

DEFINITIONS FOR ELECTROMAGNETIC DELAY LINES

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3. DEFINITIONS AND SYMBOLS

3.1 Distortion — May be defined specifically as a special case or more commonly as a generalized or all encompassing condition.

3.1.1 Specific — Defined in % by specifically indicating the maximum value of pre-pulse distortion (b), pulse amplitude distortion (c), and post pulse distortion (d) relative to the pulse amplitude (E), where each is not necessarily of equally permissible amplitude. May further be defined by indicating the period in which these spurious responses may occur.

3.1.1.1 PRE-PULSE DISTORTIONb (%)

$$b (\%) = \pm \frac{|b|}{E} \times 100$$

where |b| represents peak pre-pulse distortion.

3.1.1.2 PULSE AMPLITUDE DISTORTIONc (%)

$$c (\%) = \pm \frac{|c|}{E} \times 100$$

where |c| represents peak pulse amplitude distortion.

3.1.1.3 POST PULSE DISTORTIONd (%)

$$d (\%) = \pm \frac{|d|}{E} \times 100$$

where |d| represents peak post pulse distortion.

3.1.2 All EncompassingS (%)

Defined as the largest peak amplitude of all spurious responses either in the positive or negative direction relative to the pulse amplitude. Calculated in %.

$$S (\%) = \pm \frac{|b| \text{ or } |c| \text{ or } |d|}{E} \times 100$$

where |b|, |c| or |d| represents largest peak amplitudes.

3.2 Impedance

3.2.1 Characteristic ImpedanceZ₀

That value of terminating impedance which provides minimum reflections to the input of the line.

3.2.2 Source ImpedanceZ_s

The impedance of the pulse source as seen by the delay line input terminals.

3.2.3 Terminating ImpedanceZ_t

The impedance of the load as seen by the delay line output terminals.

3.3 Pulse Amplitude (see figures)E

3.4 Temperature Coefficient of DelayT_c

The change in delay with temperature expressed as:

3.4.1 Parts per million per degree centigrade(PPM/°C)

or,

3.4.2 Microsecond per microsecond per degree centigrade (μsec/μsec/°C)

or,

3.4.3 Percent per degree centigrade(%/°C)

3.5 Tilth

Expressed in % as:h (%)

$$h (\%) = \pm \frac{|h|}{E} \times 100$$

where |h| is absolute value of height of tilt axis.

3.6 Time

3.6.1 Delay Line Fall Timet_f

The time of the amplitude decreasing edge of the output pulse, assuming a step-function input.

3.6.2 Delay Line Rise Timet_r

The time of the amplitude increasing edge of the output pulse, assuming a step-function input.

3.6.3 Delay Timet_d

Elapsed time between the 50% amplitude of the leading edges (refer to point 1 on all figures) of the delay line input and output pulses or between an otherwise designated input and output point.

3.6.4 Pulse Duration (see figures)t_p

3.6.5 Pulse Fall Time (see figures)t_{fn}

3.6.6 Pulse Rise Time (see figures)t_{rn}

3.7 Voltage Attenuationα

The difference in voltage amplitude between delay line input and output pulses or between an otherwise designated input (E_i) and output (E_o). Expressed in % or db as:

3.7.1 α (%) = $\frac{E_i - E_o}{E_i} \times 100$ (%)

3.7.2 α (db) = $20 \log_{10} \frac{E_i}{E_o}$ (db)

3.7.3 = $20 \log_{10} \frac{E_{ni}}{E_{no}}$ (db)

4. NOTES

4.1 Figure 1 — General case.

4.2 Figure 2 — Where tilt is essentially 0 (zero), the axis of oscillation will be horizontal, eliminating the need of establishing intersection points 2 and 3 of Figure 1.

4.3 Figure 3 — Where pulse width is narrowed to the point where no axis of oscillation (A_p) can be established then the pulse amplitude (E) will be considered as the peak of the pulse.

Figure 1

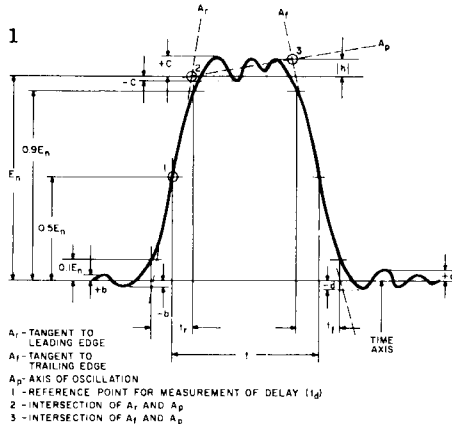


Figure 2

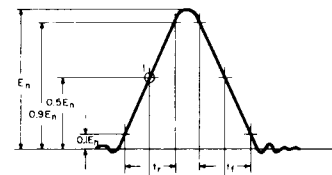
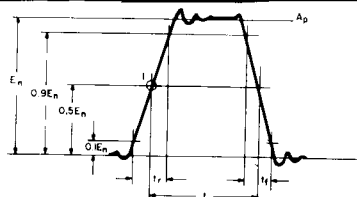


Figure 3

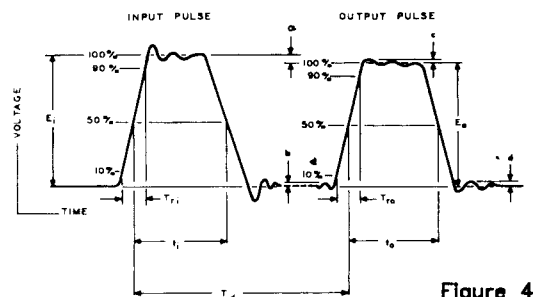


Figure 4