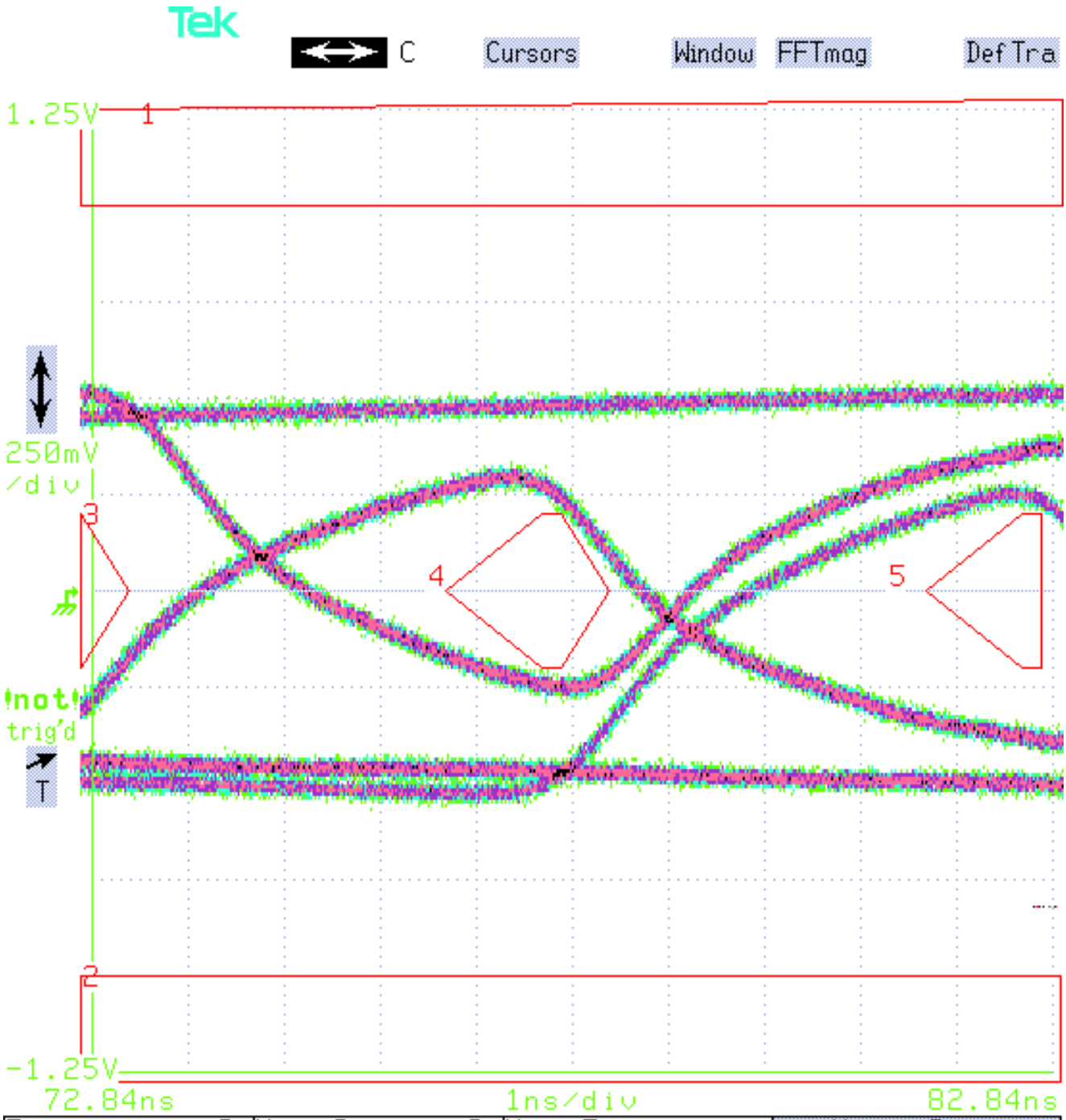
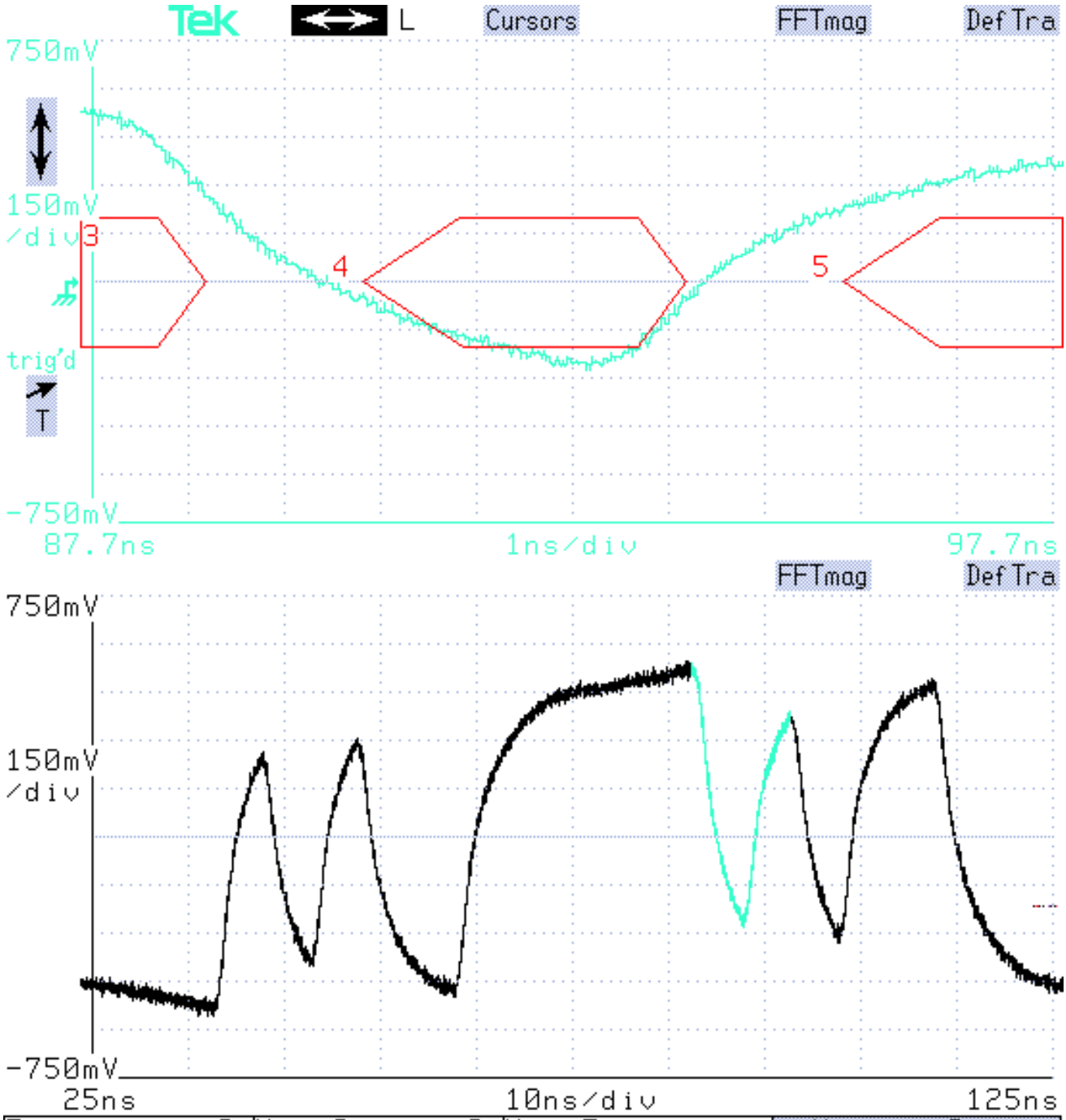
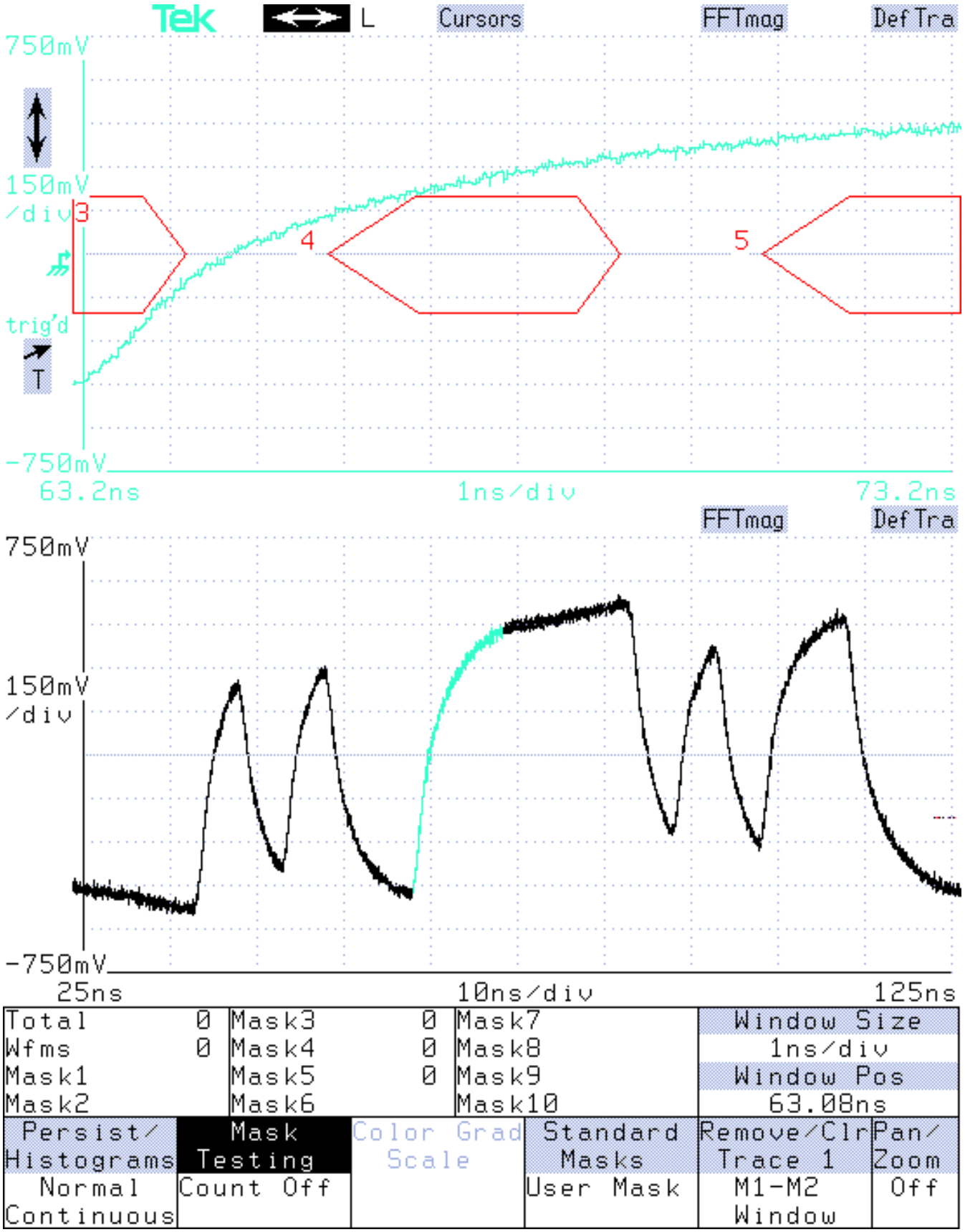


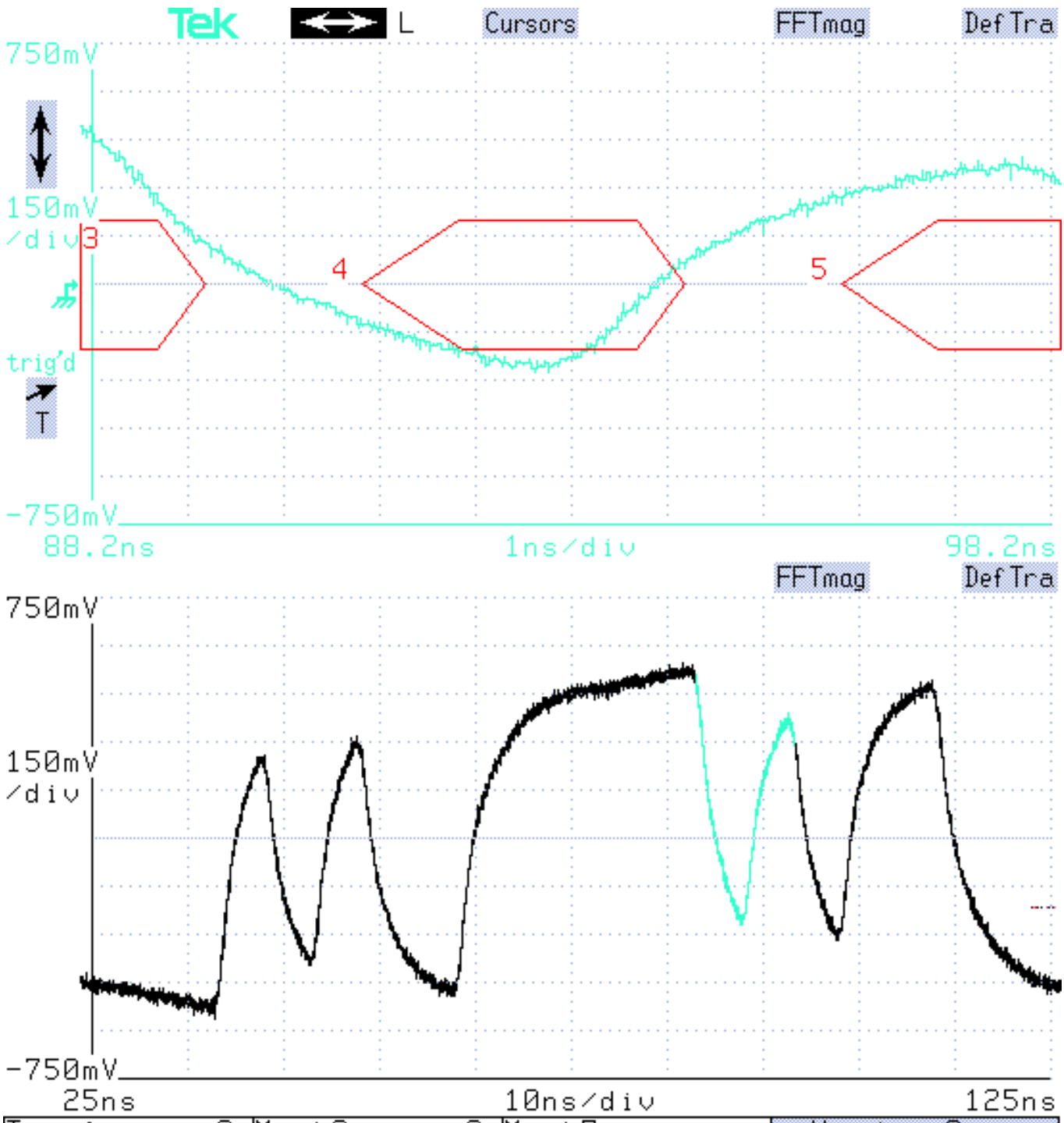
Screen dump 1: 35 meter cable



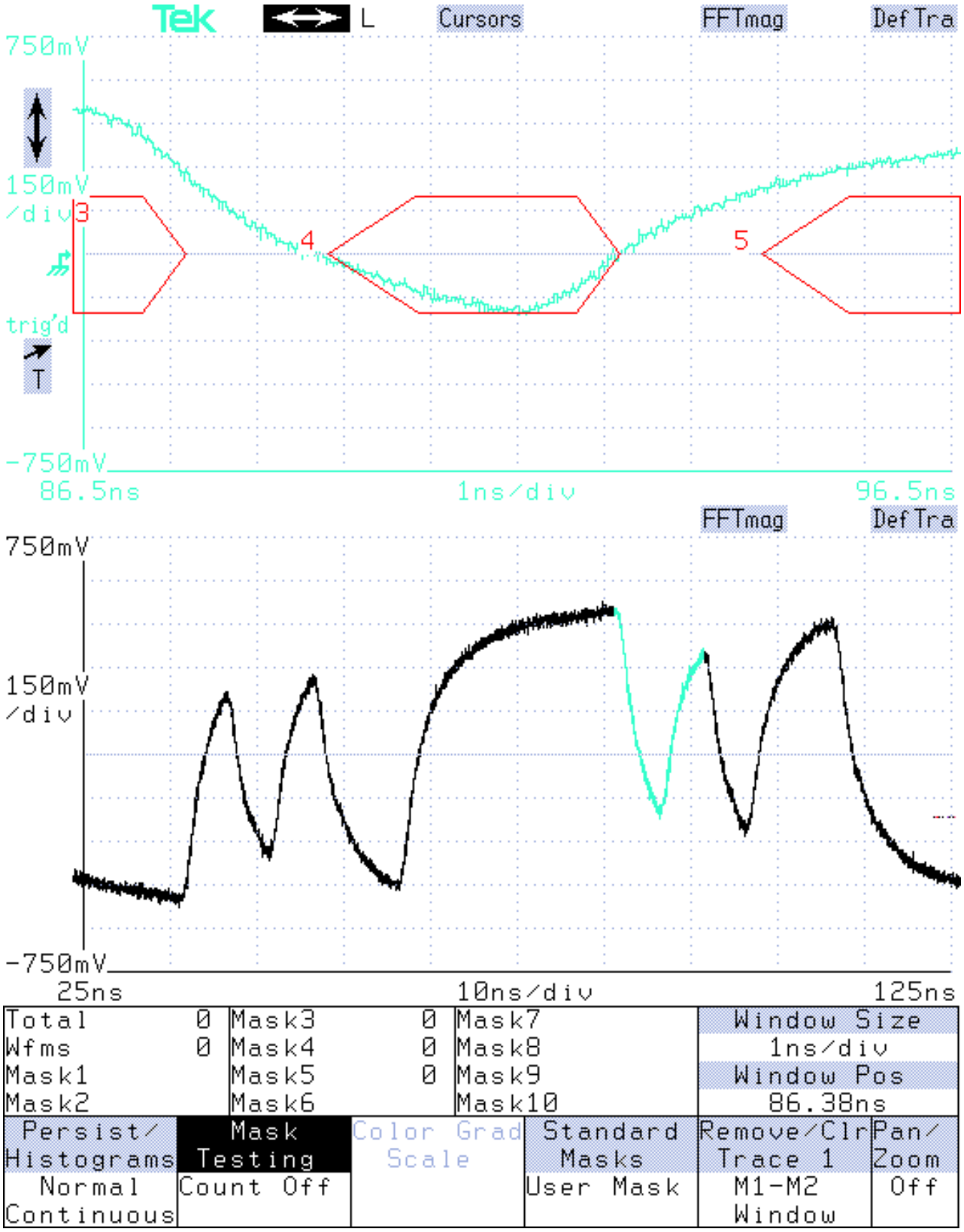
Screen dump 2: 35 meter cable



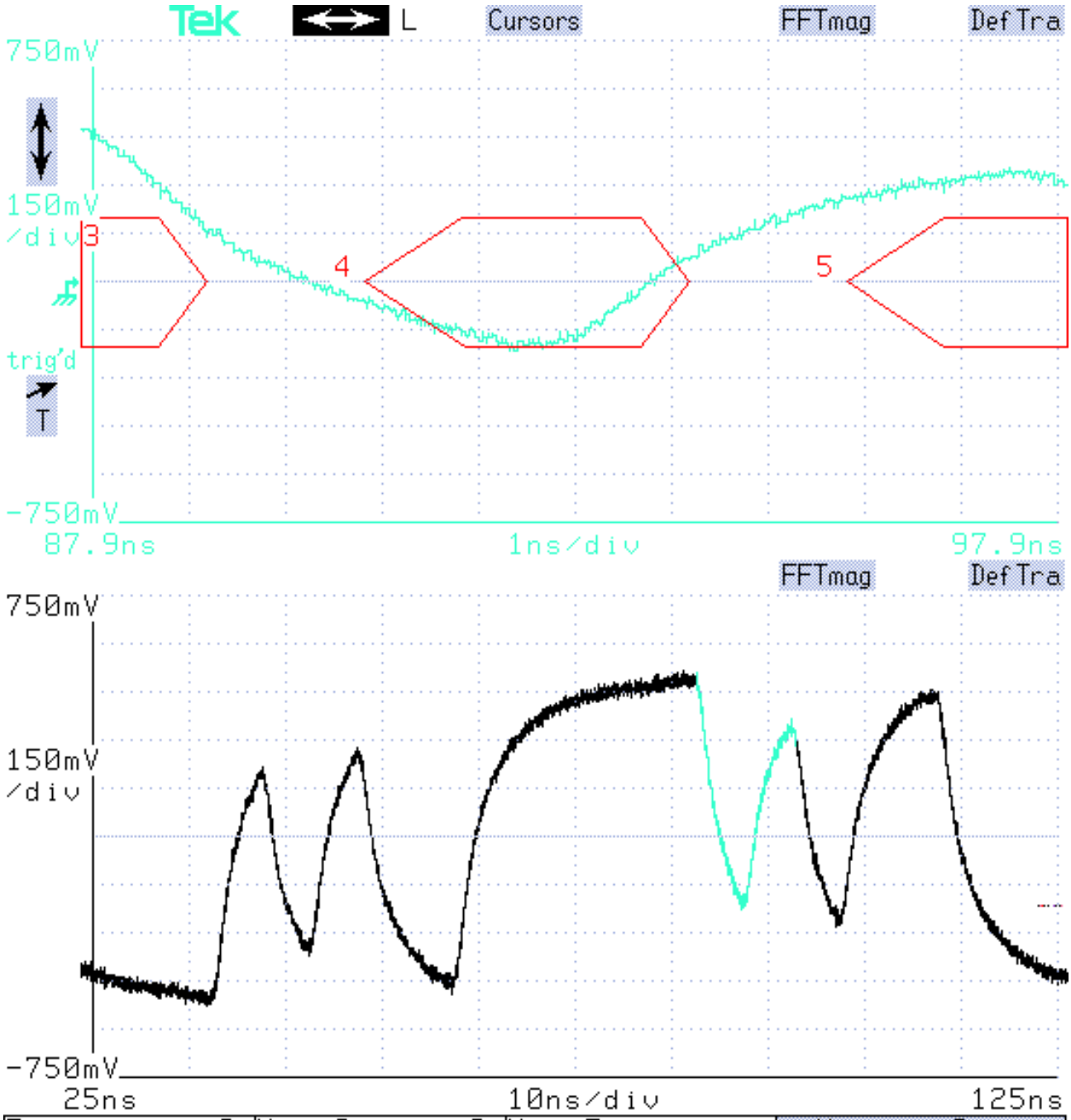
Screen dump 3: 35 meter cable



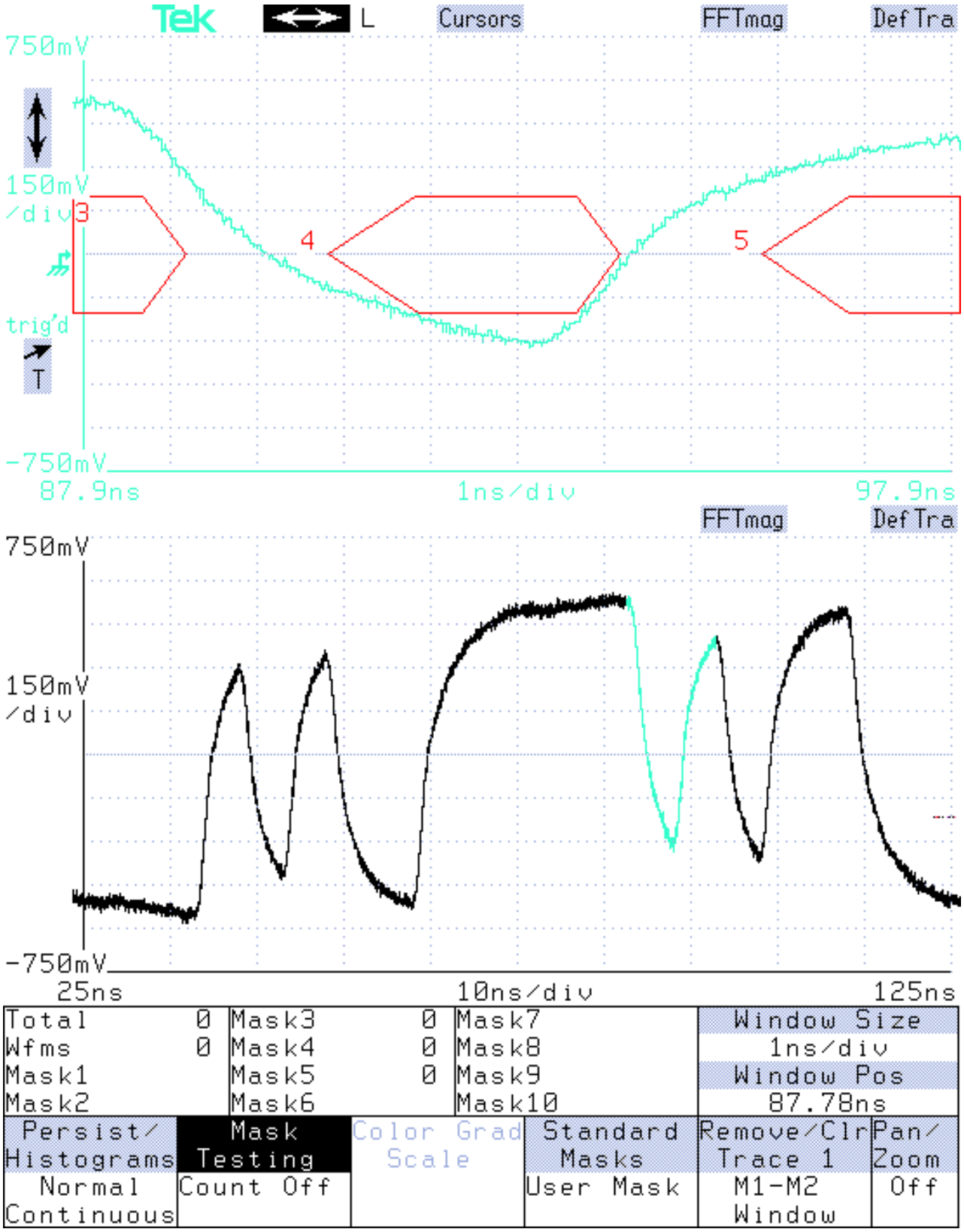
Screen dump 4: 35 meter cable



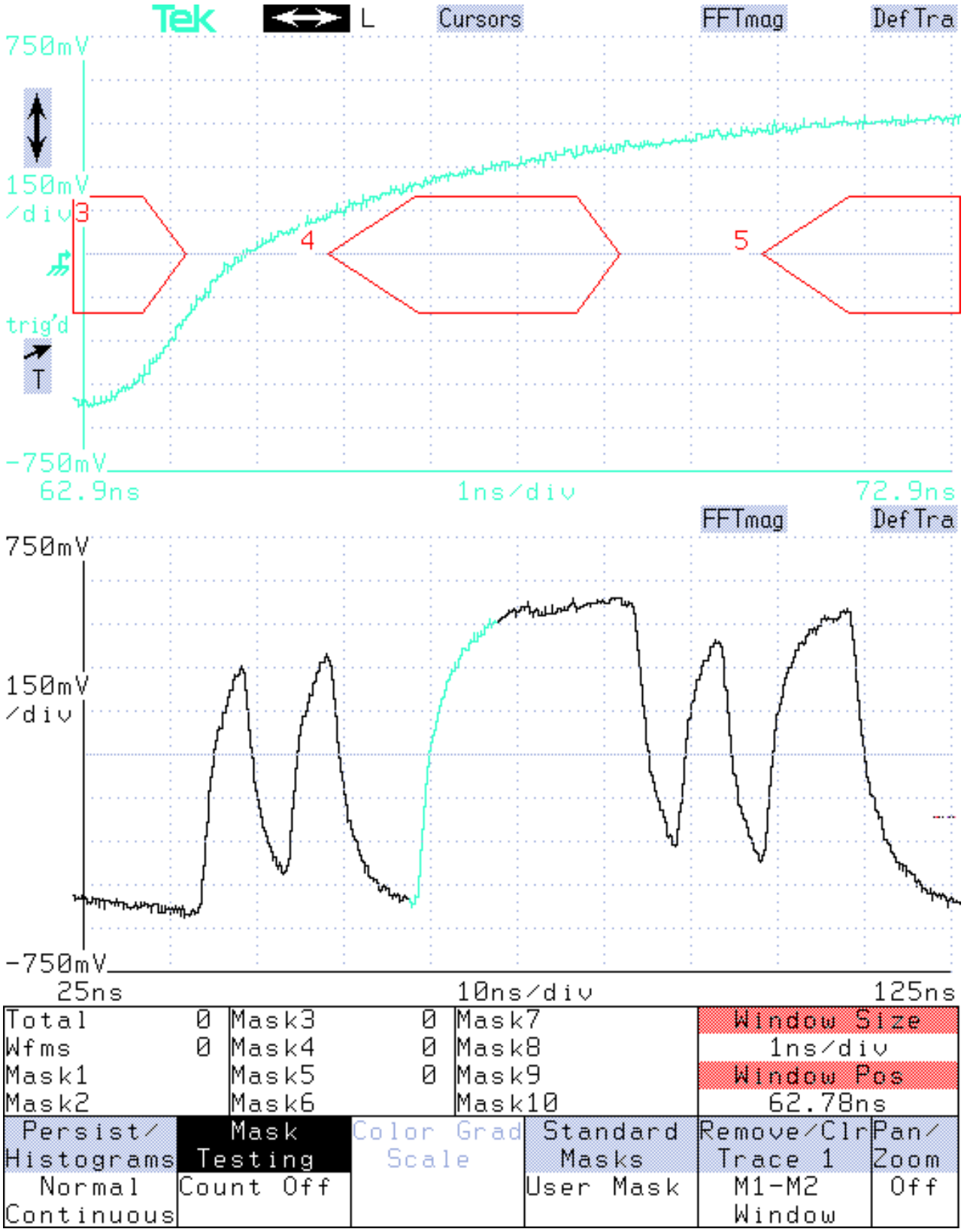
Screen dump 5: 40 meter cable



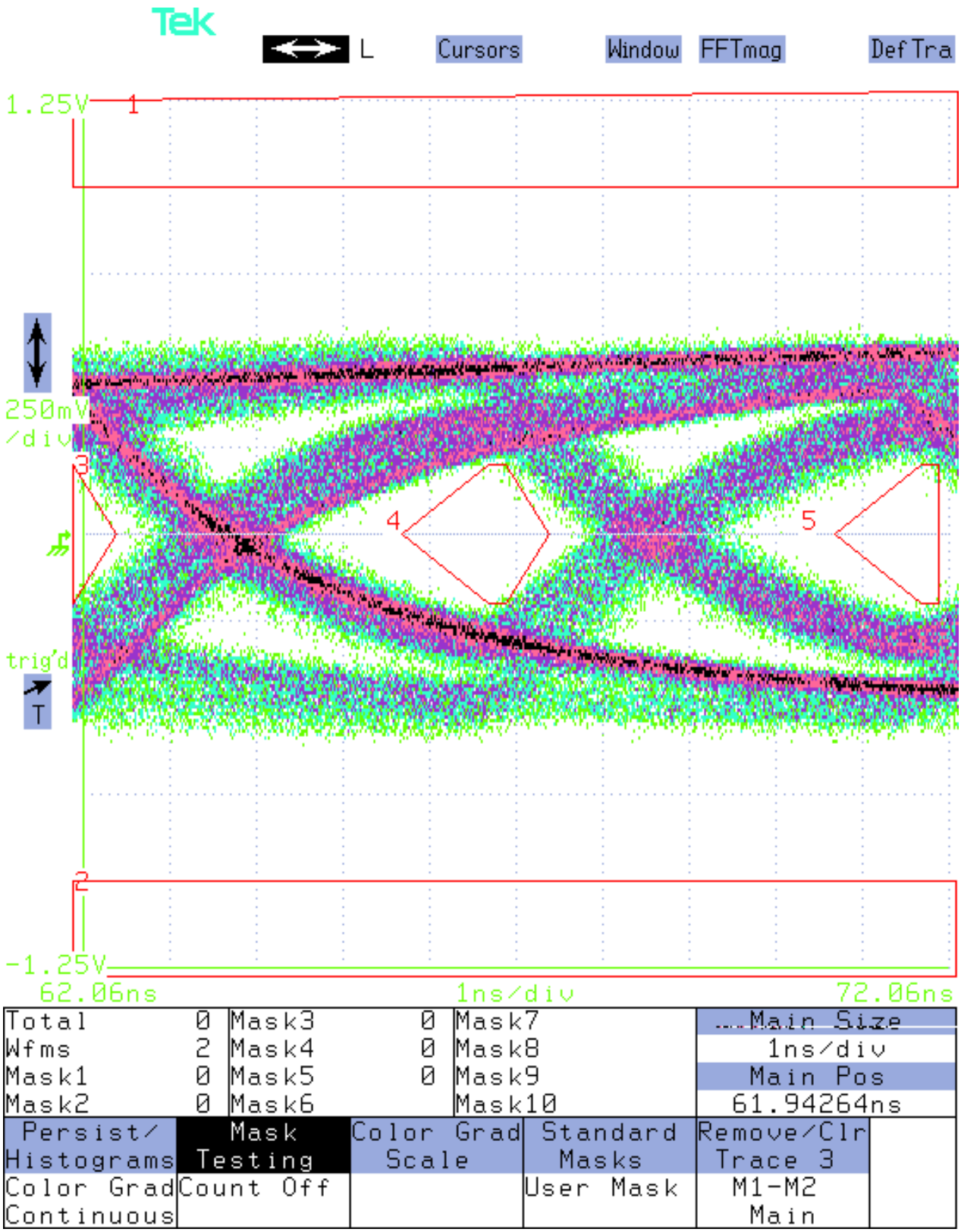
Screen dump 6: 40 meter cable



Screen dump 7: 29 meter cable



Screen dump 8: 29 meter cable



Screen dump 9: 40 meter cable traffic data

Jitter Nulling

Relevant sections 7.2.3 and 7.5.1

When creating a degraded signal for receiver testing, 7.2.3, it is possible to degrade the signal such that it fits the Receiver pulse mask as defined by the Table 8 timings but the signal actually presented to the receiver intrudes into the pulse mask as defined by Table 7. This is particularly true if a long cable is used as the means of signal degradation by introducing jitter by intersymbol interference. Because the only trigger available is the data itself a method is needed is that removes jitter so that the actual width of each bit can be checked.

The requirement that Port Connection Segments be tested using DIS characters, 7.5.1, has the same problem but the use of a constant character gives us the means by which jitter can effectively be removed (perhaps nulled is a better word than removed).

The DIS character is a pattern that repeats every 20 bits so if the only jitter is intersymbol jitter then the time between any two edges within that 20 bit pattern is constant. If the scope is now adjusted so that the complete 20 bit pattern is displayed then the trigger is now being taken from the same edge in the pattern and the display will be jitter free. Driver clock jitter will still remain but is almost insignificant and in any case is easily seen as being such.

A window or delayed sweep containing the Receiver Pulse Mask using Table 7 timings can now be moved across the 20 bit trace in 1 bit time increments and any intrusions noted. The actual reference point from which the 1 bit time increments can be set by repeatedly moving the window across the 20 bit display until a reference point is found from which every bit time meets the pulse mask, or no point can be found.

This is not as onerous as it sounds. Simply check each single bit pulse to see if it could fit around the mask if the reference point is ignored, if it cannot then the PCS has failed without further checks being required. If all can then make the one that comes closest the reference point. Note, the bit that will come closest to the perimeter of the mask will, in the case of a cable, usually be the single bit that follows the 5 bits of constant 1 or 0.

This method can be used to check the validity of the amount of degradation used in the receiver checks of 7.2.3. Simply apply the amount and type of degradation being used on the test system to constant DIS characters of the same amplitude. Then use the method described above to check that the mask is not violated.

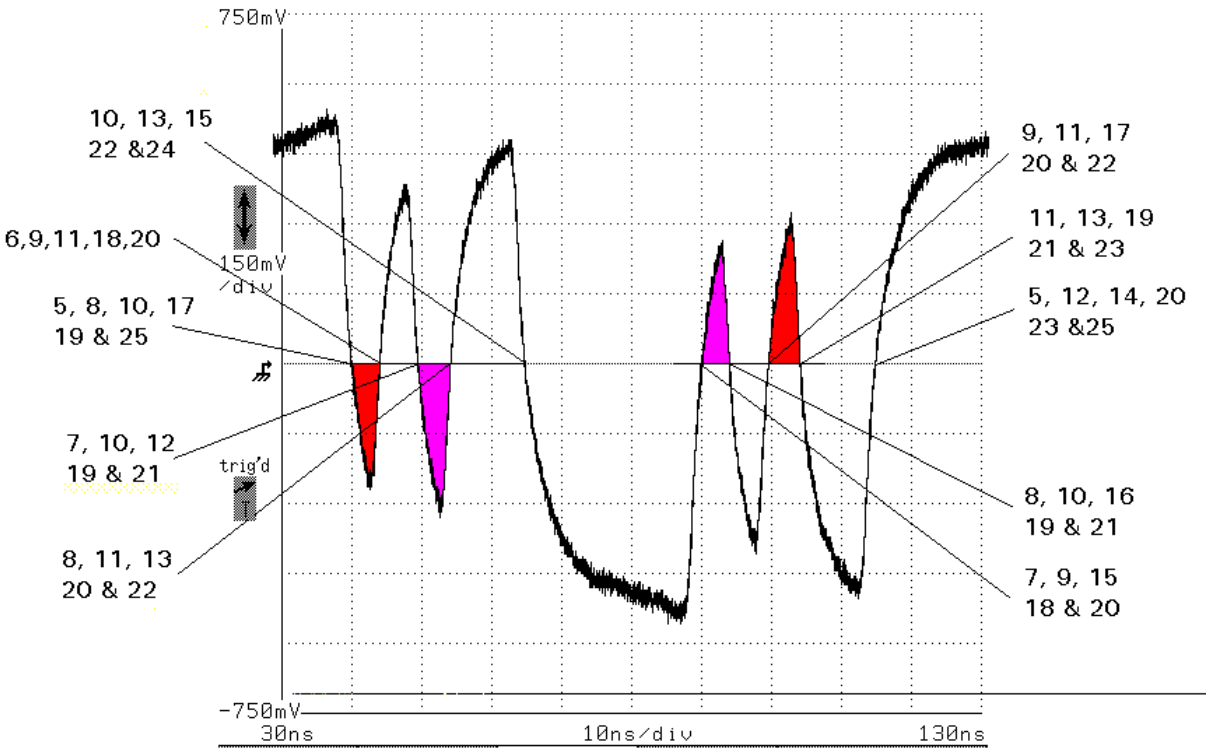


Figure 1: A complete 'cycle' of the K28.5 character

It is not possible for all bit times of a K28.5 DIS character to form part of an 'eye' pattern for mask checking.

The DIS character has only 5 trigger edges in every cycle of 20 bits so for every setting of data bit delay from trigger only 5 data bit times out of the total of 20 will be displayed.

Some combinations of data bit times can never occur.

Figure 1 shows which bit times of the K28.5 DIS character can superimpose for every data bit delay from trigger for delays from 5 to 25 data bit times. The numbers show the data bit delay to every data bit from all possible preceding trigger edges. Only those edges that have a bit delay number in common will superimpose, and then only when the delay is equal to the common number or numbers.

Examples:

The bit times coloured red will superimpose when the data bit delay from trigger is 17

The bit times coloured purple will superimpose when the data bit delay from trigger is 7

The bit times coloured red cannot superimpose with those coloured purple

This shows that the lowest amplitude +ve bit time and the lowest amplitude -ve bit time cannot be simultaneously checked against the Pulse Masks.

Annex X

(normative/informative)

Nulling of Intersymbol Jitter

The scope trigger source used for the Pulse Mask testing does not allow the timings of Table 4 (for the driver) or Table 7 (for the receiver) to be used for varying data patterns, or directly used on data streams of one character value. This appendix describes a method whereby the timings of Tables 4 or 7 can be applied to the K28.5 character when the predominant jitter is intersymbol jitter.

1. Trigger the scope as detailed in 7.2.3 but use a delay of 4 to 6 data bit times.
2. Adjust the scope timebase such that a total of 20 data bit times is displayed. A stable display of the K28.5 character should now be possible. Adjustment of trigger holdoff may be required.
3. Define a window or delayed sweep trace containing the Driver or Receiver Pulse Mask of figures 9 or 11 using the timings from Table 4 or 7 as required.
4. Check each data bit time of the main display by moving the window or delayed sweep in 1 data bit time intervals. Adjust the reference point, to which the 1 data bit time intervals are referenced, in increments of less than 1 data bit time, until a point is found at which all data bit times pass the mask without interim adjustment of the reference point, or no such point is found.

Amendments to body of specification

Add to the end of para 6 of 7.2.3 (which starts - The amplitude and jitter appearing at the line receiver....).

> The validity of the degradation applied shall be checked by temporarily substituting continuous K28.5 characters with alternate running disparity for the data pattern that will be used for the test and applying the method detailed in Annex X.

Add to the end of the 2nd sentence of 7.5.1 para 1, that currently ends ....receiver pulse mask in 7.2.

> so that it ends ....receiver pulse mask in 7.2 using the method of Annex X.