

410 S. Sunset Street, Longmont, CO  
[www.circuitswest.com](http://www.circuitswest.com)

# Circuits West, LLC

## ▶ CAPABILITIES OVERVIEW

**INDUSTRY LEADING QUALITY  
PRINTED CIRCUIT BOARDS**

Since 1976

ISO 9001:2015 Certified

UL Certified

ITAR Registered

JCP Registered



CALL US NOW:  
**877 650 5321**

Email: [info@circuitswest.com](mailto:info@circuitswest.com)

## MATERIALS

### FR4

STANDARD FR4.....	40 LAYERS
ISOLA FR406 .....	40 LAYERS

### HALOGEN FREE

VENTEC VT-441, VT-447.....	40 LAYERS
ISOLA TERRAGREEN.....	40 LAYERS

### ROHS

ITEQ IT-180A.....	20 LAYERS
ISOLA 185HR.....	30 LAYERS
ISOLA 370HR.....	40 LAYERS
FR408HR.....	40 LAYERS
ISOLA I-TERA MT (RF/MW).....	40 LAYERS
NELCO BT-N5000.....	30 LAYERS
NELCO 4000-29.....	40 LAYERS
NELCO 4000-13 & 13SI.....	40 LAYERS
NELCO 4000-13EP & EPSI.....	20 LAYERS
POLYIMIDE.....	12 LAYERS
CYANATE ESTER.....	20 LAYERS

### RF MATERIALS

"ROGERS 3000 SERIES (FR-4 W/ RO3000 CAPS)".....	20 LAYERS
ROGERS 4003C & 4350B.....	20 LAYERS
ROGERS DICLAD 880.....	20 LAYERS
ROGERS AD300A.....	20 LAYERS
ROGERS CUCLAD 250 & 233.....	20 LAYERS
ROGERS CTLE.....	20 LAYERS
ROGERS 5870/5880 .....	8 LAYERS
ROGERS 6000 SERIES.....	4 LAYERS
ROGERS 5000 SERIES.....	2 LAYERS
ROGERS 2929 BONDPLY.....	AVAILABLE
ISOLA I-SPEED.....	40 LAYERS
ISOLA IS680.....	20 LAYERS
ISOLA ASTRA MT77 .....	20 LAYERS
ARLON GENCLAD 280 .....	10 LAYERS
ARLON LX250.....	10 LAYERS
ARLON GYN 2.17 DK.....	10 LAYERS
ARLON 6700 & 6250 BONDPLY.....	AVAILABLE
I-TERA RF MT.....	40 LAYERS
NELCO 9000 SERIES.....	2 LAYERS
TACONIC RF MATERIALS.....	2 LAYERS
TACONIC FASTRISE 27 & 28 BONDPLY.....	AVAILABLE

### ADVANCED SIGNAL INTEGRITY

PANASONIC MEGTRON 6.....	AVAILABLE
3M ECM.....	AVAILABLE
ROHACELL.....	12 LAYERS
ISOLA TACHYON 100G .....	40 LAYERS
ISOLA I-TERA MT 40.....	40 LAYERS

## SPECIAL FEATURES

HEAVY COPPER.....	UP TO 6 OZ.
HEATSINKS (Outside Service).....	AVAILABLE
BACKPLATES (Outside Service).....	AVAILABLE

## FEATURE SIZE CAPABILITIES

### INTERNAL LAYER CAPABILITIES

#### INTERNAL COPPER WEIGHT 1/2 OZ.

- 0.003" LINE / 0.003" SPACE

#### INTERNAL COPPER WEIGHT 1 OZ.

- 0.004" LINE / 0.004" SPACE

#### INTERNAL COPPER WEIGHT 2 OZ.

- 0.006" LINE / 0.006" SPACE

#### INTERNAL COPPER WEIGHT 3 OZ.

- 0.008" LINE / 0.008" SPACE

#### INTERNAL COPPER WEIGHT 4 OZ.

- 0.010" LINE / 0.010" SPACE

### EXTERNAL LAYER CAPABILITIES

#### EXTERNAL COPPER FINISHED THICKNESS 1.0 OZ.

- 0.003" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 1.5 OZ.

- 0.003" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 2.0 OZ.

- 0.003" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 3.0 OZ.

- 0.006" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 4.0 OZ.

- 0.008" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 5.0 OZ.

- 0.012" FINISHED LINE & SPACE

#### EXTERNAL COPPER FINISHED THICKNESS 6.0 OZ.

- 0.016" FINISHED LINE & SPACE

### PAD DIAMETER TO DRILLED HOLE SIZE:

#### IPC-6012 CLASS 2

COMPONENT HOLES.....DRILLED SIZE PLUS 0.006"

VIA HOLES.....DRILLED SIZE PLUS 0.006"

### PAD DIAMETER TO DRILLED HOLE SIZE:

#### IPC-6012 CLASS 3

COMPONENT HOLES.....DRILLED SIZE PLUS 0.008"

VIA HOLES.....DRILLED SIZE PLUS 0.008"

## VIA-IN-PAD

### NON-CONDUCTIVE VIA FILL

EPOXY FILLED THRU HOLE CAPABILITY..... YES

EPOXY FILLED THRU HOLE MINIMUM..... MIN 0.008" FHS

EPOXY FILLED THRU HOLE MAXIMUM.....0.040" FHS

MINIMUM BOARD THICKNESS..... 0.028"

MAXIMUM BOARD THICKNESS..... 0.187"

NON-CONDUCTIVE VIA FILL ASPECT RATIO..... 8:1

### CONDUCTIVE VIA FILL

CONDUCTIVE FILLED PROCESS..... YES

CONDUCTIVE FILLED HOLE MIN..... MIN 0.008" FHS

CONDUCTIVE FILLED HOLE MAX.....0.040" FHS

MINIMUM BOARD THICKNESS..... 0.014" with Copper paste

MAXIMUM BOARD THICKNESS..... 0.187"

CONDUCTIVE VIA FILL ASPECT RATIO..... 8:1

## MECHANICAL

### MECHANICAL DRILL CAPABILITIES

PRIMARY DRILLED HOLE LOCATION TOLERANCE TO DATUM ZERO (DTP)	0.003"
2ND DRILL HOLE LOCATION TOLERANCE TO DATUM ZERO (DTP)	0.003"
MINIMUM CLEARANCE FROM COPPER CONDUCTOR TO MECHANICAL DRILLED HOLE	0.007"
FINISHED PANEL THICKNESS < 0.031"	0.003" FINISHED HOLE
FINISHED PANEL THICKNESS 0.062"	0.004" FINISHED HOLE
FINISHED PANEL THICKNESS 0.093"	0.008" FINISHED HOLE
FINISHED PANEL THICKNESS 0.125"	0.010" FINISHED HOLE
FINISHED PANEL THICKNESS 0.187"	0.016" FINISHED HOLE
PLATED HOLE SIZE TOLERANCE	± 0.003" STANDARD ; ± 0.002" SPECIAL
PLATED HOLE SIZE PRESS FIT APPLICATIONS	± 0.002" TYPICAL
ASPECT RATIO	10:1
PLATED HOLE SPACING MIN. (DRILLED HOLE TO HOLE)	0.008"

### NON-PLATED THROUGH HOLES

SMALLEST NON-PLATED HOLE SIZE	0.006"
LARGEST NON-PLATED HOLE SIZE ROUTED	NO LIMIT
NON-PLATED ROUTED HOLE TOLERANCE	± 0.005" TYPICAL ; ± 0.003" SPECIAL
MINIMUM NPTH TO EDGE OF BOARD SPACING	0.010"

### BLIND / BURIED VIAS (SEQUENTIAL LAMINATION)

MIN. FINISHED VIA HOLE DIAMETER (EPOXY FILLED)	0.006"
MAX. FINISHED VIA HOLE DIAMETER (EPOXY FILLED)	0.04"
MAX. ASPECT RATIO FOR EPOXY FILLED VIA HOLES	8:1
RESIN	CONDUCTIVE & NON-CONDUCTIVE

### CONTROL DEPTH / BACK DRILLING CAPABILITIES

BACKDRILL - PTH STUB REMOVAL	PTH + 0.010" DIAMETER (TYPICAL)
MINIMUM BACKSIDE DIELECTRIC SEPARATION	0.003"
CONTROL DEPTH DRILL DEPTH TOLERANCE	± 0.002"
MINIMUM BACK DRILL DIAMETER	0.014"
DRILLED HOLE OVER FINISHED HOLE SIZE	0.010"

### SCORING CAPABILITIES

OPTIMUM REMAINING WEB THICKNESS	TYPICAL MAX. 1/3 OF THICKNESS
REMAINING WEB TOLERANCE	± 0.005"
TRUE POSITION TOLERANCE	± 0.005"

### EDGE CONNECTOR BEVEL CAPABILITIES

FINGER TIP ANGLE	15°, 20°, 30°, 45°
BEVEL DEPTH TOLERANCE	± 0.005"

### PROFILE CAPABILITIES

STANDARD ROUTER BIT DIAMETER	0.093", 0.062", 0.031" (ROUTER BITS); 0.021" SPECIAL
ROUTED PROFILE TOLERANCE	± 0.005" STANDARD ; ± 0.004" SPECIAL
MINIMUM INTERNAL ROUT RADIUS	0.016" STANDARD ; SPECIAL 0.005"
MINIMUM ROUTED PTH SLOT WIDTH	0.014" TYPICAL W/ 0.006" MIN.
CONTROLLED DEPTH MILLING	YES

## SOLDER MASK & LEGEND

### SOLDER MASK

#### MIN. LPI SOLDER MASK CLEARANCE (FLOOD)

- 0.0015" / SIDE (PAD SIZE + 0.004")

#### PAD SIZE LARGER THAN NPTH

- 0.005" / SIDE (PAD SIZE + 0.010")

WEB BETWEEN SURFACE MOUNT PADS..... 0.004" MIN

LED BRIGHT WHITE LPI..... 0.005" MIN

#### SOLDER MASK COLORS

- GREEN, MATTE GREEN, BLUE, RED, BLACK, MATTE BLACK, YELLOW, LEW WHITE, WHITE, ORANGE, PURPLE, PINK, BROWN, CLEAR

#### SOLDER MASK TYPE

- LIQUID PHOTO IMAGEABLE (LPI)

MIN. MASK DEFINED PAD DIAMETER ..... 0.005"

SOLDER MASK PLUGGED VIAS ..... YES -90% COVERAGE

### LEGEND

PRINTED LEGEND MINIMUM STROKE/WIDTH ..... 0.005"

LPI LEGEND CAPABILITY..... YES

LPI LEGEND MINIMUM STROKE/WIDTH ..... 0.003"

#### SCREENED / LPI LEGEND COLORS

- WHITE, BLACK, YELLOW, RED, BLUE

SERIALIZATION / UNIQUE SERIALIZATION..... YES

## SURFACE FINISH OPTIONS

### SURFACE FINISH SELECTION

HOT AIR SOLDER LEVEL (LEAD-FREE, LEAD BASED) . YES

ELECTROLESS NICKEL IMMERSION GOLD (ENIG) ..... YES

IMMERSION SILVER ..... YES

ELECTROLESS NICKEL..... YES

COPPER..... YES

ENEPIG ..... YES (OUTSOURCED)

IMMERSION TIN ..... YES (OUTSOURCED)

FULL BODY GOLD..... YES (OUTSOURCED)

BONDABLE GOLD..... YES (OUTSOURCED)

PLATED NICKEL..... YES (OUTSOURCED)

OSP ..... YES (OUTSOURCED)

### MIXED FINISHES

IMMERSION GOLD W/ HARD GOLD ON FINGERS ..... YES

RECESSED FINGERS ..... YES

## USABLE PANEL AREA

FOR 12" X 18" PANEL ..... 10.5" X 16.5"

- 24 - 30 LAYERS

FOR 18" X 24" PANEL ..... 16.5" X 22.5"

- 24 - 30 LAYERS

FOR 16" X 18" PANEL ..... 14.5" X 16.5"

- 24 - 30 LAYERS

## STACK UP

### OVERALL BOARD THICKNESS

- 0.010" - 0.250"

### OVERALL BOARD TOLERANCES:

- <0.020"  
STANDARD ± 0.004" SPECIAL ± 0.003"
- 0.031" - 0.250"  
STANDARD ± 10% SPECIAL ± 0.003"

### THINNEST DIELECTRIC FINISHED:

#### OVERALL THICKNESS

- 0.010" 2 LAYER / 0.015" 4 LAYER

#### THINNEST PLATED CORE

- 0.008"

## ELECTRICAL PERFORMANCE

TDR TEST TOLERANCE ..... STANDARD 10% / SPECIAL 5%

HIPOT TESTING (AC&DC) ..... STANDARD AVAILABLE

## DATA & DOCUMENTATION

### TOOLING FORMATS

#### FILM DATA FORMATS

- DXF; RS-274-X; RS-274-D; ODB++

#### DRILL DATA FORMATS

- ASCII, EXCELLON FORMAT; RS-274-X; RS-274-D

#### ELECTRICAL TEST FORMATS

- IPC-D356

#### NETLIST COMPARE FORMATS

- IPC-D356; IPC-D356A

## TESTING CAPABILITIES

### MIN. TEST CONTINUITY RESISTANCE

- OHMS

### MAX. TEST VOLTAGE

- 1000 VOLTS

### MAX. TEST ISOLATED RESISTANCE

- 25 MOHM - 2GOHM

### LARGEST TEST - FLYING PROBE

- 18" X 24" MAX

### E-TEST PITCH (FLYING PROBE TEST)

- 0.004"

### DC LINE RESISTANCE TESTING

- YES