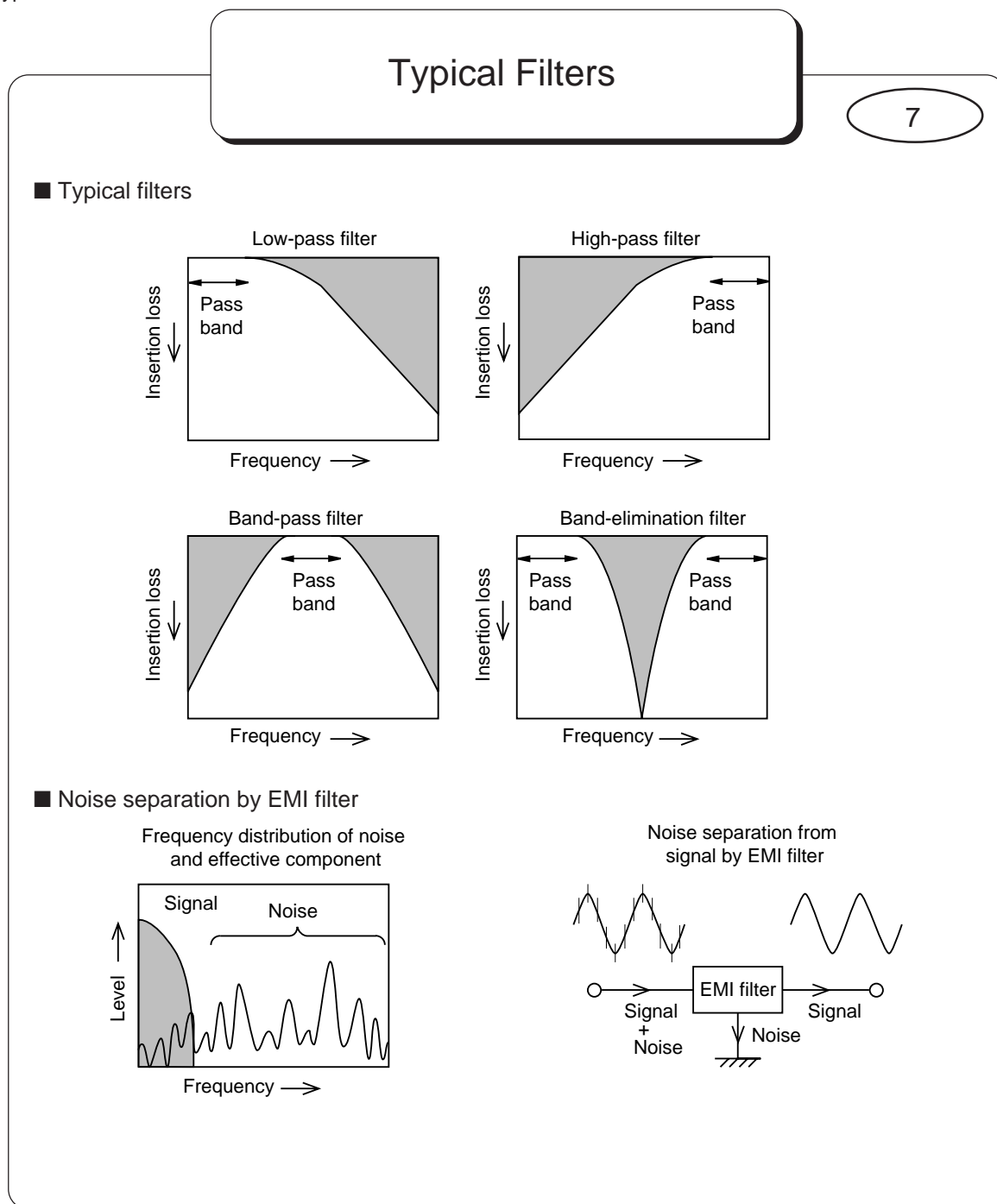


3. Noise Suppression by Low-pass Filters

3.1. Typical Filters



Filters used to pick out the desired signals are classified into the following four types.

Low-pass filter (LPF):

A filter which passes signals at frequencies lower than a specified frequency but attenuates signals at frequencies higher than the specified frequency.

High-pass filter (HPF):

A filter which passes signals at frequencies higher than a specified frequency but attenuates signals with frequencies lower than the specified frequency.

Band-pass filter (BPF):

A filter which only passes signals within a specified range of frequencies.

Band-elimination filter (BEF):

Filter which does not pass signals within a specified range of frequencies.

Most noise emitted from electronic equipment is at frequencies higher than circuit signals. Therefore, low-pass filters, which only pass signals with frequencies lower than a specified frequency and attenuates signals with frequencies higher than this frequency, are generally used as EMI filters.

3.Noise Suppression by Low-pass Filters

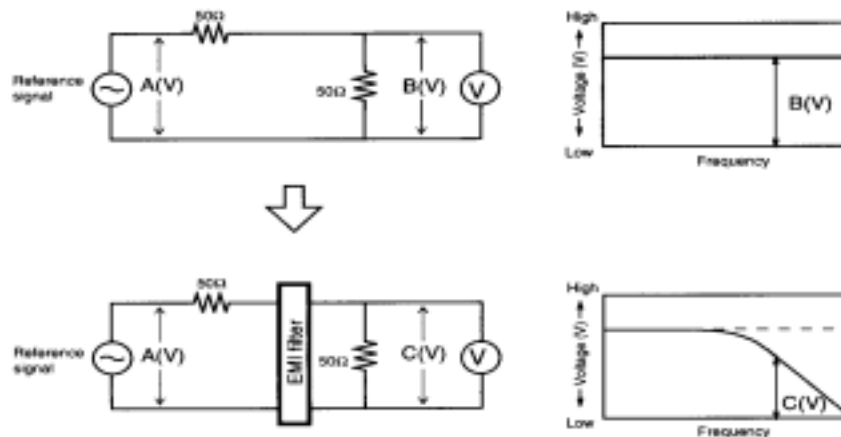
3.2.Insertion Loss

Insertion Loss

8

Measuring methods of insertion loss (as specified in MIL STD-220 with input and output impedances of 50 ohm)

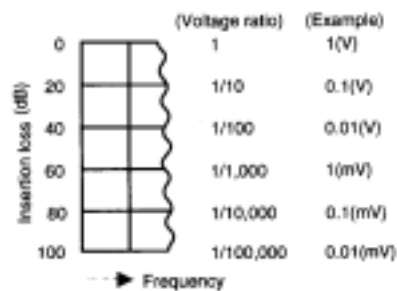
(a) Circuit for measuring insertion loss



(b) Expression to find insertion loss

$$\text{Insertion loss} = 20 \log \frac{B}{C}$$

(c) Relationship between dB and voltage ratio



The noise suppression performance of EMI filters is measured according to the measuring method of insertion loss specified in MIL STD-220. Voltage across a load is measured both with and the expression shown above. The unit of insertion loss is expressed in dB (decibel). For example, when insertion loss is 20 dB, noise voltage is reduced to one-tenth.

[Notes]

This measurement is performed with input/output impedance of 50 ohm (50 ohm system). However, in real-life circuit the input/output impedance is not 50 ohm so the filter performance will differ from the 50 ohm system.