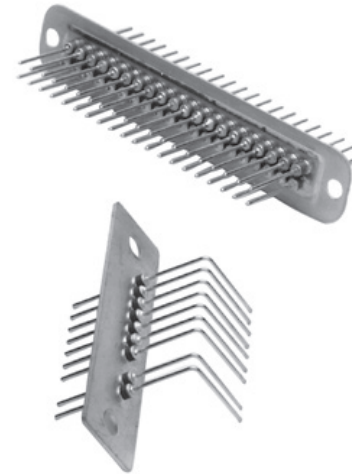


Bolt-In Style Filter Plates

The bolt-in style plate provides an excellent method for electronic system interface and EMI filtering. Bolt-in filter plates are available in a variety of plate sizes and up to 74 lines per plate in high-density (2.00mm) and 60 pins per plate in standard density (.100"). On the larger plate sizes, APITech ensures structural integrity through a unique coining process. The drawing on the next page shows an electronic system utilizing bolt-in style filter plates.

Bolt-in Filter Plate Advantages

- Eliminates the need to assemble filters into a bulkhead
- Excellent filtering from 5 MHz to 1 GHz
- Total cost savings vs. customer installed discrete filter elements
- Ideal for isolation of electronic compartments to suppress EMI
- Outperforms surface mount filters over 50 MHz

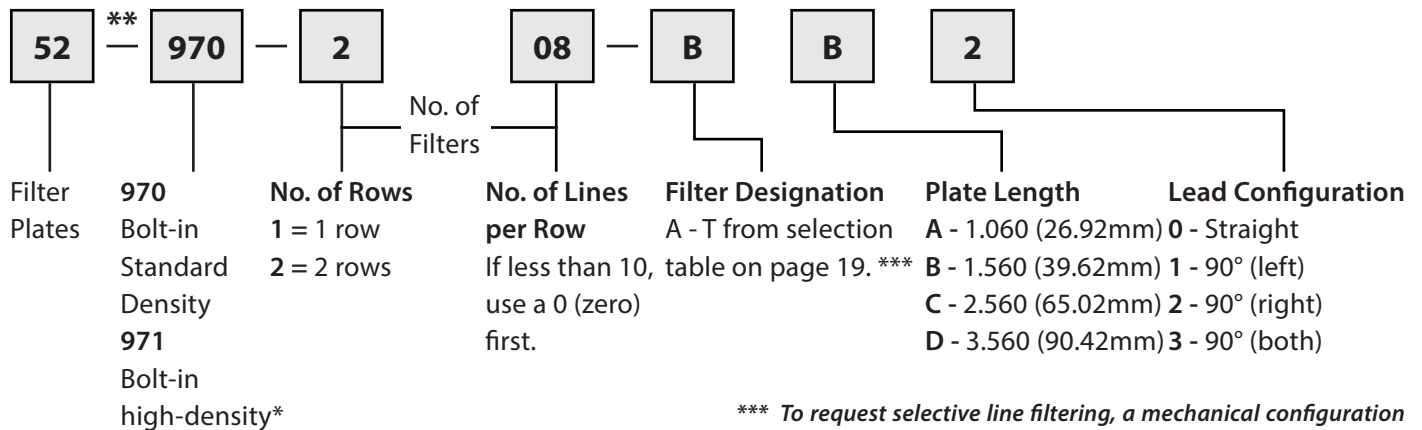


- Improved reliability
- Mixed capacitance values and schematics
- Maximize real estate on PCB
- Available in RoHS compliant versions

Ordering Information

Example: **52-970-208-BB2**

The part number shown represents a bolt-in style filter plate with 2 rows, 8 filters per row. Filters are C style with a capacitance value of 100pF. The plate length is 1.560", and the leads are bent 90° to the right side.



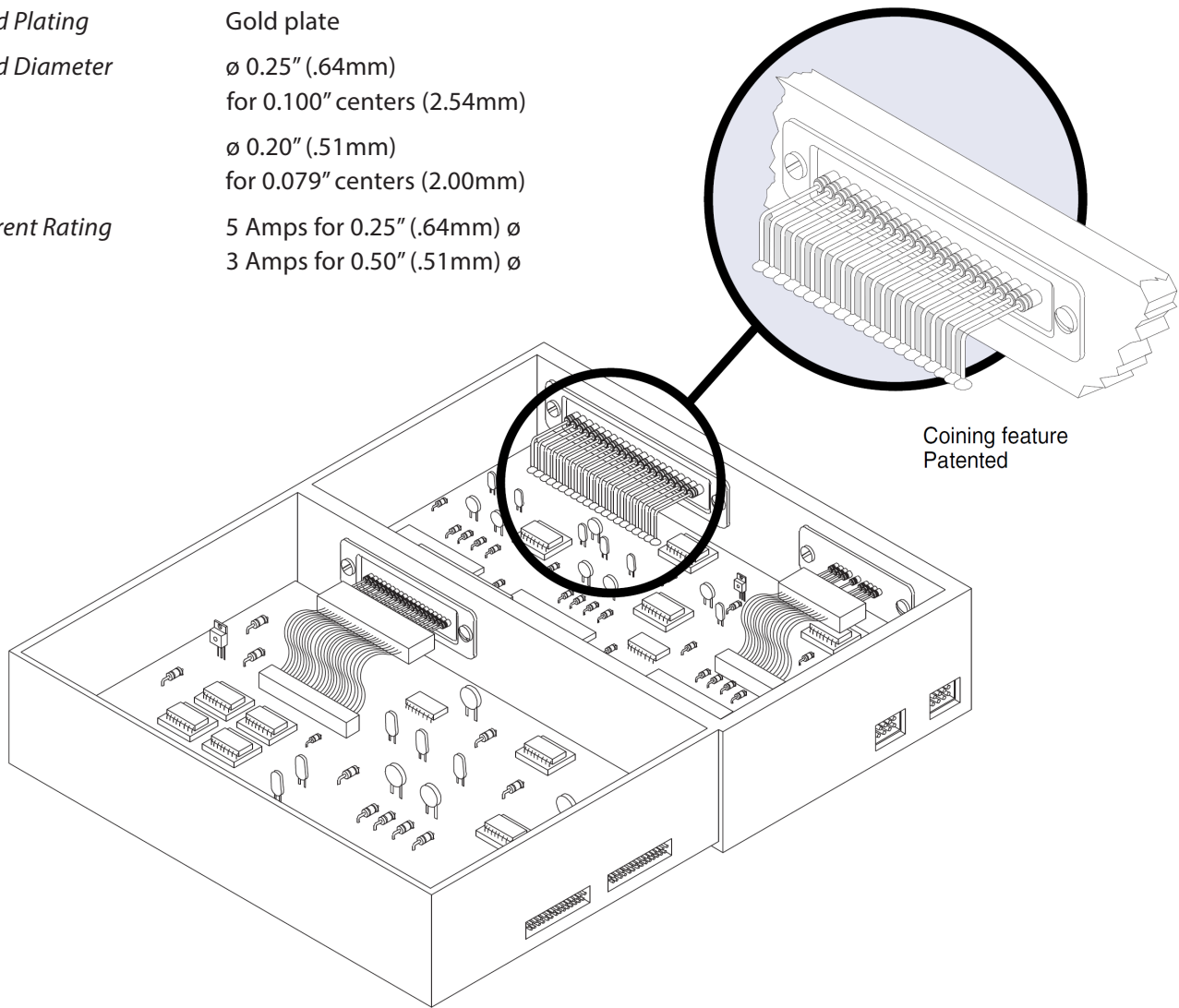
* Maximum capacitance up 400pF C style filter.
** Replace "-" with "F" for RoHS compliant version.

*** To request selective line filtering, a mechanical configuration or material specification not shown in this catalog, please contact APITech. We will review your request and provide you with a part number.

Bolt-In Style Filter Plates

Mechanical Specifications

| | |
|-----------------------------|--|
| <i>Base Plate Material</i> | Brass UNS C26000/C27000 |
| <i>Base Plate Thickness</i> | 0.020 inches (.51mm) |
| <i>Plating</i> | Tin, RoHS version will be silver |
| <i>Lead Material</i> | Copper alloy |
| <i>Lead Plating</i> | Gold plate |
| <i>Lead Diameter</i> | \varnothing 0.25" (.64mm) for 0.100" centers (2.54mm) \varnothing 0.20" (.51mm) for 0.079" centers (2.00mm) |
| <i>Current Rating</i> | 5 Amps for 0.25" (.64mm) \varnothing 3 Amps for 0.50" (.51mm) \varnothing |



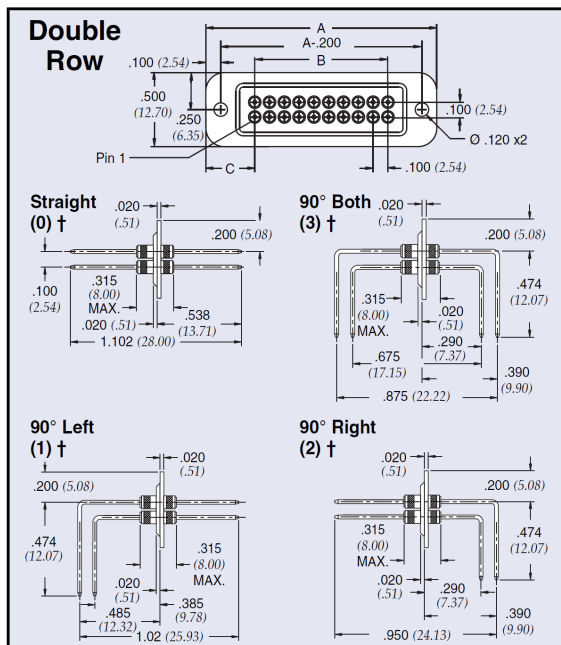
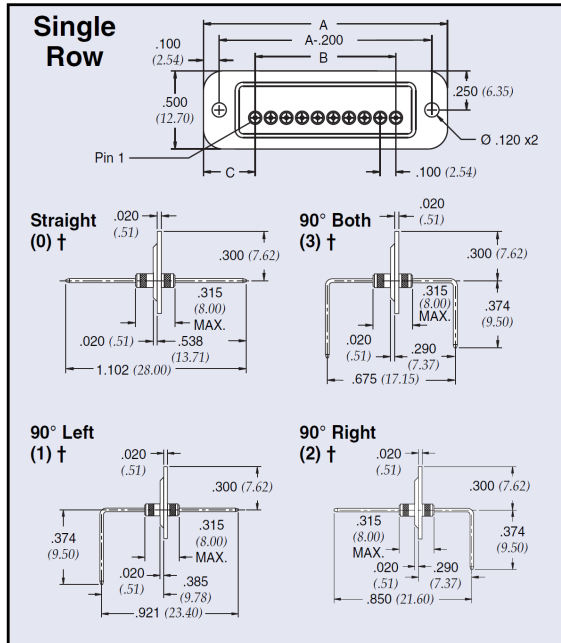
Coining feature Patented

Bolt-In Style Filter Plates

Standard Density Centers .100"

Dimensions Inches and (mm)

Lead Spacing .100" (2.54mm)



| Plate length (A) | No. of filtered lines per row | 52-970-XXX-XXX | |
|-------------------|-------------------------------|----------------|--------------|
| | | B | C |
| 1.060* (26.92) | 1 | 0 (0.00) | 0.53 (13.46) |
| | 2 | 0.1 (2.54) | 0.43 (10.92) |
| | 3 | 0.2 (5.08) | 0.43 (10.92) |
| | 4 | 0.3 (7.62) | 0.33 (8.38) |
| | 5 | 0.4 (10.16) | 0.33 (8.38) |
| 1.560* (39.62) | 1 | 0 (0.00) | 0.73 (18.54) |
| | 2 | 0.1 (2.54) | 0.73 (18.54) |
| | 3 | 0.2 (5.08) | 0.63 (16.00) |
| | 4 | 0.3 (7.62) | 0.63 (16.00) |
| | 5 | 0.4 (10.16) | 0.53 (13.46) |
| | 6 | 0.5 (12.70) | 0.53 (13.46) |
| | 7 | 0.6 (15.24) | 0.43 (10.92) |
| | 8 | 0.7 (17.78) | 0.43 (10.92) |
| | 9 | 0.8 (20.32) | 0.33 (8.38) |
| | 10 | 0.9 (22.86) | 0.33 (8.38) |
| 2.560 (65.02) | 5 | 0.4 (10.16) | 1.03 (26.16) |
| | 6 | 0.5 (12.70) | 1.03 (26.16) |
| | 7 | 0.6 (15.24) | 0.93 (23.62) |
| | 8 | 0.7 (17.78) | 0.93 (23.62) |
| | 9 | 0.8 (20.32) | 0.83 (21.08) |
| | 10 | 0.9 (22.86) | 0.83 (21.08) |
| | 11 | 1.0 (25.40) | 0.73 (18.54) |
| | 12 | 1.1 (27.94) | 0.73 (18.54) |
| | 13 | 1.2 (30.48) | 0.63 (16.00) |
| | 14 | 1.3 (33.02) | 0.63 (16.00) |
| | 15 | 1.4 (35.56) | 0.53 (13.46) |
| | 16 | 1.5 (38.10) | 0.53 (13.46) |
| | 17 | 1.6 (40.65) | 0.43 (10.92) |
| | 18 | 1.7 (43.18) | 0.43 (10.92) |
| | 19 | 1.8 (45.72) | 0.33 (8.38) |
| 3.560 (90.42) | 13 | 1.2 (30.48) | 1.13 (27.70) |
| | 14 | 1.3 (33.02) | 1.13 (27.70) |
| | 15 | 1.4 (35.56) | 1.03 (26.16) |
| | 16 | 1.5 (38.10) | 1.03 (26.16) |
| | 17 | 1.6 (40.65) | 0.93 (23.62) |
| | 18 | 1.7 (43.18) | 0.93 (23.62) |
| | 19 | 1.8 (45.72) | 0.83 (21.08) |
| | 20 | 1.9 (48.26) | 0.83 (21.08) |
| | 21 | 2.0 (50.80) | 0.73 (18.54) |
| | 22 | 2.1 (53.34) | 0.73 (18.54) |
| | 23 | 2.2 (55.88) | 0.63 (16.00) |
| 24 | 2.3 (58.42) | 0.63 (16.00) | |
| 25 | 2.4 (60.96) | 0.53 (13.46) | |
| 26 | 2.5 (63.50) | 0.53 (13.46) | |
| 27 | 2.6 (66.04) | 0.43 (10.92) | |
| 28 | 2.7 (68.58) | 0.43 (10.92) | |
| 29 | 2.8 (71.12) | 0.33 (8.38) | |
| 30 | 2.9 (73.66) | 0.33 (8.38) | |

Coining feature patented.

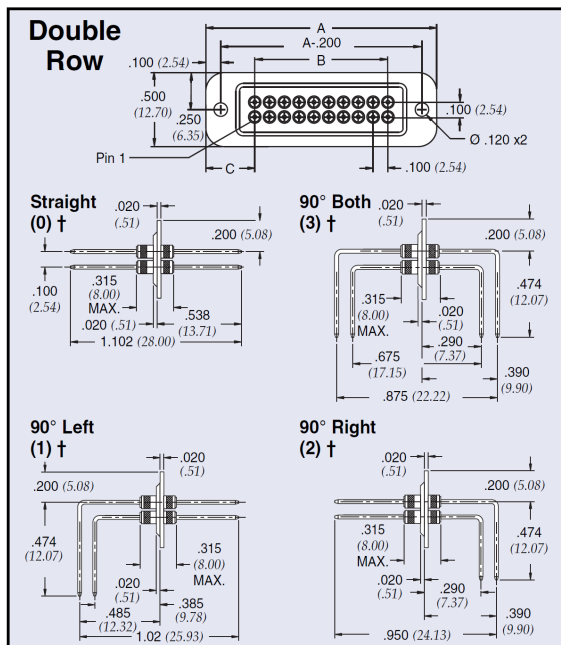
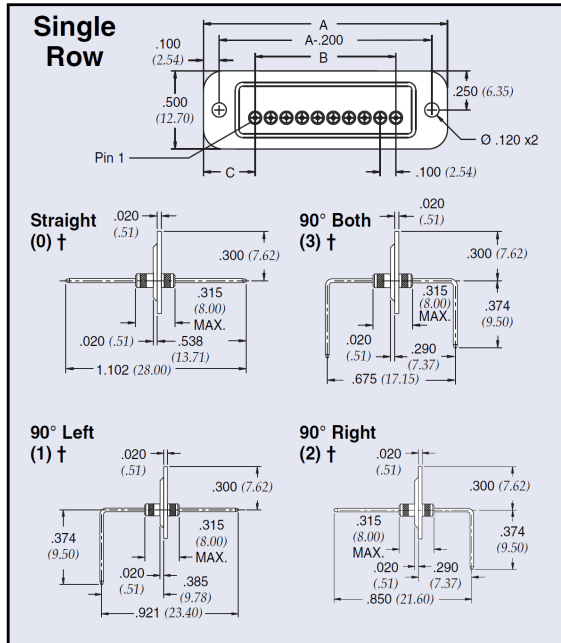
† Refers to lead configuration for part number/ordering information.

* For plate widths 1.060 and 1.560 there will be no coining. For these plates, increase dimensions to the right .020". Thus, any dimension on left will be reduced by .020".

Bolt-In Style Filter Plates

High-Density Centers 2.00mm

Dimensions Inches and (mm)
Lead Spacing .079" (2.00mm)



| Plate length (A) | No. of filtered lines per row | 52-970-XXX-XXX | |
|-------------------|-------------------------------|----------------|--------------|
| | | B | C |
| 1.060* (26.92) | 1 | 0 (0.00) | 0.53 (13.46) |
| | 2 | 0.1 (2.54) | 0.43 (10.92) |
| | 3 | 0.2 (5.08) | 0.43 (10.92) |
| | 4 | 0.3 (7.62) | 0.33 (8.38) |
| | 5 | 0.4 (10.16) | 0.33 (8.38) |
| 1.560* (39.62) | 1 | 0 (0.00) | 0.73 (18.54) |
| | 2 | 0.1 (2.54) | 0.73 (18.54) |
| | 3 | 0.2 (5.08) | 0.63 (16.00) |
| | 4 | 0.3 (7.62) | 0.63 (16.00) |
| | 5 | 0.4 (10.16) | 0.53 (13.46) |
| | 6 | 0.5 (12.70) | 0.53 (13.46) |
| | 7 | 0.6 (15.24) | 0.43 (10.92) |
| | 8 | 0.7 (17.78) | 0.43 (10.92) |
| | 9 | 0.8 (20.32) | 0.33 (8.38) |
| | 10 | 0.9 (22.86) | 0.33 (8.38) |
| 2.560 (65.02) | 5 | 0.4 (10.16) | 1.03 (26.16) |
| | 6 | 0.5 (12.70) | 1.03 (26.16) |
| | 7 | 0.6 (15.24) | 0.93 (23.62) |
| | 8 | 0.7 (17.78) | 0.93 (23.62) |
| | 9 | 0.8 (20.32) | 0.83 (21.08) |
| | 10 | 0.9 (22.86) | 0.83 (21.08) |
| | 11 | 1.0 (25.40) | 0.73 (18.54) |
| | 12 | 1.1 (27.94) | 0.73 (18.54) |
| | 13 | 1.2 (30.48) | 0.63 (16.00) |
| | 14 | 1.3 (33.02) | 0.63 (16.00) |
| | 15 | 1.4 (35.56) | 0.53 (13.46) |
| | 16 | 1.5 (38.10) | 0.53 (13.46) |
| | 17 | 1.6 (40.65) | 0.43 (10.92) |
| | 18 | 1.7 (43.18) | 0.43 (10.92) |
| | 19 | 1.8 (45.72) | 0.33 (8.38) |
| 3.560 (90.42) | 13 | 1.2 (30.48) | 1.13 (27.70) |
| | 14 | 1.3 (33.02) | 1.13 (27.70) |
| | 15 | 1.4 (35.56) | 1.03 (26.16) |
| | 16 | 1.5 (38.10) | 1.03 (26.16) |
| | 17 | 1.6 (40.65) | 0.93 (23.62) |
| | 18 | 1.7 (43.18) | 0.93 (23.62) |
| | 19 | 1.8 (45.72) | 0.83 (21.08) |
| | 20 | 1.9 (48.26) | 0.83 (21.08) |
| | 21 | 2.0 (50.80) | 0.73 (18.54) |
| | 22 | 2.1 (53.34) | 0.73 (18.54) |
| | 23 | 2.2 (55.88) | 0.63 (16.00) |
| | 24 | 2.3 (58.42) | 0.63 (16.00) |
| | 25 | 2.4 (60.96) | 0.53 (13.46) |
| | 26 | 2.5 (63.50) | 0.53 (13.46) |
| | 27 | 2.6 (66.04) | 0.43 (10.92) |
| 28 | 2.7 (68.58) | 0.43 (10.92) | |
| 29 | 2.8 (71.12) | 0.33 (8.38) | |
| 30 | 2.9 (73.66) | 0.33 (8.38) | |

Coining feature patented.

† Refers to lead configuration for part number/ordering information.

* For plate widths 1.060 and 1.560 there will be no coining. For these plates, increase dimensions to the right .020". Thus, any dimension on left will be reduced by .020".

Filter Plate Filter Selection

EMI Filter Performance

The electrical characteristics table and insertion loss graphs indicate the performance of feedthrough capacitors and Pi type filters. Utilize this information to specify the EMI filtering components included in your filter plate.

Custom Filtering

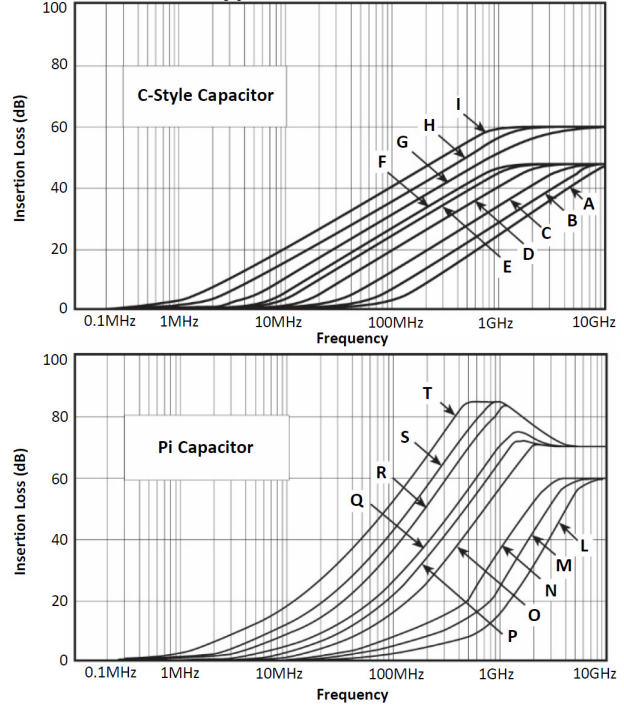
APItech filter plates are engineered to accommodate selective line filtering. Several different types of filters may be specified in a single, easy to install filter plate, allowing you to facilitate a wide range of filtering requirements.

For select line filtering, provide a sketch indicating the filters and positions required. The example below represents a 10-pin, 2-row plate with six 1000 pF feedthrough capacitors and four 1700 pF Pi type filters.

Part Number
Based on front
view of plate

| | | | | | | | |
|--|----|---|---|---|---|---|---|
| | 10 | F | F | F | R | R | 6 |
| | 1 | F | F | F | R | R | 5 |

Typical Insertion Loss



The above curves represent the application of proper grounding fundamentals.

| Filter Designation | Filter** Circuits | Capacitance | | 3 dB Max Cut-off Frequency (MHz) | Working Voltage DC -55°C to +125°C | Minimum Insertion Loss - Decibels (dB) 50 ohm system per MIL-STD-220 (no load) | | | | | | | |
|--------------------|-------------------|-------------|-----------|----------------------------------|------------------------------------|--|--------|--------|--------|---------|---------|---------|-------|
| | | Value | Tolerance | | | 5 MHZ | 10 MHZ | 20 MHZ | 50 MHZ | 100 MHZ | 200 MHZ | 500 MHZ | 1 GHZ |
| A | C | 68pF | ±20% | 77 | 100V | — | — | — | — | — | 3 | 10 | 16 |
| B | C | 100 pF | ±20% | 53 | 100V | — | — | — | — | 1 | 6 | 14 | 19 |
| C | C | 135 pF | ±100/-0% | 23 | 100V | — | — | — | 1 | 5 | 10 | 16 | 20 |
| D | C | 470 pF | ±20% | 11 | 100V | — | — | 2 | 7 | 13 | 19 | 25 | 27 |
| E | C | 820 pF | ±20% | 6 | 100V | — | 2 | 6 | 12 | 18 | 24 | 30 | 33 |
| F | C | 1000 pF | ±20% | 5 | 100V | — | 3 | 7 | 14 | 20 | 26 | 32 | 35 |
| G | C | 1500 pF | ±20% | 3.5 | 100V | 1 | 4 | 10 | 16 | 22 | 29 | 36 | 37 |
| H | C | 2500 pF | ±100/-0% | 1.3 | 100V | 5 | 11 | 17 | 23 | 29 | 35 | 38 | 40 |
| I | C | 4000 pF | ±100/-0% | .8 | 100V | 9 | 15 | 21 | 27 | 34 | 38 | 42 | 46 |
| J | Insulated | 10 pF | Max. | 635 | 100V | — | — | — | — | — | — | — | — |
| K | Grounded Insert | | | | | — | — | — | — | — | — | — | — |
| L | Pi | 68 pF | ±20% | 65 | 100V | — | — | — | — | 1 | 6 | 17 | 23 |
| M | Pi | 100 pF | ±20% | 46 | 100V | — | — | — | — | 2 | 9 | 22 | 28 |
| N | Pi | 135 pF | ±100/-0% | 25 | 100V | — | — | — | 1 | 6 | 17 | 26 | 34 |
| O | Pi | 470 pF | ±20% | 11 | 100V | — | — | — | 9 | 18 | 22 | 36 | 43 |
| P | Pi | 820 pF | ±20% | 6 | 100V | — | — | 4 | 13 | 23 | 31 | 45 | 52 |
| Q | Pi | 1000 pF | ±20% | 5 | 100V | — | 2 | 7 | 16 | 24 | 36 | 51 | 59 |
| R | Pi | 1700 pF | ±100/-0% | 1.9 | 100V | 1 | 5 | 14 | 28 | 35 | 49 | 64 | 69 |
| S | Pi | 2500 pF | ±100/-0% | 1.3 | 50V | 4 | 6 | 16 | 28 | 41 | 54 | 70 | 70 |
| T | Pi | 5000 pF | ±100/-0% | .7 | 100V | 9 | 15 | 28 | 41 | 53 | 66 | 70 | 70 |

* 3dB cut-off frequency calculated at the maximum capacitance.

** For high-density centers (2mm) only C style filters are available, to maximum of 4000pF.

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