Transmitter Jitter Specifications for CL179

Alexander Rysin and Piers Dawe
NVIDIA

Supporters

- Karl Muth, Broadcom
- Pavel Zivny, Tektronix
- Karl Bois, Nvidia
- Bill Simms, Nvidia

Introduction

- It was previously demonstrated (rysin_3ck_01b_0122) that J3u/Jrms measurements at TP2 are highly dependent on the loss between TP0d and TP2 and the transmitted signal amplitude via effects of slew rate and noise and do not reflect actual uncorrelated jitter.
- Several possible methods to mitigate this were proposed – accounting only for faster edges, lower order PRBS pattern, TX FIR.
- Initial numbers for 802.3dj transmitter specification were also proposed (ran_3dj_03a_2405).
- This contribution presents measured jitter data for TP0v and TP2 using an industry grade pattern generator.
- Relates to comments 513, 514, 515, 204

Test setups

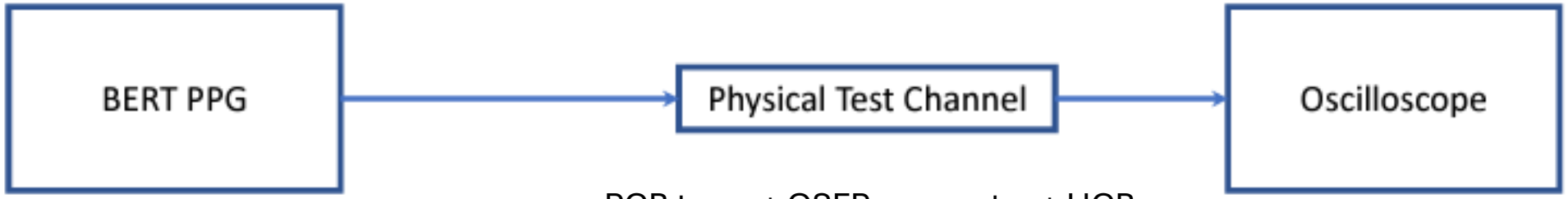
TP0v Setup

Signal amplitude swept between 800 - 1,600 mV

CRU frequency: 4 MHz

40 cm cables
IL=1.72 dB@ 53.125 GHz

TP2 Setup



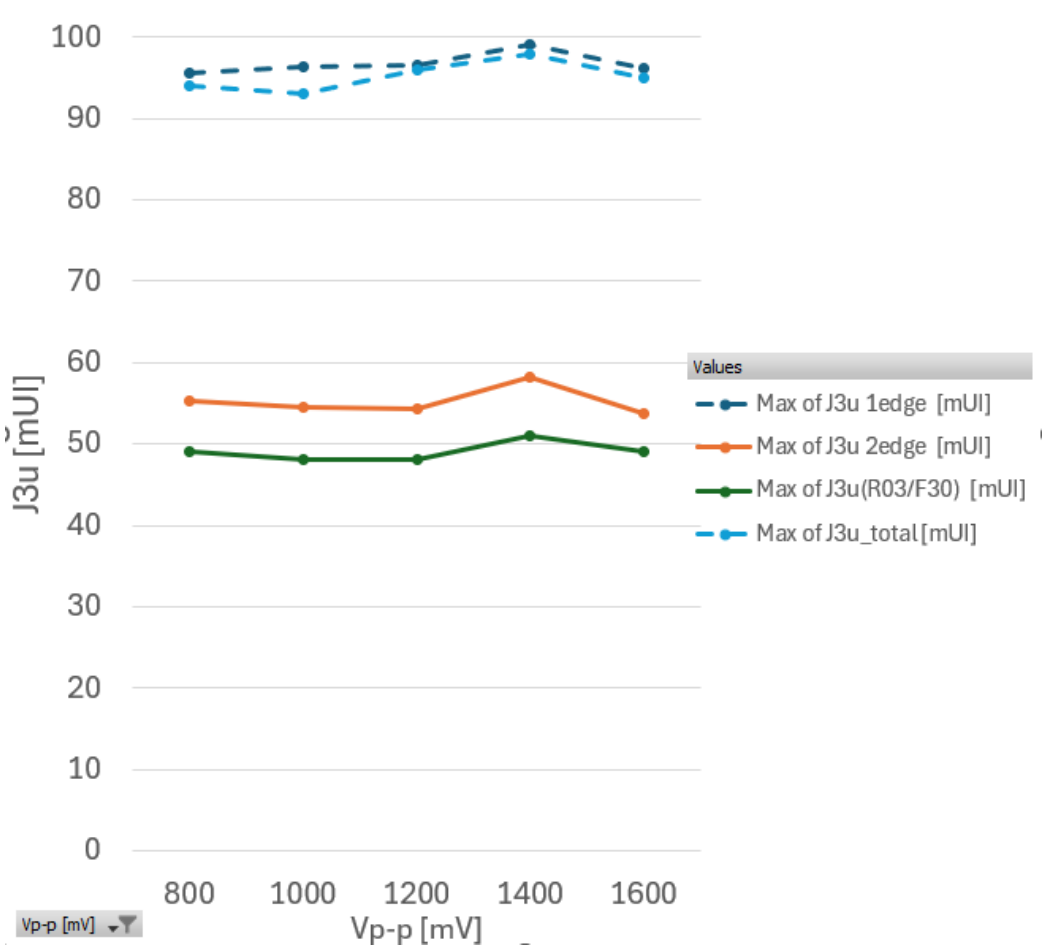
Signal amplitude swept between 800 - 1,600 mV

PCB trace + OSFP connector + HCB

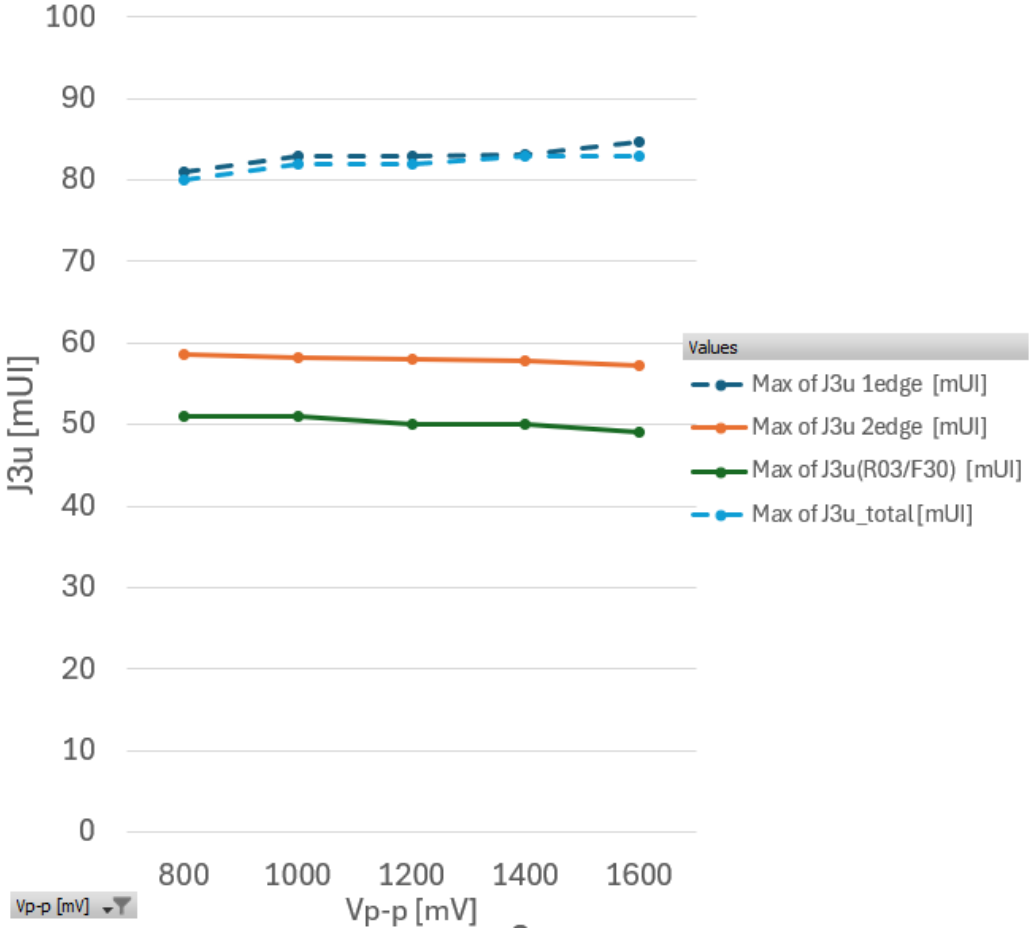
Total insertion loss – 18 and 24 dB

CRU frequency: 4 MHz

Reference measurements – “TP0v”

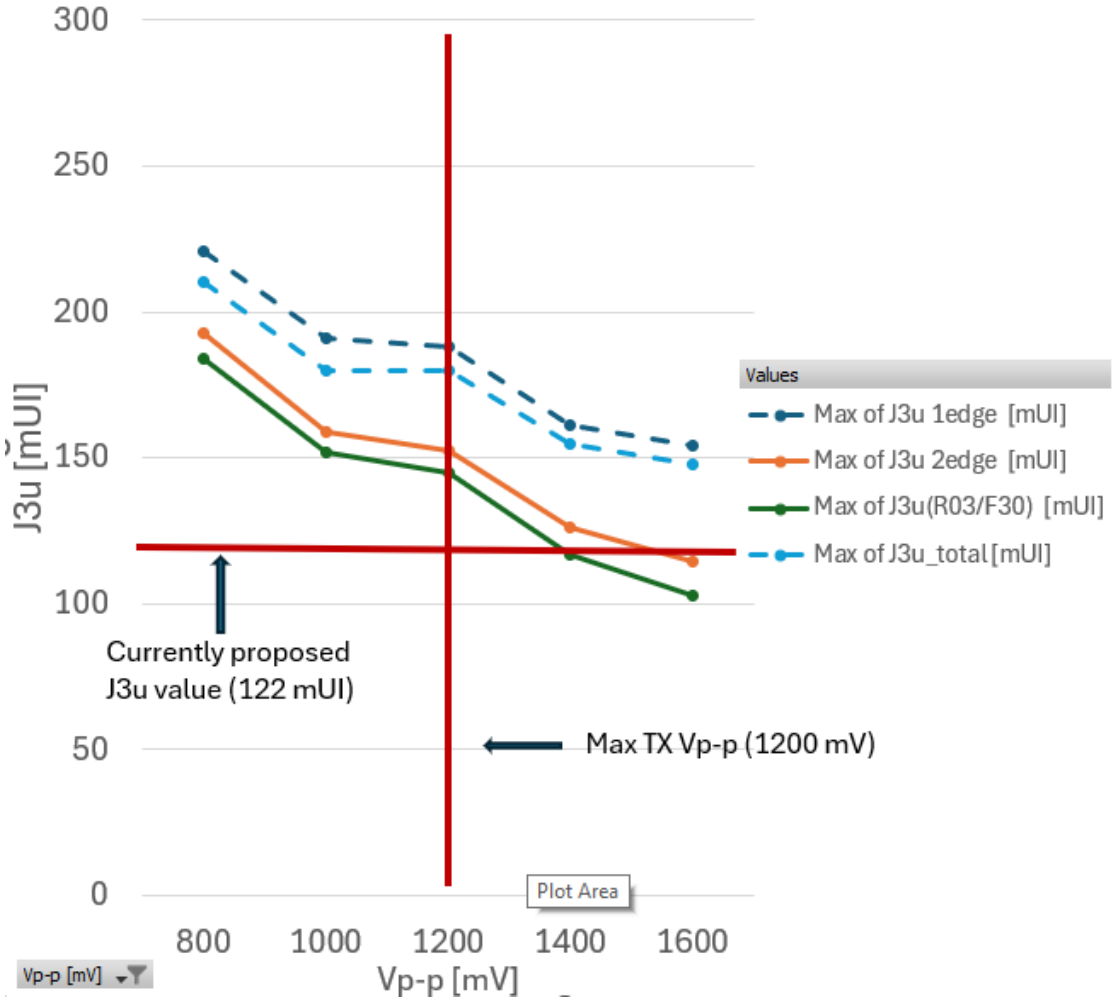


PRBSQ13

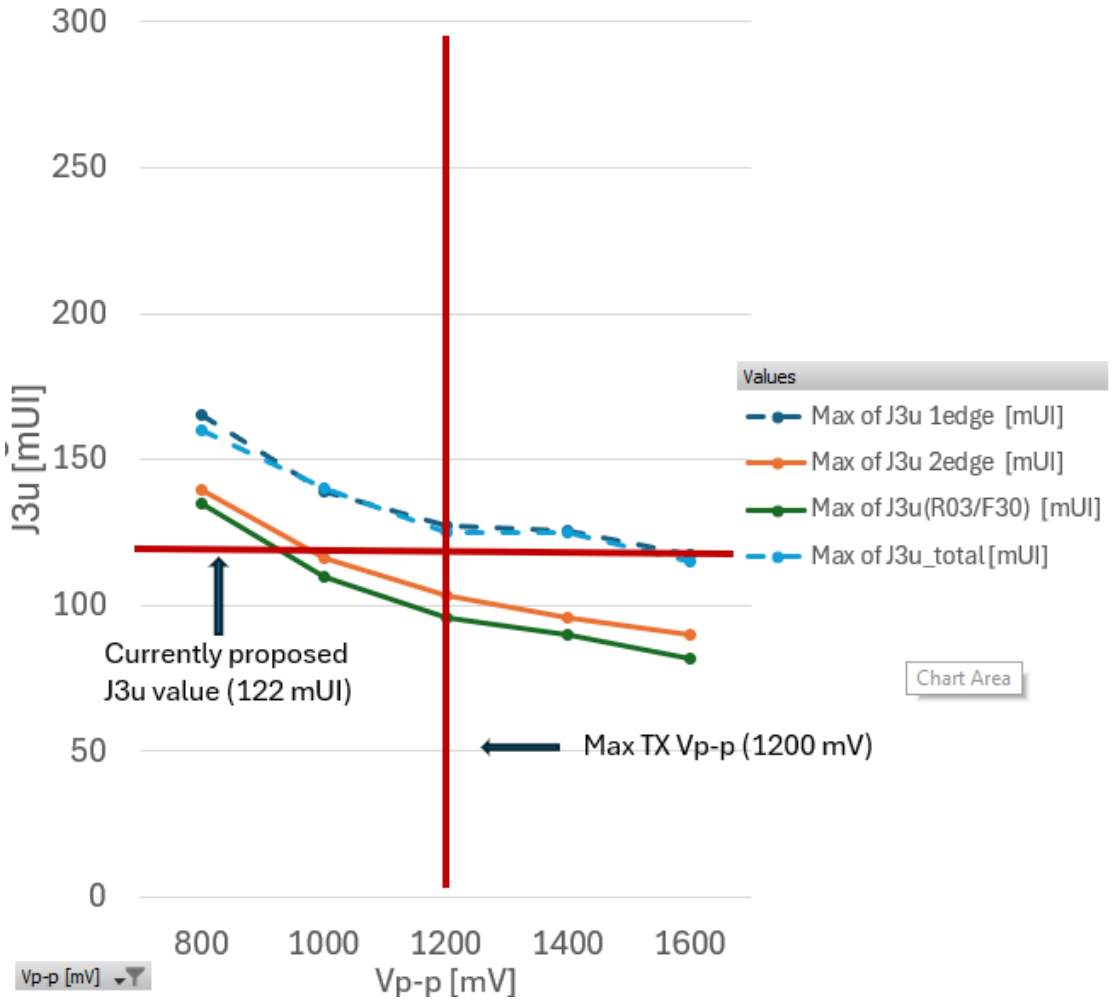


PRBSQ9

TP2 – Nom loss host (18 dB)

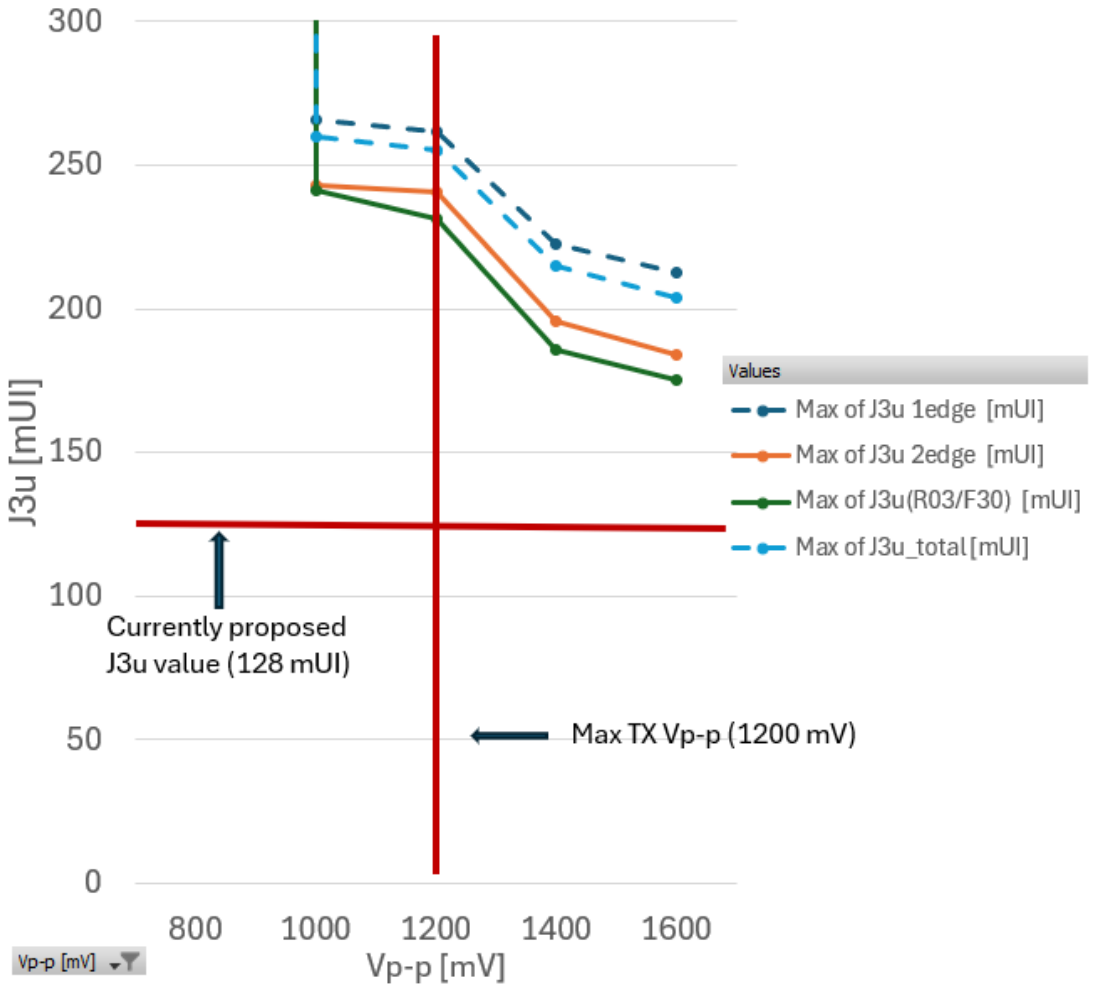


PRBSQ13

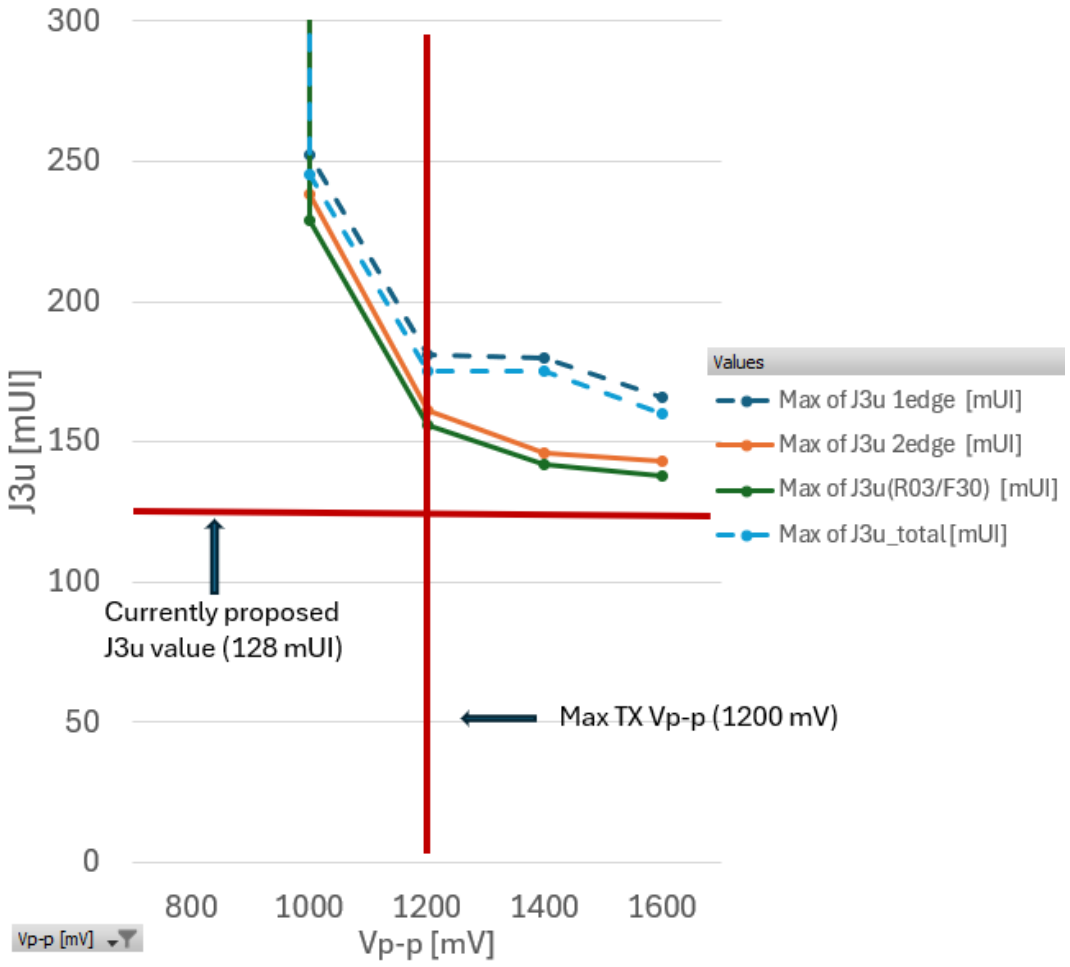


PRBSQ9

TP2 – High loss host (24 dB)



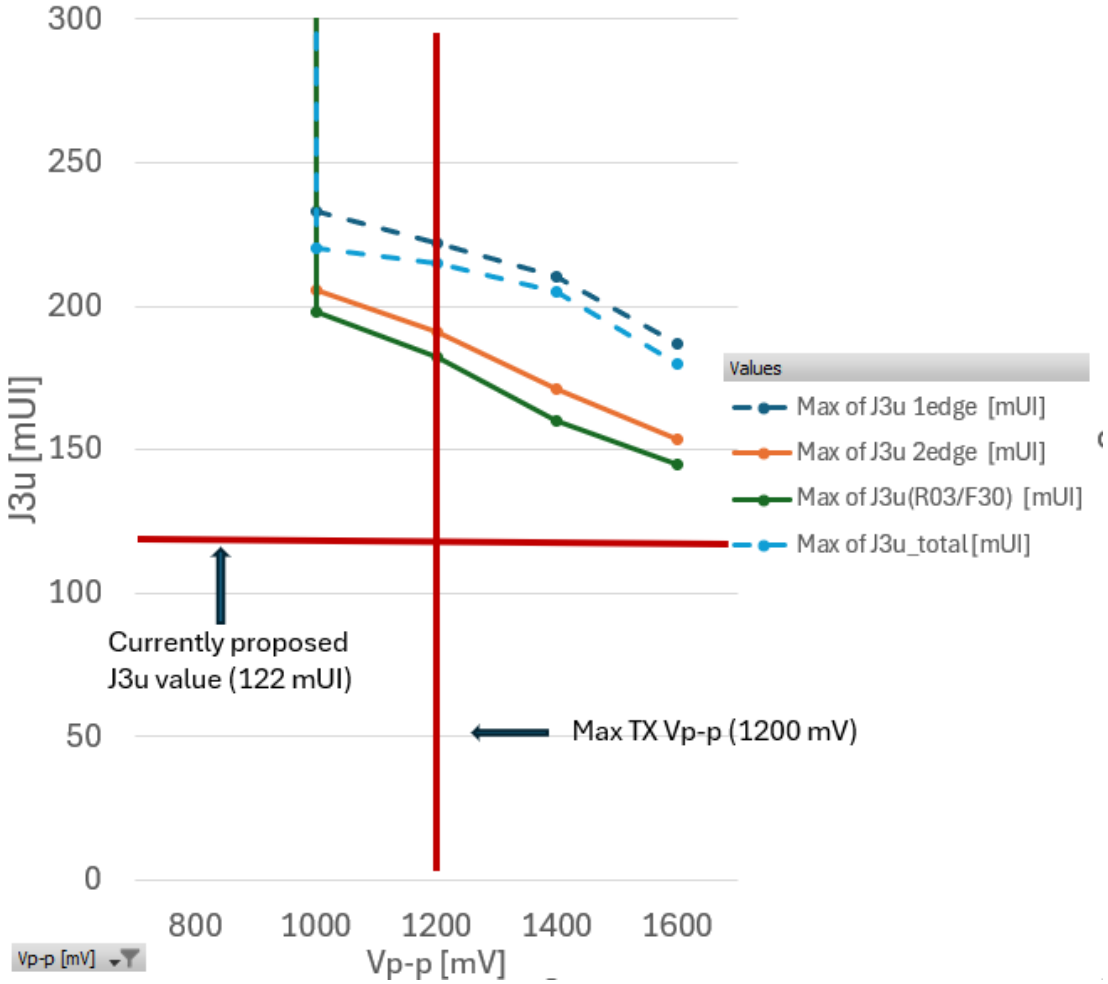
PRBSQ13



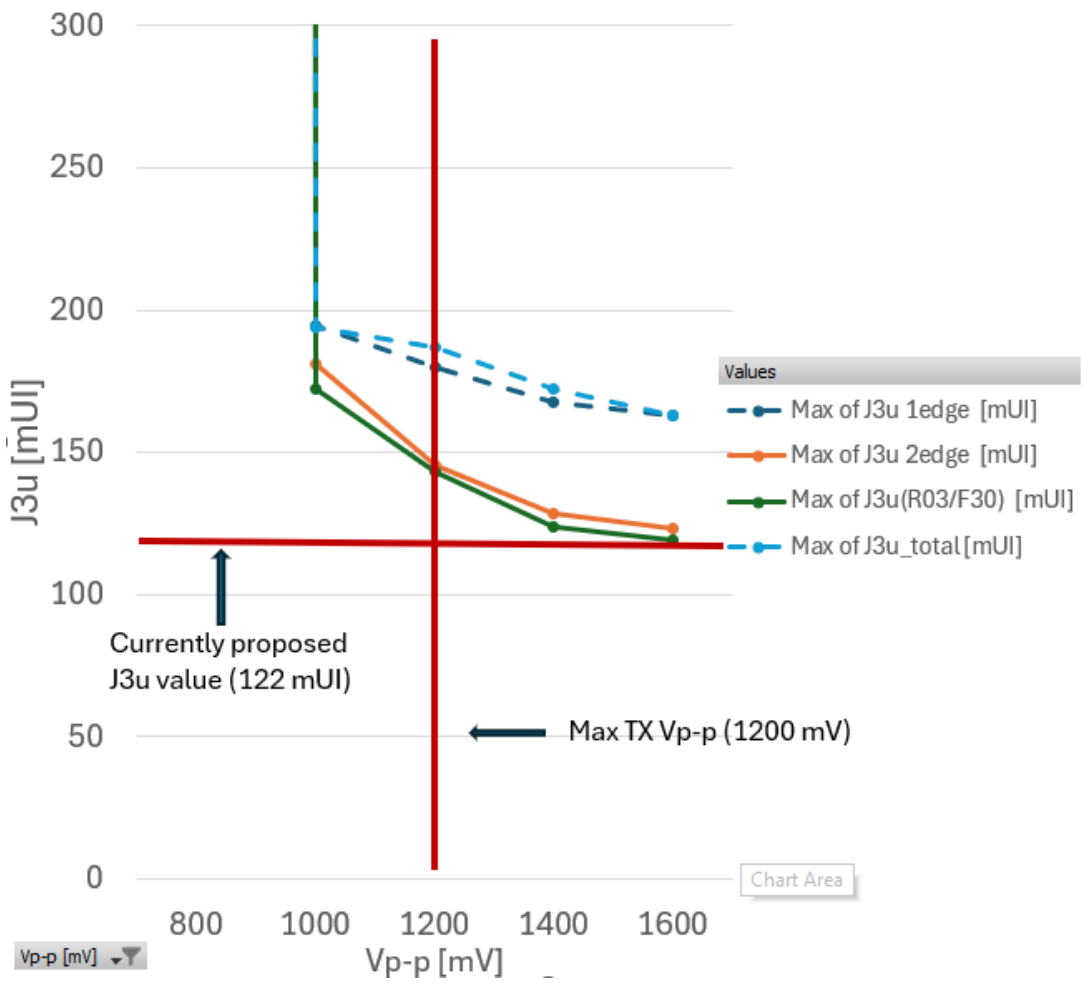
PRBSQ9

* Test equipment was not able to lock on the pattern edges at 800 mV, hence measurement is not available

TP2 – Nom loss host (18 dB) with TX FIR



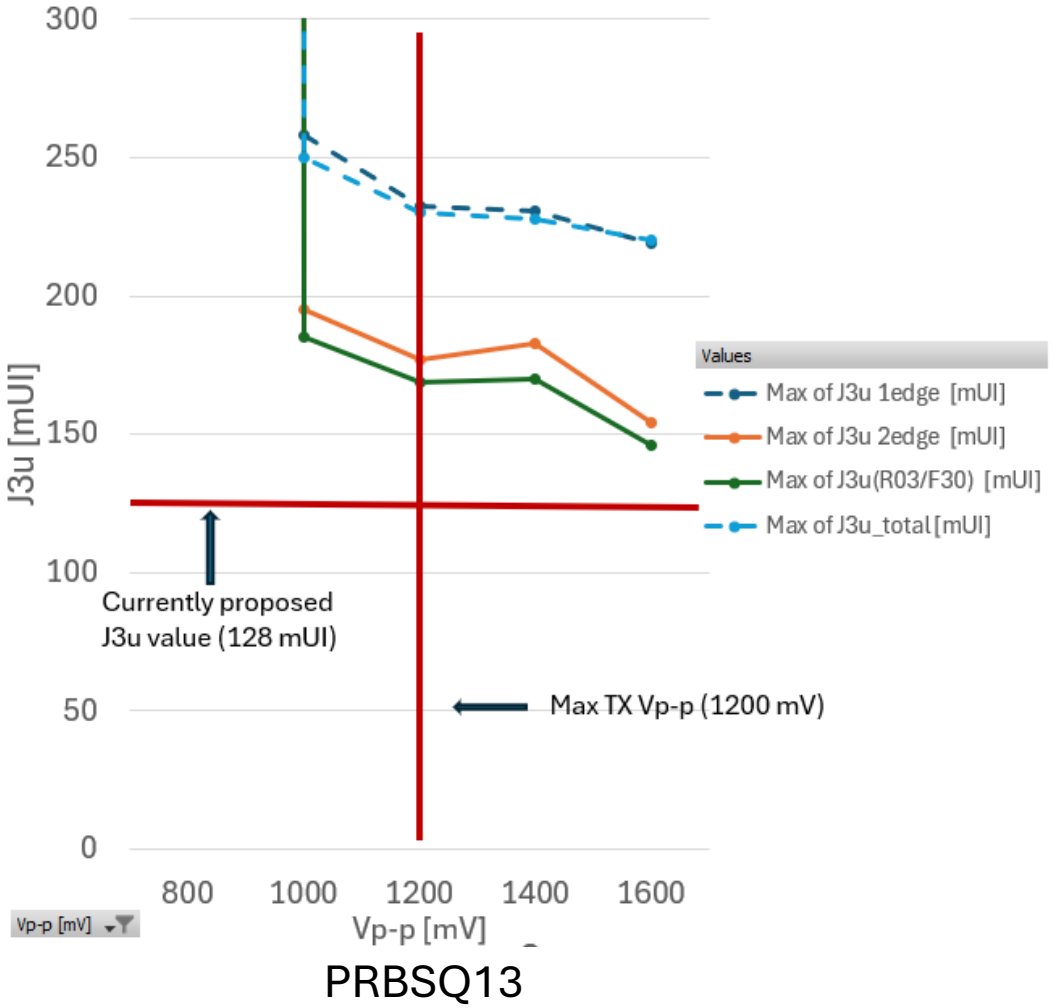
PRBSQ13



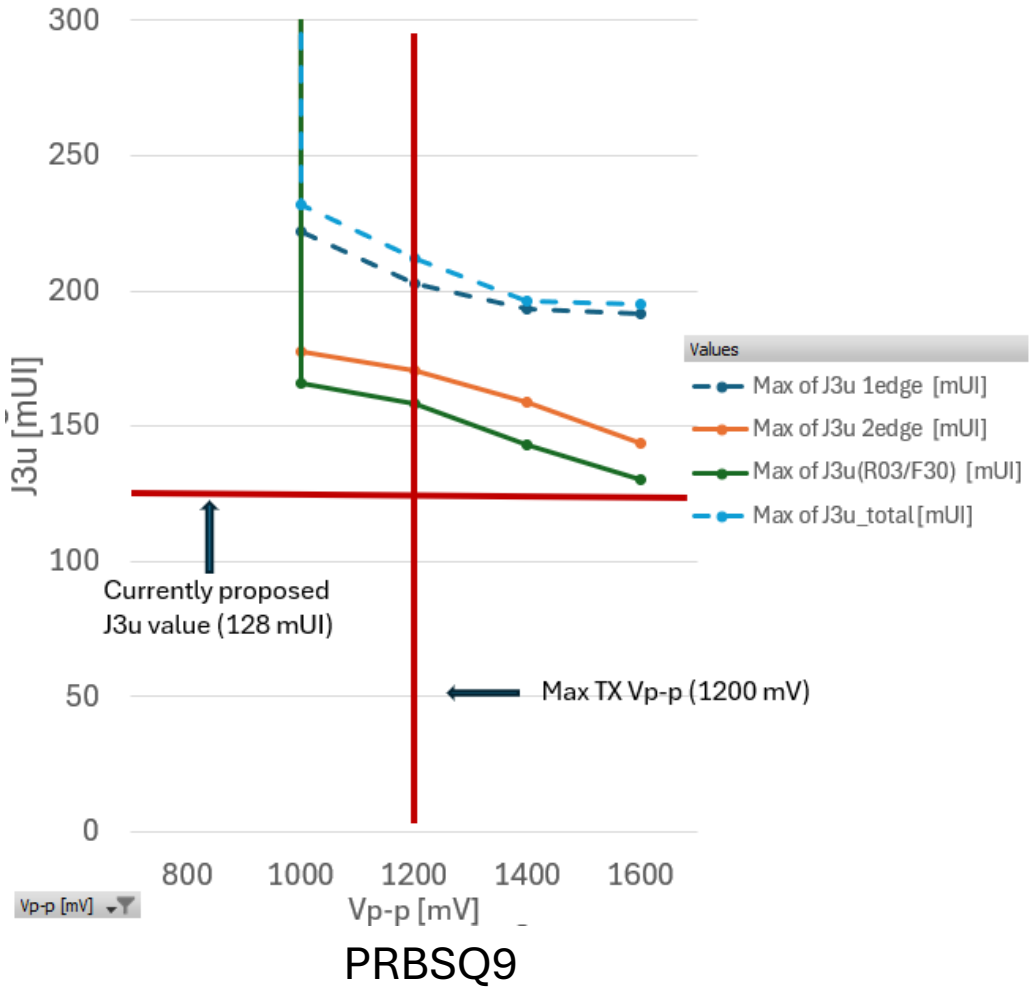
PRBSQ9

* Test equipment was not able to lock on the pattern edges at 800 mV with TX FIR, hence measurement is not available

TP2 – High loss host (24 dB) with TX FIR



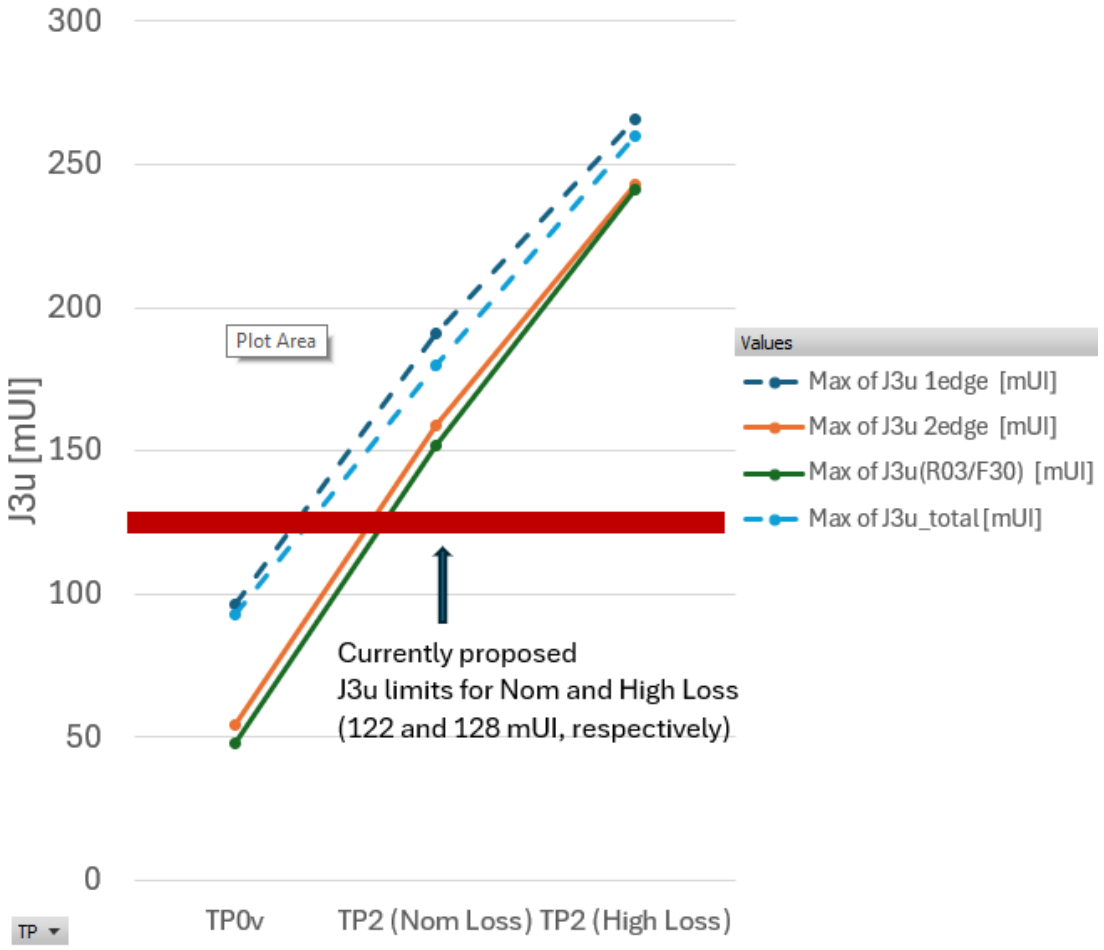
PRBSQ13



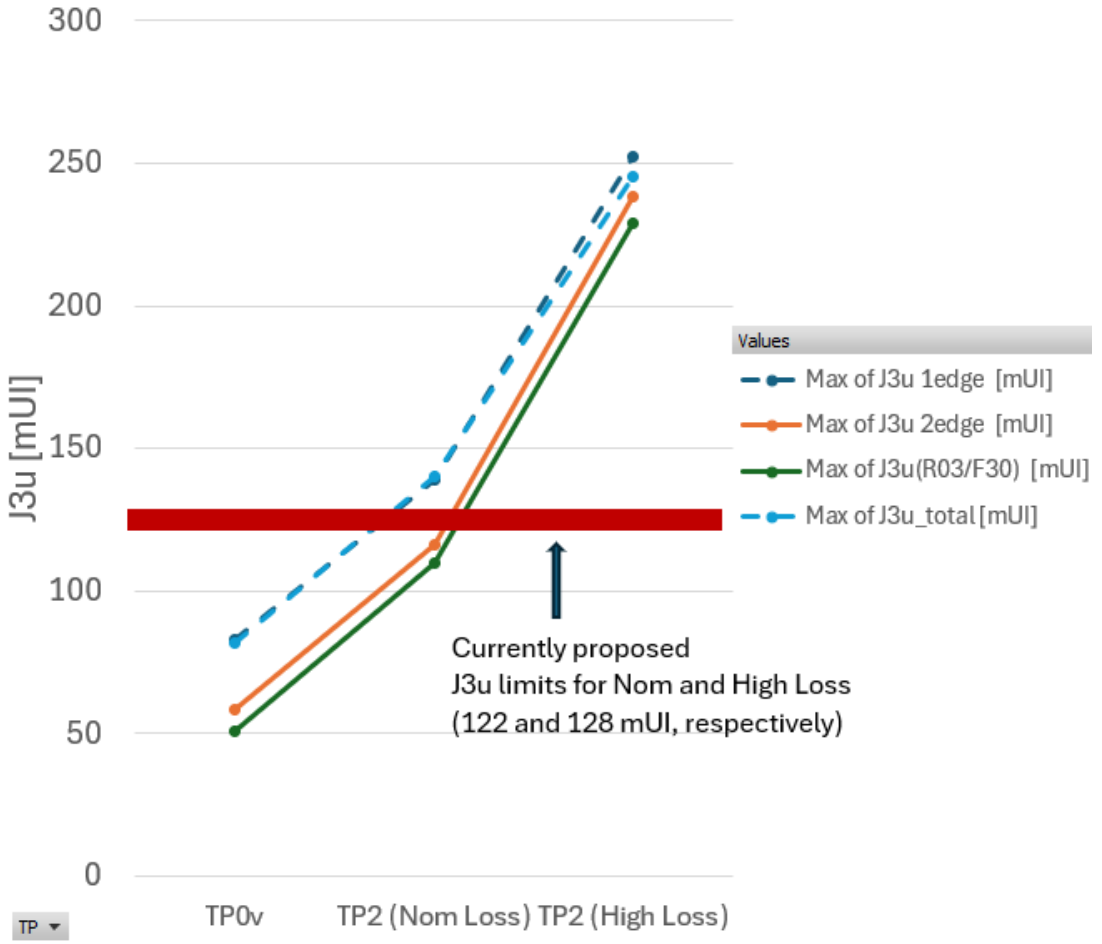
PRBSQ9

* Test equipment was not able to lock on the pattern edges at 800 mV, hence measurement is not available

J3u at Vp-p of 1000 mV vs. test point



PRBSQ13



PRBSQ9

Summary and conclusions

- J3u/Jrms measurements do not represent actual uncorrelated jitter, as they are highly dependent on the loss between TP0d and TP2 and the transmitted signal amplitude via effects of slew rate and noise.
- Currently proposed jitter numbers at TP2 cannot be met even with test equipment PPG.
- Lower order PRBS pattern and optimized TX FIR somewhat mitigate the issues, but not resolve them.
- Measuring jitter only for faster edges does not help and sometimes not feasible.
- Other metric of uncorrelated jitter should be considered.

Backup Slides

Test channels Loss