



MLC capacitors with silver/palladium (Ag/Pd) terminations have often been used in medical applications where non-magnetic components are required, for example in MRI equipment - however, conventional nickel barrier terminations are not suitable due to their magnetic properties. In addition, RoHS requirement to use lead-free solders would cause an increase in soldering temperatures and cause solder leaching problems for the Ag/Pd termination. This has meant alternatives have had to be found and one solution is to use a copper barrier instead of a nickel barrier, with a tin finish on top. This non-magnetic termination is offered with selected non-magnetic C0G/NP0, High Q and X7R dielectrics, providing a fully non-magnetic component ( $\mu_r = 1.0000$ ).

To meet high temperature 260°C soldering reflow profiles as detailed in J-STD-020, C0G/NP0 dielectrics are supplied with FlexiCap™ or sintered termination whilst X7R dielectrics are supplied only with the FlexiCap™ termination.

Available in chip or ribbon leaded format for certain case sizes (consult sales office).



## High Q, C0G/NP0 - minimum / maximum capacitance values

| Chip Size       | 0402  | 0603  | 0505  | 0805  | 1206  | 1111<br>1210 | 1808  | 1812  | 2220  |
|-----------------|-------|-------|-------|-------|-------|--------------|-------|-------|-------|
| <b>Min Cap</b>  | 0.1pF | 0.1pF | 0.2pF | 0.2pF | 0.5pF | 0.3pF        | 1.0pF | 1.0pF | 2.0pF |
| <b>50V 63V</b>  | 22pF  | 100pF | 220pF | 470pF | 1.5nF | -            | -     | -     | -     |
| <b>100V</b>     | 15pF  | 68pF  | 150pF | 330pF | 1.0nF | 2.2nF        | 2.2nF | 4.7nF | 10nF  |
| <b>150V</b>     | 10pF  | 47pF  | 100pF | 220pF | 680pF | 1.5nF        | 1.5nF | 3.3nF | 6.8nF |
| <b>200V250V</b> | 6.8pF | 33pF  | 56pF  | 150pF | 470pF | 1.0nF        | 1.0nF | 2.2nF | 4.7nF |
| <b>300V</b>     | -     | 27pF  | 47pF  | 120pF | 390pF | 820pF        | 820pF | 1.8nF | 3.9nF |
| <b>500V</b>     |       |       |       | 68pF  | 270pF | 680pF        | 680pF | 1.5nF | 3.3nF |
| <b>630V</b>     |       |       |       | -     | 150pF | 390pF        | 390pF | 1.0nF | 2.2nF |
| <b>1000V</b>    |       |       |       | -     | 82pF  | 220pF        | 220pF | 680pF | 1.5nF |
| <b>2000V</b>    |       |       |       | -     | 18pF  | 68pF         | 68pF  | 150pF | 470pF |
| <b>3000V</b>    |       |       |       | -     | -     | -            | -     | 68pF  | 150pF |

Min Capacitance Tolerance  
 ±0.05pF (<4.7pF)  
 0.1pF (≥4.7pF & <10pF)  
 ±1% (≥10pF)

## X7R - minimum / maximum capacitance values

| Chip Size       | 0402  | 0603  | 0805  | 1206  | 1210  | 1808  | 1812  | 2220  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Min Cap</b>  | 47pF  | 100pF | 330pF | 680pF | 1.5nF | 2.2nF | 3.3nF | 6.8nF |
| <b>16V</b>      | 10nF  | 100nF | 330nF | 1.0μF | 1.5μF | 1.5μF | 3.3μF | 5.6μF |
| <b>25V</b>      | 6.8nF | 68nF  | 220nF | 820nF | 1.2μF | 1.2μF | 2.2μF | 4.7μF |
| <b>50V 63V</b>  | 4.7nF | 47nF  | 150nF | 470nF | 1.0μF | 680nF | 1.5μF | 3.3μF |
| <b>100V</b>     | 1.5nF | 10nF  | 47nF  | 150nF | 470nF | 330nF | 1.0μF | 1.5μF |
| <b>200V250V</b> | 680pF | 5.6nF | 27nF  | 100nF | 220nF | 180nF | 470nF | 1.0μF |
| <b>500V</b>     | -     | 1.5nF | 8.2nF | 33nF  | 100nF | 100nF | 270nF | 560nF |
| <b>630V</b>     |       |       | 4.7nF | 10nF  | 27nF  | 33nF  | 150nF | 330nF |
| <b>1000V</b>    |       |       | 3.3nF | 4.7nF | 15nF  | 18nF  | 56nF  | 120nF |
| <b>1200V</b>    |       |       | -     | 3.3nF | 10nF  | 10nF  | 33nF  | 82nF  |
| <b>1500V</b>    |       |       | -     | 2.7nF | 6.8nF | 6.8nF | 22nF  | 47nF  |
| <b>2000V</b>    |       |       | -     | 2.2nF | 4.7nF | 4.7nF | 10nF  | 27nF  |

Min Capacitance Tolerance  
 ±5%

## High Q, C0G/NP0 High Power RF capacitors - minimum / maximum capacitance values

A range of ultra-low loss High Q ceramic capacitors with C0G/NP0 characteristics suitable for high power applications where minimal power loss and very low self heating is demanded.

Common applications include MRI body coils and wireless charging systems operating in the kHz and MHz frequencies.

Available in chip or ribbon leaded format.

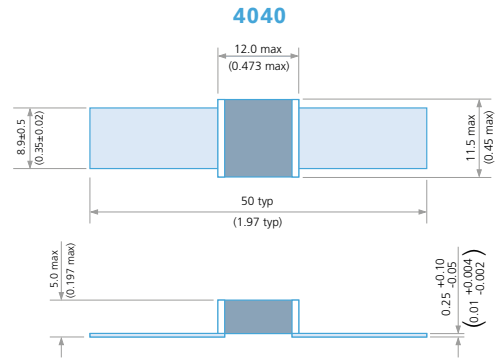
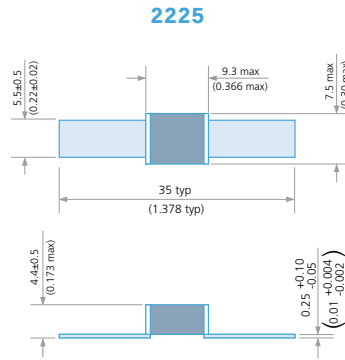
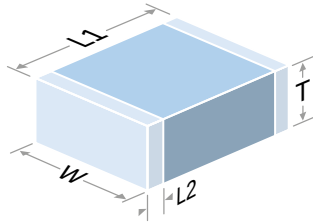
| Chip size        | Case size 25 - 2225 |           | Case size 40 - 4040 |            |
|------------------|---------------------|-----------|---------------------|------------|
|                  | Min.                | Max.      | Min.                | Max.       |
| <b>200V</b>      | 6.2nF               | 10nF      | 16nF                | 27nF       |
| <b>500V</b>      | 5.1nF               | 5.6nF     | 13nF                | 15nF       |
| <b>630V</b>      | 3.9nF               | 4.7nF     | 12nF                | 12nF       |
| <b>1kV</b>       | 1.2nF               | 3.3nF     | 5.6nF               | 10nF       |
| <b>2kV</b>       | 510pF               | 1.0nF     | 1.6nF               | 5.1nF      |
| <b>3kV</b>       | 1pF                 | 47*/470pF | 910pF               | 1.5nF      |
| <b>4kV</b>       |                     |           | 620pF               | 820pF      |
| <b>5kV</b>       |                     |           | 390pF               | 560pF      |
| <b>6kV</b>       |                     |           | 160pF               | 330pF      |
| <b>7.0/7.2kV</b> |                     |           | 1pF                 | 56**/150pF |

\*47pF max. for dual rated @2.5kVac 30MHz  
 \*\*56pF max. for dual rated @5kVac 30MHz.

# Non-Magnetic Capacitors - High Q, C0G/NP0, X7R - 16V to 7.2kV

**Surface Mount** See page 20 for dimensions

**Ribbon Leaded** Silver plated copper ribbon attached with HMP solder - (MP greater than 260°C)



## Ordering information - Syfer Non-Magnetic capacitors

| 1206      | 2                                        | 500        | 0223                                                                                                                            | J                                                                | Q                | T                             | -               | -                                 |
|-----------|------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------|-------------------------------|-----------------|-----------------------------------|
| 4040      | 2                                        | 7K0        | 0470                                                                                                                            | G                                                                | Q                | B                             | -               | AF9                               |
| 2225      | B                                        | 3K0        | 6P80                                                                                                                            | G                                                                | Q                | B                             | R               | W221                              |
| Chip size | Termination or Coating (Ribbon Leaded)   | Voltage    | Capacitance in picofarads (pF)                                                                                                  | Capacitance tolerance                                            | Dielectric       | Packing                       | Lead Options    | Suffix code                       |
| 0402*     | 2 = Sintered silver with copper barrier* | 50 = 50V   | <10pF Insert a P for the decimal point, eg 2P20 = 2.2pF.                                                                        | <4.7pF<br>H = ±0.05pF<br>B = ±0.1pF<br>C = ±0.25pF<br>D = ±0.5pF | C = C0G/NP0 (1B) | T = 178mm (7") reel           | R = Ribbon lead | W221 = Leaded                     |
| 0603      | 3 = FlexiCap™ with copper barrier.       | 100 = 100V | >10pF. 1st digit is 0. 2nd and 3rd digits are significant figures of capacitance code. The 4th digit is number of 0's following | ≥4.7pF ~ <10pF<br>B = ±0.1pF<br>C = ±0.25pF<br>D = ±0.5pF        | Q = High Q       | R = 330mm (13") reel          | Blank = SM chip | W211 = Leaded marked              |
| 0505      | 4 = Sintered silver with copper barrier* | 1K0 = 1kV  | eg. 0470 = 47pF                                                                                                                 | ≥10pF<br>F = ±1%<br>G = ±2%<br>J = ±5%<br>K = ±10%<br>M = ±20%   | X = X7R (2R1)    | B = Bulk pack - tubs or trays |                 | **AF9 = SM standard chip          |
| 0805      | 5 = FlexiCap™ base with copper barrier.  | 2K0 = 2kV  | 0512 = 5100pF                                                                                                                   |                                                                  |                  |                               |                 | **AF9LM = SM marked standard chip |
| 1206      | Ribbon Leaded                            | 3K0 = 3kV  |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 1111      | B = Uncoated                             | 4K0 = 4kV  |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 1210      | V = Coated with modified silicone laquer | 5K0 = 5kV  |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 1808      |                                          | 6K0 = 6kV  |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 1812      |                                          | 7K0 = 7kV  |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 2220      |                                          |            |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 2225†     |                                          |            |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |
| 4040†     |                                          |            |                                                                                                                                 |                                                                  |                  |                               |                 |                                   |

Note: \*0402 - C0G/NP0 and High Q only. †Ribbon Leads available. \*\*AF9 and AF9LM suffix code only available in 1111, 2225 and 4040 chip sizes.

## Ordering information - Voltronics Non-Magnetic capacitors

| 11        | 470         | J         | 1000         | W                                           | F             | R                |
|-----------|-------------|-----------|--------------|---------------------------------------------|---------------|------------------|
| Chip size | Capacitance | Tolerance | Voltage      | Termination                                 | Material      | Lead / Packaging |
| 4 0402*   | 0R1 0.1pF   | A ±0.05pF | 50 = 50V     | W = Ag/Cu/Sn                                | Q = High Q    | R = Ribbon       |
| 5 0505    | 100 10pF    | B ±0.1pF  | 100 = 100V   | S = Pd/Ag                                   | 0±30ppm/°C    | T* = Tape & Reel |
| 6 0603*   | 101 100pF   | C ±0.25pF | 1000 = 1000V | M = Poly/Cu/Sn                              | X = X7R (2R1) | B* = Bulk        |
| 8 0805*   | 102 1000pF  | D ±0.5pF  |              | 2 = Ag/Cu/Sn - (Q dielectric only)          |               |                  |
| 11 1111†  |             | F ±1%     |              | 3 = Poly/Cu/Sn - (X dielectric only)        |               |                  |
| 12 1206*  |             | G ±2%     |              | B = Silver - (Q ribbon only)                |               |                  |
| 13 1210*  |             | J ±5%     |              | V = Silver, laquer Coated - (Q ribbon only) |               |                  |
| 18 1812*  |             | K ±10%    |              |                                             |               |                  |
| 22 2220*  |             | M ±20%    |              |                                             |               |                  |
| 25 2225†  |             |           |              |                                             |               |                  |
| 38 3838†  |             |           |              |                                             |               |                  |
| 40 4040†  |             |           |              |                                             |               |                  |

Note: \*Q and X dielectric only. †Ribbon Leads available.



# Non-Magnetic Capacitors, High Power RF - Porcelain High Q

Made from highly stable, low loss dielectric formulations, these traditional porcelain MLCs are known for their high RF power handling capability. Available in all industry common case sizes. The special silver-palladium termination and the proprietary ceramic formulations guarantee consistent non-magnetic performance. All MLCs in these series are RoHS compliant. Chips are available either with standard termination or can be fitted with ribbon leads, depending on your application.

## Description

- Porcelain Capacitors • Zero TC • Low Noise • Low ESR, High Q
- High Self-resonance • Established Reliability
- Capacitance range 0.1pF to 5.1nF

## Functional Applications

- Impedance Matching • DC Blocking • Bypass • Coupling
- Tuning and Feedback



## High Power RF capacitors - F & H materials - Minimum / maximum capacitance values - see ordering information

| Chip Size | Case size 5<br>0505 |       | Case size 11<br>1111 |       | Case size 25<br>2225 |       | Case size 38<br>3838 |       |
|-----------|---------------------|-------|----------------------|-------|----------------------|-------|----------------------|-------|
|           | Min.                | Max.  | Min.                 | Max.  | Min.                 | Max.  | Min.                 | Max.  |
| 50V       | -                   | -     | 680pF                | 1nF   | -                    | -     | -                    | -     |
| 100V      | -                   | -     | 510pF                | 620pF | -                    | -     | -                    | -     |
| 200V      | 36pF                | 100pF | 220pF                | 470pF | -                    | -     | -                    | -     |
| 250V      | 0.1pF               | 33pF  | -                    | -     | -                    | -     | -                    | -     |
| 300V      | -                   | -     | -                    | -     | 2.2nF                | 2.7nF | -                    | -     |
| 500V      | -                   | -     | 110pF                | 200pF | 1.5nF                | 1.8nF | 2.7nF                | 5.1nF |
| 1kV       | -                   | -     | 0.1pF                | 100pF | 510pF                | 1.2nF | 750pF                | 2.2nF |
| 1.5kV     | -                   | -     | -                    | -     | 300pF                | 470pF | -                    | -     |
| 2kV       | -                   | -     | -                    | -     | -                    | -     | -                    | -     |
| 2.5kV     | -                   | -     | -                    | -     | 0.3pF                | 270pF | 430pF                | 680pF |
| 3.6kV     | -                   | -     | -                    | -     | -                    | -     | 110pF                | 390pF |
| 7.2kV     | -                   | -     | -                    | -     | -                    | -     | 0.3pF                | 100pF |

Note: Special capacitance values available upon request.

## Ordering information - Non-Magnetic capacitors

| 11        | 470         | J         | 1000       | W            | F                 | R          |
|-----------|-------------|-----------|------------|--------------|-------------------|------------|
| Chip size | Capacitance | Tolerance | Voltage    | Termination  | Material          | Lead       |
| 5 0505    | 0R1 0.1pF   | A ±0.05pF | 50 50V     | W Ag/Cu/Sn   | H AH +90±20ppm/°C | B = Chip   |
| 11 1111†  | 100 10pF    | B ±0.1pF  | 100 100V   | S Pd/Ag      | F CF 0±15ppm/°C   | R = Ribbon |
| 25 2225†  | 101 100pF   | C ±0.25pF | 1000 1000V | M Poly/Cu/Sn |                   |            |
| 38 3838†  | 102 1000pF  | D ±0.5pF  |            |              |                   |            |
|           |             | F ±1%     |            |              |                   |            |
|           |             | G ±2%     |            |              |                   |            |
|           |             | J ±5%     |            |              |                   |            |
|           |             | K ±10%    |            |              |                   |            |

Note: †Available in chip or ribbon lead format.

## Reeled Quantities

| Chip Size | 0402                                     | 0505 | 0603 | 0805 | 1206 | 1111<br>1210 | 1808 | 1812 | 2220 | 2225 |
|-----------|------------------------------------------|------|------|------|------|--------------|------|------|------|------|
| 7" Reel   | 10000                                    | 2500 | 4000 | 3000 | 2500 | 1000/2000    | 1500 | 500  | 500  | 500  |
| 13" Reel  | 13" reel quantities available on request |      |      |      |      |              | 6000 | 2000 | 2000 | 2000 |

Note: Other capacitance values may become available, please contact the Sales Office if you need values other than those shown in the above tables. For dimensions and soldering information, please go to our website [www.knowlescapacitors.com](http://www.knowlescapacitors.com).

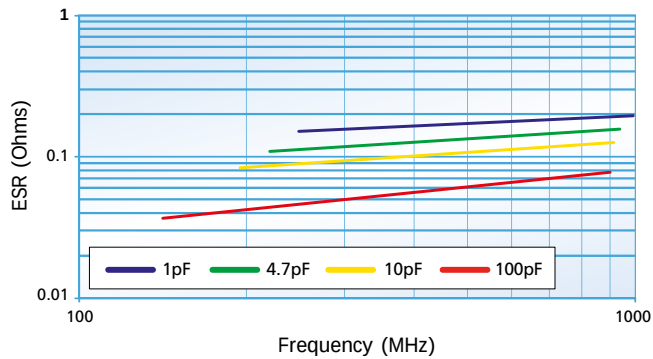
# Non-Magnetic Capacitors - High Q, X7R

Typical performance data - chip size 0805 High Q

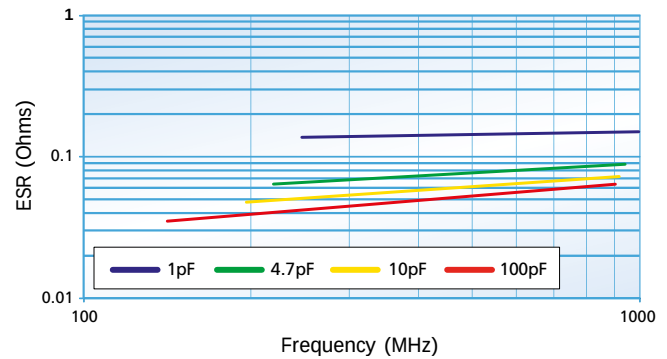
Typical performance data - chip size 1111 High Q



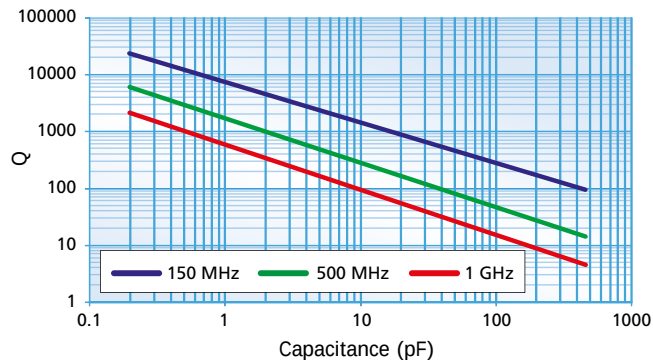
ESR vs Frequency



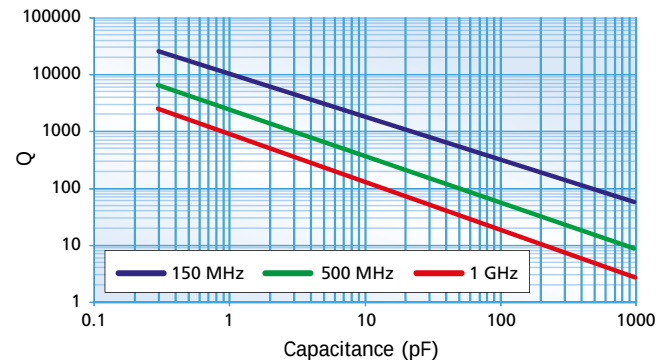
ESR vs Frequency



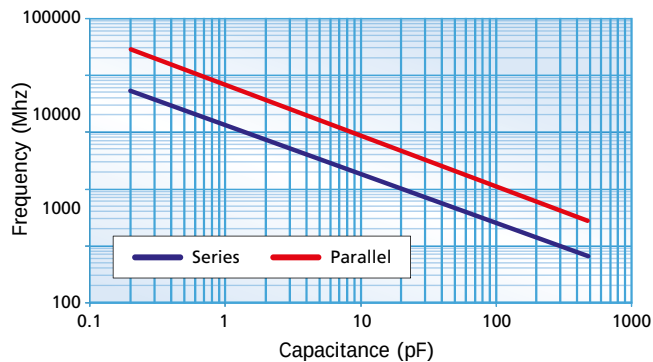
Q vs Capacitance



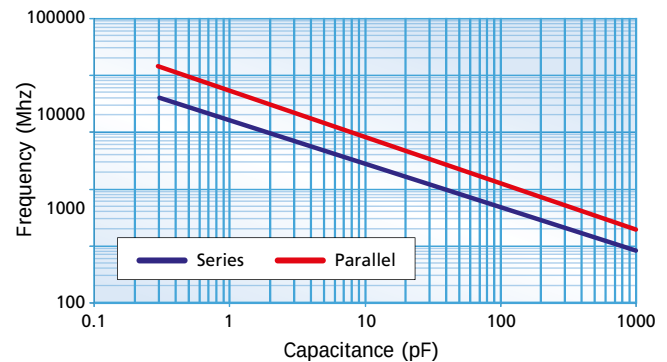
Q vs Capacitance



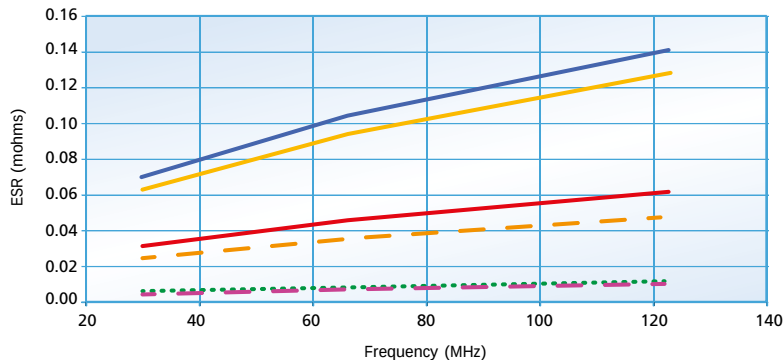
Resonant Frequency vs Capacitance



Resonant Frequency vs Capacitance



Typical ESR vs Frequency



- 4040 56pF
- 4040 18pF
- ... 2225 2.2nF
- 2225 39pF
- 2225 10pF
- 4040 5.1nF

## ESR Measurement

All ESR figures are measured using a VNA and 2m copper resonant tube and extrapolating to 30MHz by ratio. Measured data can be supplied on request. Measurement of ESR can vary with test method and components should only be compared when tested back-to-back on the same equipment under controlled conditions.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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