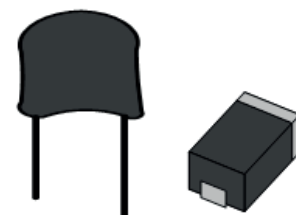# TANTALUM CAPACITORS

What are tantalum capacitors?

Tantalum capacitors are a type of electrolytic capacitor that uses the metal tantalum for the anode. They provide higher capacitance in a smaller package than other types of capacitors, and they offer better voltage and temperature characteristics than high-capacitance ceramic capacitors.

Setting example of measurement conditions

Parameters	Cs - D (120Hz), Rs (100kHz)
Frequency	120 Hz, 100 kHz
DC bias	OFF
Signal level	0.5 Vrms
Measurement range	AUTO
Speed	SLOW2
LowZ mode	ON

*Otherwise, default settings are used.
*The above settings apply to an example measurement. Since optimal conditions vary with the measurement target, specific settings should be determined by the instrument operator.

Surface mount fixed tantalum electrolytic capacitors with manganese dioxide solid electrolyte (IEC 60384-3) (JIS C5101-3)

Parameters	Rated capacitance	Rated voltage	Measurement Frequency	Measurement Voltage *1	DC bias *2
C,D (tanð)	ALL	ALL	100 Hz or 120 Hz	5 Vrms or less	0.7 to 1.0 V
Rs (ESR), Z	ALL	ALL	100 kHz	5 Vrms or less	0.7 to 1.0 V

Fixed tantalum capacitors with non-solid electrolyte and foil electrode(IEC 60384-15)(JIS C5101-15)

Parameters	Rated voltage Rated capacitance	Measurement Frequency	Measurement Voltage *1	DC bias *2
C,D (tanð) Rs (ESR)	ALL	100 Hz or 120 Hz	0.1 Vp to 1.0 Vp	2.1 V to 2.5 V *3
Rs (ESR), Z	ALL	Choose the frequency that yields the lowest impedance value from the following : 100 Hz, 120 Hz, 1kHz, 10 kHz, 100 kHz, 1 MHz	0.1 Vp to 1.0 Vp	2.1 V to 2.5 V *4

Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte(IEC 60384-24) (JIS C5101-24)

Parameters	Rated capacitance	Rated voltage	Measurement Frequency	Measurement Voltage *1	DC bias *2
C,D (tanð)	ALL	2.5 V or less	100 Hz or 120 Hz	5 Vrms or less	1.1V to 1.5V
		2.5V or greater			1.5V to 2.0V
Rs (ESR)	ALL	ALL	100 kHz	5 Vrms or less	OFF

*1 The measurement voltage (i.e., the voltage applied to the sample) is the voltage obtained by dividing the open-terminal voltage by the output resistance and the sample.
*1 The measurement voltage (i.e., the voltage applied to the sample) can be calculated based on the open-terminal voltage, the output resistance, and the sample's impedance.
*2 DC bias need not be applied.
*3 DC bias need not be applied to bipolar capacitors.
*4 Apply only when using a measurement voltage of 0.5 Vp or greater.

Determining Cs and Cp

Generally speaking, series equivalent circuit mode is used when measuring low-impedance elements (approximately 100Ω or less) such as high-capacitance capacitors, and parallel equivalent circuit mode is used when measuring high-impedance elements (approximately 10 kΩ or greater) such as low-capacitance capacitors. When the appropriate equivalent circuit mode is unclear, for example when measuring a sample with an impedance from approximately 100Ω to 10 kΩ, check with the component's manufacturer.

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Products used

Mass Production Applications

| Model	Measurement frequency	Features
IM3523	DC, 40 Hz to 200 kHz	Measurement time : 2ms, high cost performance
IM3533	DC, 1 mHz to 200 kHz	Internal DC bias function, touch panel

Research and Development Applications

| Model	Measurement frequency	Features
IM3570 IM9000	DC, 4 Hz to 5 MHz	Frequency sweep with analyzer mode
		Optional equivalent cuircuit analysis firmware for the IM3570
IM3590	DC, 1 mHz to 200 kHz	Can measure ESR and ESL separately with its equivalent circuit analysis function

*For more information, please see the product catalog.

Four terminal method

When shielding is connected close to the sample Zx, the measurement current I will return via the shielding. Because the magnetic flux generated by the current returning through the shielding negates the magnetic flux generated by the measurement current I, this technique is especially useful as a way to reduce measurement error during low-impedance measurement (IM35xx).

Four terminal method

Connect all 4 wires to each shield and come as close to the DUT as possible
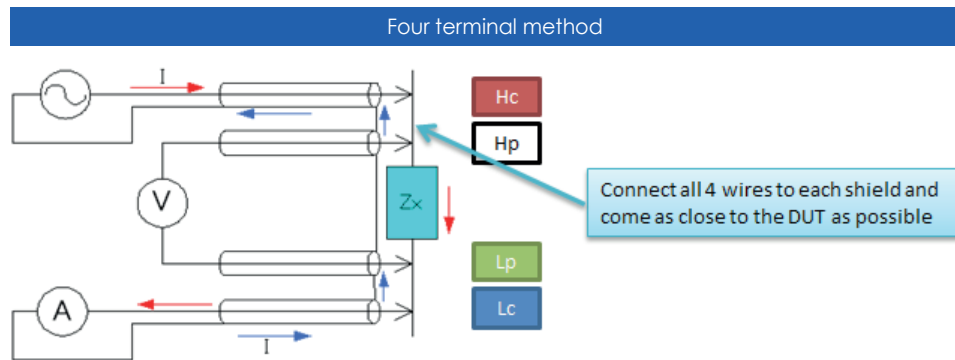
Continuous measurement mode

The IM35xx series' continuous measurement mode can be used to make continuous measurements while varying settings (frequency and level). In the following example, continuous Cs-D (120 Hz) and ESR (100 kHz) measurements are performed :
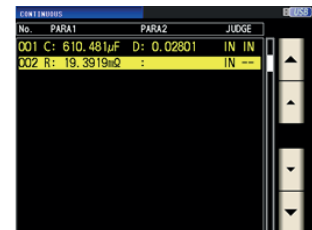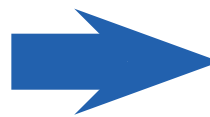
Save the 120 Hz and 100 kHz Measurement condition panels.

Make the measurements together un continuons measurement mode

Related Products List

CHEMICAL IMPEDANCE ANALYZER IM3590

EQUIVALENT CIRCUIT ANALYSIS FIRMWARE IM9000

IMPEDANCE ANALYZER IM3570

LCR METER IM3533

LCR METER IM3523