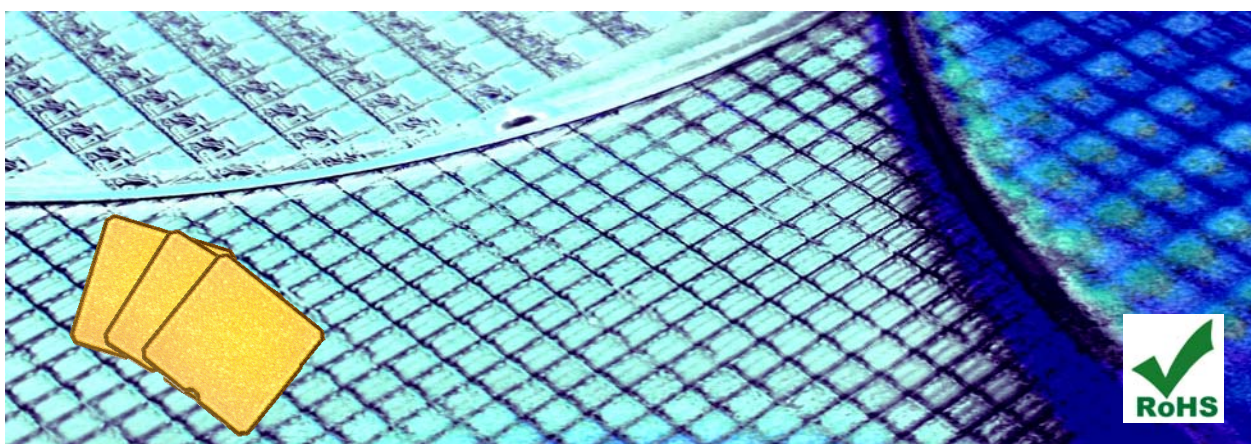




# UWSC – Ultra large-band Wire bonding Silicon Capacitor – Wire Bondable Vertical

Rev 1.5



## Key Features

- Ultra largeband performance up to 26 GHz
- Resonance free
- Phase stability
- Unique capacitance value of 1nF in 0101
- Ultra high stability of capacitance value
  - Temperature  $< \pm 0.5\%$  (-55°C to +150°C)
  - Voltage  $< 0.02\%$ /V
  - Negligible aging  $< 0.001\%$ /1000 hours
- Ultra low ESR and ESL
- High reliability (FIT  $< 0.017$  parts/billion hours)
- Compatible with standard wire bonding assembly (ball and wedge)\*

\* Please refer to our Assembly Application Note for more details

## Key Applications

- Optoelectronics/high-speed data
- Trans-Impedance Amplifiers (TIA)
- Receive-and-Transmit Optical Sub-Assembly (ROSA/TOSA)
- Synchronous Optical Networking (SONET)
- High speed digital logic
- Broadband test equipment
- Broadband microwave/millimeter wave
- Replacement of X7R and NP0
- Low profile applications (250  $\mu\text{m}$ , 100  $\mu\text{m}$  on request)

UWSC Capacitors target **optical communication systems** (ROSA/TOSA, SONET and all optoelectronics) as well as **high speed data systems** or products. The UWSC are designed for DC decoupling and bypass applications. The unique technology of integrated passive devices in silicon developed by IPDiA, offers **high rejection up to 26GHz**. The UWSC capacitors are manufactured with both deep trench and MOS semiconductor processes to cover low and high capacitance requirements.

The UWSC capacitors provide **very high reliability** and capacitance stability over temperature ( $\pm 0.5\%$ ) and voltage. They have an extended operating temperature range from -55 to 150°C. **Reliable and repeatable performances** are obtained thanks to a fully controlled production line with high temperature curing (above 900°C) generating a highly pure oxide. These capacitors are compatible with standard wire bonding assembly (ball and wedge). They are RoHS-compliant and are available with thick gold terminations.

## Electrical Specifications

| Part number     | Product description                                                                                    | Case Size | Thickness |
|-----------------|--------------------------------------------------------------------------------------------------------|-----------|-----------|
| UWSC.xxx        | Ultra largeband Wire bondable vertical Silicon Capacitor, from -55 to 150°C, 26GHz with Au termination |           |           |
| 935 153 622 410 | Ultra largeband Wire bondable vertical Si Cap 1nF, BV>50V                                              | 0101      | 250µm     |
| 935 153 620 510 | Ultra largeband Wire bondable vertical Si Cap 10nF, BV>50V                                             | 0303      | 250µm     |
| 935 153 624 522 | Ultra largeband Wire bondable vertical Si Cap 22nF, BV>50V                                             | 0504      | 250µm     |
| 935 153 821 510 | Ultra largeband Wire bondable vertical Si Cap 10nF, BV>30V                                             | 0202      | 250µm     |
| 935 154 622 410 | Ultra largeband low profile Wire bondable vertical Si Cap 1 nF, BV>50V                                 | 0101      | 100µm     |
| 935 154 620 510 | Ultra largeband low profile Wire bondable vertical Si Cap 10nF, BV>50V                                 | 0303      | 100µm     |
| 935 154 821 510 | Ultra largeband low profile Wire bondable vertical Si Cap 10nF, BV>30V                                 | 0202      | 100µm     |

| Parameters                         | Value                                 |
|------------------------------------|---------------------------------------|
| Capacitance range                  | 10pF to 100 nF <sup>(1)</sup>         |
| Capacitance tolerance              | ± 15 % <sup>(2)</sup>                 |
| Operating temperature range        | -55 °C to 150 °C                      |
| Storage temperature                | - 70 °C to 165 °C                     |
| Temperature coefficient            | <±0.5 %, from -55 °C to +150 °C       |
| Breakdown voltage (BV)             | 11, 30, 50, 150, 450 V <sup>(3)</sup> |
| Capacitance variation versus RVDC  | 0.02 %/V (from 0 V to RVDC)           |
| Equivalent Serial Inductance (ESL) | typ 6 pH <sup>(4)</sup> @SRF          |
| Equivalent Serial Resistance (ESR) | typ. 14 mΩ <sup>(4)</sup>             |
| Insulation resistance              | 100 GΩ min @ RVDC & +25°C             |
| Aging                              | Negligible, < 0.001 % / 1000h         |
| Reliability                        | FIT<0.017 parts / billion hours,      |
| Capacitor height                   | Max 250 µm or 100 µm                  |

(\*\*) Other values on request

(\*\*\*) e.g. 10nF/0303/BV 50V

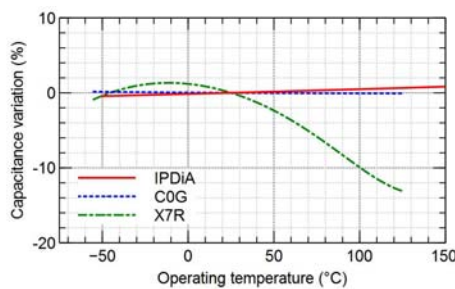


Fig.1: Capacitance variation vs temperature (for UWSC and MLCC technologies)

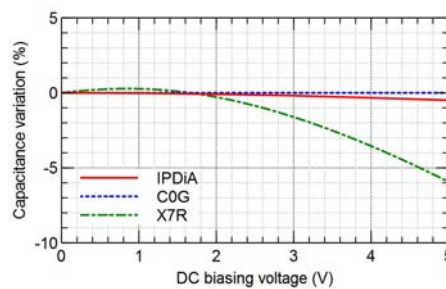


Fig.2: Capacitance variation vs DC biasing voltage (for UWSC and MLCC technologies)

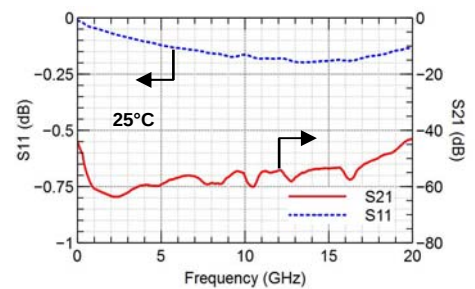
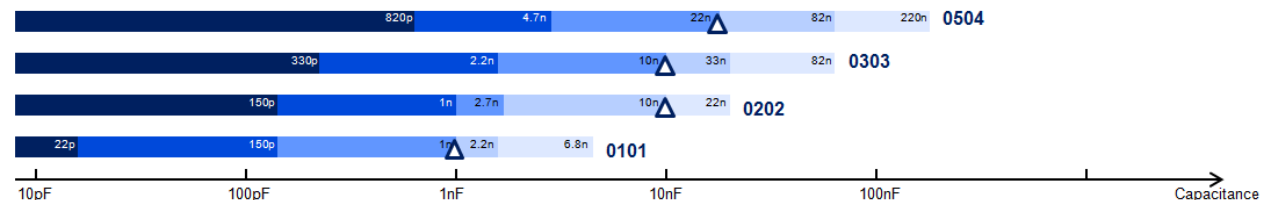


Fig.3: 10 nF/0303 UWSC measurement results (S-parameters in shunt mode)

## UWSC Capacitance Range



Δ Available parts – see table above

For other values, contact your IPDiA sales representative

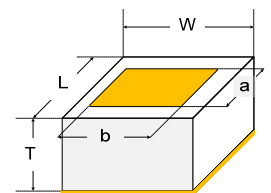
## Termination and Outline

### Termination

Can be directly mounted on the PCB using die bonding and wire bonding. Bottom electrode in Ti/Ni/Au and top electrode in Ti/Cu/Ni/Au. Other top finishings available on request (ex: 3µm Al/Si/Cu). Compatible with standard wire bonding assembly (ball and wedge).

### Package Outline

| (mm) | Pad dimension |       | Case size (typ. ±0.01mm) |                     |                                               |
|------|---------------|-------|--------------------------|---------------------|-----------------------------------------------|
|      | a             | b     | L                        | W                   | T                                             |
| 0101 | >0.15         | >0.15 | 0.25 <sup>(1)</sup>      | 0.25 <sup>(1)</sup> | 0.25 (standard profile) or 0.10 (low profile) |
| 0201 | >0.40         | >0.15 | 0.50                     | 0.25                |                                               |
| 0202 | >0.40         | >0.40 | 0.50                     | 0.50                |                                               |
| 0303 | >0.70         | >0.70 | 0.80                     | 0.80                |                                               |
| 0404 | >0.94         | >0.94 | 1.04                     | 1.04                |                                               |
| 0503 | >1.17         | >0.72 | 1.27                     | 0.82                |                                               |
| 0504 | >1.28         | >0.92 | 1.38                     | 1.02                |                                               |



## Packing

Tape and reel, wafer pack, film frame carrier or raw wafer delivery.

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- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
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