

## **Errata Information**

### ***EMC and the Printed Circuit Board – Design, Theory and Layout Made Simple***

**Last update: January 14, 2001**

To ascertain which printing the book is in, refer to the Library of Congress catalog page. In the middle of the page is a series of numbers. The lowest number indicates the print run. If a “1” appears, this is the original copy. If the number “1” is missing and the smallest number is a “2,” then this is a second printing to incorporate errors detailed below.

The following changes were incorporated into the **2<sup>nd</sup> printing**. Grammatical, syntax or formatting changes not provided herein, only technical material important to the reader.

**Pg. 39**, Eq. (2.5) definitions “where”  
Change “ $\mu$ ” to “ $\mu_0$ ”

**Pg. 40**, Eq (2.6)  
Change “ $r^2w$ ” to  $r^2_{\omega}$  (subscript omega, not regular case w)

**Pg. 42**, last paragraph, section 2.7.1, 8<sup>th</sup> line  
Change “differential” to “common”

**Pg. 55**, Table 3.1  
Add “ns \*” to Published Rise/Fall Time for BTL, LVDS, GaAs and GTL+ logic families.

**Pg. 103**, Figure 4.17  
Change the word “via” to “via not connected to power plane”

**Pg. 122**, Header 14.5.1 Digital-to Analog Partitioning  
Change “14.5.1” to “4.5.1”

**Pg. 149**, Section 5.7.1, third sentence  
Delete the word “decoupling”

**Pg. 151**, Eq (5.14), definitions “where”  
Change under variable  $k$  the word “single” to “one”

**Pg. 159**, Second paragraph, second sentence  
Delete the words “and electric power”

**Pg. 164**, 1<sup>st</sup> sentence.  
Change “19” to “9” in two places

**Pg. 167**, Table 6.2, Velocity (ps/inch) column  
Change “170.0” to “170.1”  
Change “212.0” to “212.8”

**Pg. 173, Two major changes**

Eq. (6.10) – Change:  $\left(\frac{87}{\sqrt{\epsilon'_r}}\right)$

To:  $\left(\frac{87}{\sqrt{\epsilon'_r + 1.41}}\right)$

Eq. (6.11) – Change:  $C_0 = \left(\frac{1}{H+T}\right) \ln\left(1 - \frac{0.6897(\epsilon_r + 1.41)}{\sqrt{\epsilon_r}}\right)$

To:  $C_0 = \frac{1.41(\epsilon'_r)}{\ln\left[\frac{5.98H}{(0.8W+T)}\right]}$

Note: Eq. (6.11) was not incorporated fully into the second printing, but shown here. It is, however included in the 3<sup>rd</sup> printing.

**Pg. 174, Eq. 6.13)**

Change:  $\left(\frac{60}{\sqrt{\epsilon'_r}}\right) \ln\left(\frac{1.9B}{(0.8W+T)}\right)$

To:  $\left(\frac{60}{\sqrt{\epsilon'_r}}\right) \ln\left(\frac{1.9B}{(0.8W+T)}\right) = \left(\frac{60}{\sqrt{\epsilon'_r}}\right) \ln\left(\frac{1.9((2H+T))}{(0.8W+T)}\right)$

**Pg. 177 (several changes)**

Between Eq. (6.19) and (6.20)

Add the word “where”

Eq. (6.20)

Change:  $Z_0 = \frac{60}{\sqrt{0.475\epsilon_r + 0.67}} \ln\left(\frac{4h}{0.67(0.8W+T)}\right)$  ohms (microstrip)

$Z_0 = \frac{60}{\sqrt{\epsilon_r}} \ln\left(\frac{4h}{0.67\pi(0.8W+1)}\right)$  ohms (stripline)

To:  $Z_0 = \frac{87}{\sqrt{\epsilon_r + 1.41}} \ln\left(\frac{5.98H}{(0.8W+T)}\right)$  ohms (microstrip)

$Z_0 = \left(\frac{60}{\sqrt{\epsilon'_r}}\right) \ln\left(\frac{1.9B}{(0.8W+T)}\right) = \left(\frac{60}{\sqrt{\epsilon'_r}}\right) \ln\left(\frac{1.9((2H+T))}{(0.8W+T)}\right)$  ohms (stripline)

**Pg. 196, 3<sup>rd</sup> line**

Change from:

“To calculate the constant for  $I_{max}$ , use the following example, which is in inches.

To:

“To calculate the constant,  $k$ , either 7 or 9, for  $I_{max}$ , use the following example.

Example

Change within the equation from:

“ $L_{max}$ ” to “ $k$ ”

Change in the section “where”

$\epsilon_r = 4.1, I_{max} = 8.9 \dots$  to  $\epsilon_r = 4.6, k = 8.9 \dots$

$I_{max} = 6.9 \dots$   $k = 6.9 \dots$

**Pg. 202, Eq (7.12)**

Change “ $I(d)$ ” to “ $i(d)$ ”

**Pg. 205**

Last line: Change "A-B" to "C-D"

**Pg. 206**

1st and 4th line: Change "C-D" to "A-B"

5th, 8<sup>th</sup>, 10th line: Change "C" to "A"

6th line: Change "D" to "B"

**Pg. 208, Eq (7.16)**

Add superscript "2" to equation

Change: 
$$\frac{1}{1 + \left( \frac{D}{H1 * H2} \right)}$$

To: 
$$\frac{1}{1 + \left( \frac{D}{H1 * H2} \right)^2}$$

**Pg. 214, Reference [14]**

Change "1994" to "1984"

**Pg. 231, R1>R2 statement**

Change "This setting will not work for TTL and CMOS devices"

To: "This setting works well with TTL and CMOS devices"

**Pg. 236, Third from last line.**

Change "Fig. 8.20" to "Fig. 8.2"

**Pg. 248, Equipotential Ground Plane**

Delete the word "solid"

**Pg. 285, Ringing**

First line – remove the word "both"

Second line: Change: "circuit) and undershoot (going past the low voltage"

To: "circuit and below the low-voltage"

**Pg. 289, Paul, C. R., *Analysis of Multiconductor Transmission Lines***

Change "1994" to "1984"

**Pg. 291, Appendix A**

Voltage gain: Change subscript in middle equation to superscript.

Current gain: Change subscript in middle equation to superscript.

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The following changes were incorporated into the **3rd printing**. Grammatical, syntax or formatting changes not provided herein, only technical material important to the reader. Please incorporate these also along with the 1<sup>st</sup> and 2<sup>nd</sup> printing updates.

**Pg. 25**, 4<sup>th</sup> paragraph, Section 2.1.1. 3<sup>rd</sup> line  
Change "5 mΩ" to "50 mΩ"

**Pg. 29**, 4<sup>th</sup> paragraph, 3<sup>rd</sup> line  
Change: "...produce magnetic fields, not electric fields."  
To: "...produce both magnetic static and electric fields."

**Pg. 39**, Table 2.1 – Replace entire table,  $\delta$  (*copper*) column

**Table 2.1** Skin Depth for Copper Substrate.

$f$	$\delta$ ( <i>copper</i> )
60 Hz	0.335 in. (335 mil, 8.5 mm)
100 Hz	0.260 in. (260 mil, 6.6 mm)
1 kHz	0.082 in. (82 mil, 2.1 mm)
10 kHz	0.026 in. (26 mil, 0.66 mm)
100 kHz	0.0082 in. (8.2mil, 0.20 mm)
1 MHz	0.0026 in. (2.6 mil, 0.066 mm)
10 MHz	0.00082 in. (0.8 mil, 0.026 mm)
100 MHz	0.00026 in. (0.26 mil, 0.0066 mm)
1 GHz	0.000082 in. (0.082 mil, 0.0026 mm)

**Pg. 40**, Equation 2.8 (Note: the second "1" in the factor is actually a lower case letter "l". Make the equation more accurate by using a finer number for the correction factor.

Change: 
$$L = 0.00511 \left( 2.38 \ln \frac{4l}{d} - 1 \right)$$

To: 
$$L = 0.0051 * l \left( 2.38 \ln \frac{4l}{d} - 0.75 \right)$$

**Pg. 78**, References  
Change "Bakogly" to "Bakoglu"

**Pg. 173**

Eq. (6.11) – Change: 
$$C_0 = \left( \frac{1}{H+T} \right) \ln \left( 1 - \frac{0.6897(\epsilon_r + 1.41)}{\sqrt{\epsilon_r}} \right)$$

To: 
$$C_0 = \frac{1.41(\epsilon' r)}{\ln \left[ \frac{5.98H}{(0.8W + T)} \right]}$$

**Pg. 209**

Correct the values for  $C_{sv}$  for  $W/h=1$  and  $W/h=0.3$  in the table

S/W ( $C_{sv}$ , pF/cm)	W/h = 3 ( $C_{cg} \approx 1.2$ pF/cm) $Z_0 = 50 \Omega$				W/h = 1 ( $C_{cg} \approx 0.5$ pF/cm) $Z_0 = 90 \Omega$				W/h = 0.3 ( $C_{cg} \approx 0.1$ pF/cm) $Z_0 = 120 \Omega$			
	10 (0.003)	3 (0.02)	1 (0.06)	0.3 (0.17)	10 (0.02)	3 (0.06)	1 (0.12)	0.3 (0.28)	10 (0.08)	3 (0.3)	1 (0.45)	0.3 (1.2)
F ( $\omega$ ) = 1 kHz	-174	-158	-148	-140	-158	-148	-142	-136	-146	-134	-130	-122
3 kHz	-164	-148	-138	-130	-148	-138	-132	-126	-136	-124	-120	-112
10 kHz	-154	-138	-128	-120	-138	-128	-122	-116	-126	-114	-110	-102
30 kHz	-144	-128	-118	-110	-128	-118	-112	-106	-116	-104	-100	-92
100 kHz	-134	-118	-108	-100	-118	-108	-102	-96	-106	-94	-90	-82
300 kHz	-124	-108	-98	-90	-108	-98	-92	-86	-96	-84	-80	-72
1 MHz	-114	-98	-88	-80	-98	-88	-82	-76	-86	-74	-70	-62
3 MHz	-104	-88	-78	-70	-88	-78	-72	-66	-76	-64	-60	-52
10 MHz	-94	-78	-68	-60	-78	-68	-62	-56	-66	-54	-50	-42
30 MHz	-84	-68	-58	-50	-68	-58	-52	-46	-56	-44	-40	-32
100 MHz	-74	-58	-48	-40	-58	-48	-42	-36	-46	-34	-30	-22
300 MHz	-64	-48	-38	-30	-48	-38	-32	-26	-36	-24	-20	-12
1 GHz	-56	-40	-30	-22	-38	-30	-22	-18	-28	-18	-14	-8
3 GHz	-52	-36	-26	-20	-32	-24	-18	-14	-24	-14	-10	-4
10 GHz	-52	-36	-26	-18	-30	-22	-16	-10	-24	-14	-10	-4

**Pg. 270**, Center of page

Change: "CMMR" to "CMRR" in three places

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The following changes were discovered in the 4<sup>th</sup> printing and beyond, discovered by Stefano Bani of Italy

**Pages 114**

Typographical error in dimension conversion

Fifth paragraph:

From: 0.008 inch (2mm)  
To: 0.008 inch (0.20 mm)

**Page 115** – Figure 4.27

From: 0.008" (2mm)  
To: 0.008" (0.20 mm)

From: 0.064" (16mm)  
To: 0.064" (1.6mm)

**Page 253**, Eq. (9.2)

There is a mistake in the right side of the equation, missing the  $V_1$ .

From: 
$$V_{chassis} = \left( \frac{Z_2}{Z_1 + Z_2} \right)$$

To: 
$$V_{chassis} = V_1 \left( \frac{Z_2}{Z_1 + Z_2} \right)$$