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**Application Note:**  
**Extended Range Optical Transceiver with APD Receivers**  
**Attenuation Best Practices**  
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## **Best Practices when deploying 80km rated (ZR, ZX) Optical Transceivers in Test, Lab, and Evaluation Scenarios**

**Summary:** The output power of a ZR-rated optical transceiver typically is in the range of 0 to +5dBm. As a result, standard loopback testing and 'staging' setups (where short fiber jumpers are utilized) are not advised, as the high power level over such a short distance will invariably cause damage to the receiver.

**Affects:** 80km rated (ZX, ZR) XFPs, X2s, SFPs, and GBICs utilizing APD (avalanche photodiode) receivers.

**Explanation:** The APD (avalanche photodiode) receiver employed in these extended-reach optical transceivers has an enhanced sensitivity to allow for these extended distance fiber runs. However, it is to be noted that the operating range (in terms of input power) is typically between -7 and -24 dBm. This fact **MUST** be considered and compensated for when laboratory testing is being done to verify operation. Power higher than that -7dBm incident upon the receiver can cause **PERMANENT** damage to the receiver and **FAILURE** of the device.

**Resolution:** As stated above, power levels incident upon the APD receiver higher than the range described via data sheets can and will result in permanent damage to the receiver, and the optical transceiver will no longer function.

It is understood that typical 'lab' testing for qualification or staging of devices does not allow for adequate fiber distances between devices. Therefore, in-line attenuators are recommended (which will attenuate 1550nm-based laser signals) of a value recommended at 10dB or 15dB.

This will allow for adequate attenuation of the signal to a power level which is well within the safe operating range of the optical transceiver.