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# Receiver sensitivity comments against 802.3cu D2.0 #29, 77, 78, 83, 84, 96, 102, 111

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IEEE P802.3cu 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength Task Force

# Subclause 140.6.2 changes

- Update Table 140-7 as below.

**Table 140–7—100GBASE-DR, 100GBASE-FR1, and 100GBASE-LR1 receive characteristics**

| Description | ~~Value~~ 100GBASE-DR | 100GBASE-FR1 | 100GBASE-LR1 | Unit |
|---|---|---|---|---|
| Receiver sensitivity ($OMA_{outer}$) (max)<br>for SECQ < 1.4 dB<br>for 1.4 dB ≤ SECQ ≤ 3.4 dB | Equation (140–1)[c]<br>—<br>— | —<br>–4.5<br>–5.9 + SECQ | —<br>–6.1<br>–7.5 + SECQ | dBm<br>dBm<br>dBm |
| Stressed receiver sensitivity ($OMA_{outer}$)[d] (max) | –1.9 | –2.5 | –4.1 | dBm |
| Conditions of stressed receiver sensitivity test:[e] | | | | |
| Stressed eye closure for PAM4 (SECQ) | 3.4 | 3.4 | 3.4 | dB |
| SECQ – $10\log_{10}(C_{eq})$[f] (max) | 3.4 | 3.4 | 3.4 | dB |

[a]The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.

[b]Average receive power (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

[c]Receiver sensitivity ($OMA_{outer}$) (max) for 100GBASE-DR is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB. ~~Receiver sensitivity (OMAouter) (max) for 100GBASE-FR1 and 100GBASE-LR1 is defined for a transmitter with a value of SECQ up to 1.4 dB, and for values of SECQ greater than 1.4 dB see Equation (140–2) and Equation (140–3), respectively.~~

[d]Measured with conformance test signal at TP3 (see 140.8) for the BER specified in 140.1.1.

[e]These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

[f]$C_{eq}$ is a coefficient defined in 121.8.5.3, which accounts for the reference equalizer noise enhancement.

# Subclause 140.7.9 changes

- Change text of 140.7.9 as below.

**140.7.9 Receiver sensitivity**

***Change the contents of 140.7.9 and Figure 140-5 as follows:***

Receiver sensitivity for 100GBASE-DR is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity for 100GBASE-DR should meet Equation (140–1), which is illustrated in Figure 140–5. The normative requirement for the 100GBASE-DR receiver is stressed receiver sensitivity.

$$RS = \max(-3.9, SECQ - 5.3) \quad \text{(dBm)} \qquad (140\text{–}1)$$

~~The normative requirements for the 100GBASE-FR1 and 100GBASE-LR1 receivers include both receiver sensitivity and stressed receiver sensitivity.~~

~~Receiver sensitivity for 100GBASE-FR1 is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity should meet Equation (140–2), which is illustrated in Figure 140–5.~~

~~$RS = \max(-4.5, SECQ - 5.9)$ (dBm)~~ ~~(140–2)~~

~~Receiver sensitivity for 100GBASE-LR1 is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity should meet Equation (140–3), which is illustrated in Figure 140–5.~~

~~$RS = \max(-6.1, SECQ - 7.5)$ (dBm)~~ ~~(140–3)~~

where

| | |
|---|---|
| *RS* | is the receiver sensitivity |
| *SECQ* | is the SECQ of the transmitter used to measure the receiver sensitivity |

# Subclause 140.7.9 changes (cont'd)

The receiver sensitivity ($OMA_{outer}$) shall be within the limits given in Table 140–7 for 100GBASE-FR1 and 100GBASE-LR1, if measured using a test pattern specified for receiver sensitivity in Table 140–10.

The conformance test signal applied at TP3 meets the requirements for a 100GBASE-FR1 or 100GBASE-LR1 transmitter followed by an attenuator.

The SECQ of the conformance test signal is measured according to 140.7.5, except that the test fiber is not used. The measured value of SECQ is then used to calculate the limit for receiver sensitivity ($OMA_{outer}$) as specified in Table 140–7 and illustrated in Figure 140–5.

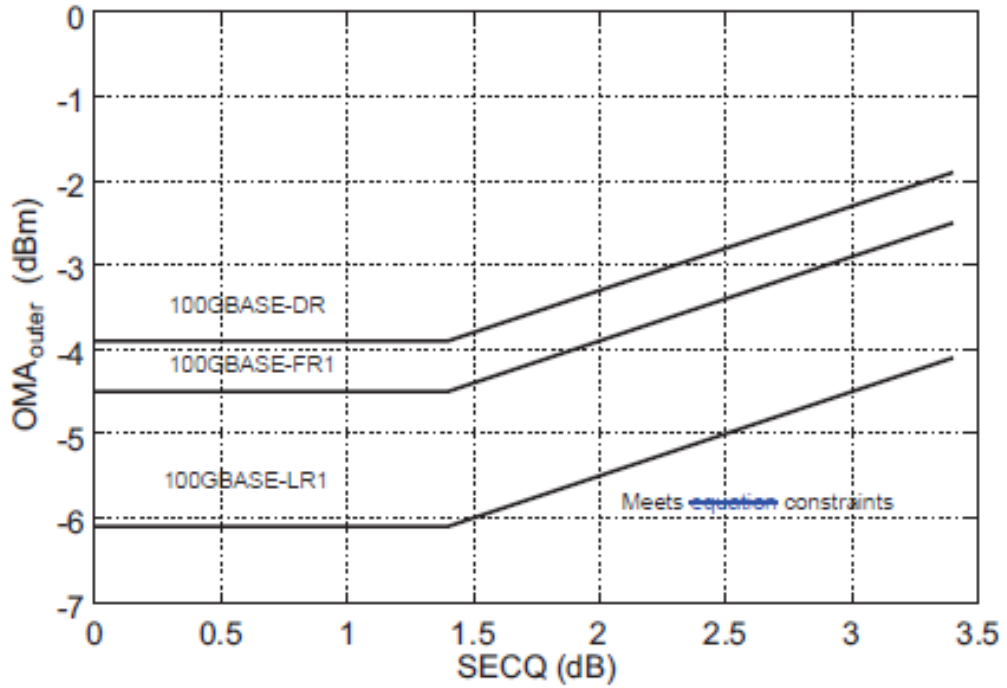


Figure 140–5—Illustration of receiver sensitivity

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# Subclause 151.7.2 changes

- Update Table 151-8 as below.

**Table 151–8—400GBASE-FR4 and 400GBASE-LR4-6 receive characteristics**

| Description | 400GBASE-FR4 | 400GBASE-LR4-6 | Unit |
|---|---|---|---|
| Receiver sensitivity ($OMA_{outer}$), each lane[c] (max)<br>for SECQ < 1.4 dB<br>for 1.4 dB ≤ SECQ ≤ 3.5 dB | <br>–4.6<br>–6 + SECQ | <br>–6.8<br>–8.2 + SECQ | <br>dBm<br>dBm |
| Stressed receiver sensitivity ($OMA_{outer}$), each lane[d] (max) | –2.6 | –4.7 | dBm |
| Conditions of ~~stressed~~ receiver sensitivity test:[e] | | | |
| Stressed eye closure for PAM4 (SECQ), lane under test (max) | 3.4 | 3.5 | dB |
| ~~SECQ – $10\log_{10}(C_{eq})$, lane under test (max)~~ | ~~3.4~~ | ~~3.5~~ | ~~dB~~ |
| $OMA_{outer}$ of each aggressor lane | 1.5 | –0.4 | dBm |

[a] The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.

[b] Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

[c] ~~Receiver sensitivity (OMAouter), each lane (max) is defined for a transmitter with a value of SECQ up to 1.4 dB. For values of SECQ greater than 1.4 dB, see Equation (151–1) and Equation (151–2) for 400GBASE-FR4 and 400GBASE-LR4-6, respectively.~~

[d] Measured with conformance test signal at TP3 (see 151.8.11) for the BER specified in 151.1.1.

[e] These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

# Subclause 151.8.10 changes

- Change text of 151.8.10 as below.

**151.8.10 Receiver sensitivity**

The receiver sensitivity ($OMA_{outer}$) of each lane shall be within the limits given in Table 151–8 for 400GBASE-FR4 and 400GBASE-LR4-6, if measured using a test pattern specified for receiver sensitivity in Table 151–11.

The conformance test signal applied at TP3 meets the requirements for a 400GBASE-FR4 or 400GBASE-LR4-6 transmitter followed by an attenuator. An optical demultiplexer may be used to separate the lane having the wavelength for the lane under test as specified in Table 151–8 for calibrating the SECQ.

The SECQ of the conformance test signal is measured according to 151.8.5, except that the test fiber is not used. The measured value of SECQ is then used to calculate the limit for receiver sensitivity ($OMA_{outer}$) as specified in Table 151–8 and illustrated in Figure 151–6.

~~For 400GBASE-FR4, receiver sensitivity is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity should meet Equation (151–1), which is illustrated in Figure 151–6.~~

~~For 400GBASE-LR4-6, receiver sensitivity is defined for a transmitter with a value of SECQ up to 3.5 dB. Receiver sensitivity should meet Equation (151–2), which is illustrated in Figure 151–6.~~

# Subclause 151.8.10 changes (cont'd)

~~$RS = \max(-4.6, SECQ - 6)$ (dBm)~~ ~~(151-1)~~

~~$RS = \max(-6.8, SECQ - 8.2)$ (dBm)~~ ~~(151-2)~~

~~where~~

~~$RS$~~ ~~is the receiver sensitivity~~

~~$SECQ$~~ ~~is the SECQ of the transmitter used to measure the receiver sensitivity~~

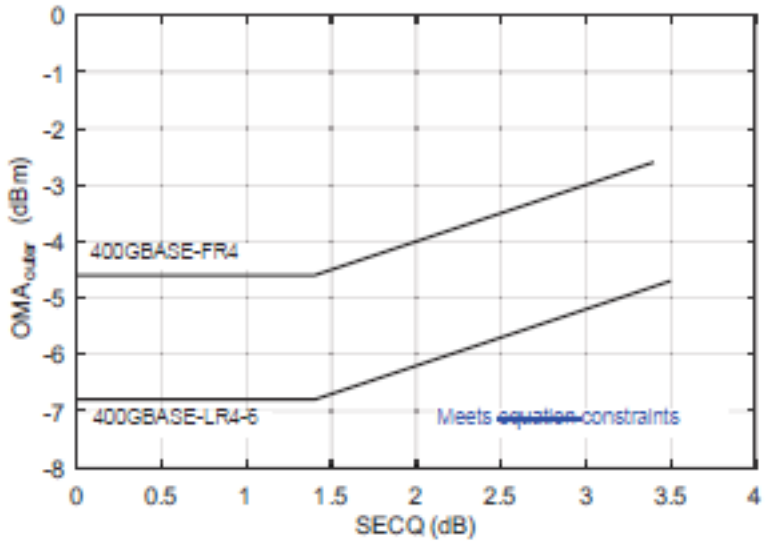


Figure 151–6—Illustration of receiver sensitivity for 400GBASE-FR4 and 400GBASE-LR4-6

~~The normative requirements for the 400GBASE-FR4 and 400GBASE-LR4-6 receivers include both receiver sensitivity and stressed receiver sensitivity.~~