

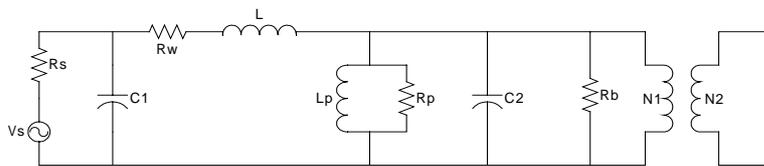
# APPLICATION

## PULSE AND SIGNAL TRANSFORMER

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Pulse and signal transformers, also known as wideband transformers, are used in communication systems, including digital networks such as, for example ISDN and xDSL. They provide impedance matching and DC isolation or transform signal amplitudes. Signal power levels are low. In order to transmit analog signals or digital characteristics are needed. The principal function of the transformer core is providing optimum coupling between the windings.

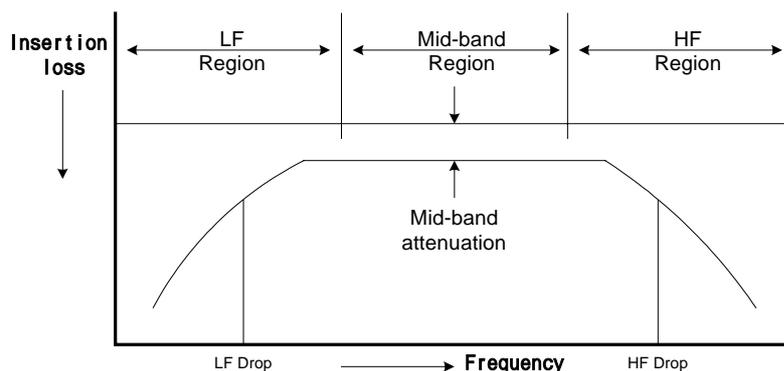
The basic equipment circuit of a signal transformer is shown in Fig. 1.



**Fig.1. Equivalent circuit of a transformer**

A high permeability core with polished pole faces results in a large flux contribution, improving the coupling. Open circuit inductance will be high, leakage inductance is kept low compared to this main inductance.

Toroids are very suitable since they have no air gap and make use of the high permeability of the ferrite. The frequency response of a practical transformer is shown in Fig. 2.



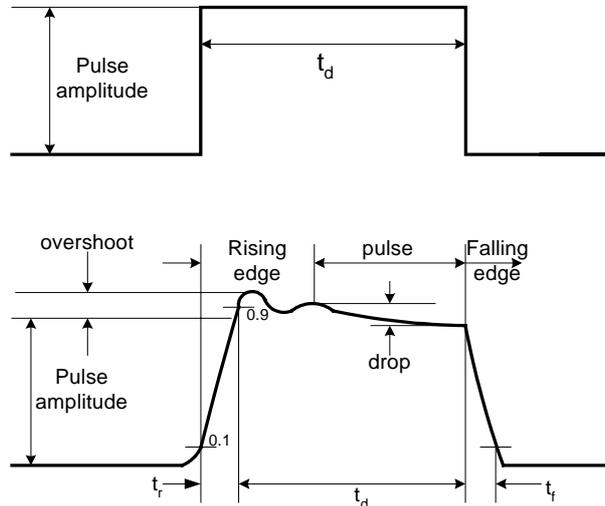
**Fig. 2. Transmission characteristic of a wideband transformer**

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The corresponding distortion of a rectangular pulse by the same circuit is shown in Fig. 3.



**Fig. 3. An ideal rectangular pulse and the pulse distortions that may be induced by a transformer**

The shunt inductance ( $L_p$ ) is responsible for the low frequency droop in the analog transformer since its reactance shunts the circuit as the frequency decreases. In case of the pulse transformer, the shunt inductance causes the top of the pulse to droop, because, linearly with time causing an increasing voltage drop across the resistance.

The Winding resistance is the main cause of the mid-band attenuation in low frequency analog transformer; it attenuates the output pulse but usually has little effect on the pulse distortion

The high frequency droop of an analog transformer maybe due to either the increasing series reactance of the leakage inductance or the decreasing shunt reactance of the self-capacitance, or a combination of both as the frequency increases. In a pulse transformer, the leakage inductance, self-capacitances and the source or load resistance combine to slow down, or otherwise distort the leading and trailing edge responses.