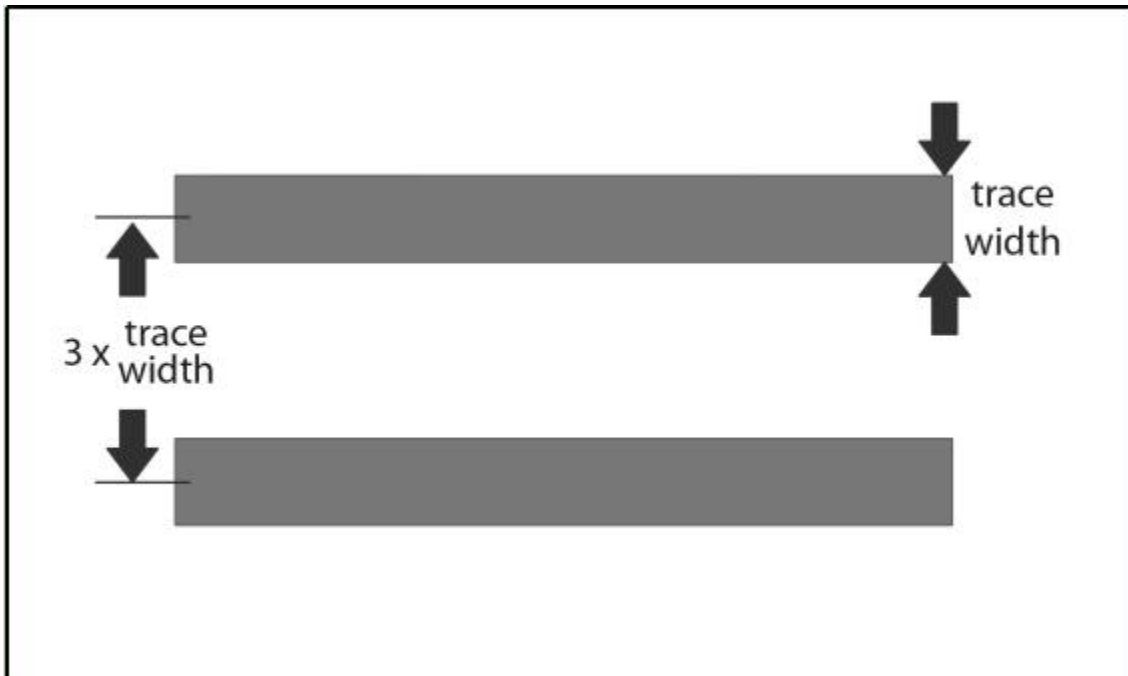


#### H- Use the 3W Rule to Minimize Coupling Between Traces:

Having your transmission lines couple can spell bad news for the integrity of your signal in transit. And while there's always the general rule of keeping traces as far apart as possible to minimize this risk, it gets a bit fuzzy when it comes to the execution.

If you've ever wondered how far you need to keep your traces from each other to minimize coupling, then use the 3W rule. It states that the separation between traces must be three times the width of a single trace when measured from center to center. You can also increase this separation from three to 10 times to get even greater gains on reducing coupling and crosstalk.



OR you can use the IPC-2221 Standard Table to size distance between traces

Table 6-1 Electrical Conductor Spacing

Voltage Between Conductors (DC or AC Peaks)	Minimum Spacing						
	Bare Board				Assembly		
	B1	B2	B3	B4	A5	A6	A7
0-15	0.05 mm	0.1 mm	0.1 mm	0.05 mm	0.13 mm	0.13 mm	0.13 mm
16-30	0.05 mm	0.1 mm	0.1 mm	0.05 mm	0.13 mm	0.25 mm	0.13 mm
31-50	0.1 mm	0.6 mm	0.6 mm	0.13 mm	0.13 mm	0.4 mm	0.13 mm
51-100	0.1 mm	0.6 mm	1.5 mm	0.13 mm	0.13 mm	0.5 mm	0.13 mm
101-150	0.2 mm	0.6 mm	3.2 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
151-170	0.2 mm	1.25 mm	3.2 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
171-250	0.2 mm	1.25 mm	6.4 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
251-300	0.2 mm	1.25 mm	12.5 mm	0.4 mm	0.4 mm	0.8 mm	0.8 mm
301-500	0.25 mm	2.5 mm	12.5 mm	0.8 mm	0.8 mm	1.5 mm	0.8 mm
> 500 See para. 6.3 for calc.	0.0025 mm /volt	0.005 mm /volt	0.025 mm /volt	0.00305 mm /volt	0.00305 mm /volt	0.00305 mm /volt	0.00305 mm /volt

- B1 - Internal Conductors
- B2 - External Conductors, uncoated, sea level to 3050 m
- B3 - External Conductors, uncoated, over 3050 m
- B4 - External Conductors, with permanent polymer coating (any elevation)
- A5 - External Conductors, with conformal coating over assembly (any elevation)
- A6 - External Component lead/termination, uncoated
- A7 - External Component lead termination, with conformal coating (any elevation)

**Uncoated : with no solder mask**

**Coated : with solder mask**

**OR use calculator:**

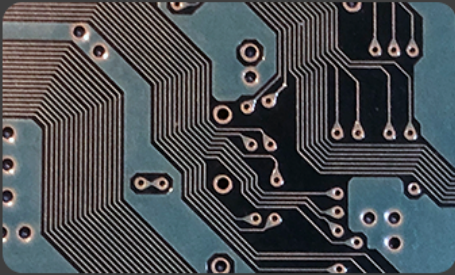
Signal Rise Time  
**1 ns**

Signal Voltage  
**5 V**

Coupled Length  
**6.35 mm**

Conductor Spacing (S)  
**0.254 mm**

Conductor Height (H)  
**0.762 mm**



Base Copper Weight

- ☐ 9um
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um
- ☐ 142um
- ☐ 178um

Plating Thickness

- ☐ Bare PCB
- ☐ 18um
- ☐ 35um
- ☐ 53um
- ☐ 70um
- ☐ 88um
- ☐ 106um

Plane Thickness

- ☐ 0.5oz / 1oz
- ☐ 2oz

Conductor Layer

- ☒ Microstrip
- ☐ Stripline

Crosstalk Coefficient  
**-2.23327 dB**

Coupled Voltage  
**3.86640 Volts**

Units

- ☒ Imperial
- ☐ Metric

Substrate Options

Material Selection  
**FR-4 STD**

Er **4.6** Tg (°C) **130**

Temp Rise (°C)  
**20**

Ambient Temp (°C)  
**22**

Print Solve!

Information

Total Copper Thickness  
N/A

Via Thermal Resistance  
N/A

