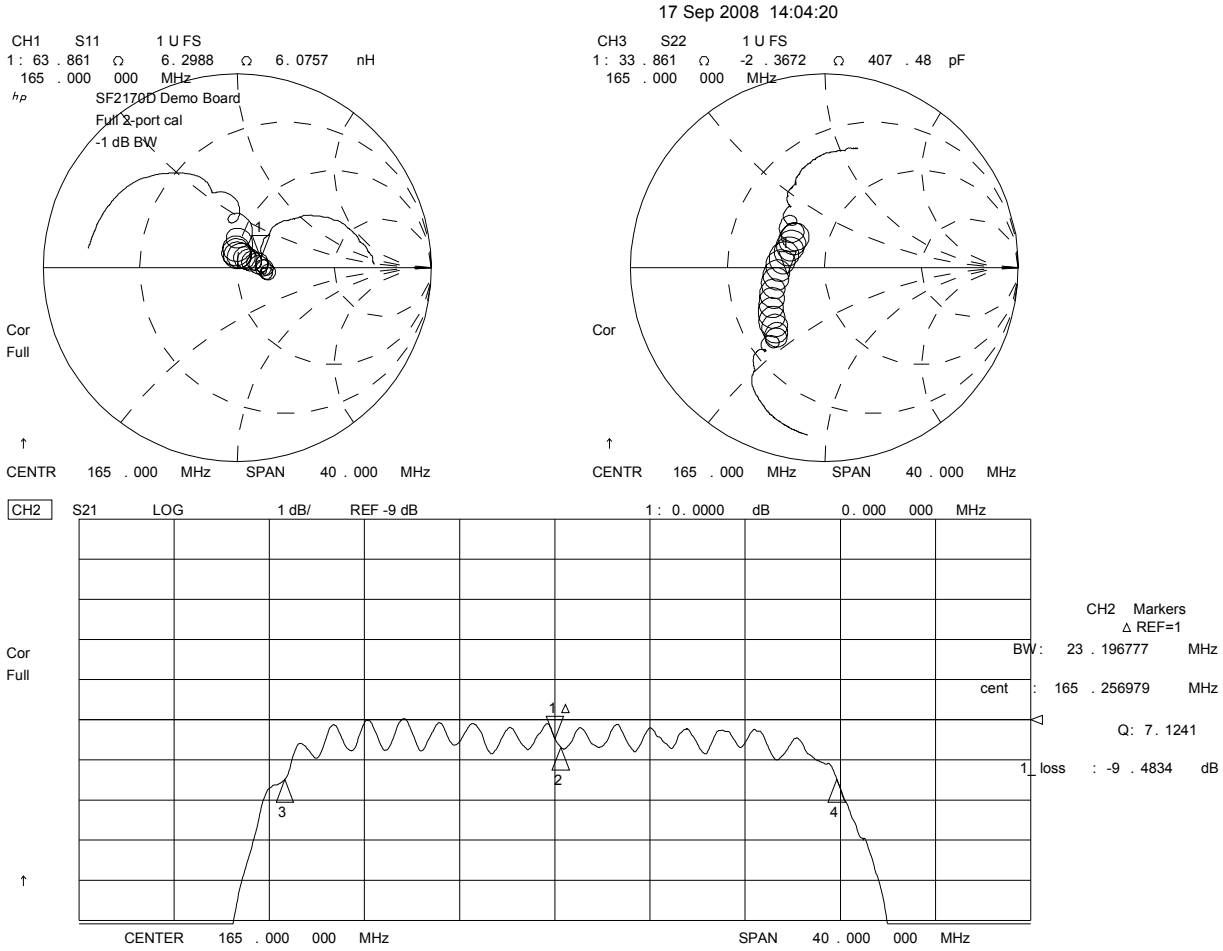
**NOTES:**

1. Unless noted otherwise, all specifications apply over the operating temperature range with filter soldered to the specified demonstration board with impedance matching to 50 Ω and measured with 50 Ω network analyzer.
2. Unless noted otherwise, all frequency specifications are referenced to the nominal center frequency, fc.
3. Rejection is measured as attenuation below the minimum IL point in the passband. Rejection in final user application is dependent on PCB layout and external impedance matching design. See Application Note No. 42 for details.
4. The design, manufacturing process, and specifications of this filter are subject to change.
5. Either Port 1 or Port 2 may be used for either input or output in the design. However, impedances and impedance matching may vary between Port 1 and Port 2, so that the filter must always be installed in one direction per the circuit design.
6. US and international patents may apply.
7. Murata, stylized Murata logo, and Murata N.A., Inc. are registered trademarks of Murata Manufacturing Co., Ltd.

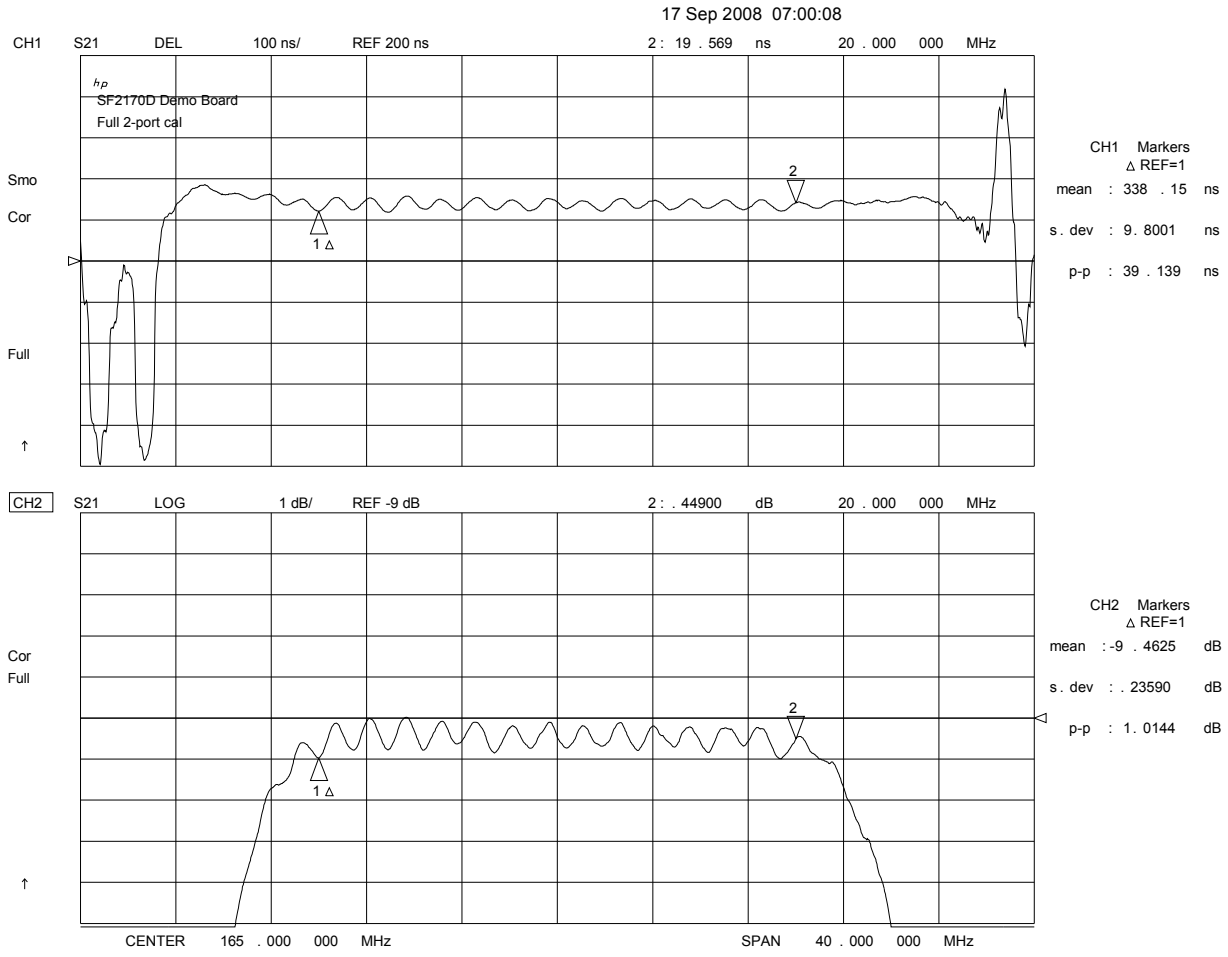
# Broadband Filter Response and Return Loss (through matching network)



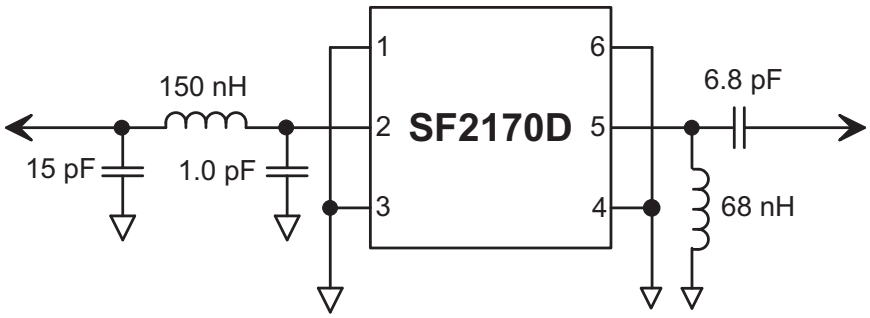
# Passband Amplitude and Impedance Detail



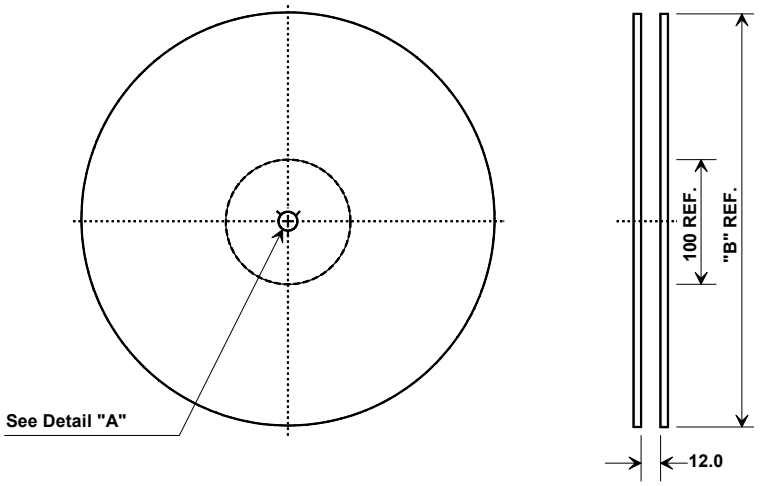
## Passband Group Delay and Amplitude Ripple




## SF2170D Demo Circuit



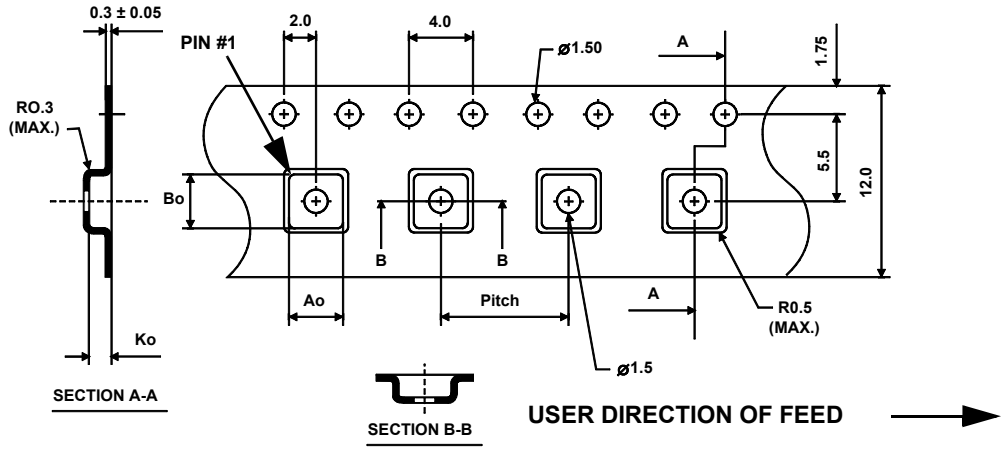
**Tape and Reel Specifications**




| "B " | | Quantity Per Reel |
|---|---|---|
| Inches | millimeters | |
| 7 | 178 | 1000 |
| 13 | 330 | 3000 |

**COMPONENT ORIENTATION and DIMENSIONS**

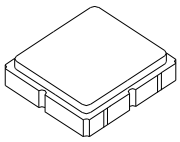
| Carrier Tape Dimensions | |
|---|---|
| **Ao** | 4.25 mm |
| **Bo** | 4.25 mm |
| **Ko** | 1.30 mm |
| **Pitch** | 8.0 mm |
| **W** | 12.0 mm |

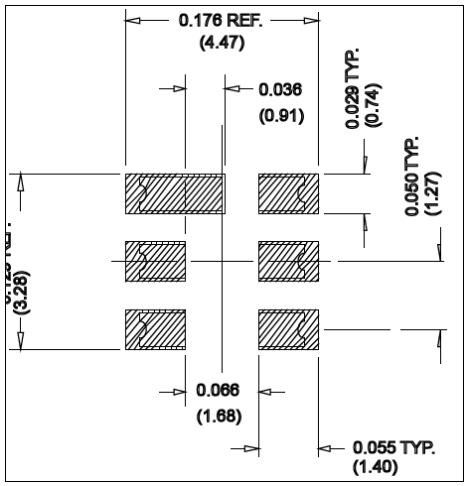


# SM3838-6 Case

## 6-Terminal Ceramic Surface-Mount Case

## 3.8 X 3.8 mm Nominal Footprint





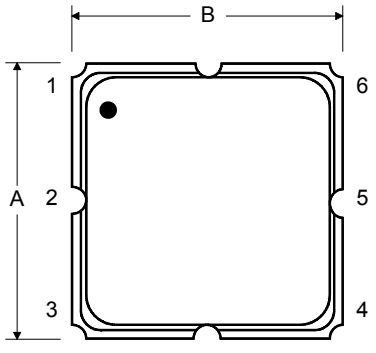

**PCB Footprint**

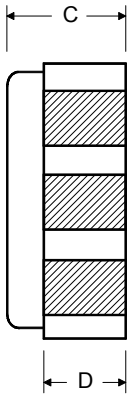
| Case Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| **Dimension** | **mm** | | | **Inches** | | |
| | **Min** | **Nom** | **Max** | **Min** | **Nom** | **Max** |
| **A** | 3.60 | 3.80 | 4.0 | 0.14 | 0.15 | 0.16 |
| **B** | 3.60 | 3.80 | 4.0 | 0.14 | 0.15 | 0.16 |
| **C** | 1.30 | 1.50 | 1.70 | 0.05 | 0.06 | 0.067 |
| **D** | 0.95 | 1.10 | 1.25 | 0.037 | 0.043 | 0.05 |
| **E** | 2.39 | 2.54 | 2.69 | 0.090 | 0.10 | 0.110 |
| **G** | 0.90 | 1.0 | 1.10 | 0.035 | 0.04 | 0.043 |
| **H** | 1.90 | 2.0 | 2.10 | 0.75 | 0.08 | 0.83 |
| **I** | 0.50 | 0.6 | 0.70 | 0.020 | 0.024 | 0.028 |
| **J** | 1.70 | 1.8 | 1.90 | 0.067 | 0.07 | 0.075 |

| Electrical Connections | | |
|---|---|---|
| **Connection** | | **Terminals** |
| Port 1 | Single-ended Input | 2 |
| Port 2 | Single-ended Output | 5 |
| | Ground | All others |
| **Single Ended Operation Only** | | |
| Dot indicates Pin 1 | | |

| Materials | |
|---|---|
| Solder Pad Plating | 0.3 to 1.0 µm Gold over 1.27 to 8.89 µm Nickel |
| Lid Plating | 2.0 to 3.0 µm Nickel |
| Body | $Al_2O_3$ Ceramic |
| Pb Free | |

TOP VIEW




BOTTOM VIEW