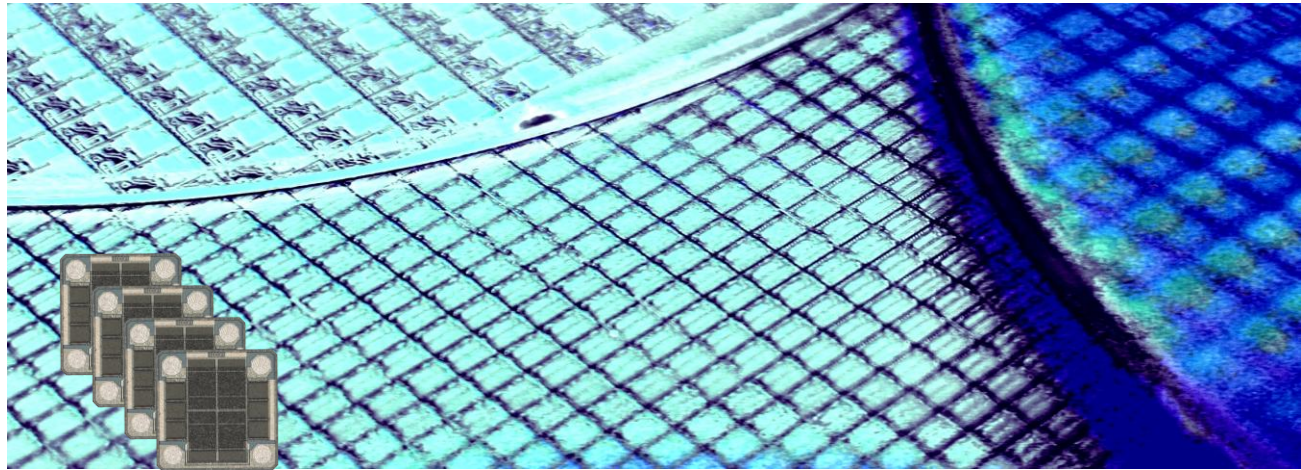


# EMSC – Embedded & Wirebond Silicon Capacitor

Rev 3.5



## Key features

- Ultra low profile (100µm)
- Ultra high stability of capacitance value:
  - ◆ Temperature  $\pm 0,5\%$  (-55°C to +150°C)
  - ◆ Voltage  $< 0.1\%$ /Volts
  - ◆ Negligible capacitance loss through ageing
- Low leakage current down to 100pA
- High reliability
- High operating temperature (up to 150°C)

Thanks to the unique IPDiA Silicon capacitor technology, most of the problems encountered in demanding applications can be solved.

**EMbedded Silicon Capacitors** are available with **thicknesses down to 80µm** and are the most appropriate solution for Chip On Board, Chip On Foil, Chip On Glass, Chip On Ceramic, flip chip and embedded applications, when designers are looking at **utmost decoupling behaviours**.

EMSC are optimized for laminate substrate package, rigid/flex PCB, FR4, ceramic, glass, leadframe or foil platforms.

The Silicon capacitor technology offers a capacitor integration capability (up to 250nF/mm<sup>2</sup>) which allows **downsizing** compared to existing solutions.

## 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

The IPDiA technology features **high reliability**, up to 10 times better than alternative capacitor technologies, such as Tantalum or MLCC, and eliminates cracking phenomena.

Silicon Capacitor technology also offers a very stable capacitor value over the full operating voltage & temperature range, with a high and stable insulation resistance.

This Silicon based technology is ROHS compliant and compatible with lead free reflow soldering process.

Electrical Specification

		Capacitance value						
		10	15	22	33	39	47	68
Unit	10pF	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	390pF/0202/30V 935 121 72C 339	470pF/0202/30V 935 121 72C 347	680pF/0202/30V 935 121 72C 368
	0.1nF	1nF/0202/30V 935 121 72C 410	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales
	1nF	10nF/0202/30V 935 121 72C 510	Contact IPDIA Sales	Contact IPDIA Sales	33nF/0404/30V 935 121 72F 533	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales
	10nF	100nF/0404/11V 935 121 42F 610 100nF/0605/30V 935 121 72G 610	Contact IPDIA Sales	220nF/0505/11V 935 121 42H 622	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales	Contact IPDIA Sales
	0.1µF	1µF/1208/11V 935 121 42S 710 1µF/1616/30V 935 121 72Y 710	Contact IPDIA Sales	2.2µF/1612/11V 935 121 42V 722	3.3µF/1616/11V 935 121 42Y 733	Contact IPDIA Sales	4.7µF/2016/11V 935 121 42X 747	

(\*) 80µm thickness on request

(\*\*) For extended temperature range (up to +250°C), see Embedded Xtreme Temperature Silicon Capacitor product (EXSC).

(\*\*\*) other values on request

Parameters	Value
Capacitance range	390pF to 4.7µF
Capacitance tolerances	±15% <sup>(**)</sup>
Operating temperature range	-55 to 150 °C <sup>(**)</sup>
Storage temperatures	-70 to 165 °C
Temperature coefficient	±0.5%, from -55 to +150°C
Breakdown Voltage (BV)	30V, 11V
Capacitance variation versus RVDC	0.1 % /V (from 0 V to RVDC)
Equivalent Serial Inductor (ESL)	Max 100 pH
Equivalent Serial Resistor (ESR)	Max 0.1Ω
Insulation resistance	100GΩ min @ 3V,25°C
Aging	Negligible, < 0.001% / 10000h
Reliability	FIT<0.017 parts / billions hours
Capacitor height	Max 100µm <sup>(*)</sup>

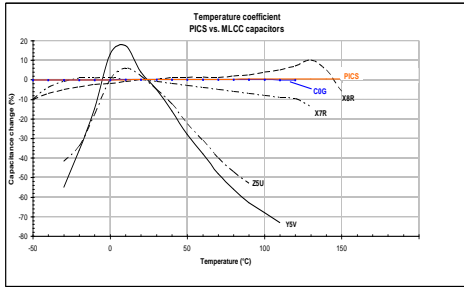


Fig.1 Capacitance change versus temperature variation compared to alternative technologies

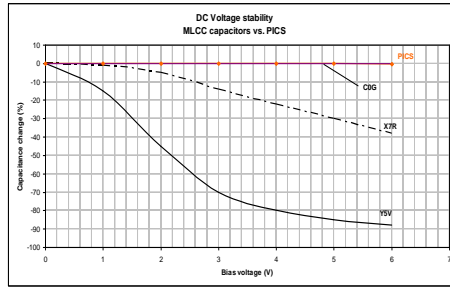


Fig.2 Capacitance change versus voltage variation compared to alternative

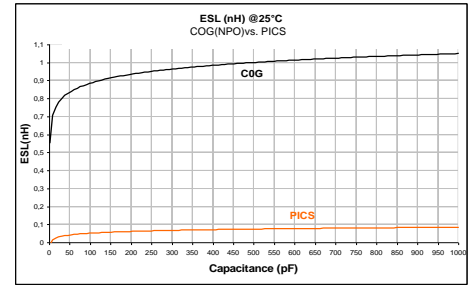


Fig.3 ESL versus capacitance value compared to alternative technologies

Part Number

**935.121.**

i.e: 100nF/0404 → 935 121 42F 610

<b>B.</b>	<b>2.</b>	<b>S.</b>	<b>U</b>	<b>XX</b> →	<b>Value</b>
↓	↓	↓	↓		
<b>Breakdown Voltage</b>	<b>Size</b>	<b>Unit</b>			
4 = 11V	F = 0404	0 = 10 f	5 = 1 n		10
1 = 20V	H = 0505	C = 0202	6 = 10 n		15
7 = 30V	I = 0302	V = 1612	2 = 1 p		22
6 = 50V	S = 1208	Y = 1616	3 = 10 p		33
	V = 1216	X = 2016	4 = 0.1 n		39
					47
					68

Termination

Pad finishing in Aluminum ( 3µm thickness +/-10%), other finishing available such as copper, nickel or gold. Applicable for almost all embedded applications. Parts should be glued with non conductive paste. If conductive glue is used on the backside of the silicon cap, it is strongly recommended to connect the backside and pads 3&4 to the same level (GND preferred).

Pinning definition & Outline

pin #	Symbol	Description
1, 2	Signal	Signal
3, 4	GND	Ground

Typ.	0202	0203	0303	0404	0505	0605	1208	1612	1616	2016	
Comp. size	A	0.58 ±0.05	0.64 ±0.05	0.80 ±0.05	1.00 ±0.05	1.25 ±0.05	1.50 ±0.05	3.00 ±0.05	4.00 ±0.05	5.00 ±0.05	
	B	0.58 ±0.05	0.80 ±0.05	0.80 ±0.05	1.00 ±0.05	1.25 ±0.05	2.00 ±0.05	3.00 ±0.05	4.00 ±0.05	4.00 ±0.05	
	c	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
	d	0.3			0.72	0.97	1.22	2.72	3.72	3.72	4.72
	e	0.3			0.72	0.97	1.22	1.72	2.72	3.72	3.72

Packaging

Tape and reel, tray, waffle pack or wafer delivery.

Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.



For more information, please visit: <http://www.ipdia.com>  
To contact us, email to: [sales@ipdia.com](mailto:sales@ipdia.com)

Date of release: 28<sup>th</sup> February 2014  
Document identifier : CL xxxxxxxxxxxx