ERL Results for 50GBASE KR Devices

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Supporters

- Richard Mellitz   Samtec
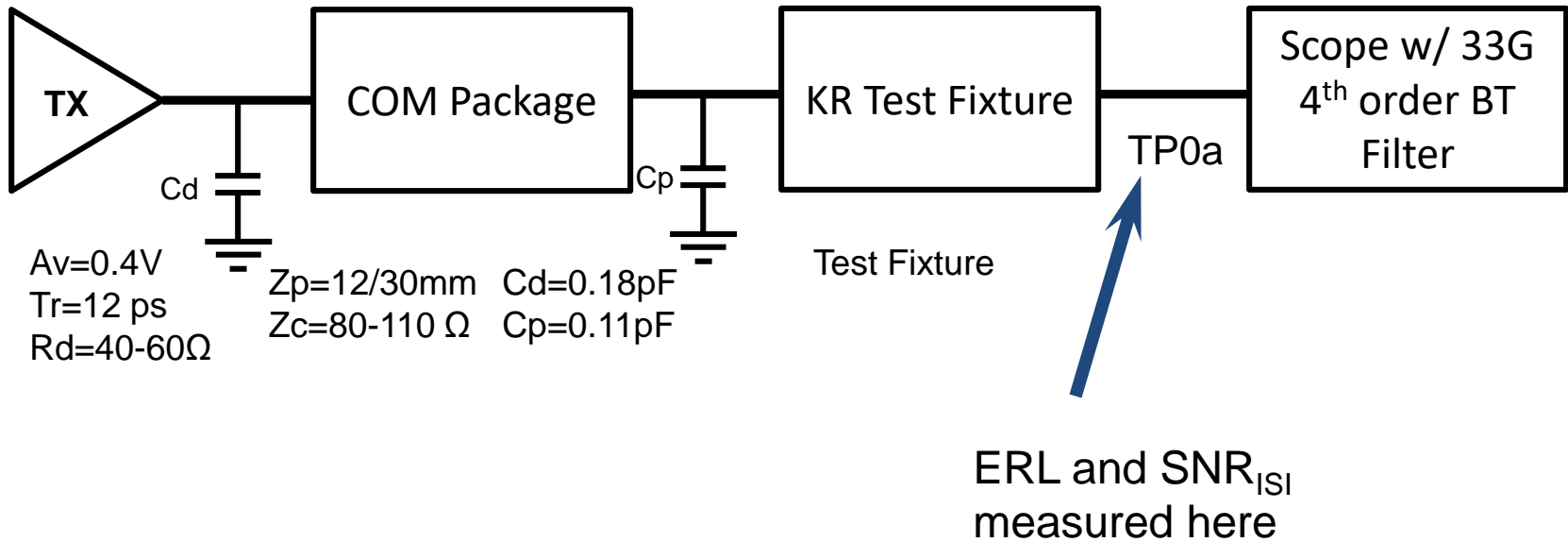
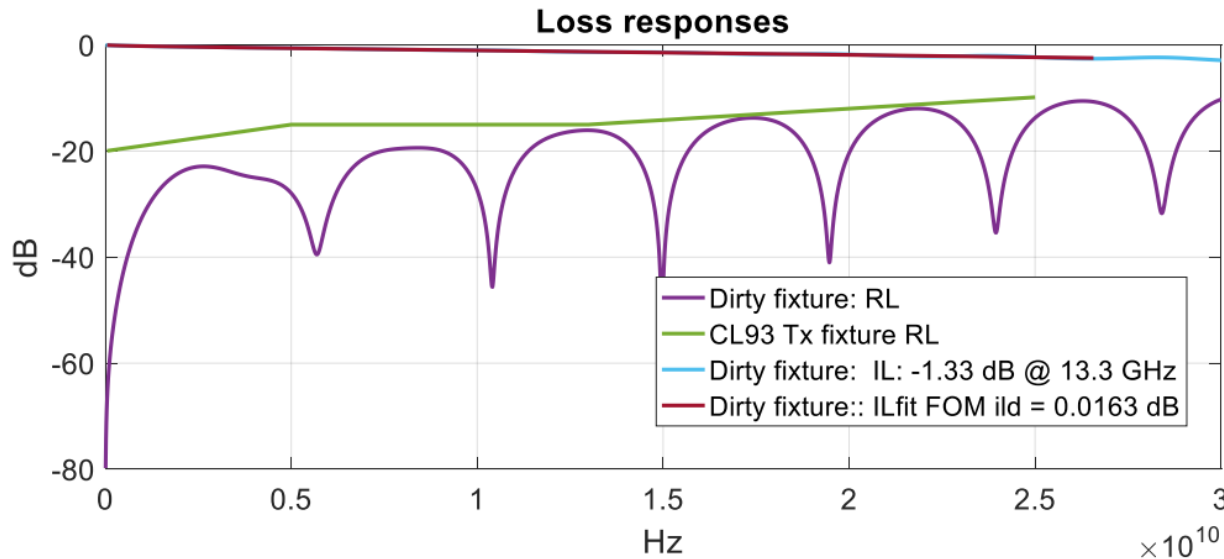- Zvi Rechtman   Mellanox

Introduction

- ERL is suggested to replace return loss masks and SNR_{ISI}

- ERL and SNR_{ISI} data for 50GBASE KR devices will be presented

- Relates to comments 25, 43, D3.0 comments 97, 137

Simulation Setup

TX

Av=0.4V
Tr=12 ps
Rd=40-60Ω

Cd

COM Package

Zp=12/30mm Cd=0.18pF
Zc=80-110 Ω Cp=0.11pF

Cp

KR Test Fixture

Test Fixture

TP0a

ERL and SNR_{ISI}
measured here

Scope w/ 33G
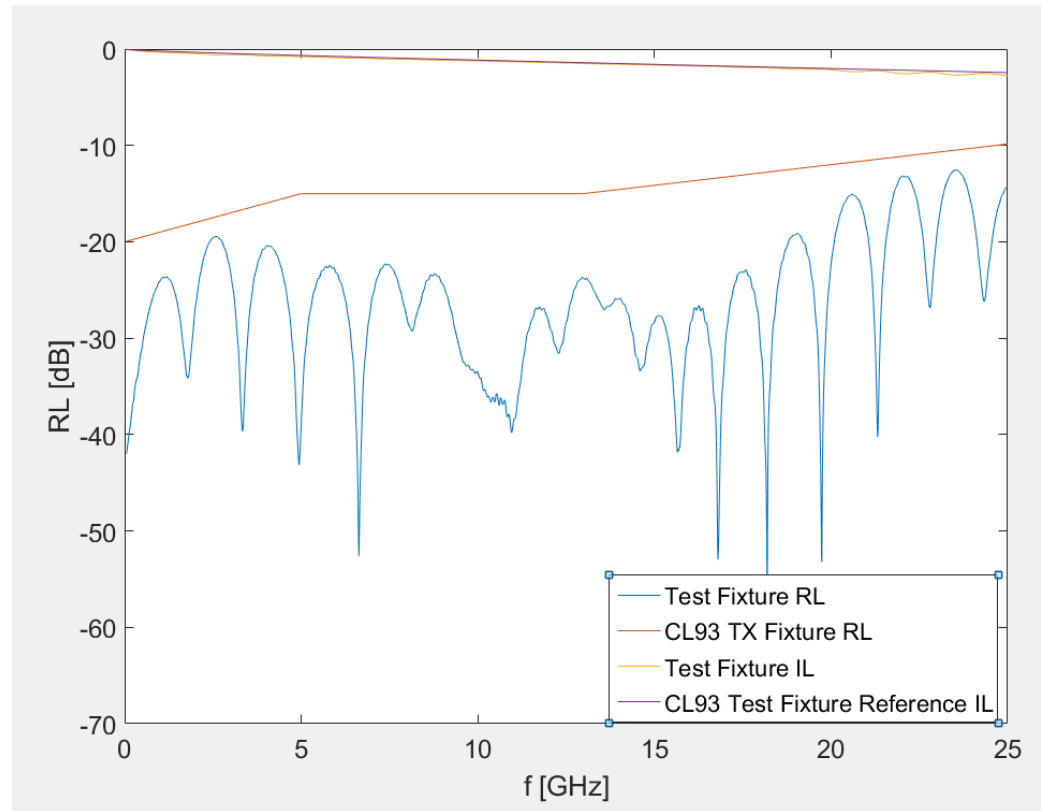4th order BT
Filter

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
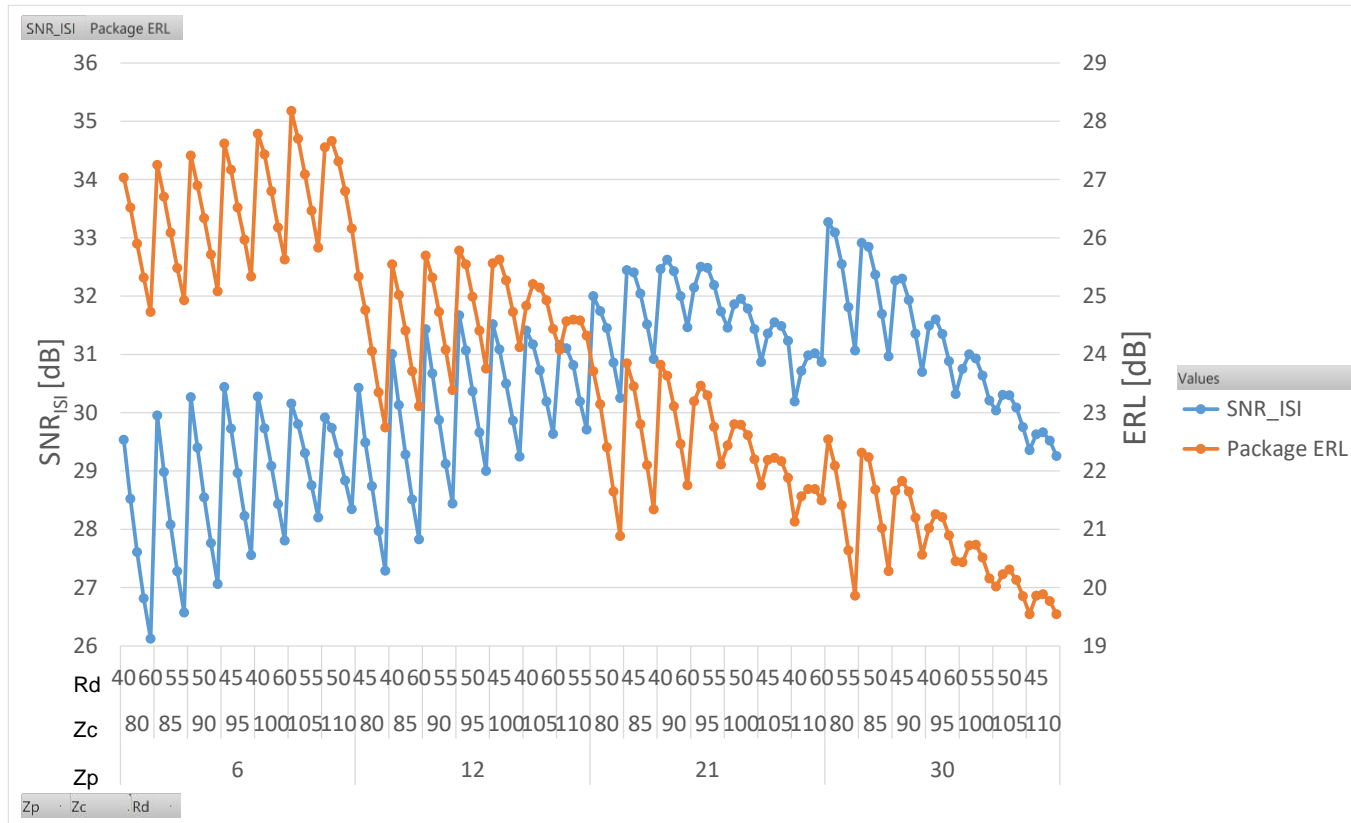

mellitz_112217_3cd_adhoc-v2.pdf

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$_{ISI}$ 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

	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_{ISI} 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 SNR_{ISI} for KR devices for the same package length.

- SNR_{ISI} tends to penalize short device packages. ERL accounts for the reference RX equalization and lacks this artefact.

- SNR_{ISI} is measured at TP0a, so it is affected by the test fixture. ERL is calculated effectively for TP0, which is the interface between the KR TX and the channel.

- Therefore, ERL is a better FOM for the device reflections and can replace SNR_{ISI}.