Comparison of link Type A and Type B specifications

Matthias Fritsche

Harting Electronics

Dieter Schicketanz consultant

Reutlingen University

Supporters

- Yvan Engels — Leoni
- Martin Rossbach — Nexans
- Dave Hess — CORD DATA

General

- 802.3bp: baudrate of 1 Gbit /pair
  - Up to 600 MHz, up to 15/40m
  - Automotive noise level assumptions
- 10GBASE-T : 2.5 Gbaud/pair
  - Up to 500 MHz, up to 100m
  - Office noise level assumptions
- The lower T1 baud rate would mean that both systems should operate over similar link performance . Automotive rules could make some values different.

Insertion loss

- At 100 MHz
  - Class E_A 20,9 dB 100m
  - Type A ~6,5 dB 15 m
  - Type B ~7,5 dB 40m

  - A and B despite different length similar insertion loss

Alien Noise

- Definition of alien noise is standardized in cabling with a 6 over 1 set up and assumes the same protocol on all disturbing cables.
- With 1 pair 6 over 1 will show instead of 24 disturbing pairs only 6 pairs and therefore 4 times (6 dB) less coupling.
- But because the twist of the pairs will be likely similar more noise expected
- No cords, therefore ANEXT more important than eg in 802.3bz

- For type A a different methodology (Annex 97B) is proposed it can be (including connections):
  - 2 around 1 or
  - 4 around 1
- For type B ? The standardized 6 over 1 should be used

Alien NEXT

- Type A
  - Class E_A proposal
  - Low length E_A get out

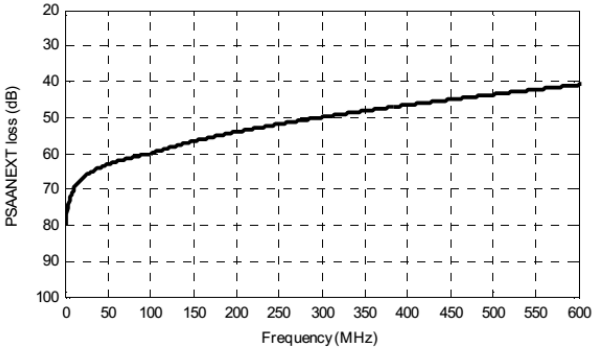


Figure 97–34—PSANEXT calculated using Equation (97–20)

- Type B
  - Extremly high >65 dB Why this difference?
  - Proposal to use Class E_A limit as for type A

Alien ACR-F

- Type A
  - Class E_A proposal
    - at 100 MHz 37 dB
  - length correction (8.2dB)
  - ~44 dB (only cable part)

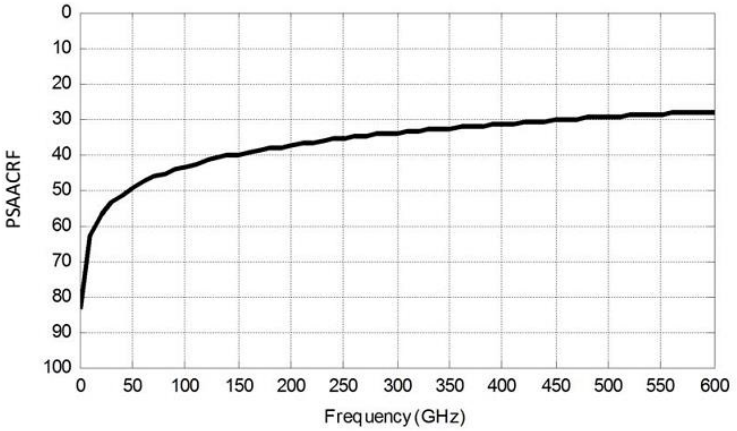


Figure 97–35—PSAACRF calculated using Equation (97–22)

- Type B
  - Class E_A + length correction would be at 100 MHz 41 dB
  - But it is 61 dB at 100 MHz why this high value ?
  - Proposal to use Type A limits
    - Class E_A limits + length correction (4dB) result in less

Coupling attenuation for type B

- There are 3 levels, as defined in ISO for
  - typical office,
  - light industrial and
  - heavy industrial.
- This is a good idea, the customer could chose where to install (as mentioned in the draft).

Unbalance type A cabling

Limit very high

- mueller_01_1113
  - 15 m measurements on insulating surface
  - Unbalance low margin on metal surface
- Tazebay_01a_0913
  - EMC testing but 5 cm over ground
- In reality the cable will be attached to ground and in a bundle may be difficult to show this limits in an installation (Annex 97A).
- Or a very thick cable is to be used

Return loss

- Type A backed up by modelling herman_3bp_01_1113. 4 connectors could be done due to high insertion loss of cable. It has to be avoided to have them near together.
- But connectors with a return loss never seen in practice (flat from 350 to 600 MHz) were used in modelling.
- As no rule for the positioning is known the values at higher frequencies are to high
- No type B presentation to back up.

Return loss connectors

- As there are no compensation circuits the high return loss limits could be reached, but plateau from 300 MHz not seen.
- The cable needs to show also good Rl behavior. Task for IEC to standardize
- A plateau depends on the test leads

Return loss type A and Type B

- As connectors does not show a plateau from 300 MHz on, and connectors may be placed elsewhere it would be adviceable to take out the plateau from the link specification.

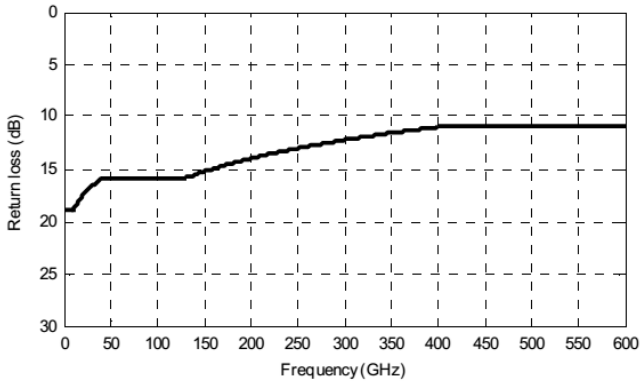
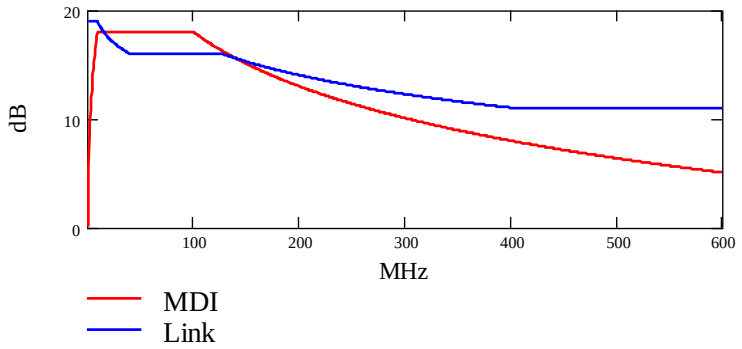


Figure 97–30—Return loss calculated using Equation (97–15)

MDI (clause 97.6)

Return loss:

$$\text{ReturnLoss} \geq \begin{cases} 18 - 18\log_{10}\frac{10}{f} & 1 \leq f < 10 \\ 18 & 10 \leq f < 100 \\ 18 - 16.7\log_{10}\frac{f}{100} & 100 \leq f \leq 600 \end{cases} \text{dB}$$



At 600 MHz 5 dB does ruin the link spec of 11 dB

At 1 MHz it reflects all power (purpose of this?)

Unbalance: Not specified

How will the Type A balance be preserved ?

Thank You!