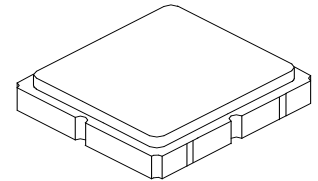


- **High Performance SAW Filter**
- **3.8 x 3.8 x 1.4 mm Surface-mount Package**
- **Complies with Directive 2002/95/EC (RoHS)**


**SF2223D**
**184.32 MHz  
SAW Filter**

**SM3838-8**

#### Absolute Maximum Ratings

| Rating                                                       | Value           | Units |
|--------------------------------------------------------------|-----------------|-------|
| Maximum Incident Power in Passband                           | +10             | dBm   |
| Maximum DC Voltage Between any Two Active Terminals          | 30              | VDC   |
| Storage Temperature Range in Tape and Reel                   | -40 to +85      | °C    |
| Operating Temperature Range                                  | -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             |
|------------------------------------------|------------|-------|------|--------|------|-------------------|
| Nominal Center Frequency                 | $f_c$      |       |      | 184.32 |      | MHz               |
| Minimum Insertion Loss                   | $IL_{MIN}$ |       |      | 8.5    | 10.0 | dB                |
| 1 dB Bandwidth                           | $BW_1$     |       | 30   | 32     |      | MHz               |
| Amplitude Ripple, 169.32 to 199.32 MHz   |            |       |      | 0.6    | 1.0  | dB <sub>P-P</sub> |
| Group Delay Ripple, 169.32 to 199.32 MHz |            |       |      | 18     | 50   | ns <sub>P-P</sub> |
| Rejection referenced to $IL_{MIN}$ :     |            |       |      |        |      |                   |
| 1.00 to 137.88 MHz                       |            |       | 45   | 60     |      | dB                |
| 149.32 MHz                               |            |       | 16.5 | 60     |      |                   |
| 219.32 MHz                               |            |       | 16.5 | 60     |      |                   |
| 261.48 to 600.00 MHz                     |            |       | 45   | 50     |      |                   |

|                                                                  |                                         |                  |  |  |  |  |
|------------------------------------------------------------------|-----------------------------------------|------------------|--|--|--|--|
| Case Style                                                       | SM3838-8 3.8 x 3.8 mm Nominal Footprint |                  |  |  |  |  |
| Lid Symbolization, Y=year, WW=week, S=shift, Dot=pin 1 indicator | 959, <u>YWWS</u>                        |                  |  |  |  |  |
| Standard Reel Quantity                                           | Reel Size 7 Inch                        | 500 Pieces/Reel  |  |  |  |  |
|                                                                  | Reel Size 13 Inch                       | 3000 Pieces/Reel |  |  |  |  |

#### Electrical Connections

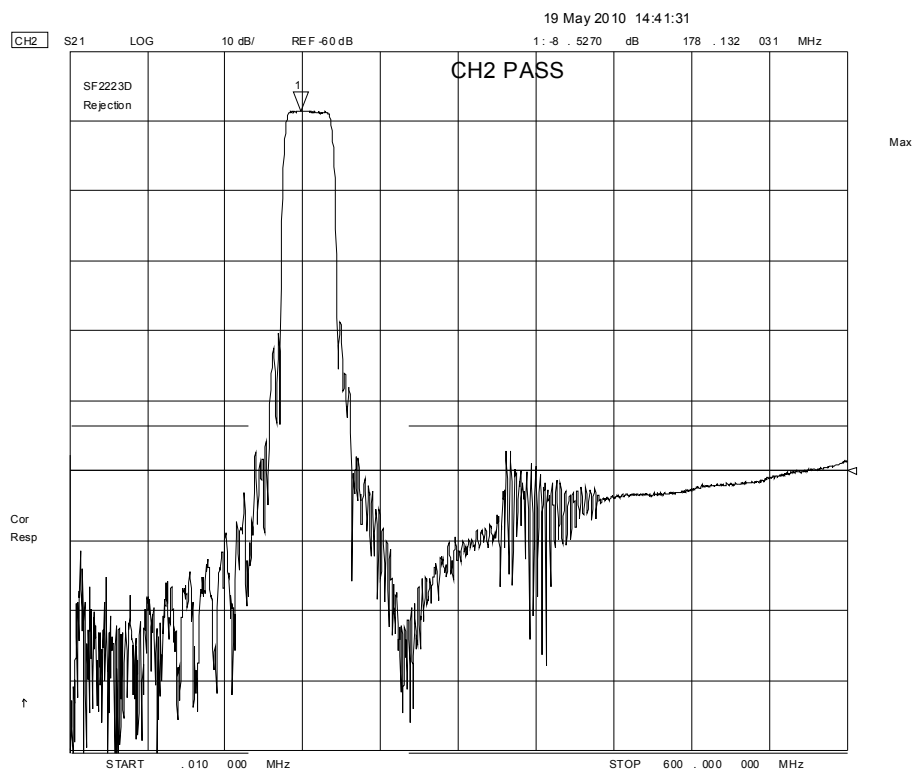
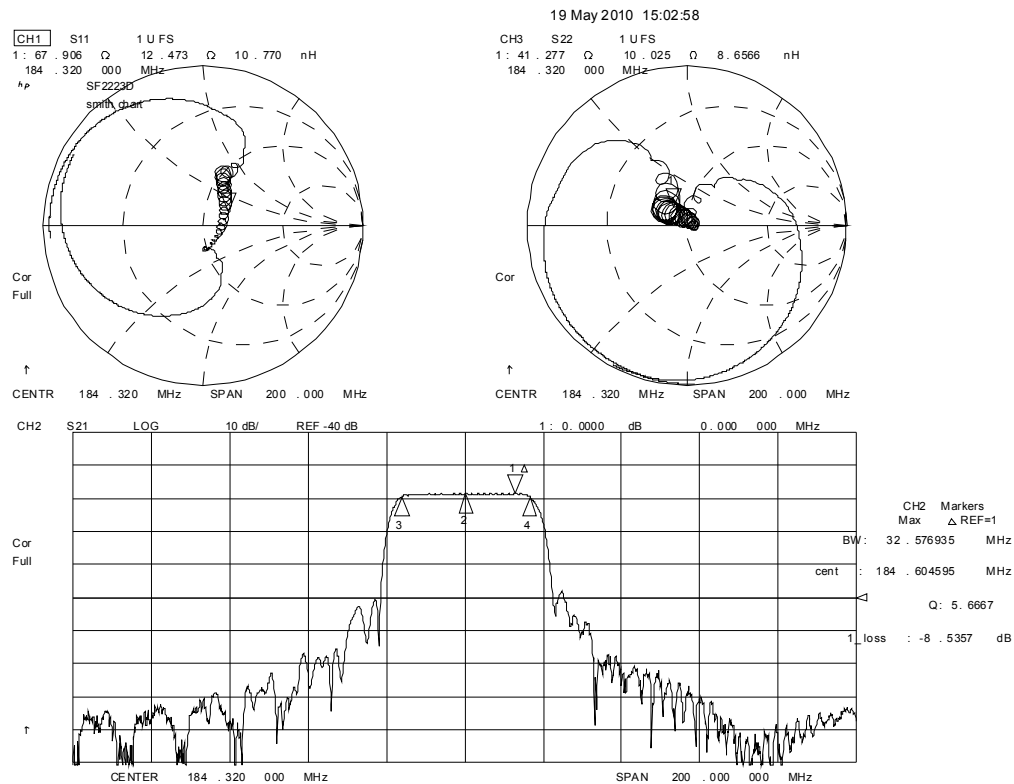
| Connection                | Terminals  |
|---------------------------|------------|
| Balanced Input Option     | 1 and 2    |
| Single-ended Input Option | 1          |
| Output                    | 5          |
| Case Ground               | All others |


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

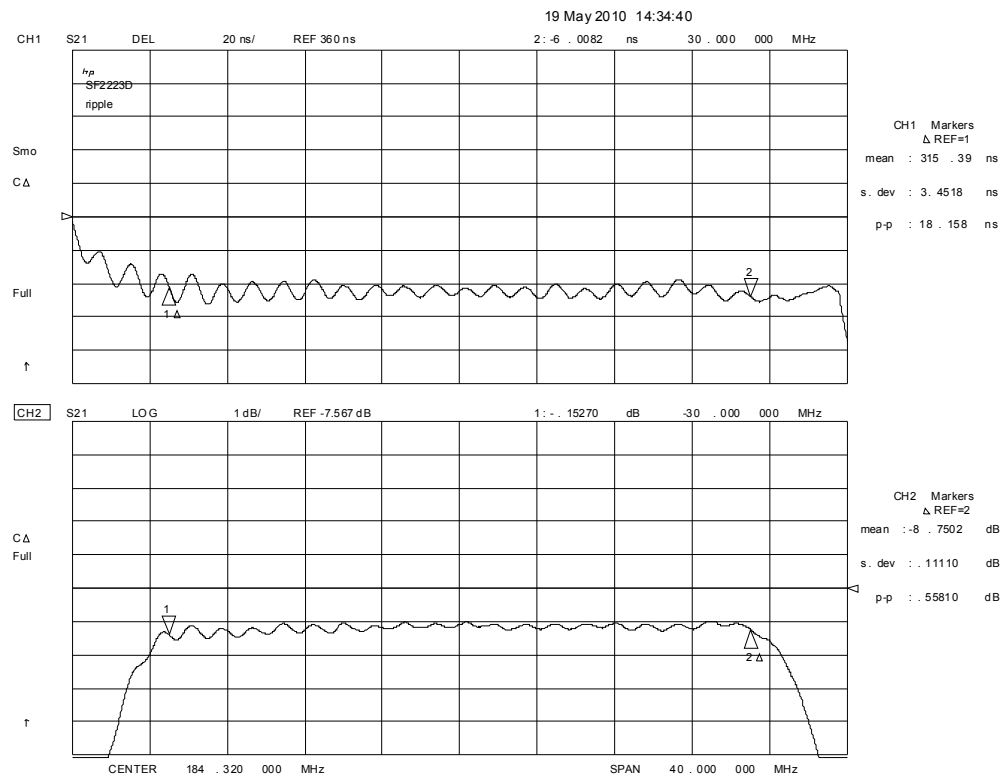
#### NOTES:

1. The design, manufacturing process, and specifications of this device are subject to change.
2. US or International patents may apply.

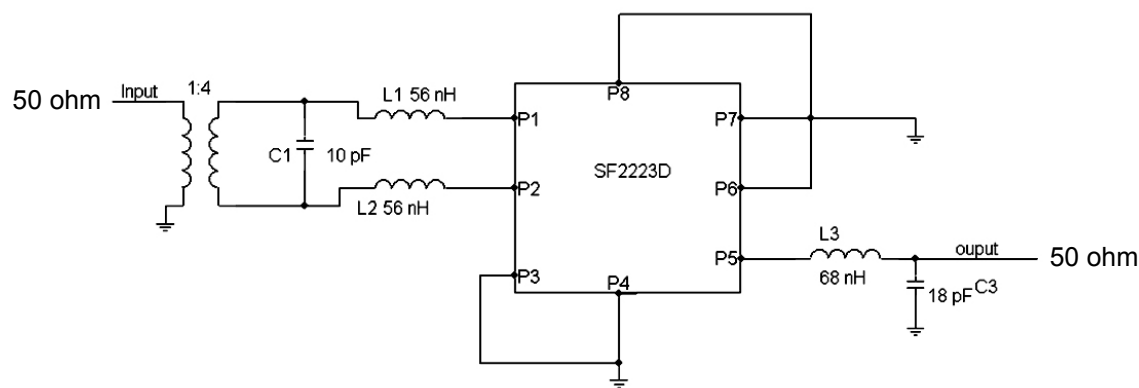
## Filter Amplitude and Impedance Plots for Balanced Input



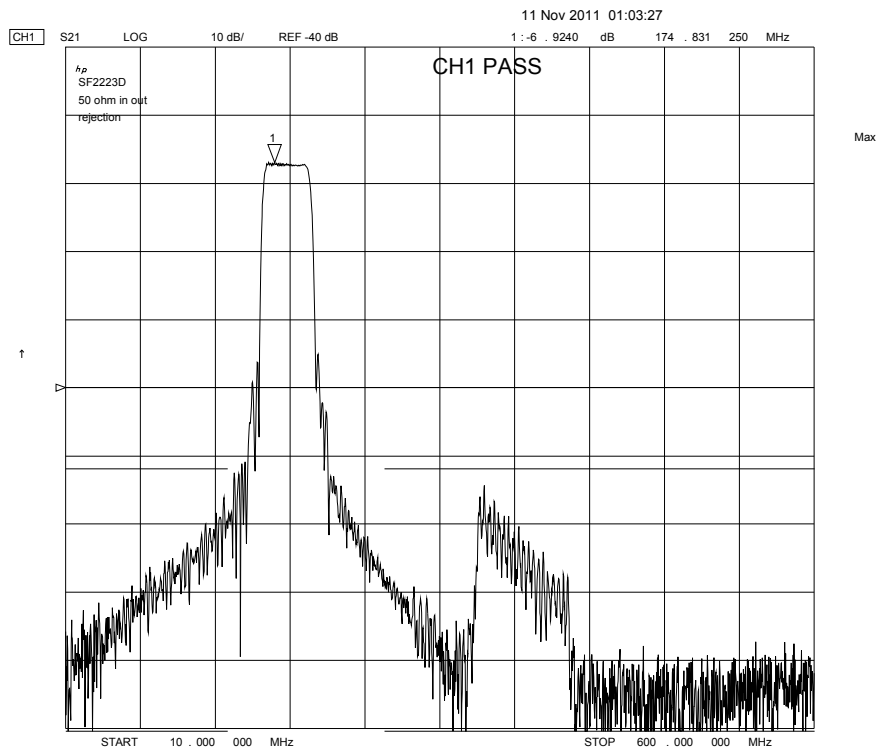
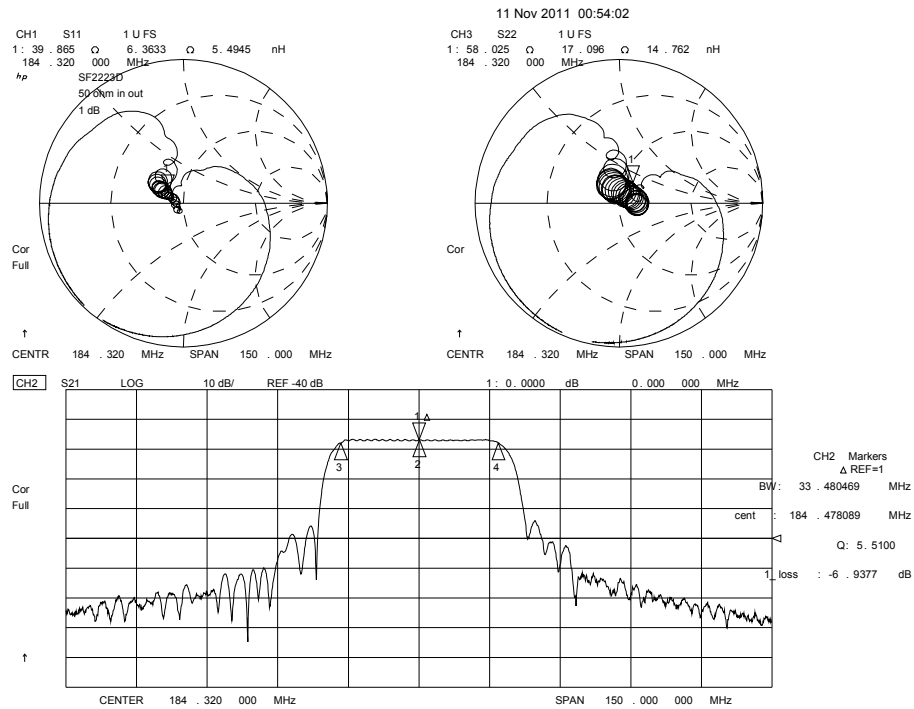
# Filter Passband Group Delay and Amplitude Plots for Balanced Input



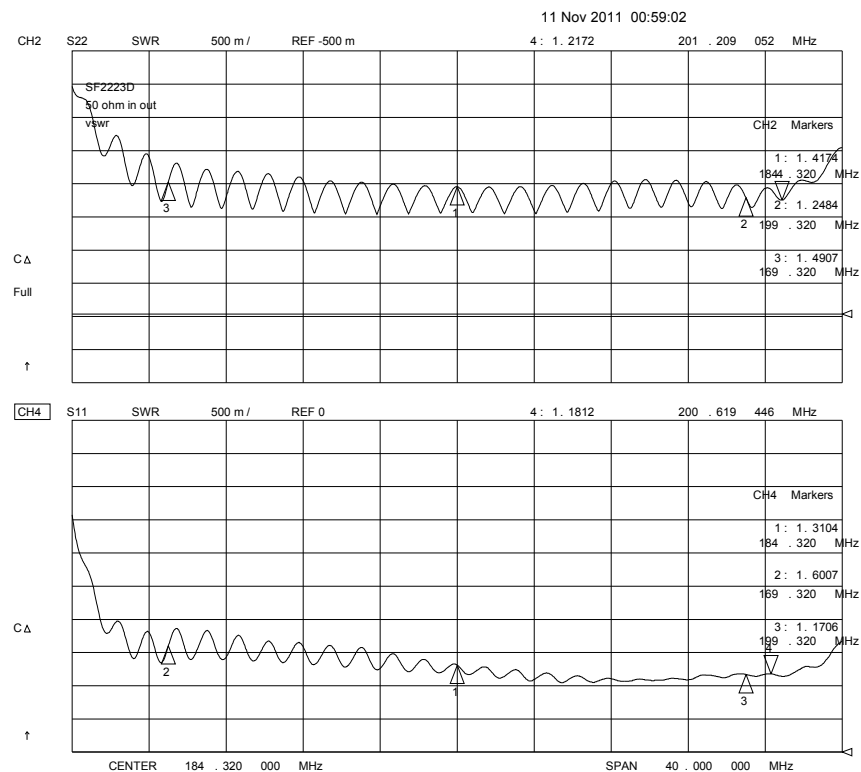
## Balanced Input Filter Test Circuit



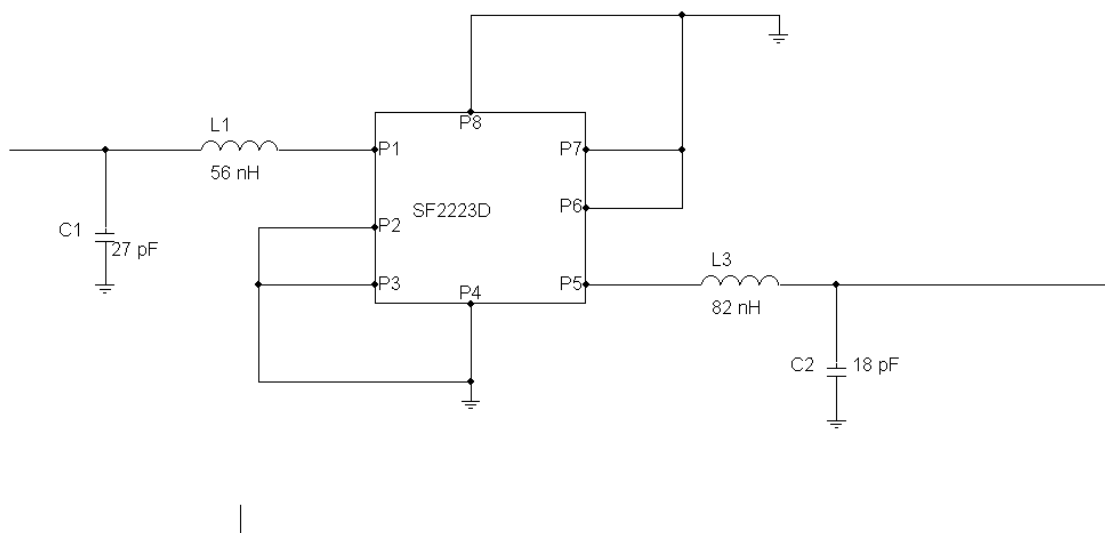
## Filter Amplitude and Impedance Plots for Single-ended Input



# Filter Passband Group Delay and Amplitude Plots for Single-ended Input



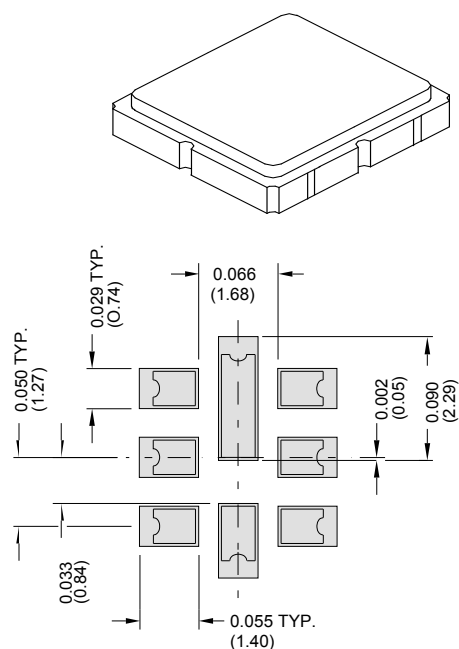
## Single-ended Input Filter Test Circuit



# SM3838-8 Case

## 8-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         | 3.6  | 3.8  | 4.0  | 0.142  | 0.150 | 0.157 |
| B         | 3.6  | 3.8  | 4.0  | 0.142  | 0.150 | 0.157 |
| C         | 1.05 | 1.20 | 1.35 | 0.041  | 0.047 | 0.053 |
| D         | 0.95 | 1.10 | 1.25 | 0.037  | 0.043 | 0.049 |
| E         | 0.90 | 1.00 | 1.10 | 0.035  | 0.040 | 0.043 |
| F         | 0.50 | 0.60 | 0.70 | 0.020  | 0.024 | 0.028 |
| G         | 2.39 | 2.54 | 2.69 | 0.090  | 0.100 | 0.110 |
| H         | 1.40 | 1.75 | 2.05 | 0.055  | 0.069 | 0.080 |

### Electrical Connections

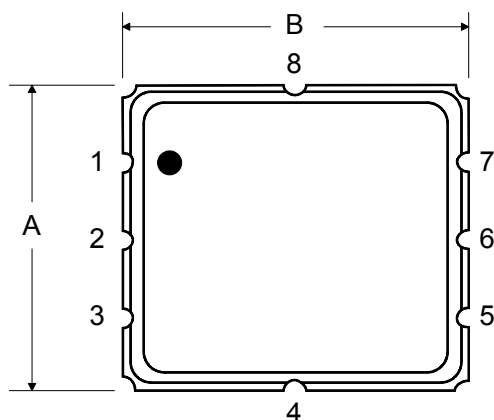
|        | Connection          | Terminals  |
|--------|---------------------|------------|
| Port 1 | Balanced Input      | 1,2        |
| Port 2 | Single-ended Output | 5          |
|        | Ground              | All Others |

Dot Indicates Pin 1

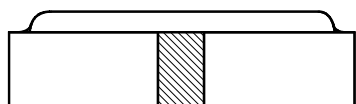
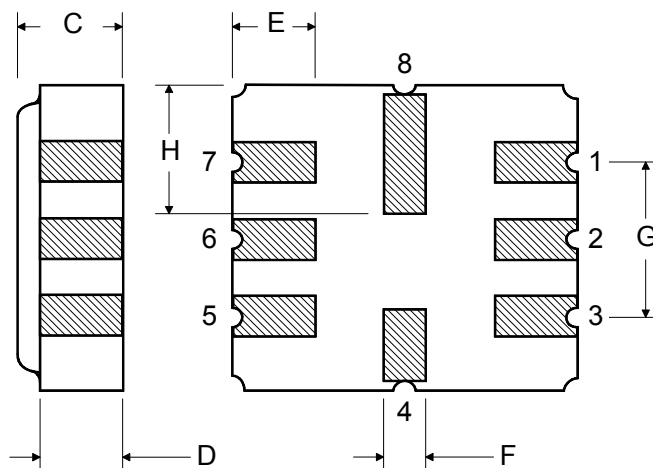
### Materials

|                    |                                                                      |
|--------------------|----------------------------------------------------------------------|
| Solder Pad Plating | 0.3 to 1.0 $\mu\text{m}$ Gold over 1.27 to 8.89 $\mu\text{m}$ Nickel |
| Lid Plating        | 2.0 to 3.0 $\mu\text{m}$ Nickel                                      |
| Body               | $\text{Al}_2\text{O}_3$ Ceramic                                      |
| Pb Free            |                                                                      |

### TOP VIEW



### BOTTOM VIEW

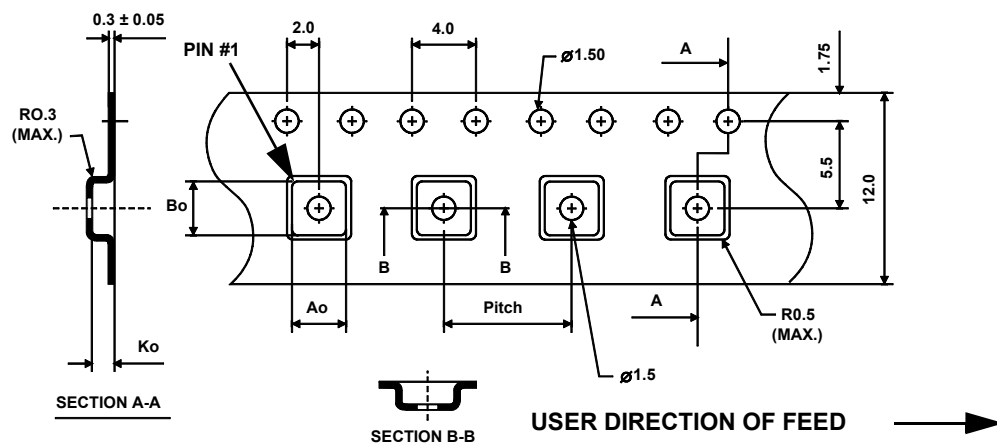


Tape and Reel Standard per ANSI/EIA-481

The technical drawing illustrates the ANSI/EIA-481 tape and reel standard. It includes three views: a top view, a side view, and a detail view. The top view shows a circular reel with a central hub and a concentric circle representing the tape path. A leader line points from the text 'See Detail "A"' to the central hub. The side view shows the profile of the reel, with dimensions 100 REF. and 'B' REF. indicating the reference height and the height of the tape path, respectively. The detail view, labeled 'A', shows a cross-section of the tape path with dimensions 13.0, 20.2, and 2.0 indicating the width of the tape path, the width of the tape, and the width of the tape carrier, respectively.

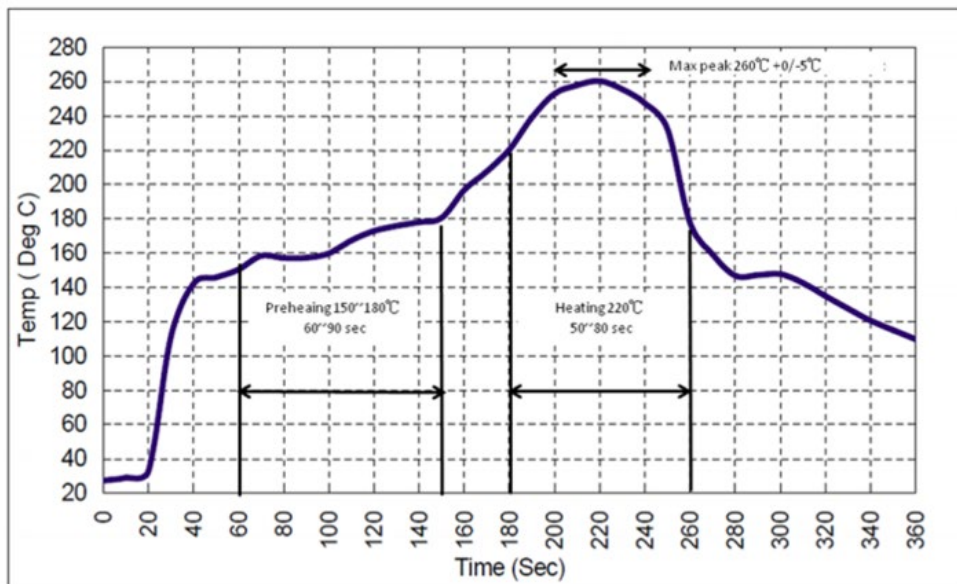
| "B"    |             | Quantity Per Reel |
|--------|-------------|-------------------|
| Inches | millimeters |                   |
| 7      | 178         | 500               |
| 13     | 330         | 3000              |

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



## Recommended Reflow Profile

1. Preheating shall be fixed at 150~180°C for 60~90 seconds.
2. Ascending time to preheating temperature 150°C shall be 30 seconds min.
3. Heating shall be fixed at 220°C for 50~80 seconds and at 260°C +0/-5°C peak (10 seconds).
4. Time: 5 times maximum.



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