

WBSC / WTSC / WXSC

Wire-bondable vertical Si Capacitors up to 250°C



Rev 2.3

Key features

- Low profile 250 µm.
- 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 µm).

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/mm² to 250 nF/mm² (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.



WBSC electrical specifications

Part number	Capacitance	BV	Case size	Thickness
935142521310-xxT	100 pF	150 V	0202	250 μm
935142045347-xxT	470 pF	450 V	0302	250 μm
935142521410-xxT	1 nF	150 V	0202	250 μm
935242520427-xxT	2.7 nF	150 V	0205	250 μm
935242521437-xxT	3.7 nF	150 V	02065	250 μm
935242522447-xxT	4.7 nF	150 V	0208	250 μm
935142831510-xxT	10 nF	30 V	0202	250 μm
935142630510-xxT	10 nF	50 V	0303	250 μm
935142050510-xxT	10 nF	100 V	0303	250 μm
935142837522-xxT	22 nF	30 V	0402	250 μm
935142634522-xxT	22 nF	50 V	0504	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

WTSC electrical specifications

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 electrical specifications

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

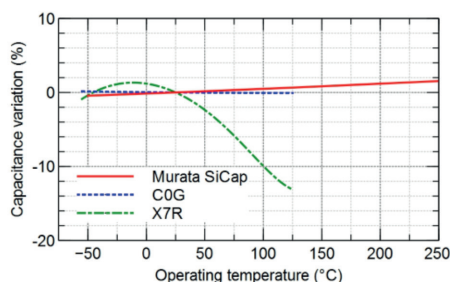


Fig. 1: Capacitance variation vs temperature (for WXSC and MLCC technologies)

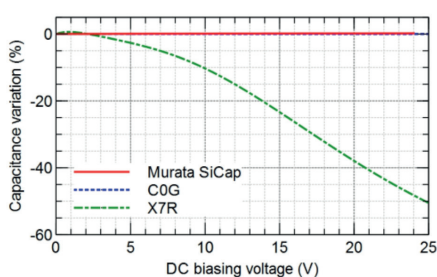


Fig. 2: Capacitance variation vs DC biasing voltage @ BV30 (for WXSC and MLCC technologies)

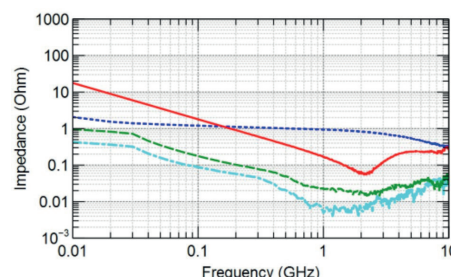
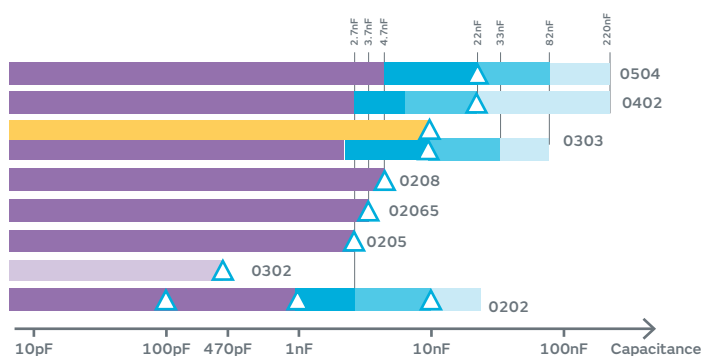


Fig. 3: Various WXSC measurement results (Impedances in shunt mode) with capacitance value from 100pF to 22nF

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

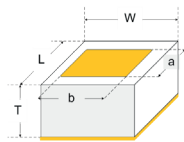
Termination

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	
0205	0.39	1.09	0.5	1.25	
02065	0.39	1.52	0.5	1.63	
0208	0.39	1.90	0.5	2	

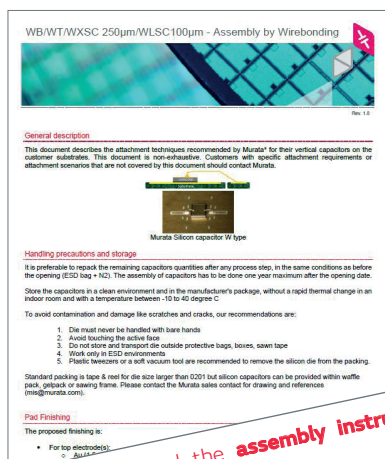


Packaging

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 and read them carefully.**



Please download the **assembly instructions** on www.murata.com and read them carefully before use.
 在使用MURATA电容之前请从 www.murata.com

For the assembly instructions, please go to :

www.murata.com/ and follow the sections :

- Products
- Capacitor
- Silicon Capacitor
- WBSC/WTSC/WXSC/WLSC Series

Download the pdf file called :

'Assembly Note WBSC / WTSC / WXSC / WLSC'

Scan us, and visit our official Website to get more details :



https://www.murata.com/en-eu/products/capacitor/siliconcapacitors/wbwc_wtsc_wxsc

Application Notes references

For the application instructions, please refer to our documents:

- Storage and Shelf Life Conditions
- Recommendation to handle bare dies
- Nozzle recommendation

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