Specification Details: **Date: 2/8/2024**

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: 614-692-9508, e-mail: vqe.kp@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:	PLANT LOCATION:	CAGE Code: 45032
AC Universal Circuits, LLC 886 Zachary Lane North, Maple Grove, MN, 55369-4524 US	Same Address as Manufacturer	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
Composition: S - Homogenous thermosetting 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: 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, 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, 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
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: .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: VQ (VQE 24-038188), VQ (VQE-20-034383), VQE-11-021326, VQE-12-024534
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: 12
Max. Board Thickness: .125"
Min. Hole Size: .0118" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8.1:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate 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, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg
Additional Fab Capabilities: Foil Lamination

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0MNN9
Accurate Circuit Engineering, Inc. 3019 S. Kilson Drive, Santa Ana, CA, 92707 USA	Same Address as Manufacturer	Phone: 714-546-2162 Fax: 714-546-8134 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
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: .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, 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:
Accurate Engineering Inc..
8710 Telfair Ave, Sun Valley, CA, 91352 USA

CAGE Code: 1W538
Phone: 818-768-3919
Fax: 818-768-2771
EMail: harsh@accueng.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-20-035521)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 16" x 21"
Max. Number of Layers: 20
Max. Board Thickness: .128"
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 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-20-035521)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Max. Panel Size: 16" x 21"
Max. Number of Layers: 20
Max. Board Thickness: .128"
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 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-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ(VQE-23-037397)
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: 24
Max. Board Thickness: .18"
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, 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
Flex Usage: Use A (Flex During Installation)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6RJS1
Advanced Circuits Inc.	Same Address as Manufacturer	Phone: 480-966-5894
6615 W. Boreon St., Chandler, AZ, 85266 US		Fax: 480-966-5896
		EMail:

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,
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: 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,
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: .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

SECTION I
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: .035"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65114
All Flex Solutions, Inc. 1200 West 96th Street, Bloomington, MN, 55431 USA	Same Address as Manufacturer	Phone: (507) 663-7162 Fax: EMail: tblakstad@allflexinc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-23-038000
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: 18
Max. Board Thickness: .095"
Min. Hole Size: .0119" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Direct Metallization
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG
Flex Usage: Use A (Flex During Installation)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-23-038000
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: 18
Max. Board Thickness: .095"
Min. Hole Size: .0119" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 8:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Direct Metallization
Copper Plating: Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG
Flex Usage: Use A (Flex During Installation)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4AA34
AMERICAN STANDARD CIRCUITS, LLC	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-31032/3, 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: 10
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
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: .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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4AA34
AMERICAN STANDARD CIRCUITS, LLC 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-31032/1, 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

AMITRON, INC.

2001 Landmeier Road, Elk Grove Village, IL, 60007 USA

CAGE Code: 1LHP6

Phone: 2242658761

Fax:

EMail: csavaliya@amitroncorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-19-033935
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: .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: Graphite-based
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
AMPHENOL PRINTED CIRCUITS, INC. 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-20-035416, VQE-97-000649
Composition: S - Homogenous thermosetting base material printed boards
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, Ni/Pd/Au
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-20-035416, VQE-97-000649
Composition: S - Homogenous thermosetting base material printed boards
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, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias, Foil Lamination, Press Fit Mounting, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
AMPHENOL PRINTED CIRCUITS, INC. 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-19-033889, VQE-20-035416
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, Ni/Pd/Au
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-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-10-019533, VQE-12-023765, VQE-15-029690
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, VQE-20-035416
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, Ni/Pd/Au
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:
Best Circuit Boards, Inc. Lone Star Circuits
901 Hensley Drive, Wylie, TX, 75098-4909 US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 04RV5
Phone: 214-291-1427
Fax:
EMail: sdiacont@lscpwb.com

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: .013"/.005", .19"/.005"
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, 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-31032/1, 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: 6
Max. Board Thickness: .074"
Min. Hole Size: .031" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 2:1 Through-Hole
Min. Conductor Width/Space: .01"/.014"
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65337
Calumet Electronics Corp. 25830 Depot Street, Calumet, MI, 49913-1985 US	Same Address as Manufacturer	Phone: 906-337-1305 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
Composition: S - Homogenous thermosetting base material printed boards
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: Conductive, 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
Composition: S - Homogenous thermosetting 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: 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: Conductive, 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

SECTION I
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

SECTION I
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)

SECTION I
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE 19 033331)
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: .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), VQ (VQE-19-034352)
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: 14
Max. Board Thickness: .1"
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 30598
Compunetics Inc. 700 Seco Rd, Monroeville, PA, 15146 US	Same Address as Manufacturer	Phone: 412-858-1272 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)
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: 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, 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-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, ImmAg
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX, 75006 US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 79616
Phone: 972-466-0818
Fax: 972-466-9078
EMail: jim@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)
Composition: S - Homogenous thermosetting base material printed boards
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)
Composition: S - Homogenous thermosetting base material printed boards
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
FCG Inc.
222 Valley Rd, Warrington, PA, 18976 US

CAGE Code: 22928
Phone: 215-343-2300
Fax:
EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ(VQE-21-035706)
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: .07"
Min. Hole Size: .031" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 3:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Periodic Reverse Plate
Finish System: HASL
Flex Usage: Use A (Flex During Installation)

SECTION I
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
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: 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
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: 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

SECTION I
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
Composition: S - Homogenous thermosetting base material printed boards
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

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
Composition: S - Homogenous thermosetting base material printed boards
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, VQE-21-036160
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: .073"
Min. Hole Size: .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9:1
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
FTG Circuits Fredericksburg Inc. 1026 Warrenton Road, Fredericksburg, VA, 22406-6200 US	Same Address as Manufacturer	Phone: 540-753-5511, x177 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQ(VQE-23-038137)
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: 6
Max. Board Thickness: .065"
Min. Hole Size: .0138" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4.9:1 Through-Hole
Min. Conductor Width/Space: .005"/.007"
Hole Preparation: Plasma Desmear
Hole Wall Conductive Coating: Carbon-based
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)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-21-035719), VQE-04-6002
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: 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, 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: VQ(VQE-21-035719), VQE-04-6002, VQE-20-034719
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: 16
Max. Board Thickness: .127"
Min. Hole Size: .015"
Aspect Ratio: 8.5:1 Through-Hole
Min. Conductor Width/Space: .005"/.004"
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, Hot Oil Reflow of Plated Sn/Pb
Additional Fab Capabilities: Foil Lamination

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
FTG Circuits Fredericksburg Inc. 1026 Warrenton Road, Fredericksburg, VA, 22406-6200 US	Same Address as Manufacturer	Phone: 540-753-5511, x177 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

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, Pulse Plate
Solder Resist: Liquid Photoimageable
Finish System: ENIG, HASL, ImmAg
Flex Usage: Use A (Flex During Installation),

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 30803
FTG Circuits Inc.		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-19-033705
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
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
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
FTG Circuits Inc.
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-19-033706
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3C7D2
Gorilla Circuits 1445 Old Oakland Rd, San Jose, CA, 95112 US	Same Address as Manufacturer	Phone: 408-294-9897 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
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: .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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 59554
Holaday Circuits Inc.	Same Address as Manufacturer	Phone: 952-988-8059
11126 Bren Road West, Minnetonka, MN, 55343 US		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, .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.56:1 Microvia, 6.75:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0045"
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: Dry Film, 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, 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: .014" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.66:1 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, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
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: 59554
Holaday Circuits Inc.	Same Address as Manufacturer	Phone: 952-988-8059
11126 Bren Road West, Minnetonka, MN, 55343 US		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, .012" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 0.56:1 Microvia, 6.75:1 Through-Hole
Min. Conductor Width/Space: .0035"/.0045"
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: Dry Film, 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, 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: .014" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6.66:1 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, Electrolytic Ni / Hard Au, HASL, Hot Oil Reflow of Plated Sn/Pb
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:		CAGE Code: 78259
IMI, Inc.		Phone: 978-373-9190
140 Hilldale Avenue, Haverhill, MA, 01832		Fax: 978-521-1846
		EMail: sales@imipcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-17-031308)
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 16" x 18"
Max. Number of Layers: 10
Max. Board Thickness: .11"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 12.5:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Preparation: Permanganate Desmear
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Direct Current Plate
Solder Resist: Liquid Photoimageable
Finish System: HASL

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38747
Integrated Technology Limited DBA Summit Interconnect Toronto 90 Don Park Road, Markham, L3R 1C4, Ontario, Canada	Same Address as Manufacturer	Phone: 905-475-6658 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
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: 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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

ISU Petasys Corp.

12930 Bradley St, Sylmar, CA, 91342 US

CAGE Code: 1WFH9

Phone: 818-833-5800

Fax:

EMail: andrewy@isupetasys.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-15-028813), VQ(VQE-23-037565)
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 24" x 30"
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
Hole Fill/Via Plug: Non-Conductive
Solder Resist: Liquid Photoimageable
Finish System: ENIG, Electrolytic Ni / Hard Au, HASL, ImmAg, OSP
Additional Fab Capabilities: Buried Vias, Foil Lamination, Sequential Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 0JKV9
JVB ELECTRONICS INC.		Phone: 972-790-0062
3835 West Conflans Road, Irving, TX, 75061		Fax:
		EMail: rick@multilayer.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE(VQ-20-034746)
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: 16
Max. Board Thickness: .102"
Min. Hole Size: .005" Laser Ablated Plated Hole Size Before Plating, .008" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11.625:1 Through-Hole, 1:1 Microvia
Min. Conductor Width/Space: .00325"/.0049"
Hole Preparation: 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
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:
KCA Electronics, Inc.
223 N. Crescent Way, Anaheim, CA, 92801 US

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 1VUH8
Phone: 714-239-2433
Fax: 714-239-2455
EMail: info@summitinterconnect.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033897)
Composition: S - Homogenous thermosetting base material printed boards
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
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: .132"
Min. Hole Size: .008" Laser Ablated Plated Hole Size Before Plating, .01" 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

SECTION I
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: info@summitinterconnect.com

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
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: .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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
LOCKHEED MARTIN CORPORATION ROTARY AND MISSION SYSTEMS 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-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
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: 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
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: 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

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;
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
LOCKHEED MARTIN CORPORATION ROTARY AND MISSION SYSTEMS 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-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
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)

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
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: 18
Max. Board Thickness: .11"
Min. Hole Size: .016" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 6:1
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Permanganate Etchback, Plasma Desmear
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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 3AD63
Metaplast Circuits Ltd.		Phone: 416-285-5000
180 Hymus Road, Scarborough, M1L 2E1, Ontario, Canada		Fax:
		EMail: sales@metaplast.ca

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-18-032032
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: .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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0436Y
Micropack Private Limited , Plot No. 16, Jigani Industrial Area, Anekal Taluk, Bangalore District 560105 India	Same Address as Manufacturer	Phone: 91-80-27825223 Fax: 91-80-27825225 EMail: process@micropack.in

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031258
Composition: S - Homogenous thermosetting 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: 26
Max. Board Thickness: .12"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 11.92:1 Through-Hole
Min. Conductor Width/Space: .0035"/.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-31032/3, 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
Additional Fab Capabilities: Foil Lamination, Metal Core
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Micropack Private Limited

, Plot No. 16, Jigani Industrial Area, Anekal Taluk,
Bangalore District 560105 India

PLANT LOCATION:
Same Address as Manufacturer

CAGE Code: 0436Y

Phone: 91-80-27825223

Fax: 91-80-27825225

EMail: process@micropack.in

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-031258
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: .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-31032/5, MIL-PRF-31032/6
Qualification Letters: VQ (VQE-20-035093)
Composition: 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: 20
Max. Board Thickness: .1366"
Min. Hole Size: .00984" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 13.9:1 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, HASL
Additional Fab Capabilities: Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 0YYS4
Midwest Printed Circuit Services, Inc.		Phone: 847-740-4120
1741 Circuit Drive, Round Lake Beach, IL, 60073 US		Fax: 847-740-4187
		EMail: mpcs@midwestpcb.com

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
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: 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
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: 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

SECTION I
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: twalker@multicircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQ(VQE-19-033227)
Composition: S - Homogenous thermosetting 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, 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
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, 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
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-20-034846
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: .103"
Min. Hole Size: .01" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 9.4:1 Through-Hole
Min. Conductor Width/Space: .0045"/.0045"
Hole Preparation: 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-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

SECTION I
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
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: .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
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: .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

SECTION I
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, 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)

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)

SECTION I
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 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)

SECTION I
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
Composition: S - Homogenous thermosetting base material printed boards
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
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: .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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Prototron Circuits Southwest Inc.

3760 East 43rd Place, Tucson, AZ, 58713 US

CAGE Code: 66108

Phone: 520-745-8515

Fax: 520-747-8334

EMail: Info@Prototron.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-17-030991
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Sanmina Corp 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: .008"/.008"
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, 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"
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: .008"/.008"
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
Additional Fab Capabilities: Foil Lamination
Controlled Impedance: Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
Sanmina Corporation San Jose, CA - Plant 20
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, Ni/Pd/Au
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, Ni/Pd/Au
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, 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: 3DR67
Sanmina Corporation San Jose, CA - Plant 20	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: 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, Ni/Pd/Au
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, Ni/Pd/Au
Additional Fab Capabilities: Blind Vias
Controlled Impedance: Differential, Single-Ended

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
SIERRA CIRCUITS, INC.
1108 West Evelyn Ave, Sunnyvale, CA, 94086 USA

CAGE Code: 0ZHS4
Phone: 800-763-7503
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: 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: .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: 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: .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-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-22-037319
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: 2
Max. Board Thickness: .12"
Min. Hole Size: .0079"
Aspect Ratio: 12:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Dry Film
Finish System: ENIG, HASL
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:
SIERRA CIRCUITS, INC.
1108 West Evelyn Ave, Sunnyvale, CA, 94086 USA

CAGE Code: 0ZHS4
Phone: 800-763-7503
Fax: 408-735-0175
EMail: estrelitam@protoexpress.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification: MIL-PRF-31032/3, MIL-PRF-31032/4
Qualification Letters: VQE-22-037319
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: 2
Max. Board Thickness: .12"
Min. Hole Size: .0079"
Aspect Ratio: 12:1 Through-Hole
Min. Conductor Width/Space: .005"/.005"
Hole Wall Conductive Coating: Electroless Copper
Copper Plating: Pulse Plate
Solder Resist: Dry Film
Finish System: ENIG, HASL
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: 66030
Sierra Electrotek LLC 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)

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: 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)

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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: H0203
Thales Nederland 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
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: 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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM PRINTED CIRCUIT GROUP, INC. 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,
Composition: S - Homogenous thermosetting base material printed boards
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
Composition: S - Homogenous thermosetting base material printed boards
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM PRINTED CIRCUIT GROUP, INC. 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
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: 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

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)

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:
TTM PRINTED CIRCUIT GROUP, INC.
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-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: 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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM PRINTED CIRCUIT GROUP, INC. 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-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: .135"
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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3AF82
TTM Technologies 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
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: .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
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: .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: 0GN71
TTM Technologies, Inc. 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
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc. 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-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. 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-31032/3, 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
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: 0GN71
TTM Technologies, Inc. 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
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc.	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
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc.	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-31032/3, 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
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: 0GN71
TTM Technologies, Inc. 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
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc. 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-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. 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-31032/3, 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
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: 0GN71
TTM Technologies, Inc.	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-31032/2
Qualification Letters: VQE-18-032965
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc.	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
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. 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-31032/3, 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
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: 0GN71
TTM Technologies, Inc. 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
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc. 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-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc. 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-31032/3, 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
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: 0GN71
TTM Technologies, Inc. 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
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: 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: 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 / Hard Au, Electrolytic Ni / Soft 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: 0GN71
TTM Technologies, Inc. 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-31032/1, MIL-PRF-31032/2
Qualification Letters: VQE-03-003121, VQE-03-003214, VQE-07-012925, VQE-10-020405, VQE-19-033261
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: .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

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
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: 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

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
TTM Technologies, Inc.	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-31032/3, 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
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:		CAGE Code: 66483
U.S. Circuit Inc.		Phone: 760-489-1413
2071 Wineridge Place, Escondido, CA, 92029		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), VQE-20-035360
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: 9.1:1 Through-Hole
Min. Conductor Width/Space: .004"/.004"
Hole Preparation: Plasma Etchback
Hole Wall Conductive Coating: Electroless Copper, Graphite-based
Copper Plating: Periodic Reverse 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-19-033744), VQE-20-035305
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: Electroless Copper, Graphite-based
Copper Plating: Periodic Reverse 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, VQE-22-037175
Composition: S - Homogenous thermosetting base material printed boards
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: Dry Film, 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, VQE-20-034915
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 12" x 18"
Max. Number of Layers: 10
Max. Board Thickness: .063"
Min. Hole Size: .015" Drilled Plated-Through Hole Before Plating
Aspect Ratio: 4:1 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: Dry Film, 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:	PLANT LOCATION:	CAGE Code: 65745
WESTAK OF OREGON, INC.	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
Composition: S - Homogenous thermosetting base material printed boards
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: .008" 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
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
Composition: S - Homogenous thermosetting base material printed boards
Rigid Base Material: GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Max. Panel Size: 21" x 26"
Max. Number of Layers: 20
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
Hole Fill/Via Plug: Non-Conductive
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

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
AC Universal Circuits, LLC	886 Zachary Lane North, Maple Grove, MN, 55369-4524 US	45032	✔	✔					
Accurate Circuit Engineering, Inc.	3019 S. Kilson Drive, Santa Ana, CA, 92707 USA	0MNN9	✔	✔					
Accurate Engineering Inc..	8710 Telfair Ave, Sun Valley, CA, 91352 USA	1W538	✔	✔	✔	✔			
Advanced Circuits Inc.	6615 W. Boreon St., Chandler, AZ, 85266 US	6RJS1	✔	✔					
Airborn Flexible Circuits, Inc.	11 Dohme Avenue, Toronto, M4B 1Y7, Ontario Canada	38661			✔	✔			
All Flex Solutions, Inc.	1705 Cannon Lane, Northfield, MN, 55057-3605 USA	0ZGB2			✔	✔			
All Flex Solutions, Inc.	1200 West 96th Street, Bloomington, MN, 55431 USA	65114			✔	✔			
AMERICAN STANDARD CIRCUITS, LLC	475 Industrial Drive, West Chicago, IL, 60185 US	4AA34	✔	✔	✔	✔			
AMITRON, INC.	2001 Landmeier Road, Elk Grove Village, IL, 60007 USA	1LHP6	✔	✔					
AMPHENOL PRINTED CIRCUITS, INC.	91 Northeastern Boulevard, Nashua, NH, 03062 US	57034	✔	✔	✔	✔			
Best Circuit Boards, Inc. Lone Star Circuits	901 Hensley Drive, Wylie, TX, 75098-4909 US	04RV5	✔	✔				✔	
Calumet Electronics Corp.	25830 Depot Street, Calumet, MI, 49913-1985 US	65337	✔	✔					
Circuit Tech Inc.	399 Denison Street, Markham, ON, L3R 1B7 Canada	L4387	✔	✔					

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
Cirexx International, Inc. 791 Nuttman Street, Santa Clara, CA, 95054 US CAGE Code: 4MEG7	✔	✔	✔	✔	☐	☐	☐
Cirtech Inc. 250 E. Emerson Ave., Orange, CA, 92865-3303 CAGE Code: 8K616	✔	✔	✔	✔	☐	☐	☐
Compunetics Inc. 700 Seco Rd, Monroeville, PA, 15146 US CAGE Code: 30598	✔	✔	✔	✔	☐	☐	☐
Electro Plate Circuitry, Inc. 1430 Century Drive, Carrollton, TX, 75006 US CAGE Code: 79616	✔	✔	☐	☐	☐	☐	☐
FCG Inc. 222 Valley Rd, Warrington, PA, 18976 US CAGE Code: 22928	☐	☐	✔	✔	☐	☐	☐
Firan Technology Group 250 Finchdene Square, Scarborough, M1X 1A5, Ontario, Canada CAGE Code: L2665	✔	✔	✔	✔	☐	☐	☐
FTG Circuits Fredericksburg Inc. 1026 Warrenton Road, Fredericksburg, VA, 22406-6200 US CAGE Code: 6T499	✔	✔	✔	✔	☐	☐	☐
FTG Circuits Inc. 20750 Marilla Street, Chatsworth,, CA, 91311 US CAGE Code: 30803	✔	✔	✔	✔	☐	☐	☐
Gorilla Circuits 1445 Old Oakland Rd, San Jose, CA, 95112 US CAGE Code: 3C7D2	✔	✔	☐	☐	☐	☐	☐
Holaday Circuits Inc. 11126 Bren Road West, Minnetonka, MN, 55343 US CAGE Code: 59554	✔	✔	☐	☐	☐	☐	☐
Holaday Circuits Inc. 540 S. Pacific Street, San Marcos, CA, 92078-4056 US CAGE Code: 1KXU6	✔	✔	☐	☐	☐	☐	☐
IMI, Inc. 140 Hilldale Avenue, Haverhill, MA, 01832 CAGE Code: 78259	✔	✔	☐	☐	☐	☐	☐
Integrated Technology Limited DBA Summit Interconnect Toronto 90 Don Park Road, Markham, L3R 1C4, Ontario, Canada CAGE Code: 38747	✔	✔	☐	☐	☐	☐	☐

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

ISU Petasys Corp.
12930 Bradley St, Sylmar, CA, 91342 US
CAGE Code: 1WFH9

- [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

JVB ELECTRONICS INC.
3835 West Conflans Road, Irving, TX, 75061
CAGE Code: 0JKV9

- [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

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

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

LOCKHEED MARTIN CORPORATION ROTARY AND MISSION SYSTEMS
1801 State Route 17C, Owego, NY, 13827 US
CAGE Code: 03640

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

Metaplast Circuits Ltd.
180 Hymus Road, Scarborough, M1L 2E1, Ontario, Canada
CAGE Code: 3AD63

- [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

Micropack Private Limited
, Plot No. 16, Jigani Industrial Area, Anekal Taluk, Bangalore District 560105 India
CAGE Code: 0436Y

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

Midwest Printed Circuit Services, Inc.
1741 Circuit Drive, Round Lake Beach, IL, 60073 US
CAGE Code: 0YYS4

- [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

Multicircuits Inc.
2301 Universal St, Oshkosh, WI, 54904
CAGE Code: 1BQS8

- [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

Murrietta Circuits
5000 E. Landon Drive, Anaheim, CA, 92807 US
CAGE Code: 0EJD7

- [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

Pioneer Circuits Inc.
3000 S. Shannon Street, Santa Ana, CA, 92704-6321 US
CAGE Code: 65723

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

PRO-TECH INTERCONNECT SOLUTIONS, LLC
4300 Peavey Road, Chaska, MN, 55318 US
CAGE Code: 3CP65

- [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

Prototron Circuits Southwest Inc.
3760 East 43rd Place, Tucson, AZ, 58713 US
CAGE Code: 66108

- [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

Sanmina Corp Costa Mesa
2945 Airway Avenue, Costa Mesa, CA, 92626 US
CAGE Code: 3BKL5

- [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

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
Sanmina Corporation San Jose, CA - Plant 20 2050 Bering Drive, San Jose, CA, 95131 US CAGE Code: 3DR67	☑	☑	☐	☐	☐	☐	☐
SIERRA CIRCUITS, INC. 1108 West Evelyn Ave, Sunnyvale, CA, 94086 USA CAGE Code: 0ZHS4	☑	☑	☑	☑	☐	☐	☐
Sierra Electrotek LLC 7745 S. 10th Street, Oak Creek, WI, 53154 US CAGE Code: 66030	☑	☑	☐	☐	☐	☐	☐
Thales Nederland Haaksbergerstraat 49, 7554PA Hengelo The Netherlands CAGE Code: H0203	☑	☑	☐	☐	☐	☐	☐
TTM PRINTED CIRCUIT GROUP, INC. 407 Mathew Street, Santa Clara, CA, 95050 US CAGE Code: 65916	☑	☑	☑	☑	☐	☐	☐
TTM Technologies Toronto Inc. 8150 Sheppard Avenue East, Scarborough, M1B 5K2, Ontario Canada CAGE Code: 3AF82	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. 3140 East Coronado Street, Anaheim, CA, 92806 US CAGE Code: 0BSG1	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. 1200 Severn Way, Sterling, VA, 20166-8904 US CAGE Code: 0K703	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. 4 Old Monson Road, Stafford, CT, 06075 US CAGE Code: 5L706	☑	☑	☑	☑	☑	☐	☐
TTM Technologies, Inc. 2630 South Harbor Boulevard, Santa Ana, CA, 92704 US CAGE Code: 1WQ42	☑	☑	☐	☐	☐	☐	☐
TTM Technologies, Inc. 12080 DeBartolo Drive, North Jackson, OH, 44451 US CAGE Code: 0GN71	☑	☑	☑	☑	☐	☐	☐
TTM Technologies, Inc. 1521 Poplar Lane, Forest Grove, OR, 97116-2033 CAGE Code: 01KV9	☑	☑	☑	☑	☐	☐	☐
U.S. Circuit Inc. 2071 Wineridge Place, Escondido, CA, 92029 CAGE Code: 66483	☑	☑	☐	☐	☐	☐	☐

SECTION II
LIST OF MANUFACTURERS AND ASSOCIATED SPECIFICATION

Unicircuit, Inc.
8192 Southpark Lane, Littleton, CO, 80120 US
CAGE Code: 66311

- [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

WESTAK OF OREGON, INC.
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