Wire bonding vertical SiCap 4.7nF 0,5x2mm

Rev. 3.0

General description

Market: The aim of this document is to give a description of Murata Integrated Passive Solutions' Wire Bonding Silicon vertical Capacitor (WBSC/WLSC) characteristics for Chip On Board (COB) assembly solutions.

The WBS/WLS Capacitor targets power supplies decoupling and filtering of active devices. This version is a single 4.7nF capacitor in 0.5 x 2mm package size. Other capacitance values and other package size are available as a single die or capacitor array; please feel free to contact us.

The WBS/WLS Capacitor is based on PICS Integrated Passive technology.

Standard PCB FR4 can be used.

Assembly: WBSC/WLSC capacitors are directly mounted on the PCB application using die bonding and wire bonding.

WBSC/WLSC capacitors have the bottom electrode in Ti (0.1 µm)/Ni (0.3µm)/Au (0.2µm) and top electrode in gold, other top finishing are available on request such as Aluminum.

Key features

- Full compatible Monolithic ceramic capacitors for replacement
- Ultra-high stability of capacitance value:
  - Temperature 70 ppm/K (-55 °C to +150 °C)
  - Voltage <0.02%/Volts
  - Negligible capacitance loss through ageing
- Low profile 0.1mm+/-0.010mm (standard) or 0.25mm, but other thicknesses possible on request.
- Small size 0.5 x 2mm +/-0.02mm
- Break down voltage 150V
- Low leakage current
- High reliability
- High operating temperature (up to 150 °C)
- Compatible with high temperature cycling during manufacturing operations (exceeding 300 °C)
- Applicable for standard wire bonding assembly (ball and wedge)

Key applications

- Any demanding applications, such as medical, aerospace, automotive industrial…
- Supply decoupling / filtering of active device
- High reliability applications
- Devices with battery operations
- High temperature applications
- Volume limited applications

Functional diagram

The next figure provides implementation set-up diagram.

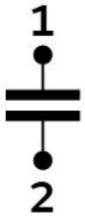

Figure 1 Block Diagram

Electrical performances

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C	Capacitance value	@+25°C	-	4.7	-	nF
ΔC_P	Capacitance tolerance (1)	@+25°C	-15	-	+15	%
T_{OP}	Operating temperature		-55	20	150	°C
T_{STG}	Storage temperature (2)		-70	-	165	°C
ΔC_T	Capacitance temperature variation	-55 °C to 150 °C	-	70	-	ppm/K
RV_{DC}	Rated voltage (3)		-			V_{DC}
BV	Break down voltage	@+25°C	150	-	-	V
ΔC_{RVDC}	Capacitance voltage variation	From 0 V to RV_{DC}, @+25°C	-	-	0.02	$\%/V_{DC}$
IR	Insulation resistor	@RV_{DC}, +25°C, 120s	-	tbd	-	GΩ
ESL	Equivalent Serial Inductance	@+25°C, SRF shunt mode	-	20	-	pH
ESR	Equivalent Serial Resistance	@+25°C, shunt mode	-	30	-	mOhm

Table 1 - Electrical performances

(1): other tolerance available upon request
(2): without packaging
(3): Lifetime is voltage and temperature dependent, please refer to application note 'Lifetime of 3D capacitors'
(4): 10 years of intrinsic life time prediction at 100°C continuous operation
(5): 10 years of intrinsic life time prediction at 150°C continuous operation

For extended frequency range (up to 26GHz), see Ultra large band Wire bonding vertical Silicon Capacitor (WBSC/WLSC).

Pinning definition

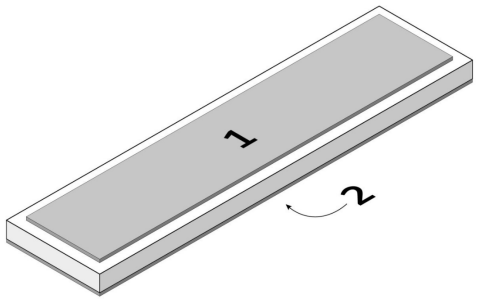

Figure 2 Pin Configuration

pin #	Symbol (optional)	Coordinates X / Y
1	Signal	0.0 / 0.0
2	GND	Backside

Table 2 - Pining description. Reference (0,0) located at the centre of the die.

Ordering Information for WBSC/WLSC .447

'Regardless of packaging, Murata Integrated Passive Devices delivers products with AQL level II (0.65).

Type number (15NC)	Package		
	Packaging	Finishing	Description
935242522447-F1T	6” FFC	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.25mm
935242522447-F2T	8” FFC	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.25mm
935242522447-T3T	T&R 1Kunits(3)	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.25mm
935246522447-F1T	6” FFC	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.10mm
935246522447-F2T	8” FFC	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.10mm
935246522447-T3T	T&R 1Kunits(3)	Au(1)	4.7nF BV150 – 1 bondpad – 0.5 x 2mm x 0.10mm

(1) Au = TiW (0.3µm) / Au (3µm)
(2) Al = Aluminum
(3) missing capacitors can reach 0.5%

Table 3 - Packaging and ordering information

Product Name	Die Name	Description
WBSC.447	WO02084471A	WBSC 4.7nF/BV>150V – 1 bondpad – 0.5 x 2mm x 0.25mm
WLSC.447	WO02084471A	WLSC 4.7nF/BV>150V – 1 bondpad – 0.5 x 2mm x 0.10mm

Table 4 - Die information

Pad Metallization

The WBSC/WLSC Capacitor is delivered as standard with the bottom electrode in TiNiAu and top electrode in TiWAu.

Other Metallization, such as thick Gold or Aluminum top pads are possible on request.

WBSC/WLSC capacitors are directly mounted on the PCB application using die bonding and wire bonding.

It is applicable for standard wire bonding assembly (ball and wedge).

Silicon dies are not sensitive to humidity, please refer to applications notes ‘Assembly Notes’ section ‘Handling precautions and storage’.

For further information, please see our mounting application note.

Material regulation

This product is RoHS compliant.

Package outline

The product is delivered as a naked silicon die, with passivation opening for contacts.

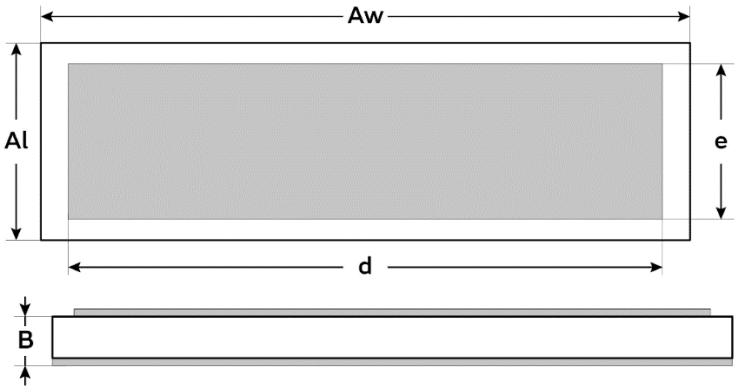

Figure 3 - Package outline 4.7nF Capacitor

Al (mm)	Aw (mm)	B (mm)	d (mm)	e (mm)
0.50 ±0.02	2 ±0.02	0.25 or 0.10 ±0.01	1.894	0.394

Table 5 - Dimensions and tolerances

Assembly

The attachment techniques recommended by Murata on the customer's substrates are fully detailed in specific documents available on our website. To assure the correct use and proper functioning of Murata capacitors **please download the assembly instructions on https://www.murata.com/en-us/products/capacitor/siliconcapacitors and read them carefully.**

Figure 4 Scan this QR Code to access the Murata Silicon Capacitor web page

Packaging format

Please refer to application note 'Products Storage Conditions and Shelf Life'.

Tape and Reel:

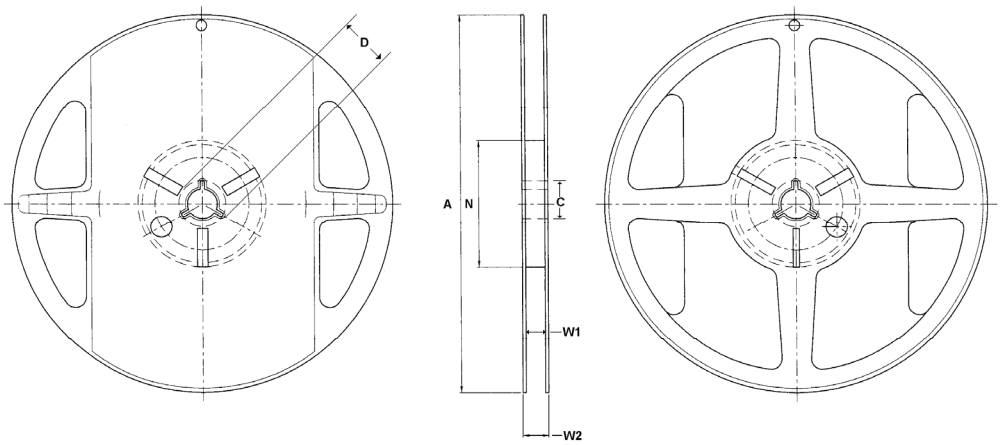

Figure 5 - Reel drawing

Tape Width	Diameter A	C	D	Hub N	W1	W2
8	178 (7 inches)	13.5	20.2	60	9	11.5

Table 6 – Reel dimensions (mm)

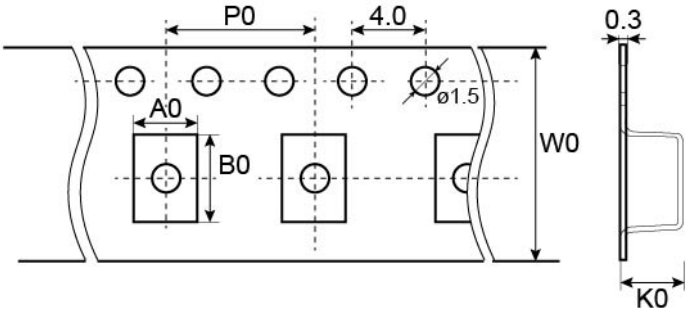

Figure 6 - Tape drawing

Cavity dimensions			Carrier tape width W0	Carrier tape pitch P0
Ao	Bo	Ko		
0.6	2.1	0.34(1) 0.2(2)	8	2

Table 7 - Tape dimensions (mm)

(1): for 0.25mm thickness products

(2): for 0.1mm thickness products

Film frame carrier:

With UV curable dicing tape (UV performed).

Good dies are identified using electronic mapping format. No ink is added on wafer to label other dies.

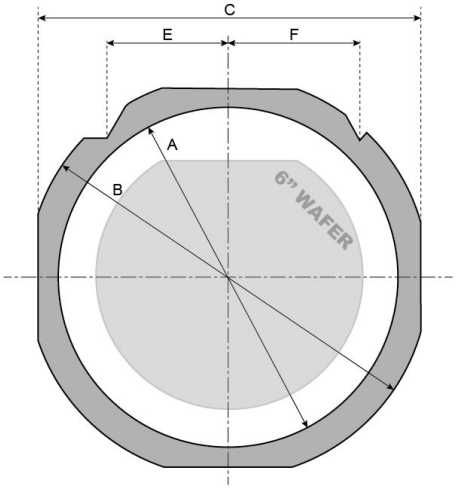

Figure 7 FF070 Frame with a 6" wafer

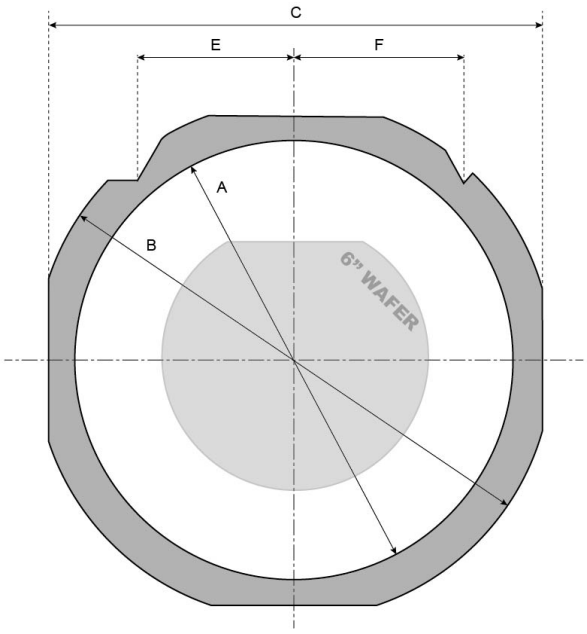

Figure 8 FF108 Frame with a 6" wafer

Frame Reference	Frame Style	Inside diameter A	Outside diameter B	Width C	Thickness	Pin location E	Pin location F
FF070 (1)	DTF-2-6-1	7.638”	8.976”	8.346”	0.048’’	2.370”	2.5’’
FF108 (1)	DTF-2-8-1	9.842”	11.653”	10.866”	0.048”	2.381”	2.5’’

Table 8 - Frame dimensions (inches)

(1) or equivalent

Definitions

Data sheet status

Objective specification: This data sheet contains target or goal specifications for product development.

Preliminary specification: This data sheet contains preliminary data; supplementary data may be published later.

Product specification: This data sheet contains final product specifications.

Limiting values

Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those given in the Electrical performances sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Where application information is given, it is advisory and does not form part of the specification.

Revision history

Revision	Date	Description	Author.
Release 1.0	**2019 January 09th**	**Objective specification**	**LLE**
Release 1.4	**2019 september 12th**	**Objective specification**	**LLE**
Release 3.0	**2021 january 6th**	**Product specification**	**LLE**

Disclaimer / Life support applications

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