# 802.3bj D3.0 sponsor ballot comment i-122 Revision 1a

# Contributors

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- Chris DiMinico – MC Communications/Panduit

# Purpose

- **Supporting presentation D3.0 sponsor ballot comment i-122**
- **Review achievability of 802.3bj D3.0 mated test fixture specifications.**

*Cl* **92** *SC* **92.11.3.2** *P* **224** *L* **23** # i-122

Palkert, Thomas — Molex Incorporated

*Comment Type* G *Comment Status* X

MCB's and HCB's that are within reasonable manufacture impedance tolerances (~5%) can fail the 92.11.3.2 Mated test fixtures return loss specifications.
Change 92.11.3.2 Mated test fixtures return loss specifications to proposed limits.
See supporting presentation

*SuggestedRemedy*

Change 92.11.3.2 Mated test fixtures return loss specifications to..

| Return loss(f)>/= | |
|---|---|
| 20-1.429*f | 0.01 </= f < 4.9 GHz |
| 14.4-0.286*f | 4.9 </= f < 10.85 GHz |
| 12.05-51.1*log(f/10.5) | 10.85 </= f < 13.8 GHz |
| 5 | 13.8 </= f </= 25 GHz |

*Proposed Response* *Response Status* O

# Summary

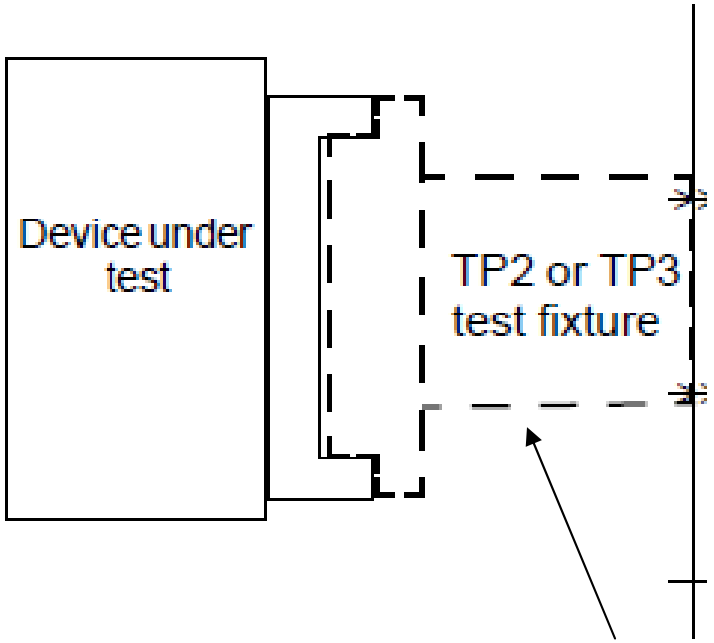
- **Measurements of TP2/TP3 (HCB) and mated test fixtures provided.**

- **802.3bj mated test fixture specifications reviewed (D3.0).**
  - ✓**Insertion loss – meets maximum specification (better than minimum)**
  - ✓**Common mode return loss – meets specification**
  - **Return loss – marginal**
  - **Common to differential mode conversion loss – marginal**
  - **Common to differential mode return loss – marginal**
  - **Integrated crosstalk noise (ICN) – meets specification**

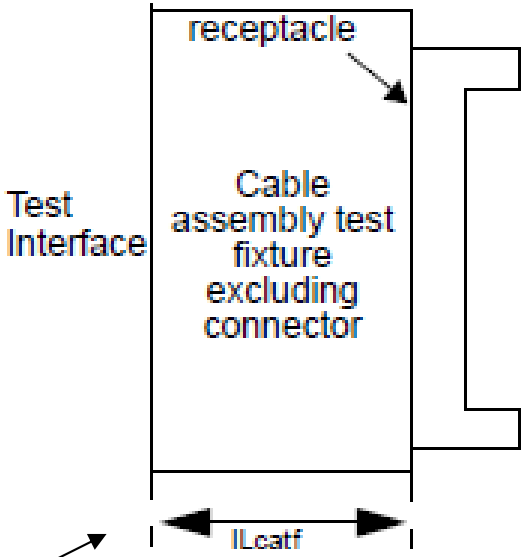
- **Proposals to adjust specification limits for marginal parameters and MTF IL minimum and TP2/TP3 reference PCB IL**

# 802.3bj Test Fixtures

**TP2/TP3 Test fixture (HCB)**

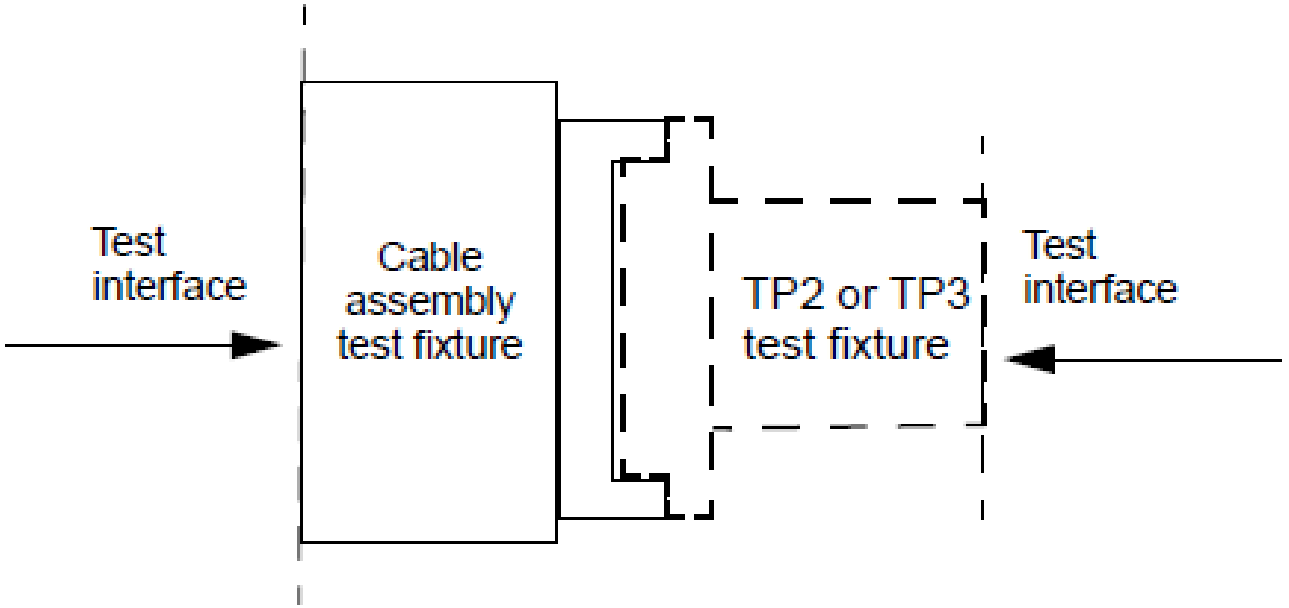



**Cable assembly test fixture (MCB)**



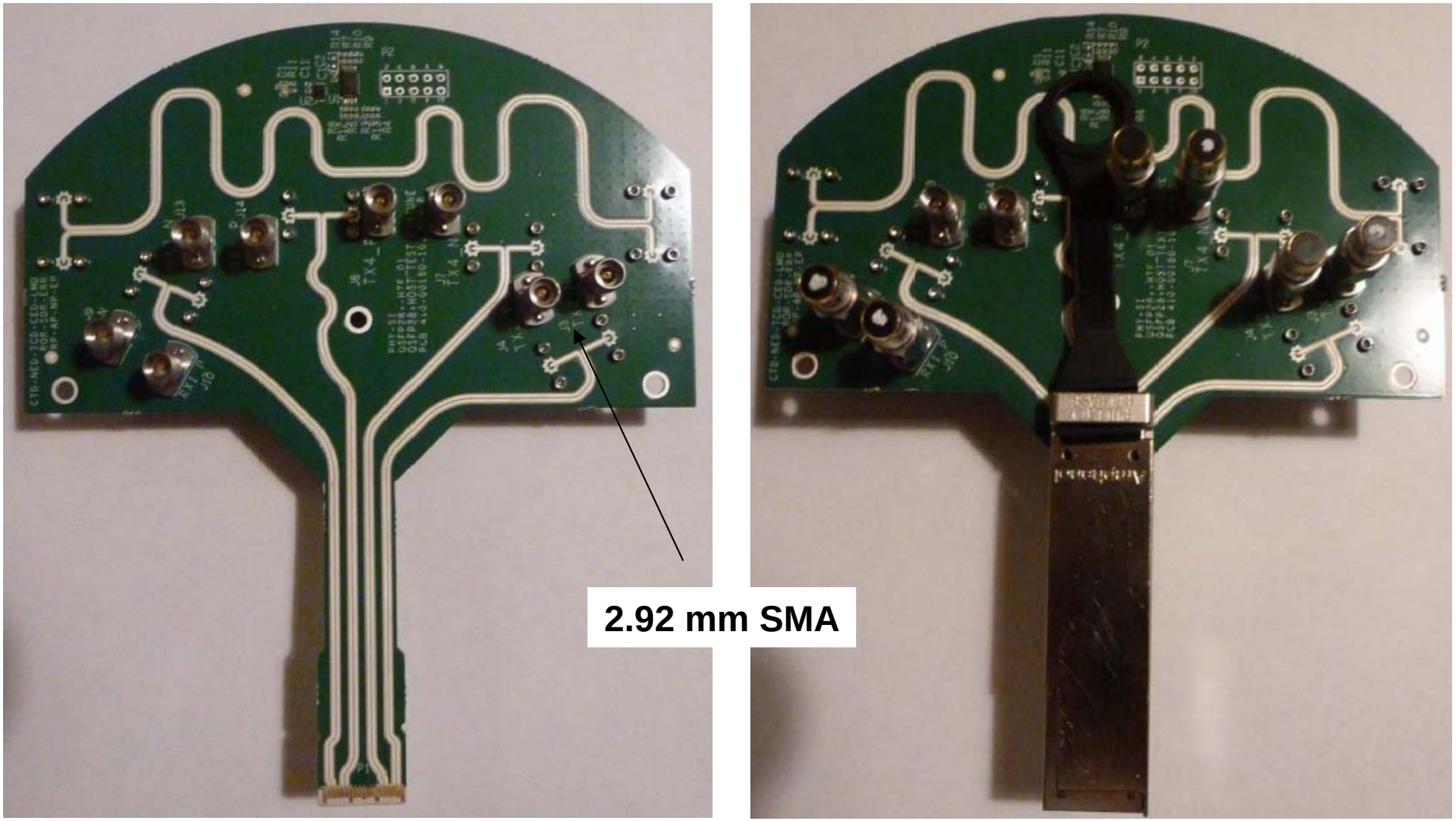

- **PCB reference IL specified**

# 802.3bj Test Fixtures

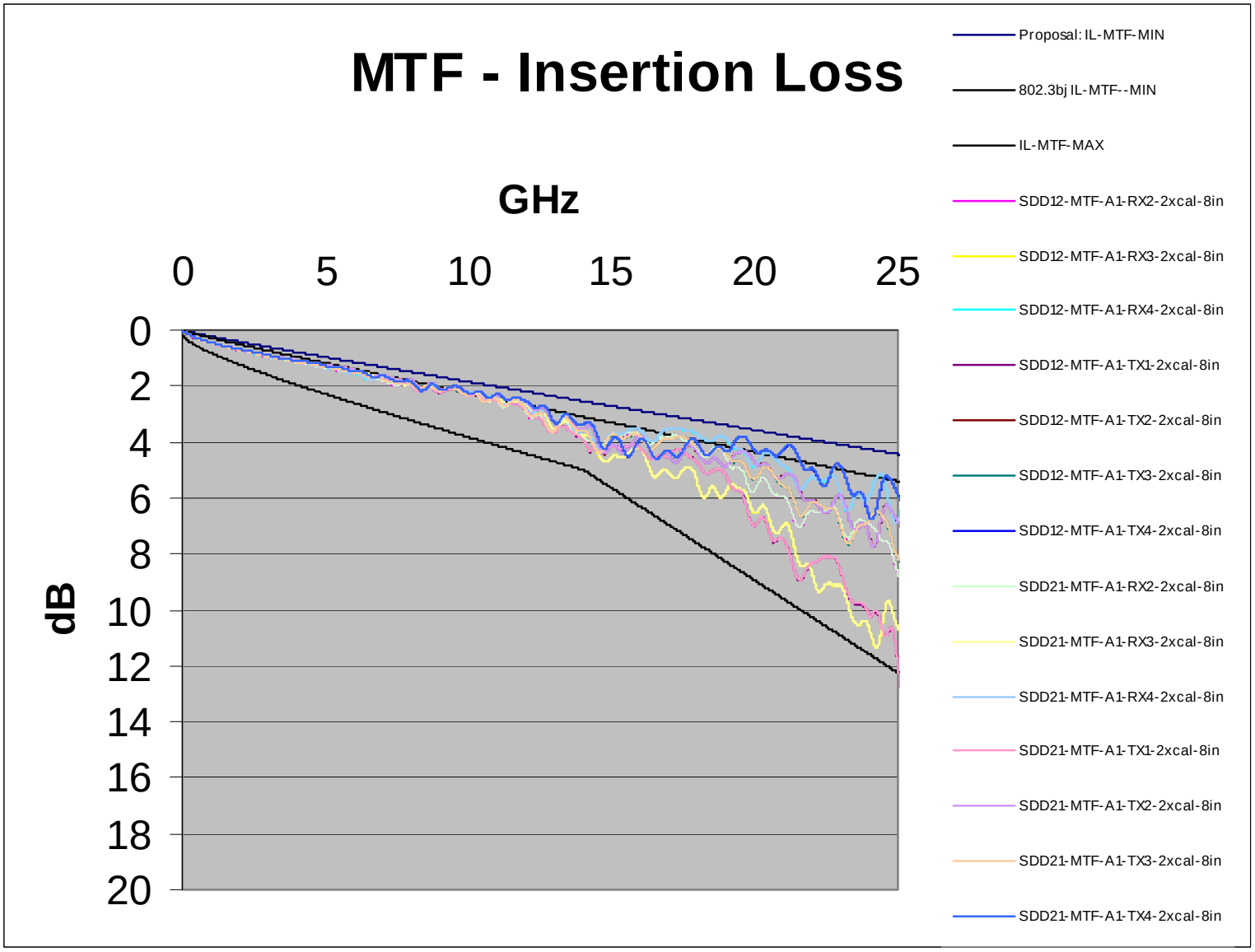



- **Specified in mated state**
  - **Insertion loss**
  - **Differential return loss**
  - **Common mode return loss**
  - **Common to differential mode conversion loss**
  - **Common to differential mode return loss**
  - **Integrated crosstalk noise (ICN)**

# TP2/TP3 (HCB) Test Fixture



# QSFP28 MTF IL




***Proposal: IL(f)>/= ILMTFmin=0.0656*sqrt(f)+0.164*f  0.01 </= f </= 25 GHz***

# MTF Insertion Loss

92.11.1.2 Test fixture insertion loss

$$IL(f) \le IL_{MTFmax}(f) = \begin{cases} 0.12 + 0.475\sqrt{f} + 0.221f & 0.01 \le f \le 14 \\ -4.25 + 0.66f & 14 < f \le 25 \end{cases} \quad \text{(dB)} \qquad (92\text{–}43)$$

$$IL(f) \ge IL_{MTFmin}(f) = 0.08\sqrt{f} + 0.2f \quad 0.01 \le f \le 25 \quad \text{(dB)} \qquad (92\text{–}44)$$

where

| | |
|---|---|
| $f$ | is the frequency in GHz |
| $IL(f)$ | is the mated test fixture insertion loss at frequency $f$ |

***Change (92-44) to:***
***IL(f)>/= ILMTFmin=0.0656*sqrt(f)+0.164*f  0.01 </= f </= 25 GHz***

# TP2/TP3 test fixture reference insertion loss proposal

**92.11.1.2 Test fixture insertion loss**

The test fixture printed circuit board insertion loss values determined using Equation (92–41) shall be used as the reference test fixture insertion loss. The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

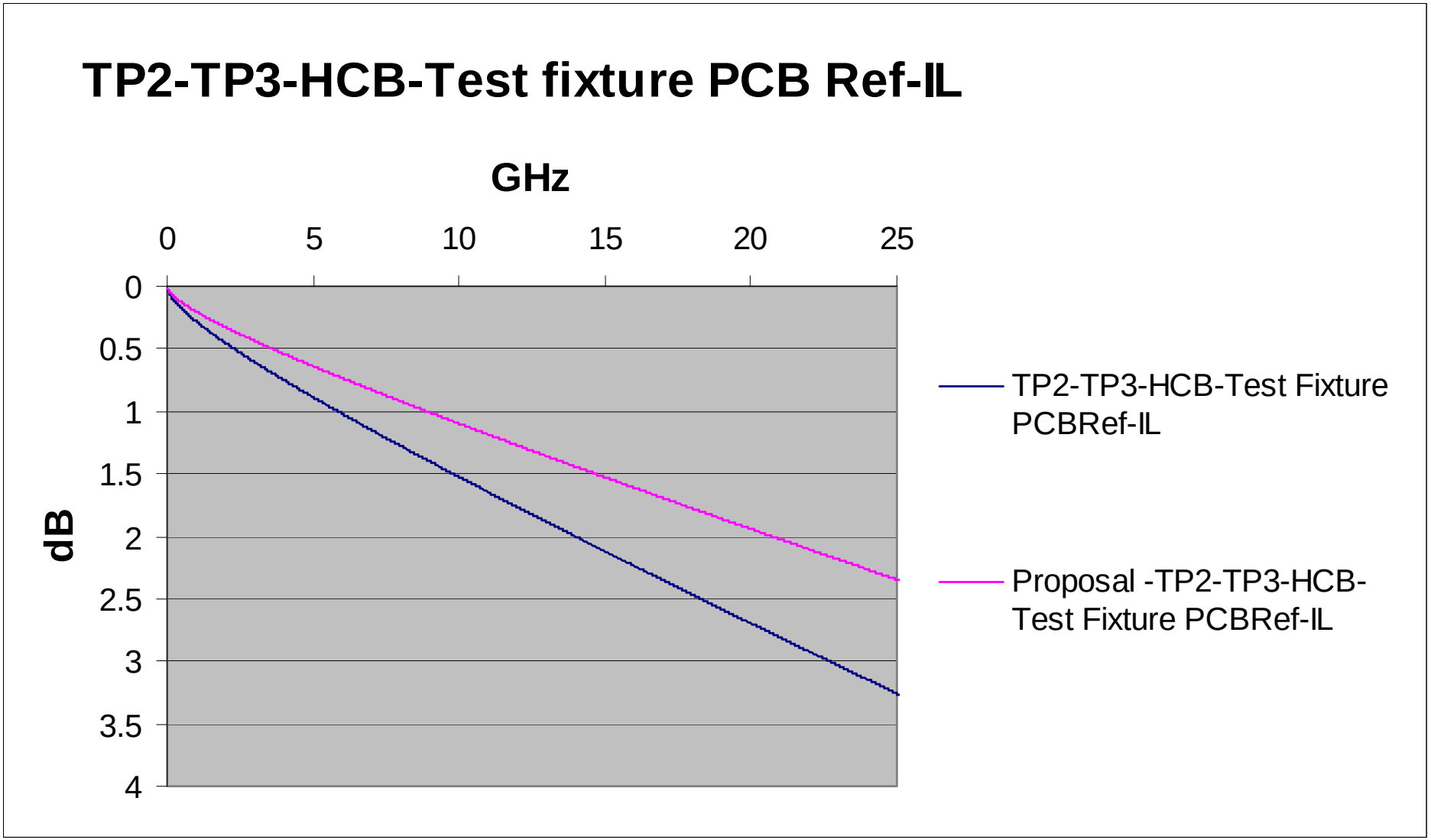
$$IL_{tfref}(f) = -0.002 + 0.192\sqrt{f} + 0.092\ f \quad \text{(dB)} \qquad (92\text{–}41)$$

for $0.01 \le f \le 25$ GHz
where

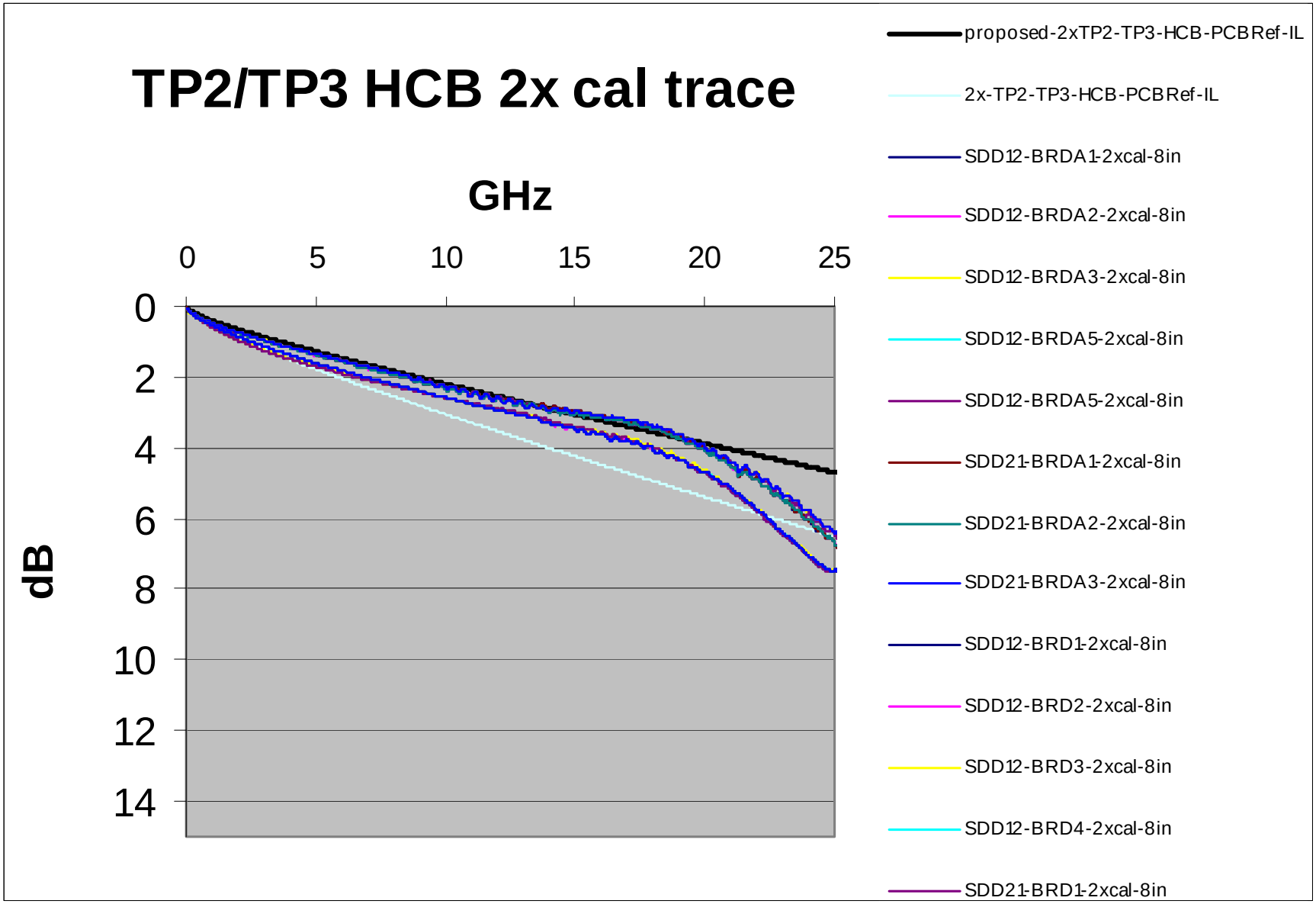
| | |
|---|---|
| $f$ | is the frequency in GHz |
| $IL_{tfref}(f)$ | is the reference test fixture PCB insertion loss at frequency $f$ |

- **Change TP2/TP3 test fixture PCB reference insertion loss**
- **ILtfref (f) = – 0.00144 + 0.13824sqrt(f) + 0.06624f**

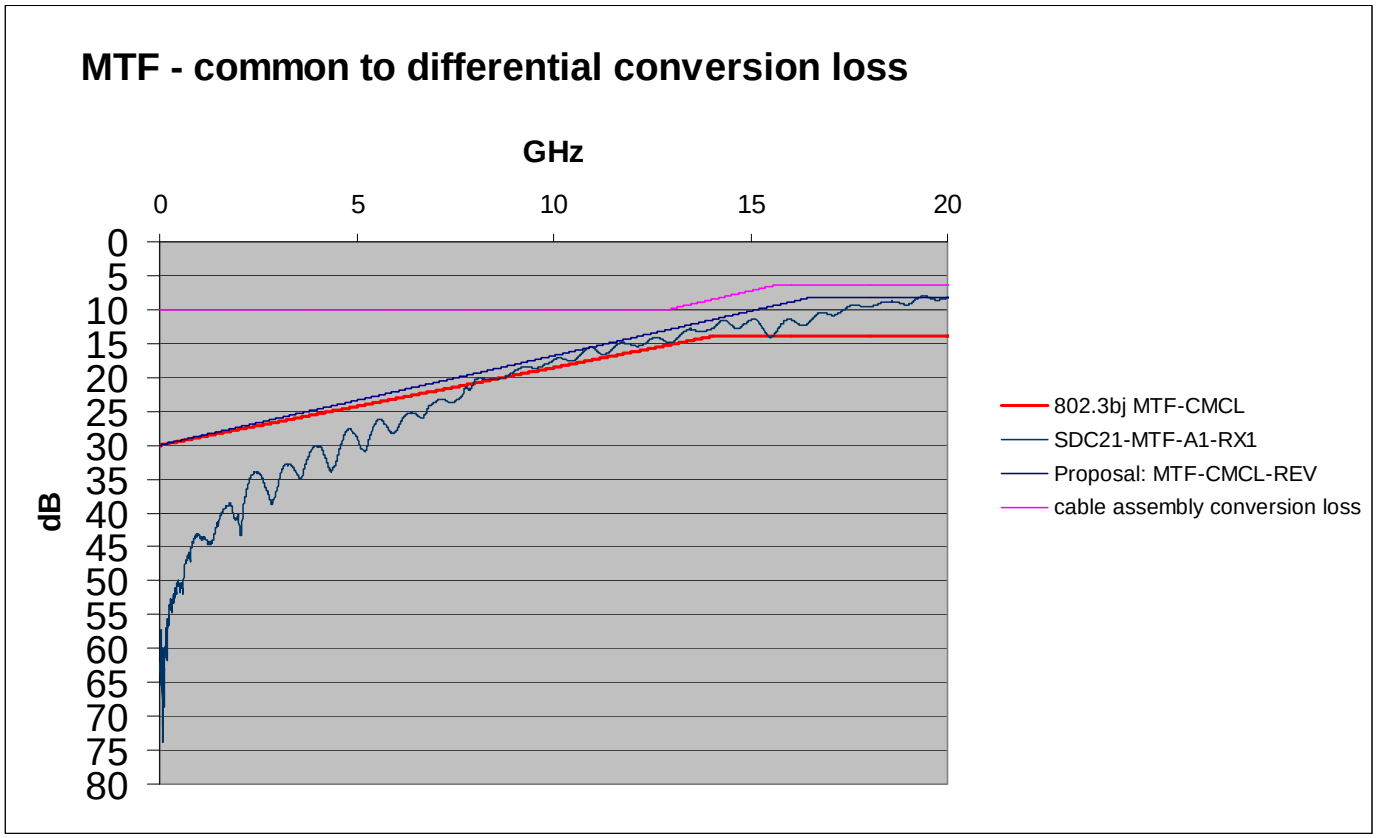
# TP2/TP3 test fixture reference insertion loss proposal



# TP2/TP3 (HCB) test fixture reference IL proposal



# MTF and Cable Assembly CM-DM conversion loss




***mated test fixtures.***

***Equation 92-46***

***=30-29/22*f***

***from 0.01 to 16.5 GHz***

***=8.25***

***from 16.5 to 25 GHz***

***cable assembly conversion loss minus insertion loss***

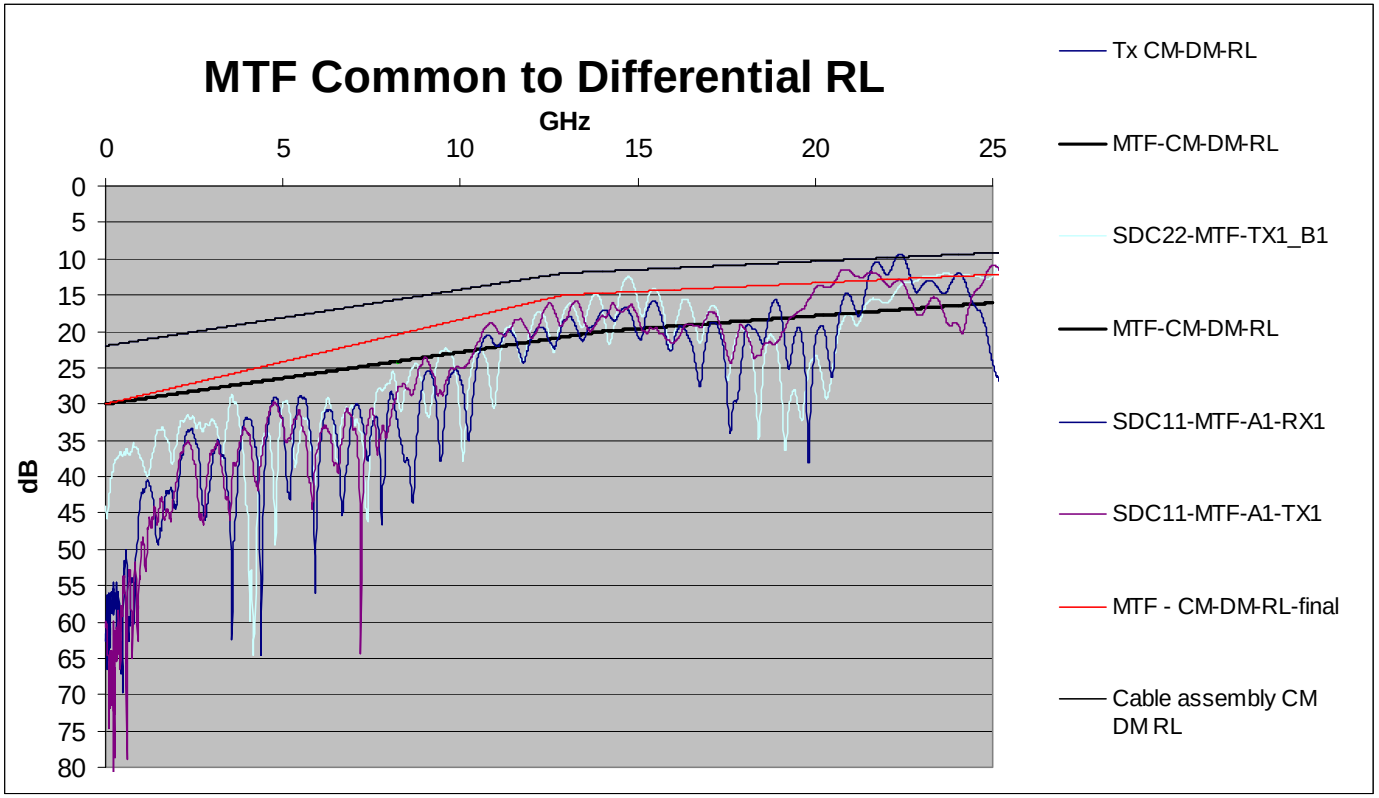
***Equation 92-29***

***10 from 0.01 to 12.89 GHz***

***27-29/22*f from 12.89 to 15.7 GHz***

***6.30 from 15.7 to 19 GHz***

# MTF and Cable Assembly CM-DM Return Loss




***mated test fixtures***

***EQ 92-48***

***30 - 30/25.78*f***

***from 0.01 to 12.89 GHz***

***18-6/25.78*f***

***from 12.89 to 25 GHz***

***cable assembly***

***EQ 92-28***

***22 - 20/25.78*f***

***from 0.01 to 12.89 GHz***

***15-6/25.78*f***

***from 12.89 to 19 GHz***

***Receive input at TP3***

***EQ 92-21***

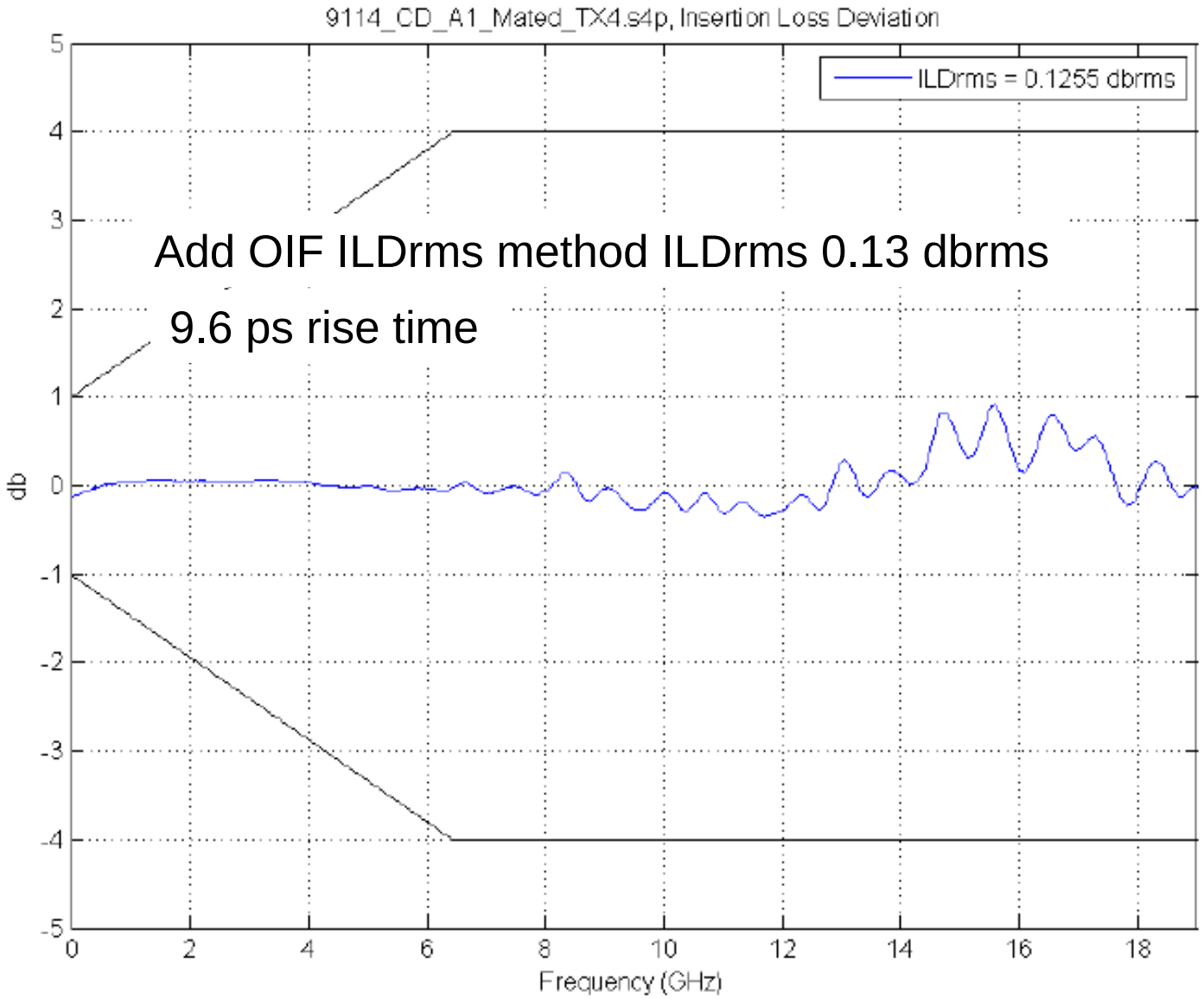
***22 - 20/25.78*f***

***from 0.01 to 12.89 GHz***

***15-6/25.78*f***

***from 12.89 to 19 GHz***

# ILDrms


9114_CD_A1_Mated_TX4.s4p, Insertion Loss Deviation
ILDrms = 0.1255 dbrms
Add OIF ILDrms method ILDrms 0.13 dbrms
9.6 ps rise time
db
Frequency (GHz)
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
2
4
6
8
10
12
14
16
18

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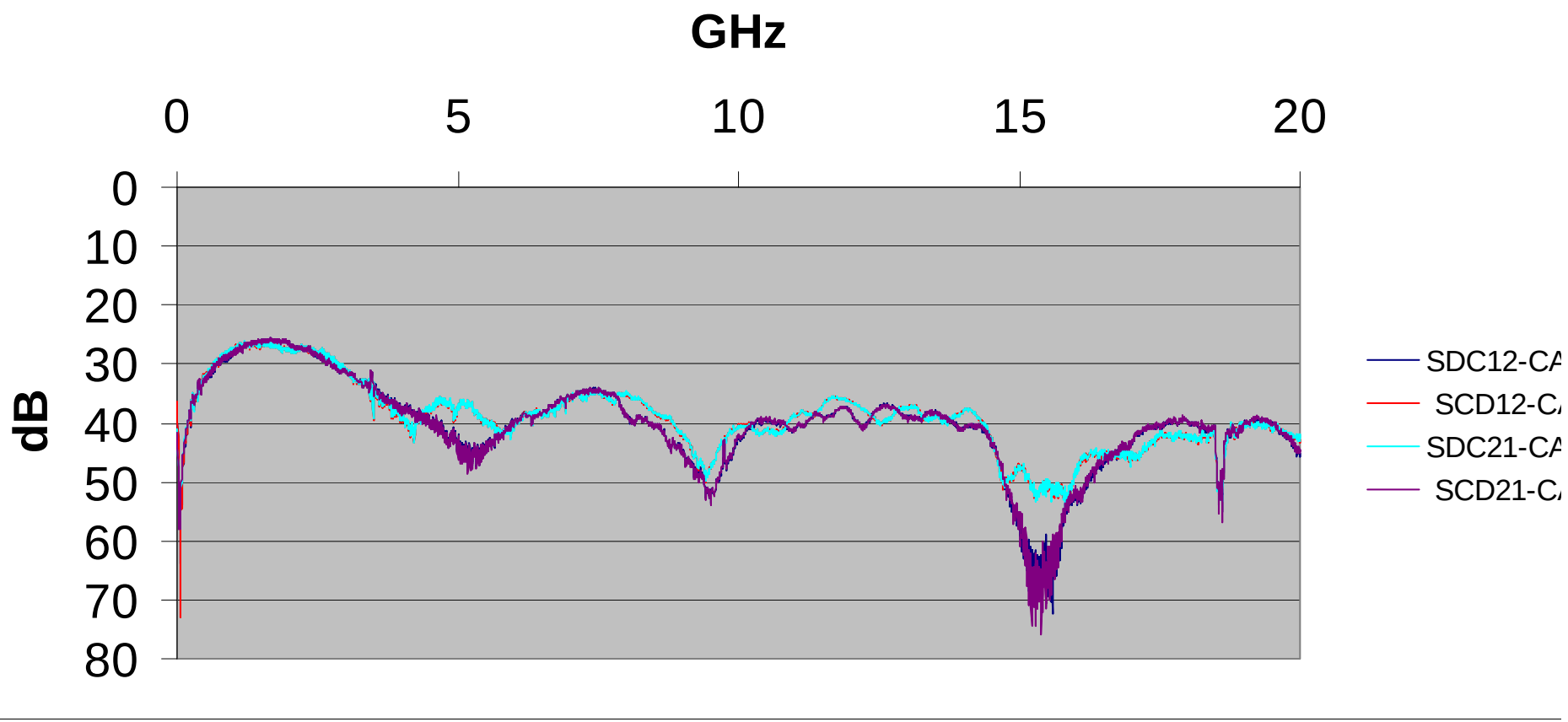
# MTF Consensus Proposal Supplemental

# 5 m cable assembly - SDC12/21/SCD12/21



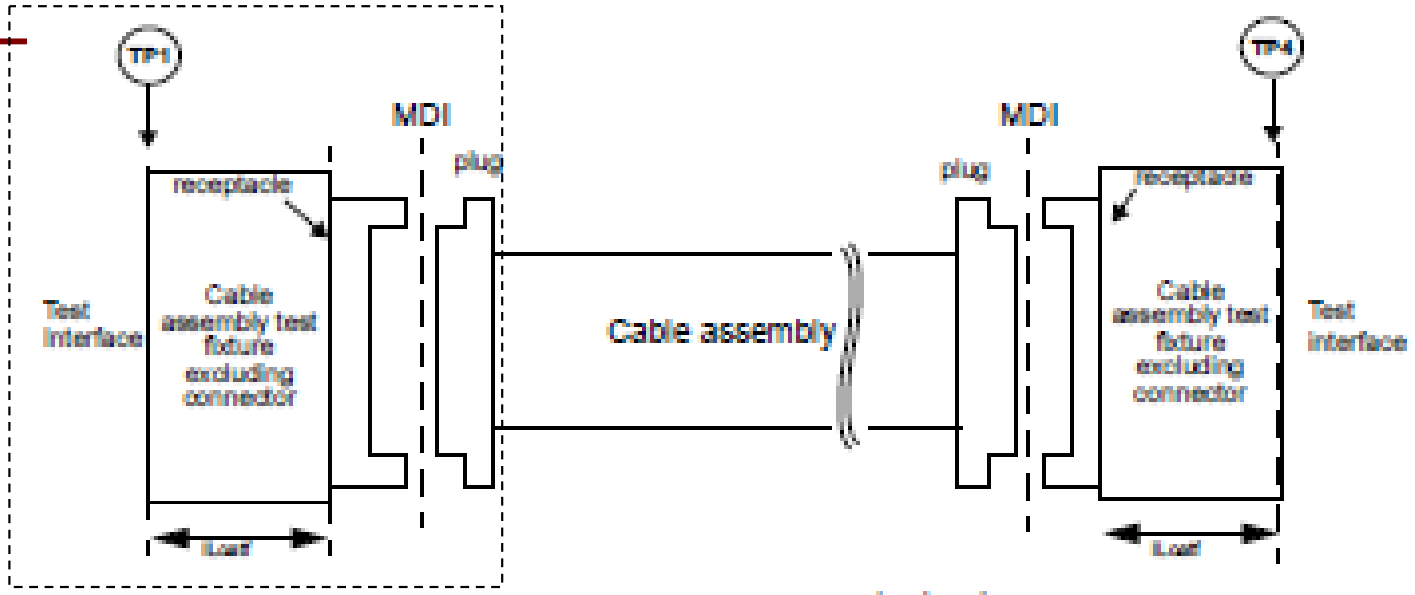



Figure 92–16—Cable assembly test fixtures

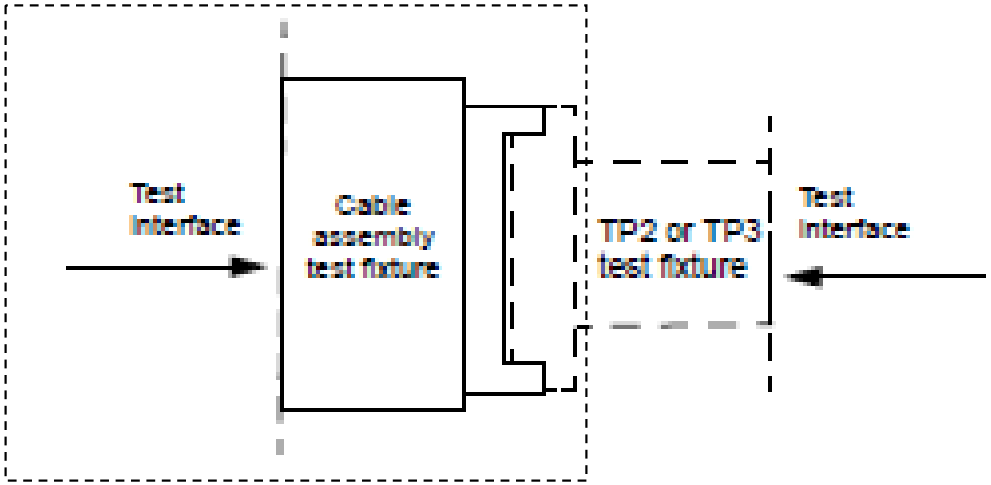
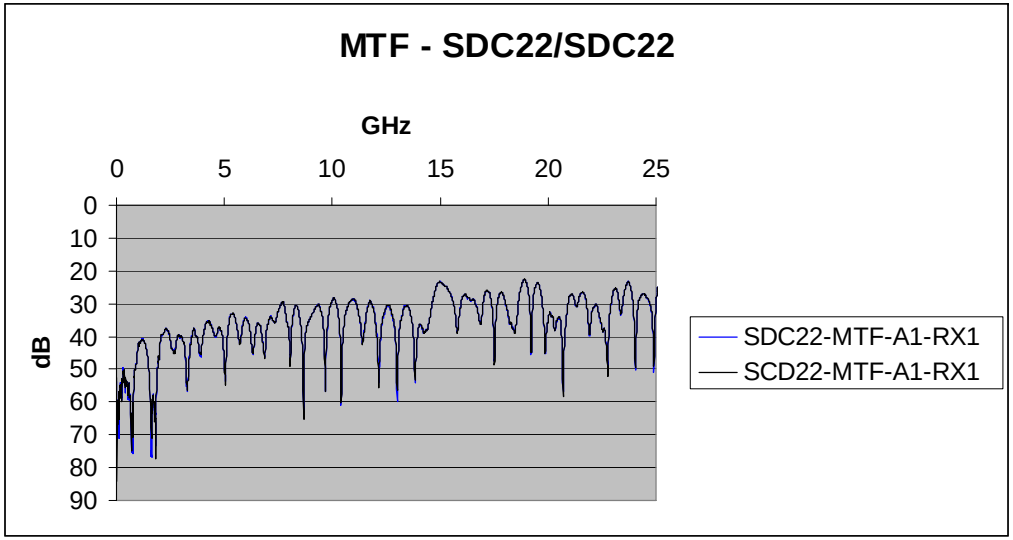
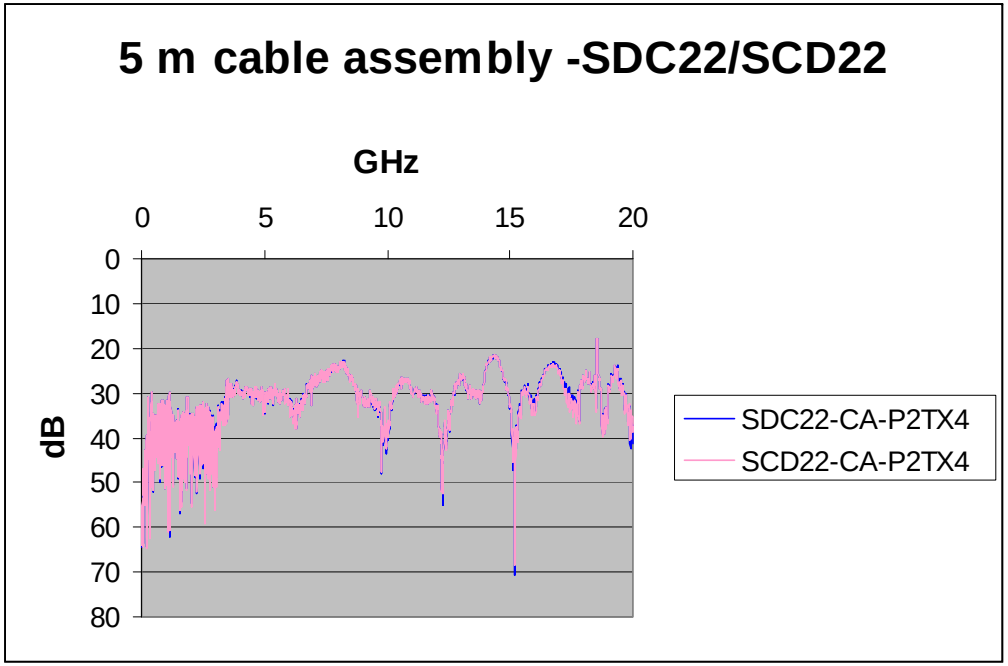



Figure 92–17—Mated test fixtures

For reflection parameters cable assembly tested in mated state and cable assembly measurement dominated by mating interface.

# Common to differential return loss



# TDD12/TDC12/TDC21