

Common-mode return loss limits

P802.3ck Draft 3.1 comments 48 and 49

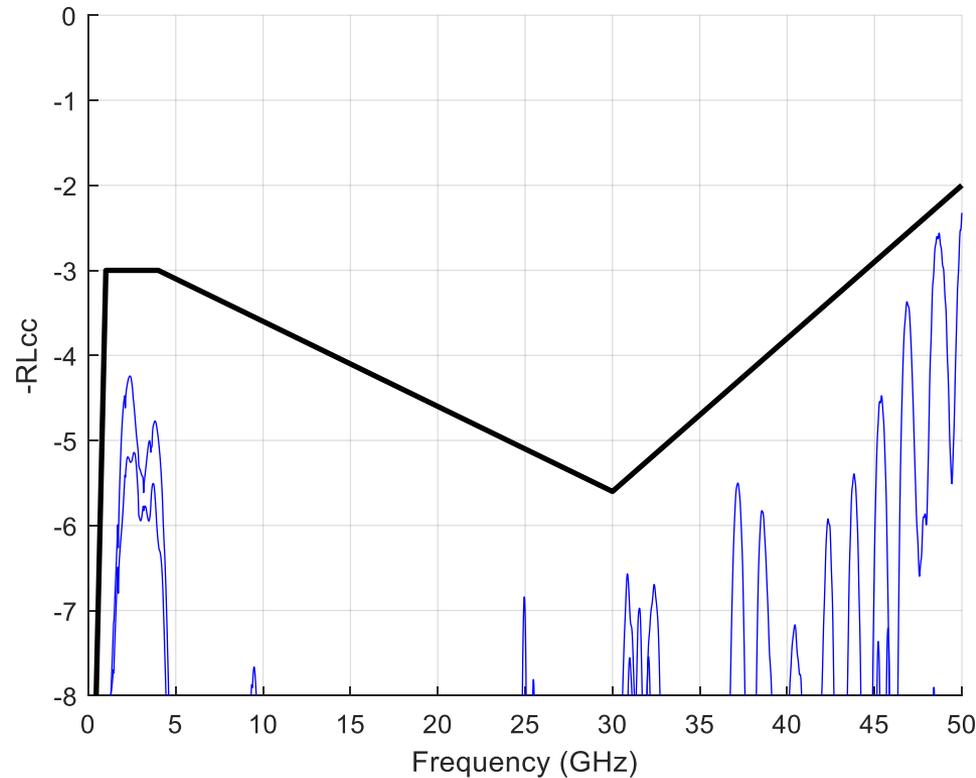
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Introduction

- We have common-mode return loss specs to ensure that any common-mode signal can dissipate
- CR host output and CR cable
 - These are observed through defined test fixtures
- The limits (2 dB, 1.8 dB) are weak
- A 2 dB limit is ineffective above the frequency where the test fixture PCB loss is 1 dB
 - It acts as an indication that very bad common-mode return loss is not desired, but it does not impose an actual limit
- At low frequencies, the limit has to allow for the characteristics of paddle-card connectors
- At higher frequencies, we can do better

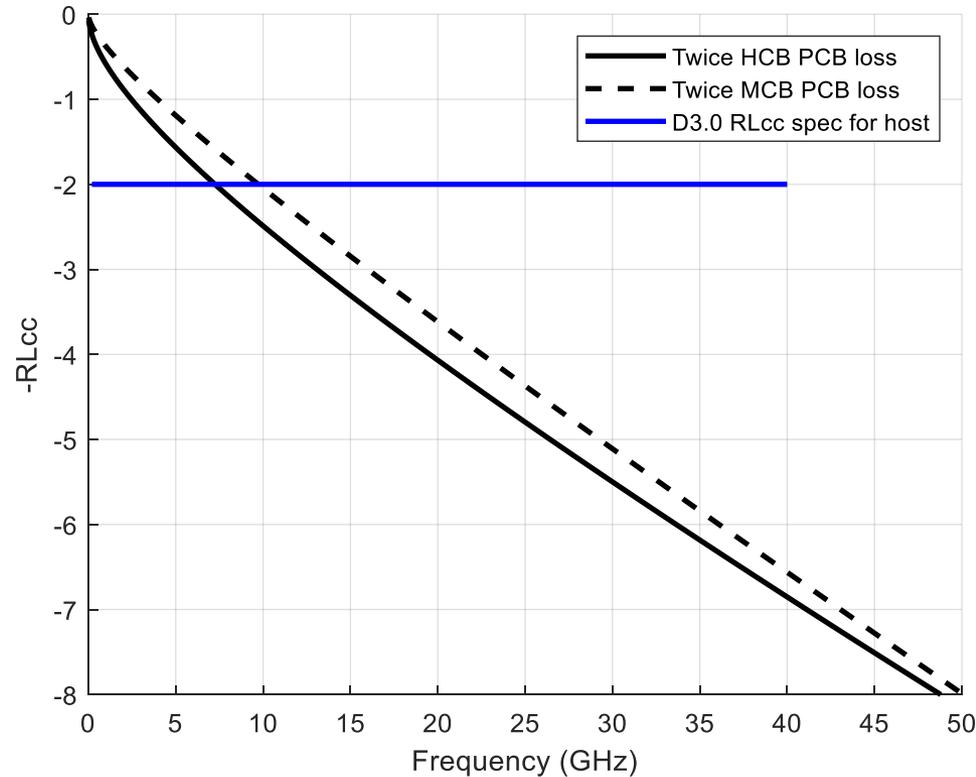
Mated test fixture RLcc for reference



- Measured vs. spec

https://iee802.org/3/ck/public/19_07/kocsis_3ck_01_0719.pdf

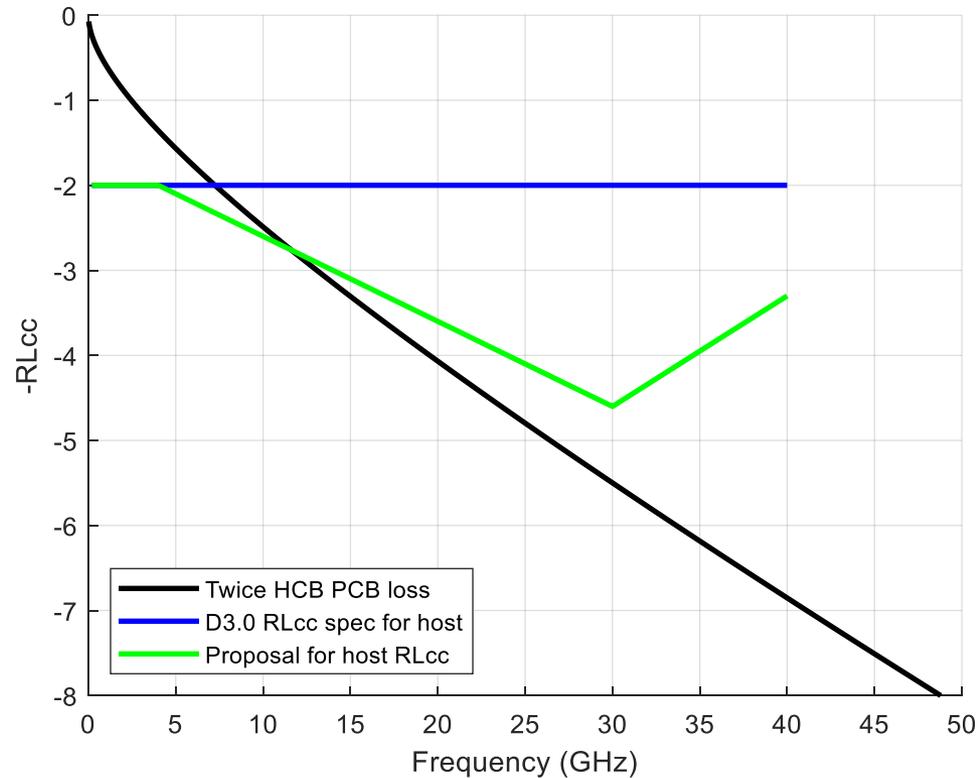
Tx RLcc spec is ineffective above 7.25 GHz



Comment 48 on CR Tx RLcc

- As already noted, this common mode return loss spec RLcc becomes useless at the frequency when the HCB loss is 2/2 dB, which is only 7.5 GHz. The spec should trend down somewhat slower than twice the MCB trace loss, at 0.1 dB/GHz
- Use a frequency-dependent mask
- 2 dB $0.2 \leq f \leq 4$
- $1.6 + 0.1 * f$ dB $4 < f \leq 30$
- $8.5 - 0.13f$ $30 < f \leq 40$
- f is in GHz
- See another comment for cable RLcc, 162.11.6.
- Same as D3.0 comment 178 (straw poll 9 to 10)

Proposed improved host RLcc spec

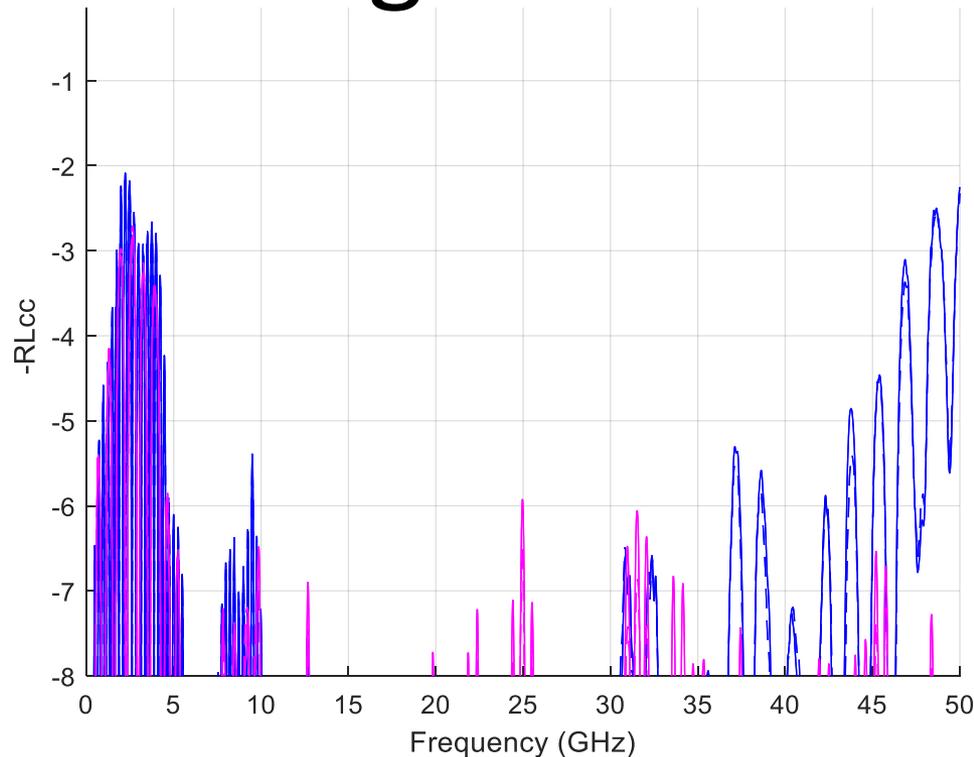


Comment 49

RLcc for cable is different to host

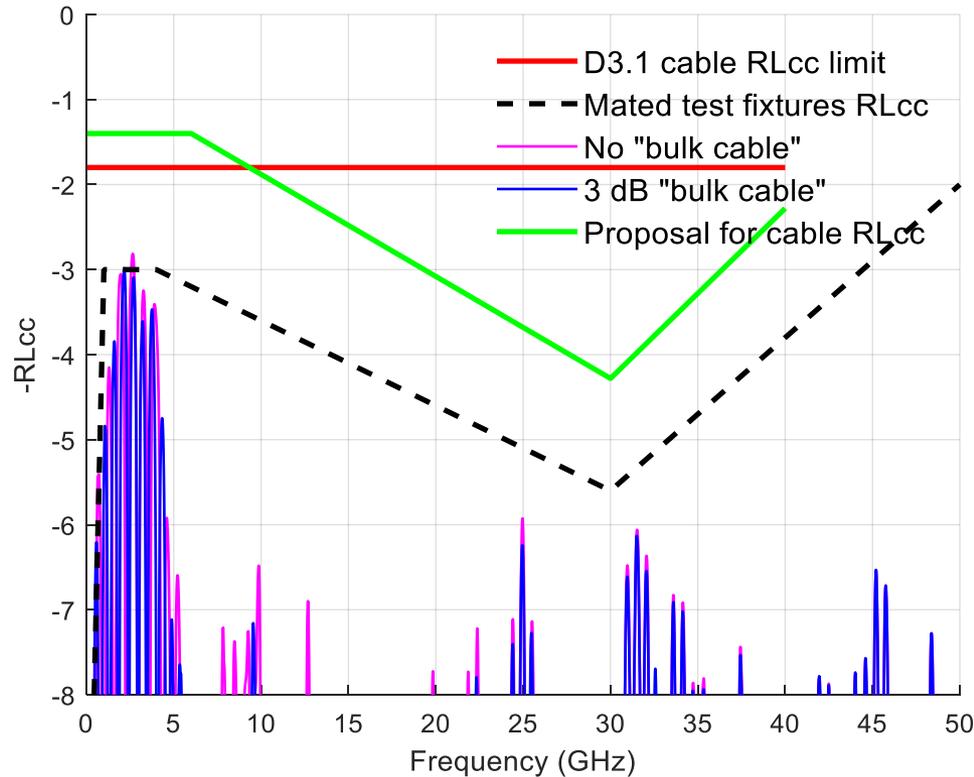
- At the lowest frequencies, the measurement can "see" connectors at both ends of the cable
- Spec in draft 3.1, 1.8 dB, is tight at low frequencies and ineffective from 8.5 GHz where the test fixture PCB loss is 1.8/2 dB
- The spec should be further relaxed at low frequencies, and tightened at higher frequencies
- 1.4 dB $0.05 \leq f \leq 6$
- $0.68 + 0.12f$ dB $6 < f \leq 30$ GHz
- $10.28 - 0.2f$ $30 < f \leq 40$
- f is in GHz

Two mated compliance board pairs as surrogate for cable



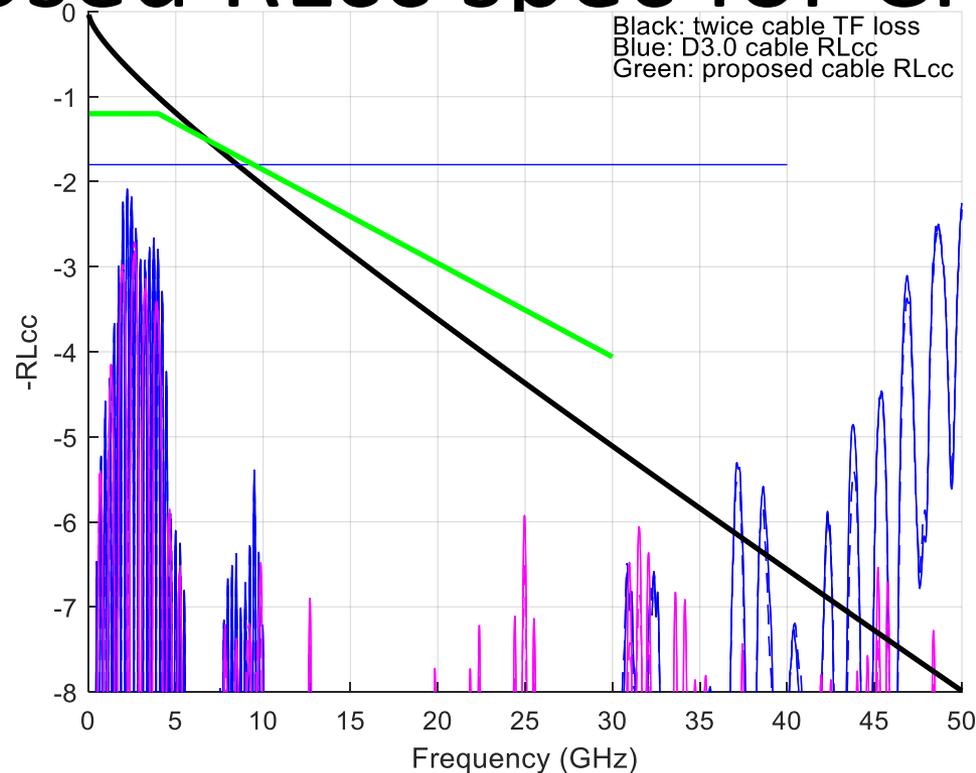
- Same as in dawe_3ck_04_0122
- Mated pairs connected both ways round
 - Magenta is the relevant way
- Represents a near lowest-loss cable

Illustrating the proposed RLcc spec



- Thin magenta: as on previous slide
- Thin blue: extra 3 dB lossy line between "cable" ends gives a small improvement at medium frequencies
- Green cable limit is well above both mated test fixtures limit and this measurement

Backup: D3.0 comment 181, earlier proposed RLcc spec for CR cable



- 1.2 dB $0.05 \leq f \leq 4$
- $0.76 + 0.11f$ dB $4 < f \leq 30$ GHz
- f is in GHz