
802.3ck D1.4

162 cable assembly

162 A-D Annexes (TBDs)

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Purpose

- **TBDs - 162 cable assembly and 162 Annexes A-D**
 - **162 Cable assembly ERL**
 - **Annex 162B MTF - FOM_{ILD} , ERL**
- **Annex 162B MTF – Informative RL**

162 Cable assembly

- 162 Cable assembly Minimum ERL

Table 162–16—Cable assembly characteristics summary

Description	Reference	Value	Unit
Maximum insertion loss at 26.56 GHz	162.11.2	19.75	dB
Minimum insertion loss at 26.56 GHz	162.11.2	11	dB
Minimum cable assembly ERL ^a	162.11.3	TBD	dB
Differential to common-mode return loss	162.11.4	Equation (162–9)	dB
Differential to common-mode conversion loss	162.11.5	Equation (162–10)	dB
Common-mode to common-mode return loss	162.11.6	Equation (162–11)	dB
Minimum COM	162.11.7	3	dB

^aCable assemblies with a COM greater than 4 dB are not required to meet minimum ERL.

CI 162 SC 162.11 P 156 L 37 # 110

Champion, Bruce TE Connectivity

Comment Type T Comment Status D ERL value

Cable Assembly ERL listed as TBD in Table 162-16

SuggestedRemedy

TBD to be changed to 7.4 dB. See presentation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Resolve using the response to comment #114.

CI 162 SC 162.11 P 156 L 37 # 110

Champion, Bruce TE Connectivity

Comment Type T Comment Status R ERL value (bucket5)

Cable Assembly ERL listed as TBD in Table 162-16

SuggestedRemedy

TBD to be changed to 7.4 dB. See presentation

Response Response Status C

REJECT.

[Editor's note: Addresses incomplete specification.]

The response to closed comment #114 indicates that there was no consensus to make the changes proposed in this comment.

CI 162 SC 162.11 P 156 L 37 # 114

Kocsis, Sam Amphenol

Comment Type TR Comment Status D ERL value

Minimum cable assembly ERL = TBD

SuggestedRemedy

Change to "7.4dB", see background/consensus presentation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Implement suggested remedy.
Pending review of the presentation
[Editor's note: Add presentation URL.]
For task force discussion.task force review of cited presentation.

CI 162 SC 162.11 P 156 L 37 # 114

Kocsis, Sam Amphenol

Comment Type TR Comment Status A ERL value

Minimum cable assembly ERL = TBD

SuggestedRemedy

Change to "7.4dB", see background/consensus presentation

Response Response Status C

ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]

The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/20_10/kocsis_3ck_01a_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_02_1020.pdf

Additional presentations were posted for review:
https://www.ieee802.org/3/ck/public/20_10/champion_3ck_02_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_03_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_04_1020.pdf

ERL parameter and value comments were discussed together by reviewing
https://www.ieee802.org/3/ck/public/20_10/kochuparambil_3ck_03b_1020.pdf

There was no consensus to change the parameters values shown in red with strikethrough or the ERL value for the cable assembly.

Implement with editorial license the parameter values proposed in red without strikethrough in slide 3 of kochuparambil_3ck_03b_1020 with the exception of the cable assembly ERL value.

162 Cable assembly

- 162 Cable assembly Minimum ERL

Table 162–16—Cable assembly characteristics summary

Description	Reference	Value	Unit
Maximum insertion loss at 26.56 GHz	162.11.2	19.75	dB
Minimum insertion loss at 26.56 GHz	162.11.2	11	dB
Minimum cable assembly ERL ^a	162.11.3	TBD	dB
Differential to common-mode return loss	162.11.4	Equation (162–9)	dB
Differential to common-mode conversion loss	162.11.5	Equation (162–10)	dB
Common-mode to common-mode return loss	162.11.6	Equation (162–11)	dB
Minimum COM	162.11.7	3	dB

^aCable assemblies with a COM greater than 4 dB are not required to meet minimum ERL.

CI 162 SC 162.11 P 156 L 37 # 110

Champion, Bruce TE Connectivity

Comment Type T Comment Status D ERL value

Cable Assembly ERL listed as TBD in Table 162-16

SuggestedRemedy

TBD to be changed to 7.4 dB. See presentation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Resolve using the response to comment #114.

CI 162 SC 162.11 P 156 L 37 # 110

Champion, Bruce TE Connectivity

Comment Type T Comment Status R ERL value (bucket5)

Cable Assembly ERL listed as TBD in Table 162-16

SuggestedRemedy

TBD to be changed to 7.4 dB. See presentation

Response Response Status C

REJECT.

[Editor's note: Addresses incomplete specification.]

The response to closed comment #114 indicates that there was no consensus to make the changes proposed in this comment.

CI 162 SC 162.11 P 156 L 37 # 114

Kocsis, Sam Amphenol

Comment Type TR Comment Status D ERL value

Minimum cable assembly ERL = TBD

SuggestedRemedy

Change to "7.4dB", see background/consensus presentation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Implement suggested remedy.
Pending review of the presentation
[Editor's note: Add presentation URL.]
For task force discussion.task force review of cited presentation.

CI 162 SC 162.11 P 156 L 37 # 114

Kocsis, Sam Amphenol

Comment Type TR Comment Status A ERL value

Minimum cable assembly ERL = TBD

SuggestedRemedy

Change to "7.4dB", see background/consensus presentation

Response Response Status C

ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]

The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/20_10/kocsis_3ck_01a_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_02_1020.pdf

Additional presentations were posted for review:
https://www.ieee802.org/3/ck/public/20_10/champion_3ck_02_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_03_1020.pdf
https://www.ieee802.org/3/ck/public/20_10/wu_3ck_04_1020.pdf

ERL parameter and value comments were discussed together by reviewing
https://www.ieee802.org/3/ck/public/20_10/kochuparambil_3ck_03b_1020.pdf

There was no consensus to change the parameters values shown in red with strikethrough or the ERL value for the cable assembly.

Implement with editorial license the parameter values proposed in red without strikethrough in slide 3 of kochuparambil_3ck_03b_1020 with the exception of the cable assembly ERL value.

162 Cable assembly

- 162 Cable assembly Minimum ERL (D1.4)

162.11.3 Cable assembly ERL

~~ERL—~~The values of the cable assembly ERL at TP1 and at TP4 are computed using the procedure in 93A.5 with the values in Table 162–22. Parameters that do not appear in Table 162–22 take values from Table 162–23.

~~Cable—~~The values of cable assembly ERL at TP1 and at TP4 shall ~~be—~~meet the requirement specified in Table 162–21 for cable assemblies that have a COM less than 4 dB.

Table 162–22—Cable assembly ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	350045 00	UI
Equalizer length associated with reflection signal	N_{dx}	0	UI
Twice the propagation delay associated with the test fixture Time-gated propagation delay	T_{fx}	0.2 ^a	ns
Tukey window flag	tw	1	—

~~^aThe specified T_{fx} value represents twice the transmission line delay which sufficiently mitigates the test point and transmission line return loss.~~

NOTE—The specified T_{fx} value represents a propagation delay which sufficiently mitigates the effect of reflections from the test connector and test fixture transmission line.

Annex 162B Mated Test Fixtures

- **162B.1.3.1 Mated test fixtures FOM_{ILD}**

The FOM_{ILD} is calculated according to 93A.4 with $f_b=53.125$ GHz, $T_t=7.5$ ps, and $f_r=0.75 \times f_b$. The fitted insertion loss and insertion loss deviation are computed over the range $f_{min}=0.05$ GHz to $f_{max}=40$ GHz. FOM_{ILD} shall be less than **(TBD)** dB.

- **162B.1.3.2 Mated test fixtures effective return loss (ERL)**

The values of the mated test fixtures ERL are computed using the procedure in 93A.5 with the parameter values in Table 162B–2. Parameters that do not appear in Table 162B–2 take values from Table 162–18.

The mated test fixture ERL shall be greater than or equal to **(TBD)** dB.

Table 162B–1—Mated test fixture ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	400	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Time-gated propagation delay	T_{fx}	0	ns
Tukey window flag	tw	1	—

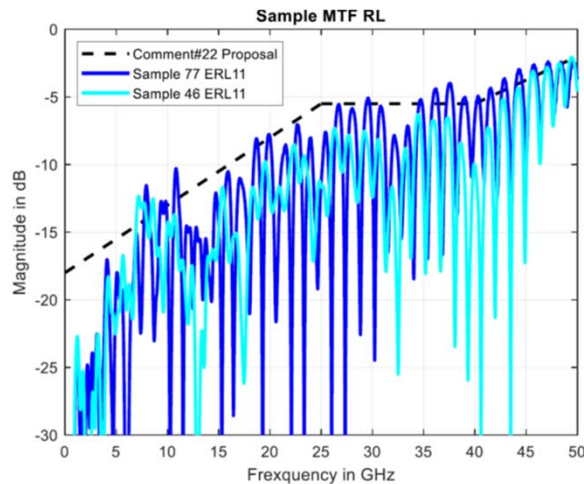
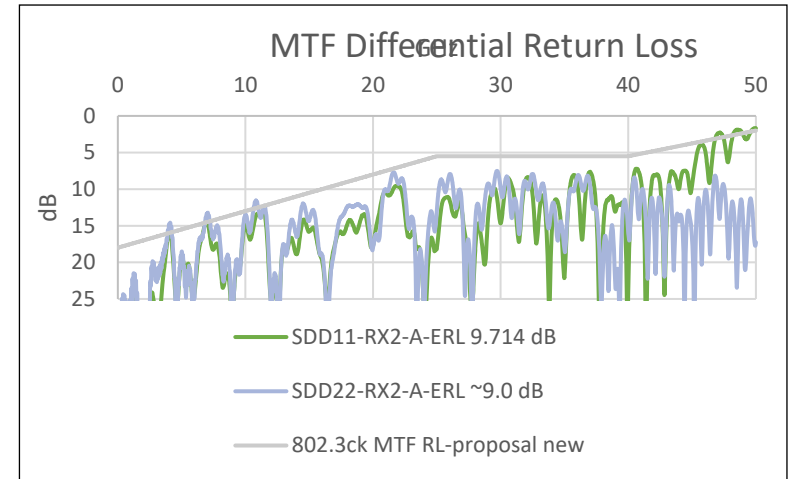
MTF ERL

- Specify MTF ERL with 9 dB requirement
- Use MTF ERL Parameters Table Below

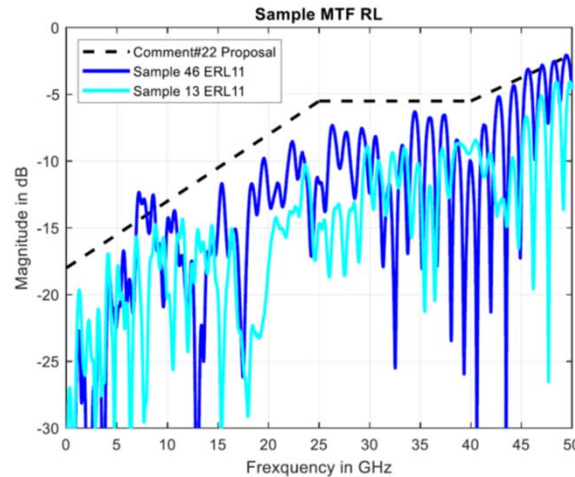
Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	400	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Twice the propagation delay associated with the test fixture	T_{fx}	0	ns
Tukey window flag	τ_w	1	—

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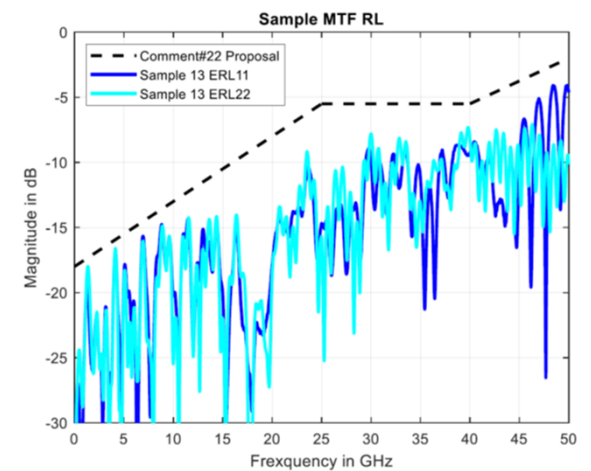
TDR_W_TXPKG	0	
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Shown difference between ERL ~7dB and ERL ~8dB



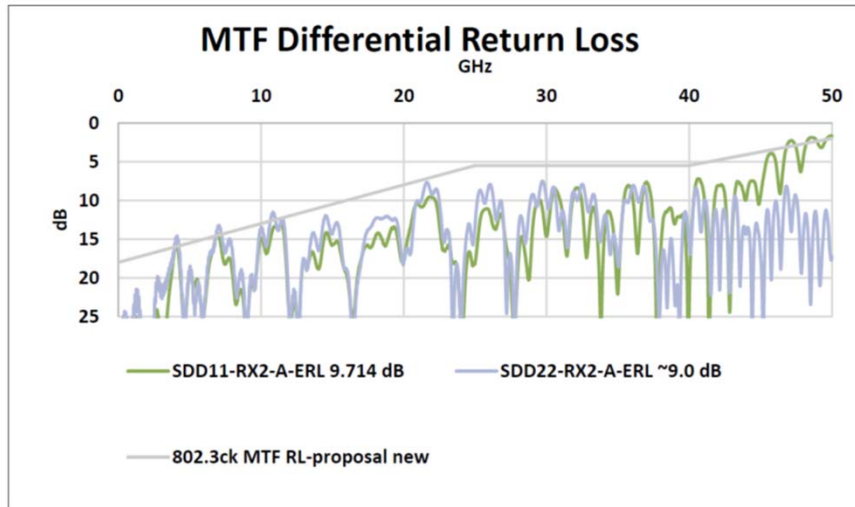
Shown difference between ERL ~8dB and ERL ~10dB



The difference caused by the limit line violation >45GHz is ~0.2dB ERL

https://www.ieee802.org/3/ck/public/20_10/kocsis_3ck_02b_1020.pdf

MTF RL



- MTF RL limit informative
- Change RL limit > 40 GHz

PROPOSAL: Differential Return Loss =

$$18 - 0.5 \cdot f_{\text{GHz}} \quad 0.05 \text{ GHz} \leq f_{\text{GHz}} < 25 \text{ GHz}$$

$$5.5 \quad 25 \text{ GHz} \leq f_{\text{GHz}} < 40 \text{ GHz}$$

$$-.35 \cdot (f_{\text{GHz}} - 40) + 5.5 \quad 40 \text{ GHz} \leq f_{\text{GHz}} \leq 50 \text{ GHz}$$

CI 162B SC 162B.1.3.2 P 256 L 46 # 22
 DiMinico, Christopher MC Communications
 Comment Type TR Comment Status R MTF RL

Modify Equation (162B-6) DRL(f) > 40 GHz to align with achievable MTF return loss

Suggested Remedy

See supporting presentation diminico_3ck_1020.pdf

Response

Response Status C

REJECT.

The following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/20_10/diminico_3ck_03a_1020.pdf

The response to closed comment #178 changes the differential return loss specification from normative to informative.

The RL mask proposed on slide 12 of diminico_03a relaxes RL at frequencies greater than 40 GHz.

There is no consensus to make the proposed change.

162B.1.3.3 Mated test fixtures differential return loss

The recommended differential return loss of the mated test fixtures measured at each test fixture interface shall meet the values is determined using Equation (162B-7), and illustrated in Figure 162B-7.

$$DRL(f) \geq \begin{cases} 18 - 0.5f & 0.01 \leq f < 25 \\ 5.5 & 25 \leq f \leq 50 \end{cases} \quad (162B-7)$$

for 0.01 GHz ≤ f ≤ 50 GHz

where

DRL(f) is the differential return loss in dB at frequency f
 f is the frequency in GHz

HCB – Test Methods without MCB

