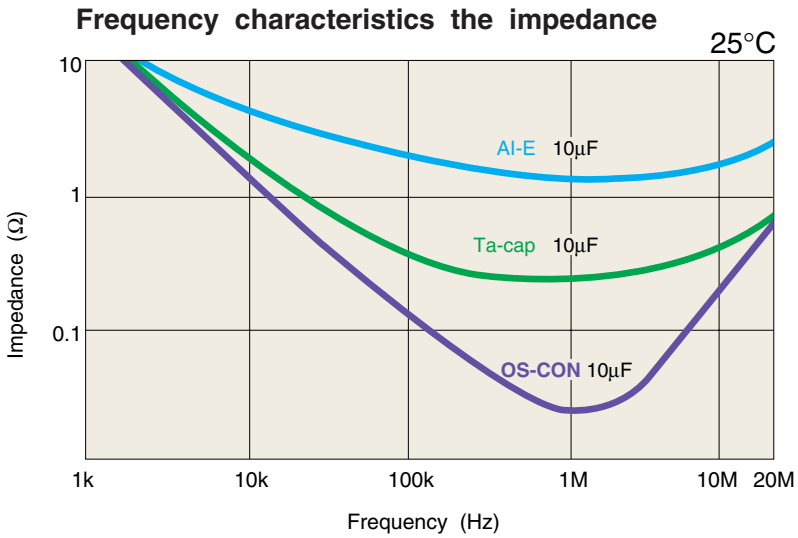
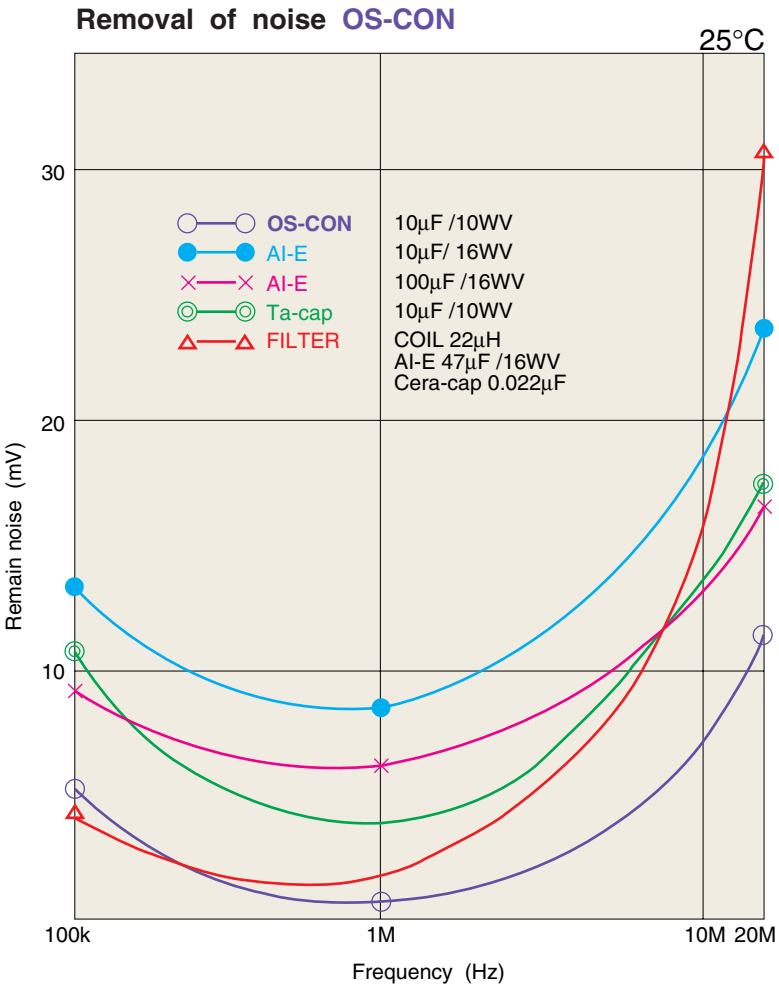
# OS-CON noise removal capability

## 1. Impedance characteristics of OS-CON




Left figure shows the impedance chara-cteristics of the **OS-CON**, aluminum electrolytic capacitor, and tantalum capacitor (10μF each). At the frequency of 1MHz, the **OS-CON** has the impedance of about 40mΩ, aluminum electrolytic capacitor of about 1,500mΩ and tantalum capacitor of about 230mΩ. The impedance of the **OS-CON** is about one-fortieth of aluminum electrolytic capacitor.

## 2. Ripple noise removal capability of OS-CON

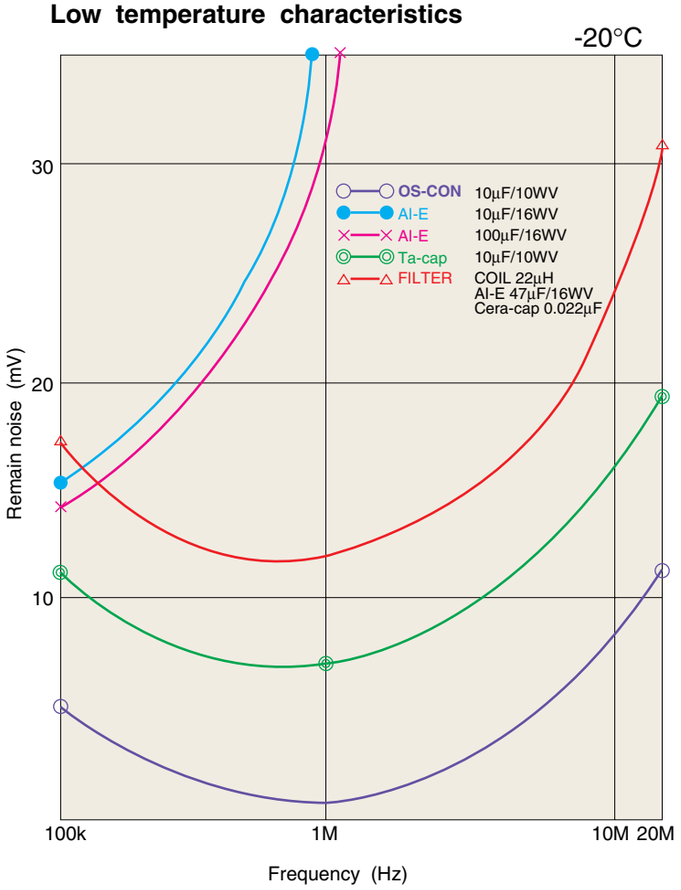



This section explains the fundamental ripple noise removal performance of the **OS-CON**. The noise removal test entered superimposed signal of 5V DC voltage and 1 Vp-p sine wave AC voltage (in the frequency range between 100kHz to 20MHz) to connect devices and monitored the output with an oscilloscope.

As known from left figure, the noise levels of aluminum electrolytic capacitors are high and if the capacitance value is increased from 10μF to 100μF (10 times), the noise removal perfor-mance is improved only by 1.3 times. Next, the tantalum capacitor has the noise level as half as the aluminum electrolytic capacitor. The noise level of the filter is rather low in the frequency range subject of filtering. For the filter of such constant, the noise level suddenly increases from around 10MHz. The **OS-CON** has the noise level about one twentieth of the aluminum electrolytic capacitor (10μF), about one tenth of the tantalum capacitor, and about one fourth of the filter. (at 25°C and 1MHz).

# Ⅸ. Application

**Low temperature characteristics**




Next the devices were cooled to -20°C to compare their characteristics at the temperature. The results are shown in left figure For the aluminum electrolytic capacitors, the noise levels rapidly increase at the frequency of around 100kHz. This is caused by increase in tanδ and impedance of the aluminum electrolytic capacitors. This symptom appears at the temperature as low as around 0°C.

Even for the tantalum capacitor having good temperature charcteristic, the noise level increases in high frequency range.

For the filter, the noise level increases about five times of that at 25°C due to the influence of the aluminum electrolytic capacitors.

However, the filter is less affected by low temperature than a single aluminum electrolytic capacitor. An LC filter relies on the coil to suppress the noise level at low temperature.

Lastly the filtering performance of the **OS-CON** does not decrease at all even at the temperature of -20°C.

As estimated from these results, the capacitance of 470 to 1,000μF is necessary for the aluminum electrolytic capacitor and the capacitance of more than 47μF is nesessary for the tantalum capacitor to require the same noise level of the **OS-CON** of 10μF. This means that the **OS-CON** can remove the noise level equal to or more than those of aluminum electrolytic and tantalum capacitors with the capacitance value one fiftieth to one hundredth of that of the aluminum electrolytic capacitor or less than one fifth of that of the tantalum capacitor.

Three devices; coil, aluminum electrolytic capacitor, and ceramic capacitor; may be replaced with **OS-CON**s to reduce space and cost in comparison with the LC filter. In addition, it is unnecesary to be anxious about decrease in filtering performance in the low temperature range. As the LC filter changes their constants depending on frequency components of noises, the **OS-CON** is required to select an appropriate capacitance value. (The capacitance of **OS-CON**s range from 1.0μF to 2,200μF) Because the impedance of lead terminal affects the characteristics of every device at the frequency of around 1MHz or higher, it is important to shorten lead wires as much as possible.