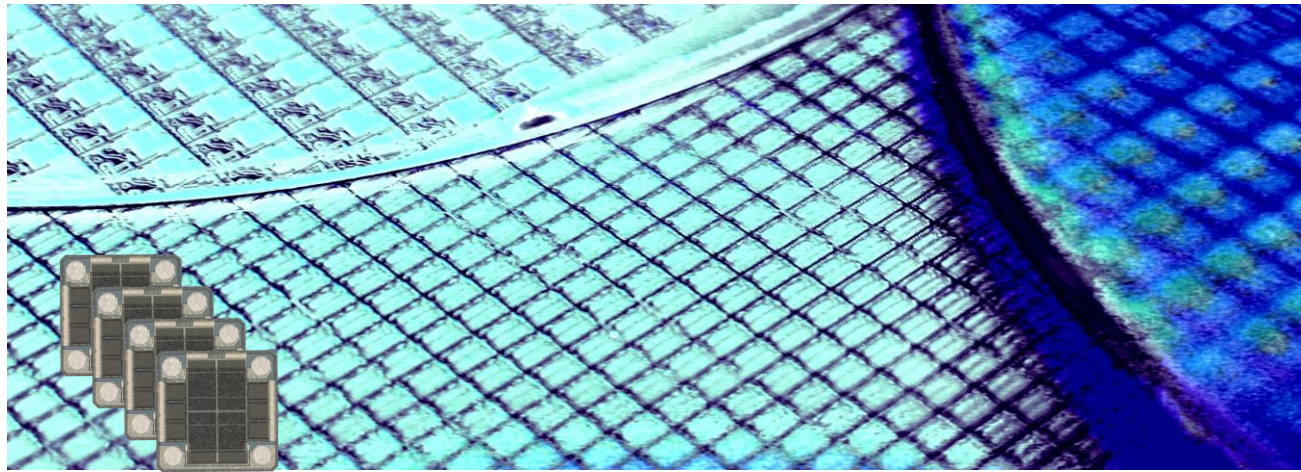


# ETSC – Embedded & Wirebond Temperature Silicon Capacitor

Rev 3.6



## Key features

- High Operating temperature ( 200°C)
- Low profile (250µm)
- High stability of capacitance value:
  - ◆ Temperature  $\pm 1\%$  (-55°C to +200°C)
  - ◆ Voltage  $< 0.1\%$ /Volts
  - ◆ Negligible capacitance loss through ageing
- Low leakage current down to 100pA
- High reliability
- Pad finishing : Aluminum

Thanks to the unique IPDiA Silicon capacitor technology, most of the problems encountered in demanding applications can be solved.

Embedded Temperature Silicon Capacitors are dedicated to applications where **reliability** up to **200°C** is the main parameter.

ETSC are the most appropriate solution for Chip On Board, Chip On Foil, Chip On Glass, Chip On Ceramic, flip chip and embedded applications.

This technology features a capacitor integration capability (up to 250nF/mm<sup>2</sup>) which offers capacitance value similar to X7R dielectric, but with better electrical performances than C0G/NP0 dielectrics, up to **200°C**.

## Key applications

- All applications up to 200°C, such as defense, downhole and automotive industries
- High reliability applications
- Replacement of X7R and C0G dielectrics
- Decoupling / Filtering / Charge pump (i.e.: motor management, temperature sensors)
- Downsizing

ETSC provides the highest capacitor **stability** over the full -55°C/+200°C temperature range in the market with a **TC<1%**.

The IPDiA technology offers industry leading performances relative to **Failure rate** with a FIT<0,017.

This technology also offers **high reliability**, up to 10 times better than alternative capacitor technologies, such as Tantalum or MLCC, and eliminates cracking phenomena.

This Silicon based technology is ROHS compliant and compatible with lead free reflow soldering process.

## Electrical specification

|      |       | Capacitance value  |                        |                                   |                                   |                                   |                                   |                                   |
|------|-------|--|------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
|      |       | 10   | 15                     | 22                                | 33                                | 39                                | 47                                | 68                                |
| Unit | 10pF  | Contact<br>IPDIA Sales   | Contact<br>IPDIA Sales | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | 390pF/0202/30V<br>935 124 72C 339 | 470pF/0202/30V<br>935 124 72C 347 | 680pF/0202/30V<br>935 124 72C 368 |
|      | 0.1nF | 1nF/0202/30V<br>935 124 72C 410  | Contact<br>IPDIA Sales | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            |
|      | 1nF   | 10nF/0202/30V<br>935 124 72C 510                                       | Contact<br>IPDIA Sales | Contact<br>IPDIA Sales            | 33nF/0404/30V<br>935 124 72F 533  | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            |
|      | 10nF  | 100nF/0404/11V<br>935 124 42F 610<br>100nF/0605/30V<br>935 124 72G 610 | Contact<br>IPDIA Sales | 220nF/0505/11V<br>935 124 42H 622 | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            | Contact<br>IPDIA Sales            |
|      | 0.1µF | 1µF/1208/11V<br>935 124 42S 710<br>1µF/1616/30V<br>935 124 72Y 710     | Contact<br>IPDIA Sales | 2.2µF/1612/11V<br>935 124 42V 722 | 3.3µF/1616/11V<br>935 124 42Y 733 | Contact<br>IPDIA Sales            | 4.7µF/2016/11V<br>935 124 42X 747 |                                   |

(\*) Other values on request

(\*\*) For extended temperature range (up to +250°C), see Embedded Xtreme Temperature Silicon Capacitor product (EXSC).

| Parameters                        | Value   |
|-----------------------------------|---|
| Capacitance range                 | 390pF to 4.7µF <sup>(*)</sup>                   |
| Capacitance tolerances            | ±15% <sup>(*)</sup>                             |
| Operating temperature range       | -55 to 200 °C <sup>(**)</sup>                   |
| Storage temperatures              | -70 to 215 °C                                   |
| Temperature coefficient           | ±1%, from -55 to +200°C                         |
| Breakdown Voltage (BV)            | 30, 11V   |
| Capacitance variation versus RVDC | 0.1 % /V (from 0 V to RVDC)                     |
| Equivalent Serial Inductor (ESL)  | Max 100 pH                                      |
| Equivalent Serial Resistor (ESR)  | Max 0.1Ω  |
| Insulation resistance             | 50GΩ min @ RVDC, 25°C<br>20GΩ min @ RVDC, 200°C |
| Aging                             | Negligible, < 0.001% / 10000h                   |
| Reliability                       | FIT<0.017 parts / billions hours                |
| Capacitor height                  | Max 250µm <sup>(*)</sup>                        |

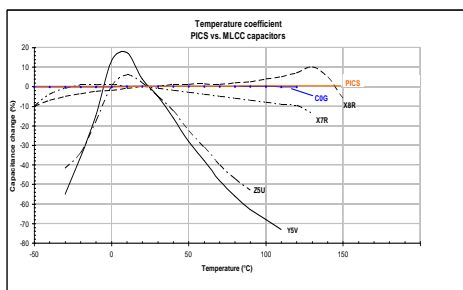


Fig.1 Capacitance change versus temperature variation compared to alternative technologies

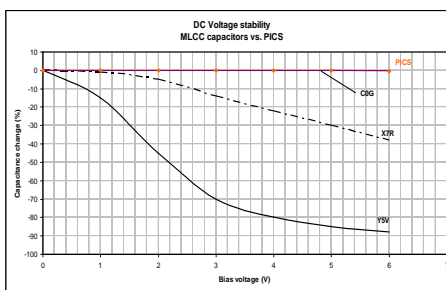


Fig.2 Capacitance change versus voltage variation compared to alternative

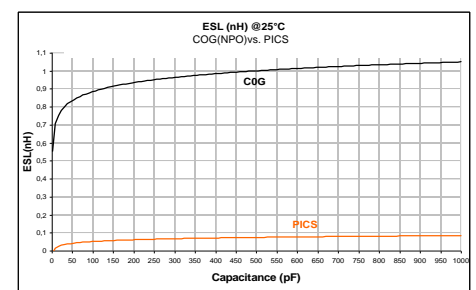


Fig.3 ESL versus capacitance value compared to alternative technologies

## Part Number

|                                   |  |  |  |   |  |
|-----------------------------------|--|--|--|---|--|
| <b>935.124.</b>                   | <b>B.2.</b>  | <b>S.</b>  | <b>U</b>   | <b>XX</b> →   | <b>Value</b>                           |
| i.e: 100nF/0404 → 935 124 42F 610 | <b>Breakdown Voltage</b><br>4 = 11V<br>1 = 20V<br>7 = 30V<br>6 = 50V | <b>Size</b><br>F = 0404 G = 0605<br>H = 0505 C = 0202<br>I = 0302 V = 1612<br>S = 1208 Y = 1616<br>V = 1216 X = 2016 | <b>Unit</b><br>0 = 10 f<br>1 = 0.1 p<br>2 = 1 p<br>3 = 10 p<br>4 = 0.1 n | 5 = 1 n<br>6 = 10 n<br>7 = 0.1 µ<br>8 = 1 µ<br>9 = 10 µ | 10<br>15<br>22<br>33<br>39<br>47<br>68 |

## Termination

Pad finishing in Aluminum (3µm thickness +/-10%)

Applicable for almost all embedded applications.

Parts should be glued with non conductive paste. If conductive glue is used on the backside of the silicon cap, it is strongly recommended to connect the backside and pads 3&4 to the same level (GND preferred).

## Pinning definition & Outline

| pin # | Symbol | Description |
|-------|--------|-------------|
| 1, 2  | Signal | Signal      |
| 3, 4  | GND    | Ground      |

| Typ.       | 0202 | 0302          | 0303          | 0404          | 0505          | 0605          | 1208          | 1612          | 1616          | 2016          |
|------------|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Comp. size | A    | 0.58<br>±0.05 | 0.80<br>±0.05 | 0.80<br>±0.05 | 1.00<br>±0.05 | 1.25<br>±0.05 | 1.50<br>±0.05 | 3.00<br>±0.05 | 4.00<br>±0.05 | 5.00<br>±0.05 |
|            | B    | 0.58<br>±0.05 | 0.64<br>±0.05 | 0.80<br>±0.05 | 1.00<br>±0.05 | 1.25<br>±0.05 | 1.25<br>±0.05 | 2.00<br>±0.05 | 3.00<br>±0.05 | 4.00<br>±0.05 |
|            | c    | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          |
|            | d    | 0.3           | 0.52          | 0.52          | 0.72          | 0.97          | 1.22          | 2.72          | 3.72          | 4.72          |
|            | e    | 0.3           | 0.36          | 0.52          | 0.72          | 0.97          | 1.22          | 1.72          | 2.72          | 3.72          |

## Packaging

Tape and reel, tray, waffle pack or wafer delivery.

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