

Rev. 1.5

General description

LPSC MIPS* 3D Silicon Capacitor targets antenna matching, RF filtering and decoupling of active dies, in applications with height and volume constraints.

This version based on PICS technology, is a single Low ESL 47pF +/-15% Capacitor in size 0402 offering low profile (100µm thin), with very high stability upon applied voltage, up to 150°C, very low leakage current and high level performances dedicated to industries such as Smart Cards, RFID tags and others where integration as well as excellent antenna matching play a key role.

Assembly: Dedicated for wirebonding, Flip Chip or bumping either in the modules or directly attached to the inlays.

Please refer to our assembly Application note for further recommendations

Pad finishing: Aluminum, other finishing available on request such as nickel/gold electroless, thin copper, lead-free nickel solder coating or thin gold.

Other capacitance values and other package size are available as a single die or capacitor array, on demand.

Market: All demanding market with space constraint such as RFID Tags, Smart Cards, Telecom and other applications where integration needs to be managed for performances.

Key features

- High stability
- ♦ Temperature $\pm 0.5\%$ (-55°C to +150°C)
- ♦ Voltage $< 0.1\%$ /Volts
- ♦ Negligible capacitance loss through ageing
- Small size : 0402
- Low leakage current $< 100\text{pA}$
- High reliability
- Low ESL characteristics
- Applicable for embedded and wire bonding
- Low profile (100µm)

Key Applications

- RFID & Smart Cards Applications
- HF (13,56MHz) & UHF (800/900MHz)
- Decoupling, Antenna matching & filtering of active device
- High reliability applications
- Devices with battery operations
- Volume limited applications



Functional diagram

The next figure provides implementation set-up of the capacitor (2 connections).

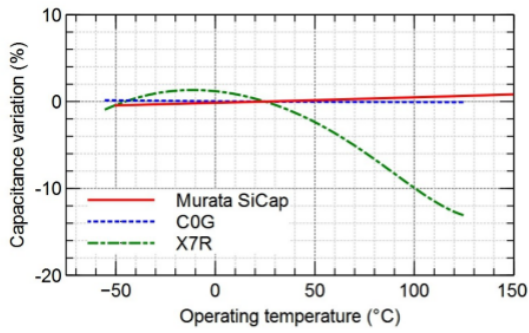


Electrical performances

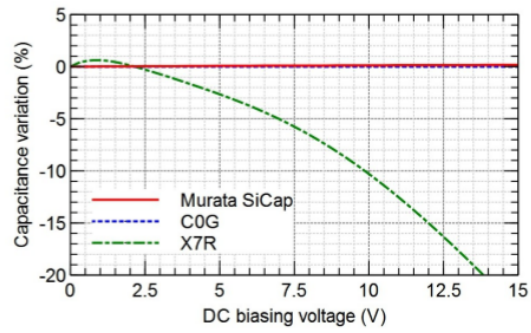
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C	Capacitance value		-	47	-	pF
ΔC_P	Capacitance tolerance		-15	-	+15	%
T _{OP}	Operating temperature		-55	20	150	°C
T _{STG}	Storage temperature		-70	-	165	°C
ΔC_T	Capacitance temperature variation	-55°C to 150°C	-0.5	-	+0.5	%
BV	Break down voltage		11			V
RV _{DC}	Rated voltage		-	3.6		V _{DC}
ESD	ESD capabilities		NA	NA	NA	
ΔC_{RVDC}	Capacitance voltage variation	From 0V to RV _{DC}	-	-	0.1	%/V _{DC}
IR	Insulation resistor		-		-	GΩ
ESR	Parasitic series resistance		-			mΩ
ESL	Parasitic series inductance		-		-	pH

Table 1 – 47pF performances

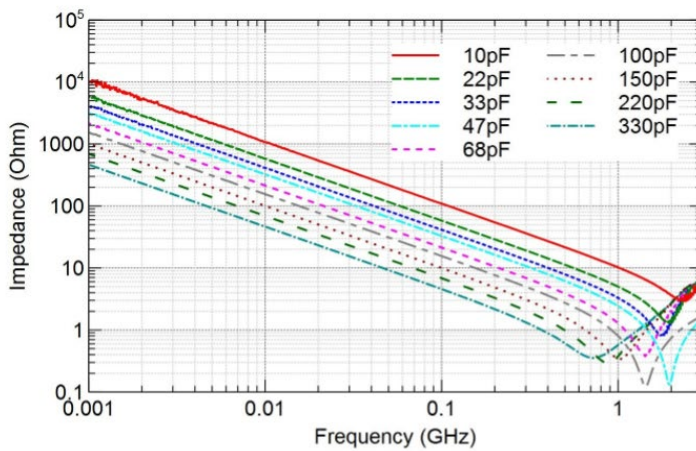


Capacitance variation vs temperature (for LPSC and MLCC technologies)



Capacitance variation vs DC biasing voltage (for LPSC and MLCC technologies)

Frequency Response



Impedance variation vs Frequency

Pinning definition

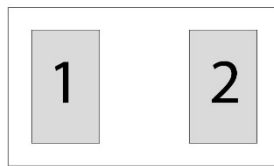


Table 2 - Capacitor pinning description



Package outline

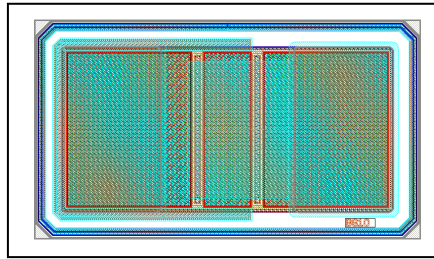


Figure 1 - Top view of the 47pF capacitor

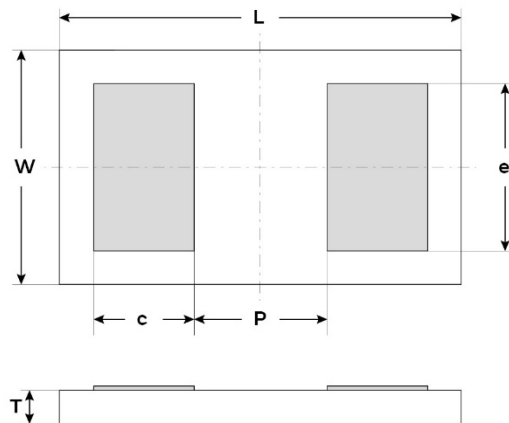


Figure 2 - Package outline drawing

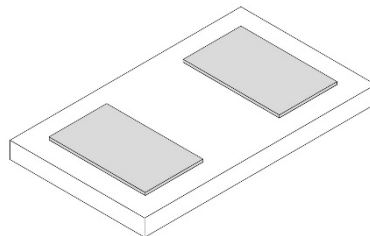


Figure 3 - Package isometric view

L (mm)	W (mm)	T (mm)	c (mm)	P (mm)	e (mm)
1.20 ±0.04	0.70 ±0.04	0.10 ±0.02	0.30	0.40	0.50



Ordering Information

Type number (12NC)			
	Product Name	Die Name	Description
935121424247	LPSC 424.247	C0402247	47pF / 0402 / BV>11V – 1.20mm x 0.70mm x 0.10

Table 3 - Die information

Ordering number (16NC)	Package			
	Packaging	Top finishing	Description	Version
935121424247-F2A	6" Wafer, 8" Metal Frame *	ALU	47pF 15% – 1.20mm x 0.70mm x 0.10mm	1
935121424247-F2N	6" Wafer, 8" Metal Frame *	NiAu	47pF 15% – 1.20mm x 0.70mm x 0.10mm	1
935121424247-T3N	T&R 1000pcs	NiAu	47pF 15% – 1.20mm x 0.70mm x 0.10mm	1

Table 4 - Packing ordering information

* 8" Metal Frame should be returned to MIPS on regular shipments

The MIS' manufacturing center is certified:

- ISO-9001
- ISO-14001
- ISO-TS16949
- OHSAS-18001

Murata Integrated Passive Solutions is RoHS compliant.



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 / Function
Release 1.0	2013 Nov. 27 th	Objective specification	LLE
Release 1.4	2017 Oct 18 th	Preliminary specification	LLE
Release 1.5	2021 Aug. 13 th	Package outlines update	SCA

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 Integrated Passive Solutions 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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