

05/28/25

Subject: Change #2 to SAE/USCAR-49 (Revision 1)

This letter describes a change to the USCAR-49 specification. Comments and questions can be sent to EWCAP@uscar.org.

Situation:

Several corrections were identified in the equations defined in this document.

- Section 4.3.2 Item d. Equation 1, the “electrical length” equation as outlined in the document has led to confusion.
- Section C.2.5 Measurements, Equation 4. and Equation 5. are incorrect. They are equations to calculate magnitude and should be in the form of “root-sum-of-squares”.

Resolution

The consensus is to make the following changes.

Correction #1: Simplify this section by eliminating Equation 1. Change Section 4.3.2 Item d. as follows:

If DUT is not same as what was used in 4.2, ensure the “electrical length” between measurement planes is a minimum of 10 times the rise time. ~~with electrical length defined in Equation 1.~~

~~$$\text{Electrical Length} = (c)(t_r)(v_p) \quad (\text{Eq. 1})$$~~

~~where:~~

~~c = speed of light (299.792×10^6) in m/s~~

~~t_r = rise time in seconds~~

~~v_p = velocity of propagation in cable (dimensionless)~~

Correction #2: Correct Equation #4 and Equation #5 as follows.

C.2.5 Measurements

- Measure and record the magnitudes S_{21} and S_{22} (i.e., $|S_{21}|$, $|S_{22}|$ over the test frequency range). For reference, use Equations 4 and Equation 5.

$$|S_{21}| = \sqrt{(reS_{21})^2 + (jS_{21})^2} = 10^{\frac{S_{21}(db)}{20}} \{ |S_{21}| < 1 \} \quad (\text{Eq. 4})$$

$$|S_{22}| = \sqrt{(reS_{22})^2 + (jS_{22})^2} = 10^{\frac{S_{22}(db)}{20}} \{ |S_{22}| < 1 \} \quad (\text{Eq. 5})$$