



# **VALU BUILDS FOR RIGID FLEX**

**STABLE, ROBUST BUILDS FOR COST EFFECTIVE RIGID FLEX**



8 Layer  
Rigid Flex

We have gathered a set of low cost standard materials, with yield friendly design guidelines, to produce a cost effective rigid flex solution for PWB designers who are new to rigid flex, or need a low cost rigid flex solution to their electronic packaging needs.



# VALU BUILDS FOR RIGID FLEX

## STABLE, ROBUST BUILDS FOR COST EFFECTIVE RIGID FLEX

### VALU FOR OUR CUSTOMERS

- Low cost rigid flex – nominal 50¢, or less, per square inch per layer, versus 65¢
- Simple solution
- Increased manufacturing yield
- “One board” electronic packaging - no connectors to fail
- Thinner, less weight, and form fitting electronics
- Faster production times
- Easy, low risk entry point for those new to rigid flex
- “Stepping stone” to more advanced rigid flex designs
- Comprehensive solution
  - RA wrought foil, rather than ED, for maximum endurance life in dynamic flex
  - UL 94V0 approved
  - RoHS compliant
  - Polyimide for lead free assembly
  - One solution – dynamic or flex to install applications

### SEVEN LAYUPS AVAILABLE

- 4 Layer
- 6 Layer
- 6 Layer with quad flex
- 6 Layer with 2 doublets
- 8 Layer
- 8 Layer with quad flex
- 8 Layer with 2 doublets
- 10 Layer
- 10 Layer with quad flex
- 10 Layer with 2 doublets

### CERTIFICATION

- IPC Class I, II and III

### 12 LOW COST BUILDING BLOCKS

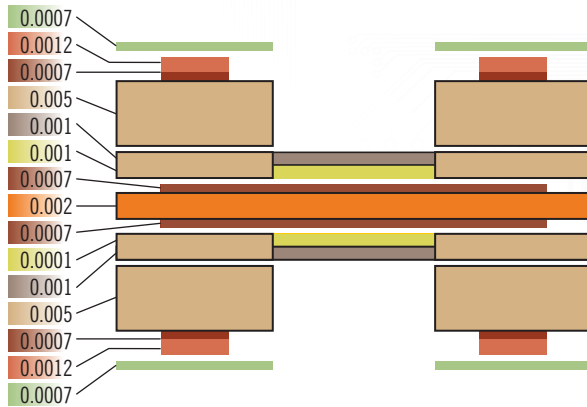
Items may be substituted with similar IPC certified materials

- Adhesiveless flex .002 H/H
- Adhesiveless flex .002 1/1
- .002 coverlayer – .001 Kapton/.001 adhesive
- 1080 no flow prepreg
- .005” core H/H
- .005” core 1/1
- ½ oz copper foil
- 1 oz copper foil

## DESIGN RULES

- Thickness tolerance:  $\pm 10\%$
- Line spacing: 0.0035”/0.0035” and greater
- Conventional Vias: 0.0079” drilled and greater
- Pad size: drilled via + 0.010”
- Copper plate: 0.001” minimum in hole
- Mechanical dimension tolerance:  $\pm 0.005$ ”
- Feature to edge distance: 0.015” min
- Feature to rigid/flex transition: 0.025” min
- Feature to routed profile tolerance:  $\pm 0.005$ ”
- Feature to flex profile laser tolerance:  $\pm 0.004$
- All flex arms must terminate in rigid area (no pouch construction)
- No fillets (beading at rigid/flex interface)
- Hole prep: desmear only
- 25% or less X outs per array
- Panel size: 18” by 24”
- Minimum quantity: 100 panels
- Pad finish: ENIG, ENEPIG or HASL
- Soldermask: Taiyo
- Electrically tested and certified
- DRC run on your data prior to build
- Cost adders:
  - Controlled impedance
  - Laser, blind, buried or filled vias
  - Button plating
  - Laser profiling
  - High pot testing
- Possible one time tooling charges:
  - NRE
  - AS 9102 FAIR if required

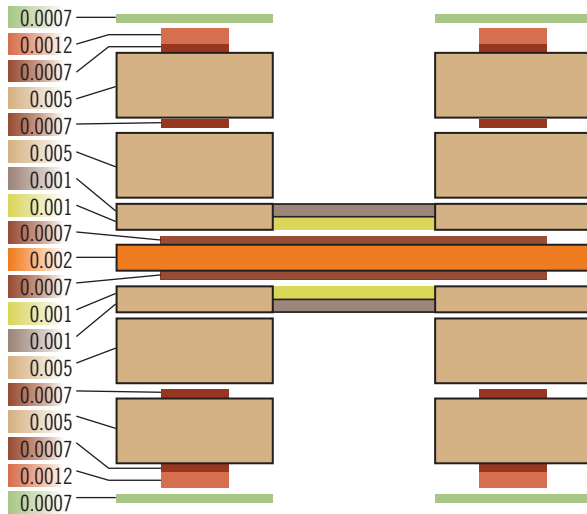
# 4 LAYER BUILD



IPC Material Designation	
FR4 Build	Polyimide Build
IPC - 4101/P24	IPC - 4101/P42
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4101/P24	IPC - 4101/P42

IPC Material Description
Photoimageable Soldermask
Plated Copper 1/2 oz Copper Foil
1080 No Flow Prepeg (1 or 2 Plies)
Flame Retarded Coverlayer
Acrylic Adhesive
1/2 oz RA Copper Foil
Adhesiveless Flexible Laminate .002 H/H
<b>0.0226 Total Thickness w/ 1/2 oz Copper</b> 0.0014 adder for 1 oz Copper
<b>0.024 Total Thickness w/ 1 oz Copper</b>
<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
<b>0.0528 Min. bend radius for 1 oz flex area</b>

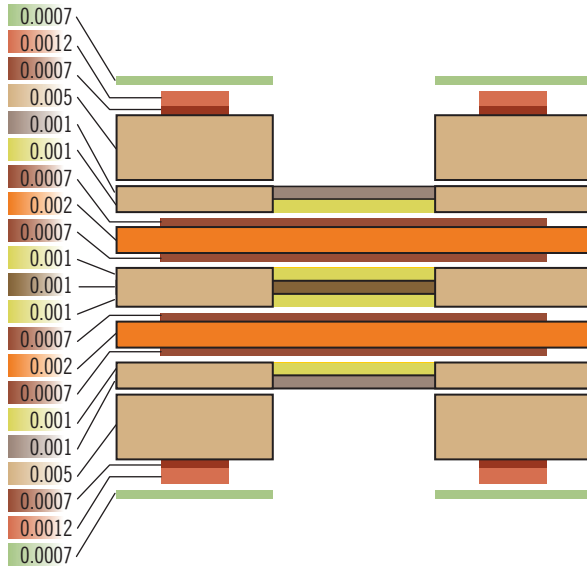
# 6 LAYER VALU BUILD



IPC Material Designation	
FR4 Build	Polyimide Build
IPC - 4101/L24	IPC - 4101/L42
IPC - 4101/P24	IPC - 4101/P42
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4101/P24	IPC - 4101/P42
IPC - 4101/L24	IPC - 4101/L42

IPC Material Description
Photoimageable Soldermask
Plated Copper 1/2 oz Copper Foil
0.005 H/H Core
1080 No Flow Prepeg (1 or 2 Plies)
Flame Retarded Coverlayer
Acrylic Adhesive
1/2 oz RA Copper Foil
Adhesiveless Flexible Laminate .002 H/H
<b>0.034 Total Thickness w/ 1/2 oz Copper</b> 0.0014 adder for 1 oz Copper
<b>0.0354 Total Thickness w/ 1 oz Copper</b>
<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
<b>0.0528 Min. bend radius for 1 oz flex area</b>

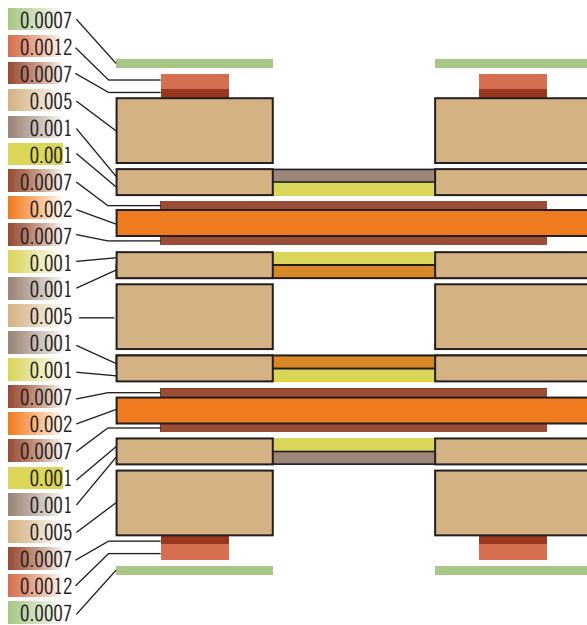
# 6 LAYER QUAD FLEX VALU BUILD



IPC Material Designation	
FR4 Build	Polyimide Build
IPC - 4101/P24	IPC - 4101/P42
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4101/P24	IPC - 4101/P42

IPC Material Description
Photoimageable Soldermask
Plated Copper 1/2 oz Copper Foil
1080 No Flow Prepeg (1 or 2 Plies)
Flame Retarded Coverlayer
Acrylic Adhesive
1/2 oz RA Copper Foil
Adhesiveless Flexible Laminate .002 H/H
Flame Retarded Bondply
<b>0.029 Total Thickness w/ 1/2 oz Copper</b> 0.0028 adder for 1 oz Copper
<b>0.0318 Total Thickness w/ 1 oz Copper</b>
<b>0.0138 Flexible composite thickness</b> x 12 "Rule of thumb" min. bend radius
<b>0.1656 Min. bend radius for 1/2 oz flex area</b>
<b>0.1992 Min. bend radius for 1 oz flex area</b>

# 6 LAYER TWO DOUBLET FLEX VALU BUILD



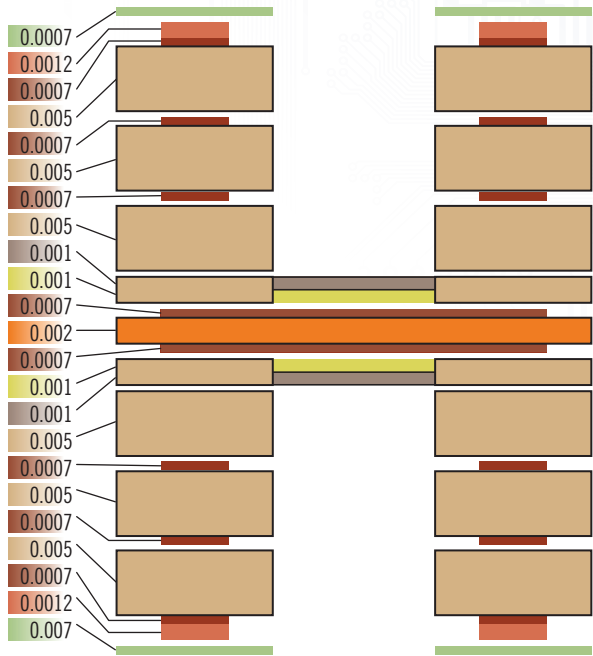
IPC Material Designation	
FR4 Build	Polyimide Build
IPC - 4101/P24	IPC - 4101/P42
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4101/P24	IPC - 4101/P42
IPC - 4203/1	IPC - 4203/1
IPC - 4204/11	IPC - 4204/11
IPC - 4203/1	IPC - 4203/1
IPC - 4101/P24	IPC - 4101/P42

IPC Material Description
Photoimageable Soldermask
Plated Copper 1/2 oz Copper Foil
1080 No Flow Prepeg (1 or 2 Plies)
Flame Retarded Coverlayer
Acrylic Adhesive
1/2 oz RA Copper Foil
Adhesiveless Flexible Laminate .002 H/H
<b>0.035 Total Thickness w/ 1/2 oz Copper</b> 0.0028 adder for 1 oz Copper
<b>0.0378 Total Thickness w/ 1 oz Copper</b>
<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
<b>0.0528 Min. bend radius for 1 oz flex area</b>

# VALU BUILDS FOR RIGID FLEX

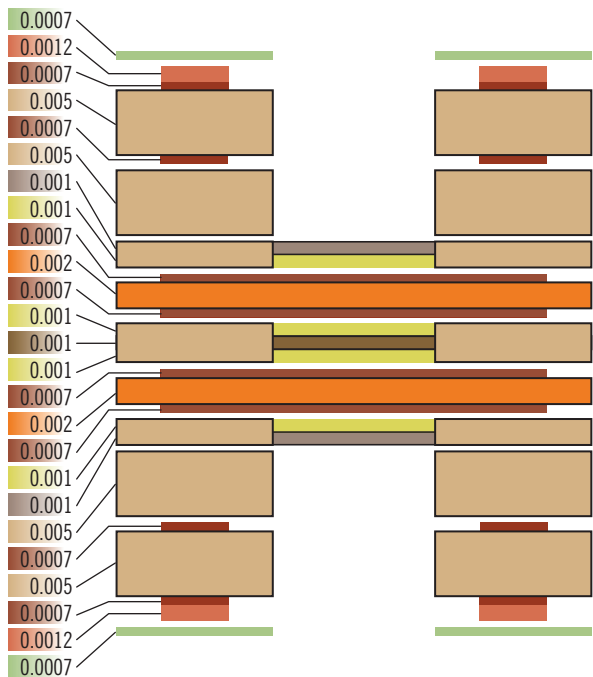
STABLE, ROBUST BUILDS FOR COST EFFECTIVE RIGID FLEX

## 8 LAYER VALU BUILD



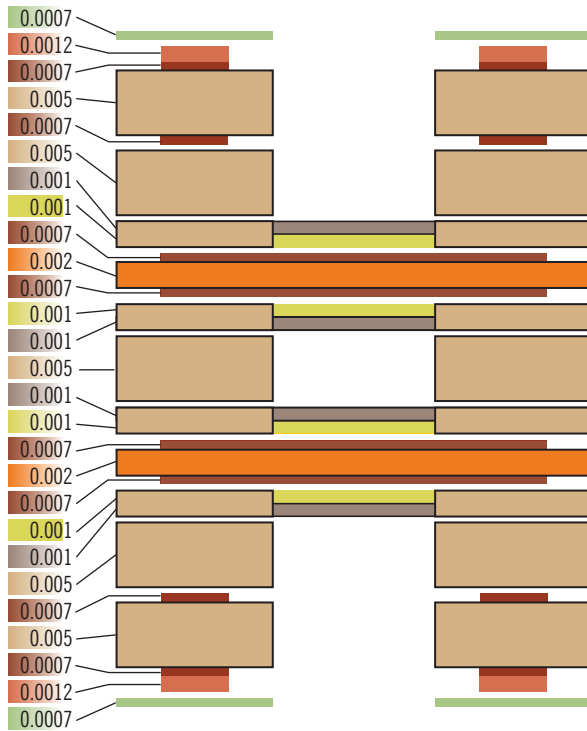
IPC Material Designation		IPC Material Description
FR4 Build	Polyimide Build	
		Photoimageable Soldermask
IPC - 4101/P24	IPC - 4101/P42	Plated Copper 1/2 oz Copper Foil
IPC - 4101/L24	IPC - 4101/L42	0.005 H/H Core 1080 No Flow Prepeg (1 or 2 Plies)
IPC - 4101/P24	IPC - 4101/P42	Flame Retarded Coverlayer
IPC - 4203/1	IPC - 4203/1	Acrylic Adhesive
IPC - 4204/11	IPC - 4204/11	1/2 oz RA Copper Foil
IPC - 4203/1	IPC - 4203/1	Adhesiveless Flexible Laminate .002 H/H
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
IPC - 4101/P24	IPC - 4101/P42	
		<b>0.0454 Total Thickness w/ 1/2 oz Copper</b> 0.0014 adder for 1 oz Copper
		<b>0.0456 Total Thickness w/ 1 oz Copper</b>
		<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
		<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
		<b>0.0528 Min. bend radius for 1 oz flex area</b>

## 8 LAYER QUAD FLEX VALU BUILD



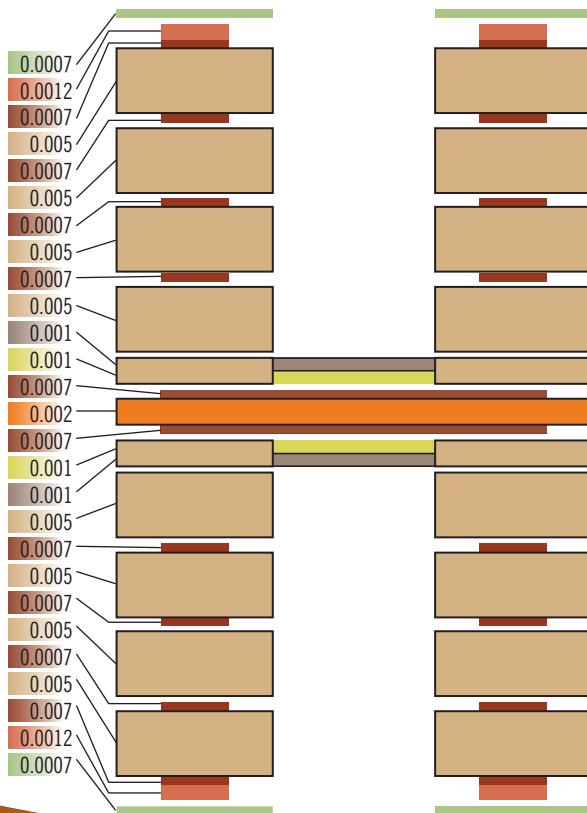
IPC Material Designation		IPC Material Description
FR4 Build	Polyimide Build	
		Photoimageable Soldermask
IPC - 4101/L24	IPC - 4101/L42	Plated Copper 1/2 oz Copper Foil
IPC - 4101/P24	IPC - 4101/P42	0.005 H/H Core 1080 No Flow Prepeg (1 or 2 Plies)
IPC - 4203/1	IPC - 4203/1	Flame Retarded Coverlayer
IPC - 4204/11	IPC - 4204/11	Acrylic Adhesive
IPC - 4203/1	IPC - 4203/1	1/2 oz RA Copper Foil
IPC - 4204/11	IPC - 4204/11	Adhesiveless Flexible Laminate .002 H/H
IPC - 4203/1	IPC - 4203/1	Flame Retarded Bondply
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
		<b>0.0404 Total Thickness w/ 1/2 oz Copper</b> 0.0028 adder for 1 oz Copper
		<b>0.0432 Total Thickness w/ 1 oz Copper</b>
		<b>0.0138 Flexible composite thickness</b> x 12 "Rule of thumb" min. bend radius
		<b>0.1656 Min. bend radius for 1/2 oz flex area</b>
		<b>0.1992 Min. bend radius for 1 oz flex area</b>

# 8 LAYER TWO DOUBLET FLEX VALU BUILD



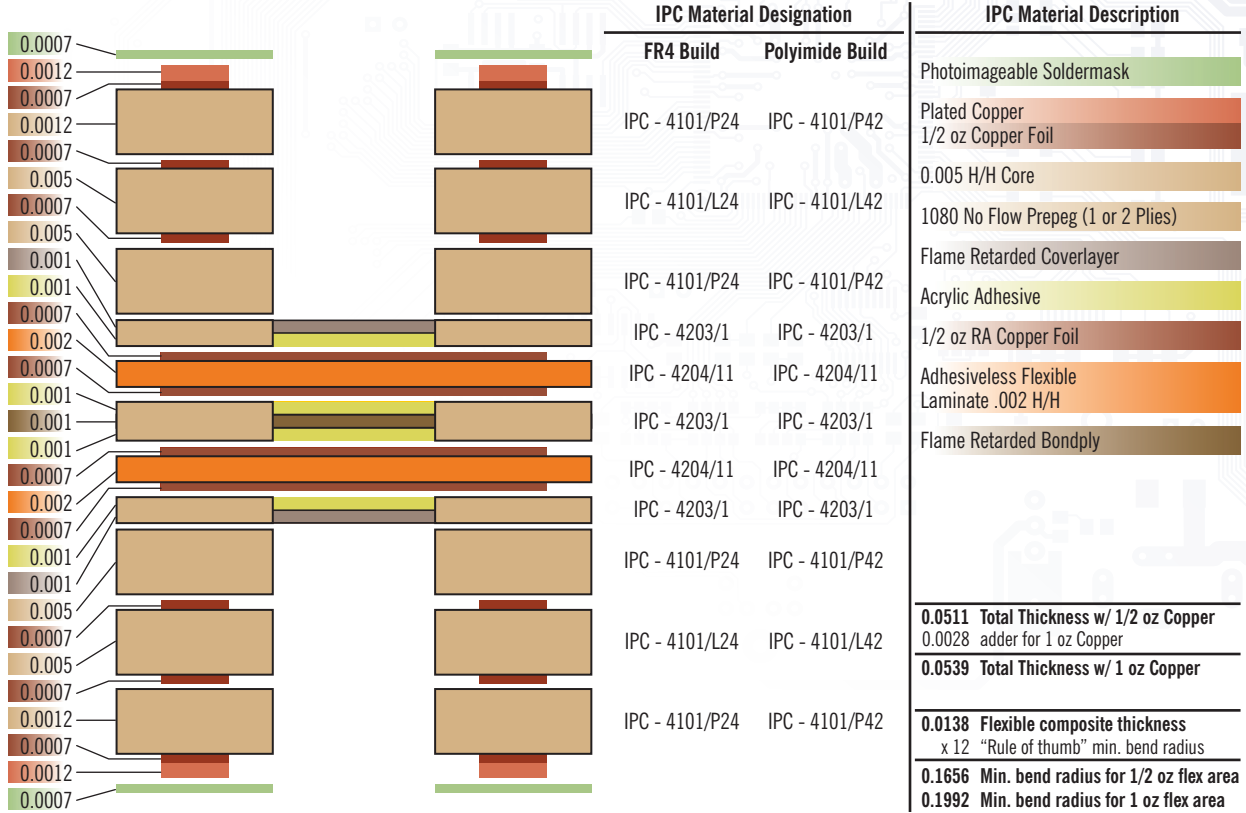
IPC Material Designation		IPC Material Description
FR4 Build	Polyimide Build	
		Photoimageable Soldermask
		Plated Copper 1/2 oz Copper Foil
		0.005 H/H Core
		1080 No Flow Prepeg (1 or 2 Plies)
		Flame Retarded Coverlayer
		Acrylic Adhesive
		1/2 oz RA Copper Foil
		Adhesiveless Flexible Laminate .002 H/H
IPC - 4101/L24	IPC - 4101/L42	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4203/1	IPC - 4203/1	
IPC - 4204/11	IPC - 4204/11	
IPC - 4203/1	IPC - 4203/1	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4203/1	IPC - 4203/1	
IPC - 4204/11	IPC - 4204/11	
IPC - 4203/1	IPC - 4203/1	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
		<b>0.0464 Total Thickness w/ 1/2 oz Copper</b> 0.0028 adder for 1 oz Copper
		<b>0.0492 Total Thickness w/ 1 oz Copper</b>
		<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
		<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
		<b>0.0528 Min. bend radius for 1 oz flex area</b>

# 10 LAYER VALU BUILD

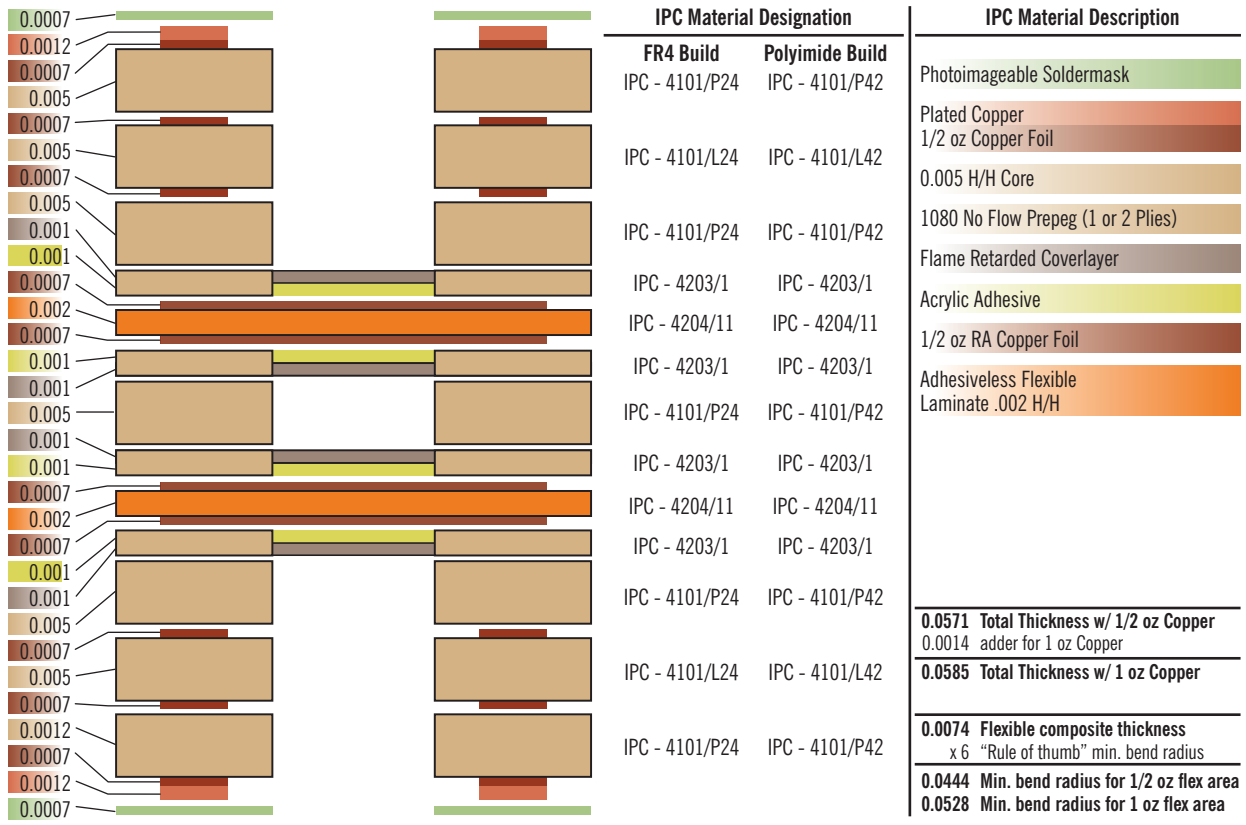


IPC Material Designation		IPC Material Description
FR4 Build	Polyimide Build	
		Photoimageable Soldermask
		Plated Copper 1/2 oz Copper Foil
		0.005 H/H Core
		1080 No Flow Prepeg (1 or 2 Plies)
		Flame Retarded Coverlayer
		Acrylic Adhesive
		1/2 oz RA Copper Foil
		Adhesiveless Flexible Laminate .002 H/H
IPC - 4101/L24	IPC - 4101/L42	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4203/1	IPC - 4203/1	
IPC - 4204/11	IPC - 4204/11	
IPC - 4203/1	IPC - 4203/1	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
IPC - 4101/P24	IPC - 4101/P42	
IPC - 4101/L24	IPC - 4101/L42	
		<b>0.0568 Total Thickness w/ 1/2 oz Copper</b> 0.0014 adder for 1 oz Copper
		<b>0.0582 Total Thickness w/ 1 oz Copper</b>
		<b>0.0074 Flexible composite thickness</b> x 6 "Rule of thumb" min. bend radius
		<b>0.0444 Min. bend radius for 1/2 oz flex area</b>
		<b>0.0528 Min. bend radius for 1 oz flex area</b>

**10 LAYER QUAD FLEX  
 VALU BUILD**



**10 LAYER TWO DOUBLET  
 FLEX VALU BUILD**





**Flex Circuit Center of Excellence**  
1705 Cannon Lane  
Northfield, MN 55057

**Rigid Flex Center of Excellence**  
1200 W 96th St  
Bloomington, MN 55431

**Flex Heater & Assembly  
Center of Excellence**  
9401 James Ave S Suite #120  
Bloomington, MN 55431  
(507) 663-7162  
[www.allflexinc.com](http://www.allflexinc.com)  
[info@allflexinc.com](mailto:info@allflexinc.com)

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