ExpressPCB Manufacturing Specifications

	Standard	MiniBoard Standard	Production	MiniBoard Pro	Proto Pro	Production 4 Layer	Miniboard Pro 4 Layer	Proto Pro 4 Layer
Quantity	1 and up	3	2 and up	3	4	2 and up	3	4
Layers	2 Layer	2 Layer	2 Layer	2 Layer	2 Layer	4 Layer	4 Layer	4 Layer
Lead Time	1, 2, 5 Day	1 Day	1, 2, 5 Day	2 day	2 Days	2, 3, 5 Day	3 Day	3 Day
Maximum Board Size	The maximum board size we manufacture is 12 x 14 inches.	Boards are cut in a rectangle 3.8 x 2.5 inches.	The maximum board size we manufacture is 12 x 14 inches.	Boards are cut in a rectangle 3.8 x 2.5 inches.	The board size must fit in a rectangle that is 21 square inches or smaller, and the longest dimension can not exceed 12 inches.	The maximum board size we manufacture is 12 x 14 inches.	Boards are cut in a rectangle 3.8 x 2.5 inches.	The board size must fit in a rectangle that is 21 square inches or smaller, and the longest dimension cannot exceed 12 inches.
Minimum Board Size	Minimum dimension in height or width is 0.35 inches.Total board area must be greater than 0.4 square-inches. (i.e. smallest square board we can make is 0.64 x 0.64 inches)	Boards are cut in a rectangle 3.8 x 2.5 inches.	Minimum dimension in height or width is 0.35 inches.Total board area must be greater than 0.4 square-inches. (i.e. smallest square board we can make is 0.64 x 0.64 inches)	Boards are cut in a rectangle 3.8 x 2.5 inches.	Minimum dimension in height or width is 0.35 inches.Total board area must be greater than 0.4 square-inches. (i.e. smallest square board we can make is 0.64 x 0.64 inches)	Minimum dimension in height or width is 0.35 inches.Total board area must be greater than 0.4 square-inches. (i.e. smallest square board we can make is 0.64 x 0.64 inches)	Boards are cut in a rectangle 3.8 x 2.5 inches.	Minimum dimension in height or width is 0.35 inches.Total board area must be greater than 0.4 square-inches. (i.e. smallest square board we can make is 0.64 x 0.64 inches)
Panelize Muliple Boards	Multiple circuits can be pasted together on a single board, but we do not cut them apart. The perimeter of a board cannot include long slots as they can cause manufacturing problems. We are not responsible for any defects that are a result of routing multiple circuits on a single board.	Multiple circuits can be pasted together on a single board, but we do not cut them apart. The perimeter of a board cannot include long slots as they can cause manufacturing problems. We are not responsible for any defects that are a result of routing multiple circuits on a single board.	Multiple circuits can be pasted together on a single board, but we do not cut them apart. The perimeter of a board cannot include long slots as they can cause manufacturing problems. We are not responsible for any defects that are a result of routing multiple circuits on a single board.	Multiple circuits can be pasted together on a single board, but we do not cut them apart. The perimeter of a board cannot include long slots as they can cause manufacturing problems. We are not responsible for any defects that are a result of routing multiple circuits on a single board.	Multiple circuits can be pasted together on a single board, but we do not cut them apart. The perimeter of a board cannot include long slots as they can cause manufacturing problems. We are not responsible for any defects that are a result of routing multiple circuits on a single board.	We do not recommend that users cut apart 4 layer boards because this can result in shorts between the inner layers.	We do not recommend that users cut apart 4 layer boards because this can result in shorts between the inner layers.	We do not recommend that users cut apart 4 layer boards because this can result in shorts between the inner layers.
Minimum Trace and Space	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.	Etching resolution is: 0.006″ minimum trace width, 0.006″ minimum space width.
Inner Layers	No Inner Layers	No Inner Layers	No Inner Layers	No Inner Layers	No Inner Layers	The two inner layers are solid copper planes. Through-hole pads can either be connected to or isolated from these copper planes. The planes are inset 0.025″ from edge of the board.	The two inner layers are solid copper planes. Through-hole pads can either be connected to or isolated from these copper planes. The planes are inset 0.025″ from edge of the board.	The two inner layers are solid copper planes. Through-hole pads can either be connected to or isolated from these copper planes. The planes are inset 0.025″ from edge of the board.
Solder Mask	None	None	Top and Bottom	Top and Bottom	Top and Bottom	Top and Bottom	Top and Bottom	Top and Bottom
Silk Screen	None	None	Top	Top	Top	Top	Top	Top

	Standard	MiniBoard Standard	Production	MiniBoard Pro	Proto Pro	Production 4 Layer	Miniboard Pro 4 Layer	Proto Pro 4 Layer
Surface Finish	Tin\Lead	Tin\Lead	Tin\Lead or Silver	Tin\Lead	Tin\Lead	Tin\Lead or Silver	Tin\Lead	Tin\Lead
Solder Mask Pad Tolerance	No Soldermask Layer	No Soldermask Layer	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.	Pads on the solder mask layers are grown by 0.003″ on all sides. As a result, very fine pitch surface mount components may not include any solder mask between the pins.
Material	Our 2 layer laminate is .059" FR-4 epoxy glass which includes .0007" copper on each side (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".***	Our 2 layer laminate is .059" FR-4 epoxy glass which includes .0007" copper on each side (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".***	Our 2 layer laminate is .059" FR-4 epoxy glass which includes .0007" copper on each side (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".***	Our 2 layer laminate is .059" FR-4 epoxy glass which includes .0007" copper on each side (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".***	Our 2 layer laminate is .059" FR-4 epoxy glass which includes .0007" copper on each side (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".***	Our 4 layer laminate is constructed as a .059" FR-4 package, which includes .0007" starting copper on layers 1 and 4 (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".*** The two inner layers are each constructed with .0014" copper (industry standard 1 ounce).	Our 4 layer laminate is constructed as a .059" FR-4 package, which includes .0007" starting copper on layers 1 and 4 (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".*** The two inner layers are each constructed with .0014" copper (industry standard 1 ounce).	Our 4 layer laminate is constructed as a .059" FR-4 package, which includes .0007" starting copper on layers 1 and 4 (industry standard 1/2 ounce copper base). We plate an additional .001" copper on the surface after drilling and imaging, resulting in a copper thickness on the surface of ***~0.0017".*** The two inner layers are each constructed with .0014" copper (industry standard 1 ounce).
Dielectric Constant (DK)	The dielectric constant of our FR-4 laminate ranges from 4.2 to 5.0.	The dielectric constant of our FR-4 laminate ranges from 4.2 to 5.0.	The dielectric constant of our FR-4 laminate ranges from 4.2 to 5.0.	The dielectric constant of our FR-4 laminate ranges from 4.2 to 5.0.	The dielectric constant of our FR-4 laminate ranges from 4.2 to 5.0.	The dielectric spacing between the top layer and the “Ground” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the bottom layer and the “Power” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the “Power” and “Ground” inner layers is 0.028″ with a dielectric constant of 4.6 +/-0.2.	The dielectric spacing between the top layer and the “Ground” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the bottom layer and the “Power” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the “Power” and “Ground” inner layers is 0.028″ with a dielectric constant of 4.6 +/-0.2.	The dielectric spacing between the top layer and the “Ground” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the bottom layer and the “Power” inner layer is 0.012″ with a dielectric constant of 4.6 +/-0.2. The dielectric spacing between the “Power” and “Ground” inner layers is 0.028″ with a dielectric constant of 4.6 +/-0.2.

	Standard	MiniBoard Standard	Production	MiniBoard Pro	Proto Pro	Production 4 Layer	Miniboard Pro 4 Layer	Proto Pro 4 Layer
Plated Holes	Boards are manufactured double-sided with all holes plated-through.	Boards are manufactured double-sided with all holes plated-through.	Boards are manufactured double-sided with all holes plated-through.	Boards are manufactured double-sided with all holes plated-through.	Boards are manufactured double-sided with all holes plated-through.	Boards are manufactured with 4 copper layers and all holes plated-through.	Boards are manufactured with 4 copper layers and all holes plated-through.	Boards are manufactured with 4 copper layers and all holes plated-through.
Maximum Hole Count	No maximum count.	The maximum number of holes allowed in a MiniBoard is 350.	No maximum count.	The maximum number of holes allowed in a MiniBoard is 350.	The maximum number of holes allowed in a ProtoPro is 650.	No maximum count.	The maximum number of holes allowed in a MiniBoard is 350.	The maximum number of holes allowed in a ProtoPro is 650.
Holes	Twenty-three hole sizes are available: 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-three hole sizes are available: 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-three hole sizes are available: 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-three hole sizes are available: 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-three hole sizes are available: 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-four hole sizes are available: 0.008″, 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-four hole sizes are available: 0.008″, 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.	Twenty-four hole sizes are available: 0.008″, 0.014″, 0.020″, 0.025″, 0.029″, 0.033″, 0.035″, 0.040″, 0.043″, 0.046″, 0.052″, 0.061″, 0.067″, 0.079″, 0.088″, 0.093″, 0.100″, 0.110″, 0.125″, 0.141″, 0.150″, 0.167″, 0.192″, 0.251″. Hole sizes other than those list are not offered.
Temperature	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.	The maximum operating temperature is 125 degrees C.
Hole Tolerance	These sizes are the finished hole diameters after plating. The 0.014″ hole may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.014″ hole may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.014″ hole may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.014″ hole may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.014″ hole may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.008″ and 0.014″ holes may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.008″ and 0.014″ holes may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.	These sizes are the finished hole diameters after plating. The 0.008″ and 0.014″ holes may be filled with solder and can only be used as via. The tolerance for the 0.020″ hole is +0.003 / -0.005. The tolerance for the other hole sizes are +/- 0.004″.
Hole Location Tolerance	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.	Our hole location tolerance is +/- 0.005”. As such, the tolerance between two holes would be +/- 0.010”.
Minimum Hole Distance	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.	A minimum of 0.021″ space must remain between adjacent holes. For example, the center-to-center distance between two pads with 0.020″ holes must be 0.041″ or greater.
Internal Slots and Cutouts	None	None	None	None	None	None	None	None

	Standard	MiniBoard Standard	Production	MiniBoard Pro	Proto Pro	Production 4 Layer	Miniboard Pro 4 Layer	Proto Pro 4 Layer
Perimeter Routing	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.	The edges of the board are cut with an accuracy of +/- 0.015″. A minimum of 0.020″ blank space is recommended between the perimeter and all features on the board. Traces placed closer than 0.015″ to the board's edge may be routed off.