

Review of impulse noise measurement

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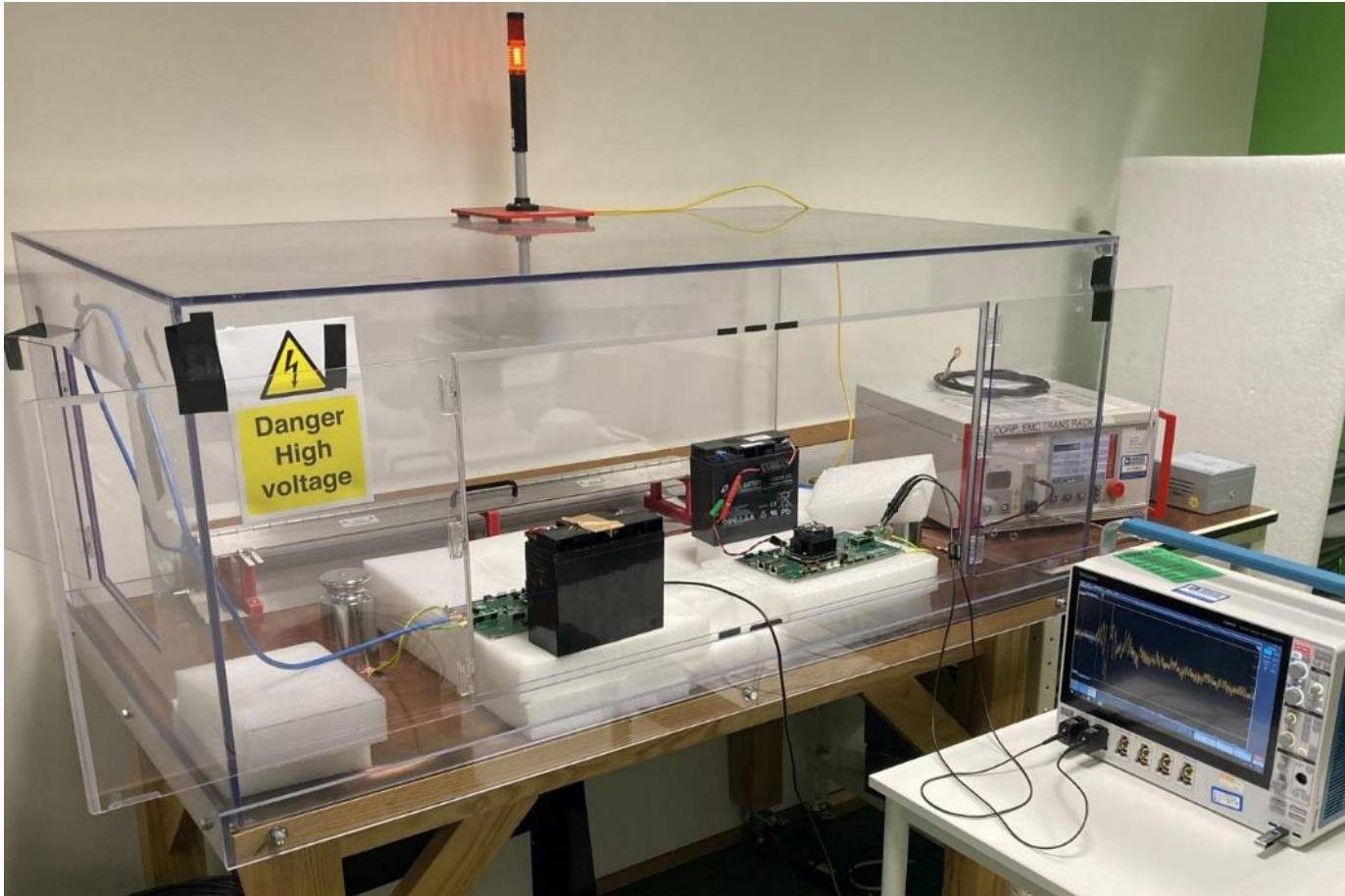
July 2024

Review of Impulse Noise Measurement

- ▶ Electrical Fast Transients (EFT)
 - “Random” / once off noise
- ▶ Communication Interference from Motor PWM
 - Constantly / all-time present

Electrical Fast Transients (EFT) Test

Details of setup and results in presentation from March 2024
[IEEE P802.3dg 100BASE-T1L Impulse Noise Measurements on Cables](#)

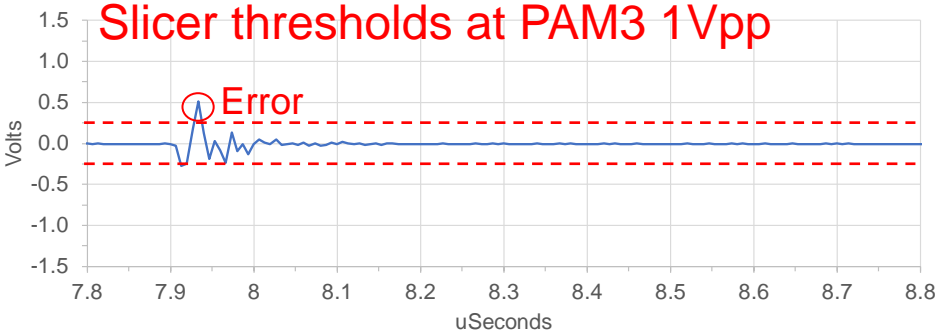


- ▶ Electrical Fast Transient (EFT) Test
- ▶ Specified in IEC61000-4-4
- ▶ Voltage 1kV
- ▶ Frequency 100kHz
- ▶ Burst 750us
- ▶ Repetition 300ms

EFT Noise vs. Assumed PAM 3 Slicer Thresholds

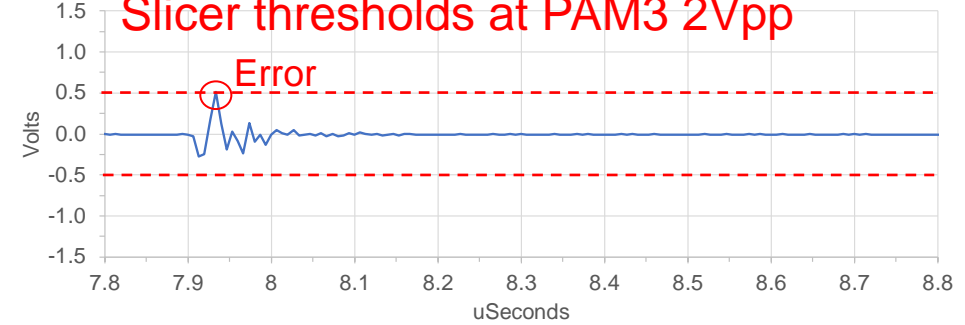
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin & foil connector

Slicer thresholds at PAM3 1Vpp

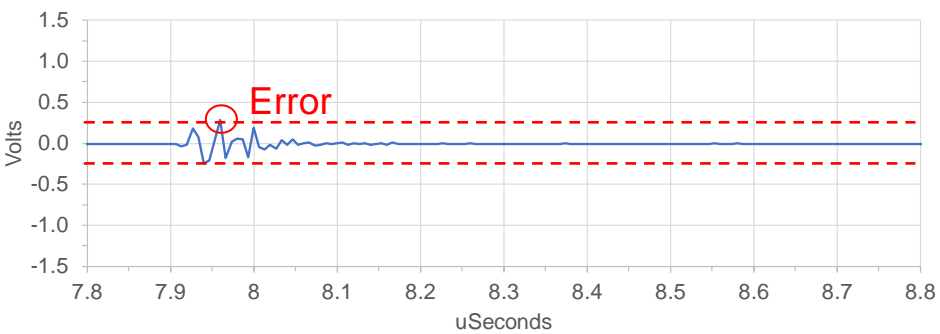


EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin & foil connector

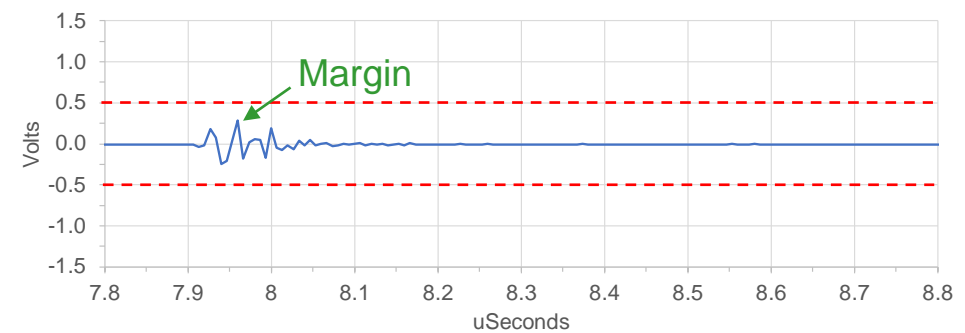
Slicer thresholds at PAM3 2Vpp



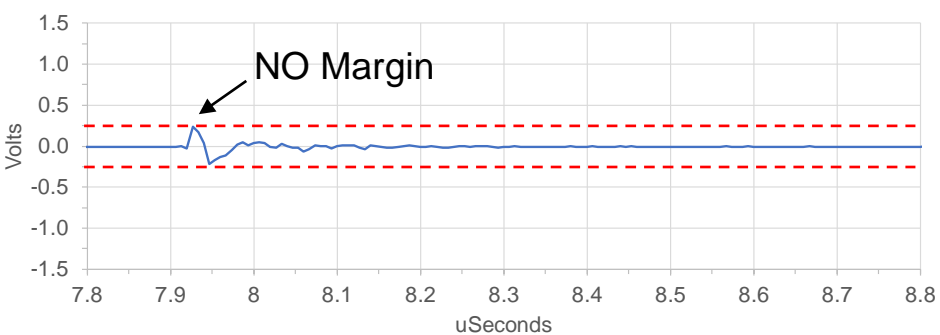
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin conn. & more foil



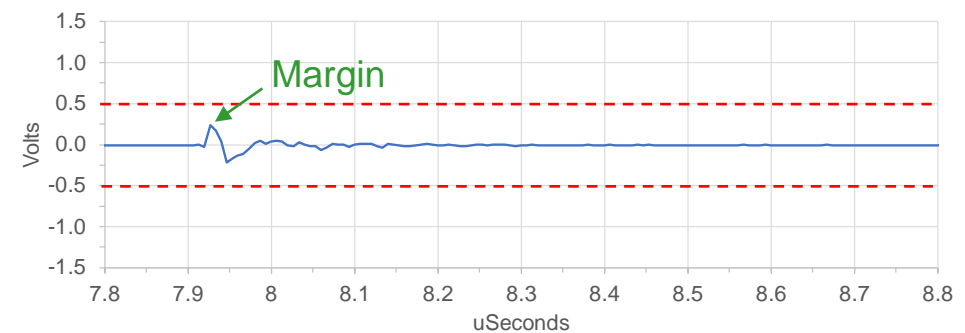
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin conn. & more foil



EFT 1kV, CAT6 8/FTP LSZH 250MHz, 20m

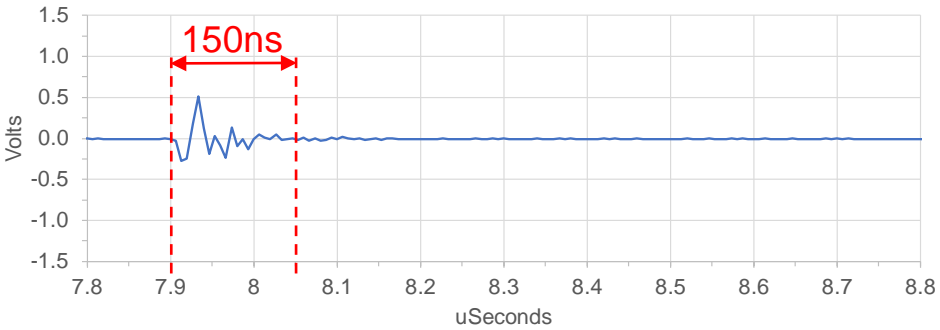


EFT 1kV, CAT6 8/FTP LSZH 250MHz, 20m

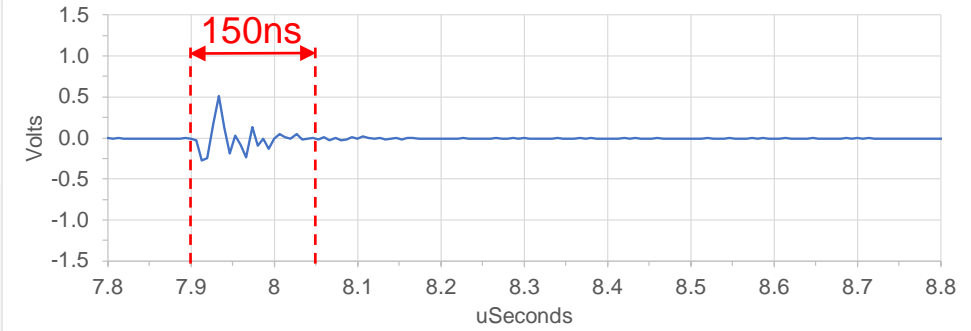


EFT Noise in Context of 150ns Error Correction

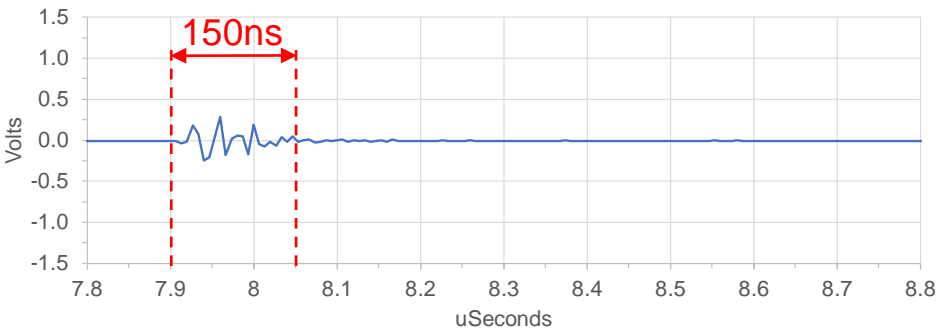
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin & foil connector



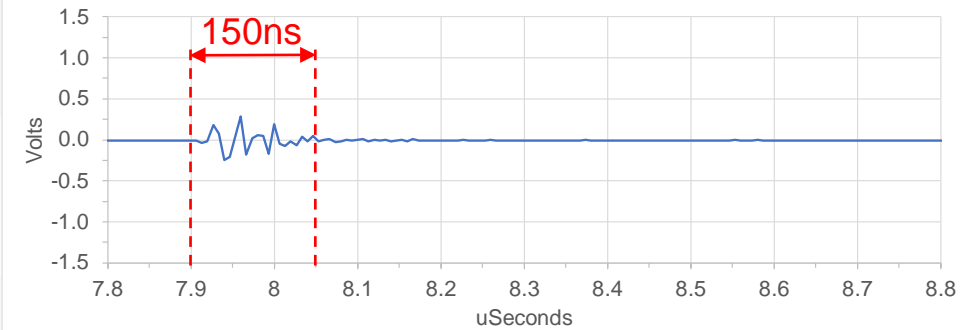
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin & foil connector



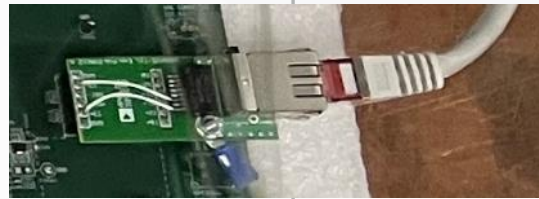
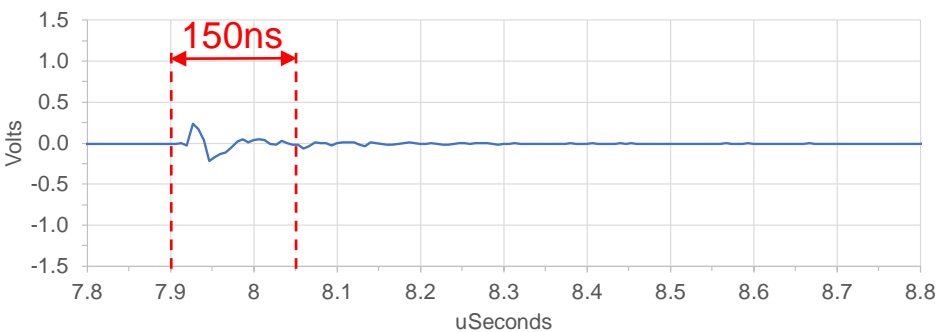
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin conn. & more foil



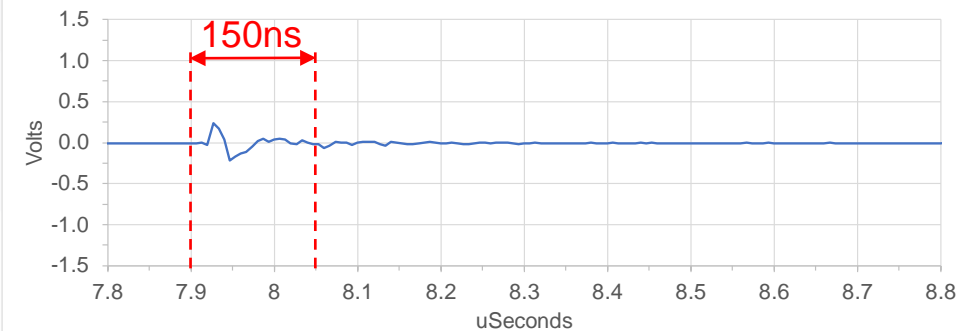
EFT 1kV, SIMATIC 6XV18305AH10, 3m, 4-pin conn. & more foil



EFT 1kV, CAT6 8/FTP LSZH 250MHz, 20m



EFT 1kV, CAT6 8/FTP LSZH 250MHz, 20m



Communication Interference from Motor PWM

Details of setup and results in presentations from May 2024

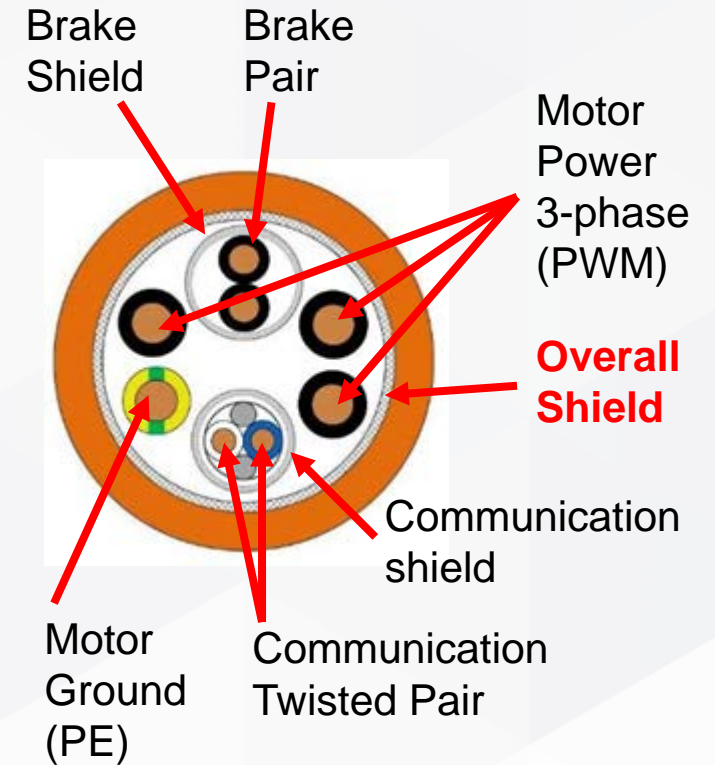
[Communications interference from Motor PWM variants within hybrid cables](#)

and

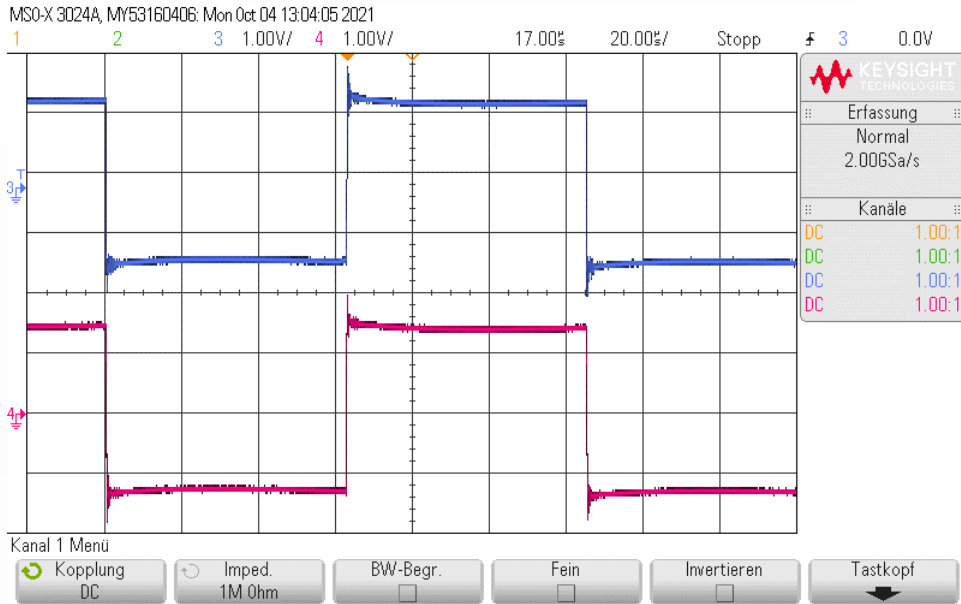
[Motor PWM coupling on 100m hybrid cables \(in context of 100BASE-T1L\)\(rev a\)](#)



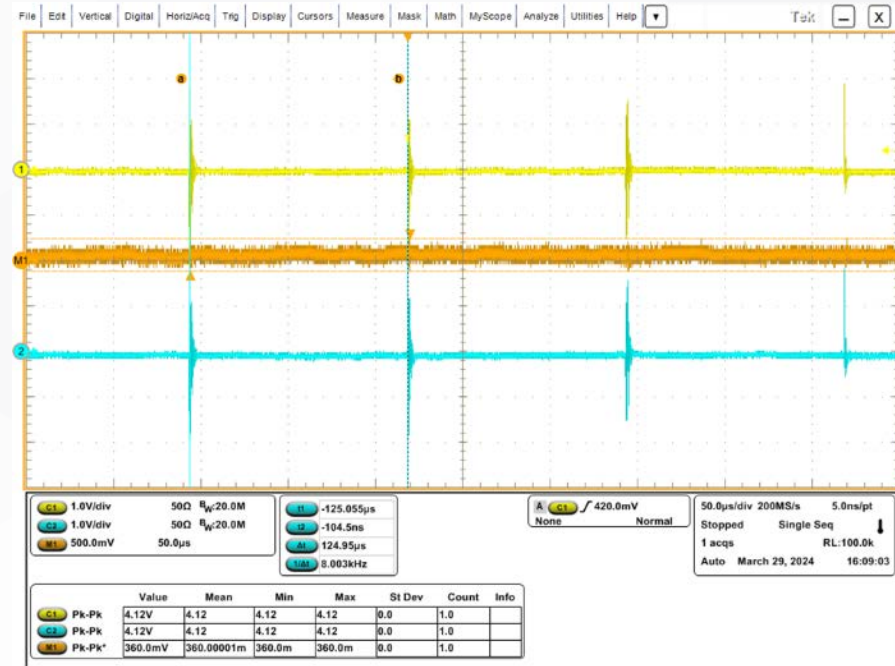
“Standard” Hybrid Cable



Motor PWM Signal Coupling to MDI

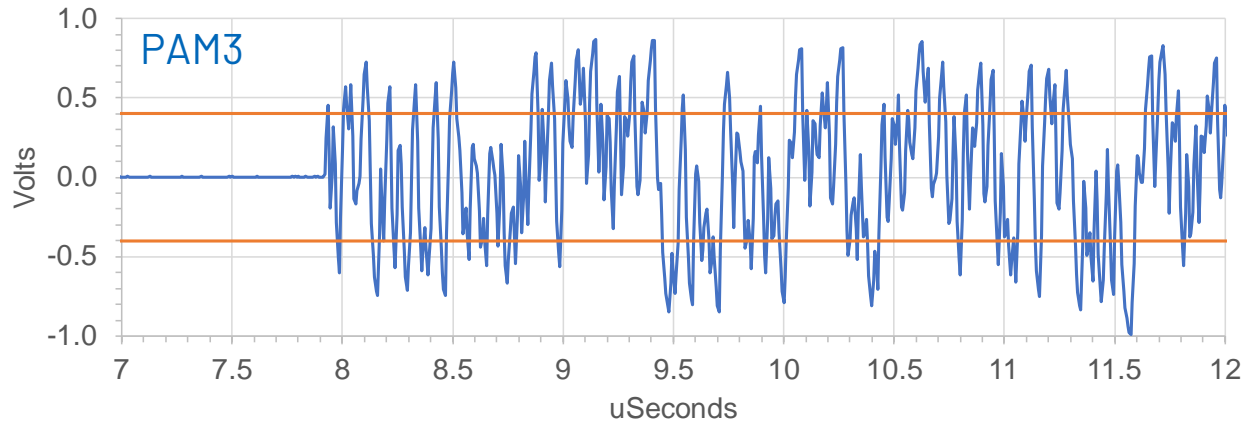


- ▶ 3-phase PWM
- ▶ Amplitude approx. 565V
- ▶ Frequency ~8 to 16kHz
- ▶ Rise time btw. 50 to 200ns
- ▶ Pulse duration and alignment changing all time when motor driven

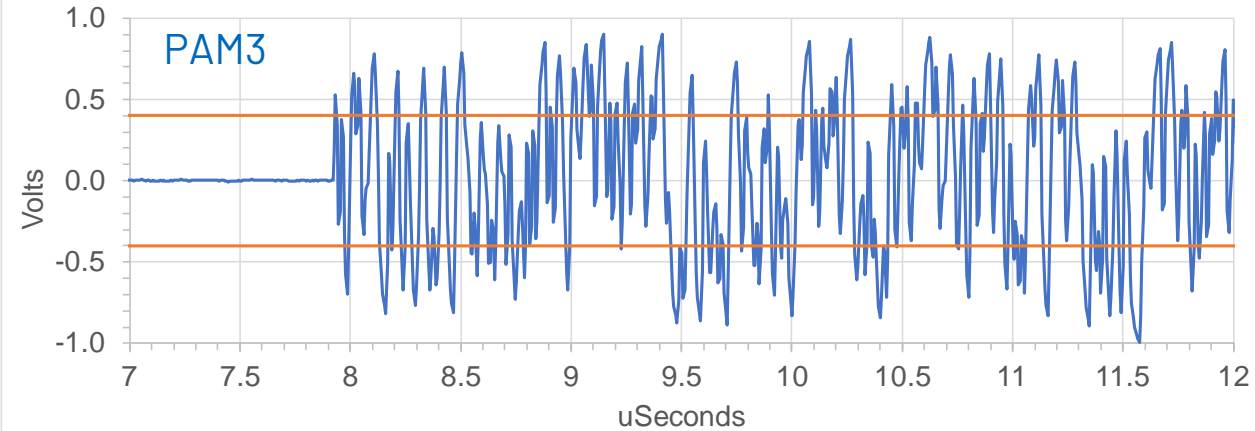


Motor Interference vs. Assumed PAM 3 Slicer Thresholds

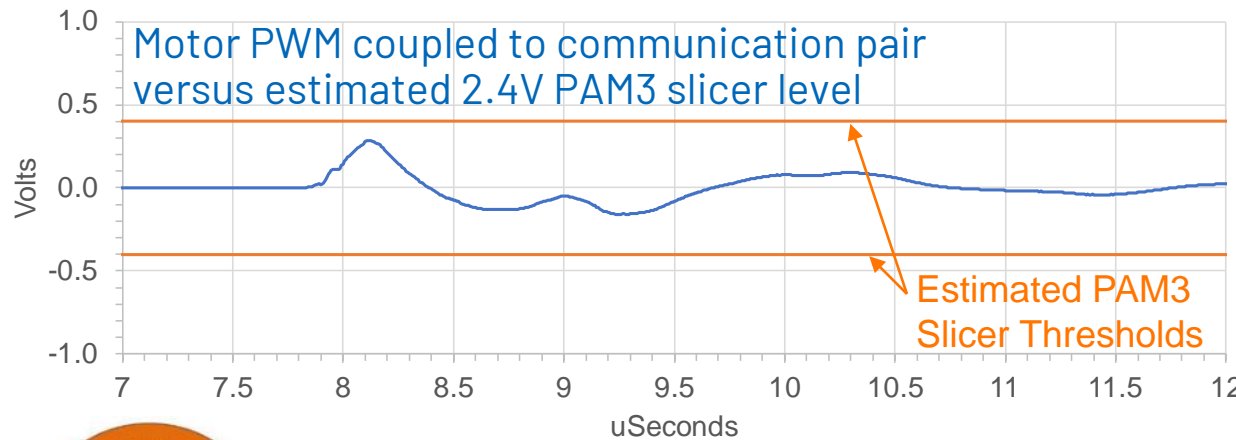
100m standard hybrid cable, motor off, PAM3 2.4Vpp



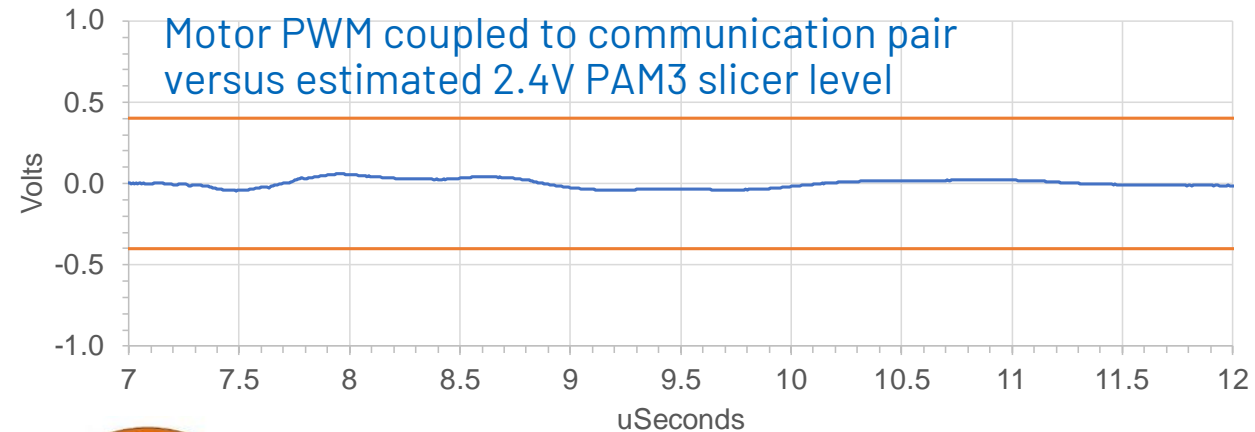
100m advanced hybrid cable, motor off, PAM3 2.4Vpp



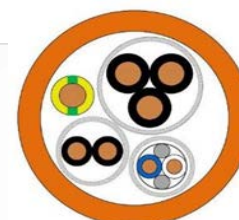
100m standard hybrid cable, motor holding



100m advanced hybrid cable, motor holding



100m "Standard" Hybrid Cable
Estimated a small margin at PAM3 2.4V



100m "Advanced" Hybrid Cable
Estimated a good margin at PAM3 2.4V

Thank You

Questions?