CONDUCTIVE POLYMER CAPACITORS

What are conductive polymer capacitors?

Conductive polymer capacitors have lower ESR (see below) than aluminum electrolytic capacitors and are characterized by greater stability with regard to temperature variations. In addition, they offer excellent stability of capacitance relative to DC bias. Measurement conditions are defined by IEC standards 60384-25-1 and include measurements of equivalent series resistance (ESR) and the tangent D (tanδ) of the loss angle.

Setting example of measurement conditions

Parameters	Cs - D (120Hz), Rs (100kHz)
Frequency	120 Hz, 100 kHz
DC bias	ON 1.5 V
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.

IEC 60384-25-1 Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte

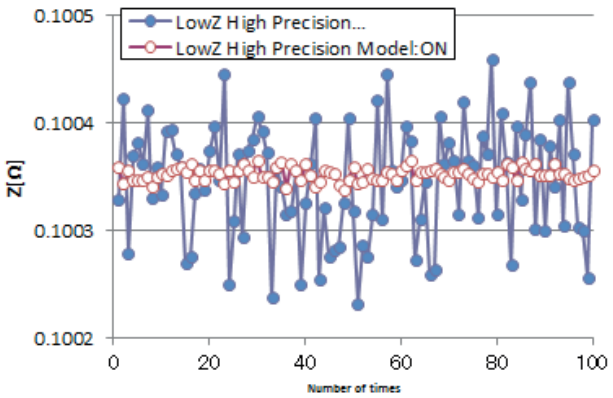
Parameters	Rated capacitance	Rated voltage	Measurement Frequency	Measurement Voltage *1	DC bias *2
C,D (tanδ)	ALL	2.5 V or less	120 Hz	0.5 Vrms or less	1.1 to 1.5 V
Rs (ESR), Z		2.5 V or less			1.5 to 2.0 V
Rs (ESR), Z	ALL	ALL	100 kHz ± 10 kHz	0.5 Vrms or less	OFF

*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.

Low impedance high accuracy mode

In low impedance high accuracy mode, the instrument's output resistance is reduced, and the measurement current is applied repeatedly for increased measurement precision. When measuring a capacitor with a high capacitance of greater than 100µF (and therefore low impedance), low-impedance high-precision mode yields more stable measurement. The graph below compares repeatability when using the IM3570 to make measurements with low-impedance high-precision mode enabled and disabled (100kHz, 1Ω range, 1V).
*The conditions under which low-impedance high-precision mode can be enabled vary with the instrument model. Please refer to the user's manual of the instrument you are using.

Repeated measurement of a resistance of approximately 100 mΩ with the IM3570



Products used

Mass Production Applications

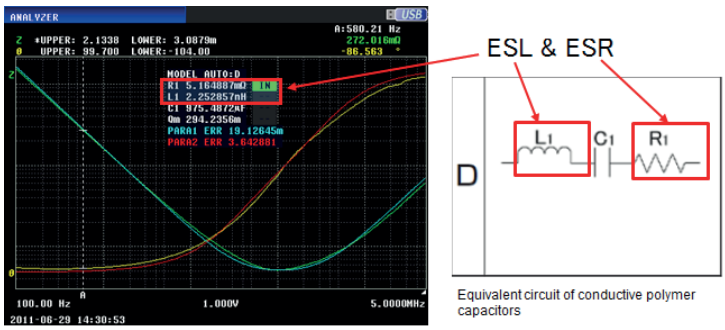
Model	Measurement frequency	Features
IM3523	DC, 40 Hz to 200 kHz	Measurement time : 2ms, high cost performance
IM3533	DC, 1 mHz to 200 kHz	Internal DC bias function, touch panel

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

Equivalent circuit analysis function

The instrument's equivalent circuit analysis function can be used to analyze the L, C, and R elements that make up the component separately. In the following figure, a conductive polymer capacitor's ESR and ESL are measured using the IM3570 and IM9000 :

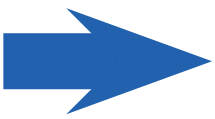


Equivalent circuit of conductive polymer capacitors

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 :

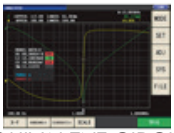
Save the 120 Hz and 100 kHz Measurement condition panels.



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

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