

# WBSC / WTSC / WXSC

Wire-bondable vertical Si Capacitors up to 250°C



Rev 2.2

## Key features

- Low profile 250  $\mu\text{m}$ .
- Low leakage current.
- High stability (temperature and voltage).
- Negligible capacitance loss through aging.
- Compatible with standard wire bonding assembly (ball and wedge).

(please refer to our Assembly Application Note for more details)

## Key applications

- Any demanding applications such as radar, lidar, aerospace, wireless infrastructure communication, data broadcasting, automotive (e.g: Lidar)
- Applicable for standard wire bonding approach (ball and wedge), thanks to a perfect pad flatness.
- Decoupling / DC noise and harmonic filtering / Matching networks (e.g: GaN power amplifier, LDMOS).
- High reliability applications.
- Downsizing.
- Low profile applications (250  $\mu\text{m}$ ).

The WBSC / WTSC / WXSC Capacitors are dedicated to applications where **reliability up to 250°C** (for WXSC) is the main parameter. They are suitable for **DC decoupling**. The unique technology of integrated passive devices in silicon developed by Murata Integrated Passive Solutions can **solve most of the problems encountered** in demanding applications. These Si capacitors in **ultra-deep trenches** have been developed with a semiconductor process which enables the integration of **high capacitance** density from 1.55 nF/mm<sup>2</sup> to 250 nF/mm<sup>2</sup> (with a breakdown voltage of respectively **450 V** to 11 V).

Our SiCap technology features **high reliability** - up to 10 times better than alternative capacitors technologies - thanks to a full control of the production process with **high temperature** curing (above 900°C) generating a highly pure oxide. This technology provides industry leading performances relative to the **capacitor stability** up to 250°C for WXSC, up to 200°C for WTSC and up to 150°C for WBSC with a **temperature coefficient equals to +60 ppm/K**. In addition, intrinsic properties of the silicon show a low dielectric absorption and a low to zero piezo electric effect resulting **in no memory effect**. This Silicon based technology is ROHS compliant.



## Electrical specifications

WBSC.xxx	Wire-bondable vertical Si Capacitors from -55°C to 150°C			
Part number	Capacitance	BV	Case size	Thickness
935142521310-xxT	100 pF	150 V	0202	250 μm
935142521410-xxT	1 nF	150 V	0202	250 μm
935142831510-xxT	10 nF	30 V	0202	250 μm
935142630510-xxT	10 nF	50 V	0303	250 μm
935142634522-xxT	22 nF	50 V	0504	250 μm

WTSC.xxx	High temperature Wire-bondable vertical Si Capacitors from -55°C to 200°C			
Part number	Capacitance	BV	Case size	Thickness
935144521310-xxA	100 pF	150 V	0202	250 μm
935144521410-xxA	1 nF	150 V	0202	250 μm

WXSC.xxx	Extreme temperature Wire-bondable vertical Si Capacitors from -55°C to 250°C			
Part number	Capacitance	BV	Case size	Thickness
935145521310-xxA	100 pF	150 V	0202	250 μm
935145521410-xxA	1 nF	150 V	0202	250 μm

Parameter	Value
Capacitance range	100 pF to 22 nF(*)
Capacitance tolerances	±15 % (*)
Operating temperature range	-55 °C to 250°C for WXSC
Storage temperature range	-70°C to 265°C(**) for WXSC
Temperature coefficient	+60 ppm/K
Breakdown Voltage (BV)	11 V, 30 V, 50 V, 100 V, 150 V, 450 V(*)
Capacitance variation versus RVDC	0.02 %/V (from 0 to RVDC)
Equivalent Series Inductance (ESL)	Typ. 50 pH @ SRF (***)
Equivalent Series Resistance (ESR)	Typ. 50 mΩ (***)
Insulation resistance	10 GΩ @ RVDC @ 25°C t>120s for 10 nF
Ageing	Negligible, < 0.001 % / 1000 h
Reliability	FIT<0.017 parts / billions hours
Capacitor thickness	250 μm

(\*) Other values on request (\*\*) w/o packing

(\*\*\*) with wire-bonding de-embedded

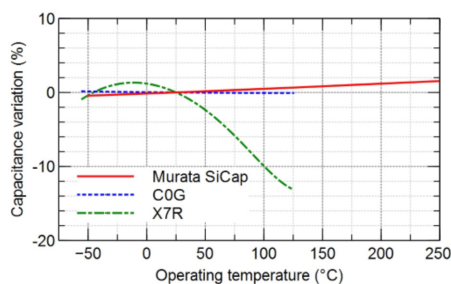


Fig. 1: Capacitance variation vs temperature  
(for WXSC and MLCC technologies)

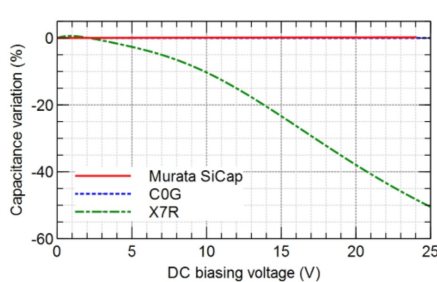


Fig. 2: Capacitance variation vs DC biasing voltage  
@ BV30 (for WXSC and MLCC technologies)

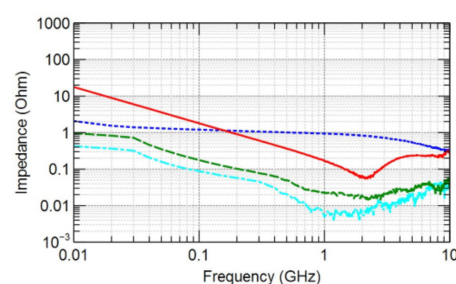
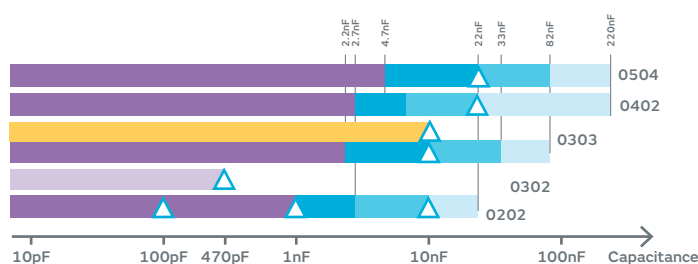


Fig. 3: Various WXSC measurement results  
(Impedances in shunt mode)  
with capacitance value from 100pF to 22nF

## Capacitance range



△ Available parts.  
For other values, contact your Murata sales representative.

0202 - 10nF - BV30 available as WBSC only.

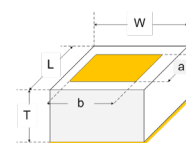
BV 50V	BV 11V	BV 450V
BV 150V	BV 30V	BV 100V

## Termination

Can be directly mounted on the PCB using die bonding and wire bonding(s). Bottom electrode is in Ti/Ni/Au and top electrode in Gold (TiWAu) for WBSC and in Aluminum for WTSC/WXSC. Other top finishings available on request. Compatible with standard wire bonding assembly (ball and wedge).

## Package Outline

	Pad dimension mm		Case size mm (typ ±0.02 mm)		
	a	b	L	W	T
0202	>0.40	>0.40	0.50	0.50	0.25
0302	>0.7	>0.4	0.8	0.5	
0303	>0.70	>0.70	0.80	0.80	
0402	>0.9	>0.4	1.00	0.50	
0504	>1.15	>0.9	1.25	1.00	



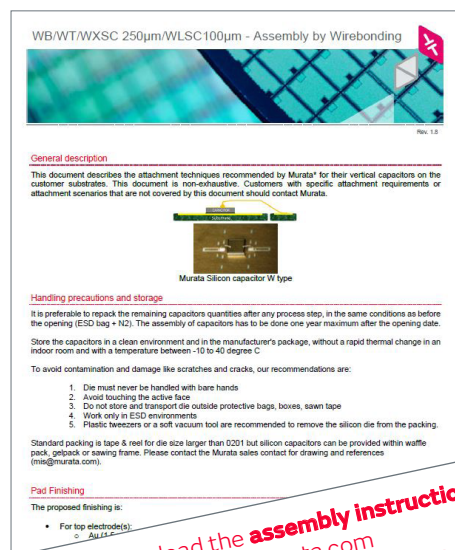


## Packaging

Tape & reel (up to 0202 case size included), waffle pack, film frame carrier or raw wafer delivery.

## Assembly by Soldering

The attachment techniques recommended by Murata for the WBSC/WTSC/WXSC capacitors on the customers substrates are fully detailed in specific documents available on our website. To assure the correct use and proper functioning of Murata Silicon capacitors **please download the assembly instructions on [www.murata.com](http://www.murata.com) and read them carefully.**



Please download the **assembly instructions**  
on [www.murata.com](http://www.murata.com)  
and **read them carefully before use.**  
在使用MURATA电容之前请从  
[www.murata.com](http://www.murata.com)  
网站上下载电容安装说明并仔细阅读

For the assembly instructions, please go to :  
<https://www.murata.com/> and follow the sections :  
Products > Capacitor > Silicon Capacitor > WBSC / WTSC  
/ WXSC

Download the pdf file called **"Assembly Note WBSC /  
WTSC / WXSC / WLSC\_V1.8\_Murata "**

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