Embedded and Wire bondable SiCap EMSC 0404 100nF BV11

Rev. 3.03

General description

The aim of this document is to give a description of Murata Integrated Passive Solutions' Wire Bondable Silicon Capacitor (EMSC) characteristics for Chip On Board (COB) assembly solutions.

The EMS Capacitor targets power supplies decoupling and filtering of active devices. This is a single 100nF capacitor in 0404 package size.

EMS Capacitors are based on PICS Integrated Passive technology, they are directly mounted on the PCB application using wire bonding. EMS capacitors have bonding pads in Aluminum.

EMS capacitors are also suitable for Embedding technology.

Standard PCB FR4 can be used.

Pad finishing: Aluminum, other finishing available on request such as copper or gold.

Other capacitance values and other package size are available as a single die or capacitor array, please feel free to contact us

PRODUCT

Key features

- High temperature stability (up to 150°C)
- Low profile (100µm)
- Ultra high stability of capacitance value:
  - Temperature ±0.5% (-55°C to +150°C)
  - Voltage <0.1%/Volts
  - Negligible capacitance loss through ageing
- Small size 1.07x 1.07mm (0404)
- Low leakage current <100pA
- High reliability
- Compatible with high temperature cycling during manufacturing operations (exceeding 300°C)
- Applicable for embedded and wire bonding application

Key applications

- Any demanding applications, such as medical, aerospace, 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 of the capacitor (4 connections):

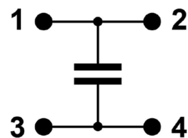

Figure 1 – 100nF EMS capacitor block diagram

Electrical performances

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C	Capacitance value	@+25°C	-	100	-	nF
ΔC_P	Capacitance tolerance (1)	@+25°C	-15	-	+15	%
T_{OP}	Operating temperature		-55	-	+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)		-		3.6 (4)	V_{DC}
BV	Breakdown voltage	@+25°C	11	-	-	V_{DC}
ΔC_{RVDC}	Capacitance voltage variation	From 0V to RV_{DC}	-	-	0.1	%/V_{DC}
IR	Insulation resistance	@ 3V, +22°C, 120s	50	-	-	GΩ
ESR	Equivalent Series Resistance	@+22°C, shunt mode	-	250	-	mΩ
ESL	Equivalent Series Inductance	@+22°C, SRF shunt mode	-	100	-	pH

Table 1 – 100nF EMS capacitor 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*

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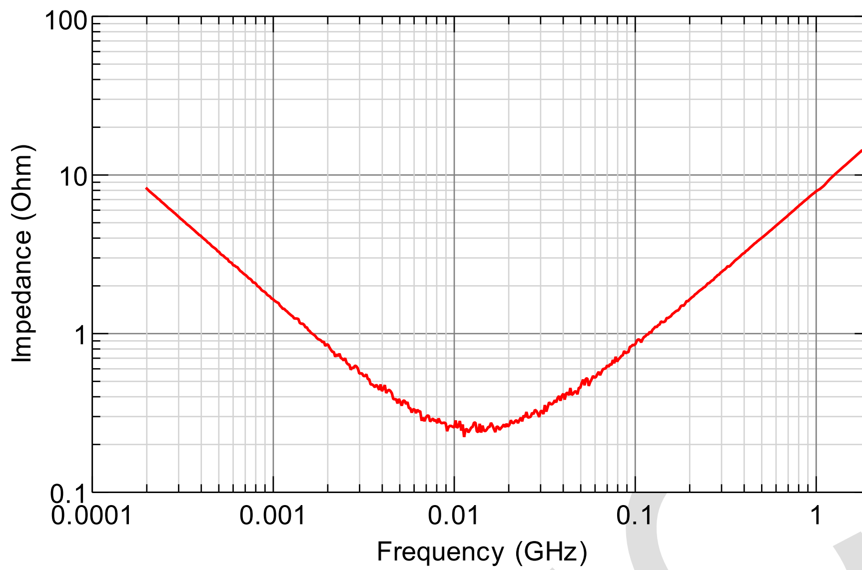

Figure 2 - Decoupling (shunt mode) impedance

Pinning definition

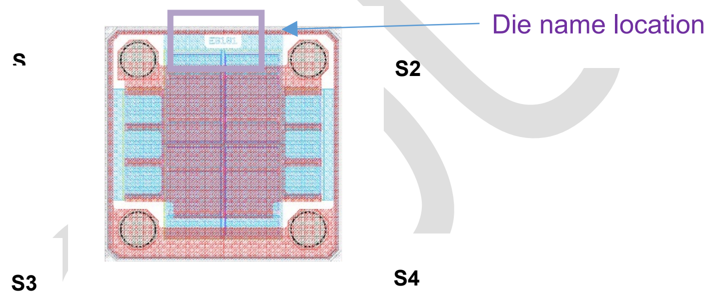

Figure 3- Pin configuration

pin #	Symbol	Coordinates X / Y (mm)
1	Signal 1	-0.36 / 0.36
2	Signal 1	0.36 / 0.36
3	Signal 2	0.36 / -0.36
4	Signal 2	0.36 / -0.36

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

Parts should be glued with non-conductive paste.If conductive glue is used on the backside of the silicon cap, it's strongly recommended to avoidto connect the backside to electrical signal.If backside is connected to electrical signal, this signal will absolutely be the same as pads 3-4.

Ordering Information for product EMSC 0404 100nF BV11

PRODUCT

Type number	Package		
	Packaging	Finishing	Description
935123421610–F1A	6'' FFC(1)	Alu(2)	EMSC / 0404 / 100nF(3) / FF070 / Alu pads
935123421610–F2A	8'' FFC(1)	Alu(2)	EMSC / 0404 / 100nF(3) / FF108 / Alu pads
935123421610–T3A	7'' T&R (4)	Alu(2)	EMSC / 0404 / 100nF(3) / Tape & Reel of 1k pcs / Alu pads

Table 3 - Packaging and ordering information

(1) Other film frame carrier are possible on request
(2) Aluminium 3µm
(3) Refer to Figure7
(4) missing capacitors can reach 0.5%

Product Name	Die Name	Description
935123421610	E0404610	Embedding Low Profile Silicon Capacitor 100nF, -55/+150°C, 0404, 1.07 x 1.07mm,Thickness : 100µm, BV: 11V

Table 4 - Die information

Pad Metallization

Pad finishing in Aluminum (3µm thickness +/- 10%), other finishing available on request such as copper, nickel or gold.
Silicon dies are not sensitive to humidity, please refer to applications notes 'Assembly Notes' section 'Handling precautions and storage'.

Material regulation

This product is RoHS compliant at the time of publication. For further information about regulation compliancy, please ask your sales representative.

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Package outline

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

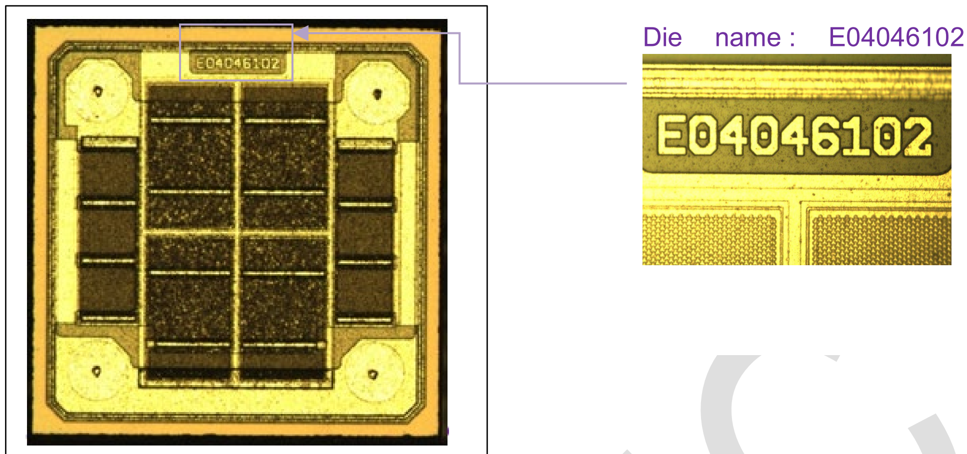

Figure 4 – Die Micro photography

A (mm)	B (mm)	T (mm)	c (mm)	d (mm)	e (mm)
1.07 ±0.02	1.07 ±0.02	0.10 ±0.02	0.15	0.72	0.72

Table 5 - Dimensions and tolerances

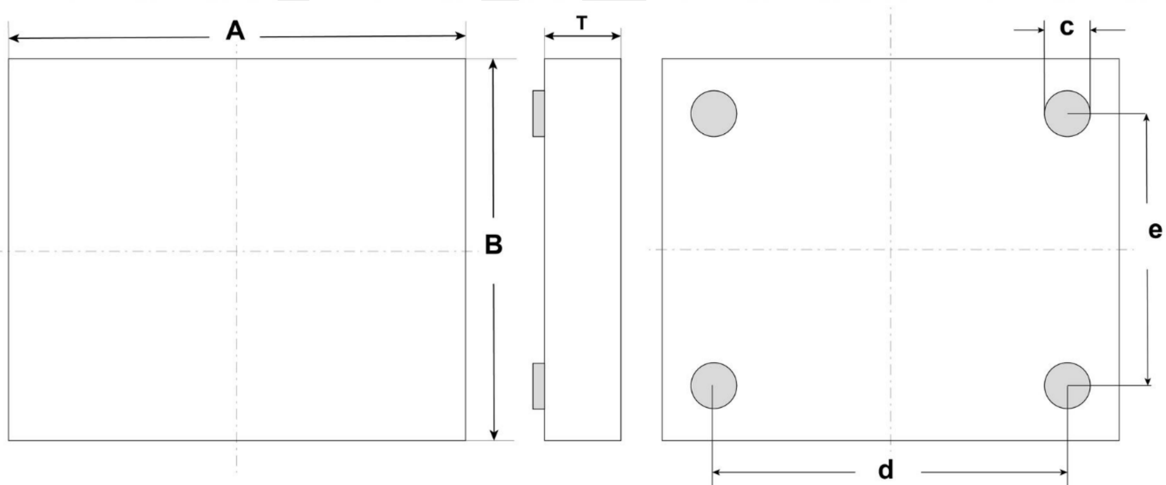

Figure 5 - Package outline drawing

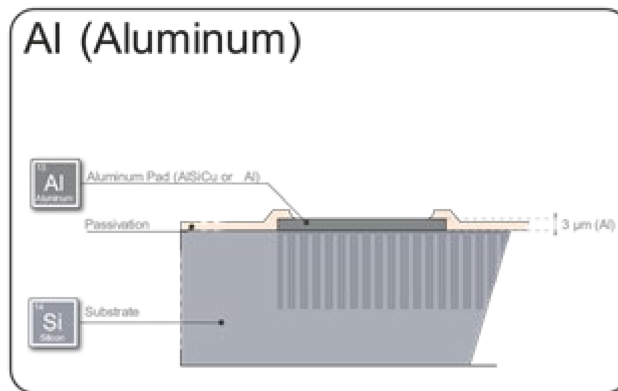

Figure 6 – Cross section on top finishing

Assembly

ETSC series is compatible with standard wire bonding and embedding technology.
For further information, please see our mounting application note

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

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Packaging format

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

Tape and Reel:
Dies are not flipped in the tape cavity (wire bond pad up) with die ID located near the driving holes of the tape.

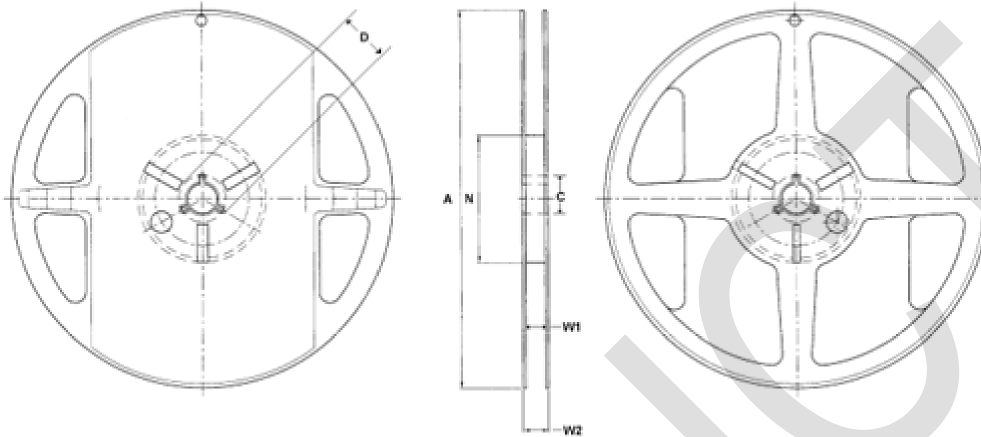

Figure 8 - Reel drawing

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)

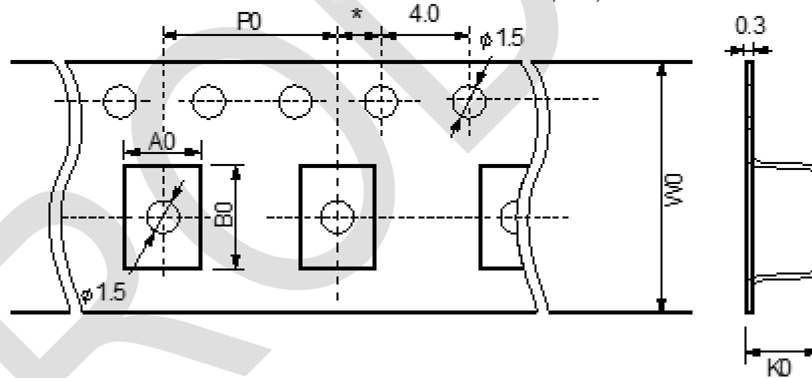

Figure 9 - Tape drawing

Cavity dimensions			Carrier tape width W0	Carrier tape pitch P0	Quantity per reel
Ao	Bo	Ko			
1.15	1.15	0.2	8	4	1000

Table 7- Tape dimensions (mm)

Film frame carrier:
With UV curable dicing tape (UV performed)
Good dies are identified using the SINF electronic mapping format. No ink is added on wafer to label other dies.

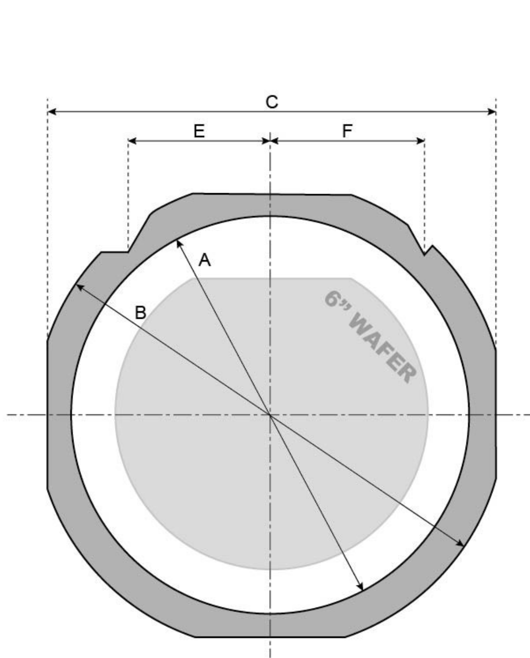

Figure 10 FF070 Frame with a 6" wafer

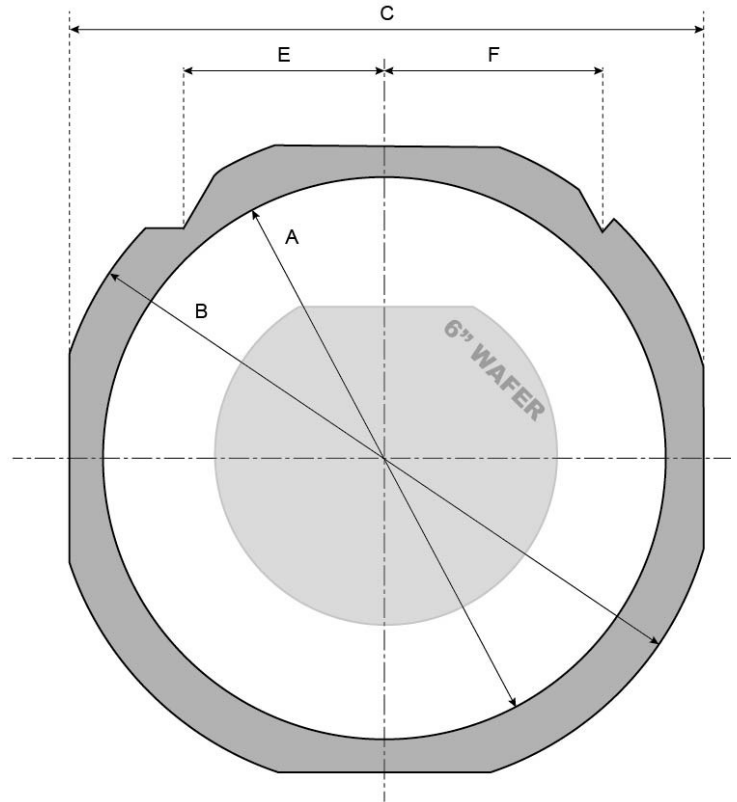

Figure 11 FF108 Frame with a 6" wafer

PRO

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

Expander grip ring 6” diameter:

With UV curable dicing tape (UV not performed)

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

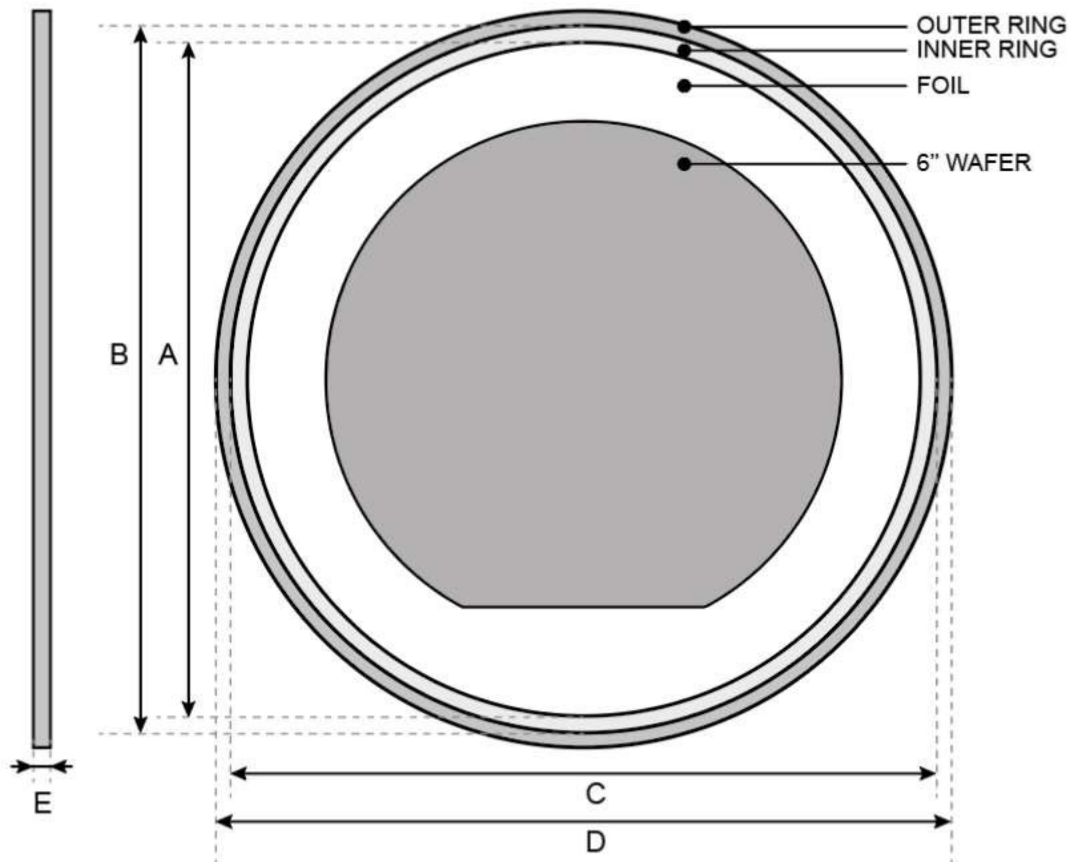

Figure 12 – Grip Ring drawing

Grip Ring Style	A	B	C	D	E	Locator Notch
GRP-2620-6 (1)	7.670”	7.973”	7.975”	8.280”	0.236”	None

Table 9 - Frame dimensions (inches)

(1) or equivalent

PROXY

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 1.00	2010 February 8h	Objective specification	OGA
Release 1.01	2010 February 26rd	minor update	OGA
Release 2.00	2014 december 02nd	Preliminary specification	LLE
Release 2.01	2017 december 07th	PN change according to PCN	LLE
Release 2.02	2018 december 07th	PN update	FNO
Release 3.00	2020 Januray 05th	Product version	OGA
Release 3.01	2022 December 15th	minor update	OGA
Release 3.02	2023 May 26th	minor update	OGA, LLE, SGU, SCA
Release 3.03	2025 October 20th	Key applications have been updated according to the latest market requirement / Ordering information has been updated according to the latest product lineup and specification.	CGU - HFU

Disclaimer / Life support applications

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