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# *SPECIFICATION*

**PRODUCT: SAW FILTER**

**MODEL: HDAF389A9D 2.3mm**

**SHOULDER ELECTRONICS LIMITED**

## 1.SCOPE

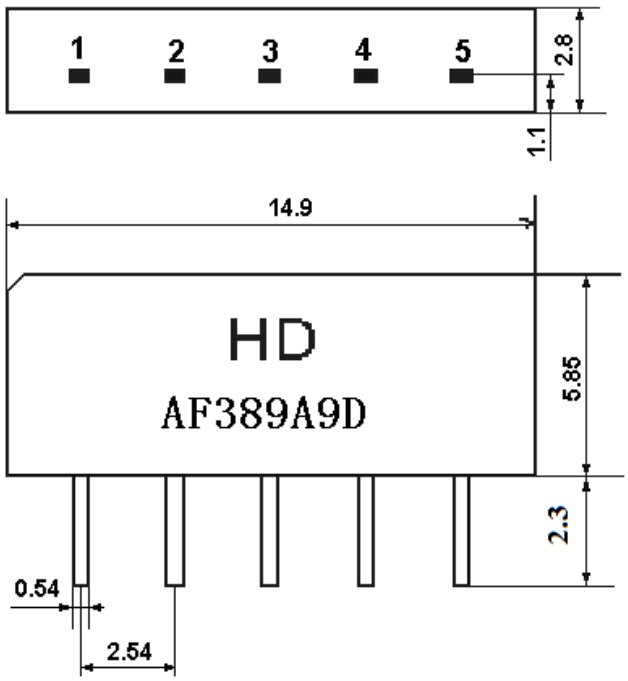
**SHOULDER's SAW filter series have broad line up products meeting all broadcast standard including NTSC,PAL and SECAM systems. These filters are composed of two interdigital transducers on a single-crystal. piezoelectrical chip. they are used in electronic equipments such as TV and so on.**

## 2.Construction

### 2.1 Dimension and materials

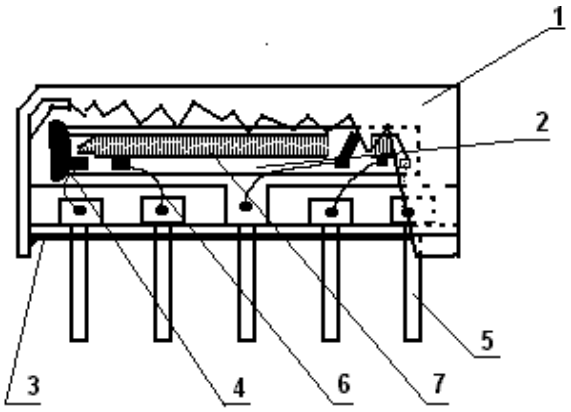
**Manufacturer's name : SHOULDER ELECTRONICS Co. LTD(CHINA)**

**Type: AF389A9D**



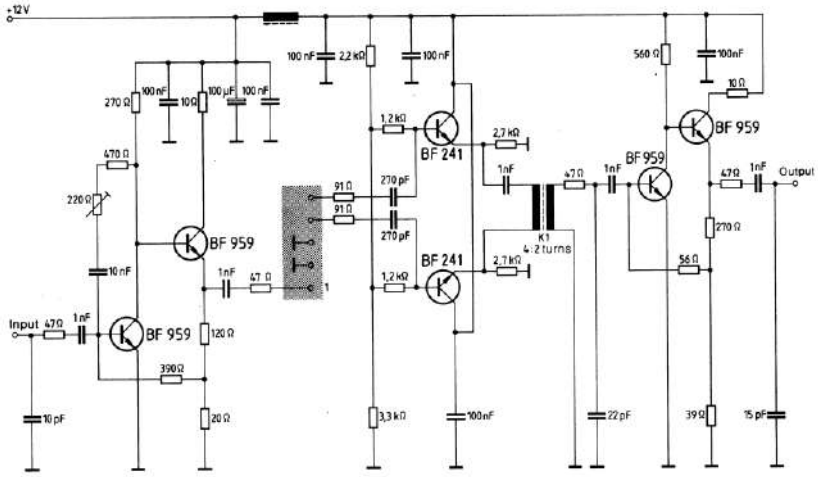

Unit : mm

1 Input channel 1/ Input ground
2 Input ground / Input channel 2
3 Chip carrier - ground
4 Output
5 Output




| Components | Materials |
|---|---|
| 1.Outer casing | PPS |
| 2.Substrate | Lithium niobate |
| 3.Base | Epoxy resin |
| 4.Absorber | Epoxy resin |
| 5.Lead | Cu alloy+Au plate |
| 6.Bonding wire | AlSi alloy |
| 7.Electrode | Al |

### 2.2. Circuit construction, measurement circuit




Test circuit for SIP-5 filter
Input impedance of the symmetrical post-amplifier: 2 kΩ in parallel with 3 pF

## 3.Characteristics

| Items | Conditions | Specifications |
|---|---|---|
| Standard atmospheric conditions | Unless otherwise specified , the standard rang of atmospheric conditions for making measurements and tests is as follows;<br>Ambient temperature : 15℃ to 35℃<br>Relative humidity : 25% to 85%<br>Air pressure : 86kPa to 106kPa | There shall be no damage. |
| Operating temperature rang | Operating temperature rang is the rang of ambient temperatures in which the filter can be operated continuously. -20℃ ~ +60℃ | |
| Storage temperature rang | Storage temperature rang is the rang of ambient temperatures at which the filter can be stored without damage.<br>Conditions are as specified elsewhere in these specifications. -40℃ ~ +70℃ | |
| Reference temperature | +25℃ | |

### 3.1 Maximum Rating

| | | | | |
|---|---|---|---|---|
| **DC voltage** | **VDC** | **12** | **V** | **Between any terminals** |
| **AC voltage** | **Vpp** | **10** | **V** | **Between any terminals** |

### 3.2 Electrical Characteristics

**Characteristics of channel 1**

Source impedance Zs=50Ω

Load impedance $Z_L$=2kΩ//3pF $T_A$=25℃

| Item | | Freq | min | typ | max | |
|---|---|---|---|---|---|---|
| Insertion attenuation Reference level | | 40.40MHz | 14.6 | 16.6 | 18.6 | dB |
| Relative attenuation | | 39.75MHz | -1.5 | -0.3 | 0.9 | dB |
| | | 38.40MHz | 27.0 | 40.0 | - | dB |
| | | 33.90MHz | 37.0 | 45.0 | - | dB |
| | | 41.90MHz | 28.0 | 38.0 | - | dB |
| | | 32.40MHz | 38.0 | 45.0 | - | dB |
| Sidelobe | 25.00~33.90MHz | | 34.0 | 41.0 | - | dB |
| | 41.90~45.00MHz | | 28.0 | 34.0 | - | dB |
| Temperature coefficient | | | -72 | | | ppm/k |

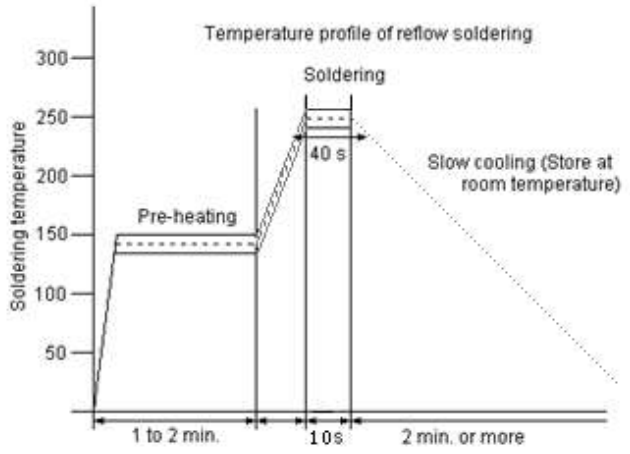
**Characteristics of channel 2**

Source impedance Zs=50Ω

Load impedance $Z_L$=2kΩ//3pF $T_A$=25℃

| Item | | Freq | min | typ | max | |
|---|---|---|---|---|---|---|
| Insertion attenuation Reference level | | 33.40MHz | 14.0 | 16.0 | 18.0 | dB |
| Relative attenuation | | 33.05MHz | -1.6 | -0.4 | 0.8 | dB |
| | | 32.90MHz | -1.6 | -0.4 | 0.8 | dB |
| | | 32.40MHz | 0 | 1.2 | 2.4 | dB |
| | | 38.90MHz | 37.0 | 49.0 | - | dB |
| | | 34.47MHz | 23.0 | 31.0 | - | dB |
| | | 30.90MHz | 37.0 | 45.0 | - | dB |
| | | 31.90MHz | - | 9.4 | - | dB |
| | | 40.40MHz | 35.0 | 40.0 | - | dB |
| | | 40.90MHz | 35.0 | 42.0 | - | dB |
| | | 41.40MHz | 40.0 | 52.0 | - | dB |
| Sidelobe | 25.00~30.90MHz | | 36.0 | 42.0 | - | dB |
| | 38.90~45.00MHz | | 34.0 | 40.0 | - | dB |
| Temperature coefficient | | | -72 | | | ppm/k |

**3.3Environmental Performance Characteristics**

<table>
<tr><th>Item</th><th>Condition</th><th>Specifications</th></tr>
<tr><td>High temperature</td><td>The specimen shall be store at a temperature of 80±2℃ for 96±4h. Then it shall be subjected to standard atmospheric conditions for 1h, after which measurement shall be made within 1h.</td><td rowspan="4">Mechanical characteristics and specifications in electrical characteristics shall be satisfied. There shall be no excessive change in appearance.</td></tr>
<tr><td>Low temperature</td><td>The specimen shall be store at a temperature of -20±3℃ for 96±4h. Then it shall be subjected to standard atmospheric conditions for 1h, after which measurement shall be made within 1h.</td></tr>
<tr><td>Humidity</td><td>The specimen shall be store at a temperature of 40±2℃ with relative humidity of 90% to 96% for 96±4h. Then it shall be subjected to standard atmospheric conditions for 1h, after which measurement shall be made within 1h.</td></tr>
<tr><td>Thermal shock</td><td>The specimen shall be subjected to 8 continuous cycles each as shown below. Then it shall be subjected to standard atmospheric conditions for 1h, after which measurement shall be made within 1h.
<table>
<tr><th></th><th>Temperature</th><th>Duration</th></tr>
<tr><td>1</td><td>+25℃=>-40℃</td><td>0.5h</td></tr>
<tr><td>2</td><td>-40℃</td><td>4h</td></tr>
<tr><td>3</td><td>-40℃=>+85℃</td><td>2h</td></tr>
<tr><td>4</td><td>+85℃</td><td>4h</td></tr>
<tr><td>5</td><td>+85℃=>+25℃</td><td>0.5h</td></tr>
<tr><td>6</td><td>+25℃</td><td>1h</td></tr>
</table></td></tr>
<tr><td>Resistance to Soldering heat</td><td>Reflow soldering method<br>Peak: 255 ±5 ℃, 220 ±5℃, 40s<br>At electrode temperature of the specimen.<br> 

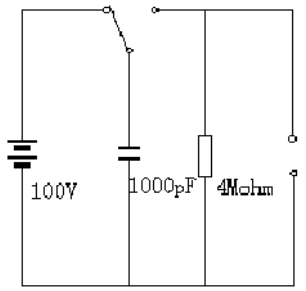
The specimen shall be passed through the reflow furnace with the condition shown in the above profile for 1 time.<br>The specimen shall be stored at standard atmospheric conditions for 1h, after which the</td></tr>
</table>

| | | |
|---|---|---|
| | measurement shall be made. Test board shall be 1.6 mm thick. Base material shall be glass fabric base epoxy resin. | |
| Solder ability | Immerse the pins melt solder at 260℃+5/-0℃ for 5 sec. | More then 95% of total area of the pins should be covered with solder |

**3.4Mechanical Test**

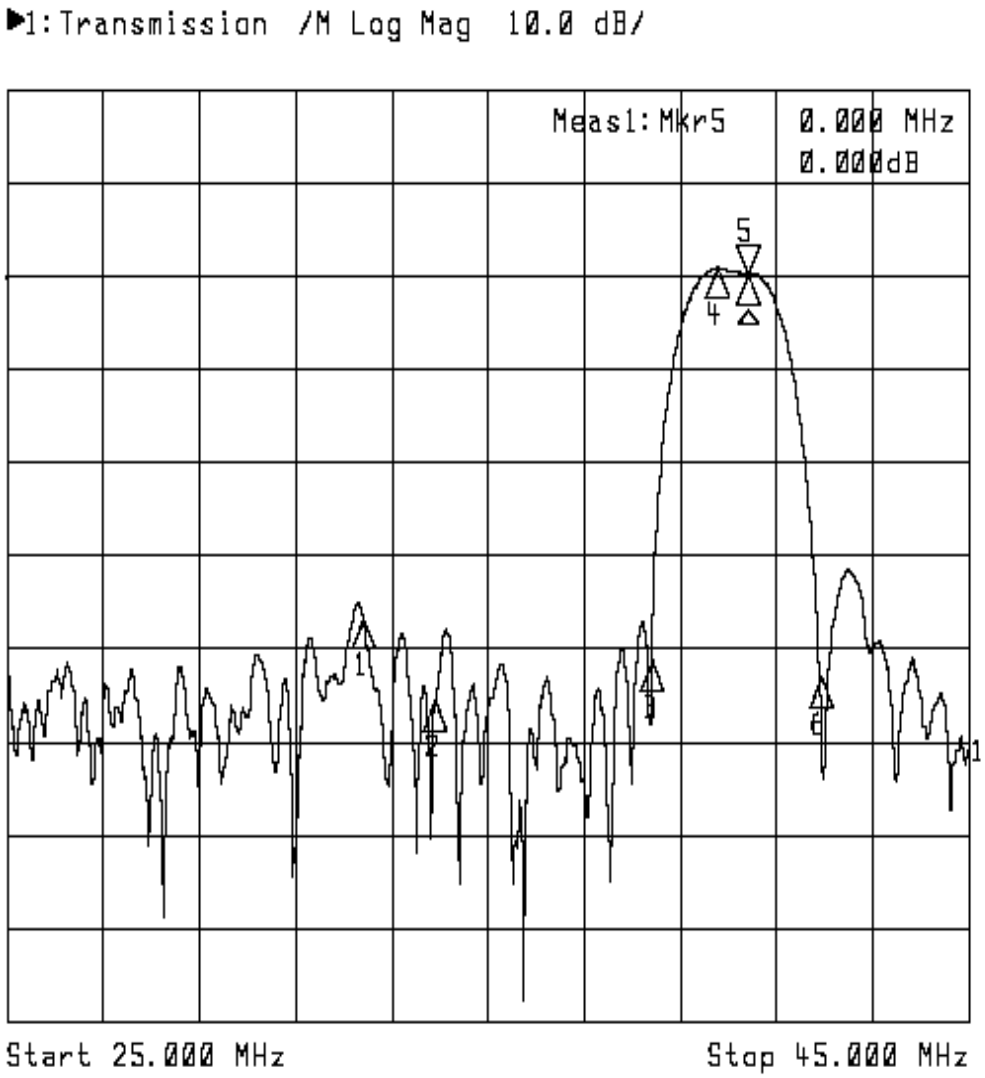
| Items | Conditions | Specifications |
|---|---|---|
| Vibration | 600-3300rpm amplitude 1.5mm<br>3 directions 2 H each | There shall be no damage. |
| Drop | On maple plate from 1m high 3 times | |
| Lead pull | Pull with 1kg force for 30 seconds | |
| Lead bend | $90^{o}$ bending with 500g weigh 2 times | |

**3.5Voltage Discharge Test**

| Item | Condition | Specifications |
|---|---|---|
| Surge | Between any two electrode<br>  | There shall be no damage |

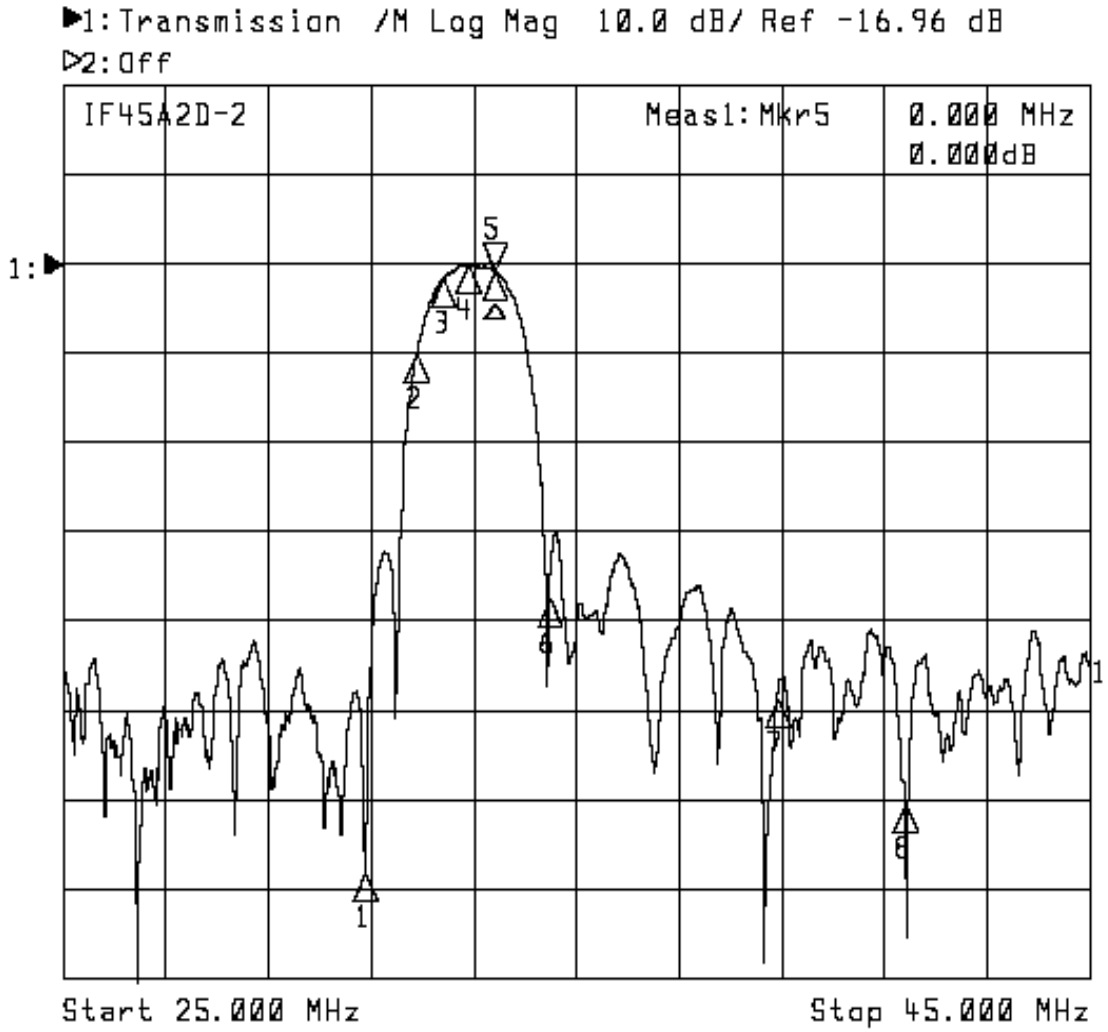
### 3.6 Frequency response

**Frequency response of channel 1:**




| 1:Mkrᐃ(MHz) | dB | 2:Mkr (MHz) | dB |
|---|---|---|---|
| 1: -8.0000 | -37.026 | | |
| 2: -6.5000 | -45.894 | | |
| 3: -2.0000 | -41.663 | | |
| 4: -0.6500 | 0.592 | | |
| 5> 0.0000 | 0.000 | | |
| 6: 1.5000 | -43.338 | | |

**Frequency response of channel 2:**




| 1: Mkr Δ (MHz) | dB | 2: Mkr (MHz) | dB |
|---|---|---|---|
| 1: | -2.5000 | -67.721 | |
| 2: | -1.5000 | -9.352 | |
| 3: | -1.0000 | -0.916 | |
| 4: | -0.5000 | 0.570 | |
| 5> | 0.0000 | 0.000 | |
| 6: | 1.0700 | -36.836 | |
| 7: | 5.5000 | -48.090 | |
| 8: | 8.0000 | -59.973 | |