P802.3bq Rx CMNR ad hoc activity - Annex 113A (Informative)

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Outline

- Highlights of ad hoc discussions on P802.3bq D2.2 comments
  - Equipment bandwidth
  - Cable clamp calibration
  - Injected signal power measurement
  - Step size and dwell time
- Moving forward
  - Sandbox & markup
  - Potential path forward
  - How do we know when we're done?

Considerations for Suggested Equipment Bandwidth

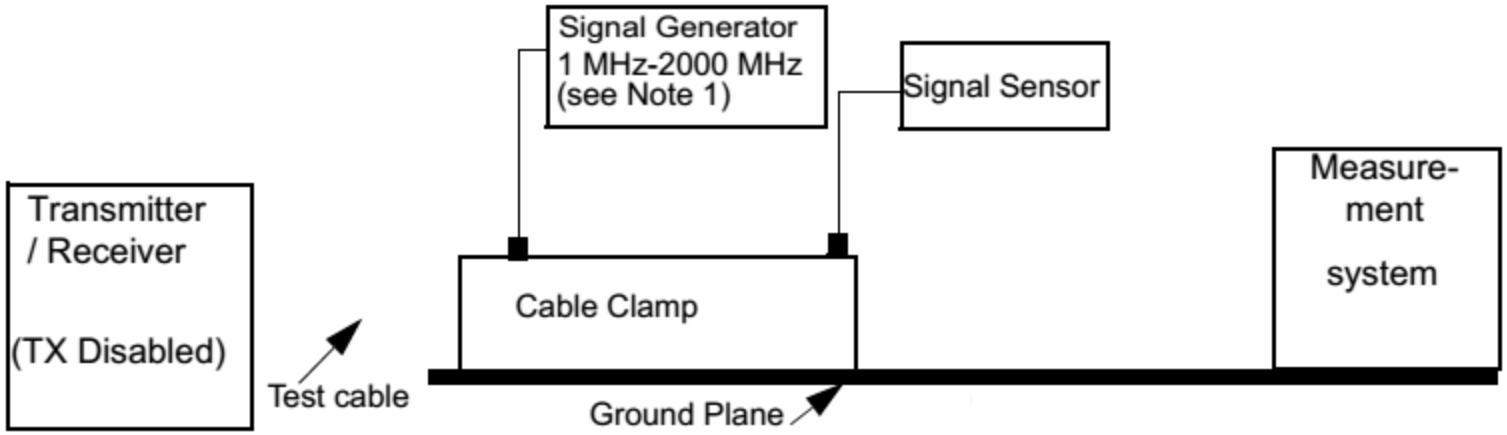
- Several comments received suggest changing the lower frequency to align with the test bandwidth defined in 113.5.4.3 (and/or 126.5.4.3), increasing 1MHz to 80MHz
- Discussion of the lower frequency range included the following:
  - The Annex defines the equipment capability
  - The 1MHz lower limit intentionally aligns with Annex 40B
  - The “calling” subclause specifies the range to be used as noted in 113A.1, “Refer to the receiver specifications of the PHY under test for specific impairments, impairment source power levels, and relevant frequency ranges.”
- Ad hoc resolution is trending to retaining the 1MHz to 2000 MHz equipment capability as defined in P802.3bq D2.2
- To facilitate better understanding of the “re-use” model, the ad hoc discussed hosting a tutorial on Annex 113A (“User’s Guide to Annex 113A”) – a topic for further discussion.

Considerations for Note 1

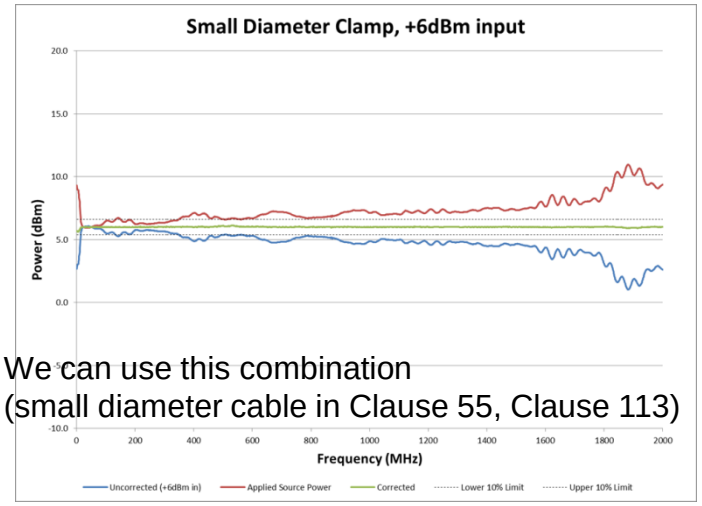
- Note 1 allows practitioners to correct the injected source power for known losses in the cable clamp.
  - This is similar to the “field calibration with no EUT in place” process defined in IEC 61000-4-3, 6.2 “Calibration of field”, which establishes a constant source power reference over the test frequency range before validating the setup and performing the test.
- Participants highlighted that there is a risk of applying excessive impairment levels when compensating for these losses, and that the language in P802.3bq D2.2 (“must”) is restrictive.
- Discussion noted that the validation process outlined in 113A.3 and the limits identified in Table 113A-2 provide a check against this risk
- Ad hoc resolution is trending to changing “must” to “may” to allow some flexibility in implementation.
  - A proposed and believed to be helpful note states “If used, the signal power correction factor should not result in common-mode and differential-mode voltages that exceed the limits defined in Table 113A-2.“

“NOTE 1” Test Configuration, D2.2

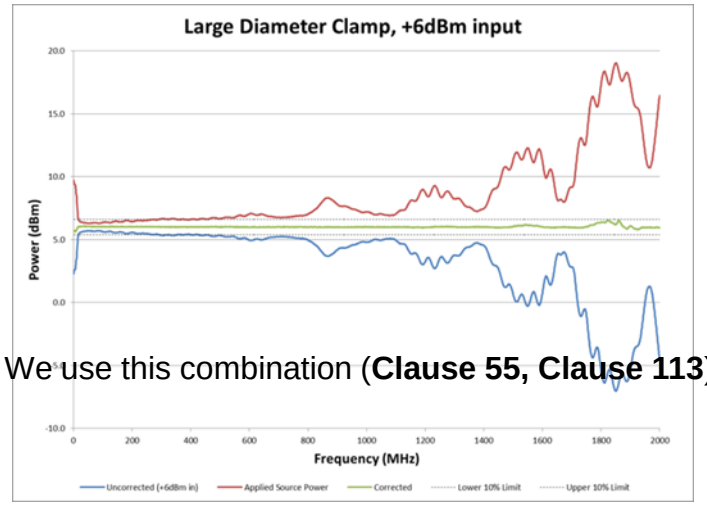
NOTE 1 —Prior to making validation measurements or performing the test described in 113A.4, the cable clamp should be tested without the cable inserted to determine the variation of the signal generator voltage with frequency at the output of the clamp. The signal generator output should be adjusted to the specified signal power (for example 6 dBm for 40GBASE-T) at 20 MHz on the signal sensor. When the frequency is varied from 1 MHz to 2000 MHz, the measured power should not vary more than ±10 %. If the measured power varies more than ±10%, then a correction factor must be applied at each measurement frequency.



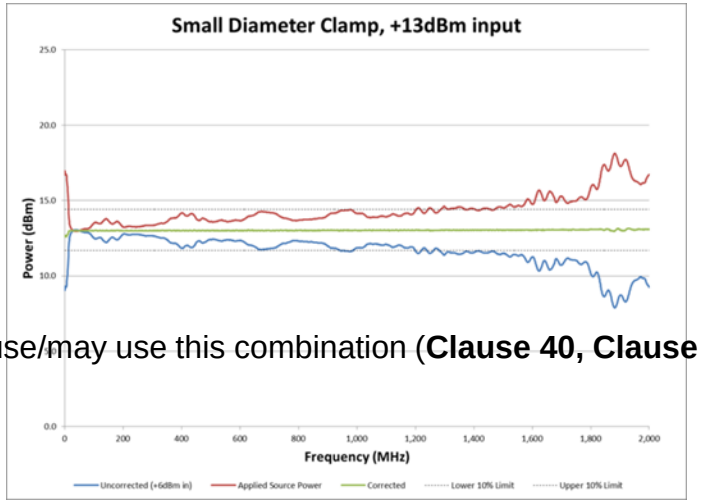
Correction Factor Examples



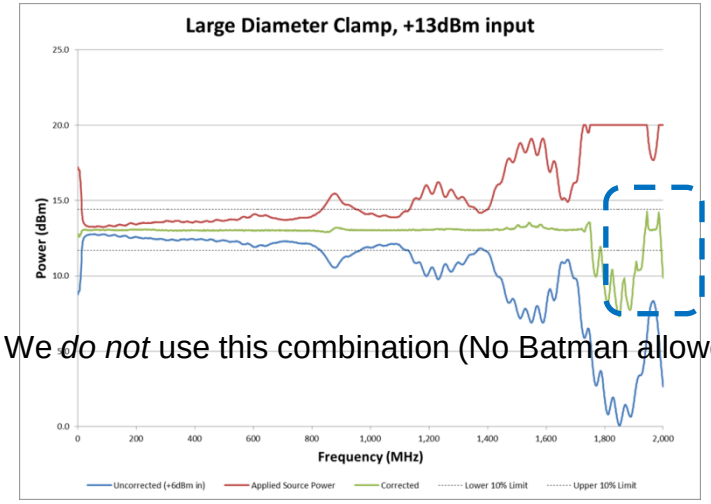
We can use this combination
(small diameter cable in Clause 55, Clause 113)



We use this combination (**Clause 55, Clause 113**)



We use/may use this combination (**Clause 40, Clause 126**)



We *do not* use this combination (No Batman allowed!)

Injected Signal Power Measurement

- Technical contributions have identified several advantages with measuring the injected signal power at the source using a directional coupler
- The suggestion is in line with generally accepted good measurement practice and not viewed as restrictive or burdensome
- An example of suggested figure changes are shown
- Accompanying text has been proposed in comments but not reviewed

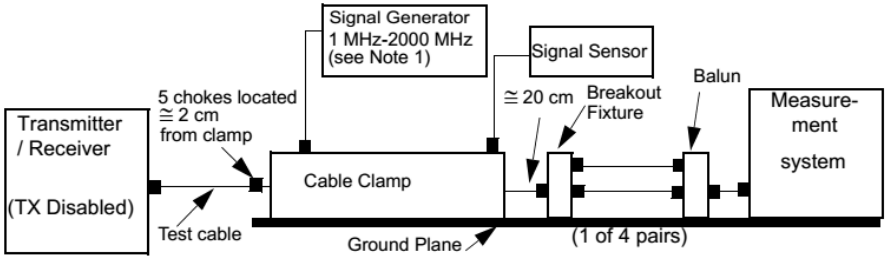
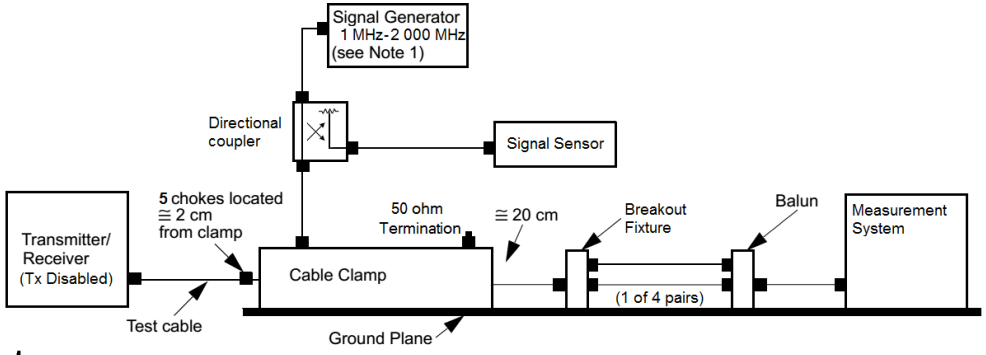


Figure 113A–3—Cable clamp validation test configuration



Step Size and Dwell Time

- The present text in Annex 113A (and Annex 40B) does not provide suggested step sizes and dwell times.

- Ad hoc discussion is trending to adding suggested step sizes and dwell times that align with IEC61000-4-3, such as
  - Defining a minimum 500ms/step
  - Defining a minimum 255 points for “1% maximum from previous” step size without prohibiting other frequency step spacing or number of points
  - Including a recommendation to reduce the signal generator output to a low (lowest) output power level before switching frequencies.

Sandbox & Working Document

- Sandbox – A workbook that is a transcription and sort of both .bq and .bz cable clamp comments. The intent of this document is to allow the ad hoc to summarize discussion of comments as we work to resolution.
  - 11/39 not implemented
  - 14/39 have associated changes and proposed text is updated in the working document
  - 16/39 are open
    - 4/16 should be relatively easy to tackle
    - 12/16 have been either not discussed or only briefly discussed
- Working document/markup – An updated version of the July Word document that includes updates based on changes summarized in the sandbox (changes are tracked)

Potential Path Forward

- Recommend accepting proposed changes summarized in the v1p3 sandbox and implemented in the v0p7 markup
  - Addresses 23/39 comments
- Address the remaining 16
  - On the floor or defer until later in the week (Tues AM?) so we can discuss in ad hoc

Knowing when we're done…

- Some guidelines/criteria for closure
  - Assuming that the 802.3 baseline/ benchmark for this type of test is Annex 40B, does Annex 113A "meet or exceed" Annex 40B?
  - Can a practitioner successfully implement a test against the referenced specification with the information and guidance provided in the Annex?
- Focus on implementing the necessary changes to successfully meet these guidelines/criteria
- Include/develop a technical tutorial for a future IEEE plenary.

Thank You!

V0p7 Markup Changes
.bq Comment #135

P204 Line 20 from

- "… are as specified in 113A.2."

to

- "…are as specified in Table 113A-1."

V0p7 Markup Changes
.bz Comment #217

P204 Line 20 from

- "… between teh source connections…"

to

- "…between the source connections…"

V0p7 Markup Changes
.bq Comment #136, .bz Comment #198

P204 Lines 35-41 from

c) Balun – 4 ports, laboratory quality with a 100 Ω differential input and a 50 Ω single-ended, unbalanced output:

Insertion Loss (100 Ω balanced <-> 50 Ω unbalanced): < 4dB (1 MHz-2000 MHz)

Return Loss: > 8dB (1 MHz- 3 MHz), > 15dB (3 MHz-2000 MHz)

Common-Mode Rejection: > 50dB (1 MHz-1000 MHz), > 40dB at 2000 MHz

Common-Mode Return Loss > 8 dB (1 MHz-2000 MHz)

to

c) Balun – 3 ports, laboratory quality with a 100 Ω balanced differential input (Port 1), a 50 Ω unbalanced single-ended output for the differential component (Port 2), and a 50 Ω unbalanced single-ended output for the common-mode component (Port 3):

Insertion Loss (Port 1 <-> Port 2): < 4dB (1 MHz-2000 MHz)

Return Loss (Port 1, ~~Zref = 100 Ω~~): > 8dB (1 MHz- 3 MHz), > 15dB (3 MHz-2000 MHz)

Common-Mode Rejection (Port 1 <-> Port 2): > 50dB (1 MHz-1000 MHz), > 40dB up to 2000 MHz

Common-Mode Return Loss (Port 1, ~~Zref = 25 Ω~~): > 8 dB (1 MHz-2000 MHz)

V0p7 Markup Changes
.bq Comment #136, .bz Comment #200

- Insert new text after P204 Line 41

Note that other devices for detecting differential and common mode signals may also be used, provided the performance is demonstrated to be equivalent or better.

The use of two separate differential and common-mode signal component measurement configurations is permissible provided the ~~above~~ specifications are met for each measurement device. ~~configuration~~.

The common-mode reference (termination) impedance may be standard specific. The common-mode return loss requirement does not change, but Zref (common-mode) may be 50 Ω for shielded or 75 Ω for ~~UTP~~ unshielded applications.

V0p7 Markup Changes
.bz Comment #202

Change P204 Lines 45-50

from

f) Chokes (5) - Wideband Ferrite Material:

Inner diameter: Selected to minimize the gap between the ferrite and the cable used for the test.

Impedance: 175 Ω @ 100 MHz, 275 Ω @ 250 MHz, 375 Ω @ 500 MHz, 400 Ω @ 1000 MHz

to

f) Chokes (minimum 5) - Wideband Ferrite Material:

Inner diameter: Selected to minimize the gap between the ferrite and the cable used for the test.

Minimum Impedance: 175 Ω @ 100 MHz, 275 Ω @ 250 MHz, 375 Ω @ 500 MHz, 400 Ω @ 1000 MHz

V0p7 Markup Changes
.bz Comment #199

Change P204 Line 54 from

h) Signal generator capable of providing a sine wave signal of 1 MHz to 2000 MHz.

to

h) Signal generator capable of providing a sine wave signal of 1 MHz to 2000 MHz, with adequate test power for adjustments, low harmonic distortion and the ability to control and monitor power and frequency transitions.

V0p7 Markup Changes
.bq Comment #138

- Add new text after P205 Line 2 and change existing “j)” to “k)”

j) Directional coupler:

Mainline Insertion Loss: < 2.5 dB (1 MHz-2000 MHz)

Coupling Loss: < 20 dB (1 MHz-2000 MHz)

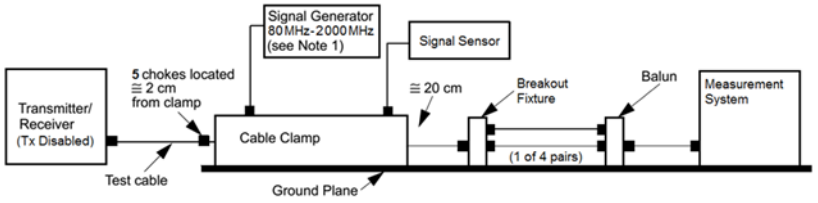
Return Loss (Mainline Ports): > 16 dB (1 MHz-2000 MHz)

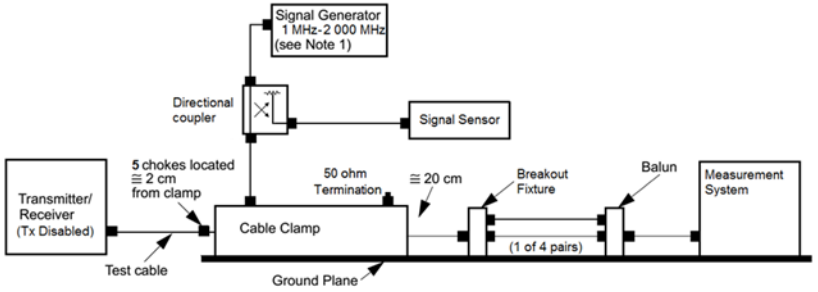
Return Loss (Coupling Port): > 15 dB (1 MHz-2000 MHz)

- Comment deferred to BZ discussion

V0p7 Markup Changes
.bq Comment #139

- Change Figure 113A-3 - Cable clamp validation test configuration to use a directional coupler
- Comment deferred to BZ discussion





V0p7 Markup Changes
“shall/must” .bz Comment #216
“or equivalent” .bq Comment #143

Change P205 L24 from

The signal generator shall be capable of…

to

The signal generator should be capable of…

Insert text in P205 L26, from

…not connected to the balun are terminated…

to

…not connected to the balun (or equivalent measurement network) are terminated…

Change text in P205 L27, from

The cable clamp, breakout fixture and balun must be in direct contact with…

to

The cable clamp, breakout fixture and balun are in direct contact with…

V0p7 Markup Changes
.bz Comment #202

Change P205 L29 from

The chokes are placed on the table,

to

The chokes are placed on the cable,

V0p7 Markup Changes
.bq Comment #189

Change P206 Line 4 from

If the power varies more than ±10%, then a correction factor must be applied at each measurement frequency.

to and add the new text

If the power varies more than ±10%, then a correction factor may be applied at each measurement frequency. If used, the signal power correction factor should not result in common-mode or differential-mode voltages that exceed the limits defined in Table 113A-2.

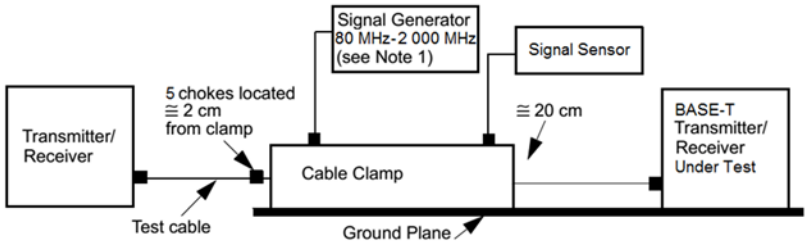
- Comment is resolved using this text with some additional changes to Note 1

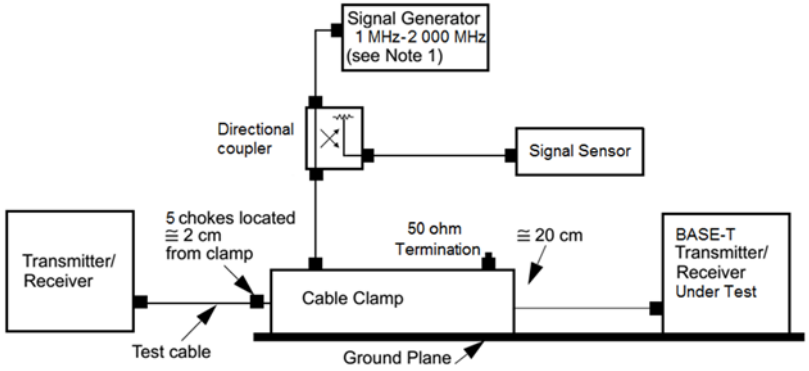
V0p7 Markup Changes
.bz Comment #216

Change P206 Line 23 from	**to**
The signal generator shall be capable of	The signal generator should be capable of

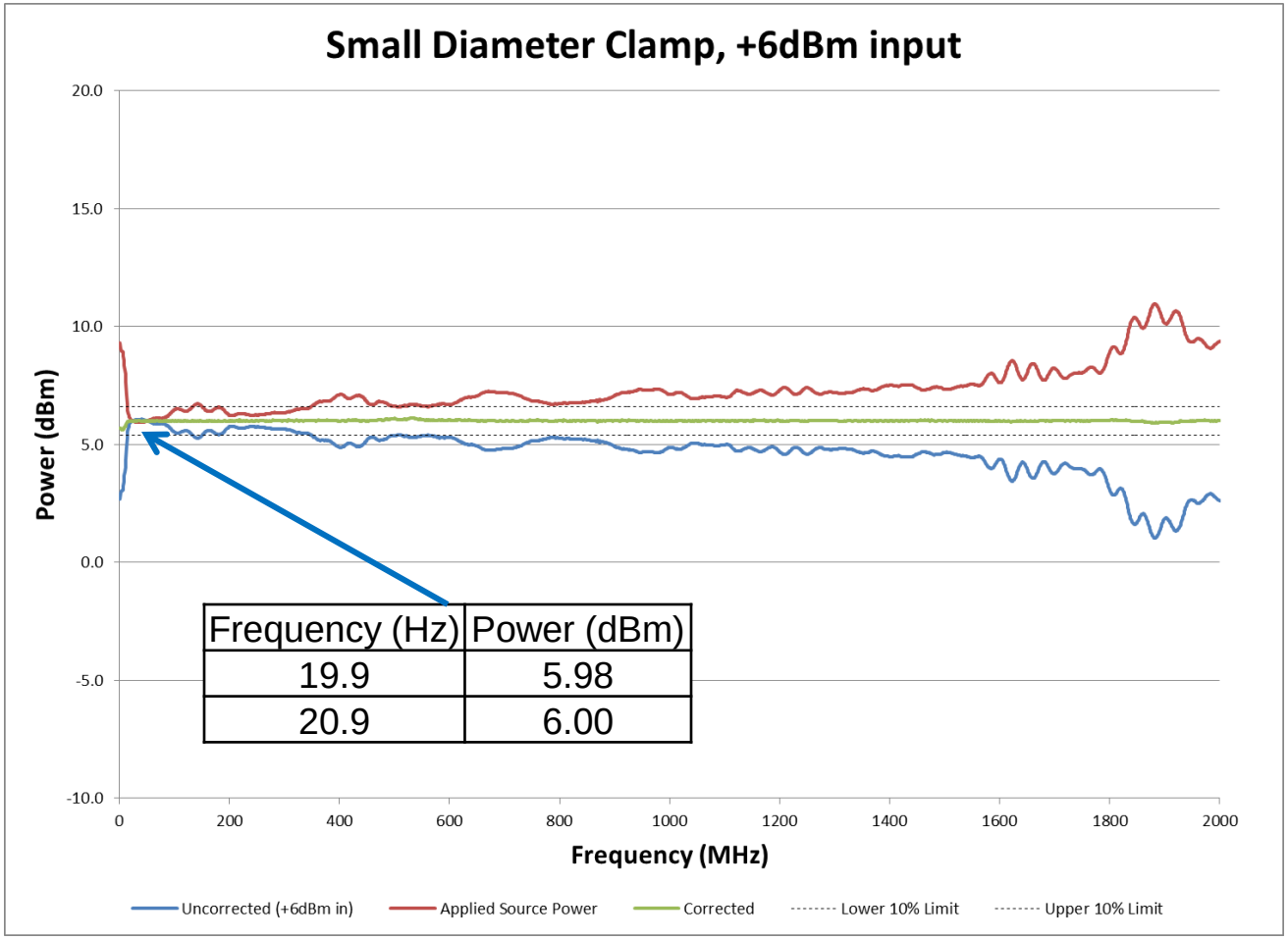
V0p7 Markup Changes
.bq Comment #149

- Change Figure 113A-4 - Cable clamp test configuration to use a directional coupler
- Comment deferred to BZ discussion





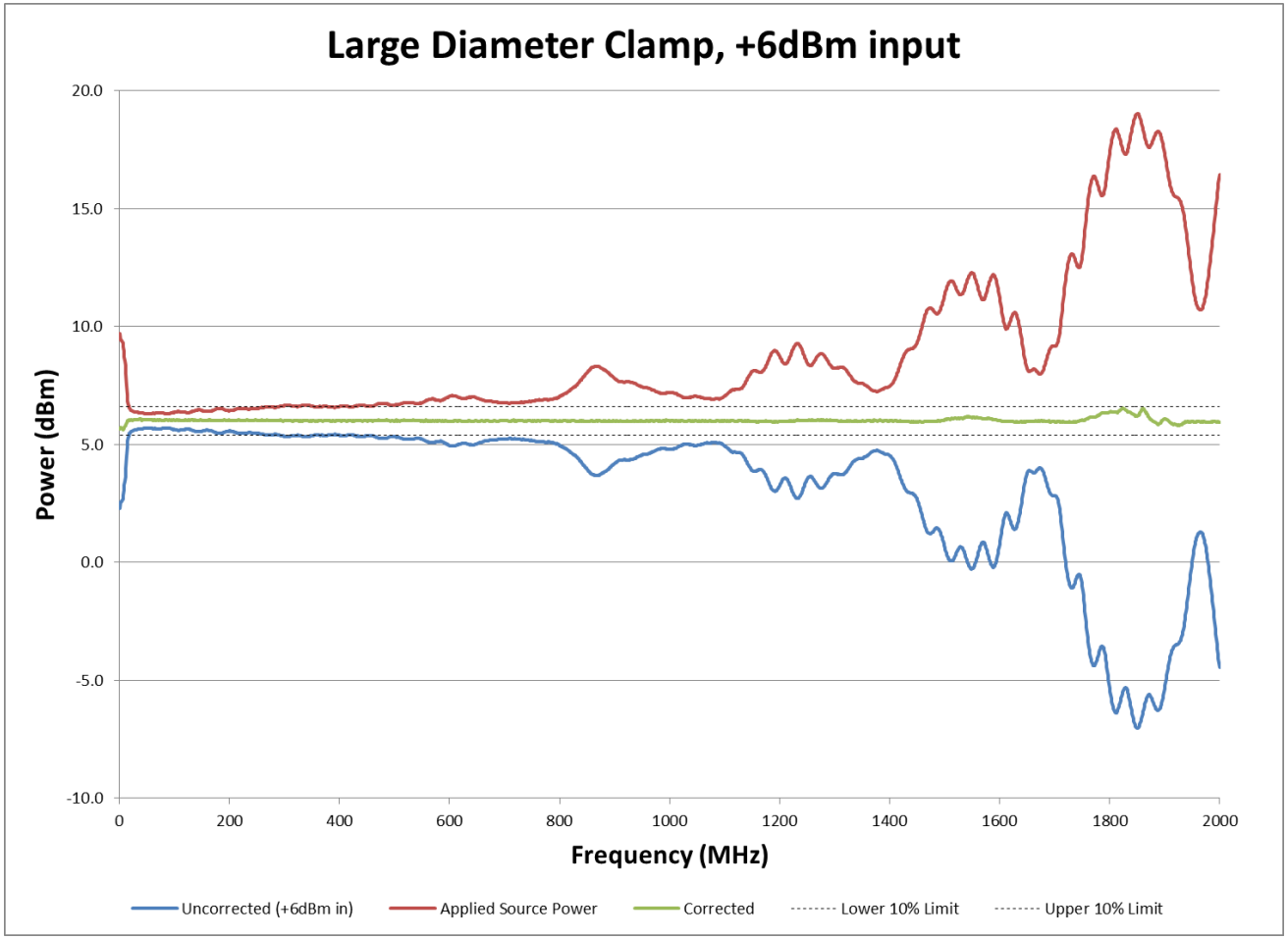
Correction Factor Examples



Frequency (Hz)	Power (dBm)
19.9	5.98
20.9	6.00

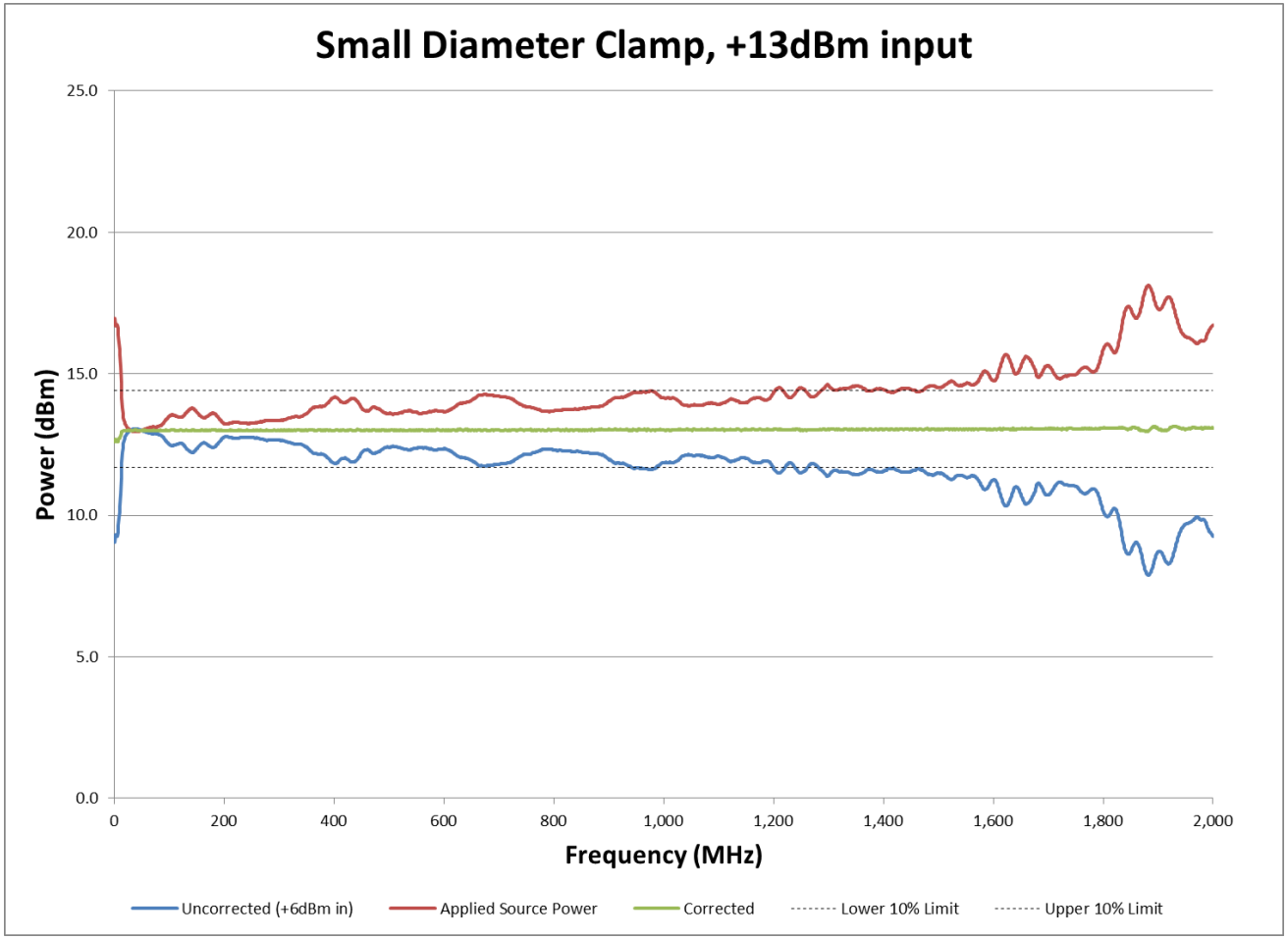
We can use this combination (small diameter cables)

Correction Factor Examples



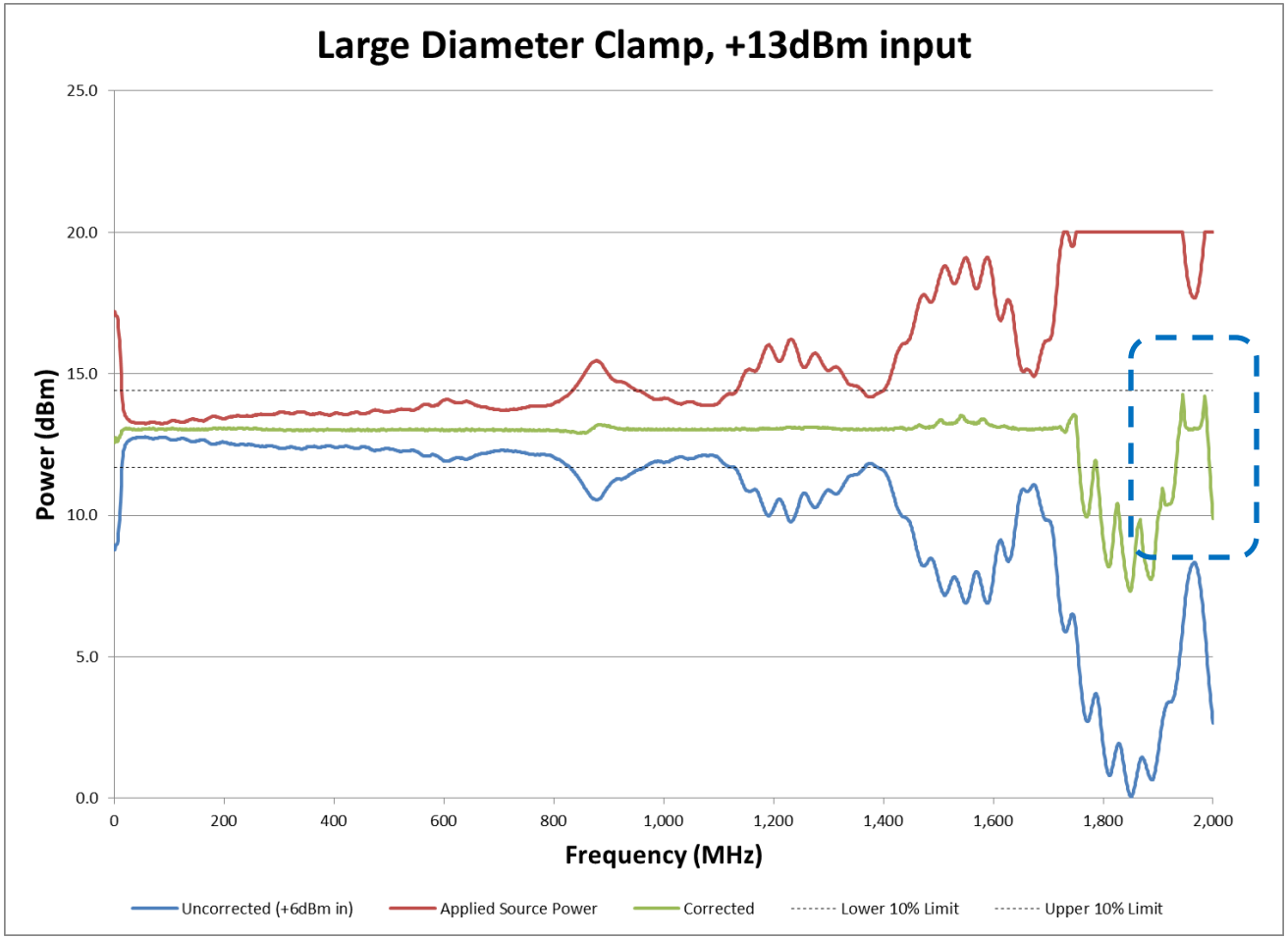
We use this combination (Clause 55, Clause 113)

Correction Factor Examples



We use/*may* use this combination (Clause 40, Clause 126)

Correction Factor Examples



We *do not* use this combination (No Batman allowed!)