

ACPF-7003

High Rx and Image Rejection Tx Filter for US PCS Band



Data Sheet

General Description

The ACPF-7003 is a high rejection full band transmit filter designed for US PCS handsets. Its performance rivals split-band surface acoustic wave (SAW) transmit filters. Since a single filter provides the rejection, no switches are required, saving board space and external components, eliminating switch loss, and reducing programming complexity. Furthermore, with 25dB rejection at 1830 MHz, it is a true split band replacement.

The ACPF-7003 FBAR transmit filter utilizes Avago Technologies' Microcap bonded-wafer chip scale packaging technology. This process allows the ultra small filters to be assembled into a Molded Chip on Board (MCOB) Module.

In typical cellular phone architectures, the transmit filter fits between the driver amplifier and the power amplifier. This filter reduces the noise in the Rx band being amplified by the transmit chain, enhancing receiver sensitivity. High rejection keeps unwanted signals out of the receive path.

Avago Technologies' thin-Film Bulk Acoustic Resonator (FBAR) technology makes possible high-Q filters at a fraction their usual size.

Features

- High rejection from a single filter with no switches required
- True split band replacement
- Passband: 1850-1910 MHz
- 35 dB min Attenuation, 1930-1990 MHz
- 2.5 dB Typical Insertion Loss
- 25dB image rejection at 1830 MHz
- Space saving solution
 - Small footprint: 1.6 x 2.0-mm solution
 - Low profile package: 0.9 mm high (Typ)
 - 1.0mm (Max)

Applications

- US PCS band handsets
- Wireless Data terminals

Electrical Specifications, $Z_0=50\ \Omega$

| Symbol | Parameters | Units | +25° C | | | -30° to +85° C | | |
|----------|--------------------------------|-------|--------|-----|-----|----------------|-----|-----|
| | | | Min | Typ | Max | Min | Typ | Max |
| f | Passband [1850.6 - 1909.4] | MHz | | | | | | |
| IL | Insertion Loss 1850.6-1855 MHz | dB | | 2.0 | 3.5 | | | 3.5 |
| IL | Insertion Loss 1855-1905 MHz | dB | | 1.5 | 2.5 | | | 2.5 |
| IL | Insertion Loss 1905-1909.4 MHz | dB | | 2.5 | 3.0 | | | 3.0 |
| D S21 | Ripple, 1850-1910 MHz | dB | | | 2.5 | | | |
| S21 | Min Rejection, 1930.6-1990 MHz | dB | 35 | 45 | | 35 | 45 | |
| S21 | Min Rejection 10 -1715 MHz | dB | 25 | | | 25 | | |
| S21 | Min Rejection 1715 - 1785 MHz | dB | 25 | | | 25 | | |
| S21 | Min Rejection 1785 - 1830 MHz | dB | 25 | | | 25 | | |
| S21 | Min Rejection 1990 - 2500 MHz | dB | 30 | | | 30 | | |
| S21 | Min Rejection 2500 - 3820 MHz | dB | 22 | | | 22 | | |
| S21 | Min Rejection 3820 - 5730 MHz | dB | 15 | | | 15 | | |
| S11, S22 | In-band return loss | dB | 10 | 13 | | 10 | 13 | |
| Pin max | Safe Input Power Level | dBm | 20 | | | 20 | | |

Absolute Maximum Ratings^[2]

| Parameter | Unit | Value |
|--------------------------------------|------|-------------|
| Operating temperature ^[1] | °C | -30 to +85 |
| Storage temperature ^[1] | °C | -40 to +125 |

Notes:

1. Temperature is defined at case T_C , the temperature of the underside of the filter where it makes contact with the circuit board.
2. Specifications are guaranteed over the given temperature range. Operation in excess of any one of these conditions may result in permanent damage to the device.

Typical Performance (25 C, Zo = 50 Ohms)

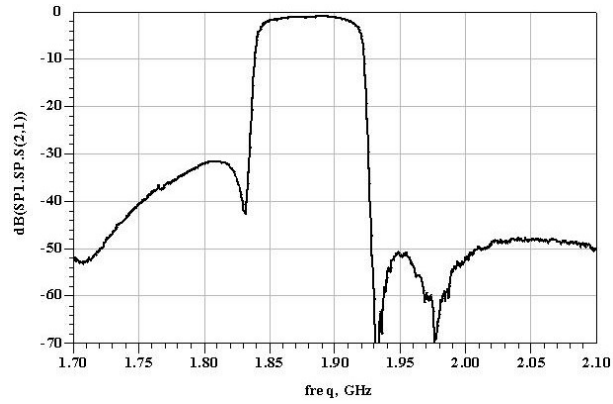


Figure 1. Attenuation (dB) vs. frequency

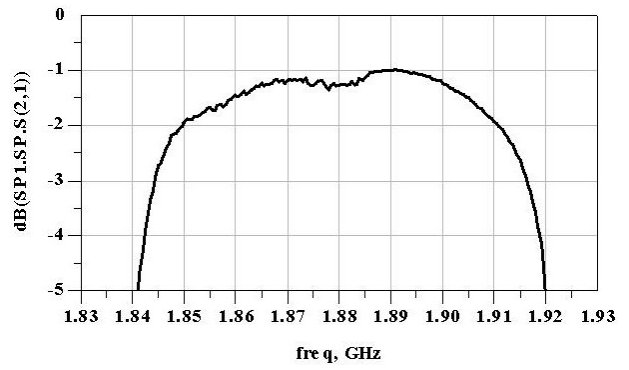


Figure 2. Insertion Loss (dB) vs. frequency

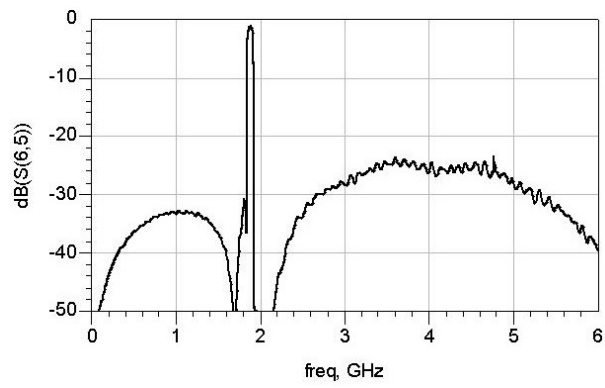


Figure 3. Attenuation (dB) vs. frequency (broadband)

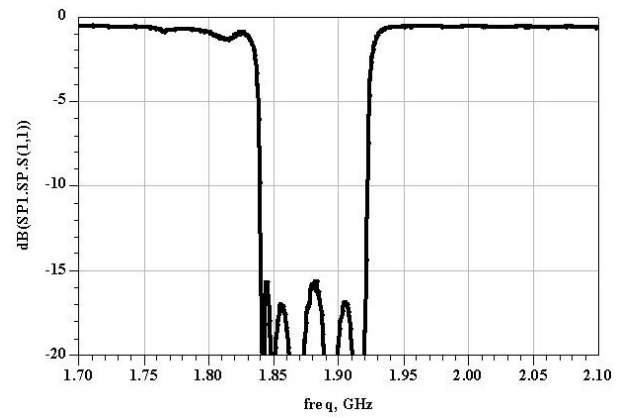


Figure 4. Return Loss (dB) vs. frequency

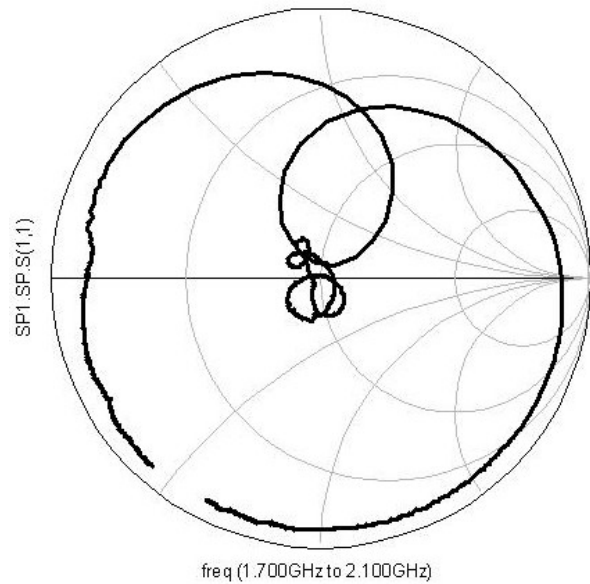


Figure 5. S(1,1)

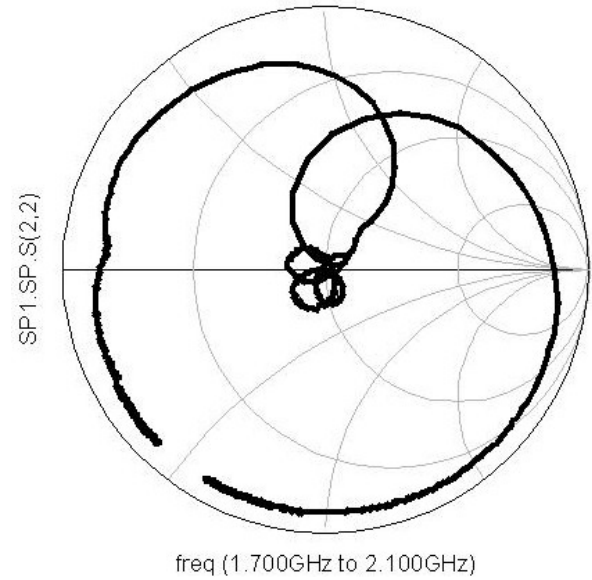


Figure 6. S(2,2)

PCB Interface & Mounting instructions

Mounting Consideration and board description

The ACPF-7003 FBAR filter has one input (Pin 1), one output (Pin 3) and two grounds (Pins 2 and 4.)

- Demo board uses 3 mil Getek Microstrip.

The demo board uses CPWG transmission lines for high isolation between the two ports. It uses via holes to connect the CPWG line from the underside of the board to the filter mounting pads on top.

Note: For best performance, try to reproduce this board stack up closely.
If Ground-Signal-Ground (GSG) type board is used, better return loss can be achieved since it eliminates connector mismatch.

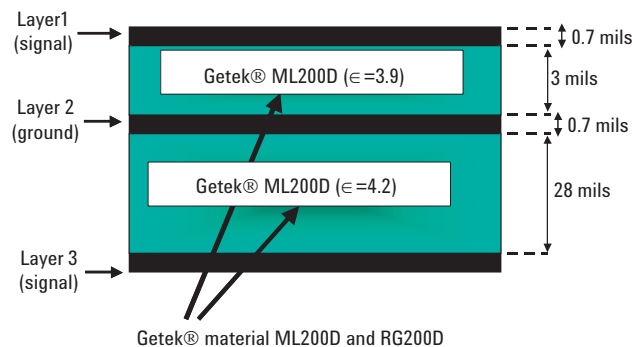


Figure 7. Board stack up description

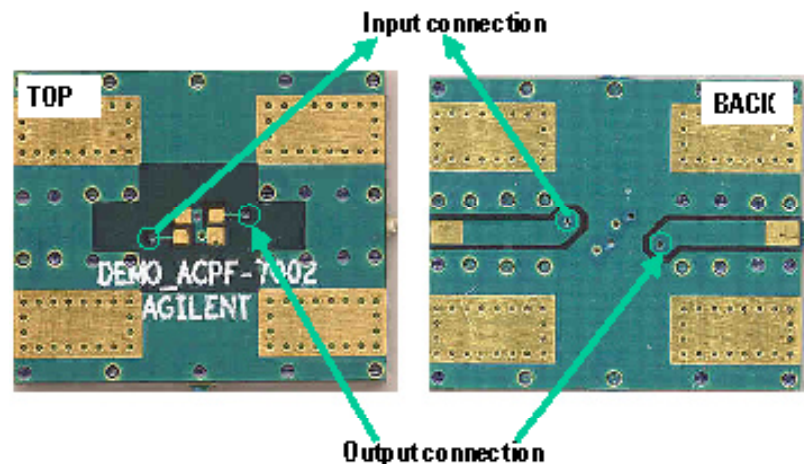


Figure 8. PCB Footprint pad

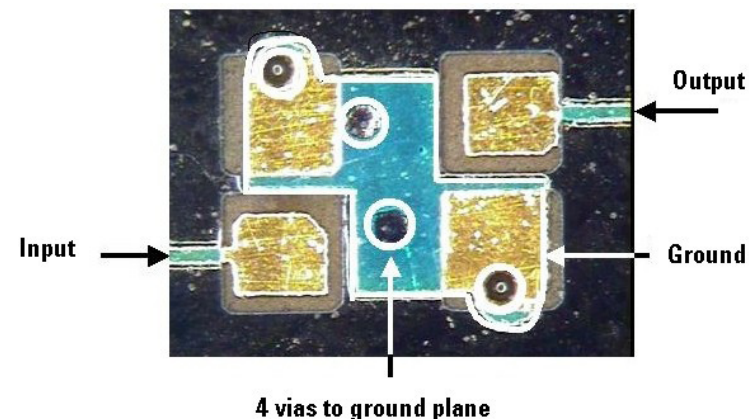


Figure 9. Closer look at the recommended board footprint and soldermask

Demo boards

Demo boards are available for sampling. (See board drawing in Figures 7, 8, and 9.)

| Alloy type | Melting temperature (°C) | Recommended working temperature (°C) | Alloy type | Melting temperature (°C) | Recommended working temperature (°C) |
|-----------------------|--------------------------|--------------------------------------|------------------|--------------------------|--------------------------------------|
| Sn42Bi58 | 138 | 160 - 180 | Sn95.8Ag3.5Cu0.7 | 217 | 235 - 255 |
| Sn43Pb43Bi14 | 144 - 163 | 165 - 185 | Sn96.5Ag3.5 | 221 | 240 - 260 |
| Sn63Pb37 | 183 | 200 - 240 | Sn100 | 232 | 260 - 280 |
| Sn60Pb40 | 186 | 200 - 240 | Sn95Sb5 | 235 | 260 - 280 |
| Sn91/Zn9 | 199 | 200 - 240 | Sn97Cu3 | 240 | 260 - 300 |
| Sn96.2Ag2.5Cu0.8Sb0.5 | 216 | 235 - 255 | | | |

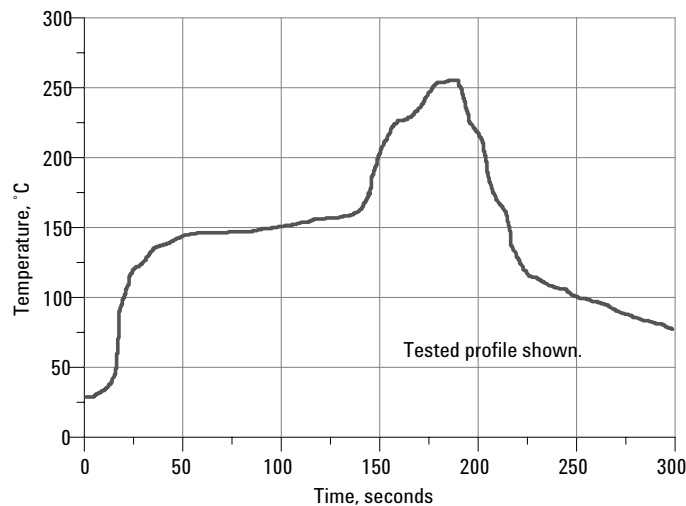
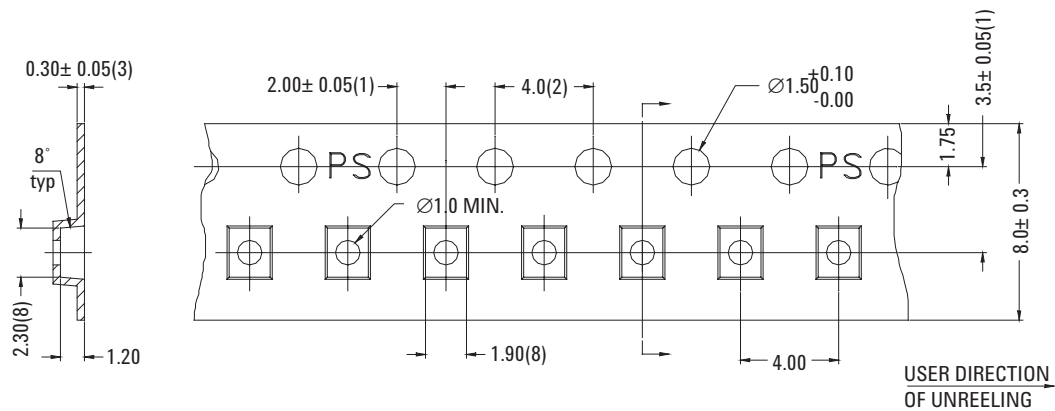


Figure 12. Recommended solder profile



NOTE:

1. MEASURED FROM THE CENTRELINE OF THE SPROCKET HOLE TO THE CENTRELINE OF THE POCKET HOLE AND FROM THE CENTRELINE OF THE SPROCKET HOLE TO THE CENTERLINE OF THE POCKET
2. CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS ± 0.20
3. THIS THICKNESS IS APPLICABLE AS MEASURED AT THE EDGE OF THE TAPE.
4. MATERIAL: BLACK POLYSTYRENE
5. ALL DIMENSIONS IN MM.
6. ALLOWABLE CAMBER TO BE 1MM PER 250MM IN LENGTH
7. UNLESS OTHERWISE SPECIFIED TOLERANCE ± 0.10 .
8. MEASUREMENT POINT TO BE 0.3 FROM BOTTOM POCKET.
9. SURFACE RESISTIVITY FROM 1.0×10^5 TO 1.0×10^{10} HMS/SQ

Figure 13. Carrier tape drawing

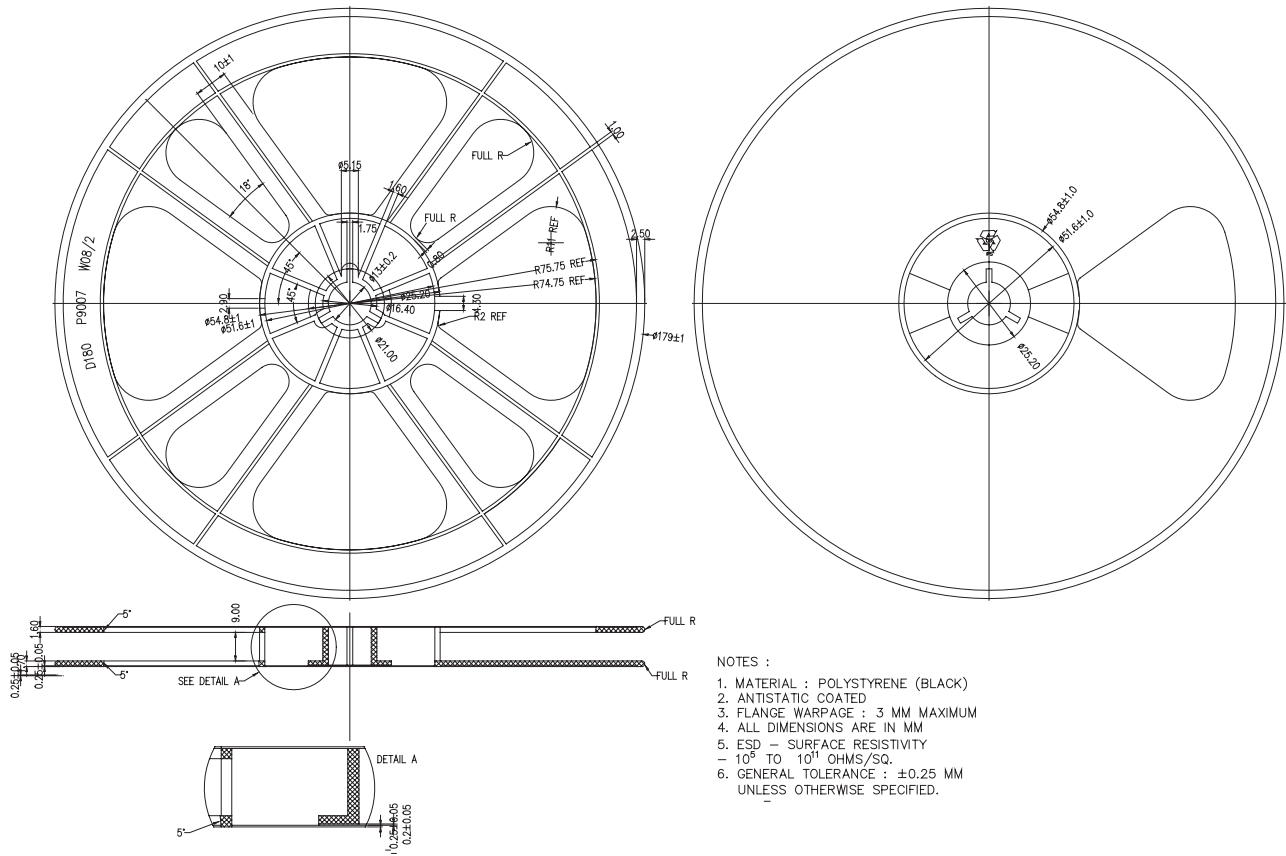
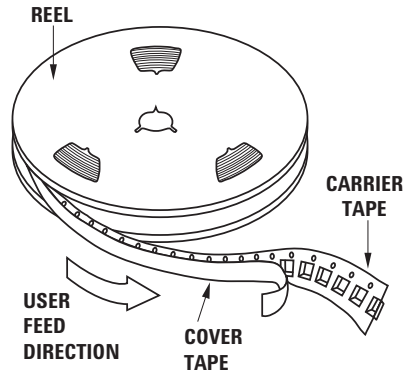


Figure 14. Reel drawing



Notes:

1. Cover tape material is clear polyester film coated with heat activated and anti static properties.
2. All dimensions are in mm except tape length.
3. Surface resistivity: 10^{10} to 10^{11} Ohms/sq.

Figure 15. Tape and reel orientation

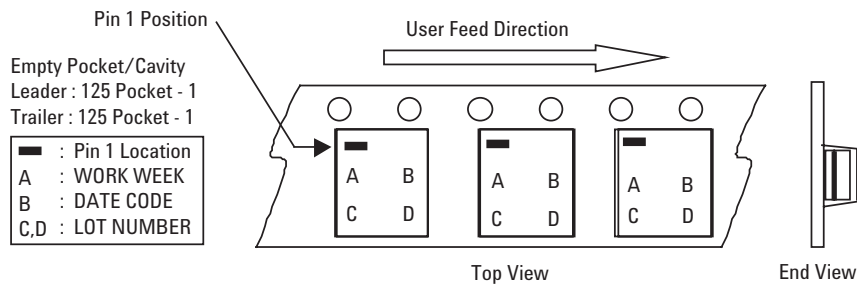


Figure 16. Device orientation in the carrier tape

Ordering Information

ACPF-7003-BLK = Bulk option,
100 pieces per antistatic bag

ACPF-7003-TR1 = Tape and reel option,
3000 pieces per 7-inch reel

For product information and a complete list of distributors, please go to our web site: www.avagotech.com

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