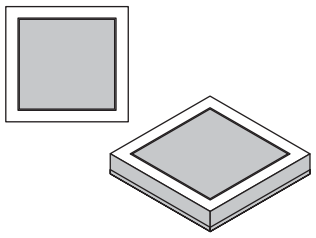
SKYWORKS®

DATA SHEET

SC Series: MIS Chip Capacitors

Features

- Readily available from stock
- High reliability silicon oxide–nitride dielectric
- Low loss — typically 0.04 dB in a 50 Ω system
- Operation through 26 GHz
- Wide temperature operation



Description

Skyworks MIS Chip Capacitors are available in a wide range of sizes and capacitance values. They are frequently used in applications requiring DC blocking, RF bypassing, or as a fixed capacitance tuning element in filters, oscillators, and matching networks. The devices have a dielectric composed of thermally grown silicon dioxide over which a layer of silicon nitride is deposited. This dielectric possesses a low temperature coefficient of capacitance and very high insulation resistance. The devices also exhibit excellent long-term stability making them suitable for high-reliability applications. The capacitors have a high dielectric breakdown which permits the use of thin dielectrics resulting in large capacitance per unit area. The temperature coefficient is less that 50 ppm/°C, and operation is suitable from -65 °C to 200 °C. Compared to ceramic capacitors, Skyworks MIS chip capacitors offer higher Q, and a lower insertion loss of 0.04 dB, in a 50 Ω system. Insulation resistance is greater than 10^5 M Ω. To accommodate high-volume automated assembly methods, wafers can be supplied on expanded film frame. To reduce cost, chips can be supplied packaged in vials with sample testing only. Packaging in waffle packs with 100% electrical test and visual inspection is available.

Electrical Specifications

Capacitance range[1]: 0.8 to 1000 pF

Temperature coefficient: 50 ppm/°C typical

Capacitance tolerance[2]: ±20%

Operating temperature: -65 °C to +200 °C

Dielectric withstanding voltage: 100 V

Insulation resistance: 10^5 megohms typical

Leakage current: typ. < 1 nA

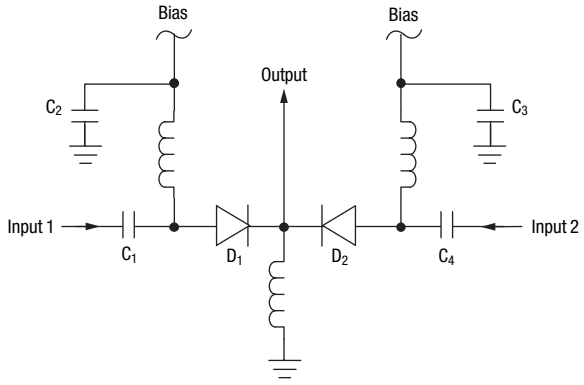
Absolute Maximum Ratings

Characteristic	Value
Operating temperature range (T_{OP})	-65 °C to +200 °C
Storage temperature range (T_{STG})	-65 °C to +200 °C
Dielectric withstanding voltage	100 V

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

CAUTION: *Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.*

Typical SPDT Switch



C_2, C_3 — Chip MIS capacitor
C_1, C_4 — Chip or beam-lead MIS capacitor
D_1, D_2 DSG9500 beam-lead pIN diode

Example

Part Number Structure — SCXXXXYYZZ

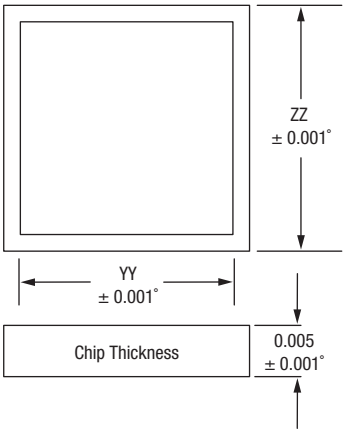
where:

SC = Silicon Capacitor

XXXX = Capacitance (pF)

YY = Square Contact Size (mils)

ZZ = Square Chip Size (mils)



Performance Data

Tests on typical MIS capacitors at L and S band show insertion loss to be 1/2 to 1/3 that of equivalent ceramic-type capacitors, without any of the associated resonance problems. Power tests indicate that the only limitation is the actual breakdown voltage of the device (see data section). A typical insertion loss versus frequency graph is shown in Figure 1. This data is taken from an actual test circuit with series mounted beam-lead or chip capacitors on a 50 Ω microstrip transmission line. The apparent higher loss at lower frequencies on the lower capacitance units is strictly due to the capacitive reactance of the capacitor.

Electrical Specifications

Part Number	Capacitance (20%) pF	Chip Dimensions (1 mil)
SC00080912	0.8	9 mil pad/12 mil chip
SC00120912	1.2	9 mil pad/12 mil chip
SC00180912	1.8	9 mil pad/12 mil chip
SC00260912	2.6	9 mil pad/12 mil chip
SC00380912	3.8	9 mil pad/12 mil chip
SC00560912	5.6	9 mil pad/12 mil chip
SC00680912	6.8	9 mil pad/12 mil chip
SC00820710	8.2	7 mil pad/10 mil chip
SC00821518	8.2	15 mil pad/18 mil chip
SC01000710	10	7 mil pad/10 mil chip
SC01000912	10	9 mil pad/12 mil chip
SC01001518	10	15 mil pad/18 mil chip
SC01500710	15	7 mil pad/10 mil chip
SC01500912	15	9 mil pad/12 mil chip
SC01501518	15	15 mil pad/18 mil chip
SC02201518	22	15 mil pad/18 mil chip
SC03301518	33	15 mil pad/18 mil chip
SC04701518	47	15 mil pad/18 mil chip
SC06801518	68	15 mil pad/18 mil chip
SC10002430	100	24 mil pad/30 mil chip
SC33303440	333	34 mil pad/40 mil chip
SC50004450	500	44 mil pad/50 mil chip
SC99906068	1000	60 mil pad/68 mil chip

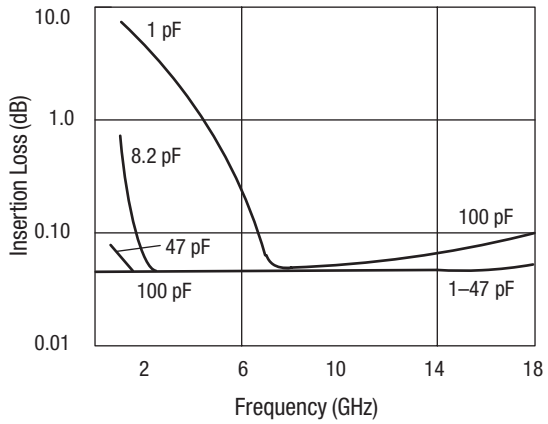


Figure 1. Typical Insertion Loss vs. Frequency (50 Ω System)

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