Specification Details: **Date: 7/10/2019**

Specification: MIL-PRF-31032
Title: Printed Circuit Board/Printed Wiring Board
Federal Supply Class (FSC): 5998
Conventional: No
Specification contains quality assurance program: Yes
MIL-STD-790 Established Reliability & High Reliability: No
MIL-STD-690 Failure Rate Sampling Plans & Procedures: No
Weibull Graded: Yes
Specification contains space level reliability requirements: No
Specification allows test optimization: Yes

Contact Information:

Office of Primary Involvement: Electronic Devices Branch, DLA Land and Maritime - VQE
Primary Qualifying Activity Contact: 614-692-0627, e-mail: vqe.ls@dla.mil
Secondary Qualifying Activity Contact: 614-692-0625, e-mail: vqe.rp@dla.mil

Notes:

If a manufacturer desires to have test data considered for qualification, it must be certified and meet all qualification test requirements of MIL-PRF-31032 and the applicable associated specification.

The listing of printed board manufacturing lines in the QML applies only to printed boards produced in the plant(s) specified herein. Therefore, only those printed boards that have been manufactured and tested on the certified/qualified lines listed herein can be supplied as QML printed boards.

The DLA Land and Maritime - VQE contacts for QML companies can be located in the file "31032 main points-of-contact" at website:
http://www.dscc.dla.mil/offices/sourcing and qualification/offices.asp?section=VQE

QML is a definition of a manufacturer's verified capabilities. Manufacturers may use the add-on qualification process to qualify capabilities that are not currently listed on the QML. The user is encouraged to contact the manufacturer or Qualifying Activity to make arrangements for QML availability.

The following abbreviations are used in this listing:

Ag: Silver
Au: Gold
CAGE: Commercial and Government Entity (Code)
Cu: Copper
ENIG: Electroless Nickel Immersion Gold
HASL: Hot Air Solder Level
ImmAg: Immersion Silver
IR: Infrared
LPI: Liquid Photoimageable
MIX: Mix of SMT and THM
Ni: Nickel
OSP: Organic Surface Protection
Pb: Lead
Pd: Palladium
PTH: Plated Thru Hole
SMOBC: Solder Mask Over Bare Copper
SMT: Surface-Mount Technology
Sn: Tin
THM: Through-Hole Mounting

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
AC Universal Circuits LLC
886 Zachary Lane North, Maple Grove, MN, 55369-4524
US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 45032
Phone: 763-315-1719
Fax: 763-425-0999
EMail: MG_Quality@4pcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-10-019530, VQE-10-020323, VQE-12-024534
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .125"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.88:1 Through-Hole
Min. Conductor Width/Space: .0032"/.0032"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-10-019530, VQE-10-020323, VQE-12-024534
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .18"
Min. Hole Size: .021" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.57:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg,
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-021326, VQE-12-024534
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 8
Max. Board Thickness: .062"
Min. Hole Size: .0138" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4.5:1 Through-Hole
Min. Conductor Width/Space: .007"/.006"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Foil Lamination

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0MNN9
Accurate Circuit Engineering 3019 S. Kilson Drive, Santa Ana, CA, 92707 US	Same Address as Manufacturer	Phone: 714-546-2162 Fax: 714-433-7418 EMail: quality@ace-pcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-06-012150, VQE-07-012577, VQE-09-018384, VQE-10-020411, VQE-11-022279, VQE-13-026528, VQE-13-026662
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 20" x 26"
Max. Number of Layers: 24
Max. Board Thickness: .22"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6RJS1
Advanced Circuits - Tempe Diasion 229 S. Clark Drive, Tempe, AZ, 85281-3073 US	Same Address as Manufacturer	Phone: 480-966-5894 Fax: 480-966-5896 EMail: tempesales@4pcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-12-024291, VQE-12-024631, VQE-12-025042, VQE-13-025402, VQE-13-025881,
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .125"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: .8:1 Microvia, 12.5:1 Through-Hole
Min. Conductor Width/Space: .004"/.0033"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-12-024291, VQE-12-024631, VQE-12-025042, VQE-13-025402, VQE-13-025881, VQE-15-029681,
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .125"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1.1:1 Microvia, 12.5:1 Through-Hole
Min. Conductor Width/Space: .004"/.0033"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38661
Airborn Flexible Circuits, Inc.	Same Address as Manufacturer	Phone: 416-285-3825
11 Dohme Avenue, Toronto, M4B 1Y7, Ontario Canada		Fax: 416-752-6719
		EMail: pialisp@airbornflex.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-04-005354, VQE-08-015729
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 12" x 18"
Max. Number of Layers: 7
Max. Board Thickness: " Not Specified
Aspect Ratio: 3:1 Through-Hole
Min. Conductor Width/Space: .007"/.007"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Direct Metalization
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: HASL
Additional Fab Capabilities: Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-04-005354, VQE-08-015729
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 12
Max. Board Thickness: .094"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 12:1 Through-Hole
Min. Conductor Width/Space: .006"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Direct Metalization
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: HASL
Additional Fab Capabilities: Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0ZGB2
All Flex, Inc.	Same Address as Manufacturer	Phone: (800) 959-0865
1705 Cannon Lane, Northfield, MN, 55057-3605 USA		Fax: (844) 274-3970
		EMail: tblakstad@allflexinc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ(VQE-19-033269), VQ(VQE-19-033661)
Composition: S - Homogenous thermosetting base material printed boards
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 107"
Max. Number of Layers: 6
Max. Board Thickness: .029"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ(VQE-19-033269), VQ(VQE-19-033661)
Composition: S - Homogenous thermosetting base material printed boards
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 54"
Max. Number of Layers: 6
Max. Board Thickness: .029"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4AA34
American Standard Circuits 475 Industrial Drive, West Chicago, IL, 60185 US	Same Address as Manufacturer	Phone: 603-639-5444 Fax: 603-293-1240 EMail: sales@asc-i.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-17-031437
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 14
Max. Board Thickness: .095"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .0033"/.006"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Foil Lamination
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-08-015934, VQE-11-021830, VQE-11-023138, VQE-13-025323, VQE-13-025791, VQE-13-025834
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .09" (for /1, Type 3 - Multilayer), .125" (for /2, Type /2 - Double-sided only)
Min. Hole Size: .009" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Blind Vias, Foil Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-022358, VQE-11-023138
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .125"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4AA34
American Standard Circuits	Same Address as Manufacturer	Phone: 603-639-5444
475 Industrial Drive, West Chicago, IL, 60185 US		Fax: 603-293-1240
		EMail: sales@asc-i.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-16-029852
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .095"
Min. Hole Size: .017" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION: **Amitron Corporation** 2001 Landmeier Road, Elk Grove Village, IL, 60007 USA		CAGE Code: 1LHP6 Phone: 847-290-9800 Fax: 847-290-9823 EMail: kammrad@amitroncorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033935
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .08"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable, Silk Screen
Finish System: ENIG, HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
Amphenol Printed Circuits 91 Northeastern Boulevard, Nashua, NH, 03062 US	Same Address as Manufacturer	Phone: 603-879-3268 Fax: 603-879-2818 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE 10-020582, VQE-06-010054, VQE-09-017008, VQE-12-023765, VQE-15-029690, VQE-17-031637, VQE-97-000649
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 24" x 36"
Max. Number of Layers: 33
Max. Board Thickness: .25"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Permanganate Etchback, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE 10-020582, VQE-06-010054, VQE-09-017008, VQE-12-023765, VQE-15-029626, VQE-17-031637, VQE-97-000649
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 30" x 36"
Max. Number of Layers: 28
Max. Board Thickness: .18"
Min. Hole Size: .006" Laser Ablated Plated Hole Size Before Plating, .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: .8:1 Microvia, 11:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE 10-020582, VQE-06-010054, VQE-09-017008, VQE-12-023765, VQE-15-029690, VQE-19-033889
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 24" x 31"
Max. Number of Layers: 12
Max. Board Thickness: .101"
Min. Hole Size: .04" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2.6:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
Amphenol Printed Circuits 91 Northeastern Boulevard, Nashua, NH, 03062 US	Same Address as Manufacturer	Phone: 603-879-3268 Fax: 603-879-2818 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-10-019533, VQE-12-023765, VQE-15-029690
Composition: S - Homogenous thermosetting base material printed boards
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 24" x 36"
Max. Number of Layers: 4 (types 1, 2, and 3 only)
Max. Board Thickness: .035"
Min. Hole Size: .0145"
Aspect Ratio: 1.75:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Palladium-based
Copper Plating: Direct Current Plate, Pulse Plate
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-10-019533, VQE-12-023765, VQE-15-029690
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 24" x 36"
Max. Number of Layers: 22
Max. Board Thickness: .14"
Min. Hole Size: .0197" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper, Palladium-based
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65337
Calumet Electronics Corp.	Same Address as Manufacturer	Phone: 906-337-1305
25830 Depot Street, Calumet, MI, 49913-1985 US		Fax: 906-337-5359
		EMail: quality@calumetelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033358), VQE 12 023734, VQE-03-4657, VQE-04-6280, VQE-14-027692, VQE-17-030995, VQE-18-032747, VQE-18-033030
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .125"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based, Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, ImmAg
Additional Fab Capabilities: Blind Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033358), VQE 12 023734, VQE-03-4657, VQE-04-6280, VQE-13-026419, VQE-17-030995, VQE-18-032747
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .125"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, ImmAg
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: L4387
Circuit-Tech, Inc. 399 Denison Street, Markham, ON, L3R 1B7 Canada	Same Address as Manufacturer	Phone: 905-474-9227 Fax: 416 497-4953 EMail: sales@circuittech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033355
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .125"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 12:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0035"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International, Inc. 791 Nuttman Street, Santa Clara, CA, 95054 US	Same Address as Manufacturer	Phone: 408-988-3980 Fax: 408-988-4534 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-08-016602, VQE-14-028536, VQE-18-032748, VQE-19-034045
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .185"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14.2:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-08-016602, VQE-14-028536, VQE-18-032748, VQE-19-034045
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .185"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14.2:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-07-014176, VQE-15-029356, VQE-19-033333, VQE-19-034045
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 12" x 18"
Max. Number of Layers: 5
Max. Board Thickness: .056"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3.5:1 Through-Hole
Min. Conductor Width/Space: .0058"/.01"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, Ni/Pd/Au
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International, Inc. 791 Nuttman Street, Santa Clara, CA, 95054 US	Same Address as Manufacturer	Phone: 408-988-3980 Fax: 408-988-4534 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-08-016602, VQE-14-028536, VQE-19-033333, VQE-19-034045
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .125"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2, MIL-PRF-31032/5, MIL-PRF-31032/6
Qualification Letters: VQE-19-033722, VQE-19-034045
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .175"
Min. Hole Size: .0145" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 12.14:1 Through-Hole
Min. Conductor Width/Space: .005"/.006"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 8K616
Cirtech, Inc.	Same Address as Manufacturer	Phone: 714-921-0860
250 E. Emerson Ave., Orange, CA, 92865-3303		Fax:
		EMail: dennisw@apctinc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE 19 033331)
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .125"
Min. Hole Size: .016"
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .008"/.006"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ (VQE-19-033575)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .08"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.5:1 Through-Hole
Min. Conductor Width/Space: .005"/.006"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ (VQE-19-033573)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 8
Max. Board Thickness: .098"
Min. Hole Size: .011" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .006"/.006"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Foil Lamination

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Coast to Coast Circuits, Inc. 5331 McFadden Avenue, Huntington Beach, CA, 92649-1204 US	Same Address as Manufacturer	Phone: 714-898-4901 Fax: 714-891-0607 EMail: sales@speedycircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-08-016434, VQE-10-021007, VQE-18-33028
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .083"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-08-016434, VQE-10-021007, VQE-18-033028
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 8
Max. Board Thickness: .088"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-08-016434, VQE-10-019157, VQE-10-021007, VQE-18-033028
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 8
Max. Board Thickness: .088"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Coast to Coast Circuits, Inc. 5331 McFadden Avenue, Huntington Beach, CA, 92649-1204 US	Same Address as Manufacturer	Phone: 714-898-4901 Fax: 714-891-0607 EMail: sales@speedycircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/6
Qualification Letters: VQE-08-016434, VQE-18-033028
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GR: Glass Base, Nonwoven, Polytetrafluoroethylene Resin, Flame Resistant; GY: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant, for Microwave Application
Max. Panel Size: 12" x 18"
Max. Number of Layers: 2
Max. Board Thickness: .028"
Min. Hole Size: .03" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/5, MIL-PRF-31032/6
Qualification Letters: VQE-09-018657, VQE-18-033028
Composition: M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; With or without woven or non-woven E-glass, Polytetrafluoroethylene (PTFE) resin, ceramic filler
Max. Panel Size: 18" x 24"
Max. Number of Layers: 7 Woven E-Glass, Hydrocarbon Resin, Ceramic Filler - Homogenous
Max. Board Thickness: .055"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/5, MIL-PRF-31032/6
Qualification Letters: VQE-09-018657, VQE-18-033028
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 7 With or Without Woven or Non-woven E-Glass, PTFE Resin, Ceramic Filler and Woven E-Glass, Epoxy Resin - Mixed
Max. Board Thickness: .055"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road, Fredericksburg, VA, 22406-6200 US	Same Address as Manufacturer	Phone: 540-753-5511, x125 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-04-6002
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .088"
Min. Hole Size: .021" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4.2:1 Through-Hole
Min. Conductor Width/Space: .006"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-04-6002
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .127"
Min. Hole Size: .015"
Aspect Ratio: 8.5:1 Through-Hole
Min. Conductor Width/Space: .008"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-04-6002
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 12" x 18"
Max. Number of Layers: 10
Max. Board Thickness: .093"
Min. Hole Size: .025" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3.7:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Flex Usage: Use A (Flex During Installation),

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 30598
Compunetics Inc.	Same Address as Manufacturer	Phone: 412-858-1272
700 Seco Rd, Monroeville, PA, 15146 US		Fax:
		EMail: sales@compunetics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-13-026082), VQ(VQE-15-029422)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 32
Max. Board Thickness: .26"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10.8:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-15-029722
Composition: M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .177"
Min. Hole Size: .017" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10.4:1 Through-Hole
Min. Conductor Width/Space: .0047"/.006"
Hole Preparation: Plasma Desmear
Copper Plating: Periodic Reverse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Blind Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ (VQE-17-031349)
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 24" x 18"
Max. Number of Layers: 4
Max. Board Thickness: .024"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1.3 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Finish System: HASL
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry, Inc. 1430 Century Drive, Carrollton, TX, 75006 US	Same Address as Manufacturer	Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-06-010333), VQ(VQE-06-011433), VQ(VQE-10-020352)
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 16", 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .12"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Foil Lamination, Sequential Lamination, ,
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-06-010333), VQ(VQE-06-011433), VQ(VQE-10-020352)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 16", 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .17"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/5, MIL-PRF-31032/6
Qualification Letters: VQ(VQE-10-021161)
Rigid Base Material: GT: Woven E-Glass, PTFE Resin; GX: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant; GY: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant, for Microwave Application; With or without woven or non-woven E-glass, Polytetrafluoroethylene (PTFE) resin, ceramic filler
Max. Panel Size: 12" x 18", 18" x 12"
Max. Number of Layers: 6
Max. Board Thickness: .18"
Min. Hole Size: .039" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66030
Electrotek Corp. 7745 S. 10th Street, Oak Creek, WI, 53154 US	Same Address as Manufacturer	Phone: 414-762-1390 Fax: 414-762-1510 EMail: sales@boards4u.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2

Qualification Letters: VQ(VQE-06-011451), VQ(VQE-08-014513), VQ(VQE-09-018692), VQ(VQE-12-024024), VQ(VQE-12-024411), VQ(VQE-17-031008, VQ(VQE-19-033298), VQ(VQE-19-033627)

Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant

Max. Panel Size: 21" x 24"

Max. Number of Layers: 24

Max. Board Thickness: .115"

Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating

Aspect Ratio: 9.7:1 Through-Hole

Min. Conductor Width/Space: .003"/.003"

Hole Preparation: Permanganate Desmear, Plasma Etchback

Hole Wall Conductive Coating: Electroless Copper

Copper Plating: Direct Current Plate

Hole Fill/Via Plug: Conductive, Non-Conductive

Solder Resist: Dry Film, Liquid Photoimageable

Finish System: Carbon Ink, ENIG, Electrolytic Ni/Au, HASL, ImmAg

Additional Fab Capabilities: Foil Lamination

Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2

Qualification Letters: VQ(VQE-06-011451), VQ(VQE-08-014513), VQ(VQE-09-018692), VQ(VQE-12-024024), VQ(VQE-12-024411), VQ(VQE-19-033298)

Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant

Max. Panel Size: 21" x 24"

Max. Number of Layers: 18

Max. Board Thickness: .115"

Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating

Aspect Ratio: 9:1 Through-Hole

Min. Conductor Width/Space: .003"/.003"

Hole Preparation: Permanganate Desmear, Plasma Etchback

Hole Wall Conductive Coating: Electroless Copper

Copper Plating: Direct Current Plate

Hole Fill/Via Plug: Conductive, Non-Conductive

Solder Resist: Dry Film, Liquid Photoimageable

Finish System: Carbon Ink, ENIG, Electrolytic Ni/Au, HASL, ImmAg

Additional Fab Capabilities: Foil Lamination

Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: L2665
Firan Technology Group 250 Finchdene Square, Scarborough, M1X 1A5, Ontario, Canada	Same Address as Manufacturer	Phone: 416-299-4000 Fax: 416-292-4308 EMail: info@ftgcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-009339, VQE-06-010764, VQE-06-010889, VQE-15-028987, VQE-16-030295, VQE-17-031083, VQE-17-031084
Rigid Base Material: BI: Aramid Fabric, Nonwoven, Polyimide Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .106"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.1:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-009339, VQE-06-010764, VQE-06-010889, VQE-15-028987, VQE-16-030295, VQE-17-031083
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 30
Max. Board Thickness: .245"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1.01:1 Microvia, 15.9:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-009339, VQE-06-010764, VQE-06-010889, VQE-15-028987, VQE-16-030295, VQE-17-031083
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .17"
Min. Hole Size: .0059" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.6:1 Microvia, 9.6:1 Through-Hole
Min. Conductor Width/Space: .0035"/.003"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: L2665
Firan Technology Group	Same Address as Manufacturer	Phone: 416-299-4000
250 Finchdene Square, Scarborough, M1X 1A5, Ontario, Canada		Fax: 416-292-4308
		EMail: info@ftgcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-009339, VQE-06-010764, VQE-06-010889, VQE-15-028987, VQE-16-030295, VQE-17-031083
Rigid Base Material: GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .137"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.0037"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-15-029018, VQE-16-030295
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 12
Max. Board Thickness: .086"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

FTG Circuits, Inc. - Chatsworth

20750 Marilla Street, Chatsworth,, CA, 91311 US

CAGE Code: 30803

Phone: 818-407-4024

Fax: 818-407-4034

EMail: info@ftgcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033705
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .165"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-19-033708
Composition: M - Mixed based material printed boards, S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .18"
Min. Hole Size: .0197" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .0035"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-19-033709
Composition: M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .165"
Min. Hole Size: .0256" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.5:1 Through-Hole
Min. Conductor Width/Space: .007"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: ENIG, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 30803
FTG Circuits, Inc. - Chatsworth		Phone: 818-407-4024
20750 Marilla Street, Chatsworth,, CA, 91311 US		Fax: 818-407-4034
		EMail: info@ftgcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033706
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 32
Max. Board Thickness: .201"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11.3:1 Through-Hole, 1:1 Microvia
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033707
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: BI: Aramid Fabric, Nonwoven, Polyimide Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .095"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 12:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3C7D2
Gorilla Circuits	Same Address as Manufacturer	Phone: 408-294-9897
1445 Old Oakland Rd, San Jose, CA, 95112 US		Fax: 408-297-1540
		EMail: info@gorillacircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: 11-022314, 14-028138, 17-031452, 17-031462, 18-032591
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .18"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: 11-022314, 14-028138, 17-031452, 17-031462
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .093"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.005"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 07284
Hamby Corporation 27704 Avenue Scott, Valencia, CA, 91355-1218 US	Same Address as Manufacturer	Phone: 661-257-1924 Fax: 661-257-1213 EMail: suesharp@hambycorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-017349
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 12" x 18"
Max. Number of Layers: 6
Max. Board Thickness: .035"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .009"/.009"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: Electrolytic Ni / Hard Au, HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-08-14596
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 11
Max. Board Thickness: .085"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: Electrolytic Ni / Hard Au, HASL
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-017349
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 12" x 18"
Max. Number of Layers: 6
Max. Board Thickness: .035"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .009"/.009"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: Electrolytic Ni / Hard Au, HASL

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 07284
Hamby Corporation 27704 Avenue Scott, Valencia, CA, 91355-1218 US	Same Address as Manufacturer	Phone: 661-257-1924 Fax: 661-257-1213 EMail: suesharp@hambycorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-08-14596
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 24"
Max. Number of Layers: 11
Max. Board Thickness: .095"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: Electrolytic Ni / Hard Au, HASL
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH	Same Address as Manufacturer	Phone: 0049-431-71966-0, -30
Clara-Immerwahr-Strabe 7, 24145 Kiel Germany		Fax: 0049-431-71966-29
		EMail: Joerg.Kremer@brockstedt.de

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-2619, VQE-05-7480
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 9" x 13", 13" x 20", 15" x 21", 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .2"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-03-2619, VQE-05-7480,
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 9" x 13", 13" x 20"
Max. Number of Layers: 12
Max. Board Thickness: .2"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3
Qualification Letters: VQE-03-2619, VQE-05-7480, VQE-13-25594
Composition: S - Homogenous thermosetting base material printed boards,
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 9" x 13", 13" x 20"
Max. Number of Layers: 2
Max. Board Thickness: .01"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH Clara-Immerwahr-Strabe 7, 24145 Kiel Germany	Same Address as Manufacturer	Phone: 0049-431-71966-0, -30 Fax: 0049-431-71966-29 EMail: Joerg.Kremer@brockstedt.de

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-2619, VQE-05-7480
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 9" x 13", 13" x 20", 15" x 21", 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .2"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 59554
Holaday Circuits, Inc. 11126 Bren Road West, Minnetonka, MN, 55343 US	Same Address as Manufacturer	Phone: 952-988-8059 Fax: EMail: MarwanR@Holaday.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-15-028707), VQ(VQE-18-032982), VQ(VQE-19-033858)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .136"
Min. Hole Size: .007" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.56:1 Microvia, 7.8:1 Through-Hole
Min. Conductor Width/Space: .003"/.0037"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-15-028707), VQ(VQE-18-032982), VQ(VQE-19-033858)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant;
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .122"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.66:1 Through-Hole
Min. Conductor Width/Space: .003"/.0037"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1KXU6
Hughes Circuits, Inc. 540 S. Pacific Street, San Marcos, CA, 92078-4056 US	Same Address as Manufacturer	Phone: 760-744-0300 Fax: 760-744-6388 EMail: Trevor@hughescircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-07-014018), VQ(VQE-14-028093), VQE-12-24783
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .08"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-08-015865), VQ(VQE-14-028093), VQE-12-24783
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .08"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

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MANUFACTURER INFORMATION:		
IMI, Inc.		CAGE Code: 78259
140 Hilldale Avenue, Haverhill, MA, 01832		Phone: 978-373-9190
		Fax: 978-521-1846
		EMail: elaine@imipcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 1WFH9
ISU Petasys		Phone:
12930 Bradley St, Symar, CA, 91342 US		Fax:
		EMail: simeonr@isupetasys.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-15-028813)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .15"
Min. Hole Size: .0098"
Aspect Ratio: 12.5:1 Through-Hole
Min. Conductor Width/Space: .003"/.004"
Hole Preparation: Permanganate Desmear, Permanganate Etchback, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg
Additional Fab Capabilities: Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 38747
ITL Circuits		Phone: 905-475-6658
90 Don Park Road, Markham, L3R 1C4, Ontario, Canada		Fax: 905-475-5097
		EMail: sales@itlcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031450
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .08"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.7:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-18-032695
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .08"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.7:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1VUH8
KCA Electronics, Inc. 223 N. Crescent Way, Anaheim, CA, 92801 US	Same Address as Manufacturer	Phone: 714-239-2433 Fax: 714-239-2455 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033897)
Rigid Base Material: AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .076"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3.8:1 Through-Hole
Min. Conductor Width/Space: .008"/.007"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-11-021796, VQE-14-027414, VQE-16-030557, VQE-16-030789
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .133"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7:1 Through-Hole
Min. Conductor Width/Space: .005"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-022398, VQE-14-027414, VQE-17-031406
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .187"
Min. Hole Size: .004" Laser Ablated Plated Hole Size Before Plating, .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.75:1 Microvia, 7:1 Through-Hole
Min. Conductor Width/Space: .0048"/.004"
Hole Preparation: Permanganate Etchback, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: HASL
Controlled Impedance: Differential, Single-Ended

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1VUH8
KCA Electronics, Inc. 223 N. Crescent Way, Anaheim, CA, 92801 US	Same Address as Manufacturer	Phone: 714-239-2433 Fax: 714-239-2455 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-022964, VQE-14-027414, VQE-16-030045
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .117"
Min. Hole Size: .0135" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.67:1 Through-Hole
Min. Conductor Width/Space: .0098"/.0044"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: HASL

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Mission Systems & Training 1801 State Route 17C, Owego, NY, 13827 US	Same Address as Manufacturer	Phone: 607-751-5395 Fax: 607-751-7714 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-00-000961, VQE-15-029009, VQE-15-029561, VQE-16-030240, VQE-18-032427, VQE-99-000130
Rigid Base Material: AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin
Max. Panel Size: 12" x 18"
Max. Number of Layers: 16
Max. Board Thickness: .075"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3.6:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-00-000961, VQE-07-013268, VQE-07-013459, VQE-11-022596, VQE-15-029009, VQE-15-029561, VQE-16-030240, VQE-16-030354, VQE-18-032427, VQE-99-000130
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 9
Max. Board Thickness: .104"
Min. Hole Size: .018" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-00-000961, VQE-07-013459, VQE-15-029009, VQE-15-029561, VQE-16-030240, VQE-18-032427, VQE-99-000130
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .082"
Min. Hole Size: .0256" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Mission Systems & Training 1801 State Route 17C, Owego, NY, 13827 US	Same Address as Manufacturer	Phone: 607-751-5395 Fax: 607-751-7714 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-00-000684, VQE-07-013459, VQE-15-029009, VQE-18-032427
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 18
Max. Board Thickness: .11"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-00-000684, VQE-07-013459, VQE-15-029009, VQE-15-029562, VQE-18-032427
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 12" x 18"
Max. Number of Layers: 4 (types 1, 2, and 3 only)
Max. Board Thickness: .022"
Min. Hole Size: .0413"
Aspect Ratio: .5:1 Through-Hole
Min. Conductor Width/Space: .009"/.01"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Lone Star Circuits	Same Address as Manufacturer	Phone: 214-291-1427
901 Hensley Drive, Wylie, TX, 75098-4909 US		Fax:
		EMail: sdiacont@lscpwb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/6

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-4341, VQE-04-5599, VQE-04-5891, VQE-05-7288
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .119"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7.5:1 Through-Hole
Min. Conductor Width/Space: .004"/.005"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Fused Tin Lead, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-04-4957, VQE-05-7288
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .074"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.2:1 Through-Hole
Min. Conductor Width/Space: .007"/.007"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Fused Tin Lead, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/6
Qualification Letters: VQ(VQE-15-029714), VQE-11-021947
Rigid Base Material: GR: Glass Base, Nonwoven, Polytetrafluoroethylene Resin, Flame Resistant; GY: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant, for Microwave Application
Max. Panel Size: 9" x 16", 18" x 24"
Max. Number of Layers: 2 , 2
Max. Board Thickness: .031" , .098"
Min. Hole Size: .031" , .039" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Through-Hole, 3.2:1
Min. Conductor Width/Space: .005"/.005", .19"/.9515"
Hole Preparation: Sodium Treatment, Sodium Treatment
Hole Wall Conductive Coating: Electroless Copper, Electroless Copper
Copper Plating: Direct Current Plate, Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Hard Au, Fused Tin Lead, HASL, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAg
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Metaplast Circuits Ltd.

180 Hymus Road, Scarborough, M1L 2E1, Ontario, Canada

CAGE Code: 3AD63

Phone: 416-285-5000

Fax:

EMail: sales@metaplast.ca

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-18-032032
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .113"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	
Micropack Limited , Plot No. 16, Jigani Industrial Area, Anekal Taluk, Bangalore District 560105 India	Same Address as Manufacturer	CAGE Code: SAL28 Phone: 91-80-27825223 Fax: 91-80-27825225 EMail: process@micropack.in

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-17-031413
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031258
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole,
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination, Metal Core
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031258
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole,
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination, Metal Core
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Midwest Printed Circuit Services
1741 Circuit Drive, Round Lake Beach, IL, 60073 US

CAGE Code: 0YYS4
Phone: 847-740-4120
Fax: 847-740-4187
EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-12-024841, VQE-12-025070, VQE-13-025727, VQE-14-028088, VQE-16-030296
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .1"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7.92:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Controlled Depth Mechanically Drilled Low Aspect Ratio Blind Vias, Foil Lamination
Controlled Impedance: Differential

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-13-025705, VQE-14-028088
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .1"
Min. Hole Size: .038" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2.5:1 Through-Hole
Min. Conductor Width/Space: .01"/.01"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-16-030690
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 10
Max. Board Thickness: .094"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.8:1 Through-Hole
Min. Conductor Width/Space: .01"/.01"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, HASL
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Multicircuits Inc.
2301 Universal St, Oshkosh, WI, 54904

CAGE Code: 1BQS8
Phone: 920-385-7537
Fax:
EMail: cgauthier@multicircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033227)
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .127"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .0035"/.003"
Hole Preparation: Permanganate Desmear, Permanganate Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033870)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .093"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:3:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Permanganate Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0EJD7
Murrietta Circuits, Inc. 5000 E. Landon Drive, Anaheim, CA, 92807 US	Same Address as Manufacturer	Phone: 714-970-2430 Fax: 714-970-2406 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-15-029521, VQE-18-032565
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .11"
Min. Hole Size: .011" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Etchback, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Ni/Pd/Au
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA, 92704-6321
US

CAGE Code: 65723
Phone: 714-641-3132
Fax: 714-641-3120
EMail: Quality@pioneercircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-017323, VQE-09-017656
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .177"
Min. Hole Size: .0135" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0035"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-017323, VQE-09-017656
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .275"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0035"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-09-017323, VQE-09-017656, VQE-10-029651
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 26"
Max. Number of Layers: 22
Max. Board Thickness: .231"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.5:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA, 92704-6321
US

CAGE Code: 65723
Phone: 714-641-3132
Fax: 714-641-3120
EMail: Quality@pioneercircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-09-017323, VQE-09-017656
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .1"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0035"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Book Binder, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-09-017323, VQE-09-017656
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 24" x 36"
Max. Number of Layers: 26
Max. Board Thickness: .185"
Min. Hole Size: .013" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0035"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Periodic Reverse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Book Binder, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66766
PNC, Inc. 115 East Centre Street, Nutley, NJ, 07110 US	Same Address as Manufacturer	Phone: 973-284-1600 Fax: EMail: carmela@pnconline.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-10-19440, VQE-15-029233
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 16
Max. Board Thickness: .12"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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MANUFACTURER INFORMATION:	PLANT LOCATION:	
Printed Circuits, Inc. 1200 West 96th Street, Bloomington, MN, 55431-2606 US	Same Address as Manufacturer	CAGE Code: 65114 Phone: 952-888-7900 Fax: EMail: wdrinken@printedcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-01-000024
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18", 18" x 24"
Max. Number of Layers: 7
Max. Board Thickness: .12"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.005"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Sequential Lamination
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Pro-Tech Interconnect Solutions LLC
4300 Peavey Road, Chaska, MN, 55318 US

CAGE Code: 3CP65
Phone: 952-442-2189
Fax: 952-442-2472
EMail: stum@protechmn.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-021704, VQE-19-033101
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 12" x 24"
Max. Number of Layers: 16 ,
Max. Board Thickness: .1"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1.8:1 Microvia, 12:1 Through-Hole
Min. Conductor Width/Space: .005"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-11-021704, VQE-16-030058, VQE-19-033101
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0059" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 15:1 Through-Hole, 1:1 Microvia
Min. Conductor Width/Space: .003"/.002"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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MANUFACTURER INFORMATION:
Prototron Circuits, Inc.
3760 East 43rd Place, Tucson, AZ, 58713 US

CAGE Code: 66108
Phone: 520-745-8515
Fax: 520-747-8334
EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-030991
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .112"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Sanmina (Costa Mesa)
2945 Airway Avenue, Costa Mesa, CA, 92626 US

CAGE Code: 3BKL5
Phone: 714-371-2800
Fax: 714-371-2833
EMail: terry.lichte@sanmina.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033984)
Rigid Base Material: Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 6
Max. Board Thickness: .12"
Min. Hole Size: .0159"
Aspect Ratio: 7.59
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ImmAu

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-12-024031
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 12" x 18"
Max. Number of Layers: 8
Max. Board Thickness: .063"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .013" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 5:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: Electrolytic Ni / Soft Au, HASL
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033984), VQE-12-24471
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant;
Max. Panel Size: 12" x 18", " x "
Max. Number of Layers: 18 ,
Max. Board Thickness: .093" , "
Min. Hole Size: .013" Drilled Plated-Through Hole Before Plating, " , "
Aspect Ratio: 7 : 1 Through-Hole,
Min. Conductor Width/Space: .003"/.0035", NS/NS
Hole Preparation: Plasma Desmear, Plasma Etchback,
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive,
Solder Resist: Liquid Photoimageable
Finish System: Electrolytic Ni / Soft Au, HASL,
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Sanmina (Costa Mesa)
2945 Airway Avenue, Costa Mesa, CA, 92626 US

CAGE Code: 3BKL5
Phone: 714-371-2800
Fax: 714-371-2833
EMail: terry.lichte@sanmina.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-16-030438
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 14" x 14"
Max. Number of Layers: 14
Max. Board Thickness: .07"
Min. Hole Size: .008"
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .005"/.0045"
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Sanmina-SCI (San Jose)
2050 Bering Drive, San Jose, CA, 95131 US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 3DR67
Phone: 408-964-6515
Fax: 408-964-6453
EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-18-031913), VQ(VQE-19-033467)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 21" x 27"
Max. Number of Layers: 20
Max. Board Thickness: .221"
Min. Hole Size: .0157" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14.1:1 Through-Hole
Min. Conductor Width/Space: .00735"/.004"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, IR Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-06-11137, VQE-10-19381, VQE-11-22038
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 21" x 27"
Max. Number of Layers: 8
Max. Board Thickness: .062"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.32:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Additional Fab Capabilities: Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-06-11137
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 27"
Max. Number of Layers: 30
Max. Board Thickness: .25"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 15:1 Through-Hole, 1:2 Microvia
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3DR67
Sanmina-SCI (San Jose)	Same Address as Manufacturer	Phone: 408-964-6515
2050 Bering Drive, San Jose, CA, 95131 US		Fax: 408-964-6453
		EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-16-030024
Rigid Base Material: BI: Aramid Fabric, Nonwoven, Polyimide Resin
Max. Panel Size: 21" x 27"
Max. Number of Layers: 12
Max. Board Thickness: .088"
Min. Hole Size: .0138"
Aspect Ratio: 5.4:1 Through-Hole
Min. Conductor Width/Space: .0064"/.0068"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-18-031913)
Composition: M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 21" x 27"
Max. Number of Layers: 24
Max. Board Thickness: .111"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14.1:1 Through-Hole
Min. Conductor Width/Space: .003"/.0025"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Carbon-based
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-18-031913)
Composition: M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 21" x 27"
Max. Number of Layers: 28
Max. Board Thickness: .227"
Min. Hole Size: .0157" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14.5:1 Through-Hole
Min. Conductor Width/Space: .0046"/.0035"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, ImmAu, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 0ZHS4
Sierra Circuits Inc.		Phone: 800-763-7503
1108 West Evelyn Ave, Sunnyvale, CA, 94086 USA		Fax: 408-735-0175
		EMail: estrelitam@protoexpress.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-18-032408)
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .007" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.6:1 Microvia, 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-18-032408)
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .1"
Min. Hole Size: .007" Laser Ablated Plated Hole Size Before Plating, .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.6:1 Microvia, 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination
Controlled Impedance: Differential, Single-Ended

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MANUFACTURER INFORMATION:
Streamline Circuits
1410 Martin Ave., Santa Clara, CA, 95050

CAGE Code: 3WUY3
Phone: 408-727-1418
Fax: 408-727-8971
EMail: trb@streamlinecircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031750
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .093"
Min. Hole Size: .024" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3.6:1 Through-Hole
Min. Conductor Width/Space: .009"/.006"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-18-031873
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 12" x 18"
Max. Number of Layers: 10
Max. Board Thickness: .063"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.02:1 Through-Hole
Min. Conductor Width/Space: .008"/.003"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: Electrolytic Ni (no Au), HASL
Additional Fab Capabilities: Sequential Lamination
Flex Usage: Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-18-031945
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 28
Max. Board Thickness: .16"
Min. Hole Size: .0225" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7.2:1 Through-Hole
Min. Conductor Width/Space: .004"/.00475"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: H0203
Thales Nederland B.V. Haaksbergerstraat 49, 7554PA Hengelo The Netherlands	Same Address as Manufacturer	Phone: 31 0 742482880 Fax: 31 0 742484124 EMail: jan.bokhove@nl.thalesgroup.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-14-028079, VQE-19-034061
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .1"
Min. Hole Size: .014" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film
Finish System: HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-14-028079, VQE-19-034062
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .1"
Min. Hole Size: .014" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5.7:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film
Finish System: HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0BSG1
TTM Technologies, Inc. (Anaheim) 3140 East Coronado Street, Anaheim, CA, 92806 US	Same Address as Manufacturer	Phone: 714-688-7382 Fax: EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-09-018147), VQ(VQE-14-028542), VQE-14-028660, VQE-16-029908
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .1"
Min. Hole Size: .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .01"/.01"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-018147, VQE-17-031347, VQE-18-031989
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .115"
Min. Hole Size: .007" Laser Ablated Plated Hole Size Before Plating, .009" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.6:1 Microvia, 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.006"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL
Additional Fab Capabilities: Buried Vias, Foil Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 75815
TTM Technologies, Inc. (Denver) 10570 Bradford Road, Littleton, CO, 80127-4211 US	Same Address as Manufacturer	Phone: 303-972-4105 Fax: 303-933-2934 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2

Qualification Letters: VQE-02-000317, VQE-05-007627, VQE-05-009014, VQE-09-018719, VQE-10-020224, VQE-12-024984, VQE-13-026251, VQE-13-026429, VQE-15-029639, VQE-17-031662

Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant

Max. Panel Size: 18" x 24"

Max. Number of Layers: 24

Max. Board Thickness: .125"

Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0091" Drilled Plated-Through Hole Before Plating

Aspect Ratio: 10:1 Through-Hole, 1:1 Microvia

Min. Conductor Width/Space: .004"/.004"

Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback

Hole Wall Conductive Coating: Electroless Copper

Copper Plating: Direct Current Plate

Hole Fill/Via Plug: Non-Conductive

Solder Resist: Liquid Photoimageable

Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb

Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination

Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2

Qualification Letters: VQE-02-000317, VQE-05-007627, VQE-05-009014, VQE-09-018719, VQE-10-020224, VQE-12-024984, VQE-13-026251, VQE-13-026429, VQE-15-029639, VQE-17-031662

Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant

Max. Panel Size: 18" x 24"

Max. Number of Layers: 24

Max. Board Thickness: .15"

Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0091" Drilled Plated-Through Hole Before Plating

Aspect Ratio: 10:1 Through-Hole, 1:1 Microvia

Min. Conductor Width/Space: .004"/.004"

Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback

Hole Wall Conductive Coating: Electroless Copper

Copper Plating: Direct Current Plate

Hole Fill/Via Plug: Non-Conductive

Solder Resist: Liquid Photoimageable

Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb

Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination

Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 01KV9
TTM Technologies, Inc. (Forest Grove)	Same Address as Manufacturer	Phone: (503) 992-4336
1521 Poplar Lane, Forest Grove, OR, 97116-2033		Fax:
		EMail: alan.preston@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE 19-033918), VQ(VQE-19-033180)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 24"
Max. Number of Layers: 31
Max. Board Thickness: .156"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.84:1 Microvia, 11.9:1 Through-Hole
Min. Conductor Width/Space: .0032"/.0025"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: LDI, Liquid Photoimageable
Finish System: ENIG
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE 19-033919), VQ(VQE-19-033181)
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .099"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.84:1 Microvia, 8.4:1 Through-Hole
Min. Conductor Width/Space: .0032"/.004"
Hole Preparation: Permanganate Desmear, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: LDI, Liquid Photoimageable
Finish System: ENIG
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. (North Jackson) 12080 DeBartolo Drive, North Jackson, OH, 44451 US	Same Address as Manufacturer	Phone: 330-538-3900 Fax: 330-538-3820 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/2
Qualification Letters: VQE-18-032965
Rigid Base Material: Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 2
Max. Board Thickness: .117" (with Bonded Copper Backer)
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4.1:1 Through-Hole
Min. Conductor Width/Space: .0152"/.009"
Hole Preparation: Permanganate Desmear, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG
Additional Fab Capabilities: Metal Core

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-17-030811
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 24"
Max. Number of Layers: 4
Max. Board Thickness: .044"
Min. Hole Size: .035" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1.08:1 Through-Hole
Min. Conductor Width/Space: .015"/.008"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: HASL
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .25"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 15:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. (North Jackson)	Same Address as Manufacturer	Phone: 330-538-3900
12080 DeBartolo Drive, North Jackson, OH, 44451 US		Fax: 330-538-3820
		EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .25"
Min. Hole Size: .0075" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.53:1 Microvia, 15:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, Ni/Pd/Au, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .25"
Min. Hole Size: .0075" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.53:1 Microvia, 15:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni/Au, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1WQ42
TTM Technologies, Inc. (Santa Ana) 2630 South Harbor Boulevard, Santa Ana, CA, 92704 US	Same Address as Manufacturer	Phone: 714-241-0303 Fax: 714-241-0708 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-008644, VQE-06-011211, VQE-16-030524
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .135"
Min. Hole Size: .006" Laser Ablated Plated Hole Size Before Plating, .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: .75:1 Microvia, 11.5:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-05-008644, VQE-06-011211, VQE-12-023569, VQE-16-030524
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 24
Max. Board Thickness: .135"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: .75:1 Microvia, 11.5:1 Through-Hole
Min. Conductor Width/Space: .003"/.003"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies, Inc. (Santa Clara) 407 Mathew Street, Santa Clara, CA, 95050 US	Same Address as Manufacturer	Phone: 408-486-3184 Fax: 408-727-1003 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-030872, VQE-18-032677,
Rigid Base Material: GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant
Max. Panel Size: 18.5" x 24.5"
Max. Number of Layers: 10
Max. Board Thickness: .079"
Min. Hole Size: .023" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .02"/.007"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Foil Lamination

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003888, VQE-10-020500, VQE-10-020581, VQE-11-022973, VQE-14-028240, VQE-14-028262, VQE-15-029137, VQE-15-029683, VQE-16-030610, VQE-18-032677
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21.5" x 24.5"
Max. Number of Layers: 28
Max. Board Thickness: .19"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003888, VQE-10-020500, VQE-10-020581, VQE-11-022973, VQE-14-028240, VQE-14-028262, VQE-16-030610, VQE-18-032677
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 33
Max. Board Thickness: .19"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
TTM Technologies, Inc. (Santa Clara)
407 Mathew Street, Santa Clara, CA, 95050 US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 65916
Phone: 408-486-3184
Fax: 408-727-1003
EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-03-003895, VQE-10-020500, VQE-10-020581, VQE-11-022973, VQE-14-028240, VQE-14-028262, VQE-16-030610, VQE-18-032677, VQE-18-032893
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 18.5" x 24.5"
Max. Number of Layers: 20
Max. Board Thickness: .17"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Sequential Lamination
Controlled Impedance: Differential, Single-Ended
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-03-003895, VQE-10-020500, VQE-10-020581, VQE-11-022973, VQE-14-028240, VQE-16-030610, VQE-18-032677
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive
Max. Panel Size: 18" x 24"
Max. Number of Layers: 6
Max. Board Thickness: .043"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-07-013211, VQE-11-022973, VQE-14-028240, VQE-14-028262, VQE-16-030611, VQE-17-030871, VQE-18-032677
Composition: H - Homogenous thermoplastic base material printed boards, M - Mixed based material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .109"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Etchback, Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies, Inc. (Santa Clara) 407 Mathew Street, Santa Clara, CA, 95050 US	Same Address as Manufacturer	Phone: 408-486-3184 Fax: 408-727-1003 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003888, VQE-10-020500, VQE-10-020581, VQE-11-022973, VQE-14-028240, VQE-14-028262, VQE-16-030610, VQE-18-032677
Rigid Base Material: BI: Aramid Fabric, Nonwoven, Polyimide Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .182"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.45:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-13-026953, VQE-14-028262, VQE-17-030872, VQE-18-032677
Rigid Base Material: BF: Aramid Fabric, Nonwoven, Epoxy Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 14
Max. Board Thickness: .076"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7:1 Through-Hole
Min. Conductor Width/Space: .0088"/.008"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb
Controlled Impedance: Differential

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies, Inc. (Stafford)	Same Address as Manufacturer	Phone: 860-684-5881
4 Old Monson Road, Stafford, CT, 06075 US		Fax: 860-684-7425
		EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003348, VQE-09-018855, VQE-11-023287, VQE-12-023366, VQE-17-031350
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; Woven E-Glass, Epoxy Resin, Flame Resistant, with Inorganic Filler
Max. Panel Size: 30" x 54"
Max. Number of Layers: 50
Max. Board Thickness: .4"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Embedded Resistors, Foil Lamination, Metal Core, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003348, VQE-09-018855, VQE-11-023287, VQE-12-023366, VQE-16-030095, VQE-17-031350
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 24" x 36"
Max. Number of Layers: 33
Max. Board Thickness: .219"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 14:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Copper Invar Copper, Embedded Resistors, Foil Lamination, Metal Core, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003348, VQE-09-018855, VQE-11-023287, VQE-16-030095, VQE-17-031350
Rigid Base Material: AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 12
Max. Board Thickness: .1"
Min. Hole Size: .0138" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 5:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Foil Lamination,
Controlled Impedance: Differential, Single-Ended

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies, Inc. (Stafford)	Same Address as Manufacturer	Phone: 860-684-5881
4 Old Monson Road, Stafford, CT, 06075 US		Fax: 860-684-7425
		EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003348, VQE-09-018855, VQE-11-023287, VQE-12-023366, VQE-16-030095, VQE-17-031350
Rigid Base Material: BI: Aramid Fabric, Nonwoven, Polyimide Resin
Max. Panel Size: 18" x 24"
Max. Number of Layers: 22
Max. Board Thickness: .129"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Embedded Resistors, Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003348, VQE-09-018855, VQE-11-023287
Rigid Base Material: GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .1"
Min. Hole Size: .032" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: Custom
Qualification Letters: VQE-03-003348, VQE-10-019855, VQE-11-023287, VQE-16-030095, VQE-17-031350
Rigid Base Material: With or without woven or non-woven E-glass, Polytetrafluoroethylene (PTFE) resin, ceramic filler
Max. Panel Size: 30" x 36"
Max. Number of Layers: 16
Max. Board Thickness: .16"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating, .012" Laser Ablated Plated Hole Size Before Plating
Aspect Ratio: .5:1 Microvia, 7.6:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Embedded Resistors, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies, Inc. (Stafford) 4 Old Monson Road, Stafford, CT, 06075 US	Same Address as Manufacturer	Phone: 860-684-5881 Fax: 860-684-7425 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2, Custom
Qualification Letters: VQE-03-003348, VQE-10-019855, VQE-11-023287, VQE-16-030095, VQE-17-031350
Composition: M - Mixed based material printed boards
Rigid Base Material: Woven Glass Reinforced, Hydrocarbon Resin with Ceramic Fill
Max. Panel Size: 30" x 36"
Max. Number of Layers: 30
Max. Board Thickness: .216"
Min. Hole Size: .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Embedded Resistors, Foil Lamination, Metal Core, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-03-003349, VQE-09-018855, VQE-10-019456, VQE-11-023287, VQE-12-023366, VQE-16-030095, VQE-17-031350
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant; Woven E-Glass, Epoxy Resin, Flame Resistant, with Inorganic Filler
Flex Base Material: Copper Clad Adhesiveless Polyimide
Max. Panel Size: 24" x 48"
Max. Number of Layers: 24
Max. Board Thickness: .275"
Min. Hole Size: .0079" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen
Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Embedded Resistors, Foil Lamination, Sequential Lamination
Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies, Inc. (Stafford) 4 Old Monson Road, Stafford, CT, 06075 US	Same Address as Manufacturer	Phone: 860-684-5881 Fax: 860-684-7425 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4

Qualification Letters: VQE-03-003349, VQE-10-019456, VQE-11-023287, VQE-17-031350

Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant; GI: Glass Base, Woven, Polyimide Resin, Heat Resistant; Woven E-Glass, Epoxy Resin, Flame Resistant, with Inorganic Filler

Flex Base Material: Copper Clad Polyimide with Acrylic Adhesive

Max. Panel Size: 24" x 36"

Max. Number of Layers: 11

Max. Board Thickness: .082"

Min. Hole Size: .0225" Drilled Plated-Through Hole Before Plating

Aspect Ratio: 2:1 Through-Hole

Min. Conductor Width/Space: .004"/.003"

Hole Preparation: Plasma Desmear, Plasma Etchback

Hole Wall Conductive Coating: Electroless Copper

Copper Plating: Direct Current Plate, Pulse Plate

Hole Fill/Via Plug: Conductive, Non-Conductive

Solder Resist: Dry Film, Liquid Photoimageable, Silk Screen

Finish System: ENIG, Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au

Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination

Controlled Impedance: Differential, Single-Ended

Flex Usage: Use A (Flex During Installation), Use B (Dynamic Flex)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0K703
TTM Technologies, Inc. (Sterling) 1200 Severn Way, Sterling, VA, 20166-8904 US	Same Address as Manufacturer	Phone: 703-652-2200 Fax: 703-652-2272 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-03-003545), VQ(VQE-09-018207), VQ(VQE-14-028500), VQ(VQE-14-028501), VQ(VQE-17-031087)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 26
Max. Board Thickness: .11"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .009" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: LDI, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Resistors
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-03-003545), VQ(VQE-09-018207), VQ(VQE-14-028500), VQ(VQE-14-028501), VQ(VQE-17-031087)
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 26
Max. Board Thickness: .11"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .009" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 10:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: LDI, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, Electrolytic Ni / Soft Au, HASL, Hot Oil Reflow of Plated Sn/Pb, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Resistors
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-11-021244), VQ(VQE-14-028500), VQ(VQE-15-028809)
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: Woven glass, reinforced, hydrocarbon resin, with ceramic fill
Max. Panel Size: 18" x 24"
Max. Number of Layers: 9
Max. Board Thickness: .0844"
Min. Hole Size: .0135" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 7.4:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66311
Unicircuit, Inc. 8192 Southpark Lane, Littleton, CO, 80120 US	Same Address as Manufacturer	Phone: 303-730-0505, x110 Fax: EMail: blageman@unicircuit.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-07-13789, VQE-09-17422, VQE-11-23044
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 12" x 18"
Max. Number of Layers: 16
Max. Board Thickness: .12"
Min. Hole Size: .006" Laser Ablated Plated Hole Size Before Plating, .02" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-09-17422, VQE-12-24296
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 20" x 26"
Max. Number of Layers: 16
Max. Board Thickness: .12"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 15:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate, Pulse Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: HASL, Hot Oil Reflow of Plated Sn/Pb
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
US Circuit
2071 Wineridge Place, Escondido, CA, 92029

CAGE Code: 66483
Phone: 760-489-1413
Fax:
EMail: jmcintosh@uscircuit.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033743
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .11"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Periodic Reverse Plate
Solder Resist: Liquid Photoimageable
Finish System: HASL

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033744)
Composition: H - Homogenous thermoplastic base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 10
Max. Board Thickness: .11"
Min. Hole Size: .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Graphite-based
Copper Plating: Periodic Reverse Plate
Solder Resist: Liquid Photoimageable
Finish System: HASL

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3AF82
Viasystems Toronto Inc. 8150 Sheppard Avenue East, Scarborough, M1B 5K2, Ontario Canada	Same Address as Manufacturer	Phone: 416-208-2100 Fax: 416-208-2196 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-04-006240, VQE-08-015407, VQE-09-018857, VQE-11-022676, VQE-12-023550
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 18
Max. Board Thickness: .088"
Min. Hole Size: .0069" Laser Ablated Plated Hole Size Before Plating, .0098" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 8.4:1 Through-Hole
Min. Conductor Width/Space: .0037"/.0028"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper,
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-04-006240, VQE-08-015407, VQE-09-018857, VQE-11-022676, VQE-12-023550
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 18" x 24"
Max. Number of Layers: 20
Max. Board Thickness: .093"
Min. Hole Size: .0069" Laser Ablated Plated Hole Size Before Plating, .0091" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 1:1 Microvia, 9.6:1 Through-Hole
Min. Conductor Width/Space: .004"/.003"
Hole Preparation: Plasma Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Conductive, Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, ImmAg, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65745
Westak of Oregon	Same Address as Manufacturer	Phone: 503-359-3593
3941 24th Avenue, Forest Grove, OR, 97116 US		Fax: 503-357-5332
		EMail: or-qa@westak.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-13-026434, VQE-14-027108, VQE-17-030915
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 21" x 24", " x "
Max. Number of Layers: 18
Max. Board Thickness: .18"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.3:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, HASL
Additional Fab Capabilities: Blind Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-13-026434, VQE-14-027109, VQE-17-030915
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 26"
Max. Number of Layers: 10
Max. Board Thickness: .11"
Min. Hole Size: .006" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 15:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Desmear, Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Dry Film, Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni (no Au), Electrolytic Ni / Hard Au, HASL
Controlled Impedance: Differential, Single-Ended

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

AC Universal Circuits LLC
886 Zachary Lane North, Maple Grove, MN, 55369-4524 US
CAGE Code: 45032

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Accurate Circuit Engineering
3019 S. Kilson Drive, Santa Ana, CA, 92707 US
CAGE Code: 0MNN9

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Advanced Circuits - Tempe Diasion
229 S. Clark Drive, Tempe, AZ, 85281-3073 US
CAGE Code: 6RJS1

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Airborn Flexible Circuits, Inc.
11 Dohme Avenue, Toronto, M4B 1Y7, Ontario Canada
CAGE Code: 38661

☐ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☐ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

All Flex, Inc.
1705 Cannon Lane, Northfield, MN, 55057-3605 USA
CAGE Code: 0ZGB2

☐ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☐ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

American Standard Circuits
475 Industrial Drive, West Chicago, IL, 60185 US
CAGE Code: 4AA34

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Amitron Corporation
2001 Landmeier Road, Elk Grove Village, IL, 60007 USA
CAGE Code: 1LHP6

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Amphenol Printed Circuits
91 Northeastern Boulevard, Nashua, NH, 03062 US
CAGE Code: 57034

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Calumet Electronics Corp.
25830 Depot Street, Calumet, MI, 49913-1985 US
CAGE Code: 65337

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Circuit-Tech, Inc.
399 Denison Street, Markham, ON, L3R 1B7 Canada
CAGE Code: L4387

☑ MIL-PRF-31032/1 ☐ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☐ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Cirexx International, Inc.
791 Nuttman Street, Santa Clara, CA, 95054 US
CAGE Code: 4MEG7

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☑ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☑ MIL-PRF-31032/6

Cirtech, Inc.
250 E. Emerson Ave., Orange, CA, 92865-3303
CAGE Code: 8K616

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

Coast to Coast Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA, 92649-1204 US
CAGE Code: 66982

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☑ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☑ MIL-PRF-31032/6

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA, 22406-6200 US
CAGE Code: 6T499

☑ MIL-PRF-31032/1 ☑ MIL-PRF-31032/4 ☐ Custom
☑ MIL-PRF-31032/2 ☐ MIL-PRF-31032/5
☑ MIL-PRF-31032/3 ☐ MIL-PRF-31032/6

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

Compunetics Inc.
700 Seco Rd, Monroeville, PA, 15146 US
CAGE Code: 30598

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX, 75006 US
CAGE Code: 79616

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [x] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [x] MIL-PRF-31032/6

Electrotek Corp.
7745 S. 10th Street, Oak Creek, WI, 53154 US
CAGE Code: 66030

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Firan Technology Group
250 Finchdene Square, Scarborough, M1X 1A5, Ontario, Canada
CAGE Code: L2665

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

FTG Circuits, Inc. - Chatsworth
20750 Marilla Street, Chatsworth,, CA, 91311 US
CAGE Code: 30803

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Gorilla Circuits
1445 Old Oakland Rd, San Jose, CA, 95112 US
CAGE Code: 3C7D2

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Hamby Corporation
27704 Avenue Scott, Valencia, CA, 91355-1218 US
CAGE Code: 07284

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Hans Brockstedt GmbH
Clara-Immerwahr-Strabe 7, 24145 Kiel Germany
CAGE Code: C4831

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Holaday Circuits, Inc.
11126 Bren Road West, Minnetonka, MN, 55343 US
CAGE Code: 59554

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

Hughes Circuits, Inc.
540 S. Pacific Street, San Marcos, CA, 92078-4056 US
CAGE Code: 1KXU6

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

IMI, Inc.
140 Hilldale Avenue, Haverhill, MA, 01832
CAGE Code: 78259

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

ISU Petasys
12930 Bradley St, Symar, CA, 91342 US
CAGE Code: 1WFH9

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

ITL Circuits
90 Don Park Road, Markham, L3R 1C4, Ontario, Canada
CAGE Code: 38747

- [x] MIL-PRF-31032/1 [ ] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

KCA Electronics, Inc.
223 N. Crescent Way, Anaheim, CA, 92801 US
CAGE Code: 1VUH8

- [x] MIL-PRF-31032/1 [x] MIL-PRF-31032/4 [ ] Custom
- [x] MIL-PRF-31032/2 [ ] MIL-PRF-31032/5
- [x] MIL-PRF-31032/3 [ ] MIL-PRF-31032/6

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

Manufacturer	Address	CAGE Code	MIL-PRF-31032/1	MIL-PRF-31032/2	MIL-PRF-31032/3	MIL-PRF-31032/4	MIL-PRF-31032/5	MIL-PRF-31032/6	Custom
Lockheed Martin Mission Systems & Training	1801 State Route 17C, Owego, NY, 13827 US	03640	☑	☑	☑	☑	☐	☐	☐
Lone Star Circuits	901 Hensley Drive, Wylie, TX, 75098-4909 US	04RV5	☑	☑	☐	☐	☐	☑	☐
Metaplast Circuits Ltd.	180 Hymus Road, Scarborough, M1L 2E1, Ontario, Canada	3AD63	☑	☑	☐	☐	☐	☐	☐
Micropack Limited	, Plot No. 16, Jigani Industrial Area, Anekal Taluk, Bangalore District 560105 India	SAL28	☑	☑	☑	☑	☐	☐	☐
Midwest Printed Circuit Services	1741 Circuit Drive, Round Lake Beach, IL, 60073 US	0YYS4	☑	☑	☑	☑	☐	☐	☐
Multicircuits Inc.	2301 Universal St, Oshkosh, WI, 54904	1BQS8	☑	☑	☐	☐	☐	☐	☐
Murrietta Circuits, Inc.	5000 E. Landon Drive, Anaheim, CA, 92807 US	0EJD7	☑	☑	☐	☐	☐	☐	☐
Pioneer Circuits, Inc.	3000 S. Shannon Street, Santa Ana, CA, 92704-6321 US	65723	☑	☑	☑	☑	☐	☐	☐
PNC, Inc.	115 East Centre Street, Nutley, NJ, 07110 US	66766	☑	☑	☐	☐	☐	☐	☐
Printed Circuits, Inc.	1200 West 96th Street, Bloomington, MN, 55431-2606 US	65114	☐	☐	☑	☑	☐	☐	☐
Pro-Tech Interconnect Solutions LLC	4300 Peavey Road, Chaska, MN, 55318 US	3CP65	☑	☑	☐	☐	☐	☐	☐
Prototron Circuits, Inc.	3760 East 43rd Place, Tucson, AZ, 58713 US	66108	☑	☑	☐	☐	☐	☐	☐
Sanmina (Costa Mesa)	2945 Airway Avenue, Costa Mesa, CA, 92626 US	3BKL5	☑	☑	☑	☑	☐	☐	☐
Sanmina-SCI (San Jose)	2050 Bering Drive, San Jose, CA, 95131 US	3DR67	☑	☑	☐	☐	☐	☐	☐

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

Manufacturer	MIL-PRF-31032/1	MIL-PRF-31032/2	MIL-PRF-31032/3	MIL-PRF-31032/4	MIL-PRF-31032/5	MIL-PRF-31032/6	Custom
Sierra Circuits Inc. 1108 West Evelyn Ave, Sunnyvale, CA, 94086 USA CAGE Code: 0ZHS4	☑	☑	☐	☐	☐	☐	☐
Streamline Circuits 1410 Martin Ave., Santa Clara, CA, 95050 CAGE Code: 3WUY3	☑	☑	☑	☑	☐	☐	☐
Thales Nederland B.V. Haaksbergerstraat 49, 7554PA Hengelo The Netherlands CAGE Code: H0203	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. (Anaheim) 3140 East Coronado Street, Anaheim, CA, 92806 US CAGE Code: 0BSG1	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. (Denver) 10570 Bradford Road, Littleton, CO, 80127-4211 US CAGE Code: 75815	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. (Forest Grove) 1521 Poplar Lane, Forest Grove, OR, 97116-2033 CAGE Code: 01KV9	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. (North Jackson) 12080 DeBartolo Drive, North Jackson, OH, 44451 US CAGE Code: 0GN71	☑	☑	☑	☑	☐	☐	☐
TTM Technologies, Inc. (Santa Ana) 2630 South Harbor Boulevard, Santa Ana, CA, 92704 US CAGE Code: 1WQ42	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. (Santa Clara) 407 Mathew Street, Santa Clara, CA, 95050 US CAGE Code: 65916	☑	☑	☑	☑	☐	☐	☐
TTM Technologies, Inc. (Stafford) 4 Old Monson Road, Stafford, CT, 06075 US CAGE Code: 5L706	☑	☑	☑	☑	☐	☐	☑
TTM Technologies, Inc. (Sterling) 1200 Severn Way, Sterling, VA, 20166-8904 US CAGE Code: 0K703	☑	☑	☐	☐	☐	☐	☐
Unicircuit, Inc. 8192 Southpark Lane, Littleton, CO, 80120 US CAGE Code: 66311	☑	☑	☐	☐	☐	☐	☐
US Circuit 2071 Wineridge Place, Escondido, CA, 92029 CAGE Code: 66483	☑	☑	☐	☐	☐	☐	☐
Viasystems Toronto Inc. 8150 Sheppard Avenue East, Scarborough, M1B 5K2, Ontario Canada CAGE Code: 3AF82	☑	☑	☐	☐	☐	☐	☐

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

Westak of Oregon
3941 24th Avenue, Forest Grove, OR, 97116 US
CAGE Code: 65745

- [x] MIL-PRF-31032/1
- [x] MIL-PRF-31032/2
- [ ] MIL-PRF-31032/3
- [ ] MIL-PRF-31032/4
- [ ] MIL-PRF-31032/5
- [ ] MIL-PRF-31032/6
- [ ] Custom