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Attenuation Data for Ultra320 SCSI

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Introduction

- There were questions about SCSI cable and system attenuation at the SPI-4 working group meeting at the end of April in Colorado Springs.
- What follows in this presentation is some of the SCSI attenuation data that Quantum has collected.
- All of this data was gathered from several configurations that all meet the specifications in the SPI-4 standard.
- The cables used were:
  - 10m AWG30 laminated ribbon (Amphenol Twist'N'Flat)
  - 10m AWG32 ribbon (Hitachi)
  - 3.75m AWG32 ribbon
  - 10m round AWG28 (Madison)
  - 25m round AWG28 (Madison)

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Test Procedure

- The following procedure was used for gathering the data:
  - A DC level was transmitted to the receiver, and the amplitude of the DC level was measured at the receiver.
  - A "101010..." pattern was transmitted to the receiver, and the average peak amplitude of the pattern was measured at the receiver.
  - The difference between the DC level and the average of the "101010..." pattern was calculated.
  - All data was gathered at 10 gigasamples per second.
  - Slot 1 was nearest the cable connector; the slot with the highest number was nearest the terminator for the backplane.
  - When measuring point-to-point the launching and receiving boards are ideal. They are not SCSI boards. This should be stressed as the data presented for this case is cable raw bandwidth (not masked by other components).
  - For ease of measurement the values for V_{iso} were measured at the peak of the pulse while, in reality, the center of bit cell is to the left of the peak at lower amplitude.
  - This data does not represent worst-case conditions as driver and terminator offsets in this data are negligible.

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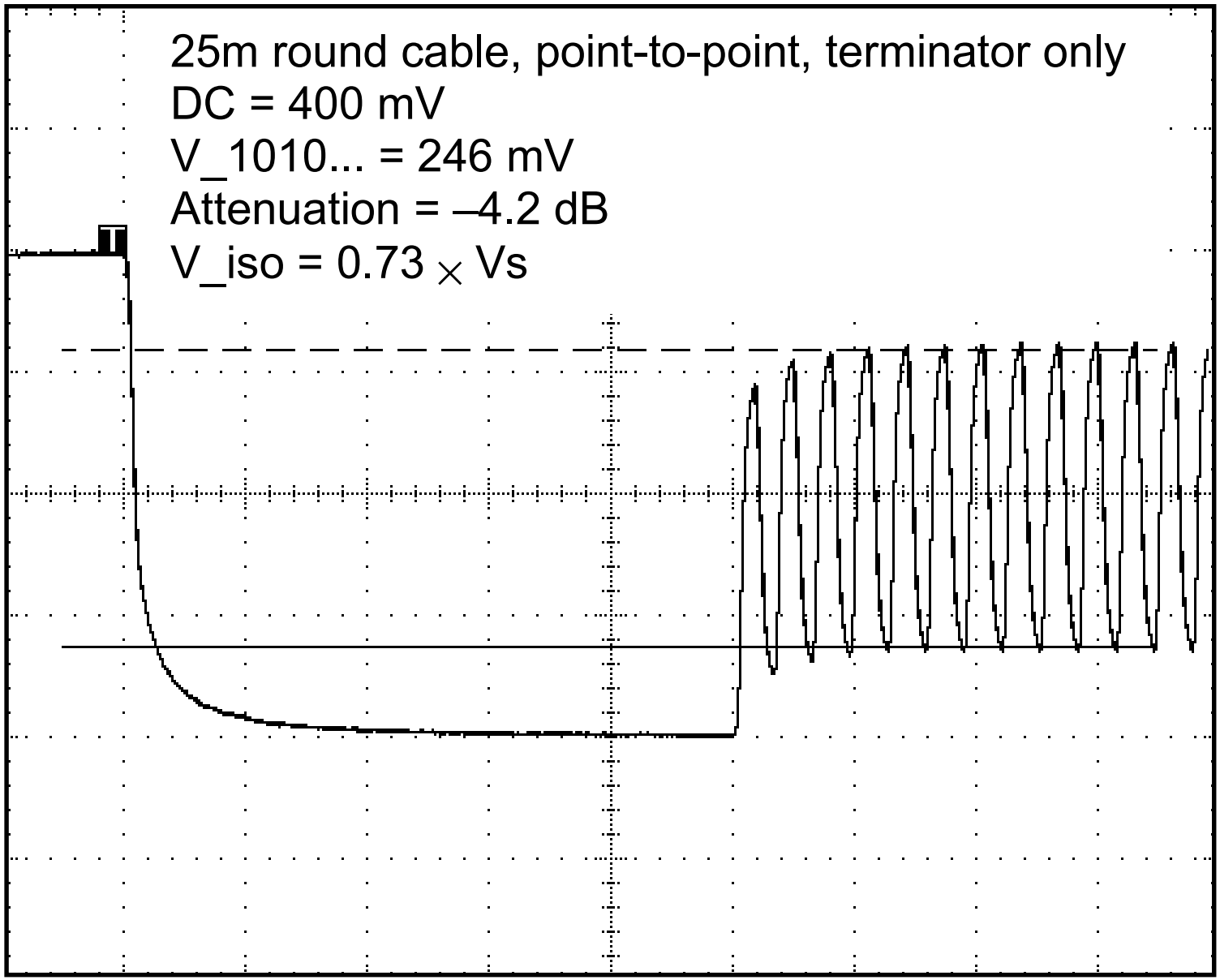
25m round, point-to-point



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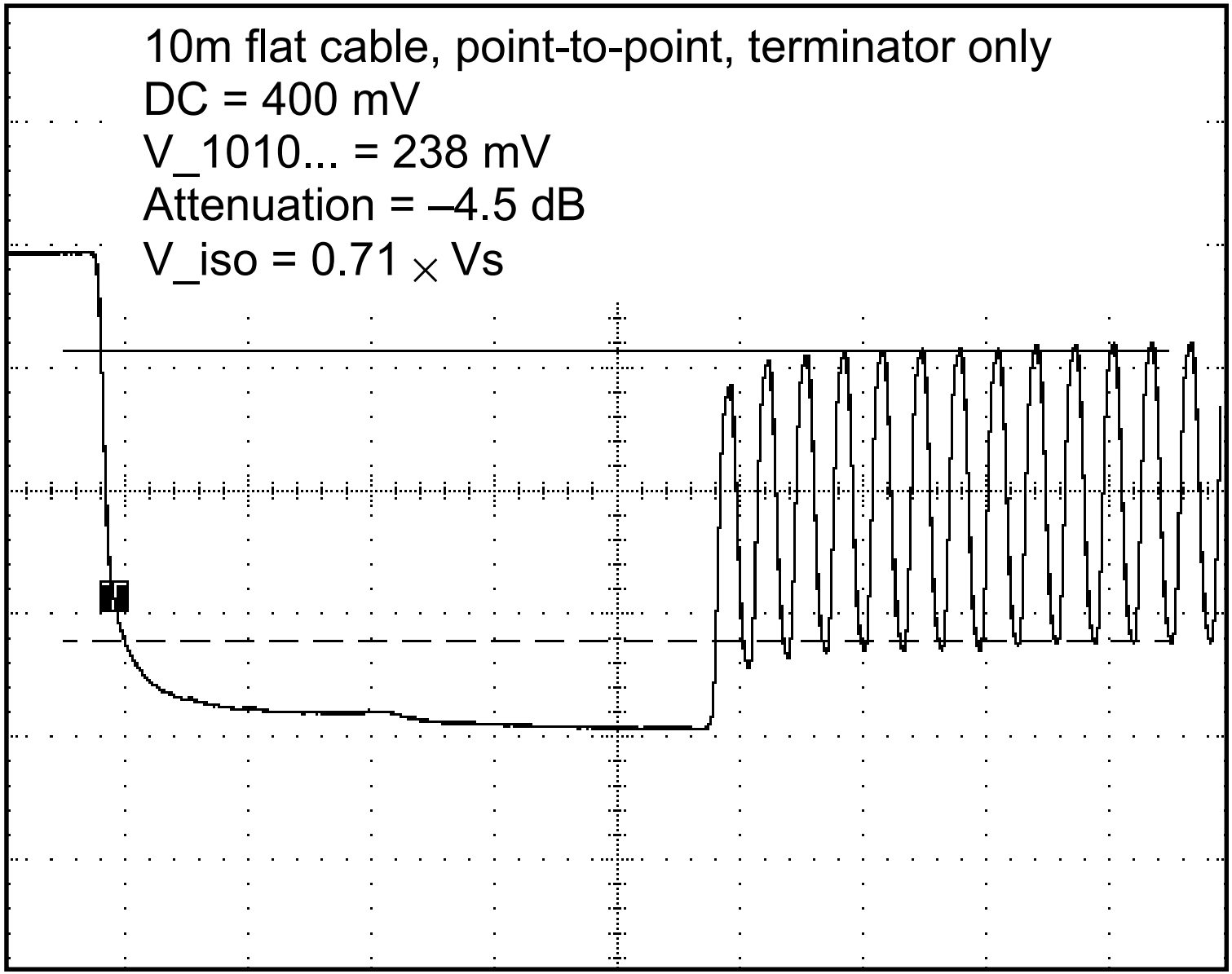
10m flat, point-to-point



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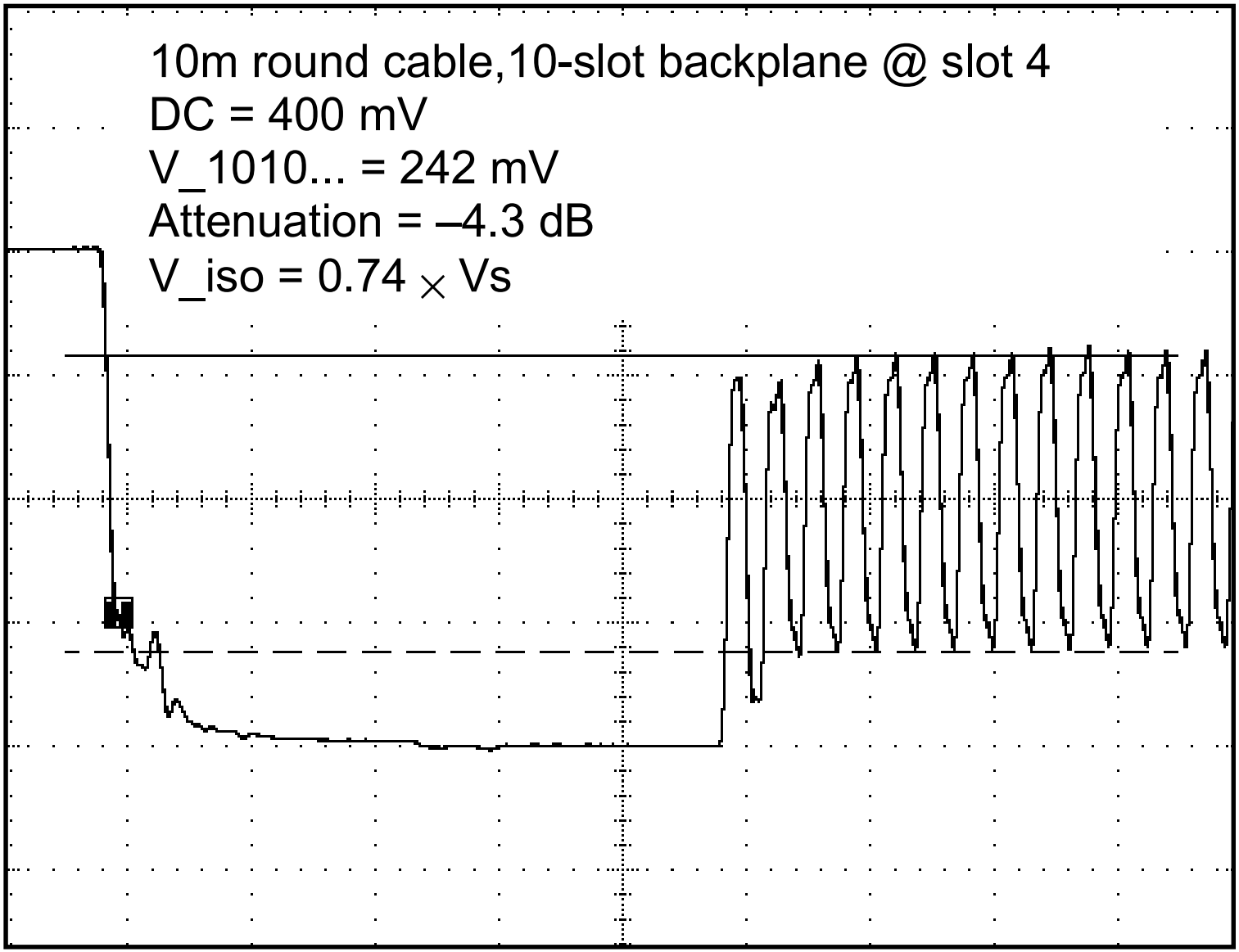
10m round, 10-slot, @ slot 4



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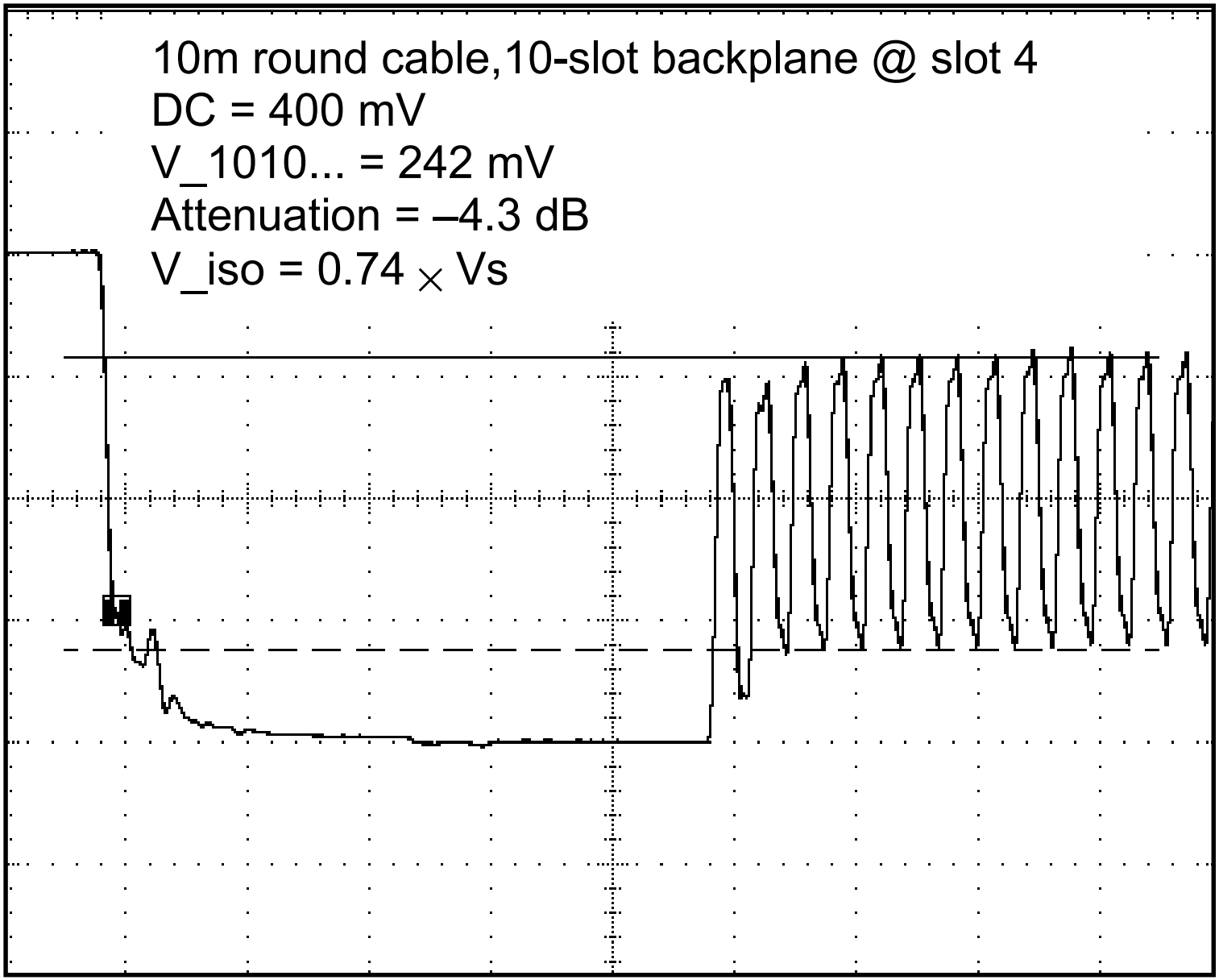
10m laminated, 10-slot, @ slot 4



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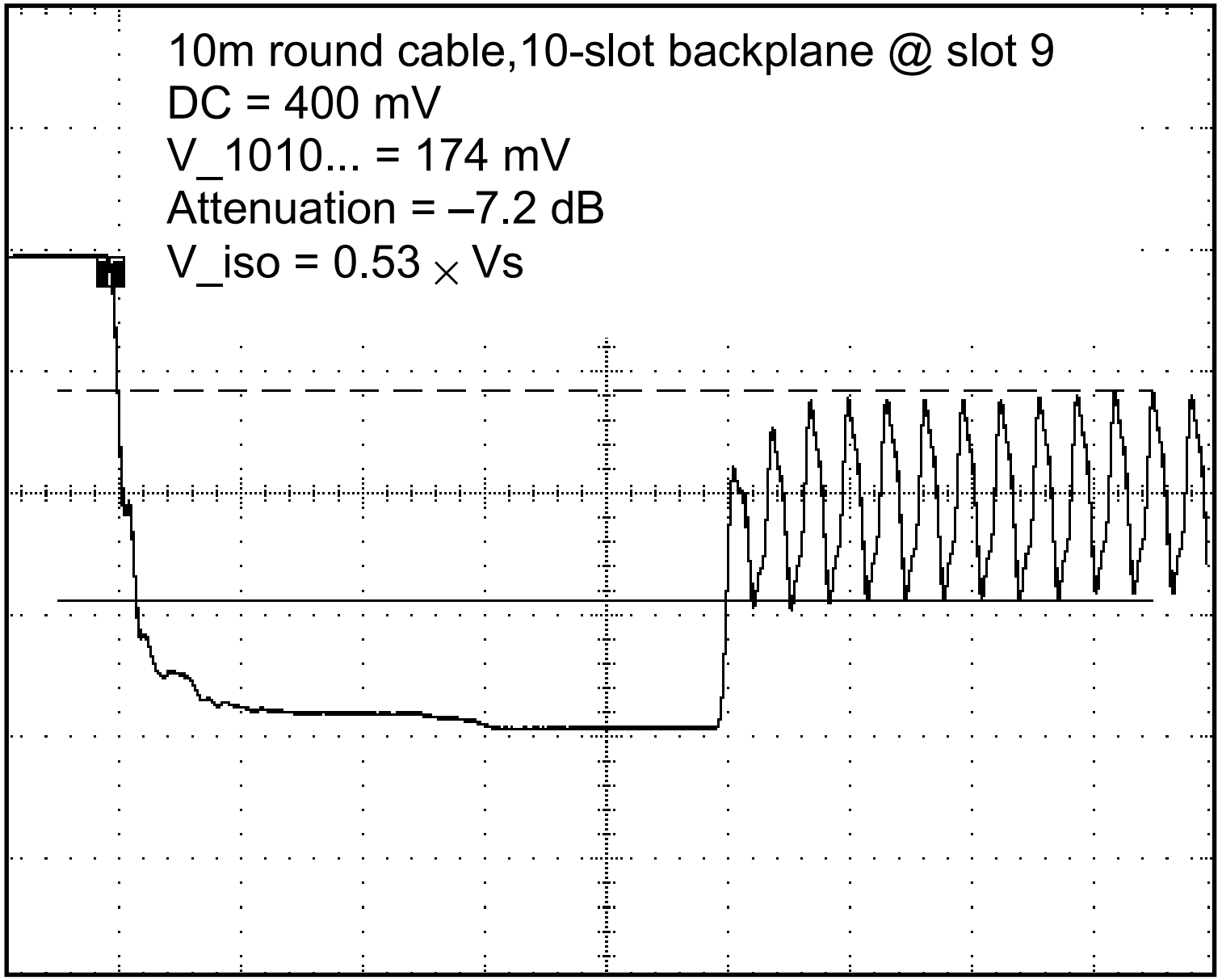
10m round, 10-slot, @ slot 9



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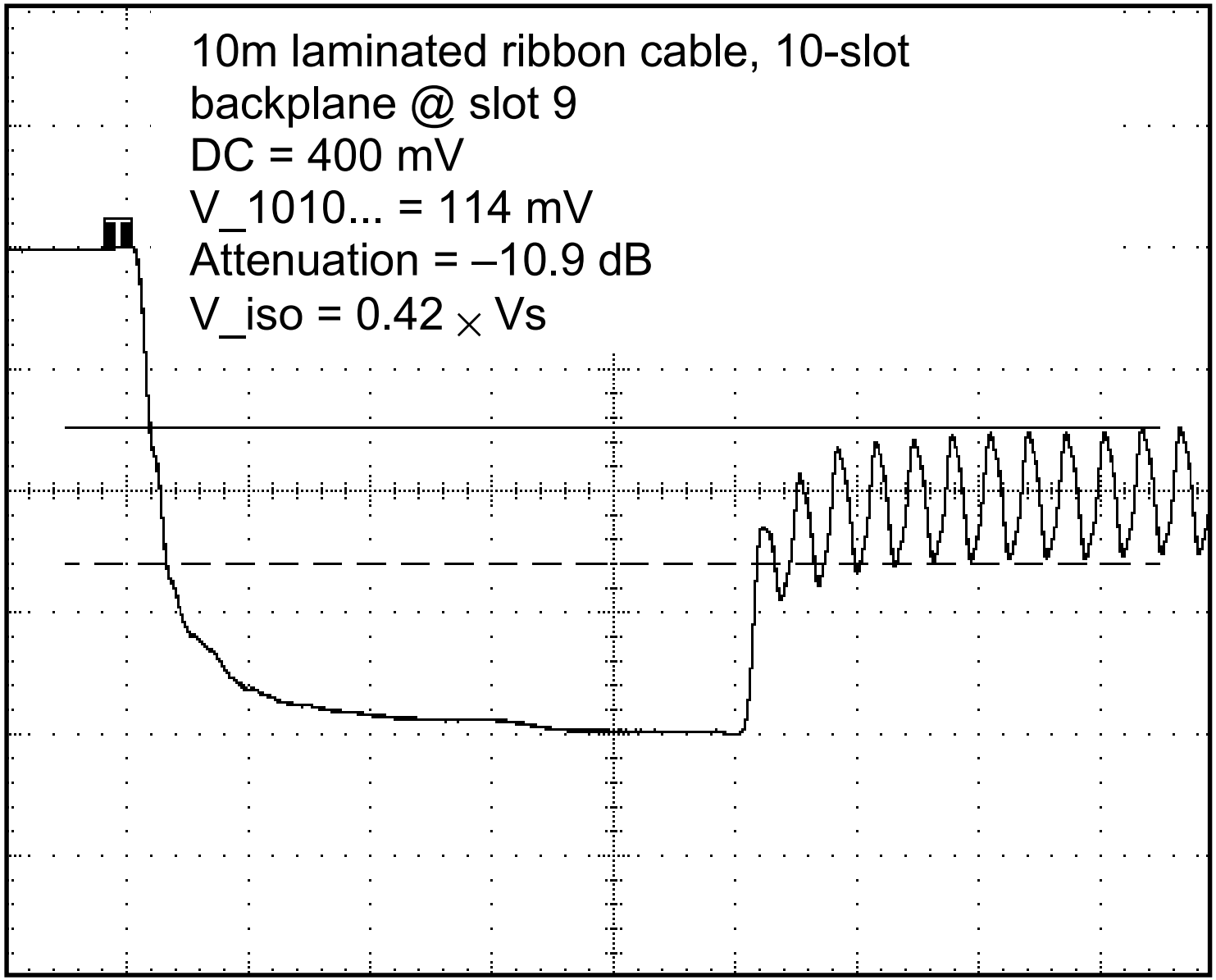
10m laminated, 10-slot, @ slot 9



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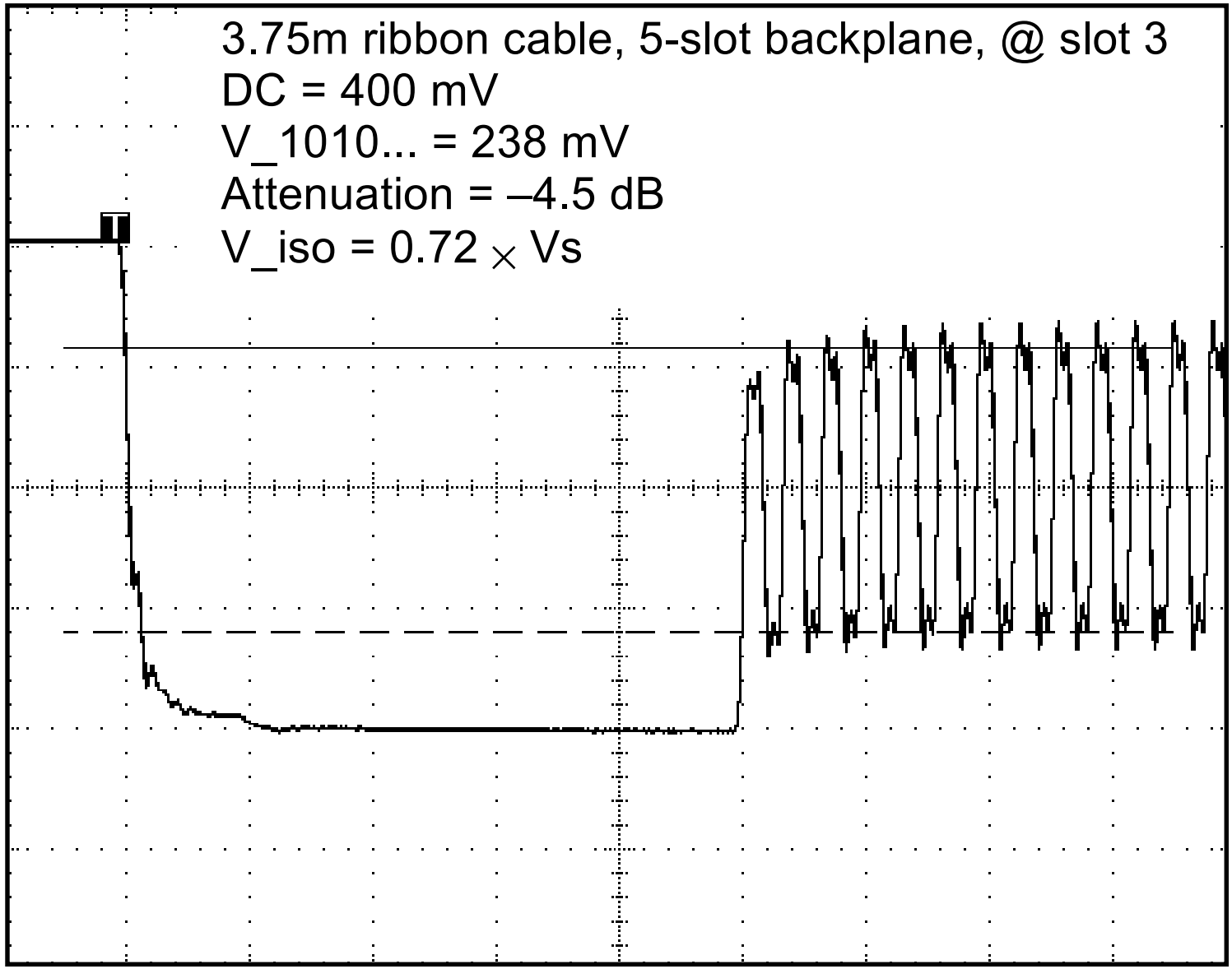
3.75m flat, 5-slot, @slot 3



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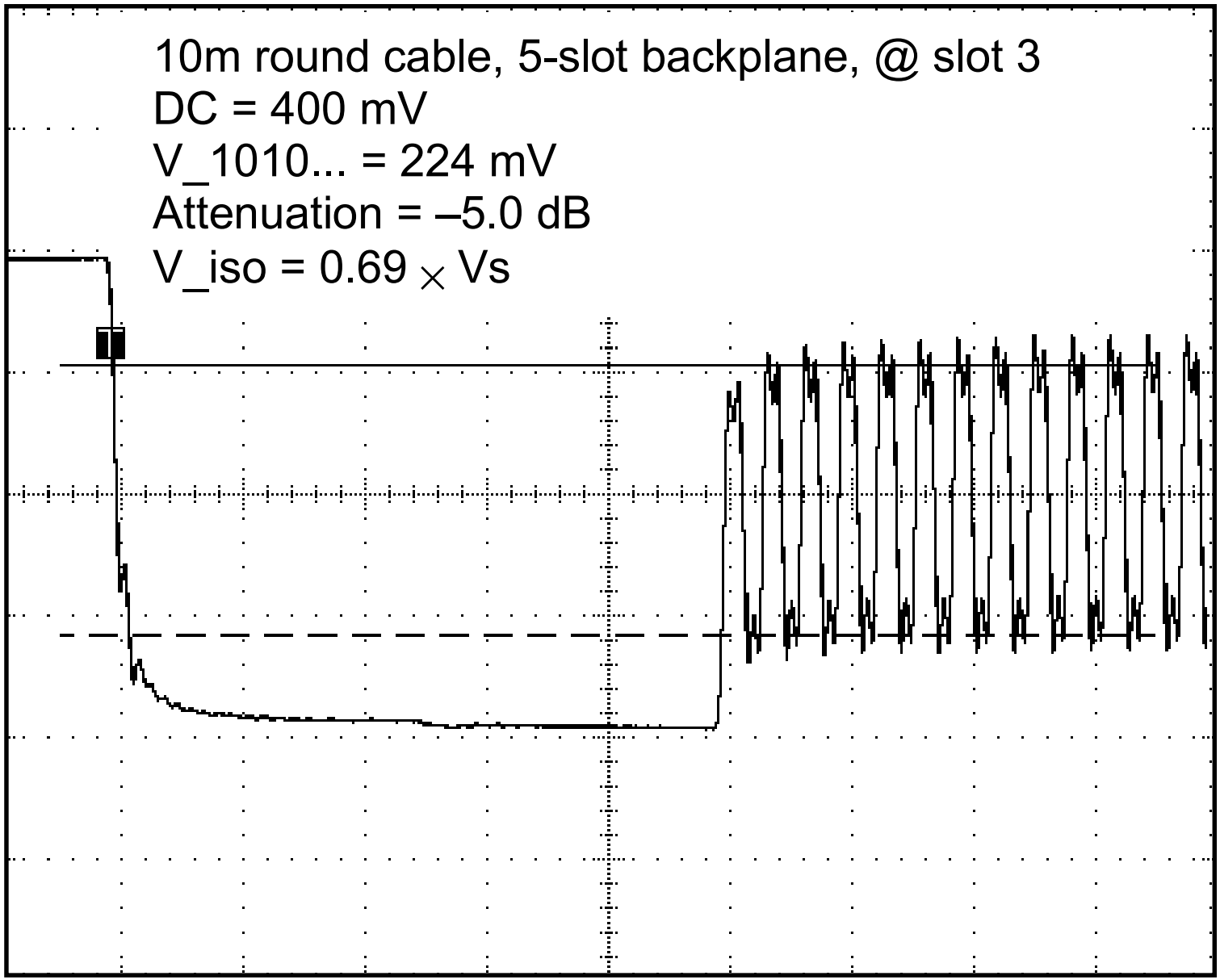
10m round, 5-slot, @ slot 3



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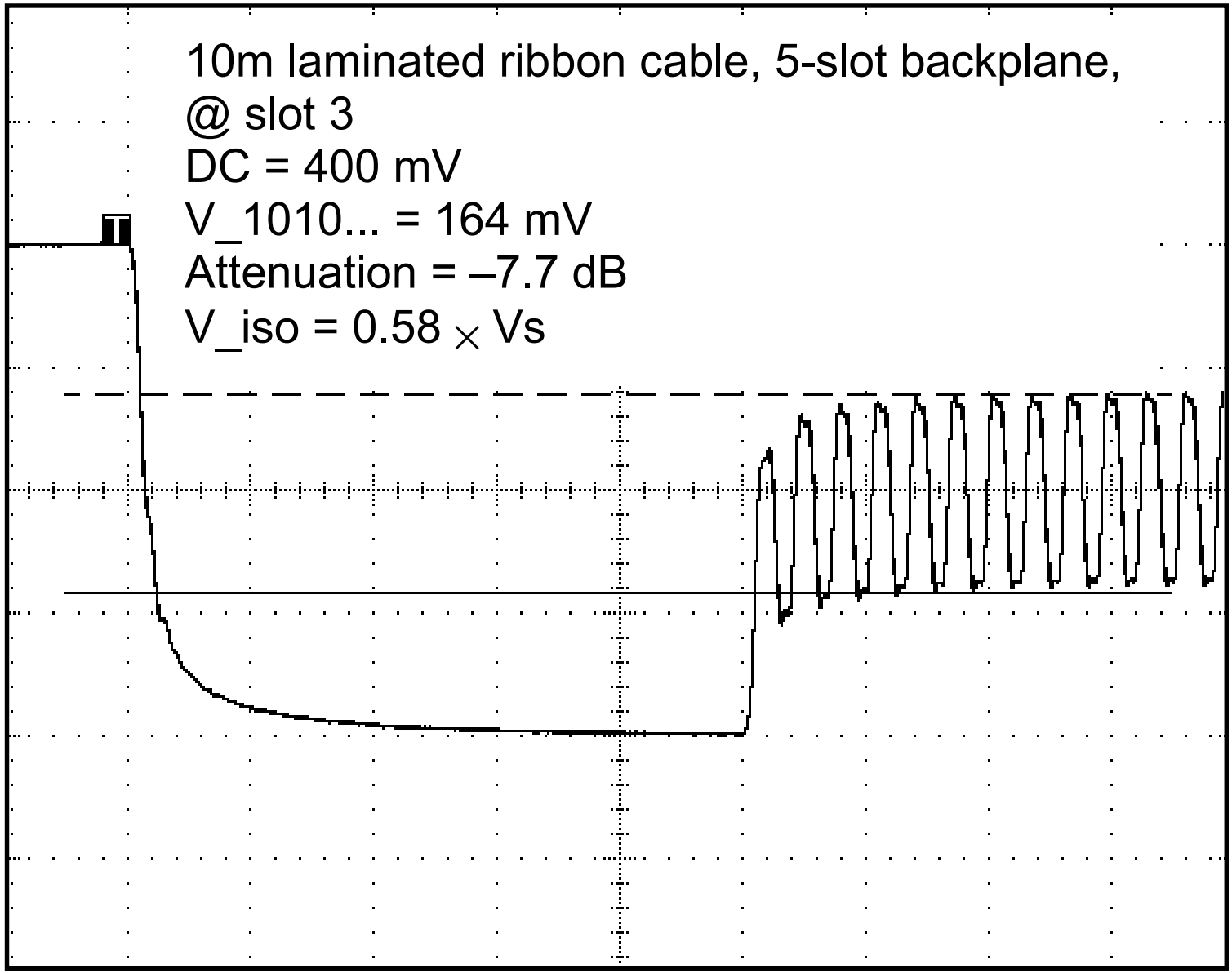
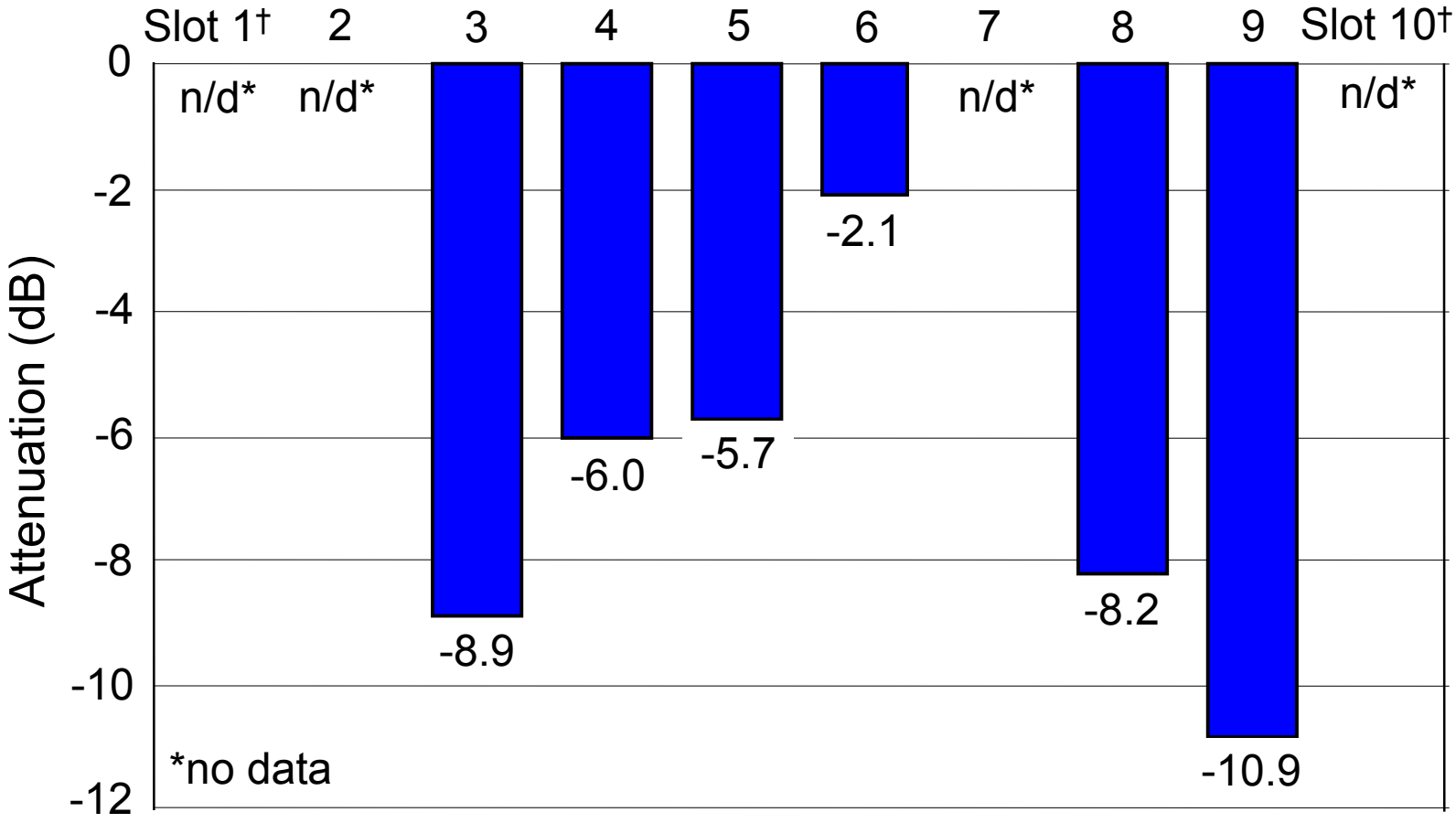
10m laminated, 5-slot, @ slot 3



Quantum™ 10m laminated, 10-slot, several slots



† Slot 1 was closest to the cable, Slot 10 was closest to the terminator.

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Summary

Configuration	Attenuation	V_{iso}/V_s
25m round, point-to-point, term. Only	–4.2 dB	0.73
10m flat, point-to-point, terminator only	–4.5 dB	0.71
10m round, 10-slot bp, @ slot 4	–4.3 dB	0.74
10m laminated ribbon, 10-slot bp, @slot 4	–6.0 dB	0.64
10m round, 10-slot bp, @ slot 9	–7.2 dB	0.53
10m laminated ribbon, 10-slot bp, @slot 9	–10.9 dB	0.42
3.75m ribbon, 5-slot bp, @ slot 3	–4.5 dB	0.72
10m round, 5-slot bp, @ slot 3	–7.7 dB	0.69
10m laminated ribbon, 5-slot bp, @slot 3	–5.0 dB	0.58

note: V_{iso} is measured at the peak of the ‘first pulse’, not in the middle where data is nominally clocked.

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Conclusions

- Different SCSI cable and system configurations that all meet the specifications in the SPI-4 standard may have a broad range of attenuation.
- Attenuations measured for several configurations ranged from almost 1 dB to almost 11 dB.
- A single SCSI cable and system configuration that meets the specifications in the SPI-4 standard may have a broad range of attenuation from slot to slot.
- Attenuations measured at several slots of a single configuration ranged from 2.1 dB to almost 11 dB.
- This data is based on a very small sample.
- We would expect the range of attenuation for the population of actual systems to be greater than that given in this presentation.