

# Type FCP Surface Mount Film Capacitors

## Stable Stacked Metallized Film (PPS) Chips for Reflow Soldering



The Type FCP's combination of high capacitance density and excellent high frequency response makes it a great choice for wireless and instrumentation applications.

Type FCP stacked metallized polyphenylene sulfide (PPS) film capacitors offer high capacitance per unit volume, stable capacitance and DF over a wide temperature range, and excellent high frequency performance. Type FCP capacitors conform to standard EIA 0603, 0805, 1206, 1210, 1913 & 2416 surface mount case sizes and are packaged on tape and reel.

### Highlights

- Stacked metallized polyphenylene sulfide (PPS) film.
- High operating temperature to +125 °C
- High capacitance per unit volume
- Excellent high frequency performance
- Typical  $\Delta C$  from -55 °C to 105 °C  $\leq \pm 1.5\%$
- Stable cap and DF over wide temperature range

### Specifications

|                                    |                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacitance Range                  | 100 pF to 0.22 $\mu$ F (1kHz at $\leq 5$ Vrms)                                                                                                                                                                                                                                                                                      |
| Capacitance Tolerance              | $\pm 5\%$ (J) Standard, $\pm 2\%$ (G) Optional                                                                                                                                                                                                                                                                                      |
| Rated Voltage                      | 16 Vdc and 50 Vdc                                                                                                                                                                                                                                                                                                                   |
| Dissipation Factor (Tan $\delta$ ) | 0.6% Max. (1 kHz at $\leq 5$ Vrms)                                                                                                                                                                                                                                                                                                  |
| Operating Temperature Range        | -55 °C to +125 °C (See Voltage derating chart for 0.12 - 0.22 $\mu$ F above 105 °C)                                                                                                                                                                                                                                                 |
| Dielectric Strength                | 150% of rated Vdc for 60 s                                                                                                                                                                                                                                                                                                          |
| Insulation Resistance              | 3000 M $\Omega$ Min. at 20 °C, after 60 s (16 Vdc rated, test 10 Vdc; 50 Vdc rated, test 50 Vdc)                                                                                                                                                                                                                                    |
| Construction                       | Stacked metallized polyphenylene sulfide (PPS) film. Terminations are lead free with a Sn-Ag-Cu solder finish.                                                                                                                                                                                                                      |
| Life Test                          | Capacitors subjected to 1000 hours of maximum rated temperature and 125% of the rated voltage will not have any significant visual damage, the capacitance will be within $\pm 2\%$ of the initial measured value, DF will be a maximum of 0.66%, and IR will be a minimum of 1000 Megohms.                                         |
| Resistance to Soldering Heat       | Capacitors subjected to a maximum of 260 °C reflow soldering process will not have any significant visual damage, the dielectric strength will be as specified, the capacitance will be within $\pm 3\%$ of the initial measured value, DF will be a maximum of .66%, and IR will be a minimum of 1000 Megohms.                     |
| Moisture Resistance                | Capacitors subjected to 1000 h at 40 °C and 90% to 95% RH and rated voltage will not have any significant visual damage, will withstand 1.3 times the rated voltage for one minute, the capacitance will be within $\pm 2\%$ of the initial measured value, DF will be a maximum of 0.9%, and IR will be a minimum of 1000 Megohms. |
| RoHS Compliant                     |                                                                                                                                                                                                                                                                                                                                     |

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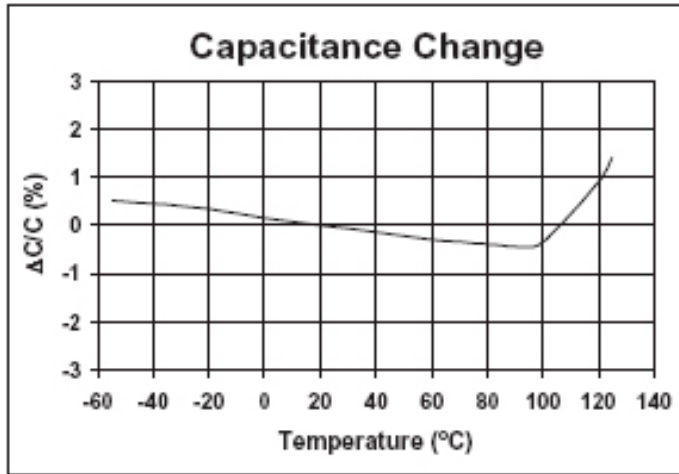
### Ratings

| Capacitance |      |        | 16 Vdc                 |              | 50 Vdc                 |              |
|-------------|------|--------|------------------------|--------------|------------------------|--------------|
| (μF)        | (nF) | (pF)   | Catalog<br>Part Number | Case<br>Code | Catalog<br>Part Number | Case<br>Code |
| .00010      | .10  | 100    | FCP0603C101J-K1        | 0603         | FCP0805H101J-J1        | 0805         |
| .00012      | .12  | 120    | FCP0603C121J-K1        |              | FCP0805H121J-J1        |              |
| .00015      | .15  | 150    | FCP0603C151J-K1        |              | FCP0805H151J-J1        |              |
| .00018      | .18  | 180    | FCP0603C181J-K1        |              | FCP0805H181J-J1        |              |
| .00022      | .22  | 220    | FCP0603C221J-K1        |              | FCP0805H221J-J1        |              |
| .00027      | .27  | 270    | FCP0603C271J-K1        |              | FCP0805H271J-J1        |              |
| .00033      | .33  | 330    | FCP0603C331J-K1        |              | FCP0805H331J-J1        |              |
| .00039      | .39  | 390    | FCP0603C391J-K1        |              | FCP0805H391J-J1        |              |
| .00047      | .47  | 470    | FCP0603C471J-K1        |              | FCP0805H471J-J1        |              |
| .00056      | .56  | 560    | FCP0603C561J-K1        |              | FCP0805H561J-J1        |              |
| .00068      | .68  | 680    | FCP0603C681J-K1        |              | FCP0805H681J-J1        |              |
| .00082      | .82  | 820    | FCP0603C821J-K1        |              | FCP0805H821J-J1        |              |
| .0010       | 1.00 | 1000   | FCP0603C102J-K1        |              | FCP0805H102J-J1        |              |
| .0012       | 1.20 | 1200   | FCP0603C122J-K1        |              | FCP0805H122J-J1        |              |
| .0015       | 1.50 | 1500   | FCP0603C152J-K1        |              | FCP0805H152J-J1        |              |
| .0018       | 1.80 | 1800   | FCP0603C182J-K1        |              | FCP0805H182J-J1        |              |
| .0022       | 2.20 | 2200   | FCP0603C222J-K1        |              | FCP0805H222J-J1        |              |
| .0027       | 2.70 | 2700   | FCP0603C272J-K1        |              | FCP0805H272J-J1        |              |
| .0033       | 3.30 | 3300   | FCP0805C332J-J1        | 805          | FCP1206H332J-H1        | 1206         |
| .0039       | 3.90 | 3900   | FCP0805C392J-J1        |              | FCP1206H392J-H1        |              |
| .0047       | 4.70 | 4700   | FCP0805C472J-J1        |              | FCP1206H472J-H1        |              |
| .0056       | 5.60 | 5600   | FCP0805C562J-J1        |              | FCP1206H562J-H1        |              |
| .0068       | 6.80 | 6800   | FCP0805C682J-J1        |              | FCP1206H682J-H1        |              |
| .0082       | 8.20 | 8200   | FCP0805C822J-J2        |              | FCP1206H822J-H2        |              |
| .010        | 10   | 10000  | FCP0805C103J-J2        | 1206         | FCP1206H103J-H2        | 1210         |
| .012        | 12   | 12000  | FCP1206C123J-H1        |              | FCP1210H123J-G1        |              |
| .015        | 15   | 15000  | FCP1206C153J-H1        |              | FCP1210H153J-G1        |              |
| .018        | 18   | 18000  | FCP1206C183J-H1        |              | FCP1210H183J-G2        |              |
| .022        | 22   | 22000  | FCP1206C223J-H1        |              | FCP1210H223J-G2        |              |
| .027        | 27   | 27000  | FCP1206C273J-H2        |              | FCP1210H273J-G2        |              |
| .033        | 33   | 33000  | FCP1206C333J-H2        |              | FCP1210H333J-G3        |              |
| .039        | 39   | 39000  | FCP1206C393J-H3        |              | FCP1210H393J-G3        |              |
| .047        | 47   | 47000  | FCP1206C473J-H3        | 1210         | FCP1913H473J-E1        | 1913         |
| .056        | 56   | 56000  | FCP1210C563J-G2        |              | FCP1913H563J-E1        |              |
| .068        | 68   | 68000  | FCP1210C683J-G2        |              | FCP1913H683J-E1        |              |
| .082        | 82   | 82000  | FCP1210C823J-G3        |              | FCP1913H823J-E2        |              |
| .100        | 100  | 100000 | FCP1210C104J-G3        |              | FCP1913H104J-E2        | 2416         |
| .12         | 120  | 120000 |                        |              | FCP2416H124J-D1        |              |
| .15         | 150  | 150000 |                        |              | FCP2416H154J-D1        |              |
| .18         | 180  | 180000 |                        |              | FCP2416H184J-D3        |              |
| .22         | 220  | 220000 |                        |              | FCP2416H224J-D4        |              |

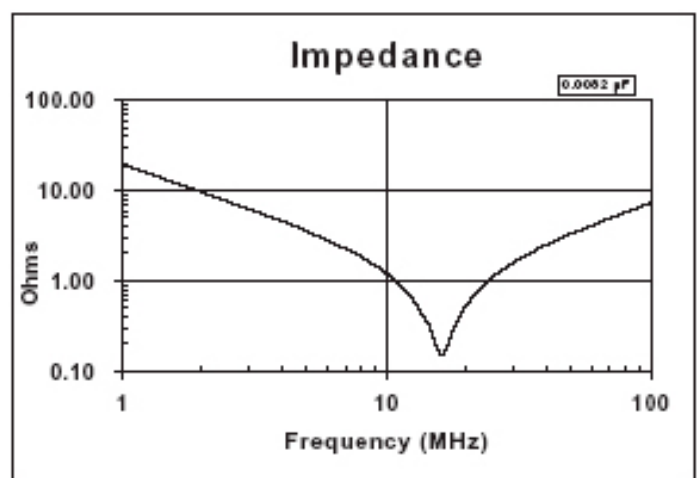
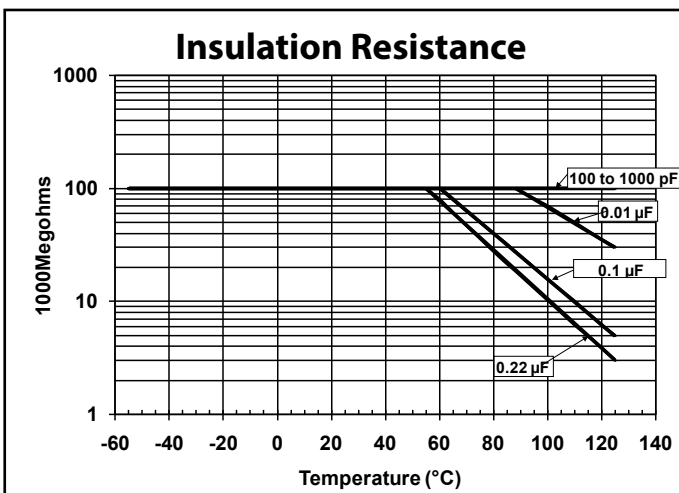
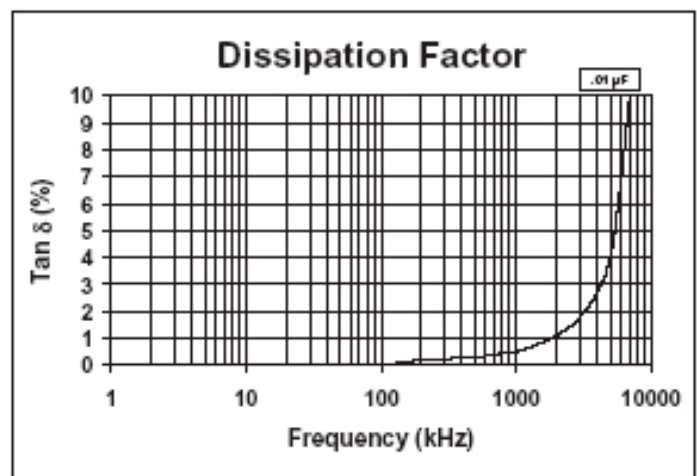
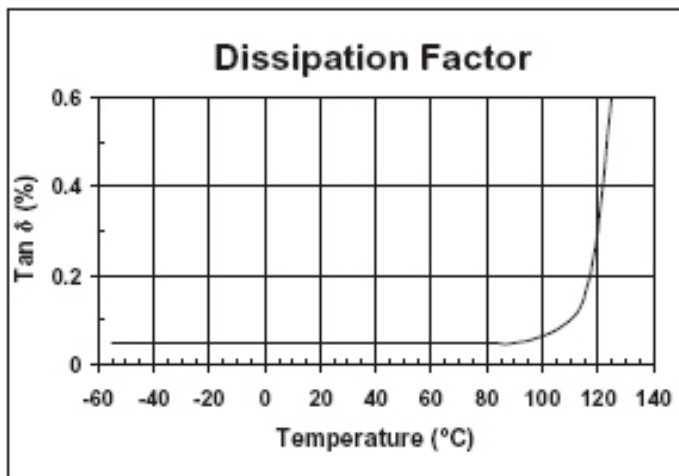
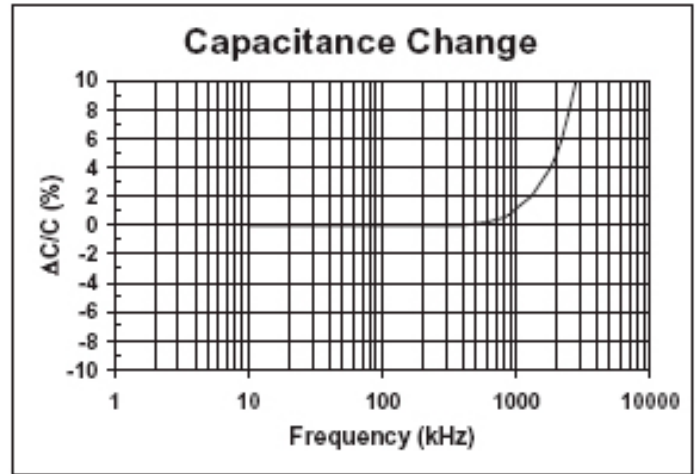
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### Typical Temperature Characteristics



### Typical Frequency Characteristics



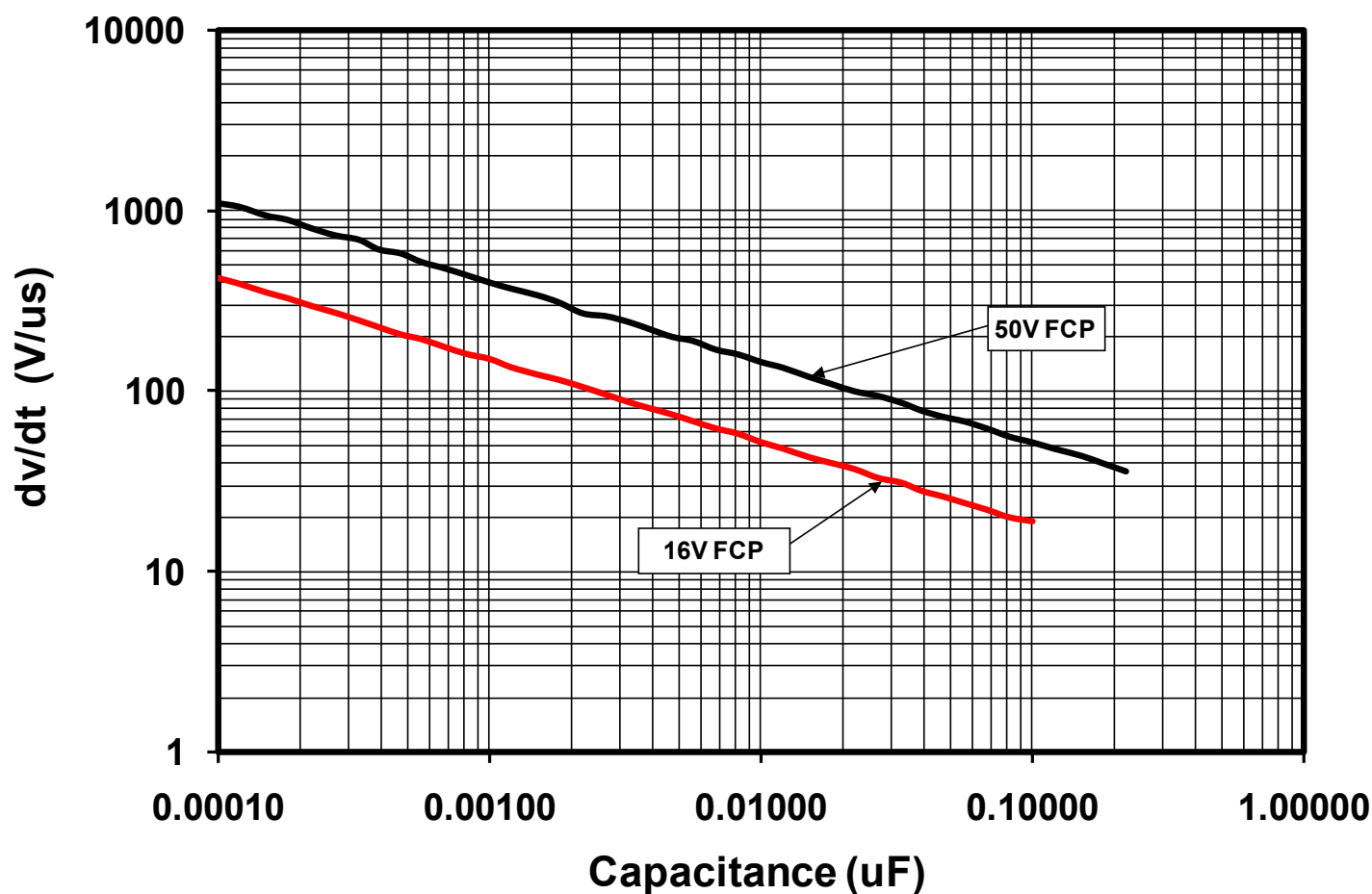
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## Stable Stacked Metallized Film (PPS) Chips for Reflow Soldering

### Outline Dimensions

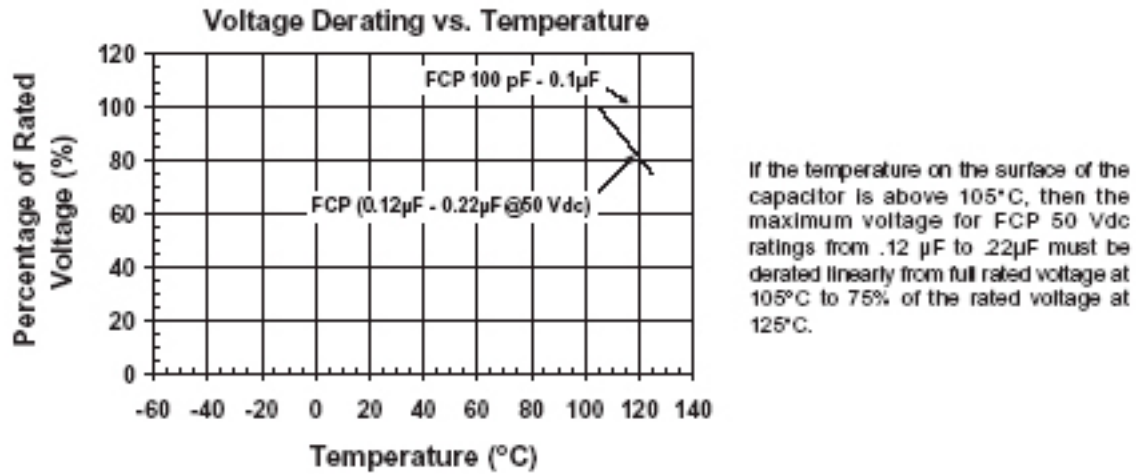


| Case Code | Outline Dimensions (in.) |             |             |             | Case Code (metric) | Outline Dimensions (mm) |           |           |           | Packaging Code |
|-----------|--------------------------|-------------|-------------|-------------|--------------------|-------------------------|-----------|-----------|-----------|----------------|
|           | L ±0.008                 | W           | T ±0.008    | t           |                    | L ±0.2                  | W         | T ±0.2    | t         |                |
| 0603      | 0.063                    | 0.032±0.006 | 0.028±0.006 | 0.014±0.008 | 1608               | 1.6                     | 0.80±0.15 | 0.70±0.15 | 0.35±0.2  | K1             |
| 0805      | 0.079                    | 0.049±0.008 | 0.035       | 0.018±0.010 | 2012               | 2.0                     | 1.25±0.2  | 0.9       | 0.45±0.25 | J1             |
|           |                          |             | 0.043       |             |                    |                         |           | 1.1       |           | J2             |
| 1206      | 0.126                    | 0.063±0.008 | 0.035       | 0.026±0.012 | 3216               | 3.2                     | 1.6±0.2   | 0.9       | 0.65±0.3  | H1             |
|           |                          |             | 0.043       |             |                    |                         |           | 1.1       |           | H2             |
|           |                          |             | 0.059       |             |                    |                         |           | 1.5       |           | H3             |
| 1210      | 0.126                    | 0.098±0.008 | 0.043       | 0.026±0.012 | 3225               | 3.2                     | 2.5±0.2   | 1.1       | 0.65±0.3  | G1             |
|           |                          |             | 0.059       |             |                    |                         |           | 1.5       |           | G2             |
|           |                          |             | 0.083       |             |                    |                         |           | 2.1       |           | G3             |
| 1913      | 0.189                    | 0.130±0.012 | 0.059       | 0.031±0.012 | 4833               | 4.8                     | 3.3±0.3   | 1.5       | 0.80±0.3  | E1             |
|           |                          |             | 0.083       |             |                    |                         |           | 2.1       |           | E2             |
| 2416      | 0.236                    | 0.161±0.012 | 0.075       | 0.031±0.012 | 6041               | 6.0                     | 4.1±0.3   | 1.9       | 0.80±0.3  | D1             |
|           |                          |             | 0.098       |             |                    |                         |           | 2.5       |           | D3             |
|           |                          |             | 0.110       |             |                    |                         |           | 2.8       |           | D4             |

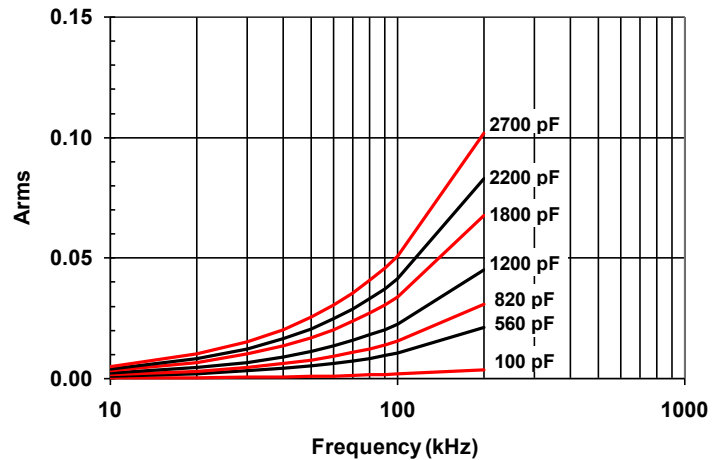


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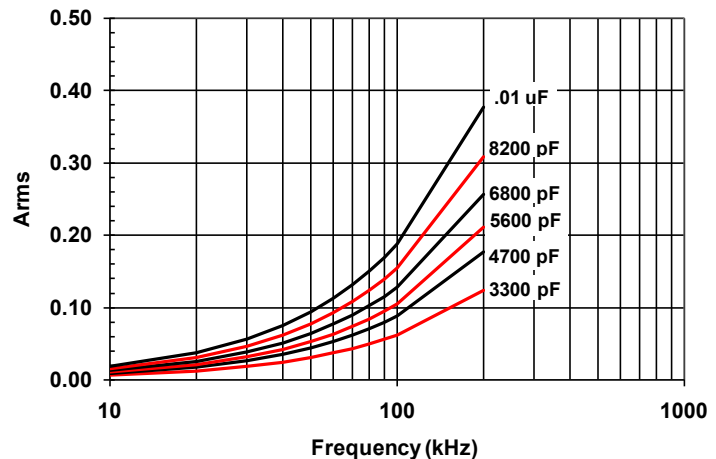
## Stable Stacked Metallized Film (PPS) Chips for Reflow Soldering



## FCP 0805 50 Vdc Rating Vrms and Arms vs. Frequency



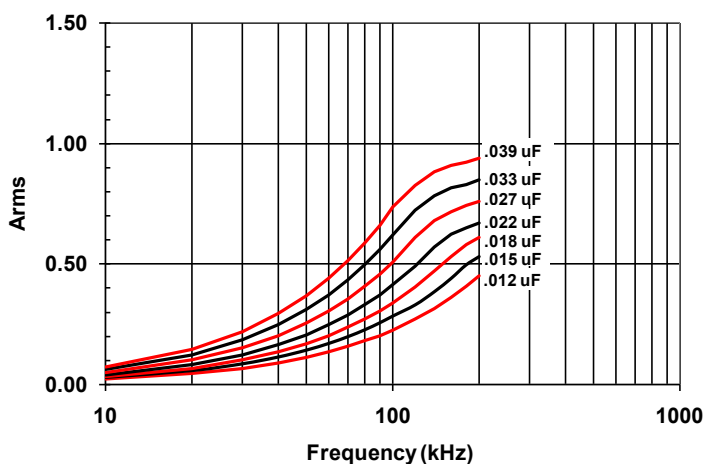
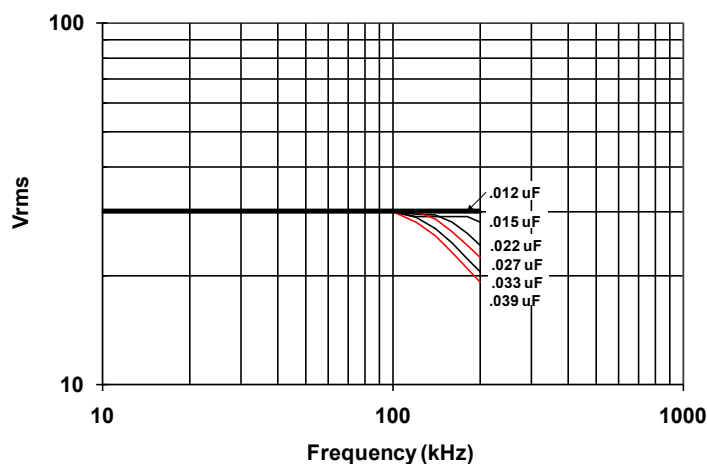
## FCP 1206 50 Vdc Rating Vrms and Arms vs. Frequency



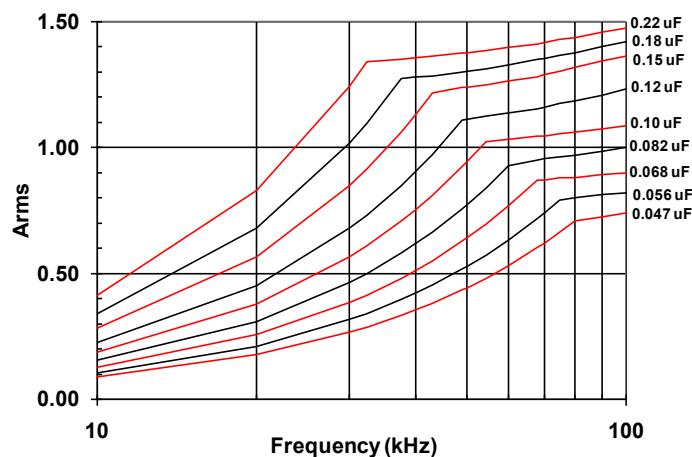
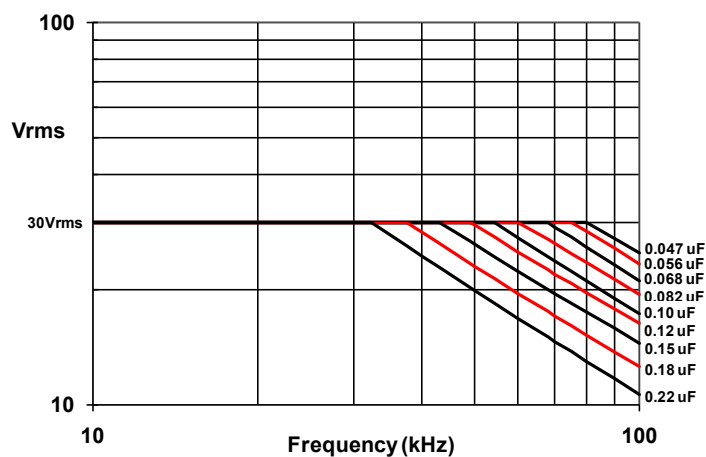
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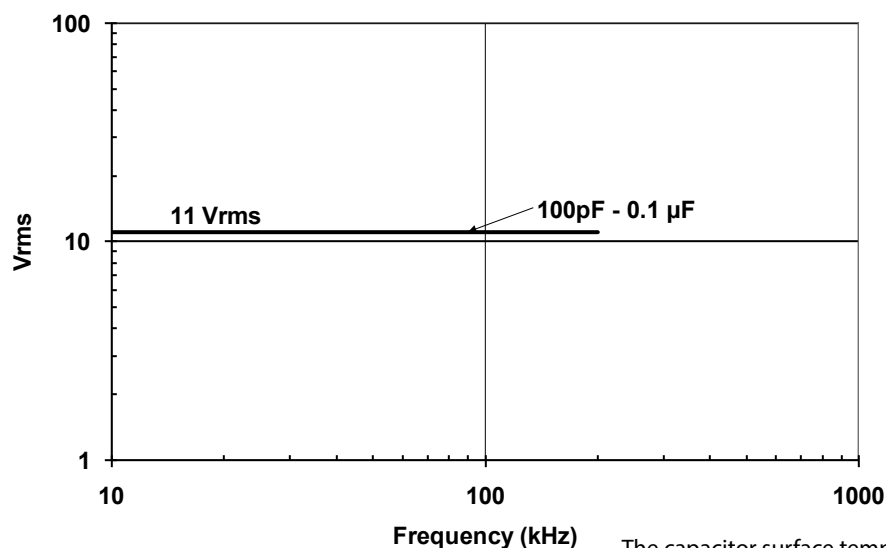
### FCP 1210 50 Vdc Rating Vrms and Arms vs. Frequency



### FCP 1913 & 2416 50 Vdc Rating Vrms and Arms vs. Frequency



### Maximum AC Voltage FCP 16Vdc Series



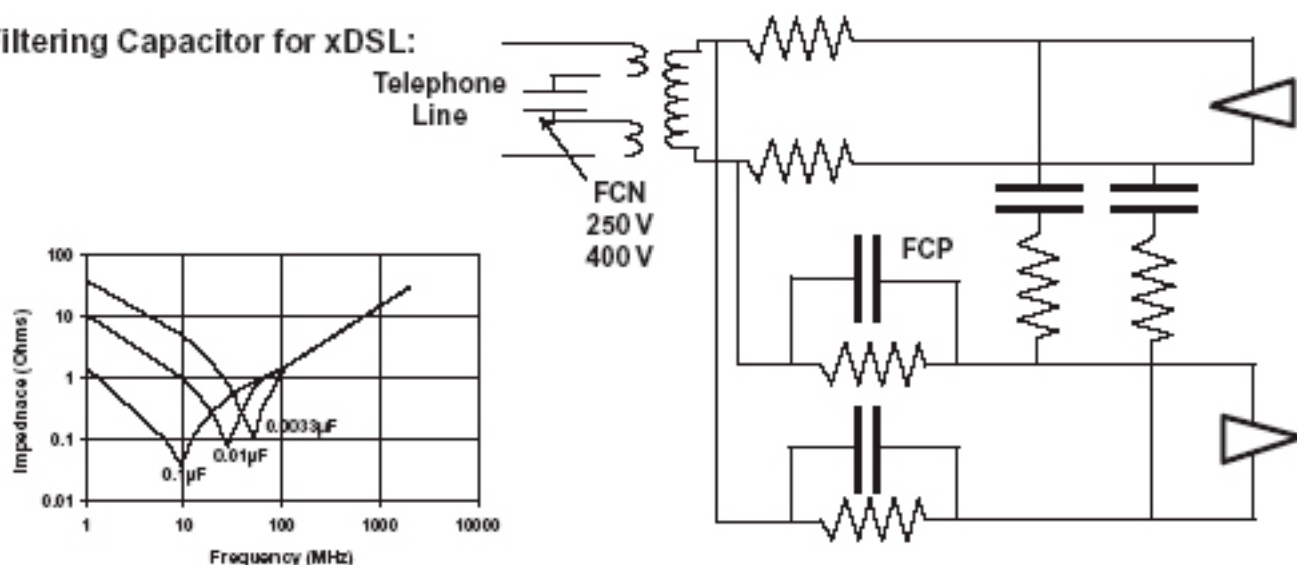
The capacitor surface temperature should not exceed 125 °C.

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### Typical Applications

#### Filtering Capacitor for xDSL:



#### Capacitance Change vs. Bias Voltage

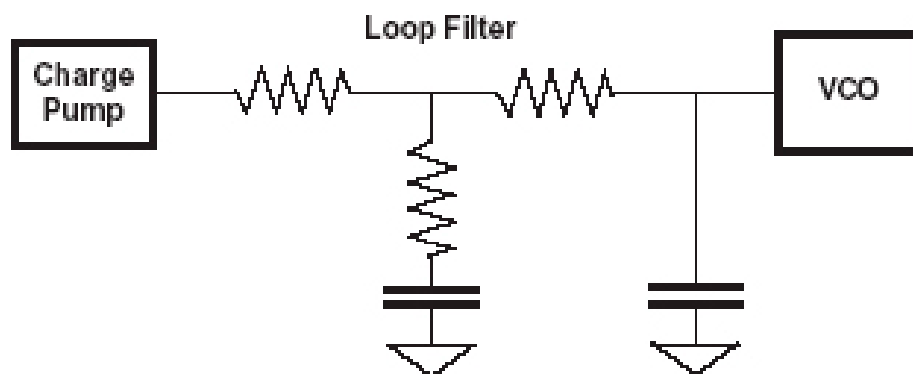
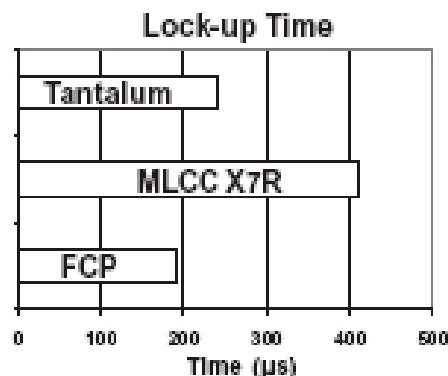


#### Capacitance Change vs. Temperature



*The capacitance of SMT film chips is much more stable with applied voltage and with changes in temperature than multilayer ceramic capacitors. Add in the low ESR characteristics of film chips and the final result is improved performance in filter circuit applications.*

#### PLL Circuit: Cellular phone, Blue Tooth, Data Communication Cards



*In PLL circuit applications, FCP SMT film capacitor advantages are tight tolerance on the capacitance value, stable capacitance with temperature, faster lock-up times, and no noise due to piezoelectric effects.*

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