Embedded and Wire bondable SiCap EMSC 0605 100nF BV30

Rev.3.01

General description

The EMS Capacitor targets power supplies decoupling and filtering of active devices. This version is a single 100nF capacitor in 0605 package size.
100nF EMSC Capacitor targets filtering and decoupling in high reliability applications with space constraint.
100nF EMSC Capacitor is using our PICS3-HV process which allows it to operate under 16V at 100°C (10years)
EMSC Capacitor is based on Silicon Integrated Passive technology could operate up to 250°C on request.

Assembly: This Capacitor is designed to support wire bond on lead frame applications, as well for embedding inside PCB.
Pads finishing: Aluminum. Copper pads for embedding version and Gold pads for wire bonding version, as an optional finishing.

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

Key features

- High operating temperature (up to 150 °C)
- Ultra-high stability of capacitance value:
  - Temperature 70ppm/K (-55 °C to +150 °C)
  - Voltage <0.1%/Volt
  - Negligible capacitance loss through ageing
- Low profile: 100 µm
- Size 1.59x1.32mm (0605)
- Break down voltage: 30V
- Low leakage current < 100pA
- High reliability
- ESD compatibility
- Load Dump
- Compatible with high temperature cycling during manufacturing operations (exceeding 300 °C)
- Applicable for almost embedded and wire bonding application

Key applications

- Any demanding applications, such as medical, aerospace, industrial…
- Supply decoupling / filtering of active device
- High reliability applications
- High volumetric efficiency *(i.e. capacitance per unit volume)*
- Devices with battery operations
- High temperature applications

Functional diagram

The next figure provides implementation set-up diagram.

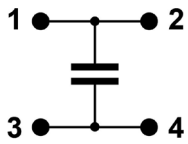

Figure 1 Block Diagram

Electrical performances

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C	Capacitance value	@25°C	-	100	-	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)		-	-	16(4) 14.7(5)	V_{DC}
BV	Break down voltage	@+25°C	30	-	-	V
ΔC_{RVDC}	Capacitance voltage variation	From 0 V to RV_{DC}, @+25°C	-	-	0.1	$\%/V_{DC}$
IR	Insulation resistor	@25°C,10V, 120s	-	10	-	GΩ
ESR	Equivalent Serial Resistor	@+25°C, shunt mode	-	0.15	-	Ω
ESL	Equivalent Serial Inductor	@+25°C, SRF shunt mode	-	300	-	pH
ESD	HBM stress (6)	(100pF/1.5kOhms) max +/-8kV Level H3B	8	-	-	kV
ESD	HMM stress (6)	ANSI/ESD SP5.6-2009 (150pF/330Ohms) max +/-8kV Setup A Level 5	8	-	-	kV

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.
(6): please refer to application note 'ESD Challenge in 3D Murata Integrated Passive technology'.

Pinning definition

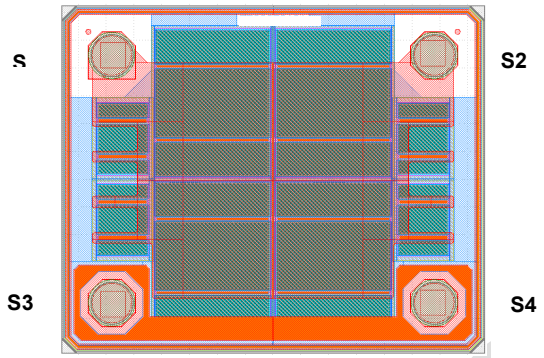

Figure 2 Pin configuration

pin #	Symbol	Coordinates X / Y
1	Signal	-580 / 445
2	Signal	580 / 445
3	Signal	-580 / -445
4	Signal	580 / -445

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 metal plane connected to the backside must either be left floating or be connected to S3-S4.

Ordering Information

Type number	Package		
	Packaging	Finishing	Description
935123733610-F1A	6” film frame carrier(1)	Alu(2)	EMSC 100nF/0605/BV30 – 4 pads – 1.59 x 1.32 x 0.10 mm (4)
935123733610-E1A	6” Expander Gripring (1)	Alu(2)	EMSC 100nF/0605/BV30 – 4 pads – 1.59 x 1.32 x 0.10 mm (4)
935123733610-F2A	8” film frame carrier(1)	Alu(2)	EMSC 100nF/0605/BV30 – 4 pads – 1.59 x 1.32 x 0.10 mm (4)
935123733610-T3A	7” T&R (1 000 pieces/reel) (3)	Alu(2)	EMSC 100nF/0605/BV30 – 4 pads – 1.59 x 1.32 x 0.10 mm (4)

(1) Other Film Frame Carrier are possible on request
(2) Alu (3µm) - AlSiCu
(3) Missing capacitors can reach 0.5%
(4) Refer to Figure7

Product Name	Die Name	Description
EMSC733.610	EJ0605610	EMSC 100nF/0605/BV30 – 4 pads – 1.59 x 1.32 x 0.10 mm

Table 3 - Die information

Pad Metallization

This Wirebondable and Embedding Silicon Capacitor is delivered as standard with Aluminum finishing (3µm thickness +/- 10%), with 2 pads on each terminal.

Other metallizations, such as ENIG, Copper or Thick Gold are possible on request.

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

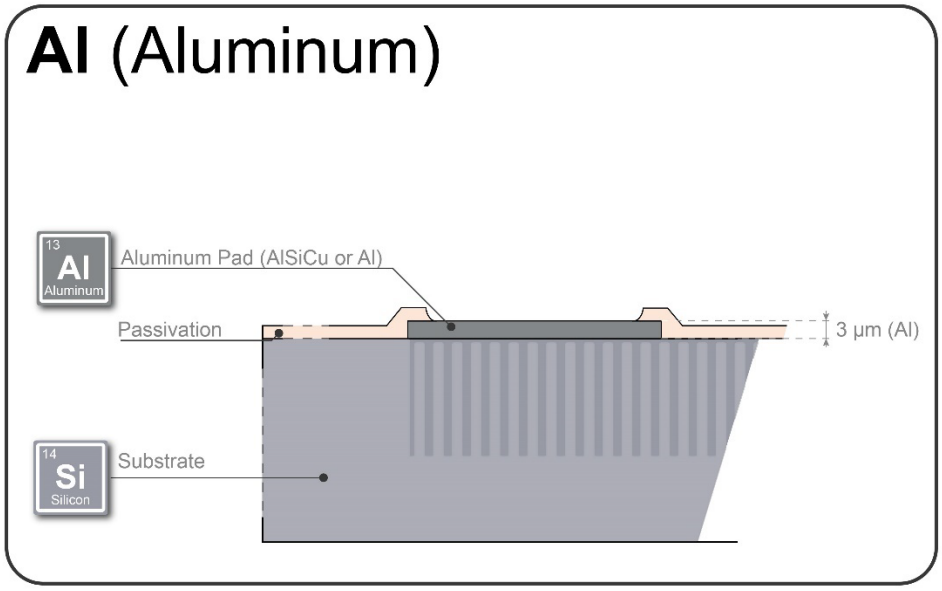

Figure 6 – Cross section on top finishing

Material regulation

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

Package outline

The product is delivered as a bare silicon die, with 150 µm opening for contacts.

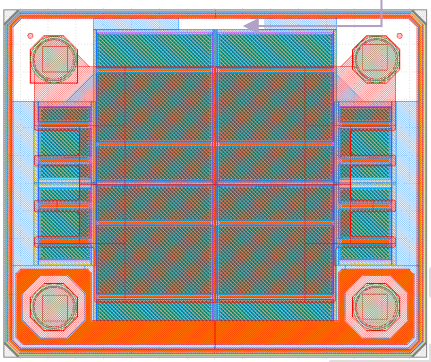

Figure 3 – Layout view

A (mm)	B (mm)	T (mm)	c (mm)	d (mm)	e (mm)
1.59 ±0.02	1.32 ±0.02	0.10 ±0.015	0.15	1.16	0.89

Table 4 - Dimensions and tolerances

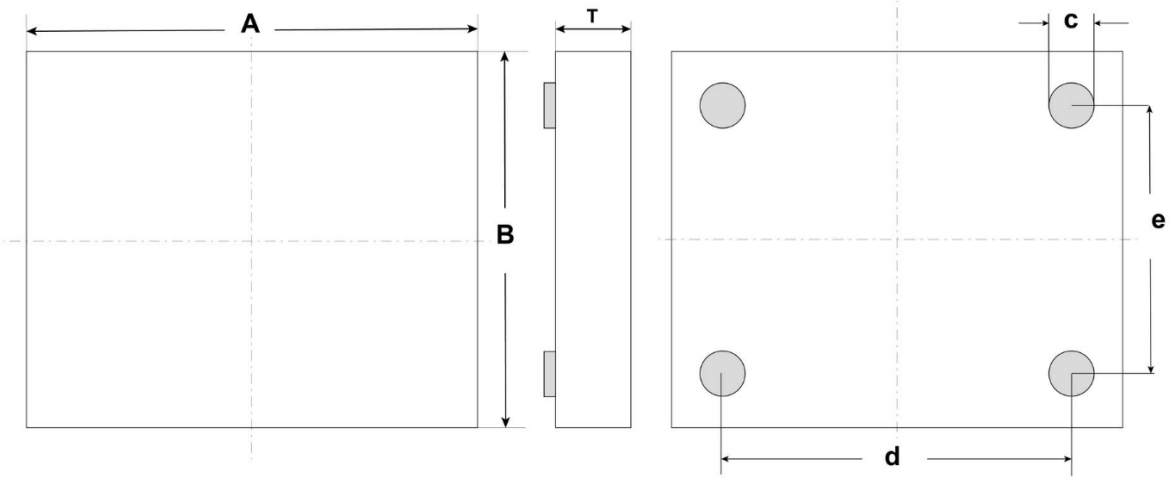

Figure 4 - Package outline drawing

Assembly

EMSC 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 5 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: Dies are none flipped in the tape cavity (bump down) with die ID located near the driving holes of the tape.

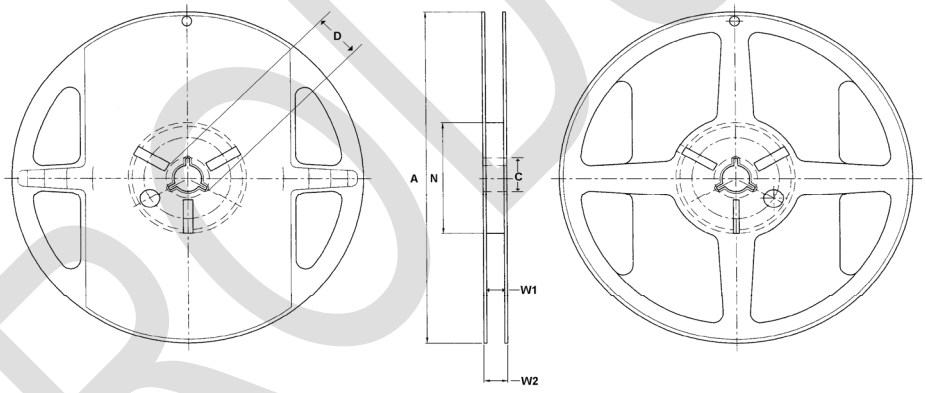

Figure 6 - Reel drawing

Tape Width	Diameter A	C	D	Hub N	W1	W2
8	178 (7 inches)	13.5	21	60	9.5	11.4

Table 5 - Reel dimensions (mm)

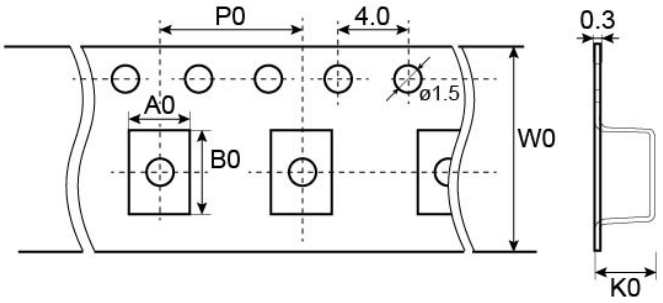

Figure 7 - Tape drawing

Cavity dimensions			Carrier tape width W0	Carrier tape pitch P0	Reel Capacity
Ao (*)	Bo (*)	Ko (*)			
1.45	1.75	0.55	8	4	1000

Table 6 - Tape dimensions (mm)

(*) A0, B0 and K0 dimensions depends on the Packaging subcontractor.

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.

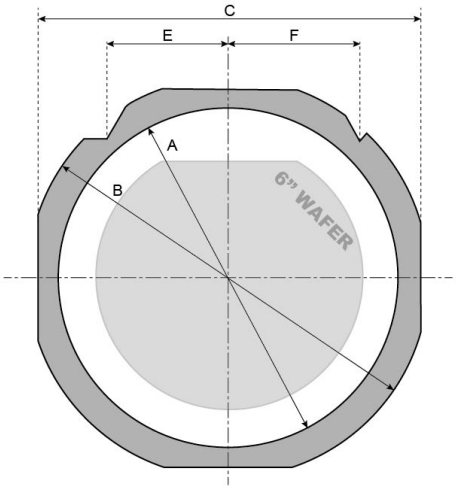

Figure 8 FF070 Frame with a 6" wafer

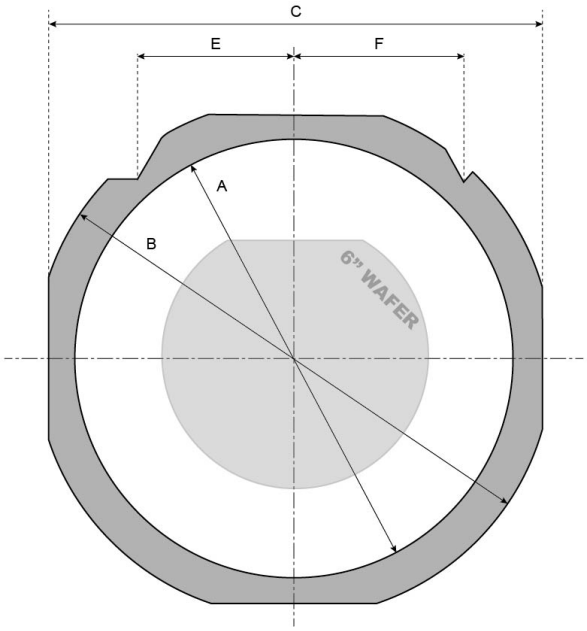

Figure 9 FF108 Frame with a 6" wafer

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 7 - Frame dimensions (inches)

(1) or equivalent

Expander grip ring 6” diameter:

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.

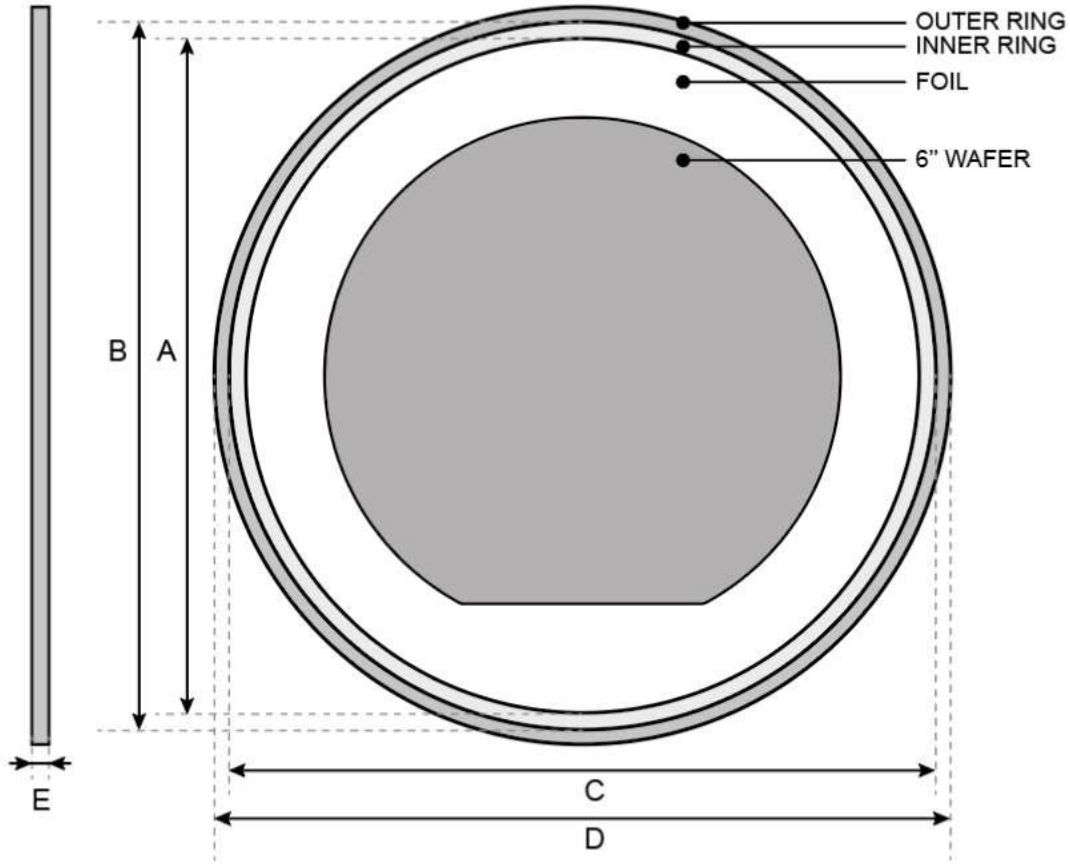

Figure 12 – Grip Ring drawing

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

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.
1.03	28/03/2019	Minor update	OGA
3.00	**2023 May 26th**	**minor update**	**OGA, LLE, SGU, SCA**
3.01	2025 Sept 16th	Minor update	CGU

Disclaimer / Life support applications

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Murata customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Murata for any damages resulting from such improper use or sale.

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