

Agilent ACPF-7001

High Rejection Tx Filter for US PCS Band

Data Sheet



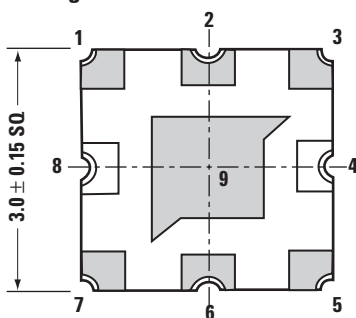
Description

This product is a high rejection full band transmit filter designed for US PCS handsets. Its performance rivals splitband surface acoustic wave (SAW) transmit filters. Since the rejection is provided by a single filter, no switches are required, saving board space and external components, eliminating switch loss, and reducing programming complexity.

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.

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

Package



4: Input
8: Output
1, 2, 3, 5, 6, 7, 9: Grounded
Center pad grounded
See Figure 10 for details.
"x" = date code character

Features

- High rejection from a single filter with no switches required
- Passband: 1850 – 1910 MHz
33 dB min Attenuation,
1930 – 1990 MHz
3.5 dB max Insertion Loss
- Space saving solution
Small footprint: 3 x 3-mm solution
Low profile package:
1.1 mm high (typ)
1.25 mm (max)

Applications

- US PCS band handsets
- Wireless data terminals



Agilent Technologies

Electrical Specifications, $Z_0 = 50\Omega$

| Symbol | Parameter | Units | 25°C | | | -30° to +25°C | | | 25° to +70°C | | |
|-----------------------------------|------------------------------|-------|------|-----|------|---------------|-----|------|--------------|-----|------|
| | | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max |
| f | Passband | MHz | 1850 | | 1910 | 1850 | | 1910 | 1850 | | 1910 |
| IL | Insertion Loss 1850-1855 MHz | dB | | 2.0 | 3.5 | | | 3.7 | | | 3.2 |
| IL | Insertion Loss 1855-1905 MHz | dB | | 1.5 | 3.0 | | | 3.0 | | | 3.0 |
| IL | Insertion Loss 1905-1910 MHz | dB | | 2.5 | 3.5 | | | 3.2 | | | 3.7 |
| ΔS_{21} | Ripple, 1850-1910 MHz | dBm | | | 2.5 | | | | | | |
| S ₂₁ | Min Rejection, 1930-1990 MHz | dB | 33 | 37 | | 33 | | | 33 | | |
| S ₂₁ | Min Rejection, 10-1800 MHz | dB | | | 25 | | | | | | |
| S ₂₁ | Min Rejection, 1990-3820 MHz | dBm | | | 30 | | | | | | |
| S ₂₁ | Min Rejection, 3820-5730 MHz | dBm | | 15 | | | | | | | |
| S ₁₁ , S ₂₂ | In-band Return Loss | dB | 9.0 | 11 | | 9.0 | 11 | | 9.0 | 11 | |
| Pin max | Safe Input Power Level | dBm | 20 | | | 20 | | | 20 | | |

Absolute Maximum Ratings^[2]

| Parameter | Unit | Value |
|--------------------------------------|------|-------------|
| Operating Temperature ^[1] | °C | -30 to +85 |
| Storage Temperature ^[1] | °C | -30 to +100 |

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, $Z_0 = 50\Omega$

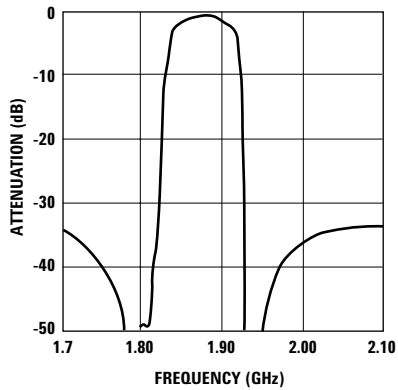


Figure 1. Attenuation vs. Frequency.

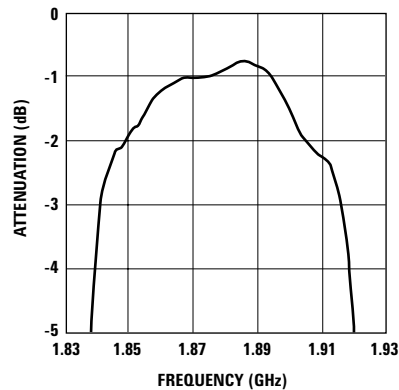


Figure 2. Insertion Loss vs. Frequency.

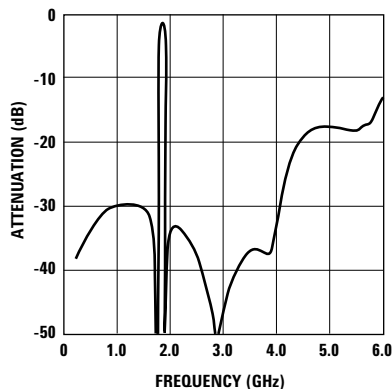


Figure 3. Attenuation vs. Frequency (Broadband).

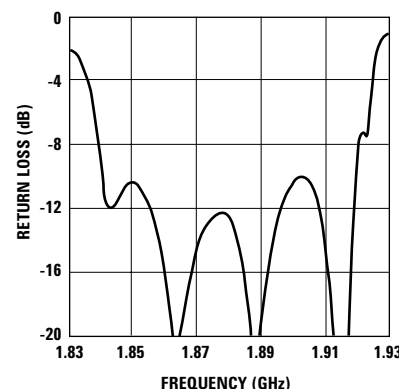


Figure 4. Return Loss vs. Frequency.

PCB Interface and Mounting Instructions

Mounting Consideration and Board Description

The ACPF-7001 filter has one input (Pin 4), one output (Pin 8) and 6 grounds (Pins 1, 2, 3, 5, 6, 7). Furthermore, the inside of the filter (center pad Pin 9) is ground-plane; therefore it must be soldered to PCB ground.

In summary:

- Pins 1, 2, 3, 5, 6, 7, 9 are grounded. (Figure 5)
- Demo board uses 14 mil Getek Microstrip. (see board layer Figure 6)

Note: For best performance, try to reproduce this board stack up closely. For example, if customer's ground layer is less than 14 mils, void the 1st ground layer (and others if necessary) and use the next available ground closest to 14 mils. If less than 14 mils dielectric is used, parasitic capacitance will slightly degrade the return loss and rejection. If Ground-Signal-Ground (GSG) type board is used, better return loss can be achieved since it eliminates connector mismatch.

Demo Boards

SMA connectorized Demo boards are available for sampling. (See board drawing in Figure 5).

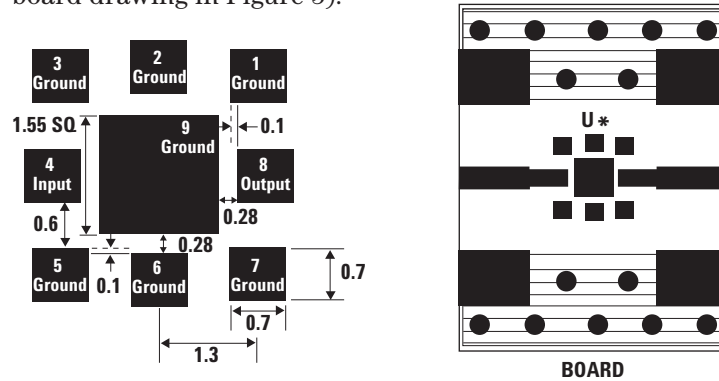


Figure 5. PCB footprint dimensions in mm; pad nomenclature and grounding description.

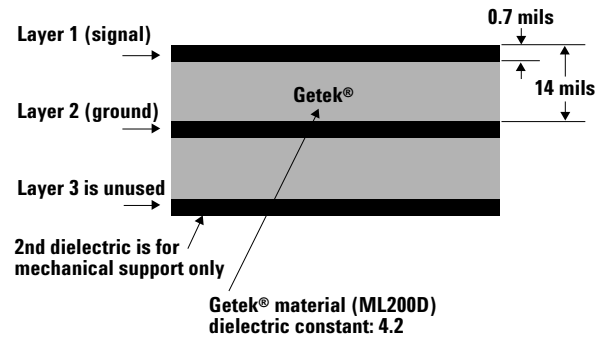
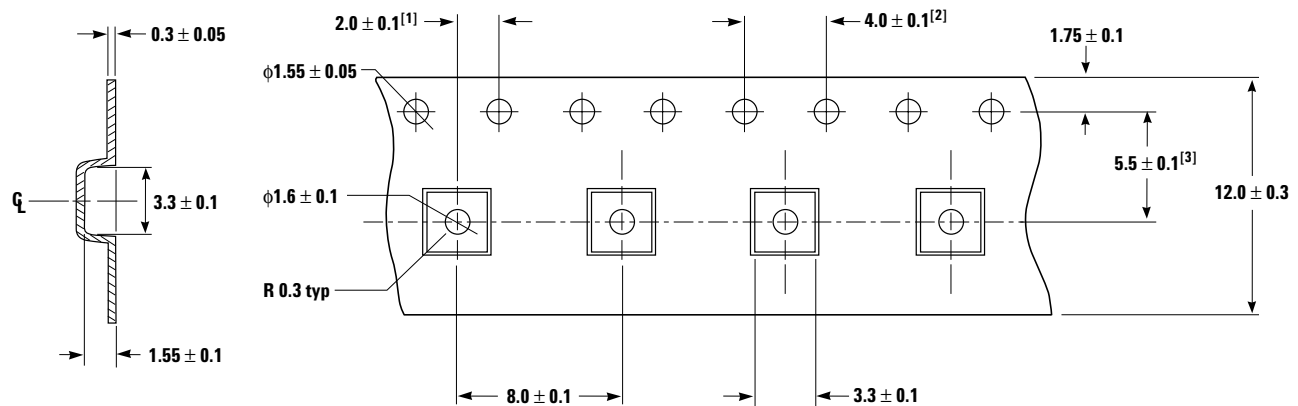


Figure 6. Demo board stack up description: layer 1 (signal), layer 2 (ground), 14 mils Getek® dielectric constant (4.2)



Notes:

1. Measured from centerline of sprocket hole to centerline of pocket
2. Cumulative tolerance of 10 sprocket holes is ± 0.20
3. All dimensions in millimeters unless otherwise stated.

Figure 7. Tape drawing.

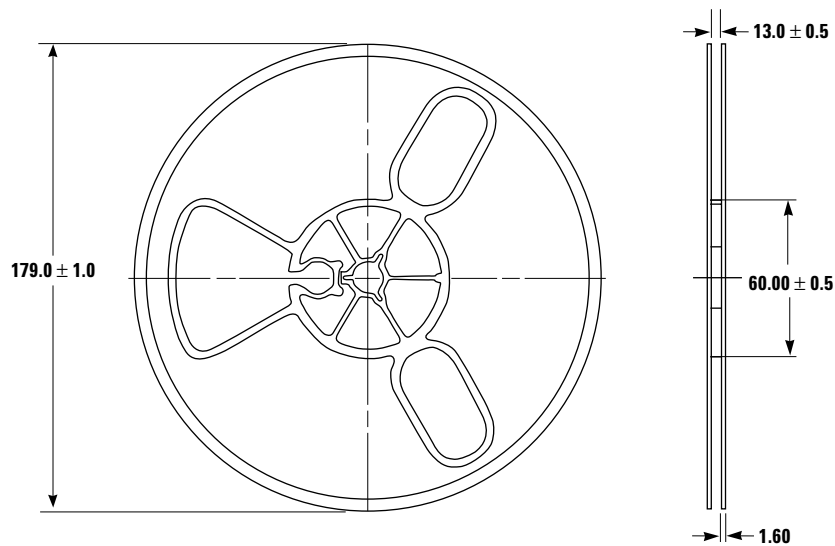
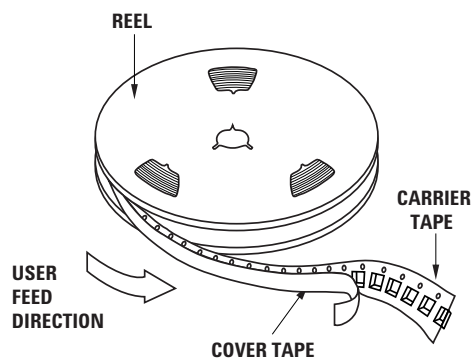


Figure 8. Reel drawing.



Notes:

1. Material polyester and acrylic adhesive layers
2. All dimensions in mm, except tape length.
3. Surface resistivity: 10^6 to 10^{12} ohms/sq

Figure 9a. Device orientation in the tape.

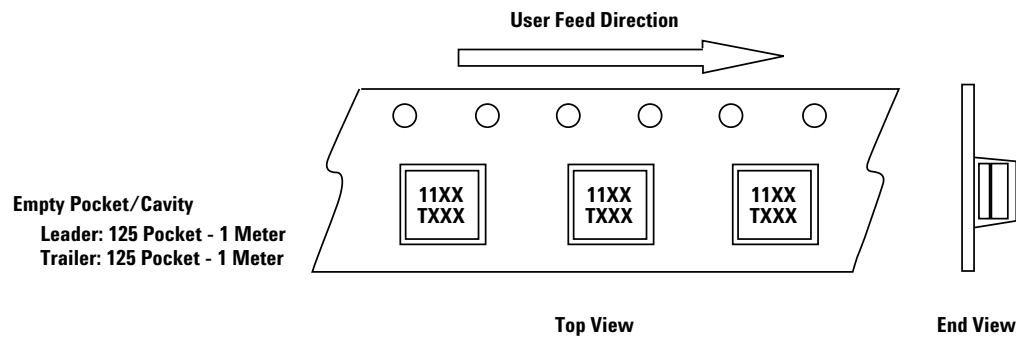


Figure 9b. Device orientation in the tape.

Ordering Information

Specify part number followed by option. For example:

ACPF-7001-XXX

└─ Bulk or Tape and Reel option

Option Descriptions

-BLK = Bulk, 25 parts per antistatic bag

-TR1 = Tape and Reel, 1000 devices per 7" reel

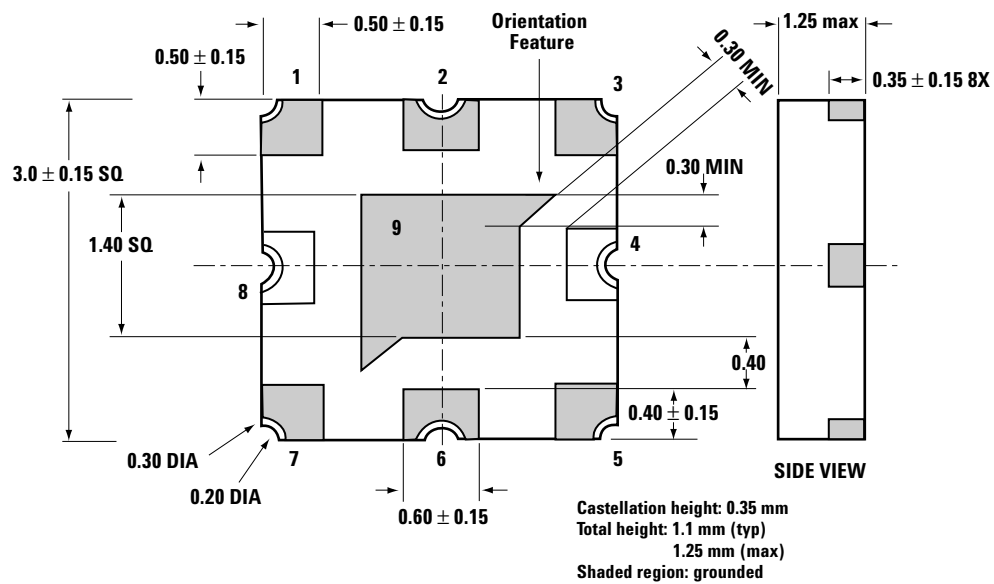


Figure 10. Detailed bottom and side view of package (dimensions in mm).

| Alloy type | Melting temp. (°C) | Recommended working temperature (°C) | Comments |
|-----------------------|--------------------|--------------------------------------|--|
| Sn42Bi58 | 138 | 160 – 180 | Lead free |
| Sn43Pb43Bi14 | 144 – 163 | 165 – 185 | Contains lead – some customers prohibit it |
| Sn63Pb37 | 183 | 200 – 240 | Contains lead – some customers prohibit it |
| Sn60Pb40 | 186 | 200 – 240 | Contains lead – some customers prohibit it |
| Sn91/Zn9 | 199 | 200 – 240 | May have oxidation problems |
| Sn96.2Ag2.5Cu0.8Sb0.5 | 216 | 235 – 255 | Popular lead free composition |
| Sn95.8Ag3.5Cu0.7 | 217 | 235 – 255 | Other alloy ratios are available |
| Sn96.5Ag3.5 | 221 | 240 – 260 | Used in the assembly of filters |
| Sn100 | 232 | 260 – 280 | Too hot – will melt package assembly |
| Sn95Sb5 | 235 | 260 – 280 | Too hot – will melt package assembly |
| Sn97Cu3 | 240 | 260 – 300 | Too hot – will melt package assembly |

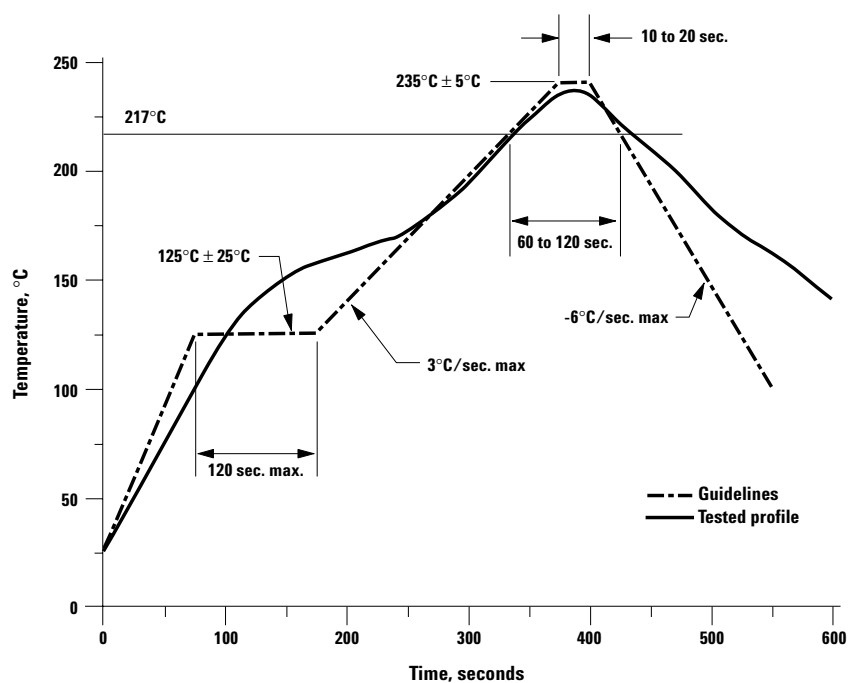


Figure 11. Recommended solder profile.

www.agilent.com/semiconductors

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

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or
(408) 654-8675

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+65) 6271 2451

India, Australia, New Zealand: (+65) 6271 2394

Japan: (+81 3) 3335-8152(Domestic/International), or
0120-61-1280(Domestic Only)

Korea: (+65) 6271 2194

Malaysia, Singapore: (+65) 6271 2054

Taiwan: (+65) 6271 2654

Data subject to change.

Copyright © 2002 Agilent Technologies, Inc.

May 15, 2002

5988-6276EN



Agilent Technologies