

# USB Type-C ENGINEERING CHANGE NOTICE

**Title: Cable Electrical requirement**

**Applied to: USB Type-C Specification Release 1.0, August 11, 2014**

## **Brief description of the functional changes:**

Test data of Type-C to Type-C cables indicate the electrical requirements are too tight in the specification. The changes relax the electrical requirements without significant impact on the system. The changes are applied to Type-C to Type-C cable and to Type-C to legacy cable. For Type-C to Type-C cable, the changes include relaxed IMR, relaxed IRL and reduced fMAX. For Type-C to legacy cable, the changes include relaxed IMR and relaxed IRL.

## **Benefits as a result of the changes:**

As the result of the changes, well designed cables should be able to comply with the electrical requirements, while bad-designed cables will fail to meet the electrical requirements.

## **An assessment of the impact to the existing revision and systems that currently conform to the USB specification:**

8 Type-C to Type-C cables from 7 different companies were used in the assessment. None of 8 cables passed the requirements in the existing revision of the specification. Checked with the change, 6 out of 8 cables met IMR requirement and 6 out of 8 cables meet IRL requirement.

## **An analysis of the hardware implications:**

N/A

## **An analysis of the software implications:**

N/A

## **An analysis of the compliance testing implications:**

Measurement was done to evaluate the change using the compliance test fixture. Test criteria will need to be updated to reflect the new requirements.

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## Actual Change

### (a). Section 3.7.3.2.2, Page 78

#### From:

where  $f_{max} = 15$  GHz and  $Vin(f)$  is the input trapezoidal pulse spectrum, defined in Figure 3-44.

#### To:

where  $f_{max} = 12.5$  GHz and  $Vin(f)$  is the input trapezoidal pulse spectrum, defined in Figure 3-44.

### (b). Section 3.7.3.2.2, Page 78

#### From:

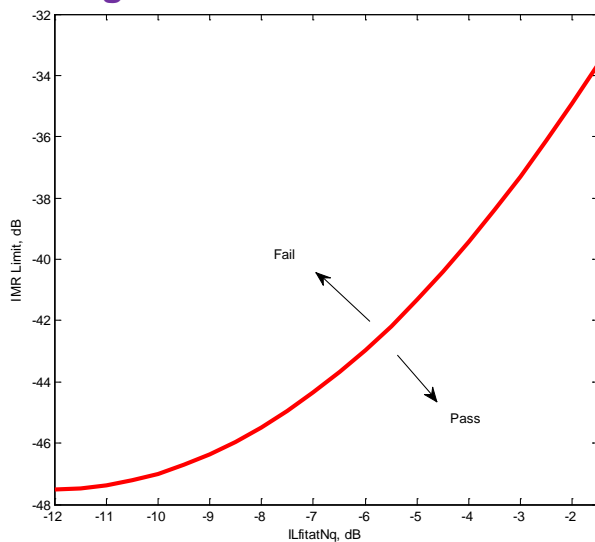
$$IMR \leq 0.126 \cdot IL_{fitatNq}^2 + 3.024 \cdot IL_{fitatNq} - 29.353$$

#### To:

$$IMR \leq 0.126 \cdot IL_{fitatNq}^2 + 3.024 \cdot IL_{fitatNq} - 23.392$$

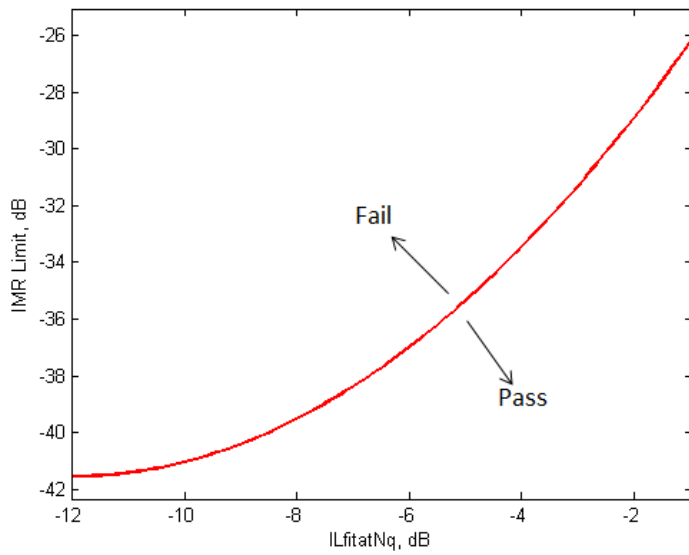
### (c) Section 3.7.3.2.2, Figure 3-45, Page 79

#### From Figure 3-45



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To Figure 3-45



**(d) Section 3.7.3.2.4, Page 80**

**From:**

$$IRL \leq 0.046 \cdot ILfitatNq^2 + 1.812 \cdot ILfitatNq - 15.825$$

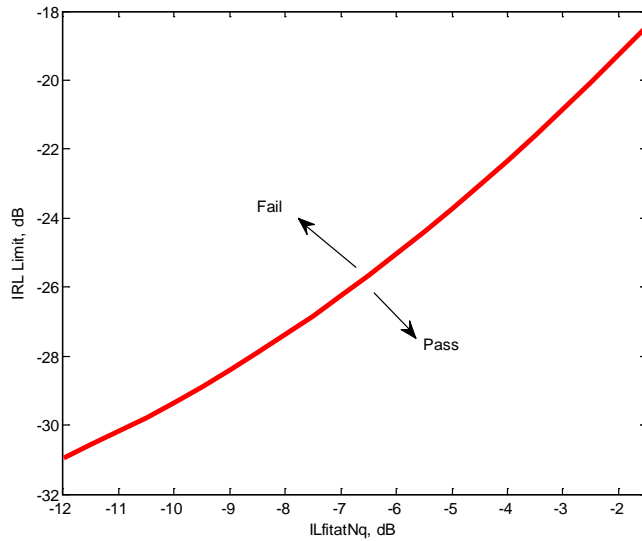
**To:**

$$IRL \leq 0.046 \cdot ILfitatNq^2 + 1.812 \cdot ILfitatNq - 10.784$$

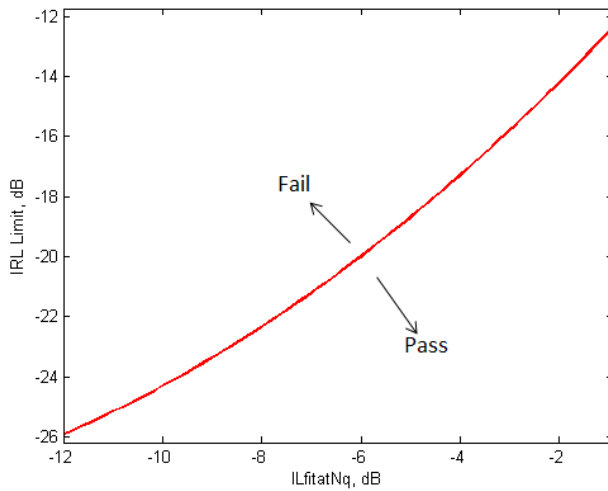
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(e) Section 3.7.3.2.4, Figure 3-46, Page 80

From Figure 3-46



To Figure 3-46



(f) Section 3.7.4.2, Table 3-27, Page 86

From: Table 3-27

$$\leq 0.126 \cdot ILfitatNq^2 + 3.024 \cdot ILfitatNq - 27.353$$

See Figure 3-52

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To:

$$\leq 0.126 \cdot IL_{fitatNq}^2 + 3.024 \cdot IL_{fitatNq} - 21.392$$

See Figure 3-52

**(g). Section 3.7.4.2, Table 3-27, Page 86**

From: Table 3-27

$$\leq 0.046 \cdot IL_{fitatNq}^2 + 1.812 \cdot IL_{fitatNq} - 14.825$$

See Figure 3-53

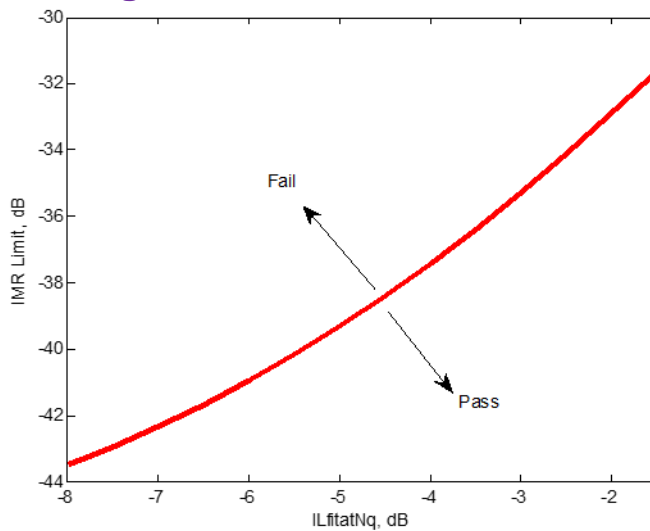
To:

$$\leq 0.046 \cdot IL_{fitatNq}^2 + 1.812 \cdot IL_{fitatNq} - 9.784$$

See Figure 3-53

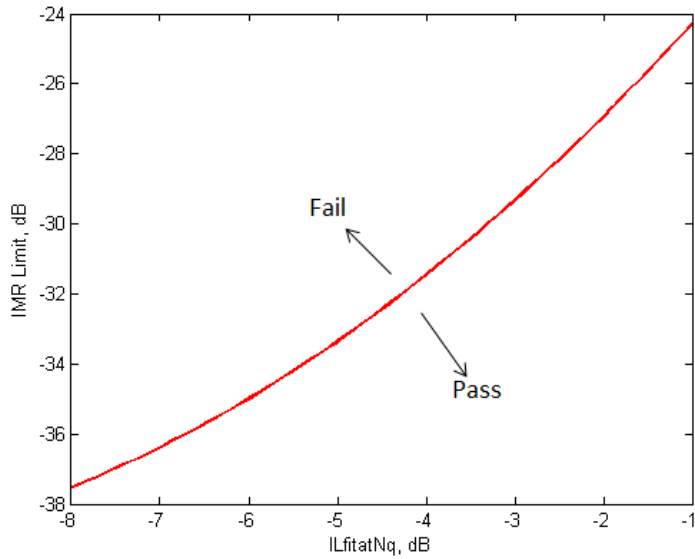
**(h) Section 3.7.4.2, Figure 3-52, Page 87**

From: Figure 3-52

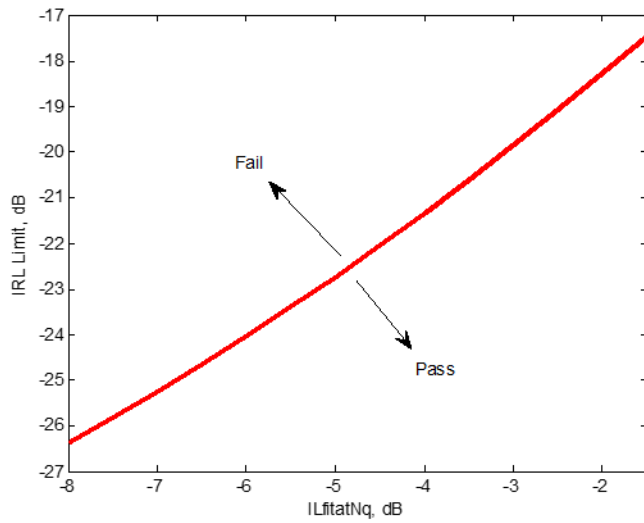


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To: Figure 3-52



(i) Section 3.7.3.2.4, Figure 3-53, Page 87  
From: Figure 3-53



# USB Type-C ENGINEERING CHANGE NOTICE

To: Figure 3-53

