

# ERL Results for 50GBASE KR Devices

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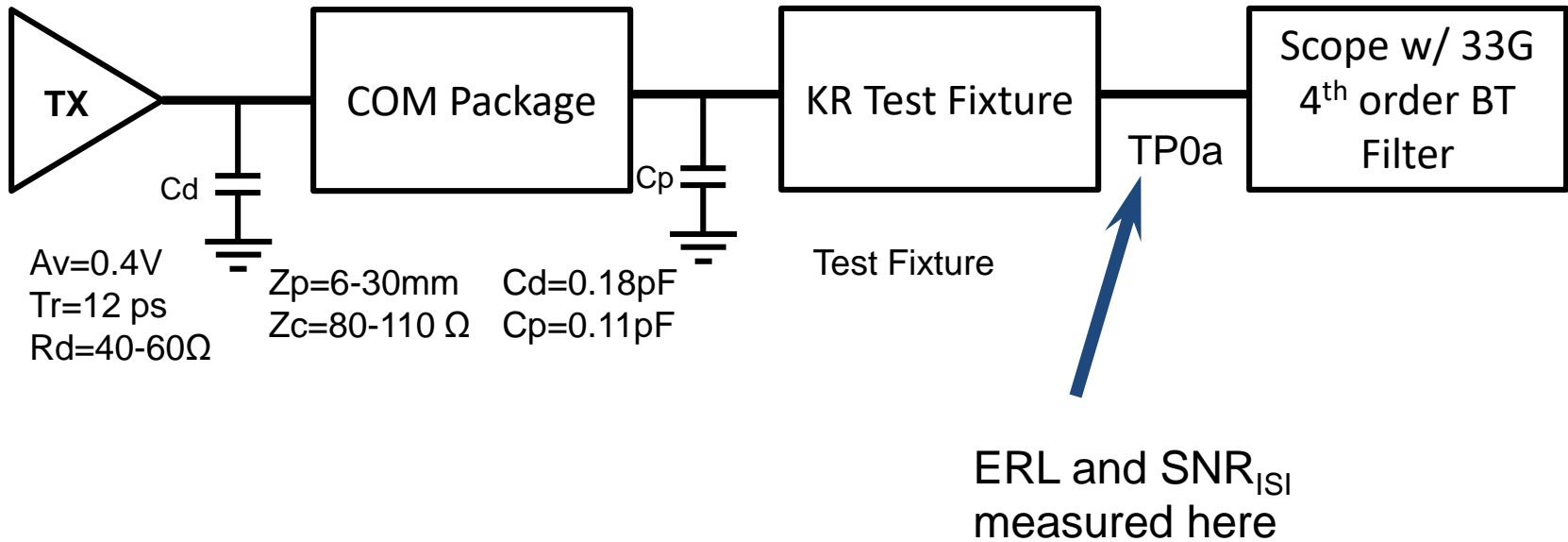
# Supporters

- Richard Mellitz
  - Liav Ben-Artzi
  - Zvi Rechtman
- Samtec
- Marvell
- Mellanox

# Introduction

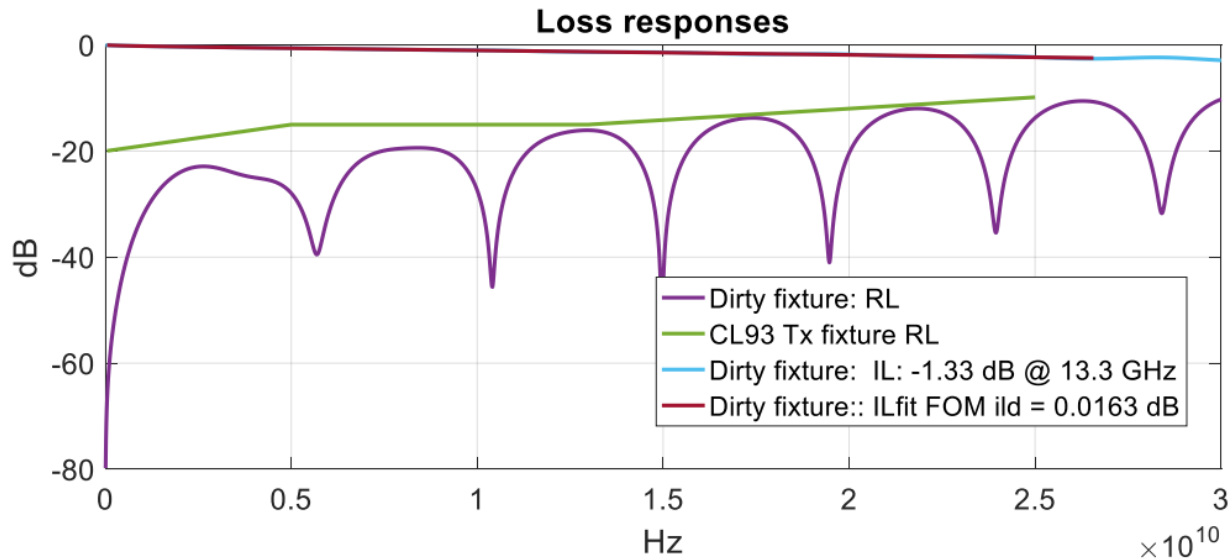
- ERL is suggested to replace return loss masks and  $\text{SNR}_{\text{ISI}}$
- ERL and  $\text{SNR}_{\text{ISI}}$  data for 50GBASE KR devices will be presented
- Relates to comments 25, 43, D3.0 comments 97, 137

# Simulation Setup



# Simulation Setup – Test Fixture No. 1

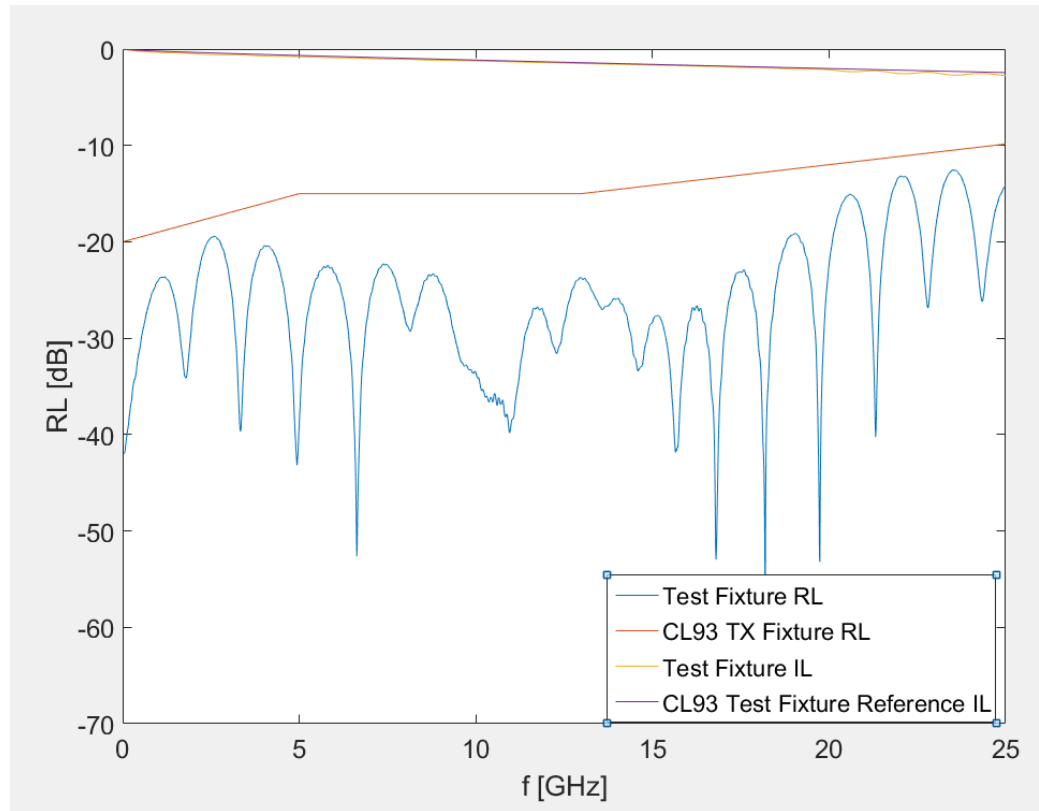
Test fixture with 1.2 to 1.6 dB IL and < 0.1 dB FOM  
ILD, A somewhat “dirty fixture”, but passing



[mellitz\\_112217\\_3cd\\_adhoc-v2.pdf](#)

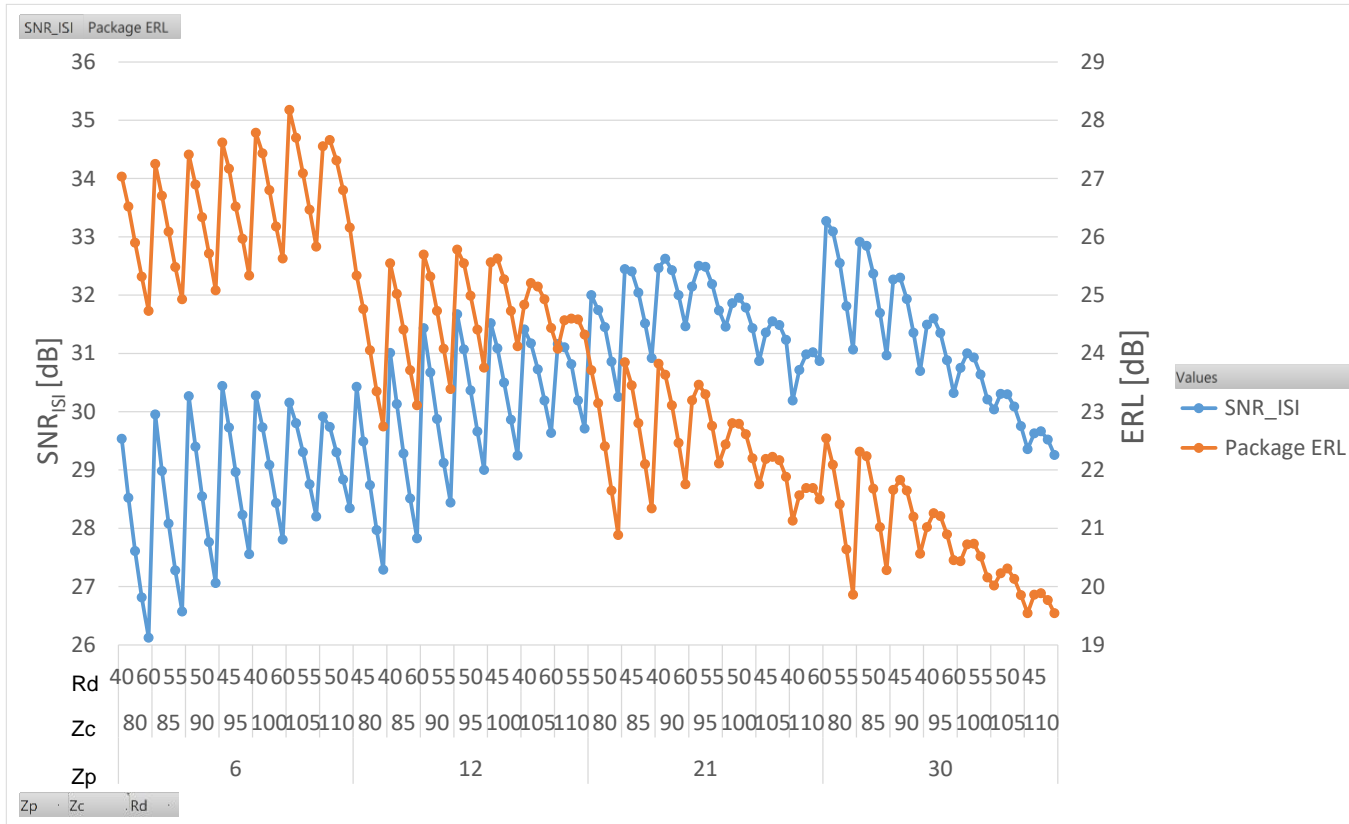
IL:1.39 dB @ 12.89GHz, 1.42 dB @ 13.28GHz

# Simulation Setup – Test Fixture No. 2



Test fixture with slightly worse IL, relative to TF1 (1.49 dB @ 12.89GHz, 1.52 dB @ 13.28GHz) but better RL.

# Results – Test Fixture No. 2



ERL is higher for shorter packages, which is indeed expected to perform better. SNR<sub>ISI</sub> has the opposite effect.

Correlation – 6 mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.972754	1

Correlation – 12 mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.887707	1

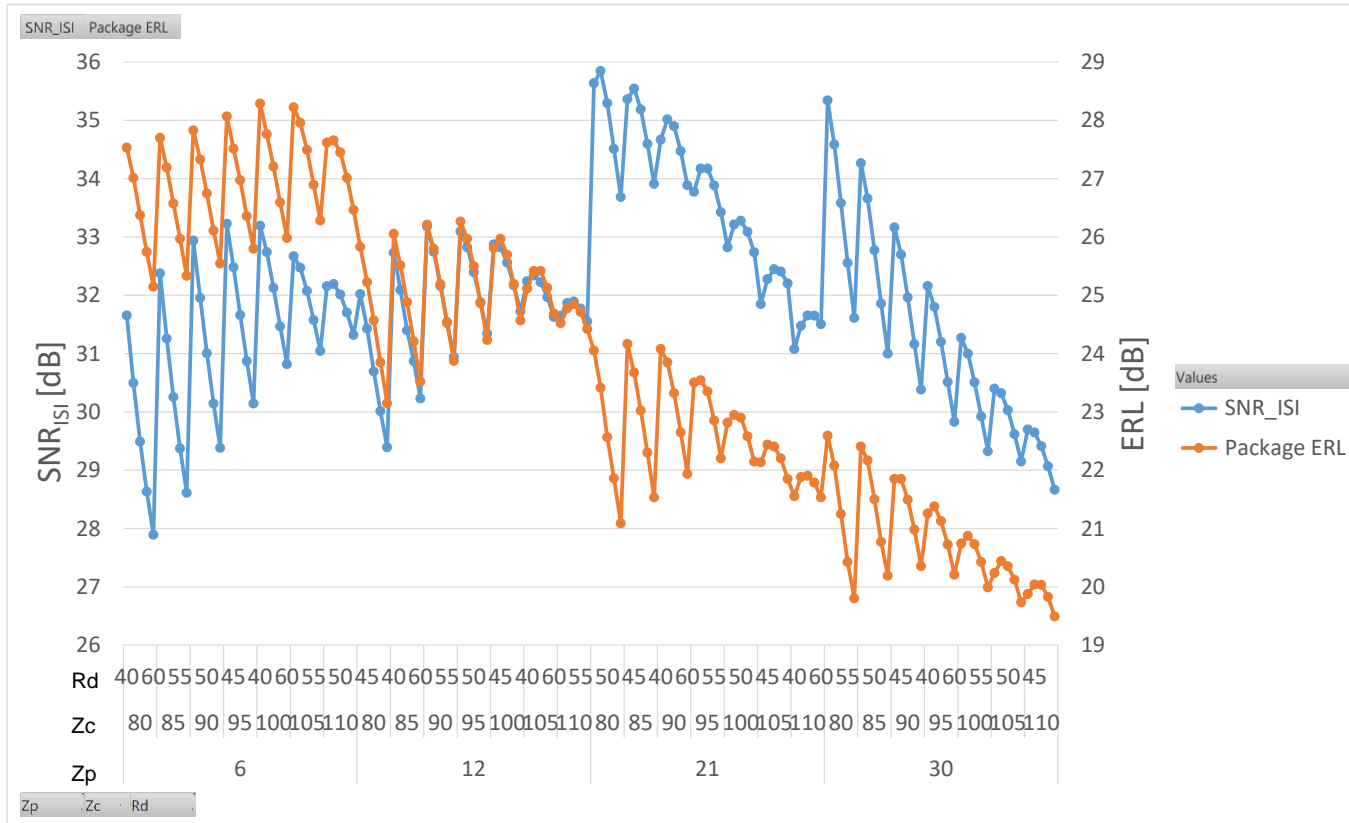
Correlation – 21mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.93693	1

Correlation – 30mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.952682	1

# Results – Test Fixture No. 1



ERL is higher for shorter packages, which is indeed expected to perform better. SNR<sub>ISI</sub> is worse for short packages and is strongly affected by the test fixture.

Correlation – 6 mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.93249	1

Correlation – 12 mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.936301	1

Correlation – 21mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.684289	1

Correlation – 30mm package

	SNR_ISI	ERL
SNR_ISI	1	
ERL	0.906552	1



# Conclusions

- ERL correlates well with  $\text{SNR}_{|S|}$  for KR devices for the same package length.
- $\text{SNR}_{|S|}$  tends to penalize short device packages. ERL accounts for the reference RX equalization and lacks this artefact.
- $\text{SNR}_{|S|}$  is measured at TPOa, so it is affected by the test fixture. ERL is calculated effectively for TPO, which is the interface between the KR TX and the channel.
- Therefore, ERL is a better FOM for the device reflections and can replace  $\text{SNR}_{|S|}$ .